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Monteath & Powys Pty Ltd

SURVEYING, PLANNING, ENGINEERING DESIGN, PROJECT MANAGEMENT

ENVIRONMENTAL ASSESSMENT

Capital II Wind Farm
Bungendore

Volume 1 of 2: Environmental Assessment

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AER	Australian Energy Regulator
AFG	Aboriginal Focus Group
AHIMS	Aboriginal Heritage Information Management System
AIS	Aeronautical Information Service
ANZECC	Australia and New Zealand Environment and Conservation Council
AHD	Australian Height Datum
AS	Australian Standard
BCA	Building Code of Australia
BPA	Bushfire Protection Assessment
PC	Palerang Council
CASA	Civil Aviation Safety Authority
CIS	Community Information Session
CEMP	Construction and Environmental Management Plan
CNMP	Construction Noise Management Plan
CTMP	Construction Traffic Management Plan
CLM Act	*Contaminated Land Management Act 1997*
CAA	Controlled Activity Approval
CWFI	Capital Wind Farm
CWFII	Capital II Wind Farm
The Proponent	Capital II Wind Farm Pty Ltd
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DEHWA	Department of Environment, Heritage, Water and the Arts
DII	Department of Industry and Investment
DoP	Department of Planning
DPI	Department of Primary Industries
DGRs	Director-General's Requirements
ESD	Ecologically Sustainable Development
EEC	Endangered Ecological Community
EPL	Environment Protection Licence
EA	Environmental Assessment
ECRTN	Environmental Criteria for Road Traffic Noise
ENM	Environmental Noise Model
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPI	Environmental Planning Instrument
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
ERA	Environmental Risk Analysis
ESCP	Erosion and Sediment Control Plan
Ha	Hectares
HIS	Heritage Impact Statement
Km	Kilometres (1,000 metres)
Km^2	Square kilometre (1,000 hectares)
Kv	Kilovolts (1,000 volts)
LCU	Landscape Character Units

LEP	Local Environmental Plan
LGA	Local Government Area
m	Metres
m/s	Metres per second
MW	Megawatt
MWh	Megawatt hour
Minister	Minister for Planning
NEM	National Electricity Market
NES	National Environmental Significance
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
NW Act	*Noxious Weeds Act 1993*
The Strategy	NSW State Infrastructure Strategy
NSW State Plan	NSW State Plan, a New Direction for NSW
PAD	Potential Archaeological Deposit
PCR	Preliminary Contamination Report
PEA	Preliminary Environmental Assessment
PFM	Planning Focus Meeting
PHA	Preliminary Hazard Assessment
PSNL	Project Specific Noise Levels
RAAF	Royal Australian Air Force
RAP	Remedial Action Plan
REP	Renewable Energy Precinct
REPAC	Renewable Energy Precinct Advisory Committee
RET	Renewable Energy Target
Roads Act	*Roads Act 1993*
ROTAP	Rare or Threatened Australian Plant
RTA	Roads and Traffic Authority
RTA Guide	RTA Guide to Traffic Generating Development
RCM	Rural Capability Map
RFS	Rural Fire Service
s	Seconds
SPL	Sound Power Level
SCLP	Stakeholder and Community Liaison Plan
SEPPs	State Environmental Planning Policies
SEPP Infrastructure	State Environmental Planning Policy (Infrastructure) 2007
SEPP Major Development	State Environmental Planning Policy (Major Development) 2005
SEPP Rural Lands	State Environmental Planning Policy (Rural Lands) 2009
SEPP 33	State Environmental Planning Policy 33 – Hazardous and Offensive Development
SEPP 44	State Environmental Planning Policy 44 – Koala Habitat Protection
SEPP 55	State Environmental Planning Policy 55 – Remediation of Land
SOC	Statement of Commitments
SWMP	Surface Water Management Plan
POEO Act	*Protection of the Environment Operations Act 1997*
TS Act	*Threatened Species Act*

TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
WMP	Waste Management Plan
Water Act	*Water Act 1912*
WHO	World Health Organisation
WM Act	*Water Management Act 2000*
WQCP	Water Quality Control Ponds
WTG	Wind Turbine Generator

CERTIFICATION

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PROJECT:	Environmental Assessment for Capital II Wind Farm, Bungendore in the Palerang Shire Local Government Area
CLIENT:	Infigen Energy
OUR REFERENCE:	10/096
REV / DATE:	8 December 2010
AUTHOR:	Stuart Greville BEnvSci, MURP, CPP
CERTIFICATION:	I certify that this Environmental Assessment has been prepared in accordance with the requirements of Part 3A of the *Environmental Planning and Assessment Act 1979* and in accordance with the Director-General's Requirements issued for MP10_0135 on 3 September 2010. I certify that to the best of my knowledge, the information contained in this assessment is neither false nor misleading.
SIGNATURE:	
CHECKED BY:	Stephen Barr B. Surv. MPlan. CPP, Registered Surveyor
SIGNATURE:	

I. EXECUTIVE SUMMARY

ES1: INTRODUCTION

This Environmental Assessment (EA) has been prepared in accordance with the Director-General's Requirements (DGR's) issued by the NSW Department of Planning (DOP) for the Project to support a Major Projects Application pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979 (EP&A Act).* The Project application seeks consent for two possible layouts to construct and operate a wind farm (a power station that generates electricity from wind energy) (hereafter referred to as the Project) comprising the erection of up to 55 wind turbines (of which only one layout would be constructed) and associated infrastructure. The Project is to be located in the Southern Tablelands near Bungendore, NSW. The Project can be found adjacent to the operational Capital Wind Farm (CWFI) and is known as Capital II Wind Farm (CWFII).

This EA has been prepared by Monteath and Powys on behalf of Capital II Wind Farm Pty Ltd (the Proponent), an Australian developer and operator of renewable energy assets.

ES2: BACKGROUND

The Project is adjacent to the existing CWFI, approved by the Minister for Planning (Minister) on 7 November 2006. Project Approval for CWFI was for 63 x 2.1 megawatt (MW) wind turbine generators (WTGs) and associated infrastructure. Subsequent to the Project Approval being issued, five separate modifications to the approved project were submitted to the Department of Planning (DOP). The final Approved Project incorporated:-

> *The construction and operation of a wind farm comprising 67 x 2.1 megawatt wind turbine generators, an electrical substation to facilitate connection to an existing TransGrid 330,000 volt transmission line, a facilities building, temporary and permanent wind monitoring towers, underground cables, a 12 kilometre internal overhead power line, and access tracks and works.*

Construction of CWFI commenced in early 2008, with the wind farm becoming fully operational in October 2009 and was officially opened by former Prime Minister Kevin Rudd on 18 November 2009. The total installed capacity is 140.7 MW, generated from 67 Suzlon S88 2.1 MW WTGs. CWFI has since been registered (8 July 2009) as an Accredited Renewable Power Station (WD00NS06) by the Australian Government Office of the Renewable Energy Regulator.

Capital II Wind Farm Pty Ltd is wholly owned by Infigen Energy, a specialist renewable energy business that owns and operates wind farms in Australia, the US, Germany and France. In Australia, Infigen Energy owns the Alinta Wind Farm (89 MW) in Western Australia, Lake Bonney Wind Farm (280 MW) in South Australia, in addition to the Capital Wind Farm (140 MW).

Figure 1: Capital Wind Farm - Commenced operation in October 2009

ES3: SITE DESCRIPTION

The Project can be found near the village of Bungendore, New South Wales in the Local Government Area of Palerang Council. The site is located about 10 kilometres (kms) north of Bungendore and 30 kms east of Canberra on the ridges of the Great Dividing Range to the east of Lake George. The subject site for CWFII is in close proximity to CWFI and the approved Woodlawn Wind Farm to the east. All three wind farms are designed to utilise parts of the existing infrastructure constructed as part of CWFI, including the operational substation.

Figure 2: Typical landscape of the Capital Wind Farm

The wind turbines and associated infrastructure will be spread over open farming country that has been extensively cleared, allowing for optimum spacing of wind turbines. There are minimal obstructions in the landscape as the land is predominantly used for grazing and some cropping.

The Proponent has secured the necessary lease agreements, licenses or easements over the affected properties for the purpose of construction and operation of the Project.

ES4: PROJECT DESCRIPTION

The wind farm will be dispersed over an area of about 50 square kilometres (km^2) however the actual area occupied by the wind turbine equipment is about 47 hectares (ha) (or less than 1%), for the turbine footings and construction assembly areas. A range of design variables has been considered during the planning of the Project including a variety of wind farm layouts. The Project application is for two separate layouts, of which only one will be constructed. The final design will be confirmed following assessment of the final energy studies and site conditions and in accordance with the project approval conditions. For the purpose of the EA, the highest impact scenario has been assessed. However it is anticipated that the impacts of the final design will be in accordance with this EA, or more than likely be less, due to the conservative nature of the assessment.

The Project involves the installation and operation of up to 55 WTGs each with a capacity of up to 3 MW. Two separate layouts have been prepared in order to achieve the required capacity (100MW), only one of which will be constructed. Layout A will have the potential to create the highest impact due to the greater number of WTGs, conversely a reduced layout proposing only 31 WTGs has been prepared.

Notwithstanding, due to ongoing wind monitoring and unknown construction constraints, the final location and number of WTGs may be altered. The intent of the Project is to optimise the existing wind resource. To do this, minor variations to the final locations to reduce wake disturbance may be required, however these minor variations will be limited to 100m from the original proposed location.

The main components of the wind farm will involve the installation and construction of the following:-

- Up to 55 WTGs including:-
  Wind turbines
  - Nacelles
  - Blades
  - Towers
  - Concrete foundations

- Potential for up to 55 kiosk transformers with individual concrete pad adjacent to the WTGs;

- Up to three permanent meteorological monitoring masts;

- The forming of about 20kms of access tracks;

- Crane hardstand areas adjacent to the WTGs;

- Staging areas for partial assembly of WTG components;
- Trenching for installation of about 20kms of underground cables;
- Up to a 10 km section of internal overhead transmission line including an easement for electricity (30m);
- Sub-surface optic fibre cables laid along the same alignment as the access roads and underground electrical cabling;
- Minor upgrades to existing transformer, control room and 33,000 volt switchyard at the existing substation; and
- Operation and maintenance building.

In addition to the above permanent works, the following temporary and ancillary works will be undertaken:

- Delivery of infrastructure, equipment and material;
- Up to two concrete batching plants;
- Earthworks associated with the gravel pit/s;
- Laydown areas;
- Construction site office;
- Staff lunch rooms and facilities;
- Up to three meteorological monitoring masts; and
- Testing and commissioning of the WTGs.

Each WTG comprises a three bladed rotor with a diameter of up to 114 metres (m) mounted on a 100m steel tower. The top of the blade sweep will be up to 157m above ground level. The WTGs will be mounted on a reinforced concrete footing measuring about 18m by 18m and up to 3m thick. A transformer will be located near the base of each tower on a separate foundation to raise the output voltage to 33,000 volts.

The WTGs will be linked by underground cables and an overhead transmission line to an existing substation (part of CWFI) where the output voltage will be raised from 33,000 volts to 330,000 volts for connection to the existing electricity grid.

The construction stage of the Project is estimated to be between 12 and 18 months and will involve:-

- The delivery of equipment and materials to the site;
- Provision of temporary office and batch plant facilities;
- Earthworks for turbine footings and access tracks;
- Erection of 55 WTGs;
- Trenching and installation of underground cables; and
- Construction of a 10 km overhead transmission line.

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

ES6: PLANNING FRAMEWORK

The Project is being undertaken pursuant to Part 3A of the NSW *Environmental Planning and Assessment Act 1979 (EP&A Act).*

Additionally, the Project represents development that is considered essential to the State. Accordingly, the Project has been declared to be '*critical infrastructure'* under Section 75C of the *EP&A Act.* This is due to the Project proposing to generate more than 30 MW from a renewable fuel source, in this instance, wind energy (the Project proposes to generate approximately 100 MW (peak) from wind energy). The Approval Authority for Part 3A projects, including critical infrastructure, is the NSW Minister for Planning (Minister).

A wind farm is a permissible land use within the 1(a) General Rural Zone pursuant to the Mulwaree Local Environmental Plan 1995 (Mulwaree LEP).

ES7: KEY ENVIRONMENTAL ISSUES

The Preliminary Environmental Assessment (PEA) and an Environmental Risk Analysis (ERA) undertaken for the Project, as well as the DGRs issued by the NSW Department of Planning, have identified a number of key environmental issues for the Project as detailed below:-

- Visual impact
- Noise impact
- Flora and Fauna
- Indigenous Heritage
- Traffic and Transport
- Hazards/Risks
- Water Quality and Hydrology

Other environmental issues have also been assessed in this report including Land Use, Waste Management, Flooding, and Water Supply.

A summary of these issues is provided below:-

VISUAL

The surrounding area is dominated by rural holdings used for cropping and grazing. The broader landscape within the locality is characterised by a mosaic of open agricultural land with patches of forest and woodland including riparian vegetation.

The visual landscape in the study area has already been substantially modified as the majority of the site has been cleared and only small pockets of native woodlands remain.

A comprehensive visual impact assessment (VIA) has been undertaken (**Appendix A**) that incorporates elements of landscape analysis, identification of the visual catchment and preparation of a series of photomontages.

Wind turbines are large structures that are generally located in exposed and elevated positions. A viewpoint analysis was undertaken at 18 locations within the locality. Of these, 15 were assessed as having a low visual impact. Three have been assessed as having a moderate visual impact and none were assessed as having a high visual impact.

It was found that the Project would result in some impacts on the existing surrounding environment in terms of landscape and scenic values. The visual impacts would vary depending on the viewing location, with the visual impact reducing with distance despite it being visible. The development of the wind farm has considered a range of aspects to mitigate the visual impact and where, practicable, measures have been incorporated into the design. Where buildings and infrastructure are visible, landscaping and materials treatment may help soften any potential visual impact.

The assessment concluded that there were no areas where the Project would create unacceptable visual impacts. Visual impacts from the surrounding areas are expected to be low, and while there would be visibility from publicly accessible areas, the overall impact has been found to be acceptable.

NOISE

Advances in the technology of wind turbine rotor blades and generators in recent years have significantly reduced their noise emissions. The sound emitted by wind turbines is mainly of an aerodynamic nature due to the rotor blades moving through the air.

The noise issues associated with the construction and operation of the Project have been assessed and documented in **Appendix C** and are summarised in **Chapter 8**. The noise assessment included long term background monitoring data before the CWFI commenced operation and assessed the predicted results against the acceptable noise levels outlined in the South Australia Environment Protection Authority (SAEPA) Environmental Noise Guidelines for wind farms and the World Health Organisation's (WHO) Guidelines for Community Noise.

The surrounding residents and greater community have experienced the noise generated from a wind farm for almost 12 months. By demonstrating that the proposed wind turbines will for the most part be located a greater distance away from the nearest residences (relevant receivers), it is expected that there will be no noticeable increase in the volume of noise generated from the site.

The Project is adjacent to the existing CWFI and therefore the cumulative noise impact of both wind farms was investigated. It was found that the cumulative impact of CWFI and the Project met the selected criteria where the Project WTGs are dominant.

FLORA AND FAUNA

The majority of the study area supports cleared open paddocks predominantly used for grazing. There is minimal native vegetation remaining and the study area is for the most part cleared and covered with a mixture of native and introduced grasses.

The potential impacts of the proposed wind farm relate to site disturbance during construction, and once operational, the potential for blade strike by birds or bats.

An assessment of the flora and fauna values present at the site and of the Project's impacts on those values are provided in **Appendix D** and a specialist consultant prepared a report assessing the impact of the Project on bat fauna (**Appendix E**).

It was determined that the Project is unlikely to impose a 'significant impact' on local populations of threatened species, endangered communities or their habitats as listed under the *Threatened Species Act 1995 (TS Act)* on the basis that the proposed works are limited to disturbing only a minor portion of the site.
At most, there are occasional visits by woodland birds and bats, although there is no breeding or special habitat for such species on the Project site.

The potential to impact upon matters of national environmental significance listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Comm.) *(EPBC Act)* has also been assessed. The assessment concluded that the impact of constructing the Project is not likely to be significant therefore referral to the Commonwealth Minister for the Environment for assessment and approval is not warranted.

INDIGENOUS HERITAGE

An Aboriginal Archaeological and Cultural Heritage Assessment was completed in accordance with the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DECCW 2005) and is provided in **Appendix F**.

An extensive site survey was undertaken over 10 days where ground surface visibility was excellent. As a result of the survey, 63 new sites and two Potential Archaeological Deposits (PAD) were recorded with a total of 213 artefacts.

Discussions with Aboriginal stakeholders has revealed a strong attachment to the area and identified that nearly all archaeological sites are highly significant as reminders of the Aboriginal presence and connection to the land.

The potential impacts of the proposed CWFII on indigenous heritage have been considered at the early stages of the Project, including during development of the concept design for the Project. A number of changes were made to the site layout and design during the concept design phase to minimise the potential impact of the Project on indigenous heritage. Due to the limited disturbance it is concluded that the risk of residual impacts to Indigenous heritage from the Project would be very low.

TRAFFIC AND TRANSPORT

The traffic and transport issues related to the construction and operation of the proposed CWFII have been assessed and documented in **Appendix G** and are summarised in **Chapter 11**.

The primary impact of the Project on local roads will be during the construction phase, this is mainly due to the additional volume of traffic on the normally lightly used local roads and the need to use over-size and over-mass vehicles. It is unlikely that there will be noticeable increase in traffic volumes during the operation of the Project given the workforce is likely to be no more than 10 employees.

The construction phase of the Project involves the transport of a considerable quantity of components and materials to the site, including over-size and over-mass vehicles that may create disruption to local traffic at times.

To minimise disruption and ensure road safety a Traffic and Access Management Plan (TAMP) will be developed and implemented during the construction phase of the Project.

The Project is likely to have a lesser impact than during the construction of CWFI as there are at least 12 fewer wind turbines proposed for the Project. History has shown that the traffic volume and movements generated during the construction of a wind farm can be accommodated without significant disturbance to the community and local road users.

The transport routes utilised during the transport of components to the site of CWFI were proven to be capable of accommodating over-size and over-mass vehicles.

Once on-site, the extension to the existing access tracks will be used wherever possible and these will be designed in accordance with the sedimentation requirements for the Project outlined in the Construction Environmental Management Plan (CEMP).

TELECOMMUNICATIONS

As part of the environmental assessment, the potential for disruption to radio communications and broadcasting in the Project site area was assessed (**Appendix H).** All radio communication services within at least 50km of the Project site were identified to determine if any of the wind turbines could obstruct line-of-site paths or have any likely detrimental effect on these services.

The assessment recommended acceptable clearance distances between point to point microwave links and buffer zones from radio sites. Where necessary, the preliminary Project layouts were modified to ensure the acceptable horizontal and vertical clearance distances were maintained and the integrity of those services preserved.

The assessment considered the potential for interference of television and radio signals and indicated that some residences may be affected however it is the analogue television reception which is the most vulnerable. Given the analogue television signal in this area will cease transmission by June 2012, any remedial action necessary for interference to analogue television reception should focus on a digital solution where possible.

AVIATION SAFETY

The Project is more than 30kms from the closest airfield using instrument landings. The risk of airborne collision presented by the Project is considered minimal since the majority of the proposed turbines will be located on the lower slopes below the ridges and hills where the wind turbines in CWFI are found. The blade tip height of all of the proposed wind turbines will be below those of the wind turbines in CWFI.

In this regard, AirServices Australia (AirServices) consider the wind farm structures as being obstacles that are shielded by the existing CWFI and therefore, do not require marking or night lighting as they should not impose any additional restrictions to aircraft operations.

The Civil Aviation Safety Authority (CASA) and the Royal Australian Air Force (RAAF) Aeronautical Information Service (AIS) will be notified of the final location of the WTGs, therefore pilots will be aware of the Project site and be able to make suitable adjustments to flight paths if necessary.

ES8: CUMULATIVE IMPACT

The Project will be located at a site that comprises cleared grazing land and which is regarded as suitable for wind farm development, and continued grazing. The development of CWFI has proven that wind farms can co-exist with traditional farming activities with little effect.

The development of CWFII adjacent to CWFI is anticipated to successfully assimilate into the landscape without impact to the established land use and surrounding environment.

ES8: PROJECT JUSTIFICATION

In summary, the Project is justified for the following reasons:-

- It utilises renewable energy with a peak generating capacity of approximately 100 MW of electrical power;
- It provides additional generating plant to assist the National Electricity Market (NEM) to be able to meet forecasted demands;
- By displacing generation from fossil fuels it can deliver net savings in the emissions of greenhouse gases in the order of 315,000 tonnes per year and up to 7.8 million tonnes over the expected life of the Project;
- It contributes to the Federal Government's Renewable Energy Target Scheme (RET);
- It contributes to achieving the NSW Government's priority to tackle climate change by assisting in the reduction of greenhouse gas emissions;

- When implemented in accordance with the environmental management controls identified in this document, it does not compromise environmental values at the locality, including ecological, heritage, soils and water quality;

- 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 small but significant boost to the local economy, particularly associated with the construction phase of the Project;

- It is a commercially viable development that capitalises on a proved wind energy resource; and

- The Project complies with the principles of ecologically sustainable development; including inter-generational equity and the precautionary principle.

The Project supports the State Government's renewable energy policies and directly assists the Federal Government's renewable energy target of 20% of Australia's energy being sourced from renewable energy sources by 2020. By supplying a clean and renewable source of energy, the Project will help reduce Australia's greenhouse gas emissions and assists in addressing the potential impacts of climate change.

ES9: STATEMENT OF COMMITMENTS

The mitigating measures that are proposed for the Project have been identified throughout the relevant Chapters of the EA and Appendices. A compilation of the mitigation measures is provided in Chapter 17 of the EA and represents the Project's Statement of Commitments (SOCs) as required for assessment under Part 3A of the *EP&A Act*. A CEMP and an Operational Environmental Management Plan (OEMP) will incorporate the SOCs.

ES10: CONCLUSION

This EA has been prepared in accordance with the DGRs issued for the Project. The Project is being undertaken pursuant to Part 3A of the *EP&A Act.* It is a permissible land use within the 1(a) General Rural Zone pursuant to the Mulwaree LEP. The Project meets the requirements of the relevant legislation and does not raise any issues that conflict with any Commonwealth, State or local planning policies. The implementation of appropriate mitigation measures identified within this report would minimise any potential environmental impact of the Project.

Overall, it is considered once the mitigation measures have been applied that any adverse impacts will be of a minor nature and outweighed by the positive longer term environmental, social and commercial benefits of the project.

The public benefits in terms of generation of renewable energy and reduction of greenhouse gas emissions far outweigh any private dis-benefits either to the local community or specific landowners.

1. INTRODUCTION

This Environmental Assessment (EA) has been prepared by Monteath and Powys on behalf of Capital Wind Farm 2 Pty Ltd (CWFII) to support a Project Application to the New South Wales (NSW) Department of Planning (DOP) for a wind farm with a peak generating capacity of approximately 100 megawatt (MW) near the village of Bungendore. The Project is adjacent to the existing Capital Wind Farm (CWFI) that was approved under Part 3A of the *Environmental Planning and Assessment Act 1979 (EP&A Act)* in November 2006 and has been operating since October 2009.

The Project has been declared a Major Project under Part 3A of the *EP&A Act* and is classified as a Critical Infrastructure Project. This EA:-

- Addresses the specific requirements prescribed by the Director-General of the NSW Department of Planning in September 2010;
- Details the strategic planning context for the Project;
- Reviews the potential impacts from the Project; and
- Outlines the recommended mitigation measures to reduce any potential environmental impact.

This Chapter provides the introduction and background to the EA and includes a description of where each of the Director-General's Requirements (DGRs) are addressed in the EA.

1.1 BACKGROUND

With an increased focus on sustainability, renewable energy is now an essential and growing component of low emission energy generation. Capital Wind Farm 2 Pty Ltd (the Proponent) is a subsidiary of Infigen Energy, a specialist renewable energy business that owns and operates the Capital Wind Farm and four other wind farms in Australia, in addition to wind farms in Germany and the USA.

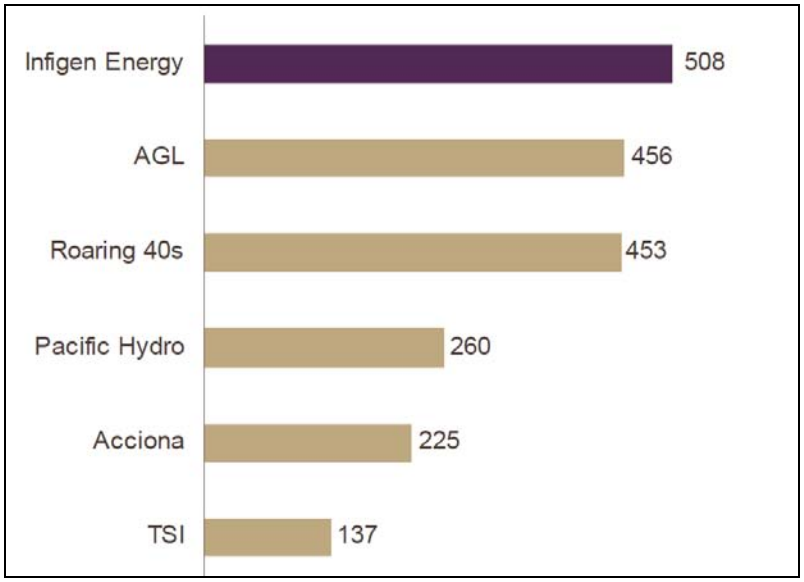

Figure 3: Top six Australian wind farm owners by total capacity (MW) (Clean Energy Council/Infigen Energy)

CWFI was commissioned late in 2009 and the generated output from the wind farm is contracted to supply Sydney Water's desalination plant. CWFI covers more than 35km^2 and comprises 67 wind turbines with a total installed capacity of 140.7 MW. This level of renewable energy generation represents a saving of around 450,000 tonnes of greenhouse gases per year, equivalent to removing over 88,000 cars from Australian roads each year.

CWFI has provided local employment opportunities and attractive rental income for the landowners aligned with the wind farm. CWFI employed over 120 people during the construction phase and employs a further 10 people for ongoing operations and maintenance.

Existing infrastructure installed as part of the CWFI, including a substation and access roads have the capacity to service additional wind turbines. The area has also proven to provide an excellent wind resource. Accordingly, installation of CWFII was proposed to capitalise on the existing infrastructure and proven wind resource.

1.2 LOCATION OF THE PROJECT

The site of the proposed facility is located near the township of Bungendore, east of the Australian Capital Territory. The Project is adjacent to the operational CWFI which was selected due to its close proximity to the existing electricity transmission network and the excellent wind resource (high average annual wind speeds) generated by the hills and ridges of the Great Dividing Range.

Further information regarding the location of the Project is contained in Chapter 2.

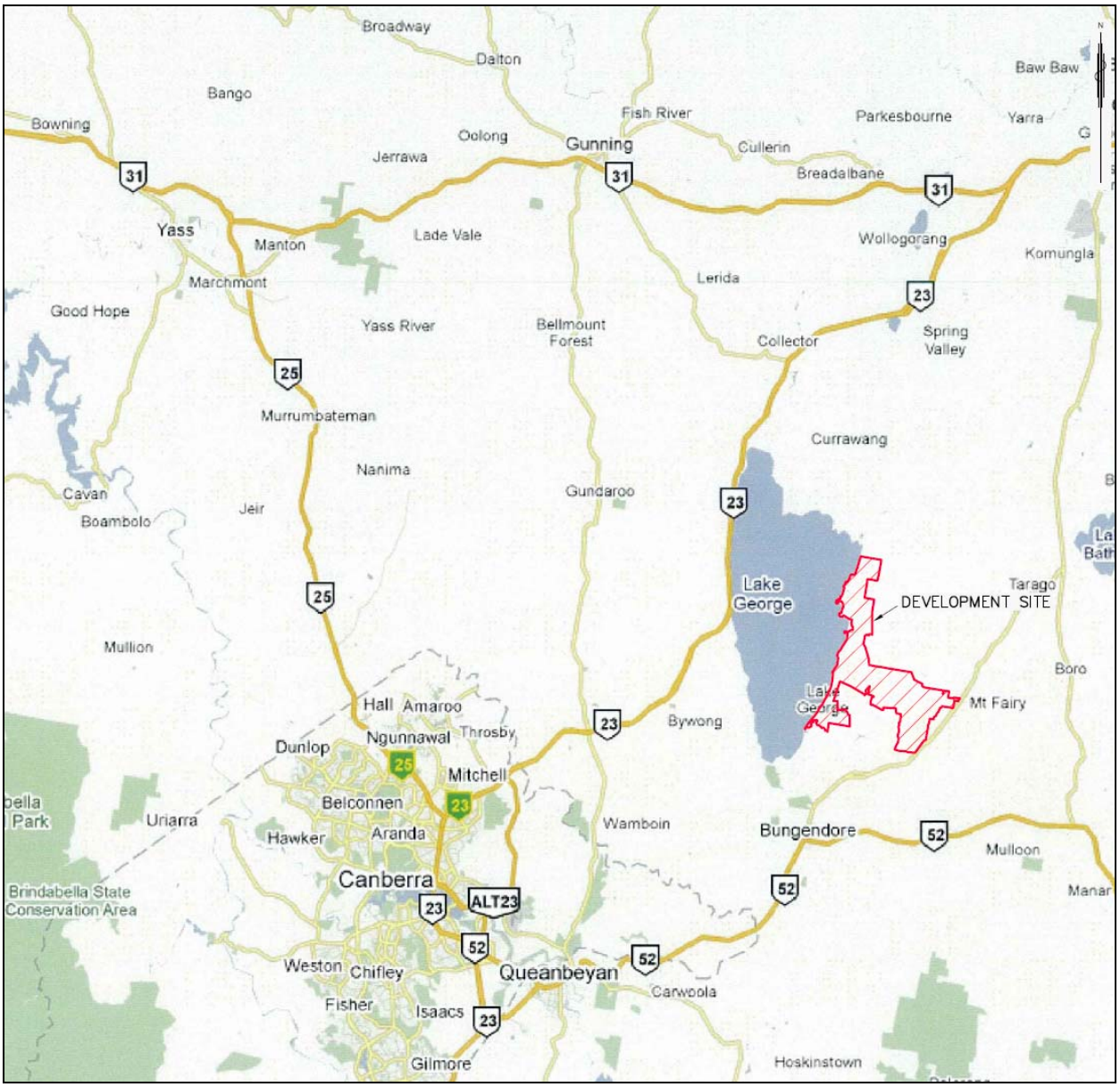

Figure 4: Site location plan

1.3 OVERVIEW OF PROJECT

The proposed Project is a result of the proven renewable energy generating capacity of the wind resource in the area, the existing agreements with property owners and the demonstrated minimal environmental impact created by the construction and operation of the CWFI.

