17 December 2013

Andrew Wilson

Construction Manager
Level 11, 75 Miller Street, NORTH SYDNEY, NSW 2060
M: +61 (0)420 379 190 | P: +61 (0)2 8456 7400 | F: +61 (0)2 9922 6645
A.Wilson@epuron.com.au

bega
suite 1, 216 carp st
(po box 470)
bega nsw 2550
t 61 2 6492 8333

bathurst
room 15, 341 havanah st
po box 434
bathurst nsw 2795
t 0488 820 748

sydney
unit 18, level 3
21 mary st
surry hills nsw 2010
t 61 2 8202 8333

wagga wagga
suite 1, 39 fitzmaurice st
(po box 5464)
wagga wagga nsw 2650
t 61 2 6971 9696
f 61 2 6971 9693

canberra
unit 17/27 yallourn st
(po box 62)
fyshwick act 2609
t 61 2 6280 5053
f 61 2 6280 9387

dunsborough
(po box 1037)
dunsborough wa 6281
t 61 8 9759 1985

ngh@nghenvironmental.com.au
www.nghenvironmental.com.au

Dear Andrew

RE – Yass Valley Wind Farm Preferred Project Report response (our ref. 4743)

Thank you for providing the OEH comments regarding this project, addressed to Department of Planning and Infrastructure, dated 29 August 2013.

Please find our response to the biodiversity issues attached.

Please contact me directly for any further advice on this matter.

Yours sincerely,

Brooke Marshall | Manager, South Coast & Snowy Mountains
Certified Environmental Practitioner (CEnvP)

PO Box 470 Bega NSW 2550
T (02) 6492 8333 **D** (02) 6492 8303 **M** 0437 700 915 **F** (02) 6494 7773

nghenvironmental
ABN: 31 124 444 622
ACN: 124 444 622

ISSUES AND APPROACH OVERVIEW

The Department of Planning and Infrastructure has deemed the biodiversity component of the Preferred Project Report inadequate, citing OEH's submission in relation to:

- Incomplete surveys (response to survey outcomes)
- Impacts to Box Gum Woodland EEC
- Additional information on how vegetation of conservation significance is defined
- Calculation of areas of impact
- Finalisation of offsets
- Locations of turbines and infrastructure in areas of high conservation significance

OEH have highlighted several areas where they continue to have concerns with the information supplied in the Preferred Project Report and Supplementary Ecology Report for this project, detailed in a letter dated 29 August 2013 to Department of Planning and Infrastructure. The letter contains recommended conditions to accompany the final project approval.

nghenvironmental provide the following additional information regarding these concerns and a suggested approach to ensure that the issues can be addressed to the satisfaction of OEH, prior to construction.

Our response (Section 1) has been prepared in consultation with Mark Henery, listed as an OEH contact for this project, to ensure we understand what further information OEH requires. This consultation has been informed by a site visit (20/11/2013), to consider specifically:

- The condition and distribution of box gum woodland
- The potential extent of Golden Sun Moth habitat
- The distribution and extent of hollow-bearing trees and means to quantify their distribution
- The ability to secure adequate offsets within the site boundaries

Revised maps (Section 1), impact area calculations and hollow quantifications (Section 2 and 3) and offset outline (Section 4) accompany this response.

1 CLARIFICATION OF ISSUES / DISCREPANCIES RAISED IN OEH SUBMISSION

OEH issue	Comment / clarification	Suggested timing and approach
Unclear which overhead transmission line options will be selected in the final design	The initial grid connection option was to connect to the TransGrid 132kV transmission line located to the north of the wind farm site. This option would involve the construction of approximately 75km of overhead powerline. Following the receipt of submissions, particularly from OEH, Epuron identified an alternative grid connection option to connect to the TransGrid transmission line located approximately 13km to the south of the wind farm. This option would involve the construction of approximately 25km of overhead powerline, significantly less than the initial option.	**Pre-approval** The updated mapping accompanying this response now differentiates the preferred and alternate options. **Post-approval** The 330kV connection option is preferred and has a lower environmental impact, however the final design and selection of the grid connection option will only be made after planning approval.
Calculation of impacts: Definitions, impact areas, significance of impact.	There has been some difficulty surrounding the definition of box gum woodland and derived pastures. The field assessments for the original BAs (Marilba, Coppabella) were undertaken in 2007-2009 with the reports finalised in mid 2009. The SER was compiled at the end of 2012. The benchmark for biodiversity assessment has been moving during this time. The Biobanking scheme and associated biometric condition classes commenced in 2008, with its two category condition classification, lower benchmark for overstorey cover and minimum remnant unit of 0.25ha. This is particularly relevant to mapping and classifying secondary pasture that has a high percentage of exotic species. We used a 5-class condition categorisation for all three assessments to assist the assessment of impact (presented below, two left columns). When compared to the biometric condition classes, it can be seen that relative degraded secondary pasture can still qualify as moderate to good condition vegetation. While exotic dominated areas have been mapped as 'exotic' or 'pasture' in previous assessments, it is recognised that it should have been ascribed to a vegetation types (particularly relevant where vegetation could be derived from Box Gum Woodland). Regarding the difficulties in mapping vegetation type and condition, the Coppabella BA states:	**Pre-approval** Vegetation types and condition have now been updated to reclassify 'exotic' and 'pasture' as Box Gum Woodland in 'poor - moderate condition'. The revised mapping allows an upper limit / worst case EEC impact area estimate. These two outputs ensure an agreed figure for EEC impact is determined prior to works. **Post approval** The BMP would include protocols to manage vegetation clearing. This plan would be prepared in consultation with OEH. It is suggested that the plan include the following: *All areas of clearing to be field validated prior to clearing (vegetation type, condition, area) in appropriate seasonal conditions (likely to be late Spring – early Summer, dependant on conditions).*

OEH issue	Comment / clarification	Suggested timing and approach
	The vegetation communities present on the site intergrade and overlap, making vegetation mapping problematic. The spatial extent of the different vegetation communities in the region and their condition are related to cover and diversity of native groundcover species. Groundcover composition and condition may be highly variable over a small area, and will often change over time depending on season, water availability and grazing pressure. These factors, combined with the high level of disturbance to the understorey from grazing makes definition and mapping of vegetation types and their condition in the field or using aerial photographs problematic. While it is difficult to say with certainty which vegetation type a degraded pasture is derived from, for the Yass site the majority of the site would have been Box Gum Woodland and therefore a precautionary approach would reclassify areas of pasture to this vegetation type. As such, areas mapped as 'exotic' and 'pasture' have now been moved into Box Gum Woodland category. Condition has been designated as 'poor - moderate', as some of these areas are native dominated. Site inspection on 20th November 2013 verified that some of these areas would more accurately be mapped as entirely exotic (cropped paddocks) or ascribed to other vegetation types (Long-leafed Box / Red Stringybark Dry Grass Forest on ridges near turbines C2, 9 and 10). However, without further field validation, the mapping and calculation and impact areas based on the mapping are now highly conservative and overestimate the amount of clearing in Box Gum Woodland.	This would ensure that clearing does not exceed the approved amount of clearing and would make clear the offset requirement.

<table>
<tr><th>OEH issue</th><th>Comment / clarification</th><th>Suggested timing and approach</th></tr>
<tr><td></td><td>
<table>
<tr><th>Condition class in assessments</th><th>Description</th><th>Biometric condition classes</th></tr>
<tr><td>Treeless</td><td>No overstorey</td><td rowspan="2">Low</td></tr>
<tr><td>Poor</td><td>Groundcover dominated by exotic species</td></tr>
<tr><td>Poor-moderate</td><td>Groundcover dominated by one or two native grass species, very few native forbs</td><td rowspan="4">Moderate to good</td></tr>
<tr><td>Moderate[1]</td><td>Groundcover dominated by several native grasses, native forbs present but low diversity</td></tr>
<tr><td>Moderate-good</td><td>Groundcover dominated by several native grasses with a range of native forbs</td></tr>
<tr><td>Good</td><td>High groundcover diversity, including significant forb species.</td></tr>
</table>
Implications for the assessment of impact
The consequence of the mapping difficulties above is OEH’s contention that is it not possible to assess the level of impact on listed EECs. We contend that these discrepancies have not affected the ability to assess the significance of impact. The areas of vegetation in question are the most degraded areas of pasture (either treeless and / or exotic dominated), not the better condition areas (higher number of native species and / or overstorey cover). While they qualify as EEC, their poor condition and the distribution of this particular vegetation type and condition in the Yass area means that impact on these areas is not of high significance to the ongoing persistence of the EEC in the locality.
We acknowledge that, due to mapping issues identified above, the area of EEC impact has been underestimated by the BAs and SER. This affects only the poor, poor to moderate and treeless examples of the EEC. Therefore, we feel that the significance of the impact has not been underestimated.
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</table>

[1] It is noted that the red shading includes those areas that would also qualify as CEEC and are mapped as high constraint – to avoid)

<table>
<tr><th>OEH issue</th><th>Comment / clarification</th><th>Suggested timing and approach</th></tr>
<tr>
<td>Areas of high ‘constraint’ vs areas of ‘high conservation significance’</td>
<td>
The constraints definitions used in all biodiversity assessments are consistent. Refer to extract below.
<table>
<tr><th>Level of constraint</th><th>Colour</th><th>Description</th></tr>
<tr><td>High constraint</td><td>Red</td><td>Impacts in these areas may be significant and should be avoided. Impacts cannot be offset or may be very costly to offset. Further assessment may be required to inform impact significance.</td></tr>
<tr><td>Moderate constraint</td><td>Orange</td><td>Impacts to these areas should be minimised and/or will require specific measures to manage impacts. Residual impacts should be offset.</td></tr>
<tr><td>Low constraint</td><td>Green</td><td>No specific mitigation measures required – development most appropriates located in these areas.</td></tr>
</table>
OEH contend that some areas mapped as moderate constraint should be high constraint and avoided. In their letter they use ‘high constraint’ synonymously with ‘high conservation significance’. Our classification of constraints categories is not only based on whether an area is an EEC or provides threatened species habitat, but on whether the type of impact expected could generate a significant impact to a listed entity or an impact that cannot be withstood without local population consequences. Hence we have areas of EEC in moderate to good condition that we contend the removal of would not constitute a significant impact and could be offset, albeit at a high offset ratio. The same vegetation qualities could be deemed a high constraint when near a turbine (and should be avoided) or a moderate constraint, when near a transmission line (to be minimised, managed and offset), due to the difference in impacts expected. The complexity of this has led to a misunderstanding regarding the definition of high conservation value areas.
In discussion with Mark Henery, October 2013, we clarified the statements in OEH’s submission regarding areas of high conservation significance and areas nominated
</td>
<td>
Pre approval
Using the updated vegetation maps (discussed above), updated constraints mapping is proposed, in consultation with OEH. High constraint areas = avoidance, as per the existing statements of commitment. We propose to develop a high constraint shape file in consultation with OEH to ensure the approval includes avoidance in these areas. The scale would be sufficient to show any allowable tracks through high constraint areas.
As this mapping will affect the offset requirement and potentially the final infrastructure layout, this is proposed to be done well in advance of construction, with input from OEH. The first draft is supplied with this letter, for consideration.
The result will ensure that a final map set can accompany the BMP which marks all high constraints for avoidance, giving certainty to OEH and Epuron, regarding infrastructure placement.
Post approval
Moderate constraint areas will require detailed protocols, mostly centred on preclearance surveys to relocate, minimise harm and / or ensure an offsetting requirement is recorded. They would be mapped as part of the BMP but are not proposed to be mapped at this stage. They would include rocky outcropping, trees greater than 40cm dbh, Golden sun moth habitat.
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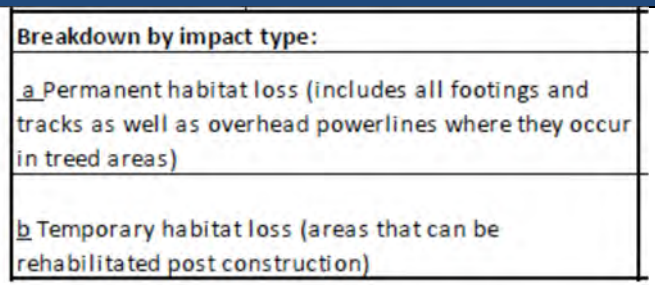
</tr>
</table>

