

#### ATTACHMENT 4 – FAUNA ASSESSMENT OF LOT 21 DALTON DRIVE AND PT LOT 437 SOUTHERN ESTUARY ROAD, HERRON

# Fauna Assessment of

# Lot 21 Dalton Drive and

# Pt Lot 437 Southern Estuary Road

# Herron

DECEMBER 2013 Version 2

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### SUMMARY

This report details the results of a fauna assessment of Lot 21 Dalton Drive and Pt Lot 437 Southern Estuary Road Herron (the study area) (Figure 1). Lot 21 Dalton Drive and Pt Lot 437 have a combine area of about 103 hectares (ha) and are almost totally covered with native remnant vegetation (Figure 2).

No development plan currently exists but it is understood that the landowners/developers are proposing to develop the land, subject to an initial rezoning application being approved. The objectives of the fauna assessment are therefor to provide information on fauna sufficient to support the preparation of an application for the rezoning. It is 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.

The scope of works was to conduct a level 1 fauna survey as defined by the Environmental Protection Authority (EPA 2004). The assessment has included a desktop study and a one day site reconnaissance survey.

The broadly defined fauna habitats identified (based on BEC 2013 mapping) within the study area are:

- Forest or Woodland of Sheoak (*Allocasuarina fraseriana*), Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*) and occasional Tuart (*E. gomphocephala*) over Low Forest or Low Woodland of Candle Stick Banksia (*Banksia attenuata*) and Woody Pear (*Xylomelum occidentale*) over Low Heath of mixed shrub species on sand. This unit represents the best quality fauna habitat on site given it appears to have been subject to the least amount of historical disturbance and contains numerous habitat trees (trees with hollows), combined with a relatively dense midstorey vegetation and native ground cover (Plate 1). ACEmBX of BEC (2013).
- Tall Woodland to Open Tall Woodland of Sheoak (A. fraseriana), Marri (C. calophylla), Tuart (E. gomphocephala), Jarrah (E. marginata) over a Low Open Woodland of Candle Stick Banksia (B. attenuata), Bull Banksia (B. grandis) and Woody Pear (X. occidentale) over weeds on sand. This unit is characterised by significant cleared areas dominated by introduced weeds/grasses with some native regrowth. Fauna habitat value of this area has been compromised to some degree by the relatively high percentage of cleared areas and lack of native ground cover but habitat trees still present (Plate 2). AE of BEC (2013).
- Dense Forest of Peppermint (*Agonis flexuosa*), Marri (*Corymbia calophylla*) and Jarrah (*E. marginata*) over a Dwarf Scrub of mixed species and Very Open Low Sedges dominated by *Desmocladus flexuosa* on sand. This unit is characterised by significant cleared areas dominated by introduced

weeds/grasses with some native regrowth. Fauna habitat value of this area has been compromised to some degree by the extent of cleared areas and lack of native ground cover. Some habitat trees present (Plate 3). Af of BEC (2013).

- Low Forest of Sheoak (*A. fraseriana*) over Low Heath dominated by *Hibbertia hypericoides* and *Templetonia retusa* over Dwarf Scrub dominated by *Tersonia brevipes* over Open Low Sedges dominated by *Desmocladus flexuosa* on sand/limestone. Relatively good quality fauna habitat with areas of dense groundcover. Habitat trees uncommon given dominance of Sheoak (Plate 4). Alf of BEC (2013).
- Dense Thicket of Melaleuca huegelii over Low Scrub of Templetonia retusa and Anthocercis littorea over Dense Herbs dominated by Geranium solandri, Drosera stolonifera, \*Lysimachia arvensis and \*Galium murale over Very Open Tall Grass dominated by Austrostipa flavescens and Poa poiformis over Open Low Sedges dominated by Desmocladus flexuosus. Relatively good quality fauna habitat given densisty of vegetation in very good to good condition. Habitat trees rare uncommon (Plate 5). Mh of BEC (2013).

Plates 1 to 5 illustrate the nature of vegetation remain with the study area.

Opportunistic fauna observations are listed in Appendix B. A total of 29 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. Three introduced species were also seen.

Evidence of two listed threatened species was observed (the forest red-tailed black cockatoo – individuals and foraging evidence and Carnaby's black cockatoo – foraging evidence). Diggings attributed to the southern brown bandicoot (DPaW Priority 5 species) were found in the central section of the study area. No evidence of any migratory species using the area was found.

With respect to native vertebrate fauna, 13 mammals (includes eight bat species), 82 bird, 36 reptile and three frog 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 136 native animals that are listed as potentially occurring in the area, six are classified as endangered/vulnerable or in need of special protection under State and/or Federal law. In addition, three migratory and five DPaW priority species may also frequent the area at times.

Constraints on development within the study area will largely be centred on the presence of habitat used or potentially used by threatened fauna species and in particular those listed under the *EPBC Act*, namely the three species of black cockatoo. Any future development may also impact on habitat used by several additional species

only listed under state legislation (*WC Act*) or given priority status by DPaW. The potential impacts on these species and/or their habitat will be taken into consideration by regulatory authorities during various approval processes and future planning for the development at the site should therefore aim to minimise these possible impacts.

A series of recommendations aimed at mitigating and minimising potential impacts on fauna and fauna habitat in general are provided in Section 10. These should be taken into consideration during planning and development where considered reasonable and practicable.

# 1. INTRODUCTION

This report details the results of a fauna assessment of Lot 21 Dalton Drive and Pt Lot 437 Southern Estuary Road Herron (the study area). The study area is located about 26 kms south of the Mandurah townsite in south west Western Australia and is centred at approximately 32.7795° S 115.68636° E (Figure 1).

Lot 21 Dalton Drive and Pt Lot 437 have a combine area of about 103 hectares (ha) and are almost totally covered with native remnant vegetation (Figure 2).

# 2. DEVELOPMENT PROPOSAL

No development plan currently exists but it is understood that the landowners/developers are proposing to develop the land, subject to an initial rezoning application being approved. The objectives of the fauna assessment are therefor to provide information on fauna sufficient to support the preparation of an application for the rezoning.

It is 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. The assessment will also guide the formulation of management plans aimed at minimising impacts if required.

# 3. SCOPE OF WORKS

The scope of works was defined as:

- 1. Undertake a Level 1 fauna survey in accordance with EPA Guidance Statement No. 56 Terrestrial Fauna Surveys for Environmental Impact Assessment in WA (EPA 2004).
- 2. Provide a report summarising results with management/planning recommendations and requirements under state and federal legislation



# 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 2013b); and
- Protected matters search tool (Department of the Environment DoE 2013).

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:

- Alan Tingay and Associates (ATA) (1998). Vertebrate Fauna. Lake Clifton Land Exchange Proposal. Unpublished report for Bouvard Investment's Pty Ltd.
- Bamford Consulting Ecologists (2003). Fauna Values of Cape Bouvard Investment's Pty Ltd Land, Yalgorup. Unpublished report for RPS.



- Bamford Consulting Ecologists (2010). Level 2 Fauna Assessment of Remnant Vegetation at the Proposed Point Grey Marina. Unpublished report for ATA Environmental.
- Dell, J. and Hyder, B. (2009). Summary of the Fauna Values of the area between Dawesville and Binningup, Southern Swan Coastal Plain. Report prepared for Environmental Protection Authority, Perth.
- ENV Australia (ENV) (2009). Clifton Beach Fauna Assessment. Unpublished report for Cape Bouvard Investments Pty Ltd.

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.
- Churchill, S. (2008). Australian Bats. Second Edition, Allen & Unwin.
- 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 (DoE);
- *Wildlife Conservation Act 1950 (WC Act).* Administered by the Western Australian Department of Parks and Wildlife (DPaW) (Govt. of WA 2012);
- 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-legislative list maintained by the DPaW for management purposes (DPaW 2013a).

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)

Other fauna species of regional significance due to declining populations on the Swan Coastal Plain, especially between Mandurah and Busselton, include the honey possum and pygmy possum (Dell 2000).

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 Invertebrates

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 Taxonomy and Nomenclature

Taxonomy and nomenclature for fauna species used in this report is generally taken from the DEC'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 Van Dyck & Strahan (2008), Bush *et al.* (2007), Wilson and Swan (2013), Bush *et al.* (2002), Tyler *et al.* (2000), Christidis and Boles (2008) and Glauret (1961). Not all common names are generally accepted.

#### 4.2 SITE SURVEYS

Daytime field survey work at the site was carried out on the 14 August, 2013. All survey work was carried out by Greg Harewood (B.Sc. Zoology).



#### 4.2.1 Fauna Habitat Assessment

The vegetation communities identified during the botanical survey of the site carried out by BEC in 2013 (BEC 2013) have been used as the basis for a classification of areas into broad fauna habitats types. This information has been supplemented with observations made during the fauna assessment.

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.

# 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.

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.

# 6. **RESULTS**

#### 6.1 POTENTIAL FAUNA INVENTORY - DESKTOP STUDY

A list of expected fauna species likely to occur in the study area was 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 2013b) and the Protected Matters Search Tool (DoE 2013) 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).



#### 6.2 SITE SURVEYS

#### 6.2.1 Fauna Habitat Assessment

The study area is located on a section of the Spearwood Dune system with the soils being comprised of a thin layer of leach quartz sand over Tamala Limestone.

Almost all of the vegetation remaining within the study area corresponds in general terms with the Karrakatta (Central and South) Complex as described by Heddle *et al.* (1980), this being predominately an open forest of tuart (*Eucalyptus gomphocephala*), jarrah (*E. marginata*) and marri (*Corymbia calophylla*) with areas of jarrah and banksia woodland.

The broadly defined fauna habitats identified (based on BEC 2013 mapping) within the study area are:

- Forest or Woodland of Sheoak (*Allocasuarina fraseriana*), Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*) and occasional Tuart (*E. gomphocephala*) over Low Forest or Low Woodland of Candle Stick Banksia (*Banksia attenuata*) and Woody Pear (*Xylomelum occidentale*) over Low Heath of mixed shrub species on sand. This unit represents the best quality fauna habitat on site given it appears to have been subject to the least amount of historical disturbance and contains numerous habitat trees (trees with hollows), combined with a relatively dense midstorey vegetation and native ground cover (Plate 1). ACEmBX of BEC (2013).
- Tall Woodland to Open Tall Woodland of Sheoak (*A. fraseriana*), Marri (*C. calophylla*), Tuart (*E. gomphocephala*), Jarrah (*E. marginata*) over a Low Open Woodland of Candle Stick Banksia (*B. attenuata*), Bull Banksia (*B. grandis*) and Woody Pear (X. occidentale) over weeds on sand. This unit is characterised by significant cleared areas dominated by introduced weeds/grasses with some native regrowth. Fauna habitat value of this area has been compromised to some degree by the relatively high percentage of cleared areas and lack of native ground cover but habitat trees still present (Plate 2). AE of BEC (2013).
- Dense Forest of Peppermint (*Agonis flexuosa*), Marri (*Corymbia calophylla*) and Jarrah (*E. marginata*) over a Dwarf Scrub of mixed species and Very Open Low Sedges dominated by *Desmocladus flexuosa* on sand. This unit is characterised by significant cleared areas dominated by introduced weeds/grasses with some native regrowth. Fauna habitat value of this area has been compromised to some degree by the extent of



cleared areas and lack of native ground cover. Some habitat trees present (Plate 3). Af of BEC (2013).

- Low Forest of Sheoak (*A. fraseriana*) over Low Heath dominated by *Hibbertia hypericoides* and *Templetonia retusa* over Dwarf Scrub dominated by *Tersonia brevipes* over Open Low Sedges dominated by *Desmocladus flexuosa* on sand/limestone. Relatively good quality fauna habitat with areas of dense groundcover. Habitat trees uncommon given dominance of Sheoak (Plate 4). Alf of BEC (2013).
- Dense Thicket of Melaleuca huegelii over Low Scrub of Templetonia retusa and Anthocercis littorea over Dense Herbs dominated by Geranium solandri, Drosera stolonifera, \*Lysimachia arvensis and \*Galium murale over Very Open Tall Grass dominated by Austrostipa flavescens and Poa poiformis over Open Low Sedges dominated by Desmocladus flexuosus. Relatively good quality fauna habitat given density of vegetation in very good to good condition. Habitat trees rare uncommon (Plate 5). Mh of BEC (2013).