The Project objective is for a wind farm with a peak generating capacity of approximately 100 MW of electricity per annum generated from wind energy which can power up to 42,000 homes or take around 63,000 cars off the road. As part of the design process numerous options have been considered with a final layout (micro-siting of all Project components) yet to be confirmed.

The Project application proposes two unique layouts that differ as a result of the final type of wind turbine model that may be installed. Following extensive site constraint investigations, the proposed layouts of both options have been situated to ensure any potential impact of the Project will be minimised.

This EA has considered the wind farm layout proposing 55 WTGs as being the layout with potentially the greatest environmental impact. As such, the focus of the site investigations has been based on this layout as being the 'highest impact scenario'. Therefore any reduction in the number of WTGs and associated infrastructure is likely to reduce the potential impact of the final Project.

Primarily due to the access to the existing resources, the installation of additional WTGs to integrate and utilise the existing infrastructure was considered to be a more sustainable outcome when compared to establishing a new wind farm where access to the necessary infrastructure may not be readily available.

The site and surrounding road network has already been augmented to accommodate the traffic associated with the construction of a wind farm. Due to the extensive public consultation process and commitment by CWFI and the Proponent to support the community, the installation of additional WTGs is expected to have a minimal social impact. This is partly due to the positive community response during the construction phase and continuing operation of CWFI.

Further information regarding the components of the Project is contained in Chapter 3.

1.4 CAPITAL WIND FARM

Project Approval was issued for CWFI on 7 November 2006 for the construction and operation of 63 x 2.1 MW WTGs and associated infrastructure. Further approval was issued for five subsequent modifications with the final project being for 67 x 2.1 MW WTGs. Following an 18 month construction program, the Capital Wind Farm became operational in October 2009.

The wind farm generates around 450,000 megawatt hours (MWh) of renewable energy each year, which is equivalent to satisfying the energy needs of approximately 60,000 homes. This level of renewable energy generation represents a saving of around 450,000 tonnes of greenhouse gases per year. It is also equivalent to removing over 88,000 cars from Australian roads each year.

The electricity generated at the CWFI is fed directly into the TransGrid network via an on-site substation, with the majority of output contracted to supply the Sydney Water Desalinisation Plant.

1.5 DIRECTOR-GENERAL'S REQUIREMENTS

The Project will be assessed under Part 3A of the *EP&A Act* as a Major Project and follow the Part 3A Project approval process. The DOP formed the opinion under Clause 6 of SEPP Major Development the Project is a Major Project in accordance with the criteria identified in Schedule 1. Following this declaration, a Preliminary Environmental Assessment Report was prepared and assessed by the DOP.

As the energy generating capacity of the Project derived from a renewable fuel source is wind energy generating at least 30 MW, the Project has been classified a Critical Infrastructure Project (CIP) under Section 75C of the *EP&A Act*. A CIP is subject to a full and thorough environmental assessment, with particular emphasis to ensure the Project proceeds in an environmentally appropriate and sustainable manner. The environmental assessment process for a CIP is the same as for any other major project, the main exception being that there are no merit appeal rights available.

The Director-General of the DOP identified a number of key and general assessment requirements to be addressed in this EA within the DGRs issued for the Project on 3 September 2010.

Table 1 below details the DGRs and where they are addressed in this EA. Chapters 7-13 of this report address the key environmental issues, including those identified in the DGRs and as a result of the Environmental Risk Analysis. Chapter 15 addresses other environmental issues associated with the Project.

Table 1: Director-General's Requirements and where they are addressed in the Environmental Assessment

	DIRECTOR-GENERAL REQUIREMENTS	CHAPTER ADDRESSED
GENERAL REQUIREMENTS	**EXECUTIVE SUMMARY**	III – ES
	A detailed description of the Project of both the wind farm and associated infrastructure including:-	Chapter 3
	• Construction, operation and decommissioning details.	Chapter 3.5
	• Location and dimensions of all project components including the wind turbines (including map co-ordinates and AHD heights), underground cabling between turbines, electrical substation and transmission line linking the wind farm to the grid, temporary concrete batching plant(s), construction compounds, access roads/road upgrades (including access tracks) and obstacle lighting.	Chapter 3.4
	• Timeline identifying the proposed construction and operation of the project components, their envisaged life span and arrangements for decommissioning and staging.	Chapter 3.5
	• Supporting maps/plans clearly identifying existing environmental features (e.g. water courses, vegetation), infrastructure and land use (including nearby residences and approved residential developments or subdivisions) and the location/siting of the project including associated infrastructure in the context of this existing environment.	Chapter 3.3 and 3.4
	• Resourcing requirements (including, but not limited to, water supply and gravel).	Chapter 3.6
	• Consideration of any **relevant statutory provisions** including the consistency of the project with the objects of the Environmental Planning and Assessment Act 1979 and any relevant development control plans.	Chapter 5
	• An **assessment of the key issues** outlined below, during construction, operation and decommissioning (as relevant). The Environmental Assessment must assess the worst case as well as representative impact for all key issues taking into account cumulative impacts from surrounding approved or operational wind farms (Capital and Woodlawn) and any proposed solar project (Capital Solar Farm), as relevant.	Chapters 7 - 13

	DIRECTOR-GENERAL REQUIREMENTS	CHAPTER ADDRESSED
	• A **draft Statement of Commitments** detailing measures for environmental mitigation, management and monitoring for the project.	Chapter 17
	• A **conclusion justifying the project** taking into consideration the environmental, social and economic impacts of the project, the suitability of the site and the public interest.	Chapter 18
	• **Certification by the author** of the EA that the information contained in the Assessment is neither false nor misleading.	II
KEY ASSESSMENT REQUIREMENTS	The EA must include assessment of the following key issues for both the wind farm and transmission line:-	Chapter 4
	STRATEGIC JUSTIFICATION – The EA must:-	Chapter 4
	Include a strategic assessment of the need, scale, scope and location for the project in relation to predicted electricity demand, predicted transmission constraints and the strategic direction of the region and the State in relation to electricity supply, demand and electricity generation technologies, and its role within the Commonwealth's Renewable Energy Target Scheme. The EA must clearly demonstrate that the existing substation/transmission infrastructure has sufficient capacity to accommodate the project as well as already operational/approved projects (Capital and Woodlawn) and proposed Solar infrastructure (Capital Solar Farm) which also envisage the use of this infrastructure.	Chapter 4.1 and 4.2
	Include a clear demonstration of quantified and substantiated greenhouse gas benefits, taking into consideration sources of electricity that could realistically be replaced and the extent of their replacement.	Chapter 4.3
	Include an analysis of the suitability of the project with respect to potential land use conflicts with existing and future surrounding land uses (including rural residential development, land of significant scenic or visual value, land of high agricultural value, mineral reserves, forestry, conservation areas and crown land) taking into account local and strategic land use objectives and the potential for cumulative social and economic impacts on the local community.	Chapter 4.4
	Describe the alternatives considered (location and/or design) for all project components, and provide justification for the preferred project demonstrating its benefits on a local and strategic scale and how it achieves staged objectives and any measures to off-set residual impacts (for example community enhancement programs).	Chapter 4.5

	DIRECTOR-GENERAL REQUIREMENTS	CHAPTER ADDRESSED
	VISUAL IMPACTS – The EA must:-	Chapter 7
	Provide a comprehensive assessment of the landscape character and values and any scenic or significant vistas of the area potentially affected by the project (including the Lake George escarpment) taking into consideration cumulative impacts from surrounding approved or operational wind farms in the locality and proposed Solar infrastructure (Capital Solar Farm). This should describe community and stakeholder values of the local and regional visual amenity and quality, and perceptions of the project based on surveys and consultation.	Chapter 7.1 and 7.2
	Assess the impact of shadow "flicker", blade "glint" and night lighting from the wind farm.	Chapter 7.3.3
	Identify the zone of visual influence of the wind farm including consideration to night lighting (no less than 10 kilometres) and assess the visual impact of all project components on this landscape.	Chapter 7.2.2
	Include an assessment of any cumulative visual impacts from transmission line infrastructure.	Chapter 7.4
	Include photomontages of the project taken from potentially affected residences (including approved but not yet developed dwellings or subdivisions with residential rights), settlements and significant public view points (including the Lake George escarpment), and provide a clear description of proposed visual amenity mitigation and management measures for both the wind farm and the transmission line. The photomontages must take into account cumulative impacts from surrounding approved or operational wind farms in the locality and include representative views of turbine night lighting if proposed.	Chapter 7.3.2
	Provide an assessment of the feasibility, effectiveness and reliability of proposed mitigation measures and any residual impacts after these measures have been implemented.	Chapter 7.5
	NOISE IMPACTS – The EA must:-	Chapter 8
	Include a comprehensive noise assessment of all phases and components of the project taking into account cumulative impacts from surrounding approved or operational wind farms in the locality including: turbine operation, the operation of the electrical substation, corona and/or Aeolian noise from the transmission line, construction noise (focussing on high noise generating activities and any works proposed outside of standard construction hours), traffic noise during construction and operation, and vibration generating activities (including blasting) during construction and/or operation.	Chapter 8.2

	DIRECTOR-GENERAL REQUIREMENTS	CHAPTER ADDRESSED
	The assessment must identify noise/vibration sensitive locations (including approved but not yet developed dwellings), baseline conditions based on monitoring results, the levels and character of noise (e.g. tonality, impulsiveness, low frequency etc) generated by noise sources, noise/vibration criteria, modelling assumptions and worse case and representative noise/vibration impacts.	
	In relation to wind turbine operation, determine the noise impacts under operating meteorological conditions (i.e. wind speeds from cut in to rated power), including impacts under meteorological conditions that exacerbate impacts (including varying atmospheric stability classes and the van den Berg effect for wind turbines). The probability of such occurrences must be quantified.	Chapter 8.2 and 8.3
	Include monitoring to ensure that there is adequate wind speed/profile data and ambient background noise data that is representative for all sensitive receptors.	Chapter 8.1
	Provide justification for the nominated average background noise level used in the assessment process, considering any significant difference between day time and night time background noise levels at background noise levels higher than 30 dB(A).	Chapter 8.5
	Identify any risks with respect to tonal, low frequency or infra-noise.	Appendix C
	If any noise agreements with residents are proposed for areas where noise criteria cannot be met, provide sufficient information to enable a clear understanding of what has been agreed and what criteria have been used to frame any such agreements.	Chapter 8.3.1
	Clearly outline the noise mitigation, monitoring and management measures that would be applied to the Project. This must include an assessment of the feasibility, effectiveness and reliability of proposed measures and any residual impacts after these measures have been incorporated.	Chapter 8.3
	Include a contingency strategy that provides for additional noise attenuation should higher noise levels than those predicted result following commissioning and/or noise agreements with land owners not eventuate.	Chapter 8.4
	The assessment must be undertaken consistent with the following guidelines:-	
	Wind Turbines – The South Australian Environment Protection *Authority's Wind Farms – Environmental Noise Guidelines* (2003).	Chapter 8
	Substation – *NSW Industrial Noise Policy* (EPA, 2000).	Chapter 8

	DIRECTOR-GENERAL REQUIREMENTS	CHAPTER ADDRESSED
	Site Establishment and Construction – *Interim Construction Noise Guidelines* (DECC, 2009).	Chapter 8
	Traffic Noise – *Environmental Criteria for Road Traffic Noise* (NSW EPA, 1999).	Chapter 8
	Vibration – *Assessing Vibration: A Technical Guideline* (DECC, 2006).	Chapter 8
	FLORA AND FAUNA – The EA must:-	Chapter 9
	Include an assessment of all project components on flora and fauna (both terrestrial and aquatic, as relevant) and their habitat consistent with the *Draft Guidelines for Threatened Species Assessment* (DECC, 2005).	Chapter 9.5
	Include details on the existing site conditions (including whether the vegetation comprises a highly modified or over-cleared landscape) and level of proposed disturbance (including quantifying the worst case extent of impact on the basis of vegetation type and total native vegetation disturbed).	Chapter 9.2
	Specifically consider impacts to threatened species and communities listed under both State and Commonwealth legislation that have the potential to occur on site including but not necessarily limited to: Box/Gum Grassy Woodland Communities, natural temperate grasslands, Tablelands Frost Hollow Grassy Woodlands, Silky Swainson-pea, Austral Toad Flax, Terengo Leek Orchid, Pink-tailed Worm-lizard, Grassland Earless Dragon, Striped Legless Lizard, Little Whip Snake, Woodland Bird Species, Superb Parrot, Squirrel Glider and the Golden Sun Moth. The EA must provide details of the survey methodology employed including survey effort and representativeness for species targeted.	Chapter 9.4
	Specifically address impacts to connectivity and biodiversity corridors and to riparian and/or in-stream habitat in the case of disturbance of waterways. In addition, impact of the project on birds and bats from blade strikes, low air pressure zones at the blade tips (barotraumas), and alteration to movement patterns resulting from the turbines must be assessed, including demonstration of how the project has been sited to avoid and/or minimise such impacts.	Chapter 9.5
	Include details of how flora and fauna impacts would be managed during construction and operation including adaptive management and maintenance protocols.	Chapter 9.6
	Include measures to avoid, mitigate or off-set impacts consistent with “improve or maintain” principles.	Chapter 9.6

	DIRECTOR-GENERAL REQUIREMENTS	CHAPTER ADDRESSED
	Sufficient details must be provided to demonstrate the availability of viable and achievable options to off-set the impacts of the project and to secure these measures in perpetuity.	
	INDIGENOUS HERITAGE – The EA must:-	Chapter 10
	Include an assessment of the potential impact of the project components on indigenous heritage values (archaeological and cultural). The EA must demonstrate effective consultation with indigenous stakeholders during the assessment and in developing mitigation options (including the final recommended measures) consistent with *Guidelines for Aboriginal Cultural Impact Assessment and Community Consultation* (DECC, July 2005).	Chapter 10
	TRAFFIC AND TRANSPORT – The EA must:-	Chapter 11
	Assess the construction and operational traffic impacts of the project including:-	Chapter 11
	Details of traffic volumes (both light and heavy vehicles) and transport routes (including site access) during construction and operation.	Chapter 11.2
	Assess the potential traffic impacts of the project on road network function (including intersection level of service) and safety.	Chapter 11.3
	Assess the capacity of the existing road network to accommodate the type and volume of traffic generated by the Project (including over-dimensional traffic) during construction and operation, including full details of any required upgrades to roads, bridges, site access provisions or other road features.	Chapter 11.3
	Details of measures to mitigate and/or manage potential impacts, including construction traffic control, road dilapidation surveys and measures to control soil erosion and dust generated by traffic volumes.	Chapter 11.4
	Details of access roads within the site including how these would connect to the existing road network and ongoing operational maintenance.	Chapter 11.1 and 11.2
	HAZARDS/RISKS – The EA must include:-	Chapter 12
	An assessment of the potential impacts on aviation safety, including the need for aviation hazard lighting considering nearby aerodromes and aircraft landing areas, defined air traffic routes, aircraft operating heights, radar interference, communication systems, and navigation aids. Aerodromes within 30km of the turbines should be identified and impacts on obstacle limitation surfaces addressed.	Chapter 12

	DIRECTOR-GENERAL REQUIREMENTS	CHAPTER ADDRESSED
	In addition, the EA must assess the impact of the turbines on the safe and efficient aerial application of agricultural fertilisers and pesticides in the vicinity of the turbines and transmission line. Possible effects on telecommunications systems must be identified. Potential hazards and risks associated with electric and magnetic fields and bushfires must also be addressed.	
	WATER QUALITY AND HYDROLOGY – The EA must:-	Chapter 13
	Identify and assess the availability of construction water sources for the project including details of their statutory (licensing) context. Where the project involves crossing or works close to significant waterways, the EA must identify likely impacts to the waterways and measures to minimise hydrological, water quality, aquatic and riparian impacts. The EA must identify design principles for any project components located on flood prone land and consider the potential for exacerbating soil salinity.	Chapter 13
	GENERAL ENVIRONMENTAL RISK ANALYSIS – Notwithstanding the above key assessment requirements, the EA must include:-	Chapter 15
	An environmental risk analysis to identify potential environmental impacts associated with the project, proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified through this environmental risk analysis, an appropriate detailed impact assessment of the additional key environmental impact(s) must be included in the EA.	Chapter 15
	The Proponent must undertake a consultation program as part of the Environmental Assessment process, including consultation with, but not necessarily limited to, the following parties:-	Chapter 6
CONSULTATION REQUIREMENTS	• Palerang Shire Council	Chapter 6.2
	• Goulburn-Mulwaree Council	
	• Department of Environment, Climate Change and Water	
	• NSW Office of Water	
	• Department of Industry and Investment	
	• NSW Roads and Traffic Authority	
	• NSW Rural Fire Service	
	• Land and Property Management Authority	

	DIRECTOR-GENERAL REQUIREMENTS	CHAPTER ADDRESSED
	• Murrumbidgee Catchment Management Authority	
	• Commonwealth Department of Defence	
	• Civil Aviation Safety Authority	
	• Air Services Australia	
	• Aerial Agricultural Society of Australia	
	• Relevant minerals stakeholders (including exploration and mining title holders)	
	• The local community and land owners	
	The consultation process shall include measures for disseminating information to increase awareness of the project as well as methods for actively engaging stakeholders on issues that would be of interest/concern to them. The EA must:-	
	Demonstrate effective consultation with stakeholders, and that the level of consultation with each stakeholder is commensurate with their degree of interest/concern or likely impact.	Chapter 6.2
	Clearly describe the consultation process undertaken for each stakeholder/group including details of the dates of consultation and copies of any information disseminated as part of the consultation process (subject to confidentiality).	Chapter 6.1
	Describe the issues raised during consultation and how and where these have been addressed in the EA.	Chapter 6.2

2. SITE DESCRIPTION

The DGRs issued for the Project require that a detailed site description be provided. The following chapter provides an overall description of the subject site, including a locality description and a table which details how the subject site meets the Proponents selection criteria.

2.1 SITE LOCATION

The site of the proposed facility is located in the Southern Tablelands of New South Wales and is wholly within the Local Government Area of Palerang Council. Bungendore, with a population of approximately 2,500 people is the closest significant population, being located approximately 10 kilometres south of the site. The site is 30kms east of Canberra and 60kms south-west of Goulburn.

The Project is adjacent to the existing CWFI which is located on the ridges of the Great Dividing Range east of Lake George. The Project will be integrated within the existing CWFI and located in three groups over 12 separate allotments owned by eight individuals. All properties are easily accessible from the north and east from Collector Road (Western Leg Road) and Tarago/Bungendore Road (Taylors Creek Road) respectively.

Figure 5: Capital Wind Farm looking south from the existing WTG 68 in the Groses Hill Group to the Ellenden Group

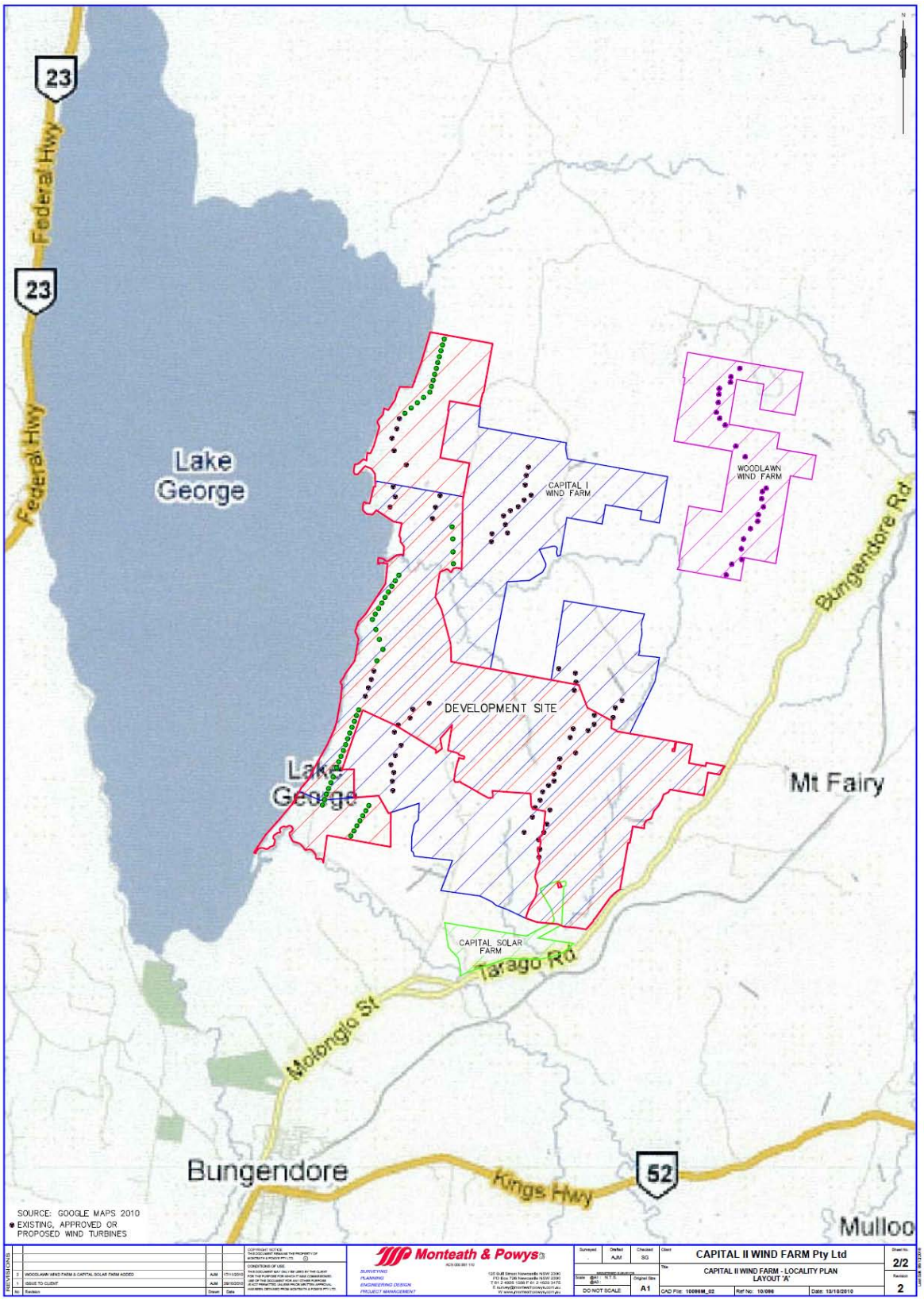

Figure 6: Site locality plan – Layout 'A'

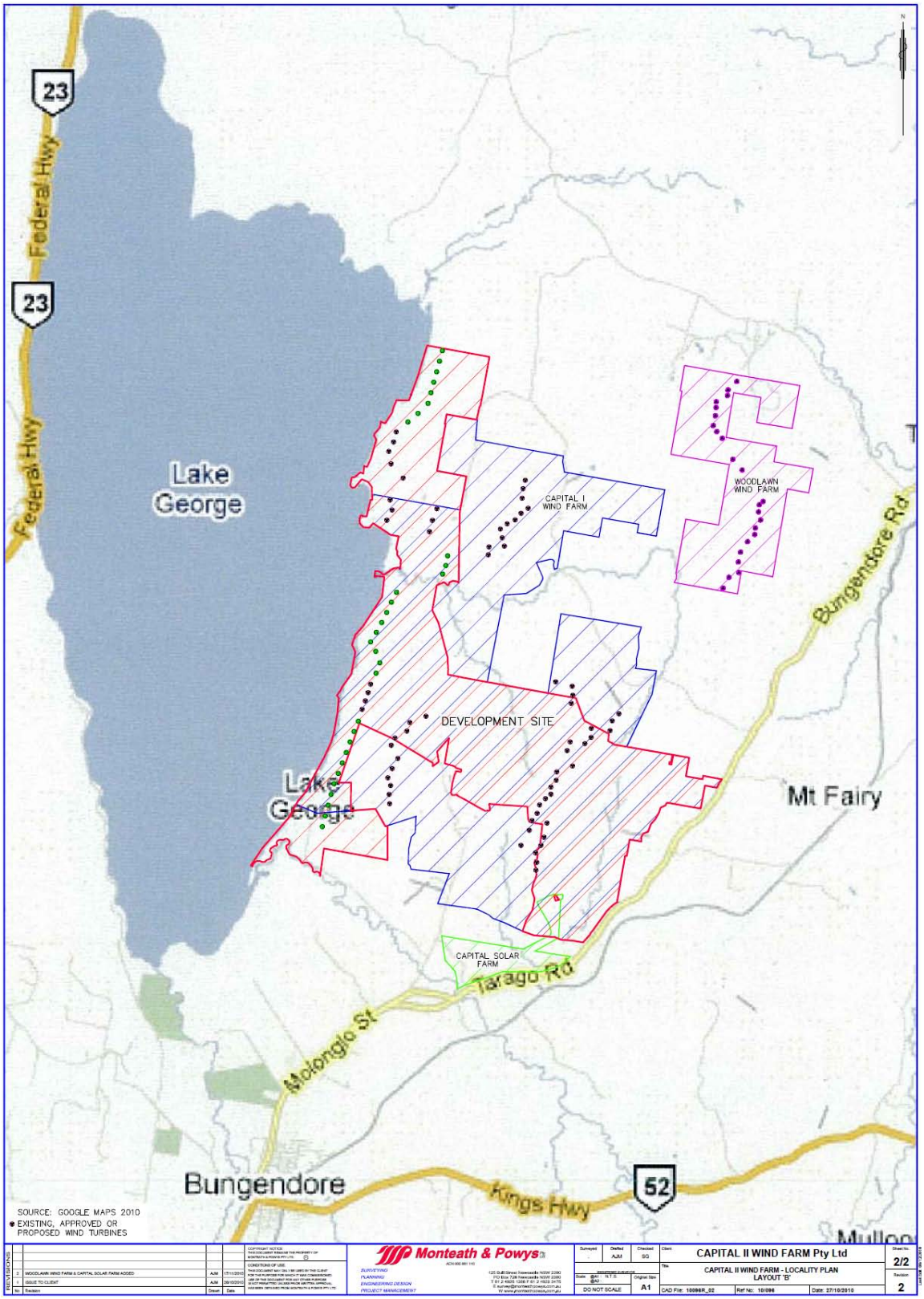

Figure 7: Site locality plan Layout 'B'

2.2 SITE DESCRIPTION

The Project site is situated over 10 privately owned properties, all of which are predominantly cleared pastoral land used for grazing sheep and other livestock. An electrical substation is located on the remaining property. **Table 2** provides property details of the lands on which the Project is located. The site has a combined area of approximately 50 square kilometres with elevations that range from between 670 metres and 835 metres above sea level. **Figure 9** shows the location and boundaries of the properties involved with, and surrounding, the Project.

Table 2: Property details for land on which the Wind Farm is located

LOT NO.	DEPOSITED PLAN (DP)	LAND USE	
		LAYOUT A (55 WTG)	LAYOUT B (31 WTG)
72	754919	12 WTG	7 WTG
80	754919	2 WTG	1 WTG
79	754919	4 WTG	3 WTG
300	1137335	13 WTG	9 WTG
7	227420	11 WTG	7 WTG
1	237079	4 WTG	2 WTG
E	38379	9 WTG	2 WTG
1	1140319	Substation (existing)	
B	370961	Transmission line	
18	535179	Transmission line	
2	1140319	Transmission line	

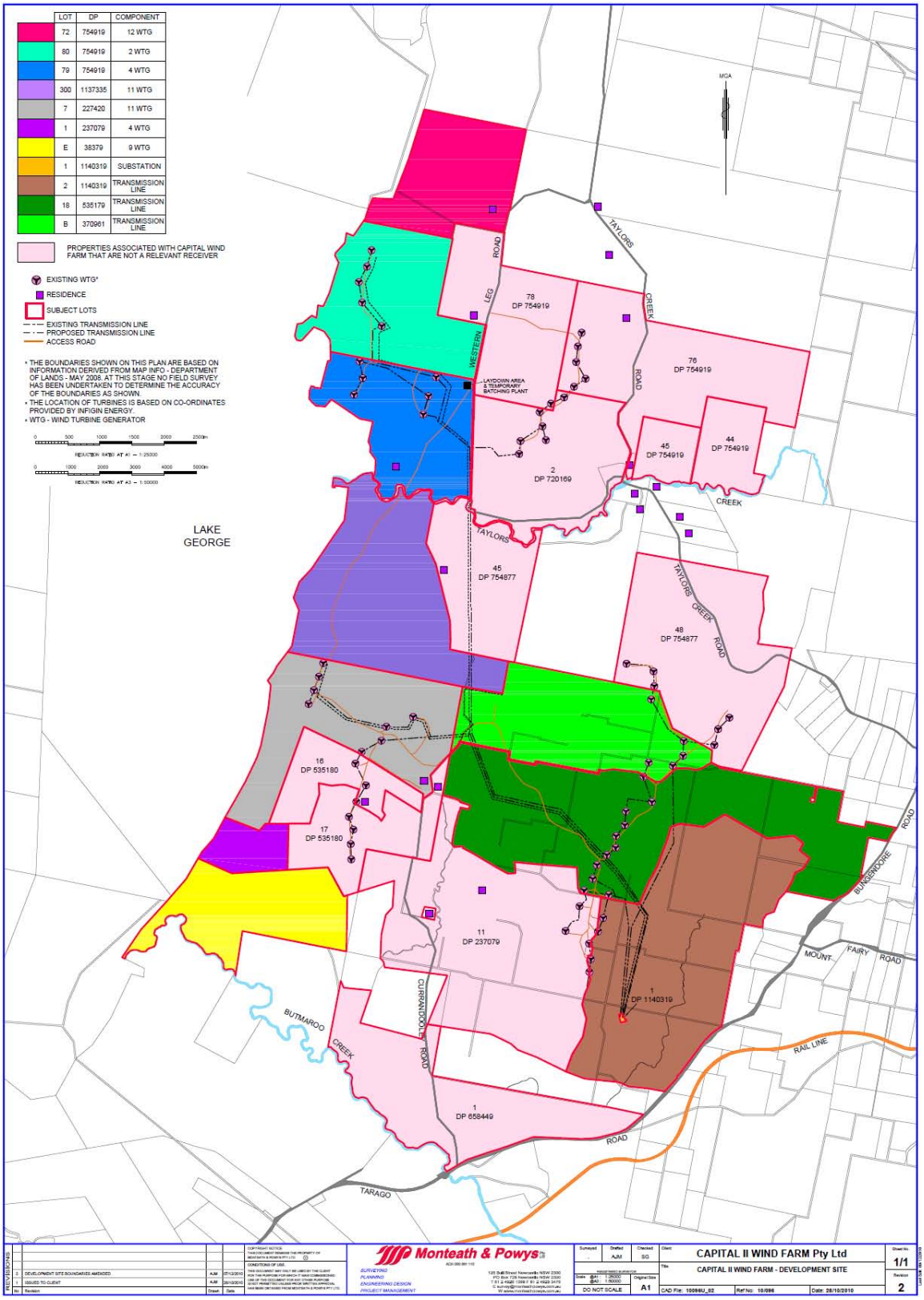

Figure 8: Capital II Wind Farm site area

The subject site is located within a predominantly rural setting. Lake George is located immediately to the west of the site. A number of rural land uses surround the site to the north, south and east. The landscape is punctuated by human infrastructure including:-

- Dwellings associated with rural properties;
- Agricultural structures (sheds, silos, etc);
- High voltage transmission lines;
- Dams;
- Access tracks; and
- Paddock fencing.

