

Coppabella Wind Farm Modification

VISUAL IMPACT ASSESSMENT

Prepared for:



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Table 1 Glossary

Term	Definition
Cumulative effects	The summation of effects that result from changes caused by a development in conjunction with other past, present or reasonably foreseeable actions.
Magnitude	A combination of the scale, extent and duration of an effect.
Mitigation	Measures, including any processes, activity or design to avoid, reduce, remedy or compensate for adverse landscape and visual effects of a development project.
Residual visual effect	Observable difference between the approved CWF and the proposed modification.
Sensitivity	Susceptibility of a receiver to a specific type of change.
Swept area	Circular area defined by the rotational path of the rotor blades.
Visibility	A relative determination at which the proposal can be discerned and described.
Visual amenity	The value of a particular area or view in terms of what is seen.
Visual envelope	Extent of potential visibility to or from a specific area or feature.
Visual Impact Assessment	A process of applied professional and methodical techniques to assess and determine the extent and nature of change to the composition of existing views that may result from a development.
View location	A place or situation from which a proposed development may be visible.
Visual receiver	Individual and/or defined groups of people who have the potential to be impacted.
Visual significance	A measure of visual effect culminating from the degree of magnitude and receiver sensitivity.
Zone of Visual Influence Diagram	A map, usually digitally produced, showing areas of land within which wind turbines are theoretically visible.

Executive summary

Green Bean Design Pty Ltd has been commissioned by Goldwind Australia Pty Ltd, to prepare a Visual Impact Assessment (VIA) report for the Coppabella Wind Farm Modification Application. The application is for an amendment of development consent in accordance with Section 96(2) of the Environment Planning and Assessment Act 1979.

This Visual Impact Assessment report has been prepared with regard to the visual assessment process outlined in the New South Wales State Government Wind Energy: Visual Assessment Bulletin December 2016 (the Guidelines) as applicable to the modification application.

The Coppabella Wind Farm development consent (dated March 2016) permits the construction and operation of up to 79 wind turbines to a maximum 150 metre tip height. This VIA has been prepared to assess the potential visual effect of the modified Coppabella Wind Farm which include increased wind turbine dimensions as follows:

- Maximum blade tip height up to approximately 171 metres (150 metres for existing consent)
- Wind turbine rotor diameter up to approximately 140 metres (100 metres for previous VIA)
- Wind turbine blade length to approximately 70 metres and
- Hub height dependent on selected rotor diameter (100 metres used for this VIA similar to previous VIA).

The location of the 79 wind turbines for the modification remain in accordance with the Development Consent, March 2016. A 100-metre hub height is also used for this VIA similar to previous VIA. Use of a smaller rotor with maximum tip height of 171 metres would allow the hub height to be increased above 100 metres.

The VIA included the following tasks:

- Preparation of Zone of Visual Influence (ZVI) Diagrams (**Figures 2 and 3**)
- Preparation of 11 wire frame models and 12 photomontages to illustrate the approved Coppabella Wind Farm and modified wind turbines. The wireframe models and photomontages are illustrated in **Figures 7 to 29**
- Assessment of twenty-four non-associated residential dwellings surrounding the approved Coppabella Wind Farm and
- Review of changes to ancillary facilities.

This VIA notes that a number of dwellings around the project are considered associated under the Development Consent but with agreements that do not waive their visual screening rights. As such these dwellings have been designated and assessed as non-associated in this VIA.

The findings of the assessments included the following:

The ZVI demonstrate that the area of land within which the approved Coppabella Wind Farm and the proposed modification would be theoretically visible (as well as overall number of wind turbines being visible at tip height), would be similar.

Where the hub height is 100 metres, consistent with previous VIA and a likely outcome for the reference turbine, the number of visible wind turbine hubs would not change, as the approved and proposed modification hub height remain the same. The number of wind turbine rotor blades and tips visible from residential dwellings within 3.4 kilometres of the Coppabella Wind Farm modification wind turbines would increase slightly.

Previously approved ancillary wind farm infrastructure would not result in significant change in levels of visual impact from surrounding key receiver locations due to the minor changes involved, the low height of ancillary facilities and locations of these facilities that are often concealed by topography and vegetation screening.

The proposed wind farm modification is not considered to be of a magnitude that would significantly increase visual effects relative to the approved Coppabella Wind Farm development. Key differences in the approved and proposed wind turbine modification are illustrated in **Figures 4, 5 and 6**.

The proposed wind farm modification would not introduce elements that are any more prominent or out of character with the approved Coppabella Wind Farm project, and the potential for the proposed wind turbine modifications to result in any additional significant cumulative visual effects is considered to be low. The proposed Coppabella Wind Farm modification would result in an overall low-level change in visibility and a largely unchanged visual impact rating in accordance with the approved Coppabella Wind Farm project.

1 Introduction

Green Bean Design Pty Ltd (GBD) has been commissioned by Goldwind Australia Pty Ltd (the Proponent) to prepare a Visual Impact Assessment (VIA) report for the Coppabella Wind Farm (CWF) Modification Application.

This VIA has been prepared to compare and assess the potential visual effect of the proposed CWF modification with the visual ratings determined for the approved CWF project. The CWF visual ratings have been extracted from the Yass Valley Wind Farm, Landscape and Visual Impact Assessment – Response to Secretary's Environmental Assessment Report (Environmental Resources Management Pty Ltd, March 2015).

The comparison between the approved CWF and proposed modification has been used to determine if any of the approved CWF visual ratings applied to view locations within 3.4 kilometres of the approved CWF are subject to an increased level of visual effect as a result of the proposed modification works. This VIA has not undertaken as assessment to verify the visual ratings determined in the original CWF Environmental Assessment.

GBD confirm the following information has been provided by the Proponent, or procured by GBD, for consideration and/or incorporation into this VIA:

- location and description of proposed wind turbine modifications
- Zone of Visual Influence (ZVI) diagrams
- wireframe models illustrating the approved CWF wind turbines and the proposed wind turbine modifications
- photomontages illustrating the approved CWF wind turbines and the proposed wind turbine modifications
- Yass Valley Wind Farm Planning Application Report for Landscape and Visual Assessment, August 2009
- Yass Valley Wind Farm Submissions Report, July 2013
- Yass Valley Wind Farm Submissions Report, April 2014
- Yass Valley Wind Farm, Landscape and Visual Impact Assessment – Response to Secretary's Environmental Assessment Report, March 2015
- Yass Valley Wind Farm Project Approval Conditions of Consent March 2016 and
- New South Wales Government Wind Energy: Visual Assessment Bulletin December 2016

2 Report structure

2.1 Report structure

This VIA report been structured into eleven parts as follows:

Table 2 – Report structure

Report section	Description
Section 1 Introduction	Overview of scope of VIA and summary of project information provided to or sourced by GBD in order to undertake the VIA
Section 2 Report structure	This section provides a description of the report structure
Section 3 Methodology	This section sets out the methodology employed in the VIA preparation
Section 4 Approved Coppabella Wind Farm and proposed modification	This section describes the key differences in wind turbine layout and design criteria between the approved and proposed modification amendments
Section 5 Zone of Visual Influence (ZVI) diagrams	This section identifies the area of land surrounding the wind farm from which wind turbines, or portions of wind turbine structures, may be theoretically visible
Section 6 Ancillary structures	This section describes infrastructure associated with the wind farm other than the wind turbines
Section 7 Assessment of visual effects	This section describes the assessment and determination of residual visual effects between the approved and proposed modification amendments
Section 8 Visual Assessment	This section describes the application of the NSW State Government Wind Energy: Visual Assessment Bulletin December 2016 to the proposed CWF modification
Section 9 Wire frame models and photomontages	This section describes and presents the wire frame models and photomontage prepared for the proposed CWF modification.

Table 2 – Report structure

Report section	Description
Section 10 Review of Conditions of Consent	This section identifies the CWF Conditions of Consent relevant to visual amenity and confirms their applicability to the proposed CWF modification.
Section 11 Conclusion	Conclusions are drawn on the overall visual impact of the proposed CWF modification.

3 Methodology

3.1 Introduction

The proposed CWF modification methodology included the following activities:

- review of the original project application and VIA undertaken and the CWF project layouts for the development consent and modification.
- preparation of ZVI diagrams
- preparation of wire frame models, photomontages and illustrative figures.
- assessment of significance of residual visual effects and changes in visual impacts

3.2 Project review

A review of the approved Yass Valley Wind Farm project application was carried out to confirm the location of sensitive view locations and the visual impact ratings determined through previous landscape and visual impact assessments. This review also included familiarisation with the NSW Department of Planning and Environment (DPE) Assessment Report, the Planning Assessment Commission Determination Report and the Development Consent Conditions.

3.3 ZVI diagrams

ZVI Diagrams were prepared to illustrate the theoretical visibility of the approved CWF wind turbines (tip height at 150 metres) and wind turbine modifications (tip height at approximately 171 metres). The ZVI Diagrams are illustrated in **Figures 2 and 3**.

3.4 Residual visual effects

The CWF residual visual effects on surrounding receiver locations would result from a combination of wind turbine modification visibility (beyond that of the approved project) and the characteristics of the landscape between, and surrounding, the receiver locations and the wind farm. The potential degree of visibility and resultant visual effect in addition to the approved CWF visual effect, would be partly determined by a combination of factors such as:

- category and type of situation from which people could view the wind farm (examples of view location categories include residents or motorists)
- visual sensitivity of view locations surrounding the wind farm
- distance of visual effect (between view locations and the wind farm) and
- duration of time people could view the wind farm from any particular static or dynamic view location.

3.5 Visual Assessment

The proposed CWF modification VIA has undertaken a further visual assessment which extends to residential dwellings located within 3.4 kilometres of the approved CWF project. The 3.4-kilometre threshold distance (blue line, refer **Figure 1**) has been established by reference to the Guidelines (Figure 5 Visual magnitude thresholds for visual assessment).

This VIA has not addressed the Stage 1 Preliminary Environmental Assessment (pre-lodgement) guidelines as these do not appear to be pertinent to the preparation of a wind farm modification.

Similarly, Stage 2 of the Guidelines (Figure 1, Steps in the Visual Assessment), addresses the preparation of a Visual Baseline Study as part of the Environmental Impact Statement, which is also not pertinent to the proposed modification.

This VIA has considered the Visual Assessment Process set out in Appendix 1 of the Guidelines against the proposed CWF modification project where relevant to the Modification Application.

3.6 Wire frame models and photomontages

Wire frame models and photomontages have been prepared from residential dwelling locations surrounding the approved CWF development. The wire frame models and photomontages illustrate and contrast the approved CWF wind turbine and the proposed wind turbine modification. The wireframe models and photomontages are illustrated in **Figures 7 to 29**.

4 Approved CWF and proposed CWF modification

4.1 Approved CWF wind turbine design

The approved CWF wind turbine design permits construction and operation of up to 79 wind turbines and the installation of wind turbines to a maximum tip height of 150 metres. The VIA for the approved wind farm was based on a 100-metre hub height and 100 metre rotor blade diameter but the consent only stipulated a maximum wind turbine height of 150 metres (measured from above ground level to the blade tip).

4.2 Proposed CWF wind turbine modification

The proposed CWF Modification design would include:

- up to 79 wind turbines (as approved)
- an increase of the blade tip height up to approximately 171 metres.
- a hub height up to approximately 100 metres (as used for previous VIA)
- an increase in blade length to approximately 71 metres
- an increase in rotor diameter up to approximately 141 metres and

Table 3 outlines the differences in the approved CWF and proposed Modification wind turbine design criteria.

Table 3: Compliant CWF and proposed CWF modification design criteria

	Hub height (assessment)	Rotor diameter (assessment)	Max. tip height	Total number
Approved CWF wind turbine	100 m	100 m	150 m	79
CWF proposed modification wind turbine	100 m	141 m	171 m	79
Difference	Nil	+41 m	+21 m	Nil
Percentage difference	0%	+41%	+14%	0%

Table 4: Compliant CWF and proposed modified CWF rotor swept area

	Rotor diameter	Swept area
Compliant CWF wind turbine	100 - 121 m	7,850 m ² to 11,499 m ²
Proposed CWF modification	141 m	15,459 m ²
Difference	+41 m	+3,960m ² to 7,609 m ²
Percentage difference	+41%	+34%

The layout for the compliant and modified CWF are the same and illustrated in **Figure 1**.

4.3 Approved CWF and proposed CWF modification wind turbine visibility

The proposed CWF wind turbine modification would result in an increase to the extent of visibility of wind turbine rotor blades and tips from residential dwellings surrounding the wind farm site. **Table 5** identifies residential dwellings within 3.4 kilometres of a wind turbine and associated changes in wind turbine visibility.

Table 5 Changes in visibility of wind turbines for the modification relative to the existing Consent

Non-associated residential dwelling (Figure 1)	Distance to closest wind turbine (m)	Wind turbine hubs and tips theoretically visible* (Tips in brackets)			ERM Visibility Rating** (2015)
		Approved CWF	Modified CWF	Difference	
C01	2,771	7 (17)	7 (22)	0 (5)	Low
C04	2,280	42(51)	42(53)	0(2)	Medium
C06	2,007	25 (29)	25 (36)	0 (8)	Low
C08	2,286	20 (33)	20 (39)	0 (6)	Low/Med
C22	3,711	25 (39)	25 (42)	0 (3)	Not assessed
C29	3,025	18 (22)	18 (24)	0 (2)	Not assessed
C37	2,527	23 (27)	23 (31)	0 (4)	Nil
C39	4,308	47 (53)	47 (55)	0 (2)	Medium
C41	2,720	31 (46)	31 (51)	0 (5)	Low
C42	3,540	19 (24)	19 (27)	0 (3)	Medium
C53	3,522	54 (59)	54 (61)	0 (2)	Not assessed
C58	3,324	44 (55)	44 (62)	0 (7)	Not assessed
C59	4,056	61 (65)	61 (68)	0 (3)	Not assessed
C60	2,564	30 (41)	30 (47)	0 (6)	Low
C71	2,978	15 (22)	15 (24)	0 (2)	Not assessed
C75	2,831	5 (5)	5 (7)	0 (2)	Med to Low
C76	3,864	45 (54)	45 (62)	0 (8)	Not assessed
C76a	4,162	39 (52)	39 (57)	0 (5)	Not assessed

Notes:

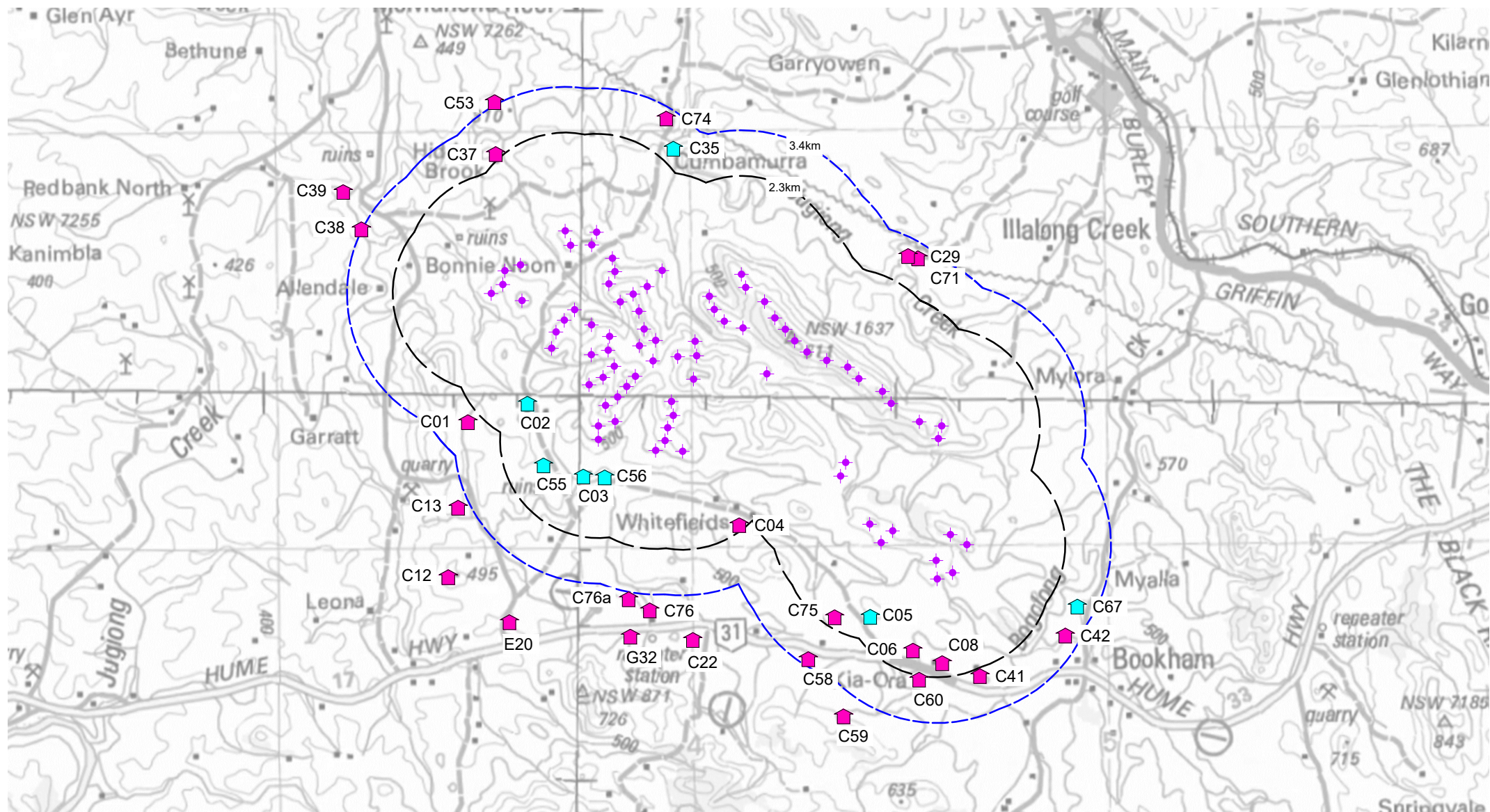
*Theoretical visibility does not account for existing vegetation or other structures that may limit views to wind farm.

**Environmental Resources Management Australia Pty Ltd, Yass Valley Wind Farm Landscape and Visual Impact Assessment – November 2009, July 2013, April 2014 and March 2015.

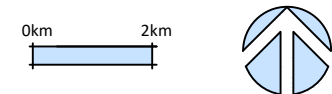
4.4 Magnitude of visual effects

The determination of residual visual effects resulting from the proposed CWF wind turbine modification would result primarily from observable differences between the approved CWF and the proposed wind turbine modifications, including an increase of 21 metres in maximum tip height and increase in the wind turbine rotor swept area (refer **Figure 4**). Observable differences would include views toward additional wind turbines (blade tips) where previously screened by landform and/or vegetation.

Table 5 indicates that the proposed CWF wind turbine modification would result in additional wind turbine blades being visible at residential dwellings within 3.4 km of the approved wind turbine locations. There would be no additional wind turbine hubs visible from the surrounding residential dwellings. Views toward additional wind turbine rotors and blade tips are not considered to result in a magnitude of visual effect which is greater than the magnitude of visual effect associated with the approved CWF project.