Plates 1 to 5 illustrate the nature of vegetation remain with the study area.

Significant sections of the study area represent fauna habitats in good condition with numerous trees (Marri, Jarrah and Tuart) with hollows being present observed. Fallen branches/logs of various sizes were common with some observed to contain hollows of various sizes. Much of the area shows only a low degree of historical disturbance with good midstorey connectivity and dense ground cover. Fauna biodiversity in these areas is likely to be relatively good for the general area (corresponds to areas mapped as ACEmBX, Alf and Mh by BEC 2013).

As can be seen for the air photo (Figure 2) there are some areas where overall fauna habitat values have been compromised to a varying degrees as a consequence of historical clearing/land use practices which have resulted in a significant reduction in native shrubs and ground cover (corresponds to areas mapped as Af and Ae BEC 2013). These areas would have reduced biodiversity values given the absence of microhabitats required by some species though a range of fauna species including some of conservation significance can still be expected to utilise these sections of the site, in particular those less reliant on a good quality lower storey vegetation elements.

#### 6.2.2 Opportunistic Fauna Observations

Opportunistic fauna observations are listed in Appendix B. A total of 29 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. Three introduced species were also seen.

Evidence of two listed threatened species was observed (the forest red-tailed black cockatoo – individuals and foraging evidence and Carnaby's black cockatoo – foraging evidence). Diggings attributed to the southern brown bandicoot (DPaW Priority 5 species) were found in the central section of the study area. No evidence of any migratory species using the area was found.

#### 6.3 FAUNA INVENTORY – SUMMARY

#### 6.3.1 Vertebrate Fauna

Table 1 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 1: 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 field survey 2013
Fish	0	0	0	0	0
Amphibians	3	0	0	0	0
Reptiles	36	1	0	2	2
Birds	85 <sup>3</sup>	4	3	1	25 <sup>1</sup>
Non-Volant Mammals	10 <sup>5</sup>	1	0	1	5 <sup>2</sup>
Volant Mammals (Bats)	8	0	0	1	0
Total	142 <sup>8</sup>	6	3	5	32 <sup>3</sup>

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)



have been include in the expected listing in Appendix B. Various 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 was found to be 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.

#### 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 over 31 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 banksii naso Forest Red-tailed Black-Cockatoo S1 (WC Act), Vulnerable (EPBC Act)
   Several individuals and small groups observed/heard and foraging evidence attributed to this species was also found to be common during the day survey (chewed marri fruits). Most of the remnant vegetation on site represents existing or potential foraging habitat for this species. Larger trees (>50cm DBH) can be considered potential breeding habitat.
- Calyptorhynchus latirostris Carnaby's Black-Cockatoo S1 (WC Act), Endangered (EPBC Act)
   Foraging evidence attributed to this species was found during the site survey (mainly chewed banksia cones). Most of the remnant vegetation on site represents existing or potential foraging habitat for this species. Larger trees (>50cm DBH) can be considered potential breeding habitat.
- Isoodon obesulus fusciventer Quenda P5 (DPaW Priority Species)
   Evidence of this species foraging (diggings) in some sections of the study area observed.



Based on the habitats present and current documented distributions it is considered possible that 11 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:

- Lerista lineata Perth Lined Lerista P3 (DPaW Priority Species) Habitat appears to be suitable for this species to persist and it has been recorded nearby (ENV 2009, Bamford 2003).
- Ctenotus ora Coastal Plain Skink P1 (DPaW Priority Species) Habitat appears to be suitable for this species to persist and it has been recorded nearby (Bamford 2010).
- Morelia spilota imbricata Southern Carpet Python S4 (WC Act) Status onsite difficulty to determine but may occasionally frequent sections of the study area especially where dense groundcover prevalent. Known to occur in the nearby Yalgorup National Park (G Harewood pers. obs. ENV 2009).
- Pandion haliaetus Osprey Migratory (EPBC Act)
   May flyover occasionally given the proximity of the Harvey Estuary and the ocean. The species is also known to nest in large trees in the general area (G Harewood pers. obs.). An abandoned nest possibly built by this species was found within the study area (see Plate 4) though no existing nest sites observed.
- Haliaeetus leucogaster White-bellied Sea Eagle S3 (WC Act), Migratory (EPBC Act)

May flyover occasionally given the proximity of the Harvey Estuary and the ocean. As with the Osprey this species is known to nest in large trees in the general area. An abandoned nest possibly built by this species was found within the study area (see Plate 4) though no existing nest sites observed.

- *Falco peregrinus* Peregrine Falcon S4 (*WC Act*) Uncommon but study site may form part of larger home range. No potential nest sites observed.
- Calyptorhynchus baudinii Baudin's Black-Cockatoo S1 (WC Act), Vulnerable (EPBC Act)
   Known to frequent the general area. Much of the remnant vegetation on site represents existing or potential foraging habitat for this species. Larger trees (>50cm DBH) can be considered potential breeding habitat.



- Tyto novaehollandae novaehollandae Masked Owl P3 (DPaW Priority Species)
   May occasionally reside in general area though status uncertain. It is unlikely to be specifically attracted to the site. Listed as a potential species but would most probably only ever occur rarely.
- Merops ornatus Rainbow Bee-eater S3 (WC Act), Migratory (EPBC Act) Rainbow bee-eaters are common seasonal visitors to south west and during summer months a small number of individuals of this species may possibly forage and roost onsite. Sandy ground conditions may be suitable for construction of breeding burrows.
- Phascogale tapoatafa ssp Southern Brush-tailed Phascogale S1 (WC Act)
   Status in the area is difficult to determine but habitat appears suitable and

therefore it must be assumed to be present, albeit in low densities.

 Falsistrellus mackenziei Western False Pipistrelle - P3 (DPaW Priority Species)
 Recorded at several locations north of Binningup to Dawesville by Bullen (Bullen 2009). Hollow trees represent potential day time roosting sites.

Note: 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. Yalgorup National Park), are not listed as potential species due to known localised extinction (and no subsequent recruitment from adjoining areas) and/or 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 2.

Thirty one bird species that potentially frequent or occur in the study area are noted as Bush Forever Decreaser Species in the Perth Metropolitan Region (nine 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

One species of conservation significant invertebrate species appeared in the DPaW or *EPBC Act* database searches (DPaW 2013b, DoE 2013), this being the shield-backed trapdoor spider (*Idiosoma nigrum*). This species is considered



very unlikely to persist within the study area due to an absence of suitable habitat and because the site is outside of its currently documented range. Additional information on this 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;
- Fauna habitat in better condition than other similar locations in general 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 vertebrate fauna within the Dawesville to Binningup area has previously been recognised as regionally significant by DPaW (Dell and Hyder 2009). Substantial sections this area have however been subject to varying degrees of disturbance and fauna is now dependent on remaining remnants and wetlands that were once part of a vegetation continuum that covered the entire area. The various fauna species present require particular habitat types of sufficient size, spatial replication and connectivity across the region to persist in the long term. Further fragmentation or loss of vegetation will result in the reduction of the abundance, diversity, geographic distribution and productivity and hence the long-term survival of fauna throughout the Dawesville to Binningup (Dell and Hyder 2009).

The results of the fauna assessment suggests that the study site itself hosts or is utilised (or potentially hosts/ or is potentially utilised) by only a subset of the total fauna assemblage known from the wider area due to historical disturbances such as partial clearing and livestock grazing. Nonetheless the site is utilised (or likely



to be utilised) by a number fauna species of special conservation significance and as such has some conservation significance.

This fact should be taken into consideration during the future planning and development of the site. Various strategies should be employed, for example the retention of best quality areas as public open space and/or the use of large lot sizes with the aim of retaining as much of the existing vegetation as possible while still allowing development of the area to proceed.

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

Linkage with adjacent bushland areas has been identified as a natural attribute of high priority in the assessment of a sites regional significance (EPA 2002a, Molloy *et al.* 2009).

Detailed analyses of potential ecological linkages more completed for the south west (Molloy *et al.* 2009) shows the study area as contributing to a north south linkage running between Harvey Estuary and Lake Preston.

Future development at the site should take this fact into consideration so that any existing values the area has an ecological linkage or wildlife corridor are not significant compromised.

### 8. POTENTIAL IMPACTS AND DEVELOPMENT CONSTRAINTS

#### 8.1 POTENTIAL IMPACTS OF DEVELOPMENT

In general the most significant <u>potential</u> 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 study area is not known at this stage however the possible impact on specific species of conservation significance previously recorded in the general area is provided in Table 2 below. Additional information on specific fauna species is provided in Appendix D

#### Table 2: 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
Shield-backed Trapdoor Spider	ldiosoma nigrum	S1 VU	No	Unlikely.	No impact.
Pouched Lamprey	Geotria australis	P1	No	Unlikely.	No impact.
Perth Lined Lerista	Lerisita lineata	P3	Yes	Possible.	Loss/modification of small areas of habitat.
Coastal Plains Skink	Ctenotus ora	P1	Yes	Possible.	Loss/modification of small areas of habitat.
Southern Carpet Python	Morelia spilota imbricata	S4	Yes	Possible.	Loss/modification of small areas of habitat.
Malleefowl	Leipoa ocellata	S1 VU Mig	No	Unlikely - species locally extinct.	No Impact.
Australian Bustard	Ardeotis australis	P4	No	Unlikely - species locally extinct.	No Impact.
Great Egret	Ardea alba	S3 Mig	No	Unlikely	No impact.
Cattle Egret	Ardea ibis	S3 Mig	No	Unlikely	No impact.
Australasian Bittern	Botaurus poiciloptilus	S1 EN	No	Unlikely	No impact.
Osprey	Pandion haliaetus	Mig	Potential for nesting	Possible but no existing nest sites observed.	No significant impact anticipated
White-bellied Sea- Eagle	Haliaeetus leucogaster	S3 Mig	Potential for nesting	Possible but no existing nest sites observed.	No significant impact anticipated



Common Name	Genus & Species	Conservation Status (See Appendix A for codes)	Habitat Present	Likelihood of Occurrence	Possible Impacts
Peregrine Falcon	Falco peregrinus	S4	Yes	Possible	Modification of an area of habitat. No significant impact likely.
Migratory shorebirds	Various	S3 Mig	No	Unlikely	No impact.
Fairy Tern (Australian)	Sternula nereis nereis	VU	No	Unlikely	No impact.
Glossy Ibis	Plegadis falcinellus	S3 Mig	No	Unlikely	No impact.
Painted Snipe	Rostratula benghalensis	S1 S3 Mig EN	No	Unlikely	No impact.
Hooded Plover	Charadrius rubricollis	P4	No	Unlikely	No impact.
Carnaby`s Black Cockatoo	Calyptorhynchus latirostris	S1 EN	Yes	Known to occur	Loss/modification of some areas of habitat.
Baudin`s Black Cockatoo	Calyptorhynchus baudinii	S1 VU	Yes	Possible	Loss/modification of some areas of habitat
Forest Red-tailed Black Cockatoo	Calyptorhynchus banksii naso	S1 VU	Yes	Known to occur	Loss/modification of some areas of habitat.
Masked Owl (SW population)	Tyto n. novaehollandiae	P3	Yes	Possible	Loss/modification of some areas of habitat. No significant impact likely.
Fork-tailed Swift	Apus pacificus	S3 Mig	Yes	Flyover only	No impact.
Rainbow Bee-eater	Merops ornatus	S3 Mig	Yes	Possible	Loss/modification of some areas of habitat. No significant impact likely.
Chuditch	Dasyurus geoffroii	S1 VU	Yes	Unlikely – locally extinct – transients only	No impact likely.
Southern Brush- tailed Phascogale	Phascogale tapoatafa ssp	S1	Yes	Possible	Loss/modification of some areas of habitat
Quenda	lsoodon obesulus fusciventer	P5	No	Known to occur	Loss/modification of some areas of habitat.
Western Ringtail Possum	Pseudocheirus occidentalis	S1 VU	Yes	Unlikely	No impact.
Western Brush Wallaby	Macropus irma	P4	No/Marginal	Unlikely	No impact.
Quokka	Setonix brachyurus	S1 VU	No	Unlikely	No impact.
Western False Pipistrelle	Falsistrellus mackenziei	P4	Yes	Possible	Loss/modification of some areas of habitat. No significant impact likely
Water Rat	Hydromys chrysogaster	P4	No	Unlikely	No impact.



