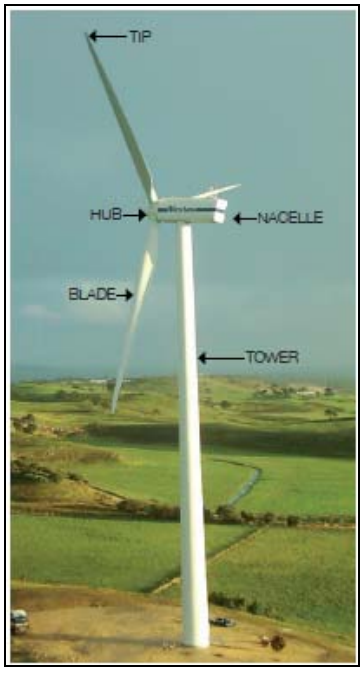
MAJOR PROJECT ASSESSMENT: Bodangora Wind Farm Bodangora, Central Western NSW (MP 10_0157)



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

June 2013

ABBREVIATIONS

CMA	Catchment Management Authority
Department	Department of Planning & Infrastructure
DGRs	Director-General's Requirements
Director-General	Director-General of the Department of Planning & Infrastructure
EA	Environmental Assessment
EEC	Endangered Ecological Community
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
ESD	Ecologically Sustainable Development
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007*
MD SEPP	*State Environmental Planning Policy (Major Development) 2005*
Minister	Minister for Planning & Infrastructure
MRET	Mandatory Renewable Energy Target
MW	Megawatts
NOW	NSW Office of Water
OEH	Office of Environment and Heritage
PAC	Planning Assessment Commission
Part 3A	Part 3A of the *Environmental Planning and Assessment Act 1979*
Proponent	Bodangora Wind Farm Pty Ltd
RET	Renewable Energy Target
RFS	NSW Rural Fire Service
RMS	Roads and Maritime Services

Cover Photograph: Proposed Vesta Wind Turbine (Infigen, May 2012)

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NSW Government
Department of Planning & Infrastructure

EXECUTIVE SUMMARY

Bodangora Wind Farm Pty Ltd (the Proponent) proposes to construct and operate the Bodangora Wind Farm (the Project), consisting of up to 33 wind turbines and with a total installed capacity of up to 120 megawatts (MW), located in Central Western NSW approximately 20 kilometres north-east of Wellington. The Project is estimated to produce approximately 333,000 megawatt hours (MWh) per annum, which will provide power for the equivalent of an estimated 35,000 standard homes in NSW. The Project is expected to generate up to 80 construction jobs and approximately 4 ongoing operational and maintenance jobs.

The Project consists of the construction and operation of a wind farm and associated infrastructure, including access tracks, local road infrastructure upgrades, electrical connections between the turbines (both underground cable and aboveground power lines), a collector substation, temporary and permanent monitoring masts, and an operation and maintenance centre. The Project also includes transmission connection from the substation to the existing 132 kV Wellington – Beryl transmission line.

The Environmental Assessment for the Project was placed on public exhibition from 8 June until 6 August 2012 (60 days). The Department received 163 submissions during the exhibition of the Environmental Assessment including 12 submissions from public authorities and 151 submissions from the general public and special interest groups. Of the 151 public submissions, 142 objected to the Project, and the remaining 9 supported the Project. Of the 151 public submissions, 108 were in the form of a standard form letter objecting to the Project.

In addition, submissions were received from 11 public authorities including NSW Rural Fire Service, NSW Department of Primary Industries, Environment Protection Authority, Office of Environment and Heritage, NSW Trade and Investment – Resources and Energy, NSW Health, Roads and Maritime Services, Central West Catchment Management Authority, Air Services Australia, Wellington Council, and Mid-Western Regional Council.

Key issues raised in submissions relate to operational noise and vibration, health, land use, visual amenity, social and economic issues, flora and fauna, safety, the consultation process, roads, justification, decommissioning, and heritage. A Submissions Response Report, prepared by the Proponent addressing the issues raised in submissions, was submitted to the Department, which included a Preferred Project Report.

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 contributing to the challenges of climate change, reliance on fossil fuels and energy supply, and is therefore in the public interest. The Department, through the assessment process, has considered the key issues relevant to the Project, and recommended a suite of conditions regarding environmental performance, community information, reporting and auditing, construction environmental management, operational environmental management, and additional procedures regarding decommissioning.

The Department considers that key issues associated with construction and operation of the Project 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 of approval.

As the Project has received more than 25 submissions in the nature of objections, and the Proponent has included a political donation disclosure statement with the application, the Planning Assessment Commission is the determining body.

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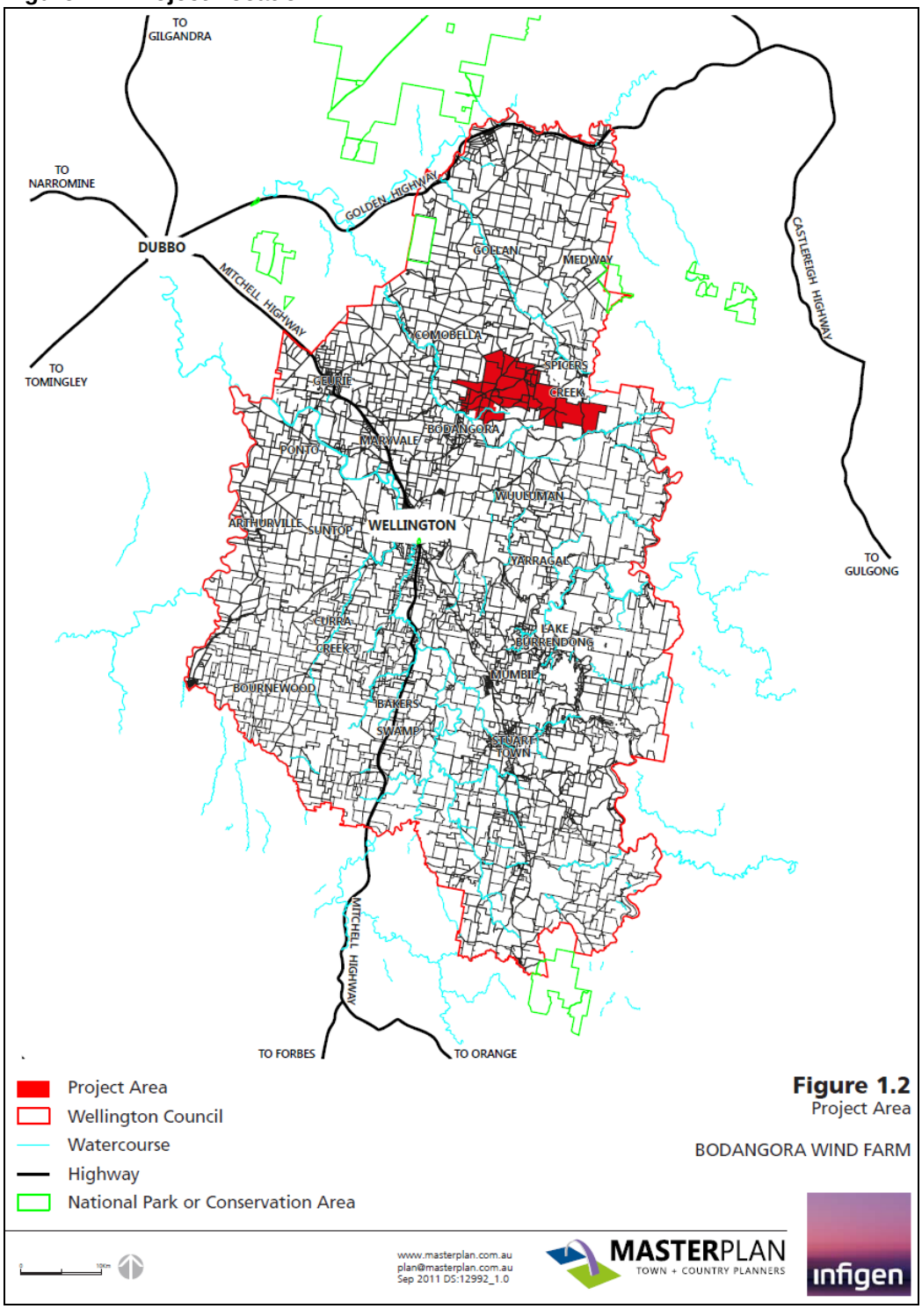
1. BACKGROUND

The Proponent proposes to construct and operate a wind farm at Bodangora, within the Wellington Local Government Area in the Central Western Region of NSW. The wind farm will involve the construction and operation of up to 33 wind turbine generators, with a total installed capacity of up to 120 MW, plus ancillary infrastructure.

The Project area comprises land owned by a total of 7 confirmed individual, private land owners spanning over an area of approximately 7,820 hectares, approximately 18 kilometres from east to west and 12 kilometres from north to south. The Project location is shown in **Figure 1.1**.

Figure 1.1: Project Location



The Project area is located within the South Western Slopes Bioregion, which is a large area of foothills and ranges comprising the western fall of the Great Dividing Range. The topography of the region is gently undulating. Within the Project area is Mount Bodangora at a height of 743m.

Currently, the primary use of the land is for sheep and cattle grazing purposes. The surrounding locality also contains a number of rural residential dwellings supporting the cropping and animal grazing uses. All wind farm neighbours are located over two kilometres from the nearest wind turbine. The wind farm is not expected to impact grazing land use activities which occur within and surrounding the Project area. Agricultural activities at neighbouring properties to the wind farm will not be affected.

Existing built features within the vicinity of the Project area include the 132kV Wellington – Beryl transmission line, and the 330kV Wellington – Wollar transmission line. The Wellington / Bodangora Airport (Wellington Aerodrome), located at Bodangora to the south-east of the Project area, is located at approximately 4.5 kilometres from the nearest wind turbine, and the runway operates in a perpendicular direction away from the wind turbines. Additionally, the Mitchell Highway is located to the west of the Project area, which runs through the town of Wellington, approximately 20 kilometres south west of the Project area.

Figures 1.2 and **1.3** show the existing view of the area surrounding Mount Bodangora, in which the majority of turbines are to be located, and the area to the west of Mount Bodangora, in which most western turbines are to be located.

Figure 1.2: Typical view – Mount Bodangora

(Infigen, May 2012)

Figure 1.3: Typical view – Bodangora

(Infigen, May 2012)

2. PROPOSED PROJECT

2.1. Project Description

The Project involves the construction and operation of up to a maximum of 33 wind turbines, each with a generation capacity of between 2.0 and 4.0 MW and a total installed capacity of up to 120 MW. Ancillary items to the Project include:

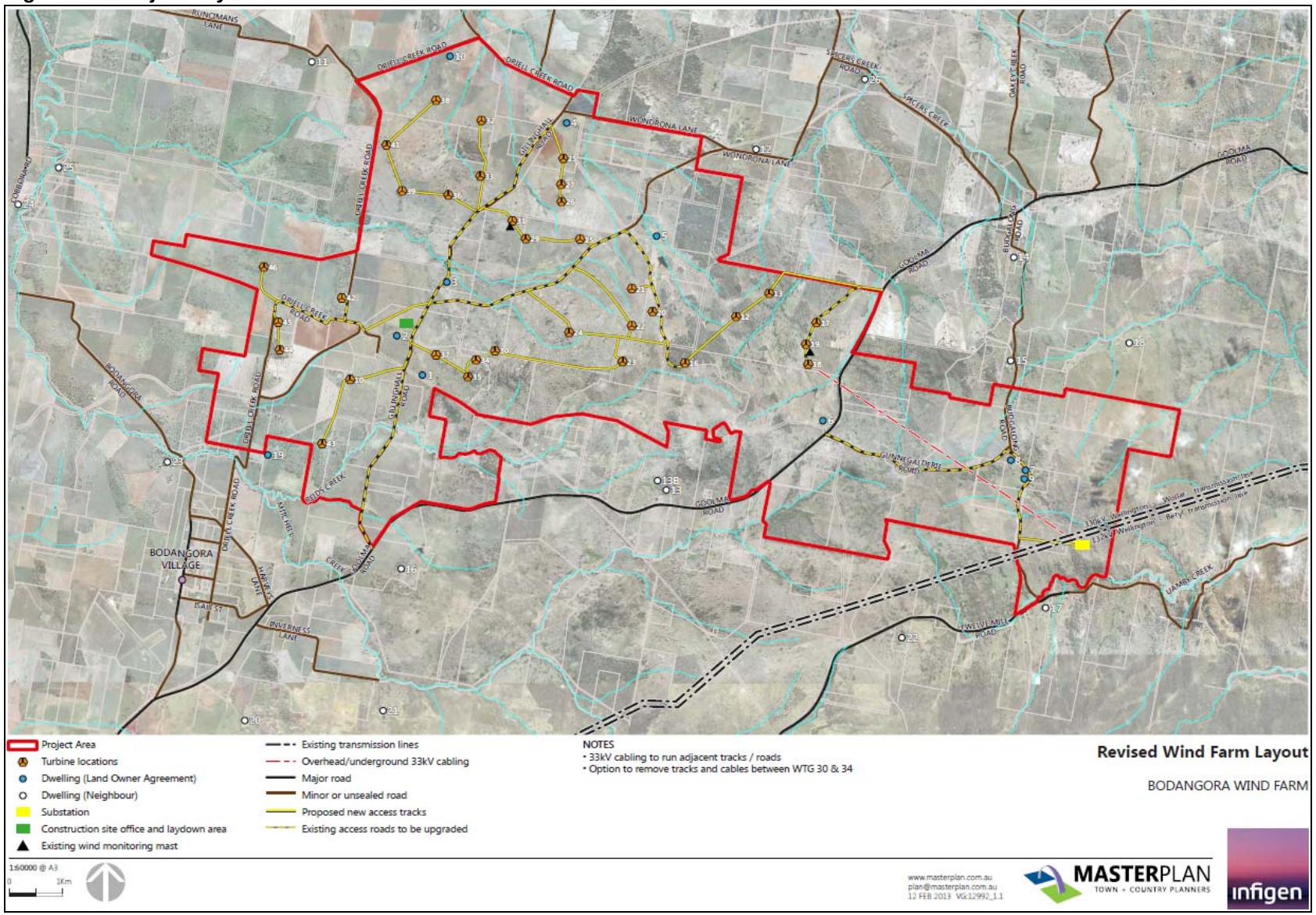
- a 33 / 132 kV substation plus switchyards, transformers and microwave towers to provide connection to the existing 132 kV Wellington – Beryl transmission line;
- 39 kilometres of new and upgraded access tracks;
- underground and overhead cabling;
- temporary and permanent wind monitoring masts;
- a construction compound;
- gravel quarries; and
- an operation and maintenance centre.

The key components of the Project are listed in **Table 2.1**, and the layout is shown in **Figure 2.1**.

Table 2.1: Key Project Components

Aspect	***Description***
Wind Turbines	The indicative turbine model selected for the planning application is the Vesta 112. The total height of each turbine to blade tip is a maximum of 150 metres. Each turbine will have a control system to face the rotor into oncoming wind, and to adjust the pitch of the turbine blades.
Footings	Each tower will be located on a reinforced concrete footing with a diameter of up to 12 metres, to a depth of two to three metres.
Electrical Infrastructure	A series of underground and overground cables, switchgear and a substation are proposed to connect the Bodangora Wind Farm with the national electricity grid via the existing 132 kV Wellington – Beryl transmission line.
Access Works	Existing local roads will be used by construction vehicles for delivery of wind farm parts. All roads will be upgraded to relevant engineering standards. On-site access tracks will also be constructed to enable access to the wind turbines for the purposes of turbine construction and maintenance. The width of access tracks will be approximately 9m to allow for the delivery of parts and materials, and will be reduced to a width of 5m following construction, or remediated to the pre-construction state if no longer required for operation of the wind farm.
Wind Monitoring Masts	There are currently two 80m wind monitoring masts installed within the Project area. After construction, the two original masts will be removed and replaced by three to four new masts to provide for ongoing meteorological investigations and power curve verification.
Construction Site Office and Laydown Area	The site office and laydown area will include office, workshop and storage buildings, provision for power and communications, staff car parking, and a cleared flat area to provide for the storage of various items during construction. The construction facility will be removed and the land restored and rehabilitated once construction has been completed.
Operational Details	Once commissioned, the wind farm will operate with a moderate on-site work force at the substation office of approximately six to ten staff, employed for inspection and maintenance purposes.
Decommissioning or Replacement	At the end of its economic life, all equipment will either be replaced with comparable new equipment, or the wind farm will be decommissioned. Any replacement would be subject to new approvals.

Figure 2.1: Project Layout



2.2. Project Need and Justification

As electricity generation contributes to a significant proportion of Australia's greenhouse gas emissions, there is considerable pressure for the electricity industry to reduce its contribution. A range of measures, including increased renewable energy generation, will need to be adopted to allow the growth of greenhouse gas emissions from the electricity industry. In addition, global markets for oil and gas have shown significant price volatility, drawing attention to the finite life of these resources.

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 as well as provide significant greenhouse gas benefits as Australia moves towards a more carbon constrained market.

Justification for the Project has been based on the following:

- the Project can be both implemented with minimal environmental impacts to the Project area and its locality, and is a sustainable energy development;
- over a full year, annual electricity production is expected at 333,000 MWh, which is enough energy to power 35,000 homes annually;
- it would reduce the increase of greenhouse gas emissions by up to 333,000 tonnes of CO_2 each year, representing 2.6 million tonnes of greenhouse gas emissions by 2020;
- it would contribute to the State and Federal Governments' target of providing 20% of consumed energy from renewable sources by 2020; and
- it would create local economic benefit, particularly to the land owners within the Project area and also to the wider Wellington community.

The Department acknowledges that the Project will assist in providing additional supply capacity, and that the proposed wind farm would make a contribution towards offsetting the emissions of CO_2 and other emissions that would otherwise be produced if the equivalent power supply was provided by fossil-fuel combustion.

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 RET of sourcing 20% of electricity from renewable sources by 2020. It is also consistent with *NSW 2021: A plan to make NSW number one* target of achieving 20% renewable energy consumption by 2020, and State and Federal Government targets for reducing greenhouse gas emissions of at least 5% below 2000 levels.

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

On the above basis, the Department considers the proposed Bodangora Wind Farm would have a role in helping to meet the energy requirements of the State as well as addressing local demand. The proposal would also 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* (MD SEPP), 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

The Minister has delegated his powers and functions for applications other than applications made by or on behalf of a public authority, to the Planning Assessment Commission (PAC). The PAC must determine all applications made by private sector Proponents, unless:

- less than 25 members of the public have made a submission on the application in the nature of an objection; and
- a relevant local council has not objected in writing to the application; and
- a political donation disclosure statement has not been lodged with the application.

