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## **Water Corporation**

### **Report for Mundaring Water Treatment Plant Site Selection**

#### **Preliminary Flora and Fauna Assessment - Site One**

July 2007



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## Executive Summary

The Water Corporation is currently conducting a site selection process for the proposed Mundaring Water Treatment Plant (WTP). This process involves community-based consultation, and has included preliminary consideration of the environmental, social, technical and economic features of a number of site options.

As part of the site selection process GHD Pty Ltd (GHD) was commissioned by the Water Corporation to undertake preliminary environmental investigations on a number of the Mundaring WTP site options. This report presents the results of the preliminary flora and fauna assessment on Site One, directly below Mundaring Weir.

This flora and fauna investigation is a preliminary investigation aimed at identifying any major environmental constraints on the site and to assess the environmental values of the site. A full flora and vegetation assessment and fauna assessment will be required once a final site has been determined.

A botanical survey was previously undertaken on this site by *ecologia* Environmental Consultants in April 1999 (*ecologia*, 1999), when this site was first proposed as a potential site for the Mundaring WTP. This report incorporates this and other relevant information through desktop analysis. Additionally, a preliminary flora and fauna assessment for Site One from site visits conducted in spring 2006 and winter 2007 is included. The results of the assessment concluded that:

- » Site One is located on a Water Corporation reserve below Mundaring Weir, bounded by Mundaring Weir Road on the west and south and by Helena River to the north. The majority of the area is unused apart from a Western Power sub-station in the centre of the site and picnic sites and public areas in the east.
- » Site One may not be able to accommodate all infrastructure required for the WTP and additional land may be required for the chlorine store and the drying beds. The sites being considered for the chlorine store and the drying beds are the other sites being considered for the WTP, the DEC land, Pine Plantation or the O'Connor Site. The additional land required for the drying beds has not been assessed as part of this survey. The other potential WTP sites have been assessed in separate flora and fauna assessments.
- » The majority of the site is open woodland of Marri (*Corymbia calophylla*) with scattered Flooded Gum (*Eucalyptus rudis*). Some sections of the site contain predominantly introduced species, including introduced *Acacias* in the overstorey and weedy herbs and grasses in the understorey. Riparian and gully vegetation occurs adjacent to Helena River. There is an area of granite boulders in the east of the site that supports a *Hypocalymma angustifolium* dominated community.
- » Site One has been subject to a number of historical disturbances, most notably the construction of Mundaring Weir adjacent to the site. Some native vegetation has recovered from major earthworks, and a number of mature native trees remain scattered throughout the site. However, there are ongoing disturbances that continue to impact the remnant vegetation. These include; the infrastructure works



related to the weir, the Western Power substation and access tracks, bulldozing and burning for fire control and public use of the site. As in many areas with these levels of disturbance there is substantial weed invasion and understorey composition is restricted to very few species. However, there are some areas where the native vegetation has recovered fairly well, and has potential to recover further. The vegetation condition at the site was rated between Condition 3 (*Good*) and Condition 6 (*Completely Degraded*) on the Bush Forever ratings condition scale.

- » No DRF species were located on the site. However, one priority species was recorded (*Acacia oncinophylla* subsp. *oncinophylla*) on the very edge of the site. If this site is chosen as the preferred site for the WTP a targeted spring survey will be required to determine the presence of any further significant species.
- » The site contains a number of weed species, including a number of species that were historically planted in the area, such as introduced *Acacia* species. There are also a number of weeds present that have been Declared under the *Agriculture and Related Resource Protection Act 1976*. A number of the weeds present at the site are considered to be serious environmental weeds, classified as Weeds of National Significance (WONS) and their presence around the Helena River could mean they are spreading downstream also. These weeds include Bridal Creeper (*Asparagus asparagoides*) and *Watsonia* sp.
- » A number of fauna species occur in the general vicinity of the site, including a number of protected species. However, the site is highly disturbed and few species would utilise the site regularly. The site offers some value to woodland birds and reptile species but few mammals would be expected to utilise the site regularly. In the eastern section of the site there is some outcropping granite that may support a variety of reptile species.
- » This site contains some native vegetation that may be used by native fauna species, particularly woodland bird species. However, the understorey of the site is impoverished and much of the site is cleared or contains only sparse cover that would provide very limited habitat for fauna species. Clearing of the vegetation at the site would be expected to have a negligible impact on fauna species; particularly given the large areas of surrounding good quality habitat. The granites in the east of the study site and the remnant riparian vegetation along Helena River offer the highest habitat value for fauna and should be retained where possible.

**Site One is highly degraded and has been subject to a long history of disturbance. If the WTP is located at this site there will be some clearing of native vegetation required, including clearing of a number of mature trees and disturbance to granite outcrops. However, the site's degraded nature means that impacts on native flora and fauna will generally be minimal. The exception to this is the priority flora species that occurs on the granite outcrops. Impacts on this species should be avoided. Where possible the better quality vegetation and habitat areas at the site should be retained. Management will be required for other potential impacts, such as weed management and erosion.**



# 1. Introduction

## 1.1 Background

The Water Corporation proposes to improve the quality and security of water supplies to the Eastern Hills areas of Perth and to the Goldfields and Agriculture regions. The \$55 million Mundaring Water Supply Improvement Project was announced in 2002, and involved the first stage construction over about six years of a 50 megalitre water tank and a 150 megalitres per day capacity Water Treatment Plant (WTP) at Sawyers Valley Tank site. Two more stages were planned and by 2030 it was projected that a total of three 50 megalitre water tanks would be constructed on the site and the WTP capacity would be increased to 250 megalitres per day.

Strong community objections emerged against the location of the WTP at Sawyers Valley. Due to these community objections the Water Corporation decided to withdraw its application to the Environmental Protection Authority (EPA) to build the WTP at Sawyers Valley and a commitment was made to undergo a more detailed site selection process, with the involvement of the community. The Water Corporation's application to the EPA to build one 50 megalitre water tank remained active.

The current site selection process commenced in mid-2005 and is a community-based consultation process, which involved reconsidering all previous site options and including any other potentially suitable options. The process has involved a preliminary consideration of the environmental, social, technical and economic features of a number of selected site options. Further detailed investigations will be required once a preferred site has been identified.

## 1.2 Scope of this Report

GHD Pty Ltd (GHD) has been commissioned by the Water Corporation to assist with the site selection process for the Mundaring WTP and to provide independent advice to the Water Corporation and the community on the environmental features of the site options, as required.

As part of the site selection process GHD was commissioned by the Water Corporation to undertake preliminary biological field surveys in spring 2006 at a number of the Mundaring WTP site options. At this time a number of site options were considered that contain considerable areas of remnant vegetation. These included:

- » Site One;
- » Site Two;
- » Site 1km below Weir;
- » Pine Plantation Site;
- » Department of Environment and Conservation (DEC) Land (formerly 'CALM Site');
- » Site Five (Sawyers Hill); and
- » Site Seven.



There had been previous biological investigations conducted at Site One and Two, so further detailed survey was not considered necessary at this time, but a brief site visit was conducted to determine the environmental condition of the site. A number of biological surveys have been conducted previously at Site Five but none were conducted in early spring so a survey was considered necessary. A biological survey was not undertaken at Site Seven but a brief inspection of the site was conducted to determine the environmental condition of the site.

The Water Corporation determined that preliminary biological surveys in spring 2006 were to be conducted at the following sites:

- » Site '1km below Weir';
- » Pine Plantation Site;
- » DEC Land (formerly 'CALM Site'); and
- » Site Five (Sawyers Hill).

In early 2007 the community undertook an assessment of the sites to determine a short-list of four sites for further investigation. The Water Corporation also undertook their own assessment that concurred with the community assessment on the sites to be short-listed. The four short-listed sites were:

- » Site One;
- » Pine Plantation Site;
- » DEC Land (formerly 'CALM Site'); and
- » "O'Connor Site" (a new site proposed by members of the community group).

Further detailed investigations were required for these short-listed sites including; preliminary environmental impact assessment, Indigenous and Non-indigenous Heritage assessment and a risk assessment. A flora and fauna assessment was also required for Site One and O'Connor Site.

This report details the flora and fauna assessment for Site One and includes:

- » A broad-scale vegetation assessment, including assessment of vegetation types, vegetation condition, dominant species and potential presence of diseases such as dieback, and weeds;
- » A targeted search for any Declared Rare Flora (DRF) and Priority flora species that occur in the area;
- » An assessment of habitat potential, including the assessment of the significance of habitat trees; and
- » A targeted opportunistic fauna search, particularly for any significant fauna species.

### **1.3 Site Location**

Site One is located on a Water Corporation reserve below Mundaring Weir, bounded by Mundaring Weir Road on the west and south of the site and by Helena River to the



north of the site. Most of the site is vacant apart from a Western Power sub-station in the centre of the site and picnic sites and public areas on the eastern side.

Site One may not be able to accommodate all infrastructure required for the WTP and additional land may be required for the chlorine store and the drying beds. The sites being considered for the chlorine store and the drying beds are the other sites being considered for the WTP, the DEC land, Pine Plantation or the O'Connor Site. The additional land required for the drying beds has not been assessed as part of this survey. The other WTP sites have been assessed in separate flora and fauna assessments.

This site was one of two initial sites considered for the Mundaring WTP. This site was previously rejected by Government.

#### **1.4 Limitations of this Survey**

This biological investigation is only a preliminary survey and a full flora and vegetation assessment and fauna assessment will be required once a final site has been determined. The investigation focused on the site of the WTP and detailed investigations of the access routes was not undertaken. However, the potential access routes were assessed to determine any major biological constraints.

The site has not been surveyed during spring, which in the south-west of Australia is the main flowering and growth period and is thus considered the optimum time to undertake flora surveys as the maximum number of species can be recorded. In particular, some of the DRF and Priority flora species can only be identified at certain times in their lifecycle, with spring allowing identification of the maximum number of species (though the optimum time for survey is dependent on the specific species and some targeted surveys should be conducted at other times of year). Further targeted surveys will be required once the final site has been selected to confirm that there are no significant flora species at the site.