#### 8.2 POTENTIAL CONSTRAINTS ON DEVELOPMENT

Constraints on development within the study area will largely be centred on the presence of habitat used or potentially used by threatened fauna species in particular those listed under the *EPBC Act*, namely the three species of black cockatoo. The potential impacts on these species and/or their habitat will need to be taken into consideration during the planning process.

While the exact location and extent of vegetation clearing that may be required is unknown, almost any clearing of native vegetation within the study area has the potential to exceed DoE thresholds for what they consider "likely significant impact" with respect to the loss of black cockatoo (see Section 9 and DSEWPaC 2012). Typically, approval will only be given if significant offsets for vegetation loss are provided. DoE assess every project separately so there are no standard offset requirements but minimising vegetation loss in the first instance will reduce possible obligations if the project is referred and deemed a controlled action.

# 9. IMPLICATIONS – EPBC ACT 1999

The objective of the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* is to provide for the protection of the environment, especially those aspects that are of national significance, promote ecologically sustainable development, the conservation of biodiversity and a cooperative approach to the protection and management of the environment.

A number of fauna species known to or potentially present within the study area are listed under the federal *EPBC Act*. *EPBC Act* listed threatened fauna species (or their habitat) identified as being present in the study area were:

- Calyptorhynchus latirostris Carnaby's Black-Cockatoo Endangered
- Calyptorhynchus baudinii Baudin's Black-Cockatoo Vulnerable
- Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo Vulnerable

*EPBC Act* listed migratory fauna species identified as possibly using the study area were:

- Pandion haliaetus Osprey Migratory
- Haliaeetus leucogaster White-bellied Sea-Eagle Migratory



• *Merops ornatus* Rainbow Bee-eater – Migratory

The following *EPBC Act* listed threatened/migratory fauna species (or their habitat) were determined during the fauna assessment <u>not</u> to be present in the study area despite appearing in database/literature searches. Their exclusion from the potential species list is primarily justified by an obvious lack of suitable habitat or known local extinction. It is also very unlikely that vegetation at the site represents habitat critical for the recovery of the respective threatened species in the area. These species will not be discussed further:

- Idiosoma nigrum Shield-backed Trapdoor Spider Vulnerable
- Leipoa ocellata Malleefowl Vulnerable
- Sternula nereis nereis Fairy Tern (Australian)
- Ardea alba Great Egret Migratory
- Ardea ibis Cattle Egret Migratory
- Botaurus poiciloptilus Australasian Bittern Endangered
- Various Migratory Shorebirds Migratory
- Rostratula benghalensis Painted Snipe Migratory/Endangered
- Plegadis falcinellus Glossy Ibis Migratory
- Apus pacificus Fork-tailed Swift Migratory
- Dasyurus geoffroii Chuditch Vulnerable
- Pseudocheirus occidentalis Western Ringtail Possum Vulnerable
- Setonix brachyurus Quokka Vulnerable

If an action (i.e. the proposed clearing for development) is deemed to have a potential "significant impact" on listed species a referral to the Department of the Environment (DoE) is required to ensure compliance with the *EPBC Act*. Currently, for the species in question, "significant impact" is defined within one or two documents, these being:



- Department of the Environment, Water, Heritage and the Arts (DEWHA) (2009b). Matters of National Environmental Significance. Significant Impact Guidelines 1.1, *EPBC Act* 1999.
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012). *EPBC Act* referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) *Calyptorhynchus latirostris*, Baudin's cockatoo (vulnerable) *Calyptorhynchus baudinii*, Forest red-tailed black cockatoo (vulnerable) *Calyptorhynchus banksii naso*.

An assessment of significant impact on federally listed threatened fauna species and the possible need to refer the project to DoE using criteria within the abovementioned documents are provided below.

#### 9.1 BLACK COCKATOOS

The DoE document titled "EPBC Act referral guidelines for three threatened black cockatoo species" (DSEWPaC 2012) summarises what scale of actions would be considered likely to have a significant impact on listed endangered and vulnerable fauna species.

The following points provide general guidance on what, in DoE's view, may be at high and low risk of requiring a referral to ensure compliance with the *EPBC Act* as well as providing some guidance on uncertainty.

#### Actions that have a high risk of significant impacts

- Clearing of any known nesting tree.
- Clearing or degradation of any part of a vegetation community known to contain breeding habitat.
- Clearing of more than 1 ha of quality foraging habitat.
- Clearing or degradation (including pruning the top canopy) of a known night roosting site.
- Creating a gap of greater than 4 km between patches of black cockatoo habitat (breeding, foraging or roosting).



#### Actions that have and uncertain risk of significant impacts

- Degradation (such as through altered hydrology or fire regimes) of more than 1 ha of foraging habitat. Significance will depend on the level and extent of degradation and the quality of the habitat.
- Clearing or disturbance in areas surrounding black cockatoo habitat that has the potential to degrade habitat through introduction of invasive species, edge effects, hydrological changes, increased human visitation or fire.
- Actions that do not directly affect the listed species but that have the potential for indirect impacts such as increasing competitors for nest hollows.
- Actions with the potential to introduce known plant diseases such as Phytophthora spp. to an area where the pathogen was not previously known.

#### Actions that have a low risk of significant impacts

- Actions that do not affect black cockatoo habitat or individuals.
- Actions whose impacts occur outside the modelled distribution of the three black cockatoos

Numerous trees within the study area were observed to have a DBH of greater than 50cm and therefore all these trees, by DoE's definition of the term, are potential black cockatoo breeding habitat. While the exact extent of clearing is unknown at this stage, the removal of any <u>one</u> of these trees will exceed DoE thresholds for the removal of black cockatoo breeding habitat (see above) and therefore maybe deemed "likely" to have a "significant impact".

Also, almost all the remnant native vegetation within the study area represents black cockatoo foraging habitat given the dominance of primary foraging species such as Marri, Jarrah and banksia. If more than 1 ha of this vegetation is planned for removal the "likely significant impact" threshold will also be exceeded.

The project may also be deemed to have "the potential to introduce known plant diseases" (e.g. during earth works) and this fact may also trigger the need for a referral or at least dialogue with DoE so they can make a full assessment of actual impact of any future proposed development on black cockatoos.



#### 9.2 LISTED MIGRATORY SPECIES

The DoE document titled "Principal Significant Impact Guidelines 1.1, Matters of National Environmental Significance (DEWHA 2009b) summarises what scale of actions would be considered likely to have a significant impact on listed migratory species.

Within this document an action has, will have, or is likely to have a significant impact on migratory species if it does, will, or is likely to:

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species; or
- result in invasive species that is harmful to the migratory species becoming established in an area of important habitat of the migratory species; or
- seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species.

An area of important habitat is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species;
- habitat that is of critical importance to the species at particular life-cycle stages;
- habitat utilised by a migratory species which is at the limit of the species range; or
- habitat within an area where the species is declining.

To have a significant impact on a migratory species as defined under the DoE Significant Impact Guidelines (DEWHA 2009b), any proposed development would need to trigger at least one of the abovementioned significant impact criteria thresholds.

It is considered extremely unlikely that any of these thresholds relating to migratory species will be compromised by development at the site at any scale. The habitat within the study area likely to be used by migratory species does not



represent "important habitat" and the number of individuals utilising the study area would not, under any circumstances, represent an ecologically significant proportion of the population of any of the species in question. Nonetheless it is possible that breeding by some of the listed migratory species may take place on site on occasions and direct impacts on these breeding activities should be avoided if encountered (e.g. in use Osprey/Sea Eagle nest tree).

# **10. RECOMMENDATIONS**

The following recommendations are provided for guidance during ongoing project planning, to ensure compliance with relevant state and federal environmental regulations and to reduce the impact on fauna and fauna habitat as much as reasonable and practicable. This listing is not exhaustive and management plans and offsets (if required) will need to be finalised after liaison with relevant regulatory advisers/authorities (e.g. DPaW and DoE). It is recommended that:

- Planning for the development should aim to avoid the need to clear as much of the existing vegetation as possible. Existing disturbed/previously cleared areas should be used where possible. Consideration should be given to retaining the best quality areas as public open space and/or the use of large lot sizes with the aim of retaining as much of the existing vegetation as possible. Reducing the area of vegetation requiring removal will minimise possible offset requirements that maybe set by regulatory authorities if conditional approval to develop the site is obtained.
- The need to commence dialogue or submit a referral to DoE regarding this project should be assessed against relevant significant impact criteria once planning for the development has progressed and an accurate assessment of the extent of clearing required can be made.
- Building envelope selection should take into consideration the presence of hollow bearing trees, in particular those with large hollows potentially suitable for black cockatoos should be avoided if possible.
- Driveways from the main road to respective building envelopes should utilise existing cleared tracks/areas where possible. New tracks should weave around larger trees in preference to removing them.
- New fence lines and firebreaks should weave around larger trees in preference to removing them.



- The proponent should take a pro-active approach to ensuring impacts on fauna that may result as a consequence of the development be offset or mitigated by revegetation plans in areas within and nearby the project site. The formulation of an offset landscape package of this nature will facilitate approval by regulatory authorities when the development if referred for assessment.
- Any proposed landscaping/plantings should utilise local seed stock of cockatoo food plants, specifically *Eucalyptus*, *Corymbia*, *Banksia*, *Hakea*, and *Allocasuarina* supplemented with peppermint (*Agonis flexuosa*). The final selection of suitable plants should be carried out after liaison with appropriate experts or local land care groups to ascertain which species are most suitable for the area.
- Prior to site works, clearing contractors should be provided with information to ensure compliance with all relevant sections of existing environmental management plans.
- If reasonable and practical Contractors should be directed to:
  - a) Avoid impacts on tree roots if feasible a ~3 m buffer around retained trees within which no soil disturbance can occur will be enforced;
  - b) Avoid branch pruning on trees that are to be retained (especially where canopy connection could be affected); and
  - c) Avoid filling of more than a metre over pre-construction soil height around the base of trees.
- No additional vegetation should be cleared within any of the allotments except for the purposes of:
  - a) Compliance with the requirements of the Bush Fires Act 1954 (as amended).
  - b) Clearing within the building envelope for a reasonable area for the construction of an approved dwelling or other building.
  - c) To construct an approved vehicular access.
  - d) For any other reason where specific written approval has first been obtained from the relevant governing body.



- During clearing operations a suitably experienced "fauna spotter" should be employed to inspect trees and dense shrubs and groundcover (where possible) before clearing to reduce likelihood of injury to fauna. Trees/large shrubs observed to contain potential fauna refuges (e.g. nests) should be felled in a manner that reduces the likelihood that fauna present will be injured. If feasible any fauna encountered should be relocated to suitable retained habitat nearby.
- During site works areas requiring clearing should be clearly marked and access to other areas restricted to prevent accidental clearing of areas to be retained.
- Design additional project infrastructure, including access routes, vehicle and plant storage and turn around areas, borrow pits etc. so that:
  - $\circ$   $\;$  previously disturbed areas are used where possible; and
  - o areas of sensitive vegetation are avoided.
- No dead, standing or fallen timber should be removed unnecessarily. Logs (hollow or not) and other debris resulting from land clearing should be used to enhance fauna habitat in untouched and rehabilitated areas if possible. Where possible, logs are to be retained either by pushing the logs into the retained bush land, when significant disturbance to the vegetation can be avoided, or the logs cut so that the length of log outside the clearing area remains insitu.
- A Construction and Operations Fire Management Plan should be prepared to reduce the risk of unplanned fires and provide contingency measures to minimise any associated impacts. The plan will include a contingency and response plan in the event of any bushfires that commence as a result of the works on site.
- All staff working on site should be made aware that native fauna is protected. Personnel working on the project should not be allowed to bring firearms, other weapons or pets onsite.
- Native fauna injured during clearing or normal site operations should be taken to a designated veterinary clinic or a DPaW nominated wildlife carer.
- Any significantly sized holes, pits or trenches required for services should be kept open for only as long as necessary and suitable escape ramps (45° batter) and bridging provided if the site is to be left unattended for



extended periods. Holes, pits or trenches should be inspected for fauna immediately prior to filling.

