



Bussell Highway - Hutton
Road to Sabina section
(30.91 - 44.18 SLK)

Level 1 Fauna and Targeted Western Ringtail Possum Survey

Prepared for:
Main Roads Western
Australia

August 2017

● people ● planet ● professional

Document Reference	Revision	Prepared by	Reviewed by	Submitted to Client	
				Copies	Date
1663 AB	A INTERNAL DRAFT	LS	RF	1 Electronic (email)	21/07/16
1663 AB	B CLIENT DRAFT	RF	NM Main Roads	1 Electronic (email)	29/07/16
1663 AB	C CLIENT FINAL	LS		1 Electronic (email)	19/08/16
1663 AB	C CLIENT FINAL	LS	RF	1 Electronic (email)	04/08/17
1663 AB	C CLIENT FINAL	LS		1 Electronic (email)	09/08/17

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Executive Summary

Main Roads South West Region (Main Roads) is planning to construct a second carriageway on a 12.4 km section of the Bussell Highway (30.91 – 44.18 Straight Line Kilometre [SLK]) between approximately 950 m west of Hutton Road to 450 m west of the Sabina River crossing.

The Project requires the clearing of native and rehabilitated/regrowth vegetation. Clearing will possibly impact on habitat for conservation significant fauna listed under the Environment Protection and Biodiversity Conservation Act (1999) (EPBC Act), particularly the Western Ringtail Possum (WRP) and potentially all three of the Black Cockatoo species. Therefore a Level 1 fauna assessment was undertaken with the primary focus being the assessment of potential habitat in the Survey Area for the Western Ringtail Possum and three species of Black Cockatoo (Baudin's, Carnaby's and Forest Red-tailed Black Cockatoo).

A 7 km Department of Parks and Wildlife threatened fauna database search and a 10 km radial NatureMap and EPBC Protected Matters Search Tool (PMST) search was undertaken from the centre of the Survey Area. The searches were undertaken to identify fauna species of conservation significance potentially occurring in the Survey Area. In addition, Greg Harewood freely provided us with his WRP survey database Harewood, G. (2012).

The field assessment was undertaken on 16 and 17 June 2016. The purpose of the field assessment was to verify the accuracy of the desktop assessment and to further delineate and characterise the fauna assemblages and fauna habitat in the Survey Area. Nonetheless, the primary objective was to assess the Survey Area for use (indirectly by looking for signs and directly via observations) by and potential habitat for the WRP and Black Cockatoos given their status as nationally listed species of conservation significance.

During the survey one drey was recorded in a Peppermint tree, however, it was inactive and there were old scats underneath on the ground (Plate 1 and Figure 2e). We also recorded WRP scats in a number of other locations. During the assessment we mapped 33.96 ha of potential WRP habitat that includes both potential foraging and potential denning habitat in which they could build dreys (no suitable hollows were observed) (Figures 2a – 2g). Of this 33.96 ha of potential WRP habitat, 19.59 ha is considered regrowth and 13.69 ha is remnant vegetation. We have also added WRP records from Greg Harewood's database to illustrate that there are a relatively high number of records surrounding the Survey Area (Figures 2a – 2g).

During the survey, a small group of Carnaby's Black Cockatoos were observed flying over the Survey Area. Chewed Marri nuts, with markings from Carnaby's Black Cockatoos were observed at several locations in the Survey Area. We also observed chewed Tuart nuts and Pine Cones in several locations and can most likely attribute the chewed Pine Cones to Carnaby's Black Cockatoo.

Three species of Eucalypts, Marri, Tuart and Flooded Gum recorded in the Survey Area are considered Black Cockatoo potential future breeding habitat. We also recorded eight Eucalypts that could not be attributed to a particular species and appear to be non-endemic. This is as reflected by the Ecoedge Environmental flora and vegetation survey (Ecoedge 2014).

The Survey Area contains 92 potential future breeding trees with a DBH of more than 500 mm (Marri [48], dead Marri [2], Tuart [25], Flooded Gum [9] and *Eucalyptus sp.* [8]). The dimensions and the locations of the potential breeding trees are displayed in Appendix F and Figures 3a – 3g. No suitable hollows for which Black Cockatoos could potentially nest in were observed from the ground during the assessment.

During the assessment we mapped 31.51 ha of potential Black Cockatoo habitat that includes both potential foraging and potential breeding habitat (Figures 3a – 3g). Of this 31.51 ha of potential Black Cockatoo habitat, 18.81 ha is considered regrowth, 13.69 ha is remnant vegetation and 2.01 ha is Pine plantation. Foraging habitat in the Survey Area includes species such as Marri, Tuart, Flooded Gum, *Acacia sp.*, *Banksia sp.*, Peppermint and *Jacksonia sp.*

During the survey two broad fauna habitats were identified in the Survey Area and these were Remnant and Regrowth Vegetation (Figures 4a – 4g). The Survey Area is also highly fragmented and linear in nature, surrounded by Pine Plantations, paddocks and the Bussell Highway on the western side.

A large section of the Survey Area that is vegetated represents regrowth; as such we examined historical aerial imagery from 1996 to determine what sections of vegetation in the Survey Area represented remnants and what was regrowth.

During the 2016 survey, there was a section of Pine plantation to the south of Ludlow-Hithergreen Road, Busso Highway, on the eastern side of the Bussell Highway. Pine are typically relatively species poor and not commonly used for nesting by bird species, consequently we didn't examine them as a specific fauna habitat (Disney & Stokes 1976; Friend 1982; Curry 1991) during the survey. However, we acknowledge that they are a food resource for Baudin's and Carnaby's Black Cockatoo and probably the WRP (Johnstone & Kirkby 2011; Shedley & Williams 2014). This area of Pine plantation, however was harvested under a separate clearing approval, in late 2016.

The remaining sections of the Survey Area were cleared of vegetation, apart from mostly introduced grasses, most likely pasture grasses. The cleared areas represented over half of the Survey Area, or 41.76 ha (total size of the Survey Area is 77.92 ha).

Due to the results of the June 2016 fauna survey, a Targeted WRP survey was subsequently commissioned by Main Roads to provide greater clarity around use (or lack of use) in the proposed clearing area along Bussell Highway. During the Targeted WRP survey undertaken in June 2017 the following was recorded in the Survey Area: two WRP, one drey and a number of scats. High rainfall was forecast later in the survey schedule and so the likelihood of observing WRP may have been reduced due to inclement weather.

More effort was therefore focused at the start of the survey to maximise WRP detection in the dry weather. Despite these conditions WRP were detected while spotlighting on two separate nights (20-21 June 2017).

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1 Introduction

1.1 The Project

Main Roads South West Region (Main Roads) is planning to construct a second carriageway on a 12.4 km section of the Bussell Highway (30.91 – 44.18 Straight Line Kilometre [SLK]) between approximately 950 m west of Hutton Road to 450 m west of the Sabina River crossing (the Project [Survey Area]) (Figure 1). Main Roads has already completed the following surveys for the Project:

- Level 1 Flora and Vegetation Survey (Ecoedge 2014);
- Aboriginal Heritage Survey (Brad Goode and Associates 2016); and
- Dieback Assessment (Gleven 2016).

In order to progress environmental approvals for the Project, Main Roads commissioned a Level 1 fauna survey in 2016. Due to the results of this survey, a Targeted WRP survey was also commissioned in 2017.

The Project requires the clearing of approximately 25 ha of native vegetation and regrowth. Clearing will possibly impact on habitat for conservation significant fauna listed under the *Environment Protection and Biodiversity Conservation Act* (1999) (EPBC Act), particularly the Western Ringtail Possum (WRP) and potentially all three of the Black Cockatoo species. Therefore referral to the Commonwealth Department of the Environment and Energy (DEE) under the EPBC Act will likely be required. Consequently the primary focus of the fauna assessment is the WRP and Black Cockatoos.

It is important to note that a 2.01 ha section of Pine plantation in the Survey Area is due to be cleared under a separate clearing approval. The Pine plantation was still examined (during the 2016 survey) and included in this report so that a comprehensive assessment of the entire Survey Area was undertaken. During the 2017 survey, it was noted that this Pine plantation had now been cleared.

1.1.1 Objectives

The objectives of the 2016 Level 1 fauna survey were to:

- Complete a desktop review;
- Undertake a Level 1 fauna survey of the area potentially impacted by the Project;
- Carry out a WRP and Black Cockatoo habitat assessment;
- Map and identify fauna habitat, particularly potential WRP and Black Cockatoo habitat; and
- Prepare a report documenting the results of the desktop review and field assessment.

Following the results of the Level 1 survey; the objectives of the 2017 Targeted WRP survey were:

- To further define the level of use of the proposed clearing area by the WRP; and
- Incorporated the results into an update of the previous Level 1 fauna survey report (360 Environmental July 2016).

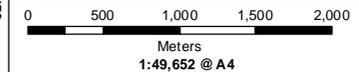


- Legend**
- Survey Area (Hutton to Sabina; 72.42 ha)
 - Map Index

NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
 SURVEY AREA PROVIDED BY MRWA 2016
 LOCALITY MAP SOURCED LANDGATE 2006
 AERIAL PHOTOGRAPHY SOURCED LANDGATE 2014
 (© Western Australian Land Information Authority 2016)

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LOCALITY MAP



PROJECT ID 1687		DATE 7/07/2016	
HORIZONTAL DATUM AND PROJECTION GDA 1994 MGA Zone 50			
CREATED JJ	CHECKED RF	APPROVED RF	REVISION 0

**Main Roads Western Australia
 Bussel Highway Expansion**

Fauna Habitat Assessment

**Figure 1
 Survey Area**

1.2 Background to the Protection of Fauna

Western Australian fauna is protected formally and informally by various legislative and non-legislative measures, which are as follows:

Legislative measures:

- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act);
- Wildlife Conservation Act 1950 (WC Act); and
- Environmental Protection Act 1986 (EP Act).

Non-legislative measures:

- Department of Biodiversity Conservation and Attractions (DBCA) (formally) Western Australian Department of Parks and Wildlife (DPaW) Priority lists for fauna; and
- Recognition of locally significant populations by the DBCA.

A short description of each is given below. Other definitions, including species conservation categories, are provided in Appendix A.

1.2.1 EPBC Act

The EPBC Act aims to protect matters of national environmental significance (MNES). Under the EPBC Act, the Commonwealth Department of the Environment and Energy (DEE) lists threatened species and communities in categories determined by criteria set out in the Act (www.environment.gov.au/epbc/index.html) (Appendix A).

The WRP (*Pseudocheirus occidentalis*) is listed as Vulnerable under the EPBC Act. Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) is listed as Endangered under the EPBC Act. The Forest Red-tailed Black Cockatoo (FRTBC [*Calyptorhynchus banksii naso*]) and Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) are classified as Vulnerable.

Projects likely to cause a significant impact on MNES should be referred to the DEE for assessment under the EPBC Act.

1.2.2 WC Act

The WA DBCA lists fauna under the provisions of the WC Act as protected according to their need for protection (Appendix A).

Fauna are classified as Schedule 1 to Schedule 7 according to their need for protection.

The WRP is listed as Critically Endangered under the WC Act. Under the WC Act both Carnaby's Black Cockatoo and Baudin's Black Cockatoo are listed as Endangered and the FRTBC is listed as Vulnerable.

1.2.3 EP Act

The Environmental Protection Act 1986 (EP Act) is the principal legislative Act dealing with the protection of the environment in Western Australia.

1.2.4 DBCA Priority Lists

The DBCA lists 'Priority' fauna that have not been assigned statutory protection under the WC Act, but which are under consideration for 'Scheduled' fauna. Fauna assessed as Priority 1-3 are considered to be in urgent need of further survey. Priority 4 fauna require monitoring every 5-10 years and Priority 5 fauna are subject to a specific conservation programme (Appendix A).

1.2.5 Informal Recognition of Fauna

Certain populations may be of local significance or interest because of their patterns of distribution and abundance. For example, specific locations of fauna may be locally significant because they are range extensions to the previously known distribution, or are newly discovered species (and have the potential to be of more than local significance). In addition, many species are in decline as a result of threatening processes (e.g. land clearing, grazing and changed fire regimes), and relict populations of such species assume local importance for the DBCA. It is not uncommon for the DBCA to make comment on these species of interest.

1.3 Background to the WRP

The WRP is a nocturnal arboreal mammal endemic to the south-west of WA. Its conservation status is currently listed as Vulnerable under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and as rare or likely to become extinct under the *Western Australian Wildlife Conservation Act 1950*. The management and recovery of the WRP is guided by a species recovery plan (DBCA 2014a).

The WRP is a medium-sized nocturnal, arboreal, folivorous marsupial. It has dark brown or occasionally dark grey fur above with cream or grey fur below. Its ears are short and rounded compared with the larger species, the Common Brushtail Possum (*Trichosurus vulpecular*), and it has a slender strongly prehensile tail with a terminal white tip, rather than a brushtail. The WRP weighs up to 1.3 kg with a body length of 40 cm and tail length of 41 cm (Van Dyck & Strahan 2008). Average mature adult weights for both sexes are approximately 1000g and they attain sexual maturity at about 830 – 1000g (Ellis & Jones, 1992; Jones *et al.*, 1994).

WRP populations have declined or become locally extinct over much of their former range in the south-west as a result of clearing and fragmentation of habitat associated with agricultural development (Jones *et al.* 1994; Shedley & Williams 2014). However, even in the relatively intact forested regions of the south-west, populations have declined

significantly, particularly since 1998 (Shedley & Williams 2014; Woinarski *et al.* 2014). Threatening processes include logging intensity, inappropriate fire regimes, dieback, and a drying climate may have all contributed to the degradation of WRP habitat, and increased the exposure of WRP to predation by foxes (*Vulpes vulpes*) and cats (*Felis catus*) or to heat stress (Jones *et al.* 1994; Wayne *et al.* 2006; Woinarski *et al.* 2014).

The population extent of WRP in the south-west has been declining since about 1900 particularly in the drier inland parts of its range (Jones *et al.* 1994; Jones 2004). However, there are no reliable estimates of the current total population size, or of the minimum viable WRP population in WA (Burbidge & de Tores 1998; DSEWPaC 2012; DBCA 2014). This situation arises because the species is elusive and difficult to survey in a cost effective manner, with predominately low detection rates that vary in different vegetation types (Wayne *et al.* 2005; de Tores & Elscot 2010). On the basis of limited existing survey data, the population in the Bunbury to Dunsborough region has been estimated to be between 2,000 and 5,000 individuals.

The highest population densities of WRP are now found around this Bunbury (Binningup) to Dunsborough coastal strip, which coincides with an area of urban development and loss of prime habitat (Shedley & Williams 2014). This coastal strip is considered to be a stronghold for the WRP and is therefore a focus for recovery and conservation of the species (Harewood 2008; DBCA 2014). High WRP population densities have been recorded in some urban areas, particularly where mature Peppermint trees (*Agonis flexuosa*) with large, dense and overlapping canopies have been retained (Harewood 2008). This habitat type is thought to provide high quality shelter and food. High population densities may indicate that WRP have benefited from some forms of urbanisation, or alternatively have been displaced from the broader setting by vegetation clearing and are confined to smaller pockets of remnant habitat.

Most ringtail species are traditionally associated with higher rainfall areas and more mesic habitats and rainforest environments (Van Dyck & Strahan 2008). WRP obtain most of their water requirements from their foliage diet, but will drink water when affected by heat stress. They appear to be particularly susceptible to heat stress and die during periods of high daytime temperatures (Jones *et al.* 1994b).

The recent significant decline in WRP population in inland areas and apparent contraction to the coastal areas may be a response to climate change over the last thirty to forty years that has seen a decrease in annual rainfall of 30% and a warming trend. While WRP are likely responding to changes across a range of interrelated bioclimatic factors, attributes of moisture and temperature and the interactions between these factors are expected to be among the most important.

Stream flows have reduced by more than 50% in recent years in inland forested catchments due to reduced rainfall (DBCA 2014), and this lack of surface water during summer may be contributing to the decline in WRP in these areas. WRP may benefit from the cooler, moist environment that is available during the critical summer period on the

coastal plain and the shady micro-climate provided within the dense canopy of peppermints and shrubs to maintain their body temperature. Thermoregulation and maintenance of body temperature within the thermoneutral zone are important for survival and this is achieved by behavioural or physiological mechanisms (Frappell & Mortola 2000).

The modelled distribution of the WRP can be seen in the 2014 DotE distribution maps in Appendix B. The Survey Area is within the known distribution of the WRP.

1.4 Background to Black Cockatoos

Three species of Black Cockatoo are found in south-west WA; Carnaby's Black Cockatoo, FRTBC and Baudin's Black Cockatoo. All three Black Cockatoos have suffered a substantial decline in numbers and breeding distribution in the past 50 years (Johnstone & Storr 1998a). Direct causes of population decline include the large numbers shot by orchardists (mainly associated with Baudin's Black Cockatoo), clearing and fragmentation of habitat (especially the loss of breeding hollows), the impact of hollow competitors including the Galah (*Cacatua roseicapilla*), corellas including Butler's Corella (*Cacatua pastinator butleri*), Australian Shelduck (*Tadorna tadornoides*), Australian Wood Duck (*Chenonetta jubata*), the feral European honey bee (*Apis mellifera*), and also vehicle strikes. Around 60% of the original vegetation on the Swan Coastal Plain has been cleared and up to 85% in other parts of the south-west region for agriculture (crops), meat production, dairying, farms, orchards, vineyards, pine plantations, mining, timber and wood chipping, cities and towns. At present, extensive tracts of uncleared land only remain in State forest and conservation reserves and what is left of remnant vegetation (in roadside verges etc.) is often disturbed to a varying degree (Johnstone & Kirkby 2011).

The south-west region is now a severely fragmented landscape and the further loss of foraging habitat, the lack of suitable breeding sites, climate change, and alterations in the landscape led to significant changes in forest structure. Almost every part of the Jarrah-Marri forest has been logged in the past, and most present day trees are too young to form hollows, and competition with exotic species, exacerbate the future conservation of Carnaby's Black Cockatoo, FRTBC's and Baudin's Black Cockatoo (Johnstone & Kirkby 2011).

The modelled distribution of all three Black Cockatoo species can be seen in the 2014 DotE distribution maps in Appendix C. The Survey Area is within the known distribution of all three Black Cockatoos.

2 Methods

2.1 Background

The Level 1 fauna and Targeted WRP surveys were compliant with the EPA requirements for the environmental surveying and reporting of fauna in WA, and EPBC Act survey and referral guidelines where practical and relevant, and as set out in the following documents:

- Terrestrial Biological Surveys as an Element of Biodiversity Protection. Position Statement No. 3 (EPA 2002);
- Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia. Guidance Statement No. 56 (EPA 2004b);
- EPBC Act Policy Statement 3.10: Significant impact guidelines for the vulnerable Western Ringtail Possum (*Pseudocheirus occidentalis*) in the southern Swan Coastal Plain, Western Australia (DEWHA 2009);
- Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA-DEC 2010); and
- EPBC Act referral guidelines for three threatened Black Cockatoo species (DSEWPaC 2012).

2.2 Fauna Survey Methods

2.2.1 Fauna Database Review

A 7 km DPaW threatened fauna database search and a 10 km radial NatureMap and EPBC Protected Matters Search Tool (PMST) search was undertaken from the centre of the Survey Area. The searches were undertaken to identify fauna species of conservation significance potentially occurring in the Survey Area (DPaW 2016a; DPaW 2016b, DotE 2016 [now known as DEE]). In addition, Greg Harewood freely provided us with his WRP survey database.

Collectively, these sources were used to compile a list of species that have been previously recorded in the vicinity of the Survey Area (Appendix D). This list invariably includes some species that do not occur in the Survey Area, as some fauna have a limited or patchy distribution or a high level of habitat specificity for habitats which are not located in the Survey Area e.g. waders/shorebirds that require coastal shores for habitat. Some fauna may also have become locally extinct or were erroneously identified in previous surveys. These fauna were examined and then excluded from the list where relevant.

2.2.2 Field assessment (2016)

The field assessment was undertaken on 16 and 17 June 2016 by two Zoologists. The survey was consistent with standard protocols for the region and relevant EPA Guidance Statements and EPBC Act Survey Guidelines as outlined above in section 2.1 (where relevant and practical).

The purpose of the field assessment was to verify the accuracy of the desktop assessment and to further delineate and characterise the fauna assemblages and fauna habitat in the Survey Area. Nonetheless, the primary objective was to assess the Survey Area for use (indirectly by looking for signs and directly via observations) by and potential habitat for the WRP and Black Cockatoos given their status as nationally listed species of conservation significance (see survey methods for these two species below).

To verify the accuracy of the background research, the field component of the Level 1 fauna survey incorporated the following tasks:

- The survey utilised passive sampling detection methods which included:
 - hand foraging for inactive and/or cryptic species (raking leaf litter, searching under rocks and logs and under loose litter);
 - looking for scats, pellets, skeletal material, tracks, diggings; and
 - opportunistic observations (visual or heard) of active species, in particular birds.
- Assessment of the habitat (within the Survey Area) to support species protected under State and/or Federal legislation or by the DBCA as a Priority species was undertaken.

Amphibians, reptiles and mammals are mainly recorded through intensive trapping (level 2 type surveys) and are infrequently recorded opportunistically. However, these animals will be noted when active, or by identifiable signs such as scats, tracks and diggings.

2.2.3 Camera Traps (2016)

Four camera traps were setup during the 2016 Level 1 fauna field survey and each ran for one night. These cameras were placed at locations with suitable WRP habitat as well as previous WRP records.

A mixture of peanut butter, oats and water were placed in the field of view for all cameras.

2.2.4 Taxonomy

For species identified in the desktop assessment, where there is doubt as to their true taxonomy (through subsequent name changes or taxonomic reviews), an effort was made to determine the current scientific name for each species. In some cases, old scientific names may be presented where correct nomenclature could not be determined due to name changes. Some taxon names may be followed by 'sp.', meaning that the species

name was not given in the data source or the identification is in doubt. Where there are previously recorded species such as this that have the potential to be a conservation significant species, they are discussed specifically in the results and discussion section.

Taxonomy and nomenclature in this report follows the accepted listing of published terrestrial vertebrate species. The listing for amphibians and reptiles follows Cogger (2014), birds follows Christidis & Boles (2008) and mammals Van Dyck & Strahan (2008).

2.3 WRP Habitat Assessment

2.3.1 Level 1 Fauna Survey (2016)

The WRP habitat assessment during the Level 1 fauna survey consisted of the following:

- Daytime searches for potential den sites were undertaken in areas where there were trees considered large enough to contain hollow-bearing trees of a suitable size (this typically coincided with areas where there were trees considered to be potential Black Cockatoo breeding trees [>500 mm DBH]); and
- Daytime searches for signs of activity, such as dreys in trees, scratches on tree trunks and scats on the ground below trees with hollows or dreys were undertaken.

Given the length and width of the Survey Area (12.4 km x 50 m) these searches had to target areas of habitat where WRP are known to forage in and build dreys or den in (Jones *et al.* 1994; Inions *et al.* 1989). Therefore two Zoologists walked on foot along transects (approximately 20 m apart where possible) in areas where there were large trees such as Tuarts, Marri and Flooded Gum (*Eucalyptus gomphocephala*, *Corymbia calophylla* and *Eucalyptus rudis*) and particularly in areas where there were Peppermint and Spearwood (*Kunzea glabrescens*).

For this assessment potential WRP habitat in the Survey Area was classified as vegetation containing species known to be used for shelter (dens and dreys) and species known to form part of their diet. This for example included areas with Tuart, Marri, Peppermint, Flooded Gum, Spearwood, *Melaleuca viminea*, Christmas Tree (*Nuytsia floribunda*), Woody Pear (*Xylomelum occidentale*) and *Acacia saligna*.

2.3.2 Targeted WRP Survey (2017)

The targeted WRP survey was undertaken from 20-22 June 2017. The survey utilised passive sampling detection methods which included:

- Two Zoologists walking transects (approximately 20 m apart) throughout the previously identified WRP habitat (with a focus on locations where there were previous records);
- Daytime searches for potential den sites in hollow-bearing trees, signs of activity, such as dreys in trees, scratches on tree trunks and scats on the ground below trees with dreys and skeletal material;

- Spotlighting and head torching at night from vehicle and on foot;
- Any observation (visual or heard) of a WRP was recorded by means of a hand-held Global Positioning System (GPS) unit;
- Ten camera traps placed across the Survey Area and baited. Camera traps were placed in areas where WRP records (Greg Harewoods database) or suitable habitat were identified in the 2016 Level 1 fauna survey and in locations where dreys or fresh scats were recorded (Table 1).

Table 1: Camera trap locations – Targeted WRP survey.

CAMERA NO.	EASTING	NORTHING	PLACED OUT	COLLECTED
8	365593	6296760	20/6/17	22/6/17
1	362407	6281723	20/6/17	22/6/17
4	359819	6279617	20/6/17	22/6/17
5	358078	6278317	20/6/17	22/6/17
12	357047	6277369	20/6/17	22/6/17
3	357032	6277342	20/6/17	22/6/17
9	353419	6274891	20/6/17	22/6/17
2	353322	6274848	20/6/17	22/6/17
11	353237	6274815	20/6/17	22/6/17
6	355150	6275894	20/6/17	22/6/17

2.4 Black Cockatoo Habitat Assessment

The Black Cockatoo habitat assessment involved traversing and searching the Survey Area by foot. These searches targeted areas of habitat where Black Cockatoos are known to forage, roost and or potentially nest in.

Any trees meeting each of the following criteria for potential breeding were recorded and electronically logged using a hand held Global Positioning System (GPS) unit:

- Native trees (e.g. Jarrah, Tuart, Marri etc.);
- Diameter at breast height (DBH) > 500 mm (300 mm for Wandoo and Salmon Gum) regardless of the presence or absence of hollows;
- Trees were placed in the following size class categories:
 - A = 500 – 1000 mm DBH
 - B = 1000 – 2000 mm DBH
 - C = >2000 mm DBH

The Black Cockatoo habitat assessment involved examining the habitat for tree and shrub species known to be important dietary items e.g. Marri, Tuart and *Banksia sp.* It also

included looking for evidence of feeding (chewed cones, seed and nut material); and opportunistic observations of Black Cockatoos in the Survey Area, either perching, foraging or while on the wing.

