



360  
environmental



Black Cockatoo  
Survey -  
Maddington Kenwick  
Strategic  
Employment Area

Prepared for:  
City of Gosnells

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● people ● planet ● professional

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## Executive Summary

360 Environmental Pty Ltd (360 Environmental) was commissioned by the City of Gosnells (CoG) to undertake a Black Cockatoo Survey at the Maddington Kenwick Strategic Employment Area within precincts 2, 3A and 3B (the site). The site comprises an area of approximately 450 hectares (ha) and is composed of predominantly cleared bushland with small patches of remnant vegetation throughout. The survey involved a Black Cockatoo Foraging Assessment, Black Cockatoo Breeding and Roosting Assessment and Black Cockatoo Significant Tree Assessment (the survey).

A search of the Environment Protection and Biodiversity Conservation (EPBC) database revealed that the Vulnerable Forest Red-tailed Black Cockatoo and Baudin's Black Cockatoo, and the Endangered Carnaby's Black Cockatoo are likely to occur within the area.

The survey identified only one suitable nesting hollow for potential Black Cockatoo breeding within the site. At the time of the survey the hollow was occupied by Galahs (*Eolophus roseicapillus*) and therefore was not being utilised by Black Cockatoo. No evidence of Black Cockatoo breeding was recorded. A total of three Black Cockatoo roosting sites were recorded within the site. These all appeared to be Forest Red-tailed Black Cockatoo roosting sites due to the large amount of Forest Red-tailed Black Cockatoo feeding evidence surrounding each of these roost sites. Suitable feeding species, particularly Marri (*Corymbia calophylla*) and Banksia species (*Banksia sp.*) were recorded in clusters throughout the site. Extensive feeding evidence was observed within these clusters of Marri and Banksia. Forest Red-tailed Black Cockatoo feeding was usually observed within the patches of Marri. A small amount of Carnaby's Black Cockatoo feeding was observed within the two isolated pockets of Banksia species. A total of 145 significant Black Cockatoo trees with a diameter at breast height (DBH) of >500 mm were recorded within the site. Almost all of these significant trees were Marri (96%), with only the occasional Jarrah (*Eucalyptus marginata*) and Flooded Gum (*Eucalyptus rudis*) reaching suitable size. Forest Red-tailed Black Cockatoo were regularly heard throughout the site and were visually observed overhead on four occasions. Carnaby's Black Cockatoo were observed once within the site. This observation was of nine birds that flew into a pine tree on the corner of Edward Street and Grove Road. No evidence of Baudin's Black Cockatoo was observed within the site.

The suggestion that Black Cockatoo's utilise the remaining patches of Marri and Banksia within the site is supported by the feeding and roosting evidence within these areas and also the regular sighting of Forest Red-tailed Black Cockatoo throughout the site and the single sighting of nine Carnaby's Black Cockatoo within the site.

Guidance for future proponents is provided within this report. It is important that impact mitigation best practices are put in place so that the significance of any proposed action is reduced.

From the outcomes of this report the following are recommended:

- Retain as many native species as possible, particularly the isolated patches of Marri and Banksia, both of which are a valuable foraging resource for Black Cockatoo species within the area;
- Retain as many trees with a trunk diameter at breast height (DBH) of 500 mm or greater. The Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) considers that trees over 500 mm could provide breeding and foraging habitat for Black Cockatoo species. Trees with DBH less than 500 mm may be considered foraging habitat for the Black Cockatoo species. SEWPaC places higher value on potential breeding trees over foraging trees. It is recommended that emphasis be placed on retaining potential breeding and foraging trees to minimise impacts. Should offsets be required for vegetation clearing they are likely to be greater for the clearing of breeding habitat than for foraging habitat;
- Retain trees that display hollows. These trees may be suitable for breeding of bird species and may become suitable for Black Cockatoo species over time (as the trees grow and the hollows increase in size). If clearing of trees with hollows is unavoidable, it is recommended that hollows are inspected prior to clearing to ensure that hollows are not currently occupied or in use;
- Implement impact mitigation best practices as outlined within the *draft referral guidelines for three threatened black cockatoo species* (SEWPAC 2011);
- Consider offset of the impacts of clearing of habitat as a last resort after consideration of avoiding or otherwise mitigating impacts. Offset could include the purchase of land containing similar habitat;
- Consider erecting artificial nesting boxes within the site to provide more breeding opportunities to Black Cockatoo species and therefore may provide a net benefit to the species;
- Clear habitat in stages to allow fauna to disperse away from the site;
- Feral bee control could be implemented on site to remove feral bees from the hollows of trees that remain on site; and
- Conduct clearing operations outside the breeding season for Black Cockatoos. Carnaby's Black Cockatoo and Baudin's Black Cockatoo breed in late winter to spring (Carnaby's primarily breed in the wheatbelt) and Red-tailed Black Cockatoos breed within a period from September to April. This will reduce the likelihood of Black Cockatoos using the site during clearing.

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# 1 Introduction

## 1.1 Background

360 Environmental Pty Ltd (360 Environmental) was commissioned by the City of Gosnells (CoG) to undertake a Black Cockatoo Survey at the Maddington Kenwick Strategic Employment Area within precincts 2, 3A and 3B (the site). The site is bound by Roe Highway to the west, Orrong Road to the north and Tonkin Highway to the East (Figure 1), located 15 kilometres (km) south east of Perth in the suburb of Kenwick within the municipal boundaries of the CoG.

The site comprises an area of approximately 450 hectares (ha) and is composed of predominantly cleared bushland with small patches of remnant vegetation throughout. The survey involved a Black Cockatoo Foraging Assessment, Black Cockatoo Breeding and Roosting Assessment and Black Cockatoo Significant Assessment Survey (the survey).

The purpose of the assessment is to explicitly address the matter of Black Cockatoo habitat as outlined by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) draft referral guidelines for three threatened Black Cockatoo species: Carnaby's cockatoo (Endangered) *Calyptorhynchus latirostri*, Baudin's cockatoo (Vulnerable) *Calyptorhynchus baudinii*, Forest red-tailed black cockatoo (Vulnerable) *Calyptorhynchus banksii naso* (Department of Sustainability, Environment, Water, Population and Communities (July 2011)).

This assessment is aimed at providing guidance for future planning of Maddington Kenwick Strategic Employment Area which has been identified for rezoning and potential industrial development.

## 1.2 Objectives

The objective of the work is to develop documentation to guide and assist CoG and landholders in the planning and development of Maddington Kenwick Strategic Employment Area, specifically in regard to Black Cockatoo habitat.

## 1.3 Scope of the Study

In order to determine what areas of the site would be considered foraging or breeding habitat for Black Cockatoos, a survey of suitable trees and habitat within the proposed development area was undertaken.

- Identification of significant habitat trees (breeding and feeding) suitable for Black Cockatoo and evidence of Black Cockatoo breeding and feeding at the site with reference to the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) (2011) draft referral guidelines for Black Cockatoos;

- Provision of detailed mapping describing the Black Cockatoo foraging and / or breeding habitat within the site;
- Provision of advice regarding the significance of any foraging and/or breeding habitat in the Study Area with regard to its regional setting and other known habitat areas;
- A discussion of available options for mitigation, enhancement and offset strategies to maximise land yield for the potential development and address the conservation requirements for black cockatoo species;

## 2 Site Description

### 2.1 Site Location

The survey site is approximately 450 ha and is bound by Roe Highway, Orrong Road and Tonkin Highway. The site is predominately cleared degraded rural habitat.

### 2.2 Broad Habitat Assessment

In 2010 Tauss and Weston undertook a flora, vegetation and wetlands study of the site. Generally the vegetation at the site consisted of:

- Low woodlands to low forest composed of Marri and *Eucalyptus* species, over *Casuarina obesa*, *Allocasuarina fraseriana* and *Banksia* species;
- Tall shrublands composed of *Melaleuca*, *Hakea* and *Acacia* species;
- Low shrublands composed of mid dense heath over open sedges, species rich sedges rushes and herbs; and
- Rushes and sedgelands composed of mid-dense, species rich rushes, sedges and open herbs.

## 3 Black Cockatoo Species

Three species of Black Cockatoo occur in the south-west of Western Australia. All three species are protected under the following State and Federal legislation:

- The *Wildlife Conservation Act 1950* (WC Act), Western Australia; and
- The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) is listed as Endangered under the EPBC Act. The Red-tailed Black Cockatoo (*Calyptorhynchus banksii*) and Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) are classified as Vulnerable.

Under the WC Act both Carnaby's Black Cockatoo and Baudin's Black Cockatoo are listed as Endangered. The Forest Red-tailed Black Cockatoo is listed as Vulnerable.

### 3.1 Carnaby's Black Cockatoo

Carnaby's Black Cockatoo is a large, Black Cockatoo with a white patch on its cheek, white bands on its tail, and a strong curved bill. Carnaby's Black Cockatoo is also known as the Short-billed Cockatoo. In males, the bill is black and the eye-ring dark-pink. Females have a light grey bill, grey eye-ring, and the cheek patch is less distinctive.

Carnaby's Black Cockatoo is endemic to the southwest of Western Australia, extending from the Murchison River to Esperance, and inland to Coorow, Kellerberrin and Lake Cronin (DEC, 2009). There is evidence the species is currently expanding its breeding range westward and south into the Jarrah-Marri forests of the Darling Range and into the Tuart forests of the Swan Coastal Plain (Johnstone and Kirkby, 2006).

Carnaby's Black Cockatoos are believed to breed mostly in the wheatbelt region of Western Australia (DEC, 2009). After breeding, Carnaby's Cockatoo disperse to the higher rainfall coastal areas of the south-west of Western Australia to feed in late December to July (DEC, 2009).

Carnaby's Black Cockatoo display strong pair bonds. They occur in uncleared or remnant areas of Eucalypt woodland, principally Salmon gum (*Eucalyptus salmonophloia*) or Wandoo (*E. wandoo*), and shrubland or kwongan heath dominated by Hakea and Banksia species. Carnaby's Black Cockatoo nest in the hollows of live or dead smooth-barked Eucalypts (Salmon Gum and Wandoo) but also in Red Morrell (*E. longicornis*), York Gum (*E. loxophleba*), Marri and Tuart (Johnstone and Storr, 1998). Nest hollows range from 2.5-12 m above ground, size of entrance from 23-30 cm and depth of hollows from 1-2.5 m (Johnstone and Storr, 1998). Eggs are laid between July to mid-October and incubation is 29 days (Johnstone and Storr, 1998).

On the Swan Coastal Plain, the birds feed on a large variety of plants including the *Proteaceae* (Banksia and Grevillea), Marri nuts and introduced species – notably Pines (DEC, 2009).

Carnaby's Black Cockatoo has undergone a dramatic decline in recent years, declining by 50 percent in the past 45 years, one of the main contributing factors being land clearing (DEC, 2009). The long-term survival and recovery of this species is linked to the availability of its habitat – both in breeding areas in the Wheatbelt and non-breeding areas such as the Swan Coastal Plain (DEC, 2009). In addition, clearing of heathland near breeding sites has reduced the availability of food for breeding pairs and their young (DEC, 2009).

### **3.2 Forest Red-tailed Black Cockatoo**

The Forest Red-tailed Black Cockatoo is a large Black Cockatoo with a pair of black central tail feathers and a bright red, orange or yellow barring on the tail (SEWPaC, 2012). This species is endemic to the south-west humid and semi-humid zones of Western Australia. It inhabits dense Jarrah, Karri and Marri forests which receive more than 600mm average annual rainfall (SEWPaC, 2012). Forest Red-tailed Black Cockatoos feed predominantly on the seeds of Jarrah and Marri fruits.

### **3.3 Baudin's Black Cockatoo**

Baudin's Black Cockatoo is a large black cockatoo with rectangular white patches in the tail. This species is only found in the extreme south-west of Western Australia. It occurs in areas of high rainfall and usually in heavily forested locations dominated by Marri, Karri or Jarrah. The diet of Baudin's Black Cockatoo consists mostly of *Eucalyptus* seeds (e.g. Marri and Jarrah) and occasionally insect larvae (SEWPaC, 2012).

## 4 Methods

### 4.1 Background Research

The background research is designed to gather existing data on known locations of breeding and feeding for Black Cockatoo. The background research and desktop study included review of the following websites and documents:

- DEC's website on Black Cockatoos;
- SEWPaC's EPBC Act draft referral guidelines; and
- Reports of previous studies undertaken in the area (Tauss and Weston, 2010).

### 4.2 Survey Personnel

The Black Cockatoo Assessment was undertaken by Black Cockatoo specialist Tony Kirkby and Environmental Scientist Andrew Hide. Tony Kirkby was a technical officer at the WA Museum and has had significant field experience with Black Cockatoos in Western Australia. He is considered an expert in the area of protected Black Cockatoos and has authored a number of papers on the subject. Over the last seven years Tony has collected, recorded and photographed most of the food taken by the three south-west Black Cockatoos and has to date a database of over 20,000 records and an image library of over 3,000 Cockatoo and Cockatoo food related photographs.

### 4.3 Site Visit

The site visit was undertaken by both Tony Kirkby and Andrew Hide throughout the 23, 24 and 25 July 2012 to assess the habitat at the site and its suitability and use by Black Cockatoo species. The site is composed of private property Lots and was assessed by traversing the road network throughout these Lots via vehicle. Generally the habitat within each Lot was visually assessed from the road with the use of binoculars. Access to all properties was not available. Therefore most of the habitat within the site was visually observed from the road. However where access to properties was available the individual Lot was traversed on foot to better determine the habitat suitability for Black Cockatoo species. Access was available to most of the Lots containing suitable Black Cockatoo habitat.

### 4.4 Black Cockatoo Foraging Habitat Assessment Methodology

The Foraging Habitat Assessment involved an observational site survey and Feeding Assessment to determine the extent of foraging habitat for Black Cockatoos throughout the site. Efforts were made to visually identify and assess all remnant vegetation within

the site. If possible a detailed assessment was undertaken on foot. The survey identified flora species viewed as being regularly fed upon by Black Cockatoo species.

In general feeding species included:

- Jarrah (*Eucalyptus marginata*);
- Marri (*Corymbia calophylla*);
- Sheoak (*Allocasuarina fraseriana*);
- Banksia species (*Banksia menziesii* or *Banksia ilicifolia*);
- Hakea (*Hakea prostrata*);
- Flooded Gum (*Eucalyptus rudis*); and
- Pine species.

