

# **Supplementary flora and fauna assessment, Picnic Point Subdivision.**

**Picnic Point,  
Lake Wonboyn,  
NSW**



**July 2010**

**lesr<sub>2</sub>ok**  
ENVIRONMENTAL  
CONSULTANTS

Cover photographs:

Photo top left: Eastern Grey Kangaroo – photo taken by infrared camera.

Photo right: Swamp Wallaby – photo taken by infrared camera..

Report prepared at the request of:

The Planning Group

On behalf of the

Picnic Point Pty Ltd

by

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*Please note that, given the dynamic nature of the relevant pieces of environmental legislation considered in this report, the authors consider that this report only has a 'shelf life' of six months. If a development application, review of environmental factors or statement of environmental effect is not submitted to a determining authority for consideration within this time frame, it is recommended that this report be reviewed and revised where required in light of any relevant legislative listings or changes.*

## **EXECUTIVE SUMMARY**

In response to comments received from the Department of Planning, supplementary investigations of the proposed Picnic Point subdivision have been undertaken. The investigation involved targeted surveys for the Koala (*Phascolarctos cinereus*), Southern Brown Bandicoot (*Isobon obesulus*) and Long-nosed Potoroo (*Potorous tridactylus*). The investigation also identified the number and location of those hollow-bearing trees present within both the easement of the proposed access track and powerline, and those areas likely to be indirectly affected by the proposed developments. The study also provided an indication of the number of hollow-bearing trees present throughout the remainder of the study area, and the percentage of these that would be cleared due to the undertaking of the works.

With reference to the obligations of Part 3A of the *Environmental Planning & Assessment Act 1979*, the assessments completed as part of this report identified that the proposal would have some adverse, permanent, irreversible impacts on the following threatened species listed as vulnerable on the *Threatened Species Conservation Act*: Yellow-bellied Glider, Greater Broad-nosed Bat, Glossy Black-Cockatoo, Gang-gang Cockatoo, Powerful Owl and Varied Sittella. To offset these impacts, it is proposed that 7.62 hectares of land be set aside in the south-west section of Portion 14 (i.e. west of the existing electricity easement and north of the southern boundary), this being managed in the long term for fauna and flora conservation. This area contains habitat suitable for all the threatened species affected by the proposal, including the provision of hollow-bearing trees. Securing habitat here would also provide a corridor for the movement of fauna from Portion 14 to bushland to the south and beyond.

The key issues raised by the Department of Planning are identified in Table 1, which also identifies the relevant response and section of this report where this matter is addressed.

**Table 1: Response to Issues of Concern from the Department of Planning**

| <b>Department of Planning Key Issues</b>             | <b>Response</b>                                                                                                                                                                                                                                                                | <b>Section of this report</b>               |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| <b>I – Flora and Fauna</b>                           |                                                                                                                                                                                                                                                                                |                                             |
| <b>a) Inadequate Surveys</b>                         |                                                                                                                                                                                                                                                                                |                                             |
| (i) power line and fire trails                       | By the completion of the current survey, combined with the April 2008 and June 2009 studies, all areas of likely impact have been adequately surveyed.                                                                                                                         | Section 2, Table 2 and Figure 1, 2 and 3.   |
| (ii) Core Koala Habitat                              | No areas of Core koala habitat are present. Some secondary feed trees occur. Though targeted during the current survey and previous April 2008 study, no individuals of this species were detected.                                                                            | Section 2.5, Table 2 & Figure 1.            |
| (iii) Ground dwelling fauna                          | Though targeted, no threatened ground dwelling fauna species were detected.                                                                                                                                                                                                    | Sections 2.2 & 2.3, Figures 1 & 2<br>LesryK |
| (iv) Extent of Surveying                             | All areas of likely impact have been adequately surveyed.                                                                                                                                                                                                                      | Figures 1, 2 & 3.                           |
| <b>b) hollow-bearing trees assessment</b>            | The location of hollow-bearing trees in relation to the proposed development was undertaken. Infrastructure easements have been adjusted in the latest plan (No. 0833B prepared by RW Surveying and Valuations) to minimise the removal of those hollow-bearing trees present. | Section 2.7 and Figure 4.                   |
| <b>c) Glider trees and Black Cockatoo Feed Trees</b> | Confusing over feed tree identifications was due to errors in the original mapping provided. This situation has been clarified and the species using                                                                                                                           | Section 2.7 and Figure 6.                   |

| Department of Planning Key Issues                              | Response                                                                                                                                                                                                                                                                  | Section of this report                                                            |
|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                                                                | those feed trees detected provided. Only one active Yellow-bellied Glider feed tree was recorded, this being present within the 75m set back zone. The remainder of the feed trees detected indicated the presence of the Glossy Black-cockatoo.                          |                                                                                   |
| <b>d) clearing of native vegetation</b>                        |                                                                                                                                                                                                                                                                           |                                                                                   |
| (i) proportion of retained vegetation                          | 94% of the site's vegetation would be retained.                                                                                                                                                                                                                           | Section 4.                                                                        |
| (ii) Map to illustrate clearing                                | Provided. This map illustrates the extent of potential clearing. n.b. not all 7000m <sup>2</sup> in each lot would be cleared/modified.                                                                                                                                   | Section 4 and Figure 4.                                                           |
| (iii) Clearing for roads                                       | This has been included in the calculations for the amount of clearing required.                                                                                                                                                                                           | Figure 4.                                                                         |
| <b>e) Part 3A Guidelines for Threatened Species Assessment</b> | Addressed.                                                                                                                                                                                                                                                                | Section 4.                                                                        |
| <b>f) Ecological Constraints</b>                               | Hollow-bearing trees were identified as the main constraint.<br><br>Though Endangered Ecological Communities are present, these occur outside of the area proposed for development or are present within those buffers established between the proposal and Wonboyn Lake. | Sections 2.7 and 3.2.6.<br><br>Plan 0833B prepared by RW Surveying and Valuations |
| <b>g) Restrictions to conserve EEC</b>                         | Addressed.                                                                                                                                                                                                                                                                | Section 4.                                                                        |

## 1.0 Introduction and background.

At the request of the Planning Group, on behalf of Picnic Point Pty Ltd, a supplementary investigation of the proposed Picnic Point subdivision site at Lake Wonboyn, New South Wales (NSW) has been undertaken. The additional surveys have been conducting to primarily provide additional information on the presence or absence of any threatened species, particularly the:

- Koala (*Phascolarctos cinereus*);
- Southern Brown Bandicoot (*Isodon obesulus*); and
- Long-nosed Potoroo (*Potorous tridactylus*).

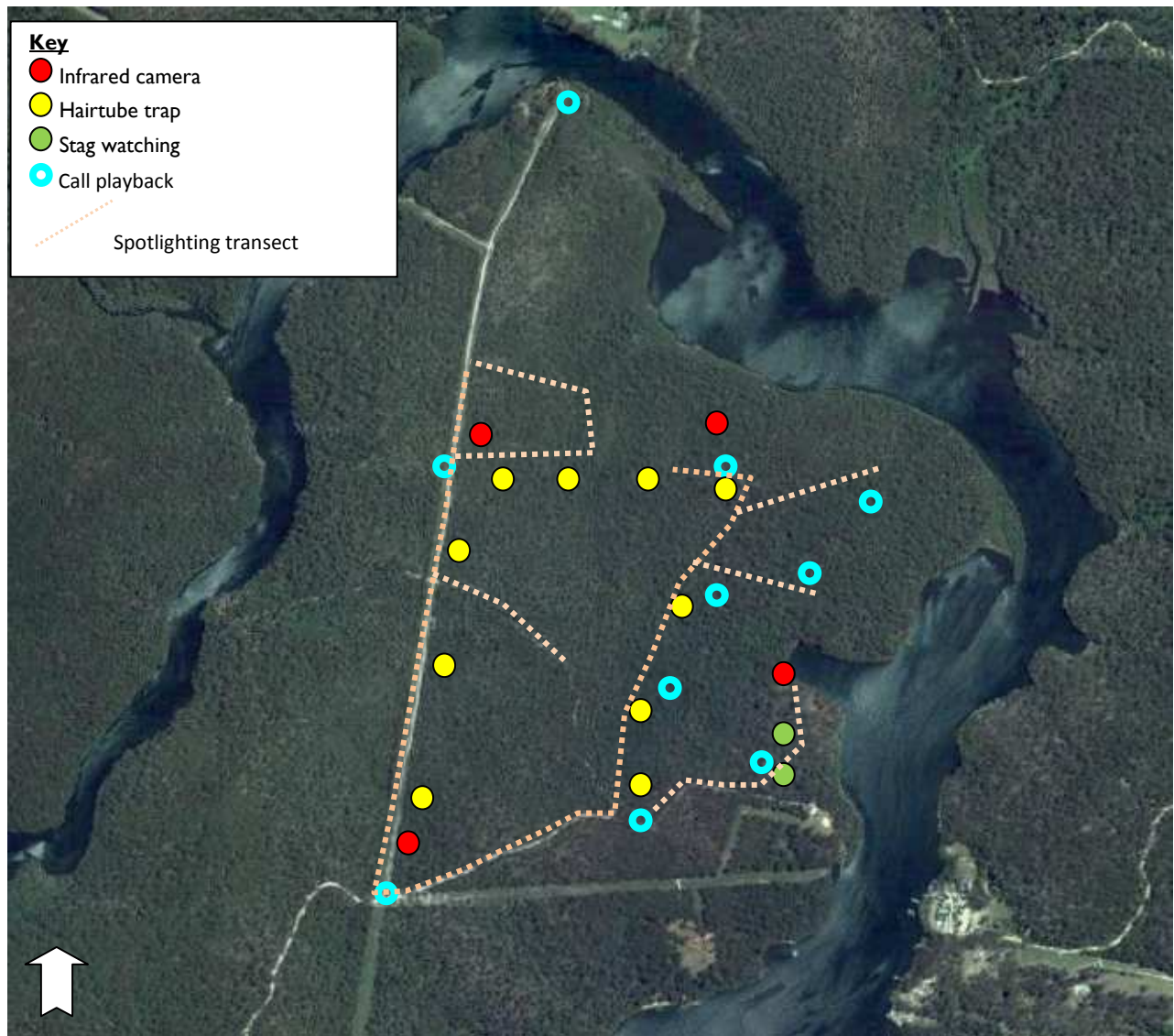
The investigation has also been undertaken to provide further information on both the distribution and abundance of those hollow-bearing trees present and the site's ground dwelling fauna.

## 2.0 Survey methods.

The supplementary surveys of the proposed subdivision area were undertaken by Paul Burcher (BApp. Sc), Stephen Bloomfield (BApp. Sc) and Deryk Engel (B.Env.Sc.HONS). For reference, the actual survey dates, weather conditions and methods employed during each investigation are provided in Table 1. Where required, detailed descriptions of the methods employed are provided below, whilst their locations are identified on Figure 1.

**Table 1:** Survey dates, methods and conditions.

| Date       | Researcher(s)            | Survey method(s) employed                                                                                                                                                        | Weather conditions                                                                                                                                                                                                    |
|------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 06/03/2010 | S.Bloomfield & P.Burcher | Placement of hairtubes and infrared cameras.<br>Direct and indirect observation of fauna species.<br>Stag watching.<br>Spotlighting.<br>Call playbacks.                          | Nocturnal - 24°, clear skies, and calm conditions.                                                                                                                                                                    |
| 07/03/2010 | S.Bloomfield & P.Burcher | Flora transects<br>Direct and indirect observation of fauna species.<br>Tree hollow mapping.<br>Stag watching.<br>Spotlighting.<br>Call playbacks.                               | Diurnal - 22°C, overcast skies, light drizzle, and calm conditions.<br><br>Nocturnal - 21°C, overcast skies, and strong NW winds.<br><br>It is noted that heavy rain fell later in the night after the survey period. |
| 08/03/2010 | S.Bloomfield & P.Burcher | Flora transects<br>Tree hollow mapping.                                                                                                                                          | Diurnal -                                                                                                                                                                                                             |
| 15/03/2010 | D.Engel                  | Direct and indirect observation of fauna species.<br>Tree hollow mapping.<br>Stag watching.<br>Spotlighting.<br>Call playbacks.                                                  | Diurnal – 18°C, clear skies, and calm.<br><br>Nocturnal - 19.6°C, clear skies, and NE breezes.                                                                                                                        |
| 16/03/2010 | D.Engel                  | Collection of hairtubes and infrared cameras.<br>Direct and indirect observation of fauna species.<br>Tree hollow mapping.<br>Stag watching.<br>Spotlighting.<br>Call playbacks. | Diurnal – 20°C, clear skies, light NW breezes.<br><br>Nocturnal - 22°C, clear skies, and NE breezes.                                                                                                                  |



Not to scale. Source: Google maps (2010)

Note: Symbols are only indicative of actual survey locations.