OEH issue	Comment / clarification	Suggested timing and approach
	as high constraints to be avoided. OEH do not intend to infer that all areas of EEC, regardless of condition, should be avoided. The key issue in moving forward is agreeing which areas within the site boundary constitute high constraints to be avoided. This is a judgment call that we intend to make in consultation with OEH, to deliver revised constraints mapping for the project. To start this process, the following areas will be mapped as high constraint (to avoid) on the advice of nghenvironmental. Epuron will finalise this mapping with input from OEH. High constraints from the BAs and SER are mapped. This includes: • WF site (BAs): o EEC in 'moderate, moderate to good and good' condition o Woodland fauna and threatened fauna habitat o Marked hollow bearing trees (not exhaustive) • TX line (SER): o EEC in 'moderate to good and good' condition o Likely movement corridors in woodland and forest o Threatened species habitat And additionally: • Yass Daisy locations with 5m buffer. It is noted that the impact of turbines within high constraint areas is not the same as tracks or transmission infrastructure. Some fine scale mapping has been undertaken to allow minimum width tracks in high constraint areas. In these areas, minimising impact on overstorey vegetation can be seen to have been achieved. Where transmission lines occur in high constraint areas, pole footings can be placed either side of the high constraint boundary or in a way that avoids tree clearance.	
Permanent impacts	OEH require that all native vegetation impacts be declared permanent and shown in impact area calculations and considered for offsets, rather than distinguishing between permanent and temporary impacts (as we have in the Bas, as set out below). They contend that native grassland cannot be effectively rehabilitated and should therefore be considered permanent impact. We accept that this new position and calculations are proposed to be revised accordingly.	**Pre approval** Revised impact area calculations have been provided, attached. Revised offset areas are required and area discussed below.

OEH issue	Comment / clarification	Suggested timing and approach
		
Discrepancy between footprint and total vegetation impact	Large areas of exotic dominated pasture were not mapped and therefore have produced a discrepancy in the calculations. Updated mapping and area calculations undertaken as part of the Controlled Action have since addressed this issue. The revisions are included in this response.	**Pre approval** Revised impact area calculations have been provided, attached.
Design and infrastructure layout		
Response to survey outcomes:	OEH state that these surveys cannot be completed after project approval if the design is to incorporate changes required (unless a modification report is prepared). They require detail on actions to be taken to avoid habitat, should threatened species or multiple hollows be found near a turbine. Considering areas outside of high constraints areas are not exclusion zones but zones where impacts are minimised and offset, we suggest that the results of the remaining surveys will be available in sufficient time to achieve these objectives. Our approach has been to recommend 'micrositing with an ecologist' as a response to surveys. The movement of turbines and other infrastructure within the development envelope is termed 'micro-siting'. Limits are placed on micro-siting by the draft standard conditions for wind farms developed by the NSW Department of Planning and Infrastructure (a location allowance of 100 metres radius for development components as long as impacts remain consistent with that assessed - http://www.planning.nsw.gov.au/standard-and-model-conditions). The term 'as long as impacts remain consistent with that assessed' provides a limit to the impact that is allowed without additional assessment.	**Post approval** Detailed protocols would be developed in consultation with OEH as part of the BMP. Specifically, this would address: • Threatened reptile finds – preclearance in mapped rocky habitats • Hollow-bearing trees – preclearing surveys • Golden Sun Moth – based on the findings of 2013 surveys (currently being undertaken)

OEH issue	Comment / clarification	Suggested timing and approach
	Where uncertainty exists with regard to impacts, and as a further opportunity to minimise impacts, we regularly recommend that micro-siting be undertaken with input from an ecologist. Examples in this proposal include, to minimise impacts on better quality areas of Box Gum Woodland EEC. This allows a response based on the specific survey findings. Specific protocols would be detailed within the BMP. Reporting and auditing, to ensure all conditions of consent have been met, are also part of the draft standard conditions for wind farms.	
New positions or turbines relative to constraints	OEH require a map showing the new positions or turbines relative to the areas mapped as high constraint in the original EA, to understand how the changes to the layout have reduced biodiversity impacts.	**Pre approval** New map provided.
Turbine locations:	OEH have nominated a number of turbines they do not support, close to woody vegetation and ridges. It is noted that while all high constraints areas mapped by nghenvironmental have been avoided by turbines, some associated infrastructure falls within these areas (tracks and powerlines). It is proposed that these areas be shown on the constraints mapping such that minimal road widths only are allowed in these areas. It is noted that OEH have stipulated several turbines they do not support that are located outside of constraints areas. These turbines cannot be moved further from the mapped constraints. It is proposed that OEH's input into the constraints mapping will ensure a clear map set accompanies the development proposal. After consideration of the additional information provided in this letter and gleaned from the site inspection, we invite OEH to identify additional high constraints areas to be included in this map layer. If any further site inspections are required by OEH, Epuron will facilitate this.	**Pre approval** A constraints layer will be developed with input from OEH to ensure all areas not endorsed by OEH are included. If this requires any additional site inspections by OEH, Epuron would facilitate this.
Impacts to Yass Daisy at Site 35	Yass Daisy were mapped as part of the Coppabella, Marilba and additional areas (SER) assessments. 1. Coppabella - avoid clusters 6,7a, 10 = known daisy population areas 2. Marilba - avoid clusters 4, 6 and 7 = known daisy population areas 3. Additional areas (SER) – can avoid direct impacts. The search area shows the nearest records are approx. 20m from the transmission line and nearest access track.	**Pre approval** New map provided showing all locations. Updated constraints mapping includes all populations with a 5m buffer as high constraints to be avoided.

OEH issue	Comment / clarification	Suggested timing and approach
	OEH require clarification on where infrastructure would be located, relative to high conservation value grassland where the Yass Daisy population is located and an increased buffer on Yass Daisy individuals. A map showing the locations, habitat and proposed infrastructure has been provided with this response. The constraints mapping provided now shows these areas as high constraints to be avoided. It is acknowledged that, while all identified populations have been avoided, that all areas of potential Yass Daisy habitat have not be avoided. It is proposed that, by avoiding know populations and managing impacts in these areas, that indirect impacts can be adequately managed sufficient that the local occurrence of this species will not be adversely impacted by the development of the wind farm. Specific commitments of the PPR include: *Works should be sited outside known Yass Daisy population areas and Commonwealth-listed CEEC areas identified in Appendix 3.1 Coppabella Hills Precinct Biodiversity Assessment (Figure 5.6), Appendix 3.2 Marilba Hills Precinct Biodiversity Assessment (Map set 2) and the SER (**Error! Reference source not found.**) .* *[Note: this includes the proposed cable route at site 35].* *The proposed cable route would be located to avoid direct or indirect impacts to all recorded plants and colonies, with a minimum 2 metre buffer* **[NOW UPDATED TO 5M IN THIS RESPONSE].** *The Yass Daisy population would be identified and protected during the construction and operation phases. Special rehabilitation measures would be used for works in the vicinity of the population, including topsoil removal, storage and replacement, whole sod removal and replacement if practicable and effective weed control at all stages. Exposed areas along the trench line would be revegetated with local native grasses (Microlaena stipoides and/or Themeda triandra).* *If works are proposed outside of the targeted survey area within the area of occupancy for the Yass Daisy mapped in nghenvironmental (2009c),*	

OEH issue	Comment / clarification	Suggested timing and approach
	further survey or micrositing by an ecologist would be undertaken to ensure that the works avoid Yass Daisy plants and colonies.	
Hollow-bearing tree constraint	OEH note the number of hollow-bearing trees to be removed has not been provided and that a 10:1 offset is required for these. OEH note that these trees are identified as a high constraint in the Marilba and Coppabella BAs but a moderate constraint in the SER additional surveys. This was clarified in Epuron's response dated July 2013: *In the Marilba and Coppabella Biodiversity Assessments, hollow bearing trees were considered a high constraint. Reasoning for this included risks associated with hollow bearing trees near turbines, the location of mature woodland fragments (particularly along roadsides) and the potential to impact breeding for species such as the Superb Parrot.* *The field assessments conducted for the additional areas* [documented in the SER] *primarily focussed on transmission line infrastructure and turbines on the periphery of the site. Generally speaking, micrositing poles to avoid hollow-bearing trees is easier to achieve in these areas and the greater abundance of hollows in these areas suggested that minimisation rather than strict avoidance was warranted as a management strategy, to avoid significant impacts.* We refer to our previous distinction between areas of constraint vs conservation value. All hollow-bearing trees are of conservation value however, removal of a limited number of these trees not expected to generate a significant impact, hence in some cases it has been considered a moderate constraint. The SOC approach is to: • Avoid all HBTs that occur within high constraint areas • Minimise clearing of HBTs that occur elsewhere. This would require survey of all trees identified as requiring removal to minimise harm to resident fauna and allow a final opportunity to microsite away from these trees where possible. As the extent of this survey is determined by the final infrastructure layout, it is best undertaken as close to construction as possible.	**Post approval** The proposed approach that would be detailed within the BMP is to: • Avoid all high constraint trees • Inventory all hollow-bearing trees proposed to be removed - moderate constraint trees can be removed with felling protocols to minimise harm to resident fauna and offsetting at a ratio of 10:1.