In addition, where possible recent feeding evidence on habitat species was recorded. This included the analysis of dentition marks in seed and nut material, this allowed the Black Cockatoo species responsible for the feeding evidence to be identified.

Feeding trees and feeding evidence was recorded and located using a hand held Differential Global Positioning System (DGPS) unit.

## 4.5 Black Cockatoo Significant Tree Assessment Methodology

The survey comprised of recording the location, species, tree diameter at breast height and any other important descriptive information about each tree located within the site boundary. The trees were assessed based on the following criteria:

- Native tree species likely to form suitable hollows (Jarrah, Tuart, Marri etc.);
- Diameter at breast height > 500 millimetres (mm); and
- Hollows > 12 centimetres (cm) diameter.

The site was surveyed for significant breeding trees by traversing the road network and observing trees within private properties. Access was not available to all properties. Several properties had issues with either bees, dogs or were inaccessible and therefore it was not possible to get tree measurements of all significant trees within the site. Where access to properties was possible the area was walked and all trees meeting the criteria for potential breeding habitat (species, girth and hollow diameter) were recorded and electronically logged using a hand held DGPS unit to get the Universal Transverse Mercator (UTM GDA 94 Zone 50) coordinates.

Trees exceeding 500 mm trunk diameter at breast height (DBH) (~1.5 m above ground level) were considered environmentally significant for the purposes of this survey based on criteria outlined by SEWPaC.

## 4.6 Black Cockatoo Breeding and Roosting Assessment Methodology

The Black Cockatoo Breeding and Roosting Assessment was undertaken alongside the Foraging Habitat Assessment and Significant Tree Assessment. Cockatoo Expert Tony Kirkby assessed the suitability of hollows for breeding and determined areas utilised for night time roosting within the site.

Each significant tree was visually assessed to determine if the tree contained a hollow suitable for Black Cockatoo breeding. Black Cockatoo species have a preference for a certain type and orientation of tree hollow. Tony Kirkby determined if the hollow had the potential to be suitable for breeding and also if the hollow was currently being used for breeding for Black Cockatoo or if the hollow was being used by another bird species.

Searches for roosting evidence were undertaken alongside the other surveys. Evidence of roosting usually involved large amount of bird scat in a specific area including a significant amount of small broken branches on the ground. Roosting sites were usually located within areas containing extensive amounts of foraging evidence.

## 4.7 Black Cockatoo Opportunistic Sightings

Opportunistic sightings of Black Cockatoo species observed while traversing the site were recorded including a DGPS location. Black Cockatoo calls were also recorded as observations while undertaking the other surveys. However a DGPS location was not recorded for these audio observations as it was difficult to determine their exact location.

## 5 Results

The following summarises the results of the Black Cockatoo Assessment. This includes the Black Cockatoo foraging habitat, significant tree, breeding and roosting survey as well as opportunistic observations within the site.

### 5.1 Black Cockatoo Foraging Habitat Results

The Black Cockatoo Assessment and background research revealed that most of the site had been previously cleared. The majority of the vegetation throughout the site was composed of planted exotic flora species and provided little benefit to Black Cockatoo. A detailed site visit was undertaken and allowed the survey team to determine all flora habitat considered to be of foraging value to the Black Cockatoo species within the site. The habitat determined as foraging value to Black Cockatoo species has been recorded in Figure 2. Exotic flora species of little value to Black Cockatoo were not recorded within the figure.

The key foraging species located within the site were primarily Marri and Banksia species. Generally feeding was observed throughout the Marri and Banksia habitat and most of the feeding was recent (Plate 1 and 2). Both Marri and Banksia are a key foraging resource for Black Cockatoo. Marri in particular was used for feeding extensively throughout the site by the Forest Red-tailed Black Cockatoo (Plate 1).



Plate 1: Evidence of extensive feeding by Forest Red-tailed Black Cockatoo

A small amount of Banksia foraging evidence was observed within the two isolated patches of Banksia within Lot 234 along Bickley Road and within Lot 222 along Brentwood Road. Plate 2 shows foraging evidence by Black Cockatoo. In this case an insect larvae has been removed from the centre of the cone and is therefore likely to be feeding evidence of Carnaby's Black Cockatoo. The primary Banksia species located at the site were *Banksia attenuata*, *Banksia menziesii* and *Banksia ilicifolia*.



**Plate 2: Black Cockatoo feeding on Banksia**

Generally foraging evidence was observed throughout the Marri and Banksia habitat displayed in Figure 2 to some extent. The following provides a summary of obvious feeding evidence observed during the Foraging Assessment.

- Recent evidence of feeding on seeds from Marri – 403694E 6457237N;
- Recent evidence of feeding on seeds from Marri – 403571E 6457275N;
- Recent evidence of feeding on seeds from Marri – 403571E 6457275N;
- Recent evidence of feeding on seeds from Marri – 403624E 6457420N;
- Recent evidence of feeding on seeds from Marri – 403497E 6458302N;
- Recent evidence of feeding on seeds from Banksia – 404566E 6456027N;
- Recent evidence of feeding on seeds from Banksia – 405066E 6456789N;
- Old evidence of feeding on seeds from Marri – 403707E 6458216N; and
- Old evidence of feeding on seeds from Marri – 403679E 6458264N.

In addition to these species the occasional Jarrah, Hakea (*Hakea* sp.), Sheoak, Cape Lilac (*Melia azedarach*) and Pine Tree (*Pinus* sp.) were scattered throughout the site and

would be of some value to Black Cockatoo species as a foraging resource. Pine in particular is fed upon regularly by the Carnaby's Black Cockatoo. Cape Lilac is fed upon regularly by the Forest Red-tailed Black Cockatoo within the Perth metropolitan area. Both Cape Lilac and Pine trees were scattered in low densities throughout the site. Both were the only exotic species that are likely to benefit Black Cockatoo located within the site.

Flooded Gum was present through the site along a thin drainage line (Figure 2). Black Cockatoo species may utilise Flooded Gum as a foraging resource, however preference is likely to be given to more suitable species such as Marri.

Native Melaleuca species were common in patches throughout the site but these species provide little value to Black Cockatoo as a resource.

Figure 2 provides a map illustrating the locations where feeding evidence was found. Appendix B provides a summary of data results for the Foraging Assessment.

## 5.2 Black Cockatoo Significant Tree Assessment Results

A summary of the results of the Black Cockatoo Significant Tree Assessment are presented in Table 1, Figure 2 and 4. The raw survey data is provided in Appendix C.

In total, 145 significant trees were recorded on site with a trunk DBH greater than 500 mm. A total of 140 (96.5%) of these trees were Marri trees. The majority (67%) of the trees recorded a DBH of 500 – 800 mm (Figure 2). A total of 15 significant trees were observed where a measurement was unattainable. Usually this was a result of feral bees or a beehive set up by residents, dogs or access to the Lot was not gained.

**Table 1: Black Cockatoo Significant Tree Assessment Results**

TRUNK SIZE (DBH)	JARRAH	MARRI	FLOODED GUM	TOTAL
Medium: 500 mm – 800 mm	3	94	0	97 (67%)
Large: 800 mm – 1,200 mm	0	28	1	29 (20%)
Extra Large: >1,200 mm	0	4	0	4 (3%)
Measurements Unattainable	1	14	0	15 (10%)
<b>TOTAL</b>	<b>4</b>	<b>140</b>	<b>1</b>	<b>145</b>

The significant trees were recorded in small isolated pockets throughout the site. Most of the significant trees were located along Grove Road within Lots 200, 302, 301, 75, 74 and along the road verge of Grove Road. It would appear these pockets of vegetation were not originally cleared when the rest of the site was cleared for rural land use. This would also explain the presence of larger older growth trees within these pocketed areas.

### 5.3 Black Cockatoo Breeding and Roosting Results

Tree hollows utilised for breeding and roosting sites were assessed by Tony Kirkby.

Any tree hollows observed at the site were assessed to determine if they were being utilised by Black Cockatoos or if not to determine if they were suitable or have the potential to be suitable for use by Black Cockatoo. Although there were many significant and very large trees throughout the site only one tree was located that contained a hollow that has the potential to be utilised by Black Cockatoo species. That hollow was being utilised by Galahs at the time of the survey. The tree was located within Lot 5 on Grove Road (at 403457E 6457743N). Although there were many large significant trees throughout the site most of these trees were located throughout paddocks and were not in close proximity to other trees. As a result most of these trees were very healthy and due to the lower density have been able to grow outwards instead of upwards. As a result of this strength and health few of the Marri trees had lost limbs, and therefore few provided the circumstances necessary to form a hollow.

Feral bees were common throughout the site. However most of these occurred in smaller hollows that were not suitable for Black Cockatoos.

During the field survey a total of three Black Cockatoo night time roosting sites were located. All of these roost sites appeared to be Forest Red-tailed Black Cockatoo due to the large amount of Forest Red-tailed Black Cockatoo feeding evidence that surrounded the roost. Each roosting site contains a significant amount of bird scat / droppings throughout the area. An example of this is displayed in Plate 3.



Plate 3: Evidence of Black Cockatoo overnight roost site (large amount of scat)

The Location of each roost site is presented below.

- Black Cockatoo Roost Site – 403578E 6457270N;
- Black Cockatoo Roost Site – 403672E 6457396N; and
- Black Cockatoo Roost Site – 403544E 6457254N.

Figure 3 provides a map illustrating the locations where possible suitable hollows and roost sites were located within the site. Appendix B provides a summary of data results for the possible Black Cockatoo hollow and roosting sites.

## 5.4 Black Cockatoo Opportunistic Sightings Results

Forest Red-tailed Black Cockatoo were regularly present throughout the site. They were observed and also heard regularly during the field survey. Figure 3 and 4 displays the locations of the sightings of birds. The species was heard within the site on many more occasions than they were sighted. The exact location of Forest Red-tailed Black Cockatoo calls were not recorded using a DGPS as the exact location could not be determined through audio cue alone. The calls were heard regularly enough to suggest that the species is regularly utilising the site for either foraging or as a stopover between destinations. Most of the bird sightings observed birds flying overhead in an east to west direction. It would appear the birds are travelling from the hills and making their way closer to the coast.

Only one sighting of Carnaby's Black Cockatoo was made during the field survey. A total of nine birds were observed at around 14:30 on 23 July 2012. The flock of birds flew into a Pine tree located out the front of Lot 14 on Edward Street. The birds stayed in the tree for several minutes before taking flight again in a north easterly direction. The location of this observation is displayed in Figure 3 and included alongside the habitat data in Figure 4.

## 6 Discussion

### 6.1 Foraging Habitat

The site contained several patches of Marri and also Banksia species that are of significant foraging value to Black Cockatoo species. Marri in particular was utilised extensively by the Forest Red-tailed Black Cockatoo and is clearly a valuable resource for the species. The small patches of Banksia are also very valuable particularly for Carnaby's Black Cockatoo. These important foraging areas are shaded in Figure 2 and should be retained were possible.

### 6.2 Breeding Habitat

A total of 145 significant trees were recorded throughout the site. These significant trees are viewed by SEWPaC as potential breeding habitat and should be retained were possible. Most of these trees were Marri and were located within small localised patches. It would appear most of these patches of Marri have not been cleared in the past and would explain why a number of significant trees still occur in the area.

Only one hollow that could potentially be utilised by Black Cockatoo species for breeding was identified within the site in one large Marri tree (403457E 6457743N). This hollow was being utilised by Galahs at the time of the survey. Galahs are generally a more aggressive and competitive species than Black Cockatoos. The impact of the reduced availability of nesting hollows could be exacerbated by an increase in inter-specific competition for nest-sites (SEWPaC 2012). Several smaller but inappropriate hollows were observed throughout the site. Several of these were invaded by feral bees. Invasion of tree hollows by feral bees leads to a reduction in the number of suitable hollows left for Black Cockatoos (WAM 2011). A number of Black Cockatoo chicks have been found dead in such hollows as a result of being stung by feral bees (WAM 2011). Therefore feral bee control is important in allowing hollows to be available for Black Cockatoos or other native bird species.

### 6.3 Recommendations

Due to the reasonable amount of foraging habitat but limited number of suitable hollows it was felt that this site may benefit from the erection of artificial nesting hollows throughout the area, particularly in the north western section throughout the Marri habitat. Within these areas there is a reasonable chance the artificial nesting hollows would be utilised by Black Cockatoo species over time and therefore provide a significant benefit to the birds.

The area surrounding the site is recently becoming more frequently affected by urban development. With the exception of the Perth Hills area there are few patches of native vegetation remaining in the regional setting. In particular large trees such as Marri are

uncommon. Although the majority of the site is relatively degraded and composed of mostly exotic species the small patches of native trees are clearly important. Therefore it is recommended that efforts be made to retain as much of this native vegetation within the site as possible. In particular native species such as Marri and Banksia should be retained. This includes road verge vegetation, particularly along Grove road which has high densities of Marri along the verge.

Although there is a large Bush Forever site located between the precincts this is generally composed of Melaleuca species which provide little value to Black Cockatoo. The Bush Forever site also has a distinct absence of any large trees such as Marri, Jarrah or Flooded Gum. Without the presence of these tree species the Bush Forever site has little value to Black Cockatoo from a breeding, roosting and to a lesser extent foraging perspective.

### 6.3.1 Nearby Potential Habitat

There are extensive areas of potential habitat (not surveyed as part of this scope of work) within 10 km of the site. A selection of these areas is vested with the Conservation Commission which does indicate a greater level of security for future retention than habitat present on free-hold parcels of land. These sites are shown in Figure 5 and are tabulated in Table 2. The significance of these areas of potential habitat cannot be assessed without survey, however it would be reasonable to assume that Black Cockatoo habitat is supported within at least some of these nearby areas.

**Table 2: Surrounding Areas of Potential (though unsurveyed) Black Cockatoo Habitat**

RESERVE	DISTANCE FROM SITE	AREA OF RESERVE
Kenwick Wetlands	0.67	20
Korung National Park	1.94	6,350
Pioneer Park	2.79	19
Canning River Regional Park	3.04	66
Lesmurdie Falls National Park	3.31	57
Miscellaneous Reserve (Department of Agriculture)	3.41	13
Mundy National Park	4.85	34
Un-named Reserve	6.53	5
Jarrahdale State Forest	6.63	44,538
Kalamunda National Park	8.19	397
Beelu National Park	9.13	3,680
Greenmount State Forest	9.41	1,192
Balannup Lake Nature Reserve	10.00	6

Generally, from a planning and development viewpoint efforts should be made to retain as much of the native vegetation within the site as possible, particularly Marri and Banksia (as outlined in Figure 2). It is recommended that these areas be left as public open spaces so they can continue to be utilised by Black Cockatoo species but also provide an aesthetical value to the area. Habitat such as the two large Banksia patches within Lots 234 on Bickley Road and Lot 222 on Brentwood Road are still in relatively good condition and are therefore of great value to many other fauna species other than Black Cockatoo.