**Figure 1:** Fauna survey locations.

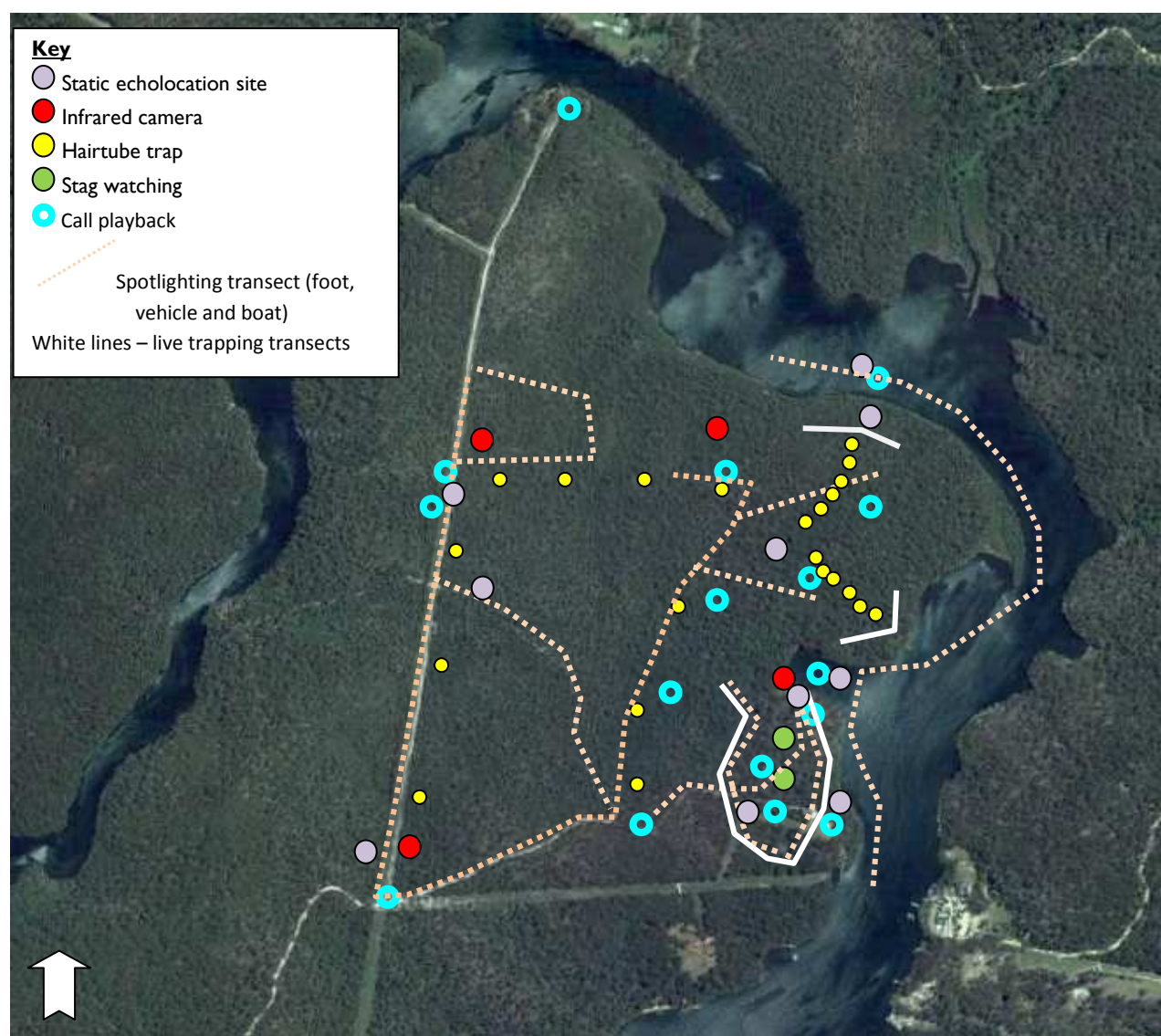
The survey methods employed during the field investigations were generally based on the descriptions provided in the Department of Environment and Conservation's (now known as Department of Environment, Climate Change and Water [DECCW]) 2004 publication titled "*Threatened biodiversity survey and assessment: Guidelines for developments and activities (Working Draft)*". It is noted that the DECCW guidelines do not provide advice on the use of infrared cameras. Therefore information on the use of these camera was sourced from the scientific literature (refer to bibliography) and discussions held with Mr Alan Campbell of Bernview Environmental Consultants (through whom the three Reconyx™ units were hired).

It is noted that a number of the survey methods employed during the current investigation were also employed during the April 2008 study, these being direct and indirect observation of those fauna species present, spotlighting, call playbacks targeting Koalas (*Phascolarctos cinereus*) and other nocturnal species and hairtube trapping.

Table 2 presents the survey effort employed during each site investigation and a cumulative total. A composite figure of the methods employed during each investigation, and therefore extent of site coverage, is also provided (Figure 2).

**Table 2:** Cumulative survey effort.

| Method                             | 2008 survey                   | 2010 survey                               | Total effort             |
|------------------------------------|-------------------------------|-------------------------------------------|--------------------------|
| Hairtube trapping                  | 36 trap nights                | 100 trap nights                           | 136 trap nights          |
| Live trapping – Elliotts and cages | 308 trap nights               | <i>Technique not employed<sup>1</sup></i> | 308 trap nights          |
| Harp trapping                      | 4 nights                      | <i>Technique not employed</i>             | 4 nights                 |
| Echolocation                       | 95 hours                      | <i>Technique not employed</i>             | 95 hours                 |
| Infrared cameras                   | <i>Technique not employed</i> | 4 cameras for ten nights                  | 4 cameras for ten nights |
| Call playbacks                     | 4 hours and 30 minutes        | 3 hours and 20 minutes                    | 7 hours and 50 minutes   |
| Spotlighting                       | Approx 16 person hours        | Approx 3 person hours                     | Approx 19 person hours   |



Not to scale. Source: Google maps (2010)

Note: Symbols are only indicative of actual survey locations.

**Figure 2:** Composition of sites surveyed during the April 2008 and March 2010 investigations.

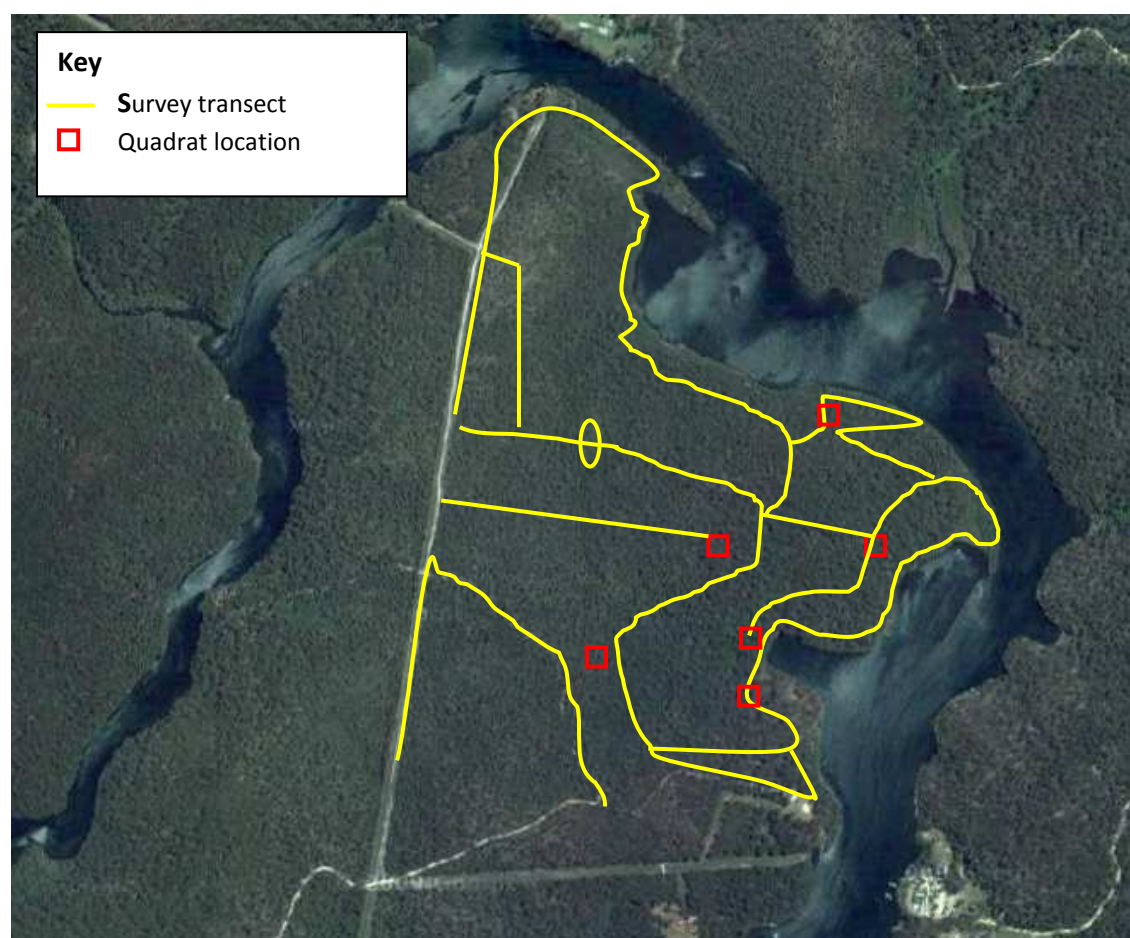
<sup>1</sup> This technique was not employed as it was beyond the scope of the works required.

## 2.1. Botanical.

In response to the comments made by the DECCW and the Department of Planning (DOP), additional flora surveys were conducted in those areas likely to be affected by the alignments of the proposed powerline easement and fire trail. Notes were made of the structure and species composition of the vegetation affected by these components of the proposed subdivision. It is considered that this survey along with the original April 2008 study has adequately covered all areas of potential impact including proposed power lines, fire trails, building footprints, services to dwellings, asset protection zones and effluent management areas. Figure 3 indicates the areas that have been surveyed during each of the two field inspections.

It is noted that a hazard reduction burn has been carried out within a portion of the subject site prior to the current survey being undertaken. This hazard reduction was undertaken to the east of the existing transmission line and west of the proposed access track. The undertaking of the hazard reduction burn would have reduced the abundance and diversity of flora present in this portion of the site to some degree. Conversely, the fire and subsequent rain would have improved the ability to detect cryptic, terrestrial orchids and some other groundcover species.

In addition to the flora transects conducted along the fire trail and powerline easement, a survey was undertaken of the estuarine-influenced vegetation that is present in the north of Portion 14 and in the adjacent Portion 11, which is under the same ownership. Notes were made of the structure, species composition and extent of the vegetation present.



Not to scale. Source: Google maps (2010)

**Figure 3:** Areas surveyed for flora species and vegetation communities during the April 2008 and March 2010 investigations (Note: Symbols are only indicative of actual survey locations).

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## 2.2. Infrared cameras.

Three Reconyx™ and one Scout Guard™ infrared cameras were established at a various locations within the study area (refer to Figure 1). These cameras all employ active infrared (AIR) systems, this requiring an animal to “break” an invisible “beam”. The cameras operate diurnally and nocturnally. The four cameras were all placed out on the site on the 6<sup>th</sup> of March and collected ten days later. They were generally situated in close proximity to animal trails, or features likely to be used by nocturnal species (e.g. patches of new grass growth [within the hazard reduction area], logs, fungi, termite mounds and so forth). All cameras were set to a sensitivity of high and a photo interval of 3/ten seconds. The cameras were placed at a height of around 1.5 metres above ground level and angles slightly downwards (as per the directions provided in the unit’s instruction manual).



**Plate 1:** Approximate layout of the Infrared camera set up.

To entice animals into the camera’s field of view, lures scented with truffle oil were used. These were placed at a distance of around 5m in front of the camera and secured to the ground by a large steel peg (Plate 1). This distance was selected as it is within the unit’s motion detector coverage range. The lures are constructed from 250mm long PVC piping, into which has been drilled a number of holes. Foam is placed in the piping and into this the truffle oil is poured.

The cameras were placed at:

- Camera 1: Easting [E] - 759675<sup>2</sup>; Northing [N] - 5875282;
- Camera 2: E - 759779; N - 5975692;
- Camera 3: E - 759748; N - 5875037; and
- Camera 4: E - 759061; N - 5876032.

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<sup>2</sup> Global Positioning System (GPS) system used is GDA 94. Accuracy ranged from 3m to 15m depending on the density of the canopy cover.

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When collecting the cameras, efforts were made to ensure that a photograph of the researcher was taken. Based on a review of the date stamp, it was therefore possible to determine if the cameras were still operating at the time of collection.

### **2.3. Hairtube trapping.**

In addition to the infrared cameras, to targeted ground dwelling fauna, ten Faunatech™ hairtubes were used. These were placed at a number of locations within the study area (refer to Figure 1), all being set on the 6<sup>th</sup> of March. The traps were baited with “the standard” rolled oats, peanut butter and honey mixture, truffle oil also being spread on top of several of these. The traps were all collected on the 16<sup>th</sup> of March, with any hairs obtained being sent to Ms Georgeanna Story of “Scats About” (Majors Creek, NSW) for analysis.

The hairtubes were placed at:

- Hairtube 1: E - 759673; N - 5875593;
- Hairtube 2: E - 759593; N - 5875548;
- Hairtube 3: E - 759454; N - 5875266;
- Hairtube 4: E - 759420; N - 5875101;
- Hairtube 5: E - 759412; N - 5874996;
- Hairtube 6: E - 759038; N - 5875766;
- Hairtube 7: E - 759244; N - 5875747;
- Hairtube 8: E - 758965; N - 5875547;
- Hairtube 9: E - 758942; N - 5875425; and
- Hairtube 10: E - 758901; N - 5875123.

By the completion of the study, 100 trap nights had been accumulated.

### **2.4. Stag watching.**

Stag watching involves a researcher being present on site approximately half an hour before dusk (this, at the time of the field survey, being around 19:43 hours). A position is selected where a researcher can watch four to five hollow-bearing trees. The researcher endeavoured to observe any movement on those trees watched, or to identify any territorial calls that are broadcast as a species exits their diurnal sheltering sites. The researcher remains on site for approximately thirty minutes after nightfall.

In addition to identifying those species exiting the hollow-bearing trees surveyed, stag watching was undertaken to “accurately” locate/confirm the tree being used by the Yellow-bellied Gliders (*Petaurus australis*) as a den site. As such, stag watching was undertaken in the area where the April 2008 study indicated the den tree was likely to be located.

For reference, the GPS coordinates of the stag watching locations are:

- Stag watch (06/03/10) a: E - 759693, N - 5875041;
- Stag watch (06/03/10) b: E - 759669; N - 5875186;
- Stag watch (07/03/10) c: E - 759693, N - 5875041;
- Stag watch (07/03/10) d: E - 759669; N - 5875186;
- Stag watch (15/03/10) e: E - 759712; N - 5875073; and
- Stag watch (16/03/10) f: E - 759748; N - 5875037.

### **2.5. Call playbacks.**

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Call playbacks targeting the presence of the Koala were undertaken at eleven locations (Figure 1). For reference, the GPS coordinates of the playback sites are:

- Call playback (06/03/10) a: E - 759693, N - 5875041 (commenced broadcasting at 20.10 hours [hr]);
- Call playback (06/03/10) b: E - 759447, N - 5875241 (20.30hr);
- Call playback (07/03/10) c: E - 759693, N - 5875041 (20.20hr);
- Call playback (07/03/10) d: E - 759224, N - 5876580 (20.40hr);
- Call playback (15/03/10) e: E - 759419; N - 5874947 (20.10hr, included owls);
- Call playback (15/03/10) f: E - 758813; N - 5874810 (20.40hr);
- Call playback (15/03/10) g: E - 759000; N - 5875887 (21.10hr);
- Call playback (16/03/10) h: E - 759761; N - 5875670 (20.25 hr);
- Call playback (16/03/10) i: E - 759982; N - 5875675 (20.58hr, included owls);
- Call playback (16/03/10) j: E - 759832; N - 5875401 (21.32hr); and
- Call playback (16/03/10) k: E - 759465; N - 5875346 (22.05hr).

