Night time lighting

Section 11

11.1 Introduction

As the Mount Emerald wind turbines will be no greater than 150 m in height (to tip of blade), and in accordance with current CASA guidelines, the Mount Emerald wind turbines will not require obstacle lighting.

Should future CASA regulations require a lighting assessment; the proponent will undertake a detailed Obstacle Lighting Assessment will be undertaken by an Aeronautical Impact Assessment expert to stipulate the turbine lighting layout which would mitigate any risks to aviation. The outcomes of the Aeronautical Impact Assessment and the Obstacle Lighting Assessment would then be submitted to CASA for their comment.

Potential visual impacts associated with obstacle marking and lighting at night time have not been extensively researched or tested in Queensland, although some site investigations have been carried out at existing wind farms in Victoria. Investigations have generally concluded that although night time lighting mounted on wind turbines could be visible for a number of kilometres from the wind farm project area, the actual intensity of the lighting appears no greater than other sources of night time lighting, including vehicle head and tail lights.

Previous investigations have also suggested that replacing the more conventional incandescent lights with light emitting diodes (LED) could help to minimise the potential visual impact of the wind turbine lights (Epuron 2008).

In order to illustrate the visual effect of turbine mounted lighting a series of night time photographs were taken of the Cullerin wind farm in the New South Wales Southern Tablelands. These were taken at distances of 500 m, 3.5 km and 17 km from the turbines and are illustrated in **Figures 46, 47** and **48**. Each night time view is presented below a corresponding day time photograph taken from the same photo location. It should be noted that following community consultation, and the preparation of an aviation risk assessment, Origin Energy have removed night time obstacle lighting from the Cullerin wind turbines.

11.2 Existing light sources

A small number of existing night time light sources occur within the Mount Emerald wind farm viewshed, and include rural residential and general lighting within surrounding towns.

Localised lighting is associated with a small number of dispersed homesteads located within the project boundary, but lighting is unlikely to be visually prominent and does not emit any significant illumination beyond immediate areas surrounding residential and agricultural buildings.

Lights from vehicles travelling along the local roads and highways provide dynamic and temporary sources of light.

11.3 Potential light sources

The main potential light sources associated with the Mount Emerald wind farm would include:

- low intensity night lights for substation, control and auxiliary buildings; and
- night time obstacle lights mounted on some wind turbines (if required in the future).

In accordance with the withdrawn CASA Advisory Circular two red medium intensity obstacle lights were required on specified turbines at a distance not exceeding 900 m and all lights were to flash synchronously. To minimise visual impact some shielding of the obstacle lights below the horizontal plane was permitted. Lighting for aviation safety could also be required prior to and during the construction period, including lighting for large equipment such as cranes.

In addition to the standard level of lighting required for normal security and safety, lighting could also be required for scheduled or emergency maintenance around the control building, substation and wind turbine areas.

As the visibility of the substation and control room would be largely contained by the surrounding landform, it is unlikely that light spill from these sources would be visible from the majority of surrounding view locations including surrounding residences.

11.4 Potential view locations and impact

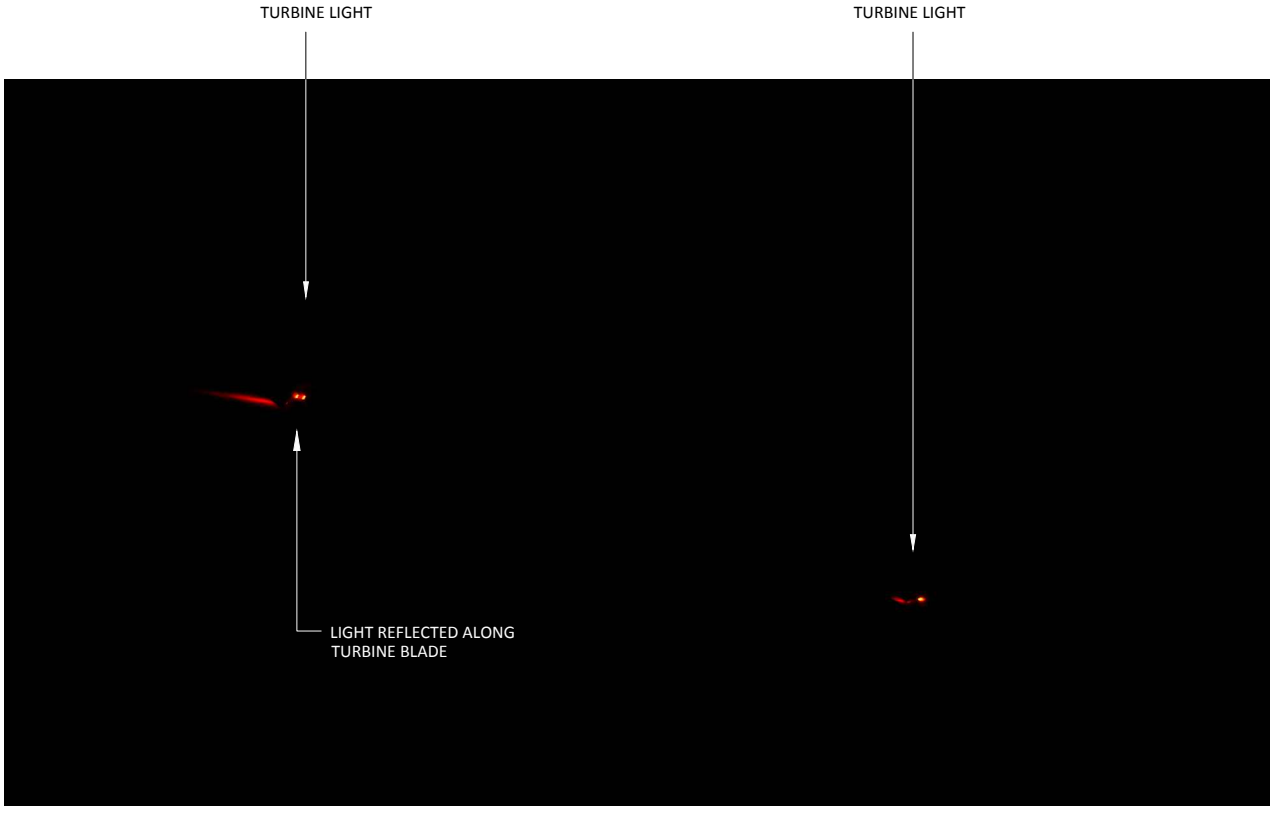
The categories of potential view locations that could be impacted by night time lighting generally include residents and motorists.

