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**Flyers Creek Wind Farm
Preliminary Environmental Assessment
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Flyers Creek Wind Farm Pty Ltd

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Contents

Section	Page
1. Introduction	1
1.1 Purpose	1
1.2 Project Overview	1
1.3 Location Details	1
1.4 Proponent Details	2
1.4.1 Flyers Creek Wind Farm Pty Ltd	2
1.4.2 Project contractor	3
1.5 Other Stakeholders	3
1.5.1 Country Energy	4
1.6 Project Timeframe	5
2. Project Description	6
2.1 Wind Farm Details	6
2.2 Transport Options to the Site	7
2.3 Grid Connection Arrangement	8
2.4 Sourcing of Materials During the Construction Phase	9
3. Planning Context	10
3.1 Statutory Planning Requirements	10
3.2 Context for Wind Energy Development	11
4. Environmental Setting	13
5. Key Environmental Issues and Their Management	15
5.1 Project Design and Landuse Issues	15
5.2 Construction Phase	17
5.3 Operational Phase	18
6. Proposed Studies for Environmental Assessment	20

Tables

Table 1.1 – Proponent's other Australian wind farm projects

Table 1.2 – Potential project timeframe

Table 2.1 – Details of grouping of turbines within the project area and naming of the groups

Table 2.2 – Potential access routes to the wind farm site for restricted access vehicles

Table 6.1 – Proposed key assessments to be included in the Environmental Assessment

Figures

- Figure 1 – Locality map
- Figure 2 – Location of wind farm site and zoning under Blayney LEP
- Figure 3 – Property map and location of residences
- Figure 4 – Site map and indicative project layout
- Figure 5 – Aerial photograph of the wind farm site
- Figure 6 – Potential transport routes to the wind farm site
- Figure 7 – Wind turbine generator schematic diagram

Plates

- Cover Plate – View from Panuara Road looking southeast to southern part of the site
- Plate 3.1 – World wind energy total installed capacity
- Plate 4.1 – View to south towards Hopkins Trig Station from the Fern Hill Group
- Plate 4.2 – View to the west from Fern Hill Group toward south western part of wind farm site
- Plate 4.3 – View to the north east from Hopkins Group toward Fern Hill Group
- Plate 4.4 – View to the south within Fern Hill Group
- Plate 4.5 – View to the northwest from Fern Hill Group – Calvert Group in distance
- Plate 4.6 – View to the east to Calvert Group from Cadia Road to the west of the wind farm site

Appendices

- Appendix A – Property details for land on which wind farm would be located

1. Introduction

1.1 Purpose

This document has been prepared to support a Project Application lodged with the NSW Department of Planning under Part 3A of the Environmental Planning and Assessment (EP&A) Act and to seek the Director-General's assessment requirements for the required Environmental Assessment.

The document sets out:

- A summary of project details including the indicative wind farm arrangement based on preliminary project design information
- An outline of potential key environmental issues and impacts arising from the wind farm's construction, operation and decommissioning phases
- An overview of the planning context and approvals review process
- The proponent's proposed approach to the assessment of key potential impacts
- The potential project implementation timeframe

1.2 Project Overview

The proposed Flyers Creek Wind Farm is a moderate scale wind farm development. It will have a generating capacity in the range of 80 to 100 MW produced from around 30 to 40 wind turbines. The turbines will be located in pastoral country along ridges to the east of the Cadia mine site. A 33,000 volt/132,000 volt substation will be installed on the western side of the wind farm. Access to the turbine sites and substation will be via internal tracks created on the private pastoral land on which the wind farm is located. Underground 33,000 volt cables will comprise the electrical collection system to transfer the power generated to the substation and for supply to the turbines when the wind farm is not operating. A limited number of 33,000 volt overhead lines may also be considered for connecting groups of turbines to the substation.

The wind farm will be connected to the electricity grid through an existing 132,000 volt Country Energy transmission line between Orange and the Cadia mine. A new section of 132,000 volt overhead line will be required between the wind farm's substation and the connection point on the Orange to Cadia mine 132,000 volt line. The new line will be of the order of ten kilometres long and involve a double circuit single pole 132,000 volt overhead line. It is also possible that other connection options might arise should the Cadia East mine expansion proceed. Options for the connection arrangement are currently being investigated.

The details of the design of the wind farm and the grid connection are still being developed and will be refined in respect of wind energy resource mapping, technical and practical considerations and identified environmental constraints. Subject to approval being obtained, construction of the wind farm could occur over a period of about twelve months. Additional details of the project description are provided in Section 2.

1.3 Location Details

The Flyers Creek Wind Farm site is located in NSW about 20 kilometres to the south of Orange and about 200 kilometres west of Sydney as shown in Figure 1. The wind farm site is located four kilometres south of the village of Forest Reef and about six kilometres northwest of Carcoar. The Cadia mine property boundary is about two kilometres to the northwest of the project area.

The project site is entirely located within Blayney Shire and classified under the Blayney Shire Local Environment Plan (LEP) as General Rural Zone 1(a) as shown in Figure 2. The wind farm site contains

no environment protection zones. The property details are listed in Appendix A. The extent of the wind farm project area is about twelve kilometres from north to south and about six kilometres east to west. The transmission line easement for grid connection will be entirely, or mostly, within Blayney Shire with the possibility of crossing into Cabonne Shire depending on the route selected.

The turbine sites will be situated along ridges to the south east of the Cadia mine site. Turbine sites are still to be determined and will be dependent on the outcome of wind monitoring results being collected at the site and subsequent wind energy modeling. The proponent expects to have sufficient wind resource data in the first half of 2009 to enable development of a proposed wind farm layout. Prior to the availability of the turbine layout, potential areas for placement of turbines have been identified and investigated by flora and fauna specialists. The indicative areas for turbine placement are shown on Figure 4. The elevations of the turbine sites may vary from about 780 metres to a maximum of 960 metres Australian Height Datum (AHD). Figure 5 provides an aerial photograph of the site and general features.

Areas of Crown Land within the project area include the small areas for the Hopkins Trig Reserve, a mine inspectors reserve and several linear Crown Road Reserves including local public road easements and stock routes. Other features not involving Crown Land are the Calvert Trig Station, an Optus communications tower at the southern end of the site, a natural gas pipeline and several overhead transmission lines that pass through the site.

Figure 3 shows the locations of residences within the project area and surrounding the proposed wind farm. The residences have been identified from a review of available mapping and preliminary site inspections. Residences that are on lands that form part of the project site are referred to as '*windfarmer*' residences while those on properties adjacent to the project site are '*non-windfarmer*' or '*relevant*' residences. Further surveys will be undertaken to verify that all neighbouring (*relevant*) residences have been identified. Neighbouring residences will be assessed in relation to specific environmental impacts such as visual impact, shadow flicker, operational noise levels, and potential for interference to television reception.