The call playback sessions involved broadcasting characteristic calls of the Koala through a loud hailer that was connected to a CD player. Prior to undertaking the call playbacks, a ten minute listening period was undertaken to determine if the species was present. The calls (which were taken from Stewart 1999) were then broadcast for 5 minutes. To detect any responses to the call playbacks, a ten minute listening period was undertaken subsequent to the call playback.

In addition to the Koala, characteristic calls of the Powerful Owl, Barking Owl, Masked Owl and Sooty Owl were also broadcast through the loud hailer at two of the call playback sites. The calls of these owls were taken from Buckingham and Jackson 1990 and all lasted for 5 minutes per species. As with the Koala playback locations, ten minute listening periods were undertaken prior to, and after, each call playback session.

The Yellow-bellied Glider was not targeted during the call playback sessions as this species is:

- a) known from the site;
- b) known to call in response to the broadcasting of owl calls; and
- c) was heard calling during each of the stag watching sessions.

## **2.6. Spotlighting.**

During the nocturnal surveys, spotlighting (using 163 lumen hand-held spotlights) was undertaken. Spotlighting was undertaken either on foot or by motor vehicle, with tracks, clearings and access ways being targeted (Figure 1). These environments were targeted to reduce the disturbance of those species present (i.e. through adverse noise generated by pushing through vegetation, stumbling over logs or crunching leaf litter and ground debris). The spotlighting sessions lasted from 30 to 60 minutes and were undertaken when traversing between the call playback sites, or once that component of the study had been completed.

By the completion of this component of the field investigation, approximately 3 person hours of spotlighting had been accumulated.

## **2.7. Identification of hollow-bearing trees.**

To identify the location of hollow-bearing trees in the vicinity of the proposed fire trail, overhead power line and access tracks, their proposed alignments and up to 20m either side was surveyed. Grid references were taken of any hollow-bearing trees observed so that alignments could be adjusted to minimise the removal of hollow-bearing trees.

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Additionally, six 50m by 50m quadrats were randomly established to provide an indication of the “density” of hollow-bearing trees present within the study area (Figure 4). Within these quadrats, the number of hollow-bearing trees present was identified.

The average number of hollow-bearing trees recorded within the six quadrats can be used to estimate (give an indication of) the number of hollow-bearing plants present throughout the entire subject site. By identifying this, the number of hollow-bearing trees being lost due to the undertaking of the subdivision and subsequent development can be put into context.

## **2.8. Direct and indirect observations of fauna species.**

Whilst traversing the study area, any fauna species observed, heard or indirectly indicated (i.e. via scats, tracks or tell-tale signs) were noted. Targeted searches for Koala scats were undertaken under a number of secondary Koala feed trees present (*Eucalyptus bosistoana*, *E.cypellocarpa* & *E.consideniana*), whilst any accumulations of crushed Casuarina cones (an indicative sign of the foraging activities of the Glossy Black-Cockatoo [*Calyptorhynchus lathamii*]) were noted. Any carnivore scats that contained bone or hair material were collected and sent to Ms Georgeanna Story for analysis. Whilst predators can traverse long distances during the course of their foraging patterns, for the purposes of this study, any species identified through the analysis of those scats collected are considered to constitute resident populations.

## **3.0 Survey results.**

### **3.1. Flora survey.**

The flora survey found that an area of heath dominated by regrowth of Scented Paperbark (*Melaleuca squarrosa*) to 0.25 metres tall occurs along a drainage depression in the north of the site. Associated species are Rapier Sedge (*Lepidosperma forsythii*), Spreading Rope-rush (*Empodisma minus*), *Selaginella uliginosa* and (*Leptospermum continentale*). Prior to the recent hazard reduction burn, this vegetation would have been denser and taller. It becomes so further north along the drainage line near the northern boundary in an area less affected by the fire. Here there is Scented Paperbark to four metres tall with a dense understorey of Saw Sedge (*Gahnia clarkei*) to two metres.

As noted in the previous report, vegetation communities dominated by Scented Paperbark have a naturally restricted distribution and clearing of them should be avoided where possible. The Scented Paperbark Heath would be traversed by the proposed powerline easement. However, it is considered unlikely that this community would be affected by installation of the powerline as it has no canopy and can readily be traversed by placing poles either side of its limits.

In the revised vegetation map (Figure 5) there are also some minor changes to other community boundaries. Some additional flora species were detected during the recent survey and are included in the revised flora species list (Appendix 1). None of these species are of conservation significance. Similarly, none are currently being considered for listing under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and/or NSW *Threatened Species Conservation Act 1995*.

The supplementary survey of Portion 11 found that it contains significant areas of Swamp Paperbark Scrub (near the estuary and Portion 11's boundary with Portion 14), Saltmarsh and Bracelet Honeymyrtle Scrub (both east of Picnic Point).

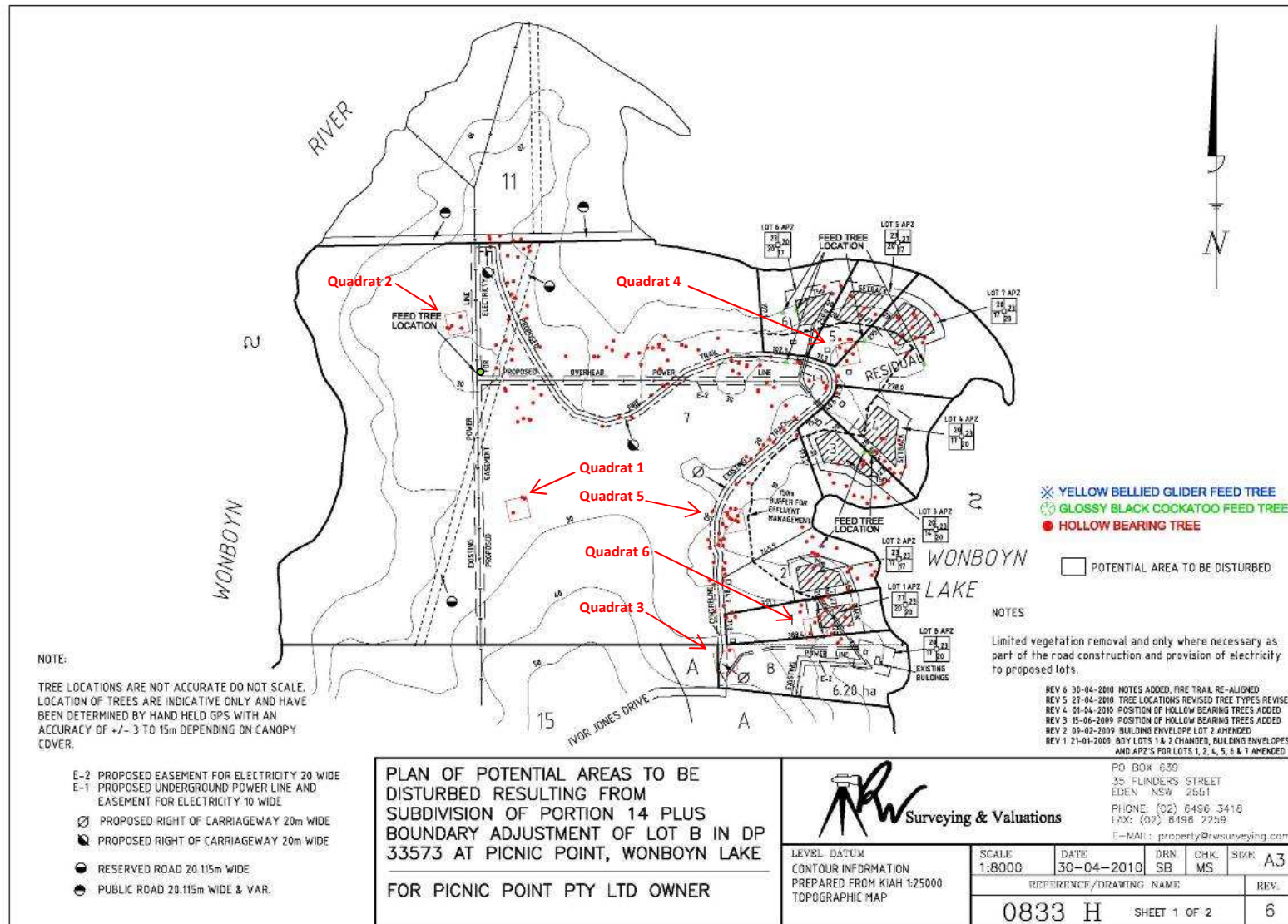


**Figure 4:** Location of the hollow-bearing tree survey quadrats, feed trees and hollow-bearing trees recorded.

**Figure 5. Vegetation Communities**

**Legend**

 Silvertop Ash – Red Bloodwood Woodland

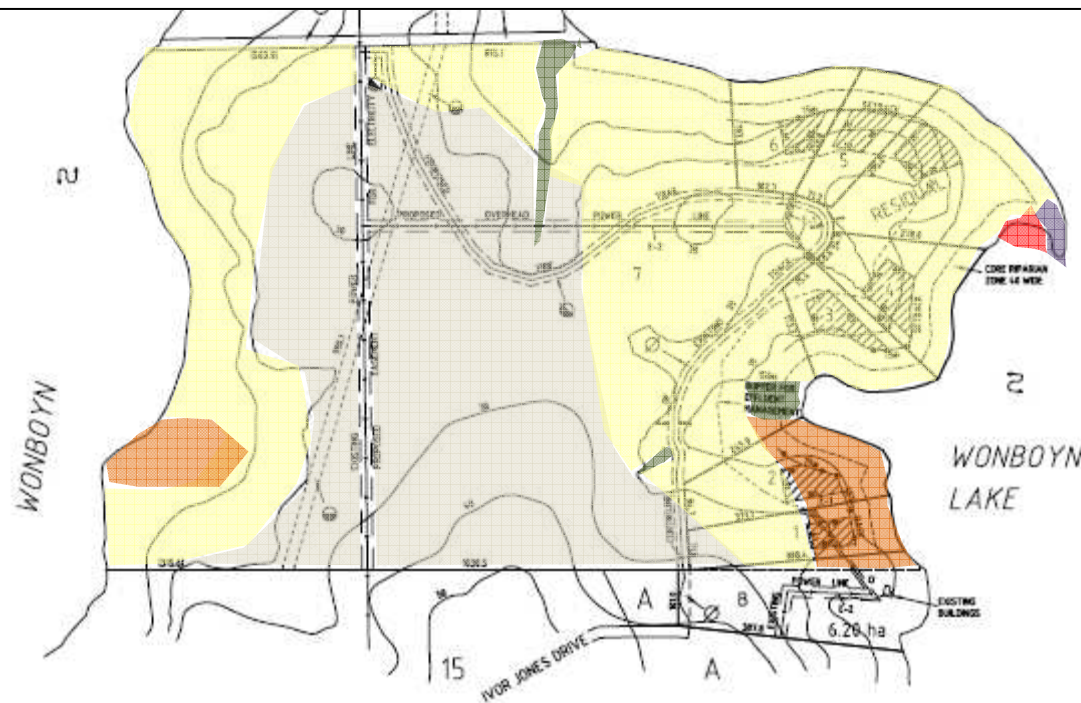
 White Stringybark – Rough-barked Apple – Silvertop Ash Woodland

 Saltmarsh

 Coast Grey Box – Woollybutt – White Stringybark  
Tall Open Forest

 Scented Paperbark Heath/Scrub/Closed Scrub

 Bracelet Honey-myrtle Scrub



| SCHEDULE OF AREAS |          |
|-------------------|----------|
| LOT No.           | AREA     |
| 1                 | 3.28 ha  |
| 2                 | 4.58 ha  |
| 3                 | 3.22 ha  |
| 4                 | 4.07 ha  |
| 5                 | 2.83 ha  |
| 6                 | 3.54 ha  |
| 7                 | 107.8 ha |

● DENOTES STAKE PLACED  
 PROPOSED BUILDING ENVELOPE

E-2 PROPOSED EASEMENT FOR ELECTRICITY 20 WIDE  
 E-1 PROPOSED UNDERGROUND POWER LINE AND  
 EASEMENT FOR ELECTRICITY 10 WIDE  
 PROPOSED RIGHT OF CARRIAGEWAY 20m WIDE  
 PROPOSED RIGHT OF CARRIAGEWAY 20m WIDE  
 RESERVED ROAD 20.15m WIDE  
 PUBLIC ROAD 20.115m WIDE & VAR.

PLAN OF PROPOSED TORRENS TITLE  
 SUBDIVISION OF PORTION 14 PLUS  
 BOUNDARY ADJUSTMENT OF LOT B IN  
 DP 33573 AT PICNIC POINT,  
 WONBOYN LAKE

FOR PICNIC POINT PTY LTD OWNER



Surveying & Valuations

PO BOX 639  
 35 FLINDERS STREET  
 EDEN NSW 2501  
 PHONE: (02) 6496 3418  
 FAX: (02) 6496 2259  
 E-MAIL: property@rswsurveying.com

LEVEL DATUM  
 CONTOUR INFORMATION  
 PREPARED FROM KIAH 1:25000  
 TOPOGRAPHIC MAP

| SCALE                  | DATE       | DRAWN | CHECK | SIZE |
|------------------------|------------|-------|-------|------|
| 1:8000                 | 30-04-2010 | SB    | MS    | A3   |
| REFERENCE/DRAWING NAME |            |       |       | REV. |
| 0833 B                 |            |       |       | 18   |
| SHEET 1 OF 2           |            |       |       |      |

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### 3.2. Fauna survey.

#### 3.2.1. Infrared cameras

Images obtained through use of the infrared cameras identified the presence of the:

- Eastern Grey Kangaroo (*Macropus giganteus*);
- Swamp Wallaby (*Wallabia bicolor*);
- Common Brushtail Possum (*Trichosurus vulpecular*); and
- Fox (*Vulpes vulpes*).

For reference, select images obtained are provided in Appendix 2.

All of these species were recorded within, and beyond the subject site, during the April 2008 study.

#### 3.2.2. Hairtube trapping.

Hair samples were obtained from two of the hairtube traps placed out on site (trap numbers 1 and 9). Analysis of these identified the presence of the Fox (trap 1) and Agile Antechinus (*Antechinus agilis*) (trap 9). As with the species identified through use of the infrared cameras, both of these animals were recorded within the study area during the April 2008 study.

