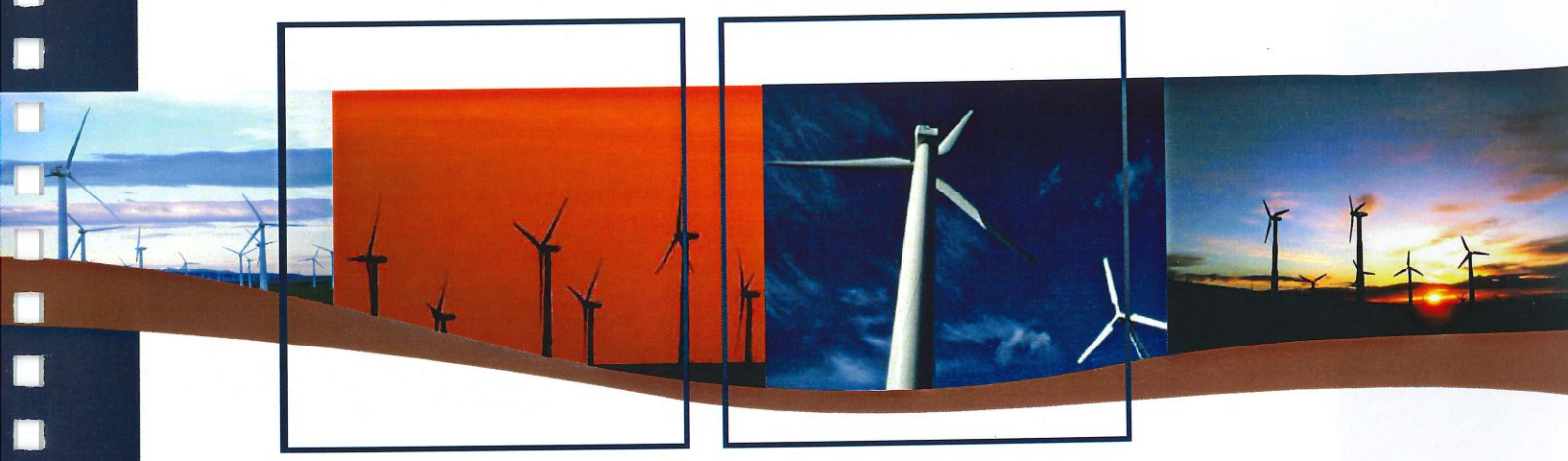

BADGINGARRA WIND FARM
Development Application Report

DRAFT REPORT
April 2008

For
Griffen Windfarm 2 Pty Ltd & Stanwell Corporation Ltd

MASTERPLAN
TOWN PLANNING
CONSULTANTS

DRAFT REPORT

BADGINGARRA WIND FARM

DEVELOPMENT APPLICATION REPORT

April 2008

Issue 2 – For Client Feedback

For:

Griffin Windfarm 2 Pty Ltd & Stanwell Corporation Ltd

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APPENDICES

ABBREVIATIONS

AGL	Above Ground Level
BWF	Badgingarra Wind Farm
CASA	Civil Aviation Safety Authority
DEWHA	Department of Environment, Water, Heritage and the Arts
DEC	Department of Conservation and Environment

DOTARS	Department of Transport and Regional Services
EDWF	Emu Downs Wind Farm
EPA	Environmental Protection Authority
EPC	Engineer, Procure, Construct
IFR	Instrument Flight Rules
LSALT	Lowest Safe Altitude
MW	Megawatts
NM	Nautical Miles
NOTAM	Notice to Airmen
OLS	Obstacle Limitation Surfaces
VFR	Visual Flight Rules
WPC	Western Power Corporation
WTG	Wind Turbine Generator

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EXECUTIVE SUMMARY

Purpose

The purpose of this Development Application Report is to provide technical evidence in support of the Application for Planning Approval lodged in accordance with the provisions of the Shire of Dandaragan Local Planning Scheme No. 7 (District Zoning Scheme). The proposed Project is to establish a Wind Farm in the Badgingarra locality. The Badgingarra Wind Farm (BWF) site is located 5km to the north of the recently completed Emu Downs Wind Farm (EDWF) developed by Stanwell Corporation Limited (Stanwell) and Griffin Energy Pty Ltd (Griffin).

Proponents

The Proponents for the proposed Badgingarra Wind Farm are Griffin Windfarm 2 Pty Ltd and Stanwell Corporation Limited.

Location

The proposed wind farm will be situated approximately 200 kilometres north of Perth in the Shire of Dandaragan. The site lies between the coastal towns of Cervantes and Jurien Bay and is 16 kilometres west from the inland town of Badgingarra.

Size

The facility will generate up to 130MW from 43 to 65 turbines (depending on the final choice of turbine size and manufacturer). The electricity generated is equivalent to meeting the requirements for approximately 80,000 homes.

Project Benefits

Badgingarra Wind Farm will provide Western Australia with clean, green and renewable energy, with savings equivalent to around 455,000 tonnes of greenhouse gas emissions each year.

Wind energy is an environmentally sustainable source of electricity. Wind power produces no waste products and displaces the emission of greenhouse gases that would otherwise be released into the atmosphere from non-renewable electricity generation.

The wind farm is close to the coast, with a good quality wind resource that has increased wind speeds and reliability aligning with periods for peak power demand.

The turbines will be situated on previously cleared farm land and have minimal environmental implications during and after the construction phase.

Extensive environmental studies have been undertaken to protect local flora and fauna, including the Carnaby's Black Cockatoo.

With renewable generation capacity of up to 130MW, the Badgingarra Wind Farm will contribute to a balanced energy mix and deliver security of supply through diversity for both Griffin Windfarm 2 Pty Ltd and Stanwell Corporation.

The project represents a significant investment in the region that will strengthen the economy, create employment opportunities and provide another tourist attraction in the mid west.

As with the Emu Downs Wind Farm, opportunities will be facilitated by the joint developer's policy to use local services, purchase from local suppliers, and generally support businesses throughout the region wherever possible.

Project construction is expected to take around 16 months, with commissioning expected to be completed in 2011.

Impacts and Environmental Protection Measures

Expert independent impact assessments conducted throughout the Feasibility Study phase of the project indicate there will be no significant environmental or social impacts resulting from the proposed development. All potential impacts will be appropriately managed through careful design and the implementation of an Environmental Management Plan.

Conclusion

This Development Application Report demonstrates that approval for the development of the Badgingarra Wind Farm is warranted subject to reasonable and relevant conditions.

This report also demonstrates the proposed wind farm proposal is acceptable under Local and State planning requirements, that the landowners strongly support the development, that economic and social benefits in the form of tourism, job creation and use of local goods and services will be derived from its implementation, and that environmental and other impacts are not significant and are capable of being managed.

On the basis of the above, and the details provided within this report and its appendices, it is requested that the Shire of Dandaragan, after consultation with the appropriate Referral Agencies grant the issue of Development Approval for the proposal.

1.0 INTRODUCTION

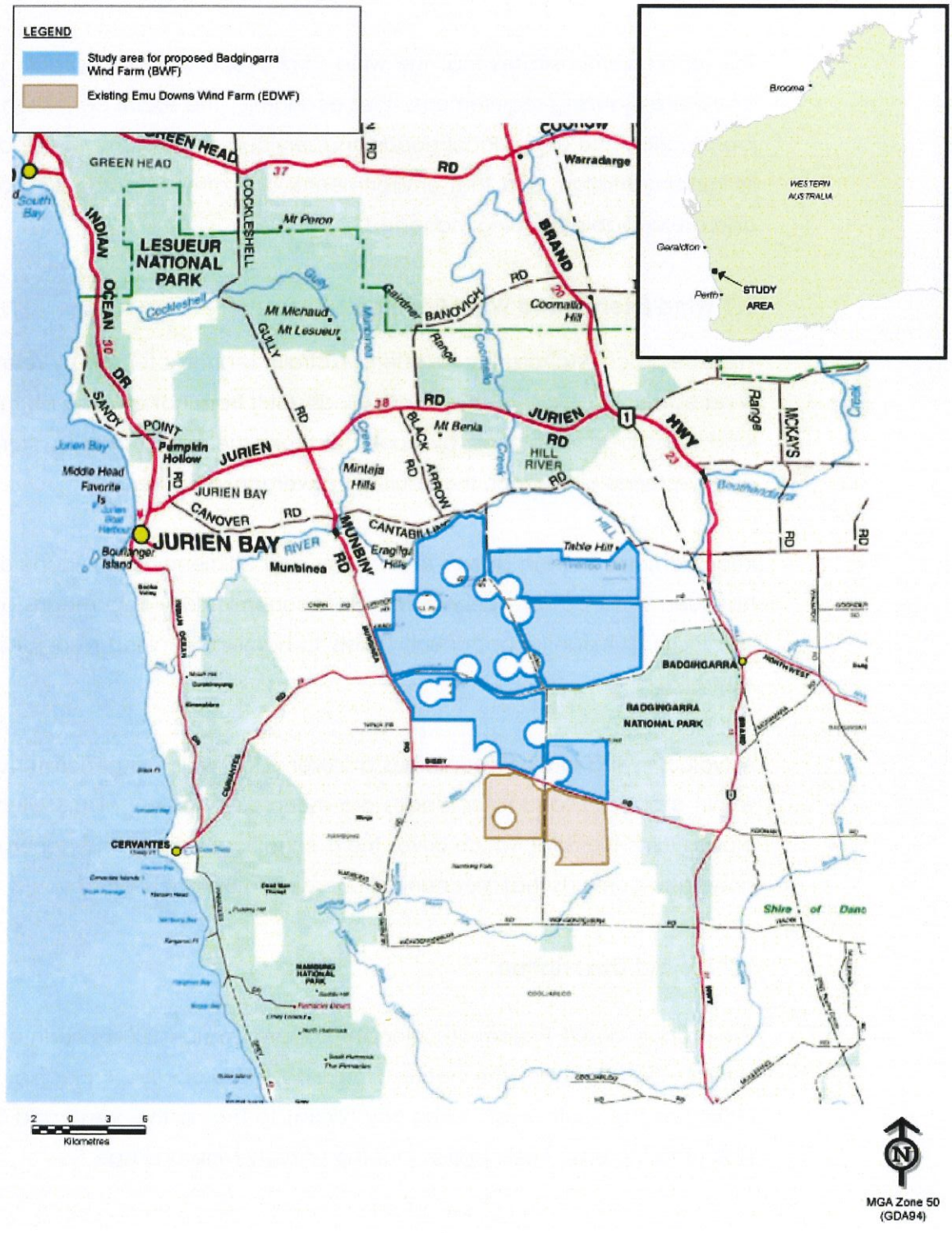
The BWF site was originally located by Hydro Tasmania (Roaring 40's) with development work commencing in April 2002. In mid 2006, Hydro Tasmania approached Stanwell which led to the sale of equipment and data to Stanwell in January 2007. In addition all landowner agreements were left to expire with the intention that Stanwell would takeover the relationships with each landholder.