1.4 Proponent Details

The proponent for the project is Flyers Creek Wind Farm Pty Ltd which is jointly owned by Babcock and Brown and NP Power Pty Ltd (National Power). Flyers Creek Wind Farm Pty Ltd is a company formed for the explicit purpose of developing the Flyers Creek Wind Farm. A project contractor will be engaged by the proponent in accordance with the project approval conditions and the proponent's statement of commitments to be provided with the Environmental Assessment.

1.4.1 Flyers Creek Wind Farm Pty Ltd

The objective of Flyers Creek Wind Farm Pty Ltd is to develop and operate a commercially viable wind farm project on the proposed site. In carrying out this function, it aims to ensure that the project will:

- (a) Operate efficiently and safely
- (b) Comply with statutory environmental requirements
- (c) Sensitively consider the concerns of the local and indigenous community
- (d) Generate renewable energy that will contribute towards a reduction in Australia's greenhouse gas emissions

The parent companies of Flyers Creek Wind Farm Pty Ltd have been involved with the planning, construction, development and operation of other Australian wind farms and sites as shown in Table 1.1. In fact, Babcock & Brown/Babcock & Brown Wind Partners are the largest owners of wind farms in Australia.

Table 1.1 – Proponent's other Australian wind farm projects

Name of Wind Farm Project	State where Wind Farm is located	Number of Turbines	Total generation capacity (MW)	Status of Development
Alinta	Western Australia	54	89	Operating
Lake Bonney 1	South Australia	46	80	Operating
Lake Bonney 2	South Australia	53	159	Operating
Lake Bonney 2A	South Australia	13	39	Planning
Capital	NSW	67	140	Construction
Glen Innes	NSW	27	80	Planning
Walkaway II	Western Australia	195	400	Planning
Totals		455	987	

Construction of the wind farm projects in Table 1.1 together with the Flyers Creek Wind Farm would contribute a combined Australian renewable energy generation capacity of greater than 1,000 megawatts and would provide significant greenhouse gas emission savings and pollution free electricity to the Australian electricity supply industry.

1.4.2 Project contractor

Flyers Creek Wind Farm Pty Ltd will engage a contractor to supply the required equipment and to construct the Flyers Creek Wind Farm. The contract specification will address the proponent's 'Statement of Commitments' that will be submitted with the Environmental Assessment. If necessary, the Statement of Commitments will be amended to address any project approval conditions applicable in respect of the construction and operation phases of the development. Flyers Creek Wind Farm Pty Ltd will work with the contractor to finalise design elements, complete planning and, subject to obtaining the necessary approvals, to progress the construction, commissioning and operation of the wind farm.

The wind farm equipment suppliers in Australia are familiar with construction environmental issues and have well developed environmental management systems. In selecting the project contractor, Flyers Creek Wind Farm Pty Ltd will review the contractor's prior environmental performance and ensure that the contractor has an effective environmental management system that will ensure that the project's environmental commitments are achieved.

1.5 Other Stakeholders

A range of other stakeholders will also be associated with the development as participant, regulator or a potentially impacted party.

- Landowners of properties on which the wind farm will be located will lease their land to Flyers Creek Wind Farm Pty Ltd for the construction and operation of the wind farm
- Country Energy is the owner and operator of the existing 132,000 volt line that supplies power to the Cadia Hill mine site to the north west of the wind farm site and also has several lower voltage overhead lines within the project area
- The energy produced by the Flyers Creek Wind Farm will be sold within the National Electricity Market
- Department of Planning (DoP) will be the Approval Authority for the project

- Blayney Shire Council has responsibility for local roads and represents the interests of its constituent community including the rural community that surround the site
- There are some rural residences distributed within the pastoral land at and around the wind farm site. While landowners at the wind farm site will benefit from the development, neighbouring residents are likely to have varying views on the acceptability of a proposed wind farm in the vicinity of their land.
- While much of the new 132,000 volt line for grid connection is likely to be within Blayney Shire it is possible that part of the line may be within Cabonne Shire.
- The construction phase will bring a workforce of up to 80 people over a period of about twelve months that will require support services including accommodation that could benefit surrounding commercial centres including the City of Orange and township of Blayney.
- Department of Lands is the custodian of Crown Lands including Trig Reserves and local road reserves
- Optus has a telecommunications tower on the southern part of the wind farm site in proximity to potential turbine sites.
- Telstra has a network of buried phone cables within the project area
- Newcrest Mining owns the nearby Cadia mine site and has mineral exploration licenses over large areas of surrounding land including parts of the wind farm site. The existing 132,000 volt line between Orange and the Cadia mine to which the wind farm would be connected is located on Cadia mine and private freehold land.
- The NSW Department of Primary Industries (DPI) is responsible for the development of NSW mineral resources, State forests and fisheries.
- DPI Fisheries would be consulted with respect to any potential impacts on the Belubula River
- NSW Forestry has a significant area of pine plantation forests to the north west of the site in the vicinity of potential routes for the new 132,000 volt overhead transmission line. Should the proponent decide to pursue transmission options within the plantations, consultation would occur with NSW Forestry including assessing any potential incremental bushfire risk.
- East Australian Pipeline Limited is the operator of the natural gas pipeline that passes through the site from southwest to northeast
- Roads and Traffic Authority has responsibility for vehicular use of main roads within NSW and the movement of oversize and overmass vehicles on main roads.
- Orange City Council is the owner of the Orange Airport located about 13km north of the northern boundary of the project.
- CASA and Airservices Australia regulate and provide services for the aviation industry.
- The Panuara Landcare Group is active in the area with a willow eradication project along Flyers Creek
- The Errowanbang public school is located in a valley to the west of the project area

Connell Wagner has been engaged by Flyers Creek Wind Farm Pty Ltd to coordinate the required environmental impact studies, prepare the Environmental Assessment and assist with consultation and other processes to obtain planning approval for the project.

1.5.1 Country Energy

Country Energy, as the owner and operator of the existing 132,000 volt transmission line to which the wind farm could be connected, will have a key role in specifying the technical requirements for the grid connection. Flyers Creek Wind Farm Pty Ltd, the project contractor and Country Energy will need to work together to reach a suitable connection arrangement that facilitates the wind farm operation while complying with applicable grid connection requirements.

Planning of the wind farm is being conducted in parallel with a connection enquiry and feasibility studies for connection to the existing 132,000 volt transmission line.