The Project has received more than 25 submissions in the nature of objections, and the Proponent has included a political donation disclosure statement with the application. Therefore, the PAC is the determining body.

3.3. Permissibility

The Environmental Assessment was prepared in accordance with, the *Wellington Local Environmental Plan (LEP) 1995*. At that time, the wind farm was situated wholly within land zoned 1(a) (General Rural). Pursuant to Clause 10 of the Wellington LEP 1995, the development of a wind farm was considered a form of development requiring consent. The development was not inconsistent with the general intent of the zone objectives nor would the establishment of the wind farm on land within the zone prejudice the continued attainment of the zone objectives.

The wind farm is situated wholly within land zoned RU1 (Primary Production) of the recently gazetted *Wellington Local Environmental Plan (LEP) 2012*. Pursuant to the Land Use Table for Zone RU1 (Primary Production) within the Wellington LEP 2012, development of a wind farm is prohibited. Notwithstanding, the project is not inconsistent with the general intent of the zone objectives, nor does the establishment of the wind farm on land within the zone prejudice the continued attainment of the zone objectives.

In addition, the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) applies to the Project. Division 4 of the Infrastructure SEPP relates to electricity generating works with Clause 34(1) stating that development for the purpose of electricity generating works (the proposal) 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.

3.4. Environmental Planning Instruments

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

3.5. Objects of the EP&A Act

The Minister should consider the objects of the EP&A Act when making decisions under the Act. The objects of most relevance to the Minister's decision on whether or not to approve the project are found in Section 5(a) (i), (ii), (iii), (vi) and (vii). They are 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,

(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.

These objects form key areas of assessment within the Proponent's EA. The Department is satisfied that the Proponent has considered the proper management of the environmental, social and economic impacts of the Project, and encourages the orderly and economic use of land and protection of utility services, as well as the consideration of the protection of the environment. 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 3.6** below.

These objects are key items for assessment with respect to the proposal and are addressed further in this Report. The agency and community consultation undertaken as part of the assessment process (refer **Section 4**), address objects 5(b) and 5(c) of the EP&A Act.

3.6. 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, and

(d) improved valuation, pricing and incentive mechanisms.

The Department's assessment of the ecological impacts of the Project (**Section 5**) is based on a conservative and rigorous assessment of the likely extent of ecological impacts. This includes likely offset requirements to ensure that appropriate and adequate measures are put in place to prevent the threat 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 Project would not require large scale earthworks and impacts to the site would be reversible. The development has significant social and environmental benefits on a local, state and federal level and can be argued to have global environmental benefits on the basis that the Project would 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, it is considered that the development would be ecologically sustainable within the context of the above principles.

4. CONSULTATION AND SUBMISSIONS

4.1. Exhibition

Under Section 75H(3) of the EP&A Act, the Director-General is required to make the EA publicly available for at least 30 days. After accepting the Bodangora Wind Farm EA, the Department publicly exhibited it from 8 June until 6 August 2012 (60 days) on the Department's website, and at the exhibition locations. The Department also advertised the public exhibition in the newspaper on 8 June 2012, and notified neighbouring landholders and relevant State and local government authorities in writing.

The Department received 163 submissions during the exhibition of the EA, 12 submissions from public authorities and 151 submissions from the general public and special interest groups. A summary of the issues raised in submissions is provided below. The Department has considered the issues raised in all submissions in its assessment of the Project.

4.2. Public Authority Submissions

A total of 11 submissions were received from public authorities, providing general comment on the proposal, with the exception of the Department of Trade and Investment – Mineral Resources Branch, which does not support the proposal in its current form. Key matters raised are summarised below and discussed in further detail in **Section 5**.

NSW Rural Fire Service provides the following key issue and assessment requirements regarding bush fire protection, in accordance with *Planning for Bush Fire Protection 2006*:

- minimise the impact of radiant heat and direct flame contact through asset protection zones;
- provide adequate access / egress to the proposed development;
- the ability to site and provide for adequate water supplies for bush fire suppression operations;
- emergency evacuation measures; and
- development of mitigation and suppression procedures during operation of the proposed development.

NSW Roads & Maritime Services (RMS) provides a number of comments for consideration, including consideration of safe intersection sight distances, conformation with *Austroads* (2009) design requirements for Rural Property Access, the removal of all redundant access points after construction, and that vehicles transporting oversize or overmass loads do not travel in convoys or platoons, and that all bridges that would be used would have adequate capacity to accommodate the vehicles.

NSW Department of Trade & Investment – Resources & Energy raises concern that correspondence from affected mineral exploration tenement holders are not included, and there appears to be an apparent misrepresentation of concerns regarding the adverse impact of the wind farm on the mineral potential of the area. The Mineral Resources Branch will not support the proposal in its current form, and consider the following needs to be addressed:

- modification of the proposal in such a way that ensures turbines are situated away from areas of recognized mineral potential; and
- correspondence with affected mineral exploration licence holders is adequately documented and clearly indicates that there are no conflicts with the Project design and mineral exploration and possible future mining.

Environment Protection Authority (EPA) provides the response that extractive activities and possible onsite cement production during the construction phase of the Project may require an Environmental Protection Licence.

Office of Environment & Heritage (OEH) raises the following key issues with regard to biodiversity:

- insufficient detail is provided to support the assessment of impacts on native flora and fauna;
- insufficient detail is provided with regard to avoidance measures;
- inadequate details are provided with regard to options for mitigating impacts on biodiversity; and
- the EA does not include a detailed offset proposal.

NSW Department of Primary Industries provides the following comment on behalf of NSW Office of Water (NOW), Agriculture NSW, Fisheries NSW, and Department of Crown Lands:

- NOW - recommends that the Statement of Commitments be included as conditions should an approval be issued;
- Agriculture NSW - recommends that reference be made to the Department's guideline: *Infrastructure Proposals for Rural Lands* to assist in identifying potential agricultural impacts;
- Fisheries NSW - is satisfied that the development should not result in any loss of aquatic habitat of fisheries resources; and
- Crown Lands - notes that approval will be required from Crown Lands for use of Crown roads within the Project site.

Central West Catchment Management Authority (CMA) provides comment on issues relating to native vegetation (including biodiversity values), water (surface and ground water), and cultural heritage and engagement with the Aboriginal community. The CMA also encourages the formation of a Community Consultation Committee to assist with the future stages of the community consultation for the Project.

NSW Health – Western NSW Local Health District provides comment on issues relating to noise and shadow flicker, air quality, and water resources.

Airservices Australia is unable to advise on the potential aviation impacts including safety, efficiency and operational consequences for aerodromes in the vicinity of the wind farm, in the absence of an Aviation Impact Study.

Wellington Council provides comment on issues relating to the adequacy of the EA against the DGRs, particularly in relation to strategic justification, Aboriginal heritage, traffic and transport, and hazards / risks. Council refers to the *NSW Draft Wind Farm Guidelines* with respect to visual amenity, noise, and health issues and provides comments on flora/fauna and social and economic matters.

Mid-Western Regional Council provides comment in relation to the traffic and transport assessment, in particular with regards to increased heavy loads over Council's local roads, and additional heavy traffic movements passing by schools.

4.3. Public Submissions

A total of 151 submissions were received from the public. This included submissions from the following special interest groups:

- The Bodangora Wind Turbine Awareness Group;
- Wellington Aeroclub Inc.; and
- The Waubra Foundation Inc.

Of the 151 public submissions received, 142 (94%) objected to the Project. The remaining 9 submissions (6%) stated support for the Project. The key issues raised in public submissions (a total of 34 non form letter submissions and 108 form letters) are summarised in **Table 4.1**. The issues raised in form letters are reproduced separately in **Table 4.2**. The form letter was presented

in the form of a list, with some submitters identifying a selection of issues of concern, and some selecting all issues listed.

Table 4.1: Summary of Issues Raised in Public Submissions

Issue	Summary of key concerns raised	Submissions % of public submissions
Operational noise and vibration	▪ audible and infrasound noise pollution; and ▪ vibration caused by turbines.	127 / 84%
Health	▪ lack of Australian research into health effects of turbines; ▪ "Wind Turbine Syndrome" and the affects of low frequency noise and infrasound; and ▪ symptoms seen in residents within 10 km of wind farms.	127 / 84%
Land Use, including property rights and value, and agricultural viability	▪ possible reduction in land values; ▪ decreased ability for aerial service use, such as spraying; ▪ soil fertility and loss of agricultural land; and ▪ health of livestock and animals.	118 / 78%
Visual amenity	▪ loss of view over natural landscape and visual impact; ▪ shadow flicker; and ▪ the use of obstacle lighting.	113 / 75%
Social and Economic	▪ perceived benefits and impacts to the community; ▪ community division; ▪ destruction of rural social infrastructure; and ▪ enforced tax payer subsidies to wind turbine industry.	111 / 73.5%
Flora and Fauna	▪ impact on local birdlife and the effect of turbines on birds; ▪ removal of habitat for access roads and other associated infrastructure; and ▪ impact on fauna.	110 / 73%
Safety, including turbine, aviation and bushfire safety	▪ possible blade failure and potential for blade throw; ▪ fire and the ability of Rural Fire Brigade to control fire; ▪ possible "Ice Shedding" and potential for ice throw; ▪ safety of low flying agricultural aircraft; and ▪ proximity to Wellington Airfield and turbine location effects on aircraft using runways.	110 / 73%
Consultation process	▪ lack of consultation; ▪ misrepresentation of community views and community surveys both for and against the Project; and ▪ lack of consultation with local Aboriginal community.	109 / 72%
Roads	▪ traffic and road impacts; and ▪ costs relating to road upgrades.	107 / 71%
Justification	▪ efficiency of wind generated electricity compared to other forms of renewable energy; ▪ questions relating to the necessity for more electricity generation; and ▪ the cost of wind generated renewable energy.	104 / 69%
Decommissioning	▪ concerned that turbines will not be removed due to financial status of the company; and ▪ request for a bond to be paid ensuring removal of turbines after decommissioning.	98 / 65%

Issue	Summary of key concerns raised	Submissions % of public submissions
Heritage	▪ potential impacts to heritage items and places; and ▪ potential impacts to Aboriginal heritage items.	91 / 60%

Table 4.2: Summary of Issues Raised in Form Letters

Issue	Form letters raising issue
Health Impacts;	101
Noise pollution both audible and infrasound;	101
Visual pollution and increasing turbine size;	91
Lack of community consultation and transparency;	95
Contractual secrecy containing gag clauses;	85
Destruction of flora and fauna with the Gillinghall Road widening;	93
Devaluation of affected land and surrounding land;	94
Safety issues relating to blade throw, fire dangers and the fire access near turbines;	89
Danger to low flying agricultural aircraft;	87
Shadow flicker;	85
Further damage to already dangerous country roads;	93
Destruction of historic, heritage and cultural areas;	79
Reduced agricultural productivity;	91
Division of rural communities and alienation within families;	93
Destruction of rural social infrastructure;	92
Enforced tax payer subsidies to the wind turbine industry;	94
Inefficient and intermittent electricity production;	95
Inability to produce base load power; and	83
Inadequate or non-existent provision for decommissioning and removal of old turbines.	89

Submissions in support of the Project provided the following comments:

- wind farms are a source of renewable energy and reduce dependence on fossil fuels for electricity generation, and work towards reaching the Renewable Energy Target;
- wind farms provide economic benefits in the form of jobs and payments to farmers;
- road access will be improved through the construction of the wind farm;
- turbines have been placed two kilometres or more away from neighbouring residential receivers;
- noise limits will not be exceeded;
- the turbines will not have an undue visual impact;
- turbines do not negatively impact on livestock; and
- the wind farm is located close to existing electrical transmission infrastructure.

A total of 24 late submissions were received, all of which objected to the proposal. Concerns raised are generally similar to those raised in submissions received during public exhibition.

4.4. Proponent's Response to Submissions

The Proponent provided a response to the issues raised in submissions (refer **Appendix C**). The response included a Preferred Project Report which identified two minor changes to the Project, in response to the submissions received.

Access tracks and cabling between wind turbine 30 and wind turbine 34 have now been changed to 'optional'. The inclusion of these will depend on the decision of the new property owner, and whether or not they elect to be involved in the Project. This does not affect the essential nature of the Project should the land not be made available for the Project.

The proposed power line connecting wind turbine 18 and the substation, which was previously identified in the EA as overhead, has been clarified as now being either underground or overhead. It is likely that the final easement will be a combination of both, and will depend on

any environmental and geotechnical restrictions. The Proponent will endeavour to use underground where practical in order to minimise any perceived visual impact of the power line, however overhead lines will be maintained between wind turbines as necessary including in sensitive locations such as creek crossings and areas of native vegetation.

4.5. Compliance with the *Draft NSW Wind Farm Planning Guidelines*

The Department has developed *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 shortly. The interim arrangements for transitional Part 3A wind farms such as Bodangora Wind Farm and the application of the draft guidelines vary depending on the stage of an application in the assessment process.

As the Bodangora Wind Farm had substantially progressed (the Project had been placed on exhibition, but not determined) by the time the draft Guidelines were exhibited, the Proponent had not addressed (in the EA) all of the new requirements of the Guidelines. However, the Department has undertaken a detailed review of the Project against the Guidelines and is satisfied that the Guidelines have been substantially addressed, and where gaps have been found, the Department has considered relevant provisions of the guidelines in developing conditions of approval. A detailed analysis of the proposal against the Guidelines is at Appendix F.

5. ASSESSMENT

A number of key issues were identified during the assessment of the Project. These key issues include:

- Operational noise and vibration;
- Visual amenity;
- Flora and fauna;
- Traffic and transport; and
- Heath.

The Department's assessment has carefully considered potential impacts on surrounding properties. Dwellings in the vicinity of the wind farm are divided into two categories: dwellings with a financial interest in the Project (associated dwellings), and neighbouring dwellings to the Project (non-associated dwellings). The Department's consideration has therefore focused on non-associated dwellings.

5.1. Operational Noise and Vibration

Issue

Noise from the wind farm has been predicted by the Proponent based on the proposed use of Vestas V112 3MW model turbines, with a total of 33 turbines proposed. The Vestas have several operating modes, which produce lower noise levels than that of the mode used in the noise assessment, being the worst case scenario for the Project.

The operational noise has been assessed against the *South Australian Environment Protection Authority Wind Farm Guidelines 2003* (SA Guidelines). The SA Guidelines require that the noise generated by the operation of wind turbines does 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 dwellings.

Associated landowners have an agreement with the Proponent, and as such suitable noise criteria for each residence will be agreed between the Proponent and the landowner. However, to protect associated landowners from unreasonable interference to amenity, reference is made to the *World Health Organisation (WHO) Guidelines for Community Noise, 1999*, which recommends an indoor level of 30 dB(A) is achieved to protect against sleep disturbance. The indoor limit of 30 dB(A) equates to an outdoor noise level of 45 dB(A) with windows open or 52 dB(A) with windows closed.

Five monitoring locations were selected around the Project 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. Results of the background noise monitoring, undertaken in accordance with the SA Guidelines, are shown in **Table 5.1**.

From the data provided in **Table 5.1**, the assessment criteria at each non-associated dwelling has been determined, and summarised in **Table 5.2**. In order to account for the difference between the measured day and night background noise levels, the criteria have been developed based on the generally lower night time background noise levels. In addition, where background noise monitoring has not occurred at a dwelling, the lowest measured background level at any of the five monitored locations has been used to derive the criteria.

Table 5.1: Background noise levels

Monitoring location *	24hr - Wind speed 10m AGL (m/s) 4-10	Day (7am to 10pm) - Wind speed 10m AGL (m/s) 4-10	Night (10pm to 7am) - Wind speed 10m AGL (m/s) 4-10
R12	29-41 dB(A)	30-42 dB(A)	28-38 dB(A)
R13	35-43 dB(A)	35-44 dB(A)	35-41 dB(A)
R14	28-41 dB(A)	29-42 dB(A)	27-40 dB(A)
R16	32-37 dB(A)	33-46 dB(A)	29-44 dB(A)
R17	31-37 dB(A)	33-40 dB(A)	27-32 dB(A)

* – The location of noise sensitive receivers, including monitoring locations, are shown in Figure 2.1 – Project location.
Note – 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.

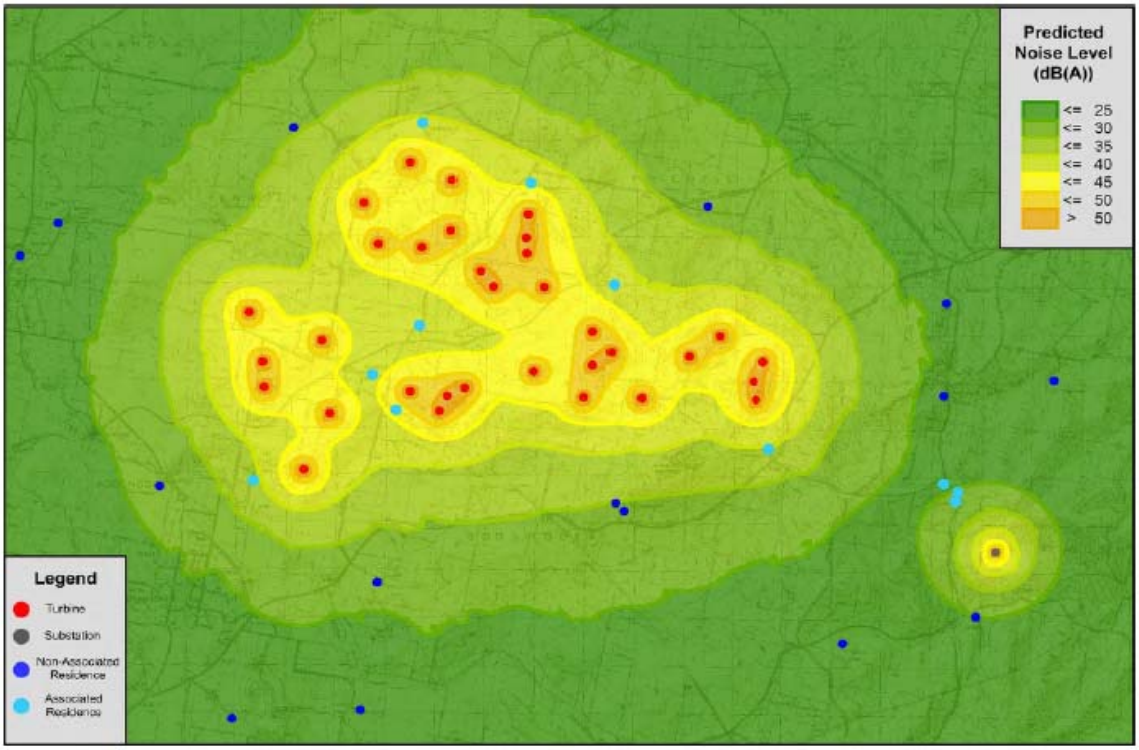
Table 5.2: Predicted wind farm noise and relevant criteria

Non-associated dwelling	Criteria - for wind speed (m/s) 4-10	Predicted noise level - for wind speed (m/s) 4-10
R11	35-37 dB(A)	22-29 dB(A)
R12	35-43 dB(A)	21-29 dB(A)
R13	40-46 dB(A)	23-30 dB(A)
R13B	35-37 dB(A)	22-29 dB(A)
R14	35-45 dB(A)	15-22 dB(A)
R15	35-37 dB(A)	18-23 dB(A)
R16	35-49 dB(A)	20-27 dB(A)
R17	35-37 dB(A)	26-26 dB(A)
R18	35-37 dB(A)	15-19 dB(A)
R20	35-37 dB(A)	10-18 dB(A)
R21	35-37 dB(A)	13-22 dB(A)
R22	35-37 dB(A)	16-20 dB(A)
R23	35-37 dB(A)	19-26 dB(A)
R24	35-37 dB(A)	13-21 dB(A)
R25	35-37 dB(A)	14-22 dB(A)

Note – Receptors 1 to 10 and 19 are associated dwellings, and therefore not included in this table.