Desktop investigations on fauna species were conducted at the regional level to determine species that are present in the general area and that have the potential to occur at the site. While this does not allow comparison between sites the information on fauna habitat obtained during the survey provides some indication of the likelihood of fauna species occurring at the site and of the value of the site as fauna habitat.



## 2. Desktop Assessment

### 2.1 Vegetation

Beard (1979) has mapped the vegetation of the general area at a scale of 1:250,000. The site vegetation is within the Darling Botanical District: Dale Subdistrict of the South Western Botanical Province as recognised by Beard (1979). According to Beard the vegetation of the sub-district is primarily Jarrah – Marri forest.

Mapping by Heddle *et al.* (1980) shows the site to be within the **Dwellingup Complex in Medium to high rainfall**. Open forest of *Eucalyptus marginata* – *E. calophylla* (now *Corymbia calophylla*).

Mundaring Weir and the study site occur on the Darling Plateau region, which has the following general vegetation complexes as defined in the Regional Forest Agreement Vegetation Complexes mapping of Mattiske and Havel (1998):

- » **Dwellingup 2 (D2) (uplands):** Open forest of *Eucalyptus marginata* subsp. *marginata* – *Corymbia calophylla* on lateritic uplands in the arid zone.
- » **Helena 2 (He2) (in valleys):** Mosaic of open forest of *Eucalyptus marginata* subsp. *thalassica*-*Corymbia calophylla* and woodland of *Eucalyptus wandoo* with some *Eucalyptus accedens* and *Eucalyptus rudis* on the deeper soils ranging to closed heaths and lithic complex on shallow soils associated with granite on steep slopes of valleys in semiarid and arid zones.
- » **Murray 2 (My2) (in valleys):** Open forest of *Eucalyptus marginata* subsp. *thalassica*-*Corymbia calophylla*- *Eucalyptus patens* and woodlands of *Eucalyptus wandoo* with some *Eucalyptus accedens* on valley slopes to woodlands of *Eucalyptus rudis*-*Melaleuca raphiophylla* on the valley floor in semiarid and arid zones.
- » **Yarragil 1 (in valleys):** Open forest of *Eucalyptus marginata* subsp. *marginata*-*Corymbia calophylla* on slopes with mixtures of *Eucalyptus patens* and *Eucalyptus megacarpa* on the valley floors in humid and subhumid zones.
- » **Pindalup (in valleys):** Open forest of *Eucalyptus marginata* subsp. *thalassica*-*Corymbia calophylla* on slopes and open woodlands of *Eucalyptus wandoo* with some *Eucalyptus patens* on the lower slopes in semiarid and arid zones.

The Mattiske and Havel mapping (1998) indicates that Site One occurs in the valley vegetation complexes: Helena 2 (He2) and Murray 2 (My2).

### 2.2 Vegetation Extent and Status

A vegetation type is considered underrepresented if there is less than 30 percent of its original distribution remaining. From a purely biodiversity perspective, and not taking into account any other land degradation issues, there are several key criteria now being applied to vegetation in States where clearing is still occurring (EPA, 2000)



- » The “threshold level” below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at a level of 30% of the pre-European/ pre-1750 extent of the vegetation type;
- » A level of 10% of the original extent is regarded as being a level representing *Endangered*; and
- » Clearing which would put the threat level into the class below should be avoided.

Such status can be delineated into five (5) classes, where:

- » *Presumed Extinct*: Probably no longer present in the bioregion
- » *Endangered\**: <10% of pre-European extent remains
- » *Vulnerable\**: 10-30% of pre-European extent exists
- » *Depleted\**: >30% and up to 50% of pre-European extent exists
- » *Least Concern*: >50% pre-European extent exists and subject to little or no degradation over a majority of this area.

\* or a combination of depletion, loss of quality, current threats and rarity gives a comparable status

Native vegetation types represented in the survey area, their regional extent and reservation status are generally drawn from Shepherd, *et al.* (2002), and Shepherd pers. comm., which are in turn based on broadscale mapping undertaken by Beard (1979). These are shown in **Table 1**.

**Table 1 Vegetation extent and status for Beard (1979) Vegetation Associations in the Mundaring areas (after Shepherd, *et al.* (2002), Shepherd, pers. comm.)**

Vegetation Association	Vegetation Description	Pre-European Extent (ha)	Current Extent (ha)	% Remaining
3	Medium Forest: Jarrah – Marri	908, 040	747, 888	82.4

Generally the extent of the vegetation remaining on the Darling Scarp is above the threshold level and it can be seen from the table above the Jarrah – Marri Medium Forest is relatively well preserved.

In the northern Jarrah forests the areas with the highest diversity and which are recognised as important areas for relictual and endemic species are the non-forest communities around granite outcrops and streams.

### 2.3 Threatened Ecological Communities

Ecological communities are defined as ‘naturally occurring biological assemblages that occur in a particular type of habitat’ (English and Blythe, 1997). Threatened Ecological Communities (TECs) are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community, i.e. Presumed Totally Destroyed, Critically Endangered, Endangered, and Vulnerable. Some TECs are protected under the Commonwealth *Environment Protection and Biodiversity Act 1999 (EPBC Act)*. Although TECs are not formally protected under the



State *Wildlife Conservation Act 1950*, the loss of, or disturbance to, some TECs triggers the *EPBC Act*. The EPA's position on TECs states that proposals that result in the direct loss of TECs are likely to require formal assessment.

A search of the DEC's TECs database was undertaken for the Mundaring area. This search recorded that there were no known occurrences of TECs for the general area of Mundaring Weir. Occurrences of the 'Critically Endangered' communities known as 'Shrublands and woodlands of the eastern side of the Swan Coastal Plain' and '*Eucalyptus calophylla* – *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain' and an occurrence of the 'Endangered' TEC known as '*Banksia attenuata* woodland over species rich dense shrublands' occur nearby to the general Mundaring area, and the potential for these communities to occur in the study site was taken into consideration during the field surveys.

## 2.4 Flora

Flora species that are considered to be significant are listed under the Western Australian *Wildlife Conservation Act 1950* and the Commonwealth *EPBC Act*. A description of the DEC's conservation codes is provided in **Table 6, Appendix B**.

A search of the DEC's Rare Flora Databases and the Western Australian Herbarium indicates that a number of significant species are known to occur in the general Mundaring area. There are no records of significant species at or near to the site, but this may simply reflect the lack of flora surveys conducted in the area. The recorded significant species in the general vicinity of the site are presented in **Table 2** and **Figure 1, Appendix A**. Please note that a large search area was requested due to the large study area for all the Mundaring WTP site options, and this large search area has resulted in a number of recorded significant flora species.

**Table 2 Significant Flora Species Previously Recorded within the Mundaring Area (Source: DEC and the WA Herbarium)**

Species	Conservation Code
<i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i>	P3
<i>Adenanthos filifolius</i>	P3
<i>Acacia anomala</i>	DRF
<i>Acacia aphylla</i>	DRF
<i>Acacia horridula</i>	P3
<i>Acacia oncinophylla</i> subsp. <i>oncinophylla</i>	P3
<i>Anthocercis gracilis</i>	DRF
<i>Aotus cordifolia</i>	P3
<i>Boronia tenuis</i>	P4



<i>Bossiaea modesta</i>	P2
<i>Caladenia arrecta</i>	P4
<i>Cyanicula ixioides</i> subsp. <i>ixioides</i>	P4
<i>Darwinia apiculata</i>	DRF
<i>Darwinia pimelioides</i>	P4
<i>Daviesia oxylobium</i>	P4
<i>Diplolaena andrewsii</i>	P2
<i>Grevillea drummondii</i>	
<i>Grevillea flexuosa</i>	DRF
<i>Grevillea pimeleoides</i>	P4
<i>Halgania corymbosa</i>	P3
<i>Hemigenia rigida</i>	P1
<i>Isopogon drummondii</i>	P3
<i>Lasiopetalum bracteatum</i>	P4
<i>Lepyrodia heleocharoides</i>	P3
<i>Persoonia sulcata</i>	P4
<i>Pimelea rara</i>	P4
<i>Pithocarpa corymbulosa</i>	P2
<i>Scholtzia</i> sp. Bickley	P1
<i>Senecio gilbertii</i>	P1
<i>Senecio leucoglossus</i>	P4
<i>Stylidium</i> sp. Boulder Rock	
<i>Stylidium striatum</i>	P4
<i>Templetonia drummondii</i>	P4
<i>Tetradheca pilifera</i>	P3
<i>Tetradheca</i> sp. Granite	P3
<i>Thelymitra manginiorum</i>	DRF
<i>Thysanotus anceps</i>	P3
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	P4
<i>Verticordia serrata</i> var. <i>linearis</i>	P3



## 2.5 Fauna

A search of the Western Australian Museum records was undertaken which determined that 19 amphibian species, 46 bird species, 26 mammal species, 3 fish species and 56 reptile species have been recorded within the general Mundaring area. These results are included in **Table 11, Appendix D**. Please note that a large area was searched for fauna records, due to the large study area for all the Mundaring WTP site options, and this search area has resulted in a substantial number of recorded fauna species.

### 2.5.1 Fauna of Conservation Significance

The conservation status of fauna species is assessed under State and Commonwealth Acts; in particular the Western Australian *Wildlife Conservation Act 1950*; *Wildlife Conservation (Specially Protected Fauna) Notice 2006*, and the Commonwealth *EPBC Act*.

The significance levels for fauna used in the *EPBC Act* are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN). These levels are described in **Table 8, Appendix D**.

The EPBC Act also has lists of migratory species that are recognised under international treaties such as the China Australia Migratory Bird Agreement (CAMBA), the Japan Australia Migratory Bird Agreement (JAMBA) and the Bonn Convention (The Convention on the Conservation of Migratory Species of Wild Animals).

Listed migratory species also include any native species identified in an international agreement approved by the Commonwealth Environment Minister. The Minister may approve an international agreement for this purpose if satisfied that it is an agreement relevant to the conservation of migratory species.

