

Liverpool Range

Wind Farm

Preliminary Environmental Assessment | February 2011



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1 Introduction

1.1 Site description and location

The proposed Liverpool Range Wind Farm would involve the construction and operation of up to 550 wind turbines, together with the associated control and maintenance buildings, civil works and electrical infrastructure required to connect into the existing transmission network.

The Project is to be located across four shires as indicated in *Figure 1*. Wind turbines would be primarily located in the Warrumbungle & Upper Hunter Shires, between the townships of Coolah and Cassilis, approximately 370 km north of Sydney. Additional turbines would be located in the Liverpool Plains Shire, with transmission line connections to the south of the site located in the LGA of Mid Western Regional Council.

The area is generally used for farming and grazing operations. In addition, mining leases and permits cover the majority of the site area, although the only large scale operations to date are in the vicinity of Wollar to the south.

Epuron has been active in this region for more than 2 years, and has found a very receptive local community. A large number of landowners are involved with the project, and many more have expressed interest in becoming involved. Discussions with landowners and the community in general are continuing, and the exact site boundary will be confirmed in the Environmental Assessment to be prepared for the Project.

Wind turbines would be placed along a series of ridges and hilltops as indicated in Figure 2. The proposed wind turbine development area covers approximately 40km (east-west) by 50km (north-south). This is a very large site, and therefore it is likely that construction of the site would occur in stages.

A new powerline is required to connect the Project to the existing electricity grid. The most likely connection is to Transgrid's 330kV Wollar – Wellington powerline located 30-40 kilometres to the south of the site. A number of transmission line corridors are under assessment, the proposed routes will be confirmed the Environmental Assessment to be prepared for the Project.

The closest population centres to this site are the villages of Coolah, to the west of the site, and Cassilis to the south east of the proposed site. A number of rural residences can be found in the vicinity of the site; these have been identified through reviews of the cadastral, topographic mapping and aerial imagery. Epuron's community consultation program outlined in Section 5 includes the owners of these surrounding residences.

The proposed wind farm site is located primarily on freehold land within and adjacent to agricultural areas, although a number of parcels within the site boundary are held by the Crown.

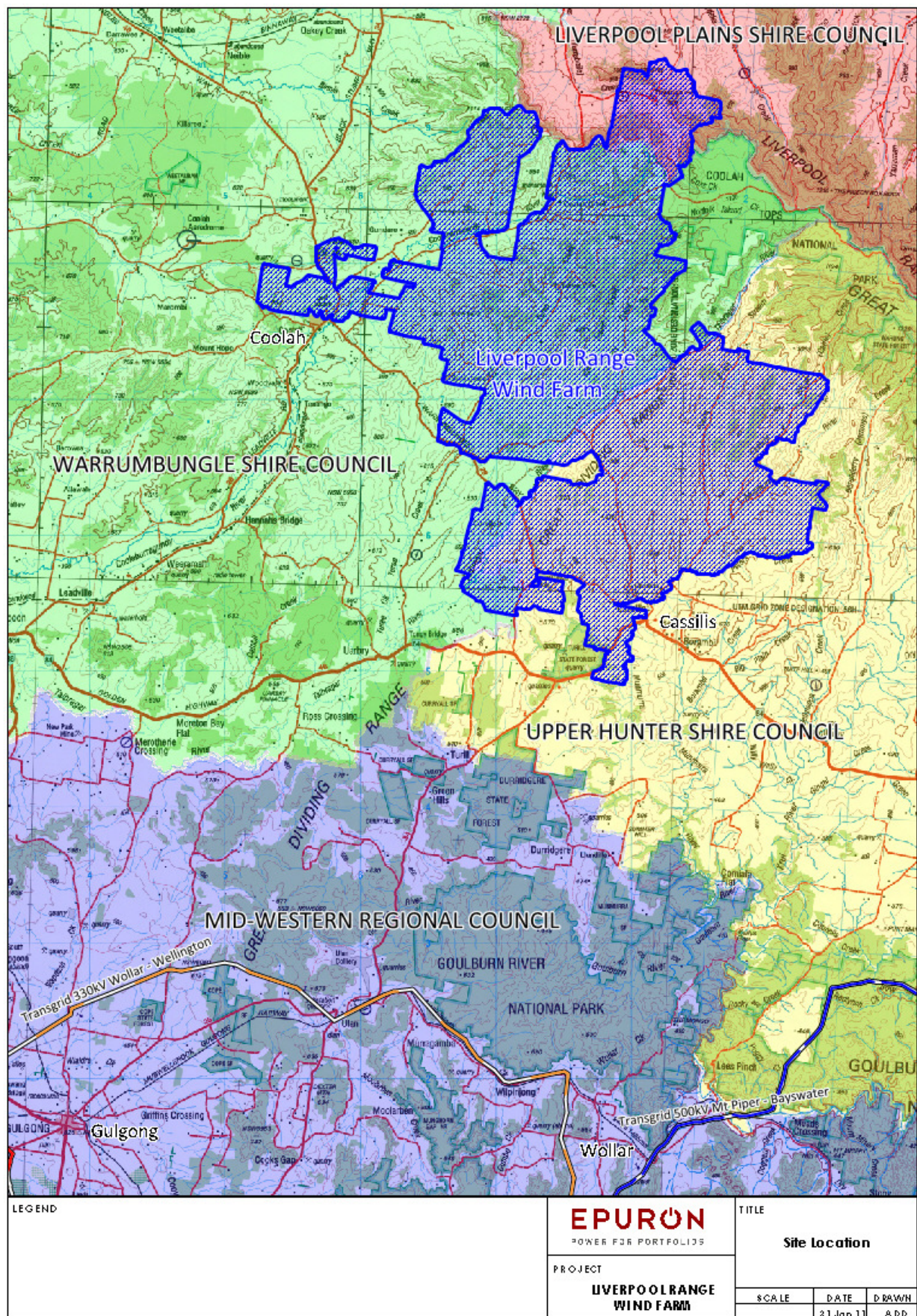


Figure 1 - Locality Map

1.2 The Proponent

The proponent for this proposal is Epuron Pty Ltd.

Epuron is the most experienced wind energy development company in NSW. Epuron commenced its operations in 2003 as Taurus Energy Pty Ltd, and since that time has developed the largest wind farm, the largest number of wind farms, and the largest number of wind turbines in NSW as indicated in Table 1.

