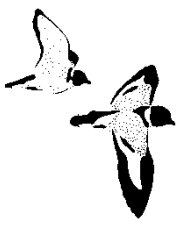
Main Roads
Great Eastern Highway SLK 55.8 – 68.5
Fauna and Black-Cockatoo Habitat Assessment

Prepared for: Main Roads
Don Aitken Centre
Waterloo Crescent
East Perth WA 6004.

Prepared by: **Cameron Everard, Mike Bamford and Eliza-Joyce Mellersch**
Bamford Consulting Ecologists
23 Plover Way
Kingsley WA 6026.



22nd December 2015
Revised 5th January 2021

Executive Summary

Background

Main Roads Western Australia is planning works along Great Eastern Highway at SLK 55.8 – 68.5 (the survey area), located approximately 50 kilometres (km) north-east of the Perth CBD, 20 km north-east of Mundaring and two km south-east of Wundowie, Western Australia. At the time of writing, a project footprint was unavailable as the proposal was still in the development phase, but may include bridge upgrades, road widening and a potential realignment. The survey area is approximately 229 ha.

Bamford Consulting Ecologists (BCE) was commissioned to conduct a targeted fauna assessment (including a Black-Cockatoo habitat assessment) to inform the design process and support future State or Commonwealth environmental approvals. The study included a desktop assessment including database searches and a review of previous fauna surveys completed in the area, and field investigations. The objective of the assessment was to identify key fauna values including critical breeding, foraging and roosting habitat for Black-Cockatoos (Carnaby's, Baudin's and Forest Red-tailed are all known to be present in the area). The potential for other conservation significant fauna species to occur in the area was also assessed during field investigations. Information from the assessment can be used to identify habitat utilisation. For the initial 2015 study further assessment of potential impacts and recommendations to minimise these impacts was presented; as part of the January 2021 review of the report, these impacts and recommendtions were placed in a separate memo.

Methods

The field survey was conducted on the 5th, 6th and 8th October 2015 and included the following components:

- Black-Cockatoo nest tree assessment;
- Black-Cockatoo foraging value assessment;
- Black-Cockatoo roosting surveys;
- Targeted searching for conservation significant fauna (i.e. Chuditch and Quenda);
- Opportunistic fauna observations; and
- Motion-sensitive camera surveys (conducted on the 28th October – 4th November 2015).

Walking transects were conducted by two BCE personnel within a 50 m buffer from the edge of the highway roadside for 13 km. Both sides of the highway were surveyed. It should be highlighted that not all trees within the Kwolyinine Nature Reserve (within the survey area) were assessed for potential nests, due to the size of the reserve. However, broad vegetation types were evaluated to ascertain the overall habitat suitability for Black-Cockatoos. Potential nest trees were surveyed as per DSEWPaC (2012) guidelines. Every tree (within a 50m buffer of the road) with a diameter at breast height (DBH) greater than 500 mm (300mm for Wandoo trees) was recorded including its location, species, status (dead/alive) and the presence of hollows. Each tree was classed on a scale of 1-5 (1 being the highest), according to their hollow suitability and activity.

All major vegetation types were visited to develop an understanding of habitat types present and to assess the value of foraging habitat for Black-Cockatoos. Key foraging species for the three Black-Cockatoo species include: Marri (*Corymbia calophylla*), eucalypts (*E. marginata, E. patens, E. wandoo*), Banksia (*B. squarrosa, B. sessilis*) and Hakea (*H. undulata).* Foraging value scores (developed by BCE) range from 0 (no foraging value) to 6 (high foraging value). An average score for the three Black-Cockatoo species was assigned to each vegetation type. Searching for foraging evidence (i.e. chewed nuts), evening roost surveys and setting motion sensitive cameras were also conducted during the field investigations.

Results

Desktop assessment

The desktop study identified 257 vertebrate fauna species as potentially occurring at the site including: 14 frogs, 49 reptiles, 157 birds and 25 native and 12 introduced mammals. The vertebrate assemblage includes 30 species of conservation significance. Field investigations identified 44 vertebrate fauna species comprising of: one frog, four reptiles, 33 bird, four native mammal and two introduced mammal species. Conservation significant fauna species recorded during the field survey include: three Black-Cockatoo species (Carnaby's, Baudin's and Forest Red-tailed) and one mammal species (Quenda).

Black-Cockatoo habitat assessment

In summary, the following key observations were made from the Black-Cockatoo habitat assessment:

- **Species presence**: All three species were recorded (seen and heard) in the survey area. Old and new foraging evidence comprising of mostly chewed Marri nuts was recorded throughout the survey area for the three Black-Cockatoo species;
- **Breeding habitat**: No active breeding nest sites were found, although suitable breeding habitat is available within and outside the survey area. It is unknown if birds are breeding in adjacent areas. The density of all potential nest trees recorded (1029 trees) within the road survey area was 7.8 trees/ha. Only 54 trees (5%) with apparently suitable hollows but no chew marks (Class 3) were recorded. Trees in this Class may be the best indicator of nest hollow "stock" in the survey area and occur at a mean density of 0.4 trees/ha. A further 54 trees (5%) were recorded in Class 4 (trees with large hollows or broken branches that might contain hollows but are not vertical or near-vertical). Of the 108 hollow bearing trees inspected, 13 were occupied by nesting galahs, smaller parrots, corellas and bees, suggesting there is some competition for nest hollows;
- **Foraging habitat**: Most important are the vegetation communities that contain key foraging species for Black-Cockatoos (i.e. those that contain high densities of Marri, Jarrah or Blackbutt over Banksia). A large part of the survey area consists of isolated or clumps of Marri, Wandoo, Jarrah and Blackbutt (in paddocks over weeds, cleared land or agricultural crops) and ranges from negligible to moderate foraging value for Black-Cockatoos. There are also several patches of remnant vegetation in the survey area where a nature reserve abuts

the highway roadside (i.e. Kwolyinine and Woondowing Nature Reserve). The vegetation in these reserves provide a moderate to high foraging value resource (including breeding and roosting habitat) for Black-Cockatoos. Similar foraging habitat is available outside the survey area. It should be highlighted that in the absence of a project footprint, it is not possible to determine the number of nest trees or foraging habitat that could be potentially impacted;

- **Roosting habitat**: No Black-Cockatoos were observed roosting in the survey area, but a roost site was recorded 600m west of the survey area at Mairinger Way, Wundowie;
- **Regional habitat analysis**: Birds breeding in the region are likely to forage within the survey area. The survey area is situated in a fragmented landscape due to clearing for agriculture, although retains some remnant areas of native vegetation within a 5-10 km radius of the site. It is unlikely that any upgrades to road infrastructure (i.e. bridges or road widening) will significantly exacerbate fragmentation and reduce landscape connectivity for the three Black-Cockatoo species, due to the availability of foraging, breeding and roosting habitat outside the survey area; and
- **Use of the survey area by Black-Cockatoos**: Carnaby's and Baudin's Black-Cockatoo's are likely to be breeding migrants to the area. The Forest Red-tailed Black-Cockatoo is likely to be a foraging visitor to the area.

Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

1.1 Background and objectives

Main Roads Western Australia is planning works along Great Eastern Highway at SLK 55.8 – 68.5 (the survey area), located approximately 50 kilometres (km) north-east of the Perth CBD, 20 km north-east of Mundaring and two km south-east of Wundowie, Western Australia (Figure 1). At the time of writing a project footprint was unavailable as the proposal was still in the development phase, but may include bridge upgrades, road widening and a potential realignment. The survey area is approximately 229 ha.

Bamford Consulting Ecologists (BCE) was commissioned to conduct a targeted fauna assessment (including a Black-Cockatoo habitat assessment) to inform the design process and support future State or Commonwealth environmental approvals. The objective of the assessment was to identify key fauna values including critical breeding, foraging and roosting habitat for Black-Cockatoos (Carnaby's, Baudin's and Forest Red-tailed are all known to be present in the area). The potential for other conservation significant fauna species to occur in the area was also assessed during field investigations. Information from the assessment can be used to identify habitat utilisation.The results of the assessment will also assist in the preparation of a Clearing Impact Assessment (CIA) and Vegetation Management Plan (VMP).

Three Black-Cockatoo species occur within the survey area and are listed under both the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Western Australian *Wildlife Conservation Act 1950* (WC Act) (Table 1). All three forage and potentially nest in the area (DSEWPaC 2012). Descriptions of conservation significance levels are described in Appendix 1.

Table 1. Black-Cockatoo species that occur in the survey area.

Species		EPBC Act	WC Act
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	Vulnerable	Schedule 1 (Vulnerable)
Calyptorhynchus latirostris	Carnaby's Black-Cockatoo	Endangered	Schedule 1 (Endangered)
Calyptorhynchus baudinii	Baudin's Black-Cockatoo	Vulnerable	Schedule 1 (Endangered)

1.2 Black-Cockatoo ecology, habitat requirements and threats

There is considerable published information on the ecology of, and threats to, Black-Cockatoo species. Key references include:

- Action plans (Garnett *et al.* 2011);
- Recovery plans (DPaW 2013);
- EPBC guidelines (DEWHA 2010; DSEWPaC 2012);
- The federal Department of the Environment (DotE) Species Profile and Threats (SPRAT) Database (DotE 2015a);
- Scientific literature (Saunders 1974, 1979a, b, 1980; Saunders *et al*. 1982; Saunders 1986; Johnstone and Storr 1998; Higgins 1999; Johnstone and Kirby 2008); and
- Major reports (Johnstone *et al.* 2011; Kabat *et al*. 2012).

Summarising this work further, there are several salient points for assessing the potential value of the survey area for Black-Cockatoos:

Key ecology

- Black-Cockatoos are long-lived with low annual reproduction rates and cannot, therefore, rapidly increase their population size;
- Black-Cockatoos undergo regular, seasonal migration between breeding and non-breeding areas; and
- In recent years there have been considerable shifts in the breeding ecology, distribution and movement patterns of Carnaby's Black-Cockatoos. These may be a response to habitat degradation/clearing and/or climatic factors.

Key habitat requirements

- Black-Cockatoos are reliant on large tree-hollows in eucalypts, in which they breed. Each species has its own preference for nesting tree species and its own geographical breeding range (although these overlap between species). There is a solid understanding of these preferences; and
- All Black-Cockatoo species primarily feed on plant seeds and flowers, but also consume wood-boring insect larvae when available. Each species has its own preference for food plant species (with considerable overlap). There is a solid understanding of these preferences.

Key threats

Key threatening processes include illegal shooting, habitat loss, habitat degradation, nest hollow shortage, competition for available nest hollows from other parrots and feral Honeybees (*Apis mellifera*), vehicle strike and illegal trade.

Figure 1. Location of the survey area.

1.3 Regional description

The Interim Biogeographic Regionalisation of Australia (IBRA) (Environment Australia, 2000) has identified 26 bioregions in Western Australia (Figure 1). Bioregions are classified on the basis of climate, geology, landforms, vegetation and fauna (Thackway and Cresswell 1995). IBRA Bioregions are affected by a range of different threatening processes and have varying levels of sensitivity to impact (EPA, 2004).

The survey area lies in the north eastern boundary of the Jarrah Forest IBRA Bioregion, in the Northern Jarrah Forest 1 (JF1) subregion. The Northern Jarrah Forest overlies Archaean granite and metamorphic rocks capped by an extensive lateritic duricrust. It is also interrupted by occasional granite outcrops in the form of isolated hills. Vegetation comprises jarrah-marri forest in the west (with bullich and blackbutt in the valleys), and grades into wandoo woodlands in the east (Mckenzie *et al.* 2003). Ecosystems affected by Jarrah dieback (*Phytophthora cinnamomi*) are considered to be ecosystems at risk (Williams and Mitchell 2001). Dieback impacts several plant families including Proteaceae and Myrtaceae and is known to occur in the survey area (Terratree 2015).

Figure 2. IBRA Subregions in Western Australia.

The vegetation in the area was originally mapped by Beard (1979) and later by Shepherd *et al.* (2001). The area is described as "*Medium woodland; marri and wandoo*". The extent of this vegetation association is 9,707.23 ha (currently 43% remains) (Government of Western Australia 2014). The study area is situated in the Dale Botanical Subdistrict which consists of Jarrah forest of ironstone gravels, Marri-Wandoo woodlands on loamy soils and sclerophyll understoreys (Beard 1990). Further detailed information on the flora and vegetation in the survey area is provided in Terratree (2015).

2 Methods

2.1 Desktop assessment

Information on the fauna assemblage was drawn from a wide range of sources. These included state and Commonwealth government databases and results of regional studies. Databases accessed were the DPaW Naturemap (incorporating the Western Australian Museum's FaunaBase and the DPaW Threatened and Priority Fauna Database), BirdLife Australia's Atlas Database (BA), the EPBC Protected Matters Search Tool and the BCE database (Table 2). All searches were undertaken in September 2015. Information from the above sources was supplemented with species expected in the area based on general patterns of distribution. Sources of information used for these general patterns were:

- Frogs: Tyler and Doughty (2009);
- Reptiles: Storr *et al*. (1983); Storr *et al*. (1990); Storr *et al.* (1999); Storr *et al.* (2002) and Wilson and Swan (2010);
- Birds: Blakers *et al.* (1984); Johnstone and Storr (1998, 2004) and Barrett *et al*. (2003); and
- Mammals: Menkhorst and Knight (2004); Strahan (1995) and Churchill (2009).

Table 2. Sources of information used for the desktop assessment.

Database	Type of records held on database	Area searched
NatureMap (DPaW 2015)	Records in the WAM and DPaW databases. Includes historical data and records on Threatened and Priority species in WA.	Line from 31° 49' 35" S, 116° 20' 37" E to 31° 46' 23" S, 116° 24' 03" E – plus 20 km buffer.
BirdLife Australia Atlas Database (BirdLife Australia 2015)	Records of bird observations in Australia, 1998-2015.	Species list for one degree cell containing: 31.77009°S, 116.40584°E
EPBC Protected Matters (DotE 2015a)	Records on matters of national environmental significance protected under the EPBC Act.	Line 31.81806°S 116.34861°E, 31.77167°S 116.40167°E, 31.75139°S 116.45389°E – plus 40 km buffer
BCE Database	Records from sightings during BCE staff visits and surveys within the region.	

2.1.1 Previous fauna surveys

Several fauna surveys have been conducted in the region and include:

- Fauna surveys and research at Karakamia Wildlife Sanctuary, located approximately 10 km west of the survey area (AWC 2013);
- A desktop fauna assessment, field investigations and targeted Black-Cockatoo habitat surveys at Bindoon, located approximately 50 km north-west of the survey area (BCE 2012);
- An assessment of the Black-cockatoo habitat potential in the Northern Jarrah Forest, near Martin, located approximately 40 km south-west of the survey area (BCE 2014; 2015);
- Regional data from Birdlife Australia's Great Cocky Count from Gidgegannup, Stoneville, Wundowie and Bakers Hill (Birdlife Australia 2014); and
- Shire of Northam Local Biodiversity Strategy (WALGA 2015).

Results from these studies have been included in this assessment where relevant.

2.1.2 Nomenclature and taxonomy

As per the recommendations of EPA (2004), the nomenclature and taxonomic order presented in this report are based on the Western Australian Museum's (WAM) *Checklist of the Fauna of Western Australia 2015*. The authorities used for each vertebrate group were: amphibians (Doughty and Maryan, 2010a), reptiles (Doughty and Maryan, 2010b), birds (Christidis and Boles, 2008), and mammals (How *et al*. 2009). English names of species, where available, are used throughout the text; Latin species names are presented with corresponding English names in tables in the appendices.

2.1.3 Interpretation of species lists

Species lists generated from the review of sources of information are generous as they include records drawn from a large region and possibly from environments not represented in the survey area. Therefore, some species that were returned by one or more of the data searches have been excluded because their ecology, or the environment within the survey area, meant that it was highly unlikely that these species would be present. Some are also known to be regionally extinct. In general, however, species returned by the desktop review process are considered to be potentially present in the survey area whether or not they were recorded during field surveys, and whether or not the survey area is likely to be important for them. This is because fauna are highly mobile, often seasonal and frequently cryptic. This is particularly important for significant species that are often rare and hard to find.

Interpretation of species lists generated through the desktop review included assigning an expected status within the survey area to species of conservation significance. This is particularly important for birds that may naturally be migratory or nomadic, and for some mammals that can also be mobile or irruptive. The status categories used are:

- Resident: species with a population permanently present in the survey area;
- Regular migrant or visitor: species that occur within the survey area regularly in at least moderate numbers, such as part of annual cycle;
- Irregular Visitor: species that occur within the survey area irregularly such as nomadic and irruptive species. The length of time between visitations could be decades but when the species is present, it uses the survey area in at least moderate numbers and for some time;
- Vagrant: species that occur within the survey area unpredictably, in small numbers and/or for very brief periods. Therefore, the survey area is unlikely to be of importance for the species; and
- Locally extinct: species that has not been recently recorded in the local area and therefore is almost certainly no longer present in the survey area.

2.2 Field survey

The field survey was conducted on the 5th, 6th and 8th October 2015 and included the following components:

- Black-Cockatoo nest tree assessment;
- Black-Cockatoo foraging value assessment;
- Black-Cockatoo roosting surveys;
- Targeted searching for conservation significant fauna (i.e. Chuditch and Quenda);
- Opportunistic fauna observations; and
- Motion-sensitive camera surveys (conducted on the 28th October – 4th November 2015).

The field survey was conducted in accordance with the requirements outlined in the EPA Guidance Statement No. 56 (EPA 2004) and Technical Guide on Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA/DEC 2010).

2.2.1 Black-Cockatoo nest tree assessment

A key aim of the survey was to provide detailed data such that an assessment of the number of hollow bearing trees could be made. Hollow-bearing trees suitable for nesting by Black-Cockatoos (predominantly Marri *Corymbia calophylla,* Jarrah *Eucalyptus marginata* and Wandoo *E. wandoo*) were systematically inspected on-foot within the survey area.

Walking transects were conducted by two BCE personnel within a 50 m buffer from the edge of the highway roadside for 13 km. Both sides of the highway were surveyed and equates to an area of approximately 130 ha. In addition, a 2.5 ha area was surveyed at Chedaring Road adjacent to the 50 m buffer. Thus, nest tree density calculations along the highway have been based on 132.5 ha. It should be highlighted that not all trees within the Kwolyinine Nature Reserve (within the survey area) were assessed for potential nests (shown in Figure 10) due to the size of the reserve. However, broad vegetation types were evaluated to ascertain the overall habitat suitability for Black-Cockatoos. The area outside the 50 m buffer, but within the Kwolyinine Nature Reserve has not been included in the density calculations. It is recommended that the survey area within the Kwolyinine Nature Reserve be reassessed when a final project footprint is available.

The following information was recorded for every tree with a diameter at breast height (DBH) greater than 500 mm (300mm for Wandoo trees) as per DSEWPaC (2012) guidelines:

- Tree location;
- Species and life status (dead/alive);
- DBH; and
- Trees were assessed (from the ground) for presence of hollows and were classed according to their suitability.

Tree status classes used during the survey are provided in Table 3 (high to low scoring value).

Table 3. Grading system for the assessment of potential nest trees for Black-Cockatoos.

Class	Description of tree and hollows/activity
1	Active nest observed; adult (or immature) bird seen entering or emerging from hollow.
2	Hollow of suitable size and angle (i.e. near-vertical) visible with chew marks around entrance.
3	Potentially suitable hollow visible but no chew marks present; or potentially suitable hollow present (as suggested by structure of tree, such as large, vertical trunk broken off at a height of >10m).
4	Tree with large hollows or broken branches that might contain large hollows but hollows or potential hollows are not vertical or near-vertical; thus a tree with or likely to have hollows of sufficient size but not to have hollows of the angle preferred by Black-Cockatoos.
5	Tree lacking large hollows or broken branches that might have large hollows; a tree with more or less intact branches and a spreading crown.

All trees that were identified as having a suitable hollow were tapped with a stick to flush any bird that may be on a nest.

Black-Cockatoos require tree hollows that have an entrance diameter of more than 100 mm (Whitford 2001). Internal dimensions may be more important than entrance diameter, although these are much more difficult to assess (Whitford 2001; Gibbons and Lindenmayer 2002; Whitford and Williams 2002). For Forest Red-tailed Black-Cockatoos, the minimum height of a nesting hollow is 4.4 m above the ground (Whitford 2001). The minimum diameter at breast height (DBH) of a nesting tree is 608 mm and the minimum age of an actual nesting tree is 214 years (Whitford 2002). In the study by Whitford and Williams (2002) the youngest tree to bear a hollow that was potentially suited to Forest Red-tailed Black-Cockatoos was 131 years (although this was not used). In general, hollows of sufficient size to support Black-Cockatoos do not form until trees are at least 230 years old, and the majority of nests are found in 300-500 year old trees (Johnstone 2006).

2.2.2 Black-Cockatoo foraging habitat assessment

Foraging habitat in the survey area was assessed during the review of previous fauna and flora assessments and as part of the field investigations. Within the survey area, all major vegetation types were visited to develop an understanding of habitat types present and to assess the value of foraging habitat for Black-Cockatoos. The foraging habitat assessment focussed on identifying key species for the three Black-Cockatoo species including; Marri (*Corymbia calophylla*), Eucalyptus (*E. marginata, E. patens, E. wandoo*), Banksia (*B. squarrosa, B. sessilis*) and Hakea (*H. undulata).* Black-Cockatoo foraging species identified in the survey area are discussed in Section 4.3.

BCE has developed categories for the condition of vegetation types present within the survey area based upon extensive field experience and ongoing consultation with the Department of Parks and Wildlife (DPaW) and the Department of the Environment (DotE). Foraging value scores for the three Black-Cockatoo species are summarised in Table 4 (low to high foraging value). Note, an average score for the three species was assigned to each vegetation type (Figures 7 to 11). Searching for foraging evidence (i.e. chewed nuts) was also conducted during the survey.

Table 4. Scoring system for the assessment of foraging value of native vegetation for Carnaby's, Baudin's and Forest Red-tailed Black-Cockatoos.

Site score	Vegetation description		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
0	No foraging value. No Proteaceae, eucalypts or other potential sources of food. Examples would be salt lakes and bare ground.	No foraging value. No eucalypts or other potential sources of food.	No foraging value. No eucalypts (i.e. Marri, Jarrah or Blackbutt) or other potential sources of food.
1	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these <2%. Could include urban areas with scattered foraging trees. Blue Gum plantations are considered to have a score of 1 as foraging by Black-Cockatoos has been reported but appears to be unusual.	Negligible to low foraging value. Scattered specimens of known food plants (e.g. Marri and Jarrah) but projected foliage cover of these <1%. Could include urban areas with scattered foraging trees.	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these <1%. Could include urban areas with scattered foraging trees.
2	Low foraging value. Examples: • Shrubland in which species of foraging value, such as shrubby banksias, with <10% projected foliage cover. • Open eucalypt woodland/mallee of small-fruited species. • Paddocks with melons or other weeds (a short-term, seasonal food source).	Low foraging value. Example: • Woodland or forest with scattered specimens of known food plants (e.g. Marri and Jarrah) but projected foliage cover of these 1-<5%. Could include urban areas with scattered foraging trees.	Low foraging value. Examples: • Open eucalypt woodland (i.e. Marri, Jarrah or Blackbutt). Projected foliage cover of these 1-<5% • Urban areas with scattered food plants such as Cape Lilac, *Eucalyptus caesia* and *Eucalyptus erythrocorys*.
3	Low to Moderate foraging value. Examples: • Shrubland in which species of foraging value, such as shrubby banksias, with 10-20% projected foliage cover. • Woodland with tree banksias 2-10% projected foliage cover. • Eucalypt woodland/mallee of small-fruited species; Marri, if present, <10% project foliage cover.	Low to Moderate foraging value. Examples: • Eucalypt woodland with known food plants (and in particular Marri) with a projected foliage cover of 5-<10%. • Parkland-cleared eucalypt woodland with projected foliage cover of known food plants of 10-<20% can be considered low-to-moderate because of poor long-term viability without management.	Low to Moderate foraging value. Examples: • Eucalypt woodland (i.e. Marri, Jarrah, or Blackbutt), if present, <10% project foliage cover.

Site score	Vegetation description		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
4	Moderate foraging value. Examples: • Woodland with tree banksias 20-40% projected foliage cover. • Eucalypt woodland/forest with Marri 20-40% projected foliage cover.	Moderate foraging value. Examples: • Eucalypt woodland with known food plants (and in particular Marri) with a projected foliage cover of 10-<20%. • Parkland-cleared eucalypt woodland with projected foliage cover of known food plants of 20-<40% can be considered moderate because of poor long-term viability without management. • Areas of orchards and especially those with apples can be considered of moderate value.	Moderate foraging value. Examples: • Eucalypt woodland/forest (i.e. Marri, Jarrah or Blackbutt) with 20-40% projected foliage cover.
5	Moderate to High foraging value. Examples: • Banksia woodlands with tree banksias >40%. Vegetation condition moderate due to weed invasion and some tree deaths.	Moderate to High foraging value. Examples: • Eucalypt woodland with known food plants (and in particular Marri) with a projected foliage cover of 20-<40%. • Parkland-cleared eucalypt woodland with projected foliage cover of known food plants of >40% can be considered moderate because of poor long-term viability without management.	Moderate to High foraging value. Examples: • Eucalypt woodland/forest (i.e. Marri, Jarrah or Blackbutt) with >40% projected foliage cover. Vegetation condition moderate due to weed invasion and some tree deaths.
6	High foraging value. Example: • Banksia woodlands of key species (e.g. *B. attenuata, B. menziesii*) with projected foliage cover >60%. Vegetation condition good with low weed invasion and low tree death to indicate it is robust and unlikely to decline in the medium term.	High foraging value. Example: • Eucalypt woodland/forest with a high proportion of Marri (>40% projected foliage cover). Vegetation condition good with low weed invasion and low tree death to indicate it is robust and unlikely to decline in the medium term.	High foraging value. Example: • Eucalypt woodland/forest (i.e. Marri, Jarrah or Blackbutt) with >60% projected foliage cover. Vegetation condition good with low weed invasion and low tree death to indicate it is robust and unlikely to decline in the medium term.

2.2.3 Black-Cockatoo roosting survey

Black-cockatoos utilise traditional roost sites that may be repeatedly used by a group of birds over many years. Roost sites are typically large and sometimes somewhat isolated trees or groups of trees. Roosting surveys were conducted at sunset on the evening of the 5th, 6th and 8th October 2015. Three different sites were selected during the day to identify the most optimal location to view birds flying into potential roost trees. Locations were:

1. 5th October 2015 - 50J 443956E and 6484554N;
2. 6th October 2015 - 50J 442193E and 6483386N; and
3. 8th October 2015 - 50J 444301E and 6484876N.

Roosting evidence (i.e. bird scats below trees) were also searched for during the survey.

2.2.4 Targeted searching for conservation significant species

Significant species recorded during the desktop assessment include several that can be found by searching for evidence of their activities (e.g. scats, tracks, diggings, burrows). Searching for evidence of significant fauna was therefore undertaken by walking through habitat considered suitable for such species.

2.2.5 Opportunistic observations

At all times, observations of Black-Cockatoos or other fauna were noted when they contributed to the accumulation of information on the fauna of the site. These included such casual observations as birds, reptiles and mammals seen while walking through the survey area. Opportunistic observations are provided in Appendix 2.