# 11. CONCLUSION

The fauna assessment within the study area was undertaken for the purposes of categorising the fauna assemblages and identifying fauna habitats present.

With respect to native vertebrate fauna, 13 mammals (includes eight bat species), 82 bird, 36 reptile and three frog 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 136 native animals that are listed as potentially occurring in the area, six are classified as endangered/vulnerable or in need of special protection under State and/or Federal law. In addition, three migratory and five DPaW priority species may also frequent the area at times.

Constraints on development within the study area will largely be centred on the presence of habitat used or potentially used by threatened fauna species and in particular those listed under the *EPBC Act*, namely the three species of black cockatoo. Any future development may also impact on habitat used by several additional species only listed under state legislation (*WC Act*) or given priority status by DPaW. The potential impacts on these species and/or their habitat will be taken into consideration by regulatory authorities during various approval processes and future planning for the development at the site should therefore aim to minimise these possible impacts.

A series of recommendations aimed at mitigating and minimising potential impacts on fauna and fauna habitat in general are provided in Section 10. These should be taken into consideration during planning and development where considered reasonable and practicable.



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# FIGURES









# PLATES



LOT 21 DALTON DVE & PT LOT 437 SOUTHERN ESTUARY RD - HERRON - FAUNA ASSESSMENT - DEC '13 - V2



Plate 1: Forest or Woodland of Sheoak, Marri, Jarrah and occasional Tuart over Low Forest or Low Woodland of Candle Stick Banksia and Woody Pear over Low Heath of mixed shrub species on sand.



Plate 2: Tall Woodland to Open Tall Woodland of Sheoak, Marri, Tuart and Jarrah over a Low Open Woodland of Banksia and Woody Pear over weeds on sand. (Abandoned large bird of prey nest visible).



Plate 3: Patchy dense forest of Peppermint, Marri and Jarrah over a Dwarf Scrub of mixed species and Very Open Low Sedges amongst totally cleared areas dominated by introduced weeds/grasses on sand.



Plate 4: Low Forest of Sheoak over Low Heath/Dwarf Scrub/Open Low Sedges on sand/limestone.



Plate 5: Dense Thicket of *Melaleuca huegelii* over Low Scrub/ Dense Herbs/Very Open Tall Grass/Open Low Sedges on sand/shallow limestone.

## **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	<ul> <li>(a) all migratory species that are:</li> <li>(i) native species; and</li> <li>(ii) from time to time included in the appendices to the Bonn Convention; and</li> <li>(b) all migratory species from time to time included in annexes established under JAMBA, CAMBA and ROKAMBA; and</li> <li>(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.</li> </ul>
Marine	Ма	Species in the list established under s248 of the EPBC Act

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

### Western Australian Wildlife Conservation Act (1950) Threatened Fauna Categories

Category	Code	Description
Schedule 1	S1	<ul> <li>Fauna which is rare or likely to become extinct</li> <li>Threatened fauna (Schedule 1) are further ranked by the DEC according to their level of threat using IUCN Red List criteria:</li> <li>CR: Critically Endangered - considered to be facing an extremely high risk of extinction in the wild.</li> <li>EN: Endangered - considered to be facing a very high risk of extinction in the wild.</li> <li>VU: Vulnerable - considered to be facing a high risk of extinction in the wild.</li> </ul>
Schedule 2	S2	Fauna which is presumed extinct
Schedule 3	S3	Birds which are subject to an agreement between the governments of Australia and Japan (JAMBA) relating to the protection of migratory birds and birds in danger of extinction
Schedule 4	S4	Fauna that is otherwise in need of special protection

### Western Australian DPaW Priority Fauna Categories

Category	Code	Description
Priority 1	P1	Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
Priority 2	P2	Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
Priority 3	P3	Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
Priority 4	P4	<ul> <li>(a) Rare. Taxa 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 taxa are usually represented on conservation lands.</li> <li>(b) Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</li> </ul>
		(c) Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
Priority 5	P5	Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxa becoming threatened within five years.

#### IUCN Red List Threatened Species Categories

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

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

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

### **APPENDIX B**

POTENTIAL FAUNA LISTING

### **Potential Fauna Listing**

Lot 21 Dalton Drive and Pt Lot 437 Southern Estuary Rd, Herron, W.A.

A = Harewood, G. (2013). Fauna Assessment of Lot 21 Dalton Dve and Pt Lot 437 Southern Estuary Rd, Herron. Unpublished Report for CoTerra.

B = Bamford Consulting Ecologists (2010). Level 2 Fauna Assessment of Remnant Vegetation at the Proposed Point Grey Marina. Unpublished report for RPS.

C = ENV (2009). Clifton Beach Fauna Assessment. Unpublished report for Cape Bouvard Investments Pty Ltd.

D = Bamford Consulting Ecologists (2003). Fauna Values of Cape Bouvard Investment's Pty Ltd Land, Yalgorup. Unpublished report for RPS.

E= ATA (1998). Vertebrate Fauna. Lake Clifton Land Exchange Proposal. Unpublished report for Bouvard Investment's Pty Ltd.

 $\mathsf{F} = \mathsf{DPaW} (2013). \text{ NatureMap Database search. "By Circle" 115°41' 11" E, 32°46' 45" S - Study area (plus 10km buffer), 23/07/2013.$ 

Class Family Species	Common Name	Conservation Status	A	В	С	D	Е	F
Amphibia								
Myobatrachidae Ground or Burrowing Frogs								
Heleioporus eyrei	Moaning Frog	LC		Х	Х		Х	
Limnodynastes dorsalis	Western Banjo Frog	LC		Х	Х		Х	Х
Pseudophryne guentheri	Crawling Toadlet	LC		Х	Х			
Reptilia								
Diplodactylidae Geckoes								
Strophurus spinigerus	Soft Spiny-tailed Gecko				Х	Х	Х	х
Gekkonidae Geckoes								
Christinus marmoratus	Marbled Gecko			Х	Х	Х	Х	Х

WAWC 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.

Compiled by Greg Harewood - October 2013 Recorded (Captured/Recorded/Sighted/Heard/Signs) = X Approximate centroid = -32.7795° S and 115.68636° E

Class Family Species	Common Name	Conservation Status	A	В	С	D	E	F
Pygopodidae Legless Lizards								
Aprasia repens	Sandplain Worm Lizard			Х				Х
Delma fraseri	Fraser's Legless Lizard				Х		Х	
Delma grayii	Side-barred Delma			Х	Х			
Lialis burtonis	Burton's Legless Lizard			Х	Х	Х		Х
Pygopus lepidopodus	Common Scaly Foot				Х		Х	
Agamidae Dragon Lizards								
Pogona minor	Western Bearded Dragon			Х	Х	Х		Х
Varanidae Monitor's or Goanna's								
Varanus gouldii	Bungarra or Sand Monitor		Х					
Varanus rosenbergi	Heath Monitor				Х			
Varanus tristis	Racehorse Monitor			Х				

Class Family Species	Common Name	Conservation Status	A	В	С	D	E	F
<b>Scincidae</b> Skinks								
Acritoscincus trilineatum	Southwestern Cool Skink			Х	х		х	
Cryptoblepharus buchananii	Fence Skink			Х	Х	Х		
Ctenotus australis	Western Ctenotus				Х			Х
Ctenotus fallens	West Coast Ctenotus							
Ctenotus impar	Odd-striped Ctenotus			Х				Х
Ctenotus ora	Coastal Plains Skink	P1		Х				Х
Egernia kingii	King's Skink							Х
Egernia napoleonis	Salmon-bellied Skink				Х	Х	Х	Х
Hemiergis quadrilineata	Two-toed Mulch Skink			Х	Х	Х	Х	Х
Lerista elegans	West Coast Four-toed Lerista			Х	Х	Х		Х
Lerista lineata	Perth Lined Lerista	P3			х	Х		х
Lerista lineopunctulata	Line-spotted Robust Lerista					Х		Х
Menetia greyii	Dwarf Skink			Х	Х	Х	Х	Х
Morethia lineoocellata	West Coast Pale-flecked Morethia	1		Х	Х	Х		Х
Morethia obscura	Shrubland Pale-flecked Morethia				Х			
Tiliqua rugosa	Bobtail		Х	Х	Х	Х		Х

Class Family Species	Common Name	Conservation Status	A	В	С	D	Е	F
<b>Typhlopidae</b> Blind Snakes								
Ramphotyphlops australis	Southern Blind Snake			х	Х		Х	Х
<b>Boidae</b> Pythons, Boas								
Morelia spilota imbricata	Carpet Python	S4			Х			
Elapidae Elapid Snakes								
Demansia psammophis reticulata	Western Reticulated Whipsnake				Х		Х	
Echiopsis curta	Bardick							
Neelaps bimaculatus	Black-naped Snake				Х			
Notechis scutatus	Tiger Snake					Х		
Parasuta gouldii	Gould's Hooded Snake				Х		Х	Х
Pseudonaja affinis	Dugite			Х	Х	Х	Х	Х
Simoselaps bertholdi	Jan's Banded Snake				Х	Х	Х	Х
Aves								
<b>Casuariidae</b> Emus, Cassowarries								
Dromaius novaehollandiae	Emu	Bp LC		Х	Х	Х	Х	Х

Class Family Species	Common Name	Conservation Status	А	В	С	D	Е	F
Phasianidae Quails, Pheasants								
Coturnix pectoralis	Stubble Quail	LC						х
Coturnix ypsilophora	Brown Quail	LC		Х				Х
Anatidae Geese, Swans, Ducks								
Anas gracilis	Grey Teal	LC		Х	Х			Х
Anas superciliosa	Pacific Black Duck	LC		Х	Х		Х	Х
Tadorna tadornoides	Australian Shelduck	LC		Х	Х	Х	Х	Х
Accipitridae Kites, Goshawks, Eagles, Harriers								
Accipiter cirrocephalus	Collared Sparrowhawk	Bp LC			Х	Х	Х	Х
Accipiter fasciatus	Brown Goshawk	Bp LC		Х				Х
Aquila audax	Wedge-tailed Eagle	Bp LC		Х	Х	Х		Х
Aquila morphnoides	Little Eagle	Bp LC		Х			Х	
Elanus caeruleus	Black-shouldered Kite	LC		Х				
Haliaeetus leucogaster	White-bellied Sea-Eagle	S3 Mig CA LC		Х				Х
Haliastur sphenurus	Whistling Kite	Bp LC		Х	Х	Х		Х
Hamirostra isura	Square-tailed Kite	Bp LC						
Pandion haliaetus	Osprey	Mig LC		Х				

lass Family Species	Common Name	Conservation Status	A	В	С	D	Е	F
<b>Falconidae</b> Falcons								
Falco berigora	Brown Falcon	Bp LC			Х	Х	Х	Х
Falco cenchroides	Australian Kestrel	LC		Х	Х	Х	Х	х
Falco longipennis	Australian Hobby	LC		Х			Х	х
Falco peregrinus	Peregrine Falcon	S4 Bp LC						х
<b>Turnicidae</b> Button-quails								
Turnix varia	Painted Button-quail	Bp LC		Х				
<b>Columbidae</b> Pigeons, Doves								
Ocyphaps lophotes	Crested Pigeon	LC						Х
Phaps chalcoptera	Common Bronzewing	Bh LC	Х	Х	Х	Х	Х	х
Streptopelia senegalensis	Laughing Turtle-Dove	Introduced			Х			Х

