

# Liverpool Range

## *Wind Farm*

Environmental Assessment | July 2014

MP10-0225

**EPURON**



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Environmental Assessment | July 2014

**MP10-0225**

**Prepared By:**

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## Foreword

*Epuron is pleased to submit this proposal to build the Liverpool Range Wind Farm. This wind farm will provide multiple opportunities to capture much needed investment and job creation in the local area and also brings environmental benefits that clean, green, renewable energy provides to the wider community.*

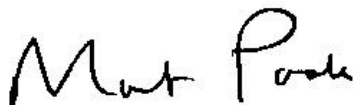
*Wind farms play a vital role in delivering renewable energy to meet New South Wales and Australia's growing demand for cleaner sources of electricity. They also reduce harmful greenhouse gas emissions and help to secure a more sustainable future.*

*Epuron strives to ensure that its projects are developed in a manner that recognises the importance of an ongoing, long-term relationship with its landowners and the local community.*

*We believe this renewable energy project enjoys the support of the majority of people living in the local community and trust this application demonstrates our thoroughness and allows you to make an informed decision on the project's merits.*

*In preparing this Environmental Assessment for the Liverpool Range Wind Farm we would like to thank the many stakeholders and community members that have provided their feedback and contribution towards its preparation.*

*Sincerely,*



---

Martin Poole  
Executive Director



---

Andrew Durrant  
Executive Director

## Addendum 21 March 2014

*The Environmental Assessment for the Liverpool Range Wind Farm (MP10-0225) was prepared in accordance with Part 3A of the Environmental Planning and Assessment Act 1979. On 07 July 2014 the NSW Department of Planning and Environment advised that the Environmental Assessment was adequate for public exhibition.*

*On 21 March 2014, by order of the Minister for Planning and Infrastructure published in the NSW Government Gazette, the project ceased to be a transitional Part 3A project and became a 'State Significant Development'. Accordingly, the environmental assessment requirements and the statement of environmental assessment under Part 3A are taken to be environmental assessment requirements and an Environmental Impact Statement under the corresponding provisions of Part 4 (clause 6(3)(b), Schedule 6A Transitional arrangements—repeal of Part 3A, Environmental Planning and Assessment Act 1979).*

*For clarity when reading this Environmental Assessment and relevant attachments any reference to Part 3A is to be read as a reference to State Significant Development (Division 4.1 of Part 4, Environmental Planning and Assessment Act 1979).*

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# 1 Executive Summary

## 1.1 Introduction

The purpose of the executive summary is to provide an overview of the key elements of the proposed Liverpool Range Wind Farm, a 288 turbine wind farm project located to the east of Coolah and northwest of Cassilis, New South Wales. The site is approximately 325 km northwest of Sydney in the New England Tablelands and is located on freehold and leasehold land within and adjacent to agricultural areas, predominantly used for grazing sheep and cattle.

The site has been selected for its exposed windy ridges, cleared grazing land and proximity to the national electricity grid. 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.

The Environmental Assessment (EA) has been prepared to assess the potential environmental impacts and highlight the key benefits associated with the development of the Liverpool Range Wind Farm. The project will be assessed as State Significant Development (SSD) under Part 4 of the NSW Environmental Planning and Assessments Act 1979.

The Proponent for the project is Epuron Pty Ltd, an Australian renewable energy company established in North Sydney in 2003. Epuron is one of the most experienced wind energy development companies in NSW, with approved projects including Cullerin Range, Conroy's Gap, Gullen Range, Silverton and White Rock wind farms.

This executive summary provides an overview of the EA. Further details of each aspect of the EA can be found throughout the document and in the specialist studies that are appendices to this EA.



*Figure 1-1 A cleared ridgeline forming part of the Liverpool Range Wind Farm*

## 1.2 Project Outline

The Liverpool Range Wind Farm would involve the construction, operation and maintenance of up to 288 wind turbines, together with the ancillary structures, access tracks and electrical infrastructure required to connect the project into the existing national electricity network. Figure 1-2 on the following page shows the proposed turbine layout and site boundary.

This wind farm site would directly involve approximately 21 properties that are currently used for agriculture and grazing purposes. These existing uses would continue with minimal interruption from the wind farm during construction and operation.

The wind turbines would have a maximum tip height (tower plus blades) of 165 metres above ground level and would be located on a series of ridgelines running generally southwest to northeast near the towns of Coolah and Cassilis and Coolah Tops National Park.

The wind turbines would be electrically connected by a series of underground and overhead cables joining each wind turbine to one of six on-site collection substations. A new overhead powerline, rated at up to 330 kV (nominal) capacity and approximately 53 km in length, running the length of the wind farm site would connect to the six collection substations and south from the project boundary to the wind farm connection substation at Ulan. The overhead powerline will connect the wind farm to the existing 330 kV TransGrid Wellington – Wollar transmission line.

Additional permanent structures such as an operations and maintenance facility would be required as well as temporary construction facilities. Minor upgrades to local roads would be required for the delivery, installation and maintenance of wind turbines and the related facilities.

*Table 1-1 Summary of the project*

<i>Aspect of the Project</i>	<i>Description</i>
Project Summary	Construction and operation of a 288 turbine wind farm approximately 325 kilometres northwest of Sydney, NSW. The project would have the ability to produce around 2,724,700 MWh of renewable energy every year, equivalent to the average consumption of around 340,600 homes (based on a 36% capacity factor).
Infrastructure & Facilities	The site will accommodate a wind farm connection substation, up to six collection substations, overhead powerlines and an operations and maintenance facility. Access tracks approximately 5-6 metres wide (wider at bends) would connect all of the wind turbines and associated infrastructure.
Electrical Connection	Underground and overhead electrical cabling and a new overhead powerline would connect the wind turbines to the on-site collection substations and wind farm connection substation. The collection substations would include transformers to step up the voltage from 22 kV or 33 kV to 330 kV and the wind farm would be connected to the existing transmission network via connection substation into the existing TransGrid 330 kV Wellington – Wollar transmission line.
Employment	The construction phase would create up to 829 jobs in direct employment and there would be a requirement for up to 78 ongoing operation and maintenance jobs during the life of the wind farm.
Project Life	Once installed, the turbines would operate for an economic life of up to thirty years. After this time the turbines may be refurbished to improve their performance or decommissioned and removed from the site.
Environmental Benefits	Carbon Dioxide (CO <sub>2</sub> ) emissions reductions of 2,634,800 tonnes per year and an increased renewable generation source for NSW.
Installed Capacity	The project would have 288 turbines with an installed capacity in the range of 432 –1,008 MW based on 288 wind turbines at 1.5 - 3.5 MW each.