Coppabella wind turbine modification layout and residential dwelling locations



- ◆ Approved CWF and wind turbine modification location
- Non associated dwelling
- Associated dwelling
- 2.3 km wind turbine distance offset in accordance with DPE Visual Bulletin Dec 2016, Figure 5 - 171 metre tip height
- 3.4 km wind turbine distance offset in accordance with DPE Visual Bulletin Dec 2016, Figure 5 - 171 metre tip height

Figure 1 - Approved CWF and wind turbine modification layout with residential dwelling locations

Coppabella Wind Farm Modification

5 Zone of Visual Influence Diagrams

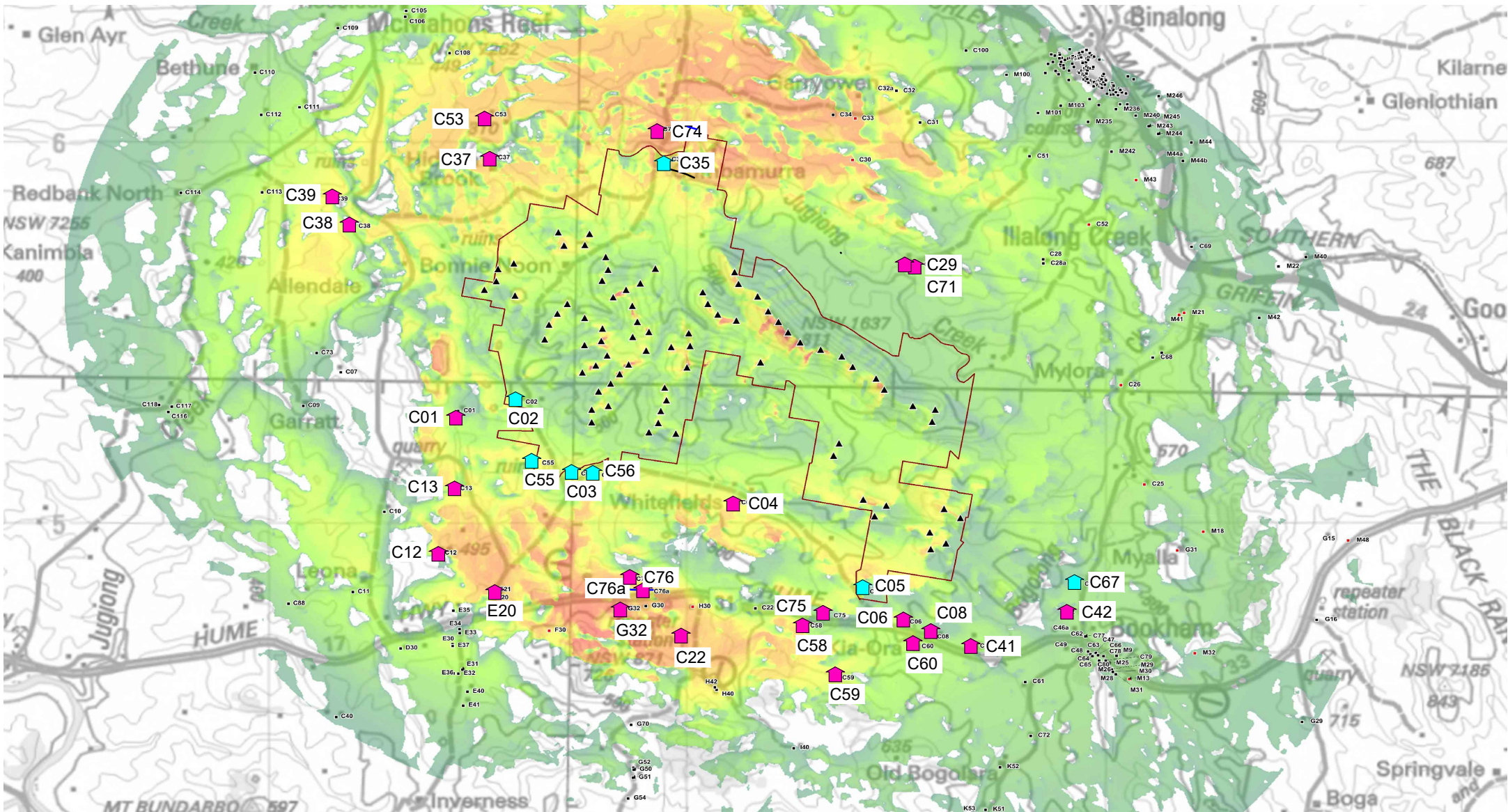
5.1 Introduction

Within the recognised limitations of Zone of Visual Influence (ZVI) diagrams, the overall extent of visibility for the approved CWF and proposed wind turbine modification, covers a very similar extent within 5 kilometres of the landscape surrounding the approved CWF wind farm.

Figure 2 illustrates the theoretical visibility of the approved CWF (at 150 metre tip height) and **Figure 3** illustrates the proposed modification (approximately 171 m tip height) wind turbines.

The similarity in theoretical wind turbine visibility shown in **Figures 2** and **3** demonstrates the influence of local topographical features on views toward the approved CWF and proposed wind turbine modification. The ZVI diagrams also illustrate that the proposed wind turbine modifications would have a very limited increase in visual effects across the potential CWF viewshed.

Whilst the overall extent of wind turbine visibility would be contained by topography for both the approved CWF and the proposed wind turbine modification, the number of wind turbine rotors and tips visible from receiver locations within the wind farm viewshed is likely to be subject to a marginal increase. The theoretical maximum change in blade tip visibility for any residence is eight additional blade tips. The maximum change is in respect of residences C06 (29 to 36 tips) and C76, (54 to 62 tips). The maximum change in visibility is derived from the preparation of the wire frame diagrams. The wire frame diagrams do not account for screening provided by trees and vegetation and are therefore very conservative in the number of wind turbine blade tip visibility.



Approved CWF ZVI Diagram (150 metre tip height)

Zone of Visual Influence
(Tip Height)

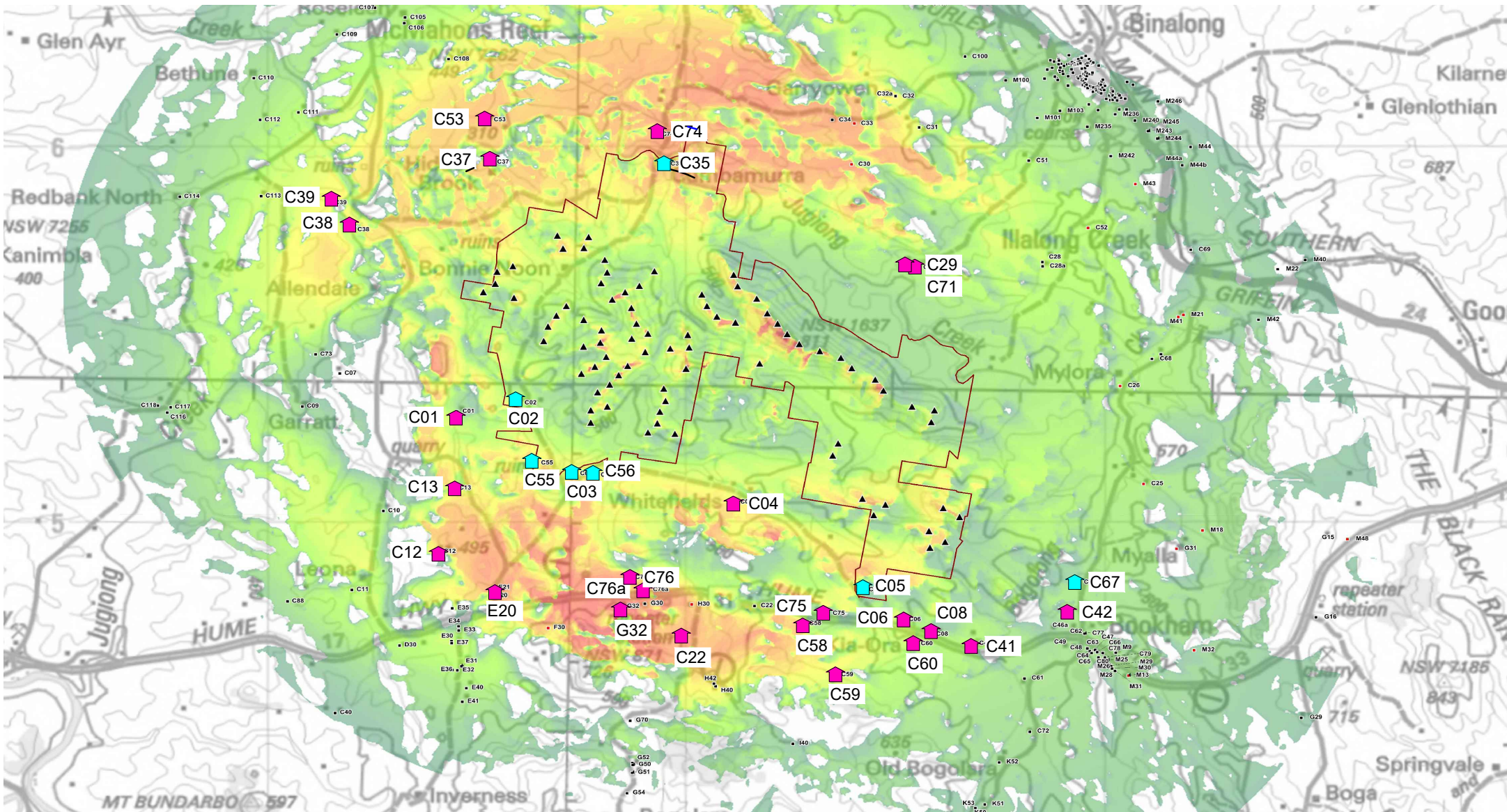
- 0
- 1-31
- 32-50
- 51-67
- 68-79

- ▲ Approved CWF and wind turbine modification location
- 🏠 Non associated dwelling
- 🏠 Associated dwelling



Figure 2 Approved CWF ZVI Diagram (150 metre tip of blade)

Coppabella Wind Farm Modification



Proposed CWF wind turbine modification ZVI Diagram (171 metre tip height)

Zone of Visual Influence
(Tip Height)

- 0
- 1-31
- 32-50
- 51-67
- 68-79

- ▲ Approved CWF and wind turbine modification location
- 🏠 Non associated dwelling
- 🏠 Associated dwelling

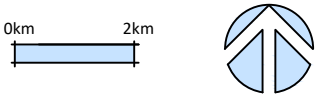


Figure 3 Proposed CWF wind turbine modification ZVI Diagram (171 metre tip of blade)

Coppabella Wind Farm Modification

6 Ancillary infrastructure

6.1 Introduction

The Development Consent defines ancillary infrastructure as follows:

‘All wind farm infrastructure with the exception of wind turbines, including but not limited to collector substations, switching stations, permanent offices and site compounds, electricity transmission lines and internal roads’.

Ancillary infrastructure may include:

- wind monitoring masts
- both overhead 132kV and 33kV powerline and
- control and operation facilities building.

The proposed wind farm modification involves changes to some of the above ancillary infrastructure. These changes are outlined below:

- the previous application documents and the Consent identify two substations of which only one is required and it is located in a valley within the project site where it will have limited potential for visibility from surrounding residences
- the associated 132kV overhead line for grid connection is essentially the same as for the approved arrangement but it is possible that the optional switching station locations may no longer be required
- additional temporary construction compounds and laydown areas are proposed for the modification but are located such that they will have limited visibility from surrounding residences. Additionally, these facilities can be removed at the completion of construction
- the 33kV overhead lines are replaced by 33kV underground cables for the modification
- access tracks do require additional clearing and larger batter formations, some of which will be visible from surrounding lands but these features are lower to the ground than structures such as wind turbines and revegetation of batter structures will ultimately reduce their visual impact.

Overall, these changes to ancillary infrastructure are not likely to result in any significant additional visual impacts to those outlined in the application that the Consent has been based on.

7 Assessment of visual effects

7.1 Introduction

This section compares the visual effect of the modified CWF wind turbine to that for turbines that can be installed under the existing Consent. It is noted that the proposed CWF wind turbine modifications would be consistent with the approved wind turbines with regard to their visual form, design, pattern and colour. This VIA therefore focusses on the change in wind turbine dimensions for the modified wind farm relative to the approved project. **Figures 4, 5 and 6** provide illustration of the change in turbine dimensions and consider the appearance at different distances. **Tables 6 and 7** describe the characterisation of visual effect (magnitude) and for respective receiver locations.

7.2 Perception of changes in Visual magnitude

A comparison of a turbine that is compliant with the Development Consent and wind turbine proposed by the modification is illustrated in **Figure 4**. Figures 5 and 6 consider:

- the representation of the compliant and proposed wind turbine in terms of comparative height when viewed from 2 and 5km
- the change in vertical view angle for the two turbines at 2 and 5 km. **Figure 5** illustrates that the proposed wind turbine modification would include an additional and approximate half degree view angle above the approved 150 metre tip of blade wind turbine from a 2-kilometre view distance. The additional view angle from a view distance of 5 kilometres would be less than one third of a degree (14 minutes) increase in view angle.
- the perceived visual scale at 2.3km and 3.4km. **Figure 6** illustrates the perceived and relative height difference between the approved 150 metre tip height wind turbine and the proposed CWF wind turbine modification 171 metre tip height. At a view distance of 3.4 kilometres the approved CWF and proposed wind turbine modifications would be perceived at less than half the height of the amended wind turbines when viewed at a distance of 2.3 kilometres. The relatively small increase in view angle toward the proposed CWF wind turbine modification tip height, at a view distance of 5 kilometres (and beyond) is considered unlikely to result in a level of visual magnitude greater than the approved CWF wind turbines.

Whilst the proposed wind turbines for the modified wind farm would extend above the approved CWF wind turbine tip height of 150 metres; this VIA has determined, using the methods described in this section, that the overall scale of the proposed CWF wind turbine modifications at a 5-kilometre (and over) view distance would not result in an order of visual magnitude that is significantly above the visual magnitude of the approved CWF wind turbines

Within the parameters of normal human vision, the proposed CWF wind turbines are not considered to give rise to an increased level of visual magnitude over and above that determined for the approved CWF project.

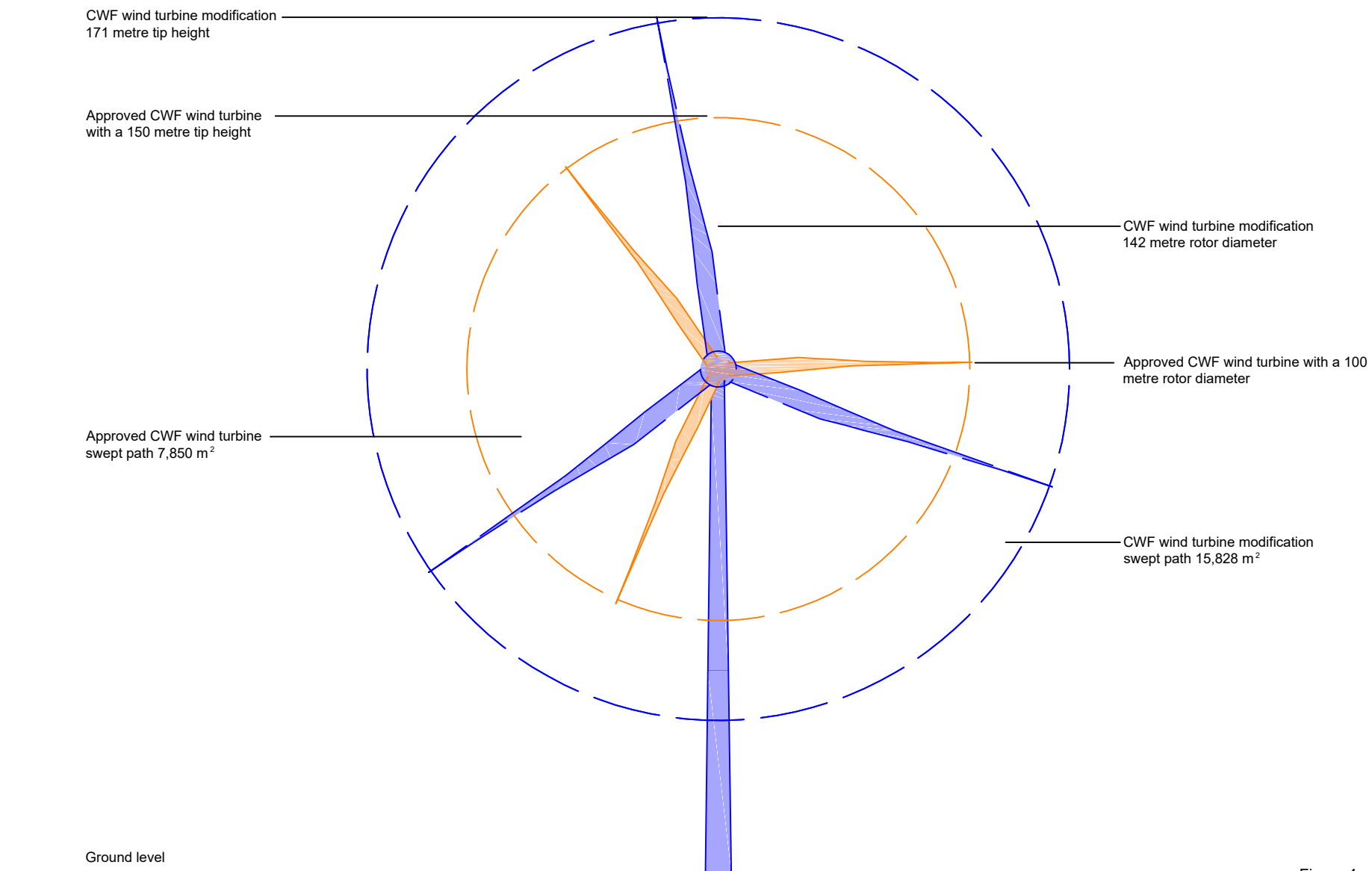


Figure 4 -
Approved CWF and wind turbine
modification comparison

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Orange line = view line toward tip height of approved wind turbine (150 metres)
 Blue line = view line toward tip height of proposed wind turbine modification (171 metres)



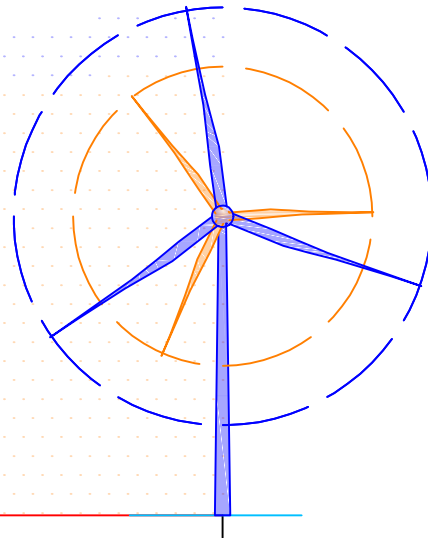
Comparative height of approved CWF and proposed wind turbine modification from a 2 km view distance



Comparative height of approved CWF and proposed wind turbine modification from a 5 km view distance

Proposed 171 m wind turbine
 view angle at 2 km =
 additional 34 minutes

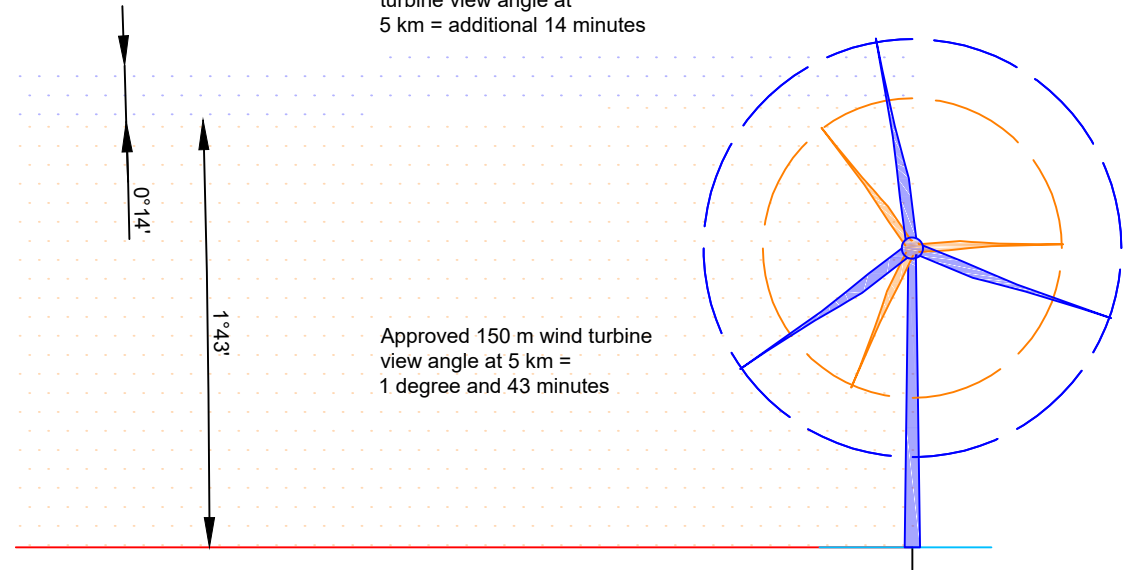
Approved 150 m wind turbine
 view angle at 2 km =
 4 degrees and 17 minutes



View angle toward approved CWF and wind turbine modification tip of blade from a 2 km view distance

Proposed 171 m wind turbine
 view angle at
 5 km = additional 14 minutes

Approved 150 m wind turbine
 view angle at 5 km =
 1 degree and 43 minutes



View angle toward approved CWF wind turbine modification tip of blade from a 5 km view distance