Epuron is therefore one of the largest wind farm developers in Australia.

Epuron operates out of its offices in North Sydney where it has a professional team with considerable development expertise. Epuron undertakes its own wind monitoring, site layout and design, and uses appropriate specialists for detailed site investigations such as biodiversity assessment, archaeological assessment, noise assessment, and visual impact assessment.

Table 1- New South Wales wind farm projects developed by Epuron

Project	Turbines / Size	Development Status	Region
Cullerin Range	15 turbines - 30 MW	Operating – now owned by Origin Energy	Southern Tablelands
Conroy's Gap	15 turbines - 30 MW	Development Approved – now owned by Origin Energy	Southern Tablelands
Snowy Plains	15 turbines - 30 MW	Development Approved – now owned by Origin Energy	Monaro
Gullen Range	73 turbines	Development Approved	Southern Tablelands
Silverton	598 turbines	JV with Macquarie Capital Wind Fund Project Approval -stage 1 Concept Approval - stage 2	Far Western NSW
Yass Valley	152 turbines	In progress - sold to Origin Energy	Southern Tablelands
White Rock	119 turbines	Environmental Assessment lodged	Northern Tablelands
Rye Park	80-110 turbines	Preliminary EA lodged	Southern Tablelands
Birrema	60 – 80 turbines	Preliminary EA lodged	Southern Tablelands

1.3 Development Application process

1.3.1 Purpose of this document

This Preliminary Environmental Assessment has been prepared by Epuron, and outlines the scope of the construction, operation and decommissioning/recommissioning phases of the Liverpool Range Wind Farm proposal. It also identifies and prioritises the associated potential environmental impacts and summarises the approach for the detailed assessments and consultation plan for the Environmental Assessment (EA) to be lodged with the Department of Planning.

This Preliminary Environmental Assessment presents:

- a description of the proposal, including preliminary information on the proposed design and infrastructure layout;
- a preliminary assessment identifying key issues in relation to environmental impacts of the proposal;
- an outline of the approach and guidelines the proponent intends to follow for the Environmental Assessment, and;
- the consultation plan the proponent is implementing in relation to this proposal.

1.3.2 Planning Context

Local Planning Legislation

The Liverpool Range Wind Farm lies across four local government areas as shown in Figure 1. The Project is to be located across four shires as indicated in Figure 1. Wind turbines would be primarily located in the Warrumbungle & Upper Hunter Shires, between the townships of Coolah and Cassilis, approximately 370 km north of Sydney. Additional turbines would be located in the Liverpool Plains Shire, with transmission line connections to the south of the site located in the LGA of Mid Western Regional Council.

Warrumbungle Shire Local Environmental Plan

The operative Local Environment Plan (LEP) for those parts of the Project in the Warrumbungle Shire is the Coolah LEP. The Proposal site (and adjacent properties) is zoned as 1(a) Rural Agriculture Zone for which development requires council consent and for which wind farms are not prohibited, in accordance to the LEP.

Upper Hunter Shire Local Environmental Plan

Until it is replaced, the operative Local Environment Plan (LEP) for those parts of the Project in the Mid Western Regional Shire is the *Merriwa Local Environmental Plan 1992*, the *Murrurundi Local Environmental Plan 1993* and the *Scone Local Environmental Plan 1986*.

Liverpool Plains Shire Local Environmental Plan

Council has prepared a new LEP titled '*Draft Liverpool Plains Local Environmental Plan 2011*'. The new LEP will apply to the whole of the Liverpool Plains Local Government Area.

Until it is replaced, the operative Local Environment Plan (LEP) for those parts of the Project in the Mid Western Regional Shire is the *Quirindi Local Environmental Plan 1991*, *Parry Local Environmental Plan 1987*, the *Murrurundi Local Environmental Plan 1991* and the *Gunnedah Local Environmental Plan 1998*.

Mid Western Regional Shire Local Environmental Plan

Mid-Western Regional Council is an amalgam of the former Mudgee Shire, Rylstone Shire and Merriwa Shire Councils. As a result the Mid-Western currently has three separate Local Environmental Plans covering these three former shire areas. A new LEP (the *Mid –Western Regional Local Environmental Plan*) is being prepared in response to the State

Government requirement for all LGAs to prepare a single comprehensive LEP in accordance with a Standard Instrument (or template) for consistency across the state. A Draft of this LEP is expected to be on exhibition in early 2011.

The operative Local Environment Plans (LEP) for those parts of the Project in the Mid Western Regional Shire are the *Merriwa Local Environmental Plan 1992* and the *Mid-western Regional Interim Local Environmental Plan 2008* until they are replaced by the new Midwest Regional LEP.

State Planning Legislation - Environmental Planning and Assessment Act (1979)

This proposal will be a major project assessed under Part 3A of the Environmental Planning and Assessment Act 1979 (the EP&A Act). The EP&A Act integrates the planning and assessment regime that requires approval from the Minister for Planning and incorporates approvals and authorisations required under other NSW legislation.

Federal Planning Legislation – Environmental Protection and Biodiversity Conservation Act (1999)

The Environment Protection and Biodiversity Conservation Act (1999) (EPBC Act) provides for a Commonwealth assessment and approval of proposals that have a significant impact on 'matters of national environmental significance'. Part 13 of the EPBC Act identifies a list of threatened species, threatened communities and key threatening processes. The Proponent will make an EPBC referral for determination by the Commonwealth.

1.3.3 Project application

This Preliminary Environmental Assessment accompanies the Project Application Form and is submitted to the Department of Planning as a Project Application in accordance with Part 3A of the Environmental Planning and Assessment Act 1979 (the EP&A Act).

In relation to this Project Application, we note:

- **Major Project.** The proposed Liverpool Range Wind Farm would have a capital cost in excess of \$30 million and in the Minister's opinion is considered to be a Major Project, under Part 3A of the EP&A Act (Minister's opinion dated 8 December 2010, included in Appendix A). Part 3A of the EP&A Act consolidates the assessment and approval regime for all Major Projects that require the approval of the NSW Minister for Planning.
- **Critical Infrastructure.** The proposed Liverpool Range Wind Farm has the capacity to generate in excess of 30 Megawatts and therefore is a Critical Infrastructure Project under section 75C of the EP&A Act by virtue of the Critical Infrastructure declaration made by the NSW Minister for Planning on 11 November 2009.

