Boco Rock Wind Farm
Preliminary Environmental Assessment

Wind Prospect CWP Pty Ltd
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1. Introduction

Wind Prospect CWP Pty Ltd (WPCWP) have prepared this Preliminary Environmental Assessment (PEA) for the New South Wales (NSW) Department of Planning (DoP) to provide preliminary details of a wind farm proposal south west of Nimmitabel, in the Cooma-Monaro Shire Council and Bombala Council Areas.

This PEA has been prepared in support of a Project Application by WPCWP for the proposed Boco Rock Wind Farm (BRWF, and otherwise referred to as "the project" and/or "the wind farm"). The wind farm will have a capacity of up to 270 megawatts (MW) at a site located 10km south west of Nimmitabel (Appendix 1).

The initial PEA was submitted in September 2008. A Planning Focus Meeting (PFM) and site visit was undertaken on the 3rd September 2008 whereby input from the two associated Councils (Cooma-Monaro Shire and Bombala) and the Department of Environment and Climate Change (DECC) was sought. Following which Director General's Requirements (DGRs) were issued to help determine and define the environmental assessments.

This revised PEA is submitted with respect to a material change to the project since the initial submission.

This document sets out:

- the details of the applicant
- an overview of planning context and review process for the project
- the approach to site identification
- a summary of the project
- typical wind farm infrastructure including wind turbine components, site access, utility services and electrical works
- potential project timeframe and details of construction and operational impacts, and
- a summary of the key environmental surveys undertaken to date

This resubmission of the PEA also coincides with a submission of an *Environment Protection and Biodiversity Conservation (EPBC) Act* Referral to the Commonwealth Department of Water, Heritage and the Arts (DEWHA) to facilitate the assimilation of the Director General's Requirements (DGRs).

2. Applicant Details

The applicant for the project is Wind Prospect CWP Pty Ltd (WPCWP), a joint venture between Wind Prospect Pty Ltd (WPPL) and Continental Wind Partners Ltd (CWP).

2.1 Wind Prospect CWP Pty Ltd

WPCWP intends to develop and operate a commercially viable wind farm on the proposed site and aims to ensure that the project will:

- operate efficiently and safely
- comply with statutory environmental requirements
- sensitively consider the concerns of the local and indigenous communities
- generate renewable energy that will contribute towards a reduction in Australia's greenhouse gas emissions

2.2 Wind Prospect Pty Ltd

Wind Prospect undertakes all aspects of wind energy development, including design, construction, operation and commercial services, with offices in the UK, Ireland, Canada, Australia, New Zealand and China. With over 18 years of successful development within the industry, the Wind Prospect Group has been involved in over 2,500MW of approved wind farms, including onshore and offshore projects, in terms of development, construction, operations and commercial services, and has a further 4000MW in the early phase of development. The company's civil, electrical and mechanical engineers have been involved in the commissioning of over 50 wind farms around the world.

Wind Prospect's development offices in the Asia-Pacific region are located in Wanaka, New Zealand, in Hong Kong (offshore wind farm project), in Beijing (mainland Chinese wind market) and in Australia (Adelaide, Newcastle, Brisbane and Melbourne). Of the Asia Pacific operations, the Australian arm is the most mature. Wind Prospect Pty Ltd (WPPL) is one of the most successful developers in Australia, having achieved planning approval for 9 wind farms totalling over 700 MW.

A recent success in South Australia is the Hallett Hill Wind Farm (71.4MW), approximately 250km north east of Adelaide, which is Wind Prospect's fifth wind farm development to progress to construction in South Australia. More projects in this region have received planning approval and are expected to proceed to construction.

WPPL has spearheaded the development of other Australian wind farms, with developments that have progressed beyond planning approval shown in Table 1.

Table 1: WPPL Wind Farm Developments to date

Wind Farm	Turbines	Total MW	Status
Hallett I (Brown Hill Range)	45	94.5	Operating
Snowtown (Stage 1)	47	98.7	Operating
Canunda	23	46	Operating
Mt Millar	35	70	Operating

Hallett II (Hallett Hill)	34	71.4	Under Construction
Snowtown (Stage 2)	83	166	Approved, awaiting construction
The Bluff Range	25	50	Approved, awaiting construction
Willogoleche Hill	26	52	Approved, awaiting construction
Troubridge Point	15	30	Approved, awaiting construction
Green Point	18	54	Under Development
Totals	351	732.6	

Wind Prospect's New South Wales office was established in January 2008, and currently has eight (8) experienced staff working out of Newcastle. Wind Prospect has also had considerable experience in providing project construction and operations services in both Australia (including the Canunda Wind Farm) and the UK, and is well placed to extend such activities to projects in New South Wales.

Wind Prospect has entered into a joint venture agreement with European renewable energy specialists Continental Wind Partners (CWP) to develop New South Wales sites.

2.3 Continental Wind Partners

Continental Wind Partners were established in 2007 to finance the development of wind farms in Romania and Poland. They have since grown to be a leader in renewable energy development, expanding into the rest of Europe, Australia and New Zealand; with projects totalling over 4500MW. Their primary focus remains in wind energy, however they also have interests in solar, hydro, biomass and other renewable energies.

Their successful and rapid expansion is based on a proven model of co-operation with local developers. Here CWP's international expertise in the finance/banking industry and technical aspects of development are combined with the developers own technical expertise and local knowledge. It is this collaborative partnership that ensures accelerated, professional wind development in a mutually successful manner.

3. Planning Instruments and Context

3.1 Context for Wind Energy Development

Australia's recent growth in wind energy developments has been buoyed by the expectation of an expanded Federal Government Mandatory Renewable Energy Target (MRET), seeking 20% of electricity to be sourced from renewable generation by 2020.

On government estimates the expanded MRET will mean 45,000GWh of additional renewable energy by 2020, or roughly an additional 3,750GWh of new generation capacity per year for the next 12 years. Of this it is well accepted that wind power will take the bulk of the target, given the historic exploitation of most of the hydro and biomass energy resources.

Converting to capacity, this equates to over 1,000MW of wind generation added to the grid each year, based on 3,750GWh, 8760 hours in a year and a capacity factor of 40%.

3.2 Statutory planning requirements

Development of wind farms in NSW is subject to the Environmental and Planning Assessment (EP&A) Act, its Regulation, various NSW environmental legislations, State Environmental Planning Policies, any relevant Regional Environmental Plans and the Commonwealth Environmental Protection and Biodiversity Conservation Act.

3.2.1 Local Environmental Plans

The wind farm site is currently zoned 1(a) Rural under both the Cooma-Monaro Local Environmental Plan (LEP), 1999 and the Bombala Local Environmental Plan, 1990. Both LEPs neither prohibit the development, nor allow it without development consent, therefore it is permissible once development consent has been granted.

3.2.2 State Environmental Planning Policy (Major Projects) 2005

On July 14, 2008 the Director General of The Department of Planning has advised that the proposed Boco Rock Wind Farm project is classified as a Major Project and subject to assessment under Part 3A of the EP&A Act. Accordingly, the approval authority is the Minister for Planning and an Environmental Assessment will need to be submitted to support the Project Application.

3.2.3 Roads Act 1993

Permits may be required under Section 138 of the Roads Act 1993 for underground cabling that could pass under the bordering roads. Advice will be sought with respect to the associated road authority.

3.2.4 Environmental Assessment

The matters to be addressed by the Environmental Assessment are specified by the Director-General of Planning NSW (DG) and generally referred to as the Director-General's Requirements (DGRs). In addition to the DGRs, key reference documents setting out planning criteria for wind farm projects include:

- the draft Impact Assessment Guidelines for Wind Energy Facilities (June 2003) prepared by the NSW Department of Planning
- AusWind (the Australian Wind Energy Association) Best Practice Guidelines for Wind Farm Developments
- South Australian EPA : The Environmental Noise Guidelines (Interim guidelines) (2007)

The Environmental Assessment will describe the potential impacts of the project and how they will be managed. A Statement of Commitments is required to be compiled and incorporated in the Environmental Assessment. The assessment may be completed prior to finalising equipment specifications and will therefore aim to address the potential impacts based on the worst case parameters of each turbine type, size and capacity considered for the project.

3.2.5 Environmental Protection and Biodiversity Conservation Act 1999 and Threatened Species Conservation Act 1995

The project will also need to consider relevant matters listed under the Environment Protection and Biodiversity Conservation (EPBC) Act 1999 as well as the Threatened Species Conservation (TSC) Act 1995. Any listed matters relevant to the project may be considered in accordance with a bilateral agreement between the Commonwealth and State Environment Ministers. Specialist advice will be sought in respect of any such issues.

3.2.6 Critical Infrastructure

The scale of the project, in excess of 250 MW, means that Boco Rock Wind Farm is a "critical infrastructure project" under the Environmental Planning and Assessment Act 1979 and if the project is subject to Part 3A of the EP&A Act. In a recent announcement (27th February 2009), NSW Premier Nathan Rees proposed a future reduction to 30MW for wind farms to be classified as critical infrastructure, to accelerate the roll-out of wind farms across the state.

4. Site Identification, Design and Assessment Requirements

4.1 Site Selection

A range of factors are considered during the 'site selection' phase, which affects the suitability of an area for a wind farm, and which can potentially constrain development. These include:

- Suitable wind resource
- Capacity within and ease of connection to the electricity transmission network
- Access and general ground conditions
- Proximity to residential properties and the nature of surrounding land uses
- Availability of turbine sites
- Presence (or absence) of nationally and locally significant areas with regard to environment, landscape, nature conservation, archaeology and cultural heritage

Numerous investigations into the wind resource potential at several locations across New South Wales (NSW) have revealed some general principles which can be applied to assess the merit of an individual site's wind resource. Wind speeds are likely to be adequate in areas that are:

- Exposed to open water without intervening obstructions. These areas receive a very smooth airflow with a high-energy content.
- On significantly elevated locations, surrounded by a smooth and gently rounded landscape, thus promoting wind speed-up. The ranges that make up the Project area offer excellent speed-up due to topographical detail.

Capacity within and ease of connection to the grid can be difficult to assess, given the commercially confidential nature of certain information concerning the electricity distribution and transmission networks, coupled with the complexity and variety of connection options that may be available. However, on a broad scale, areas remote from high voltage overhead transmission lines or from existing population centres are unlikely to offer many feasible opportunities for grid connection. Together with grid connection factors, actual grid capacity, or the ability for the electricity grid as a whole to absorb wind generated electricity, seem to be the principal limiting factor for wind farm development in NSW.

When searching for suitable wind farm sites, it is important that areas with suitable wind resources and grid connection opportunities are coupled with actual land availability for wind turbines. There are many such areas in NSW, with the Boco Rock project area being amongst them. Appropriate landscape structure and compatible land use activities are other important criteria to be met for successful wind farm development.

The presence of National Parks and other significant protected or conservation areas are also considered during site selection. Preliminary examination of the vicinity of conservation areas to a proposed wind farm site and the potential impacts to the values of those conservation areas is

undertaken. Siting of wind farms should be carried out to avoid significant impacts on conservation areas and their values.

Through its appraisal, in consideration of all factors, the Boco Rock wind farm site was identified as meeting all required criteria. A project site boundary was then defined following negotiations with landowners, and wide-ranging surveys of existing environmental conditions and grid capacity issues have or are in the process of being carried out, in order to establish a base-line against which the wind farm could be designed in detail and its impacts assessed.

4.2 Site Assessment

After selecting the project area as being fundamentally suitable for a wind farm development, and following the issuing of the initial DGRs, several studies addressing specific design criteria commenced. These studies included site assessment of a number of environmental, social and commercial factors such as ecology, cultural heritage, visual amenity and communications.

4.3 Detailed Site Design

Assessment of the results of the wind farm feasibility studies are being used to develop the 'final layout' (turbines and other infrastructure placement) for the wind farm.

4.3.1 Technical and Practicality Factors

A number of technical and practicality factors influence final turbine layout. These include:

The distance between turbines: Distances should be equivalent to at least three times the diameter of the turbine rotor proposed for use, in order to ensure that each turbine operates in relatively undisturbed wind. This 'rule of thumb' will vary from turbine to turbine depending on the characteristics of the turbine itself, the wind resource on the site and the topography.

Internal access tracks: These must interlink turbines, and be constructed up to 6 m in width (up to 12 m during construction), and at a gradient suitable for use by heavy vehicles. They should be of stone construction, the nature and colour of which should be appropriate to the land use and landscape of the site. Turning circle radii should be adequate for manoeuvring long loads within the site.

Switchgear yards and buildings location: The switchgear yards and buildings should be located on level ground at a convenient location adjacent to the point of export of the electricity from the site into the Country Energy electrical transmission system.

Cable marshalling point location: The marshalling points should be central and practically located adjacent to the underground cabling network of a cluster of turbines, and the export power lines.

Site access: Site access should utilise existing access where possible. The access point will be up to 12 m wide during construction with an appropriate splay in order to accommodate turbine deliveries and site construction vehicles. A gradient criterion must be adhered to.

4.3.2 Environmental Requirements

In addition to the technical and practicality factors of wind farm site design, the following environmental requirements, which bear directly on site design, are considered:

Turbine micro-site location: Turbines should be located near existing tracks or field boundaries where possible, to minimise disruption to the primary agricultural use of the land and minimise any vegetation clearance or disturbance. They should not be located on identified areas of high conservation value, and if they are proposed in proximity to identified sensitive environments, effective environmental management actions are required.