Based on the predicted noise levels shown in **Table 5.2**, and noise contours highlighted in **Figure 5.1**, the Proponent has predicted that operation of the wind turbines will comply with the relevant criteria at all non-associated dwellings, for all wind speeds. Notwithstanding, in the event of commissioned turbine noise exceeding the predicted noise, opportunities exist to reduce the noise of the turbines using lower noise modes that can be implemented under certain operating conditions.

Figure 5.1: Noise contours



Additional operational noise considerations associated with wind farms include cumulative impacts with other wind farms in the vicinity of the Project, and impacts from special characteristics such as 'swish', low frequency noise, and infrasound.

The Proponent considers that, due to their stringency, the SA Guidelines explicitly account for the cumulative effect of other wind farms. The baseline criterion specified by the SA Guidelines accounts for cumulative impacts according to the following: *The base noise level is typically 5 dB(A) lower than the level considered to reflect the amenity of the receiving environment. Designing new developments at a lower level accounts for the cumulative effect of noise from other similar development and for the increased sensitivity of receivers to a new noise source* (SA Guidelines).

Amplitude modulation, or 'swish' is an inherent noise character associated with wind farms. The ability to hear 'swish' depends on a range of factors, and would be most prevalent when there is a stable environment (temperature inversion) at the wind farm and the background noise level at the residence is low. The Van Den Berg effect is an increase of the modulation depth from a wind farm under very specific meteorological and operational conditions.

The SA Guidelines explicitly account for 'swish' as a fundamental characteristic of noise from a wind farm. If suitable conditions did exist at Bodangora to regularly generate high levels of 'swish', then there is no scientific research to indicate that the SA Guidelines do not adequately account for it. Additionally, the Proponent considers that given the conditions are more likely to occur at night, then sleep disturbance would be the main issue to address, and the noise standards applied by the SA Guidelines for wind farms are more stringent than limits established by the WHO for the potential onset of sleep disturbance.

At the closest non-associated dwelling, the Proponent has predicted that low frequency noise will be less than 52 dB(C) at any wind speed. This predicted level is below that required to prompt a detailed analysis in accordance with the *draft NSW Planning Guidelines for Wind Farms*, which sets threshold levels of 65 dB(C) during the day and 60 dB(C) during the night.

Turbines of contemporary design produce much lower levels of infrasound than early turbine designs. Infrasound is often described as inaudible, however, sound below 20 Hz remains audible provided that the sound level is sufficiently high. Non-audible perception of infrasound felt through vibrations in various parts of the body only occurs at levels well above the threshold of hearing. A common audibility threshold from a range of studies is an infrasound noise level of 85 dB(G) or greater. Whilst the aerodynamic noise from a rotating turbine blade produces energy in the infrasound range, the Proponent has advised that a large range of measurements of infrasound noise emissions from modern upwind turbines indicates that at distances of 200m, infrasound is in the order of 25 dB below the recognised perception threshold of 85 dB(G). Infrasound also reduces in level when moving away from the source, and separation distances between wind turbines and the nearest non-associated dwelling are well in excess of 200m.

Noise generated by the operation of stationary facilities is required to comply with the *NSW Industrial Noise Policy* (EPA, 2000) (INP). The INP requires that noise from industrial sources should not exceed the measured rating background level (RBL) by more than 5 dB(A). Therefore, the most stringent Project specific noise limit is 35 dB(A) (being 30 dB(A) RBL plus 5 dB(A)). At the non-associated dwelling closest to the proposed substation location, the predicted substation noise is 26 dB(A), which is less than the criteria of 35 dB(A) developed under the INP. The predicted noise level at the closest receiver is considered to be within INP criteria and consequently no specific noise mitigation measures are proposed.

A total of 127 submitters (84%) raised the issue of operational noise impacts, including the Bodangora Wind Turbine Awareness Group and the form letter sent in by 106 submitters. Key issues raised are summarised as:

- noise pollution both audible and infrasound, including tonality and amplitude modulation;
- effect on any approved but not yet developed dwellings;
- concern regarding sleep disturbance criteria;
- question methodology for obtaining background noise levels, including being limited to summer period, as background noise is different in winter;
- lack of a contingency strategy that provides for additional noise attenuation should higher noise levels than those predicted result following commissioning;
- noise monitoring and compliance;
- question the technical adequacy and relevancy of the SA Guidelines; and
- concerned when working on the land in close proximity to the wind turbines, as a result of noise levels.

Additionally, Wellington Council commented on the need for ongoing community consultation during the operation of the Project. No concerns were raised by the EPA.

In the Proponent's Submissions Response Report, the following additional justification was provided responding to concerns raised regarding noise impacts:

- a comprehensive noise assessment was undertaken and concluded that the proposed turbines and substation are predicted to comply with the relevant noise criteria during operation at all surrounding associated and non-associated dwellings, therefore no adverse audible noise effect is expected;
- a peer reviewed study measuring infrasound levels from two wind farms in Australia and comparing the levels measured to naturally occurring sources, found that even at a relatively close distance to the turbines of 360 metres, the measured sound power levels represent sound power levels less than naturally occurring infrasound;
- the Proponent referenced the South Australian EPA, the regulatory authority with the most experience with wind energy in Australia, which stated in its revised 2009 guidelines, that '*The EPA has … completed an extensive search but is not aware of infrasound being present at any modern wind farm site';*
- there is no scientific research to indicate that the SA Guidelines do not adequately account for modulation; and

- the SA Guidelines establish an onerous outdoor level which inherently protects the internal acoustic amenity of a dwelling.

Consideration

The Department notes that a number of non-associated residents objected to the proposal based on operational noise impacts amongst other concerns, including the methodology for obtaining background noise levels.

The Department has assessed the noise impacts based on the information provided and the relevant noise criteria, and notes that the Proponent's assessment has demonstrated that the Project can be designed to achieve compliance with applicable noise amenity criteria at all non-associated dwellings. The Department notes that regardless of the background noise levels, the predicted noise levels are below 35 dB(A), which is the criteria stipulated by the SA Guidelines.

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 is able to achieve the recommended noise goals pursuant to the SA guidelines, for the Vestas V112 turbine.

Notwithstanding, 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 a suite of conditions regarding operational noise.

It is important to note that 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, which follow closely, but improves on, the methodologies and practices of the SA Guidelines. The Department accepts the Proponent has assessed the impacts under the SA Guidelines, however, the Department has also considered the draft NSW Guidelines in formulating conditions to ensure acceptable performance.

The Department's recommended operational noise and vibration conditions include operational noise criteria, and the requirement to prepare a revised Noise Assessment in accordance with relevant noise guidelines. The revised Noise Assessment shall be prepared prior to the commissioning of the wind turbines. The assessment would be required to demonstrate consistency with the EA and the ability of the final turbine model and layout to meet the requirements of the noise criteria specified in the conditions of approval.

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 prepare a Noise Compliance Plan, and to investigate and take appropriate remedial action where a non-compliance is identified. Remedial measures shall include, in the first instance, all feasible and reasonable measures to reduce noise from the Project, including but not necessarily limited to reduced operation of wind turbines. Once all feasible and reasonable source controls are exhausted, remedial measures may include building acoustic treatments and / or noise screening for affected residents, but may only be used to address noise limit exceedances at the absolute discretion of the relevant landowner / resident.

The Department has recommended additional conditions to ensure adequate consultation with potentially affected non-associated residents. The Proponent shall be required to provide written notice to all landowners who are entitled to remedial measures, in accordance with the Noise Compliance Plan. Additionally, any landowner or resident whose residence is within 3km of a turbine may ask the Director-General in writing for an independent review of the noise impacts of the Project on his / her land. If undertaken, the results of the monitoring shall be reported to the

Director-General and where monitoring indicates that noise from the wind turbines exceeds the noise limits, remedial measures in accordance with the Noise Compliance Plan would be required.

With respect to low frequency and infrastructure 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 in Australia, that low frequency and infrasound noise emissions from modern wind turbines, are significantly below the recognised threshold of perception for acoustic energy in this range.

In particular, the recently published 'Infrasound levels near windfarms and in other environments' paper by the South Australia EPA and Resonate Acoustics, dated January 2013, identified the following:

- infrasound levels at houses adjacent to wind farms (located at 1.5 kilometres) are no higher than those at houses located a considerable distance from wind farms (at about 30 kilometres);
- infrasound levels in the rural environment appear to be controlled by localised wind conditions. During low wind periods, levels as low as 40 dB(G) were measured at locations both near to and away from wind turbines. At higher wind speeds, infrasound levels of 50 to 70 dB(G) were common at both wind farm and non-wind farm sites; and
- organised shutdowns of the wind farms indicate that there did not appear to be any noticeable contribution from the wind farm to the G-weighted infrasound level measured at adjacent houses. This suggests that wind turbines are not a significant source of infrasound at houses located approximately 1.5 kilometres away from wind farm sites.

Additionally, the recently published 'Low frequency noise near windfarms and in other environments' paper by the South Australia EPA and Resonate Acoustics, dated April 2013, identified that low frequency noise levels near wind farms are no greater than levels in comparable rural residences away from wind farms. Organised shutdowns of the wind farm also found that the contribution of the wind farm to low frequency noise levels was negligible or relatively small.

On this basis, the Department is satisfied that subject to modern design standards, the wind turbines associated with the Project are unlikely to pose a significant risk of low frequency and infrasound impacts to surrounding receptors.

No exceedance of adopted WHO criteria is predicted at non-associated dwellings. The Proponent predicts that the likelihood of swish effects occurring is very low. The Department considers that if the conditions did prevail which would trigger modulation, whilst the impact could reduce amenity, the criteria within the SA Guidelines would still be met. However, if atmospheric conditions did reduce the amenity at dwellings it would be variable and intermittent and for a short period of time. In regards to temperature inversions (the atmospheric condition in which temperature increases with height) the Department agrees with the Proponent's assessment that conditions for temperature inversions are unlikely as temperature inversions are associated with low wind speed conditions.

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 the nearest dwelling is approximately 1.5 kilometres, 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 feasible and reasonable mitigation measures to achieve applicable noise criterion at the nearest receivers.

The Department notes that the corona 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 boundary and therefore no impacts are expected on non-associated dwellings. Notwithstanding, the Department has recommended a condition of approval requiring any overhead transmission line associated with the Project to be designed, constructed and operated to minimise the generation of corona and aeolian noise as far as feasible and reasonable at nearest existing sensitive receivers.

5.2. Visual Amenity

Issue

The proposed wind farm consists of up to 33 wind turbines, each to a maximum height of 150m to blade tip, and with 3 blades. The wind turbines and blades are proposed to be an off-white matt finish constructed from non-reflective materials. The wind turbines are to be sited in an irregular pattern along two ridges, with the distances between turbines being between 300m and 1,300m.

Underground transmission cables will be used where possible, with some overhead 33kV transmission lines also required. Either an underground or overhead power line (or a combination of both) will be used to connect the wind turbines to the substation. The power line will be less than 6km long and run between wind turbine 18, crossing Mudgee Road, and connecting to the proposed substation.

A new substation, located at the south-western corner of the Project area, will occupy land approximately 120m by 80m. The substation will include two transformers, 3 small buildings, 2.4m high security fencing, and low level security lighting.

Visual Impact of Wind Turbines and Ancillary Infrastructure

The proposed wind turbines are located within rural land occupied by a small number of rural properties. Due to the large scale of the wind farm and significant contrast to the rural landscape, the proposed turbines would become a dominant feature of the landscape when viewed at close range. As the viewer distance is extended the entire Project is visible, however it becomes smaller in scale and hence becomes a less significant visual element within the landscape.

Five broad landscape character units have been identified in the vicinity of the wind farm, with associated landscape quality rating as follows:

- Mount Bodangora – moderate landscape quality, with moderately vegetated landscape;
- Bodangora (to the west of Mount Bodangora) – moderate landscape quality, with generally cleared and undulating land, the Bodangora township, and airport;
- Spicers Creek (north-east of the wind farm) – moderate landscape quality, with gently undulating land with improved pasture and red/brown soils;
- Comobella (far west) – low-moderate landscape quality, with low undulating hills dominated by grazing; and
- Wellington (south-west of Mount Bodangora) – high landscape quality, incorporating the town of Wellington, steep vegetated ranges associated with Mount Arthur, and the Macquarie River.

A total of 26 dwellings located within 6km of the nearest proposed wind turbines have been assessed as part of the visual impact assessment. These residents have been identified by the Proponent as receptors for assessment due to variations in the distance and viewing direction. Dwellings within close proximity to the Project site are shown in **Figure 5.2**. Photomontages of typical views are included in **Figure 5.3**.