2.2.6 Motion sensitive camera survey

Six motion sensitive infrared cameras were set up for seven nights (28th October – 4th November 2015) in various locations within the survey area. Bushnell and Reconyx cameras were set to record photo footage during day or night to detect diurnal and nocturnal activity. Universal bait consisting of a mixture of rolled oats, peanut butter and sardines was scattered in front of each camera to attract fauna into the field of view. Camera survey effort was a total of 42 camera trap nights representing about 1008 hours of constant video monitoring. Locations of motion sensitive cameras are provided in Table 5.

Table 5. Motion sensitive camera locations.

Camera name	Location (Easting, Northing)	Camera nights	Vegetation type
Aud 9	50J 439667E, 6480546N	7	Wandoo Woodland
Aud R1	50J 443567E, 6484579N	7	Jarrah Woodland
Aud R2	50J 443409E, 6484660N	7	Jarrah Woodland
Aud 8	50J 444499E, 6484829N	7	Jarrah, Marri Woodland
Aud 5	50J 444261E, 6484928N	7	Wandoo Woodland
Aud 2	50J 445535E, 6485274N	7	Wandoo, Jarrah Woodland

2.3 Personnel

The field survey was conducted by Wes Bancroft (B.Sc. Hons. Ph.D.) and Cameron Everard (B.Sc. M.Sc.). This assessment document was prepared by Cameron Everard and Dr Mike Bamford (B.Sc. Hons. Ph.D.). All personnel have significant field experience with regard to fauna and in particular the assessment of Black-Cockatoo habitat in Western Australia. The field survey was carried out under Regulation 17 licence number SF010524.

3 Results

3.1 Overview of vertebrate assemblage

The desktop study identified 257 vertebrate fauna species as potentially occurring at the site (Table 6 and Appendix 3) including: 14 frogs, 49 reptiles, 157 birds and 25 native and 12 introduced mammals. Note that this assemblage comes from databases and includes species that may occur occasionally on the site, but for which it is not important (such as birds that rarely fly overhead). The vertebrate assemblage includes 30 species of conservation significance (Table 6 and Appendix 3). Species returned from databases but excluded from species lists (i.e. locally extinct species) are presented in Appendix 4.

Field investigations identified 44 vertebrate fauna species comprising of: one frog, four reptiles, 33 bird, four mammal and two introduced mammal species (Tables 6, 7 and Appendix 3). Conservation significant fauna species recorded during the investigation include; the three Black-Cockatoo species (Carnaby's, Baudin's and Forest Red-tailed - CS1) and one mammal species (Quenda - CS2). These species are discussed in Sections 4 and 5.

Table 6. Composition of vertebrate fauna assemblage expected to occur and recorded in the survey area.

Taxon	Number of species expected (Recorded)	Significant fauna expected (Recorded)		
		CS1	CS2	CS3
Frogs	14 (1)	0	0	0
Reptiles	49 (4)	1	2	0
Birds	157 (33)	9 (3)	3	2
Native Mammals	25 (4)	2	4 (1)	2
Introduced Mammals	12 (2)	-	-	-
Total	**257 (44)**	**12 (3)**	**9 (1)**	**4**

CS – levels of Conservation Significance are described in Appendix 1.

Three conservation significant invertebrate species were identified from the database searches and include the Shield-backed Trapdoor Spider *Idiosoma nigrum,* a short-tongued bee *Leioproctus douglasiellus* and Carter's Freshwater Mussel *Westralunio carteri*. The Shield-backed Trapdoor Spider is unlikely to occur within the survey area, due to the lack of suitable habitat and outside known distribution ranges. The short-tongued bee is likely to be extinct in the area (DotE 2015a). The Carter's Freshwater Mussel has been recorded near Mount Helena, approximately 15 km south-west of the survey area (DPaW 2015).

The overall fauna assemblage is relatively large and typical for the region but slightly depauperate due to impacts of feral predators and environmental degradation as a result of agriculture. Key features of the fauna assemblage expected in the project area are:

- Uniqueness: It is expected that the assemblage is regionally widespread and species occur over a range of local habitats;
- Completeness: The assemblage of species is missing a significant number of native mammal species. The migratory bird species may only utilise the site occasionally; and
- Richness: The assemblage is likely to vary annually and seasonally according to climatic conditions.

Table 7. Conservation significant vertebrate fauna species identified from database searches that may occur and recorded in the survey area.

Species		Status	CS Level	Status in the survey area	Recorded in the survey area
REPTILES					
Dell's Skink	*Ctenotus delli*	P4	CS2	Possible resident	
Carpet Python	*Morelia spilota*	S4	CS1	Resident	
Southern Death Adder	*Acanthophis antarcticus*	P3	CS2	Vagrant	
BIRDS					
Blue-billed Duck	*Oxyura australis*	P4	CS2	Irregular visitor or Vagrant	
Fork-tailed Swift	*Apus pacificus*	M S3	CS1	Irregular visitor	
Cattle Egret	*Ardea ibis*	M S3	CS1	Irregular visitor or Vagrant	
Eastern Great Egret	*Ardea modesta*	M S3	CS1	Irregular visitor or Vagrant	
Glossy Ibis	*Plegadis falcinellus*	M S3	CS1	Irregular visitor or Vagrant	
Eastern Osprey	*Pandion cristatus*	M	CS1	Irregular visitor or Vagrant	
Peregrine Falcon	*Falco peregrinus*	S4	CS1	Irregular visitor or Vagrant	
Hooded Plover	*Thinornis rubricollis*	P4	CS2	Irregular visitor or Vagrant	
Common Sandpiper	*Actitis hypoleucos*	M S3	CS1	Irregular visitor or Vagrant	
Red-necked Stint	*Calidris ruficollis*	M S3	CS1	Irregular visitor or Vagrant	
Common Greenshank	*Tringa nebularia*	M S3	CS1	Irregular visitor or Vagrant	
Western Corella	*Cacatua pastinator*	V S4 (pastinator subsp. only)	CS1	Irregular visitor or Vagrant	
Red-tailed Black-Cockatoo	*Calyptorhynchus banksii naso*	V S1	CS1	Regular migrant	**X**
Baudin's Black-Cockatoo	*Calyptorhynchus baudinii*	V S1	CS1	Regular migrant	**X**
Carnaby's Black-Cockatoo	*Calyptorhynchus latirostris*	E S1	CS1	Regular migrant	**X**
Bush stone-curlew	*Burhinus grallarius*		CS3	Irregular visitor or Vagrant	
Barking Owl	*Ninox connivens*	P2	CS2	Irregular visitor or Vagrant	
Masked Owl	*Tyto novaehollandiae*	P3	CS2	Irregular visitor or Vagrant	
Rainbow Bee-eater	*Merops ornatus*	M S3	CS1	Regular migrant	
MAMMALS					
Chuditch	*Dasyurus geoffroii*	V S1	CS1	Possible resident	
Red-tailed Phascogale	*Phascogale calura*	E S1	CS1	Possible resident	
Brush-tailed Phascogale	*Phascogale tapoatafa*		CS3	Possible resident	
Quenda	*Isoodon obesulus fusciventer*	P5	CS2	Resident	**X**
Brush Wallaby	*Macropus irma*	P4	CS2	Irregular visitor or Vagrant	
Southern Freetail Bat	*Mormopterus planiceps*		CS3	Irregular visitor or Vagrant	
Western Falsistrelle	*Falsistrellus mackenziei*	P4	CS2	Irregular visitor or Vagrant	
Rakali or Water Rat	*Hydromys chrysogaster*	P4	CS2	Irregular visitor or Vagrant	
Total Number of Species:	**30**				**4**

Note: Species returned from database searches that are locally extinct are listed in Appendix 4.

4 Black-Cockatoo habitat assessment

The value of the survey area for Black-Cockatoos was assessed by:

- Understanding the use of the survey area by Black-Cockatoos (Section 4.1);
- Quantifying important ecological requirements (i.e. nesting, foraging and roosting habitat) within the survey area that are necessary for Black-Cockatoos (Section 4.2 to 4.4); and
- Providing some regional context for the site (Section 4.5).

4.1 Species presence

All three Black-Cockatoo species were seen and heard within the survey area. Old and new foraging evidence comprising of mostly chewed Marri nuts was recorded for the three Black-Cockatoo species. Potential breeding habitat and suitable foraging habitat are present within the survey area and are discussed in Sections 4.2 and 4.3 respectively.

Observations of Black-Cockatoos within the survey area include:

- A group of seven birds (comprising of Carnaby's and Baudin's Black-Cockatoos) foraging in a Marri tree (50J 442406E, 6483212N). Both species identified from foraging evidence on falling nuts;
- A group of four birds (comprising of Carnaby's and Baudin's Black-Cockatoos) in a Marri tree at (50J 442408E, 6483149N);
- Four Forest Red-tailed Black-Cockatoos perched in a Wandoo tree (50J 445242E, 6485071N);
- Two Forest Red-tailed Black-Cockatoos flying in a westerly direction over the survey area (50J 443682E, 6485305N); and
- A group of approximately 30 birds comprising of Carnaby's and Baudin's Black-Cockatoos heading north of the survey area to roost in a group of trees approximately 600 m west of Great Eastern Highway near Mairinger Way, Wundowie (50J 442004E, 6483875N).
  (Black-Cockatoo observations are provided in Figures 7 to 10).

As a part of Birdlife Australia's Great Cocky Count, significant White-tailed Black-Cockatoo counts have also been noted at Wundowie, Bakers Hill and Gidgegannup (Finn *et al*. 2014).

4.2 Black-Cockatoo nest tree assessment

4.2.1 Survey area

A total of 1029 trees was recorded during the survey (Table 8). No active nests or hollows of suitable size and angle with chew marks were found in the survey area (Classes of 1 and 2; tree Class descriptions are provided in Table 3). Only 54 trees (5%) with apparently suitable hollows but no chew marks (Class 3) were recorded. Trees in this Class may be the best indicator of nest hollow "stock" in the survey area and occur at a mean density of 0.4 trees/ha. A further 54 trees (5%) were recorded in Class 4 (trees with large hollows or broken branches that might contain hollows but are not vertical or near-vertical). The majority of trees surveyed (921 trees - 90%) were over 500mm DBH (>300mm DBH for Wandoo), but lacked large hollows and had more or less all branches intact (Class 5). This demonstrates that not all large trees contain suitable hollows. Trees considered to be hollow-bearing and therefore potential nesting sites for Black-Cockatoos were scarce compared with less suitable trees. Raw data from the tree nest assessment are provided in Appendix 5. The location of nest trees within the survey area are provided in Figures 3 to 6.

Of the 1029 trees, 899 (87%) were recorded alive and 130 (13%) dead. The 1029 trees comprised:

- 705 Wandoo (69%), DBH ranging from 300 – 1130mm (average DBH 451mm);
- 185 Marri (18%), DBH ranging from 500 – 1340mm (average DBH 674mm);
- 63 Jarrah (6%), DBH ranging from 500 – 1190mm (average DBH 680mm);
- 37 Blackbutt (4%), DBH ranging from 500 – 1320mm (average DBH 675mm);
- 24 unidentified trees (2%), DBH ranging from 380 – 1150mm (average DBH 623mm); and
- 15 Flooded Gum (1%), DBH ranging from 500 – 1150mm (average DBH 658mm).

The density of all trees recorded (1029 trees) within the road survey area was 7.8 trees/ha (based on 132.5 ha) (Table 8). Note, density calculations have been based on a 50 m buffer on each side of the highway (see Section 2.2.1).

Although no active nests or hollows of suitable size and angle with chew marks (Classes 1 and 2) were recorded in the survey area, it must be emphasised that all trees over 500mm DBH should be avoided, where possible, when planning upgrades, road widening or potential realignments. Any such tree (>500mm DBH or >300mm for Wandoo) meets the criterion for a potential nest tree and any large tree could have a concealed hollow that cannot be seen from the ground. Of the 108 hollow-bearing trees inspected during the survey, five were found with nesting galahs, five with bees, two with nesting parrots (Australian Ringneck or Red-capped Parrot) and one with nesting corellas. This would suggest that there is some competition by other species for nest hollows in the survey area and probably the region.

It should be highlighted that in the absence of a project footprint, it is not possible to determine the number of trees that could be potentially impacted. Trees that meet the basic size criterion are scattered throughout the survey area, however a greater concentration of Class 3 trees (potentially suitable hollow visible but no chew marks present) was recorded in the following locations:

1. Isolated Wandoo trees located on the southern side of Great Eastern Highway from El Cabello Resort to near Linley Valley Road (Figure 3);
2. Wandoo woodland located on the northern side of the highway, approximately 500m east of Chedaring Road (Figure 4);
3. Wandoo woodland located on southern side of the highway bordering the Kwolyinine Nature Reserve (Figure 5); and
4. Wandoo, Jarrah, Marri Woodland located on the northern side of the highway in Woondowing Nature Reserve, west and east of Coates Road (Figure 6).

Class 3 nest trees are represented in Figures 3-6 as large dots, category 4 (medium dots) and category 5 (small dots).

Withn the Kwolyinine Nature Reserve, the potential value for black-cockatoo nesting depends upon vegetation type. Terratree (2015) recognised three broad vegetation types within the survey area:

1. *Eucalyptus wandoo* Tall Woodland over *Banksia squarrosa*, *Xanthorrhoea preissii* and *Banksia sessilis* Tall Shrubland;
2. *Eucalyptus marginata* and *Corymbia calophylla* Open Woodland over *Banksia squarrosa*, *Xanthorrhoea preissii* and *Banksia sessilis* Tall Shrubland; and
3. *Eucalyptus marginata* Open Woodland over *Banksia squarrosa*, *Banksia sessilis* and *Xanthorrhoea preissii* Tall Open Shrubland over *Hakea undulata* Open Shrubland over *Melaleuca parviceps* Low Open Shrubland.

With respect to breeding habitat, the northern boundary of the Kwolyinine Nature Reserve (and southern boundary of the Great Eastern Highway) supports Wandoo woodland which contains several large hollows suitable for breeding Black-Cockatoos (Figure 5). Jarrah and Marri woodland is also present in the nature reserve with several large Marri trees that are large enough to contain hollows but are sparsely distributed (due to selective historical logging). Plant species present in this vegetation type (i.e. Jarrah, Marri and Banksia) provides more opportunities for foraging, compared with Wandoo woodland, although in some areas *Banksia sessilis* and *B. squarrosa* occur as an understorey, therefore increasing the foraging value of the woodland (Refer to Figure 10). Based on an assessment of the vegetation, the potential nest tree density is likely to be higher in the Wandoo woodland. It is recommended that this area is re-assessed for potential nest trees when a project footprint is available.

Table 8. Summary of potential nest trees and density recorded within the survey area.

Tree Class*	**Number of trees and density (trees/ha)**
1 - Active nest observed	0 (0)
2 - Hollow of suitable size and angle, visible chew marks around entrance	0 (0)
3 - Potentially suitable hollow visible but no chew marks present	54 (0.4)
4 - Has large hollows or broken branches but are not suitable angle	54 (0.4)
5 - Tree lacking large hollows or broken branches	921 (7)
No. potential nest trees in survey area[+] (Categories 1-5)	**1029**
Road survey area[+] (ha) (130 ha)	132.5
Tree density (trees/ha)	**7.8**

*all trees >500mm DBH (>300mm DBH for Wandoo)

[+] 50m buffer along the roadside, does not include Kwolyinine Nature Reserve.

4.2.2 Black-Cockatoos breeding within the survey area

While breeding by the three Black-Cockatoos within the survey area was not confirmed, the presence of potentially suitable nest sites (Class 3, Figures 3 to 6), access to foraging habitat nearby and confirmed sightings suggests that breeding within and/or adjacent to the survey area is possible. Although no active nests were recorded during the survey, it should be highlighted that the habitat assessment is a 'snapshot' in time and that unoccupied nest trees may have been used previously, or might be used in the future by Black-Cockatoos. Furthermore, many of the potential nest sites identified in the survey were difficult to accurately assess for breeding activity due to the height and upright position of the tree hollows.

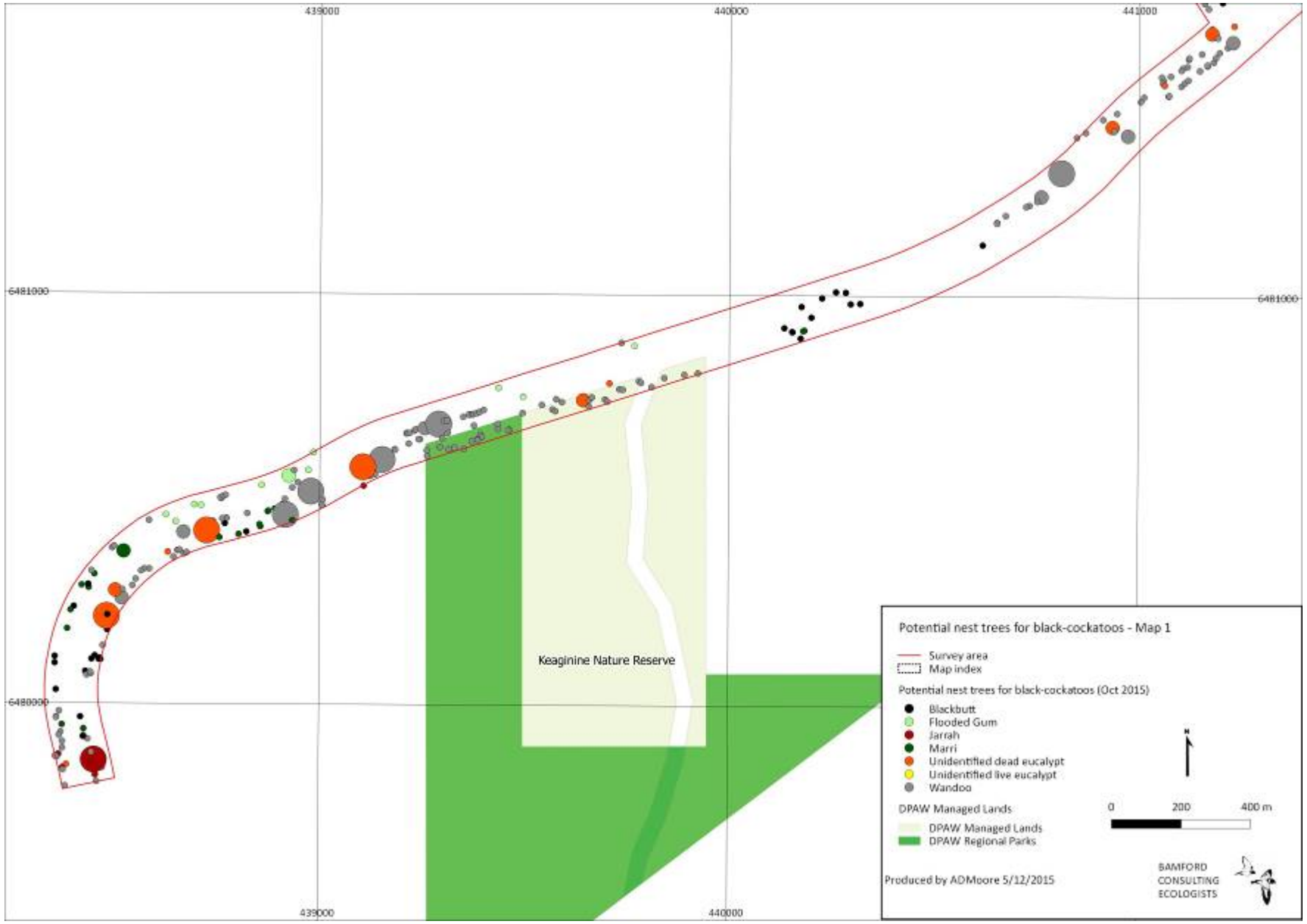


Figure 3. Location of potential Black-Cockatoo nest trees (Map 1). Nest trees: Category 3 = large dots, Category 4 = medium dots, Category 5 = small dots.

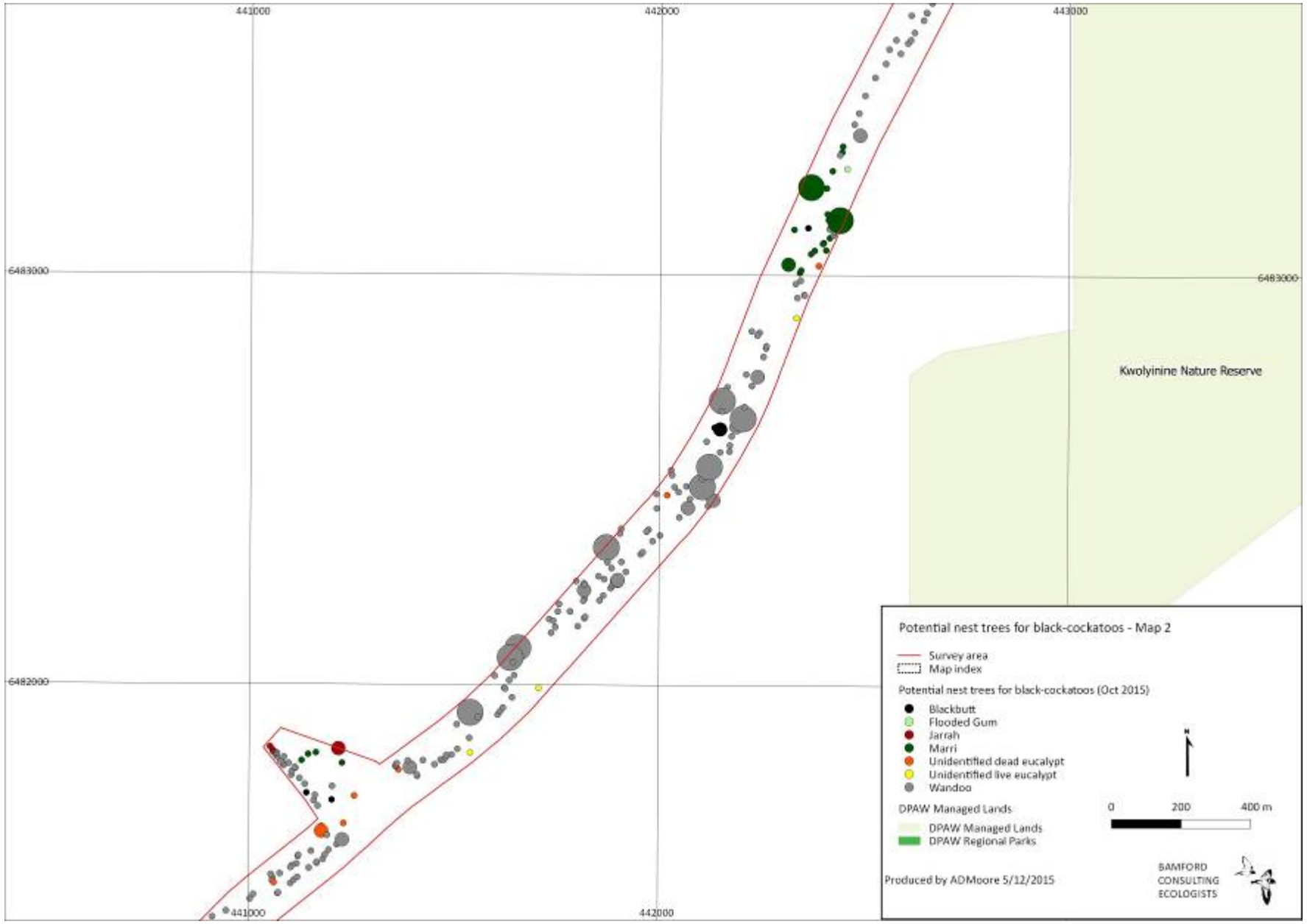


Figure 4. Location of potential Black-Cockatoo nest trees (Map 2). Nest trees: Category 3 = large dots, Category 4 = medium dots, Category 5 = small dots.