In addition, a hair sample found snagged on some ground debris was collected and sent for analysis. Analysis of this indicated the presence of the Common Ringtail Possum (*Pseudocheirus peregrinus*), an animal that was also recorded on site during the April 2008 survey.

#### 3.2.3. Stag watching.

On dusk during the stag watching session undertaken on the 15<sup>th</sup> of March, insectivorous bats (microchiropterans) were observed hawking above the researcher. Although not observed leaving any of those trees being stag-watched, it is assumed that they were roosting close to the researcher's position, as these animals were present on dusk. In addition, a Common Brushtail Possum was seen exiting a hollow-bearing tree.

At least two Yellow-bellied Gliders (*Petaurus australis*) were heard calling on dusk. These calls originated to the south east of the researcher's position, in the vicinity of a large hollow-bearing tree. During the subsequent diurnal investigation of this area, only one hollow-bearing tree was recorded, this being located at E – 759796; N – 5875035. This location is situated approximately 200m north of an existing dwelling and is located within the proposed 75m set back area (refer to Figure 6 of this report). The stag watching session undertaken on the evening of the 16<sup>th</sup> of March confirmed the use of this plant as a Yellow-bellied Glider den site, calls of this species emanating from this tree on dusk.

The location of the Yellow-bellied Glider den is consistent with the findings/observations made during the April 2008 study. During the April 2008 investigation, the den (roost) tree was identified "within the southern portions of Lot 1" (LesryK Environmental Consultants 2008 page 31). An indicative location of this den (roost) tree was provided on Figure 6 of the April 2008 report.

As noted, in the April 2008 study Yellow-bellied Gliders were recorded to the south and west of the existing dwelling (refer to Figure 6 of the April 2008 report). Gliders were also recorded to the north of this house during both the previous and current investigations. It is therefore considered that the presence of the existing dwelling, combined with the occurrence of sufficiently tall trees that permit the gliding movements of this animal, is not affecting the occurrence of the local Yellow-bellied Glider population. Based on the survey results, it appears that the Yellow-bellied Glider is tolerant of urban dwellings as long as suitable sheltering, foraging and movement corridors are maintained around and near to these structures. This finding is supported by similar observations made by the authors in regards to the occurrence of this species at other locations within its known distribution range, these supporting the view that the Yellow-bellied Glider is

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tolerant of semi-rural developments (LesryK Environmental Consultants 1996, LesryK Environmental Consultants 2004, LesryK Environmental Consultants 2009a, LesryK Environmental Consultants 2009b).

Microchiropterans were again observed on dusk during the stag watching session undertaken on the 16<sup>th</sup> of March. During this session, no additional animals were observed exiting, or in association with, those trees being stag watched.

During the stag watching session undertaken on the 15<sup>th</sup> of March, a Southern Boobook Owl (*Ninox novaeseelandiae*) and a White-throated Nightjar (*Eurostopodus mysticalis*) were heard calling. These nocturnal birds were also heard during the stag watching session undertaken on the 16<sup>th</sup> of March. In addition, the Sugar Glider (*Petaurus breviceps*) was heard calling and a Common Brushtail Possum spotlit.

#### **3.2.4. Call playbacks.**

No Koalas responded to the call playbacks. Similarly none were recorded on the site whilst undertaking the call playbacks during the April 2008 investigation. During both investigations, no Koalas were spotlit or heard calling.

Furthermore, no tree species listed as primary feed trees on the South Coast in the recovery plan for this species (DECC 2008) nor any listed on Schedule 2 of *State Environmental Planning Policy No.44- Koala Habitat Protection* occur in the study area. Three tree species listed in the recovery plan as secondary Koala feed trees occur in the study area. These are Coast Grey Box (*Eucalyptus bosistoana*), Mountain Grey Gum (*E.cypellocarpa*) and Yertchuk (*E.consideniana*). No characteristic Koala scats were observed under any of these secondary feed trees. As such, it is considered that this species is not present within the study area.

During the call playback session undertaken on the 16<sup>th</sup> of March (at call playback site i), two Powerful Owls responded (presumably a breeding pair defending their territory). These birds were heard responding/calling from the northern site of Wonboyn River, the individuals not actually being seen or heard calling from the residual Lot or Lot 5. Though a new “detection” location for this species within the study area, it is noted that the Powerful Owl was recorded on site during the April 2008 investigation. This species was heard calling west of the transmission line that runs through the centre of the property, a distance of around 1.2km west of the current detection location. Pairs of Powerful Owls are believed to have high fidelity to a small number of hollow-bearing nest trees and will defend a large home range of 400-1450 hectares (ha) (DECCW 2010a). The area present on the peninsula of land surveyed covers an area of around 190ha, the study area itself being approximately 135ha in size. As such, it is highly likely that the individuals “called up” are the same pair that was detected during the April 2008 study.

During the call playbacks, none of the other threatened owls responded and none were heard calling or spotlight.

#### **3.2.5. Spotlighting.**

The following species were observe or heard calling during the spotlighting sessions:

- Eastern Grey Kangaroo (spotlight on road verge);
- Common Wombat (*Vombatus ursinus*) (spotlight crossing track);
- Common Ringtail Possum (spotlight in tree);
- Common Brushtail Possum (spotlight in tree); and
- Southern Boobook (*Ninox novaeseelandiae*) (heard calling).

All of these species were recorded on site during the April 2008 investigation.

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### 3.2.6. Hollow-bearing trees.

In excess of 180 hollow-bearing trees were identified during the course of the field investigation. It is noted that these trees are only those that occur either side (for a distance of up to 20m) of the proposed fire trail, overhead power line and access track. Beyond this distance, and at other locations within the study area, it is noted that other-hollow-bearing trees are present.

For reference, Appendix 3 provides details on a number of those hollow-bearing trees recorded adjacent to the proposed access track. This appendix identifies:

- the trees distances from the likely centreline of the access track;
- the side of the track the tree was observed;
- the number of hollows present;
- the diameter of those hollows present; and
- whether the tree was alive or dead.

As several of the hollow-bearing trees are dead and do occur close to the proposed access track, and as there is the potential for these to present a safety risk should they fall on the track's pavement, it is expected that these plants would require removal at some stage should the subdivision proceed as planned.

In addition to those trees recorded during the current investigation, 37 hollow-bearing trees were recorded and mapped during a previous survey of the site (LesryK Environmental Consultants 2008).

The locations of all hollow-bearing trees recorded by the authors in or near proposed infrastructure easements are provided on Figure 4.

Results of the quadrat counts are provided in Table 3. The results indicate that, within the study area, there is an average of 4.3 hollow-bearing trees per 0.25ha (or 17.2 hollow-bearing trees/hectare). As mentioned the study area is around 135ha in size. Therefore, within this area, there are around 2322 hollow-bearing trees. The development of the subdivision lots, access tracks, powerline easements, asset protection zones and so forth would require the removal of around 45 hollow-bearing trees, this totalling around 2% of all hollow-bearing trees present.

**Table 3:** Results of tree hollow counts in the six quadrats surveyed.

| Quadrat | Coordinate of north eastern corner |          | Number of tree hollows present |
|---------|------------------------------------|----------|--------------------------------|
|         | Easting                            | Northing |                                |
| 1       | 759038                             | 5875493  | 3                              |
| 2       | 758990                             | 5875952  | 5                              |
| 3       | 759442                             | 5875038  | 1                              |
| 4       | 759877                             | 5875688  | 5                              |
| 5       | 759531                             | 5875358  | 9                              |
| 6       | 759666                             | 5875071  | 3                              |

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### 3.2.7. Incidental observations.

Appendix 4 identifies those species observed, heard calling or indicated whilst traversing the site. Of those native species recorded, the following six were not detected during the course of the initial April 2008 investigation, the:

- Common Bronzewing (*Phaps chalcoptera*);
- Fan-tailed Cuckoo (*Cuculus flabelliformis*);
- White-throated Nightjar (*Eurostopodus mysticalis*);
- White-throated Needletail (*Hirundapus caudacutus*);
- Varied Sittella (*Daphoenositta chrysoptera*); and
- Jacky Lizard (*Amphibolurus muricatus*).

It is noted that:

- The White-throated Needletail is listed as a migratory bird under the *EPBC Act*; and
- The Varied Sittella is listed as Vulnerable under the *TSC Act*. In regards to this species, it is noted that it was listed under the *TSC Act* subsequent to the completion of the April 2008 study.

Information on these two species is provided below.

In addition to the White-throated Needletail and Varied Sittella, the following threatened species were again recorded within the study area:

- The Powerful Owl;
- Yellow-bellied Glider; and
- Glossy Black-Cockatoo.

As mentioned, two Powerful Owls were heard to respond to the call playbacks undertaken at site i (E – 759982; N – 5875675) and Yellow-bellied Gliders were heard calling during the stag watching sessions. A Glossy Black-Cockatoo was heard calling from within a stand of woodland whose understorey is dominated by Casuarinas, this being present at E – 759712; N – 5875632. In addition, accumulations of crushed Casuarina cones were observed at the following locations:

- E – 759704; N – 5875674;
- E – 760022; N – 5875602;
- E – 759840; N – 5875427; and
- E – 759857; N – 5875423.

The four feed tree sites (which are identified on both Figures 4 and 6) are “new” locations where evidence supporting the onsite occurrence of the Glossy Black-Cockatoo was obtained. During the April 2008 investigation, Glossy Black-Cockatoo feed trees were also observed near Sites 5 and 6, and adjacent to the existing transmission line (refer to Figure 4).

During both the April 2008 study, and current investigation, no evidence was obtained to suggest that the Glossy Black-Cockatoo was breeding within the area surveyed. During both investigations, no Glossy Black-Cockatoos were seen entering, exiting or roosting on a hollow-bearing tree.

For reference the locations where all threatened species recorded or indicated during the current investigation are identified on Figure 6.



Not to scale. Source: Google maps (2010)

**Figure 6:** Indicative locations where threatened species were recorded.

In regards to the Yellow-bellied Glider feed tree identified during the April 2008 study, it is noted that this was still being used, with “active” incisions evident.

The impact of the proposed subdivision on the Powerful Owl, Yellow-bellied Glider and Glossy Black-Cockatoo was considered during the course of the April 2008 study. As hollow-bearing trees are to be retained and buffer areas/vegetation links included in the proposed subdivision layout, it is not considered that any of these species would be adversely affected such that the local viability of their populations would be significantly affected.

Though targeted, no ground-dwelling threatened fauna species were recorded during the course of the current field survey. Similarly, no evidence to suggest the presence of either the Southern Brown Bandicoot (*Isodon obesulus*) or Long-nosed Potoroo (*Potorous tridactylus*) was obtained during either the April 2008 survey or the current investigation.

As noted, though targeted, no characteristic Koala scats were found under any of the Koala feed trees surveyed. Similarly, no Koalas were heard calling and none responded to the call playbacks.

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### **3.2.7. (a) White-throated Needletail.**

The White-throated Needletail is a migratory bird that arrives in Australia around October, after having bred in the northern hemisphere (Frith 2007). In Australia, this bird is commonly associated with the east coast highlands, coastal plains and the hinterlands of arid inland Australia. Within this area, the White-throated Needletail becomes locally nomadic in response to local weather changes. The White-throated Needletail drinks and feeds on the wing, roosting during the night in trees (Frith 2007).

During the course of the field surveys, several White-throated Needletails were observed hawking above and over the study area (species observed whilst standing at E – 759376; N – 5875081) (Figure 6). Those individuals seen were only noted to be (presumably) foraging over the site and none observed roosting in any of the trees present. The individuals observed were expected to have been seen whilst they were moving through the study region in response to the locality's weather patterns. The White-throated Needletail is not expected to be reliant upon the proposed subdivision area for any major component of its foraging needs. Retention of those portions of the study area that occur to the west of the proposed subdivision sites, would provide foraging and roosting opportunities for this species should it occupy the study area on occasion. As such, the proposed subdivision of the study area would not have an adverse impact on this migratory species, its habitat needs or population.

### **3.2.7. (b) Varied Sittella.**

The Varied Sittella is a sedentary species that inhabits woodlands and eucalypt forests throughout most parts of mainland Australia (except the treeless deserts and open grasslands) (Frith 2007, DECCW 2010b). They are most abundant in areas of rough-barked eucalypts, mature smooth-barked gums with dead branches, mallee and *Acacia* woodlands, avoiding only rainforests (Frith 2007, DECCW 2010b). The Varied Sittella is a bark forager, gleaning arthropods from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy (Frith 2007, DECCW 2010b). It breeds from September to January in the south, July to October and again February to March in Queensland (Frith 2007). This species builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree during successive years (DECCW 2010b).

Around 6 Varied Sittellas were observed foraging over a mature eucalypt that is present in Site 2 (E – 759697; N – 5875227) (Figure 6). These birds were seen foraging over this plant and moving between it and the adjacent trees. During the course of this observation, they moved (foraged) in a north-westerly direction. None of the birds seen were observed building or attending a nest site.

### **3.2.8. Fauna conclusions.**

Though targeted, no evidence was obtained to suggest that a locally viable population of the Koala (*Phascolarctos cinereus*), Southern Brown Bandicoot (*Isodon obesulus*) or Long-nosed Potoroo (*Potorous tridactylus*) are present within the subject site.

The current investigation confirmed the location of the Yellow-bellied Glider (*Petaurus australis*) den tree. The den tree was noted to be located within the proposed 75m set back area, the preservation of this zone as a buffer to Wonboyn Lake ensuring the presence of this tree. Similarly, the active feed tree was also noted to occur within the 75m set back area. As such this tree would also be retained.

The current investigation identified the location of those hollow-bearing trees present within, and adjacent to (for a distance of 20 metres either side), the alignment of the proposed access track and powerline easement.

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This survey indicated that the development of the proposed residential lots would result in the loss of 2% of those hollow-bearing trees present.

Results of the field survey identified other locations within the subject site where Glossy Black-Cockatoos (*Calyptorhynchus lathami*) were feeding. The identification of these sites, particularly those that occur beyond the proposed subdivision lots, would ensure that foraging resources are retained within the subject site for this species.

