MAJOR PROJECT ASSESSMENT: Collector Wind Farm Upper Lachlan Shire, NSW Southern Tablelands (10_0156)

Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

September 2013

ABBREVIATIONS

Associated Resident	Resident who has involvement in the Project
CASA	Civil Aviation Safety Authority
CIV	Capital Investment Value
CO2e	Carbon Dioxide equivalent
Department	Department of Planning & Infrastructure
DGRs	Director-General's Requirements
Director-General	Director-General of the Department of Planning & Infrastructure
EA	Environmental Assessment
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPI	Environmental Planning Instrument
GWH	Gigawatt hours
kV	Kilovolt
MD SEPP	State Environmental Planning Policy (Major Development) 2005
Minister	Minister for Planning
MW	Megawatts
Non-associated resident	Resident who has no involvement in the Project
PAC	Planning Assessment Commission
Part 3A	Part 3A of the *Environmental Planning and Assessment Act 1979*
PEA	Preliminary Environmental Assessment
PFM	Planning Focus Meeting
PPR	Preferred Project Report
Proponent	Ratch-Australia Wind Developments Pty Ltd
RtS	Response to Submissions

Cover Photograph: Amended figure from Appendix E – Viewpoint 03_Breadalbane Road of the Collector Wind Farm Environmental Assessment

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NSW Government
Department of Planning & Infrastructure

EXECUTIVE SUMMARY

RATCH-Australia Wind Developments Pty Ltd (the Proponent) proposes to construct and operate a 63 turbine wind farm with a generating capacity of up to approximately 214 MW known as the Collector Wind Farm. The site is located 3.5 km northwest of the township of Collector and is wholly within Upper Lachlan Shire Local Government Area. The Capital Investment Value (CIV) of the Project is $350 million and the Project would create 100 full-time equivalent (FTE) construction jobs and 10 FTE operational jobs.

Pursuant to Clause 2 of Schedule 6A of the *Environmental Planning and Assessment Act 1979*, the Project is a transitional Part 3A Project as Director-General's environmental assessment requirements were issued prior to the repeal of Part 3A of the *Environmental Planning and Assessment Act 1979*. The Project is also classified as critical infrastructure pursuant to Section 75C of the *Environmental Planning and Assessment Act 1979*.

The Environmental Assessment (EA) for the Project was placed on exhibition for a period of 61 days from 26 July to 24 September 2012. The Department received 13 submissions from public authorities and Councils and 128 submissions from the general public and special interest groups including 1 late submission.

Upper Lachlan Shire Council objected to the Project based on cumulative impacts and concerns about noise, set back distances, television and radio transmission, roads, planning agreements and consistency with Council's Development Control Plan. Although none of the other public authorities objected to the Project, they did raise issues for the Department's consideration including impacts on biodiversity, Crown land and traffic. Of the 128 submissions received from the public, 58 supported the Project, 68 objected to the Project and two did not object but raised concerns. Issues raised in the public submissions included noise, health, visual amenity, traffic, property value, and construction-related impacts, with a number of submissions questioning whether the Project should be approved.

A Preferred Project and Submissions Report was submitted by the Proponent in March 2013 describing amendments made to the Project following exhibition of the EA. The report also provided additional assessment of relevant environmental impacts in response to issues raised in submissions and the amendments made to the Project. The amendments to the Project comprise:

- removal of five wind turbines from the north eastern portion of the site;
- relocation of 28 wind turbines up to 165 metres to avoid impacts to woodland vegetation and telecommunication paths;
- relocation of the substation 250 m north; and
- connection to the existing 330 kilovolt transmission line.

The Department considers the key assessment issues to be noise, visual amenity, biodiversity and health. The Department engaged an independent consultant to review the assessment provided in the Environmental Assessment, Preferred Project and Submissions Report and issues raised in submissions received. Clouston Associates reviewed the visual and landscape assessment and SKM reviewed the noise assessment. These reports are provided in **Appendix D** to this report. The Proponent provided further information in response to the Clouston Associates review, this is provided in **Appendix E**.

The Department has undertaken a comprehensive assessment of the merits of the Project and considers that all environmental issues associated with the construction and operation of the wind farm have been addressed and that the Project can achieve an acceptable level of environmental performance through the application of stringent conditions of approval and the Proponent's Statement of Commitments to manage community concerns regarding amenity, health and environmental impacts. The Department considers that the Project is justified and in the public interest and should be approved subject to the recommended conditions of approval and the Proponent's Statement of Commitments. The Project is referred to the Planning Assessment

Commission for determination given that the Project has received more than 25 submissions in the nature of objections; the proponent has lodged a political donation disclosure statement and Upper Lachlan Shire Council has objected to the Project.

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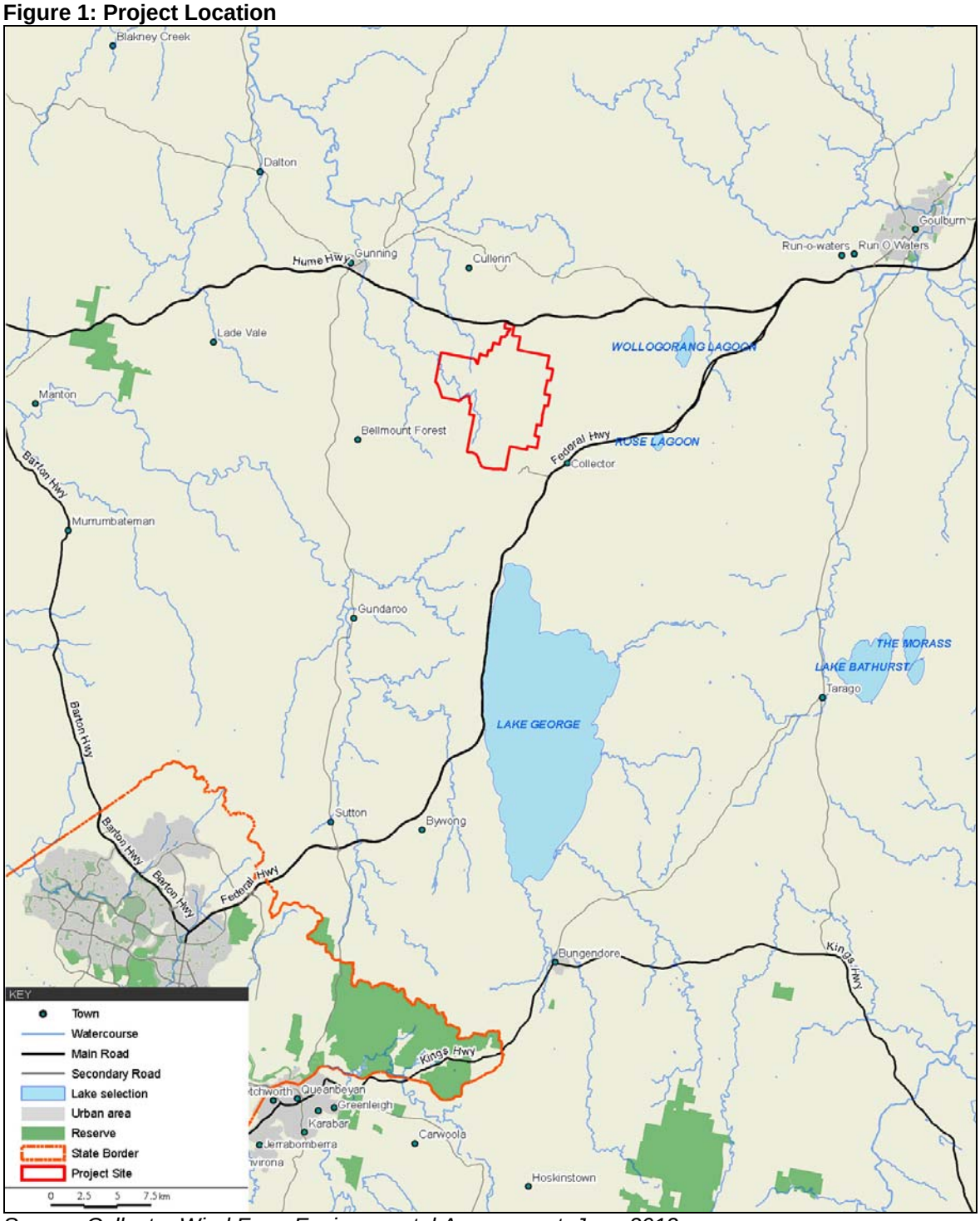
1. BACKGROUND

RATCH-Australia Wind Developments Pty Ltd (the Proponent) proposes to construct and operate a wind farm and associated infrastructure with a maximum generating capacity of up to 214 megawatts (MW) located along the Cullerin Range in the NSW Southern Tablelands. The proposed site is approximately 55km north-east of Canberra, 35km south-west of Goulburn and 3.5km north-west of the township of Collector within the Upper Lachlan Shire Local Government Area. The Project location is shown in **Figure 1**. The site is also within an area covered by the Office of Environment and Heritage's Regional Clean Energy Program.

Figure 1: Project Location



Source: Collector Wind Farm Environmental Assessment, June 2012

1.1. Study Site

The Project is proposed to be sited along the Cullerin Range on privately owned farmland predominantly used for sheep and cattle grazing, approximately 3.5km north-west of the township of Collector (population of approximately 350). The site is bounded by the Hume Highway to the north and Collector Road to the south and the elevation of the site ranges between 700m and 900m above sea level.

The wind farm footprint would occupy an area of approximately 29 ha with another 45 ha to be affected by construction, within a 6,215ha site comprised of land owned by seven different landowners. The site is of a predominantly rural character, consisting of medium sized landholdings and larger commercial pastoral operations, with areas of livestock pasture, cultivated farmland and a small number of rural homesteads, many with vegetated windbreaks.

Crown roads and three Crown reserves, for trigonometric, water supply and public school site dedication purposes are located within the Project site. The National Bicentennial Trail also traverses the site.

The Project site would be accessed from the Hume Highway and Lerida Road South with on-site access following existing Crown roads or farm tracks. Five residences, owned by landowners whose properties the Project would be sited on (ie. "associated" or "involved" residences), are located within two kilometres of the wind turbines. One other resident located within two kilometres of a turbine has recently signed an agreement with the Proponent and is also considered to be associated with the Project. There are no non-associated residences within two kilometres of the wind turbines.

1.2. Surrounding Land Use

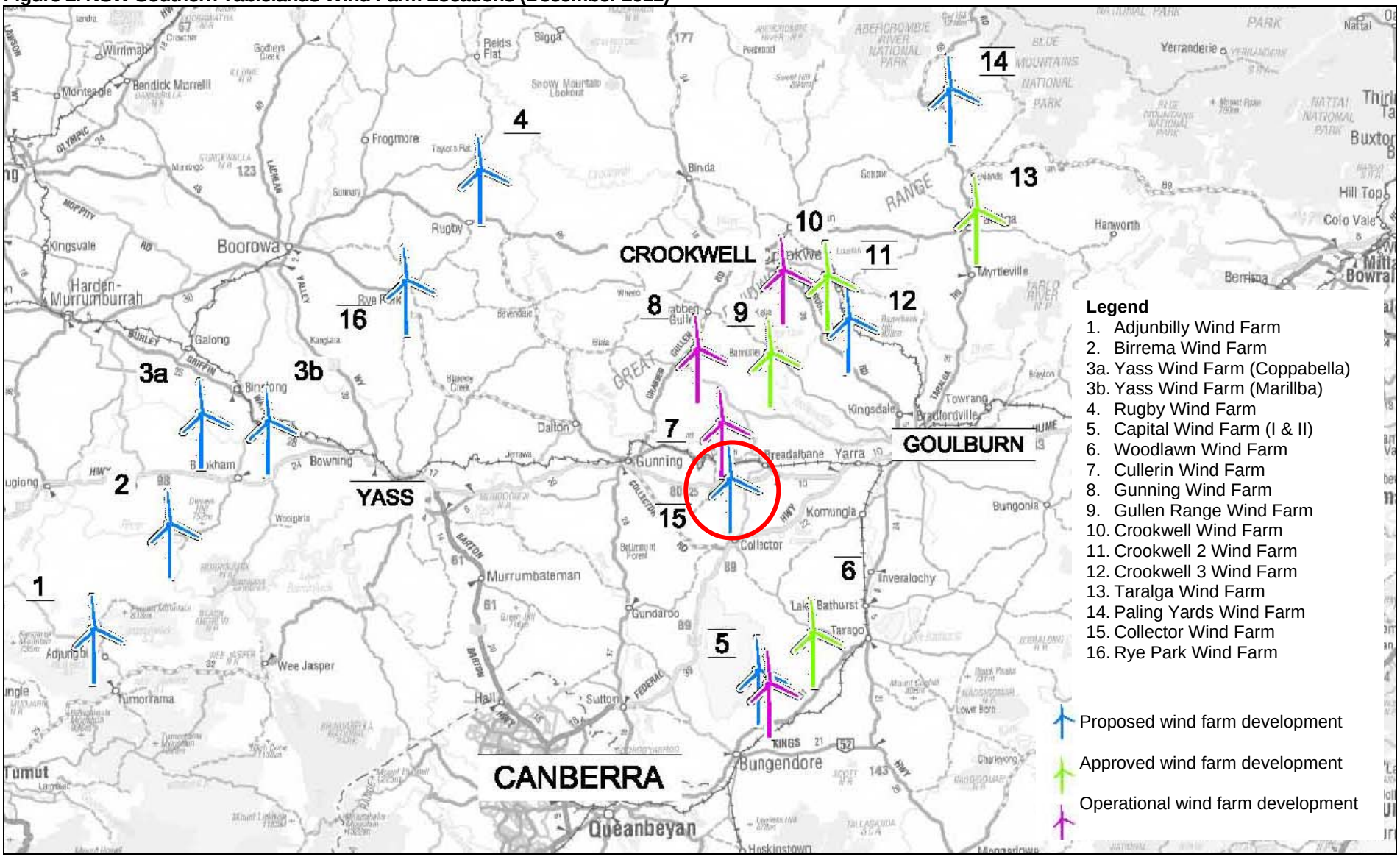
Land use surrounding the site predominantly consists of medium sized rural landholdings and larger commercial pastoral operations including areas of livestock pasture and cultivated farmland. Occasional rural homesteads are surrounded by cultural plantings and windbreaks. Other land uses include sealed and unsealed roads, drainage structures, agricultural buildings and communication structures. The township of Collector is located approximately 3.5 kilometres to the south-east of the Project.

Two 330kV electrical transmission lines run across the northern edge of the site. Directly to the north (approximately 1.3 km), along the Cullerin Range, lies the Cullerin Range Wind Farm with 15 turbines. Capital Wind Farm is located 22 kilometres to the south-east with 67 wind turbines. Woodlawn and Gunning Wind Farms are located within a 25 kilometre radius of the Collector Wind Farm and consist of 25 and 32 wind turbines respectively (see **Figure 2)**. Lake George is located to the south of the Project and two conservation reserves exist at the junction of Lerida Road South and Collector Road and Marked Tree Road and Collector Road.

One property to the south of the Project site has development approval for a rural subdivision which includes a proposed dwelling site. Both the existing dwelling and proposed dwelling are more than 2 km from the nearest wind turbine.

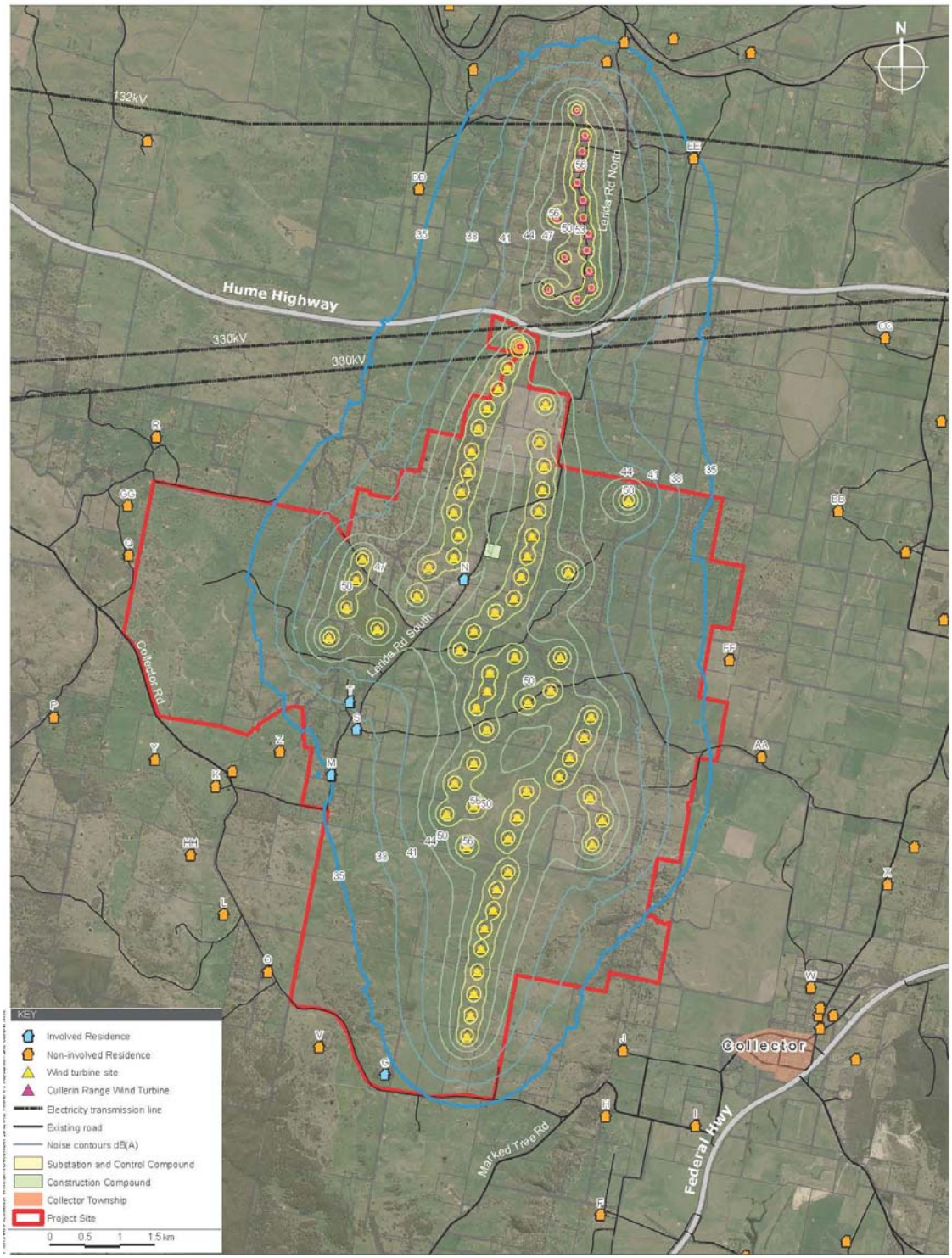
Figure 4 illustrates the proposed wind farm layout and the immediate surrounds.

Figure 2. NSW Southern Tablelands Wind Farm Locations (December 2011)



Collector Wind Farm circled in red. Capital II Wind Farm is now approved and Woodlawn Wind Farm is operational.
Source: Collector Wind Farm Landscape and Visual Assessment, January 2012

Figure 3: Site layout and immediate surrounds – showing 63 turbine layout



Source: Collector Wind Farm Preferred Project and Submissions Report, 2013

2. PROPOSED PROJECT

2.1. Project Description

The Proponent proposes to construct and operate a wind farm with a total capacity of up to approximately 214 megawatts and associated infrastructure consisting of up to 63 wind turbine generators. Three different turbines have been considered in the EA and Preferred Project and Submissions Report, these are:

- 2.1 megawatt Suzlon S88-2.1MW,V3;
- 3.4 megawatt REPower 3.4M 104; and
- 2.3 megawatt Siemens SWT-2.3-101.

The Proponent will select and confirm the final turbine model (not necessarily one of the 3 listed above) during the detailed design stage. The layouts were determined by the noise impact assessment so as to achieve noise compliance at non-associated receivers.

The proposed 214 megawatt capacity of the Project would generate approximately 600 gigawatt hours (GWh) of electricity produced annually with the Proponent estimating this would power approximately 80,000 homes annually. By 2020 it is expected that up to 2.9 million tonnes of greenhouse gases will be avoided through substitution for fossil-fuelled energy generation.

