



Planning &
Infrastructure

**MAJOR PROJECT ASSESSMENT:
White Rock Wind Farm
(MP10_0160)**



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

July 2012

ABBREVIATIONS

CEMP	Construction Environmental Management Plan
CIV	Capital Investment Value
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	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPI	Environmental Planning Instrument
MD SEPP	State Environmental Planning Policy (Major Development) 2005
Minister	Minister for Planning
OEMP	Operational Environmental Management Plan
Part 3A	Part 3A of the <i>Environmental Planning and Assessment Act 1979</i>
PEA	Preliminary Environmental Assessment
PFM	Planning Focus Meeting
PPR	Preferred Project Report
Proponent	White Rock Wind Farm Pty Ltd
RFS	Rural Fire Service
RtS	Response to Submissions

Cover Photograph: Proposed view from Maybole Road toward White Rock Wind Farm (Epuron 2011)

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EXECUTIVE SUMMARY

White Rock Wind Farm Pty Ltd proposes to construct and operate the White Rock Wind Farm, consisting of up to 119 wind turbines, located in the New England Tablelands, 20 kilometres west of Glen Innes, New South Wales. The project is expected to generate up to 70 construction jobs and up to 20 ongoing operational and maintenance jobs and involve a capital cost of \$350 million. The project is classified as critical infrastructure under the *Environmental Planning and Assessment Act 1979*.

The project consists of the construction and operation of a wind farm with up to 119 turbines and associated infrastructure including access tracks, local road infrastructure upgrades, electrical connections between the turbines (both underground cable and aboveground power lines), temporary concrete batching plant, on-site control buildings and equipment storage facilities. The project also includes an on-site substation and transmission connection from the substation to the TransGrid 132 kV transmission line to the north of the site, and permanent monitoring masts.

The EA for the project was placed on public exhibition from Friday 27 May 2011 until Monday 27 June 2011 (32 days). The Department received 10 submissions from public authorities and 5 submissions from the general public. Three of the public submissions, objected to the project, while the remainder did not specifically state a position although raised issues for consideration in the Department's assessment.

In addition, submissions were received from ten Commonwealth, State and public authorities: AirServices Australia, Office of Environment and Heritage, NSW Office of Water, Industry and Investment NSW, Glen Innes Severn Council, Inverell Shire Council, Guyra Shire Council, Department of Primary Industries – Crown Lands Division, Border Rivers – Gwydir CMA, and NSW Rural Fire Service. No objection to the project was raised subject to conditions and/or comments for the Department's consideration.

Key issues raised in submissions relate to flora and fauna, visual and landscape impacts, noise and vibration and health. A Submissions Report, prepared by the Proponent, addressing the issues raised in submissions, was submitted to the Department which included clarification of errors within the EA and updates to the flora and fauna and noise reports, NBN television signal analysis, and a preliminary aviation impact assessment.

The Department has undertaken a comprehensive assessment of the merits of the project and considers that the project is required to help meet the energy requirements of the State as well as in addressing local demand, and would have benefits for local industry and the community, as well as contributing to the challenges of climate change, reliance on fossil fuels and energy supply, and is therefore in the public interest. The Department also considers that all environmental issues have been adequately addressed and can be managed to acceptable levels. The Department therefore recommends that the project be approved, subject to the Proponent's Statement of Commitments and the Department's recommended conditions.

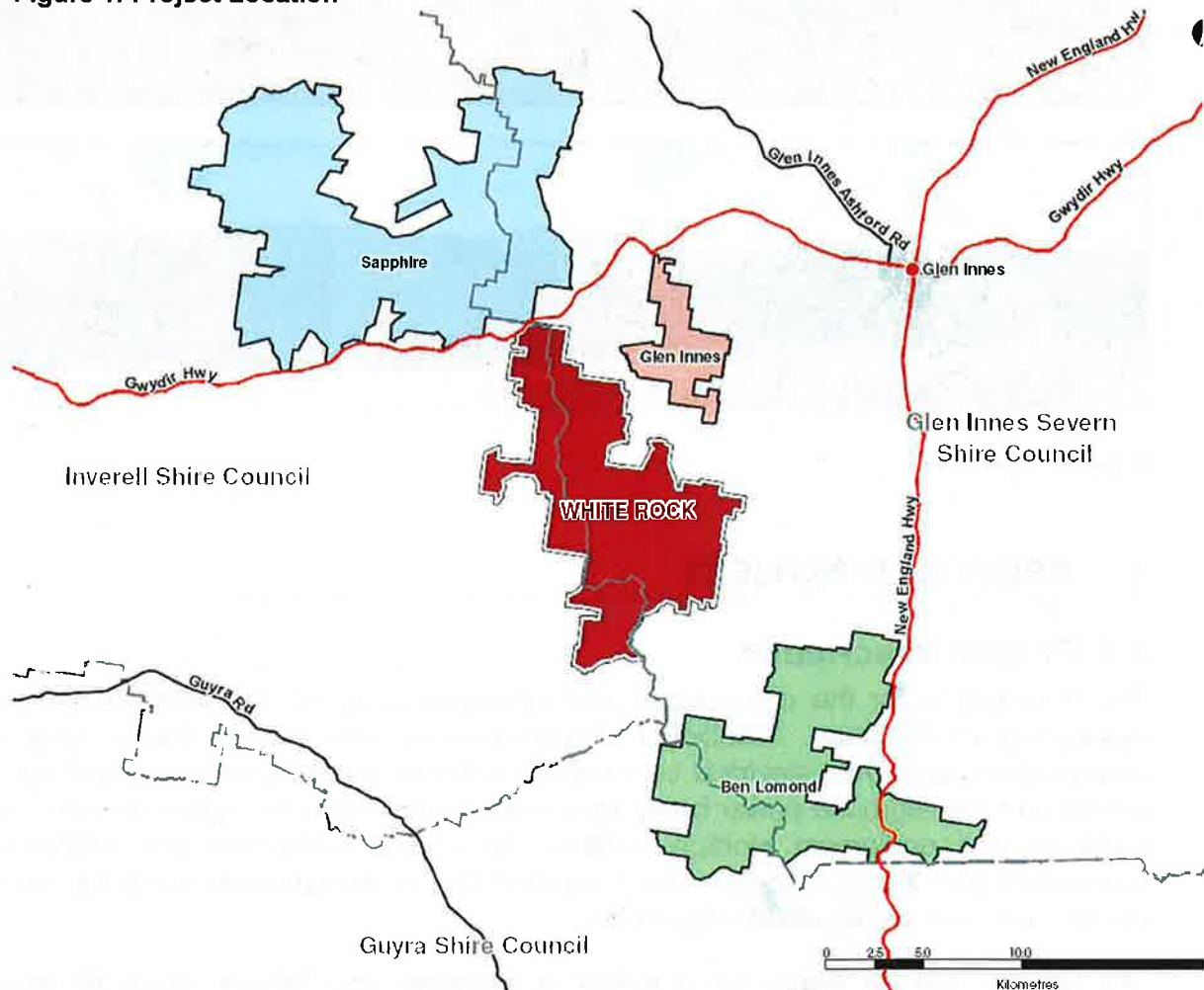
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1. BACKGROUND

White Rock Wind Farm Pty Ltd proposes to construct and operate the White Rock Wind Farm, consisting of up to 119 wind turbines, located in the New England Tablelands, 20 kilometres west of Glen Innes, New South Wales. The project location is shown in Figure 1, as well as proposed wind farms at Glen Innes, Ben Lomond and Sapphire.

Figure 1: Project Location



(Epuron, January 2011)

The proposed site is located on freehold agricultural land which is characterised by its undulating topography, forested hills, high windy ridges, and cleared land (see figure 2). The proposal would directly involve 16 properties that are currently used for commercial agriculture predominantly for sheep and cattle grazing.

The surrounding land uses also predominantly involve commercial agriculture (grazing) and include approximately 14 non-involved residences within 2km (3 uninhabited) and 47 non-involved residences within 5km (4 uninhabited). The land in and around the site has predominantly been modified, cleared and grazed over many decades.

The landscape is rural in character and occupied by medium size land holdings and large commercial pastoral operations and is characterised by a mixture of cultivated farmland, livestock pasture and rural homesteads surrounded by cultural plantings and windbreaks. The existing land uses would continue with the development of the

wind farm as minimal interruption from the wind farm is anticipated during construction and operation.

Figure 2: typical view across steep sided valleys, forested hill and ridgeline



(Epuron, April 2011)

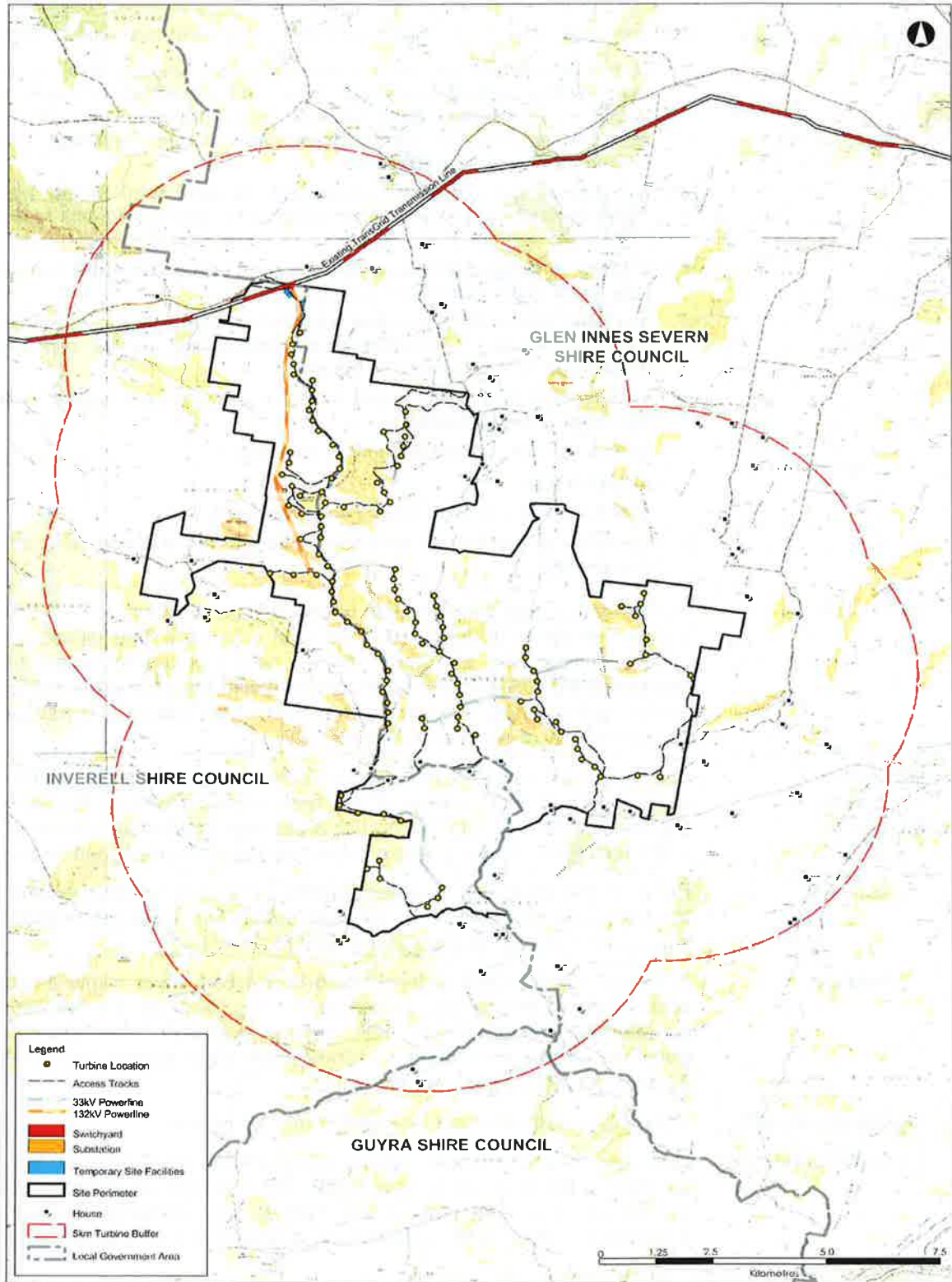
2. PROPOSED PROJECT

2.1. Project Description

The Proposal is for the construction and operation of up to 119 wind turbines, and associated infrastructure. Associated infrastructure includes access tracks, local road infrastructure upgrades, electrical connections between the turbines (both underground cables and aboveground power lines), temporary concrete batching plant, on-site control buildings and equipment storage facilities, an on-site substation and transmission connection from the substation to the TransGrid 132 kV transmission line to the north of the site, and permanent monitoring masts.

The turbines will be placed on a series of ridgelines and hilltops within 16 freehold properties running north to south between the Gwydir Highway and Maybole Road. The wind turbines would have a maximum tip height (tower plus blades) of 150 metres, and would be connected via a series of underground and overhead powerlines. The project layout is shown in Figure 3. The key components of the project are listed in Table 1.