Figure 5.2: Nearby non-associated dwellings

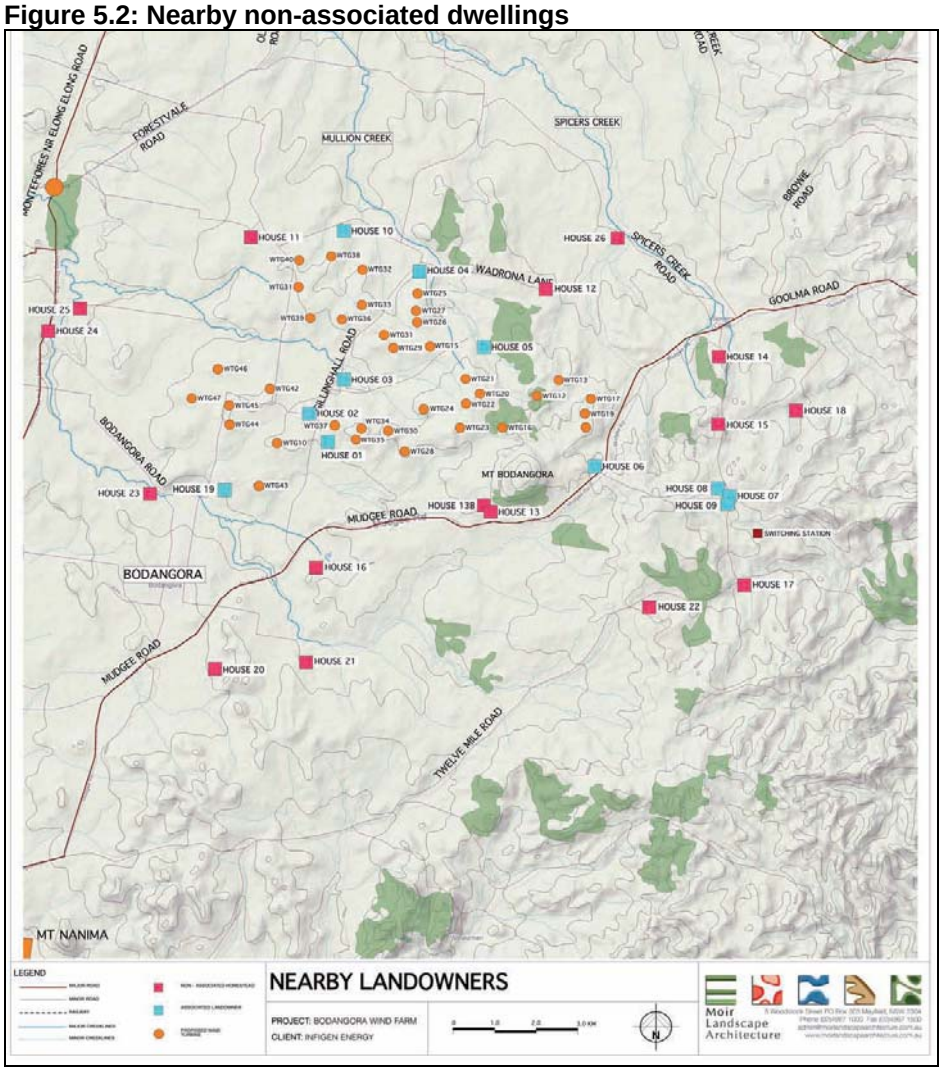
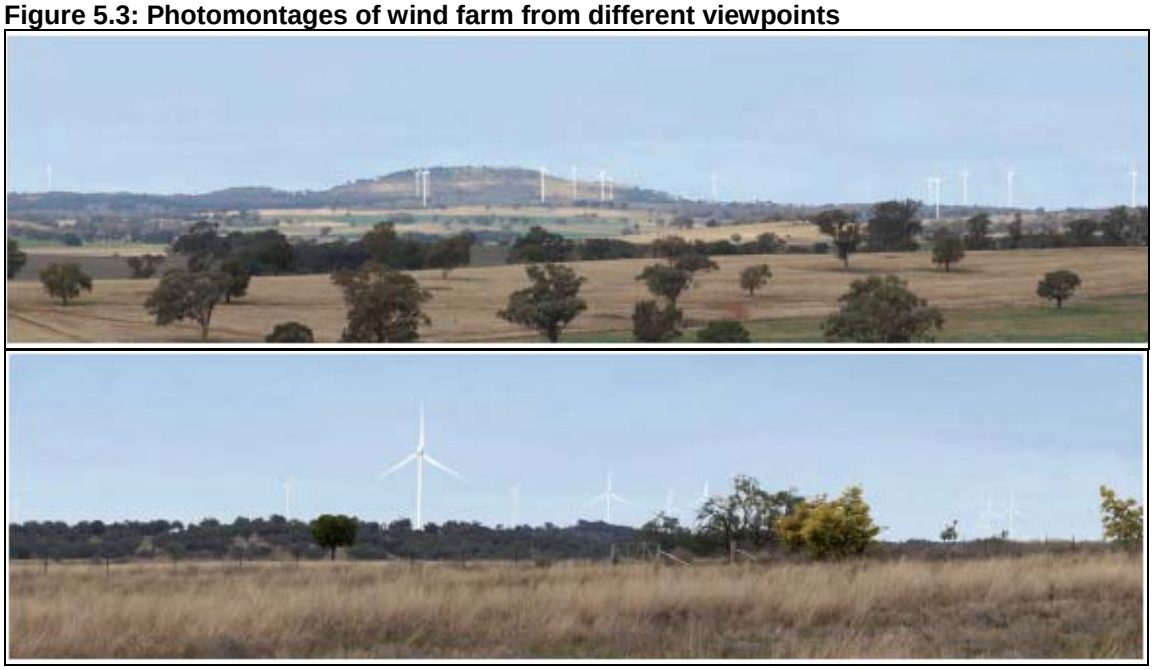
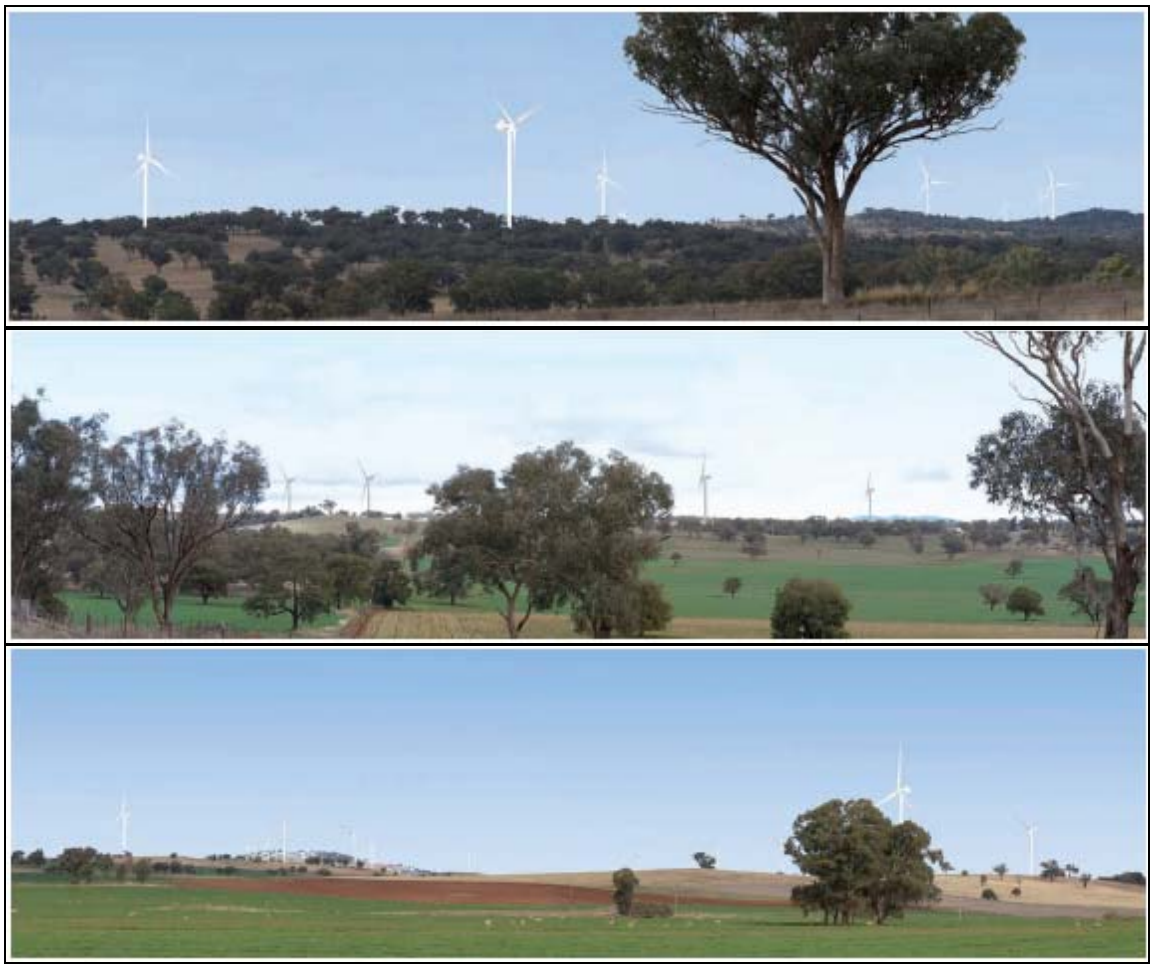


Figure 5.3: Photomontages of wind farm from different viewpoints





An analysis of the Zone of Visual Influence (ZVI) of the wind farm has been undertaken to identify the areas of surrounding land from which the wind farm may be partially or completely visible. This is based on topographic information and a turbine height of 150m, but does not consider the height and location of existing vegetation and structures which may provide screening. Based on the ZVI mapping, the highest visibility will be to those receivers within 2km of the proposed turbines. A larger percentage of wind turbines will be visible from the north-east of the Project area, while the south-east of the Project area will have significantly lower visibility as views are generally obstructed by the undulating topography in this location.

Viewpoint analysis has been prepared to assess the likely impact that the development will have on the existing landscape and character. Based on Viewpoint analysis, the Proponent's assessment has concluded that seven viewpoints are rated as having a moderate impact, and five viewpoints are rated has having a high impact. Of the five viewpoints which are expected to have a high impact, three were to associated dwellings, and two were to non-associated dwellings near Bodangora Village, which represent the worst-case scenario for the rural residential properties in Bodangora.

Of the 26 dwellings assessed (of which 11 are associated dwellings), the proposed wind turbines will not be visible from 9 dwellings. Only one non-associated dwelling is expected to have a moderate visual impact, however the residence is oriented to the west and views of the wind farm will be minimal. Additionally, a slight rise in topography and extensive native vegetation will reduce views of the proposal to filtered glimpses. Non-associated residences at Bodangora Village are expected to experience nil to low visual impact, due to individual homes screen plantings surrounding the residence, resulting in filtered views of the wind farm.

The sloping topography and existing vegetation surrounding the wind turbines significantly alters the visibility of the proposed development from many vantage points. There are limited areas within the local area from which the proposed wind farm can be viewed from a short range in its entirety. The overall expected visual impact to non-associated dwellings within the visual vicinity of the Project, which are all located over 2km from the nearest wind turbine, has therefore been determined to be nil to low. This is due to a number of factors at each dwelling including one or a combination of the following: dwelling oriented away from turbines; views obstructed by native vegetation; views obstructed by screening vegetation; or views concealed by rise and sloping topography.

There are no expected views of the substation from non-associated dwellings, and views of the overhead 33kV transmission line are generally expected to be obstructed by topography and native vegetation.

Whilst the wind farm will be visible from Mudgee Road and Montefiores Nr Elong Elong Road, given the speed of travel and local influences including roadside vegetation, the predicted visual impact is considered to be generally low. Of the local roads assessed, Gillinghall Road has been identified as having a likely 'moderate' visual impact, given this road dissects the Project area and is within close proximity to wind turbines.

Cumulative impacts

The Proponent has assessed cumulative visual impact by looking at the distance of the proposal to other developments (proposed or existing), such that high visual impact occurs within 3km, medium visual impact occurs from around 6km, and low visual impact at more than 12km.

Currently, the landscape is a predominantly rural landscape with infrastructure associated with nearby towns. A combination of developments have altered the appearance of the natural landscape, including the Wellington Substation and associated high voltage power lines, and the Wellington Correctional Centre, both located over six kilometres south from the Project area. Other proposed and approved developments in the locality include:

- the proposed Uungula Wind Farm, located to the south-east of the Bodangora Wind Farm – some wind turbines are potentially located within 12 kilometres of the Bodangora Wind Farm resulting in a low cumulative visual impact. It is unlikely that receptors will view both developments in combination from a stationary viewpoint, however there may be some perceived cumulative impact when viewed in succession as travelers move through the landscape;
- the approved Wellington Gas-Fired Power Station located along Goolma Road north of Wellington – likely insignificant impact given the separation distance is over 12 kilometres; and
- the approved gas pipeline connecting Young and Wellington – likely insignificant impact given the majority of the pipeline will be located underground.

Considering the character of existing and proposed development in the region, the Proponent considered that the visual landscape of the region has the capacity to absorb the proposed development.

Impact of Shadow Flicker, Blade Glint, and Night Lighting

The Proponent's assessment identified that as a 'worst case scenario', five dwellings are likely to experience the effects of shadow flicker. All five dwellings are associated dwellings. A number of roads through the Project area may be affected by shadow flicker, in particular Driel Creek Road and Gillinghall Road, in addition to a small section of Mudgee Road to the north-east of Mount Bodangora. There is considered to be negligible risk associated with the distraction of motorists who experience shadow flicker, likening the experience to a vehicle passing by a static object, for example a tree-lined road.

Blade glint is identified as a potential aspect which could cause distraction to drivers, where roads are aligned to turbines, and particularly where the road is located at a higher altitude to a turbine hub. While the effect may be noticeable at a distance, the impact is regarded as transient and therefore the expected impact is minimal.

The Proponent has consulted with the Civil Aviation Safety Authority (CASA), and advised that CASA identified that night time obstacle lighting is not required for the wind turbines. Therefore, night time lighting will consist of low intensity security lighting at the base of the wind turbines and at the substation, and is not perceived to be a visual issue.

Issues raised in submissions

A total of 113 submitters (75%) raised the issue of visual amenity, including the Bodangora Wind Turbine Awareness Group and the form letter sent in by 103 submitters. Key issues raised include:

- wind turbines will degrade the scenic qualities of the rural landscape;
- the predicted visual assessment is not an accurate portrayal of the potential visual impact at particular dwellings;
- zones of visual influence are never wholly accurate and other tools such as photomontages are never wholly realistic;
- the planting of trees to mitigate the visual impact of wind turbines is not feasible;
- other visual impacts including lighting and ancillary facilities such as substations, transmission lines and roads have not been adequately assessed;
- there will be cumulative visual effects, both locally and within the Wellington local government area;
- the Proponent has not sufficiently addressed the issue of shadow flicker; and
- the visual assessment should be conducted on the exact turbine infrastructure locations, with no 'wriggle room' or 'micro-siting' of up to 100m.

Additionally, Wellington Council does not believe that the criteria of the NSW draft guidelines have been appropriately addressed, and considers that the landscape and visual impact assessment has not thoroughly described the community and stakeholder values of the landscape.

The Proponent, in the Submissions Response Report, accepts that some people find wind turbines unattractive, and represent an unwelcome change on the landscape. The Proponent further acknowledges that viewpoint photographs were only taken from accessible public land, and the photomontage selection process was undertaken to best represent a range of distances as well as locations with differing views. A number of vantage points were selected nearby to neighbouring dwellings to wind farms, as best as possible.

With regards to planting vegetation as a mitigation strategy, the Proponent has identified that vegetation screening has worked successfully in the past and if there is a specific request or requirement to provide screening, the Proponent will work with a local flora specialist to select adequate species types.

Consideration

Visual Impact of Wind Turbines and Ancillary Infrastructure

The Department notes that of the five view points identified in the Proponent's assessment as likely to experience high visual impact from the Project, two are nearby to non-associated dwellings at Bodangora Village. However, the Proponent's analysis also identifies that due to existing and proposed screen plantings surrounding individual residences, resulting in filtered views of the wind farm, visual impact to these non-associated dwellings is expected to be nil to low.

The Department further notes that a number of non-associated dwellings nearby to the view points with predicted moderate to high visibility impact objected to the proposal based on the visual pollution of the rural landscape by the wind turbines. The Department acknowledges the subjective

nature of the visual impact of wind turbines, and that the Bodangora community appear to be largely of the view that wind turbines do detract from the landscape of the area.

The Department considers that generally the location of the turbines are such that no non-associated dwellings or viewpoints are expected to experience visual intrusion in multiple directions without any visual relief in any direction, due to the sporadic location of the turbines, and intervening landform and vegetation which has the potential to at least partially screen views where turbines are located. The Department considers that there would be opportunity to further supplement existing screening through targeted landscaping, and agrees that the Proponent's commitment to provide native vegetation screening to nearby neighbours and at key viewpoints, will assist in mitigating the visual effects of the Project, noting that this has been identified to work successfully in the past.

The Department considers that whilst wind turbine(s) will be visible to neighbouring properties and viewpoints, due to the distances from key viewpoints, these structures would not be visually dominant. Existing features in the landscape of similar visual prominence include existing wind masts and transmission line towers. To ensure appropriate development and maintenance of landscaping on the site, to provide adequate landscape buffers and address the visual impacts arising from the Project, the Department has recommended a condition of approval to prepare a Design and Landscaping Plan. The Plan is required to be prepared by a qualified landscape architect and where relevant meet any requirements of Council, and be approved by the Director-General prior to the commencement of permanent built works and / or landscaping.

Additionally, to ensure that the visibility of wind turbine(s) are minimised as far as practicable to neighbouring dwellings, the Department has recommended conditions of approval requiring appropriate landscaping at these dwellings, at the owners request. Should any non-associated dwelling be subject to moderate to high visual impact, as defined in the EA, consultation would also be required regarding impact minimisation measures. Further, at the request of any owners of non-associated dwellings with views of a turbine(s) located within 5km of their dwellings, the Proponent shall provide and bear the full cost of reasonable landscaping treatments to visually screen these dwellings.

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. In relation to the overhead transmission line connection from turbine 18 to the substation, although the final alignment would be subject to detailed engineering design, the proposed 6km route is unlikely to constitute a dominant visual element within the landscape, as the transmission line is expected to be obstructed by topography and native vegetation.

Notwithstanding, the Department has recommended conditions of approval requiring appropriate visual treatment of ancillary infrastructure. This includes ensuring that the substation and associated facilities are designed and constructed to minimise visual intrusion, including appropriate external finishes to minimise glare or reflection, the use of building materials and treatments which visually complement the surrounding environment, and landscape planting to screen views.

With regards to cumulative impact of the proposal, whilst there are a range of existing developments which have altered the appearance of the natural landscape from a broader perspective, it is not expected that the Project will contribute to a significant additional impact on the landscape. In addition, whilst some wind turbines associated with the proposed Uungula Wind Farm may potentially be located just within 12km of the Bodangora Wind Farm, this would represent a low impact to the majority of non-associated dwellings within the vicinity of the Bodangora Wind Farm. Some impacts may be felt by travellers moving through the landscape, or non-associated dwellings situated between the two wind farms, which at around six kilometres is considered to be a medium visual impact.

The Department's proposed condition, that at the request of any owners of non-associated dwellings with views of a turbine(s) located within 5km of their dwellings, to be provided with reasonable landscaping treatments to visually screen these dwellings, will assist in mitigating the cumulative impact. The requirements for Uungula Wind Farm would similarly consider this issue.

Shadow Flicker, Blade Glint and Night Lighting

The Department generally accepts the findings of the Proponent's assessment, which predicts that shadow flicker is only likely to be experienced by five associated dwellings, and would be unlikely to be experienced by any non-associated dwellings as a result of their location in relation to the wind turbines. Notwithstanding, to ensure the amenity of surrounding residents is preserved, and to ensure that shadow flicker is not experienced beyond an acceptable limit, the Department recommends a condition to ensure that should shadow flicker occur from the operation of the Project, shadow flicker shall not exceed 30 hours / annum.

With regards to the health effects potentially associated with shadow flicker, this has been discussed in **Section 5.5**.

The Department notes that a number of roads through the Project area may be affected by shadow flicker, however it agrees with the Proponent's conclusion that there is considered to be negligible risk associated with the distraction of motorists who experience shadow flicker, as the experience is similar to a vehicle passing by a static object, for example a tree-lined road.

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 a condition of approval in this regard.

With respect to night lighting, the Department notes the Proponent's reasons for not proposing aviation hazard lighting. However, should aviation hazard lighting be required for the Project due to potential micro-siting as a result of detailed design, 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 a condition of approval in this regard.

In consideration of the above factors, the Department considers that the Project's visual impact on landscape values as a whole would be acceptable. Whilst acknowledging that some residents are opposed to the visual intrusion of wind turbines into the rural landscape, the Department considers that with the implementation of proposed screening to individual residents and at key viewpoints, impacts can be minimised to acceptable levels.

5.3. Flora and Fauna

Issue

The Proponent has advised that the majority of the Project area comprises exotic pasture land used for cropping or grazing, where little native cover or native shrubs occur, and with some stands of modified woodland and scattered paddock trees. The understorey to most of the stands of woodland is composed almost entirely of exotic species, with exceptions at roadside remnants, in particular along Gillinghall Road.

Almost all of the remnant trees, patches of trees and occasional native grassland in the lower land areas are part of the one plant community, the White Box – Yellow Box – Blakely's Red Gum Woodland, which is listed as an Endangered Ecological Community (EEC) under both the *Threatened Species Conservation Act 1995* (TSC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Remnants of this community occur extensively across the

tablelands and the western slopes, and within the Project area remnants occur as paddock trees and in some locations in stands and along local road reserves.

No threatened plant species have been recorded within 10km of the Project area, or within the Project area. Given the highly modified environment within the Project area, it is unlikely that any threatened flora species would occur.

Trees and tree hollows are the most important habitat feature across most of the locality, providing foraging, roosting and breeding resources for native birds and other animals, however hollow-bearing trees are not common in the landscape. Another important habitat feature is the rock outcrops associated with the granite country in the central and southern parts of the locality. These areas contain much of the fauna diversity within the locality. Threatened fauna species which were recorded in the local area during field surveys are described in **Table 5.3**.

Table 5.3: Threatened species within the locality

Name	Comment	TSC Act	EPBC Act
Threatened mammals			
Spotted-tail Quoll *Dasyurus maculates*	This species has been recorded twice within the Project area, and is likely to be very thinly distributed throughout the project area and the wider region. The granite outcrops may provide habitat.	V	V
Threatened birds			
Superb Parrot *Polytelis swainsonii*	The Superb Parrot breeds further south of the Project area. Birds move north during winter, with a number of sightings within the Project area during the July 2011 survey.	V	V
Grey-crowned Babbler *Pomatostomus tempralis*	The Grey-crowned Babbler occupies the western slopes and plains of NSW, within woodlands dominated by mature eucalypts, tall shrubs and an intact ground cover of grass and forbs. The Grey-crowned Babbler was observed in the woodland along Gillinghall Road.	V	-
Threatened bats			
Yellow-bellied Sheathtail Bat *Saccolaimus flaviventris*	The Yellow-bellied Sheathtail Bat was recorded at three creek sites, very irregularly, and by just a few calls each night.	V	-

V = Vulnerable / E = Endangered / - = not listed

The results of bird surveys indicate that 97% of all observations were of birds active below 20m, in line with the average local tree height of between 8 and 20m. Only 0.4% of observations were of birds flying above 50m from the ground. The Bat Fauna Assessment identified the highest level of activity was recorded along creeks and in woodland remnants, with a very small number recorded in open pasture.

