

# Summary

## Introduction and Background

This Environmental Assessment supports a Major Project Application lodged under Part 3A of the NSW Environmental Planning and Assessment Act 1979 for the proposed construction and operation of the Flyers Creek Wind Farm to be located in the Central Western Region of New South Wales (NSW). This Environmental Assessment has been prepared for Flyers Creek Wind Farm Pty Ltd by Aurecon. It addresses the NSW Director-General's requirements for preparation of the Environmental Assessment along with matters raised during consultation with relevant stakeholders including Blayney Shire Council and the local community.

The proponent for the project is Flyers Creek Wind Farm Pty Ltd (FCWF) a company formed specifically for this Wind Farm Project. Its parent company, Infigen Energy, has been involved with the planning, construction and operation of other Australian wind farms and sites including: the 140 MW Capital Wind Farm located 30 kilometres northeast of Canberra, the 279 MW Lake Bonney Wind Farm in South Australia and the 89MW Alinta Wind Farm in Western Australia. Infigen Energy is also actively involved with planning and development of a diverse range of additional renewable energy projects and is the largest owner of wind farms in Australia.

The proposed Flyers Creek Wind Farm site is located in Central Western NSW, approximately 20 kilometres south of the regional centre of Orange and about 200 kilometres west of Sydney. It is wholly within the local government area of Blayney Shire. The project spans across 28 privately owned properties (23 for the wind farm site and five associated with the 132 kV transmission line). The properties on which the wind turbines are to be located have been substantially cleared and are predominantly used for pastoral activities.

## Project Objectives and Alternatives Considered


Based on its review of feasible renewable energy options, the proponent has identified wind energy as being the most appropriate, cost effective and commercially viable form of renewable energy generation for the project area. Australian Governments have introduced measures to foster the development of renewable energy projects and reduce Australia's greenhouse gas emissions. The Federal Government's Large Scale Renewable Energy Target (LRET) scheme has been designed, in cooperation with state and territory governments through the Council of Australian Governments (COAG), to increase Australia's electricity supply from renewable sources to over 20% by 2020.

The project began when two local farmers approached the proponent stating that they, along with their neighbours, were interested in evaluating the feasibility of a wind farm being constructed on their properties. After a review of technical, environmental, social and commercial factors relating to the development, it was determined that the Flyers Creek site was the most suitable location in the area. The popularity of the nearby Blayney Wind Farm in the local community provided confidence that the Flyers Creek project would be well received in the district.

A range of design variables has been considered including a variety of layouts, number of turbines, models and connection options. The project layout presented here has been refined to address the results of the comprehensive analysis of wind monitoring data and wind energy modelling together with commercial and environmental considerations and outcomes of community consultation. It is anticipated that the limited environmental impacts of the project will be in accordance with this Environmental Assessment, or in many cases less, due to the conservative nature of the assessment which addresses many 'worst case' scenarios.

## Project Description

The project involves the construction and operation of up to 44 wind turbines each with a typical generation capacity of between 2 and 3 MW (million watts or megawatts). The installed capacity may vary from about 88 to 132 MW depending on the turbine model selected and total number of turbines installed. The GE 2.5xl 2.5MW turbine has been used as the indicative turbine for this Environment Assessment; however, it is possible that another turbine model may be selected for construction.



Associated works include a 33 kV/132 kV substation, access works, temporary and permanent wind monitoring masts, 33 kV underground cables and one or more internal 33 kV overhead lines. A 15 kilometre section of 132 kV transmission line is proposed to connect the wind farm substation to the national electricity grid.

Each wind turbine structure will comprise a three bladed rotor with a diameter between 88 and 112 metres. The turbines will be mounted on towers between 80 metres and 100 metres in height and have a blade tip height of between 124 metres and 150 metres above ground level. The typical rotation speed of the wind turbines will be between 14 to 18 revolutions per minute. Wind turbine operation will commence at a wind speed of 4 metres per second (14.4 kilometres per hour) and cut out at 25 metres per second (90 kilometres per hour).

The turbines and the wind farm substation will be interconnected by a 33 kV electrical collection system. The collection system will mostly involve 33 kV underground cables; however, these will be complemented by 33 kV overhead lines for the connection of the southern turbine groups to the substation and for several sections of the collection system where underground lines would result in greater impacts on the environment. The collected electricity will be increased from 33 kV to 132 kV at the substation for connection to the national electricity grid.

The main components of the proposed wind farm layout, including the locations of the 44 turbines, the substation, access track routes and electrical collection routes together with locations of temporary construction facilities are shown in Figures S1 and S2.

The wind farm spans about 11 kilometres from north to south and about 10 kilometres from east to west. Its northern extent is located about 20 kilometres south of Orange and the southern extent is about 5 kilometres northwest of Carcoar.

Construction works will include:

- the forming of about 37 kilometres of upgraded and new access tracks
- construction of footings for the wind turbines and installation of the wind turbines
- installation of a substation and associated buildings
- trenching for installation of about 33 kilometres of underground cables
- installation of up to four temporary masts and a possible additional permanent wind monitoring mast

The construction phase will be followed by removal of temporary facilities and restoration of the site.