Separation from dwellings: The turbines should be located so that no neighbouring residential dwelling experiences noise exceeding the EPA noise criteria within their *Environmental Noise Guidelines* for wind farms, or 'shadow flicker' effects. It is likely that such effects will be felt at a distance of less than 500 m for noise and 800 m (or 10 blade diameters) for shadow flicker. A full analysis of potential noise impacts and shadow flicker effects will be presented in the Environmental Assessment.

Visual amenity: Visual effects of a wind farm are highly variable depending on the perceptions of the viewer. However, visual amenity from nearby residences, main roads and points of interest are considered and will be presented in the Environmental Assessment.

Ecology: Site selection and detailed site design should be such that any ecological impact is avoided or reduced to acceptable levels. Any residual effects should then be appropriately managed to ensure no significant environmental impacts occur. Ecological assessment of the wind farm site allows significant environmental features to be identified (if any) and allows planning for appropriate management. Discussions on ecological issues will be presented in the Environmental Assessment.

Cultural Heritage: Site layout should not interfere with or disturb any known sites of Aboriginal or non-Aboriginal heritage. Treatment of such sites is required to be in accordance with relevant legislation and includes negotiation with affected parties. Discussions on cultural heritage issues will also be presented in the Environmental Assessment.

Colour: An appropriate colour for the turbine towers and blades should be identified in light of the main views and backgrounds likely to be experienced. The finish should also be matt to reduce glare effects and 'glinting'.

Other: Other environmental considerations include the impact on local farming operations and public facilities such as telecommunications links, and on aircraft operations in the area.

4.3.3 Safety Requirements

All commercial wind turbines are designed to engineering standards to ensure their safe operation in all conditions. The designs are independently audited by internationally recognised classification societies, such as *Germanische Lloyd*, and receive type approval.

Wind turbines are safe for use in public access areas. For instance, in Swaffham in the UK, a 1.5 MW turbine with a 65 m tower, and 35 m blades, was approved for installation, and has been installed less than 400 metres from a supermarket and housing, and makes up part of an Ecotech Discovery Centre display. The turbine has a public viewing platform built into it, positioned approximately 60 m up the tower directly under the nacelle (Ecotricity 2007). The local townsfolk have embraced this wind turbine, and have encouraged the wind energy developer to install a second, similar machine, at the site. The 1.3 MW turbines located at the Codrington Wind Farm in Victoria are also on display for the public, with guided tours leading up to the base of one of the turbines.

Fire control prevention and control will be of paramount importance during the construction and operation of the wind farm site. Further detail on management measures will be presented in the Environmental Assessment.

All related high voltage electrical works would be installed and operated to relevant national and international standards and regulations ensuring the highest level of safety.

The permanent wind monitoring masts will be designed to prevent unauthorised persons from climbing them.

All on-site and public safety issues will be addressed by the approved project safety plan and Emergency Response Plan to be developed and implemented by the appropriate contractor(s).

5. Project Description

The Boco Rock wind farm is situated along the high altitude plateau of the Monaro Plains. The ranges are of moderate-to-high elevation (900 to 1,100 metres (m) above sea level, Australian Height Datum), dominated by the Sherwin Range running in a north-south direction. The nearest township is Nimmitabel, which is located approximately six (6) kilometres (km) east of the proposed site. (Appendix 1)

When first announced in September 2008 the proposed project consisted of up to seventy-three (73) turbines spread over nine (9) different properties, with the capability to produce enough energy to supply over 70,000 average Australian households.

However in response to our announcement and a local resident "door-knocking" exercise, several changes were made. The majority of the responses received were positive, but where they were less so, consultation with those affected parties was undertaken to mitigate the impact of the proposal. Together with more detailed grid connection studies, other project related studies and discussions with turbine manufacturers; the project was modified both in terms of scale and the area on which the wind farm will be situated.

The proposal now comprises of a wind farm with two potential design layouts; one consisting of one-hundred-and-twenty-seven (127) wind turbines and the other one-hundred-and-nine (109) wind turbines spread over seventeen (17) different properties, referred to as "the Site Area". The difference in number is with respect to the relative size of the wind turbines being considered for the project.

Ultimately the choice between these two design layouts is largely dependent on the availability of wind turbines to the project. It is important to note that the same Development Envelope of land will be utilised irrespective of the final selection (the Development Envelope refers to the 200 m corridor which encompasses the Development Footprint of the two layout options). The Development Footprints (the area directly impacted upon by the construction of the Project) differ slightly with respect to the two layouts, and is summarised in Table 2 below.

Table 2: Shows the area in hectares for each distinct region.

Region	**Area in hectares**		
Site Area	11,750 ha		
Development Envelope	1664.45 ha		
Development Footprint	Permanent	Temporary	Total
(layout option 1 – 127 wind turbines)	*75.7*	*81.39*	157.09
(layout option 2 – 109 wind turbines)	*71.78*	*81.94*	153.72

Table 2 above indicates that some of the impacts from the Development Footprint would be for the duration of the wind farm operation and some are temporary impacts during the construction phase. Taking the Development Footprint for Layout Option 1 as an example, in total approximately 1.34% of the Site Area would suffer disturbance as a result of the project and of that 0.64% of the Site Area would be permanently impacted throughout the life of the wind farm.

The proposed Project will have an installed capacity of up to 270 megawatts (MW), depending on the model of the turbine selected and consist of the following components:

- the installation of up to one-hundred-and-twenty-seven (127) wind turbines in the area south west of Nimmitabel, NSW (refer to Appendix 2);
- one collector substation comprising cable marshalling, switchgear and transformer,
- site operations facilities and services building;
- underground electrical interconnection lines (33 kilovolt (kV) capacity) and control cables within each of the wind turbine clusters, connecting to the collector substation;
- overhead electrical interconnection lines (33 kV capacity) and control cables between three of the wind turbine clusters and the collector substation;
- access roads to the turbine locations and substation;
- crane hardstand areas for the erection, commissioning, maintenance, recommissioning and decommissioning of the wind turbines;
- up to four (4) permanent wind monitoring masts;
- temporary construction facilities including site office, parking and materials storage areas;
- appropriate wind farm signage both during the construction and operational phases of the proposed development; and
- mobile concrete batching plant(s) and rock crushing facilities.

The output of the wind farm will connect via a new 132 kV double-circuit overhead transmission line to existing Country Energy owned lines east of the wind farm site. This new line and associated substation at the point of connection will be assessed separately from the wind farm and will be subject to a separate approval under Part 5 of the Environmental Planning and Assessment Act (EP&A Act) (1979).

The estimated impact areas for the components of the project to be assessed under Part 5 of the EP&A Act (1979) are detailed below to allow interested stakeholders the opportunity to understand the overall development envelope of all activities associated with the proposed wind farm. A detailed description of the proposed power line from the collector substation to the Country Energy owned lines is included later in this PEA.

Details of each of the component parts of the development are described in the following sections and in the accompanying figures. An outline of the construction and operational phases of the development are also provided, along with a timeframe detailing the proposed stages of activity pending development approval.

A detailed site plan is presented in Appendix 2, showing the two potential turbine layout designs within the same Development Envelope. These layouts are based on a number of technical, environmental and social factors and more detailed site assessments. The layouts ensure optimum, undisturbed use of the measured and predicted wind resource, after accommodating constraints, for the range of turbines currently being considered for the wind farm.

Table 3: Project Components and Approximate Dimensions

Project Component	**Approximate Dimensions**
Turbine footings	15 x 15 m
Turbine assembly / crane hardstand areas	45 x 45 m
Substation	100 x 100 m
Facilities building	30 x 6 m
Site access: new roads *	68 km x 12 m
Site access: upgrade of existing internal roads/tracks *	7 km x 6 m
Underground cabling on-site	75 km x 1m
Internal overhead electrical interconnection / easement [#]	8 km x 40 m
Temporary construction facilities	
Concrete batch plant (2)	50 x 100 m (ea.)
Rock crushing facility	50 x 60 m
Site office	40 x 100 m
Construction compound (4)	150 x 200 m (ea.)
Components Subject to Part 5 of the EP&A Act (1979)	
External overhead electrical cable [#]	25 km x 45 m
External substation	200 x 200 m

* It is expected that up to 6 m of road width will be rehabilitated after the infrastructure has been installed (post construction phase).

[#] The estimated easement width is 40 m, however the actual impact area has been estimated to be 5% of this total area given the sparse vegetation cover along the selected routes.

Given the scale of the proposed wind farm it is likely that 'clusters' of turbines will be constructed and commissioned in stages, which is discussed in more detail later in the chapter. Consequently, and for the benefit of stakeholder understanding, we have broken down the project into four (4) clusters.

Table 4: Wind Turbine Clusters

Turbine Cluster	**Number of Turbines** (based on layout option 1)	**Number of Turbines** (based on layout option 2)	**General location**
"Yandra"	32	27	North eastern cluster, accessible via Yandra and Benbullen Roads off Springfield Road
"Springfield"	23	20	North western cluster, accessible via Dummy Lane off Springfield Road
"Boco"	23	21	South eastern cluster, accessible via an internal access road and Boco Road off the Snowy River Way
"Sherwins"	49	41	South western cluster, accessible via Avon Lake Road and the Snowy River Way

6. Wind Farm Infrastructure

It is not yet known which model of wind turbine will be used for the development as final turbine selection will occur through a competitive tender process pending development approval. However, in terms of generation capacity, the wind turbines under consideration for this project vary in the range from between 2 and 3.3 MW. By way of example the Suzlon S88, 2.1 MW machine (as installed at the Capital wind farm, east of Lake George, NSW) is typical of the type of wind turbine that could be installed. See Appendix 5 for a benchmark comparison of the proposed BRWF and the Suzlon S88, 2.1 MW wind turbines at the Capital wind farm.

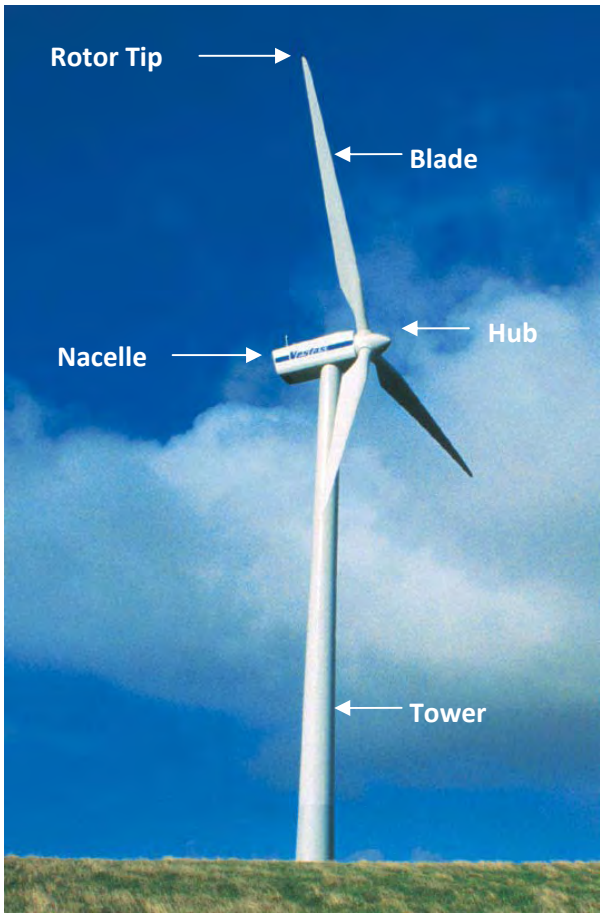


Image 1: Component Parts of a Wind Turbine

6.1 Turbines

The turbines used for the BRWF will be three-bladed, semi-variable speed, pitch regulated machines with rotor diameters between 80 and 104 m and a swept area of 6,083 to 8,496 m^2. Typically turbines of this magnitude begin to generate energy at wind speeds in the order of 4 ms^{-1} (14.4 kilometres per hour (kph)) and shut down (for safety reasons) in wind speeds greater than 25 ms^{-1} (90 kph). Wind turbine blades are typically made from glass fibre reinforced with epoxy or plastic attached to a steel hub, and include lightning rods for the entire length of the blade. The blades

typically rotate at about 12 revolutions per minute (rpm) at low wind speeds and up to 18 rpm at higher wind speeds.

6.2 Towers

The supporting structure is comprised of a reducing cylindrical steel tower fitted with an internal ladder or lift. The largest turbine under consideration will require a tower height of 85 m with an approximate diameter at the base of 4.5 m and 2.5 m at the top. Typically the tower will be manufactured and transported to site in three (3) or four (4) sections for on-site assembly.

6.3 Nacelle

The nacelle is the housing constructed of steel and fibreglass that is mounted on top of the tower and can be 10 m long and 4 m high and 4 m wide. It encloses the gearbox, generator, transformers, motors, brakes, electronic components, wiring and hydraulic and lubricating oil systems. Weather monitoring equipment located on top of the nacelle will provide data on wind speed and direction for the automatic operation of the wind turbine.

6.4 Footings

Three types of foundation for the turbines will be considered pending geotechnical investigation of the ground conditions at the site.