1.3.4 Next steps

Following review and consultation amongst agencies, the Department of Planning will issue the Director General's Requirements (DGRs) which will provide the specific requirements for the Environmental Assessment. It is understood that the Department of Planning will issue the Director General's Requirements within 28 days of receipt of the Project Application.

Epuron will then prepare an Environmental Assessment for the proposal in accordance with the requirements of the EP&A Act including the Director General's Requirements. This will include detailed expert assessment of key environmental issues, and will be prepared in parallel with detailed community consultation as outlined in Section 5.

The Environmental Assessment will contain the detailed and comprehensive assessment of the proposal and will therefore take precedence over this Preliminary Environmental Assessment to the extent of any inconsistency.

Epuron will lodge the final Environmental Assessment which will then be placed on public exhibition and assessed by the Department of Planning before consideration by the Minister for Planning. The Department of Planning will invite submissions from community and public stakeholders during the public exhibition period and will consider the issues raised in any submissions in determining the application.

2 Project Description

2.1 Wind farm site and context

The proposed Liverpool Range Wind Farm is located in the New England Tableland region of New South Wales. The site has been selected for its windy ridges and cleared grazing land. The majority of land in the region is currently used for commercial agriculture (sheep and cattle grazing) and has been cleared and grazed over many decades.

This proposal would directly involve a large number of properties that are currently used for agriculture and grazing purposes. These existing uses would continue with minimal interruption from the wind farm construction and operation.

The ridges most likely to contain turbines are generally clear on the tops with varying density of vegetation across the lower slopes. More vegetation is located along the sides of the ridges into the valleys. The surrounding slopes and gullies will not likely contain turbines but may be affected if access routes or powerlines are routed through them. In general the slopes and gullies carry more native vegetation than the ridges.

Avoiding and minimising impact to the vegetation has been considered during initial design and will be further developed with the benefit of mapped constraint areas identified during the detailed assessments. All such studies and constraints will be included in the Environmental Assessment.

A number of rural residences surround the site and will require careful consideration through the environmental impact assessment to minimise the potential for noise and visual impacts.

2.2 Wind farm description

The project is a large scale wind farm with up to 550 wind turbines proposed. At this stage, exact turbine numbers and locations have not been fixed. Final turbine numbers and power output for the site is dependent on the outcomes of the various engineering and environmental studies and is subject to change from the estimates given below.

The proposal would involve the construction, operation and decommissioning or recommissioning of:

- Up to 550 wind turbines rated at 1.5 – 3.3 MW, each with:
 - Three blades mounted on a tubular steel tower with a combined height (blades plus tower) not exceeding 150 metres;
 - an adjacent pad mounted turbine transformer, crane hardstand area, and related turbine laydown area;
- one or more substations and a transmission connection linking the turbines to the existing 330kV TransGrid Wellington - Wollar transmission line, which lies to the south of the site;
- electrical connections between wind turbines and the on-site substation, which would be a combination of underground cable and overhead powerlines linking segments of the site;
- onsite control buildings and equipment storage facilities;
- temporary concrete batching plant facilities;
- access tracks required for each turbine and the related facilities above;
- minor upgrades to access on local roads, as required for the installation and maintenance of wind turbines and the related facilities above; and,
- a number of permanent monitoring masts for wind speed verification and monitoring.

Epuron has confirmed that the newly constructed 330kV TransGrid Wellington - Wollar transmission line located to the south of the site has sufficient capacity for a project of this scale.

