EDITH COWAN UNIVERSITY,
SOUTH WEST CAMPUS, BUNBURY

FAUNA ASSESSMENT

Prepared for

EDITH COWAN UNIVERSITY

Job: 07.154

Report: RP001

Australia

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FAUNA ASSESSMENT

Prepared for

EDITH COWAN UNIVERSITY

Prepared by

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TABLE OF CONTENTS

FIGURES

TABLES (INCLUDED IN TEXT)

APPENDICES

STATEMENT OF LIMITATIONS

Scope of Services

This environmental site assessment report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and ENV.Australia Pty Ltd (ENV) ("scope of services"). In some circumstances the scope of services may have been limited by factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

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

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In accordance with the scope of services, ENV has relied on the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

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Other Limitations

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

EXECUTIVE SUMMARY

ENV.Australia Pty Ltd (ENV) was commissioned in mid-2007 by Edith Cowan University (ECU) to undertake a detailed fauna assessment of remnant bush-land in the University's South West Campus, Bunbury. It is understood that ECU is considering further development of its South West Campus and therefore, in accordance with the EPA Guidance Statement No. 56, a Level Two Fauna Survey is required to identify potential constraints on development with respect to fauna and fauna habitats that may be present on the site. In addition, management recommendations as to how environmental impacts can be managed with regard to future development will be required.

The fauna assessment has identified the presence and potential presence of certain species of conservation significance in the project area. Three species of significance were confirmed as utilising the site, these being;

- Western Ringtail Possum
- Carnaby's Black Cockatoo
- Quenda

Several other significant species are also potentially present or utilise the site at times. Those considered to have the greatest potential of being present and/or the most likely to be affected by any future development are:

- Forest Red-tailed Black Cockatoo
- Baudin's Black Cockatoo

Details of any future development in remnant bushland at the South West Campus site are not known at this stage, so the degree and nature of impacts on fauna species can not be determined with accuracy. Taking into consideration the potential impacts and constraints, the following general recommendations, with particular reference to species of conservation significance, are made:

Western Ringtail Possum

- This species favours areas of vegetation containing Peppermint (naturally-occurring and planted) on the South West Campus. Future development should take this into account, and the retention of significant portions of this habitat should be a priority during the planning process.
- The habitat retained should, if reasonable and practical, be of sufficient size and quality to support all individuals that may be displaced as a result of any development. Where the clearing of Western Ringtail Possum habitat is required, the creation and enhancement of suitable habitat should be planned for and undertaken to offset the loss.
- Wherever landscape planting is carried out, it should include the dominant species found in remnant vegetation in the area. As far as practical, plantings should aim to create a continuous link between remnant vegetation in and adjacent to the project area.

- Targeted Western Ringtail Possum surveys of the remnant vegetation should be undertaken as part of the planning process to identify areas of most significance by detailing the status and distribution of the species across the site.
- A development-specific Western Ringtail Possum management plan should be formulated to detail the status and distribution of Western Ringtail Possums, the impact of development and mitigation and offset measures.

Black Cockatoo Species

- The three Black Cockatoo species are highly mobile, and therefore will not rely specifically on the site. Nevertheless, efforts should be made to retain foraging, roosting and potential breeding habitat so that these species continue to utilise the area.
- The identification and accurate plotting of habitat trees that have the potential to be used by cockatoos for breeding should be undertaken. The location of these trees should be taken into account during development planning, and they should be retained wherever reasonable and practical.
- Where possible, remnant vegetation suitable for cockatoos to use for foraging should be retained and protected. Landscaped areas should be revegetated with local seed-stock that includes cockatoo food plants (e.g. *Corymbia, Banksia, Dryandra, Hakea, Allocasuarina,* etc.)
- If possible, clearing should be conducted outside the known breeding season of Black Cockatoo species (early July to December) to avoid disturbing or otherwise harming nesting birds.

Quenda

- Quenda appear to be confined to the wetland habitat in the westernmost section of the study area, but may also use other areas that contain suitable dense groundcover. The retention and maintenance of this wetland area and fringing vegetation in at least its current condition will aid in this species' continued presence in the area.

General Recommendations Relating to all Fauna

- A suitable area of vegetation that serves as an east-west ecological linkage should be identified and retained. The linkage should be at least 40 metres wide throughout. The logical location for the corridor is along the southern boundary of the project area, including the wetland area, but other factors such as vegetation condition and floristics should be taken into account.
- Where possible, remnant vegetation that does not require clearing (including single, dead or isolated trees) should be retained and protected. The overall subdivision design should minimise disturbance to areas having good vegetation or habitat values. Larger block sizes should be located in the areas of the best vegetation or habitat values. No vegetation should be cleared in any allotment except for :

  a) compliance with the Bush Fires Act 1954 (as amended);

  b) clearing in the building envelope for a reasonable area;

c) to construct an approved vehicular access; or

d) for any other reason where specific written approval has been obtained from the relevant governing body.

- Additional project infrastructure, including access routes, vehicle and plant storage and turnaround areas, etc., should be designed so that previously disturbed areas are used where possible.
- During site works, areas requiring clearing should be clearly marked and access to other areas restricted to prevent accidental clearing of areas to be retained.
- Development planning should take into consideration the presence of habitat trees (in addition to those potentially suitable for cockatoos/owls). If possible, all potential habitat trees should be checked for fauna before clearing.
- No dead, standing or fallen timber should be removed unnecessarily. Logs (hollow or not) and other debris resulting from land clearing should be used to enhance fauna habitat in untouched and rehabilitated areas if possible.
- A Construction and Operations Fire Management Plan should be prepared to reduce the risk of unplanned fires and to provide contingency measures to minimise any associated impacts. The plan should include a contingency and response plan in the event of any bushfires started as a result of the construction works.
- All construction staff should be made aware that native fauna is protected.
- Native fauna injured during construction should be taken to a designated veterinary clinic or a DEC-nominated wildlife carer.
- During the installation of services, pipe trenches should be kept open only for as long as necessary and suitable escape ramps and bridging provided if the site is to be left unattended for long periods. Whenever possible, pipe ends should be sealed to prevent fauna entering.

1 INTRODUCTION

1.1 THE PROJECT

1.1.1 Objectives

ENV.Australia Pty Ltd ('ENV') was commissioned in mid-2007 by Edith Cowan University ('ECU') to undertake a detailed fauna assessment of remnant bush-land in the University's South West Campus, Bunbury ('the project area'). It is understood that ECU is considering further development of its South West Campus and therefore, in accordance with the EPA Guidance Statement No. 56, a Level Two Fauna Survey is required to identify potential constraints on development with respect to fauna and fauna habitats on the site. Furthermore, management recommendations as to how environmental impacts can be managed with regard to future development will be required.

This biological assessment comprises the findings of a Level Two fauna survey (reported here) conducted in accordance with the Environmental Protection Authority's (EPA) Guidance Statements No. 51 and 56 (EPA 2004a, EPA 2004b). The objectives of the fauna assessment were to:

- confirm and comment on the fauna present (utilising field survey results) and that may be supported (utilising desktop study results) in the project area;
- confirm and comment on the habitats in the project area in terms of fauna that is and that may be supported ;
- confirm and comment on the conservation significance of fauna species present or likely to occur in the project area, and fauna habitats present in a local and regional context;
- identify potential environmental impacts, based on the results of the fauna assessment;
- describe the constraints that may be posed by fauna and fauna habitats identified and fauna potentially occurring, and;
- develop management recommendations based on the degree and nature of the impact on fauna species, with particular reference to species of conservation significance.

1.1.2 Location

The project area is located about 5km south-east of the Bunbury CBD, and is centred on approximately 33.369676° S and 115.651921° E (GDA 94). The ECU South West Campus covers an area of 48ha, approximately 38ha of which is undeveloped bushland or partially cleared bushland.

1.1.3 Previous Biological Studies

As far as ENV is aware, no detailed fauna assessments (involving trapping) have been carried out in the project area. ATA Environmental (ATA 2006) carried out a desktop fauna study in August 2006 as part of a broader environmental investigation of the site. This study compiled a list of significant species that may be present, based on broad fauna habitats defined mainly from vegetation descriptions.

In September 2006 ENV (ENV 2006) carried out a Level 1 fauna assessment and a detailed Western Ringtail Possum survey over a small section of the South West Campus that was the subject of a development proposal (Manea College). As with the ATA work, this study identified the potential presence of a number of significant species, but in particular confirmed that sections of the site were being utilised by Western Ringtail Possums.

1.2 PHYSICAL ENVIRONMENT

1.2.1 Climate

Bunbury is in the Mediterranean climate zone of Western Australia, with wet, mild winters and hot dry summers. Mean monthly maximum and minimum temperatures for nearby Bunbury (calculated from 1877 to 1985 data) range from 17-28°C and 8-15°C respectively. Mean monthly maximum and minimum temperatures calculated over a shorter, more recent period (1995 to 2007) show daily mean temperatures of 22-23°C and 10-13°C respectively (Bureau of Meteorology 2007).

The long-term average annual rainfall (calculated from 1877-1985 data) for Bunbury is 871 mm, occurring predominantly in May-October (Bureau of Meteorology 2007).

The summer wind pattern of the region is dominated by local onshore (sea breeze) and offshore (land breeze) winds, with light south-easterlies in the early morning and at night, and stronger south-westerlies during the day. The winter wind pattern is dominated by the eastward progression of rain-bearing low-pressure systems and associated cold fronts with north-westerly storms.

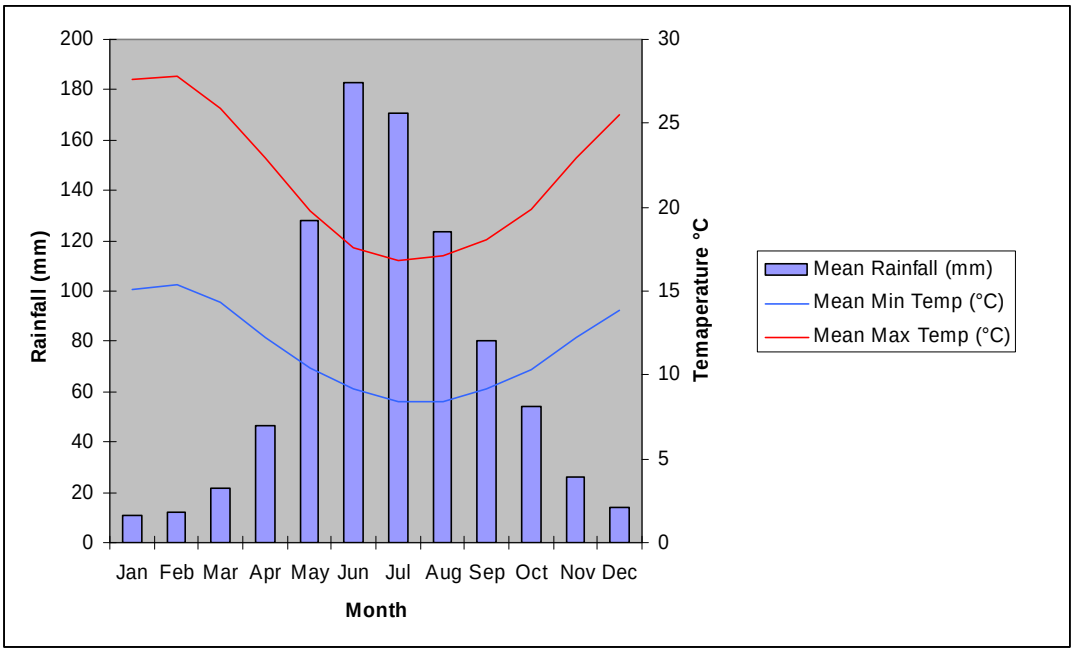

Figure 2: Mean Monthly Rainfall and Maximum and Minimum Temperatures (Bunbury PO Records 1877-1985; Bureau of Meteorology 2007)

Table 1 below shows daily weather records during the survey period.

Table 1: Daily Temperatures and Rainfall at Bunbury Station from 15-21 September (Bureau of Meteorology 2007)

Date	Min (°C)	Max (°C)	Rainfall (mm)
15/09/2007	10.8	17.4	5.8
16/09/2007	10.3	19	2.6
17/09/2007	14.6	19.9	0.4
18/09/2007	12.6	18.1	2.6
19/09/2007	6.5	18.2	2.4
20/09/2007	14.3	19.9	0
21/09/2007	10.3	20.1	5.4

1.2.2 Geology and Soils

The project area is in the western section of the Swan Coastal Plain. The site straddles a section of the Spearwood Dune System, which in this area comprises two distinct landform units:

1. Karrakatta Unit – undulating, well-drained landscape, forming a prominent ridge through the centre of study area. Geology and soils consist of deep yellow-brown and grey siliceous sands over Tamala limestone.

2. Yoongarillup Unit – plains with low ridges and swales situated west and downslope of the main dune ridge. Characterised by the development of seasonal wetlands. Geology and soils consist of shallow yellow and brown sands in addition to some peaty sandy soils over marine limestone.

1.2.3 Biogeography

Pilbara Biographic Regionalisation for Australia

The Interim Biogeographic Regionalisation for Australia (IBRA) divides Australia into 85 bioregions based on major biological and geographical/geological attributes (Thackway & Cresswell 1995). These bioregions are subdivided into 404 subregions as part of a refinement of the IBRA framework (Department of Environment and Water Resources [DEWR] 2007a). The Swan Coastal Plain Bioregion (SWA) was classified as part of the IBRA project and is described as being a:

> *"Low lying coastal plain mainly covered with Woodlands. It is dominated by Banksia or Tuart on sandy soils,* Casuarina obesa *on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah Woodland. Warm Mediterranean. Three phases of marine sand dune development provide relief.*

The outwash plains, once dominated by Casuarina obesa *– Marri Woodlands and* Melaleuca shrublands*, are extensive only in the south."* (Thackway *&* Cresswell, 1996; IBRA, 2000).

The area falls within the Drummond Botanical Subdistrict of the Southwest Botanical Province (Beard 1990). This subdistrict is mainly Banksia low woodland on leached sands with Melaleuca swamps where the area is poorly drained. Woodlands of *Eucalyptus gomphocephala* (Tuart), *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri) occur on less leached soils.