OEH issue	Comment / clarification	Suggested timing and approach
Hollow-bearing tree impact quantification	As discussed in subsequent consultation, OEH require quantification of the potential number of hollows that would be removed, in order to: 1. Assess the significance of the impact 2. Ensure that offsetting this number of hollows if feasible. The estimation of hollows is attached to this response. In summary, assuming that 46% of mature trees (those whose canopies were able to be discerned from aerial imagery) bear hollows, the following quantification of hollow-bearing tree impact is concluded: • To install 144 turbines, approximately 75 hollow-bearing trees would be removed. This is the number occurring within 50m of a turbine. • To install the transmission line, 27-33 hollow-bearing trees would be removed. This is considered an upper limit estimate that does not take into account the ability to microsite the line around trees of value. • Approximately 265 hollow-bearing trees occur between 50m and 100m from a turbine. These may be indirectly impacted in terms of the habitat value they provide. • Considering the distribution of hollows at this distance however, most occur near a relatively small number of turbines; 14 out of the 144 turbines have more than ten hollow-bearing trees within 100m. Most occur adjacent to Marilba Cluster 4a and b. • To offset the loss of hollow-bearing trees to be removed at a ratio of 1:10, around 1000 trees would need to be confirmed as being present in the offset area. Considering that offset lands are proposed in the high constraint areas (where more hollows are found), an offset of less than 1:10 in area is likely to be able to achieve this figure.	**Pre approval** An estimation of hollow impacts has been provided in with this response.

OEH issue	Comment / clarification	Suggested timing and approach
Offset proposal	OEH require that the Offset Plan be developed in consultation with a number of parties and do not agree with the outline provided as Appendix F of the SER. A more detailed offset strategy document has been provided with this response, based on our experience securing these agreements post construction. This includes consideration of the worst case EEC impact areas and discusses potential offset sites. We believe we have demonstrated offsets within the project boundary are achievable for the project. We agree that the specific areas to be offset should be based on the final impact area calculations for the project and developed in consultation with the nominated parties.	**Pre approval** Strategy document provided with this response. **Post-approval** Offset plan. We suggest that OEH be the lead agency. Once a draft has been prepared, comments would be sought from the CMA and Yass Council.
Threatened species	OEH require that the Golden Sun Moth be surveyed for, as part of the BMP. Since the original assessment, the range of the Golden Sun Moth has extended and they have been found within more disturbed habitats. We propose to survey for this species in 2013-2014, and include the results as part of the development of the BMP.	**Post approval** Surveys will be conducted to inform the BMP. Protocols for management of impact will be developed with OEH.
OEH's recommended conditions of approval		
1. The proponent shall prepare a biodiversity management plan in consultation with OEH, to the satisfaction of the Director-General. The proponent shall submit the biodiversity management plan for approval prior to the preparation of an offset plan, and prior to commencement of construction.		The actions suggested above have been proposed in the context of these recommended conditions. The sequence to achieve all actions is: **Pre approval:** **1. Revise vegetation mapping (now complete)** **2. Revise impact areas (now complete)** **3. Revise constraints mapping (first draft included with this response for OEH input)** **4. Revise offset outline (now complete)** Post approval:
2. The proponent shall prepare an offset plan, to the satisfaction of the Director-General, to offset losses of and impacts to native vegetation including hollow-bearing trees on the site. The offset plan is to be developed in consultation with OEH, Murrumbidgee CMA, and Yass Valley Council. The proponent shall submit the offset plan for approval prior to the commencement of construction.		
3. Details of the offset package shall be submitted for the approval of the Director-General prior to the commencement of construction. The package shall: a) Describe how the offset will be guaranteed and monitored in perpetuity. b) Ensure that the vegetation communities, hollow-bearing trees and threatened species subject to loss of native vegetation are represented in the offset area. c) Demonstrate how the offset ratio determined improves habitat or maintains biodiversity values.		

OEH issue	Comment / clarification	Suggested timing and approach
d) Include requirements for post-construction review to confirm the extent of clearing was commensurate with and not greater than predicted. If clearing is greater, then the package shall demonstrate how the offset was modified and increased to the value of the actual biodiversity loss.		5. Finalise surveys (hollows, threatened species, to inform the development of the BMP) 6. Develop BMP, in consultation with OEH 7. Develop Offset Plan, in consultation with OEH and CMA.
4. The area of BGW EEC to be cleared shall be clearly defined.		

1 REVISED MAPS

Three maps are provided.

1. Layout comparison — EA vs PPR layout, showing changes in turbine layout since the publically exhibited EA.

2. Vegetation types — Updated vegetation mapping to show 'worst case' clearing estimate of EEC vegetation:
   - Areas of 'pasture' and 'exotic' vegetation have been moved in to Box Gum Woodland in poor-moderate condition, as a precautionary treatment, in advance of detailed field validation.
   - EEC in 'moderate to good biometric condition' has been outlined.

   It is noted that the additional areas of vegetation now reassigned as 'moderate to good' biometric condition are comprised of the lower condition areas, considered to be highly degraded and therefore not originally mapped as EEC. These are areas of low tree density and large proportion of exotic understorey, as verified with OEH on the site inspection (November 20, 2013). In the absence of ground truthing, we have included these as 'moderate to good' biometric condition to demonstrate offsets are achievable for this area.

3. High constraint — High constraints from the BAs and SER are mapped. This includes:
   - WF site (BAs):
     - EEC in 'moderate, moderate to good and good' condition
     - Woodland fauna and threatened fauna habitat
     - Marked hollow bearing trees (not exhaustive)
   - TX line (SER):
     - EEC in 'moderate to good and good' condition
     - Likely movement corridors in woodland and forest
     - Threatened species habitat

   And additionally:
   - Yass Daisy locations with 5m buffer.

   It is noted that the impact of turbines within high constraint areas is not the same as tracks or transmission infrastructure. Some fine scale mapping has been undertaken to allow minimum width tracks in high constraint areas. In these areas, minimising impact on overstorey vegetation can be seen to have been achieved. Where transmission lines occur in high constraint areas, pole footings can be placed either side of the high constraint boundary or in a way that avoids tree clearance.

4. Potential offset sites — Potential offset areas include connected mature woodland, EEC and threatened species habitat.

2 REVISED IMPACT AREA CALCULATIONS

ALL VEGETATION TYPES

Includes: Coppabella, Marilba and new assessment areas, as defined in the Supplementary Ecology Report.

Revised impact areas reflect the worst case scenario EEC impact, based on reclassification of 'pasture' and 'exotic' vegetation map layers and have defined all impact areas previously considered 'temporary' to 'permanent'.

Yass Wind Farm					Vegetation Impact								
Infrastructure		Quantity	Width (m)	Length (m)	Total Footprint (ha)	BGW Derived Grassland	BGW	BGBPF	DSTF	LBDGF	RRG	BGWke	Total of all veg types
Turbine footing [a]		144	25	25	9.000	8.186	0.747	0.054	0.000	0.013	0.000	0.000	9.000
Crane hardstand [b]		144	22	40	12.672	12.196	0.476	0.000	0.000	0.000	0.000	0.000	12.672
Tracks [a]		1	8	113,900	91.120	83.284	7.570	0.167	0.000	0.099	0.000	0.000	91.119
Underground powerlines onsite [b]		1	2	63,730	12.746	10.798	1.884	0.041	0.000	0.023	0.000	0.000	12.746
Overhead 33kV powerline cabling / easement [a*]		1	14	16,690	23.366	18.835	4.123	0.000	0.000	0.408	0.000	0.000	23.366
Overhead 33kV power pole footings [a]		67	1	1	0.007	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.007
Preferred Electrical Connection to TransGrid 330kV	Overhead powerline [a*]	1	16	25,270	40.432	32.963	7.060	0.000	0.000	0.000	0.409	0.000	40.432
	Overhead power pole footings [a]	102	1	1	0.010	0.008	0.002	0.000	0.000	0.000	0.000	0.000	0.010
	Substation and control bldg [a]	2	150	150	4.500	4.233	0.000	0.000	0.000	0.267	0.000	0.000	4.500
	Switchyard	1	150	150	2.250	2.250	0.000	0.000	0.000	0.000	0.000	0.000	2.250
Concrete batch plant [b]		2	75	100	1.500	1.500	0.000	0.000	0.000	0.000	0.000	0.000	1.500
Construction compound, staging and storage [b]		2	300	100	6.000	6.000	0.000	0.000	0.000	0.000	0.000	0.000	6.000
Total Impacts					**203.603**	**180.258**	**21.863**	**0.262**	**0.000**	**0.811**	**0.409**	**0.000**	**203.603**

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

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.

Yass Wind Farm		Vegetation Impact											
Infrastructure		Quantity	Width (m)	Length (m)	Total Footprint (ha)	BGW Derived Grassland	BGW	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	21951	32.927	30.027	1.995	0.000	0.000	0.905	0.000	0.000	32.927
	Overhead 132kV power pole footings [a]	88	1	1	0.0088	0.0081	0.0005	0.000	0.000	0.000	0.000	0.000	0.0088
	Substation and control bldg [a]	2	150	150	4.500	4.500	0.000	0.000	0.000	0.000	0.000	0.000	4.500

EEC VEGETATION

It is noted that the additional areas of vegetation now reassigned as 'moderate to good' biometric condition are comprised of the lower condition areas, considered to be highly degraded and therefore not originally mapped as EEC. These are areas of low tree density and large proportion of exotic understory, as verified with OEH on the site inspection (November 20, 2013). In the absence of ground truthing, we have included these as 'moderate to good' biometric condition to demonstrate offsets are achievable for this area.

Yass Wind Farm						Box Gum Woodland Impact		
Infrastructure		Quantity	Width (m)	Length (m)	Total Footprint (ha)	Low	Moderate - Good	Total
Turbine footing [a]		144	25	25	9.000	0.376	8.557	8.933
Crane hardstand [b]		144	22	40	12.672	0.616	12.056	12.672
Tracks [a]		1	8	113,900	91.120	8.943	81.911	90.854
Underground powerlines onsite [b]		1	2	63,730	12.746	0.512	12.170	12.682
Overhead 33kV powerline cabling /		1	14	16,690	23.366	1.599	21.359	22.958
Overhead 33kV power pole footings [a]		67	1	1	0.007	0.0004	0.0067	0.0071
Preferred Electrical Connection to TransGrid 330kV	Overhead powerline [a*]	1	16	25,270	40.432	5.432	34.591	40.023
	Overhead power pole footings [a]	102	1	1	0.0102	0.0015	0.0087	0.010
	Substation and control bldg [a]	2	150	150	4.500	1.983	2.250	4.233
	Switchyard	1	150	150	2.250	0.000	2.250	2.250
Concrete batch plant [b]		2	75	100	1.500	0.000	1.500	1.500
Construction compound, staging and		2	300	100	6.000	0.000	6.000	6.000
Total Impacts					**203.603**	**19.463**	**182.659**	202.122

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

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.

Yass Wind Farm						Box Gum Woodland Impact		
Infrastructure		Quantity	Width (m)	Length (m)	Total Footprint (ha)	Low	Moderate - Good	Total
Option 2 Electrical Connection to 132kV Line	Overhead 132kV powerline cabling / easement [a*]	1	15	21951	32.927	0.463	31.559	32.022
	Overhead 132kV power pole footings [a]	88	1	1	0.0088	0.0006	0.0080	0.0086
	Substation and control bldg [a]	2	150	150	4.500	0.000	4.500	4.500

3 QUANTIFICATION OF HOLLOW REMOVAL

Aim

An estimate of the number of hollow bearing trees that would be removed for the development of the turbines and transmission line is require for two reasons:

1. To inform the assessment, such that OEH can make a determination as the significance of the impact
2. To demonstrate that offsets for all hollow-bearing trees to be removed can be achieved for the project.

