

UNION FENOSA
WIND AUSTRALIA



PALING YARDS WIND FARM
CHAPTER 2

INTRODUCTION

2 Introduction

2.1 Introduction

Union Fenosa Wind Australia (UFWA) (the 'proponent') and its successors and assigns, is seeking project approval for the construction and operation of a wind energy facility known as the Paling Yards Wind Farm (the 'project'). The Paling Yards Wind Farm project is a major project aimed at providing renewable energy.

Renewable energy, such as wind generated electricity, meets the Federal, State and Local Government objectives of reducing greenhouse emissions and the dangerous impacts of climate change.

The site of the project ('the site') includes two land holdings over approximately 3,900 hectares known as 'Mingary Park' and 'Paling Yards'. There are two homesteads on these properties. The majority of the site has been cleared of native vegetation, although scattered trees are common within the site and thicker vegetation exists near the site's boundary. The site is bordered by the Abercrombie National Park on the western boundary and forested land to the south-east, all of which are heavily vegetated.

The project is a transitional Part 3A project to which Part 3A of the *Environmental Planning and Assessment Act (1979)* (EP&A Act) continues to apply despite its repeal.

A Preliminary Environmental Assessment (PEA) was lodged by Tract Consultants on behalf of the proponent with the NSW Department of Planning and Infrastructure (DoPI) (formerly the Department of Planning) on 12 April 2010. This Environmental Assessment (EA) has been prepared to address the Director-General requirements (DGRs) issued by the Director General of Planning for the project under Part 3A of the EP&A Act which were provided by DoPI on 6 May 2010 and the supplementary DGRs which were provided by DoPI on 16 August 2011.

This EA has also been prepared to address the *Draft NSW Wind Farm Planning Guidelines* (Draft Guidelines), which were released for public exhibition on 23 December 2011, as required by a letter from DoPI dated 18 April 2012. The letter dated 18 April 2012 from DoPI, as well as the 'checklist for applications yet to be exhibited' can be found at **Appendix 1** of this report. Brief comments on how each item on the checklist has been addressed, and which chapter of this report to refer to, are also provided in **Appendix 1**.

The EA was lodged to DOPI on 30 January 2013, and has been subsequently updated to reflect the review by DoPI,

2.2 Project History

The project was originally proposed by TME Australia Pty Ltd in 2002, at which time wind monitoring masts were placed on site to determine the suitability of the wind resource.

Once a suitable wind resource was confirmed, the project progressed through a joint venture with Gamesa Energy Australia Pty Ltd and a consultant team was established in 2004 to prepare an Environmental Impact Statement (EIS) and EPBC referral for a project of approximately 46 turbines of 67 – 78 metres to hub height. The rapid changes in technology in the wind farm industry have now allowed for consideration of an increased number of turbines of increased size.

The project was referred to the then Minister for Environment and Heritage (now the Minister for Sustainability, Environment, Water, Population and Communities) under the *Environmental Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act) in

2005. The Minister determined that the project was not a controlled action which required approval under the EPBC Act.

A planning focus meeting was held in February 2005 to provide DoPI with a formal brief of the project and to inform the preparation of the DGRs. However, due to an uncertain investment environment for renewable energy projects, an application was not lodged at that time.

On 29 October 2009, the Deputy Director General, Development Assessment for the Department of Planning, under delegation for the Minister for Planning, determined that the project was a project to which Part 3A of the EP&A Act applied. A Part 3A application was subsequently lodged for the project on 9 April 2010.

Since lodgement of the PEA for the project in April 2010, the proponent has engaged specialist consultants to investigate and assess the site and the project. The ongoing assessments carried out by these consultants have been used in the planning and design of the wind farm and to inform this EA. The consultants' work has been guided by the DGRs and the Draft Guidelines.

A key element of the investigations undertaken in relation to the project was the face to face consultation (door-knock) carried out with surrounding land owners, which took place from 30 May 2011 to 1 June 2011. The results of the door-knock, combined with a second round of consultation with key stakeholders, and additional consultant studies, resulted in a number of changes being made to the project to address some of the major issues raised. Changes to the project since its recommencement in 2010 have included:

- The selection of the northern transmission line as the least impact option;
- Selection of the northern transmission line as the least impact option;
- Removal of the southern substation;
- Removal of turbine P26 in response to the findings of the noise assessment to reduce potential noise impact for the project involved landowners;
- Removal of turbines P2, P6, and P7 in response to the findings of the flora and fauna assessment and the Conservation Agreement in place for the Box Gum Grassy Woodland project as part of the Commonwealth Government's Environmental Stewardship program;
- Removal of turbine P11;
 - removal of associated crane pad from the remnant area; and
 - removal of associated 1,184m of access track of which 353m were in the remnant area.
- Relocation of turbine P10 to 184m south of original location;
 - removal of 184m of access track from the remnant area.
- Relocation of turbine P13 to 70m south-east of original location;
 - removal of 77m of access track from the remnant area; and
 - turbine and crane pad will be located in a more cleared area, hence reducing the vegetation clearing by approximately 50% for this location.
- Relocation of turbine P14 to 86m south-east of original location;
 - removal of 101m of access track from the remnant area; and

- turbine and crane pad will be located closer to the edge of the remnant area, hence reducing the vegetation clearing by approximately 20% for this location.
- Micrositing of the turbines to minimise local impacts;
- Changes to the location of:
 - several access tracks to further utilise the existing farm tracks and reduce the infrastructure footprint;
 - underground cabling to provide more efficient transfer of electricity and reduce the infrastructure footprint;
 - an access road to separate the wind farm construction vehicle traffic from the access used by the project involved landowners;
 - selecting a smaller wind turbine envelope size for specific locations to reduce potential noise and shadow flicker impact for the project involved landowners;
 - substations to reduce length of overhead powerlines; and
 - powerline poles for the northern transmission line route to minimise and avoid where possible the removal of native vegetation.

The initial proposal included options for 30 and 50 wind turbines, each with a power output of two megawatts and a collective capacity to produce 60 to 100 megawatts (MW) of renewable energy. The type of wind turbine initially proposed had a maximum rotor radius of 45 metres and a hub height of 67 - 78 metres. The combined height of the tower and the rotor in a vertical position was a maximum of 125 meters.

Due to technological advancements in wind turbine design, the project was enlarged to include up to 60 turbines. However, the results of the preliminary assessment recommended the removal of one turbine (P26).

Following this, the project included up to 59 turbines. The specialist consultants' assessments and the consultation with the community and stakeholders were based on this layout of up to 59 turbines.

However, the results of the final flora and fauna assessment have prompted the removal of three turbines (P2, P6 and P7) due to the Conservation Agreement in place for the Box Gum Grassy Woodland project as part of the Commonwealth government's Environmental Stewardship program. Additionally, as part of the adequacy review of this EA, discussions between DoPI and the flora and fauna specialist have prompted the removal of another turbine (P11). The proponent has agreed to remove this turbine in order to reduce vegetation clearing for the project.

Therefore, the project seeks approval for up to 55 turbines.

As the technical assessments of the project have been based on a layout of 59 turbines, the findings therefore present 'worst-case' scenario impacts and can be considered conservative in nature.

The proponent is considering a number of alternative wind turbine models and therefore has adopted a theoretical wind turbine with a capacity of up to 4.5 MW, a hub height of up to 119 metres, a rotor radius of up to 68 metres and a total tip height of up to 175 metres. This represents a combination of the maximum elements of a range of turbines under consideration. As new turbines are frequently released to the market; it is possible that minor variations to these dimensions could occur prior to the final turbine selection. Based on the maximum number of turbines now proposed, the potential capacity across the entire project is up to 178 MW of renewable energy.

2.3 The Proponent

2.3.1 Overview

Union Fenosa Wind Australia Pty Ltd (UFWA) is the proponent of the Paling Yards Wind Farm project. UFWA is a subsidiary of a Spanish Energy Utility called Gas Natural Fenosa.

The Gas Natural Fenosa group is one of the leading multinational companies in the gas and electricity sector, operating in 25 countries and employing around 20,000 staff with 15.4 GW of installed power and nearly 20 million customers.

UFWA remains a separate entity and has eight wind farm projects (in development, approved and early construction stages) across NSW and Victoria. This portfolio represents a potential investment of approximately \$2 billion in renewable wind energy generation. Once complete, the portfolio would increase Australia's present wind generation capacity by over 1,000 MW. In addition, it will result in the creation of several hundred jobs in the construction and operational phases.

Refer to **Figure 1 – Gas Natural Fenosa International Projects** and **Figure 2 – UFWA Projects**.

Following the acquisition of the electricity company Unión Fenosa, Gas Natural Fenosa has achieved its objective of integrating the gas and electricity businesses in a single company with extensive experience in the energy sector, capable of competing efficiently in markets subject to a process of increasing integration, globalisation and levels of competition.

Gas Natural Fenosa is the largest integrated gas and electricity company in Spain and Latin America, leading the natural gas sales market in the Iberian Peninsula, and it is the biggest distributor of natural gas in Latin America. With a fleet of 11 LNG tankers, it is a company of reference for LNG/NG in the Atlantic and Mediterranean basins.

Gas Natural Fenosa has a strong commitment to social and environmental issues throughout all aspects of its business. Gas Natural Fenosa's goal is to achieve sustainable growth and its electricity and gas production, transport, distribution and marketing activities focus on protecting the environment and quality of life. Gas Natural Fenosa's efforts in this regard have been acknowledged and the group has received numerous awards and public acknowledgements in 2011 for its contributions to social responsibility, sustainability and environmental protection, in addition to its strict financial control.

In 2012 Gas Natural Fenosa's sustainability strategy earned it a place on the Dow Jones Sustainability Index and DJSI Europe. This is the eighth year that Gas Natural Fenosa has earned a place in DJSI Europe (2005-2012). Likewise, for the tenth year running, it was included in the FTSE4Good sustainability indices.