Two watercourses traverse the site including Taylors Creek in the central portion of the site, and Butmaroo Creek in the southern portion of the site. Both watercourses flow from the east into Lake George and are intermittent for the most part. There was no water observed in either creek during a site inspection on 17 May 2010. An aerial photograph of the site showing the proposed and existing turbine sites and access tracks is provided in **Figure 9**: Aerial photo**.**

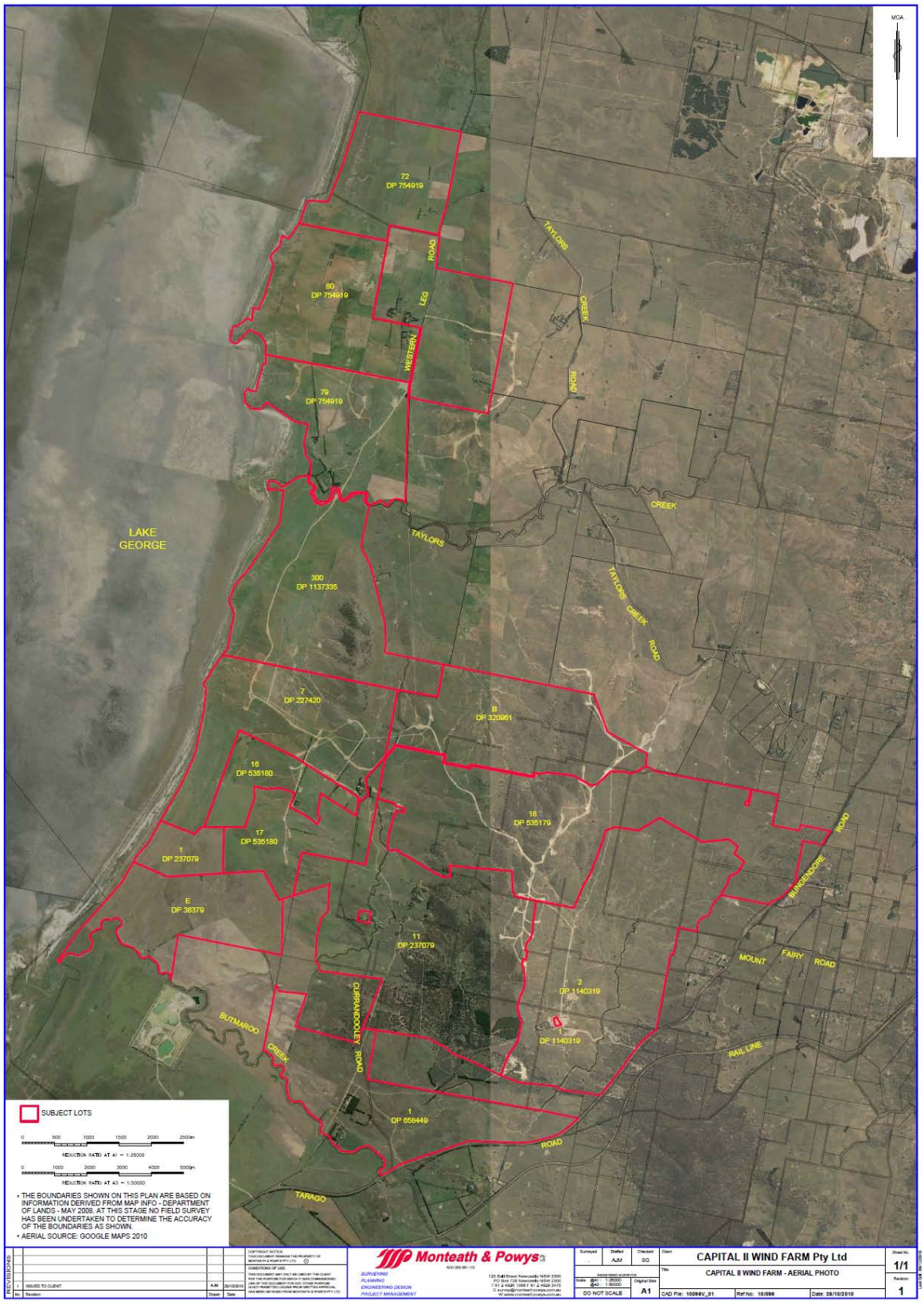

Figure 9: Aerial photo

As the Project is adjacent to the operational CWFI, the majority of the existing infrastructure constructed to support CWFI, such as transmission lines and substations, will be utilised by the Project. Accordingly, the additional wind turbines will be integrated with the existing infrastructure and layout of CWFI.

The proposed WTGs will be located in the vicinity of the existing wind turbines on the hills and slopes of the Great Dividing Range including the lower slopes falling to Lake George in the west. All wind turbines require sufficient separation from each other in order to limit disturbance to the wind flow and resultant impact on efficiency.

All properties that are part of the Project are currently zoned 1(a) General Rural Zone pursuant to the Mulwaree Local Environmental Plan 1995 (Mulwaree LEP).

Figure 10: Capital Wind Farm - Looking north

2.3 LOCATIONAL CRITERIA

The Proponent had some essential criteria that were used to determine an appropriate location for the Project. The following table details this criteria and provides an assessment of how the subject site meets it.

Table 3: Location criteria for a Wind Farm

CRITERIA	RESPONSE
The site must have a good wind resource – high average speeds, consistent throughout the year and low turbulence levels	Ongoing wind monitoring has taken place on the site since 2005. Results demonstrate the suitablity of the site for a wind farm. Furthemore, the proven viability of the site as a wind farm has been demonstrated by the success of the CWFI that has operated since October 2009.
Suitable topography - the topography of the site must also maximise wind flow.	The proposed site is located on the hills and ridges of the Great Dividing Range. Not only does the topography of this location maximise wind flow but it also provides sufficient level ground to enable the installation of the wind turbines.
Proximity to transmission lines	A 330,000 volt overhead transmission line is located immediately to the south of the site.
Land use zoning	Wind farms are permissible in the 1(a) General Rural zone with consent under the Mulwaree LEP 1995.
Good transport access	As part of the Project Approval for the CWFI, the transport route to be used by heavy vehicles was upgraded to accommodate heavy vehicles and cranes required to deliver and erect the wind turbines and equipment. Ongoing upgrading and maintenance of local roads is undertaken to ensure local transport routes are not damaged during the construction or operation phases.
Proximity to customers	The renewable energy generated from the wind farm is made available to the National Energy Market which facilitates exchange between electricity producers and consumers.
Cost of mitigating local impacts	The perceived impacts that arose during the development of CWFI were resolved equitably. It is not anticpated that there will be significant costs required to mitigate any further local impacts.

As detailed above, the subject site has previously been selected to meet the locational criteria of the Proponent. The proven success of the CWFI and the spatial ability to accommodate additional wind turbines determined the site to be feasible and sustainable. Overall, it is considered that the subject site is appropriate for the Project and that the site constraints would be manageable.

Figure 11: Existing meteorological mast found on Capital I Wind Farm

Figure 12: TransGrid 330,000 volt transmission line

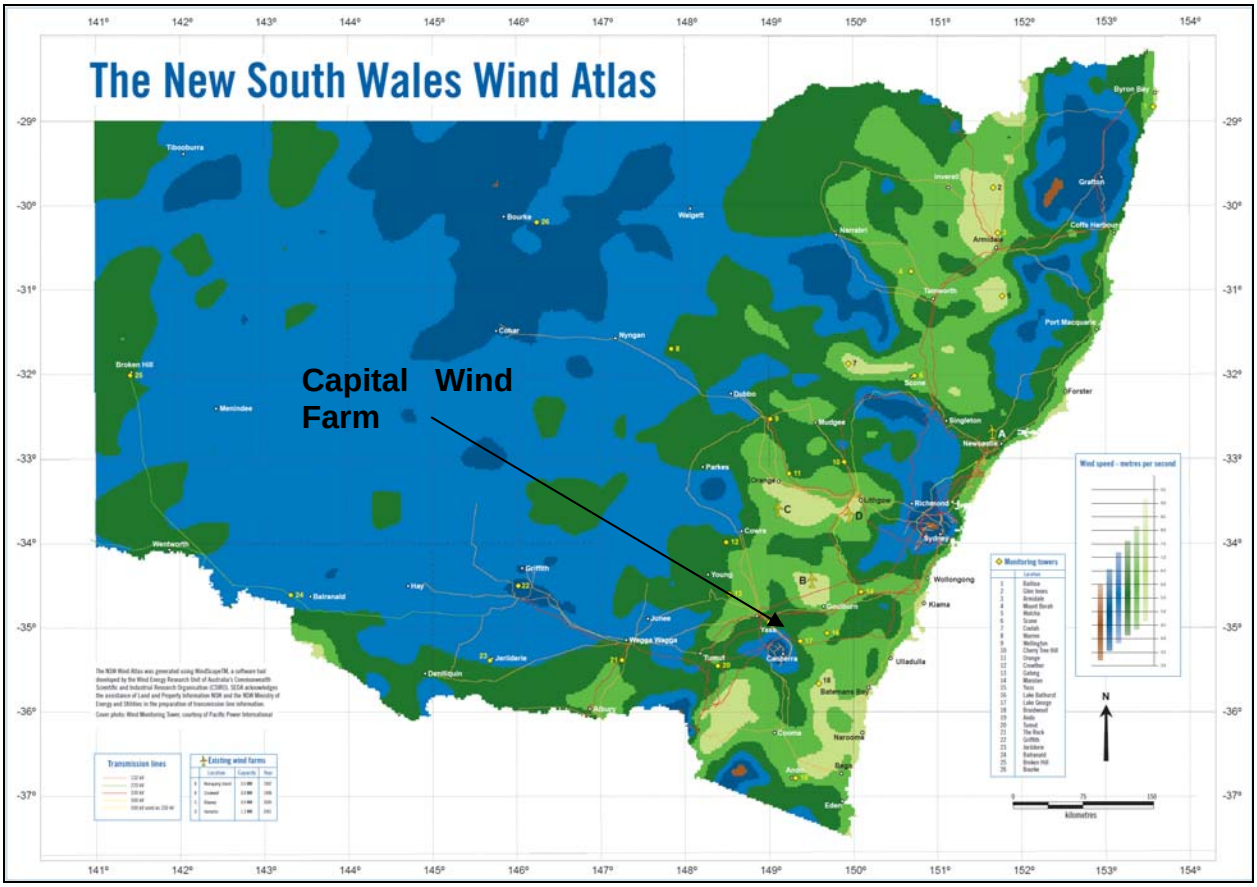

Figure 13: NSW Wind Atlas (SEDA, NSW Department of Industry and Investment)

2.4 CAPITAL WIND FARM

CWFI commenced full operation in October 2009, with a total installed capacity of 140.7 MW. The wind farm spans about 10kms north to south and about 6kms from east to west with 67 wind turbines located in three distinct groups as shown in **Figure 145**. The majority of the wind turbines have been located along the ridge lines to maximise the airflow interaction and maintain turbine spacing.

Figure 14: Capital Wind Farm looking south west towards existing WTG 6 in the Groses Hill Group to the Ellenden Group (Infigen Energy 2009)

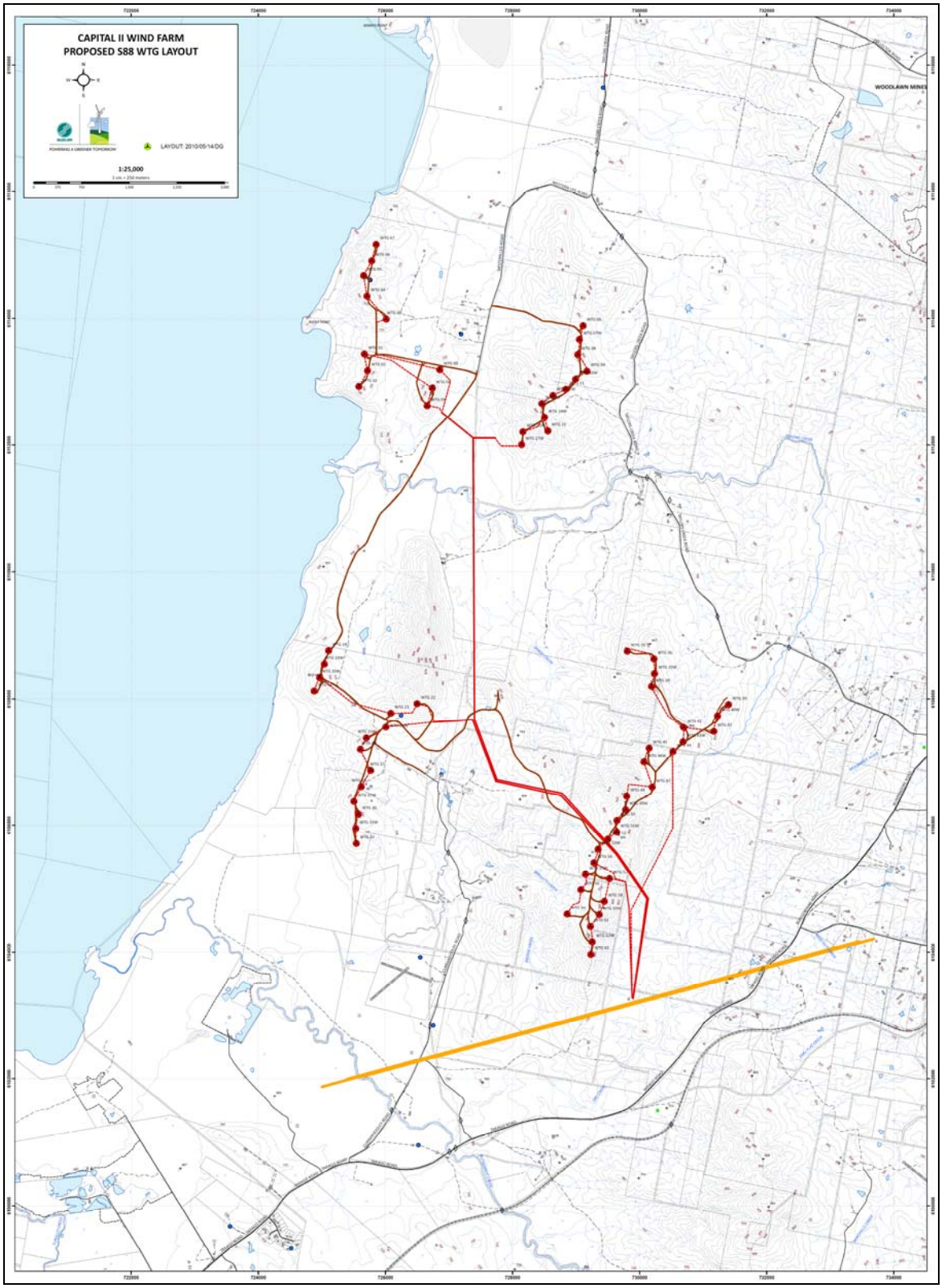

Figure 15: Location of WTGs, access roads and aboveground transmission line network for Capital Wind Farm (Infigen Energy 2009)

2.5 WOODLAWN WIND FARM

The site is also adjacent to the approved Woodlawn Wind Farm (WWF). The WWF is expected to be completed in the second half of 2011 and was granted approval for 23 x 2.1 MW WTGs. Similar to the decision to expand the CWFI, the WWF was situated due to the high quality wind resource and efficient connection to the national electricity grid. The electricity generated from the wind farm will be exported to the CWFI substation although the wind farm will operate independently to the CWFI.

2.6 CAPITAL SOLAR FARM

A Project Application was submitted to the Department of Planning on 28th July 2010 for an electricity generating plant powered by solar energy. The project is known as the Capital Solar Farm and is located adjacent to the proposed Capital II Wind Farm. The solar farm includes a 50 megawatt capacity solar farm that would occupy approximately 100 hectares to the south of the Project site, including within several properties of the Subject site.

3. PROJECT DESCRIPTION

The Director-General's Requirements require that a detailed description of the Project be provided. **Table 4** below details these requirements and identifies where in the EA they have been addressed:-

Table 4: Director-General's Requirements for Project description

REQUIREMENT	CHAPTER ADDRESSED
Construction, operation and decommissioning details	Chapter 3.4
Location and dimensions of all project components	Chapter 3.4
Timeline identifying the proposed construction and operation of the project components	Chapter 3.5
Resourcing requirements	Chapter 3.6

This Chapter provides a description of the Project including components and design elements, construction and operational characteristics and details the timeline of the operation including decommissioning.

3.1 RENEWABLE ENERGY

Renewable energy sources are an important method of reducing greenhouse gas emissions and preserving traditional energy resources for future generations. Renewable energy comes from natural sources such as sunlight, wind, tides and geothermal heat, which are naturally replenished. Wind energy is produced by airflows used to run wind turbines that convert wind energy into electricity. Renewable energy is an essential part of Australia's low emissions energy target and harnessing wind energy is a clean, non-polluting method of producing electricity.

To reduce greenhouse gas emissions, the Federal and State Governments have introduced a range of initiatives encouraging the purchase of energy generated from renewable sources. The Renewable Energy Target Scheme (Chapter 4.1) was established by the Australian Government to encourage additional generation of electricity from renewable energy sources to meet the Government's commitment to achieving a 20% share of renewable energy in Australia's electricity supply in 2020. The Project seeks to provide additional renewable energy to contribute to achieving the 2020 target.

3.2 PROJECT CONTEXT

The Project is for the erection and operation of a wind farm comprising up to 55 wind turbines and associated infrastructure. As the precise locations of the wind turbines will continue to be refined in relation to ongoing wind monitoring, the Proponent seeks project approval for two different layouts, of which only one will be constructed. To maximise the capture of wind energy without disturbing the wind flow patterns powering the Capital Wind Farm 1, several different wind turbine models are being considered. As only one layout will be constructed, this Environmental Assessment considers the highest impact scenario of each aspect and component of the proposed wind farm.

The Project is adjacent to the existing CWFI and will utilise some of the existing infrastructure such as the electrical substation, access tracks and electrical reticulation network. The Project will directly involve 11 properties, 10 of which are currently used for agriculture and grazing, and one which currently accommodates an electrical substation owned by the operator of CWFI.

Following from the successful construction and continuing operation of CWFI, the proposed Project was designed to capitalise on the available infrastructure and proven wind resource, noting that the location of the existing wind turbines have capitalised on the most productive wind resources. Consequently, the available area for the siting of the proposed wind turbines is limited to the lower slopes, away from the ridges and hills of the Great Dividing Range. To compensate for the less desirable locations, the Project application is for two unique layouts, differing in the scale and capacity of the turbines. It is intended to install wind turbines with a tower height of 100 metres.

The Project design is based on previous outcomes of the community consultation, environmental studies and tender analysis in addition to a review of CWFI since operations commenced in October 2009.

There is a trade-off between the number of wind turbines and the size of wind turbines to provide commercial volumes of electricity from the site. The smaller the wind turbine, the larger number of wind turbines required for a viable project. Increasing the size and reducing the number of wind turbines has a number of benefits:-

- Reduced overall visual impact;
- Reduced environmental impacts of construction through fewer footings, hardstands, access roads etc; and
- Reduced cost of wind power per unit of output.

Although a small number of rural residences surround the site, community feedback and results from various environmental sampling measurements provided sufficient information to the Proponent to conclude that there is merit in proceeding with CWFII.

3.3 PROPERTIES INVOLVED IN THE DEVELOPMENT

The Proponent has or will enter into lease agreements with all the landowners to secure the co-use of the subject properties. The lease outlines the terms of the use of the property where development is located, including agreements to undertake planning studies for the Project.

Table 5: Properties involved in the Project and extent wind farm infrastructure to be located on the land

LOT NO.	DEPOSITED PLAN (DP)	LAND USE	
		LAYOUT A (55 WTG)	LAYOUT B (31 WTG)
72	754919	12 WTG	7 WTG
80	754919	2 WTG	1 WTG
79	754919	4 WTG	3 WTG
300	1137335	13 WTG	9 WTG
7	227420	11 WTG	7 WTG
1	237079	4 WTG	2 WTG
E	38379	9 WTG	2 WTG
1	1140319	Substation (existing)	
B	370961	Transmission line	
18	535179	Transmission line	
2	1140319	Transmission line	

3.4 PROJECT COMPONENTS AND DESIGN ELEMENTS

Wind energy is captured and turned into electricity by a wind turbine. A modern wind turbine typically consists of three blades mounted on top of a steel tower. The energy captured by the blades steadily rotating is transferred to an electrical generator. The generator, together with a gearbox, transformer and other control equipment, is housed in what is known as the 'nacelle' of the turbine, as shown below. In modern turbines, mechanical noise has been practically eliminated and aerodynamic noise has been vastly reduced.

To achieve full capacity, the Project comprises a number of separate components and design elements. The Project involves the installation and operation of up to 55 WTGs each with a capacity of up to 3 MW.

The main components of the wind farm will involve the installation and construction of the following:-

- Up to 55 WTGs including:-
  - Wind turbines
  - Nacelles
  - Blades
  - Towers
  - Concrete foundations
- The potential for up to 55 kiosk transformers with individual concrete pad adjacent to the WTGs;
- Up to three permanent meteorological monitoring masts;
- The forming of about 20kms of access tracks;
- Crane hardstand areas adjacent to the WTGs;
- Staging areas for partial assembly of WTG components;
- Trenching for installation of about 20kms of underground cables;
- Up to a 10km section of internal overhead transmission line;
- Sub-surface optic fibre cables laid along the same alignment as the access roads and underground electrical cabling;
- Minor upgrades to existing transformer, control room and 33,000 volt switchyard at the existing substation; and
- Operation and maintenance building.

In addition to the above permanent works, the following temporary and ancillary works will be undertaken:

- Delivery of infrastructure, equipment and material;
- Up to two concrete batching plants;
- Earthworks associated with the gravel pit/s;
- Laydown areas;
- Construction site office;
- Staff lunch rooms and facilities;
- Up to three meteorological monitoring masts; and

- Testing and commissioning of the WTGs.

The following provides a detailed description of the Project components.

The proposed WTGs will be located in three groups referred as northern, middle and southern groupings. The actual land area required for WTGs is generally about 1% of the total land area of the wind farm site.

The wind turbine models under consideration have the same components. The primary difference being the dimensions and generating capacity. All wind turbines require the supporting infrastructure such as the foundations, access roads and electricity reticulation network.

3.4.1 WIND TURBINES

The most likely wind turbines proposed to be erected have a tower with a height of 100 metres supporting a nacelle that contains the electricity generating turbine. The turbine is powered by three blades, each being up to 57 metres in length.

The tower is attached to a concrete footing and is connected to a pad mounted transformer. The maximum tip height proposed for the Project is 157 metres above ground level.

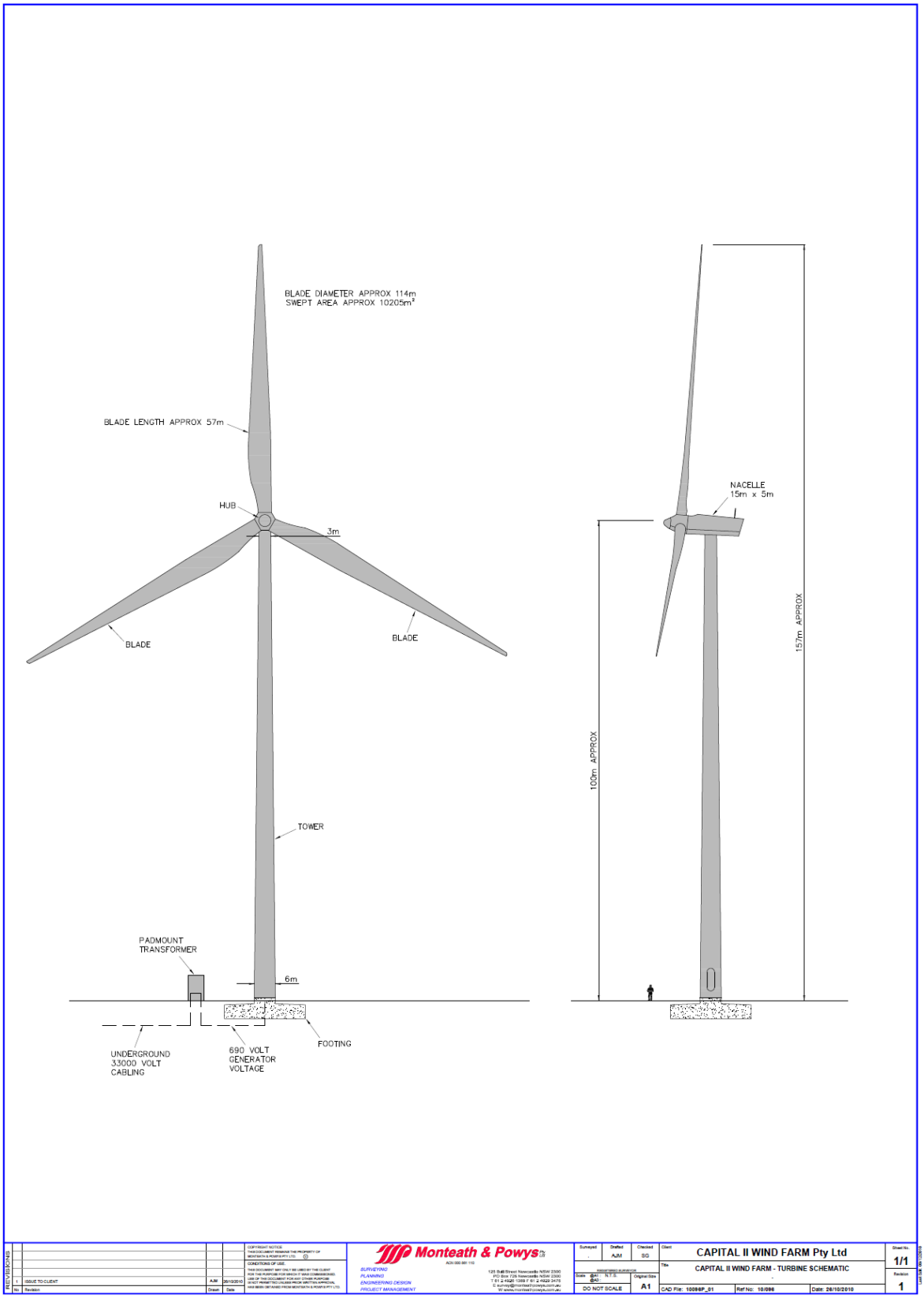

Figure 16: Wind Turbine Schematic

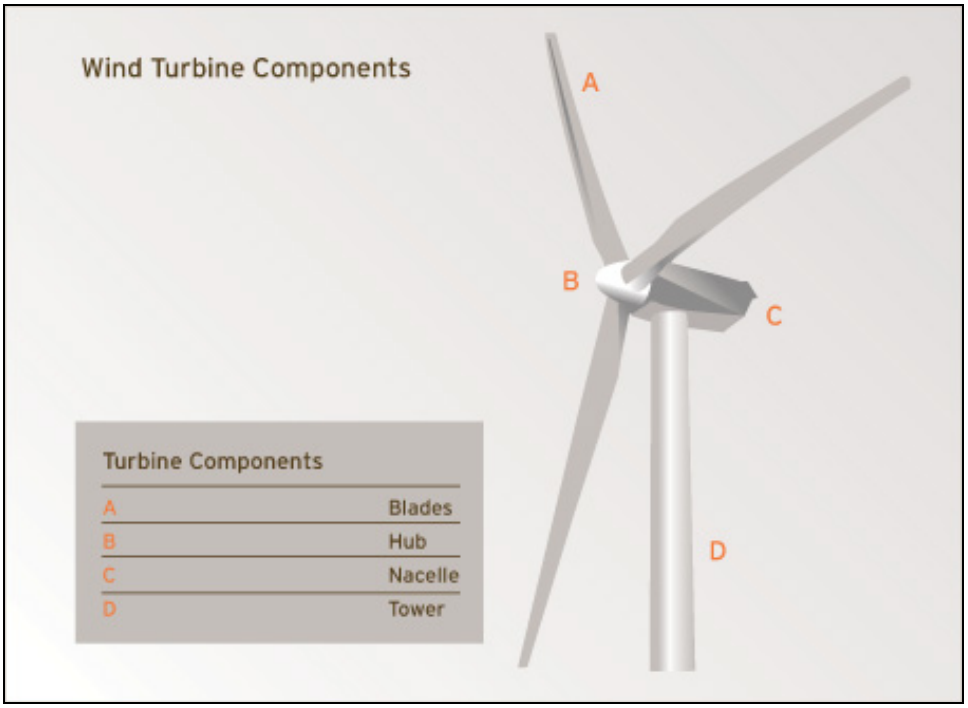

Figure 17: Wind turbine components (Infigen Energy 2010)

Figure 18: Capital I Wind Farm - WTG 03: Suzlon S88 2.1MW WTG - 80m tower and 44m blades

Tower - The tower is a tubular steel tower up to 100 metres high, tapering from around 6 metres at the base to around 3 metres at the top. The tower is constructed in four sections, each section being assembled on site. Within the tower are the power and control cables and access ladder to the nacelle.

Nacelle - The nacelle is the housing at the top of the tower enclosing the generator, gearbox and control gear including motors, pumps, brakes and electrical components. The nacelle is constructed of steel and fibre reinforced plastic. Its dimensions are about 15 metres long and about 5 metres in height. The nacelle provides noise dampening and protection for the mechanical components of the turbines.

Figure 19: Nacelle housing WTG (www.ecogeneration.com.au)

Turbine – The turbine will be of the three bladed type, with a blade diameter of 114 metres and a swept area of up to 10,200m^2. Wind turbine blades are made of glass fibre reinforced with epoxy or plastic (fibreglass). The turbines will be able to rotate at about 15 to 17.6 revolutions per minute when operating. Depending on the turbine model, the rated power of each wind turbine can be 3,000kW when it reaches a wind speed is 14m/s.