For this assessment potential Black Cockatoo habitat in the Survey Area was classified as vegetation containing species known to be used for nesting and species known to form part of their diet. This for example included areas with Tuart, Marri, Flooded Gum, *Banksia sp.*, Pine (*Pinus pinaster*), *Acacia sp.*, Peppermint and *Xanthorrhoea sp.*

3 Results

3.1 Fauna Survey Limitations and Constraints

It is important to note the specific constraints imposed on surveys and these constraints are often difficult to predict, as is the extent to which they influence survey effort. Survey constraints of the fauna assessment are listed below in Table 2.

Table 2: Limitations and Constraints Associated with the Survey Area.

VARIABLE	IMPACT ON SURVEY OUTCOMES
Access	The entire Survey Area was accessible as it ran beside Bussell Highway.
Experience	The personnel who executed these surveys were practitioners suitably qualified in their respective fields: Field Zoologists: Dr Ron Firth (18 years' experience) and Laura Stevens (5 years' experience); Data Interpretation and Reporting: Laura Stevens Report Review: Dr Ron Firth.
Timing, weather, season	<p>The Level 1 fauna survey was conducted on the 16 and 17 June 2016. We sourced minimum and maximum temperatures and rainfall data for these days from the Busselton Airport weather station (BoM 2016). Daily minimum temperatures for the 16 and 17 were 10.9°C and 10.1°C respectively. Daily maximum temperatures for the 16 and 17 were 15.5°C and 15.8°C respectively. There was no rainfall recorded on both days.</p> <p>The Targeted WRP survey was conducted from 20-22 June 2017. We sourced minimum and maximum temperatures and rainfall data for these days from the Busselton Airport weather station (BoM 2017). Daily minimum temperatures were 7.3°C, 13.9°C and 12.6°C respectively. Daily maximum temperatures were 21.3°C, 18.2°C and 18.9°C respectively. Daily rainfall was 2.0 mm, 17.8 mm and 23.6 mm respectively.</p> <p>Due to the higher rainfall forecast later in the survey, more effort was focused at the start of the survey to maximise WRP detection. Despite these conditions WRP were detected while spotlighting on two separate nights (20-21 June 2017).</p>

Scope: Life forms sampled	<p>The scope of this project was to undertake a Level 1 fauna survey (reconnaissance survey and an assessment of habitats in the Survey Area), primarily focussing on undertaking a habitat assessment for the WRP and all three species of Black Cockatoo. The Level 1 fauna survey was followed by a Targeted WRP survey.</p> <p>Given the level of survey, many species that occur in the Survey Area would not have been observed, particularly small ground-dwelling fauna that are normally captured by methods such as trapping. All conservation significant species previously recorded in the area have been considered. Based on the habitat present, those species deemed to potentially occur in the Survey Area have been addressed in this report.</p>
Sources of information	<p>The desktop analysis used several sources to produce a list of fauna species previously recorded in the vicinity of the Survey Area. This includes records from DBCA Threatened Fauna Database search (DBCA 2016b), NatureMap fauna search (DBCA 2016a), and the EPBC PMST (DotE 2016), as well as field guides and other scientific literature.</p>
Completeness	<p>Level 1 fauna survey:</p> <p>Five fauna habitat assessments were carried out. Searches for potential WRP dens and dreys (and other signs such as scats) in suitable habitat were undertaken. All trees considered to be potential Black Cockatoo breeding trees were measured and searches of their foraging (chewed nuts and cones) was also undertaken in the Survey Area.</p> <p>Targeted WRP:</p> <p>A total of eight hours of daytime searches and eight hours of spotlighting was undertaken, to identify WRP dreys, signs, scats and individuals.</p>
Disturbances	<p>During the Level 1 fauna survey a large section of the Survey Area has been cleared of native vegetation and only introduced grasses are present. Further to this a considerable portion of the Survey Area is regrowth (having been cleared sometime in the past), while other sections been severely altered and are parkland like (trees and no midstorey vegetation). There are sections of relatively intact native vegetation but this forms the smallest component of the vegetation present.</p>

	During the Targeted WRP survey, further areas of cleared vegetation were recorded.
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3.2 Fauna Results

3.2.1 Database Searches

Database searches returned 264 vertebrate species from 85 families as potentially occurring in the vicinity of the Survey Area. Of these, 11 species were amphibians from 4 families, 26 were reptiles from 8 families, 186 were bird species from 49 families and 41 were mammals from 24 families.

A total of 75 conservation significant vertebrate species (including Priority species) from 30 families were identified during the desktop review of the database searches (Appendix D). These were comprised of 4 amphibian species, 54 bird species from 17 families, and 17 mammals from 12 families.

3.2.2 Previous Surveys

Some examples of recent past consultant fauna surveys undertaken in the vicinity of the Survey Area are outlined below, including the type of assessment undertaken and the key findings of the survey.

GHD (2015). Bussell Highway - Capel to Hutton Section (26.38 - 32.15 SLK) Fauna Assessment. Report prepared for Main Roads Western Australia.

GHD undertook a level 1 fauna survey on 17-18 February 2015. During the assessment two WRP dreys were observed and 66 potential black cockatoo habitat trees, including three with hollows were recorded. They also recorded 6.44 ha of black cockatoo foraging habitat.

Biologic (2014). Wonnerup North Vertebrate Fauna Assessment. Report prepared for Cristal Mining Australia.

Biologic carried out a level 2; two season survey from 13 – 15 May 2013 and 16 – 21 October 2013. During the assessment five species of conservation significance were recorded and included:

- Southern Brush-tailed Phascogale (*Phascogale tapoatafa*);
- Western Ringtail Possum (*Pseudocheirus occidentalis*);
- Carnaby's Black Cockatoo;
- Baudin's Black Cockatoo; and
- Rainbow Bee-eater (*Merops ornatus*).

Greg Harewood (2012). Bussell Highway Capel to Hutton Road Upgrade Fauna Assessment. Report prepared for GHD.

Greg Harewood undertook a level 1 fauna survey and targeted WRP and Black Cockatoo assessment on 16 and 19 March 2012. Several WRP dreys and individuals were recorded, including while spotlighting. The black cockatoo breeding habitat assessment identified 97 potential breeding trees. Only one of the trees appeared to contain a hollow considered large enough for breeding.

3.2.3 Conservation Significant Fauna

The 7 km radial DBCA threatened fauna database, NatureMap and EPBC PMST 10 km search returned a number of wetland species, in particular birds (i.e. marine birds and waders), as well as a number of marine Turtles and mammals that require specific habitats (i.e. oceans, shorelines and wetlands) that are not present in the Survey Area.

Many of these wetland, marine and coastal species in the databases may occur nearby; however, given the absence of suitable habitat in the Survey Area, all marine and wetland species are unlikely to occur in the Survey Area itself.

A number of species returned were also known to be historical records of species now extinct (e.g. Western Quoll) in the local area and or more broadly in the region. These species have been omitted from any further discussion.

It is important to note, that the EPBC PMST is not entirely based on point records, but also on broader information, for example bioclimatic distribution models. Whereas DBCAs threatened fauna database and NatureMap is, consequently, the results of the EPBC PMST are in some cases less accurate, particularly at a local scale. Consequently, the EPBC PMST will include species that do not occur in the search area because for example there is no habitat or they are now known to be locally extinct.

In addition, many fauna are not distributed evenly across the landscape, are more abundant in some places than others are, and consequently more detectable (Currie 2007). Furthermore, some small, common ground-dwelling reptile and mammal species tend to be habitat specific, and many bird species can occur as regular migrants, occasional visitors or vagrants. Therefore all these species have been omitted from any further discussion regarding fauna results.

With the afore mentioned marine species removed, a total of 10 conservation significant species (including Priority species) from the database searches are potentially considered to either be likely, possibly or unlikely to occur in the Survey Area. These 10 species comprise five bird and five mammal species.

Of these 10 conservation significant species, three species were recorded during the field assessment, three species are considered as 'Likely' to occur, two species are considered 'Possible' and two species are considered 'Unlikely' to occur in the Survey Area (Table 3).

The Likelihood of each species is based on the following criteria:

- Recorded: Recorded during the field assessment;
- Likely: Suitable habitat is present in the Survey Area and the Survey Area is in the species' known distribution;
- Possible: Limited or no suitable habitat is present in Survey Area, but is nearby. The species has good dispersal abilities and is known from the general area; and
- Unlikely: No suitable habitat is present in Survey Area but is nearby, the species has poor dispersal abilities, but is known from the general area; or suitable habitat is present, however the Survey Area is outside of the species' known distribution.

Table 3: Conservation significant fauna potentially occurring in the Survey Area.

En = Listed as Endangered under the EBPC Act, Vu = Listed as Vulnerable under the EBPC Act, Mi = Listed as Migratory under the EBPC Act, Ma = Listed as Marine under the EBPC Act, S = Scheduled under the WC Act, and P = Listed as Priority by the DBCA.

SPECIES	CONSERVATION STATUS	LIKELIHOOD
Birds		
Peregrine Falcon (<i>Falco peregrinus</i>)	S7	Unlikely
Forest Red-tailed Black-Cockatoo (<i>Calyptorhynchus banksii naso</i>)	Vu, S3	Likely
Baudin's Black Cockatoo (<i>Calyptorhynchus baudinii</i>)	Vu, S2	Likely
Carnaby's Black Cockatoo (<i>Calyptorhynchus latirostris</i>)	En, S2	Recorded
Rainbow Bee-eater (<i>Merops ornatus</i>)	MaMi, S5	Likely
Mammals		
Southern Brush-tailed Phascogale (<i>Phascogale tapoatafa</i>)	S3	Possible
Southern Brown Bandicoot (<i>Isodon obesulus fusciventer</i>)	P5	Recorded
Western Ringtail Possum (<i>Pseudocheirus occidentalis</i>)	Vu, S2	Recorded
Water Rat (<i>Hydromys chrysogaster</i>)	P4	Possible
Western Mouse (<i>Pseudomys occidentalis</i>)	P4	Unlikely

3.2.4 Field assessment Results

During the field assessment 29 species from 19 families were recorded. This consisted of one reptile species, 24 bird species from 14 families and four mammal species from four families (Appendix E).

3.2.4.1 Amphibians

From the database searches, 11 amphibian species have been previously recorded from the following four families in the surrounding area: Cheloniidae, Limnodynastidae, Myobatrachidae and Hylidae (Appendix E). During the survey, no amphibians were recorded.

3.2.4.2 Reptiles

From the database searches, a total of 26 reptile species have been previously recorded from the following eight families in the surrounding area; Pygopodidae, Gekkonidae, Scincidae, Agamidae, Varanidae, Typhlopidae, Boidae and Elapidae. During the field assessment 1 reptile species was recorded; the Tree Dtella (Appendix E).

3.2.4.3 Birds

From the database searches, a total of 186 bird species from 49 families have been previously recorded in the surrounding area. During the field assessment 24 bird species were recorded from the following 14 families: Columbidae, Accipitridae, Falconidae, Psittacidae, Cactuidae, Acanthizidae, Meliphagidae, Pachycephalidae, Artamidae, Dicruridae, Cracticidae, Corvidae, Petroicidae and Timaliidae (Appendix E).

3.2.4.4 Mammals

From the database searches, a total of 41 mammal species from 24 families have been previously recorded in the surrounding area. During the field assessment four mammal species were recorded; the Southern Brown Bandicoot (digging were observed in several locations), the Western Ringtail Possum (scats and one drey), the Western Grey Kangaroo and the European Rabbit (Appendix E).

3.2.5 Camera Traps

No images were recorded on the camera traps during the Level 1 fauna survey. During the Targeted WRP survey, one rodent species and a Fox were recorded. No WRP were recorded on the cameras in either survey.

3.3 WRP Survey Results

All of the three database searches returned records of the WRP. The DBCA threatened fauna database had 115 records in the 7 km radial search area.

3.3.1 Level 1 fauna survey (2016)

During the Level 1 fauna survey one drey was recorded in a Peppermint, however, it was inactive and there were old scats underneath on the ground (Plate 1 and Figure 2e). A number of WRP scats were recorded in nearby locations.



Plate 1: Disused WRP drey in a Peppermint.

3.3.2 Level 1 fauna survey (2016) - WRP Habitat

During the Level 1 fauna survey we mapped 33.96 ha of potential WRP habitat that includes both potential foraging and potential denning habitat in which they could build dreys (no suitable hollows were observed) (Figures 2a – 2g). Of this 33.96 ha of potential WRP habitat, 19.59 ha is considered regrowth and 13.69 ha is remnant vegetation. We have also added WRP records from Greg Harewood's database to illustrate that there are a relatively high number of records surrounding the Survey Area (Figures 2a – 2g).

3.3.3 Targeted WRP survey (2017)

During the targeted WRP survey, two WRP were recorded. One WRP was recorded during spotlighting in a large Peppermint tree (353284 / 6274843) on 20 June 2017 (Plate 2) (Figure 2g). A second WRP was seen while spotlighting nearby to the previous location in a large Tuart tree (353150 / 6274800) on 21 June 2017. No dreys were observed in the nearby Survey Area surrounding these two WRP sightings. These WRP were most likely foraging in the Peppermints and possibly denning nearby due to the presence of a small number of trees with hollow entrances that would be potentially suitable for WRP (Plate 3).



Plate 2: Large Peppermint tree in which a WRP was observed (centre of image).



Plate 3: An example of a potentially suitable WRP hollow (approximately in the centre of the image).

One drey was recorded during the Targeted WRP survey. The drey was approximately 8 m high, so it was difficult to see clearly if it was currently in use. Scats were recorded underneath it however, so it is possible (Figure 2e).

The drey that was recorded during the 2016 Level 1 fauna survey was no longer present during the Targeted WRP survey.

A number of WRP scats were recorded in the Survey Area. These were recorded near the drey (Plate 4).



Plate 4: WRP scats.

Three dead WRP were recorded on Bussell Highway, approximately 1 km south of the southernmost extent of the Survey Area. There are areas of fragmented, but native vegetation surrounding the Survey Area. It is likely the WRP in the vicinity will utilise these areas as well as the suitable habitat in the Survey Area and as such will cross the highway regularly.

3.4 Black Cockatoo Survey Results

All three Black Cockatoo species were returned in the database searches; however, there was only one record of the FRTBC in the DBCA threatened fauna database. During the survey, a small group of Carnaby's Black Cockatoos were observed flying over the Survey Area. Chewed Marri nuts, with markings from Carnaby's Black Cockatoos were observed at several locations in the Survey Area. We also observed chewed Tuart nuts and Pine Cones in several locations and can most likely attribute the chewed Pine Cones to Carnaby's Black Cockatoo.

3.4.1.1 Potential Breeding Habitat

Three species of Eucalypts, Marri, Tuart and Flooded Gum recorded in the Survey Area are considered Black Cockatoo potential future breeding habitat. We also recorded eight Eucalypts that could not be attributed to a particular species and we think that they may be non-endemic.

The Survey Area contains 92 potential future breeding trees with a DBH of more than 500 mm (Marri [48], dead Marri [2], Tuart [25], Flooded Gum [9] and *Eucalyptus sp.* [8]). The dimensions and the locations of the potential breeding trees are displayed in Appendix F and Figures 3a – 3g. No suitable hollows for which Black Cockatoos could potentially nest in were observed from the ground during the assessment.

3.4.1.2 Foraging Habitat

During the assessment we mapped 31.51 ha of potential Black Cockatoo habitat that includes both potential foraging and potential breeding habitat (Figures 3a – 3g). Of this 31.51 ha of potential Black Cockatoo habitat, 18.81 ha is considered regrowth, 13.69 ha is remnant vegetation and 2.01 ha is Pine plantation (this Pine was harvested in late 2016). Foraging habitat in the Survey Area includes species such as Marri, Tuart, Flooded Gum, *Acacia sp.*, *Banksia sp.*, Peppermint and *Jacksonia sp.*

3.4.2 Fauna Habitat

Five fauna habitat assessments were undertaken during the survey and two broad fauna habitats were identified in the Survey Area (Appendix G) (Figures 4a – 4g).

A large section of vegetation in the Survey Area represents regrowth; as such we examined historical aerial imagery from 1996 to determine what sections of vegetation in the Survey Area represented remnants and what was regrowth.

There was also a section of Pine plantation; however, these are typically relatively species poor and not commonly used for nesting by bird species, consequently we didn't examine them as a specific fauna habitat (Disney & Stokes 1976; Friend 1982; Curry 1991). As previously mentioned this Pine plantation is due to be cleared under a separate clearing approval.

Remnant Vegetation

This habitat has an overstorey that typically included Marri, Tuart and Flooded Gum, a midstorey that was comprised of a number of species in various sections of the Survey Area and included *Acacia sp.*, *Banksia sp.*, Christmas Tree, Peppermint, Spearwood, *Jacksonia sp.*, *Melaleuca sp.*, and *Xanthorrhoea sp.*, over a relatively sparse understorey of mixed herbs and grasses. There were also some small sections that consisted almost entirely of large old Peppermints with no midstorey species and a weedy grass understorey.

The large Eucalypt trees provide potential breeding and foraging habitat for Black Cockatoos, while midstorey species such as *Banksia sp.*, Peppermints, Spearwood and *Xanthorrhoea sp.* provide potential foraging habitat for conservation significant species such as the WRP and Black Cockatoos.

Regrowth Vegetation

This habitat was to some extent a mix of many species and with a similar broad composition to the Remnant Vegetation habitat in some sections. However, most of the Eucalypts in this habitat were not large enough to be considered potential Black Cockatoo breeding trees. Large sections of this habitat consisted of *Acacia sp.* and Spearwood regrowth which can be considered potential habitat for the WRP, particularly potential foraging habitat and to a lesser extent potential denning habitat.

4 Discussion

4.1 Fauna of Conservation Significance

During the field assessment, three conservation significant species were recorded either directly or indirectly; One disused WRP drey and scats were recorded, chewed marri nuts with Carnaby's Black Cockatoo marking were recorded in several locations and a small flock were seen flying over the Survey Area. There was also evidence of Black Cockatoo feeding on Banksias with cones on the ground. Bandicoot diggings were also recorded at several locations in the Survey Area. As a WRP and Black Cockatoo habitat assessment forms part of this report, these species will be discussed further below.

4.1.1 Species Recorded

Southern Brown Bandicoot

The Bandicoot is listed as P5 under the DBCA Priority List. This species once occurred throughout south-west WA; it now occurs from Guilderton southwards on the SCP, including the Perth Metropolitan area, in Jarrah and Karri (*Eucalyptus diversicolor*) forests and adjacent coastal vegetation complexes. The species inhabits scrubby, often swampy, vegetation with dense cover up to about 1 m high. It 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. The Bandicoot is patchily distributed in suitable habitat, with populations inhabiting Jarrah and Wandoo forests usually associated with watercourses. On the Swan Coastal Plain it is often associated with wetlands with dense vegetation where they feed on fruit, seeds, insects and fungi (Woinarski *et al.* 2014). The DBCA threatened fauna database returned 23 records from between 1981 to 2015. The Survey Area does contain foraging and likely nesting habitat and this is evident by the diggings observed in various locations.

4.1.2 Species Considered Likely to Occur

Three species are considered Likely to occur in the Survey Area; Baudin's Black Cockatoo, FRTBC and the Rainbow Bee-eater. As a Black Cockatoo habitat assessment forms part of this report, these species will be discussed below.

Rainbow Bee-eater

The Rainbow Bee-eater is listed as Marine and Migratory under the EPBC Act and Schedule 5 under the WC Act. This species is one of the most common and widespread birds in Australia with a distribution that covers the majority of Australia (Barrett *et al.* 2003). It occurs in lightly wooded, often sandy country, preferring areas near water. It feeds on airborne insects, and nests throughout its range in WA in burrows excavated in sandy ground or banks, often at the margins of roads and tracks. In WA this species can occur as a 'resident, breeding visitor, postnuptial nomad, passage migrant and winter visitor' (Johnstone & Storr 1998b). The DBCA threatened fauna database returned 61 records of the Rainbow Bee-eater from between 1998 to 2014. This species was also

recorded by Biologic (2014) during their assessment in Wonnerup North which is very close to this Survey Area. The Survey Area contains potential foraging habitat for this species.

4.1.3 Species Considered as Possibly Occurring

Two species are considered as Possibly occurring in the Survey Area; Southern Brush-tailed Phascogale and Water Rat.

Southern Brush-tailed Phascogale

The Southern Brush-tailed Phascogale is listed Schedule 3 under the WC Act. It is restricted to the extreme south-west, and its characteristic low population densities make it vulnerable to localised extinction (Van Dyck & Strahan 2008). This subspecies has been observed in dry sclerophyll forests and open woodlands containing hollow-bearing trees with a sparse ground cover.

The DBCA threatened fauna database returned 20 records of the Southern Brush-tailed Phascogale. The Biologic (2014) survey in Wonnerup North which is very close to this Survey Area recorded six animals in 2013. Some sections of the Survey Area do have potential foraging habitat for this species, however, there were very few hollows observed in which the species could den.

Water Rat

The Water Rat is listed as Priority 4 under the DBCA Priority List. The species lives in the vicinity of permanent water bodies of fresh or brackish water and can travel a considerable distance overland. Dens are made at the end of tunnels in banks or occasionally in logs. The Water Rat hunts on land but takes much of its food from the water, searching among vegetation along the shoreline and diving around submerged roots and logs. It is an opportunistic hunter and scavenger of large aquatic insects, fish, crustaceans and mussels, also taking frogs, lizards, water birds, small mammals, turtles and their eggs, fresh carrion and a little plant material (Van Dyck 2008).

The DBCA threatened fauna database returned just two records of the Water Rat. This species is notoriously cryptic and not often detected during wildlife surveys. Suitable habitat is present in a number of water ways that intersect Survey Area, including Abba and Sabina River.

4.1.4 Species Considered as Unlikely to Occur

A total of two species of conservation significance are considered unlikely to occur in the Survey Area; the Peregrine Falcon and Western Mouse.

Peregrine Falcon

The Peregrine Falcon is listed as Schedule 7 under the WC Act and is an uncommon but a wide-ranging bird across Australia. It occurs mainly along rivers and ranges as well as wooded watercourses and lakes and nests primarily on cliffs, granite outcrops, quarries

and in large tree hollows. The diet of the Peregrine Falcon has been well studied and includes primarily flocking species such as European Starlings (Olsen *et al.* 2008).

The DBCA results returned 12 records of the Peregrine Falcon from between 1999 to 2014. The Survey Area lacks any suitable nesting habitat, but it could hunt in the Survey Area given their large home range.

Western Mouse

The Western Mouse is listed as Priority 4 under the DBCA Priority List. This species is restricted to small areas of the remnant vegetation in the wheatbelt (Woinarski *et al.* 2014). There are two records of this species in the DBCA threatened fauna database from 2013 and the site name is attributed to Wonnerup North. The Biologic (2014) field survey in Wonnerup North was undertaken in 2013 so I have assumed that the two records are from that survey. However, the Biologic (2014) report does not mention the Western Mouse, nor do the other two reports that were examined as part of this assessment. Given our current understanding of the species distribution, it assumed to be a database error.

4.2 WRP Habitat Assessment

The Survey Area does contain sections of foraging and denning habitat (Figures 2a – 2g) and this was made evident by the recoding of two WRP, dreys with scats underneath on the ground in the both the 2016 Level 1 fauna survey and the 2017 targeted WRP survey, as well as recording scats in several other locations in both surveys (see Figures 2a – 2g). There are also over 100 records of the WRP in the DBCA threatened fauna database and the species was recorded in the three previous reports reviewed as part of this work. Further to this we plotted records from Greg Harewood's WRP database and 17 of these occurred in or adjacent to this Survey Area (Figures 2a, 2c, 2d, and 2g). This is not an unexpected result given that the Survey Area sits in the coastal strip between Bunbury and Dunsborough, an area where the species population density is at its highest (Shedley & Williams 2014).

This is further evidenced by the fact that the WRP was recorded on both nights of spotlighting during the Targeted WRP survey. One was recorded in a large Peppermint tree and one was recorded in a large Tuart tree (Figure 2g).

WRP are active at night and need to shelter during the day. They use a variety of shelters including tree hollows and forks, dreys, grass trees (*Xanthorrhoea spp.*), hollow logs, rabbit burrows and forest debris (de Tores *et al.*, 2005). In inland areas, tree hollows are more commonly used while in coastal areas, hollows may be used in tuart forest and dreys in peppermint woodland (Ellis and Jones, 1992; Inions *et al.*, 1989; Jones *et al.* 1994; Jones and Hillcox 1995). However, dreys are used in some dense habitats in jarrah forest indicating that vegetation structure may determine the different shelter types used by WRP.

Dreys are constructed from flexible twigs and foliage and are attached to branches of trees or shrubs in usually dense vegetation (Ellis & Jones, 1992). As observed in the Survey Area, nest materials include peppermint foliage, as well as bracken fern fronds, creepers and sedge leaves. The average height of dreys varied from 1.6m to 5.4m. Dreys break down over time or are abandoned but have been known to persist from 6 to 38 months, although a new drey may be re-built in the same position as an old one. WRP may occupy around 40–46% of dreys present, usually by a single male or female, or a female and her young (Ellis & Jones 1992).

Shelters and nest sites need to provide protection from the effects of high ambient temperatures and from a variety of predators, both introduced and native, and attacking either from the ground or air. Tree hollows have an advantage in providing better insulation against excessive heat than dreys (Pahl 1984), but possums may be more prone to attack from pythons and large goannas in hollows. Dreys built in thin branches can vibrate easily when disturbed and this may give resident possums early warning of approaching predators (Russell *et al.* 2003). Dreys built in open or recently burnt vegetation would be more exposed to heat than those built in dense vegetation (Russell *et al.* 2003) and would be more visible to predators.

It is likely that the choice of shelter sites is determined not only by the vegetation structure present but by the physiological requirements of the WRP and by the type and abundance of predators. Other factors such as fire regimes and drought may also affect the availability of shelter sites.

4.3 Black Cockatoo Habitat Assessment

The Survey Area is in the known distribution of all three species of Black Cockatoo (Appendix C) and we identified areas of potential foraging habitat and mapped potential breeding trees (Figures 3a – 3g).

Carnaby's Black Cockatoo

Carnaby's Black Cockatoo was present in all three databases (DBCA threatened fauna database, NatureMap and EPBC PMST) and was observed flying over during the field assessment. Foraging evidence in the form of chewed Marri nuts and to a much lesser extent on Banksia cones was observed in sections of the Survey Area and there were chewed Pine Cones in some areas outside of the Pine Plantation section of the Survey Area, though they were typically found adjacent to Pine Plantations.