During the Pre Feasibility Study most of the land identified as part of the BWF was secured under a "Wind Farm Feasibility Agreement" between Stanwell and the owners with these Agreements being assigned to Griffin.

The Pre Feasibility Study involved a number of specialist studies to determine any likely major impediments to the Project in this location. The Pre Feasibility Study report discussed background information to the proposal including site details, project description, legislative requirements, potential social and environmental issues and their management.

The Pre Feasibility Study was completed for the proposed Project in August 2007 and the Project is now in the Feasibility Study phase.

FIGURE 1 – LOCALITY MAP



In addition to providing development details to the Shire, this report forms the basis for referral to stakeholder agencies and organisations, and the community at large. In particular, the report is anticipated to provide the Environmental Protection Authority (EPA) with the level of detail required for its consideration and environmental assessment.

This report demonstrates that the wind farm proposal is acceptable under Local and State planning requirements, that economic and social benefits in the form of job creation, the use of local goods and services and tourism, will be derived from its implementation, and that environmental and other impacts are not significant and are capable of being managed.

1.1 Wind Energy and Wind Farming

Weather in coastal areas of Western Australia is characterised by relatively strong wind patterns. Strong south-westerly winds result from hot air rising off the Australian land mass being replaced by cooler air from the Indian Ocean. North-easterlies and westerlies also occur, the result of convergent weather.

Improvements in wind power technology and efficiency, and financial incentives, has seen wind power become a more economically viable means of producing electricity. Substantial opportunity exists to harness the wind resources of Western Australia.

A typical "wind turbine" comprises a tower upon which a generator unit (housed within a nacelle) and rotor blades are mounted. The flow of the wind across the blades turns the rotor, which drives the mechanical turbine and generator unit. The generator converts that mechanical energy into electrical energy.

1.2 Project Description

The proposed BWF Project site is located approximately 200km north of Perth in the Shire of Dandaragan. The nearest towns to the proposed Project are Cervantes (29km) to the south west; Jurien Bay (29km) to the north – west; and Badgingarra (16km) to the east. Refer **Figure 1** for the Locality Map on Page 5.

The Project site consists of 17 properties with a total land area of approximately 21,660ha. The land is used predominately for grazing sheep and cattle, some

cropping, and with some small areas of remnant vegetation most of which is of poor quality.

The Badgingarra National Park is located to the immediate south-east of the Project site.

The proposed generating capacity of the Project is planned for up to 130MW, comprising between 43 and 65 turbines depending on the Wind Turbine Generator (WTG) manufacturer and the size of the turbine selected. The Pre Feasibility Study was based on 43 x Vestas V90 (3MW) turbines or alternately 65 x RePower MM82 (2MW) turbines depending upon the final selection of manufacturer.

The size of the Project has been determined by the available spare capacity on the electrical transmission network, and maximising the number of WTG's on the site while ensuring compliance with the predicted noise levels at residences and the site boundary.

The electricity produced by the wind turbines will be transmitted to an adjacent substation, which transforms the power to 132kV for connection to the existing and planned Western Power 132kV overhead transmission lines, running through the site. The electricity will then be sold to the electricity market as a "Green Power" product.

The Badgingarra site has been selected based upon investigations to identify suitable locations for potential wind farms in Western Australia. These investigations involve detailed analysis of a number of environmental, planning, engineering and commercial constraints. The Pre-feasibility Study (refer 1.4 below) and the favourable results of this Study has enabled the Project to move into the Feasibility Study phase whereby the Proponents are now ready to seek Local Government and environmental approvals.

The scope of this proposal includes the following major components:

- Construction of a number of wind turbines on the site to transform the wind energy in the area;
- Installation of internal access tracks and underground cables between each turbine;
- Construction of a substation;

- Connection of power lines from the new substation across to the existing Western Power electricity grid; and
- Site Compound comprising various support buildings.

Final turbine type, capacity, numbers and final site layout will depend on a number of commercial, engineering and environmental factors. These details will not be known until the contract for turbine supply and construction is negotiated and awarded.

As a result, the Proponents are seeking approval for the development of the Wind Farm within a defined Development Envelope. The Development Envelope has taken account of the relevant wind flow characteristics, the topography and the desire to locate turbines away from vegetation, sensitive habitats, roads, occupied dwellings, and other infrastructure.

Use of a Development Envelope ensures the final turbine layout is responsive to the make and model of turbine selected. Once contracts have been awarded, detailed engineering site plans for the turbines and support infrastructure will be commenced. Indicative WTG layouts for the 43 x Vestas V90 (3MW) turbines and the 65 x RePower MM82 (2MW) turbines are included in **Appendix 1.**

The exact position for each turbine has not been determined, however the likely location within the Development Envelope is indicated **Appendix 1.** The Development Envelope has a minimum setback of 50 metres from infrastructure including roads, property boundaries and a minimum setback from neighbouring rural residential dwellings of 1000 metres.

This distance should prove adequate to mitigate any amenity and noise issues. Please refer to **Section 5.6** which demonstrates the noise limits to be experienced at residences is less than the defined criteria.

Any future changes to the layout will be within the Development Envelope and will comply with the intent and philosophy of the current design, and be made in-accordance with the constraints identified in this report.

1.3 SCOPE OF THE PRE FEASIBILITY STUDY (complete) AND FEASIBILITY STUDY (part complete)

The extent of work completed under the Pre Feasibility Study was extensive. Further studies and work have been commenced and / or completed as part of the Feasibility Study. Work completed to date includes:

- Landscape and Visual Impact Study Report – GHD Pty Ltd – May 2008.
- Flora and Fauna Assessment and Bird Utilisation Survey – Brett Lane and Associates – July 2007
- EPBC Act Referral submitted in February 2008 and a ruling provided in March 2008.
- Background Noise Assessment – Sonus Pty Ltd – July 2007.
- Environmental Noise Assessment – Sonus Pty Ltd – July 2007.
- Proposed Badgingarra Wind Farm – An Archaeological Desktop Assessment – Biosis Pty Ltd – May 2007.
- Ethnographic Survey for Aboriginal Heritage at Badgingarra Wind Farm Project – Biosis Pty Ltd – July 2007.
- Fire Management Plan – Enthalpy Pty Ltd – July 2007.
- Directions Report (Town Planning) – Whelans – March 2007.
- Report on Road Condition for Badgingarra Wind Farm – Rural Road Services – June 2007.
- Mining and Petroleum Tenements – AAR – March 2007.
- WTG Layout Coordinates – PB Power – April 2008.
- Electromagnetic Interference Report – PB Power – April 2008.
- Shadow Flicker Report – PB Power – April 2008
- Aeronautical Assessment – Rehbein AOS – April 2008

1.4 Project Proponents

1.4.1 Griffin Windfarm 2 Pty Ltd

Griffin Windfarm 2, a subsidiary of the West Australian based Griffin Group, has an established management team with experience in the development and operation of energy facilities within Australia and internationally. The Group aims, to participate in the development of power generation projects resulting from the implementation of major reforms proposed for the West Australian Electricity Sector. Another Griffin Group company, Griffin Coal, is a major coal supplier from

modern open cut mines in Collie to power stations in WA. The Griffin Group also own and operate cattle stations, including Emu Downs, and undertake property development in southern WA.

Griffin Energy's management experience includes leadership in the following power station development and operation:

- Parkeston Power Station – Open Cycle 105MW gas fired. Located near Kalgoorlie this plant was built to supply electricity to Western Australia's largest gold mining operation. The plant was the first generator to take advantage of the open access regime instituted in WA under market reform and began servicing contestable customers in the SWIS as early as 1998.

- Southdown Cogeneration Facility – 155MW. Located in Auckland, New Zealand this facility was the first independent power plant in New Zealand.

- WA Gas Fired Operations – 250MW gas fired capacity and 120MW diesel fired backup. 7 gas turbines operating at 5 different locations across the eastern mineral fields of Western Australia, providing all of the electrical energy consumed by Western Mining Corporation (now BHP Billiton) and Normandy Mining (now Newmont) in their nickel and gold operations in WA.

- Millmerran Power Station – 840MW supercritical coal fired. Located in Southern Queensland.

- Mubuku Hydro Power Station – 10MW run of river hydro power station. Located in Western Uganda, this plant supplies power to the Ugandan Grid and to a local cobalt plant.

- Solar Thermal Power Stations. Investigation into the use of solar thermal power stations to supply remote mines in Australia.

- Bluewater's Power Station – 2 x 200MW supercritical coal fired. Located within the Coolangatta Industrial Estate adjoining its Ewington Open Cut coal mining operation in Collie, WA.

- Griffin Energy Pty Ltd (Griffin Energy) and Stanwell Corporation Limited (Stanwell) jointly constructed and operate a wind farm at the Emu Downs

cattle property, located approximately 180 kilometres north of Perth and 30 kilometres to the east of Cervantes. The EDWF generates up to 80 MW of renewable energy.