Many listed internationally protected migratory species occur in the locality of the wind farm. Such species include diurnal birds of prey (eg Nankeen Kestrel) and waterfowl (eg native ducks), species that are not threatened in Australia and are in some cases abundant. Some of these species occur within the Project area from time to time, but there is no important habitat within the Project area for such species, and the habitat within the Project area does not support an ecologically important proportion of a population of such species.

Based on existing information and field surveys, the Proponent has advised that the overall impact of the wind farm at Bodangora on native flora and fauna is expected to be small. The majority of wind turbine locations and access routes are across cleared and heavily modified grazing land, and therefore very little clearing is required. Some vegetation clearing is required at a few wind turbine

sites, however it is expected that the wind farm can be constructed with almost no tree removal required, and would avoid local habitats including woodland, rocky outcrops, creeks, or other features that could be important to native biota. The worst case loss of vegetation is calculated at 1.32 hectares, including small amounts of White Box – Yellow Box – Blakely's Red Gum Woodland.

The impact to birds is often cited as a potential impact of wind farms, referred to as 'blade-strike'. To date, data suggests that wind farms in Australia have little impact on native birds. Studies in Australia have found bird mortality associated with wind farms to be very low. After a review of the threatened bird species known and potentially present in the locality, the relevant species are either ground species or are unlikely to occur in the Project area because of lack of suitable habitat. The potential risk to threatened bird species from blade-strike is therefore very low to negligible.

Impacts that can potentially occur for bat species from wind farm developments include habitat loss or disturbance during the construction phase, and once operational, collision of bats with turbines that result in external injury, or air turbulence or pressure effects that result in internal injury (barotrauma). There is unlikely to be any significant impact on the local bat community as long as habitat such as creeks, high quality woodland remnants, and mature trees, are avoided and retained.

With regards to barotrauma, this is most likely to occur where bats swerve to avoid a moving turbine blade, but meet a zone of low pressure and suffer expansion of air in the lungs. It is difficult to mitigate for bat barotrauma issues, and although currently under development, deterrent devices using ultrasound are not currently available. Given that the majority of bat calls were identified along the creek lines and in the woodlands, it is expected that turbine layout away from these areas minimises the opportunity for blade strike and barotrauma.

Outcomes of the assessment against the *Guidelines for Threatened Species Assessment* for threatened species listed under the TSC Act, and the effect of the proposal as a proposed action on any matters of national environmental significance under the EPBC Act, are included in **Table 5.4**.

Table 5.4: Threatened species and matters of national environmental significance

Name	TSC Act	EPBC Act*
Vegetation communities		
White Box - Yellow Box - Blakely's Red Gum Woodland	The quality of native understorey is low to very low, and stands of these trees are common in the district. Whilst the wind farm will result in some loss of native vegetation that is part of this community, the loss is small and trees constituting high value sites will be avoided.	Almost none of the treed areas in the Project area meet the minimum criteria for the community. Notwithstanding, micro-siting of project elements can avoid woodland areas.
Threatened mammals		
Spotted-tail Quoll *Dasyurus maculates*	No turbines are proposed in the area where species have been spotted in the past, or in the species likely habitat.	-
Threatened bats		
Yellow-bellied Sheathtail Bat *Saccolaimus flaviventris*	The majority of bat calls were identified along the creek lines and in the woodlands, which are areas where the design avoids placing turbines. It can be concluded that the design of the turbine layout also minimises the opportunity for blade strike and barotrauma.	-

Name	TSC Act	EPBC Act*
Threatened birds		
Superb Parrot *Polytelis swainsonii*	Micro-siting of infrastructure should avoid tree hollows. Blade strike is unlikely to be a threat since the parrot is a ground feeder and seldom flies above the canopy.	The wind turbine and infrastructure layout can be constructed without the loss of any hollow-bearing trees.
Grey-crowned Babbler *Pomatostomus tempralis*	This bird resides in natural woodland with a native understorey, which is rare in most parts of the Project area, additionally the wind farm does not impact on any natural woodland. The species is a ground bird and could not be impacted by blade strike.	-

** The Proponent has advised that as the proposed wind farm is not likely to have a significant impact on matters of national environmental significance listed under the EPBC Act, referral to the Commonwealth Minister for the Environment for assessment and approval is not warranted.*

The following mitigation measures will be incorporated in the Proponent's Construction Environmental Management Plan for the protection of native vegetation and habitat:

- micro-siting of turbines and infrastructure to avoid areas of woodland and native trees;
- where tree clearing cannot be avoided, develop an appropriate tree clearance protocol;
- minimise the effect of the wind farm on threatened and other species, and implement continued monitoring of the impact of the wind farm;
- implement environmental management and construction procedures with regards to weed control, erosion management, and planting of locally indigenous species; and
- prepare and implement a vegetation off-set strategy to assist in regeneration of woodland areas.

A total of 110 public submitters (73%) raised the issue of impact to flora and fauna, including the Bodangora Wind Turbine Awareness Group and 98 form letters. Key issues raised include:

- destruction of flora and fauna, in particular that associated with the Gillinghall Road widening, the Wedgetail Eagle, and destruction of grassy box woodland;
- no commitment as to how noxious weed spread by air turbulence are to be managed;
- no part of the EA deals with the possibility of Koala populations;
- the EA is silent on the impact noise and sound changes might have on neighbouring bird types and numbers; and
- the EA does not adequately meet the requirements of the DGRs, or provide adequate evidence of the extent of vegetation clearing.

OEH considers that the EA does not contain sufficient information to support the conclusions of the impact assessment. In particular:

- the Proponent has not provided sufficient detail to support the assessment of impacts on native flora and fauna, and as such it is difficult to reach conclusions regarding the acceptability of impacts or the need for modification of the proposal;
- the EA does not contain sufficient detail regarding avoidance measures;
- the EA does not adequately detail options for mitigating impacts on biodiversity; and
- the EA does not include a detailed offset proposal.

Wellington Council notes the particular importance of retaining native fauna habitats established within existing tree hollows. Council recommended that a condition of approval be placed on the development to ensure the identified habitats are preserved and not disturbed. Additionally,

Council considers that the Proponent should complete an EIS for roadside vegetation affected by construction of new access and transport routes, to ensure that significant vegetation is retained.

The Central West Catchment Management Authority encourages the development of a Flora and Fauna Management Plan to outline the mitigation strategies to minimise impact to native vegetation and habitat across the Project area.

The Proponent, in the Submissions Response Report, provided the following further comments and justification regarding potential impacts to flora and fauna:

- threatened fauna species not recorded during field surveys may be occasional visitors to the Project area and are not likely to be significantly impacted given habitat features will be avoided;
- stated observations of Koalas are more likely wandering males that could have come from some distance away;
- while raptors do fly at rotor height, they have demonstrated excellent avoidance behavior around wind farms;
- the Proponent is not aware of any regulatory authority or published studies of the effects of wind farms on the behaviour of birds as a result of noise from wind farms;
- documentation of avoidance measures and final wind turbine locations can be incorporated in the Flora and Fauna Management Plan;
- a bird and bat collision monitoring program is proposed to be undertaken once the wind farm is operational, in consultation with OEH and in accordance with the *Australian Wind Energy Association July 2005* report; and
- information on location and protection measures for the White Box - Yellow Box - Blakely's Red Gum Woodland will be provided in the Flora and Fauna Management Plan.

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 has considered issues raised by the community and Wellington Council. 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 location of wind turbines and roadside vegetation where road widening for construction access is required.

The Department 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 within and adjacent to the Project site are taken into account and avoided during construction. Although the Proponent has committed to developing construction management measures, the Department has reinforced this commitment so as to ensure the measures are developed in consultation with the appropriate public authorities and approved by the Director-General.

Included in these measures is the requirement for the Proponent to develop, in consultation with the OEH, a Construction 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 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), as well as a procedure for the review of management methods in the event such methods are found to be ineffective.

The Department acknowledges that 1.32 hectares of native vegetation is proposed to be removed (less than 0.1% of the Project area), and is satisfied that the Proponent has minimised potential impacts through careful siting of turbines, 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. To ensure that the Proponent minimises clearing to the greatest extent possible, the Department has recommended a suite of conditions regarding clearing and detailed design and micro-siting, to ensure that all feasible and reasonable effort is made to avoid native vegetation and fauna habitat clearing and disturbance, including limiting clearing to 1.32 hectares unless otherwise agreed by the Director-General.

The Department notes that the Proponent has highlighted sufficient areas within the Project site which contain granite outcrops and stands of woodland, to offset the 1.32 hectares of losses to a ratio of 4:1. The offset locations would be determined in consultation with an ecologist, looking at suitable offset opportunities on associated wind farm properties. Based on the worst case scenario of 1.32 hectares of vegetation removal, the maximum expected offset associated with the Project is 5.28 hectares. The exact offset ratio will be determined through the recommended offset process, and the Department is satisfied that additional land is available on site if necessary.

The Department has considered issues raised by OEH in relation to the level of assessment undertaken, including details regarding avoidance measures and options for mitigating impacts, and OEH's recommendations that offset commitments be demonstrated prior to the approval of the impact. OEH recommends that a detailed offset strategy should be provided to OEH, which is supported by a suitable metric and which addresses OEH's '*Principles for the use of biodiversity offsets in NSW*'. The Department is satisfied that the Proponent has satisfactorily addressed the issues raised by OEH in the Submissions Response Report, and that the Proponent has demonstrated suitable offset arrangements exist on site.

The Department considers that through careful management measures 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. The Package is to be developed in consultation with the OEH, and is required to be submitted to the Director-General for approval prior to the commencement of any construction works in areas requiring native vegetation clearing.

The Department is satisfied that the Proponent has undertaken adequate consideration 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. For the Bodangora Wind Farm Project, turbine lighting is not proposed, the site is not located near significant wetlands, and the wind farm is not located in any known migratory paths. The turbine sites are generally characterised by treeless pasture areas. Additionally, the wind farm is in a non-linear formation and the spacing between turbines is variable.

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

Raptors 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 of raptors detected, the Department accepts that impact 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. Notwithstanding, to ensure that potential risks are minimised as far as practicable, the Department has recommended a condition of approval which requires that all feasible and reasonable efforts shall be made to locate wind turbines at least 30m from adjacent hollow-bearing trees which have the potential to provide roost or nesting habitat for bird and bat species identified to be at risk of rotor collision during turbine operation.

Additionally, to further ensure that impacts are kept to a minimum, the Department has recommended a condition of approval requiring the implementation of a Bird and Bat Adaptive Management Program. The Program would be required to specifically identify pre-emptive and reactive measures for minimising impacts and would determine the incidence of mortality at different parts of the site and at different seasons, and respond to identified issues.

The Department is satisfied that with the implementation of the Bird and Bat Adaptive Management Program, the bird and bat impacts of the Project can be appropriately managed so as to not result in significant 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).

In consideration of the above factors, the Department considers that the Project's impacts on flora and fauna as a whole would be acceptable. Whilst accepting that some residual impacts to flora and fauna may remain, the Department does not consider that these residual impacts would outweigh the Project's broader public interest with respect to renewable energy generation.

5.4. Traffic and Transport

Issue

Construction of the wind farm will impact on the road network due to both short term increased volume of traffic, and the size of the loads, over a construction and commissioning period of around 18 to 24 months. **Table 5.5** outlines the expected traffic volumes associated with each construction phase, based on worst probable case for trip generation. These volumes will be spread over the construction period and over the different potential access routes. Final access routes will be selected in consultation with Wellington Shire Council and RMS to minimise disruption to local traffic and on-site environmental impacts.

Table 5.5: Estimated construction traffic volumes

Phase	Vehicle type / trailer type	No. of one way vehicle movements
Site set-up and de-mobilisation	▪ low loader / semi-trailer / truck	16
Roads and hardstands	▪ truck and dog / truck / low loader	3,696
Foundations	▪ concrete agitator / semi-trailer / low loader	3,368
Cable installation	▪ semi-trailer / dump truck / low loader	328
Wind Turbine Generators	▪ low loader / semi-trailer	76
	▪ restricted access vehicle	612
Overhead line	▪ semi-trailer / low loader	26
	▪ restricted access vehicle	6
Sub Station	▪ concrete agitator / low loader / semi-trailer	48
	▪ restricted access vehicle	2
Other	▪ light vehicle / truck / van	12,176
	TOTAL	20,354

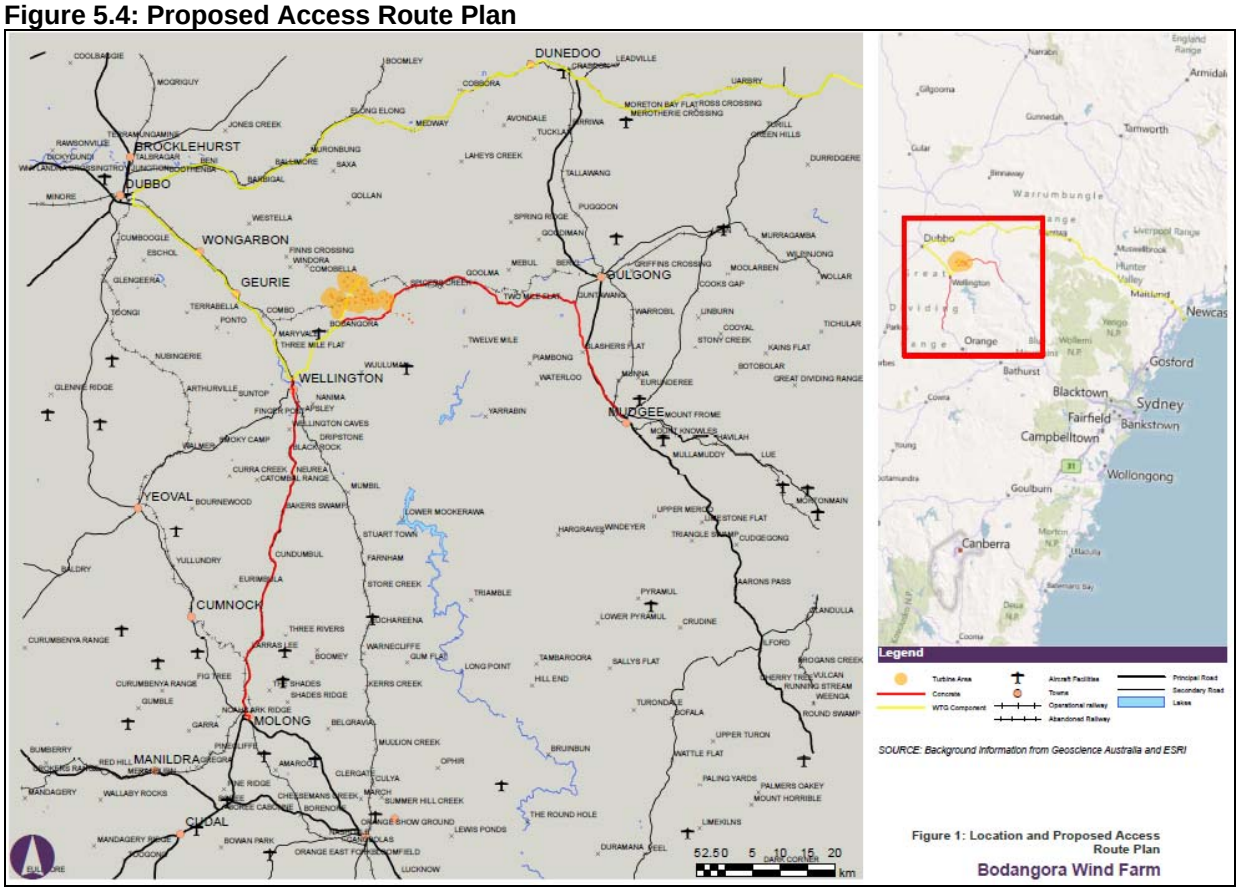
The proposed routes, described in **Table 5.6** and shown in **Figure 5.4**, represent the shortest paths from the likely delivery ports to the site. The delivery of the heaviest equipment will require special trailer combinations to reduce the axle loading. After detailed design the requirement for upgrading of the horizontal geometry or pavement for safe access will be investigated. **Table 5.6** also identifies the areas that will require further investigation.

Table 5.6: Proposed route description

Component	Route description	Areas that will require further investigation
Restricted access vehicles access to site – approximately 450 kilometres from the Port of Newcastle	▪ Bourke St to Hannell St ▪ Industrial Drive to Pacific Hwy ▪ New England Hwy to Golden Hwy ▪ Golden Hwy to Mitchell Hwy ▪ Mitchell Hwy to Goolma Rd ▪ Goolma Rd to Gillinghall Rd	▪ Denham Rd/Golden Hwy: the turning angle is acute, and oversize vehicles may need to enter into the opposite lane to negotiate the turn. ▪ Palace St/Golden Hwy: vehicles may need to mount median strip.
Tower delivery – from Queensland or South Australia, via Dubbo	▪ Mitchell Hwy to Goolma Rd ▪ Goolma Rd to Gillinghall Rd	▪ Goolma Rd/Gillinghall Rd intersection: geometry is adequate for turbine blade delivery, however it is recommended that the spray seal at the intersection be extended to allow for the increased turning movements. ▪ Goolma Rd/Mitchell Creek crossing: investigation into strength rating of bridge required. ▪ Gillinghall Rd: will require regular maintenance during construction, and capping stone may also be required.

NB – watercourses will typically be negotiated by the construction of new culverts with inlet and outlet protection.

Figure 5.4: Proposed Access Route Plan



The maximum traffic volume is expected to be in the order of 120 vehicles per day in each direction, with an average of around 25 per hour in each direction outside of the peak period. The morning peak would include approximately 30 light vehicles, 3 restricted access vehicles and 5 heavy vehicles one way in the hour.

Potential impacts to local road safety will include additional vehicle movements, large vehicle movements, congestion with other road users, and the identification of areas which may require special consideration for upgrades. The timing of vehicle movements could also potentially impact upon sensitive land uses along the travel route, including schools and dwellings. The impact to surrounding highways used by construction vehicles is expected to be minimal.