Forest Red-tailed Black Cockatoo

FRTBC was present in all three databases (DBCA threatened fauna database, NatureMap and EPBC PMST). However, no birds were seen or heard in the Survey Area or flying over during the assessment and further to this no foraging evidence was recorded. The DBCA threatened fauna database had only one record of the FRTBC from 2012. This species was also not recorded during previous surveys that are in close proximity to this assessment

(Harewood 2012; Biologic 2014; GHD 2015). Sections of the Survey Area contain species such as Marri that provide potential suitable foraging habitat for the FRTBC.

Baudin's Black Cockatoo

Baudin's Black Cockatoo was present in all three databases (DBCA threatened fauna database, NatureMap and EPBC PMST). However, no birds were seen or heard in the Survey Area or flying over during the assessment and furthermore no foraging evidence was recorded. The DBCA threatened fauna database has 19 records of the Baudin's Black Cockatoo from 1999 to 2013. This species was recorded during surveys undertaken in 2013 near Wonnerup North (Biologic 2014). Sections of the Survey Area contain species such as Marri that provide potential suitable foraging habitat for Baudin's Black Cockatoo.

4.3.1 Breeding Habitat

Black Cockatoos breed in large hollow-bearing trees, generally within woodlands or forests (Johnstone *et al.* 2013a). The size of the tree can be a useful indication of the hollow-bearing potential of the tree. Trees of suitable DBH are potentially important for maintaining breeding in the long-term, through maintaining the integrity of the habitat and allowing trees to provide future nest hollows. Maintaining the long-term supply of trees of a size to provide suitable nest hollows is particularly important in woodland stands that are known to support Black Cockatoo breeding (DSEWPaC 2012).

The Black Cockatoo habitat assessment revealed that the Survey Area contains Marri, Tuart, Flooded Gum and non-endemic *Eucalyptus sp.* trees which have reached a size that are considered to be potential future hollow bearing trees, therefore potential breeding trees (>500 mm DBH) according to the EPBC Act Black Cockatoo referral guidelines.

In total, 92 trees were recorded which met the criteria to be classed as a potential future breeding tree (Appendix F). This suggests that these trees may develop hollows and have the potential to be use for breeding in the future. In order to be suitable for Black Cockatoos, the hollow entrances need to be greater than 120 mm diameter, particularly for the FRTBC (Johnstone *et al.* 2013a). No suitable hollows for which Black Cockatoos could potentially nest in were observed from the ground during the assessment.

4.3.2 Foraging Habitat

During the 2016 fauna survey we mapped 31.51 ha of potential Black foraging habitat (Figures 3a – 3g). Of this 31.51 ha of potential Black Cockatoo foraging habitat, 18.81 ha is considered regrowth, 13.69 ha is remnant vegetation and 2.01 ha is Pine plantation. In the 2017 Targeted WRP survey, this Pine plantation had been cleared. The resulting factor is a total of 29.5 ha of Black Cockatoo foraging habitat now being present in the Survey Area. Foraging evidence in the form of chewed Marri nuts and too a much lesser extent on Banksia and Pine cones was observed in sections of the Survey Area. There is foraging habitat present in the Survey Area for all three species of Black Cockatoos and this

includes species such as Marri, Tuart, Flooded Gum, *Acacia sp.*, *Banksia sp.*, Peppermint and *Jacksonia sp.* (Johnstone & Kirkby 2011).

4.4 Fauna Habitat Types

During the survey two broad fauna habitats were identified in the Survey Area and these were Remnant and Regrowth Vegetation (Figures 4a – 4g). The Remnant Vegetation in the Survey Area is for the most part analogous to Eucalypt woodland that has an overstorey that is either dominated by Marri or Tuart and Flooded Gum when beside rivers such as Abba and Sabina or wetter areas. The Survey Area is also highly fragmented and linear in nature, surrounded by Pine Plantations, paddocks and the Bussell Highway on the western side.

A large section of the Survey Area that is vegetated represents regrowth; as such we examined historical aerial imagery from 1996 to determine what sections of vegetation in the Survey Area represented remnants and what was regrowth.

And the remaining sections of the Survey Area were cleared of vegetation, apart from mostly introduced grasses, most likely pasture grasses. The cleared areas represented over half of the Survey Area, or 41.76 ha (total size of the Survey Area is 77.92 ha).

Remnant Vegetation

This habitat has an overstorey that typically included Marri, Tuart and Flooded Gum, a midstorey that was comprised of a number of species in various sections of the Survey Area and included *Acacia sp.*, *Banksia sp.*, Christmas Tree, Peppermint, Spearwood, *Jacksonia sp.*, *Melaleuca sp.*, and *Xanthorrhoea sp.*, over a relatively sparse understorey of mixed herbs and grasses. There were also some small sections that consisted almost entirely of large old Peppermints with no midstorey species and a weedy grass understorey.

The large Eucalypt trees provide potential breeding and foraging habitat for Black Cockatoos, while midstorey species such as *Banksia sp.*, Peppermints, Spearwood and *Xanthorrhoea sp.* provide potential foraging habitat for conservation significant species such as the WRP and Black Cockatoos.

This habitat has vegetation in multiple strata (canopy, midstorey and understorey), woody debris and leaf litter that provides habitat for small reptile, bird and mammal species. However, as many of these patches are fragmented and isolated, fauna movement between them is limited, particularly for the less mobile groups such as small reptiles and mammals.

Regrowth Vegetation

This habitat was to some extent a mix of many species and with a similar broad composition to the Remnant Vegetation habitat in some sections. However, most of the Eucalypts in this habitat were not large enough to be considered potential Black Cockatoo breeding

trees. Large sections of this habitat consisted of *Acacia sp.* and Spearwood regrowth which can be considered potential habitat for the WRP, particularly potential foraging habitat and to a lesser extent potential denning habitat.

Much of this habitat lacks vegetation in multiple strata (canopy, midstorey and understorey) and woody debris; however, there is considerable leaf litter and cover in some sections that provides habitat, particularly for small reptiles and birds. However, as many of these patches are fragmented and isolated, fauna movement between them is limited, particularly for the less mobile groups such as small reptiles and mammals.

5 Acknowledgements

360 Environmental would like to thank Greg Harewood for freely providing us with his extensive database of WRP records.

6 References

- 360 Environmental. (2016) Fauna Assessment Bussell Highway. Main Roads WA.
- Barrett, G., Silcocks, A., Barry, S., Cunningham, R., & Poulter, R. (2003). The New Atlas of Australian Birds. Hawthorn East, Victoria: Royal Australasian Ornithologists Union.
- Biologic (2014). Wonnerup North Vertebrate Fauna Assessment. Report prepared for Cristal Mining Australia.
- Brad Goode and Associates (2016). Report of an Ethnographic Aboriginal Survey of the Bussell Highway (H036) SLK 26.1 to SLK 44.1, Capel to Sabina, Western Australia. Report prepared for Main Roads Western Australia.
- Burbidge, A.A. & de Tores, P. (1998). Western Ringtail Possum (*Pseudocheirus occidentalis*) Interim Recovery Plan 1997–1999. Internal Report, Department of Conservation and Land Management, Perth, Western Australia.
- Bureau of Meteorology [BOM]. (2016). Daily Weather Observations, Commonwealth of Australia. Retrieved July, 2016, from <http://www.bom.gov.au/climate>
- Christidis, L., & Boles, W. E. (2008). Systematics and Taxonomy of Australian Birds. Victoria: CSIRO Publishing.
- Currie, D. J. (2007). Disentangling the roles of environment and space in ecology. *Journal of Biogeography* **34**, 2009-2011.
- Curry, G. N. (1991). The Influence of Proximity to Plantation Edge on Diversity and Abundance of Bird Species in an Exotic Pine Plantation in North-eastern New South Wales. *Wildlife Research* **19**, 299-314.
- Cogger, H. (2013). Reptiles and Amphibians of Australia. CSIRO Publishing.
- Department of Biodiversity Conservation and Attractions (DBCA) (2014b). Western Ringtail Possum (*Pseudocheirus occidentalis*) Recovery Plan. Wildlife Management Program No. 58. Department of Parks and Wildlife, Perth, WA.
- Department of Biodiversity Conservation and Attractions (DBCA) (2016a). NatureMap: Mapping Western Australia's Biodiversity. Department of Parks and Wildlife and Western Australian Museum. <http://naturemap.dec.wa.gov.au/>
- Department of Biodiversity Conservation and Attractions (DBCA) (2016b). Threatened and Priority Fauna Information (custom search).
- Department of the Environment (DotE) (2016). *Protected Matters Search Tool*. Accessed from <http://www.environment.gov.au/epbc/pmst/index.html>.
- Department of Sustainability, Environment, Water, Populations and Communities (DSEWPaC) (2012). EPBC Act referral guidelines for three threatened black cockatoo species.

- de Tores P, Guthrie N, Jackson J and Bertram I (2005) The western ringtail possum – a resilient species or another taxon on the decline? Part 1. *Western Wildlife*, 9 (3): 4–5.
- de Tores, P.J. & Elscot, S. (2010). Estimating the population size of a threatened arboreal marsupial: use of distance sampling to dispense with ad hoc survey techniques. *Wildlife Research* **37**, 512–523.
- Disney, H. J. de S., & Stokes, A. (1976). Birds in pine and native forests. *Emu* **76**, 133–138.
- Ecoedge Environmental (2014). Level 1 flora and vegetation survey – Bussell Highway, Hutton Rd to Sabina River (32.10 – 43.92 SLK). Report prepared for Fulton Hogan Services.
- Ellis, M. & Jones, B. (1992). Observations of captive and wild western ringtail possums *Pseudocheirus occidentalis*. *The Western Australian Naturalist* **19**, 1–10.
- Environmental Protection Authority (EPA) (2002). Terrestrial Biological Surveys as an Element of Biodiversity Protection. Position Statement No. 3.
- Environmental Protection Authority (EPA). (2004). Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (Guidance Statement No. 56).
- Environmental Protection Authority (EPA) and Department of Environment and Conservation (DEC). (2010). Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment.
- Frappell, P.B. & Mortola, J.P. (2000). Ventilatory responses to changes in temperature in mammals and other vertebrates. *Annual Review of Physiology* **62**, 847–874.
- Friend, G. R. (1982). Bird populations in exotic pine plantations and indigenous eucalypt forests in Gippsland, Victoria. *Emu* **82**, 80–91.
- GHD (2015). Bussell Highway - Capel to Hutton Section (26.38 - 32.15 SLK) Fauna Assessment. Report prepared for Main Roads Western Australia.
- Glevan Consulting (2016). Forrest and Bussell Highway Upgrades, Phytophthora Dieback occurrence assessment – Version 2. Report prepared for Main Roads Western Australia.
- Harewood, G. (2008). An assessment of the distribution and abundance of Western Ringtail Possum (*Pseudocheirus occidentalis*) in Busselton urban public reserves. Unpublished report prepared for Geocatch.
- Harewood, G. (2012). Bussell Highway Capel to Hutton Road Upgrade Fauna Assessment. Report prepared for GHD.
- Inions, G. B., Tanton, M. T., & Davey, S. M. (1989). Effect of fire on the availability of hollows in trees used by the common brushtail possum, *Trichosurus vulpecular* Kerr, 1792, and the ringtail possum, *Pseudocheirus occidentalis* Boddaerts, 1785. *Australian Wildlife Research* **16**, 449–458.

- Jones, B. & Hillcox, S. (1995). A survey of the possums *Trichosurus vulpecular* and *Pseudocheirus occidentalis* and their habitats in forest at Ludlow, Western Australia. *Western Australian Naturalist* **20**, 139–150.
- Johnstone, R. E., & Kirkby, T. (1999). Food of the forest red-tailed black cockatoo *Calyptorhynchus banksii naso* in south-west Western Australia. *Western Australian Naturalist* **22**, 167–177.
- Johnstone, R. E., & Kirkby, T. (2011). Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*), Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) and the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) on the Swan Coastal Plain (Lancelin–Dunsborough), Western Australia. Studies on distribution, status, breeding, food, movements and historical changes. Perth: Department of Planning.
- Johnstone, R. E., Kirkby, T., & Sarti, K. (2013a). The breeding biology of the Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* Gould in south-western Australia. I. Characteristics of nest trees and nest hollows. *Pacific Conservation Biology* **19**, 121-142.
- Johnstone, R. E. & Storr, G. M. (1998a). *Handbook of Western Australian Birds*. Volume 1 - Non-Passerines (Emu to Dollarbird). Oxford University Press.
- Johnstone, R. E. & Storr, G. M. (1998b). *Handbook of Western Australian Birds*. Volume 2 - Passerines (Blue-winged Pitta to Goldfinch). Oxford University Press.
- Jones, B. A., How, R. A., and Kitchener, D. J. (1994). A field study of *Pseudocheirus occidentalis* (Marsupialia: Petauridae). I. Distribution and habitat. *Wildlife Research* **21**, 175-187.
- Pahl, L. (1984). Diet preference, diet composition and population density of the ringtail possum (*Pseudocheirus peregrinus cooki*) in several plant communities in southern Victoria. In: Possums and Gliders (Eds Smith PA and Hume ID), pp 253–260, Australian Mammal Society. Surrey Beatty & Sons Pty Ltd, Sydney.
- Russell, B.G., Smith, B. & Augee, M.L. (2003). Changes to a population of ringtail possums (*Pseudocheirus peregrinus*) after bushfire. *Wildlife Research* **30**, 389–396.
- Shedley, E., & Williams, K. (2014). Western Ringtail Possum (*Pseudocheirus occidentalis*) on the southern Swan Coastal Plain (Binningup to Dunsborough). Department of Parks and Wildlife.
- Van Dyck, S., & Strahan, R. (2008). *The Mammals of Australia*. New South Wales: New Holland Publishers.
- Wayne, A. F., Cowling, A., Ward, C.G., Rooney, J.F., Vellios, C.V., Lindenmayer, D.B. & Donnelly, C.F. (2005) A comparison of survey methods for arboreal possums in jarrah forest, Western Australia. *Wildlife Research* **32**, 701–714.
- Wayne, A. F., Cowling, A., Lindenmayer, D. B., Ward, C. G., Vellios, C. V., Donnelly, C. F., & Calver, M. C. (2006). The abundance of a threatened arboreal marsupial in relation

to anthropogenic disturbances at local and landscape scales in Mediterranean-type forests in south-western Australia. *Biological Conservation* **127**, 463–476.

Woinarski, J. C. Z., Burbidge, A. A., & Harrison, P. L. (2014). The action plan for Australian Mammals 2012. CSIRO Publishing.

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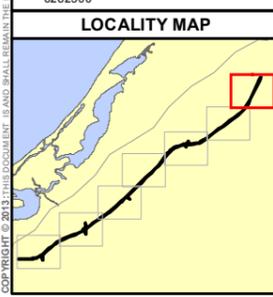
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FIGURES



Legend

- Survey Area
- Western Ringtail Possum Potential Foraging Habitat (33.96 ha)
- ▲ Camera Trap (2017)
- Camera Trap (2016)
- WRP Records (Harewood 2016)

DATA SOURCES

- BUSSELL HIGHWAY HUTTON TO SABINA SURVEY AREA PROVIDED BY MRWA 2016
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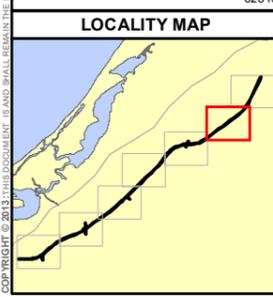
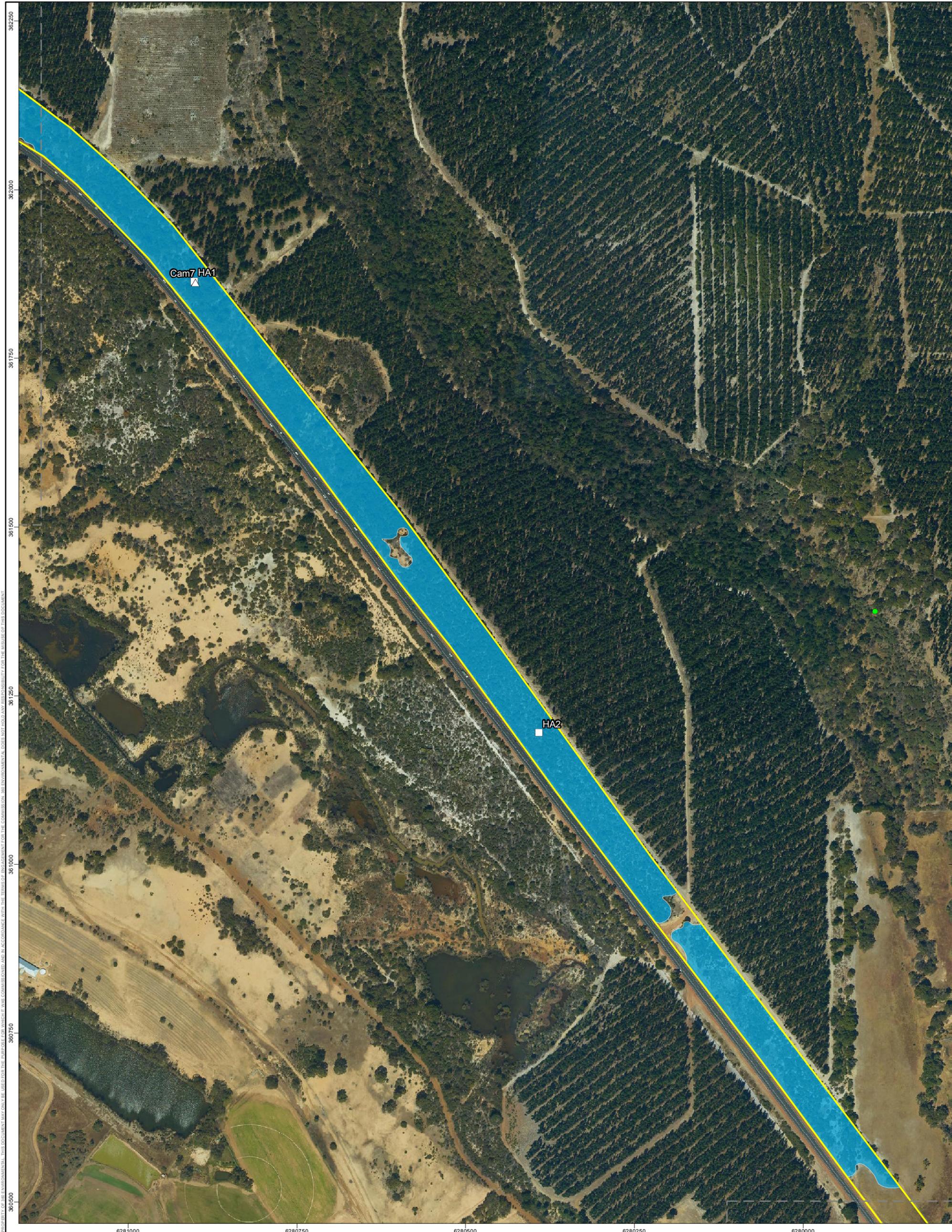
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**Main Roads Western Australia
Bussell Highway Widening**

Fauna and WRP Survey

**Figure 2a
Fauna and WRP Survey**

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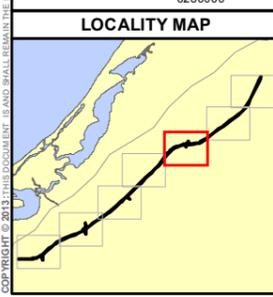
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**Main Roads Western Australia
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Fauna and WRP Survey

**Figure 2b
 Fauna and WRP Survey**

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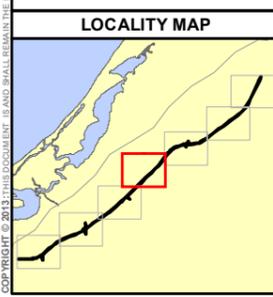
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Fauna and WRP Survey

**Figure 2c
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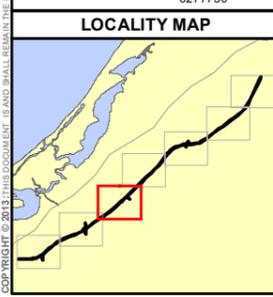
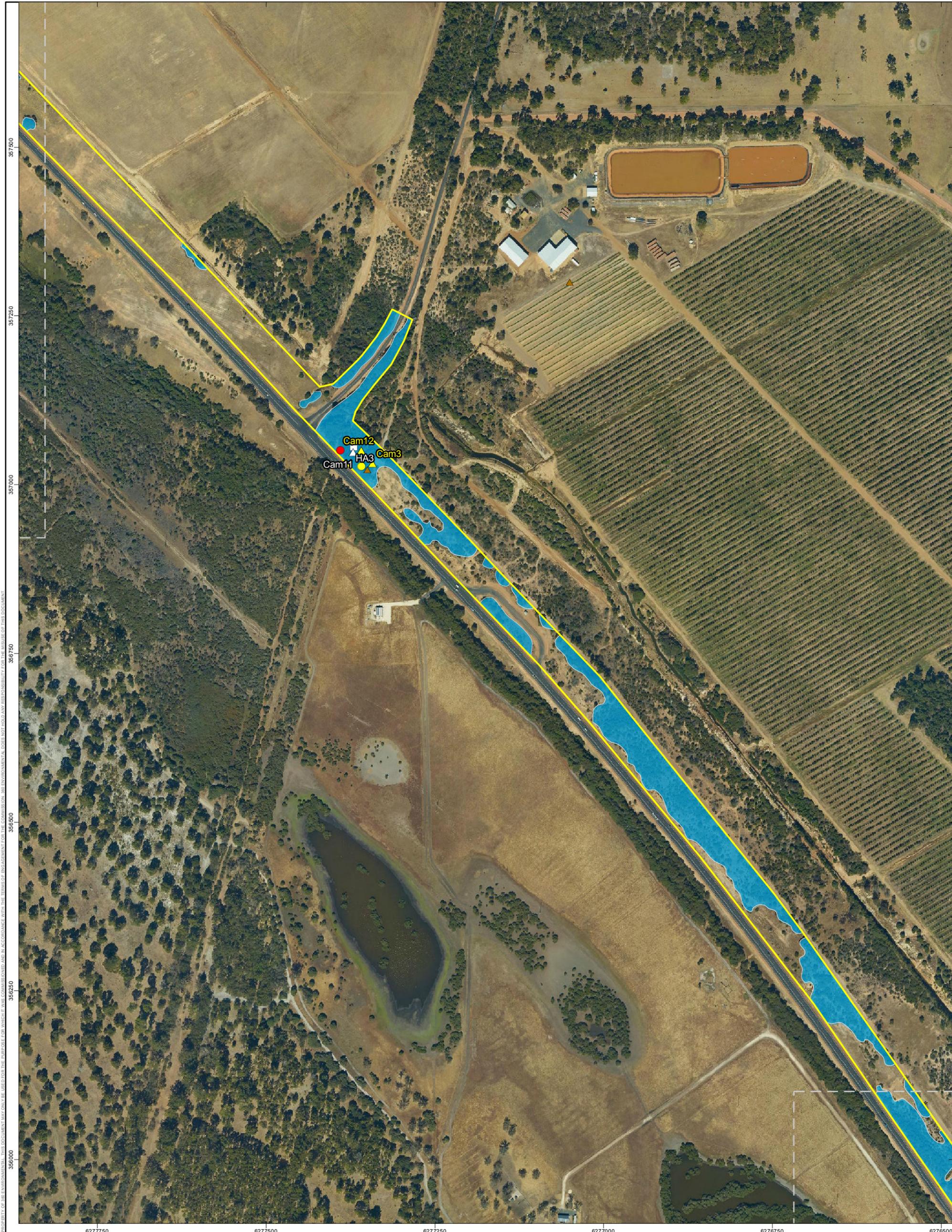
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**Main Roads Western Australia
 Bussel Highway Widening**

Fauna and WRP Survey

**Figure 2d
 Fauna and WRP Survey**

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Legend

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- Western Ringtail Possum Potential Foraging Habitat (33.96 ha)
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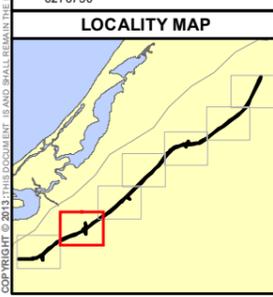
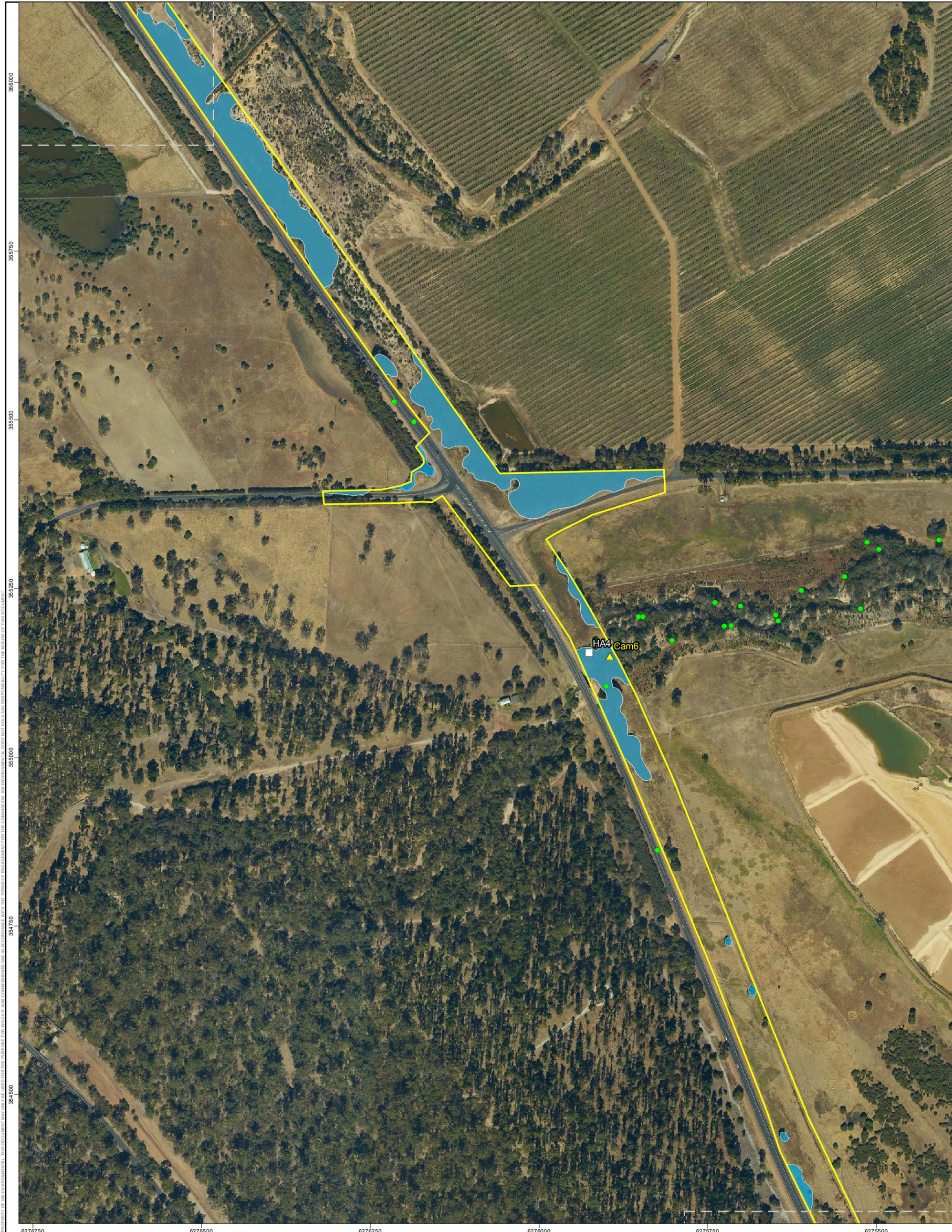
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**Main Roads Western Australia
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Fauna and WRP Survey