Before any proposed action takes place mitigation strategies should be considered. If removal of native vegetation within the site is essential for the development of the site, offset strategies should be put in place. Offset strategies are usually determined in consultation with the appropriate federal and state regulators. Some strategies that may be implemented include the purchase and protection of native vegetation within close proximity to the site in order to provide an appropriate offset for the proposed impact, or the installation of artificial nesting boxes throughout the site particularly within the remaining Marri remnants.

## 6.4 Guidance for Future Proponents

The most current guidance on the significance of Black Cockatoo habitat is the draft *Environment Protection and Biodiversity Conservation Act 1999 draft referral guidelines for three threatened black cockatoo species* (SEWPAC 2011) which is available at <http://www.environment.gov.au/epbc/publications/pubs/referral-guidelines-wa-black-cockatoo.pdf> and is attached to this report in Appendix E.

The following guidance to future proponents is based on the current draft SEPWAC documentation. This guidance is likely to be superseded in the future. Future proponents should not rely on the following interpretation in the future and should seek updated information from SEWPAC.

Table 3 is based on the risks to Black Cockatoos as outlined in SEWPAC (2011). Proponents should consider this risk table (or updated version from SEWPAC) when determining their responsibilities under the EPBC Act.

Table 3 should be read and interpreted in conjunction with the following flow chart (reproduced from SEWPAC [2011]) is the current guide for proponents to self-assess their responsibilities under the EPBC Act. A table has been included within Appendix D, this table contains an estimate of the total area (in hectares) of Black Cockatoo foraging habitat present within each Lot and the adjoining road verge. This data is useful for individual land owners when determining the potential risk any development may have on Black Cockatoo species as outlined within Table 3 below.

Individual lots that do not contain any Black Cockatoo potential breeding trees (DBH >500 mm), foraging habitat, roosting sites or potential nesting sites as outlined in Figure

2, 3 and 4 have a low risk of resulting in an impact and therefore it is unlikely that a referral is required in regard to Black Cockatoo species (unless being developed as part of a larger action). Within Lots that contain some Black Cockatoo foraging habitat it is uncertain whether the proposed action will have a significant impact on the Black Cockatoo species.

However as stated in Table 3 clearing of any quality foraging or breeding habitat greater than one hectare is likely to require referral. In this case a referral may be required, but it is up to the individual land owner to determine whether this is necessary.

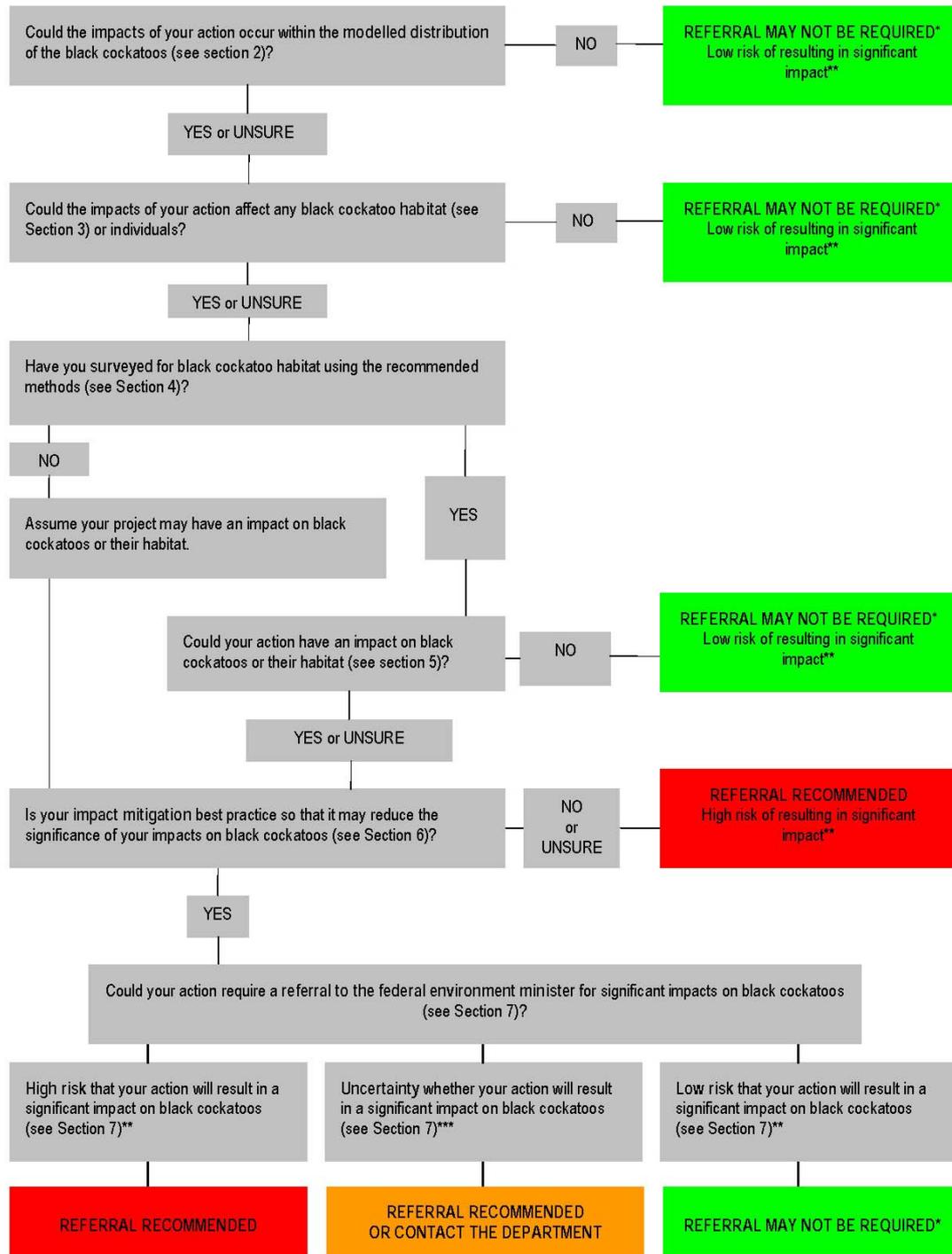
Table 3: Risk Examples for Black Cockatoos, after SEWPAC (2011)

HIGH RISK OF SIGNIFICANT IMPACTS: REFERRAL RECOMMENDED	
<ul style="list-style-type: none"> <li>● Clearing of any known nesting tree.</li> <li>● Clearing of any part or degradation of breeding habitat.</li> <li>● Clearing of more than one hectare of quality<sup>1</sup> foraging habitat<sup>2</sup> (see Figures 2 and 3).</li> <li>● Creating a gap of greater than four kilometres between patches of black cockatoo habitat (breeding, foraging or roosting) (see Figure 4).</li> <li>● Clearing or degradation (including pruning the top canopy) of a known roosting site (see Figure 3).</li> </ul>	
UNCERTAINTY: REFERRAL RECOMMENDED OR CONTACT THE DEPARTMENT	
<ul style="list-style-type: none"> <li>● Degradation (such as through altered hydrology or fire regimes) of more than one hectare of foraging habitat<sup>1</sup>. Significance will depend on the level and extent of degradation and the quality of the habitat.</li> <li>● Clearing or disturbance in areas surrounding black cockatoo habitat that has the potential to degrade habitat through introduction of invasive species, edge effects, hydrological changes, increased human visitation or fire.</li> <li>● Actions that do not directly affect the listed species but that have the potential for indirect impacts such as increasing competitors for nest hollows.</li> <li>● Actions with the potential to introduce known plant diseases such as <i>Phytophthora</i> spp.</li> </ul>	
LOW RISK OF SIGNIFICANT IMPACTS: REFERRAL MAY NOT BE REQUIRED BUT YOU MAY REFER FOR LEGAL CERTAINTY	
<ul style="list-style-type: none"> <li>● Actions that do not affect black cockatoo habitat or individuals.</li> <li>● Actions whose impacts occur outside the modelled distribution of the three black cockatoos.</li> </ul>	

Reproduced from (SEWPAC 2011) – all reference to section numbers within this flow-chart refer back to SEWPAC (2011) and do not correspond to section numbers in this report.

<sup>1</sup> Quality should be assessed as it pertains specifically to black cockatoo use of the habitat. For example, the condition of the understorey is a standard component of most ecological habitat quality surveys but is of limited relevance to considerations for black cockatoos, particularly in relation to breeding habitat which often consists of mature woodland canopy with little or no understorey.

<sup>2</sup> Maintaining the availability of foraging habitat is especially important in the breeding range, as sufficient foraging habitat within a 4–12 km radius of breeding sites is necessary to successfully raise chicks. Maintaining foraging habitat is also particularly important in the Perth metropolitan area, due to the role of these feeding areas in the survival of young birds and the maintenance of the population between breeding seasons, coupled with the lack of habitat remaining in this region and its connectivity values.



\* Although it would appear a referral may not be required, you may still refer your proposed action if unsure, or if you think the proposal would not have significant impacts on matters of national environmental significance, but would like legal certainty. An example may be when other matters of national environmental significance, in addition to black cockatoos, are potentially affected.

\*\* Risk is the chance of something happening that will have a [significant] impact on objectives [for example, protecting matters of national environmental significance] (adapted from Australian / New Zealand Risk Management Standard 4360: 2004).

\*\*\* If you are uncertain about the need to refer then you may also contact the federal environment department to discuss your action by emailing [epbc.referrals@environment.gov.au](mailto:epbc.referrals@environment.gov.au)

## 7 Summary and Recommendations

The evidence recorded during this survey suggests that the study area is used extensively by Forest Red-Tailed Black Cockatoos for feeding and roosting and also to an extent by Carnaby's Black Cockatoo for feeding. It would appear neither Black Cockatoo species are utilising the site for breeding as most of the trees have not developed appropriate hollows. Due to the extensive clearing throughout the site and surrounds small patches of Marri and Banksia such as those located on the site become valuable resources for Black Cockatoo species.

In order to reduce the impacts of the proposed development on Black Cockatoos, the following are recommended:

- Retain as many native species as possible, particularly the isolated patches of Marri and Banksia, both of which are a valuable foraging resource for Black Cockatoo species within the area;
- Retain as many trees with a trunk diameter at breast height (DBH) of 500 mm or greater. The SEWPaC considers that trees over 500 mm could provide breeding and foraging habitat for Black Cockatoo species. Trees with DBH less than 500 mm are considered foraging habitat for the Black Cockatoo species. SEWPaC places higher value on potential breeding trees over foraging trees. It is recommended that emphasis be placed on retaining potential breeding and foraging trees to minimise impacts. Should offsets be required for vegetation clearing they are likely to be greater for the clearing of breeding habitat;
- Retain trees that display hollows. These trees may be suitable for breeding of bird species and may become suitable for Black Cockatoo species over time (as the trees grow and the hollows increase in size). If clearing of trees with hollows is unavoidable, it is recommended that hollows are inspected prior to clearing to ensure that hollows are not currently occupied or in use;
- Implement impact mitigation best practices as outlined within the *draft referral guidelines for three threatened black cockatoo species* (SEWPAC 2011);
- Consider offset of the impacts of clearing of habitat as a last resort after consideration of minimising and otherwise mitigating impacts. Offset could include the purchase of land containing appropriate habitat (including suitable Black Cockatoo habitat);
- Consider erecting artificial nesting boxes within the site to provide more breeding opportunities to Black Cockatoo species and therefore may provide a net benefit to the species;
- Clear habitat in stages to allow fauna to disperse away from the site;

- Feral bee control could be implemented on site to remove feral bees from the hollows of trees that remain on site; and
- Conduct clearing operations outside the breeding season for Black Cockatoos. Carnaby's Black Cockatoo and Baudin's Black Cockatoo breed in late winter to spring (although Carnaby's primarily breed in the wheatbelt) and Red-tailed Black Cockatoos breed within a period from September to April. This will reduce the likelihood of Black Cockatoos using the site during clearing.

## 8 Limitations

This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of biological results other than the visual observation and analytical data in this report.

In the preparation of this report, 360 Environmental has relied upon documents, information, data and analyses (“client’s information”) provided by the client and other individuals and entities. In most cases where client’s information has been relied upon, such reliance has been indicated in this report. Unless expressly set out in this report, 360 Environmental has not verified that the client’s information is accurate, exhaustive or current and the validity and accuracy of any aspect of the report including, or based upon, any part of the client’s information is contingent upon the accuracy, exhaustiveness and currency of the client’s information. 360 Environmental shall not be liable to the client or any other person in connection with any invalid or inaccurate aspect of this report where that invalidity or inaccuracy arose because the client’s information was not accurate, exhaustive and current or arose because of any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to 360 Environmental.

Aspects of this report, including the opinions, conclusions and recommendations it contains, are based on the results of the investigation, sampling and testing set out in the contract and otherwise in accordance with normal practices and standards. The investigation, sampling and testing are designed to produce results that represent a reasonable interpretation of the general conditions of the site that is the subject of this report. However, due to the characteristics of the site, including natural variations in site conditions, the results of the investigation, sampling and testing may not accurately represent the actual state of the whole site at all points.

It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

Subject to the terms of the contract between the Client and 360 Environmental Pty Ltd, copying, reproducing, disclosing or disseminating parts of this report is prohibited (except to the extent required by law) unless the report is produced in its entirety including this page, without the prior written consent of 360 Environmental Pty Ltd.