Class Family Species	Common Name	Conservation Status	A	В	С	D	Е	F
<b>Psittacidae</b> Parrots								
Cacatua galerita	Sulphur-crested Cockatoo	Introduced		Х				х
Cacatua roseicapilla	Galah	LC	Х	Х		Х	Х	
Cacatua sanguinea	Little Corella	LC		Х				Х
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	S1 VU Be VU A2c+3c+4c	Х	Х				Х
Calyptorhynchus baudinii	Baudin's Black-Cockatoo	S1 VU Bp VU C2a(ii)			Х		Х	Х
Calyptorhynchus latirostris	Carnaby's Black-Cockatoo	S1 EN Bp EN A2bcde+3bcde	Х	Х	Х	Х	Х	Х
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	LC			Х			
Neophema elegans	Elegant Parrot	LC		Х	Х			Х
Platycercus icterotis icterotis	Western Rosella (western ssp)	Bp LC						Х
Platycercus spurius	Red-capped Parrot	LC	Х	Х	Х	Х	Х	
Platycercus zonarius	Australian Ringneck	LC	Х	Х	Х	Х	Х	
Polytelis anthopeplus	Regent Parrot	LC	Х	Х	Х	Х		Х

Class Family Species	Common Name	Conservation Status	A	В	С	D	E	F
<b>Cuculidae</b> Parasitic Cuckoos								
Cacomantis flabelliformis	Fan-tailed Cuckoo	LC			Х		Х	Х
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	LC			Х			
Chrysococcyx lucidus	Shining Bronze Cuckoo	LC		Х	Х	Х		
Cuculus pallidus	Pallid Cuckoo	LC			Х	Х		
<b>Strigidae</b> Hawk Owls								
Ninox novaeseelandiae	Boobook Owl	LC			Х	Х		
<b>Tytonidae</b> Barn Owls								
Tyto alba	Barn Owl	LC				Х		
Tyto n. novaehollandiae	Masked Owl (SW pop)	РЗ Вр						
Podargidae Frogmouths								
Podargus strigoides	Tawny Frogmouth	LC				Х		Х
Aegothelidae Owlet-nightjars								
Aegotheles cristatus	Australian Owlet-nightjar	LC			Х			Х

Class Family Species	Common Name	Conservation Status	A	В	С	D	Е	F	
Halcyonidae Tree Kingfishers									
Dacelo novaeguineae	Laughing Kookaburra	Introduced	Х	Х	Х	Х	Х	Х	
Todiramphus sanctus	Sacred Kingfisher	LC		Х	Х			х	
Meropidae Bee-eaters									
Merops ornatus	Rainbow Bee-eater	S3 Mig JA LC		Х	Х	Х		Х	
<b>Maluridae</b> Fairy Wrens, GrassWrens									
Malurus splendens	Splendid Fairy-wren	Bh LC	Х	Х	Х	Х	Х	Х	
Acanthizidae Thornbills, Geryones, Fieldwrens & Whitefaces									
Acanthiza apicalis	Broad-tailed Thornbill	Bh LC	Х	Х	Х	Х	Х	Х	
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Bh LC	Х	Х	Х	Х		х	
Acanthiza inornata	Western Thornbill	Bh LC		Х				Х	
Gerygone fusca	Western Gerygone	LC	Х	Х	Х	Х		Х	
Sericornis frontalis	White-browed Scrubwren	Bh LC		Х	Х	Х	Х	Х	
Smicrornis brevirostris	Weebill	Bh LC	Х	Х	Х	Х	Х	х	

Class Family Species	Common Name	Conservation Status	А	В	С	D	E	F
Pardalotidae Pardalotes								
Pardalotus punctatus	Spotted Pardalote	LC		Х			х	Х
Pardalotus striatus	Striated Pardalote	LC	Х	Х	Х	Х	Х	Х
Meliphagidae Honeyeaters, Chats								
Acanthorhynchus superciliosus	Western Spinebill	LC		Х			Х	Х
Anthochaera carunculata	Red Wattlebird	LC	Х	Х	Х	Х	Х	Х
Epthianura albifrons	White-fronted Chat	LC			Х	Х		Х
Lichenostomus virescens	Singing Honeyeater	LC			Х	Х	Х	
Lichmera indistincta	Brown Honeyeater	LC		Х	Х	Х	Х	Х
Phylidonyris novaehollandiae	New Holland Honeyeater	Bp LC		Х	Х	Х	Х	Х
Petroicidae Australian Robins								
Eopsaltria australis griseogularis	Western Yellow Robin	Bh LC			Х			
Petroica multicolor	Scarlet Robin	Bh LC		Х	Х	Х	Х	
Neosittidae Sitellas								
Daphoenositta chrysoptera	Varied Sittella	Bh LC				Х		Х

Class Family Species	Common Name	Conservation Status	A	В	С	D	Е	F
Pachycephalidae Crested Shrike-tit, Crested Bellbird, Shrike T	hrushes, Whistlers							
Colluricincla harmonica	Grey Shrike-thrush	Bh LC	х	х	Х	х	х	Х
Pachycephala pectoralis	Golden Whistler	Bh LC	х	Х	Х	Х	Х	Х
Pachycephala rufiventris	Rufous Whistler	LC		х	Х	Х	Х	Х
<b>Dicruridae</b> Monarchs, Magpie Lark, Flycatchers, Fantail	ls, Drongo							
Grallina cyanoleuca	Magpie-lark	LC		х				Х
Rhipidura fuliginosa	Grey Fantail	LC	х	Х	Х	Х	Х	
Rhipidura leucophrys	Willie Wagtail	LC		х	Х	Х	Х	Х
Campephagidae Cuckoo-shrikes, Trillers								
Coracina novaehollandiae	Black-faced Cuckoo-shrike	LC	Х	Х	Х	Х	Х	Х
Lalage tricolor	White-winged Triller	LC			Х			
Artamidae Woodswallows, Butcherbirds, Currawongs								
Artamus cinereus	Black-faced Woodswallow	Bp LC		Х	Х	Х		Х
Artamus cyanopterus	Dusky Woodswallow	Bp LC		Х			Х	Х

Class Family Species	Common Name	Conservation Status	A	В	С	D	E	F
Cracticidae Currawongs, Magpies & Butcherbirds								
Cracticus tibicen	Australian Magpie	LC	Х	х	Х	Х	Х	х
Cracticus torquatus	Grey Butcherbird	LC	Х	х	Х	Х	Х	х
Strepera versicolor	Grey Currawong	Bp LC						х
Corvidae Ravens, Crows								
Corvus coronoides	Australian Raven	LC	Х	Х	Х	Х	Х	х
Motacillidae Old World Pipits, Wagtails								
Anthus australis	Australian Pipit	LC			Х			
Dicaeidae Flowerpeckers								
Dicaeum hirundinaceum	Mistletoebird	LC					Х	
Hirundinidae Swallows, Martins								
Hirundo neoxena	Welcome Swallow	LC	Х	Х	Х	Х	Х	Х
Hirundo nigricans	Tree Martin	LC	Х	х	Х	Х	Х	
Sylviidae Old World Warblers								
Cincloramphus cruralis	Brown Songlark	LC			Х			Х

Class Family Species	Common Name	Conservation Status	A	В	С	D	Е	F
<b>Zosteropidae</b> White-eyes								
Zosterops lateralis	Grey-breasted White-eye	LC	Х	Х	Х	Х	Х	Х
Mammalia								
<b>Tachyglossidae</b> Echidnas								
Tachyglossus aculeatus	Echidna	LC			Х			
<b>Dasyuridae</b> Carnivorous Marsupials								
Phascogale tapoatafa ssp	Southern Brush-tailed Phascogale	S1 VU NT						Х
Peramelidae Bandicoots								
Isoodon obesulus fusciventer	Southern Brown Bandicoot	P5 LC	Х	х	Х			
Phalangeridae Brushtail Possums, Cuscuses								
Trichosurus vulpecula	Common Brushtail Possum	LC	х		Х	Х	Х	Х
Macropodidae Kangaroos, Wallabies								
Macropus fuliginosus	Western Grey Kangaroo	LC	х	Х	Х	Х	Х	Х

Class Family Species	Common Name	Conservation Status	A	В	С	D	E	F	
<b>Molossidae</b> Freetail Bats									_
Mormopterus sp 4 (SW)	Southern Freetail-bat	LC							
Tadarida australis	White-striped Freetail-bat	LC				Х		Х	
Vespertilionidae Ordinary Bats									
Chalinolobus gouldii	Gould's Wattled Bat	LC			Х		Х	Х	
Chalinolobus morio	Chocolate Wattled Bat	LC							
Falsistrellus mackenziei	Western False Pipistrelle	P4 VU A2c							
Nyctophilus geoffroyi	Lesser Long-eared Bat	LC			Х	Х		Х	
Nyctophilus major	Western Long-eared Bat	LC							
Vespadelus regulus	Southern Forest Bat	LC			Х	Х		Х	
Muridae Rats, Mice									
Mus musculus	House Mouse	Introduced		Х	Х	Х	Х	Х	
Rattus rattus	Black Rat	Introduced					Х	Х	
Canidae Dogs, Foxes									
Vulpes vulpes	Red Fox	Introduced	Х	Х	Х	Х			

Class Family Species	Common Name	Conservation Status	A	В	С	D	E	F
<b>Felidae</b> Cats								
Felis catus	Cat	Introduced				Х	х	
Leporidae Rabbits, Hares								
Oryctolagus cuniculus	Rabbit	Introduced	Х	Х	Х	Х	Х	
# **APPENDIX C**

**DPAW & EPBC DATABASE SEARCH RESULTS** 



# NatureMap - Fish - Herron Sth

Created By Greg Harewood on 23/07/2013

Kingdom	Animalia
Current Names Only	Yes
Core Datasets Only	Yes
Species Group	Fish
Method	'By Circle'
Centre	115°41' 11" E,32°46' 45" S
Buffer	10km

l	Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
1.	-13637	??			
2.	-17589	Anoplocapros lenticularis			
3.	-13587	Cheilopogon sp.			
4.	-13512	Cristiceps aurantiacus			
5.	-15994	Edelia vittata			
6.	34028	Galaxias occidentalis (Western Minnow)			
7.	34030	Geotria australis (Pouched Lamprey)		P1	
8.	-14608	Lobotes surinamensis			
9.	-16086	Pseudogobius olorum			
10.	-16053	Seriola hippos			

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

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

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# NatureMap - Frogs - Herron Sth

Created By Greg Harewood on 23/07/2013

Kingdo	<b>n</b> Animalia
Current Names On	<b>y</b> Yes
Core Datasets On	<b>y</b> Yes
Species Grou	<b>p</b> Amphibians
Metho	d 'By Circle'
Centr	<b>e</b> 115°41' 11" E,32°46' 45" S
Buffe	r 10km

		Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
	1.	25400	Crinia insignifera (Squelching Froglet)			
	2.	25415	Limnodynastes dorsalis (Western Banjo Frog)			
	3.	25378	Litoria adelaidensis (Slender Tree Frog)			
	4.	25388	Litoria moorei (Motorbike Frog)			
Conser T - Rare X - Pres IA - Prot S - Othe 1 - Prior 2 - Prior 3 - Prior 4 - Prior 5 - Prior	vation Codes or likely to be umed extinct ected under i r specially pro- ity 1 ity 2 ity 3 ity 4 ity 5	s ecome extinc nternational i otected fauna	t agreement a			

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

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# NatureMap - Reptiles - Herron Sth

Created By Greg Harewood on 23/07/2013

Kingdom	Animalia
Current Names Only	Yes
Core Datasets Only	Yes
Species Group	Reptiles
Method	'By Circle'
Centre	115°41' 11" E,32°46' 45" S
Buffer	10km

	Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
1.	42368	Acritoscincus trilineatus			
2.	24980	Christinus marmoratus (Marbled Gecko)			
3.	25027	Ctenotus australis			
4.	25047	Ctenotus impar			
5.	25049	Ctenotus labillardieri			
6.	41641	Ctenotus ora (Coastal Plains Skink)		P1	
7.	25096	Egernia kingii (King's Skink)			
8.	25100	Egernia napoleonis			
9.	25119	Hemiergis quadrilineata			
10.	25131	Lerista distinguenda			
11.	25133	Lerista elegans			
12.	25147	Lerista lineata (Perth Slider, Lined Skink)		P3	
13.	25148	Lerista lineopunctulata			
14.	25005	Lialis burtonis			
15.	25184	Menetia greyii			
16.	25191	Morethia lineoocellata			
17.	-17934	Pelamis platurus			
18.	24907	Pogona minor subsp. minor (Dwarf Bearded Dragon)			
19.	25259	Pseudonaja affinis subsp. affinis (Dugite)			
20.	25271	Ramphotyphlops australis			
21.	25266	Simoselaps bertholdi (Jan's Banded Snake)			
22.	24942	Strophurus spinigerus subsp. spinigerus			