**Figure 2e
Fauna and WRP Survey**

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Legend

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- Camera Trap (2017)
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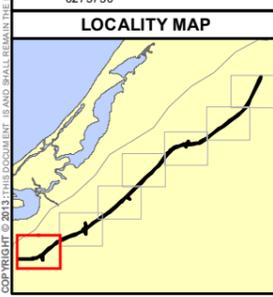
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Fauna and WRP Survey

**Figure 2f
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Legend

- Survey Area
- Western Ringtail Possum Potential Foraging Habitat (33.96 ha)
- ▲ Camera Trap (2017)
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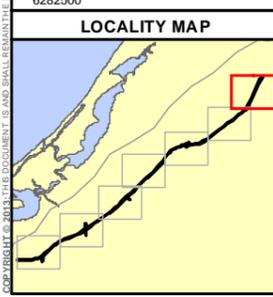
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Fauna and WRP Survey

**Figure 2g
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Legend

- △ Camera Trap
- Habitat Assessment Location
- Cockatoo Foraging Habitat (31.51 ha)

Potential Breeding Trees (92)

Size Category

- 500 - 1000mm DBH (91)
- 1000 - 2000mm DBH (1)

Species

- *Corymbia calophylla* (dead; 2)
- *Corymbia calophylla* (48)
- *Eucalyptus gomphocephala* (25)
- *Eucalyptus rudis* (9)
- *Eucalyptus* sp. (exotic; 8)

DATA SOURCES

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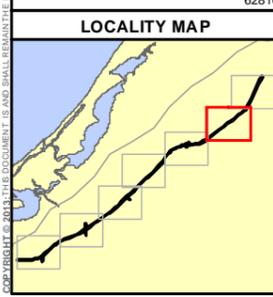
**Main Roads Western Australia
 Bussel Highway Widening**

Fauna Habitat Assessment

**Figure 3a
 Black Cockatoo Habitats**

K:\Projects\1.0 EBS\1687 Bussel Hwy Surveys\Figures\1687 Figure 3a - Cockatoo Habitat.mxd

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Legend

- △ Camera Trap
- Habitat Assessment Location
- Orange Area Cockatoo Foraging Habitat (31.51 ha)

Potential Breeding Trees (92)

Size Category

- 500 - 1000mm DBH (91)
- 1000 - 2000mm DBH (1)

Species

- *Corymbia calophylla* (dead; 2)
- *Corymbia calophylla* (48)
- *Eucalyptus gomphocephala* (25)
- *Eucalyptus rudis* (9)
- *Eucalyptus* sp. (exotic; 8)

DATA SOURCES

- BUSSEL HIGHWAY HUTTON TO SABINA SURVEY AREA PROVIDED BY MRWA 2016
- LOCALITY MAP SOURCED LAND GATE 2006
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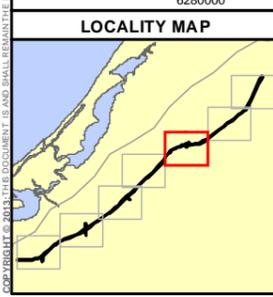
**Main Roads Western Australia
 Bussel Highway Widening**

Fauna Habitat Assessment

**Figure 3b
 Black Cockatoo Habitats**

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Legend

- △ Camera Trap
- Habitat Assessment Location
- Cockatoo Foraging Habitat (31.51 ha)

Potential Breeding Trees (92)

Size Category

- 500 - 1000mm DBH (91)
- 1000 - 2000mm DBH (1)

Species

- *Corymbia calophylla* (dead; 2)
- *Corymbia calophylla* (48)
- *Eucalyptus gomphocephala* (25)
- *Eucalyptus rudis* (9)
- *Eucalyptus* sp. (exotic; 8)

DATA SOURCES

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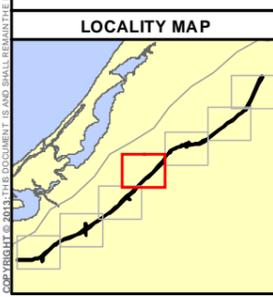
**Main Roads Western Australia
 Bussel Highway Widening**

Fauna Habitat Assessment

**Figure 3c
 Black Cockatoo Habitats**

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Legend

- △ Camera Trap
- Habitat Assessment Location
- Cockatoo Foraging Habitat (31.51 ha)

Potential Breeding Trees (92)

Size Category

- 500 - 1000mm DBH (91)
- 1000 - 2000mm DBH (1)

Species

- *Corymbia calophylla* (dead; 2)
- *Corymbia calophylla* (48)
- *Eucalyptus gomphocephala* (25)
- *Eucalyptus rudis* (9)
- *Eucalyptus* sp. (exotic; 8)

DATA SOURCES

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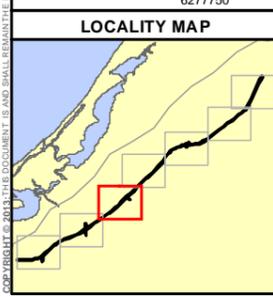
**Main Roads Western Australia
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Fauna Habitat Assessment

**Figure 3d
Black Cockatoo Habitats**

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Legend

- △ Camera Trap
- Habitat Assessment Location
- Orange shaded area Cockatoo Foraging Habitat (31.51 ha)

Potential Breeding Trees (92)

Size Category

- 500 - 1000mm DBH (91)
- 1000 - 2000mm DBH (1)

Species

- *Corymbia calophylla* (dead; 2)
- *Corymbia calophylla* (48)
- *Eucalyptus gomphocephala* (25)
- *Eucalyptus rudis* (9)
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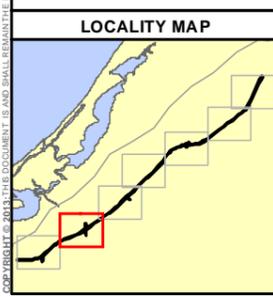
**Main Roads Western Australia
 Bussel Highway Widening**

Fauna Habitat Assessment

**Figure 3e
 Black Cockatoo Habitat**

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Legend

- △ Camera Trap
- Habitat Assessment Location
- Orange shaded area Cockatoo Foraging Habitat (31.51 ha)

Potential Breeding Trees (92)

Size Category

- 500 - 1000mm DBH (91)
- 1000 - 2000mm DBH (1)

Species

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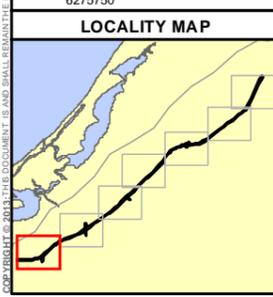
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**Main Roads Western Australia
Bussel Highway Widening**

Fauna Habitat Assessment

**Figure 3f
Black Cockatoo Habitat**

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Legend

- △ Camera Trap
- Habitat Assessment Location
- Cockatoo Foraging Habitat (31.51 ha)

Potential Breeding Trees (92)

Size Category

- 500 - 1000mm DBH (91)
- 1000 - 2000mm DBH (1)

Species

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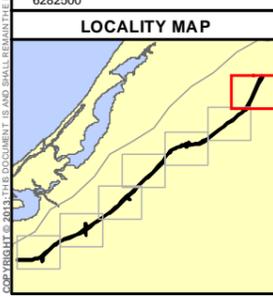
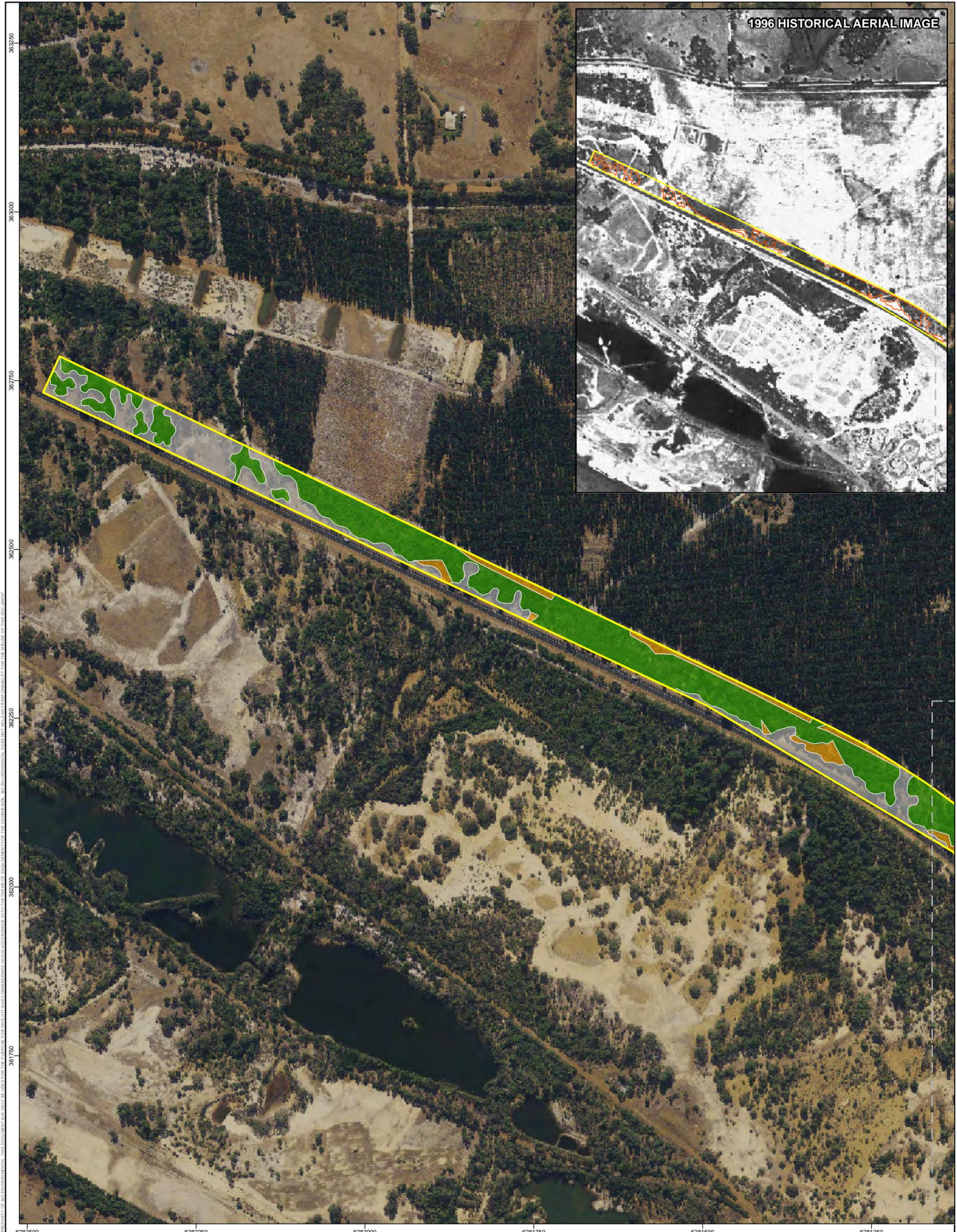
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 Bussel Highway Widening**

Fauna Habitat Assessment

**Figure 3g
 Black Cockatoo Habitat**

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Legend

- Survey Area
- Habitat Type**
 - Pine (2.01 ha)
 - Regrowth (19.75 ha)
 - Remnant (14.40 ha)
 - Not Applicable (41.76 ha)

DATA SOURCES

- BUSSELL HIGHWAY HUTTON TO SABINA SURVEY AREA PROVIDED BY MRWA 2016
- LOCALITY MAP SOURCED LAND GATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE JAN 2016
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NOTE:
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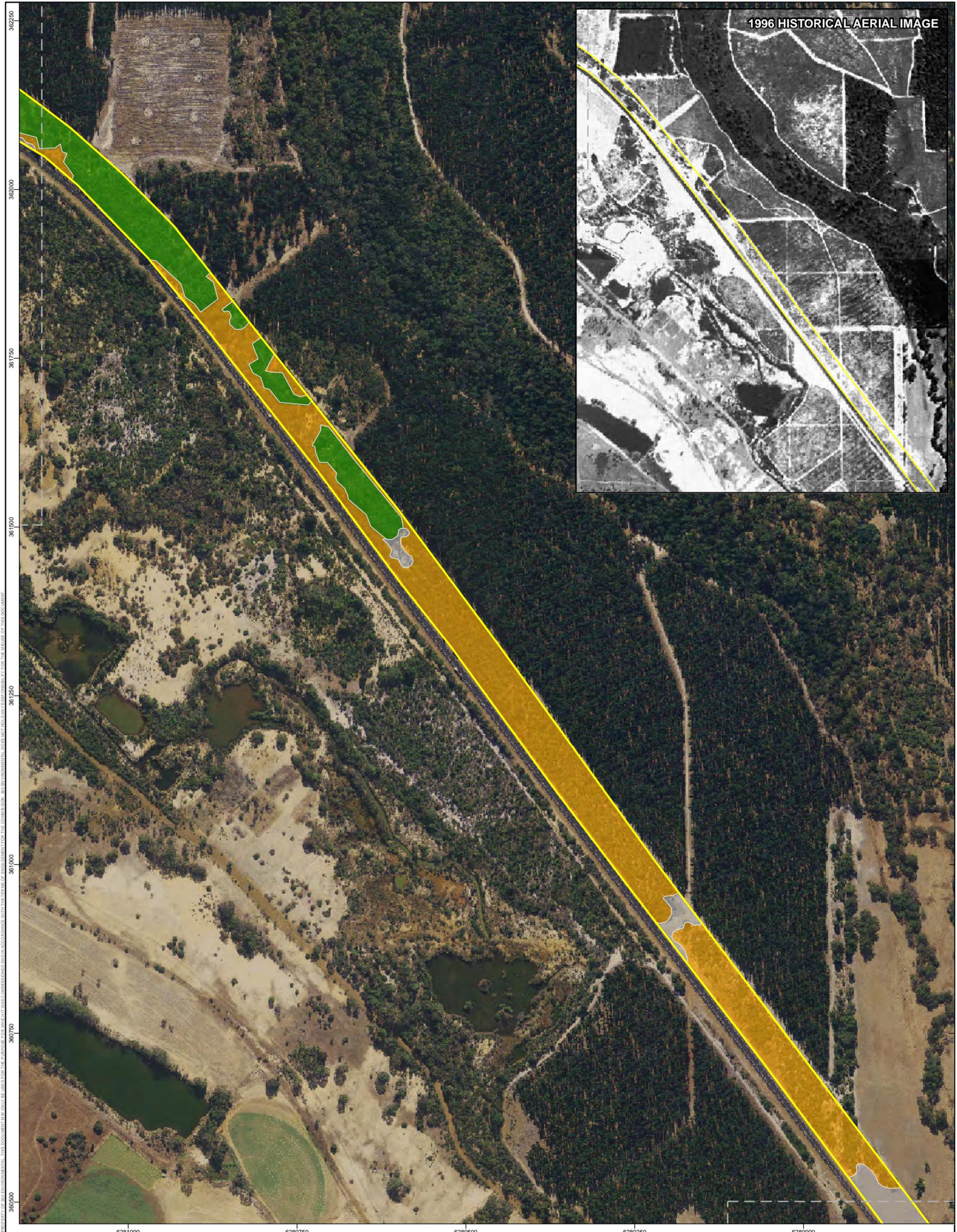
**Main Roads Western Australia
Bussell Highway Widening**

Fauna Habitat Assessment

**Figure 4a
Habitat Type**

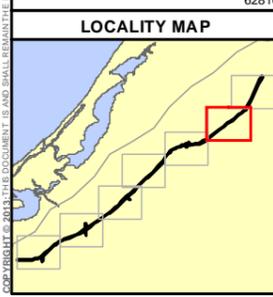
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1996 HISTORICAL AERIAL IMAGE

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Legend

- Survey Area
- Habitat Type**
- Pine (2.01 ha)
- Regrowth (19.75 ha)
- Remnant (14.40 ha)
- Not Applicable (41.76 ha)

DATA SOURCES

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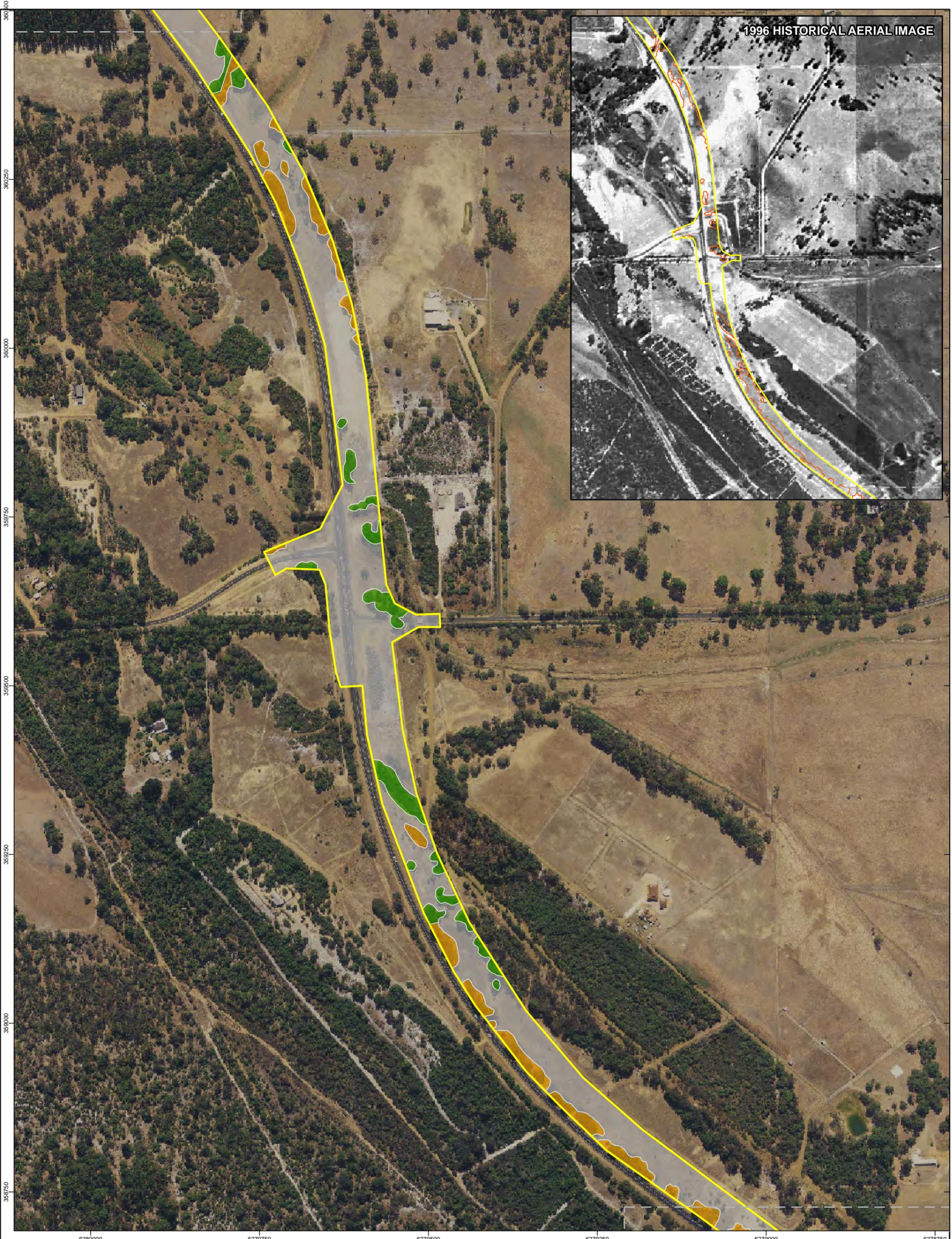
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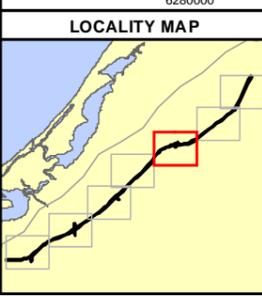
**Main Roads Western Australia
Bussel Highway Widening**

Fauna Habitat Assessment

**Figure 4b
Habitat Type**



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Legend

- Survey Area
- Habitat Type**
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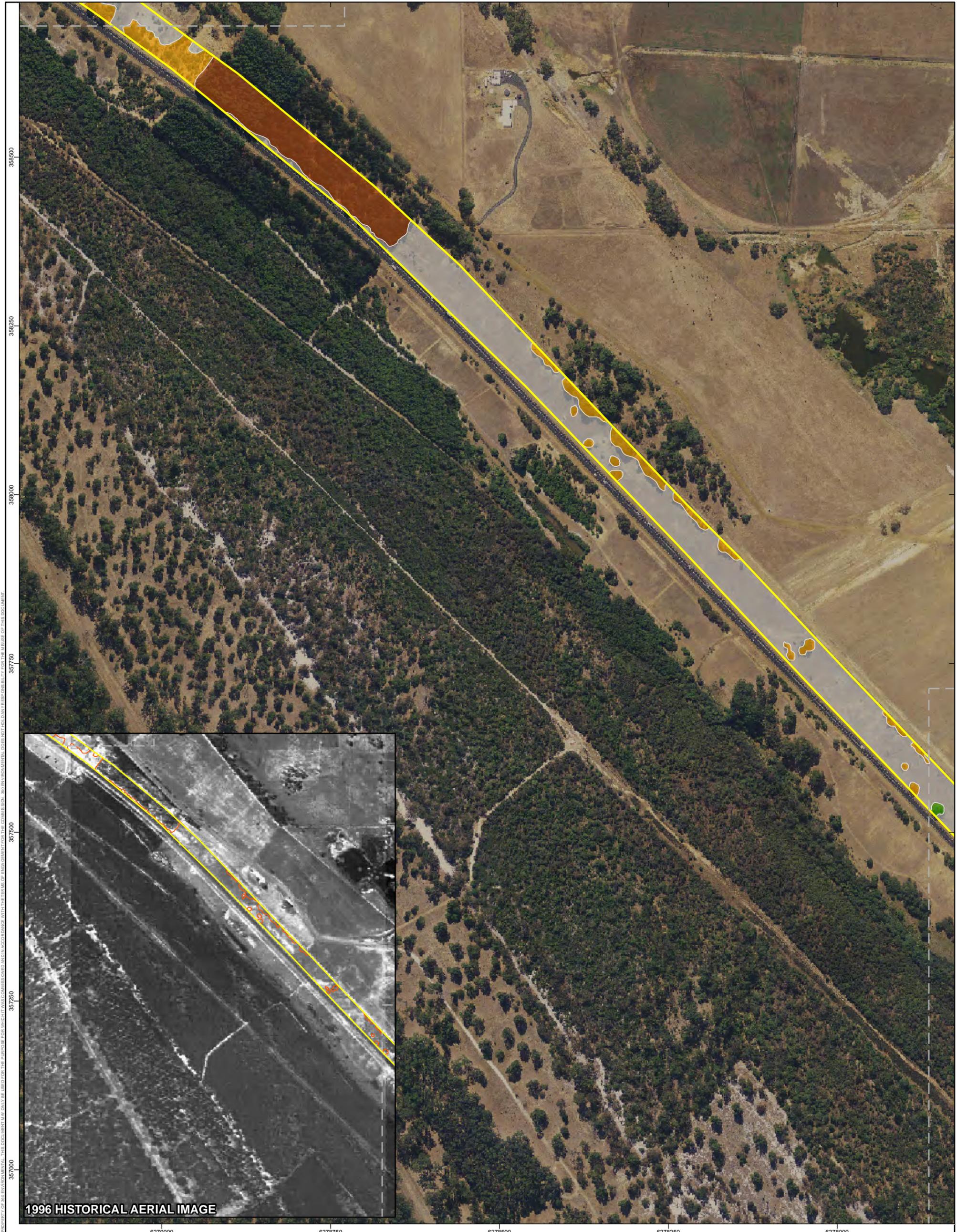
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**Main Roads Western Australia
Bussel Highway Widening**