Figure 5 - Approved CWF and wind turbine modification view angle comparison

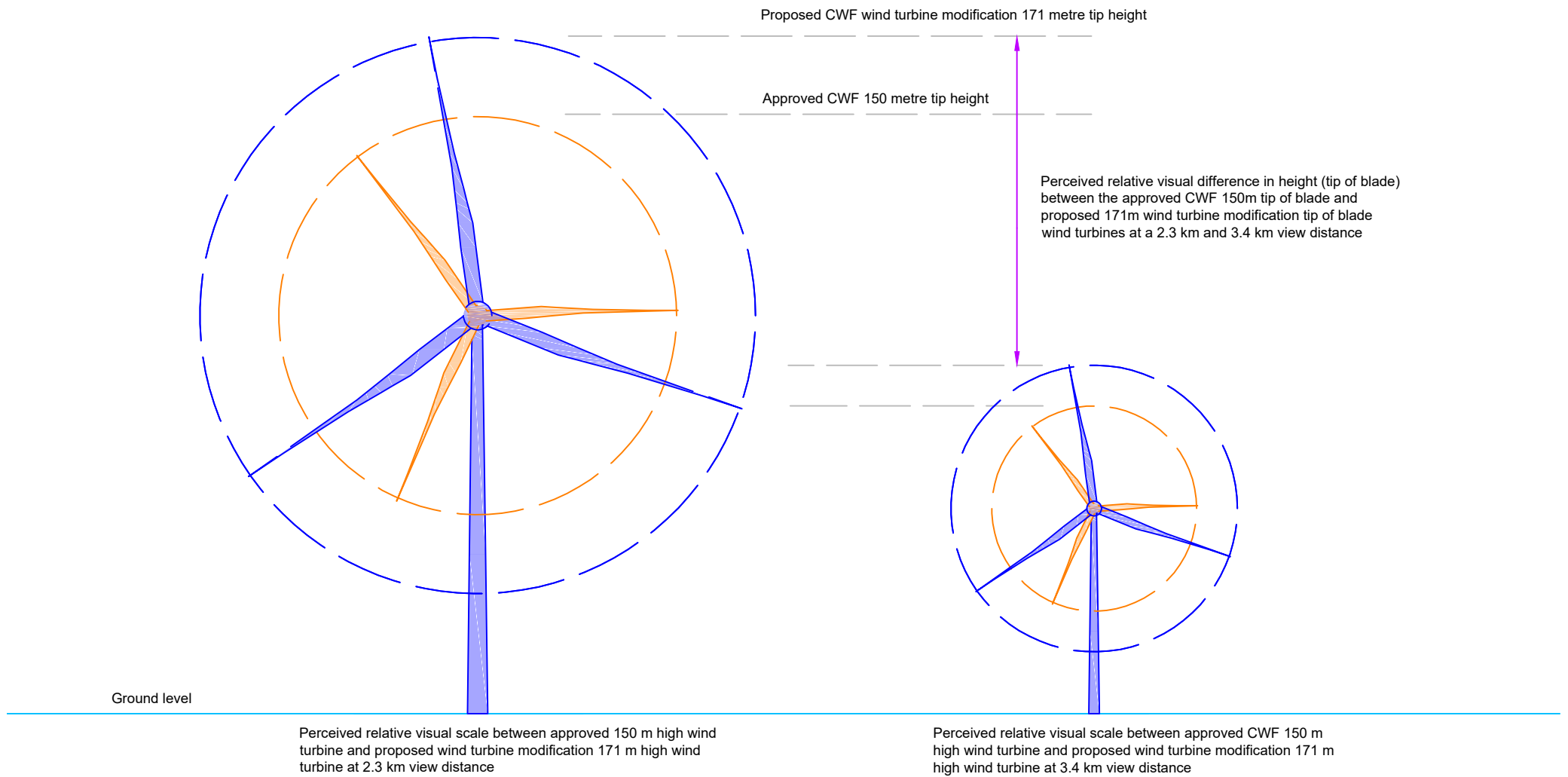


Figure 6 - Approved CWF and wind turbine modification comparison at 2.3km and 3.4km view distance

For the purpose of this VIA the magnitude of visual effect takes account of the scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition or contrast with the landscape, including the proportion of the view occupied by the proposed CWF wind turbine relative to the approved CWF wind turbines.

For the purpose of this VIA **Table 6** sets out ratings and definitions associated with the magnitude of visual effects.

Table 6 – Magnitude of visual effect

Visual effect	Magnitude
Amendments to the approved CWF project would result in a major and prominent visual effect and introduce elements that contrast, or are not in character with the approved CWF project.	High
Amendments to the approved CWF project would result in a partial visual effect and introduce elements which may be prominent, but not completely out of character with the approved CWF project.	Medium
Amendments to the approved CWF project would result in minor visual effects and introduce elements which are not prominent or out of character with the approved CWF project.	Low
Amendments to the approved CWF project would result in a very minor visual effect and introduce elements which are not prominent or uncharacteristic of the approved CWF project. There would likely be 'no change' to the approved CWF visual effect.	Negligible

7.2 Visual effect matrix

Table 7 sets out the assessment of visual effects from residential dwellings up to 3.4 kilometres from the approved CWF project and specifically addresses the residential dwellings locations assessed in the Environmental Assessment. The residential dwelling locations are illustrated in **Figure 1**.

Whilst the assessment includes a determination of visual effects from dwellings, it also takes into account any curtilage surrounding each dwelling which may be considered an extension to the dwelling for domestic or social activities. The criteria set out in **Table 6** are noted against each dwelling, with a visual effect rating determined against the matrix in **Table 7**.

Table 7 – Visual effect matrix (Refer Figure 1 for non-associated residential dwelling locations)

Receiver location/s	Category of receiver location	Approximate distance to proposed CWF wind turbine modification (m)	Approved CWF Visual Rating* ERM 2015	Description and Magnitude of CWF wind turbine modification visual effect	CWF wind turbine modification Visual Rating
Residential dwellings within 3.4 km of approved Coppabella Wind Farm turbine					
C01	Non-associated residential dwelling	2,771	Low	Views toward wind turbines screened by landform. Magnitude rating Negligible – resulting in no change to the approved CWF visual impact rating	Same as approved Low
C06	Non-associated residential dwelling	2,007	Low	The observable scale of change would be partially limited by distance and existing tree planting between the dwelling and closest approved wind turbine. There would be very limited change in the composition or contrast between the approved and proposed wind turbines and the surrounding landscape. Scattered tree cover beyond the dwelling would filter some views toward the proposed wind turbine modifications. Magnitude rating Low – resulting in no change to the approved CWF visual impact rating.	Same as approved Low
C08	Non-associated residential dwelling	2,286	Low to Negligible	The observable scale of change would be limited by intervening vegetation and built form between the dwelling and wind turbines. There would be very limited change in the composition	Same as approved

Table 7 – Visual effect matrix (Refer Figure 1 for non-associated residential dwelling locations)

Receiver location/s	Category of receiver location	Approximate distance to proposed CWF wind turbine modification (m)	Approved CWF Visual Rating* ERM 2015	Description and Magnitude of CWF wind turbine modification visual effect	CWF wind turbine modification Visual Rating
				or contrast between the approved and proposed development and the surrounding landscape. Scattered tree cover beyond the dwelling would filter some views toward the CWF wind turbine modifications. Magnitude rating Low – resulting in no change to the approved CWF visual impact rating.	Low to Negligible
C37	Non-associated residential dwelling	2,527	Nil	Views toward the wind turbine modification would be screened through a combination of landform and tree planting. Magnitude rating Negligible – resulting in no change to the approved CWF visual impact rating.	Same as approved Nil
C39	Non-associated residential dwelling	4,308	Medium	Views toward the wind turbine modification would be partially screened through a combination of landform and tree planting. Magnitude rating Negligible – resulting in no change to the approved CWF visual impact rating.	Same as approved Medium

Table 7 – Visual effect matrix (Refer Figure 1 for non-associated residential dwelling locations)

Receiver location/s	Category of receiver location	Approximate distance to proposed CWF wind turbine modification (m)	Approved CWF Visual Rating* ERM 2015	Description and Magnitude of CWF wind turbine modification visual effect	CWF wind turbine modification Visual Rating
C41	Non-associated residential dwelling	2,720	Low	Views toward the wind turbine modification would be screened through a combination of landform and tree planting. Magnitude rating Low – resulting in no change to the approved CWF visual impact rating.	Same as approved Low
C42	Non-associated residential dwellings	3,540	Medium	The observable scale of change would be limited by distance between the dwelling and closest approved CWF wind turbine. The EA LVIA noted: <i>“There is extensive existing vegetation around the dwelling however the nearest wind turbines would be visible and would be just over 3 km away. For this reason, the overall visual impact from this residence is assessed as medium without additional landscape mitigation. However, additional planting, supplementing that which the owner has commenced, could readily screen the turbines from view, if the owner felt this was desirable”.</i>	Same as approved Medium

Table 7 – Visual effect matrix (Refer Figure 1 for non-associated residential dwelling locations)

Receiver location/s	Category of receiver location	Approximate distance to proposed CWF wind turbine modification (m)	Approved CWF Visual Rating* ERM 2015	Description and Magnitude of CWF wind turbine modification visual effect	CWF wind turbine modification Visual Rating
				Magnitude rating Low – resulting in no change to the approved CWF visual impact rating.	
C60	Non-associated residential dwellings	2,564	Low	The observable scale of change would be partially limited by distance between the dwelling and closest approved CWF wind turbine. There would be very limited change in the composition or contrast between the approved and proposed wind turbine modification. Magnitude rating Low – resulting in no change to the approved CWF visual impact rating.	Same as approved Low
C75	Non-associated residential dwelling	2,831	Medium to Low	The observable scale of change would be partially limited by distance between the dwelling and closest approved CWF wind turbine. There would be very limited change in the composition or contrast between the approved and proposed development. Magnitude rating Low – resulting in no change to the approved CWF visual impact rating.	Same as approved Medium to Low

* Approved CWF Visual Rating as determined by ERM, March 2015

7.3 Summary of visual effects

The Visual Effects Matrix includes eight residential dwellings within 3.4 kilometres of a proposed CWF wind turbine modification which were originally assessed in the Yass Valley Wind Farm Environmental Assessment. The overall assessment of magnitude of visual effects associated with the proposed CWF wind turbine modification is summarised as Low.

The scale of change in the wind turbine structures, whilst noticeable from proximate residential view locations would not result in a degree of change significantly above the visibility of the approved CWF wind turbines.

7.4 Night time obstacle lighting

The Yass Valley Wind Farm Consent Conditions note that the Applicant shall ensure that any aviation hazard lighting complies with CASA's requirements. This VIA notes that no requirements have been provided by CASA with the regard to the proposed CWF modification and no assessment has been prepared to assess potential visual impacts associated with night time obstacle lighting.

8 Visual assessment

8.1 Introduction

Following the assessment of the magnitude of visual effects between the approved CWF and the proposed wind turbine modification, this VIA has undertaken a further visual assessment of the proposed wind turbines on people at residential dwellings surrounding the approved CWF. The visual assessment has been prepared with regard to the Guidelines, and specifically the inputs required for the baseline study outlined in the Guidelines Appendix 1: Visual Assessment Process.

8.2 Sensitive Land Use Designations

The approved CWF wind farm is wholly located within land use zone RU1 (Primary Production). Land use zone RU1 is not considered to be a sensitive land use designation as per the Guidelines, Appendix 1 Table 3.

The Bookham township (incorporating land use zones RU5, R5 and RE1) is located beyond 3.4 kilometres from the closest approved CWF wind turbine.

8.3 Landscape character type

The broader landscape character type surrounding the approved CWF has been previously described as both pastoral with agricultural improvements (ERM 2009). The Planning Application Report Landscape and Visual Assessment noted:

The pre-European landscape of the area surrounding the proposed Yass Valley Wind Farm has been heavily modified through agricultural practices that have included the clearing of native vegetation for cropping and grazing. The resultant cleared landscape is interspersed with agricultural buildings including farmhouses, outbuildings, sheds, stockyards, access roads, silos as well as road and rail networks. Associated with these structures are plantings along roadsides or as shelter belts. The “Gently Undulating to Flat Cleared Landscape Unit” is not rare, nor is it high in scenic quality and for these reasons its landscape sensitivity is considered to be low sensitivity where the predominant character is that of cleared land. However, it must be recognised that some areas have a greater topographic diversity that many people find very appealing. These areas have been included within the “Steeply Undulating Cleared Farmland Landscape Unit” and are given a “medium” sensitivity rating.

Subsequent to previous landscape assessments undertaken for the approved CWF, this VIA has determined that the Scenic Quality Class applicable to the landscape surrounding the approved CWF is Moderate.

8.4 Viewer sensitivity levels and visibility distance zones

Viewer sensitivity and visibility distance zones are included in Table 8. These predominantly include Level 2 Sensitivity Levels from rural dwellings. Visibility distance zones have been classified from near-middle ground to far middle-ground views.

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
C01	Non-associated residential dwelling Level 2	2,771 Near middle-ground	VIZ2	Low	The Yass Valley Submissions Report (ERM 2014) notes that: <i>“the nearest wind turbine is located 2.7 km to the north-east. At this distance, the wind turbines “highly visible and will usually dominate the landscape”. However, there are no views from the living areas towards the wind farm. The overall visual impact is assessed as nil from living areas. There will be views to the proposed wind farm from the driveway of the property. However, given the topography and intervening vegetation, the wind turbines will be partially or wholly screened. Therefore, the overall visual impact is assessed as low”.</i> The wind turbine modification would be unlikely to result in any significant amendment to the ERM assessment and visual mitigation measures would not result in any significant screening benefit toward the approved CWF and wind turbine modifications.

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
C04	Non-associated residential dwelling Level 2	2,280 Near middle-ground	VIZ2	Medium	The Response to Secretary's Environmental Assessment Report (ERM 2015) notes that: <i>'The dwelling is located at an elevated location... (and) is set with(in) a garden area that has established planting comprising of native and exotic vegetation...The dwelling is oriented north towards Whitefield's Road and the proposed wind farm.</i> <i>Views to the nearest wind turbines to the north-west will be available from the entry porch.</i> <i>Given the distance and intervening vegetation, the overall visual impact of the proposed wind turbines from C04 is assessed as Medium.</i> <i>If desired, mitigation is possible through additional planting along the northern perimeter of the garden. The planting can comprise of a mix of native and deciduous trees or continue with the species that are already planted along the boundary. Such foreground vegetation can screen views to the wind turbines therefore bring the overall visual impact to a Low'.</i> The wind turbine modification would be unlikely to result in any significant amendment to the ERM assessment. Visual mitigation measures including tree planting may assist in reinforcing the

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
					existing screening and filtering of views toward the approved CWF and wind turbine modifications.
C06	Non-associated residential dwelling Level 2	2,007 Near middle-ground	VIZ2	Low	The Response to Secretary's Environmental Assessment Report (ERM 2015) notes that: <i>'the nearest wind turbines will be screened from the dwelling due to intervening vegetation'.</i> The wind turbine modification would be unlikely to result in any significant amendment to the ERM assessment. Visual mitigation measures including tree planting may assist in reinforcing the existing screening and filtering of views toward the approved CWF and wind turbine modifications.
C08	Non-associated residential dwelling Level 2	2,286 Near middle-ground	VIZ2	Low to Negligible	The Response to Secretary's Environmental Assessment Report (ERM 2015) notes that: <i>"The dwelling is oriented to the south towards the Hume Freeway. There is established planting to the south and west.... existing sheds to the north limit views towards the proposed wind farm...given the</i>

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
					<i>intervening vegetation and built-form, the overall visual impact of the proposed wind farm on the living areas of dwelling C08 is assessed as Low to Negligible”.</i> The wind turbine modification would be unlikely to result in any significant amendment to the ERM assessment and visual mitigation measures would not result in any significant screening benefit toward the approved CWF and wind turbine modifications.
C12	Non-associated residential dwelling Level 2	4,770 Far middle-ground	VIZ2	Not assessed	The dwelling is located around 1,900 metres to the north of the Hume Highway corridor and is situated on top of a low hill. The dwelling consists of a single storey rural dwelling in an east to west alignment. The dwelling has some surrounding scattered tree cover. Wind turbines would be partially screened from the dwelling and/or curtilage and would not tend to form an overly dominant element due to distance, but would be visible where located on hills to north east of the dwelling. The wind turbine modification would be unlikely to result in any significant visual amendment to the approved CWF project. Visual

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
					mitigation measures including tree planting to the north east of the residential curtilage would provide some screening benefit toward the approved CWF and wind turbine modifications.
C13	Non-associated residential dwelling Level 2	3,684 Near middle-ground	VIZ2	Not assessed	The dwelling is located around 1,90 metres to the west of the Berremangra Road corridor. The dwelling consists of a single storey rural dwelling in an east to west alignment. The dwelling has some surrounding scattered tree cover including shrub and tree planting to the east of the dwelling curtilage. Wind turbines would be partially screened from the dwelling and/or curtilage and would not tend to form an overly dominant element due to distance, but would be visible where located on hills to north east of the dwelling. The wind turbine modification would be unlikely to result in any significant visual amendment to the approved CWF project. Visual mitigation measures including supplementary tree planting to the north and north east of the residential curtilage would provide some screening benefit toward the approved CWF and wind turbine modifications.

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
C22	Non-associated residential dwelling Level 2	3,711 Near middle-ground	VIZ2	Not assessed	The dwelling is located around 260 metres to the south of the Hume Highway corridor. The dwelling consists of a single storey rural dwelling in a north to south alignment. The dwelling has some surrounding scattered tree cover, including tree cover following a drainage line to the west of the dwelling curtilage. Wind turbines would be partially screened from the dwelling and/or curtilage and would not tend to form an overly dominant element due to distance, but would be visible where located on hills to the north and north east of the dwelling. The wind turbine modification would be unlikely to result in any significant visual amendment to the approved CWF project. Visual mitigation measures including tree planting to the north of the residential curtilage would provide some screening benefit toward the approved CWF and wind turbine modifications.
C29	Non-associated residential dwelling	3,025 Near middle-ground	VIZ2	Not assessed	The dwelling is located around 6.5 kilometres to the south west of the Binalong township and north east of the approved CWF main ridgeline. The dwelling consists of a single storey rural dwelling in a

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
	Level 2				north west to south east alignment. The dwelling has some surrounding scattered tree cover, including tree planting to the south west of the dwelling curtilage. Wind turbines would be partially screened from the dwelling and/or curtilage and would not tend to form an overly dominant element due to distance, but would be directly visible and elevated along the ridgeline. The wind turbine modification would be unlikely to result in any significant visual amendment to the approved CWF project. Visual mitigation measures would not result in any significant overall screening benefit toward the approved CWF and wind turbine modifications.
C37	Non-associated residential dwelling Level 2	2,527 Near middle-ground	VIZ2	Nil	The Response to Submissions Report (ERM 2014) notes that: <i>“The nearest wind turbine is located 2.5 km to the south-east. At this distance, the wind turbines “highly visible and will usually dominate the landscape”. However, given the location of the dwelling in the valley and intervening vegetation there will be no views of the wind farm. Therefore, the overall visual impact is assessed as nil”.</i>

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
					The wind turbine modification would be unlikely to result in any significant amendment to the ERM assessment and visual mitigation measures would not result in any significant screening benefit toward the approved CWF and wind turbine modifications.
C38	Non-associated residential dwelling Level 2	4,620 Far middle-ground	VIZ2	Not assessed	The dwelling is located around 600 metres to the west of the Berremangra Road corridor and consists of a single storey rural dwelling in an approximate east to west alignment. The dwelling has some existing scattered mature trees beyond the curtilage predominantly to the north and north east which does not provide direct screening toward the wind farm. A small number of distant wind turbines would be visible from the dwelling and/or curtilage which would not tend to form a dominant element where visible due to distance. The majority of the wind farm site will be screened by landform rising to the east and south east of the dwelling. The wind turbine modification would be unlikely to result in any significant visual impact in addition to the approved CWF project. Visual mitigation measures including tree planting to the north of

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
					the dwelling would provide some screening benefit toward the approved CWF and wind turbine modification.
C39	Non-associated residential dwelling Level 2	4,308 Far middle-ground	VIZ2	Medium	The Yass Valley Submissions Report (ERM 2014) notes that: <i>“The nearest wind turbine is now located 4.3 km south-east. At this distance the proposed wind turbines will be “potentially noticeable-but will not dominate the landscape “. Overall the visual impact is assessed as medium”.</i> The wind turbine modification would be unlikely to result in any significant amendment to the ERM assessment and visual mitigation measures would provide some screening benefit toward the approved CWF and wind turbine modifications.
C41	Non-associated residential dwelling Level 2	2,720 Near middle-ground	VIZ2	Low	The Planning Application Report (ERM 2009) notes that: <i>“The nearest wind turbine is 2.7 km to the north west, however the hill behind the residence screens views in this direction to the nearest wind turbine”.</i> The wind turbine modification would be unlikely to result in any significant amendment to the ERM assessment and visual mitigation