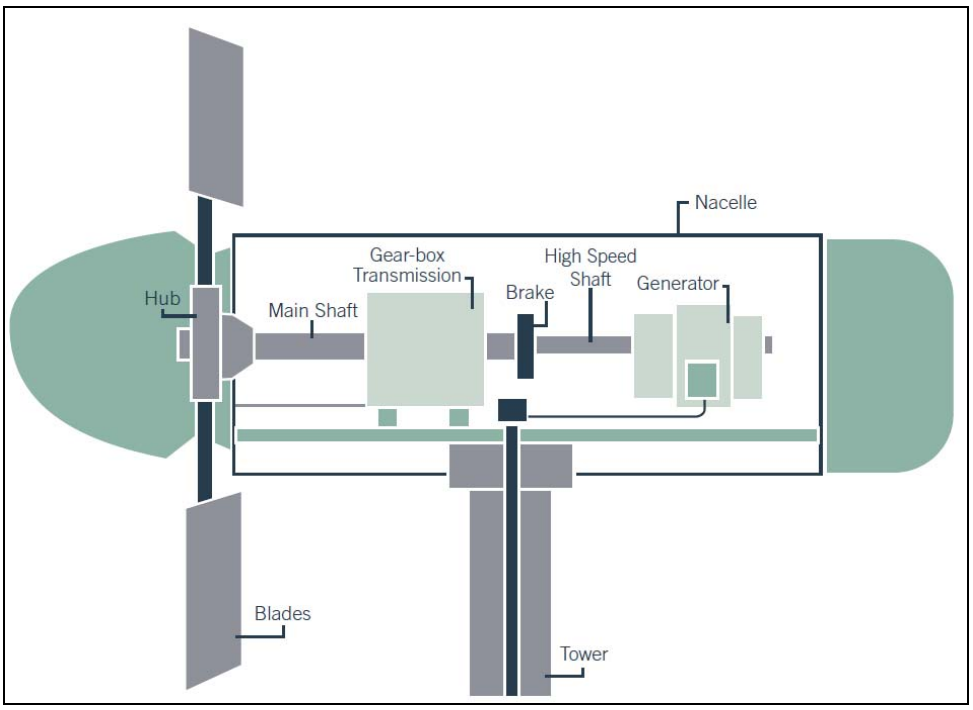

Figure 20: Anatomy of a wind turbine (Source: SEDA NSW Wind Energy Handbook 2002)

Although a wind turbine is designed to operate continuously across a range of wind speeds, it does not always generate electricity at its rated capacity (e.g. a 3 MW turbine has a rated capacity of 3 MW while its actual generation of electricity at any given time may be less than 3 MW). A wind turbine normally does not generate electricity if the wind speed is below a certain level, the 'cut-in' and 'cut-out' speed varies with different models of wind turbines, for example the cut-in speed is approximately 3m/s for a 3MW turbine. As wind speed increases, the wind turbine will gradually increase its electricity output until it reaches its rated capacity. When the wind speed rises to a certain threshold, the cut-out speed (25m/s), the wind turbine will shut down in order to protect itself from the forces exerted by high wind conditions.

Footings - The tower would be seated in a reinforced concrete footing with a diameter of about 18 metres and up to 3 metres thick. The base of the footing will be about 2 metres to 3 metres below ground level.

Figure 21: WTG tower set on a concrete footing

Transformer - At the base of each tower an enclosed transformer may be situated to step of the voltage from 690V to 33,000V (depending on the model of turbine selected). Each transformer would be located on a separate reinforced concrete pad immediately adjacent to the tower.

Figure 22: Individual transformers are located at the base of each WTG

Access tracks - Each wind turbine would require track access and cabling access to allow construction and connection to the substation. Access tracks would typically be 6 metres wide to accommodate construction vehicles and be all weather graded tracks. The graded hardstand area surrounding each turbine would be approximately 30m x 50m (1,500m^2).

Access to CWFII will be from the existing access points to CWFI at the southern end of Western Leg Road. Significant road upgrades are currently under construction as required by the Project Approval for CWFI. These works included sealing the approaches to and the intersection of Taylors Creek Road and Western Leg Road (complete).

Given that the transport routes and site access points will be the same for CWFII (discussed further in Chapter 11), it is expected the condition of the local public roads and access tracks are suitable to accommodate the expected vehicle traffic during construction and operation without the need for further upgrades.

Figure 23: Typical access track between WTGs covering underground transmission lines

Hardstand areas surrounding the wind tower would be left in situ after construction to provide for ongoing maintenance and repairs if necessary. Access tracks will also be left in situ with the possibility that the width would be reduced after construction and revegetated.

Figure 24: Typical hardstand area

3.4.2 WIND FARM LAYOUT

The existing wind farm (CWFI) spans 10kms from north to south and about 6kms from east to west with the 67 wind turbines located in three distinct groups. The proposed CWFII wind turbines will generally run north south over a distance of up to 12kms. The actual area occupied by the wind turbine equipment is approximately 10 hectares for the turbine footings and construction assembly area. The access tracks are approximately 12 hectares and include some upgrades to existing tracks.

The design of the Project, including the site layout and equipment specifications, is the result of a number refinements in response to matters arising out of community and stakeholder consultation, tender analysis, environmental investigations and contractor selection stages. It is considered that the resultant proposed layout provides for an acceptable impact on the environment and surrounding communities.

The Proponent has prepared two wind farm layouts that reflect the typical spacing required for wind turbines to operate efficiently for two different wind turbine models.

The final layout is dependent on the outcomes of the various engineering and environmental studies, particularly the results from ongoing wind monitoring and is proposed to include a layout of 31 WTGs or a layout of 55 WTGs depending on the final wind turbine model selected. The proponent is applying for a degree of flexibility to optimise the layouts by micro sitting within a 100m radius. The maximum number of WTG will be the 55 WTG layout, however, with optimisation and final wind turbine selection, this number may be reduced. The assessments have been completed on the highest impact scenario; any reduced number of WTG will have less of an impact.

The proposed WTGs will be located in three distinct groups, generally on the lower slopes to the west of the hills and ridges. The WTGs will be micro-sited within three separate strings oriented north to south in addition to a small cluster of two to four WTGs depending on the final layout. This layout reflects the typical spacing required for wind turbines currently under consideration and known site constraints.

The Land and Environment Court found that the relocation of wind turbine components within 250 metres is not unreasonable (Taralga Landscape Guardians v Minister for Planning NSWLEC 2007). If such relocation cannot be accommodated within a 250 metre radius of the original location, a modification application will be made to allow relocation at a greater distance. This will enable an assessment, at that time, of any possible impacts of the revised proposed location.

The key issues of the EA including noise and visual impacts have included allowances of up to 100m from the nominated location of each WTG to the nearest relevant receiver. Notwithstanding, and in accordance with the precedence established by (Taralga Landscape Guardians v Minister for Planning NSWLEC 2007), variations of up to 250m from the nominated layout of each WTG may occur.

To prepare this layout, the Proponent had to consider several key parameters and environmental site constraints, including:-

- Site boundary;
- Aerial photography;
- Landscape and topography;
- Wind speed data;
- Location of residences in the vicinity of the site; and
- General site constraints (flora and fauna, heritage, noise and communications).

The primary technical parameters that dictated the location of the wind turbines include the following:-

- To maximise the wind farm electrical output;
- Maintain turbine spacing's to minimise turbulence and airflow interactions between turbines;
- To reduce the wind farms visual impact;
- Accessibility in relation to the ability to deliver and construct large turbine components; and
- Avoid locations with unacceptable impacts on the flora and fauna.

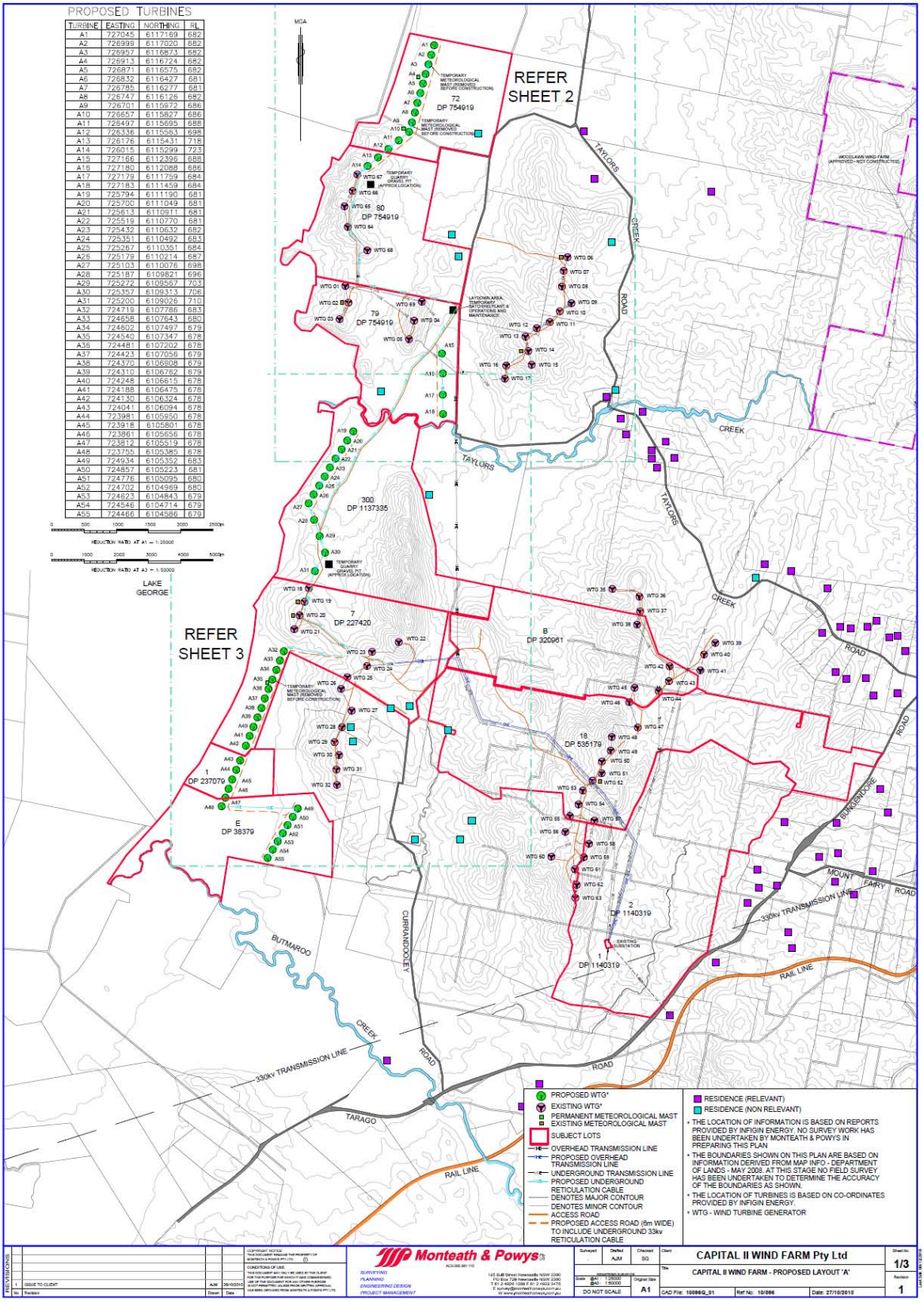

Figure 25: Proposed 55 turbine layout 'A'

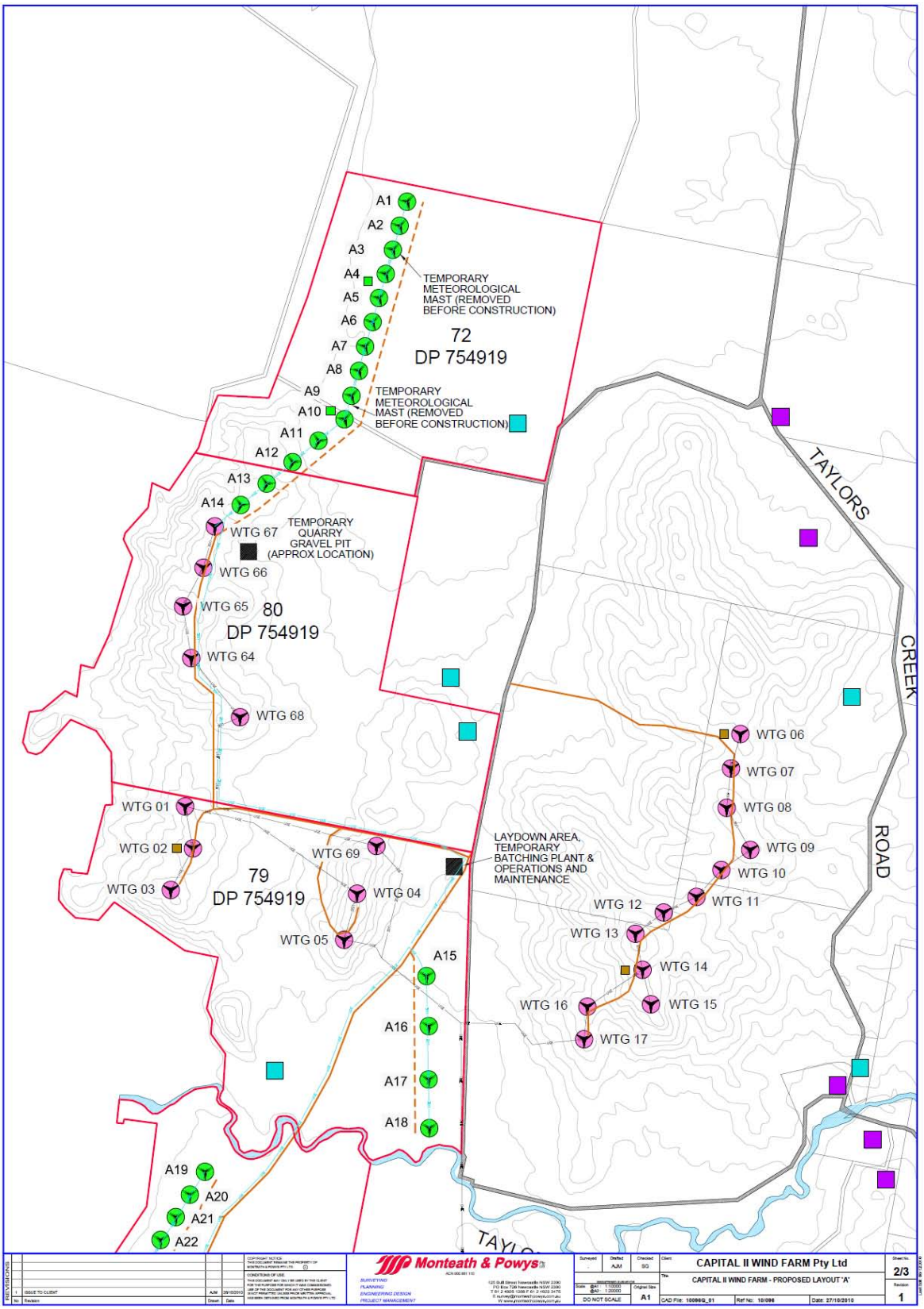

Figure 26: Proposed 55 turbine layout 'A' – North

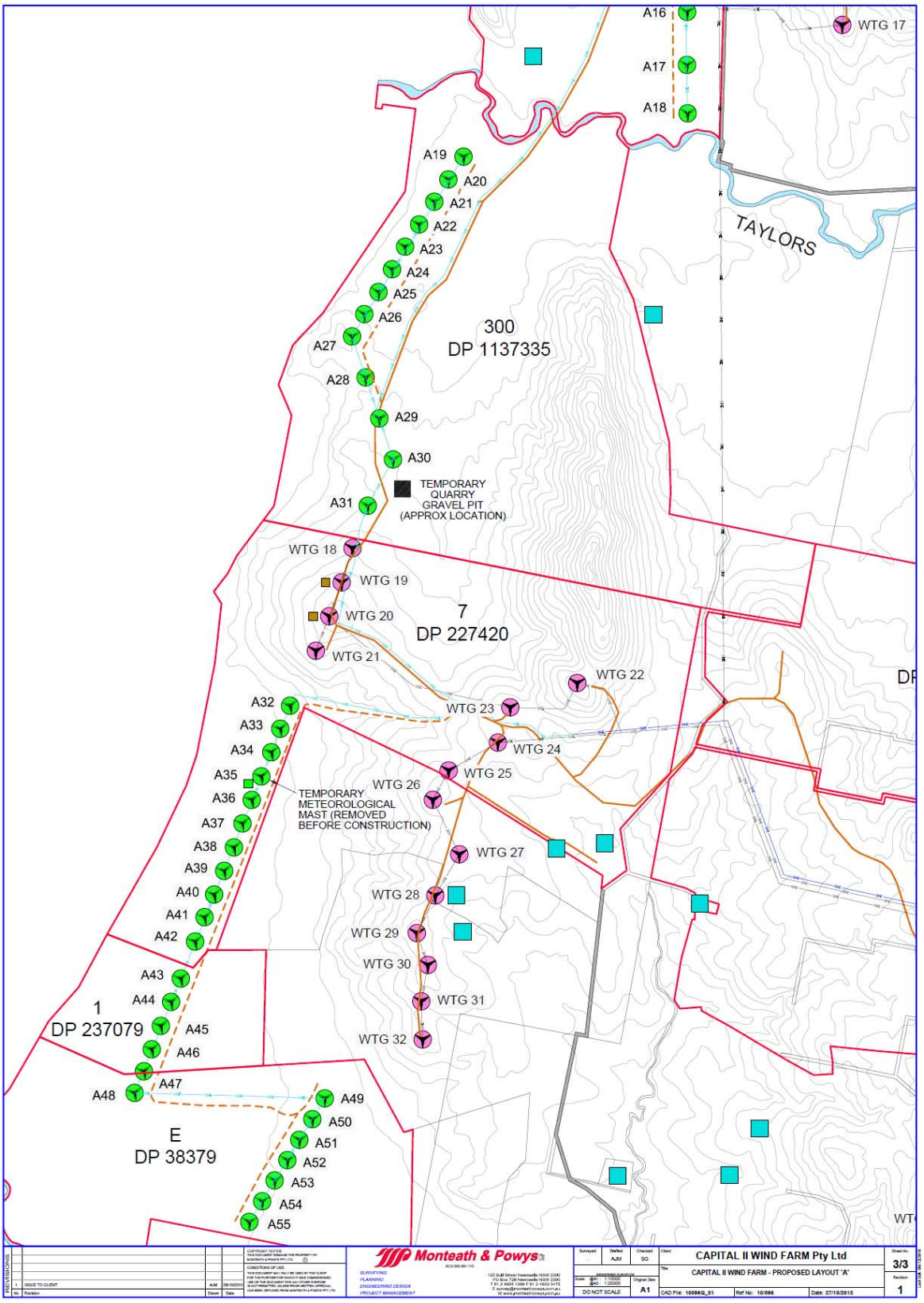

Figure 27: Proposed 55 turbine layout 'A' – South

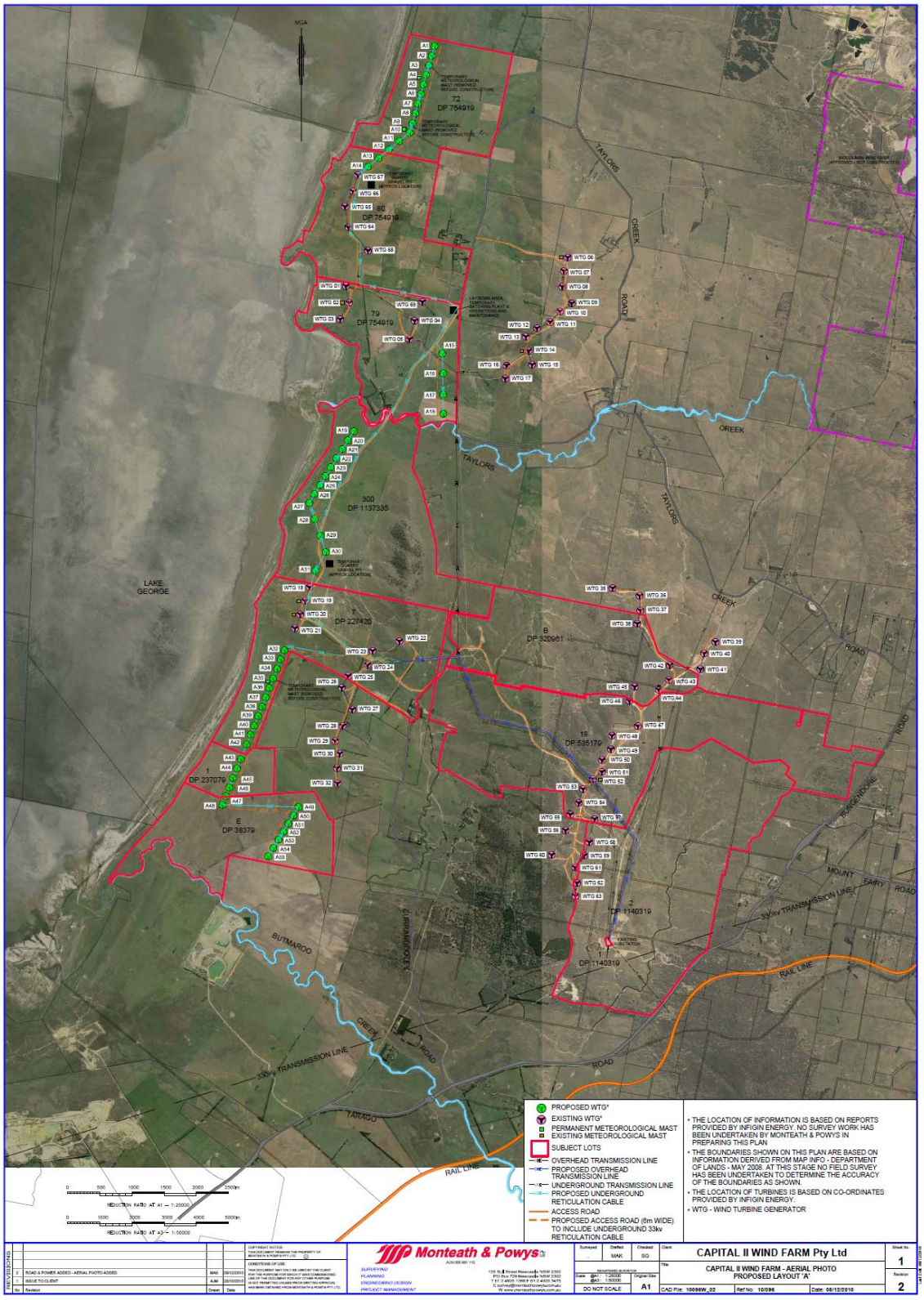

Figure 28: Proposed 55 turbine layout 'A' - Aerial

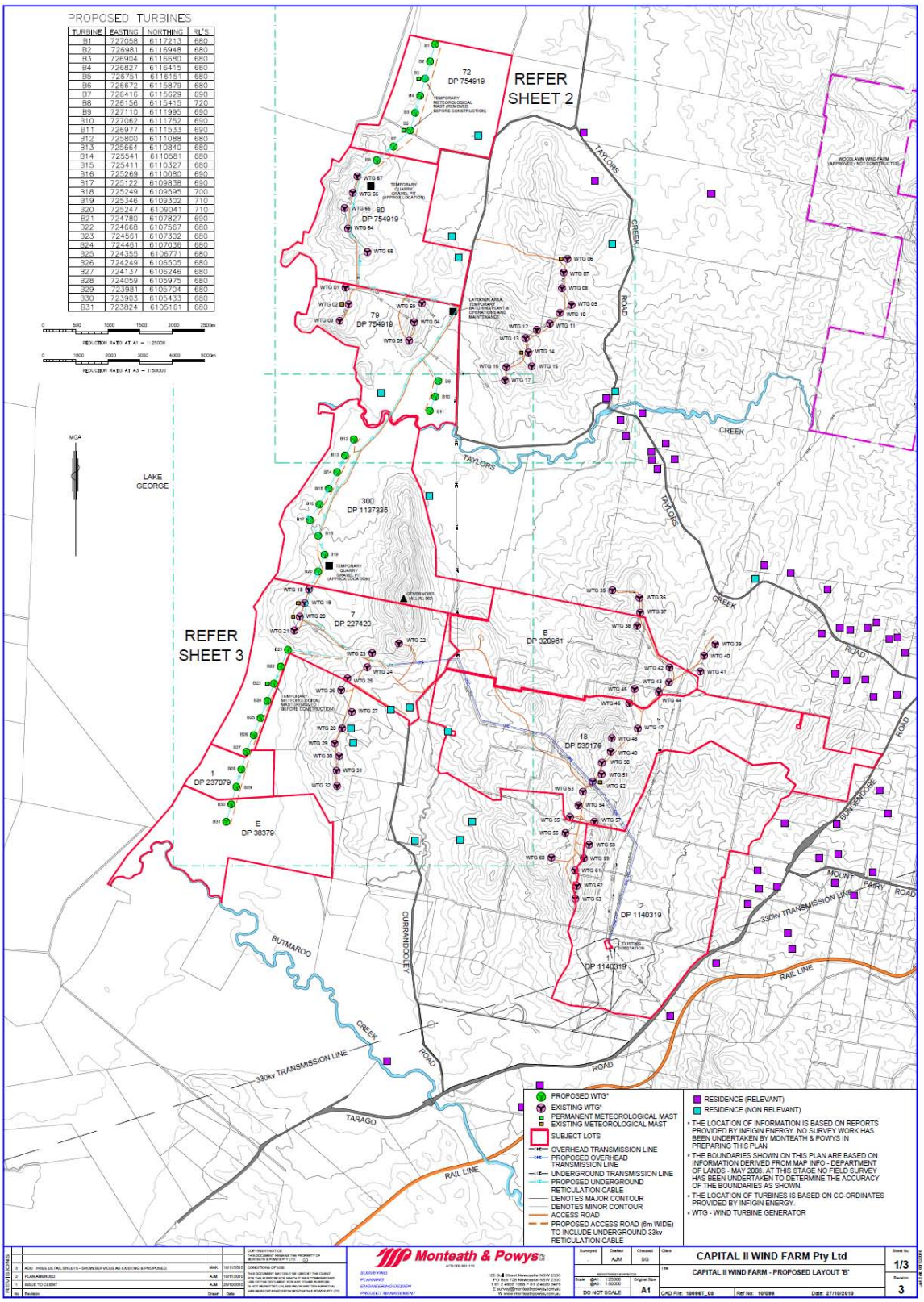

Figure 29: Proposed 31 turbine layout 'B'

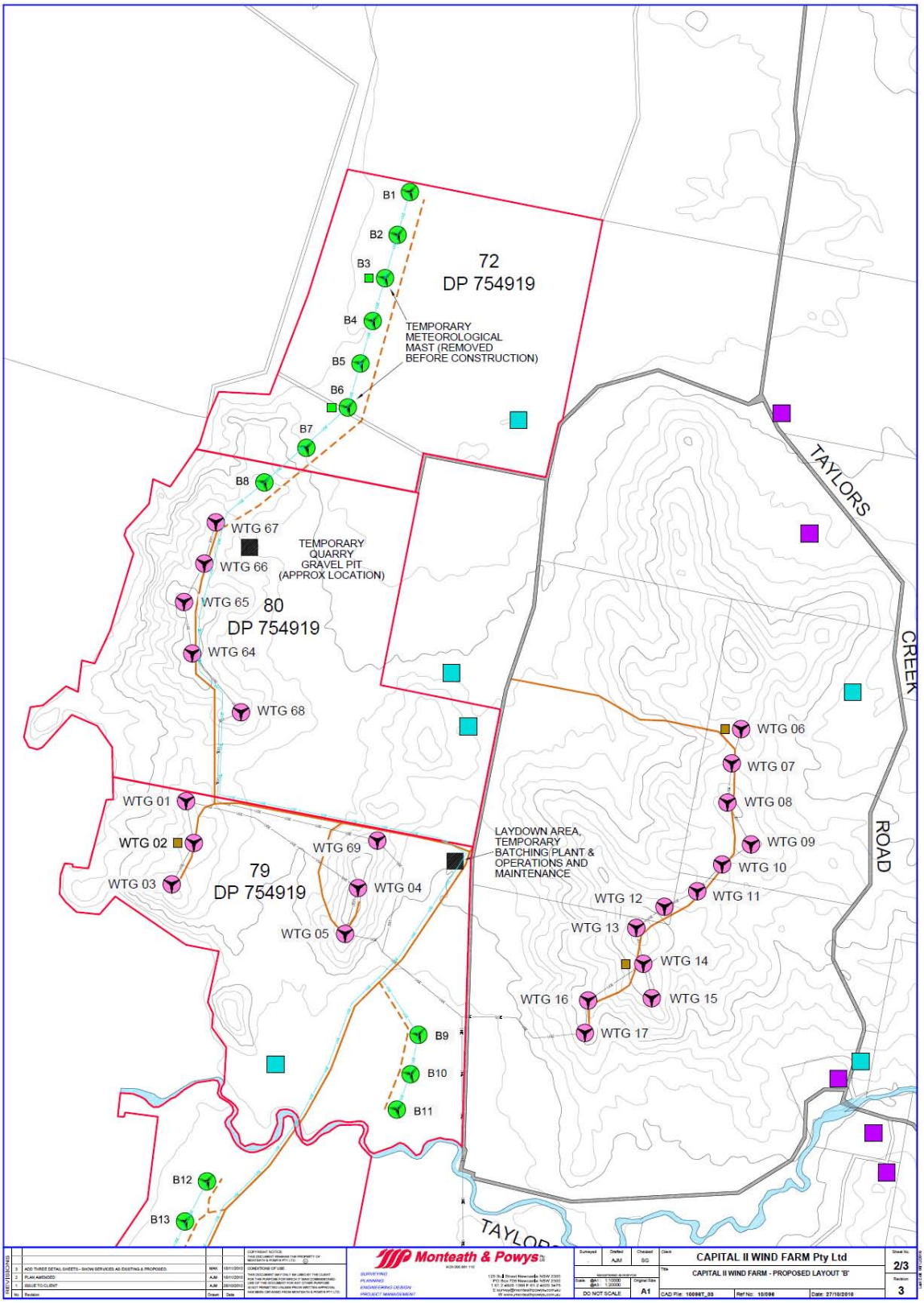

Figure 30: Proposed 31 turbine layout 'B' - North

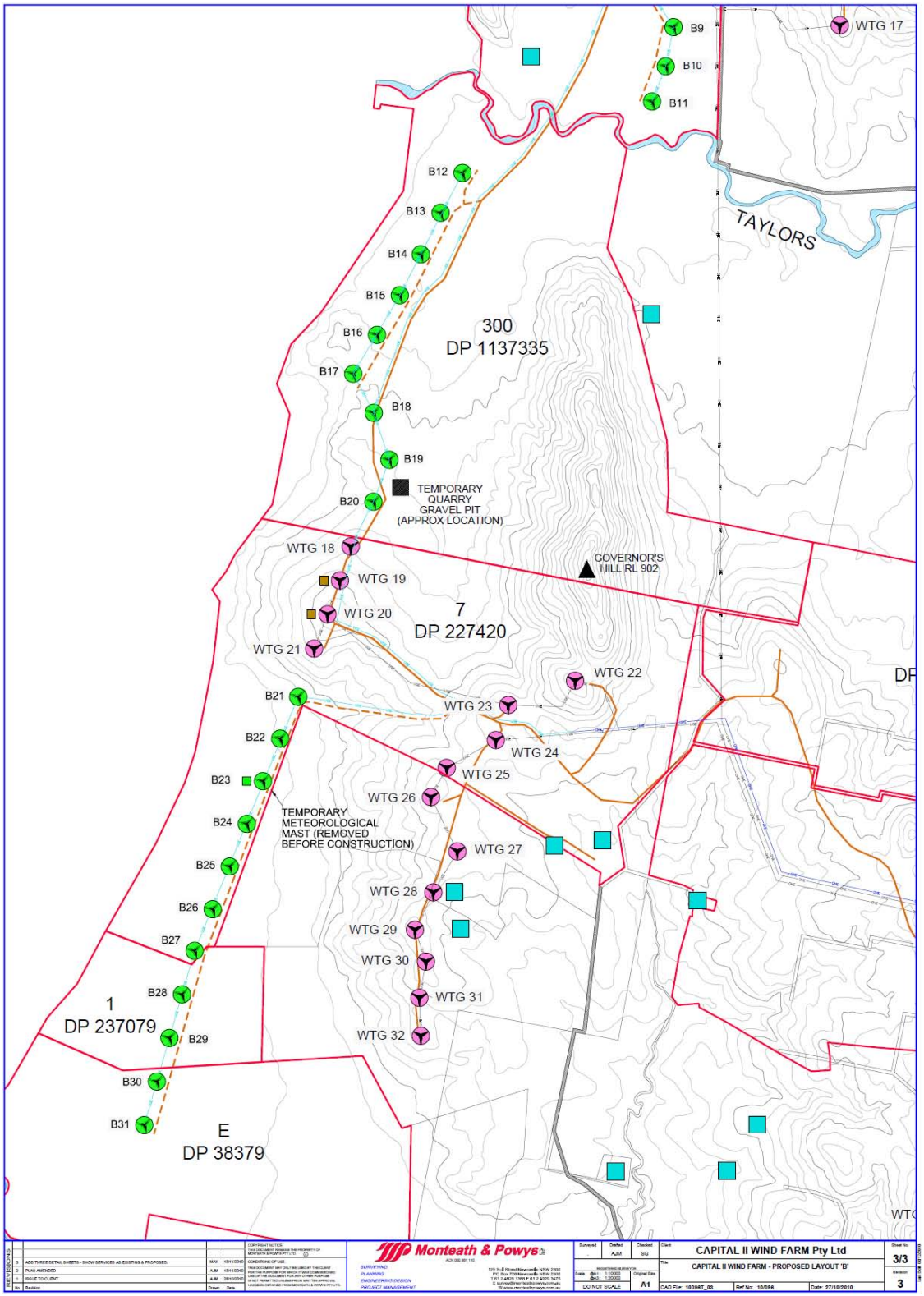

Figure 31: Proposed 31 turbine layout 'B' – South

Figure 32: Proposed 31 turbine layout 'B' - Aerial

Table 6: Extent of the Project

PROJECT COMPONENT	APPROXIMATE DIMENSIONS	ESTIMATED AREA (HECTARES)	
		Long Term	Temporary
Turbine footings (55)	Each 18 by 18 metres	1.8	-
Turbine assembly hardstand areas (55)	Each 30 by 50 metres	8.3	-
Access tracks - upgraded	6 metres wide by 20km	12	-
33,000 volt underground cables	1 to 2m wide by 20km	2-4	-
33,000 volt overhead line	30 metres by 10km (including 30m easement	30	-
Operations and Maintenance Facility	50 by 30 metres	0.15	-
Temporary construction facilities			
Site Office	50 by 100 metres		0.5
Mobile Batch Plant (2)	70 by 70 metres		0.5
Gravel pit and crushing facility (up to 2)	100 by 100 metres		1
	Totals	**57**	**1**

3.4.3 CONNECTION TO THE ELECTRICAL GRID

The WTGs will be connected to the national electrical grid by a combination of underground and overhead 33kV transmission lines. The WTGs will be linked by underground cables and overhead lines will be used to connect the groups of WTGs to the existing substation.