Figure 3: Project Layout



(Epuron, April 2011)

Table 1: Key Project Components

<i>Aspect</i>	<i>Description</i>
Project Summary	<p>The components of the proposed wind farm included in this application are:</p> <ul style="list-style-type: none"> • up to 119 wind turbines, each with three blades mounted on a tubular steel tower, with a combined height of blade and tower limited to a maximum tip height of 150 metres. Each turbine will require the construction of an adjacent pad mounted turbine transformer, crane hardstand area, and related turbine lay down area; • a 6-8km on-site powerline connecting the wind farm to the TransGrid 132kV Inverell – Glen Innes transmission line, which intersects to the north of the site; • a 132kV switchyard at the connection point to the TransGrid transmission line, and a 132kV substation on-site; • electrical connections between wind turbines and the on-site substation, which would be a combination of underground cables and overhead powerlines linking sections of the site; • an operation and maintenance facility incorporating a control room and equipment storage facilities; • temporary concrete batching plant facilities; • access tracks; • minor upgrades to local roads (when required); and • a number of permanent monitoring masts for wind speed verification and monitoring.
<i>Wind Turbines</i>	<p>The turbines under consideration have a typical hub height of 80-100m and a blade length of 40-55m (80-110m total diameter). The tallest tip height under consideration is 150m, with tip height generally expected to be approximately 125 – 135m. Each turbine would be a three bladed "up wind design" (blades face into the wind in front of the tower) and have a rated power capacity of between 1.5 and 3.4MW.</p>
<i>Access track, hardstands and footings</i>	<p>The towers would be mounted on reinforced concrete footings, requiring the removal of rock and subsoil at the base of each turbine. Footing design options include a gravity footing (for areas with less stable subsoil geology) and a rock bolted footing (where subsoil geology provides good bedrock).</p> <p>Each turbine would require approximately 5m wide all weather graded gravel access tracks and cabling to the site substation. Hardstand areas below each turbine would measure 25m x 45m (1125m²).</p>
<i>Transformer</i>	<p>A transformer for each turbine would be located either within the base of each tower, in the nacelle, or adjacent to the tower as a small pad-mount transformer depending on final turbine selection. The turbine would transform power from 690V – 1000V from each turbine into 22,000V – 33,000V for reticulation around the site.</p>
<i>Lightning protection</i>	<p>Lightning protection would be installed in each turbine.</p>
<i>Electrical Connection</i>	<p>Underground and overhead cabling would connect the turbines to the on-site substation, which would include transformers to step up voltage from 33kV to 132 kV. The wind farm is proposed to be connected to the existing transmission network via a switchyard adjacent to the existing transmission line.</p>
<i>Site Substation and Transmission connection</i>	<p>The site substation would contain two large power transformers to change the voltage from reticulation voltage (22kV or 33kV) up to transmission voltage (132kV) and would take up an approximate area of 100m x 100m. Other equipment in the substation includes circuit breakers and a 132kV busbar.</p> <p>The substation would include all necessary equipment such as a substation control room and amenities, communication equipment, control cubicles, voltage and current transformers, and circuit breakers for control and</p>

<i>Aspect</i>	<i>Description</i>
	protection of the substation. In addition the substation would also require telecommunications and backup electricity connections from local services. A 132kV on-site powerline would connect the site substation to the 132kV switchyard.
<i>Operation and Maintenance Facilities</i>	An operation and maintenance facility would be constructed on site, which would include car parking, offices and amenities for the maintenance staff, a control room and storage facilities for spares and equipment needed for the maintenance of the wind turbines.

2.2. Project Need and Justification

The project has been justified based on the following:

- In full operation, it would generate more than 830,000 MWh of electricity per year - sufficient for the average consumption of around 130,000 homes.
- It would improve the security of electricity supply through diversification of generation locations.
- It would reduce the increase of greenhouse gas emissions by approximately 754,000 tonnes of carbon dioxide equivalent (CO²e) per annum under the current system and approximately 743,000 tonnes of CO²e if a Carbon Pollution Reduction Scheme were introduced.
- It would contribute to the State and Federal Governments' target of providing 20% of consumed energy from renewable sources by 2020.
- It would contribute to reducing increases of greenhouse gas emissions.
- It would create local employment opportunities and inject funds of up to \$300 million into the Australian economy.

Electricity demand in NSW is predicted to rise and exceed existing reserves and there is a need to reduce greenhouse gas emissions through clean energy sources, contributing to State and Federal renewable energy targets. The Proponent's Environmental Assessment (EA) states that, according to TransGrid's 2010 Annual Planning Report, growth in electricity demand will soon exceed supply during peak times (although the Department notes that the 2011 projection of the 10% Probability of Exceedance summer demand projection is 3.3% on average below the 2010 projections; and on average 5.0% lower for the 10% Probability of Exceedance winter demand projection). Meeting the demand will require existing energy generators to increase their annual output, but will eventually require additional power generators to be constructed. TransGrid has estimated that additional power generating units will be required to manage peak periods by summer 2016/17.

The Australian Energy Market Operator (AEMO) annual report is based on forecast energy demand growth consistent with TranGrid's medium growth estimate, among other contributing sources. The Proponent's EA states that the AEMO Electricity Statement of Opportunities 2010 report indicates that the NSW average annual growth rate of energy consumption and maximum demand (based on medium economic growth forecasts) over the next 10 years is 2.6%, which in 5 years is predicted to surpass the NSW summer 2010/11 summer aggregate scheduled and semi-scheduled generation capacity of 15,950MW.

The Department notes the updated AEMO 2011 report (updated 2 March 2012) predicts that low reserve conditions (LRC) are likely to occur in 2017/2018 (with a predicted shortfall of 104 megawatts) representing a two-year delay compared with the 2010 report. The LRC point is the time at which the network reliability standard may not be met, and at which point loadshedding may be required and brown-outs may occur in some areas therefore affecting the quality and reliability of supply (i.e. increases in brown-out events, severity and duration).

The Department notes that the timing of a generation capacity shortfall in New South Wales has shifted by two years. This in itself is sufficient to suggest that a level of caution should be applied to predictions made about events five to ten years into the future. Further, the changing regulatory, policy and market setting for electricity generation in New South Wales and more broadly across the National Electricity Market is another factor that has the potential to affect future predictions. However, the Department considers it prudent to take a strategic approach to the issue of timing of additional generating capacity by accepting that such additional capacity *may be required* at any point in the period 2014-2020, and that additional generating capacity should be available for implementation within that period, *if required*, rather than conclusively determining a date for implementation at this time. 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 Australian Government's Mandatory Renewable Energy Target (MRET) scheme was established in 2001 to expand the renewable energy market and increase the amount being utilised in Australia's electricity supply. The Renewable Energy Target (RET) scheme is an expansion of the MRET and has been established to encourage additional generation of electricity from renewable energy sources to meet the Government's commitment to achieving a 20% share of renewables in Australia's electricity supply in 2020. The Proponent has identified that the project would help meet the RET targets for renewable energy as well as provide significant greenhouse gas benefits as Australia moves towards a more carbon constrained market.

The Proponent states that the White Rock Wind Farm will contribute towards this required generation and decrease the country's dependence on fossil fuel power stations, which currently contribute approximately 90% of electricity generation. The proposed wind farm is to have an installed capacity of around 238 MW with a likely capacity of 2MW per turbine. It is estimated the wind farm would produce in the order of 830 GWh of electricity per year over its operating life, which the Proponent calculates to be equivalent to the average annual consumption of 130,000 homes.

Pursuant to the NSW wind farm greenhouse gas saving tool developed by the Department of Environment, Climate Change and Water (DECCW) the Proponent states the White Rock Wind Farm will reduce the increase in greenhouse gas emissions by around 754,000 tonnes of carbon dioxide equivalent per annum, which will contribute to global efforts to mitigate climate change.

In addition to the environmental benefits, the Proponent has justified the project as having significant economic benefits. Pursuant to a report by MacGill & Watt (2002) *Jobs and Investment Potential of Renewable Energy: Australian Wind Industry*

Scenarios, the Proponent states the White Rock Wind Farm could inject approximately \$300 million into the Australian economy over its life time (based on \$1.1 million per megawatt for wind farm installation in 2010). Furthermore, the Proponent states the local community will benefit from employment opportunities, use of local services, infrastructure upgrades (e.g. some local roads), and tourism.

The Department acknowledges that the proposal will assist in providing additional supply capacity which could contribute to addressing the supply/demand shortfalls predicted by AEMO. The Department also considers that the proposed wind farm would make a contribution towards offsetting the emissions of CO₂ and other emissions that would otherwise be produced if the equivalent power supply was provided by fossil-fuel combustion. The project would also result in the avoidance of water consumption that would otherwise be used in fossil fuel fired power stations.

The Department supports the development of wind farms as a form of renewable energy, subject to suitability of the location of these wind farms. This is consistent with Commonwealth and State policies promoting renewable energies as a means of addressing climate change. The wind farm would contribute to Australia's Renewable Energy Target (RET) of sourcing 20% of electricity from renewable sources by 2020. It is also consistent with the *NSW 2021: A plan to make NSW number one* target of achieving 20 per cent renewable energy consumption by 2020 and State and Federal Government targets for reducing greenhouse gas emissions of at least 5 per cent below 2000 levels.

The Department considers that in conjunction with relevant demand management and efficiency measures, a diverse mix of 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. Local embedded generation in regional areas would also result in greater transmission efficiencies (and associated greenhouse gas benefits from reduced transmission losses).

The Department also accepts that the subject proposal would involve a number of direct local benefits including employment generation, potential tourist opportunities and opportunities for local landowners to supplement rural income.

On the above basis, the Department considers the proposed White Rock Wind Farm would have a role in helping to meet the energy requirements of the State as well as in addressing local demand, would have benefits for local industry and the community, as well as contributing to the challenges of climate change, and reliance on fossil fuels.

3. STATUTORY CONTEXT

3.1. Major Project

The proposal is a major project under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) because it is development of a kind that was described in the then Schedule 1, Group 8, clause 24 of *State Environmental Planning Policy (Major Development) 2005*, namely development for the purpose of a

wind electricity generation facility that has a capital investment value of more than \$30 million.

Part 3A of the EP&A Act, as in force immediately before its repeal on 1 October 2011 and pursuant to Schedule 6A to the EP&A Act, continues to apply to transitional Part 3A projects. Director-General's environmental assessment requirements (DGRs) were issued in respect of this project prior to 1 October 2011, and the project is therefore a *transitional Part 3A project*. Consequently, this report has been prepared in accordance with the requirements of Part 3A and associated regulations, and the Minister for Planning and Infrastructure (or his delegate) may approve or disapprove of the carrying out of the project under section 75J of the Act.

3.2. Delegated Authority

On 1 October 2011, the Minister delegated his powers and functions under section 75J of the EP&A Act to the Deputy Director-General, Development Assessment and Systems Performance, where the relevant local council has not made an objection, a political disclosure statement has not been made, and there are less than 25 public submissions in the nature of objections in respect to the project. As there was no objection from the relevant Councils to the project, less than 25 public submissions were received, and a political disclosure statement has not been made, the Deputy Director-General, Development Assessment and Systems Performance may determine the project under delegated authority.

3.3. 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 former Minister's declaration of 11 November 2009 relating to renewable energy projects including the White Rock Wind Farm (MP10_0160), being development for the purposes of a wind farm with a capacity to generate at least 30 MW, which is the subject of a project application lodged pursuant to section 75E or 75M of the EP&A Act.

3.4. Permissibility

The site is zoned 1(a) Rural Agriculture pursuant to the Glen Innes Local Environmental Plan (LEP) 1991, Severn LEP 2002, and Inverell LEP 1988. Generating works are permitted with development consent within the zone. 'Generating Works' are defined as 'a building or place used for the purpose of making or generating gas, electricity or other forms of energy' under the Environmental Planning and Assessment Model Provisions 1980. This definition encompasses a wind farm development.

In addition, the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) also 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 consent on land in a prescribed zone. Therefore, as the proposal is for the purpose of generating electricity in a prescribed zone it is permissible with consent.

3.5. Environmental Planning Instruments

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

3.6. Objects of the EP&A Act

Decisions made under the EP&A Act must have regard to the objects of the Act, as set out in Section 5 of the Act. The relevant objects are:

- (a) *to encourage:*
 - (i) *the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*
 - (ii) *the promotion and co-ordination of the orderly and economic use and development of land,*
 - (iii) *the protection, provision and co-ordination of communication and utility services,*
 - (iv) *the provision of land for public purposes,*
 - (v) *the provision and co-ordination of community services and facilities, and*
 - (vi) *the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and*
 - (vii) *ecologically sustainable development, and*
 - (viii) *the provision and maintenance of affordable housing, and*
- (b) *to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and*
- (c) *to provide increased opportunity for public involvement and participation in environmental planning and assessment.*

The most relevant objects of Section 5 of the EP&A Act are those under 5(a) in particular those objects under 5(a) (i), (ii), (iii), (vi), (vii) as these objects form key areas of assessment within the environmental impact assessment and are of particular relevance to the eventual determination of the subject project application. Sections 5(a) (iv), (v) and (viii) are not relevant to this proposal as the proposal does not raise significant issues relating to land for public purposes, community services and facilities or affordable housing. With respect to ecologically sustainable development, the EP&A Act adopts the definition in the *Protection of the Environment Administration Act 1991*, including the precautionary principle which is discussed in Section 3.5.

In addition to the above, the agency and community consultation undertaken as part of the assessment process (see Section 4 of this report), address objects 5(b) and (c) of the Act.

3.7. 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 5.1) is based on a conservative and rigorous assessment of the likely extent of ecological impacts and of 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. The majority of potential impacts of the proposal are likely to be localised and would not diminish the options regarding land and resource uses and nature conservation available to future generations. The proposal 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 produce electricity with minimal production of greenhouse gases. With the identified benefits of the proposal and the assessed impacts on the environment and their ability to be managed (section 5.1), it is considered that the development would be ecologically sustainable within the context of the above principles.

3.8. Statement of Compliance

In accordance with section 75I of the EP&A Act, the Department is satisfied that the Director-General's environmental assessment requirements have been complied with.