Gas Natural Fenosa is committed to the community in which it operates, where it generates value through community investment. Gas Natural Fenosa received the 2011 Platts Global Energy Award in New York for the most outstanding community

A new group in the world

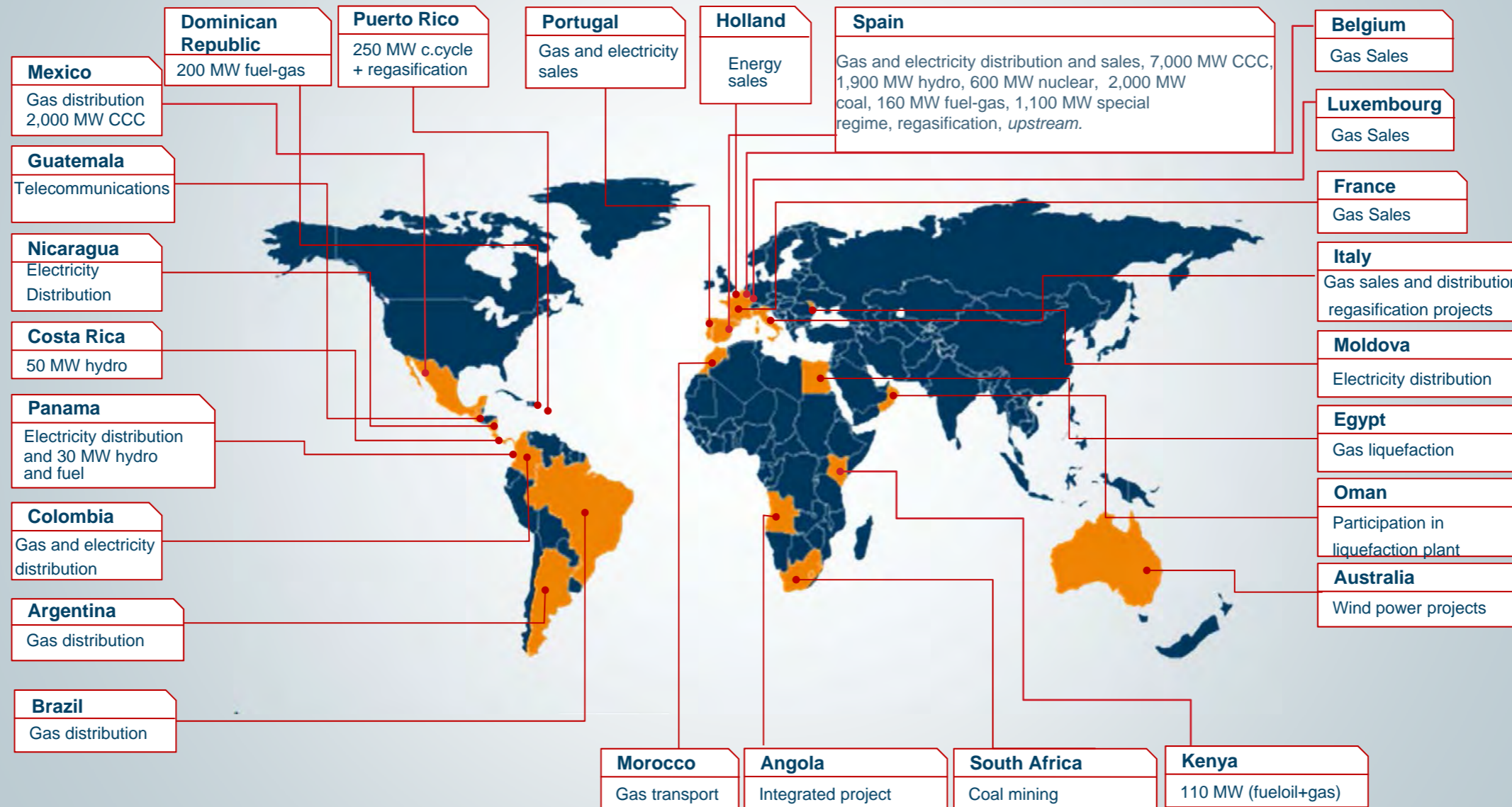


Figure 1

Gas Natural Fenosa International Projects

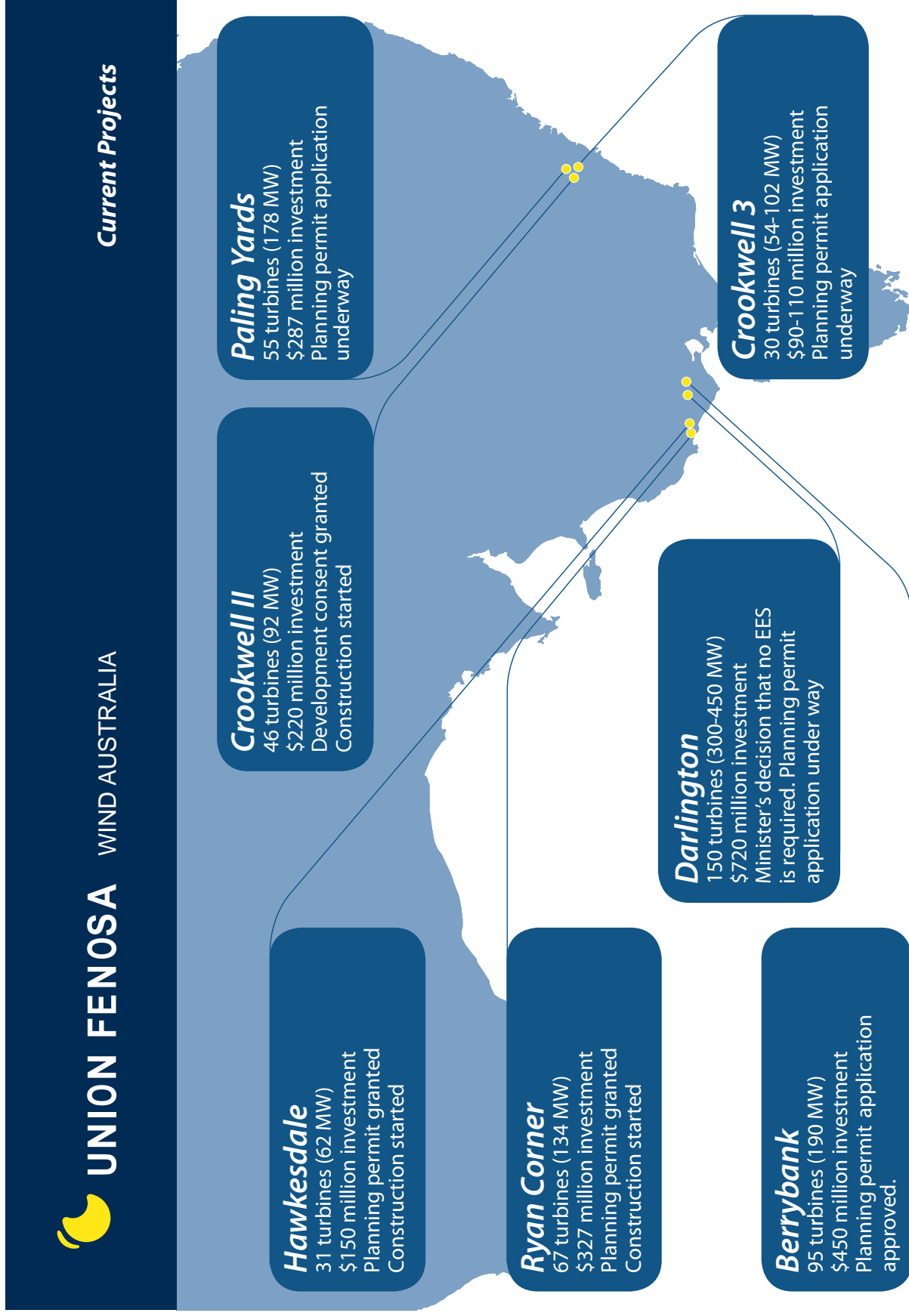


Figure 2

UFWA Projects

development programme for its Cuartel V gasification project in Buenos Aires, Argentina. The award winning initiative works to improve access to public services for the neediest groups and to contribute in this way to reducing poverty in local communities where the company operates.

The company has a Corporate Social Responsibility (CSR) policy that is implemented rigorously across all of its projects in all countries. The fundamental aim of this CSR is to share the benefits with the communities in which they operate to ensure that Gas Natural Fenosa forms an important component within the community. In previous projects, this has translated to direct investment in local projects to assist communities, such as sponsoring organic farmer markets (Columbia), bringing technology and computers to schools (Guatemala), and running educational programs for the unemployed (Spain).

2.4 Structure of the report

This document is an Environmental Assessment (EA) presented on behalf of UFWA. It has been prepared by Tract Consultants with the assistance of specialist consultants. The aims of this EA are to:

- Describe and detail the subject site and its context, the project and design response;
- Provide a strategic justification which details the site selection process, renewable energy benefits, wind power in the international, Australian and regional context, and the community and environmental benefits of the project;
- Provide an assessment of the project against all relevant Federal, State and Local policies and guidelines;
- Assess the likely economic, social, environmental and cumulative impacts of the project;
- Describe and provide recommendations on stakeholder and community consultation; and
- Identify, and outline management or mitigation options for any negative impacts arising out of the project.

This EA draws on the expert knowledge and investigations of a wide range of specialist assessments that are summarised within this EA, with the full reports attached as appendices. The project team comprises:

- Tract Consultants Pty Ltd – Environmental Planning
- AECOM Australia Pty Ltd – Decommissioning
- Anderson Environmental Consultants Pty Ltd – Flora and Fauna, and Indigenous and Non-Indigenous Archaeological Heritage
- Aviation Projects Pty Ltd – Aeronautical Safety and Obstacle Night Lighting
- Environmental Resources Management Australia Pty Ltd – Socio-Economic and Landholder Consultation, Flora and Fauna, Indigenous and Non-Indigenous Archaeological Heritage and Hydrology
- Garrad Hassan Pacific Pty Ltd – Electromagnetic Interference and Shadow Flicker
- Green Bean Design – Landscape and Visual Assessment
- SLR Consulting Australia Pty Ltd – Noise
- URS Australia Pty Ltd – Traffic and Transport

This EA is structured as follows:

- The **Site and Context** provides discussions of the major elements of the site and surrounds
- The **Design Response** details how the project has been designed in response to the site analysis.
- The **Proposal** describes the project in terms of the proposed use, buildings and works, connections to the grid and native vegetation removal.
- The **Project Justification** provides justification for the site selection, outlines community benefits, discusses alternatives and demonstrates greenhouse gas savings.
- The **Statutory Provisions** provides an overview and assessment of the planning and environmental legislation, regulations and guidelines as relevant to the project.
- **Specialist Assessments** of the following impact areas as they relate to the project, including:
 - Economic and social impacts
 - Landscape and visual impacts
 - Noise impacts
 - Flora and fauna impacts
 - Aeronautical impacts
 - Transport impacts
 - Electromagnetic interference impacts
 - Shadow flicker impacts
 - Heritage impacts
 - Geotechnical impacts
 - Hydrological impacts
- An outline of the **Consultation** strategies undertaken with the community and stakeholders of the project (to date and future).
- A **Risk Analysis** of the project,
- A **Statement of Commitments** which outlines the measures which UFWA will carry out, subject to project approval, in order to manage any project impacts.
- A **Conclusion** which concludes this EA.