Beard Vegetation Mapping

The area is in the Drummond Botanical Subdistrict of the Southwest Botanical Province (Beard 1990). This subdistrict is mainly *Banksia* low woodland on leached sands with *Melaleuca* swamps where the area is poorly-drained. Woodlands of *Eucalyptus gomphocephala* (Tuart), *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri) occur on less leached soils.

2 METHODOLOGY

2.1 BACKGROUND TO SURVEY METHODOLOGY

2.1.1 State and Federal Legislation

All surveys undertaken by ENV are designed to meet the requirements of the following State and Commonwealth legislation:

- Environmental Protection Act 1986 (WA).
- Wildlife Conservation Act 1950 (WA) ('WC Act).
- Environment Protection and Biodiversity Conservation Act 1999 (Cth) ('EPBC Act).

The surveys were carried out in a manner designed to be compliant with the Environmental Protection Authority (EPA) requirements for the environmental surveying and reporting of fauna surveys in Western Australia, as set out in the following documents:

- *Terrestrial Biological Surveys as an Element of Biodiversity Protection. Position Statement No. 3* (EPA 2002); and
- *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia. Guidance Statement No. 56* (EPA 2004b).

2.1.2 EPA Guidance Statement No. 56

A baseline field fauna survey for an Environmental Impact Assessment (EIA) should provide a comprehensive list of species in a given area. There are two formal levels of fauna survey delineated by the EPA:

- ***Level One:*** a 'desktop' study to collate historical knowledge conducted in conjunction with a reconnaissance survey (site inspection).
- ***Level Two:*** a trapping and opportunistic field survey to characterise the fauna present, combined with a Level One survey.

Where the scale and nature of the proposed impact is moderate to high, a Level Two survey is required in most areas of the State, and is typically required for resource development projects. The expectations of the EPA are set out in *Guidance Statement No. 56* (EPA 2004b). Specifically, it details the extent, design and intensity of field surveys for environmental assessments in Western Australia.

The methodology of this survey, a Level Two survey, has been developed to be compliant with EPA *Guidance Statement No. 56.*

2.1.3 Fauna of Conservation Significance

Fauna species can be classified as of conservation significance on an international, Commonwealth, State, or local level, in accordance with EPA *Guidance Statement No. 56* (EPA 2004b). Under each level, the conservation status of fauna is determined by various Acts and Agreements. A short description of these Acts and Agreements is given below, with definitions of the conservation codes detailed in Appendix A.

International Level:

- IUCN Red List: The IUCN (International Union for Conservation of Nature and Natural Resources, also known as the World Conservation Union) publishes an international listing of species of conservation importance known as the IUCN Red List (IUCN 2006). This list identifies those species most in need of conservation if global extinction rates are to be reduced. It should be noted that the IUCN Red List has no legal status in Australia, but it is recognised as an authoritative guide to the status of biological diversity and to species of conservation importance.

- **JAMBA, CAMBA and ROKAMBA**: Australia has agreements with the governments of Japan, the People's Republic of China and the Republic of Korea relating to the conservation and protection of migratory birds. These Migratory Bird Agreements are known as JAMBA, CAMBA and ROKAMBA respectively, and they list terrestrial, water and shorebird species which migrate between Australia and these countries. As noted below, all the migratory species listed in JAMBA, CAMBA and ROKAMBA are protected under the EPBC Act.

- **Bonn Convention**: The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) aims to improve the status of all threatened migratory species through national action and international Agreements. The convention lists migratory species that would benefit from conservation measures undertaken by the countries that have agreed to the Convention.

Commonwealth Level:

- **Environment Protection and Biodiversity Conservation Act 1999 (Cth)** ("EPBC Act"): The EPBC Act aims to protect matters of national environmental significance (see Appendix A), which includes species listed in the international agreements referred to below. Under the EPBC Act, the Commonwealth Department of Environment, Water, Heritage and the Arts

("DEWHA") (formerly the Department of the Environment and Water Resources - DEWR) lists threatened species and threatened ecological communities, determined by criteria set out in the Act (DEW 2006).

State Level:

- Wildlife Conservation Act 1950 (WA) ('WC Act'): The Western Australian Minister for the Environment produces a notice where fauna taxa are listed as protected and are classified as Schedule 1 through to Schedule 4 according to their relative need for protection.

- DEC Priority species: The DEC produces a list of Priority species that have not been assigned statutory protection under the WC Act 1950. Priority Fauna are under consideration as 'Scheduled' fauna, but are in urgent need of further survey or require regular monitoring, and although not currently threatened may become so in the future.

Local Level:

- Species may be considered of local conservation significance due to their patterns of distribution and abundance. Although not formally recognised under legislation, many species are in decline as a result of threatening processes; primarily the loss and/or restriction of breeding grounds, foraging areas or resident habitat due to historical or current land use.

2.1.4 Assignment of Fauna Conservation Codes

A relative level of conservation importance has been assigned to the fauna in this report based on the background information detailed in Section 2.1.3. These levels are outlined below:

- ***Conservation Importance 1 (CI 1):*** Refers to species listed as Declared Threatened Fauna as per international publications, Commonwealth and State Acts. These species are those with a rating of Vulnerable, Endangered or Critically Endangered under the IUCN Red List (International Level) or under the EPBC Act (Commonwealth level), or those with a Schedule rating under the WC Act (State level).

- ***Conservation Importance 2 (CI 2):*** Refers to those species listed as Priority Fauna by the WA branch of the DEC and species listed in peer-reviewed publications of threatened fauna. These species are not officially protected by any legislation, but are considered of conservation importance on a State level.

- ***Conservation Importance 3 (CI 3):*** Species not formally identified (CI 1, CI 2 or CI 4), yet considered of conservation importance on a local level because

of their known distribution and abundance. This status includes regionally endemic species and species with habitats that are in decline.

- ***Conservation Importance 4 (CI 4):*** Species recognised on an international level under treaties such as CAMBA, JAMBA, ROKAMBA and the Bonn Convention, and also on a State level under the EPBC Act list of marine species. Because of the high mobility of many of these species, impacts upon them are generally less direct or severe, therefore offering a lower status of conservation importance.

- ***Conservation Importance 5 (CI 5):*** Refers to species identified by the IUCN as Near Threatened, Least Concern or Data Deficient. Although these species are recognised on an international level, they are considered of lower conservation importance, as they may be widespread and abundant, and not specifically dependent on habitats in the project area.

2.2 SURVEY METHODOLOGY

2.2.1 Desktop Survey

The purpose of a desktop survey is to gather background information on the project area and the fauna it may support. This involves a search of literature, data, aerial photographs and maps for information relating to habitats likely to be found in the area.

A search of the Western Australian Museum's (WAM) FaunaBase (WAM 2003) was undertaken to generate a list of fauna species previously recorded in the area. In addition, a review of literature was conducted, together with a review of historical and current records of fauna species for the project area. Collectively, these sources were used to compile a list of species that could plausibly use the habitat/s in the project area. Habitat knowledge gained from the above initial research, and that gained during the field habitat assessment, were used to refine this list of expected species to those likely to occur at the site.

2.2.2 Field Survey

The purpose of the field survey was to verify the accuracy of the desktop survey and further to delineate and characterise the fauna and faunal assemblages in the project area. The field survey consisted of a fauna habitat assessment, trapping program and opportunistic searches.

Habitat Assessment

During the field survey, the vegetation communities previously identified by ATA (2006) and landforms in the project area were used to identify broad fauna habitats. These fauna habitats were assessed for specific habitat components, such as significant trees with hollows, loose bark, fallen hollow logs, and leaf

litter, to determine the potential of these habitats to support threatened species. In addition to assessing these habitats for the likely occurrence of threatened fauna species, the habitat types were assessed for their complexity and the presence of microhabitats. From these attributes, the fauna habitats were ranked according to the quality they provide for a wider suite of fauna species.

Trapping Program

Fauna habitats identified through the habitat assessment were targeted by the trapping program. A trapping line was established in each fauna habitat type, with each line consisting of 10 trap arrays. Each trap array comprised Elliott and cage traps to target mammal species; funnel traps to target large reptile species; and pot traps to target small fossorial species.

Five sites were established during the survey. These sites were within the ECU South West campus, in the following broad habitat types:

- Tuart and Banksia Woodland over Peppermint Low Woodland;
- Tuart Woodland over Jarrah/*Banksia attenuata*/Peppermint Low Woodland;
- Tuart/Jarrah/Marri Woodland over *Banksia attenuata* Low Woodland;
- Jarrah/Marri Woodland over *Banksia attenuata* Low Woodland;
- *Melaleuca preissiana*/*Melaleuca rhaphiophylla* Woodland over Jarrah/Marri/*Banksia attenuata* Woodland.

The location and habitat details of each site are given in Appendices B1 and B2 respectively, and in Figure 4, with site photographs in Appendix C.

Each trap line contained 10 trap arrays, which consisted of a ~7 m long, 30 cm high fly wire drift fence with two pot traps dug in underneath and a funnel trap at each end. One Elliott trap and one cage trap were positioned at each trap array. The trap lines were positioned approximately 30 m apart. Details of the trap lines at each site are given in Appendix B3.

The trapping program was conducted from 15-21 September 2007, with traps being open for five or six nights each. Details are presented in Appendix B4.

Opportunistic Searches

Opportunistic diurnal and nocturnal searches of major habitats in the project areas were undertaken to search for fauna species. Searches included investigating burrows, investigating scats, tracks and other traces, turning fallen timber, opening standing timber crevices, and raking leaf litter.

Ornithological Surveys

Ornithological surveys were undertaken throughout the project area. Survey locations were roughly limited to trap site locations, but also included adjoining areas. Details of the ornithological surveys are presented in Appendix D.

Nocturnal Survey

A nocturnal survey was conducted over four hours on 20 September 2007. The survey was carried out on foot, using a head torch. The principal aim of the survey was to confirm the status and distribution of Western Ringtail Possums on site and to determine the areas they favoured, in addition to recording observations on other fauna species.

2.2.3 Taxonomic Identification

Where field identification of the species was not possible, specimens were collected in a systematic manner and later identified by reference to relevant manuals.

3 FAUNA

3.1 FAUNA SURVEY CONSTRAINTS

It is important to note the specific constraints imposed on surveys. Constraints are often difficult to predict, as is the extent to which they influence survey outcomes. Survey constraints of the ECU South West Campus fauna survey are detailed in Table 1.

Table 2: Constraints associated with the ECU South West Campus Fauna Assessment

Variable	Impact on Survey Outcomes
Experience levels/ Resources	The biologists who executed these surveys were practitioners suitably qualified in their respective fields. Mr Greg Harewood - Senior Biologist/Ornithologist
Scope: sampling methods/ Intensity	The survey carried out was a Level Two survey, comprising a desktop survey and a site visit that included a habitat assessment, trapping program, and opportunistic observations.
Proportion of fauna recorded/ Completeness	The field survey recorded 65 taxa, which is 38% of the expected fauna for the project area.
Sources of Information	At the bioregion level, the South West has been the subject of many targeted biological surveys, primarily for the resource and residential development sector. Site-specific data is limited, but this is not considered a limiting factor for this survey.
Proportion of task completed	The field survey was completed adequately, with the trapping program and opportunistic searches carried out to a sufficient level. A minimum of five nights were invested in trapping and opportunistic searches, which were conducted from 15-21 September 2007.
Timing, weather, season.	The survey was undertaken in September, after the period of highest seasonal rainfall. The day temperatures were in the high teens, with night temperatures generally being around 10°C (Bureau of Meteorology 2007). These weather conditions were relatively cool, and may have limited the activity of some faunal groups, in particular reptile species.
Disturbances	No disturbances affected the outcomes of the ECU South West Campus fauna survey.
Access problems	All areas were accessible and adequately surveyed during the survey.

3.2 HABITAT ASSESSMENT

The broadly-defined fauna habitats are based principally on vegetation structure and composition as detailed in ATA's 2006 report (ATA 2006), and are listed in Table 3 and shown in Figure 4.

Table 3: Major habitat types for the ECU South West Campus project area

Habitat	Major Landform Type
Tuart and Banksia Woodland over Peppermint Low Woodland	Dune Crest
Tuart Woodland over Jarrah/Banksia attenuata/Peppermint Low Woodland	Dune Crest
Tuart/Jarrah/Marri Woodland over *Banksia attenuata* Low Woodland	Dune Slope
Jarrah/Marri Woodland over Banksia attenuata Low Woodland	Dune Slope and Lower Dune Slope
Melaleuca preissiana/*Melaleuca rhaphiophylla* Woodland over Jarrah/Marri/Banksia attenuata Woodland	Wetland - Dampland

Most of the site shows evidence of historical disturbance, such as logging, clearing for access tracks, frequent fires and past land use (e.g. as a rifle range).

A large percentage of the trees are small. Fallen logs are uncommon and typically are small. The site contains some dead trees that contain hollows. During the course of the opportunistic and habitat assessment, observations of "habitat" trees were recorded using a GPS. The aim of the survey was to document the presence of trees containing significant hollows. For the purposes of this study a "habitat" tree "was defined as "generally an old tree, live or dead, which contains one or more visible hollows (cavities in the trunk or branches) suitable for the occupation of hollow-dependent fauna as nesting, roosting and/or denning sites". In some cases, large trees that did not appear to have hollows were also assessed as habitat trees, as there was potential for them to develop hollows in the short term. Most trees on all the sites were young – presumably a consequence of historical logging.

The assessment of hollows was conducted from ground level. Because it is impossible to determine all the characteristics of hollows favoured by fauna species, the assessment of suitability for fauna was based principally on the size of each hollow's entrance, although other factors such as orientation and position

(relative to ground level) were also taken into consideration. The locations of recorded habitat trees are shown in Figure 5.

3.3 RECORDED FAUNA

The field survey was conducted from 15-21 September 2007, with five sites established in the major fauna habitat types in the project area. One thousand seven hundred and three trap nights (combined total of all trap types) were completed during the survey (Appendix B4). The fauna species recorded (Appendix E and G) during the survey are discussed in the following sections. Additional information on each of the recorded species, classified as CI 1, CI 2 and CI 4, can be found in Appendix F.