4. CONSULTATION AND SUBMISSIONS

4.1. Exhibition

Under section 75H(3) of the EP&A Act, the Director-General is required to make the environmental assessment (EA) of an application publicly available for at least 30 days. After accepting the EA, the Department publicly exhibited it from Friday 27 May 2011 until Monday 27 June 2011 (32 days) on the Department's website, and at the Department of Planning & Infrastructure Information Centre, Nature Conservation Council of NSW, Glen Innes Severn Council, Glenn Innes Library, Guyra Shire Council, and Inverell Shire Council. The Department also advertised the public exhibition in the Glen Innes Examiner and Tamworth Northern Daily Leader on Thursday 26 May 2011 and notified relevant State and local government authorities in writing.

The Department received 15 submissions during the exhibition of the EA - 10 submissions from public authorities and 5 submissions from the general public.

A summary of the issues raised in submissions is provided in Section 4.2.

4.2. Public Authority Submissions

Ten submissions were received from public authorities, key matters raised include:

Department of Trade and Investment

- Minerals Branch noted that the Proponent consulted with mineral title holders in the subject area and committed to ongoing consultation with current holders of relevant exploration licences, and this consultation should include final turbine locations and access track locations. Requested that this information also be provided to the Minerals Branch prior to construction.

Glen Innes Severn Council

- Requested that the Proponent incorporate provisions set out in *Chapter D1 Wind Power Generation Glen Innes Severn DCP 2008* and *Glen Innes Severn Section 94A Contribution Plan* in relation to the design and location of the wind farm proposal and that levies be paid to council for community initiatives. Chapter D1 of the DCP details development controls and guidelines for wind farm developments, in particular that a development shall not be located within 2km's of any dwelling not associated with the development.
- Required that wind turbines comply with the South Australian Environment Protection Authority's Wind Farms – Environmental Noise Guidelines.

Inverell Shire Council

- Acknowledged the positive aspects of the project, but requested that negative effects on local and wider communities be minimised.
- Requested negative effects on Council's assets be minimised and rectified, including impacts on infrastructure and requested that road dilapidation reports be compiled.
- Noted that the location of a mobile phone tower in the White Rock Mountain locality was not acknowledged.
- Requested that social impacts on the locality be detailed and discussed, including proposed community initiatives and monetary contributions to community programs in accordance to Council's Section 94 Contribution Plan, and that the Department condition a Community Enhancement Program.
- Requested that a Noxious Weeds Management Plan be included in the future Environmental Management Plan.
- Assumed that temporary facilities will be subject to further applications, and requested such approvals to be determined by the relevant consent authority.
- Requested a wind turbine setback of 2km from non-involved dwellings and 260-300m from non-involved property boundaries, in compliance with Inverell Shire Council DCP – Wind Power Generation 2009. Also requested the inclusion of a Bushfire Asset Protection Zone within the project boundary and that justification was required for the non-compliance with the DCP.
- Represented local residents of 'Tryagain', in relation to the visual impact of turbines 32 and 33, and requested that these turbines be relocated.

Guyra Shire Council

- Noted that Council has a radio tower site at Mount Rumbée. Council communications are not expected to be affected, however rural fire services may be affected.

- Raised concern over possible damage to Council road infrastructure, requesting further consultation if route changes occur, including haulage impacts associated with unknown source locations, including the proposed Spring Mountain Quarry.
- Raised concern over potential impacts on safety arising from increased use of roads.

Office of Environment and Heritage (OEH)

- Raised concerns that the potential impacts on biodiversity had been underestimated, including:
 - basic descriptions of vegetation communities, and recommended that plot data assessing impacted vegetation be made available, as well as further assessments on the vegetation type labelled 'Cleared Pasture with Scattered Trees';
 - underestimation of threatened flora and fauna species, including bat species. OEH required that a more specific assessment and search of species located within the Glen Innes – Guyra Basalts CMA sub-region be conducted, including the assessment of any caves within the area; and
 - a lack of understanding about the ecology and behaviour of bird species, resulting in an underestimation of impact. OEH was concerned about the lack of discussion on the additional three wind farms proposed within 8km of the White Rock Wind Farm, and required more specific detail regarding local species and their migration, including a discussion about the cumulative effects of neighbouring proposed wind farms, with estimated turbine numbers totalling 371.
- Considered the offset proposal to be inadequately detailed and unlikely to be sufficient, particularly in relation to:
 - condition of potential offset areas, assessment against the OEH 'Principles of the use of biodiversity offsets in NSW'. Insufficient information in regard to possible Derived Native Grassland and Woodland and their effect on the calculation of offsets;
 - two of the three identified offset areas are located too close to the turbines; and
 - recommended that the Proponent be required to submit a Biodiversity Offset Strategy that meets the 'Principles for the use of biodiversity offsets in NSW'.
- Recommended that the buffer for the three scarred trees (items of Aboriginal heritage), be 30m from the edge of the tree canopy and not from the trunk, to protect the trees root system.

Department of Primary Industries – Crown Lands Division

- Noted that the Proponent will require a Crown Land Licence to authorise the use of Crown land where access tracks and underground cables intersect Crown road reserves, estimated to be 6-7 crossings.

Airservices Australia

- Noted that it had advised the Proponent that the proposed wind farm would have an effect on the minimum safe altitude (MSA) for two procedural air arrivals into Glen Innes Airport, and that the Proponent had not responded to this advice.

Border Rivers – Gwydir CMA

- Noted the development did not include appropriate offsets or mitigating management actions associated with clearing native vegetation, including the clearing of EEC's.
- Suggested the use of the NSW Government 'Biodiversity Banking and Offset Scheme', including 'biodiversity credits'.

Office of Water (NOW)

- Noted that a detailed assessment of surface water and groundwater within the project area had not been provided, and recommended that:
 - all proposed groundwater works be identified and relevant approvals be obtained from NOW; and
 - that a Construction Environmental Management Plan (CEMP) needs to be provided to NOW for review, including mitigation measures for potential contamination of surface water and groundwater.

NSW Rural Fire Service

- RFS recommended the development should address:
 - minimising the impact of radiant heat and direct flame contact by separating structures from bush fire hazards by identifying adequate asset protection zones in accordance with *Planning for Bush Fire Protection 2006*;
 - the provision of adequate egress/access as outlined *Planning for Bush Fire Protection 2006*;
 - the ability to site and provide for adequate water supplies for bush fire suppression operations;
 - emergency evacuation measures in accordance with *Planning for Bush Fire Protection 2006*; and
 - operational procedures related to the mitigation and suppression of bush fires.

4.3. Public Submissions

Five submissions were received from the public. Three of the public submissions, (McGrath, Ryan and Keough) objected to the project. The remainder did not specifically state a position although raised issues for consideration in the Department's assessment. The key issues raised in public submissions are listed in Table 2.

Table 2: Summary of Issues Raised in Public Submissions

Issue	Number of submissions
Consultation Process <ul style="list-style-type: none"> • Lack of consultation. • Concern that dealings with Epuron had not been honest, professional or productive. • Land owners hosting towers comments restricted. • Misrepresentation of some residences as '<i>associated residences</i>'. 	4
Health <ul style="list-style-type: none"> • Concern regarding lack of Australian research into the health effects of turbines, as raised in the Federal Senate Inquiry into the social and economic impact of rural wind farms (23 June 2011). 	4

Issue		Number of submissions
Noise and Vibration	<ul style="list-style-type: none"> • Concern regarding "Wind Turbine Syndrome" and the effects of low frequency noise. • Concerns regarding the critical noise threshold reached within 1km of turbines. • Concerns regarding the measurement of noise readings only being taken from dwellings, with no measurement in paddocks or grazing land. • Concern that dBA units are not the best measurement of low frequency noise associated with wind turbines. 	4
Turbine Safety	<ul style="list-style-type: none"> • Concerns regarding possible blade failure and pieces of blade being thrown from turbines. • Concerns regarding possible fire breakouts after mechanical failure, and NSW Fire Brigade's turbine policy of "watch it burn". • Concern over possible 'Ice Shedding', as ice builds up on turbine blades and is flung in an outward motion. 	1
Landscapes and View	<ul style="list-style-type: none"> • Underestimation of visual impact. • Loss of view over natural landscape. • Limited opportunity for screening. 	4
Shadowing and reflection	<ul style="list-style-type: none"> • Concern over underestimation of shadow flicker and its possible effect on grazing activities. • Concern over possible light reflection from turbines. 	3
Property rights and devaluation	<ul style="list-style-type: none"> • Concern over possible reduction in land values. • Decreased ability for aerial service use, such as aerial spraying. • Concern over possible restrictions for future development on properties surrounding the wind farm. 	4
Telecommunications	<ul style="list-style-type: none"> • Concern over possible interference with mobile phone, internet and television services. 	2
Insurance	<ul style="list-style-type: none"> • Concern that the Proponent is only liable for damage to the base of the tower, without inclusion of possible fire, ice or blade damage to neighbouring properties. 	1
Ecology	<ul style="list-style-type: none"> • Concern over local birdlife and the effect of turbines on threatened bird species. 	1
Erosion	<ul style="list-style-type: none"> • Concern that the wind turbines could increase the risk of soil erosion. 	
Modifications	<ul style="list-style-type: none"> • Concern over incorrect positioning of properties within some sections of the EA report. 	2

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

4.4. Proponent's Response to Submissions

The Proponent provided a response to the issues raised in submissions (see Appendix C), which has been considered in the Department's assessment of the project.

4.5. Compliance with the Draft NSW Wind Farm Planning Guidelines

The Department has recently developed the *Draft NSW Wind Farm Planning Guidelines* ('the guidelines'), which were publicly exhibited from 23 December 2011 to 14 March 2012. The guidelines provide a regulatory framework to guide investment in wind farms across NSW while minimising potential impacts on local communities, and it is intended that the guidelines will be finalised by mid 2012. The

interim arrangements for transitional Part 3A wind farms such as White Rock Wind Farm and the application of the draft guidelines vary depending on the stage of an application in the assessment process.

As the White Rock Wind Farm has substantially progressed (the project had been exhibited, Submissions Report received, but not determined) the Proponent had not addressed (in the EA or Submissions Report) all of the new requirements of the Guidelines. Although the Department is satisfied that the Guidelines have been substantially addressed, where gaps have been found, the Department has considered relevant provisions of the guidelines in developing conditions of approval. Table 4 below shows how the White Rock Wind Farm has adopted, where possible, the Guidelines.

Table 4- NSW Planning Guidelines Wind Farms Checklist

Issue	NSW Planning Guidelines Checklist	Response
Consultation	<ul style="list-style-type: none"> • Form a Community Consultation Committee (CCC). • 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. 	<ul style="list-style-type: none"> • Section 7 of the EA documents the consultation process. • Epuron has designed a community consultation program to consult with immediate neighbours of the project. Epuron has made contact with all neighbours within a 4km radius of the project, which at a minimum involved a phone call, and in most cases a face-to-face meetings. • Epuron has sought to seek agreements with neighbours where appropriate however not with all dwellings within 2km. • The Department has recommended a condition requiring the Proponent establish a CCC for the life of the project.
Landscape and visual amenity	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • Section 9 of the EA and 3.1 of the Submission Report. • Photomontage locations were selected from publically accessible sections of surrounding road corridors as well as areas of private property in the vicinity of residential dwellings. Photomontages were selected to provide representative views from a single or multiple residential properties located within the vicinity of the photomontage location where possible. • The zone of visual influence and mitigation measures to avoid or manage impacts were addressed within section 9 of the EA.
Noise	<ul style="list-style-type: none"> • Undertake assessment based on separate daytime (7am to 10pm) and night-time periods (10pm to 7am). • Predict noise levels at all 	<ul style="list-style-type: none"> • The noise assessment in Section 9.2 of the EA was produced giving consideration to the South Australian Guidelines, which was required by the DGRs. The NSW Guidelines

	<p> dwellings within 2km of a proposed turbine.</p> <ul style="list-style-type: none"> • 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. 	<p>follow closely but improve on the methodologies and practices of the SA Guidelines. The NSW Guidelines give greater consideration to low-frequency noise, tonality, excessive amplitude modulation and auditing and compliance issues. The proponent's EA addresses these issues, however, not in the detail required by the Guidelines, in particular regarding low-frequency noise. The Department accepts the Proponent has assessed the impacts under the SA Guidelines, however, the Department has considered the NSW Guidelines in formulating conditions to ensure acceptable performance.</p>
Health	<ul style="list-style-type: none"> • Consider and document health issues, focusing on neighbours with dwellings within 2km of proposed wind turbines. 	<ul style="list-style-type: none"> • Section 10 of the EA addresses health impacts, in particular magnetic fields, while section 9.2 addresses health concerns related to noise. In addition section 3.6 of the Submissions Report also expands on health concerns.
Ecological issues	<ul style="list-style-type: none"> • Consider potential impacts on birds and bats, particularly migratory species and outline the proposed monitoring and mitigation strategy 	<ul style="list-style-type: none"> • Section 9.3 of the EA and 3.5 of the Submissions Report.
Aviation safety	<ul style="list-style-type: none"> • 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 guidelines. 	<ul style="list-style-type: none"> • Section 10.1 of the EA and Section 3.9 of the Submissions Report.
Bushfire hazard	<ul style="list-style-type: none"> • Consider bush fire issues consistent with the draft guidelines, including the risks that a wind farm will cause bush fire and any potential impacts on the aerial fighting of bush fires. 	<ul style="list-style-type: none"> • Section 10.5 of the EA and section 3.8 of the Submissions Report.
Blade throw	<ul style="list-style-type: none"> • Assess blade throw risks consistent with the draft guidelines. • Outline measures to avoid, minimise, manage and monitor impacts. 	<ul style="list-style-type: none"> • Section 3.7 of the Submissions Report.
Economic issues	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Section 6 of the EA addresses relevant local or regional land use planning strategies. • Section 11.4 of the EA addresses mineral exploration. • Economic issues are addressed in section 11.5 of the EA while land value impacts are addressed in section 3.4 of the EA.

	consistent with the draft guidelines, including properties within 2km.	
Decommissioning	<ul style="list-style-type: none"> • Include a Decommissioning and Rehabilitation Plan in the EA, including proposed funding arrangements. • Confirm that the proponent not the landowner is responsible for decommissioning. 	<ul style="list-style-type: none"> • Decommissioning is addressed in section 3.9 of the EA, however, no decommissioning plan has been provided at this stage. The Department has recommended a condition of approval requiring the submission of a Decommissioning and Rehabilitation Plan prior to the commencement of construction, as well as requiring the lease to ensure that the Proponent is responsible for decommissioning.
Monitoring and compliance program	<ul style="list-style-type: none"> • Outline program to monitor environmental performance to ensure compliance including mechanisms for reporting outcomes and procedures to rectifying non-compliance – including any provisions for independent reviews. 	<ul style="list-style-type: none"> • Monitoring and compliance programs have been discussed throughout the EA, however the Department has recommended specific conditions ensuring suitable monitoring and compliance programs are in place.
Council planning controls	<ul style="list-style-type: none"> • Outline whether the proposal is consistent with any relevant provisions of the relevant council's Development Control Plan and list any variations. 	<ul style="list-style-type: none"> • Section 6 of the EA.