The final wind farm grid connection arrangement will be dependent on the wind farm design, outcome of the Connection Study and the proposed construction schedule. The current options being considered are described further in Section 2.

A number of existing minor overhead electricity lines are also evident within the project area and will need to be taken into account by the project design.

1.6 Project Timeframe

Initial planning for the wind farm has identified that a suitable wind resource is potentially available and agreements have been established with landowners on which the wind farm will be located. The actual locations of individual turbines, the substation, tracks and underground cables are still to be determined. The site layout will address a range of environmental, technical and commercial considerations. Technical and commercial details of equipment potentially available will also be sought to confirm the wind farm viability and to confirm the final design.

A Planning Focus Meeting was conducted in mid November 2008 involving representatives of the NSW Department of Planning, Department of Environment and Climate Change, Blayney Shire Council, the Department of Primary Industries (Forestry, Fisheries and Mineral Resources), the Proponent and Connell Wagner. Issues raised during the Planning Focus Meeting have informed the preparation of this Preliminary Environmental Assessment.

It is expected that Director-General's requirements for the Environmental Assessment would be issued in January 2009. Assuming that assessment requirements have been issued in January 2009 and key elements of the project design are consolidated over the following months then an Environmental Assessment could be completed by third Quarter 2009. The proponent's objective is to obtain planning approval in the latter part of 2009.

Construction would follow the granting of the necessary approvals, completion of all the pre-construction commitments and award of the wind farm contract(s). Subject to satisfactory progress of the pre-construction stage and construction works it is anticipated that the wind farm could be commissioned by the end of 2011 as indicated in Table 1.2.

Table 1.2 – Potential project timeframe

Phase	Duration	Approximate Timing
Planning Focus Meeting and Project Application	2 months	Nov/December 2008
D-G's Assessment Requirements issued	1 month	January 2009
Environmental Assessment prepared	6 months	3 rd Quarter 2009
Approval authority review and determination	5 months	Latter half of 2009
Wind farm construction and grid connection	12 months	2010 - 2011
Commissioning	2 - 3 months	2 nd half 2011
Operation	20-25 years	To about 2035
Decommissioning or re-powering	1 year	After 2035

2. Project Description

Agreements have been established between Flyers Creek Wind Farm Pty Ltd and the respective landowners for wind farm planning and development. Currently, a total of 17 properties are involved in the wind farm site as shown in Figure 3. Three 80 metre high meteorological masts with four levels of instrumentation have been established within the project area to obtain detailed data on the wind energy resource at the site. Confirmation of the properties to be involved and provision of access for site investigations has enabled planning studies to be initiated and potential sites to be indicated as discussed in the following sections.

2.1 Wind Farm Details

The proponent is seeking to develop a wind farm comprising around 30 to 40 wind turbines, a substation and about ten kilometres of 132,000 volt overhead line for grid connection. While individual turbine sites have not yet been determined, the potential areas for turbine placement are shown in Figure 4. The wind farm site extends about twelve kilometres from north to south and approximately six kilometres east to west. However, like most wind farms, only 1-3% of the land area is actually directly impacted by the construction or operation of the project.

The potential areas for turbine placement can be grouped into three discrete areas that would be linked by an electrical and controls network. The groups are informally referred to as shown in Table 2.1 below.

Table 2.1 – Details of grouping of turbines within the project area and naming of the groups

Turbine Group	General location within project area	Possible access route
Calvert	Northwestern group Mostly south west of Calvert Trig Station and generally northwest of Gooley Creek	Beneree Flyers Creek Road and Beneree Carcoar Road
Fern Hill	Middle group Central eastern area west of the Beneree to Carcoar Road and north of Fern Hill	Beneree Carcoar Road, Halls Road and Gap Road
Hopkins	Southwestern group Southwest of Errowanbang to Carcoar Road and in the vicinity of Hopkins Trig Station	Errowanbang Road

The informal naming of the turbine groups has been developed for ease of reference and is based on existing names of elevated topographic features within the groups.

The actual locations for the wind turbines will be refined through the assessment process based on the wind monitoring results and wind energy modeling and with adjustments to turbine locations due to identified social, environmental or engineering issues.

Each wind turbine in the array will have a nominal capacity of between 1.8 MW to 3 MW with the total wind farm capacity likely being between 80 MW and 100 MW. The nominal hub height of the turbines will be between 80 and 100 metres and the blade length could be up to 50 metres (ie rotor diameter of up to 100 metres) as shown in Figure 7. The total height of the wind turbines to the blade tip is likely to be in the order of 130 metres but the assessment will utilise a maximum height of up to 150 metres.

The wind turbines will be automated to face into the wind and to start generating once sufficient wind speeds occur, typically above four metres per second (14 km/hour). At wind speeds above

approximately 25 metres per second (90 km/hour) the turbines will automatically shut down to avoid damage to the equipment or unsafe operation.

The individual turbines within the wind farm will be connected electrically by 33,000 volt underground cables to a new 33,000 volt/132,000 volt substation constructed at the wind farm site. It is likely that the substation will be located at the western side of the wind farm and a new 132,000 volt transmission line will connect the wind farm to the existing 132,000 volt transmission line between Orange and the Cadia mine site. A facilities building will also be located within the project area, probably adjacent the sub-station.

Given the distribution of the turbine groups over an area extending about twelve kilometres from north to south, the option to use a limited number of 33,000 volt overhead lines for connection of groups of turbines to the substation will be considered as part of the wind farm assessment and design process. Limited use of overhead lines for connection of groups of turbines to the substation could reduce the amount of earthworks required for the project and may be necessary due to geological constraints. The project area already has several 33,000 volt overhead powerlines running through the site.

On site access tracks will be required to each of the turbine sites, the substation and the facilities building. Preliminary options for access within the project site have been identified but will be subject to further review in terms of practicality, landowner preferences and environmental issues. The suitability and acceptability of these options will be reviewed and adjusted as necessary based on the findings of the environmental assessments and the progress of the wind farm planning studies. It is possible that the final access arrangement will not be confirmed until the project contractor has been appointed.

Initial planning studies conducted so far have included:

- Surveys of native flora and fauna by Kevin Mills and Associates within, and in the vicinity of, the project site (see Section 5.1),
- Monitoring of bat species by Greg Richards and Associates
- Identification of the settlement pattern in the area around the wind farm site.
- Visual assessment has commenced through site observations and collection of photography
- Review of traffic and transport options including desktop review and site inspections in the area around the site

The studies to date have focused on firming up options for the project layout and identifying any project constraints and will be progressed as the layout details are developed. If necessary, the studies may also need to address additional matters arising from the Director-General's requirements.