In particular, this EA has been guided by the criteria set out in the DGRs (refer to **Appendix 2**). The DGRs outline the matters which this EA must address to enable an assessment of the project under Part 3A of the EP&A Act. The DGRs are set out in the table below, together with cross references to the corresponding sections of this report that address each of the issues raised.

Table 1 Director-General Requirements

General Requirements	Relevant Report Chapter	Relevant Figures
The Environmental Assessment (EA) must include:		
<ul style="list-style-type: none"> ▪ An executive summary; 	1	
<ul style="list-style-type: none"> ▪ A detailed description of the project including: <ul style="list-style-type: none"> - construction, operation and decommissioning details; - the location and dimensions of all project components including the wind turbines (including map coordinates and AHD heights), underground cabling between turbines, electrical substation and transmission line linking the wind farm to the grid (adjacent Transgrid or to the Crookwell 2 wind farm substation, including easement width and height), on site control room and equipment storage, temporary concrete batching plant(s), construction compounds, access roads/road upgrades (including access tracks) and obstacle lighting - a timeline identifying the proposed construction and operation of the project components, their envisaged lifespan and arrangements for decommissioning and staging - supporting maps/plans clearly identifying existing environmental features (e.g. watercourses, 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 - and resourcing requirements (including, but not limited to, water supply and gravel) 	<p>5.13 – 5.16</p> <p>5</p> <p>5.13 – 5.16, 5.19</p> <p>3</p> <p>5.12 – 5.16</p>	<p>12, 13, 14, 51</p> <p>3, 4, 5, 6</p>
<ul style="list-style-type: none"> ▪ Consideration of any relevant statutory provisions including the consistency of the project with the objects of the Environmental Planning and Assessment Act 1979 and the relevant matters within the Oberon Wind Power Generation Development Control Plan and the Oberon Development Control Plan (Part O) – Wind Power Generation 	7	
<ul style="list-style-type: none"> ▪ 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 considering cumulative impacts, as applicable. This should include the cumulative effect of the transmission line on the landscape in the vicinity of the existing Crookwell 1 Wind Farm, approved Crookwell 2 and proposed Crookwell 3 Wind Farm 	8 – 21	29 – 60
<ul style="list-style-type: none"> ▪ A draft Statement of Commitments detailing measures for environmental mitigation, management and monitoring for the project 	24	

General Requirements	Relevant Report Chapter	Relevant Figures
<ul style="list-style-type: none"> ▪ 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 ▪ Certification by the author of the EA that the information contained in the Assessment is neither false nor misleading ▪ Given the length of the grid connection transmission line to Crookwell 2, the EA should present, with respect to each relevant transmission line impact, a considered screening of potential impacts along the length of the line, to identify the areas of potentially significant impact for further, more detailed assessment. In addition to detailed assessment of areas of potentially significant impact other areas along the length of the line should be assessed in a more general manner, with a particular focus on the development of frameworks for the mitigation, management and monitoring of more minor and generic environmental issues 	<p style="text-align: center;">25</p> <p style="text-align: center;">Page 3</p> <p style="text-align: center;">5.8, 8 – 14, 18 – 23</p>	<p style="text-align: center;">13, 17</p>
Key Assessment Requirements	Relevant Report Chapter	Relevant Figures
<ul style="list-style-type: none"> ▪ Strategic Justification - the EA must: <ul style="list-style-type: none"> - 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 - 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 - 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 and conservation areas), taking into account local and strategic land use objectives - Describe the alternatives considered (location and/or design) for all project components, and provide justification for the preferred project demonstrating its benefits including community benefits (for example community enhancement programs) on a local and strategic scale and how it achieves stated objectives 	<p style="text-align: center;">6</p> <p style="text-align: center;">6.5</p> <p style="text-align: center;">3.3, 4, 7.4</p> <p style="text-align: center;">6.6</p>	<p style="text-align: center;">18–27</p> <p style="text-align: center;">7</p> <p style="text-align: center;">10, 12, 13, 17</p>

Key Assessment Requirements	Relevant Report Chapter	Relevant Figures
<ul style="list-style-type: none"> ▪ Visual Impacts - the EA must: <ul style="list-style-type: none"> - Provide a comprehensive assessment of the landscape character and values and any scenic or significant vistas of the area potentially affected by the project. 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. Consideration must be given to impacts on the values of the adjacent national parks, including impacts on wilderness and Greater Blue Mountains World Heritage area values - assess the impact of shadow “flicker”, blade “glint” and night lighting from the wind farm - identify the zone of visual influence (no less than 10 kilometres) and assess the visual impact of all project components on this landscape - include an assessment of the visual influence of the wind farm (no less than 10 kilometres) and assess the visual impact of all project components on this landscape - 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, and provide a clear description of proposed visual amenity mitigation and management measures for both the wind farm and the transmission line - provide an assessment of the feasibility, effectiveness and reliability of proposed mitigation measures and any residual impacts after these measures have been implemented 	<p style="text-align: center;">9</p> <p style="text-align: center;">17</p> <p style="text-align: center;">9.7.2</p> <p style="text-align: center;">9.7</p> <p style="text-align: center;">9.2, 9.8</p> <p style="text-align: center;">9.8</p>	<p style="text-align: center;">29 – 41</p> <p style="text-align: center;">51, 55, 56, 57</p> <p style="text-align: center;">30, 31</p> <p style="text-align: center;">32 – 41</p> <p style="text-align: center;">32 – 41</p>
<ul style="list-style-type: none"> ▪ Noise Impacts - the EA must: <ul style="list-style-type: none"> - include a comprehensive noise assessment of all phases and components of the project including, but not limited to, turbine operation, the operation of the electrical substation, corona and / or Aeolian noises 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 approved but not yet developed dwellings), baseline conditions based on monitoring results, the levels and character of noise (e.g. tonality, impulsiveness etc) generated by noise sources, noise / vibration criteria, modelling assumptions and worst case and representative noise / vibration impacts - 	<p style="text-align: center;">10</p>	<p style="text-align: center;">42</p>

Key Assessment Requirements	Relevant Report Chapter	Relevant Figures
<ul style="list-style-type: none"> - 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 	10.3	
<ul style="list-style-type: none"> - include monitoring to ensure that there is adequate wind speed/profile data and ambient background noise data that is representative for all sensitive receptors 	10.3.2	42
<ul style="list-style-type: none"> - provide justification for the nominated average background noise level used in the assessment process, considering any significant difference between daytime and night time background noise levels 	10.2, 10.3, 10.4	
<ul style="list-style-type: none"> - identify any risks with respect to low frequency or infra-noise 	10.4.2	42
<ul style="list-style-type: none"> - 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 	10.5	
<ul style="list-style-type: none"> - 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 	10.5	
<ul style="list-style-type: none"> - 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 landowners not eventuate 	10.5	
<p>The assessment must be undertaken consistent with the following guidelines:</p>		
<ul style="list-style-type: none"> - Wind Turbines – South Australian Environment Protection Authority’s Environmental Noise Guidelines (2003) 	10	
<ul style="list-style-type: none"> - Substation – NSW Industrial Noise Guidelines (2003) 		
<ul style="list-style-type: none"> - Site Establishment and Construction – Interim Construction Noise Guidelines (DECC, 2009) 		
<ul style="list-style-type: none"> - Traffic Noise – Environmental Criteria for Road Traffic Noise (NSW EPA, 1999) 		
<ul style="list-style-type: none"> - Vibration – Assessing Vibration: A Technical Guideline (DECC, 2006) 		

Key Assessment Requirements	Relevant Report Chapter	Relevant Figures
<ul style="list-style-type: none"> ▪ Flora and Fauna - the EA must: <ul style="list-style-type: none"> - include an assessment of all project components on flora and fauna and their habitat consistent with the Draft Guidelines for Threatened Species Assessment (DEC, 2005), including details on the existing site conditions and quantity and likelihood of disturbance (including quantifying the worst case extent of impact on the basis of vegetation type and total native vegetation disturbed) - The EA must specifically consider impacts to threatened species and communities listed under both State and Commonwealth legislation that have been recorded on the site and surrounding land, impacts to riparian and/ or instream habitat in the case of disturbance of waterways, and to biodiversity corridors. In addition, impact of the project on birds and bats from blade strikes, low air pressure zones at the blade tips, 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 - details of how flora and fauna impacts would be managed during construction and operation including adaptive management and maintenance protocols (including the mitigation and/or management of weeds) - measures to avoid, mitigate or offset impacts consistent with "improve or maintain" principles. Sufficient details must be provided to demonstrate the availability of viable and achievable options to offset the impacts of the project 	<p style="text-align: center;">12</p> <p style="text-align: center;">12.2, 12.3</p> <p style="text-align: center;">12.2.11, 12.3.6, 12.3.7</p> <p style="text-align: center;">12.3.5 – 12.3.7</p>	<p style="text-align: center;">45 – 50</p>
<ul style="list-style-type: none"> ▪ Indigenous Heritage – the EA must 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 (DEC, July 2005) 	<p style="text-align: center;">18</p>	<p style="text-align: center;">58</p>
<ul style="list-style-type: none"> ▪ Traffic and Transport – the EA must assess the construction and operational traffic impacts of the project including: <ul style="list-style-type: none"> - details of the nature of traffic generated, transport routes, traffic volumes and potential impacts on local and regional roads, bridges and intersections, including any proposed road upgrades and repairs - details of measures to mitigate and/or manage the potential impacts, including measures to control soil erosion and dust generated by traffic volumes - details of site access roads including how these would connect to the existing road network and any operational maintenance or handover requirements 	<p style="text-align: center;">14.3</p> <p style="text-align: center;">14.4</p> <p style="text-align: center;">14.3.1</p>	<p style="text-align: center;">15, 16</p>