Method

Hollow-bearing tree impacts have been estimated using the following steps:

- Using aerial imagery of the final layout, the number of tree canopies were counted:
    - within 50m of a turbine
    - within 100m of a turbine
    - on the transmission line (trees directly on the line, no buffer).
- To estimate the percentage of trees that may have hollows, hollow-bearing tree inventories completed in 2009 for six turbine sites at Coppabella were used. The inventories were completed in areas with high hollow-bearing tree density; Clusters 6, 7 and 10. (The Additional Survey at Coppabella Hills targeting Barking Owl, Squirrel Glider and Bush Stone Curlew is included as Appendix G of the SER). The coordinates of the turbine location and all hollow-bearing trees within 50m allowed for an accurate count of hollow-bearing trees. Counts of total canopies for these areas was done with reference to the aerial imagery.

Limitations

The use of aerial imagery underestimates trees of small canopy size. As these are generally less likely to contain hollows, this is not considered a large issue.

Is difficult to obtain a reliable count in dense woodland using aerial imagery. Areas of mature woodland and dense regrowth would appear the same on the aerial. In these cases, an average canopy size for the area was used to estimate tree canopy number.

The transmission line, to a much greater extent than turbine infrastructure, can be microsited to avoid mature and hollow bearing trees on the route. The estimation of total number of trees for the transmission line is therefore considered an upper estimate, as it counts all trees and does not make allowance for micrositing.

It is acknowledged that the density of hollow bearing trees across the site varies. However, one correction figure has been applied to all areas, to simplify this analysis. Using aerials to count total tree canopies for six reference sites demonstrated that stags are not very visible from aerials. Using the average of these sites, known to have a greater density of hollows, is considered to address this issue.

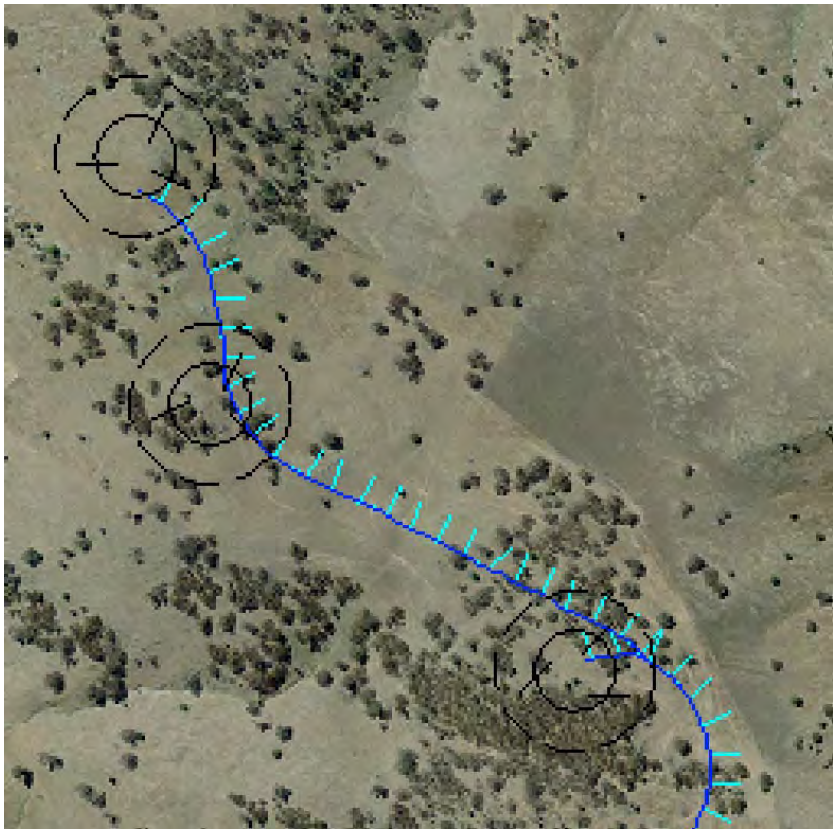


Figure 3-1 Example of resolution used to count tree canopies. Inner circle radius = 50m. Outer circle radius = 100m.

Note the difficulty in dense areas, where an average canopy size has been assumed.

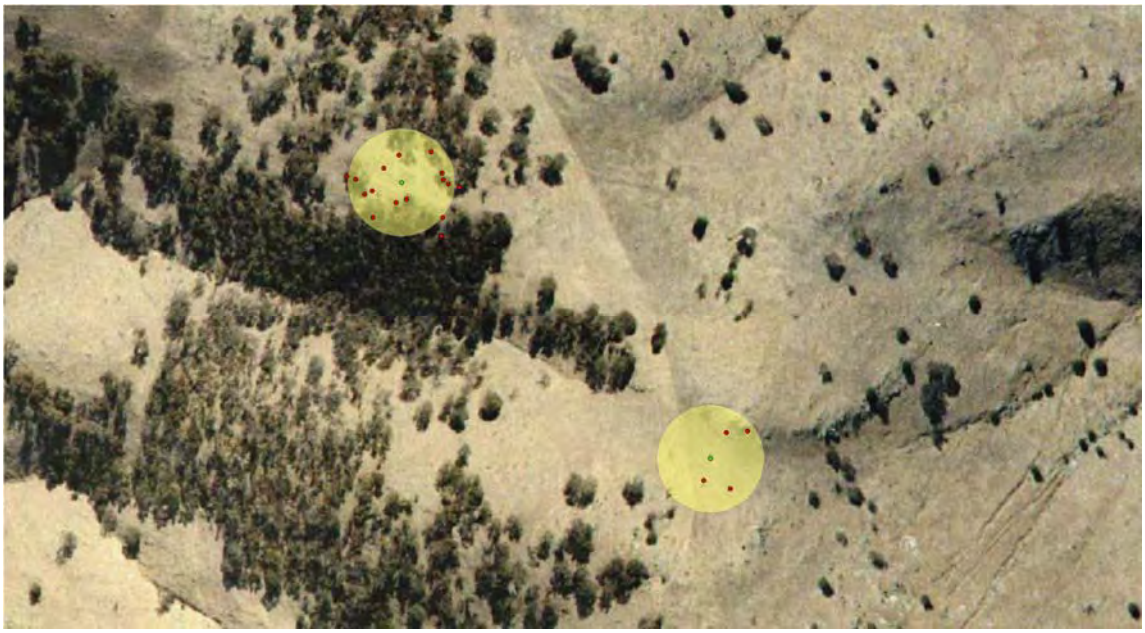
Results

Correction factor

Hollow-bearing tree inventories completed in 2009 for six turbine sites at Coppabella were compared to total tree canopy counts (using aerial imagery) for these same locations. On average 46% of trees were found to bear hollows, across these six locations. It is noted that, as these sites were selected on the basis of proximity to areas of high hollow-bearing tree density, that the average provides a conservative estimate of the potential for trees to bear hollows for the broader site.

Table 3-1 Correction factor

Reference turbine	Tree canopies	Hollow-bearing trees	Percentage of trees that bear hollows
1	23	15	65%
2	8	4	50%
3	7	5	71%
4	6	0	0%
5	1	0	0%
6	26	24	92%
Average:			46%



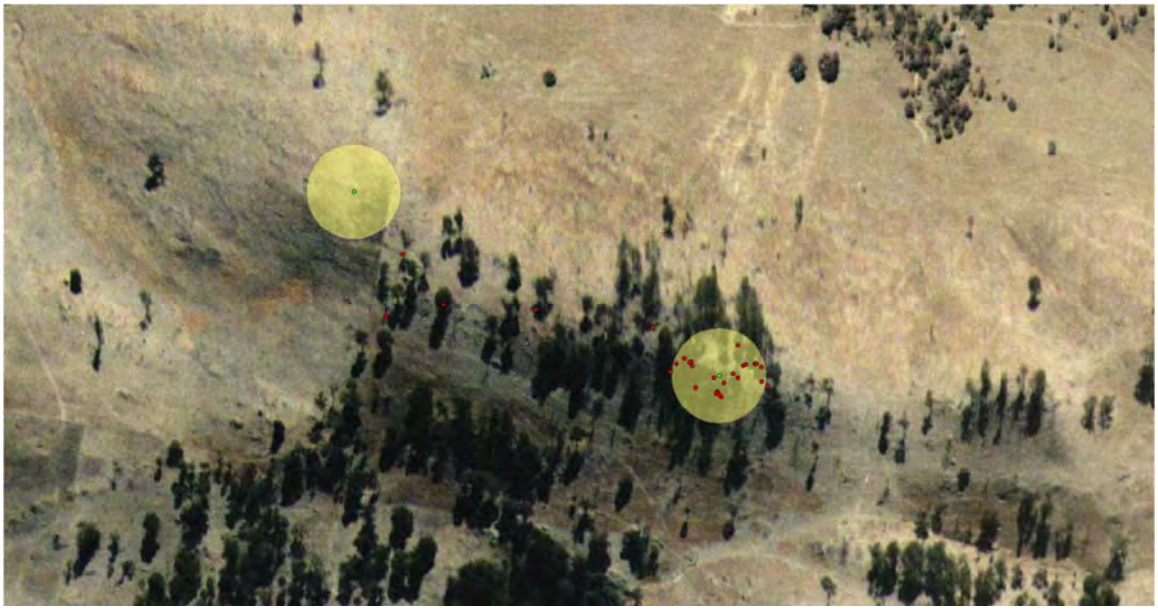


Table 3-2 Six reference sites where all hollow-bearing trees within 50m of a turbine had been GPSed were used to provide a correction factor (percentage of trees that bear hollows) for the broader site. Green dot = turbine centre. Red dot = hollow bearing tree.

Turbines

The total number of tree canopies counted within 50m of a turbine is 163. Assuming 46% of these trees are hollow-bearing, up to 75 hollow bearing trees would be removed to install 144 wind turbines. Considering the potential to retain some trees within 50m of a turbine, the actual number of hollow-bearing trees expected to be removed is less however, using this figure accounts for the loss of habitat values expected to accompany this proximity to turbines.

The additional number of tree canopies counted between 50m and 100m of a turbine is 575. Assuming 46% of these trees are hollow-bearing, up to 265 hollow bearing trees may be would be indirectly impacted, in terms of their reduced habitat value. Note: these trees would not be removed.

Considering the distribution of hollows at this distance however, most occur near a relatively small number of turbines; 14 out of the 144 turbines have more than ten hollow-bearing trees within 100m. Highest density of hollows adjacent to Marilba Cluster 4a and b.

Table 3-2 Turbine count

	Within 50m	**Between 50 and 100m**
Average per turbine	1.13	3.99
Total number of trees	163	575
Correction factor	46%	46%
Hollow-bearing tree estimate: turbines	75	265

Table 3-3 Turbine count - distribution

Cluster number	Turbine ID	Tree estimate between 50-100m
Cop 7a	4	25
Cop 3	56	15
Cop 3	57	17
Cop 10	77	11
Mar 4	89	37
Mar 4	90	25
Mar 4	93	17
Mar 4	94	18
Mar 4	96	17
Mar 4	97	15
Mar 6	102	13
Cop 2	129	11
Mar 7	145	50
Mar 7	148	11

Transmission line

The total number of tree canopies counted on the preferred transmission line is 58. The alternative line has a higher number of trees; 72. Assuming 46% of these trees are hollow-bearing, 27-33 hollow-bearing trees may be affected. This is considered an overestimate of trees to be removed, as not all trees are of sufficient height to affect the line and it does not take into account the ability to microsite the line around trees of value. Considering poles would be located every 200-300m and the potential to microsite infrastructure around identified hollow-bearing trees, the actual number of hollow-bearing trees expected to be impacted would be much less.

