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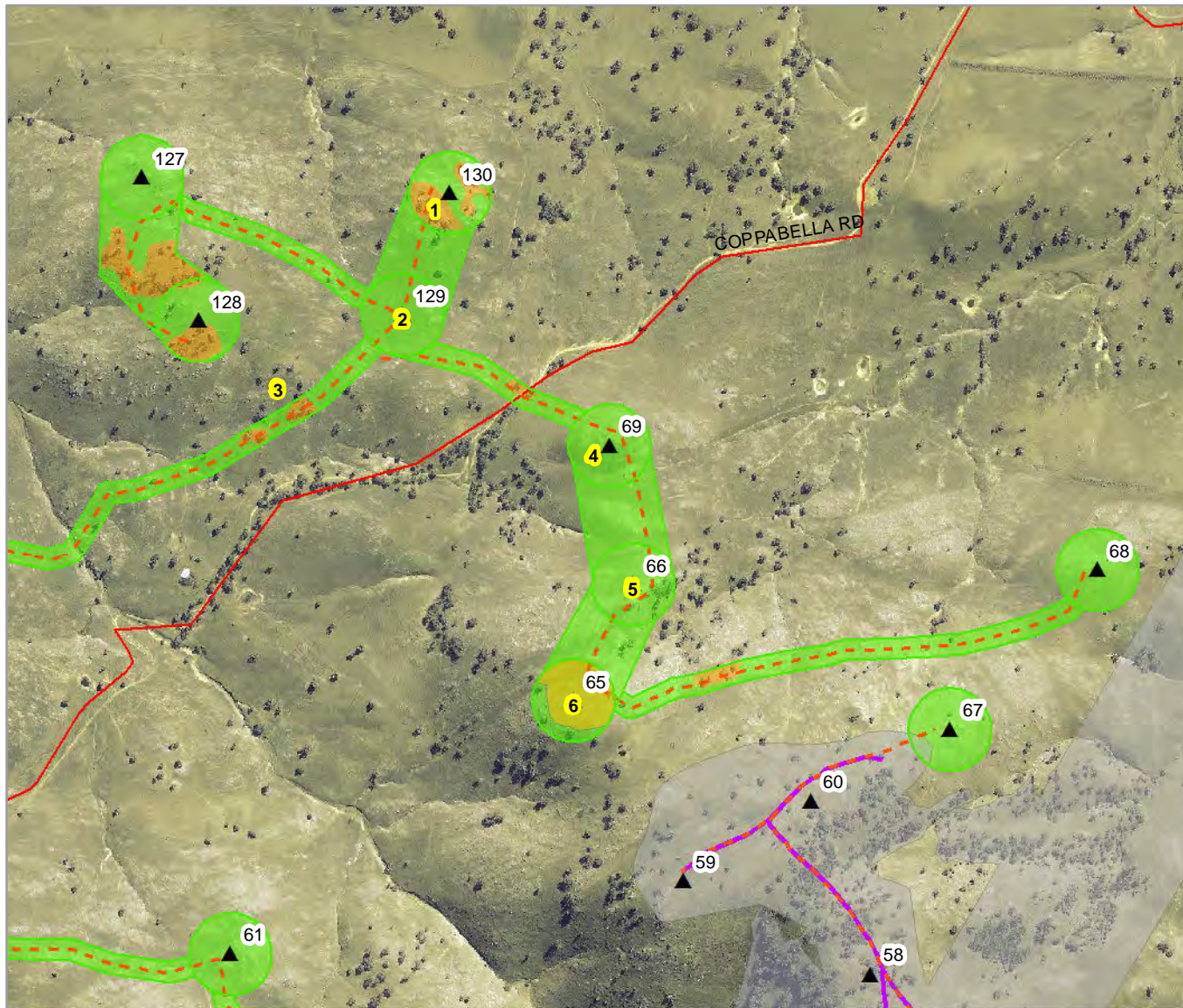
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- Latest Development Envelope
- Turbines (011112)
- Access Tracks (011112)
- Electrical Return Line (00912) 22
- Roads
- Previously assessed area

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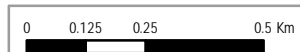
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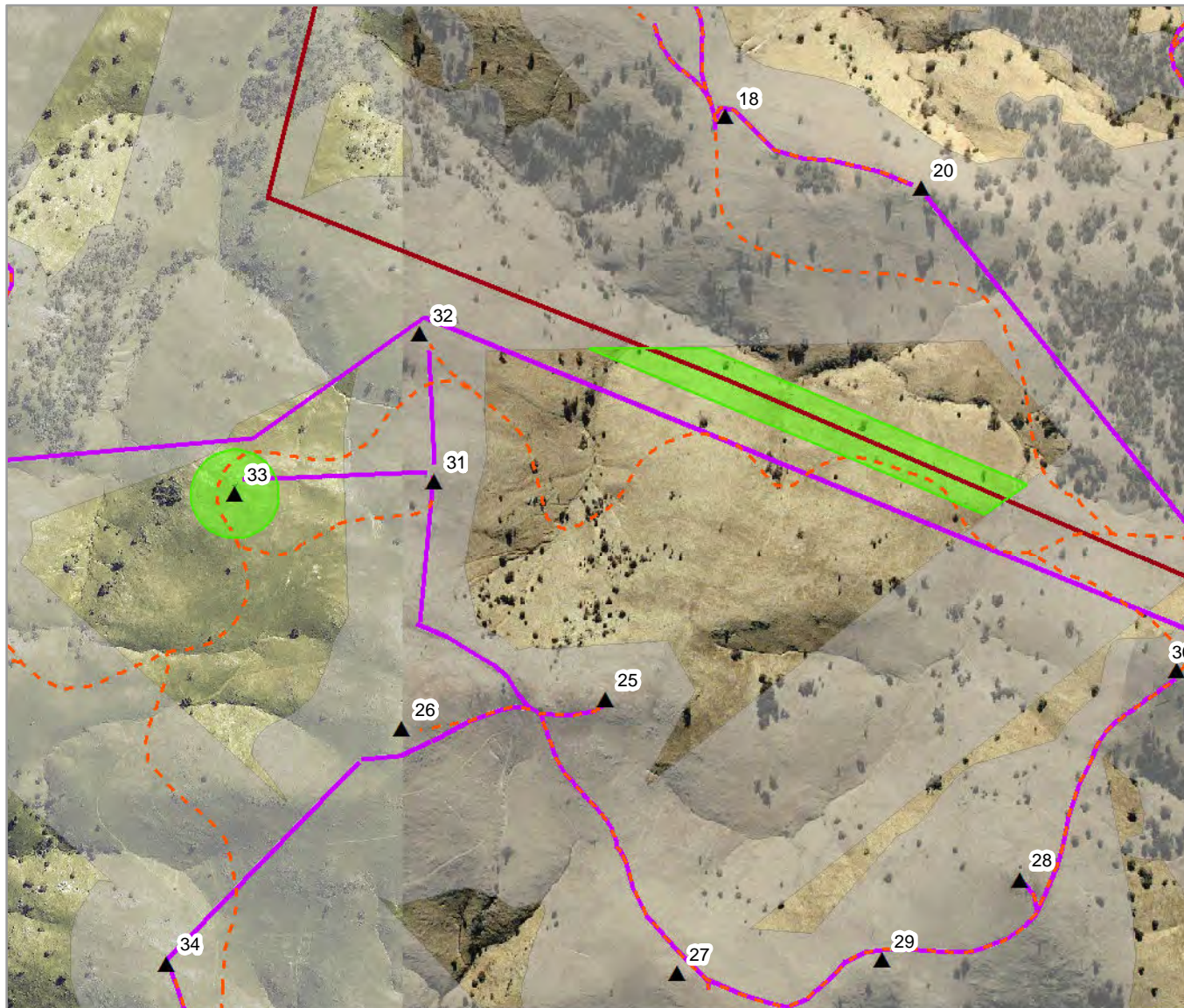
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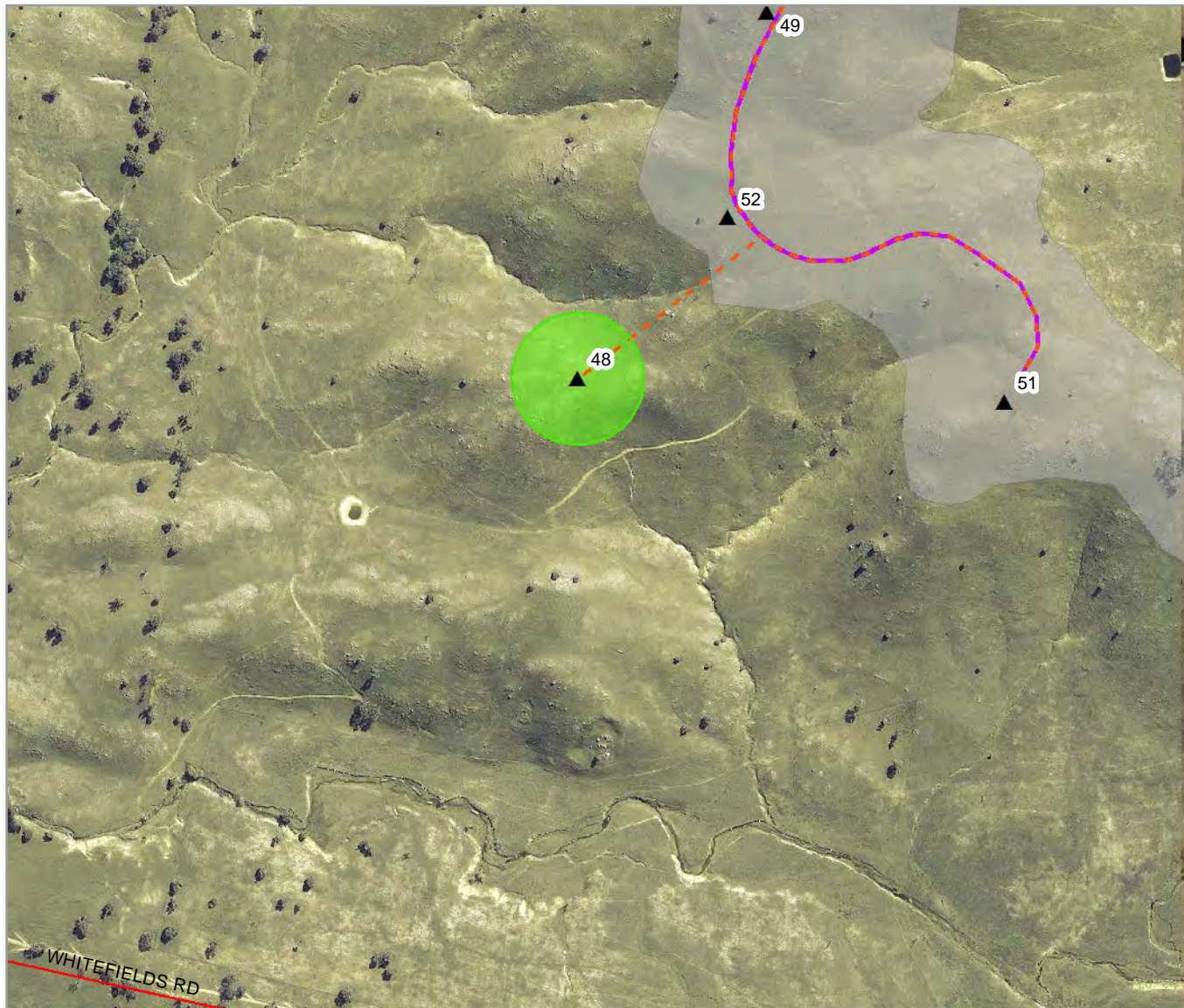
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- - - Roads
- Previously assessed area