- Slab (gravity) foundations would involve the excavation of approximately 450 cubic metres (m3) of ground material to a depth of approximately 2m. Approximately 200 m3 would, if suitable, be used as backfill around the turbine base. A slab foundation would involve installation of shuttering and steel reinforcement, followed by the pouring of concrete.
- If slab plus rock anchor foundations are required, the construction of the foundation for each machine would involve the excavation of approximately 300 m3 of ground material to a depth of approximately 2m. Slab plus rock anchor foundations require shuttering and steel reinforcement, drilling of rock anchor piles up to a depth of approximately 20m, concrete pour, after which the rock anchors are stressed and secured once the concrete has cured sufficiently.
- Alternatively, if a single mono-pile foundation is required (rock anchor), approximately 50 m3 of ground material would be removed by a rock drill to a depth of approximately 10 m, of which 30 m3 would, if suitable, be used as back fill. If a mono-pile foundation is used, a tubular section with tower connection flange attached is inserted in the hole and concrete is then poured in situ.

Image 2: Typical Gravity (left) and Rock Anchor (right) Footings

Detailed geotechnical surveys will be carried out during pre-construction work to determine the necessary foundation type per turbine. It is feasible that more than one type of turbine foundation may be required for the BRWF, following the assessment of the individual turbine locations. New turbines are continually coming on to the market and it is possible that minor variations to these typical dimensions could occur prior to final turbine selection.

6.5 Crane Hardstand

Site access roads would have areas of hardstand (approximately 45 m by 45 m) adjacent to each wind turbine for use by cranes during construction. The clearing of native vegetation for the construction of access roads and hardstand areas will be avoided where possible. If clearing is found to be unavoidable, this will be appropriately managed and carried out as described in the Draft Statement of Commitments. The roads would be surfaced with local stone (where possible) to required load bearing specifications. The nature and colour of surfacing would be selected to minimise visual impact prior to construction. The roads and hardstand areas would be maintained throughout the operational life of the wind farm and used principally for the periodic maintenance of the wind turbines.

Image 3: Typical Hardstand area adjacent to a Rock Anchor footing

6.6 Monitoring Masts

There are currently two (2) temporary wind monitoring masts installed on-site and close to the site (60 and 40 m high respectively), to provide necessary wind data for project development and planning.

Four (4) permanent wind monitoring masts, up to 85 m high, are proposed to be installed on-site. The purpose of the additional monitoring masts is to provide information for the performance monitoring of the wind turbines. The wind monitoring masts would be of a guyed, narrow lattice or tubular steel design.

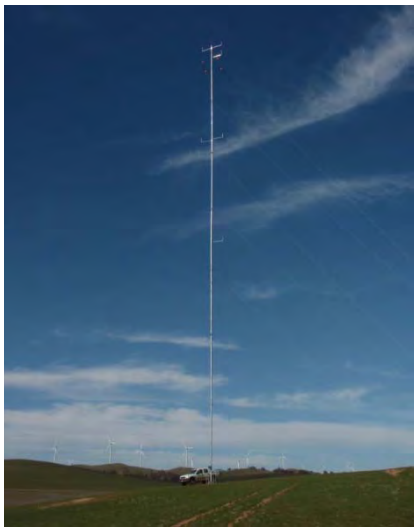


Image 4: Wind monitoring mast

6.7 Site Access Works

6.7.1 Site Entry

The wind farm locality can be reached via the Monaro Highway at Nimmitabel via the existing arterial roads of Springfield Road, Avon Lake Road, and the Snowy River Way.

The deep gullies which join the Maclaughlin River provide an access constraint within the site resulting in the proposed layout comprising four (4) clusters of turbines which require separate access points to the public road network. Existing access roads are shown in Appendix 2 and can be classified in to three broad categories.

- National Highways - Monaro Highway which is maintained by the Roads & Traffic Authority and would provide access from Canberra to Springfield Road immediately south of Nimmitabel.
- Regional Roads – Snowy River Way (also referred to as Ando Rd) which is maintained by Bombala Shire Council and connects the Bombala area to the Snowy Mountains via Dalgety and Berridale.
- Local Roads – All other roads which are maintained by the Council (either Cooma Monaro or Bombala). This includes Springfield Road which will be the major access to the site from Nimmitabel.

The Roads and Traffic Authority, Cooma Monaro and Bombala Councils have ongoing maintenance and improvement programmes for the roads and bridges under their control.

Bombala Shire Council has a continuing programme for the reconstruction and sealing of the gravel section of Snowy River Way. Reconstruction is currently taking place from the western end of the gravel section near Boco Road towards Ando for a distance of 3 km.

There are no current proposals for major road improvements on the other access roads under consideration.

The currently favoured access points for the four (4) clusters are described below:

- Yandra Cluster: The major access point is from Yandra Road via the access road to “Benbullen” which departs Yandra Road at 1.51 km from Springfield Road.
- Springfield Cluster: The access point under consideration is from Springfield Road at approximately 16.2 km from Nimmitabel, along an existing laneway entry known locally as “Dummy Lane”.
- Sherwins Cluster: Access points being considered are at 22.45 kilometres from Nimmitabel on Avon Lake Road and on both sides of Snowy River Way (Ando Road) at approximately 28 km from Nimmitabel.
- Boco Cluster: Access will be from the same internal access road from Avon Lake Road as required for the Sherwins Cluster, to avoid unnecessary impacts to the Riparian corridor along the Maclaughlin River that would otherwise result from the upgrade of the Boco Road.

Note: 25 km of the arterial road access likely to be used for construction activities are unsealed. This has implications for water usage and dust suppression and is discussed later in this chapter.

All entrances to the wind farm site from the existing arterial roads will be designed to allow long vehicles to safely exit from or re-enter the site without disrupting traffic. Further consultation will be undertaken with Council and the Roads and Traffic Authority to confirm the final design.

6.7.2 On-site Access Roads

Other access consists of on-site roads between turbines and hardstand areas. The on-site access road system will be rationalised and, where possible, these roads will follow existing farm tracks that traverse the ridgelines and plateaus. All roads leading from the arterial roads and all on-site access roads are likely to require a full or partial upgrade to accommodate the construction traffic loads, as well as for maintenance purposes during operation.

Access roads will be up to 12 m wide in parts during construction to allow for safe passage of construction traffic and wind turbine components, and at least 6 m wide once the wind farm is operational. The roads will be surfaced with compactable, engineered base material with suitable drainage. Materials will be sourced locally where possible and in consultation with the local councils. Measures will be taken to minimise the risk of the spread of weeds and disease from materials brought in for construction purposes.

The required on-site access for the four (4) clusters is described below:

- Yandra Cluster: Approximately 6 km of the existing roads will require full or partial upgrade; with a further 17 km of internal on-site access will be required.
- Springfield Cluster: Approximately 200 m of the existing laneway entrance (Dummy Lane) will require a full upgrade; with a further 11 km of internal on-site access will be required.
- Sherwins Cluster: No existing roads will require upgrade; although 25 km of internal on-site access will be required.
- Boco Cluster: Approximately 1 km of existing farm track will require a full upgrade; with a further 16 km of internal on-site access will be required.

6.7.3 Internal Link Road

As indicated above, a link road from the Sherwins Cluster and collector substation site to the Boco Cluster has been proposed as the main access point for construction activity to occur between to two sites. Transport distances, the requirement to upgrade the Boco Road and the impact on the Riparian corridor along the Maclaughlin River were the primary drivers for identifying this route as an alternative.

The proposed link road has been assessed both through a desktop assessment and subsequently a field inspection to determine a preferred path with respect to the gradient of the slope, potential ecological and ground water impacts, and the requirement to cross the Maclaughlin River at a single point on the valley floor where there is an existing causeway. As a result the proposed route is approximately 2.6 km long with an average gradient of 6 percent. A variation to the route is

indicated (see Appendix 2) where the path diverges to take a steeper path then converges again to form a single route. Further investigation involving a topographic survey to produce more accurate contours will be required before the final route and extent of earth works can be determined. Both routes would avoid disturbance of a natural spring located west of the proposed route.

The existing causeway on the link road under investigation will require reconstruction to provide sufficient width and suitable approach gradients for construction traffic. The causeway if reconstructed would also need to meet the requirements of the Department of Water and Energy for watercourse crossings under the Water Management Act 2000. These requirements include provisions for the passage of fish as required by the NSW DPI (Fisheries). In its existing form the causeway has one 0.75 m diameter pipe culvert for low-flows which is considered to be insufficient. The guidelines for fish passage require culverts to have a large opening which will provide light penetration through the structure. The existing outlet is above the natural stream level, which would prevent the upstream passage of fish in all low flow conditions.

A reconstructed crossing would be designed and certified by a suitably qualified engineer in accordance with the "Guidelines for controlled activities Watercourse Crossings" (NSW DWE Feb 2008) and contain the following elements:

- Box culvert or culverts with wet cells to provide for low level flows. These culverts would have an invert level below the existing pipe at stable stream bed level.
- Elevated dry cells to accommodate higher flows. The invert of these cells could be at the existing causeway level.
- The deck or road surface at a level which would allow approach gradients at less than 14% with vertical curves accordance with Austroads rural road geometry.
- An available minimum deck width of 4.5 m on straight alignment.
- Road approach alignment to allow for long vehicles transporting wind turbine blades up to 50 m long.
- Minimum disturbance of existing banks and streambed.

It is envisaged that this structure would be constructed at the existing crossing with slight widening on the upstream side. Evidence of flood levels at the site and at the crossings downstream indicate that it would be uneconomical to provide a high level structure and that the structure should be designed with a deck level below the high flood level and at a level approximately 1 to 2 m above the existing causeway level.

The construction of a road link as proposed will have significant environmental benefits:

- Travel distances from Nimmitabel to the Boco cluster will be reduced by 7.0 km by the construction of approximately 2.6 km of additional internal road from the proposed substation to the Boco Cluster.
- Upgrading works on Boco road can be significantly reduced as the existing causeways are of an acceptable standard for light traffic.

- The reconstruction of the causeway across the Maclaughlin River at 2.85 km will not need to be upgraded for large vehicles.
- The improvements to the existing stream crossing at Boco will restore the passage of fish species at all water levels in this section of the Maclaughlin River.
- The passage of heavy vehicles past the residence on Boco Road will be eliminated.

6.7.4 Ancillary Roads and Remediation

Some additional roads may also be required for construction of the overhead transmission line, cable routes and for access to erosion control sites. The erosion control sites will benefit from the use of excess rock excavated from turbine footings and will be chosen based on the availability of excess material, the need for erosion repair, and minimising the distance for material transport.

If roads are not required for the ongoing operation and maintenance works of the project they will be removed and revegetated on completion of the construction phase, and in accordance with landowner preferences where possible.

6.8 Utility Services

The proposed wind farm will be connected to Country Energy's 132 kV transmission network and when not generating will draw a minor amount of electricity from that source. The development of the external 132 kV overhead electrical interconnection will be undertaken separately from the wind farm (refer to subsequent sections).

A telephone connection to the proposed operation facilities building involving multiple telephone lines will also be provided to enable remote monitoring and control of the wind farm.

Mobile telephone coverage is available on most of the ridgelines and plateaus with limited service available on the valley floor. Although the wind farm will not rely on this form of communication, it can be assumed that members of the construction, operation and maintenance teams will communicate using both mobile telephones and radios.

Water will be provided to the proposed facilities and auxiliary services building from a storage tank designed to collect water from roof drainage. An approved septic system or composting system will be installed to treat minor quantities of waste water. The proponent will be responsible for the removal of all other wastes from the site.

7. Electrical Infrastructure

The electrical works, including those incorporated in the wind turbine structures, will involve:

- up to one-hundred-and-twenty-seven (127) wind turbine generator transformers;
- the establishment of a 100 m by 100 m collector substation with 33 kV-to-132 kV transformer circuit breakers and isolators;
- approximately 75 km of 33 kV underground cables;
- approximately 8 km of 33 kV overhead electrical interconnection cables;
- approximately 83 km of control cables (8 km may be underground or overhead); and
- the establishment of a 30 m by 6 m operation facilities building to house control and communications equipment.

7.1 Generator Transformer

The wind turbine generators typically produce electricity at nominally 0.69 kV which is raised to 33 kV by the transformer located either in the nacelle, the base of the tower or close to the base of the tower on a concrete pad.

The generator transformer may be oil-filled or a dry type depending on the wind turbine. Where oil-filled transformers are used, appropriate measures will be incorporated to prevent any oil loss reaching local water courses. The volume of oil used for generator transformers is in the order of 1,000 litres (l). The output from each of the turbines will be directed via 33 kV cables that link to the 33/132 kV collector substation.

Image 5: Transformer adjacent to wind turbine

7.2 Collector Substation

The substation location has been chosen to minimise access distance and electrical losses, and to reduce its visibility from surrounding public viewpoints (see Appendix 2). The substation will be 2 km from 'Boco', the nearest inhabited dwelling. Following construction, and if warranted, small areas of tree planting could be undertaken to screen any part of the substation that are visible from the surrounding country to reduce visual impact. Access to the substation site for construction purposes will be via the new internal access road off Avon Lake Road. Post-construction access would be along the same route or alternatively via Boco Road, which links to the internal road network via the Snowy River Way.