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
					measures would not result in any significant screening benefit toward the approved CWF and wind turbine modifications.
C42	Non-associated residential dwelling	3,540 Near middle-ground	VIZ2	Medium	The Planning Application Report (ERM 2009) notes that: <i>“There is extensive existing vegetation around the dwelling however the nearest wind turbines would be visible and would be just over 3 km away. For this reason, the overall visual impact from this residence is assessed as medium without additional landscape mitigation. However, additional planting, supplementing that which the owner has commenced, could readily screen the turbines from view, if the owner felt this was desirable”.</i> The wind turbine modification would be unlikely to result in any significant amendment to the ERM assessment and visual mitigation measures would provide some screening benefit toward the approved CWF and wind turbine modifications.
C53	Non-associated residential dwelling	3,522 Near middle-ground	VIZ2	Not assessed	The dwelling is located around 14 kilometres to the west of the Binalong township and consists of a single storey rural dwelling in a south east to north west alignment. The curtilage surrounding the

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
	Level 2				dwelling has a small number of scattered trees which do not provide any significant degree of screening. Wind turbines would be visible from the dwelling and/or curtilage. The wind turbine modification would be unlikely to result in any significant visual impact in addition to the approved CWF project. Visual mitigation measures including tree planting to the south of the dwelling would provide some screening and/or filtering benefit toward the approved CWF and wind turbine modification.
C58	Non-associated residential dwelling Level 2	3,324 Near middle-ground	VIZ2	Not assessed	The dwelling is located around 190 metres to the south of the Hume Highway road corridor and consists of a single storey rural dwelling in a north to south alignment. The dwelling has a small amount scattered tree and shrub cover. Wind turbines would be visible from the dwelling and/or curtilage which would not form a dominant element where visible due to distance. The wind turbine modification would be unlikely to result in any significant visual impact in addition to the approved CWF project. Visual mitigation measures including tree planting to the north of

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
					the dwelling would provide some screening benefit toward the approved CWF and wind turbine modification.
C59	Non-associated residential dwelling Level 2	4,056 Far middle-ground	VIZ2	Not assessed	The dwelling is located around 1,400 metres to the south of the Hume Highway road corridor and consists of a single storey rural dwelling in a north to south alignment. The dwelling has some surrounding scattered tree and shrub cover. Wind turbines would be visible from the dwelling and/or curtilage and would not form a dominant element where visible due to distance. The wind turbine modification would be unlikely to result in any significant visual impact in addition to the approved CWF project. Visual mitigation measures including tree planting along the northern curtilage boundary would provide screening benefit toward the approved CWF and wind turbine modification.
C60	Non-associated residential dwelling	2,564 Near middle-ground	VIZ2	Low	The Response to Secretary's Environmental Assessment Report (ERM 2015) notes that: <i>"The dwelling is oriented north towards the proposed wind farm. The garden associated with the dwelling has an open aspect to the north.</i>

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
	Level 2				<i>Hedgerows are planted to the northeast and north-west directions. The proposed wind farm will be partially visible through gaps in vegetation. The nearest wind turbines will be screened by intervening vegetation. Therefore, the overall visual impact of the proposed wind turbines is assessed as Low”.</i> The wind turbine modification would be unlikely to result in any significant amendment to the ERM assessment and visual mitigation measures would not result in any significant screening benefit toward the approved CWF and wind turbine modifications.
C71	Non-associated residential dwelling Level 2	2,978 Near middle-ground	VIZ2	Not assessed	The dwelling is located around 6.5 kilometres to the south west of the Binalong township, and north east of the approved CWF main ridgeline. The dwelling consists of a single storey rural dwelling in a north west to south east alignment. The dwelling has some surrounding scattered tree cover, including tree planting to the south west of the dwelling curtilage. Wind turbines would be partially screened from the dwelling and/or curtilage and would not tend to form an overly dominant element due to distance, but would be directly visible and elevated along the ridgeline.

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
					The wind turbine modification would be unlikely to result in any significant visual amendment to the approved CWF project. Visual mitigation measures would not result in any significant overall screening benefit toward the approved CWF and wind turbine modifications due to wind turbine elevation along the ridgeline.
C74	Non-associated residential dwelling Level 2	3,193 Near middle-ground	VIZ2	Not assessed	The dwelling is located around 10 kilometres to the west of the Binalong township, and north of the approved CWF wind turbines. The dwelling consists of a single storey rural dwelling in a north west to south east alignment. The dwelling has some surrounding tree cover, including tree planting to the south west of the dwelling curtilage. Wind turbines would be partially screened from the dwelling and/or curtilage and would not tend to form an overly dominant element due to distance, but would be directly visible and elevated along the ridgeline. The wind turbine modification would be unlikely to result in any significant visual amendment to the approved CWF project. Visual mitigation measures including tree planting to the south east of

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
					the dwelling would provide some screening and/or filtering benefit toward the approved CWF and wind turbine modification.
C75	Non-associated residential dwelling Level 2	2,831 Near middle-ground	VIZ2	Medium to Low	The Response to Secretary's Environmental Assessment Report (ERM 2015) notes that: <i>"Given the intervening topography of the hill to the north of the dwelling, the nearest wind turbines that are to the north will also be potentially screened from view. Established vegetation near the house, particularly to the east will also filter and screen views to the proposed wind turbines from the dwelling. Therefore, the overall visual impact of the proposed wind turbines is assessed as Medium to Low".</i> The wind turbine modification would be unlikely to result in any significant amendment to the ERM assessment, which recommended planting along the eastern perimeter of the garden. Landscape mitigations works would have some benefit in reducing the overall level of visual impact.

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
C76	Non-associated residential dwelling Level 2	3,864 Near middle-ground	VIZ2	Not assessed	The dwelling is located around 190 metres to the north of the Hume Highway road corridor and consists of a single storey rural dwelling in an east to west alignment. The dwelling has some surrounding scattered tree cover more predominantly to the south. Wind turbines would be visible from the dwelling and/or curtilage but would not form a dominant element where visible. Landscape mitigations work, along the north boundary of the dwelling curtilage, would have some benefit in reducing the overall level of wind turbine visibility.
C76a	Non-associated residential dwelling	4,162 Far middle-ground	VIZ2	Not assessed	The dwelling is located around 525 metres to the north of the Hume Highway road corridor and consists of a single storey rural dwelling in a north east to south west alignment. The dwelling has some scattered tree cover surrounding and beyond the dwelling curtilage. A hill and low ridgeline landform would also provide screening toward the majority of wind turbines within the CWF. Wind turbines

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
					would be visible from the dwelling and/or curtilage but would not form a dominant element where visible in excess of 4 km. Landscape mitigations work (tree planting) beyond the dwelling curtilage, would have some benefit in reducing the overall level of wind turbine visibility, including views toward a small number of hubs and blades visible above ridgelines.
E20	Non-associated residential dwelling Level 2	4,977 Far middle-ground	VIZ2	Not assessed	The dwelling is located around 600 metres to the north of the Hume Highway corridor. The dwelling consists of a single storey rural dwelling in a north to south alignment. The dwelling has surrounding mature tree cover which would screen views toward the wind turbines from within the dwelling as well as the curtilage immediately surrounding the dwelling. Wind turbines would be visible from various areas beyond the immediate dwelling curtilage including working areas and sheds to the north and north east of the dwelling. The wind turbines would not tend to form an overly dominant element due to distance, but would be visible where located on hills to north east of the dwelling.

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
					The wind turbine modification would be unlikely to result in any significant visual amendment to the approved CWF project. Visual mitigation measures would not tend to provide any significant screening benefit from the dwelling and immediate curtilage toward the approved CWF and wind turbine modifications.
G32	Non-associated residential dwelling	4,220 Far middle-ground	VIZ2	Not assessed	The dwelling is located around 198 metres to the south of the Hume Highway corridor. The dwelling consists of a single storey rural dwelling in a north to south alignment. The dwelling has some surrounding scattered tree cover. Wind turbines would be partially screened from the dwelling and/or curtilage and would not tend to form an overly dominant element due to distance, but would be visible where located on hills to the north and north east of the dwelling. The wind turbine modification would be unlikely to result in any significant visual amendment to the approved CWF project. Visual mitigation measures including tree planting to the north of the residential curtilage would provide some screening benefit toward the approved CWF and wind turbine modifications.

Table 8 – Visual assessment matrix (Refer **Figure 1** for dwelling locations)

Receiver location	Category of receiver location and viewer sensitivity level	Approximate distance to approved CWF wind turbine (m) and Distance Zone	Visual Influence Zone	Approved CWF ERM visual rating*	CWF wind turbine modification visual assessment
Bookham township	Non-associated residential dwellings	In excess of 3,400 Near middle-ground	VIZ1	Low to Negligible	The Yass Valley Submissions Report (ERM 2014) notes that: <i>“Residences within Bookham are with large rural allotments arranged in a grid. Most dwellings are set within landscaped gardens that comprise of mature trees. The foreground topography and vegetation will screen/ filter views towards the proposed wind farm. Therefore, for most residences within Bookham, given the intervening topography, vegetation and the distance, the overall visual impact of the proposed wind farm is assessed low to negligible”.</i> The wind turbine modification would be unlikely to result in any significant visual impact in addition to the approved CWF project, and visual mitigation measures within or surrounding the Bookham township would not result in any significant screening benefit toward the approved CWF and wind turbine modification.

*Environmental Resources Management Australia Pty Ltd, Yass Valley Wind Farm Landscape and Visual Impact Assessment – November 2009, July 2013, April 2014 and March 2015.

9 Wire frame models and photomontages

9.1 Introduction

The wireframe model and photomontage locations have been selected to illustrate viewpoints from residential dwellings with views toward the approved CWF and the proposed CWF wind turbine modifications.

The photomontage and wireframe locations coincide, and are numbered in accordance with, dwelling locations illustrated in **Figure 1**. The photomontages illustrate views toward the proposed CWF wind turbine modifications. The wireframe models illustrate views toward the approved CWF and the proposed wind turbine modifications.

The wireframe models do not include, or illustrate, the location of existing trees or other structures that may limit views to the approved and modified wind farm. The wire frame models are therefore considered to be very conservative in both the extent of view and visibility of wind turbines indicated in each wire frame model.

9.2 Wireframe model and photomontage preparation

The wireframe models and photomontages have been prepared with regard to the general guidelines set out in the Scottish Natural Heritage (2006) Visual representation of windfarms: good practice guidance and British Landscape Institute Advice Note 01/11 (March 2011) Photography and photomontage in landscape and visual impact assessment.

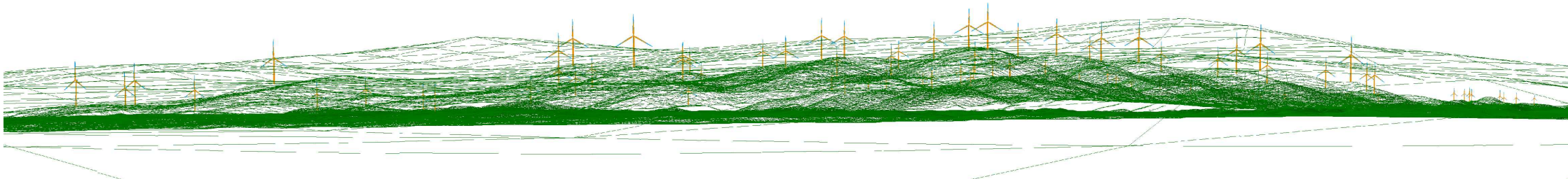
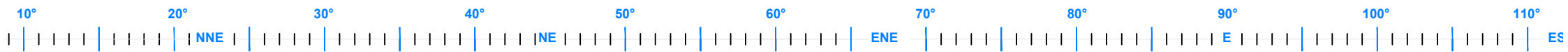
Photography for the photomontages was undertaken by GBD using tripod mounted Nikon D700 a digital single-lens reflex (SLR) full frame sensor camera. A 50mm focal length prime lens was attached to the Nikon D700 SLR camera.

The Nikon D700 has a full frame image sensor (36 x 23.9 mm Nikon FX format), and when mounted with a 50mm lens results in a single photographic image with a view angle equivalent to a 35 mm SLR camera with a 50mm lens. The 50mm lens is commonly utilised, and cited in landscape and visual assessment manuals and guidelines, for the preparation of landscape and visual assessment photomontages. Following site photography, the wireframe models and photomontages were generated through the following steps:

- a digital terrain model (DTM) of the project site was created from a terrain model of the surrounding area using digital contours
- the site DTM was loaded in the DNV-GL 'Wind Farmer' software package
- the layout of the wind farm and 3D representation of the wind turbine was configured in Wind Farmer
- the location of each viewpoint (photo location) was configured in Wind Farmer – the sun position for each viewpoint was configured by using the time and date of the photographs from that viewpoint
- the view from each photomontage location was then assessed in Wind Farmer. This process requires accurate mapping of the terrain as modelled, with that as seen in the photographs. The photographs, taken

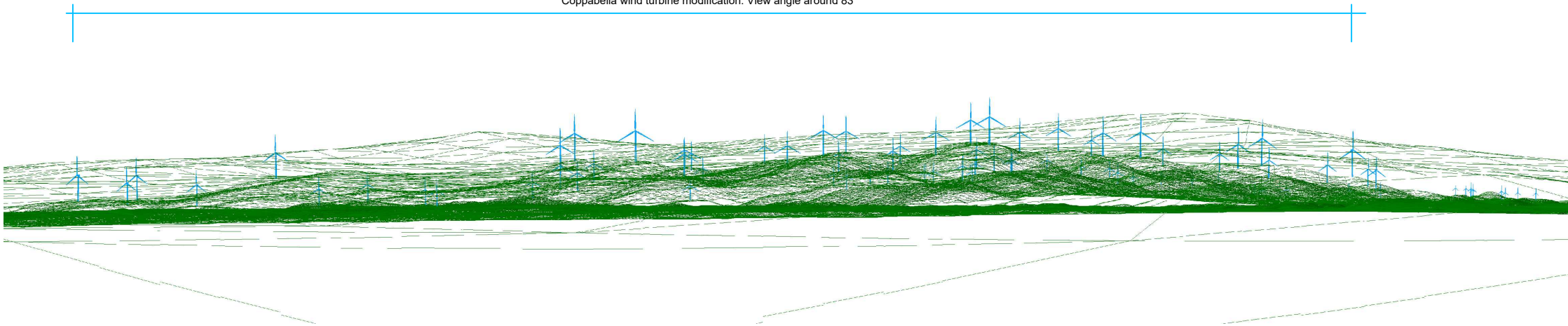
from each photomontage location were loaded into Wind Farmer and the visible turbines superimposed on the photographs

- the photomontage were adjusted using Photoshop CS3 to compensate for fogging due to haze or distance, as well as screening by vegetation or obstacles and
- the final image was converted to JPG format and imported and annotated as the final figure.

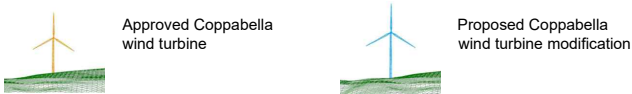


Wireframe 1 Dwelling C01: Approved CWF and wind turbine modification.
 Distance to closest approved Coppabella wind turbine 2.77 kilometres. Tips visible 17, Hubs visible 7
 Distance to closest Coppabella wind turbine modification 2.77 kilometres. Tips visible 22, Hubs visible 7

Coppabella wind turbine modification. View angle around 83°



Wireframe 1 Dwelling C01: Coppabella wind turbine modification

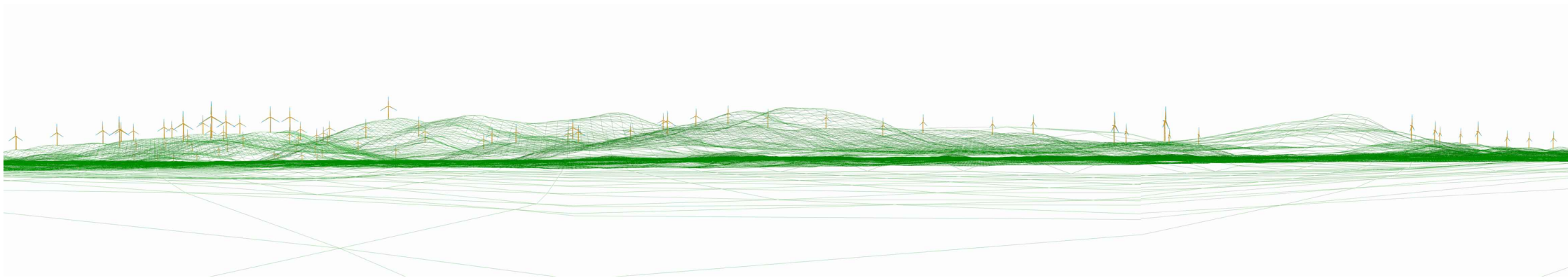
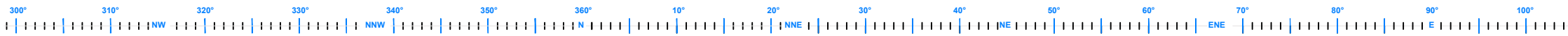


Notes:
 Views toward wind turbines or portions of wind turbines located below the green wire-frame will be screened by landform.

The wire-frame does not account for, or illustrate, any vegetation including trees adjacent to or beyond residential dwellings which may screen or filter views toward the wind turbines. The extent of wind turbine visibility is very conservative and may illustrate a number of wind turbines that will not be visible from the dwelling.

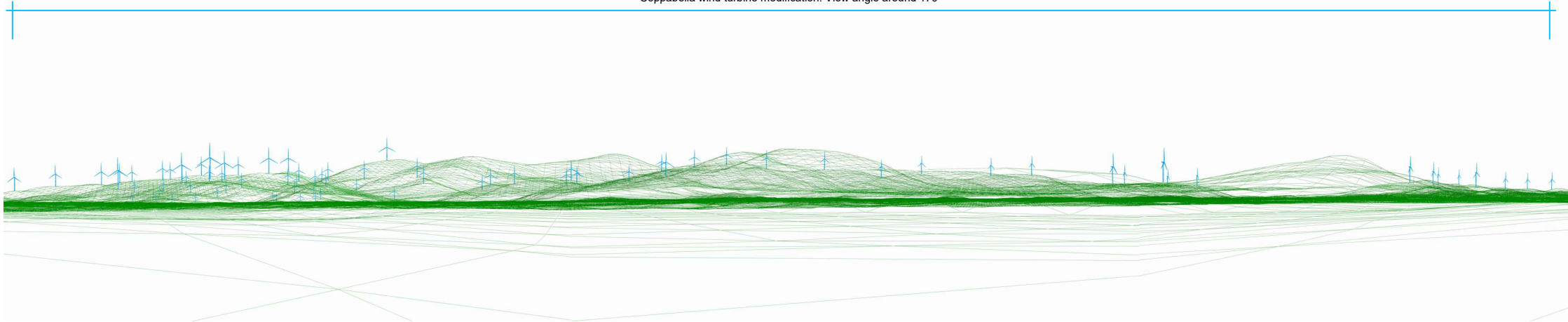
Figure 7 -
 Wireframe 1
 Dwelling C01

Coppabella Wind Farm Modification

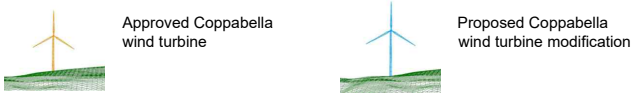


Wireframe 2 Dwelling CO4: Approved CWF and wind turbine modification overlay
Distance to closest approved Coppabella wind turbine 2.28 kilometres. Tips visible 51, Hubs visible 42
Distance to closest Coppabella wind turbine modification 2.28 kilometres. Tips visible 53, Hubs visible 42

Coppabella wind turbine modification. View angle around 170°



Wireframe 2 Dwelling CO4: Coppabella wind turbine modifications

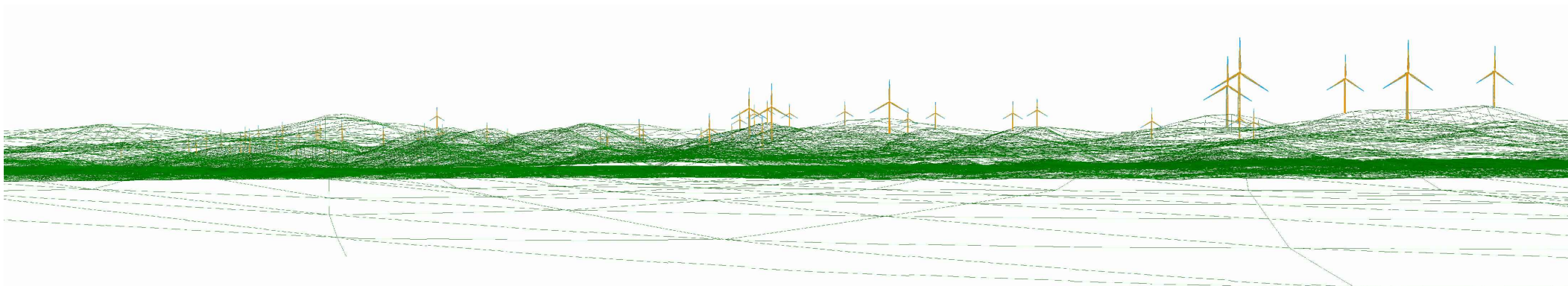
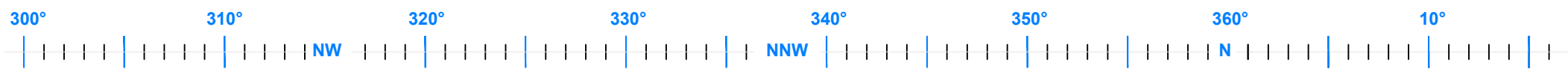


Notes:
Views toward wind turbines or portions of wind turbines located below the green wire-frame will be screened by landform.

