

History of Changes to the Project Infrastructure Layout

1.1 Overview of Changes

This attachment documents changes made to the proposed wind turbine locations and associated infrastructure made in the PPR (November 2012) compared to the infrastructure layout proposed in the EA (2009). The changes included a reduction in the number of wind turbines, a relocation of a number of wind turbines and a new preferred transmission line route.

Table 1-1 Overview of changes to wind farm layout from 2009 to 2012

Detail	Environmental Assessment November 2009	Preferred Project Report November 2012
Number of wind turbines	152	148
Length of high voltage overhead powerline	>75 km	25 km (330kV) or 22 km (132kV)
Number of site substations	6	Up to 2
Maximum tip height	150	150

Further details are documented in Table 1-2 below.

Table 1-2 Changes to the proposed wind farm infrastructure

Item	Reason for Redesign
Deletion of 5 most westerly turbines (COP 72, 73, 74, 75 & 76)	Visual impact concerns from involved landowners
Additional 12 turbines in north west of (COP)	Additional viable wind turbine locations included COP 64, 65, 68, 69, 70, 71, 72, 126, 127, 128, 129, 130)
Deletion of turbine (COP 13)	High vegetation constraint
Deletion of turbine (COP 67)	Turbine layout optimisation
Relocation of access track (between COP 66 and 68)	High vegetation constraint
Deletion of turbines (MRL 01 & 05)	At the involved landowner's request
Deletion of turbine (MRL 30)	Turbine layout optimisation & vegetation constraint
Deletion of turbine (MRL 35)	High vegetation constraint for access track to turbine location
Revised overhead powerline route to TransGrid's existing 330kV transmission line	The revised overhead powerline route to connect the wind farm to the electricity grid runs south from the wind farm site for approximately 12km. Connection to the 330kV transmission line is expected to be slightly more expensive, but is expected to provide less constraint to the output of the wind farm when compared with the alternative connection to the 132kV transmission line to the north of the wind farm site.

These changes were made for a number of reasons including:

- ▶ Reducing the overall environmental impact of the wind farm, including reducing impacts on flora and fauna habitat,
- ▶ Accommodating operational noise and visual impact constraints;
- ▶ In response to submissions made to the EA and to on-going community consultation;
- ▶ At the request of the involved landowners;

- ▶ To avoid constructability constraints; and
- ▶ When each of the above had been completed, to optimise the turbine layout to maximise the energy output of the wind farm.

The revised infrastructure layout significantly reduced the impact of the wind farm on the Box Gum Woodland Endangered Ecological Community (EEC) and reduced the preferred overhead transmission line from >75km to approximately 25km which were two particular issues raised in submission from OEH.

Where the changes resulted in infrastructure being relocated, additional assessments were carried out to ensure that the impacts continued to have the effect of minimising the overall environmental impact of the wind farm and complied with the relevant criteria. The additional assessments included:

- ▶ Ecology – additional field surveys and assessment;
- ▶ Archaeology & Heritage – additional field survey and assessment;
- ▶ Visual – additional photomontages and assessment;
- ▶ Noise – additional background noise monitoring and assessment;
- ▶ Consultation with neighbours within 2km and beyond; and
- ▶ Consideration of impacts in accordance with the draft NSW Planning Guidelines: Wind Farms

1.2 Changes to Transmission Lines & Grid Connection

The original 132kV grid connection involved more than 75km of high voltage overhead powerline and 40km of medium voltage overhead powerline (within the site). A large part of the 75km was due to a required upgrade of the existing 132kV line from the wind farm site back to the Yass substation. This connection was revisited and a new and preferred 330kV transmission line connection was proposed in the PPR (Nov 2012) which remains the preferred connection in the PP&SR. The preferred 330kV connection is not only significantly shorter than the 132kV transmission line routes presented in the EA (2009), but it also significantly reduces impacts to biodiversity.

See Figure 8-1 for a map comparing the original transmission line routes to the preferred and alternative transmission line routes presented in the PPR (Nov 2012). For clarity, the preferred and alternative transmission line routes are also shown in Figure 1-4 and 1-5.

There are a number of key reasons for the current preferred transmission line route:

- ▶ The existing TransGrid 132kV transmission line to the north of the site has less capacity available
- ▶ The new, preferred transmission line documented and exhibited in the PPR provides a more secure connection for the total output of the wind farm
- ▶ The preferred transmission line minimises the impacts to biodiversity – see Table 1-3 for comparison on the length of HV and MV powerlines within Box Gum Woodland:

The preferred connection enables the entire site to be connected to the 330kV transmission line to the south of the wind farm. An alternative option to connect sections of the wind farm to the 132 kV transmission line to the north of the site, but without requiring an upgrade back to Yass is also included. This allows for the potential for a staged project where an initial first stage cannot justify the full 330kV connection.