## 9 References

- Department of Environment and Conservation (DEC) 2009. Carnaby's Black-cockatoo *Calyptorhynchus latirostris* (Carnaby 1948)  
[www.dec.wa.gov.au/component/option,com\\_docman/itemid,/gid,117/task,doc\\_download/](http://www.dec.wa.gov.au/component/option,com_docman/itemid,/gid,117/task,doc_download/) Accessed on 2/3/2012.
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# APPENDIX A

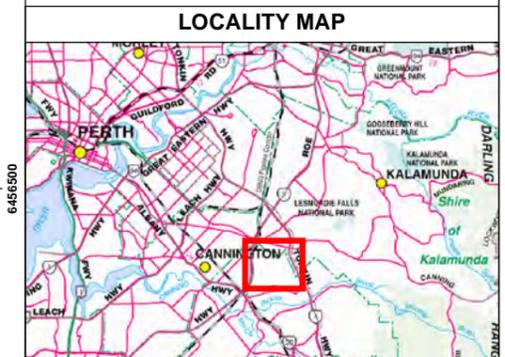
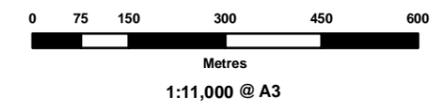
## Figures



### Legend

- Study Areas
- Bush Heritage Area
- Cadastral Boundary
- Roads

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS  
 - AERIAL PHOTOGRAPHY SOURCED FROM LANDGATE 2009  
 - TRAVELLERS ATLAS SOURCED FROM LANDGATE 2007

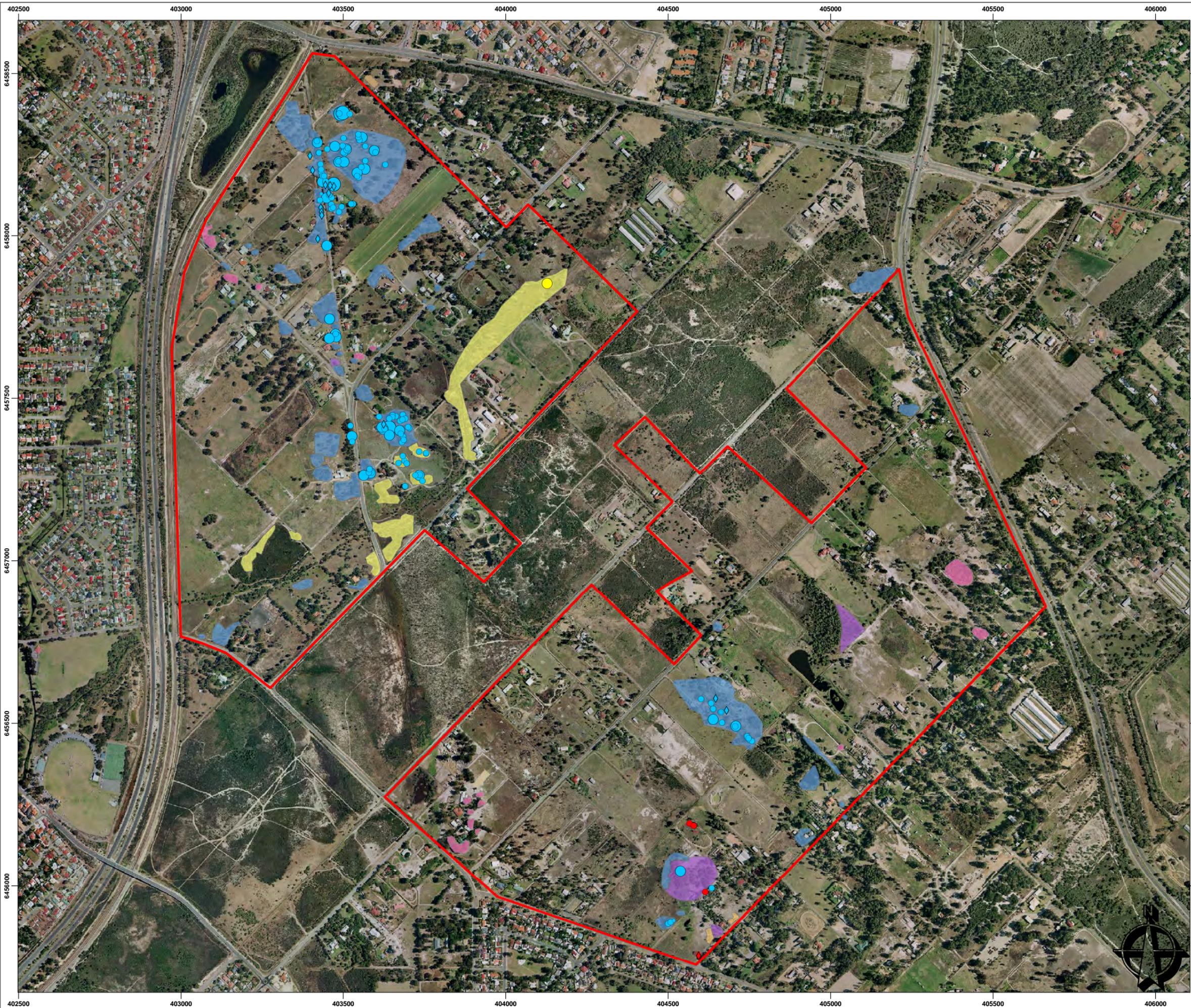


DRAWING ID EBS198.01		DATE 09/08/2012	
HORIZONTAL DATUM AND PROJECTION GDA 1994 MGA Zone 50			
CREATED TD	CHECKED JJ	APPROVED AH	REVISION 0

**City of Gosnells**

**Black Cockatoo Survey  
Site Location**

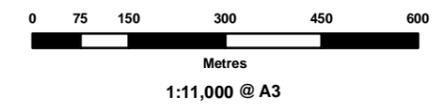
**Figure 1**



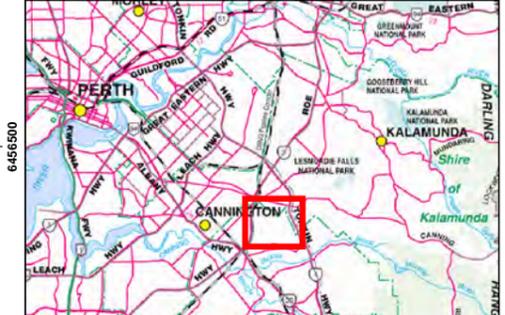
**Legend**

- Study Sites
- Vegetation Type**
- Species**
- Banksia
- Flood Gum
- Hakea
- Jarrah
- Marri
- Pine
- Sheoak
- Tree Species**
- Flooded Gum
- Jarrah
- Marri
- Trunk Diameter (mm)**
- 400 - 500
- 500 - 800
- 800 - 1200
- >1200
- Not measured

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS  
 - AERIAL PHOTOGRAPHY SOURCED FROM LANDGATE 2009  
 - TRAVELLERS ATLAS SOURCED FROM LANDGATE 2007



**LOCALITY MAP**

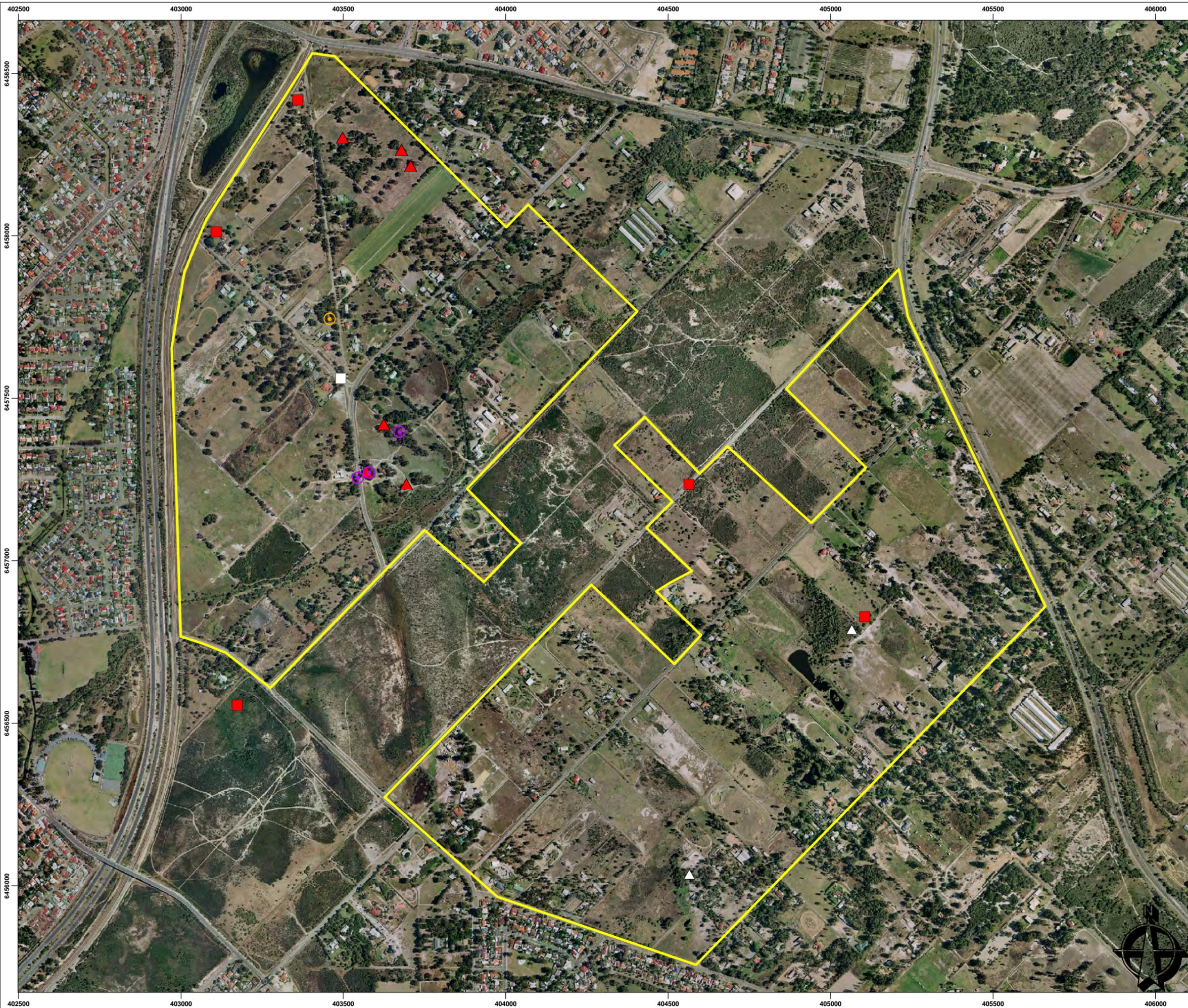


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<b>HORIZONTAL DATUM AND PROJECTION</b> GDA 1994 MGA Zone 50			
<b>CREATED</b> TD	<b>CHECKED</b> JJ	<b>APPROVED</b> AH	<b>REVISION</b> 0

**City of Gosnells**

**Black Cockatoo Survey  
 Black Cockatoo Foraging Habitat and  
 Significant Tree Survey**

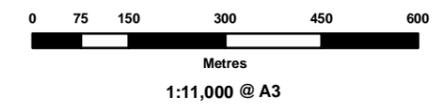
**Figure 2**



**Legend**

- Study Sites
- Roosting Location
- Potential Nesting Location
- Red-tailed Black Cockatoo**
- ▲ Feeding Location
- Sighting Location
- Carnaby's Black Cockatoo**
- △ Feeding Location
- Sighting Location

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS  
 - AERIAL PHOTOGRAPHY SOURCED FROM LANDGATE 2009  
 - TRAVELLERS ATLAS SOURCED FROM LANDGATE 2007



**LOCALITY MAP**



<b>DRAWING ID</b> EBS198.03		<b>DATE</b> 08/08/2012	
<b>HORIZONTAL DATUM AND PROJECTION</b> GDA 1994 MGA Zone 50			
<b>CREATED</b> JJ	<b>CHECKED</b> AH	<b>APPROVED</b> AH	<b>REVISION</b> 0

**City of Gosnells**

**Black Cockatoo Survey  
 Black Cockatoo Foraging Evidence,  
 Roost Evidence and Sightings**

**Figure 3**



### Legend

- Study Sites
- Roads
- Banksia
- Flood Gum
- Hakea
- Jarrah
- Marri
- Pine
- Sheoak
- Flooded Gum
- Jarrah
- Marri
- Black Cockatoo Locations
- Roosting Location
- Potential Nesting Location
- Carnaby's Black Cockatoo
- Feeding Location
- Sighting Location
- Red-tailed Black Cockatoo
- Feeding Location
- Sighting Location

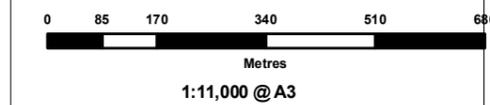
**Tree Species**

- Flooded Gum
- Jarrah
- Marri

**Trunk Diameter (mm)**

- 400 - 500
- 500 - 800
- 800 - 1200
- >1200
- Not measured

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS  
 - AERIAL PHOTOGRAPHY SOURCED FROM LANDGATE 2009  
 - TRAVELLERS ATLAS SOURCED FROM LANDGATE 2007

