



Birrema *WindFarm*

Preliminary Environmental Assessment | July 2010



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1 Introduction

1.1 Site description and location

The proposed Birrema Wind Farm is to be located on the boundary of the Southern Tablelands and South Western Slopes regions of New South Wales, 30 kilometres west of Yass, and approximately 300 kilometres south west of Sydney. The site is in the vicinity of a number of proposed wind farms including the proposed Conroy's Gap Wind Farm, the Carroll's Ridge Wind Farm, the Marilba Hills Wind Farm and Coppabella Wind Farm as outlined in Figure 1.

The project would involve the construction and operation of approximately 60 - 80 wind turbines, together with the associated control and maintenance buildings, civil works and electrical infrastructure required to connect into the existing transmission network. The turbines would be placed along a series of ridgelines and hilltops as indicated in Figure 2.

Epuron is currently assessing the potential of ridgeline and hilltops from the Benangaroo Road through to Childowla Road with elevations of these ridgelines ranging from 500 to 700 meters above sea level. The exact site boundary will be confirmed in the Environmental Assessment to be prepared for the site.

The closest population centre to the site is the village of Bookham some 8km from the site. The closest rural centre is Yass located some 30km from the site. A number of residences surround the site; these have been identified through reviews of cadastral and 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 on freehold and leasehold land within and adjacent to agricultural areas. The proposed site is located across the Local Government Areas (LGA) of Yass Valley Shire and Harden Shire. See site photos in section 8.2.

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 leading 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 specialists for detailed site investigations into areas such as biodiversity, archaeology, noise and visual impact.

Epuron is part of the Conergy AG group of companies. Conergy is a renewable energy company listed on the Frankfurt stock exchange and has over 1000 employees around the world.

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

Project	Turbines / Size	Development Status	Region
Cullerin Range	15 turbines - 30 MW	Now owned by Origin Energy - operating	Southern Tablelands
Conroy's Gap	15 turbines - 30 MW	Now owned by Origin Energy - Development Approved	Southern Tablelands
Snowy Plains	15 turbines - 30 MW	Now owned by Origin Energy - Development Approved	Monaro
Gullen Range	73 turbines	Development Approved	Southern Tablelands
Silverton	598 turbines	Joint Venture with Macquarie Capital Wind Fund Project Approval -stage 1 Concept Approval - stage 2	Far Western NSW
Yass Valley	152 turbines	Now owned by Origin Energy – under development	Southern Tablelands