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Constraints: Map 4 of 9

Constraints

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Infrastructure

1 Site Numbers

Latest Development Envelope

▲ Turbines (011112)

- - Access Tracks (011112)

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— Roads

Previously assessed area

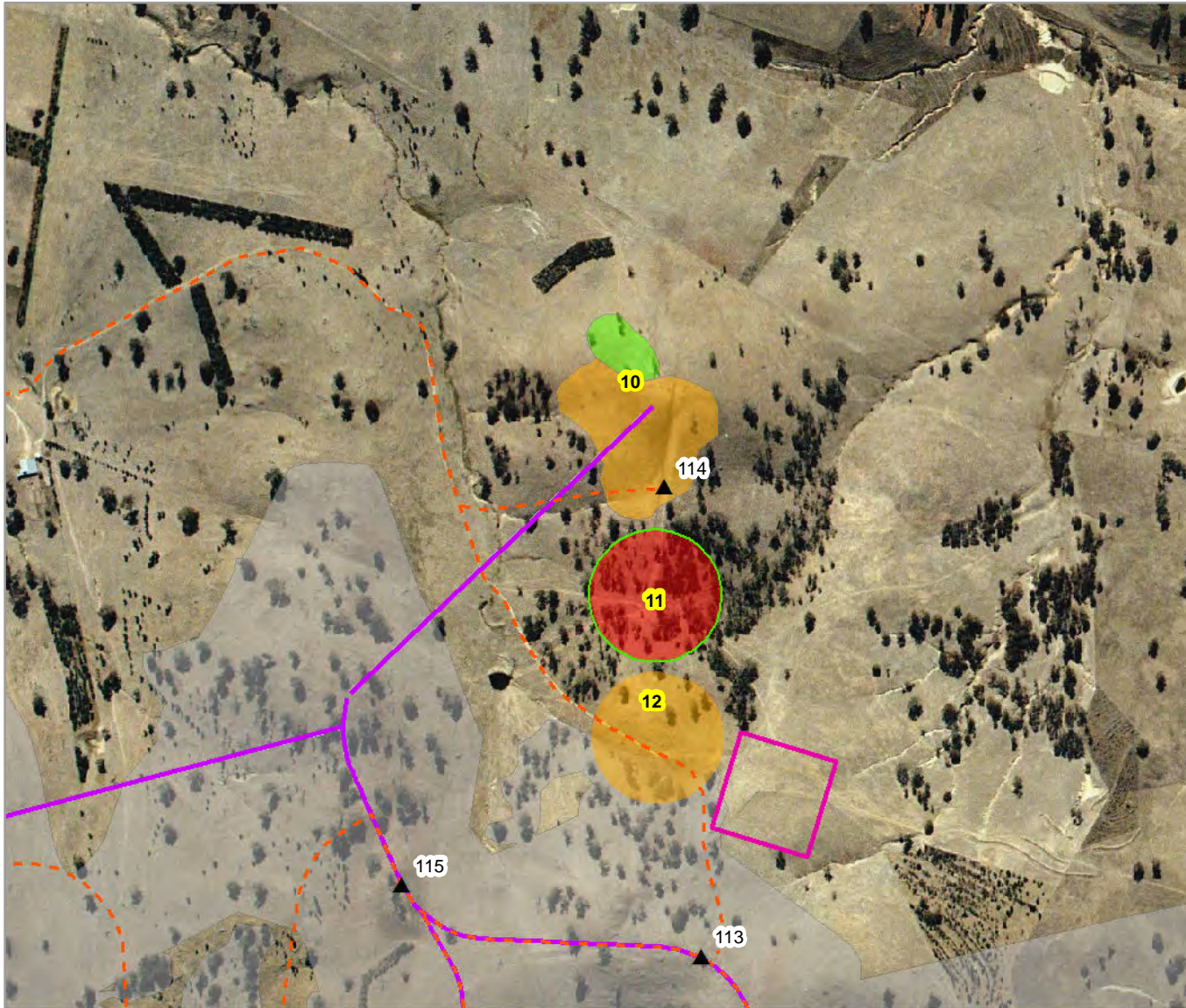


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Author: AM





Constraints: Map 5 of 9

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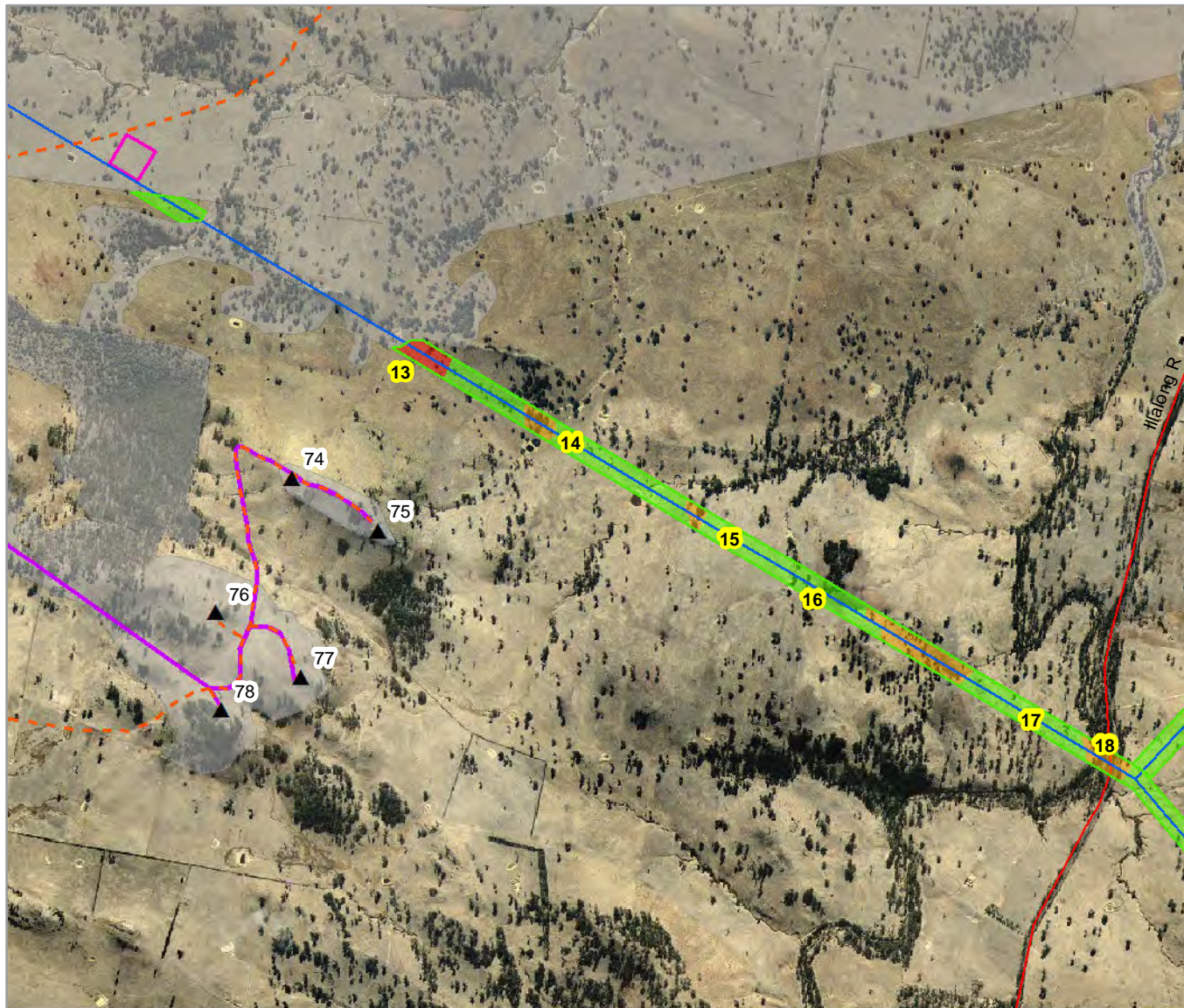
Infrastructure