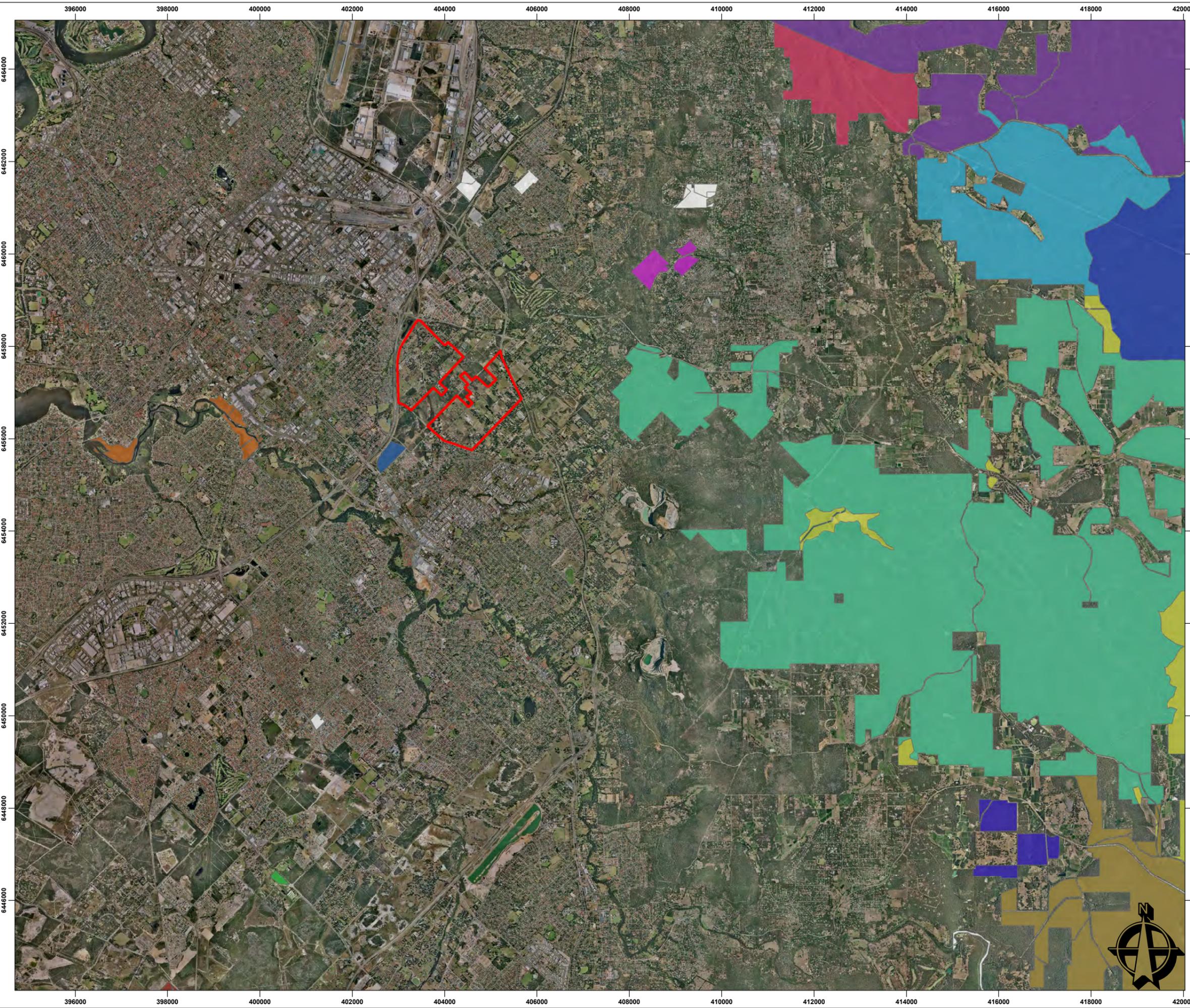


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<b>HORIZONTAL DATUM AND PROJECTION</b> GDA 1994 MGA Zone 50			
<b>CREATED</b> JJ	<b>CHECKED</b> AH	<b>APPROVED</b> AH	<b>REVISION</b> 0

**City of Gosnells**

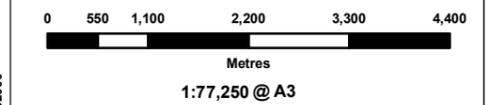
**Black Cockatoo Survey**  
**Black Cockatoo Survey Summary**

**Figure 4**



- ### Legend
- Study Sites
  - DEC Managed Land**
  - Unnamed
  - Balannup Lake Nature Reserve
  - Beelu National Park
  - Canning River Regional Park
  - Greenmount State Forest
  - Jarrahdale State Forest
  - Kalamunda National Park
  - Kenwick Wetlands
  - Korung National Park
  - Lesmurdie Falls National Park
  - Midgegooroo National Park
  - Mundaring State Forest
  - Piara Nature Reserve
  - Stinton Cascades Nature Reserve

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS  
 - AERIAL PHOTOGRAPHY SOURCED FROM LANDGATE 2009  
 - TRAVELLERS ATLAS SOURCED FROM LANDGATE 2007  
 - DEC ESTATES SOURCED FROM DEC 2006



#### LOCALITY MAP



<b>DRAWING ID</b> EBS198.04		<b>DATE</b> 08/08/2012	
<b>HORIZONTAL DATUM AND PROJECTION</b> GDA 1994 MGA Zone 50			
<b>CREATED</b> JJ	<b>CHECKED</b> AH	<b>APPROVED</b> AH	<b>REVISION</b> 0

**City of Gosnells**  
**Black Cockatoo Survey**  
**DEC Estates**

Figure 5



# APPENDIX B

## Black Cockatoo Breeding, Foraging and Sighting Data

DATE	SPECIES	EASTINGS (UTM GDA 94 ZONE 50)	NORTHINGS (UTM GDA 94 ZONE 50)	COMMENTS
23/07/2012- 25/07/2012	Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i>	403707	6458216	Small patch of young Marri with old feeding evidence
		403694	6457237	Feeding evidence
		403571	6457275	Feeding evidence
		403679	6458264	Small patch of young Marri with old feeding evidence
		403624	6457420	Large Marri tree with extensive feeding evidence.
		403497	6458302	Feeding evidence
		404566	6456027	Feeding evidence
		405066	6456789	Feeding evidence
		403359	6458418	Sighting of Red-tail Black Cockatoo
		404564	6457235	Two (2) Red-tail Black Cockatoo Sighted heading west across Boundary Rd
		405105	6456828	Two (2) Red-tail Black Cockatoo sighted overhead
		403173	6456555	Sighted seven (7) Red-tail Black Cockatoo early morning heading north west
		403108	6458011	Two birds sighted with Cape Lilac Tree
	Carnaby's Cockatoo <i>Calyptorhynchus latirostris</i>	404564	6456035	Banksia feeding likely Carnaby's Black Cockatoo
		405064	6456789	Banksia feeding likely Carnaby's Black Cockatoo
		403492	6457560	Nine (9) Carnaby's Black Cockatoo flew into single pine tree
	Black Cockatoo Roosting Site	403578	6457270	Black Cockatoo Roosting Site
		403672	6457396	Black Cockatoo Roosting Site
		403544	6457254	Black Cockatoo Roosting Site
	Potential Black Cockatoo Hollow	403457	6457743	Potential Black Cockatoo Nesting Hollow

# APPENDIX C

## Black Cockatoo Significant Tree Data

LOT NUMBER	EASTINGS (UTM GDA 94 ZONE 50)	NORTHINGS (UTM GDA 94 ZONE 50)	SPECIES	DBH	SIZE CATEGORY
Road Reserve	403432	6458130	Marri	471.10	1
Road Reserve	403435	6458186	Marri	576.14	2
Road Reserve	403432	6458196	Marri	604.79	2
Road Reserve	403429	6458221	Marri	607.97	2
Road Reserve	403425	6458256	Marri	658.90	2
Road Reserve	403418	6458292	Marri	681.18	2
Road Reserve	403425	6458256	Marri	700.28	2
Road Reserve	403431	6458204	Marri	722.56	2
Road Reserve	403427	6458110	Marri	770.31	2
Road Reserve	403436	6458167	Marri	811.69	3
Road Reserve	403420	6458287	Marri	891.27	3
Road Reserve	403435	6458166	Marri	913.55	3
Road Reserve	403449	6457969	Marri	1142.73	3
Road Reserve	403527	6457366	Marri	550.68	2
Road Reserve	403521	6457416	Marri	713.01	2
Road Reserve	403521	6457416	Marri	722.56	2
Road Reserve	403526	6457383	Marri	862.62	3
200	403450	6458267	Marri	557.04	2
200	403500	6458300	Marri	572.96	2
200	403497	6458278	Marri	583.14	2
200	403485	6458376	Marri	595.24	2
200	403487	6458376	Marri	598.42	2
200	403520	6458375	Marri	604.79	2
200	403474	6458275	Marri	846.70	3
200	403492	6458376	Marri	1317.80	4
200	403498	6458378	Marri	1333.72	4
226	404663	6456533	Marri	445.63	1
226	404663	6456533	Marri	509.30	2
226	404751	6456448	Marri	518.85	2
226	404758	6456445	Marri	525.21	2
226	404743	6456456	Marri	541.13	2
226	404743	6456460	Marri	572.96	2
226	404638	6456544	Marri	636.62	2
226	404665	6456502	Marri	668.45	2
226	404632	6456562	Marri	668.45	2
226	404747	6456454	Marri	678.00	2
226	404706	6456490	Marri	706.65	2
226	404601	6456575	Marri	728.93	2

LOT NUMBER	EASTINGS (UTM GDA 94 ZONE 50)	NORTHINGS (UTM GDA 94 ZONE 50)	SPECIES	DBH	SIZE CATEGORY
226	404708	6456491	Marri	802.14	3
226	404638	6456512	Marri	980.39	3
5	403476	6457699	Marri	671.63	2
5	403476	6457698	Marri	827.61	3
5	403478	6457688	Marri	833.97	3
5	403457	6457743	Marri	980.39	3
5	403456	6457684	Marri	1082.25	3
234	404517	6455892	Marri	480.65	1
234	404614	6455981	Jarrah	560.23	2
234	404500	6455884	Marri	582.51	2
234	404507	6455888	Marri	713.01	2
234	404538	6456044	Marri	888.08	3
74	403735	6457265	Marri	544.31	2
74	403754	6457330	Marri	560.23	2
74	403733	6457336	Marri	560.23	2
74	403687	6457307	Marri	572.96	2
74	403670	6457301	Marri	588.87	2
74	403680	6457364	Marri	604.79	2
74	403695	6457299	Marri	662.08	2
74	403683	6457322	Marri	668.45	2
74	403754	6457331	Marri	681.18	2
74	403721	6457263	Marri	709.83	2
74	403743	6457246	Marri	773.49	2
74	403734	6457263	Marri	993.13	3
16	404566	6456192	Jarrah	563.41	2
16	404579	6456184	Jarrah	732.11	2
235	404634	6455992	Marri	693.92	2
75	403661	6457445	Marri	509.30	2
75	403702	6457409	Marri	557.04	2
75	403683	6457449	Marri	611.15	2
75	403698	6457411	Marri	636.62	2
75	403684	6457382	Marri	652.54	2
75	403651	6457448	Marri	662.08	2
75	403685	6457372	Marri	662.08	2
75	403690	6457438	Marri	668.45	2
75	403674	6457430	Marri	687.55	2
75	403650	6457442	Marri	690.73	2
75	403610	6457443	Marri	700.28	2

LOT NUMBER	EASTINGS (UTM GDA 94 ZONE 50)	NORTHINGS (UTM GDA 94 ZONE 50)	SPECIES	DBH	SIZE CATEGORY
75	403641	6457438	Marri	706.65	2
75	403682	6457434	Marri	706.65	2
75	403676	6457391	Marri	748.03	2
75	403627	6457406	Marri	751.21	2
75	403673	6457401	Marri	830.79	3
75	403622	6457404	Marri	868.99	3
75	403642	6457387	Marri	888.08	3
75	403618	6457411	Marri	1031.32	3
75	403641	6457409	Marri	1324.17	4
301	403463	6458084	Marri	531.58	2
301	403464	6458117	Marri	576.14	2
301	403463	6458097	Marri	598.42	2
301	403629	6458219	Marri	604.79	2
301	403486	6458074	Marri	636.62	2
301	403456	6458125	Marri	639.80	2
301	403468	6458086	Marri	662.08	2
301	403547	6458180	Marri	703.46	2
301	403494	6458089	Marri	728.93	2
301	403599	6458257	Marri	754.39	2
301	403555	6458212	Marri	757.58	2
301	403567	6458231	Marri	757.58	2
301	403542	6458185	Marri	779.86	2
301	403566	6458205	Marri	846.70	3
301	403448	6458117	Marri	859.44	3
301	403595	6458261	Marri	954.93	3
301	403542	6458193	Marri	999.49	3
76	403579	6457273	Marri	531.58	2
76	403584	6457271	Marri	553.86	2
76	403587	6457272	Marri	592.06	2
76	403578	6457271	Marri	636.62	2
76	403580	6457281	Marri	700.28	2
76	403690	6457230	Marri	773.49	2
76	403584	6457269	Marri	942.20	3
76	403562	6457262	Marri	945.38	3
302	403503	6458253	Marri	525.21	2
302	403549	6458295	Marri	592.06	2
302	403546	6458303	Marri	604.79	2
302	403436	6458185	Marri	607.97	2

LOT NUMBER	EASTINGS (UTM GDA 94 ZONE 50)	NORTHINGS (UTM GDA 94 ZONE 50)	SPECIES	DBH	SIZE CATEGORY
302	403484	6458229	Marri	642.99	2
302	403504	6458254	Marri	684.37	2
302	403499	6458257	Marri	719.38	2
302	403461	6458156	Marri	732.11	2
302	403445	6458163	Marri	738.48	2
302	403509	6458264	Marri	748.03	2
302	403445	6458168	Marri	751.21	2
302	403546	6458312	Marri	783.04	2
302	403440	6458185	Marri	783.04	2
302	403567	6458276	Marri	792.59	2
302	403514	6458271	Marri	795.77	2
302	403558	6458303	Marri	875.35	3
302	403486	6458228	Marri	875.35	3
302	403509	6458267	Marri	916.73	3
302	403502	6458228	Marri	1050.42	3
302	403470	6458158	Marri	1464.23	4
500	403530	6458098	Marri	550.68	2
500	403523	6458098	Marri	668.45	2
67	404127	6457853	Flooded Gum	954.93	3
225	404679	6456539	Marri		
225	404646	6456576	Marri		
75	403624	6457420	Marri	-	-
235	404594	6455784	Jarraah	-	-
Road Reserve	403433	6458064	Marri	-	-
Road Reserve	403432	6458072	Marri	-	-
Road Reserve	403433	6458084	Marri	-	-
301	403470	6458152	Marri	-	-
301	403459	6458155	Marri	-	-
301	403454	6458133	Marri	-	-
301	403444	6458157	Marri	-	-
Road Reserve	403397	6458247	Marri	-	-
Road Reserve	403405	6458203	Marri	-	-
Road Reserve	403430	6458087	Marri	-	-
Road Reserve	403432	6458073	Marri	-	-
Road Reserve	403433	6458064	Marri	-	-
Road Reserve	403421	6457991	Marri	-	-

## APPENDIX D:

Estimated area of black cockatoo foraging habitat within  
each lot and on the road verge

LOT NUMBER	ESTIMATED FORAGING HABITAT (HA)	
	WITHIN LOT	ON ROAD VERGE
<b>Precinct 3</b>		
2008	1.37	0.05
4488	0.02	0.00
2	1.42	0.09
4	1.29	0.00
5	0.64	0.24
6	0.09	0.00
7	0.40	0.00
8	0.35	0.02
9	0.24	0.00
10	0.29	0.00
11	0.02	0.00
12	0.09	0.06
13	0.00	0.00
14	0.13	0.00
16	0.18	0.33
17	0.12	0.00
52	0.03	0.04
53	0.08	0.01
66	0.17	0.04
67	0.41	0.00
68	1.30	0.02
69	0.05	0.00
70	0.00	0.00
71	0.03	0.02
72	0.20	0.00
73	0.83	0.00
74	0.72	0.00
75	1.20	0.01
76	1.52	0.02
101	0.03	0.00
102	0.15	0.09
200	0.78	0.30
250	0.09	0.03
301	1.47	0.01
302	1.24	0.02
376	0.11	0.04