In Western Australia, the *Wildlife Conservation (Specially Protected Fauna) Notice 2006* has significant levels for fauna classified in a series of Schedules (**Table 9, Appendix C**). The DEC also produces a supplementary list of Priority Fauna, being species that are not considered Threatened under the Western Australian *Wildlife Conservation Act 1950* but for which the Department feels there is a cause for concern. These species have no special protection, but their presence would normally be considered and they need further survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna. Levels of Priority are described in **Table 10, Appendix C**.

A listing of Significant Fauna from the EPBC Act Protected Matters Search Tool and Rare and Priority species from the DEC rare fauna database for the general Mundaring area are presented in **Table 3**.

It should be noted that the results of the searches are only an indication of the threatened fauna that may be present in the general area and detailed fauna surveys, including trapping programs are required to verify these results.



**Table 3 Listing of Potentially Occurring Rare and Priority Fauna Species – Mundaring Weir area (Source: EPBC Act Protected Matters Search, DEC Threatened and Priority Fauna Database search results and WA Museum Faunabase search for the general Mundaring Weir area)**

Genus	Species	Common Name	DEC/ Wildlife Conservation Act 1950 Rating	EPBC Act Rating	DEC Database	EPBC Act Protected Matters search
<i>Dasyurus</i>	<i>geoffroi</i>	Chuditch	Vulnerable / Schedule 1	Vulnerable	x	
<i>Myrmecobius</i>	<i>fasciatus</i>	Numbat	Vulnerable / Schedule 1	Vulnerable	x	
<i>Calyptorhynchus</i>	<i>latirostris</i>	Carnaby's Cockatoo	Endangered / Schedule 1	Endangered	x	
<i>Calyptorhynchus</i>	<i>baudinii</i>	Baudin's Cockatoo	Endangered / Schedule 1	Vulnerable		x
<i>Pseudocheirus</i>	<i>occidentalis</i>	Western Ringtail Possum	Vulnerable / Schedule 1	Vulnerable		X
<i>Phascogale</i>	<i>tapoatafa tapoatafa</i>	Southern Brush-tailed Phascogale	Priority 3		x	
<i>Macropus</i>	<i>irma</i>	Western Brush Wallaby	Priority 4		x	
<i>Hydromys</i>	<i>chrysogaster</i>	Water-rat (Rakali)	Priority 4		x	
<i>Isoodon</i>	<i>obesulus fusciventer</i>	Quenda	Priority 5		x	
<i>Haliaeetus</i>	<i>leucogaster</i>	White-bellied Sea-eagle		Migratory		X
<i>Apus</i>	<i>pacificus</i>	Fork-tailed Swift		Marine		X



<b>Genus</b>	<b>Species</b>	<b>Common Name</b>	<b>DEC/ Wildlife Conservation Act 1950 Rating</b>	<b>EPBC Act Rating</b>	<b>DEC Database</b>	<b>EPBC Act Protected Matters search</b>
<i>Ardea</i>	<i>alba</i>	Great Egret, White Egret		Marine		X
<i>Ardea</i>	<i>ibis</i>	Cattle Egret		Marine		X
<i>Merops</i>	<i>ornatus</i>	Rainbow Bee-eater		Marine		X



Some species that appear in the *EPBC Act* Protected Matters Search Tool are often not likely to occur within the specified area, as the search provides an approximate guidance to matters of national significance that require further investigation. The records from the DEC searches of threatened fauna provide more accurate information for the general area, however some records of sightings or trappings can be dated and often misrepresent the current range of threatened species.

The habitat requirements of the protected species listed under the *EPBC Act*, the *Wildlife Conservation Act 1950* and listed as priority species by the DEC, and the likelihood of their occurrence in the site is considered below.

#### ***Dasyurus geoffroii* Chuditch**

The Chuditch is the largest carnivorous marsupial in Western Australia. This species occupies a wide range of habitats including woodlands, riparian vegetation, beaches and deserts. The Chuditch formerly ranged over nearly 70 % of Australia but now retains only a patchy distribution through the Jarrah forest and mixed Karri/Marri/Jarrah forest of south-western WA. This reduction in range and decline in population numbers have been caused by habitat alteration, impacts from the introduction of foxes and cats, hunting and poisoning. This species is currently listed as Vulnerable on the *EPBC Act* (CALM, 2005a).

Chuditch are known to occur in the general area of the site; however, the site is highly degraded, with little vegetation cover and subject to high human visitation and Chuditch would be highly unlikely to occur at the site.

#### ***Myrmecobius fasciatus* Numbat**

The Numbat is a small, banded, diurnal marsupial that feeds solely on termites. This species once ranged widely in southern semi-arid and arid Australia, distributed within a number of vegetation types. However, the Numbat's current distribution is limited to Dryandra and Perup/Kingston area east of Manjimup and a number of nature reserves into which it has been reintroduced. This species occupies a number of habitat types including Jarrah forest, open eucalypt woodland, banksia woodland and tall closed shrubland (CALM, 2005b).

This species only occurs in isolated populations in Western Australia, in a number of small reserves, and it is highly unlikely that this species would be found at this site.

#### ***Calyptorhynchus latirostris* Carnaby's Cockatoo**

Carnaby's Cockatoo, also known as the Short-billed Black-Cockatoo, is distributed across the south-west of Western Australia in uncleared or remnant areas of eucalypt woodland and shrubland or kwongan heath. Breeding usually occurs in the Wheatbelt region of Western Australia, with flocks moving to the higher rainfall coastal areas to forage after the breeding season. These black cockatoos feed on the seeds of a variety of native plants, including *Allocasuarina*, *Banksia*, *Dryandra*, *Eucalyptus*, *Grevillea* and *Hakea*, and some introduced plants, including *Pinus*. They will also feed on the nectar from flowers of a number of species, and on insect larvae. Carnaby's Cockatoo has been listed as Endangered under the Federal *EPBC Act*.



This species is known to occur in the study area and could use a number of the plant species on this site for foraging. However, the feeding habitat at the site is of much lower value than the large areas of surrounding state forest and national park.

#### ***Calyptorhynchus baudinii* Baudin's Cockatoo**

Baudin's Cockatoo, also known as the Long-billed Black-Cockatoo, is found in the south-west of Western Australia in the forest and woodlands of Jarrah (*Eucalyptus marginata*), Karri (*E. diversicolor*) and Marri (*Corymbia calophylla*). The primary food source of this cockatoo is the seeds of the Marri (Garnett and Crowley, 2000). This species has been impacted by the removal of large Marri throughout its range. Baudin's Cockatoo has been listed as Vulnerable under the Commonwealth *EPBC Act*.

Baudin's Cockatoo are known to occur in the Mundaring area and the site contains habitat that is suitable for this species. This species may utilise the site for foraging, and the site also contains Marri trees, that are used by this cockatoo for breeding. However, the feeding and breeding habitat at the site is of much lower value than the large areas of surrounding state forest and national park.

#### ***Pseudocheirus occidentalis* Western Ringtail Possum**

The Western Ringtail Possum (*Pseudocheirus occidentalis*) is found in the south-west of Western Australia, with a patchy occurrence from the Collie River to Two Peoples Bay (Jones, *et al.*, 1994). Urban populations of this species are located in Busselton, as well as East Augusta and Albany.

This species was recorded in the *EPBC Act* Protected Matters Search but this species is not known from the Mundaring area and this record is likely to be inaccurate.

#### ***Phascogale tapoatafa tapoatafa* Southern Brush-tailed Phascogale**

This arboreal marsupial occurs in forest and woodland with suitable tree hollows. Populations fluctuate dramatically in response to invertebrate prey abundance. This subspecies has been observed in dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover. Records are less common from wetter forests (CALM, 2005c).

The Southern Brush-tailed Phascogale is known to occur in low densities in the northern Jarrah forests. This species is known to occur in the Mundaring area and is likely to occur in areas adjacent to the site; however the site is degraded and does not offer optimal habitat for this species.

#### ***Macropus irma* Western Brush Wallaby**

The Western Brush Wallaby, a medium sized macropod, is a grazer found primarily in open forest and woodland. This species was once very common in the south-west of Western Australia but has undergone a reduction in range and a significant decline in abundance in its current habitat. The decline in populations of this species has resulted from extensive clearing within its original distribution and from predation of juvenile Western Brush Wallabies by foxes (CALM, 2005d).

This species is known to occur in the general area but is unlikely to regularly utilise the site due to its degraded nature.



### ***Hydromys chrysogaster* Water-rat (Rakali)**

The water rat occupies habitat in the vicinity of permanent water and nests are constructed in logs or at the end of tunnels dug into banks. Unlike many other Australian rodents, the water rat is not entirely nocturnal, with activity usually high at sunset, though animals have been seen foraging during the day. The water rat is an opportunistic predator, feeding upon large aquatic insects, fish, crustaceans and mussels. They are also known to feed on frogs, lizards, small mammals, fresh carrion, and birds (CALM, 2005e).

This species is not protected under legislation but is listed as a Priority 4 species by DEC, which means it is a species in need of monitoring. There is no suitable habitat for this species at the study site and it would be highly unlikely to occur here.

### ***Isoodon obesulus fusciventer* Quenda**

The Quenda is an omnivorous marsupial that occurs in the south-west of Western Australia. It prefers areas with dense understorey vegetation, particularly around swamps and along watercourses. However, it also occurs in woodlands, and may use less ideal habitat where this habitat occurs adjacent to the thicker, more desirable vegetation. On the Swan Coastal Plain Quenda are often associated with wetlands (CALM, 2005f).

Quenda are known to occur in the Mundaring region and may be present in the small area of the site with thick wetland vegetation (in the west, adjacent to the river) but would be unlikely to occur at the majority of the site (except possibly very occasionally for foraging) as the site does not contain the thick undergrowth required by this species.



## 3. Field Survey

### 3.1 Survey Methods

A botanical survey was conducted by *ecologia* Environmental Consultants in April 1999 (*ecologia*, 1999) and the results from this survey have been included in this report. *Ecologia* used quadrats and foot surveys across the site to determine vegetation types and a list of species for the site.