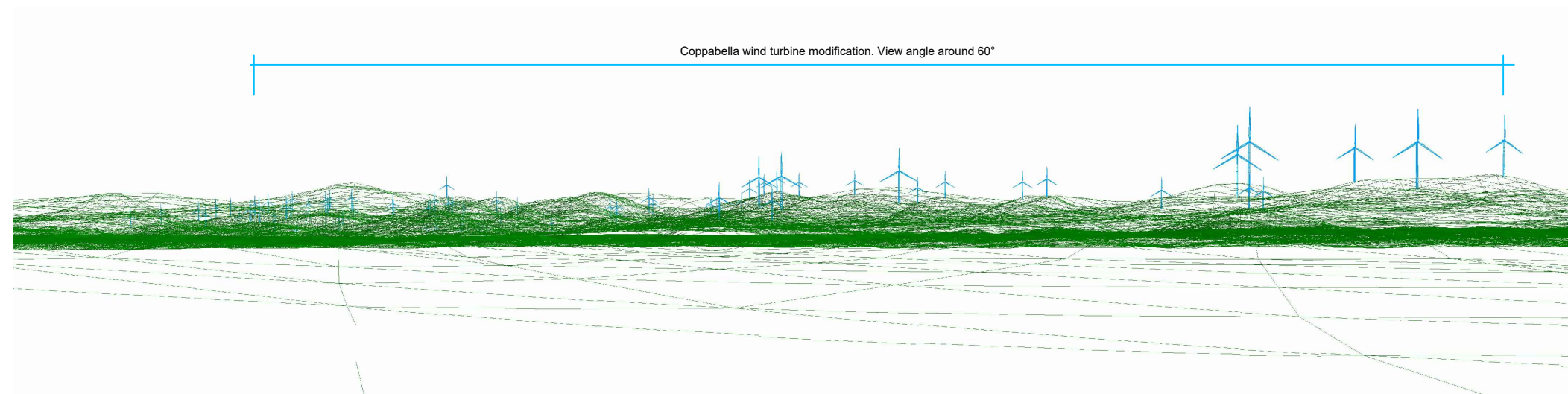
The wire-frame does not account for, or illustrate, any vegetation including trees adjacent to or beyond residential dwellings which may screen or filter views toward the wind turbines. The extent of wind turbine visibility is very conservative and may illustrate a number of wind turbines that will not be visible from the dwelling.

Figure 8 -
Wireframe 2
Dwelling CO4

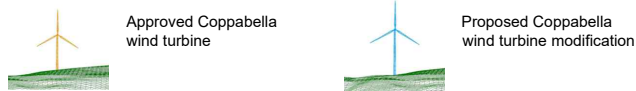
Coppabella Wind Farm Modification



Wireframe 3 Dwelling CO8: Approved CWF and wind turbine modification overlay
 Distance to closest approved Coppabella wind turbine 2.28 kilometres. Tips visible 33, Hubs visible 20
 Distance to closest Coppabella wind turbine modification 2.28 kilometres. Tips visible 39, Hubs visible 20

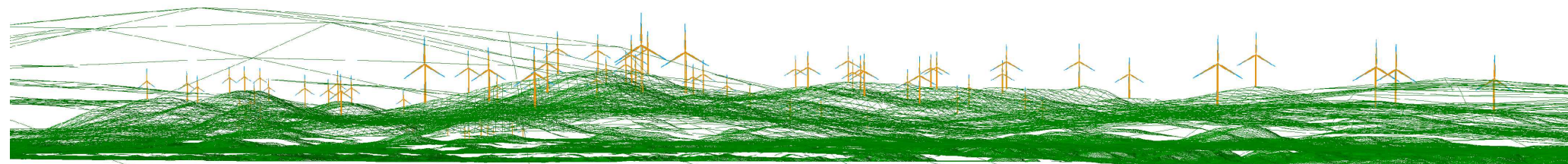


Wireframe 3 Dwelling CO8: Coppabella wind turbine modifications

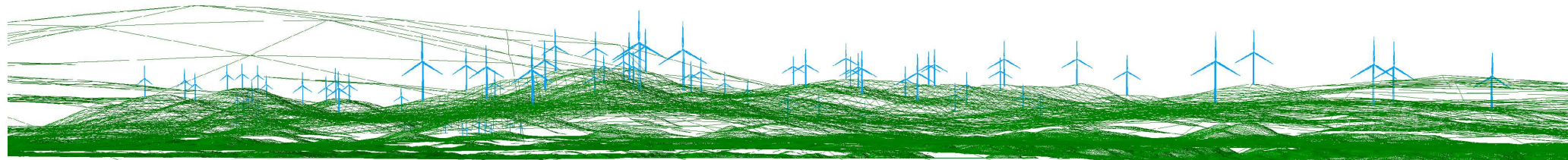
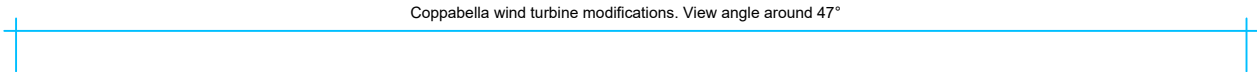


Coppabella Wind Farm Modification

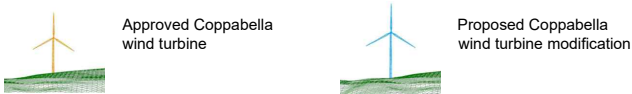
Notes:
 Views toward wind turbines or portions of wind turbines located below the green wire-frame will be screened by landform.
 The wire-frame does not account for, or illustrate, any vegetation including trees adjacent to or beyond residential dwellings which may screen or filter views toward the wind turbines. The extent of wind turbine visibility is very conservative and may illustrate a number of wind turbines that will not be visible from the dwelling.



Wireframe 4 Dwelling C37: Approved CWF and wind turbine modification overlay
 Distance to closest approved Coppabella wind turbine 2.52 kilometres. Tips visible 27, Hubs visible 23
 Distance to closest Coppabella wind turbine modification 2.52 kilometres. Tips visible 31, Hubs visible 23



Wireframe 4 Dwelling C37: Coppabella wind turbine modification

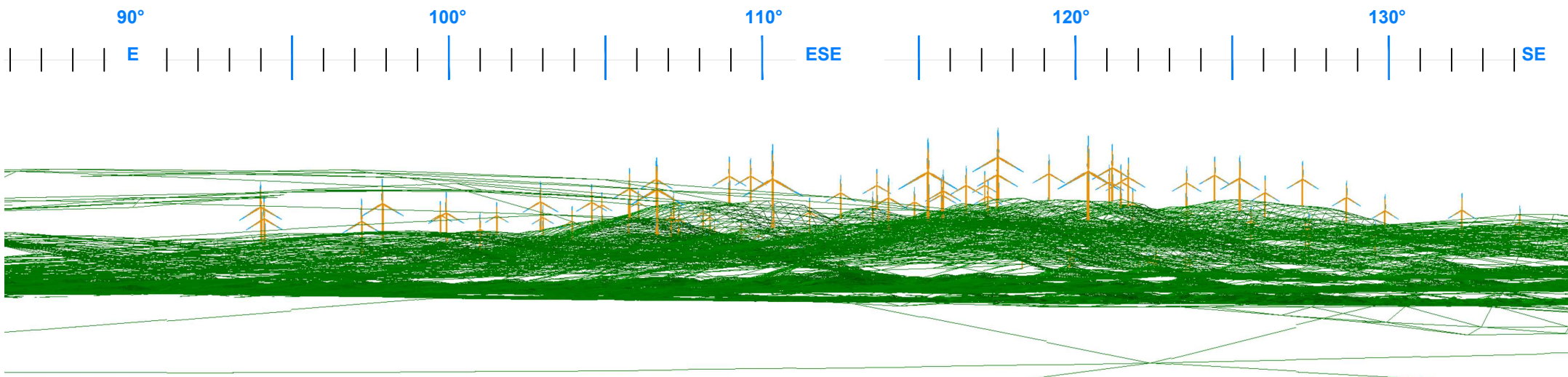


Notes:
 Views toward wind turbines or portions of wind turbines located below the green wire-frame will be screened by landform.

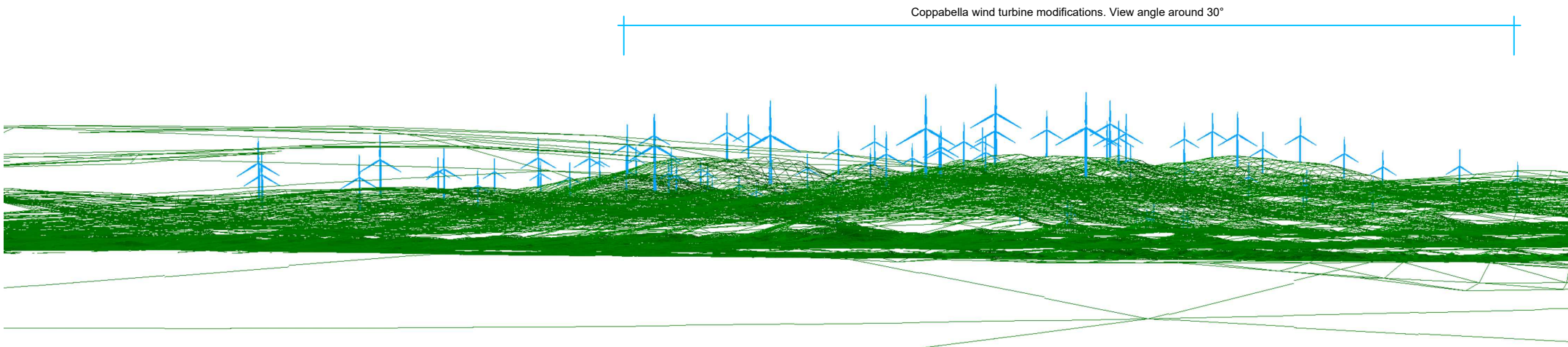
The wire-frame does not account for, or illustrate, any vegetation including trees adjacent to or beyond residential dwellings which may screen or filter views toward the wind turbines. The extent of wind turbine visibility is very conservative and may illustrate a number of wind turbines that will not be visible from the dwelling.

Figure 10
 Wireframe 4 Dwelling C37

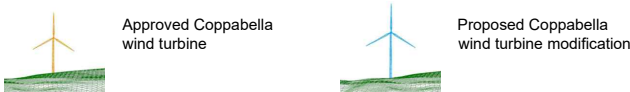
Coppabella Wind Farm Modification



Wireframe 5 Dwelling C38: Approved CWF and wind turbine modification overlay
 Distance to closest approved Coppabella wind turbine 3.54 kilometres. Tips visible 36, Hubs visible 30
 Distance to closest Coppabella wind turbine modification 3.54 kilometres. Tips visible 36, Hubs visible 30



Wireframe 5 Dwelling C38: Coppabella wind turbine modification

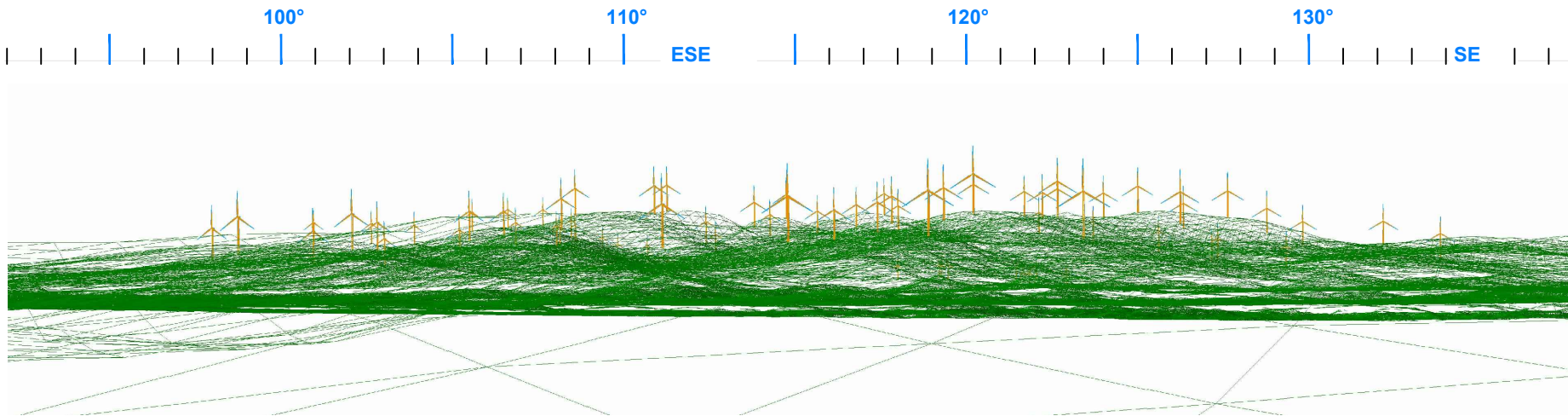


Notes:
 Views toward wind turbines or portions of wind turbines located below the green wire-frame will be screened by landform.

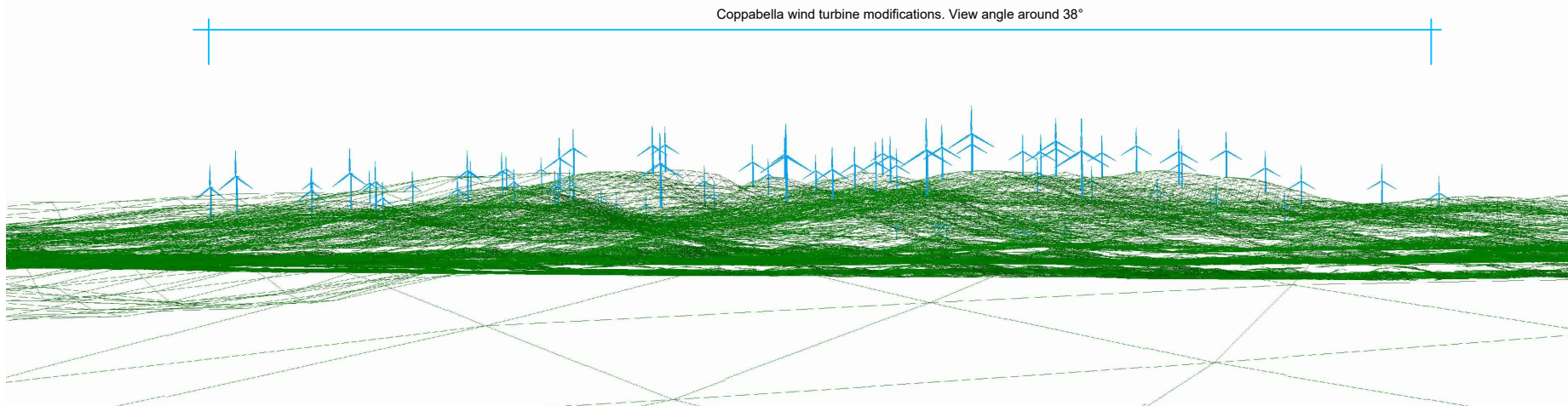
The wire-frame does not account for, or illustrate, any vegetation including trees adjacent to or beyond residential dwellings which may screen or filter views toward the wind turbines. The extent of wind turbine visibility is very conservative and may illustrate a number of wind turbines that will not be visible from the dwelling.

Figure 11
 Wireframe 5 Dwelling C38

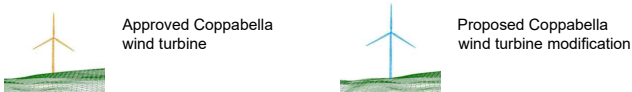
Coppabella Wind Farm Modification



Wireframe 6 Dwelling C39: Approved CWF and wind turbine modification overlay
 Distance to closest approved Coppabella wind turbine 4.31 kilometres. Tips visible 53, Hubs visible 47
 Distance to closest Coppabella wind turbine modification 4.31 kilometres. Tips visible 55, Hubs visible 47



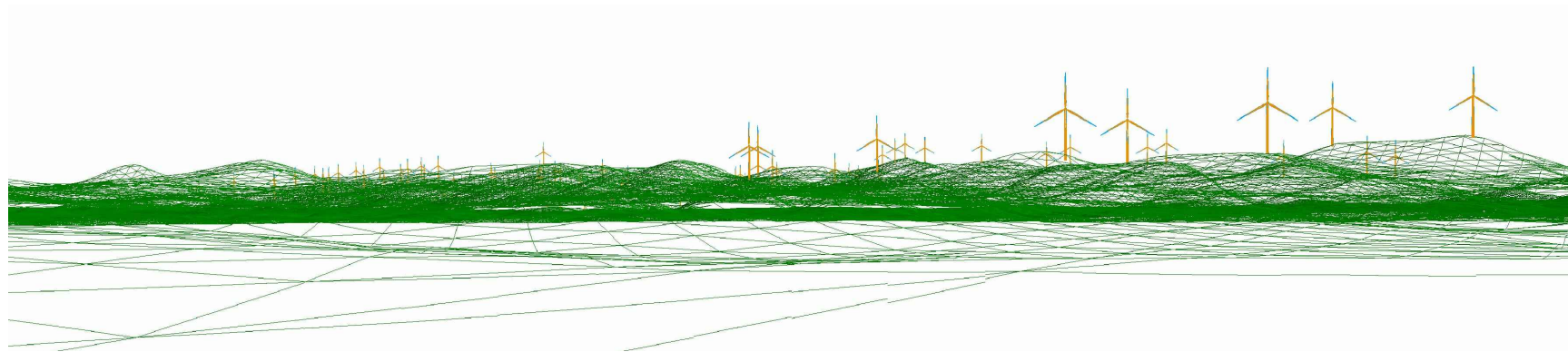
Wireframe 6 Dwelling C39: Coppabella wind turbine modification



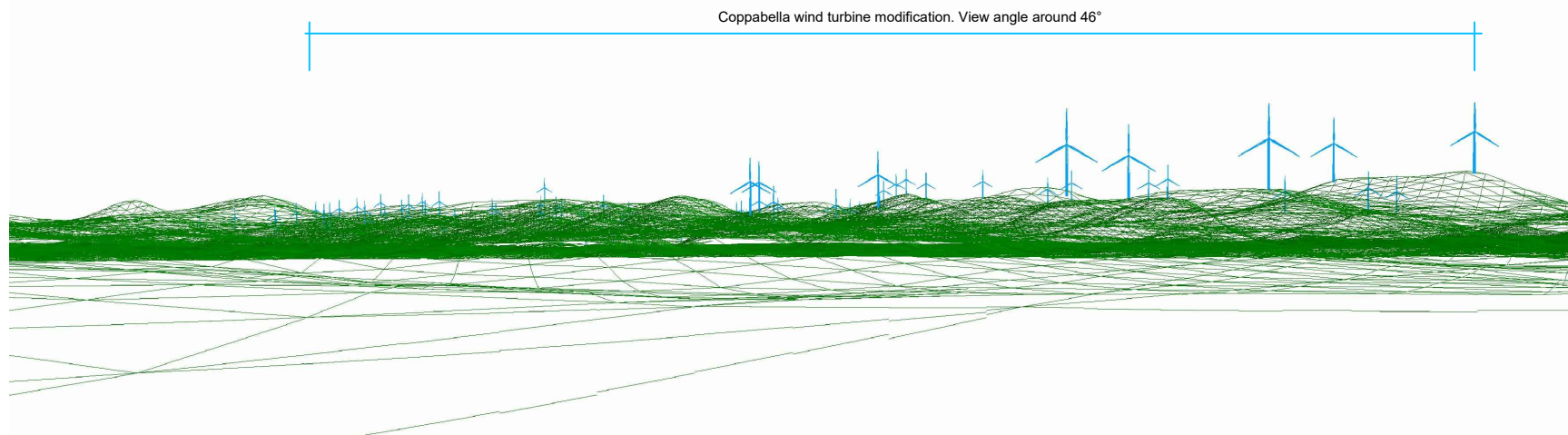
Notes:
 Views toward wind turbines or portions of wind turbines located below the green wire-frame will be screened by landform.

The wire-frame does not account for, or illustrate, any vegetation including trees adjacent to or beyond residential dwellings which may screen or filter views toward the wind turbines. The extent of wind turbine visibility is very conservative and may illustrate a number of wind turbines that will not be visible from the dwelling.