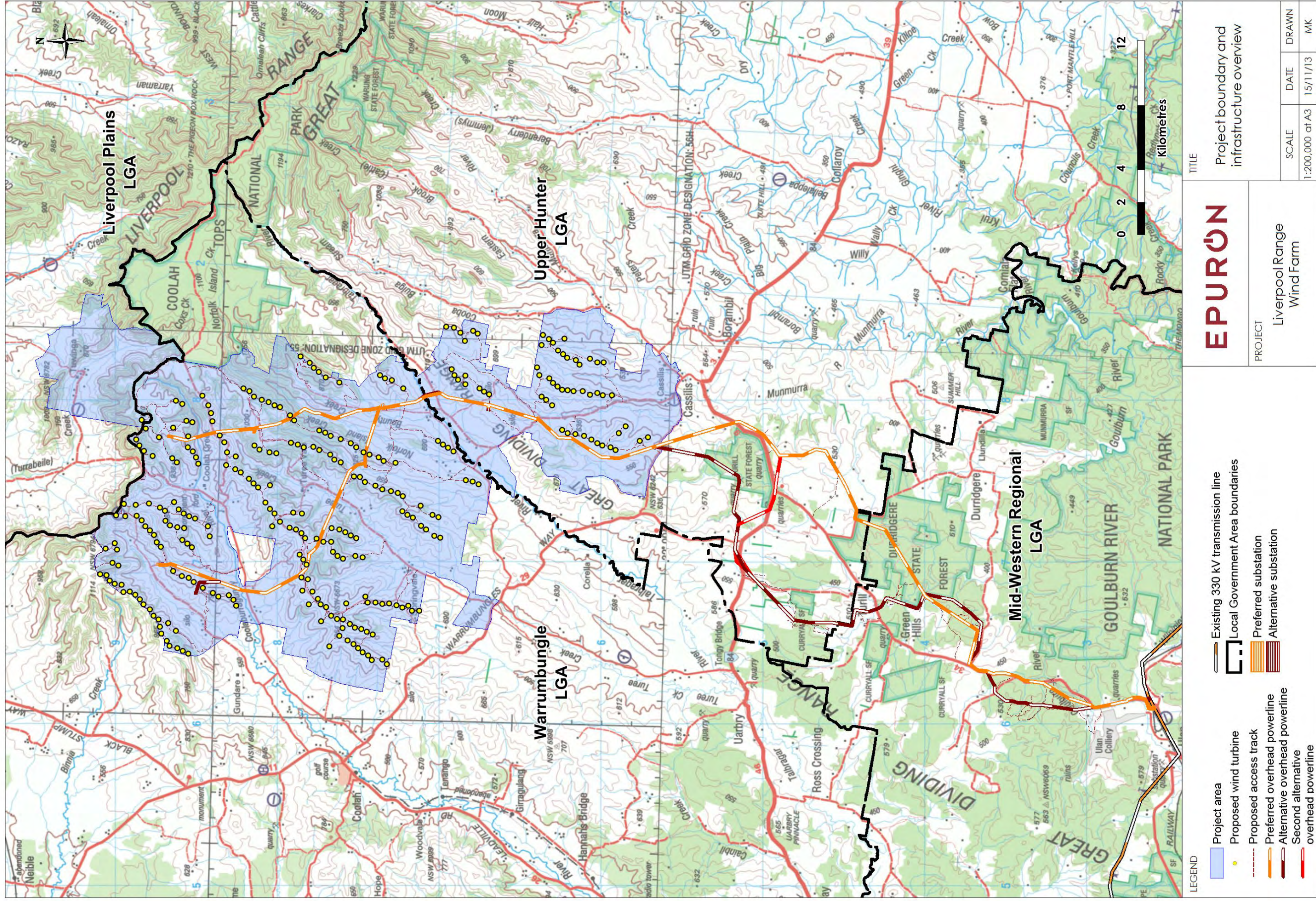


Figure 1-2 Liverpool Range Wind Farm turbine layout, proposed transmission routes and site boundary



### 1.3 Strategic Justification

The NSW Government has released its draft of the Renewable Energy Action Plan (REAP) to support the achievement of the national target of 20% renewable energy by 2020. The REAP positions NSW to increase the use of energy from renewable sources, such as wind energy, at least cost to the energy customer and with maximum benefits flowing to NSW.

*The need for power*

Primary drivers for developing renewable energy projects in NSW such as the Liverpool Range Wind Farm are: meeting a growing demand for electricity, the need for reducing greenhouse gas (GHG) emissions through clean energy generation sources, and contributing towards state and federal renewable energy targets.

Electricity consumption continues to grow, and the additional demand must be met by either increased fossil fuel generation such as coal or gas or an increase in generation from renewable sources such as wind power.

TransGrid’s Annual Planning Report (2012) and AEMO’s Annual Electricity Statement of Opportunities (2012) confirms that growth in demand for electricity will soon exceed supply during peak times. Over the next 10 years energy use in NSW is expected to increase at an average of 1.6% per year. By 2020 electricity demand in NSW is expected to be 87,745 GWh/an, an increase of approximately 13,000 GWh per annum over today’s consumption (AEMO, 2012; TransGrid, 2012).

Meeting this demand will require our existing electricity generators to increase their annual output and the development of additional power generation will also be required. AEMO has estimated that additional power generating capacity will be required to manage peak periods in NSW by summer 2018/19. Alternative sources of generation need to be developed to meet this expected demand growth to ensure reliability of supply and avoid power outages and blackouts (TransGrid, 2012). The lead time for new generation to be available is several years.

New South Wales summer supply-demand outlook

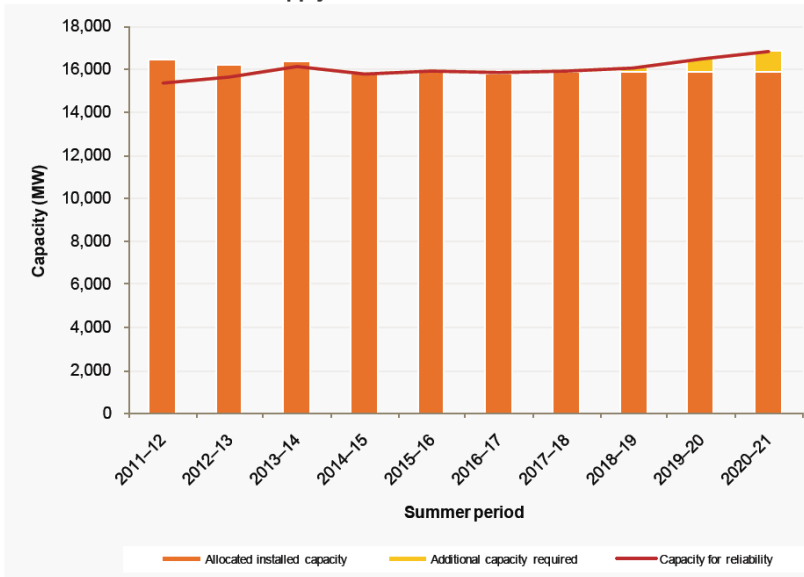


Figure 1-3 AEMO NSW Summer Generation Capacity Outlook (AEMO, 2010)

The Liverpool Range Wind Farm would contribute towards this growing demand for generation and decrease the country’s dependence on fossil fuel power stations, which currently contribute over 90% of electricity generation in the National Electricity Market (NEM). The Liverpool Range Wind Farm represents a large sized wind farm with an installed capacity of around 864 MW based on a 3.0 MW turbine.