Key Assessment Requirements	Relevant Report Chapter	Relevant Figures
<p>▪ Hazard/Risks – the EA must include an assessment of the potential impacts on aeronautical safety considering nearby aerodromes and aircraft landing areas, defined air traffic routes, aircraft operating heights, radar interference, communication systems, and navigation aids</p> <p>In addition, the EA must assess the impact of the turbines on:</p> <ul style="list-style-type: none"> - the safe and efficient aerial application of agricultural fertilisers and pesticides in the vicinity of the turbines - Possible effects on telecommunication systems must be identified. Potential hazards and risks associated with electric and magnetic fields (EMFs) (with reference to Australian Radiation Protection and Nuclear Safety Agency standards) - bushfires must be assessed - The EA should demonstrate the application of the Principles of Prudent Avoidance in relation to EMFs. The EA must also detail measures to contain any hazardous substances to prevent the contamination of pasture and dams 	<p>Hazards and risks covered in multiple chapters:</p> <p>13 – Aeronautical</p> <p>16 – Fire</p> <p>11.4.9 – Blade throw</p> <p>15 – EMI</p> <p>13.3.3</p> <p>15</p> <p>16</p> <p>20</p>	<p>51 – 54</p> <p>52,53,54</p>
<p>▪ Water Supply and Waterways – The EA must determine whether an adequate and secure water supply is available for the life of the project including the statutory (licensing) context of the water supply sources, and assess potential environmental impacts associated with the identified sources, including impacts on groundwater. Where the project would cross significant waterways, the EA must identify likely impacts to the waterways and measures to minimise impacts. Details of the design of waterway crossings where such crossings are to be located I third order or higher streams are to be provided. Particular consideration should be given to the Abercrombie River. The EA must also assess the potential for water pollution impacts, including the risks to the environment and human health, consistent with the heads of consideration provided in Drinking Water Catchments Regional Environmental Plan No. 1, including determining whether the project will have a neutral or beneficial effect on water quality</p>	<p>20</p>	
<p>▪ General Environmental Risk Analysis – notwithstanding the above key assessment requirements, the EA must include 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 appropriately detailed impact assessment of the additional key environmental impact(s) must be included in the EA</p>	<p>23</p>	

Key Assessment Requirements	Relevant Report Chapter	Relevant Figures
<ul style="list-style-type: none"> ▪ Consultation Requirements – The proposal must undertake a consultation program as part of the environmental assessment process, including consultation with, but not necessarily limited to, the following parties: <ul style="list-style-type: none"> - Oberon Council; - Oberon Shire Council; - Department of Environment, Climate Change and Water; - NSW Office of Water; - NSW Road and Traffic Authority; - NSW Rural Fire Service; - Land and Property Management Authority; - Sydney Catchment Authority; - Lachlan CMA; - TransGrid; - Commonwealth Department of Defence; - Civil Aviation Safety Authority; - Airservices Australia; - Aerial Agricultural Society of Australia; - Relevant minerals stakeholders (including exploration and - The local community and landowners. 	22	
<ul style="list-style-type: none"> ▪ The consultation process shall include measures for dissemination 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: 	22.3	
<ul style="list-style-type: none"> - 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 	22	
<ul style="list-style-type: none"> - 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) 	22.3	
<ul style="list-style-type: none"> - Describe the issues raised during consultation and how and where these have been addressed in the EA 	22.4	

Supplementary DGRs	Relevant Report Chapter	Relevant Figures
<p>Under section 75F(3) of the <i>Environmental Planning and Assessment Act</i>, the following supplementary requirements must be addressed:</p> <ul style="list-style-type: none"> ▪ A comprehensive, detailed and genuine community consultation and engagement process must be undertaken. This process must ensure that the community is both informed of the proposal and is actively engaged in issues of concern to them, and is given ample opportunity to provide its views on the proposal. Sufficient information must be provided to the community so that it has a good understanding of what is being proposed and of the impacts. There should be a particular focus on those non wind farm associated community members who live in proximity to the site ▪ the Environmental Assessment must clearly document and provide details and evidence of the consultation process and who was consulted with ▪ all issues raised during the consultation process must be clearly identified and tabulated in the Environmental Assessment ▪ the Environmental Assessment must state how the identified issues have been addressed, and how they have informed the proposal as presented in the Environmental Assessment. In particular, the Environmental Assessment must state how the community's issues have been responded to 	<p>22</p> <p>22.3</p> <p>8.4, 22.4</p> <p>22.4, 22.6</p>	
Referral Authorities' Submissions to DoPI	Relevant Report Chapter	Relevant Figures
<p>Oberon Shire Council</p> <p>Council proposes the following issues for inclusion in the EA for the proposed wind farm development:</p> <ul style="list-style-type: none"> ▪ The Oberon Wind Power Generation DCP: <ul style="list-style-type: none"> - Address all matters within the DCP in respect to any impact within the Oberon Council area ▪ Traffic and Transport: <ul style="list-style-type: none"> - A detailed pavement and structure analysis to be undertaken on any affected sections of public road. - A road safety audit to be undertaken on all affected sections of public road - An analysis of the horizontal and vertical alignment to determine the adequacy of the affected public road network for all expected traffic types ▪ Noise Impacts: <ul style="list-style-type: none"> - An analysis of the Van de Berg effect on all residences in the Oberon council area within 2m of a proposed turbine 	<p>7</p> <p>14</p> <p>10</p>	

Referral Authorities' Submissions to DoPI	Relevant Report Chapter	Relevant Figures
<ul style="list-style-type: none"> - Consideration of the cumulative impacts from other existing and proposed wind turbines in the area ▪ Visual Impacts <ul style="list-style-type: none"> - Consideration of the cumulative impacts from other existing and proposed wind turbines in the area. - Impact of any lighting on the turbines ▪ Hazards <ul style="list-style-type: none"> - Impact of bushfires on the turbines - Bushfire ignition threats from the turbines and sub-station ▪ Proposed community enhancement program <p>In respect to the proposed transmission line, the following requirements are submitted:</p> <ul style="list-style-type: none"> ▪ Visual Impact <ul style="list-style-type: none"> - Analysis of the visual impact of the transmission line on all existing residences in the Oberon Council area. ▪ Traffic and Transport <ul style="list-style-type: none"> - Analysis of the impact of construction traffic on the structural integrity of the road network and road safety in the Oberon Council area, including the road approaches to the Abercrombie Bridge and the bridge itself. ▪ Environmental <ul style="list-style-type: none"> - Analysis of the impact on flora and fauna on the road network in the Oberon Council area. 	<p>9</p> <p>16</p> <p>8, 22</p> <p>9</p> <p>14</p> <p>12</p>	
<p>Sydney Catchment Authority (SCA)</p> <p>The EA for the part of the proposed wind farm and transmission line located in the Drinking Water Catchment must include an assessment as to whether the project will have a neutral or beneficial effect on water quality as per the following:</p> <ul style="list-style-type: none"> ▪ Consider the Drinking Water Catchment Regional Environmental Plan No. 1 and have regard to the aims of the plan and the water quality objectives detailed in the plan ▪ Contain relevant studies and plans such as a Water Cycle Management Study (WCMS) that incorporates a Conceptual Construction Environmental Management Plan including a Soil and Water Management Plan (based on Managing Urban Stormwater: Soils and Construction, Vol 1, 4th edition (Landcom, 2004 – the “Blue Book”) and Managing Urban Stormwater: Soils and Construction, Vol. 2C Unsealed Roads (DECC)). The WCMS should address the following: 	<p>20</p>	

Referral Authorities' Submissions to DoPI	Relevant Report Chapter	Relevant Figures
<ul style="list-style-type: none"> - The proposed erosion and sediment control practices for the construction of the transmission line component that address its linear nature - Details of surface runoff and water quality management works proposed for access roads and tracks that will be used to construct and provide ongoing access to the transmission lines - Details of the management of any wastewater that is produced during construction and operational stages of the development - Details of proposed measures to prevent and manage fuel spills - Details the measures, responsibilities and reporting for the management of major incidents involving water quality - Demonstrate that the proposed water quality management measures for construction and operational stages of the project are based on SCA-endorsed Current Recommended Practices (CRPs). Where proposed measures are not based on SCA-endorsed CRPs, it needs to be demonstrated that the measures will achieve the same water quality outcomes - The sustainability of systems and proposed management measures over the long term, including delineation of ongoing maintenance responsibilities - Determine whether a neutral or beneficial effect on water quality of surface will occur during the construction and operational stages of the project 		
<p>NSW Government Industry & Investment</p> <p>Industry & Investment proposes the following DGRs for the wind farm project, in order to reflect the view of the Minerals & Energy Division and the Fisheries Division:</p> <ul style="list-style-type: none"> ▪ Fisheries issues: <ul style="list-style-type: none"> - Details of any direct impacts to the Abercrombie River. If any is proposed or likely, then a Test of Significance for Macquarie Perch should be included - Proposals for erosion and sediment control across the site to ensure no impact upon water quality in the Abercrombie River - Details of all access tracks to be upgraded or constructed (both at the wind farm site as well as along the transmission line corridor). Include a map showing these sites in relation to watercourses (creeks and rivers) 	20	

Referral Authorities' Submissions to DoPI	Relevant Report Chapter	Relevant Figures
<ul style="list-style-type: none"> ▪ A description and assessment of any potential requirement to intercept groundwater, including predicted dewatering volumes, zone of drawdown and associated impact, water quality and disposal methods ▪ Adequate mitigating and monitoring requirements to address surface and groundwater impacts ▪ The proposal must address the NSW State Government natural resource management policies, as applicable. Policies to include but not to be limited to: <ul style="list-style-type: none"> - NSW Inland Groundwater Shortage zones Order No. 2 (2008) - NSW Inland Groundwater Policy Framework Document (1997) - NSW Inland Groundwater Quantity Management Policy (1998) - NSW Inland Groundwater Quality Protection Policy (1998) - NSW Inland Groundwater Dependent Ecosystems Policy (2002) - Australian and NZ Guidelines for Fresh and Marine Water Quality (2000) - Australian and NZ guidelines for Water Quality Monitoring and Reporting (2000) - Guidelines for the Assessment and Management of Groundwater Contamination (2007) - Guidelines for Groundwater Protection in Australia (1995) - MDBC Guidelines on Groundwater Model Development ▪ General Environmental Risk Analysis <ul style="list-style-type: none"> - An environmental risk analysis to identify potential environmental impacts associated with the project (construction and operation) - 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 appropriately detailed impact assessment of these additional key environmental impacts must be included in the EA 	23	

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PALING YARDS WIND FARM
CHAPTER 3

THE SITE & CONTEXT

3 The Site and Context

3.1 Site Locality

The site is located on the western extent of the Great Dividing Range in NSW, in an area known as the Central Tablelands. The site is situated approximately:

- 60km south of Oberon;
- 60km north of Goulburn in NSW;
- 140km north east of Canberra; and
- 140km west of Sydney.