Table 1-3 Transmission line impacts to Box Gum Woodland EEC

	Length of powerlines (km)			Length of powerline in BGW & BGW derived grassland in moderate, moderate-good & good condition (km)		
	(EA 2009)	Preferred (2014)	Alternative (2014)	(EA 2009)	Preferred (2014)	Alternative (2014)
High voltage transmission (132/330kV)	75	25	22	10.0	1.3	6.1
Medium voltage overhead reticulation (33/66kV)	40	17	17	18.4	3.5	3.5

For clarification of how the 75km length of the original powerline was calculated see Figure 3-14 and Figure 3-15 (pages 54 & 55) of the EA which showed the original high voltage transmission line routes including the length of each section. The lengths are shown in the table below.

Table 1-4 Lengths of proposed EA layout transmission line sections

Transmission line	Length (km)	Cumulative length (km)
COP B to COP C	6.3	-
COP C to MRL A	16.7	23.0
COP A to MRL A	14.7	37.7
MRL A to CON B	8.2	45.9
CON B to CON A	6.4	52.3
MRL B to Yass	22.5	74.8
CON B to MRL B	6.0	80.8

Only six residences lie within 1km of the preferred transmission line. Expert assessment has concluded that four of these will have negligible visual impact and two dwellings, M9 and C67, will have a medium level of visual impact.

Landscape mitigation of visual impact is achievable for these two dwellings through selective planting to the foreground of the residences if desired, which will reduce the visual impact to low.

Table 1-5 Transmission line impact assessment on residential viewpoints within 1km

House ID	Location	Distance to transmission line (m)	Direction to transmission line	Overall Visual Impact
M28	Bookham	960	East	Negligible
M29	Bookham	910	East	Negligible
M30	Bookham	880	East	Negligible
M31	Bookham	800	East	Negligible
M9	Bookham	800	East	Medium Low – if landscape mitigation is undertaken
C67	Illalong Rd	840	North	Medium Low – if landscape mitigation is undertaken

Figure 1-1 on the following page shows the location of these houses relative to the preferred transmission line.

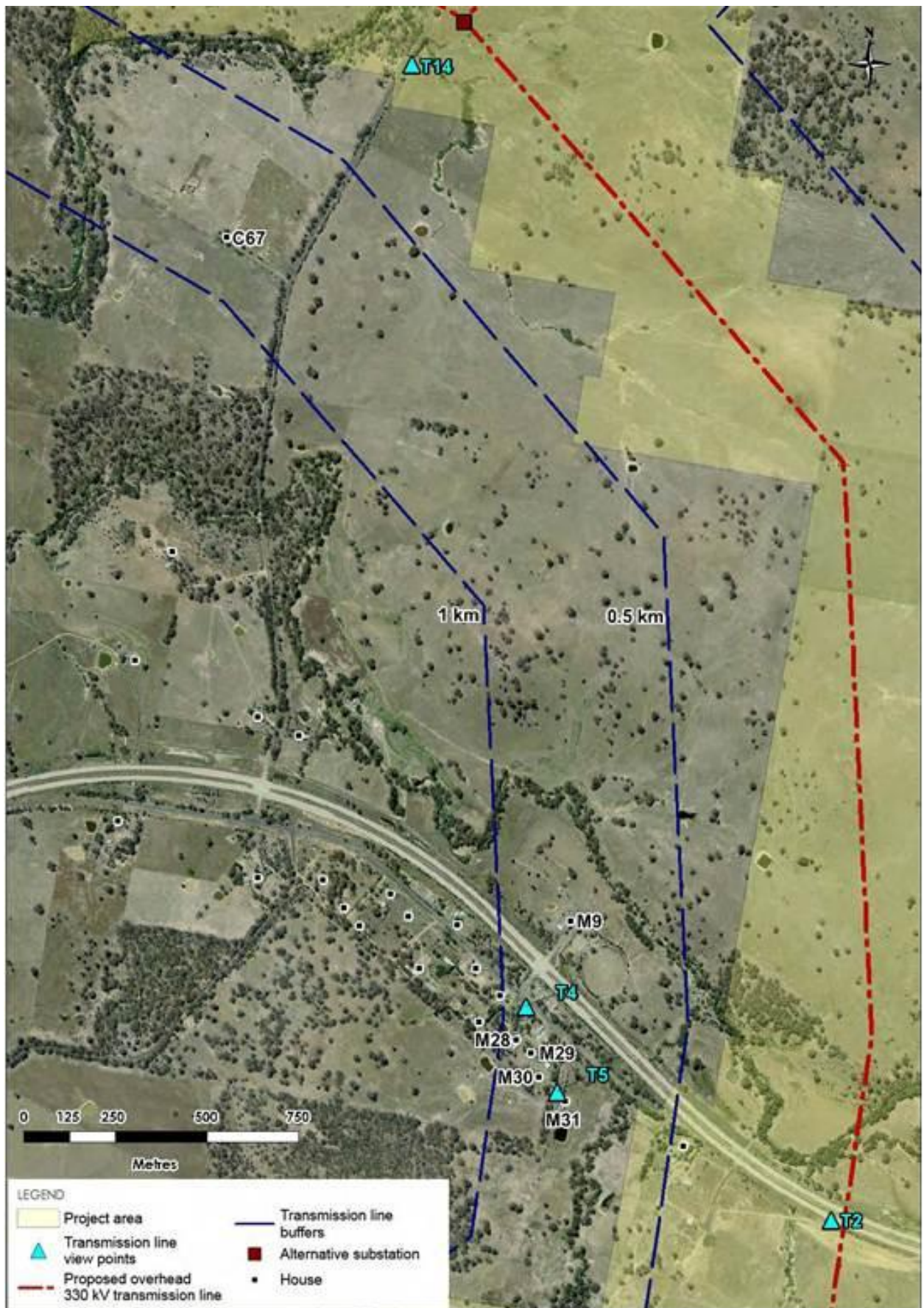


Figure 1-1 Residences within 1km of the preferred Transmission Line (see full assessment on Page 88 of the Landscape and Visual Impact Assessment April 2014)