- 1 Site Numbers
- Latest Development Envelope
- ▲ Turbines (011112)
- Access Tracks (011112)
- Electrical Return Line (0912) [2]
- Yass Substation location (011112) [2]
- Roads
- Previously assessed area

0 0.125 0.25 0.5 Km

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 Author: AM





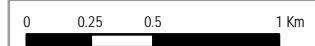
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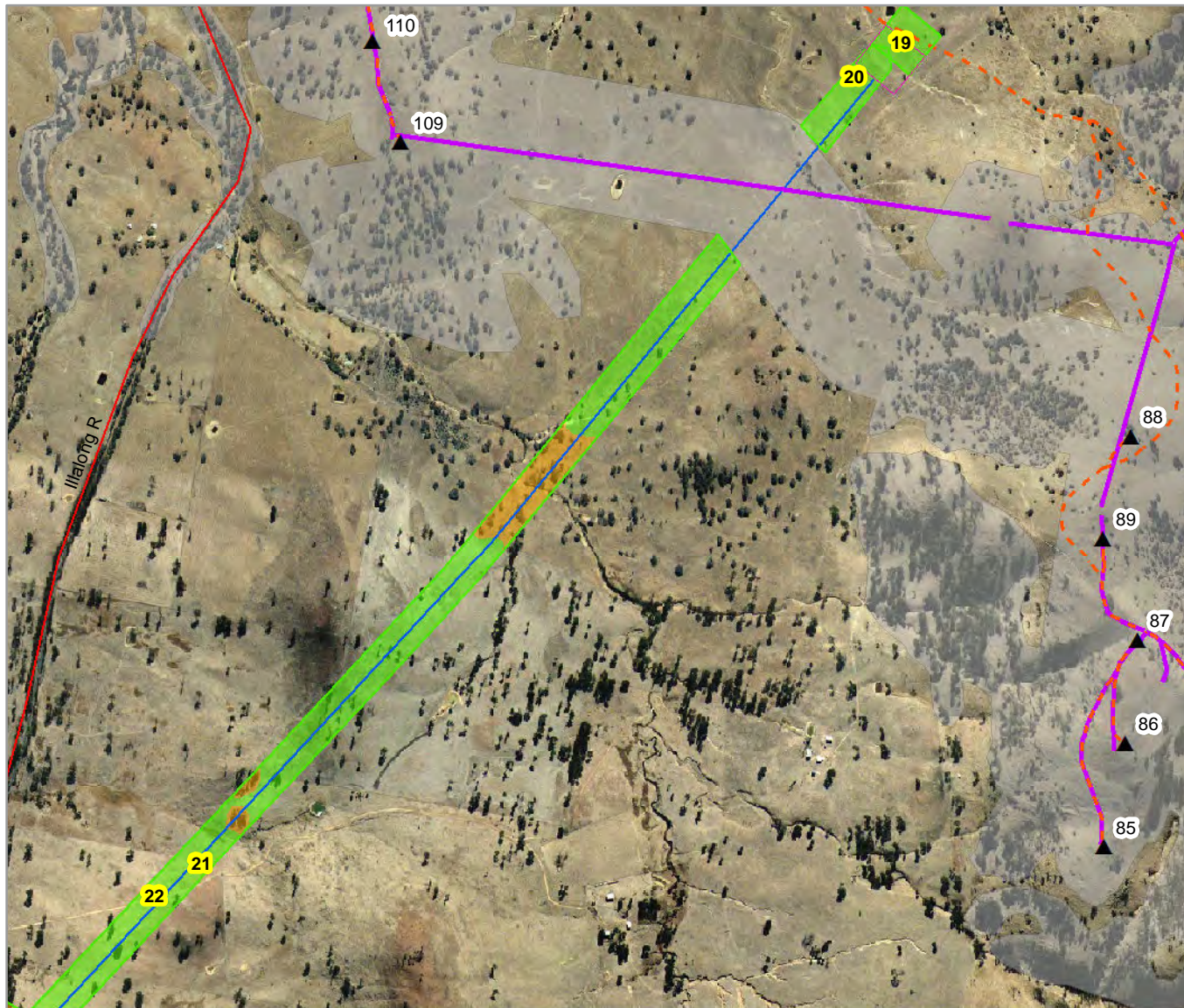
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- 1 Site Numbers
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- ▲ Turbines (011112)
- Access Tracks (011112)
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- Powerline Easement (011112)
- Yass Substation locations (011112) (011112)
- Roads
- Previously assessed area



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 Author: AM





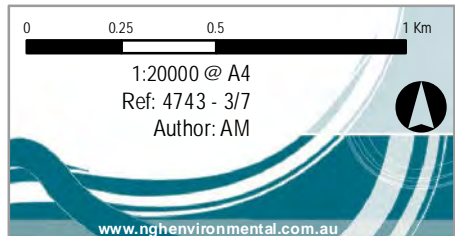
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Infrastructure

- 1 Site Numbers
- Yass Substation locations (011112)
- Latest Development Envelope
- ▲ Turbines (011112)
- - - Access Tracks (011112)
- Electrical Return (00912)
- Powerline Easement (011112)
- Roads
- Previously assessed area





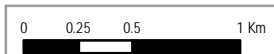
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Infrastructure

- 1 Site Numbers
- Latest Development Envelope
- Powerline Easement (011112)
- Roads
- Previously assessed area



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Constraints: Map 9 of 9

Constraints

- High
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Infrastructure

- Site Numbers
- Powerline Easement (011112)
- Latest Development Envelope
- Yass Substation location (011112) (2)
- Previously assessed area

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Ref: 4743 - 3/9

Author: AM



APPENDIX F REVISED IMPACT AREA CALCULATIONS

Revised impact area calculations for the entire Yass Valley Wind Farm

Table 7-1 Impact area calculations for the revised proposal; Coppabella, Marilba, and new assessment areas.

Yass Wind Farm		Impact areas				Vegetation types									
Infrastructure	Quantity	Width (m)	Length (m)	Total Footprint (ha)	Exotic Pasture	Native Pasture	BGW pasture	BGW trees	BGBPF	DSTF	LBDGF	RRG	BGWke	Total of all veg types	
Turbine footing ^a	148	25	25	9.250	0.000	7.681	1.000	0.500	0.063	0.000	0.006	0.000	0.000	9.250	
Crane hardstand ^b	148	22	40	13.024	0.088	10.340	2.552	0.088	0.000	0.000	0.044	0.000	0.000	13.112	
Tracks ^a	1	8	110,800	88.640	6.400	60.352	15.648	5.968	0.159	0.000	0.000	0.040	0.000	88.567	
Underground powerlines onsite ^b	1	2	64,630	12.926	0.789	9.862	2.018	0.158	0.066	0.000	0.037	0.000	0.000	12.931	
Overhead 33kV powerline cabling / easement ^{a*}	1	14	15,480	21.672	0.000	0.000	0.000	0.840	0.000	0.000	0.522	0.000	0.000	1.362	
Overhead 33kV power pole footings ^a	62	1	1	0.006	0.001	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.007	
Preferred Electrical Connection to TransGrid 330kV	Overhead powerline ^{a*}	1	16	25,510	40.816	0.000	0.000	0.000	5.290	0.000	0.000	0.000	0.947	0.000	6.237
	Overhead power pole footings ^a	103	1	1	0.010	0.001	0.000	0.010	0.001	0.000	0.000	0.000	0.0003	0.000	0.012
	Substation and control bldg ^a	3	150	150	6.750	0.000	0.000	6.300	0.000	0.000	0.000	0.450	0.000	6.750	
Concrete batch plant ^b	2	75	100	1.500	0.000	0.750	1.500	0.000	0.000	0.000	0.000	0.000	0.000	2.250	
Construction compound, staging and storage ^b	2	300	100	6.000	0.000	3.000	3.000	0.000	0.000	0.000	0.000	0.000	0.000	6.000	
				200.595	7.278	91.989	32.030	12.846	0.288	0.000	1.060	0.988	0.000	146.478	
Breakdown by impact type:															
a Permanent habitat loss (includes all footings and tracks as well as overhead powerlines where they occur in treed areas)					6.402	68.037	22.960	12.599	0.222	0.000	0.979	0.988	0.000	112.185	
b Temporary habitat loss (areas that can be rehabilitated post construction)					0.877	23.952	9.070	0.246	0.066	0.000	0.081	0.000	0.000	34.293	

Yass Wind Farm		Impact areas				Vegetation types									
Infrastructure		Quantity	Width (m)	Length (m)	Total Footprint (ha)	Exotic Pasture	Native Pasture	BGW pasture	BGW trees	BGBPF	DSTF	LBDGF	RRG	BGWke	Total of all veg types
Option 2 Electrical Connection to 132kV Line	Overhead 132kV powerline cabling / easement ^{a*}	1	15	19096	28.644	0.000	0.000	0.000	3.053	0.000	0.000	0.960	0.000	0.000	4.013
	Overhead 132kV power pole footings ^a	77	1	1	0.008	0.000	0.005	0.002	0.0009	0.000	0.000	0.0003	0.0000	0.000	0.008
	Substation and control bldg ^a	4	150	150	9.000	0.000	0.000	7.875	0.675	0.000	0.000	0.450	0.000	0.000	9.000

BGW: Box Gum Woodland, BGBPF: Brittle Gum – Broad-leaved Peppermint Forest, DSTF: Dry Shrub – Tussock Grass Forest, LBDGF: Long-leaved Box Dry Grass Forest, BGWke: Box-Gum Woodland – Kunzea ericoides, RRG: River Red Gum Woodland.