Night time lighting associated with the wind farm is unlikely to have a significant visual impact on the majority of public view locations. Whilst obstacle lighting would be visible to motorists travelling along the local roads, the duration of visibility would tend to be very short and partially screened by undulating landform along some sections of local road corridors and influenced by the direction of travel.

Night time obstacle lighting associated with the wind farm would be visible from a number of the residential view locations surrounding the Mount Emerald wind farm; however, topography and screening by vegetation and screen planting around residential dwellings would screen or partially obscure views toward night time obstacle lighting.

Irrespective of the total number of visible lights, any lighting is more likely to be noticeable from exterior areas surrounding residences rather than from within residences, where internal lighting tends to reflect and mirror views in windows, or where exterior views would be obscured when curtains and blinds are closed.

Day time view from Hume highway toward Cullerin wind farm at around 500m



Night time view from Hume highway toward Cullerin wind farm at around 500m

Figure 46
Night lighting Cullerin wind farm at 500m

Cullerin wind farm night time lighting. View approximately 500 m west from Hume Highway

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MOUNT EMERALD WIND FARM

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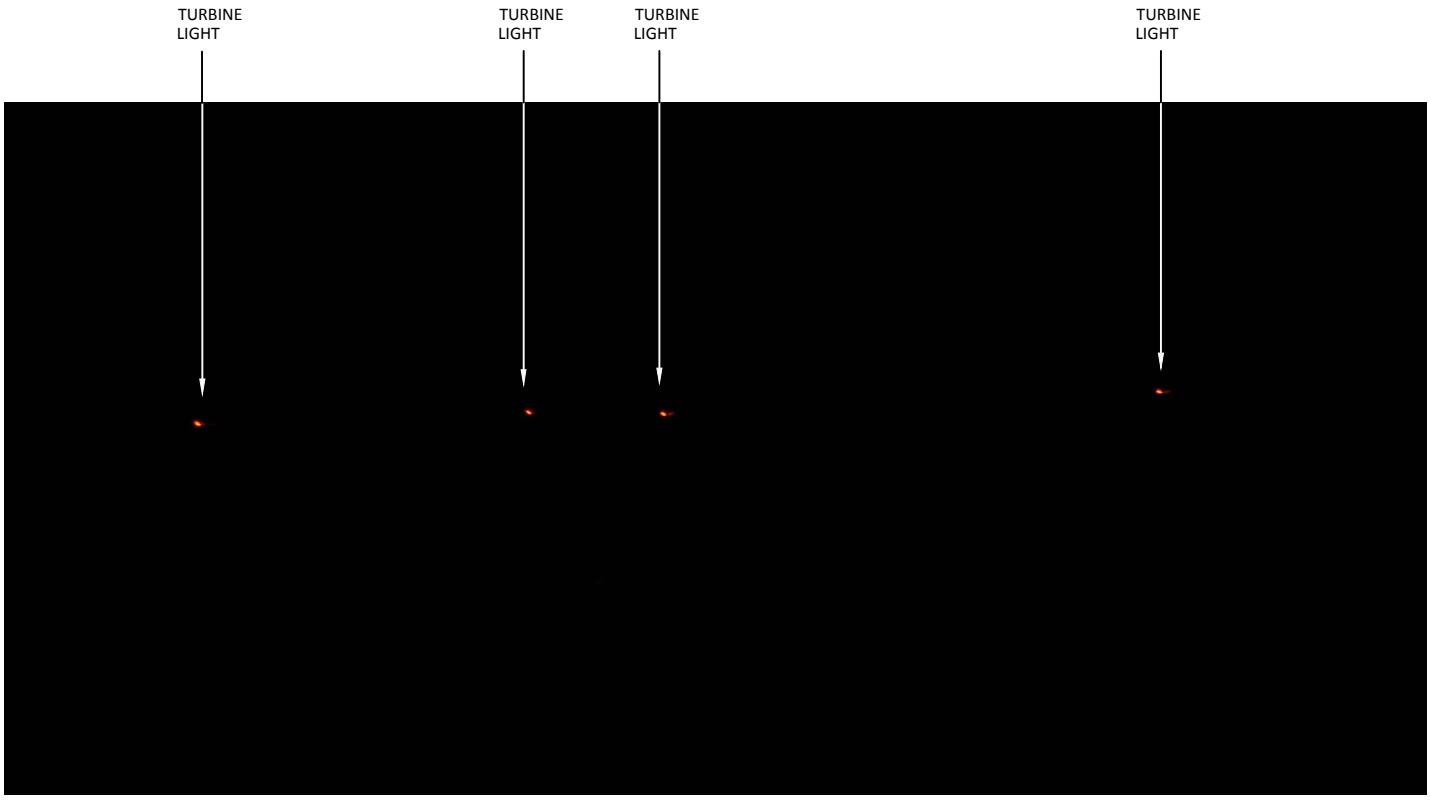
Day time view from Hume highway toward Cullerin wind farm at around 3.5km