LOT NUMBER	ESTIMATED FORAGING HABITAT (HA)	
	WITHIN LOT	ON ROAD VERGE
500	1.01	0.00
501	0.09	0.03
<b>Precinct 2</b>		
0	0.00	0.04
3	0.00	0.00
4	0.00	0.00
5	0.00	0.00
6	0.00	0.00
7	0.00	0.00
8	0.00	0.00
9	0.02	0.00
10	0.04	0.00
11	0.01	0.00
12	0.10	0.00
13	0.00	0.00
14	0.06	0.00
15	0.00	0.00
16	0.14	0.00
20	0.00	0.00
23	0.00	0.00
30	0.00	0.00
31	0.00	0.00
52	0.00	0.00
61	0.00	0.00
62	0.00	0.00
64	0.00	0.00
101	0.48	0.00
104	0.00	0.00
109	0.00	0.00
128	0.29	0.00
129	0.00	0.00
132	0.00	0.00
133	0.00	0.00
136	0.00	0.00
137	0.00	0.00
138	0.00	0.00
141	0.00	0.00

LOT NUMBER	ESTIMATED FORAGING HABITAT (HA)	
	WITHIN LOT	ON ROAD VERGE
216	0.00	0.00
218	0.00	0.00
219	0.00	0.00
220	0.00	0.00
221	0.08	0.00
222	0.53	0.00
223	0.00	0.00
225	1.67	0.00
226	1.45	0.00
227	0.00	0.00
228	0.00	0.00
229	0.00	0.00
233	0.37	0.00
234	1.75	0.00
235	0.28	0.02
270	0.00	0.00
271	0.00	0.00
272	0.00	0.00
276	0.00	0.00
278	0.14	0.00
279	0.17	0.00
301	0.00	0.00
401	0.00	0.00
402	0.00	0.00
403	0.17	0.00
500	0.44	0.00
501	0.16	0.00
601	0.00	0.00
802	0.00	0.00
803	0.00	0.00
1892	0.00	0.00

## APPENDIX E:

Draft referral guidelines for three species of Western  
Australian black cockatoos (SEWPAC 2011)



Australian Government

Department of Sustainability, Environment, Water, Population and Communities

***Environment Protection and Biodiversity  
Conservation Act 1999* draft referral guidelines  
for three threatened black cockatoo species:**

**Carnaby's cockatoo (endangered)**

*Calyptorhynchus latirostris*

**Baudin's cockatoo (vulnerable)**

*Calyptorhynchus baudinii*

**Forest red-tailed black cockatoo (vulnerable)**

*Calyptorhynchus banksii naso*



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### **Disclaimer**

The contents of this document have been compiled using a range of source materials and is valid as at July 2011. The Australian Government is not liable for any loss or damage that may be occasioned directly or indirectly through the use of reliance on the contents of the document.

Front page photograph: male Carnaby's cockatoo (Leonie McMahon).

## Important notice

Please note that these guidelines are general in nature and do not remove your obligation to consider whether you need to make a referral to the federal environment minister under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). While these guidelines provide information to help you decide whether to refer your action, the possible impacts of your proposal will depend on the particular circumstances of the action. These circumstances may include issues such as the precise location, mitigation measures, and indirect impacts.

These guidelines were made on the basis of the best information available at the time of writing. However, the impacts of proposals will be assessed by the department on the basis of the best information available at that point in time, which may differ from the information on which these guidelines are based.

These guidelines do not provide guidance on requirements under state and local government laws. Information on Western Australian and local government council laws can be obtained from the Western Australian Department of Environment and Conservation and the local councils in or near the proposed project area.

## How to use these guidelines

These guidelines are intended to assist you in determining whether your action needs to be referred to the Australian Government Department of Sustainability, Environment, Water, Population and Communities (the department). These guidelines should be read in conjunction with the [EPBC Act Policy Statement 1.1 Significant Impact Guidelines – Matters of National Environmental Significance](#).

These guidelines apply to Carnaby's cockatoo (*Calyptorhynchus latirostris*), Baudin's cockatoo (*Calyptorhynchus baudinii*) and the forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*), collectively referred to here as black cockatoos, anywhere they may occur in Western Australia. These species are listed as threatened under the EPBC Act as follows:

- Carnaby's cockatoo: endangered.
- Baudin's cockatoo: vulnerable.
- Forest red-tailed black cockatoo: vulnerable.

Listed threatened species and ecological communities are matters of national environmental significance under the EPBC Act.

If you plan to undertake an action that has, will have or is likely to have a significant impact on any of these species of black cockatoos you must refer the proposal to the minister before starting. The minister will then decide, within 20 business days, whether assessment is required under the EPBC Act. The potential significance of each action is judged on a case-by-case basis. Substantial penalties apply for undertaking an action, to which the EPBC Act applies, without approval (civil penalties up to \$5.5 million or criminal penalties of up to seven years imprisonment). More information on

referral, assessment and compliance is available at [www.environment.gov.au/epbc/](http://www.environment.gov.au/epbc/).

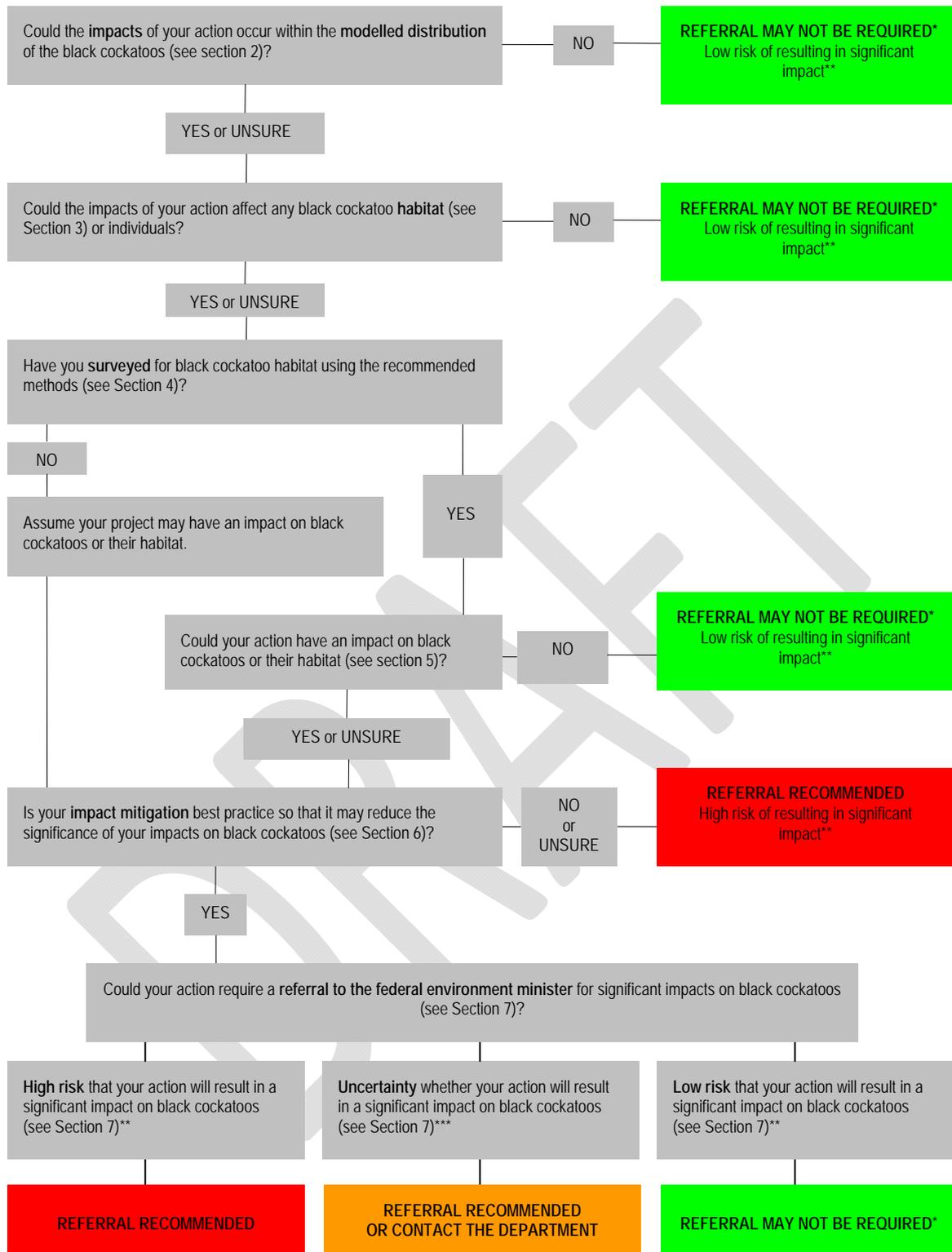
A [national recovery plan](#) is in place for Baudin's and forest red-tailed black cockatoos. A national recovery plan for Carnaby's cockatoo is in development at the time of writing. The federal environment minister must not make a decision that is inconsistent with a national recovery plan.

The decision tree in Figure 1 and the rest of these guidelines are designed to assist you in determining whether your proposed action needs to be referred. You may also refer your proposed action if you are uncertain about the need to refer, or if you think the proposal would not have significant impacts on matters of national environmental significance, but would like legal certainty.

### **Possible exceptions to the need to refer**

Certain actions are exempt from the requirement of assessment and approval under the EPBC Act. These include lawful continuations of land use that started before 16 July 2000, or actions that were legally authorised before 16 July 2000. There are a number of criteria that must be satisfied to rely on any such exemptions. More information on exemptions under the EPBC Act is available at [www.environment.gov.au/epbc/publications/exemptions.html](http://www.environment.gov.au/epbc/publications/exemptions.html).

**Figure 1: Decision making**



\* Although it would appear a referral may not be required, you may still refer your proposed action if unsure, or if you think the proposal would not have significant impacts on matters of national environmental significance, but would like legal certainty. An example may be when other matters of national environmental significance, in addition to black cockatoos, are potentially affected.

\*\* Risk is the chance of something happening that will have a [significant] impact on objectives [for example, protecting matters of national environmental significance] (adapted from Australian / New Zealand Risk Management Standard 4360: 2004).

\*\*\* If you are uncertain about the need to refer then you may also contact the federal environment department to discuss your action by emailing [epbc.referrals@environment.gov.au](mailto:epbc.referrals@environment.gov.au)

## 1. What is known about black cockatoos?

Black cockatoos are long-lived, slow-breeding birds that display strong pair bonds and probably mate for life. These characteristics exacerbate the effects of population decline and habitat loss, and make population recovery very slow.

Baudin's cockatoo breeds from August/September to February/March, while Carnaby's cockatoo breeds from July/August to January/February. The forest red-tailed black cockatoo is thought to breed in October/November, but in years with good autumn rainfall they may breed in March/April. All three black cockatoos addressed in these guidelines breed in hollows in very long-lived trees. Hollows large enough for nesting black cockatoos are usually only found in trees that are more than 200 years old.

Currently, the overall population trend for all three black cockatoo species is declining. Large-scale clearing has seen a significant proportion of original black cockatoo habitat removed. Habitat loss and alteration contribute to the major decline in population density and occupancy of habitat across the range.

Relevant background information on the biology and ecology of the black cockatoos is provided in the department's Species Profile and Threats ([SPRAT](#)) database.

## 2. Could the impacts of your action<sup>1</sup> occur within the modelled distribution of black cockatoos?

Baudin's cockatoo breeds in the eucalypt forests of the south western humid and sub-humid zones. From March, flocks migrate north to the central and northern parts of the Darling Scarp for the non-breeding season. Some flocks also move on to the southern Swan Coastal Plain and into the Perth hills districts and south coast during the non-breeding season (Map 1). They move back to breeding areas from August.

Carnaby's cockatoo breeds in the semi-arid and sub-humid interior ("wheatbelt") and some locations along the south and west coasts (Map 2). From late January/early February most interior-breeding birds leave their breeding areas, moving west, south and east towards the coast. The movement back to breeding sites in the interior occurs in July/August, and September/October to breeding areas on the Swan Coastal Plain.

The forest red-tailed black cockatoo is endemic to the south-west humid and sub-humid zones of Western Australia (Map 3). Their distribution extends north to Perth and east to Mount Helena, Christmas Tree Well, North Banister, Mount Saddleback, Rocky Gully and the upper King River. They are also found on the Swan Coastal Plain.