A number of onsite access roads have been identified within the Project area, as shown in **Figure 2.1**. Proposed new access roads to a width of nine metres within the Project area will provide for access to the wind turbines and other infrastructure within the Project area. A number of different options have been identified, not all of which will be required to be constructed. It is also likely that a number of water course crossings will be required, and stormwater culverts will be installed where necessary according to erosion control measures.

To mitigate the construction traffic and access impacts associated with construction of the wind farm, a Traffic Management Plan will be developed in consultation with RMS, local councils and other stakeholders, and include:

- traffic control measures – provision of traffic control personnel, restrictions on the timing of some large equipment and materials deliveries, establishment of an inspection and maintenance program, and road access / occupation permits for any upgrade works;
- public awareness – implementation of a community information and awareness program, and general signposting of the access roads; and
- onsite mitigation measures – targeted at safety and reducing the impact of onsite traffic.

Overall, the traffic impact during the operational phase will be minor, as only low levels of vehicle access to the site from local roads will be required. Local transportation routes for operational vehicles are expected to be the same as those used during construction. Onsite access tracks will be reduced to 5m in width following the completion of construction, and adjoining areas restored.

A total of 107 submitters (71%), raised traffic and access issues, including the Bodangora Wind Turbine Awareness Group and the form letter sent in by 93 submitters. Key issues raised include:

- further damage to already dangerous country roads, as the local road network was clearly not designed to handle vehicles that are over size and over mass;
- consideration of the Proponent's ability to uphold a promise to upgrade and repair country roads;
- construction vehicles will have a significant impact on Gillinghall Road, which currently has a 4.5m width of pavement material, and is barely suitable for the occasional stock transport vehicle or wheat harvest traffic;
- safety at property entrances due to construction vehicles and the risk to residents using these roads; and
- the EA makes no attempt to quantify the extent of the soil erosion and land degradation issues associated with the internal access roads.

Wellington Council identified a number of recommendations / conditions in relation to traffic and transport. These include the requirement for road condition surveys, agreement that Gillinghall Road will be reinstated to an equivalent or better condition, all access roads off Gillinghall Road to be approved by Council, sealing of Gillinghall Road in the vicinity of property access, maintaining all Council roads during construction, speed limits and advisory signs put in place, and Council to be consulted on the final Traffic Management Plan.

Mid-Western Regional Council raised concern that the volumes / quantities of product and the number of truck movements that are likely to be sourced from Mudgee are not specified and therefore it is difficult to assess the potential impacts on local roads. Council is therefore seeking compensation from the Proponent for the additional heavy traffic that will be on Council roads. Additionally, Council consider that additional heavy traffic movements passing schools and driving along school bus routes should be restricted between the hours of 8.00am to 9.30am and 2.30pm to 4.00pm.

The RMS provided detailed comments for consideration, in summary these included safe intersection site distances, sealing of access points, drainage at access points, damage of classified road reserves, management of oversize and over-mass loads, and removal of construction access points not required during the operational phase.

With regards to further damage to country roads, the Proponent, in the Submissions Response Report, committed to undertaking a detailed condition survey for roads in conjunction with the Wellington and Mid-Western Regional Councils to document the condition of local roads prior to the commencement of construction, to ensure adequacy of roads for construction purposes, and to ensure that local roads will be reinstated to an appropriate condition following construction.

Consideration

The Department agrees with Councils 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. This includes over-mass or over-dimensional traffic that would be required for turbine transport.

The Department considers the maintenance and safe use of local roads to be a key issue, and has consequently recommended conditions of approval to strengthen the Proponent's commitment to maintain the condition of local roads, requiring the Proponent to commission an independent expert to undertake, in consultation with the relevant road authority, the following:

- prior to commencement of construction, review the proposed route and existing access provisions to the Wind Farm site to determine whether the route and existing provisions allow for safe access of construction and operational vehicles associated with the Project. Where improvements or changes to the proposed route are required, the Proponent shall implement these in consultation with the relevant road authority prior to the commencement of construction;
- prior to commencement of construction, assess all roads proposed to be used for over-mass and / or over-dimensional transport to determine whether the existing road condition can accommodate the proposed over-mass and / or over-dimensional haulage. Where improvements are required, the Proponent shall implement these in consultation with the relevant road authority prior to the commencement of construction; and
- undertake pre-construction road dilapidation surveys in consultation with the relevant road authority. The surveys will 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. A Road Dilapidation 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. Further, measures undertaken to restore or reinstate roads affected by the Project shall be at the full expense of the Proponent.

The Department considers that this process would provide a robust basis for determining the need for and extent of upgrade works which may be required for the purposes of heavy vehicle movements prior to construction, including at those intersections identified in the EA, and post construction as 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.

Additionally, the Department is aware that the Proponent has entered into a Voluntary Planning Agreement with Wellington Council, which includes provision to cater for the impact of construction traffic. In particular, in addition to development contributions, a Traffic Study will be undertaken to further confirm works to be undertaken at the expense of the Proponent, including in summary:

- upgrade Gillinghall Road from the intersection with Goolma Road to the intersection of Driell Creek Road prior to any construction works associated with the Project;
- upgrade other roads, bridges, intersections in the Bodangora district that require modification to allow construction of the Project; and
- maintain Gillinghall Road from the intersection with Goolma Road to the intersection of Driell Creek Road for the duration of the construction of the Project.

To further ensure appropriate traffic management during the construction phase, without undue disruption to the local road network, the Department has recommended, to strengthen the Proponent's own commitment to prepare a Traffic Management Plan, additional requirements to be considered in the Construction Traffic Management Plan. This Plan is to be prepared in consultation with the relevant road authorities prior to the commencement of construction of the Project, to ensure the preparation and implementation of comprehensive traffic and access control measures, and is subject to approval by the Director-General. This includes:

- identification of construction traffic routes and volumes;
- details of vehicle movements;
- identification of construction impacts;
- details of management measures to minimise traffic impacts; and
- a response plan for any traffic, construction or other incident.

In consideration of the above factors, the Department considers that the Project's impacts on the regional and local road network as a whole would be acceptable, particularly as any residual pavement impacts as a result of construction vehicle use of roads would be repaired.

5.5. Health

Issue

The Proponent acknowledges that there are public concerns that wind turbines could potentially cause health issues, including diabetes, heart palpitations, behaviour swings, depression and headaches. The Proponent, as the largest owner of operating wind farms in Australia, has advised that they have never received any formal complaints relating to health. The Proponent also notes, that in 2010, the National Health and Medical Research Council (NHMRC) of the Australian Government issued the following statement on the matter: *'There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines'*. Accordingly, the Proponent considers that the wind farms are not expected to cause any adverse human health impacts.

Shadow Flicker

Shadow flicker is the result of shadows across turbines, whereby the rotating blades of the turbine momentarily block the sun's path and a moving shadow is caused. Five dwellings have been identified in proximity to the wind farm which are likely to experience the effects of shadow flicker as a result of the Project. All five dwellings are associated dwellings. The Proponent's assessment concludes that the effects of shadow flicker will be negligible to non-existent for the majority of dwellings and local roads in the region, with the effects of shadow flicker to associated dwellings being appropriately mitigated.

Infrasound

Infrasound is sound that is lower in frequency than 20 Hz, which is often described as inaudible, although remains audible if produced at sufficiently high levels. Non-audible perception (vibrations) of infrasound only occurs at levels well above the threshold of hearing, and modern turbines generate lower levels of infrasound than early turbine designs.

The accepted approach for a common audibility threshold is an infrasound level of 85 dB(G) or greater. Whilst the aerodynamic noise from a rotating turbine blade produces energy in the infrasound range, measurements of infrasound noise emissions from modern turbines indicates that at distances of 200m, infrasound is in the order of 25 dB below the recognised threshold of 85 dB(G), which represents a 100 fold difference in energy content. Additionally, infrasound reduces at greater distances, and separation distances between turbines and non-associated dwellings are well in excess of 200m.

Electric and Magnetic Fields

Electric and Magnetic Fields (EMF) are a combination of invisible electric and magnetic fields, which occur both naturally and as a result of human activity. EMFs occur wherever electricity is present, so therefore in the case of wind farms, this is found in electrical equipment such as transmission lines, substations and electrical components within the turbines.

The Proponent states that there are currently no Australian standards regulating exposure to power frequency. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) of the Australian Government has prepared a draft *Radiation Protection Standard; Exposure Limits for Electric & Magnetic Fields – 0 Hz to 3 kHz; Public Consultation Draft* dated 7 December 2006. Whilst the research has identified that concerns for health effects of EMF is not fully dispelled by existing scientific data, a precautionary approach is recommended.

Previously, the NHMRC has provided *Interim Guidelines on Limits of Exposure to 50/60 Hz Electric and Magnetic Fields* (1989). These Guidelines identify a 24 hour exposure limit of 1,000 milligaus (mG) for magnetic fields and 5.0 kilovolts per metre for electric fields. (Note that these Guidelines have since been rescinded).

The actual level of EMFs will be dependent on a number of factors according to the final design including on the load current, the spacing of equipment, and temperature. However, all EMFs will be localised in areas not frequented by the general public.

The nearest dwellings to electrical infrastructure are as follows:

- the nearest non-associated dwelling to a wind turbine is approximately 2.35 kilometres;
- the nearest non-associated dwelling to the substation is approximately 1.2 kilometres;
- the nearest associated dwelling to a wind turbine is approximately 400 metres; and
- the nearest associated dwelling to the overhead powerline connecting to the substation, and the substation, is approximately 400 metres.

On this basis, the Proponent considers that the possibility of human health effects due to EMFs would not be an issue for the Project.

Issues raised in submissions

A total of 127 submitters (84%), raised the issue of potential health impacts relating to the operation of the wind farm, including the Bodangora Wind Turbine Awareness Group and the Waubra Foundation, and the form letter sent in by 106 submitters. Key issues raised are summarised as:

- question whether the Proponent can guarantee that there will be no adverse health effects on any individual in or surrounding the Project area;
- there is growing evidence that there can be a negative impact on the health of humans, and the attempts to deny the evidence cannot be seen as honest scientific disagreement, and represent either gross incompetence or intentional bias;
- just because it is not proven by science does not mean there are not real health issues associated with wind turbines;
- the presence of wind turbine infrasound and low frequency noise emitted by wind turbines has been categorically and undeniably confirmed at multiple wind developments in Australia and internationally, by multiple acousticians;
- the Proponent has not sufficiently addressed the issue of shadow flicker, including its potential relationship to epilepsy; and
- independent research needs to be carried out into the possible health effects on livestock and working animals.

Additionally, Wellington Council notes that the community has outstanding and unanswered concerns pertaining to health related issues associated with wind farm developments. Council requests that further community consultation meetings be held to consult on this.

NSW Health – Western NSW Local Health District, has raised no concerns regarding the operation of the wind farm.

The Proponent, in the Submissions Response Report, provided the following additional justification responding to concerns raised regarding health impacts:

- there is still no evidence of a causal relationship between symptoms and wind turbines – there is no acoustic, electrical or other physical force or energy from the turbines affecting health;
- Simon Chapman, Professor of Public Health at University of Sydney, has indicated that some cases could be as a result of the 'nocebo' effect, which has proven that some people who believe that something is making them ill can actually make themselves ill;
- infrasound levels, measured and documented in peer-reviewed studies, have been measured to be hundreds of times lower than can be perceived, let alone impact on someone's health; and
- reference is made to an article investigating how shadow flicker can induce seizures in persons with epilepsy, with guidelines recommending that revolutions should be kept to sixty revolutions per minute for a three-bladed turbine. Modern wind turbines rotate at

speeds around 20 rpm, or one revolution every three seconds. This results in a shadow flicker frequency of about 1 per second in accordance with the article's recommendations.

The Proponent has also presented arguments against the validity of claims of health impacts due to wind turbines, made by the Waubra Foundation.

Consideration

The issue of health effects has been extensively reviewed over the past 30 years both in Australia and internationally, however adverse health effects have not been proven. Notwithstanding, the Department takes the conservative approach and does not rule them out, but due to the distance between the Project's infrastructure and non-associated dwellings it is considered unlikely to be an issue. Additionally, all associated dwellings have signed an agreement with the Proponent with full knowledge of alleged health risks.

Shadow Flicker

Although there is currently no standard relating to the appropriate limits for shadow flicker effects, a commonly applied limit used around the world is 30 hours per year and 30 minutes per day, based on a worst case scenario. Shadow flicker is not predicted at any non-associated dwelling, and so the Department considers that no adverse health impacts are expected from the Project as a result of shadow flicker.

Nevertheless, to ensure that the maximum level will not be exceeded, the Department has recommended a condition that shadow flicker from the Project must not exceed 30 hours per annum at any residence not associated with the Project. Additionally, the Department accepts the Proponent's advice that in relation to the effects of shadow flicker on persons with epilepsy, the shadow flicker frequency of modern wind turbines is well below that which could potentially affect people with epilepsy.

Infrasound

As discussed in the previous **Section 5.1**, the noise assessment has determined that the operation of the turbines can comply with the noise criteria and will not emit a significant amount of low frequency noise or infrasound. The Department considers that the Proponent has adequately assessed the impacts of any infrasound from the Project and that no adverse health impacts are expected beyond distances of 200 metres from a wind turbine, which therefore includes all associated and non-associated dwellings.

Additionally, the Department has consulted with NSW Health regarding potential health impacts resulting from wind farms. NSW Health advised it supports the NHMRC statement that '*there are no direct pathological effects from wind farms and that any potential impacts on humans can be minimized by following existing planning guidelines'*, and will continue to seek NHMRC's guidance on health impacts of wind farms. The NHMRC conducted a scientific forum in June 2011 and is currently undertaking a systematic comprehensive review of evidence around wind farms and health impacts. The aim of this review is to identify any gaps in the evidence and identify any recommendations for further research. NSW Health is supportive of this process and will update its policy should this review bring any new evidence to light.

Electric and Magnetic Fields

Electric fields can be mitigated by shielding provided by the equipment itself. Therefore, to the extent there is a potential health concern, the focus is now on magnetic fields (MFs), rather than electric fields. The Department is satisfied that the Proponent has demonstrated the principles of prudent avoidance by locating transmission and power lines, wind turbine infrastructure, and the substation, as far as practical from non-associated dwellings, as well as no closer than 400 metres to associated dwellings. The Department is also satisfied that as the levels of MF are identified as conforming with the recommended maximum exposure limit of 1,000 mG, identified in the ARPANSA draft standard, impact on human health is considered unlikely to occur.

The Department has considered the impacts of shadow flicker, infrasound, and EMFs, and based on the information provided by the Proponent, and supporting evidence from the NHMRC and NSW Health, the Department considers that the proposed wind farm would not give rise to any adverse human health impacts.

5.6. Other

Heritage

Aboriginal use of this landscape is predicted to have been sparse, of low intensity, and restricted to a limited range of activities such as movement through the country, hunting and gathering forays, etc. Three previously recorded heritage places have been identified within proximity to the Project area. Two additional unlisted Aboriginal objects have been identified within the Project area during field surveys.

A scatter of stone artefacts considered to be of low local scientific significance is located on an existing access track, and given the nature of the site, unmitigated impacts are considered appropriate. A possible stone procurement area considered to be of moderate local scientific significance, is located along a proposed access track. The Proponent has advised that impact to the stone procurement area will be avoided by diverting the proposed access road around this site. Additionally, a conservation strategy will be developed to detail the avoidance of this site.

Historic Heritage values at Bodangora and in the wider region relate to pastoral and agricultural activities, mining, and transport. Two heritage items listed on the NSW Heritage Database are located in proximity to the Project area, and one, the Sandy Hollow to Maryvale Railway, transects the Project area. Sections of the unfinished Sandy Hollow to Maryvale Railway within the Project area are currently used as a farm road within the Glen Oak property. This roadway is proposed to be utilised for wind farm access during the construction and operation of the Project. The Proponent has advised that proposed impact to the railway / road would be negligible, as it is not expected that there will be any additional impacts beyond those to which the railway line already sustains as a local road.

The Proponent's field surveys identified the Kaiser Mine complex within the Project area, comprising a concrete ore treatment plant, mine shaft, a mullock heap, and associated features and discarded items. The Proponent has identified that this item is not considered to warrant heritage listing. However, the Department notes that the Kaiser Mine Site (530 Driel Creek Road) is listed as locally significant within the *Wellington Local Environmental Plan 2012*. Notwithstanding, the Kaiser Mine complex is situated entirely outside the area of proposed wind turbine 44, access tracks and other infrastructure elements, and the mine will be identified as a restricted area during wind farm construction. The Proponent has therefore advised that it is not expected that there will be any direct impact to the mine.

The Proponent has identified general mitigation measures to be implemented to manage potential impacts to any Aboriginal and Historic Heritage items within and in the vicinity of the Project area. These include minimising ground disturbance impacts, additional archaeological surveys, preparation of a Cultural Heritage Management Protocol to document additional procedures required for impact avoidance or mitigation, and stop work procedures for discovery of any unrecorded Aboriginal objects or any additional Historic items.

A total of 91 public submitters (60%) raised concern regarding the destruction of historic, heritage and cultural areas, including the Bodangora Wind Farm Awareness Group and form letters. In particular historic sites within and surrounding the Project, including the Kaiser Mine, would be susceptible to blasting and excessive traffic during construction. The Bodangora Wind Farm Awareness Group also specifically raised concern that the Proponent has not sought to consult with local Heritage groups or community members in relation to local heritage, nor addressed the requirement to demonstrate the likely impact of the proposal on heritage vistas.

Both Wellington Council and the Central West Catchment Management Authority do not consider that adequate or effective consultation with Aboriginal Stakeholders has occurred. In particular with the Wellington Local Aboriginal Land Council, Wellington Aboriginal Community Working Party, and the local Gallanggabang Aboriginal group. Ongoing consultation during the construction and operation of the Project should occur, including consultation when developing the Cultural Heritage Management Protocol.

The Proponent responded to concerns raised within the Submissions Response Report, re-iterating that the Project's potential impacts on Aboriginal and Historic Heritage would be minimal, and it is not expected there will be any impacts to the Sandy Hollow to Maryvale railway line beyond those which the railway line already sustains as a road. Therefore there is no destruction of historic, heritage or cultural areas expected as a result of the proposal.

The Proponent, in the Submissions Response Report, clarified that the Wellington Local Aboriginal Land Council is currently in administration. The Proponent has further advised that the State Local Aboriginal Land Council was contacted to determine the status of the Wellington Local Aboriginal Land Council, which confirmed that the Land Council was still in administration. Further, the appropriate Aboriginal representatives were consulted on the Project, and appropriate members participated in the field inspection.