Table 3-4 Transmission line count

Preferred TX line	58
Alternative TX line	72
Correction factor	46%
Hollow-bearing tree estimate: Preferred TX line	27
Hollow-bearing tree estimate: Alternative TX line	33

Conclusion

Assuming that 46% of mature trees (those whose canopies were able to be discerned from aerial imagery) bear hollows, the following quantification of hollow-bearing tree impact is concluded:

Loss of habitat

- To install 144 turbines, approximately 75 hollow-bearing trees would be removed. This is the number occurring within 50m of a turbine. While some may be able to be retained, for

the purpose of this assessment, they are considered to constitute a total loss. The average is approximately one hollow-bearing tree per turbine.

- To install the transmission line, 27-33 hollow-bearing trees may be affected. This is considered an overestimate of trees to be removed, as not all trees are of sufficient height to affect the line and it does not take into account the ability to microsite the line around trees of value.

Indirect affects

- Approximately 265 hollow-bearing trees occur between 50m and 100m from a turbine. These may be indirectly impacted in terms of the habitat value they provide. The average is 4 hollow-bearing trees per turbine.
- Considering the distribution of hollows at this distance however, most occur near a relatively small number of turbines; 14 out of the 144 turbines have more than ten hollow-bearing trees within 100m. Most occur adjacent to Marilba Cluster 4a and b.

Offsetting

To offset the loss of hollow-bearing trees to be removed at a ratio of 1:10, around 1000 trees would need to be confirmed as being present in the offset area. Considering that offset lands are proposed in the high constraint areas (where more hollows are found), an offset of less than 1:10 in area is likely to be able to achieve this figure.

4 OFFSET STRATEGY

4.1 INTRODUCTION

While measures have been taken to avoid and minimise impacts (such as avoiding high constraints areas and requiring a management plan minimise impacts in other areas), residual impacts including habitat loss remain and therefore an Offset Package is considered to be required.

The following commitments are made by the proponent to address this requirement:

The proponent shall prepare an offset plan, to the satisfaction of the Director-General, to offset losses of and impacts to native vegetation including hollow-bearing trees on the site. The offset plan is to be developed in consultation with OEH, Murrumbidgee CMA, and Yass Valley Council. The proponent shall submit the offset plan for approval prior to the commencement of construction.

Details of the offset package shall be submitted for the approval of the Director-General prior to the commencement of construction. The package shall:

> *a) Describe how the offset will be guaranteed and monitored in perpetuity.*
>
> *b) Ensure that the vegetation communities, hollow-bearing trees and threatened species subject to loss of native vegetation are represented in the offset area.*
>
> *c) Demonstrate how the offset ratio determined improves habitat or maintains biodiversity values.*
>
> *d) Include requirements for post-construction review to confirm the extent of clearing was commensurate with and not greater than predicted. If clearing is greater, then the package shall demonstrate how the offset was modified and increased to the value of the actual biodiversity loss.*

The key aim of the provision of this information is to demonstrate, prior to project approval that the offsets required can be achieved and will be acceptable to the impact proposed. Furthermore, it sets out a clear pathway to implementation of the offsets, to provide certainty regarding the outcomes for all parties involved. It is based on similar strategies undertaken in consultation with OEH for renewable energy projects in NSW.

Specific to key components of this outline, it is noted that, in advance of project approval, allowances have to be made for changes in the infrastructure layout. The movement of infrastructure within the development envelope is termed 'micro-siting'. Limits are placed on micro-siting by the draft standard conditions for wind farms developed by the NSW Department of Planning and Infrastructure (a location allowance of 100 metres radius for development components as long as impacts remain consistent with that assessed - http://www.planning.nsw.gov.au/standard-and-model-conditions). These changes may also affect the landowners involved in the project and therefore the ability to use suitable areas of their property in the Offset Package. In response to this issue, a 'criteria approach' has been adopted in the development of this offset outline. The criteria and methods set out below are intended to guide the finalisation of the Offset Package whilst allowing the project the flexibility it requires to be developed.

4.2 IMPLEMENTATION OVERVIEW

The following stages of implementing the Offset Package are proposed:

Stage	Timing
1. Offset Strategy (this document)	Draft Strategy supplied pre project approval.
a. Estimation of loss of habitat (including hollows) required for the project.	
b. Calculation of the required offsets, using predetermined offset ratios.	
c. Outline of the implementation (including management and security)	
d. Identification of potential offset sites	
2. Offset Plan	Prior to any impact.
a. Consultation and endorsement of CMA and OEH to finalise the Offset Strategy (including finalisation of offset ratios).	
b. Selection of offset sites	
c. For each offset site:	
o Establishment of baseline data.	
o Documentation of key biodiversity risks, opportunities and relevant local initiatives.	
o Refinement of management actions specific to the site (with input from the landowner), including monitoring regime and reporting requirements.	
o Consultation and endorsement of CMA and OEH to finalise the Offset Plan (could be documented separately for each site or in one combined document).	
3. Verification of the actual area of native vegetation clearing of the constructed wind farm and transmission line.	After construction.
4. Formalisation of the offset on the title of each involved property by way of a CPVP, including the inclusion of the management plan and its required management actions and land use restrictions.	After construction.
5. Monitoring in order to demonstrate maintain or improve and adapt management as required.	During operation.

These stages are detailed further in the sections below.

4.3 ESTIMATION OF LOSS OF HABITAT

This response document estimates the impact area for the proposal through calculation of permanent habitat loss on a worst case scenario.

4.4 CALCULATION OF REQUIRED OFFSETS

The proponent commits to determining an offset ratio with reference to:

- The conservation status of the vegetation (EECs would be offset at a higher ratio than common vegetation types)
- The condition of the vegetation (a standard metric has been used to collect condition data and would be used to ensure vegetation in better condition is offset at a higher ratio than degraded vegetation[2])
- Habitat values (important habitat elements or verified threatened species habitat would be offset at a higher ratio)

The offset ratios are proposed to be via negotiated agreement with OEH, rather than using the Biometric Assessment Methodology. A large amount of biodiversity survey work has been undertaken onsite. The intention is to supplement rather than redo this survey work in the calculation of offset areas. Using the Biometric Assessment Methodology at this time would duplicate survey effort.

The proposed ratios below have been developed based on **ngh**environmental's experience with the Biobanking calculator in similar vegetation types as well as in negotiations with OEH for similar renewable energy projects. They are proposed as a starting point for a negotiated agreement. They have the benefit of being transparent to the proponent and the consent authority, facilitating an upfront understanding of the offset requirements for the project in advance of impacts occurring. Where multiple factors apply and their ratios are contradictory (i.e. 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. While the Biometric Assessment Methodology has the advantage of being more clear cut, we propose a negotiated agreement that is flexible to achieving an overall beneficial outcome is better suited to the many individual sites that are likely to be included in the final offset plan.

Proposed offset ratios

[2] This is a five class condition categorization, documented within the BA and able to be easily related to the Biometric two-class condition categories.

Condition class	Biometric condition[3]	Vegetation NOT OF conservation significance	Vegetation OF conservation significance	Threatened species habitat
Poor	Low	1 : 1	1 : 2	1 : 2
Poor-moderate	Moderate- Good	1 : 1	1 : 2	1 : 2
Moderate	Moderate- Good	1 : 1	1 : 5	1 : 5
Moderate-good	Moderate- Good	1 : 1	1 : 10	1 : 10
Good	Moderate- Good	1 : 1	1 : 10	1 : 10

Justification of these ratios is based on the following:

- In a recent project with Dubbo OEH office, a 1:5 ratio was endorsed by OEH for all native vegetation to be impacted; that being the ratio for the Grey –Crowned Babbler, considered to be the key significant species to be impacted. The ratios above are lower than this for degraded vegetation and higher than this for vegetation in moderate to good quality, achieving a comparative offset.
- In a recent project with Queanbeyan OEH office, a 1:10 ratio was suggested by OEH for Box Gum Woodland EEC with tree cover and 1: 5 ratio for EEC derived pasture. The ratios above are lower than this for degraded vegetation and higher than this for vegetation in good quality, achieving a comparative offset.
- In a recent project with South West OEH office, a 1:1 ratio was endorsed by OEH for a common vegetation type. The offset site included better habitat values than the development site. The ratios above include 1:1 for common vegetation types and higher ratios for threatened species habitat values, achieving a comparative offset.
- In several Biobanking Assessments undertaken using the BioBanking calculator, EECs in moderate to good biometric condition have returned ratios averaging 1:6. This can be verified as required.
- The Part 3A Transitional Project Biobanking Guidance for Offset Ratios allow a Tier 2 'no net loss' option rather than an 'maintain or improve' option, whereby lesser ratios are accepted if 'maintain or improve' cannot be achieved. This pathway must consider whether feasible alternatives to the clearing exist and the value of the resource (in this case wind energy). It is considered that the location of turbines and associated infrastructure is restricted by sites with suitable wind speed and that a lesser goal of 'no net loss' may be applicable to this project.

Based on the impact areas provided in Section 2 of this document, although over-estimated, around 180ha of Box Gum woodland derived grassland would be required to be offset. Around 25 ha of vegetation of other types would be required to be offset, including Box Gum woodland with tree cover (around 21 ha).

Most high conservation value areas have been avoided by the development and would therefore not require offsets at the highest ratios proposed. Most of the Box Gum woodland to be impacted is in a degraded condition and an average of 1:3 offset is considered likely, based on this. This would result in an offset site totalling approximately 600 ha. A preliminary identification of potential offset sites has identified around 650 ha of high conservation value areas (quality EEC and threatened species, dense areas of hollow-bearing trees) suitable for offsets. It is noted that, prior to detailed validation, condition of degraded areas has been overestimated in the impact calculations but that substantial areas are exotic dominated and lack tree cover. A detailed and appropriately timed survey has been proposed to ensure an accurate offset requirement is determined as part of the Offset Plan. By specifying up front ratios, the development is limited in its clearing by what can be offset, providing certainty regarding clearing amounts.

Hollows

Based on the estimates set out in Section 3 of this response, to offset the loss of hollow-bearing trees to be removed at a ratio of 1:10, around 1000 trees would need to be confirmed as being present in the offset area. Considering that offset lands are proposed in the high constraint areas (where more hollows are found), an offset of less than 1:10 in area is likely to be able to achieve this figure.

4.5 IDENTIFICATION OF POTENTIAL OFFSET SITES

4.5.1 Criteria

The proponent would establish offsets within the private land holdings of the project site. This is an area of over 14,600 hectares.