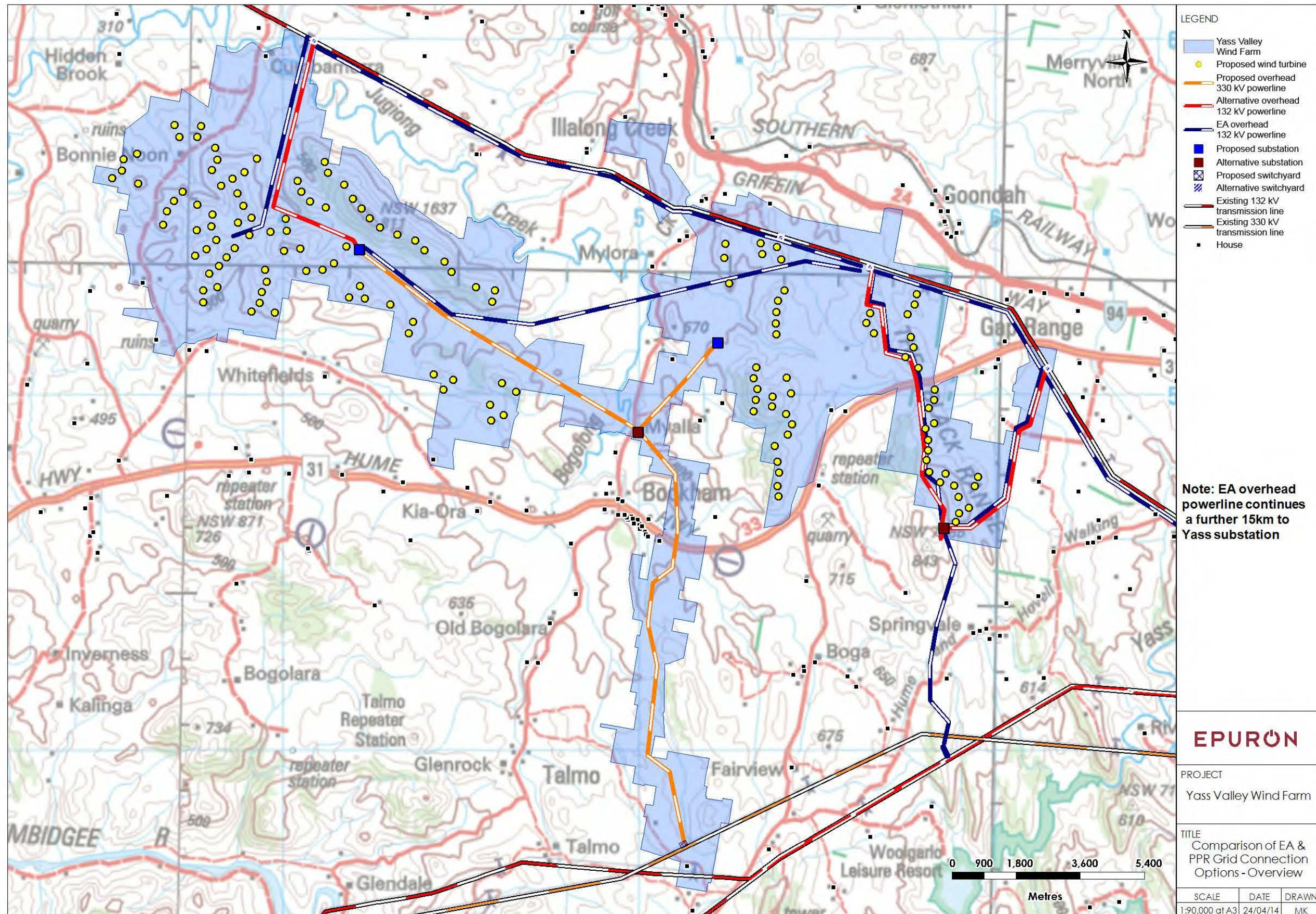


Figure 1-2 Comparison of EA & PPR grid connection options

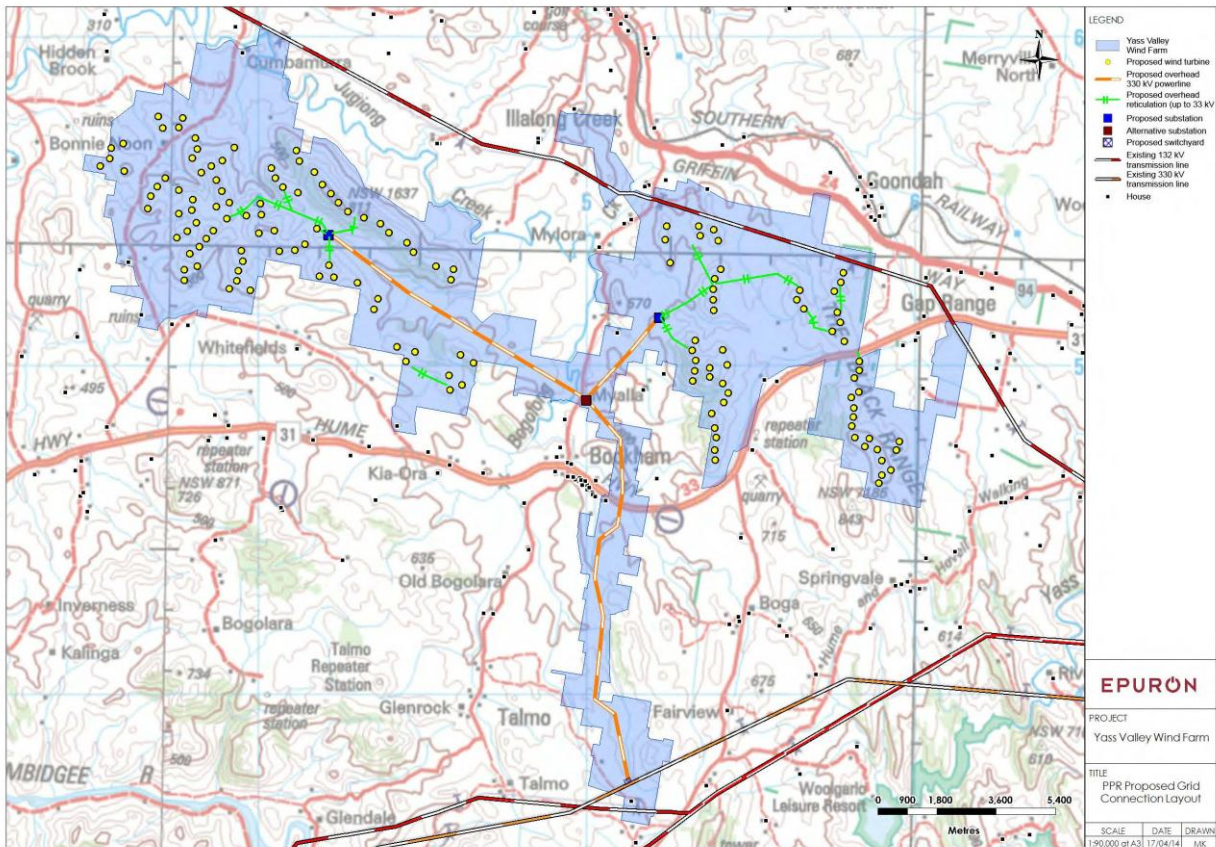


Figure 1-3 PPR Preferred 330kV transmission line route and MV reticulation

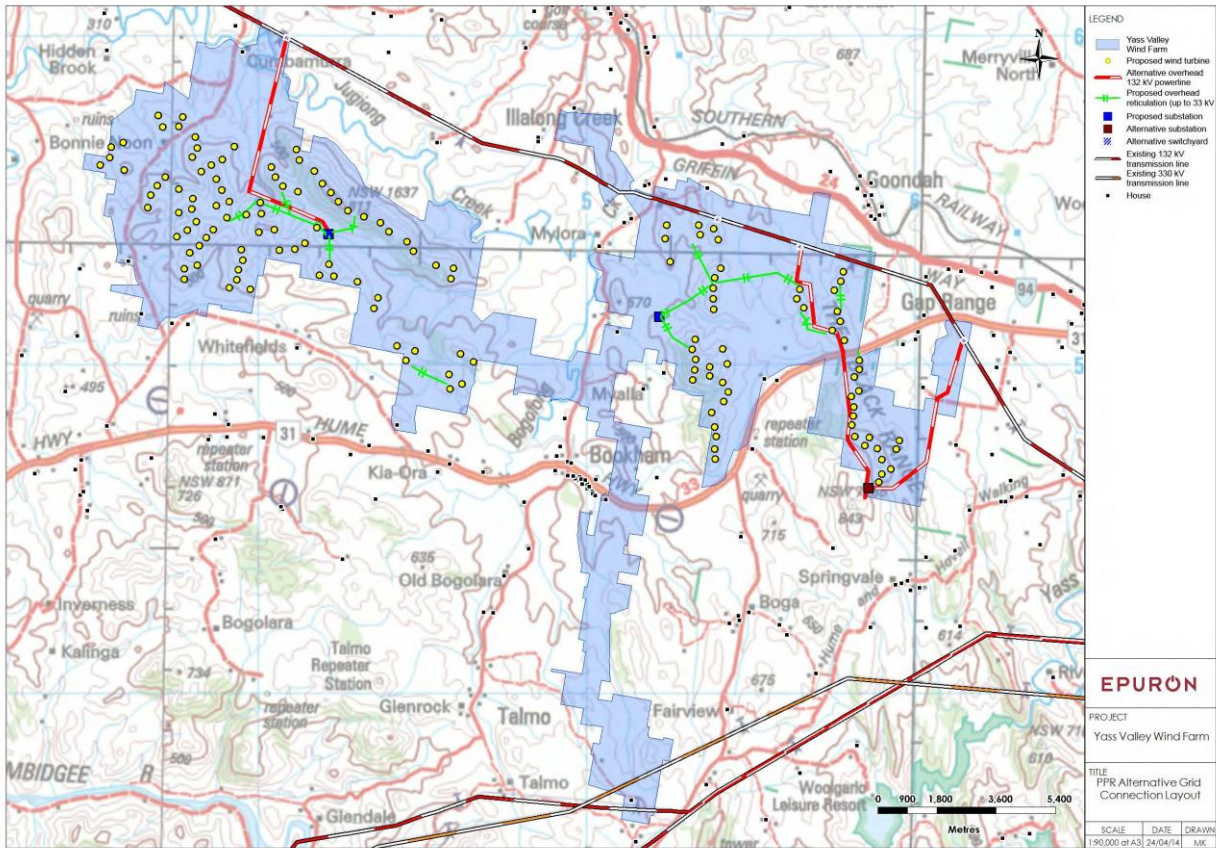


Figure 1-4 PPR Alternative 132kV transmission lines and MV reticulation

1.3 Wind Turbine Location Changes

As noted in section 1.1, the overall number of wind turbines was reduced from 152 to 148. The reason for the change in location for wind turbines is listed in section 2.3 of the PPR (Nov 2012). The maps on the following pages highlight the changes in turbine locations for the Coppabella and Marilba precincts.