3.3.1 Mammals

Twenty-nine species of mammal potentially occur in the general area, 10 of which were recorded in the project area (Appendix G). Of these 10 species, six were introduced species (Dog, Cat, Red Fox, Rabbit, Black Rat and House Mouse)

Conservation Importance 1

Of the four native mammals detected, one species is classified as being of Conservation Importance 1 (CI 1), the Western Ringtail Possum (*Pseudocheirus occidentalis)*.

Western Ringtail Possum *Pseudocheirus occidentalis*

Status and Distribution: Listed as Schedule 1 under the WC Act and as Vulnerable under the EPBC Act. Most known populations are restricted to near-coastal areas of the south-west from the Dawesville area to the Waychinicup National Park. Inland, it is known to be relatively common in a small part of the lower Collie River valley, the Perup Nature Reserve and surrounding forest blocks near Manjimup. Its distribution has reduced dramatically since European settlement for a number of reasons, but destruction of its habitat in the general south-west is believed to be the main threatening process.

Habitat: The Western Ringtail Possum (WRP) was once located in a variety of habitats including Coastal Peppermint, Coastal Peppermint-Tuart, Jarrah-Marri associations, Sheoak woodland, and eucalypt woodland and mallee. Present populations mostly inhabit Coastal Peppermint-Tuart associations from near Bunbury to Albany. Along the Swan Coastal Plain near Busselton, the highest densities occur in habitats with dense, relatively lush vegetation. In these areas the main determinant of suitable habitat for WRPs appears to be the presence of Peppermint *(Agonis flexuosa)* as the dominant tree or as an understorey component of eucalypt forest or woodland (Jones *et al*. 1994a).

Presence in study area: The Tuart/Peppermint associations along the dune crest represent the best potential habitat in the study area, and it was in this area that individual WRPs were sighted during nocturnal survey work. The WRP is less likely to utilise vegetation associations that do not contain Peppermint, especially where the canopy is discontinuous.

This species has been detected in the South West campus (ENV 2006), and populations are also known to exist nearby in bushland bordering Robertson Drive, College Grove, Gelorup, Dalyellup, South Bunbury and Glen Iris.

Conservation Importance 2

Of the four native mammals detected, one species is classified as being of Conservation Importance 2 (CI 2): the Quenda (or Southern Brown Bandicoot) (*Isoodon obesulus fusciventer).*

Quenda *Isoodon obesulus fusciventer*

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

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

Presence in study area: Individuals were captured in the dense sedges in the seasonal wetland at the western edge of the project area. This species may utilise other areas of the study area, but there is a very high chance of fox or cat predation, given the relatively sparse ground cover in most of the project area outside the wetland area.

Conservation Importance 5

The remaining two native mammal species (Common Brushtail Possum and Western Grey Kangaroo) are classified as conservation importance status CI 5. These species have an IUCN rating of Least Concern or Data Deficient, and are therefore not considered of significant conservation value. As a result, these

species will not be discussed further, as they are considered widespread and abundant, and not specifically dependent on the project area at the local level.

3.3.2 Reptiles

Thirty-two species of reptile potentially occur in the project area, nine of which were recorded during the survey period (Appendix G).

Conservation Importance 5

All the reptile species detected are classified under the conservation importance status CI 5. These species have an IUCN rating of Near Threatened, Least Concern, or Data Deficient and are therefore not considered of significant conservation value. Therefore these species will not be discussed further, as they are considered widespread and abundant, and not specifically dependent on the project area at the local level.

3.3.3 Amphibians

Nine species of amphibians potentially occur in the region of the project area (Appendix G), four of which were recorded in the project area during the survey.

Conservation Importance 5

All the amphibian species detected are classified under the conservation importance status CI 5. These species have an IUCN rating of Near Threatened, Least Concern, or Data Deficient and are therefore not considered of significant conservation importance. As a result, these species will not be discussed further, as they are considered widespread and abundant, and not specifically dependent on the project area at the local level.

3.3.4 Birds

One hundred species of bird potentially occur in the project area, 42 of which were recorded in the project area during the survey (Appendix G).

Conservation Importance 1

Of the 42 bird species observed, one is classified as CI 1, Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*).

Carnaby's Black- Cockatoo *Calyptorhynchus latirostris*

Status and Distribution: Carnaby's Black Cockatoo is listed as Schedule 1 under the WC Act and as Endangered under the EPBC Act. Confined to the south-west of Western Australia, north to the lower Murchison River and east to Nabawa, Wilroy, Waddi Forest, Nugadong, Manmanning, Durokoppin, Noongar (Moorine Rock), Lake Cronin, Ravensthorpe Range, head of Oldfield River,

20km ESE of Condingup and Cape Arid; also casual on Rottnest Island (Johnstone and Storr 1998).

Habitat: Forests, woodlands, heathlands, farms; feeds on banksia, hakeas, dryandras and Marri. Breeding occurs in winter/spring mainly in eastern forest and wheatbelt where they can find mature hollow-bearing trees to nest in (Morcombe, 2003).

Likely presence in study area: This species was observed several times feeding on banksia and marri trees in the project area. Several individuals were also observed investigating hollows in a dead tuart. It is not clear if this was with the intention of selecting a hollow for breeding, or normal investigative behaviour of non-breeding birds.

Conservation Importance 3

Fourteen bird species classified as CI 3 were observed during the survey (Appendix G). All the species in the CI 3 category observed in the study area are Bush Forever 'decreaser' species. Whilst not classified as Rare, Threatened or Vulnerable under any State or Commonwealth legislation, these species have been listed as of significance on the Swan Coastal portion of the Perth Metropolitan Region (Bush Forever - Government of Western Australia 1998, 2000).

Although the study area is outside the Perth metropolitan area, there are similar development pressures on bushland remnants in the Bunbury region. Therefore Bush Forever species, if present, should be taken into consideration when determining an area's fauna value to ensure actions are taken that will aid in their continuing presence in the region.

Conservation Importance 5

The remaining 27 bird species are classified as CI 5 because of their IUCN rating of Near Threatened, Least Concern, or Data Deficient. These species will not be discussed further, as they are considered widespread and abundant, and not specifically dependent on the project area at the local level.

3.4 POTENTIALLY OCCURRING FAUNA

Fauna species of conservation importance that potentially occur in the project area are discussed in the following sections. This list of species (Appendix F) has been refined through the assessment of the habitat in the project area. More detailed information on each of the potentially occurring species, classified as CI 1, CI 2 and C4, is given in Appendix F.

3.4.1 Mammals

Conservation Importance 1

There are three mammal species classified as CI 1 which were not detected during the fauna assessment but, based on published records, could potentially occur in the project area (Appendices F and G). One species (the Quokka) has been omitted from the potential listing (Appendix G) because of a lack of suitable habitat and its known local extinction.

Chuditch *Dasyurus geoffroii*

Status and Distribution: Listed as Schedule 1 under the WC Act and as Vulnerable under the EPBC Act. Formerly occurred over nearly 70% of Australia. The Chuditch now has a patchy distribution throughout the Jarrah forest and mixed Karri/Marri/Jarrah forest of south-west Western Australia. Also occurs in very low numbers in the Midwest, Wheatbelt and South Coast Regions, with records from Moora to the north, Yellowdine to the east and south to Hopetoun.

Habitat: Chuditch are known to have occupied a wide range of habitats from woodlands, dry sclerophyll (leafy) forests, riparian vegetation, beaches and deserts. Riparian vegetation appears to support higher densities of Chuditch, possibly because food supply is better or more reliable and better cover is offered by dense vegetation. Chuditch appear to utilise native vegetation along roadsides in the Wheatbelt (CALM 1994). The estimated home range of a male Chuditch is more than 15 $km^{2,}$ whilst that for females is 3-4 km^2 (Sorena & Soderquist 1995).

Likely presence in study area: This species is rarely recorded on the coastal plain, though its occasional presence in the general area cannot be discounted. The nearest most recent record in the DEC database is from Eaton in 2000. The species may occasionally pass through the general area, but is unlikely to be specifically attracted to the study site because of a general lack of suitable daytime refuges and its relatively small size. Could be considered locally extinct.

Southern Brush-tailed Phascogale *Phascogale tapoatafa tapoatafa*

Status and Distribution: Listed as Priority 3 by DEC. Present distribution is believed to have been reduced to approximately 50% of its former range. Now known from Perth and south to Albany, west of Albany Highway. Occurs at low densities in the northern Jarrah forest. Highest densities occur in the Perup/Kingston area, Collie River valley, and near Margaret River and Busselton (DEC information pamphlet). Records are less common from wetter forests. Most recent DEC record from Glen Iris (4 km north-east of the project area) in 2003.

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

Likely presence in study area: Possibly present in the general area, and therefore may use the study site as part of a larger home range. Number of hollow trees appears to be relatively low, so population numbers, if present at all, can be expected to be low.

Quokka *Setonix brachyurus*

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

Species or species habitat listed as likely to occur in general area in EPBC database search.

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

Likely presence in study area: No suitable habitat for this species is present and it would not utilise the study area under normal circumstances. Without doubt locally extinct.

Conservation Importance 2

Two mammal species classified as CI 2 potentially occur in the project area (Appendices F and G). One species (the Water Rat) has been omitted from the potential listing (Appendix G) because of a lack of suitable habitat.

Western Brush Wallaby *Macropus irma*

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

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

Likely presence in study area: Habitat on site is marginal for this species, given its small size and the proximity of existing development. May occasionally stray into the study site from larger adjoining bush remnants, but would not persist. Listed as a potential species, but possibly locally extinct as there are no recent records from the immediate vicinity.

Western False Pipistrelle *Falsistrellus mackenziei*

Status and Distribution: Listed as Priority 4 by DEC. Confined to south-west W.A. south of Perth and east to the Wheatbelt. Most records from Karri forests, but also recorded in wetter stands of jarrah and tuart and woodlands on the Swan Coastal Plain (Menkhorst & Knight 2001).

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

Likely presence in study area: This species is a likely inhabitant of the general study area, as suitable habitat appears to be present.

Water Rat *Hydromys chrysogaster*

Status and Distribution: Listed as Priority 4 by DEC. The water rat is widely distributed around Australia and its offshore islands, New Guinea and some adjacent islands. It occurs in fresh brackish water habitats in the south-west of Western Australia, but occurs in marine environments along the Pilbara coastline and offshore islands. Surveys in the south-west suggest this species is relatively common and widespread, though difficult to capture (Christensen *et al*. 1985, How *et al.* 1987).

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

Likely presence in study area: No suitable habitat for this species is present and it would not utilise the study area under normal circumstances. Not listed as a potential species.

Conservation Importance 3

Two mammal species classified as CI 3 potentially occur in the project area (Appendix G).

Western Pygmy Possum *Cercartetus concinnus*

Status and Distribution: Not listed under any Federal or State legislation, but noted by Dell (2000) as a species of regional significance because of declining populations on the Swan Coastal Plain, especially between Mandurah and Busselton. The species is widespread in the Wheatbelt and the south coast of Western Australia (Menkhorst & Knight 2001). Does not appear common, but is widespread. Some evidence that numbers may fluctuate widely (Christensen *et al*. 1985).

Habitat: Appears to favour coastal and sub-coastal banksia woodland and heathland (Christensen *et al*. 1985).

Likely presence in study area: Suitable habitat for this species is present, and it may be present.

Honey Possum *Tarsipes rostratus*

Status and Distribution: Not listed under any Federal or State legislation, but noted by Dell (2000) as a species of regional significance because of declining populations on the Swan Coastal Plain, especially between Mandurah and Busselton. Locally common in coastal Western Australia from Kalbarri to Esperance (Menkhorst & Knight 2001). Some evidence that numbers may fluctuate widely (Christensen *et al*. 1985).

Habitat: Favours coastal and sub-coastal areas. This species is mostly found in open woodland of *Banksia attenuata*, or Sheoak *Allocasuarina fraseriana*, or areas of heathland with Bottle Brush *Beaufortia sparsa* on sandy soil (Christensen *et al*. 1985). Needs high diversity of shrubs with overlapping flowering seasons to provide year-round nectar (Menkhorst & Knight 2001).

Likely presence in study area: Possibly present, as habitat appears consistent with requirements.

Conservation Importance 5

Thirteen mammal species (additional to those recorded) classified as CI 5 potentially occur in the project area (Appendix G). As stated previously, these species have an IUCN rating of Near Threatened, Least Concern, or Data Deficient, and do not qualify for the rating of Vulnerable. These species will not be discussed further, as many of them are considered widespread and abundant and not specifically dependent on the project area at the local level.

3.4.2 Reptiles

Conservation Importance 1

One reptile species classified as CI 1 potentially occurs in the project area (Appendices F and G).

Southern* Carpet Python *Morelia spilota impricata

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

Habitat: This species has been recorded from semi-arid coastal and inland habitats, banksia woodland, eucalypt woodlands, and grasslands. It commonly utilises hollow logs for shelter.

Likely presence in study area: Recently recorded at Dalyellup (Perkins Brothers Builders, pers. comm.), and therefore, despite there being no DEC database records and no recent WAM records of this species occurring in the general area, its presence cannot be discounted. If present, population densities are expected to be low.

Conservation Importance 5

Twenty-three reptile species (additional to those recorded) classified as CI 5 potentially occur in the project area (Appendix G). These species have an IUCN rating of Near Threatened, Least Concern, or Data Deficient. These species will not be discussed further, as many of them are considered widespread and abundant and not specifically dependent on the project area at the local level

3.4.3 Amphibians

Conservation Importance 5

Six amphibian species (additional to those recorded) classified as CI 5 potentially occur in the project area (Appendix G). These species have an IUCN rating of Near Threatened, Least Concern, or Data Deficient. These species will not be discussed further, as many of them are considered widespread and abundant and not specifically dependent on the project area at the local level

3.4.4 Birds

Conservation Importance 1

Three bird species (in addition to the one recorded) classified as CI 1 potentially occur in the project area (Appendix F and G). One species (the Australasian Bittern) has been omitted from the potential listing (Appendix G) because of a lack of suitable habitat for it.

Australasian Bittern Botaurus poiciloptilus

Status and Distribution: Classified as Schedule 1 under the WC Act. The species is uncommon to rare (Morcombe, 2003), but locally common in wetter parts of the south-west (Johnstone & Storr 1998). Occurs north to Moora and east to Mt Arid (Johnstone & Storr 1998).