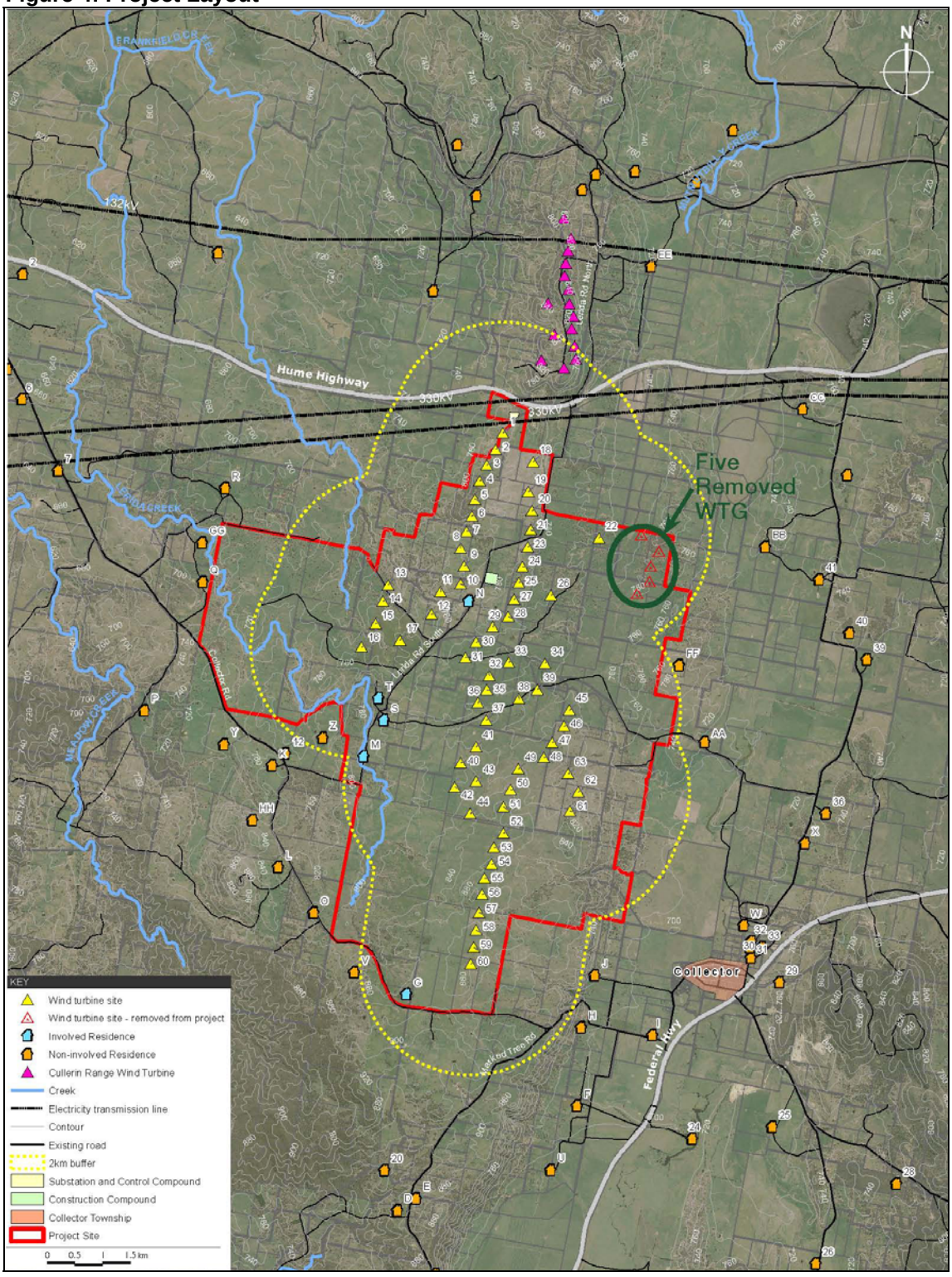
The Project layout for 63 turbines is shown in **Figure 4**. The key components of the Project are listed in **Table 1.**

Table 1: Key Project Components

Aspect	*Description*
Project Summary	The construction and operation of up to 63 wind turbines with underground cabling and an overhead connection to the existing 330 kilovolt transmission line network. The Project also includes a substation, control room and maintenance facilities, up to 4 wind monitoring masts, internal access roads, and crane hardstand areas adjacent to each turbine. The development footprint during the operational phase will be approximately 29ha with other areas affected by construction activities including being approximately 45ha (which are proposed to be rehabilitated following construction).
Wind Turbine Generators	Up to 63 wind turbines with a capacity between 2.1 megawatts and 3.4 megawatts. Each turbine would consist of three-blades between 41m and 56m in length or a diameter of 88m to 112m atop towers of 80m to 100m high. The total height from the base of the tower to blade tip would be between 124m and 150m. The turbines would be erected upon either gravity or rock-anchor type concrete and steel foundations depending on geotechnical conditions at each site. The turbines will be micro-sited, meaning that they will be located to minimise environmental impacts and may be located within a 100m radius from the point shown in the EA.
Crane Hardstand Areas	Crane hardstand areas (32m x 15m) located next to each turbine to be used for crane operations during construction and maintenance during the operational phase.
Wind Monitoring Masts	Up to 4 permanent wind monitoring masts would be installed (2 temporary monitoring masts are already installed near the site). Each mast would be fitted with equipment such as an anemometer, wind vanes and temperature sensors.
Wind Turbine Generator Transformer	Up to 63 wind turbine generator transformers - 1 transformer per turbine located either at the base of the tower or on the hardstand next to the tower. The transformers are required to step-up the voltage from 0.7 kilovolts to 33 kilovolts before transmission in an underground cable system.

Aspect	***Description***
Wind Farm Substation	The substation compound (approximately 50m x 150m) would be located within the easement of the existing TransGrid 330 kilovolt transmission line traversing the northern end of the site. The substation compound would be fenced and house 2x130 megavolt-ampere (MVA) transformers each containing approximately 35 kilolitres of transformer oil to provide insulation and to cool the transformer. The transformers would be located on concrete pads with protective bunding to contain any leaks or spills.
Underground Cabling	Approximately 35km of 33 kilovolt underground electricity cables will connect the wind turbines to the wind farm substation. Underground cables would also connect each turbine to the wind farm control room's computerised operation system.
Overhead Transmission Connection	Relocation of the 330 kilovolt TransGrid transmission line including the replacement of 3 existing suspension towers with up to 4 tension structures and a new connection from the substation to the relocated transmission line.
Operations and Maintenance Building	The operations and maintenance building would be constructed within the substation compound. The building would house monitoring and communications equipment, the maintenance store, work area, staff amenities, rain water tanks, septic system and car parking for staff and visitors.
Access Tracks	Approximately 42km of access road where possible following existing Crown roads or farm tracks. Existing and new tracks would be widened during construction to between 8m to 10m wide and reduced for the operation phase to 6m wide.
During Construction	Additional project components include a construction compound approximately 300m x 100m (which includes site offices and storage areas) and possibly an on-site concrete batching plant (the concrete batching plant would be subject to a separate development application).

Figure 4: Project Layout



Source: Collector Wind Farm Preferred Project and Submissions Report (APP, March 2013)

2.2. Project Need and Justification

The Federal Government's long-term target is to reduce greenhouse gas emissions to 80% below 2000 levels by 2050. This is supported by Government initiatives such as the *Clean Energy Act 2011* and the Renewable Energy Target Scheme (RET). The *NSW 2021: A Plan to Make NSW Number One* and the draft *Renewable Energy Action Plan*, (which was on public exhibition in late 2012) supports the national RET of achieving a target of 20% renewable energy by 2020.

The *Clean Energy Act 2011* introduces a carbon pricing mechanism which commenced on 1 July 2012, with an initial fixed price of $23 per tonne rising at 2.5% each year in real terms with the carbon pricing mechanism transitioning to flexible pricing from 1 July 2015. The carbon pricing mechanism is expected to create an incentive for businesses to cut their pollution, invest in clean technology or find more efficient ways of operating. The Renewable Energy Target (RET) scheme is an expansion of the Australian Government's Mandatory Renewable Energy Target (MRET) scheme and was established to encourage additional generation of electricity from renewable energy sources in order to meet the Government's commitment of achieving a 20% share of renewables in Australia's electricity supply in 2020.

The *Electricity Statement of Opportunities for the National Electricity Market 2012* (2012 ESOO) *(Australian Energy Market Operator 2012)* analysis concludes that there are currently enough Renewable Energy Certificates being generated to satisfy demand up until 2016. Additional Renewable Energy Certificates or Large Scale Generation Certificates are expected to be required from 2016 in order to meet the additional Large-scale Renewable Energy Target and the demand for GreenPower. The 2012 ESOO suggests that there is, therefore, a strong driver for additional investment in large-scale renewable energy technologies under the RET from 2016 to 2020.

The Climate Change Authority released its review of the RET in December 2012 for the Commonwealth Minister for Climate Change and Energy Efficiency which makes a number of recommendations including retaining the RET of 41,000 GWh and the interim targets.

The 2012 ESOO analysis has downgraded its forecast for energy demand and growth when compared to the 2011 ESOO analysis. The 2011 ESOO predicted that new supply capacity was required by 2017/2018 in order to avoid low reserve conditions (LRC) and a shortfall of 104 megawatts. Low reserve conditions are expected when unserved energy (that is the amount of energy that is demanded but cannot be supplied) is projected to exceed reliability standards because the supply capacity is too low relative to the expected maximum demand. The 2012 ESOO now considers that NSW would not experience LRC for the ten year period considered in the model (ie. not before the year 2022) and is still the case in the 2012 ESOO update (22 February 2013).

The Department notes that there is a level of uncertainty surrounding the assumptions used and the predictions made by the Australian Energy Market Operator. Noting that the 2012 ESOO has revised the maximum demand predictions downwards compared with the 2011 ESOO due to:

- a moderation in gross domestic product, especially in the short term, due to the changed economic outlook;
- reduced manufacturing consumption in response to the high Australian dollar;
- significant installation of rooftop photovoltaic generation which contributes to lowering maximum demand; and
- consumer responses to rising electricity costs and energy efficiency measures.

Further, the changing regulatory, policy and market setting for electricity generation in NSW and more broadly across the National Electricity Market is another factor that has the potential to affect future modelling predictions. The Department has, therefore, taken a cautious view of predictions made about events five to ten years into the future.

The Department therefore considers it prudent to take a strategic approach to the issue of timing of additional generating capacity by accepting that such additional capacity is likely to be required in the future due to factors such as increased demand or the retirement of emissions intensive electricity generators in response to government policy. This would allow for additional generating capacity to be available for implementation when required rather than conclusively determining a date for its implementation. To do otherwise is to fail to recognise that estimates such as the LRC point are not fixed and determinative, but rather reflect the uncertainties inherent in the

assumptions around matters such as future market conditions, domestic and global economics, demand management and energy efficiency uptake.

The Department also notes that wind farms can put downward pressure on electricity prices. Noting the 2012 ESOO states that the average spot market prices (the spot price for one megawatt hour of electricity for the trading interval at regional reference nodes) for electricity in 2010-11 and 2011-12 has been lower than expected and similar to the average spot price levels recorded for the years 2001-02 to 2005-06. The reduction in average spot market prices was attributed to certain factors including:

- mild summer temperatures in both years, with fewer and shorter high-price periods;
- reduced annual energy and increasing energy contributions from rooftop photovoltaics; and
- the increasing capacity of connected wind farms which, due to their lower operating costs, put downwards pressure on spot prices.

The Department considers the Project would help meet the state and national targets for renewable energy generation through the production of renewable electricity. The Proponent estimates that the Project would generate enough electricity to power approximately 80,000 homes annually (based on average Australian household usage of 7.3 megawatts per hour per annum). The proposed establishment of a commercial wind resource would also provide for greenhouse gas saving benefits. The Proponent has estimated that the Project has the potential to abate between 150 kilo tonnes (kt) CO2e (carbon dioxide equivalent) to 450 kt CO2e per annum (based on a 150 MW wind farm) dependent on whether the wind farm would replace gas-fired or coal-fired electricity. The Proponent calculates for a 230 MW wind farm, this would be equivalent to taking approximately 122,222 cars off the road annually for 25 years. The Department has calculated[*] that based on a 214 MW wind farm the proposal has the potential to generate 673 GWh of electricity annually saving 3.5 million tonnes of greenhouse gas emissions by 2020. This was the equivalent of producing enough electricity to power 92,200 homes annually.

The Department supports the development of wind farms as a form of renewable energy, subject to the suitability of the location of these wind farms. The proposed wind farm site is located within the NSW/ACT Border Region, recognised as one of the State's six renewable energy precincts due to its access to good wind resources. The Project is located within the Sydney-Canberra growth corridor. It is close to the 330kV electricity grid, and therefore transmission losses would be reduced. The Project is also considered compatible with current land use as current farming practices and the wind farm can coexist.

In NSW, approximately 90% of the State's electricity needs are provided by non-renewable coal-fired power stations and as such, contribute the greatest share of base load production and carbon dioxide emissions. The remaining 10% is produced from alternative sources including gas/distillate power stations as well as hydro electric power.

On this basis, the Department accepts that new renewable electricity generating sources are required to meet the State and Federal government's target of achieving the 20% renewable energy target. The Department considers that in conjunction with relevant demand management and efficiency measures, a diverse mix of local embedded generating solutions would provide the most risk-averse method of achieving a secure and reliable electricity supply base for the State, which is resilient to changing market factors including a more constrained carbon market and water restrictions associated with drought (which were noted in the 2012 ESOO to have affected the performance of existing hydro and coal-fired generators). Local embedded generation in regional areas would promote greater transmission efficiencies (and associated greenhouse gas benefits from reduced transmission losses) by reducing the need for electricity to be delivered from further afield. This also has the potential to facilitate more efficient supply to the areas of greatest demand being the load centres of Newcastle, Sydney and Wollongong.

[*] http://www.environment.nsw.gov.au/ggecapp/CalculatorStandard.aspx

The Project would contribute to the increasing use of renewable, rather than non-renewable, sources of electricity generation. As such, the proposed use of wind energy for electricity generation is considered to be appropriate for the purposes of addressing government policy on renewable energy generation. The Department is therefore satisfied that the Project is in the public interest.

2.3. Critical Infrastructure

The Project is classified as critical infrastructure in accordance with Section 75C of the *Environmental Planning and Assessment Act 1979*, by virtue of the then Minister for Planning's declaration of 11 November 2009 with respect to development for the purposes of a facility for the generation of electricity derived from renewable fuel sources (including wind energy), which has the capacity to generate at least 30 megawatts.

3. STATUTORY CONTEXT

3.1. Major Project

Transitional arrangements are in place as a result of the repeal of Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Clause 2(1)(c) of Schedule 6A states that Part 3A of the EP&A Act continues to apply to projects where EA requirements for approval to carry out the Project were last notified or adopted within two years before the repeal of Part 3A. The environmental assessment requirements for the Collector wind farm were notified on 15 October 2010 with additional requirements notified on the 2 February 2011 and 16 August 2011, within the two years before the repeal of Part 3A, the Project is therefore a transitional Part 3A Project.

The Project is a major project under Part 3A of the EP&A Act because it is development for the purpose of a facility for the generation of electricity or heat or their co-generation (using any energy source, including gas, coal, bio-fuel, distillate and waste hydro, wave, solar or wind power) being development that has a capital investment value of more than $30 million under clause 24 of Schedule 1 of *State Environmental Planning Policy (Major Development) 2005*. Therefore the Minister for Planning and Infrastructure is the approval authority.

Delegations
Under the Minister's delegations of 14 September 2011, the PAC may determine the application as:

- more than 25 members of the public have made a submission on the application in the nature of an objection; and
- the Upper Lachlan Shire Council has objected in writing to the application; and
- a political donation disclosure statement has been lodged with the application.

3.2. Permissibility

The Project is located on land zoned RU2 Rural Landscape under the *Upper Lachlan Local Environmental Plan 2010* (Upper Lachlan LEP). The larger project site or study area considered in the Environmental Assessment, is also partially on land zoned RU1 Rural Primary Production also under the Upper Lachlan LEP. Electricity generation works are permissible with development approval within the land zoned RU2 and RU1.

In addition, the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) applies to the Project. Division 4 of the Infrastructure SEPP relates to electricity generating works with Clause 34(1) stating that development for the purpose of electricity generating works may be carried out by any person with approval on any land in a prescribed rural, industrial or special use zone. Therefore, as the Project is for the purpose of generating electricity within a prescribed rural zone it is permissible.

3.3. Environmental Planning Instruments

There are no other environmental planning instruments that substantially govern the carrying out of the Project.

3.4. Objects of the EP&A Act

Decisions made under the EP&A Act should have regard to the objects of the Act, as set out in Section 5 of the Act. The Department considers the application is consistent with relevant objects of the Act for the following reasons, including the Project would allow for:

- property management, development and conservation of natural and artificial resources including agricultural land and natural areas for the purpose of promoting the social and economic welfare of the community and a better environment;

- promotion and co-ordination of the orderly economic use and development of land;
- the protection, provision and co-ordination of utility services;
- protection of the environment including threatened species and their habitat;
- promotion of the sharing of responsibility for environmental planning between different levels of government; and
- provision of increased opportunity for public involvement and participation in environmental planning and assessment.

Ecologically sustainable development is discussed further in **Section 3.5**.

3.5. Ecologically Sustainable Development

The EP&A Act adopts the definition of Ecologically Sustainable Development (ESD) found in the *Protection of the Environment Administration Act 1991*. Section 6(2) of that Act states that ESD requires the effective integration of economic and environmental considerations in decision-making processes and that ESD can be achieved through the implementation of:

(a) the precautionary principle,
(b) inter-generational equity,
(c) conservation of biological diversity and ecological integrity,
(d) improved valuation, pricing and incentive mechanisms.

The Department's assessment of the ecological impacts of the Project (**Section 5**) is based on a conservative and rigorous assessment of the likely extent of ecological impacts and the likely offset requirements to ensure that appropriate and adequate measures are put in place to prevent the threats of serious or irreversible environmental damage consistent with the precautionary principle and the principle of conservation of biological diversity and ecological integrity.

As a source of renewable energy, the Project has the potential to address future degradation of the global environment by reducing use of fossil fuels whilst most of the potential impacts from the Project are likely to be localised and would not diminish the options regarding land and resource uses and nature conservation available to future generations. The Project would not require large scale earthworks and impacts to the site would be reversible. The development has significant social and environmental benefits on a local, state and federal level and can be argued to have global environmental benefits on the basis that the Project would lower greenhouse gases created in the production of electricity. The development will see a decrease in costs to the community as a result of a reduction in the externalities involved with burning fossil fuels, such as those resulting from particulate air pollution and greenhouse gas emissions.

The Project would also provide an income for the associated landowners during times of drought which will have positive flow on effects for businesses and service providers in the region.

The Department has considered the need to encourage the principles of ESD, in addition to the need for the proper management and conservation of natural resources; the orderly development of land considering land use; the need for the Project as a whole (which comprises a utility provision); and the protection of the environment including threatened species in **Section 5** of this report.

3.6. Draft NSW Planning Guidelines: Wind Farms

On the 18 April 2012 the Department advised the Proponent that the EA was to address the Draft NSW Planning Guidelines: Wind Farms in accordance with the Department's Policy Statement for Applications for which Director General's Requirements have been issued but are yet to be exhibited. The Department is satisfied that the EA has considered the draft NSW Wind Farm Guidelines consistent with the Department's Policy Statement.

The Department has undertaken a detailed review of the Project against the draft NSW Wind Farm Guidelines and is also satisfied that the Guidelines have been substantially addressed, and where gaps have been found, the Department has considered relevant provisions of the draft NSW Wind Farm Guidelines in developing conditions of approval. A detailed analysis of the proposal against the draft NSW Wind Farm Guidelines is at **Appendix F**.

4. CONSULTATION AND SUBMISSIONS

4.1. Exhibition

Under Section 75H(3) of the EP&A Act, the Director-General is required to make the EA of an application publicly available for at least 30 days. However, after accepting the EA, and in accordance with the draft NSW Wind Farm Guidelines, the Department publicly exhibited it for an extended period from Thursday 26 July 2012 until Monday 24 September 2012 (61 days) on the Department's website, and at the exhibition locations. The Department also advertised the public exhibition in the following newspapers:

- Goulburn Post Wednesday 25 July 2012;
- Yass Tribune Wednesday 25 July 2012;
- Crookwell Gazette Tuesday 24 July 2012;
- Palerang and Queanbeyan District Bulletin on Monday 20 August 2012; and
- the Gunning Lions Club Noticeboard on Tuesday 24 July 2012.

The Department notified landholders within five kilometres of the Project and relevant State and local government authorities in writing.

The Department received 140 submissions in response to the exhibition of the EA; 13 submissions from public authorities and Councils and 127 submissions from the general public and special interest groups. One late submission objecting to the Project was also received after the exhibition period. A summary of the issues raised in submissions is provided below.

4.2. Public Authority Submissions

Thirteen submissions were received from public authorities. The NSW Office of Water and Fisheries NSW submission's were combined and counted as one single submission. As of 28 June 2013, the EPA has a statutory role in the licensing of wind farms under the *Protection of Environment Operations Act, 1997.*

Air Services Australia (ASA) – did not object to the Project but noted that an Aviation Impact Study is required to be submitted to Air Services Australia for review. The Department notes that the Proponent has committed to providing this study to ASA.