5. ASSESSMENT

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

- Flora and Fauna (Section 5.1);
- Visual Amenity (Section 5.2);
- Noise and Vibration (Section 5.3);
- Health Impacts (Section 5.4); and

Other issues have been considered in Section 5.5 of the report.

5.1. Flora & Fauna

Site vegetation is mainly cleared, although remnant patches of tall open forests occur. The predominant vegetation communities are Ribbon Gum, Mountain Gum, Snow Gum and Grassy Forest/Woodland of the New England Tableland Bioregion (known as Ribbon Gum-Mountain Gum Woodland) endangered ecological community (EEC), Yellow Box Woodland EEC and cleared pasture with scattered trees. Both EEC's are listed under the *Threatened Species Conservation Act 1995* (TSC Act). The construction of the wind farm will involve the removal or modification of 7% of the native vegetation (22 hectares) on site.

Flora

Within the 1,361 ha study area, 330 ha is native vegetation, with the Ribbon Gum EEC occupying 327 ha and the Yellow Box EEC occupying 3.4 ha. The remaining

1031 ha is occupied by cleared pasture with scattered trees. During surveys, 87 flora species were identified, which included 55 native species and 32 exotic species.

Although no rare or threatened flora species were identified during surveys, records within the Atlas of NSW Wildlife indicate 14 threatened flora species occur within 30km radius of the site. In addition, within this area, a search of the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* Protected Matters Search Tool, identified potential for 19 threatened flora species. The following flora was therefore assessed as having potential to be impacted as a result of the proposal:

- *Bothriochloa biloba* - Lobed Bluegrass (Vulnerable Species under the EPBC Act);
- *Dichanthium setosum* - Bluegrass (Vulnerable Species under the TSC Act);
- *Digitaria porrecta* - Finger Panic Grass (Endangered Species under the TSC and EPBC Acts); and
- *Thesium australe* - Austral Toadflax (Vulnerable Species under the TSC and EPBC Acts).

However, due to the likely small area of any potential habitat, and as the land has been significantly impacted through a long history of agriculture, and the proposed location of turbines is away from likely habitats, the proposal is not expected to have a significant impact upon these species.

The Ribbon Gum-Mountain Gum Woodland EEC, which is the dominant treed vegetation community within the study area, has the potential to be impacted by the proposal, with approximately 22ha (7%) of the EEC needed to be removed. This includes 4.9 ha from direct and complete clearing (as a result of access roads, turbine footprints, cabling etc) and up to 17.6 ha to be removed in the worst case scenario layout of the transmission lines. The majority of this community has been degraded by grazing with incursions of pasture weeds and a simplified structure. The removal has been justified as 93% of the EEC on this site will not be impacted and the larger intact stands occur on adjacent steeper slopes, which will not be disturbed. It is therefore considered unlikely this EEC will be significantly impacted.

The Proponent's Key Thresholds Assessment concluded that no significant impacts to threatened species or endangered ecological communities are likely as a consequence of the proposal.

Fauna

Fauna species were surveyed through a range of methods, with the focus of the surveys on bird and bat species as these are the fauna groups most likely to be impacted by the proposal. A total of 70 vertebrate fauna species (of 51 bird species, and 12 mammals, 1 reptile and 6 amphibians) were recorded. Fauna species recorded, and those which have potential to occur, are typical of the habitats present at the site, and wider locality.

Three threatened fauna species listed as 'Vulnerable' under the TSC Act were recorded and included the Eastern Bentwing-bat (*Miniopterus shreibersii*), Little Pied Bat (*Chalinolobus picatus*) and the varied Sittella (*Daphoenositta chrysoptera*).

Bats

Two threatened microchiropteran bat species were recorded. The Eastern Bentwing-bat which is listed as 'Vulnerable' under the TSC Act, was recorded at 12 of 21 (at definite and probable levels of identification) field survey sites within the study area. The Little Pied Bat was recorded at the possible level of identification (therefore not confirmed) at two sites within the study area. Areas within woodland vegetation had the greatest level of bat activity compared to cleared sites with scattered trees. Using the precautionary principle, all identifications were considered positive for assessment purposes.

The Eastern Bentwing-bat and Little Pied Bat are likely to use the study area as part of their foraging range, rather than for roosting and breeding. Notwithstanding, these bat species are known to forage above the tree canopy, and it is unknown if they commonly fly at the height range of the turbine blades. Accordingly, a precautionary assessment approach was undertaken and the species were assessed as potential turbine strike victims. The assessment concluded that if strikes were to occur they would be rare and in small numbers and therefore both these species are unlikely to be significantly impacted.

The White-striped Freetail Bat is a high flying species and has the highest potential to be impacted by the turbines. As this species is not manoeuvrable and relies on speed to capture prey items, it is at particular risk. However, previous studies done for the Crookwell Wind Farm suggest that turbines situated in open pasture are less likely to experience high levels of bat strike. In addition, as low numbers were recorded, impact to this species is predicted to be low.

In regards to hollow roosting species of bats such as the Gould's Wattlebat and Chocolate Wattlebat, impacts are predicted to be minor as only a small number of hollow bearing trees are to be removed, and turbines and infrastructure are proposed to be generally located away from key habitats. Other potential bat species that may be in the project area (including those not recorded such as the Grey-headed Flying-fox) are likely to occur in such low numbers that impacts would also be minimal.

Barotrauma is when bats pass suddenly through an area of low air pressure surrounding the turbine blade tips, resulting in death through lung or tissue damage. Although the assessment acknowledges that there is potential for isolated cases of barotrauma, due to key habitat features such as caves and forests being relatively unaffected by the proposal, impacts are not expected to be significant as the numbers of bats around the turbine blades is predicted to be low.

Birds

As the project is removing a relatively small area of remnant vegetation, the Proponent's assessment considered the main potential impacts to birds to be collisions and/or avoidance behaviour.

A total of 48 bird species were recorded, with four species recorded in the height range of the turbine blades (52m to 150m) (Rotor Swept Area (RSA)). These include the Wedge-tailed Eagle (*Aquila audax*), the Nankeen Kestrel (*Falco cenchroides*), and two parrots, the Galah (*Eulophus roseicapillus*) and Rainbow Lorikeet (*Trichoglossus haematodus*). In addition, nine bird species were recorded up to a

maximum height zone of 21 to 51 metres, and 26 bird species were recorded up to a maximum height zone of 0 – 20 metres, below the RSA.

The most commonly recorded species were the Red Wattlebird (*Anthochaera carunculata*), Crimson Rosella (*Platycercus elegans*), Rainbow Lorikeet (*Trichoglossus haematodus*) and Australian Magpie (*Gymnorhina tibicen*).

The Varied Sittella (*Daphoenositta chrysoptera*) was the only threatened bird listed Vulnerable under the TSC Act that was recorded, on a single occasion. The Rainbow Bee-eater (*Merops ornatus*), was located at 2 sites and is listed as a Migratory species under the EPBC Act.

The EA identified that Raptors, wetland / waterbirds and other common local resident birds would be most prone to turbine collision. The Varied Sittella has been assessed as unlikely to be impacted by rotor blades or turbulence as the species forages within the tree canopy and inhabits woodland vegetation. Impacts will be restricted to localised indirect effects (avoidance, habitat disruption and displacement) on common farmland birds, with collisions expected to be rare due to the spacing of wind turbines from forest vegetation, which subsequently protects likely breeding and foraging habitats. In regards to Raptors, the Proponent states that Australian examples have shown that species such as Wedge-tailed Eagles were regularly observed before and after wind farm operations began and tended to avoid the turbines by flying around or between them.

Other Fauna

As only 7% of the native vegetation is to be removed, only minor impacts would be expected to terrestrial and arboreal fauna during construction. These impacts would be manageable and operations are not expected to have long term adverse impacts. No listed ground based fauna species under the EPBC or TSC Acts were detected or assessed as being potentially impacted.

Cumulative Impacts

The Proponent assessed the cumulative impacts of other known proposed windfarms in the area, in particular Glen Innes (5km east), Sapphire (adjoining the current study area) and Ben Lomond wind farms (8km south east). The main cumulative impact is determined to be from barrier effects. Notwithstanding, the spacing of turbines (250m-500m apart) allows expansive areas for birds and bats to move through the site with only minor disruptions to their existing movement patterns. The most likely movement of birds is through Wellingrove Creek valley and through the northern parts of Falls Creek which would contain low numbers of turbines.

Mitigation & Offset

The Proponent has described measures within the EA to avoid, minimise and/ or offset ecological impacts. With respect to impact avoidance, the project has included design changes to avoid impacts to native vegetation and habitats. To further avoid impacts, the Proponent has committed to further design refinement during micro-siting and construction with consideration to surrounding good quality vegetation or habitat. This includes constructing access roads around isolated trees and locating temporary construction sites in already disturbed areas.

To offset the residual ecological impacts of the project, the Proponent has calculated that a 'worst case' scenario would require 22ha to be offset at a ratio of 2 to 1 using similar quality vegetation, and would be subject to a Conservation Agreement with OEH. The Proponent has identified areas within the project boundary (three areas of similar or better quality vegetation totalling 168ha), which have been confirmed by an ecologist to be suitable to offset the lost habitats and vegetation. Measures would be implemented to improve the condition of the native vegetation, including fencing (to stop grazing) and removal of weeds and feral animals. In addition, all offsets will be secured in perpetuity. The details of the Offset Plan and Conservation Agreement will be developed in consultation with OEH once the project infrastructure layout and associated impacts have been finalised. In addition to offsetting, the Proponent will attempt to minimise vegetation removal through careful micro-siting of infrastructure.

The Proponent has additionally committed to a post-construction bird and bat monitoring program to determine the impacts of the project on bird and bat populations.

Consideration

In assessing the acceptability of the biodiversity impacts, the Department has considered whether the Proponent has demonstrated that impacts on biodiversity have been avoided wherever possible. The Department notes that the majority of the project area is cleared of native vegetation, and is used for grazing purposes. The extent of proposed works within native vegetation areas would be limited, thereby minimising the amount of flora and potential fauna habitat to be impacted. The Department acknowledges that 22ha of EEC (7% vegetation removal) is proposed to be removed, however is satisfied that the Proponent has minimised impact through careful siting of turbines, that removal of trees would be limited with few impacts to remnant vegetation, and that the majority of impacted EEC is degraded and of low quality.

The Department also accepts that the Proponent has attempted to avoid the EEC as far as possible through a Project Refinement Process which maximised the distance of wind turbines from forested vegetation and forested areas of EEC. The Department notes that no significant areas of flora species or vegetation were identified to be impacted, and the Proponent has demonstrated that viable options exist to offset the impacts of the project consistent with "maintain or improve" principles.

The Department has also considered issues raised by OEH in relation to the level of assessment undertaken and OEH's recommendations that the Proponent be required to submit a Biodiversity Offset Strategy that adequately assesses the ecological condition of the impacted vegetation and proposed offset sites, and considers the conservation value of impacted vegetation. OEH recommends the strategy should include maps and scientifically justify that it meets the OEH '*Principles for the use of biodiversity offsets in NSW*'. The Department is satisfied that the Proponent has conducted suitably robust survey work and satisfactorily addressed the issues raised by OEH in the Submissions Report. Although OEH would have preferred offset arrangements to be finalised during the assessment stage, as discussed above, the Department is satisfied that the Proponent has demonstrated suitable offset arrangements exist on site.

Whilst the Department is satisfied that the Proponent has given due consideration to avoiding impacts where possible, the Department accepts that some biodiversity impacts would be unavoidable as a result of the final development footprint of the project (including vegetation and habitat loss, potential direct injury to fauna during construction and reductions to local flora and fauna populations through the loss and disturbance of habitat including roosting, foraging and breeding resources). The Department notes that the Proponent has highlighted sufficient areas within the site which contain the Ribbon Gum – Mountain Gum Woodland EEC to offset the 22ha of losses to a ratio of 2:1. However, the exact ratio to offset will be determined through the recommended offset process, and the Department is satisfied that additional land is available on site if necessary. The Department is also satisfied that through careful management measures and a conservation agreement with OEH that these proposed offsets will be achievable.