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

Likely presence in study area: This species is extremely difficult to observe because of its preferred habitat. There appears to be no recent WAM, DEC or Birds Australia records of this species from the area. Potential habitat in the study area (the wetland) appears very marginal, and as a consequence this species has been omitted from the potential species listing (Appendix G).

Peregrine Falcon *Falco peregrinus*

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

Habitat: Diverse from rainforest to arid shrublands, from coastal heath to alpine (Morcombe 2003). Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes (Johnstone & Storr 1998). The species utilises the ledges, cliff-faces and large hollows/broken spouts of trees for nesting. Also occasionally uses the abandoned nests of other birds of prey.

Likely presence in study area: The species may utilise some sections of the study area as part of a much larger home range. Some tree hollows (broken spouts) in the project area could be regarded as potential nest sites, though this is difficult to qualify. No evidence of breeding found.

Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*

Status and Distribution: This species is listed as Schedule 1 under the WC Act. Found in the humid and subhumid south-west, mainly hilly interior, north to Gingin and east to Mt Helena, Christmas Tree Well, North Bannister, Mt Saddleback, Rock Gully and the upper King River (Johnstone & Storr 1998).

Habitat: Eucalypt forests, feeds on Marri, Jarrah, Blackbutt, Karri, Sheoak and Snottygobble. Breeding commences in winter/spring (Johnstone & Storr 1998). The Forest Red-tailed Black Cockatoos has been recorded nesting in jarrah, marri, karri and wandoo trees (Gould 1865, Abbott 1998, Johnstone & Kirkby 1999). It needs hollows in standing trees as nesting sites. The nest site is usually a vertical hollow in the trunk, and sometimes in a large branch. Nest hollows in marri range from 8-14m above ground, with the entrance size 12-41cm and depth of the hollow 1-5m (Johnstone & Storr 1998).

Likely presence in study area: A likely infrequent visitor to the area. This species is more often observed along and inland of the Darling and Whicher Scarps or along drainage lines on the coastal plain.

Baudin's Black Cockatoo *Calyptorhynchus baudinii*

Status and Distribution: Listed as Scheduled 1 under the WC Act and as Vulnerable under the EPBC Act. Confined to the south-west of Western Australia, north to Gidgegannup, east to Mt Helena, Wandering, Quindanning, Kojonup, Frankland and King River and west to the eastern strip of the Swan Coastal Plain including West Midland, Byford, North Dandalup, Yarloop, Wokalup and Bunbury. (Johnstone & Storr 1998).

Habitat: Mainly eucalypt forests, where it feeds primarily on the Marri seeds, (Morcombe 2003), banksia, hakeas and *Erodium* sp. Also strips bark from trees in search of beetle larvae (Johnstone & Storr 1998).

Likely presence in study area: This species is probably a frequent visitor to the general area.

Conservation Importance 2

Two bird species classified as CI 2 potentially occur in the project area (Appendices F and G). Four further species (Bush Stone Curlew, Black Bittern, Little Bittern and Western Shrike-tit) have been omitted from the potential listing (Appendix G) because of a lack of suitable habitat or their known local extinction.

Black Bittern *Ixobrychus flavicollis*

Status and Distribution: Listed as Priority 2 by DEC. Occurs north to Yanchep and Northam and east to Albany (Johnstone & Storr 1998).

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

Likely presence in study area: Very difficult to observe, and therefore few records exist. There appears to be no recent WAM, DEC or Birds Australia records of this species from the area. Potential habitat in the study area (the

wetland) appears very marginal, and as a consequence this species has been omitted from the potential species listing (Appendix G).

Little Bittern *Ixobrychus minutus*

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

Habitat: Usually located on dense vegetation beds of freshwater pools, swamps and lagoons, well screened with trees. Shelters in dense beds of *Typha*, *Baumea* and tall rushes in freshwater swamps around lakes and along rivers (Johnstone & Storr 1998).

Likely presence in study area: Very difficult to observe, and therefore few records exist. There appears to be no recent WAM, DEC or Birds Australia records of this species from the area. Potential habitat in the study area (the wetland) appears very marginal, and as a consequence this species has been omitted from the potential species listing (Appendix G).

Bush Stone Curlew *Burhinus grallarius*

Status and Distribution: Listed as Priority 4 by DEC. Occurs over much of the western half of the State (and Kimberley) but rare to uncommon in the south of its range because of fox predation (Johnstone & Storr 1998).

Habitat: Lightly wooded country (including partly-cleared forests) near daytime shelter, e.g. thickets or long grass (Johnstone & Storr 1998).

Likely presence in study area: There is one DEC database record from Bunbury in 1939. No recorded sightings since suggest the species is locally extinct. Not listed as a potential species.

Barking Owl *Ninox connivens connivens*

Status and Distribution: Listed as Priority 2 by DEC. Found north to Perth (formerly) and east to Northam, Katanning and nearly to Bremer Bay. Declining in south-west (Johnstone & Storr 1998).

Habitat: Dense vegetation, especially forest and thickets of waterside vegetation such as melaleucas (Johnstone & Storr 1998). Roosts in tree hollows.

Likely presence in study area: Based on preferred habitat descriptions, this species potentially occasionally frequents areas of densest vegetation in the west of the study area. Listed as a potential species, but most likely a rare visitor to the site.

Masked Owl *Tyto novaehollandiae*

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

Habitat: Roosts and nests in heavy forest, hunts over open woodlands and farmlands (Morcombe 2003). Probably breeding in forested deep south-west with some autumn–winter wanderings northwards (Johnstone & Storr 1998).

Likely presence in study area: Potentially frequents areas of densest vegetation. More likely to be an infrequent visitor to the site than a resident.

Western Shrike Tit *Falcunculus frontatus leucogaster*

Status and Distribution: Listed as Priority 4 by DEC. The species is locally common (e.g. Boyup Brook), but generally scarce or rare and locally extinct (e.g. Swan Coastal Plain and much of Wheatbelt). Occurs mainly in southern subhumid and semiarid interior from Moora, Kodj Kodjin, Narembeen, Bank Rock and Newman Rock, south to Pemberton, Lake Muir, Porongurup Range, lower Fitzgerald River, Forrestania, Maggie Hays Hill and Little Jam Hill and west to Julimar, Christmas Tree Well, Mt Saddleback and Boyup Brook (Johnstone & Storr 1998).

Habitat: Woodlands, scrubs and more open forest of *Eucalyptus*, especially of wandoo (*E. wandoo*), flat topped yate (*E. occidentalis*), karri (*E. diversicolor*), tingle (*E.* jacksonii), flooded gum (*E. rudis*), salmon gum (*E. salmonaphloia*) and gimlet (*E. salubris*) (Johnstone & Storr 1998).

Likely presence in study area: No recent records in area, suggesting this species is locally extinct despite the presence of suitable habitat. Not listed as a potential species.

Conservation Importance 3

A further 17 bird species classified as CI 3 but not observed during the survey (Appendix G) may occasionally utilise the site. Whilst not classified as Rare, Threatened or Vulnerable under any State or Commonwealth legislation, these species have been listed as of significance on the Swan Coastal portion of the Perth Metropolitan Region (Bush Forever - Government of Western Australia 1998, 2000).

Whilst the study area is outside the Perth metropolitan area, similar development pressures exist on bushland remnants in the Bunbury region. Therefore Bush Forever species, if present, should be taken into consideration when determining an area's fauna value to ensure actions are taken that will aid in their continued presence in the region.

Conservation Importance 4

Four bird species classified as CI 4 potentially occur in the project area (Appendices F & G). One species (White-bellied Sea Eagle) has been omitted from the potential listing (Appendix G) because of a lack of suitable habitat.

White-bellied Sea Eagle *Haliaeetus leucogaster*

Status and Distribution: This species is listed as migratory under the EPBC Act and under international agreements to which Australia is a signatory. White-bellied sea eagles are moderately common to common on Kimberley and Pilbara islands, coasts and estuaries, on Bernier, Dorre and Dirk Hartog Island, in Houtman Abrolhos and in the Archipelago of the Recherche; rare to uncommon elsewhere (Johnstone & Storr 1998). Also found in New Guinea, Indonesia, China, southeast Asia and India. Scarce near major coastal cities (Morcombe 2003).

Habitat: Nests and forages usually near the coast, over islands, reefs, headlands, beaches, bays, estuaries, mangroves, but also lives near seasonally flooded inland swamps, lagoons and floodplains, often far inland on large pools of major rivers. Established pairs usually sedentary, immatures dispersive (Morcombe 2003). White-bellied Sea-Eagles build a large stick nest, which is used for many seasons in succession.

Likely presence in study area: The species is unlikely specifically to frequent the site. May fly over on rare occasions. Not listed as a potential species

Great Egret *Ardea alba*

Status and Distribution: This species of egret is listed as migratory under the EPBC Act and under international agreements to which Australia is a signatory. The Great Egret is common and very widespread in any suitable permanent or temporary habitat (Morcombe 2003).

Habitat: Wetlands, flooded pasture, dams, estuarine mudflats, mangroves and reefs (Morcombe 2003).

Likely presence in study area: May visit the seasonally-inundated wetland area in the western section of the study area. Site appears unsuitable for breeding.

Cattle Egret *Ardea ibis*

Status and Distribution: This species of egret is listed as migratory under the EPBC Act and under international agreements to which Australia is a signatory. The Cattle Egret is common in the north sections of its range, but is an irregular visitor to the better watered parts of the State (Johnstone & Storr 1998). The population is expanding (Morcombe 2003).

Habitat: Moist pastures with tall grasses, shallow open wetlands and margins, mudflats (Morcombe 2003).

Likely presence in study area: Possibly visits the seasonally-inundated areas in the south-east section of the study area, but this does not represent significant habitat for this species because of its limited extent and its degraded nature. Site is unsuitable for breeding.

Likely presence in study area: May visit the seasonally-inundated wetland area in the western section of the study area, but tends to favour more open areas. Site appears unsuitable for breeding.

Fork-tailed Swift *Apus pacificus*

Status and Distribution: The Fork-tailed Swift is listed as migratory under the EPBC Act and under international agreements to which Australia is a signatory. It is a summer migrant (October-April) to Australia (Morcombe 2003).

Habitat: Low to very high airspace over varied habitat from rainforest to semi-desert (Morcombe 2003).

Likely presence in study area: Potentially an occasional summer visitor to the general study area. Entirely aerial and largely independent of terrestrial habitats.

Rainbow Bee-eater *Merops ornatus*

Status and Distribution: This species is listed as migratory under the EPBC Act and under international agreements to which Australia is a signatory. The Rainbow Bee-eater is a common summer migrant to southern Australia, but resident in the north (Morcombe 2003).

Habitat: Open country, of woodlands, open forest, semi-arid scrub, grasslands, clearings in heavier forest, farmlands (Morcombe 2003). Breeds underground in areas of suitable soft soil firm enough to support tunnel building.

Likely presence in study area: Potential seasonal visitor to site. Possibly breeds onsite.

Conservation Importance 5

In additional to those recorded in the project area and its vicinity, a further 41 bird species classified as CI 5 potentially occur in the project area (Appendix H4). As discussed previously, these species are considered widespread and abundant, and not specifically dependent on the project area. Potential impacts associated with the project are unlikely to affect these species.

4 POTENTIAL IMPACTS, CONSTRAINTS, AND MANAGEMENT

4.1 POTENTIAL IMPACTS OF DEVELOPMENT

As the precise nature and extent of likely development on the site is not known, it is possible only to identify potential impacts. The potential impact on fauna species depend on the population density of each species, and the quantity and quality of potential foraging/breeding/roosting/denning habitat that is affected by any development.

The most significant potential impacts are:

- loss of vegetation/fauna habitat;
- fragmentation of vegetation/fauna habitat, which may restrict the movement of some fauna species;
- modifications to surface hydrology;
- increases in the number of vehicle movements and consequential loss of individual fauna as a result of vehicle impacts;
- changes to fire regimes; and
- death, injury or disturbance of fauna during clearing and construction.

4.2 POTENTIAL CONSTRAINTS ON DEVELOPMENT

Certain constraints may alone be sufficiently significant to prohibit development in the study area. Conversely, whilst individual constraints may not restrict development in the study area, a combination of constraints may do so. Thus it is important, when assessing development potential, to consider not only constraints relating to fauna in isolation, but collectively.

The fauna assessment has identified the presence and potential presence of a number of species of conservation significance in the project area. Three species of significance were confirmed as utilising the site:

- Western Ringtail Possum
- Carnaby's Black Cockatoo
- Quenda

Several other significant species are also potentially present or utilise the site at times. Those considered to have the greatest potential of being present and/or the most likely to be affected by any future development are:

- Forest Red-tailed Black Cockatoo
- Baudin's Black Cockatoo

The presence of threatened fauna species and their habitat in the project area represents a potentially significant constraint on development, as implications arise with respect to the Environmental Protection Act 1986 (WA), administered by the State Department of Environment and Conservation (DEC) and the Environmental Protection and Biodiversity Conservation Act 1999 (Cth), administered by the Federal Department of Environment, Water, Heritage and the Arts (DEWHA).

Any clearing required for development on site will need to be assessed against the ten clearing principles related to native vegetation in the Environmental Protection Act. These principles provide a guide for assessing requests to clear native vegetation, and the DEC must consider these principles in making a decision on whether to issue a clearing permit. One principle relates directly to fauna, and states:

- Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia

This principle is most likely to be considered with respect to Western Ringtail Possums and their potential habitat onsite, and has the potential to constrain the location and extent of any future development.

Similar constraints on development may also arise because of certain provisions of the EPBC Act. If an action (e.g. development of the project site) is deemed likely to have a significant impact on listed species, a referral to DEWHA is required. Approval for development may be hindered or denied if it can not be demonstrated that the impact on threatened species can be mitigated, offset or prevented.

It should also be noted that the Significant Impact Guidelines have recently undergone a review, and new draft policy guidelines are expected shortly. The definition of 'significant impact" is understood to have been redefined, and in relation to current understanding of Western Ringtail Possum (WRP) ecology, the Australian Government deems an action is likely to have a significant impact on the WRP in the Southern Swan Coastal Plain Region if it:

- reduces the ability of the region to support the persistence of the WRP;

- modifies, destroys, removes or isolates important remnant habitat patches, or decreases the availability or quality of remnant habitat patches;
- adversely affects connections between important areas; or
- interferes substantially with the ability of the area to contribute effectively to the recovery of the species.