The Project is able to utilise the infrastructure already constructed to connect CWFI and the connection infrastructure currently under construction for the Woodlawn Wind Farm (WWF), to connect to the national electricity network. The existing infrastructure, including the on-site substation and on-site transmission network are able to sustain the increased supply generated from the new wind turbines with only minor augmentation necessary. Under the project approval for the WWF a 180 MVA transformer has been approved. The Project will be able to utilise the additional capacity of this transformer. In order to connect the new wind turbines to the existing substation, additional overhead transmission lines are likely to be required.

Alternatively, the option to duplicate the existing transmission lines included in the Project Approval for CWFI may be exercised subject to commercial and technical feasibility. The extent of additional electrical infrastructure include:-

- Up to 55 pad mount transformers; depending on the turbine model selected, there may be one transformer at the base of each turbine site;
- About 20 kilometres of 33,000 volt underground cables;
- About 10 kilometres of 33,000 volt over head transmission lines;
- About 20 kilometres of optic fibre control cables; and
- Additional on-site control and communications cabling.

The routes for power reticulation and the use of overhead or underground cabling would be finalised taking into account the ease of excavation of cable trenches with an effort to limit any potential erosion.

The energy generated from the new wind turbines would then be stepped up at the substation to 330,000 volts.

Other ancillary components of the Project include:-

- Up to three permanent meteorological monitoring masts;
- Crane hardstand areas adjacent to the WTGs;
- Staging areas for partial assembly of WTG components;
- Minor upgrades to existing transformer, control room and 33,000 volt switchyard at the existing substation; and
- Operation and maintenance building.

In addition to the above permanent works, the following temporary and ancillary works will be undertaken:

- Delivery of infrastructure, equipment and material;
- Up to two temporary concrete batching plants;
- Earthworks associated with the gravel pit/s;

- Laydown areas;
- Construction site office;
- Staff lunch rooms and facilities;
- Up to three temporary meteorological monitoring masts; and
- Testing and commissioning of the WTGs.

3.5 PROJECT LIFE CYCLE

3.5.1 CONSTRUCTION

Civil works associated with wind farm construction cause the most significant disturbance and impact on the local environment. Civil works include the access roads, hardstands, cable trenching and tower footings. A Construction Environmental Management Plan (CEMP) will be prepared to establish the management framework for environmental issues relating to the construction phase of the CWFII.
The CEMP will formalise the processes and procedures to ensure compliance with the relevant statutory instruments and that the appropriate levels of environmental standards are achieved.

The project works can be subdivided into two main components:-

- Construction works related to the WTGs: delivery, assembly and erection of up to 55 WTGs (including towers with four sections, nacelle and three blades for each), temporary (three) and permanent (three) meteorological masts. Required infrastructure including foundations for the WTGs and access roads.
- Construction works related to the electrical connection of the WTGs to the 33kV reticulation system and further on to the existing 33kV substation: and possibly include a kiosk transformer per WTG, its earthing and 33kV switch gear, and the required electrical feeders.

The construction works will be staged between the geographically separate parts of the site and the types of work being undertaken for each component area of the site. This is required to ensure an orderly progress of the construction works and efficient management of activities.

Construction activities and heavy vehicles deliveries will be similar to the construction program implemented for the CWFI.

Assuming construction works would be undertaken progressively on two fronts concurrently, a workforce of up to 90 staff at any one time would be expected. The number and expertise of employees will change throughout the project from civil to electrical and further on to installation. It is expected that construction staff will be accommodated off site in nearby towns.

Hardstand area

The hardstand area is used for placing the crane during erection of the wind turbine. It must be level and usually requires a compacted gravel rubble surface. The size is dependent on the requirements of the crane, but is typically of the order of 30 metres by 50 metres.

Access roads

The WTG's are interconnected by unsealed internal site access roads that have been constructed as part of CWFI or will be constructed as part of this Project. Access roads within the site may be up to 6 metres wide and will be graded to allow for controlled run-off. The access roads are typically surfaces with gravel rubble. Throughout the operation phase of the wind farm, the operation and maintenance personnel will continue to utilise the access roads. All existing access roads will be utilised where available, including the necessary watercourse crossings.

Figure 33: Typical access road in Capital I Wind Farm

Accordingly there are no works associated with the construction of the access roads within 40 metres of any major watercourse, however it is likely that several culverts will be required to suitably manage stormwater flows besides the access roads.

Depending on the frequency of traffic and the loads applied, general maintenance of access roads will require regular grading at a frequency of every four to six months using a grader, smooth drum roller and water cart.

Drainage control structures such as table drains, cross-over drains and pipe crossings will be constructed as part of the access roads to ensure they continue to function effectively and the road maintains its structural integrity. Drainage structures incorporated into the works are designed to ensure the effective management of stormwater run-off and serve to direct run-off away from access roads and hardstands. Effective operation of these structures is a key to ensuring the ongoing performance of the access roads and, at the same time, limiting potential erosion across the site.

Figure 34: Existing access track water crossing over Taylor's Creek

Overall every effort will be made to ensure that access tracks are:-

- Minimised in length;

- Located along the routes of existing tracks where possible;
- Located where clearing of vegetation is minimised;
- Constructed with due regard to erosion, sediment control and drainage;
- Positioned and designed as far as possible to reduce visual impacts; and
- If not required for the ongoing operation and maintenance of the works, removed and revegetated on completion of the construction phase.

Cable Trenches

The electrical distribution system consists of underground cable between the WTGs, generally about one metre in depth to give a maximum cover of 0.75 metres. The width of the trenches will be about 0.5 to 0.75 metres with power cables and control cables being installed in the same trench.

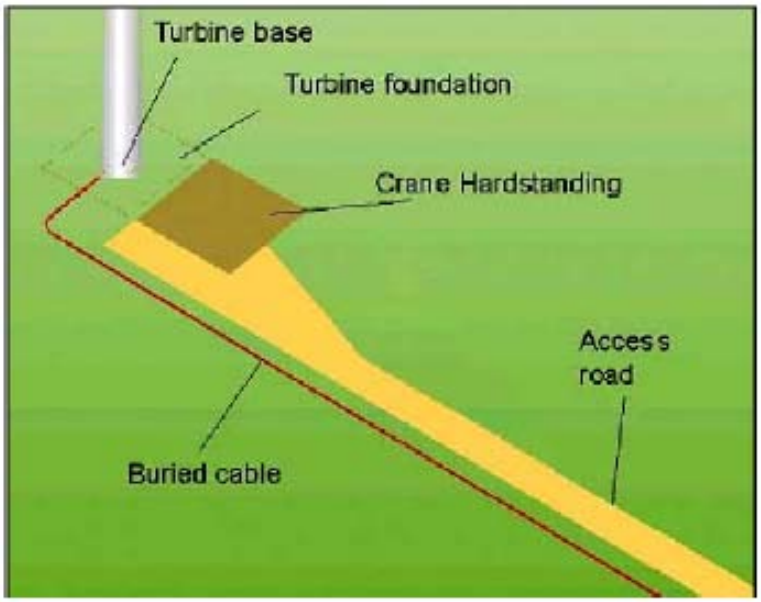

Figure 35: Civil Works at base of turbine (Suzlon CEMP CWF 2008)

Temporary Concrete Batching Plant

Two temporary batching plants may be installed consisting of a trailer mounted concrete mixer, cement bins, sand and aggregate stockpiles and a storage container for various equipment and tools.

The batch plants will be powered by diesel generators and will have a capacity of 50m^3/hour. All temporary construction facilities will be removed and the land restored once the construction stage has been completed.

Gravels Pit and Crushing Facilities

A supply of road base material will be required for construction of access tracks to turbine sites. It is proposed that to the extent practical, this be sourced from the properties on which the wind farm will be located.
This will reduce the need for aggregate material to be transported to the site. Part of the road base requirement may be sourced from material extracted from turbine footings but the bulk is expected to be obtained from on-site gravel pits. The total per annum volume of material obtained from on-site sources will not exceed 30,000 cubic metres or be extracted over an area not more than 2 hectares.

Traffic and Transport

Heavy vehicle deliveries will be in accordance with a Traffic Management Plan (TMP) and any conditions of the project approval.

The details of the TMP for the delivery of the large items will be similar to that prepared for CWFI. An updated TMP will be prepared for the construction of CWFII following consultation with the relevant councils and other stakeholders.

In addition to the above main components of the project, construction activities will be staged between the geographically separate parts of the site and the types of works being undertaken for each component of the site. This will be required to ensure an orderly progress of the work and efficient management of activities.

These two phases and the different noise impacts are represented in the noise model undertaken by Vipac. This has been discussed in Chapter 8.

Construction Timing

It is expected that construction of the Project would take 12-18 months. The intent is to have the project operational by mid 2012.

Table 7: Construction sequence

ACTIVITY	WORKS INVOLVED
Site Establishment	Clearing of work areas, levelling and compaction, installation of portable buildings and installation/connection of utility services. Site Survey.
Internal Road Works	Removal of topsoil, levelling, sub-base compaction, gravel, drainage.
External Road Works	Upgrade existing roads where required.
Foundations	Removal of topsoil, excavation, screed concrete, reinforcement steel bottom, installation of foundation ring, reinforcement steel top, concreting, concrete ring and conduits, backfilling.
Crane Pad Establishment	Removal of topsoil, base compaction, rock/gravel compaction.
Trenches and Cabe Laying	Excavation, sand infill, cable laying with protective covering, fackfilling and compacting, installation of cable route markers.
Electrical Works	Control building switchboards, communications, Supervisory Control and Data Acqusition (SCADA) systems. Installation of cabling, switchgear, turbine control panels.
Turbine Supply	Transport of towers, nacelles, hubs and blades to site.
Turbine Erection	Erection of towers, nacelle, blades, installation of cabling.
Wind Farm Commissioning	Pre-commissioning of turbines, SCADA, cables testing, optical fibre. Testing and commissioning of turbines, switchgear, SCADA.
Construction Closure	Site cleanup, revegetation, landscaping.

3.5.2 OPERATION

The operation phase of the project reflects the leasing arrangement with landowners. During the operation, all infrastructure associated with the wind farm would remain the responsibility of the Proponent. All access tracks used by the wind farm would be maintained by the wind farm operator as part of the operation of the wind farm.

It is proposed to operate the facilities within the Project 24 hours a day, seven days a week. A number of core activities would be undertaken on site during the operation of the Project. The wind farm would be controlled by a computerised system.

The system would be linked to each turbine by fibre-optic cables laid in the same trench as the electrical cables. The computerised system would log all relevant operating parameters and initiate the most efficient functionality of the turbines according to the atmospheric characteristics. The computerised system would also enable the controller to stop the turbines should the need arise.

The computerised system would ensure that rotational speed and the wind turbine angle operate automatically within the wind speed design envelope.

WTGs require regular and ongoing maintenance. Maintenance checks would rarely involve the use of a crane to remove or replace turbine components.

The operation of the wind farm is estimated to provide full time employment for up to ten people.

3.5.3 DECOMMISSIONING

At the end of its economic life, the components of the wind turbine equipment will either be replaced with new equipment or the wind farm would be decommissioned. It is expected that each WTG will have an operational lifespan of 25 years. Where appropriate, several components may be retained, such as the tower and new components replaced such as old blades and nacelles. Refurbishment of the Project may extend the operational lifespan of the wind farm.

Decommissioning will involve dismantling and removal of all aboveground elements and the site will be rehabilitated, including overhead transmission lines (subject to the adjacent CWFI, WWF and CSF). Following dismantling, the components of the WTG may be recycled. Access tracks may be retained depending on the landowner's wishes. If not required, the access tracks would be removed and the Project site reinstated as close as possible to its original condition.

3.6 RESOURCE REQUIREMENTS

The wind turbines will be imported from the manufacturers. Where commercially feasible, components such as power lines, buildings, control equipment will be sourced from within Australia.

Road base (gravel) for the access roads will be obtained from either excavations made for the WTG footings, from other sources within the development envelope, from existing gravel pits located within the Project site, or from commercial suppliers.

3.6.1 WATER AND SEWER

Water Supply

The Project site is not located within a potable water supply catchment and relies on groundwater extraction bores to service the water needs. It is acknowledged that the region is under significant stress due to inadequate water supply with nearby townships such as Bungendore approaching the sustainable yield (based on current usage rates).

Water will be required throughout the construction phase for concrete mixing, road construction and dust suppression. The water requirements are expected to be met from a variety of sources, however it is anticipated that groundwater will be suitable to supply the majority of water needs. The necessary licenses for water extraction will be secured if required.

Potable water will be supplied to the proposed facilities and ancillary buildings from a rainwater storage tank designed to collect water from roof drainage.

Wastewater Treatment

The capacity of the existing substation septic system constructed for CWFI was designed to handle the demand generated from the peak staffing period during the construction phase of CWFI. Accordingly, as the construction phase of CWFII is expected to have a similar or potentially reduced demand, the existing wastewater service is expected to be sufficient. Should additional services be required, temporary on-site septic systems or relocatable toilets will be provided at various locations throughout the Project site.

Waste Material

A Waste and Re-Use Management Plan was prepared for the construction and operation of CWFI. A similar plan will be implemented to manage the waste generated from the site. The Proponent will be responsible for the removal of all other wastes from the Project site.

3.6.2 ELECTRICITY AND TELECOMMUNICATIONS

The new Operations and Maintenance facility will include all necessary services and utilities including toilet facilities, telephone and communication connections and mains power.

Mobile phone coverage is available over most of the site. The Project will not rely on this form of communication however it can be assumed that both mobile phones and two-way radios will be used by staff to communicate across the site.

4. STRATEGIC AND PROJECT JUSTIFICATION

The Director-General's Requirements require a strategic assessment of the need, scale, scope and location for both the wind farm and transmission lines in relation to predicted electricity demand, predicted transmission constraints and the strategic direction of the region and the State in relation to electricity supply, demand and electricity generation technologies, and its role within the Federal Government's Renewable Energy Target scheme.

4.1 STRATEGIC ASSESSMENT

The growing awareness of the impacts of climate change, and the ongoing implementation of climate change policies, will over time, change the way in which Australia produces and consumes electricity. Australia accounts for only 1.5% of global greenhouse gas emissions, and approximately 70% of these emissions come from the production and use of energy. Over the 10 years from 1997-98 to 2007-08, Australia's electricity use increased at an average rate of 2.8% per year. The majority of Australia's electricity is produced using coal, which accounted for 76% of total electricity generation 2007-08. This is because coal is a relatively low cost energy source in Australia. It also reflects the abundance of coal reserves along the eastern seaboard where the majority of electricity is generated and consumed.

Table 8: Australian electricity generation by fuel (IEA, World Energy Balances 2009 ABARE)

	2003-04 TWh	2004-05 TWh	2005-06 TWh	2006-07 TWh	2007-08 TWh
FOSSIL FUELS					
Black Coal	124.4	131.9	137.2	136.7	142.7
Brown Coal	57.5	60.8	61.7	57.5	59.6
Oil	1.6	1.9	2.4	2.2	2.4
Gas	32.6	32.2	30.6	39.2	42.2
Total Fossil Fuels	**216.1**	**226.8**	**231.9**	**235.6**	**246.9**
RENEWABLES					
Hydro	16.3	15.6	16.0	14.5	12.1
Wind	0.7	0.9	1.7	2.6	3.9
Solar	0.1	0.1	0.1	0.1	0.1
Biomass	1.1	1.1	1.1	1.1	1.2
Biogas	0.8	0.8	0.9	0.9	1.0
Total Renewables	**19.0**	**18.5**	**19.8**	**19.2**	**18.3**

The NSW Government is focused on actions needed to reduce greenhouse gas emissions, build a prosperous low-carbon economy and prepare NSW for unavoidable changes in our climate.

4.1.1 NEED FOR THE PROJECT

Concerns about the environment and the threat of global warming continue to play an increasingly important role in global politics. In NSW, more than 90% of electricity is generated from coal and 28% of greenhouse gas emissions are due to the generation of electricity (SEDA NSW Wind Energy Handbook 2002).

Generating electricity from wind energy causes no greenhouse gas emissions. Wind energy also avoids other environmental impacts associated with coal-fired electricity generation. These impacts include emissions of oxides of nitrogen and sulphur, which cause acid rain and other atmospheric pollution. Wind farms offer several strategic and long term benefits. In addition to specific local and environmental benefits, wind farms:-

- Reduce greenhouse gas emissions, helping to move towards cleaner electricity generation and reduce the impact of climate change in a carbon-constrained environment.

- Supply renewable energy that would assist electricity retailers to fulfil their obligations under State and Federal renewable energy targets, and would otherwise lead to increased consumption of non-renewable fossil fuels.

- Provide additional generation capacity into the NSW grid that would assist in meeting load growth and result in a clean, reliable generation mix.

- Provide an opportunity for greater regional investment as the renewable energy section grows in NSW.

Today's Wind Energy Industry

In the last 20 years, wind energy has gone from an emerging source of fuel to a significant energy resource in many countries. Generation costs have fallen by 50% over the last 15 years, moving progressively towards the cost of conventional energy sources in many markets. Wind energy continues to become more price competitive, as traditional fuel prices escalate and further technical efficiencies are achieved.

Cumulative wind power capacity worldwide grew from 4,500 MW to 158,505 MW between 1995 and 2009, according to statistics released by the Global Wind Energy Council, with 38,343 MW installed in 2009 alone.

Wind power is now established as an energy source in over 50 countries worldwide, and generates an increasing amount towards the world's overall electricity supply. Emerging Energy Research forecasts that wind energy will account for approximately 3% of global electricity generation by 2015.

Key Factors Driving the Rapid Development of Wind Energy

A range of policy measures have been introduced in Australia to support the uptake and development of renewable energy. These measures include the Australian Government's Renewable Energy Target (RET). The renewable energy sources that have experienced the greatest growth under the RET are wind energy and solar hot water. In 2008, electricity generation from wind was 3,125 GWh higher than in 1997.

There are three key factors driving the growth of renewable energy and wind energy globally, in particular:-

- Recognition of the desire to address human-induced climate change through a reduction of greenhouse gas emissions.
- Need to reduce the dependence on, and depletion, of non-renewable resources.
- Desire by many countries to diversify the sources of their energy supply.

Predicted Electricity Demand

Australia faces a major challenge to maintain its long-term energy security, including the adjustment to a carbon-constrained future. Over the past five years, electricity generation in Australia has increased by 7%, and the number of customers has also increased by around 7%. The NEM has projected under a medium growth scenario that the national energy demand is projected to increase 2.1% per year over the next 10 years. In NSW the projected annual average growth rate is lower at 1.8% over the next 10 years (medium growth scenario). The rate of growth has risen from 2009 due to the less severe than expected economic slowdown in NSW and improved economic outlook in the near term, compared to 2009 projections.

Conversely to projected demands based on traditional patterns of consumption, consumer behaviour is also likely to affect electricity demand in the future as changing consumption patterns as a result of policy responses to climate change that are likely to result in an increase in energy conservation.

Overall, without an increase in electricity generation capacity, it has been projected that the low reserve capacity (LRC) calculated by the AEMO will be exceed by 2017.

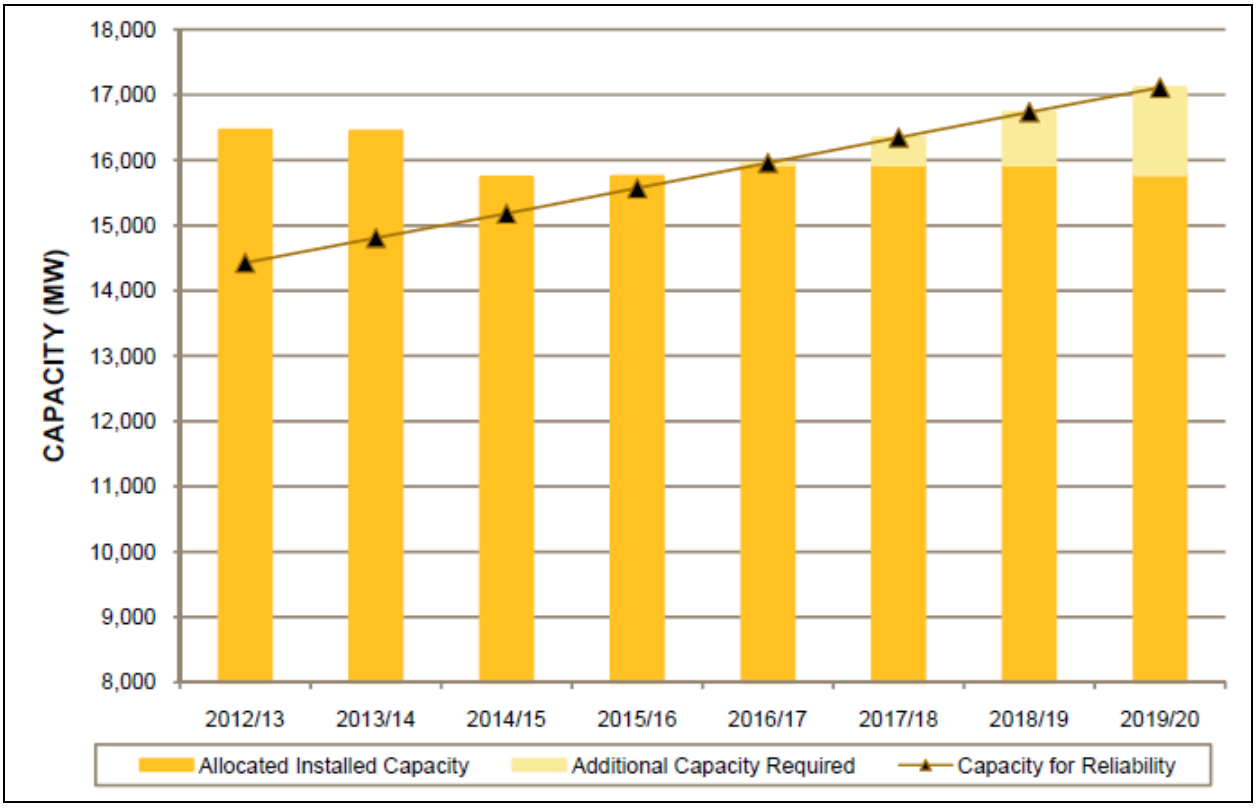

Figure 36: New South Wales supply demand outlook summary (AEMO 2010)

Electricity Supply

Electricity supply in NSW is generated from a wide range of fuel sources including black coal, natural gas, coal seam methane gas and renewable energy sources such as hydro, wind, biomass and solar.

NSW currently has installed electricity generation capacity of around 18,000 megawatts (MW). A further 16,000 MW of power plant proposals (3,800 MW from renewable sources – including CWFII updated 27 September 2010) are at various stages of development from concept to construction (NSW Department of Industry and Investment).

A report by the Australian Energy Market Operator (AEMO) shows that NSW has been prudent in its planning for the State's future electricity needs, however to meet the State and Federal RET's, a greater proportion of new power plants would need to be from renewable sources.

Transmission Constraints

The distribution of renewable energy production facilities in Australia reflects the climatic characteristics of different regions.
Hydroelectricity capacity in Australia is mostly located in New South Wales, Queensland, Tasmania and Victoria, while wind farms are most abundant in South Australia and Victoria. Almost all bagasse fuelled energy production facilities are located in Queensland where sugar production plants are located.

Given the limitations presented to wind farms due to difficulties in connecting to major transmission lines from areas with a proven wind resource, the benefit of utilising the existing transmission infrastructure constructed as part of CWFI supports the decision to maximise the wind resource in the area.

National Electricity Market

The National Electricity Market (NEM) is the name of the Australian wholesale electricity market that facilitates the exchange between electricity producers and electricity consumers. This process is operated by the Australian Energy Market Operator (AEMO), an independent organisation that manages the wholesale and retail energy market operations.

The NEM is a wholesale market through which generators and retailers trade electricity. Wholesale trading in electricity is conducted as a spot market where supply and demand are instantaneously matched in real time. Generators offer to supply the market with specific amounts of electricity at particular prices. Offers are submitted every five minutes. From all offers submitted, AEMO determines the generators required to produce electricity based on the prevailing demand.

4.1.2 SCALE OF THE PROJECT

There is no set size for a wind farm. The scale usually depends on economics, available land and transmission capacity. The proposed Project was designed to maximise the local wind resource and existing grid capacity whilst ensuring that the efficiency of the existing WTGs and those proposed will not be affected by turbulence generated from wind turbines being located too close to each other.

4.1.3 SCOPE AND LOCATION OF THE PROJECT

A rigorous site selection process was undertaken to determine the most appropriate location prior to the development of the Capital Wind Farm (CWFI). The site of CWFI has proven to be both financially successful and environmentally sustainable.

Given the ancillary infrastructure required to support a wind farm such as an electricity substation, access roads, and transmission lines, the establishment costs of a wind farm could be significantly reduced if the existing infrastructure is able to support additional loading, specifically, an increased loading from additional wind farms/wind turbines.

The operational CWFI and the under construction WWF provide a large amount of essential infrastructure required to support a wind farm, and there are synergies gained from co-locating the projects including increasing its viability. The Project can share infrastructure, lending significant benefits to the Project and increasing its viability. It also limits the potential environmental impacts arising from additional substations, control buildings and switchyards that are not necessary given the proximity to the existing essential infrastructure.

Upon assessment of the variables associated with the establishment of a wind farm, the development of a wind farm adjacent to CWFI was concluded to create a potentially lesser impact on the environment (reduced footprint) and would be more financially feasible due to the reduced costs associated with sharing the adjacent infrastructure.

Wind Resource

The New South Wales Wind Atlas (**Figure 377**) provides a rudimentary map of areas within the State with the highest average wind speeds, accordingly these areas potentially offer the best locations for the siting of a wind farm.

The need for extensive wind monitoring to determine if the site benefits from a valuable wind resource was not necessary as the site has a proven wind resource. Notwithstanding, ongoing wind monitoring continues in several locations within the site to determine those parts of the site that are less affected by localised variations created by obstacles, turbulence, and topography. From this information, the placement of wind turbines can be determined. Further assessment is required to determine the minimum turbine spacing's and the model of wind turbine that would best convert the wind resource and useable and transportable energy.