2.2 Transport Options to the Site

A range of options exist for delivery of component parts and materials to the site. The movement of Restricted Access Vehicles (RAVs), either overmass or oversize, on public roads that could be used to access the site during the construction phase will be a subject of further study for the project. Oversize vehicles may be up to 55 metres long to transport the blades that form the turbine rotors. Components weighing as much as 70 tonnes will also need to be delivered to the site.

Selection of route(s) to be used will depend on the nature of the items being delivered, the source locations for the component items, the part of the site to which the items need to be delivered, individual road design and the preferences and requirements of the Roads and Traffic Authority (RTA), Police and local Councils. Aspects such as road safety and impacts on existing road users will be important transport planning considerations for the proponent and respective regulators.

Initial investigations have identified a number of potentially suitable routes to access the wind farm site. The Mid Western Highway (Bathurst to Cowra) passes within 5 kilometres of the wind farm site and feeds into a number of local roads that could be used to reach the project site. A review of the various roads would be required in respect of their suitability for movement of overmass and oversize vehicles to the site. The access route options that have been identified by the initial review, and which will be assessed in terms of suitability for site access during the construction phase, are shown in Figure 6 and are listed in Table 2.2 below.

Table 2.2 Potential access routes to the wind farm site for restricted access vehicles

Highway and exit point	Local roads and constraints	Part of site accessed
Mid Western Highway via Millthorpe	Millthorpe to Forest Reef and via Beneree Flyers Creek Road and Beneree Carcoar Road	Calvert, Fern Hill and Hopkins Groups
Mid Western Highway via Carcoar	Errowanbang Road	Hopkins and Fern Hill and Calvert Groups
	Errowanbang Road and Gap Road	Fern Hill, Calvert, and Hopkins Groups
Mid Western Highway via Mandurama	Mandurama Burnt Yards Road and Burnt Yards Errowanbang Road.	Hopkins and Fern Hill Groups and possibly Calvert Group
Mid Western Highway via Blayney	Browns Creek Road – road geometry at Browns Creek probably unsuitable	Route may not be suitable for site access
Mitchell Highway and via Orange	Various depending on alignment and structures, site accessed via Forest Road to Beneree Flyers Creek Road and Beneree Carcoar Road or Cadia Road	Calvert, Fern Hill and Hopkins Groups

The suitability of the various options for site access will be assessed as part of the planning studies in consultation with local Councils. The assessment will include review of the suitability of alignment, road widths and constructed structures such as creek crossings and bridges and issues relevant to road safety or impact on other road users. The consultation with local Councils may also need to address minor temporary modifications to road structures or alignments and temporary impacts on local road condition during the construction phase and potential additional maintenance requirements.

A Traffic Management Plan will be developed by the proponent's chosen contractor which will incorporate the results of the consultation process with the RTA and local Councils and will outline the final options chosen for the transport of the wind farm components. It will also address all safety issues associated with light and heavy vehicle access to the site.

2.3 Grid Connection Arrangement

The grid connection arrangement and route for the new 132,000 volt line will be developed based on access to suitable land as well as technical, engineering and environmental considerations. The preferred route option will be chosen to minimize adverse impacts on the environment.

2.4 Sourcing of Materials During the Construction Phase

Gravel supplies: During the construction phase it will be necessary to obtain supplies of gravel for surfacing access roads and as a component of concrete for turbine footings and substation construction works. The source of gravel has not yet been defined but could involve:

- Use of on site borrow pits
- Import of gravel from off site suppliers
- Supply from the Cadia mine site where large amounts of excavated rock are available. Use of rock from the Cadia mine would reduce the need to form quarries on the pastoral land or long distance travel for gravel supplies. Should it be intended to obtain supply gravel from the mine site then the characteristics of the rock would need to be reviewed to ensure that no contamination of the wind farm site occurred.

The impacts of the activities associated with the sourcing of gravel on-site would be addressed by the Environmental Assessment. Any importing of gravel will also need to consider the characteristics of the material and any potential for on-site contamination.

Concrete supply: The supply of concrete for turbine and substation footings could be from Orange or from a temporary batch plant on site. If an on site batch plant was to be used then environmental assessment would also address that activity.

Water supply: The area in which the project is located has experienced severe drought in recent times and the Cadia mine has also required significant water resources for its operations. Sourcing of water for the construction works is an important planning issue but this is only a temporary requirement and with careful planning should be able to be accommodated within the water supply arrangements for the broader region. The Environmental Assessment will identify sources of water that may be considered by the contractor for use during the construction phase.

3. Planning Context

3.1 Statutory Planning Requirements

Development of wind farms in NSW is subject to the Environmental and Planning Assessment (EP&A) Act, its Regulations, various NSW environmental legislation, State Environmental Planning Policies, any relevant Regional Environmental Plans, Local Environmental Plans, the Commonwealth Environmental Protection and Biodiversity Conservation Act and various related planning guidelines some of which are specific to development and assessment of wind farms and transmission lines.

The land on which the wind farm would be located is currently zoned 1(a) General Rural under the Blayney Local Environment Plan (LEP), 2001. The wind farm is not a prohibited development, but does require planning consent.

The new 132,000 volt line required for the grid connection will be entirely, or mostly, within Blayney Shire and could be partly in Cabonne Shire depending on the location of the connection point.

The proponent has received documentation from the Director-General of the NSW Department of Planning (24/10/08) confirming the project is subject to assessment under Part 3A of the EP&A Act. Accordingly, the approval authority will be the Minister for Planning and an Environmental Assessment will need to be prepared and lodged to support the Major Project Application.

The matters to be addressed by the Environmental Assessment are specified by the Director-General of the NSW Department of Planning and are generally referred to as the Director-General's requirements (DGRs). The Planning Focus Meeting assisted in the identification and discussion of potential assessment requirements. In addition to the DGRs, key reference documents setting out planning criteria for wind farm projects, some of which may be referenced by the DGRs, include:

- 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
- Auswind and National Trust - Wind Farm Visual Issues - National Assessment Framework
- South Australian EPA Noise Assessment Guidelines
- EPBC Act Policy Statement 2.3 - Wind Farm Industry, 2008 Guideline

The Environmental Assessment will describe the potential impacts of the project and how they will be managed as well as outlining the alternatives that have been considered in the development of the proposal. A '*Statement of Commitments*' is required to be incorporated in the Environmental Assessment. The Environmental Assessment is likely to be completed prior to finalising equipment specifications and will therefore aim to address the potential impacts based on the consideration of the range of foreseeable equipment options including the worst case parameters for specific design options.

Wind farms do not represent '*scheduled premises*' as defined under the Protection of the Environment Operations Act and accordingly they do not require an Environment Protection Licence for the construction and operation phases.