Consideration

The Department acknowledges that the construction activities and operation of the Project would have an impact on one known Aboriginal site (scatter of stone artefacts), and one State listed heritage item (Sandy Hollow to Maryvale Railway). Construction activities would also be carried out in the vicinity of one possible Aboriginal site (stone procurement area) and one local historic site (Kaiser Mine complex).

The Department considers that generally, the Proponent's mitigation measures and statement of commitments provide an appropriate framework to manage direct and indirect impacts during construction. Notwithstanding, the Department has further recommended conditions of approval to strengthen the Proponent's management measures, providing further detailed requirements to minimise the heritage impacts for the Project, including to:

- ensure that impacts to heritage shall to the greatest extent practicable, be avoided and minimised, and in particular avoid the stone procurement site and Kaiser Mine;
- clearly identify the level of construction vehicles required to use the Sandy Hollow to Maryvale Railway line, and should widening or other enhancements be required to safely accommodate heavy vehicles, a Statement of Heritage Impact is required in accordance with the relevant Heritage Council guidelines, in consultation with the Heritage Branch of OEH and to the satisfaction of the Director-General; and
- prepare a Construction Heritage Management Plan to detail how construction impacts on Aboriginal and Historic heritage will be minimised and managed, in consultation with the OEH and registered Aboriginal stakeholders (for Aboriginal heritage).

The Department is satisfied that at this time, the Proponent has adequately consulted with the Aboriginal community in accordance with the relevant heritage guidelines. This includes participation in field work by the registered Aboriginal parties for the Project. Notwithstanding, to ensure ongoing consultation is adequately undertaken, the Department has recommended that the Construction Heritage Management Plan specifically include procedures for ongoing Aboriginal consultation and involvement during construction and for the duration of the Project.

The Department is satisfied, taking into account the proposed conditions, that the Project's direct and indirect impacts on heritage items would not significantly affect the overall heritage values of the area and that any impacts can be appropriately managed and / or mitigated.

Construction Noise and Vibration

Construction activities include road construction, civil works, excavation and foundation construction, electrical infrastructure works, and turbine erection. These works require processes such as heavy vehicle movements, crushing and screening, concrete batching, loaders, excavators, generators, cranes and, subject to local conditions, possibly blasting.

The equipment and activities required on site will vary throughout the construction of the Project, depending on the various stages of construction. The Proponent has therefore presented the predicted noise as a worst case scenario, where it is assumed all equipment is present and operating simultaneously, and separation distances are approximately that of the closest non-associated dwelling to a proposed wind turbine. Predicted construction noise levels based on a worst case scenario are shown in **Table 5.7**. Greater distances than two kilometres will result in lower noise levels.

Table 5.7: Predicted construction noise levels at two kilometres

Phase	Predicted Noise Level	Rating Background Level	ICNG# management levels – standard construction hours
Site set-up and civil works	37 dB(A) at 2,000m	30-31 dB(A)	40-41 dB(A)
Road and hard stand construction	**44 dB(A) at 2,000m**	30-31 dB(A)	40-41 dB(A)
Excavation and foundation construction	**43 dB(A) at 2,000m**	30-31 dB(A)	40-41 dB(A)
Earthing	**42 dB(A) at 2,000m**	30-31 dB(A)	40-41 dB(A)
Turbine delivery and erection	37 dB(A) at 2,000m	30-31 dB(A)	40-41 dB(A)

#ICNG – *Interim Construction Noise Guideline 2009* – Noise affected = RBL + 10 dB / Highly noise affected = 75 dB(A)

In accordance with the ICNG, it is expected that a dwelling two kilometres from some construction activity may be noise affected, but would not be highly noise affected, as seen by the bolded predicted noise levels shown in **Table 5.7**, which are significantly below the ICNG highly noise affected criteria of 75 dB(A). Therefore, the ICNG requires that the Proponent *'apply all feasible and reasonable work practices to meet the noise affected level'*.

The majority of non-associated dwellings are further than 2km from construction activities, with the nearest non-associated dwelling to a wind turbine located approximately 2.1km. However, the nearest non-associated dwelling to the substation is located approximately 1.5km away. Construction activity at 1.5km will be in the order of 40 to 47 dB(A), which remains significantly below the ICNG highly noise affected criteria of 75 dB(A).

With regards to construction traffic noise, the daytime criterion provided by the *Environmental Criteria for Road Traffic Noise* (ECRTN) is an equivalent (L_{Aeq},1_{hour}) noise level of 55 dB(A) during any given hour. The Proponent has predicted that at a distance of 10 metres from the road side the criterion can be achieved for 10 passenger vehicle movements and three heavy vehicle movements in any one hour.

The Proponent has advised that minimal blasting is likely to occur, notwithstanding, separation distances between the potential blasting activity and the nearest dwelling are of the order of magnitude for which ground vibration and airblast levels have been adequately controlled at other sites. It is expected that the main sources of vibration will be the drilling rigs where required, rock trenching equipment and roller operation during the road and hard stand construction. Based on the separation distances between the construction activities and the nearest dwellings being well in excess of the conservative distance of 100 metres as identified by the *Assessing Vibration: A Technical Guideline* (DECC, 2006), the Proponent expects that vibration levels will achieve the criteria.

The Proponent has identified that feasible and reasonable noise control strategies to minimise noise during construction may include engineering measures such as the construction of temporary acoustic barriers, the use of proprietary enclosures around machines, the use of silencers, the substitution of alternative construction processes and the fitting of broadband reversing signals. It may also include administrative measures such as inspections, scheduling, and providing training to establish a noise minimisation culture for the works.

Based on expected noise exceedances, including exceedances of construction traffic, and potential for vibration impacts, the following mitigation measures are proposed by the Proponent for the construction works, to be considered as part of the Proponent's Construction Noise Management Plan:

- schedule noise audible construction works, including heavy vehicle movements, to between 7am and 6pm Monday to Friday, and between 8am and 1pm on Saturdays;
- locate fixed noise sources at the maximum practicable distance to the nearest dwellings;
- consider provision of acoustic screens around fixed noise sources;
- provide proprietary acoustic enclosures for site generators and compressors;
- incorporate site management, equipment and vehicle management practices;
- undertake community consultation to ensure adequate community awareness and notice of expected construction noise;
- locate construction traffic route(s) into the site to avoid sensitive areas; and
- in the event of blasting occurring, implement a monitoring regime to ensure compliance with blasting guidelines.

It is unlikely that the above measures will result in the Project meeting the construction noise goals at all times due to the variable nature of construction activity. However, they will serve to reduce the impacts and represent feasible and reasonable noise reduction measures in accordance with the relevant guidelines.

Consideration

In accordance with the Director-General's requirements, the Proponent has assessed construction noise impacts associated with the Project consistent with the 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 (without mitigation measures in place) there would be aspects of construction which exceed the targets of 40 dB(A) (30 dB(A) + 10) to 41 dB(A) (31 dB(A) +10) depending on receiver location and construction activity during recommended standard hours, by up to 4 dB(A) for non-associated dwellings located over two kilometres from construction activities. At one non-associated dwelling, exceedances of up to 7 dB(A) may be experienced due to the closer proximity of 1.5 kilometres to the substation construction site. The Proponent has therefore incorporated mitigation measures accordingly.

The Department supports the approach taken by the Proponent, to mitigate construction noise impacts that could affect nearby residents through the establishment of a Construction Noise Management Plan. The Department acknowledges that potential impacts would be minimal and transient, notwithstanding, mitigation methods to reduce any impact should be implemented to minimise construction noise to the greatest extent possible.

To ensure that all feasible and reasonable noise mitigation measures are implemented during construction, the Department has further recommended a suite of conditions to strengthen the Proponent's statement of commitments. Conditions include specification of construction hours, construction noise aims, and minimisation and management of construction noise impacts. The Department has also recommended a condition requiring the preparation and implementation of a Construction Noise and Vibration Management Plan to strengthen the Proponent's own commitment to prepare a Construction Noise Management Plan, to be consistent with the guidelines contained in the ICNG, and to additionally include identification of sensitive receivers,

details of construction activities, identification of mitigation measures, monitoring requirements, and an out-of-hours work protocol.

With respect to traffic noise, based on the Proponent's assessment the Department is satisfied that the construction traffic noise impacts associated with the Project are manageable. Vehicle numbers have been discussed previously in **Section 5.4**, however in summary, the morning peak period has been determined to include approximately 30 light vehicles and eight heavy vehicles one way in an hour. Based on the counts provided, the criteria would be met for a dwelling that is located at a distance of 30m from the roadside during the morning peak period.

The Department is satisfied that any residual impacts as a result of exceedance of this criteria can be adequately managed through the Proponent's statement of commitments, and the Department's recommended conditions of approval for construction noise, including the Construction Noise and Vibration Management Plan, which requires the identification of feasible and reasonable measures to minimise and manage construction traffic noise impacts.

With respect to blasting and vibration impacts, the Department is satisfied that the assessment has considered that should blasting be required, ground vibration and airblast generated as a result of blasting can be managed. Notwithstanding, the Department has recommended best practice vibration and blasting limits be incorporated into the conditions of approval to provide performance standards that must be achieved during the construction of the Project, to ensure that relevant human comfort and building damage criteria are achieved. Any vibration impacts would also be managed through the Construction Noise and Vibration Management Plan. In the event of blasting occurring, the plan would require procedures and mitigation measures to be implemented, including a suitable blast program, applicable buffer distances for vibration intensive works, use of low-vibration generating equipment, and pre and post construction dilapidation surveys of sensitive structures where blasting and / or vibration is likely to result in damage to buildings and structures, to ensure relevant vibration and blasting criteria are achieved.

Land Use

Once developed, the area of land required by the wind farm structures will comprise only a very small component of each associated property, a total estimated land area of less than 3% of the total Project area. There will be some disruption of rural activities within the Project area during the construction phase of the Project to associated land owners, however operation of the wind farm is unlikely to affect the ongoing rural use of land within the Project area, and agricultural activities at adjacent non-associated properties to the wind farm will not be affected.

Mineral exploration titles exist across a portion of the Project area. The wind turbines have a relatively small footprint, with each tower located on a reinforced concrete footing with a diameter of up to 12m, to a depth of 2-3m. The Proponent has advised that consultation to date indicates that the construction and operation of the wind farm is unlikely to present any limitation to the future potential of mineral exploration activities within the Project area.

A total of 118 submitters (78%), including 99 form letters, raised concern regarding impacts to land use. The form letter identified concern regarding devaluation of affected land and surrounding land. Individual submissions also raised concern regarding:

- devaluation of affected land and surrounding land;
- restrictions to building developments within close proximity to wind turbines;
- potential impacts to livestock on property – any developmental / weight gain / breeding impact problems will significantly affect livelihood, particularly where livestock are located within two kilometres of the wind farm; and
- impact on agricultural use and management of the land, working and grazing within close proximity of the turbines, particularly where aerial crop dusting is required.

Additionally, Wellington Council raised concern regarding the potential impacts on un-used building entitlements, so as to ensure permissible development on the land in the future is not constrained. There is no information contained within the EA that provides an analysis of the Project's potential impacts on rural dwelling entitlements.

Trade & Investment – Resources & Energy, does not support the wind farm in its current form, identifying the Proponent's failure to include correspondence from affected mineral exploration tenement holders, misrepresentation of concerns regarding the mineral potential of the area, and the adverse impact that the wind farm will have upon access to mineral resources for exploration and possible mining.

The Proponent, in the Submissions Response Report, provided the following responses to issues raised:

- with regards to potential property devaluation, studies have shown in Australia and overseas that wind farms generally do not have a negative impact on the value of surrounding land;
- with regards to potential restrictions to building developments, the proposal is consistent and compatible with the land use of the region. It is expected that there will be limited opportunities for the wind farm to 'cause restrictions' to other developments given the existing zone policy;
- the Proponent advised they are not aware of any evidence of a relationship between any alleged health symptoms in animals, including effects to breeding or egg laying associated with wind turbines; and
- with regards to mineral resources, the Proponent has committed to continue to consult with all mineral exploration licence holders, however based on information provided to date, the Proponent does not believe that the wind farm will materially restrict further exploration activity in the region. Additionally, the Proponent has done some further research and it appears the primary focus for gold and copper resources in the Bodangora region is further north towards Comobella.

Consideration

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. The Department also considers that if potential impacts generated by the wind farm are within acceptable limits, including in particular operational noise and visual amenity residual impacts, impacts on property values should be limited. Project impacts are discussed in the previous sections of this Report.

With regards to potential restrictions to building development, the Department does not consider that the construction of a wind farm would restrict future developments on adjacent non-associated properties, as establishment of the wind farm on land within the RU1 (Primary Production) zone, does not prejudice the continued attainment of the zone objectives and permissible uses (including building entitlements).

The Department considers that the proposed development is not expected to have a significant impact on agriculture or land use. The wind turbines are located on private involved properties, which are currently predominantly used for grazing purposes. The infrastructure would occupy less than three percent of the associated properties land, so therefore the impact on associated properties would be minimal.

One particular landowner is located within the Project area, but has not come to an agreement with the Proponent as an associated landowner. This land is used primarily for grazing purposes and does not currently have building entitlements. The landowner has raised concern regarding rounding up cattle in close proximity of the wind turbines on adjacent properties, as well as concern

regarding potential limitations to building if Council zoning for the land changes in the future, to allow for a building entitlement on the land.

With regards to non-associated landowners adjacent to the Project area, and including the non-associated landowner situated within the Project area, as the physical footprint of the wind turbines are located solely on associated properties, it is not considered that the land use of adjacent non-associated properties will be adversely affected by the wind turbines. Specific consideration regarding aerial crop dusting is included in the following Table 5.8 – Aircraft Safety.

The Department, through (anecdotal) discussions with a veterinary surgeon located in the vicinity of an established wind farm in NSW in operation since January 2010, is satisfied that there have been no known behavioural or medical issues for livestock (including cattle, sheep, horses and dogs) within the vicinity of the operational turbines in this locality. This includes 'spooking' of horses associated with wind farms. On the contrary, livestock are known to take shelter in turbine's shadows in the summer.

In consideration of the above factors, the Department considers that the Project's impacts on land use as a whole would be minimal, and generally limited to associated landowners. The Department does not consider any residual impacts to land use would outweigh the Project's broader public interest with respect to renewable energy generation.

With regard to mineral resources, to ensure that measures are applied during construction and operation of the Project so as to minimise the potential for any sterilisation of resources on the tenement, the Department has recommended a condition of approval requiring the Proponent to undertake further consultation with the Department of Trade and Investment (Mineral Resources) and holders of mineral, mining and exploration titles or tenements.

Social and Economic

Overall, the Proponent considers that it is expected that the Project will have minimal negative social effects, and will provide substantial benefits to associated landowners, as well as economic stimulus to the local economy. The Project will allow for employment and associated economic benefits within the region, particularly resulting from the construction stage of the Project. Contractors will be encouraged to employ local tradesmen for suitable construction where possible. Services such as accommodation, vehicle maintenance, refuelling and food are likely to benefit from additional construction staff. These services are likely to be spread within the region, including at Wellington, Mudgee, Gulgong and Dubbo.

A total of 111 submitters (73.5%), including 98 form letters, as well as the Wellington Aeroclub and Bodangora Wind Farm Awareness Group, raised the issue of social and economic impacts to the community. The form letter identified concern regarding division of rural communities and alienation within families, and destruction of rural social infrastructure. Individual submissions also raised concern regarding:

- division of rural communities and alienation within families and lifelong friendships, and the reluctance to help one another in time of need, which has always been an integral part of the rural lifestyle;
- the Project will not provide increased employment opportunities for local trades people; and
- potential undue financial pressure put on the Council which in turn will be carried through to ratepayers.

Wellington Council considers that the EA does not provide consideration of the potential social and economic impacts of the development associated with the additional demand on services in the region, including increased demand on housing stock and the implications on the rental market. Further, Council considers there will be increased demand on limited resources in the region, such

as health and education services, and the impact on the region resulting from an increased demand for skilled labour.

The Proponent, in its Submissions Response Report, acknowledged that a major proposal of any kind is likely to cause different reactions in the community, including some in opposition and some in support. Therefore, any proposal for change can be 'divisive'. The Proponent reiterated its belief that the proposal is expected to create a positive effect for the region in terms of employment and services benefits. Additionally, any demand expected in the region as a result of the accommodation of construction staff is expected to create a positive effect for the region, including in the surrounding communities of Wellington, Mudgee, Gulgong and Dubbo.

The Proponent also proposes two voluntary community enhancement programs, the Bodangora Community Enhancement Fund, and a Voluntary Planning Agreement to be negotiated with Wellington Council. A Voluntary Planning Agreement has since been entered into to the total value of $2,125,000 + CPI for the first 25 years of the life of the Project.

Consideration

The Department has seen evidence of communities both dividing and uniting over various infrastructure projects, and considers that the socio economic impacts associated with the proposal are reasonable. The Department has recommended conditions of approval regarding community information, consultation and involvement, including the requirement for the ongoing operation of a Community Consultative Committee throughout the construction of the proposal to facilitate communication between the Proponent, Council, and community stakeholders. The Department notes that the Proponent has already established and is operating the Community Consultative Committee.

The Department additionally notes that the Proponent has now entered into a Voluntary Planning Agreement with Wellington Council, which includes provisions for a Community Benefit Fund, Road Maintenance, and Project related Council Administration. The Department's recommended conditions of approval make reference to the implementation of the Voluntary Planning Agreement.
In consideration of the above factors, the Department considers that the Project's impacts on social and economic values as a whole would be generally positive. The Department does not consider any residual impacts to social or economic values of the region would outweigh the Project's broader public interest with respect to employment generation and renewable energy generation.

Other Issues

The Department's consideration of other minor issues identified in the assessment and in submissions is presented in **Table 5.8**.