Department of Defence (DoD) – advised that the Project would not cause any unacceptable interference to Defence communications or surveillance radars and recommended that the colour used for the turbines ensures that they are conspicuous to aircraft during daylight hours and that "as constructed" details are provided to the RAAF Aeronautical Information Service.

Civil Aviation Safety Authority (CASA) – notes that it is likely that only daytime agricultural and low level survey operations would be conducted within the airspace below 500 feet Above Ground Level; none of the turbines in the proposed Project would affect the Obstacle Limitation Surface criteria if the closest Aircraft Landing Area at Wanderadeen was registered and classified; turbulence in the wake of rotating blades has not been quantified; and there are concerns with night lighting and painting of towers to make them less obtrusive. These issues have been addressed in the Proponent's assessment.

Goulburn Mulwaree Council (GMC) - did not object to the proposed wind farm providing the commitments detailed in the EA are adhered to.

Trade & Investment: Resources and Energy (R&E) - had no concerns regarding the Project.

Environment Protection Authority (EPA) – noted that it is satisfied that noise impacts can be managed within guideline limits for the construction and operation phases of the Project.

Office of Environment and Heritage (OEH) – did not object to the Project but raised concerns about impacts to Endangered Ecological Communities, threatened species and the offset strategy.

Department of Primary Industries: Catchments & Lands (C&L) – did not object to the Project and provided comment on the impact to Crown land including where cabling connecting turbines is proposed to cross small sections of 18 Crown roads and lots 7003 and 7004 DP 94490 that are the subject of a Land Claim by the NSW Aboriginal Land Council. C&L advised the proponent to redesign this part of the Project in order to avoid these lots. The Proponent has addressed these issues in the PPR and the Department has considered this further in Section 5.5.

Department of Primary Industries: (Fisheries NSW) – Fisheries NSW did not object to the Project and commented on creeks within the proposed project area and supports the proposed safeguards and mitigation measures listed in the EA and appendices.

Department of Primary Industries: NSW Office of Water (NOW) – NOW also did not object to the Project and requested to be consulted on the preparation of a Construction Environmental Management Plan and commented on impacts to waterways and licensing required under the *Water Act 1912 and/*or the *Water Management Act 2000.*

NSW Ministry of Health – did not object to the Project and advised that the EA appears to comprehensively address any potential public health issues particularly with regard to noise and shadow flicker and states that the proposed monitoring, controls and remediation for affected properties within two kilometres of turbines appears to be adequate.

Transport for NSW, Roads and Maritime Services (RMS) – did not object to the Project, however it did object to the proposed widening of three intersections (Hume Highway and Lerida Road; Hume Highway and Picton Road; and Picton Road and Mount Ousley Road) and commented on the proposed transport of oversized loads and vehicle movements.

Upper Lachlan Shire Council (ULSC) – objects to the Project based on the cumulative effect of wind farms in the shire and raised concerns about noise, setback distances, television and radio transmission, Council roads, planning agreements and Council's Development Control Plan. The noise, visual impact and planning agreement issues raised by Council are considered in Section 5. The other issues raised are considered to have been appropriately managed by the application of standard conditions of approval.

Murrumbidgee Catchment Management Authority (MCMA) – did not object to the Project and commented on impacts to vegetation and proposed offsets.

4.3. Public Submissions

A total of 128 submissions were received from the public. This included submissions from the following special interest groups:

- Boorowa District Landscape Guardians Inc.;
- Clean Energy Council;
- Friends of Collector;
- Friends of Grasslands; and
- The Waubra Foundation Inc.

Of the 128 public submissions, 68 (53%) objected to the Project, 58 (45%) supported the Project and 2 (1.5%) did not object but raised concerns regarding biodiversity impacts, proximity of turbines to residences, night lighting and noise. The key issues raised in public submissions objecting to the Project are listed in **Table 2** and the key issues raised in public submissions supporting the Project are listed in **Table 3**.

Table 2: Summary of Issues Raised in Public Submissions objecting to the Project

Issue	Issues Raised in Objections to the Project
Health	• Lack of Australian research into health effects of turbines, "Wind Turbine Syndrome" and low frequency noise and infrasound.
Noise and vibration	• Audible and infrasound noise and vibration from turbines.
Turbine safety	• Possible turbine and blade failure including fire and "ice shedding".
Consultation process	• Lack of consultation with the community and misrepresentation of community views through surveys.
Landscapes, view and visual amenity	• Underestimation of visual impact and loss of views over the natural landscape.
Property rights and devaluation	• Possible reduction in land values and decreased ability for aerial service use, such as aerial spraying.
Environmental Assessment	• The EA is deficient, lacking transparency and biased in its assessment of the environmental impacts. • A call for a moratorium on wind farm developments. The draft NSW Wind Farm Guidelines should be finalised before a decision is made on this Project.
Shadow flicker and night lighting	• Shadow flicker and the use of obstacle lighting.
Agriculture	• Soil fertility, loss of agricultural land and the health of livestock and animals.
Decommissioning	• Decommissioned turbines will not be removed due to financial status of the company.
Ecology	• Impact to bird species and habitat removal and changes to microclimates.
Heritage	• Potential impacts to heritage items and places and a Native Title Claim.
Aviation safety	• Impacts to low flying agricultural aircraft.
Community	• Perceived benefits and impacts to the community of Collector including community division, local employment opportunities and the Community Consultative Committee.
Electricity generation and market factors	• The efficiency of wind generated electricity compared to other forms of renewable energy, that wind sources will add to increased energy prices and whether more electricity generation is required.
Telecommunications and electrical interference	• Possible interference with telecommunications and aviation equipment.
Traffic	• Impacts on roads and traffic.
Compliance and monitoring	• Safety training for construction personnel will be limited.

Table 3: Summary of Issues Raised in Public Submissions supporting the Project

Issue	Reason for Supporting the Project
Environment	• Support for renewable energy, the Project is consistent with the renewable energy target and the NSW Renewable Energy Action Plan.
Health	• Research that is quoted to support the negative health impacts of wind turbines has questionable methodology and bias. • Health impacts associated with coal fired power stations and the use of fossil fuels are proven and outweigh those perceived of wind farms.
Environmental Assessment	• EA effectively assesses all impacts of the Project and proposes opportunities to limit the adverse effects of the development.
Economy	• The Project will provide a stimulus to individuals and the local economy and will contribute to a more diversified and sustainable national economy.
Community consultation	• Consultation has been well managed throughout the Project and concern raised about the representiveness of the survey completed by people opposing the Project.
Location	• The location is ideal for a wind farm as it has sufficient wind resource, is within close proximity to main distribution power lines and in a low density area.
Community	• Support for a Community Enhancement Fund and concern about its management for the benefit of the community. • Concern about groups claiming to represent the views of the whole community.
Visual Impact	• Aesthetic attraction or otherwise to wind farms is based on personal taste.
Property Rights and Values	• Ability of farmers to develop their land for their own benefit. • 2011 Senate Inquiry found no unequivocal link between the location of wind farms and property prices.

The Department has considered the issues raised in submissions in its assessment of the Project.

Community Surveys

The Department notes the multiple community surveys that have been conducted in order to gather information on the support or otherwise of wind farms and renewable energy developments including the:

- *Exploring community acceptance of rural wind farms in Australia: a snapshot* (CSIRO 2012);
- *Collector Community Survey* for the Friends of Collector (StollzNow Research, 2012);
- *Community Attitudes Survey* for the Environmental Assessment (Auspoll, 2010);
- *Community attitudes to wind farms and renewable energy in NSW* (the former Department Environment, Climate Change and Water, 2010); and
- Upper Lachlan Shire Council's 2008 Referendum on whether there was support for the continuing development and construction of wind farm turbines in the Upper Lachlan Council area.

The Department notes the various criticisms made in the submissions received and the response to submissions about whether a survey is really a representative sample or not. The Department will not comment on the representativeness of a particular survey, apart to say that a survey will only ever represent the views of those people who were surveyed in response to the questions asked at that time.

The Department will therefore not focus on the numbers and percentages reported within the surveys or on the criticisms raised about the methods employed but instead consider the issues raised in the

surveys regardless of whether these have been raised by individuals or groups known to oppose or support the wind farm.

4.4. Proponent's Response to Submissions

RATCH-Australia Wind Developments Pty Ltd provided a response to the issues raised in submissions (see **Appendix C**). The response included a Preferred Project and Submissions Report (PPR) which has resulted in the following changes:

- a reduction in the number of wind turbine generators from 68 to 63 (from the north-eastern section of the layout) as shown in **Figure 4.** The removal of these 5 turbines will reduce visual, noise and ecological impacts;
- relocation of 28 wind turbine generators up to 165m from the locations in the EA to avoid woodland vegetation (23 wind turbines) or telecommunication paths (five wind turbines);
- relocation of the substation 250m north of the location shown in the EA. This is TransGrid's preferred location for the substation; and
- connection of the substation to the existing 330 kilovolt transmission line.

5. ASSESSMENT

The Department considers the key environmental issues for the Project to be:

- noise (construction and operation impacts);
- visual amenity (operation impacts);
- biodiversity (construction and operation impacts); and
- health impacts.

Other issues are considered in **Section 5.5**.

5.1. Noise

Operational Noise – Wind Turbines

Noise generated by the operation of wind turbines has been assessed by Marshall Day Acoustics (MDA), on behalf of the Proponent, in accordance with the South Australian Environment Protection Authority *Wind Farms Environmental Noise Guidelines February 2003* (SA Guidelines), the Department's *NSW draft NSW Wind Farm Guidelines* (draft NSW Wind Farm Guidelines) and other relevant limits and guidelines. The noise impact assessment in the EA, assessed the 68 turbine wind farm layout and the PPR provided a revised assessment for the smaller wind farm of 63 turbines. As the Proponent will select the final turbine model during the detailed design stage, MDA assessed three turbine models to represent the range of noise levels that may be experienced by the Project (Suzlon S88-2.1MW which has the highest sound power level of 106dB(A), REPower 2.4M104 with a sound power level of 105 dB(A) and Siemens SWT-2.3-101 with the lowest sound power level of 103.6dB(A)). The three turbine models selected by the Proponent are considered to be representative of the range of turbines considered for the Project. The three turbines considered in the impact assessment comprise three upwind rotor blades with variable blade pitch to control rotational speed, power generation and noise emissions.

Noise generated by wind turbines increases as wind speeds increase. However, as background noise levels are also affected by increased wind speed, the noise generated by wind turbines at a higher speed may be fully or partially masked by a corresponding increase to background noise levels at the receiver from windy conditions. In recognition of this relationship between wind speed and background noise, the SA guidelines specify operational noise limits with consideration to applicable background noise levels at receptors.

The SA Guidelines and the draft NSW Wind Farm Guidelines require that the noise generated by the operation of wind turbines do not exceed a noise level of 35 dB(A) LAeq or the background noise level by more than 5 dB(A) (whichever is greater) at surrounding "non-associated" landowners. The Proponent has, however, adopted the minimum noise level of 35dB(A) irrespective of the background noise for non-associated residents. MDA conducted background noise monitoring and presented these in the assessment for reference purposes, however as the minimum noise level of 35dB(A) has been adopted by the Proponent as the noise criteria, background noise levels do not alter the assessment outcomes.

The SA Guideline and the draft NSW Wind Farm Guidelines do not identify specific noise limits for "associated" or "involved" landowners noting that this is subject to agreement between parties as part of commercial negotiations. The Proponent has adopted the noise limit of 45 dB(A) for associated dwellings.

The noise assessment in the EA shows noise emissions for 34 identified noise receiver locations (or residences), (receivers approximately within 3km of the wind farm). Of these receivers, 8 residences were originally situated within 2km of the nearest wind turbine, however with the removal of 5 turbines in the revised layout presented in the PPR, 6 residences are now within 2km of the nearest turbine. All of these six residences are "associated" or "involved" landowners, meaning that they have signed an agreement with the Proponent for the siting of turbines within 2km of their residence, see **Figure 4**.

Following the review of submissions, the Proponent removed 5 wind turbines from the north-eastern section and relocated a further 28 wind turbines as discussed in **Section 4.4**. The Proponent revised the noise assessment for the reduced 63 turbine layout for the same three turbine models used in the original assessment in the EA. The assessment states that operational noise for the wind farm would comply with the 35dB(A) noise criteria for all non-involved receivers and the Proponent's adopted criteria of 45dB(A) for all project-involved receivers with the exception of Resident N. The proposed wind farm layout would exceed 45dB(A) at associated receiver N by 1 to 4dB(A), depending on the layout and proposed turbines selected. The Proponent has committed to implementing additional contingency measures, such as additional insulation measures and landscaping, in recognition of the higher predicted noise levels expected at receiver N.

The Proponent proposes to prepare a revised noise assessment once the preferred turbine has been selected and the final layout has been determined to verify compliance of the Project with relevant noise limits.

In addition, the Proponent also states that noise from the wind farm would be monitored to assess compliance with the noise criteria. Should noise exceedances be discovered, the Proponent proposes to use active noise control functions on the turbines, rectify any defects or change control settings to reduce noise. The Proponent also proposes to acoustically treat any receiver dwellings if noise exceedances still occur.

Operational Noise - Cumulative Noise impact

The cumulative noise impacts from the operational Cullerin Range Wind Farm were also assessed. Cullerin Range Wind Farm is located on the Cullerin Range to the north of the proposed Collector Wind Farm on the opposite side of the Hume Highway. The assessment predicts operational noise levels from Cullerin, and overlays the relative noise contribution from Cullerin and the Project for the three turbine models (as discussed above). The noise predictions assume simultaneous downwind propagation from each turbine from both wind farms. The Proponent considers this results in a conservative assessment as in most cases, the receivers could not possibly be downwind of all the turbines at the same time or would only be downwind of the turbines for a narrow range of wind conditions. The Proponent assessed the cumulative impact on these receivers most affected for the Cullerin Range Wind Farm (non-associated residents DD and EE) and for the Collector Wind Farm (non-associated residents FF and CC and associated residents T and G). The assessment found that there would be a marginal increase in noise at DD and a negligible increase in noise levels at residence EE arising from the Collector Wind Farm. The contribution of noise from Cullerin Range Wind Farm to the cumulative impact for noise receivers of the Project is in most cases 0.6 dB(A) (with the exception of resident CC with a 2dB(A) increase). Nevertheless, the cumulative noise levels at all non-associated receivers is predicted to comply with the 35 dB(A) noise level. The cumulative noise levels at the two "associated" residences assessed (associated residents G and T) are also predicted to comply with the 45 dB(A) noise level with an increase of noise levels less than 0.2 dB(A) predicted.

Operational Noise – Low Frequency Noise

The Proponent has considered low frequency noise in accordance with the draft NSW Wind Farm Guidelines for non-associated receivers located within 2km of a turbine. The draft NSW Wind Farm Guidelines require a further assessment of low frequency noise where the predicted noise levels are above the daytime level of 65dB(C) and the night time level above 60dB(C). The revised low frequency noise assessment of three residential locations (associated resident Z, non-associated residents BB and FF), notes that the maximum C-weighted levels would be below the draft NSW Wind Farm Guidelines and therefore further assessment is not warranted. The Proponent, however, also notes the high level of uncertainty for C-weighted noise emissions, quoting an error of up to +/- 1dB to approximately +/- 6dB for the Suzlon turbine depending on the specific circumstances in which the sound power test is conducted. Further, this uncertainty is considered to be typical of the range of uncertainties that could be applied to the other two turbines under consideration in the noise assessment. This was also noted in the independent SKM review. The assessment concludes that the C-weighted noise levels should be regarded as indicative predictions and when accounting for the uncertainties, the predicted low

frequency noise level is still likely to comply with the day time and night time noise levels specified in the draft NSW Wind Farm Guidelines.

Other Operational Noise – Substations, Corona and Aeolian noise

The Proponent has assessed the substation component of the Project consistent with the requirements of the *NSW Industrial Noise Policy* (EPA, 2000) (INP). The assessment included measuring background noise levels (termed Rating Background Level) which were measured to be less than 30dB(A) under calm wind conditions. The assessment set the RBL to 30dB(A) in accordance with the INP and also applied a +5 dB(A) penalty for the known tonality in transformers. The assessment predicts noise levels at the nearest receivers (non-associated resident DD and associated resident N, 2.9km and 3.2 km from the substation respectively) and concludes that both are below the Rating Background Levels and comply with the INP noise limits.

The MDA assessment considers the corona and aeolian noise associated with the overhead connection from the transformer to the existing TransGrid transmission line to be minimal. The assessment concludes that the distance from the connection to the nearest residence is approximately 3km and at a similar distance to the existing overhead line. The assessment states that the Proposed Collector Wind Farm would not give rise to any change in level or regularity of noise emissions from the existing overhead line.

Construction Noise and Vibration

The construction noise assessment was conducted by using the Interim Construction Noise Guideline (DECCW, 2009). Construction noise was assessed by considering the five main construction activities and predicting noise levels for receivers that are closest to the construction activities. The construction noise levels are predicted to comply with the Noise Management Level of 40 dB(A) at all non-associated receivers as shown in **Table 4**. At the three associated receivers, the construction noise levels are predicted to exceed the Noise Management Level between 5 and 20 dB(A) as shown in **Table 4** (based on the original 68 turbine layout).

Table 4: Construction Noise Level Predictions (exceedances highlighted in grey)

Receiver	Management level ($L_{eq, 15\ minutes}$)	Indicative Predicted Noise Level in dB(A)					Comply
		Access Road Construction	Turbine Foundation preparation	Cable Trench Digging	WTG Assembly	Concrete Pouring	
G*	40	**40-45**	**40-45**	**40-45**	<30	30-35	N
M*	40	35-40	35-40	35-40	<30	<30	Y
N*	40	**55-60**	**55-60**	**55-60**	**40-45**	**45-50**	N
T*	40	**45-50**	**45-50**	**40-45**	30-35	35-40	N
L	40	30-35	30-35	30-35	<30	<30	Y
Q	40	30-35	30-35	30-35	<30	<30	Y
Z*	40	35-40	30-40	35-40	<30	<30	Y
FF	40	35-40	30-40	35-40	<30	<30	Y

Source: Table 16 Collector Wind Farm Environmental Assessment June 2012

** indicates an associated receiver. Resident Z has recently signed an agreement and is now considered an associated receiver.*

For the associated receivers, the predicted construction noise levels will be up to 20dB(A) greater than the noise affected level, however they will be more than 10dB(A) below the threshold of highly affected levels as defined by the Interim Construction Noise Guideline. The Proponent proposes to implement an Environmental Management Plan for the construction phase of the Project which would detail the proposed measures including the notification process for affected residents.

Vibration caused by construction activities was assessed by considering a worst case scenario and propagation conditions. The nearest receivers are 300m and 1km away from the nearest turbine. The assessment states that for the nearest receiver (associated resident N), 300m away from the nearest turbine, the majority of the predicted vibration levels are expected to fall within the preferred value (0.28mm/s for continuous vibration and 8.6mm/s for impulsive vibration) and all are below the maximum

value (0.56mm/s for continuous vibration and 17mm/s for impulsive vibration) specified in the *NSW Assessing Vibration: A technical guideline (Department of Environment and Conservation, 2006)*. Vibration levels at the next nearest receiver, one kilometre away, were predicted to be well below the preferred criteria.

Construction Traffic Noise

Construction traffic noise was considered in accordance with the Environmental Criteria for Road Traffic Noise (ECRTN). The assessment focuses on construction traffic noise levels at associated receivers N and Z (adjacent to the Lerida South Road) and non-associated receiver CC (adjacent to the Hume Highway west of Federal Highway). In the absence of nearby receivers, construction traffic noise levels were also assessed at Picton Road and the Hume Highway south of Illawarra Highway. The assessment concludes that construction traffic noise at both associated and non-associated receivers complies with the criteria in the ECRTN. As all other receivers are located further from the traffic routes the assessment further concludes that all other receivers will also comply with the ECRTN.

Other Noise Affects

The Proponent's assessment also discusses and includes consideration of specific conditions (ie. weather) when receptors may experience increased annoyance from modulation effects (i.e. the "whooshing" sound caused by different wind speeds or wind gradients forming between the top and bottom of the rotor blades during stable atmospheric conditions - also known as "van den Berg effects"). The assessment considered wind turbine emissions based on hub-height wind speeds. This methodology provides a more realistic assessment of wind speeds under different meteorological conditions. This gives greater confidence in the noise predictions as it removes the potential for lower or higher than expected turbine emissions caused by site wind shear conditions. The Department notes that the use of hub-height wind speeds is an improvement on the SA 2003 guidelines and that this requirement is now reflected in later version of the SA Guidelines. The Proponent noted that the van den Berg effect is unlikely and has not been observed in Australia. The Department concurs with this statement as the phenomenon referred to as van den Berg effect occurred in meteorological and topographical conditions unlikely to be reproduced in Australia.