Please refer to **Figure 3 – Location Plan** and **Figure 4 – Regional Plan**.

A large portion of the area surrounding the site is National Park. Abercrombie National Park borders the site to the west and south. To the east of the site is the Mount Werong State Forest and Kanangra Boyd National Park. Other land uses in the locality include rural and agricultural industries including wool, lamb and beef cattle.

The site and preferred transmission line are both situated within the Oberon Local Government Area (LGA).

The area is heavily undulating with some steep slopes. The site is bisected by Taralga Road which links the towns of Oberon and Goulburn. The closest towns are Porters Retreat and Curraweela which have township populations of approximately 180 and 320 respectively.

Several water courses traverse the area including the Abercrombie River which flows into the Lachlan River. The Abercrombie River forms part of the southern boundary of the site.

The site is approximately 40km to the north-east of the existing Crookwell 1 Wind Farm, the approved Crookwell 2 Wind Farm, and proposed Crookwell 3 Wind Farm. Work has recently commenced on the 46 turbine Crookwell 2 project (a UFWA Project).

3.2 Site Details

The site includes two land holdings over approximately 3,900 hectares, known as 'Mingary Park' and 'Paling Yards', and contains two homestead areas. Please refer to **Figure 5 – Site Analysis Plan** and the accompanying site photos at **Figure 6 – Site Photos**. The majority of the site has been cleared of native vegetation, although scattered trees are common within the site and thicker vegetation exists near the site boundary. The site is bordered by a National Parks and forested land to the south-east, all of which are heavily vegetated.

Topographic elevation ranges between 900 metres and 1065 metres above sea level with significant slopes in many areas. A number of ephemeral creeks and drainage lines cross the site and drain into the Abercrombie River. The site is currently used for agricultural purposes, such as predominantly sheep and cattle grazing).

Access to the site is achieved by Taralga Road which is a Council maintained road.

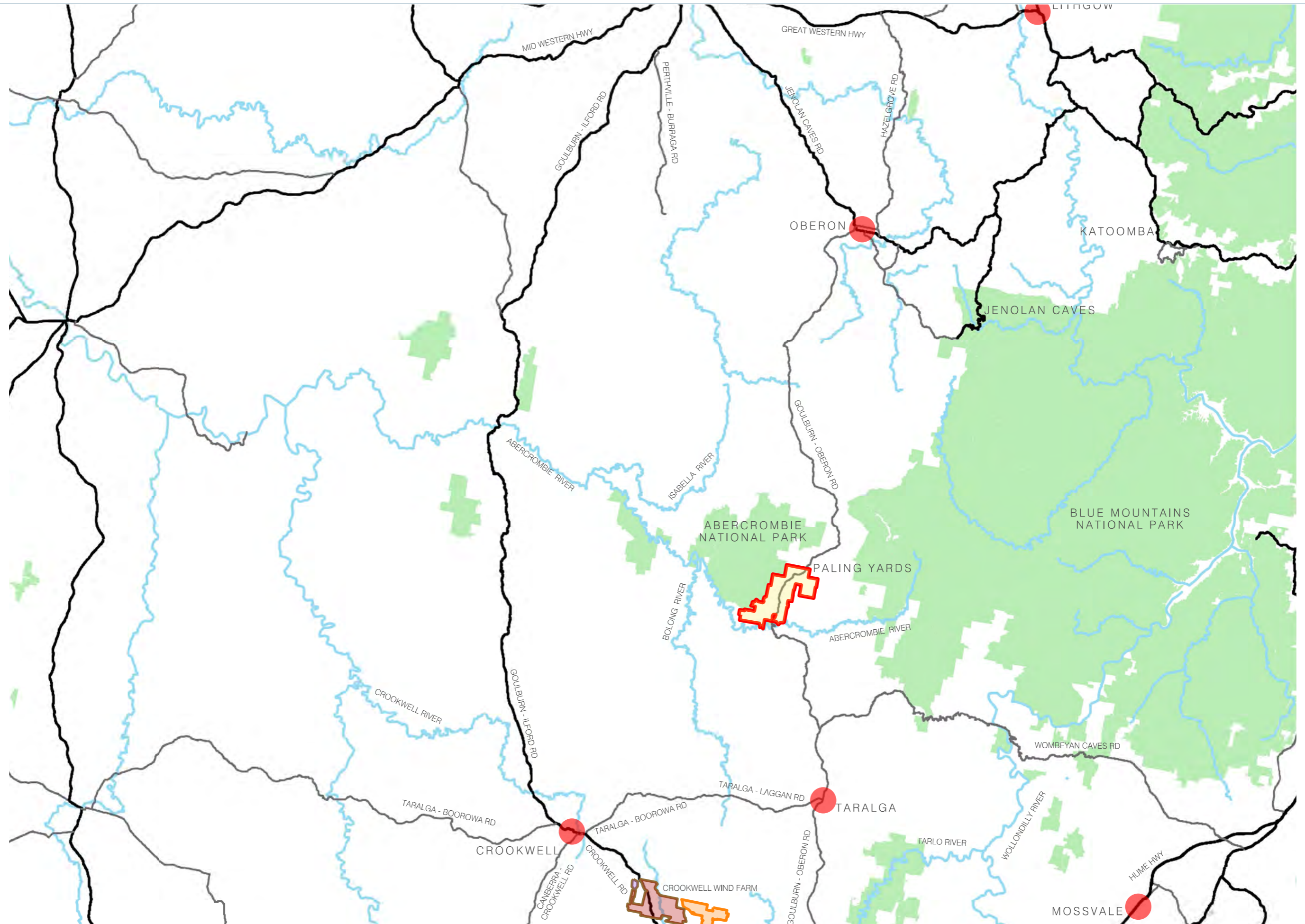


Figure 3

Location Plan

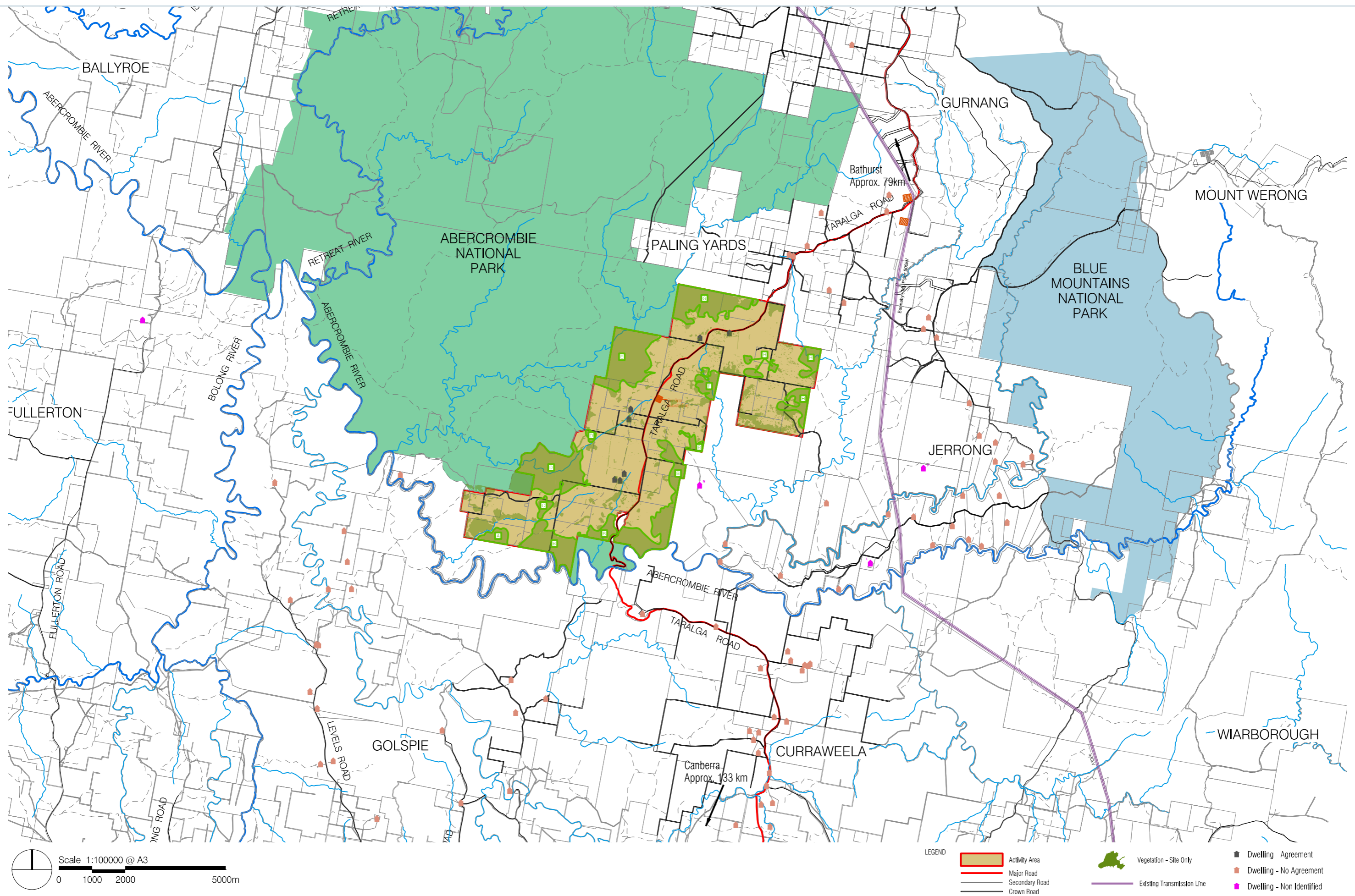
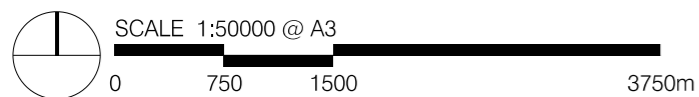
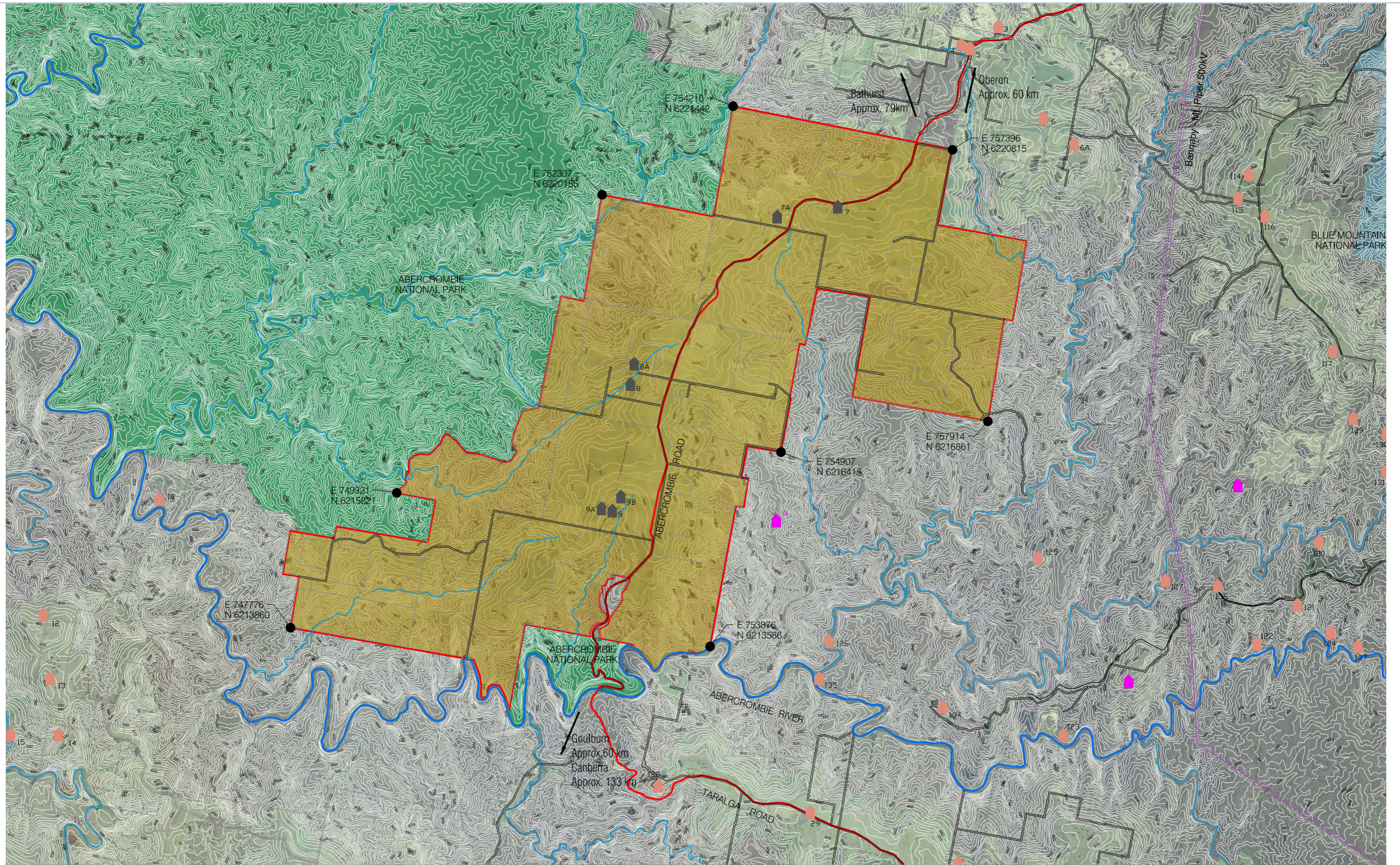