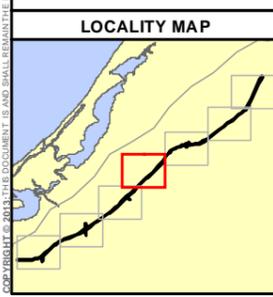
Fauna Habitat Assessment

**Figure 4c
Habitat Type**

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Legend

- Survey Area
- Habitat Type**
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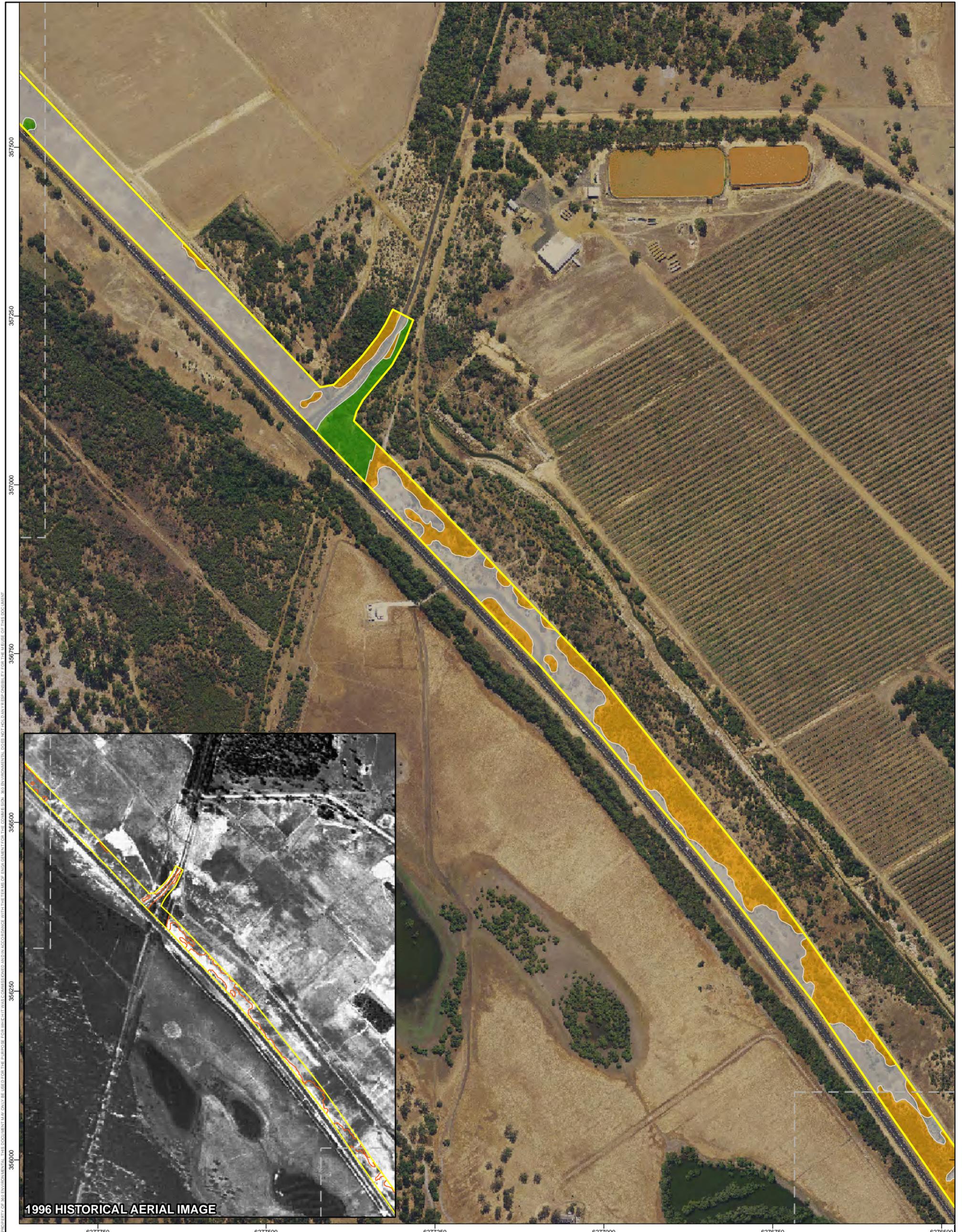
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**Main Roads Western Australia
Bussel Highway Widening**

Fauna Habitat Assessment

**Figure 4d
Habitat Type**

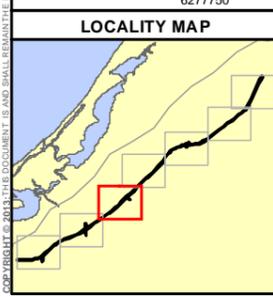
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Legend

Habitat Type

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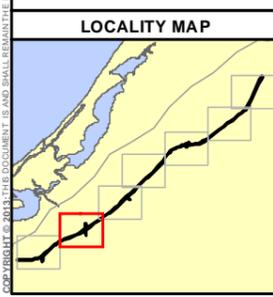
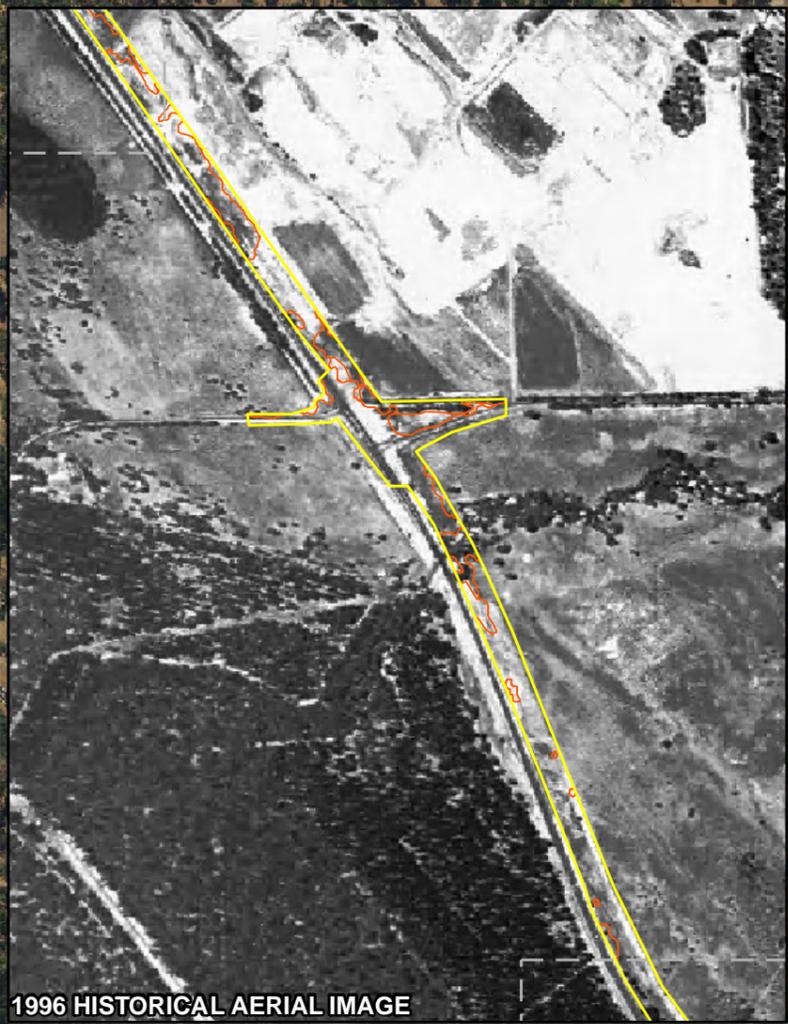
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 1:5,000 @ A3

**Main Roads Western Australia
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Fauna Habitat Assessment

**Figure 4e
 Habitat Type**

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Legend

Habitat Type

- Survey Area
- Pine (2.01 ha)
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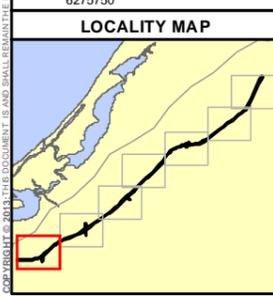
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Bussel Highway Widening**

Fauna Habitat Assessment

**Figure 4f
Habitat Type**

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Regrowth and Remnant vegetation determined by comparing the 2016 aerial imagery with historical aerial imagery from 1996 and 2003.

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NOTE THAT POSITIONAL ERRORS MAY BE >5M IN SOME AREAS

360 environmental
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people planet professional

mainroads
WESTERN AUSTRALIA

CREATED JJ	CHECKED RF	APPROVED RF	REVISION DRAFT	DATE 20-Jul-16
HORIZONTAL DATUM GDA 1994 MGA Zone 50		PROJECT NO 1687		

0 25 50 100 150 200 250
Meters
1:5,000 @ A3

**Main Roads Western Australia
Bussel Highway Widening**

Fauna Habitat Assessment

**Figure 4g
Habitat Type**

K:\Projects\1.0 EBS\1687 Bussel Hwy Surveys\Figures\1687 Figure Xg - Habitat Type.mxd

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APPENDIX A

Definition of Threatened Fauna Species Categories

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

CATEGORY	CODE	DESCRIPTION
Schedule 1	S1	Rare or likely to become extinct as critically endangered fauna.
Schedule 2	S2	Fauna that is rare or is likely to become extinct as endangered fauna.
Schedule 3	S3	Fauna that is rare or is likely to become extinct as vulnerable fauna.
Schedule 4	S4	Fauna presumed to be extinct.
Schedule 5	S5	Migratory birds protected under an international agreement.
Schedule 6	S6	Fauna that is of special conservation need as conservation dependent fauna.
Schedule 7	S7	Other specially protected fauna

Department of Parks and Wildlife Fauna Priority Codes

CATEGORY	CODE	DESCRIPTION
Priority 1	P1	Taxa with few, poorly known populations on threatened lands.
Priority 2	P2	Taxa with few, poorly known populations on conservation lands.
Priority 3	P3	Taxa with several, poorly known populations, some on conservation lands.
Priority 4	P4	Taxa in need of monitoring: not currently threatened or in need of special protection, but could become so. Usually represented on conservation lands.
Priority 5	P5	Taxa in need of monitoring: not considered threatened, but the subject of a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Categories of Threatened Fauna Species under the EPBC Act

CONSERVATION CODE	DESCRIPTION
Ex	Extinct Taxa which at a particular time if, at the time, there is no reasonable doubt that the last member of the species has died.
ExW	Extinct in the Wild Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons,

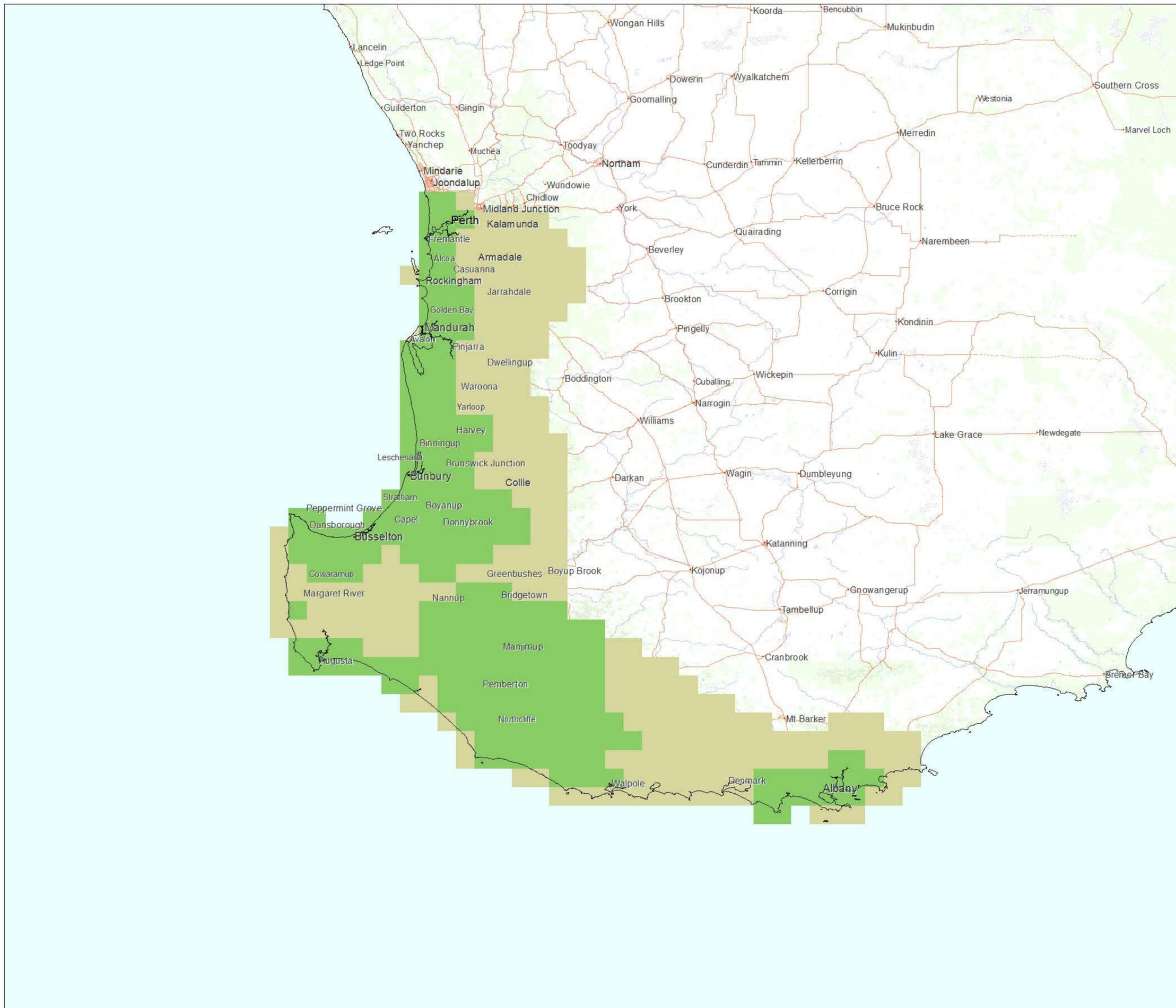
	anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered Taxa which at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	Endangered Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
V	Vulnerable Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Source: *Environment Protection and Biodiversity Conservation Act 1999*

APPENDIX B

DotE Western Ringtail Possum Distribution Map

Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir

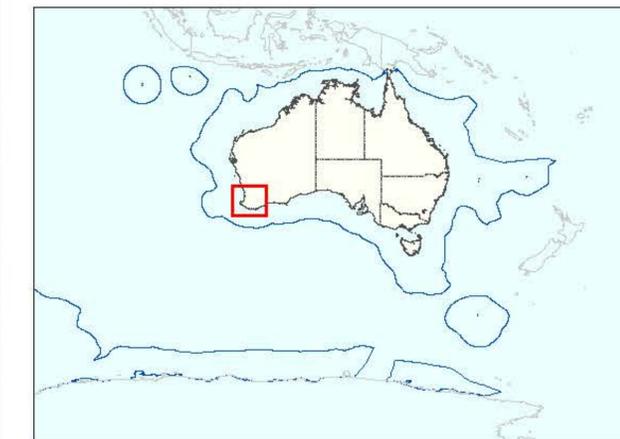


Species of National Environmental Significance, Map Summary Version 1 2014

Distribution

- Species or species habitat likely to occur
- Species or species habitat may occur

Commonwealth Marine Area



Produced by: Environmental Resources Information Network
Contextual data source: Geoscience Australia (2006), Geodata Topo 250K Topographic Data

Indicative Map Only: This map has been compiled from datasets with a range of geographic scales and quality. Species distributions are indicative only and not to be used for local assessment. Local knowledge and information should be sought to confirm the presence of the species, or its habitat, at the location of interest.



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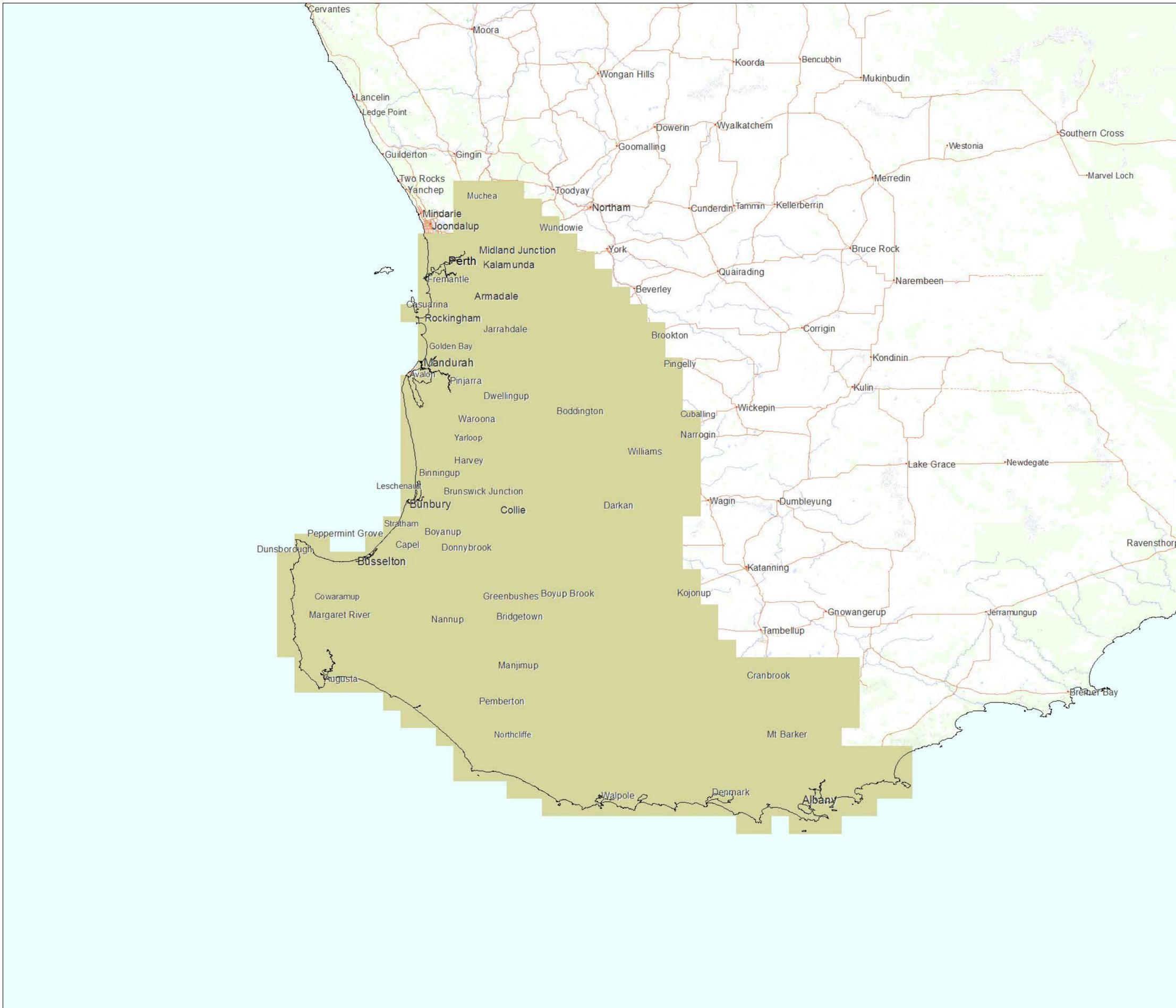


Australian Government
Department of the Environment

APPENDIX C

DotE Black Cockatoo Distribution Map

Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo

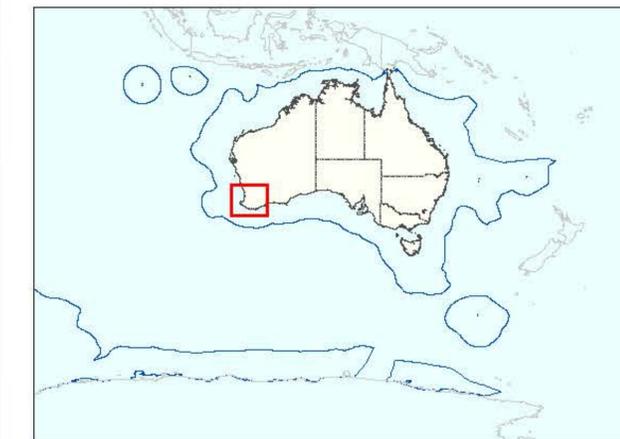


Species of National Environmental Significance, Map Summary Version 1 2014

Distribution

- Species or species habitat likely to occur
- Species or species habitat may occur

Commonwealth Marine Area



Produced by: Environmental Resources Information Network
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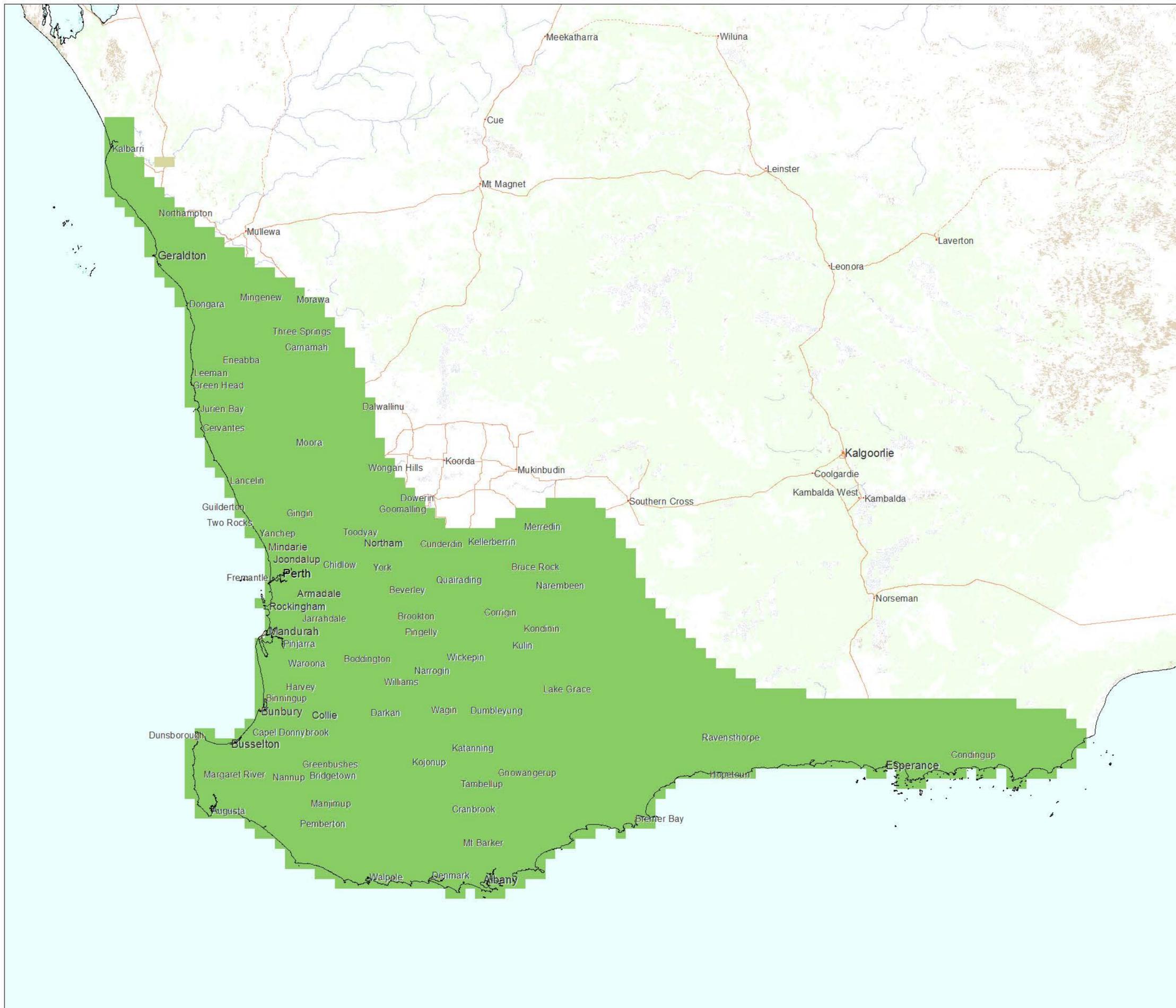
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Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo

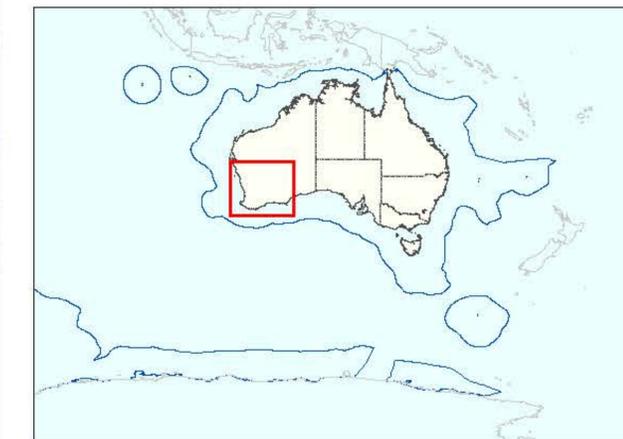


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Distribution

- Species or species habitat likely to occur
- Species or species habitat may occur

Commonwealth Marine Area



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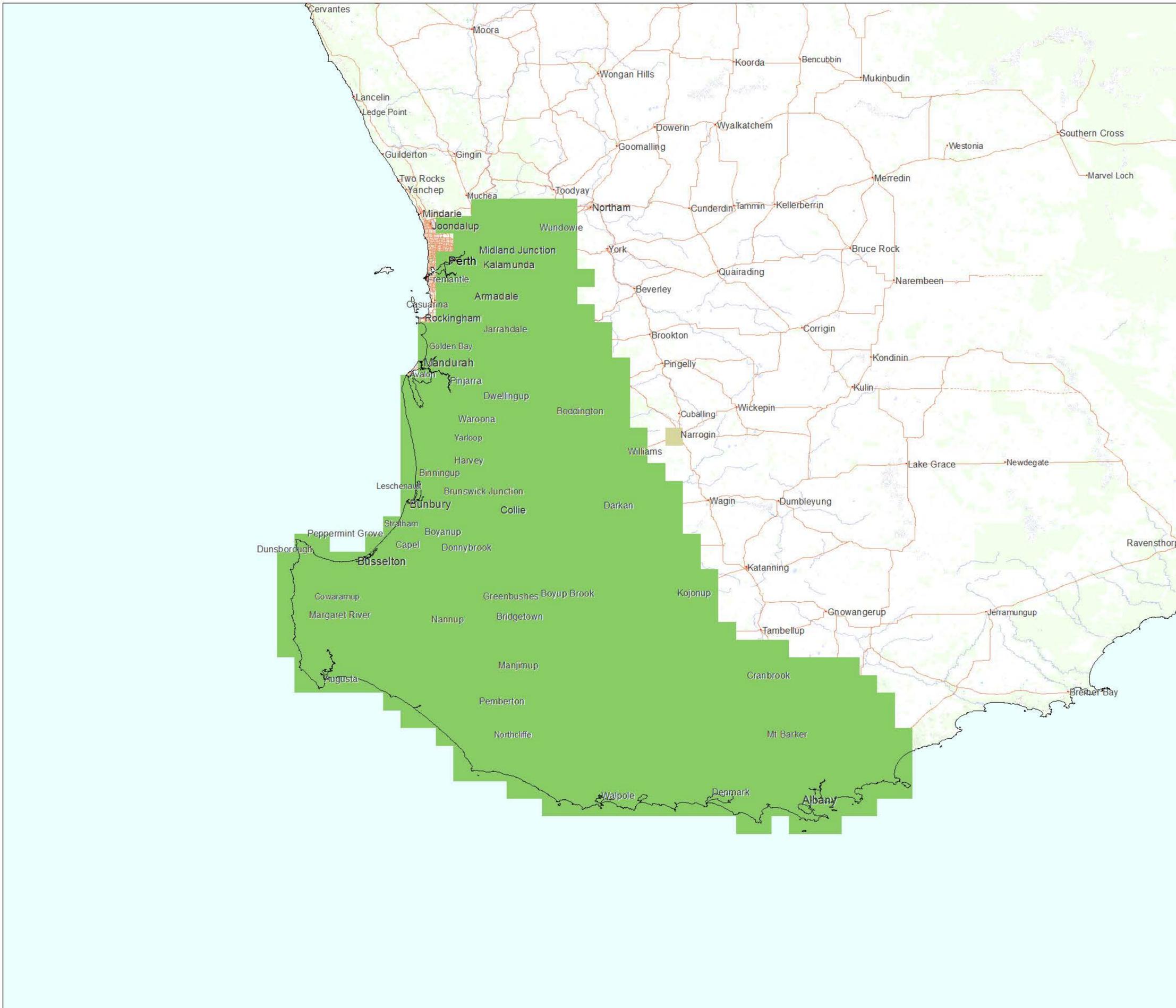
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Calyptorhynchus baudinii Baudin's Black-Cockatoo, Long-billed Black-Cockatoo