Consideration

Operational Noise – Wind Turbines

The Department notes that noise concerns, specifically audible and infrasound noise and vibration from the turbines, was a significant issue raised in the submissions received on the Project. The Department commissioned an independent noise expert (undertaken by SKM) to review the Proponent's noise impact assessment and issues raised in key submissions made by the public on noise aspects and impacts of the Project (see **Appendix D**). The SKM review concluded that the Proponent's assessment was comprehensive and that the Director-General's requirements had been fulfilled. Furthermore, the SKM review concluded that with reference to the SA Noise Guidelines, the predicted noise impact of the Project would be acceptable.

The Department is satisfied that the Proponent has undertaken an acceptable assessment of the operational noise impacts of the Project. The Department is also satisfied that the Proponent has sought to reduce noise impacts by designing the wind turbine layout to comply with the 35dB(A) noise level at all non-associated receivers.

The SKM review also noted that the Proponent chose not to use background data but rather demonstrate compliance with the most stringent criterion of 35 dB(A) instead. The Proponent advised that this was due to concerns over the quality of the background data collected. By taking this approach the Proponent did not need to provide further information on the background data to calculate the further noise criterion of background noise plus 5 dB(A). The Department therefore considers that the Project has demonstrated it can meet the criteria in the draft NSW Wind Farm Guidelines at all non-associated residences but in doing so has not provided enough information to allow a condition based on the criterion of background plus 5 dB(A). The Department has therefore recommended conditions of approval requiring compliance with 35 dB(A) only, with no reference to background plus 5 dB(A). The

Proponent does not agree with this approach and has requested a noise condition consistent with the South Australian Wind Farms Environmental Noise Guidelines of 35 dB(A) or background plus 5 dB(A).

The Department, in considering the Proponent's request, has also considered the likely community expectations, particularly those located closest to the wind turbines where the EA indicates that noise levels would not exceed 35 dB(A) regardless of the background noise level, and considers that without the additional background information the Department cannot recommend a condition allowing noise levels above what was considered.

The Department would reconsider this position and the noise limit if the Proponent updated its assessment based on newly collected background data. The Department could also consider this subject to a future modification application that included accompanying background data.

The Department, however, does concur with the noise assessment, that the wind farm is predicted to meet the noise criteria at all non-associated residences and has also recommended a condition of approval regarding the methodology that should be used to determine compliance. This is also supported by the EPA which stated that noise impacts could be managed within the guideline limits for construction and operational phases of the project. Further, recent changes to the *Protection of Environment Operations Act 1997* requires wind farms, generate greater than 30 megawatts of power, to obtain an Environment Protection Licence (EPL) after March 2014. The EPL will also specify noise limits. The EPA has since indicated that the proposal could be licenced.

The Department notes that the noise modelling undertaken for the assessment is based on three turbine models which provide an indicative range of likely noise emissions from the Project. The Department acknowledges that the Proponent would begin the detailed design phase if the Project is granted approval and, therefore, at this stage has not committed to a specific turbine model. To ensure the final project design does not result in noise levels greater than those predicted, the Department has recommended a condition requiring the Proponent to prepare and submit a revised noise assessment for the final turbine model selected and the final wind farm layout to demonstrate the consistency of the noise predictions against those made in the assessment to ensure that the guideline level of 35dB(A) is not exceeded (at non-associated residences).

Furthermore, the Department has also recommended a condition requiring the Proponent to prepare a Noise Compliance Plan prior to the commissioning of the turbines to assess the performance of the Project against the noise predictions and criteria and to commit to undertaking noise compliance monitoring within three calendar months of the wind farm being commissioned. This condition ensures that noise levels would be measured soon after commissioning to ensure that the performance criteria for noise levels from the Project are being met. In the event that noise compliance monitoring (undertaken under the Noise Compliance Plan) shows that the noise levels exceed the performance criteria set out in the conditions, the recommended conditions require the Proponent to investigate and develop suitable mitigation and management measures to achieve compliance with the noise criteria. Remedial measures should include, in the first instance, reasonable and feasible measures to reduce noise from the Project by implementing controls at the source (such as reduced operation of wind turbines, design changes or sector management). While considered unlikely, should these measures be exhausted, the recommended condition requires the Proponent to consider remedial measures for affected residents but only at the absolute discretion of the resident.

The Department considers that the recommended conditions would ensure that the performance criteria for noise emissions of the Project are met. Consistent with other wind farm approvals, the Department has also recommended a condition to allow residents within 3km of a turbine to request an independent review of noise impacts from the Project on their residence. Three kilometres is considered to be a suitable distance as it would include occupants of residences just outside of 2km who may be concerned about noise impacts to be able to seek a review.

For associated residents, the assessment shows that the Proponent's adopted criteria of 45dB(A) will be met for all associated residences with the exception of residence N which is predicted to exceed the

adopted noise level of 45dB(A) by 1 to 4dB(A) depending on the proposed wind turbine and associated layout. The Proponent has committed to additional contingency measures at this location in recognition of the predicted noise level. Proposed measures include a package of insulation designed to achieve suitable internal noise levels, and landscaping. The SKM review also considered this approach to be reasonable and satisfactory.

The Department also notes that residents most affected by the cumulative noise, from Cullerin Wind Farm and the proposed Collector Wind Farm, are also predicted to comply with the 35dB(A) noise level at all non-associated receivers and comply with the Proponent's adopted criteria of 45dB(A) at the associated receivers.

Potential noise impacts from low frequency noise and infrasound (very low frequency sound with a frequency below 20Hz) has recently raised significant concern amongst communities regarding wind farm proposals. The Department has considered the issues raised in submissions, the assessment provided by the Proponent and the findings of the SKM review. Additionally, literature reviews and research undertaken in Australia during development of the SA Guidelines and the recently released Technical Information guides on Wind Farms by the Victorian Government's Department of Health and reports on Infrasound and low frequency noise by the South Australian Government's Environment Protection Authority have also informed the Department's position.

As stated in the draft NSW Wind Farm Guidelines, "*analysis of wind turbine spectra shows that low frequency noise is typically not a significant feature of modern wind turbine noise and is generally less than that of other industrial and environmental sources*". The draft NSW Wind Farm Guidelines set thresholds for when more detailed low frequency noise assessments are required, which is when the C-weighted noise is greater than 65dB(C) during the daytime and 60dB(C) during the night time.

The Department notes that there are no non-associated residences within 2km of the proposed turbines. The Proponent's revised assessment of the C-weighted noise levels shows that at the two residences previously within 2km of the wind farm (associated residence Z and non-associated residence FF) the predicted C-weighted levels approach the draft NSW Wind Farm Guidelines threshold for one of the three turbine models (REpower 3.4M 104). The Department, in also noting the SKM review, considers caution should be used in the application of these levels as once the uncertainty of C-weighted noise emissions from turbine manufacturers are considered, the C-weighted noise levels could be in the range of +/- 6dB either side of the levels shown in the revised assessment. The Department's recommended condition requires the Proponent to prepare a revised Noise Assessment for the final turbine layout to demonstrate that the final design can meet the criteria and to explain the difference (if any) of the spectral noise signature between the turbines used in the assessment and the final turbine model selected. This revised Noise Assessment must also include a revised assessment of low frequency noise to determine whether the thresholds in the draft NSW Wind Farm Guidelines are predicted to be exceeded and if so then the Proponent will be required to prepare a detailed low frequency noise assessment.

The Department acknowledges that there is concern within the community about infrasound which may stem from previously reported noise and health concerns from the older style wind turbines where the blades were placed downwind. The design of modern wind turbines has changed whereby blades are positioned to the upwind side of the tower which has reduced the levels of low frequency and infrasound produced. Recent literature reviewed also states that although infrasound is perceived by the ear like other frequencies it has to be above the hearing threshold to be detected. Infrasound from wind farms has been demonstrated to be well below the hearing threshold of 85 dBG and therefore inaudible as close as 185m from the turbines (Department of Health 2013). The Department considers that based on the modern turbine models, the evidence, and that there are no non-associated residences within 2km of the turbines, that infrasound issues have been satisfactorily addressed.

Operational Noise – Ancillary Infrastructure

The Department is satisfied that the Proponent's assessment shows that the noise levels from the substation will not exceed relevant criteria at private residences. The Department has recommended a

condition which sets criteria for noise levels from the substation to ensure that the substation is designed, constructed, operated and maintained to meet appropriate noise levels.

Construction Noise
In accordance with the Director-General's requirements, the Proponent has assessed the construction noise impacts of the Project consistent with the Interim Construction Noise Guidelines (DECC 2009). The Proponent has predicted that construction noise levels would comply with the Noise Management Level of 40 dB(A) at all non-associated receivers and the noise levels are predicted to exceed the Noise Management Level between 5 and 20 dB(A) at three associated receivers (G, N and T). The Department considers that potential construction impacts are transient, particularly for receivers G and T which are predicted to experience construction noise impacts from three construction activities (access road construction, turbine foundation preparation and cable trench digging). Associated resident N, however, is predicted to experience construction noise impacts across all five construction activities modelled.

To ensure all reasonable and feasible measures are implemented to mitigate the construction noise, the Department has recommended a condition which requires the Proponent to develop a Construction Noise and Vibration Management Plan to detail how construction noise and vibration impacts will be mitigated, monitored and reviewed. The Department considers that the assessment demonstrates that vibration and construction traffic noise impacts should be negligible, however, the Proponent will be required to demonstrate management of these potential impacts within the Construction Noise and Vibration Management Plan and to comply with noise criteria in the EPL.

5.2. Visual

The Landscape and Visual Impact Assessment (LVIA) was revised in the PPR to assess the impacts of the smaller 63 turbine layout. The LVIA assessed the impacts of placing the wind turbines in the landscape and assumed the following design parameters: tower height - 94m, rotor diameter - 112m, overall height from ground to top of blade - 150m. The LVIA also includes an assessment of the ancillary infrastructure, construction impacts, cumulative impacts, blade glint and night-lighting impacts. The assessment considered a range of guidelines in developing its visual impact assessment framework including the: draft NSW Wind Farm Guidelines; "Wind Farms and Landscape Values National Assessment Framework"; "National Wind Farm Development Guidelines"; "Auswind Best Practice Guidelines" and Upper Lachlan Shire Council's Development Control Plan (2010) for Wind Farms.

The Proponent also prepared a LIVA Addendum A (see **Appendix E**) in response to the independent peer review completed by Clouston Associates (see **Appendix D**).

The revised turbine layout removed 5 turbines in the north-east area of the wind farm and relocated 28 other turbines between 25m and 165m from their original position (in the EA) as shown in **Figure 5**.

Wind Turbines – Impacts to Surrounding Receptors and Landscape
Five Landscape Character Areas were identified within the surrounding landscape; undulating grasslands, wetland and drainage areas, slope and ridgeline areas, timbered areas (cultural and remnant native), and settlements and homesteads.

The sensitivity of each landscape element or feature to the Project was considered using a number of factors including:

- landform and scale;
- landcover;
- settlement and human influence;
- movement;
- rarity; and
- intervisibility with adjacent landscapes.

The LVIA categorised each of the Landscape Character Areas to be of medium sensitivity with the Slope and Ridgelines Landscape character area being regarded as medium to high sensitivity in relation to their ability to accommodate visual changes associated with the Project.

The Proponent also prepared Zone of Visual Influence (ZVI) maps for a 10km radius and considered 113 residential view locations within the 10km radius and an additional 31 view locations within the Collector Village (see **Table 5**). The significance of visual impacts to identified receptors and view locations is likely to reduce as the distance increases.

Table 5. Summary of view locations and visual significance

Visual Significance	Outside Collector Village	Within Collector Village
Nil to low	86	21 locations (46 dwellings)
Low to Medium	9	5 locations (6 dwellings)
Medium	9	5 locations (14 dwellings)
Medium to High	3	Nil
High	6	Nil

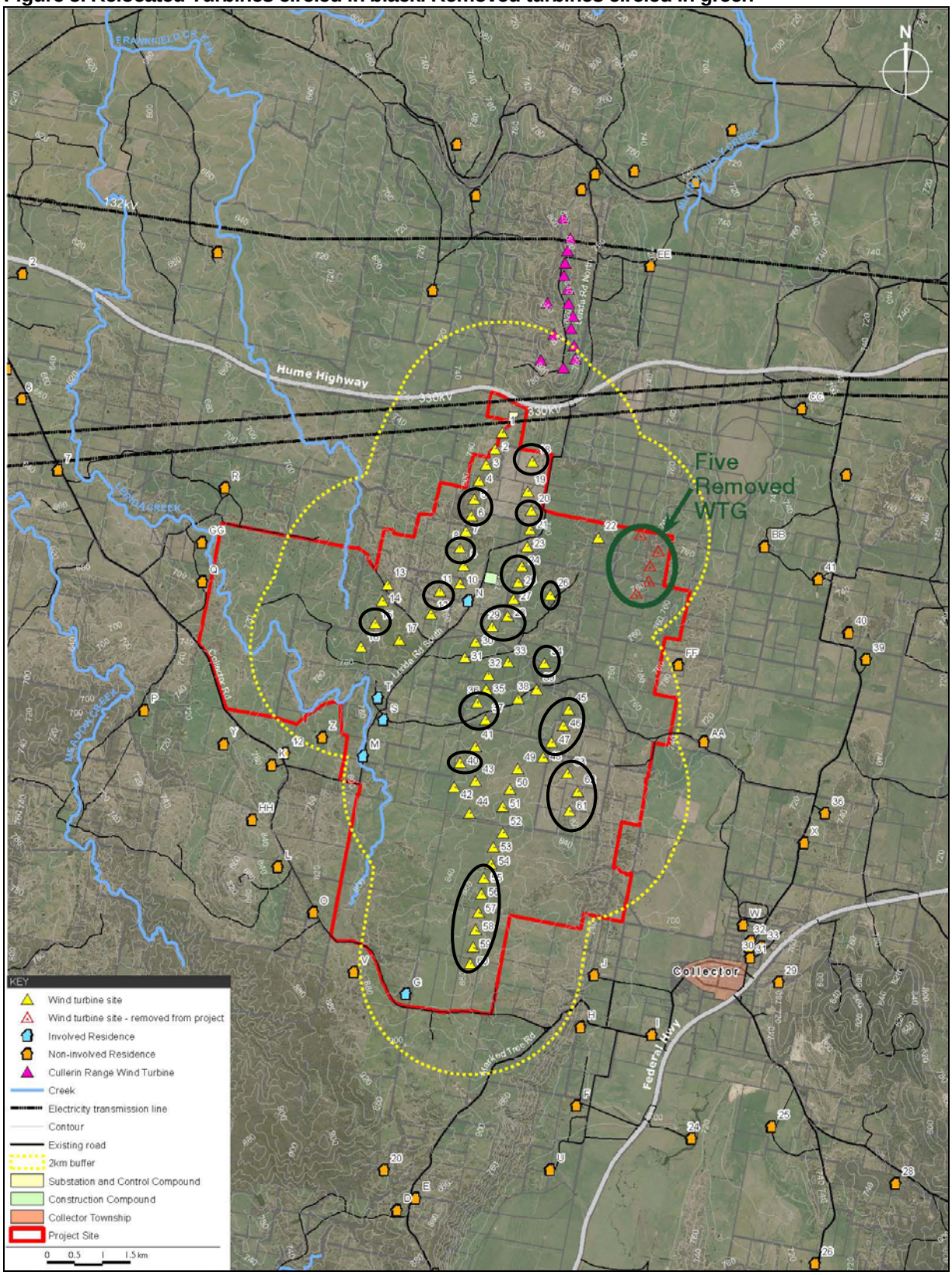
Source: LVIA Addendum A (Green Bean, 2013) based on the revised layout

Locations with a medium to high and high visual significance are located between 2.15km and 4.6km of the nearest turbine.

Of the three residential view locations with a high visual impact rating as presented in the EA, two are now considered to be associated residents, resident 12 (location R6), and resident Z (location R5). The third resident is a non-associated resident FF (location R16). The removal of five turbines in the revised layout would result in a reduced visual impact for residents, including non-associated resident FF, the closest resident to the five removed turbines (FF is now located approximately 2.15 km from the nearest wind turbine). The house at FF is not occupied full time as the owners live outside of the area. Resident FF also did not make a submission on the Project.

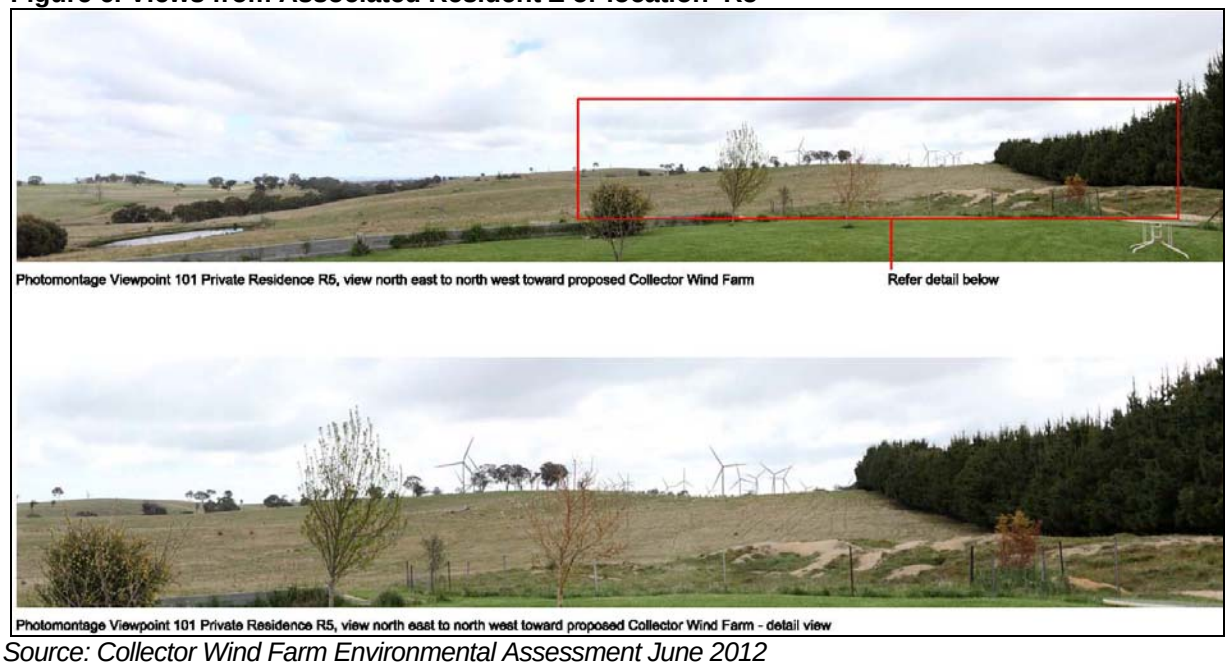
In accordance with the draft NSW Wind Farm Guidelines, photomontages were prepared for two of the three non-associated residential dwellings located within 2km of the nearest turbine (at the time of the EA). The third photomontage was unable to be obtained from the third residence. Resident Z until recently was the only non-associated resident within 2km of the revised wind turbine layout but has since signed an agreement and is now considered an associated resident. **Figure 6** is a photomontage from associated resident Z (location R5 approximately 1.82 km from the nearest turbine). Resident 12, also considered an associated resident, is located approximately 600m further away from the nearest wind turbine than resident Z and could be expected to have a similar viewshed.

Figure 5. Relocated Turbines circled in black. Removed turbines circled in green



Source: Collector Wind Farm Preferred Project and Submissions Report (APP, March 2013) – amended.