The collector substation will include two 150 megavolt ampere (MVA) transformers to step-up the voltage from 33 kV to 132 kV, together with ancillary equipment. It will occupy an area approximately 100 m by 100 m and will be surrounded by a 2 m high security fence, surmounted by four (4) strands of barbed wire. The substation arrangement will include an array of busbars, circuit breakers, isolators, various voltage and current transformers and a static compensator-capacitor as agreed with Country Energy. A buried earth grid will extend one metre beyond the fence on all sides. The ground surface within the substation enclosure will be covered partly with a layer of crushed rock and partly by concrete slabs. As the transformer may contain upwards of 80,000 litres of oil, provision will be made in the design for primary and secondary containment of any oil that may leak or spill from the transformers or associated components. This would involve constructed concrete bunds around each transformer and a spill oil retention basin or oil/water separator outside the substation compound. The 1 ha area includes a provision for a 20m buffer of land surrounding the equipment.

Consideration was give to the establishment of two (2) internal collector substations. However studies indicated that although both options would have similar electrical protection requirements, a single collector substation approach both reduces the land use requirement (and therefore impact area) but in addition offered greater operational flexibility by allowing for full power transfer between the two transformers. Therefore a single collector substation design results in a lower cost, lower land use and a better level of network reliability so is the preferred and proposed option.

7.3 Overhead and Underground Cables

The underground cables from the Sherwins cluster will connect directly to the substation. The Yandra, Springfield and Boco clusters are over a kilometre or greater from the substation and a single overhead transmission line from each cluster operating at 33 kV is proposed to connect the combined output of the turbines to the substation. These single circuit 33 kV overhead lines will run approximately east-west for distances of 2 to 4 km. Where feasible the lines will be attached to the same poles and along the same easement, to a point where the easement will need to split to connect the three individual clusters of Yandra, Springfield and Boco to the collector substation. The route will be located such that it will not be generally visible from much of the surrounding countryside and to minimise the clearance of trees (see Appendix 2).

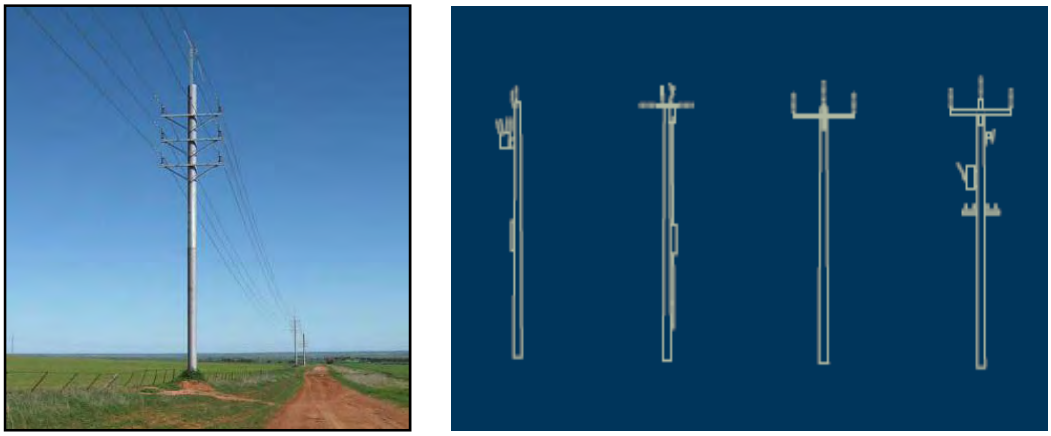


Image 6: Overhead 33 kV power line (carrying multiple lines) and typical alternate designs

The underground cable routes will generally be between the turbines and, where possible, follow the route of the internal access roads. The final route will minimise clearing and avoid potential erosion and heritage sites and will also depend on the ease of excavation, ground stability and cost. Markers may be placed along the route of the underground cables. Placement of these cables below ground will result in minimal visual impact.

Control cables will interconnect the wind turbine generators and the operation facilities building. Computerised controls within each wind turbine will automatically control start-up, speed of rotation and cut-out at high wind speeds. Recording systems will monitor wind conditions and energy output at each of the turbines. Remote monitoring and control of the wind farm will also be possible. Control cables will consist of optic fibre, twisted pair or multi-core cable and will be located underground within the groups of turbines and either underground or above ground between the Yandra, Springfield and Boco clusters and the facilities building within the Sherwins cluster. Above ground control cables, if used, would be strung from the poles of the internal 33 kV overhead lines located between the clusters.

The installation of buried earthing conductors and electrodes will also be required in the vicinity of the turbines, the facilities building and the substation.

Image 7: Laying underground electrical cable within road network

7.4 Operation Facilities Building

A facilities building approximately 30 m by 6 m will be constructed at the same location as the collector substation. The general location has been chosen to minimise the length of overhead lines and underground cables and also to minimise the visibility of the facilities building and substation. The building will house instrumentation, electrical and communications equipment, routine maintenance stores, a small work area and staff amenities.

The structure is proposed to be a slab on ground construction with steel frame, metal or brick walls and a sheet steel roof or alternatively a transportable type building constructed on piers. It will be of sturdy construction, suitable for the weather conditions it will be exposed to and will be compatible with the rural environment. Roof drainage will collect rainwater for domestic use. A septic system or composting toilet system, which complies with Council requirements, will be installed to treat the small amount of waste water produced.

The design of the collector substation, electrical installations and operation facilitates building will be developed in conjunction with Country Energy and comply with relevant technical, electrical and planning standards.

8. Overview of Connection of the Wind Farm to the Electricity Grid

To harness the energy produced by the wind farm, a new transmission line is required to connect it to the existing electricity grid. To meet this requirement the construction of a new double-circuit 132 kV overhead transmission line would be required to connect the wind farm with two existing Country Energy lines located approximately 25 km east of the wind farm site.

Country Energy would be the ultimate owner and operator of the proposed transmission line. Country Energy is therefore considered to be the proponent for the proposed transmission line for the purposes of the EP&A Act. Design and construction of the transmission line is to be undertaken by the wind farm proponent and is therefore responsible for completing the necessary environmental studies for the transmission line on behalf of Country Energy.

Image 8: Overhead 132 kV power line and typical alternate designs

It is expected that the approvals process for the transmission connection will consist of the following general stages:

- Preparation of a 'Route Options Study' - *completed*;
- Preparation of a 'Review of Environmental Factors' for the determining authority - underway;
- Approval by determining authority, which in this case will be Country Energy; and
- Implementation in accordance with the necessary controls.

An overview of the transmission line connection is provided below to explain the associated infrastructure so that all stakeholders are able to understand the full context of the development.

8.1 Proposed Transmission Connection Works

Country Energy has been approached regarding the connection of the Project to their high voltage transmission system to the east of the proposed development. A Connection Application has been lodged by the proponent and a written response has been received from Country Energy indicating the necessary requirements for connection. Further electrical studies are currently underway to determine the connection configuration.

Country Energy has indicated that the combination of the existing 132 kV and the planned upgrade to the 66 kV network to a 66/132 kV rating will have sufficient capacity to accept the output from the Project without augmentation to other existing transmission lines or substations.

Connection of the wind farm would involve:

- The construction of a double-circuit, overhead 132 kV line and is anticipated to be constructed using a single pole design. Based on Country Energy's requirements for 132 kV, single pole, long span transmission lines, the transmission line easement would be 40 to 45 m in width. Depending on the final route selected, the transmission line length would be in the order of 25 km. Assuming a maximum easement width of 45 m and a maximum length of 25 km, the footprint of the easement would be up to 112.5 ha.; and,
- The construction of a single substation at the point of connection to both existing lines to enable effective connection of the new 132 kV double-circuit transmission line. The switching station will consist of an outdoor high voltage enclosure containing circuit breakers, isolators and other necessary equipment. Assuming a maximum compound area of 200 m by 200 m, the footprint of the switching substation would be up to 4.0 ha.

A new easement will be required on all properties affected by the transmission line. Each landowner has been approached and preliminary agreement has been reached. Further discussions and formal consent by each landowner will form part of the separate approvals process for the transmission connection.

Access requirements for transmission line include access to each pole placement during construction and access to various points along the line during operation. For the proposed transmission line, these requirements would be met to the greatest extent possible using existing roads and vehicle tracks. The requirements for construction of new access tracks for the transmission line has yet to be determined.

The existing roads that would be used to gain general access to the transmission line route are the same as those that would be used for the wind farm and existing internal farm roads and vehicle tracks within the wind farm site would also be used to gain access to the western end of the transmission line.

To facilitate construction and operation of the transmission line, clearing of vegetation that has the potential to interfere with transmission line conductors or access to infrastructure is required. Country Energy has developed vegetation clearing guidelines for power line easements. The key points of these guideline are as follows:

- a clearing zone corresponding to the width of the easement is required along the length of the transmission line route;
- the easement width and clearing zone shall allow for conductor blow out; and
- all vegetation types except grasses shall be removed from the clearing zone, except as follows:
    - low growing species shall be retained at river or creek crossings,
    - in deep valleys where the conductors will be well above the maximum height of the prevailing vegetation and the clearance space will never be compromised, all vegetation shall be retained (except where it impedes construction access),
    - low growing species may be retained for the first five metres of the corridor adjacent to main roads to provide a visual buffer zone,
    - stumps shall be retained where there is the possibility of erosion.

The connection will be carried out in accordance with Country Energy's normal procedures for maintenance works involving interruptions to supply.

The output of the BRWF will be directed to primarily supply the population of Cooma and the larger electrical load centres to the north, however supplies will also flow to the local area and to the substations at Bega and Bombala for further distribution.

8.2 Identification of Potential Transmission Line Development Corridors

As the first step in the environmental planning process for the transmission line identification, potential transmission line development corridors were established (Table 5; Appendix 3). These corridors comprise broad areas that are anticipated to provide feasible options for a transmission line route. The main considerations in the identification of these corridors were:

- land owner requirements; and
- opportunities for aligning the transmission line with existing road easements to minimise vegetation clearing requirements.

The planning process for the wind farm has involved consultation with land holders that have the potential to be affected by the proposed transmission line connection. As a result of this process, a number of land owners who are opposed to transmission line infrastructure and easements on their land have been identified which in turn have shaped the assessment corridors.

The potential transmission line development corridors identified have been used as a starting point for an environmental constraints and route options identification study.

Table 5: Potential transmission line development corridors

Corridors	Description
Southern Corridor	Runs in a general easterly direction along the Maclaughlin River valley from the wind farm substation. Converges with the other identified corridor options east of the Monaro Highway and Cooma-Bombala railway line.
Northern Corridor A	Runs initially in a general easterly direction along the Maclaughlin River valley as for the Southern Corridor before turning northwards along the valley of Boco Creek (a tributary of the Maclaughlin) then eastwards parallel to Springfield Road. Converges with the other corridor options east of the Monaro Highway and Cooma-Bombala railway line.
Northern Corridor B	Runs initially west then northwest from the wind farm substation to Avon Lake Road then northwards to Springfield Road, then runs parallel to Springfield Road, converging with Northern Corridor A at the headwaters of Boco Creek.

8.3 Summary of Environmental Constraints

A summary of the key environmental constraints for the proposed transmission line development is presented in Table 6. The results of this qualitative desktop assessment indicate that the Northern Corridor B option is likely to be the least favourable for transmission line development. Of the remaining two corridor options, Northern Corridor A appears to present a greater number of constraints to transmission line development, although it is anticipated that a suitable transmission line route through this corridor could be identified following detailed field investigations. At this stage of the environmental assessment process, the Southern Corridor appears to be the most favourable of the potential transmission line development corridors, although field surveys are required to confirm this and identify a suitable transmission line route, particularly through the eastern portion of the study area.

Detailed field survey will be required to identify a suitable transmission line route and determine whether or not ecological impacts can be satisfactorily avoided, mitigated and/or managed. These assessments will form part of a Review of Environmental Factors (REF) in accordance with Country Energy's specifications and subject to Part 5 of the EP&A Act (1979).

Table 6: Comparison of potential transmission line development corridors

Corridor	Preliminary indication of significance of potential adverse impacts				
	Land holders and local community	**Flora and fauna**	**Aboriginal heritage**	**Non-Aboriginal heritage**	**Waterway crossings**
Southern Corridor	Moderate	High	Moderate	Low	High
Northern Corridor A	High	High	Low-Moderate	Low-Moderate	Moderate
Northern Corridor B	High	Very High	Low-Moderate	Low-Moderate	High

8.4 Identification of Preliminary Transmission Line Route Options

Five (5) preliminary route options have been identified based on the desktop assessment of the potential transmission line development corridors (Appendix 3). These options represent the anticipated optimal routes through each corridor, based on the current level of knowledge gained from this qualitative desktop investigation.

Further assessment of route options is required to confirm the extent and significance of the environmental constraints identified in this study and guide selection of a preferred. This assessment will include specialist field surveys of flora and fauna, as well as a general site inspection to gain a better understanding of visual impacts and the issues associated with waterway crossings. Technical issues also need to be investigated to ensure that the option selected can be constructed and meets Country Energy connection requirements. These assessments will be undertaken in close cooperation with Country Energy and in relation to Part 5 of the EP&A Act (1979).

Once a preferred transmission line route has been selected, detailed environmental impact assessment will be required to determine the significance of environmental effects. It is likely that minor modifications to the alignment of the preferred transmission line route will need to be made during this process as further information is collected on Aboriginal heritage, threatened species, land owner requirements, and visual effects.

9. Wind Farm Development Phases – Development Approval to Operation

The following section provides a brief description of the detailed design, pre-construction and construction works, operation/maintenance and refurbishment/decommissioning work required at the Boco Rock wind farm site.