GHD has conducted a number of brief site visits to determine a species list for the site (including dominant species) map vegetation type, condition and weed status, assess the site for the presence of TECs, assess fauna habitat potential and to determine the general environmental characteristics of the site. Brief site visits occurred on 6 September 2006, 27 September 2006 and 20 June 2007, with a full day visit on 26<sup>th</sup> June 2007.

A reconnaissance survey was conducted for the presence of fauna. A consideration of fauna habitat was undertaken within the study area.

Nomenclature of the species follows that of *Florabase* (2007) for flora species and the *Faunabase* (2007) for fauna species.

### 3.2 Vegetation Types

The vegetation of the site has been highly altered by past disturbances and much of the original vegetation is no longer intact. However, there is enough of the overstorey and patches of remnant vegetation to provide an indication of the original vegetation type of the site. Some of the vegetation types have regenerated relatively well following disturbance. A full description of the vegetation types, photographs and inventory of vascular plants is provided in **Appendix B** and **Appendix C**. The broad vegetation types at the site have been mapped in **Figure 2, Appendix A**.

Most of the site is highly degraded and little of the original vegetation remains intact. The overstorey at the site is generally in better condition than the middle and understorey. The central section of the site is an open woodland of Marri (*Corymbia calophylla*) and Flooded Gum (*Eucalyptus rudis*). Flooded Gum is dominant in the lower lying areas, including the gullies, with Marri dominant on higher ground. In some areas the understorey is almost completely cleared or comprised predominantly of weedy herbs and grasses. Some areas are dominated by weedy creepers, including Dolichos Pea (*Dipogon lignosus*), or weedy shrubs, such as Italian Lavender (*Lavandula stoechas*).

The east of the site supports a Granite System of Marri (*Corymbia calophylla*), Grass Trees (*Xanthorrhoea preissii*), Zamia (*Macrozamia riedeli*), and native herbs and shrubs over outcropping granites. White Myrtle (*Hypocalymma angustifolium*) is dominant in the mid-storey.

In the north-west corner of the site, adjacent to Helena River, there is an area of dense riparian vegetation and includes: *Corymbia calophylla*, *Eucalyptus rudis*, *E. patens*



over introduced *Acacias* and *Grevillea manglesii subsp. manglesii*, *Trymalium spp.*, *Baeckea camphorosmae*, *Macrozamia riedlei*, *Asparagus asparagoides*, *Darwinia citriodora*.

Some sections of the site have had some rehabilitation works conducted historically, with planted species such as *Hypocalymma angustifolium* and *Pimelea sp.* along the roads and edges of gully.

### 3.3 Vegetation Condition

The vegetation in the study area was given a condition rating based on the Bush Forever (Government of Western Australia, 2000) vegetation condition ratings scale. This scale recognises a level of intactness of vegetation, which is defined by the following:

- » Completeness of structural levels;
- » Extent of weed invasion;
- » Historical disturbance from tracks and other clearing or dumping;
- » The potential for natural or assisted regeneration.

The ratings in this scale are described as follows:

**Table 4 Government of Western Australia (2000) Vegetation Condition Scale**

Assigned Number	Classification	Description
1	<i>Pristine or nearly so</i>	No obvious signs of disturbance
2	<i>Excellent</i>	Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species
3	<i>Very Good</i>	Vegetation structure altered, obvious signs of disturbance
4	<i>Good</i>	Vegetation structure significantly altered by very obvious signs of multiple disturbance, retains basic vegetation structure or ability to regenerate it
5	<i>Degraded</i>	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.
6	<i>Completely Degraded</i>	The structure of the vegetation is no longer intact and the area is completely or almost without native species

Site One has been subject to a number of historical disturbances, most notably the construction of Mundaring Weir adjacent to the site. Some native vegetation has



recovered from major earthworks, and a number of mature native trees remain scattered throughout the site. However, there are ongoing disturbances that continually impact the remnant vegetation. This includes; the infrastructure works related to the weir, the Western Power substation and access tracks, bulldozing and burning for fire control and public use of the site. As in many areas with these levels of disturbance, there is substantial weed invasion and understorey composition is restricted to very few species.

However, there are some areas where the native vegetation has recovered fairly well, and has potential to recover further. In particular, the north-western corner of the site, adjacent to Helena River, has vegetation that is still largely intact and has fewer signs of disturbance. This area was rated as Condition 3 (*Very Good*). The highly disturbed sections, in the middle of the site around access tracks and the infrastructure footprints were rated between Condition 5 – 6 (*Disturbed to Highly Disturbed*). The majority of the rest of the site was rated between Condition 3 – 4 (*Very Good to Good*) as the overstorey was still intact. While the understorey was disturbed, with cleared areas and weed species, these areas showed potential to regenerate. The vegetation condition of the site is recorded at **Figure 3**.

### 3.3.1 Plant Pests and Diseases

There was little evidence to suggest that *Phytophthora cinnamomi* (commonly known as dieback) was present within the Site, based on the health of indicator species. However, dieback is known from the general area and if this site is chosen as the preferred site for the Mundaring WTP, a DEC interpreter or equivalent should assess the presence of dieback formally.

## 3.4 Threatened Ecological Communities

No TECs were identified during the field survey.

## 3.5 Flora

The Site has moderate species diversity with a total of 150 taxa (74 native taxa) from 58 families recorded within the surveyed area.

The dominant families recorded from the area were:

» Myrtaceae	16 taxa
» Poaceae	11 taxa
» Mimosaceae	9 taxa
» Cyperaceae	9 taxa
» Papilionaceae	8 taxa
» Proteaceae	8 taxa
» Iridaceae	8 taxa

Additionally, the dominant genus recorded was:



» <i>Acacia</i>	9 taxa
» <i>Eucalyptus</i>	7 taxa
» <i>Asparagus</i>	4 taxa
» <i>Lepidosperma</i>	4 taxa
» <i>Hakea</i>	4 taxa

Nineteen species were identified to genus only, due to lack of distinctive features, such as flowers. Additionally two species were identifiable to family only, as only the basal leaves were present. Field surveys at different times of year (particularly spring) would allow the identification of a greater number of plant species.

See **Appendix B** for a full list of flora species recorded in the project area.

Floristically the site is impoverished of native flora species, by comparison to typical vegetation in the region. This is due primarily to previous disturbance activities (*ecologia*, 1999).

### 3.5.1 Significant Species

No DRF species were identified at the site. However, one priority flora species, *Acacia ocnophylla* subsp. *ocnophylla* (Priority 3) was identified on the granite system east of the site. Priority 3 species are *taxa which are known from several populations, and are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.*

While priority species are not directly protected under legislation, impacts on these species should be avoided where possible. Only one of the plants located in the field survey was within the site boundaries, with the other two plants just outside the boundary. From the conceptual plant layout provided by Water Corporation it appears that all the plants are outside the footprint of the WTP and so should not be directly impacted by the project. However, further work would be required to determine potential indirect impacts from the proposal. If chosen as the preferred WTP site, consultation with DEC to assess potential management options for these species will be required.

If chosen as the preferred site a targeted spring survey will be required to search for presence of other significant species.

### 3.5.2 Weeds

Weed species were present across the whole site, due to past disturbances. In the south and west of the site weed species were the most dominant groundcover while on the granite system on the eastern side and in the native vegetation adjacent to the river on the western side weed species were less common. A number of planted, introduced species occur at the site, namely *Acacias* from the eastern states and



ornamental species, such as Jacaranda. These species are a reminder of the site's previous history as an old work camp.

A total of 76 weed species were recorded within the site, which represents about 51 % of the total species recorded. These were mainly pasture grasses (Poaceae), Acacias (Mimosaceae) from the eastern states, irises (Iridaceae) and daisies (Asteraceae).

Four of the weed species recorded at the site are Declared Plants under the *Agriculture and Related Resource Protection Act 1976*. Weeds that are declared plants under the *Act* are assigned to control class codes, as defined in **Table 5**. The Declared Plants at the site included: Bridal Creeper (*Asparagus asparagoides* – P1 for the whole of state) Cape Tulip (*Moraea* sp.- P1 for the whole of state), Narrow-leaf Cottonbush (*Gomphocarpus fruticosus* – not assigned to a control class code in the Shire of Mundaring), Blackberry (*Rubus ulmifolius* – P1 for the whole of state).

Two of the weed species recorded at the site are Weeds of National Significance (WONS), which are weeds that have been identified as causing significant environmental damage. These are Bridal Creeper (*Asparagus asparagoides*) and Blackberry (*Rubus ulmifolius*). Implementing practices to control these environmental weeds is strongly recommended.

**Table 5 Department of Agriculture and Food Declared Plant Control Classes.**

Control Class Code	Description
P1	Prohibits movement of plants or their seeds within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder.
P2	Eradicate infestation to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.
P3	Control infestation in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants.
P4	Prevent the spread of infestation from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set on all plants.
P5	Infestations on public lands must be controlled.

### 3.6 Fauna

#### 3.6.1 Fauna Species

An opportunistic fauna survey was completed in association with the spring flora survey. The results from this survey are included in **Table 11, Appendix D**. The site offers some value to woodland birds and reptile species but few mammals would be



expected to utilise the site regularly. In the eastern section of the site there is some outcropping granite that may support a variety of reptile species.

Of significance, noted in the opportunistic survey were the Forest Red-tailed Black-cockatoo and Carnaby's Cockatoo, both species are listed under the *Wildlife Conservation Act 1950* and the *EPBC Act*. There were feeding signs present, such as chewed nuts, which indicated these species uses the site for foraging.

The number of species determined during the opportunistic survey was limited by two factors; the short period of the survey and the fact that it was purely opportunistic and did not provide the opportunity to survey those species that are cryptic or not active during the day. Further detailed fauna surveys will be required if this site is selected as the preferred site for the WTP.

### **3.6.2 Habitat Value**

This site contains areas of native vegetation that may be used by native fauna species and therefore has some habitat value. However, this habitat is fairly uniform and largely disturbed and cannot be considered of 'high value'. The understorey is impoverished and much of the site is cleared or contains only sparse cover. Thus, habitat value for fauna species is very limited. There are some mature trees that are of value and should be retained where possible.