Figure 6. Views from Associated Resident Z or location 'R5'



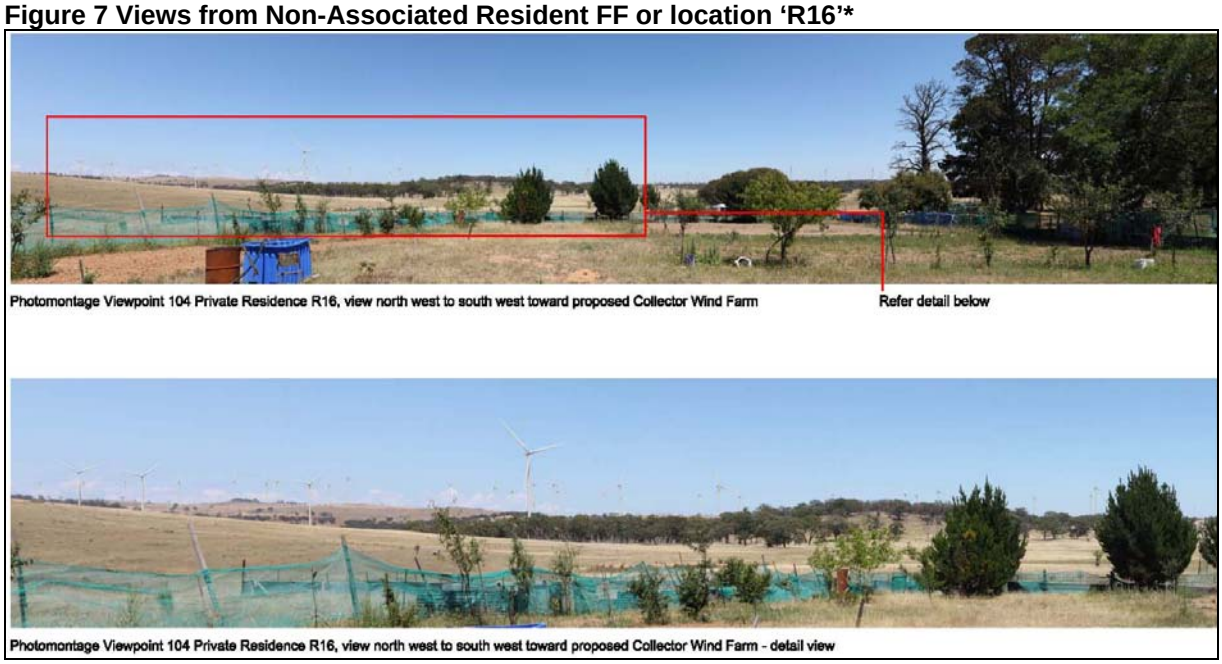
Source: Collector Wind Farm Environmental Assessment June 2012

There are no non-associated residents within 2km of a wind turbine following the revised layout and removal of the 5 turbines. One of the closest non-associated residents is residence FF (location R16) approximately 2.15km from the nearest turbine.

Figure 7 is a photomontage taken from residence FF and shows the earlier 68 turbine layout presented in the EA. The 5 closest turbines shown in the foreground of Figure 7 were removed in the revised turbine layout (although they are still shown).

There are also an additional three view locations that are predicted to experience a medium to high visual impact, with two of these locations containing multiple dwellings. These receptors are non-associated residences Y (view location R8) being 3.1km south-west of the nearest turbine and the group of residences labelled 30, 31,32 and 33 (view locations R34 and R35) which are located 4.1km and 4.6km respectively east of the wind farm, north of Collector Village.

Figure 7 Views from Non-Associated Resident FF or location 'R16'*



Source: Collector Wind Farm Environmental Assessment June 2012

* Important Note: The revised Project no longer includes the 5 closest turbines shown in this photomontage

None of the 31 view locations, representing 66 dwellings, within the Collector Village, located between 3.49km and 4.23km away from the nearest turbine, were considered to have a medium to high or high visual significance. **Figure 8** summarises the types of views towards the wind farm from the different view locations in Collector village.

The Proponent has also considered the visual impact of the Project on the heritage items and public roads and places located within Collector. The assessment predicts that the impact on these locations would either be nil, very low or of low visual significance. Additional photomontages were prepared for two locations along Bourke St Collector near the Collector Oval and cemetery.

Outside of the Collector Village, the visual assessment considers nine public viewing locations, including those along the National Bicentennial Trail, the Main Southern Railway and roads within the 10km viewshed. All locations were assessed as having low visual impact with all locations considered to have a very short viewing period, with people on the National Bicentennial Trail likely to have a moderate to short term period of view due to their mode of transport via vehicle, horse, cycling or hiking despite being approximately 50m from the nearest turbine. This is due to the transient nature of the view towards the wind farm.

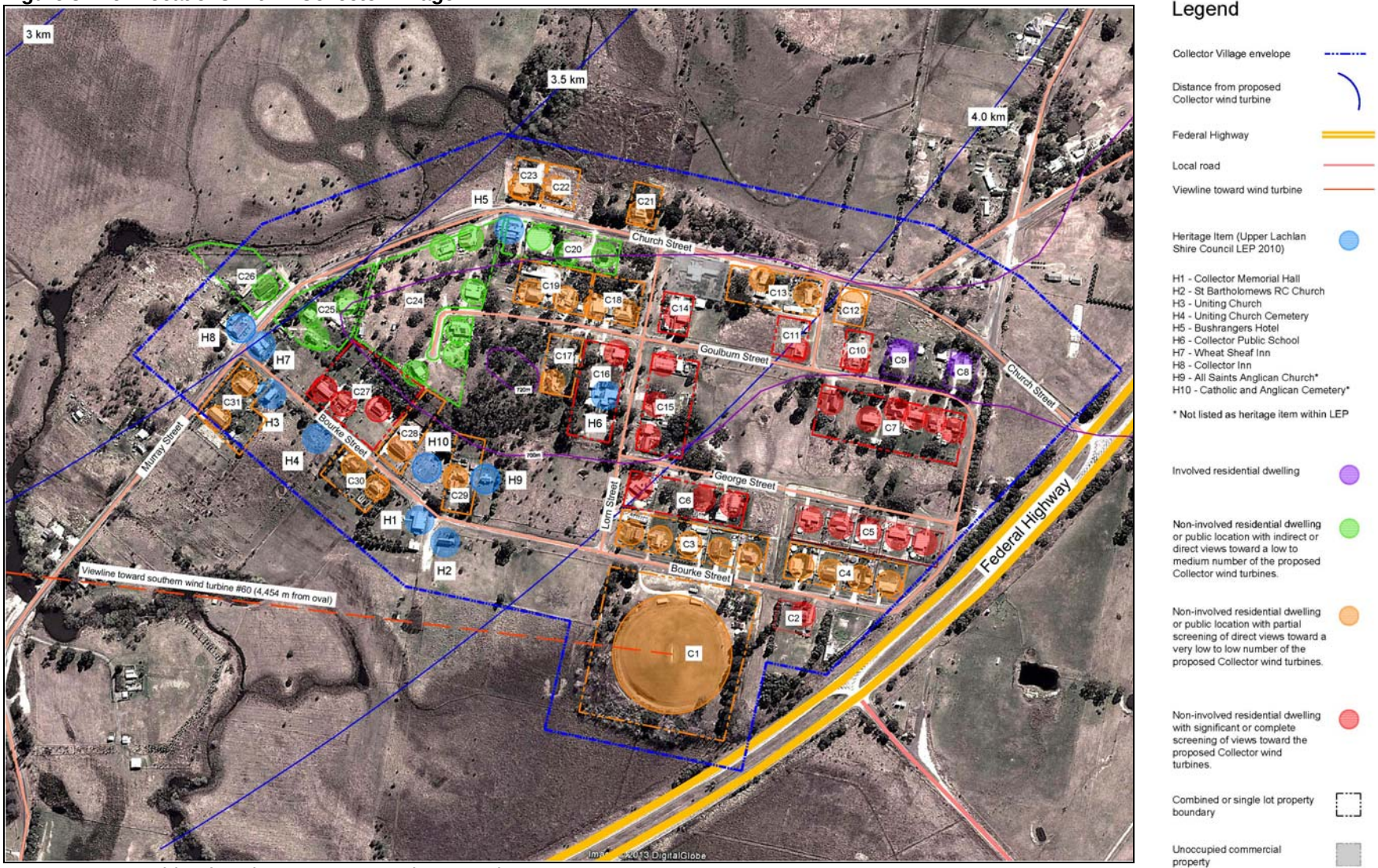
The Proponent's assessment concludes that the landscape has a medium/medium to high sensitivity to accommodate change and while some characteristics are likely to be altered the landscape is expected to have some capability to accommodate change given the large and open landscape portions of the wind farm and low settlement density within the 10km viewshed.

Cumulative Impacts

The Proponent has conducted an assessment of cumulative impacts from nearby operational and approved wind farm developments. The Cullerin Wind Farm (15 wind turbines) is located within 10km and the Gunning, Capital I and II and Woodlawn Wind Farms are located within a 25km radius of the proposed Collector Wind Farm, see Figure 2. The LVIA found that there may be direct and indirect views of both the Cullerin and proposed Collector Wind Farms from residential locations, including those located to the south, west and east, but, direct views towards Cullerin and Collector wind farms would be partially obscured by undulating topography and vegetation.

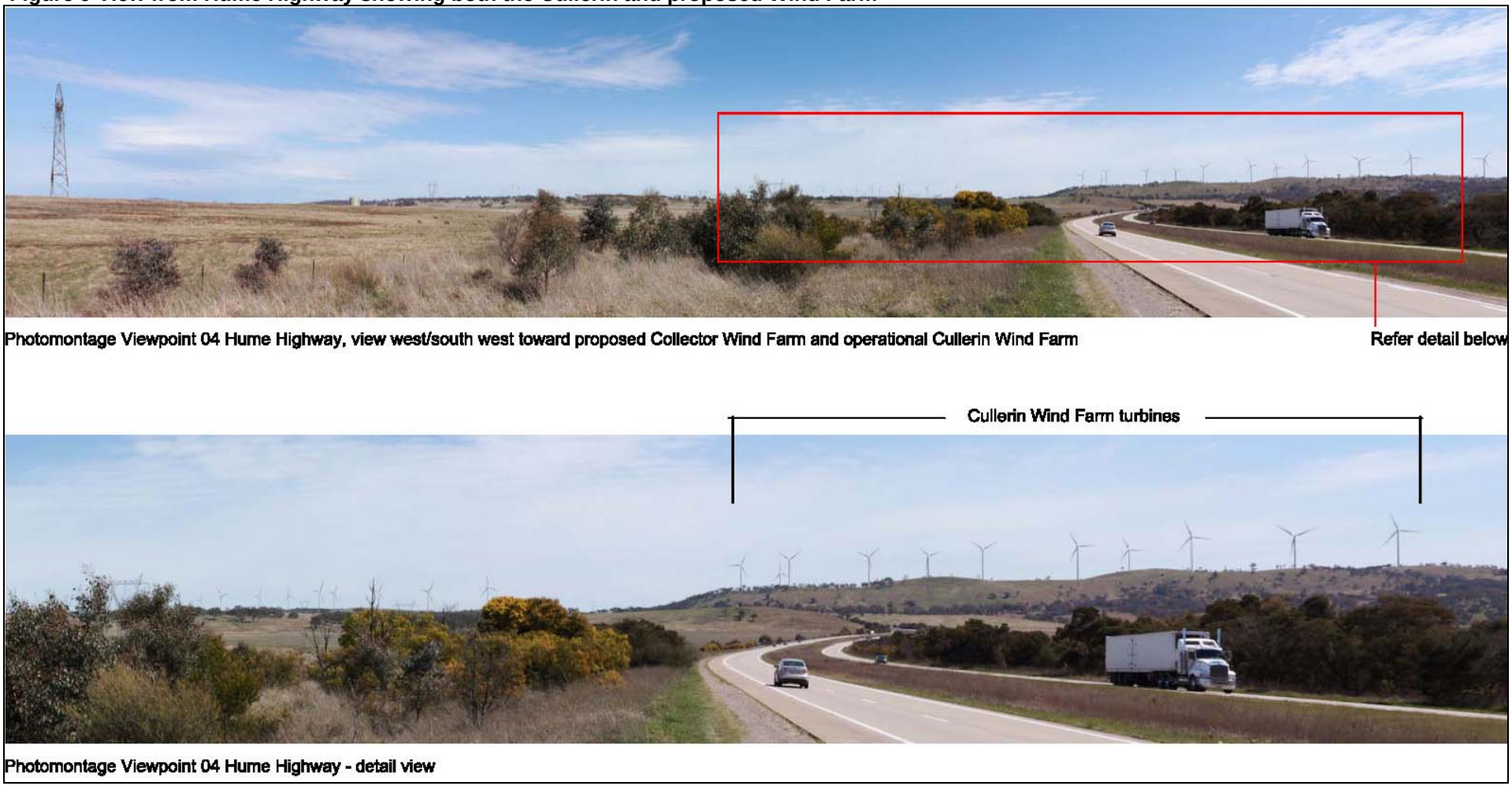
Direct and indirect views towards the Cullerin Wind Farm from transport corridors would occur with sequential views occurring for motorists travelling north to south on Lerida Road South and other local roads around Cullerin Wind Farm, while views from the Hume Highway would be direct due to the direction of travel as shown in **Figure 9**.

Figure 8. View locations within Collector Village



Source: LVIA Addendum (Green Bean Design, 2013)

Figure 9 View from Hume Highway showing both the Cullerin and proposed Wind Farm



Source: Collector Wind Farm Environmental Assessment June 2012

The Proponent's assessment considers the opportunity for direct and indirect views of both the Collector and Gunning Wind Farms is limited. It also notes the potential for indirect views from a small number of residences located on elevated ground to the north-west of the Collector Wind Farm and that sequential views of Collector and Gunning Wind Farms are likely for motorists travelling along local roads between Collector and Gunning and from Gunning towards Grabben Gullen and Crookwell. Motorists travelling this route would also see views of Gullen Range and Crookwell Wind Farms.

The Proponent's assessment also considers that direct and indirect intervisibility between Capital, Woodlawn and Collector Wind Farms is possible but predicted to be limited by topographical features such as the Lake George escarpment and the hills north-east of Lake George. The LVIA concludes that the Collector Wind Farm is unlikely to cause significant cumulative visual impact resulting from views towards other wind farms within its 10km viewshed.

Wind Turbines – Shadow Flicker and Blade Glint

The Proponent has considered shadow flicker in accordance with the draft NSW Wind Farm Guidelines which state that shadow flicker experienced at any dwelling should not exceed 30 hours per year as a result of the operation of the wind farm. The Proponent's assessment concluded that as a worst case shadow flicker was expected for approximately 3 to 5 hours a year and for 5 to 6.5 hours a year at two non-associated residents depending on the turbine layout (Residence BB and AA) well below the 30 hours per year specified in the draft NSW Wind Farm Guidelines.

All associated residents, except for associated resident 'N', are predicted to experience shadow flicker less than the 30 hours per year as recommended by the draft NSW Wind Farm Guidelines. Associated resident 'N', is expected to experience up to 151 to 178 hours per year of shadow flicker. With respect to blade glint, the Proponent has proposed the use of low glare and non-reflective colours to minimise the visual impact of the wind turbines and notes that the blades are largely convex and tend to result in divergence of reflected light rather than convergence towards a particular point.

Wind Turbines – Night Time Lighting

While the Proponent has not proposed night lighting, the requirement for lighting would be subject to advice and endorsement of the Civil Aviation Safety Authority (CASA) and may include two red medium intensity obstacle lights on specified turbines at a distance not exceeding 900m with all lights to flash synchronously. The National Airports Safeguarding Framework - *Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers* (Department of Infrastructure and Transport, 2012) outlines the considerations and circumstances where night lighting of wind farms may be required and alternatives to fixed obstacle lighting.

Although the Proponent considers that night-lighting would not be required, the Proponent has assessed the impacts of night-lighting to ensure a thorough assessment of all visual impacts, and to meet the requirements of the draft NSW Wind Farm Guidelines. The assessment acknowledges that potential visual impacts associated with night-lighting on wind turbines has not been extensively researched or tested in New South Wales. Investigations undertaken in Victoria have concluded that night-lighting on wind turbines may be visible for a number of kilometres however the actual intensity of the lighting appears no greater than other sources of night-lighting such as vehicle head and tail lights. It is noted that the night time obstacle lighting at Cullerin Wind Farm was removed following community consultation and the preparation of an aeronautical impact risk assessment.

Obstacle lighting may also be required during construction to indicate large equipment such as cranes.

Other light sources include security and safety night lights around the control and auxiliary buildings, however, visibility of these lights is considered to be largely contained by the surrounding landform with light spill considered unlikely to be visible at the majority of surrounding locations.

Ancillary Infrastructure
In the PPR, the substation was relocated to a site approximately 250m north of the site proposed in the EA. Views of the substation will be restricted to eastbound traffic on the Hume Highway and these views will be short-term and not result in a significant visual impact. The Proponent concludes that the ancillary project components, substation and transmission line are unlikely to pose an unacceptable visual impact to surrounding receptors and the landscape due to a combination of distance between the substation (2.9km and 3.2 km to the nearest receiver), transmission line (connection approximately 3km from the nearest resident) and ancillary components to surrounding view locations and the presence of scattered or grouped vegetation and topography reducing visibility.

Consideration
Wind Turbines
The Department recognises that the predicted visual impact of the Project is one of the key concerns raised in public submissions. The concerns include the methodology of the assessment including the photomontages, the underestimation of visual impacts of the Project and the loss of views over the landscape.

The Department commissioned an independent landscape expert, Clouston Associates, to provide an independent peer review of the Proponent's visual impact assessment, Preferred Project and Response to Submissions Report and to review key submissions on landscape and visual issues. The Proponent submitted an Addendum to the LVIA to respond to comments made in the Clouston Associates review (the LVIA Addendum A is in **Appendix E**). The Department also conducted an additional site visit of the area in May 2013.

Wind Turbines – Receptors beyond Collector Village
The Department notes that four of the six residential dwellings identified in LVIA Addendum A as likely to experience high visual impact from the Project are associated residents who have reached a commercial agreement with the Proponent. Consequently, the Department's consideration has focused predominantly on the non-associated residents.

One associated resident, residence FF (view location R16), is predicted to experience a visual significance of high. There are also an additional three view locations that are predicted to experience a medium to high visual impact, with two of these locations each containing multiple dwellings. A further eight non-associated residences are predicted to experience a medium visual impact and range in distance from the nearest turbine from 2.8 km to 3.8 km. A summary of these residences is provided in **Table 6**.

Table 6. Summary of residential receptors beyond Collector Village

View Location	Residence	Distance to closest turbine (approx km)	Visual Significance
R6	12	2.4	High
R16	FF	2.1	High
R8	Y	3.1	Medium to High
R34	30, 32*	4.1	Medium to High
R35	31, 33*	4.6	Medium to High
R9	O	3.1	Medium
R19	DD	2.8	Medium
R28	I	3.6	Medium
R29	Unlabelled	3.7	Medium
R30	Unlabelled	3.8	Medium
R31	Unlabelled	3.4	Medium
R47	R	3.5	Medium
R48	GG	3.7	Medium

Source: Source data from Table 18 in the LVIA Addendum A

* Denotes indicative residences as residences 30, 31, 32 and 33 are clustered.

The Department notes that all non-associated dwellings around the Project site would be located over 2km from the Project. The Department also acknowledges the subjective nature of the visual impact of wind turbines. It is possible that a dwelling with a high visibility of wind turbines may be seen, by residents, as being of minimal or of great concern regarding the change in the landscape. This disparity in perspective is also reflected in the submissions received and depends on each individual's placement of scenic and landscape value.

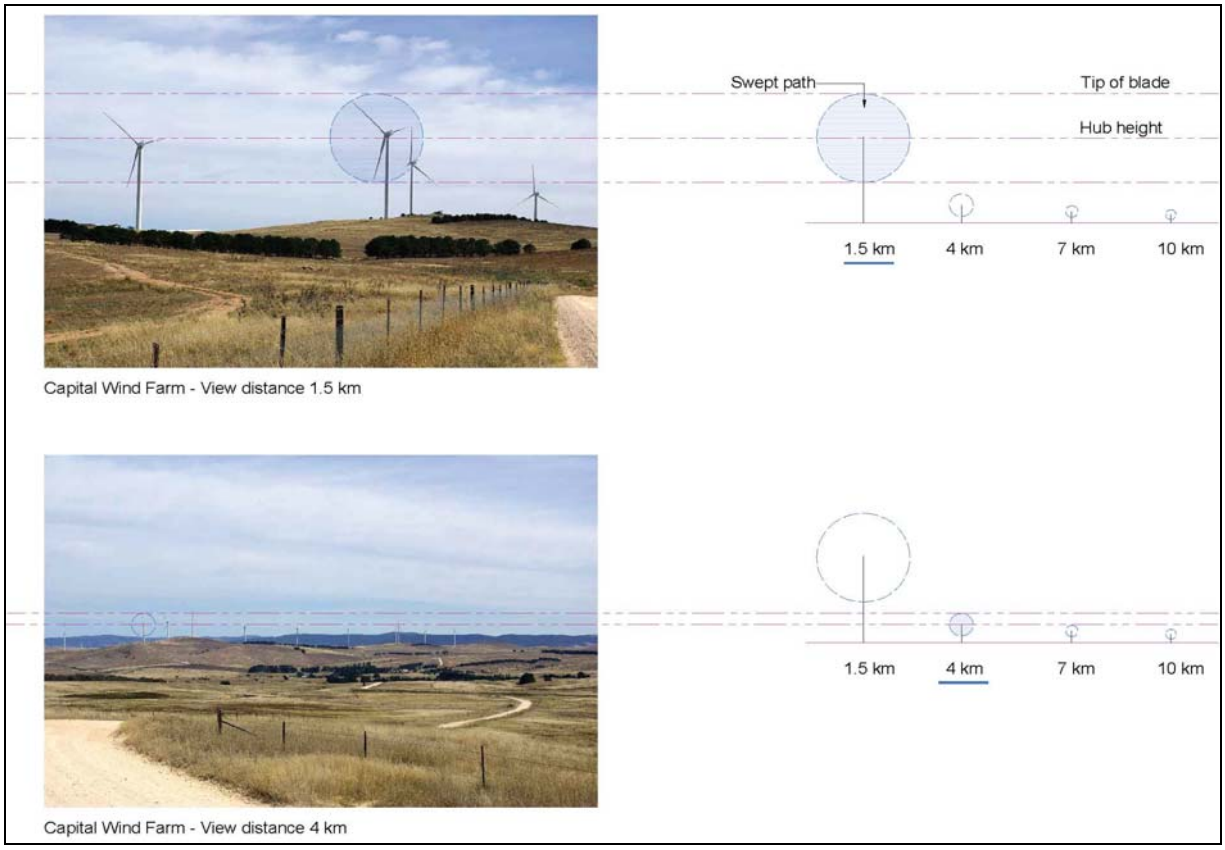
The Department considers that the relocation of 28 turbines, between 25m and 165m, would be more difficult to discern as distance from the turbines increases and is satisfied that the visual assessment in the EA is still appropriate and indicative of visual impacts.