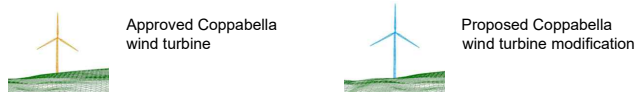
Coppabella Wind Farm Modification



Wireframe 7 Dwelling C41: Approved CWF and wind turbine modification overlay
 Distance to closest approved Coppabella wind turbine 2.72 kilometres. Tips visible 46, Hubs visible 31
 Distance to closest Coppabella wind turbine modification 2.72 kilometres. Tips visible 51, Hubs visible 31



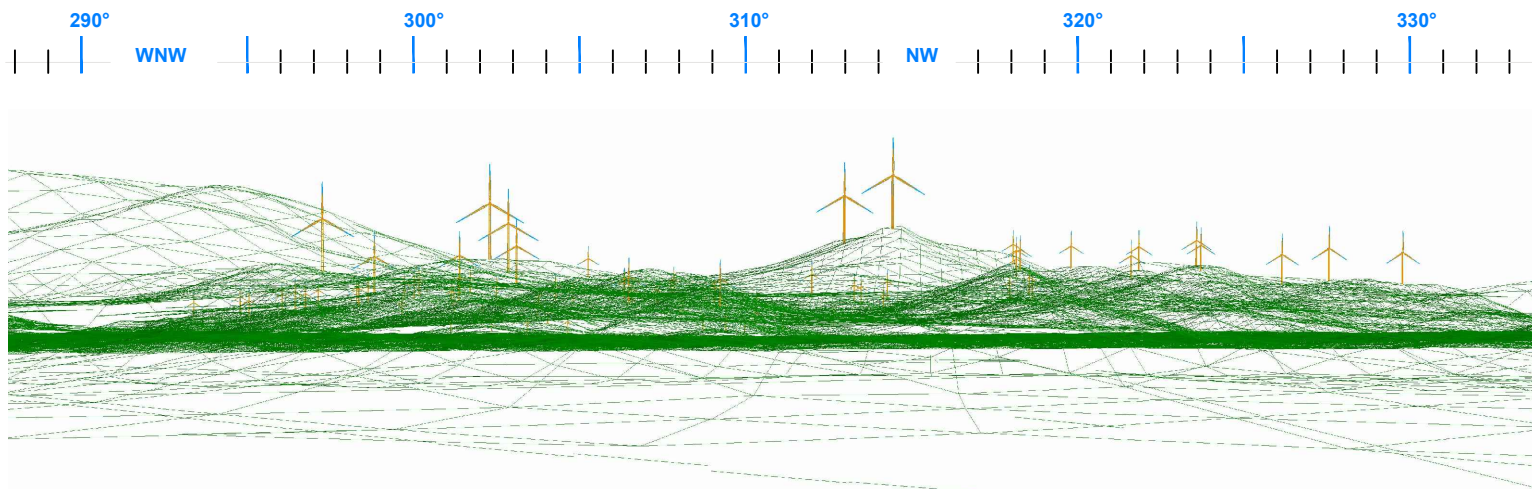
Wireframe 7 Dwelling C41: Coppabella wind turbine modifications



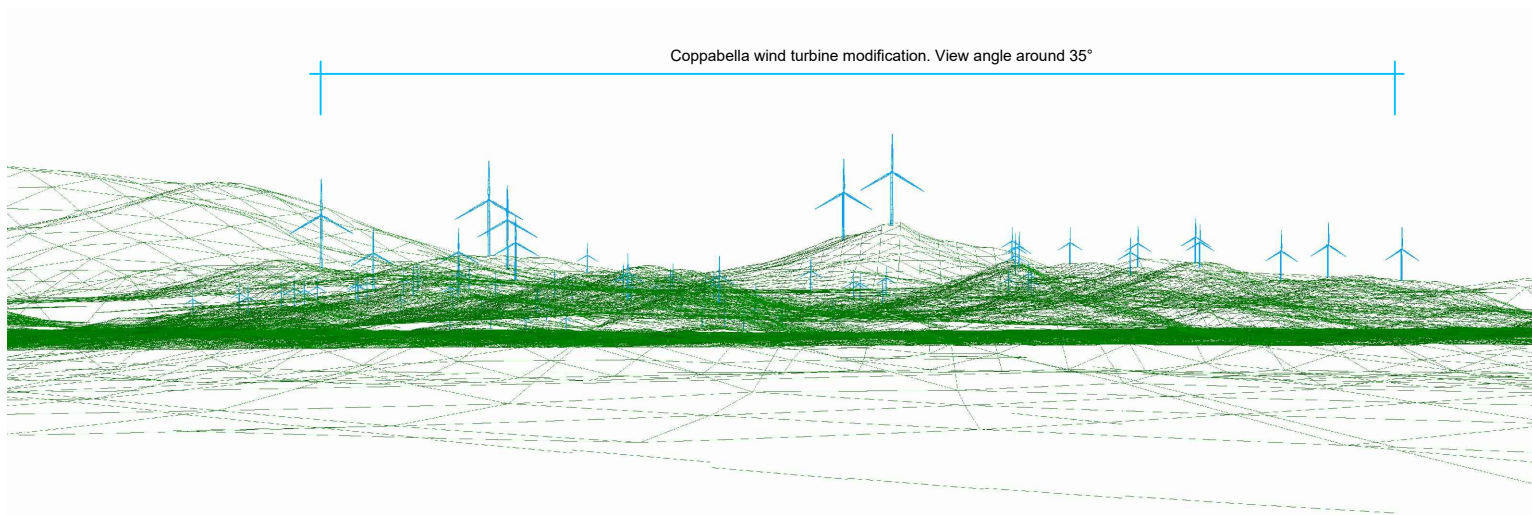
Coppabella Wind Farm Modification

Notes:
 Views toward wind turbines or portions of wind turbines located below the green wire-frame will be screened by landform.

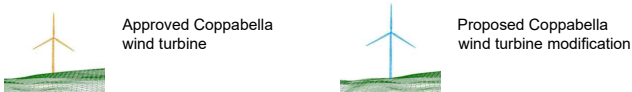
The wire-frame does not account for, or illustrate, any vegetation including trees adjacent to or beyond residential dwellings which may screen or filter views toward the wind turbines. The extent of wind turbine visibility is very conservative and may illustrate a number of wind turbines that will not be visible from the dwelling.



Wireframe 8 Dwelling C42: Approved CWF and wind turbine modification overlay
 Distance to closest approved Coppabella wind turbine 3.54 kilometres. Tips visible 24, Hubs visible 19
 Distance to closest Coppabella wind turbine modification 3.54 kilometres. Tips visible 27, Hubs visible 19

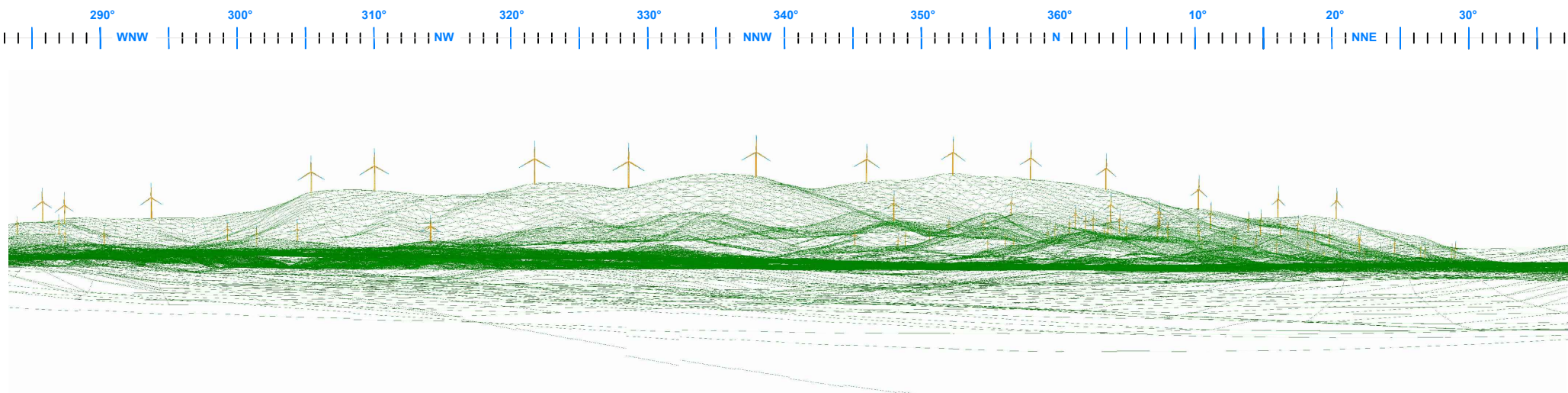


Wireframe 8 Dwelling C42: Coppabella wind turbine modification



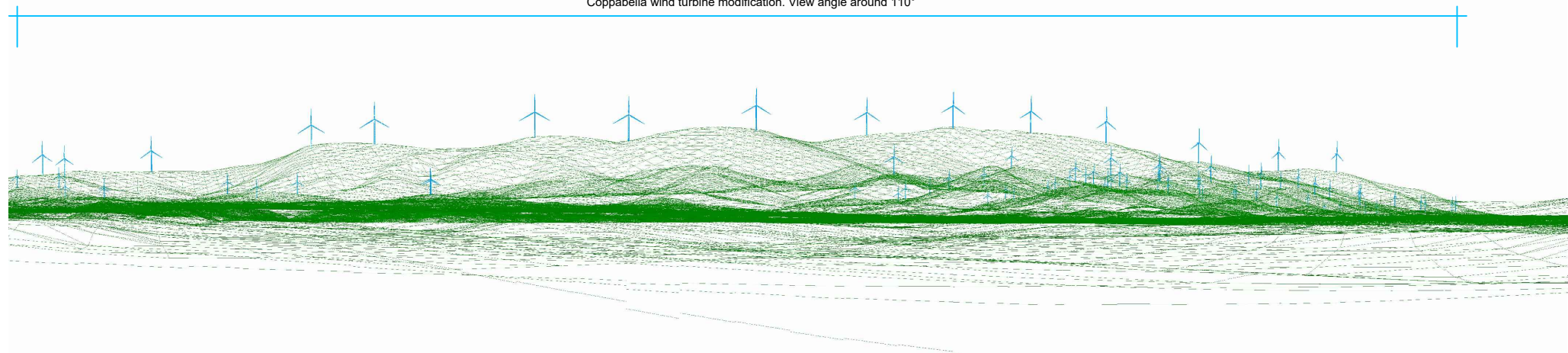
Coppabella Wind Farm Modification

Notes:
 Views toward wind turbines or portions of wind turbines located below the green wire-frame will be screened by landform.
 The wire-frame does not account for, or illustrate, any vegetation including trees adjacent to or beyond residential dwellings which may screen or filter views toward the wind turbines. The extent of wind turbine visibility is very conservative and may illustrate a number of wind turbines that will not be visible from the dwelling.



Wireframe 9 Dwelling C71: Approved CWF and wind turbine modification overlay
 Distance to closest approved Coppabella wind turbine 2.97 kilometres. Tips visible 22, Hubs visible 15
 Distance to closest Coppabella wind turbine modification 2.97 kilometres. Tips visible 24, Hubs visible 15

Coppabella wind turbine modification. View angle around 110°



Wireframe 9 Dwelling C71: Coppabella wind turbine modifications

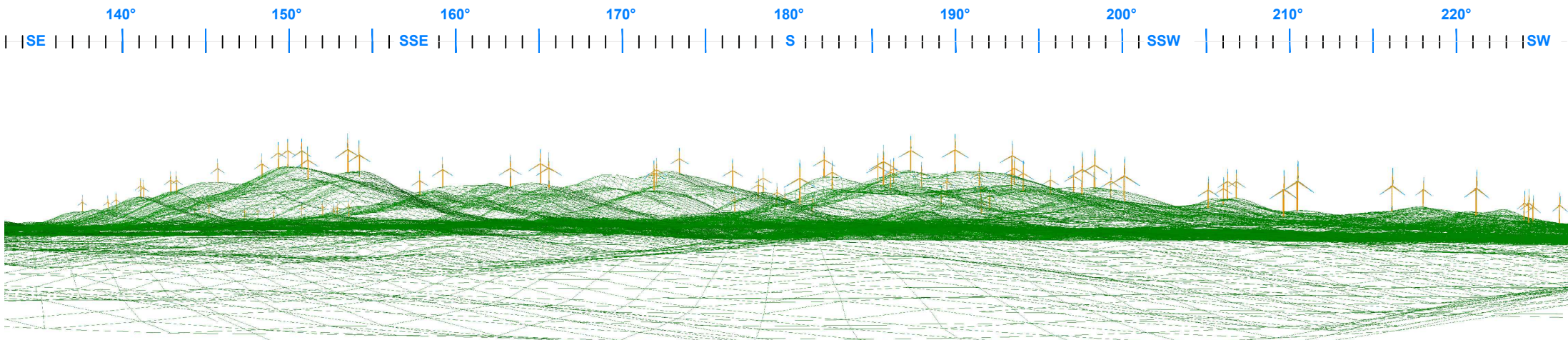


Notes:
 Views toward wind turbines or portions of wind turbines located below the green wire-frame will be screened by landform.

The wire-frame does not account for, or illustrate, any vegetation including trees adjacent to or beyond residential dwellings which may screen or filter views toward the wind turbines. The extent of wind turbine visibility is very conservative and may illustrate a number of wind turbines that will not be visible from the dwelling.

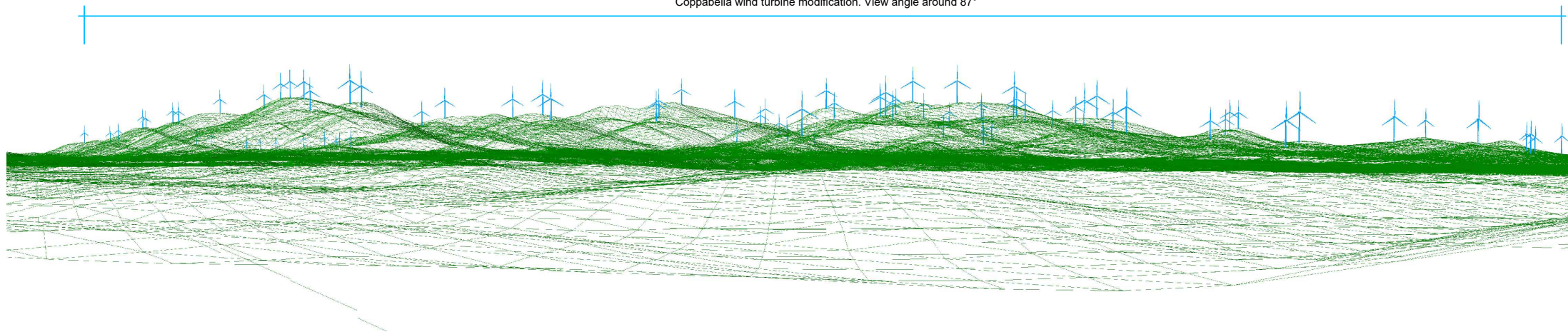
Figure 15 -
 Wireframe 9 Dwelling C71

Coppabella Wind Farm Modification

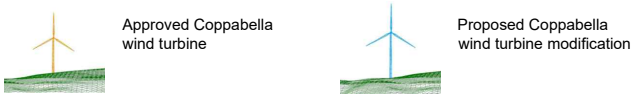


Wireframe 10 Dwelling C74: Approved CWF and wind turbine modification.
 Distance to closest approved Coppabella wind turbine 3.19 kilometres. Tips visible 62, Hubs visible 60
 Distance to closest Coppabella wind turbine modification 3.19 kilometres. Tips visible 63, Hubs visible 60

Coppabella wind turbine modification. View angle around 87°



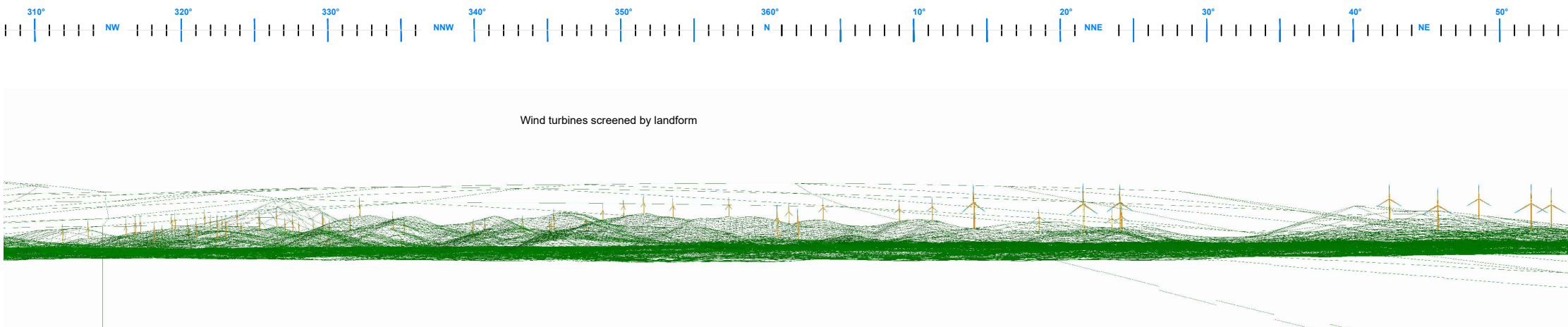
Wireframe 10 Dwelling C74: Coppabella wind turbine modification



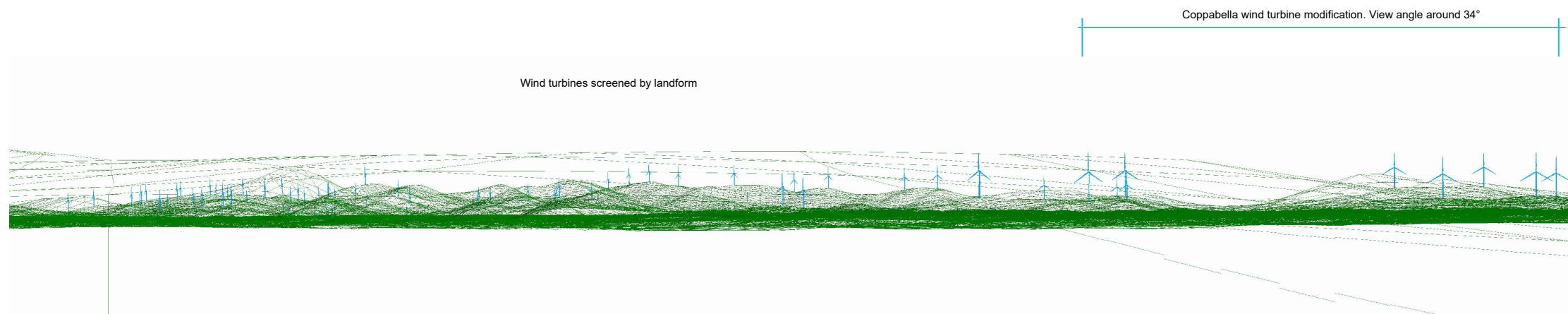
Notes:
 Views toward wind turbines or portions of wind turbines located below the green wire-frame will be screened by landform.

The wire-frame does not account for, or illustrate, any vegetation including trees adjacent to or beyond residential dwellings which may screen or filter views toward the wind turbines. The extent of wind turbine visibility is very conservative and may illustrate a number of wind turbines that will not be visible from the dwelling.

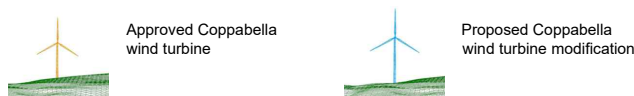
Coppabella Wind Farm Modification



Wireframe 11 Dwelling C75: Approved CWF and wind turbine modification overlay
 Distance to closest approved Coppabella wind turbine 2.83 kilometres. Tips visible 5, Hubs visible 5
 Distance to closest Coppabella wind turbine modification 2.83 kilometres. Tips visible 7, Hubs visible 5



Wireframe 11 Dwelling C75: Coppabella wind turbine modification



Coppabella Wind Farm Modification

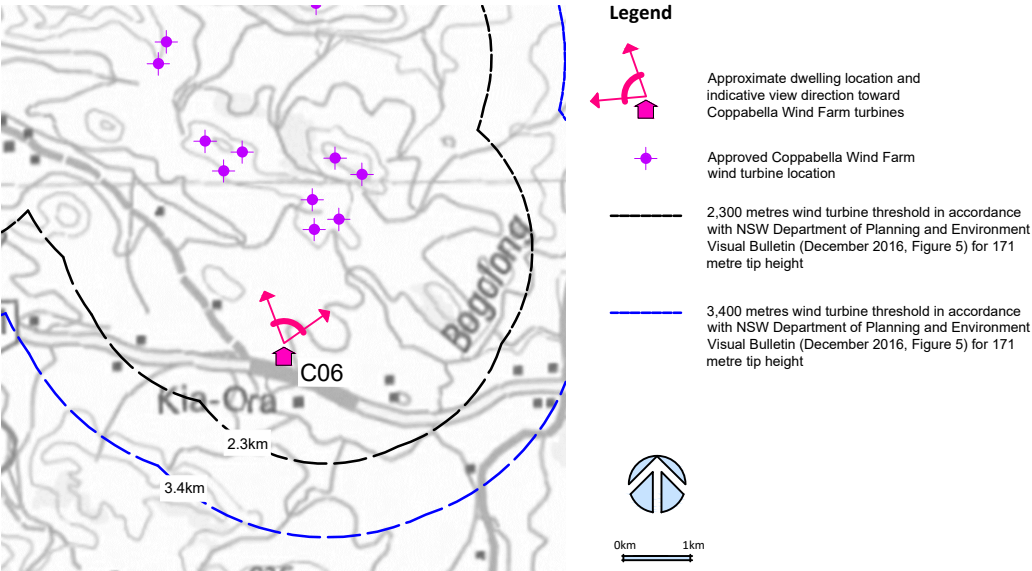
Notes:
 Views toward wind turbines or portions of wind turbines located below the green wire-frame will be screened by landform.