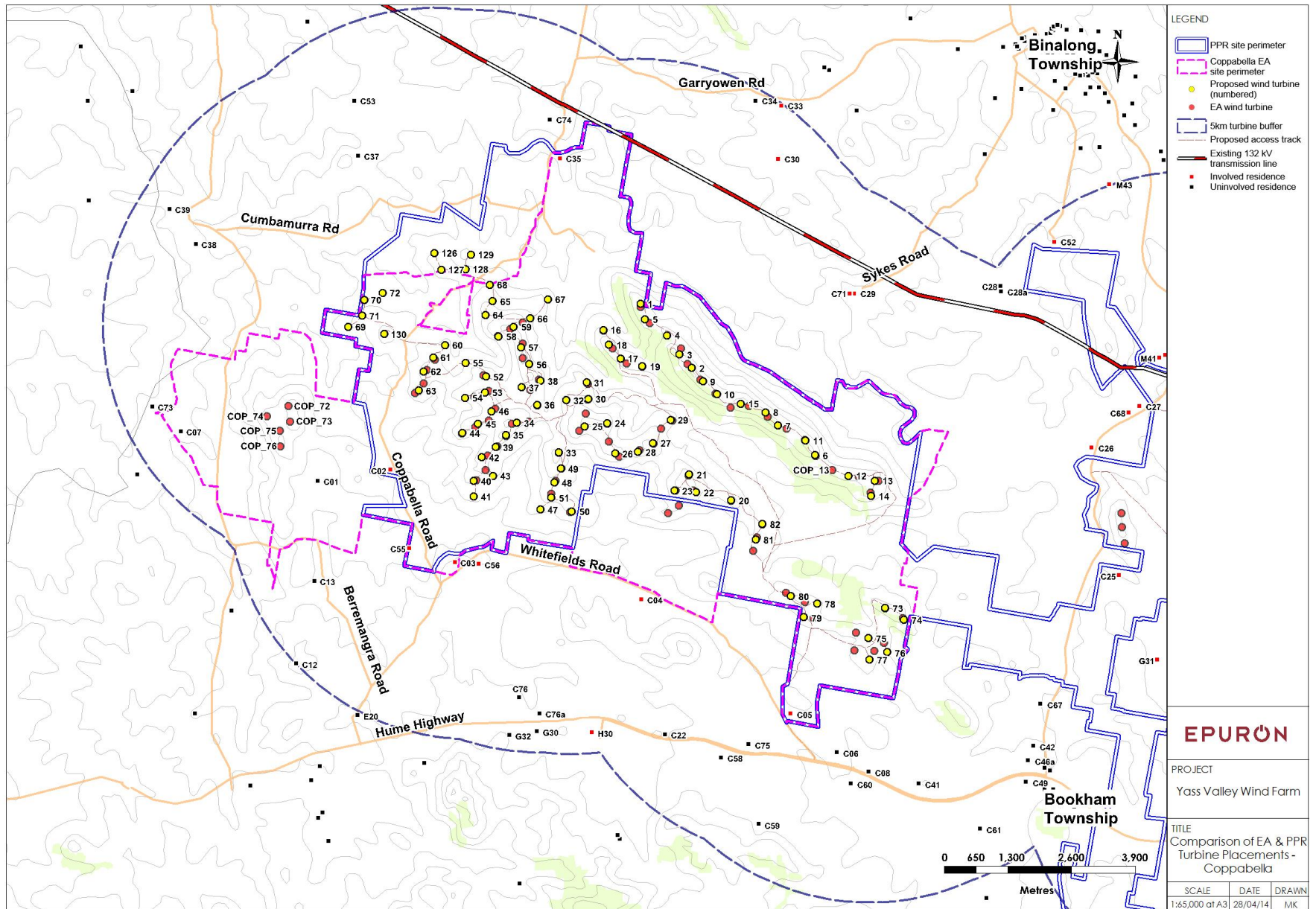


Figure 1-5 Wind turbine location changes - Coppabella precinct

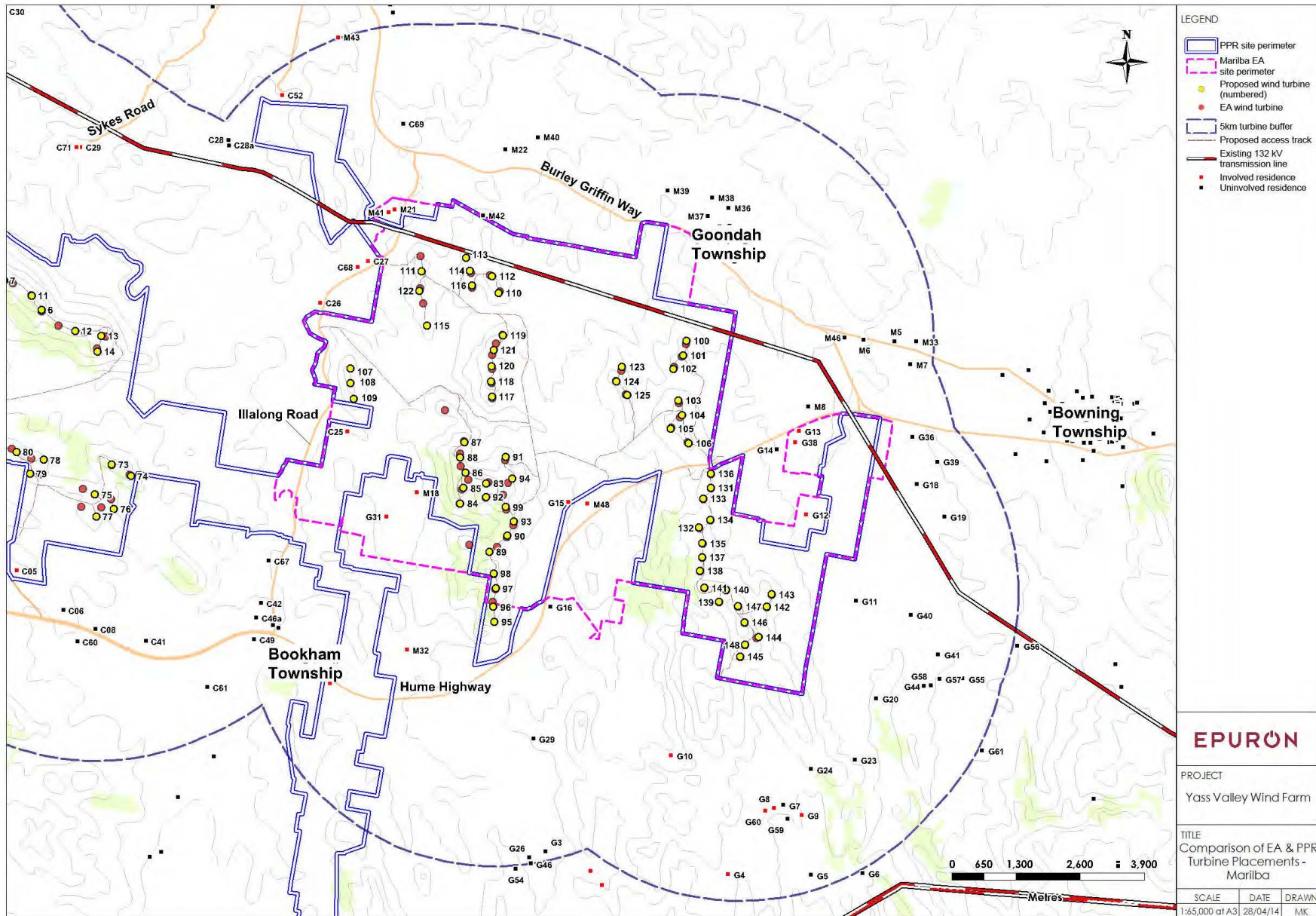


Figure 1-6 Wind turbine location changes - Marilba precinct

1.4 Changes to the North West of Coppabella

Following exhibition of the EA, a number of individual turbines were removed throughout the site along with a group of 5 turbines which were the most westerly wind turbines of the Coppabella precinct. Sixteen turbines in total were removed and of this number twelve were relocated to the north west of the site. Eight of these turbines were consolidated within the existing boundary of the site and four were positioned on land which extended the site boundary in the north west.