Night time view from Hume highway toward Cullerin wind farm at around 3.5km

Figure 47
Night lighting Cullerin wind farm at 3.5km

Cullerin wind farm night time lighting . View approximately 3.5 km west from Hume highway.

RATCH-Australia Corporation

MOUNT EMERALD WIND FARM

GREEN BEAN DESIGN
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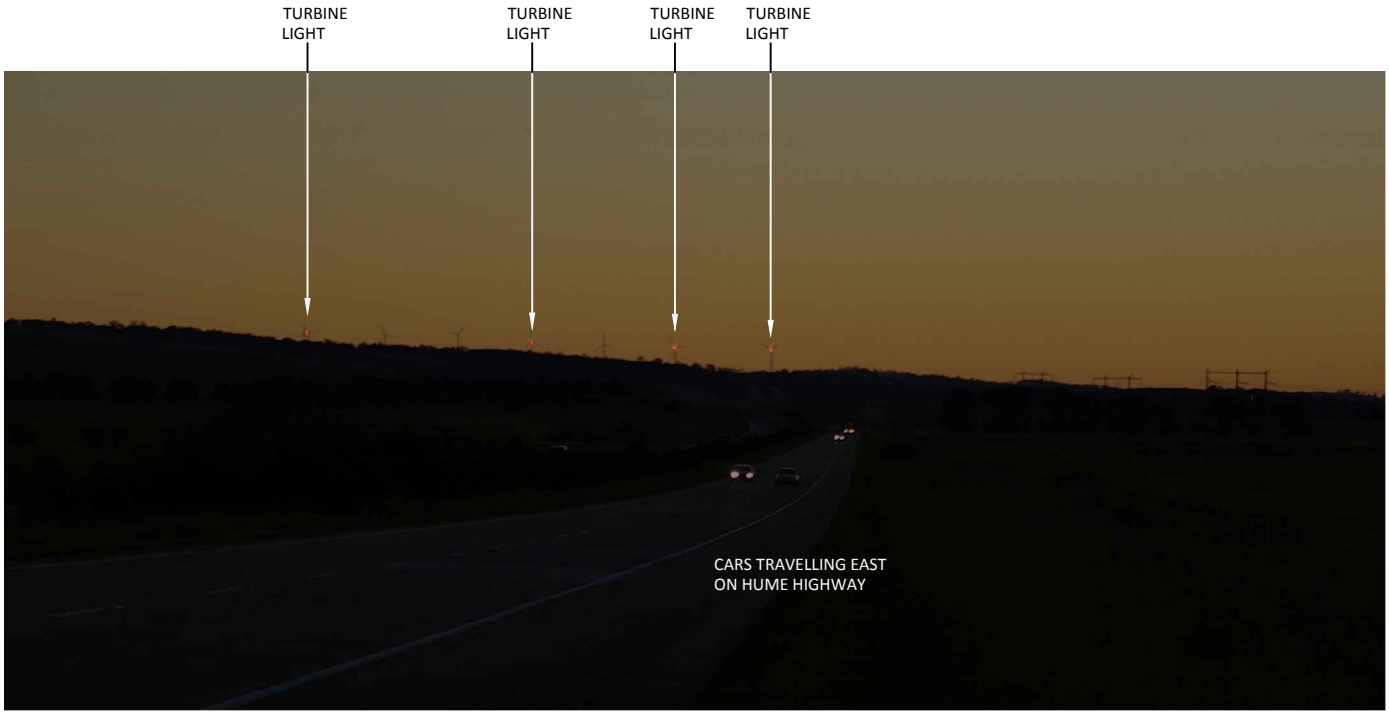
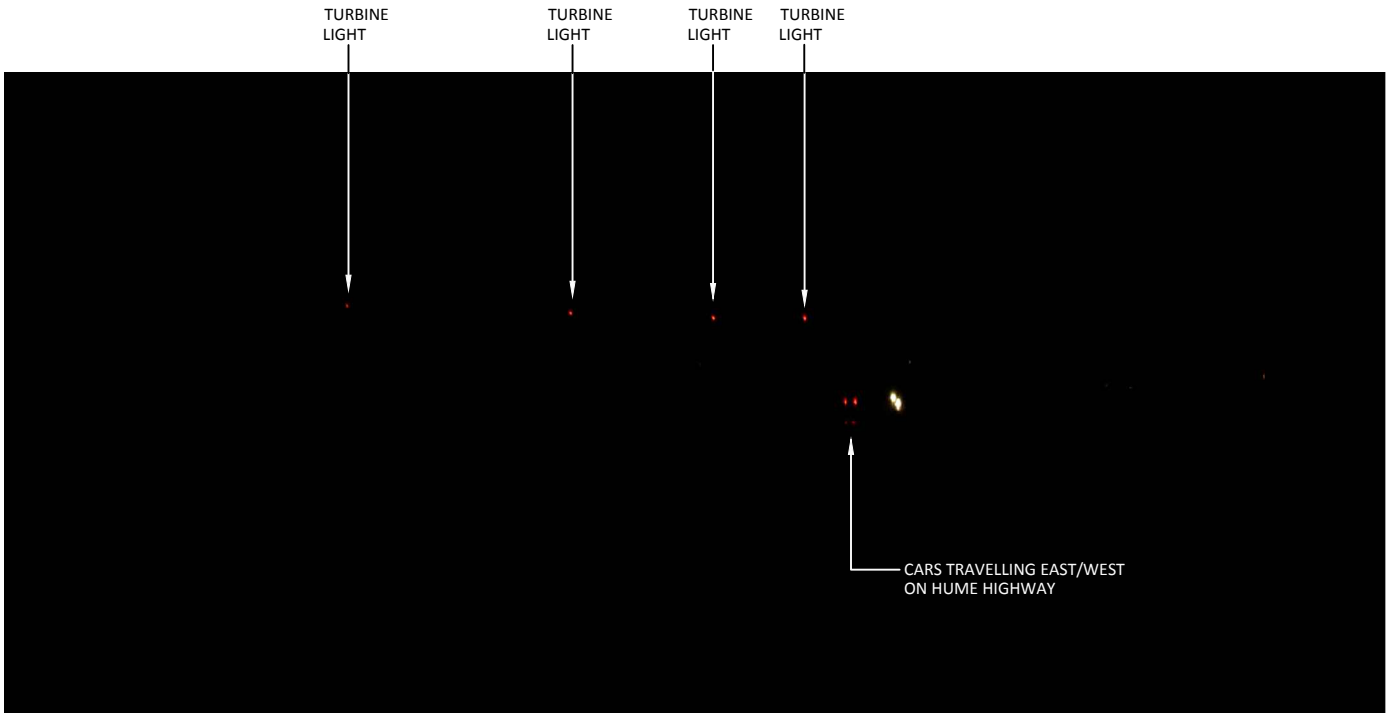