### **3.6.3 Habitat Linkages**

Fauna corridors and habitat linkage are important to allow animals to move between areas of resource availability. Such corridors are important for ground and aerial fauna, providing cover, resources, and linking areas suitable for rest and reproduction.

Some areas of this site may facilitate fauna movement, but the majority has been highly disturbed and subject to ongoing human disturbance and visitation. Therefore, it is of less importance to fauna movement than the large areas of remaining native vegetation that surround it.



## 4. Conclusions and Recommendations

The preliminary flora and fauna investigations for Site One included a desktop assessment and a preliminary field assessment. The results of the assessment concluded that:

- » Site One is located on a Water Corporation reserve below Mundaring Weir, bounded by Mundaring Weir Road on the west and south and by Helena River to the north. The majority of the area is unused apart from a Western Power sub-station in the centre of the site and picnic sites and public areas in the east.
- » Site One may not be able to accommodate all infrastructure required for the WTP and additional land may be required for drying beds. Potential sites for the drying beds include a pine plantation to the south of the site or alternatively, one of the other sites being considered for the WTP, such as the DEC land or the O'Connor Site. The additional land required for the drying beds has not been assessed as part of this survey. Other potential WTP sites were assessed in separate reports but should a new site be required (such as the pine plantation to the south of Site One) then additional flora and fauna survey work would be required.
- » The majority of the site is open woodland of Marri (*Corymbia calophylla*) with scattered Flooded Gum (*Eucalyptus rudis*). Some sections of the site contain predominantly introduced species, including Pines (*Pinus radiata*) and introduced *Acacia* species in the overstorey and weedy herbs and grasses in the understorey. Riparian and gully vegetation occurs adjacent to Helena River. There is an area of granite boulders in the east of the site that supports *Hypocalymma angustifolium* dominated community.
- » Site One has been subject to a number of historical disturbances, most notably the construction of Mundaring Weir adjacent to the site. Some native vegetation has recovered from major earthworks, and a number of mature native trees remain scattered throughout the site. However, there are ongoing disturbances that continually impact the remnant vegetation. This includes; the infrastructure works related to the weir, the Western Power substation and access tracks, bulldozing and burning for fire control and public use of the site. As in many areas with these levels of disturbance there is substantial weed invasion and understorey composition is restricted to very few species as a result. However, there are some areas where the native vegetation has recovered fairly well, and has potential to recover further. The vegetation condition at the site was rated between Condition 3 (*Good*) and Condition 6 (*Completely Degraded*) on the Bush Forever ratings condition scale.
- » No DRF species were located on the site. However, one priority species was recorded (*Acacia oncinophylla* subsp. *ocinophylla*). If this site is chosen as the preferred site for the WTP a targeted spring survey will be required to determine the presence of any further significant species..



- » The site contains a number of weed species, including a number of species that were historically planted in the area, such as introduced *Acacia* species. There are also a number of weeds present that have been Declared under the *Agriculture and Related Resource Protection Act 1976*. A number of the weeds present at the site are considered to be serious environmental weeds and their presence around the Helena River could mean they are spreading downstream also. These weeds include Bridal Creeper (*Asparagus asparagoides*) and *Watsonia* sp.
- » A number of fauna species occur in the general vicinity of the site, including a number of protected species. However, the site is highly disturbed and few species would utilise the site regularly. The site offers some value to woodland birds and reptile species but few mammals would be expected to utilise the site regularly. In the eastern section of the site there is some outcropping granite that may support a variety of reptile species.
- » This site contains some native vegetation that may be used by native fauna species, particularly woodland bird species. However, the understorey of the site is impoverished and much of the site is cleared or contains only sparse cover that would provide very limited habitat for fauna species. Clearing of the vegetation at the site would be expected to have a negligible impact on fauna species; particularly given the large areas of surrounding good quality habitat. The granites in the east of the study site and the remnant riparian vegetation along Helena River offer the highest habitat value for fauna and should be retained where possible.

**Site One is highly degraded and has been subject to a long history of disturbance. If the WTP is located at this site there will be some clearing of native vegetation required, including clearing of a number of mature trees and disturbance to granite outcrops. However, the site's degraded nature means that impacts on native flora and fauna will generally be minimal. The exception to this is the priority flora species that occurs on the granite outcrops. Impacts on these species should be avoided.**

**Where possible the better quality vegetation and habitat areas at the site should be retained. Management will be required for other potential impacts, such as weed management and erosion.**



## 5. Limitations

This report presents the results of a Preliminary Flora and Fauna Assessment prepared for the purpose of this commission. The data and advice provided herein relate only to the project described herein and must be reviewed by a competent scientist before being used for any other purpose. GHD accepts no responsibility for other use of the data.

Where reports, searches, any third party information and similar work have been performed and recorded by others the data is included and used in the form provided by others. The responsibility for the accuracy of such data remains with the issuing authority, not with GHD.

For these investigations GHD has conducted desktop data searches and preliminary field surveys. The conclusions of this report were based on the information gathered during these investigations and thus reflect the environment of the site at the time of survey. GHD accepts no responsibility for any variation in the flora and fauna present at the site due to natural and seasonal variability.



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## Appendix A

# Figures

- Figure 1**    **Location Plan and Environmental Constraints**
- Figure 2**    **Vegetation Type at Site One**
- Figure 3**    **Vegetation Condition at Site One**



## Appendix B

# Flora

Conservation Codes and Descriptions for DEC Declared Rare  
and Priority Flora Species.

Flora List for the Pine Plantation Site



**Table 6 Conservation Codes and Descriptions for DEC Declared Rare and Priority Flora Species.**

<b>Conservation Code</b>	<b>Description</b>
R: Declared Rare Flora – Extant Taxa	Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.
P1: Priority One – Poorly Known Taxa	Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P2: Priority Two – Poorly Known Taxa	Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P3: Priority Three – Poorly Known Taxa	Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.
P4: Priority Four – Taxa in need of monitoring	Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5 – 10 years.



**Table 7 Flora List for Site One. Source: (GHD Surveys 26 June 2007, and *ecologia*, 1999)**

Family	Genus	Species	Common Name	Status
Adiantaceae	<i>Cheilanthes</i>	<i>austrotenuifolia</i>		
Agavaceae	<i>Agave</i>	<i>americana</i>	Century Plant	*
Amaryllidaceae	<i>Narcissus</i>	<i>tazetta</i>	Jonquil	*
Anacardiaceae	<i>Schinus</i>	<i>molle</i>	Pepper Tree	*
Anacardiaceae	<i>Schinus</i>	<i>terebinthifolius</i>	Japanese Pepper Tree	*
Anthericaceae	<i>Corynotheca</i>	<i>micrantha</i>	Sand Lily	
Anthericaceae	<i>Thysanotus</i>	<i>dichotomus</i>	Branching Fringe Lily	
Anthericaceae	<i>Tricoryne</i>	<i>elator</i>	Yellow Autumn Lily	
Apiaceae	<i>Centella</i>	<i>asiatica</i>		
Apiaceae	<i>Platysace</i>	<i>compressa</i>	Tapeworm Plant	
Apocynaceae	<i>Vinca</i>	<i>major</i>	Blue Periwinkle	*
Arecaceae	? <i>Phoenix</i>	<i>dactylifera</i>	Date Palm	*planted
Asclepiadaceae	<i>Gomphocarpus</i>	<i>fruticosus</i>	Narrowleaf Cottonbush	* DP
Asparagaceae	<i>Asparagus</i>	<i>asparagoides</i>	Bridal Creeper	* WONS/ DP
Asparagaceae	<i>Asparagus</i>	<i>declinatus</i>	Bridal Veil	*
Asparagaceae	<i>Asparagus</i>	<i>officinalis</i>	Asparagus	*
Asparagaceae	<i>Asparagus</i>	<i>plumosus</i>		*
Aspleniaceae	<i>Pleurosorus</i>	<i>rutifolius</i>	Blanket Fern	
Asteraceae	<i>Cirsium</i>	<i>vulgare</i>	Spear Thistle	*
Asteraceae	<i>Conyza</i>	<i>parva</i>		*
Asteraceae	<i>Conyza</i>	<i>sumatrensis</i>		*
Asteraceae	<i>Ditrichia</i>	<i>graveolens</i>	Stinkwort	*
Asteraceae	<i>Hypochaeris</i>	sp.		*
Asteraceae	<i>Sonchus</i>	<i>oleraceus</i>	Common Sowthistle	*
Asteraceae	<i>Ursinia</i>	<i>anthemoides</i>	Ursinia	*
Bignoniaceae	<i>Jacaranda</i>	<i>mimosifolia</i>		* planted
Boryaceae	<i>Borya</i>	<i>sphaerocephala</i>	Pincushions	
Caesalpiniaceae	<i>Labichea</i>	<i>lanceolata</i>	Tall Labichea	
Cannaceae	<i>Canna</i>	<i>x orchiodes</i>		*
Colchicaceae	<i>Wurmbea</i>	<i>tenella</i>	Eight Nancy	
Convolvulaceae	? <i>Pomoea</i>	<i>cairica</i>	Coast Morning Glory	*