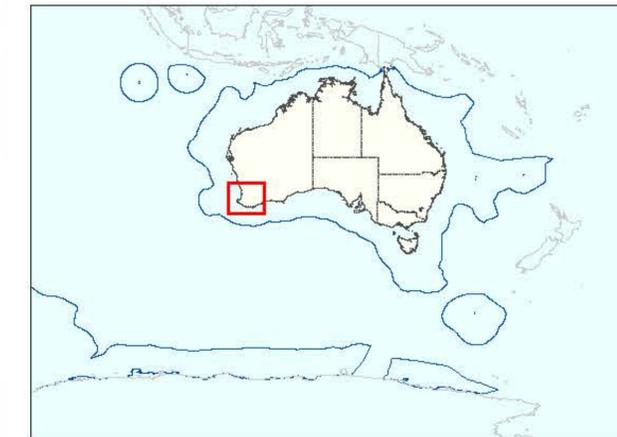


Species of National Environmental Significance, Map Summary Version 1 2014

Distribution

- Species or species habitat likely to occur
- Species or species habitat may occur

Commonwealth Marine Area



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Contextual data source: Geoscience Australia (2006), Geodata Topo 250K Topographic Data
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APPENDIX D

Database Search Results

NatureMap Species Report

Created By Guest user on 23/06/2016

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115° 28' 24" E, 33° 37' 19" S
Buffer 10km
Group By Family

Family	Species	Records
Acanthizidae	8	479
Acariformes	1	11
Accipitridae	11	380
Actinopodidae	2	3
Agamidae	1	1
Anatidae	14	1304
Anhingidae	1	48
Anobiidae	1	1
Apogonidae	2	4
Araneidae	12	117
Ardeidae	8	336
Artamidae	2	33
Asterinidae	1	1
Atemnidae	1	1
Atherinidae	2	3
Boidae	1	1
Bombyliidae	2	3
Bothriuridae	1	2
Bovidae	1	1
Buccinidae	1	1
Bullidae	1	1
Burramyidae	1	2
Cacatuidae	1	58
Campephagidae	2	87
Canidae	2	3
Cassidae	1	1
Charadriidae	9	85
Cheloniidae	2	3
Chiltoniidae	1	3
Chironomidae	3	9
Chthoniidae	1	1
Cicadellidae	1	1
Clinidae	3	4
Columbellidae	1	1
Columbidae	4	167
Conidae	1	1
Conopidae	1	1
Corvidae	3	321
Coryphaenidae	1	1
Cracticidae	3	371
Cuculidae	5	26
Curculionidae	1	2
Cypraeidae	2	3
Dasyuridae	2	9
Delphinidae	2	2
Dicaeidae	1	1
Dicruridae	4	284
Diomedeidae	1	1
Dolichopodidae	3	7
Doridae	1	1
Dytiscidae	2	2
Elapidae	5	16
Enchytraeidae	1	2
Falconidae	5	66
Flatidae	2	2
Formicidae	44	108
Galaxiidae	1	51
Gekkonidae	1	4
Geogarypidae	1	1
Gobiesocidae	2	2
Gobiidae	2	9
Haematopodidae	1	5
Halcyonidae	2	176
Haliotidae	2	3
Haliplidae	2	4
Henicopidae	1	2
Hersiliidae	2	4
Hesperidae	1	1
Heterodontidae	1	3
Hirundinidae	2	236
Hydrobiidae	2	4
Hydrophilidae	3	7
Hylidae	2	5
Ixodidae	1	1
Labridae	3	5

Lamponidae	2	2
Laridae	3	123
Leporidae	1	2
Limnodynastidae	2	45
Macropodidae	3	17
Macrtridae	1	1
Maluridae	2	124
Megapodagrionidae	1	7
Meliphagidae	7	394
Meropidae	1	71
Micronectidae	1	1
Micropholcommatidae	1	1
Monacanthidae	7	7
Mugilidae	2	2
Muridae	4	19
Myobatrachidae	3	12
Nannopercidae	1	1
Naticidae	1	1
Nemesiidae	1	1
Neosebastidae	1	1
Neosittidae	1	4
Nephiidae	1	4
Nymphalidae	1	3
Octopodidae	1	1
Ostraciidae	1	1
Pachycephalidae	5	110
Palaemonidae	1	3
Parastacidae	3	43
Pardalotidae	3	108
Pelecanidae	1	70
Peramelidae	2	43
Percichthyidae	2	31
Petroicidae	3	19
Phalacrocoracidae	5	345
Phalangeridae	2	17
Phasianidae	1	4
Philotarsidae	1	1
Pieridae	1	1
Plectidae	1	1
Podargidae	2	10
Podicipedidae	3	132
Poeciliidae	2	4
Pomatiopsidae	1	3
Potoroidae	1	1
Pratylenchidae	1	3
Procellariidae	2	3
Pseudocheiridae	1	536
Psittacidae	19	561
Pygopodidae	1	1
Pyralidae	1	1
Rallidae	8	208
Recurvirostridae	3	144
Rhinotermitidae	1	9
Salticidae	1	2
Scarabaeidae	3	6
Scincidae	17	116
Scolopacidae	7	113
Scombridae	1	1
Soleidae	1	1
Sparidae	1	1
Steinernematoidea	1	17
Strigidae	1	18
Sylviidae	3	12
Syngnathidae	2	4
Synthemistidae	1	1
Syrphidae	2	3
Tabanidae	2	2
Tarsipedidae	1	3
Termitidae	4	8
Tetrarogidae	1	2
Tettigoniidae	1	1
Threskiornithidae	5	404
Thylacomyidae	1	1
Triaenonychidae	1	20
Trochidae	4	4
Turbinidae	1	2
Tylenchidae	1	1
Typhlopidae	1	3
Tytonidae	2	2
Urodacidae	1	2
Varanidae	2	3
Vespertilionidae	2	8
Ziphiidae	1	1
Zosteropidae	2	145
TOTAL	429	9070

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
Acanthizidae				
1.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
2.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
3.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
4.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
5.	24271 <i>Gerygone fusca</i> subsp. <i>fusca</i> (Western Gerygone)			
6.	25534 <i>Sericornis frontalis</i> (White-browed Scrubwren)			
7.	24279 <i>Sericornis frontalis</i> subsp. <i>maculatus</i> (White-browed Scrubwren)			
8.	30948 <i>Smicromis brevirostris</i> (Weebill)			
Acariformes				
9.	<i>Acarina</i> sp.			
Accipitridae				
10.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
11.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
12.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
13.	25538 <i>Aquila morphnoides</i> (Little Eagle)			
14.	24288 <i>Circus approximans</i> (Swamp Harrier)			
15.	24289 <i>Circus assimilis</i> (Spotted Harrier)			
16.	<i>Elanus axillaris</i>			
17.	24293 <i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)		IA	
18.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
19.	<i>Lophoictinia isura</i>			
20.	<i>Pandion cristatus</i>			
Actinopodidae				
21.	<i>Missulena granulosa</i>			
22.	<i>Missulena occatoria</i>			
Agamidae				
23.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
Anatidae				
24.	24310 <i>Anas castanea</i> (Chestnut Teal)			
25.	24312 <i>Anas gracilis</i> (Grey Teal)			
26.	24313 <i>Anas platyrhynchos</i> (Mallard)			
27.	24315 <i>Anas rhynchotis</i> (Australasian Shoveler)			
28.	<i>Anas</i> sp.			
29.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
30.	24318 <i>Aythya australis</i> (Hardhead)			
31.	24319 <i>Biziura lobata</i> (Musk Duck)			
32.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
33.	24322 <i>Cygnus atratus</i> (Black Swan)			
34.	24326 <i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
35.	24328 <i>Oxyura australis</i> (Blue-billed Duck)		P4	
36.	24329 <i>Stictonetta naevosa</i> (Freckled Duck)			
37.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
Anhingidae				
38.	<i>Anhinga novaehollandiae</i>			
Anobiidae				
39.	<i>Enasiba mirocera</i>			
Apogonidae				
40.	<i>Apogon rueppellii</i>			
41.	<i>Siphamia cephalotes</i>			
Araneidae				
42.	<i>Araneus cyphoxis</i>			
43.	<i>Araneus eburneiventris</i>			
44.	<i>Araneus recherchensis</i>			
45.	<i>Araneus senicaudatus</i>			
46.	<i>Argiope protensa</i>			
47.	<i>Argiope trifasciata</i>			
48.	<i>Arkys walckenaeri</i>			
49.	<i>Austracantha minax</i>			
50.	<i>Backbourkia brounii</i>			
51.	<i>Cyrtophora parnasia</i>			
52.	<i>Eriophora pustulosa</i>			
53.	<i>Heurodes turritus</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Ardeidae				
54.	25558 <i>Ardea ibis</i> (Cattle Egret)		IA	
55.	41324 <i>Ardea modesta</i> (Eastern Great Egret)		IA	
56.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
57.	24345 <i>Botaurus poiciloptilus</i> (Australasian Bittern)		T	
58.	<i>Egretta garzetta</i>			
59.	<i>Egretta novaehollandiae</i>			
60.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
61.	24350 <i>Nycticorax caledonicus</i> subsp. <i>hilli</i> (Rufous Night Heron)			
Artamidae				
62.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
63.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
Asterinidae				
64.	<i>Nepanthia crassa</i>			
Atemnidae				
65.	<i>Oratemnus curtus</i>			
Atherinidae				
66.	<i>Atherinosoma elongata</i>			
67.	<i>Atherinosoma</i> sp.			
Boidae				
68.	25240 <i>Morelia spilota</i> subsp. <i>imbricata</i> (Carpet Python)		S	
Bombyliidae				
69.	<i>Comptosia tendens</i>			
70.	<i>Kapu westralica</i>			
Bothriuridae				
71.	<i>Cercophonius sulcatus</i>			
Bovidae				
72.	24251 <i>Bos taurus</i> (European Cattle)	Y		
Buccinidae				
73.	<i>Cominella (Josepha) tasmanica</i>			
Bullidae				
74.	<i>Bulla quoyii</i>			
Burramyidae				
75.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
Cacatuidae				
76.	<i>Eolophus roseicapillus</i>			
Campephagidae				
77.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
78.	24367 <i>Lalage tricolor</i> (White-winged Triller)			
Canidae				
79.	30883 <i>Canis lupus</i> subsp. <i>familiaris</i> (Dog)	Y		
80.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		
Cassidae				
81.	<i>Cassia (Hypocassia) fimbriata</i>			
Charadriidae				
82.	25575 <i>Charadrius leschenaultii</i> (Greater Sand Plover)		IA	
83.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
84.	<i>Elseymornis melanops</i>			
85.	24379 <i>Erythronyx cinctus</i> (Red-kneed Dotterel)			
86.	24382 <i>Pluvialis fulva</i> (Pacific Golden Plover)		IA	
87.	24383 <i>Pluvialis squatarola</i> (Grey Plover)		IA	
88.	<i>Thinornis rubricollis</i>			
89.	25577 <i>Vanellus miles</i> (Masked Lapwing)			
90.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
Cheloniidae				
91.	25335 <i>Caretta caretta</i> (Loggerhead Turtle)		T	
92.	25336 <i>Chelonia mydas</i> (Green Turtle)		T	
Chiltoniidae				
93.	<i>Austrochiltonia subtenuis</i>			
Chironomidae				

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
94.	<i>Cladopelma curivalva</i>			
95.	<i>Procladius paludicola</i>			
96.	<i>Tanytarsus fuscithorax/semibarbitarsus</i>			
Chthoniidae				
97.	<i>Austrochthonius strigosus</i>			Y
Cicadellidae				
98.	<i>Paradorydium viridis</i>			
Clinidae				
99.	<i>Cristiceps australis</i>			
100.	<i>Heteroclinus adalaidae</i>			
101.	<i>Heteroclinus sp.</i>			
Columbellidae				
102.	<i>Euplica sp.</i>			
Columbidae				
103.	24399 <i>Columba livia (Domestic Pigeon)</i>	Y		
104.	24407 <i>Ocyphaps lophotes (Crested Pigeon)</i>			
105.	24409 <i>Phaps chalcoptera (Common Bronzewing)</i>			
106.	25590 <i>Streptopelia senegalensis (Laughing Turtle-Dove)</i>	Y		
Conidae				
107.	<i>Conus anemone</i>			
Conopidae				
108.	<i>Setosiconops epixanthus</i>			Y
Corvidae				
109.	24416 <i>Corvus bennetti (Little Crow)</i>			
110.	25592 <i>Corvus coronoides (Australian Raven)</i>			
111.	<i>Corvus sp.</i>			
Coryphaenidae				
112.	<i>Coryphaena hippurus</i>			
Cracticidae				
113.	25595 <i>Cracticus tibicen (Australian Magpie)</i>			
114.	24422 <i>Cracticus tibicen subsp. dorsalis (White-backed Magpie)</i>			
115.	25596 <i>Cracticus torquatus (Grey Butcherbird)</i>			
Cuculidae				
116.	25598 <i>Cacomantis flabelliformis (Fan-tailed Cuckoo)</i>			
117.	42307 <i>Cacomantis pallidus (Pallid Cuckoo)</i>			
118.	24431 <i>Chrysococcyx basalis (Horsfield's Bronze Cuckoo)</i>			
119.	25601 <i>Chrysococcyx lucidus (Shining Bronze Cuckoo)</i>			
120.	24432 <i>Chrysococcyx lucidus subsp. plagosus (Shining Bronze Cuckoo)</i>			
Curculionidae				
121.	<i>Catasarcus coruscus</i>			
Cypraeidae				
122.	<i>Zoila friendii</i>			
123.	<i>Zoila friendii subsp. friendii</i>			
Dasyuridae				
124.	25508 <i>Phascogale tapoatafa (Brush-tailed Phascogale)</i>			
125.	24099 <i>Phascogale tapoatafa subsp. tapoatafa (Southern Brush-tailed Phascogale, Wambenger)</i>		T	
Delphinidae				
126.	30954 <i>Tursiops aduncus (Indo-Pacific Bottlenose Dolphin)</i>			
127.	24069 <i>Tursiops truncatus (Bottlenose Dolphin)</i>			
Dicaeidae				
128.	25607 <i>Dicaeum hirundinaceum (Mistletoebird)</i>			
Dicruridae				
129.	24443 <i>Grallina cyanoleuca (Magpie-lark)</i>			
130.	25610 <i>Myiagra inquieta (Restless Flycatcher)</i>			
131.	25613 <i>Rhipidura fuliginosa (Grey Fantail)</i>			
132.	25614 <i>Rhipidura leucophrys (Willie Wagtail)</i>			
Diomedidae				
133.	25618 <i>Diomedea exulans (Wandering Albatross)</i>		T	
Dolichopodidae				
134.	<i>Austrosclapopus pulvillus</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
135.	<i>Parentia nudicosta</i>			
136.	<i>Parentia perthensis</i>			
Dorididae				
137.	<i>Halgerda</i> sp.			
Dytiscidae				
138.	<i>Necterosoma penicillatus</i>			
139.	<i>Necterosoma</i> sp.			
Elapidae				
140.	25250 <i>Elapognathus coronatus</i> (Crowned Snake)			
141.	43384 <i>Hydrophis platurus</i> (Yellow-bellied Seasnake)			
142.	25252 <i>Notechis scutatus</i> (Tiger Snake)			
143.	25255 <i>Parasuta nigriceps</i>			
144.	25511 <i>Pseudonaja affinis</i> (Dugite)			
Enchytraeidae				
145.	<i>Enchytraeidae</i> sp.			
Falconidae				
146.	25621 <i>Falco berigora</i> (Brown Falcon)			
147.	25622 <i>Falco cenchroides</i> (Australian Kestrel)			
148.	24472 <i>Falco cenchroides</i> subsp. <i>cenchroides</i> (Australian Kestrel)			
149.	25623 <i>Falco longipennis</i> (Australian Hobby)			
150.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
Flatidae				
151.	<i>Anzora unicolor</i>			
152.	<i>Phantiopsis australiaca</i>			Y
Formicidae				
153.	<i>Amblyopone clarki</i>			
154.	<i>Anisopheidole antipodum</i>			
155.	<i>Anonychomyrma</i> sp.			
156.	<i>Camponotus ephippium</i> subsp. <i>narses</i>			
157.	<i>Camponotus johnclarki</i>			
158.	<i>Camponotus rufus</i>			
159.	<i>Doleromyrma</i> sp.			
160.	<i>Dolichoderus ypsilon</i>			
161.	<i>Iridomyrmex chasei</i>			
162.	<i>Iridomyrmex conifer</i>			
163.	<i>Iridomyrmex discors</i>			
164.	<i>Iridomyrmex turbineus</i>			
165.	<i>Iridomyrmex viridiaeneus</i>			
166.	<i>Meranoplus oceanicus</i>			
167.	<i>Monomorium kiliani</i>			
168.	<i>Monomorium rothsteini</i>			
169.	<i>Monomorium rubriceps</i>			
170.	<i>Monomorium sordidum</i>			
171.	<i>Monomorium</i> sp.			
172.	<i>Monomorium sydneyense</i>			
173.	<i>Myrmecia chasei</i>			
174.	<i>Myrmecia desertorum</i>			
175.	<i>Myrmecia infima</i>			
176.	<i>Myrmecia ludlowi</i>			
177.	<i>Myrmecia nigra</i>			
178.	<i>Myrmecia nigriscapa</i>			
179.	<i>Myrmecia pavidata</i>			
180.	<i>Myrmecia rufinodis</i>			
181.	<i>Myrmecia rugosa</i>			
182.	<i>Myrmecia</i> sp.			
183.	<i>Myrmecia swalei</i>			
184.	<i>Myrmecia testaceipes</i>			
185.	<i>Myrmecia urens</i>			
186.	<i>Myrmecia vindex</i>			
187.	<i>Notoncus gilberti</i>			
188.	<i>Notoncus hickmani</i>			
189.	<i>Notoncus</i> sp.			
190.	<i>Platythyrea turneri</i>			Y
191.	<i>Polyrhachis phryne</i>			
192.	<i>Rhytidoponera punctigera</i>			
193.	<i>Solenopsis</i> sp.			
194.	<i>Stigmacros clarki</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
195.	<i>Stigmacros sp.</i>			Y
196.	<i>Tapinoma sp.</i>			
Galaxiidae				
197.	34028 <i>Galaxias occidentalis (Western Minnow)</i>			
Gekkonidae				
198.	24980 <i>Christinus marmoratus (Marbled Gecko)</i>			
Geogarypidae				
199.	<i>Geogarypus taylori</i>			
Gobiesocidae				
200.	<i>Cochleoceps viridis</i>			
201.	<i>Posidonichthys hutchinsi</i>			
Gobiidae				
202.	<i>Favonigobius sp.</i>			
203.	<i>Pseudogobius olorum</i>			
Haematopodidae				
204.	24487 <i>Haematopus longirostris (Pied Oystercatcher)</i>			
Halcyonidae				
205.	30901 <i>Dacelo novaeguineae (Laughing Kookaburra)</i>	Y		
206.	25549 <i>Todiramphus sanctus (Sacred Kingfisher)</i>			
Haliotidae				
207.	<i>Haliotis scalaris subsp. scalaris</i>			
208.	<i>Haliotis semiplicata</i>			
Haliplidae				
209.	<i>Haliplidae sp.</i>			
210.	<i>Halipus sp.</i>			
Henicopidae				
211.	<i>Henicops dentatus</i>			
Hersiliidae				
212.	<i>Tamopsis distinguenda</i>			
213.	<i>Tamopsis perthensis</i>			
Hesperiidae				
214.	<i>Trapezites argenteornatus</i>			
Heterodontidae				
215.	??			
Hirundinidae				
216.	24491 <i>Hirundo neoxena (Welcome Swallow)</i>			
217.	25629 <i>Hirundo nigricans (Tree Martin)</i>			
Hydrobiidae				
218.	<i>Ascorhis occidua</i>			
219.	<i>Tatea rufilabris</i>			
Hydrophilidae				
220.	<i>Berosus discolor</i>			
221.	<i>Berosus sp.</i>			
222.	<i>Hydrophilidae sp.</i>			
Hylidae				
223.	25378 <i>Litoria adelaidensis (Slender Tree Frog)</i>			
224.	25388 <i>Litoria moorei (Motorbike Frog)</i>			
Ixodidae				
225.	<i>Amblyomma albolimbatum</i>			
Labridae				
226.	<i>Dotalabrus aurantiacus</i>			
227.	<i>Haletta semifasciata</i>			
228.	<i>Siphonognathus radiatus</i>			
Lamponidae				
229.	<i>Lampona cylindrata</i>			
230.	<i>Lampona punctigera</i>			
Laridae				
231.	<i>Chroicocephalus novaehollandiae</i>			
232.	<i>Hydroprogne caspia</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
233.	<i>Thalasseus bergii</i>			
Leporidae				
234.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
Limnodynastidae				
235.	25410 <i>Heleioporus eyrei</i> (Moaning Frog)			
236.	25415 <i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
Macropodidae				
237.	24132 <i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
238.	24133 <i>Macropus irma</i> (Western Brush Wallaby)		P4	
239.	24145 <i>Setonix brachyurus</i> (Quokka)		T	
Mactridae				
240.	<i>Mactra (Mactra) australis</i>			
Maluridae				
241.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
242.	25655 <i>Stipiturus malachurus</i> (Southern Emu-wren)			
Megapodagrionidae				
243.	<i>Archargiolestes pusillus</i>			
Meliphagidae				
244.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
245.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
246.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
247.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
248.	42314 <i>Gavicalis virescens</i> (Singing Honeyeater)			
249.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
250.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
Meropidae				
251.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)		IA	
Micronectidae				
252.	<i>Micronecta</i> sp.			
Micropholcommatidae				
253.	<i>Raveniella peckorum</i>			
Monacanthidae				
254.	<i>Acanthaluteres spilomelanurus</i>			
255.	<i>Acanthaluteres vittiger</i>			
256.	<i>Brachaluteres jacksonianus</i>			
257.	<i>Eubalichthys mosaicus</i>			
258.	<i>Meuschenia flavolineata</i>			
259.	<i>Meuschenia freycineti</i>			
260.	<i>Scobinichthys granulatus</i>			
Mugilidae				
261.	<i>Liza argentea</i>			
262.	<i>Mugil cephalus</i>			
Muridae				
263.	24215 <i>Hydromys chrysogaster</i> (Water-rat)		P4	
264.	24223 <i>Mus musculus</i> (House Mouse)	Y		
265.	24240 <i>Pseudomys occidentalis</i> (Western Mouse)		P4	
266.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
Myobatrachidae				
267.	25399 <i>Crinia glauerti</i> (Clicking Frog)			
268.	25400 <i>Crinia insignifera</i> (Squelching Froglet)			
269.	25433 <i>Pseudophryne guentheri</i> (Crawling Toadlet)			
Nannopercidae				
270.	<i>Edelia vittata</i>			
Naticidae				
271.	<i>Polinices (Conuber) conicus</i>			
Nemeseiidae				
272.	<i>Aname tepperi</i>			
Neosebastidae				
273.	<i>Neosebastes pandus</i>			
Neosittidae				
274.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			

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Nephilidae				
275.	<i>Nephila edulis</i>			
Nymphalidae				
276.	<i>Geitoneura minyas</i>			
Octopodidae				
277.	<i>Octopus sp.</i>			
Ostraciidae				
278.	<i>Aracana aurita</i>			
Pachycephalidae				
279.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
280.	25679 <i>Pachycephala pectoralis</i> (Golden Whistler)			
281.	24623 <i>Pachycephala pectoralis</i> subsp. <i>fuliginosa</i> (Golden Whistler)			
282.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
283.	<i>Pachycephala sp.</i>			Y
Palaemonidae				
284.	<i>Palaemonetes australis</i>			
Parastacidae				
285.	<i>Cherax destructor</i>			
286.	<i>Cherax preissii</i>			
287.	<i>Cherax quinquecarinatus</i>			
Pardalotidae				
288.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
289.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
290.	24630 <i>Pardalotus striatus</i> subsp. <i>westraliensis</i> (Striated Pardalote)			
Pelecanidae				
291.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
Peramelidae				
292.	25478 <i>Isoodon obesulus</i> (Southern Brown Bandicoot)		P5	
293.	24153 <i>Isoodon obesulus</i> subsp. <i>fusciventer</i> (Quenda, Southern Brown Bandicoot)		P5	
Percichthyidae				
294.	<i>Bostockia porosa</i>			
295.	<i>Nannoperca vittata</i>			
Petroicidae				
296.	24651 <i>Eopsaltria australis</i> subsp. <i>griseogularis</i> (Western Yellow Robin)			
297.	24652 <i>Eopsaltria georgiana</i> (White-breasted Robin)			
298.	25695 <i>Petroica multicolor</i> (Scarlet Robin)			
Phalacrocoracidae				
299.	<i>Microcarbo melanoleucos</i>			
300.	25697 <i>Phalacrocorax carbo</i> (Great Cormorant)			
301.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
302.	25699 <i>Phalacrocorax varius</i> (Pied Cormorant)			
303.	24668 <i>Phalacrocorax varius</i> subsp. <i>hypoleucos</i> (Pied Cormorant)			
Phalangeridae				
304.	25521 <i>Trichosurus vulpecula</i> (Common Brushtail Possum)			
305.	24158 <i>Trichosurus vulpecula</i> subsp. <i>vulpecula</i> (Common Brushtail Possum)			
Phasianidae				
306.	24671 <i>Coturnix pectoralis</i> (Stubble Quail)			
Philotarsidae				
307.	<i>Latribiella guttatus</i>			
Pieridae				
308.	<i>Pieris rapae</i> subsp. <i>rapae</i>			Y
Plectidae				
309.	<i>Plectus sp.</i>			
Podargidae				
310.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
311.	24679 <i>Podargus strigoides</i> subsp. <i>brachypterus</i> (Tawny Frogmouth)			
Podicipedidae				
312.	25704 <i>Podiceps cristatus</i> (Great Crested Grebe)			
313.	24681 <i>Poliiocephalus poliocephalus</i> (Hoary-headed Grebe)			
314.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			