Griffin Energy has proposed an innovative, sustainable approach to coal fired power generation in WA. The approach includes improved generation technologies, water management initiatives, renewable power generation, and carbon sequestration projects to ameliorate greenhouse gas emissions. The experience of the management team and knowledge of the West Australian Energy market provides a solid foundation for Griffin Energy to make the progression from fuel supplier for power generation, to supplier of power generation.

1.4.2 Stanwell Corporation Limited

Stanwell is a dynamic, regionally focused, Queensland-based utility that owns and operates coal-fired, hydro-electric, wind, biomass, solar and gas turbine plants. The corporation is actively involved in the National Electricity Market.

Stanwell has a current portfolio of:

- 60 MW Hydro-electric at Barron Gorge, Far North Queensland;
- 72 MW Hydro-electric at Kareeya near Tully, Far North Queensland;
- 7 MW Mini Hydro on Koomboolomba Dam near Ravenshoe, Far North Queensland;
- 4.5 MW Wivenhoe Mini-hydro on Wivenhoe Dam, near Brisbane.
- 34 MW Gas-Turbine at Mackay, North Queensland;
- 2 x 115 kW Biogas Plants at Townsville, North Queensland; and
- 1400MW Coal-Fired Power Station at Stanwell, Central Queensland.
- Stanwell Corporation Limited (Stanwell) and Griffin Energy Pty Ltd (Griffin Energy), jointly constructed and operate a wind farm at the Emu Downs cattle property, located approximately 180 kilometres north of Perth and 30 kilometres to the east of Cervantes. The EDWF generates up to 80 MW of renewable energy.

1.5 Project Schedule

Assuming a favourable outcome of the Feasibility Study and approvals process, it is envisaged that construction will commence in mid / late 2009 with completion in early / mid 2011. Should the Proponents experience delays relating to grid connection and power sales, the project may be delayed and completed within 4 years.

The project is currently being designed for a 25-year life with the potential for re-powering with new equipment or decommissioning of the site.

1.6 Project Justification

1.6.1 General

The Western Australian government has indicated it is intending to increase the renewable generation capacity within the state to 15% of total generation by 2015, while the new Rudd government has announced a target of 20% by 2020 This project would make a significant contribution to meeting these renewable energy targets and the Government's policy objectives.

The State Government is seeking opportunities for meeting the future energy demand of its citizens through the use of renewable energy. The government's relevant policies include:

- Ensuring Western Australian policies are consistent with national and international commitments to renewable energy development and the uptake of energy efficient technologies;

- Promoting a whole-of-government response to renewable energy and energy efficiency issues;

- Expanding markets for renewable energy and energy efficiency products and services both domestically and internationally;

- Reforming relevant public sector agencies to strengthen energy policy responses to climate change and Greenhouse Gas issues;

- Strengthening ties with Commonwealth and other State authorities responsible for energy policy responses to Greenhouse Gas and climate change issues;

- Promoting fuel switching, energy efficiency and green power purchases among domestic and commercial users.

The project is expected to generate approximately 480 Gigawatt hours per annum (equivalent electricity to power approximately 80,000 homes). The project will offset greenhouse gas emissions by 455,000 tonnes of CO_2 per year.

1.6.2 Socio-Economic

The proposed Project will have a positive impact on the local economy through job creation and the use of local goods and services. The wind farm's construction will generate employment and expenditure in the area both during and post-construction. The use of local goods and services will be strongly encouraged through the tendering process. In addition, the wind farm will complement the region's environmental tourism image.

The Proponents will be encouraging the selected contractor to source both goods and services, where practical, from the local area. A list of local suppliers will be compiled and will be supplied to the contractor during negotiations and where practical, local industry network services such as those permitted by ISOWA, will be utilised to allow fair and reasonable participation by local industry. Many contractors and service providers on the EDWF project are likely to be re-engaged.

Currently, wind turbines of the capacity proposed for this site are not manufactured in Australia.

2.0 PROJECT DESCRIPTION

2.1 Site Location and Physical Environment

The BWF site is located approximately 200 km north of Perth in the Shire of Dandaragan in Western Australia. The nearest sizable towns to the proposed wind farm are Cervantes (29 km) to the south west, Jurien Bay (29 km) to the north west and Badgingarra (16 km) to the east, as shown in **Figure 1** for the Locality Map on Page 5.

Yerramullah Road dissects the site in a north-south direction. Access to the site from Brand Highway, located to the east, is available from Cadda Road.

The BWF is proposed to be located across 17 landholdings all of which are held in private ownership. **Table 1** on Page 166 depicts each of the properties. **Appendix 2** provides an aerial view of the site.

BLE : BA GI GA A V ND RM AN HO IN

No.	House	Lot No.	Road	Owner	Plan No.	Certificate tles	Area ha
1	1192	3850	Bibby Road / Yerramullah Road	Ackland (High Hill Pty Ltd)	P209077	387 - 27A	1596.7
2	1359	3755	Yerrramullah Road / Bibby Road	Phillip Anthony Panizza & Aubrey Vincent Panizza	P207065	1949 - 781	1593.9
3	N/A	51	Yerrramullah Road / Cadda Road	Robin Derek Deutscher & Valerie Olive Deutscher	P20080	2034 - 798	806.7322
4	2481	3745	Yerrramullah Road / Cowalla Peak Road	Geoffrey Ronald Teasdale	P207067	1383 - 850	1391.4989
5	218	3704	Cowalla Peak Road / Yerramullah Road	Robin Derek Deutscher & Valerie Olive Deutscher	P206786	2153 - 111	1376.4
6	2007	50	Cadda Road	Phillip Anthony Panizza & Aubrey Vincent Panizza	P20080	2034 - 797	807.1314
7	2030	3747	Cadda Road	Sudholz (Coralong Pty Ltd)	P207067	1754 - 557	1545.621
8	1750	3754	Bibby Road / Cadda Road	Sudholz (Coralong Pty Ltd)	P207065	1581 - 112	1475.0539
9	2349	3753	Cadda Road / Munbinea Road	Dennis Robert Murray & Margaret Anne Murray	P207071	1680 - 747	1401.3327
10	1581	3748	Munbinea Road / Cadda Road	Dennis Robert Murray & Margaret Anne Murray	P207071	2060 - 600	1122.8307
11	N/A	1651	Cowalla Peak Road	Robin Derek Deutscher & Valerie Olive Deutscher	P133599	1629 - 941	40.5
12	N/A	3774	Cadda Road	Dennis Robert Murray & Margaret Anne Murray	P207065	1786 - 255	92.355
13	2446	3742	Yerrramullah Road / Cowalla Road	Brogate Pty Ltd & Dain Pty Ltd (Brown)	P207066	508-160A	1710.4
14	N/A	3743	Yerrramullah Road / Cowalla Road	Brogate Pty Ltd & Dain Pty Ltd (Brown)	P207069	69-37A	1822.5
15	N/A	3744	Yerrramullah Road	Brogate Pty Ltd & Dain Pty Ltd (Brown)	P207069	2125-563	1659.6929
16	N/A	3738	Cowalla Road	Brogate Pty Ltd & Dain Pty Ltd (Brown)	P207066	1687-897	1735.6765
17	N/A	3739	Cowalla Road	Brogate Pty Ltd & Dain Pty Ltd (Brown)	P207069	2125-562	1483
		Total Area					**21661.3252**

2.1.1 Site Zoning and Surrounding Land Uses

The wind farm site is included in the Rural Zone under the provisions of the Shire of Dandaragan Local Planning Scheme No. 7 (LPS No. 7). The Planning Scheme designates the future use and development of the land as being for rural pursuits.

Pursuant to the Shire's LPS No. 7 the Wind Farm is a Land Use that is not classified under the Scheme and therefore does not appear in the Zoning Table.

Under Clause 4.4.2 "If a person proposes to carry out on land any use that is not specifically mentioned in the Zoning Table and cannot reasonably be determined as falling within the type, class or genus of activity of any other use category the local government may –

(a) determine that the use is consistent with the objectives of the particular zone and is therefore permitted;

(b) determine that the use may be consistent with the objectives of the particular zone and thereafter follow the advertising procedures of Clause 9.4 in considering an application for panning approval

(c) determine that the use is not consistent with the objectives of the particular zone and therefore is not permitted."

From discussions with the Shire to date, it is expected that Council will treat the Application in accordance with paragraph (b) thereby requiring formal advertising.

Clause 9.4 stipulates that the "local government is not to grant planning approval to that application unless notice is given in accordance with clause 9.4.3."

Clause 9.4.3 states: "The local government may give notice or require the applicant to give notice of an application for planning approval in one or more of the following ways –

(a) notice of the proposed use or development served on nearby owners and occupiers who, in the opinion of the local government, are likely to be affected by the granting of planning approval, stating that submissions may

be made to the local government by a specified date being not less than 14 days from the day the notice is served;

(b) notice of the proposed use or development published in a newspaper circulating in the Scheme area stating that submissions may be made to the local government by a specified day being not less than 14 days from the day the notice is published;

(c) a sign or signs displaying notice of the proposed use or development to be erected in a conspicuous position on the land for a period of not less than 14 days from the day the notice is erected."

In terms of the period of public advertising, for a project of this nature, it is expected that the period would be for 42 days, to allow sufficient time for information displays; community meetings, and input from key stakeholders.

In terms of current land use activity of the subject landholdings and their surrounds the land use in the area comprises freehold agricultural land used for sheep and cattle grazing and some cropping.

The Development Envelope also contains some associated houses, outbuildings and other farming infrastructure. The development of the Wind Farm will not affect grazing activities as livestock will continue to graze to the base of the turbines; as is the case at Emu Downs Wind Farm.

There are 13 residences on the proposed Wind Farm site and these are shown on the Site Plan in **Appendix 3.**

2.1.2 Land Tenure Issues

The Proponents will enter into land leases with the landowners, to lease the portions of the site required for the turbines and associated infrastructure and to place easements over the roads and underground high voltage reticulation. As the wind farm will operate for a period in excess of twenty years, the Western Australian Planning Commission's approval to the lease agreement will be required within 3 months of the agreement being entered into.