Family	Genus	Species	Common Name	Status
Cyperaceae	<i>?Cyperus</i>	sp.		
Cyperaceae	<i>Lepidosperma</i>	<i>costale</i>		
Cyperaceae	<i>Lepidosperma</i>	<i>effusum</i>	Spreading Sword Sedge	
Cyperaceae	<i>Lepidosperma</i>	sp.		
Cyperaceae	<i>Lepidosperma</i>	<i>squamatum</i>		
Cyperaceae	<i>Mesomelaena</i>	<i>tetragona</i>	Semaphore Sedge	
Cyperaceae	<i>Schoenus</i>	<i>clandestinus</i>		
Cyperaceae	<i>Schoenus</i>	sp.		
Cyperaceae	<i>Tetaria</i>	<i>octandra</i>		
Dasypogonaceae	<i>Lomandra</i>	<i>brittanii</i>		
Dasypogonaceae	<i>Lomandra</i>	sp.		
Dilleniaceae	<i>Hibbertia</i>	<i>hypericoides</i>	Yellow Buttercups	
Droseraceae	<i>Drosera</i>	<i>bulbosa</i>	Red-leaved Sundew	
Droseraceae	<i>Drosera</i>	<i>glanduligera</i>	Pimpernel Sundew	
Epacridaceae	<i>Leucopogon</i>	<i>propinquus</i>		
Euphorbiaceae	<i>Phyllanthus</i>	<i>calycinus</i>	False Boronia	
Euphorbiaceae	<i>Ricinus</i>	<i>communis</i>	Castor Oil Plant	*
Fumariaceae	<i>Fumaria</i>	<i>muralis</i>	Wall Fumitory	*
Geraniaceae	<i>Geranium</i>	<i>molle</i>	Dove's Foot Cranesbill	*
Geraniaceae	<i>Erodium</i>	<i>botrys</i>	Long Storksbill	*
Geraniaceae	<i>Erodium</i>	<i>moschatum</i>	Musky Crowfoot	*
Goodeniaceae	<i>Scaevola</i>	<i>calliptera</i>		
Haemodoraceae	<i>Anigozanthos</i>	sp.		
Haemodoraceae	<i>Haemodorum</i>	<i>paniculatum</i>	Mardja	
Iridaceae	<i>Freesia</i>	<i>alba x leichtlinii</i>		*
Iridaceae	<i>Gladiolus</i>	sp.		*
Iridaceae	<i>Moraea</i>	<i>?flaccida</i>	One-leaf Cape Tulip	* DP
Iridaceae	<i>Orthrosanthus</i>	<i>laxus var. laxus</i>	Morning Iris	
Iridaceae	<i>Romulea</i>	<i>rosea</i>	Guildford Grass	*
Iridaceae	<i>Watsonia</i>	<i>?borbonica</i>		*
Iridaceae	<i>Watsonia</i>	sp.		*
Iridaceae	sp.			*



Family	Genus	Species	Common Name	Status
Juncaceae	<i>Juncus</i>	<i>microcephalus</i>		*
Juncaceae	<i>Juncus</i>	<i>pallidus</i>	Pale Rush	
Juncaceae	<i>Juncus</i>	<i>subsecundus</i>	Finger Rush	
Lamiaceae	<i>Lavandula</i>	<i>stoechas</i>	Italian Lavender	*
Lauraceae	<i>Cassytha</i>	sp.		
Loganiaceae	? <i>Mitrasacme</i>	sp.		
Mimosaceae	<i>Acacia</i>	<i>baileyana</i>		*
Mimosaceae	<i>Acacia</i>	<i>decurrens</i>		*
Mimosaceae	<i>Acacia</i>	<i>extensa</i>	Wiry Wattle	
Mimosaceae	<i>Acacia</i>	<i>iteaphylla</i>		*
Mimosaceae	<i>Acacia</i>	<i>oncinophylla</i> subsp. <i>oncinophylla</i>		P3
Mimosaceae	<i>Acacia</i>	<i>podalyriifolia</i>		*
Mimosaceae	<i>Acacia</i>	<i>pulchella</i>	Prickly Moses	
Mimosaceae	<i>Acacia</i>	<i>pycnantha</i>	Golden Wattle	*
Mimosaceae	<i>Acacia</i>	<i>saligna</i>	Orange Wattle	
Moraceae	<i>Ficus</i>	<i>carica</i>	Common Fig	*
Myrtaceae	<i>Baeckea</i>	<i>camphorosmae</i>	Camphor Myrtle	
Myrtaceae	<i>Corymbia</i>	<i>calophylla</i>	Marri	
Myrtaceae	<i>Corymbia</i>	<i>maculata</i>	Spotted Gum	* planted
Myrtaceae	<i>Darwinia</i>	<i>citriodora</i>	Lemon-scented Darwinia	
Myrtaceae	<i>Eucalyptus</i>	<i>rudis</i>	Flooded Gum	
Myrtaceae	<i>Eucalyptus</i>	? <i>eremophila</i>		planted
Myrtaceae	<i>Eucalyptus</i>	? <i>patens</i>	Swan River Blackbutt	
Myrtaceae	<i>Eucalyptus</i>	<i>citriodora</i>	Lemon-scented Gum	* planted
Myrtaceae	<i>Eucalyptus</i>	<i>marginata</i>	Jarrah	
Myrtaceae	<i>Eucalyptus</i>	sp.		* planted
Myrtaceae	<i>Eucalyptus</i>	<i>wandoo</i>	Wandoo	
Myrtaceae	<i>Hypocalymma</i>	<i>angustifolium</i>	White Myrtle	
Myrtaceae	<i>Leptospermum</i>	<i>erubescens</i>	Roadside Teatree	
Myrtaceae	<i>Melaleuca</i>	<i>parviceps</i>		
Myrtaceae	<i>Melaleuca</i>	<i>rhopiophylla</i>	Swamp Paperbark	
Myrtaceae	<i>Taxandria</i>	<i>linearifolia</i>		



Family	Genus	Species	Common Name	Status
Orobanchaceae	<i>Orobanche</i>	<i>minor</i>	Lesser Broomrape	*
Oxalidaceae	<i>Oxalis</i>	<i>glabra</i>		*
Oxalidaceae	<i>Oxalis</i>	<i>pes-caprae</i>	Soursob	*
Oxalidaceae	<i>Oxalis</i>	sp.		*
Papilionaceae	<i>Bossiaea</i>	<i>spinescens</i>		
Papilionaceae	<i>Dipogon</i>	<i>lignosus</i>	Dolichos Pea	*
Papilionaceae	<i>Jacksonia</i>	<i>sternbergiana</i>	Stinkwood	
Papilionaceae	<i>Kennedia</i>	<i>prostrata</i>	Scarlet Runner	
Papilionaceae	<i>Lupinus</i>	<i>angustifolius</i>	Narrowleaf Lupin	*
Papilionaceae	<i>Medicago</i>	sp.		*
Papilionaceae	<i>Trifolium</i>	sp.		*
Papilionaceae	<i>Viminaria</i>	<i>juncea</i>	Swishbush	
Phormiaceae	<i>Stypandra</i>	<i>glauca</i>	Blind Grass	
Plantaginaceae	<i>Plantago</i>	<i>lanceolata</i>	Ribwort Plantain	*
Plantaginaceae	<i>Plantago</i>	<i>major</i>	Greater Plantain	*
Poaceae	<i>Aira</i>	<i>caryophylla</i>	Silvery Hairgrass	*
Poaceae	<i>Aira</i>	<i>praecox</i>		*
Poaceae	<i>Arundo</i>	<i>donax</i>	Giant Reed	*
Poaceae	<i>Avena</i>	sp.		*
Poaceae	<i>Briza</i>	<i>maxima</i>	Blowfly Grass	*
Poaceae	<i>Briza</i>	<i>minor</i>	Shivery Grass	*
Poaceae	<i>Cynodon</i>	<i>dactylon</i>	Couch	*
Poaceae	<i>Ehrharta</i>	sp.		*
Poaceae	<i>Melinis</i>	<i>?repens</i>		*
Poaceae	<i>Poa</i>	<i>annua</i>	Winter Grass	*
Poaceae	<i>Stenotaphrum</i>	<i>secundatum</i>	Buffalo Grass	*
Polygonaceae	<i>Acetosella</i>	<i>vulgaris</i>		*
Portulacaceae	sp.			
Primulaceae	<i>Anagallis</i>	<i>arvensis var. arvensis</i>	Pimpernel	*
Proteaceae	? <i>Hakea</i>	sp.		juv.
Proteaceae	<i>Dryandra</i>	<i>lindleyana</i>	Couch Honeypot	
Proteaceae	<i>Grevillea</i>	<i>manglesii</i> subsp. <i>manglesii</i>		



Family	Genus	Species	Common Name	Status
Proteaceae	<i>Hakea</i>	<i>amplexicaulis</i>	Prickly Hakea	
Proteaceae	<i>Hakea</i>	<i>lissocarpa</i>	Honey Bush	
Proteaceae	<i>Hakea</i>	<i>stenocarpa</i>	Narrow-fruited Hakea	
Proteaceae	<i>Hakea</i>	<i>undulata</i>	Wavy-leaved Hakea	
Proteaceae	<i>Persoonia</i>	<i>elliptica</i>		
Restionaceae	<i>Desmocladus</i>	sp.		
Rhamnaceae	<i>Trymalium</i>	<i>floribundum</i> subsp. <i>floribundum</i>		
Rhamnaceae	<i>Trymalium</i>	<i>ledifolium</i> var. <i>rosmarinifolium</i>		
Rosaceae	<i>Acaena</i>	<i>?agnipila</i>		*
Rosaceae	<i>Rubus</i>	<i>ulmifolius</i>	Blackberry	* WONS/ DP
Rubiaceae	<i>Opercularia</i>	<i>hispidula</i>	Hispid Stinkweed	
Scrophulariaceae	<i>Bartsia</i>	<i>trixago</i>		*
Scrophulariaceae	<i>Kickxia</i>	<i>elatine</i>	Pointed Toadflax	*
Scrophulariaceae	<i>Verbascum</i>	<i>virgatum</i>	Twiggy Mullein	*
Solanaceae	<i>Solanum</i>	<i>nigrum</i>	Black Berry Nightshade	*
Sterculiaceae	<i>Brachychiton</i>	<i>populneus</i>	Kurrajong	*
Sterculiaceae	<i>Brachychiton</i>	<i>gregorii</i>	Desert Kurragong	*planted
Sterculiaceae	<i>Thomasia</i>	<i>macrocarpa</i>	Large Fruited Thomasia	
Stylidiaceae	<i>Stylidium</i>	<i>repens</i>	Matted Triggerplant	
Thymelaeaceae	<i>Pimelea</i>	sp.		planted
Tropaeolaceae	<i>Tropaeolum</i>	<i>majus</i>	Garden Nasturtium	*
Xanthorrhoeaceae	<i>Xanthorrhoea</i>	<i>preissii</i>	Grass Tree	
Zamiaceae	<i>Macrozamia</i>	<i>riedlei</i>	Zamia	

\* Introduced species

**DP** Declared Plant (a weed declared under the *Agriculture and Related Resources Protection Act 1976*)

**WONS** “Weed of National Significance”

**P3** DEC Priority 3 species (see **Table 6**)



Appendix C  
**Vegetation**

Vegetation Community Descriptions at the Site



Appendix D

## Fauna

*Environment Protection And Biodiversity Conservation Act  
1999 Fauna Conservation Categories*

*Western Australian Wildlife Conservation Act 1950 Fauna  
Conservation Codes*

DEC Priority Fauna Conservation Codes.