Table 5.8: Other impacts

Issue	Issues raised in submissions	Department's consideration
Community Consultation	A total of 109 submitters (72%), including the Bodangora Wind Turbine Awareness Group and 95 form letters, raised concern regarding the lack of community consultation. This includes misrepresentation of community views and community surveys both for and against the Project, and lack of consultation with the local Aboriginal community. Additionally, the Central West Catchment Management Authority encourages the formation of a Community Consultation Committee to assist with the future stages of the community consultation for the Project.	The Department considers that adequate consultation has been undertaken during the preparation of the EA, and through the exhibition of the EA (see previous **Chapter 4**). The Department is further satisfied that these matters have been adequately addressed in the Proponent's Submissions Response Report and / or Statement of Commitments. The Department also notes that the Proponent has established a Community Consultative Committee. Additionally, the Department's Conditions of Approval include a suite of community consultation requirements, including the requirement for ongoing operation of the Community Consultative Committee, complaints and enquiries procedures, and provision of electronic information.
Justification	A total of 104 submitters (69%), including the Bodangora Wind Turbine Awareness Group and 95 form letters, raised concern regarding the justification of the Project. This includes concern about the efficiency of wind generated electricity compared to other forms of renewable energy, questions relating to the necessity for more electricity generation, and concern regarding the cost of wind generated renewable energy.	The Department is satisfied that these matters have been adequately addressed in the Proponent's Submissions Response Report. Refer to Section 2.2 of this report regarding the Department's consideration of the need and justification of the Project.
Soils and Water	A small number of submitters, including the Bodangora Wind Turbine Awareness Group, raised concern regarding soil vulnerability and the threat of erosion and spread of salinity. A small number of submitters, including the Bodangora Wind Turbine Awareness Group, as well as the Central West Catchment Management Authority and NSW Health, also raised concern regarding water issues. This includes water supply, surface flow, and pollution of water resources.	The Proponent has committed to preparing and implementing a Soil and Water Management Plan in consultation with relevant Government Departments and Wellington Council. The Plan will be designed to: ▪ divert surface run-off away from earthwork areas and soil stockpiles; ▪ reduce the energy of surface flows in areas of potential erosion; ▪ prevent sediment-laden or contaminated water leaving the construction areas; ▪ provide containment for sediment entrained in surface flows; and ▪ reduce susceptibility of disturbed areas to erosion and include prompt revegetation of disturbed areas.

Issue	Issues raised in submissions	Department's consideration
		Additionally, the Proponent has committed to consulting a soil scientist and implementing a number of soil and water mitigation measures, including management of impacts associated with earthworks, incorporation of erosion and sediment control measures, stabilisation of disturbed areas, design of watercourse crossings, consideration of local water supplies, and reinstating and revegetating disturbed areas at the conclusion of construction. Any interception or the use of groundwater may require a licence under the relevant NSW water legislation. The Department considers that generally, the Proponent's mitigation measures and statement of commitments provide an appropriate framework to manage any residual impacts as a result of construction works in relation to potential impacts to soil and water. Notwithstanding, the Department's Conditions of Approval provide a suite of soil, water quality and hydrology requirements, including consideration of construction near watercourses and watercourse crossings, soil and water management measures, and prohibition of the pollution of waters, as well as the requirement to prepare and implement a Construction Soil and Water Management Plan.
Telecommunications	A small number of submitters raised concern regarding impact to telecommunication services, in particular digital TV reception, and UHF and Micro wave bands.	The Proponent confirmed that it would be unlikely that digital TV would be impacted, but also difficult to exclude, and re-iterated commitment to implement mitigation measures should this occur, at the cost of the Proponent. Additionally, sufficient clearances are expected for UHF radio, accordingly, there are no expected effects for the emergency channel or other channels. A late submission from the NSW Telecommunications Authority raised the additional following concerns: ▪ potential for there to be a degrading effect on the operations of existing NSW Government owned radio communications services located at the adjacent Mt Bodangora radio site; ▪ the Project has the potential to adversely impact radio signals, including the primarily voice communications services which are relied upon by agencies such as the NSW Rural Fire Service, the NSW Police Force and the OEH, particularly during critical events such as preparing for and responding to emergencies; and ▪ further and more comprehensive engineering studies should be carried out in order to accurately determine the potential full impact on existing radio communications services.

Issue	Issues raised in submissions	Department's consideration
		The Department considers that generally, the Proponent's mitigation measures and statement of commitments provide an appropriate framework to manage residual impacts. Notwithstanding, and further to the additional concerns raised by the NSW Telecommunications Authority, the Department has recommended conditions of approval to minimise potential impacts of the Project on telecommunication services, including requirements in relation to radio communication, and television and radio interference.
Bushfire Safety	A number of submitters raised the issue of bushfire risks, including the Bodangora Wind Turbine Awareness Group and the form letter. Key concerns include: ▪ aircraft inability to operate effectively from Bodangora airstrip to fight bush fires, and the inability to fight fire on the ground near turbines; ▪ the ability to use aerial water bombing will be severely impacted; and ▪ by placing a wind farm at Bodangora it jeopardizes the lives of pilots, residents, fire crews, farmers, livestock and wildlife to a potentially much larger fire. The Wellington Aeroclub object to the proposed wind farm, stating that firebombing aircraft are going to have problems clearing the towers when taking off loaded, as their rate of climb to the east may be insufficient to clear the towers. NSW Rural Fire Service provided a submission incorporating assessment requirements regarding bush fire protection.	The Proponent, in the Submissions Response Report, provided the following additional justification responding to concerns raised regarding fire danger: ▪ all turbines will be lightning grounded; ▪ the provided Aviation Impact Statement identifies that the location and height of the proposed wind farm will not affect flying operations at the Bodangora Airport; and ▪ a Bushfire Risk Management Plan will be prepared in consultation with the NSW RFS and based upon the *Planning for Bushfire Protection Guidelines* (RFS, 2006). Additionally, the Proponent considers that the completion of the Project will enable improved fire fighting capabilities should a fire occur within the Project area, given improved access along upgraded access tracks. The Department considers that the Project must be designed, constructed and operated to minimise the risk of bushfire, and has therefore recommended conditions of approval to strengthen the Proponent's commitment regarding bushfire management. This includes ensuring regular consultation with the local RFS, and compliance with any reasonable request of the RFS to reduce the risk of bushfire and to enable fast access in emergencies. Further consideration of aviation safety is included in the next section of this table.
Aviation Safety	A number of submitters raised the issue of aircraft safety risks, including the Bodangora Wind Turbine Awareness Group and the form letter. The key concerns include: ▪ the danger to low flying agricultural aircraft; and	The Proponent, in the Submissions Response Report, included an Aviation Impact Statement (prepared by an independent consultant) for the Bodangora Airport. The Aviation Impact Statement clarifies that the closest wind turbine is 5.05km north-east of the airport, and is not within the current obstacle limitation surface for the airport. The report concluded that at present, the location and

Issue	Issues raised in submissions	Department's consideration
	▪ the safety of flight crews, as due to the nature of the topography in the area pilots will have to negotiate with rising, rugged terrain, smoke, thermals, and down drafts. Additionally, the Wellington Aeroclub object to the proposed wind farm for the following reasons: ▪ the towers are going to be difficult to see in bad weather and when approaching the runway when flying towards the sun, so will be a hazard to aircraft; and ▪ wind turbines would jeopardize future upgrades of the aerodrome for night VMC use and instrument approaches – it is highly likely that this use will increase in the future, due to personnel coming to the jail, use by the Flying Doctor, service to mines, and for training purposes. AirServices Australia advised they are not able to comment on the potential aviation impacts without an Aviation Impact Study. Wellington Council consider the following matters remain unaddressed by the EA: defined air traffic routes, aircraft operating heights, radar interference, communication systems, navigation aids, and safe and efficient aerial application of agricultural fertilisers and pesticides. A primary concern is the conspicuity of the wind turbines during periods of low visibility and night operations. Council consider that the nearest wind turbine should not be located closer than five kilometres to the 13/31 sealed runway at Bodangora Airstrip. The reason for such requirements is to maximise safety of aerial users during periods of low visibility and night landing operations. This separation distance will also better	height of the proposed wind farm would not affect flying operations at Bodangora Airport. No indication was provided as to whether the wind farm would limit the expansion of the airport. The Aviation Impact Statement states that the only potential impact on operations would be a likely limitation on circling to the north-eastern side of Runway 13/31. The proposed wind farm does not impact on the approach and departure airspace for any of the runways. There are currently no departures from runway 05/23 due to the rising terrain. Night operations on Runway 13/31 facilitated by the recent installation of runway lights are also not affected by the proposed wind farm. The Proponent, in the Submissions Response Report, also provided the following additional justification responding to concerns raised regarding safety impacts: ▪ low flying agricultural aircraft – it is expected that aerial operations will still be able to be undertaken, the prominent and visible nature of the turbines will mean they will be easily avoided by pilots. Additionally, the Proponent will communicate the risk of turbulence when providing details of final turbine locations including to CASA, Department of Defence, AirServices Australia, the Aerial Agricultural Association of Australia, Wellington Aerodrome, and identified aerial application operators, in accordance with the Australian Department of Infrastructure and Transports, 'National Airports Safeguarding Framework', which may occur within approximately 1.8 kilometres downwind of the wind turbines; ▪ local airstrips – during the consultation process the feedback received indicated that the majority of landowners in the vicinity of the Project utilise the existing Bodangora airstrip. For all airstrips located outside the Project area, and according to the CASA guidelines the proposed wind farm is not near an Obstacle Limitation Surface, and therefore does not represent a hazard to aircraft operation; and ▪ aviation safety – the location and height of the proposed wind farm will not affect flying operations, nor impact the approach and departure space for any runways, as outlined in the Aviation Impact Statement. The Department is satisfied that the Proponent has adequately considered and concluded that the turbines will not pose an unacceptable risk to the existing

Issue	Issues raised in submissions	Department's consideration
	accommodate any future development and / or registration of the airstrip.	uses of the Bodangora Airport, local air fields, or aerial agricultural operations, as well as proposed future night operations. Notwithstanding, to strengthen the Proponent's statement of commitments, the Department has recommended a suite of conditions regarding aviation obstacles and hazards during construction and operation of the Project. These in summary include: ▪ 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 additional mitigation measures for each of the potential impacts and hazards identified, prior to the commencement of construction; ▪ 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; and ▪ fully fund any increased cost of aerial agricultural spraying on non-associated property which is directly attributable to the Project.
Decommissioning	A total of 98 submitters (65%), including the Bodangora Wind Farm Awareness Group and 89 form letters, raised concern regarding decommissioning of the wind farm. This includes concern that turbines will not be removed due to financial status of the company, and request for a bond to be paid ensuring removal of turbines after decommissioning.	The Department is satisfied that these matters have been adequately addressed in the Proponent's Submissions Response Report / Decommissioning and Rehabilitation Plan and / or Statement of Commitments. In particular the Proponent has committed to restoring the land to its previous condition as per the decommissioning clause in the lease agreement with associated landowners. The Department notes that the Proponent intends to fund the decommissioning of the wind farm through the salvage potential and scrap value of the materials. The Proponent's proposed funding plan starts at the end of the warranty period (approximately 10 years), whereby the Proponent will undertake a quantitative survey on the cost to decommission the Project. The Proponent considers that the salvage potential and scrap value of the materials would be higher than the cost to dismantle and decommission. However assuming there is a shortfall, the Proponent will create a trust fund to cover these costs.

Issue	Issues raised in submissions	Department's consideration
		In order to ensure decommissioning of the wind farm is undertaken with appropriate associated rehabilitation, and can be appropriately financed by the Proponent, the Department's conditions of approval include a suite of requirements regarding decommissioning of the Project, including that: ▪ the Proponent shall provide written evidence that the lease agreements with the site landowners have adequate provisions to require that decommissioning occurs in accordance with this Approval, and is the responsibility of the Proponent; ▪ the Proponent shall update the Decommissioning and Rehabilitation Plan, including funding arrangements, including provision for a decommissioning bond or other funding mechanisms, every five years, and provide a copy to the Director-General; ▪ within 18 months of the cessation of operation of the Project, the site shall be decommissioned by the Proponent; ▪ the Proponent shall prepare a Road Dilapidation Report; and ▪ the Proponent shall prepare and implement a Decommissioning Environmental Management Plan.

6. CONCLUSION

The Department considers that the Bodangora Wind Farm would provide for a 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. In addition, the Project would benefit the wider community by helping to meet the energy requirements of the State.

The key issues associated with the Project relate to operational noise, visual amenity, flora and fauna, traffic and transport, and health concerns. Submissions on the Project reflected these issues, however also raised other concerns including: land use issues, including property and devaluation impacts; social and economic issues, including community benefits and contributions; safety issues, including aircraft and bushfire safety; the consultation process; justification for the Project; decommissioning; and impacts to heritage items.

The Department has assessed the Proponent's EA, Preferred Project Report and Response to Submissions Report, 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 generally proposed adequate construction and operational environmental management measures.

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

The Department's assessment of visual impacts has taken into consideration the subjective nature of the visual impact of wind turbines, and that the Bodangora community appear to be largely of the view that wind turbines do detract from the landscape of the area. However, as all wind turbines are located more than 2km from the nearest non-associated dwelling, the Department has concluded that, with appropriate landscaping put in place, significant impacts are unlikely and considers that the Project's impacts on landscape values as a whole would be acceptable.

The Department's assessment indicates that the Project would result in some unavoidable biodiversity impacts to native vegetation, including the White Box – Yellow Box – Blakely's Red Gum Woodland EEC. However, as only 1.32 hectares of native vegetation clearing is expected to be required as a worst case, the Department is satisfied that 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 of construction traffic and transport has considered the maintenance and safe use of local roads, and has concluded that significant impacts are unlikely. In particular, with the preparation and consideration of Road Dilapidation Reports and associated road upgrades if required, and Traffic Management Plans, the Project can be constructed with minimal impact to the local road network and local road users.

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 biodiversity, noise, hazards and risk, visual amenity, community consultation, heritage, traffic and transport, and decommissioning, amongst others, to ensure that the Project achieves acceptable environmental standards, protects public amenity and offsets residual impacts.

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

On balance, the Department considers the Project to be justified and in the public'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 Planning Assessment Commission:

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

A/Director 13/6/13
Infrastructure Projects

18.6.13

Executive Director
Development Assessment Systems and Approvals

APPENDIX A ENVIRONMENTAL ASSESSMENT

See the Department's website at www.majorprojects.planning.nsw.gov.au.

APPENDIX B SUBMISSIONS

See the Department's website at www.majorprojects.planning.nsw.gov.au.

APPENDIX C PREFERRED PROJECT REPORT & SUBMISSIONS RESPONSE REPORT

See the Department's website at www.majorprojects.planning.nsw.gov.au.

APPENDIX D POLITICAL DONATION DISCLOSURES

See the Department's website at www.majorprojects.planning.nsw.gov.au.

APPENDIX E RECOMMENDED CONDITIONS OF APPROVAL

APPENDIX F NSW PLANNING GUIDELINES WIND FARM CHECKLIST

Issue	NSW Planning Guidelines Checklist	Response
Consultation	▪ Form a Community Consultative 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.	▪ Chapter 6 of the EA documents the consultation process. ▪ The Proponent has conducted extensive consultation in the form of telephone conversations and emailing, face-to-face meetings with associated and non-associated property owners generally within a 4km radius, establishment of a project website, media releases and community information days. ▪ The Proponent has reached agreements with all properties with dwellings within 2km of a wind turbine. ▪ The Proponent has established a CCC.
Landscape and visual amenity	▪ Provide photomontages from all non-host dwellings within 2km of a proposed wind turbine. ▪ Identify the zone of visual influence of the wind farm (no less than 10km) and likely impacts on community and stakeholder values. Consider cumulative impacts on landscape and views. ▪ Outline mitigation measures to avoid or manage impacts.	▪ Chapter 8 and Appendix F of the EA provides a landscape and visual impact assessment. ▪ There are no non-associated dwellings within 2km of a proposed wind turbine. A total of 9 viewpoints were selected for the production of photomontages to best represent a range of distances as well as locations with differing views. ▪ The zone of visual influence has been assessed on a distance of up to 10km. ▪ Mitigation measures to avoid or manage impacts have been provided.
Noise	▪ Undertake assessment based on separate daytime (7am to 10pm) and night-time periods (10pm to 7am). ▪ Predict noise levels at all dwellings within 2km of a proposed turbine. ▪ Consider special audible characteristics, including tonality, amplitude modulation, and low frequency noise (apply penalties where relevant). ▪ Outline measures to avoid, minimise, manage and monitor impacts.	▪ Chapter 11 and Appendix J provides a noise assessment for the Project. ▪ The noise assessment was produced giving consideration to the South Australian Guidelines, which was required by the DGRs. ▪ The NSW Guidelines 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.

Issue	NSW Planning Guidelines Checklist	Response
		▪ 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 night/day performance.
Health	▪ Consider and document health issues, focusing on neighbours with dwellings within 2km of proposed wind turbines.	▪ The issue of health was considered in various sections of the EA, looking at the potential impacts of shadow flicker, infrasound, and electric and magnetic fields. No non-associated dwelling is located within 2km of a wind turbine.
Ecological issues	▪ Consider potential impacts on birds and bats, particularly migratory species and outline the proposed monitoring and mitigation strategy.	▪ Chapter 9 and Appendices G and H of the EA provides a flora and fauna assessment, and bat fauna assessment, including monitoring and mitigation measures.
Aviation safety	▪ Outline current agricultural aerial uses on neighbouring properties. ▪ Consider the potential for the proposed wind farm to impact on aviation safety associated with agricultural aerial uses consistent with the draft guidelines.	▪ Section 15.1 of the EA provides an assessment of air safety, and Appendix B of the Submissions Response Report provides an Aviation Impact Statement, including consideration of Airservices guidelines and aerial fertilising.
Bushfire hazard	▪ 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.	▪ Section 15.4 of the EA provides an assessment of bushfire risk, including consideration of relevant RFS design guidelines.
Blade throw	▪ Assess blade throw risks consistent with the draft guidelines. ▪ Outline measures to avoid, minimise, manage and monitor impacts.	▪ Section 15.2 of the EA provides an assessment of physical safety, including blade throw, and outlines measures to shut down turbines during high wind speeds to avoid damage occurring.
Economic issues	▪ Consider whether the wind farm use is consistent with relevant local or regional land use planning strategies. ▪ Consider potential to impact upon mining/petroleum leases and exploration licences. ▪ Consider any potential impacts upon property values consistent with the draft guidelines, including properties within 2km.	▪ Chapter 7 of the EA provides an assessment of the planning context for the Project, including State planning policies and the Wellington Local Environmental Plan. ▪ Section 14.2 of the EA identifies consideration of possible mineral deposits in the region. ▪ Chapter 16 of the EA provides an assessment of social and economic aspects of the Project, including property values.

Issue	NSW Planning Guidelines Checklist	Response
Decommissioning	▪ Include a Decommissioning and Rehabilitation Plan in the EA, including proposed funding arrangements. ▪ Confirm that the Proponent not the landowner is responsible for decommissioning.	▪ Decommissioning is addressed in section 3.9 of the EA, and a Decommissioning and Rehabilitation Plan has been provided at Attachment D. The Plan identifies proposed funding arrangements and confirms the Proponent's responsibility for decommissioning.
Monitoring and compliance program	▪ 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.	▪ 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	▪ Outline whether the proposal is consistent with any relevant provisions of the relevant council's Development Control Plan and list any variations.	▪ Section 7.4 of the EA considers Wellington Development Control Plans.