The maps presented in this document are based on the best available information at the time of publication and remain a static product. For the most up-to-date report of

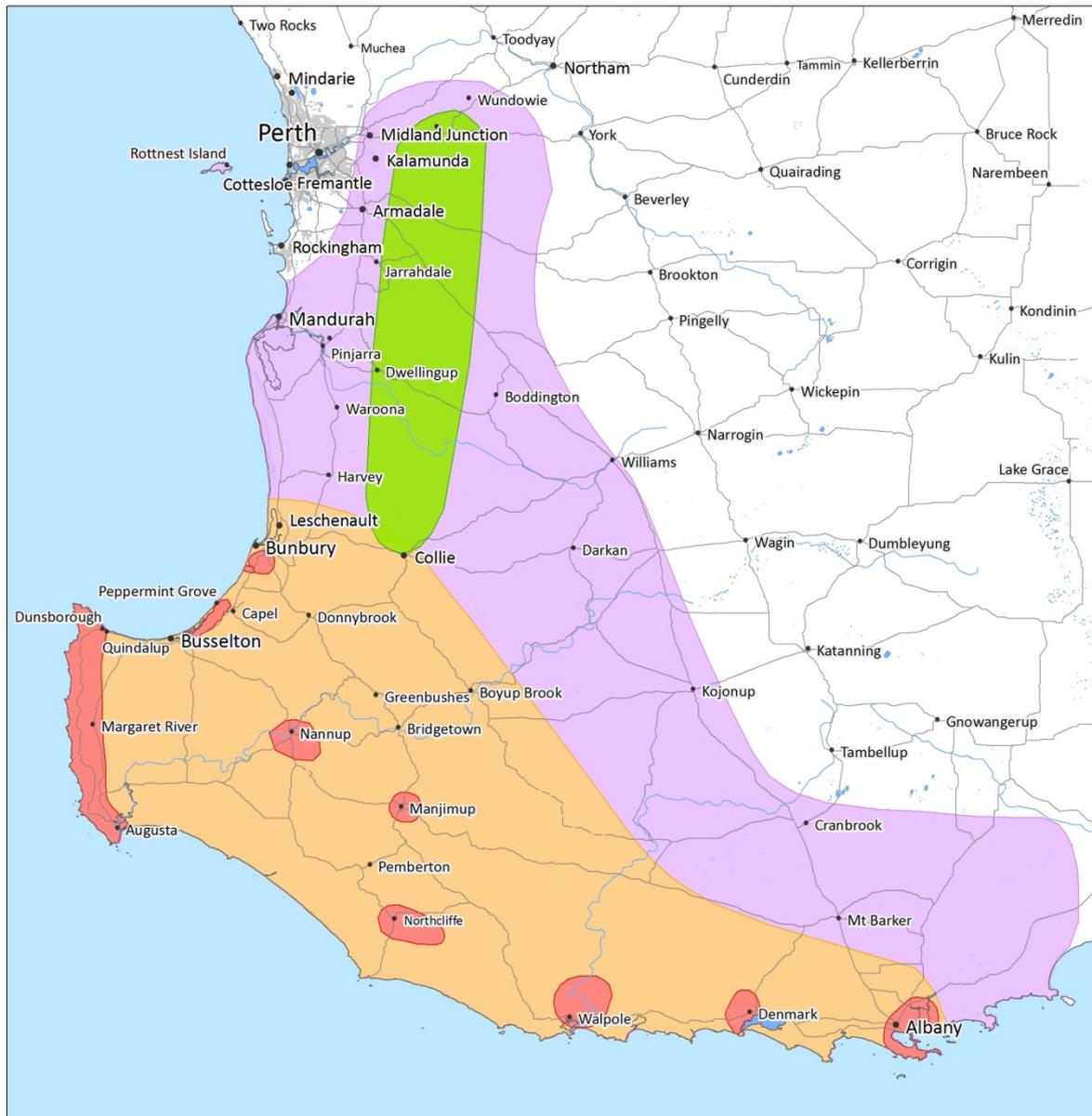
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<sup>1</sup> When considering whether your action will have a significant impact on black cockatoos, you should consider all adverse impacts from the action, including direct, indirect and offsite impacts such as downstream, upstream and facilitated impacts (impacts that result from further actions, which are made possible or facilitated by the action).

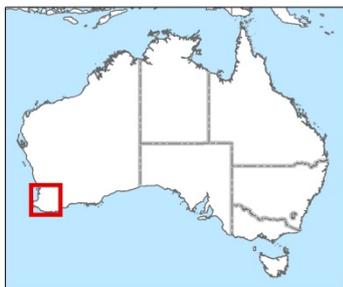
whether black cockatoos may occur in your project area, always use the [Protected Matters Search Tool](#).

DRAFT

Map 1: Modelled distribution of Baudin's black cockatoo (*Calyptorhynchus baudinii*)



INDICATIVE MAP ONLY: For the latest departmental information, please refer to the Protected Matters Search Tool at [www.environment.gov.au/epbc/index.html](http://www.environment.gov.au/epbc/index.html)



0 20 40 60 80 100 km



Australian Government

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Contextual data sources:  
DEWHA (2006), Collaborative Australian Protected Areas Database  
Geoscience Australia (2006), Geodata Topo 250K Topographic Data

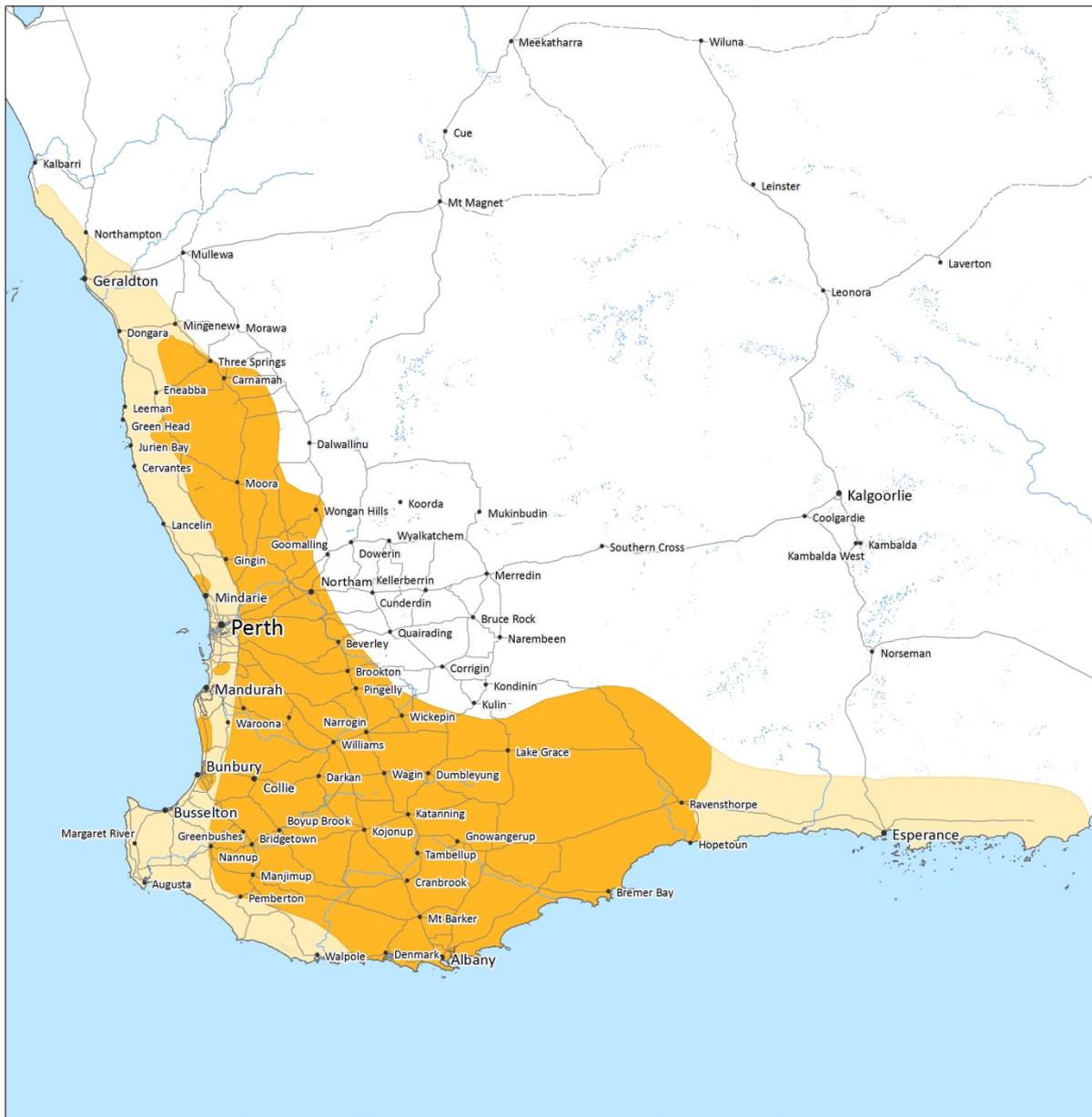
Legend

- Known Breeding Areas
- Predicted Breeding Range
- Main Wintering Area
- Species May Occur
- Cities & Towns
- Roads
- Major Rivers
- Lakes

**Please Note:** Known breeding areas represent locations known to be used by birds for breeding as at December 2009. As habitat has been lost in traditional breeding areas, birds have begun breeding at new locations.

**CAVEAT:** The information presented in this map has been provided by a range of groups and agencies. While every effort has been made to ensure accuracy and completeness, no guarantee is given, nor responsibility taken by the Commonwealth for errors or omissions, and the Commonwealth does not accept responsibility in respect of any information or advice given in relation to, or as a consequence of, anything containing herein.  
**INDICATIVE MAP ONLY:** This map has been compiled from datasets with a range of geographic scales and quality. Species or ecological community distributions are indicative only and not to be used for local assessment. Local knowledge and information should be sought to confirm the presence of the species, or species habitat, at the location of interest.

Map 2: Modelled distribution of Carnaby's black cockatoo (*Calyptorhynchus latirostris*)



INDICATIVE MAP ONLY: For the latest departmental information, please refer to the Protected Matters Search Tool at [www.environment.gov.au/epbc/index.html](http://www.environment.gov.au/epbc/index.html)



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Contextual data sources:  
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Geoscience Australia (2006), Geodata Topo 250K Topographic Data

Legend

- Breeding Range
- Non-breeding Range
- Roads
- Major Rivers
- Cities & Towns
- Lakes

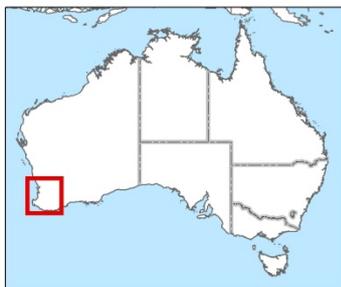
**Please Note:** The breeding range represents the areas known to be used by birds for breeding as at December 2009. As habitat has been lost in traditional breeding areas, birds have begun breeding at new locations.

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

Map 3: Modelled distribution of forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*)



INDICATIVE MAP ONLY: For the latest departmental information, please refer to the Protected Matters Search Tool at [www.environment.gov.au/epbc/index.html](http://www.environment.gov.au/epbc/index.html)



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Contextual data sources:  
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Geoscience Australia (2006), Geodata Topo 250K Topographic Data

Legend

- Species May Occur
- Cities & Towns
- Roads
- Major Rivers
- Lakes

**CAVEAT:** The information presented in this map has been provided by a range of groups and agencies. While every effort has been made to ensure accuracy and completeness, no guarantee is given, nor responsibility taken by the Commonwealth for errors or omissions, and the Commonwealth does not accept responsibility in respect of any information or advice given in relation to, or as a consequence of, anything containing herein.  
**INDICATIVE MAP ONLY:** This map has been compiled from datasets with a range of geographic scales and quality. Species or ecological community distributions are indicative only and not to be used for local assessment. Local knowledge and information should be sought to confirm the presence of the species, or species habitat, at the location of interest.

### **3. Could the impacts of your action affect habitat for black cockatoos?**

The seasonal movements of black cockatoos means they require large areas of habitat for breeding, roosting and foraging, as well as connectivity between these habitats to assist their movement through the landscape.

#### **Breeding habitat**

Black cockatoos breed in large hollow-bearing trees, generally within woodlands or forests. The size of the tree (measured as the diameter at breast height) can be a useful indication of the hollow-bearing potential of the tree and is used below to define areas of forest or woodland that are likely breeding habitat. In a woodland stand with trees of suitable diameter at breast height, all trees of all ages and size are potentially important for maintaining breeding in the long term.

#### **Foraging habitat**

While breeding, black cockatoos will generally forage within a 10–15 km radius of their nesting site. Following breeding, birds assemble into flocks and move through the landscape searching for food. Because of this mobility, and the irregular or infrequent flowering patterns of many of their food sources, large areas of foraging habitat are required to support black cockatoo populations.

#### **Roosting habitat**

All three black cockatoos use communal roosting sites. Flocks may use several different roosts across the year, with major roosts typically used for a period of weeks or until the local foraging resources are exhausted. Flocks of black cockatoos show some fidelity to roost sites, with ‘traditional’ roost sites being used in most years to access high-quality feeding sites. Due to changing patterns of food and water availability across the landscape, not all roosts will be used every year. Carnaby’s and Baudin’s cockatoos mainly use roost sites in the non-breeding areas. However, both breeding and non-breeding forest red-tailed black cockatoos use roosting sites. Groups of birds will roost in a suitable tree or group of tall trees, usually close to an important water source, and fly to feeding areas each day before returning to the roost at night. However, use of roosts sites may vary from daily to weekly. Roosts are generally located in the tallest trees in an area.

Details on the habitat types used by each species for breeding, foraging and roosting are listed in Table 1.

**Table 1: habitats used by black cockatoos.**

Habitat	Baudin's	Carnaby's	Forest red-tailed
Breeding <sup>2</sup>	Any patch of woodland or forest that contains live or dead trees of karri ( <i>Eucalyptus diversicolor</i> ), marri ( <i>Corymbia calophylla</i> ), wandoo ( <i>E.wandoo</i> ) or tuart ( <i>E. gomphocephala</i> ), with either a diameter at breast height greater than 500 mm, <b>or</b> presence of suitable nest hollow <sup>3</sup> .	Any patch of woodland or forest that contains live or dead trees of salmon gum ( <i>E. salmonophloia</i> ), wandoo, tuart, jarrah ( <i>E. marginata</i> ), flooded gum ( <i>E. rudis</i> ), york gum ( <i>E. loxophleba</i> subsp. <i>loxophleba</i> ), karri or marri, with either a diameter at breast height greater than 500 mm, <b>or</b> presence of suitable nest hollow <sup>3</sup> .	Any patch of woodland or forest that contains live or dead trees of marri, karri, wandoo, bullich ( <i>E. megacarpa</i> ) or jarrah, with either a diameter at breast height greater than 500 mm, <b>or</b> presence of suitable nest hollow <sup>3</sup> .
Roosting <sup>4</sup>	Generally in or near riparian environments or natural and artificial permanent water sources. Jarrah, marri, flooded gum, blackbutt ( <i>E. patens</i> ), tuart, and introduced eucalypts including blue gum ( <i>E. globulus</i> ), and lemon scented gum ( <i>Corymbia citriodora</i> ).	Generally in or near riparian environments or natural and artificial permanent water sources. Flat-topped yate ( <i>E. occidentalis</i> ), salmon gum, wandoo, marri, karri, blackbutt, tuart, introduced eucalypts (for example blue gum) and introduced pines.	Tall jarrah and marri trees within or on the edges of forests.
Foraging	Eucalypt woodlands and forest, and proteaceous woodland and heath. During the breeding season feed primarily on native vegetation, particularly marri. Outside the breeding season, may feed in pome fruit orchards (mostly apple and pear, but also persimmon) and tips of <i>Pinus</i> spp.	Native shrubland, kwongan heathland and woodland dominated by proteaceous plant species such as <i>Banksia</i> spp. (including <i>Dryandra</i> spp.), <i>Hakea</i> spp. and <i>Grevillea</i> spp. Forages in pine plantations ( <i>Pinus</i> spp.), Eucalypt woodland and forest that contains foraging species. Also individual trees and small stands of these species.	Jarrah and marri eucalypt woodlands and forest within the range of the subspecies.
Foraging: common food items	Mostly marri (seeds, flowers, nectar and grubs) and proteaceous trees and shrubs. Also other native seeds and introduced fruits; insects and insect larvae; pith of kangaroo paw ( <i>Anigozanthos flavidus</i> ); juice of ripe persimmons; tips of <i>Pinus</i> spp.	Seeds, flowers and nectar of native proteaceous plant species (for example, <i>Banksia</i> spp., <i>Hakea</i> spp., <i>Dryandra</i> spp, and <i>Grevillea</i> spp) and eucalypts. Also seeds of introduced species including <i>Pinus</i> spp., <i>Erodium</i> spp., wild radish, canola, almonds and pecan nuts; insects and insect larvae; occasionally flesh and juice of apples and persimmons.	Mostly seeds of marri and jarrah, also <i>Allocasuarina</i> cones. On the Swan Coastal Plain, often feed on introduced cape lilac ( <i>Melia azedarach</i> ).