Fauna Species that may occur in the O'Connor Site



**Table 8 Environment Protection And Biodiversity Conservation Act 1999 Fauna Conservation Categories**

<b>Conservation Category</b>	<b>Definition</b>
Extinct	Taxa not definitely located in the wild during the past 50 years
Extinct in the Wild	Taxa known to survive only in captivity
Critically Endangered	Taxa facing an extremely high risk of extinction in the wild in the immediate future
Endangered	Taxa facing a very high risk of extinction in the wild in the near future
Vulnerable	Taxa facing a high risk of extinction in the wild in the medium-term
Near Threatened	Taxa that risk becoming Vulnerable in the wild
Conservation Dependent	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classified as Vulnerable or more severely threatened.
Data Deficient (Insufficiently Know)	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
Least Concern	Taxa that are not considered Threatened

**EPBC Act Categories**

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered species if it does, will, or is likely to:

- » Lead to a long-term decrease in the size of a population, or
- » Reduce the area of occupancy of the species, or
- » Fragment an existing population into two or more populations, or
- » Adversely affect habitat critical to the survival of a species, or
- » Disrupt the breeding cycle of a population, or
- » Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
- » Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat\*, or
- » Interfere with the recovery of the species.



*\* Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a critically endangered or endangered species by direct competition, modification of habitat, or predation.*

An action has, will have, or is likely to have a significant impact on a vulnerable species if it does, will, or is likely to:

- » Lead to a long-term decrease in the size of an important population of a species, or
- » Reduce the area of occupancy of an important population, or
- » Fragment an existing important population into two or more populations, or
- » Adversely affect habitat critical to the survival of a species, or
- » Disrupt the breeding cycle of an important population, or
- » Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
- » Result in invasive species that are harmful a vulnerable species becoming established in the vulnerable species' habitat\*, or
- » Interferes substantially with the recovery of the species.

An important population is one that is necessary for a species' long-term survival and recovery. This may include populations that are:

- » Key source populations either for breeding or dispersal,
- » Populations that are necessary for maintaining genetic diversity, and/or
- » Populations that are near the limit of the species range.

*\* Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a vulnerable species by direct competition, modification of habitat, or predation.*

**Table 9 Western Australian Wildlife Conservation Act 1950 Fauna Conservation Codes**

<b>Conservation Code</b>	<b>Description</b>
Schedule 1	"...fauna that is rare or likely to become extinct, are declared to be fauna that is in need of special protection."
Schedule 2	"...fauna that is presumed to be extinct, are declared to be fauna that is in need of special protection."
Schedule 3	"...birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be fauna that is in need of special protection."
Schedule 4	"...fauna that is in need of special protection, otherwise than for the reasons mentioned [in Schedule 1 – 3]"



**Table 10 DEC Priority Fauna Conservation Codes.** (Species not listed under the Wildlife Conservation Act 1950, but for which there is some concern).

<b>Conservation Code</b>	<b>Description</b>
Priority 1	Taxa with few, poorly known populations on threatened lands.
Priority 2	Taxa with few, poorly known populations on conservation lands. Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown Land, water reserves, etc.
Priority 3	Taxa which are known from few specimens or sight records, some of which are on lands not under immediate threat of habitat destruction or degradation.
Priority 4	Rare taxa. Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5 – 10 years.
Priority 5	Taxa in need of monitoring. Taxa 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.



**Table 11 Fauna Species that may occur in the O'Connor Site (Source: Western Australian Museum *Faunabase* Search of the Mundaring area); and those recorded during the opportunistic fauna surveys.**

Family	Genus	Species	Common Name	Status	Recorded During the Field Survey
<b>Birds</b>					
Acanthizidae	<i>Acanthiza</i>	<i>?chrysorrhoa</i>	Yellow-rumped Thornbill		+
Accipitridae	<i>Accipiter</i>	<i>fasciatus fasciatus</i>	Brown Goshawk		
Accipitridae	<i>Aquila</i>	<i>audax</i>	Wedge-tailed Eagle		
Aegothelidae	<i>Aegotheles</i>	<i>cristatus cristatus</i>	Australian Owlet Nightjar		
Anatidae	<i>Chenonetta</i>	<i>jubata</i>	Australian Wood Duck		
Ardeidae	<i>Ixobrychus</i>	<i>minutus dubius</i>	Little Bittern	P2	
Campephagidae	<i>Coracina</i>	<i>novaehollandiae</i>	Black-faced Cuckoo-Shrike		+
Campephagidae	<i>Coracina</i>	<i>maxima</i>	Ground Cuckoo-shrike		
Columbidae	<i>Phaps</i>	<i>chalcoptera</i>	Common Bronzewing		+
Corvidae	<i>Corvus</i>	<i>bennetti</i>	Little Crow		
Corvidae	<i>Corvus</i>	<i>coronoides</i>	Australian Raven		+
Cracticidae	<i>Cracticus</i>	<i>tibicen dorsalis</i>	Australian Magpie		+
Cracticidae	<i>Strepera</i>	<i>versicolor</i>	Grey Currawong		
Cuculidae	<i>Chrysococcyx</i>	<i>lucidus plagosus</i>	Shining Bronze-cuckoo		
Cuculidae	<i>Cuculus</i>	<i>pallidus</i>	Pallid Cuckoo		
Dicruridae	<i>Rhipidura</i>	<i>fuliginosa preissi</i>	Grey Fantail		+
Falconidae	<i>Falco</i>	<i>berigora berigora</i>	Brown Falcon		
Falconidae	<i>Falco</i>	<i>longipennis longipennis</i>	Australian Hobby		
Halcyonidae	<i>Dacelo</i>	<i>novaeguineae</i>	Laughing Kookaburra	*	+



Family	Genus	Species	Common Name	Status	Recorded During the Field Survey
Hirundinidae	<i>Hirundo</i>	<i>nigricans</i>	Tree Martin		
Maluridae	<i>Malurus</i>	<i>elegans</i>	Red-winged Fairy-wren		
Maluridae	<i>Malurus</i>	<i>splendens</i>	Splendid Fairy-wren		+
Meliphagidae	<i>Acanthorhynchus</i>	<i>superciliosus</i>	Western Spinebill		
Meliphagidae	<i>Anthochaera</i>	<i>carunculata</i>	Red Wattlebird		+
Meliphagidae	<i>Lichenostomus</i>	<i>virescens</i>	Singing Honeyeater		+
Motacillidae	<i>Anthus</i>	<i>australis australis</i>	Richard's Pipit		
Pachycephalidae	<i>Pachycephala</i>	<i>pectoralis fuliginosa</i>	Golden Whistler		
Pardalotidae	<i>Pardalotus</i>	<i>punctatus punctatus</i>	Spotted Pardalote		
Pardalotidae	<i>Pardalotus</i>	<i>punctatus xanthopyge</i>	Yellow-rumped Pardalote		
Pardalotidae	<i>Pardalotus</i>	<i>striatus</i>	Striated Pardalote		
Passeridae	<i>Neochmia</i>	<i>temporalis temporalis</i>	Red-browed Finch		
Passeridae	<i>Stagonopleura</i>	<i>oculata</i>	Red-eared Firetail		
Petroicidae	<i>Petroica</i>	<i>multicolor campbelli</i>	Scarlet Robin		
Phasianidae	<i>Pavo</i>	<i>cristatus</i>	Common Peafowl (Indian Peafowl)	*	
Podargidae	<i>Podargus</i>	<i>strigoides brachypterus</i>	Tawny Frogmouth		
Psittacidae	<i>Calyptorhynchus</i>	<i>banksii</i>	Red-tailed Black Cockatoo		
Psittacidae	<i>Calyptorhynchus</i>	<i>banksii naso</i>	Forest Red-tailed Black Cockatoo	Schedule 1 / Vulnerable (DEC)	+
Psittacidae	<i>Calyptorhynchus</i>	<i>baudinii</i>	Baudin's Cockatoo	Schedule 1 / Endangered (DEC) (EPBC - Vulnerable)	



Family	Genus	Species	Common Name	Status	Recorded During the Field Survey
Psittacidae	<i>Calyptorhynchus</i>	<i>latirostris</i>	Carnaby's Cockatoo	Schedule 1 / Endangered	+
Psittacidae	<i>Calyptorhynchus</i>	<i>sp</i>			
Psittacidae	<i>Melopsittacus</i>	<i>undulatus</i>	Budgerigar		
Psittacidae	<i>Neophema</i>	<i>elegans</i>	Elegant Parrot		
Psittacidae	<i>Platycercus</i>	<i>icterotis</i>	Western Rosella		
Psittacidae	<i>Platycercus</i>	<i>spurius</i>	Red-capped Parrot		
Psittacidae	<i>Platycercus</i>	<i>zonarius</i>	Australian Ringneck (Ring-necked Parrot)		
Psittacidae	<i>Platycercus</i>	<i>zonarius torquatus</i>	Twenty-eight Parrot		+
Psittacidae	<i>Polytelis</i>	<i>anthopeplus anthopeplus</i>	Regent Parrot		
Rallidae	<i>Porzana</i>	<i>pusilla palustris</i>	Baillon's Crake		
Rallidae	<i>Porzana</i>	<i>tabuensis</i>	Spotless Crake		
Strigidae	<i>Ninox</i>	<i>connivens</i>	Barking Owl	P2 ( <i>N. connivens connivens</i> )	
Strigidae	<i>Ninox</i>	<i>novaeseelandiae</i>	Boobook Owl		
Strigidae	<i>Ninox</i>	<i>novaeseelandiae boobook</i>	Boobook Owl		
Turnicidae	<i>Turnix</i>	<i>varia varia</i>	Painted Bustard-Quail		
<b>Mammals</b>					
Burramyidae	<i>Cercartetus</i>	<i>concinnus</i>	Western Pygmy-possum / Mundarda		
Dasyuridae	<i>Antechinus</i>	<i>flavipes</i>	Yellow-footed Antechinus		
Dasyuridae	<i>Antechinus</i>	<i>flavipes leucogaster</i>	Mardo		
Dasyuridae	<i>Dasyurus</i>	<i>geoffroi</i>	Western Quoll / Chuditch	Schedule 1 / Vulnerable	