The revised guidelines have categorised certain areas between Bunbury and Dunsborough as "Core Habitat", "Supporting Habitat" or "Primary Corridors". The ECU South West Campus falls in an area defined as "Supporting Habitat" (also referred to as Area 2). As defined in the revised guidelines, a significant impact on WRPs is deemed "likely" if there is a real chance or possibility that an action in the defined Area 2 will result in:

- any clearing of a remnant habitat patch greater than 0.5ha;
- the clearing of more than 50% of a remnant habitat patch of 0.2-0.5ha;
- the fragmentation of any existing habitat linkages; or
- the sterilisation of an area to the extent that appropriate corridors could not be enhanced or re-established in future.

Within the draft guidelines document, an "important remnant habitat patch" is defined as:

> "an area of native vegetation used or occupied by the Western Ringtail Possum that is greater than 0.1 hectares in size in core habitat areas and primary corridors or 0.2 hectares in size in supporting habitat areas. A patch is an area with more than 30% Peppermint tree canopy cover that is disjunct".

If the abovementioned criteria were applied to the project area, then it would be deemed that a significant impact is "likely" if clearing of vegetation in any of the areas on site containing Peppermint (fulfilling the "habitat patch" classification) over the threshold values were to take place.

It is understood that significant impact guidelines are currently being formulated for some or all of the black cockatoo species. As the project area contains trees that have potential nest hollows and areas of foraging habitat for cockatoos, it is very important that any development affecting these elements be taken into serious account during the planning process.

In relation to fauna habitat in general, the remnant vegetation onsite has been recognised as part of a regionally-significant ecological linkage. As part of its assessment of the Greater Bunbury Region Scheme, the EPA identified 16 preliminary ecological linkages in the Scheme area (EPA 2003). The linkages

are based on sequences of ecological communities that join or potentially join the major landform elements in the region. One of the identified linkages, the Maidens/Preston River Ecological Linkage, includes the study area.

The EPA (2003) has specifically stated that naturally vegetated areas (and in particular larger, relatively intact, remnants) in the linkage areas will be priorities for retention and protection, subject to them meeting criteria for regional significance against at least two criteria - "Representation of ecological communities" and "Maintaining ecological processes or natural systems". Taking into consideration the presence of several fauna species of conservation significance, parts of the project area are likely to fulfil these criteria, and therefore maintenance of the site's function as an ecological linkage must be taken into consideration when planning any future development.

4.3 MANAGEMENT RECOMMENDATIONS

Details of development in remnant bushland at the South West Campus site are not known at this stage, and therefore the degree and nature of impacts on fauna species cannot be determined with accuracy. Taking into consideration the potential impacts and constraints, the following general recommendations, with particular reference to species of conservation significance, are made:-

Western Ringtail Possum

- This species favours areas of vegetation containing Peppermint (naturally-occurring and planted) on the South West Campus. Future development should take this into account, and the retention of significant portions of this habitat should be a priority in the planning process.

- If reasonable and practical, any development should aim to retain habitat of sufficient size and quality to support all individuals that may be displaced as a result of any development. Where the clearing of WRP habitat is required, the creation and enhancement of suitable habitat elsewhere should be planned for and undertaken to offset the loss.

- Wherever landscape planting is carried out, it should include the dominant species found in remnant vegetation in the area. As far as practical, plantings should be planned to create a continuous link between remnant vegetation in and adjacent to the project area.

- Targeted WRP surveys of the remnant vegetation should be undertaken as part of the planning process to identify areas of most significance to the species by detailing its status and distribution across the site.

- A development-specific WRP management plan should be formulated which details the status and distribution of WRPs onsite, the impact of development, and mitigation and offset measures.

Black Cockatoo species

- The three Black Cockatoo species are highly mobile, and would not specifically rely on the site. Nevertheless, efforts should be made to retain foraging, roosting and potential breeding habitat so that these species continue to utilise the area.

- The identification and accurate plotting of habitat trees with potential to be used by cockatoos for breeding should be undertaken. The location of these trees should be taken into account during development planning, and they should be retained wherever reasonable and practical.

- Where possible, remnant vegetation suitable for cockatoos to use for foraging should be retained and protected. Landscaped areas should be revegetated with local seedstock that includes cockatoo food plants (e.g. *Corymbia, Banksia, Dryandra, Hakea*, *Allocasuarina* etc.)

- If possible, clearing should be conducted outside the breeding season of Black Cockatoo species (early July-December) to avoid disturbing or harming nesting birds.

Quenda

- Quenda appear to be confined to the wetland in the westernmost section of the study area, but may use other areas that contain suitable dense groundcover. The retention and maintenance of this wetland and its fringing vegetation in at least its current condition will aid in this species continuing to be present in the area.

General recommendations relating to all fauna

- An area of vegetation suitable as an east-west ecological linkage should be identified and retained. The linkage should be at least 40m wide. The logical location for such a corridor is along the southern boundary of the project area, including the wetland area, but other factors such as vegetation condition and floristics should also be taken into account.

- Where possible, remnant vegetation that does not require clearing (including single, dead and isolated trees) should be retained and protected. The overall subdivision design should aim to minimise disturbance to areas having good vegetation or habitat values. Larger block sizes should be located in the areas of the best vegetation or habitat values. No vegetation should be cleared in any allotment except for:

  a) compliance with the Bush Fires Act 1954 (as amended);

  b) clearing within the building envelope for a reasonable area;

  c) construction of an approved vehicular access; or

d) for any other reason where specific written approval has been obtained from the relevant governing body.

- Project infrastructure, including access routes, vehicle and plant storage and turnaround areas, etc, should be designed so that previously disturbed areas are used where possible;

- During site works, areas requiring clearing should be clearly marked and access to other areas restricted to prevent accidental clearing of areas that are to be retained;

- Development planning should take into consideration the presence of habitat trees (in addition to those potentially suitable for cockatoos or owls). If possible, all potential habitat trees should be checked for fauna before clearing.

- No dead, standing or fallen timber should be removed unnecessarily. Logs (hollow or not) and other debris resulting from land clearing should be used to enhance fauna habitat in untouched and rehabilitated areas.

- A Construction and Operations Fire Management Plan should be prepared to reduce the risk of unplanned fires and to provide contingency measures to minimise any associated impacts. The plan should include a contingency and response plan in the event of any bushfires that are started as a result of the construction works.

- All construction staff should be made aware that native fauna is protected.

- Native fauna injured during construction should be taken to a designated veterinary clinic or a DEC-nominated wildlife carer.

- During the installation of services, pipe trenches should be kept open only for as long as necessary, and suitable escape ramps and bridging provided if the site is to be left unattended for long periods. Whenever possible, pipe ends should be sealed to prevent fauna entering.

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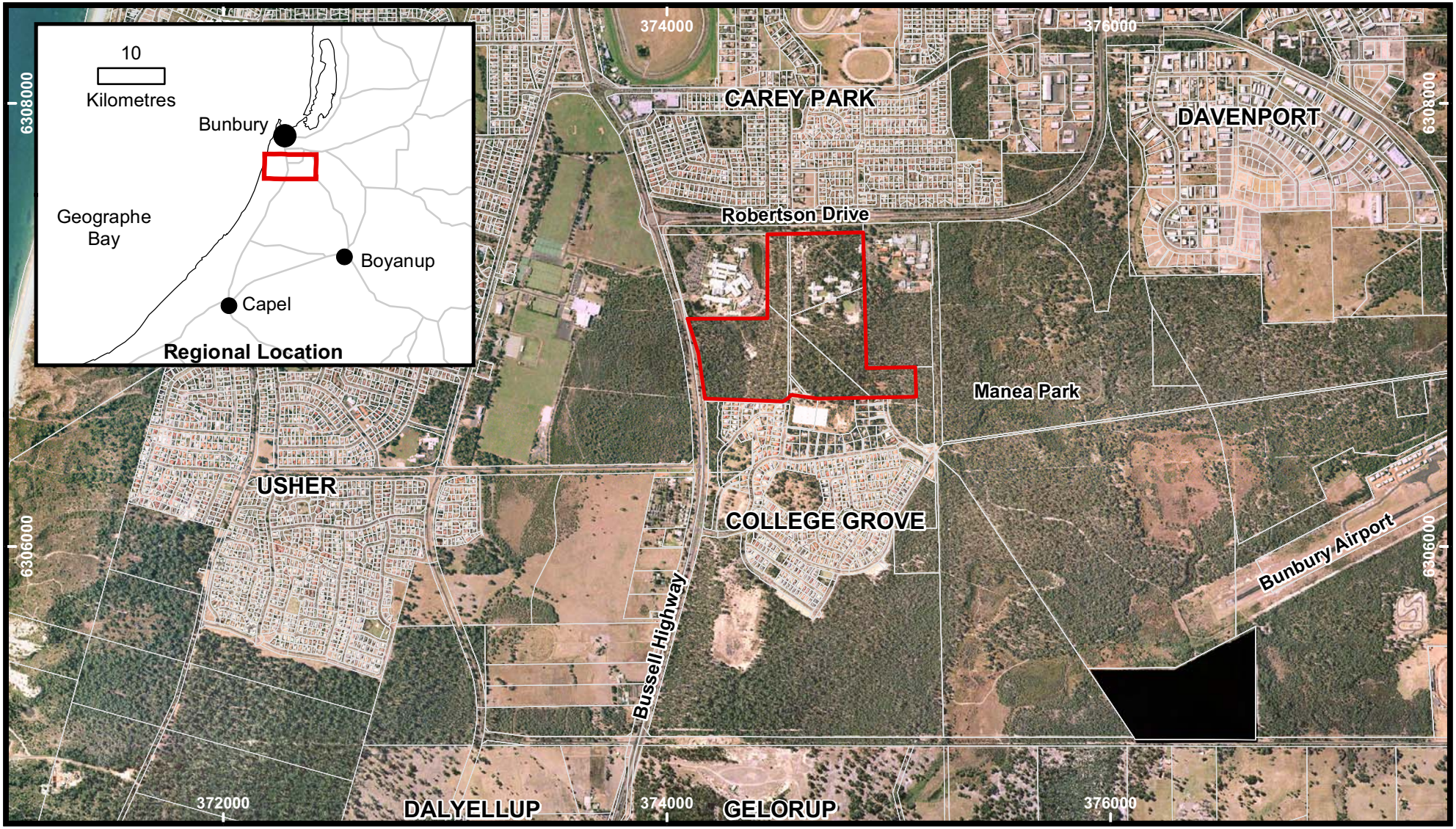
FIGURES