<sup>2</sup> See glossary.

<sup>3</sup> See glossary. Nest hollows have been found in salmon gum (*Eucalyptus salmonophloia*) of 360 mm diameter at breast height.

<sup>4</sup> Black cockatoos will roost in any tall tree in the Perth metropolitan area

## 4. Have you surveyed for black cockatoo habitat using the recommended methods?

A guide to conducting surveys for Carnaby's, Baudin's and forest red-tailed black cockatoo habitat is outlined below. Surveys should:

- be done by a suitably qualified person with experience in cockatoo surveys
- maximise the chance of detecting the species and/or signs of use
- determine the context of the site within the broader landscape—for example, the amount and quality of similar habitat nearby and in the local region (for example, within 10 km)
- account for uncertainty and error (false presence and absences)
- include collation of existing data on known locations of breeding and feeding birds and night roost locations.

### Habitat assessment

Habitat assessment is the primary technique used to inform decisions on significant impact for black cockatoos. Assess the extent, type and quality of the vegetation present, including the presence and extent of plants known to be used by the black cockatoos (see Table 1). In potential breeding habitat, measurements of the diameter at breast height of trees in the patch of woodland/forest must be made to determine whether the habitat meets the definition of 'breeding habitat'. Surveys for black cockatoo foraging habitat should be done in any remaining vegetation containing proteaceous heath/woodland, eucalypt woodlands or forest (particularly marri and jarrah forest) and in areas dominated by *Pinus* spp.

Any area within the range of the black cockatoos that contains known food or nesting plant species is considered to be habitat for the species. Additional information on black cockatoo use of an area can be determined by searching for signs of use by black cockatoos (for example, suitable hollows, feeding signs or feeding debris), including sighting records. The presence of cockatoo droppings and feathers, or 'chewed' banksia or pine cones or marri nuts, can indicate feeding by black cockatoos (including, if possible, the identification of bite patterns to indicate which black cockatoo species fed there). This can be assessed at any time of year, as cones can remain on the ground for many months. Cones and nuts should be identified by a suitably qualified person.

### Targeted surveys

Short-term surveys for bird presence are unlikely to give a true representation of habitat use by black cockatoos, due to the mobile nature of these birds and their reliance on different areas of habitat at different times of the year and between years. Targeted presence/absence surveys are considered optional for the purposes of environmental impact assessment, and, if done, lack of detection should not be taken to mean that black cockatoos do not use the site. A guide to conducting targeted surveys can be found in the relevant SPRAT profiles for the three species.

## **5. Could your action have an impact on black cockatoos?**

Potential impacts on black cockatoos should be considered when determining whether to refer your action. You should consider referring your action if there is a real chance or possibility that it will have a significant impact on black cockatoos. The criteria used to judge significant impact differ for vulnerable and endangered species. They are listed in the [Significant impact guidelines 1.1](#).

The criteria in the significant impact guidelines refer to ‘populations’ and ‘important populations’. These terms have not been defined for black cockatoos, due to the mobile and widely-distributed nature of these species, and the variation in flock compositions (for example, between breeding and non-breeding seasons). For black cockatoos, it is more appropriate to consider significance in terms of impacts on habitat rather than a resident population.

Section 7 provides guidance for when one or more of these criteria may trigger the need to refer your action.

## **6. Is your impact mitigation best practice so that it may reduce the significance of your impacts?**

Mitigation has the principal aim of avoiding significant impacts, and should be applied in a hierarchical order:

1. avoid impacts—preserve populations and habitat. Effective avoidance will result in no net loss of habitat for the species. For example, site developments on previously cleared land that does not contain black cockatoo habitat.
2. manage impacts—prevent habitat damage. Effective mitigation/management will result in no net decline in the capacity for habitat to support black cockatoos (for example, availability of nest hollows).
3. monitor effectiveness of mitigation—observe and respond. To ensure effective and timely mitigation and management responses, active monitoring of cockatoo habitat and populations should be done by proponents before, during and after undertaking an action. Effective monitoring will allow continuous feedback, immediate response and consequent rehabilitation to prevent net decline in habitat area or quality.

Table 2 outlines the main threats to black cockatoos, their impacts and mitigation. It is not intended to be exhaustive or prescriptive.

**Table 2: Primary threats, impacts and mitigation**

Threat and impact	Mitigation
<p><b>Habitat loss and degradation<sup>5</sup></b></p> <ul style="list-style-type: none"> <li>• Loss and isolation of mature, hollow-bearing trees necessary for breeding.</li> <li>• Lack of or loss of younger age class trees required to replace old trees that die or are destroyed, leading to a shortage of hollows in the future.</li> <li>• Loss, degradation and fragmentation of foraging habitat. This is particularly important in breeding areas: removal of vegetation around breeding sites, and the removal of native vegetation corridors that connect breeding and foraging sites, reduces the amount of food available to breeding birds and can affect chick survival rates. Breaks of more than 4 km have been shown to prevent breeding birds reaching resources.</li> <li>• Removal of native vegetation corridors, restricting the birds' ability to migrate across the landscape.</li> <li>• Loss, degradation and isolation of roost sites and surrounding feeding or watering habitat.</li> <li>• Loss and degradation of habitat by secondary impacts such as introduction of dieback caused by <i>Phytophthora cinnamomi</i> (and other plant diseases) and hydrological changes (such as flooding, drainage or salinity).</li> </ul>	<ul style="list-style-type: none"> <li>• Design the action to avoid or minimise clearing of cockatoo habitat.</li> <li>• Manage forested areas to protect present and future hollow-bearing trees in areas where birds breed.</li> <li>• Retain habitat along riparian and other corridors to preserve roosting habitat, movement corridors and watering points.</li> <li>• Improve, replant and manage habitat on or next to the site of the impact. Plantings should be local species of suitable size and quality to ensure that they contribute to the local functioning of the landscape and become self-sustaining to support black cockatoos over the long term.</li> <li>• Preserve foraging habitat near to breeding resources to allow for the successful fledging of chicks.</li> <li>• Re-create movement corridors between patches of remnant habitat, particularly where these link breeding or roosting sites to patches of foraging habitat.</li> <li>• Maintain a mosaic of vegetation age classes and species to increase the ecological value and longer-term viability of the vegetation.</li> <li>• Plant a mix of foraging habitat species, using local plants species. Plant in blocks or corridors of several hectares to produce enough food to sustain a local population for some weeks.</li> <li>• Avoid or control plant diseases such as dieback caused by <i>Phytophthora</i> spp.</li> <li>• Notify landowners of the importance of artificial watering points, such as stock watering points, close to roost sites.</li> </ul>
<p><b>Interactions with humans</b></p> <ul style="list-style-type: none"> <li>• Death or injury when hit by cars or trucks, particularly road constructions that concentrate birds at roadsides to feed on roadside vegetation and spilt grain, or drink from rainwater retained as puddles on roadsides.</li> <li>• Crop protection measures may trap or injure birds, or prohibit them from accessing nearby native vegetation.</li> <li>• Shooting of birds.</li> <li>• Poaching of birds and eggs.</li> </ul>	<ul style="list-style-type: none"> <li>• Manage habitat for conservation (for example, preventing access from people, livestock, pets, machinery etc.).</li> <li>• Appropriate road and construction design and management to limit concentration of birds on roadsides.</li> <li>• Signage to alert motorists to watch for birds along roadsides.</li> <li>• Employ effective, safe crop protection such as netting that exclude birds during production periods; contact the Western Australian departments of Environment and Conservation or Agriculture and Food.</li> <li>• Shooting and poaching are illegal under Western Australian wildlife laws. Substantial penalties may apply to any person found guilty of interfering with native wildlife.</li> </ul>

<sup>5</sup> Degradation may occur through a variety of sources, including changes to the hydrology or fire regimes, and chemical application (causing death or dieback) to known roosting or nesting trees.  
Draft referral guidelines for three threatened black cockatoo species

<p><b>Invasive species</b></p> <ul style="list-style-type: none"> <li>• Competition for nest hollows with European honeybees and invading bird species</li> <li>• Injury and death from European honeybees.</li> </ul>	<ul style="list-style-type: none"> <li>• Control hollow-competing fauna (for example, feral bees, corellas, galahs, wood and mountain ducks).</li> </ul>
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## 7. Could your action require a referral to the federal environment minister for significant impacts on black cockatoos?

As the person proposing the action it is your responsibility to decide whether or not to refer your action. If you believe your action is at high risk of having a significant impact on black cockatoos you should refer the action to the federal environment minister. If you are uncertain whether your action will have a significant impact on black cockatoos you may also refer your action or contact the department.

In determining the potential significance of your action, the department will consider the particular circumstances of your case. This may include factors such as the suitability of the habitat, its connectivity, and the amount of habitat remaining in the region.

Table 3 provides general guidance on what, in the department's view, may be at high and low risk of requiring a referral to the department as well as providing some guidance on uncertainty.

**Table 3: Referral guidelines**

<b>High risk of significant impacts: referral recommended</b>
<ul style="list-style-type: none"> <li>• Clearing of any known nesting tree (see glossary).</li> <li>• Clearing of any part or degradation of breeding habitat (see Table 1).</li> <li>• Clearing of more than 1 ha of quality<sup>6</sup> foraging habitat<sup>7</sup>.</li> <li>• Creating a gap of greater than 4 km between patches of black cockatoo habitat (breeding, foraging or roosting).</li> <li>• Clearing or degradation (including pruning the top canopy) of a known roosting site (see glossary).</li> </ul>
<b>Uncertainty: referral recommended or contact the department</b>
<ul style="list-style-type: none"> <li>• Degradation (such as through altered hydrology or fire regimes) of more than 1 ha of foraging habitat<sup>6</sup>. Significance will depend on the level and extent of degradation and the quality of the habitat.</li> <li>• Clearing or disturbance in areas surrounding black cockatoo habitat that has the potential to degrade habitat through introduction of invasive species, edge effects, hydrological changes, increased human visitation or fire.</li> <li>• Actions that do not directly affect the listed species but that have the potential for indirect impacts such as increasing competitors for nest hollows.</li> <li>• Actions with the potential to introduce known plant diseases such as <i>Phytophthora</i> spp.</li> </ul>
<b>Low risk of significant impacts: referral may not be required but you may refer for legal certainty</b>
<ul style="list-style-type: none"> <li>• Actions that do not affect black cockatoo habitat or individuals.</li> <li>• Actions whose impacts occur outside the modelled distribution of the three black cockatoos.</li> </ul>

<sup>6</sup> Quality should be assessed as it pertains specifically to black cockatoo use of the habitat. For example, the condition of the understorey is a standard component of most ecological habitat quality surveys but is of limited relevance to considerations for black cockatoos, particularly in relation to breeding habitat which often consists of mature woodland canopy with little or no understorey.

<sup>7</sup> Maintaining the availability of foraging habitat is especially important in the breeding range, as sufficient foraging habitat within a 4–12 km radius of breeding sites is necessary to successfully raise chicks. Maintaining foraging habitat is also particularly important in the Perth metropolitan area, due to the role of these feeding areas in the survival of young birds and the maintenance of the population between breeding seasons, coupled with the lack of habitat remaining in this region and its connectivity values.

## 8. Where can you get more information?

The SPRAT profiles for these species provide the biological and ecological context for survey guidelines, mitigation measures and significant impact guidance. They can be accessed at [www.environment.gov.au/cgi-bin/sprat/public/sprat.pl](http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl).

Other EPBC Act policy statements are available to help you understand the EPBC Act and your obligations. They are available from the department's website at [www.environment.gov.au/epbc/guidelines-policies.html](http://www.environment.gov.au/epbc/guidelines-policies.html) or by emailing [ciu@environment.gov.au](mailto:ciu@environment.gov.au) or calling 1800 803 772. The department can provide assistance in ensuring your action complies with the EPBC Act, especially when contacted early in the planning process.

The [Protected Matters Search Tool](#) can provide a good starting point for determining the likelihood of having matters of national environmental significance in your area. State and territory government agencies may also hold relevant information including habitat and species distribution information.

## 9. Glossary

**Affected area:** The area likely to be affected by the action. This includes the project site and any additional areas likely to be affected, either directly or indirectly. That is, anywhere on or off site where the effects, good and bad, of the proposed action would be felt. Habitat and/or populations may, and often will, extend beyond the development site boundaries. Therefore, the affected area should extend as far as necessary to take all potential impacts, including off site impacts, into account. This is the area that the person proposing an action must survey.

**Breeding habitat:** Habitat which meets the definition set out in Table 1 for the respective species. Breeding habitat predominantly applies to those areas with the breeding range of the respective species as identified in the maps provided. However, given: incomplete knowledge of breeding activity; the potential for these areas to change; and known breeding sites outside the traditional breeding ranges, habitat that meets the definition set out here, but is outside of the predicted breeding range, is considered breeding habitat unless proven otherwise.

**Known nesting trees:** Any existing tree in which breeding has been recorded or suspected. Data on known nesting trees is available from the Western Australian Department of Environment and Conservation and the Western Australian Museum.

**Known roosting site:** A tree or group of trees where there are records or recent evidence of roosting.

**Suitable nest hollow:** Any hollow that appears to be deep enough and with an opening large enough to be used by black cockatoos, or any trees that appear to be likely to have such hollows.

**Suitably qualified person:** A person with at least three years experience surveying for black cockatoos and/or black cockatoo habitat. Surveys for black cockatoos or their habitat must be done, or supervised, by such a person.