View west at dusk from Hume highway toward Cullerin wind farm at around 17km



View west after dark from Hume highway toward Cullerin wind farm at around 17km

Cullerin wind farm night time lighting . view west from Hume highway at around 17km distance.

Figure 48
Night lighting Cullerin wind farm at 17km

RATCH-Australia Corporation

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Electrical works

Section 12

12.1 Introduction

The Mount Emerald wind farm would include a range of electrical infrastructure to collect and distribute electricity generated by the wind turbines. Electrical works would include elements such as:

- wind turbine transformers at each turbine site located within the turbine tower;
- a wind farm substation with two 130 MVA transformers, switch gear and circuit breakers;
- approximately 40km of 33kV underground electrical and control cabling to connect each wind turbine to the substation;
- an overhead transmission connection to the existing 275kV transmission line; and
- an operations building containing control and communications equipment.

A typical design for a wind farm substation is illustrated in **Plate 6** and demonstrates the relatively small scale development required for this component of the electrical infrastructure. The majority of electrical connections between the wind turbines would be via underground cabling wherever possible, including areas along ridgelines within the project boundary. Some sections of 33kV overhead electrical reticulation could be required within the site boundary; however, the scale of these structures would be similar to existing medium voltage electrical distribution utility infrastructure found throughout the landscape.

Plate 6 – Typical wind farm collector substation

12.2 Substation

The final location and layout of the substation would be selected subject to detail engineering design. The main visual components of a typical wind farm collection/connection substation would likely comprise:

- incoming and outgoing overhead powerlines;
- a single storey control building;
- electrical housings and buildings
- an access road and parking (or road utilising wind turbine maintenance access track);
- various switch bays and transformers;
- a communications pole;
- lightning masts;
- water tank;
- external lighting for security and maintenance; and
- security fencing including a palisade fence and internal chainmesh fence.

The substation location and associated electrical infrastructure works would not be visible from residential or public view locations beyond the project area, and would be screened by landform extending across the project area plateau.

Pre-construction and construction

Section 13

13.1 Potential visual impacts

There are potential visual impacts that could occur during both pre-construction and construction phases of the project. The wind farm construction phase is likely to occur over a period of around 24 months, although the extent and nature of pre-construction and construction activities would vary at different locations within the project area.

The key pre-construction and construction activities that would be visible from areas surrounding the proposed wind farm include:

- ongoing detailed site assessment including sub surface geotechnical investigations;
- various civil works to upgrade local roads and access point;
- construction compound buildings and facilities;
- construction facilities, including portable structures and laydown areas;
- various construction and directional signage;
- mobilisation of rock crushing equipment and concrete batching plant (if required);
- excavation and earthworks; and
- various construction activities including erection of wind turbines, monitoring masts and substation with associated electrical infrastructure works.