Any matters of '*National Environmental Significance*' as listed under the Environment Protection and Biodiversity Conservation (EPBC) Act 1999 need to be identified and an assessment made as to the

significance of the project's impacts on these. Specialist advice will be obtained in respect of any such issues.

Consultation will continue to be undertaken with a range of stakeholders, as identified in Section 1.5, including government agencies, neighbours to the wind farm and the broader local community. In particular, the views of local Council will be sought on key issues as well as options for suitable consultation.

3.2 Context for Wind Energy Development

Globally, the wind power industry has been growing at an average annual rate of 28% (IEA, 2006) and is forecast to continue to grow strongly as shown in Plate 3.1. The generation of electricity from wind energy is considered a mature form of power generation with about 93,849 megawatts of installed capacity worldwide at the end of 2007 and about 170,000 megawatts expected by the end of 2010 (World Wind Energy Association, February 2008). On this basis the global installed wind energy generation capacity could double in just four years. The development and integration of advanced technologies into wind turbine designs is enabling the worldwide trend towards the use of larger turbines and the subsequent reduction in wind generation costs.

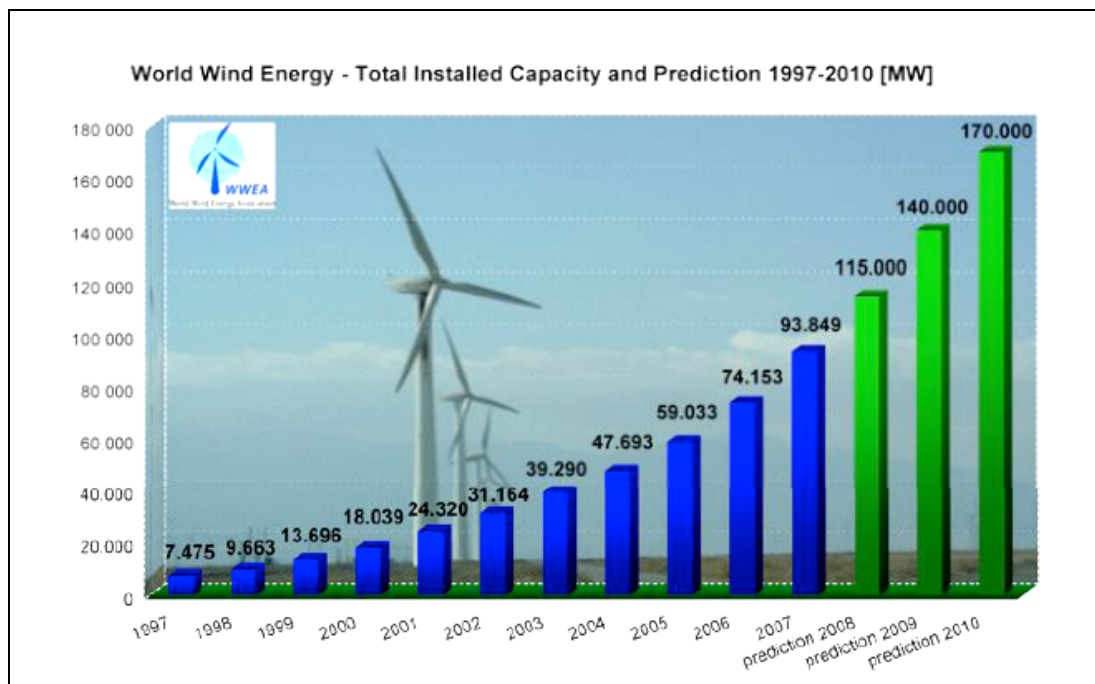


Plate 3.1 World wind energy total installed capacity

Australia has a relatively small proportion (~ 1%) of the installed global wind energy capacity but has experienced a significant expansion of its wind generation capacity over the last decade. A number of wind farm projects have received planning approvals and are potentially able to be developed as conditions permit. Despite this expansion, the overall percentage of electricity produced from wind energy in Australia is much lower than is the case for many other countries.

Australia's recent growth in wind energy developments has been supported by the Federal Government's Mandated Renewable Energy Target (MRET) and is very likely to be given additional impetus by the committed expansion of the MRET measure from 9,500 GWh to 45,000 GWh/year of renewable energy.

The Federal Government's stated commitment to doing its proportionate part to addressing the challenges of anthropogenic climate change has been evidenced by the implementation of a range of mitigation and adaptation responses. Measures such as Australia's signing of the Kyoto Protocol, the promised expansion of the MRET Scheme, the Garnaut review process and the development of a Carbon Pollution Reduction Scheme (CPRS) demonstrate the proposed direction being taken by the Federal Government. While some sectors of the community are indicating a potential reduction in these efforts due to the present issues affecting the global economy, others believe that these initiatives provide new opportunities in expanding markets as well as preparing the Australian economy for a more sustainable future.

Much of the global trend toward implementation of renewable energy development can be attributed to greenhouse gas emission reduction targets in response to growing concerns about the potential for significant and rapid climate change. Complementing this situation is the increased pressure being placed on fossil fuel resources from a growing world population and the corresponding growth in energy consumption and for some less developed countries accelerating growth in energy consumption. The world's current pattern of growth in energy consumption will ultimately lead to higher energy pricing and in some cases supply shortfalls. It appears likely that countries that decrease their future reliance on fossil fuels will be better placed to avoid disruption to their economies and societies.

Based on the above, development of a significant proportion of electricity sourced from renewable energy is a constructive means to mitigate the greenhouse gas emissions from the stationary energy sector which is responsible for the largest part of Australia's emissions and is also a means to diversify our primary energy sources. The development of the Flyers Creek Wind Farm is consistent with the Australian Government's strategy for re-positioning Australia for a more sustainable energy future.

4. Environmental Setting

The site is located in a rural area that has been extensively cleared for grazing as shown in Plates 4.1 to 4.6. Rural residential development is also scattered throughout the locality and the wind farm design will include appropriate distances from turbines to neighbouring residences to ensure compliance with the applicable noise amenity criteria historically being the South Australian EPA environmental noise guidelines. The Cadia mine is widely visible from within the project site and represents a significant modification to the landscape. In addition, various amenity impacts are inevitable from such a large mine including spreading of dust, some noise, and traffic impacts. The large area occupied by the Cadia mine to the west of the site has likely resulted in a low settlement density in that area.

The turbine sites will likely be on the higher elevations along the ridges within the project area. Elevations of the turbine sites will likely vary from around 780 metres to 960 metres (AHD). Most of the ridges have been extensively cleared but some areas proposed for turbine placement do include isolated large mature trees of up to 20 to 25 metres in height. It is expected that spacing of the mature trees is sufficient to allow development of a project design that retains these trees. No intact woodland remnants will be impacted by the project as these will be avoided by turbine sites and associated access tracks and cable routes.