9.1 Anticipated Project Timeline

Approval will be sought for the final positioning of up to 127 turbines within a radius of 100 m of the locations indicated in Appendix 2. The proponent will be applying for Development Approval to allow for substantial construction to begin within 24 months of the date of Consent. The actual timing of construction will principally be driven by the length of time taken to obtain other permits and authorisations, attaining Board approval/project financing for commencement and the long lead times for wind farm components.

The following provides a guide to the anticipated activities subject to Development Approval for the Project and an indicative timeline in relation to commission the 132 kV double-circuit transmission line and external substation equipment.

Table 7: Anticipated Project Timeline

		2009		2010				2011				2012				Onwards	2031/32
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
Wind Farm related activities	Detailed Design and Contract Development																
	Preconstruction Works																
	Construction Works																
	Commissioning																
	Operation																
	Maintenance																
	Decommissioning or Equipment Replacement																
Transmission line related activities	Review of Environmental Factors																
	Approval from Country Energy																
	Detailed Design and Contract Development																
	Preconstruction Works																
	Construction Works																
	Commissioning																
	Upgrade of Existing 66 kV line																

9.2 Detailed Design and Contract Development

Once approvals have been obtained and tenders for the design and construction have been awarded the project design can be finalised. This stage takes account of updated wind resource monitoring, revised energy modelling and the latest equipment and technology that is available to the proponent at that time.

Project environmental commitments, including undertakings arising from the impact assessment, consent conditions and any licensing conditions will be compiled and used to prepare the Project Environmental Management Plans (EMPs) as outlined in the Draft Statement of Commitments. The Project EMPs would also be incorporated into the contract specifications for the required construction works and equipment supply to ensure compliance and achieve the project environmental objectives.

Tenders will be issued using the abovementioned specifications and tenderers' records of performance will be reviewed as part of the selection process to ensure that they are able to achieve the required specification of works.

The Contractor will also be required to produce a Contractor Environmental Management Plan to address its component of the project works.

9.3 Pre-construction Works

Prior to the main construction commencing, a number of enabling works and further site planning would be undertaken by the selected Contractor, including:

- Detailed site investigation including geotechnical investigations involving a series of trial pits and/or boreholes.
- Upgrading the surfaces of local roads and access roads where required.
- Widening the junctions or corners of local roads, entrance/access points where required.
- Widening the existing gateways, or inserting new gateways as necessary along fencelines.
- Stripping and careful storage of existing soil from the areas which would be affected by construction activities, including the tower bases, switchgear/substation yards, access road areas, crane hardstand areas and temporary laydown/carpark areas.
- The construction of a secure works facility, with project owner and subcontractors field offices (portables), carpark, laydown yard and toilet facilities (temporary).
- Erection of signage on roads.
- Enabling works for the locating of a mobile concrete batching plant (temporary, if required).
- Enabling works for the locating of a rock crushing plant (temporary, if required).
- Environmental survey and refinement (if necessary) of the Environmental Management Plan in line with the Draft Statement of Commitments, Health and Safety Plan, Traffic Management Plan and any other documentation as required under the planning authorisation.
- Survey of critical boundaries and pegging of infrastructure locations.
- Detailed cultural heritage and flora/fauna surveys across entire site (if required).
- Preparation of works procedures and Project Implementation Plan.

- Engineering design works and submission for Building Rules Consent.

9.4 Construction Works

Construction activities include activities that cross over with pre-construction works and comprise site establishment, earthworks for access roads, footings and crane hardstand areas, erection of up to one-hundred-and-twenty-seven (127) wind turbines, four (4) permanent wind monitoring masts, a collector substation, above and below ground cabling and temporary site facilities. Construction activity is likely to occur over a period of approximately 18 to 24 months with restoration following the completion of works.

Community construction awareness program: Prior to the commencement of the site construction activities, a program of community awareness initiatives will be implemented. Information will be disseminated to the local community through local newspapers and direct mail to advise them of the nature of the construction activities, their timing and potential impacts. Contact details will be provided for individuals to gain further information or if required to express concerns or complaints.

Updates on the progress of construction works and relevant impacts will be provided during the construction period.

Site Establishment and Temporary Site Infrastructure: Site works will require the erection of temporary infrastructure such as portable field offices, toilet facilities, materials storage areas and parking bays. This infrastructure will be typical of that used at construction sites, however it is unlikely to include full accommodation facilities.

Image 9: Temporary site infrastructure

Traffic signage required as part of traffic safety during construction will be installed by the contractor, in compliance with relevant regulations and in accordance with any permits obtained for traffic management.

Signage will be erected on the Monaro Highway and other critical locations from the outset of construction, directing all vehicles associated with the construction site to the site office. Sightseeing traffic will be managed towards safe, prominent viewpoints where they may view the wind farm, but not in a way that would jeopardise the safety of sightseers or the progress of construction. Additional signage would be located near to the site, providing information about the turbines, the companies involved in the projects and essential safety information and telephone numbers. The need for a pull-off bay for sightseers' cars will also be assessed. Negotiations with the Cooma Monaro Shire and Bombala Councils, NSW Road Transport Authority and other affected parties will be initiated to determine final signage locations and various works required.

Ancillary Construction Activities: On-site Concrete Batch Plant / Rock Crusher: Up to two (2) concrete batching plants will be required on site to supply concrete for the wind turbines foundations.

An on-site batching plant would occupy an area of approximately 50 by 100 m and likely consist of a trailer-mounted concrete mixer, cement bins, sand and aggregate stockpiles and a storage container for various equipment and tools. Sufficient area will be required for the use of front-end loaders, delivery of materials and entry and exit of vehicles. A batch plant would be powered by a diesel generator and have a production capacity of approximately 50 m^3/hour.

Three (3) locations have been identified to locate the concrete batch plants within the Site Area (see Appendix 2), these are summarised below.

Table 8: Summary of preferred concrete batch plant locations

No.	Location	Site Features
1	Along Brechnoch Road (Springfield Cluster)	An area of exotic vegetation, existing access from the arterial roads, close to turbine clusters, set back from publically accessible areas, 800m from nearest dwelling (associated landowner).
2	Along Yandra Road (Yandra cluster)	An area of exotic vegetation, existing access from the arterial roads, close to turbine clusters, set back from publically accessible areas, 1.8km from nearest dwelling (associated landowner).
3	Substation location (Sherwins cluster)	An area of native vegetation, new access road to be built foe substation, close to turbine clusters, set back from publically accessible areas, 1.8km from nearest dwelling (associated landowner).

Although the concrete batching plants will be a temporary impact of the development, the selection criteria for identifying these locations has been with respect to the following:

- Minimising the ecological impact – avoidance of Endangered Ecological Communities (EEC's), avoidance of mapped hollow bearing trees, away from recorded Threatened Species, avoidance of major creeks and the Maclaughlin River;
- Minimising traffic and transport activity during construction;
- Minimising visual impact from publically accessible locations;
- Minimising noise impacts at receptor locations;
- Close to an accessible water source.

The concrete batching plants will be strategically sited in so far as responding to local features, which will occur at the construction planning stage.

Image 10: Temporary on-site concrete batching plant

Under the Protection of the Environment Operations Act 1997 'Concrete Works' are considered a scheduled activity requiring any such works to have a Licence from the Department of Environment and Climate Change (DECC) where the capacity of production of concrete exceeds 30,000 tonnes per year. Liaison with the DECC will be undertaken to obtain a licence for its operation subject to approval.

There is an existing ninety-two (91) mega litre (ML) dam within the Site Area. However a current embargo on water usage rights within the Maclaughlin River catchment restricts water supply for activities classified as "Industrial Use". Under this heading, the supply of water to concrete batching plants is restricted.

As an alternative, water required for the batching plants could also be sourced from a bore hole within the Site Area. Under this instance, so long as a ground water source is identified that is outside of the alluvial zone as determined by the DWE, and permissive occupancy rights are obtained from the landowner within the Site Area for the establishment of a bore hole, then supply of water for use in the batching plants will be permitted subject to a production licence being issued by the DWE.

To address this concern, WPCWP have in the first instance sought from the DWE permission for a temporary licence be issued to extract the quantity of water required for the concrete batching plant from the on-site dam. As an alternative measure WPCWP will seek permissive occupancy for one or more bore holes from landowners within the Site Area. A three (3) year Test Licence will then be sought from the DWE that would allow for test drilling to occur within the licensed area. Subject to Development Approval, test bores will be drilled and Production Licences sought for one or more suitable bores. It is the preferred option of the proponent to source all water from the on-site dam.

It is estimated that in the order of 11 ML of water would be required to produce the quantity of concrete required for gravity footings for layout option 1, and as such can be considered the maximum amount of water required. By way of comparison, it is estimated that only 3.5 ML of water would be required if standard rock anchors were used for all footings layout option 1. The following section explains the volume of water required and how it may be sourced during the construction of roads and their subsequent use.

Beyond the construction phase the licence rights to the bores could be handed over to the landowners for agricultural use, if appropriate to do so.

A supply of road base material will be required for construction of access tracks to turbine sites and the substation. Part of the road base requirement may be sourced from material extracted from turbine footings or imported to the Project site. A mobile rock crusher may be required to convert the material in to road grade aggregate.

Site Access Roads and Crane Hardstand Areas: Site access roads and crane hardstand areas require surfacing in order to cater for construction traffic and machinery. This involves the excavation of the roads and hardstand areas to an agreed depth, prior to the laying of a compacted quarry rubble base. It is anticipated that the majority of material retrieved from cuttings and excavations will be used on site or in the immediate vicinity of the site. Site access points would be gated and secured, and appropriate warning signs erected.

During construction, site access roads are constructed at a width of up to 12 m to allow for passing construction traffic, large mobile cranes, and other long and wide loads. Once the wind farm is operational, the access roads will be reduced in size to 6 m in width, acknowledging that traffic from this point onwards will principally involve commercial vehicles. The crane hardstand areas will be sized at approximately 45 m by 45 m.

Dust suppression is a key consideration during the construction and use of roads. As stated above, the current embargo on water usage in the Maclaughlin River catchment area restricts the use of water from the dam located within the Site Area for "Industrial Use". However there are some exemptions to the embargo and road construction and use are considered to fall under this category. Two options are therefore present for the supply of water for road construction and dust suppression purposes.

- With permission from the landowner with the dam on their property a permit is sought from the DWE for the extraction of the necessary quantity of water to enable the construction and dust suppression of up to 75 km of new and upgraded internal access roads and up to 25 km of unsealed arterial roads that are likely to be used for site access.
- Alternatively, as may be the case with sourcing water for the concrete batching plant facilities, water could be sourced from a bore hole within the Site Area, subject to the procedure outlined above.

To address this concern, WPCWP have in the first instance sought from the DWE permission for a temporary licence be issued to extract the quantity of water required for road construction and dust suppression purposes from the on-site dam. As an alternative measure WPCWP will seek permissive occupancy for one or more bore holes from landowners within the Site Area. A three (3) year Test Licence will then be sought from the DWE that would allow for test drilling to occur within the licensed area. Subject to Development Approval, test bores will be drilled and Production Licences sought for one or more suitable bores. It is the preferred option of the proponent to source all water from the on-site dam.

Footing Construction: If gravity foundations are required, the construction of the foundation for each wind turbine would involve the excavation of approximately 450 m3 of ground material to a depth of approximately 2.5 m. Shuttering and steel reinforcement would then be put in place and concrete poured to form the base in-situ. The upper surface of each base would finish approximately 0.5-1 m below ground level with either a central reinforced concrete plinth to support the tower, or a base steel tower section set into the concrete.

If rock anchor foundations are required, the construction of the foundation for each wind turbine would involve the excavation of approximately 100 m3 of ground material to a depth of approximately 2.5 m. The rock anchor cores are drilled into the bed-rock prior to concrete pour, and are up to a depth of approximately 20 m. The rock anchor tendons are grouted into place, stressed and secured once the concrete has cured sufficiently. Steel forms shuttering and steel reinforcement would then be put in place and concrete poured to form the base in-situ. The upper surface of each base would finish at ground level with either a central reinforced concrete plinth to support the tower, or a base steel tower section set into the concrete.

On-site Electrical Reticulation: Either prior to or during turbine base construction, the underground site electrical system would be installed. This would involve the cutting or excavation of trenches to

a depth of up to 1.2 m, for the laying of the underground cabling that links the turbines. All trenches would be backfilled and marked with warning tape once the cables were laid.

The majority of the underground cabling will be located adjacent to the access roads. The general procedure followed for the laying of underground cables will be:

- Preparation work, including installation of gates/temporary removal of fences as required.
- Use of an excavator or rock saw to dig a trench (0.45 m wide by 1.2 m deep).
- Material excavated is stored adjacent to the trench for subsequent back-filling.
- Laying of bundled cables within a bed of protective sand.
- Backfilling and compaction of previously excavated material in layers by use of a vibration plate compactor, all in accordance with Engineering Specifications.

On completion the cable route may be marked with small marker posts and the surrounding vegetation will be allowed to regrow.

On-Site Substation Compound: A location for the on-site substation has been selected (Figure XX). The total compound area will be in the order of 100 m by 100 m incorporating a 20 m Asset Protection Zone (APZ) area extending from the boundary of the installed equipment. The yard will be surfaced with compacted quarry rubble to form a hardstand area. Reinforced concrete footings will then be constructed to support electrical infrastructure and buildings. Infrastructure required within the yard includes a 33/132 kV transformer, switchgear, power conditioning equipment and operation facilities building.