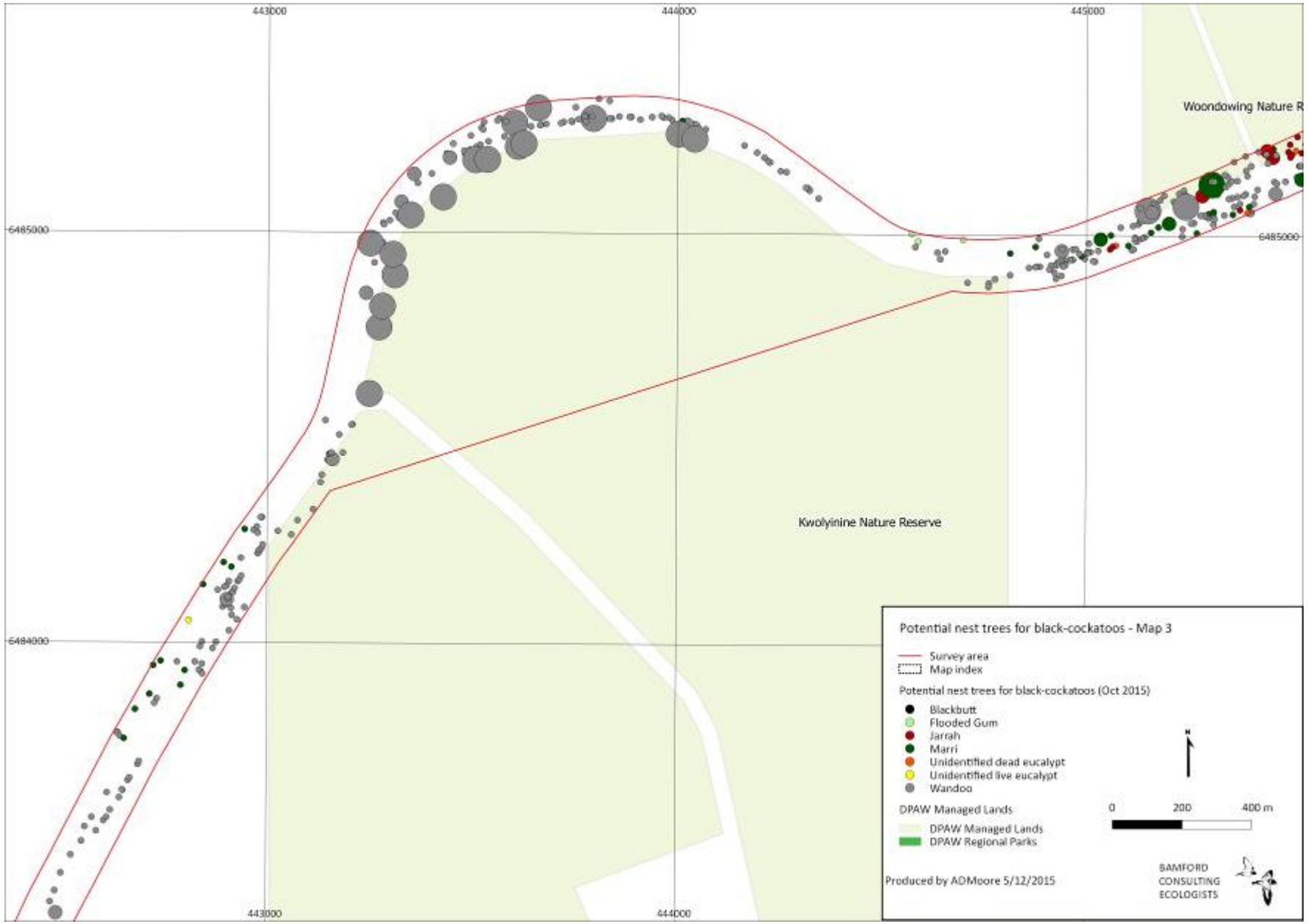


Figure 5. Location of potential Black-Cockatoo nest trees (Map 3). Nest trees: Category 3 = large dots, Category 4 = medium dots, Category 5 = small dots

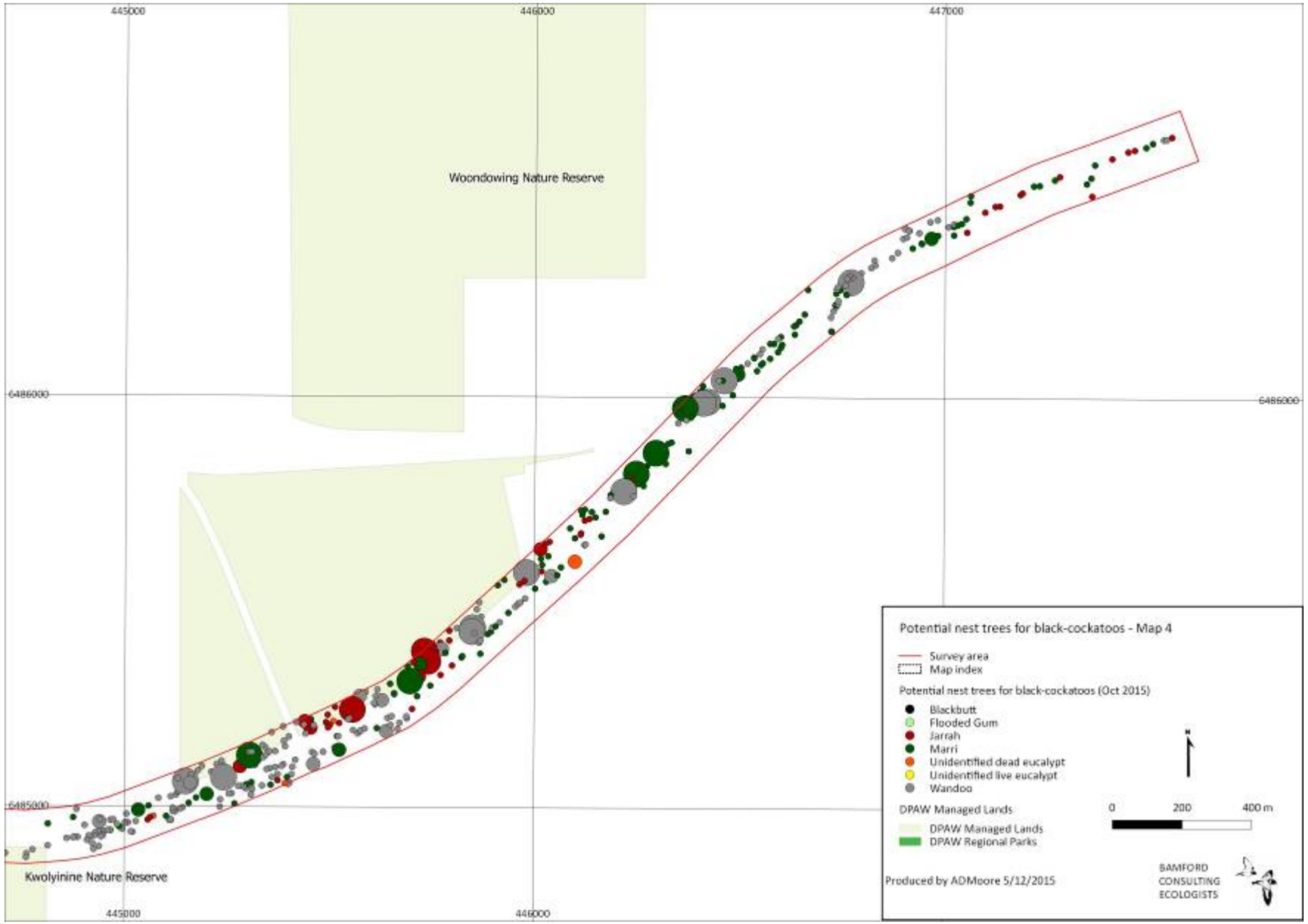


Figure 6. Location of potential Black-Cockatoo nest trees (Map 4). Nest trees: Category 3 = large dots, Category 4 = medium dots, Category 5 = small dots

4.3 Black-Cockatoo foraging habitat assessment

The survey area contains a number of key foraging species for Black-Cockatoos (Table 9). Forest Red-tailed Black-Cockatoo primarily feeds on Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*) and Blackbutt (*E. patens*) seeds. Carnaby's Black-Cockatoo feeds on a broader range of plants, including proteaceous trees and heath (e.g. *Acacia, Banksia, Dryandra, Hakea, Grevillea*), eucalypt trees, and introduced or plantation trees (e.g. *Pinus*). Carnaby's Black-Cockatoo in particular forages widely, including foraging in paddocks for seeds. Baudin's Black-Cockatoo primarily feeds on Marri and Jarrah. As with breeding habitat, core and secondary foraging habitats are recognised.

Table 9. Plant species known to be used for foraging, nesting and roosting by Black-Cockatoos (Forest Red-tailed, Carnaby's and Baudin's).

Plant Species	FRTBC	CBC	BBC
Acacia saligna (Orange Wattle)		F	
Allocasuarina fraseriana	F		
Banksia dallanneyi (Honeypot Dryandra)		F	
Banksia sessilis (Parrot Bush)		F	F
Banksia squarrosa (Pingle)		F	F
Corymbia calophylla (Marri)	F,N	F,n,R	F,n
Eucalyptus marginata (Jarrah)	F,N	F,n,R	F
Eucalyptus patens (Blackbutt)	F	F,R	
Eucalyptus rudis (Flooded Gum)		R	
Eucalytpus wandoo (Wandoo)		F,N,R	F,n
Hakea undulata (Wavy-leaved Hakea)		F	
Kingia australis (Kingia)			F
Xanthorrhoea preissii (Grass Tree)		F	F

Data compiled from the literature (Davies 1966; Saunders 1974, 1979a, b, 1980; Saunders *et al.* 1982; Saunders 1986; Johnstone and Storr 1998; Higgins 1999; Johnstone and Kirkby 1999, 2008, 2011; Groom 2011; DotE 2015b, c, d; DPaW 2013).
FRTBC = Forest Red-tailed Black-Cockatoo, CBC = Carnaby's Black-Cockatoo, BBC = Baudin's Black-Cockatoo
F = foraging, R = roosting, N or n = nesting (main and less commonly used species, respectively).

A summary of the vegetation types in the survey area is presented in Table 10. Foraging habitat was based on seven main vegetation community types described by Terratree (2015). An additional category has been included, "Isolated (or clumps of) trees (*Eucalyptus marginata, Eucalyptus wandoo, Eucalyptus patens, Eucalyptus rudis* and/or *Corymbia calophylla*) in paddocks over weeds, cleared land or agricultural crops". Although not a native vegetation community, single or clumps of trees over weeds still provide an important foraging resource, especially for Carnaby's Black-Cockatoos.

Most important are the vegetation communities that contain key foraging species for Black-Cockatoos (i.e. those that contain high densities of Marri, Jarrah or Blackbutt over Banksia). Some areas were assigned a lower foraging value due to the absence or low density of other key species such as *Eucalyptus marginata* (Jarrah), *Banksia sessilis, B. squarrosa* and *Xanthorrhoea preissii* (Grasstree). The lack of these species in some vegetation communities may be a result of historical logging (i.e. Jarrah) or grazing activities in the area. Similarly, higher value scores were assigned to areas where high quality foraging species were present. Photographs of vegetation types within the survey area are provided in Appendix 6.

A large part of the survey area consisted of isolated or clumps of Marri, Wandoo, Jarrah and Blackbutt (in paddocks over weeds, cleared land or agricultural crops) and ranges from negligible to moderate

foraging value for Black-Cockatoos. There are also several patches of remnant vegetation in the survey area where a nature reserve abuts the highway roadside (i.e. Kwolyinine and Woondowing Nature Reserves). The vegetation in these reserves provides a moderate to high foraging value resource (including breeding and roosting habitat) for Black-Cockatoos. An overview map of vegetation types and foraging values is provided in Figure 7. Note, an average foraging score for the three species was assigned to each vegetation type (Figures 7 to 11).

Foraging evidence (primarily chewed Marri nuts) was found in several locations in the survey area (Figures 9 and 11, Plate 1). Chewed nuts were found at the base of trees in woodland areas and isolated trees in paddocks along the highway and suggest that the latter provide an important foraging resource for Black-Cockatoos. Both Marri and Jarrah is considered a significant resource for the three Black-Cockatoo species.

As with the nest tree assessment, it is not possible to determine the area of foraging habitat that could be impacted due to the absence of a project footprint. As expected, different vegetation types (and foraging values) are distributed throughout the survey area. Foraging values range from negligible value (bare cleared ground) to low (some areas of Wandoo woodland) to moderate to high foraging value (Marri and Jarrah woodland over Banksia). For some vegetation types, a range of foraging values are provided (Table 10) to account for changes across the landscape.

With respect to foraging habitat, the following locations are of particular interest:

1. Blackbutt and Marri woodland located on the northern and southern side of Great Eastern Highway near Linley Valley Road (Figure 8);
2. Wandoo/Jarrah woodland and isolated patches of Marri trees between Chedaring Road and Hawke Avenue (Figure 9);
3. Wandoo, Jarrah and Marri woodland located in Kwolyinine Nature Reserve (Figure 10);
4. Wandoo and Jarrah woodland located in Woondowing Nature Reserve (Figure 11); and
5. Marri/Jarrah woodland located on the northern side of the highway west of Koojedda Road (Figure 11).

Plate 1. Fresh foraging evidence from Carnaby's and Baudin's Black-Cockatoos. Both species were recorded foraging in the same Marri tree (ca. 600m south of Hawke Avenue, 50J 442406E, 6483212N).

Table 10. Vegetation community types and foraging value in the survey area.
Vegetation descriptions are based on Terratree (2015).

Vegetation type (Code)	Vegetation description	Foraging value (scores)
Jarrah, Marri over Banksia (J)	*Eucalyptus marginata* and *Corymbia calophylla* Open Woodland over *Banksia squarrosa*, *Xanthorrhoea preissii* and *Banksia sessilis* Tall Shrubland over *Hibbertia hypericoides* and *Banksia dallaneyi var. dallanneyi* Low Shrubland.	Mod-High (5)
Jarrah over Banksia (M)	*Eucalyptus marginata* Open Woodland over *Banksia squarrosa, Banksia sessilis* and *Xanthorrhoea preissii* Tall Open Shrubland over *Hakea undulata* Open Shrubland over *Melaleuca parviceps* Low Open Shrubland.	Mod (4)
Wandoo, Jarrah over Banksia (W)	*Eucalyptus wandoo* and *Eucalyptus marginata* Open woodland over *Xanthorrhoea preissii* and *Banksia sessilis* Tall Sparse Shrubland over Mixed Species Low Open Shrubland.	Low –Mod (2-4)
Degraded wetland (D)	Degraded to Completely Degraded Wetlands - *Melaleuca viminea ssp viminea* over *Juncus acutus ssp acutus*, *Watsonia meriana var bulbillifera* and *Cenchrus clandestinus* Sedge/Grassland.	Low (1,2)
Blackbutt, Marri (B)	*Eucalyptus patens* and *Corymbia calophylla* woodland over *Acacia saligna* Shrubland over *Patersonia occidentalis*, *Watsonia meriana var. bulbillifera* Sedgeland.	Mod (4)
Marri, Jarrah (C)	*Corymbia calophylla* and *Eucalyptus marginata* Woodland over *Xanthorrhoea preissii* Shrubland over *Hibbertia commutate* Low Open Shrubland.	Mod (4)
Wandoo over Banksia (S)	*Eucalyptus wandoo* Tall Woodland over *Banksia squarrosa*, *Xanthorrhoea preissii* and *Banksia sessilis* Tall Shrubland over *Hibbertia commutate* Low Open Shrubland.	Low-Mod (1,3)
Isolated trees (I)	Isolated (or clumps of) trees (*Eucalyptus marginata*, *Eucalyptus wandoo, Eucalyptus patens, Eucalyptus rudis* and/or *Corymbia calophylla*) in paddocks over weeds, cleared land or agricultural crops.	Nil-Low/Mod (0,1,3)

*Refer to Table 4 for foraging value scores. Photographs of vegetation community types are provided in Appendix 6.

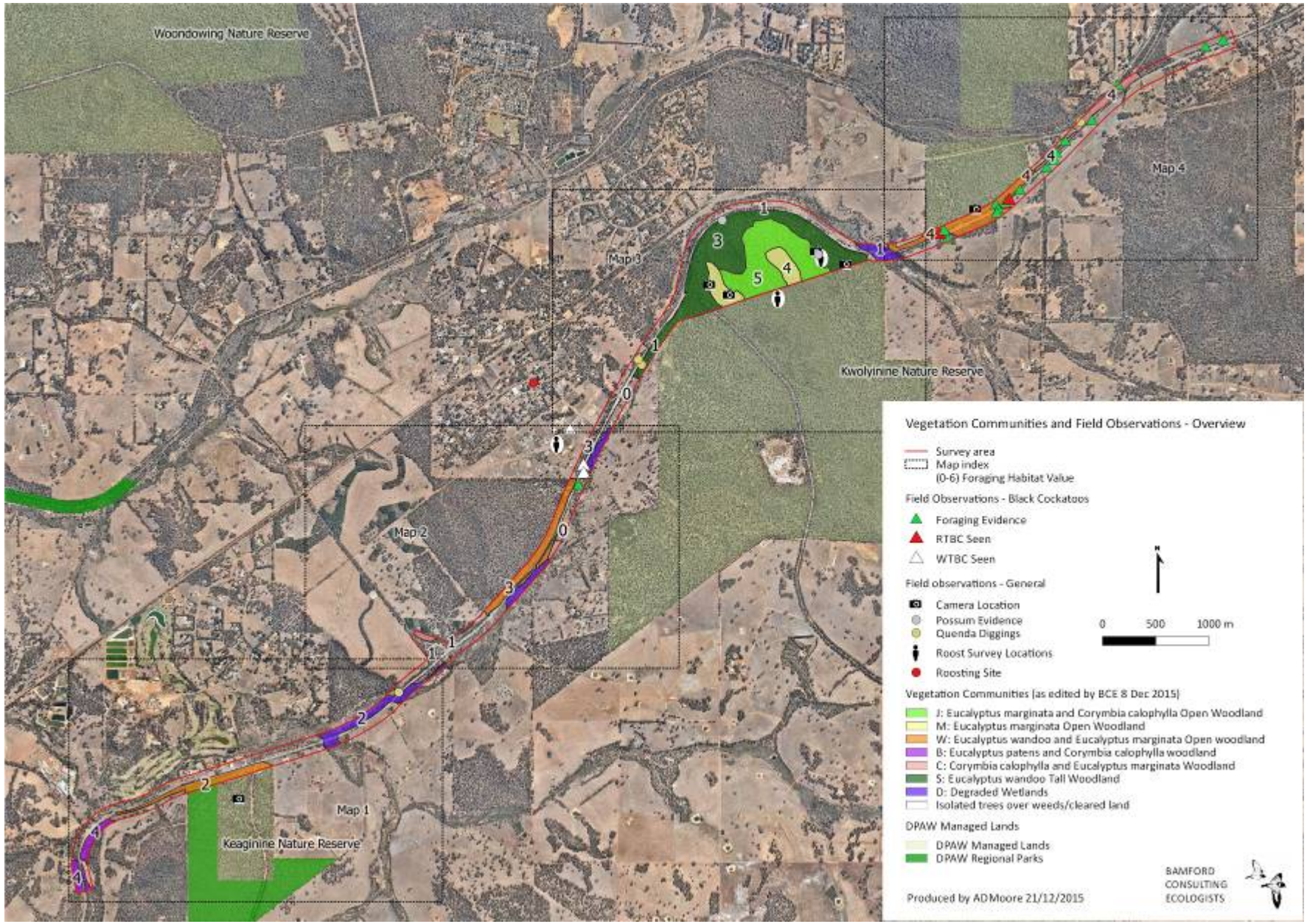


Figure 7. Overview map of Black-Cockatoo foraging habitat values and field observations.

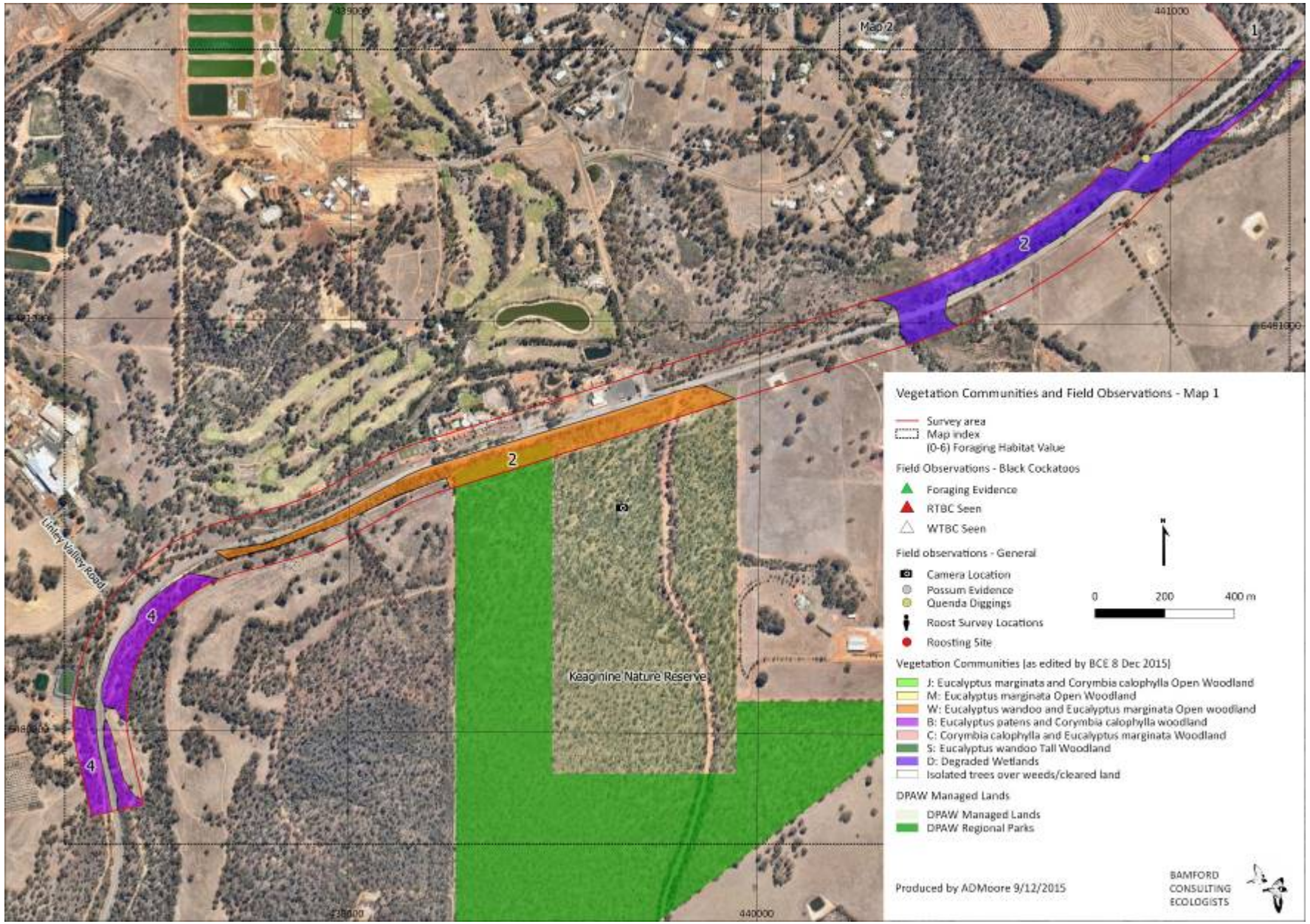


Figure 8. Black-Cockatoo foraging habitat value and field observations (Map 1).

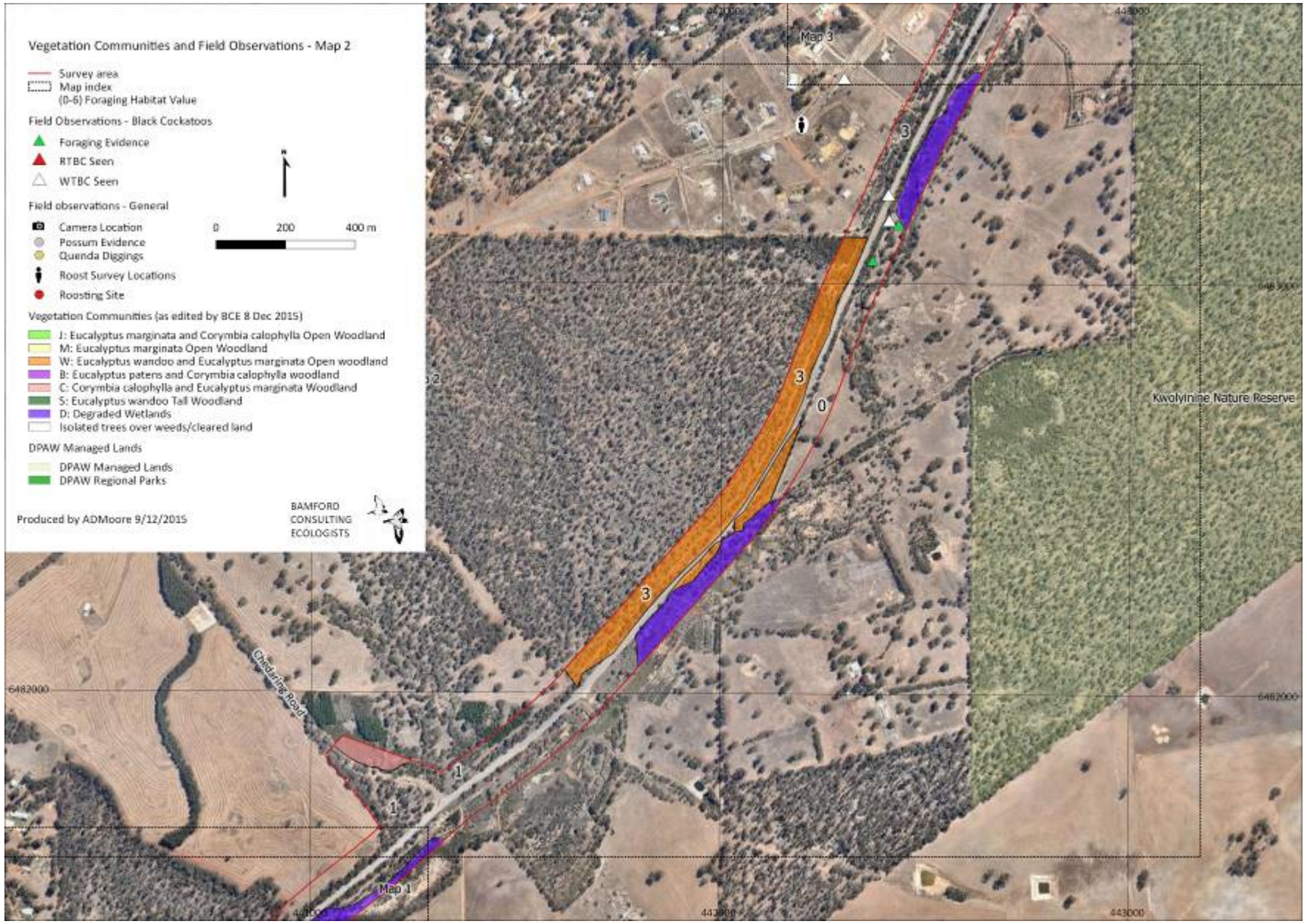


Figure 9. Black-Cockatoo foraging habitat value and field observations (Map 2).

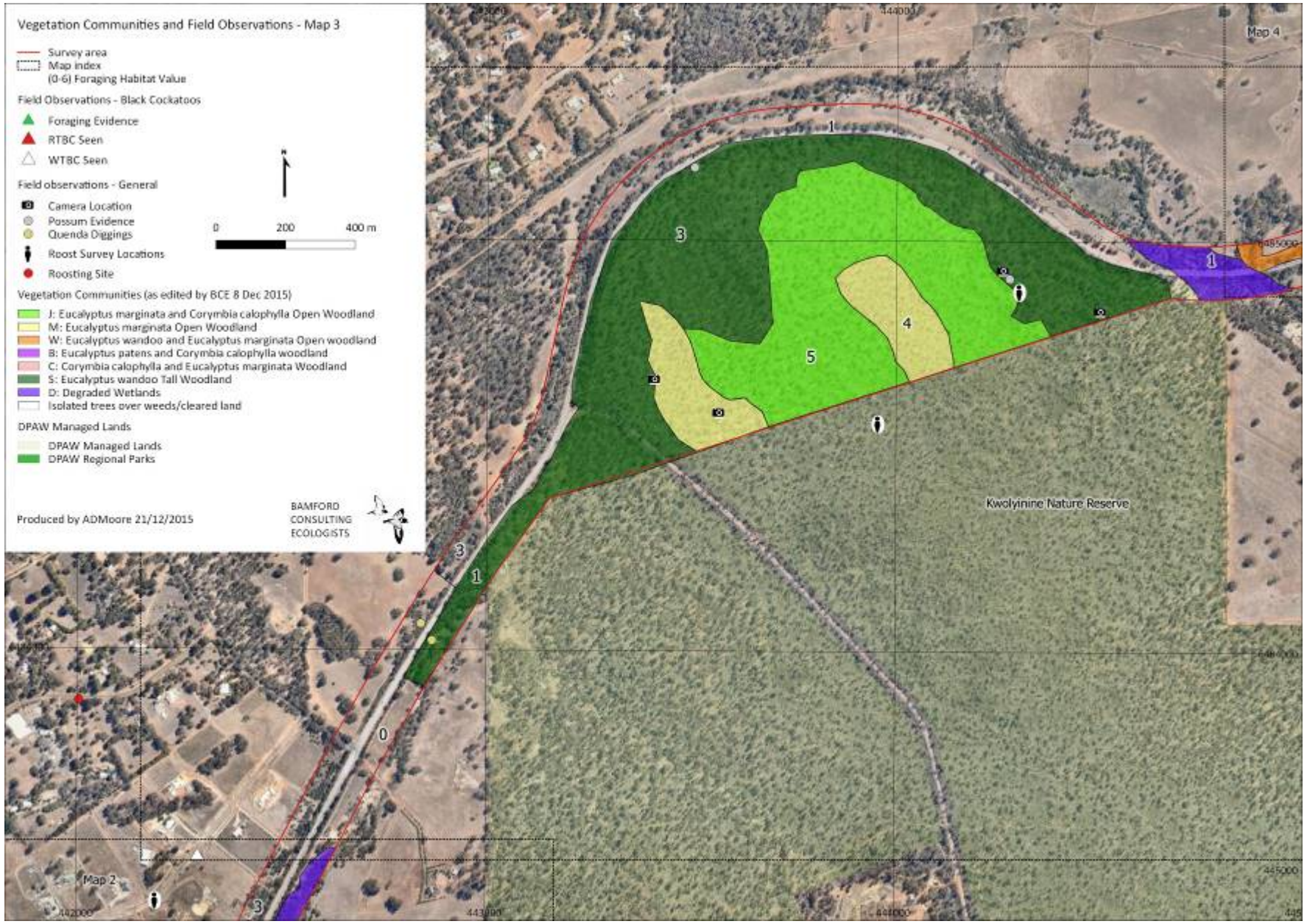


Figure 10. Black-Cockatoo foraging habitat value and field observations (Map 3).