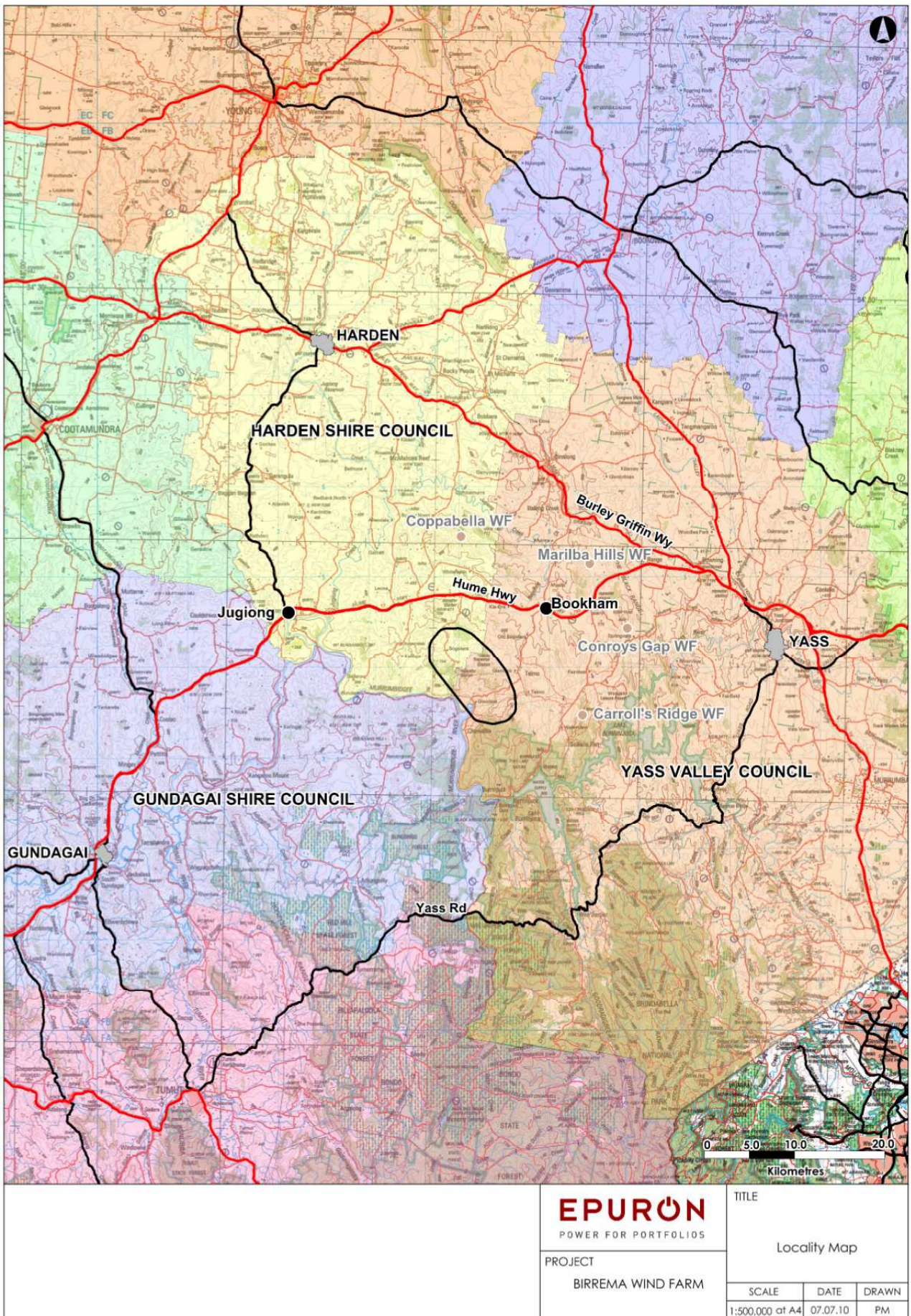


Figure 1 Locality map

1.3 Development Application process

1.3.1 Purpose of this document

This Preliminary Environmental Assessment is an introduction to the Birrema Wind Farm project and summarises the approach for the detailed assessments and consultation plan for the Environmental Assessment to be lodged with the Department of Planning.

This Preliminary Environmental Assessment presents:

- a description of the proposal;
- a preliminary environmental risk assessment identifying key issues in relation to possible impacts of the proposal;
- an outline of the approach and guidelines Epuron intends to follow for the Environmental Assessment (EA), and;
- the consultation plan Epuron is implementing in relation to this proposal.

It also identifies and prioritises the associated potential environmental impacts.

1.3.2 Planning Context

Local Planning Legislation

The proposed Birrema Wind Farm site straddles two local government areas as shown in Figure 1. The eastern part of the site is located in the Yass Valley LGA and the western portion in the Harden Shire.

Yass Valley Local Environmental Plan

The Yass Valley LGA was created following council amalgamation in 2004. The operative LEP for the wind farm land is the Yass LEP. The Proposal site (and adjacent properties) is zoned as 1(a) Rural Agriculture Zone for which development requires consent and for which wind farms are not prohibited, in accordance with the LEP.

The Yass Valley Council is preparing a new LEP for the entire council area and it is expected that this will be released for exhibition and subsequently adopted in late 2010.

Shire of Harden

The western portion of the site is within the Harden Shire LGA and the operative development controls are prescribed in the Interim Development Order (IDO) No. 1. The proposal (and adjacent land) falls on land zoned as 1(a) Non-urban "A" for which development requires consent and for which wind farms are not prohibited.