Based on the *NSW wind farm greenhouse gas savings tool* developed by the Department of Environment, Climate Change and Water (DECCW), the Liverpool Range Wind Farm will reduce greenhouse gas emissions by around 2,634,800 tonnes of carbon dioxide equivalent (CO<sub>2</sub>e) per annum. This is equivalent to taking 717,000 cars off our roads, and will contribute to global efforts to mitigate climate change.

### *The Benefits to the Region*

There are also benefits to the local economy through job creation and investment. The Proponent is committed to developing this project in a way which minimises the adverse local impacts while maximising the potential energy in the wind resource and the benefits to the local community.

The project offers the following benefits:

- ▶ Production of more than 2,724,700 MWh of electricity per year - sufficient for the average consumption of around 340,600 homes;
- ▶ Improvement to the security of electricity supply through diversification of generation sources and locations;
- ▶ Reduction of greenhouse gas emissions by approximately 2,634,800 t CO<sub>2</sub>e per annum;
- ▶ Contribution to the State and Federal Governments' target of providing 20% of consumed energy from renewable sources by 2020;
- ▶ The creation of up to 829 direct employment jobs in the region during the construction phase and up to 78 permanent jobs for the life of the project; and
- ▶ An injection of up to \$3,905 million into the Australian economy through the inclusion of flow on effects and multipliers.

## 1.4 Consideration of Alternatives

### *Site Selection*

The site for the proposed Liverpool Range Wind Farm was fundamentally identified due to its excellent wind resource, proximity to an existing strong transmission network and the identification of willing landowners. A prefeasibility assessment revealed the site had excellent potential due to its elevated ridgelines, access via a main highway and relatively low density of residential houses.

### *Design Principles*

Potential wind farm sites in NSW are typically located in areas with elevated ridgelines and strong prevailing winds. Due to these geographical attributes the potential turbine locations are more limited than on flatter areas such as near the coastal plains. Standard distances between turbines must be considered in conjunction with the prevailing wind conditions to avoid unnecessary turbulence that can lead to a decrease in energy yield and mechanical stress on the turbines. While the final turbine model has not yet been selected, a likely turbine size of 3.0 MW was considered when developing the layout for this EA as this presents the representative design impact.

### *Layout Adjustments*

The design of the wind farm layout was an iterative process that sought to maximise the energy potential of the site while minimising amenity impacts to the surrounding community. Community feedback and various expert assessments were considered when adjusting the turbine locations in order to design the most appropriate layout given the surrounding environment. In some instances, turbines were relocated and in some cases deleted to minimise or avoid impacts in response to issues such as noise, ecological, heritage and community concerns.

## 1.5 Planning Context

### *State Legislation*

The determination process for the proposed Liverpool Range Wind Farm is governed by the NSW Environmental Planning and Assessment Act 1979 (EP&A Act). The Liverpool Range Wind Farm will be assessed as State Significant Development (SSD) under Part 4 of the NSW Environmental Planning and Assessments Act 1979.

The Director General of the Department of Planning and Environment (DP&E) has issued requirements for Epuron to consider and address in this EA (known as the Director General's Requirements or DGRs). These requirements incorporate inputs from the various government agencies that will provide advice to the DP&E in the assessment of this proposal.

The steps in the planning determination process are outlined in Table 1-2.

Table 1-2 Planning Assessment Process

Stage of the Assessment	Description
Project Application and Preliminary Environmental Assessment	A Preliminary Environmental Assessment (PEA) is conducted by the Proponent to support the Project Application and give context to the site and potential issues that would need to be considered. This was submitted by Epuron in February 2011.
Director General Requirements (DGRs)	Using the PEA and advice from other governmental departments the Department of Planning and Environment (DP&E) issues DGRs. This is a list of issues that must be addressed by the proponent in an EA. The DGRs were issued to Epuron on 31 March 2011 and Supplementary DGRs were issued to Epuron on 16 August 2011.
Environmental Assessment and Consultation	The Proponent prepares an EA following the DGRs. This involves extensive studies to be conducted on site as well as consultation with the local community and other stakeholders.
Submission and Departmental Review of the EA	The Proponent submits the EA and supporting studies to the DP&E who undertakes a review of the EA to ensure the document is acceptable and addresses all issues raised in the DGRs. The DPI may require further work to be carried out by the Proponent.
Public Exhibition	The EA is placed on display locally and electronically for the public to review and provide feedback via submissions to the DPI. It is expected the EA will be on display for a minimum of 60 days.
Response to Submissions	The DPI provides the Proponent with a summary of issues raised in submissions. The Proponent is required to respond to each issue that is raised in the submissions and submit a Submissions Report to support the EA.
Determination	The DP&E considers the EA and the Submissions Report, preparing its advice and recommendations for the Minister for Planning and Infrastructure, and the Minister or the minister's delegate determines the application.

### About This Report

This EA was prepared with the intention of providing the reader with a clear concise overview of the project details, the rationale behind the project and the issues that have been considered from a social and environmental perspective. Additional detail is provided in the attachments and appendices. The EA references these sections wherever relevant in order to aid the reader in locating the more detailed sections.

This EA document comprises the following sections and the hard copy version has been printed in two volumes:

**Main Report:** Environmental Assessment for the proposed Liverpool Range Wind Farm

#### Attachments:

Attachment 1 - Detailed Site Maps

Attachment 2 – Involved Land Parcels

Attachment 3 – Residence Coordinates

Attachment 4 – Turbine Coordinates

Attachment 5 – Letter Confirming Part 3A Position

Attachment 6 – Director General's Requirements and Supplementary Director General's Requirements

Attachment 7 – Community Consultation Plan

Attachment 8 – Consultation Material

#### Appendices:

Appendix A – Landscape and Visual Assessment

Appendix B – Noise Assessment

Appendix C – Biodiversity Assessment

Appendix D – Aboriginal and European Heritage

Appendix E – Traffic and Transport Assessment

Appendix F – Telecommunications Impact Assessment

Appendix G - Decommission and Rehabilitation Plan

Appendix H - Addressing the Terms of Reference (TOR) for Matters of National Environmental Significance (MNES) for the proposed Liverpool Range Wind Farm and Transmission Line

## 1.6 Consultation

In 2010 the NSW Government commissioned a report *'Community Attitudes to Wind Farms in NSW'* to assess residents attitudes towards targets set to achieve 20% renewable energy sources by 2020. The survey was conducted by telephone of 2022 resident's aged 18 years and older and 300 businesses across the 6 Renewable Energy Precincts, including the Upper Hunter and New England Tablelands areas and a control area in regional NSW.