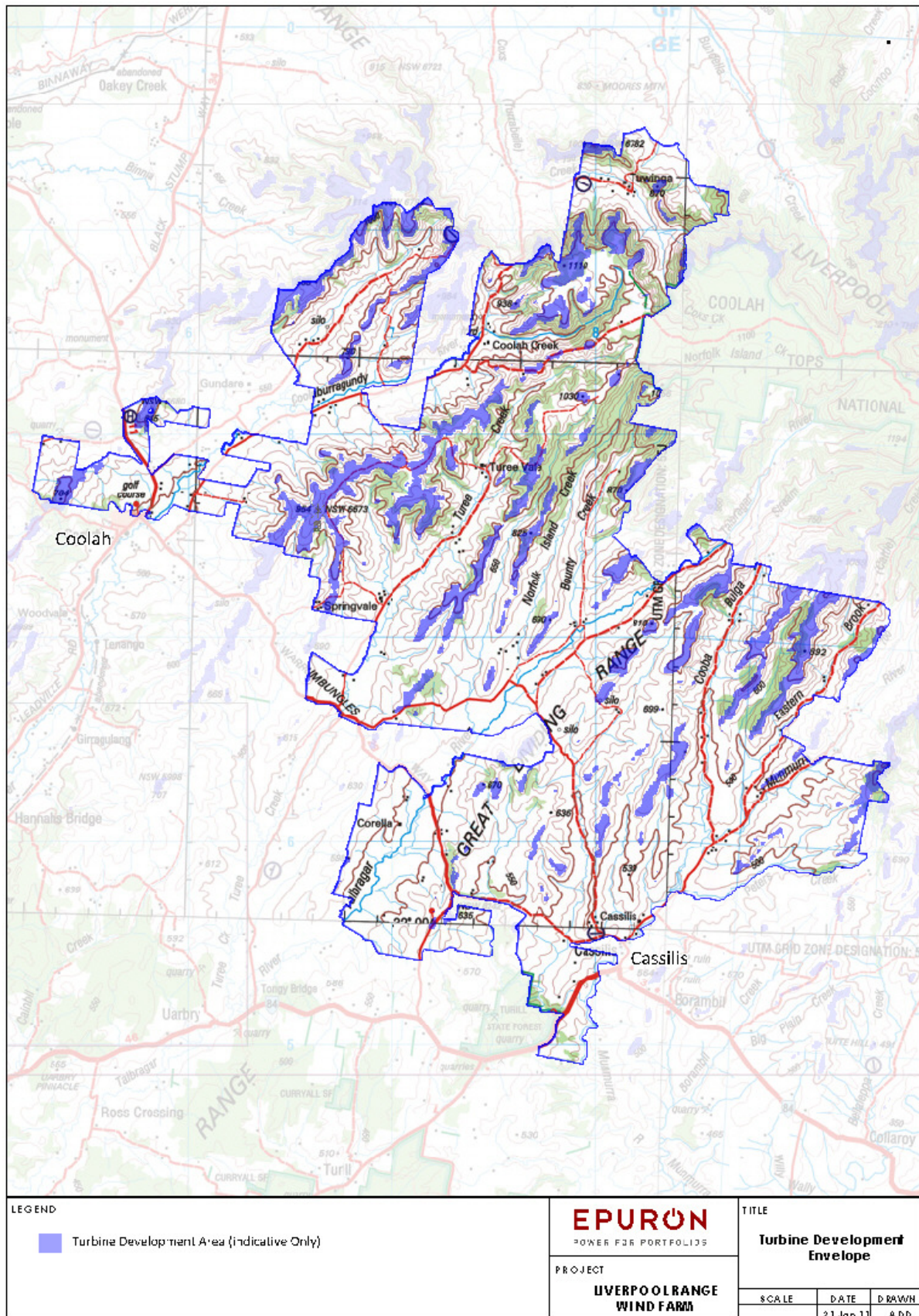


Figure 2 - Proposed wind turbine development area

2.3 Wind farm layout

At this stage in the project development the turbine and infrastructure layout has not been finalised. Further detailed design will be completed taking into consideration the findings from the detailed assessments, constraints and engineering design as well as feedback from community consultation.

This design optimisation will be completed prior to submission of the Environmental Assessment.

Epuron is developing a number of wind turbine layouts for the various wind turbines under consideration. Proposed layouts have undergone a preliminary review to determine constructability. Further studies will provide greater information in determining the optimised locations for wind farm infrastructure. These include, but are not limited to, the environmental constraints, final geotechnical investigations, and community and stakeholder considerations.

Biodiversity and archaeology assessments are being conducted based on a “development envelope” approach, and will identify any constraints around which Epuron can accommodate relocation of turbines, roads and other infrastructure.

Noise and visual impact assessments will then be completed based on a final proposed layout which will be submitted with the final Environmental Assessment.

The assessments will be carried out on the basis of the most representative project impacts, however a worst case impact assessment will also be provided.

Detailed geotechnical investigations and final engineering design can only be carried out once consent conditions are known and a turbine supplier has been selected. Accordingly, minor changes to the layout are still possible prior to construction. Epuron will ensure that any minor changes are not detrimental to the project and, if any revisions are material, will resubmit noise and visual impact assessments based on the revised layout prior to construction.

2.4 Land boundaries and subdivision

In some locations the development may require boundary adjustments or subdivision to facilitate the development and reduce impacts on land use of the involved properties, these areas will be highlighted in the Environmental Assessment and approval sought for the relevant changes.

3 Project Justification

3.1 Project Benefits

Wind farms, including the Liverpool Range Wind Farm, offer several strategic and long term benefits. In addition to specific local and environmental benefits, wind farms:

- reduce greenhouse gas emissions, helping to move towards cleaner electricity generation and reduce the impact of climate change in a carbon-constrained environment;
- supply renewable energy that would assist electricity retailers to fulfil their obligations under state and federal renewable energy targets, and would otherwise lead to increased burning of fossil fuels;
- provide additional generation capacity into the NSW grid that would assist in meeting load growth and result in a clean, reliable generation mix; and,
- provide an opportunity for regional investment as the renewable energy sector grows in the New England Tablelands.

The Liverpool Range Wind Farm offers several specific benefits to the environment and local community:

- this project would directly inject funds into the local community through:
 - the direct provision of local jobs in construction and operation;
 - use of local services in both the construction and operation phases; and,
 - ongoing landowner payments and financial contributions to the local community being re-injected in the local community;
- if the Project is built to its ultimate capacity, in a typical year, based on a typical capacity factor of 35% (and assuming 550 turbines at 2.5 Megawatts each), the wind farm could produce around 4,215,000 Megawatt-hours of clean, renewable energy, enough for the average consumption of around 525,000 homes; and
- this in turn will lead to a significant reduction in greenhouse gas emissions through the avoidance of around 4,100,000 tonnes of carbon dioxide each year from coal fired power stations, the equivalent of removing 945,000 cars from our roads.

3.2 Project Viability

In Australia, wind farms are viable because of specific legislation which requires electricity retailers to source a certain percentage of electricity from renewable sources. The Federal Government's expanded Renewable Energy Target (RET) creates a renewable energy market of over 45,000GWh/annum, requiring approximately 10,000 – 12,000 MW of additional renewable energy capacity to be built. Wind energy is anticipated to be the primary technology used due to its reliable and consistent nature, and low cost.

The RET is a market based mechanism designed to encourage investment in renewable technologies that will provide the lowest cost generation of renewable electricity in the National Electricity Market. Projects like the Liverpool Range Wind Farm would encourage renewable investment in NSW.

Data collected from wind monitoring masts located throughout the state have established that the Upper Hunter area has some of the fastest wind speeds in NSW. To confirm the viability of wind projects in NSW, Epuron has established a vast network of wind monitoring masts. These masts together with the wind monitoring masts on site confirm that wind speeds are high at the site and more than sufficient for a viable wind farm.

4 Preliminary Environmental Assessment

4.1 Introduction

The Environmental Assessment will be carried out in accordance with the Director General's Requirements (DGRs) to be released by the Department of Planning. All assessments (including expert reports) will be completed taking into consideration experience from other wind farm projects, consultation with stakeholders, and industry best practice guidelines.

Epuron has used its experience in wind farm development, together with a preliminary assessment of the site, to identify the key issues to be assessed in relation to the Project. This process has included a review of the Director General Requirements and environmental assessments of recent wind farm projects in NSW including those nearby the site.

Environmental issues most often associated with wind farms include:

- Visual amenity
- Biodiversity including flora and fauna
- Electromagnetic interference (Telecommunications)
- Soil and landforms
- Climate and air emissions
- Property value issues
- Noise amenity
- Indigenous and European heritage
- Traffic and transport
- Water and groundwater
- Safety issues (including aviation and bushfire safety)
- Health issues (including infrasound and electromagnetic fields)

These issues are assessed both individually and cumulatively, and taking into account appropriate consultation with relevant stakeholders.

The following outlines the key issues in relation to the Liverpool Range Wind Farm, and summarises Epuron's approach to addressing each issue. As a general rule, in undertaking this assessment:

- issues identified as Key Issues will be addressed through use of an independent expert assessment together with specific on-site assessment and field work;
- additional issues will be addressed, where necessary, via desktop assessment, precedent and consultation.