The majority of pre-construction and construction activities, some of which would result in physical changes to the landscape (which have been assessed in this LVIA report), are generally temporary in nature and for the most restricted to various discrete areas within or beyond the immediate wind farm project area. The majority of pre-construction and construction activities would be unlikely to result in an unacceptable level of visual impact for their duration and temporary nature.

Plate 7 Illustrating typical activities during wind farm construction and installation.

(Image: Wind Prospect CWP Pty Ltd).

Perception and public consultation

Section 14

14.1 Perception

People's perception of wind farms is an important issue to consider as the attitude or opinion of individual people adds significant weight to the level of potential visual impact.

The opinions and perception of individuals from the local community and broader area were sought and provided through a range of consultation activities. These included:

- public open days
- public site inspection;
- dedicated project web; and
- individual stakeholder meetings.

The attitudes or opinions of individuals toward wind farms can be shaped or formed through a multitude of complex social and cultural values. Whilst some people may accept and support wind farms in response to global or local environmental issues, others may find the concept of wind farms completely unacceptable. Some may support the environmental ideals of wind farm development as part of a broader renewable energy strategy but do not consider them appropriate for their regional or local area. It is unlikely that wind farm projects will ever conform or be acceptable to all points of view; however, research within Australia as well as overseas consistently suggests that the majority of people who have been canvassed do support the development of wind farms.

Wind farms are generally easy to recognise in the landscape and to take advantage of available wind resources are more often located in elevated and exposed locations. The geometrical form of a wind turbine is a relatively simple one and can be visible for some distance beyond a wind farm, and the level of visibility may be accentuated by the repetitive or repeating pattern of multiple wind turbines within a local area. Wind farms do have a significant potential to alter the physical appearance of the landscape, as well as change existing landscape values.

14.2 Public consultation and survey

Public open days were held at the Mareeba Heritage Centre in March 2011 and September 2012. The open days provided an opportunity for members of the local community to view preliminary photomontages as well as other maps and plans illustrating layouts and potential locations for project infrastructure. The open day also provided an opportunity for the local community to provide feedback on their experience and personal values associated with the surrounding landscape.

The Proponent commissioned a community survey in March 2012. The survey undertaken by Auspoll was carried out to identify community attitudes to the proposed Mount Emerald wind farm project. The key outcomes of the survey identified that:

- *Over 80% of respondents are aware of the proposed development.*
- *Around three quarters of respondents (76%) support the project, with only 13% opposed to it.*
- *32% of opponents say it will be an eyesore or unattractive*
- *29% of opponents say it is too close to residences*
- *Less than 30% of respondents think the wind farm will have a negative impact on their favourite aspect of the local landscape.*
- *Most respondents are not aware of any local historical or culturally significant sites, but of those that are, less than 30% think the wind farm will have a negative impact on these sites.*

14.3 Australian quantitative research

Whilst published Australian research into the potential landscape and visual impacts of wind farms is limited, there are general corresponding results between the limited number that have been carried out when compared with those carried out overseas.

A recent survey was conducted by ARM Interactive on behalf of the NSW Department of Environment, Climate Change and Water (September 2010). The survey polled 2,022 residents across the 6 Renewable Energy Precincts established by the NSW Government. Key findings of the survey indicated that:

- *97% of people across the Precincts had heard about wind farms or turbines, and 81% had seen a wind farm or turbine (in person or the media);*
- *85% of people supported the construction of wind farms in New South Wales, and 80% within their local region; and*
- *76% supported wind farms being built within 10km of residences and 47% of people surveyed supported the construction of wind turbines within 1 to 2km from their residences.*

These general levels of support for wind farm developments have also been recorded for a number of wind farm developments around Australia as well as overseas.

Auspoll research carried out in February 2002 on behalf of a wind farm developer for a wind farm project in Victoria included just over 200 respondents. The results indicated that:

- *Over 92% of respondents agreed that wind farms can make a difference in reducing greenhouse emissions and mitigating the effects of global warming;*
- *Over 88% disagreed with the statement that wind farms are ugly;*
- *Over 93% of respondents identified 'interesting' as a good way to describe wind farms, over 73% nominating 'graceful' and over 55% selecting 'attractive';*
- *Over 79% of respondents thought that the wind farm would have a good impact on tourism, with 15% of respondents believing that the wind farm would make no difference; and*
- *Over 40% of respondents believed that the impact of the wind farm on the visual amenity of the area would be good, with 40% believing that it would make no difference.*

The majority of research carried out to date has focussed on public attitudes to wind farms and does not provide any indication for acceptable or agreed thresholds in relation to numbers and heights of turbines, and the potential impact of distance between turbines and view locations.

Mitigation measures

Section 15

15.1 Mitigation measures

The British Landscape Institute states *'the purpose of mitigation is to avoid, reduce, or where possible remedy or offset any significant negative (adverse) effects on the environment arising from the proposed development' (2002).* In general mitigation measures would reduce the potential visual impact of the project in one of two ways:

- firstly, by reducing the visual prominence of the wind turbines and associated structures by minimising the visual contrast between the wind turbines and the landscape in which they are viewed; and
- secondly, by screening views toward the wind turbines from specific view locations.

In relation to the first form of mitigation, the design of the turbine structures has been highly refined over a number of years to maximise their efficiency. The height of the supporting towers and dimensions of the rotors are defined by engineering efficiency and design criteria. Consequently, modification of the turbine design to mitigate potential visual impacts is not considered a realistic option.