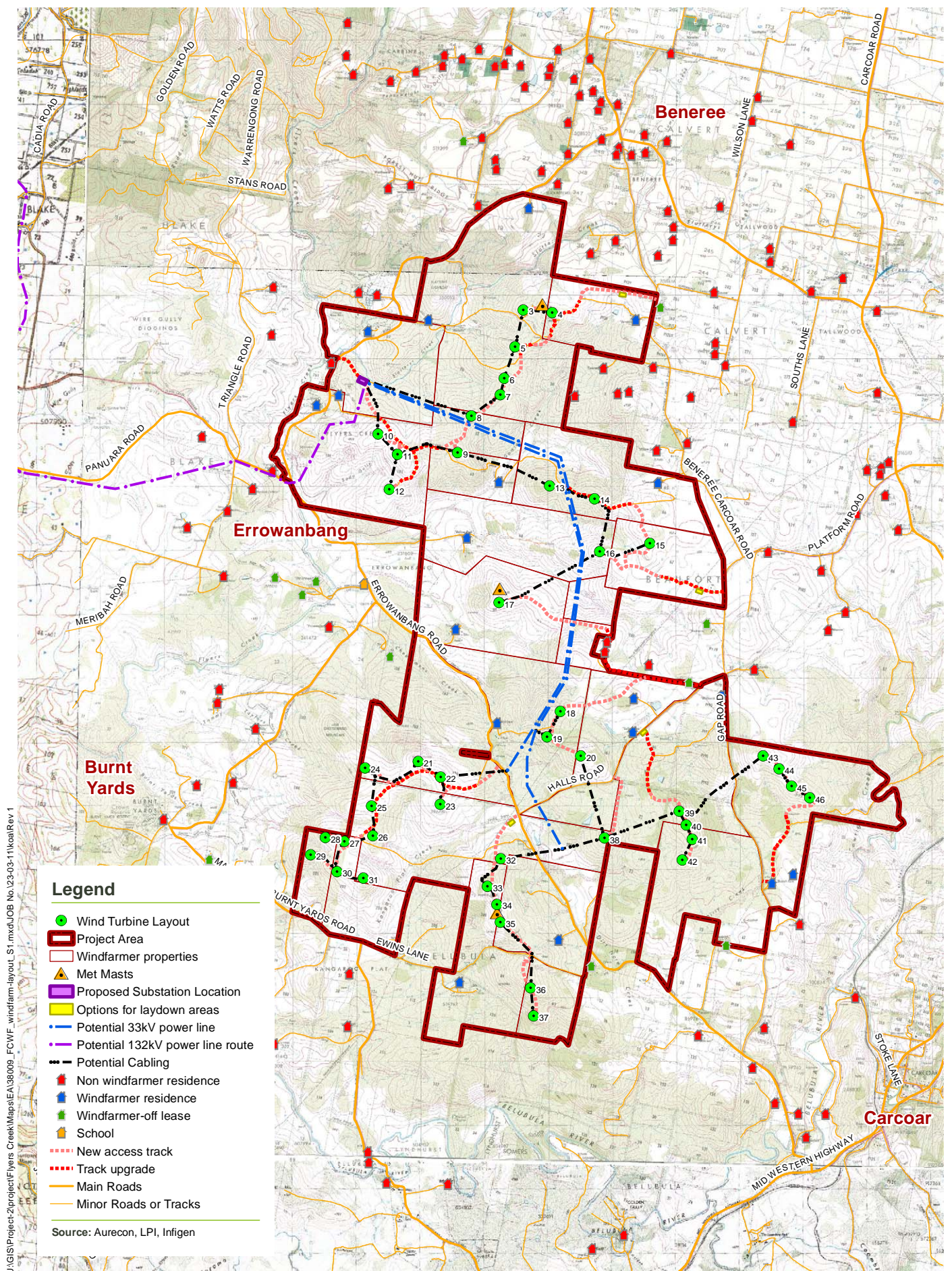
Subject to gaining the necessary approvals and award of contract(s) for the supply and construction of the wind farm, its construction could commence from about mid 2012.

While the wind farm is capable of automatic operation, a small number of permanent operations staff will be employed on site for inspection and maintenance purposes.

The substation and associated facilities and auxiliary services buildings will be located at the north western part of the wind farm. The location is partly determined by its proximity to the existing Country Energy 132 kV transmission line from Orange substation to Cadia Mine where the wind farm connection is proposed to be located. The substation will contain two large 33 kV/132 kV transformers each rated at about 50 to 80 MVA as well as, switchgear and control and communications equipment.

The project locality can be accessed via the Mid Western Highway and local roads within the Blayney Shire. A number of local roads surrounding the site are suitable for gaining access to the site. The optimum transport route options will be further discussed between Blayney Council and the contractor to confirm final routes, but at this stage the proposed access for large vehicles is via Errowanbang Road and Gap Road. This route is the shortest route from the Mid Western Highway and is assessed as being the least impact route for the delivery of large items to the site. On-site access will be by unsealed tracks using upgraded existing tracks wherever suitable and new tracks elsewhere. The access tracks will predominantly be located on the ridges.