The Department therefore recommends a condition requiring the Proponent to prepare and implement an appropriate biodiversity offset package, which includes offsetting impacts in perpetuity to the Ribbon Gum, Mountain Gum, Snow Gum and Grassy Forest/Woodland ecological community. The Package is to be developed in consultation with the OEH. It is also required to be submitted to the Director-General for approval, and approval must be obtained prior to the commencement of any construction works.

The Department also considers that the adequate management of construction activities would ensure the avoidance of significant ecological impacts. This includes ongoing ecological monitoring so as to ensure that potential impacts to habitats and threatened species adjacent to the project site are taken into account and avoided during construction. Therefore, although the Proponent has committed to developing construction management measures, this commitment should be reinforced so as to ensure the measures are developed in consultation with the appropriate public authorities and are approved by the Director-General.

Included in these measures is the requirement for the Proponent to develop, in consultation with the OEH, a Flora and Fauna Management Plan. This Plan is to outline measures to be implemented during construction, to ensure the protection and minimisation of native vegetation (and habitat) loss. The Plan is to be included within the Construction Environmental Management Plan, and would require the approval of the Director-General prior to the commencement of construction works. The Plan is required to include finalised plans that illustrate all terrestrial vegetation communities and those areas to be cleared for construction. Specific methods to manage the potential impacts on flora and fauna species and their habitat (due to the removal of limited amounts of native vegetation present within the project site) are also to be included in the Plan. Importantly, the Plan is to include a procedure for the review of management methods, in the event such methods are found to be ineffective.

With regards to specific fauna impacts, the Department considers that construction is unlikely to cause significant impacts, given the small amount of native vegetation within the project site to be removed. However, the Department concurs with the OEH, that there is the potential for native fauna to occur within or close to the project site. This is due to the presence of native vegetation and habitat areas surrounding the project site. As such, the Department recommends that the Proponent consider,

develop and include specific fauna management measures within the Flora and Fauna Management Plan.

The Department also recommends a condition that requires the Proponent to conduct pre clearing surveys by an experienced ecologist, prior to construction, during optimal times, to identify hollow bearing trees and threatened flora species. These surveys will enable the Proponent to mark hollow bearing trees to minimise removal through micro-siting of turbines and assist in calculating suitable offsets. Any removal of Hollow Bearing trees would be conducted with an ecologist present to minimise harm to fauna species. The Proponent is also required to ensure that construction personnel are made aware of the fauna species that have a potential of occurring within the project site and provide details of those specific measures that should be implemented to avoid significant ecological impacts.

The Department is satisfied that the Proponent has provided a suitably robust assessment of the potential risks of the project on bird and bat species from rotor interaction (including direct collision or "barotrauma"). The Department accepts that some level of mortality to individual bird and bats is likely to be unavoidable as a result of interaction with wind turbines just as some level of faunal mortality is likely to occur in other activities, such as collision with vehicles on rural and regional roads. Notwithstanding, the Department considers that the project should be designed to avoid risks of collision wherever possible.

The Department notes the risk of bird and bat rotor interactions are generally known to be greater where wind farm development is located in proximity to wetlands (which are known congregation points for large 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 rotor interaction. In this regard, turbine lighting is not proposed, and the site is not located near significant wetlands, and creek lines are generally degraded, although a number of small farm dams would provide habitat for a small number of water birds and frogs. The wind farm is not located in any known migratory paths and turbine sites are generally characterised by treeless pasture areas close to existing woodland remnants or within treeless pasture areas. Although the wind farm is in a linear formation the spacing between turbines and maximising the distance from forested vegetation significantly reduces potential for bird and bat impacts.

The Department notes that the highest potential for bird or bat strike is from high flying bird species such as raptors and bat species such as the White-striped Freetail Bat and potentially the Eastern Bent-Wing Bat. In regards to the White-striped Freetail Bat, as discussed by the Proponent, previous studies for a wind farm at Crookwell established that turbines situated in open pasture are unlikely to suffer from high numbers of strikes. Similarly, the Eastern Bent-wing Bat generally flies at low levels in open areas. Therefore as the turbines are proposed to be located predominantly within cleared areas, impacts on bats are expected to be low.

Raptors such as the Wedge-tailed Eagle have 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 the impact. From examples of other wind farms with Wedge-tailed Eagle populations, notably

Cullerin Wind Farm, bird strike was the result of unusual circumstances where poor weather conditions coincided with lambing, resulting in higher than normal levels of mortality and thus carcass availability. Therefore, mitigation measures such as prompt carcass removal will significantly reduce raptors striking the turbines by decreasing the attraction of the area to feeding birds. Due to low numbers detected, the Department accepts that impact on other species should be low.

The Department considers that the project would not pose an overall significant or unacceptable level of risk to bird and bat species from rotor interaction. To ensure that potential risks are minimised as far as practicable, the Department has recommended conditions of approval reinforcing the Proponent's commitments, including to site turbines at least 30m from hollow bearing trees and ensure that night lighting requirements for the project are minimised as far as possible unless specifically required by the Civil Aviation Safety Authority for aviation hazard purposes.

To further ensure that impacts are kept to a minimum, the Department has recommended conditions of approval requiring the implementation of a bird and bat adaptive management program. The adaptive management 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. In addition, although the Proponent has committed to undertaking a post-construction bird and bat monitoring program for a period of up to five years from the date of initial operation, the Department recommends the monitoring program be in perpetuity, or unless otherwise agreed to by the Director-General.

The Department is satisfied that with the implementation of the above measures, the bird and bat impacts of the project can be appropriately managed so as to not result in significant residual impacts. The Department is 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).

5.2. Visual Amenity

A visual impact assessment was undertaken focusing on the wind turbines (which pose the greatest potential for impacts) and to a lesser extent on ancillary infrastructure associated with the project (including the substation, transformers, control room, monitoring masts and internal overhead transmission lines). The assessment of the turbines considered potential impacts to surrounding dwellings (considering blade glint, shadow flicker and night lighting impacts) as well as to existing landscape values.

Wind Turbines – Impacts to Surrounding Receptors and Landscape

Five broad landscape elements occur within the landscape surrounding the project: gently undulating to flat cultivated/pastoral farmland, steep sided valleys, drainage lines, forested hills and ridgelines, and rural dwellings.

The sensitivity of each landscape element to the project considered a combination of factors including:

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

In considering the above, the Proponent has characterised each of the landscape elements within the project view shed to be of medium sensitivity with a moderate capacity to accommodate the visual changes associated with the project and that the project would not be unacceptable within the view shed, due to an existing altered agricultural landscape, which also contains built elements such as roads, agricultural industry, communication towers and powerlines.

Based on “zone of visual influence” (ZVI) maps, the Proponent’s assessment has concluded that the theoretical visibility of the project could extend to isolated pockets of landscape beyond 15 kilometres (particularly when considering visibility up to the tip of the turbines rather than the full rotor face), however that the visual influence of turbines at individual receptors is likely to reduce significantly at distances greater than 10 kilometres away, with the turbines forming less distinct elements in the landscape. The visibility of the turbines based on distance is detailed in table 5 below.

Table 5 – Visibility based on distance from turbines

Distance from turbines	Visibility
<1 km	Wind turbines would dominate the landscape in which they are situated due to large scale, movement and proximity. Dominant and significant within viewshed potentially resulting in High level visibility.
1 – 5 km	Wind turbines would generally dominate the landscape in which the wind turbine is situated. Potential for high visibility depending on the category of receptor, their location, sensitivity and subject to other visibility factors. Potentially dominant within viewshed resulting in Moderate to High level visibility.
5 – 10 km	Wind turbines clearly visible in the landscape but tending to become less dominant with increasing distance. Movement of blades discernable. Noticeable but less dominant potentially resulting in Moderate level visibility.
10 – 15 km	Wind turbines visible but tending to become less distinct depending on the overall extent of view available from the potential receptor location. Movement of blades may be discernable where visible against the skyline. Potentially noticeable resulting in Low to Moderate level visibility.
15 - 20 km	Wind turbines become less distinct. Some blade movement visible but less discernable with increasing distance. Partially discernable but generally indistinct within viewshed resulting in Low level visibility.
>20km	Wind turbines become indistinct with increasing distance. Some blade movement visible but are usually not discernable. Turbines may be discernable but generally indistinct within viewshed resulting in Low level visibility.

(Epuron Environmental Assessment, April 2011)

The Proponent assessed the significance of visual impacts to identified receptors and viewpoints based on a combination of factors including: the visibility of turbines; the category and type of situation from which people could view the wind farm including land use sensitivity and the nature of the receptors viewpoint (i.e. permanent and transitory views); the visual sensitivity of view locations (i.e. capability of the landscape to visually accommodate the turbines); the distance between the receptor and turbines; the potential number of receptors from a viewpoint; and the duration of time that a receptor may view the turbines.

Based on the above, the assessment determined that the project would have a high visual impact on eight of the 142 residential view locations within the 10km viewshed. Of the eight with a high visual impact only 1 is a non-associated landowner 'Novar 2'. 29 of the 142 residential view locations have been determined to have moderate visual impact while the remaining 105 had either low or no visual impact.

In addition to residential view locations, 19 public view locations were identified, with 13 determined to have low visual impact and 6 determined to have no visual impact. Like the residential view locations, the public locations have a low visual impact due to vegetation screening, as well as undulating landforms and the proximity of the turbines to the view location. In addition, public viewpoint locations are often along roads giving transient views of the windfarm.

Wind Turbines – Blade Glint, Shadow Flicker and Night Lighting

At present there are no assessment guidelines governing shadow flicker in New South Wales. However, the Proponent's EA states that the Victorian Planning Guidelines limit the duration of shadow flicker to a minimum of 30 hours per year and the South Australian Planning Bulletin suggests that shadow flicker is insignificant at a distance of 500m.

The Proponent's assessment concluded that although a number of residences are within the 1km radius, as those dwellings are located either north or south of the nearest turbine, no shadow flicker is predicted to occur at those residences.

With respect to blade glint, the Proponent has identified that this issue can be effectively managed through the use of low reflectivity matt finishes and has committed to the use of such finishes as part of the detailed design for the project.

White Rock Wind Farm is not proposing to install night lighting. The Proponent has justified the exclusion of night lighting due to the separation from the nearest airports, the height of the turbines being below the lowest safe altitude for aviation (therefore aircraft should not be flying at the level of the turbines) and community perception that night lighting is visually intrusive. Notwithstanding the above, the Proponent has committed to determining final night lighting requirements for the turbines as part of detailed design in consultation with CASA.

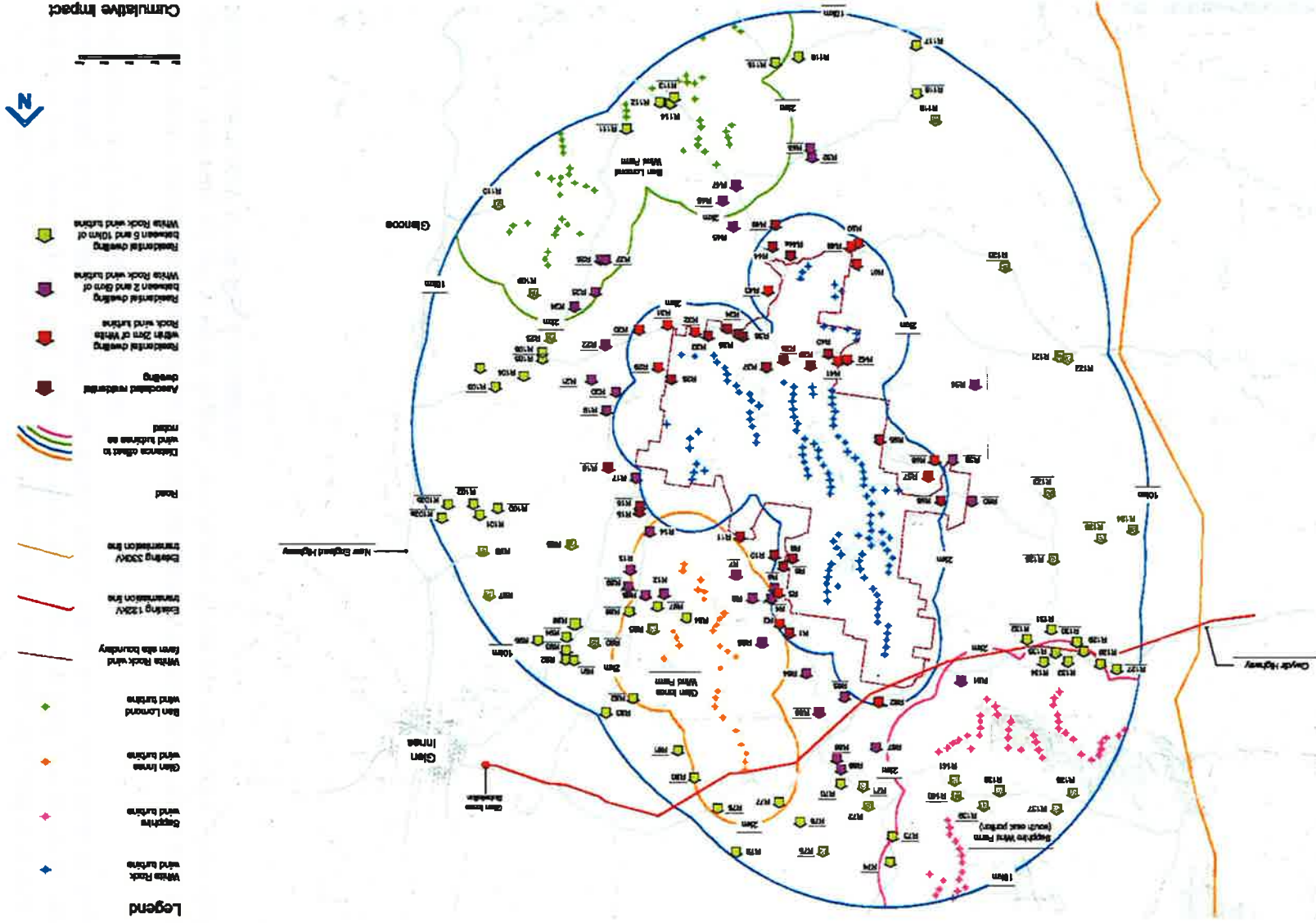
Cumulative impacts

The Proponent has conducted an assessment of cumulative impacts and established that a number of turbines within the Sapphire, Glen Innes and Ben Lomond wind farms would occur within the 10km of the White Rock view shed. Figure 4 below illustrates the extent and location of wind turbines within the view shed.