* Overhead cabling has no permanent impact on pasture and other vegetation < 4.5m in height

nghenvironmental provided shape files from surveys to Epuron, who undertook the calculations.

Table 7-2 Revised maximum impact areas on Box Gum Woodland EEC vegetation; Coppabella, Marilba, and new assessment areas

Vegetation condition		Poor	Poor-Mod	Mod	Mod-Good	Good	Total
CEEC 1		no			yes		
EEC 2		no	yes				
BIOMETRIC CONDITION 3		low	mod - good				
Turbine footing ^a		0.313	1.125	0.063	0.000	0.000	1.500
Crane hardstand ^b		0.616	1.936	0.044	0.044	0.000	2.640
Tracks ^a		10.208	9.549	1.305	0.271	0.278	21.611
Underground powerlines onsite ^b		0.369	1.410	0.340	0.036	0.006	2.162
Overhead 33kV powerline cabling		0.000	0.717	0.122	0.000	0.000	0.839
Overhead 33kV power pole		0.001	0.001	0.000	0.000	0.000	0.002
Preferred Electrical Connection to TransGrid 330kV	Overhead powerline ^{a*}	0.000	3.333	0.560	1.397	0.000	5.290
	Overhead power pole footings ^a	0.001	0.007	0.000	0.000	0.000	0.009
	Substation and control bldg ^a	4.050	2.250	0.000	2.250	0.000	8.550
Concrete batch plant ^b		0.750	0.750	0.000	0.000	0.000	1.500
Construction compound, staging		0.000	3.000	0.000	0.000	0.000	3.000
		16.308	24.077	2.434	3.998	0.284	47.102
Breakdown by impact type:							
<u>a</u> Permanent habitat loss (includes all footings and tracks as well as overhead powerlines where they occur in treed areas)		14.573	16.981	2.049	3.918	0.278	37.800
<u>b</u> Temporary habitat loss (areas that can be rehabilitated post construction)		1.735	7.096	0.384	0.080	0.006	9.302

¹ potential Commonwealth CEEC status when applied to the Box-Gum Woodland community (floristic criteria only)

² potential NSW EEC status when applied to the Box-Gum Woodland community (floristic criteria only)

³ potential NSW Biometric condition status when applied to the Box-Gum Woodland community (floristic criteria only)

* Overhead cabling has no permanent impact on pasture and other vegetation < 4.5m in height

nghenvironmental provided shape files from surveys to Epuron, who undertook the calculations.

APPENDIX G ADDITIONAL SURVEYS

G.1 SOC 18: FLORA

Note, the following report references the *Draft* Statement of Commitment which was previously numbered SOC 19.

18 November 2009

Julian Kasby
Epuron

Dear Julian

RE: Further vegetation survey work at Yass Valley: Marilba Hills.

Additional survey work was identified as being required in the Draft Statements of Commitment (specifically SoC 19) for the Yass Valley Wind Farm to cover off on vegetation constraints. SoC 19 of the Yass Valley Wind Farm Environmental Assessment (EA) July 2009 states:

Additional targeted surveys would be undertaken, if the identified areas would be impacted by the proposal. These areas include:

Marilba Hills

- *Burrinjuck Spider Orchid, undertaken in mid-October, where the dry forest remnant in the far south of Cluster 7 would be impacted by the proposed works.*
- *Threatened grassy woodland species, undertaken in Spring, if the secondary grassland on the south-western side of Cluster 7 would be substantially impacted*

Mid-October marked the appropriate time to survey for these species. The work was undertaken by a botanist and technical assistant on the 15th October 2009.

The findings of these surveys are provided in a brief report attached to this letter. Survey methodology, results and recommendations are discussed.

If you have any further questions regarding the report, please do not hesitate to contact me.

Kind regards,



Dave Maynard

Project officer
nghenvironmental
02 6492 8311

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Burrinjuck Spider Orchid (*Caladenia* sp. Burrinjuck) targeted survey

Methods

The forest fragment identified as potential habitat for the Burrinjuck Spider Orchid (Figure 1) was searched systematically by two botanists over a 1.5 hour period. The entire forest fragment was searched, employing north-south running transects each spaced 5-10m apart.

This survey satisfies the first component of SoC 19.

Results

The orchid was not detected during the search. This result, combined with the results of the survey conducted in September 2008, indicates that the species is not present at the site. No further surveys are considered to be warranted. We consider that the proposal as set out in the Yass Valley Wind Farm Environmental Assessment (July, 2009) would **not** be likely to significantly affect the Burrinjuck Spider Orchid at this site.

As discussed in the Biodiversity Assessment, the district is heavily cleared and impacts to the forest remnant should be minimised. Specifically, Statements of Commitment 11, 12, 19 and 23 in the EA address measures to reduce impacts on forest fragments.

Targeted survey for threatened grassy woodland species within the diverse secondary grassland

Methods

The area of diverse secondary grassland to the south-west of cluster seven was surveyed utilising the random meander technique described by Cropper (1993). The survey had the aim of identifying the approximate extent of this diverse secondary grassland and associated Yass Daisy population in the vicinity of the proposed substation and access road (Figure 1). Two botanists spent approximately 3 hours on this aspect of the survey.

During the survey, the site was also searched for threatened species previously identified as potentially present, including *Swainsona sericea*, *Cullen parvum* and *Thesium australe*, utilising the random meander technique described by Cropper (1993). Road crossing points that would minimise impacts to threatened and regionally significant species were also identified.

The second component of SoC 19 has been satisfied by this survey.

Results

The Yass Daisy (*Ammobium craspedioides*) listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) and the *Threatened Species Conservation Act, 1995* (TSC Act), was identified within the search area and its extent marked by hand held GPS. Its distribution in this area has been mapped on Figure 1 (red polygon – area corresponds with high diversity native grassland discussed below). This species had been previously identified on the subject site south of cluster seven. No other threatened species were recorded during the survey.

The site carries Box Gum Woodland understorey dominated by Kangaroo Grass (*Themeda triandra*) and Wallaby Grasses (*Austrodanthonia* spp.) with relatively high floristic diversity. Drier areas support Kangaroo Grass and abundant Yass Daisy plants. Linear wet areas beside drainage lines do not carry these species, but have a range of regionally significant species such as Yam Daisy (*Microseris lanceolata*) and the Early Snake Orchid (*Diuris chryseopsis*).

On the basis of understorey diversity, the vegetation belongs to the Box Gum Woodland Endangered Ecological Community (EEC) listed under the TSC Act, despite being almost treeless. The grassland patch has at least 30 non-grass species and easily qualifies as a Critically Endangered Ecological Community (CEEC) under the EPBC Act. In addition to the threatened Yass Daisy, 11 Box Gum Woodland species listed as important by the Commonwealth are present, including the Early Snake Orchid and the daisies Billy Buttons (*Craspedia variabilis*), Scaly Buttons (*Leptorhynchos squamatus*), Yam Daisy, Smooth Solenogyne (*Solenogyne dominii*), Spoon Cudweed (*Stuartina muelleri*) and Austral Sunray (*Triptilodiscus pygmaeus*). Other woodland species present such as Tadgell's Bluebell (*Wahlenbergia multicaulis*) and Slender Tick-trefoil (*Desmodium varians*) are likely to be uncommon or declining in the region.

Figures 1, 2 and 3 clearly show the native grassland vegetation within the affected paddocks, contrasting with the greener low diversity native pasture in surrounding paddocks. The red polygon in Figure 1 shows the approximate extent of the diverse grassland and Yass Daisy population boundary. Remnant woodlands and native pastures dominated by Kangaroo Grass with a high diversity of native forbs are very uncommon in the region and have high conservation value. Kangaroo Grass is a keystone species in this community and its loss is generally associated with a drastic reduction in stand diversity.

Recommendations

It is recommended that the proposal aim to minimise the area of disturbance caused by the construction of the access road and substation. Further it is recommended that the access road be placed to avoid the core Yass Daisy population north of the proposed substation site. Route 1 that is detailed below would achieve this objective..

Figure 1 identifies potential road crossing points (as indicated by the dotted yellow lines) to minimise impacts to the diverse grassland and Yass Daisy population. In order of preference these options are:

- **Route 1 is the preferred option since it avoids the diverse grassland paddock and Yass Daisy population altogether.**
- Route 2 passes through the proposed substation site. This site is already disturbed and of lower conservation value however it is not certain if the area can accommodate the substation as well as the access road.
- Route 3 passes south of the substation site. There are few Yass Daisy plants within 5-10 metres of the existing woodlot boundary. Some Yass Daisy plants and *Themeda* grassland would be disturbed along the western boundary of the property. This route would cross a moist drainage line.
- Route 4 passes through a 10 metre wide corridor alongside a drainage line. This area has no Kangaroo Grass or Yass Daisy but does support a range of regionally significant species. The corridor is within a seepage zone associated with the drainage line to the immediate north.

The assessments of significance conducted as part of the original EA included both the Yass Daisy and Box-Gum Woodland however, it assumed that the area of diverse grassland west of Cluster 7 would not be impacted. **All of the above options, excluding option 1 will result in some level of impact to the Yass Daisy population and/or Box-Gum Woodland EEC within the diverse grassland and revised assessments of significance would be required.**

The diverse grassland paddocks have potential for management as offset sites.



Figure 1: Forest remnant containing suitable habitat for the Burrinjuck Spider Orchid (green line) and approximate extent of the diverse secondary grassland (EEC) and Yass Daisy population (red line). Recommended routes for the road crossing are indicated by the dotted yellow lines (aerial image: Google Earth).