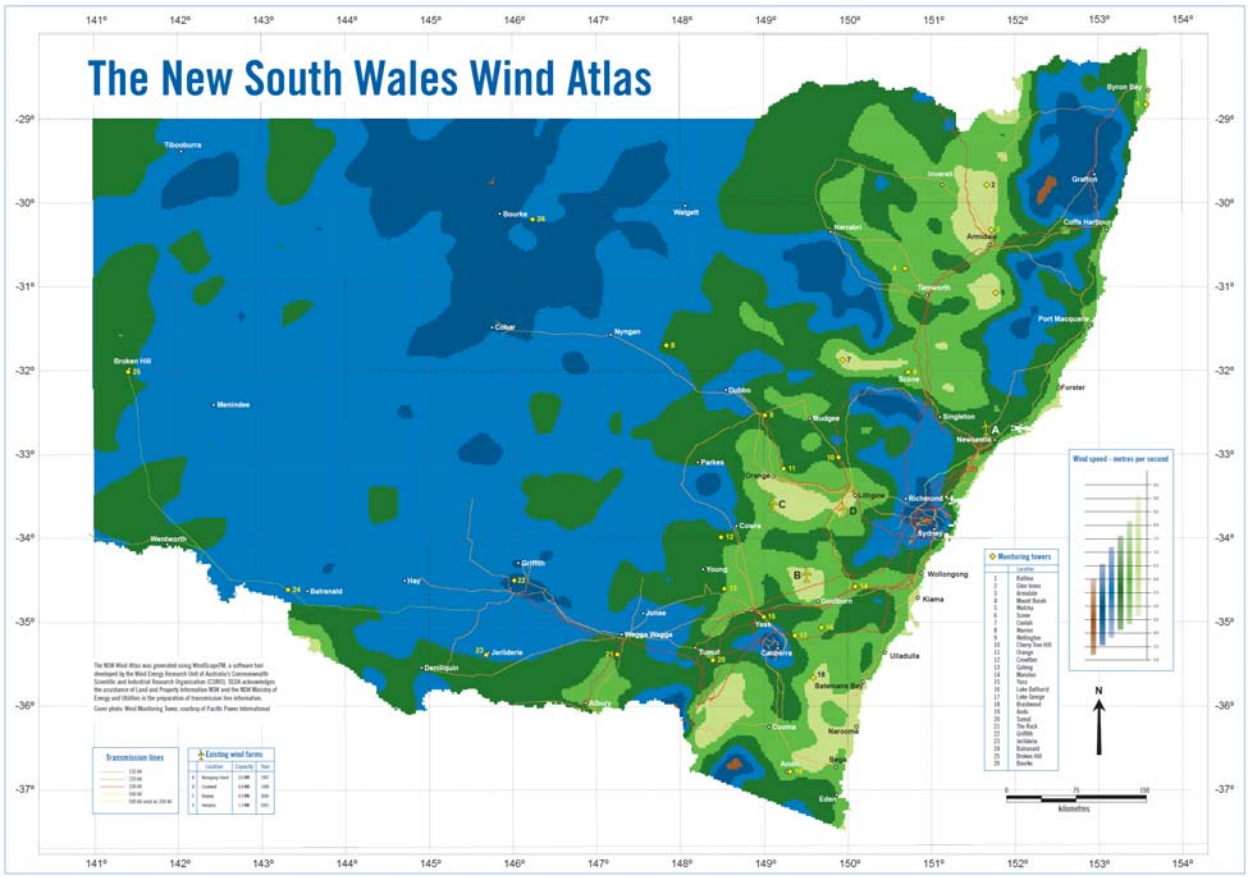

Figure 37: NSW Wind Atlas (SEDA, NSW Department of Industry and Investment)

Market Supply

The proposed Project provides an additional source of renewable power generation over its operating life of around 25 years.

Its location between the major electrical load centres of Canberra and Wollongong, where the electricity may be consumed is advantageous in that electrical transmission losses associated with voltage drop increases the further away the consumer is from the generator will be minimised.

4.1.4 STRATEGIC DIRECTION OF THE REGION

Renewable Energy Precinct

The site is located within the NSW/ACT Border Region Renewable Energy Precinct (REP) (**Figure 38**).

REPs were established in areas with the best known wind resources in order to streamline the planning and approval process.

In support of the expanded Federal Renewable Energy Target scheme (RET), the NSW Government introduced planning reforms to encourage an investment in renewable energy projects.

CWFII is to be assessed as a Critical Infrastructure Project.

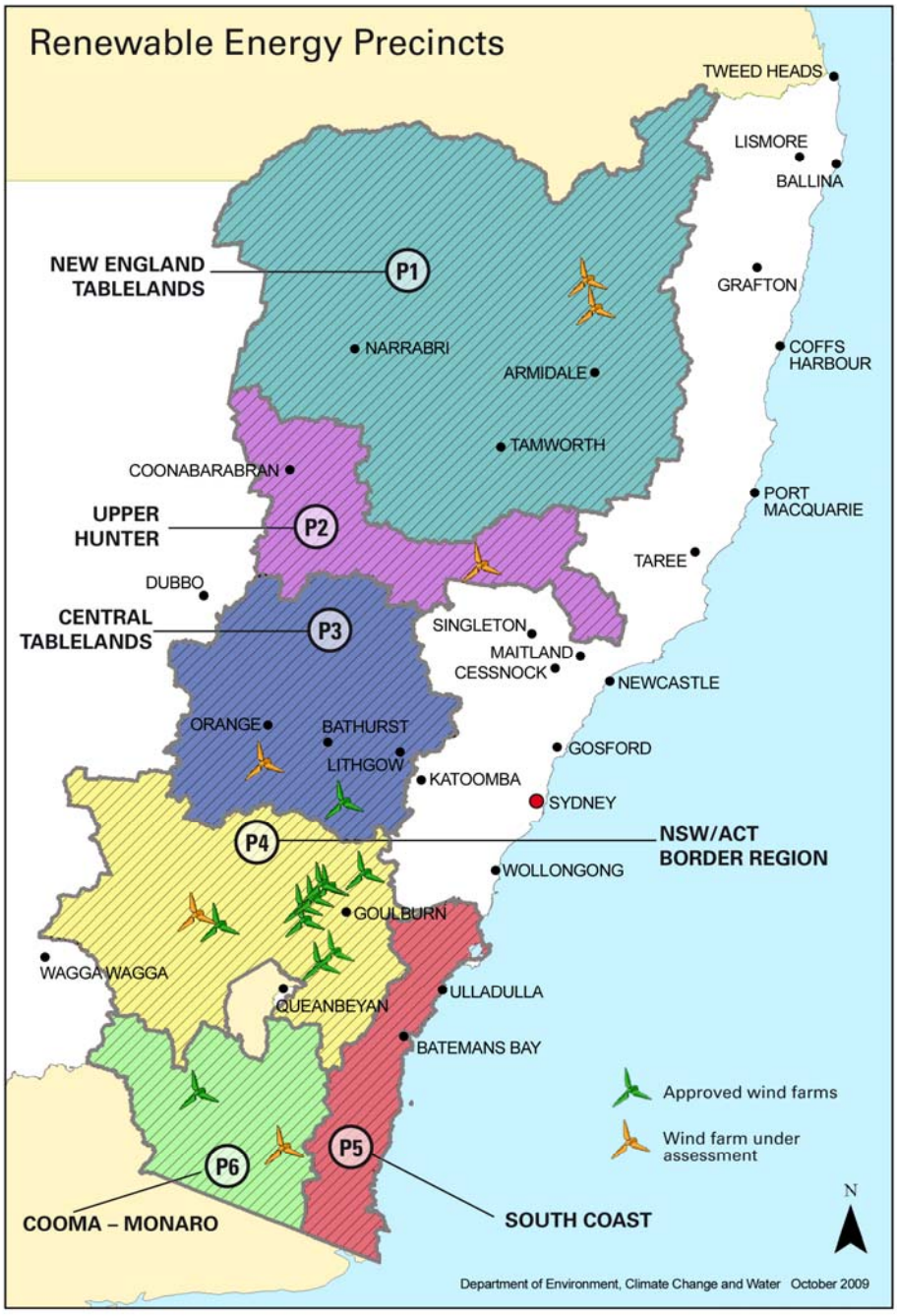

Figure 38: Renewable Energy Precincts Map (NSW DECCW 2009)

Sydney – Canberra Corridor Regional Strategy

The Department of Planning (DOP) prepared a Sydney-Canberra Corridor Regional Strategy (SCCRS) in 2006 that applied to several local government areas found along the Sydney-Canberra Corridor including Palerang Council. The purpose of the SCCRS is to accommodate and manage growth while ensuring that the rural landscapes and environmental settings that define the regions character are not compromised.

The SCCRS recognises that the region has become attractive for wind farming which has identified a challenge to balance the scenic and cultural landscape values with the potential economic benefits for rural areas and the much wider reaching environmental benefits.

Wind farms are not included in the aims of the SCCRS however the SCCRS aims to manage the environmental impact of development whilst supporting economic growth, mainly to support the projected population growth in the region.

Accordingly, the Project has been designed and will occur in a way that safeguards and enhances the existing environment and regional biodiversity. Without the benefit of local planning tools to direct the development of wind farms, CWFII recognises the need to reduce conflict with existing communities, recognises and protects key landscape features, and most importantly, takes the greatest advantage of the potential economic and environmental benefits available to be capitalised on.

Overall the SCCRS supports the development of wind farms and includes an action plan to preserve the opportunity for wind farming by restricting incompatible land uses in high quality wind resource areas.

4.1.5 STRATEGIC DIRECTION OF THE STATE

The New South Wales (NSW) Government is focusing on renewable energy generation as a key response to the increasing greenhouse gas emissions. The NSW Government has introduced a range of voluntary and mandatory measures to reduce greenhouse gas emissions from power consumed in NSW. These include emission intensity limits on power consumed in NSW, mandatory performance standards for design of new residential buildings, and voluntary rating schemes for the greenhouse performance of existing commercial and residential buildings.

4.1.6 NSW STATE PLAN

The NSW State Plan has set a priority to tackle climate change by achieving a 60% cut in greenhouse gas emissions by 2050. By supporting clean energy, the State Government aims to achieve its goal by matching the Federal Government's Renewable Energy Target of achieving 20% renewable energy consumption by 2020.

A Clean Energy Strategy has been developed to deliver the State Plans targets that include the creation of six wind energy precincts, the subject site being within the NSW/ACT Border Region precinct. The Strategy commits to streamlining the planning assessment process for developments within these energy precincts. Amending the legislation determining critical infrastructure projects is an example of the State Government's drive to encourage major change in the renewable energy sector.

Priority E2 of the State Plan seeks a reliable electricity supply with an increased use of renewable energy. A reliable electricity supply is a basic and critical service and only 6% of NSW's total energy consumption being provided from renewable energy sources. A key target of Priority E2 is to increase the amount of renewable energy production to 15% by 2020.

Although the Strategy does not specifically identify any renewable energy projects, it does recognise that the reliability of electicity supply together with an increased use of renewable energy as a priority of the State Plan. Accordingly, it is considered that the Project is consistent with the Strategy, as it assists in the delivery of more 'green' power for the State.

4.1.7 AUSTRALIAN GOVERNMENT RENEWABLE ENERGY TARGET

In Australia, wind farms are viable because of specific legislation (Chapter 5.2) which requires energy retailers to source a certain percentage of electricity from renewable sources. In 2001 the Australian Government established the Mandatory Renewable Energy Target (MRET) Scheme increasing the generation of electricity from renewable energy sources and achieving reductions in greenhouse gas emissions.

The MRET places a legal liability on wholesale purchasers of electricity under the *Renewable Energy Electricity Act 2000* (REE Act) to proportionately contribute towards the generation of additional renewable electricity.

In August 2009 the Australian Government implemented the Renewable Energy Target Scheme (RET) which is designed to deliver on the Government's commitment to ensure that 20% of Australia's electricity supply will come from renewable sources by 2020. The RET expands on the earlier MRET.

The RET Scheme places a legal liability on energy retailers (such as Energy Australia, Integral Energy and Country Energy) to source at least 20% or 45,000 gigawatt hours (GWh) from renewable energy producers.

The RET is a market based mechanism designed to encourage investment in renewable energy projects. Electricity retailers and other wholesale electricity users are required to meet the RET by surrendering a pre-determined number of Renewable Energy Certificates (REC) per annum. The RECs are created by renewable energy generators such as wind farms.

The intended purpose of the RET is to encourage renewable energy production to increase by 2020. Failure by a retailer or user to meet its designated share of the RET results in it being liable for a penalty calculated on the shortfall.

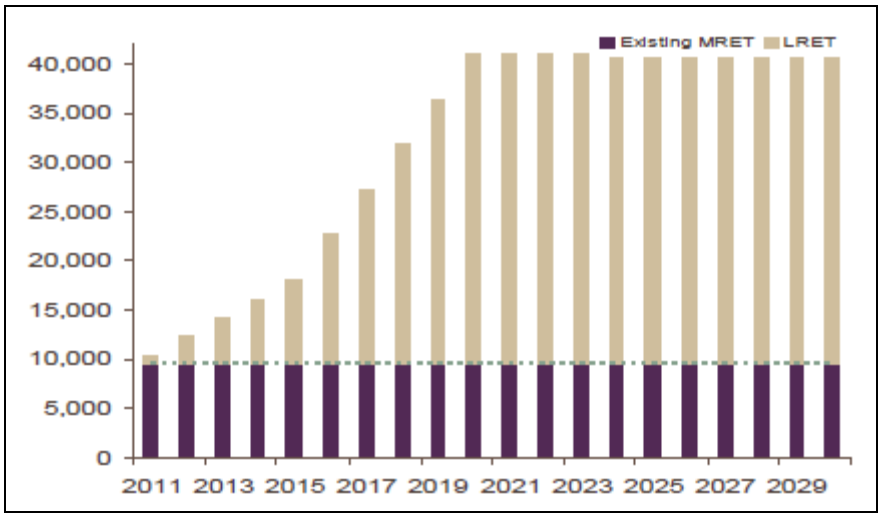

Figure 39: Demand for renewable energy in Australia
(Enhanced RET Fact Sheet, Australian Government 2010)

Enhanced Renewable Energy Target

In February 2010, the Government announced changes to be made to the RET Scheme separating large-scale renewable energy projects and installers of small-scale renewable energy systems like solar panels and solar water heaters.

From January 2011, the existing RET Scheme will be separated into two parts – the Small-scale Renewable Energy Scheme (SRES) and the Large-scale Renewable Energy Target (LRET). Combined, the new LRET and SRES are expected to deliver more renewable energy than the existing 45,000 gigawatt hour target in 2020.

Large Scale Renewable Energy Target

The Large-scale Renewable Energy Target (LRET) will continue to operate in much the same way as the existing RET, but is restricted to large-scale renewable energy projects such as wind farms and will deliver the vast majority of the 2020 target. The AEMO expect that wind generation will attract considerable new investment as it is currently the most abundant, commercially viable renewable technology.

CWFI is an accredited renewable energy power station (Accreditation Code: WD00NS06) under the *Renewable Energy (Electricity) Act 2000 (RE Act)* and is eligible to create "renewable energy certificates" (RECs).

The RECs created from CWFI can be traded independently of the sale of electricity to third parties and provides a second revenue stream for the operator of CWFI.

An accredited power station such as CWFI may trade RECs created from the generation of renewable energy to wholesale electricity purchasers who in turn surrender the RECs. The surrender of RECs by the wholesale electricity purchasers demonstrates that they are supporting the generation of renewable electricity, thereby contributing to achieving the RET.

The Proponent will seek to have the CWFII registered as an accredited renewable energy power station to contribute towards the achievement of the Federal RET.

New South Wales Renewable Energy Target

In 2007 the NSW Government implemented a broad range of measures designed to address greenhouse gas emissions, including from electricity generation. Similar to the Federal Government's RET, the NSW Government's response was the introduction of a mandatory NSW Renewable Energy Target (NRET).

4.2 EXISTING INFRASTRUCTURE

In order to utilise the energy generated from wind turbines, wind farms must be connected to an external electricity grid capable of transporting high voltage power. Part of this process requires the voltage transfer to be stepped up suitable for connection to the existing Transgrid transmission line that traverse the southern portion of the site. An on-site substation was constructed as part of CWFI to complete this process.

4.2.1 EXISTING SUBSTATION AND TRANSMISSION INFRASTRUCTURE

The existing electrical substation has the capacity to receive the additional electrical loading generated from CWFII in addition to the existing CWFI, the approved WWF and the proposed CSF. For the Woodlawn wind farm project a transformer of 180MVA will be installed. This transformer is designed and has the capacity to accommodate the Woodlawn wind farm and CWFII. Minor augmentation may be required to the substation, and additional electrical reticulation is included as part of the Project.

As part of the Project, an electricity reticulation network to connect the substation with the proposed WTGs will be constructed. The proposed network will include a combination of overhead and underground transmission lines. The overhead transmission lines will follow the alignment of the existing overhead lines and connect with underground cabling (as shown on the Project Layouts **Figures 25** and **29**).

All underground cabling will be located adjacent to the existing and new access roads so to minimise disturbance to the landscape.

4.2.2 APPROVED AND FUTURE PROJECTS

The Project is located adjacent to the operational CWFI and the approved Woodlawn Wind Farm (WWF).

The Director-Generals Requirements (DGRs) for the proposed Capital Solar Farm (CSF) were issued on 1 September 2010. The CSF is located adjacent to CWFI and the Capital Substation.

Table 9: Capital Renewable Energy Park

PROJECT	CAPACITY	COMPONENTS	STATUS	DATE
Capital Wind Farm I	141 MW	67 WTGs	Operational	October 2009
Woodlawn Wind Farm	48 MW	23 WTGs	Approved	October 2010
Capital Wind Farm II	100 MW (approx.)	(up to) 55 WTGs	DGR's issued	September 2010
Capital Solar Farm	50 MW	Solar Array	On exhibition	October 2010

4.3 GREENHOUSE GAS BENEFITS

There is considerable scientific debate over the impact of greenhouse gases (GHGs) on our climate. The scientific consensus is that GHGs contribute to climate change through global warming. When light hits the surface of the earth, a proportion of it is re-emitted as thermal infrared radiation. In the atmosphere, gases such as water vapour, CO_2, and ozone (O_3) absorb the radiation. This has a heating effect in the atmosphere and in turn, the atmosphere emits infrared radiation, with a significant portion warming the surface of the Earth. This phenomenon is part of a natural mechanism known as the 'greenhouse effect'. The greenhouse effect allows Earth to maintain an 'energy neutral' balance where the net energy coming from the Sun to the Earth is zero. When GHGs are added to the atmosphere, through anthropogenic (human-caused) mechanisms, it shifts the energy balance of the Earth. This is sometimes referred to as the 'enhanced greenhouse effect', which results in global warming and climate change.

The NSW Wind Farm Greenhouse Gas Savings Tool (DECCW 2010) estimated that the Project will save 2.5 million tonnes of greenhouse gas emissions within 10 years. This will be achieved through the generation of 314 gigawatt hours (GWh) of electricity annually.

Based on average household electricity consumption, the renewable energy generated by the Project will produce enough electricity to power 43,100 homes each year.

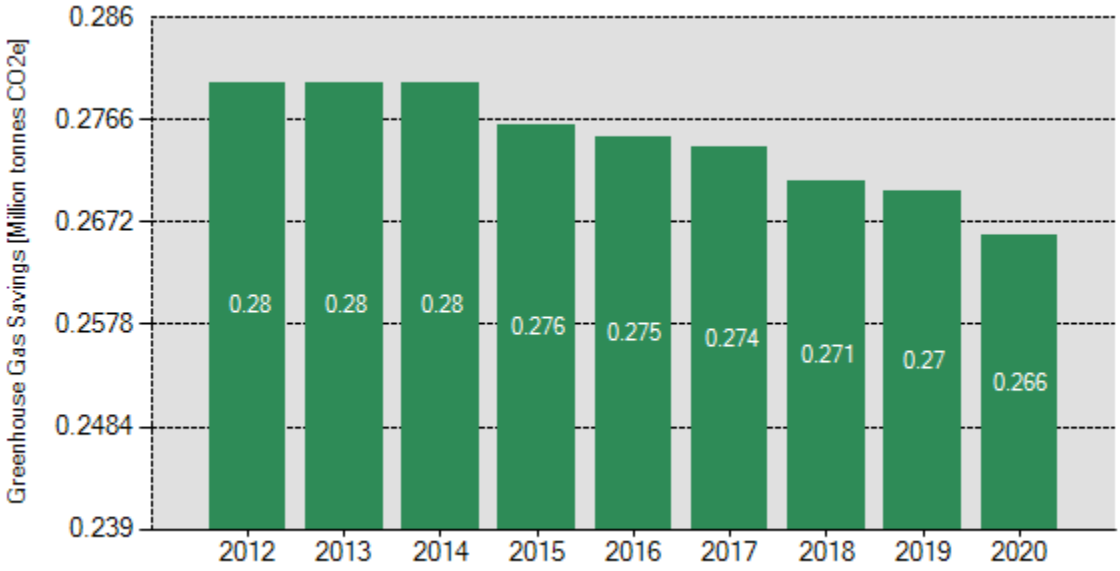

Figure 40: Annual Greenhouse gas savings from a 100MW wind farm in P4. NSW-Act Border Region.

4.4 LAND USE CONFLICTS

The Project is situated on 12 properties combining to cover an area of approximately 50,000 hectares of predominantly cleared agricultural land. Of this area, only a very small percentage will be disturbed for placement of wind turbines, access tracks and transmission lines. Existing grazing activities will not be significantly affected by the proposed Project.

Wind farms add a new source of economic activity that assist to diversify the economic performance of traditional farming activities.

4.4.1 EXISTING AND FUTURE SURROUNDING LAND USES

Agricultural is the main land use in the area and the majority of the community rely on the agricultural industry as their main source of income. As a rural community, there is a low population density within and around the Project.

The Project is located on several properties that already accommodate WTGs and assorted infrastructure that are part of CWFI. The agricultural productivity of the land accommodating the CWFI may have been subject to minor impacts however, these properties continue to operate the same agricultural pursuits.

The remaining properties are currently utilised for grazing and some cropping. Numerous wind farms have been established in the Southern Tablelands within the past 10 years, all of which have been able to co-exist with the existing land use. Wind farming itself is beginning to become a new rural industry, providing a significant new income stream for rural communities.

Land of Significant Scenic or Visual Value

The project will be visible from parts of the local area which may be regarded by some members of the community as an adverse impact. However, overall it is expected that there will be broad community acceptance of the Project. The proven integration with existing rural activities has largely alleviated the concerns originally raised prior to the construction of CWFI.

Land of High Agricultural Value

The project is spread over more than 50 square kilometres of predominantly cleared agricultural land. Of this area, only a very small percentage is required for placement of turbines, access tracks and overhead transmission lines. Existing grazing activities will not be significantly affected by the development, which has already been demonstrated by the successful integration of the CWF into the existing agricultural activities.

Mineral Reserves, Forestry, Conservation and Crown Land

The Project is located wholly within a rural landscape and does not share any additional land uses that may be adversely affected such as conservation lands.

Several extractive industries operate to the south of the development site however the Project components are unlikely to be affected by CWFII due to the separation distance. Notwithstanding, it is more than likely that a wind farm could be designed to co-exist with an extractive industry, as shown by the recently approved Woodlawn Wind Farm WWF). The WWF is directly adjacent to the disused open cut Woodlawn Mine which is now the site of Veolia's Woodlawn Bioreactor, itself a renewable energy generator.

4.4.2 LOCAL AND STRATEGIC LAND USE OBJECTIVES

Renewable energy generators, including wind farms, are permissible in this part of Palerang Council.

The development site is zoned 1(a) Rural, the primary objective being to promote the proper management and utilisation of resources (discussed further in Chapter 5.5). The Project is compatible with the fundamental objectives of the zones through the utilisation of two separate resources, wind and earth.

The mutually beneficially use of the land to harness the energy of the wind and cultivate and graze the earth is achieved by the Project responding to the existing use of the land and adapting to capitalise on the available resources without the comprising that existing use.

4.4.3 CUMULATIVE SOCIAL AND ECONOMIC IMPACTS

The Project will require a modest workforce during the construction stage and it is likely that some services will be drawn from the local area. The services required during construction are not expected to place undue stress on local resources and will provide a noticeable boost to the local economy. The operational project will provide a worthwhile contribution to the local economy over its lifetime.

4.4.4 'IMPROVE AND MAINTAIN' – ENVIRONMENTAL OFFSETS

There is no need for modification of the Project to avoid high value vegetation or habitats. Mitigation and offset are therefore not required. The components of the wind Project are located to avoid impacts on all important native habitats. The development will be mitigated in those areas where there is some native habitat by minimising the footprint of the development and micro-siting components to avoid local habitat features. As there is no significant impact on native habitat or habitat likely to be important to threatened birds or other species there is no need for an offset. The 'maintain or improve' test is met in this case, i.e. "there is no net impact on threatened species or native vegetation". However, the proponent has committed up to a maximum of $100,000 to go towards a conservation offset for this project to improve biodiversity values as a way of compensating for any unavoidable impacts."

4.5 ALTERNATIVE OPTIONS

Suitable sites for wind farms are dependent on the strength and more importantly the consistency of the wind resource. Such sites are typically in elevated locations near the coast. The suitability of the site is dependent on its elevation, proximity to electricity infrastructure, and the strength and consistency of its wind regime.

In considering the development of the site, the final project design has been an iterative process providing different options that will not only serve CWFII but also consider the environmental constraints of the site.

Site selection includes:-

- Anaylsis of wind resource;
- Anaylsis of technical and commercial factors;
- Optimised wind turbine layouts;
- Estimates of energy production and greenhouse gas emissions reductions;
- Assessment of environmental and cultural factors including noise and visual impact; and
- Securing land access.

The Project site was selected due to several reasons, primarily:-

- Proven wind resource;
- Suitable topography;
- Proximity to transmission lines;
- Zoning;
- Demonstrated management of environmental and cultural issues; and
- Community acceptance of CWFI.

4.5.1 ALTERNATIVE LOCATION

CWFII was located adjacent to CWFI due to the proven excellent wind resource, supportive landholders and existing electricity infrastructure with capacity to accommodate higher loads.

An alternative location would require the construction of a new substation, reticulation network and other ancillary facilities. Locating CWFII adjacent to CWFI provides several advantages that are not provided from another site. The final development was selected due to its commercial viability, landowner agreements and opportunity to minimise environmental impacts. Furthermore, the surrounding community are aware of the characteristics of wind farms and for the most part supportive of the environmental benefits of renewable energy.

4.5.2 ALTERNATIVE DESIGN

Several wind farm layouts have been developed as part of the design process including the use of various turbine models in order to achieve the Project objective of producing approximately 100 MW (peak) of renewable energy. Due to the available land and wind conditions, several scenarios were considered to maximise the wind resource.

Accordingly, the Project application is for two different layouts allowing for a development envelope surrounding the proposed turbines. Only one layout will be constructed, following further site investigation and to maximise the efficient of the wind farm.

Notwithstanding, the environmental assessment has been completed as a highest impact scenario. Any alternative designs will likely have fewer components (WTGs) and therefore a reduced footprint and associated construction works.

4.5.3 ALTERNATIVE SOURCE OF ENERGY

Wind farms do not rely on combustion to generate electricity and thus do not produce notable amounts of air pollution directly. However some emissions of air pollutants can arise during the manufacture and construction such as in the production of steel for the turbine towers, but these are considerably lower compare with other types of electricity generator relying on combustion for electricity generation (Markandya and Wilkinson 2007).

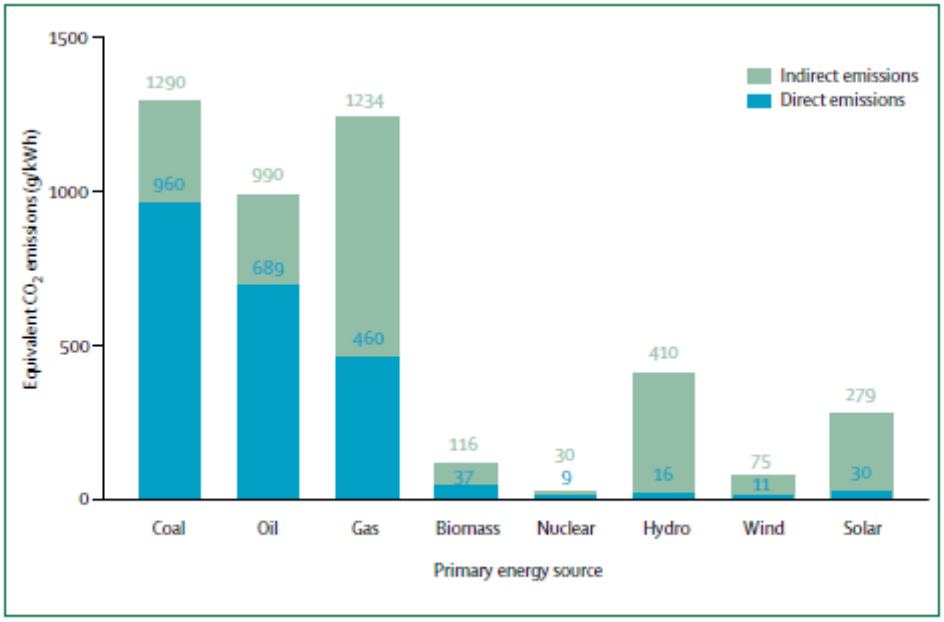

Figure 41: Full energy chain carbon dioxide emissions by primary energy source (Markandya and Wilkinson 2007)

The Project objective is to produce renewable energy. The site was selected partially due to the access to the existing substation and infrastructure in the CWFI however the most appropriate form of energy to capture on the site is from wind power.

Other sources of energy that have the potential to be captured on the site include solar energy. Similar to the reasons for locating CWFII adjacent to CWFI, the Proponent is associated with the proposed Capital Solar Farm (CSF) further to the south of CWFI.

4.6 CONCLUSION

The proposed wind farm supports the NSW Government's renewable energy policies and directly contributes to the Federal Government's renewable energy target of 20% of Australia's energy sourced from renewable energy by 2020. The Project also supports the practice of environmentally sustainable development which ensures the environmental, economic and social benefits of the Project will be realised in the most effective and sustainable way. By supplying a clean and renewable source of energy, the Project will help reduce Australia's greenhouse gas emissions and assist in addressing the dangerous impacts of climate change, whilst simultaneously contributing to the development of NSW's renewable energy sector and electricity infrastructure, and contributing to the local rural economies of nearby townships.

Project benefits:-

- It provides a new source of electricity generation from renewable energy;
- It can provide net greenhouse gas emission savings of up to 315,000 tonnes CO_2/year;
- It assists the Federal Government's Renewable Energy Target;
- It provides an income to the landowners of the properties on which it is located;
- It would create local employment opportunities and inject funds likely in excess of $100 million into the Australian economy;
- It would improve the security of electricity supply through diversification; and
- It can provide a small but significant economic boost to the local community.

The Project supports the States renewable energy policies and directly implements the Federal Government's renewable energy target of 20% of Australia's energy sourced by renewable energy by 2020.

By supplying a clean and renewable source of energy, the Project will help reduce Australia's greenhouse gas emissions and assist in addressing the dangerous impacts of climate change.

Because the Project will operate in close proximity to CWFI and the under construction WWF, the three wind farms can share infrastructure, lending significant benefits to the Project and increasing its viability. It also reduces the potential amenity impacts arising from separate substations, control buildings and switchyards.

5. STATUTORY & PLANNING FRAMEWORK

The DGR's issued for the Project require that a description of the planning context be undertaken in the Environmental Assessment for the Project. The following chapter provides description of the relevant statutory planning framework and their applications to the Project.