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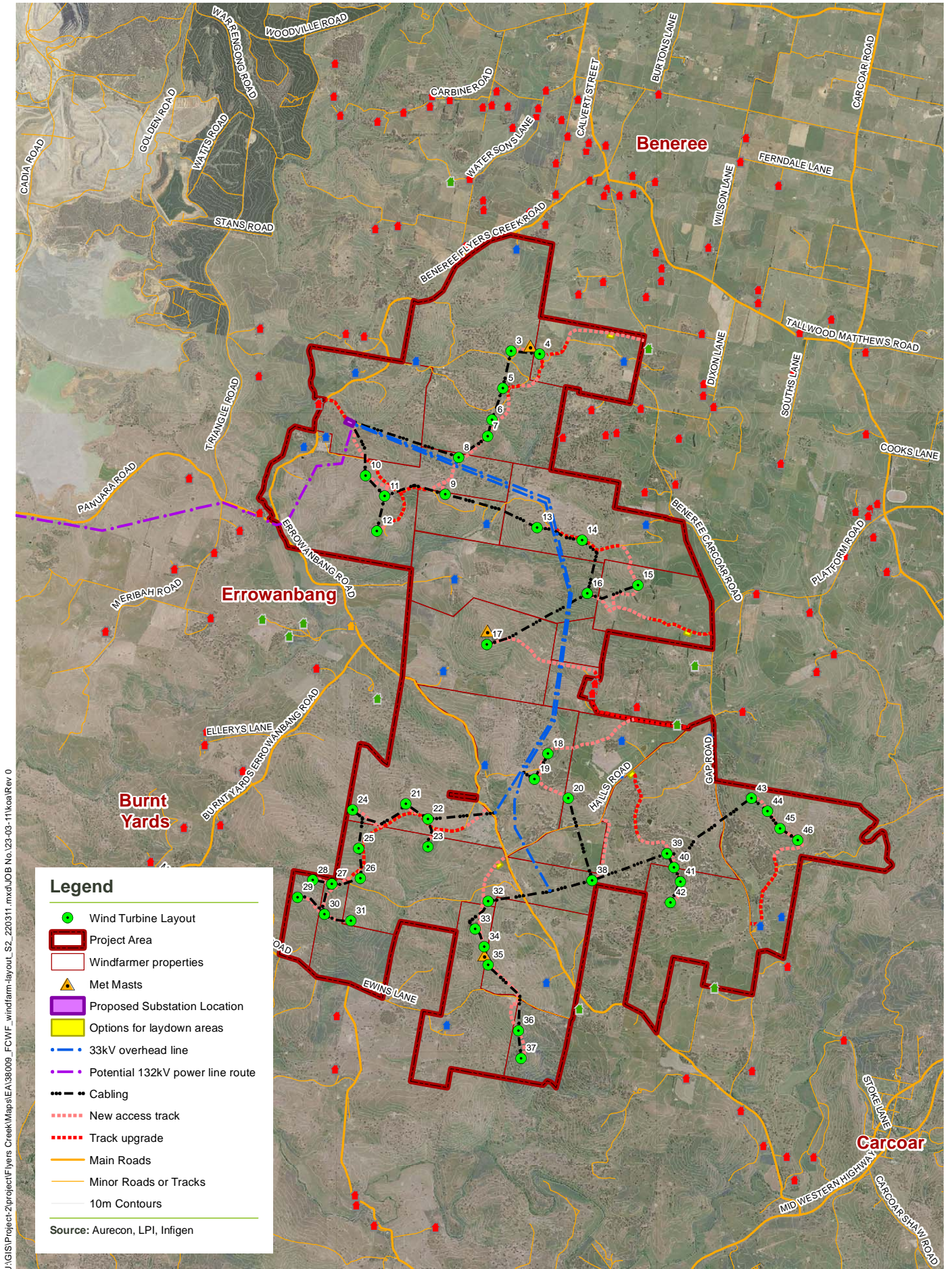
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Projection: GDA 1994 MGA Zone 55

Flyers Creek Wind Farm **Environmental Assessment**

**FIGURE S1:** Wind Farm Layout on mapping





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Flyers Creek Wind Farm **Environmental Assessment**

**FIGURE S2:** Wind Farm Layout on aerial photograph and contours





The construction phase of the project will continue for approximately 18 months and will involve:

- the delivery of equipment and materials to the site
- provision of temporary office, workshop and storage facilities
- earthworks for turbine footings, the substation structures and for access tracks
- erection of up to 44 turbines and the substation structures and associated buildings
- trenching and installation of underground cables
- erection of additional permanent and temporary wind monitoring towers
- grid connection and commissioning of the wind farm
- Site restoration works

A mobile concrete batching plant could be used to produce the concrete required for the project, however at this stage it is considered more likely that concrete would be delivered from Orange or Blayney rather than an on site batching plant. The contractor will need to review the practicality and commercial aspects to determine if an on-site batching plant is warranted, and if so, suitable sites will need to be identified, assessed and any approvals obtained.

The construction phase of the project shall be subject to a Construction Environmental Management Plan (CEMP) that will incorporate controls to address the identified potential environmental impacts of the construction activities.

Once the wind farm has been commissioned it will be able to operate whenever wind speeds allow generation. The operations phase will also be subject to an Operational Environmental Management Plan (OEMP) that will routinely monitor activities of both operations and maintenance.

### Property Description and Local Government

The Flyers Creek Wind Farm will be located on privately owned lands that are used for pastoral purposes. Flyers Creek Wind Farm Pty Ltd (FCWF) has entered into leases with the landowners of the 23 properties within the project boundary on which the wind turbines are to be located.

Within the project area, there are also small areas of land that are associated with other uses, local roads, trig stations, survey stations, a gas pipeline easement, power line easements and a telecommunications facility.