The focus on this delineation is to ensure that every issue is adequately addressed considering the potential risks and impacts associated with the issue, and without burdening the Environmental Assessment with details which are unlikely to affect the ultimate assessment of the proposal.

For this purpose, Epuron proposes to note some general issues which have previously been assessed in relation to wind farms in general, but not to carry out a project assessment of these issues as they have previously been demonstrated to not affect the assessment of projects or the consent conditions relevant.

4.2 Environmental risk assessment

Epuron has carried out an environmental impact risk assessment based on information collected to date on site, at nearby sites, generally within the region and based on similar proposals in other regions.

In relation to each risk, Epuron has established a priority which takes into consideration:

- The level of information already available about that issue;

- The extent to which site specific assessment is required to define that issue;
- The likelihood of that issue occurring, and potential impacts of that issue if it did occur; and
- The extent to which standard industry practice, statutory requirements, and standard consent conditions adequately address the issue.

Table 2 summarises the sources of impact, typical mitigation options, and proposed strategies for addressing each issue. These issues and the proposed assessment arrangements are discussed in more detail below.

Table 2 - Environmental impact risk assessment

Issue	Sources of impact Options for mitigation	Investigation strategy
Landscape and visual	Impacts: <ul style="list-style-type: none"> Loss of visual amenity Impact on scenic character Shadow flicker disturbance Cumulative visual impacts Mitigation: <ul style="list-style-type: none"> Screening key views using landscape measures 	Key issue
Noise	Impacts: <ul style="list-style-type: none"> Operational or construction noise may impact residences nearby Mitigation <ul style="list-style-type: none"> Mitigation available through turbine selection, location, and other noise control measures 	Key issue
Biodiversity	Impacts: <ul style="list-style-type: none"> Clearing of vegetation during construction and maintenance Loss or modification of habitat Potential for spread of weeds through soil disturbance and traffic movement Impact on threatened species or endangered ecological communities Mitigation: <ul style="list-style-type: none"> Relocation of equipment Appropriate environmental management procedures Species-specific mitigation options 	Key issue
European and Indigenous Heritage	Impacts: <ul style="list-style-type: none"> Potential to impact indigenous or European heritage values and items Mitigation: <ul style="list-style-type: none"> Relocation of equipment Appropriate environmental management procedures 	Key issue

Issue	Sources of impact Options for mitigation	Investigation strategy
Electromagnetic interference (Telecommunications)	Impacts: Loss of communication signals Reduction in strength of broadcast signals (TV or radio) Mitigation: Relocation of equipment Site specific mitigation	Additional issue - requires assessment
Traffic and transport	Impacts: Increased traffic may be a safety risk in the local area Construction traffic may contribute to road pavement deterioration Turbines may distract drivers Mitigation: Traffic management plan	Additional issue - requires assessment
Soil and landforms	Impacts: Erosion Mitigation: Standard practices apply	General environmental risk analysis and assessment
Water and groundwater	Impacts: Availability of water for construction Environmental pollution Mitigation: Standard practices apply	General environmental risk analysis and assessment
Climate and air emissions	Impacts: Dust generation Greenhouse gas impacts Mitigation: Standard practices apply Greenhouse gas impacts are beneficial	General environmental risk analysis and assessment
Social	Impacts: Land use change Economic impacts Mitigation: Economic impacts are positive	General environmental risk analysis and assessment
Safety	Impacts: Aviation safety Bushfire safety Fire management Mitigation: Standard practices apply	General environmental risk analysis and assessment
Property value	Impacts: Potential impact on property valuation Mitigation: Not required	No further assessment (see below)
Health	Impacts: Epilepsy Infrasound Electromagnetic fields (EMF) Mitigation: Standard practices apply	No further assessment (see below)

4.3 Assessment of Key Issues

4.3.1 Visual amenity

Visual amenity, particularly at surrounding residences and highly used public locations within 5km, will require detailed and site specific assessment by specialist consultants.

The visual amenity assessment will include use of site visits and inspections together with desktop tools including computer modelling of shadow flicker and zones of visual impact, as well as preparation of photomontages for various locations.

The visual impact assessment will be completed in accordance with best practice and reference to Wind Farms and Landscape Values: National assessment Framework (Auswind and Australian Council of National Trusts June 2007).

4.3.2 Operational and construction noise

Noise impacts, particularly at nearby residences within 2km, will require detailed and site specific assessment.

Noise impact assessment will use a combination of background noise measurement and desktop noise analysis to ensure compliance with the appropriate noise guidelines. The noise impact assessment will be completed in accordance with AS 4959-2010 Acoustics - Measurement, prediction and assessment of noise from wind turbine generators.

Relevant guidelines for assessment include:

- the World Health Organisation *guidelines for community noise* (1999)
- the South Australian Environmental Protection Authority's *Wind Farms – Environmental Noise Guidelines* (2009);
- the *NSW Industrial Noise Policy* (EPA, 2000).

NSW does not currently have specific wind farm noise guidelines, and historically has adopted the 2003 version of the *South Australian Environment Protection Authority's Wind Farms – Environmental Noise Guidelines*. These guidelines have recently been updated, and Epuron considers that the revised 2009 guidelines provide the most advanced and comprehensive benchmark for noise assessment of wind farms in Australia. The assessment will be in accordance with the requirements outlined in the Director General's Requirements.

4.3.3 Biodiversity including flora and fauna

Biodiversity will require site specific assessment of flora, ground-based fauna, and aerial fauna (including bats and birds). Detailed site survey is essential to assess possible impacts.

The biodiversity assessment will include detailed site investigation including field visits and bat identification using anabat loggers. The biodiversity assessment will consider and implement where appropriate a number of guidelines in accordance with the Department of Environment and Climate Change and Water (DECCW) and the Department of the Environment, Water, Heritage and the Arts.

Some of the guidelines to be considered include:

- AusWEA (2005) *Wind Farms and Birds: Interim Standards for Risk Assessment*. Australian Wind Energy Association. July 2005.
- AusWEA (2006) *Best Practice Guidelines for Implementation of Wind Energy Projects in Australia*. Australian Wind Energy Association. December 2006.
- DECCW (2004) *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft*. November 2004.
- DEH (2006) *Wind Farm collision risk for birds – Cumulative risks for threatened and migratory species*.