Figure 2: View from north-east of diverse grassland site looking south



Figure 3: View of grassland looking north showing Kangaroo Grass patches (Yass Daisy habitat)

Staff members undertaking surveys

<p>Paul McPherson Dip. (Env. Cont.), B. Sc. (Nat. Res.)</p>	<p>Since commencing at nghenvironmental in 1996, Paul has undertaken environmental assessments and prepared EIA reports for a wide range of proposals located in the Far South Coast, South Coast, Kosciuszko and Southern Tablelands regions.</p> <p>Flora work has included detailed flora surveys in association with the above EIA projects, surveys undertaken for the broadscale mapping of the vegetation of the Far South Coast region and property scale vegetation management planning.</p> <p>Prior to nghenvironmental, Paul worked in the Commonwealth Environment Department. He co-drafted the Commonwealth policy papers on the Regional Forest Agreement process and forest reserve criteria, and wrote numerous Ministerial speeches and parliamentary statements on forest issues.</p>
<p>Dave Maynard BSc Biological Ecology (Hons1)</p>	<p>Since joining nghenvironmental Dave has undertaken a number of botanical assessments, and has worked on Biodiversity Assessments, Biodiversity Constraints Analysis, Reviews of Environmental Factors and reviews of external Flora and Fauna Assessments.</p> <p>Prior to commencing on project work with nghenvironmental, Dave was employed at the Alice Springs Herbarium (NT) as a Botanist to develop the MacFlora interactive flora key project.</p>

G.2 SOC 23: FAUNA

ADDENDUM:

Additional survey at Coppabella Hills

Targeting Barking Owl, Squirrel Glider and Bush Stone Curlew

October 2009

Document Verification



Job title: ADDENDUM:
 Additional survey at Coppabella Hills
 Targeting Barking Owl, Squirrel Glider and Bush
 Stone Curlew
 October 2009

Document Title		Addendum					
File Name							
Revision	Date	Prepared by		Checked by		Approved by	
Draft	161109	name	Amy Curry	name	Brooke Marshall	name	Nick Graham-Higgs
			<i>Amy Curry</i>		<i>Brooke Marshall</i>		<i>Nick Graham-Higgs</i>
		name		name		name	

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1 INTRODUCTION

In September 2008, a Flora and Fauna Assessment was undertaken to determine the likely biodiversity values and impacts associated with a proposed wind farm site at “Coppabella Hills” near Yass on the Southern Tablelands in NSW. The Coppabella proposal forms part of a larger project, the proposed Yass Valley Wind Farm.

The Flora and Fauna Assessment included a constraints map showing, among other constraints, areas containing multiple hollow-bearing trees – deemed a high constraint due to the habitat they provide.

This report documents the methods and results of further survey effort required to target hollow-bearing trees which may be removed in three areas of the Coppabella Hills site. The study area incorporated three areas of the Coppabella Hills site where hollow bearing trees were present within close proximity to identified indicative turbine locations. The purpose of this additional survey was to determine the importance of the habitat provided by these hollow bearing trees on threatened species that are known or likely to occur within the study area. Threatened species that were targeted specifically during this additional fieldwork included the:

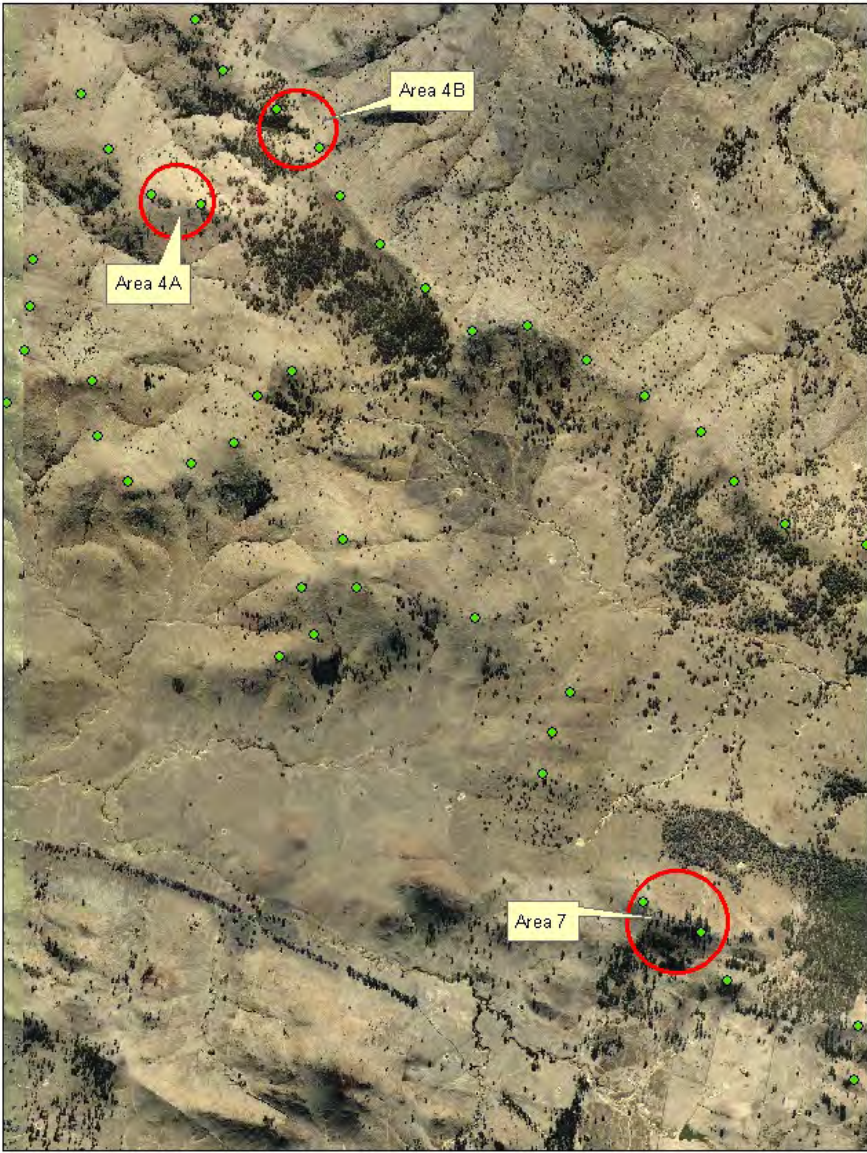
- Squirrel Glider
- Barking Owl

Additionally, the Bush Stone Curlew was targeted in woodland in and around the same study area, during the survey.

Refer to study area,

Figure 1-1.

Coppabella Additional Survey Areas



- Legend**
- ◆ Proposed Turbines
 - Additional Survey Areas

0 0.5 1 2 Kilometres



Figure 1-1: Coppabella Hills additional survey locations. Area names are consistent with the Flora and Fauna Assessment report.

2 METHODS

2.1 FIELD INVESTIGATIONS

Field investigations were undertaken over a four day period from the 13th October to 16th October 2009. The survey team consisted of one biodiversity project officer (Amy Currey, **ngh**environmental) and one technical assistant (Peter Milenkovic, Epuron). An additional technical assistant (Julian Kasby, Epuron) also assisted for one night and the last day of field investigations.

Weather conditions varied over the four day survey period from overcast cool days to cold, windy days. The following table represents weather conditions over the four day survey period.

Table 2-1: Weather Conditions

Date	Minimum Temp	Maximum Temp	Rainfall (mm)	Wind Speed (km/h)
Tuesday 13 th October	7.4°C	16.1°C	6.8mm	31 km/h
Wednesday 14 th October	8.4°C	14.0°C	4.0mm	24km/h
Thursday 15 th October	7.4°C	13.7°C	1.4mm	30km/h
Friday 16 th October	3.8°C	14.5°C	4.0mm	19km/h

(Source: Weatherzone, 2009)

2.1.1 Targeted Squirrel Glider Survey Works

Live trapping using specially designed cage traps were used to survey for Squirrel Gliders at two of the three sites (Area 4B was inaccessible by vehicle). This method was considered more effective than spotlighting or hair-tube analysis as differentiation of hairs from Squirrel Gliders and Sugar Gliders is problematic (Lobert *et al.* 2001), while spotlighting can repeatedly fail to detect the presence of Squirrel Gliders due to their small stature, poor reflective eye shine and quiet behaviour (Van Der Ree 2003), unlike Sugar Gliders, Squirrel Gliders rarely vocalise – calling rates may only be one per night, and not all nights (Goldingay pers. comm.).

Specially designed wire cage traps (30 in total) were positioned across the two sites using an aluminium extension ladder to nail each trap onto selected tree trunks at a height of 3-5 m off the ground. Each trap was covered with plastic and fitted with a piece of poly pipe to assist in providing some protection from wind and rain. Traps were placed approximately 50-100 m apart to maximise the area covered and to accommodate for home ranges and territories of Squirrel Gliders.

Each cage trap was baited with a mixture of honey, rolled oats and peanut butter to attract the Squirrel Glider, while a trail of diluted honey water was sprayed above the trap to a height of 5 – 10 m each morning. The location of each tree trap was marked with a GPS unit. The following table represents the survey effort.

Table 2-2: Number of Squirrel Gliders traps at each site.

Survey Period	Area 4 A	Area 4 B	Area 7	Total trap nights
13 th – 16 th October 2009	6 traps	Nil – due to access issues	8 traps	42

Each traps was set for three nights, set at dusk and checked from dawn the following morning.

2.1.2 Targeted Barking Owl Survey Works

The field investigations were undertaken to coincide with the breeding season of the Barking Owl (documented as July through October) when individual are more vocal and evidence of nesting would be detectable. Spotlighting was conducted over two consecutive nights using two hand held 12v 50w spotlights. Spotlighting was undertaken with call playback to maximise detectability rates.