Epuron have lease agreements with all involved landholders (where infrastructure is proposed to be located). These contracts stipulate that the land may be considered for biodiversity offsets. The intention is to select offset lands from within the project boundary. Broad scale mapping for the site identifies that the vegetation is representative of that that would be cleared and therefore allows a like for like offset criteria to be targeted. Additional criteria that would be used to select offset sites that will together make up the Offset Package include:

- Of sufficient combined size to achieve the set ratios above (or as negotiated with OEH)
- Complying with *Principles for the use of biodiversity offsets in NSW* guidance document (refer below for explicit reference to these principles)
- Will include provisions for offsetting Commonwealth listed EEC to demonstrate compliance with the Commonwealth offset policy.
- Selected to minimize:
    - Edge area
    - Number of land holdings
- Selected to maximize:
    - Landscape connectivity
    - Preservation of declining habitat types and resources
- Located no closer than 100m from a wind turbine (to minimise any indirect impacts of the wind farm)

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.

While specific sites have yet to be identified, there are large amounts of land of suitable type and condition within the project boundaries to demonstrate that offsets are achievable. In principle agreements with landholders are in place.

4.5.2 Potential offset sites

Several areas able to meet the criteria above have been identified. It is likely that the final 'package' will comprise a number of sites. Areas of high constraint (to avoid), where these occur further than 100m from a turbine (in order to reduce indirect impact of turbines on these areas), are the most likely candidates.

Where they can be secured in relatively continuous areas, they would represent the least ongoing management cost as they are already in good condition.

These include areas of EEC in better quality, habitat for Superb Parrot, where they occur in lower landscape positions, and would offset habitat loss for turbine construction, where they occur in higher landscape positions. They include areas of more intact woodland, providing hollow-bearing trees for a number of other threatened birds. They include areas where Yass Daisy occurs. Additionally, an area outside the development envelope has been identified as having high numbers of Golden Sun Moth (Nov-Dec 2013 surveys). This area would provide offsets for areas of impact to Golden Sun Moth habitat.

In total, sourced from the text of the biodiversity assessments, candidate areas include:

- Coppabella precinct
    - Box gum woodland EEC in moderate, moderate-good and good condition - Clusters 10, north west and central; 8, 6 slope and small areas on 5; southern edge of Cluster 7; 3 north and central north. Gullies between Clusters 6 and 3, 6 and 7a, and between 5 and 7a; 3 east and north. Adjacent to Whitefields Road
    - Threatened species habitat - Clusters 3 and 10, small areas on 7, between Clusters 6 and 7a, and on the eastern slope of 3.
    - Hollow-bearing trees and mature paddock trees: Clusters 10, 3 north and 6; in paddock trees in low lying areas within transmission envelopes; and also adjacent to Whitefields Road.
    - Yass Daisy – Cluster 7a, south; Cluster 8, north; Cluster 10, north.
- Marilba precinct
    - Box gum woodland EEC in moderate, moderate-good and good condition - Cluster 7
    - Threatened bird species habitat (Speckled Warbler, Diamond Firetail, and Superb Parrot) Clusters 3, 4, 6 and 7.
    - Yass Daisy - Clusters 4, 6 and 7
    - Golden Sun Moth – Cluster 2, north
- New areas (transmission easement and peripheral areas, covered in the SER)
    - Box-Gum Woodland EEC/CEEC
    - Moderate-Good and Good condition areas Yass Daisy
    - Movement corridors

Summary

Some of the larger and more connected areas cited above have been mapped to indicate a potential offset package. The total area mapped totals around 650 ha. Without breaking down the specific offset requirements, this generally achieves a 1: 3 ha offset. On this basis, the security of offsets for the project is considered to be highly feasible.

4.6 FOR EACH OFFSET SITE

As part of the development of the Offset Plan, the following information would be documented.

4.6.1 Baseline data

Desktop assessment

Evaluation of potential for threatened species to occur onsite, with reference to prior to field work and data base searches, below:

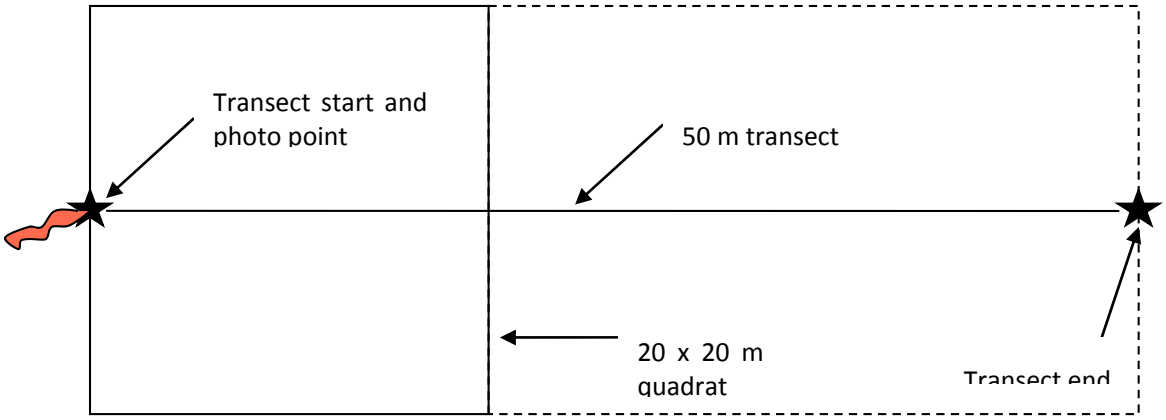
- The OEH threatened species database to identify species listed as threatened under the NSW *Threatened Species Conservation Act 1995* (TSC Act).
- The DSEWPC protected matters search tool to identify species listed as threatened or migratory under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act).

Field survey

A field survey would be undertaken by an ecologist. This would include:

- Mapping of vegetation types and condition
- Establishment of monitoring plots
- Onground validation / assessment of habitats for threatened species with the potential to occur at the site

BioBanking plots would be established in accordance with the BioBanking Assessment Methodology (BBAM, DECC 2009) to collect baseline data on vegetation structure and quality. The location of the plots would be marked using 1650mm star pickets to facilitate the replication of the plots. The ends of the star pickets would be painted white to enable easy identification in the field. Star pickets would be placed at the start and end of the 50 metre transect required by the BBAM and their co-ordinates recorded. To delineate the start point of transects, orange flagging tape would be tied to the top of the appropriate picket. The 20 x 20 metre quadrat required by the BBAM would be conducted within an area bounded by the first 20 metres of the transect and extending 10 metres either side as shown below. Photo points would be established at each of the start points of the transects, with views along the length of the transect.



Monitoring plot layout

Data evaluation

Data recorded from the BioBanking monitoring plots were compared with the benchmark data for the vegetation type as provided in the BioBanking vegetation types benchmark database (DECC 2008). Monitoring plot data would also be entered into the BioBanking Credit Calculator (BBCC) version 2 to obtain a baseline site value score for dominant vegetation formations at each site.

4.6.2 Key biodiversity risks, opportunities and relevant local initiatives

As a background to the development of appropriate management actions for the site, key biodiversity risks, opportunities and relevant local initiatives for each site would be documented.

4.6.3 Site specific management actions

Offset site management measures are required to be specific to each area in question. These measures aim to result in an improvement in the biodiversity values of the site and are designed to be adaptive (informed by a monitoring regime). These management measures would be incorporated into a detailed management plan for each offset site (one plan per landowner).

Management measures would be developed with reference to the Biobanking Management Plan template and with input from the CMA. Examples of likely measures are included below.

Example offset site management measures

Management measure	Objective	Justification	Action	Timing
Exclusion of stock	To prevent overgrazing and encourage regeneration of native vegetation	Grazing would be likely to degrade habitat.	• Install stock proof fencing around the perimeter of the Offset Site.	• At establishment of the Offset Site. • Ongoing repairs as required.
Weed control	To minimise the occurrence of weeds within the Offset Site particularly Weeds of National Significance (WoNS) and listed noxious weeds.	Weeds compete with native species and degrade habitats.	• Survey to identify target locations for weed control. • Weed control using appropriate methodologies considering target species and landscape context.	• At establishment of the Offset Site. • Ongoing as required.
Rabbit control	To minimise the risk of the Offset Site becoming a refuge for rabbits.	Increased rabbit numbers can reduce native regeneration and support higher numbers of pest animals such as cats and foxes.	• Monitor for presence of rabbits. • Conduct baiting or controlled grazing to reduce the ability of the site to act as a refuge to rabbits. • Where possible, coordinate baiting with adjacent landowners to maximise effects	• Consideration given to action on the basis of monitoring results.

4.7 VERIFICATION OF THE ACTUAL AREA OF NATIVE VEGETATION CLEARING

Verification of the actual area of impact of the constructed wind farm and transmission line is required to be verified, prior to finalising the CPVPs. This provides an incentive throughout construction to minimise impacts and thereby reduce the offset requirement for the project. It also verifies that the actual amount and type of clearing undertaken is offset, as required.

It is expected that a detailed Biodiversity Management Plan would be prepared to guide construction. This would contain updated vegetation mapping specific to the final infrastructure layout (refer to note on micrositing above). Verification of the actual area of native vegetation clearing can be undertaken as an audit after construction. (Incentives to minimize clearing would be an appropriate stipulation in EPC contracts).

4.8 FORMALISATION OF INDIVIDUAL CPVPS AND FUNDING ARRANGEMENTS

Offsets would be governed by conservation mechanisms to ensure long-term protection and management of the site, including funding arrangements.

A Conservation Property Vegetation Plan (CPVP) would be implemented on each involved private land holding. The process would be driven by Epuron, with input from each landholder. The CPVP would include management actions associated with the offset area that would apply in perpetuity.

To ensure that the CPVP is binding on successors in title, an abstract of the CPVP would be registered with the Land and Property Management Authority under the *Real Property Act 1900.* The CPVP would be a legally binding agreement under both the *Native Vegetation Act 2003* and the *Threatened Species Conservation Act 1995*. The terms of the CPVP would not be affected by any changes to local or state planning rules or new listings of threatened species. A CPVP can be varied at the landholder's request, provided the variation would still improve or maintain environmental outcomes.

As the CPVP is attached to the land title, the landowner is ultimately responsible for funding the management actions required at the Offset Site and monitoring the effectiveness of their implementation. However the Proponent would take responsibility for management and would ensure the landowner has sufficient resources and information to implement the management actions for the operational life of the project, as management of offsets would form a condition of the project's consent.

Even though a CPVP is binding in perpetuity, it is acknowledged that there is less incentive to manage the offset site after the decommissioning of the wind farm. Therefore, it is proposed that the bulk of the management actions be focused in the early years of the project. Monitoring and reporting, as outlined above, would demonstrate whether this is being satisfactorily achieved and allow a point for the consent authority to intervene.

4.9 REQUIREMENT TO MONITOR THE OFFSET SITE

In order to ensure that biodiversity improvement is occurring within the offset sites (and therefore that a 'maintain or improve outcome' can be met over time), monitoring is required.

Monitoring is recommended to be repeated initially, every two years. As a part of monitoring surveys, a report would be prepared to document the success or otherwise of management and adaptations required to obtain better results.

Reporting is proposed every two years to the Department of Planning and Infrastructure, until such time as this is deemed acceptable to cease. The reports would also be submitted to OEH for comment.