One of the key findings from this study was the overall support for wind farms as a source of energy generation within the vicinity of a residence. 85% of the population across the precincts supported wind farms in NSW, with 80% supporting them within their local region, 79% supporting a wind farm being built 10 km from their residence, and 60% supporting a wind farm being built 1-2 km from their residence.

Based on this survey, including observations made by the project consultation team, it can be concluded that communities in the region are generally supportive of wind farms. The survey also showed that a majority of the population did not feel they had adequate information about wind farms, even in areas where general wind farm awareness was much greater.

Epuron prepared a Project Consultation Plan to inform and guide the community consultation and development program for the Liverpool Range Wind Farm. The Project Consultation Plan focused on providing information to the local community about the project and the assessment process and outlining the mitigation of potential impacts. The Project Consultation Plan continues to be implemented and has proved to be effective and has included individual consultation with neighbouring residents of the project, distribution of newsletters as well as an information 'Open House' day held in Cassilis in November 2012. A Community Consultation Committee has been established for the project and has currently met on four occasions prior to exhibition of the EA.

## 1.7 Landscape and Visual impact

The Liverpool Range Wind Farm Landscape and Visual Impact Assessment (LVIA) has been prepared by the landscape architectural consultancy and visual assessment specialist Green Bean Design (GBD). The LVIA involved a comprehensive evaluation of the visual character of the landscape in which the wind farm would be located, and an assessment of the potential significance of landscape and visual impacts that may result from the construction and operation of the wind farm, taking into account appropriate mitigation measures.

In terms of overall landscape sensitivity, the LVIA determined that in aggregate each of the five Landscape Character Areas (LCAs) within the 10 km wind farm viewshed had a medium sensitivity to accommodate change, and represented a landscape that is reasonably typical of other landscape types found in surrounding areas.

The LVIA determined that the wind farm is likely to be an acceptable development within the viewshed, which in a broader context also contains approved wind farm developments and built elements such as roads, agricultural industry, mining, aircraft landing strips, communication and transmitter towers and powerlines.

The LVIA identified a total of 23 potential involved and uninvolved residential view locations within the Liverpool Range wind farm 2 km viewshed. Unoccupied residential dwellings have been included and assessed as part of this LVIA where structures and buildings were considered to be potentially habitable at the time of the field work.

An assessment of each potential residential view location indicated that for the Liverpool Range wind turbine design layout:

- ▶ 1 of the 23 residential view locations has been determined to have a low visual significance;
- ▶ 3 of the 23 residential view locations have been determined to have a low to medium visual significance;
- ▶ 9 of the 23 residential view locations have been determined to have a medium visual significance;



- ▶ 9 of the 23 residential view locations have been determined to have a medium to high visual significance; and
- ▶ 1 of the 23 residential view locations has been determined to have a high visual significance.

The residential view location with a high visual significance will be an involved residential dwelling.

The LVIA determined that the majority of residential dwellings and public viewpoints located beyond the 2 km wind turbine offset are unlikely to be significantly impacted by the wind farm development. The localised influence of topography, as illustrated in the Zone of Visual Influence (ZVI) diagrams, has a direct and marked impact on the extent and nature of views within the 2 km and wider viewshed.

Taking into account the mitigation measures outlined in Section 9 of the LVIA concludes that the Liverpool Range wind farm project would have an overall low to medium visual significance on the majority of uninvolved residential view locations within the 10 km viewshed as well public view locations.

## 1.8 Cumulative Impacts

An assessment of cumulative environmental impacts considers the potential impact of a proposal in the context of existing developments and future developments to ensure that any potential environmental impacts are not considered in isolation.

There are a number of proposed, approved and operating wind farm developments within New South Wales which are illustrated in the Appendix A of the LVIA. The number and location of wind farms is likely to change as more wind farm projects are announced and enter the planning system.

The Kyoto wind farm development is currently the only approved wind farm development in the Upper Hunter Renewable Energy Precinct. With an approval for up to 34 wind turbines, the Kyoto wind farm development has yet to commence construction. The Liverpool Range wind farm development would be located approximately 70 km to the west of the Kyoto project site, therefore the opportunity for any significant 'direct' or 'indirect' visual impacts are likely to be limited.

'Sequential' visual impacts will be limited by the absence of additional wind farm developments within the regional context and would not be expected to be significant between the approved Kyoto wind farm development and the Liverpool Range project.

## 1.9 Environmental Noise

SLR Consulting Australia Pty Ltd (SLR Consulting) has completed a noise impact assessment of Liverpool Range Wind Farm. The methodology and criteria used in the assessment are in line with the South Australia Environmental Protection Authority (SA EPA) Environment Noise Guidelines for Wind Farms (February 2003), World Health Organisation (WHO) limits, construction noise guidelines (DECC Interim Construction Noise Guideline 2009) and blasting impact to the ANZECC Guidelines.

Noise predictions were made from selected receptors within 6 km of a proposed turbine. Turbine noise for a layout of 288 Vestas V112 turbines has been predicted. The predicted noise levels were assessed against the relevant criteria prescribed.

The predicted noise levels of the layout were determined to meet the relevant criteria at all receptors. The project is yet to select and finalise the turbine make and model. Upon finalising turbine selection for the project a revised noise prediction and assessment will be completed to confirm compliance.

Construction noise has been predicted for all receivers; a number of these are deemed 'noise affected' under the NSW Construction Noise Guidelines. In order to ensure all appropriate measures are being taken to manage construction noise, a more detailed construction management plan should be developed by the Proponent. This document will provide detailed guidance on various noise mitigation strategies for the construction stage.

Vibration impacts from construction have been assessed and the 'worst case' scenarios modelled were found to be acceptable.

Blasting impacts have been assessed to the ANZECC Guidelines and found to be acceptable. With a maximum instantaneous charge (MIC) of up to 98 kg, the airblast overpressure is anticipated to be below the acceptable level of 115 dB Linear for all existing residences. Similarly, vibration levels are anticipated to be well below the acceptable criteria.

Construction traffic noise impacts have been assessed and the 'worst case' maximum construction traffic scenario would comply with the NSW Road Noise Policy (RNP) requirements, due to the typically large setback of dwellings from the road network. Night-time deliveries are unlikely to cause sleep disturbance based on predicted maximum noise levels.

Transmission line noise (corona noise) has also been assessed against NSW Industrial Noise Policy (INP) noise limits and has been found to be acceptable as all receiver locations are greater than 240 m from the proposed transmission line.

## 1.10 Ecology

Epuron commissioned a Biodiversity Assessment (BA) by NGH Environmental to assess the biodiversity impacts of the project with particular attention to threatened entities (species, populations and communities).