Colour is one aspect of the wind turbine design that does provide an opportunity to reduce visual contrast between the turbine structures and the background against which they are viewed. The white colour that is used on a majority of turbine structures provides the maximum level of visual contrast with the background. This maximum level of visual contrast could be reduced through the use of an appropriate off white or grey colour for the turbines where the visual contrast would be reduced when portions of the turbine were viewed against the sky as well as for those portions viewed against a background of landscape. The final colour selection would, however, be subject to the availability of turbine models on the market at the time of ordering and to aviation safety requirements.

The potential visual impact of the project from specific view locations could be mitigated by planting vegetation close to the view locations. For instance, tree or large shrub planting close to a residence

can screen potential views to individual or clusters of turbines. Similarly roadside tree planting can screen potential views of turbines from portions of road corridors.

The location and design of screen planting used as a mitigation measure is very site specific and requires detailed analysis of potential views and consultation with surrounding landowners. Planting vegetation would not provide effective mitigation in all circumstances and can reduce the extent of existing views available from residences or other view locations.

There is greater potential to mitigate the visual prominence for some of the ancillary structures and built elements associated with the wind farm through the appropriate selection of materials and colours, together with consideration of their reflective properties.

The potential visual impacts of vehicular tracks providing access for construction and maintenance can be mitigated by:

- minimising the extent of cut and fill in the track construction;
- re-vegetating disturbed soil areas immediately after completion of construction works; and
- using local materials as much as possible in track construction to minimise colour contrast.

15.2 Summary of mitigation measures

A summary of the mitigation measures available for the wind farm and powerline infrastructure is presented in **Tables 18** and **19**.

Table 18 - Mitigation measures summary

Safeguard	Implementation			
	Design	Site Preparation	Construction	Operation
Consider options for use of colour to reduce visual contrast between project structures and visible background.	✓			
Avoid use of advertising, signs or logos mounted on turbine structures, except those required for safety purposes.			✓	✓

Table 18 - Mitigation measures summary

Safeguard	Implementation			
	Design	Site Preparation	Construction	Operation
If necessary, design and construct site control building and facilities building sympathetically with nature of locality.	✓		✓	
If necessary, locate substations away from direct views from roads and residential dwellings.	✓		✓	
Enforce safeguards to control and minimise fugitive dust emissions.		✓	✓	
Restrict the height of permanent stockpiles to minimise visibility from outside the site.		✓	✓	
Minimise construction activities that may require night time lighting, and if necessary use low lux (intensity) lighting designed to be mounted with the light projecting inwards to the site to minimise glare at night.		✓	✓	
Minimise cut and fill for site tracks and revegetate disturbed soils as soon as possible after construction.		✓	✓	
Maximise revegetation of disturbed areas to ensure effective cover is achieved.			✓	
Consider options for planting screening vegetation in vicinity of nearby residences and along roadsides to screen potential views of turbines. Such works to be considered in consultation with local residents and authorities.	✓	✓	✓	
Undertake revegetation and off-set planting at areas around the site where required in consultation and agreement with landholders.	✓	✓	✓	

Conclusion

Section 16

16.1 Summary

In summary, this LVIA concludes that the Mount Emerald wind farm project would have an overall low to medium visual significance on the majority of uninvolved residential view locations within the viewshed as well public view locations (from sections of local roads and amenity areas within urban localities). This LVIA has determined that the project will have a medium to high visual significance for five uninvolved residential view locations within 2 km of the proposed Mount Emerald wind farm turbines. This LVIA has also determined that the project will have a medium significance for two residential dwellings within 2 km of the proposed turbines.

This LVIA determined the overall landscape character sensitivity to be medium to high. Some recognisable characteristics of the LCA will be altered by the proposed project, and result in the introduction of visually prominent elements that will alter the perceived characteristics of the LCA but may be partially mitigated by existing landscape elements and features within the LCA.

The main characteristics of the LCA's, patterns and combinations of landform and landcover will still be visually evident from within and beyond the project site boundary.

The LCA's identified and described in this LVIA are generally well represented throughout the surrounding Local Government Areas and more generally within other regions across the Atherton Tablelands. This LVIA has determined that the landscape surrounding the project will have some ability to accommodate the physical changes associated with the wind farm and its associated structures.

Many of the residential dwellings surrounding the wind farm have been positioned within the landscape to mitigate exposure to inclement weather, or have adopted measures to reduce these impacts by planting and maintaining windbreaks around residential dwellings. The extent of windbreak planting reduces the potential visibility of the wind farm from a number of residential view locations in the surrounding landscape.

This LVIA has determined that views toward the Mount Emerald wind turbines would generally result in a low impact for the majority of motorists travelling through the area due to the short duration and

transitory nature of effects. This low level of impact would include tourist traffic travelling along the Kennedy Highway.

This LVIA has determined that the construction of the project would not result in any significant 'direct', 'indirect' or 'sequential' cumulative impacts when considered against any existing or proposed wind farm developments within the planning system located in the Atherton Tablelands.

The potential substation location and associated electrical infrastructure works are unlikely to result in any visual impact for surrounding residential or public view locations.

Both pre-construction and construction activities are unlikely to result in an unacceptable level of visual impact due to the temporary nature of these activities together with proposed restoration and rehabilitation strategies. The preferred location for some of the construction activities, including the on-site concrete batch plant and rock crushing equipment, would be located away from publicly accessible areas, with the closest residential view locations generally comprising involved landowners.