Image 11: Transformer foundation (foreground) and electrical substation and switchgear infrastructure (background)

Turbine Erection: The turbine components would be delivered to the site on semi-trailers. The method of construction would involve the use of a small mobile crane (up to 100 tonne) for the ground assembly operation. A larger 600-1000 tonne mobile crane (or alternatively a 300-400 tonne

crawler crane) together with the small mobile crane, would be required to erect the turbines once ground assembly is complete. Erection is likely to take approximately 2-3 days per turbine. Depending on the configuration, the crane may require up to 2 days to disassemble and remobilise to a new site.

Image 12: A range of typical construction images

Overhead Power Line: A 132 kV double-circuit overhead power line will be required to transport the electricity from the wind farm site to a substation (to be assessed under a separate approvals process). The power line poles will be supported by reinforced concrete piers to a depth determined by an engineer, taking into account the local geotechnical conditions. The poles will be either concrete or wooden, approximately 25 m in height as determined by Country Energy.

9.5 Commissioning

Pre-commissioning checks will be carried out on the high voltage electrical equipment prior to connection to the Country Energy transmission network. The connection to the grid, as discussed earlier in the PEAis dependent on the associated transmission works. When the wind farm electrical system has been energised, the wind turbines will be commissioned and put into service.

9.6 Operation

Once operational, the wind farm would be monitored both by on-site staff and through remote monitoring. Aspects of the wind farm operation to be dealt with by on-site staff would include safety management, environmental condition monitoring, landowner management, routine servicing, malfunction rectification and site visits. Those functions to be overseen by remote monitoring include turbine performance assessment, wind farm reporting, remote resetting and maintenance coordination. Pro-active computer control systems monitor the performance of the wind turbines and ensure that any issues are dealt with by on-site staff or contractors, as appropriate.

9.7 Servicing and Maintenance

Maintenance staff are likely to be on-site throughout the year, making routine checks of the wind turbines on an ongoing basis. Major planned servicing would be carried out approximately twice a year on each wind turbine. Each major service visit would potentially involve a number of service vans (two technicians per van) on-site.

Should a problem occur with a wind turbine, then the on-site maintenance staff will attend to the machine to get it operational again. Depending on the situation, a turbine could be non-operational for several hours or days. Significant problems which require the replacement of major components, such as turbine blades, may require the use of cranes and ancillary equipment. This can result in a turbine being offline for several weeks whilst the appropriate equipment and materials are sourced.

9.8 Refurbishment

After approximately 20-25 years of operation (or sooner if deemed economically viable) the blades, nacelles (top section of the turbine) and towers could be removed and replaced. Old blades, nacelles and towers are removed from site for recycling and new components installed on existing or new foundations, as appropriate. Refurbishment would extend the life of the wind farm for a further twenty (20) years.

Any material change to the wind farm layout, or significant changes to the turbine technology, will be referred to the Department of Planning as an amended proposal. It would also be subject to the regulations and guidelines of the day. Refurbishment requires the transportation and installation equipment and facilities, similar to that used during initial construction.

9.9 De-commissioning

At the end of the operational life of the wind farm, the turbines and all above ground infrastructure will be dismantled and removed from the site. This includes all the interconnection and substation infrastructure. The tower bases would be cut back to below ploughing level or topsoil built up over the footing to achieve a similar result. The land will be returned to prior condition and use. A compressor and rock breaker may be needed to carry out the cutting work.

The access roads, if not required for farming purposes or fire access, would be removed and the site reinstated to its original condition and use. Access gates, if not required for farming purposes, would also be removed. Individual landowners will be involved in any discussion regarding the removal or hand-over of infrastructure on their property.

The underground cables are buried below ploughing depth and contain no harmful substances. They can be recovered if economically viable or left in the ground. Terminal connections would be cut back to below ploughing levels.

All decommissioning work would be the responsibility of the wind farm owner. Experience in Denmark and The Netherlands shows that sale of the scrap metal and other valuable items salvaged from the turbines and electrical components would more than meet the cost of decommissioning.

9.10 Fire management

A fire management plan is an important part of both wind farm project planning and the community consultation process. All aspects of the Boco Rock wind farm project will adhere to the *Rural Fire Service, Planning for Bushfire Protection*, and will be in consideration of the *Auswind Best Practice Guidelines (Fire Management Guidelines) 2006*.

Despite the low risk that wind farms present, fire management is a major concern within the Cooma-Monaro region of NSW, and planning for fire prevention and an effective and informed response is of paramount importance. Not only does effective planning in regard to fire management provide wind farm proponents with assurance that minimum damage would result from a fire incident, it also reassures the local community and enables the rural fire service to confidently plan and execute an effective response.

Appropriate fire management actions for all stages of the wind farm development (*i.e.* pre-construction, construction, operation and decommissioning) include:

- Adherence to all regulations
- Installation of access tracks at least 5 m wide (7 m for corners) and with appropriate vertical clearance and suitability for all weather conditions
- Provision of basic fire-fighting equipment at each active site, including fire extinguishers, knapsacks and other equipment suitable for initial response actions
- Maintaining provision for mobile telephone and UHF radio communications
- Provision of on-site identification of individual turbine locations and access gates for fire-fighting services, and an undertaking to provide local rural fire service groups with access to gates

- Consideration of total fire ban days in regard to hours within which construction takes place
- Providing the Rural Fire Service (RFS) with:
    - A construction works schedule
    - Maps of final turbine layout and identification information for individual turbine sites
    - Access road plans and locations of access gates
    - Security information such as location of locked gates and restricted access areas
    - Location of any additional water supplies installed for construction activities
    - Location of potential landing pads for fire-fighting aircraft or helicopters

The RFS has been notified of the proposed wind farm project and further consultation will continue. Details of the wind farm site (such as turbines, access tracks and gate locations) will be provided to assist their internal response planning. Specific fire prevention and response measures will be outlined in the project EMP. Furthermore, an Emergency Response Plan will be developed in consideration of RFS guidelines and further consultation with regional and local rural fire groups, and would include agreed notification protocols, contacts and response actions.

10.Environmental Surveys

It is proposed that the Environmental Assessment (EA) will provide a comprehensive assessment of all relevant environmental issues. In turn, these issues and their management strategies will play a key role in determining the final wind farm layout. The EA will address the Director-General's Requirements and will include the following key specialist assessments as shown in Table 9. Preliminary findings from key studies are detailed following the table.

Table 9: Key site surveys

Issue	Scope of Assessment
Visual	A comprehensive visual impact assessment will be undertaken incorporating landscape analysis, view field identification, provision of photomontages and review of likely visibility at key viewpoints surrounding the wind farm. Potential mitigation measures will also be identified. Issues of shadow flicker and glint will be assessed and documented in the EA.
Noise	A comprehensive Noise Assessment will be undertaken in accordance with the relevant Environmental Noise Guidelines for wind farms.
Flora and Fauna	A review of vegetation of the site will be conducted with a focus on native vegetation, particularly those having conservation significance. Important areas of vegetation and fauna habitat will be identified and, as far as possible, such areas will be avoided by the development. Impact on such areas would only occur subject to agreement with relevant authorities and the necessary mitigation measures being incorporated into the project. Assessment of relevant avifauna species will be undertaken to identify any potential at-risk species.
Archaeological / Heritage	A heritage assessment will be undertaken by a suitable specialist in conjunction with representatives of one or more indigenous stakeholder groups.
Electro-magnetic Interference	An assessment of services potentially impacted will be undertaken.
Traffic Assessment	A comprehensive assessment may be required to determine suitability of local roads to cope with the increased traffic load, and specifically the impacts associated with over-size and over-mass vehicles accessing the site during the construction phase.
Air safety, bushfire risk, catchment issues, etc.	A number of issues will be dealt with, as necessary, by review of the issue, identification of options for mitigation and consultation with relevant stakeholders. The outcome will be incorporated into the Environmental Assessment.
Community Consultation	Thorough community consultation is a key requirement. Identifying and providing information to those that are likely to be affected by the proposal has and will continue to occur

	throughout all stages of the project.
Geology soils and geotechnical information	Information on these aspects will be compiled and incorporated in the Environmental Assessment.
Water supply and site drainage	The project's requirements for water will be assessed for the construction and operations stages. In addition, any potential for the project to impact on drainage systems at or surrounding the site will be assessed.

10.1 Landscape and Visual Impact

A full landscape and visual impact assessment report is currently being prepared by Green Bean Design Pty Ltd as part of the Environmental Assessment. This report will include a Zone of Theoretical Visibility (ZTV) map, shadow flicker assessments and photomontages from a range of representative viewpoints around the site. Four photomontages from locations around Project are included as Appendix 4. It is worth noting from that these photomontages have been benchmarked against the existing Capital Hill wind farm to give stakeholders a true appreciation of our proposal.

10.2 Residential Houses and Noise

Residences surrounding the proposed wind farm have been identified from a review of topographic maps and by ground-truthing visits to the area. Neighbouring properties will be assessed against the potential audio and visual impacts of the wind farm and appropriate setback distances have been a key design consideration in finalising the wind farm layout. There are, however, no non-associated dwellings within 2km of the nearest turbine.

Heggies Pty Ltd was commissioned to undertake the noise assessment in accordance with the Director General's Requirements issued by the Department of Planning. Their desktop analysis shows that wind turbine noise is not predicted to exceed 35dBA at any of the nearest non-associated residential homes. Background noise monitoring is currently underway at eight properties surrounding the Project however based on the preliminary results; wind turbine noise is not expected to pose an issue at any of the surrounding non-associated residential properties.

10.3 Ecology

Flora and Fauna assessments are well advanced thorough Eco Logical Australia Pty Ltd (ELA). Field surveys commenced in September 2008 and have continued in intervals through the summer months with respect to weather conditions and required survey effort and be concluded at the end of April 2009.

Vegetation types present within the Project study area include; Natural Temperate Grassland (NTG), Snow Gum / Ribbon Gum Woodland, Disturbed Native Grassland and Exotic Pasture. Of those listed above NTG is listed as an Endangered Ecological Community under both state and commonwealth legislation, and covers much of the eastern part of the study area. The study area also provides potential habitat for a variety of threatened species. These species are protected under both state and commonwealth legislation, namely the NSW Threatened Species Conservation Act 1995 (TSC

Act), and Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Threatened flora and fauna species targeted during the survey period are listed below together with the survey techniques used.

Table 10: Threatened Species and Survey Techniques.

Target Species	**Survey Technique**	**Recorded at Boco Rock**
FAUNA		
Grassland Earless Dragon (*Tympanocryptis pinguicolla*)	Rock Rolling	√
	Spider Tubes	
Golden Sun Moth (*Synemon plana*)	Hand-netting	
Pink-tailed Worm Lizard (*Aprasia parapulchella*)	Rock Rolling	
Little Whip Snake (*Suta flagellum*)	Rock Rolling	√
Striped Legless Lizard (*Delma impar*)	Snake Funnels	
	Tiles	
Birds Diamond Firetail (*Stagonopleura guttata*) Hooded Robin (*Melanodryas cucullata*) Brown Treecreeper *(Climacteris picumnus victoriae*)	40 min census dawn and dusk	√ Diamond Firetail
Owls Powerful Owl (*Ninox strenua*)	Call playback	
Barking Owl (*Ninox connivens*)	Spotlighting	
Microchiropteran Bats Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) Large-footed Myotis (*Myotis macropus*) Common Bentwing Bat (*Miniopterus schreibersii oceanensis*)	Anabat Detection	

Target Species	Survey Technique	Recorded at Boco Rock
Mammals Squirrel Glider (*Petaurus norfolcensis*)	Spotlighting	√
FLORA		
Mauve Burr Daisy (*Calotis glandulosa*)	Systematic searches	
Trailing Hop-bush (*Dodonaea procumbens*)	Systematic searches	
Monaro Golden Daisy (*Rutidosis leiolepis*)	Systematic searches	
Austral Toadflax (*Thesium australe*)	Systematic searches	

Our two site layout designs currently take in to account all known ecological constraints as posed by the impacts from the Project, however it is important to note that surveys are still continuing and with respect to the sensitivities surrounding the presence of species such as the Grassland Earless Dragon, minor changes to both layouts may occur.

Moreover the presence of both NTG and those species recorded in the impact area requires the Project to be referred to the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) for assessment under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). This lodgement will be submitted in April 2009 and a determination made as to whether the Project is considered a 'Controlled Action' within 20 business days of submission. If the Project is deemed a Controlled Action additional survey effort can be one of the outcomes, however representatives of ELA and Wind Prospect CWP have meet several times to discuss the extent of current survey efforts with DEWHA and at each stage our approach was deemed reasonable. Deeming the Project a Controlled Action would also trigger the bilateral agreement the Commonwealth has with the NSW Department of Planning, which is effectively a measure to streamline the process of assessment under one Environmental Assessment (to meet the needs of both parties) rather that prepare two separate assessment reports. If the Project is deemed Not a Controlled Action then no further input from the Commonwealth is sought or received.

10.3.1 Environmental Offsets

There is a requirement to set aside an environmental offset area with respect to the scale and nature of the impacts caused by the Project. The Biodiversity and Offset Scheme (Bio Banking) is the preferred methodology from the DECC and is designed to help minimise the loss of biodiversity and species and to place a value on threatened species and communities. It is an ideal scheme for both wind farm developers and landowners since for developers, it allows a streamlined biodiversity assessment process and for landowners interested in conservation, an opportunity to generate income.