The proposed Flyers Creek Wind Farm, the associated 33 kV/132 kV substation and 132 kV overhead line for grid connection will be located wholly within Blayney Shire Local Government Area (LGA). Blayney Shire Council has responsibility for local roads and representing the interests of its constituent community including those in and around the wind farm site.

The Cabonne Shire is located to the west of the project site and is in close proximity to the route of the 132 kV transmission line, while Orange City LGA is located to the north of the project area and is not directly impacted by the project. The surrounding LGA's may be slightly affected by marginal changes to traffic movements and accommodation of construction staff.

### Planning Context and Approvals

Project approval is being sought for both the construction and operation of the Flyers Creek Wind Farm pursuant to Part 3A of the NSW Environmental Planning & Assessment (EP&A) Act. The approvals process under Part 3A of the EP&A Act requires an Environmental Assessment to support the Major Project Application. The Approval Authority for projects determined under Part 3A is the NSW Minister for Planning. The Minister's delegate, the Director-General of the NSW Department of Planning (DoP) has specified the matters to be dealt with by this Environmental Assessment.

The Flyers Creek Wind Farm will represent an electricity generation station that will be able to generate in excess of 30 MW of electrical power, but as the electricity is generated from wind energy, it will not constitute 'scheduled premises' under the NSW Protection of the Environment Operations Act and will not require an Environment Protection Licence.



The Major Project Application will be assessed by the NSW Department of Planning with referral of specific issues to relevant regulatory agencies undertaken as considered necessary by the Department of Planning to support appropriate assessment. It is expected that the Department of Environment, Climate Change and Water (DECCW) will provide advice on matters including noise, air, water, Aboriginal heritage, flora and fauna, soil conservation and native vegetation aspects.

The Department of Planning will assess the project in relation to planning matters and is likely to also seek advice from Blayney Shire Council with regard to local planning issues. Chapter 5 includes a review of the project planning requirements including consideration of the Blayney Local Environmental Plan and relevant environmental legislation and associated policy and guidelines.

## **Consultation**

Chapter 6 sets out the program of consultation undertaken and proposed for the project. Consultation to date has included numerous individual meetings with neighbours of the wind farm, two community information days held in Tallwood Hall, mail outs to neighbours to the project and various media articles. While there has been broad community support for the Flyers Creek Wind Farm project, a small number of neighbours to the wind farm site have expressed concerns regarding the proposed development. The exhibition of the Environmental Assessment will provide the community with a substantive set of information on the project details including the assessment of potential impacts as well as proposed controls to be incorporated by the proponent. During the exhibition period, the community is able to make submissions to the Department of Planning in respect to the proposal.

## **Existing Environment**

The existing environment relevant to the project is described in Chapter 7, with specific environmental issues addressed in subsequent chapters. Description of the management of specific environmental issues is provided in conjunction with details of the environmental issues and potential impacts.

## **General Setting**

The proposed development is located within the Central West Tablelands of NSW in an inland rural setting that has been substantially cleared and utilised for predominantly pastoral purposes. A few areas of remnant woodland remain and provide an element of visual diversity in the landscape. The development does not preclude the existing land use; on the contrary, the wind farm provides an alternate and incremental source of income for the landowners to enable them to continue to graze stock on their properties even during times of drought or low commodity prices.


The project's elevation ranges from 650 metres (Australian Height Datum) in the south to 950 metres in the north, with valleys and creek lines 200 metres below ridges in some places. The ridges where the wind turbines will be located are between 110 metres to 210 metres above the surrounding valleys and are located entirely within the Belubula River catchment.

## **Weather**

The climate of the Flyers Creek Wind Farm site is typical of inland areas on the Central Western Tablelands with an elevated location on the Great Dividing Range. Rainfall is in the range of 750 mm to 950 mm per year. Mean daily temperatures for Flyers Creek vary from a maximum mean temperature of 26.2 °C for January to a minimum mean temperature of -1.1 °C for July. Snow also occurs occasionally on the higher elevations on parts of the project area, although it does not last long. The site has high average wind speeds with the most prominent direction from the west followed by the north east. Over two years of wind measurements have confirmed that the ridges at the project site have an excellent wind resource and will support an economically viable wind energy project.

## **Geology and mineral prospectivity**

The geology of the project area, the associated mineral resources, geotechnical considerations and earthquake potential for the site have been addressed in Section 7.4. The project area is regarded as



having high mineral prospectivity and as such, extensive exploration drilling has occurred within the project area over many years. The Department of Industry and Investment and relevant mining companies have been consulted regarding potential issues that could arise with regards to mineral exploration and mining operations.

### **Water Resources and Site Drainage**

The water related issues for the project include water usage requirements and potential impacts on waterways and any aquatic ecosystems.

The project will require water during the construction phase for activities such as dust control and plant and equipment wash down. The total water supply required for construction represents a small proportion of the available local water supply and usage and is unlikely to compete with other users of local water supplies. Once operational, the project will require only a small amount of water and it may be able to obtain much of the requirement from roof drainage at the facilities and auxiliary services buildings.

The project area is located wholly within the Belubula River Catchment area which is in turn within the Lachlan River Catchment. The location of the wind farm site is a moderate rainfall area; however, its location on ridges and hilltops means that it is distant from permanent watercourses.

### **Land Uses**

The wind farm site is located on moderate sized rural properties that are predominantly used for sheep and cattle grazing. Each of the properties has extensive clearing and now comprises large areas of mainly exotic grassland, with varying degrees of remnant native woodlands which are generally located in areas away from turbine sites.