The Department also considers that the residents closest to the 5 turbines that were removed as part of the revised turbine layout would experience a significant reduction in visual impact (compared to the turbine layout presented in the EA) than those residents located in other areas surrounding the wind farm. The photomontage in **Figure 7** shows the original layout (taken from the EA) where the predicted visual impact on residence FF (view location R16) was high. As a result of changes made in the PPR the five turbines in the foreground of this photomontage have been removed. The removal of these turbines resulted in resident FF now being located 2.15km away from the nearest turbine. But the visual impact is still predicted to be high.

In considering the visual impact on the non-associated residence predicted to have a high visual significance, Residence FF (view location R16), shows that views towards the wind farm will be comparatively more extensive and comprise a larger field of view and that there is currently no screening of the wind farm (from the photograph location in **Figure 7**) through built structures, vegetation or intervening landform compared to that of Resident Z or 12 which would only experience views of the wind turbines in one direction from the property and that the wind farm would not visually intrude in all directions. The Department considers that the Proponent has reduced the impact to resident FF by removing the five closest wind turbines and while the impact is still classified as being of high visual significance the Department considers that the impact could be further mitigated through the use of landscaping, in consultation with the resident. The Department also notes that the expanse of views of the wind farm from resident FF is not dominated by individual or groups of turbines, that this residence is not occupied full time and the resident did not make a submission on the Project. The Department is, therefore, satisfied that the visual impact is acceptable.

Residents predicted to have a visual significance of medium to high (view locations R8, R34 and R35) would experience a view of wind turbines in a particular direction and would not experience a view dominated by wind turbines in all directions. The Department considers this impact to be acceptable but notes that people have differing views of what constitutes an acceptable visual impact. The Department also notes that these residences do not appear to have existing screening in place and that landscaping to screen views of wind turbines and reduce the potential visual impacts is possible. Some of the receptors predicted to have a medium visual significance already have existing screening in place through tree plantings or intervening landforms whereas other receptors currently do not.

The Department also notes the "distance effect" as shown in the excerpt provided in **Figure 10**. That is with increasing distance, the intrusiveness of turbines diminishes and that there is a substantive difference between the visual perception of a turbine viewed at a distance of 1.5km compared to 4km. Approximately two-thirds of the residences identified in **Table 6** are approaching a distance close to 4km from the wind turbines and would not experience expansive views of wind turbines.



Source: LVIA Addendum A (Green Bean Design, 2013)
Figure 10. Distance Effect. Excerpt of Figure 1 LVIA Addendum A

The Department considers that visual impacts from the proposed wind farm are acceptable but notes that people's view of what constitutes an acceptable impact differs. To reduce the visual impact of the Project on non-associated residences and businesses, the Department has recommended a condition that requires the Proponent to consult with residents, business owners or public authorities (which may experience medium, medium to high or high visual significance) regarding visual impact mitigation measures. Consistent with other recent wind farm approvals, the Department has also recommended a condition that enables landowners to require the Proponent to provide mitigation measures, provided they are located within 5km of the nearest wind turbine and the request is made within six months of the commencement of the operational phase of the wind farm. The Department considers that at a distance of 5km wind turbines are still considered to be discernible and notes that residences up to 4.6km away were predicted to have a visual significance of medium.

Notwithstanding, the Department notes that generally the location of the turbines relative to the receptors are such that none of these non-associated residents are expected to experience visual intrusion in multiple directions without any visual relief in any direction. Furthermore, the Department notes the Proponent's assessment has identified that intervening landform and vegetation has the potential to at least partially screen views of the turbines for some residences. The Department considers that there would be opportunities to either provide new screening or further supplement existing screening through targeted landscaping, to assist in alleviating some of the visual impacts that may be experienced.

Wind Turbines – Receptors within Collector Village

The LVIA Addendum A reviewed 31 receptor view locations for Collector Village (some of these locations refer to more than one residence). The residences of Collector Village are approximately 3.5km to 4.2km away from the nearest turbines.

No residences were identified with a visual significance of high, or medium to high. Five receptor locations (representing approximately 14 residences) were predicted to have a medium visual significance. The Department again notes that with the "distance effect", the perception of the turbines will be insignificant for most of the residences within the village as they are approaching a distance of 4km from the turbines. However, to ensure the Collector Village community is given the opportunity to have visual impacts from the proposed wind farm on their property or business alleviated, the Department has recommended a condition which requires the Proponent to provide mitigation measures for landowners, provided they are located within 5km of the nearest wind turbine and the request is made within six months of the commencement of the operational phase of the wind farm. The Department considers this condition will provide the residents of Collector Village the opportunity to have visual impacts (if they occur) potentially screened from their residence or property. The recommended condition requires the Proponent to pay for the full cost of such mitigation measures and to implement them within 12 months of the agreement with the landowner.

Impacts to Public Viewing Locations and Heritage places

The visual significance of transport corridors was re-evaluated in the LVIA Addendum A. All nine transport corridors were considered in the assessment to have a low visual impact. The Department notes that users of local roads may have a different view to those only travelling along the highway. The Department, however, considers that given the transient nature of users of transport corridors that the visual impact on motorists would be minimal.

The visual impact for other public areas was also considered in the LVIA Addendum A. This assessment considered the potential visual impact on public roads and places within Collector Village such as Collector Oval and heritage places and recognises that some turbines may be visible from some public roads or places. The LVIA Addendum A also includes additional photomontages from different locations along Bourke Street, Collector. The assessment concludes that the visual impact will not be significant. The Department reviewed the photomontages and concurs with the assessment that although some turbines may be visible from some public locations within Collector Village, the visual impacts are not considered to be overly intrusive.

Ancillary Infrastructure

The Department is satisfied that the substation, relocated to a site approximately 250m north of the site in the EA, and other ancillary infrastructure associated with the Project (for example the overhead transmission line) are not likely to be visually intrusive and that impacts are manageable through the implementation of appropriate landscaping design and rehabilitation measures.

The Department has recommended conditions of approval requiring appropriate visual treatment of ancillary infrastructure (including landscaping) and for the rehabilitation of disturbed areas as far as practicable to minimise and mitigate visual impacts from the disturbance footprint of the Project.

Cumulative Impact

The Department notes that the Collector Wind Farm will be considerably larger than the Cullerin Range Wind Farm (15 turbines combined with the proposed 63 turbines) could be viewed as the one wind farm from certain viewpoints. In noting this, however, the Department considers that the visual impacts would be greater for road users in the area due to direct views to both wind farms. The Department is satisfied, that given the distance between the proposed Collector Wind Farm and other wind farms within a 10km viewshed and the intervening topography, that the cumulative visual impact of multiple wind farms will be limited and insignificant.

Blade Glint, Shadow Flicker and Night Lighting

With respect to potential blade glint impacts, the Department agrees with the Proponent that this can be effectively managed through appropriate turbine treatments (such as the use of low sheen and matt finishes) to ensure negligible impacts and has recommended conditions of approval in this regard.

With respect to shadow flicker impacts, the Department notes that shadow flicker is only predicted to exceed 30 hours per annum at a single associated residence identified as 'N' (or 'R1'). The Department notes that the predictions represent "theoretical maximum" levels based on highly conservative modelling assumptions including worst case turbine position relative to the sun (which would not occur at all times) and nil consideration of mitigating factors such as cloud cover and screening.

In relation to possible screening, the assessment identifies that screening any east and west facing windows would shield those windows from the shadows cast from the turbines. In consideration of the above factors, the Department is satisfied that while the worst case shadow flicker levels are above the recommended 30 hours per year, at residence 'N' (also known as location 'R1'), the impact could be mitigated through the use of visual mitigation measures as suggested by the Department's recommended conditions regarding visual amenity. The Department also considers that shadow flicker is only a consideration in terms of amenity and possible annoyance. Notwithstanding, the Department understands that the owner of the residence has reached a commercial agreement with the Proponent and expects that any residual amenity impacts at this residence would be accounted for in such agreements.

With respect to night lighting, the Department notes the Proponent's reasons for not proposing aviation obstacle lighting for the Collector Wind Farm and notes that night time lighting has been removed from the nearby Cullerin Wind Farm. However, a final determination cannot be made on this until the aviation hazard risks for the Project have been confirmed by CASA following detailed design. Although night lighting would potentially be visible to motorists and at a number of residential view locations, the view would be limited by topography, screening vegetation and screen planting around residences and only be for a relatively short duration for motorists.

Should aviation obstacle lighting be required for the Project, the Department considers that all reasonable efforts should be made to ensure that lighting requirements are designed to be as minimally intrusive as possible (in consultation with CASA), and has recommended conditions in this regard. While the Department considers the impacts from appropriately designed night lighting to be acceptable it has also recommended conditions of approval requiring consideration of potentially intrusive effects from night lighting in implementing screen planting at potentially affected residences.

The LVIA Addendum A concludes that the landscape has an overall medium to medium to high sensitivity to accommodate change and although some characteristics of the landscape are likely to be modified by the Project, it has capability to absorb these changes to the landscape. Further, the Department considers that the five Landscape Character Areas (undulating grasslands; wetland and drainage areas; slope and ridgeline areas; timbered areas; and settlements and homesteads) are well represented throughout the Upper Lachlan Shire Council and more generally within the NSW Southern Tablelands.

The Department understands that whether landscape changes are considered acceptable is sometimes a subjective matter, irrespective of the outcomes from visual assessments and modelling. People have differing connections or attachments to places and particular landscapes and different views on what they consider to be an acceptable level of change. The Department recognises that there are diverse views on whether the placement of wind turbines in a landscape is acceptable.

The Department recognises that the proposed wind farm would introduce more anthropogenic features into a predominantly rural landscape. However, the Department is required to consider all aspects of the Project including the benefits and the broader outcomes for society and the environment.

In consideration of the above, the Clouston Associates Review and the Proponent's LVIA Addendum the Department considers that the Project's visual impact on landscape elements or features as a whole would be acceptable. Whilst acknowledging that some residents are opposed to the visual intrusion of wind turbines into the rural landscape, the Department considers that with the implementation of landscape screening of individual residents and at key viewpoints, impacts can be minimised to acceptable levels.

5.3. Health

A number of concerns regarding health impacts of wind turbines were raised in submissions and by the broader community. These concerns were predominantly aimed at the potential for "Wind Turbine Syndrome" (the claim that exposure to wind turbines causes adverse health impacts) and the effects of low frequency noise on vestibular organs – balance, motion and position. In addition, further concern was raised regarding the lack of Australian research into the health effects of turbines on people, as raised in the Federal Senate Inquiry into the social and economic impact of rural wind farms.

The Proponent has established that the main health concerns raised by the public predominantly related to low frequency noise impacts (see **Section 5.1**), shadow flicker (see **Section 5.2**) and the impacts of magnetic fields.

Electric and Magnetic Fields (EMF) are a combination of electric and magnetic fields (MF), which occur naturally and as a result of human activity. EMFs occur wherever electricity is present, and can be found in electrical equipment such as transmission lines, substations and electrical components within the turbines. To the extent there is a potential health concern, the focus is now on MFs, rather than electric fields. The generally recommended MF maximum exposure limit for members of the public (24 hour exposure) is 1,000 milligauss (mG) and for occupational exposure (whole working day) 5,000 mG.

The proponent has determined the MF likely to be generated during operation of the Project, as shown in **Table 7,** is well below that of the above MF exposure limit for both members of the public and for occupational exposure.

Table 7. Magnetic fields likely to be generated by Project

Component	Distance	Measurement (mG)
Underground cabling	Approximately 1.2m below ground	10mG
Grid Interconnection Powerline	30m from powerline	5-50mG
Substation	In vicinity of transformers and other electrical components	<100mG

The Proponent proposes fencing the substation and as the nearest associated or non-associated residence is over 2km away, impacts to human health are not anticipated. Other mitigation

measures include bundling wires together and placing the electrical cables below ground to reduce magnetic field emissions. Non-staff that need to go near these structures would only be permitted in the company of trained and qualified staff member.

The nearest dwellings to electrical infrastructure are as follows:

- the nearest dwellings to the substation are located 2.9 and 3.2 km away;
- the nearest dwelling to the overhead transmission line is located approximately three kilometres away; and
- the nearest dwelling to a wind turbine is approximately 300m away.

Consideration

The Department notes that NSW Health did not object to the Collector Wind Farm provided that it complied with the recommendations of the EA and meets the requirements of the Draft NSW Guidelines.

The Department considers that the issue of MF and health effects has been extensively reviewed over the past 30 years, both in Australia and internationally, however, adverse health effects due to MF or EMF have not been proven. The Department has however taken a conservative approach and does not rule health effects out, but due to the distance between infrastructure and receivers it is highly unlikely to be an issue. As there is currently no Australian Standard for electric or magnetic field exposure limits, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) has released fact sheets and a draft standard based on consideration of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) standards which are generally used and accepted. The Department is satisfied that as the levels of EMFs are significantly lower than the recommended MF maximum exposure limit (1,000 mG for public exposure and 5,000 mG for occupational exposure) that impacts on human health would not occur. In addition, the Department is satisfied that commitments from the Proponent demonstrate that the principles of prudent avoidance have been applied by fencing and locating infrastructure which emits EMF as far as practicable from residences.

The Victorian Government recently released Fact Sheets on wind farms, sound and health[2]. It presents a review of recent studies and research regarding noise emitted from wind farms and human health. It recognises that many symptoms have been attributed to wind turbines, including "wind turbine syndrome" and that these have been reported in individual studies or non peer-reviewed literature. Based on the evidence reviewed, it did not support claims that inaudible sounds (such as infrasound when at an inaudible level) can have direct physiological effects. It also states that the research suggests that an expectation of symptoms may lead to an increase in the reporting of health symptoms associated with wind turbines. It does recognise that infrasound (when at an audible level), like other sounds can cause annoyance and sleep disturbance[3].

NSW Health also advised that the potential public health issues particularly in regard to noise and shadow flicker have been comprehensively addressed and notes that the proposed monitoring, controls and remediation for affected properties within two kilometres of the turbines appears to be adequate.

The Department has considered the Proponent's noise assessment, the impacts of low frequency noise and wind turbine syndrome. In this regard, the Department notes the National Health and Medical Research Council (NHMRC) conducted a rapid review of the evidence relating to the adverse health impacts caused by the wind turbines and concluded that:

- there is currently insufficient published scientific evidence to positively link wind turbines with adverse health effects;
- relevant authorities should take a precautionary approach; and

[2] Department of Health (2013) "Wind farms, sound and health" Technical information. Published by the Victorian Government
[3] Ibid

- people who believe they are experiencing any health problems should consult their GP promptly.

The NHMRC is currently conducting a systematic review of the potential health impacts of wind farms and an update of the Public Statement: Wind Farms and Health, is anticipated to be completed by the second half of 2013.

The Department in considering the Proponent's assessment, statement of commitments and the draft NSW Wind Farm Guidelines has taken a precautionary approach to the issue of potential health impacts, noting that the draft NSW Wind Farm Guidelines require compliance with stringent noise limits compared to world standards and that a buffer distance of 2 km represents a very conservative and precautionary approach to mitigating any potential health impacts.

For associated residences located within 2km of a turbine, the Department considers that health impacts are unlikely from noise, shadow flicker and MF. The Department supports the Proponent adopted noise level of 45dB(A) for associated residences and commitment to the implementation of insulation measures to achieve a suitable internal noise level and landscaping for associated residence N where the noise level is predicted to exceed 45dB(A) and shadow flicker exceed the recommended 30 hours per year. Accordingly, it is considered that the proposed wind farm would not give rise to any adverse human health impacts.

5.4. Biodiversity

Flora

The flora and fauna attributes of the site were assessed by nghenvironmental on behalf of the Proponent. Most of the Project area has been cleared and grazed by cattle and sheep and a large proportion of the pasture has been cultivated and sown to exotic pasture species. Mature forest regrowth occurs in some dry forest remnants and some older trees are present in woodland remnants and paddocks. Five vegetation communities identified within the study site include three threatened vegetation Communities:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland, and Derived Native Grassland, Tablelands Basalt Forest meeting the definition of an Endangered Ecological Community (EEC) under the *Threatened Species Conservation Act 1995* (TSC Act);
- Tablelands Snow Gum Grassy Woodlands meeting the definition of an EEC under the TSC Act; and
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is also listed as a Critically Endangered Ecological Community (CEEC) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

No nationally significant (Rare or Threatened Australian Plants ROTAP) or regionally significant species were recorded on the project site. Seven threatened flora species were considered to have a moderate potential to occur in the area, however, only one threatened flora species, Hoary Sunray (*Leucochrysum albicans var tricolor*) listed under the EPBC Act, was identified outside the study site on Lerida Road South.

Vegetation Impacts

The project would result in impacts to 34.81 ha of native vegetation including EECs. This figure was revised down to account for the reduced impact from the revised turbine layout, including the removal of five wind turbines from the Project, which resulted in a reduction in permanent native vegetation habitat loss of:

- 3.8 ha of Box- Gum Woodland Derived Grassland EEC in low and moderate condition; and
- 0.25 ha of White Gum Forest in good condition.

The relocation of the substation approximately 250m north of the location would not have a net change in biodiversity impact as the new location contains the same vegetation community as at the original location. The proposed temporary and permanent habitat loss of Endangered Ecological Communities is summarised in Table 8.

Table 8 Impact to Endangered Ecological Communities for revised Project*

Endangered Ecological Community	Temporary Impact (ha)	Permanent Impact High constraint EEC (ha)	Permanent Impact (ha) Moderate constraint EEC (ha)	Total Impact (ha)
• Box Gum Woodland and Derived Grassland:	13.76	6.59	11.44	31.79
Box Gum Woodland and Derived Grassland with over storey component	*(1.15)*	*(2.35)*	*(3.58)*	*(7.08)*
Box Gum Woodland and Derived Grassland without over storey component	*(12.61)*	*(4.24)*	*(7.86)*	*(24.71)*
• Tablelands Snow Gum Grassy Woodland	0.21	1.62	0	1.83
Total	**13.97**	**8.21**	**11.44**	**33.62**

** Figures in this table were clarified by nghenvironmental on 16 July 2013 due to inconsistencies in the EA, PPR and specialist reports.*

The Project would result in impacts to 33.62 ha of EEC consisting of a temporary impact to 13.97 ha and a permanent impact to 19.65 ha of EEC within a development envelope of approximately 898ha.

Temporary impacts are defined as construction phase impacts such as extra width of tracks, cable trench alignments, temporary crane hardstands and construction site compounds within grassland areas with no over storey component. Temporary habitat loss is proposed to be rehabilitated to existing condition following construction. The Department and OEH's concerns regarding the ability to successfully rehabilitate areas that are impacted by the project are discussed later in this Section.

Offsets

The Proponent proposes to offset permanent impacts to 19.65 ha of EEC at a ratio of 6:1.

The Proponent has identified several areas of EEC in moderate to good condition within the site, which will not be cleared as part of the Project, as suitable offsets subject to the requirements of the landowners. These areas include:

- 455 ha of Box Gum Woodland EEC located to the north and potentially occurring in the central east of the site; and
- 65 ha of Tablelands Snow Gum Grassy Woodland EEC in moderate to good condition including a remnant adjoining more extensive areas of good quality Box Gum Woodland.

The Proponent has committed to implementing offsets that seek to restore degraded sections of Box-Gum Woodland and secure remaining areas in moderate to good condition. The Proponent proposes an area of 123.1 ha to offset permanently removed EECs to achieve a 'maintain or improve' biodiversity standard in perpetuity through a Property Vegetation Plan as the preferred mechanism. The Proponent has not proposed to include areas temporarily impacted in its calculations for an offset.