The landowners have been consulted on the project and are strongly supportive of the concepts included in this document and are committed to working actively with the Proponents to implement the project when approved.

From an examination of the Pre-feasibility Study report the following encumbrances appear:

- A north south 90 – 100m wide Western Power transmission line easement traverses Lots 3755 (Panizza), 3742 (Brogate Pty Ltd & Dain Pty Ltd), 3743 (Brogate Pty Ltd & Dain Pty Ltd), 51(Deutscher) and 50 (Panizza).

- Lot 3754 (Coralong) is subject to a Tree Farming Agreement covering four (4) areas in favour of the DEC for a period of 40 years commencing from 1/1/1999.

- Lot 3747 (Coralong) is subject to a right of carriageway easement for access and power lines to service adjoining lots.

- Lot 51 (Deutscher) has a Soil Conservation Memorial (Soil and Conservation Act 1945) which requires the owners to permanently fence a number of vegetated areas and prevent livestock intrusion.

2.1.3 Topography, Soils and Vegetation

The coastal plain areas of the Shire of Dandaragan are located to the west of the site and the ground elevation rises until the Gingin Scarp is reached. The wind farm site straddles the Gingin Scarp and contains substantial ridge formations. The peaks of the ridges are between 190 - 315 metres above sea level. The increase in elevation towards the scarp results in an amplification of wind speeds, making the chosen sites ideal for construction of a wind farm.

The Central Coast Regional Strategy (WAPC 1996) describes the topography of the site as consisting of undulating slopes, dominated by flat-topped lateritic plateau. The deep sands contain coloured sub-soils and are of low agricultural potential. The hill slopes are susceptible to sheet erosion where soils are non-wetting.

The soil profiles are expected to be similar to those of the Emu Downs site which generally comprises sandy gravel or gravely sand between 0.3 to 2.0 metres, overlying clayey sand or sand up to the investigated depth of 10 metres. Some

exceptions were found, but this related to clay layers being found at depth of between 5 to 8 metres.

2.1.4 Surface Water

Water courses throughout the site are seasonally dry. Most are made up of small drainage lines running down the sides of hills. Hill River borders part of the western and northern boundaries of the proposed wind farm site. Many small farm dams have been constructed throughout the site for watering stock.

2.2 Proposed Wind Farm Facility

This project will be the largest wind farm in terms of generating capacity in Western Australia comprised of the following components:

- 43 - 65 Wind Turbines with a hub height of 80m;
- Meteorological masts to monitor weather conditions including wind speed and directions at turbine hub height and below;
- Underground cables between turbines;
- An electrical substation and control room;
- A Site Compound containing an Administration Building, Workshop, Fluid Store, Maintenance Store, storage compound and car parking;
- Site roads, fences and other associated infrastructure;
- Transmission lines connecting the wind farm substation to the existing and planned Western Power electricity lines; and
- Extension of the on-site 19kV line to connect the Site Compound.

The wind farm comprises an area of 21,660ha with seven (7) land owners. The 'Disturbed Area' (construction estimate) is less than 1% of the site area, while the 'Disturbed Area' (operation estimate) is less than 1% of the Development Envelope.

The layout of the wind farm can only be finalised once the tender responses are received. However, the turbines will generally be placed on the ridgelines, to take greatest advantage of the higher wind speeds at these locations.

2.2.1 Turbines

The Proponents have initiated a tender process for the engineering, procurement, construction and commissioning of the WTGs, substation, site roads and underground reticulation. The successful tenderer for the wind farm will be based on a number of environmental, commercial, and economic factors. Hence, this process will determine the manufacturer and the model of WTG selected.

Due to this tender process, the details of the particular turbine type that would be installed at the Badgingarra site are currently unknown. The Proponents have specified a maximum installed capacity of 130MW. During the Pre Feasibility Study a range of WTGs were investigated which ranged in size from 2MW to 3MW. It is this range for which a Planning Consent is being sought. The following Table provides details of the possible Turbine details for BWF.

Table 2 - Possible turbine details for the Badgingarra Wind Farm

	RePower MM82 WTGs	Vestas V90 WTGs
Turbine Generation Capacity	2MW	3MW
Hub Height (approx)	80m	80m
Blade diameter (approx)	82m	90m
Overall Height (approx)	121m	125m
Number installed	65	43

Wind turbines use the energy from the wind to generate electricity. A wind turbine consists of four large main components:

- Foundation unit
- Tower
- Nacelle (turbine housing)
- Rotor

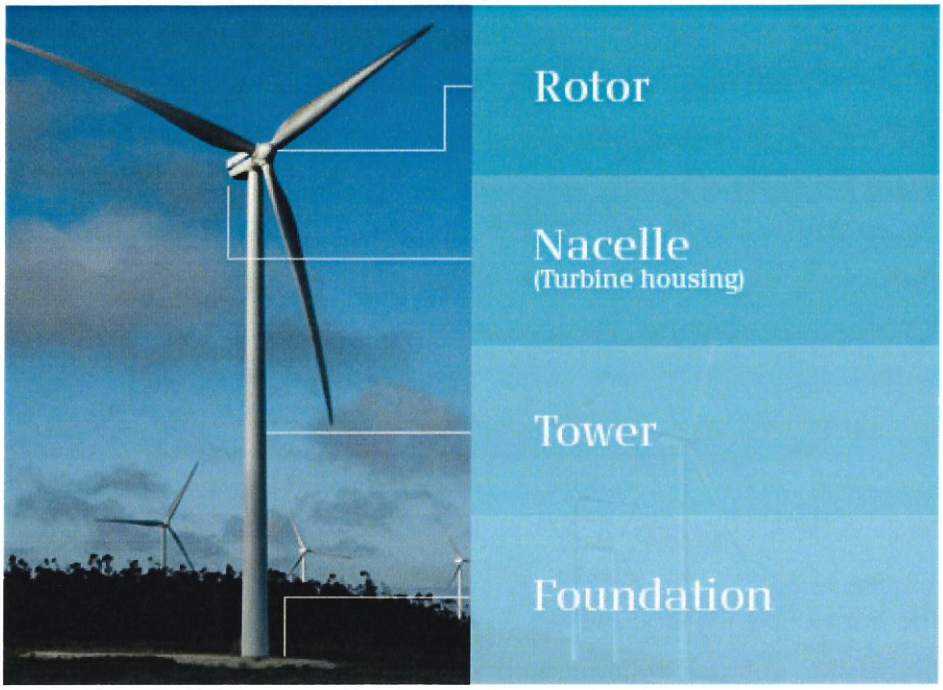


Figure 2 Wind Turbine – Vestas V90 – 3MW

Wind turbines use energy from the wind in order to generate electricity. They do this with their blades, which capture the wind and turn. When there is no wind, the blades will remain at a 45-degree angle so that the turbine can draw maximum energy from gentle winds.

Turbines begin to produce energy when wind speeds reach about four meters per second. The blade gradually rotates towards an angle of 0 degrees with the broad surface facing the wind. When the wind strikes the blade, it creates positive pressure on the front of it and negative pressure behind it. In other words, the wind pushes against the front edge and creates a suction effect behind the blade, which makes the rotor turn. At maximum rotational speed, the blade tips reach a speed of 250 km an hour.

Refer to **Section 5.12** for a description of the components requiring transport to site as part of the construction operations.

2.2.2 On-Site Electrical Distribution

The on-site electrical reticulation shall consist of underground cables and will connect all turbines to the site substation. The depth below ground of all cables and method of trenching and ducting shall be in accordance with relevant Australian Standards and any local authority and landowner requirements. Where

cable routes need to cross under public roads appropriate Works Permit (Underground Road Crossing) will be obtained from the Planning and Building Department of Dandaragan Shire Council. On-site cabling routes will be placed to avoid disturbing vegetation.

There will be a requirement to connect the construction and operation infrastructure including Site Compound to the existing on-site 19kV transmission system. This would involve a tee connection to the existing lines supplying the existing farming operations with domestic power.

2.2.3 Substation

The substation will occupy an area of approximately 6,400 square metres and house the outdoor switchgear and a control room fitted out with switchgear, protection, metering and communication equipment.

The substation will be located centrally to the development, and preliminary siting has identified an area on the Brown's property east of where the 132kV tansmission line currently crosses Yerramullah Road. Final siting of the substation will result from the development of a final turbine and cabling layout upon award of the contract for supply and construction of the wind farm.

2.2.4 Electrical Transmission and Grid Connection

The existing Western Power 132kV transmission line runs directly through the proposed Development Envelope. The substation will be located close to the centre of the development to minimise underground cabling costs. Overhead transmission lines will link the substation to the existing and planned transmission lines traversing the site.

2.2.5 Site Roads

On-site service roads linking all turbines and associated infrastructure to the existing external roads will be required. This will include an access road joining Yerramullah Road with the internal site roads. These would be gravel roads and will be utilised for construction, operation and maintenance activities.

The main site access is proposed to be from from Yerramullah Road onto the Brown's property. The site access would be located approx. 100m south of where the 132kV transmission line currently crosses Yerramullah Road. The final design of this access point will be developed in conjunction with the Shire prior to commencement of construction.

The site road layout has yet to be designed as it is dependent on the final WTG layout. Access to the site from Cadda Road and other points on Yerramullah Road is likely to be required.

At each turbine location, an area around the base will have to be prepared to provide suitable space for the assembly of the turbines. Some other small areas may be required for crane tables and hardstands for use during construction and the majority of these areas will be revegetated upon completion of construction.

2.2.6 Control Building

A permanent on-site control building will be constructed as part of the substation infrastructure. The contractor will apply for the required Building Approval after the EPC Contract has been awarded and the final design is developed.