Figure 4 Regional Plan

Source: Tract Consultants



LEGEND





- | | | | | | |
|---|----------------|---|----------------------------|---|---------------------------|
|  | Activity Area |  | Existing Transmission Line |  | Dwelling - Agreement |
|  | Major Road |  | |  | Dwelling - No Agreement |
|  | Secondary Road |  | |  | Dwelling - Non Identified |
|  | Crown Road | | | | |

Figure 5

Site Analysis Plan

Levels Road
Abercrombie Road (descending to Abercrombie River)



Photo Location P1- View north east from Levels Road, Golspie

Abercrombie Road



Photo Location P9- View south from Abercrombie Road

Abercrombie Road
(descending to Abercrombie River)



Photo Location P5- View north from Abercrombie Road

Abercrombie River



Photo Location P6- View north from Bummaroo Ford campground (adjacent Abercrombie River)

Abercrombie Road

Substation (indicative location for Option 1, beyond trees)

Residential dwelling R9

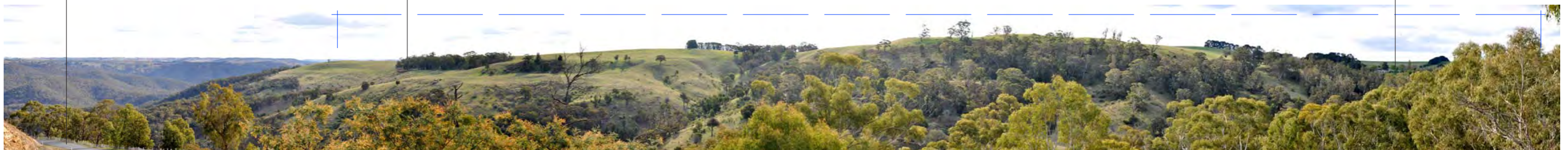


Photo Location P7- View north to west from Abercrombie Road



Photo Location P13- View north to north east from Abercrombie Road

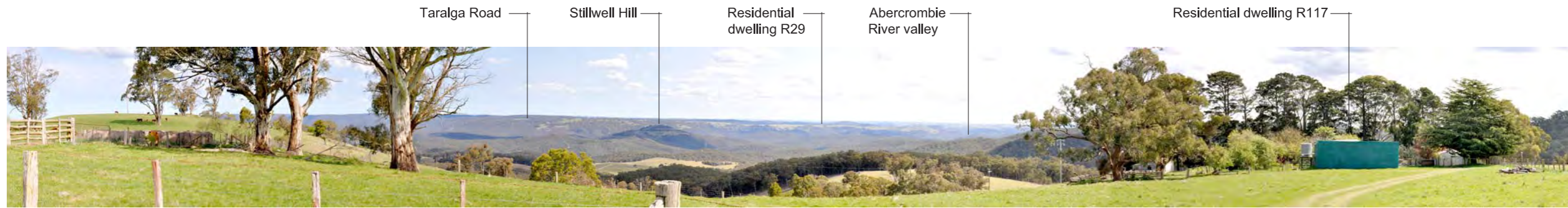


Photo Location P22- View south to west from Jerrong Road



Photo Location P23- View south to south west from Gurnang State Forest



Photo Location P16- View south to south west from Abercrombie Road



Photo Location P17- View south to south west from Abercrombie Road

The MGA co-ordinates for the outer boundary of Paling Yards are;

NW	N:754212	E:6221425
NE	N:757397	E:6220798
SW	N:747778	E:6213843
SE	N:753878	E:6213569

For a list of lot details comprising the subject site, refer to **Appendix 3 – Lot Details**.

Some works, such as powerlines, access track crossings and road works, are also proposed within the adjacent road reserves and nearby private property. **Chapter 5** details these elements of the project and includes plans showing their location relative to property boundaries.

The proposed overhead transmission line route of approximately 9km connecting the electrical substation on site to the Mt Piper to Bannaby 500kV transmission line is located to the north-east of the site. The transmission line route has two sub-options and is proposed to be constructed over a maximum of eight or nine land parcels. These land parcels contain generally cleared farmland.

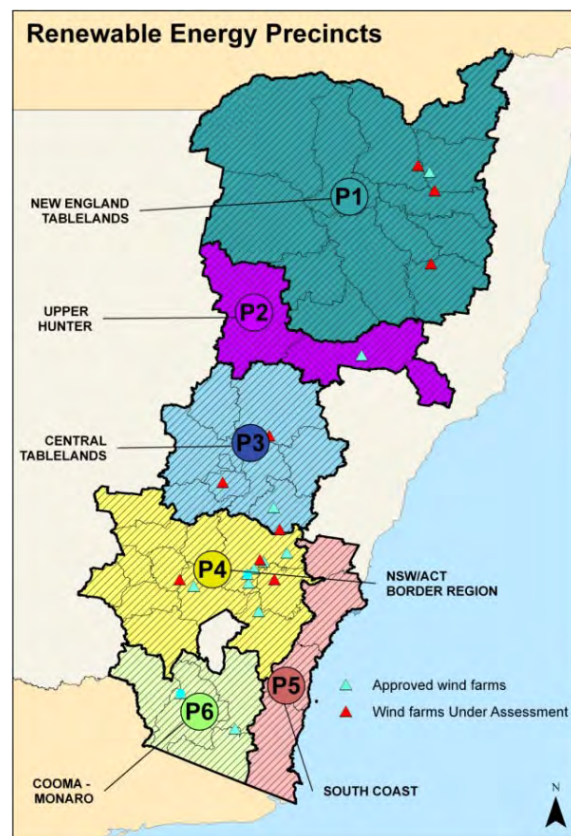
3.3 Site Suitability

The Central Tablelands is known for its strong wind resource and includes several other wind farms in various stages of planning and development. The area is located within one of six designated 'Renewable Energy Precincts' established by the NSW Government. The six designated precincts are known as the New England Tablelands, Upper Hunter, Central Tablelands, NSW/ACT Cross Border Region, Snowy-Monaro and the South Coast.

These precincts have been established as locations for the State's future wind power investment due to their suitability for the technology. The precincts are a community partnership initiative in areas where significant future renewable energy development is expected (especially wind farms), designed to give local communities a voice and a stake in renewable energy development.

The project is located in Renewable Energy Precinct 4 – NSW/ACT Border Region. This precinct has a number of wind farms (refer to **Figure 7** below).

Figure 7 Renewable Energy Precincts



Source: <http://www.environment.nsw.gov.au/climatechange/renewableprecincts.htm>

The average wind speed tested across the Paling Yards region is approximately 7.0 metres per second which is considered a good wind resource.

There are several other factors that are important in establishing a site as suitable for a wind energy facility. These have been taken into account in choosing the site as a location for a wind farm. These include:

- Distance from coastline;
- Population density and buffers to residential settlements;
- Willingness of land owners;
- Size of land holdings;
- Proximity to existing electricity grid;
- Strength of wind resource;
- Minimal impacts on:
 - Flora and fauna;
 - Heritage (including Aboriginal);
 - Non-stakeholder dwellings; and
 - Vistas and viewlines.
- Appropriate terrain and land capability; and

- Access to existing infrastructure (ports, good quality roads etc).