The Mount Emerald wind turbines do not exceed the 150 m tip height threshold and, in accordance with current CASA guidelines, will not require night time obstacle lighting.

Although some mitigation measures are considered appropriate to minimise the visual effects for a number of the elements associated with the wind farm, it is acknowledged that the degree to which the wind turbines would be visually mitigated is limited by their scale and position within the landscape relative to surrounding view locations.

The Proponent has engaged in ongoing consultation with local residents and made adjustments to the location of individual turbines and associated infrastructure to minimise visual impacts where possible.

References and bibliography

Australian Bureau of Statistics 2006 Census:
http://www.abs.gov.au/websitedbs/d3310114.nsf/home/census+data

Australian Government Bureau of Meteorology, Climate statistics for Australian locations, monthly climate statistics – Mareeba Airport
http://www.bom.gov.au/climate/averages/tables/cw_031190.shtml

British Landscape Institute Advice Note 01/11 (March 2011): Photography and photomontage in landscape and visual impact assessment.

Community Attitudes to Wind Farms in NSW, September 2010, AMR Interactive.

Guidelines for Landscape and Visual Impact Assessment 3rd ed. The Landscape Institute & Institute of Environmental Management & Assessment, 2013.

Landscape Sensitivity and Capacity Study for Wind Farm Development on the Shetland Islands, March 2009, Land Use Consultants.

National Wind Farm Development Guidelines – Public Consultation Draft, July 2010, Environment Protection and Heritage Council.

Photography and photomontage in landscape and visual impact assessment, Advice Note 01/11, British Landscape Institute, March 2011.

Scottish Natural Heritage (2006) Visual representation of windfarms: good practice guidance. Inverness: Scottish Natural Heritage. SNH report no. FO3AA 308/2

The Countryside Agency and Scottish Natural Heritage (2002) Landscape Character Assessment Topic Paper 6.

Visual Landscape Planning in Western Australia, A manual for evaluation, assessment, siting and design, Western Australian Planning Commission, November 2007.

Visual Representation of Wind Farms, Good Practice Guidance, Scottish Natural Heritage March 2006.

Visual Assessment of Windfarms: Best Practice. Scottish Natural Heritage Commissioned Report F01AA303A, University of Newcastle 2002.

Wind Farms in New South Wales, Wind in the Bush, David Clarke 2011:
(http://www.geocities.com/daveclarkecb/Australia/WindNSW.htlm)

Wind Farms and Landscape Values National Assessment Framework, June 2007, Australian Wind Energy Association and Australian Council of National Trusts.

Limitations

GBD has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of RACL (Pty Ltd) and only those third parties who have been authorised in writing by GBD to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the GBD Proposal dated 17th September 2013.

The methodology adopted and sources of information used are outlined in this report. GBD has made no independent verification of this information beyond the agreed scope of works and GBD assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to GBD was false.

This report was prepared between April 2013 and November 2013 and is based on the conditions encountered and information reviewed at the time of preparation. GBD disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

Appendix A – Andrew Homewood, curriculum vitae

GREEN BEAN DESIGN

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Areas of Expertise

Landscape and Visual Impact Assessment
Landscape Design and Contract Documentation
Independent Verification & Landscape Management

Education

University of Sheffield, Graduate Diploma Landscape Management, 1996
University of Sheffield, BSc (Dual Hons), Landscape Architecture & Archaeology, 1995
Writtle College, National Diploma Amenity Horticulture, 1989

Registration & Memberships

Registered Landscape Architect , Australian Institute Landscape Architects (AILA)
Member Environmental Institute Australia and New Zealand (MEIANZ)
Member of the Landscape Research Group (UK)

Selected Project Experience

Landscape and Visual Impact Assessment

Wind and Solar Farms

BP Moree Solar Power Station, Status: Approved

LVIA for the Solar Flagship Moree Solar Farm site in northern New South Wales.

Boco Rock Wind Farm EA, (Wind Prospect CWP Pty Ltd) Status: Approved

LVIA for the proposed construction of up to 125 wind turbine generators in the NSW Southern Tablelands Monaro sub region, including coordination for supply of photomontage, ZVI and flicker assessment.

Sapphire Wind Farm EA (Wind Prospect CWP Pty Ltd) Status: Approved

LVIA for the proposed construction of up to 174 wind turbine generators in the NSW New England region, including coordination for supply of photomontage, ZVI and flicker assessment.

Silverton Wind Farm EA Stages 1 & 2 (Epuron Pty Ltd) Status: Approved

LVIA for a 1000MW wind farm at Silverton in the Unincorporated Area of western NSW, for up to 600 wind turbines including a 25km length of 220kV transmission line between the wind farm and Broken Hill.

Conroy's Gap Wind Farm (Epuron Pty Ltd) Status: Approved

LVIA for a DA modification for additional wind turbines to an approved development located in the southern highlands NSW.

Bango Wind Farm (Wind Prospect CWP Pty Ltd)

LVIA for the proposed construction of up to 100 wind turbines located in the southern highlands NSW.

Liverpool Range Wind Farm Stage 1 (Epuron Pty Ltd)

LVIA for the proposed construction of up to 200 wind turbines located in the Warrumbungle and Upper Hunter Shire Councils approximately 370 km north of Sydney, and a 60 km length of 330 kV line connecting to the Ulan mine site.