The ranges and undulating areas within the project area are characterised by cleared farmland, mostly derived from Box Gum Woodland on the lower slopes and flats, with Norton Box Woodland and to a lesser degree, Brittle Gum Stringybark Woodland or Mountain Gum Silvertop Stringybark Forest vegetation on the steeper sheltered slopes. Sandstone Forest is common within the flats of the southern half of the Project Area (i.e. Transmission Line study area). In particular, the composition and structure of vegetation types have been modified as a result of managed stock grazing as well as grazing by feral goats. Remnant stands of the original vegetation remain as paddock trees or larger scattered patches of forest/woodland. The midslopes and steeper ridge tops contain the majority of remnant native vegetation, from sparse to moderately treed woodlands. The pasture ranges from exotic to native species dominated. This pattern of vegetation and land use onsite is common across the locality.

Eleven vegetation types occur within the development envelope. Assessment results indicated 46 threatened species or their habitat and six endangered ecological communities could occur in the Project Area. A threatened species evaluation was undertaken to evaluate the presence of habitat in the Project Area and the likelihood of occurrence and impact from the proposal for each identified species and community. The proposal would require the removal of both TSC and EPBC listed EEC as follows:

- ▶ TSC EEC Up to 462.8 ha to be removed or modified (284.3 ha of poor or poor-moderate condition), and
- ▶ EPBC EEC Up to 23 ha to be removed or modified.

Fauna assessment results indicated 88 threatened species or their habitat could occur in the Project Area. Five species of common raptors were seen in the Project Area and include: Brown Falcon (*Falco berigora*); Nankeen Kestrel (*Falco cenchroides*); Australian Hobby (*Falco longipennis*); Black-shouldered Kite (*Elanus axillaris*); and Wedge-tailed Eagle (*Aquila audax*). Raptors were seen in a variety of landscape types, but mostly in pasture with scattered trees or along the edges of forest or woodland

The proposal has been developed with input from a biodiversity constraints analysis to assist in avoiding biodiversity impacts as a starting point. Detailed mitigation prescriptions have been developed to address the remaining risks, aimed at avoiding a significant impact on any listed threatened entity. The development of an offset strategy and agreement of an appropriate offset management plan with OEH, or other appropriate mitigation, forms part of the proposal.

The pattern of development proposed would comprise a series of sparsely distributed discrete footprints (turbines, substations and control buildings) and narrow linear footprints (transmission line and tracks). Considering the habitat within and surrounding these areas and the ecological characteristics of the Project Area, the impacts identified appear able to be managed such that significant impacts can be avoided and a maintain or improve outcome can be met for the proposal. On balance, the impacts are considered acceptable. The proposal would have benefits as the development of a large scale renewable energy project would address, to some extent, rising greenhouse gas emissions which stands to have broader far reaching negative ecological impacts.

## 1.11 Cultural Heritage

A Cultural and Archaeological Heritage Assessment was undertaken for the project by NSW Archaeology with involvement from the local Aboriginal community and other interested stakeholders. The assessment considered the heritage and archaeological context of the project area and included development of a methodology to help target a field survey of the study area for Aboriginal and non-indigenous heritage items.

The 17 Registered Aboriginal Parties for the project area and other stakeholders were consulted during the assessment of the project; some of these parties were included in the 15 day field survey, traversing around 169 km. Epuron would like thank these local groups and stakeholders for their contribution and assistance to the project.

The Aboriginal object locales (and any undetected and subsurface artefacts) and heritage values of the project do not surpass archaeological and cultural significance thresholds which would act to preclude the construction of the proposed wind farm.

The assessment and field survey effort has resulted in the following summary of key conclusions for the project;

- ▶ Based on a consideration of the small and discrete nature of proposed impacts and the identified archaeological and cultural values, the subject areas do not warrant subsurface test excavation.
- ▶ The level of assessment achieved during the field survey is considered to have been adequate for the purposes of determining the cultural and archaeological status of the proposal area.
- ▶ The recorded Aboriginal object locales and the predicted generally very low density subsurface artefact distribution in the proposal area does not surpass archaeological significance thresholds which would act to entirely preclude the proposal. There are no identified Aboriginal archaeological and cultural constraints.
- ▶ It is recommended that when the design is finalised, additional archaeological assessment is conducted in any areas which are proposed for development that have not been surveyed during the current assessment.
- ▶ The Proponent should, in consultation with an archaeologist, develop a Cultural Heritage Management Protocol, which documents the procedures to be followed for impact mitigation and management.
- ▶ Personnel involved in the construction and management phases of the project should be trained in procedures to implement recommendations relating to cultural heritage, as necessary.
- ▶ Cultural heritage should be included within any environmental audit of impacts proposed to be undertaken during the construction phase of the development.

## 1.12 Additional Issues

### *Traffic and Transport*

The construction phase of the project generates the greatest volume of traffic and accordingly presents the most issues. A Traffic and Transport Assessment considered the potential issues associated with the proposed wind farm and provided mitigation measures to minimise and avoid such issues.

Access to the site would primarily be via the Golden Highway and the Warrumbungle Way at the southern end of the site. New unsealed tracks would be constructed to access the temporary construction compounds, operation and maintenance facility, connection substation, collection substations and the turbine locations across the site. Additional traffic generated from the project would not constitute a significant or material increase in existing volumes on the Golden Highway.

The operational phase would have a very minimal impact to traffic volumes as the turbines would be maintained by a selected crew of technicians likely to be based out of Coolah or Mudgee.

### *Aviation*

Epuron has consulted with the relevant aviation associations in relation to air safety and potential hazards caused by the construction of turbines. The location of the proposed turbines would not encroach on an Obstacle Limitation Surface (OLS) of any registered or regulated aerodrome. The closest Civil Aviation Safety Authority (CASA) registered aerodrome to the proposed wind farm site is Coolah Aerodrome, which is 17.3 km from the closest proposed wind turbine. Epuron has consulted with Andrew Wilkes from Warrumbungle Shire Council (registered operator) and will continue to consult during the assessment process.

The presence and location of 18 active agricultural airstrips identified within 5 km of the project have been assessed and considered in the design of the wind farm to ensure turbines do not encroach on any of the existing landing areas. 8 airstrips occur within 500 m of a proposed wind turbines, yet each of these complies with the CASA take-off and approach clearance areas.

## 1.13 Land Management

### *Land Use*

The wind farm project infrastructure is located on private property that is primarily used for grazing and agricultural purposes. Once operational the wind farm will have a negligible impact on normal farming operations and the agricultural capacity of the land as it would occupy only a few per cent of land from the involved landowner properties.

### *Hydrology and Drainage*

The layout for the wind turbines and associated wind farm infrastructure has been designed with particular emphasis on protecting existing streams and ephemeral watercourses. The layout avoids crossing or interfering with watercourses wherever possible. This is to avoid and minimise any adverse impacts to the existing drainage and hydrological regime in the local area.

The water required for construction of this project will be predominantly locally sourced from natural water bodies.

Once the wind farm is completed it will require only a small volume of water. This will be obtained through the use of storage tanks collecting water runoff from any of the permanent structures.

### *Soils and Landforms*

The project is not predicted to have any significant adverse environmental impacts on the geology or soils of the site or its surrounds, as the overall surface disturbance is relatively small in size and manner.