A decision to reduce or continue bi-annual reporting may also be made by DPI or OEH following submission of each report. A final report should be prepared prior to decommissioning of the project, to verify that a 'maintain or improve' outcome is being met and that residual management actions can largely coincide with routine agricultural land management.

4.10 MAINTAIN OR IMPROVE

With the effective implementation of the stages outlined above, a 'maintain or improve' outcome would be achieved for the project. By the coordinated selection of offset sites over such a large area, and their management for biodiversity improvement, a regional scale beneficial biodiversity impact is anticipated. Benefits are expected to include:

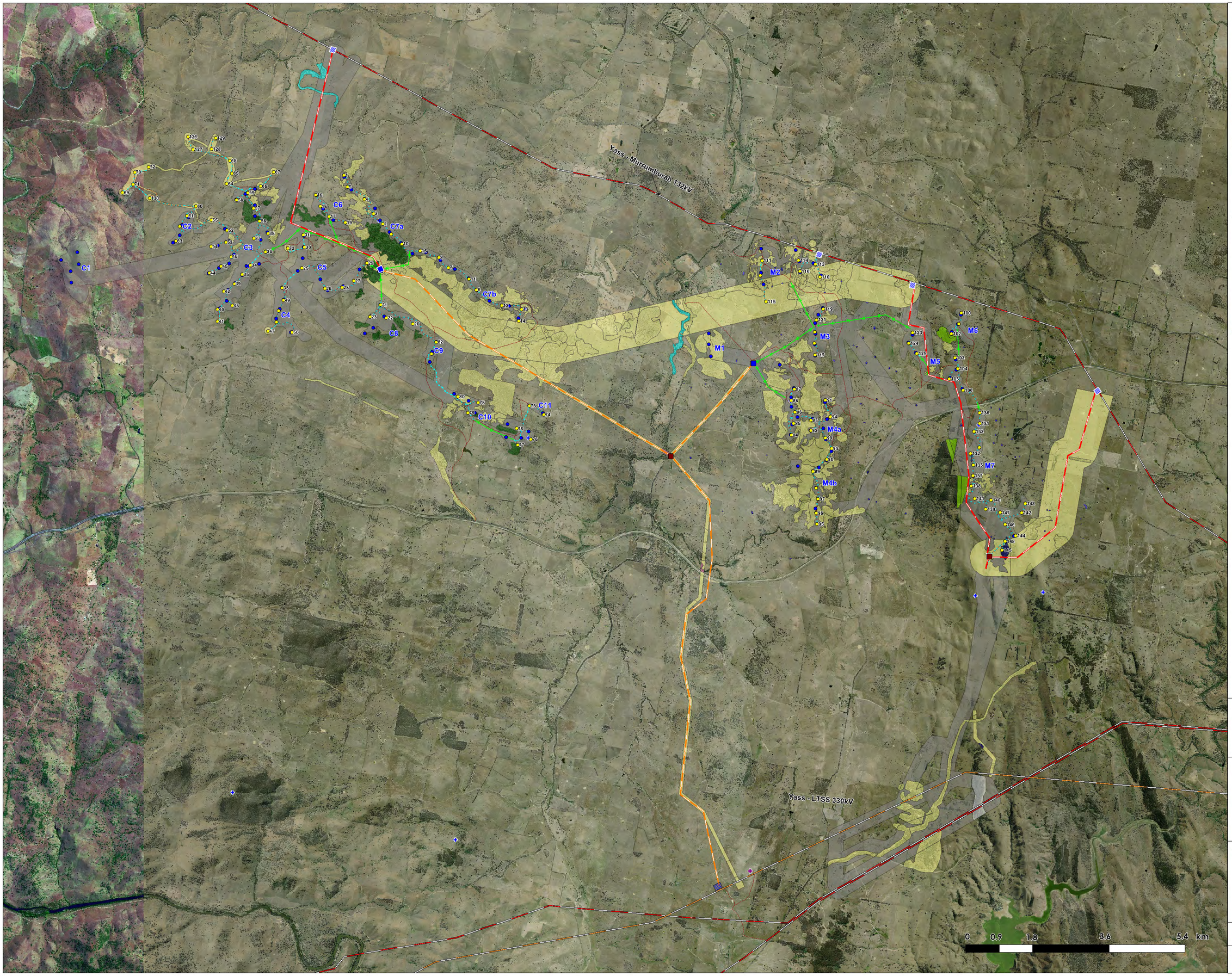
- Incentive to minimize clearing during the detailed design and construction phases of the wind farm project
- Targeted and coordinated weed and feral animal management, informed by ecologists working with landowners
- Retention of declining habitat resources including hollows, fallen timber and logs, riparian habitats
- Protection of specific habitat linkages and wildlife corridors
- Improved infrastructure to assist management including fencing and access

4.11 PRINCIPLES FOR BIODIVERSITY OFFSETS IN NSW

The biodiversity offset principles developed by the former DECCW (now OEH) would guide the selection and management of the offset site, namely:

Impacts must be avoided first by using prevention and mitigation measures.	*The BA sets out mitigation measure to minimse impacts. The aim of the offset package is to ensure that where impacts cannot be avoided, or sufficiently minimised, the residual impact would be offset in perpetuity.*
All regulatory requirements must be met.	*Offset land is required as part of the approval conditions for the project. The proposed offsets would not be used to satisfy approvals or assessments under other legislation.*
Offsets must never reward ongoing poor performance.	*Monitoring would be required as part of the implementation of management actions for the offset site.*
Offsets will complement other government programs.	*The Offset Package would be finalized in consultation with OEH and the CMA, allowing any local programs or initiatives to be considered and included.*
Offsets must be underpinned by sound ecological principles.	*Selection criteria have been developed to ensure the location of offset sites is appropriate. Management measures have been outlined by an ecologist. Specific management plans would accompany each CPVP, developed in consultation with the CMA and the proponent.*
Offsets should aim to result in a net improvement in biodiversity over time.	*Management actions would be developed specific to each offset site (one per private property).*
Offsets must be enduring - they must offset the impact of the development for the period that the impact occurs.	*Native vegetation clearing impacts are deemed permanent and therefore the offset sites would be preserved and managed in perpetuity.*
Offsets should be agreed prior to the impact occurring.	*The offset criteria set out in this document form part of the proposal. If approved, the commitment is carried*

	over as a condition of consent. The commitment includes consultation with OEH and the CMA to ensure the final offset package is acceptable, prior to construction impacts.
Offsets must be quantifiable - the impacts and benefits must be reliably estimated.	*An estimation of impact has been provided based on GIS mapping. Criteria have been proposed that provide clear quantification of offsets, based on the actual area cleared.*
Offsets must be targeted.	*Refer to selection criteria.*
Offsets must be located appropriately.	*Refer to selection criteria.*
Offsets must be supplementary.	*Offsets would be comprised of private land not currently under any form of biodiversity conservation protection. In this way the land would be additional to government reserves and programs. Refer to selection criteria.*
Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.	*A CPVP would be attached to the title of the offset land (one per landowner). To ensure that the CPVP is binding on successors in title, an abstract of the CPVP would be registered with the Land and Property Management Authority under the Real Property Act 1900. The CPVP would be a legally binding agreement under both the Native Vegetation Act 2003 and the Threatened Species Conservation Act 1995. The terms of the CPVP would not be affected by any changes to local or state planning rules or new listings of threatened species. A CPVP can be varied at the landholder's request, provided the variation would still improve or maintain environmental outcomes.*



LEGEND

- PPR wind turbine (labels)
- EA wind turbine (no labels)
- Proposed access track
- Proposed underground electrical reticulation
- Proposed overhead electrical reticulation
- Proposed (preferred) 330kV overhead powerline
- Alternative 132kV overhead powerline
- Existing 132kV transmission line
- Existing 330kV transmission line
- Proposed (preferred) substation
- Alternative substation
- Proposed (preferred) switchyard
- Alternative switchyard
- Proposed transmission communications tower
- Wind monitoring mast

Vegetation Types

- Aquatic
- Box Gum Woodland
- Box Gum Woodland Derived Grassland
- Broad-leaved Peppermint Dry Grass Forest
- Dry Shrub/ Tussock Grass Forest
- Long-leaved Box Dry Grass Forest
- Long-leaved/Red Stringybark Dry Grass Forest
- Riparian
- River Red Gum