3.4 Land Use

The current land use of the site is primarily agricultural across medium sized land holdings. Common agricultural activities include grazing of sheep and cattle, with limited cropping due to the steep topography.

Human infrastructure, associated with the current land use, that is present on the site, includes:

- Residences, generally associated with a surrounding farm;
- Agricultural structures (such as sheds);
- Dams;
- Farm tracks; and
- Fencing and stockyards.

3.5 Demographic Profile

Based on the Australian Bureau of Statistics (ABS) 2006 Census Data, the demographic profile of Oberon Local Government Area's (Oberon (A) SLA) local population has following key characteristics:

- Rurally based with very low population density;
- 12.7 % of the population is aged between 15 and 24 years old;
- 12.9 % of the population is aged 55 years or over;
- Predominantly English speaking and Australian born;
- High proportion of persons in the labour force and in full time employment, with 4.6 % unemployment rate;
- Lower than average income; and
- High rates of home ownership.

3.6 Dwellings

The project is not located close to any significant population centres, and is located in a particularly remote part of the eastern New South Wales. The closest centres are Oberon and Goulburn, which are located approximately 60km north and 60km south of the site respectively. The lack of towns or other population centres in close proximity of the site is a significant determinant of the site's viability for a wind farm.

There are a small number of dwellings in the vicinity of the site, dispersed across the agricultural landscape at a low density, as shown in **Figure 5 – Site Analysis Plan**. Within the site there are seven dwellings, all owned by those with a declared interest in the project, having entered into commercial arrangements with UFWA.

Non-project involved dwellings are generally located on medium sized agricultural properties nearby, with some smaller hobby type farms present. The majority of the dwellings are located a significant distance from any turbines proposed as part of the project. In fact, there are no non-project related dwellings within 2km of any turbine.

According to Oberon Shire Council's records, there have been no approvals granted for residential dwellings or subdivisions immediately surrounding the site in the past decade.

3.7 Topography and Soils

A geotechnical assessment undertaken for the project found that the site topography comprises 'plateau' and 'hillcrest' areas at an elevation of between 900 and 1065 metres surrounded by steeply sloping gullies and creek lines that flow to the Abercrombie River. The gently sloping plateau areas are generally cleared and used for grazing, while the more steeply sloping areas are generally uncleared and heavily vegetated.

An investigation undertaken as part of the geotechnical analysis found that the plateau areas are underlain by 'Tertiary aged Volcanics', which comprises residual clay, frequently with cobbles and boulders, overlying variably weathered basalt.

The geotechnical assessment (refer to **Chapter 19**) found no major faults of shear zones cross the site and the boundaries between the rock units that are erosional.

The assessment concluded that further geotechnical investigations at the turbine sites are recommended to guide footing designs.

3.8 Hydrology

A hydrological assessment undertaken for the project found that the site is characterised by a prominent elevated plateaux landscape dissected by deep valleys. More than 50 ephemeral first order watercourses are present within the site, including the Abercrombie River (which is outside the site). The watercourses flow generally towards the south and west, to the Abercrombie River.

These first order watercourses are generally stable and well vegetated with pasture grasses. There are very few instances of active erosion along watercourses. The higher order watercourses also tend to be stable and well vegetated, with only minor areas of active erosion.

The Abercrombie River is present directly south of the site, flowing along the site's south-eastern boundary. It is 130 km in length and commences from Mount Werong in the east to the Wyangala Dam near Cowra to the west. The river is a tributary of the Lachlan, a significant river in central New South Wales, which it joins at Wyangala Lake.

The Goulburn-Oberon (Abercrombie) Road crosses the Abercrombie River in the Abercrombie Gorge.

Refer to **Chapter 20** for further details.

3.9 Transport and Infrastructure

The site is divided by the Goulburn-Oberon (Abercrombie) Road. There are six access points proposed to access the site from Abercrombie Road.

Goulburn-Oberon (Abercrombie) Road is a classified two-lane, two-way road of approximately 150 km between the Hume Highway, Goulburn in the south and O'Connell Road, Oberon in the north. The condition of the road's surface varies considerably in the vicinity of the site. On the northern side the road's surface condition is excellent, and on the southern section the road has winding parts with diminishing surface condition. Close to the Abercrombie River the road features strong bends and steep descents.

The Great Western Highway, known as the National Route 32 in the vicinity of the site, provides access to the area from Sydney. Key access routes to the site are also provided by Bells Line of Road (National Route 40), Jenolan Caves Road, Duckmaloi Road and O'Connell Road.

Refer to **Chapter 14** for further details.

3.10 Vegetation

The majority of the site comprises cleared grazing paddocks, most of which is highly disturbed, with only limited areas of native vegetation remaining. The site has been highly modified from its pre-disturbance state and whilst several patches of remnant native vegetation remain, these are generally located in areas that are not subject to wind turbine infrastructure.

No endangered ecological communities were identified as being present on site other than the State 2 (Box Gum Grassy Woodland State and Transition Model) which is protected by the conservation agreement applying to part of the site. Refer to **Chapter 12 – Flora and Fauna Impacts, Appendix 8a – Flora and Fauna Assessment and Appendix 8b – Supplementary Flora and Fauna Assessment** for detailed information regarding the ecological assessments undertaken in relation to the site and transmission line options.

The project has been designed to be situated mainly on cleared grazed paddocks, therefore avoiding as far as possible potential ecological impacts.

The results of the field surveys detected no threatened fauna species other than the Gang Gang Cockatoo, Flame Robin and Scarlet Robin which are listed under the *Threatened Species Conservation Act 1995 (NSW)* (TSC Act) as 'Vulnerable'. The Gang Gang Cockatoo was detected in the woodland area near turbine P14.

The Wedge-tailed Eagle (*Aquila audax*) was also detected during the surveys (around the area of turbines P1-P8 and flying over the Abercrombie River and, while not a protected listed species under the TSC Act or the EPBC Act, it represents a significant species.

Refer to **Chapter 12 – Flora and Fauna Impacts and Appendix 8a – Flora and Fauna Assessment and Appendix 8b – Supplementary Flora and Fauna Assessment** for more information on the vegetation that exists in the site and the region.

3.11 Landscape and Visual Features

The landscape within and surrounding the site generally contains undulating pastoral farmland, steep sided valleys and hills, drainage lines, forested hills and ridgelines, and rural dwellings.

Remnant woodland occurs within the broader context of a modified landscape which continues to be managed through a variety of farming activities.

An assessment of the potential landscape and visual impacts of the project found that the surrounding areas has an overall 'medium to high sensitivity' to accommodate change, and represents a landscape that is typical that in the New South Wales Central Tablelands and the NSW/ACT Border Region Renewable Energy Precinct.

The site contains portions of plateau remnants above steep sided valleys cut by drainage lines, including the Abercrombie River.

Large portions of the NSW/ACT Border Region Renewable Energy Precinct landscape have been heavily modified by agricultural improvement post-European settlement.

A total of 78 residential dwellings were identified during the field surveys and were included and assessed in the landscape and visual assessment.

Refer to **Chapter 9** for further details.

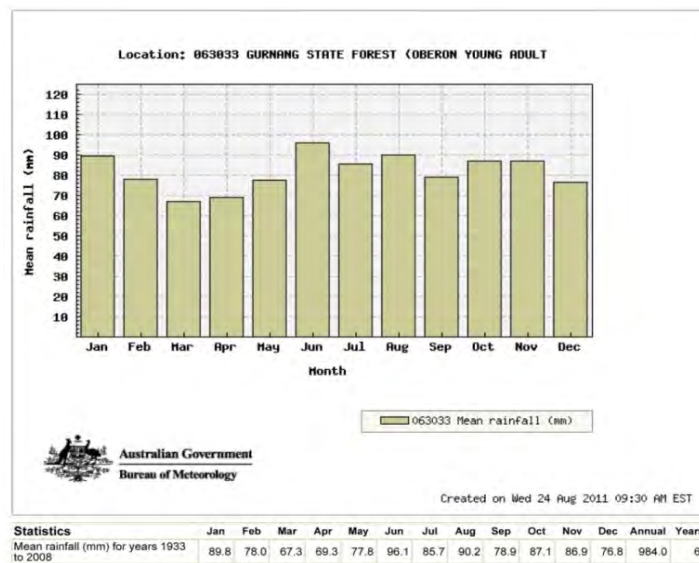
3.12 Climate

The Bureau of Meteorology (BOM) publishes climate data from the Gurnang State Forest on temperature and rainfall (refer to **Figures 8** and **9** below).

The area has a temperate climate and receives rain all year round, peaking at 90.2mm in August, and having an annual average rainfall total of 984mm (BOM, 2011).

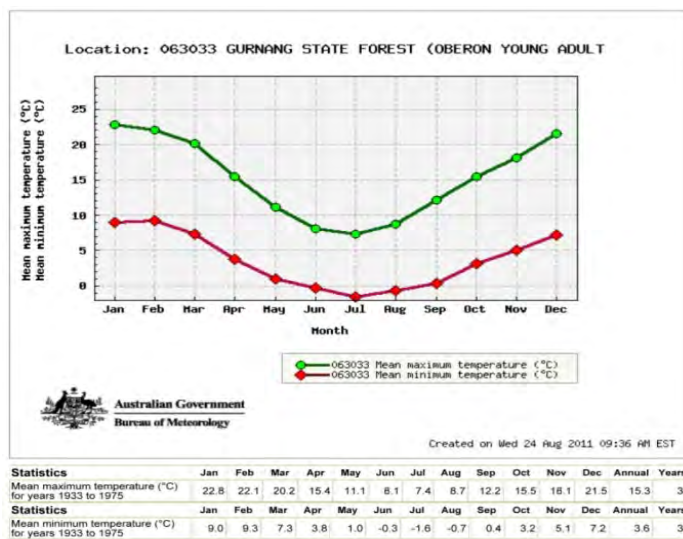
Temperatures peak in January with mean maximum of 22.8 degrees and drop in winter to a maximum of 7.4 degrees during the month of July. Frosts are common during the winter months, with an average overnight minimum temperature of -1.6 degrees (BOM 2011).

Figure 8 Oberon mean rainfall per month (1933-2008)



Source: www.bom.gov.au

Figure 9 Oberon mean maximum and minimum temperatures (oC) per month (1933-1975)



Source: www.bom.gov.au

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PALING YARDS WIND FARM
CHAPTER 4

DESIGN RESPONSE

4 Design Response

Having established the characteristics of the site and surrounds and its specific constraints and opportunities, this chapter details how the project has evolved through the design phase;

- to respond to issues raised during consultation; and
- to minimise negative impacts.