The Proponent's EA states that there would be a small number of residential view locations with a direct view between the White Rock and Sapphire turbines due to tree cover and undulating landforms. Intervisibility between Glen Innes and White Rock turbines is identified to occur from residential dwellings north and north east of White Rock Wind farm and south east of Glen Innes wind farm. However, it is expected that direct views would be limited for the majority of dwellings due to their position and orientation. The Ben Lomond wind farm would have no or very little intervisibility for residents within the White Rock 10km view shed due to separation distances and coverage from trees.

Sequential cumulative visual impacts may be observed on local roads and along the Gwydir Highway of all 4 wind farms, which would be for relatively short durations, within the 10km White Rock viewshed.

Figure 4 – Extent and location of wind turbines within the view shed.



Ancillary Infrastructure

The Proponent has concluded that the remainder of project components would pose negligible visual impacts on surrounding receptors and the landscape on the basis of:

- the project has been designed to minimise the disturbance footprint;
- the small scale of above ground infrastructure;
- large set back distances to the nearest receptors; and
- availability of measures to further mitigate visual impacts, primarily the substation, through screening.

The key concern raised in public submissions to the project related to visual impacts associated with the wind turbines. This included visual impacts to surrounding non-associated dwellings (including the number and height of turbines, and distance to dwellings) and impacts to existing landuse and future development potential on surrounding properties.

A submission from the property owners of "Tryagain" noted that the Proponent's EA, which refers to the property as having a moderate visual impact, is inconsistent with previous correspondence between the Proponent and "Tryagain" which indicated high visual impact. In addition, the submission alludes to the view that the photomontages are not a fair representation of impacts. Inverell Shire Council also stated that the photomontage W41 (Figure 4) is not an accurate representation of the primary view from the dwelling and immediate curtilage.

The Proponent responded in the Submissions Report that the viewpoint in the EA was selected at a location 55m south east of the residential dwelling representing a typical view towards the greater number of wind turbines within the proximity of the dwelling. In addition, the Proponent argues that Council's assessment which determines that turbine numbers 32 and 33 would be completely visible from "Tryagain", is not correct, and that only the hub and portions of the blades will be visible.

Figure 4 – Photomontage W41



Photomontage Location W41 - Detail A

Consideration

The Department is satisfied that the visual impacts of the ancillary infrastructure associated with the project (substation, internal overhead transmission line etc) are unlikely to be significant for the reasons outlined in the Proponent's assessment (as identified in the preceding sections) and can be managed 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.

In relation to the overhead transmission line connection to the grid, although the final alignment would be subject to detailed engineering design, the proposed 5km route located 30m to 60m below the White Rock ridgeline is unlikely to constitute a dominant visual element within the landscape. Views from the east and south would be largely blocked by the White Rock ridge line. Residential dwellings along Spring Mountain Road would be partially screened by landforms and vegetation, while all remaining visible views would generally be in excess of 3km, minimising the potential for visual impact. In consideration of the above, the Department has focused its assessment on the potential visual impacts of the wind turbines.

The Department notes that all but one of the dwellings identified in the Proponent's assessment as likely to experience high visual impact from the project are "associated" receptors, who have reached a commercial agreement with the Proponent. Consequently, the Department's consideration has focused on non-associated receptors. The Department notes that the one dwelling with predicted high visibility impact which is not "associated" did not object to the proposal.

The Department also notes that the vast majority of non-associated dwellings surrounding the project site would be located over 2km from the project. Nine occupied non associated dwellings, and 2 unoccupied non associated dwellings are located under 2km from the closest turbines, which have all been determined by the Proponent to have low to moderate visual impact (with the exception of 1 dwelling mentioned above). The Department acknowledges the subjective nature of visual impact of wind turbines. This means that it is possible that a dwelling with a high visibility of turbines may be interpreted by some residents as a positive impact or at least not concerned, and the small number of community objections can be construed to mean that there is low community objection to the proposal.

The three public objections to the wind farm were received from 3 properties within 2km of the closest wind turbine. All three objectors' properties have been determined to have moderate visual impact, which have views characterised by surrounding tree cover, and partially screened views of the turbines. The Department accepts that turbines have the potential to have a greater dominating influence on foreground views at these dwellings, due to their closer proximity. Notwithstanding, the Department notes that generally the location of the turbines relative to the receptors are such that none of these dwellings are expected to experience visual intrusion in multiple directions without any visual relief in any direction. Furthermore, the Department notes that the Proponent's assessment has identified intervening landform and vegetation which has the potential to at least partially screen views of the turbines. The Department considers that there would be opportunity to further supplement existing screening through targeted landscaping, which would not result in significant alteration to the landscape beyond that which has already occurred.

The Department conducted a site visit in January 2012, which included a visit to "Tryagain". The Department subsequently concluded that the photomontage taken by the Proponent (W41), which represents the view towards the greatest number of turbines, does not necessarily represent the view with the greatest visual impact. The Department was particularly concerned with potential visual impacts of turbines 32 and 33. Located 1.3 kilometres away atop the nearest hill north east of 'Tryagain', it would appear the turbines would be completely visible from this residence including

blades and most of the tower. Due to the short separation distance from the turbines, lack of vegetation screening and vertical imposition of the turbines placed atop the adjacent hill, the Department agrees with the submission from "Tryagain" and Inverell Shire Council, and considers turbines 32 and 33 would have an over-bearing visual dominance on the residence's viewfield. The Department therefore recommends taking a precautionary approach and recommends removing turbines 32 and 33 from the scope of the project. In relation to other turbines visible from "Tryagain" the Department believes the visual impact to be acceptable and manageable.

It should be noted that the Department places greater emphasis on visual impacts from the dwelling, as this is more of a sensitive location, and is generally where most recreational time is spent. Although it is acknowledged that impacts will be higher on the working property, visual impacts are considered to be less sensitive when in a work environment. The deletion of turbines 32 and 33 will also act to further minimise any potential impacts from other parts of the property.

Should the Proponent wish to proceed with turbines 32 and 33, a condition is recommended, which would allow the Proponent to seek an agreement with the property owner to acquire the property "Tryagain", which would negate the need to delete the turbines. It should be noted that the requirement for the proponent to either acquire the land, or delete the two turbines, lapses if the owners of "Tryagain" do not consent to their lot being acquired, or fail to provide a written request for the property to be acquired. This is justified as the impacts to "Tryagain" are purely visual, and the Department is satisfied that the property will not receive adverse health impacts and will comply with the recommended noise criteria.

The Department is satisfied that although located close to the turbines, visual impacts at the 3 objectors properties is unlikely to be significantly intrusive and able to be managed through other measures (such as screen planting), and subject to deletion of turbines 32 and 33, no further specific modification to the project would be warranted. To ensure that residual impacts are minimised as far as practicable to all surrounding non-associated receptors predicted to be visually impacted by the project, the Department has recommended conditions of approval requiring appropriate landscaping at these dwellings (where this is agreed to by the landowner) including long-term monitoring and maintenance requirements to maintain the condition of the screening.

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.

The Department accepts the findings of the Proponent's assessment, which predicts that shadow flicker is unlikely to be experienced by any residence as a result of their location in relation to the wind turbines. The Proponent has additionally committed to program the control system so that wind turbines automatically shut down whenever shadow flicker is present at a residence (which is predicted through modelling using specialist industry software). In addition, although unlikely, the Proponent has committed to monitor the effects of shadow flicker on motorists and any remedial

measures will be developed in consultation with RMS and the Department. To strengthen these commitments and to ensure the amenity of surrounding residents is preserved, the Department recommends a condition to ensure that shadow flicker arising from the operation of the project shall not exceed 30 hours/annum at any non-associated receptor.

With respect to night lighting, the Department notes the Proponent's reasons for not proposing aviation hazard lighting. However a final determination cannot be made on this until aviation hazard risks for the project have been confirmed in consultation with CASA following detailed design. The Department agrees that if obstacle lighting is required, night lighting would be most visible to motorists travelling along local roads. However, impacts would be short and partially screened by vegetation and undulating landforms. Although night lighting would be visible at a number of residential view locations, views from dwellings would be limited and vegetation and landforms would help screen the majority of turbines. Should aviation hazard 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. The Department has also recommended conditions of approval requiring consideration of potential intrusive effects from night lighting (if required) in implementing screen planting at neighbouring receptors.

Impacts to Landscape and Public Views

The Proponent's Environmental Assessment considered that the project would result in a moderate level of impact to characteristic landscape elements in the area and low impact to representative public viewpoints.

The Department notes that the Proponent's assessment has indicated that the view shed of the project would be limited to only a relatively small part of the region. The Department considers that the project would pose limited influence on broader landscape views and values.

With respect to public view points, the Department considers that given the limited locations and large distance of the project area from the majority of public view locations, any views of this region would be limited to distant views. The Proponent's assessment has identified that the presence of intervening landforms and vegetation would significantly screen views of the project.

With respect to views from surrounding roads, the Department is satisfied that given the largely transient nature of views from moving vehicles, that road side views are unlikely to be significantly affected by the project and may in fact provide a point of interest to visitors to the area.

In consideration of the above factors, the Department considers that the project's impacts on landscape values as a whole would be acceptable. Whilst accepting that some residual impacts to landscape amenity may remain (particularly at a local level), the Department does not consider that these residual impacts would outweigh the project's broader public interest with respect to renewable energy generation.

5.3. Noise and Vibration

The operational noise has been assessed against South Australian Environment Protection Authority Wind Farm Guidelines 2003 (the SA Guidelines). Two turbines have been considered as part of the assessment, which included the REPower MM92 2.5MW turbine and the larger Vestas V90 3MW turbine (which is the worst case scenario).

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 requires that the noise generated by the operation of wind turbines do not exceed a noise level of 35 dB(A) L_{Aeq} or the background noise level by more than 5 dB(A) (whichever is greater) at surrounding "non-associated" landowners. The SA Guidelines do not identify specific noise limits for "associated" landowners noting that this is subject to agreement between parties as part of commercial negotiations. Despite this, in order to protect amenity of residents in Commercial Agreements, the Proponent has committed to ensuring that sound levels will comply with the World Health Organisation (WHO) guidelines for sleep disturbance. The WHO Guidelines recommend an indoor level of 30dB(A) which equates to an outdoor noise level of 45dB(A) with windows open, or 52dB(A) with windows closed. Two residences Novar 1 & 2 are "non associated" residences, however are designated as "associated" in the noise assessment as the Proponent has indicated that a commercial agreement will be entered in to, and therefore has assessed noise impacts pursuant to WHO criteria.

The SA Guidelines require the predicted noise levels from the wind farm to be compared against the measured background noise levels in the area, with sufficient data considered to be approximately 2000 data points. Seven receiver locations were selected around the site for background noise monitoring, which were based on initial predictions of wind farm noise, with preference given to houses with the highest predicted noise levels. Background noise monitoring was conducted by setting up noise loggers at each relevant receiver for a 21 day period equivalent to 3000 valid data points (after extraneous noise was taken out of the dataset). The results of the background noise monitoring are indicated in Table 6.

Table 6 - RBL at Background Monitoring Locations

RBL	R1	R21	R27	R35	R44	R56	R64
Day	33	29	32	31	27	29	30
Evening	31	34	32	31	31	30	40
Night	25	29	32	26	26	25	34

(Epuron Environmental Assessment, April 2011)

The REpower MM92 turbines are predicted to comply with the relevant criteria at all "non associated" dwellings for all wind speeds. The Vestas V90 turbines will also comply at all "non associated" dwellings with the exception of one residence and objector "Kia Ora" (R27) at one speed (8m/s) for two turbines (T2 and T112).

However, the 2 turbines are capable of operating in low noise mode (i.e. at a lower capacity) which would enable them to comply with the relevant criteria.

In addition to the noise generated from the wind turbines, 2 x 100-120 MVA transformers have been assessed for their operational noise. The transformers are required to convert the electricity produced from 33kV to 132kV at the substation. The Proponent's assessment predicts levels of 21dB(A) at the worst case residence (closest residence to either the proposed substation locations), which is 14dB(A) below the base level of the SA Guidelines.

Noise generated by the operation of stationary facilities is required in New South Wales to comply with the *NSW Industrial Noise Policy* (EPA, 2000) (INP). Under the INP the most stringent project specific noise limit that can apply to a sensitive receiver is 35 dB(A) for $L_{Aeq}(15 \text{ minute})$ noise and 45 dB(A) for peak noise events ($L_{A1}(1 \text{ minute})$) in the night time period. The noise limits under the INP apply to all receivers (associated and non-associated). The predicted noise level at the closest receiver is considered well within INP criteria and consequently no specific noise mitigation measures are proposed.