2.2.7 Site Compound

A Site Compound will be erected in the general vicinity of the substation. This will provide a base for the construction and operations personnel and support services. The Site Compound will comprise an Administration Building, Workshop, Fluid Store, Maintenance Store, Storage Compound, and car parking facilities.

It is anticipated the Site Compound will be utilised by the operations personnel and support services for the lifetime of the project. The Proponents will apply for the required Building Approval after the successful tendering of the project.

2.2.8 Meteorological Mast

To assist in the collection of wind data, Hydro Tasmania erected a 50m high lattice tower meteorological mast with anemometers in May 2002 to record wind speeds. The mast was positioned on Cowalla Peak in the western sector of the proposed Wind Farm site (at coordinates 335349E, 6638256N in WGS84 Datum, Zone 50).

In February 2008 two further masts were erected by the Proponents at the following locations:

- High Hill – A 70m high lattice tower meteorological mast with anemometers on Lot 3755 on Plan 207065.
- Panizza – An 80m high lattice tower meteorological mast with anemometers on Lot 3850 on Plan 209077.

Plate 1 – 70m Mast – Lot 3755 Yerramullah Road

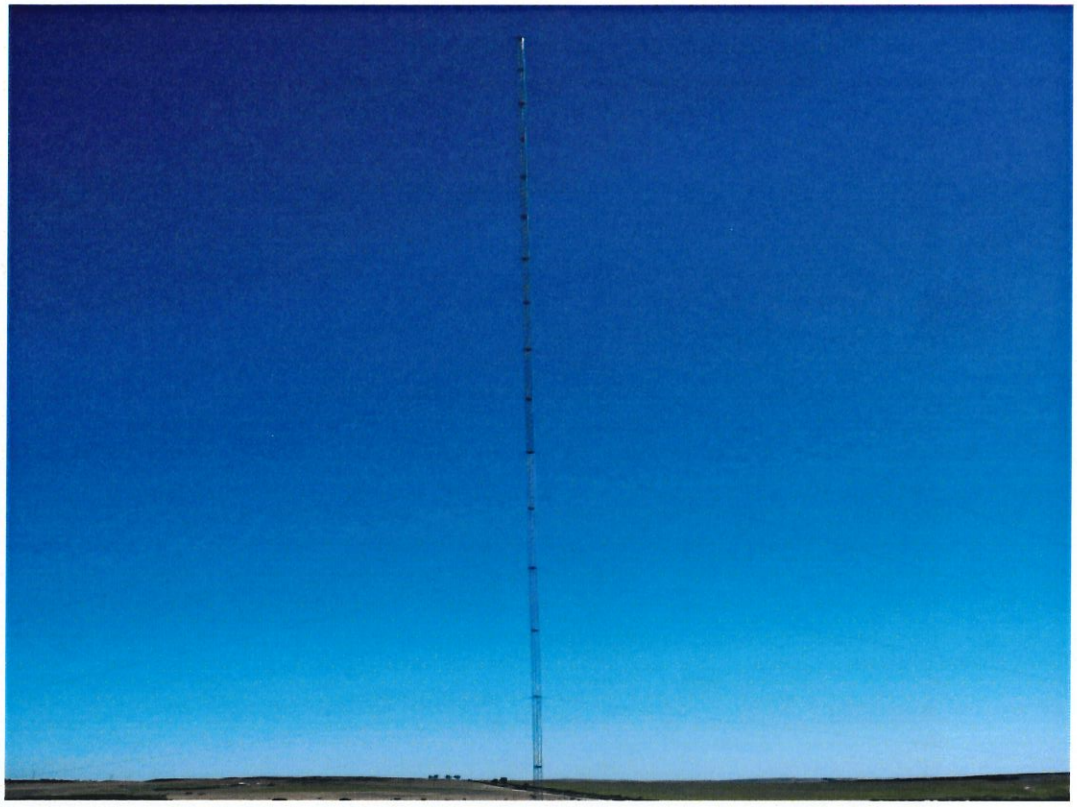


Plate 2 – 80m Mast – Lot 3850 Yerramullah Road

During operations, permanent meteorological masts will be installed on the site to measure wind speeds at various heights. The maximum height of the anemometer will be dictated by turbine type selected as wind speed measurement is required at the turbine hub height.

The location of the permanent meteorological masts will be dictated by the final layout. The existing masts may be utilised or become redundant and replaced with new masts in different locations.

2.2.9 Visitors Viewing Area

The Visitors Viewing Area at the Emu Downs Wind Farm will also serve the Badgingarra Wind Farm. This facility is located on Bibby Road which is a sealed road carrying tourist traffic to and from Cervantes and Jurien Bay.

The Visitors Viewing Area will allow viewing of the Badgingarra Wind Farm from a distance. The facility is well signposted and has adequate parking spaces and safe traffic flow.

A display panel will be designated to the Badgingarra Wind Farm.

The following photographs show the Visitors Viewing Area constructed at the Emu Downs Wind Farm.

Plate 3 – Car Park Entry

Plate 4 – Viewing Area – Information Stand

2.3 Construction Activities

Construction and operation of the wind farm will involve the following activities:

- Construction of on-site service roads (gravel) linking all turbines and associated infrastructure to the existing external roads. These would be gravel roads and will be utilised for construction, operation and maintenance activities;

- Construction of a permanent Site Compound containing an Administration Building, Workshop, Fluid Store, Maintenance Store, storage compound and car parking facilities;

- Construction of temporary construction infrastructure including site offices parking, hardstand areas and amenities to accommodate the needs of the construction workforce. These facilities will be removed and the areas rehabilitated after construction;

- Excavation of foundations for each turbine footing followed by steel installation and concrete pouring. The foundations for the turbines are typically 12 to 15 metres diameter steel reinforced concrete rafts, nominally 1 to 2 metres deep;

- Erection of tubular steel towers of up to 80 metres in height and the installation of the nacelle and rotor blades;

- Excavation, laying and backfilling of underground electrical cabling linking all turbines and the substation;

- All wind turbines will be connected to the substation constructed on the site, which incorporates a control building;

- The substation, located centrally to the development will be connected to the existing and planned Western Power transmission lines spanning the site by new 132kV extensions;

- Extension of the existing site domestic power supply (19kV) to supply domestic power to the Site Compound ;

- Where possible, the construction workforce and the supply of such supporting services and accommodation will be sourced from the local area;

- Installation of a temporary concrete batching plant; and

- Restoration of areas used for construction, which are not required for operational activities.

All construction activities will be managed through the implementation of a comprehensive environmental management system, which will cover all aspects of construction activities. Risk management plans will be developed for all significant issues.

2.3.1 Concrete Batching Facility

A temporary concrete batching facility will be required on-site to facilitate the continuous pouring of concrete for the turbine footings. Raw materials will be trucked to site and stockpiled adjacent to the batching facility. A small sediment /

waste dam will be required as part of the facility. The siting of the batching facility will be responsive to the distances to be travelled for concrete pours and will be the responsibility of the contractor.

It is envisaged the batching plant will be sited approximately central to the site and will utilise the site access point for haulage of materials and equipment.

2.3.2 Temporary Construction Facilities

General temporary facilities required for construction will generally include:
Site sheds and offices;
Ablution facilities;
Crib rooms;
Covered external area
Laydown areas etc.; and
These facilities will be located close to the permanent Site Compound and be the responsibility of the contractor. They will be removed following construction and all areas disturbed will be rehabilitated.

2.4 Operation and Maintenance

Operation of the wind farm will involve the following activities:

- The wind turbines will operate when the site wind speeds are between approximately 3 and 25 metres per second, or between 85 and 90% of the time;

- Permanent meteorological masts mast will be installed on the site to measure wind speeds at various heights. The maximum height of the anemometer will be dictated by the turbine type selected, as wind speed measurement is required at the turbine hub height;

- Servicing of the wind turbines will generally be performed every three months. This will involve shutting the turbines down separately for a day or two and performing routine maintenance activities.

- Regular monitoring and inspection will occur.

An Environmental Management System based on ISO 14001 will be developed and implemented for the operation of the wind farm.

2.5 Decommissioning

The project economics are based on a wind farm design life of 25 years, after which the Proponents will either continue, if practical, to generate wind power using the existing wind turbines, upgrade the wind turbines with more efficient machines or the infrastructure will be removed and the site decommissioned. Decommissioning of the site would involve the following activities:

- Dismantling of turbines using cranes;
- Towers will be cut off below ground level and the soil will be replaced reinstating the land for continuation of agricultural activities;
- All material would be removed on trucks for recycling;
- Where access tracks of no use to the Landowner would be removed and the land reinstated for grazing;
- Underground cabling will either be removed or those portions below ploughing depth may be left. All cabling close to the surface will be removed to allow agricultural activities to continue undisturbed; and
- The substation and Site Compound would be removed and the land reinstated for agricultural use.

2.6 Workforce

2.6.1 Labour

In addition to the use of local goods and services, the Proponents will be encouraging the hiring of local subcontractors during the tendering process. It is anticipated some of the work force will be sourced from local contractors. The construction of a wind farm largely requires skills that are used in other construction activities and therefore some of this skill base is expected to be available locally.

The type of workers required for the project will include plant operators, truck drivers, excavator drivers, mechanics, welders, crane operators, fencers, electricians, labourers and other individuals typically used in civil construction activities. It is expected the workforce on site will peak at 110 people during the construction period.

The wind farm's construction will also generate employment through additional expenditure in the region both during and post-construction.

The workforce will require an induction prior to beginning any work and part of the induction will address the code of conduct requirements for both on and off-site.

2.6.2 Accommodation

Both construction and to a lesser extent, operation, will increase the demand for accommodation in the region and it is envisaged that motels and other accommodation in the local area will be well utilised.

3.0 LEGISLATIVE REQUIREMENTS

The purpose of this section is to provide the Shire of Dandaragan and other Referral Agencies with a description of the proposed project and to highlight the likely approval process and legislative requirements.

The development of the Badgingarra Wind Farm project will involve addressing the requirements of and making applications under Commonwealth, State and Local Government legislation.