#### **4.0 Impacts Assessment and Offset Strategy.**

The proposed development would result in the removal or modification of approximately 7.62ha of native vegetation/fauna habitat at the subject site. This means that more than 94% of the site's vegetation would be retained. The 7.62ha is composed of:

- Building envelopes:  $7 \times 4000\text{m}^2 = 2.8\text{ha}$ ;
- Right of way and fire trail:  $2000\text{m} \times 10\text{m} = 2\text{ha}$ ;
- Electricity easement:  $750 \times 20\text{m} = 1.5\text{ha}$
- Effluent management areas:  $7 \times 1400\text{m}^2 = 0.98\text{ha}$ ; and
- Access and passing bays: approximately 0.34ha.

In the Lesryk (2008) report it was estimated that 6.1ha of vegetation would be affected by the proposal. The revised figure is a result of revisions to the plan, a more detailed analysis of likely impacts and the requirement of Council's engineer that the access road/fire trail have a 10m width of "leaf to leaf" clearing.

7000m<sup>2</sup> building envelopes have been identified on each lot in the environmental assessment. However, given the asset protection zone stipulations required (Straight 2009) and envisaging that each lot would have an approximately 2000m<sup>2</sup> building footprint, the amount of clearing on each lot would be approximately 0.4ha.

In terms of the vegetation communities present, the 7.62ha of vegetation clearing and modification would be comprised of:

- approximately 1.85ha of Silvertop Ash – Red Bloodwood Woodland;
- 4.76ha of White Stringybark – Rough-barked Apple – Silvertop Ash Woodland;
- 1ha of Coast Grey Box – Woollybutt – White Stringybark Tall Open Forest; and
- 0.01ha of Scented Paperbark Scrub.

There would be no clearing of Saltmarsh or Bracelet Honey-myrtle Scrub, these two vegetation types being examples of the endangered ecological communities Coastal Saltmarsh and Swamp Oak Floodplain Forest, respectively. Nevertheless, these communities would be protected by covenants (where they occur above the mean high water mark) and by erection of signage indicating their conservation significance and sensitivity to disturbance.

Whilst neither of the endangered ecological communities at the site would be affected by the proposed development, there would be impacts on the habitat for a range of fauna species listed as vulnerable on the TSC Act.

Developments assessed under Part 3A of the *Environmental Planning & Assessment Act 1979* (EP&A Act) are exempt from the provisions of the TSC Act. i.e. there is no requirement to undertake seven-part tests (Section 5A of the EP&A Act) to determine whether a proposed development would have a significant effect on threatened species, populations or communities, or their habitat.

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Instead, draft guidelines for threatened species assessment have been prepared by DEC (now DECCW) & DPI (2005). The objective of the assessment process is to provide information to enable decision makers to ensure that developments deliver the following environmental outcomes:

1. Maintain or improve biodiversity values (i.e. there is no net impact on threatened species or native vegetation).
2. Conserve biological diversity and promote ecologically sustainable development.
3. Protect areas of high conservation value (including areas of critical habitat).
4. Prevent the extinction of threatened species.
5. Protect the long-term viability of local populations of a species, population or ecological community.
6. Protect aspects of the environment that are matters of national environmental significance.

An assessment matrix based on Appendix 3 of the draft guidelines has been prepared and is attached below. In short, it is considered that there would be some adverse, permanent, irreversible impacts on the following species as a result of the proposal: Yellow-bellied Glider, Greater Broad-nosed Bat, Glossy Black-Cockatoo, Gang-gang Cockatoo, Powerful Owl and Varied Sittella.

As impacts on these species cannot be further avoided or mitigated, an offset strategy for the loss of habitat needs to be considered. It is proposed that this take the form of securing habitat for the affected species elsewhere on site through the dedication of land for conservation purposes.

The impact assessment found that there would be a low level of impact on each of the threatened species affected. Each affected species is listed as vulnerable (rather than endangered or critically endangered) on the TSC Act and there are substantial areas of similar habitat in the study region including within conservation reserves. Taking into account these factors, it is considered that amount of land dedicated for conservation purposes on the site should be at a ratio of 1:1 to that lost.

It is proposed that the dedicated land (this totalling 7.62 hectares in size) be located in the south-west section of Portion 14 (i.e. west of the existing electricity easement and north of the southern boundary) (Figure 7). This area contains habitat suitable for all the threatened species affected by the Proposal, including the provision of hollow-bearing trees. Securing habitat here would also provide a corridor for movement of fauna from Portion 14 to bushland to the south in Lot 15 DP 650087 and beyond, which extends along the Wonboyn River.

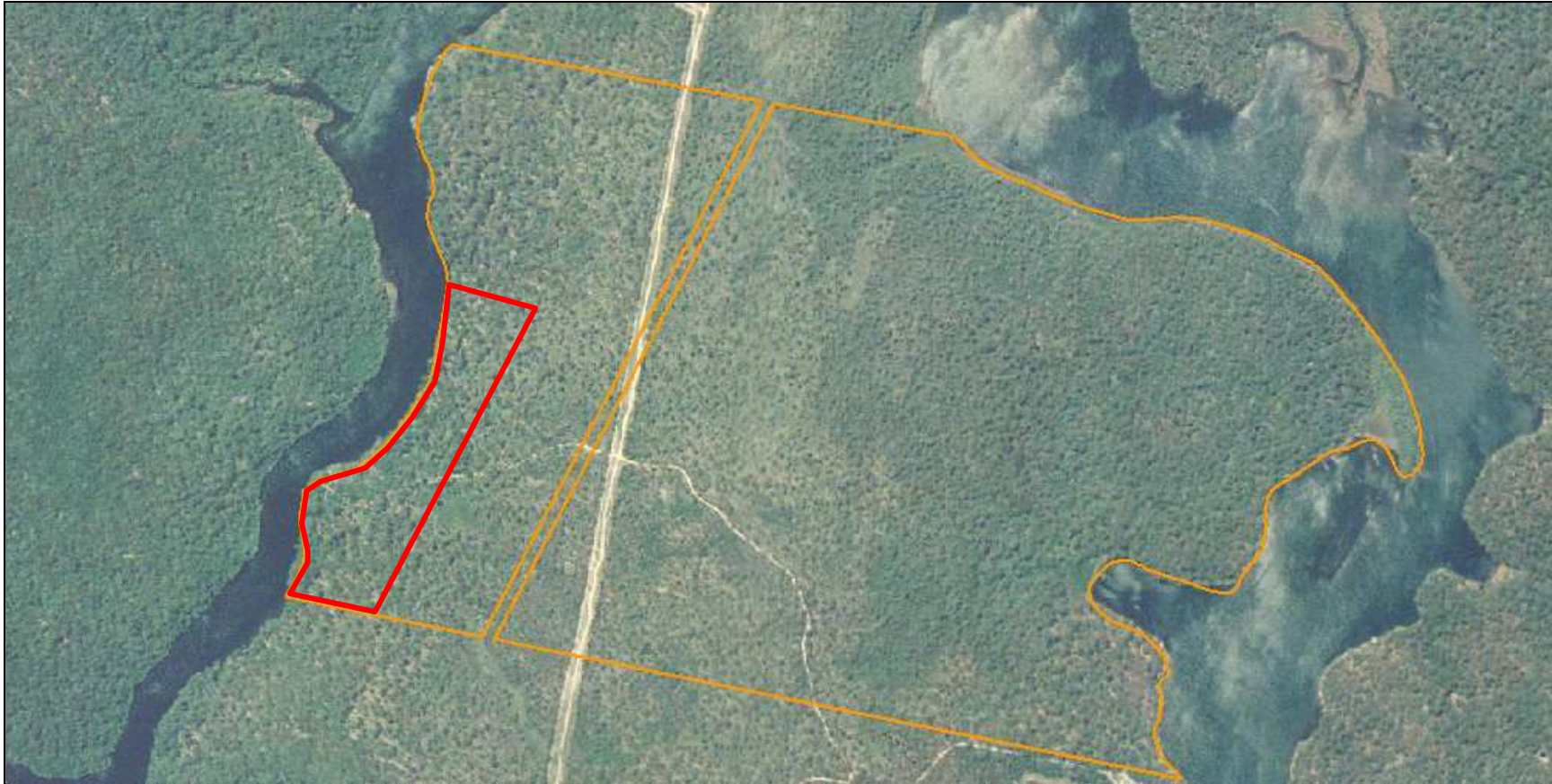


**Figure 7.** Location of proposed offset area.

(Aerial photo [© CNES 2006] and cadastre sourced from Department of Lands Six Viewer site <http://imagery.maps.nsw.gov.au/>).

DECCW has prepared principles for the use of biodiversity offsets in NSW (DECCW undated). These are assessed in relation to this offset proposal below

| <b>Principle</b>                          | <b>Achievement Mechanism</b>                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Avoidance of Impacts                   | Detailed information about flora and fauna impacts and proposed mitigation measures is discussed in the Flora and Fauna Assessment Report                                                                                                                                                                                                                                                                                                        |
| 2. Meeting regulatory requirements        | All relevant regulatory requirements will be met, outside of the process of developing offsets                                                                                                                                                                                                                                                                                                                                                   |
| 3. Existing Management                    | None                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 4. Complement other government programs   | The proposed offset areas will complement biodiversity management, including threatened species conservation within local conservation reserves.                                                                                                                                                                                                                                                                                                 |
| 5. Meeting Ecological Principles          |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 5a. Structure and function                | Offset area is comparable in relation to structure and function of the affected fauna habitats.                                                                                                                                                                                                                                                                                                                                                  |
| 5b. Enhance biodiversity across scales    | The offset areas would secure habitat along the Wonboyn River thus enhancing links between large areas of habitat to the north, south and west                                                                                                                                                                                                                                                                                                   |
| 5c. Consider conservation status          | Included within flora and fauna assessment                                                                                                                                                                                                                                                                                                                                                                                                       |
| 5d. Ensure long term viability            | The offset area would be covered by an instrument prepared under Section 88b of the <i>Conveyancing Act 1919</i> that confers protection of the land                                                                                                                                                                                                                                                                                             |
| 6. Net improvement                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 6a. Equal or greater benefit from offset  | The offset area would be the same in size and habitat quality as that removed or modified by the Proposal                                                                                                                                                                                                                                                                                                                                        |
| 6b. Additional protection                 | It is recommended that vehicular tracks into this land be blocked and natural rehabilitation allowed.                                                                                                                                                                                                                                                                                                                                            |
| 6c. Improvement strategy                  | see above                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 7. Enduring offsets                       | The 88b instrument would be perpetual                                                                                                                                                                                                                                                                                                                                                                                                            |
| 8. Timing                                 | The offset area would be an integral part of the Part 3a application                                                                                                                                                                                                                                                                                                                                                                             |
| 9. Quantification of impacts and benefits | The project will involve clearing of 7.62ha of open forest and woodland that is habitat to a range of fauna species, most notably the Yellow-bellied Glider, Glossy Black-cockatoo and Powerful Owl. Whilst it is considered there would not be a significant impact on local populations of these species, the offset would permanently conserve an equal amount of habitat for these species in a strategic position adjacent to Wonboyn River |

It is considered that the environmental outcomes required in the draft guidelines for threatened species assessment (DEC & DPI 2006) would be met by the proposed development when taking into account the proposed offset for impacts on the site's biodiversity.

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Straight , M (2009) Bushfire Risk Assessment to Accompany 7 Lot Rural Subdivision & Boundary Adjustment Application Lot 14 DP 750222 and Lot B DP 33573 Parish of Narrabarba County of Auckland Ivor Jones Drive, Wonboyn Lake. RW Surveying & Valuations, Eden, NSW.

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**Appendix I: Plant species recorded during the surveys of vegetation at Lake Wonboyn.**


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**Key**

\* = Introduced (weed) species

| <b>FAMILY</b>                    | <b>SPECIES</b>                  |
|----------------------------------|---------------------------------|
| LYCOPSIDA – Club Mosses          |                                 |
| Lycopodiaceae                    | <i>Lycopodium deuterodensum</i> |
|                                  |                                 |
| Selaginellaceae                  | <i>Selaginella uliginosa</i>    |
|                                  |                                 |
| FILICOPSIDA - Ferns              |                                 |
| Adiantaceae                      | <i>Adiantum aethiopicum</i>     |
|                                  |                                 |
| Aspidiaceae                      | <i>Polystichum australiense</i> |
|                                  |                                 |
| Cyatheaceae                      | <i>Cyathea australis</i>        |
|                                  |                                 |
| Dicksoniaceae                    | <i>Calochlaena dubia</i>        |
|                                  | <i>Dicksonia antarctica</i>     |
|                                  |                                 |
| Dennstaedtiaceae                 | <i>Histiopteris incisa</i>      |
|                                  | <i>Hypolepis muelleri</i>       |
|                                  | <i>Pteridium esculentum</i>     |
|                                  |                                 |
| Gleicheniaceae                   | <i>Gleichenia dicarpa</i>       |
|                                  |                                 |
| MAGNOLIOPSIDA – Flowering Plants |                                 |
| Magnoliidae – Dicotyledons       |                                 |
|                                  |                                 |
| Apiaceae                         | <i>Apium prostratum</i>         |
|                                  | <i>Platysace lanceolata</i>     |
|                                  | <i>Xanthosia pilosa</i>         |
|                                  |                                 |
| Apocynaceae                      | <i>Tylophora barbata</i>        |
|                                  |                                 |
| Araliaceae                       | <i>Polyscias sambucifolia</i>   |
|                                  |                                 |
| Asteraceae                       | <i>Cassinia aculeata</i>        |
|                                  | <i>Cassinia longifolia</i>      |
|                                  | <i>Ozothamnus diosmifolium</i>  |
|                                  | <i>Taraxacum officinale*</i>    |
|                                  |                                 |
| Cassythaceae                     | <i>Cassytha pubescens</i>       |
|                                  |                                 |
| Casuarinaceae                    | <i>Allocasuarina littoralis</i> |
|                                  |                                 |
| Cassythaceae                     | <i>Cassytha pubescens</i>       |
|                                  |                                 |