The development of the Project requires:-

- Consideration of the requirements of the Federal *Environment Protection and Biodiversity Conservation Act 1999*;
- Project Approval under Part 3A of the NSW *Environmental Planning and Assessment Act 1979*; and
- Consideration of the requirement sof the NSW Protection of the Environmental Operations Act 1997.

In addition, various Federal, State and local government legislation, policy and guidelines are considered and described in the following chapter.

All components of the Project including the permanent and temporary activities have been investigated to the fullest extent possible to ensure compliance will the relevant statutory instruments. The EA assessed both a 31 WTG and a 55 WTG with the highest impact scenario being the construction of 55 WTGs (and associated infrastructure).

5.1 ASSESSMENT AND APPROVAL PROCESS

The Project is being undertaken pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979* (*EP&A Act*). Part 3A of the *EP&A Act* provides a streamlined and integrated development assessment and approvals regime for major infrastructure and other Projects of significance to the State that need the approval of the Minister for Planning. Part 3A applies to certain types of Projects declared by the Minister as outlined in the *State Environmental Planning Policy (Major Projects) 2005*.

As detailed in correspondence dated 30 April 2010, the Director-General of the DOP has formed the opinion under Clause 6 of *State Environmental Planning Policy (Major Development)* that the Project is development of a kind that is described in Schedule 1 of the Major Development SEPP. Accordingly, the Director-General has declared that the Project is a Major Project under Part 3A of the *EP&A Act*. Under Part 3A of the *EP&A Act*, an Environmental Assessment is required to be prepared and submitted with an application for approval to the NSW DOP.

5.1.1 APPROVALS AND OTHER LEGISLATION

It is noted that Section 75U of the *EP&A Act* outlines approvals and legislation that do not apply when a Project is assessed under Part 3A. These are:-

- The concurrence under Part 3 of the *Coastal Protection Act 1979*;
- A permit under Section 201, 205 or 219 of the *Fisheries Management Act 1994*;
- An approval under Part 4, or an excavation permit under Section 139 of the *Heritage Act 1977*;
- A permit under Section 87 or a consent under Section 90 of the *National Parks and Wildlife Act 1974*;
- An authorisation referred to in Section 12 of the *Native Vegetation Act 2003* to clear native vegetation;
- A bushfire safety authority under Section 100B of the *Rural Fires Act 1997*; and
- A water use approval under Section 89, a water management work approval under Section 90 or a controlled activity approval under Section 91 of the *Water Management Act 2000*.

Section 75V of the *EP&A Act* outlines approvals and legislation that still apply when a Project is assessed under Part 3A. These are:-

- An aquaculture permit under Section 144 of the *Fisheries Management Act 1994*.
- An approval under Section 15 of the *Mine Subsidence Compensation Act 1961*.
- A mining lease under the *Mining Act 1992*.
- A production lease under the *Petroleum (Onshore) Act 1991*.
- An environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in Section 43 of that Act).
- A consent under Section 138 of the *Roads Act 1993*.

The exemptions granted under Section 75U of the *EP&A Act*, the DGRs were prepared to take into consideration the aims and objectives of the abovementioned Acts. A number of specialist studies have been prepared for the Project to address these issues and assess the potential impacts of the Project.

Once the DOP is satisifed with that the Environmental Assessment has provided a detailed description and an assessment of the key issues in accordance with the DGRs, the Environmental Assessments will be placed on public exhibition.

5.2 COMMONWEALTH STATUTORY PLANNING FRAMEWORK

ENVIRONMENTAL PROTECTION AND BIODIVERSITY ACT 1999

The Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) is administered by the Federal Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) and is the central piece of environmental legislation for the Federal government. It provides the legal framework to protect and manage matters of national environmental signficance, while also considering cultural values and society's economic and social needs. The aims of the *EPBC Act* are to:-

- *Provide for the protection of the environment, especially matters of national environmental significance.*
- *Conserve Australian biodiversity.*
- *Enhance the protection and management of important natural and cultural places.*
- *Control the international movement of plants and animals (wildlife), wildlife specimens and products made or derived from wildlife.*
- *Promote ecological sustainable development through the conservation and ecologically sustainable use of natural resources.*

The *EPBC Act* requires the Federal Environment Minister's approval for an action that will, or is likely to, have a detrimental or adverse impact on a matter of National Environmental Significance (NES) or on Commonwealth land, unless the action is exempt.

Under the *EPBC Act*, actions that are likely to have a significant impact on a matter of NES are subject to a rigorous referral, assessment, and approval process. An 'action' includes a project, development, undertaking, activity, or series of activities.

Matters of NES currently include World Heritage properties, Ramsar wetlands, nationally threatened species and ecological communities, migratory species, Commonwealth marine areas, nuclear actions and national heritage places.

A search was undertaken using the DSEWPC Protection Matters Search tool national database. This search confirmed that there may be matters on or near the site that are either of national significance or other matters protected by the *EPBC Act*. On the basis of the specialist studies, the Project is not considered likely to have a signficant impact on any listings in identified in the *EPBC Act* Protected Matters Search.

RENEWABLE ENERGY (ELECTRICITY) ACT 2000

The *Renewable Energy (Electricity) Act 2000* (*RE Act*) is administered by the Federal Office of the Renewable Energy Regulator (ORER) and was established to oversee the implementation of the Federal Government's Renewable Energy Target (RET). The RET was established to encourage additional generation of electricity from renewable energy sources to provide an additional 45,000 GWh of renewable energy by 2020.

The effect of the legislation is to place a legal liability on wholesale purchasers of electricity to be directly responsible for supporting an increase in the amount of electricity generate from renewable energy sources.

CWFI is an accredited renewable energy power station (Accreditation Code: WD00NS06) under the *RE Act* and is eligible to create "renewable energy certificates" (RECs). The RECs created from CWFI can be traded independently of the sale of electricity to third parties and provides a second revenue stream for the operator of CWFI.

The role of an accredited power station such as CWFI is to trade RECs created from the generation of renewable energy to wholesale electricity purchasers who in turn surrender the RECs. The surrender of RECs by the wholesale electricity purchasers demonstrates that they are supporting the generation of renewable electricity, thereby contributing to achieving the RET.

The Proponent will seek to have the CWFII registered as an accredited renewable energy power station to contribute towards the achievement of the RET.

CIVIL AVIATION SAFETY REGULATION 1998

The Civil Aviation Safety Regulation 1998 (CAS Regulations) require CASA be informed about structures with a height greater than 110 metres above ground level in areas remote from an aerodrome. This is required to allow assessment of whether the structure may represent a hazard to aircraft, and to provide any associated mitigation measures including any requirements for markings or lighting. In addition to reporting tall structures to CASA, the Royal Australian Air Force (RAAF) maintains a database for all structures with a height greater than 45 metres above ground level.

The development of the CWFII involves the construction of up to 55 WTGs that could have a height of about 157 metres to the top of the area swept by the turbine blades.

Information, including the proposed location and heights of the proposed structures were provided to CASA. CASA did not provide comment due to the likelihood of additional changes to the layout of the wind farm. CASA will provide comment following confirmation of the final height and location of the structures so that aeronautical charts can be accurately updated.

The exact location, number of WTGs and final heights (AHD) will be provided to CASA prior to construction commencing. This issue is further discussed in Chapter 12.2.

RADIO COMMUNICATIONS ACT 1992

Potential for the proposed wind farm to interfere with telecommunications signals has been assessed by a specialist (**Appendix G**) and the findings are summarised in Chapter 12. As part of the site constraint analysis, the path of transmission signals was located and the layout of the wind farm modified to avoid these signals. Various measures are also available to mitigate impacts on television services, with the actual measures used being dependant on the nature and scale of interference and circumstances of the receiver. This issue is further discussed in Chapter 12.3.

5.3 STATE STATUTORY PLANNING FRAMEWORK

The following text details the State statutory planning framework including State Environmental Planning Policies (SEPPs) and other relevant NSW legislation.

5.3.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

CRITICAL INFRASTRUCTURE

The Project is classified as critical infrastructure (in accordance with Section 75C of the *EP&A Act)* by virtue of the Minister's declaration of 11 November 2009 relating to developments generating electricity derived from renewable fuel sources, including the CWFII, being an electricity generating development deriving electricity from wind energy with a capacity greater than 30 MW.

OBJECTS OF THE *EP&A ACT*

In accordance with the Director-General's Requirements, consideration has been given to the objects of the NSW *Environmental Planning and Assessment Act 1979* (*EP&A Act 1979*) as outlined below:-

Table 10: Objects of the Environmental Planning and Assessment Act 1979 - Section 5

SECTION 5		COMMENT	CHAPTER OF EA
(a)	*To encourage:-*		
(i)	*The proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.*	The Project would facilitate the proper management and development of renewable energy. The Project has been developed to minimise impacts to local biodiversity and ecological integrity. Where impacts may be imposed, mitigation measures have been developed in the design to reduce the scale and intensity of those impacts.	Chapter 7 to Chapter 16
(ii)	*The promotion and co-ordination of the orderly and economic use and development of land.*	The Project would not significantly affect the current or future orderly and economic use of land. The existing economic use of the land is limited to traditional agricultural pursuits. The construction of a wind farm will provide an additional income source for the property owners without signficantly affecting the existing agricultural use of the land.	Chapter 5 and Chapter 15
(iii)	*The protection, provision and co-ordination of communication and utility services.*	Rigorous assessment of both CWFI and CWFII concluded that the Project is likely to have a neligible impact to communication services or existing utility services. Subject to the implementation of mitigation measures outlined in Chapter 17, any potential impacts are considered to be acceptable.	Chapter 3, Chapter 4, Chapter 12 and Chapter 17

SECTION 5	COMMENT	CHAPTER OF EA
(iv) The provision of land for public purposes.	There will be no loss of land as a result of the Project.	N/A
(v) The provision and co-ordination of community services and facilities.	Substantial upgrades to the local road network were completed or are currently under construction as part of CWFI and a new fire tanker was provided to the local NSW Rural Fire Service Brigade. The expanded Capital Wind Farm is not anticpated to generate additional demands on local services that would require further upgrades and contributions.	Chapter 15 and Chapter 17
(vi) The protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitatis.	Both wind farm layouts were designed to respond to the existing site constraints. Appropriate environmental mitigation measures will be implemented where necessary to ensure the protection of the environment. The final design/s have been selected following field work and represents the best environmental outcome for the site.	Chapter 9
(vii) Ecologically sustainable development.	The final design and site layouts were selected in preference to other options as it has a comparatively lower ecological impact. Where impacts on biodiversity may potentially occur, mitigation measures have been developed to reduce the scale and intensity of those impacts. This will assist in maintaining biological diversity.	Chapter 4, Chapter 5, Chapter 9 and Chapter 17

SECTION 5		COMMENT	CHAPTER OF EA
(viii)	*The provision and maintenance of affordable housing.*	N/A	N/A
(b)	*To promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and*	The Project is being undertaken pursuant to Part 3A of the EP&A Act 1979. Accordingly the NSW DOP are the approval authority. Notwithstanding, the relevant State and local authorities have been provided the opportunity to comment on the proposed wind farm and identify any potential issues that may require detailed investigation. As part of the DGRs, these issues have been addressed in this EA.	Chapter 4 to Chapter 17
(c)	*To provide increased opportunity for public involvement and participation in environmental planning and assessment.*	In accordance with Section 75H of the EP&A Act 1979, the EA will be made publicly available for at least 30 days to allow the public the opportunity to comment on the Project. In response to any public submissions, all reasonable concerns will be considered.	Chapter 6

ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Ecologically sustainable development (ESD) involves the effective integration of economic and environmental considerations in decision-making processes. This EA aims to justify the carrying out of the project and has considered the biophysical, economic and social aspecis of the Project including the following ESD principles:-

(i) The Precautionary Principle;

(ii) Intergenerational Equity;

(iii) Biodiversity Conservation; and

(iv) Improved valuation, pricing and incentive mechanisms.

The Precautionary Principle

This principle states that if there are threats of serious or irreversible environmental damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

The precautionary principle has played a key role in the development of the Project. As part of the design options, investigation and assessment of the environmental impact of various options was undertaken.

The environmental consequences of the Project have been assessed using appropriate specialists to identify potential impacts. Where impacts have been identified, mitigation measures have been proposed to minimise any potential impact including the redesign of the layout to avoid any likely impacts. Where there was uncertainty, then the worst case scenario was examined.

These mitigation measures are reflected in the draft Statement of Commitments (SOC) contained in Chapter 17. The Project will not result in any impacts of serious or irreversible damage.

Intergenerational Equity

This principle states that the current generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. By developing and improving the economic conditions in the area, the Project would enhance productivity for future generations.

The Project is consistent with the principles of social equity and intergenerational equity through the harnessing of a renewable resource for energy generation and is supported and encouraged by the Federal Renewable Energy Target scheme and the NSW State Plan.

Biodiversity Conservation

This principle requires that the diversity of genes, species, populations and communities, as well as ecosystems and habitats to which they belong, must be maintained and improved to enable their survival.

Both layouts of the proposed wind farm have been designed based on a conservative and rigorous assessment of the likely ecological impacts and to ensure that appropriate and adequate measures are put in place to prevent the threats of serious or irreversible environmental damage consistent with the precautionary principle and the principle of conservation of biological diversity and ecological integrity.

Improved valuation, pricing and incentive mechanisms

The Project generates electricity by harnessing wind energy. The method of converting wind energy to electricity in a form that can be transported and utilised by the public is an efficient and non-polluting process. A life-cycle analysis identifying the overall costs of a wind farm development would identify the manufacture and construction (including decommissioning and disposal) process as the only asset and non-renewable, however it has been demonstrated by calculating the reduction in greenhouse gas emissions; as compared to traditional methods of electricity production; the environmental benefits of a wind farm development offset any potential waste generation and pollution generated from the manufacture of wind farm components. The use of natural resources in this instance provides a substantial environmental benefit that supports ecological sustainable development.

5.3.2 STATE ENVIRONMENTAL PLANNING POLICIES

A review of all *State Environmental Planning Policies (*SEPPs) reveals that the following are of particular relevance to the Project.

State Environmental Planning Policy (Major Development) 2005

This Policy identifies the type of development that will be subject to provisions of Part 3A of the *EP&A Act*. The DOP provided a Clause 6 opinion on 30 April 2010, which concluded that the proposal would be assessed under Part 3A of the *EP&A Act*. This opinion was based on the criteria for projects identified in Schedule 1 of the Policy, in particular, Clause 24 – Generation of electricity of heat or co-generation. As such, the Project is to be assessed under Part 3A of the *EP&A Act* and submitted for approval by the Minister for Planning.

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (SEPP Infrastructure) was designed to assist in the delivery of significant infrastructure. The Project is permitted with consent as the development is on land that is in a prescribed zone, in this instance the General Rural Zone 1(a) under the Mulwaree LEP, being equivalent to the RU1 Primary Production zone identified in the SEPP.

State Environmental Planning Policy (Rural Lands) 2009

The aim of SEPP (Rural Lands) is to facilitate the orderly and economic use and development of rural lands for rural and related purposes. Part 2 of SEPP (Rural Lands) identifies rural planning principles to be considered.

The Project is located on land zoned 1(a) General Rural pursuant to Mulwaree LEP. The rural planning principles contained within SEPP (Rural Lands) encourage the protection and promotion of opportunities for productive and sustainable economic activities in rural areas. The SEPP (Rural Lands) also identifies that in planning for rural lands, the social, economic and environmental interests of the community are to be balanced.

Although the Project is not required to consider SEPP Rural lands as it has been declared a Major Development and is being undertaken pursuant to Part 3A of the *EP&A Act 1979*, the aims of the policy are considered relevant and have been considered as part of the EA.

The Project would result in the loss of use of some land that is zoned for rural purposes. However, the Project will only affect a small proportion of the total site area.
Furthermore, as the site is predominantly used for grazing, it is unlikely that the loss of less than 47 hectares of land will have a significant impact on the agricultural viability of the site.

As shown by the operation of CWFI, wind farms can co-exist with the majority of agricultural pursuits. The loss of arable land following the construction of CWFI was negligible and has had a minimal impact on the productive value of the land. It is anticipated that the construction of CWFII will similarly have a negligible impact on the agricultural use of the land. Notwithstanding, the economic value of the land has substantially increased as a result of the area being identified as having a valuable wind resource. Accordingly, the value of the land as a 'wind farm' has been demonstrated by CWFI to be substantially greater than the economic potential of the land being limited to traditional agricultural pursuits.

Overall, it is considered that the Project would result in an outcome where by the social, economic and environmental interests are balanced. As such, the Project is appropriate for the site in which it is proposed to be located, and does not raise any issues that conflict with SEPP Rural Lands.

5.3.3 OTHER NSW LEGISLATION

As detailed above, Section 75U of the *EP&A Act* outlines approvals and legislation that do not apply when a Project is assessed under Part 3A. The following provides an assessment of the Project against the relevant NSW legislation that is applicable to the Project.

Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (*POEO Act*) provides for the issue of an Environment Protection Licence (EPL) pursuant to Section 48 of the *POEO Act* for scheduled activities (being activities listed in Schedule 1 of the Act). The objects of the POEO Act relate to the protection of water, air and noise pollution and the control of wastes to enhance the quality of the environment having regard to the need to maintain ecologically sustainable development.

Activities relating to electricity generation are identified under Clause 17 of Schedule 1 – Scheduled Activities under the *POEO Act*. As the energy source is from wind power, the Project is not classified as "*electricity generating works*" and therefore does not require a license under the *POEO Act*.

It is anticipated that up to two temporary concrete batching plants will need to be installed on site should the required volume of concrete not be sourced from local batching plants. In the event that the temporary concrete batching plants produce more than 30,000 tonnes of concrete per year, a license under the *POEO Act* will be required.
Similarily, during the process of constructing the access roads and through the operation of the temporary batching plants, should more than 150 tonnes of materials per day, or 30,000 tonnes of material be crushed, grinded or separated, a license under the *POEO Act* will be required. Notwithstanding, it is not anticipated that during the construction phase of the Project the nominated thresholds will be exceeded.

The mitigation measures outlined in the draft Statement of Commitments (Chapter 17) will be implemented to minimise the potential of the Project to result in pollution of the environment and ensure the necessary licenses are issued by DECCW should they be required.

Roads Act 1993

The *Roads Act 1993* (*Roads Act*) regulates a range of activities undertaken on public roads. Approval is generally required under Section 138 of the *Roads Act* for works within a public road including connecting a private road to a classified road. Section 138 of the *Roads Act* requires that a person obtain the consent of the appropriate roads authority for the erection of a structure, or the carrying out of work in, on or over a public road, or the digging up or disturbance of the surface of a public road. Approval from Palerang Council would be required under Section 138 of the *Roads Act* for any road works.

A Traffic Assessment Report has been prepared for the Project and is discussed in Chapter 11 of this report.

As part of the traffic and access assessment, an evaluation of the existing private and public roads was completed that investigated the condition and capacity of the road network to be utilised during the construction and operation of CWFII. It was concluded that all access roads to be utilised have previously been upgraded prior to the construction of CWFI. Given the demand and volume of traffic anticipated as part of the construction and operation of CWFII, it is not considered that any additional upgrades to the roads in the area are required. Furthermore, no new connections to classified roads from any private roads are required as access will be provided via the existing private roads that were proven to be satisfactory during the construction of CWFII.

As discussed in the Traffic Assessment Report (**Appendix F**), the extent of works on public roads is likely to be limited to general maintenance including sweeping of loose material. Should any additional works be required, the relevant approvals will be sought from Palerang Council of the Roads and Traffic Authority.

Noxious Weeds Act 1993

The objectives of the *Noxious Weeds Act 1993* (*NW Act*) are to reduce the negative impact of weeds on the economy, community and environment of this State by establishing control mechanisms, and to provide for the monitoring of and reporting on the effectiveness of the management of weeds in this State.
Mitigation measures have been contained within the draft Statement of Commitments for the Project to manage the risk of noxious weeds on site. Details of these measures are contained in Chapter 17 of this Report.

5.4 LOCAL STATUTORY PLANNING FRAMEWORK

The Project is located within Palerang Council local government area (LGA) which is made up of the from Tallaganda Shire and parts of the Yarrowlumla, Mulwaree and Gunning Shires. However in the absence of a Palerang local environmental plan, the provisions of the local planning instruments that prevailed over the land, prior to the amalgamation into Palerang Council apply.

Accordingly, the Project is subject to the provisions of the Mulwaree Local Environmental Plan 1995 (Mulwaree LEP).

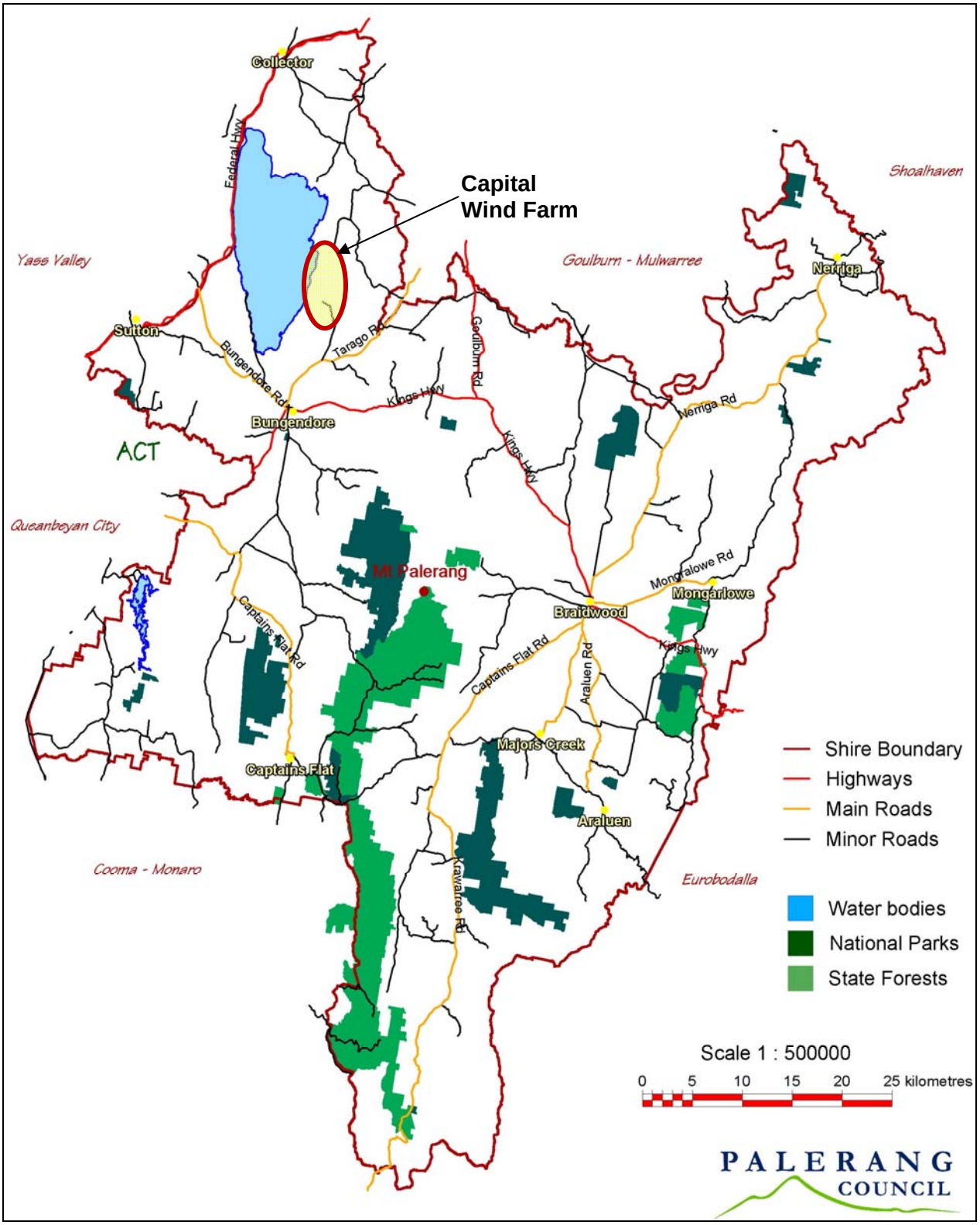

Figure 42: Local government area of Palerang Council

5.4.1 MULWAREE LOCAL ENVIRONMENTAL PLAN 1995

The site is zoned 1(a) General Rural Zone pursuant to the Mulwaree Local Environmental Plan (Mulwaree LEP). Wind farms and associated infrastructure would be a permissible use in the 1(a) zone and may only carried out with the consent of Council in accordance with Clause 9 of the Mulwaree LEP.

MULWAREE LEP 1995 ZONE 1(A) GENERAL RURAL OBJECTIVES	RELEVANCE OF THE PROJECT TO THE ZONE 1(A) OBJECTIVE
(a) Promoting, enhancing and conserving.	
(i) Agricultural land, particularly prime crop and pasture land, in a manner which sustains its efficient and effective agricultural production potential.	The development is spread over a large area but with a relatively small 'footprint' for the turbine components and access tracks. The existing grazing activities will continue and the landowners will benefit through income from leases for the wind farm and improved access infrastructure. Pastoral activities will be unaffected on neighbouring lands.
(ii) Soil stability by controlling and locating development in accordance with soil capability, as identified by the Department of Conservation and Land Management/Soil Conversation Service.	The areas of soil disturbance will be limited to access track works, turbine and meteorological tower footings and trenching for underground cables. Appropriate soil erosion mitigation measures will be implemented as part of the CEMP, similar to those implemented during the construction of CWFI.
(iii) Forests of existing and potential commercial value for timber production.	No commercial forests will be impacted. The development will involve minimal clearing for access tracks and foundations of installations.
(iv) Valuable deposits of minerals, coal, petroleum, and extractive materials by controlling the location of development for other purposes in order to ensure the efficient extraction of those deposits	No mining activities will be affected. The locality has been subject to intensive exploration and the project site is about 6km south-west of the Woodlawn Mine where mining operations have ceased. Sand mining operations to the south of the site will not be affected.

MULWAREE LEP 1995 ZONE 1(A) GENERAL RURAL OBJECTIVES	RELEVANCE OF THE PROJECT TO THE ZONE 1(A) OBJECTIVE
(v) Trees and other vegetation in sensitive areas and in any place where the conservation of the vegetation is significant to the protection of scenic amenity or natural wildlife habitat or is likely to control or contribute to the control of land degradation.	An assessment of conservation values of the site has been prepared and measures will be incorporated to mitigate any impacts. Appropriate measures will be taken to ensure that minimal clearing is undertaken and to prevent soil erosion and land degradation. The limited extent of clearing and its location will be such that it will have minimal impact on scenic amenity.
(vi) Water resources and water catchment areas for use in the public interest.	As mentioned above, a Soil and Water Management Plan will be developed for the construction works and will incorporate controls to prevent sediment discharge to creeks. The existing water resources available on site are able to provide sufficient volume to sustain the construction of CWFII.
(vii) Localities of significance for nature conservation, including localities with rare plants, wetlands, permanent watercourses and significant wildlife habitat	A detailed assessment of the site's flora and fauna has been undertaken and constraints identified. No permanent watercourses will be affected by the development. Measures to mitigate the Project's impacts on flora and fauna are listed in Chapter 9.
(viii) Places and buildings of archaeological or heritage significance, including Aboriginal relics and places.	No buildings with heritage significance will be affected. An assessment of Aboriginal heritage has been undertaken and a number of Aboriginal sites identified (Chapter 10). Measures to avoid or mitigate impacts on heritage aspects are included in Chapter 10 and 17.
(b) Minimising the cost to the community of:-	
(i) Fragmented and isolated development of rural land, and	No subdivision of land is required. The project will not adversely affect the continued use of the land for its existing use of grazing. The income stream from the wind farm leases is likely to reduce the incentive for sub-division by landowners.

MULWAREE LEP 1995 ZONE 1(A) GENERAL RURAL OBJECTIVES	RELEVANCE OF THE PROJECT TO THE ZONE 1(A) OBJECTIVE
(ii) Providing, extending and maintaining public amenities and services.	The project will supply electricity to the grid using an available renewable energy source while still allowing grazing to continue. The development represents a commercially viable project that will support the State's infrastructure. The Capital Wind Farm has already provided many benefits to the local community including improvement to local roads.
(c) Providing land for future urban development, for rural residential development and for development for other non-agricultural purposes, in accordance with the need for that development, and subject to the capability of the land and its importance in terms of the other objectives of this zone.	The development is a non-agricultural purpose that fulfils a need to supply more electricity from renewable energy sources as a means to reduce the carbon intensity of electricity generation. It is compatible with the existing rural land use and provides additional income to the owners of the properties affected by the development. Parts of the wind farm site may have reduced potential for urban development due to proximity to turbines. Rural residential development potential of neighbouring lands will be generally unaffected.

5.4.2 SPECIAL PROVISIONS OF THE MULWAREE LEP

The following special provisions of the Mulwaree LEP have been identified as potentially applicable to the Project. An assessment of compliance for each clause is also provided below.

Part 3 - Special Provisions

Clause 10 – General considerations for development

Clause 10 requires that Council must take into consideration, but only if relevant, the effect of the carrying out of development of land on:-

(a) *The present use of the land for the purposes of agriculture and the potential of any land which is prime crop and pasture land for sustained agricultural production.*

Wind farms have been shown to successfully co-exist with traditional farming practices. The local community surrounding CWFI has benefited from observing the operation of CWFI for over 12 months. The operation of CWFI on land that continues to be used for grazing and cropping has demonstrated that the agricultural potential of the land is not lost. Although it is acknowledged that there is an inevitable loss of agricultural land, this is considered to be negligible, particularly as it is preferred to site wind turbines on the higher ridges and outcrops that are generally not suited to cropping, and has limited grazing benefit.

It is recognised that the proposed layouts will be situated on the lower slopes throughout the development site however the proportion of the site that will be occupied by the wind farm components and infrastructure will not significantly reduce the agricultural potential of the land.

It is worth mentioning that the land in the area benefits from a valuable wind resource. As shown by the substantial investment in the area to capitalise on that wind resource, the best use of the land may not be from traditional agricultural pursuits. In this regard, it is considered an additional benefit that the existing use of land on the development site, which could be reduced to the 'secondary' use, can continue in conjunction with the wind farms. Given the economic benefits from accommodating wind turbines on private properties, the landowners find themselves with an additional income source that requires negligible resources or labour.

(b) *Vegetation, timber production, land capability (including soil stability) and water resources (including the quality and stability of watercourses, aquatic wildlife habitat, ground water storage and riparian rights).*

The siting of all WTGs in both wind farm layouts eliminates the need to clear any significant tracts of existing native vegetation. All WTGs are to be sited on existing pasture lands and only limited extensions to existing access roads will be required. All watercourses traversing the site will be protected as no new water crossings are required, nor will any WTGs or associated infrastructure be constructed within 40 metres of a waterway, including Lake George.