3.1 Commonwealth

3.1.1 Environmental Protection Biodiversity and Conservation Act 1999

An EPBC Referral was submitted to the Department of Environment, Water, Heritage and the Arts (DEWHA) in February 2008. After assessing the information provided, the DEWHA responded (in part) in March 2008:

"We have decided that the proposed action is not a controlled action and, as such, does not require assessment and approval by the Minister for the Environment, Water, Heritage and the Arts before it can proceed."

The EPBC Referral addressed potential issues the proposed development would raise under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. The Act places an obligation on proponents to determine if their proposed developments will have, or are likely to have, an impact on a matter of national environmental significance (MNES).

Matters of national environmental significance that must be considered by proponents under the EPBC Act are: -

- World Heritage Properties;
- Wetlands of International Significance nominated on the Convention on Wetlands (the "Ramsar" Convention);
- Nationally threatened species;
- Migratory Species;
- Commonwealth marine areas; and
- Nuclear matters.

Administrative guidelines have been developed to determine if a significant impact is likely to occur.

Appendix 4 includes the EPBC Referral submitted to the DEWHA and their assessment. The assessment of the proposal reveals that the project will have not have a significant impact on any MNES (as detailed below) and therefore does not trigger the requirements of the EPBC Act.

World Heritage Properties

There are no world heritage listed properties in the vicinity of the project site.

Wetlands of International Significance

There are no wetlands of international significance in the region.

Nationally threatened Species / Migratory Species

The project activities are unlikely to impact on any nationally threatened species or migratory species.

Commonwealth Marine Areas

The project site is not located near any commonwealth marine areas.

Nuclear Matters

The project is not a nuclear matter.

3.1.2 Aeronautical Assessment

The Principals appointed Rehbein AOS to prepare an Aeronautical Assessment Report to examine the proposed wind farm in relation to aviation activities in the region. A copy of the report is included in Appendix 5. The following is a summary of their findings.

The wind turbines do not penetrate the OLS for any nearby aerodromes so will not be designated as obstacles to aircraft operating in their vicinity.

However as they will be more than 110 m high the Proponents must advise CASA of their height and location so that CASA may undertake a risk assessment to determine if they will be hazardous to aviation.

Draft advisory circular AC139-18(0), *Obstacle Marking and Lighting of Wind Farms*, issued in June 2004, was revised in December 2005 to incorporate further guidance. The circular specifies that CASA may determine that a proposed wind farm will be:

- not hazardous to aviation; or
- not hazardous if provided with approved marking or lighting; or
- hazardous but the risks to aircraft safety may be reduced by the provision of approved marking or lighting.

The Proponents would be advised in writing of this determination, and may be expected to reduce the potential hazard by lighting the facility or portions of it as specified in the CASA Advisory Circular, despite the assessment by Rehbein AOS that the wind turbines will have no impact on:

- current flying activity at Jurien Bay, Cervantes and Moora aerodromes;
- radar coverage of controlled airspace;
- the operation of ground-based navaids;
- IFR air routes;
- VFR activity by day or night;
- military operations in restricted areas; or
- any other aviation related activities.

If required for wind farms that are not located near aerodromes, obstacle lighting may be placed on the top of the wind turbine generator housing. Sufficient individual wind turbines should be lighted to indicate the lateral and vertical extent of each group of turbines. The guidance suggests that the horizontal interval between lighted turbines should not exceed 900 metres, and the highest turbines should also be lighted if they are not already lighted to indicate the horizontal extent of a group.

CASA would also publish particulars of the wind farm if it were determined to be a hazard. This would be done initially by NOTAM, pending incorporation of the appropriate symbol to denote the activity on relevant air navigation charts.

CASA may seek formal advice from Air Services concerning radar and navaid impacts before finalising its decision.

It should be noted that timely assessment by CASA cannot be guaranteed as it is not bound by legislation to provide a decision within a prescribed timeframe. In the

past developers have experienced significant delays in obtaining a CASA assessment and in extreme circumstances have sought intervention by the Commonwealth Ombudsman on the grounds of unreasonable delay.

The proposed wind farm at Badgingarra will not impact on any Department of Defence areas that are protected by the DACR at this time.

The proposed site does not fall within prescribed airspace administered by the Department of Infrastructure (formally DOTARS).

The Principals propose to have discussions with local aerodrome operators (Jurien Bay and Cervantes) to gain an understanding of their current usage and future plans for development and expansion of their aerodromes.

The proposed wind farm will not impact upon current aircraft operations to/from Jurien Bay, Cervantes (as can best be assessed) or Moora, nor interfere with radio or navigation aid performance.

Analysis undertaken by Rehbein AOS indicates that there will be no impact upon IFR traffic operating to any local aerodromes or transiting the area with reference to the Jurien Bay VOR navaid. Further investigation of the impact upon IFR operations will most likely not be required.

Traffic operating under the VFR will not be affected by the proposed wind farm as the structures will be sufficiently conspicuous by day and at night, local LSALTs will provide clearance well in excess of the minimum required for night VFR operations.

Since the greatest lateral extent of the OLS for any aerodrome is 15 km (8 NM), the proposed height and location of the turbine structures will not infringe the OLS for any existing aerodromes.

Although interference caused by electromagnetic interference is negligible it would be prudent to confirm whether Air Services Australia has any concerns about the impact of the proposed wind farms upon radio performance in the region. Investigation undertaken by Rehbein AOS suggests that the impact, if any, will not be of operational significance.

Analysis suggests that there will be no impact upon the safety of recreational aviation activities in the region. The Principals propose to confirm that their proposal does not impact on recreational aviation activities that may be undertaken in the area near the proposed wind farm by consulting relevant national associations/federations. In this assessment Rehbein AOS has relied on the location of such activities being accurately depicted on navigation charts.

CASA currently allows fixed structures up to 110 m AGL without marking, lighting or advice to the aviation industry. These structures could be located anywhere and be any shape, size, colour or number.

In this instance the Principals propose structures that are marginally higher at approximately 125 m (400ft) above ground level, concentrated in a defined area, conspicuous because of their shape and colour and unlikely, on the basis of this preliminary investigation, to pose a hazard to aviation.

In this case all the safeguards imposed by CASA to ensure tall structures including wind turbines do not constitute a hazard to the safety of civil aircraft operations in Australia are satisfied and the risk to civil aviation activities, if any, that this wind farm may pose is trivial.

As with any reported tall structure that may pose any risk, regardless of its triviality, it would seem sufficient to indicate the position of the proposed wind farm on appropriate air navigation charts to assist pilots operating in the region and to provide lighting as deemed acceptable to CASA and possibly, in this case, the Royal Australian Air Force (RAAF) Aeronautical Information Service (AIS) as a representative for the Department of Defence.

3.2 State

3.2.1 Planning and Development Act 2005 - Lease

The Proponents intend entering into Land Leases with the landowners, to lease portions of the site required for the wind-turbines, associated infrastructure and to allow for access and maintenance. Easements are proposed for site roads and underground electrical reticulation.

The project economics are based on a wind farm design life of 25 years and the Land Leases will be for this time frame with the option of renewal.

Under the Section 140 of the Planning and Development Act 2005 leases for terms exceeding 20 years over portions of lots require the approval of the Western Australian Planning Commission within 3 months of the agreement being entered into. Accordingly, the Land Leases will be forwarded to the Commission for approval once Local Planning Consent has been granted and micro-siting of the turbines has been finalised.

3.2.2 Environmental Protection Act 1986

The Environmental Protection Act 1986, is the principle environmental legislation in Western Australia outlining the environmental assessment procedure applying to the evaluation of the proposed wind farm.

The potential environmental impacts discussed under **Section 5.0** of this Report, indicate the proposed wind farm may be referred to the EPA by the Shire, in accordance with section 38a of the Environmental Protection Act 1986.

Under this Act - Section 40, the EPA is required to notify the Shire within 28 days whether the proposal is to be assessed (environmental impact assessment) or give advice and make recommendation to the Shire on the environmental aspects of the proposal.

Section 5.0 of this Report comprehensively identifies and discusses all the relevant environmental issues and identifies management strategies and control practices to minimise environmental impacts.

The Proponents are confident this Development Application Report adequately addresses the environment effects, and that management and control practices to minimise environment impacts are adequate for the proposed wind farm to proceed without being subject to a formal assessment under Section 40 of the Environmental Protection Act 1986. **Sections 5.0 and 6.0** of this Report deal specifically with these environmental issues.

The proponents and their representatives are available to consult with the Department of Environment and Conservation (DEC) on environmental matters during consideration of the proposed Wind Farm by the Shire.

Should the EPA determine the proposed wind farm to be non-assessed, it may be referred to the DEC Licensing Branch for consideration of the issue of a Works Approval - for construction of the Wind Farm - and registration or licensing. The requirement for the issue of these is dependant upon whether the potential environmental impacts are significant enough for the development to be considered a 'prescribed premise' under the Act, which will be determined by the DEC Licensing Branch.

The proponents undertake to obtain all approvals deemed necessary by the DEC and comply with such conditions as may be imposed.

It is noted that the existing Emu Downs Wind Farm was determined to require only informal assessment, and the EPA provided comment and recommended conditions of approval to the Shire of Dandaragan for inclusion within the Planning Consent.

During preliminary discussions in April 2007 staff of the DEC indicated that informal assessment may again be all that is required for the proposed development, given the experience and positive outcomes with the neighbouring Emu Downs Wind Farm development. This will be dependent on the EPA's view of the potential for impact on environmental values (e.g. noise, landscape and visual, flora and fauna, etc.).

Should the EPA decide to impose a formal environmental assessment then this would be pursuant to Section 40 of the Environmental Protection Act.

3.2.3 Mining and Petroleum Tenements

Mining Exploration Licences are granted to enable exploration for minerals and E70/2715 is of a type routinely granted under the Mining Act. It authorises entry to the land to explore for minerals with such vehicles, machinery and equipment as may be necessary and permits digging pits, trenches and holes, sinking bores and tunnelling.