All non-windfarmer neighbouring residences are over one kilometre from the nearest wind turbine and the density of rural residential settlement in the surrounding area is mostly low. Neighbouring properties are primarily used for grazing of various types of stock, with or without rural residential use and limited cropping. The wind farm construction does not impact neighbouring properties.

The two existing trig stations within the project area, Calvert and Hopkins Trig Stations, will not be impacted by the construction, and survey operations at those sites are expected to continue without significant impact. An Optus communications facility is also located at the southern end of the wind farm site.


Orange Aerodrome is located approximately 13 kilometres to the north of the site and is the nearest commercial aerodrome to the wind farm site. The proposed wind farm is not near the Aerodrome's Obstacle Limitation Surface, and therefore, does not represent an issue for the Orange Aerodrome as discussed in Chapter 16.

### **Utility Services**

The local area has a network of local roads, overhead power lines and communications infrastructure. A 132 kV Country Energy line runs from the Cadia Mine north-west of the Flyers Creek site to Orange Substation and it is proposed that the wind farm be connected to this line. The wind farm will draw a small amount of power from the grid when not operating. Other than electricity, the main utility service required by the wind farm will be a number of telephone connections to enable the wind farm to be remotely monitored and controlled as necessary.

### **Social Impact**

The Shire of Blayney has a rural population of low density with the majority of the rural activity being sheep and cattle grazing and limited cropping. Mining is also an important contributor to the local economy. The wind farm site is located on moderate sized rural properties which appear to be productive and successful rural businesses. Owners of the farms involved have indicated that income



from the wind farm leases will support maintenance of their farming operations, effectively drought proofing them to some degree.

Over the last few years there has been an increasing awareness in the Australian community of the potential impacts of anthropogenic climate change. The proposal will introduce a second visible renewable energy project into the rural setting, providing a significant stimulus to local employment particularly during construction.

In terms of amenity impacts, a small number of neighbours to the wind farm have expressed concerns in relation to potential noise, visual and property value impacts. The Environmental Assessment provides a detailed review of these aspects. Where possible, the project design has been modified to minimise impacts on neighbours including the deletion of two high producing turbines from the project. The majority of the community that is further distant from the site will essentially be unaffected by the development. The project is unlikely to result in an excessive demand on local resources.

A program of community consultation was initiated including individual consultation meetings with neighbours, information days held in Tallwood Hall and media articles. Issues raised during that consultation have been considered during the project planning and where warranted and practicable, the project has been amended to address specific issues as previously mentioned. Consultation will be continued through the remaining planning and subsequent construction and operational stages.

### **Economic Impact**

The construction of the wind farm will provide significant economic stimulus to the local economy employing local contractors, construction companies and providing increased trade for local industries such as the hospitality industry. Over one hundred people will be employed on site during the busier construction periods. Once operational, the wind farm will provide direct income to landowners where the wind farm is located.

The Flyers Creek Wind Farm contributes to meeting the Commonwealth's mandatory Renewable Energy Target (RET) scheme, which is recognised to comprise mostly wind energy in the short to medium term. Further introduction of Carbon Price mechanisms could also improve the viability of renewable energy generation and its competitiveness with fossil fuelled forms of generation.

### **Visual Issues**


Wind turbines, by their nature, are usually located in elevated exposed positions and as large structures, can be highly visible. The proposed development is no exception in this regard, and the wind turbines will be clearly visible from a range of viewing points.

It is likely that many surrounding viewpoints will only provide partial views of the wind farm with parts of it being concealed by intermediate topography and/or woodland. In general, the moderate size of the properties where the wind farm is located and the low settlement density of some surrounding areas will mean that the bulk of public views of the wind farm will be distant views.

Neighbouring residences will all be at least one kilometre from the nearest turbine, and the majority will be at greater distances. In general, the site exhibits a reasonable degree of relief and its ridges are most prominent from viewpoints to the south in the sparsely populated Belubula Valley. There will be filtered views to the wind farm site from the Mid Western Highway which passes Carcoar about five kilometres south east of the wind farm site.

Fourteen representative viewpoints within the visual catchment were selected to provide realistic representations of the appearance and scale of the wind farm in the landscape to assess the wind farm's visual impact. Photomontages (simulations of the installed wind farm on a panoramic photobase obtained for the respective viewpoints) were prepared for these locations. Viewpoints with direct views to the wind farm were selected in preference to those that had filtered views through vegetation. The photographic simulations (photomontages), along with an analysis of the existing





landscape and the constituent turbines were considered in the assessment of the visual impact. These photomontages, along with the visibility assessment, are provided in Appendix C.

Development of the wind farm will introduce large wind turbine structures to the generally rural landscape that will be a new noticeable element in the existing views. Due to the turbines being located on top of the ridgelines they will have potential to attract attention but they will not obscure views of the existing rural landscape features.

Trees of various heights at residence locations can provide effective visual screening. Where a landowner, within three kilometres of the wind farm site, has expressed an interest in reducing the visual impact of the wind farm, Flyers Creek Wind Farm will offer assistance with tree planting for screening at the neighbouring residence locations. It is recognised that this may not provide an effective strategy for all neighbouring residences depending on the house's position in the landscape and the owner's preferences. Viewers' opinions of the visual impact of the turbines in the landscape will vary widely and will be influenced by subjective factors including their opinion of whether wind turbines are an attractive feature or not.