At each site, spotlighting was undertaken by two people for a maximum of 15 minutes at 5 minute intervals, with call playback being undertaken in between these intervals for 5 minutes. In total, 50 minutes were spent at each site undertaking spotlighting and call playback surveys for the threatened Barking Owl.

Due to access restrictions and safety, spotlighting and call playback survey efforts were undertaken approximately 300 m north of Area 7 and approximately 1 km north-west of sites 4A and 4B. This survey effort is considered to be adequate as the home range of the Barking owl is estimated to be between 30-200 ha with breeding pairs occupying areas at less than 1km to 10 km apart. They have been observed to forage reasonably close to their nesting sites (1-2kms). The Barking Owl is a sedentary species, likely to remain in the same territories all year round.

2.1.3 Bush Stone Curlew Survey Works

At each of the three sites, searches of evidence of Bush Stone Curlews inhabiting the area was undertaken. This species inhabits areas of open forests and woodlands with a sparse grassy understorey with fallen timber present. As this species is largely nocturnal, call playback and spotlighting were undertaken on two consecutive nights by two people for a maximum of 10 minutes at 5 minute intervals, with call playback being undertaken in between these intervals for 5 minutes. In total, 30 minutes were spent at each site, undertaking spotlighting and call playback surveys for the Bush Stone Curlew.

2.1.4 Detailed Hollow Bearing Tree Register

A detailed hollow bearing tree assessment was undertaken at each of the three sites, all of which had two proposed turbine envelopes that could potentially impact on hollow bearing trees. All hollow-bearing trees located within a 50 m radius of each indicative turbine location were recorded with the following details:

- Each tree was recorded using a GPS system
- Photo taken
- Tree species type
- Description of the size and estimation of hollows present in each tree
- Recording DBH (diameter at breast height)

2.2 LIMITATIONS

Several limitations were encountered during the field investigations, including:

- Medium and long term climatic conditions including the current drought has influenced the presence of annual ground cover species
- Past clearing regimes and heavy grazing by sheep across the sites has resulted in a lack of abundance of native and annual species
- Surveys were conducted over brief periods of time to obtain an indicative assessment of the three identified sites, survey results may vary during different seasons and where they are conducted over longer periods of time
- Together with access difficulties and continued wet conditions, access was restricted in some areas, which were traversed on foot, limiting trapping and nocturnal survey work at Area 4B

3 RESULTS

3.1 TARGETED SQUIRREL GLIDER SURVEY WORKS

No Squirrel Gliders were captured at either Area 4A or Area 7 during the trapping survey. All cage traps were inspected each morning with no evidence of animals being caught or consuming the bait mixture. One trap at Area 7 was found closed during each inspection, with nothing caught and the bait still present. This may be due to the strong wind patterns at the site or a malfunction of this cage trap.

Although Area 4A, Area 4B and Area 7 all comprise of a variety of ideal hollows supporting potential roosting and breeding habitat for the Squirrel Glider, the understorey and ground cover species have greatly been modified due to past clearing regimes and the constant ongoing grazing pressures of sheep across the sites. None of the sites contain a shrub layer and none of the eucalypt species were flowering during the time of the field investigations, greatly reducing foraging habitat for this species across the three sites.

3.2 TARGETED BARKING OWL SURVEY WORKS

No Barking Owls were detected during the spotlighting and call playback surveys at each of the two survey locations. This species is unlikely to roost or breed at Area 4A as no large hollows were detected at this site that could provide roosting habitat for this species. At Area 4B, Turbine 2 and Area 7, Turbine 2 a number of large hollows were recorded that could support potential roosting and breeding habitat for this species, however these trees were located outside a 50 m radius of the turbine envelopes.

This species is highly flight mobile with a large home range that can traverse vast tracks of land. Suitable habitat to the north and east of Area 7 is present in flat eucalypt woodland that has no proposed turbine envelopes intended for construction.

At Area 4A, suitable habitat for this species is present in a woodland area approximately 900 m south-east of the site that may support suitable roosting and breeding habitat for this species as no large hollows were evident at Area 4A.

At Area 4B, Turbine 2 is located adjacent woodland area that consists of a number of large hollow bearing trees that may support suitable roosting and breeding habitat for this species. Approximately 16 hollow bearing trees are located within a 50 m radius of this turbine envelope, however the majority of them are too small to provide roosting or breeding habitat for the Barking Owl.

3.3 BUSH STONE CURLEW SURVEY WORKS

Both Area 7 and 4A are highly degraded sites with little fallen timber present. Area 4A is dominated by stinging nettle (*Urtica sp.*) providing minimal if any suitable habitat for the Bush Stone Curlew. At Area 7, the constant degradation of sheep grazing along the ridges has diminished the ground cover species greatly. Sheep faeces are scattered across the entire site with exotic species dominating areas.




Spotlighting and call playback of this species was undertaken on two consecutive nights, however this species was not detected at either Area 7 or Area 4A as the habitat at these two sites is highly degraded providing no coverage, roosting or breeding habitat for this species.




Area 4B did provide some areas of ideal fallen timber across the woodland area to the south. These areas were assessed in detail on foot for presence of the Bush Stone Curlew. The ground cover species were mostly dominated by exotic species, and the site has been constantly degraded by sheep grazing in the area.




3.4 DETAILED HOLLOW BEARING TREE REGISTER




A detailed hollow bearing tree register was undertaken at each of the three sites near the identified turbine envelopes that would potentially impact on hollow resources. The following table represents the results of all hollow bearing trees recorded within a 50 m radius of these turbine envelopes.




Table 3-1: Hollow Bearing Tree Register




Area 4A									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co-ordinates	Photo
1	Red Stringybark <i>Eucalyptus macrorhyncha</i>	100	8	1	0	1	2	640846 E 6155425 N	
2	Blakely's Red Gum <i>Eucalyptus blakelyi</i>	130	15	>5	2	1	8	640855 E 6155392 N	
3	White Box <i>Eucalyptus microcarpa</i>	70	10	>5	2	0	7	640888 E 6155371 N	




Area 4A									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
4	White Box <i>Eucalyptus microcarpa</i>	50	8	1	0	0	1	640898 E 6155366 N	
5	White Box <i>Eucalyptus microcarpa</i>	40	8	4	0	0	4	640898 E 6155363 N	
6	White Box <i>Eucalyptus microcarpa</i>	50	7	4	1	0	5	640898 E 6155362 N	

Area 4A									
No.	Tree Species	D.B.H	Tree Height	Small l < 10 cm	Medium 10 – 20 cm	Large e > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
7	White Box <i>Eucalyptus microcarpa</i>	70	8	3	4	0	7	640902 E 6155371 N	
8	Stag	50	6	4	0	0	4	640907 E 6155377 N	
9	White Box <i>Eucalyptus microcarpa</i>	30	6	3	2	1	6	640908 E 6155375 N	



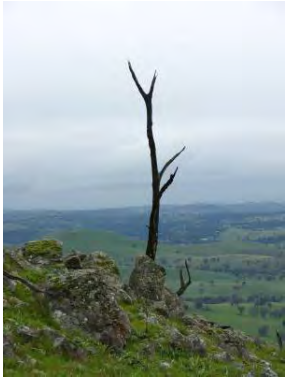
Area 4A									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
10	Stag	60	8	>5	3	0	8	640915 E 6155396 N	
11	White Box <i>Eucalyptus microcarpa</i>	1 x 60 1 x 30	6	4	2	0	6	640913 E 6155395 N	
12	White Box <i>Eucalyptus microcarpa</i>	60	5	3	1	0	4	640910 E 6155396 N	

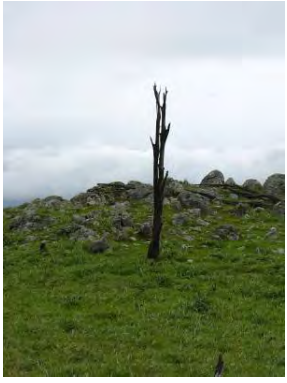

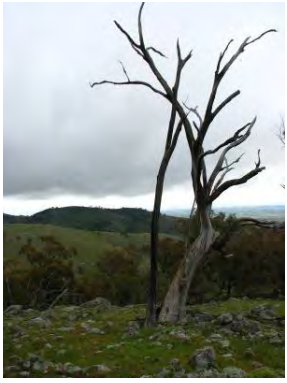
Area 4A									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
13	White Box <i>Eucalyptus microcarpa</i>	2 x 60	8	3	0	0	3	640898 E 6155401 N	
14	White Box <i>Eucalyptus microcarpa</i>	50	6	1	0	0	1	640901 E 6155400 N	
15	Half Stag	80	10	2	3	0	5	640912 E 6155319 N	




Area 4A									
No.	Tree Species	D.B.H	Tree Height	Small l < 10 cm	Medium 10 – 20 cm	Large e > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
16	Dead Stag	80	15	>15	6	1	22	640921 E 6155403 N	
17	White Box <i>Eucalyptus microcarpa</i>	100	12	>5	0	0	5	641026 E 6155373 N	
18	Dead Stag	80	6	>10	1	0	11	641073 E 6155398 N	




Area 4A									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
19	White Box <i>Eucalyptus microcarpa</i>	70	5	>10	0	0	10	641118 E 6155353 N	
20	White Box <i>Eucalyptus microcarpa</i>	100	15	>8	3	0	11	641112 E 6155365 N	
21	White Box <i>Eucalyptus microcarpa</i>	50	4	>5	1	1	7	641110 E 6155373 N	




Area 4B									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co- ordinates	Photo





Area 4B									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
1	Stag	1 x 30 4 x 20	7	>10	0	0	10	641986 E 6155696 N	
2	Stag	30	3	<10	0	0	10	641961 E 6155704 N	
3	Stag	20	4	5	0	0	5	642001 E 6155748 N	