4.1 Location Criteria

Chapter 3.3 of this report details the characteristics that make a region suitable for a wind farm. Early wind farms were often located along the coast, but advances in turbine technology have allowed wind farm proponents to select inland areas away from more sensitive coastline locations.

The undulating topography rising out of generally flatter lands to the west and south provide the project area with a wind resource that is stronger than most inland regions.

The strengths of the region have been recognised by the NSW Government through the inclusion of Paling Yards as part of the Renewable Energy Precinct 4: NSW/ACT Border Region, one of six such precincts across the state.

The subject site is also favoured by the presence of the existing Mt Piper to Bannaby 500kV high voltage transmission line, which is located approximately 2km to the east of the site.

Whilst a number of transmission line options have been proposed, the northern option, connecting to the Mt Piper to Bannaby 500kV transmission line is the preferred and proposed option for this project. Refer to **Chapter 5.8** for more details.

4.2 Design Criteria

In designing the wind farm the consultant team and proponent have had regard to the following site specific factors as described in **Chapter 3 – The Site and Context**;

- Site Details;
- Wind Resource;
- Land Use;
- Dwellings;
- Topography and Soils;
- Hydrology;
- Transport and Infrastructure;
- Vegetation; and
- Landscape and Visual Features.

The design of the wind farm followed an iterative process whereby specialist inputs and consultation influenced the design at various stages. An initial wind farm layout was produced which was the subject of preliminary consultant studies. Stakeholders have been provided opportunities to express their views on the project through a community door-knock consultation which was conducted on 30 and 31 May and 1 June 2011 and again on 5 and 6 July 2011, as well as through telephone discussions, emails and letters with UFWA representatives. Furthermore, newsletters about the project have been widely distributed in the region and advertisements published in

three local newspapers. UFWA has responded to queries via the information line and email.

The results from the preliminary technical studies and the community consultation undertaken have informed changes to the proposed layout of the wind farm. Refer to **Chapter 22** for details of the community consultation undertaken and how the issues raised during this process have been responded to in the project design.

The key changes made to the project since its renewed commencement in 2010 include:

- Selection of the northern transmission line as the least impact option;
- Removal of the southern substation;
- Removal of turbine P26 in response to the findings of the noise assessment to reduce potential noise impact for the project involved landowners;
- Removal of turbines P2, P6, and P7 in response to the findings of the flora and fauna assessment and the Conservation Agreement in place for the Box Gum Grassy Woodland project as part of the Commonwealth Government's Environmental Stewardship program;
- Removal of turbine P11;
 - removal of associated crane pad from the remnant area; and
 - removal of associated 1,184m of access track of which 353m were in the remnant area.
- Relocation of turbine P10 to 184m south of original location;
 - removing 184m of access track from the remnant area.
- Relocation of turbine P13 to 70m south-east of original location;
 - removing 77m of access track from the remnant area; and
 - turbine and crane pad will be located in a more cleared area, hence reducing the vegetation clearing by 50% for this location.
- Relocation of turbine P14 to 86m south-east of original location;
 - removing 101m of access track from the remnant area; and
 - turbine and crane pad will be located closer to the edge of the remnant area, hence reducing the vegetation clearing by approximately 20% for this location.
- Micrositing of the turbines to minimise local impacts;
- Changes to the location of:
 - several access tracks to further utilise the existing farm tracks and reduce the infrastructure footprint;
 - underground cabling to provide more efficient transfer of electricity and reduce the infrastructure footprint;
 - an access road to separate the wind farm construction vehicle traffic from the access used by the project involved landowners;
 - selecting a smaller wind turbine envelope size for specific locations to reduce potential noise and shadow flicker impact for the project involved landowners;

- substations to reduce length of overhead powerlines; and
- powerline poles for the northern transmission line route to minimise and avoid where possible the removal of native vegetation.

Refer to **Figure 10 – History Plan** for further details.

Modern wind farms also differ from older projects because they have greater distances between turbines and therefore have fewer turbines per site, through the use of taller turbine models. This has been reflected in the evolution of the project, where there has been a significant increase in generating capacity through only a moderate increase in the number of turbines.

The following principles have guided the evolution of the wind farm layout.

Access to infrastructure – UFWA investigated a number of options for connection to the electricity transmission grid:

- Northern connection option: The Mt Piper to Bannaby 500kV transmission line is located approximately 10km to the east of the site; and
- Southern connection option: The Crookwell 2 Wind Farm substation provides a connection to the Yass to Bannaby 330kV transmission line.

It has been determined that the northern connection option is the most feasible and approval for this connection is being sought.

Connection to transport routes is provided via Taralga Road, Goulburn to Oberon Road to the Hume Highway. This enables efficient access for operations and ongoing maintenance.

Balance impacts with energy production – The wind farm has been designed to minimise the following impacts, to the extent practicable, whilst retaining the viability of the project to substantially contribute to the generation of renewable energy:

- Economic and Social Impacts – Ensure the project minimises any negative impacts and maximises positive impacts.
- Visual amenity – Ensure visual impact is minimised and where appropriate employ mitigation measures to reduce impact.
- Noise – Ensure noise impacts are acceptable with significant buffers to non-project involved land holders.
- Flora and Fauna – Ensure that the project is designed so that native vegetation is avoided where possible and that any unavoidable loss of vegetation is minimised and mitigated through replanting of areas disturbed during the construction phase and other offset planting.
- Aeronautics – Ensure the safety of aircraft in the vicinity.
- Transport – Ensure the safe and efficient transportation of equipment to the site and the upgrading of roads to facilitate access and for the benefit of the community.
- Electromagnetic Interference – Ensure any disruption to telecommunication services is ameliorated.
- Fire – Ensure the potential risk of fire is managed appropriately.
- Shadow Flicker – Ensure the incidence of shadow flicker is managed to acceptable standards.

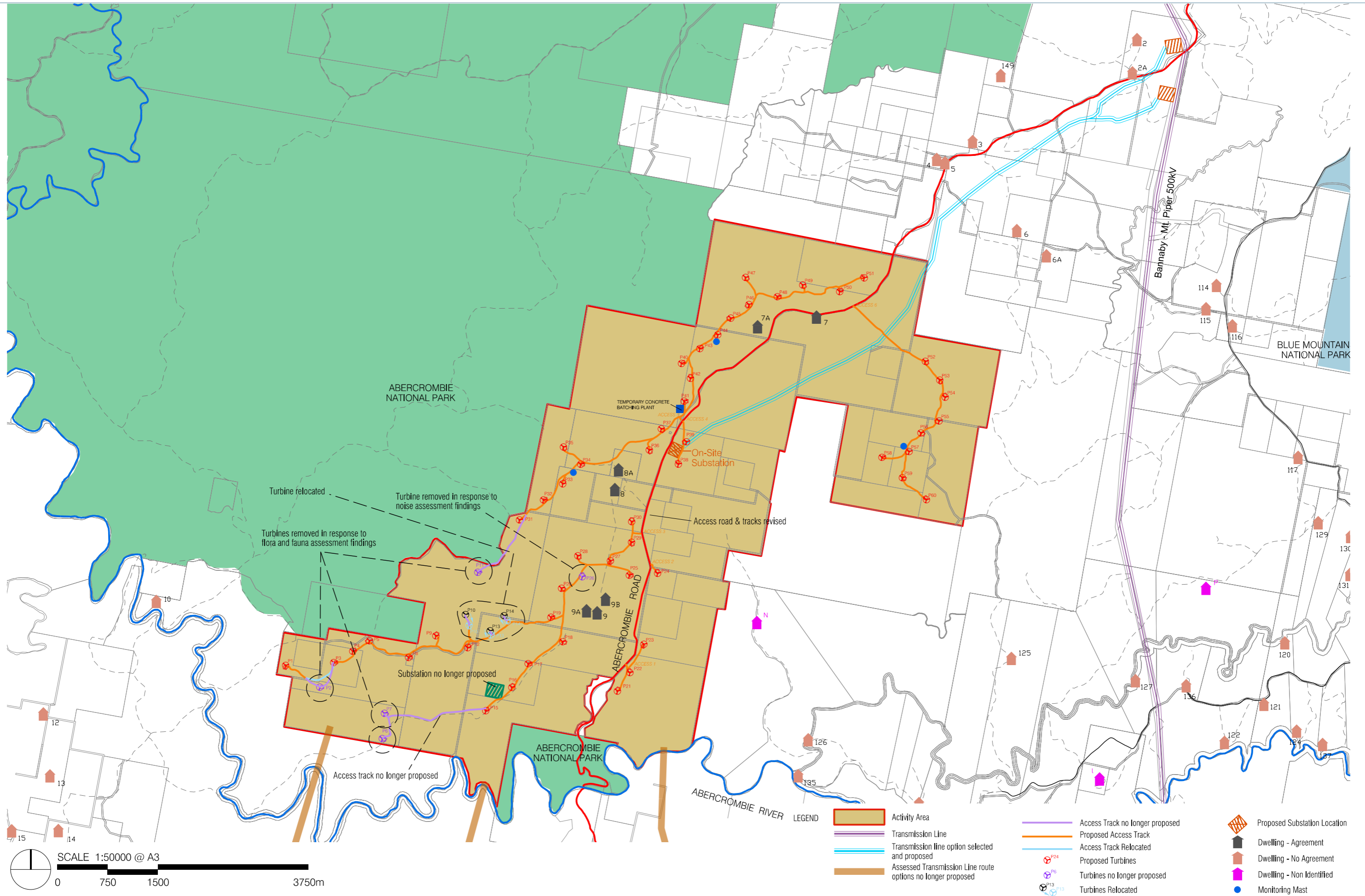


Figure 10 History Plan

- Heritage – Ensure the protection of aboriginal and cultural heritage.
- Health and Safety – Ensure the safety and wellbeing of the community is preserved.
- Geotechnical – Ensure the design of turbine footings, access roads and other infrastructure is appropriate and minimises the impact of soil erosion and/or groundwater contamination.
- Hydrology – Ensure that site activities do not pollute local streams and water bodies.

Match turbines with the wind resource – The turbine selection has been made to respond to the good wind resource at the site with low cut in speeds.

Separation to non-project involved land holders – The site is bounded by National Parks to the west and south. Adjoining national park reduces the number of non-project involved landholders in close proximity, thereby reducing potential impacts on households. Notwithstanding this, substantial buffer distances from turbines to non-project involved landholders have been employed to manage the impact on neighbouring residents.