It is not expected that the wind farm will require lighting for aviation safety purposes. However, if lighting is required by CASA or warranted as the result of a risk analysis, Flyers Creek Wind Farm will install the required lighting. Mitigation measures to minimise the impact of such lighting are discussed in Chapter 9 and Appendix C.

Compared to the wind turbines, the visual impact of ancillary works will be minor and appropriate design and siting will further reduce their impact.

## Flora and Fauna Issues

The wind farm site is located predominantly within cleared grazing land and has been sited to avoid the remnant woodland. The potential ecological impacts of the wind farm development relate to the disturbance during construction and the operational impacts that are predominantly associated with potential for avifauna to strike the rotating turbine blades.

Kevin Mills and Associates (KMA) were engaged to assess the flora and fauna (excluding bat fauna) for the project area while Greg Richards and Associates (GRA) was engaged to assess bat species. Assessments of flora and fauna values of the wind farm site by the relevant specialists and the project's impact on those values are provided in Appendices D and E with key findings summarised in Chapter 10.


KMA's review of the NSW Wildlife Atlas found that no threatened plants have been recorded within 20 kilometres of the project area and none were observed during surveys of the Flyers Creek Wind Farm site. Given the highly disturbed character on the whole area, particularly the ground cover, KMA advised that it seemed unlikely that any such species occurs on the wind farm site.

The Superb Parrot was the only threatened bird species observed during the several periods of bird surveys. Kevin Mills states in his report in Appendix D that,

*"It is concluded that the development of the proposed wind farm, considering all of its components, is not likely to 'adversely affect habitat critical to the survival of a species' (i.e. tree hollows), and therefore it will not have a significant impact on the Superb Parrot."*

Assessment of bat fauna was undertaken with surveys during late 2008 and early 2009 when conditions were suitable for bats to be active at the site. The surveys found only one threatened bat species utilising the site; however, the ecologist concluded that, "no significant impact upon the local population of the Yellow-bellied Sheath-tail Bat was expected due to the small size of remnants, its occasional occurrence and very low activity in the area."

The assessments by the ecologists indicated that the development will not significantly impact on any listed Threatened Species under the NSW Threatened Species Act and that a Species Impact Statement will not be required. Also the development will not significantly impact on matters of national



environmental significance listed under the Environment Protection and Biodiversity Conservation (EPBC) Act. Under those circumstances a referral under the EPBC Act is not required. Nevertheless, the proponent proposes to lodge a referral under the EPBC Act later this year.

## Heritage Issues

The Aboriginal and non-Aboriginal heritage issues have been assessed for the wind farm site and findings of the Aboriginal heritage assessment are presented in Appendix F and findings of the investigations of heritage issues (Aboriginal and non-Aboriginal) are summarised in Chapter 11.

### Aboriginal heritage

Austral Archaeology undertook a desktop search of the NSW DECCW Aboriginal Heritage Information Management System (AHIMS) and a subsequent survey of the project area. Orange Local Aboriginal Land Council and four independent Aboriginal stakeholders participated in the field assessment, completed in October and November 2010.

A search of the National Native Title Tribunal (NNTT) database identified no registered Native Title Holders or Claimants for the project area. The Austral review of the AHIMS database for an area approximately 17km<sup>2</sup> around the proposed wind farm area revealed only two recorded Aboriginal objects and places within this area. While one of these objects was located within the project boundary, it is in a 'corner' of the project well away from any proposed infrastructure or construction activity.

As a result of the field assessment, nine new Aboriginal archaeological sites were identified and recorded in the study area with a total of 32 artefacts. Seven of the sites involved scatters or isolated finds that were of limited extent, 20m<sup>2</sup> or less, and with low to moderate archaeological potential. Two Potential Archaeological Deposits (PADs) were assessed as having an extent of 100m<sup>2</sup> and being of moderate to high archaeological potential and research potential. Apart from the two PADs, further investigation is unlikely to add any significant archaeological data.

The proponent has taken into account the recommendations provided in the Aboriginal heritage assessment and will incorporate mitigation measures to avoid impacting significant Aboriginal sites and items. It is likely that the layout of the proposed wind farm can be slightly modified to avoid disturbing the two high significance PADs, and temporary fencing of these PAD areas will be undertaken during construction. Alternatively, further investigation of the PADs and other sites may be commissioned if disturbance is proposed. Development and implementation of care and control of artefacts strategy shall be agreed and finalised with the Aboriginal stakeholders prior to any archaeological site works commencing.


### Non-Aboriginal heritage

During site reviews, no historic buildings within the project area with potential to be impacted by the project have been identified as having any heritage significance. Few intact historic sites or relics relating to the historic mining activity are indicated to be retained in the precinct. Several items of potential heritage interest have been identified, and are discussed in Chapter 11. But in all cases, the items are considered to be of low heritage significance and are sufficiently separate from areas to be impacted by the wind farm development that they will not be impacted. However, fencing will be installed around any of the items that are less than 100 metres of proposed disturbance.

## Noise Issues

The noise issues associated with the construction and operation of the Flyers Creek Wind Farm have been assessed and reported in Appendices G1 and G2 and key findings are summarised in Chapter 12. For this Environment Assessment, the GE 2.5xl 2.5 MW wind turbine has been used as the indicative wind turbine. The proposed layout for the indicative turbine has been designed to achieve acceptable acoustic impacts at neighbouring residences primarily through ensuring sufficient setback of turbines from nearby residences.