Area 4B									
No.	Tree Species	D.B.H	Tree Height	Small l < 10 cm	Medium 10 – 20 cm	Large e > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
4	Stag	20 x 10	3	3	0	0	3	641982 E 6155748 N	
5	White Box <i>Eucalyptus microcarpa</i>	5 x 20- 60	8	<3	0	0	3	641655 E 6155947 N	
6	Stag	50	6	>10	2	0	12	641647 E 6155969 N	



Area 4B									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
7	Stag	70	7	>10	0	0	10	641654 E 6155972 N	
8	White Box <i>Eucalyptus microcarpa</i>	80	8	2	0	0	2	641638 E 61155983 N	
9	White Box <i>Eucalyptus microcarpa</i>	70	7	4	1	0	5	641630 E 6155985 N	




Area 4B									
No.	Tree Species	D.B.H	Tree Height	Small l < 10 cm	Medium 10 – 20 cm	Large e > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
10	Stag	40	5	<10	2	1	13	641664 E 6155993 N	
11	White Box <i>Eucalyptus microcarpa</i>	100	15	7	0	0	7	641678 E 6156005 N	
12	White Box <i>Eucalyptus microcarpa</i>	90	12	6	2	0	8	641709 E 6156008 N	

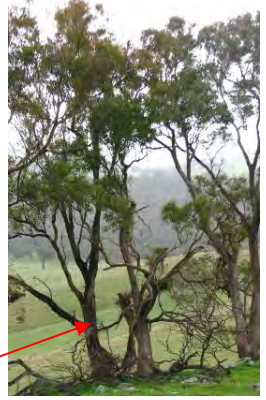


Area 4B									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
13	White Box <i>Eucalyptus microcarpa</i>	100	15	3	1	0	4	641718 E 6155989 N	
14	White Box <i>Eucalyptus microcarpa</i>	95	15	2	2	0	4	641720 E 6155982 N	
15	White Box <i>Eucalyptus microcarpa</i>	80	12	3	0	0	3	641724 E 6155978 N	




Area 4B									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
16	White Box <i>Eucalyptus microcarpa</i>	85	12	2	0	0	2	641734 E 6155975 N	
17	White Box <i>Eucalyptus microcarpa</i>	200	15	>20	<10	4	35	641719 E 6155948 N	
18	White Box <i>Eucalyptus microcarpa</i>	100	10	<5	2	0	7	641718 E 6155930 N	
19	Stag	5 X 50	10	<10	0	0	10	641685 E 6155965 N	




Area 4B									
No.	Tree Species	D.B.H	Tree Height	Small l < 10 cm	Medium 10 – 20 cm	Large e > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
20	White Box <i>Eucalyptus microcarpa</i>	80	8	<10	0	0	10	641676 E 6155961 N	




Area 7									
No.	Tree Species	D.B.H	Tree Height	Small l < 10 cm	Medium 10 – 20 cm	Large e > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
1	White Box <i>Eucalyptus microcarpa</i>	30	12	1	0	0	1	644513 E 6150562 N	
2	White Box <i>Eucalyptus microcarpa</i>	80	13	2	1	0	3	644487 E 6150528 N	


Area 7									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
3	White Box <i>Eucalyptus microcarpa</i>	70	10	2	0	0	2	644508 E 6150532 N	
4	White Box <i>Eucalyptus microcarpa</i>	60	12	2	0	0	2	644518 E 6150541 N	
5	White Box <i>Eucalyptus microcarpa</i>	80	12	3	1	0	4	641521 E 6150542 N	

Area 7									
No.	Tree Species	D.B.H	Tree Height	Small l < 10 cm	Medium 10 – 20 cm	Large e > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
6	White Box <i>Eucalyptus microcarpa</i>	80	12	2	2	0	4	644531 E 6150543 N	
7	White Box <i>Eucalyptus microcarpa</i>	30	12	2	3	0	5	644532 E 6150543 N	
8	White Box <i>Eucalyptus microcarpa</i>	50	12	4	2	1	6	644538 E 6150539 N	

Area 7									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
9	White Box <i>Eucalyptus microcarpa</i>	40	15	3	2	0	5	644538 E 6150524 N	
10	Stag	60	10	>10	0	0	10	644544 E 6150519 N	
11	White Box <i>Eucalyptus microcarpa</i>	50	10	4	2	2	8	64495 E 6150508 N	

Area 7									
No.	Tree Species	D.B.H	Tree Height	Small l < 10 cm	Medium 10 – 20 cm	Large e > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
12	Red Stringybark <i>Eucalyptus macrorhyncha</i>	80	18	>10	1	0	11	644493 E 6150510 N	
13	Red Stringybark <i>Eucalyptus macrorhyncha</i>	80	20	4	2	0	6	644489 E 6150511 N	
14	White Box <i>Eucalyptus microcarpa</i>	4 x 60	15	>15	3	2	20	644468 E 6150518 N	

Area 7									
No.	Tree Species	D.B.H	Tree Height	Small < 10 cm	Medium 10 – 20 cm	Large > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
15	White Box <i>Eucalyptus microcarpa</i>	30	8	1	0	0	1	644465 E 6150541 N	
16	White Box <i>Eucalyptus microcarpa</i>	70	10	5	1	0	6	644463 E 6150545 N	
17	Stag	60	8	3	0	0	3	644461 E 6150544 N	

Area 7									
No.	Tree Species	D.B.H	Tree Height	Small l < 10 cm	Medium 10 – 20 cm	Large e > 20 cm	Total of Hollows	GPS Co- ordinates	Photo
18	White Box <i>Eucalyptus microcarpa</i>	1 x 100 2 x 10 1 x 60	10	5	2	0	7	644441 E 6150535 N	

4 CONCLUSION

Additional survey was undertaken for the Squirrel Glider, Barking Owl and Bush Stone Curlew, in areas identified as containing abundant hollow-bearing trees within close proximity of indicative turbine locations. Survey limitations included cool to cold weather, rain and access difficulties.

These species were not recorded during the survey. The areas contain an array of mature trees containing hollows of diverse sizes. However, the vegetation structure, specifically the under and mid story, have been radically modified.

The results confirmed the assumptions of previous work, those being that the degree of modification from past clearing and heavy grazing have reduced the habitat quality and the likelihood that the sites provide important resources for the subject species.

It is recommended however, that any hollow removed during site development be offset. This could involve mounting removed hollows or installing nest boxes at a safe distance from the final turbine location (for example 100m). This will retain the level of resources currently found onsite for other hollow-dependant species. It will also retain the opportunity that the site could provide better quality habitat, under less intensive land use in the future.

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6 PHOTOS



Photo 1: Anabat Detection Unit set up at Area 4A.
Area 4A.



Photo 2: Trap set up in large tree at



Photo 3: Hollows found at Area 4B
Area 7.



Photo 4: Trap set up in dead stag at

Area 4 A Turbine Locations

Turbine 1

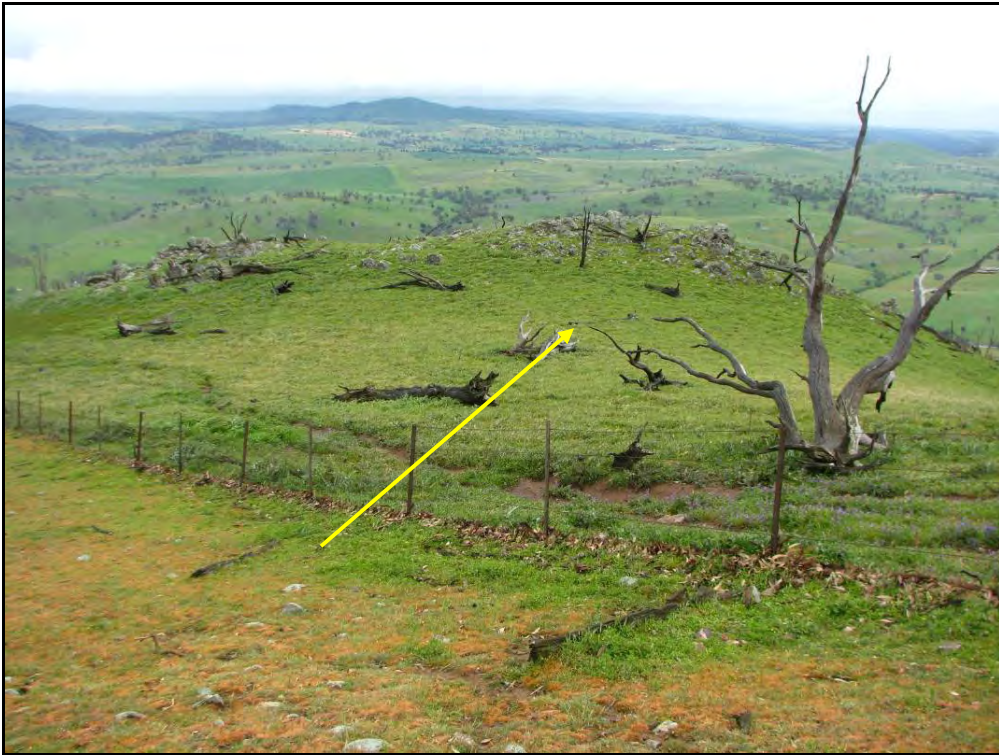


Turbine 2



Area 4 B Turbine Locations

Turbine 1



Turbine 2



Area 7 Turbine Locations

Turbine 1



Turbine 2



APPENDIX H OFFSET STRATEGY

H.1 REQUIREMENT TO OFFSET

The publically exhibited Yass Valley Wind Farm proposal included as a Statement of Commitment (SoC 21) as follows:

The Proponent would commit to preparing and implementing an Offset Plan, to offset the quantum and condition of native vegetation to be removed, in order to achieve a positive net environmental outcome for the proposal. Offset areas would reflect the actual footprint of the development (ie footing areas and new tracks) not the maximum impact areas included in Table 7.7 and 7.9 (which include easements and existing tracks). The Offset Plan would be prepared in consultation with DECC, prior to construction.