While the overall and cumulative impacts of the project as documented in the Preferred Project Report were minimised from the EA, NSW Planning & Environment considered that there were areas where local impacts had not been minimised but had potentially been increased. Because NSW Planning & Environment did not consider that all changes to the exhibited EA, as documented in the Preferred Project Report lodged on 30 November 2012, minimised its environmental impact, in line with the then current Section 75H (7) of the EP&A Act, the Preferred Project Report was put on public exhibition from 14 December 2012 to 1 March 2013.

While this relocation minimised the overall environmental footprint and consolidated the layout of the wind farm it did result in the potential for increased impact on the residences in proximity to the relocated turbines. See Figure 0-7 below. The turbines relocated to the north west of the Coppabella precinct were numbered 64, 65, 67, 68, 69, 70, 71, 72, 126, 127, 128, 129 and 130. While the relocation of turbines has the potential for an increase in environmental or amenity impact, expert assessment, in conjunction with consultation, has shown that there has not been an increased impact on each of the closest residences in this case.

The relocated turbine locations are consistent with the requirements of the draft NSW Planning Guidelines: Wind Farms. The key elements of proximity, consultation, visual impact and noise are considered below:

- ▶ Proximity - None of the relocated wind turbines are within 2 km of non-involved existing residences
- ▶ Community consultation –
 - There are two residents within 3 km, C37 and C01, both of whom have been visited and have no outstanding issues. C01 was previously an involved landowner.
 - There are seven further residences within 5 km – C74, C13, C53, C38, C39, C07, and C73. All of these residents have been sent newsletters and have been telephoned. Three of these residents have been visited and a photomontage has been prepared for one (C39) and background noise monitoring undertaken at another. There are no known outstanding concerns.
- ▶ Visual amenity – The landscape and visual impact assessor has assessed the two closest properties and a further property C39 which is orientated towards the wind farm across a valley. The assessments are:
 - C01 – 2.7 km – While the nearest wind turbine is located 2.7 km from this residence there are no views from the living areas towards the wind farm due to topography. There will be views from the driveway although the turbines will be partially or wholly screened so the overall visual impact is assessed as low.
 - C37 – 2.5 km - due to its location in a valley and having intervening vegetation there will be no views of the wind farm so the impact is assessed as nil.
 - C39 – 4.3 km – there are some clear views to the wind farm but due to the distance the visual impact has been assessed as medium.
- ▶ Noise – Full details of the noise assessment are in the noise section – see Attachment 4 and summary 4.7 below. The detailed predicted noise levels for the two closest non-involved properties, which show compliance with the noise criteria, are:
 - C01 - 33.1 dB(A)
 - C37 - 32.2 dB(A)

As Table 1-6 demonstrates, the amenity impacts to the residences located closest to the exhibited PPR relocated wind turbines are considered to be acceptable.