| <b>FAMILY</b>         | <b>SPECIES</b>                             |
|-----------------------|--------------------------------------------|
| Chenopodiaceae        | <i>Atriplex prostrata</i>                  |
|                       | <i>Einadia hastata</i>                     |
|                       | <i>Enchylaena tomentosa</i>                |
|                       | <i>Sarcocornia quinquiflora</i>            |
|                       |                                            |
| Convolvulaceae        | <i>Dichondra repens</i>                    |
|                       |                                            |
| Dilleniaceae          | <i>Hibbertia aspera</i>                    |
|                       | <i>Hibbertia empetrifolia</i>              |
|                       |                                            |
| Eleocarpaceae         | <i>Eleocarpus reticulatus</i>              |
|                       | <i>Tetratheca ericifolia</i>               |
|                       |                                            |
| Epacridaceae          | <i>Epacris impressa</i>                    |
|                       | <i>Leucopogon ericoides</i>                |
|                       | <i>Leucopogon lanceolatus</i>              |
|                       | <i>Lissanthe strigosa</i>                  |
|                       | <i>Monotoca ledifolia</i>                  |
|                       |                                            |
| Euphorbiaceae         | <i>Amperea xiphoclada</i>                  |
|                       | <i>Phyllanthus hirtellus</i>               |
|                       | <i>Ricinocarpus pinifolius</i>             |
|                       |                                            |
| Fabaceae: Faboideae   | <i>Aotus ericoides</i>                     |
|                       | <i>Bossiaea ensata</i>                     |
|                       | <i>Bossiaea heterophylla</i>               |
|                       | <i>Dillwynia floribunda</i>                |
|                       | <i>Glycine clandestina species complex</i> |
|                       | <i>Phyllota phyllicoides</i>               |
|                       | <i>Pultenaea daphnoides</i>                |
|                       |                                            |
| Fabaceae: Mimosoideae | <i>Acacia mearnsii</i>                     |
|                       | <i>Acacia longifolia</i>                   |
|                       | <i>Acacia suaveolens</i>                   |
|                       |                                            |
| Goodeniaceae          | <i>Goodenia ovata</i>                      |
|                       | <i>Scaevola calendulacea</i>               |
|                       |                                            |
| Haloragaceae          | <i>Gonocarpus teucroides</i>               |
|                       |                                            |
| Hypericaceae          | <i>Hypericum gramineum</i>                 |
|                       |                                            |
| Myoporaceae           | <i>Myoporum acuminatum</i>                 |
|                       |                                            |
| Myrtaceae             | <i>Angophora floribunda</i>                |
|                       | <i>Callistemon citrinus</i>                |
|                       | <i>Corymbia gummifera</i>                  |
|                       | <i>Eucalyptus agglomerata</i>              |
|                       | <i>Eucalyptus bosistoana</i>               |

| <b>FAMILY</b>                | <b>SPECIES</b>                                   |
|------------------------------|--------------------------------------------------|
|                              | <i>Eucalyptus consideriana</i>                   |
|                              | <i>Eucalyptus cypellocarpa</i>                   |
|                              | <i>Eucalyptus globoidea</i>                      |
|                              | <i>Eucalyptus longifolia</i>                     |
|                              | <i>Eucalyptus muelleriana</i>                    |
|                              | <i>Eucalyptus sieberi</i>                        |
|                              | <i>Kunzea ambigua</i>                            |
|                              | <i>Leptospermum continentale</i>                 |
|                              | <i>Leptospermum polygalifolium</i>               |
|                              | <i>Leptospermum trinervium</i>                   |
|                              | <i>Melaleuca armillaris</i>                      |
|                              | <i>Melaleuca squarrosa</i>                       |
|                              |                                                  |
| Oleaceae                     | <i>Notelaea longifolia</i>                       |
|                              |                                                  |
| Oxalidaceae                  | <i>Oxalis perrenans</i>                          |
|                              |                                                  |
| Pittosporaceae               | <i>Bursaria spinosa</i>                          |
|                              | <i>Billardiera scandens</i>                      |
|                              |                                                  |
| Proteaceae                   | <i>Banksia paludosa</i>                          |
|                              | <i>Banksia serrata</i>                           |
|                              | <i>Lomatia ilicifolia</i>                        |
|                              | <i>Persoonia levis</i>                           |
|                              | <i>Persoonia linearis</i>                        |
|                              |                                                  |
| Rubiaceae                    | <i>Opercularia varia</i>                         |
|                              |                                                  |
| Rutaceae                     | <i>Correa reflexa</i>                            |
|                              |                                                  |
| Santalaceae                  | <i>Leptomeria acida</i>                          |
|                              | <i>Exocarpus cupressiformis</i>                  |
|                              | <i>Exocarpus strictus</i>                        |
|                              |                                                  |
| Sapindaceae                  | <i>Dodonaea triquetra</i>                        |
|                              |                                                  |
| Thymeliaceae                 | <i>Pimelea linifolia</i> subsp. <i>linifolia</i> |
|                              |                                                  |
| Verbenaceae                  | <i>Clerodendrum tomentosum</i>                   |
|                              |                                                  |
| Violaceae                    | <i>Viola hederacea</i>                           |
|                              |                                                  |
| Liliidae -<br>Monocotyledons |                                                  |
|                              |                                                  |
| Cyperaceae                   | <i>Baumea rubiginosa</i>                         |
|                              | <i>Carex appressa</i>                            |
|                              | <i>Caustis flexuosa</i>                          |
|                              | <i>Cyathochaeta diandra</i>                      |

| <b>FAMILY</b> | <b>SPECIES</b>                                    |
|---------------|---------------------------------------------------|
|               | <i>Eleocharis sphacelata</i>                      |
|               | <i>Gahnia clarkei</i>                             |
|               | <i>Gahnia radula</i>                              |
|               | <i>Isolepis nodosa</i>                            |
|               | <i>Lepidosperma laterale</i>                      |
|               | <i>Lepidosperma urophorum</i>                     |
|               | <i>Ptilothrix deusta</i>                          |
|               | <i>Schoenus melanostachys</i>                     |
|               | <i>Schoenus minimus</i>                           |
|               | <i>Schoenus villosus</i>                          |
|               |                                                   |
| Iridaceae     | <i>Patersonia glabrata</i>                        |
|               | <i>Patersonia sericea</i>                         |
|               |                                                   |
| Juncaceae     | <i>Juncus krausii</i>                             |
|               |                                                   |
| Lomandraceae  | <i>Lomandra filiformis</i>                        |
|               | <i>Lomandra glauca</i>                            |
|               | <i>Lomandra longifolia</i>                        |
|               |                                                   |
| Philesciaceae | <i>Eustrephus latifolius</i>                      |
|               | <i>Geitonoplesium cymosum</i>                     |
|               |                                                   |
| Phormiaceae   | <i>Dianella caerulea</i>                          |
|               |                                                   |
| Poaceae       | <i>Anisopogon avenaceus</i>                       |
|               | <i>Austrostipa</i> sp                             |
|               | <i>Chionochloa pallida</i>                        |
|               | <i>Cynodon dactylon</i>                           |
|               | <i>Cymbopogon refractus</i>                       |
|               | <i>Danthonia tenuior</i>                          |
|               | <i>Entolasia stricta</i>                          |
|               | <i>Festuca littoralis</i>                         |
|               | <i>Imperata cylindrica</i> var. <i>major</i>      |
|               | <i>Microlaena stipoides</i> var. <i>stipoides</i> |
|               | <i>Poa meionectes</i>                             |
|               | <i>Tetrarrhaena juncea</i>                        |
|               |                                                   |
| Restionaceae  | <i>Empodisma minus</i>                            |
|               |                                                   |
| Smilacaceae   | <i>Smilax australis</i>                           |
|               |                                                   |
| Uvulariaceae  | <i>Schelhammera undulata</i>                      |

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**Appendix 2:** Images obtained through use of the infrared camera.

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**Plate 2:** Eastern Grey Kangaroo (*Macropus giganteus*).

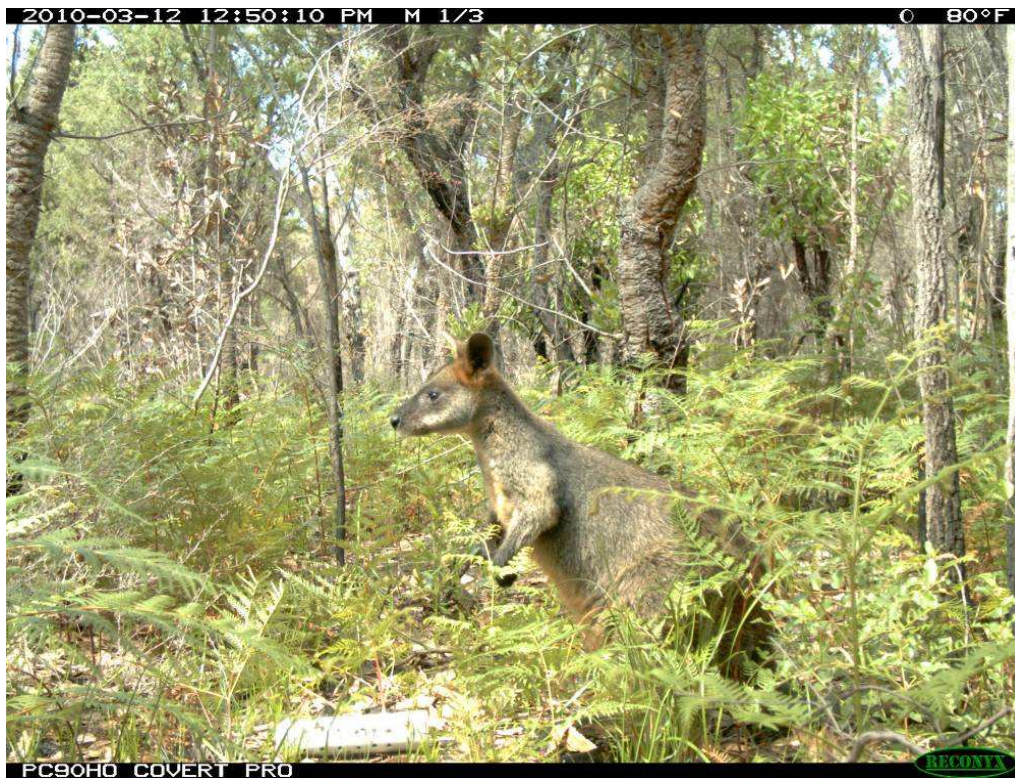


**Plate 3:** Swamp Wallaby (*Wallabia bicolor*).



**Plate 4:** Common Brushtail Possum (*Trichosurus vulpecular*).



**Plate 5:** Fox (*Vulpes vulpes*).

**Appendix 3:** “Character” of those hollow-bearing trees recorded within, and either side of, the proposed access track.

| Tree Number | GPS Co-ordinates |         | Distance from track (m) | Number of hollows present | Hollow diameter (mm) (approx) | Tree condition |
|-------------|------------------|---------|-------------------------|---------------------------|-------------------------------|----------------|
| 1           | Easting [E]      | 759433  | 1<br>(western side)     | 3                         | 100-300mm                     | [A]live        |
|             | Northing [N]     | 5875145 |                         |                           |                               |                |
| 2           | [E]              | 759424  | 3(w)                    | 2                         | 50-100                        | [D]ead stag    |
|             | [N]              | 5875129 |                         |                           |                               |                |
| 3           | [E]              | 759441  | 5(w)                    | 1                         | 500                           | D stag         |
|             | [N]              | 5875114 |                         |                           |                               |                |
| 4           | [E]              | 759462  | 30<br>(eastern side)    | 5                         | 50-500                        | A              |
|             | [N]              | 5875112 |                         |                           |                               |                |
| 5           | [E]              | 759456  | 24(e)                   | 3                         | 20                            | A              |
|             | [N]              | 5875124 |                         |                           |                               |                |
| 6           | [E]              | 759444  | 2(w)                    | 5                         | 10-30                         | A              |
|             | [N]              | 5875203 |                         |                           |                               |                |
| 7           | [E]              | 759420  | 40 (w)                  | >5                        | 10-600                        | D              |
|             | [N]              | 5875209 |                         |                           |                               |                |
| 8           | [E]              | 759428  | 13 (w)                  | 4                         | 100-600                       | A              |
|             | [N]              | 5875197 |                         |                           |                               |                |
| 9           | [E]              | 759459  | 20(e)                   | 5                         | 100                           | A              |
|             | [N]              | 5875215 |                         |                           |                               |                |
| 10          | [E]              | 759459  | 15(e)                   | 3                         | 500                           | A              |
|             | [N]              | 5875227 |                         |                           |                               |                |
| 11          | [E]              | 759446  | 7(w)                    | 4                         | 150-300                       | A              |
|             | [N]              | 5875244 |                         |                           |                               |                |
| 12          | [E]              | 759465  | 15(e)                   | 3                         | 150-200                       | A              |
|             | [N]              | 5875242 |                         |                           |                               |                |
| 13          | [E]              | 759461  | 5(e)                    | 2                         | 150                           | A              |
|             | [N]              | 5875284 |                         |                           |                               |                |
| 14          | [E]              | 759466  | 8(e)                    | 1                         | 500                           | D              |
|             | [N]              | 5875296 |                         |                           |                               |                |
| 15          | [E]              | 759473  | 18(e)                   | >5                        | 100-600                       | A              |
|             | [N]              | 5875297 |                         |                           |                               |                |
| 16          | [E]              | 759465  | 5(e)                    | 1                         | 600                           | A              |
|             | [N]              | 5875312 |                         |                           |                               |                |
| 17          | [E]              | 759444  | 10(w)                   | >5                        | 100-300                       | D              |
|             | [N]              | 5875298 |                         |                           |                               |                |
| 18          | [E]              | 759444  | 7(w)                    | 1                         | 300                           | D              |
|             | [N]              | 5873280 |                         |                           |                               |                |
| 19          | [E]              | 759451  | 3(w)                    | 1                         | 10                            | A              |
|             | [N]              | 5875288 |                         |                           |                               |                |
| 20          | [E]              | 759478  | 16(e)                   | 1                         | 100                           | D              |
|             | [N]              | 5875333 |                         |                           |                               |                |
| 21          | [E]              | 759484  | 20(e)                   | 1                         | 100                           | A              |
|             | [N]              | 5875324 |                         |                           |                               |                |
| 22          | [E]              | 759460  | 15(w)                   | >5                        | 100-600                       | A              |
|             | [N]              | 5875366 |                         |                           |                               |                |
| 23          | [E]              | 759522  | 1(e)                    | 1                         | 150                           | A              |
|             | [N]              | 5875419 |                         |                           |                               |                |