It is expected that the substation will be located at a lower elevation than the wind turbines and will be visible over a lesser area than the wind turbines. Site screening with earth mounds and/or trees can further reduce its visibility. The construction of a new overhead line for grid connection is being considered as an integral part of the project and is to be covered by the Environmental Assessment.

It is noteworthy that the existing Blayney Wind Farm, located approximately ten kilometres south east of the proposed Flyers Creek Wind Farm's southern boundary, is visible in the distance from many areas near and within the project site. Therefore, residents of the Flyers Creek area are well aware, and largely used to, having a wind farm in the district. It is also possible for local residents to visit the Blayney Wind Farm locality and experience the wind farm at close distance under various weather conditions.

The geology of the site is folded volcanic rocks and the ridge areas have varying degrees of rock outcrop and thickness of soil cover. The climate of the site is characterised by annual rainfall of about 790 mm, mean daily temperatures of -1° (minimum) to 26° (maximum). It is noted that climate change predictions indicate future changes from historical weather patterns and a trend towards slightly hotter and drier conditions with more variable conditions being possible during the period of the wind farm operation. Wind modelling results for the locality indicate that a suitable wind energy resource is available to support wind farm development and the existing Blayney Wind Farm is evidence of the potential available within the region.

The widely scattered areas of remnant woodlands and sporadic mature trees present at the locality are typical of the *White Box Yellow Box – Blakelys Red Gum* community that has been listed as an Endangered Ecological Community. A flora and fauna assessment has been initiated to identify the site's ecological sensitivities, any project constraints and, where necessary, potential mitigation measures. Areas of pine forest plantations are also distributed throughout the broader region, particularly to the northwest of the site near the Cadia mine site.

The project area is situated within the Belubula River valley of the Lachlan River catchment. Locally, the site drains to the south to Belubula River which flows into the Lachlan River that is within the upper reaches of the Murray Darling Basin. Based on the nature of the project and controls to be implemented, it is not expected that any of the local watercourses will be significantly impacted by the

development. The Department of Primary Industries (DPI) has advised that below Carcoar, the Belubula River is classified as an Endangered Ecological Community (EEC).

Plate 4.1 – View to the south towards Hopkins Trig Station from the Fern Hill Group	Plate 4.2 – View to the west from Fern Hill Group toward south western part of wind farm site
Plate 4.3 – View to the north east from Hopkins Group toward Fern Hill Group	Plate 4.4 – View to the south within Fern Hill Group
Plate 4.5 – View to the northwest from Fern Hill Group – Calvert Group ridgeline in the distance	Plate 4.6 – View to the east to Calvert Group from Cadia Road to the west of the wind farm site

5. Key Environmental Issues and Their Management

A range of environmental issues will need to be addressed as part of the planning and approvals process for this project. The key environmental issues relating to wind farm projects are well defined and for the Flyers Creek Wind Farm the key anticipated issues are outlined below.

5.1 Project Design and Landuse Issues

The wind farm layout will be developed to maximise utilisation of the available wind resource while being sympathetic to social and environmental constraints. The planning and design stages of the wind farm will address potential environmental impacts such as on flora communities, fauna habitat and heritage aspects along with consideration of the location of neighbouring residences. The number of turbines, their location and positioning relative to neighbouring residences are important considerations for the design. The details of proposed turbine locations are unlikely to be firmed up until about April – May 2009 when sufficient wind monitoring data for array design is available.

It is expected that some adjustment of the turbine locations will occur during the planning and assessment phase in response to findings of the various planning studies and further minor adjustments are possible once the construction contractor is appointed. Access routes will be selected to achieve practical transport routes that minimise disruption to local traffic and on-site environmental impacts. Several transport options have been identified and these will be reviewed in terms of practicality and acceptability to Council and local road users.

The location of the substation and the 132,000 volt overhead transmission line for grid connection will also be an important design consideration and planning of these elements is at an early stage.

Flora and Fauna Issues – Specialists have been engaged to survey the flora and fauna values of the project site at an appropriate time of year and in relation to the preliminary design arrangement for the wind farm development.

Kevin Mills and Associates has undertaken a survey of the project site and is preparing a report on the survey findings. The bulk of the wind farm site has been cleared for pastoral use but small areas of remnant woodland are also present including areas of the Endangered Ecological Community *White Box Yellow Box Blakely's Red Gum community*. Most of the cleared grazing land is represented by exotic pasture with few areas of native grasses remaining. Siting of turbines would need to consider the location of large remnant native trees to eliminate, or at least minimise, any negative impacts.

In addition, survey of avifauna present at the site has identified the presence of the Superb Parrot *Polytelis swainsonii* that is listed as Vulnerable under the NSW Threatened Species Act and the EPBC Act. As the Superb Parrot may use hollows in the large remnant trees this adds further weight to retention of these woodland elements. The Superb Parrot was the sole vulnerable or endangered fauna species sighted during the survey by Kevin Mills and Associates.

Initial monitoring for bat species has been undertaken by Greg Richards and Associates both at ground level and at higher elevations utilising the three monitoring masts however, the results have not been processed at this time. Further monitoring may be undertaken in January/February 2009 depending on the results of the October survey. Additionally, significant assessment of bat species has previously been undertaken for adjacent areas and this data complements the survey being undertaken at the wind farm site.

Visual – The wind farm is located in an elevated position and will be visible to varying degrees from surrounding lands. Parts of the wind farm may also be visible in the distance from parts of small villages around the area. The presence of the Cadia mine to the west of the site means that there is a low settlement density to the west and therefore the visual impact in that area will be low. As the topography falls away to the south towards the Belubula River there are likely to be many locations that will have views of at least part of the wind farm however, this area has a low density of rural residential settlement. Carcoar is located to the southeast of the wind farm site but is in a valley and topography will effectively shield views of the wind farm.

Due to the nature of the landform at the locality and the elevated plateau to the north and east there will be varying degrees of visibility of the wind farm from the north and east of the wind farm site. The visual impact for neighbours is expected to be greater in the area immediately to the east of the site where the land is elevated, close to the wind farm site and has some aspects facing the wind farm site. Residences in this situation will need to be reviewed to describe the impact.

Visual impact can be a key issue for neighbours to wind farm developments and a comprehensive visual assessment will be undertaken including landscape assessment, view field analysis, preparation of photomontages from various public view points and a review of options for mitigation of the visual impacts. The public view points for the photomontages will be selected from a variety of directions and distances to provide stakeholders with images that are representative of the wind farm's visual impact. Issues of shadow flicker and blade glint will also be addressed and if required, aircraft safety lighting.