Modelling of the turbine sound power levels and their propagation at the locality has provided predicted wind farm noise levels for all nearby residences. The predicted noise levels derived from the computer modelling were compared with the noise criteria developed from the background monitoring according to the procedure outlined in the South Australian EPA Noise Assessment Guidelines as required by the Director-General's assessment requirements. Two noise models were used for the assessment each including appropriate ground surface and atmospheric factors for noise propagation. As the Concawe noise prediction model was generally providing slightly lower, but very similar, noise level predictions compared to the ISO 9613 model, the more conservative ISO 9613 predictions were utilised in the final analysis.

The ISO 9613 assessment for the 44 turbine array has shown that the wind farm will achieve noise levels that comply with the SA EPA Noise criteria at all neighbouring residence locations for all wind speeds.

### **Traffic and Transport Issues**

The traffic and transport issues relating to the construction and operation of the Flyers Creek Wind Farm have been documented in Chapter 13.

The main issues for traffic management are associated with the construction stage, due to the additional volumes of traffic on local roads and the need to use over-size vehicles to transport the wind farm components. Once the wind farm is operational, there will be a low level of traffic accessing the site mainly comprising a small number of permanent on-site staff and small numbers of intermittent maintenance staff visiting the site for temporary periods.

The delivery of component parts of the wind turbines may be spread over about six months and the movement of these vehicles will be arranged to minimise impact on local communities and road congestion. Up to 4,150 one-way truck movements may be involved in the construction period of the Flyers Creek Wind Farm. In addition, 457 Restricted Access Vehicle (RAV) movements involving either 'over-size' (longer than 19 metres) or 'over-mass' (gross mass in excess of 42.5 tonnes) loads are likely to occur.

The movement of the construction vehicles to the site using public roads will be undertaken in consultation with Blayney Shire Council and the NSW Roads and Traffic Authority. There are RTA approved heavy vehicle routes that can be used for transport to the Flyers Creek Wind Farm site. To minimise disruption and ensure road safety a Traffic Management Plan will be developed in consultation with relevant agencies (RTA, Council and Police) and implemented during the construction phase of the project.


Recommendations with regard to minimising any potential impacts on flora and fauna and indigenous heritage with the proposed routes has been addressed, and will continue to be minimised as documented in the CEMP. At the conclusion of the construction phase, any temporary tracks not required for subsequent operation and maintenance of the wind farm will be restored and revegetated.

### **Telecommunications Interference**

The potential for telecommunications interference associated with the operation of the Flyers Creek Wind Farm has been assessed and documented in Appendix H and summarised in Chapter 14.

The development is located approximately 14 kilometres to the south west of the Orange Aerodrome which does not use instrument landings. Information on the proposal has been provided to Airservices Australia as it has a communications facility on Mt Canobolas, and they have indicated there is no detrimental impact on their communications systems.

Overseas and local experience indicates that radio reception and the audio component of television reception are unlikely to be affected by operating wind farms.



Mobile phone service providers (Optus and Telstra) have been provided with information on the proposal and comments sought. A mobile phone base station facility is located within the southern part of the project area. Mobile phone services are typically focused on the main transport routes such as the Mid Western Highway and transmission of mobile phone signals is not expected to be significantly affected by the operating wind farm as discussed in Appendix H.

Point to point telecommunications services have been reviewed and where necessary, adjustments have been made to the turbine array to provide adequate clearances from link paths as advised by a specialist.

The closest transmitter of television programs is at Mt Canobolas located about 20 kilometres north-west of the wind farm site and about 400 metres above the wind farm site. Due to the proximity of the transmitters to the wind farm locality, the elevation of transmitters and expected relatively strong signal strength for the project locality, the risk of interference will be less than if the wind farm locality were more distant from the transmitter. In addition, analogue TV broadcasts are scheduled to be shut down well before the Flyers Creek wind farm is operational; replaced by digital TV broadcast which is very unlikely to be impacted by the project. In the unlikely event that TV reception impacts do occur at any residence, a suite of measures as outlined in Section 13.6 can be relatively easily implemented to overcome any problems.

## Greenhouse Issues

An assessment of the greenhouse gas emissions for the Flyers Creek Wind Farm project is provided in Chapter 15. Generation of electricity from wind energy results in no greenhouse gas emissions. When the wind farm displaces the burning of fossil fuels to generate electricity, which will be a great majority of the time, the project will result in net greenhouse gas emission savings for electricity generation.

The Greenhouse Gas Emissions Calculation Tool developed by the NSW State Government was used to assess the potential emissions savings. Application of the DECCW NSW wind farm gas savings tool to the proposed wind farm projected savings of approximately 305,000 tonnes of carbon dioxide equivalent per year. This equates to 6.1 million tonnes of abatement over a 20 year period.

In terms of a Life Cycle Analysis for the proposed wind farm, it is noted that while 58,000 tonnes of life cycle carbon dioxide emissions are associated with component manufacturing, transport and construction of the wind farm, this is completely offset within the first three months of wind farm operation. Subsequent operation of the wind farm after 3 months will provide significant net savings in greenhouse gas emissions.

## Safety Issues

A review of potential safety issues associated with the construction and operation of the Flyers Creek Wind Farm is documented in Chapter 16. Issues considered include air safety, physical, electrical and bushfire risk. All of these matters are manageable and controls will be incorporated in the relevant project management plans to ensure safe conduct of the activities arising from the project.