Legend

- Cadastral Boundaries (Existing)
- Project Area Boundary

N

0 0.5 1 1.5 2

Kilometres

MGA Zone 50

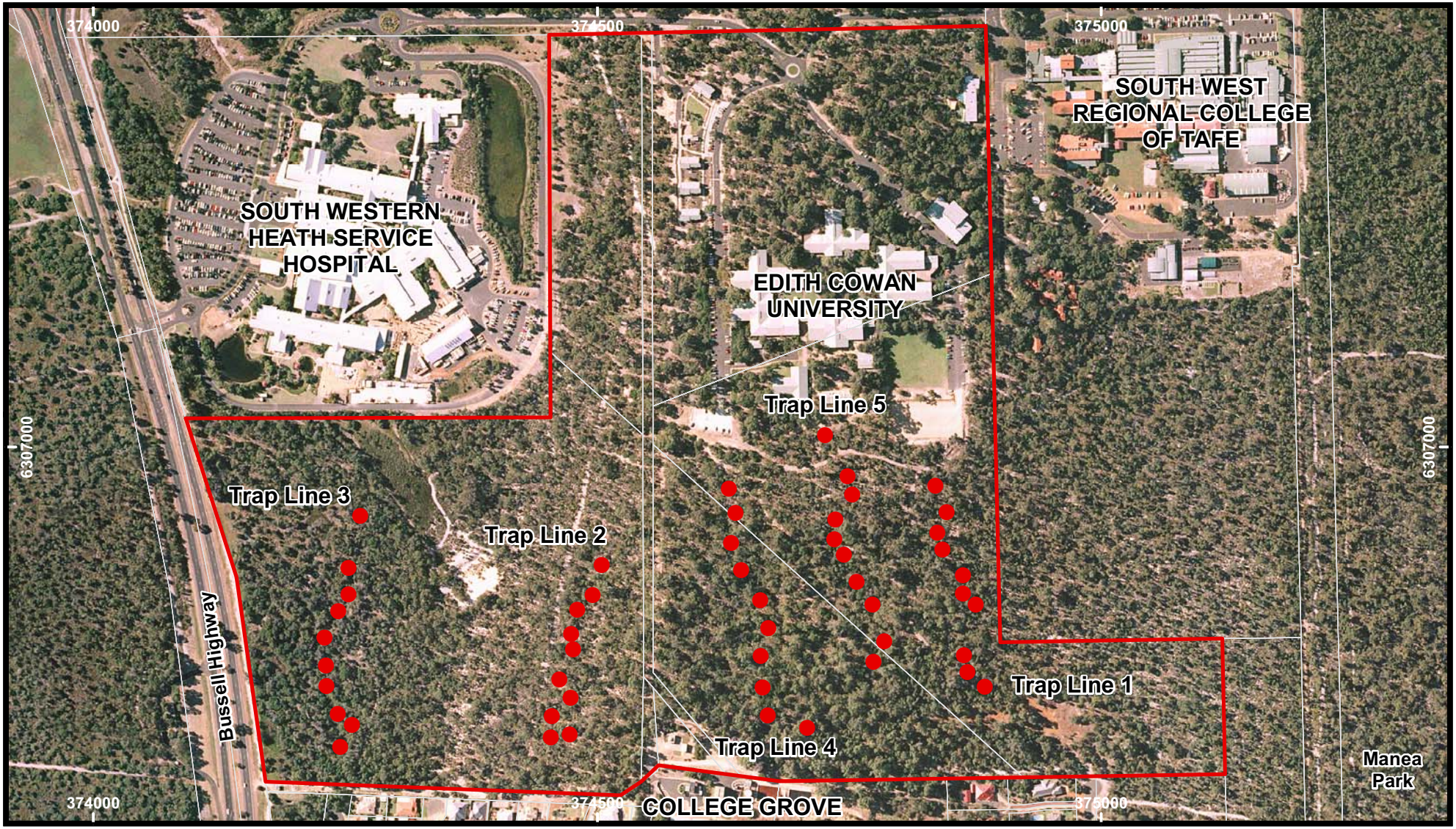
env Australia

ECU
South West Campus

Regional Location

DRAWN:	G Harewood
DATE :	Nov 2007
SCALE:	1: 25,000

Figure: 1



Legend

- Cadastral Boundaries (Existing)
- Project Area Boundary
- Trap Sites

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Metres

MGA Zone 50

env Australia

DRAWN:G Harewood

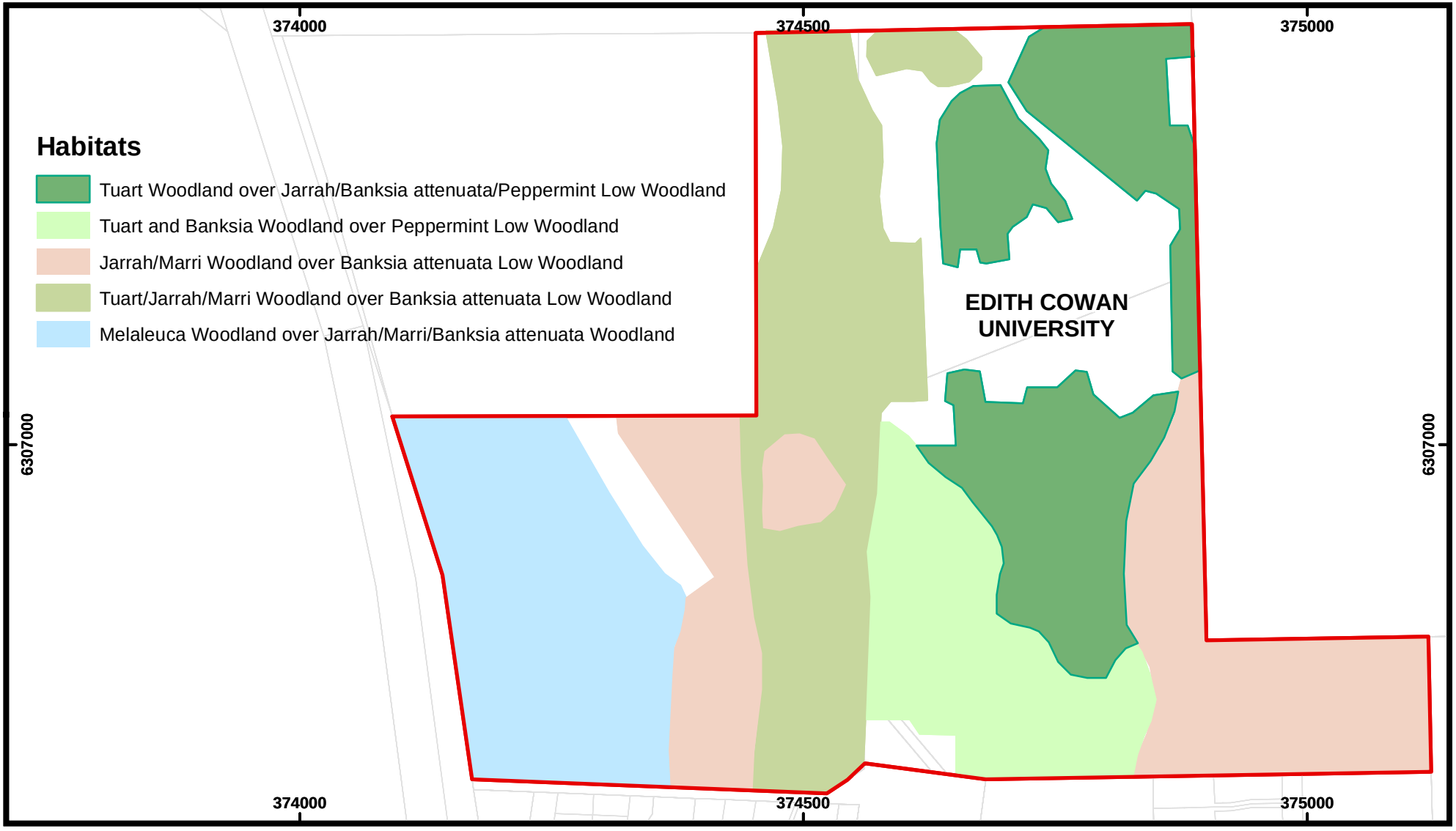
DATE : Nov 2007

SCALE: 1: 5,500

ECU
South West Campus

Trap Locations

Figure: 3



Legend

- Cadastral Boundaries (Existing)
- Project Area Boundary

0 125 250 375 500

Metres

MGA Zone 50

env Australia

DRAWN:G Harewood

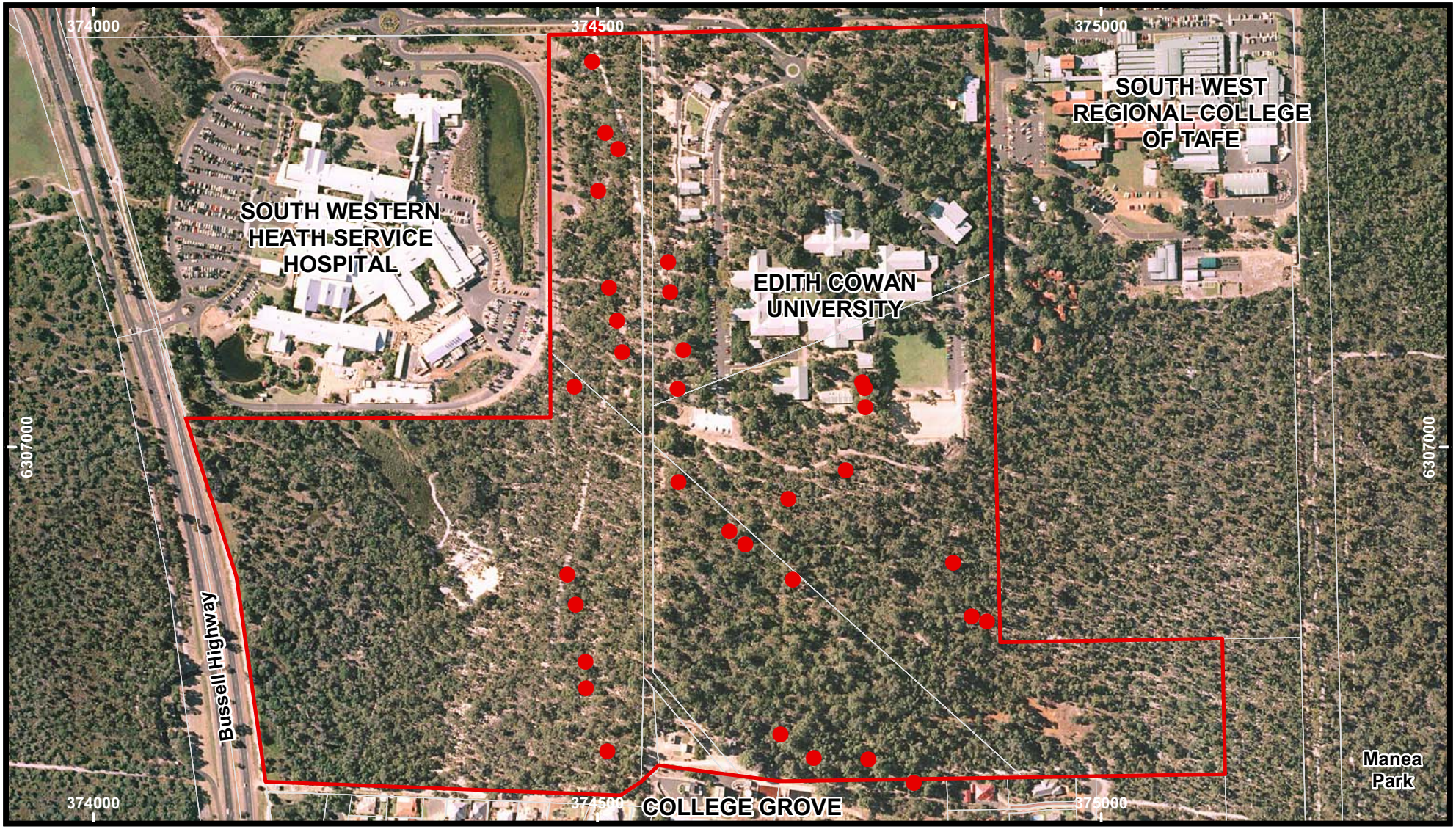
DATE : Nov 2007

SCALE: 1: 5,500

ECU
South West Campus

Fauna Habitats

Figure: 4



Legend

- Cadastral Boundaries (Existing)
- Project Area Boundary
- Habitat Trees

N

0 125 250 375 500

Metres

MGA Zone 50

env Australia

DRAWN:G Harewood

DATE : Nov 2007

SCALE: 1: 5,500

ECU
South West Campus

Habitat Trees

Figure: 5

APPENDIX A

DEFINITION OF CONSERVATION CODES FOR FAUNA OF CONSERVATION SIGNIFICANCE

ECU – SOUTH WEST CAMPUS, BUNBURY
FAUNA ASSESSMENT

APPENDIX A

Definition of Conservation Codes for Fauna of Conservation Significance

Western Australian Threatened Fauna Categories

Category	Code	Description
Schedule 1	S1	Fauna which is rare or likely to become extinct.
Schedule 2	S2	Fauna which is presumed extinct.
Schedule 3	S3	Birds which are subject to an agreement between the governments of Australia and Japan (JAMBA) relating to the protection of migratory birds and birds in danger of extinction.
Schedule 4	S4	Fauna that is otherwise in need of special protection.

Department of Environment and Conservation (DEC) 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 which are considered not currently threatened or in need of special protection, but could be if present circumstances change. Usually represented on conservation lands.
Priority 5	P5	Taxa in need of monitoring which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Environment Protection and Biodiversity Conservation Act 1999 (EPBC)
Threatened Species Codes

Category	Code	Description
Extinct	EX	Taxa for which there is no reasonable doubt that the last member of the species has died.
Extinct in the wild	EW	Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range and it has not been recorded in known or expected habitat despite exhaustive survey over a time frame appropriate to its life cycle and form.
Critically endangered	CR	Taxa which is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	EN	Taxa which is not critically endangered but is facing a high risk of extinction in the wild in the near future.
Vulnerable	VU	Taxa which is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium-term future.
Conservation dependent	CO	Taxa which are 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.

IUCN Red List of Threatened Species Codes

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

International conventions and agreements

Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)

This is an intergovernmental treaty under the United Nations Environmental Program which lists migratory species that would significantly benefit from international cooperation on their conservation and management.

Japan-Australia Migratory Bird Agreement (JAMBA)

This is an agreement between the Government of Australia and the Government of Japan for the protection of migratory, threatened and birds in danger of extinction. It requires both parties to conserve and protect the birds and their habitats as well as exchange information and build a cooperative relationship.

China-Australia Migratory Bird Agreement (CAMBA)

This is an agreement between the Government of Australia and the Government of the People's Republic of China for the protection of migratory birds and their environment. It requires both parties to conserve and protect the birds and their habitats as well as exchange information and build a cooperative relationship.

APPENDIX B
TRAPPING PROGRAM

ECU – SOUTH WEST CAMPUS, BUNBURY
FAUNA ASSESSMENT

APPENDIX B

TRAPPING PROGRAM

Appendix B1 - Trap Site Locations

Trap Number	#GPS Coordinates	
	Easting	Northing
S1.01	374884	6306761
S1.02	374867	6306776
S1.03	374863	6306793
S1.04	374875	6306843
S1.05	374863	6306854
S1.06	374862	6306872
S1.07	374842	6306898
S1.08	374837	6306914
S1.09	374846	6306935
S1.10	374835	6306960
S2.01	374504	6306882
S2.02	374495	6306853
S2.03	374480	6306838
S2.04	374474	6306813
S2.05	374476	6306799
S2.06	374462	6306769
S2.07	374473	6306751
S2.08	374455	6306732
S2.09	374453	6306711
S2.10	374472	6306714
S3.01	374244	6306701
S3.02	374256	6306724
S3.03	374242	6306735
S3.04	374231	6306762
S3.05	374231	6306783
S3.06	374229	6306810
S3.07	374243	6306836
S3.08	374253	6306853
S3.09	374253	6306879
S3.10	374265	6306931
S4.01	374630	6306958
S4.02	374637	6306934
S4.03	374632	6306904
S4.04	374642	6306877
S4.05	374661	6306847
S4.06	374669	6306820

Trap Number	#GPS Coordinates	
	Easting	Northing
S4.07	374662	6306792
S4.08	374664	6306760
S4.09	374669	6306733
S4.10	374708	6306720
S5.01	374726	6307011
S5.02	374748	6306970
S5.03	374753	6306952
S5.04	374736	6306928
S5.05	374735	6306907
S5.06	374744	6306893
S5.07	374757	6306865
S5.08	374773	6306843
S5.09	374784	6306806
S5.10	374774	6306786

Australian Geocentric 1994 (GDA94) Zone 50H

Appendix B2 – Major Habitat Types and Vegetation Descriptions of Traps Sites

Site Number	Habitat Type	Vegetation Description
1	Dune Slope	Jarrah/Marri Woodland over Banksia attenuata Low Woodland.
2	Dune Slope and Lower Dune Slope	Tuart/Jarrah/Marri Woodland over *Banksia attenuata* Low Woodland
3	Wetland - Dampland	*Melaleuca preissiana*/*Melaleuca rhaphiophylla* Woodland over Jarrah/Marri/*Banksia attenuata* Woodland
4	Dune Crest	Tuart and Banksia Woodland over Peppermint Low Woodland
5	Dune Crest	Tuart Woodland over Jarrah/Banksia attenuata/Peppermint Low Woodland.