A detailed geotechnical assessment would be conducted once the turbine locations have been finalised to determine the ground conditions and stability at each turbine site.

An Environmental Management Plan (EMP) would be developed in accordance with the Best Practice Guidelines for Wind Energy Projects and the project consent conditions to ensure that issues such as erosion, weed control, air quality (such as dust management) and drainage are appropriately addressed.

## 1.14 Environmental Management

Prior to the commencement of construction works a Construction Environmental Management Plan (CEMP) will be prepared to the satisfaction of the relevant authorities to manage and mitigate environmental impacts on the wind farm site and powerline. The CEMP will incorporate all relevant processes and mitigation measures for development activity and will include:

- ▶ Traffic and Transport;
- ▶ Erosion & Sediment Control Plan;
- ▶ Landscape Management Plan;
- ▶ Soil & Water Management;
- ▶ Chemical and Fuel Storage - to avoid pollution of surface and ground waters;
- ▶ Fire Management;
- ▶ Waste Generation and Disposal; and
- ▶ Additional measures mentioned in the Statement of Commitments.

Prior to the commencement of permanent wind farm operations an Operational Environmental Management Plan (OEMP) will be prepared to the satisfaction of the relevant authorities to manage and mitigate environmental impacts on the wind farm site. The OEMP will incorporate all relevant processes and mitigation measures for wind farm operations and will include:

- ▶ Health and Safety;
- ▶ Community and Communications
- ▶ Waste Generation and Disposal; and
- ▶ Additional measures mentioned in the Statement of Commitments.



## 1.15 Draft Statements of Commitment

A number of Draft Statements of Commitment are proposed by the Proponent to address significant impacts predicted and are set out in Section 17 of the EA.

These Draft Statements of Commitment aim to avoid, mitigate, manage or offset all significant impacts from the development of the wind farm.

These measures will be generally incorporated and addressed in the proposed CEMP and OEMP.

## 1.16 Contact Information and Further Details

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## 2 Introduction

### 2.1 Overview of the Project

The proposed Liverpool Range Wind Farm is located in the New England Tableland region of New South Wales. The site is located between the rural centres of Coolah to the northwest and Cassilis to the southeast. The site is in close proximity to a number of proposed and constructed wind farms, as shown in Figure 2-1.

The proposed site is located on freehold land within and adjacent to agricultural areas. There are a number of local residences that surround the site; these have been identified through reviews of cadastral and topographic mapping, on-site inspection and aerial imagery.

The project would involve the construction, operation and maintenance of up to 288 wind turbines, together with the ancillary structures, access tracks and electrical infrastructure required to connect the project into the existing electricity network.

The turbines would be placed along a series of ridgelines and surrounding hilltops in order to maximise the renewable energy produced by the wind (discussed in detail in Section 3). The site would contain both wind turbines and electrical infrastructure (substations and powerlines) and continues south down a powerline corridor to connect into the existing electricity network.



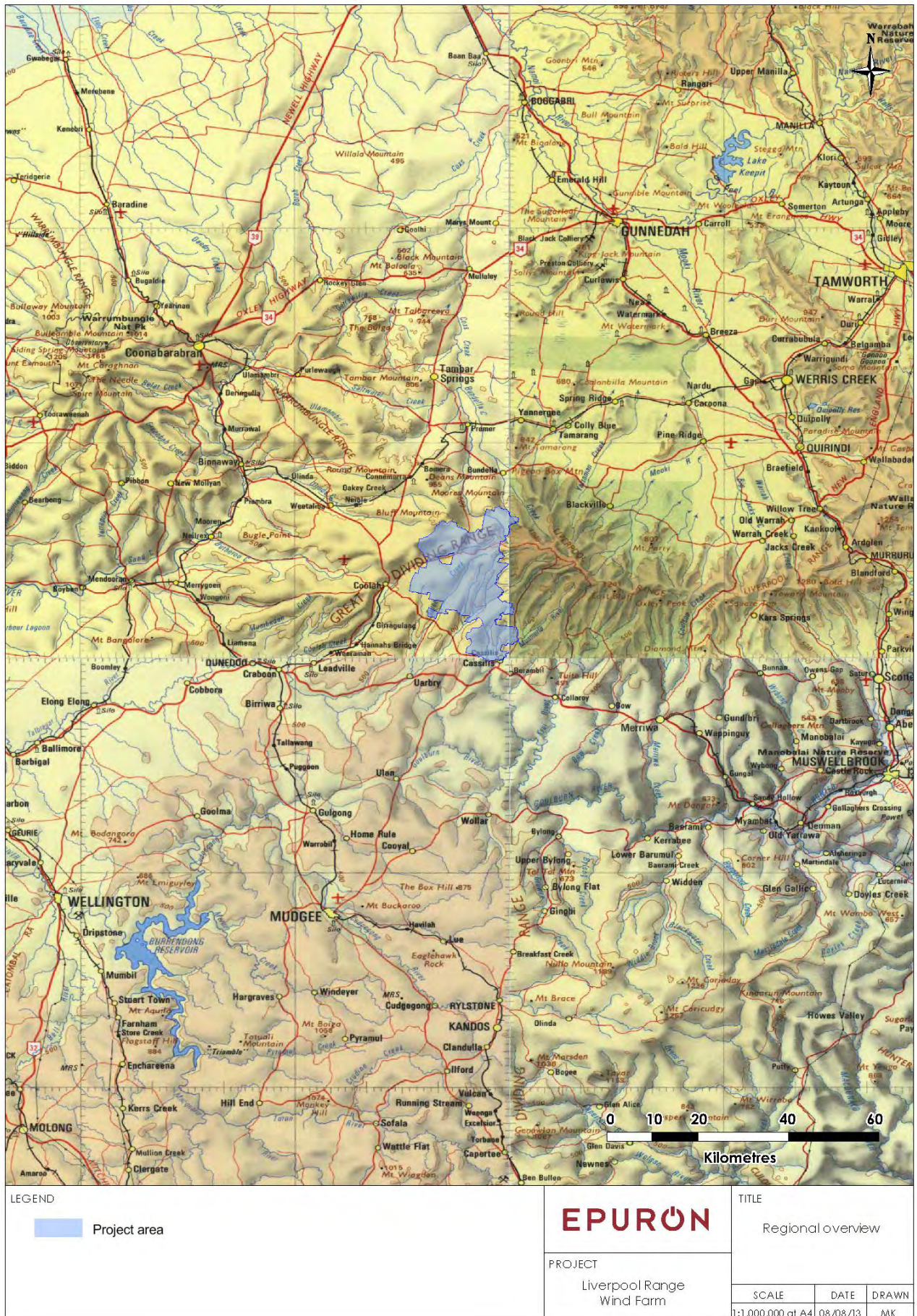


Figure 2-1 Regional overview of the proposed Liverpool Range Wind Farm



## 2.2 Proponents and Stakeholders

### *Proponent: Epuron Pty Ltd*

The Proponent of the proposed Liverpool Range Wind Farm is Epuron Pty Ltd. Epuron is one of the most experienced wind energy development companies in NSW. Epuron commenced its operations in 2003 as Taurus Energy Pty Ltd and since that time, in NSW, has developed the largest wind farm, the largest number of wind farms and the largest number of wind turbines as indicated in Table 2-1.