Appropriate soil erosion mitigation measures will be implemented as part of the Construction Environmental Management Plan. Similar measures have already been installed through CWFI and have successfully managed the soil stability and quality of watercourses within and surrounding the site.

(c) *The future recovery of known or prospective areas of valuable deposits of minerals, coal, petroleum, or extractive materials.*

Several mineral exploration licenses have been granted in the development site and surrounding area. Consultation with the NSW Department of Mineral Resources prior to the commencement of CWFI confirmed that there are no known coal or petroleum resources at the locality. The nearest extractive industry is the sand mining activities to the south of the site. These will not be affected by either Project layout.

(d) The protection of localities of significance for nature conservation or of high scenic or recreational value, and places and buildings of archaeological or heritage significance, including aboriginal relics and places.

Historic rural and grazing land use has led to the area being significantly cleared of all native vegetation. The landscape is dominated by grasslands, comprising both native and exotic species. There are very few areas of remnant vegetation on the development site. Those patches of remnant vegetation have been avoided and will not be affected by either wind farm layout.

Notwithstanding, being private land used for grazing, the development site is not accessible by the public and therefore, there is no public recreational value attached to the site, nor are there any places or buildings that hold any heritage significance.

The European and Indigenous heritage significance has been assessed (**Appendix E**) and findings are summarised in Chapter 10. Several areas of the development site were identified as a Potential Archaeological Deposit (PAD) and several artefacts were located in various parts of the development site. To avoid disturbing the existing or potential items of significance, both wind turbine layouts have been designed to avoid the areas where those items were identified.

(e) The cost of providing, extending and maintaining public amenities and services, including electricity, to the development.

The Project is being undertaken on private land that already accommodates a wind farm. The majority of infrastructure, amenities, services and utilities are currently available and it is not anticipated that the extension of CWFI will require the extension or upgrade of the existing and available services and utilities.

During the construction of CWFII, regular inspections of amenities including public roads will be undertaken to ensure there is no damage or disturbance resulting from the construction phase. The appropriate mitigation and management measures will be detailed in the Construction Environmental Management Plan.

(f) Future expansion of settlement in the locality.

Land use in the surrounding locality is characterised by rural grazing with generally low population density.

It is unlikely that the development site and immediately adjoining properties have the potential to sustain a feasible re-development that would accommodate an expansion of the local population. Any future expansion is likely to occur closer to the regional centres such as Bungendore: 10km to the south.

(g) The quality and availability of water resources within the water catchment area.

There is extensive sub-surface water available on site and it is proposed to utilise existing or new bores to source the bulk of the water required during construction of CWFII.

The existing water resources available on site provided sufficient volume to sustain the construction of CWFI. The quality and availability of water resources were not adversely affected, and due to the scale of the Project being significantly less than CWFI, it is highly probable that subject to the implementation of the relevant mitigation measures in the Soil and Water Management Plan, it is unlikely that the construction and operation of CWFII will affect the quality or availability of the existing water resources within the Lake George catchment.

Clause 24 – Applications that must be Advertised

The Department of Planning is responsible for the advertisement of the Project Application in accordance with Section 75H of the *Environmental Planning and Assessment Act 1979.*

Clause 25 – Development along Arterial Roads

Access to the site is provided by a public road other than an arterial road. Western Leg Road will provide the main access point to the site and Currandooley Road may be used as a secondary access. All construction traffic and employee vehicles will be parked on-site. Traffic and Access is discussed in further detail in Chapter 11 and specific mitigation measures are provided in the draft Statement of Commitments (Chapter 17).

Clause 26 – Heritage Items

A specialist consultant conducted a cultural heritage assessment of the development site (**Appendix E**). Upon review of the recommendations, the proposed wind farm layout was modified to avoid areas of the site that were surveyed to be of potential historical significance. No other items of historical significance were located on the site, nor are any items listed in Schedule 1 of the Mulwaree LEP present on the development site.

It is therefore not anticiapted that the Project is likely to have any impact on a heritage item.

Clause 27 – Heritage Conservation Areas

The development site is not identified within or part of a listed heritage conservation area.

Clause 28 – Development in the Vicinity of Heritage Items

The Project is not proposed near or in the vicinity of any heritage items, nor is it likely to affect any heritage items in the LGA.

Clause 31 – Access

No new access roads or driveways to public roads are proposed or required as part of the Project. The majority of the Project is set well back from main or arterial roads and is connected to the public road network by the existing access roads constructed as part of CWFI. All existing access points will continue to provide access to CWFI and the proposed CWFII turbine sites, including the following:-

- Tarago to Bungendore Road entrance will provide access to the substation. It is located about 3kms south of the Mt Fairy Road intersection;
- Taylors Creek Road to the CWFI (Hammonds Hill and Ellendon Groups) with through access to the remaining parts of the development site; and
- Western Leg Road off Taylors Creek Road will provide access to the majority of the turbine sites, one of the temporary concrete batching plants and the laydown yard.

A detailed assessment of Traffic and Access issues is provided in **Appendix F** and is summarised in Chapter 11 together with proposed mitigating measures.

The Proponent of CWFI undertook substantial road infrastructure upgrades prior to the construction of CWFI in accordance with the Project Approval. The required works have been completed or are currently under construction and were demonstrated to be capable of accommodating the traffic demand and volumes generated from the construction and operation of CWFI. It is not expected that the construction and operation of CWFII will generate additional traffic that would place sufficient additional demand on those roads to require further upgrading works.

Clause 33 – Land Subject to Bushfire Hazard

A Bushfire Risk Management Plan will be prepared for the Project in consultation with the local Rural Fire Service (RFS). The plan will be incorporated in the Construction Environmental Management Plan and an amended version in the Operation Environmental Management Plan.

Clause 41 – Tree clearing

Both Project layouts have been designed toIt is unlikely that it will be necessary to remove any trees, in the event that the removal of trees or other vegetation is required, this will be permissible in accordance with the Project Approval. Regardless, the consent of Council is not required for clearing of trees that is reasonably necessary for the carrying out of development for the purpose of a power line where the land cleared is not more than 30 metres wide.

The issue of vegetation is discussed in further detail in Chapter 9.

The remaining special provisions identified in the Mulwaree LEP are considered not to be relevant in this instance as they generally relate to the subdivision of land or the erection of a dwelling.

5.5 CONCLUSION

The Project is compatible with the capability of the land and consistent with the character of the locality, being an emerging renewable energy park and within a Renewable Energy Precinct established by the Federal Government. All required services and utilities are already available to the site and the expansion of the wind farm is unlikely to place an undue increase in demand of those services. Suitable measures would be in place to ensure that the Project does not result in soil erosion. The Project would generate some additional traffic movements within the locality, however, as discussed in Chapter 9, the impacts of this are not considered significant. The Project would have a positive economic impact in the community (refer to Chapter 15) and would not create demands for the extension of services by Council. The Project would incorporate on-site stormwater management, and suitable controls would be in place to ensure that the Project would not lead to any deterioration of water supply or water quality within the water catchment (refer Chapter 13).

The Project is consistent with the objects of the *EP&A Act* and the relevant Federal, State and local legislation, policy and guidelines. The development site is appropriately zoned for the Project and the Project does not raise any issues that conflict with any Federal, State or local environmental planning instruments.

6. CONSULTATION

A Preliminary Environmental Assessment for the proposed Capital 2 Wind Farm project was submitted to the Department of Planning (DOP) on 8 August 2010. This document initiated the Department of Planning process to identify relevant stakeholders and other interested parties in providing input into the scope of studies for the full Environmental Assessment (EA). This input was used in the preparation of the Director-General's Requirements (DGRs), issued on 3 Septemeber 2010.

The DGRs state that the Environmental Assessment must include a detailed description of the consultation program and the process undertaken as part of the consultation process. The consultation process must reflect an appropriate and justified level of consultation with relevant parties during the preparation of the Environmental Assessment for disseminating information to increase awareness of the Project. The consultation process includes notifying the stakeholders not only about the proposed project and area of investigation, but includes information on the potential life cycle of the wind farm: from conception, development, planning, construction through to operation.

The Department of Planning identified interested stakeholders during their initial review of the Preliminary Environmental Assessment. In addition to those interested parties, this Chapter details the consultation process undertaken with all the relevant government authorities, other stakeholders and the public. All community consultation undertaken to date is documented below as well as details of any issues raised.

In general, the location of the proposed project is adjacent to the existing Capital Wind Farm and in the vicinity to the Woodlawn Wind Farm which is currently under construction. This has assisted with the consultation process as all relevent stakeholders have previously been through the various stages of a wind farm. As a consequence, there has been significantly less introduction to the general wind farm stages and requirements and more detailed questions regarding location and project specific components, timing and cummulative impacts. Due to the experience gained from the previous projects in the area, an established stakeholder consultation process has been implemented for this project which is in addition to the ongoing consultation that occurs out of commitments from the existing projects.

6.1 CONSULTATION OBJECTIVE AND APPROACH

6.1.1 OBJECTIVE

The objectives of the consultation process during the concept design phase, preparation of the Preliminary Environmental Assessment and draft Environmental Assessment and throughout the Department of Planning process are:-

- To provide government authorities, stakeholders and the public, information about the proposal including the planning process;

- To provide government authorities, stakeholders and the public, with the opportunity to detail their views and opinions about the proposal, including any issues they would like considered;

- To identify issues and suggestions to be incorporated into the concept design, the assessment process and to address concerns raised by government authorities, stakeholders and the public; and

- To ensure that the community is fully informed about the proposed project.

6.1.2 APPROACH

The public consultation for the proposed project commenced with the submission of the Preliminary Environmental Assessment in early August 2010. The proponent, Infigen Energy, has a policy to directly notify all existing landowners residing within a 3km radius around the project area. This is to inform the immediate community of the proposed project, stage of the project, to give them opportunity to go over any questions or concerns and to inform them of the planned community information day.

Engagement of all relevent stakeholders has occurred through the following means:-

- An information day was hosted by the proponent on 8 September 2010 at the War Memorial Hall in Bungendore;

- Telephone discussions with the public and various government authorities;

- A Newsletter;

- A digital presentation outlining the background and experience of the proponent and scope of the project;

- Follow up emails with project specific details including additional requested information;

- One-on-one meetings with the public and government authorities; and

- Ongoing consultation meetings with various stakeholders throughout the project planning and life cycle.

The consultation methods have and will vary with the stages of planning, the stakeholders involved and the nature and degree of their interest and/or concern, including a digital presentation outlining the background and experience of the Proponent and scope of the Project.

Following the submission of the draft Environmental Assessment, the EA will be formally exhibited by the Department of Planning for a minimum period of 30 days. During the exhibition period, submissions will be invited from relevant agencies and members of the public.

6.2 STAKEHOLDERS

The following Chapter lists out the stakeholders identified in the DGRs and other relevant parties that have been part of the consultation process. These parties have been consulted about the proposed project, provided with additional details and invited to provide comments or questions on the development.

6.2.1 LOCAL GOVERNMENT

Consultation has taken place with both Palerang Shire Council and Goulburn-Mulwaree Council on a number of occassions. It is likely that due to the demonstrated capability by Renewable Power Ventures (Infigen Energy) during the construction of CWFI, both Councils have not raised any significant issues regarding the construction of the expanded wind farm or the adopted transport route subject to the implementation of an appropriate Traffic and Transport Management Plan.

6.2.2 STATE GOVERNMENT

In accordance with the requirements of the DGRs, consultation has been undertaken with the following State agencies:-

- The New South Wales Member of Parliament for Goulburn, Pru Goward;
- Department of Environment, Climate Change and Water;
- NSW Office of Water;
- Department of Industry and Investment;
- NSW Roads and Traffic Authority;
- Rural Fire Service;

- Land and Property Management Authority; and
- Murrumbidgee Catchment Management Authority.

The relevant State authorities have been consulted on several occasions, by phone, email and/or the submission of a digital presentation introducing the project, local area and going through the specific development details.

They are also part of the ongoing consultation process which is part of the consultation process from the other wind farm projects in the vicinity. Due to the location of the proposed project and history of previous wind farms in the area, there were no new concerns about this proposal. The DGR's have encapsulated the concerns raised by the State and local authorities. Several agencies did not provide a formal response as no further consultation prior to the submission of the EA is required subject to the preparation of a comprehensive CEMP and OEMP.

6.2.3 COMMONWEALTH GOVERNMENT

In accordance with the requirements of the DGRs, consultation has been undertaken with the following Commonwealth authorities:-

- Commonwealth Department of Defence;
- Civil Aviation Safety Authority; and
- Airservices Australia.

The relevant Commonwealth authorities have been consulted on several occassions and are part of the ongoing consultation process that is also part of the conditions and process with the various other wind farm projects in the area. No new concerns have been raised, and the discussed comments raised have been addressed as part of the DGR's.

As the final layout has not been confirmed, Airservices Australia has requested the GPS co-ordinates of the final siting of the Project components once the project has been completed. An appropriate commitment has been included in the Statement of Commitments (Chapter 17).

6.2.4 SERVICE AND INFRASTRUCTURE PROVIDERS

Consultation was undertaken with the relevant service and infrastructure providers including the NSW Roads and Traffic Authority. The outcomes of this consultation, including any issues raised and where they are addressed in this report, is detailed below.

NSW Roads and Traffic Authority

The NSW Roads and Traffic Authority (RTA) Southern Region office was contacted and RTA staff were briefed on the Project scope and anticipated impacts as a result of the development, particularly during the construction phase.
The RTA were advised that the proposed Project is of a lesser scale than the completed CWFI and that the traffic generation would not exceed the previous construction and operational phase construction traffic generations.

RTA representatives did not immediately raise issue, however, the RTA requested that the EA for the Project consider the cumulative traffic impacts of the project. This has been done and is detailed in Chapter 11 of this report. Furthermore, the RTA would review the EA documentation following submission to the Department of Planning.

6.2.5 SPECIALIST INTEREST GROUPS

Indigenous Community

The stakeholder consultation process for the Project was conducted in accordance with the DECCW (NSW) *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation 2005.*

The Local Aboriginal Land Council (LALC) and registered stakeholders for the Project were consulted with. Stakeholders were invited to register their interest by advertisements in the Koori Mail and Queanbeyan Age. In addition, contact was made with the Local Aboriginal Land Council and the Buru Ngunnawal Aboriginal Corporation in the form of letters of notification prior to newspaper advertisement.

At the time this EA was prepared there had been no issues raised.

Aerial Agricultural Association of Australia

The Aerial Agriculture Association of Australia (AAAA) represents commercial aerial agriculture operators involved in the aerial application of a variety of materials. There is no history of the aerial application of agricultural materials being employed at any of the properties on the Project site. Notwithstanding, concern has previously been raised regarding overhead transmission lines. In response to this, the overhead transmission lines proposed as part of the Project will be minimal, and if required, be located adjacent to the existing overhead transmission lines which will have no additional impacts to aerial application which is unlikely to occur anyway.

Given the location of the WTGs on each property, the closest boundary adjoins Lake George, where the aerial application of materials is unlikely to occur.

Furthermore, all new WTGs will be connected to the existing electrical reticulation network through underground transmission lines. The AAAA has been consulted and no further comments have been received regarding the Project.

Exploration Licenses

Several mineral exploration licenses have been granted in the project site and surrounding area. Two mineral exploration companies issued with the exploration licenses have been contacted and the digital presentation provided. The Project was considered not to have any impact on the exploration activities in the area and both companies did not have concerns with the Project proceeding.

6.2.6 THE PUBLIC

A community information day was held at the War Memorial Hall in Bungendore on 8 September 2010. All landowners within 3kms of the Project site were directly contacted and informed and a notice advertising the details of the open day was posted in the Bungendore Mirror and the Tarago Times three weeks prior to the information day. Approximately 30 interested persons attended throughout the day.

The information day allowed the opportunity for members of the community to speak to the project team. Through conversations held on the day with local people, it was clear that residents were often identifying cumulative impacts of the expanded wind farm highlighting the noise generated from the existing WTGs as being of concern. Access to the Project site by small and heavy vehicles and transport routes for delivery of turbine components was raised as a concern in conjunction with the uncertainty of the final location of the proposed WTGs. This is discussed further in Chapter 14 of this report.

The majority of the common issues raised as part of the public consultation related to noise. Some further minor concerns identified the visual appearance of the wind farm as an issue. These are addressed in Chapters 7 and 8 respectively. The Proponent acknowledged the issues raised following the community consultation process and responded by ensuring the potential visual and noise effects of the Project were minimised through careful design.

Some concerns were also raised about the potential impact the proposed Project would have on their property value. A report prepared for the NSW Valuer General in 2009 concluded that the majority of wind farms erected in Australia have no quantifiable effect on land values. This conclusion was based on an investigation into the sale transactions of 45 properties within a 10km radius of eight wind farms, including CWFI. It was found that any wind farm related impacts on land values can be alleviated by careful design and consideration of the separation distance with the nearest residential dwellings.

In this instance the Proponent has for the most part increased the separation distances from the neasest residential dwellings that are not associated with either CWFI or CWFII.

Throughout the Project life cycle, the development, construction and operational activities will continue to be monitored and maintained in accordance with the Statement of Commitments, industry requirements and all approvals and licenses. Additionally, a Project website will be established as a mechanism for the public to submit questions.

6.3 CONCLUSION

As detailed above, an appropriate and justified level of consultation has been undertaken with the relevant parties during the preparation of the draft Environmental Assessment and concept design. In addtion to the experience gained from the previous projects in the area, an established stakeholder consultation process has been implemented along with the ongoing consultation that occurs out of commitments from the existing projects.

Further to pre-lodgement consultation undertaken for the Project during the concept design phase, the Environmental Assessment will also be formally exhibited by the Department of Planning for a minimum period of least 30 days. During the exhibition period, submissions will be invited from relevant agencies and members of the public. Overall, this is considered a suitable consultation strategy taking into consideration the level of impact and involvement of stakeholders, which is appropriate for the Project.

7. VISUAL ASSESSMENT

The insertion of wind farms into a rural landscape involves interrupting the rural and natural cohesion of that landscape. Excluding the Capital I Wind Farm (CWFI), the only present intrusions are roads, occasional dwellings, fence lines and the like which typify an agricultural landscape whose substantial modification since European settlement has been extensive clearing and removal of native vegetation for the establishment of pasture lands.

The Visual Impact Assessment (VIA) (**Appendix A**) has considered potential visual impacts of the Project to surrounding dwellings (considering blade glint and shadow flicker) as well as to existing landscape values. The key aspects of that assessment are summarised in this Chapter of the Environmental Assessment (EA).

7.1 OVERVIEW OF ASSESSMENT

The Project is found on comparatively low land when compared with the existing CWFI. The existing wind turbines associated with CWFI are generally sited on the ridges of the Great Dividing Range reaching heights ranging from 750 metres to 935 metres. The proposed wind turbines are located on the slopes and lower lying land ranging from 680 metres up to 750 metres.

As cadastral information has little influence in defining visual catchments, the VIA identified the existing landscape character and dominant features of the relevant visual catchments that the Project lies within.

Wind farms by their nature are usually located in elevated exposed positions and, as large structures can be highly visible. The Project is unique in that the preferred positions throughout the Project site are already occupied by the wind turbines forming the CWFI. This being the case, the 55 WTGs proposed as part of the Project are for the most part, located on the lower slopes to the west of the dominant ridges and hills of the Great Dividing Range.

In addition to the wind turbines, the visual assessment of the associated infrastructure is included as part of the Project.

7.1.1 POLICY CONSIDERATIONS

Wind Farms and Landscape Values National Assessment Framework

The Australian Council for National Trusts (ACNT) and the Australian Wind Energy Association have prepared a report outlines: Wind Farms and Landscape Values.

The purpose of the report is to develop a mutually agreed methodology for assessing landscape values for wind farm proposals. The National Assessment Framework, Stage 2 of the document, provides a rigorous and transparent method for assessing, evaluating and managing the impact of wind farms on landscape values. The step by step approach entails describing and modelling wind farms proposals in the landscape, assessing the positive and negative impacts on landscape values and finally managing those impacts.

The National Assessment Framework has four steps as follows:-

Step 1: Assess the Landscape Value;
Preliminary Landscape Assessment;
Full Landscape Assessment;

Step 2: Describe and model the wind farm in the landscape;

Step 3: Assess the impacts of the wind farm on landscape values; and

Step 4: Respond to impacts.

Palerang Council

Palerang Council have not currently prepared any relevant policies of landscape or scenic quality that may apply to the area within the Shire or apply to developments of this nature.

7.1.2 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

A Landscape Assessment and Visual Impact Assessment (LVIA) is used to identify and determine the value, significance and sensitivity of a landscape. The method applied involved systematically evaluating the visual environment pertaining to the Project site and using value judgements based on community responses to scenery. The assessment was undertaken in stages as noted below.

An LVIA involves:-

- Classification of the landscape into different character types and a description of those types. These are referred to as Landscape Character Units (LCU);

- Objective assessment of the relative aesthetic value of the landscape defined as visual quality and expressed as high, medium or low. This assessment generally relates to variety, uniqueness, prominence and naturalness of the landform, vegetation and water forms within each character type or LCU;

- Determination of the landscapes ability to absorb different types of development on the basis of physical and environmental character;

- An assessment of viewer sensitivity to change. This includes how different groups of people view the landscape (for example, a resident as opposed to a tourist), and how many people are viewing and from how far;

- The undertaking of a viewpoint analysis to identify sites likely to be affected by development of the site and a photographic survey using a digital camera and a handheld GPS unit to record position and altitude; and

- An assessment of visual impacts; and the preparation of recommendations for impact mitigation and suggestions for suitable development to maintain the area's visual quality.

The purpose is to reduce the amount of subjectivity entering into the assessment and to provide sufficient data to allow for third party verification of results.

The second stage of the Assessment involves a quantitative approach. The quantitative assessment of the visual impacts is defined by methods including:-

- Computer modelling to determine the Zone of Visual Influence (ZVI); and

- Visual modelling of the Project from key viewpoints in the form of photomontages to depict the potential visual change.

7.2 DESCRIPTION OF EXISTING ENVIRONMENT

The Project site and much of the landscaping surrounding it comprises rural land that has been extensively cleared.

Figure 43: Capital I Wind Farm looking south from Collector Road

7.2.1 LANDSCAPE CHARACTER UNITS

The existing landscape context of the Project site and its surrounding environment has been classified into distinct and relatively homogenous units of landscape character (**Figure 435**). These landscape character units (LCU) form the elements of the local visual context hence their quality also reflects to a degree its visual amenity.

The LCU'S for the purpose of the VIA have been defined as:

- LCU 1 – Lake George Plain
- LCU 2 – Bungendore Plan
- LCU 3 – Collector Road/Tarago
- LCU 4 – Tarago/Bungendore Road
- LCU 5 – Groses/Governors Hill
- LCU 6 – Taylors Creek Catchment
- LCU 7 – Hammonds Hill
- LCU 8 – Lake George Road

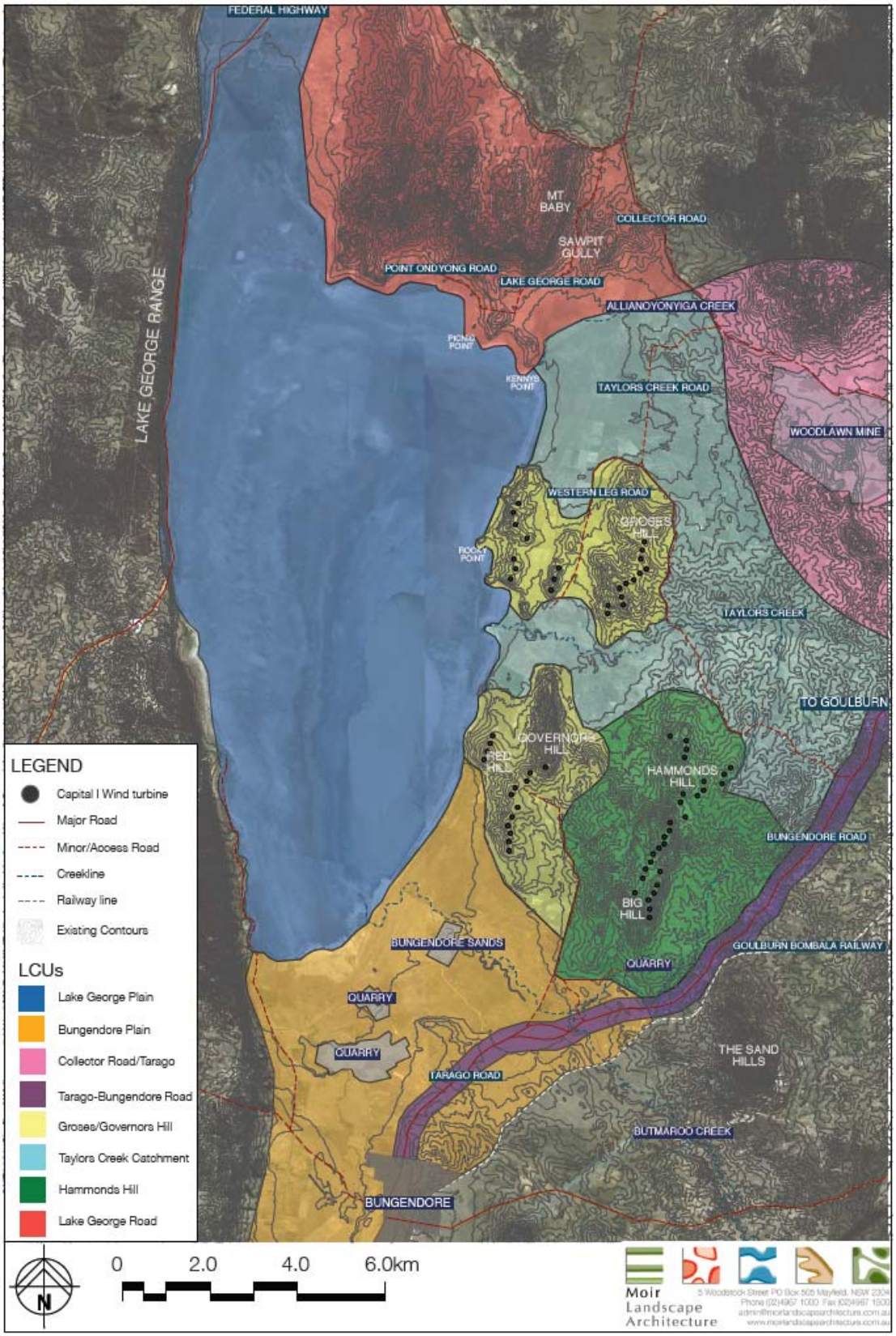

Figure 44: Identified landscape character units

The landscape elements through the LCUs comprise mainly cleared pastoral land with some adjacent uncleared remnant woodlands. Built features such as buildings, roads, fences and transmission lines are scattered throughout the landscape at a low density.

The following is a comprehensive assessment of the landscape character and values and any scenic or significant vistas of the eight LCUs:-

LCU 1 – Lake George Plain

The Lake George Plain LCU encompasses the open expanse of Lake George, the Federal Highway and rest areas, the northern section of Lake Road and the relatively uninhabited western fringe of Lake George. Lake George, located immediately west of the Project, is approximately 25kms and 10kms wide. It is a long, large and extremely shallow with a relatively small catchment.

Figure 45: Lake George from the Federal Highway VC Wheatley Rest Area

LCU 2 – Bungendore Plain

Escarpments and steep ranges adjoin the west and east side of Lake George. The open flat valley to the south of the Lake is referred to as the Bungendore Plan. The LCU incorporates the relatively flat rural plans, the township of Bungendore and recent rural residential subdivisions northeast of the township.

Figure 46: Bungendore Plain looking north along Bungendore Road

LCU 3 – Collector Road/Tarago

Collector Road runs north of the Project site between Bungendore Road and the Federal Highway, concluding at the town of Collector. The extent of the LCU has been identified as Collector Road, the forested escarpment to the north of the Woodlawn Mine site to the south. The eastern perimeter of the LCU runs from the entry of Taylors Creek Road along the edge of the Taylors Creek Catchment. Collector Road is assessed as being a minor road. It is partially unsealed road utilised for heavy vehicle transport associated with the Woodlawn Mine site and rural residential access.

Figure 47: Collector Road looking south

LCU 4 – Tarago/Bungendore Road

Bungendore/Tarago Road runs along the south-eastern edge of the Project area in a generally north-east direction from the town of Bungendore to Tarago. The road transects with the Bungendore Rural Plain LCU and Hammonds Hill LCU, yet is included as a separate LCU due to the distinct character of the road. As it reaches Bungendore, Tarago Road connects with the Kings Highway which then continues to Canberra. Tarago Road is generally utilised by residents and the occasional heavy transport. In this context, it is identified as a minor road.

Figure 48: Bungendore/Tarago Road looking north

Figure 49: Bungendore/Tarago Road looking south

LCU 5 – Groses/Governors Hill

The Groses/Governors Hill LCU is generally defined by the ridge lines along the eastern edge of Lake George. These ridge lines include Red Hill, Groses Hill, Governors Hill and associated high points. The existing wind turbines of the Ellenden and Governors Hill groups are sited along these ridge lines. These hills are of a generally similar landscape character typified by cleared rural land and steep topography.

Figure 50: Groses Hill Group and Ellenden Group of wind turbines in the Capital I Wind Farm are part of the Groses/Governors Hill LCU

LCU 6 – Taylors Creek Catchment

The Taylors Creek Catchment LCU covers an extensive area of flat, low-lying land on the eastern side of Lake George. Included in this LCU is Taylors Creek Road and Taylors Creek. Taylors Creek Road runs to the east of the Project area connecting with Collector Road to the north and Bungendore/Tarago Road to the south. The catchment includes Taylors Creek and associated drainage lines which run into Lake George.

Figure 51: Western Leg Road looking north west

Figure 52: Taylors Creek Road looking south

LCU 7 – Hammonds Hill

Hammonds Hill LCU is generally defined by the extent of Hammonds Hill and Big Hill. The LCU is defined to the north by land identified in the Taylors Creek Catchment LCU, to the east by the Great Dividing Range and to the southwest by the Bungendore Rural Plain LCU.

The LCU is characterised by a steep rise in topography and density of vegetation associated with the Hammonds Hill ridgeline. The existing CWFI wind turbines dominate the ridgelines.

Figure 53: Capital I Wind Farm - Hammonds Hill Group looking north

LCU 8 – Lake George Road

The Lake George Road LCU includes the area to the north of Lake George, up to Collector Road. The area is generally defined by the hills connecting with Mt Baby, Lake George Road and Sawpit Gully. The LCU is defined by views from the northern edge of Lake George, over Lake George towards the CWFI and contained by the Lake George western Range. The LCU is bordered to the south and east by the Lake George Plain LCU, to the west by Allianoyonyiga Creek on the perimeter of the Taylors Creek Catchment LCU and the north by the Collector Road LCU.

Figure 54: Lake George looking south from Lake George Road