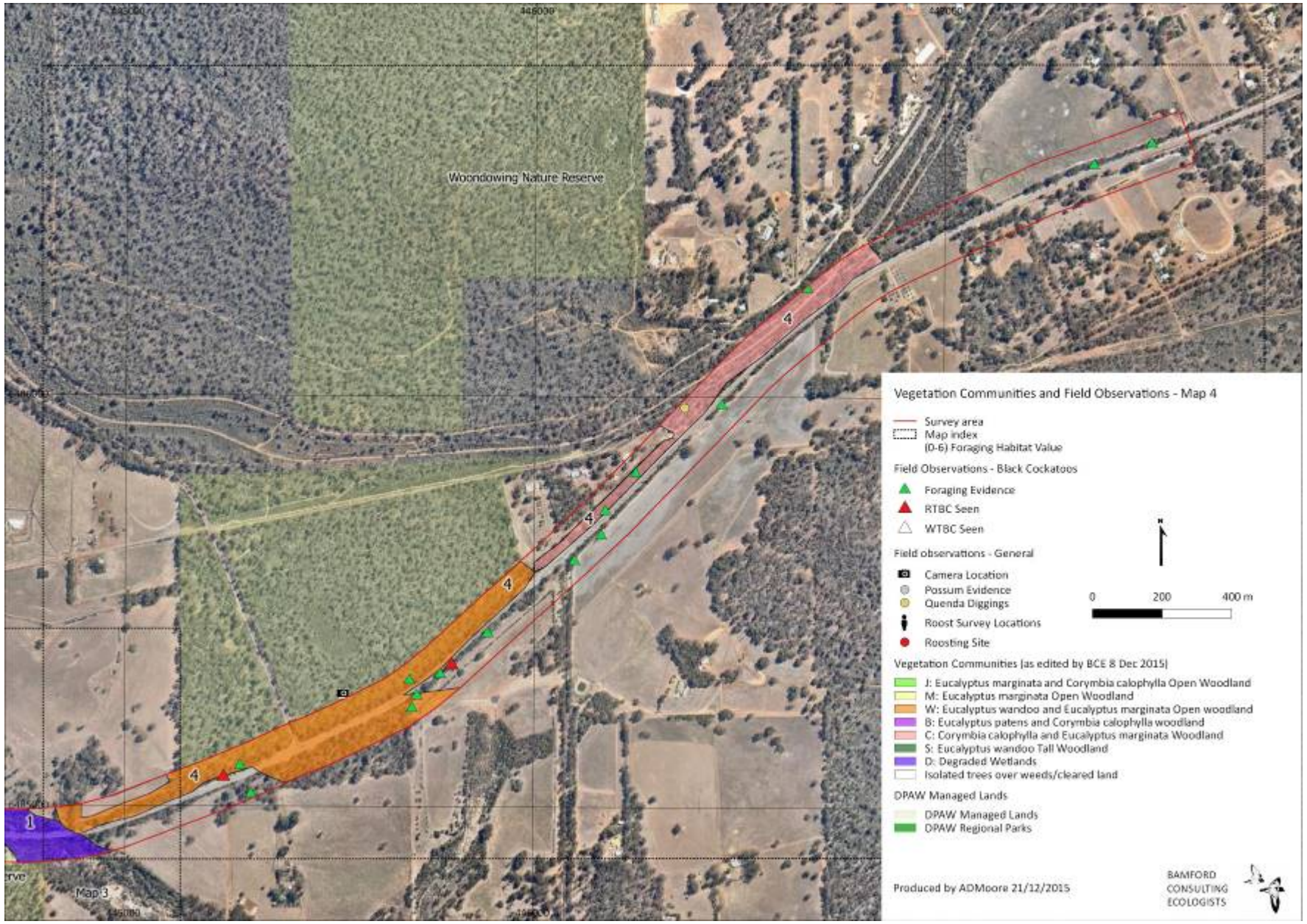


Figure 11. Black-Cockatoo foraging habitat value and field observations (Map 4).

4.4 Black-Cockatoo roosting survey

Three different sites were selected to observe roosting activity. The location of roost surveys and an identified roost site are shown in Figure 10. A group of 30 Black-Cockatoos (comprising of Carnaby's and Baudin's) was recorded at sunset flying over the highway (approximately 500 m south of Hawke Road) and roosting in small groups in several trees on Mairinger Way, Wundowie (50J 442004E, 6483875N). The roost site is located approximately 600 m west of the survey area (Figure 10). Two roost surveys were conducted in western and eastern parts of the Kwolyinine Nature Reserve (within the survey area) and yielded no result (Figure 10). No roost sites were identified from bird droppings under trees in the survey area. A roost site is also located approximately 600 m west of the survey area, near Hyde Drive Wundowie. This site has been monitored since 2010 as a part of the Great Cocky Count conducted by BirdLife Australia. In 2010, up to 125 White-tailed Black-Cockatoos (Carnaby's or Baudin's) were recorded, however none to very low numbers of cockatoos have been recorded between 2011 and 2014 (Finn *et al.* 2014).

4.5 Regional habitat analysis

Several conservation estates (i.e. Regional Parks and National Parks) occur in the region and provide critical foraging, breeding and roosting habitat for Black-Cockatoos. These include:

- Kwolyinine Nature Reserve, borders and situated in the survey area (570 ha);
- Keaginine Nature Reserve, borders and situated in the survey area (ca. 100 ha);
- Coates Reserve, adjacent to the survey area (ca. 90 ha);
- Woondowing Nature Reserve, borders and situated in the survey area (3,100 ha);
- Wooroloo Regional Park, 5 km south-west of the survey area (3,244 ha)
- Woottating Nature Reserve, 10 km south of the survey area (234 ha);
- Clackline Nature Reserve, 10 km north-east of the survey area (330 ha); and
- Avon Valley National Park, 15 km north-west of the survey area (4,800 ha).

At a regional level, the survey area is situated on the eastern edge of the Darling Scarp and borders several nature reserves (listed above). The reserves may be used by Black-Cockatoos as a stepping stone between larger forested areas to the south (Woottating Nature Reserve) and north (Avon Valley National Park) and most likely provide some connectivity role across the mostly cleared agricultural landscape (Figure 7). Birds may also forage in the area if migrating from the east (Northam and Toodyay area) to the west or between breeding grounds. However, further investigation would be required to fully understand migration patterns and usage by Black-Cockatoos. Carnaby's Black-Cockatoo is known to migrate west to higher rainfall areas following the breeding season (late winter to early summer). All three Black-Cockatoo species were recorded foraging in the survey area, and Carnaby's and Baudin's were observed roosting approximately 600m to the west. Earlier studies by Saunders (1980) show that birds will forage 1.4 km from the nest where food is abundant (7.1 km maximum; Coomaloo Creek) and 2.5 km from the nest where food is scarce (12.1 km maximum; Manmanning). On the basis of these data, it is therefore highly likely that if birds are breeding in adjacent nature reserves they will forage on vegetation within the survey area during this period.

The Woottating Nature Reserve is located approximately 10 km south of the survey area. This reserve is situated at the northern end of a large contiguous landscape dominated by *Corymbia* and *Eucalyptus* forest which extends down to the south coast and comprises of excellent opportunities for breeding, foraging and roosting for Black-Cockatoos. The survey area is situated in a fragmented landscape due to clearing for agriculture, although retains some remnant areas of native vegetation within a 5 km radius

of the site. It is unlikely that any upgrades to road infrastructure (i.e. bridges or road widening) will significantly exacerbate fragmentation and reduce landscape connectivity for the three Black-Cockatoo species. This is due to the availability of foraging, breeding and roosting habitat outside the survey area. Small remnant areas of native vegetation and single trees along the highway are not strategically located so that they contribute to landscape permeability. Furthermore, Black-Cockatoos are a strong-flying species known to cross large areas of open land to access feeding areas and water.

4.6 Summary of the use of the survey area by Black-Cockatoos

The three species of Black-Cockatoo are known to use the survey area for foraging and potentially roosting and breeding as summarised below.

Carnaby's Black-Cockatoo

Carnaby's Black-Cockatoo was recorded at three separate locations within the survey area (Section 4.1). Although suitable nest trees are present, no evidence was found that Carnaby's are breeding in the survey area, although the potential for breeding clearly exists both witin the survey area and in the local area. During the dusk roost surveys, a group of approximately 30 birds (comprising of Carnaby's and Baudin's Black-Cockatoos) was observed heading north of the survey area to roost in a group of trees approximately 600 m west of Great Eastern Highway near Mairinger Way, Wundowie. A considerable amount of foraging evidence (i.e. chewed Marri nuts) was observed in the field to suggest that the species is feeding regularly on vegetation within the survey area. Foraging evidence was recorded under trees situated very close to the highway, suggesting that noise and disturbance from vehicles does not deter birds from birds feeding on roadside trees. Carnaby's Black-Cockatoo is likely to be a breeding migrant to the area (Table 11).

Baudin's Black-Cockatoo

Baudin's Black-Cockatoo was recorded at three separate locations within the survey area (Section 4.1) and were often observed foraging and flying together with Carnaby's. Foraging evidence was recorded under several Marri trees during the survey; however, no nests or roosts were located in the survey area. Baudin's Black-Cockatoo is likely to be a breeding migrant to the area (Table 11).

Forest Red-tailed Black-Cockatoo

The Forest Red-tailed Black-Cockatoo was inconsistently encountered during the survey. It was recorded twice in the survey area, fours birds perched in a Wandoo tree and two birds flying over Great Eastern Highway. Foraging evidence (chewed Marri nuts) were found in the survey area. No roost sites were recorded at the time of the survey. Similar to the other Black-Cockatoo species, the Forest Red-tailed was not found to be breeding within the survey area, however may migrate to the survey area from adjacent areas during the breeding season. The Forest Red-tailed Black-Cockatoo is likely to be a foraging and roosting visitor to the area (Table 11).

Table 11. Summary of the use of the survey area by Black-Cockatoos.

+++ = considerable evidence/recorded. ++ = moderate evidence/likely. + = minor evidence/possible. - = no evidence/unlikely

Species	Recorded in the survey area	Activity		
		Foraging	Roosting	Breeding*
Carnaby's Black-Cockatoo	Yes	+++	+	+
Baudin's Black-Cockatoo	Yes	+++	+	+

Forest Red-tailed Black-Cockatoo	Yes	++	+	+

*Minor evidence of breeding includes the availability of potential nest hollows/trees, thus possible for Black-Cockatoos to breed in the survey area.

In summary, the following key observations were made from the Black-Cockatoo habitat assessment:

- **Species presence**: All three species were recorded (seen and heard) in the survey area. Old and new foraging evidence comprising of mostly chewed Marri nuts was recorded throughout the survey area for the three Black-Cockatoo species (Section 4.1);
- **Breeding habitat**: No active breeding nest sites were found although suitable breeding habitat is available within and outside the survey area. It is unknown if birds are breeding in adjacent areas. The density of all potential nest trees recorded (1029 trees) within the road survey area was 7.8 trees/ha. Only 54 trees (5%) with apparently suitable hollows but no chew marks (Class 3) were recorded. Trees in this Class may be the best indicator of nest hollow ”stock” in the survey area and occur at a mean density of 0.4 trees/ha . A further 54 trees (5%) were recorded in Class 4 (trees with large hollows or broken branches that might contain hollows but are not vertical or near-vertical). Of the 108 hollow bearing trees inspected, 13 were occupied by nesting galahs, smaller parrots, corellas and bees suggesting there is some competition for nest hollows (Section 4.2);
- **Foraging habitat**: Most important are the vegetation communities that contain key foraging species for Black-Cockatoos (i.e. those that contain high denisties of Marri, Jarrah or Blackbutt Woodland over Banksia). A large part of the survey area consists of isolated or clumps of Marri, Wandoo, Jarrah and Blackbutt (in paddocks over weeds, cleared land or agricultural crops) and ranges from negligible to moderate foraging value for Black-Cockatoos. There are also several patches of remnant vegetation in the survey area where a nature reserve abuts the highway roadside (i.e. Kwolyinine and Woondowing Nature Reserves). The vegetation in these reserves provide a moderate to high foraging value resource (including breeding and roosting habitat) for Black-Cockatoos. Similar foraging habitat is available outside the survey area (Section 4.3);
- **Roosting habitat**: No Black-Cockatoos were observed roosting in the survey area, but a roost site was recorded 600m west of the survey area at Mairinger Way, Wundowie (Section 4.4);
- **Regional habitat analysis**: Birds breeding in the region are likely to forage within the survey area. The survey area is situated in a fragmented landscape due to clearing for agriculture, although retains some remnant areas of native vegetation within a 5-10 km radius of the site. It is unlikely that any upgrades to road infrastructure (i.e. bridges or road widening) will significantly exacerbate fragmentation and reduce landscape connectivity for the three Black-Cockatoo species, due to the availability of foraging, breeding and roosting habitat outside the survey area (Section 4.5); and
- **Use of the survey area by Black-Cockatoos**: Carnaby’s and Baudin’s Black-Cockatoos are likely to be breeding migrants to the area. The Forest Red-tailed Black-Cockatoo is likely to be a foraging visitor to the area (Section 4.6).

The impact on foraging, breeding and roosting habitat can be minimised through avoidance strategies and mitigation measures outlined in Section 8.

5 Other fauna observations

5.1 Opportunistic fauna observations

Opportunistic fauna observations (e.g. birds, reptiles and mammals) were recorded during the survey with a list of such records provided in Appendix 2. A total of 44 species was recorded comprising of 33 birds, six mammals, four reptiles and one frog species. Of these, two mammal species are of interest: the Quenda *Isoodon obesulus* (listed as Priority 5, DPaW) and the Brush-tailed Possum. Old and fresh Quenda foraging signs were recorded at four locations within the survey area (Figures 8, 10 and 11, Plate 2).

Signs of Brush-tailed Possums were recorded on tree trunks within the survey area (located within the Kwolyinine Nature Reserve) (Figure 10, Plate 3). A Brush-tailed Possum was also recorded in the same area by a motion sensitive camera (Section 5.2). Evidence of several introduced species such as the European Red Fox and Rabbit was observed in the survey area. Bird species recorded during the survey are listed in Appendix 2.

Plate 2. Fresh Quenda digging

Plate 3. Possum scratch marks recorded on a Wandoo tree (Kwolyinine Nature Reserve).

5.2 Motion-sensitive camera survey

As discussed in Section 2.2.6, six motion sensitive infrared cameras were set up for seven nights (28th October – 4th November 2015) in various locations throughout the survey area. Camera survey effort was a total of 42 camera trap nights representing about 1008 hours of constant monitoring. Fauna species recorded from the motion sensitive cameras are provided in Table 12 and include four common native species (Western Grey Kangaroo, Brush-tailed Possum, Bobtail and Australian Ringneck Parrot, and two introduced species (Fox and Rabbit). Refer to plates 4 and 5. Locations (GPS coordinates) of motion sensitive cameras are provided in Table 5 and shown in Figures 8, 10 and 11.

Table 12. Motion sensitive camera locations.

Camera name	Camera nights	Vegetation type	Fauna records
Aud 9	7	Wandoo Woodland	-
Aud R1	7	Jarrah Woodland	Western Grey Kangaroo
Aud R2	7	Jarrah Woodland	Western Grey Kangaroo
Aud 8	7	Jarrah, Marri Woodland	Brush-tailed Possum, Bobtail, Fox and Australian Ringneck
Aud 5	7	Wandoo Woodland	Rabbit, Brush-tailed Possum
Aud 2	7	Wandoo, Jarrah Woodland	-

Plate 4. Brush-tailed Possum recorded in Wandoo Woodland (Kwolyinine Nature Reserve).

Plate 5. Fox recorded in Wandoo Woodland (Kwolyinine Nature Reserve).

References

AWC (2013). Karakamia Wildlife Sanctuary Species List. Available online at: http://www.australianwildlife.org/sanctuaries/karakamia-sanctuary.aspx (accessed September 2015).

Barrett, G., Silcocks, A., Barry, S., Cunnningham, R. and Poulter, R. (2003). The New Atlas of Australian Birds. Royal Australasian Ornithologists Union, Melbourne.

Beard, J. (1979). The vegetation of the Perth area, Western Australia: map and explanatory memoir, 1:250,000 series. Vegmap Publications, Perth.

Beard, J. (1990). Plant Life of Western Australia. Kangaroo Press, NSW.

BCE (2012). Fauna Assessment - Bindoon Bauxite Mining Proposal. Prepared for Bauxite Resources Limited by Bamford Consulting Ecologists.

BCE (2014). Targeted Qualitative Black-Cockatoo and Quenda Habitat Assessment. Holcim Gosnells Quarry and adjacent areas. Prepared for Holcim (Australia) Pty Ltd by Bamford Consulting Ecologists.

BCE (2015). Holcim Gosnells Quarry - Targeted Black-Cockatoo Habitat Assessment. Prepared for Holcim (Australia) Pty Ltd by Bamford Consulting Ecologists.

BirdLife Australia (2014). The 2014 Great Cocky Count: a community-based survey for Carnaby's Black-Cockatoos (*Calyptorhynchus latirostris*) and Forest Red-tailed Black-Cockatoos (*Calyptorhynchus banksia naso*). Available online at: http://birdlife.org.au/documents/CBC-2014GCC-Report.pdf (accessed September 2015).

BirdLife Australia (2015). Birdata Database. Available online at: www.birdata.com.au (accessed September 2015).

Blakers, M., Davies, S.J.J.F. and Reilly, P.N. (1984). The Atlas of Australian Birds. Royal Australasian Ornithologists Union. Melbourne University Press.

Calver, M., Lymbery, A., McComb, J. and Bamford, M. (2009). Environmental Biology. Cambridge University Press, Melbourne.

Christidis, L. and Boles, W. E. (2008). *Systematics and Taxonomy of Australian Birds*. CSIRO Publishing, Collingwood, Victoria.

Churchill, S. (2009). Australian Bats. Reed New Holland Press, Sydney.

Davies, S. J. J. F. (1966). The movements of the White-tailed Black-Cockatoos (*Calyptorhynchus baudinii*) in south-western Australia. The Western Australian Naturalist 10: 33-42.

Dell, J. and Banyard, J. (eds). (2000). Bush Forever. Vol. 2. Department of Environmental Protection, Perth.

DEWHA. (2010). Survey guidelines for Australia's threatened birds. Department of the Environment, Water, Heritage and the Arts, Canberra, Australia.

DotE (2013). Matters of National Environmental Significance. Significant impact guidelines 1.1. *Environment Protection and Biodiversity Conservation Act 1999*. Department of the Environment. Canberra, Australia.

DotE (2015a). EPBC Protected Matters Search Tool. Available online at: https://www.environment.gov.au/epbc/protected-matters-search-tool (accessed September 2015). Department of the Environment.

DotE (2015b). *Calyptorhynchus banksii naso* in Species Profile and Threats Database. Department of the Environment. http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

DotE (2015c). *Calyptorhynchus baudinii* in Species Profile and Threats Database. Department of the Environment. http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

DotE (2015d). *Calyptorhynchus latirostris* in Species Profile and Threats Database. Department of the Environment. http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Doughty, P. and Maryan, B. (2010a). Checklist of the Amphibians of Western Australia. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.

Doughty, P. and Maryan, B. (2010b). Checklist of the Reptiles of Western Australia. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.

DPaW (2013). Carnaby's Cockatoo (Calyptorhynchus latirostris) Recovery Plan October 2013. Prepared by the Department of Parks and Wildlife, Perth, Western Australia.

DPaW (2015). NatureMap Database. Available online at: http://naturemap.dec.wa.gov.au/default.aspx (accessed September 2015). Department of Parks and Wildlife, Perth, Western Australia.

DSEWPaC (2012). EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) *Calyptorhynchus latirostris*, Baudin's cockatoo (vulnerable) *Calyptorhynchus baudinii,* Forest red-tailed black cockatoo (vulnerable) *Calyptorhynchus banksii naso*. Department of Sustainability, Environment, Water, Population and Communities.

Environment Australia (2000). Revision of the Interim Biogeographic Regionalisation for Australia (IBRA) and Development of Version 5.1 - Summary Report. Environment Australia.

Environmental Protection Authority (2002). Terrestrial Biological surveys as an Element of Biodiversity Protection. Position Statement No. 3. Environmental Protection Authority, Perth, Western Australia.

EPA (2004). Guidance for the assessment of environmental factors: Terrestrial fauna surveys for environmental impact assessment in Western Australia. No. 56. Environmental Protection Authority, Perth, Western Australia.

EPA/DEC (2010). Technical Guide - Terrestrial Vertebrate Fauna surveys for Environmental Impact Assessment (eds B.M. Hyder, J. Dell and M.A Cowan). Environmental Protection Authority and Department of Environment and Conservation, Perth, Western Australia.

Finn, H., Barrett, G., Groom, C., Blythman, M., and Williams, M. (2014). The 2014 Great Cocky Count: a community based survey for Carnaby's Black-Cockatoos (*Calyptorhynchus latirostris*) and Forest Red-tailed Black-Cockatoos (*Calyptorhynchus banksii naso*).

Garnett, S.T., Szabo, J.K. and Dutson, G. (2011). The Action Plan for Australian Birds 2010. CSIRO Publishing, Melbourne.

Gibbons, P. and Lindenmayer, D. (2002). Tree Hollows and Wildlife Conservation in Australia. CSIRO Publishing, Collingwood, Victoria, Australia.

Government of Western Australia. (2014). 2014 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of June 2014. WA Department of Parks and Wildlife, Perth. Available at: https://www2.landgate.wa.gov.au/web/guest/downloader

Groom, C. (2011). Plants Used by Carnaby's Black Cockatoo. Department of Environment and Conservation, Perth, Western Australia.

Harvey, M. (2002). Short-range Endemism amongst the Australian fauna: examples from non-marine environments. *Invertebrate Systematics*, 16: 555-570.

Higgins, P. J. (Ed.) (1999). Handbook of Australian, New Zealand and Antarctic Birds. Volume 4: Parrots to Dollarbird. Oxford University Press, Melbourne, Australia.

How, R. A., Cooper, N. K. and Bannister, J. L. (2009). Checklist of the Mammals of Western Australia. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.

Johnstone, R. E. (2006). Going, going, gone! Veteran and stag trees: a valuable resource. Western Wildlife 10: 6

Johnstone, R. E. and Kirkby, T. (1999). Food of the Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* in south-west Western Australia. The Western Australian Naturalist 22: 167-177.

Johnstone, R. E. and Kirkby, T. (2008). Distribution, status, social organisation, movements and conservation of Baudin's Cockatoo (*Calyptorhynchus baudinii*) in South-west Western Australia. Records of the Western Australian Museum 25: 107-118.

Johnstone, R. E. and Kirkby, T. (2011). Muja to Wellstead Proposed Transmission Lines Targeted Black Cockatoo Assessment. Unpublished report prepared for URS on behalf of Western Power by the Western Australian Museum, Welshpool, Western Australia.

Johnston, R.E., Kirkby, T. and Sarti, K. (2010). Cockatoos calling. In: Endangered Black Cockatoos in Western Australia. Proceedings of a symposium about their biology, status, threats and efforts to restore their habitat and populations. Urban Bushland Council.

Johnstone, R. E. and Storr, G. M. (1998). Handbook of Western Australian birds. Volume 1: Nonpasserines (Emu to Dollarbird). Western Australian Museum, Perth, Western Australia.

Johnstone, R. E. and Storr, G. M. (2004). Handbook of Western Australian birds. Volume 2: Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth, Western Australia.

Kabat, T.J., Scott, R., Kabat, A.P. and Barrett, G. (2012). 2011 Great Cocky Count: Population estimates and identification of roost sites for Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*). BirdLife Australia, Perth, Western Australia.

Le Souef, A. (2012). Black Cockatoo (*Calyptorhynchus spp*.) Conservation in Western Australia: Developing and improving tools for the clinical evaluation and management of rehabilitated birds, PhD Thesis (currently under examination), Murdoch University.

Mace, G. and Stuart, S. (1994). Draft IUCN Red List Categories, Version 2.2.Species; Newsletter of the Species Survival Commission. IUCN - The World Conservation Union. No. 21-22: 13-24.

McKenzie, N. L., May, J. E. and McKenna, S. (2003). Bioregional Summary of the 2002 Biodiversity Audit for Western Australia. The National Land and Water Resources Audit and the Western Australian Department of Conservation and Land Management, Perth, Western Australia.

Menkhorst, P. and Knight, F. (2004). A Field Guide to the Mammals of Australia. Oxford University Press, South Melbourne.

Saunders, D. A. (1974). Breeding biology of the Short-billed form of the White-tailed Black Cockatoo *Calyptorhynchus baudinii latirostris* (Carnaby). Emu 74: 292-293.

Saunders, D. A. (1979a). The availability of tree hollows for use as nest sites by White-tailed Black Cockatoos. Australian Wildlife Research 6: 205-216.

Saunders, D. A. (1979b). Distribution and taxonomy of the White-tailed and Yellow-tailed Black-Cockatoos *Calyptorhynchus spp*. Emu 79.

Saunders, D. A. (1980). Food and movements of the short-billed form of the White-tailed Black Cockatoo. Australian Wildlife Research 7: 257-269.

Saunders, D. A. (1986). Breeding season, nestling success and nestling growth in Carnaby's Black-Cockatoo, *Calyptorhynchus funereus latirostris*, over 16 years at Coomallo Creek, and a method for assessing the viability of populations in other areas. Australian Wildlife Research 13: 261-273.

Saunders, D. A., Smith, G. T. and Rowley, I. (1982). The availability and dimensions of tree hollows that provide nest sites for cockatoos (Psittaciformes) in Western Australia. Australian Wildlife Research 9: 541-556.

Shepherd, D. P., Beeston, G. R. and Hopkins, A. J. M. (2001). Native Vegetation in Western Australia: Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Government of Western Australia.

Strahan, R. (Ed.) (1995). The Mammals of Australia. Reed Books, Chatswood, New South Wales, Australia.

Storr, G. M., Smith, L. A. and Johnstone, R. E. (1983). Lizards of Western Australia. II. Dragons and Monitors. Western Australian Museum, Perth, Western Australia.

Storr, G. M., Smith, L. A. and Johnstone, R. E. (1990). Lizards of Western Australia. III. Geckoes and Pygopods. Western Australian Museum, Perth, Western Australia.

Storr, G. M., Smith, L. A. and Johnstone, R. E. (1999). Lizards of Western Australia. I. Skinks. Western Australian Museum, Perth, Western Australia.

Storr, G. M., Smith, L. A. and Johnstone, R. E. (2002). Snakes of Western Australia. Western Australian Museum, Perth, Western Australia.

Terratree (2015). Flora and Vegetation Assessment. – *Need reference from Terratree/Main Roads.*

Tyler, M.J. and Doughty, P. (2009). Field Guide to Frogs of Western Australia (Fourth Edition). Western Australian Museum.