- DEH (2005) EPBC Act Policy Statements, Supplementary Significant Impact Guidelines 2.1.1 Wind Farm Industry Sector.
- Planning NSW (2002) Draft NSW Wind Energy EIA Guidelines.
- DECC (2007) Threatened Species Assessment Guidelines. The Assessment of Significance.
- Commonwealth (2006) Significant Impact Guidelines. EPBC Act Policy Statement 1.1. Matters of National Environmental Significance.
- Environment Protection and Heritage Council (July 2010) National Wind Farm Development Guidelines – Draft

4.3.4 Indigenous and European heritage

The Heritage assessment will require site specific assessment of European and indigenous heritage, as well as searches of relevant databases and consultation with members of the local indigenous communities. Detailed site survey is essential to understand possible impacts.

The investigation and assessment will be on Indigenous and Non-Indigenous cultural, archaeological and built heritage items and issues. It will be in consideration of the following guidelines and statutory requirements:

- Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010)
- Guidelines for Aboriginal Cultural Impact Assessment & Community Consultation (DEC July 2005)

4.4 Additional issues to be assessed

4.4.1 Telecommunications impacts

A number of telecommunications towers in the area have been identified and the operators of equipment on each of these towers which have services that cross the site will be consulted in carrying out the assessment of potential impacts to telecommunication signals.

4.4.2 Traffic and Transport

A traffic and transport assessment will be completed taking into consideration any potential environmental issues associated with transport of equipment to site, site construction vehicles and worker transport and operational traffic impacts.

4.4.3 Soil and Landform issues

A soil and landform issues assessment will focus on soil disturbance from vegetation clearing and erosion from excavation work given the erosion prone nature of the slopes of the site.

4.4.4 Water and groundwater

There will be a review of standard construction environment management plans to ensure that impacts from mobilisation of sediment and pollutants generated during excavation, road works, transport of machinery etc will be adequately covered by avoidance, minimizing and managing. It will also address sources of water required for construction.

4.4.5 Climate and air emissions

There will be a review of standard construction environment management plans to ensure that impacts from dust and emissions generated during excavation, road works, transport of machinery will be adequately covered by avoidance, minimizing and managing.

Greenhouse gas emissions -The proposal would make a positive contribution to the reduction in greenhouse gas emissions by providing alternative electricity sourced from fossil fuels.

4.4.6 Safety hazards and risks

Safety hazards and risks in relation to aviation, traffic, and bushfire will be assessed and be based on best practice procedures and will include appropriate consultation with the relevant authorities.

Epuron will review aviation impacts considering the local aviation operations and the Australian Aviation regulations.

4.5 Additional issues which do not require further assessment

The Crookwell 1 wind farm was the first grid-connected wind farm proposed and constructed in NSW. It was constructed in 1998, and since then, a total of 19 wind farms consisting of approximately 935 turbines have been assessed and approved in NSW, of which approximately 710 turbines were developed by Epuron.

This substantial amount of investigation and analysis of a range of specific wind farm issues over the past 10 years provides a valid basis for considering that some issues do not warrant further assessment because the impacts have been clearly shown to be minimal or that the impacts are manageable.

4.5.1 Property Valuation

Wind farm developments which appropriately address noise and visual amenity concerns have been demonstrated previously to not materially impact the valuation of surrounding properties. Wind farms are approved by following a merit based assessment by the consent authority including assessment of noise and visual impacts.

In August 2009, the NSW Valuer General undertook an investigation into the impacts of wind farms on surrounding land values. This report, titled Preliminary Assessment of the Impact of Wind Farms on Surrounding Land Values in Australia, reviewed previous studies into the issue as well undertaking an investigation into 8 wind farms (in NSW and Vic) using conventional land valuation analysis of actual market data. The main findings were that:

“the wind farms do not appear to have negatively affected property values in most cases.”

“From our analysis of previous studies and our own investigations, the majority of wind farms erected in Australia appear to have had no quantifiable effect on land values.”

“A relatively small number of “lifestyle” type properties located very close (less than 500 metres) to wind farms in Victoria were found to have lower than expected sale prices (based on a statistical analysis), and it is possible that audio and visual aspects of wind farms contributed to this. Evidence suggests that any such wind farm related impacts on land values can be readily alleviated by ensuring a suitable separation distance between the wind turbines and any nearest residential dwellings.”

“Generally, the separation distances identified in NSW appear to be sufficient in this regard.”

In summary, wind farms do not appear to have negatively affected property values in most cases and this is consistent with other studies.

Accordingly Epuron believes no further assessment or commentary on land value impacts is required. If applicable the above information will be included in the EA for information.

Importantly, two recent court decisions have found that property valuation impacts are not relevant or lawful considerations in the assessment of wind farms (or any development, for that matter).

- In *Parkesbourne Mummel Landscape Guardians v. Minister for Planning* (2010) NSWLEC 1102, the Commissioners were asked to consider impacts on property values and sought compensation. The Commissioners concluded that the proposal was permissible with development consent and that they were unable to lawfully consider loss of value issues.

- In *Taralga Landscape Guardians v. Minister for Planning* (2007) NSWLEC 79, in considering a request for compensation of nearby landowners in relation to a possible reduction in property value, Chief Justice Preston concluded that:

“Creating such a right for compensation would strike at the basis of the conventional framework of land use planning but would also be contrary to the relevant objective of the EP&A Act, in Section 5(a)(ii) for “the promotion and co-ordination of the orderly and economic use and development of land.””

Accordingly Epuron believes no further assessment or commentary on land value impacts is required. If applicable the above information will be included in the EA for information.

4.5.2 Health Impacts

Possible health impacts that have been raised in association with wind farms include:

- shadow flicker and its potential to act as an epilepsy trigger;
- audible noise and its potential to disrupt sleep;
- inaudible noise (infrasound); and
- electromagnetic fields (EMF).

These impacts are not specific to any particular wind farm.

Shadow flicker has previously been found to not create an epilepsy trigger because the flicker frequency is outside the frequency band associated with photosensitive epilepsy [NHMRC 2010]. Shadow flicker will be assessed as an amenity impact in the visual impact assessment.