Exploration Licence holders are authorised to extract up to 1,000 tonnes per year of soil from the tenement. Typically, this would be used for testing but there is no requirement in the Mining Act that it be used for that purpose.

Exploration is permitted over the entire tenement to an unlimited depth, except that because the tenement is held over freehold land, no exploration is permitted on land under cultivation, or where there is a yard, stockyard, substantial improvement, dam, bore, well or spring, or on land within 100 metres of any of these areas (*Restricted Areas*), unless the exploration is below 30 metres from the surface of the land. These Restricted Areas may only be explored with the consent of the landowner and occupier, which has not been obtained for either the Licence or the Application.

Exploration licences are granted for an initial term of five years and may be extended in prescribed circumstances for further periods of 1 or 2 years.

The exploration licence holder under the Mining Act has the statutory right to apply for, and have granted, mining leases over the land covered by the exploration licence. This means that if Exploration Licence holders wish to conduct more substantial mining operations on the land (or even if it wishes only to conduct further exploration) it is entitled as of right to the grant of a mining lease which gives it the right to mine, unless the Minister is satisfied on reasonable grounds in the public interest that the mining lease should not be granted. This is only tempered to the extent of any private agreement that the tenement holder may have reached with the underlying landowner.

Pursuant to the provisions of the Mining Act 1978 no mining may commence unless and until the Lease Holder has paid, or tendered to the owner and occupier the amount of compensation required under the Act, or has made an agreement as to the amount; times and mode of compensation, if any.

The following Table sets out the Mining Exploration Licences affecting the Badgingarra Wind Farm Area.

Table 3 – Mining Exploration Licences

Mining Exploration Licence No.	Licence Holder	Date Granted From:	Date Granted To:	Landholdings (Lot No.)
E 70/2715	Jurien Energy Limited	07.06/2006	06.06.2011	3738
E 70/2716	Jurien Energy Limited	07.06/2006	06.06.2011	51; 500; 3738; 3739; 3743; 3744; 3747; 3753; 3754; 3755; 3850
E 70/2892	Image Resources NL	04.10.2006	03.10.2011	3753; 3748
E 70/2549	Tronox WA Pty Ltd & Yalgoo Minerals	11.09.2003	10.09.2008	3753; 3748
E70/2688	Hill River Coal	Pending	Pending	3728; 3704; 3745

With respect to Petroleum Exploration Permits there are two that cover the site. Similar to Mining Licences, the Permits allow for exploration only following which a lease is required to be applied for under the provisions of the Petroleum Act 1976. Again further work cannot commence until such time as agreement has been reached with the land owner with respect to compensation.

The following Table sets out the Petroleum Exploration Permits affecting the Badgingarra Wind Farm Area.

Table 4 – Petroleum Exploration Permits

Petroleum Exploration Permits	Permit Holder	Date Granted From:	Date Granted To:	Landholdings (Lot No.)
EP 447	Kimberley Oil NL	12.04.2006	11.04.2012	50; 51; 3738; 3739; 3742; 3743; 3744; 3850
EP 432	Empire Oil Company WA Ltd	11.10.2004	10.10.2010	3704; 3728; 3738; 3745; 3747; 3748; 3753; 3755

3.2.4 Town Planning Framework

There are several State Government planning instruments relevant to the Shire of Dandaragan District and the carrying out of the Council's planning function including land use planning decisions. These initiatives are in the form of policies and strategies as outlined below.

3.2.5 State Planning Framework Policy - Statement of Planning Policy No. 1 (Variation No. 2 – 2006)

The State Planning Framework is divided into two parts:

Part A General Principles for Land Use Planning and Development.
These principles are derived from the State Planning Strategy (1997) and form the basis for all other provisions of this Framework. As well, they will act as the underlying principles for all State and regional plans, policies and strategies.

Part B State and Regional Provisions.
The plans, policies and strategies that form the State Planning Framework are listed in this Part. They are divided into functional categories and may be amended from time to time.

Each policy, strategy or guideline listed shall be called a provision for the purposes of this Statement of Planning Policy.

The State Planning Framework, or Strategy as it is commonly referred to, unites existing State and regional policies, strategies and guidelines within a central framework which provides a context for decision-making on land use and development in Western Australia.

The policy was initially gazetted on 22 December 1998 as Statement of Planning Policy No8. Subsequently, a variation to the policy, Statement of Planning Policy No 1 (Variation No. 1) State Planning Framework Policy, was gazetted on 30 May 2000.
The Statement of Planning Policy has now been further updated to include additional regional strategies, regional and sub-regional structure plans, strategic policies and operational policies that have been endorsed by the WAPC since

May 2000.

This Statement of Planning Policy, which does not introduce new policies but simply brings together existing policies, strategies and plans approved by the WAPC, will continue to assist local governments in preparing schemes and will also clarify the State and regional policies that apply to a particular locality.

The State Planning Strategy identifies the **five key principles** which further define this primary aim and describe the considerations which influence good decision-making in land use planning and development. Planning should take account of and give effect to, these principles and related policies to ensure integrated decision-making throughout government.

Environment:
To protect and enhance the key natural and cultural assets of the State and deliver to all West Australians a high quality of life which is based on environmentally sustainable principles.

Community:
To respond to social changes and facilitate the creation of vibrant, safe and self reliant communities.

Economy:
To actively assist in the creation of regional wealth, support the development of new industries and encourage economic activity in accordance with sustainable development principles.

Infrastructure:
To facilitate strategic development by making provision for efficient and equitable transport and public utilities.

Regional Development:
To assist the development of regional Western Australia by taking account of the special assets and accommodating the individual requirements of each region.

The State Planning Framework identifies the Shire of Dandaragan (and hence the subject properties) within the Wheat-Belt Region. There is no direct reference to the Shire of Dandaragan and in particular wind farms in the Strategy. The Strategy

identifies actions in relation to improving regional infrastructure, supplementing agricultural activity and promoting tourism development within the Region.

To date these actions have not been incorporated within a Statutory Region Planning Scheme, as indicated in the Strategy, which would include the Shire of Dandaragan.

It is considered the proposed wind farm is consistent in a general sense with the strategies and actions of the State Planning Strategy, and development of the wind farm will not compromise the implementation of a future Statutory Region Scheme for the location. In particular, with reference to Regional Development, the proposed wind farm proposals should be able to be supported, having regard to the five key principles elicited above.

3.2.6 Central Coast Regional Strategy (1996)

The Badgingarra Wind Farm falls within the Central Coast Regional Strategy (CCRS). The Land Use Plan identifies the area a "Rural (Grazing)" with "The predominant preferred use across the rural areas are grazing and diversified grazing, cropping, horticulture and floriculture. Other rural uses include tree farming, rural residential and the controlled extraction of minerals and basic raw materials."

The CCRS utilises five major water catchments for land use planning management purposes with each catchment containing Planning Units. For each Planning Unit there is a defined location plan, an outline of the planning unit features, the major issues and planning considerations, a list of land uses to be promoted / encouraged, and recommended planning and management guidelines.

It is highlighted that the "land use emphasis and guidelines within each planning unit will require more detailed definition by expanding the range of uses suitable within units and specific planning and management guidelines. This will be a requirement of local land use plans, local rural strategies, conservation strategies and management plans."

The Badgingarra Wind Farm falls within Planning Units C5 and HR1 as described below:

PU – C5: Features: Arrowsmith Region – hills and breakaways. Undulating country dominated by flat topped lateritic plateau remnants, gravely hills and concave sand-filled valleys.

Predominantly private land which contains some remnant vegetation. Partly covered by Mining and Petroleum Act tenements and includes part of the Yardarino and Cataby heavy mineral sands.

Land Uses to be encouraged: Continued broadacre agriculture including – grazing with some cropping.

Major issues and planning considerations: Soil erosion; crests and ridges not suitable for agriculture (cropping); continued access to mineral and energy resources and basic raw materials.

Planning Management and Guidelines: Generally discourage further subdivision; protect remnant vegetation; and allow for mineral resource development / basic raw material extraction in accordance with policy and legislation.

PU – HR1: Features: Hill River Catchment Inland lateritic sandplain. Undulating country dominated by flat topped lateritic plateau remnants, gravely hills and concave sand-filled valleys. Predominantly private land which contains some remnant vegetation. Partly covered by Mining and Petroleum Act tenements and includes part of the Hill River Coalfield. Land Uses to be encouraged: Continued broadacre agriculture including – grazing with some cropping.

Major issues and planning considerations: Soil erosion; crests and ridges not suitable for agriculture (cropping); continued access to mineral and energy resources and basic raw materials.

Planning Management and Guidelines: Generally discourage further subdivision; protect remnant vegetation; and allow for mineral resource development / basic raw material extraction in accordance with policy and legislation. Encourage a catchment based approach to rural land use planning and management.

In summary, the CCRS is silent on wind farm developments however, having regard to the Planning Management and Guidelines a wind farm development should not be prohibited by the Strategy provided due regard is held with respect to soil

erosion and mineral resource development / basic raw material extraction. The issue of mining is dealt with under Section 3.2.3 of this report.

Most importantly, regard should be taken into account of the six broad principles that provide the foundations for the strategy when measuring whether a wind farm is an appropriate land use. This assessment was undertaken for the Emu Downs Wind Farm and applies equally for Badgingarra.

Compatibility with the six guiding principles of the Strategy is described as follows:

"1. Promote ecologically sustainable development in the planning of the region to enhance the quality of life for residents and visitors, both now and in the future."
Wind farming is an ecologically sustainable form of development, as it relies on a renewable resource, does not produce air emissions, does not result in the loss of natural vegetation and conserves valuable fossil fuels for alternative use by future generations. Wind farming is therefore consistent with this guiding principle.

"2. Recognise the regions distinct cultural and natural character and its community networks to provide a positive identity and image for the region."
The focus of this principle is on identity and community development. The assessment of the wind farm proposal cannot be made against this principle.