The Harden Shire Council has developed a new LEP that is expected to be placed on public exhibition shortly and will be adopted.

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 – Environment 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. While a preliminary investigation has indicated the proposal would not have an impact on EPBC listed species, Epuron 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 Birrema 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 24/05/2010, included in Appendix 8.1). 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 Birrema 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) for the project 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 Birrema Wind Farm is located on the boundary of the Southern Tablelands and South Western Slopes regions of New South Wales. It 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 approximately 9 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, and carry dry forest vegetation communities on the steeper sheltered slopes. Remnant stands of the original vegetation remain as paddock tress or larger scattered patches of forest/woodland. The surrounding slopes and gullies are unlikely to contain turbines but could be affected if access routes or powerlines were routed through them. In general the slopes and gullies carry more native vegetation than the ridges.

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 moderate size wind farm, with approximately 60 - 80 wind turbines proposed. At this stage, exact turbine numbers and locations have not been fixed, so for the purpose of providing an indication of the possible project extent, the estimation of turbine numbers is based on 70 turbines.

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 also involve the construction, operation and decommissioning or recommissioning of:

- approximately 60 - 80 wind turbines (rated at 1.5 - 3.3 MW), each with:
 - three blades up to 55m in length mounted on a tubular steel tower of up to 105 metres with a combined height of a blade and tower restricted to a maximum tip height of 150 metres;
 - an adjacent a pad mounted turbine transformer, crane hardstand area, and related turbine laydown area;
- a substation and transmission connection linking the turbines to the existing TransGrid 132kV or 330kV transmission line network, which intersects the south east 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 is currently consideration several grid connection options using powerlines which are located on or near the site including the 132kV Yass-Wagga, 132kV Yass-Burrinjuck, and 330kV Yass-Lower Tumut powerlines owned by Transgrid.