| Tree Number | GPS Co-ordinates |         | Distance from track (m) | Number of hollows present | Hollow diameter (mm) (approx) | Tree condition |
|-------------|------------------|---------|-------------------------|---------------------------|-------------------------------|----------------|
| 24          | [E]              | 759558  | 30(e)                   | >5                        | 100                           | A              |
|             | [N]              | 5875414 |                         |                           |                               |                |
| 25          | [E]              | 759583  | 3(w)                    | >5                        | 50-150                        | D              |
|             | [N]              | 5875463 |                         |                           |                               |                |
| 26          | [E]              | 759573  | 15(w)                   | >5                        | 50-200                        | D              |
|             | [N]              | 5875471 |                         |                           |                               |                |
| 27          | [E]              | 759583  | 3(w)                    | >5                        | 50-200                        | D              |
|             | [N]              | 5875464 |                         |                           |                               |                |
| 28          | [E]              | 759643  | 2(w)                    | 1                         | 600                           | D              |
|             | [N]              | 5875491 |                         |                           |                               |                |
| 29          | [E]              | 759636  | 15(w)                   | 2                         | 600                           | A              |
|             | [N]              | 5875499 |                         |                           |                               |                |
| 30          | [E]              | 759619  | 18(w)                   | 2                         | 50                            | A              |
|             | [N]              | 5875490 |                         |                           |                               |                |
| 31          | [E]              | 759610  | 13(w)                   | >5                        | 50-300                        | A              |
|             | [N]              | 5875480 |                         |                           |                               |                |
| 32          | [E]              | 759674  | 2(e)                    | 1                         | 200                           | A              |
|             | [N]              | 5875514 |                         |                           |                               |                |
| 33          | [E]              | 759694  | 25(e)                   | 4                         | 300                           | A              |
|             | [N]              | 5875501 |                         |                           |                               |                |
| 34          | [E]              | 759697  | 15(w)                   | 3                         | 300                           | A              |
|             | [N]              | 5875543 |                         |                           |                               |                |
| 35          | [E]              | 759799  | 9(e)                    | 2                         | 100-300                       | A              |
|             | [N]              | 5875580 |                         |                           |                               |                |
| 36          | [E]              | 759783  | 14(w)                   | 3                         | 100-300                       | A              |
|             | [N]              | 5875595 |                         |                           |                               |                |
| 37          | [E]              | 759804  | 1(e)                    | 5                         | 50-150                        | A              |
|             | [N]              | 5875607 |                         |                           |                               |                |
| 38          | [E]              | 759987  | 17(w)                   | 4                         | 100-300                       | D              |
|             | [N]              | 587505  |                         |                           |                               |                |
| 39          | [E]              | 759787  | 13(w)                   | 1                         | 150                           | A              |
|             | [N]              | 5875599 |                         |                           |                               |                |
| 40          | [E]              | 759783  | 12(w)                   | 1                         | 100                           | A              |
|             | [N]              | 5875597 |                         |                           |                               |                |
| 41          | [E]              | 759818  | 12(e)                   | 1                         | 400                           | A              |
|             | [N]              | 5875616 |                         |                           |                               |                |
| 42          | [E]              | 759738  | (w)                     | 1                         | 600                           | D              |
|             | [N]              | 5875669 |                         |                           |                               |                |
| 43          | [E]              | 759733  | (w)                     | 3                         | 1 of 10 & 2 of 600            | A              |
|             | [N]              | 5875670 |                         |                           |                               |                |

**Appendix 4:** Fauna species recorded during the course of the current site investigation including their detection method.

**Key**

Column A – indicates species listed under the *EPBC Act*.

Column B – indicates species listed under the *TSC Act*.

E – Species is listed as being endangered.

V – Species is listed as being vulnerable.

F – migratory Family listed under the *EPBC Act*.

M – Species listed as migratory listed under the *EPBC Act*.

\* - indicates introduced species.

| A | B | Common Name                  | Scientific Name                 | Detection method                      |
|---|---|------------------------------|---------------------------------|---------------------------------------|
|   |   | <b>MAMMALS</b>               |                                 |                                       |
|   |   |                              | <b>Dasyuridae</b>               |                                       |
|   |   | Agile Antechinus             | <i>Antechinus agilis</i>        | Hair analysis                         |
|   |   |                              | <b>Vombatidae</b>               |                                       |
|   |   | Common Wombat                | <i>Vombatus ursinus</i>         | Spotlight                             |
|   |   |                              | <b>Petauridae</b>               |                                       |
|   | V | Yellow-bellied Glider        | <i>Petaurus australis</i>       | Heard calling                         |
|   |   | Sugar Glider                 | <i>Petaurus breviceps</i>       | Heard calling                         |
|   |   |                              | <b>Pseudocheiridae</b>          |                                       |
|   |   | Common Ringtail Possum       | <i>Pseudocheirus peregrinus</i> | spotlight                             |
|   |   |                              | <b>Phalangeridae</b>            |                                       |
|   |   | Common Brushtail Possum      | <i>Trichosurus vulpecula</i>    | Infrared camera and spotlight         |
|   |   |                              | <b>Macropodidae</b>             |                                       |
|   |   | Eastern Grey Kangaroo        | <i>Macropus giganteus</i>       | Infrared camera                       |
|   |   | Swamp Wallaby                | <i>Wallabia bicolor</i>         | Infrared camera and observed          |
|   |   |                              | <b>Molossidae</b>               |                                       |
|   |   | White-striped Freetail Bat   | <i>Nyctinomus australis</i>     | Heard calling                         |
|   |   |                              | <b>Canidae</b>                  |                                       |
|   |   | * Fox                        | <i>Vulpes vulpes</i>            | Infrared camera and hair analysis     |
|   |   | <b>BIRDS</b>                 |                                 |                                       |
| F |   |                              | <b>Anatidae</b>                 |                                       |
|   |   | Australian Wood Duck         | <i>Chenonetta jubata</i>        | Observed                              |
|   |   |                              | <b>Phalacrocoracidae</b>        |                                       |
|   |   | Pied Cormorant               | <i>Phalacrocorax varius</i>     | Observed                              |
| F |   |                              | <b>Accipitridae</b>             |                                       |
| M |   | White-bellied Sea-eagle      | <i>Haliaeetus leucogaster</i>   | Observed                              |
|   |   |                              | <b>Laridae</b>                  |                                       |
|   |   | Silver Gull                  | <i>Larus novaehollandiae</i>    | Observed                              |
|   |   |                              | <b>Columbidae</b>               |                                       |
|   |   | Common Bronzewing            | <i>Phaps chalcoptera</i>        | Heard calling                         |
|   |   | Wonga Pigeon                 | <i>Leucosarcia melanoleuca</i>  | Observed                              |
|   |   |                              | <b>Cacatuidae</b>               |                                       |
|   | V | Glossy Black-Cockatoo        | <i>Calyptorhynchus lathami</i>  | Heard calling and crushed cones found |
|   |   | Yellow-tailed Black Cockatoo | <i>Calyptorhynchus funereus</i> | Heard calling                         |
|   |   |                              | <b>Psittacidae</b>              |                                       |
|   |   | Rainbow Lorikeet             | <i>Trichoglossus haematodus</i> | Observed                              |
|   |   | Australian King Parrot       | <i>Alisterus scapularis</i>     | Observed                              |
|   |   | Crimson Rosella              | <i>Platycercus elegans</i>      | Observed                              |
|   |   |                              | <b>Cuculidae</b>                |                                       |
|   |   | Fan-tailed Cuckoo            | <i>Cuculus flabelliformis</i>   | Observed & heard calling              |
|   |   |                              | <b>Strigidae</b>                |                                       |

| A | B | Common Name                | Scientific Name                     | Detection method            |
|---|---|----------------------------|-------------------------------------|-----------------------------|
|   | V | Powerful Owl               | <i>Ninox strenua</i>                | Responded to call playbacks |
|   |   | Southern Boobook           | <i>Ninox novaeseelandiae</i>        | Heard calling               |
|   |   |                            | <b>Caprimulgidae</b>                |                             |
|   |   | White-throated Nightjar    | <i>Eurostopodus mysticalis</i>      | Heard calling               |
|   |   |                            | <b>Apodidae</b>                     |                             |
| M |   | White-throated Needletail  | <i>Hirundapus caudacutus</i>        | Observed                    |
|   |   |                            | <b>Menuridae</b>                    |                             |
|   |   | Superb Lyrebird            | <i>Menura novaehollandiae</i>       | Observed                    |
|   |   |                            | <b>Neosittidae</b>                  |                             |
|   | V | Varied Sittella            | <i>Daphoenositta chrysoptera</i>    | Observed                    |
|   |   |                            | <b>Climacteridae</b>                |                             |
|   |   | White-throated Treecreeper | <i>Cormobates leucophaeus</i>       | Observed                    |
|   |   |                            | <b>Maluridae</b>                    |                             |
|   |   | Superb Fairy-wren          | <i>Malurus cyaneus</i>              | Observed                    |
|   |   |                            | <b>Pardalotidae</b>                 |                             |
|   |   | Spotted Pardalote          | <i>Pardalotus punctatus</i>         | Heard calling               |
|   |   | White-browed Scrubwren     | <i>Sericornis frontalis</i>         | Observed                    |
|   |   |                            | <b>Meliphagidae</b>                 |                             |
|   |   | Red Wattlebird             | <i>Anthochaera carunculata</i>      | Observed                    |
|   |   | Bell Miner                 | <i>Manorina melanophrys</i>         | Heard calling               |
|   |   | Lewin's Honeyeater         | <i>Meliphaga lewinii</i>            | Heard calling               |
|   |   | Eastern Spinebill          | <i>Acanthorhynchus tenuirostris</i> | Observed                    |
|   |   |                            | <b>Petroicidae</b>                  |                             |
|   |   | Eastern Yellow Robin       | <i>Eopsaltria australis</i>         | Observed                    |
|   |   |                            | <b>Pachycephalidae</b>              |                             |
|   |   | Grey Shrike-thrush         | <i>Colluricincla harmonica</i>      | Observed                    |
|   |   |                            | <b>Dicruridae</b>                   |                             |
|   |   | Grey Fantail               | <i>Rhipidura fuliginosa</i>         | Observed                    |
|   |   | Willie Wagtail             | <i>Rhipidura leucophrys</i>         | Observed                    |
|   |   |                            | <b>Artamidae</b>                    |                             |
|   |   | Australian Magpie          | <i>Gymnorhina tibicen</i>           | Observed                    |
|   |   | Pied Currawong             | <i>Strepera graculina</i>           | Observed                    |
|   |   |                            | <b>Corvidae</b>                     |                             |
|   |   | Australian Raven           | <i>Corvus coronoides</i>            | Observed                    |
|   |   |                            | <b>Ptilonorhynchidae</b>            |                             |
|   |   | Satin Bowerbird            | <i>Ptilonorhynchus violaceus</i>    | Observed                    |
|   |   |                            | <b>Ploceidae</b>                    |                             |
|   |   | Red-browed Finch           | <i>Neochmia temporalis</i>          | Observed                    |
|   |   |                            | <b>Hirundinidae</b>                 |                             |
|   |   | Welcome Swallow            | <i>Hirundo neoxena</i>              | Observed                    |
|   |   | <b>REPTILES</b>            |                                     |                             |
|   |   |                            | <b>Agamidae</b>                     |                             |
|   |   | Jacky Lizard               | <i>Amphibolurus muricatus</i>       | Observed                    |
|   |   | <b>AMPHIBIANS</b>          |                                     |                             |
|   |   |                            | <b>Hylidae</b>                      |                             |
|   |   | Peron's Tree Frog          | <i>Litoria peronii</i>              | Heard calling               |

**Appendix 5:** Assessment matrix (based on Appendix 3 of DEC & DoP 2005).

| Potential Impacts                                                                                                                                                      | Threatened Biota                  |                      |                          |                                                                                                                                                                      |                                                                                                      |                                                                   |                        |                           |                       |                                                                                                                |                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------------------|---------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------|-----------------|
|                                                                                                                                                                        | Swamp Oak<br>Floodplain<br>Forest | Coastal<br>Saltmarsh | Yellow-bellied<br>Glider | Grey-headed<br>Flying-fox                                                                                                                                            | Greater Broad-<br>nosed Bat                                                                          | Common Bent-<br>wing Bat                                          | Sooty<br>Oystercatcher | Glossy Black-<br>Cockatoo | Gang-gang<br>Cockatoo | Powerful Owl                                                                                                   | Varied Sittella |
| <b>How is the proposal likely to affect the lifecycle of a threatened species and/or population?</b><br>a) displaces or disturbs threatened species and/or populations | N/A                               | N/A                  |                          | Only likely to forage on site intermittently. Given negligible loss of foraging trees and availability of foraging habitat in wider area, unlikely to be any impact. | May roost on site. Some potential roost trees will be removed.                                       |                                                                   |                        |                           |                       |                                                                                                                |                 |
| b) disrupts the breeding cycle                                                                                                                                         | N/A                               | N/A                  |                          | Breeds in camps in gullies, none of which are on site. No impact expected.                                                                                           | May breed on site in tree hollow roosts, some of which would be removed by the proposed development. | Breeds in caves, mines, tunnels etc. No breeding habitat on site. |                        |                           |                       | Breeds in large tree hollows in gullies near roosting habitat (closed forest). Site not suitable for breeding. |                 |

| Potential Impacts               | Threatened Biota                  |                      |                          |                                                                                                                                                                                                   |                                            |                                                    |                        |                           |                       |                                                   |                 |
|---------------------------------|-----------------------------------|----------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------------------------|------------------------|---------------------------|-----------------------|---------------------------------------------------|-----------------|
|                                 | Swamp Oak<br>Floodplain<br>Forest | Coastal<br>Saltmarsh | Yellow-bellied<br>Glider | Grey-headed<br>Flying-fox                                                                                                                                                                         | Greater Broad-<br>nosed Bat                | Common Bent-<br>wing Bat                           | Sooty<br>Oystercatcher | Glossy Black-<br>Cockatoo | Gang-gang<br>Cockatoo | Powerful Owl                                      | Varied Sittella |
| c) disturbs the dormancy period | N/A                               | N/A                  | N/A                      | N/A                                                                                                                                                                                               | N/A                                        | N/A                                                | N/A                    | N/A                       | N/A                   | N/A                                               | N/A             |
| d) disrupts roosting behaviour  | N/A                               | N/A                  |                          | Roosts in large camps in gullies none of which are on site. Not relevant                                                                                                                          | May roost in hollow-bearing trees on site. | Roosts in caves, mines, tunnels etc. Not relevant. |                        |                           |                       | Roosts in closed forest in gullies. Not relevant. |                 |
| e) changes foraging behaviour   | N/A                               |                      |                          | Forages widely on flowering and fruiting trees. Site represents very small area of potential habitat and most potential foraging trees will be retained. No impact on foraging behaviour expected |                                            | Forages above the canopy. No impact expected.      |                        |                           |                       |                                                   |                 |