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

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

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# NatureMap - Birds - Herron Sth

Created By Greg Harewood on 23/07/2013

Kingdom Animalia Current Names Only Yes Core Datasets Only Yes Species Group Birds Method 'By Circle' Centre 115°41' 11" E,32°46' 45" S Buffer 10km

			Area
1. 24260 Acanthiza apicalis (Broad-tailed Thorr	nbill, Inland Thornbill)		
2. 24261 Acanthiza chrysorrhoa (Yellow-rumpe	d Thornbill)		
3. 24262 Acanthiza inornata (Western Thornbil	)		
4. 24560 Acanthorhynchus superciliosus (West	tern Spinebill)		
5. 25535 Accipiter cirrocephalus (Collared Spar	rrowhawk)		
6. 25536 Accipiter fasciatus (Brown Goshawk)	,		
7. 25755 Acrocephalus australis (Australian Re	ed Warbler)		
8. 41323 Actitis hypoleucos (Common Sandpip	er)	IA	
9. 25544 Aegotheles cristatus (Australian Owle	t-nightjar)		
10. 24310 Anas castanea (Chestnut Teal)			
11. 24312 Anas gracilis (Grey Teal)			
12. 24315 Anas rhynchotis (Australasian Shovel	er)		
13. 24316 Anas superciliosa (Pacific Black Duck	)		
14. 24561 Anthochaera carunculata (Red Wattle	, bird)		
15. 24562 Anthochaera lunulata (Western Little	Wattlebird)		
16. 24285 Aquila audax (Wedge-tailed Eagle)	,		
17. 25558 Ardea ibis (Cattle Earet)		IA	
18. 41324 Ardea modesta (Eastern Great Egret)		IA	
19. 24341 Ardea pacifica (White-necked Heron)			
20. 24610 Ardeotis australis (Australian Bustard	)	P4	
21. 25736 Arenaria interpres (Ruddy Turnstone)		IA	
22. 25566 Artamus cinereus (Black-faced Wood	swallow)		
23 24353 Artamus cvanopterus (Dusky Woods)	vallow)		
24 24318 Avthva australis (Hardhead)			
25 24319 Riziura lobata (Musk Duck)			
26 25713 Cacatua galerita (Sulphur-crested Co	ckatoo)		
27 25716 Cacatua sanguinga (Little Corolla)			
28 24729 Cacatua tenuirostris (Eastern Long-bi	lled Corelle)		
20. 25508 Cacamantic flabolliformic (Eastern Eoligical			
23. 23396 Cacomantis nabelinormis (Fairfaired)			
31. 24770 Calidris acuminata (Sharp tailed San	(nipor)	14	
32 24779 Calidris abba (Sandorling)		IA	
32 25738 Calidris caputus (Pad Knot)			
34. 24784 Calidris forruginoa (Curlow Sandning	-	T	
34. 24164 Calidris reiruginea (Currew Sandpiper		1	
35. 24760 Calidris minute (Little Stint)		IA	
30. 24707 Calidris minuta (Little Stint)		IA	
31. 24100 Galidris ruincullis (Red-fileCked Stillt)		IA	
38. 24789 Calidris subminuta (Long-toed Stint)			
39. 24790 Galluris tenuirostris (Great Khot)	Plack Cookatoo)	I	
40. 25717 Galyptornynchus banksii (Red-talled E	(Forant Rad tailed Plack Conketer)	Ŧ	
41. 24731 Galyptornyncnus banksii subsp. naso	(FUIES) REU-TAILED BIACK-CUCKALUU)	I	
42. 24733 Galyptornynchus baudinii (Baudin's C	uckalou (IUIIg-billed black-cockalou), balldin's	т	
	Conjustes (short hilled black esservates)		
43. 24134 Galyptornynchus latirostris (Carnaby's	s Ουσκατύο (snort-billed black-cockatoo),	т	
Carnaby's Cockatoo)	Discord		
44. 25573 Charadrius bicinctus (Double-banded	Plover)		
45. 25575 Charadrius leschenaultii (Greater San	a Plover)	IA _	
46. 25576 Charadrius mongolus (Lesser Sand P	lover)	Т	
47. 24376 Charadrius rubricollis (Hooded Plover		P4	
48 24377 Charadrius ruficanillus (Red-conned F	Plover)		

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	Name ID	Species Name Natura	lised Conservation Code	Endemic To Query Area
50.	24833	Cincloramphus cruralis (Brown Songlark)		
51.	24288	Circus approximans (Swamp Harrier)		
53	24209	Cladorhynchus leucocephalus (Banded Stilt)		
54.	25675	Colluricincla harmonica (Grev Shrike-thrush)		
55.	25568	Coracina novaehollandiae (Black-faced Cuckoo-shrike)		
56.	25592	Corvus coronoides (Australian Raven)		
57.	24671	Coturnix pectoralis (Stubble Quail)		
58.	25701	Coturnix ypsilophora (Brown Quail)		
59.	25595	Cracticus tibicen (Australian Magpie)		
60.	25596	Cracticus torquatus (Grey Butcherbird)		
61.	24322	Cygnus atratus (Black Swan)		
62.	30901	Dacelo novaeguineae (Laughing Kookaburra) Y		
63.	25673	Daphoenositta chrysoptera (Varied Sittelia)		
65	24470	Enthianura albitrans (White franted Chat)		
66	24307	Epithanura aburons (White-noneu Onat)		
67	25621	Falco berigora (Brown Falcon)		
68.	25622	Falco cenchroides (Australian Kestrel)		
69.	25623	Falco longipennis (Australian Hobby)		
70.	25624	Falco peregrinus (Peregrine Falcon)	S	
71.	25727	Fulica atra (Eurasian Coot)		
72.	24791	Gallinago hardwickii (Latham's Snipe)	IA	Y
73.	25729	Gallinula tenebrosa (Dusky Moorhen)		
74.	25730	Gallirallus philippensis (Buff-banded Rail)		
75.	25530	Gerygone fusca (Western Gerygone)		
76.	24443	Grallina cyanoleuca (Magpie-lark)		
77.	24487	Haematopus longirostris (Pied Oystercatcher)		
78.	24293	Haliaeetus leucogaster (White-bellied Sea-Eagle)	IA	
79.	24295	Haliastur sphenurus (Whistling Kite)		
80.	20734	Himantopus himantopus (Biack-winged Suit)		
82	24491	Lichmera indistincta (Brown Honeyeater)		
83	25739	Limicola falcinellus (Broad-billed Sandpiner)	١۵	
84.	30932	Limosa lapponica (Bar-tailed Godwit)	IA	
85.	25741	Limosa limosa (Black-tailed Godwit)	IA	
86.	24690	Macronectes giganteus (Southern Giant Petrel)	P4	
87.	24326	Malacorhynchus membranaceus (Pink-eared Duck)		
88.	25654	Malurus splendens (Splendid Fairy-wren)		
89.	24583	Manorina flavigula (Yellow-throated Miner)		
90.	25758	Megalurus gramineus (Little Grassbird)		
91.	24598	Merops ornatus (Rainbow Bee-eater)	IA	
92.	24738	Neophema elegans (Elegant Parrot)		
93.	24739	Neophema petrophila (Rock Parrot)	_	
94.	24798	Numenius madagascariensis (Eastern Curlew)	1	
95.	25742	Numenius phaeopus (Whimbrei)	IA	
90.	23304	Ocuphans Ionhotes (Crested Pireon)		
97.	24407	Ovyura australis (Blue-billed Duck)		
99.	25679	Pachycephala pectoralis (Golden Whistler)		
100.	25680	Pachycephala rufiventris (Rufous Whistler)		
101.	25681	Pardalotus punctatus (Spotted Pardalote)		
102.	25682	Pardalotus striatus (Striated Pardalote)		
103.	24648	Pelecanus conspicillatus (Australian Pelican)		
104.	24659	Petroica goodenovii (Red-capped Robin)		
105.	25697	Phalacrocorax carbo (Great Cormorant)		
106.	24667	Phalacrocorax sulcirostris (Little Black Cormorant)		
107.	25699	Phalacrocorax varius (Pied Cormorant)		
108.	24409	Phaps chalcoptera (Common Bronzewing)		
109.	24802	Fillionacius pugnax (Kull) Dhulidenuris peusehellendiae (New Hellend Heneuseter)	IA	
110.	24596	r nyinonyns novaenollanolae (ivew nollano noneyealer) Platalea flavines (Yellow-hilled Snoophill)		
112	25720	Platvcercus icterotis (Western Rosella)		
113.	24843	Plegadis falcinellus (Glossy Ibis)	IA	
114.	24382	Pluvialis fulva (Pacific Golden Plover)	IA	
115.	24383	Pluvialis squatarola (Grey Plover)	IA	
	25703	Podargus strigoides (Tawny Frogmouth)		
116.		Poderaus striggides suber brochusterus (Towny Fragmenth)		
116. 117.	24679	Fourigus surgoides subsp. brachypterus (Tawny Frogmouth)		
116. 117. 118.	24679 25704	Polargus surgiolas subsp. brachpletos (rawny Pogniouri) Podiceps cristatus (Great Crested Grebe)		

	Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
120.	25722	Polytelis anthopeplus (Regent Parrot)			
121.	25731	Porphyrio porphyrio (Purple Swamphen)			
122.	24769	Porzana fluminea (Australian Spotted Crake)			
123.	24771	Porzana tabuensis (Spotless Crake)			
124.	24776	Recurvirostra novaehollandiae (Red-necked Avocet)			
125.	25614	Rhipidura leucophrys (Willie Wagtail)			
126.	25534	Sericornis frontalis (White-browed Scrubwren)			
127.	24279	Sericornis frontalis subsp. maculatus (White-browed Scrubwren)			
128.	30948	Smicrornis brevirostris (Weebill)			
129.	24329	Stictonetta naevosa (Freckled Duck)			
130.	24554	Stipiturus malachurus subsp. westernensis (Southern Emu-wren)			
131.	25597	Strepera versicolor (Grey Currawong)			
132.	25590	Streptopelia senegalensis (Laughing Turtle-Dove)	Y		
133.	25705	Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)			
134.	24331	Tadorna tadornoides (Australian Shelduck, Mountain Duck)			
135.	24844	Threskiornis molucca (Australian White Ibis)			
136.	24845	Threskiornis spinicollis (Straw-necked Ibis)			
137.	25549	Todiramphus sanctus (Sacred Kingfisher)			
138.	24803	Tringa brevipes (Grey-tailed Tattler)		IA	
139.	24806	Tringa glareola (Wood Sandpiper)		IA	
140.	24808	Tringa nebularia (Common Greenshank)		IA	
141.	24809	Tringa stagnatilis (Marsh Sandpiper)		IA	
142.	24855	Tyto novaehollandiae subsp. novaehollandiae (Masked Owl (southern subsp))		P3	
143.	25577	Vanellus miles (Masked Lapwing)			
144.	24386	Vanellus tricolor (Banded Lapwing)			
145.	25765	Zosterops lateralis (Grey-breasted White-eye, Silvereye)			

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

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

NatureMap is a collaborative project of the Department of Environment and Conservation, Western Australia, and the Western Australian Museum.