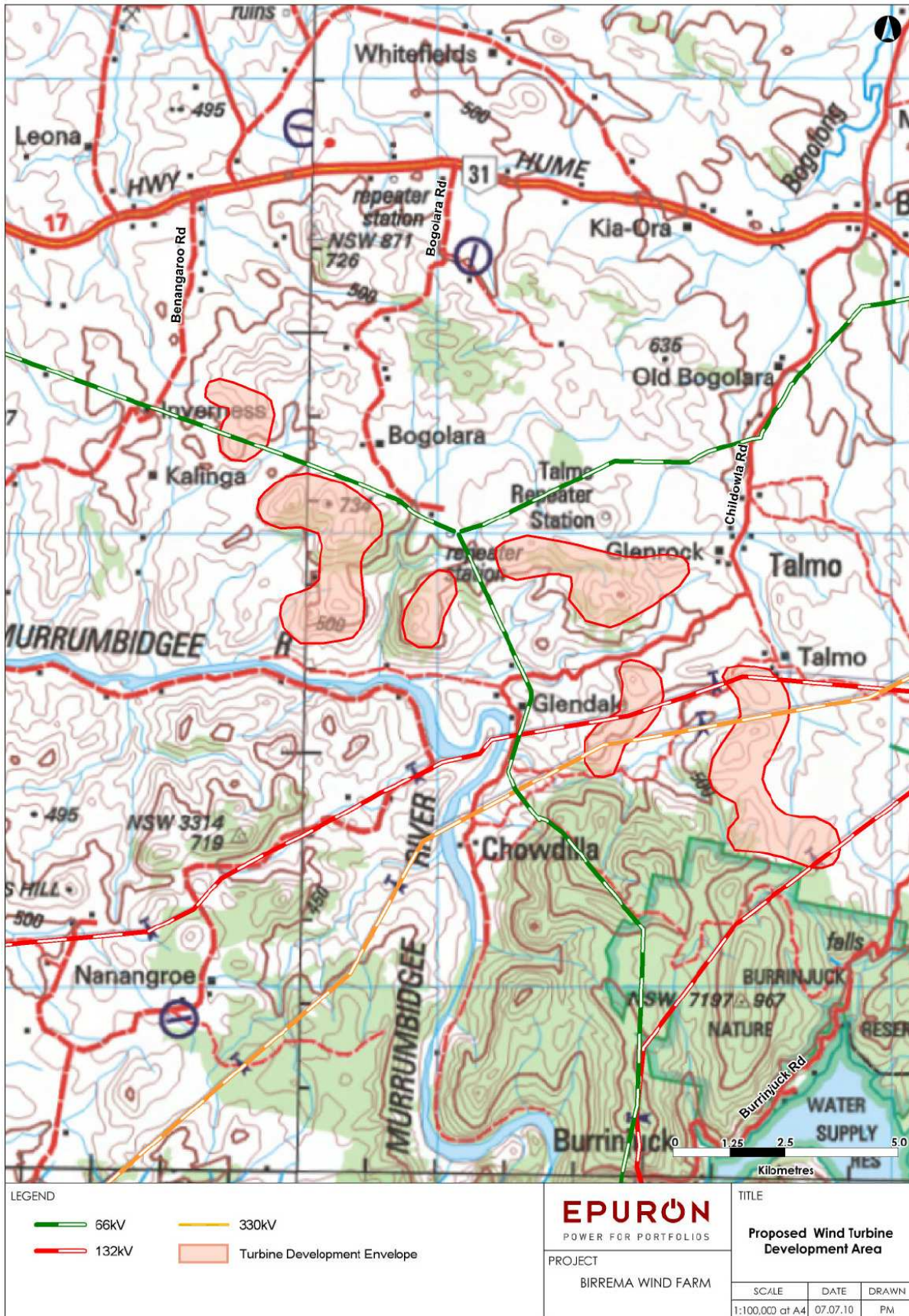


Figure 2 Wind turbine development area

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.

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.

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 Birrema 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 Southern Tablelands and South Western Slopes.

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

- the 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;
- in a typical year, based on a typical capacity factor of 35% (and assuming 70 turbines at 2.5 Megawatts each), the wind farm could produce around 536,000 Megawatt-hours of clean, renewable energy, enough for the average consumption of around 67,000 homes; and
- this in turn will lead to a significant reduction in greenhouse gas emissions through the avoidance of around 510,000 tonnes of carbon dioxide each year from coal fired power stations, the equivalent of removing 140,000 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/an, 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, consistent and low cost nature.

The RET is a market based mechanism designed to encourage investment in renewable energy projects. The design of the RET encourages renewable energy projects with the lowest cost of renewable energy generation. The generation cost of a wind farm is related to the energy production as well as the capital cost and ongoing operating costs. Any cost increase or energy production constraint introduced as a result of the planning process will affect the cost of energy produced. This could therefore affect the viability of the project.

Projects like the Birrema Wind Farm would encourage renewable investment in NSW and reduce the costs of production by reducing transmission losses to the NSW load centres.

Data collected from wind monitoring masts located throughout the state have established that the Southern Tablelands have 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 including a number of masts in the Yass area. These masts, including the existing wind monitoring tower on site, confirm wind speeds at the site are 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 impacts potentially associated with wind farms include:

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

The Environmental Assessment will address relevant issues both individually and cumulatively where appropriate, and taking into account appropriate consultation with relevant stakeholders.

In preparing the Environmental Assessment, a balance is required to ensure that every issue is adequately addressed considering the potential risks and impacts associated with the issue, but without burdening the Environmental Assessment with details which are unlikely to affect the ultimate assessment of the proposal or development of the project. Accordingly, the greatest effort is put towards the areas with the highest potential for impact.

To guide the Environmental Assessment, Epuron has carried out an environmental risk assessment which separates the issues into three priorities:

- High Priority (Key) Issues which will be addressed through use of an independent expert assessment together with specific on-site assessment and field work;
- Moderate Priority issues which will be addressed, where necessary, via desktop assessment, precedent and consultation; and,
- Low Priority issues which for the reasons outlined do not require further assessment.