| Potential Impacts                                                                                                                                   | Threatened Biota                  |                      |                          |                                                                                                                                       |                             |                          |                        |                           |                       |              |                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------|-----------------|
|                                                                                                                                                     | Swamp Oak<br>Floodplain<br>Forest | Coastal<br>Saltmarsh | Yellow-bellied<br>Glider | Grey-headed<br>Flying-fox                                                                                                             | Greater Broad-<br>nosed Bat | Common Bent-<br>wing Bat | Sooty<br>Oystercatcher | Glossy Black-<br>Cockatoo | Gang-gang<br>Cockatoo | Powerful Owl | Varied Sittella |
| f) affects migration and dispersal ability                                                                                                          | N/A                               |                      |                          |                                                                                                                                       |                             |                          |                        |                           |                       |              |                 |
| g) disrupts pollination cycle;                                                                                                                      | N/A                               |                      |                          | N/A                                                                                                                                   | N/A                         | N/A                      |                        |                           |                       | N/A          |                 |
| h) disturbs seedbanks;                                                                                                                              | N/A                               | N/A                  | N/A                      | N/A                                                                                                                                   | N/A                         | N/A                      | N/A                    | N/A                       | N/A                   | N/A          | N/A             |
| i) disrupts recruitment (i.e. germination and establishment of plants);                                                                             | N/A                               | N/A                  | N/A                      | N/A                                                                                                                                   | N/A                         | N/A                      | N/A                    | N/A                       | N/A                   | N/A          | N/A             |
| j) affects the interaction between threatened species and other species in the community (e.g. pollinators, host species, mycorrhizal associations) | N/A                               |                      |                          | This species is an important pollinator and vector of seed. Given the level of impact, no effect in relation to pollination expected. | N/A                         | N/A                      |                        |                           |                       | N/A          |                 |
| <b>How is the</b>                                                                                                                                   | Wonboyn estuary is the            |                      |                          |                                                                                                                                       |                             |                          |                        |                           |                       |              |                 |

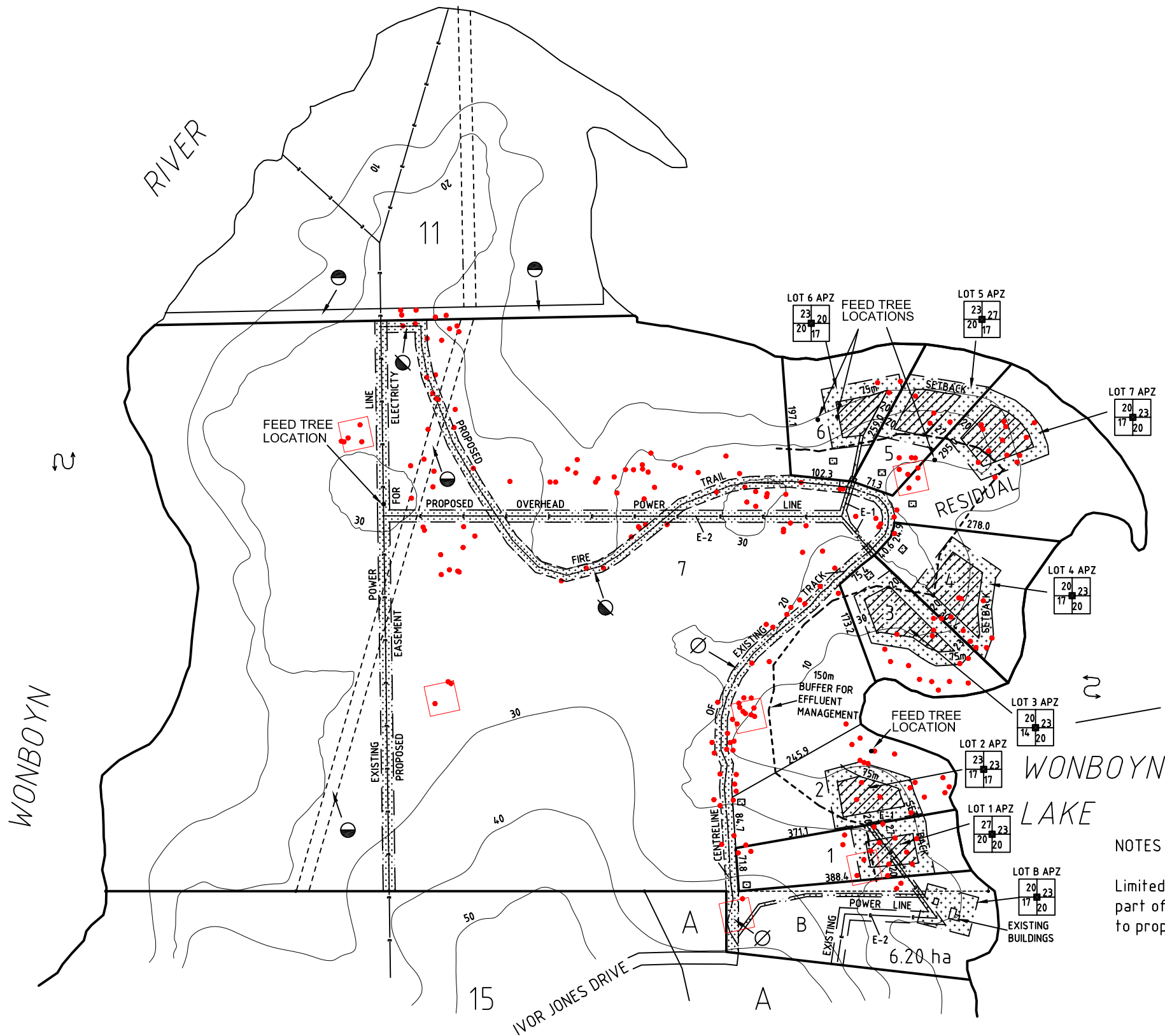
| Potential Impacts                                                                                                                                                                 | Threatened Biota                                                                                                                                                              |                      |                          |                           |                             |                          |                        |                           |                       |              |                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------|---------------------------|-----------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------|-----------------|
|                                                                                                                                                                                   | Swamp Oak<br>Floodplain<br>Forest                                                                                                                                             | Coastal<br>Saltmarsh | Yellow-bellied<br>Glider | Grey-headed<br>Flying-fox | Greater Broad-<br>nosed Bat | Common Bent-<br>wing Bat | Sooty<br>Oystercatcher | Glossy Black-<br>Cockatoo | Gang-gang<br>Cockatoo | Powerful Owl | Varied Sittella |
| <b>proposal likely to affect the habitat of a threatened species, population or ecological community?</b><br>a) disturbs any permanent, semi-permanent or ephemeral water bodies; | only waterway that has any significant influence on these two communities. The proposed development is unlikely to affect the estuary such that the communities are affected. |                      |                          |                           |                             |                          |                        |                           |                       |              |                 |
| b) degrades soil quality;                                                                                                                                                         | Both communities are underlain by salty, sandy soils and are remote from the proposed development. There is unlikely to be any degradation of soil quality                    |                      |                          |                           |                             |                          |                        |                           |                       |              |                 |
| c) clears or modifies native vegetation;                                                                                                                                          | Neither community would be affected by clearing of native vegetation.                                                                                                         |                      |                          |                           |                             |                          |                        |                           |                       |              |                 |
| d) introduces weeds, vermin or feral species or provides conditions for                                                                                                           | Both communities are remote enough from the proposed development that there is unlikely to be any introduction of weeds.                                                      |                      |                          |                           |                             |                          |                        |                           |                       |              |                 |

| Potential Impacts                                                                                                  | Threatened Biota                                                                                                                      |                      |                          |                                                                          |                                              |                                                 |                        |                           |                       |                                                                                                          |                 |
|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------|--------------------------------------------------------------------------|----------------------------------------------|-------------------------------------------------|------------------------|---------------------------|-----------------------|----------------------------------------------------------------------------------------------------------|-----------------|
|                                                                                                                    | Swamp Oak<br>Floodplain<br>Forest                                                                                                     | Coastal<br>Saltmarsh | Yellow-bellied<br>Glider | Grey-headed<br>Flying-fox                                                | Greater Broad-<br>nosed Bat                  | Common Bent-<br>wing Bat                        | Sooty<br>Oystercatcher | Glossy Black-<br>Cockatoo | Gang-gang<br>Cockatoo | Powerful Owl                                                                                             | Varied Sittella |
| them to increase and/or spread;                                                                                    |                                                                                                                                       |                      |                          |                                                                          |                                              |                                                 |                        |                           |                       |                                                                                                          |                 |
| e) removes or disturbs key habitat features such as trees with hollows, caves and rock crevices, foraging habitat; | N/A. No habitat for either community would be affected                                                                                |                      |                          | No key habitat features (gullies suitable for breeding camps)are present | Tree hollows are present.                    | No key habitat features (caves etc) are present |                        |                           |                       | No key habitat features (suitable tree hollows, roosting sites) are present in the area to be developed. |                 |
| f) affects natural revegetation and recolonisation of existing species following disturbance; and                  | It is unlikely that there would be any modification to either community's disturbance regimes as a result of the proposed development |                      |                          |                                                                          |                                              |                                                 |                        |                           |                       |                                                                                                          |                 |
| Does the proposal affect any threatened species or                                                                 | N/A                                                                                                                                   | N/A                  |                          | The species is not at the limit of its known                             | The species is not at the limit of its known | The species is not at the limit of its known    |                        |                           |                       | The species is not at the limit of its known                                                             |                 |

| Potential Impacts                                            | Threatened Biota            |                   |                       |                        |                         |                      |                     |                       |                    |              |                 |
|--------------------------------------------------------------|-----------------------------|-------------------|-----------------------|------------------------|-------------------------|----------------------|---------------------|-----------------------|--------------------|--------------|-----------------|
|                                                              | Swamp Oak Floodplain Forest | Coastal Saltmarsh | Yellow-bellied Glider | Grey-headed Flying-fox | Greater Broad-nosed Bat | Common Bent-wing Bat | Sooty Oystercatcher | Glossy Black-Cockatoo | Gang-gang Cockatoo | Powerful Owl | Varied Sittella |
| populations that are at the limit of its known distribution? |                             |                   |                       | distribution           | distribution            | distribution         |                     |                       |                    | distribution |                 |

| Potential Impacts                                                        |                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>How is the proposal likely to affect current disturbance regimes?</b> |                                                                                                                                                                                                                                                                                                                                          |
| a) modifies the intensity and frequency of fires;                        | The proposal may lead to more frequent, low-intensity fires in the vicinity of the new lots. This may result in some reduction in the abundance of some plant species that require longer intervals between fires or require high-intensity fires to propagate. Some species such as Bladley Grass and Bracken may become more dominant. |
| b) modifies flooding flows.                                              | There are only ephemeral streams on site that do not flood. There is unlikely to be any impact in relation to flooding.                                                                                                                                                                                                                  |
| <b>How is the proposal likely to affect habitat connectivity?</b>        |                                                                                                                                                                                                                                                                                                                                          |
| a) creates a barrier to fauna movement;                                  |                                                                                                                                                                                                                                                                                                                                          |
| b) removes remnant vegetation or wildlife corridors;                     | Approximately 7.62ha of vegetation would be removed. It is considered that there would not be any significant effect on local or regional wildlife corridors.                                                                                                                                                                            |
| c) modifies remnant vegetation or wildlife corridors.                    | There will inevitably be some modification of vegetation in the vicinity of the dwellings, APZs, access roads and electricity easements. More frequent low intensity fires may also modify vegetation. <b>Corridor modification</b>                                                                                                      |
| How is the proposal likely to affect critical habitat?                   | No critical habitat of any endangered species, population or community is present at the subject site or in the vicinity.                                                                                                                                                                                                                |

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- HOLLOW BEARING TREE
- POTENTIAL AREA TO BE DISTURBED

#### NOTES

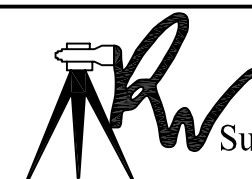
Limited vegetation removal and only where necessary as part of the road construction and provision of electricity to proposed lots.

REV 5 27-04-2010 TREE LOCATIONS REVISED TREE TYPES REVISED  
 REV 4 01-04-2010 POSITION OF HOLLOW BEARING TREES ADDED  
 REV 3 15-06-2009 POSITION OF HOLLOW BEARING TREES ADDED  
 REV 2 09-02-2009 BUILDING ENVELOPE LOT 2 AMENDED  
 REV 1 21-01-2009 BDY LOTS 1 & 2 CHANGED, BUILDING ENVELOPES AND APZ'S FOR LOTS 1, 2, 4, 5, 6 & 7 AMENDED

- E-2 PROPOSED EASEMENT FOR ELECTRICITY 20 WIDE
- E-1 PROPOSED UNDERGROUND POWER LINE AND EASEMENT FOR ELECTRICITY 10 WIDE
- ⊘ PROPOSED RIGHT OF CARRIAGEWAY 20m WIDE
- ⊙ PROPOSED RIGHT OF CARRIAGEWAY 20m WIDE
- ⊖ RESERVED ROAD 20.115m WIDE
- ⊕ PUBLIC ROAD 20.115m WIDE & VAR.

PLAN OF POTENTIAL AREAS TO BE DISTURBED RESULTING FROM SUBDIVISION OF PORTION 14 PLUS BOUNDARY ADJUSTMENT OF LOT B IN DP 33573 AT PICNIC POINT, WONBOYN LAKE

FOR PICNIC POINT PTY LTD OWNER



Surveying & Valuations

PO BOX 639  
 35 FLINDERS STREET  
 EDEN NSW 2551  
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LEVEL DATUM  
 CONTOUR INFORMATION  
 PREPARED FROM KIAH 1:25000  
 TOPOGRAPHIC MAP

| SCALE                  | DATE       | DRN. | CHK. | SIZE | REV. |
|------------------------|------------|------|------|------|------|
| 1:8000                 | 27-04-2010 | SB   | MS   | A3   |      |
| REFERENCE/DRAWING NAME |            |      |      |      |      |
| 0833 H SHEET 1 OF 2    |            |      |      |      | 5    |