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# NatureMap - Mammals - Herron Sth

Created By Greg Harewood on 23/07/2013

Kingdom	Animalia
Current Names Only	Yes
Core Datasets Only	Yes
Species Group	Mammals
Method	'By Circle'
Centre	115°41' 11" E,32°46' 45" S
Buffer	10km

	Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
1.	24186	Chalinolobus gouldii (Gould's Wattled Bat)			
2.	24092	Dasyurus geoffroii (Chuditch, Western Quoll)		т	
3.	24153	Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)		P5	
4.	24132	Macropus fuliginosus (Western Grey Kangaroo)			
5.	24133	Macropus irma (Western Brush Wallaby)		P4	
6.	24223	Mus musculus (House Mouse)	Y		
7.	24042	Mustela putorius (European Polecat, Ferret)	Y		
8.	24194	Nyctophilus geoffroyi (Lesser Long-eared Bat)			
9.	24099	Phascogale tapoatafa subsp. tapoatafa (Southern Brush-tailed Phascogale, Wambenger)		т	
10.	24166	Pseudocheirus occidentalis (Western Ringtail Possum)		Т	
11.	24173	Pteropus scapulatus (Little Red Flying-fox)			
12.	24185	Tadarida australis (White-striped Freetail-bat)			
13.	24158	Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)			
14.	24206	Vespadelus regulus (Southern Forest Bat)			

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

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

NatureMap is a collaborative project of the Department of Environment and Conservation. Western Australia, and the Western Australian Museum.

Department of Environment and Conservation

museum



Department of Sustainability, Environmen Water, Population and Communities

# **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 <u>Environment Assessments</u> and the EPBC Act including significance guidelines, forms and application process details.

Report created: 23/07/13 12:13:49

Summary Details Matters of NES Other Matters Protected by the EPBC Act Extra Information Caveat Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates 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 <u>Administrative Guidelines on Significance</u>.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	18
Listed Migratory Species:	7

# 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 <u>heritage values</u> 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 <u>permit</u> 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:	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:	None
Invasive Species:	22
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

# Details

# Matters of National Environmental Significance

Wetlands of International Importance (RAMSAR)	[Resource Information]
Name	Proximity
Peel-yalgorup system	Within 10km of Ramsar

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso		
Forest Red-tailed Black-Cockatoo [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus baudinii		
Baudin's Black-Cockatoo, Long-billed Black- Cockatoo [769]	Vulnerable	Species or species habitat likely to occur within area
Carptornynchus latirostris	En den mens d	Deservices libely to second
Carnaby's Black-Cockatoo, Short-billed Black- Cockatoo [59523]	Endangered	within area
Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Rostratula australis		ulou
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
Pseudocheirus occidentalis		
Western Ringtail Possum [25911]	Vulnerable	Species or species habitat likely to occur within area
Setonix brachyurus		
Quokka [229]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence	
		area	
Other			
Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	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	
King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area	
Centrolepis caespitosa [6393]	Endangered	Species or species habitat likely to occur within area	
Darwinia foetida Muchea Bell [83190]	Critically Endangered	Species or species habitat may occur within area	
Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area	
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area	
Drakaea elastica Glossy-leafed Hammer-orchid, Praying Virgin [16753]	Endangered	Species or species habitat may occur within area	
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area	
Listed Migratory Species * Species is listed under a different scientific name on th	e EPBC Act - Threatened	[Resource Information] Species list.	
Name	Threatened	Type of Presence	
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur	
Migratory Terrestrial Species			
Haliaeetus leucogaster			
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	
Malleefowl [934]	Vulnerable	Species or species habitat may occur within area	
Rainbow Bee-eater [670]		Species or species habitat may occur within area	
Migratory Wetlands Species			
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area	
Cattle Egret [59542]		Species or species habitat likely to occur within area	
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species	

Threatene	ed

Type of Presence habitat may occur within area

Other Matters Protected by the EPBC Act

Name

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the	ne 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
Ardea alba		On a size on an a size
Great Egret, white Egret [59541]		habitat likely to occur within area
<u>Ardea ibis</u>		
Cattle Egret [59542]		Species or species habitat likely to occur within area
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		<b>a</b>
Osprey [952]		Species or species habitat may occur within area
Painted Snine [889]	Endangered*	Species or species
		habitat may occur within area

### **Extra Information**

**Invasive Species** 

#### [Resource Information]

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

Name	Status	Type of Presence
Birds		
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Columba livia Reak Digeon, Reak Dave, Demostic Digeon [202]		
Rock Pigeon, Rock Dove, Domestic Pigeon [803]		habitat likely to occur within area
Passer domesticus		
House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus		0
Eurasian Tree Sparrow [406]		habitat likely to occur within area
		0
Spotted Turtle-Dove [780]		habitat likely to occur within area
Streptopelia senegalensis		
Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer		<b>.</b>
Mus mussulus		habitat likely to occur within area
Hause Mause [120]		Species of species
		habitat likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		habitat likely to occur within area
Rattus rattus		
Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrota		
Pig [6]		Species or species habitat likely to occur within area
Red Fox Fox [18]		Species or species
		habitat likely to occur within area
Plants		

<u>Asparagus asparagoides</u> Bridal Creeper, Bridal Veil Creeper, Smilax,

Species or species

#### Name Florist's Smilax, Smilax Asparagus [22473]

Brachiaria mutica Para Grass [5879]

<u>Cenchrus ciliaris</u> Buffel-grass, Black Buffel-grass [20213]

<u>Chrysanthemoides monilifera</u> Bitou Bush, Boneseed [18983]

<u>Genista sp. X Genista monspessulana</u> Broom [67538]

#### Lantana camara

Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] <u>Olea europaea</u> Olive, Common Olive [9160]

Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]

Rubus fruticosus aggregate Blackberry, European Blackberry [68406] Status

Type of Presence

habitat likely to occur within area

Species or species habitat may occur within area

Species or species habitat likely to occur within area

Species or species habitat may occur within area

Species or species habitat may occur within area

Species or species habitat likely to occur within area

# Coordinates

-32.7795 115.68636

# 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.

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# **APPENDIX D**

SIGNIFICANT SPECIES PROFILES

# Shield-backed Trapdoor Spider Idiosoma nigrum

<u>Status and Distribution</u>: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. The species is known from three locations. One location consists of a number of severely fragmented populations in the central and northern wheatbelt (Main *et al.*, 2000). The second and third locations are at Jack Hills and Weld Range, two isolated populations approximately 200km further north, in more arid areas (Main, pers. comm., 2009). The species' area of occupancy is estimated to be 1700km<sup>2</sup> and its extent of occurrence is approximately 21 500 km<sup>2</sup> (Main, unpublished data).

<u>Habitat</u>: Burrows in heavy clay soils in areas of open *Eucalyptus loxophleba, E. salmonophloia* and *E. capillosa* woodland, where *Acacia acuminata* forms a sparse understorey. Forages within ground litter surrounding burrows (TSSC 2011).

Likely presence in study area: Outside of documented range and habitat unsuitable.

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

# Pouched Lamprey Geotria australis

<u>Status and Distribution</u>: 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).

<u>Habitat</u>: 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).

<u>Likely presence in study area</u>: The study area contains no suitable habitat for this species to utilise.

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

# Perth Lined Lerista Lerista lineata

<u>Status and Distribution</u>: Listed as Priority 3 by DPaW. Found in the lower west coast from Perth south to Leschenault Peninsula/Kemerton. It has also been found at Rottnest Island and Garden Island (Storr *et al.* 1999). Found in the southern suburbs of Perth (Bush *et al.* 2002).

<u>Habitat</u>: This small species of skink inhabits white sands (Storr *et al.* 1999) under areas of shrubs and heath where it inhabits loose soil and leaf litter (Nevill 2005) particularly in association with banksias (Bush *et al.* 2002).

<u>Likely presence in study area</u>: Those sections of the study area containing dense groundcover vegetation represent suitable habitat for this species.

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

# Coastal Plains Skink Ctenotus ora

<u>Status and Distribution</u>: Listed as Priority 1 by DPaW. *Ctenotus ora* is a recently described species of medium sized skink with a restricted range in the south-west of Western Australia, most of which has been cleared for agriculture and urban development. It cannot reliably be distinguished from the more widespread *C. labillardieri* except by DNA sequences, but the two species appear to have disjunct distributions. Based on only five specimens reliably identified as *Ctenotus ora*, the species is apparently restricted to the southern Swan Coastal Plain and Cape Naturaliste area, as far north as Pinjarra and south as far as Yallingup (Kay & Keogh 2012).

<u>Habitat:</u> Sandy substrates with low vegetation (including heath) in open *Eucalyptus/Corymbia* woodland over *Banksia* (Kay & Keogh 2012). Individuals have been found sheltering under *Banksia* logs on white sand, and trapped in eucalypt woodland with *Banksia* or peppermint mid-storey, or heath (Bamford *et al.* 2010). Open eucalypt woodland over *Banksia* and low vegetation on sandy coastal plain and coastal dunes (Wilson and Swan 2013).

<u>Likely presence in study area</u>: Those sections of the study area containing dense groundcover vegetation represent suitable habitat for this species.

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

# Southern Carpet Python Morelia spilota imbricata

<u>Status and Distribution</u>: 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). Records from Dalyellup (2007 Perkins Brothers Builders pers. comm.) and Peppermint Grove Beach (2006 Eleanor Bennett pers. comm.). Also know from Leschenault Conservation Park and in coastal dunes northwards including Yalgorup National Park (G Harewood pers. obs./ENV 2009).

<u>Habitat</u>: 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.

<u>Likely presence in study area</u>: May occasionally frequent sections of the study area in particular those areas containing the best quality groundcover. Would only occur in low densities.

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

# Malleefowl Leipoa ocellata

<u>Status and Distribution</u>: 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).

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

<u>Likely presence in study area</u>: This species is regionally extinct and would never, under normal circumstances occur anywhere on the Swan Coastal Plain.

<u>Potential impact of development</u>: No impact on this species will occur as it is unlikely to be present.

# Australian Bustard Ardeotis australis

<u>Status and Distribution</u>: This species is listed as Priority 4 by DPaW. A nomadic species that is common away from settled areas over much of Australia (Morcombe 2004).

<u>Habitat</u>: Grasslands, especially tussock grasses, like speargrass, Mitchell grass, spinifex; arid scrub with saltbush, bluebush; open dry woodland of mulga, mallee and, heath (Morcombe 2004).

Likely presence in study area: This species is locally and regionally extinct.

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

#### Great Egret Ardea alba

<u>Status and Distribution</u>: 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).

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

<u>Likely presence in study area</u>: The study area contains no suitable habitat for this species to utilise.

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

# Cattle Egret Ardea ibis

<u>Status and Distribution</u>: 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).

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

<u>Likely presence in study area</u>: The study area contains no suitable habitat for this species to utilise.

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

# Australasian Bittern Botaurus poiciloptilus

<u>Status and Distribution</u>: Classified as Schedule 1 under the *WC Act* and as Endangered under the *EPBC Act*. 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).

<u>Habitat</u>: Freshwater wetlands, occasionally estuarine; prefers heavy vegetation (Morcombe 2003) such as beds of tall dense *Typha*, *Baumea* and sedges in freshwater swamps (Johnstone and Storr 1998).

<u>Likely presence in study area</u>: The study area contains no suitable habitat for this species to utilise.

<u>Potential impact of development</u>: No impact on this species or its preferred habitat will occur as a consequence of development the site.

### **Osprey** Pandion haliaetus

<u>Status and Distribution</u>: 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).

<u>Habitat</u>: 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).

<u>Likely presence in study area</u>: May flyover occasionally given the proximity of the Harvey Estuary and the ocean. The species is also known to nest in large trees in the general area (G Harewood pers. obs.). An abandoned nest possibly built by this species was found within the study area (see Plate 4) though no existing nest sites observed.

<u>Potential impact of development</u>: No direct impact on this species is anticipated unless trees with existing nests require removal.

# White-bellied Sea Eagle Haliaeetus leucogaster

<u>Status and Distribution</u>: 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).

<u>Habitat</u>: 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.

<u>Likely presence in study area</u>: May flyover occasionally given the proximity of the Harvey Estuary and the ocean. As with the Osprey this species is known to nest in large trees in the general area. An abandoned nest possibly built by this species was found within the study area (see Plate 4) though no existing nest sites observed.

<u>Potential impact of development</u>: No direct impact on this species is anticipated unless trees with existing nests require removal.

# Peregrine Falcon Falco peregrinus

<u>Status and Distribution</u>: 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).

<u>Habitat</u>: 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.

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

<u>Potential impact of development</u>: No impact anticipated. This species will continue to utilise the area, if it does now, despite any proposed development.