The wire-frame does not account for, or illustrate, any vegetation including trees adjacent to or beyond residential dwellings which may screen or filter views toward the wind turbines. The extent of wind turbine visibility is very conservative and may illustrate a number of wind turbines that will not be visible from the dwelling.



Viewpoint Dwelling C06 - view north to north east from dwelling verandah toward the proposed wind turbines (171 metre tip height) for Coppabella Wind Farm

Approximate distance to closest approved wind turbine 2,007 metres



Photomontage location plan

General Notes: Viewpoint Dwelling C06

Coordinates: Easting 645152, Northing 66147462

Photo date: 6th May 2017, 12.19pm

Elevation 525m AHD

Camera: Nikon D700, 50mm 1:1.4D Lens

Original Page Format - A1 Landscape

Viewpoint C06 is illustrated at a view angle of around 60 degrees which is within the central, binocular field, of human vision.

View at a comfortable arms length at A1 print size

Photomontage limitations

A photomontage can never show exactly what the wind farm will look like in reality due to factors such as different lighting, weather and seasonal conditions which vary through time and the resolution of the image. Also a static image cannot convey turbine movement.

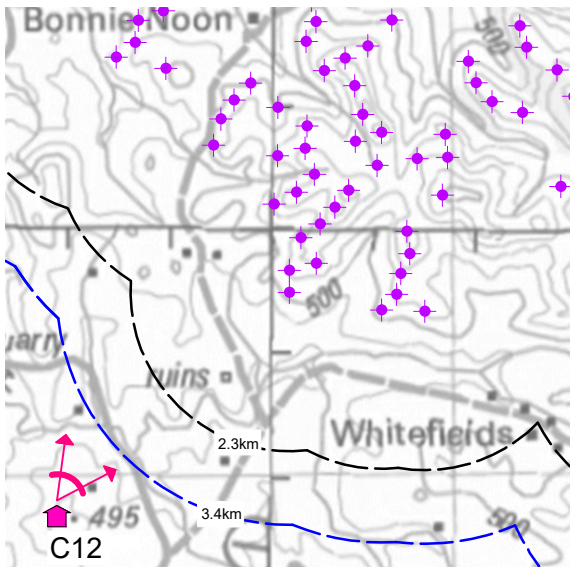
The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate.

The viewpoints illustrated are representative of views in this location, but cannot represent visibility at all locations.

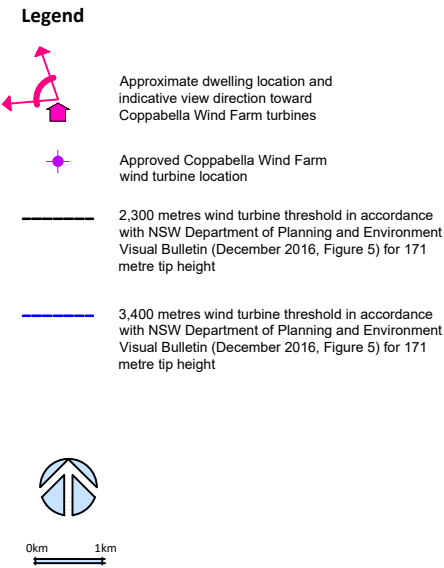
Figure 18 Residential dwelling C06 photomontage from verandah facing north



Viewpoint Dwelling C12 - view north north west to north north east from dwelling verandah toward the proposed wind turbines (171 metre tip height) for Coppabella Wind Farm
 Approximate distance to closest approved wind turbine 4,770 metres



Photomontage location plan



General Notes: Viewpoint Dwelling C12

Coordinates: Easting 634108, Northing 6149277
 Photo date: 5th May 2017, 11.55am
 Elevation 481m AHD
 Camera: Nikon D700, 50mm 1:1.4D Lens
 Original Page Format - A1 Landscape
 Viewpoint C12 is illustrated at a view angle of around 60 degrees which is within the central, binocular field, of human vision.
 View at a comfortable arms length at A1 print size

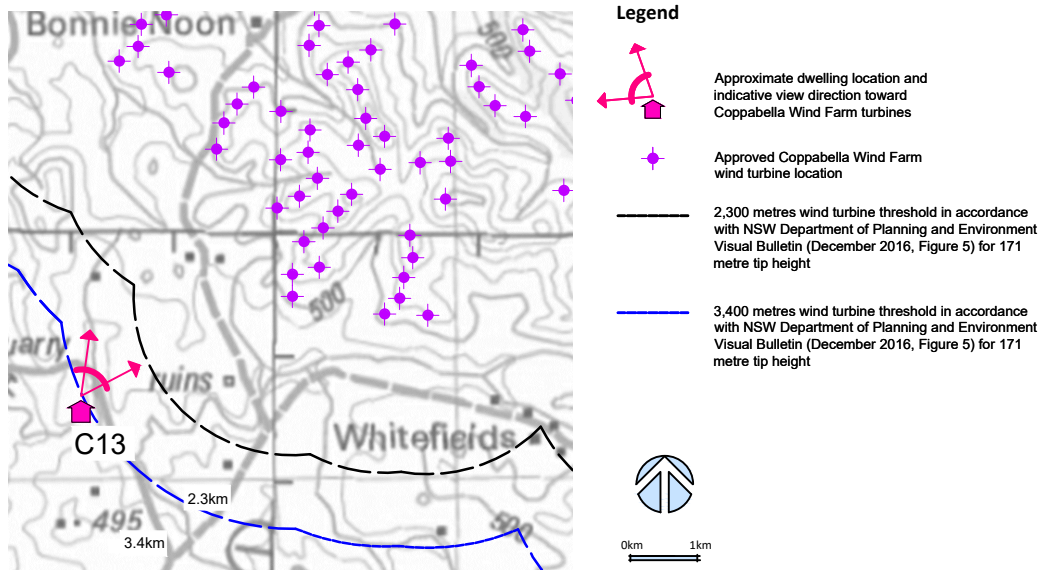
Photomontage limitations

A photomontage can never show exactly what the wind farm will look like in reality due to factors such as different lighting, weather and seasonal conditions which vary through time and the resolution of the image. Also a static image cannot convey turbine movement.
 The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate.
 The viewpoints illustrated are representative of views in this location, but cannot represent visibility at all locations.

Figure 19 Residential dwelling C12 photomontage from verandah facing north east



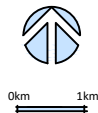
Viewpoint Dwelling C13 - view north to north east from garden toward the proposed wind turbines (171 metre tip height) for Coppabella Wind Farm
Approximate distance to closest approved wind turbine 3,684 metres



Photomontage location plan

Legend

- Approximate dwelling location and indicative view direction toward Coppabella Wind Farm turbines
- Approved Coppabella Wind Farm wind turbine location
- 2,300 metres wind turbine threshold in accordance with NSW Department of Planning and Environment Visual Bulletin (December 2016, Figure 5) for 171 metre tip height
- 3,400 metres wind turbine threshold in accordance with NSW Department of Planning and Environment Visual Bulletin (December 2016, Figure 5) for 171 metre tip height



General Notes: Viewpoint Dwelling C13

Coordinates: Easting 634418, Northing 6151006
Photo date: 6th May 2017, 10.57am
Elevation 403m AHD
Camera: Nikon D700, 50mm 1:1.4D Lens
Original Page Format - A1 Landscape
Viewpoint C13 is illustrated at a view angle of around 60 degrees which is within the central, binocular field, of human vision.
View at a comfortable arms length at A1 print size

Photomontage limitations

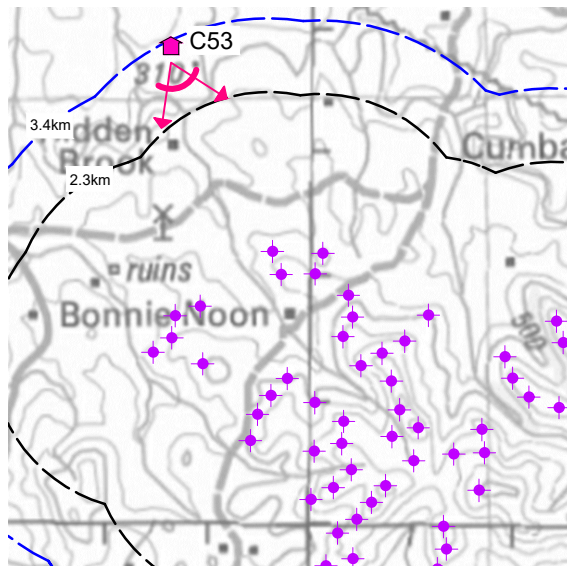
A photomontage can never show exactly what the wind farm will look like in reality due to factors such as different lighting, weather and seasonal conditions which vary through time and the resolution of the image. Also a static image cannot convey turbine movement.
The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate.
The viewpoints illustrated are representative of views in this location, but cannot represent visibility at all locations.

Figure 20 Residential dwelling C13 photomontage from garden north of dwelling



Viewpoint Dwelling C53 - view south east to south from south of dwelling toward the proposed wind turbines (171 metre tip height) for Coppabella Wind Farm

Approximate distance to closest approved wind turbine 3,522 metres



Legend



Approximate dwelling location and indicative view direction toward Coppabella Wind Farm turbines



Approved Coppabella Wind Farm wind turbine location



2,300 metres wind turbine threshold in accordance with NSW Department of Planning and Environment Visual Bulletin (December 2016, Figure 5) for 171 metre tip height



3,400 metres wind turbine threshold in accordance with NSW Department of Planning and Environment Visual Bulletin (December 2016, Figure 5) for 171 metre tip height



0km 1km

Photomontage location plan

General Notes: Viewpoint Dwelling C53

Coordinates: Easting 635369, Northing 6160606

Photo date: 6th May 2017, 13.10pm

Elevation 359m AHD

Camera: Nikon D700, 50mm 1:1.4D Lens

Original Page Format - A1 Landscape

Viewpoint C53 is illustrated at a view angle of around 60 degrees which is within the central, binocular field, of human vision.

View at a comfortable arms length at A1 print size

Photomontage limitations

A photomontage can never show exactly what the wind farm will look like in reality due to factors such as different lighting, weather and seasonal conditions which vary through time and the resolution of the image. Also a static image cannot convey turbine movement.

The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate.

The viewpoints illustrated are representative of views in this location, but cannot represent visibility at all locations.

Figure 21 Residential dwelling C53 photomontage from garden/paddock south of dwelling

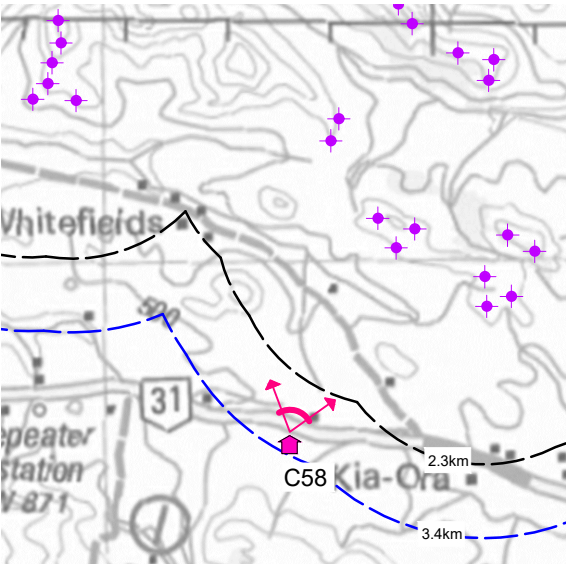
Coppabella Wind Farm Modification

GREEN BEAN DESIGN

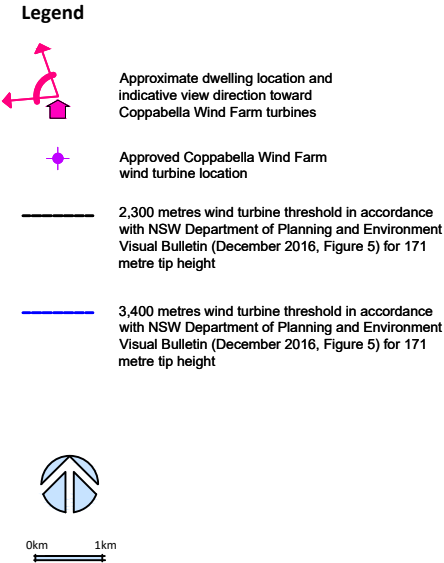
landscape architects



Viewpoint Dwelling C58 - view north to east north east from dwelling toward the proposed wind turbines (171 metre tip height) for Coppabella Wind Farm
 Approximate distance to closest approved wind turbine 3,324 metres



Photomontage location plan



General Notes: Viewpoint Dwelling C58

Coordinates: Easting 642788, Northing 6147347
 Photo date: 30th June 2017, 11.49am
 Elevation 550m AHD
 Camera: Nikon D700, 50mm 1:1.4D Lens
 Original Page Format - A1 Landscape
 Viewpoint C58 is illustrated at a view angle of around 60 degrees which is within the central, binocular field, of human vision.
 View at a comfortable arms length at A1 print size

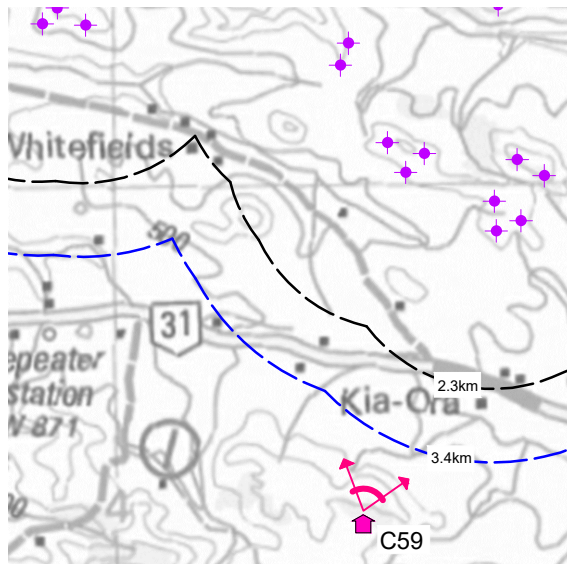
Photomontage limitations

A photomontage can never show exactly what the wind farm will look like in reality due to factors such as different lighting, weather and seasonal conditions which vary through time and the resolution of the image. Also a static image cannot convey turbine movement.
 The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate.
 The viewpoints illustrated are representative of views in this location, but cannot represent visibility at all locations.

Figure 22 Residential dwelling C58 photomontage from verandah north of dwelling



Viewpoint Dwelling C59 - view north north west to north east from paddock north of dwelling toward the proposed wind turbines (171 metre tip height) for Coppabella Wind Farm
 Approximate distance to closest approved wind turbine 4,056 metres



Legend



Approximate dwelling location and
indicative view direction toward
Coppabella Wind Farm turbines



Approved Coppabella Wind Farm
wind turbine location



2,300 metres wind turbine threshold in accordance
with NSW Department of Planning and Environment
Visual Bulletin (December 2016, Figure 5) for 171
metre tip height



3,400 metres wind turbine threshold in accordance
with NSW Department of Planning and Environment
Visual Bulletin (December 2016, Figure 5) for 171
metre tip height



0km 1km

Photomontage location plan

General Notes: Viewpoint Dwelling C59

Coordinates: Easting 643583, Northing 6146011

Photo date: 6th May 2017, 12.51pm

Elevation 550m AHD

Camera: Nikon D700, 50mm 1:1.4D Lens

Original Page Format - A1 Landscape

Viewpoint C59 is illustrated at a view angle of around
60 degrees which is within the central, binocular field,
of human vision.

View at a comfortable arms length at A1 print size

Photomontage limitations

A photomontage can never show exactly what
the wind farm will look like in reality due to
factors such as different lighting, weather and
seasonal conditions which vary through time
and the resolution of the image. Also a static
image cannot convey turbine movement.

The images provided give a reasonable
impression of the scale of the turbines and
the distance to the turbines, but can never be
100% accurate.

The viewpoints illustrated are representative
of views in this location, but cannot represent
visibility at all locations.

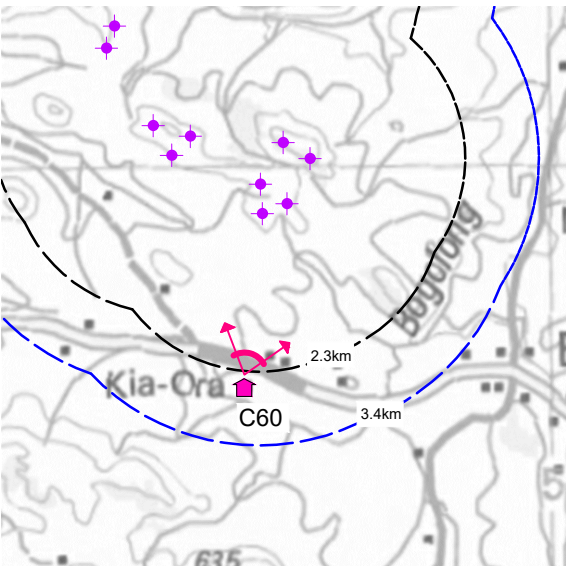
**Figure 23 Residential dwelling
photomontage from paddock
north of dwelling**

Coppabella Wind Farm Modification

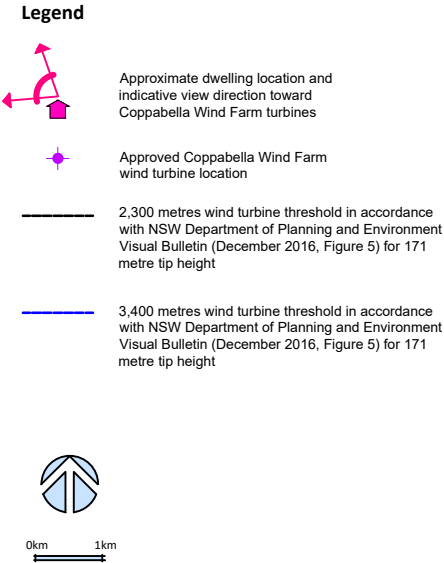


Viewpoint Dwelling C60 - view north north west to north east from dwelling verandah toward the proposed wind turbines (171 metre tip height) for Coppabella Wind Farm

Approximate distance to closest approved wind turbine 2,564 metres



Photomontage location plan



General Notes: Viewpoint Dwelling C60

Coordinates: Easting 645427, Northing 6146819

Photo date: 6th May 2017, 11.57pm

Elevation 502m AHD

Camera: Nikon D700, 50mm 1:1.4D Lens

Original Page Format - A1 Landscape

Viewpoint C60 is illustrated at a view angle of around 60 degrees which is within the central, binocular field, of human vision.

View at a comfortable arms length at A1 print size

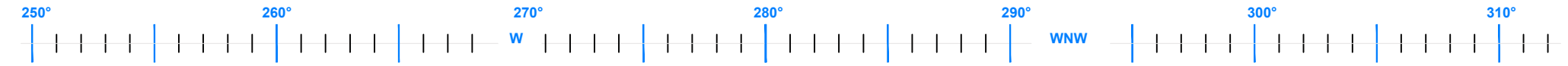
Photomontage limitations

A photomontage can never show exactly what the wind farm will look like in reality due to factors such as different lighting, weather and seasonal conditions which vary through time and the resolution of the image. Also a static image cannot convey turbine movement.

The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate.