Noise – Once the wind farm is operational the main potential for noise impact will relate to noise arising from the operating turbines or from the transformer(s) at the substation facility. The wind farm design will include sufficient distance between turbines and neighbouring residences to ensure compliance with all relevant noise amenity criteria. A specialist will assess the acoustic environment within the vicinity of the site through monitoring of background levels and modelling of potential acoustic impacts for neighbouring residences. The assessment will be undertaken in accordance with the South Australian EPA's Noise Assessment Guideline for Wind Energy Facilities unless otherwise notified by the NSW Department of Planning. Noise management plans to address potential impacts will be developed and implemented for the construction and operations phases.

Telecommunications – An assessment of local telecommunications services with potential to experience interference arising from the wind farm operation will be undertaken. At residences surrounding the wind farm the potential for interference to television reception will be assessed and where necessary, mitigation measures identified. Point to Point communications services that pass through the wind farm site will also be identified to allow consideration of turbine siting in respect to the interference zones for these services. Based on the assessment of the potential impacts management measures will be developed and incorporated in the Environmental Assessment.

Aircraft Safety – Being tall structures, wind turbines are assessed for the potential to present a risk to aircraft. The Orange airport is located close to Orange at a distance from the site where no significant impact on existing aircraft operations is expected. Consultation has occurred, and will continue, with Orange City Council officers in this regard.

The assessment will include consultation with the Civil Aviation Safety Authority (CASA) including a review of the potential need for lighting of selected turbines. Air Services Australia, the Defence Department and the Aerial Agricultural Association of Australia will also be informed of the project details.

Pastoral land use: The project is unlikely to materially affect the pastoral use of the lands within the project site or on neighbouring lands. Some temporary impact may occur for the properties on which the wind farm will be located during the construction phase. Once operational the wind farm and its

ancillary facilities will only occupy a very small part of the subject lands. The landowners will take these matters into account as part of the lease agreements with the proponent. Where landowners have residences close to the wind turbine sites, the noise impact may exceed the amenity criteria normally applied for neighbouring residential locations. If such a case arises, further agreements would be established between the proponent and any affected wind farmer landowners in respect of the nature of the impact.

Rural Neighbours: Wind farm developments are of benefit to the landowners where the wind farm is located but can raise concern amongst neighbours to the wind farm. Neighbours' concerns generally relate to a perception of a potentially negative impact while not receiving any benefit from the development. The proponent's primary design consideration in this instance is to locate the turbines relative to neighbouring residences to try to reduce any potential adverse impacts to the neighbour's amenity. Visual and noise amenity issues can be important issues for neighbours and some may have concern with respect to potential for adverse impact on land values. These matters will be dealt with as part of the Environmental Assessment.

Mining: The Cadia mine, located northwest of the project site, represents a large scale mining development that produces a significant mineral output--primarily gold. A major mine expansion, known as Cadia East, is also under active consideration on their existing lands. The mine is understood to have conducted mineral exploration across a variety of areas in the region including some areas of the wind farm site to explore for future underground mining potential. This issue will be dealt with by ongoing consultation with Cadia mine management and the Mineral Resources division of the Department of Primary Industries and will be discussed in the Environment Assessment.

5.2 Construction Phase

The construction phase may extend over about 12 months and will involve:

- Transport of equipment and materials to site
- Daily movement of a small work force between the site and surrounding towns potentially including, Orange, Blayney, Carcoar, Millthorpe and Mandurama
- Earthworks for access tracks, turbine footings, underground cables and the substation site
- Erection of turbines and substation structures and construction of a facilities building
- Electrical connections within the wind farm
- Construction of about 10 kilometres of new overhead transmission line for grid connection
- Commissioning of the wind farm
- Rehabilitation of any disturbed areas of land

The transport of materials and equipment to site during the construction phase will involve a temporary increase in the local traffic volume. Vehicles accessing the site will include some 'over-size' (up to 55 metres in length) and 'over-mass' vehicles (up to 70 tonnes). Preliminary indications are that a number of possible routes could be used to access the site (Section 2.2). The Environmental Assessment will include a review of the suitability of roads that can potentially be used to access the site and potential impacts on road safety and local traffic movements identified. Where necessary, mitigation measures will be proposed for the project and suitable measures will be incorporated within a traffic management plan. Drafting of this plan will be undertaken in consultation with local Councils.

Initial site works will include establishment of a temporary construction site office, preparation of access tracks to turbine sites, excavation of footings for turbines and trenching for underground cables. Most of the turbine sites are within cleared pastoral land predominately consisting of exotic pasture. As discussed previously, the proposed wind farm layout will seek to minimise impact on remnant native vegetation and avoid significant habitat. A flora and fauna assessment has been

undertaken to identify site sensitivities and to identify and develop potential mitigation measures to manage the project's impacts.

Potential for soil erosion and dust generation during earthworks will be assessed and measures identified to mitigate such impacts. Earthworks also have potential to disturb surface or shallow sub-surface heritage items, if such items exist. Accordingly, an assessment of indigenous and non-indigenous heritage values of the site will be undertaken by a specialist in conjunction with relevant stakeholders. Where potential impacts are identified, management measures will be developed to address the potential impacts.

Noise impacts can be associated with the construction phase arising from transport of materials and equipment to site, site earthworks, excavation of turbine footings, erection of the turbines, and construction of the substation and 132,000 volt overhead line. Environmental noise controls will be incorporated in the construction environmental management plan and will include adoption of specific working hours and use of noise compliant equipment. A complaints line and complaints handling system will be implemented for the project.

Site restoration following construction works will focus on revegetation of disturbed ground, reduction of weed development and control of any erosion and sedimentation.

Construction will be undertaken in accordance with an environmental management plan and monitoring of performance will be routinely undertaken.

Construction contractors will, in consultation with the Rural Fire Service, implement fire prevention procedures during the wind farm construction phase. Fire fighting equipment will be located on site and all site vehicles will have diesel engines. Construction activities will be modified to suit any fire bans.