Wind farms in Australia apply strict noise criteria in line with World Health Organisation guidelines. Audible noise is assessed as an amenity issue and the amenity guidelines applied are more restrictive than the World Health Organisation guidelines. To that end, meeting the amenity guidelines means that any health-related requirements will automatically be met. Audible noise is therefore assessed as an amenity impact in the visual impact assessment.

Numerous studies have found that current wind farm developments using modern up-wind wind turbines do not generate appreciable infrasound, and that sound below the hearing threshold does not cause psychological or physiological impacts.

In relation to EMF, the issues associated with wind farms are no different to the issues associated with the electricity industry in general and the use of industry best practice (and in particular the appropriate location of associated powerlines and related easements) ensure EMF risk is adequately managed.

The National Health and Medical Research Council (NHMRC) has recently carried out a review of the available evidence in relation to health impacts of wind farms, including journal articles, surveys, literature reviews and government reports. This review included discussion of shadow flicker, blade glint, audible noise, infrasound, and EMF. As a result, the NHMRC has issued a public statement titled *Wind Turbines and Health (July 2010)*. While acknowledging that the evidence is limited, the statement concludes:

- *“there is currently no evidence linking these phenomena with adverse health effects”;* and
- *“there is no published scientific evidence to support adverse effects of wind turbines on health”.*

An assessment of potential health impacts is therefore not required.

4.5.3 Noise impacts – Van Den Berg Effect

The Van Den Berg effect stems from Dr Van Den Berg’s Doctoral thesis at the University of Groningen in 2006 following research into a wind farm on the Rhede plain in northern western Germany. The thesis concluded that using measured wind speeds recorded at 10m to calculate hub height wind speeds for noise assessments can lead to under-estimation of turbine noise during stable atmospheric conditions.

This particular issue will not be considered further in the assessment because of advancements in the noise assessment guidelines which now use hub height wind speeds for modelling and accordingly Epuron proposes to use the SA EPA Guidelines of 2009 for this proposal. By using hub height wind speeds for modelling any inaccuracies in calculating from 10m reference wind speeds (as per SA EPA Guidelines 2003) will be minimised.

In *Parkesbourne Mummel Landscape Guardians v. Minister for Planning* (2010) NSWLEC 1102, this issue was investigated by expert meteorologists (paragraph 131 of the judgment refers). The experts analysed actual wind speed data collected at different heights and locations on at particular site and concluded that *the Van Den Berg effect would occur rarely if at all* because of the topographically induced turbulence. Dr Van Den Berg notes himself in his report that the research at Rhede, an extremely flat plain, does not apply to hilly or mountainous regions such as found along the Great Dividing Range of NSW. This proposal is in a hilly region and therefore the Van Den Berg effect is unlikely to occur.

5 Consultation

5.1 Community perceptions

A Newspan conducted for the Clean Energy Council in May 2010 found that nine out of every ten Australians think that Australia should produce more renewable energy. Exactly 90 per cent of people polled think Australia needs "more renewable energy", and almost eight in every ten people polled said it should be 'much more'. <http://www.cleanenergycouncil.org.au/cec/resourcecentre/newspan.html>

Several community perception studies have been conducted in rural areas on the issue of wind farm development in NSW. The studies produced similar trends, showing general support for wind farms in NSW and in the local region.

The NSW Government recently commissioned the report '*Community Attitudes to Wind Farms in NSW*' to assess residents attitudes towards set targets to achieve 20% renewable energy consumption by 2020. The survey was conducted by telephone of 2022 residents aged 18 years and older and 300 businesses across the 6 Renewable Energy Precincts, including the Upper Hunter and a control area in regional NSW.

The outcomes of the study are as follows:

- 81% believed wind power was acceptable for power generation.
- General awareness of turbines was very high. 97% of people had heard about wind farms or wind turbines generating electricity and 81% of the population had seen a wind farm or wind turbine.
- On average, over half (61%) of the population living in these precincts knew about wind farms currently operating in NSW. However, the average of the New England Tablelands Precinct was well below the state at only 38%.
- 85% of the population across the Precincts support wind farms in NSW, with 80% supporting them within their local Precinct, 79% support for a wind farm being built 10 km from their residence and 60% support for wind farms within 1-2 km of their residence.
- A similar trend occurs with business opinion with 88% support for wind farms within NSW, 83% support for a wind farm in the Precinct, 82% support for a wind farm 10 km from the residence and 60% support for a wind farm within 1-2 km of the residence.

Several community perception studies have been conducted in rural areas on the issue of wind farm development in NSW. The studies produced similar trends, showing general support for wind farms in NSW and in the local region.

In October 2007 Epuron commissioned a, *Report on Community Perceptions of Wind Farms in the Southern Tablelands, New South Wales* by Environmental Resources Management (ERM), to assess attitudes of local residents towards the construction of a wind farm in their local community. The survey was conducted by telephone survey of 300 residents in the Goulburn – Crookwell – Yass region within the southern highlands of NSW.

The outcomes of the study undertaken as adapted from ERM (2007) are as follows:

- Eighty percent of respondents are concerned with the threat of global warming and its impact on the environment. Conversely, 16% of respondents indicated that were not concerned.
- General awareness of wind turbines was very high. Almost all of respondents had claimed that they had seen a wind turbine. Further, in excess of 8 in 10 respondents had seen the current wind farm located at Crookwell.
- Approximately 90% of respondents were aware of announcements relating to wind farms.
- Eighty-nine percent of respondents were in favour of wind farm projects to be developed in the southern tablelands with 5% opposed. Of the 89%, 83% stated "*I would be happy to see a wind farm, built on farm land near where I live*"

- Eighty-seven percent of respondents supported the development of a wind farm within 25 kilometres of their house, with 71% supporting development of a wind farm within 1 kilometre of their house.
- With respect to the construction of multiple wind farms, 75% accepted two 'typical' wind farms (15 to 80 turbines) in their local rural area, with 17% opposed

These results were further supported by a poll of constituents in the Upper Lachlan Shire Council during the 2008 election. The poll showed that 70% of constituents were in support of wind farms in the local area.

These figures of upwards of 70% of people in support of wind energy in particular and renewable energy in general are replicated consistently in polls.

5.2 Consultation Objectives

Prospective wind energy projects in NSW are limited to sites with elevated land, good wind speeds, usually in rural areas, and with good transmission line access. Such sites are relatively rare, and often, these sites are located in the vicinity of rural dwellings and in some cases in the vicinity of small to medium sized regional communities. This can cause conflict where local community members feel impacted by the development and yet do not see any direct benefits from the development.