Wilson, S. and Swan, G. (2010). A Complete Guide to Reptiles of Australia. New Holland Publishers Pty Ltd.

Thackway, R. and Cresswell, I.D. (1995) An Interim Biogeographic Regionalisation for Australia: A framework for establishing the national system of reserves, Version 4.0. Australian Nature Conservation Agency, Canberra.

Tyler, M.J. and Doughty, P. (2009). Field Guide to Frogs of Western Australia (Fourth Edition). Western Australian Museum.

WALGA (2015). Shire of Northam Local Biodiversity Strategy. Local Biodiversity Program. Western Australian Local Government Association.

Whitford, K. R. (2001). Dimensions of tree hollows used by birds and mammals in the jarrah forest: improving the dimensional description of potentially usable hollows. Calmscience 3: 499-511.

Whitford, K. R. (2002). Hollows in jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*) trees I. Hollow sizes, tree attributes and ages. Forest Ecology and Management 160: 201-214.

Whitford, K.R., Williams, M.R. (2002). Hollows in jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*) trees: II. Selecting trees to retain for hollow dependent fauna. *Forest Ecology and Management* 160: 215–232.

Williams, K. and Mitchell, D. (2001). Jarrah Forest 1 (JF1 – Northern Jarrah Forest subregion. In: A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions.

Appendices

Appendix 1. Species of conservation significance

Species of conservation significance are of special importance in impact assessment. The conservation status of fauna species in Australia is assessed under Commonwealth and State Acts such as the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Western Australian *Wildlife Conservation Act 1950* (Wildlife Conservation Act). In addition, the Western Australian Department of Parks and Wildlife (DPaW) recognises priority levels, while local populations of some species may be significant even if the species as a whole has no formal recognition. Therefore, three broad levels of conservation significance can be recognised and are used for the purposes of this report, and are outlined below.

Conservation Significance (CS) 1: Species listed under State or Commonwealth Acts.

Species listed under the EPBC Act are assigned to categories recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN) and reviewed by Mace and Stuart (1994), or are listed as migratory. Migratory species are recognised under international treaties such as the China Australia Migratory Bird Agreement (CAMBA), the Japan Australia Migratory Bird Agreement (JAMBA), the Republic of South Korea Australia Migratory Bird Agreement (ROKAMBA), and/or the Convention on the Conservation of Migratory Species of Wild Animals (CMS; also referred to as the Bonn Convention). The Wildlife Conservation Act uses a series of Schedules to classify status, but also recognizes the IUCN categories and ranks species within the Schedules using the categories of Mace and Stuart (1994).

Conservation Significance (CS) 2: Species listed as Priority by the DEC but not listed under State or Commonwealth Acts.

In Western Australia, the DPaW has produced a supplementary list of Priority Fauna, being species that are not considered threatened under the Wildlife Conservation Act but for which the DPaW feels there is cause for concern. Some Priority species are also assigned to the Conservation Dependent category of the IUCN.

Conservation Significance (CS) 3: Species not listed under Acts or in publications, but considered of at least local significance because of their pattern of distribution.

This level of significance has no legislative or published recognition and is based on interpretation of distribution information, but is used here as it may have links to preserving biodiversity at the genetic level (EPA 2002). If a population is isolated but a subset of a widespread (common) species, then it may not be recognised as threatened, but may have unique genetic characteristics. Conservation significance is applied to allow for the preservation of genetic richness at a population level, and not just at a species level. Species on the edge of their range, or that are sensitive to impacts such as habitat fragmentation, may also be classed as CS3, as may colonies of waterbirds. The Western Australian Department of Environmental Protection, now DPaW, used this sort of interpretation to identify significant bird species in the Perth metropolitan area as part of the Perth Bushplan (Dell and Banyard 2000).

Invertebrate species considered to be short range endemics (SREs) also fall within the CS3 category, as they have no legislative or published recognition and their significance is based on interpretation of distribution information. Harvey (2002) notes that the majority of species that have been classified as short-range endemics have common life history characteristics such as poor powers of dispersal or confinement to discontinuous habitats. Several groups, therefore, have particularly high instances of short-range endemic species: Gastropoda (snails and slugs), Oligochaeta (earthworms), Onychophora (velvet worms), Araneae (mygalomorph spiders), Pseudoscorpionida (pseudoscorpions), Schizomida (schizomids), Diplopoda (millipedes), Phreatoicidea (phreatoicidean crustaceans), and Decapoda (freshwater crayfish). The poor understanding of the taxonomy of many of the short-range endemic species hinders their conservation (Harvey 2002).

Introduced species

In addition to these conservation levels, species that have been introduced (INT) are indicated throughout the report. Introduced species may be important to the native fauna assemblage through effects by predation and/or competition.

Categories used in the assessment of conservation status.

IUCN categories (based on review by Mace and Stuart 1994) as used for the *Environment Protection and Biodiversity Conservation Act 1999* and the Western Australian *Wildlife Conservation Act 1950*.

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

Schedules used in the WA *Wildlife Conservation Act 1950*

Schedule 1	Rare and Likely to become Extinct.
Schedule 2	Extinct.
Schedule 3	Migratory species listed under international treaties.

Schedule 4	Other Specially Protected Fauna

WA Department of Parks and Wildlife Priority species (species not listed under the *Wildlife Conservation Act 1950*, but for which there is some concern).

Priority 1	Taxa with few, poorly known populations on threatened lands.
Priority 2	Taxa with few, poorly known populations on conservation lands; or taxa with several, poorly known populations not on conservation lands.
Priority 3	Taxa with several, poorly known populations, some on conservation lands.
Priority 4.	Taxa in need of monitoring. Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change.
Priority 5	Taxa in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years (IUCN Conservation Dependent).

Appendix 2. Opportunistic sightings within the survey area.

Species	Scientific name	Conservation significance	Comments
Frogs			
Quacking Frog	*Crinia georgiana*		Heard calling
Reptiles			
Skink	*Cryptoblepharus buchananii*		
Bobtail	*Tiliqua rugosa*		
Gould's Goanna	*Varanus gouldi*		
Dugite	*Pseudonaja affinis*		
Mammals			
Western Grey Kangaroo	*Macropus fuliginosus*		
Echidna	*Tachyglossus aculeatus*		Diggings
Quenda	*Isoodon obesulus fusciventer*	Priority 5 (DPaW)	Diggings (old and fresh)
Brush-tailed Possum	*Trichosurus vulpecula*		Tree scratching
Rabbit	*Oryctolagus cuniculus*	Introduced species	Diggings, scats
European Red Fox	*Vulpes vulpes*	Introduced species	Hole
Birds			
Grey Teal	*Anas gracilis*		
Pacific Black Duck	*Anas superciliosa*		
Australian Wood Duck	*Chenonetta jubata*		
Australian Shelduck	*Tadorna tadornoides*		
Wedge-tailed Eagle	*Aquila audax*		
Nankeen Kestrel	*Falco cenchroides*		
Galah	*Cacatua roseicapillus*		
Little Corella	*Cacatua sanguinea*		
Red-tailed Black-Cockatoo	*Calyptorhynchus banksii naso*	V, S1	
Baudin's Black-Cockatoo	*Calyptorhynchus baudinii*	V, S1	
Carnaby's Black-Cockatoo	*Calyptorhynchus latirostris*	E, S1	
Australian Ringneck	*Platycercus zonarius*		
Red-capped Parrot	*Purpureicephalus spurius*		
Laughing Kookaburra	*Dacelo novaeguineae*	Introduced species	
Sacred Kingfisher	*Todiramphus sanctus*		
Splendid Fairy-wren	*Malurus splendens*		
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*		
Western Thornbill	*Acanthiza inornata*		
Western Gerygone	*Gerygone fusca*		
Weebill	*Smicrornis brevirostris*		
Striated Pardalote	*Pardalotus striatus*		
Western Wattlebird	*Anthochaera lunulata*		
Tawny-crowned Honeyeater	*Glyciphila melanops*		
Brown Honeyeater	*Lichmera indistincta*		
White-winged Triller	*Lalage sueurii*		
Grey Shrike-thrush	*Colluricincla harmonica*		
Rufous Whistler	*Pachycephala rufiventris*		
Australian Magpie	*Cracticus tibicen*		

Species	Scientific name	Conservation significance	Comments
Magpie-lark	*Grallina cyanoleuca*		
Grey Fantail	*Rhipidura albiscapa*		
Australian Raven	*Corvus coronoides*		
Silvereye	*Zosterops lateralis*		
Tree Martin	*Petrochelidon nigricans*		

Appendix 3. Fauna species expected to occur in the survey area.

These lists are derived from the results of database and literature searches and from previous field surveys conducted in the area. Results do not include returned marine species. Abbreviations as follows:

- CS = Conservation Status (see Appendix 1);
- N = Naturemap Database, searched September 2015;
- EPBC = EPBC Protected Matters Search, searched September 2015;
- BA = Birdlife Australia's Birdata database, searched September 2015;
- AWC – Australian Wildlife Conservancy, fauna surveys and monitoring at Karakamia Wildlife Sanctuary, located approximately 10 km west of the survey area; and
- GEH = Great Eastern Highway, this survey conducted in October 2015.

Frogs species expected to occur in the survey area.

FROGS		CS	N	EPBC	AWC	GEH
HYLIDAE						
Slender Tree Frog	*Litoria adelaidensis*		X		X	
Motorbike Frog	*Litoria moorei*		X		X	
LIMNODYNASTIDAE						
Western Banjo Frog	*Limnodynastes dorsalis*		X		X	
MYOBATRACHIDAE						
Quacking Frog	*Crinia georgiana*		X		X	X
Clicking Frog	*Crinia glauerti*		X		X	
Bleating Froglet	*Crinia pseudinsignifera*		X		X	
Ticking Frog	*Geocrinia leai*		X		X	
Western Spotted Frog	*Heleioporus albopunctatus*		X			
Hooting Frog	*Heleioporus barycragus*		X		X	
Moaning Frog	*Heleioporus eyrei*		X			
Whooping Frog	*Heleioporus inornatus*		X			
Sand Frog	*Heleioporus psammophilus*		X			
Humming Frog	*Neobatrachus pelobatoides*		X			
Crawling Toadlet	*Pseudophryne guentheri*		X		X	
Total Number of Species Expected:	**14**	**0**	**14**	**0**	**9**	**1**

Reptile species expected to occur in the survey area.

Common Name	Species Name	CS	N	EPBC	AWC	GEH
CHELIDAE						
Oblong Turtle	*Chelodina colliei*				X	
AGAMIDAE						
Ornate Crevice-Dragon	*Ctenophorus ornatus*		X			
Bearded Dragon	*Pogona minor*		X		X	
CARPHODACTYLIDAE						
Barking Gecko	*Underwoodisaurus milii*		X		X	
DIPLODACTYLIDAE						
	Diplodactylus granariensis		X			

Common Name	Species Name	CS	N	EPBC	AWC	GEH
Speckled Stone Gecko	*Diplodactylus lateroides*		X			
	Diplodactylus polyophthalmus		X		X	
	Diplodactylus pulcher		X			
	Hesperoedura reticulata		X			
GEKKONIDAE						
Marbled Gecko	*Christinus marmoratus*		X		X	
Clawless Gecko	*Crenadactylus ocellatus*		X		X	
	Gehyra variegata		X		X	
PYGOPODIDAE						
	Aprasia pulchella		X		X	
	Aprasia repens		X			
Fraser's Legless Lizard	*Delma fraseri*		X		X	
	Lialis burtonis		X		X	
Common Scaly Foot	*Pygopus lepidopodus*		X		X	
SCINCIDAE						
	Acritoscincus trilineatus		X		X	
	Cryptoblepharus buchananii		X		X	X
	Ctenotus delli	P4	X			
	Ctenotus labillardieri		X		X	
King's Skink	*Egernia kingii*		X		X	
	Egernia napoleonis		X		X	
Broad-banded Sand Swimmer	*Eremiascincus richardsonii*		X		X	
	Hemiergis initialis		X		X	
	Hemiergis quadrilineata		X			
	Lerista distinguenda		X		X	
Bull Skink	*Liopholis multiscutata*		X			
	Menetia greyii		X		X	
	Morethia lineoocellata				X	
	Morethia obscura		X		X	
Bobtail Lizard	*Tiliqua rugosa*		X		X	X
TYPHLOPIDAE						
	Ramphotyphlops australis				X	
	Ramphotyphlops pinguis				X	
VARANIDAE						
Bungarra	*Varanus gouldii*		X		X	X
Racehorse Monitor	*Varanus tristis*		X		X	
BOIDAE						
Stimson's Python	*Antaresia stimsoni stimsoni*		X			
Carpet Python	*Morelia spilota*	S4	X		X	
ELAPIDAE						
Southern Death Adder	*Acanthophis antarcticus*	P3	X			
	Brachyurophis semifasciatus		X		X	
Black-naped Snake	*Neelaps bimaculatus*		X			
Tiger Snake	*Notechis scutatus*		X		X	
	Parasuta gouldii		X		X	
	Parasuta nigriceps		X			
Mulga Snake	*Pseudechis australis*		X			
Dugite	*Pseudonaja affinis*		X		X	X

Common Name	Species Name	CS	N	EPBC	AWC	GEH
Western Brown Snake	*Pseudonaja mengdeni*		X			
Ringed Brown Snake	*Pseudonaja modesta*		X			
Jan's Banded Snake	*Simoselaps bertholdi*		X			
Total Number of Species Expected:	**49**	**CS: 3**	**45**	**0**	**32**	**4**

Bird species expected to occur in the survey area.

BIRDS		CS	N	EPBC	BA	AWC	GEH
CASUARIIDAE							
Emu	*Dromaius novaehollandiae*		X		X		
PHASIANIDAE							
Stubble Quail	*Coturnix pectoralis*		X		X	X	
ANATIDAE							
Grey Teal	*Anas gracilis*		X		X	X	X
Pacific Black Duck	*Anas superciliosa*		X		X	X	X
Hardhead	*Aythya australis*		X		X	X	
Australian Wood Duck	*Chenonetta jubata*		X		X	X	X
Australian Shelduck	*Tadorna tadornoides*		X		X	X	X
PODICIPEDIDAE							
Hoary-headed Grebe	*Poliocephalus poliocephalus*		X		X		
Australasian Grebe	*Tachybaptus novaehollandiae*		X		X	X	
COLUMBIDAE							
Rock Dove	*Columba livia*	Int.	X	X	X		
Crested Pigeon	*Ocyphaps lophotes*		X		X	X	
Common Bronzewing	*Phaps chalcoptera*		X		X	X	
Brush Bronzewing	*Phaps elegans*		X		X	X	
Spotted Dove	*Streptopelia chinensis*	Int.	X	X	X		
Laughing Dove	*Streptopelia senegalensis*	Int.	X	X	X		
PODARGIDAE							
Tawny Frogmouth	*Podargus strigoides*		X		X	X	
CAPRIMULGIDAE							
Spotted Nightjar	*Eurostopodus argus*		X		X		
AEGOTHELIDAE							
Australian Owlet-nightjar	*Aegotheles cristatus*		X		X	X	
APODIDAE							
Fork-tailed Swift	*Apus pacificus*	M S3		X	X	X	
PHALACROCORACIDAE							
Little Pied Cormorant	*Microcarbo melanoleucos*				X	X	
ARDEIDAE							
Eastern Great Egret	*Ardea modesta*	M S3	X	X	X	X	
White-necked Heron	*Ardea pacifica*		X		X	X	
White-faced Heron	*Egretta novaehollandiae*				X	X	
Nankeen Night-Heron	*Nycticorax caledonicus*		X		X	X	
THRESKIORNITHIDAE							
Yellow-billed Spoonbill	*Platalea flavipes*		X		X	X	
Glossy Ibis	*Plegadis falcinellus*	M S3			X		
Australian White Ibis	*Threskiornis molucca*		X		X	X	

BIRDS		CS	N	EPBC	BA	AWC	GEH
Straw-necked Ibis	*Threskiornis spinicollis*		X		X	X	
ACCIPITRIDAE							
Collared Sparrowhawk	*Accipiter cirrocephalus*		X		X	X	
Brown Goshawk	*Accipiter fasciatus*		X		X	X	
Wedge-tailed Eagle	*Aquila audax*		X		X	X	X
Swamp Harrier	*Circus approximans*		X		X		
Spotted Harrier	*Circus assimilis*		X		X		
Black-shouldered Kite	*Elanus axillaris*		X		X	X	
Whistling Kite	*Haliastur sphenurus*		X		X	X	
Little Eagle	*Hieraaetus morphnoides*		X		X	X	
Square-tailed Kite	*Lophoictinia isura*				X	X	
FALCONIDAE							
Brown Falcon	*Falco berigora*		X		X	X	
Nankeen Kestrel	*Falco cenchroides*		X		X	X	X
Australian Hobby	*Falco longipennis*		X		X	X	
Peregrine Falcon	*Falco peregrinus*	S4	X		X	X	
RALLIDAE							
Eurasian Coot	*Fulica atra*		X		X	X	
Dusky Moorhen	*Gallinula tenebrosa*		X		X	X	
Buff-banded Rail	*Gallirallus philippensis*		X		X	X	
Purple Swamphen	*Porphyrio porphyrio*		X		X	X	
Baillon's Crake	*Porzana pusilla*				X		
Spotless Crake	*Porzana tabuensis*				X	X	
Black-tailed Native-hen	*Tribonyx ventralis*		X		X		
OTIDIDAE							
Australian Bustard	*Ardeotis australis*				X		
BURHINIDAE							
Bush Stone-curlew	*Burhinus grallarius*	CS3	X		X		
RECURVIROSTRIDAE							
Black-winged Stilt	*Himantopus himantopus*		X		X	X	
CHARADRIIDAE							
Black-fronted Dotterel	*Elseyornis melanops*				X	X	
Red-kneed Dotterel	*Erythrogonys cinctus*				X		
Banded Lapwing	*Vanellus tricolor*		X		X	X	
TURNICIDAE							
Painted Button-quail	*Turnix varius*		X		X	X	
Little Button-quail	*Turnix velox*		X		X	X	
CACATUIDAE							
Western Corella	*Cacatua pastinator*	V S4 (pastinator subsp. only)	X		X		
Galah	*Cacatua roseicapillus*		X		X	X	X
Little Corella	*Cacatua sanguinea*		X		X		X
Long-billed Corella	*Cacatua tenuirostris*	Int.	X		X		
Red-tailed Black-Cockatoo	*Calyptorhynchus banksii naso*	V S1	X	X	X	X	X
Baudin's Black-Cockatoo	*Calyptorhynchus baudinii*	V S1	X	X	X	X	X
Carnaby's Black-Cockatoo	*Calyptorhynchus latirostris*	E S1	X	X	X	X	X
PSITTACIDAE							

BIRDS		CS	N	EPBC	BA	AWC	GEH
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*		X		X	X	
Elegant Parrot	*Neophema elegans*		X		X	X	
Western Rosella	*Platycercus icterotis*	P4 (xanthogenys supsp. only)	X		X	X	
Australian Ringneck	*Platycercus zonarius*		X		X	X	X
Regent Parrot	*Polytelis anthopeplus*				X		
Mulga Parrot	*Psephotus varius*				X		
Red-capped Parrot	*Purpureicephalus spurius*		X		X	X	X
Rainbow Lorikeet	*Trichoglossus haematodus*	Int.	X		X	X	
CUCULIDAE							
Fan-tailed Cuckoo	*Cacomantis flabelliformis*		X		X	X	
Pallid Cuckoo	*Cacomantis pallidus*		X		X	X	
Horsfield's Bronze-Cuckoo	*Chalcites basalis*		X		X		
Shining Bronze-Cuckoo	*Chalcites lucidus*		X		X	X	
Black-eared Cuckoo	*Chalcites osculans*				X		
STRIGIDAE							
Barking Owl	*Ninox connivens*	P2			X	X	
Southern Boobook	*Ninox novaeseelandiae*		X		X	X	
TYTONIDAE							
Barn Owl	*Tyto alba*		X		X	X	
Masked Owl	*Tyto novaehollandiae*	P3	X			X	
HALYCONIDAE							
Laughing Kookaburra	*Dacelo novaeguineae*	Int.	X		X	X	X
ALCEDINIDAE							
Red-backed Kingfisher	*Todiramphus pyrrhopygius*				X		
Sacred Kingfisher	*Todiramphus sanctus*		X		X	X	X
MEROPIDAE							
Rainbow Bee-eater	*Merops ornatus*	M S3	X	X	X	X	
CLIMACTERIDAE							
Rufous Treecreeper	*Climacteris rufa*		X		X	X	
MALURIDAE							
Red-winged Fairy-wren	*Malurus elegans*		X		X		
Variegated Fairy-wren	*Malurus lamberti*				X		
White-winged Fairy-wren	*Malurus leucopterus*				X		
Splendid Fairy-wren	*Malurus splendens*		X		X	X	X
Blue-breasted Fairy-wren	*Malurus pulcherrimus*				X		
ACANTHIZIDAE							
Inland Thornbill	*Acanthiza apicalis*		X		X	X	
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*		X		X	X	X
Western Thornbill	*Acanthiza inornata*		X		X	X	X
Western Gerygone	*Gerygone fusca*		X		X	X	X
White-browed Scrubwren	*Sericornis frontalis*		X		X	X	
Weebill	*Smicrornis brevirostris*		X		X	X	X
PARDAOTIDAE							
Spotted Pardalote	*Pardalotus punctatus*		X		X	X	
Striated Pardalote	*Pardalotus striatus*		X		X	X	X
MELIPHAGIDAE							

BIRDS		CS	N	EPBC	BA	AWC	GEH
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*		X		X		
Western Spinebill	*Acanthorhynchus superciliosus*		X		X	X	
Red Wattlebird	*Anthochaera carunculata*		X		X	X	
Western Wattlebird	*Anthochaera lunulata*		X		X	X	X
White-fronted Chat	*Epthianura albifrons*		X		X		
Crimson Chat	*Epthianura tricolor*		X		X		
Tawny-crowned Honeyeater	*Glyciphila melanops*		X		X	X	X
White-eared Honeyeater	*Lichenostomus leucotis*		X		X		
Singing Honeyeater	*Lichenostomus virescens*		X		X	X	
Brown Honeyeater	*Lichmera indistincta*		X		X	X	X
Yellow-throated Miner	*Manorina flavigula*		X		X		
Brown-headed Honeyeater	*Melithreptus brevirostris*		X		X	X	
Gilbert's Honeyeater	*Melithreptus chloropsis*		X		X	X	
White-cheeked Honeyeater	*Phylidonyris niger*		X		X	X	
New Holland Honeyeater	*Phylidonyris novaehollandiae*		X		X	X	
Yellow-plumed Honeyeater	*Ptilotula ornatus*		X		X	X	
POMATOSTOMIDAE							
White-browed Babbler	*Pomatostomus superciliosus*		X		X		
NEOSITTIDAE							
Varied Sittella	*Daphoenositta chrysoptera*		X		X	X	
CAMPEPHAGIDAE							
Ground Cuckoo-shrike	*Coracina maxima*		X				
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*		X		X	X	
White-winged Triller	*Lalage sueurii*				X	X	X
PACHYCEPHALIDAE							
Grey Shrike-thrush	*Colluricincla harmonica*		X		X	X	X
Crested Shrike-tit	*Falcunculus frontatus*	CS3	X		X		
Crested Bellbird	*Oreoica gutturalis*				X		
Western Whistler	*Pachycephala occidentalis*		X		X	X	
Rufous Whistler	*Pachycephala rufiventris*		X		X	X	X
ARTAMIDAE							
Black-faced Woodswallow	*Artamus cinereus*		X		X	X	
Dusky Woodswallow	*Artamus cyanopterus*		X		X	X	
Masked Woodswallow	*Artamus personatus*		X		X	X	
Pied Butcherbird	*Cracticus nigrogularis*		X		X	X	
Australian Magpie	*Cracticus tibicen*		X		X	X	X
Grey Butcherbird	*Cracticus torquatus*		X		X	X	
Grey Currawong	*Strepera versicolor*		X		X	X	
DICRURIDAE							
Magpie-lark	*Grallina cyanoleuca*		X		X	X	X
Restless Flycatcher	*Myiagra inquieta*		X		X	X	
Grey Fantail	*Rhipidura albiscapa*		X		X	X	X
Willie Wagtail	*Rhipidura leucophrys*		X		X	X	

BIRDS		CS	N	EPBC	BA	AWC	GEH
CORVIDAE							
Little Crow	*Corvus bennetti*		X		X		
Australian Raven	*Corvus coronoides*		X		X	X	X
PETROICIDAE							
White-breasted Robin	*Eopsaltria georgiana*		X		X		
Western Yellow Robin	*Eopsaltria griseogularis*				X	X	
Hooded Robin	*Melanodryas cucullata*				X		
Jacky Winter	*Microeca fascinans*		X		X	X	
Red-capped Robin	*Petroica goodenovii*		X		X	X	
Scarlet Robin	*Petroica multicolor*		X		X	X	
SYLVIDAE							
Australian Reed-Warbler	*Acrocephalus australis*		X		X	X	
Little Grassbird	*Megalurus gramineus*		X		X	X	
ALAUDIDAE							
Brown Songlark	*Cincloramphus cruralis*		X		X	X	
Rufous Songlark	*Cincloramphus mathewsi*		X		X	X	
ZOSTEROPIDAE							
Silvereye	*Zosterops lateralis*		X		X	X	X
HIRUNDINIDAE							
White-backed Swallow	*Cheramoeca leucosterna*				X		
Welcome Swallow	*Hirundo neoxena*		X		X	X	
Fairy Martin	*Petrochelidon ariel*				X		
Tree Martin	*Petrochelidon nigricans*		X		X	X	X
DICAEIDAE							
Mistletoebird	*Dicaeum hirundinaceum*		X		X	X	
PASSERIDAE							
Red-browed Finch	*Neochmia temporalis*	Int.			X		
Red-eared Firetail	*Stagonopleura oculata*				X		
Zebra Finch	*Taeniopygia guttata*				X		
MOTACILLIDAE							
Australasian Pipit	*Anthus novaeseelandiae*		X		X		
Total Number of Species Expected:	**157**	**CS:14 Int:7**	**130**	**9**	**155**	**113**	**33**

Mammal species expected to occur in the survey area.