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Poeciliidae				
315.	<i>Gambusia affinis</i>			
316.	<i>Gambusia holbrooki</i>			
Pomatiopsidae				
317.	<i>Coxiella</i> sp.			
Potoroidae				
318.	24162 <i>Bettongia penicillata</i> subsp. <i>ogilbyi</i> (Woylie, Brush-tailed Bettong)		T	
Pratylenchidae				
319.	<i>Radopholus</i> sp.			
Procellariidae				
320.	24690 <i>Macronectes giganteus</i> (Southern Giant Petrel)			
321.	25710 <i>Pterodroma macroptera</i> (Great-winged Petrel)			
Pseudocheiridae				
322.	24166 <i>Pseudocheirus occidentalis</i> (Western Ringtail Possum)		T	
Psittacidae				
323.	<i>Barnardius zonarius</i>			
324.	25714 <i>Cacatua pastinator</i> (Western Long-billed Corella)			
325.	25715 <i>Cacatua roseicapilla</i> (Galah)			
326.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
327.	<i>Cacatua</i> sp.			
328.	24731 <i>Calyptorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black-Cockatoo)		T	
329.	24733 <i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)		T	
330.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)		T	
331.	<i>Calyptorhynchus</i> sp.			
332.	24735 <i>Glossopsitta porphyrocephala</i> (Purple-crowned Lorikeet)			
333.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
334.	24739 <i>Neophema petrophila</i> (Rock Parrot)			
335.	25720 <i>Platycercus icterotis</i> (Western Rosella)			
336.	24745 <i>Platycercus icterotis</i> subsp. <i>icterotis</i> (Western Rosella)			
337.	24747 <i>Platycercus spurius</i> (Red-capped Parrot)			
338.	25721 <i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
339.	24750 <i>Platycercus zonarius</i> subsp. <i>semitorquatus</i> (Twenty-eight Parrot)			
340.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
341.	<i>Purpureicephalus spurius</i>			
Pygopodidae				
342.	24990 <i>Aprasia pulchella</i> (Granite Worm-lizard)			
Pyralidae				
343.	<i>Pyralidae</i> nr. sp. 39/40 of JHH (SAP)			
Rallidae				
344.	25727 <i>Fulica atra</i> (Eurasian Coot)			
345.	25729 <i>Gallinula tenebrosa</i> (Dusky Moorhen)			
346.	25730 <i>Gallirallus philippensis</i> (Buff-banded Rail)			
347.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
348.	24769 <i>Porzana fluminea</i> (Australian Spotted Crane)			
349.	25732 <i>Porzana pusilla</i> (Baillon's Crane)			
350.	24771 <i>Porzana tabuensis</i> (Spotless Crane)			
351.	<i>Tribonyx ventralis</i>			
Recurvirostridae				
352.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
353.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
354.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
Rhinotermitidae				
355.	<i>Coptotermes acinaciformis</i> subsp. <i>raffrayi</i>			
Salticidae				
356.	<i>Maratus pavonis</i>			
Scarabaeidae				
357.	<i>Onthophagus evanidus</i>			
358.	<i>Onthophagus haagi</i>			
359.	<i>Onthophagus vermiculatus</i>			
Scincidae				
360.	42368 <i>Acritoscincus trilineatus</i> (Western Three-lined Skink)			

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361.	30893 <i>Cryptoblepharus buchananii</i>			
362.	25020 <i>Cryptoblepharus plagiocephalus</i>			
363.	25047 <i>Ctenotus impar</i>			
364.	25049 <i>Ctenotus labillardieri</i>			
365.	25096 <i>Egernia kingii</i> (King's Skink)			
366.	25100 <i>Egernia napoleonis</i>			
367.	30919 <i>Hemiergis gracilipes</i>			
368.	25475 <i>Hemiergis peronii</i>			
369.	25118 <i>Hemiergis peronii</i> subsp. <i>tridactyla</i>			
370.	25119 <i>Hemiergis quadrilineata</i>			
371.	25131 <i>Lerista distinguenda</i>			
372.	25133 <i>Lerista elegans</i>			
373.	25147 <i>Lerista lineata</i> (Perth Slider, Lined Skink)		P3	
374.	25184 <i>Menetia greyii</i>			
375.	25191 <i>Morethia lineocellata</i>			
376.	25519 <i>Tiliqua rugosa</i>			
Scolopacidae				
377.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
378.	24779 <i>Calidris acuminata</i> (Sharp-tailed Sandpiper)		IA	
379.	24784 <i>Calidris ferruginea</i> (Curlew Sandpiper)		T	
380.	24788 <i>Calidris ruficollis</i> (Red-necked Stint)		IA	
381.	25741 <i>Limosa limosa</i> (Black-tailed Godwit)		IA	
382.	24806 <i>Tringa glareola</i> (Wood Sandpiper)		IA	
383.	24808 <i>Tringa nebularia</i> (Common Greenshank)		IA	
Scombridae				
384.	<i>Thunnus maccoyii</i>			
Soleidae				
385.	<i>Aseraggodes haackeanus</i>			
Sparidae				
386.	<i>Acanthopagrus butcheri</i>			
Steirnermatoidea				
387.	<i>Steinemema</i> sp.			
Strigidae				
388.	25748 <i>Ninox novaeseelandiae</i> (Boobook Owl)			
Sylviidae				
389.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
390.	24833 <i>Cincloramphus cruralis</i> (Brown Songlark)			
391.	25758 <i>Megalurus gramineus</i> (Little Grassbird)			
Syngnathidae				
392.	<i>Stigmatopora argus</i>			
393.	<i>Vanacampus poecilolaemus</i>			
Synthemistidae				
394.	<i>Archaeosynthemis leachii</i>			
Syrphidae				
395.	<i>Eristalinus</i> (<i>Lathyrrophthalmus</i>) <i>punctulatus</i>			
396.	<i>Psilota coerulea</i>			Y
Tabanidae				
397.	<i>Scaptia</i> (<i>Pseudoscione</i>) <i>calabyi</i>			
398.	<i>Scaptia</i> (<i>Pseudoscione</i>) <i>regisgeorgii</i>			
Tarsipedidae				
399.	24167 <i>Tarsipes rostratus</i> (Honey Possum, Noolbenger)			
Termitidae				
400.	<i>Amitermes obeuntis</i>			
401.	<i>Ephelotermes argutus</i>			
402.	<i>Hesperotermes infrequens</i>			
403.	<i>Nasutitermes exitiosus</i>			Y
Tetrarogidae				
404.	<i>Gymnapistes marmoratus</i>			
Tettigoniidae				
405.	<i>Kawanaphila mirla</i>			
Threskiornithidae				
406.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			

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407.	24842 <i>Platalea regia</i> (Royal Spoonbill)			
408.	24843 <i>Plegadis falcinellus</i> (Glossy Ibis)		IA	
409.	24844 <i>Threskiornis molucca</i> (Australian White Ibis)			
410.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
Thylacomyidae				
411.	24168 <i>Macrotis lagotis</i> (Bilby, Dalgyte)		T	
Trienonychidae				
412.	<i>Nunciella aspera</i>			
Trochidae				
413.	<i>Cantharidus lepidus</i>			
414.	<i>Odontotrochus chlorostomus</i>			
415.	<i>Phasianotrochus irisodontes</i>			
416.	<i>Thalotia conica</i>			
Turbinidae				
417.	<i>Turbo (Euninella) gruneri</i>			
Tylenchidae				
418.	<i>Tylenchus</i> sp.			
Typhlopidae				
419.	44629 <i>Anilios australis</i>			
Tytonidae				
420.	24852 <i>Tyto alba</i> subsp. <i>delicatula</i> (Barn Owl)			
421.	24855 <i>Tyto novaehollandiae</i> subsp. <i>novaehollandiae</i> (Masked Owl (southern subsp))		P3	
Urodacidae				
422.	<i>Urodacus novaehollandiae</i>			
Varanidae				
423.	25218 <i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
424.	25225 <i>Varanus rosenbergi</i> (Heath Monitor)			
Vespertilionidae				
425.	24189 <i>Falsistrellus mackenziei</i> (Western False Pipistrelle)		P4	
426.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
Ziphiidae				
427.	24078 <i>Mesoplodon grayi</i> (Gray's Beaked Whale)			
Zosteropidae				
428.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			
429.	24856 <i>Zosterops lateralis</i> subsp. <i>gouldi</i> (Grey-breasted White-eye)			

Conservation Codes

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

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



EPBC Act Protected Matters Report

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

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

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 23/06/16 16:49:27

[Summary](#)

[Details](#)

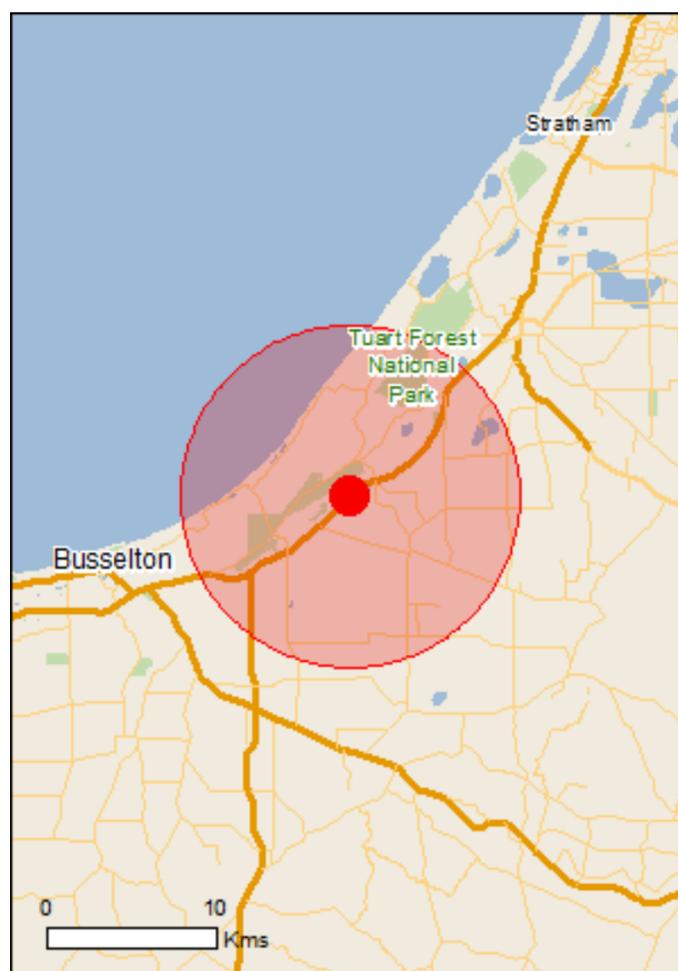
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

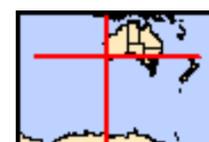
[Acknowledgements](#)



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

[Coordinates](#)

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	63
Listed Migratory Species:	42

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	71
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	9
Regional Forest Agreements:	None
Invasive Species:	25
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Vasse-wonnerup system	Within Ramsar site

Listed Threatened Ecological Communities

 [Resource Information]

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

Name	Status	Type of Presence
Claypans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area
Shrublands on southern Swan Coastal Plain ironstones	Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species

 [Resource Information]

Name	Status	Type of Presence
Birds		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or

Name	Status	Type of Presence
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	related behaviour likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Extinct within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat may occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Vulnerable	Breeding known to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Banksia nivea subsp. uliginosa Swamp Honeypot [82766]	Endangered	Species or species habitat known to occur within area
Banksia squarrosa subsp. argillacea Whicher Range Dryandra [82769]	Vulnerable	Species or species habitat known to occur within area
Brachyscias verecundus Ironstone Brachyscias [81321]	Critically Endangered	Species or species habitat known to occur within area
Caladenia busselliana Bussell's Spider-orchid [24369]	Endangered	Species or species habitat known to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Caladenia procera Carbunup King Spider Orchid [68679]	Critically Endangered	Species or species habitat may occur within area
Chamelaucium sp. S coastal plain (R.D.Royce 4872) Royce's Waxflower [87814]	Vulnerable	Species or species habitat known to occur within area
Darwinia whicherensis Abba Bell [83193]	Endangered	Species or species habitat known to occur within area
Daviesia elongata subsp. elongata Long-leaved Daviesia [64883]	Vulnerable	Species or species habitat may occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leaved Hammer-orchid, Praying Virgin [16753]	Endangered	Species or species habitat known to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Gastrolobium papilio Butterfly-leaved Gastrolobium [78415]	Endangered	Species or species

Name	Status	Type of Presence
Grevillea elongata Ironstone Grevillea [64578]	Vulnerable	habitat known to occur within area Species or species habitat likely to occur within area
Grevillea maccutcheonii McCutcheon's Grevillea [64522]	Endangered	Species or species habitat likely to occur within area
Lambertia echinata subsp. occidentalis Western Prickly Honeysuckle [64528]	Endangered	Species or species habitat known to occur within area
Petrophile latericola Laterite Petrophile [64532]	Endangered	Species or species habitat known to occur within area
Synaphea stenoloba Dwellingup Synaphea [66311]	Endangered	Species or species habitat may occur within area
Tetraria australiensis Southern Tetraria [10137]	Vulnerable	Species or species habitat known to occur within area
Verticordia densiflora var. pedunculata Long-stalked Featherflower [55689]	Endangered	Species or species habitat likely to occur within area
Verticordia plumosa var. ananeotes Tufted Plumed Featherflower [23871]	Endangered	Species or species habitat likely to occur within area
Verticordia plumosa var. vassensis Vasse Featherflower [55804]	Endangered	Species or species habitat known to occur within area

Reptiles

Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Sharks

Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species

[[Resource Information](#)]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		

Name	Threatened	Type of Presence
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Sterna anaethetus Bridled Tern [814]		Foraging, feeding or related behaviour likely to occur within area
Sterna caspia Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Charadrius bicinctus Double-banded Plover [895]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

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

Name
Commonwealth Land -

Listed Marine Species [\[Resource Information \]](#)

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

Name	Threatened	Type of Presence
Birds		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Charadrius bicinctus Double-banded Plover [895]		Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Himantopus himantopus Black-winged Stilt [870]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species

Name	Threatened	Type of Presence
Puffinus assimilis Little Shearwater [59363]		habitat may occur within area Foraging, feeding or related behaviour known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Sterna anaethetus Bridled Tern [814]		Foraging, feeding or related behaviour likely to occur within area
Sterna caspia Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat likely to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse		Species or species

Name	Threatened	Type of Presence
[66234]		habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stigmatopora olivacea a pipefish [74966]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Whales and other Cetaceans		
		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to

Name	Status	Type of Presence
Orcinus orca Killer Whale, Orca [46]		occur within area Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Capel	WA
Ruabon Townsite	WA
Sabina	WA
Tuart Forest	WA
Unnamed WA41568	WA
Unnamed WA44838	WA
Unnamed WA46070	WA
Unnamed WA50190	WA
Unnamed WA50270	WA

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

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii		Species or species habitat likely to occur within area
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		
Tamarix aphylla		Species or species habitat likely to occur within area
Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		

Nationally Important Wetlands [Resource Information]

Name	State
McCarleys Swamp (Ludlow Swamp)	WA
Vasse-Wonnerup Wetland System	WA

Caveat

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

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

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

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

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.

Coordinates

-33.62137 115.47419

Acknowledgements

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

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Parks and Wildlife Commission NT, Northern Territory Government](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- Other groups and individuals

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

Please feel free to provide feedback via the [Contact Us](#) page.

APPENDIX E

Species List

AMPHIBIAN SPECIES RECORDED IN THE REGION

Key: EPBC = Environmental Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DPaW = Department of Parks and Wildlife Priority Code, A = Listed in Naturemap, B= DPaW Threatened and Priority fauna search, C = EPBC Protected Matters search, D= Current Survey;

Note: For Definitions of Conservation Codes see Appendix A.

Scientific Name	Common Name	Conservation Codes						
		EPBC	WC	DPaW	A	B	C	D
CHELONIIDAE								
<i>Caretta caretta</i>	Loggerhead Turtle	MiMa, En	S2		X	X	X	
<i>Chelonia mydas</i>	Green turtle	MiMa, Vu	S3		X		X	
<i>Dermochelys coriacea</i>	Leatherback Turtle	MiMa, En	S3				X	
<i>Natator depressus</i>	Flatback Turtle	MiMa, Vu	S3				X	
LIMNODYNASTIDAE								
<i>Heleioporus eyrei</i>	Moaning Frog				X			
<i>Limnodynastes dorsalis</i>	Western Banjo Frog				X			
MYOBATRACHIDAE								
<i>Crinia glauerti</i>	Clicking Frog				X			
<i>Crinia insignifera</i>	Squelching Froglet				X			
<i>Pseudophryne guentheri</i>	Crawling Toadlet				X			
HYLIDAE								
<i>Litoria adelaidensis</i>	Slender Tree Frog				X			
<i>Litoria moorei</i>	Motorbike Frog				X			

REPTILIAN SPECIES RECORDED IN THE REGION

Key: EPBC = Environmental Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DPaW = Department of Parks and Wildlife Priority Code, A = Listed in Naturemap, B= DPaW Threatened and Priority fauna search, C = EPBC Protected Matters search, D= Current Survey:

Note: For Definitions of Conservation Codes see Appendix A.

Scientific Name	Common Name	Conservation Codes							
		EPBC	WC	DPaW	A	B	C	D	
PYGOPODIDAE									
<i>Aprasia pulchella</i>	Granite Worm-lizard				X				
GEKKONIDAE									
<i>Christinus marmoratus</i>	Marbled Gecko				X				
<i>Gehyra variagata</i>	Tree Dtella								X
SCINCIDAE									
<i>Acritoscincus trilineatus</i>	Western Three-lined Skink				X				
<i>Cryptoblepharus buchananii</i>	Buchanans Snake-eyed Skink				X				
<i>Cryptoblepharus plagioccephalus</i>	Perons Snake-eyed Skink				X				
<i>Ctenotus impar</i>	Odd-striped Ctenotus				X				
<i>Ctenotus labillardieri</i>					X				
<i>Egernia kingii</i>	King's Skink				X				
<i>Egernia napoleonis</i>	South-western Crevice Skink				X				
<i>Hemiergis quadrilineata</i>	Two-toed Earless Skink				X				
<i>Lerista distinguenda</i>	South-western Orange Tailed-Slider				X				
<i>Lerista elegans</i>	Elegant Slider				X				
<i>Menetia greyii</i>	Common Dwarf Skink				X				
<i>Morethia lineococellata</i>	West Coast Morethia Skink				X				
<i>Tiliqua rugosa</i>	Shingleback				X				
AGAMIDAE									
<i>Pogona minor</i>	Dwarf Bearded Dragon				X				
VARANIDAE									
<i>Varanus gouldii</i>	Sand Monitor				X				
<i>Varanus rosenbergi</i>	Heath Monitor				X				
TYPHLOPIDAE									
<i>Ramphotyphlops australis</i>	Southern Blind Snake				X				

Scientific Name	Common Name	Conservation Codes						
		EPBC	WC	DPaW	A	B	C	D
BOIDAE								
<i>Morelia spilota imbricata</i>	Carpet Python				X			
ELAPIDAE								
<i>Elapognathus coronatus</i>	Crowned Snake				X			
<i>Hydrophis platurus</i>	Yello-bellied Seasnake				X			
<i>Notechis scutatus</i>	Tiger Snake				X			
<i>Parasuta nigriceps</i>	Black-backed Snake				X			
<i>Pseudonaja affinis affinis</i>	Dugite				X			

AVIAN SPECIES RECORDED IN THE REGION

Key: EPBC = Environmental Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DPaW = Department of Parks and Wildlife Priority Code, A = Listed in Naturemap, B= DPaW Threatened and Priority fauna search, C= EPBC Protected Matters search, D= Current Survey

Note: For Definitions of Conservation Codes see Appendix A.

Scientific Name	Common Name	Conservation Codes						
		EPBC	WC	DPaW	A	B	C	D
PHASIANIDAE								
<i>Coturnix pectoralis</i>	Stubble Quail				X			
STERCORARIIDAE								
<i>Catharacta skua</i>	Great Skua						X	
ANATIDAE								
<i>Anas castanea</i>	Chestnut Teal				X			
<i>Anas gracillis</i>	Grey Teal				X			
<i>Anas platyrhynchos</i>	Mallard				X		X	
<i>Anas rhynchotis</i>	Australian Shoveler				X			
<i>Anas superciliosa</i>	Pacific Black Duck				X			
<i>Aythya australis</i>	Hardhead				X			
<i>Biziura lobata</i>	Musk Duck				X			
<i>Chenonetta jubata</i>	Australian Wood Duck				X			
<i>Cygnus atratus</i>	Black Swan				X			
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck				X			
<i>Oxyura australis</i>	Blue-billed Duck			P4	X	X		
<i>Stictonetta naevosa</i>	Freckled Duck				X			
<i>Tadorna tadornoides</i>	Australian Shelduck				X			
PODICIPEDIDAE								
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Greb				X			
<i>Podiceps cristatus</i>	Great Crested Grebe				X			
<i>Tachybaptus novaehollandiae</i>	Australian Grebe				X			
ANHINGIDAE								
<i>Anhinga novaehollandiae</i>	Australasian Darter				X			
PHALACROCORACIDAE								
<i>Phalacrocorax carbo</i>	Great Cormorant				X			
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant				X			
<i>Phalacrocorax varius</i>	Pied Cormorant				X			

Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
PELECANIDAE								
<i>Pelecanus conspicillatus</i>	Australian Pelican				X			
ARDEIDAE								
<i>Ardea garzetta</i>	Little Egret				X			
<i>Ardea ibis</i>	Cattle Egret	Mi			X		X	
<i>Ardea modesta</i>	Great Egret	Mi			X	X	X	
<i>Ardea novaehollandiae</i>	White-faced Heron				X			
<i>Ardea pacifica</i>	White-necked Heron				X			
<i>Botaurus poiciloptilus</i>	Australasian Bittern	En	S2		X	X	X	
<i>Calidris ferruginea</i>	Curlew Sandpiper			P1			X	
<i>Nycticorax caledonicus</i>	Rufous Night Heron				X			
HAEMATOPODIDAE								
<i>Haematopus longirostris</i>	Australian Pied Oystercatcher				X			
RECURVIROSTRIDAE								
<i>Cladorhynchus leucocephalus</i>	Banded Stilt				X			
<i>Himantopus himantopus</i>	Black-winged Stilt	Ma			X		X	
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet	Ma			X		X	
CHARADRIIDAE								
<i>Charadrius bincinctus</i>	Double-banded Plover	MiMa	S5				X	
<i>Charadrius leschenaultii</i>	Greater Sand Plover	IA			X	X		
<i>Charadrius ruficapillus</i>	Red-capped Plover				X		X	
<i>Euseyornis melanops</i>	Black-fronted Dotterel				X			
<i>Erythronyx cinctus</i>	Red-kneed Dotterel				X			
<i>Pluvialis fulva</i>	Pacific Golden Plover				X			
<i>Pluvialis squatarola</i>	Grey Plover	IA	S5		X	X		
<i>Thinornis rubricollis</i>	Hooded Plover	Ma			X		X	
<i>Vanellus miles</i>	masked Lapwing				X			
<i>Vanellus tricolour</i>	Banded Lapwing				X			
SCOLOPACIDAE								
<i>Actitis hypoleucos</i>	Common Sandpiper	MiMa			X			
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	MiMa			X	X	X	
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR, MiMa			X	X	X	
<i>Calidris ruficollis</i>	Red-necked Stint	MiMa	S3		X	X	X	
<i>Limosa lapponica</i>	Bar-tailed Godwit	MiMa	S5				X	
<i>Limosa lapponica baueri</i>	West Alaskan Bar-tailed Godwit	Vu, MiMa					X	
<i>Limosa lapponica menzbieri</i>	Northern Siberian Bar-tailed Godwit	CR, MiMa					X	
<i>Limosa limosa</i>	Black-tailed Godwit	MiMa			X			
<i>Tringa glareola</i>	Wood Sandpiper	MiMa			X	X	X	
<i>Tringa nebularia</i>	Common Greenshank	MiMa	S3		X	X	X	
<i>Tringa stagnatilis</i>	Little Greenshank	MiMa	S5			X	X	

Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
LADIDAE								
<i>Anous tenuirostris melanops</i>	Australian Lesser Noddy	En	S2				X	
COLUMBIDAE								
<i>Columba livia</i>	Domestic Pigeon				X		X	
<i>Ocyphaps lophotes</i>	Crested Pigeon				X			
<i>Phaps chalcoptera</i>	Common Bronzewing				X			X
<i>Streptopelia senegalensis senegalensis</i>	Laughing Dove				X		X	
PODARGIDAE								
<i>Podargus strigoides</i>	Tawny Frogmouth				X			
APODIDAE								
<i>Apus pacificus</i>	Fork-tailed Swift	MiMa					X	
DIOMEDEIDAE								
<i>Diomedea amsterdamensis</i>	Amsterdam Albatross	En	S5				X	
<i>Diomedea dabbenena</i>	Tristan Albatross	En	S1				X	
<i>Diomedea epomophora</i>	Southern Royal Albatross	Vu	S2				X	
<i>Diomedea exulans</i>	Wandering Albatross	Vu	S3		X	X	X	
<i>Diomedea sanfordi</i>	Northern Royal Albatross	En	S2				X	
<i>Thalassarche cauta cauta</i>	Shy Albatross	Vu	S5				X	
<i>Thalassarche cauta stadi</i>	White-capped Albatross	Vu	S5				X	
<i>Thalassarche chlororhynchus</i>	Yellow-nosed Albatross	Vu	S5				X	
<i>Thalassarche impavida</i>	Campbell Albatross	Vu	S5				X	
<i>Thalassarche melanophris</i>	Black-browed Albatross	Vu	S5				X	
<i>Phoebastria fusca</i>	Sooty Albatross	Vu	S5				X	
PROCELLARIIDAE								
<i>Ardenna carneipes</i>	Flesh-footed Shearwater	Ma	S5				X	
<i>Halobaena caerulea</i>	Blue Petrel	Vu, Ma					X	
<i>Macronectes giganteus</i>	Southern Giant-Petrel	En	S5		X	X	X	
<i>Macronectes halli</i>	Northern Giant Petrel	Vu	S5				X	
<i>Pachyptila turtur</i>	Fairy Prion						X	
<i>Pachyptila turtur subantarctica</i>	Fairy Prion (Southern)	Vu					X	
<i>Pterodroma macroptera</i>	Great-winged Petrel				X		X	
<i>Pterodroma mollis</i>	Soft-plumaged Petrel	Vu					X	
<i>Puffinus assimilis</i>	Little Shearwater	Ma					X	
THRESKIORNITHIDAE								
<i>Plegadis falcinellus</i>	Glossy Ibis	Al			X	X		
<i>Platalea regia</i>	Royal Spoonbill				X			
<i>Plegadis flavipes</i>	Yellow-billed Spoonbill				X			
<i>Threskiornis molucca</i>	Australian White Ibis				X			
<i>Threskiornis spinicollis</i>	Straw-necked Ibis				X			
ACCIPITRIDAE								

Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
<i>Accipiter cirrocephalus cirrocephalus</i>	Collared Sparrowhawk				X			
<i>Accipiter fasciatus didimus</i>	Brown Goshawk				X			
<i>Aquila audax</i>	Wedge-tailed Eagle				X			
<i>Aquila morphnoides</i>	Little Eagle				X			X
<i>Circus approximans</i>	Swamp harrier				X			
<i>Circus assimilis</i>	Spotted Harrier				X			
<i>Elanus axillaris</i>	Black Souldered Kite				X			
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle	Ma			X		X	
<i>Haliastur sphenurus</i>	Whistling Kite				X			
<i>Lophoictinia isura</i>	Square-tailed Kite				X			
<i>Pandion cristatus</i>	Osprey	MiMa	S5				X	
FALCONIDAE								
<i>Falco berigora</i>	Brown Falcon				X			
<i>Falco cenchroides</i>	Australian Kestrel				X			X
<i>Falco longipennis</i>	Australian Hobby				X			
<i>Falco peregrinus</i>	Peregrine Falcon	S7			X	X		
RALLIDAE								
<i>Fulica atra</i>	Eurasian Coot				X			
<i>Gallinula tenebrosa</i>	Dusky Moorhen				X			
<i>Gallirallus philippensis</i>	Buff-banded Rail				X			
<i>Porphyrio porphyrio bellus</i>	Purple Swamphen				X			
<i>Porzana fluminea</i>	Australian Spotted Crake				X			
<i>Porzana pusilla</i>	Ballions Crake				X			
<i>Porzana tabuensis</i>	Spotless Crake				X			
<i>Tribonyx ventralis</i>	Black-tailed Native-hen				X			
LARIDAE								
<i>Chroicocephalus novaehollandiae</i>	Silver Gull				X			
<i>Thalasseus bergii</i>	Crested Tern				X			
<i>Hydroprogne caspia</i>	Caspian Tern	Ma			X		X	
<i>Sternula nereis</i>	Fairy Tern	Vu					X	
CACACTUIDAE								
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black-Cockatoo	Vu	S1		X	X	X	
<i>Calyptorhynchus baudinii</i>	Baudin's Cockatoo	Vu	S1		X	X	X	
<i>Calyptorhynchus latirostris</i>	Carnaby's Black Cockatoo	En	S1		X	X	X	X
<i>Cacatua pastinator</i>	Western Long-billed Corella				X			
<i>Cacatua sanguinea</i>	Little Corella				X			
<i>Eolophus roseicapilla</i>	Galah				X			X
<i>Nymphicus hollandicus</i>	Cockatiel							X
PSITTACIDAE								
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet				X			

Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
<i>Neophema elegans</i>	Elegant Parrot				X			
<i>Platycercus icterotis</i>	Western Rosella				X			
<i>Purpureicephalus spurius</i>	Red-capped Parrot				X			
<i>Platycercus zonarius</i>	Australian Ringneck				X			X
<i>Polytelis anthopeplus</i>	Regent parrot				X			
<i>Pezoporus occidentalis</i>	Night Parrot	En	S1				X	
CUCULIDAE								
<i>Cacomantis flabelliformis</i>	Fan-tailed Cockoo				X			
<i>Cacomantis pallidus</i>	Pallid Cuckoo				X			
<i>Chrysococcyx basalis</i>	Horsfields Bronze Cuckoo				X			
<i>Chrysococcyx lucidus plagosus</i>	Shining Bronze Cockoo				X			
STRIGIDAE								
<i>Ninox novaeseelandiae boobook</i>	Boobook Owl				X			
TYTONIDAE								
<i>Tyto alba deliculata</i>	Barn Owl				X			
HALCYONIDAE								
<i>Dacelo novaeguineae</i>	Laughing Kookaburra				X			
<i>Todiramphus sanctus sanctus</i>	Sacred Kingfisher				X			
MEROPIIDAE								
<i>Merops ornatus</i>	Rainbow Bee-eater	MiMa			X	X	X	
MALURIDAE								
<i>Malurus splendens</i>	Splendid Fairy-wren				X			
<i>Stipiturus malachurus</i>	Southern Emu-wren				X			
ACANTHIZIDAE								
<i>Acanthiza apicalis</i>	Inland Thornbill				X			
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill				X			
<i>Acanthiza inornata</i>	Western Thornbill				X			
<i>Gerygone fusca</i>	Western Gerygone				X			X
<i>Sericornis brevirostris</i>	Weebill				X			X
<i>Sericornis frontalis</i>	White-browed Scrubwren				X			
PARDALOTIDAE								
<i>Pardalotus punctatus</i>	Spotted Pardalote				X			
<i>Pardalotus striatus</i>	Striated Pardalote				X			
MELIPHAGIDAE								
<i>Acanthorhynchus superciliosus</i>	Western Spinebill				X			
<i>Anthochaera carunculata</i>	Red Wattlebird				X			X
<i>Anthochaera lunulata</i>	Western Little Wattlebird				X			
<i>Epthianura albifrons</i>	White-fronted Chat				X			
<i>Gavicalis virescens</i>	Singing Honeyeater				X			
<i>Lichmera indistincta</i>	Brown Honeyeater				X			X

Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater				X			X
<i>Phylidonyris niger</i>	White-cheeked Honeyeater							X
NEOSITTIDAE								
<i>Daphoenositta chrysostera</i>	Varied Sittella				X			
CAMPEPHAGIDAE								
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike				X			
<i>Lalage tricolour</i>	White-winged Triller				X			
PACHYCEPHALIDAE								
<i>Colluricincla harmonica</i>	Grey Shrike Thrush				X			
<i>Pachycephala pectoralis</i>	Golden Whistler				X			X
<i>Pachycephala rufiventris</i>	Rufous Whistler				X			X
ARTAMIDAE								
<i>Artamus cinereus</i>	Black-faced Woodswallow				X			X
<i>Artamus cyanopterus</i>	Dusky Woodswallow				X			
DICRURIDAE								
<i>Grallina cyanoleuca</i>	Magpie-lark				X			X
<i>Myiagra inquite</i>	Restless Flycatcher				X			
<i>Rhipidura albiscapa</i>	Grey Fantail				X			X
<i>Rhipidura leucophrys</i>	Willie Wagtail				X			X
CRACTICIDAE								
<i>Cracticus tibicen</i>	Australian Magpie				X			X
<i>Cracticus tibicen dorsalis</i>	White-backed Magpie				X			
<i>Cracticus torquatus</i>	Grey Butcherbird				X			X
CORVIDAE								
<i>Corvus bennetti</i>	Little Crow				X			
<i>Corvus coronoides</i>	Australian Raven				X			X
PETROICIDAE								
<i>Drymodes brunneopygia</i>	Southern Scrub-robin							
<i>Eopsaltria australis griseogularis</i>	Western Yellow Robin				X			
<i>Eopsaltria georgiana</i>	White-breasted Robin				X			
<i>Petroica boodang</i>	Scarlet Robin				X			X
DICAEIDAE								
<i>Dicaeum hirundinaceum</i>	Mistletoebird				X			
ACROCEPHALIDAE								
<i>Acrocephalus australis</i>	Australian Reed-Warbler				X			
MEGALURIDAE								
<i>Megalurus gramineus</i>	Little Grassbird				X			
<i>Cincloramphus cruralis</i>	Brown Songlark				X			
TIMALIIDAE								
<i>Zosterops lateralis</i>	Silvereye				X			X

Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
HIRUNDINIDAE								
<i>Hirundo neoxena</i>	Welcome Swallow				X			
<i>Hirundo nigricans</i>	Tree Martin				X			
STURINADAE								
<i>Sturnus vulgaris</i>	Common Starling						X	
MOTACILLIDAE								
<i>Motacilla cinerea</i>	Grey Wagtail	MiMa					X	

MAMMALIAN SPECIES RECORDED IN THE REGION

Key: EPBC = Environmental Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DPaW = Department of Parks and Wildlife Priority Code, A = Listed in Naturemap, B= DPaW Threatened and Priority fauna search, C = EPBC Protected Matters search, D= Current Survey

Note: For Definitions of Conservation Codes see Appendix A.

Scientific Name	Common Name	Conservation Codes						
		EPBC	WC	DPaW	A	B	C	D
DASYURIDAE								
<i>Dasyurus geoffroi</i>	Western Quoll	Vu	S3				X	
<i>Phascogale tapoatafa</i>	Southern Brush-tailed Phascogale		S3		X	X		
PERAMELIDAE								
<i>Isoodon obesulus fusciventer</i>	Southern Brown Bandicoot			P4	X	X		X
THYLACOMYIDAE								
<i>Macrotis lagotis</i>	Bilby	Vu	S3		X	X		
BURRAMYDAE								
<i>Cercartetus concinnus</i>	Western Pygmy-possum				X			
PSEUDOCHEIRIDAE								
<i>Pseudocheirus occidentalis</i>	Western Ringtail Possum	Vu	S2		X	X	X	X
TARSIPEDIDAE								
<i>Tarsipes rostratus</i>	Honey Possum				X			
PHALANGERIDAE								
<i>Trichosurus vulpecula</i>	Common Brushtail Possum				X			
POTOROIDAE								
<i>Bettongia penicillata</i>	Brush-tailed Bettong	CR	S1		X			
MACROPODIDAE								
<i>Macropus fuliginosus</i>	Western Grey Kangaroo				X			X
<i>Macropus irma</i>	Western Brush Wallaby				X	X		
<i>Setonix brachyurus</i>	Quokka	Vu	S3		X			
VESPERTILIONIDAE								
<i>Falsistrellus mackenziei</i>	Western False Pipstrelle			P4	X	X		
<i>Vespadelus regulus</i>	Southern Forest Bat				X			
MURIDAE								
<i>Hydromys chrysogaster</i>	Water Rat			P4	X	X		
<i>Mus musculus</i>	House Mouse				X		X	

Scientific Name	Common Name	Conservation Codes						
		EPBC	WC	DPaW	A	B	C	D
<i>Pseudomys occidentalis</i>	Western Mouse			P4	X	X		
<i>Rattus rattus</i>	Black Rat				X		X	
OTARIIDAE								
<i>Neophoca cinerea</i>	Australian Sea-lion	Vu	S3				X	
<i>Arctocephalus forsteri</i>	New Zealand Fur Seal	Ma	S7				X	
CANIDAE								
<i>Canis lupus familiaris</i>	Domestic Dog				X		X	
CARNIVORA								
<i>Vulpes vulpes</i>	Red Fox				X		X	
FELIDAE								
<i>Felis catus</i>	Cat						X	
LEPORIDAE								
<i>Oryctolagus cuniculus</i>	European Rabbit				X			X
SUIDAE								
<i>Sus scrofa</i>	Pig						X	
BOVIDAE								
<i>Bos taurus</i>	Cattle				X		X	
CERVIDAE								
<i>Dama dama</i>	Fallow Deer						X	
ZIPHIIDAE								
<i>Mesoplodon grayi</i>	Grays Beaked Whale				X			
BALAENIDAE								
<i>Eubalaena australis</i>	Southern Right Whale	En	S3				X	
NEOBALAENIDAE								
<i>Caperea marginata</i>	Pygmy Right Whale	MiMa					X	
BALAENOPTERIDAE								
<i>Balaenoptera acutorostrata</i>	Dwarf Minke Whale						X	
<i>Balaenoptera adeni</i>	Brydes Whale	MiMa					X	
<i>Balaenoptera musculus</i>	Blue Whale	MiMa, En	S2				X	
<i>Megaptera novaeangliae</i>	Humpback Whale	Vu	S6				X	
DELPHINIDAE								
<i>Delphinus delphis</i>	Common Dolphin						X	
<i>Orcinus orca</i>	Orca						X	
<i>Stenella attenuata</i>	Spotted Dolphin						X	
<i>Tursiops aduncus</i>	Indo-Pacific Bottlenose Dolphin				X		X	

APPENDIX F

Black Cockatoo Potential Breeding Trees

Tree Species	DBH Size Class	Height (m)	No. of Hollows	Hollow Size	Easting	Northing	Comments
<i>Eucalyptus gomphocephala</i>	A	20			362630	6282153	Splits in two at 1.5 m
<i>Eucalyptus gomphocephala</i>	A	20			362638	6282189	Chewed Tuart nuts
<i>Eucalyptus gomphocephala</i>	A	20			362612	6282188	Chewed Pine cones
<i>Eucalyptus sp.</i>	A	20			362682	6282290	
<i>Eucalyptus sp.</i>	A	20			362687	6282297	Splits in two at 1m
<i>Eucalyptus sp.</i>	A	20			362682	6282298	
<i>Eucalyptus sp.</i>	A	20			362685	6282339	
<i>Eucalyptus sp.</i>	A	20			362715	6282378	
<i>Eucalyptus sp.</i>	A	20			362715	6282378	
<i>Eucalyptus sp.</i>	A	20			362707	6282399	
<i>Eucalyptus sp.</i>	A	16			362757	6282458	
<i>Corymbia calophylla</i>	A	18			362255	6281466	
<i>Corymbia calophylla</i>	A	18			362138	6281251	
<i>Corymbia calophylla</i>	A	16			361919	6280988	
<i>Corymbia calophylla</i>	A	18			361861	6280901	Camera
<i>Eucalyptus gomphocephala</i>	A	20			361637	6280718	Splits in two at 1m (Bandicoot diggings)
<i>Eucalyptus gomphocephala</i>	A	20			361637	6280718	Splits in two at 1m
<i>Eucalyptus gomphocephala</i>	A	20			361637	6280718	Splits in two at 1m
<i>Corymbia calophylla</i>	A	18			361549	6280653	
<i>Corymbia calophylla</i>	A	19			361549	6280653	
<i>Corymbia calophylla</i>	A	24			361532	6280620	
<i>Eucalyptus gomphocephala</i>	A	16			360563	6279905	
<i>Eucalyptus rudis</i>	A	15			360405	6279787	Splits in two at 1.8 m
<i>Eucalyptus rudis</i>	A	15			360397	6279775	
<i>Eucalyptus rudis</i>	A	15			360397	6279775	
<i>Corymbia calophylla</i>	A	15			360300	6279792	Under border of Jarrah
<i>Corymbia calophylla</i>	A	15			360300	6279792	Under border of Jarrah
<i>Corymbia calophylla</i>	A	15			360300	6279792	Under border of Jarrah
<i>Eucalyptus gomphocephala</i>	A	18			360277	6279751	
<i>Eucalyptus gomphocephala</i>	A	20			360251	6279739	
<i>Eucalyptus gomphocephala</i>	A	20			360192	6279710	
<i>Eucalyptus gomphocephala</i>	A	20			360192	6279710	
<i>Eucalyptus gomphocephala</i>	A	20			360177	6279707	
<i>Corymbia calophylla</i>	A	16			357030	6277373	
<i>Corymbia calophylla</i>	A	21			357018	6277359	
<i>Corymbia calophylla</i>	A	20			357034	6277350	
<i>Eucalyptus gomphocephala</i>	A	20			357034	6277350	
<i>Eucalyptus gomphocephala</i>	A	20			357034	6277350	
<i>Corymbia calophylla</i>	A	20			357043	6277343	
<i>Corymbia calophylla</i>	A	18			357070	6277340	Partially dead

<i>Corymbia calophylla</i>	A	17		357059	6277364	
<i>Corymbia calophylla</i>	A	10		357068	6277400	
<i>Corymbia calophylla</i>	A	17		357073	6277409	
<i>Corymbia calophylla</i>	A	18		357086	6277395	
<i>Corymbia calophylla</i>	A	18		357086	6277394	
<i>Corymbia calophylla</i>	A	16		357085	6277405	
<i>Corymbia calophylla</i>	A	18		357106	6277401	
<i>Eucalyptus gomphocephala</i>	A	18		357009	6277349	
<i>Corymbia calophylla</i>	A	15		355587	6276243	
<i>Corymbia calophylla</i>	A	15		355577	6276232	
<i>Corymbia calophylla</i>	A	16		355406	6275916	
<i>Corymbia calophylla</i>	A	16		355406	6275916	
<i>Corymbia calophylla</i>	A	22		355407	6275898	
<i>Corymbia calophylla</i>	A	17		355409	6275893	
<i>Eucalyptus gomphocephala</i>	A	17		355422	6275859	
<i>Corymbia calophylla</i>	A	20		355426	6275833	
<i>Corymbia calophylla</i>	A	18		355425	6275825	
<i>Corymbia calophylla</i>	A	18		355080	6275895	
<i>Corymbia calophylla</i>	A	18		355080	6275895	
<i>Corymbia calophylla</i>	A	18		355080	6275895	
<i>Corymbia calophylla</i>	A	18		355080	6275895	
<i>Corymbia calophylla</i>	A	18		355080	6275895	
<i>Corymbia calophylla</i>	A	18		355080	6275895	
<i>Corymbia calophylla</i>	A	18		355080	6275895	
<i>Corymbia calophylla</i>	A	18		355080	6275895	
<i>Corymbia calophylla</i>	A	18		355080	6275895	
<i>Eucalyptus rudis</i>	A	18		355108	6275912	
<i>Corymbia calophylla</i>	A	18		353570	6274916	
<i>Corymbia calophylla</i>	A	18		353575	6274892	
<i>Corymbia calophylla</i>	A	16		353439	6274926	
<i>Corymbia calophylla</i>	A	20		353464	6274921	
<i>Eucalyptus rudis</i>	A	15		353480	6274909	
<i>Eucalyptus rudis</i>	A	15		353480	6274909	
<i>Eucalyptus rudis</i>	A	18		353494	6274919	
<i>Corymbia calophylla (dead)</i>	B	22		353477	6274930	1 hollow not vertical
<i>Corymbia calophylla (dead)</i>	A	24		353467	6274925	
<i>Eucalyptus rudis</i>	A	18		353268	6274824	
<i>Eucalyptus rudis</i>	A	18		353246	6274811	
<i>Eucalyptus gomphocephala</i>	A	21		353215	6274838	
<i>Eucalyptus gomphocephala</i>	A	26		353210	6274821	
<i>Eucalyptus gomphocephala</i>	A	26		353210	6274821	
<i>Eucalyptus gomphocephala</i>	A	26		353202	6274822	
<i>Eucalyptus gomphocephala</i>	A	26		353202	6274822	
<i>Eucalyptus gomphocephala</i>	A	26		353202	6274822	

<i>Eucalyptus gomphocephala</i>	A	26		353200	6274805	
<i>Eucalyptus gomphocephala</i>	A	26		353188	6274802	
<i>Corymbia calophylla</i>	A	18		353181	6274813	
<i>Corymbia calophylla</i>	A	20		353163	6274824	
<i>Eucalyptus gomphocephala</i>	A	24		353166	6274791	
<i>Corymbia calophylla</i>	A	18		353139	6274803	
<i>Corymbia calophylla</i>	A	20		353134	6274795	
<i>Corymbia calophylla</i>	A	16		353119	6274804	

APPENDIX G

Habitat Assessments

FAUNA HABITAT ASSESSMENT SHEET - 360 ENVIRONMENTAL

(South West)

Location: Busselton Highway	Site Number Habitat Assessment #1
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Project:						
Date: 16/06/2016	Easting: 361864	Aspect	N	NE	SW	NW
Quadrat Size: 50 x 50 m	Northing: 6280902		E	SE	W	N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION										
Vegetation Description	Hummock Grassland	Other:		Average Height (M)	Cover					
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick		
	Riverine Woodland	Overstorey	<i>Corymbia calophylla</i> , <i>E. gomphocephala</i>		18	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	
	Other Grassland	Midstorey	<i>Acacia sp.</i> , <i>Agonis flexuosa</i>		4	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	
	Low Woodland	Ground Cover	Mixed		<0.05m	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	

CONDITION					LAST FIRE					
Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 Yr	3 >5 Yr

(Cattle)				DISTURBANCE			(Other)			
	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	

GROUND COVER										
Bare Ground	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	Hummock Grass	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	
Rock	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	Other Grass	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	
Leaf Litter	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	Herbs	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	
Logs >10cm	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	Other:	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	

MICROHABITATS

FAUNA HABITAT ASSESSMENT SHEET - 360 ENVIRONMENTAL

(South West)

Location: Busselton Highway	Site Number Habitat Assessment #2
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Project:						
Date: 16/06/2016	Easting: 361195	Aspect	N	NE	SW	NW
Quadrat Size: 50 x 50 m	Northing: 6280391		E	SE	W	N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Other:		Average Height (M)	Cover				
	Hummock Grassland	Acacia Shrubland		Scattered Plants	Sparse	Moderate	Thick	
Riverine Woodland	Overstorey	<i>Corymbia calophylla</i>	8	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	
Other Grassland	Midstorey	<i>Acacia sp., Melaleuca sp., Kunzea sp.</i>	6	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	
Low Woodland	Ground Cover	Mixed shrubs	< 1	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 Yr	3 4-5 Yr	>5 Yr
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(Cattle)

DISTURBANCE

(Other)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	All others previously cleared
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GROUND COVER

	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%		0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%
Bare Ground					Hummock Grass				
Rock					Other Grass				
Leaf Litter					Herbs				
Logs >10cm					Other:				

MICROHABITATS

Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 2-5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES			NO		Termite Mounds	0 none	1 rare	2 moderate	3 common

FAUNA HABITAT ASSESSMENT SHEET - 360 ENVIRONMENTAL

(South West)

Location: Busselton Highway	Site Number Habitat Assessment #3
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Project:

Date: 17/06/2016	Easting: 357056	Aspect	N	NE	SW	NW
Quadrat Size: 50 x 50 m	Northing: 6277370		E	SE	W	N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other:	Average Height (M)	Cover				
	Acacia Shrubland	Stratum		Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey		<i>Corymbia calophylla</i> , <i>E. gomphocephala</i> , <i>E. marginata</i>	0 COVER	<5% 1 <20% COVER	2 20-60%	3 60-100%
Other Grassland	Midstorey	<i>Acacia sp.</i> , <i>Agonis flexuosa</i> , <i>Banksia grandis</i> , <i>Melaleuca sp.</i>	0 COVER	<5% 1 <20% COVER	2 20-60%	3 60-100%		
Low Woodland	Ground Cover	Grass trees, sedges and weeds	0 COVER	<5% 1 <20% COVER	2 20-60%	3 60-100%		

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(Cattle)

DISTURBANCE

(Other)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	Hummock Grass	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%
Rock	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	Other Grass	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%
Leaf Litter	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	Herbs	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%
Logs >10cm	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	Other:	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%

MICROHABITATS

FAUNA HABITAT ASSESSMENT SHEET - 360 ENVIRONMENTAL

(South West)

Location: Busselton Highway

Site Number Habitat Assessment #4

Project:

Date: 17/06/2016

Easting: 355155

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50 m

Northing: 6275926

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Other:		Average Height (M)	Cover				
	Hummock Grassland			Scattered Plants	Sparse	Moderate	Thick	
	Acacia Shrubland	Stratum		0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	
Riverine Woodland	Overstorey	<i>Eucalyptus rudis</i>	16	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	
Other Grassland	Midstorey	<i>Melaleuca sp., Agonis flexuosa</i>	10	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	
Low Woodland	Ground Cover	Weedy/grassy	<0.5	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Good	2 Very Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 Yr	3 4-5 Yr	3 >5 Yr
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(Cattle)

DISTURBANCE

(Other)

0 heavy	1 medium	2 mild	3 none	0 heavy	1 medium	2 mild	3 none
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GROUND COVER

	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%		0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%
Bare Ground					Hummock Grass				
Rock					Other Grass				
Leaf Litter					Herbs				
Logs >10cm					Other:				

MICROHABITATS

Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common
Caves	Absent	Present	Total =		Woody Debris	0 none	1 rare	2 moderate	3 common

SPECIES

Black Cockatoo Foraging Habitat

Species:	% cover	Hollows:
<i>Eucalyptus rudis</i>	10	Small (<120mm)
		Large (>120mm)

Birds	Mammals	Reptiles
Grey Fantail		
Thornbill		
Rufous Whistler		
Magpie Lark		

FAUNA HABITAT ASSESSMENT SHEET - 360 ENVIRONMENTAL

(South West)

Location: Busselton Highway Site Number Habitat Assessment #5

Project:

Date: 17/06/2016	Easting: 353383	Aspect	N	NE	SW	NW
Quadrat Size: 50 x 50 m	Northing: 6274879		E	SE	W	N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Other:		Average Height (M)	Cover				
	Stratum			Scattered Plants	Sparse	Moderate	Thick	
				<5% COVER	<20% COVER	20-60%	60-100%	
Hummock Grassland								
Acacia Shrubland								
Riverine Woodland	Overstorey	<i>Agonis flexuosa</i>	18	0	1	2	3	
Other Grassland	Midstorey			0	1	2	3	
Low Woodland	Ground Cover	Weedy grass	<0.5	0	1	2	3	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 Yr	4-5 Yr	3 >5 Yr
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(Cattle)

DISTURBANCE

(Other)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

	0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%		0 <5% COVER	1 <20% COVER	2 20-60%	3 60-100%
Bare Ground					Hummock Grass				
Rock					Other Grass				
Leaf Litter					Herbs				
Logs >10cm					Other:				

MICROHABITATS

Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 2-5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES			NO		Termite Mounds	0 none	1 rare	2 moderate	3 common