Epuron is therefore one of the largest wind farm developers in Australia and has focussed on NSW as the most populous state which should benefit accordingly from new development.

Epuron operates out of its offices in North Sydney where it has a professional team with considerable development expertise and a proven track record. Epuron undertakes its own developments including wind monitoring, site layout and design. For environmental assessments such as ecology, archaeology, noise and visual, appropriate specialists are engaged.

*Table 2-1 New South Wales wind farm projects developed by Epuron*

<b>Project</b>	<b>Turbines / Size</b>	<b>Development Status</b>	<b>Region</b>
Cullerin Range	15 turbines 30 MW	Operating – now owned by Origin Energy	Southern Tablelands
Conroy's Gap	15 turbines 30 MW	Development Approved	Southern Tablelands
Snowy Plains	15 turbines 30 MW	Development Approved – now owned by Origin Energy	Monaro
Gullen Range	73 turbines	Development Approved – now owned by Goldwind Australia and under construction	Southern Tablelands
Silverton	598 turbines Stage 1 - 282 Stage 2 - 316	Joint Venture (JV) with Macquarie Capital Wind Fund – now owned by AGL Project Approval - stage 1 Concept Approval - stage 2	Far Western NSW
Yass Valley	152 turbines	Preparing Submission Report	Southern Tablelands
White Rock	119 turbines 238 MW	Development Approved	New England Tablelands
Rye Park	Up to 126 turbines	Environmental Assessment lodged	Southern Tablelands

### *Consent Authority: Department of Planning and Environment*

The project will be assessed as State Significant Development (SSD) under Part 4 of the NSW Environmental Planning and Assessments Act 1979. The determination is to be made by the Minister or the Minister's delegate.

An additional consent is required from the Federal Government, through the Department of Sustainability, Environment, Water, Population and Communities, under the Environment Protection and Biodiversity Conservation (EPBC) Act 1999.

An outline of the assessment processes including consultation with the community and other government agencies is found in Sections 6 and 7.

### *Key Stakeholders*

During the development of this project, Epuron and its consultants has engaged with a number of key stakeholders including:

- ▶ local councils – Liverpool Plains Shire, Mid-Western Regional, Upper Hunter Shire and Warrumbungle Shire;
- ▶ State Government agencies – to receive specialised advice on the assessment of key issues;
- ▶ local community – involved and neighbouring or nearby landowners as well as community groups; and

- ▶ TransGrid – the high voltage transmission infrastructure that the project would connect into is owned and operated by TransGrid.

During the assessment process the Department of Planning and Environment (DP&E) will seek comments on the project from key stakeholders and relevant government agencies, which will include a review of this Environmental Assessment (EA).

## 2.3 Development Application Process

### *Purpose of this document*

This EA has been prepared to support the Development Application for the Liverpool Range Wind Farm and to address the Director General's Requirements (DGRs) issued by the NSW Department of Planning and Environment.

This EA presents:

- ▶ a detailed description of the project;
- ▶ a summary of the development and assessment process;
- ▶ findings and recommendations from the detailed EA studies; and
- ▶ a description of the consultation plan Epuron is implementing in relation to this project.

### *Overview of the planning process*

The Project will be assessed as State Significant Development (SSD) under Part 4 of the NSW Environmental Planning and Assessments Act 1979, and the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The proposal will also have regard, where possible, to the draft NSW Wind Farm Planning Guidelines (2012).

The assessment process for the project is as follows:

- ▶ The Proponent of a Major Project first submits a Project Application for the approval of the Minister for Planning and Environment.
- ▶ The Department of Planning and Environment seeks input from key government agencies in detailing the requirements of the EA.
- ▶ The Director-General of the Department of Planning and Environment then issues the Proponent with requirements for the EA, indicating the issues to be addressed, the level of assessment required and consultation requirements. These are the DGRs.
- ▶ The DGRs may also require the Proponent to include in the EA a Statement of Commitments (SOC) the Proponent is prepared to make for environmental management and mitigation measures on the site.
- ▶ After an EA has been prepared and submitted to the DP&E, the report is placed on public exhibition for up to 60 days during which time submissions from the community, local government and state agencies are accepted.
- ▶ Following the consultation period, the Director-General may require the Proponent to respond to the submissions, revise the proposal or revise the Statement of Commitments.


Consistent with the former Part 3A requirements, this assessment was preceded by an issues scoping exercise to identify and prioritise issues related to the project. A Preliminary Environmental Assessment identifying and prioritising issues relating to the project was submitted to the Department of Planning and Infrastructure (DPI) on 11 February 2011. The DPI responded on 31 March 2011 and 16 August 2011 with the DGRs and Supplementary DGRs for this EA.

## 2.4 Content in this Environmental Assessment

This EA draws together a number of specialist studies investigating the potential impacts of the wind farm. The findings of these studies have been summarised into the EA and are also included as standalone documents appended to this EA. This EA concludes with a Statement of Commitments to which the Proponent would commit, pending approval of the proposal, in order to manage identified impacts.

A brief summary of the sections in this EA is as follows:



- ▶ **Section 1** – The Executive Summary aims to give a brief overview of the wind farm and how impacts will be managed.
  - ▶ **Section 2** – Introduces the project and the process.
  - ▶ **Section 3** – Provides a detailed description of the project and the activities involved with each stage of development.
  - ▶ **Section 4** – Provides a context for the project in the form of an overview of the current energy situation and how wind energy fits in to this, including justification for the project.
  - ▶ **Section 5** – Describes the alternatives considered for this project
  - ▶ **Section 6** – Provides a description of the planning process
  - ▶ **Section 7** – Details Epuron’s community consultation process
  - ▶ **Section 8** – Addresses the risk analysis of the issues identified in the DGRs
  - ▶ **Section 9** – Visual and Landscape Impact Assessment
  - ▶ **Section 10** – Operation and Construction Noise Impacts
  - ▶ **Section 11** – Ecological Assessment
  - ▶ **Section 12** – Aboriginal and European Heritage Assessment
  - ▶ **Section 13** – Traffic and Transport
  - ▶ **Section 14** – Hazards and Risks
  - ▶ **Section 15** – Water Supply, Water Quality and Hydrology
  - ▶ **Section 16** – General Environmental Assessment
  - ▶ **Section 17** – Epuron’s Draft Statements of Commitment
  - ▶ **Section 18** – Conclusions
  - ▶ **Section 19** – Glossary and Acronyms
  - ▶ **Section 20** – Acknowledgement by authors of EA
  - ▶ **Section 21** – EA reference documents
- 

## 3 The Project

### 3.1 Description of the Project

#### *Wind Farm Infrastructure*

This section of the EA provides a detailed description of the project and in particular outlines the work associated with the construction and operation of the wind farm and all associated infrastructure.