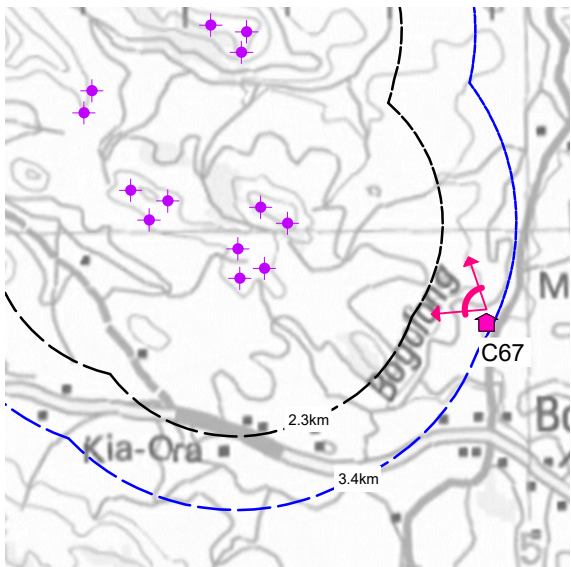
The viewpoints illustrated are representative of views in this location, but cannot represent visibility at all locations.

Figure 24 Residential dwelling C60 photomontage from verandah north of dwelling

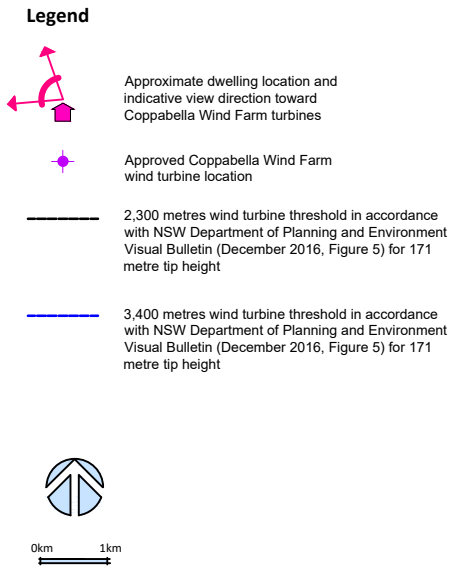


Viewpoint Dwelling C67 - view west south west to north west from paddock north of dwelling toward the proposed wind turbines (171 metre tip height) for Coppabella Wind Farm

Approximate distance to closest approved wind turbine 3,263 metres



Photomontage location plan



General Notes: Viewpoint Dwelling C67

Coordinates: Easting 649282, Northing 6148464

Photo date: 6th May 2017, 9.03am

Elevation 451m AHD

Camera: Nikon D700, 50mm 1:1.4D Lens

Original Page Format - A1 Landscape

Viewpoint C67 is illustrated at a view angle of around 60 degrees which is within the central, binocular field, of human vision.

View at a comfortable arms length at A1 print size

Photomontage limitations

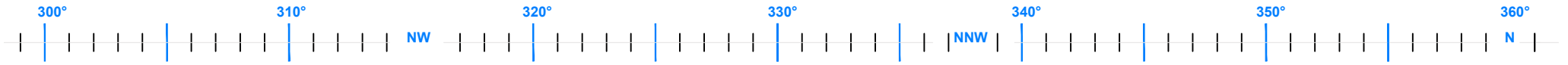
A photomontage can never show exactly what the wind farm will look like in reality due to factors such as different lighting, weather and seasonal conditions which vary through time and the resolution of the image. Also a static image cannot convey turbine movement.

The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate.

The viewpoints illustrated are representative of views in this location, but cannot represent visibility at all locations.

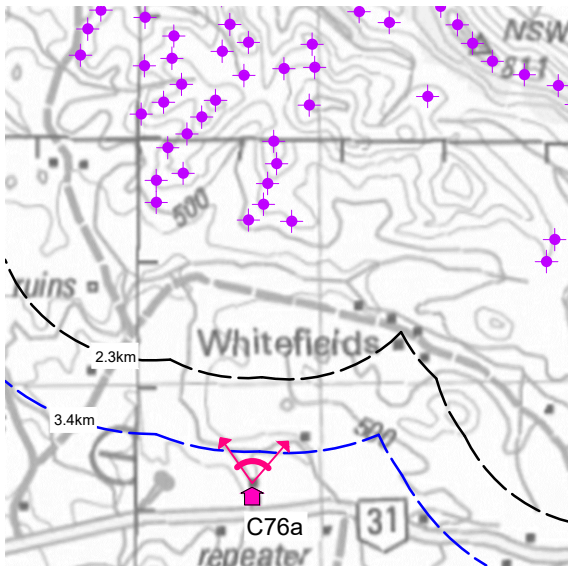
Figure 25 Residential dwelling C67 photomontage from paddock north of dwelling

Coppabella Wind Farm Modification

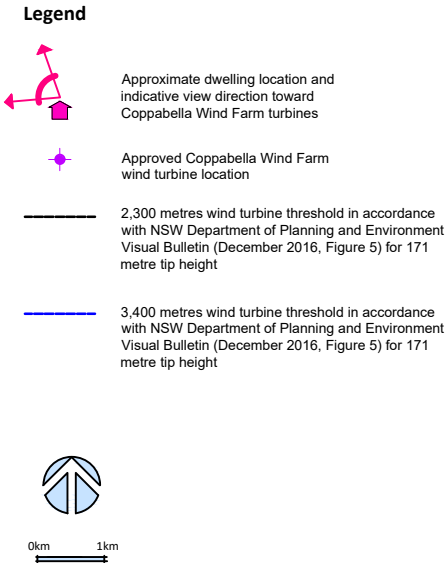


Viewpoint Dwelling C76a - view west to north from yards north of dwelling toward the proposed wind turbines (171 metre tip height) for Coppabella Wind Farm

Approximate distance to closest approved wind turbine 4,162 metres



Photomontage location plan



General Notes: Viewpoint Dwelling C76a

Coordinates: Easting 639096, Northing 6148326

Photo date: 5th May 2017, 10.23am

Elevation 467m AHD

Camera: Nikon D700, 50mm 1:1.4D Lens

Original Page Format - A1 Landscape

Viewpoint C76a is illustrated at a view angle of around 60 degrees which is within the central, binocular field, of human vision.

View at a comfortable arms length at A1 print size

Photomontage limitations

A photomontage can never show exactly what the wind farm will look like in reality due to factors such as different lighting, weather and seasonal conditions which vary through time and the resolution of the image. Also a static image cannot convey turbine movement.

The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate.

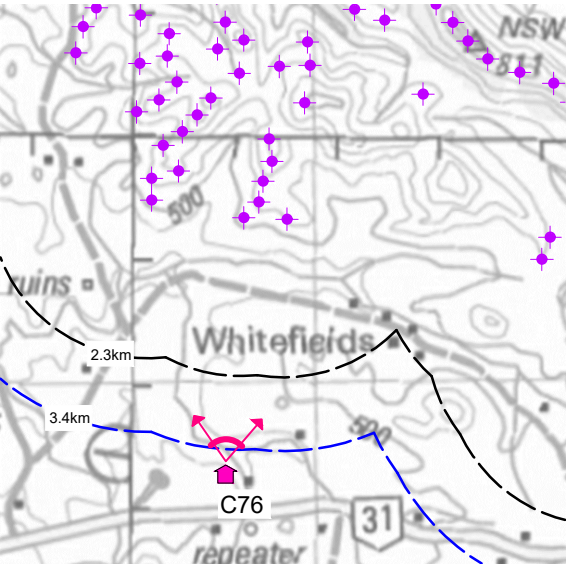
The viewpoints illustrated are representative of views in this location, but cannot represent visibility at all locations.

Figure 26 Residential dwelling C76a photomontage from yards north of dwelling

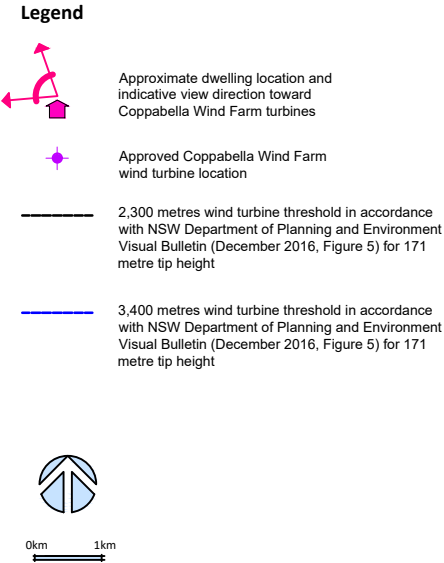


Viewpoint Dwelling C76 - view north north west to north east from dwelling verandah toward the proposed wind turbines (171 metre tip height) for Coppabella Wind Farm

Approximate distance to closest approved wind turbine 3,864 metres



Photomontage location plan



General Notes: Viewpoint Dwelling C76

Coordinates: Easting 639096, Northing 6148326

Photo date: 5th May 2017, 10.23am

Elevation 467m AHD

Camera: Nikon D700, 50mm 1:1.4D Lens

Original Page Format - A1 Landscape

Viewpoint C76 is illustrated at a view angle of around 60 degrees which is within the central, binocular field, of human vision.

View at a comfortable arms length at A1 print size

Photomontage limitations

A photomontage can never show exactly what the wind farm will look like in reality due to factors such as different lighting, weather and seasonal conditions which vary through time and the resolution of the image. Also a static image cannot convey turbine movement.

The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate.

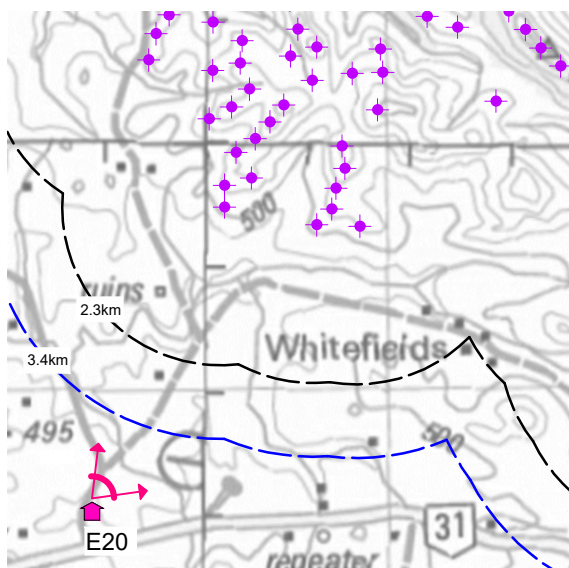
The viewpoints illustrated are representative of views in this location, but cannot represent visibility at all locations.

Figure 27 Residential dwelling C76 photomontage from verandah north of dwelling

Coppabella Wind Farm - C76



Viewpoint Dwelling E20 - view north to east north east from garden north of dwelling toward the proposed wind turbines (171 metres tip height) for Coppabella Wind Farm
Approximate distance to closest approved wind turbine 4,977 metres



Legend



Approximate dwelling location and indicative view direction toward Coppabella Wind Farm turbines



Approved Coppabella Wind Farm wind turbine location



2,300 metres wind turbine threshold in accordance with NSW Department of Planning and Environment Visual Bulletin (December 2016, Figure 5) for 171 metre tip height



3,400 metres wind turbine threshold in accordance with NSW Department of Planning and Environment Visual Bulletin (December 2016, Figure 5) for 171 metre tip height



0km 1km

Photomontage location plan

General Notes: Viewpoint Dwelling E20

Coordinates: Easting 635411, Northing 6148245

Photo date: 6th May 2017, 11.19am

Elevation 472m AHD

Camera: Nikon D700, 50mm 1:1.4D Lens

Original Page Format - A1 Landscape

Viewpoint E20 is illustrated at a view angle of around 60 degrees which is within the central, binocular field, of human vision.

View at a comfortable arms length at A1 print size

Photomontage limitations

A photomontage can never show exactly what the wind farm will look like in reality due to factors such as different lighting, weather and seasonal conditions which vary through time and the resolution of the image. Also a static image cannot convey turbine movement.

The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate.

The viewpoints illustrated are representative of views in this location, but cannot represent visibility at all locations.

Figure 28 Residential dwelling E20 photomontage from garden north of dwelling

Coppabella Wind Farm Modification

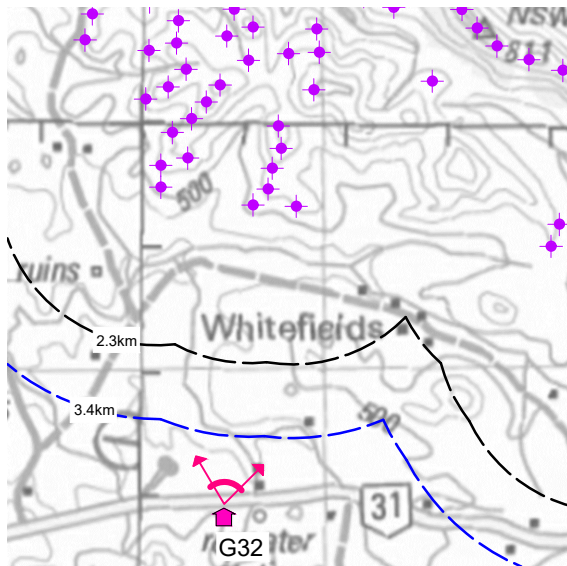
GREEN BEAN DESIGN

landscape architects



Viewpoint Dwelling G32 - view west to north north east from dwelling verandah toward the proposed wind turbines (171 metre tip height) for Coppabella Wind Farm

Approximate distance to closest approved wind turbine 4,220 metres



Photomontage location plan

Legend



Approximate dwelling location and indicative view direction toward Coppabella Wind Farm turbines



Approved Coppabella Wind Farm wind turbine location



2,300 metres wind turbine threshold in accordance with NSW Department of Planning and Environment Visual Bulletin (December 2016, Figure 5) for 171 metre tip height



3,400 metres wind turbine threshold in accordance with NSW Department of Planning and Environment Visual Bulletin (December 2016, Figure 5) for 171 metre tip height



0km 1km

General Notes: Viewpoint Dwelling G32

Coordinates: Easting 638451, Northing 6147811

Photo date: 5th May 2017, 9.43am

Elevation 504m AHD

Camera: Nikon D700, 50mm 1:1.4D Lens

Original Page Format - A1 Landscape

Viewpoint G32 is illustrated at a view angle of around 60 degrees which is within the central, binocular field, of human vision.

View at a comfortable arms length at A1 print size

Photomontage limitations

A photomontage can never show exactly what the wind farm will look like in reality due to factors such as different lighting, weather and seasonal conditions which vary through time and the resolution of the image. Also a static image cannot convey turbine movement.

The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate.

The viewpoints illustrated are representative of views in this location, but cannot represent visibility at all locations.

Figure 29 Residential dwelling G32 photomontage from verandah north of dwelling

Coppabella Wind Farm Modification

10 Review of Conditions of Consent

10.1 Introduction

The CWF Conditions of Consent have been reviewed as part of this VIA to determine the type and extent of additional mitigation measures that would be required, or should be modified as a result of the proposed CWF wind turbine modifications.

10.2 Review of Conditions of Consent

The following Table outlines the existing Conditions relevant to mitigate the potential visual effects of the CWF modification.

Table 9 Conditions of Consent

Condition	Description	Comment								
Condition 1	Prior to the commencement of construction, the Applicant shall notify in writing the owner of: - any non-associated residence listed in Table 1; or - any other non-associated residence within 5 kilometres of any wind turbine, that they have the right to request implementation of visual impact mitigation measures at their residence (including its curtilage). <i>Table 1: Visual impact mitigation upon request</i> <table><tr><th><i>Residence</i></th><th><i>Characterisation of Impact</i></th></tr><tr><td>C06, C53, C67, C74</td><td>Moderate</td></tr><tr><td>C04, C13, C39, C41, C75</td><td>Low/Moderate</td></tr><tr><td>C01, C07, C08, C09, C37, C38, C60, C73, C76, C76a, G32, H40, H42</td><td>Low</td></tr></table> <i>Note: If the construction of the development is being staged, the Applicant is only required to notify those owners referred to in condition 1(b) that would be within 5 kilometres of any wind turbine that forms part of the relevant stage.</i>	<i>Residence</i>	<i>Characterisation of Impact</i>	C06, C53, C67, C74	Moderate	C04, C13, C39, C41, C75	Low/Moderate	C01, C07, C08, C09, C37, C38, C60, C73, C76, C76a, G32, H40, H42	Low	This condition remains generally valid; however, dwelling C67 is now associated. It is unclear how the conditions for residences listed in Table 1 differ in applicability to other residences within 5 kilometres of any wind turbine.
<i>Residence</i>	<i>Characterisation of Impact</i>									
C06, C53, C67, C74	Moderate									
C04, C13, C39, C41, C75	Low/Moderate									
C01, C07, C08, C09, C37, C38, C60, C73, C76, C76a, G32, H40, H42	Low									
Condition 2	If following the commencement of construction, the Applicant receives a written request from the owner of any residence referred to in condition 1 above for the implementation of visual impact mitigation measures (such	This condition remains valid.								

Condition	Description	Comment
	as landscaping, vegetation screening, provision of awnings/blinds), then the Applicant shall implement measures at the residence (including its curtilage) in consultation with the landowner. These mitigation measures must be reasonable and feasible, directed towards reducing the visual impacts of the wind turbines on the residence (including its curtilage), and commensurate with the level of visual impact. The mitigation measures must be implemented within 12 months of receiving the written request, unless the Secretary agrees otherwise. If the Applicant and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution. Notes: • To identify the residences referred to in Table 1, see the figures in Appendix 2. • To avoid any doubt, the visual impact mitigation measures must be aimed at reducing the visibility of the wind turbines from the residence and its curtilage. Mitigation measures are not required to be implemented to reduce the visibility of wind turbines from other locations on the property. • In some cases, mitigation measures may not be warranted as the wind turbines would not be visible from the residence and its curtilage. • The identification of appropriate visual impact mitigation measures will be easier following the construction of the wind turbines. While landowners may ask for the implementation of visual impact mitigation measures shortly after the commencement of construction, they should consider the merits of delaying this request until the wind turbines are visible from their residence.	
Condition 3	The Applicant shall: (a) implement all reasonable and feasible measures to minimise the off-site visual impacts of the development; (b) ensure the wind turbines are:	This condition remains valid.

Condition	Description	Comment
	• painted off white/grey; and • finished with a surface treatment that minimises the potential for glare and reflection; (c) ensure the visual appearance of all ancillary infrastructure (including paint colours, specifications and screening) blends in as far as possible with the surrounding landscape; and (d) not mount any advertising signs or logos on wind turbines or ancillary infrastructure.	
Condition 4	The Applicant shall: (a) implement all reasonable and feasible measures to minimise the off-site lighting impacts of the development; (b) ensure that any aviation hazard lighting complies with CASA's requirements; (c) ensure that all external lighting associated with the development (apart from any aviation hazard lighting): • is installed as low intensity lighting (except where required for safety or emergency purposes); • does not shine above the horizontal; • uses best management practice for bat deterrence; and • complies with Australian Standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting, or its latest version.	This condition remains valid.

11 Conclusion

A determination for potential increases to the visual effects associated with the proposed CWF wind turbine modifications has been based upon professional judgement in consideration of:

- the proposed amendments to the wind turbines
- the blade length (and tip height difference) between approved CWF and proposed CWF wind turbine modifications
- the overall visibility and visual scale of the proposed CWF wind turbine modifications and
- the proposed CWF magnitude of visual effect compared to the approved CWF wind turbines.

The proposed CWF wind turbine modifications are not considered to be dissimilar to other approved and constructed wind farm projects in the NSW Southern Tablelands, and is located within an area of low density rural settlement zoned RU1 Primary Production. The closest rural town is Bookham that is over 3.4km from the closest approved wind turbine. Binalong, the largest town in proximity to the wind farm, is over 7km distance and will have various degrees of visual screening due to topography and vegetation.

This VIA has illustrated and compared the approved CWF project against the proposed CWF wind turbine modifications. This VIA concludes that the proposed increase in wind turbine rotor diameter (and maximum tip height) would be discernible from some surrounding and proximate view locations where views toward the approved CWF wind turbines exist.

The additional level of wind turbine visibility would only involve the upper parts of the rotors, no additional hubs would be visible, and only the blade tips for a maximum of eight turbines would be visible at any dwelling location. The CWF wind turbine modification is not considered to be of a magnitude that would significantly increase visual effects and visual impact ratings associated with the approved CWF development.

This VIA has addressed the Guidelines and established Visual Influence Zones for residential dwellings located within 3.4 kilometres in accordance with the Guideline requirements.

Whilst the approved CWF and the proposed CWF wind turbine modifications would be visible (in whole or in part) from the majority of residential dwellings within 3.4 kilometres of wind turbine locations, overall visibility would be partially restricted from many areas (including from dwellings and associated curtilage) due to tree cover and/or the influence of surrounding landforms. The implementation of landscape works would provide visual mitigation for a number of dwellings surrounding the approved wind farm site in accordance with the Conditions of Consent.