While unfortunate, the limited number of appropriate wind farm sites means that this conflict is often unavoidable and cannot be eliminated by simply moving the wind farm to a different location.

Accordingly, community consultation is not focussed on alternate locations of a wind farm, but rather, on understanding and mitigating the impacts of the wind farm, and on showing and maximising its benefits to the local community.

The objectives of the community consultation are:

- To ensure the community is fully informed about the proposal, its likely impacts, and its likely benefits;
- To ensure that the community has sufficient notice regarding upcoming events such as Open House days and exhibition periods.
- To ensure that Epuron fully understands the local context for the proposal, including any local impacts that the proposal may have or opportunities that it could provide;
- In that context, to provide multiple opportunities for dialogue in various forms to allow the community to receive information and provide feedback about the proposal;
- To incorporate the feedback into the design of the wind farm where possible;
- To explain where and how this feedback can be and has been incorporated; and,
- To build positive, trust-based relationships with members of the local community.

Epuron's consultation process will also look at how best to maximise the local and regional benefit of the development.

While some will object to the proposal, it is hoped that the community will form the view that their collective interests are best served by assisting Epuron with the identification and mitigation of potential impacts of importance to the community.

Further specific consultation is carried out with key stakeholders including local indigenous representatives, other affected parties (e.g. telecommunications carriers) as well as representatives from the local and relevant state government agencies.

5.3 Consultation approach

Epuron will consult with the community and stakeholders through a variety of means, including:

- Newsletters updating the community on progress and involvement opportunities
- Media opportunities
- Community Open House in the local area
- Letters to identified residents within 5kms of the proposed site
- Follow up phone calls and/or individual meetings to concerned landowners



Planning Focus Meeting – Conroy's Gap Wind Farm

The Community Open House forum will seek to inform the community about the wind farm as well as seeking individual and community views on issues that the community perceives as being important. A summary of the project and the expected impacts will be presented, with professional and expert staff available to respond to queries and better understand issues raised. Follow up phone calls, emails, letters can progress individual issues raised.

6 Glossary and acronyms

AusWEA	Australian Wind Energy Association (now part of Clean Energy Council)
DCP	Development Control Plan
DECCW	NSW Department of Environment, Climate Change and Water
DEH	Commonwealth Department of Environment and Heritage, now the Department for Environment, Water Resources, Heritage and the Arts
DGRs	NSW Department of Planning's Director General's Requirements. The Environmental Assessment report must address issues as directed in the DGRs
DoP	NSW Department of Planning
EA	Environmental Assessment report, format dictated by the DGRs
EMF	Electromagnetic fields
EPA	Environment Protection Agency
GWh	gigawatt-hour
kV	kilovolt
LEP	Local Environmental Plan
MW	megawatt, equal to 1,000,000 watts
MWh	megawatt-hour
NHMRC	National Health and Medical Research Council
PFM	Planning Focus Meeting
SEPP	State Environmental Planning Policy

7 References

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- Heritage Branch, NSW Department of Planning (1996). *NSW Heritage Manual*.
- NHMRC (2010). Wind Turbines and Health – A Rapid Review of the Evidence.
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- World Health Organisation (1999). *WHO Guidelines for Community Noise*.

8 Appendices

8.1 Major Project – Minister's Opinion



Planning

Contact: Neville Osborne
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Email: neville.osborne@planning.nsw.gov.au

Our ref.: 10/23653

Mr Andrew Durran
Executive Director
Epuron Pty Ltd
Level 11
75 Miller Street
NORTH SYDNEY NSW 2060

Dear Mr Durran

Subject: Liverpool Range Wind Farm (MP10_0225)

I refer to your correspondence dated 18th November, 2010, and additional information dated 3rd and 6th December, 2010, seeking confirmation that the above proposal is a project to which Part 3A of the *Environmental Planning and Assessment Act 1979* (the Act) applies.

On 8th December, 2010, the Director, Infrastructure Projects branch of the Department, as delegate for the Minister, formed the opinion under clause 6 of the *State Environmental Planning Policy (Major Development) 2005* (the Major Development SEPP) that the above proposal is development of a kind that is described in Schedule 1 of the Major Development SEPP.

The project is therefore subject to determination by the Minister for Planning under Part 3A of the Act.

Section 75E of the Act requires you to lodge an application for your project with the Director-General. The application must include a completed application form (available at http://www.planning.nsw.gov.au/assessingdev/pdf/part3a_applicationform.pdf) and a Preliminary Environmental Assessment. Please include both hard and electronic copies of each of these documents.

You are also advised that your project meets the definition of 'critical infrastructure' under Section 75C of the Act, by virtue of the Minister's declaration of 26th February, 2008 in relation to electricity generating projects with a capacity of at least 250MW and the Minister's declaration of 11th November, 2009 in relation to renewable energy projects. Consequently, under Clause 8F(1)(b) of the *Environmental Planning and Assessment Regulation 2000* (the Regulation), landowner's consent is not required for the purpose of this project application, subject to the notification requirements specified in Clause 8F(3) of the Regulation being carried out by the Proponent.

Please note that it is the Proponent's responsibility to meet the landowner notification requirements of Clause 8F(3)(c) of the Regulation within 14 days of the lodgement of the project application. It is noted that the project may also involve linear infrastructure (grid

connection) and, if so, you will need to comply with the public notification requirements of Clause 8F(3)(a) of the Regulation prior to the commencement of the exhibition period for the project. If these notifications are not carried out, the Proponent will be required to obtain landowners consent for the purposes of the application from all landowners traversed by the project prior to the determination of the project.

I note that you have indicated your intention to seek a specific critical infrastructure declaration for this project. In light of the existing declarations, the Department does not support such a request at this stage.

The Major Project Application Number for this project is MP10_0225. Please use this number in all correspondence with the Department. Your contact officer for this proposal, Neville Osborne, can be contacted on (02) 9228 6337 or via email at neville.osborne@planning.nsw.gov.au. Please mark all correspondence regarding the proposal to the attention of the contact officer.

Yours sincerely,

 12/10/10
Daniel Keary
Director
Infrastructure Projects

8.2 Site Photos



View east along Coolah Creek Road



View south from the northern boundary of the site