Rye Park Wind Farm, (Epuron Pty Ltd)

LVIA for the proposed construction of up to 120 wind turbines adjoining multiple wind farm sites in the New South Wales southern highlands.

Deepwater Wind Farm (Epuron Pty Ltd)

LVIA for the proposed construction of up to 7 wind turbines at Deepwater in north NSW.

Port Kembla Wind Farm (Epuron Pty Ltd)

LVIA for the proposed construction of up to 7 wind turbines within the Port Kembla industrial facility at Wollongong.

Eden Wind Farm, (Epuron Pty Ltd)

LVIA for the proposed construction of up to 7 wind turbines within the SEFE woodchip facility on the south coast of New South Wales.

Paling Yards Wind Farm EA, (Union Fenosa Pty Ltd)

LVIA for the proposed construction of up to 59 wind turbines including night lighting, cumulative impact assessment, detailed field assessment for shadow flicker and preparation of photomontages.

Collector Wind Farm EA, (APP/RATCH)

LVIA for the proposed construction of up to 68 wind turbines adjoining the operation Cullerin wind farm project including a detailed cumulative impact assessment.

Willatook Wind Farm EES Referral, (Wind Prospect WA Pty Ltd)

Preliminary LVIA for the proposed construction of up to 190 wind turbines within Moyne Shire Council (Victoria) including a detailed cumulative impact assessment, photomontage location selection and community consultation.

Birrema Wind Farm EA (Epuron Pty Ltd)

LVIA for the proposed construction of up to 75 wind turbines adjoining the proposed Yass Valley wind farm project development including a detailed cumulative impact assessment, photomontage location selection and community consultation.

White Rock Wind Farm EA, (Epuron Pty Ltd)

LVIA for the proposed construction of up to 100 wind turbines adjoining the proposed Sapphire and approved Glen Innes wind farm projects including a detailed cumulative impact assessment, photomontage location selection and community consultation.

Crookwell 3 Wind Farm EA, (Union Fenosa Wind Australia)

LVIA for the proposed construction of up to 35 wind turbines adjoining the approved Crookwell 2 wind farm development including a detailed cumulative impact and night time lighting assessment.

Electrical Infrastructure

22kV transmission line (Country Energy)

LVIA for a short section of electrical distribution line through central New South Wales.

Wagga North 132kV substation (TransGrid)

LVIA for a proposed 132/66kV substation and installation of transmission line connections at Wagga Wagga New South Wales.

Lismore to Dumaresq 330kV transmission line (TransGrid)

LVIA for a proposed 330kV transmission line through northern New South Wales.

Manildra to Parkes 132kV transmission line (TransGrid)

LVIA for a proposed 132kV transmission line through central New South Wales.

Mount Macquarie Communication Tower (TransGrid)

LVIA and preparation of visual simulations for proposed 80m high microwave communication tower in rural New South Wales, adjacent to the Blayney Wind Farm.

Broken Hill to Red Cliffs 220kV transmission line duplication (Epuron Pty Ltd)

LVIA for approximately 300km of 220kV transmission line duplication for the Silverton Wind Farm Concept Approval application.

Molong to Manildra 132kV transmission line (TransGrid)

View catchment mapping and visual assessment for a 28 km section of 132kV transmission line through rural landscape in central western New South Wales.

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Power Generation

Dalton Gas fired Power Plant (AGL Energy)

LVIA for gas turbine peaking power station, valve station and communication tower in rural NSW. Preparation of photomontage and 3D modelling.

Herons Creek Peaking Power Station (International Power)

LVIA for 120MW distillate-fired peaking power station in rural landscape setting. Visual assessment included preparation of visual simulations to model each of the three 40MW generating units in the existing landscape.

Parkes Peaking Power Station (International Power)

LVIA for 120MW distillate-fired peaking power station in central New South Wales, including provision of photomontages.

Buronga Peaking Power Station (International Power)

LVIA for 120MW distillate-fired peaking power station in far west New South Wales.

Leafs Gully Peaking Power Plant (AGL Energy Pty Ltd)

LVIA and landscape master plan for gas turbine peaking power station in south-west Sydney.

Bio Energy Project (SEFE)

LVIA for a 5MW bio fuel power plant located on the south of Two Fold Bay, Eden.

Professional History

Green Bean Design, Principal Landscape Architect 2006 -
URS Australia Pty Ltd, Practice Leader Landscape Architecture 2005 - 2006
URS Australia Pty Ltd, Associate Landscape Architect 2003-2005
URS Australia Pty Ltd, Senior Landscape Architect, 2002 - 2003
URS Australia Pty Ltd, Landscape Planner, 2001-2002
URS, Contract Landscape Architect, 2000-2001
Blacktown City Council, Contract Landscape Planner, 2000-2001
Knox & Partners Pty Ltd, Landscape Architect, 1996-2000
Brown & Associates, Landscape Architect, 1996
Philip Parker & Associates, Graduate Landscape Architect, 1994-1995
Rendel & Branch, Landscape Assistant, 1989-1991
National Trust, Horticulturalist, 1987-1988
English Nature, Species Protection Warden, 1985-1986
Essex Wildlife Trust, Botanist, 1984-1985
Royal Society for the Protection of Birds, Voluntary Warden, 1983-1984