As part of this revised submission, the following text has been added to SoC 21:

The Offset plan would be prepared in accordance with the offset strategy included as Appendix H of the SER.

The purpose of this appendix is to outline the offset strategy, providing more certainty around:

- How offsets will be identified
- How offsets will be secured
- How offsets will be managed

H.2 PROPOSED METHODOLOGY

The key components of the methodology are:

- a) Calculating the areas to be impacted
- b) Determining a suitable offset ratio
- c) Selecting the offset site

The proposed methodology for each of these components is detailed below.

H.2.1 *Calculating the areas to be impacted (areas requiring offsets)*

As part of the biodiversity assessment for the Yass Valley Wind Farm proposal, the impact area for the proposal has been estimated to both assess the impacts of the habitat loss and habitat modification associated with construction, but also to inform the commitment to offset that impact. In response to agency comments, the method for calculating permanent impact areas has been revised. The new calculation format is shown in Table 2-10 of this SER. Particularly:

- a) Permanent habitat loss includes all footings and tracks as well as easements where they occur in treed areas
- b) Habitat modification includes transmission easements where they occurs in pasture only
- c) Temporary habitat loss applies to any areas that can be rehabilitated post construction (not decommissioning).

The proponent commits to offset a) only, that is, permanent habitat loss.

This area has been estimated for the revised proposal (Appendix F) however, the proponent commits to offset actual not estimated impact. Therefore, a post-construction audit of vegetation impact would be undertaken to finalise the boundaries of the offset site. In this way, there is a mechanism to ensure the actual amount of clearing is offset and an incentive throughout construction to minimise impacts and thereby reduce the offset requirement for the project.

H.2.2 Determining a suitable offset ratio

Agency requirements

In response to agency comments (Appendix B), a condition comparison table has been provided in Table 2-2 of the SER to demonstrate how the 5-class condition categorisation method used in the biodiversity surveys relates to the Biometric Assessment Guideline definitions. This is restated below:

Table D.1 Vegetation condition classes used at the site and Box-Gum Woodland EEC/CEEC and Biometric condition relationships

Condition class	Characteristics	CEEC ¹	EEC ²	Biometric condition ³
Poor	Groundlayer dominated by exotics (native grasses <50% cover)	No	No	Low
Poor-moderate	Groundlayer dominated by native grasses (>50%), with <5 native non-grass species	No	Yes	Moderate-Good
Moderate	Groundlayer dominated by native grasses (>50%), with 5-11 native non-grass species	No	Yes	Moderate-Good
Moderate-good	Groundlayer dominated by native grasses (>50%), with 12-24 native non-grass species	Yes	Yes	Moderate-Good
Good	Groundlayer dominated by native grasses (>50%), with >25 native non-grass species	Yes	Yes	Moderate-Good

¹ potential Commonwealth CEEC status when applied to the Box-Gum Woodland community (floristic criteria only)

² potential NSW EEC status when applied to the Box-Gum Woodland community (floristic criteria only)

³ potential NSW Biometric condition status when applied to the Box-Gum Woodland community (floristic criteria only)

Agency comments (Appendix B) also require a series of additional threatened species and hollow-bearing tree surveys, to inform the offset site. These surveys have been committed to in the revised SoC 23).

Proposed methodology

Using the information currently available for the site and additional survey data that will be collected, the proponent commits to determining an offset ratio with reference to:

- The conservation status of the vegetation
- The condition of the vegetation
- Whether the habitat provides actual (not potential) threatened species habitat

Regarding the latter point, additional surveys will be undertaken in consultation with OEH (as per SoC 23) in areas of habitat to be removed. These will inform whether the habitat is used by threatened species, increasing the offset ratio where threatened species habitat would be removed. Where the survey effort is not considered adequate to make a reasonably confident assessment, the precautionary approach will be employed and the area will be assumed to qualify as threatened species habitat.

Proposed ratios

For a number of reasons, we propose not to calculate ratios using the Biometric Assessment Methodology, but rather to set ratios in advance, based on vegetation type, condition and habitat value. A large amount of biodiversity survey work has been undertaken onsite, as part of several layout revisions to reduce biodiversity impacts. This has included sampling several seasons over several years, providing a substantial baseline from which to propose offsets. The work has been targeted to the specific nature of wind farm impacts – with a focus on birds and bats and to allow the development of management prescriptions to avoid and minimise impacts in specific areas, such as micro-siting tracks and transmission infrastructure to avoid impacts on high conservation value areas. The intention is to supplement rather than redo this survey work. Using the Biometric Assessment Methodology at this time would duplicate survey effort.

The proposed ratios below have been developed based on our experience with the Biobanking calculator in similar vegetation types. They are a simplification but have the benefit of being transparent to the proponent and the consent authority. Where multiple factors apply and their ratios are contradictory (ie threatened species habitat and low condition vegetation) it is proposed that the highest offset ratio would apply. Hollow bearing tree requirements (HBT) are supplementary to area offsets. The ratios apply only to areas of moderate and low constraint, as all high constraint areas would be excluded from impact (as per SoC 12).

Table 7-3 Proposed offset ratios for native vegetation to be permanently removed

Condition class	Biometric condition ³	Vegetation <u>NOT OF</u> conservation significance	Vegetation <u>OF</u> conservation significance	Threatened species habitat	HBT removed: nest box
Poor	Low	1 : 1	1 : 2	1 : 2	1 : 1
Poor-moderate	Moderate- Good	1 : 1	1 : 2	1 : 2	1 : 1
Moderate	Moderate- Good	1 : 1	1 : 5	1 : 5	1 : 1
Moderate-good	Moderate- Good	1 : 1	1 : 10	1 : 10	1 : 1
Good	Moderate- Good	1 : 1	1 : 20	1 : 20	1 : 1

Based on the preferred layout (tabulated in Table 2-11 and illustrated over the constraints map set, Appendix H), the proposed offset ratios would result in the following areas being secured in perpetuity, for the purpose of biodiversity improvement, totalling approximately 211 hectares. The extent of threatened species habitat (to be determined by supplementary surveys) may increase this ratio, where it is found to coincide with vegetation NOT of conservation significance.

Table 7-4 Proposed offset areas

Condition class	Biometric condition ³	Vegetation <u>NOT OF</u> conservation significance	Vegetation <u>OF</u> conservation significance	Threatened species habitat	HBT removed: nest box	
Poor	Low	70.22	29.15	tbd	tbd	
Poor-moderate	Moderate-Good		33.96	tbd	tbd	
Moderate	Moderate-Good		10.25	tbd	tbd	
Moderate-good	Moderate-Good		39.18	tbd	tbd	
Good	Moderate-Good		5.57	tbd	tbd	
Total (hectares)		70.22	118.11	tbd	tbd	188.33

H.2.3 Selecting the offset site

When selecting the offset site (or sites) able to meet the ratios set out above, the proponent will ensure the selected offset site is:

- Of sufficient size to achieve the set ratios above
- Of appropriate type to achieve a 'like for like' or 'like for better' offset
- Complying with *Principles for the use of biodiversity offsets in NSW* guidance document

Any areas of ambiguity will be clearly stated so that a decision can be made about the overall suitability of the site. For example, it may be that exact ratios and types are not achieved but the overall package is still considered to achieve an overall neutral or beneficial outcome. If so, this will be identified and justified.

A specific site has yet to be identified however, there are large amounts of land of suitable type and condition within the project boundaries to demonstrate that offsets are achievable. The proponent has identified several sites with a total area in excess of 500 hectares, sufficient to offset the estimation provided in the table above.

The publically exhibited Environmental Assessment for the Yass Valley Wind Farm (nghenvironmental November 2009) demonstrates that these areas include vegetation types that would be impacted by the proposal (both common vegetation types and those of conservation significance) and contains habitat for threatened fauna, particularly woodland birds. Furthermore, within the originally assessed 'development envelope' there are approximately 792 hectares of high constraint EEC (Coppabella and Marilba combined). This is the highest value vegetation that would be impacted by the proposal and therefore a 'like for better' offset is highly feasible for this project.

H.3 SECURING AND MANAGING THE OFFSET SITE

It is proposed that the wind farm operator (which may be different to the proponent) would be responsible for the management of the offset site, during the operational life of the wind farm. The operator is likely to finance the landowner of the site to undertake management actions (such as fencing and weed control) but would retain responsibility for the management of the site. This provides surety that the actions will be undertaken, as the requirement to offset would be a condition of the wind farm operator's consent.

At the decommissioning stage, the ongoing management would be the responsibility of the landowner. It is expected that by this time the majority of the required management actions would have been undertaken and ongoing management tasks will largely coincide with routine agricultural activities. Land use restrictions will remain in place on the offset site so that any activities undertaken on the offset site must be compatible with the site's overall function: to improve biodiversity values.

The proponent commits to securing a formal vehicle to manage the offset site in perpetuity. A Property Vegetation Plan is proposed, attached to the land title. The agreement will specify management actions and restrictions on land use, in accordance with the finalised offset plan for the site.

H.4 CONCLUSION

This Offset Strategy sets out a methodology to calculate, manage and secure an offset site to offset the impacts of the construction of the proposed Yass Valley Wind Farm. A site has yet to be identified, but there is ample land of suitable type within the project boundaries to demonstrate that offsets are achievable. Further, the plan provides clear incentives, in the form of pre-set ratios that relate to existing mapping, for the proponent to further minimise impacts and thereby reduce the offset requirement for the proposal.