The Proponent would also consider areas outside the Project site as part of the offset package consistent with OEH's selection criteria for conservation reserves in the region and in consultation with OEH. The Biodiversity Offset strategy would be developed in accordance with Draft Principles for the use of Biodiversity Offsets in NSW prior to construction and in consultation with OEH and would explore:

- other options for offsets including third party biodiversity management actions and research;
- more detailed assessment of biodiversity impacts and determination of offset criteria;
- mechanisms to deliver the offset, including management arrangements with landowners and coordination with statutory agencies and offset agents in the area; and
- monitoring, evaluation and reporting.

Fauna Impacts

The key habitat types found at the site include:

- exotic pasture with scattered trees;
- woodland;
- forest; and
- native pasture.

In total, 129 fauna species were recorded during all the field surveys undertaken for the Project. Field surveys recorded 10 threatened species listed under the TSC Act and/or the EPBC Act and 1 migratory bird species listed under the EPBC Act. The species recorded included 7 vulnerable bird species, 3 vulnerable bat species and 1 migratory bird species. A further 31 threatened or migratory species listed under the TSC Act or EPBC Act have the potential to occur based on suitable habitat being present including 2 frog species, 22 bird species, 2 bat species, 3 reptile species, the Squirrel glider and the Golden Sun Moth.

Species recorded on site or with the potential to occur in the area could be impacted by:

- blade strike (potential impact on 20 bird species, seven bat species and the Golden Sun Moth);
- barotrauma (potential impact on seven bat species); and
- habitat alienation and / or habitat loss (potential impact on 25 bird species, seven bat species, three reptile species, the Squirrel Glider and the Golden Sun Moth).

Fatality and/or injury (from blade strike and barotrauma) are caused by collision with the moving blades, turbine infrastructure or rapid changes in air pressure whereas habitat alienation refers to behavioural avoidance of suitable habitat near the turbine infrastructure.

The biodiversity assessment also considered bird movement corridors for waterbirds, to and from Lake George. The assessment considers that populations of breeding birds may be specifically vulnerable to impacts such as blade-strike as the death of an individual may also result in the death of eggs and nestlings or fledglings and juveniles learning to fly could also be vulnerable to blade-strike. Also, the Lake George escarpment is a locally unique topographic feature which creates an area of strong updraught favoured by a number of bird species including raptors and the escarpment provides breeding habitat for a high diversity and abundance of raptors which is unique in the local area.

During the Project design, the layout of turbines was refined following the consideration of biodiversity constraints. For example, turbine clusters proposed along the southern-most part of the Project on the Lake George escarpment were removed in earlier iterations of the Project, to avoid raptor and birdlife habitats and movement corridors.

The Proponent's assessment states the potential impacts from collision and loss of habitat from the Project would only be significant for two key risk species; the Little Eagle and the Eastern Bentwing Bat. The assessment concluded that impacts to the other threatened species would be minimal due to a small loss of good quality forest or woodland habitat across the site. The loss of

hollow-bearing trees would be minimised through micro-siting and the replacement of removed hollows with artificial hollows.

The Little Eagle has one known nesting site approximately 10km south of Collector on the escarpment and its population in the ACT has declined from 11 breeding pair nests in 1990-1992 to four nests in 2007. It is vulnerable while travelling to and from the known nesting site, and may forage within the sweep zone of the blades. The risk of collision with the Little Eagle was reduced by removing wind turbines along the Lake George escarpment with the current Project having its most southernmost proposed turbine approximately eight kilometres north of the Little Eagle nest and north of the escarpment.

The migrating bats are the most likely microbat group to be potentially impacted by either collision or barotrauma rather than from habitat loss. The escarpment along the western edge of Lake George is a prominent landscape feature and a potential movement corridor for migrating bats. Of the three vulnerable bat species recorded, two are migratory bats being the Eastern Bentwing Bat and the Yellow-bellied Sheathtail bat. The assessment found that the Yellow-bellied Sheathtail bat is likely to occur in low numbers across the site and therefore is unlikely to be impacted at a population level. However, the Eastern Bentwing Bat could potentially occur in larger numbers across the site.

The Eastern Bentwing Bat is vulnerable while flying in the sweep zone, during foraging and seasonal migration to a nearby staging cave near Mount Fairy, approximately 35 km south-east of the wind farm. There is a risk of collision from bats moving to and from the staging cave from other locations, such as the Blue Mountains, between mid-February to mid-March. The most direct route between the staging cave and the maternity cave in Wee Jasper, 60 km south-west of the Project area, is south of the Project but the Project may also be within the nightly foraging range (up to 25km) from the staging cave. The assessment also notes that there is no evidence to suggest the species utilises the site heavily for foraging and further considers that the removal of the turbine locations from the south and east of the proposal has reduced the risk of impact to migrating bats.

The Proponent proposes to implement an adaptive management and monitoring program for birds and bats during the operational phase of the Project which includes monitoring during high risk periods when the Eastern Bentwing Bat may be foraging in the area and also to look for evidence of foraging activities associated with the Little Eagle. The monitoring program is proposed to include a set of feasible management measures that could be implemented to reduce collision risks, if required.

Consideration

The Department has considered the Proponent's biodiversity assessment and is satisfied that the level of information is sufficient to enable the Department to form a view regarding the existing biodiversity values within the Project footprint and the likely extent of significance of impacts associated with the construction and operation of the Project. The Department also considers that the Proponent has showed a commitment to the avoidance of impacts through project design iterations to remove turbines from the Lake George escarpment and the further removal of five turbines and relocation of 23 turbines in the revised project layout, to reduce the biodiversity (and other) impacts of the Project. The Department is supportive of measures to reduce the impact to EECs and notes OEH's support for the revised layout and particularly the removal of the five wind turbines.

The Department has also considered the flora and fauna issues raised in submissions from the community, and the Office of Environment and Heritage. OEH noted inconsistencies with the calculated areas of impact and raised concerns about the classification of impacts to vegetation as temporary and permanent, biodiversity offsets including the calculation of hollow-bearing trees in the offset site, and identification of Sugar or Squirrel Gliders.

Temporary and Permanent Impacts

The Department notes the Proponent has categorised some biodiversity impacts based on whether they are a result of construction or operational impacts. Specifically, the Proponent considers that where vegetation and land disturbance is of a temporary nature and does not have an overstorey component (that is, grasslands), these impacts have been quantified as "temporary", as the Proponent proposes to rehabilitate these areas so they will not form part of the development footprint of the operational phase of the Project. The Proponent has not proposed to include "temporary" impacts in its calculations for offset measures. The Department, however, considers that activities which disturb the vegetation and land/soil, are likely to disrupt the attributes of the local ecosystem such as the characteristics of the soil and the microflora, important components of the ecosystem structure, which may affect the sustainability of the ecosystem in the long term. This potentially reduces the success of rehabilitation initiatives in returning the temporarily disturbed area to an equivalent pre-construction community. The Department recognises that the Proponent proposes to rehabilitate these temporary work sites and construction areas, however, the Department considers that a precautionary approach is required, particularly where "temporary" impact is predicted to affect EEC communities.

The Department notes OEH's concerns that reinstatement of good condition high diversity grassland would be difficult and highly unlikely to be successfully reinstated, at least in the short to medium term, and considers that where it is uncertain whether the grassland could be reinstated, to pre-disturbance levels, it should be offset. The Department concurs with this position and considers temporary impacts of EECs should be classed as permanent for the purposes of calculating offset areas and not limited to areas of EEC with an overstorey component.

Biodiversity Offset

The Proponent proposes to offset vegetation impacted at a ratio of 6:1 and considers that this ratio will achieve a 'maintain or improve' outcome and is similar to offsets provided for other projects. The Department notes OEH's concern that the offset ratio proposed has not been demonstrated to be adequate to offset high conservation value vegetation that is proposed to be impacted.

Instead OEH considers that the Biobanking Assessment methodology should be applied in order to determine an offset that would meet the 'improve or maintain' standard and that ratios of up to 10:1 should be applied. The Department considers that the final offset package should offset the specific residual impacts from this Project using a recognised method, irrespective of what other offset packages have been used to secure offsets in other locations for other projects. The Department considers that each case or project is required to be examined on its merits and that the use of a lesser offset ratio is not justified where it cannot be demonstrated through the application of an appropriate metric method to be acceptable. The Department also considers that appropriate offsets are available in the vicinity of the wind farm project and that the Proponent must demonstrate that the proposed offset ratio will meet the 'maintain or improve' standard and has recommended a condition to this effect.

The Department considers that the impacts to flora are acceptable providing the Proponent's mitigation measures and statement of commitments are implemented and that an acceptable biodiversity offset is secured to mitigate the residual flora and fauna impacts where avoidance is not possible.

The Department also recommends a condition for the preparation of an Offset Package in consultation with OEH, which would need to be approved prior to construction activities occurring on site. As part of the Biodiversity Offset Package the Proponent must identify the final extent of and types of habitat that will be lost as a result of the Project, including areas that are considered by the Proponent to be temporarily impacted. The Package must require the details of objectives and biodiversity outcomes to be achieved including the "improve or maintain" biodiversity values and the final suite of biodiversity offset measures to be secured including the use of a suitable metric method such as the Biobanking Assessment Methodology. The recommended condition

requires the offset to be consistent with the *Principles for the use of Biodiversity Offsets in NSW (*NSW Office of Environment and Heritage).

The Proponent prefers to secure the offset through a formal Property Vegetation Plan in perpetuity with the wind farm operator being responsible for management of the offset site until decommissioning when management responsibility would become the landowners. The Department considers that the Proponent's commitment to secure and manage the offset in accordance with a formal mechanism in perpetuity is appropriate and should the Property Vegetation Plan not be possible other mechanisms do exist that would secure the offset in perpetuity.

The Department has also recommended a condition requiring the Proponent to prepare a Construction Flora and Fauna Management Plan to detail how ecological impacts during the construction phase will be minimised and managed.

Fauna

The Department considers the Proponent has adequately assessed the impacts to key threatened bird and bat species from collision impacts with turbines and barotrauma, leading to injury and/or mortality and habitat alienation and avoidance. The Department also recognises the Proponent has aimed to reduce mortality impacts from blade-strike by removing proposed turbines along the Lake George escarpment, to reduce the risk of collisions with raptor and bat species. The Department accepts that there is the risk of residual habitat alienation and avoidance and that there will be some mortality of individual birds and bats associated with the wind turbines. Monitoring data from nearby wind farms confirms this is the case. In particular, raptors and bats (particularly migrating bats) are more vulnerable than other bird or bat species due to their foraging behaviour at flying altitude.

The Department notes the Proponent's Biodiversity Assessment refers to mortality data from wind farms internationally, however, also suggests that these statistics should be applied with caution to Australian conditions. The literature cited by the Proponent shows there is a correlation of higher mortality rates for both bird and migratory bat species with higher turbine structures, however turbine heights are not provided in the report. Based on mortality statistics per turbine (from international literature quoted in the Proponent's assessment), the potential mortality rates could be up to 88 birds per year and 371 microbats per year for the 63 turbine layout. However, the Department acknowledges the difficulty in extrapolating data from the international literature for this purpose and also notes the mortality data from nearby wind farms (Cullerin and Capital) in the last few years shows that these high numbers (based on international literature) seem very unlikely to occur in local conditions.

The Department also notes that the risk of bird and bat collisions are known to be generally greater where wind farm developments are located in close proximity to wetlands (known congregation areas for flocks of birds), along known migratory paths, in proximity to forested areas, and along forested ridgelines. Turbine lighting, as well as close turbine spacing and a linear pattern layout, is also generally correlated with higher rates of collision. For the Collector Wind Farm Project, the Department notes that turbine lighting is not proposed and that the turbine layout was selected to avoid turbines being located near Lake George, south of the Cullerin Range, known flight and migratory paths, and is located away from large forested areas.

The Department considers that the highest potential for bird or bat strike is from high flying bird species such as raptors or bats where a turbine is in close proximity to a creek or high quality woodland area. As the turbines are proposed to be located predominantly within cleared areas and well away from creeks and woodland areas, impacts on birds and bats are expected to be low.

Raptors have the potential to suffer from blade strike as they forage in open areas at high altitudes looking for prey. However, the Department accepts that stringent management and mitigation measures can reduce this impact. An example from other wind farms with Wedge-tailed Eagle

populations, i.e. Cullerin Wind Farm, noted that bird strike was the result of unusual circumstances where poor weather conditions coincided with lambing, resulting in higher than normal levels of lamb mortality and thus carcass availability attracting the Wedge-tailed Eagle to the area. Therefore, mitigation measures such as prompt carcass removal will significantly reduce raptor blade strikes by decreasing the attraction of the area to feeding birds.

The Department has recommended a condition that requires the Proponent to develop a Bird and Bat Adaptive Management Program to ensure that monitoring of bird and bat populations is undertaken so any changes to population levels attributable to the Project can be detected. The condition also requires the development of a decision making matrix which will set out the actions of the Proponent in response to the monitoring outcomes. The condition also requires monitoring assessments of monthly mortality and periodic bird utilisation surveys. The Proponent will also be required to identify and implement appropriate mitigation measures to reduce the impacts on birds and bats.

The Department expects the Proponent to give specific consideration to the Little Eagle and the Eastern Bentwing Bat in the development and reporting of the Bird and Bat Adaptive Management Program. The Program should include consideration and monitoring for all bird and bat species. The Program would be required to specifically identify pre-emptive and reactive measures for minimising impacts and would determine the incidence of mortality at different parts of the site and at different seasons, and respond to identified issues.

Based on the Department's review of bird and bat monitoring and mortality data for other nearby wind farms, and the implementation of an adaptive management approach, the Department has observed that the Bird and Bat specialists have used the monitoring data to further minimise bird and bat mortality by making targeted recommendations for the ongoing operation of the wind farm. The Department is confident that ongoing monitoring and an adaptive management approach will ensure that the mortality risks to bird and bat species are minimised.

The Department considers that the Project would not pose significant or unacceptable level of risk to bird and bat species from collision or barotrauma. Notwithstanding, to ensure that potential risks are minimised as far as practicable, the Department has recommended a condition of approval, consistent with the comments from OEH, which requires that all feasible and reasonable efforts shall be made to locate wind turbines at least 60m from adjacent hollow-bearing trees which have the potential to provide roost or nesting habitat for bird and bat species identified to be at risk of collision during turbine operation.

The Department recognises that there is a lack of extensive publicly reported bird and bat mortality data associated with the operation of wind turbines and contributes this partly to the relatively young age of this emerging industry in NSW. In consideration of this the Department has recommended a condition that requires the Proponent to provide a copy of its reports (including the Bird and Bat Adaptive Management Program and monitoring data) on its website. The publication of this data in the public domain will increase the evidence base of data concerning species mortality statistics around wind turbines in NSW and Australia.

The Department is satisfied that with the implementation of the Bird and Bat Adaptive Management Program, the bird and bat impacts of the Project can be appropriately managed so as to not result in significant impacts. The Department is also satisfied that the overhead transmission line component of the Project would not pose a significant risk of collision or mortality to bird / bat species beyond that posed by similar infrastructure already existing in the area (such as existing transmission lines).

The Department further considers that the appropriate management of construction activities would ensure the avoidance of significant ecological impacts. This includes ongoing ecological monitoring to ensure potential impacts to habitats and threatened species within and adjacent to the Project site are identified and avoided during construction. Although the Proponent has

committed to developing construction management measures, the Department has also recommended a condition requiring the Proponent to prepare a Construction Flora and Fauna Management Plan to detail how ecological impacts during the construction phase will be minimised and managed. The Plan should be developed in consultation with OEH and construction cannot commence until this Plan is approved by the Director General.

The Department acknowledges that 34.81 ha of native vegetation (including 33.62 ha of EECs) is proposed to be removed (less than 4 per cent of the Project area), and is satisfied that the Proponent has minimised potential impacts through careful siting of turbines. To ensure that the Proponent minimises clearing to the greatest extent possible, the Department has recommended a suite of conditions regarding clearing, detailed design and micro-siting, to ensure that all feasible and reasonable effort is made to avoid clearing and disturbing native vegetation and fauna habitat, including limiting clearing to 34.81ha unless otherwise agreed by the Director-General.

Given the above, the Department considers the Project's impacts on flora and fauna as a whole would be acceptable and that populations of species including threatened species would not be at undue risk. The Department recognises that there will be some residual impacts to both flora and fauna, however it considers that the Offset Package and the monitoring and adaptive management approach for fauna will minimise the biodiversity risks of the Project.

5.5. Other Issues

The Department's consideration of other issues identified during the assessment of the Collector Wind Farm is presented in **Table 9**.

Table 9. Department's consideration of other issues

Issue	Department's Consideration
Property Impacts and Land Use	In regards to potential property devaluation the Proponent addressed this issue in the EA and PPR indicating that studies have indicated in Australia and overseas that wind farms generally do not have a negative impact on the value of surrounding land. The NSW Valuer-General commissioned a report on the impacts of wind farms on land values in Australia. The report states as its principal finding that there are no obvious discernible impacts on land values from wind farms in the large majority of cases. In noting submissions received about property impacts and land values, the Department considers the value of a property is made up of a myriad of considerations and not only includes proximity to wind turbines but also other infrastructure, the potential use of the property and any improvements. The Department notes that Council controls could possibly limit certain types of development within proximity of wind turbines, however, the Department does not consider that the construction of a wind farm should restrict future development on properties, providing they are well sited. In consideration of the above the Department does not consider there to be grounds for the recommendation of financial compensation to any individual receptor on the basis of reduced property value or reduced development potential. The Department notes that this does not preclude any landowner from reaching an independent agreement with the Proponent at any time. The proposed development is also not expected to have a significant impact on agriculture or land use. The wind turbines are located on private associated properties, which are currently used for grazing cattle and sheep. Grazing of sheep and cattle and other farming

Issue	Department's Consideration
	activities, on the involved properties, can continue as the infrastructure would occupy a relatively small amount of land. Impacts to farming activities are therefore expected to be minimal.
Proponent's Consultation Process	The Department is satisfied that these matters have been adequately addressed in the Proponent's Preferred Project and Submissions Report and / or Statement of Commitments.
Heritage	The Proponent assessed the Aboriginal and Non-Aboriginal characteristics of the area to determine the potential heritage impacts on both heritage sites and cultural heritage. The Department is satisfied that impacts to Non-Aboriginal heritage are unlikely and has therefore focused on impacts to Aboriginal heritage. The Department notes that from the submissions received, key issues were raised about consultation with Aboriginal groups, and survey effort. The Department and OEH are satisfied that the Proponent has followed the draft *Guidelines for Aboriginal Cultural Impact Assessment and Community Consultation* (DEC, July 2005) and *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010) to satisfy consultation requirements with Aboriginal people. The Department also notes that Aboriginal representatives participated in the archaeological survey and that comments on the report were appended to the Proponent's heritage assessment. The Department also notes that OEH did not raise any concerns about the Proponent's assessment of Aboriginal heritage. The Department acknowledges that the overall survey coverage as a percentage of the area may appear small. However, the Department has considered the conclusions drawn by the Proponent's archaeologist, in that although it is highly likely that additional stone artefacts are likely to be present in other non-surveyed areas, they would be predicted to be low in density and of low archaeological significance. To address the issue of impact to previously unidentified Aboriginal and Non-Aboriginal heritage items, the Department has recommended conditions requiring the Proponent to cease work if an impact will occur. The Department has also recommended conditions to avoid and minimise impacts to the five 'Locales' where conservation was recommended and understands this is achievable by using micro-siting to avoid impacts to these 'Locales'. The Proponent has committed to avoiding impact to the four possibly scarred trees. All of these measures and strategies will be outlined in the Proponent's Construction Heritage Management Plan which will require approval from the Director General prior to construction activities onsite. The Department is satisfied that the impacts to Aboriginal and non-Aboriginal heritage can be appropriately managed through the implementation of the Proponent's statement of commitments and the recommended conditions of approval and are considered to be acceptable.