The scheme works on a system of 'biodiversity credits'. Credits can either be species credits or ecosystem credits. The amount of credits is assigned based on the Bio Banking Assessment Methodology and the Credit Calculator. Factors that can influence the amount of credits include the area of the habitat, connectivity between patches of similar vegetation, and the condition of the habitat.

Landowners can access these credits after signing a bio banking agreement which states that the landowner will enhance and protect the biodiversity on the selected area. Credits can either be sold to any interested organisation as long as the original Bio Banking agreement is met or retired to counterbalance (or offset) the effects of development on existing biodiversity. This methodology requires a fund to be established by the owner of the Project at the point of construction from which the landowner can draw down on to manage the conservation requirements of the Bio Banking Agreement.

Our field survey effort has taken in to account potential bio banking offset areas and suitable areas and keen landowners to take part in the scheme have been identified.

As noted above, Bio Banking is the preferred option for environmental offsetting by the DECC however alternatives such as Voluntary Conservation Agreements (VCAs) and the purchase of land and gifting to the DECC have also been mooted given the sensitivities of the species in the area.

10.4 Archaeological Heritage

New South Wales Archaeology Pty Ltd was commissioned in December 2008 to undertake an archaeological and heritage assessment of the Project. As the Project will entail ground disturbance, accordingly the Project has the potential to cause impacts to any Aboriginal objects or Non-Indigenous items which may be present within the zones of direct impact.

The majority of the Aboriginal object locales found were low density stone artefacts assessed to be of low archaeological potential and sensitivity, as a result the object locales recorded in the proposal area do not surpass scientific significance thresholds which would act to preclude the construction of the proposed wind farm.

The majority of Non-Indigenous heritage items recorded are stone fences dating to the mid 1800s. Most are in a poor state of repair and in terms of individual recordings these items do not warrant heritage listing. Nevertheless, these items are part of a broader cultural landscape that dates to the late nineteenth century that appears to be associated with the introduction of the Robertson Land Acts, the conversion of Bibbenluke land from leasehold to freehold land and the activities of Chinese workers in the local area.

Given that the proposed wind farm will materially impact the existing cultural landscape of which the fences form a strong visual component it has been recommended that appropriate forms of mitigation should be instated in relation to the stone fences, however these again would not preclude the construction of the proposed wind farm.

10.5 Electro-magnetic Interference

The criteria for clearance of obstructions from point to point link ray lines has been well established in the literature including for the specific case of rotating turbines. For omnidirectional mobile and other services however any need for a buffer zone is usually dismissed on the basis of the accepted variability of coverage to/from the mobile or hand held terminals in the normal operational environment.

There are two point to point links that traverse both near to and through the Project. However with respect to buffer zones as determined by our EMI consultant, Laurie Derrick Associates, neither link is expected to be impacted by the site layouts.

The potential impact on free-to air television and radio broadcasting services to residents near the wind farm is in the process of being assessed by various state and national organisations on the advice of Laurie Derrick Associates.

10.6 Traffic, Transport and On-site Access Routes

Bega Duo Designs was commissioned to complete the Traffic and Transport Study for inclusion in the Environmental Assessment. Observations from the draft report are summarised below along with a description of site access.

The site is accessed from the Monaro Highway at Nimmitabel via Springfield Road, Avon Lake Road, Snowy River Way, Bungarby Road and Boco Road. On site access for all sites would generally be across open grazing land and along the ridges on which the turbines are located. The geology of the site is primarily basalt soil and the elevated areas appear to have soil cover to a reasonable depth.

The location of the access routes through the properties is displayed in Appendix 2 and has been undertaken in consultation with the individual property owners to ensure minimal impact on their management and to avoid areas of identified environmental sensitivity.

Road pavement widths would generally be up to 6m wide to allow for the transport of turbine components and cranes used in the erection. Wider track widths of up to 10m may be required between turbine locations depending on the width required for the movement of the mobile cranes. Longitudinal grades of less than 8% would generally be required for ease of access however grades up to 14% can be negotiated.

The earthworks required along most of the ridges would be minimal including clearing, filling, grading and drainage improvements. Earthworks would be balanced where possible with material from the higher areas being used as filling in embankments.

It is expected that some access tracks would be downgraded following the completion of construction as access by the oversize and over mass vehicles may not be required during the operational phase of the project. The rehabilitation of these tracks would be carried out in consultation with the property owner and addressed in the Environmental Management Plan.

Management strategies required to address the traffic impacts of the proposal are outlined the Bega Duo Designs report and will be incorporated into the Statement of Commitments section of the Environmental Assessment.

10.7 Aviation

The nearest aerodromes are the Bombala Airport, located approx 30km to the south east of the site and the Snowy Mountains Airport, located approx 30km to the north west of the site. The next closest is the Merimbula Airport located 70km to the south east of the site.

Consultation is underway with the Civil Aviation Safety Authority (CASA), Department of Defence (DoD), Airservices Australia (AA) and Aerial Agricultural Association of Australia (AAAA) regarding radar and safety related issues.

All four organisations were made aware of the development from an early stage and have not raised any concerns that would severely impact the proposal. Final comments are being sought in relation to both site layout designs.

10.8 Community Consultation

Consultation is the key to any development and for the BRWF has been undertaken with a range of stakeholders including government agencies, neighbours to the wind farm and the broader local community. Various media types have been used to identify and consult with the local community including:

- Telephone conversations, letters and emails – targeting key consultees and/or responding to enquiries.
- Newsletters – two issued to date; the first in September to accompany the project announcement, the second in February ahead of the Open Day.
- Public Opinion Surveys – two issued to date; one a general survey gauging public opinion on the proposal, the second more focused on landscape and visual criteria to assist with the key assessment.
- Frequently Asked Questions – to provide background information on all aspects of the project
- Door knocking in an area within 5 km radius of the project – conducted in September 2008 to coincide with the project announcement and to provide locals within a 5 km radius of the project to have their say.
- Face to face meetings – ongoing as a result of the project being made public.
- Project website – www.bocorockwindfarm.com.au – providing updates on progress and notifications on key events.
- Community Open Day – held on the 26th March 2009 – providing the opportunity to present the project, findings from the environmental assessments currently underway and the opportunity to meet the proponents – attended by over 100 local residents.

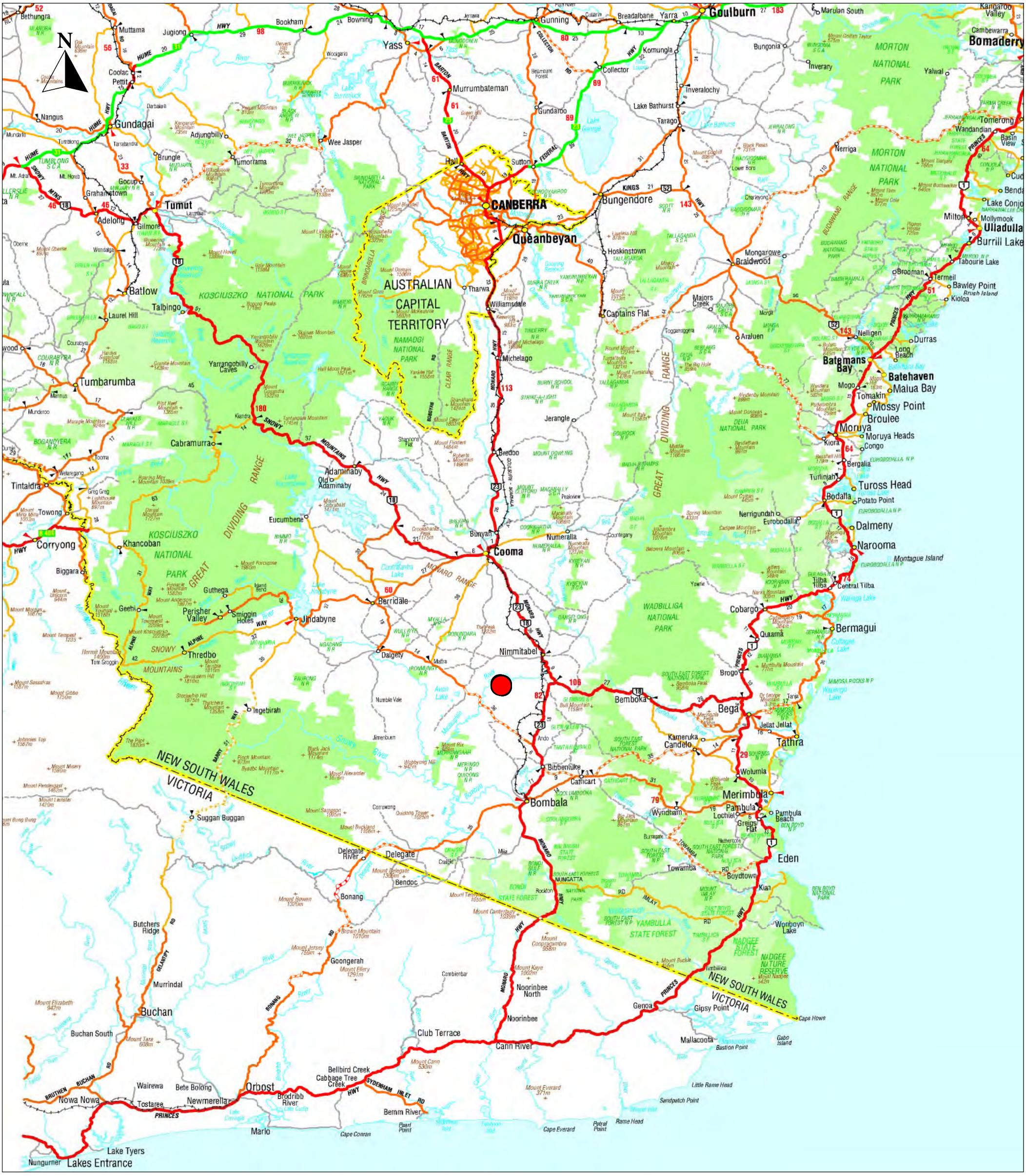
11.Conclusion

The Boco Rock Wind Farm proposes to be an environmentally sensitive, sustainable development in order to meet renewable energy targets for the nation's electricity supply.

Through community and stakeholder consultation, meeting planning requirements, carrying out environmental assessments and employing mitigation measures where necessary, the project aims to create minimal environmental impact during construction and operation while generating clean, renewable energy.

Appendices

Appendix 1 – General Site Location



LEGEND

Wind Farm Location

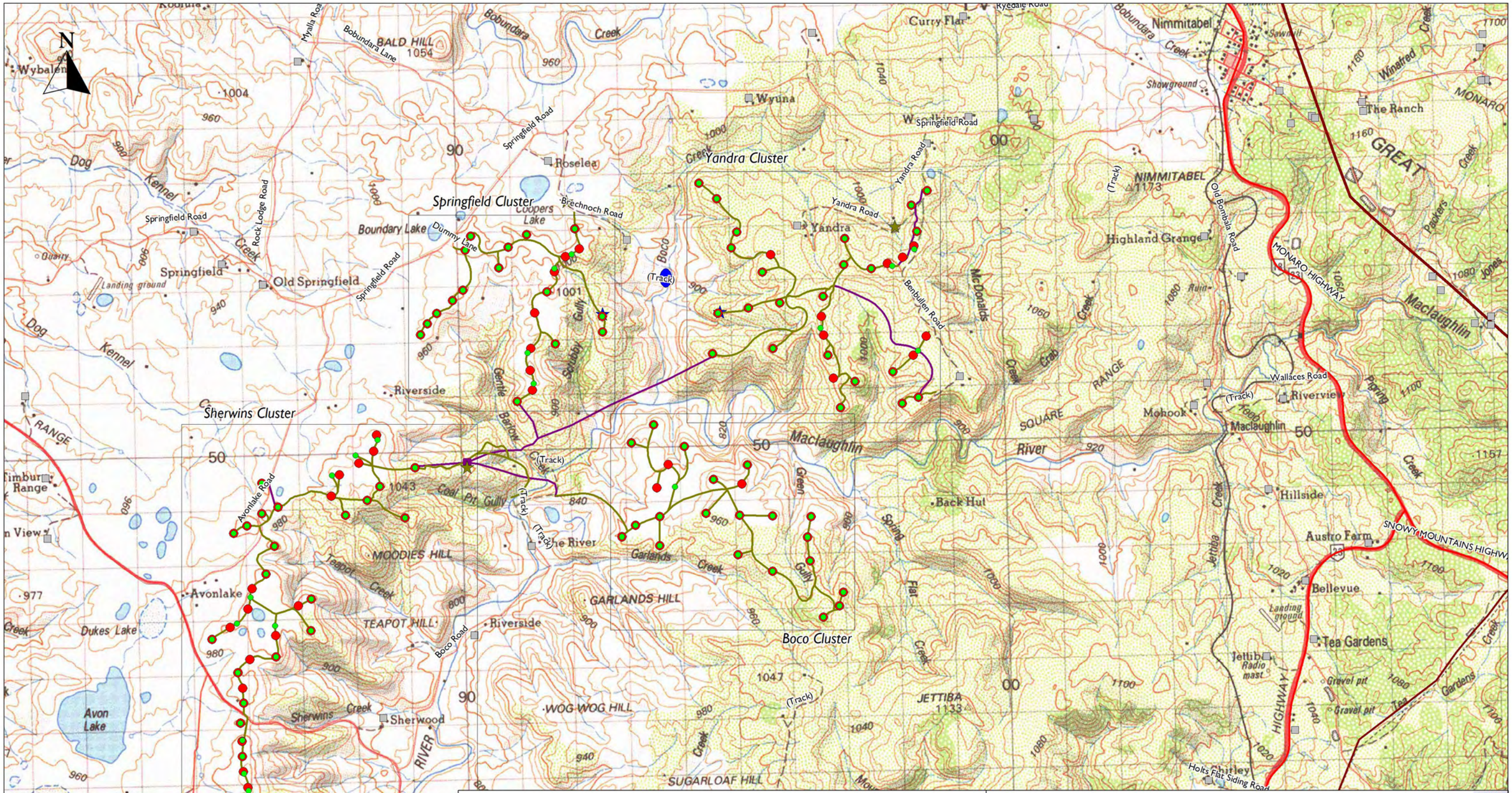
SCALE BAR 0 50 100 kilometers

COMPANY	WIND PROSPECT CWP PTY LTD
TITLE	BOCO ROCK WIND FARM LOCATION

DATE	SCALE	DWG NO	REV
25 JULY 2008	1:900,000	WP_BOC05	A

DRAWN BY	CHECKED BY	SHEET	SIZE
A SAUNDERS	E MOUNSEY	1 OF 1	A3

Appendix 2 – Detailed Site Layout



LEGEND

- Inhabited Building
- Layout Option 2 (109 wtg)
- Layout Option 1 (127 wtg)
- Internal Road
- Internal Electrical Reticulation
- Concrete Batch Plant Options
- Existing 91 Mega Litre Dam
- Proposed Water Tank Locations
- Collector Substation Location
- 66kV line (Part of to be upgraded to 132kV)
- 132kV line