Family	Genus	Species	Common Name	Status	Recorded During the Field Survey
Dasyuridae	<i>Phascogale</i>	<i>tapoatafa tapoatafa</i>	Brush-tailed Phascogale / Wambenger	P3	
Dasyuridae	<i>Sminthopsis</i>	<i>gilberti</i>	Gilbert's Dunnart		
Felidae	<i>Felis</i>	<i>catus</i>	Cat	*	
Leporidae	<i>Oryctolagus</i>	<i>cuniculus</i>	European Rabbit	*	+
Macropodidae	<i>Macropus</i>	<i>eugenii derbianus</i>	Tammar Wallaby	P5	
Macropodidae	<i>Macropus</i>	<i>fuliginosus</i>	Western Grey Kangaroo		+
Macropodidae	<i>Macropus</i>	<i>irma</i>	Western Brush Wallaby	P4	
Macropodidae	<i>Setonix</i>	<i>brachyurus</i>	Quokka	Schedule 1 / Vulnerable	
Muridae	<i>Hydromys</i>	<i>chrysogaster</i>	Water Rat	P4	
Muridae	<i>Mus</i>	<i>musculus</i>	House Mouse	*	
Muridae	<i>Rattus</i>	<i>rattus</i>	Black Rat	*	
Mustelidae	<i>Mustela</i>	<i>putorius</i>	European Polecat / Ferret	*	
Myrmecobiidae	<i>Myrmecobius</i>	<i>fasciatus</i>	Numbat / Walpurti	Schedule 1 / Vulnerable	
Peramelidae	<i>Isoodon</i>	<i>obesulus fusciventer</i>	Quenda / Southern Brown Bandicoot	P5	
Phalangeridae	<i>Trichosurus</i>	<i>vulpecula vulpecula</i>	Common Brushtail Possum		
Tachyglossidae	<i>Tachyglossus</i>	<i>aculeatus</i>	Short-beaked Echidna		
Tarsipedidae	<i>Tarsipes</i>	<i>rostratus</i>	Honey Possum / Noolbenger		
Thylacomyidae	<i>Macrotis</i>	<i>lagotis</i>	Bilby	Schedule 1 / Vulnerable	
Vespertilionidae	<i>Chalinolobus</i>	<i>gouldii</i>	Gould's Wattled Bat		
Vespertilionidae	<i>Nyctophilus</i>	<i>geoffroyi</i>	Lesser Long-eared Bat		



Family	Genus	Species	Common Name	Status	Recorded During the Field Survey
Vespertilionidae	<i>Nyctophilus</i>	<i>timoriensis timoriensis</i>	Greater Long-eared Bat		
Vespertilionidae	<i>Vespadelus</i>	<i>regulus</i>	Southern Forest Bat		
<b>Reptiles</b>					
Agamidae	<i>Ctenophorus</i>	<i>ornatus</i>	Ornate Rock Dragon		
Agamidae	<i>Pogona</i>	<i>minor minor</i>	Western Bearded Dragon		
Agamidae	<i>Rankinia</i>	<i>adelaidensis</i>	Western Heath Dragon		
Boidae	<i>Antaresia</i>	<i>stimsoni stimsoni</i>	Western Stimson's Python		
Boidae	<i>Morelia</i>	<i>spilota imbricata</i>	Southern Carpet Python	Schedule 4	
Cheluidae	<i>Chelodina</i>	<i>oblonga</i>	Oblong Turtle		
Elapidae	<i>Acanthophis</i>	<i>antarcticus</i>	Southern Death Adder	P3	
Elapidae	<i>Brachyuropis</i>	<i>semifasciata</i>	Southern Shovel-nosed Snake		
Elapidae	<i>Notechis</i>	<i>scutatus</i>	Tiger Snake		
Elapidae	<i>Parasuta</i>	<i>gouldii</i>	Gould's Snake		
Elapidae	<i>Parasuta</i>	<i>nigriceps</i>	Black-backed Snake		
Elapidae	<i>Pseudechis</i>	<i>australis</i>	Mulga Snake		
Elapidae	<i>Pseudonaja</i>	<i>affinis affinis</i>	Dugite		
Elapidae	<i>Pseudonaja</i>	<i>modesta</i>	Ringed Brown Snake		
Elapidae	<i>Pseudonaja</i>	<i>nuchalis</i>	Gwardar		
Gekkonidae	<i>Christinus</i>	<i>marmoratus</i>	Marbled Gecko		
Gekkonidae	<i>Diplodactylus</i>	<i>granariensis granariensis</i>	Wheatbelt Stone Gecko		
Gekkonidae	<i>Diplodactylus</i>	<i>polyophthalmus</i>	Speckled Stone Gecko		



Family	Genus	Species	Common Name	Status	Recorded During the Field Survey
Gekkonidae	<i>Gehyra</i>	<i>variegata</i>	Variegated Tree Dtella		
Gekkonidae	<i>Strophurus</i>	<i>spinigerus</i>	Western Spiny-tailed Gecko		
Gekkonidae	<i>Strophurus</i>	<i>spinigerus inornatus</i>	Western Spiny-tailed Gecko		
Gekkonidae	<i>Underwoodisaurus</i>	<i>milli</i>	Barking Gecko		
Pygopodidae	<i>Aprasia</i>	<i>pulchella</i>	Granite Worm Lizard		
Pygopodidae	<i>Aprasia</i>	<i>repens</i>	Sandplain Worm Lizard		
Pygopodidae	<i>Lialis</i>	<i>burtonis</i>	Burton's Legless Lizard		
Pygopodidae	<i>Pygopus</i>	<i>lepidopodus</i>	Common Scaly-foot		
Scincidae	<i>Acritoscincus</i>	<i>trilineatum</i>	Southwestern Cool Skink		
Scincidae	<i>Cryptoblepharus</i>	<i>plagiocephalus</i>	Fence or Wall Skink		
Scincidae	<i>Ctenotus</i>	<i>delli</i>	Dell's Skink	P4	
Scincidae	<i>Ctenotus</i>	<i>fallens</i>	-		
Scincidae	<i>Ctenotus</i>	<i>labillardieri</i>	Red-legged Skink		
Scincidae	<i>Egernia</i>	<i>kingii</i>	King's Skink		
Scincidae	<i>Egernia</i>	<i>napoleonis</i>	Southwestern Crevice Skink		
Scincidae	<i>Eremiascincus</i>	<i>richardsonii</i>	Banded Skink		
Scincidae	<i>Hemiergis</i>	<i>initialis</i>	Five-toed Earless Skink		
Scincidae	<i>Hemiergis</i>	<i>initialis initialis</i>	Five-toed Earless Skink		
Scincidae	<i>Lerista</i>	<i>distinguenda</i>	-		
Scincidae	<i>Lerista</i>	<i>elegans</i>	-		
Scincidae	<i>Lerista</i>	<i>microtis</i>	-		



Family	Genus	Species	Common Name	Status	Recorded During the Field Survey
Scincidae	<i>Menetia</i>	<i>greyii</i>	Common Dwarf Skink		
Scincidae	<i>Morethia</i>	<i>lineocellata</i>	-		
Scincidae	<i>Morethia</i>	<i>obscura</i>	Woodland Flecked Skink		
Scincidae	<i>Tiliqua</i>	<i>rugosa rugosa</i>	Southwestern Bobtail		
Typhlopidae	<i>Ramphotyphlops</i>	<i>australis</i>	-		
Typhlopidae	<i>Ramphotyphlops</i>	<i>pinguis</i>	-		
Typhlopidae	<i>Ramphotyphlops</i>	<i>waitii</i>	-		
Varanidae	<i>Varanus</i>	<i>gouldii</i>	Gould's Sand Monitor		
Varanidae	<i>Varanus</i>	<i>tristis tristis</i>	Black-headed Monitor		
<b>Amphibia</b>					
Hylidae	<i>Litoria</i>	<i>adelaidensis</i>	Slender Tree Frog		
Hylidae	<i>Litoria</i>	<i>moorei</i>	Motorbike Frog or Bell Frog		
Myobatrachidae	<i>Crinia</i>	<i>georgiana</i>	Quacking Frog		+
Myobatrachidae	<i>Crinia</i>	<i>glauerti</i>	Glauerts' Froglet		+
Myobatrachidae	<i>Crinia</i>	<i>pseudinsignifera</i>	Bleating Froglet		
Myobatrachidae	<i>Geocrinia</i>	<i>leai</i>	Lea's Frog		
Myobatrachidae	<i>Heleioporus</i>	<i>albopunctatus</i>	Western Spotted Frog		
Myobatrachidae	<i>Heleioporus</i>	<i>barycragus</i>	Western Marsh Frog		
Myobatrachidae	<i>Heleioporus</i>	<i>eyrei</i>	Moaning Frog		
Myobatrachidae	<i>Heleioporus</i>	<i>inornatus</i>	Whooping Frog		
Myobatrachidae	<i>Heleioporus</i>	<i>psammophilus</i>	Sand Frog		



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Myobatrachidae	<i>Limnodynastes</i>	<i>dorsalis</i>	Bullfrog or Banjo Frog		
Myobatrachidae	<i>Myobatrachus</i>	<i>gouldii</i>	Turtle Frog		
Myobatrachidae	<i>Pseudophryne</i>	<i>guentheri</i>	Crawling Frog or Gunther's Toadlet		
<b>Fish</b>					
Poeciliidae	<i>Gambusia</i>	<i>affinis</i>	Mosquito Fish / Plague Minnow	*	



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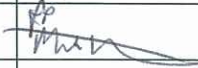
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