Construction Noise

Noise may be generated from construction activities such as road construction, civil works, excavation and foundation construction, electrical infrastructure works and turbine erection. Such activities will require potential noise generating processes such as heavy vehicle movements, crushing and screening, concrete batching, rock trenches, loaders, excavators, generators, cranes and possible blasting.

The Proponent conducted a noise assessment based on the *Interim Construction Noise Guideline* (DECCW, 2009) (ICNG). The area surrounding the proposed wind farm is primarily used for agricultural purposes with an ambient noise background dominated by natural sources which is reflected in the low Rating Background Level dB(A) (refer to table 6).

Table 7 shows the predicted construction noise levels at 1000m. Based on these predicted noise levels, it is expected that the construction noise will be greater than 10 dB(A) above the RBL and less than 75 dB(L_{Aeq}) (above this level the receiver would be highly noise affected) at a distance of 1000m. Pursuant to the ICNG any dwelling 1000m from the construction activity would be "noise affected" but not "highly noise affected". This requires the developer to apply feasible and reasonable work practices to meet the noise affected level and should inform any impacted residents of the proposed construction work. As the closest non-associated dwelling is approximately 1000m (980m), no dwellings are anticipated to be highly noise affected.

Table 7 – Predicted construction noise levels at 1000m.

Phase	Main Plant and Equipment	Predicted Noise Level
Site Set-Up and Civil Works	Generators Transport trucks Excavators Low Loaders	42 dB(A) at 1000m
Road and Hard Stand Construction	Mobile crushing and screening plant Dozers Rollers Low loaders Tipper trucks Excavators Scrapers Transport trucks	49 dB(A) at 1000m
Excavation and foundation construction	Concrete batching plant Mobile crushing and screening plant Truck-mounted concrete pumps Concrete mixer trucks Excavators Front End Loaders Mobile Crane Transport trucks Tipper trucks	48 dB(A) at 1000m
Earthing	Percussion drilling rig	47 dB(A) at 1000m
Electrical Installation	Concrete trucks Low loaders Tipper trucks Mobile Crane Rock trenchers	47 dB(A) at 1000m
Turbine Delivery and Erection	Extendable trailer trucks Low loaders Mobile crane	42 dB(A) at 1000m

(Sonus, December 2010)

Traffic Noise

The Proponent has assessed traffic noise against the *Environmental Criteria for Road Traffic Noise* (EPA) (ECRTN). The Proponent established the criterion of equivalent ($L_{Aeq, 1 \text{ hour}}$) noise levels of no greater than 55dB(A) during daytime (7am to 10pm). The Proponent has predicted at a distance of 10m the daytime criterion can be achieved for 10 passenger movements and 3 heavy vehicle movements per hour. In addition, with every doubling of distance the number of vehicle movements can be doubled and still achieve the criteria (e.g. at 20m, you can achieve 20 passenger movements and 6 heavy vehicle movements).

Blasting and Vibration

Blasting is unlikely to occur. However, the Proponent's noise assessment recommends if blasting was to occur the separation distances between the potential blasting activity and the nearest dwellings would be in the order of magnitude for which ground vibration and airblast levels have been adequately controlled at other sites. In the event of blasting, a monitoring regime is recommended to be implemented to ensure compliance with the *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990).

The main source of vibration will be from drilling rigs, rock trenching equipment and roller operation during the road and hard stand construction. The EA states that the

level of vibration at specific distances will depend on the energy input of specific equipment, however, the typical distances required to achieve the construction vibration criteria provided in the *Assessing Vibration: A Technical Guideline* (DECC, 2006) is in the order of 20m to 100m. The Proponent states that the separation distances between the construction and the nearest dwellings is in excess of 100m. However, it is recommended that, if construction activities do occur within 100m of a dwelling a monitoring regime be implemented to ensure compliance with the Guidelines.

Mitigation

The Proponent has committed to monitoring noise levels during operation and implementing an approach of adaptive management where noise impacts are identified. The adaptive management approach proposed includes documenting noise complaints through a complaints line or other means, investigating the nature of the complaint including conditions when noise impact occurs and implementing measures to minimise the impact including sector management (i.e. slowing down or shutting down of specific turbines during periods of likely worst impact, such as specific weather conditions) or providing acoustic attenuation at the receiver.

The Proponent has committed within the EA to apply all "feasible and reasonable" mitigation measures during construction to minimise noise at affected properties in accordance with the ICNG which could involve the construction of temporary acoustic barriers, the use of proprietary enclosures around machines, silencers, use of alternative construction processes and the fitting of broadband reversing signals.

The Proponent also plans to use administrative measures such as inspections, scheduling and providing training to reduce noise impacts. Construction hours including heavy vehicle movement are proposed to be restricted to 7am and 6pm Monday to Friday and between 8am and 1pm on Saturdays. The only work to be conducted outside these hours would be for emergency purposes.

Consideration

Operational Noise – Wind Turbines

The Department has developed draft *NSW Planning Guidelines – Wind Farms* (December 2011). The guidelines provide a policy and regulatory framework to guide investment in wind farms in NSW while minimising potential impacts on local communities. As part of the guidelines the Department has developed the NSW wind farm noise guidelines. The NSW Guidelines follow closely, but improves on, the methodologies and practices of the SA Guidelines, although the NSW Guidelines give greater consideration to low-frequency noise, tonality, excessive amplitude modulation and auditing and compliance issues. The Department accepts the Proponent has assessed the impacts under the SA Guidelines, however, the Department has considered the NSW Guidelines in formulating conditions to ensure acceptable performance.

The Department is satisfied that the Proponent has undertaken a robust and representative assessment of the operational noise impacts of the project's wind turbine generators and based on this assessment is satisfied that the project, subject to the recommended conditions, can be designed and operated to achieve acceptable operational noise outcomes at nearby receptors, both associated and non-associated.

The Department notes that dwelling R27 could be potentially noise affected, but only if the worst case turbine is selected by the Proponent. The subject dwelling known as "Kia Ora" objected to the proposal on noise and vibration grounds among other concerns. The Department recognises that the Proponent is able to achieve the recommended noise goals pursuant to the SA guidelines for the Vestas V90 3MW turbine (worst-case, noisiest turbine) if the 2 turbines operate in low noise mode in the required conditions.

To ensure that the final project design (including likely micro-siting refinements and turbine selection) does not result in noise levels any greater than those predicted by the Proponent's assessment, the Department has recommended conditions of approval requiring the Proponent to prepare a detailed design noise report consistent with the requirements of the SA Guidelines/NSW Guidelines prior to the commissioning of the wind turbines, to confirm the noise impacts of the final turbine layout and design. The report must demonstrate noise levels are no greater than the criteria within the SA Guidelines/ NSW Guidelines, or where noise levels have been indicated to be less than SA Guidelines/NSW Guidelines criteria, no greater than the indicated level.

Furthermore, the Department has recommended stringent compliance monitoring requirements following the commencement of operation of the project to confirm the performance of the project, including requirements to investigate and take appropriate remedial action where a non-compliance is identified. Appropriate remedial action would take the form of source measures (i.e. design changes or sector management) or receiver measures, but only if agreed to by the receiver (i.e. acoustic shielding or similar in the case that all reasonable and feasible at source measures have been exhausted).

Furthermore, no exceedance of adopted WHO criteria is predicted at associated receptors. Notwithstanding, the Proponent's assessment identified that there may be specific conditions when receptors may experience reduced noise amenity such as annoyance impacts 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"). However, due to the conditions of the site (the elevated ridgeline is not a feature of the environment to trigger the effect) the Proponent predicts that the likelihood of such impacts occurring is very low.

With respect to low frequency noise impacts, which has generated significant concern amongst members of the public in relation to recent wind farm proposals, the Department is satisfied, based on the consensus of research both in Australia (i.e. literature reviews undertaken in the development of the SA Guidelines) and overseas (as reported by the Proponent), that modern wind turbines are unlikely to be a source of significant low frequency noise such as to result in adverse health impacts. On this basis, the Department is satisfied that subject to modern design standards, the wind turbines associated with the White Rock Wind Farm project are unlikely to pose a significant risk of low frequency noise impacts to surrounding receptors. Notwithstanding, the Department has recommended a condition of approval for the Noise Compliance Plan to report against both the SA Guidelines and NSW Guidelines, which includes Low Frequency Noise.

With respect to noise impacts to neighbouring (non-associated) properties, the Department notes that the Proponent's assessment has demonstrated that the project can be designed to achieve compliance with applicable noise amenity criteria at all neighbouring non-associated dwellings. On this basis, the Department is satisfied that the project would not significantly impact on the noise amenity of surrounding dwellings. The residences Novar 1 and 2 are non-associated, however the Proponent has indicated that it will enter a Commercial Agreement with these residences. It is understood by the Department that these residences would not meet the standards under the SA Guidelines in all conditions if an agreement is not reached. To protect their amenity, a condition of approval is recommended ensuring if agreements are unsuccessful, that applicable noise levels are met. This would involve the Proponent mitigating the noise impacts by operating turbines in low noise mode, or turning turbines off in certain weather conditions.

In relation to existing dwelling entitlements at surrounding properties, the Department notes that the Proponent's noise modelling indicates that noise generated by the project would be well within noise limits at most of the non-associated surrounding properties meaning that there would be scope for locating future dwellings in areas within the properties unaffected by noise generated by the project. Accordingly, the Department is satisfied that the project would not pose an unacceptable impediment to the future development of dwellings in surrounding properties such as to warrant compensation.

Operational Noise – Ancillary Infrastructure

The Department is satisfied based on the Proponent's assessment and predicted low levels of noise generation that the project substation would not pose an operational noise risk to surrounding receptors by itself or cumulatively with associated wind turbines. Whilst the Proponent has not specifically assessed peak noise events associated with the substation (L_{A1} (1 minute)), the Department is satisfied the substation is unlikely to result in sleep disturbance during the night time period given its distance to nearest inhabited dwellings (approximately 2km at worst case) and given that this type of development would not normally pose a significant source of peak noise events. Notwithstanding, the Department has recommended stringent operational noise verification requirements as part of its conditions of approval to ensure that the substation is designed incorporating all reasonable and feasible mitigation measures to achieve applicable noise criterion at the nearest receivers.

The Department notes that the corona, insulator, and aeolian noise typically generated by overhead transmission lines is generally intermittent and in most cases not high enough to be audible above background noise. The proposed overhead transmission lines are to be constructed only within the project site and therefore no impacts are expected. Notwithstanding, the Department has recommended conditions of approval requiring the lines to be designed and installed with consideration to the protection of the noise amenity of surrounding dwellings.

Other Noise and Vibration Impacts

In accordance with the Director-General's requirements, the Proponent has assessed construction noise impacts associated with the project consistent with the *Interim Construction Noise Guidelines* (DECC, 2009) (ICNG) which requires the derivation of construction noise goals based on existing background noise levels. In the case of

low existing background noise levels (such as the project site), the ICNG requires that construction noise goals be set at background + 10 dB(A). The Proponent has determined that there would be aspects of construction which exceed the targets of 37dB(A) (27dB(A) + 10) to 43dB(A) (33dB(a) +10) depending on receiver location during recommended standard hours.

Although the Department acknowledges potential impacts are transient, mitigation methods to reduce any impact should be deployed. To ensure that all reasonable and feasible noise mitigation measures are implemented during construction, the Department has recommended conditions of approval requiring the Proponent to develop comprehensive noise management measures as part of a construction environmental management plan, including measures for community notification, noise monitoring and complaints management.

With respect to traffic noise, the Department concurs with the Proponent's assessment that any road traffic noise impacts are most likely to be a result of construction related traffic rather than operational traffic, which would be limited to operational personnel and intermittent maintenance activities. Based on the Proponent's assessment, the Department is satisfied that the construction traffic noise impacts associated with the project are acceptable.

With respect to vibration impacts, the Department is satisfied that the assessment has demonstrated that ground borne and blasting vibration generated during the construction of the project can be managed to achieve relevant human comfort and building damage criteria and that the project would not pose a perceptible source of vibration impacts during operation. Notwithstanding, the Department has recommended best practice vibration and blasting limits to be incorporated into the conditions of approval to provide performance standards that must be achieved during the construction and operation of the project.

5.4. Health Impacts

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 relate to low frequency noise impacts, atmospheric stability and amplitude modulation (swish) noise (discussed in Section 5.3), shadow flicker (Section 5.2), and the impact of magnetic fields.

The term EMF (electromagnetic fields) is frequently used to describe magnetic field (MF) impacts. However, this term is used to include both electric and magnetic fields. To the extent there is a potential health concern, the focus is now on MFs, rather than electric fields. MF impacts are to be mitigated by locating transmission and powerlines as far as practicable from residences in accordance with the minimum distances set in *Essential Energy's Procedural Guideline – Easement Requirements*.

The Proponent also proposes fencing around the substation and as the nearest residence to either substation option is over 2km, impacts to human health are not anticipated.

In regards to MFs from wind turbines the Proponent's EA states that a report investigating magnetic fields for proposed wind turbines for Windrush Energy (October 2004) concluded the level of magnetic field was 0.4mG, which is significantly lower than the acceptable level for human health, and that ultimately the magnetic fields produced by the generation of electricity through turbines would not pose a threat to human health. In addition, the Windrush Energy report states that at a distance of 25 feet (7.62 metres) from the wind turbine and associated transformer, no measurable magnetic fields is expected. Due to the distances of the turbines from the nearest receptors (840 metres from the closest associated dwelling to the closest turbine), impacts on health are not anticipated.