Appendix B3 – Traps and Number of Replicates Used at Each Trap Line

Site Number	# Cage Traps	# Elliott Traps	# Funnel Traps	# Bucket Traps	# Pot Traps	Total
1	10	10	20	1	20	**61**
2	10	10	20	1	20	**61**
3	10	10	20	1	20	**61**
4	10	10	20	1	20	**61**
5	10	10	20	0	20	**60**
TOTAL	**50**	**50**	**100**	**4**	**100**	**304**

Appendix B4 – Systematic Trapping Program

Site Number	# nights for Cage Traps	# nights for Elliott Traps	# nights for Funnel Traps	# nights for Bucket Traps	# nights for Pot Traps	Total # nights
1	60	60	120	6	120	**366**
2	60	60	120	6	120	**366**
3	60	60	120	6	120	**366**
4	50	50	100	5	100	**305**
5	50	50	100	0	100	**300**
TOTAL	**280**	**280**	**560**	**23**	**560**	**1703**

APPENDIX C
SITE PHOTOGRAPHS

ECU – SOUTH WEST CAMPUS, BUNBURY
FAUNA ASSESSMENT

APPENDIX C

SITE PHOTOGRAPHS

Site 1: Jarrah/Marri Woodland over *Banksia attenuata* Low Woodland

Site 2: Tuart/Jarrah/Marri Woodland over *Banksia attenuata* Low Woodland

Site 3: *Melaleuca preissiana*/*Melaleuca rhaphiophylla* Woodland over Jarrah/Marri/*Banksia attenuata* Woodland

Site 4: ***Tuart and Banksia Woodland over Peppermint Low Woodland***

Site 5: ***Tuart Woodland over Jarrah/Banksia attenuata/Peppermint Low Woodland***

APPENDIX D
ORNITHOLOGICAL CENSUS

ECU – SOUTH WEST CAMPUS, BUNBURY
FAUNA ASSESSMENT

APPENDIX D

ORNITHOLOGICAL CENSUS

Opportunistic bird searching program for the ECU South West Campus Area

Date	Location	Duration
17th September 2007	Trap Site 1	1/2hr
	Trap Site 2.	1/2hr
18th September 2007	Trap Site 3	1/2hr
	Trap Site 4	1/2hr
19th September 2007	Trap Site 5	1/2hr
	Trap Site 6 & 7.	1/2hr
20th September 2007	Trap Site 4	1/2hr
	Trap Site 5	1/2hr
Total		**4 hrs**

APPENDIX E
SITE SPECIFIC CAPTURES

ECU – SOUTH WEST CAMPUS, BUNBURY
FAUNA ASSESSMENT

APPENDIX E
SITE SPECIFIC CAPTURES/OBSERVATIONS

Amphibian species recorded within the project area			**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Total**
Myobatrachidae								
Heleioporus eyrei	Moaning Frog		6	4	1	4	3	18
Crinia glaureti	Clicking Toadlet		0	0	1	0	0	1
Crinia insignifera	Squelching Toadlet		0	0	1	0	0	1
Limnodynastes dorsalis	Banjo Frog		0	0	1	0	0	1
Hylidae								
Littoria adeladensis	Slender Brown Tree Frog		0	0	1	0	0	1
		Total	6	4	5	4	3	22
Herpetofauna species recorded within the project area								
Gekkonidae								
Christinus marmoratus	Marbled Gecko		0	2	0	0	0	2
Agamidae								
Pogona minor	Western Bearded Dragon		0	0	0	1	1	2
Scincidae								
Acritoscincus trilineatum	South-western Cool Skink		0	0	2	0	0	2
Cryptoblepharus plagiocephalus	Fence Skink		1	0	0	0	0	1
Egernia kingii	King's Skink		0	0	4	1	1	6
Egernia napoleonis	Salmon-bellied Skink		2	0	0	0	0	2
Hemiergis quadrilineata	Two-toed Earless Skink		1	0	1	0	2	4
Morethia lineoocellata	Western Pale-flecked Morethia		5	0	0	2	6	13
Tiliqua rugosa rugosa	Western Bobtail		2	4	1	1	1	9
		Total	11	6	8	5	11	41
Mammal species recorded within the project area								
Peramelidae								
Isoodon obesulus fusciventer	Southern Brown Bandicoot		0	0	3	0	0	3
Phalangeridae								
Trichosurus vulpecula	Common Brushtail Possum		3	1	0	2	1	7
Pseudocheiridae								
Pseudocheirus occidentalis	Western Ringtail Possum		0	0	0	0	2	2
Macropodidae								
Macropus fuliginosus	Western Grey Kangaroo		3	1	0	2	3	9
Muridae								
Mus musculus	House Mouse		0	1	0	0	0	1
Rattus rattus	Black Rat		0	0	3	0	0	3
Canidae								
Canis lupus	Dog		1	0	0	0	0	1
Vulpes vulpes	Red Fox		0	0	0	1	0	1
Felidae								
Felis catus	Cat		0	0	0	1	0	1
Leporidae								
Oryctolagus cuniculus	Rabbit		1	0	0	0	0	1
		Total	8	3	6	6	6	29

APPENDIX F

LISTED THREATENED AND PRIORITY FAUNA SPECIES POTENTIALLY OCCURRING IN THE STUDY AREA

ECU – SOUTH WEST CAMPUS, BUNBURY
FAUNA ASSESSMENT

APPENDIX F

Listed Threatened and Priority Fauna Species Potentially Occurring in Study Area.

Common Name/Species	Conservation Code				Actual Records or Listed as Potentially in Area				Threatening Processes	Habitat Requirements	Habitat in Project Area
	EPBC Act Status	WAWC Act Status	ICUN Status	DEC Priority Status	EPBC Act Database	DEC Database	WAM Database	Birds Aust. Data Base			
Southern Carpet Python *Morelia spilota impricata*		S4	LR/NT	P4					Fox predation.	This species has been recorded from semi-arid coastal and inland habitats, Banksia woodland, Eucalypt woodlands, and grasslands. Often arboreal. Will utilise hollow logs, trees and the burrows of other animals for shelter.	Yes
Great Egret *Ardea alba*	Migratory (CAMBA, JAMBA)				Yes		Yes	Yes	Loss of breeding habitat and declines in water quality.	Wetlands, flooded pasture, dams, estuarine mudflats, mangroves and reefs	Yes, unlikely to breed
Cattle Egret *Ardea ibis*	Migratory (CAMBA, JAMBA)				Yes				Loss of breeding habitat and declines in water quality	Moist pastures with tall grasses, shallow open wetlands and margins, mudflats.	Yes, unlikely to breed
White-bellied Sea Eagle *Haliaeetus leucogaster*	Migratory (CAMBA)								Loss of breeding habitat and declines in water quality	Nests and forages near the coast over islands, reefs, headlands, beaches, bays, estuaries, mangroves, but will also live near seasonally flooded inland swamps, lagoons and floodplains, often far inland on large pools of major rivers. Established pairs usually sedentary, immatures dispersive. Builds a large stick nest, which is used for many seasons in succession.	No
Peregrine Falcon *Falco peregrinis*		S4	LC						Loss of breeding habitat	Diverse from rainforest to arid shrublands, from coastal heath to alpine. Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes. The species utilises the ledges, cliff faces and large hollows/broken spouts of trees for nesting. It will also occasionally use the abandoned nests of other birds of prey.	Yes
Australasian Bittern *Botaurus poiciloptilus*		S1	EN						Land clearing (wetlands/swamps)	Freshwater wetlands, occasionally estuarine; prefers heavy vegetation such as beds of tall dense Typha, Baumea and sedges in freshwater swamps.	No/Very Marginal
Black Bittern *Ixobrychus flavicollis*			LC	P2		Yes			Land clearing (wetlands/swamps)	Freshwater pools, swamps and lagoons, well screen with trees. Shelters in dense waterside vegetation.	No/Very Marginal
Little Bittern *Ixobrychus minutus*			LC	P4					Land clearing (wetlands/swamps)	In south dense beds of Freshwater pools, swamps and lagoons, well screen with trees. Shelters in dense beds of Typha, Baumea and tall rushes in freshwater swamps around lakes and along rivers	No/Very Marginal
Bush Stone Curlew *Burhinus grallarius*			NT	P4		Yes			Fox predation and land clearing	Lightly wooded country (including partly cleared forests) near daytime shelter e.g. thickets or long grass	Yes but considered locally extinct
Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*	VU	S1				Yes	Yes	Yes	Land clearing and logging.	This subspecies of the Red-tailed Black Cockatoo is restricted to the forests of the south-west. It requires tree hollows to nest and breed and is totally dependent on jarrah-marri forest	Yes
Baudin's Black-Cockatoo *Calyptorhynchus baudinii*	EN	S1	EN		Yes	Yes		Yes	Land clearing and illegal shooting	Heavily forested areas of the south-west, where it feeds on the seeds of' eucalypts and various proteaceous species. It is a nomadic species. Breeding mostly occurs in areas south of Donnybrook during spring/summer nesting in tree hollows (primarily Marri).	Yes
Carnaby's Black-Cockatoo *Calyptorhynchus latirostris*	EN	S1	EN		Yes	Yes	Yes	Yes	Land clearing and illegal shooting	This species moves around in seasonal flocks to feeding areas in proteaceous scrubs and heaths and eucalypt woodlands as well as pine plantations. Breeding occurs in winter/spring mainly in eastern forest and wheatbelt where they can find mature hollow bearing trees to nest in.	Yes
Barking Owl				P2					Land clearing and logging	Dense vegetation, especially forest and thickets of waterside vegetation such as melaleucas. Roosts in tree	Yes, but

Common Name/Species	Conservation Code				Actual Records or Listed as Potentially in Area				Threatening Processes	Habitat Requirements	Habitat in Project Area
	EPBC Act Status	WAWC Act Status	ICUN Status	DEC Priority Status	EPBC Act Database	DEC Database	WAM Database	Birds Aust. Data Base			
Ninox connivens connivens										hollows.	probably only rare visitor
Masked Owl *Tyto novaehollandae*				P3					Land clearing and logging	Roosts and nests in heavy forest, hunts over open woodlands and farmlands. Probably breeding in forested deep south west with some autumn–winter wanderings northwards	Yes, but probably only rare visitor
Fork-tailed Swift *Apus pacificus*	Migratory (CAMBA, JAMBA)				Yes				None identified	Low to very high airspace over varied habitat from rainforest to semi desert.	Yes
Rainbow Bee-eater *Merops ornatus*	Migratory (JAMBA)				Yes			Yes	Loss of roosting and breeding sites	Open Country, of woodlands, open forest, semi arid scrub, grasslands, clearings in heavier forest, farmlands. Common as a regular summer migrant to southern Australia (September to April) and breeds underground during this period in areas of suitable soft soil firm enough to support tunnel building.	Yes
Western Shrike Tit *Falcunculus frontatus leucogaster*				P4			Yes		Land clearing.	Woodlands, scrubs and more open forest of Eucalyptus, especially of Wandoo, Flat Topped Yate, Karri, Tingle, Flooded Gum, Salmon Gum and Gimlet.	Yes but considered locally extinct
Chuditch *Dasyurus geoffroii*	VU	S1	VU		Yes	Yes			Competition from and predation by foxes and cats, land clearing, habitat alteration through removal of suitable den logs, poisoning, illegal shooting and road traffic.	This carnivorous marsupial occupies large home ranges, is highly mobile and appears to utilise bush remnant and corridors. Requires a medium sized hollow at or near ground level or will dig burrow under log or stump. Chuditch occur in a wide range of habitats but are more commonly found in woodland, forest and riparian vegetation.	Yes, marginal, considered locally extinct
Brush-tailed Phascogale *Phascogale tapoatafa*		S1	LR/NT			Yes	Yes		Fox and cat predation, reduction in trees with suitable hollows and possibly altered fire regimes.	This arboreal marsupial occurs in forest and woodland where suitable tree hollows are available. Requires small hollows. Prefers dense crown vegetation. Populations fluctuate dramatically in response to invertebrate prey abundance.	Yes
Western Ringtail Possum *Pseudocheirus occidentalis*	VU	S1	VU		Yes	Yes			Fox predation, habitat loss and/or modification, changing fire regimes.	Western Ringtail Possums feed, rest and socialise in the canopy, primarily coastal peppermint woodlands and peppermint/tuart associations. Inland, the largest known populations occur in the Upper Warren area east of Manjimup. In this area the Peppermint tree is naturally absent and Jarrah and Marri foliage constitutes the species staple diet. They require tree hollows and/or dense canopy for refuge and nesting.	Yes
Quenda *Isoodon obesulus fusciventer*				P5		Yes	Yes		Fox predation and land clearing	This species prefers areas with dense understorey vegetation, particular around swamps and along watercourses that provide ample protection from predators.	Yes
Quokka *Setonix brachyurus*	VU	S1	VU						Fox predation, altered fire regimes	Densely vegetated wetlands and tea-tree thickets along creek systems and dense heath on valley slopes. Peppermint and *Thomasia* species being dominant vegetation items in their diet	No, locally extinct
Western Brush Wallaby *Macropus irma*				P4		Yes			Fox predation.	The western brush wallaby prefers areas of forest and woodland supporting a dense shrub layer adjacent to small open areas.	Yes, but probably only rare visitor. Possibly locally extinct
Western False Pipstrelle *Falsistrellus mackenziei*			VU	P4					Land clearing and logging.	This species of bat occurs in high jarrah forest and coastal woodlands. It roosts in small colonies in tree hollows and forages in the cathedral-like spaces between trees.	Yes
WaterRat *Hydromys chrysogaster*				P4		Yes	Yes		Fox predation and a decline in water quality.	Water rats occur along permanent watercourses where there are freshwater molluscs and crustaceans (its main prey), frogs, small mammals and water birds present. Requires healthy fresh (to brackish) water habitat containing diverse water and bank life.	No

APPENDIX G

FAUNA OBSERVED OR POTENTIALLY WITHIN THE PROJECT AREA

ECU – SOUTH WEST CAMPUS, BUNBURY
FAUNA ASSESSMENT

APPENDIX G

Fauna Observed or Potentially in Study Area.