Issue	Department's Consideration
Bush Fire Risk and Safety	The Department is satisfied that these matters have been adequately addressed in the Proponent's EA and Statement of Commitments. The Proponent has consulted with the Rural Fire Service and provided a number of mitigation measures which include the preparation of a Bushfire Risk Management Plan in consultation with the Rural Fire Service and NSW Fire Brigade and the provision of appropriate fire-fighting equipment and water supplies to respond to a bush fire or other fire event. The Department also notes the quotes from the Rural Fire Service and the Victoria Country Fire Authority which note that the presence of wind turbines are unlikely to restrict fire fighting operations and that wind turbines are similar to high voltage transmission lines and are considered in the incident action plan. In addition, a condition of approval has been recommended requiring the Proponent to provide for asset protection consistent with relevant Rural Fire Service guidelines and provide for necessary emergency management. A further condition has been recommended requiring all licences, permits and approvals to be obtained and maintained including compliance with the Building Code of Australia. The Department has also recommended a condition requiring the Proponent to prepare a report outlining a comprehensive Safety Management System, covering all on-site systems relevant to ensuring safe operation of the Project. Further consideration of aviation safety is included in the next section of this table.
Aviation Safety	The Department notes that the Aviation Impact Assessment concluded that the proposed wind farm would not impact on aircraft operations to or from Canberra or Goulburn airports or the private aerodromes at Gundaroo and Winderadeen, nor will the wind farm interfere with radio or navigation equipment. It also noted that flights operating under the Visual Flight Rules would not be affected as these flights are required to be at a minimum height of 500 ft. Night flights are guided by the lowest safe altitudes to ensure adequate clearance of obstacles under Instrument Flight Rules and the night Visual Flight Rules. The flight rules would ensure that the proposed wind farm would not impact on aircraft operations. Agricultural aerial spreading and spraying operations or power line inspections may be affected on the downwind side of the turbines and over some adjoining properties sited downwind of the turbines. The report however, notes that agricultural operations are normally carried out at very low levels under calm or very light wind conditions which would limit any impact to approximately 600m from the nearest turbine. The Proponent also notes that crop spraying had been occurring with few impacts within 1 km of the Cullerin Range Wind Farm but also notes that aerial operations at the proposed Collector site had not been undertaken for over 12 years as the land is predominantly used for sheep grazing.

Issue	Department's Consideration
	The Proponent has also committed to providing further information to Airservices Australia, Department of Defence, CASA and the Aerial Agricultural Association of Australia. The Department is satisfied that the Proponent has adequately considered and supports the conclusion that the turbines will not pose an unacceptable risk to the operation of existing airports and private aerodromes, or aerial agricultural operations, as well as any night operations. Notwithstanding, to strengthen the Proponent's statement of commitments, the Department has recommended a suite of conditions regarding aviation obstacles and hazards during construction and operation of the Project. These in summary include: • the requirement to consult with aerodrome and airport operators that have an aerodrome located within 30 kilometres of the boundaries of the site, Airservices Australia, and Aerial Agriculture Association Australia, and provide additional mitigation measures for each of the potential impacts and hazards identified, prior to the commencement of construction; • the need to provide construction coordinates, heights and ground levels for the base of each turbine to the Civil Aviation Safety Authority, Airservices Australia, Royal Australian Air Force - Aeronautical Information Services, Aerial Agricultural Association of Australia and the RFS, as well as all known users of privately owned local airfields; and • the need to consult local aerial agricultural stakeholders and fully fund any increased cost of aerial agricultural spraying on non-associated property which is directly attributable to the Project.
Pending Inquiries	Submissions were received requesting that no wind farms be approved until further research has been conducted into the impacts of wind farms as recommended by the Senate Inquiry into the social and economic effects of rural wind farms or until the draft NSW Wind Farm Guidelines and Wind Farm audits have been finalised. However under the *Environmental Planning and Assessment Act 1979*, the Department of Planning and Infrastructure is required to accept applications for, and undertake the assessment of, State significant infrastructure and development such as wind farm projects within statutory time frames. Furthermore, provided acceptable environmental outcomes are likely to be achieved through the assessment process, wind farms can provide regional development and sustainability benefits for the State. The Department is satisfied that the Proponent has considered the draft NSW Wind Farm Guidelines and has proposed a turbine layout resulting in no non-associated residences being located within 2km of a wind turbine. Concern was also raised regarding the cost to the taxpayer through government subsidies for wind farms. The Department is not aware of any direct Commonwealth or NSW subsidy for the construction or operation of wind farms. Most wind farms apply for eligibility to create Large Scale Generation Certificates (LGCs), formerly Renewable Energy Certificates, under the Commonwealth's Renewable Energy

Issue	Department's Consideration
	Target (RET) scheme. Eligible renewable energy generators are able to create 1 LGC for every megawatt hour (MWh) of eligible electricity generated. Other parties, predominantly electricity retailers, are required to surrender LGCs equivalent to a proportion of their total electricity sales (increasing up to 20% by 2020). Wind farms are able to sell the certificates they create to liable parties, thereby gaining additional revenue to help offset the costs of wind energy generation compared to other generation, such as coal or gas.
Traffic and Transport Impacts	The Department has considered the Proponents' assessment of traffic and transport impacts and is satisfied that the level of assessment undertaken is sufficient for the Department to form a view of the likely extent and significance of impacts associated with the construction and operation of the proposed wind farm. The Department notes that impacts to local roads are limited due to the Project's close proximity to the Hume Highway and that the Proponent proposes to upgrade roads and intersections including Lerida Road South to accommodate construction traffic and oversized vehicles. The Department considers that traffic and transport impacts from the construction and operation of the wind farm are acceptable. Submissions regarding traffic impacts were received from the NSW Roads and Maritime Services (RMS), Upper Lachlan Shire Council (ULSC) and the public. Both the RMS and ULSC made conflicting comments about the upgrading of intersections and the Department considers that applications for approval to upgrade intersections will need to be lodged with the relevant road authority that has jurisdiction over that road prior to the commencement of construction. Submissions also raised concerns about possible damage to publicly owned roads. The Department considers the Proponent should be required to investigate the existing condition of all public roads that are proposed to be used for construction, and upgrade these to a standard considered necessary to accommodate the traffic volumes associated with the Project, in particular, construction traffic including over-mass or over-dimensional traffic that would be required for turbine transport. The Department has recommended conditions requiring an independent expert to determine whether the proposed route allows for safe access of construction and operational vehicles (including over-sized vehicles) and, where necessary any upgrades required. These are to be carried out in consultation with the relevant road authority at full expense of the Proponent and are to be resolved prior to construction. In regards to road dilapidation, a Report must be submitted to the relevant road authority for review prior to the commencement of haulage for the pre-construction phase of the Project. Following completion of construction, a subsequent report shall be prepared to assess any damage that may have resulted from the construction of the Project and the relevant roads returned to original condition, at full cost to the Proponent. Similarly, the Department has recommended a Decommissioning Road Dilapidation process to ensure appropriate mechanisms are implemented to restore any damage to roads during decommissioning of the Project.

Issue	Department's Consideration
	The Department considers this process will provide a robust basis for determining the need for and extent of upgrade works required. The consultation requirements with the RMS and Councils will also ensure that relevant design standards of these road authorities are taken into account in this assessment. The Department has further recommended conditions of approval requiring all the upgrade works identified by the independent expert in consultation with the relevant road authority be implemented in a timely manner and at the full expense of the Proponent, in accordance with the reasonable requirements of the relevant road authority. To ensure appropriate traffic management during the construction and decommissioning periods without undue disruption to the local road network, the Department has also recommended that the Proponent be required to prepare a Traffic Management Plan in consultation with road authorities prior to the commencement of construction and decommissioning. The Department considers that the traffic and transport impacts are acceptable and can be managed by the implementation of the Proponent's statement of commitments and the recommended conditions of approval.
Crown Land impacts including Native Title	A submission was received from the Department of Primary Industries (Catchments & Lands) regarding the potential impacts to Crown land including where cabling connecting turbines is proposed to cross small sections of Crown roads and lots 7003 and 7004 DP 94490 that are the subject of a Land Claim by the NSW Aboriginal Land Council. The Proponent proposes to establish an easement where the Project would cross or traverse Crown Roads. The Department has recommended conditions of approval requiring consultation with Crown Lands in respect to Crown land impacted by the Project. The Department has considered the Proponent's response to concerns raised about the Aboriginal Land Claim over lots 7003 and 7004 DP 94490 and notes that the Proponent has advised that no infrastructure is proposed for these lots. While the Proponent's review of historical title searches determined that freehold title was granted in respect of these lots prior to 1 January 1994 the Department of Primary Industries (Catchments & Lands) has instead confirmed that these parcels are Crown land. The Department is satisfied that further consideration of the Aboriginal Land Claim is not necessary as no infrastructure is proposed for lots 7003 and 7004 DP 94490.

Issue	Department's Consideration
Community benefits and contributions;	The Proponent proposes to establish a Community Enhancement Fund (or similar mechanism) to provide services and facilities for the benefit of the Collector community. The Proponent proposes to contribute approximately $200,000 each year for the life of the Project to the fund which is proposed to be administered by a committee consisting of representatives of the community, ULSC and the Proponent. A submission from ULSC, however, requested the Proponent enter into a Voluntary Planning Agreement with Council to provide contributions for a Community Enhancement Fund. The Department notes that a Voluntary Planning Agreement has not been agreed. However, in this case, the Department does not consider this is necessary as the Proponent has voluntarily committed to, as part of the project application, a Community Enhancement Fund to be administered in cooperation with Council and the local community for local community interest groups and activities.
Decommissioning	The Department is satisfied that these matters have been adequately addressed in the Proponent's Decommissioning and Rehabilitation Plan and Statement of Commitments. In particular, the Proponent has provided a cost estimate for decommissioning and examples of current wind turbines prices and has committed to restoring the land to its previous condition as per the decommissioning clause in the lease agreement with associated landowners. The Department notes the Proponent intends to fund the decommissioning of the wind farm through the salvage and potential scrap value of the materials and update the Decommissioning and Rehabilitation Plan every five years. The Proponent considers that the salvage and scrap value of the materials would be higher than the cost to dismantle and decommission. However, should the plan indicate that there would be a shortfall, the Proponent proposes to establish a dedicated decommissioning reserve to cover the decommissioning costs. In order to ensure decommissioning of the wind farm is undertaken with appropriate rehabilitation, and can be appropriately financed by the Proponent, the Department has recommended conditions of approval that include: • The Proponent providing written evidence that lease agreements with the site landowners have adequate provisions to require that decommissioning occurs in accordance with this Approval, and is the responsibility of the Proponent; • The Proponent must update the Decommissioning and Rehabilitation Plan, including funding arrangements and provisions for a decommissioning bond or other mechanism every five years and provide a copy to the Director General and make it publicly available; • Within 18 months after the cessation of operation of the Project, the site shall be fully decommissioned by the Proponent; • The Proponent shall prepare a Road Dilapidation Report and repair any damage; and

Issue	Department's Consideration
	• The Proponent shall prepare and implement a Decommissioning Environmental Management Plan to manage impacts during the decommissioning phase.

6. CONCLUSION

The Department considers that the Collector Wind Farm would provide for a greater level of access to renewable energy, as well as contributing to meeting the challenges of climate change, reducing the reliance on fossil fuels and increasing energy supply and would benefit the wider community of NSW.

The key issues associated with the Project relate to operational noise, visual amenity, flora and fauna and health concerns. Submissions received on the Project both supported and objected to the Project reflecting the disparity of views regarding the Collector Wind Farm Project. Issues reflected in these submissions also raised other concerns including: land use issues including property and devaluation impacts; social and economic issues including community benefits; safety issues including bush fire safety; the consultation process; justification for the Project; decommissioning and impacts to heritage items.

The Department has assessed the Proponent's Environmental Assessment, Preferred Project and Submissions Report and Statement of Commitments as well as the submissions received from agencies and the public on the Project. The Department also considered the findings of independent reports by Clouston Associates on the landscape and visual aspects of the Project and SKM on the noise aspects of the Project. Based on its assessment, the Department is satisfied that sufficient justification exists for the Project and that the Proponent has, for the most part, undertaken a conservative assessment of the impacts of the Project and that the impacts of the Project can be managed and/or mitigated to an acceptable level.

The Department's assessment of operational noise and vibration has considered potential impacts and has concluded that significant impacts are unlikely. In particular, the Proponent's assessment has demonstrated that the Project can be designed to achieve compliance with applicable noise and vibration criteria at all non-associated residents. The SKM review also supports this finding.

The Department's assessment of visual impacts has taken into consideration the subjective nature of the visual impact of wind turbines which is also demonstrated by the differing views held in the submissions received including those received locally from Collector and nearby communities. In considering the visual impact, the Department notes that all wind turbines are located more than two kilometres from the nearest non-associated dwelling and has concluded that significant impacts are unlikely. Notwithstanding, the Department considers that the recommended condition requiring the consideration and provision of appropriate landscaping in consultation with the affected residents or businesses would further minimise residual visual impacts.

The Department's assessment indicates that the Project would result in some unavoidable biodiversity impacts to native vegetation including Endangered Ecological Communities. The Department is however, satisfied that the impacts can be suitably offset in perpetuity consistent with 'maintain or improve' principles. The Department is also satisfied that potential risks to fauna in relation to rotor collisions would be low and can be effectively managed through the implementation of an appropriate adaptive bird and bat management plan.

The Department's assessment of health found that the proposed wind farm would not give rise to any adverse human health impacts. The Department's assessment has also addressed a range of other relevant matters. The Department considers that none of these matters raise significant issues, and is satisfied that any residual impacts can be effectively managed.

The Department has formulated stringent recommended conditions of approval in relation to noise, visual amenity, biodiversity, hazards and risk, community consultation, heritage, traffic and transport and decommissioning, amongst others, to ensure that the Project achieves acceptable environmental standards, protects public amenity and offsets residual impacts.

The Department considers that if the Proponent implements its nominated environmental commitments, its recommended impact avoidance and management measures contained in the EA, Preferred Project and Submissions Report and Statement of Commitments, and the Department's recommended conditions, the impacts associated with the construction and operation of the Project can be minimised and managed to acceptable levels.

On balance, the Department considers the Project to be justified and in the public interest and should be approved subject to the Department's recommended conditions of approval and the Proponent's Statement of Commitments.

7. RECOMMENDATION

It is recommended that Planning Assessment Commission:

- consider the findings and recommendations of this report;
- approve the Project Application subject to conditions under Section 75J of the EP&A Act; and
- sign the attached instrument of approval (Appendix G)

20/9/13

Director
Infrastructure Projects

20.9.13

Executive Director
Major Projects Assessment

APPENDIX A ENVIRONMENTAL ASSESSMENT

See the Department's website at
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3778

APPENDIX B SUBMISSIONS

See the Department's website at
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3778

APPENDIX C PROPONENT'S RESPONSE TO SUBMISSIONS

See the Department's website at
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3778

APPENDIX D INDEPENDENT REVIEWS

Collector Wind Farm Landscape Character and Visual Impact Assessment Peer Review. Clouston Associates, 10 May 2013

Collector Wind Farm – Technical Review of Supporting Documentation. SKM, 24 June 2013

APPENDIX E ADDITIONAL INFORMATION

Collector Wind Farm LVIA Addendum A, Response to Clouston Associates Peer Review S13-0011. Green Bean Design, 19 June 2013.

APPENDIX F NSW PLANNING GUIDELINES WIND FARM CHECKLIST

Issue and Potential Issues for considerations	How Addressed in the Collector Wind Farm Environmental Assessment
Consultation • Form a Community Consultation Committee. • Document the consultation process undertaken, including stakeholders consulted. Identify and tabulate issues raised by stakeholders during consultation. Describe how issues raised have been addressed. • Consult with all neighbours with dwellings within 2km of a proposed wind turbine. Identify the neighbours' issues and potential approaches to mitigate any adverse impacts. • Consider seeking agreement with neighbours with dwellings within 2km of a proposed wind turbine.	• The Proponent has established a Community Consultation Committee with the Committee Chair being Ms Deborah Cameron. • Chapter 14 – Community and Stakeholder Consultation summarises consultation to date. Issues raised are tabulated and the relevant section in the EA cross referenced. • The Proponent has conducted extensive consultation in the form of telephone conversations and emailing, face-to-face meetings with associated and non-associated property owners generally within a 5km radius, establishment of a project website, media releases and community information days. • The Proponent has reached agreements with all properties with dwellings within 2km of a wind turbine.
Landscape and visual amenity • Provide photomontages from all non-host dwellings within 2km of a proposed wind turbine. • Identify the zone of visual influence of the wind farm (no less than 10km) and likely impacts on community and stakeholder values. Consider cumulative impacts on landscape and views. • Outline mitigation measures to avoid or manage impacts.	• Photomontages prepared for 2 out of 3 non associated dwellings within 2 km for the original layout in the EA. The third resident declined permission for access to undertake the necessary photographs. There are no non-associated residents within 2km of the revised wind turbine layout. • The Landscape and Visual Impact Assessment includes Zone of Visual Influence diagrams (to 10km) and cumulative impacts with other wind farms in the area (approved and constructed) have been considered. • Mitigation measures to avoid or manage impacts have been provided.
Noise • Undertake assessment based on separate daytime (7am to 10pm) and night-time periods (10pm to 7am). • Predict noise levels at all dwellings within 2km of a proposed turbine. • Consider special audible characteristics, including tonality, amplitude modulation, and low frequency noise (apply penalties where relevant). • Outline measures to avoid, minimise, manage and monitor impacts.	• The wind farm operation noise assessment adopts the lowest criteria independent of background noise of no more than 35dBA at non-associated residents. • Noise levels have been predicted for all dwellings within 2km of the turbines. • Special characteristics of the noise have been taken into consideration including predicting the level of low frequency noise against the draft NSW Wind Farm Guidelines to determine if further assessment is warranted. • Measures to mitigate and manage the noise impacts are discussed and presented in the EA.

Issue and Potential Issues for considerations	How Addressed in the Collector Wind Farm Environmental Assessment
Health • Consider and document health issues, focusing on neighbours with dwellings within 2km of proposed wind turbines.	• The EA considers health issues including concerns related to low frequency noise, electromagnetic fields and blade throw. The EA summarises current research on the topic. • No non-associated dwellings are located within 2km of a wind turbine.
Ecological issues • Consider potential impacts on birds and bats, particularly migratory species and outline the proposed monitoring and mitigation strategy	• The EA considers impacts on birds and bats including migratory species and proposes monitoring and mitigation measures.
Aviation safety • Outline current agricultural aerial uses on neighbouring properties. • Consider the potential for the proposed wind farm to impact on aviation safety associated with agricultural aerial uses consistent with the draft NSW Wind Farm Guidelines.	• The EA reviewed current aerial application operations within the area. The closest being undertaken within 1km of the currently operational Cullerin Wind Farm. • Two landing strips identified (one 3km and one 11km) from the proposed site. • Consultation undertaken with CASA, ASA, AAAA and DoD with respect to aviation safety. • Impacts from turbines considered unlikely to impact agricultural aerial uses.
Bushfire hazard • Consider bush fire issues consistent with the draft NSW Wind Farm Guidelines, including the risks that a wind farm will cause bush fire and any potential impacts on the aerial fighting of bush fires.	• The EA addresses the bushfire hazard, to the wind farm and caused by the wind farm, consistent with the draft NSW Wind Farm Guidelines. • The Proponent has consulted with the RFS and considered impacts to aerial fire fighting operations.
Blade throw • Assess blade throw risks consistent with the draft NSW Wind Farm Guidelines. • Outline measures to avoid, minimise, manage and monitor impacts.	• Blade throw risk has been assessed consistent with the draft NSW Wind Farm Guidelines. • Management measures include turbines being certified against the International Electrotechnical Commission Standards (IEC 61400), have overspeed protection mechanisms and independent electronic pitch motors that can be used in an emergency to stop the rotor from spinning.
Economic issues • Consider whether the wind farm use is consistent with relevant local or regional land use planning strategies. • Consider potential to impact upon mining/petroleum leases and exploration licences. • Consider any potential impacts upon property values consistent with the draft NSW Wind Farm Guidelines, including properties within 2km.	• The EA considers regional strategies and policies and considers the proposal to be consistent. • The EA discusses exploration licences. No exploration licences are within the area proposed to be impacted. • The EA includes consideration of the impact to property values as a result of this project.

Issue and Potential Issues for considerations	How Addressed in the Collector Wind Farm Environmental Assessment
Decommissioning • Include a Decommissioning and Rehabilitation Plan in the EA, including proposed funding arrangements. • Confirm that the proponent not the landowner is responsible for decommissioning.	• The EA includes a Decommissioning and Rehabilitation Plan. The EA provides an indicative figure for the decommissioning of each turbine and proposes to use the re-sale value of the wind farm to fund the decommissioning. The Proponent proposes to update this plan every 5 years. • The Plan confirms that the Proponent is responsible for decommissioning.
Monitoring and compliance program • Outline program to monitor environment performance to ensure compliance including mechanisms for reporting outcomes and procedures to rectifying non-compliance – including any provisions for independent reviews.	• The Proponent commits to preparing an environmental performance monitoring and compliance program as part of the Operational EMP. The program would be subject to independent review within 2 years of commencement of operations. • Monitoring and performance measures are also included throughout the EA including in the Statement of Commitments.
Council planning controls • Outline whether the proposal is consistent with any relevant provisions of the relevant council's Development Control Plan and list any variations.	• The EA considers the DCP in detail including where it is consistent and where it has been "considered to be consistent" with the intent of the DCP provision. Details of how the proposal differs, in these instances, are described.

APPENDIX G POLITICAL DONATION DISCLOSURES

See the Department's website at
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3778

APPENDIX H RECOMMENDED CONDITIONS OF APPROVAL