COMPANY

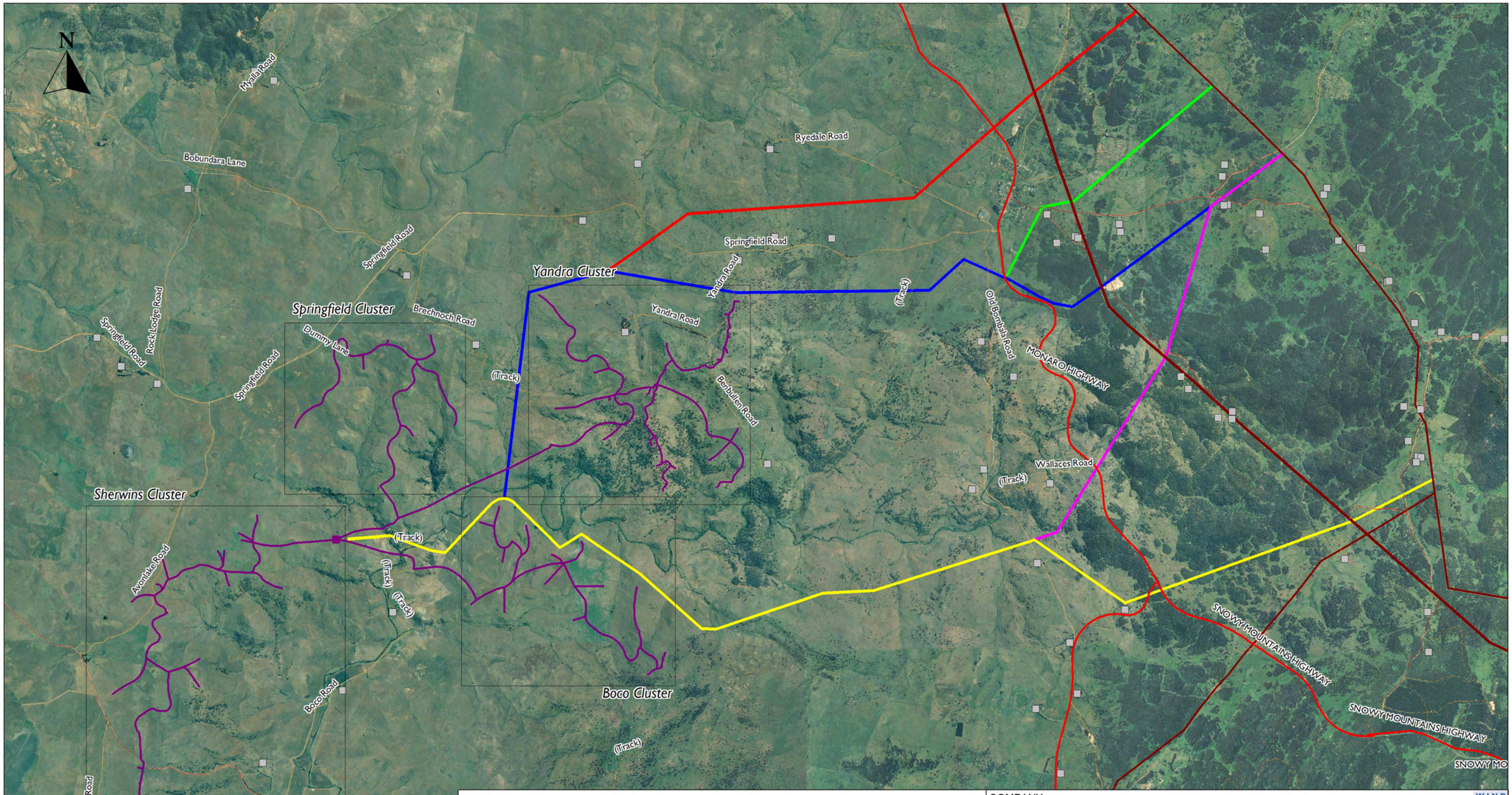
WIND PROSPECT CWP PTY LTD

TITLE

BOCO ROCK WIND FARM LAYOUT AND SITE INFRASTRUCTURE

DATE	SCALE	DWG NO	REV
15 MAY 2009	1:75,000	WP_BOC034	A
DRAWN BY	CHECKED BY	SHEET	SIZE
A. SAUNDERS	E. MOUNSEY	1 OF 1	A3

Appendix 3 – Assessed route options for the Transmission Line



LEGEND

- Inhabited Building
- Internal Electrical Reticulation
- Collector Substation Location
- 66kV line (Part of to be upgraded to 132kV)
- 132kV line
- Preliminary Transmission Line Route Options

COMPANY

WIND PROSPECT CWP PTY LTD

TITLE

BOCO ROCK WIND FARM
ELECTRICAL INFRASTRUCTURE

DATE	SCALE	DWG NO	REV
15 MAY 2009	1:80,000	WP_BOC035	A
DRAWN BY	CHECKED BY	SHEET	SIZE
A. SAUNDERS	E. MOUNSEY	1 OF 1	A3

Appendix 4 – Property details for land on which the wind farm would be located

Landowner	DP	Lot	Landowner	DP	Lot	Landowner	DP	Lot	Landowner	DP	Lot
Landowner #1	DP14852	21	Landowner #3	DP14852	2	Landowner #5	DP756818	253	Landowner #16	DP104319	1
	DP14852	22		DP14852	7	Landowner #6	DP1106223	4		DP1047307	1
	DP165394	1		DP14852	19		DP1106223	5		DP1048382	42
	DP172979	1		DP14852	6		DP756821	149		DP1097791	3
	DP229550	2		DP14852	2		DP756848	128		DP1097791	5
	DP229550	3		DP14852	15	Landowner #7	DP756818	252		DP1097791	1
	DP40035	139		DP14852	8	Landowner #8	DP14852	1		DP1097791	4
	DP589421	2		DP14852	4	Landowner #9	DP404379	2		DP1097791	2
	DP756839	80		DP14852	16		DP404379	1		DP651450	3
	DP756839	7		DP229559	1		DP571796	1		DP756861	79
	DP756839	76		DP229559	2	Landowner #10	DP1104462	6		DP756861	178
	DP756839	63		DP229560	2		DP1104462	5		DP756861	116
	DP756839	55		DP334225	1		DP1104462	3		DP756861	163
	DP756839	54		DP364283	1		DP1104462	2		DP756861	9
	DP841200	2		DP368317	1		DP1106223	3		DP756861	162
	DP934064	1		DP404379	3		DP404377	1		DP756861	14
	DP934065	4		DP756821	150		DP756820	48		DP756861	116
	DP934066	2		DP756821	65		DP756821	70	Landowner #17	DP1104104	37
	DP934066	1		DP756821	64		DP756821	68		DP756820	181
Landowner #2	DP229550	1		DP756821	83		DP756821	71		DP756820	15
	DP756818	190		DP756828	145		DP756821	144		DP756820	36
	DP756818	156		DP756828	146		DP756821	3		DP756820	12
	DP756818	193		DP756861	166		DP756821	145		DP756820	32
	DP756818	208		DP841200	1		DP756821	69		DP756820	17
	DP756818	207	Landowner #4	DP1047307	2		DP756848	33		DP756820	35
	DP756818	206		DP456670	4		DP756848	55		DP756820	194
	DP756818	192		DP456670	6		DP756848	89		DP756820	34
	DP756818	157		DP456670	3		DP756848	31		DP756820	30
	DP756818	154		DP456670	5		DP756848	80		DP756820	196
	DP756818	191		DP456670	7		DP756848	88		DP756820	16
	DP756818	185		DP756848	32		DP756848	60		DP756820	33
	DP756818	100		DP756848	1		DP756848	20		DP756820	154
	DP756818	158		DP756848	167	Landowner #11	DP14852	3		DP756820	14
	DP756818	205		DP756848	57	Landowner #12	DP801347	2		DP756820	139
	DP756818	159		DP756861	169	Landowner #13	DP229560	1		DP756820	192
	DP756818	155		DP756861	59		DP602318	102		DP756820	195
	DP756839	120				Landowner #14	DP210967	1		DP952162	1
						Landowner #15	DP1106166	1		DP952576	1

Appendix 5 – Photomontage

Detail A (approximate 50mm field of view)

Receptor Location B7 - Springfield Road, view west to south west
Distance to closest turbine 1km

Detail A - Proposed Boco Rock windfarm
Distance to closest turbine 1km
Extract replicating 50mm camera lens field of view

Capital Hill Windfarm (as constructed)
Distance to closest turbine 1km
Single frame with a 50mm camera lens

Proposed Boco Rock windfarm - full rotor swept path (red) at 1km

Existing Capital Hill windfarm - full rotor swept path (blue) at 1km

Detail B (approximate 50mm field of view)

Receptor Location B72 - Ando Road, view south west to north east.
Distance to closest turbine 4.6km

Detail B - Proposed Boco Rock windfarm
Distance to closest turbine 4.6km
Extract replicating 50mm camera lens field of view

Capital Hill Windfarm (as constructed)
Distance to closest turbine 4km
Single frame with a 50mm camera lens

Proposed Boco Rock windfarm - full rotor swept path (red) at 4.6km

Existing Capital Hill windfarm - full rotor swept path (blue) at 4km

Photomontage Bench Mark Test

The Boco Rock Windfarm photomontages have been prepared with the technically advanced computer software program GH Windfarmer, specifically designed for windfarm development.

A bench mark test was also carried out to compare the scale of the proposed wind turbines illustrated in the photomontage against the scale of wind turbines within a constructed windfarm.

The Capital Hill windfarm, located north of Bungendore in NSW, was selected for the bench mark test due to similarities in landform characteristics as well as almost identical tower and rotor dimensions to those proposed at Boco Rock.

The bench mark test, and images as illustrated, demonstrate that the scale of the proposed wind turbines in the photomontage are relative and comparable with those at the existing Capital Hill windfarm.

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BOCO ROCK WINDFARM - SHEET 3

Detail C (approximate 50mm field of view)

Receptor Location B20 - Ando Road, view north east to south
Distance to closest turbine 1.5km

Proposed Boco Rock windfarm - full rotor swept path (red) at 1.5km

Existing Capital Hill windfarm - full rotor swept path (blue) at 1.5km

Detail C - Proposed Boco Rock windfarm
Distance to closest turbine 1.5km
Extract replicating 50mm camera lens field of view

Capital Hill windfarm (as constructed)
Distance to closest turbine 1.5km
Single frame with 50mm camera lens

Detail D (approximate 50mm field of view)

Receptor Location B21 - Ironmungy Road, view north east to south east.
Distance to closest turbine 4.6km

Proposed Boco Rock windfarm - full rotor swept path (red) at 4.5km

Existing Capital Hill windfarm - full rotor swept path (blue) at 4km

Detail D - Proposed Boco Rock windfarm
Distance to closest turbine 4.5km
Extract replicating 50mm camera lens field of view

Capital Hill windfarm (as constructed)
Distance to closest turbine 4km
Single frame with 50mm camera lens

Photomontage Bench Mark Test

The Boco Rock Windfarm photomontages have been prepared with the technically advanced computer software program GH Windfarmer, specifically designed for windfarm development.

A bench mark test was also carried out to compare the scale of the proposed wind turbines illustrated in the photomontage against the scale of wind turbines within a constructed windfarm.

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The bench mark test, and images as illustrated, demonstrate that the scale of the proposed wind turbines in the photomontage are relative and comparable with those at the existing Capital Hill windfarm.

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