This EA has assessed the impacts of locating wind farm components within an up to 200 m wide corridor across the wind farm site and powerline routes in which all proposed infrastructure will be contained (**Project Corridor**).

The main components of the proposed wind farm and grid connection infrastructure included in this application, each of which will be located within the assessed Project Corridor, are:

- ▶ **Wind Turbines:** up to 288 wind turbines, each with:
  - a capacity between 1.5 and 3.5 MW;
  - three blades mounted on a tubular steel tower, with a combined height of blade and tower limited to a maximum tip height of 165 metres;
  - an adjacent pad mounted turbine transformer, crane hardstand area, and related turbine lay down area;
- ▶ **Connection Substation:** a 330 kV Connection Substation located in the vicinity of Ulan, allowing connection to the existing TransGrid 330 kV Wellington - Wollar transmission line approximately 35 km to the south of the site;
- ▶ **Main Powerline:** a double circuit overhead powerline of up to 330 kV running from the Connection Substation at Ulan to the wind farm site, and then on to the wind farm collection substations;
- ▶ **Collection Substations:** a number of collection substations increasing the voltage from the wind turbine reticulation voltage (22 kV or 33 kV) to the main powerline voltage (330 kV);
- ▶ **Site Reticulation:** underground and overhead 22 kV or 33 kV electrical reticulation cabling and powerlines linking the wind turbines to the Collection Substations;
- ▶ **Access tracks:** access tracks required for each wind turbine and the related facilities above;
- ▶ **O&M Facility:** operation and maintenance facilities incorporating a control room, maintenance and equipment storage facilities;
- ▶ **Construction Facilities:** various construction facilities including temporary concrete batching plants, rock crushing equipment, temporary laydown facilities, and construction compounds;
- ▶ **Road Upgrades:** minor upgrades to local roads, as required for the delivery, installation and maintenance of wind turbines and the related facilities above; and
- ▶ **Wind Monitoring:** permanent wind monitoring masts for wind speed verification, weather and general monitoring purposes.

An overview of the wind farm layout can be seen in Figure 3-1, with more detail of the site shown in Figure 3-2. In general, high level maps are included in this chapter with more detailed maps of the wind farm site outlined in Attachment 1 – Detailed Site Maps.

#### *Wind Farm Precincts*

In designing the wind farm a number of broadly defined geographical Precincts were established as outlined in Figure 3-3. The Precincts indicate areas of turbines and infrastructure that from a construction perspective are likely to be built as a group. This potentially allows for staged construction of the project to suit future operational requirements.

In principle, each group within a Precinct is likely to connect to a common collection substation; therefore allowance has been made for at least one collection substation within each Precinct. However, it is possible that a collection substation could be used for multiple Precincts, or that multiple collection substations could be required in a single Precinct.



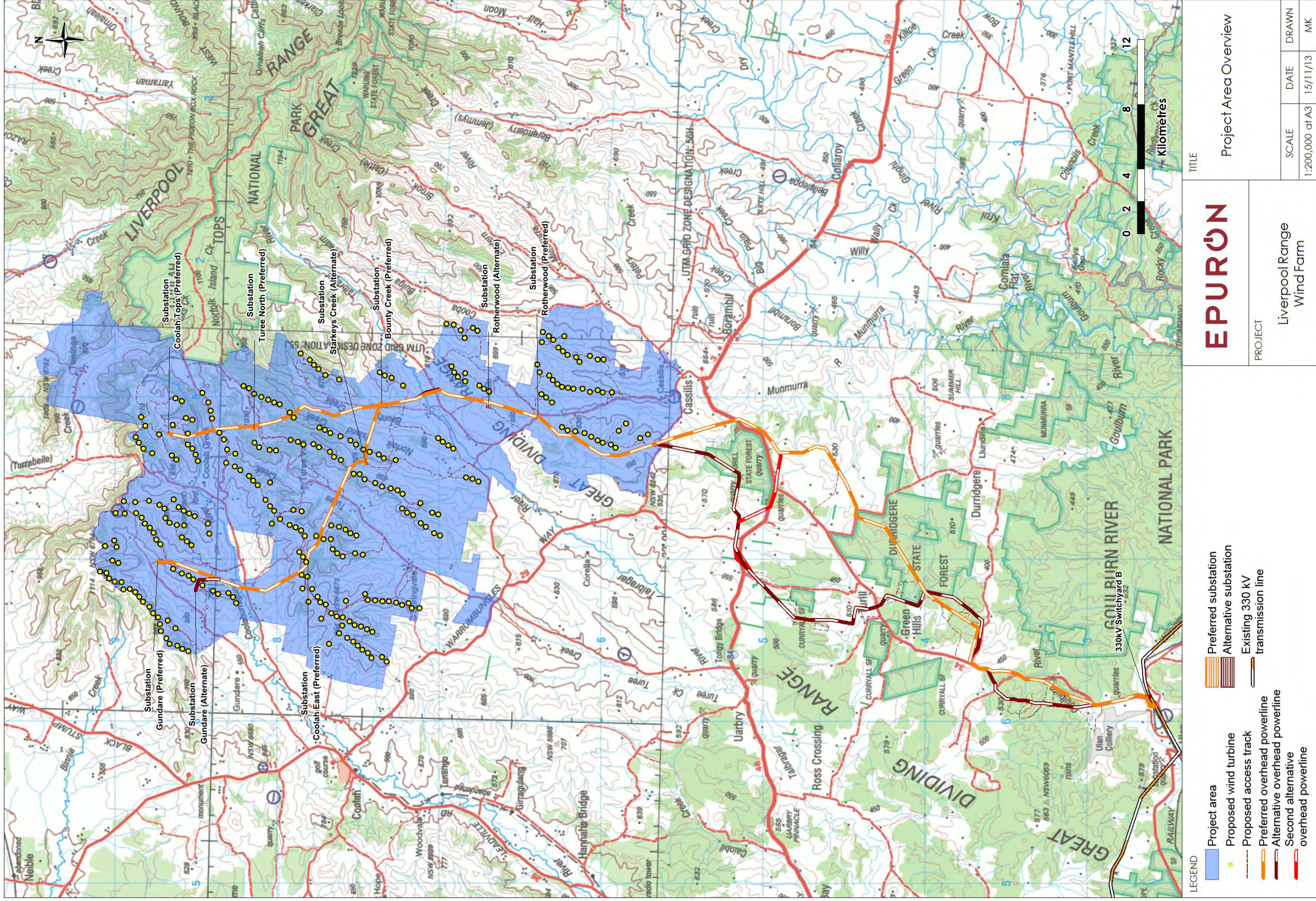


Figure 3-1 Liverpool Range Wind Farm wind turbine layout and grid connection overview