MAMMALS		CS	N	EPBC	AWC	GEH
TACHYGLOSSIDAE						
Echidna	*Tachyglossus aculeatus*		X		X	X
DASYURIDAE						
Mardo	*Antechinus flavipes leucogaster*		X		X	
Chuditch	*Dasyurus geoffroii*	V S1	X	X	X	
Red-tailed Phascogale	*Phascogale calura*	E S1	X	X		
Brush-tailed Phascogale	*Phascogale tapoatafa*	CS3	X			
Little long-tailed Dunnart	*Sminthopsis dolichura*		X			
Gilbert's Dunnart	*Sminthopsis gilberti*		X			
Grey-bellied Dunnart	*Sminthopsis griseoventer*				X	
PERAMELIDAE						

MAMMALS		CS	N	EPBC	AWC	GEH
Quenda	*Isoodon obesulus fusciventer*	P5	X		X	X
PHALANGERIDAE						
Brush-tailed Possum	*Trichosurus vulpecula*		X		X	X
PSEUDOCHIERIDAE						
BURRAMYIDAE						
Western Pygmy Possum	*Cercartetus concinnus*		X		X	
TARSIPEDIDAE						
Honey Possum	*Tarsipes rostratus*		X			
MACROPODIDAE						
Western Grey Kangaroo	*Macropus fuliginosus*		X		X	X
Brush Wallaby	*Macropus irma*	P4	X		X	
Euro	*Macropus robustus*		X			
MOLLOSIDAE						
Southern Freetail Bat	*Mormopterus planiceps*	CS3	X			
White-striped Freetail-bat	*Tadarida australis*		X		X	
VESPERTILIONIDAE						
Gould's Wattled Bat	*Chalinolobus gouldii*		X		X	
Chocolate Wattled Bat	*Chalinolobus morio*		X			
Western Falsistrelle	*Falsistrellus mackenziei*	P4	X			
Lesser Long-eared Bat	*Nyctophilus geoffroyi*		X		X	
Inland Broad-nosed Bat	*Scotorepens balstoni*		X			
Southern Forest Bat	*Vespadelus regulus*		X		X	
MURIDAE						
Rakali or Water Rat	*Hydromys chrysogaster*	P4	X			
Moodit or Bush-Rat	*Rattus fuscipes*		X			
INTRODUCED MAMMALS						
Cattle	*Bos taurus*	Int.		X		
Dingo	*Canis lupus subsp. dingo*	Int.	X	X		
Goat	*Capra hircus*	Int.		X		
Fallow Deer	*Dama dama*	Int.	X			
Horse	*Equus caballus*	Int.	X			
Feral Cat	*Felis catus*	Int.	X	X		
House Mouse	*Mus musculus*	Int.	X	X		
Rabbit	*Oryctolagus cuniculus*	Int.	X	X		X
Brown Rat	*Rattus norvegicus*	Int.		X		
Black Rat	*Rattus rattus*	Int.	X	X		
Feral Pig	*Sus scrofa*	Int.	X	X		
European Red Fox	*Vulpes vulpes*	Int.	X	X		X
Total Number of Species Expected:	**37 (Native mammals:25)**	**CS:8 Int:12**	**33**	**12**	**13**	**6**

Appendix 4. Species returned from database searches but unlikely to occur in the survey area.

+: Unlikely to occur, vagrant only; and

*: Locally extinct.

SPECIES		CS	N	EPBC	BA	AWC
FROGS						
Turtle Frog	*Myobatrachus gouldii*		X			
REPTILES						
Western Swamp Tortoise	*Pseudemydura umbrina*	C S1		X		
Asian House Gecko	*Hemidactylus frenatus*	Int.		X		
Flowerpot Blind Snake	*Ramphotyphlops braminus*	Int.		X		
BIRDS						
Red Junglefowl	*Gallus gallus*	Int.	X			
Indian Peafowl	*Pavo cristatus*	Int.	X		X	
Malleefowl*	*Leipoa ocellata*	V S1	X	X		
Mute Swan	*Cygnus olor*	Int.		X	X	
Chestnut Teal+	*Anas castanea*		X		X	
Northern Mallard+	*Anas platyrhynchos*	Int.		X	X	
Australasian Shoveler+	*Anas rhynchotis*		X		X	
Musk Duck+	*Biziura lobata*		X		X	X
Black Swan+	*Cygnus atratus*		X		X	X
Wandering Whistling-Duck+	*Dendrocygna arcuata*				X	
Pink-eared Duck+	*Malacorhynchus membranaceus*		X		X	
Blue-billed Duck+	*Oxyura australis*	P4	X		X	X
Great Crested Grebe+	*Podiceps cristatus*		X		X	X
Diamond Dove+	*Geopelia cuneata*				X	
Australasian Darter+	*Anhinga novaehollandiae*				X	X
Great Cormorant+	*Phalacrocorax carbo*		X		X	X
Little Black Cormorant+	*Phalacrocorax sulcirostris*		X		X	X
Pied Cormorant+	*Phalacrocorax varius*				X	X
Australian Pelican+	*Pelecanus conspicillatus*		X		X	
Cattle Egret+	*Ardea ibis*	M S3		X		
Little Egret+	*Egretta garzetta*				X	
Royal Spoonbill+	*Platalea regia*				X	
Eastern Osprey+	*Pandion cristatus*	M		X		
Black Kite+	*Milvus migrans*		X		X	
Banded Stilt+	*Cladorhynchus leucocephalus*				X	X
Red-necked Avocet+	*Recurvirostra novaehollandiae*				X	
Red-capped Plover+	*Charadrius ruficapillus*				X	
Hooded Plover+	*Thinornis rubricollis*	P4		X		
Common Sandpiper+	*Actitis hypoleucos*	M S3	X		X	
Red-necked Stint+	*Calidris ruficollis*	M S3			X	
Common Greenshank+	*Tringa nebularia*	M S3	X			
Cockatiel+	*Nymphicus hollandicus*		X		X	
Budgerigar+	*Melopsittacus undulatus*		X		X	
Soft-plumaged Petrel	*Pterodroma mollis*		X			
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	S3		X		
Australian Painted Snipe	*Rostratula australis*	E S3		X	X	

SPECIES		CS	N	EPBC	BA	AWC
Silver Gull	*Chroicocephalus novaehollandiae*				X	X
Sulphur-crested Cockatoo	*Cacatua galerita*	Int.			X	
Major Mitchell's Cockatoo	*Lophochroa leadbeateri*	S4			X	
Chestnut-rumped Thornbill+	*Acanthiza uropygialis*				X	
Shy Heathwren	*Calamanthus cautus*				X	
Redthroat	*Pyrrholaemus brunneus*				X	
Pied Honeyeater	*Certhionyx variegatus*				X	
White-fronted Honeyeater	*Purnella albifrons*				X	
Grey Wagtail	*Motacilla cinerea*	M S3		X		
Indian Myna	*Acridotheres tristis*	Int.		X		
European Goldfinch	*Carduelis carduelis*	Int.		X		
House Sparrow	*Passer domesticus*	Int.		X		
Eurasian Tree Sparrow	*Passer montanus*	Int.		X		
Common Starling	*Sturnus vulgaris*	Int.		X		
MAMMALS						
Northern Palm Squirrel	*Funambulus pennantii*	Int.		X		
Kultarr+	*Antechinomys laniger*		X			
Numbat*	*Myrmecobius fasciatus*	V S1	X			
Western Ringtail Possum*	*Pseudocheirus occidentalis*	V S1	X	X		X
Woylie*	*Bettongia penicillata ogilbyi*	E S1	X	X		X
Tammar Wallaby*	*Macropus eugenii*	P5	X			X
Black-flanked Rock-wallaby*	*Petrogale lateralis lateralis*	V S1	X	X		
Quokka*	*Setonix brachyurus*	V S1	X	X		X
Bilby*	*Macrotis lagotis*	V S1	X			
Total Number of Species Expected:	**63**	**CS: 20 Int: 12**	**28**	**22**	**36**	**14**

Appendix 5. Tree species, DBH, Class as a potential nest tree (see Table 3) and location of potential nest trees (Zone 50J, WGS84).

UDE – Unidentified Dead Eucalypt

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
5/10/2015	1	438436	6480282	Marri	Alive	630	5
5/10/2015	2	438435	6480290	Blackbutt	Alive	570	5
5/10/2015	3	438419	6480288	Marri	Alive	720	5
5/10/2015	4	438400	6480236	Blackbutt	Alive	510	5
5/10/2015	5	438392	6480227	Marri	Alive	590	5
5/10/2015	6	438384	6480182	Marri	Alive	530	5
5/10/2015	7	438354	6480114	Blackbutt	Alive	680	5
5/10/2015	8	438354	6480098	Blackbutt	Alive	560	5
5/10/2015	9	438357	6480033	Blackbutt	Alive	550	5
5/10/2015	10	438365	6479981	Wandoo	Alive	320	5
5/10/2015	11	438358	6479966	Wandoo	Alive	340	5
5/10/2015	12	438358	6479965	Wandoo	Alive	390	5
5/10/2015	13	438372	6479948	Marri	Dead	710	5
5/10/2015	14	438369	6479930	Wandoo	Alive	480	5
5/10/2015	15	438365	6479922	Wandoo	Alive	570	5
5/10/2015	16	438373	6479907	Wandoo	Alive	620	5
5/10/2015	17	438373	6479891	Wandoo	Alive	690	5
5/10/2015	18	438364	6479876	Jarrah	Alive	660	5
5/10/2015	19	438360	6479869	Wandoo	Alive	360	5
5/10/2015	20	438356	6479871	Wandoo	Alive	390	5
5/10/2015	21	438383	6479851	UDE	Dead	580	5
5/10/2015	22	438374	6479843	Jarrah	Alive	690	5
5/10/2015	23	438375	6479838	Wandoo	Alive	510	5
5/10/2015	24	438380	6479799	Wandoo	Alive	500	5
5/10/2015	25	438457	6479810	Wandoo	Alive	480	5
5/10/2015	26	438454	6479826	Jarrah	Alive	760	5
5/10/2015	27	438454	6479840	Marri	Alive	620	5
5/10/2015	28	438471	6479844	Wandoo	Alive	510	5
5/10/2015	29	438450	6479863	Jarrah	Dead	510	3
5/10/2015	30	438443	6479855	Jarrah	Alive	790	5
5/10/2015	31	438444	6479881	Wandoo	Alive	400	5
5/10/2015	32	438435	6479913	Wandoo	Alive	380	5
5/10/2015	33	438425	6479921	Wandoo	Alive	380	5
5/10/2015	34	438424	6479919	Blackbutt	Alive	510	5
5/10/2015	35	438425	6479938	Marri	Alive	820	5
5/10/2015	36	438417	6479967	Blackbutt	Alive	820	5
5/10/2015	37	438429	6480078	Blackbutt	Alive	670	5
5/10/2015	38	438432	6480069	Wandoo	Alive	480	5
5/10/2015	39	438442	6480072	Wandoo	Alive	490	5
5/10/2015	40	438441	6480076	Wandoo	Alive	310	5
5/10/2015	41	438444	6480108	Blackbutt	Alive	690	5
5/10/2015	42	438452	6480116	Blackbutt	Alive	630	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
5/10/2015	43	438464	6480110	Blackbutt	Alive	720	5
5/10/2015	44	438462	6480107	Blackbutt	Alive	650	5
5/10/2015	45	438466	6480107	Blackbutt	Dead	570	5
5/10/2015	46	438471	6480141	Wandoo	Alive	410	5
5/10/2015	47	438482	6480179	Blackbutt	Dead	770	5
5/10/2015	48	438489	6480192	Blackbutt	Dead	560	5
5/10/2015	49	438480	6480213	UDE	Dead	570	3
5/10/2015	50	438482	6480216	Blackbutt	Alive	500	5
5/10/2015	51	438517	6480257	Wandoo	Alive	760	4
5/10/2015	52	438501	6480276	UDE	Dead	670	4
5/10/2015	53	438519	6480277	Wandoo	Alive	510	5
5/10/2015	54	438450	6480315	Marri	Alive	740	5
5/10/2015	55	438443	6480323	Wandoo	Alive	550	5
5/10/2015	56	438493	6480379	Wandoo	Alive	330	5
5/10/2015	57	438498	6480383	Wandoo	Alive	400	5
5/10/2015	58	438521	6480371	Marri	Alive	880	4
5/10/2015	59	438583	6480446	Wandoo	Alive	640	5
5/10/2015	60	438624	6480460	F.Gum	Alive	930	5
5/10/2015	61	438648	6480443	F.Gum	Alive	600	5
5/10/2015	62	438693	6480485	F.Gum	Alive	510	5
5/10/2015	63	438710	6480483	F.Gum	Alive	560	5
5/10/2015	64	438759	6480500	Wandoo	Alive	530	5
5/10/2015	65	438757	6480502	Wandoo	Alive	420	5
5/10/2015	66	438765	6480506	Wandoo	Alive	540	5
5/10/2015	67	438770	6480508	Wandoo	Alive	480	5
5/10/2015	68	438858	6480533	F.Gum	Alive	850	5
5/10/2015	69	438933	6480527	Wandoo	Alive	340	5
5/10/2015	70	438946	6480540	Wandoo	Alive	460	5
5/10/2015	71	438924	6480556	F.Gum	Alive	710	4
5/10/2015	72	438937	6480569	Wandoo	Alive	720	5
5/10/2015	73	438972	6480570	F.Gum	Alive	510	5
5/10/2015	74	438984	6480613	F.Gum	Alive	520	5
5/10/2015	75	439212	6480660	Wandoo	Alive	330	5
5/10/2015	76	439212	6480660	Wandoo	Alive	320	5
5/10/2015	77	439212	6480661	Wandoo	Alive	340	5
5/10/2015	78	439213	6480660	Wandoo	Alive	450	5
5/10/2015	79	439219	6480661	Wandoo	Alive	370	5
5/10/2015	80	439231	6480667	Wandoo	Alive	460	5
5/10/2015	81	439234	6480670	Wandoo	Alive	400	5
5/10/2015	82	439256	6480673	Wandoo	Alive	580	4
5/10/2015	83	439270	6480677	Wandoo	Alive	680	5
5/10/2015	84	439290	6480683	Wandoo	Alive	730	3
5/10/2015	85	439302	6480691	Wandoo	Alive	870	5
5/10/2015	86	439311	6480692	Wandoo	Alive	510	5
5/10/2015	87	439350	6480701	Wandoo	Alive	550	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
5/10/2015	88	439365	6480707	Wandoo	Alive	380	5
5/10/2015	89	439365	6480706	Wandoo	Alive	640	5
5/10/2015	90	439373	6480707	Wandoo	Alive	430	5
5/10/2015	91	439375	6480708	Wandoo	Alive	350	5
5/10/2015	92	439383	6480710	Wandoo	Alive	330	5
5/10/2015	93	439390	6480713	Wandoo	Alive	350	5
5/10/2015	94	439400	6480718	Wandoo	Alive	360	5
5/10/2015	95	439436	6480772	F.Gum	Alive	500	5
5/10/2015	96	439496	6480751	F.Gum	Alive	500	5
5/10/2015	97	439495	6480711	Wandoo	Alive	550	5
5/10/2015	98	439462	6480670	Wandoo	Alive	400	5
5/10/2015	99	439460	6480669	Wandoo	Alive	330	5
5/10/2015	100	439435	6480672	Wandoo	Alive	420	5
5/10/2015	101	439434	6480684	Wandoo	Alive	540	5
5/10/2015	102	439392	6480658	Wandoo	Alive	430	5
5/10/2015	103	439395	6480652	Wandoo	Alive	540	5
5/10/2015	104	439385	6480646	Wandoo	Alive	390	5
5/10/2015	105	439385	6480645	Wandoo	Alive	400	5
5/10/2015	106	439376	6480680	Wandoo	Alive	490	5
5/10/2015	107	439371	6480642	Wandoo	Alive	500	5
5/10/2015	108	439352	6480623	Wandoo	Alive	340	5
5/10/2015	109	439329	6480626	Wandoo	Alive	330	5
5/10/2015	110	439312	6480661	Wandoo	Alive	380	5
5/10/2015	111	439299	6480649	Wandoo	Alive	440	5
5/10/2015	112	439315	6480622	Wandoo	Alive	330	5
5/10/2015	113	439293	6480627	Wandoo	Alive	310	5
5/10/2015	114	439261	6480619	Wandoo	Alive	300	5
5/10/2015	115	439262	6480605	Wandoo	Alive	390	5
5/10/2015	116	439244	6480646	Wandoo	Alive	320	5
5/10/2015	117	439241	6480646	Wandoo	Alive	320	5
5/10/2015	118	439217	6480635	Wandoo	Alive	400	5
5/10/2015	119	439183	6480621	Wandoo	Alive	510	5
5/10/2015	120	439184	6480620	Wandoo	Alive	340	5
5/10/2015	121	439152	6480596	Wandoo	Alive	950	3
5/10/2015	122	439135	6480560	Wandoo	Alive	480	5
5/10/2015	123	439123	6480556	Wandoo	Alive	430	5
5/10/2015	124	439107	6480532	Jarrah	Alive	980	5
5/10/2015	125	439105	6480578	UDE	Dead	570	3
5/10/2015	126	438998	6480530	Wandoo	Alive	380	5
5/10/2015	127	438978	6480518	Wandoo	Alive	800	3
5/10/2015	128	438915	6480499	Wandoo	Alive	370	5
5/10/2015	129	438909	6480486	Wandoo	Alive	340	5
5/10/2015	130	438890	6480475	Marri	Alive	530	5
5/10/2015	131	438916	6480461	Wandoo	Alive	840	3
5/10/2015	132	438933	6480447	Marri	Alive	620	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
5/10/2015	133	439006	6480484	Wandoo	Alive	330	5
5/10/2015	134	439005	6480485	Wandoo	Alive	330	5
5/10/2015	135	439007	6480498	Wandoo	Alive	370	5
5/10/2015	136	438855	6480432	Marri	Alive	670	5
5/10/2015	137	438853	6480437	Marri	Alive	520	5
5/10/2015	138	438873	6480469	Marri	Alive	510	5
5/10/2015	139	438874	6480470	Marri	Alive	510	5
5/10/2015	140	438823	6480464	Wandoo	Alive	420	5
5/10/2015	141	438772	6480452	Wandoo	Alive	370	5
5/10/2015	142	438771	6480451	Wandoo	Alive	590	5
5/10/2015	143	438768	6480439	Blackbutt	Alive	740	5
5/10/2015	144	438762	6480451	Wandoo	Alive	410	5
5/10/2015	145	438739	6480444	Marri	Alive	510	5
5/10/2015	146	438724	6480422	UDE	Dead	600	3
5/10/2015	147	438667	6480418	Wandoo	Alive	500	4
5/10/2015	148	438653	6480373	Wandoo	Alive	470	5
5/10/2015	149	438654	6480373	Wandoo	Alive	320	5
5/10/2015	150	438658	6480374	Wandoo	Alive	440	5
5/10/2015	151	438668	6480365	Wandoo	Alive	360	5
5/10/2015	152	438675	6480368	Wandoo	Alive	650	5
5/10/2015	153	438755	6480405	Marri	Alive	550	5
5/10/2015	154	438802	6480413	Marri	Alive	530	5
5/10/2015	155	438821	6480419	Blackbutt	Alive	780	5
5/10/2015	156	438643	6480357	Wandoo	Alive	500	5
5/10/2015	157	438629	6480369	UDE	Dead	380	5
5/10/2015	158	438584	6480328	Wandoo	Alive	580	5
5/10/2015	159	438572	6480328	Wandoo	Alive	350	5
5/10/2015	160	438564	6480323	Wandoo	Alive	370	5
5/10/2015	161	438551	6480303	Wandoo	Alive	590	5
5/10/2015	162	438543	6480287	Wandoo	Dead	600	5
5/10/2015	163	441177	6481654	Wandoo	Alive	330	5
5/10/2015	164	441177	6481642	UDE	Dead	650	4
5/10/2015	165	441191	6481632	Wandoo	Alive	370	5
5/10/2015	166	441152	6481593	Wandoo	Alive	340	5
5/10/2015	167	441120	6481580	Wandoo	Alive	330	5
5/10/2015	168	441121	6481583	Wandoo	Alive	410	5
5/10/2015	169	441117	6481562	Wandoo	Alive	400	5
5/10/2015	170	441106	6481558	Wandoo	Alive	320	5
5/10/2015	171	441102	6481553	Wandoo	Alive	350	5
5/10/2015	172	441076	6481538	Wandoo	Alive	370	5
5/10/2015	173	441058	6481528	Wandoo	Alive	470	5
5/10/2015	174	441057	6481521	Wandoo	Alive	330	5
5/10/2015	175	441061	6481516	UDE	Dead	620	5
5/10/2015	176	441054	6481536	Wandoo	Alive	380	5
5/10/2015	177	441011	6481487	Wandoo	Alive	370	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
5/10/2015	178	441003	6481476	Wandoo	Alive	320	5
5/10/2015	179	440945	6481447	Wandoo	Alive	390	5
5/10/2015	180	440934	6481413	UDE	Dead	520	4
5/10/2015	181	440939	6481404	Wandoo	Alive	520	5
5/10/2015	182	440911	6481432	Wandoo	Alive	340	5
5/10/2015	183	440869	6481400	Wandoo	Alive	450	5
5/10/2015	184	440847	6481388	Wandoo	Alive	350	5
5/10/2015	185	440810	6481301	Wandoo	Dead	760	3
5/10/2015	186	440761	6481243	Wandoo	Alive	660	4
5/10/2015	187	440751	6481232	Wandoo	Alive	510	5
5/10/2015	188	440732	6481222	Wandoo	Alive	410	5
5/10/2015	189	440724	6481219	Wandoo	Alive	410	5
5/10/2015	190	440674	6481197	Wandoo	Alive	460	5
5/10/2015	191	440653	6481180	Wandoo	Alive	340	5
5/10/2015	192	440653	6481178	Wandoo	Alive	380	5
5/10/2015	193	440284	6481008	Blackbutt	Alive	780	5
5/10/2015	194	440260	6481009	Blackbutt	Alive	650	5
5/10/2015	195	440226	6480994	Blackbutt	Alive	530	5
5/10/2015	196	440176	6480973	Blackbutt	Alive	1320	5
5/10/2015	197	439768	6480876	F.Gum	Alive	1150	5
5/10/2015	198	439736	6480883	Wandoo	Alive	690	5
5/10/2015	199	439542	6480731	Wandoo	Alive	410	5
5/10/2015	200	439568	6480720	Wandoo	Dead	350	5
5/10/2015	201	439575	6480716	Wandoo	Alive	430	5
5/10/2015	202	439577	6480745	Wandoo	Alive	430	5
5/10/2015	203	439591	6480738	Wandoo	Alive	390	5
5/10/2015	204	439643	6480743	UDE	Dead	670	4
5/10/2015	205	439657	6480727	Wandoo	Alive	410	5
5/10/2015	206	439658	6480743	Wandoo	Alive	380	5
5/10/2015	207	439664	6480750	Wandoo	Alive	420	5
5/10/2015	208	439664	6480750	Wandoo	Dead	410	5
5/10/2015	209	439696	6480745	Wandoo	Alive	450	5
5/10/2015	210	439702	6480740	Wandoo	Alive	410	5
5/10/2015	211	439707	6480784	UDE	Dead	550	5
5/10/2015	212	439731	6480770	Wandoo	Alive	530	5
5/10/2015	213	439740	6480769	Wandoo	Alive	320	5
5/10/2015	214	439779	6480790	Wandoo	Alive	330	5
5/10/2015	215	439784	6480786	Wandoo	Alive	370	5
5/10/2015	216	439810	6480776	Wandoo	Alive	580	5
5/10/2015	217	439841	6480798	Wandoo	Alive	510	5
5/10/2015	218	439890	6480806	Wandoo	Alive	480	5
5/10/2015	219	439923	6480810	Wandoo	Alive	490	5
5/10/2015	220	440134	6480921	Blackbutt	Alive	700	5
5/10/2015	221	440183	6480915	Marri	Alive	670	5
5/10/2015	222	440180	6480914	Marri	Alive	660	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
5/10/2015	223	440174	6480896	Blackbutt	Alive	740	5
5/10/2015	224	440154	6480911	Blackbutt	Alive	820	5
5/10/2015	225	440153	6480912	Blackbutt	Alive	630	5
5/10/2015	226	440200	6480947	Blackbutt	Alive	550	5
5/10/2015	227	440296	6480980	Blackbutt	Alive	520	5
5/10/2015	228	440319	6480981	Blackbutt	Alive	590	5
5/10/2015	229	440618	6481125	Blackbutt	Alive	540	5
5/10/2015	230	440972	6481392	Wandoo	Alive	810	4
5/10/2015	231	441071	6481490	Wandoo	Alive	410	5
5/10/2015	232	441072	6481491	Wandoo	Alive	310	5
5/10/2015	233	441102	6481514	Wandoo	Alive	680	5
5/10/2015	234	441110	6481522	Wandoo	Alive	360	5
5/10/2015	235	441119	6481529	Wandoo	Dead	340	5
5/10/2015	236	441147	6481552	Wandoo	Alive	350	5
5/10/2015	237	441166	6481564	Wandoo	Dead	500	5
5/10/2015	238	441166	6481566	Wandoo	Alive	350	5
5/10/2015	239	441181	6481573	Wandoo	Alive	370	5
5/10/2015	240	441186	6481584	Wandoo	Alive	440	5
5/10/2015	241	441195	6481596	Wandoo	Dead	780	5
5/10/2015	242	441215	6481609	Wandoo	Alive	360	5
5/10/2015	243	441228	6481621	Wandoo	Dead	580	4
5/10/2015	244	441231	6481661	UDE	Dead	770	5
5/10/2015	245	441257	6481728	UDE	Dead	680	5
5/10/2015	246	441202	6481718	Blackbutt	Dead	750	5
5/10/2015	247	441168	6481703	Wandoo	Alive	400	5
5/10/2015	248	441158	6481716	Wandoo	Alive	690	5
5/10/2015	249	441161	6481729	Wandoo	Alive	370	5
5/10/2015	250	441203	6481751	Wandoo	Alive	430	5
5/10/2015	251	441140	6481735	Blackbutt	Alive	530	5
5/10/2015	252	441136	6481756	Wandoo	Alive	480	5
5/10/2015	253	441123	6481770	Wandoo	Alive	460	5
5/10/2015	254	441103	6481778	Wandoo	Alive	460	5
5/10/2015	255	441104	6481787	Wandoo	Alive	400	5
5/10/2015	256	441113	6481795	Wandoo	Alive	470	5
5/10/2015	257	441111	6481797	Wandoo	Alive	320	5
5/10/2015	258	441096	6481807	Wandoo	Alive	440	5
5/10/2015	259	441084	6481801	Wandoo	Alive	420	5
5/10/2015	260	441080	6481808	Wandoo	Alive	470	5
5/10/2015	261	441076	6481811	Wandoo	Alive	350	5
5/10/2015	262	441085	6481822	Wandoo	Alive	410	5
5/10/2015	263	441068	6481822	Wandoo	Alive	380	5
5/10/2015	264	441064	6481828	Wandoo	Alive	300	5
5/10/2015	265	441068	6481831	Wandoo	Alive	490	5
5/10/2015	266	441064	6481833	Wandoo	Alive	430	5
5/10/2015	267	441058	6481835	Wandoo	Alive	330	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
5/10/2015	268	441058	6481836	Wandoo	Alive	390	5
5/10/2015	269	441057	6481839	Jarrah	Alive	670	5
5/10/2015	270	441051	6481847	Jarrah	Alive	590	5
5/10/2015	271	441128	6481814	Marri	Alive	540	5
5/10/2015	272	441144	6481829	Marri	Alive	670	5
5/10/2015	273	441163	6481833	Marri	Alive	560	5
5/10/2015	274	441218	6481843	Jarrah	Dead	770	4
5/10/2015	275	441214	6481841	Jarrah	Dead	690	5
5/10/2015	276	441227	6481808	Marri	Alive	710	5
5/10/2015	277	441365	6481792	UDE	Dead	560	5
5/10/2015	278	441358	6481800	Wandoo	Alive	420	5
5/10/2015	279	441359	6481802	Wandoo	Alive	340	5
5/10/2015	280	441359	6481805	Wandoo	Alive	340	5
5/10/2015	281	441361	6481807	Wandoo	Alive	310	5
6/10/2015	282	442636	6483781	Wandoo	Alive	350	5
6/10/2015	283	442635	6483780	Wandoo	Alive	400	5
6/10/2015	284	442642	6483772	Wandoo	Alive	550	5
6/10/2015	285	442652	6483766	Marri	Alive	510	5
6/10/2015	286	442611	6483634	Wandoo	Alive	420	5
6/10/2015	287	442574	6483574	Wandoo	Alive	400	5
6/10/2015	288	442557	6483551	Wandoo	Alive	430	5
6/10/2015	289	442549	6483516	Wandoo	Alive	530	5
6/10/2015	290	442523	6483482	Wandoo	Alive	330	5
6/10/2015	291	442499	6483438	Wandoo	Alive	340	5
6/10/2015	292	442484	6483395	Wandoo	Alive	380	5
6/10/2015	293	442473	6483368	Wandoo	Alive	330	5
6/10/2015	294	442445	6483314	Marri	Alive	730	5
6/10/2015	295	442443	6483300	Marri	Alive	580	5
6/10/2015	296	442438	6483293	Wandoo	Alive	570	5
6/10/2015	297	442420	6483254	Marri	Alive	570	5
6/10/2015	298	442406	6483212	Marri	Alive	710	5
6/10/2015	299	442387	6483211	Blackbutt	Alive	760	5
6/10/2015	300	442368	6483214	Marri	Dead	970	3
6/10/2015	301	442361	6483115	Blackbutt	Alive	1080	5
6/10/2015	302	442327	6483111	Marri	Alive	790	5
6/10/2015	303	442313	6483026	Marri	Dead	1150	4
6/10/2015	304	442224	6482863	Wandoo	Alive	520	5
6/10/2015	305	442243	6482860	Wandoo	Dead	450	5
6/10/2015	306	442238	6482853	Wandoo	Dead	350	5
6/10/2015	307	442211	6482758	Wandoo	Alive	305	5
6/10/2015	308	442165	6482727	Wandoo	Alive	340	5
6/10/2015	309	442153	6482693	Wandoo	Dead	610	3
6/10/2015	310	442152	6482668	Wandoo	Alive	380	5
6/10/2015	311	442148	6482624	Blackbutt	Alive	520	4
6/10/2015	312	442134	6482628	Blackbutt	Alive	670	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
6/10/2015	313	442115	6482594	Wandoo	Alive	320	5
6/10/2015	314	442102	6482546	Wandoo	Alive	300	5
6/10/2015	315	442029	6482524	Wandoo	Alive	340	5
6/10/2015	316	442031	6482512	Wandoo	Alive	410	5
6/10/2015	317	442037	6482483	Wandoo	Alive	350	5
6/10/2015	318	442066	6482485	Wandoo	Alive	520	5
6/10/2015	319	442047	6482471	Wandoo	Alive	360	5
6/10/2015	320	442019	6482463	UDE	Dead	1050	5
6/10/2015	321	441993	6482466	Wandoo	Alive	420	5
6/10/2015	322	441994	6482431	Wandoo	Alive	310	5
6/10/2015	323	441974	6482379	Wandoo	Alive	330	5
6/10/2015	324	441969	6482374	Wandoo	Alive	310	5
6/10/2015	325	441907	6482381	Wandoo	Alive	440	5
6/10/2015	326	441904	6482369	Wandoo	Dead	370	5
6/10/2015	327	441890	6482348	Wandoo	Alive	350	5
6/10/2015	328	441871	6482335	Wandoo	Alive	540	3
6/10/2015	329	441908	6482300	Wandoo	Alive	330	5
6/10/2015	330	441884	6482285	Wandoo	Alive	340	5
6/10/2015	331	441874	6482299	Wandoo	Alive	360	5
6/10/2015	332	441852	6482265	Wandoo	Alive	370	5
6/10/2015	333	441866	6482258	Wandoo	Alive	370	5
6/10/2015	334	441822	6482223	Wandoo	Alive	460	5
6/10/2015	335	441818	6482210	Wandoo	Alive	380	5
6/10/2015	336	441815	6482205	Wandoo	Alive	360	5
6/10/2015	337	441817	6482231	Wandoo	Dead	910	4
6/10/2015	338	441817	6482248	Wandoo	Alive	320	5
6/10/2015	339	441818	6482244	Wandoo	Alive	310	5
6/10/2015	340	441798	6482253	Wandoo	Alive	420	5
6/10/2015	341	441783	6482179	Wandoo	Alive	320	5
6/10/2015	342	441783	6482179	Wandoo	Alive	320	5
6/10/2015	343	441756	6482197	Wandoo	Alive	350	5
6/10/2015	344	441753	6482179	Wandoo	Alive	340	5
6/10/2015	345	441732	6482160	Wandoo	Alive	320	5
6/10/2015	346	441742	6482156	Wandoo	Alive	370	5
6/10/2015	347	441747	6482141	Wandoo	Alive	310	5
6/10/2015	348	441737	6482127	Wandoo	Alive	320	5
6/10/2015	349	441656	6482090	Wandoo	Alive	850	3
6/10/2015	350	441637	6482066	Wandoo	Alive	520	3
6/10/2015	351	441644	6482055	Wandoo	Alive	430	5
6/10/2015	352	441647	6482023	Wandoo	Alive	410	5
6/10/2015	353	441635	6482011	Wandoo	Alive	350	5
6/10/2015	354	441623	6481992	Wandoo	Alive	370	5
6/10/2015	355	441625	6481990	Wandoo	Alive	310	5
6/10/2015	356	441599	6482022	Wandoo	Alive	460	5
6/10/2015	357	441540	6481932	Wandoo	Dead	520	3