Following is an outline of the potential environmental impacts in relation to the Birrema Wind Farm, together with a summary of Epuron's proposed approach to address each issue.

4.2 Environmental risk assessment

Epuron has carried out its environmental 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 the Priority by taking 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.

Note, the Priority does not reflect the importance of the issue, but rather, it reflects the importance of further detailed assessment in relation to that issue.

Where Epuron has established an issue as a Low Priority, it has done so on the basis that:

- it is a risk which is well understood;
- site-specific assessment is not required to understand the risk;
- it has previously been demonstrated to not affect the assessment of wind farm projects or the consent conditions relevant to projects;
- it has previously been found to be not relevant to the assessment of wind farm projects; and/or
- an industry standard approach is available which adequately addresses the issue and this approach will be included in the Statements of Commitment to be included in the Environmental Assessment.

Issues which fall into this category are discussed in section 4.5.

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	Priority	Investigation strategy
Visual amenity	Impacts Loss of visual amenity Impact on scenic character Shadow flicker disturbance Cumulative visual impacts Mitigation: Landscaping measures	High	Independent expert assessment
Noise amenity	Impacts Operational or construction noise may impact residences nearby Mitigation Through turbine selection, location, and other noise control measures	High	Independent expert assessment
Biodiversity	Impacts 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 Relocation of equipment Appropriate environmental management procedures Species-specific mitigation options	High	Independent expert assessment
Indigenous and European heritage	Impacts Potential to impact indigenous or European heritage values and items Mitigation Relocation of equipment Appropriate environmental management procedures	High	Independent expert 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	Moderate	Independent expert assessment and in house assessment

Issue	Sources of impact Options for mitigation	Priority	Investigation strategy
Electromagnetic interference	Impacts Loss of communication signals Reduction in strength of broadcast signals (TV or radio) Mitigation Relocation of equipment Site specific mitigation	Moderate	In house assessment
Soil and landforms	Impacts Erosion Mitigation Environmental Management Plan	Moderate	In house and/or independent expert assessment
Water and groundwater	Impacts Availability of water for construction Environmental pollution Mitigation Standard practices apply	Moderate	In house and/or independent expert assessment
Climate and air emissions	Impacts Dust generation Greenhouse gas impacts Mitigation Standard practices apply Greenhouse gas impacts are beneficial	Moderate	In house and/or independent expert assessment
Safety	Impacts Aviation safety Bushfire safety Fire management Mitigation Standard practices apply	Moderate	In house and/or independent expert assessment
Social	Impacts Land use change Economic impacts Mitigation Economic impacts are positive	Moderate	In house and/or independent expert assessment
Property value	Impacts Potential impact on property valuation Mitigation Not required	Low	No further assessment
Health	Impacts Epilepsy triggers Infrasound Electromagnetic fields (EMF) Mitigation Standard practices apply	Low	No further assessment

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 in reference to:

- AusWEA and Australian Council of National Trusts (2005). *Wind Farms and Landscape Values; Stage 1 Final Report*

4.3.2 Noise amenity

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

Australian Standard AS 4959 – 2010 *Australian Standard for the measurement, prediction and assessment of noise from wind turbine generators*.

NSW does not currently have specific wind farm noise guidelines, and historically has adopted the guidelines set out in the South Australian Environment Protection Authority (2003) *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 of compliance will be in accordance with the requirements outlined in the Director General's requirements.

4.3.3 Biodiversity

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

Epuron has carried out a preliminary biodiversity assessment of the site. The biodiversity work undertaken to date has identified that, while there are some areas of high ecological value, the approach of identifying and mapping constraints and modifying the proposal to minimise and manage these areas means significant impacts can be avoided.