# **Migratory Shorebirds**

A number of migratory shorebirds are listed as potentially occurring in the general area. Not all specific species are discussed in detail.

<u>Status and Distribution</u>: Migratory shorebirds are listed under the *EPBC Act* 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.

<u>Habitat</u>: 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.

<u>Likely presence in study area</u>: Some nearby beaches, estuaries and open wetlands maybe used by some of the *EPBC Act* listed migratory species but the study site itself contains no suitable habitat for any species. None listed as a potential species.

<u>Potential impact of development</u>: No significant impact on migratory shorebirds or wetland species will occur as the result of development within the study area.

# Glossy Ibis Plegadis falcinellus

<u>Status and Distribution</u>: 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 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 2012).

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

<u>Likely presence in study area</u>: The study area contains no suitable habitat for this species to utilise.

<u>Potential impact of development</u>: No impact on this species or its preferred habitat will occur as a consequence of development the site.

# Painted Snipe Rostratula benghalensis

<u>Status and Distribution</u>: 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).

<u>Habitat</u>: 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).

<u>Likely presence in study area</u>: There is no suitable habitat for this species within the study site.

<u>Potential impact of development</u>: No impact on this species or its preferred habitat will occur as a consequence of development the site.

# Fairy Tern (Australian) Sternula nereis nereis

<u>Status and Distribution</u>: Classified as Vulnerable under the *EPBC Act*. The total number of mature Fairy Terns (Australian) has been estimated at 3000–9000 individuals (Baling *et al.* 2009). Within Australia, the Fairy Tern occurs along the coasts of Victoria, Tasmania,

South Australia and Western Australia; occurring as far north as the Dampier Archipelago near Karratha (Birdlife International 2010).

<u>Habitat</u>: Fairy Terns utilise a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands, beaches and spits. Fairy Terns nest above the high water mark often in clear view of the water and on sites where the substrate is sandy and the vegetation low and sparse (Birdlife International 2010).

<u>Likely presence in study area</u>: The study area contains no suitable habitat for this species to utilise.

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

# Hooded Plover Charadrius rubricollis

<u>Status and Distribution</u>: Listed as Priority 4 by DPaW. In WA coastally west from Israelite Bay north to Jurien Bay and inland salt lakes more than 100km from the coast. In eastern Australia confined to suitable habitat from Jervis Bay (NSW) through Bass Strait and Tasmanian and west to Great Australian Bight in South Australia.

<u>Habitat</u>: Broad sandy ocean beaches and bays, coastal and inland salt lakes (Pizzey & Knight 2012).

Likely presence in study area: No suitable habitat.

<u>Potential impact of development</u>: No impact on this species will occur as a consequence of any development at the site.

# Forest Red-tailed Black-Cockatoo Calyptorhynchus banksii naso

<u>Status and Distribution</u>: 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).

<u>Habitat</u>: 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 in the forest redtailed black cockatoo (Johnstone and Storr 1998), but eggs are laid in October and November (Johnstone 1997; Johnstone and Storr 1998). 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 2004).

<u>Likely presence in study area</u>: Several individuals and small groups observed/heard and foraging evidence attributed to this species was also found to be common during the day survey (chewed marri fruits). Most of the remnant vegetation on site represents existing or potential foraging habitat for this species. Larger trees (>50cm DBH) can be considered potential breeding habitat.

<u>Potential impact of development</u>: Potential for the loss of existing and potential foraging, breeding and roosting habitat. Future planning for development within the site will need to take into consideration that the removal of habitat used by this species may constitute a high risk of significant impact as defined by DoE criteria (DSEWPaC 2012).

# Baudin's Black-Cockatoo Calyptorhynchus baudinii

<u>Status and Distribution</u>: 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).

<u>Habitat</u>: Mainly eucalypt forests where it feeds primarily on the Marri seeds, (Morcombe, 2003), 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).

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 2004).

J	F	М	Α	Μ	J	J	Α	S	0	Ν	D



Period in which breeding is most likely to commence Period in which fledging/weening could extend througho <u>Likely presence in study area</u>: Known to frequent the general area. Much of the remnant vegetation on site represents existing or potential foraging habitat for this species. Larger trees (>50cm DBH) can be considered potential breeding habitat.

<u>Potential impact of development</u>: Potential for the loss of existing and potential foraging, breeding and roosting habitat. Future planning for development within the site will need to take into consideration that the removal of habitat used by this species may constitute a high risk of significant impact as defined by DoE criteria (DSEWPaC 2012).

# Carnaby's Black- Cockatoo Calyptorhynchus latirostris

<u>Status and Distribution</u>: 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).

<u>Habitat</u>: Forests, woodlands, heathlands, farms; feeds on Banksia, Hakeas and Marri. Carnaby's cockatoo has specific nesting site requirements. Nests are mostly in smoothedbarked 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, 2003). 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).

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).





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

<u>Likely presence in study area</u>: Foraging evidence attributed to this species was found during the site survey (mainly chewed banksia cones). Most of the remnant vegetation on site represents existing or potential foraging habitat for this species. Larger trees (>50cm DBH) can be considered potential breeding habitat.

<u>Potential impact of development</u>: Potential for the loss of existing and potential foraging, breeding and roosting habitat. Future planning for development within the site will need to take into consideration that the removal of habitat used by this species may constitute a high risk of significant impact as defined by DoE criteria (DSEWPaC 2012).

# Masked Owl Tyto novaehollandae novaehollandae

<u>Status and Distribution</u>: Listed as Priority 3 by DPaW. Found north to Yanchep and east to Yealering, Gnowangerup and Albany, casual further north. Locally common in south west but generally uncommon (Johnstone and Storr 1998).

<u>Habitat</u>: Roosts and nests in heavy forest, hunts over open woodlands and farmlands (Morcombe 2004). Probably breeding in forested deep south west with some autumn–winter wanderings northwards (Johnstone and Storr 1998).

<u>Likely presence in study area</u>: May occasionally reside in general area though status uncertain. It is unlikely to be specifically attracted to the site. Listed as a potential species but would most probably only ever occur rarely.

<u>Potential impact of development</u>: Loss of some potential habitat but no significant impact on this species is anticipated.

# Fork-tailed Swift Apus pacificus

<u>Status and Distribution</u>: 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).

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

<u>Likely presence in study area</u>: It is potentially a very occasional summer visitor to the south west but is entirely aerial and largely independent of terrestrial habitats. Not listed as a potential species.

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

# Rainbow Bee-eater Merops ornatus

<u>Status and Distribution</u>: 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).

<u>Habitat</u>: 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.

<u>Likely presence in study area</u>: Rainbow bee-eaters are common seasonal visitors to south west and during summer months a small number of individuals of this species may possibly forage and roost onsite. Sandy ground conditions may be suitable for construction of breeding burrows.

<u>Potential impact of development</u>: Loss or modification of some natural roosting and foraging opportunities but this species can be expected to continue to utilise the area, as it does now, despite any future development as they often use modified environments. No significant impact on this species is anticipated given only a small number of individuals would ever use the site at any one time.

# Chuditch Dasyurus geoffroii

<u>Status and Distribution</u>: 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.

<u>Habitat</u>: 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 km<sup>2</sup> whilst that for females is 3-4 km<sup>2</sup> (Sorena and Soderquist 1995).

<u>Likely presence in study area</u>: This species is also most likely locally extinct though transient individuals may occur occasionally. This species has only been recorded a few times in the general area. The nearest, most recent record was form within Yalgorup National Park in 2007 (Nowicki 2007). Other sparse records indicate this species is rarely observed on the coastal plain (Dell 2000) and is only likely to pass through the area on very rare occasions at best. Not listed as a potential species.

<u>Potential impact of development</u>: No significant impact on this species is anticipated as it is unlikely to utilise the study area.

# Southern Brush-tailed Phascogale Phascogale tapoatafa ssp.

<u>Status and Distribution</u>: 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 (DEC 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. Local records from Kemerton, Dardanup and College Grove (G. Harewood pers. obs.).

<u>Habitat</u>: 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).

<u>Likely presence in study area</u>: Status in the area is difficult to determine but habitat appears suitable and therefore it must be assumed to be present, albeit in low densities.

<u>Potential impact of development</u>: Loss of potential habitat (hollow trees) and some possibility that individuals could be killed or injured during clearing operations.

# Quenda Isoodon obesulus fusciventer

<u>Status and Distribution</u>: 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 (DPaW information pamphlet) and Nambung and Yalgorup National Parks (DPaW pers. coms.).

<u>Habitat</u>: 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).

<u>Likely presence in study area</u>: Evidence of this species foraging (diggings) in some sections of the study area observed. Observations were made in sections of the study area containing dense groundcover vegetation.

<u>Potential impact of development</u>: Loss/modification of areas of habitat and some possibility that individuals could be killed or injured during clearing operations.

# Western Ringtail Possum Pseudocheirus occidentalis

<u>Status and Distribution</u>: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act.* Common in suitable habitat (de Tores 2008). The species is widespread and relatively common in vegetated remnants within the Swan Coastal Plain and along the Whicher Scarp between Bunbury and Busselton (G. Harewood pers. obs.). 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 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. It

has also been recorded in stands of Peppermint near the Harvey River and in Jarrah/Marri forest near Collie; however, the long term persistence of the species in these areas is not confirmed (de Tores *et al.* 2004). The Western Ringtail was formerly more widespread: in the 1970s it was known from Casuarina woodlands in the wheatbelt near Pingelly (southeast of Perth), and it is thought to have once occurred throughout much of south-western Western Australia (but not necessarily continuously distributed) (Maxwell *et al.* 1996; de Tores 2008).

<u>Habitat</u>: 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. In these areas the main determinants of suitable habitat for WRPs appears to be the presence of *Agonis flexuosa* either as the dominant tree or as an understorey component of Eucalypt forest or woodland (Jones *et al.* 1994a). 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.).

<u>Likely presence in study area</u>: No evidence of this species utilising vegetation within the study area was found during the day survey despite the presence of apparently suitable habitat (e.g. peppermint trees). The only known populations in the area (sections of Yalgorup National Park) are derived from individuals translocated by DPaW, although their current status is not documented. It is however considered unlikely that satellite populations would have established from the translocated populations, though on occasions transient individuals may be present.

<u>Potential impact of development</u>: No impact on this species is anticipated as it is considered unlikely to be present.

# Western Brush Wallaby Macropus irma

<u>Status and Distribution</u>: 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).

<u>Habitat</u>: 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 (DEC information pamphlet).

<u>Likely presence in study area</u>: May occur occasionally as transients for Yalgorup National Park but not listed as a potential species as occurrences would be random and temporary in nature.

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

# Quokka Setonix brachyurus

<u>Status and Distribution</u>: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Rare and restricted in south west W.A. from south of Perth to Two Peoples Bay. The distribution of the Quokka includes Rottnest and Bald Islands, and at least 25 known sites on the mainland, including Two Peoples Bay Nature Reserve, Torndirrup National Park, Mt Manypeaks National Park, Walpole-Nornalup National Park, and various swamp areas through the south-west forests from Jarrahdale to Walpole. Known population just south of Bunbury.

<u>Habitat</u>: Mainland populations of this species are currently restricted to densely vegetated coastal heaths, swamps, riverine habitats including tea-tree thickets on sandy soils along creek systems where they are less vulnerable to predation. The species is nocturnal.

Likely presence in study area: There is no potential habitat onsite for this species.

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

# Western False Pipistrelle Falsistrellus mackenziei

<u>Status and Distribution</u>: Listed as Priority 4 by DPaW and as Vulnerable 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 (Bullen pers. Coms.).

<u>Habitat</u>: 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.

<u>Likely presence in study area</u>: Recorded at several locations north of Binningup to Dawesville by Bullen (Bullen 2009). Hollow trees represent potential day time roosting sites.

<u>Potential impact of development</u>: Loss of potential habitat (i.e. hollow trees) but this will be unlikely to alter the status of the species in the general area.

# Water Rat Hydromys chrysogaster

<u>Status and Distribution</u>: 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).

<u>Habitat</u>: 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: No suitable habitat.

<u>Potential impact of development</u>: No impact on this species or its preferred habitat will occur as a consequence of development the site.

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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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