Cluster Group

EPURON

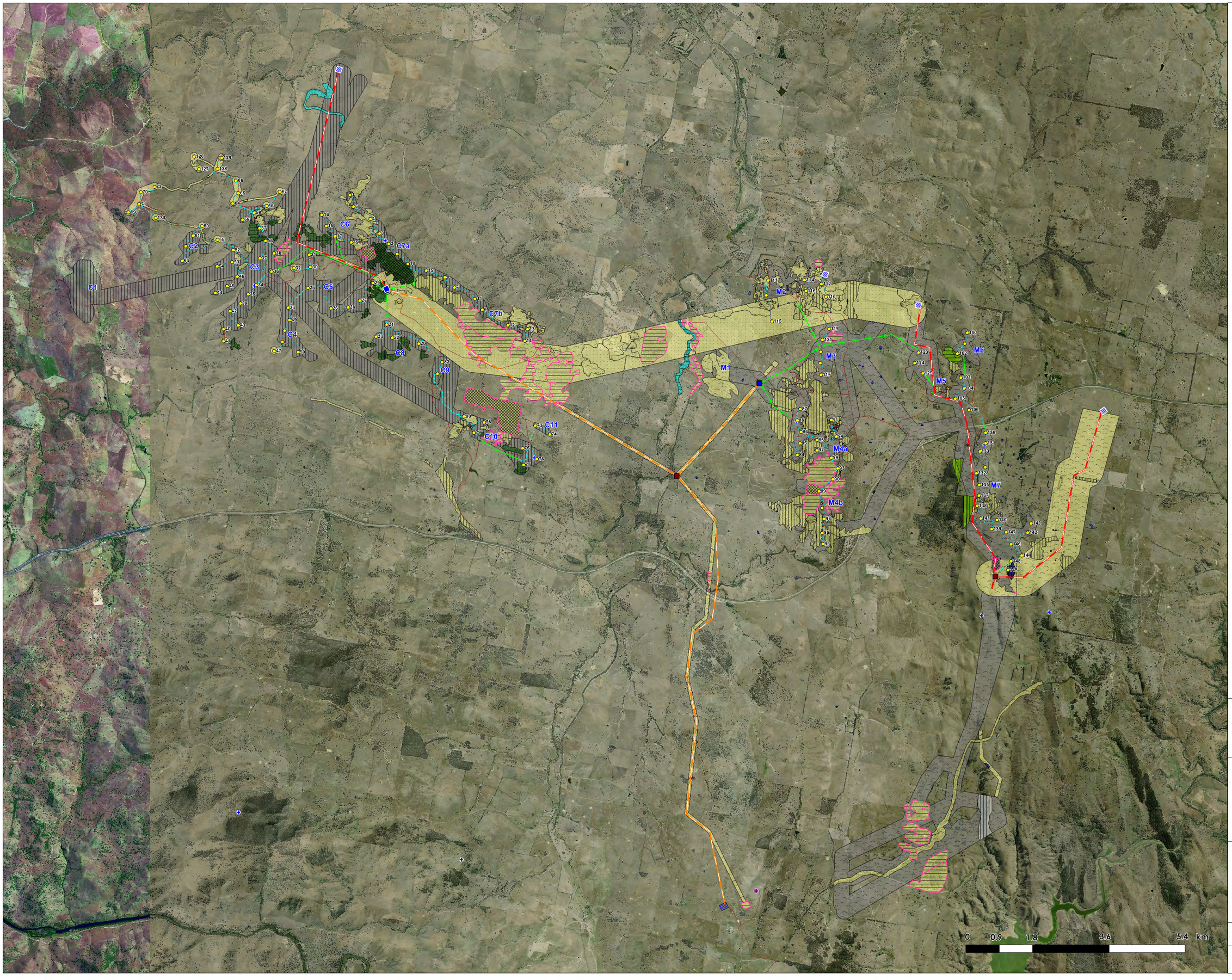
PROJECT

Yass Valley Wind Farm

TITLE

EA & PPR Turbine Layout Comparison

SCALE	DATE	DRAWN
1:45,000 at A1	17/12/13	TL



LEGEND

- PPR wind turbine
- Proposed access track
- Proposed underground electrical reticulation
- Proposed overhead electrical reticulation
- Proposed (preferred) 330kV overhead powerline
- Alternative 132kV overhead powerline
- Proposed (preferred) substation
- Alternative substation
- Proposed (preferred) switchyard
- Alternative switchyard
- Proposed transmission communications tower
- Wind monitoring mast
- EEC in moderate - good biometric condition

Vegetation Condition

- Good
- Moderate - Good
- Moderate
- Poor - Moderate
- Poor

Vegetation Types

- Aquatic
- Box Gum Woodland
- Box Gum Woodland Derived Grassland
- Broad-leaved Peppermint Dry Grass Forest
- Dry Shrub/ Tussock Grass Forest
- Long-leaved Box Dry Grass Forest
- Long-leaved/Red Stringybark Dry Grass Forest
- Riparian
- River Red Gum

Cluster Group

EPURON

PROJECT

Yass Valley Wind Farm

TITLE

Project Infrastructure & Vegetation Complete site

SCALE	DATE	DRAWN
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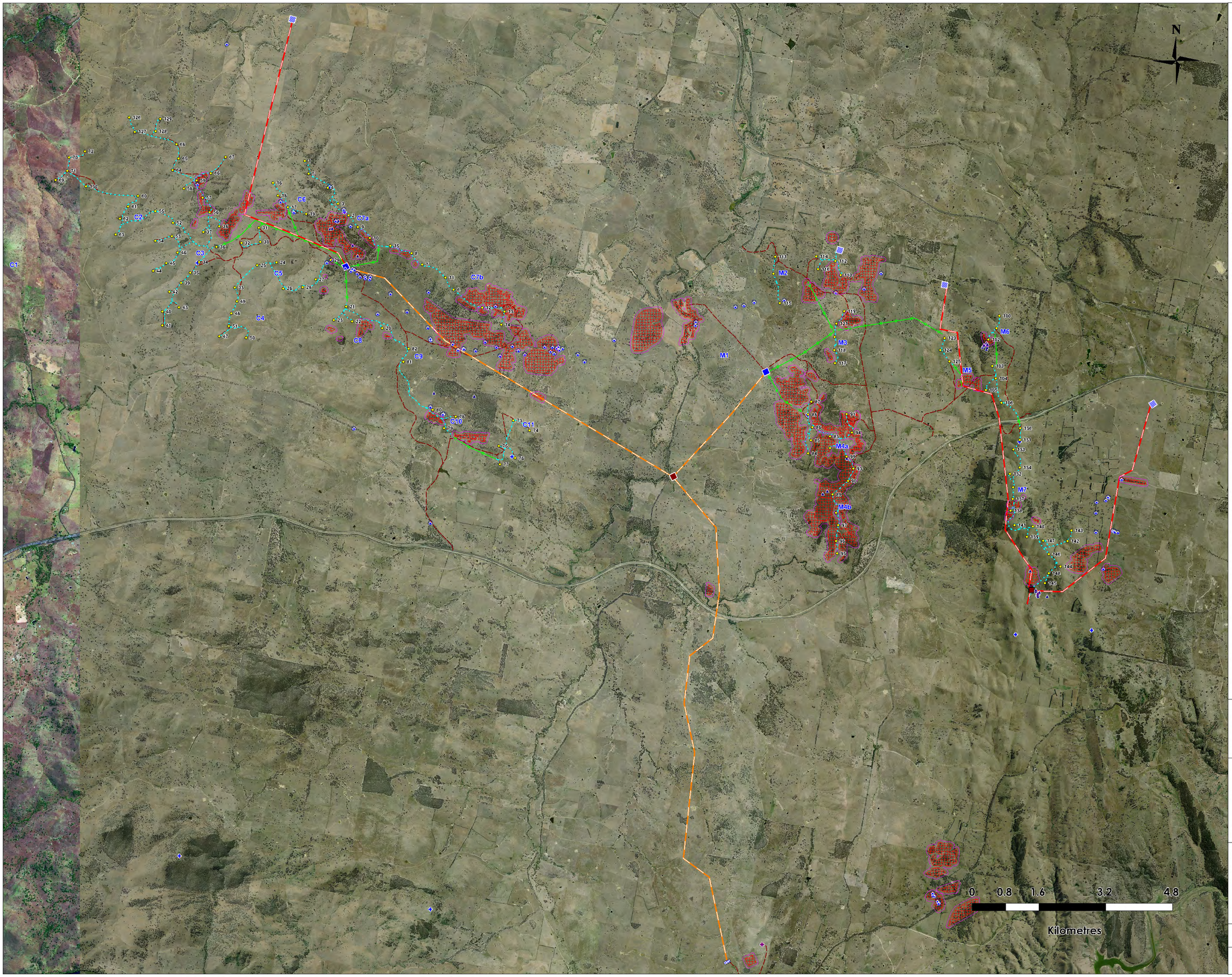

LEGEND

- PPR wind turbine
- Proposed (preferred) substation
- Alternative substation
- Proposed (preferred) switchyard
- Alternate switchyard
- Proposed transmission communications tower
- Proposed (preferred) 330kV overhead powerline
- Alternative 132kV overhead powerline
- Proposed overhead electrical reticulation
- Proposed underground electrical reticulation
- Proposed access track
- Wind monitoring mast
- High constraint
- 50m high constraint buffer
- Hollow Bearing Tree
- 50m hollow bearing tree buffer
- Yass Daisy
- 5m buffer

Cluster group

EPURON

PROJECT

Yass Valley Wind Farm

TITLE

Biodiversity
High constraint areas

SCALE	DATE	DRAWN
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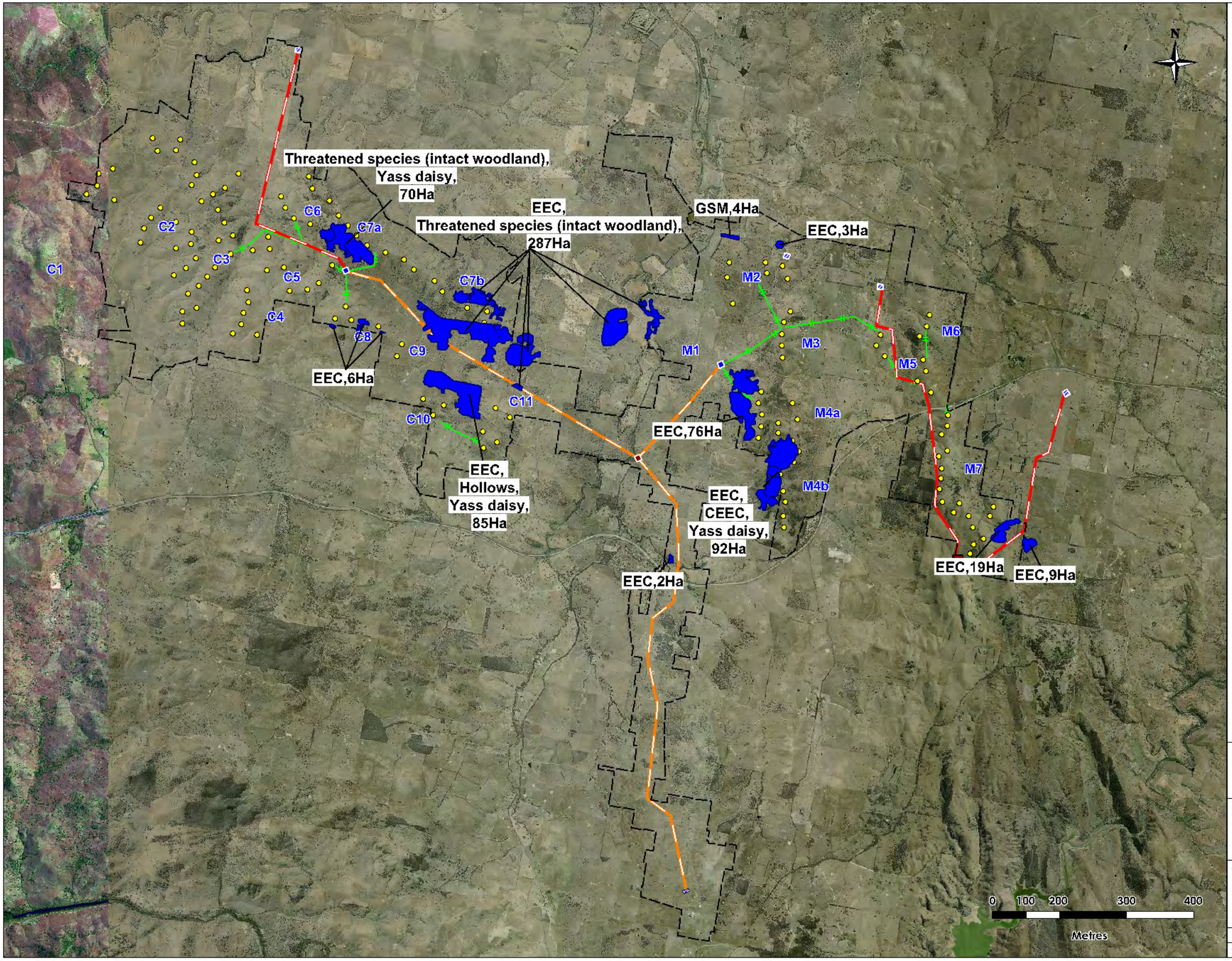

LEGEND

- Potential offsets
- Site perimeter
- PPR wind turbine
- Proposed substation
- Alternative substation
- Proposed switchyard
- Alternative switchyard
- Proposed (preferred) 330kV overhead powerline
- Alternate 132kV overhead powerline
- Proposed overhead electrical reticulation

Cluster group

EPURON

PROJECT

Yass Valley Wind Farm

TITLE

Potential Offsets

SCALE	DATE	DRAWN
1:90,000 at A3	12/12/13	TL