The biodiversity assessment will include detailed site investigation including field visits, appropriate levels of trap-and-release research, as well as bat identification using Anabat bat detectors. The biodiversity assessment will consider and implement where appropriate a number of guidelines including:

- AusWEA (Jul 2005). *Wind Farms and Birds: Interim Standards for Risk Assessment*.
- AusWEA (Dec 2006). *Best Practice Guidelines for Implementation of Wind Energy Projects in Australia*.
- DECC (2007). *Threatened Species Assessment Guidelines. The Assessment of Significance*.
- DECCW (Nov 2004). *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft*.
- 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 (Jun 2002). *Draft NSW Wind Energy EIA Guidelines*.
- Commonwealth (2006). *Significant Impact Guidelines. EPBC Act Policy Statement 1.1. Matters of National Environmental Significance*.

4.3.4 Indigenous and European heritage

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

- DECCW (1997). *Aboriginal Cultural Heritage Standards and Guidelines Kit*.
- DECCW (2005). *Guidelines for Aboriginal Heritage Impact Assessment and Community Consultation*.
- DECCW (2010). *Aboriginal Cultural Heritage Consultation Requirements for Proponents*.
- Heritage Branch, NSW Department of Planning (1996). *NSW Heritage Manual*.

The assessment will be carried out in consultation with local indigenous groups and other stakeholders.

4.4 Additional issues to be assessed

Electromagnetic interference

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

The EMI study will also address broadcast services including television and radio services.

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.

Soil and landforms

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.

Water and groundwater

A water and groundwater assessment will include 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, risk assessment and managing. It will also address sources of water required for construction and operation of the project.

Climate and air emissions

A climate and air emissions assessment will include 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, minimisation and management.

The proposal would make a positive contribution to reducing greenhouse gas emissions by providing alternative electricity sourced from fossil fuels, this benefit will be quantified.

Safety

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.

Aviation impacts will be assessed considering the local aviation operations and the Australian aviation regulations.

Social

Social impacts in relation to land use change, economic impacts and employment impacts will be assessed.

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 21 wind farms consisting of approximately 1200 turbines have been assessed and approved in NSW, of which approximately 760 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 the impacts are manageable. Accordingly, Epuron does not plan to undertake further assessment or reporting on the following issues.

4.5.1 Property valuation impacts

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 as 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.

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 *Parkebourne 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 including shadow flicker, infrasound and EMF

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 Community & Consultation

5.1 Community perceptions

A specialist report, *Report on Community Perceptions of Wind Farms in the Southern Tablelands, New South Wales* was prepared for Epuron in October 2007 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, and thus is considered to be directly geographically relevant to the proposed wind farm.

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 far, 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

The study concluded that generally adult residents in the survey area are concerned about global warming and are aware of alternatives available. Additionally, the respondents were generally aware of wind turbines and how wind turbines appear within the landscape and are generally supportive. Survey results further indicated that respondents were generally not adverse to the development of wind farms in the immediate locality. The survey also indicated that 89% of the respondents indicated that they were in favour of the development of a wind farm within the southern highlands. In addition, over 9 in 10 respondents agreed that *'wind energy is a good alternative energy source'*. The survey also found that the community had no clear preference between a few clusters, close together, or spread out at reasonable intervals along the highway (ERM & Reark 2007).

Based on the results of the survey undertaken by ERM in 2007, it would appear that the community within the southern tablelands are generally supportive of wind farms. The survey also indicated that the community was aware of announcements relating to wind farm development in the region.

A poll conducted recently in the Upper Lachlan Shire Council LGA (Local Government Elections 2009) aimed to identify the community's perspectives on wind farms. The question posed to the community was: *Do you support the continuing development and construction of wind farm turbines in the Upper Lachlan Council area?* A total of 4,727 votes were counted during the poll with 70.04% (3,311) voting 'yes' to the question posed as detailed above with 29.96% (1,416) of respondents voting 'no'. The results of this poll support the findings that general public perceptions of wind farms in the Southern Tablelands region are positive.

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 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,
- 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.

Epuron will consult throughout the planning process with government agencies and statutory stakeholders as well as community groups and individuals.

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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