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
6/10/2015	358	441559	6481921	Wandoo	Alive	460	5
6/10/2015	359	441507	6481903	Wandoo	Alive	740	5
6/10/2015	360	441425	6481815	Wandoo	Alive	340	5
6/10/2015	361	441393	6481798	Wandoo	Dead	390	4
6/10/2015	362	441388	6481814	Wandoo	Alive	350	5
6/10/2015	363	441411	6481777	Wandoo	Dead	420	5
6/10/2015	364	441410	6481780	Wandoo	Alive	560	5
6/10/2015	365	441453	6481805	Wandoo	Alive	370	5
6/10/2015	366	441468	6481816	Wandoo	Alive	420	5
6/10/2015	367	441475	6481816	Wandoo	Alive	440	5
6/10/2015	368	441480	6481821	Wandoo	Alive	330	5
6/10/2015	369	441482	6481828	Wandoo	Alive	340	5
6/10/2015	370	441495	6481829	Wandoo	Alive	420	5
6/10/2015	371	441509	6481843	Wandoo	Alive	320	5
6/10/2015	372	441538	6481870	Wandoo	Alive	340	5
6/10/2015	373	441540	6481834	Eucalyptus sp	Alive	520	5
6/10/2015	374	441607	6481927	Wandoo	Alive	380	5
6/10/2015	375	441613	6481935	Wandoo	Alive	420	5
6/10/2015	376	441620	6481944	Wandoo	Alive	440	5
6/10/2015	377	441642	6481969	Wandoo	Alive	680	5
6/10/2015	378	441707	6481993	Eucalyptus sp	Alive	390	5
6/10/2015	379	441802	6482143	Wandoo	Alive	370	5
6/10/2015	380	441818	6482163	Wandoo	Alive	320	5
6/10/2015	381	441818	6482163	Wandoo	Alive	320	5
6/10/2015	382	441820	6482166	Wandoo	Alive	350	5
6/10/2015	383	441855	6482206	Wandoo	Alive	490	5
6/10/2015	384	441864	6482218	Wandoo	Alive	720	5
6/10/2015	385	441882	6482236	Wandoo	Alive	300	5
6/10/2015	386	441886	6482242	Wandoo	Alive	480	5
6/10/2015	387	441898	6482254	Wandoo	Alive	610	4
6/10/2015	388	441899	6482256	Wandoo	Dead	520	4
6/10/2015	389	441919	6482276	Wandoo	Dead	420	5
6/10/2015	390	441955	6482319	Wandoo	Alive	360	5
6/10/2015	391	441960	6482324	Wandoo	Dead	340	5
6/10/2015	392	441984	6482351	Wandoo	Alive	540	5
6/10/2015	393	442002	6482365	Wandoo	Dead	440	5
6/10/2015	394	442049	6482409	Wandoo	Alive	450	5
6/10/2015	395	442067	6482434	Wandoo	Alive	760	5
6/10/2015	396	442070	6482432	Wandoo	Alive	630	4
6/10/2015	397	442075	6482454	Wandoo	Alive	330	5
6/10/2015	398	442091	6482470	Wandoo	Alive	360	5
6/10/2015	399	442119	6482437	Wandoo	Alive	650	5
6/10/2015	400	442132	6482451	Wandoo	Alive	520	4
6/10/2015	401	442119	6482469	Wandoo	Alive	390	5
6/10/2015	402	442125	6482476	Wandoo	Dead	320	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
6/10/2015	403	442105	6482484	Wandoo	Alive	950	3
6/10/2015	404	442105	6482503	Wandoo	Alive	320	5
6/10/2015	405	442113	6482516	Wandoo	Alive	340	5
6/10/2015	406	442122	6482532	Wandoo	Dead	500	3
6/10/2015	407	442148	6482568	Wandoo	Alive	630	5
6/10/2015	408	442171	6482570	Wandoo	Dead	620	5
6/10/2015	409	442172	6482585	Wandoo	Alive	300	5
6/10/2015	410	442176	6482607	Wandoo	Alive	310	5
6/10/2015	411	442188	6482630	Wandoo	Dead	370	4
6/10/2015	412	442195	6482641	Wandoo	Alive	440	5
6/10/2015	413	442202	6482626	Blackbutt	Alive	800	5
6/10/2015	414	442204	6482650	Wandoo	Alive	550	3
6/10/2015	415	442207	6482679	Wandoo	Alive	560	5
6/10/2015	416	442225	6482730	Wandoo	Alive	480	5
6/10/2015	417	442239	6482752	Wandoo	Alive	900	4
6/10/2015	418	442253	6482801	Wandoo	Alive	340	5
6/10/2015	419	442259	6482822	Wandoo	Alive	370	5
6/10/2015	420	442260	6482827	Wandoo	Alive	370	5
6/10/2015	421	442333	6482896	Eucalyptus sp	Alive	510	5
6/10/2015	422	442335	6482945	Wandoo	Alive	370	5
6/10/2015	423	442352	6482952	Wandoo	Alive	320	5
6/10/2015	424	442353	6482951	Wandoo	Alive	320	5
6/10/2015	425	442343	6482987	Wandoo	Alive	350	5
6/10/2015	426	442331	6482979	Wandoo	Alive	360	5
6/10/2015	427	442341	6483006	Marri	Alive	610	5
6/10/2015	428	442344	6483012	Marri	Alive	590	5
6/10/2015	429	442387	6483023	UDE	Dead	520	5
6/10/2015	430	442368	6483052	Marri	Alive	590	5
6/10/2015	431	442405	6483061	Marri	Alive	630	5
6/10/2015	432	442377	6483060	Marri	Alive	530	5
6/10/2015	433	442399	6483079	Marri	Alive	570	5
6/10/2015	434	442397	6483077	Marri	Alive	540	5
6/10/2015	435	442414	6483091	Marri	Alive	570	5
6/10/2015	436	442423	6483098	Wandoo	Alive	390	5
6/10/2015	437	442423	6483107	Wandoo	Alive	450	5
6/10/2015	438	442413	6483113	Wandoo	Alive	450	5
6/10/2015	439	442418	6483120	Marri	Alive	520	5
6/10/2015	440	442411	6483135	Marri	Alive	500	5
6/10/2015	441	442439	6483134	Marri	Dead	770	3
6/10/2015	442	442431	6483139	Marri	Alive	640	5
6/10/2015	443	442417	6483140	Marri	Alive	570	5
6/10/2015	444	442408	6483149	Marri	Alive	530	5
6/10/2015	445	442456	6483259	F.Gum	Alive	760	5
6/10/2015	446	442487	6483341	Wandoo	Dead	790	4
6/10/2015	447	442585	6483541	Wandoo	Alive	330	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
6/10/2015	448	442603	6483566	Wandoo	Alive	450	5
6/10/2015	449	442610	6483574	Wandoo	Alive	390	5
6/10/2015	450	442619	6483592	Wandoo	Alive	400	5
6/10/2015	451	442641	6483622	Wandoo	Alive	510	5
6/10/2015	452	442649	6483640	Wandoo	Alive	400	5
6/10/2015	453	442648	6483641	Wandoo	Alive	350	5
6/10/2015	454	442662	6483664	Wandoo	Alive	350	5
6/10/2015	455	442666	6483670	Wandoo	Alive	330	5
6/10/2015	456	442686	6483703	Wandoo	Alive	360	5
6/10/2015	457	442689	6483710	Wandoo	Alive	470	5
6/10/2015	458	442790	6483896	Marri	Alive	1200	5
6/10/2015	459	442800	6483932	Marri	Dead	540	5
6/10/2015	460	442825	6483953	Wandoo	Alive	510	5
6/10/2015	461	442839	6483930	Wandoo	Alive	410	5
6/10/2015	462	442835	6483933	Wandoo	Alive	380	5
6/10/2015	463	442843	6483924	Wandoo	Alive	460	5
6/10/2015	464	442842	6483948	Wandoo	Alive	490	5
6/10/2015	465	442837	6483990	Wandoo	Dead	400	5
6/10/2015	466	442868	6483986	Wandoo	Alive	320	5
6/10/2015	467	442842	6484002	Wandoo	Alive	520	5
6/10/2015	468	442876	6484001	Wandoo	Alive	340	5
6/10/2015	469	442908	6484029	Wandoo	Alive	370	5
6/10/2015	470	442914	6484067	Wandoo	Alive	410	5
6/10/2015	471	442927	6484056	Wandoo	Alive	320	5
6/10/2015	472	442945	6484086	Wandoo	Alive	470	5
6/10/2015	473	442912	6484084	Wandoo	Alive	320	5
6/10/2015	474	442892	6484087	Wandoo	Alive	350	5
6/10/2015	475	442899	6484093	Wandoo	Alive	360	5
6/10/2015	476	442901	6484096	Wandoo	Alive	400	5
6/10/2015	477	442901	6484103	Wandoo	Alive	320	5
6/10/2015	478	442902	6484105	Wandoo	Alive	670	4
6/10/2015	479	442905	6484107	Wandoo	Alive	350	5
6/10/2015	480	442906	6484111	Wandoo	Alive	360	5
6/10/2015	481	442916	6484123	Wandoo	Alive	450	5
6/10/2015	482	442916	6484122	Wandoo	Alive	430	5
6/10/2015	483	442917	6484122	Wandoo	Alive	360	5
6/10/2015	484	442921	6484132	Wandoo	Alive	460	5
6/10/2015	485	442929	6484149	Wandoo	Alive	430	5
6/10/2015	486	442932	6484153	Wandoo	Alive	370	5
6/10/2015	487	442937	6484162	Wandoo	Alive	360	5
6/10/2015	488	442977	6484217	Wandoo	Dead	320	5
6/10/2015	489	442980	6484220	Wandoo	Alive	370	5
6/10/2015	490	442980	6484225	Wandoo	Dead	490	5
6/10/2015	491	442986	6484229	Wandoo	Alive	570	5
6/10/2015	492	442989	6484238	Wandoo	Alive	370	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
6/10/2015	493	443026	6484272	Wandoo	Alive	640	5
6/10/2015	494	443074	6484298	Wandoo	Alive	310	5
6/10/2015	495	443059	6484263	Wandoo	Dead	460	5
6/10/2015	496	443112	6484325	Wandoo	Alive	830	5
6/10/2015	497	443130	6484391	Wandoo	Alive	540	5
6/10/2015	498	443133	6484409	Wandoo	Alive	370	5
6/10/2015	499	443147	6484445	Wandoo	Alive	320	5
6/10/2015	500	443159	6484447	Wandoo	Alive	720	4
6/10/2015	501	443151	6484460	Wandoo	Dead	320	5
6/10/2015	502	443153	6484461	Wandoo	Alive	320	5
6/10/2015	503	443154	6484460	Wandoo	Alive	310	5
6/10/2015	504	443156	6484463	Wandoo	Alive	530	5
6/10/2015	505	443184	6484463	Wandoo	Alive	370	5
6/10/2015	506	443175	6484507	Wandoo	Dead	300	5
6/10/2015	507	443207	6484532	Wandoo	Alive	340	5
6/10/2015	508	443205	6484531	Wandoo	Alive	520	5
6/10/2015	509	443141	6484542	Wandoo	Alive	350	5
6/10/2015	510	442987	6484305	Wandoo	Alive	340	5
6/10/2015	511	442984	6484305	Wandoo	Alive	310	5
6/10/2015	512	442975	6484282	Wandoo	Alive	320	5
6/10/2015	513	442967	6484274	Wandoo	Alive	410	5
6/10/2015	514	442977	6484267	Wandoo	Alive	430	5
6/10/2015	515	442945	6484276	Marri	Alive	510	5
6/10/2015	516	442936	6484206	Wandoo	Alive	530	5
6/10/2015	517	442913	6484184	Marri	Alive	500	5
6/10/2015	518	442894	6484195	Marri	Alive	560	5
6/10/2015	519	442907	6484149	Wandoo	Alive	380	5
6/10/2015	520	442901	6484138	Wandoo	Alive	300	5
6/10/2015	521	442880	6484128	Wandoo	Alive	390	5
6/10/2015	522	442844	6484141	Marri	Alive	930	5
6/10/2015	523	442896	6484135	Wandoo	Alive	360	5
6/10/2015	524	442809	6484054	Eucalyptus sp	Alive	680	5
6/10/2015	525	442741	6483955	Marri	Alive	700	5
6/10/2015	526	442723	6483944	Marri	Alive	510	5
6/10/2015	527	442781	6483953	Wandoo	Alive	340	5
6/10/2015	528	442732	6483863	Wandoo	Alive	310	5
6/10/2015	529	442726	6483852	Wandoo	Alive	340	5
6/10/2015	530	442714	6483874	Marri	Alive	560	5
6/10/2015	531	442679	6483837	Marri	Alive	630	5
6/10/2015	532	444642	6484941	Wandoo	Alive	510	5
6/10/2015	533	444635	6484957	Wandoo	Alive	420	5
6/10/2015	534	444654	6484960	Wandoo	Alive	340	5
6/10/2015	535	444698	6484988	F.Gum	Alive	570	5
6/10/2015	536	444813	6484956	Marri	Alive	670	5
6/10/2015	537	444875	6484972	Marri	Alive	750	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
6/10/2015	538	444883	6484992	Wandoo	Alive	590	5
6/10/2015	539	444903	6484953	Wandoo	Alive	440	5
6/10/2015	540	444939	6484962	Wandoo	Dead	520	4
6/10/2015	541	444941	6484967	Wandoo	Alive	730	5
6/10/2015	542	444966	6484966	Wandoo	Alive	320	5
6/10/2015	543	444973	6484967	Wandoo	Alive	360	5
6/10/2015	544	445005	6484981	Wandoo	Alive	310	5
6/10/2015	545	445034	6484991	Marri	Dead	520	4
6/10/2015	546	445059	6485001	Marri	Dead	540	5
6/10/2015	547	445083	6485020	Wandoo	Alive	330	5
6/10/2015	548	445113	6485024	Wandoo	Alive	300	5
6/10/2015	549	445126	6485028	Wandoo	Alive	350	5
6/10/2015	550	445130	6485035	Wandoo	Alive	530	5
6/10/2015	551	445133	6485036	Wandoo	Alive	310	5
6/10/2015	552	445144	6485041	Marri	Alive	640	5
6/10/2015	553	445152	6485039	Wandoo	Alive	440	5
6/10/2015	554	445149	6485061	Wandoo	Dead	620	3
6/10/2015	555	445131	6485068	Wandoo	Alive	620	5
6/10/2015	556	445162	6485076	Wandoo	Alive	790	5
6/10/2015	557	445160	6485067	Wandoo	Alive	310	5
6/10/2015	558	445160	6485057	Wandoo	Alive	730	4
6/10/2015	559	445179	6485087	Wandoo	Alive	320	5
6/10/2015	560	445189	6485098	Wandoo	Alive	490	5
6/10/2015	561	445212	6485084	Wandoo	Alive	420	5
6/10/2015	562	445219	6485073	Wandoo	Alive	310	5
6/10/2015	563	445219	6485066	Wandoo	Alive	380	5
6/10/2015	564	445232	6485085	Wandoo	Alive	440	5
6/10/2015	565	445225	6485103	Wandoo	Alive	580	5
6/10/2015	566	445237	6485111	Wandoo	Alive	470	5
6/10/2015	567	445242	6485099	Wandoo	Alive	360	5
6/10/2015	568	445253	6485085	Wandoo	Alive	410	5
6/10/2015	569	445242	6485071	Wandoo	Dead	510	3
6/10/2015	570	445282	6485098	Jarrah	Alive	720	4
6/10/2015	571	445319	6485101	Wandoo	Alive	380	5
6/10/2015	572	445321	6485114	Wandoo	Alive	360	5
6/10/2015	573	445305	6485125	Marri	Alive	510	3
6/10/2015	574	445305	6485133	Wandoo	Alive	480	5
6/10/2015	575	445311	6485133	Wandoo	Alive	500	5
6/10/2015	576	445339	6485120	Wandoo	Alive	650	5
6/10/2015	577	445346	6485127	Wandoo	Alive	330	5
6/10/2015	578	445354	6485134	Wandoo	Alive	490	5
6/10/2015	579	445344	6485144	Wandoo	Alive	510	5
6/10/2015	580	445337	6485150	Wandoo	Alive	370	5
6/10/2015	581	445359	6485181	Wandoo	Alive	460	5
6/10/2015	582	445368	6485135	Wandoo	Alive	780	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
6/10/2015	583	445392	6485147	Wandoo	Alive	470	5
6/10/2015	584	445389	6485160	Wandoo	Alive	310	5
6/10/2015	585	445387	6485195	Wandoo	Alive	620	5
6/10/2015	586	445401	6485171	Wandoo	Alive	420	5
6/10/2015	587	445417	6485114	Wandoo	Alive	330	5
6/10/2015	588	445410	6485097	Wandoo	Alive	320	5
6/10/2015	589	445408	6485079	Wandoo	Alive	300	5
6/10/2015	590	445397	6485072	Marri	Dead	520	5
6/10/2015	591	445403	6485059	Wandoo	Alive	470	5
6/10/2015	592	445400	6485055	Wandoo	Alive	330	5
6/10/2015	593	445392	6485057	UDE	Dead	690	5
6/10/2015	594	445374	6485064	Jarrah	Dead	1130	5
6/10/2015	595	445374	6485079	Wandoo	Alive	450	5
6/10/2015	596	445388	6485103	Wandoo	Alive	440	5
6/10/2015	597	445383	6485099	Wandoo	Alive	300	5
6/10/2015	598	445368	6485096	Wandoo	Alive	520	5
6/10/2015	599	445355	6485093	Wandoo	Alive	470	5
6/10/2015	600	445347	6485091	Wandoo	Alive	360	5
6/10/2015	601	445360	6485072	Wandoo	Alive	390	5
6/10/2015	602	445357	6485053	Marri	Alive	580	5
6/10/2015	603	445336	6485051	Wandoo	Alive	500	5
6/10/2015	604	445308	6485055	Wandoo	Alive	470	5
6/10/2015	605	445309	6485050	Wandoo	Alive	320	5
6/10/2015	606	445310	6485059	Marri	Alive	680	5
6/10/2015	607	445312	6485042	Wandoo	Alive	360	5
6/10/2015	608	445309	6485029	Wandoo	Alive	380	5
6/10/2015	609	445309	6485029	Wandoo	Alive	410	5
6/10/2015	610	445297	6485044	Wandoo	Alive	330	5
6/10/2015	611	445298	6485054	Marri	Alive	850	5
6/10/2015	612	445291	6485048	Wandoo	Alive	320	5
6/10/2015	613	445262	6485032	Wandoo	Alive	640	5
6/10/2015	614	445269	6485007	Marri	Alive	820	5
6/10/2015	615	445286	6485050	Wandoo	Alive	310	5
6/10/2015	616	445278	6485050	Wandoo	Alive	450	5
6/10/2015	617	445255	6485031	Wandoo	Alive	470	5
6/10/2015	618	445233	6484999	Wandoo	Alive	320	5
6/10/2015	619	445234	6485017	Wandoo	Alive	410	5
6/10/2015	620	445201	6485030	Marri	Dead	590	4
6/10/2015	621	445175	6485021	Marri	Alive	750	5
6/10/2015	622	445157	6485008	Marri	Alive	550	5
6/10/2015	623	445142	6484997	Wandoo	Alive	340	5
6/10/2015	624	445136	6484994	Wandoo	Alive	330	5
6/10/2015	625	445124	6484990	Wandoo	Alive	390	5
6/10/2015	626	445123	6484987	Wandoo	Alive	300	5
6/10/2015	627	445118	6484988	Wandoo	Alive	410	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
6/10/2015	628	445118	6484996	Wandoo	Alive	480	5
6/10/2015	629	445114	6484967	Wandoo	Alive	450	5
6/10/2015	630	445110	6484966	Wandoo	Alive	330	5
6/10/2015	631	445113	6484968	Wandoo	Alive	320	5
6/10/2015	632	445102	6484976	Marri	Alive	660	5
6/10/2015	633	445071	6484976	UDE	Dead	650	5
6/10/2015	634	445057	6484967	Jarrah	Alive	740	5
6/10/2015	635	445063	6484973	Jarrah	Alive	540	5
6/10/2015	636	445028	6484963	Wandoo	Alive	410	5
6/10/2015	637	445020	6484937	Wandoo	Alive	350	5
6/10/2015	638	445016	6484938	Wandoo	Alive	420	5
6/10/2015	639	444995	6484944	Wandoo	Alive	460	5
6/10/2015	640	445009	6484960	Wandoo	Alive	430	5
6/10/2015	641	445002	6484960	Wandoo	Alive	380	5
6/10/2015	642	445001	6484958	Wandoo	Alive	410	5
6/10/2015	643	444987	6484950	Marri	Alive	590	5
6/10/2015	644	444982	6484956	Wandoo	Alive	370	5
6/10/2015	645	444966	6484941	Wandoo	Alive	530	5
6/10/2015	646	444965	6484942	Wandoo	Alive	500	5
6/10/2015	647	444959	6484941	Wandoo	Alive	520	5
6/10/2015	648	444948	6484939	Wandoo	Alive	440	5
6/10/2015	649	444947	6484931	Wandoo	Alive	310	5
6/10/2015	650	444947	6484928	Wandoo	Alive	700	5
6/10/2015	651	444943	6484925	Wandoo	Alive	350	5
6/10/2015	652	444936	6484938	Wandoo	Alive	420	5
6/10/2015	653	444929	6484935	Wandoo	Alive	370	5
6/10/2015	654	444927	6484928	Wandoo	Alive	360	5
6/10/2015	655	444919	6484926	Wandoo	Alive	350	5
6/10/2015	656	444913	6484927	Wandoo	Dead	360	5
6/10/2015	657	444909	6484917	Wandoo	Alive	390	5
6/10/2015	658	444938	6484902	Wandoo	Alive	450	5
6/10/2015	659	444925	6484895	Wandoo	Alive	410	5
6/10/2015	660	444922	6484909	Wandoo	Alive	310	5
6/10/2015	661	444886	6484924	Wandoo	Alive	380	5
6/10/2015	662	444878	6484924	Wandoo	Alive	490	5
6/10/2015	663	444875	6484923	Wandoo	Alive	460	5
6/10/2015	664	444859	6484921	Wandoo	Alive	380	5
6/10/2015	665	444813	6484903	Wandoo	Dead	410	5
6/10/2015	666	444776	6484893	Wandoo	Alive	320	5
6/10/2015	667	444761	6484883	Wandoo	Alive	300	5
6/10/2015	668	444760	6484874	Wandoo	Alive	410	5
6/10/2015	669	444709	6484884	Wandoo	Alive	620	5
8/10/2015	670	444581	6484970	Wandoo	Alive	440	5
8/10/2015	671	444588	6484984	F.Gum	Alive	680	5
8/10/2015	672	444572	6485002	F.Gum	Alive	520	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
8/10/2015	673	444344	6485087	Wandoo	Alive	390	5
8/10/2015	674	444322	6485107	Wandoo	Alive	410	5
8/10/2015	675	444322	6485106	Wandoo	Alive	420	5
8/10/2015	676	444318	6485112	Wandoo	Alive	300	5
8/10/2015	677	444313	6485113	Wandoo	Alive	410	5
8/10/2015	678	444265	6485151	Wandoo	Alive	320	5
8/10/2015	679	444251	6485153	Wandoo	Alive	370	5
8/10/2015	680	444225	6485174	Wandoo	Alive	470	5
8/10/2015	681	444220	6485178	Wandoo	Alive	590	5
8/10/2015	682	444211	6485186	Wandoo	Alive	460	5
8/10/2015	683	444193	6485198	Wandoo	Alive	480	5
8/10/2015	684	444162	6485215	Wandoo	Alive	410	5
8/10/2015	685	444067	6485254	Wandoo	Alive	380	5
8/10/2015	686	444039	6485257	Wandoo	Alive	740	4
8/10/2015	687	444021	6485265	Wandoo	Alive	960	4
8/10/2015	688	444010	6485274	Marri	Dead	530	5
8/10/2015	689	443985	6485276	Wandoo	Alive	490	5
8/10/2015	690	443977	6485282	Wandoo	Alive	520	5
8/10/2015	691	443964	6485282	Wandoo	Alive	520	5
8/10/2015	692	443959	6485286	Wandoo	Alive	350	5
8/10/2015	693	443936	6485283	Wandoo	Alive	870	5
8/10/2015	694	443907	6485277	Wandoo	Alive	500	5
8/10/2015	695	443885	6485283	Wandoo	Alive	540	5
8/10/2015	696	443881	6485283	Wandoo	Alive	410	5
8/10/2015	697	443856	6485284	Wandoo	Alive	570	5
8/10/2015	698	443832	6485322	Wandoo	Alive	480	5
8/10/2015	699	443806	6485327	Wandoo	Alive	440	5
8/10/2015	700	443838	6485279	Wandoo	Alive	460	5
8/10/2015	701	443832	6485279	Wandoo	Alive	480	5
8/10/2015	702	443793	6485279	Wandoo	Alive	1020	3
8/10/2015	703	443790	6485284	Wandoo	Alive	580	5
8/10/2015	704	443774	6485285	Wandoo	Alive	510	5
8/10/2015	705	443771	6485284	Wandoo	Alive	420	5
8/10/2015	706	443775	6485272	Wandoo	Alive	340	5
8/10/2015	707	443756	6485277	Wandoo	Alive	430	5
8/10/2015	708	443749	6485306	Wandoo	Alive	440	5
8/10/2015	709	443740	6485271	Wandoo	Alive	400	5
8/10/2015	710	443739	6485273	Wandoo	Alive	320	5
8/10/2015	711	443720	6485270	Wandoo	Alive	460	5
8/10/2015	712	443713	6485267	Wandoo	Alive	320	5
8/10/2015	713	443677	6485265	Wandoo	Alive	360	5
8/10/2015	714	443664	6485263	Wandoo	Alive	420	5
8/10/2015	715	443662	6485262	Wandoo	Alive	410	5
8/10/2015	716	443682	6485305	Wandoo	Alive	370	5
8/10/2015	717	443658	6485304	Wandoo	Dead	540	3