5.3 Operational Phase

Once constructed and commissioned, the wind farm will operate for a period of about 25 years. A regular inspection and routine maintenance program will be an integral part of the wind farm operation with any repairs undertaken as required. The operation of the wind farm may have various potential impacts including those described under Section 5.1 relating to the project's operation. In addition, the following potential impacts will be addressed in the environment assessment:

Blade-strike: Blade-strike can affect avifauna species and specialist advice will be sought in relation to the potential significance of the issue at the site. The flora and fauna assessment for the site will identify species present that could be impacted, their site utilisation and qualitative risk of blade strike. The initial survey work has identified the presence of the Superb parrot *Polytelis swainsonii* which was noted to be flying between ground height and the height of the canopies of the mature remnant native trees that can be up to 20- 25 metres high. This aspect will be subject to review as part of the assessment by Kevin Mills and Associates (KMA). Preliminary bat monitoring has also been undertaken by Greg Richards and Associates (GRA) for three meteorological mast locations within the project area and the data is still to be analysed. There is additional bat monitoring data from surrounding areas including the Cadia mine site and the Blayney Wind Farm site that should enable confident assessment of the species present in the area. Consideration will also be given to the potential for the reported phenomenon of bat fatalities caused by passage close to rotating turbine blades but not involving direct blade strike.

Based on the assessments by KMA and GRA, mitigation measures will be developed and adopted for the project, if necessary.

Water Quality: The operation of the wind farm does not require any significant quantity of water. Spill containment will be provided at locations where oil is present to prevent oil reaching watercourses should the equipment's normal containment leak or be subject to damage by an electrical surge. The 33,000 volt/132,000 volt transformer(s) within the substation may contain up to 40,000 litres of oil while the smaller turbine generator transformers, one at each turbine site, may be oil filled or dry. Where oil filled the turbine generator transformers would only hold about 2,000 litres of insulating oil and would incorporate containment in the event that the equipment leaked.

Bush Fire: The wind farm operator will maintain a limited fire fighting capability on site to control small grass fires and to assist fire authorities to control any larger fires that may occur on the site. All site vehicles will have diesel engines and will use the site access roads so as to minimise the likelihood of igniting dry grass.

On very rare occasions it is possible that equipment malfunctions could cause a fire on site. Agreed procedures for liaison with fire fighting authorities will be developed to address the possibility of a bushfire occurring on site.

6. Proposed Studies for Environmental Assessment

It is proposed that the Environmental Assessment will provide a comprehensive assessment of relevant environmental issues. It will address the Director-General's requirements and is expected to include the key specialist assessments as shown in Table 6.1.

Table 6.1 – Proposed key assessments to be included in the Environmental Assessment

Issue	Scope of Assessment
Visual	<p>A comprehensive visual impact assessment will be undertaken incorporating landscape analysis, view field identification, provision of photomontages at representative public viewpoints surrounding the wind farm. A visual impact assessment of the closest relevant residences will also be undertaken and potential mitigation measures will also be identified.</p> <p>Issues of shadow flicker and glint will also be assessed and documented in the Environmental Assessment</p>
Noise	<p>A comprehensive Noise Assessment will be undertaken in accordance with the South Australian EPA's Noise Assessment Guidelines. This will include conducting background noise monitoring at representative locations, development of noise amenity criteria based on the background monitoring, conduct of noise modelling to identify predicted noise levels at sensitive receivers and preparation of a comprehensive noise assessment report.</p>
Flora and Fauna	<p>An assessment of vegetation of the site with a focus on native vegetation, particularly those species having conservation significance is in progress. 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 be proposed subject to agreement with relevant regulators and the necessary mitigation measures being incorporated in the project. Assessment of relevant bird species will be undertaken to identify potential impact for at risk species.</p>
Bat Fauna	<p>An assessment of bat species and habitat at the site is being undertaken and an assessment report will be incorporated in the Environmental Assessment. The report will include recommendations for mitigation of potential impacts identified in the report, if necessary.</p>
Archaeological	<p>A heritage assessment will be undertaken by a suitable specialist in conjunction with representatives of one or more indigenous stakeholder groups</p>
Telecommunications	<p>An assessment of services potentially impacted by the project will be undertaken and any required mitigation measures identified in the Environmental Assessment</p>

Issue	Scope of Assessment
Geology, mineral resources, soils and geotechnical information	<p>Information covering these aspects will be compiled and incorporated in the Environmental Assessment. Mitigation measures relating to soil and water management will also be identified and will be included in the Construction Environmental Management Plan to be prepared prior to construction.</p> <p>The mineral resource potential of the site will be discussed with Newcrest Mining, any other relevant holders of exploration licences for the project site, and the DPI to discuss any potential issues that may need to be addressed during project planning.</p>
Water supply and site drainage	<p>The project's requirements for water will be assessed for the construction and operations stages. In addition potential for the project to impact on drainage systems at or surrounding the site will be assessed and where necessary, mitigation options will be identified.</p>
Traffic and transport assessment	<p>A comprehensive traffic and transport assessment will be made of the suitability of local roads with respect to both construction and operation. Particular attention will be directed to consideration of the impacts associated with over-size and over-mass vehicles accessing the site during the construction phase. Each of the potential options for site access will be reviewed in terms of suitability and in conjunction with local Councils. Measures to mitigate the potential traffic impacts will be incorporated in the Environmental Assessment.</p>
Air safety, bushfire risk, catchment issues, community consultation, etc.	<p>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 outcomes will be incorporated in the Environmental Assessment.</p>
Statement of Commitments	<p>The Environmental Assessment will include a Statement of Commitments that compiles the proponent's mitigation measures for the project.</p>

Appendix A – Flyers Creek Wind Farm Site – Property owners and land holding details

Landowners	Crown Plan	DP No.	Lot No.'s
A		DP550053	6
		DP1063204	12
	CP-5258	DP750358	76
	CP-4613	DP750358	53
	CP-4611	DP750358	50
B		DP1067009	427
	CP-4863	DP750358	163
	CP-1961	DP750358	108
	CP-4867	DP750359	202
	CP-4874	DP750359	204
C	CP-4861	DP750358	161
D		DP749105	533
		DP1071270	1
E	CP-5019	DP750367	41
	CP-3803	DP750367	28
F	CP-4881	DP750358	67
G	CP-4500	DP750358	63
H	CP-4499	DP750358	62
	CP-4912	DP750358	181
	CP-4911	DP750358	180
	CP-4690	DP750358	10
I	CP-4882	DP750358	68
J		DP396680	1
		DP1079963	1
K	CP-4876	DP750359	206
		DP519767	2
	CP-1823	DP750359	120
		DP519767	1
	CP-1823	DP750359	84
L	CP-4862	DP750358	162
M	CP-4883	DP750358	69
N		DP1031238	5
		DP1031238	6
O		DP750358	7
		DP750358	65
		DP750358	66
P		DP750358	52
		DP750358	8
Q		DP750359	83
Piggery	Excluded	DP1067009	425
		DP1067009	426
		DP41965	328
Substation (33kV/132kV)	Substation location to be confirmed		
132 kV Transmission line	About 10 kilometres overhead line, route to be confirmed		