Consideration

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 have not been proven. However, the Department takes the conservative approach and does not rule them out, but due to the distance between infrastructure and receivers it is unlikely to be an issue. As there is currently no Australian Standard for EMF or MF exposure limits, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) has released fact sheets based on the ICNIRP standards which are generally used and accepted. Therefore as discussed, the Department is satisfied that as the levels of MF are significantly under the ICNIRP levels, impact on human health would not occur. In addition, the Department is satisfied that commitments from the Proponent demonstrate the principles of prudent avoidance by locating transmission and power lines as far as practical from residences and in accordance with the minimum distances set in Essential Energy's Procedural Guideline – Easement Requirements.

The Department has considered 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 review of the evidence relating to the adverse health impacts caused by the wind turbines and concluded that "*There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines*".

The Department has consulted with NSW Health regarding potential health impacts resulting from wind farms. NSW Health advised it supports the National Health and Medical Research Council position. The Department notes that impacts such as shadow flicker are not predicted at any residences, that the proposal is consistent with the South Australian 'Environmental Noise Guidelines: Wind Farms' (February 2003), and with the planning requirements identified in the Director-General's Requirements for the proposal. Accordingly, it is considered that the proposed wind farm would not give rise to any adverse human health impacts.

5.5. Other Issues

The Department's consideration of other issues identified in the assessment is presented in Table 3.

Table 3: Department's Consideration of Issues raised in Public and Agency Submissions

Issue	Department's Consideration
Property Impacts and Land Use	<p>In regards to potential property devaluation the Proponent addressed this issue in the Submissions Report and indicated that studies have shown in Australia and overseas that wind farms generally do not have a negative impact on the value of surrounding land. The Department acknowledges that, in relation to impacts on land values, 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.</p> <p>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 developments 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.</p> <p>The proposed development is also not expected to have a significant impact on agriculture or land use. The wind turbines are located on private involved properties, which are currently used for grazing cattle and sheep. The infrastructure would occupy less than 1% of land of the involved properties land, so therefore the impact would be minimal.</p>
Consultation Process	<p>The Department is satisfied that these matters have been adequately addressed in the Proponent's Submissions Report and / or Statement of Commitments.</p>
Turbine Safety	<p>Modern turbines are certified according to international engineering standards, and together with braking systems, pitch controls, sensors and speed controls, the risk of blade throw has been greatly reduced. Current turbine blade monitoring systems enable the turbines to be shut down in high winds and if significant vibrations or rotor blade stress occurs. This ensures that the risk of blade failure is minimised. The International Electrotechnical Commission (IEC) standards also consider icing of the turbines, with modern turbines designed to operate in temperatures down to -20°C. Methods to monitor potential conditions for ice shedding will include measuring the ambient temperature, differential power curve, vibration recording and anemometer plausibility.</p> <p>In addition the proponent has stated the OEMP will consider safety procedures to the specific turbine model selected. In regards to bush fires the Proponent will mitigate risks through providing asset protection zones consistent with RFS guidelines and prepare a Bushfire Management Plan as part of the CEMP and OEMP. In addition a condition of approval has been recommended requiring the Proponent to provide for asset protection consistent with relevant RFS 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</p>

	on-site systems relevant to ensuring safe operation of the project.
Telecommunication	<p>The Proponent's assessment of the impacts of telecommunication and electromagnetic interference concluded that communication services (including the RFS Mount Rumbree radio tower) are not expected to be impacted. In regards to TV interference, the existing analogue transmission is planned to be phased out by 2013, and to be replaced by digital transmission which is less susceptible to visible "ghosting" degradation. However, the Proponent has committed to undertake a monitoring program of houses within 5km of the wind farm and if any television reception interference is caused by the wind farm, to rectify this. The Department is generally satisfied that these matters have been adequately addressed in the Proponent's Submissions Report and / or Statement of Commitments.</p> <p>Notwithstanding, the Department has recommended conditions of approval that require the Proponent to undertake a pre-commissioning assessment of the existing quality of the television/radio transmission available at a representative sample of receivers located within 5 kilometres of any wind turbine. In the event of a complaint from a receptor located within 5 kilometres of a wind turbine regarding television/radio transmission during the operation of the project, the Proponent shall investigate the quality of transmission at the receptor compared with the pre-commissioning assessment and where any transmission problems can be reasonably attributable to the project, rectify the problems within three months of the receipt of the complaint.</p>
Insurance	<p>The Proponent is liable to all attributable damage to neighbouring properties, and carries, and any subsequent wind farm operating company will carry, Public Liability Insurance to cover the risks to the properties involved with the project and the risks to neighbouring properties.</p> <p>In regards to the development increasing insurance premiums for neighbouring properties, the Department has received no evidence to suggest that the development will impact premiums.</p>
Erosion	The Proponent states that areas disturbed during construction will be protected by the installation and maintenance of standard erosion and sediment control measures to avoid contributing to any soil and landform degradation. The Department has conditioned that measures to monitor and manage soil and water (surface and groundwater) impacts, developed in consultation with NOW, are included in the CEMP.
Property Misdescriptions	Concern was raised over the incorrect labelling and positioning of properties within the EA. The Proponent has amended and clarified errors within its Submissions Report. The Department is satisfied that these matters have been adequately addressed in the Proponent's Submissions Report and / or Statement of Commitments.
Crown Land	The Proponent will apply for a Crown Land Licence where any infrastructure intersects Crown road reserves prior to any work being commenced and once infrastructure layout has been finalised.
Contributions	<p>Glen Innes Severn Council requests that in line with the Glen Innes Severn Section 94A Development Contribution Plan, a contribution of 1% of the cost of the development be paid to Council. The Department notes that based on a capital investment value of \$350 million, and approximately 66% (subject to micro-siting) of the project being located in Glen Innes Severn LGA, this would equate to a payment of \$2.31 million to Glen Innes Severn Council.</p> <p>The necessary infrastructure support for the construction of this project, such as road upgrades, will be provided by the Proponent. In addition it is</p>

	<p>noted that the isolated location poses no significant amenity impacts to the community, while infrastructure development of this type is unlikely to place any significant demands on Council services particularly with a maximum workforce of only 20 people employed during operation.</p> <p>In light of the development providing key infrastructure to the state and helping to meet the energy requirements of the State as well as addressing local demand, the Department does not consider that a s94A levy is warranted in this instance. It is noted that Inverell Shire Council (which contains approximately 33% of the project within its LGA), also requested payment of Section 94 contributions, however, contributions are not required as there is no reasonable nexus to require contributions in accordance with the plan.</p> <p>Notwithstanding, it should be noted that this does not preclude the Councils and the Proponent voluntarily discussing and agreeing to a Community Enhancement Program.</p>
Traffic and Transport Impacts	<p>Both Inverell Shire and Guyra Shire Councils have directly raised concern related to traffic impacts, with particular attention made to possible damage to Council assets. The Department agrees that the Proponent should be required to investigate the existing condition of all public roads proposed to be used for construction, and upgrade these to a standard considered necessary to accommodate the traffic volumes associated with the project as well as 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-size vehicles) and where necessary upgrades to be carried out in consultation with the relevant road authority at full expense of the Proponent.</p> <p>In regards to road dilapidation, the Department has recommended conditions of approval requiring the Proponent to commission an independent expert to undertake pre-construction road dilapidation surveys in consultation with Councils and the RMS to assess the current condition of the road(s) and describe mechanisms to restore any damage that may result due to traffic and transport related to the construction of the project. The Report shall be submitted to the relevant road authority for review prior to the commencement of haulage. Following completion of construction, a subsequent report shall be prepared to assess any damage that may have resulted from the construction of the project. Similarly, the Department has recommended a Decommissioning Road Dilapidation to ensure appropriate mechanisms are implemented to restore any damage to roads during decommissioning of the project.</p> <p>The Department considers that this process would 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 assessment be implemented in a timely manner, in accordance with the reasonable requirements of the relevant road authority, and at the full expense of the Proponent. 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.</p>
Aviation Impacts	Airservices Australia indicated the proposed wind farm would have an impact on the 10 nautical miles (NM) minimum safe altitude (MSA) and two

	<p>procedural arrivals into Glen Innes Airport. The Proponent has identified that 13 turbine locations on the wind farm site penetrate the edge of the Obstruction Identification Surface (OIS) for the Sector A DME/GPS Arrival procedure for the Glen Innes airport, and has therefore committed to submit an Aviation Impact Assessment and a request to Airservices Australia to modify the arrival procedures.</p> <p>If arrival procedures are not able to be modified a secondary commitment has been made to not build the turbines which have an impact on the procedures or modify the tip height of turbines (shorten), so that they do not impact on arrival procedures.</p> <p>In regards to the impact on aerial spraying the Proponent acknowledges that the wind farm will impact aerial spraying in the area immediately adjacent to the turbine locations. The EA states that it is likely that aerial spraying within 500m of a turbine would be impacted which may require alternate methods to be considered, such as ground based methods (potentially at a higher cost). Although the impact would predominantly be on associated properties there will be an impact on some non-associated properties, although the Proponent states that impacts will be to a relatively small area, and in some case covers areas that are heavily vegetated and would not be suitable for aerial spraying. Notwithstanding, the Proponent has committed to consult with the affected landowners and investigate alternate measures for spraying in those areas.</p> <p>To strengthen these commitments the Department has recommended conditions of approval for the Proponent to consult with aerodrome operators that have an aerodrome located within 30 kilometres of the boundaries of the site, Airservices Australia and Aerial Agriculture Association Australia and provide mitigation measures for each of the potential impacts and hazards identified, prior to the commencement of construction.</p> <p>A further condition requires the Proponent to provide construction coordinates, heights and ground levels of the base of each turbine to the Civil Aviation Safety Authority, Airservices Australia, Royal Australian Air Force - Aeronautical Information Services, as well as all known users of privately owned local airfields.</p> <p>Finally, should increases to the costs of aerial spraying on any non-associated property surrounding the site be attributable to the operation of the project, the Department has recommended a condition for the Proponent to fully fund the cost difference between the current aerial spraying and the increased cost to affected landowners.</p>
<p>Setbacks</p>	<p>A 2km turbine setback from non-associated dwellings has been requested from Councils. Eleven non-associated occupied and three non-associated unoccupied dwellings are located within 2km of a turbine. The Department does not believe a 2km setback is required in this circumstance as the key impacts associated with the distance of turbines including visual and landscape (section 5.2), noise and vibration (section 5.3) and health (section 5.4) have been adequately addressed.</p> <p>The Department is satisfied that relevant operational criteria (noise, shadow flicker etc.) would be achieved at all sensitive receptors surrounding the site, and subject to the mitigation measures and recommendations detailed in section 5.2, does not believe the Wind Farm would have a significant negative visual impact.</p>

6. CONCLUSION

The Department considers that the White Rock Wind Farm would result in benefits to the wider community by helping to meet the energy requirements of the State as well as addressing the predicted electricity demand shortfall without the production of additional greenhouse gases. In addition, the project would encourage and assist future industry development, help reduce barriers to the national electricity market, and provide greater level of community access to renewable energy, as well as contributing to the challenges of climate change, reliance on fossil fuels and energy supply.

The key environmental impacts associated with the proposal relate to flora and fauna, visual, and noise impacts. Submissions on the project mainly reflected these issues, however also raised other concerns including property impacts and land use, consultation process, turbine safety, telecommunications, insurance, erosion, modifications, Crown land, community benefits and contributions, traffic and transport impacts, and aviation impacts.

The Department has assessed the Proponent's Environmental Assessment, Submissions Report and Statement of Commitments and submissions received on the project. Based on its assessment, the Department is satisfied that the Proponent has undertaken an appropriate level of assessment. The Department is satisfied that the Proponent has proposed adequate construction and operational environmental management measures. The Department also notes that the Proponent has reduced the construction footprint, so as to ensure the avoidance of significant ecological impacts during construction. Therefore, the Department considers that provided the Proponent implements its nominated environmental commitments, its recommended impact avoidance and management measures contained in the EA 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.

The Department's assessment indicates that the project would result in some unavoidable biodiversity impacts to threatened species habitat and to the Ribbon Gum endangered ecological community. However, the impacts can be suitably offset in perpetuity consistent with "maintain or improve" principles. The Department is also satisfied that potential risks in relation to rotor collisions can be effectively managed through the implementation of an appropriate adaptive bird and bat management plan.

The Department's assessment on visual impacts raised concern regarding the visual dominance of two particular turbines on one non-involved residence, which has led the Department to recommend the deletion of these turbines from the scope of the project. However, subject to the deletion of the two turbines the Department has concluded that significant impacts are unlikely and considers that the project's impacts on landscape values as a whole would be acceptable, and does not consider that any residual impacts would outweigh the project's broader public interest with respect to renewable energy generation.

The Department's assessment of noise has considered potential impacts and has concluded that significant impacts are unlikely. In particular, the assessment indicates that relevant operational criteria would be achieved at sensitive receptors

surrounding the site. The Department's assessment of health considered 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 any 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 flora and fauna, visual and landscape, noise, decommissioning, aviation hazard, and traffic and transport, among others, to ensure that the project achieves acceptable environmental standards, protects public amenity and offsets residual impacts.

On balance, the Department considers the project to be justified and in the public's 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 the Deputy Director General, as delegate for the Minister for Planning and infrastructure:

- note the information provided in this report;
- approve the Major Project Application, subject to conditions; and
- sign the attached instrument.


A/Director
Infrastructure Projects


Executive Director
Major Projects Assessment


Deputy Director-General
Development Assessment & Systems Performance

APPENDIX A ENVIRONMENTAL ASSESSMENT

See the Department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3963

APPENDIX B SUBMISSIONS

See the Department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3963

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=3963

APPENDIX D RECOMMENDED CONDITIONS OF APPROVAL

See the Department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3963