Class **Family** *Species*	Common Name	Conservation Status	Observed Sept 07
Amphibians			
Myobatrachidae Ground or Burrowing Frogs			
Crinia georgiana	Quacking Frog	CI 5	
Crinia glauerti	Glauert`s Froglet	CI 5	+
Crinia insignifera	Squelching Froglet	CI 5	+
Geocrinia leai	Lea`s Frog	CI 5	
Heleioporus eyrei	Moaning Frog	CI 5	+
Heleioporus psammophilus	Sand Frog	CI 5	
Limnodynastes dorsalis	Banjo Frog	CI 5	+
Metacrinia nichollsi	Nicholls` Toadlet	CI 5	
Pseudophryne guentheri	Güenther`s Toadlet	CI 5	
Hylidae Tree or Water-Holding Frogs			
Litoria adelaidensis	Slender Tree Frog	CI 5	+
Litoria moorei	Motorbike Frog	CI 5	
Reptiles			
Gekkonidae Geckoes			
Christinus marmoratus	Marbled Gecko	CI 5	+
Pygopodidae Legless Lizards			
Aprasia repens	Sand-plain Worm Lizard	CI 5	
Lialis burtonis	Common Snake Lizard	CI 5	
Pygopus lepidopodus	Southern Scaleyfoot	CI 5	
Agamidae Dragon Lizards			
Pogona minor	Western Bearded Dragon	CI 5	+

Class **Family** *Species*	Common Name	Conservation Status	Observed Sept 07
Varanidae Monitor's or Goanna's			
Varanus gouldii	Gould's Sand Monitor	CI 5	
Varanus rosenbergi	Heath Monitor	CI 5	
Scincidae Skinks			
Acritoscincus trilineatum	South-western Cool Skink	CI 5	+
Cryptoblepharus plagiocephalus	Fence Skink	CI 5	+
Ctenotus catenifer	Chain-striped Heath Ctenotus	CI 5	
Ctenotus impar	South-western Odd-striped	CI 5	
Ctenotus labillardieri	Red-legged Skink	CI 5	
Egernia kingii	King's Skink	CI 5	+
Egernia napoleonis	Salmon-bellied Skink	CI 5	+
Hemiergis gracilipes	Southwestern Mulch Skink	CI 5	
Hemiergis peronii peronii	Four-toed Mulch Skink	CI 5	
Hemiergis quadrilineata	Two-toed Earless Skink	CI 5	+
Lerista elegans	West Coast Four-toed Lerista	CI 5	
Menetia greyii	Dwarf Skink	CI 5	
Morethia lineoocellata	Western Pale-flecked Morethia	CI 5	+
Morethia obscura	Dusky Morethia	CI 5	
Tiliqua rugosa rugosa	Western Bobtail	CI 5	+
Typhlopidae Blind Snakes			
Ramphotyphlops australis	Southern Blind Snake	CI 5	
Boidae Pythons, Boas			
Morelia spilota imbricata	Southern Carpet Python	CI 1	

Class **Family** *Species*	Common Name	Conservation Status	Observed Sept 07
Elapidae Elapid Snakes			
Echiopsis curta	Bardick	CI 5	
Elapognathus coronatus	Crowned Snake	CI 5	
Neelaps bimaculatus	Black-naped Snake	CI 5	
Notechis scutatus	Tiger Snake	CI 5	
Parasuta gouldii	Gould's Hooded Snake	CI 5	
Parasuta nigriceps	Black-backed Snake	CI 5	
Pseudonaja affinis	Dugite	CI 5	
Simoselaps bertholdi	Jan`s Banded Snake	CI 5	
Birds			
Phasianidae Quails, Pheasants			
Coturnix pectoralis	Stubble Quail	CI 5	
Anatidae Geese, Swans, Ducks			
Anas gracilis	Grey Teal	CI 5	
Anas superciliosa	Pacific Black Duck	CI 5	+
Chenonetta jubata	Australian Wood Duck	CI 5	+
Tadorna tadornoides	Australian Shelduck	CI 5	
Ardeidae Herons, Egrets, Bitterns			
Ardea alba	Great Egret	CI 4	
Ardea ibis	Cattle Egret	CI 4	
Ardea pacifica	White-necked Heron	CI 5	
Egretta novaehollandiae	White-faced Heron	CI 5	
Nycticorax caledonicus	Rufous Night Heron	CI 3	

Class **Family** *Species*	Common Name	Conservation Status	Observed Sept 07
Threskiornithidae Iibises, Spoonbills			
Platalea flavipes	Yellow-billed Spoonbill	CI 5	
Threskiornis molucca	Australian White Ibis	CI 5	
Threskiornis spinicollis	Straw-necked Ibis	CI 5	
Accipitridae Kites, Goshawks, Eagles, Harriers			
Accipiter cirrocephalus	Collared Sparrowhawk	CI 3	
Accipiter fasciatus	Brown Goshawk	CI 3	+
Aquila audax	Wedge-tailed Eagle	CI 3	
Aquila morphnoides	Little Eagle	CI 3	
Circus approximans	Swamp Harrier	CI 5	
Elanus caeruleus	Black-shouldered Kite	CI 5	
Haliastur sphenurus	Whistling Kite	CI 3	+
Hamirostra isura	Square-tailed Kite	CI 3	
Falconidae Falcons			
Falco berigora	Brown Falcon	CI 3	
Falco cenchroides	Australian Kestrel	CI 5	
Falco longipennis	Australian Hobby	CI 5	
Falco peregrinus	Peregrine Falcon	CI 1	
Rallidae Rails, Crakes, Swamphens, Coots			
Fulica atra	Eurasian Coot	CI 5	
Gallinula tenebrosa	Dusky Moorhen	CI 3	
Porphyrio porphyrio	Purple Swamphen	CI 5	
Turnicidae Button-quails			
Turnix varia	Painted Button-quail	CI 3	

Class **Family** *Species*	Common Name	Conservation Status	Observed Sept 07
Columbidae Pigeons, Doves			
Columba livia	Domestic Pigeon	Introduced	
Ocyphaps lophotes	Crested Pigeon	CI 5	
Phaps chalcoptera	Common Bronzewing	CI 3	+
Streptopelia senegalensis	Laughing Turtle-Dove	Introduced	+
Cacatuidae Cockatoos, Corellas			
Cacatua sanguinea	Little Corella	CI 5	+
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo	CI 1	
Calyptorhynchus baudinii	Baudin`s Cockatoo	CI 1	
Calyptorhynchus latirostris	Carnaby`s Cockatoo	CI 1	+
Eolophus roseicapilla	Galah	CI 5	+
Psittacidae Parrots			
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	CI 5	
Neophema elegans	Elegant Parrot	CI 5	
Platycercus icterotis icterotis	Western Rosella (Western ssp)	CI 3	+
Platycercus spurius	Red-capped Parrot	CI 5	+
Platycercus zonarius	Australian Ringneck Parrot	CI 5	+
Polytelis anthopeplus	Regent Parrot	CI 5	+
Cuculidae Parasitic Cuckoos			
Cacomantis flabelliformis	Fan-tailed Cuckoo	CI 5	
Chrysococcyx basalis	Horsfield`s Bronze Cuckoo	CI 5	
Chrysococcyx lucidus	Shining Bronze Cuckoo	CI 5	
Cuculus pallidus	Pallid Cuckoo	CI 5	

Class **Family** *Species*	Common Name	Conservation Status	Observed Sept 07
Strigidae Hawk Owls			
Ninox connivens connivens	Barking Owl (southwest population)	CI 2	
Ninox novaeseelandiae	Boobook Owl	CI 5	
Tytonidae Barn Owls			
Tyto alba	Barn Owl	CI 5	
Tyto n. novaehollandiae	Masked Owl (southwest	CI 2	
Podargidae Frogmouths			
Podargus strigoides	Tawny Frogmouth	CI 5	
Aegothelidae Owlet-nightjars			
Aegotheles cristatus	Australian Owlet-nightjar	CI 5	
Apodidae Swifts, Swiftlets			
Apus pacificus	Fork-tailed Swift	CI 4	
Halcyonidae Tree Kingfishers			
Dacelo novaeguineae	Laughing Kookaburra	Introduced	+
Todiramphus sanctus	Sacred Kingfisher	CI 5	+
Meropidae Bee-eaters			
Merops ornatus	Rainbow Bee-eater	CI 4	
Maluridae Fairy Wrens, GrassWrens			
Malurus splendens	Splendid Fairy-wren	CI 3	+

Class **Family** *Species*	Common Name	Conservation Status	Observed Sept 07
Pardalotidae Pardalotes, Bristlebirds, Scrubwrens, Gerygones, Thornbills			
Acanthiza apicalis	Broad-tailed Thornbill	CI 3	+
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	CI 3	+
Acanthiza inornata	Western Thornbill	CI 3	
Gerygone fusca	Western Gerygone	CI 5	+
Pardalotus punctatus	Spotted Pardalote	CI 5	
Pardalotus striatus	Striated Pardalote	CI 5	+
Sericornis frontalis	White-browed Scrubwren	CI 3	
Smicrornis brevirostris	Weebill	CI 3	+
Meliphagidae Honeyeaters, Chats			
Acanthorhynchus superciliosus	Western Spinebill	CI 5	+
Anthochaera carunculata	Red Wattlebird	CI 5	+
Anthochaera lunulata	Western Little Wattlebird	CI 3	
Lichenostomus virescens	Singing Honeyeater	CI 5	+
Lichmera indistincta	Brown Honeyeater	CI 5	+
Melithreptus lunatus	White-naped Honeyeater	CI 3	+
Phylidonyris nigra	White-cheeked Honeyeater	CI 3	
Phylidonyris novaehollandiae	New Holland Honeyeater	CI 3	+
Petroicidae Australian Robins			
Eopsaltria australis	Western Yellow Robin	CI 3	+
Eopsaltria georgiana	White-breasted Robin	CI 3	
Petroica multicolor	Scarlet Robin	CI 3	+
Neosittidae Sitellas			
Daphoenositta chrysoptera	Varied Sittella	CI 3	

Class **Family** *Species*	Common Name	Conservation Status	Observed Sept 07
Pachycephalidae Crested Shrike-tit, Crested Bellbird, Shrike Thrushes, Whistlers			
Colluricincla harmonica	Grey Shrike-thrush	CI 3	+
Pachycephala pectoralis	Golden Whistler	CI 3	+
Pachycephala rufiventris	Rufous Whistler	CI 5	+
Dicruridae Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo			
Grallina cyanoleuca	Magpie-lark	CI 5	+
Rhipidura fuliginosa	Grey Fantail	CI 5	+
Rhipidura leucophrys	Willie Wagtail	CI 5	+
Campephagidae Cuckoo-shrikes, Trillers			
Coracina novaehollandiae	Black-faced Cuckoo-shrike	CI 5	+
Lalage sueurii	White-winged Triller	CI 5	
Artamidae Woodswallows, Butcherbirds, Currawongs			
Artamus cinereus	Black-faced Woodswallow	CI 3	
Artamus cyanopterus	Dusky Woodswallow	CI 3	
Cracticus tibicen	Australian Magpie	CI 5	+
Cracticus torquatus	Grey Butcherbird	CI 5	+
Strepera versicolor	Grey Currawong	CI 3	
Corvidae Ravens, Crows			
Corvus coronoides	Australian Raven	CI 5	+
Motacillidae Old World Pipits, Wagtails			
Anthus novaeseelandiae	Australian Pipit	CI 5	
Dicaeidae Flowerpeckers			
Dicaeum hirundinaceum	Mistletoebird	CI 5	

Class **Family** *Species*	Common Name	Conservation Status	Observed Sept 07
Hirundinidae Swallows, Martins			
Hirundo neoxena	Welcome Swallow	CI 5	+
Hirundo nigricans	Tree Martin	CI 5	+
Sylviidae Old World Warblers			
Cincloramphus cruralis	Brown Songlark	CI 5	
Cincloramphus mathewsi	Rufous Songlark	CI 5	
Zosteropidae White-eyes			
Zosterops lateralis	Grey-breasted White-eye	CI 5	+
Mammals			
Tachyglossidae Echidnas			
Tachyglossus aculeatus	Echidna	CI 5	
Dasyuridae Carnivorous Marsupials			
Antechinus flavipes	Yellow-footed Antechinus, Mardo	CI 5	
Dasyurus geoffroii	Chuditch	CI 1	
Phascogale tapoatafa tapoatafa	Southern Brush-tailed Phascogale	CI 1	
Sminthopsis gilberti	Gilbert`s Dunnart	CI 5	
Sminthopsis griseoventer	Grey-bellied Dunnart	CI 5	
Peramelidae Bandicoots			
Isoodon obesulus fusciventer	Southern Brown Bandicoot	CI 2	+
Phalangeridae Brushtail Possums, Cuscuses			
Trichosurus vulpecula	Common Brushtail Possum	CI 5	+
Burramyidae Pygmy Possums			
Cercartetus concinnus	Western Pygmy-possum	CI 3	

Class **Family** *Species*	Common Name	Conservation Status	Observed Sept 07
Tarsipedidae Honey Possum			
Tarsipes rostratus	Honey Possum	CI 3	
Pseudocheiridae Ringtail Posssums			
Pseudocheirus occidentalis	Western Ringtail Possum	CI 1	+
Macropodidae Kangaroos, Wallabies			
Macropus fuliginosus	Western Grey Kangaroo	CI 5	+
Macropus irma	Western Brush Wallaby	CI 2	
Molossidae Freetail Bats			
Mormopterus planiceps	Western Freetail Bat	CI 5	
Tadarida australis	White-striped Freetail-bat	CI 5	
Vespertilionidae Ordinary Bats			
Chalinolobus gouldii	Gould`s Wattled Bat	CI 5	
Chalinolobus morio	Chocolate Wattled Bat	CI 5	
Falsistrellus mackenziei	Western False Pipistrelle	CI 2	
Nyctophilus geoffroyi	Lesser Long-eared Bat	CI 5	
Nyctophilus gouldi	Gould`s Long-eared Bat	CI 5	
Nyctophilus timoriensis	Greater Long-eared Bat	CI 5	
Vespadelus regulus	Southern Forest Bat	CI 5	
Muridae Rats, Mice			
Mus musculus	House Mouse	Introduced	+
Rattus fuscipes	Western Bush Rat	CI 5	
Rattus rattus	Black Rat	Introduced	+
Canidae Dogs, Foxes			
Canis lupus	Dog	Introduced	+
Vulpes vulpes	Red Fox	Introduced	+

Class **Family** *Species*	Common Name	Conservation Status	Observed Sept 07
Felidae Cats			
Felis catus	Cat	Introduced	+
Leporidae Rabbits, Hares			
Oryctolagus cuniculus	Rabbit	Introduced	+

Compiled by ENV - October

Observed (Sighted/Heard/Signs) =