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
8/10/2015	718	443640	6485259	Wandoo	Alive	320	5
8/10/2015	719	443604	6485250	Wandoo	Alive	580	5
8/10/2015	720	443600	6485267	Wandoo	Alive	960	3
8/10/2015	721	443579	6485271	Wandoo	Alive	510	5
8/10/2015	722	443563	6485278	Wandoo	Alive	480	5
8/10/2015	723	443558	6485273	Wandoo	Alive	410	5
8/10/2015	724	443525	6485269	Wandoo	Alive	440	5
8/10/2015	725	443519	6485255	Wandoo	Alive	360	5
8/10/2015	726	443523	6485251	Wandoo	Alive	400	5
8/10/2015	727	443575	6485234	Wandoo	Alive	380	5
8/10/2015	728	443536	6485222	Wandoo	Alive	340	5
8/10/2015	729	443516	6485214	Wandoo	Alive	350	5
8/10/2015	730	443506	6485208	Wandoo	Alive	310	5
8/10/2015	731	443491	6485202	Wandoo	Dead	410	5
8/10/2015	732	443479	6485191	Wandoo	Alive	380	5
8/10/2015	733	443477	6485199	Wandoo	Alive	320	5
8/10/2015	734	443493	6485236	Wandoo	Alive	350	5
8/10/2015	735	443450	6485216	Wandoo	Alive	410	5
8/10/2015	736	443434	6485192	Wandoo	Alive	370	5
8/10/2015	737	443442	6485182	Wandoo	Alive	520	4
8/10/2015	738	443398	6485143	Wandoo	Alive	770	5
8/10/2015	739	443355	6485142	Wandoo	Alive	840	4
8/10/2015	740	443364	6485120	Wandoo	Alive	570	5
8/10/2015	741	443324	6485074	Wandoo	Alive	810	4
8/10/2015	742	443310	6485047	Wandoo	Alive	350	5
8/10/2015	743	443318	6485035	Wandoo	Alive	360	5
8/10/2015	744	443296	6485029	Wandoo	Alive	690	5
8/10/2015	745	443280	6485023	Wandoo	Alive	390	5
8/10/2015	746	443282	6485019	Wandoo	Alive	350	5
8/10/2015	747	443279	6484975	Wandoo	Alive	430	5
8/10/2015	748	443249	6484973	Wandoo	Alive	1060	3
8/10/2015	749	443259	6484926	Wandoo	Dead	390	5
8/10/2015	750	443239	6484852	Wandoo	Alive	660	4
8/10/2015	751	443248	6484607	Wandoo	Alive	800	3
8/10/2015	752	443271	6484769	Wandoo	Dead	1000	3
8/10/2015	753	443279	6484820	Wandoo	Alive	580	3
8/10/2015	754	443309	6484896	Wandoo	Alive	810	3
8/10/2015	755	443304	6484946	Wandoo	Alive	760	3
8/10/2015	756	443347	6485042	Wandoo	Alive	730	3
8/10/2015	757	443426	6485086	Wandoo	Alive	880	3
8/10/2015	758	443505	6485177	Wandoo	Alive	810	3
8/10/2015	759	443534	6485178	Wandoo	Alive	590	3
8/10/2015	760	443609	6485210	Wandoo	Alive	720	3
8/10/2015	761	443623	6485217	Wandoo	Alive	920	3
8/10/2015	762	444002	6485242	Wandoo	Alive	1120	3

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
8/10/2015	763	444041	6485230	Wandoo	Alive	850	3
8/10/2015	764	446827	6486335	Wandoo	Alive	360	5
8/10/2015	765	446829	6486323	Wandoo	Alive	500	5
8/10/2015	766	446819	6486317	Wandoo	Alive	810	5
8/10/2015	767	446795	6486304	Wandoo	Alive	630	5
8/10/2015	768	446770	6486281	Wandoo	Dead	970	3
8/10/2015	769	446773	6486293	Wandoo	Alive	550	5
8/10/2015	770	446767	6486297	Wandoo	Alive	440	5
8/10/2015	771	446765	6486290	Wandoo	Alive	460	5
8/10/2015	772	446760	6486291	Wandoo	Alive	410	5
8/10/2015	773	446756	6486274	Wandoo	Alive	340	5
8/10/2015	774	446743	6486263	Marri	Alive	550	5
8/10/2015	775	446734	6486254	Marri	Alive	900	5
8/10/2015	776	446735	6486265	Wandoo	Dead	360	5
8/10/2015	777	446738	6486270	Wandoo	Alive	530	5
8/10/2015	778	446665	6486263	Marri	Alive	750	5
8/10/2015	779	446657	6486203	Marri	Alive	730	5
8/10/2015	780	446644	6486186	Marri	Alive	550	5
8/10/2015	781	446636	6486177	Marri	Alive	820	5
8/10/2015	782	446631	6486174	Marri	Alive	660	5
8/10/2015	783	446599	6486148	Marri	Alive	1120	5
8/10/2015	784	446592	6486143	Wandoo	Alive	390	5
8/10/2015	785	446582	6486131	Marri	Alive	540	5
8/10/2015	786	446573	6486131	Marri	Alive	630	5
8/10/2015	787	446554	6486118	Wandoo	Alive	420	5
8/10/2015	788	446548	6486106	Wandoo	Alive	400	5
8/10/2015	789	446534	6486098	Wandoo	Alive	380	5
8/10/2015	790	446534	6486096	Marri	Alive	1340	5
8/10/2015	791	446518	6486083	Wandoo	Alive	480	5
8/10/2015	792	446502	6486073	Marri	Alive	690	5
8/10/2015	793	446490	6486070	Marri	Alive	520	5
8/10/2015	794	446495	6486056	Marri	Dead	680	4
8/10/2015	795	446461	6486041	Wandoo	Alive	1130	3
8/10/2015	796	446457	6486041	Marri	Alive	600	5
8/10/2015	797	446448	6486041	Wandoo	Alive	350	5
8/10/2015	798	446409	6486028	Marri	Alive	510	5
8/10/2015	799	446408	6486016	Marri	Alive	510	5
8/10/2015	800	446402	6486014	Marri	Alive	520	5
8/10/2015	801	446390	6486004	Jarrah	Alive	500	5
8/10/2015	802	446383	6486000	Marri	Alive	640	5
8/10/2015	803	446422	6485989	Wandoo	Alive	390	5
8/10/2015	804	446421	6485989	Wandoo	Dead	1050	3
8/10/2015	805	446410	6485986	Wandoo	Alive	840	3
8/10/2015	806	446382	6485974	Marri	Dead	530	5
8/10/2015	807	446366	6485973	Marri	Dead	830	3

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
8/10/2015	808	446355	6485967	Marri	Dead	760	5
8/10/2015	809	446352	6485961	Marri	Dead	790	5
8/10/2015	810	446369	6485944	Wandoo	Alive	470	5
8/10/2015	811	446380	6485951	Marri	Dead	690	5
8/10/2015	812	446349	6485937	Wandoo	Alive	550	5
8/10/2015	813	446333	6485890	Marri	Dead	920	5
8/10/2015	814	446325	6485887	Marri	Dead	670	5
8/10/2015	815	446295	6485864	Marri	Dead	780	3
8/10/2015	816	446274	6485833	Marri	Alive	880	5
8/10/2015	817	446268	6485828	Jarrah	Alive	560	5
8/10/2015	818	446247	6485813	Marri	Dead	720	3
8/10/2015	819	446238	6485798	Jarrah	Dead	700	5
8/10/2015	820	446230	6485807	Marri	Dead	800	5
8/10/2015	821	446226	6485786	Marri	Dead	740	4
8/10/2015	822	446223	6485781	Marri	Dead	590	5
8/10/2015	823	446225	6485775	Wandoo	Dead	610	5
8/10/2015	824	446220	6485771	Wandoo	Dead	550	5
8/10/2015	825	446217	6485770	Wandoo	Dead	460	3
8/10/2015	826	446185	6485762	Marri	Dead	630	5
8/10/2015	827	446184	6485754	Wandoo	Alive	310	5
8/10/2015	828	446173	6485721	Marri	Alive	780	5
8/10/2015	829	446148	6485707	Marri	Alive	690	5
8/10/2015	830	446133	6485703	Jarrah	Dead	730	5
8/10/2015	831	446122	6485699	Jarrah	Alive	710	5
8/10/2015	832	446116	6485713	Marri	Alive	880	5
8/10/2015	833	446122	6485726	Marri	Dead	560	5
8/10/2015	834	446113	6485723	Marri	Alive	570	5
8/10/2015	835	446139	6485720	Marri	Dead	690	5
8/10/2015	836	446086	6485680	Marri	Alive	530	5
8/10/2015	837	446113	6485668	Jarrah	Alive	600	5
8/10/2015	838	446112	6485665	Jarrah	Alive	730	5
8/10/2015	839	446098	6485656	Marri	Alive	550	5
8/10/2015	840	446098	6485599	UDE	Dead	1010	4
8/10/2015	841	446122	6485640	Marri	Dead	600	5
8/10/2015	842	446124	6485641	Wandoo	Alive	630	5
8/10/2015	843	446163	6485661	Marri	Dead	1120	5
8/10/2015	844	446241	6485759	Wandoo	Alive	430	5
8/10/2015	845	446265	6485784	Marri	Alive	590	5
8/10/2015	846	446319	6485838	Marri	Alive	560	5
8/10/2015	847	446375	6485869	Marri	Alive	1290	5
8/10/2015	848	446457	6485980	Marri	Alive	570	5
8/10/2015	849	446482	6486006	Marri	Alive	590	5
8/10/2015	850	446541	6486065	Marri	Alive	650	5
8/10/2015	851	446551	6486080	Marri	Alive	600	5
8/10/2015	852	446555	6486084	Marri	Alive	570	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
8/10/2015	853	446573	6486095	Marri	Alive	520	5
8/10/2015	854	446592	6486111	Marri	Alive	530	5
8/10/2015	855	446599	6486122	Marri	Alive	680	5
8/10/2015	856	446602	6486129	Marri	Alive	780	5
8/10/2015	857	446633	6486154	Marri	Dead	730	5
8/10/2015	858	446722	6486162	Marri	Alive	760	5
8/10/2015	859	446723	6486162	Marri	Alive	790	5
8/10/2015	860	446721	6486196	Wandoo	Alive	610	5
8/10/2015	861	446727	6486211	Wandoo	Alive	460	5
8/10/2015	862	446734	6486222	Wandoo	Dead	500	5
8/10/2015	863	446732	6486226	Wandoo	Alive	410	5
8/10/2015	864	446732	6486226	Marri	Alive	640	5
8/10/2015	865	446738	6486229	Wandoo	Alive	570	5
8/10/2015	866	446739	6486236	Wandoo	Alive	550	5
8/10/2015	867	446759	6486251	Marri	Alive	620	5
8/10/2015	868	446870	6486341	Wandoo	Alive	410	5
8/10/2015	869	446884	6486354	Wandoo	Alive	420	5
8/10/2015	870	446897	6486388	Wandoo	Alive	390	5
8/10/2015	871	446906	6486392	Wandoo	Alive	360	5
8/10/2015	872	446902	6486413	Wandoo	Alive	520	5
8/10/2015	873	446901	6486412	Wandoo	Alive	320	5
8/10/2015	874	446912	6486408	Wandoo	Alive	410	5
8/10/2015	875	446911	6486409	Wandoo	Alive	390	5
8/10/2015	876	446936	6486402	Wandoo	Alive	340	5
8/10/2015	877	446920	6486365	Marri	Alive	810	5
8/10/2015	878	446943	6486376	Marri	Alive	860	5
8/10/2015	879	446942	6486377	Marri	Dead	520	5
8/10/2015	880	446966	6486389	Marri	Dead	1070	4
8/10/2015	881	446982	6486396	Marri	Alive	670	5
8/10/2015	882	446963	6486429	Wandoo	Alive	580	5
8/10/2015	883	446981	6486434	Wandoo	Alive	370	5
8/10/2015	884	447008	6486417	Wandoo	Alive	380	5
8/10/2015	885	447021	6486418	Marri	Dead	620	5
8/10/2015	886	447021	6486424	Wandoo	Alive	310	5
8/10/2015	887	447031	6486422	Marri	Alive	590	5
8/10/2015	888	447040	6486425	Marri	Alive	860	5
8/10/2015	889	447051	6486437	Marri	Alive	670	5
8/10/2015	890	447061	6486477	Marri	Dead	580	5
8/10/2015	891	447062	6486493	Marri	Dead	740	5
8/10/2015	892	447097	6486453	Jarrah	Alive	680	5
8/10/2015	893	447122	6486467	Jarrah	Alive	1190	5
8/10/2015	894	447133	6486468	Jarrah	Dead	820	5
8/10/2015	895	447183	6486496	Jarrah	Alive	850	5
8/10/2015	896	447188	6486500	Jarrah	Alive	590	5
8/10/2015	897	447216	6486517	Marri	Alive	1020	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
8/10/2015	898	447230	6486518	Marri	Alive	920	5
8/10/2015	899	447267	6486532	Marri	Alive	1240	5
8/10/2015	900	447279	6486540	Jarrah	Alive	580	5
8/10/2015	901	447365	6486569	Marri	Alive	810	5
8/10/2015	902	447407	6486584	Jarrah	Alive	710	5
8/10/2015	903	447446	6486601	Jarrah	Alive	720	5
8/10/2015	904	447462	6486605	Jarrah	Alive	660	5
8/10/2015	905	447490	6486612	Marri	Alive	680	5
8/10/2015	906	447506	6486622	Marri	Alive	500	5
8/10/2015	907	447533	6486631	Wandoo	Alive	340	5
8/10/2015	908	447540	6486631	Wandoo	Alive	390	5
8/10/2015	909	447553	6486637	Jarrah	Alive	530	5
8/10/2015	910	447356	6486537	Marri	Alive	620	5
8/10/2015	911	447345	6486523	Marri	Alive	770	5
8/10/2015	912	447358	6486493	Jarrah	Alive	610	5
8/10/2015	913	447053	6486404	Jarrah	Dead	590	5
8/10/2015	914	447021	6486397	Marri	Dead	540	5
8/10/2015	915	446033	6485612	Marri	Dead	620	5
8/10/2015	916	446036	6485647	Jarrah	Dead	1030	5
8/10/2015	917	446026	6485642	Jarrah	Alive	690	5
8/10/2015	918	446014	6485629	Jarrah	Alive	1150	4
8/10/2015	919	446015	6485606	Marri	Alive	730	5
8/10/2015	920	446018	6485591	Marri	Alive	640	5
8/10/2015	921	446017	6485575	Jarrah	Alive	620	5
8/10/2015	922	445982	6485586	Marri	Alive	890	5
8/10/2015	923	445980	6485572	Wandoo	Alive	660	3
8/10/2015	924	445975	6485552	Jarrah	Alive	650	5
8/10/2015	925	445963	6485543	Jarrah	Alive	530	5
8/10/2015	926	445926	6485554	Marri	Dead	730	5
8/10/2015	927	445910	6485541	Marri	Dead	770	5
8/10/2015	928	445865	6485499	Wandoo	Alive	950	5
8/10/2015	929	445859	6485482	Wandoo	Alive	390	5
8/10/2015	930	445870	6485464	Wandoo	Alive	360	5
8/10/2015	931	445862	6485448	Wandoo	Alive	330	5
8/10/2015	932	445849	6485437	Wandoo	Alive	520	3
8/10/2015	933	445847	6485428	Wandoo	Alive	620	3
8/10/2015	934	445854	6485425	Wandoo	Alive	380	5
8/10/2015	935	445810	6485436	Wandoo	Alive	480	5
8/10/2015	936	445792	6485430	Jarrah	Alive	670	5
8/10/2015	937	445770	6485401	Jarrah	Alive	650	5
8/10/2015	938	445792	6485406	Jarrah	Alive	540	5
8/10/2015	939	445774	6485385	Wandoo	Alive	590	4
8/10/2015	940	445783	6485376	Marri	Alive	570	5
8/10/2015	941	445760	6485379	Jarrah	Dead	580	5
8/10/2015	942	445745	6485390	Jarrah	Alive	760	4

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
8/10/2015	943	445731	6485380	Jarrah	Alive	750	3
8/10/2015	944	445740	6485355	Jarrah	Alive	680	3
8/10/2015	945	445721	6485348	Marri	Alive	680	4
8/10/2015	946	445705	6485352	Jarrah	Alive	650	5
8/10/2015	947	445691	6485343	Marri	Alive	700	5
8/10/2015	948	445701	6485322	Marri	Alive	690	5
8/10/2015	949	445718	6485317	Jarrah	Alive	710	4
8/10/2015	950	445714	6485313	Marri	Alive	530	5
8/10/2015	951	445696	6485307	Marri	Alive	970	3
8/10/2015	952	445648	6485300	Marri	Dead	690	5
8/10/2015	953	445658	6485277	Marri	Alive	500	5
8/10/2015	954	445658	6485277	Wandoo	Alive	350	5
8/10/2015	955	445658	6485275	Marri	Alive	550	5
8/10/2015	956	445628	6485260	Wandoo	Alive	630	4
8/10/2015	957	445611	6485250	Wandoo	Alive	420	5
8/10/2015	958	445609	6485253	Wandoo	Alive	360	5
8/10/2015	959	445613	6485270	Wandoo	Alive	440	5
8/10/2015	960	445617	6485286	Wandoo	Alive	390	5
8/10/2015	961	445588	6485280	Wandoo	Alive	540	5
8/10/2015	962	445574	6485270	Wandoo	Alive	550	4
8/10/2015	963	445556	6485237	Jarrah	Alive	640	3
8/10/2015	964	445549	6485216	Wandoo	Alive	320	5
8/10/2015	965	445546	6485213	Wandoo	Alive	420	5
8/10/2015	966	445514	6485243	Jarrah	Dead	600	5
8/10/2015	967	445534	6485225	Jarrah	Alive	520	5
8/10/2015	968	445524	6485204	Jarrah	Alive	560	5
8/10/2015	969	445510	6485209	UDE	Dead	540	5
8/10/2015	970	445496	6485224	Jarrah	Dead	620	5
8/10/2015	971	445492	6485206	Jarrah	Alive	530	5
8/10/2015	972	445494	6485203	Jarrah	Alive	530	5
8/10/2015	973	445501	6485199	Jarrah	Alive	500	5
8/10/2015	974	445497	6485193	Jarrah	Alive	530	5
8/10/2015	975	445454	6485192	Jarrah	Dead	520	4
8/10/2015	976	445462	6485198	Wandoo	Alive	340	5
8/10/2015	977	445455	6485213	Marri	Alive	530	5
8/10/2015	978	445440	6485208	Jarrah	Dead	500	4
8/10/2015	979	445438	6485200	Wandoo	Alive	420	5
8/10/2015	980	445419	6485206	Wandoo	Alive	350	5
8/10/2015	981	445445	6485188	Jarrah	Dead	520	5
8/10/2015	982	445442	6485178	Wandoo	Alive	430	5
8/10/2015	983	445458	6485133	Wandoo	Alive	350	5
8/10/2015	984	445464	6485129	Wandoo	Alive	330	5
8/10/2015	985	445461	6485104	Wandoo	Alive	780	4
8/10/2015	986	445485	6485134	Wandoo	Alive	390	5
8/10/2015	987	445513	6485145	Wandoo	Alive	300	5

Date	Wypt No.	Easting	Northing	Species	Alive/Dead	DBH (mm)	Category
8/10/2015	988	445524	6485139	Marri	Dead	540	4
8/10/2015	989	445519	6485172	Marri	Dead	520	5
8/10/2015	990	445522	6485172	Wandoo	Alive	520	5
8/10/2015	991	445558	6485187	Wandoo	Alive	440	5
8/10/2015	992	445569	6485179	Wandoo	Alive	410	5
8/10/2015	993	445576	6485185	Wandoo	Alive	320	5
8/10/2015	994	445576	6485186	Wandoo	Alive	380	5
8/10/2015	995	445586	6485191	Wandoo	Alive	340	5
8/10/2015	996	445616	6485192	Marri	Dead	510	5
8/10/2015	997	445642	6485217	Wandoo	Alive	320	5
8/10/2015	998	445652	6485221	Wandoo	Alive	370	5
8/10/2015	999	445639	6485185	Wandoo	Dead	540	4
8/10/2015	1000	445649	6485200	Wandoo	Alive	410	5
8/10/2015	1001	445666	6485190	Wandoo	Alive	360	5
8/10/2015	1002	445671	6485205	Wandoo	Alive	340	5
8/10/2015	1003	445689	6485216	Wandoo	Alive	410	5
8/10/2015	1004	445688	6485221	Wandoo	Alive	370	5
8/10/2015	1005	445702	6485239	Jarrah	Alive	850	5
8/10/2015	1006	445714	6485270	Marri	Alive	780	5
8/10/2015	1007	445746	6485296	Marri	Alive	800	5
8/10/2015	1008	445771	6485322	Jarrah	Alive	690	5
8/10/2015	1009	445799	6485345	Jarrah	Alive	760	5
8/10/2015	1010	445822	6485365	Marri	Alive	680	5
8/10/2015	1011	445824	6485368	Marri	Alive	740	5
8/10/2015	1012	445865	6485401	Wandoo	Alive	370	5
8/10/2015	1013	445868	6485406	Wandoo	Alive	390	5
8/10/2015	1014	445868	6485374	Marri	Alive	790	5
8/10/2015	1015	445886	6485422	Marri	Alive	550	5
8/10/2015	1016	445894	6485428	Marri	Alive	550	5
8/10/2015	1017	445897	6485438	Wandoo	Alive	620	5
8/10/2015	1018	445905	6485441	Marri	Alive	520	5
8/10/2015	1019	445915	6485451	Wandoo	Alive	530	5
8/10/2015	1020	445936	6485474	Marri	Alive	680	5
8/10/2015	1021	445953	6485489	Wandoo	Alive	610	5
8/10/2015	1022	445960	6485496	Wandoo	Alive	400	5
8/10/2015	1023	445965	6485499	Wandoo	Alive	380	5
8/10/2015	1024	445977	6485509	Wandoo	Alive	310	5
8/10/2015	1025	446001	6485533	Marri	Alive	620	5
8/10/2015	1026	446028	6485550	Marri	Alive	500	5
8/10/2015	1027	446041	6485564	Wandoo	Alive	690	4
8/10/2015	1028	446064	6485585	Marri	Alive	770	5
8/10/2015	1029	446055	6485566	Marri	Dead	700	5

Appendix 6. Photographs of vegetation community types (Vegetation descriptions based on Terratree 2015).

Plate 1. Jarrah, Marri Open Woodland (J)

Plate 2. Jarrah open woodland (M)

Plate 3. Wandoo, Jarrah over Banksia (W)

Plate 4. Degraded wetland (D)

Plate 5. Blackbutt, Marri (B)

Plate 6. Marri, Jarrah (C)

Plate 7. Wandoo Woodland (S)

Plate 8. Isolated trees (Wandoo) over weeds, cleared land or crops (I)

Plate 9. Isolated trees (Marri) over weeds, cleared land or crops (I)