### Air Safety

The wind farm is located approximately 14 kilometres south of Orange Aerodrome. Consultation with the operator (Orange City Council) has confirmed that the turbines will not impinge upon the Obstacle Limitation Surface (OLS) for the aerodrome. The Civil Aviation Safety Authority (CASA) has also been advised of the proposed development and provided with details of the proposed 44 wind turbine structures. Details of wind turbine locations and their height have also been provided to Airservices Australia, Department of Defence and Aerial Agricultural Association of Australia for inclusion in their 'obstacle' databases and relevant maps. The information will be provided to these organisations prior to construction and the "as constructed" details will also be provided once construction approaches completion.





## Physical Safety

A range of design and construction standards apply to the wind turbine structures to ensure that they are soundly constructed and safe. In addition, automated controls are designed to sense defective operation and automatically shut the turbine down for inspection and maintenance. The risk of people or equipment coming into contact with moving turbine blades will be negligible as they are located on private land and clear of public areas where people or vehicles may pass under them and will have a clearance of more than 30 metres above the ground.

## Electrical Safety

There are some 15 standards applicable to electrical systems for the wind farm. All electrical equipment will be designed, installed and operated in accordance with relevant overseas or Australian standards. Additionally, protective equipment will be installed to detect faults and disconnect the faulted equipment from the system. Stringent regulation and compliance requirements are designed to ensure the safety of site staff and the community. The 44 turbines will be linked, by an electrical collection system, including 33 kV underground cables and one or more 33 kV overhead transmission lines, to the wind farm substation.

Wherever electrical equipment operates, electric and magnetic fields (EMFs) are created in the surrounding environment. The EMFs associated with the proposed wind farm will be well within the relevant health standards.

## Bushfire risk management

A bushfire risk management plan will be prepared by the project contractor in consultation with the local Rural Fire Service and Fire and Rescue NSW to ensure the adequacy of the project's bushfire controls during the construction and operations phases. The nature of the fire risk in the pastures that dominate the site will inherently be reduced by grazing and appropriate measures will be included in the site CEMP to protect working areas and control hot work during construction on high fire risk days.

## Shadow Flicker

Shadow Flicker is a visual effect that occurs when rotating turbine blades cause intermittent shadowing as the blades momentarily pass between the sun and the observer. A sophisticated computer modelling of shadow flicker has predicted that no neighbouring residence will experience more than 3 hours of shadow flicker in one year, less than 10% of the 30 hours/year typically viewed as an acceptable threshold.

## Cumulative Impact

The main cumulative impact of multiple wind farm developments for the region is likely to be related to the combined visual impact of the wind farms at locations where more than one wind farm is visible. Flyers Creek Wind Farm is about eight kilometres to the north-west of the existing Blayney Wind Farm which comprises fifteen Vestas 660kW wind turbines. Due to distance, vegetation and/or topographic features, the cumulative visual impact is considered to very minor as discussed in Chapter 17.

Cumulative noise impacts from wind farms are not significant unless residences are within about 3 kilometres of both projects. As the Blayney and Flyers Creek projects are 8km apart, cumulative acoustic impact will not be an issue.

## Project Justification

In summary, the development is justified for the following reasons:

- It utilises a renewable energy resource capable of producing 110 MW of electrical power from 44 turbines based on a 2.5MW turbine model being installed

- It provides additional electrical generation of 342,000 MWh/year to assist the National Electricity Market (NEM) to meet forecast increases in electricity demands. This is enough clean, pollution free electricity to power about 47,000 typical NSW residences.
- It assists in the diversification of energy supply sources for electricity generation
- By displacing generation from fossil fuels it will reduce greenhouse gas emissions from electricity generation of the order of 305,000 tonnes CO<sub>2</sub> per year (equivalent to removing approximately 70,000 cars from Australia's roads); this equates to 6.1 million tonnes reduction in CO<sub>2</sub> over 20 years
- It contributes additional renewable energy generation that serve to fulfil requirements of the mandatory national Renewable Energy Target
- When implemented in accordance with the measures proposed this document, it does not compromise environmental values at the locality including ecological, heritage, soils and water quality. It also does not place any material stress on local community resources.
- The development is located on cleared grazing land and is able to operate compatibly with the existing grazing operations
- It provides additional income to the landowners of the properties on which the wind farm will be located
- The project is likely to provide a significant boost to the local economy, particularly during the construction phase of the project
- There is widespread positive support from the community for wind energy projects, and a majority of the local community has indicated support for the Flyers Creek project at the Community Information Day.
- The project complies with the principles for inter-generational equity by avoiding the use of finite fossil fuel resources and by producing electricity using zero emissions technology

As a significant NSW wind farm development, the project is a worthy environmental initiative and represents an important contribution to future renewable energy generation capability in NSW. Overall, it is considered that any adverse impacts will be relatively minor and will be outweighed by the positive longer term environmental, social and economic benefits of the project.

### Statement of Commitments

The construction and operation of the project will be subject to a range of mitigating measures that are described in the respective sections of the Environmental Assessment. A compilation of the proponent's proposed mitigation measures to be incorporated in the project is provided in Chapter 19 of this Environmental Assessment. The compilation represents the project's Statement of Commitments required as part of the assessment process under Part 3A of the EP&A Act.