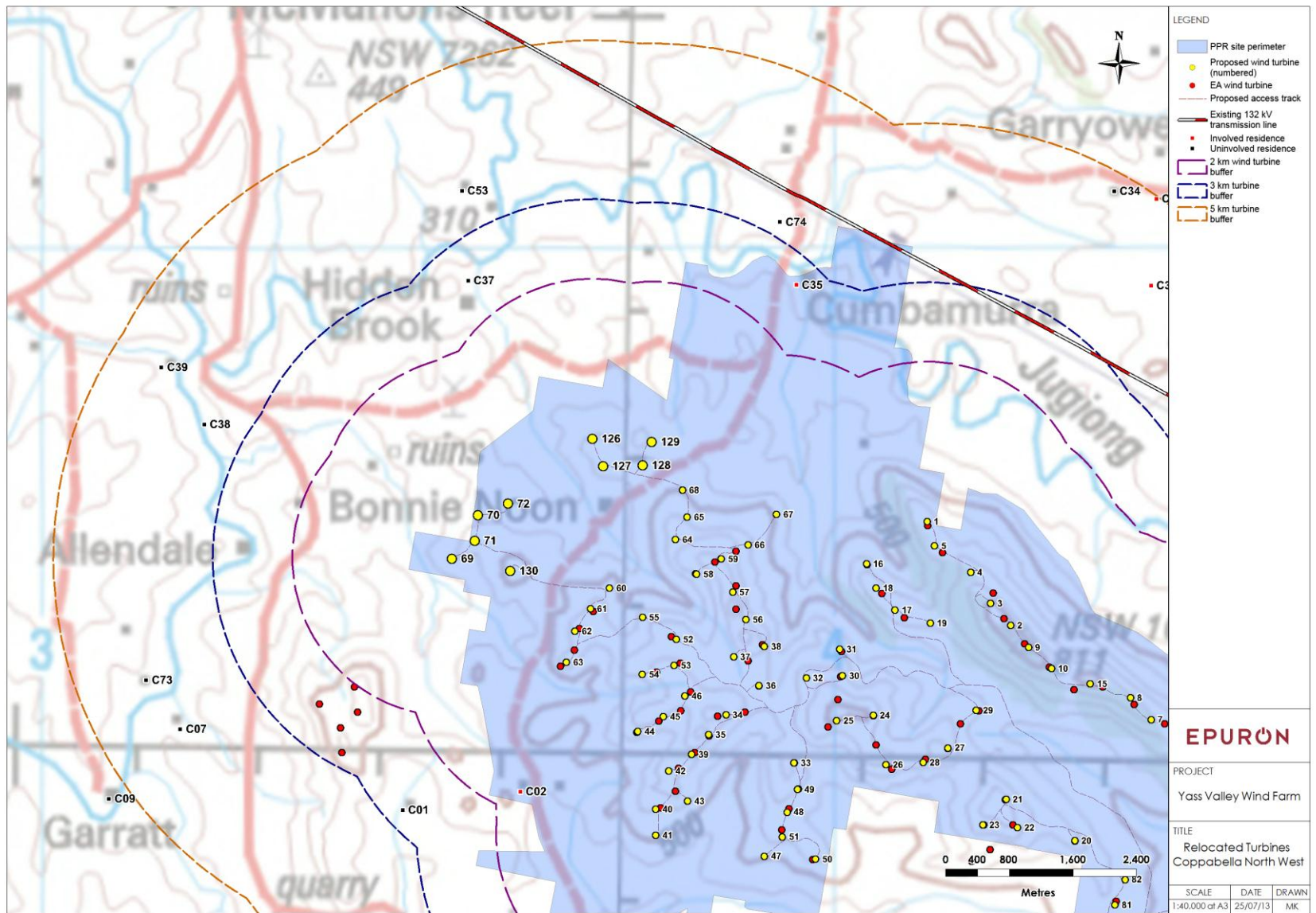


Figure 0-7 Relocated wind turbines north west Coppabella

Table 1-6 Changed impacts to individual residences

Receiver ID	Involved	Distance to nearest turbine EA (km)	Current distance to nearest turbine (km)	Predicted noise level EA (dB(A))	Current worse case noise level PPR (dB(A))	Visual impact EA	Current visual impact	Comments
G16	No	1.2	1.1	44.0	41.7	Not assessed in EA ^b	Nil from living areas. Medium - low from driveway with landscape mitigation	Supportive, owner runs quarry and is in on-going discussion regarding supply for construction
C37	No	4.4	2.5	27.9	32.2	Not assessed in EA ^b	Nil	Residence in valley with no views of turbines. Queried effects on livestock. Issue discussed. No other concerns raised.
C01	No	1.1	2.8	42.4	33.1	Not assessed in EA ^b	Nil from living areas. Low from driveway(intervening hill)	No issues, previously involved. No concerns raised.
C74	No	4.2	3.2	Not assessed in EA ^a (built since EA)	35.2 (complies – see Table 6 March 14 Acoustics Addendum)	Not assessed in EA ^b (built since EA)	High (see photomontage)	Noise logging and photomontages undertaken. Not a supporter but no issues raised.
C53	No	5.6	3.5	Not assessed in EA ^a	33.4	Not assessed in EA ^b	Medium	Noise concerns addressed (Nov 2013). Photomontage sent Jan 2014. Uncertain about what will hear but no other concerns raised.
C38	No	3.8	3.5	32.8	30.6	Not assessed in EA ^b	Medium	Reduced impact. Pleased about relocation of western-most turbines. Supports wind energy
C07	No	1.8	4.0	37.1	25.7	Not assessed in EA ^b	Low	Formally involved. Reduced impact. No concerns.
C73	No	2.2	4.3	Not assessed in EA ^a	26.4	Not assessed in EA ^b	Low	Reduced impact No issues raised. Supports renewable energy where doesn't impact others. Decommissioning queries addressed.
C39	No	4.5	4.4	29.4	27.8	Medium	Medium	Concerns (night lighting & erosion) raised through EA

<i>Receiver ID</i>	<i>Involved</i>	<i>Distance to nearest turbine EA (km)</i>	<i>Current distance to nearest turbine (km)</i>	<i>Predicted noise level EA (dB(A))</i>	<i>Current worst case noise level PPR (dB(A))</i>	<i>Visual impact EA</i>	<i>Current visual impact</i>	<i>Comments</i>
						without landscape mitigation Extensive existing screening	without landscape mitigation. Extensive existing screening	submission (see section 2.4.3) have been addressed. Visual impact is the only concern but owner considers has been improved by the relocation of turbines to the west of COP.
C09	No	2.9	5.3	32.8	24.7	Not assessed in EA ^b	low	Reduced noise and visual impacts. Concerned about level of consultation. Copies of newsletters resent (mail and email). Visual impact of concern.

^a At the time of the EA submission (see appendix 2 – Marshall Day noise assessment), these house locations did not fall within the noise contour boundary which would determine if they were relevant receivers for noise assessment as determined by the South Australian EPA's *Environmental Noise Guidelines: Wind Farms 2003*

^b At the time of the EA submission (See appendix 1 – ERM LVIA), House C39 (referred to as Residential viewpoint 5) was assessed as both representative and through community consultation having an owner interested in having the visual impact documented. For the EA, representative rather than all houses were considered. The above table includes all houses within 5 km of the relocated wind turbines to the west of Coppabella.