"3. Promote careful management of natural systems, including areas identified with conservation values to ensure maintenance of essential life-supporting resources such as clean air, water and soil and biological diversity."
The emphasis of this policy is on preserving the natural environment. The BWF will not disrupt or diminish the remaining natural vegetation and it makes use of a renewable resource and does not cause air pollution. Wind farming is therefore highly compatible with this principle.

"4. Protect and enhance the quality of life for all residents by facilitating the development of community facilities and social services, providing for fair and equal access to opportunities and encouraging greater community involvement in planning processes." This objective deals with social infrastructure and equality. Wind farming cannot be assessed against this principle.

"5. Promote economic diversification of the region as a basis for economic development."

Wind farming is a relatively new industry in WA and will provide economic benefits in the form of jobs, demand for local goods and services, and be a point of tourist interest. It will also supplement farm income for the landowners. Wind farming is considered highly compatible with this principle.

"6. Promote a coordinated and integrated approach to regional planning and development through the involvement of all three levels of government to prevent duplicated and contradictory decision-making." This principle deals with improved administration. This guiding principle is not relevant to the consideration of wind farming.

The CCRS further defines these guiding principles into **specific planning objectives** under broad headings of Settlement, Resource Development, Natural Environment and Coast. Recommended actions to achieve objectives generally relate to future policy activities i.e. studies, investigations, policy and promoting particular uses in particular locations. Of relevance to the wind farm development are the following objectives:

Commerce and Industry

"To encourage commercial and industrial development which contributes to the economic and social well being of the region without creating unacceptable environmental, economic or social impacts?" Wind farming is considered highly compatible with this objective, as there will be positive economic externalities and no significant environmental or social impacts.

Other Infrastructure

"To provide efficient infrastructure according to local needs and ensure minimum impacts on surrounding land uses and the natural environment." Wind farming is considered highly compatible with this objective as wind farming is an efficient form of energy production and no significant impact on the environment and minimal impact on surrounding land use will occur.

Mineral and Energy Resources and Basic Raw Materials Development

"To identify the occurrences of the region's mineral and energy resources (including renewable energy) and basic raw materials and plan for their exploration, extraction, development and harvest in relation to other land uses."

"To optimise the contribution of the mineral and energy industries to the development of a broad economic base for the region."

Although the BWF may occur on some mining tenements, and therefore encumber mining activity for the life of the wind farm, it is not considered contrary to the objectives, as the objective does not stipulate protection of mineral resource from other land use. Equally importantly, the wind farm is directly related to "renewable energy" and greatly assists the local economy of the region.

In addition to the above, the Badgingarra Wind Farm, being the largest in WA will contribute strongly towards the Tourism Development objectives of the CCRS.

3.2.7 Planning Bulletin No. 67 (2004) – Guidelines for Wind Farm Development

This Planning Bulletin released by the WA Planning Commission is intended to provide local government, other relevant approval authorities and wind farm developers with a guide to the planning framework for the balanced assessment of land-based wind farm developments, throughout Western Australia.

The objectives of these guidelines are to:

- Facilitate the development of wind farms in an efficient, cost effective and environmentally responsible manner that meets community needs; while taking into account the needs of developers, and State and national imperatives.

- Promote community understanding of the issues involved in the design and installation of wind farm infrastructure and provide opportunities for community input to decision-making.

- Promote a consistent approach in the preparation, assessment and determination of applications for planning approval for wind farm developments.

- Minimise disturbance to the environment (including landscape) and loss of public amenity in the establishment, operation, maintenance and decommissioning of wind farms.

Planning Bulletin 67 sets forth the "Planning Issues"; "Environmental Issues"; and "Information Requirements".

With respect to PB 67; this report and its Appendices adequately address the checklist of Information Requirements to be considered by Council and the referral authorities as part of the Development Application. A copy of the Check List is provided in **Appendix 6.**

3.2.8 Statement of Planning Policy No. 2.5 Agricultural and Rural Land Use Planning

SPP No 2.5 was gazetted in March 2002. SPP No 2.5 outlines the following four key objectives:

- To protect agricultural land resources whenever possible;
- To plan and provide for rural settlements;
- To minimise potential for land use conflict; and
- To manage natural resources.

Under each of these objectives is a set of related sub-objectives.

The objectives and requirements of SPP No 2.5 are to be implemented by Local Governments in the preparation of new Town Planning Schemes, Local Planning Strategies and Policies. Under SPP No 11, there is no mention of wind farming or a class of development to which wind farming may belong. Consequently, it is only possible to generally assess the proposed wind farm proposal against the key objectives to establish its compatibility or otherwise with the SPP No 2.5.

The proposed Wind Farm would not result in any substantial land use conflict. Environmental and Social Impacts are considered to be minor and are able to be managed as outlined under **Section 5.0** of this report. The wind farm proposal is considered to be compatible with the objective to minimise potential land use conflict.

Finally, in relation to the management of natural resources, the wind farm will have a minimal impact on the environment and continuation of agricultural activity on the land. It is acknowledged however, that development of the wind farms may encumber natural resource extraction over the site for the duration of the development.

None of the BWF site is identified within an Agricultural Priority Management Area - Potential / Development Areas (subject to additional and detailed investigation).

As wind farming does not preclude continuation of agricultural use, with perhaps the exception of tree planting / forestry, wind farming can coexist with the intended uses identified the Agricultural Priority Management Area.

3.3 LOCAL GOVERNMENT

The Shire of Dandaragan maintains both strategic and statutory planning documentation of relevance to the wind farm proposals.

3.3.1 Shire of Dandaragan Local Planning Scheme No. 7

The Badgingarra Wind Farm is zoned 'Rural' under the Shire of Dandaragan Local Town Planning Scheme No 7 (LPS No. 7). As set out in Section 2.1.1 of this report the proposed wind farm is a Land Use that is not classified under the Scheme and therefore does not appear in the Zoning Table.

Pursuant to Planning Bulletin No 67 the use should be dealt with under Clause 4.4.2 which provides the Shire with the opportunity to consider the proposal on its merits subject to undertaking the necessary public advertising and calling for public submissions.

Clause 10.2 of LPS sets out those matters to be considered in dealing with a Development Application ranging including but not limited to:

- the aims an provisions of its Scheme;
- Statements of Planning Policy made by the WA Planning Commission;
- environmental policies under the EP Act; orderly and proper planning;
- the effect upon the amenity of the locality;
- the effects upon the natural environment;
- the height, bulk, scale, orientation and appearance of the proposal;
- the proposed means of access to and egress from the site;
- whether the proposal is likely to cause soil erosion or land degradation;
- any relevant submissions received on the application; and
- the comments or submissions received from any referral authority.

With regard to Clause 10.2 of the Scheme it is considered through the work outlined in this Report together with the attached Appendices, that each of the matters (with the exception of submissions which are yet to be received) has been fully addressed and thus meets all of the objectives prescribed under Clause 10.2.

The Planning Scheme's intention for the 'Rural' Zone provides for a range of rural activities such as broadacre and diversified farming so as to retain the character and amenity of the locality, in such a way as to prevent land degradation and further loss of biodiversity.

It is considered the proposed wind farm proposal generally accords with this statement as rural uses can continue on the land and no clearing of remnant vegetation is to occur. Further, the proposal does not result in increased demand for additional service infrastructure.

3.3.2 Shire of Dandaragan Local Planning Strategy (yet to be adopted by Council)

The Shire of Dandaragan Local Planning Strategy provides the strategic context for primarily rural land within the Shire. Reference however is made in the Strategy to energy and electrical supply. Mention is made of the 132 kV transmission lines, which the proposed wind farm will connect into.

The Strategy indicates that voltage drops are experienced at the extremities of the power grid. No mention is made of the need to enhance the electricity provision via new facilities and no recommendations are made in the Strategy in this regard, but this would probably result by development of the wind farm.

The Strategy establishes a set of Planning Guidelines related to identifying land units throughout the Shire. The parts of the subject properties identified, as possible sites for wind turbines are all included within the Yerramullah (Mintaja and Alluvial) Precincts. The guidelines for this precinct identified the following key issues.

- Much of the area has been cleared and some cleared land is of poor quality and in need of restoration.
- Remnant bushland and resources exist particularly capping the hills and these needs to be preserved.
- Fertilizer application needs to be minimised to ensure shallow ground water quality does not deteriorate.

The principle objectives for the Yerramullah Precinct includes encouraging intensive agriculture in suitable places, planting more trees to help reduce wind erosion and rising water tables, continuing extensive agriculture, continuing grazing with incorporation of perennial fodder crops, and encouraging tourism and

conservation. A list of desirable, conditional and undesirable land uses are also identified, none of which include any land use activity comparative to the proposed wind farm.

A set of management guidelines are also specified for the Yerramullah Precinct which are similar to the objectives and include tree planting (to attenuate soil erosion and rising water tables), catchment management, planting of perennial fodder crops, limits on water abstraction and agriculture based on soil type.

To a limited extent, the wind farm proposal could impact on the implementation of tree planting on the subject land as trees could affect wind flow. Tree planting could still occur but with the operation of the wind farm as a determining factor on the location of planting.

The establishment of the wind farm will not impact on the implementation of other management guidelines.

In summary, the Local Planning Strategy addresses primarily agricultural land use in the rural zone with a preference for preservation of such activity. In terms of wind farming there is no specific reference.

4.0 COMMUNITY CONSULTATION

4.1 Community Consultation Objectives

The objectives for community consultation include:

- Inform the community and stakeholders of the processes involved to ensure they have an understanding of how and why decisions are being made;
- Share ownership of the Project with the local community and special interest groups;
- Ensure stakeholders have access to relevant information and adequate opportunities for input; and
- Identify stakeholder issues at an appropriate time so the Proponents may assess and address issues before progressing to the next stage of development.

4.2 Strategies

The strategies employed to achieve the objectives have been implemented in sequenced phases and include:

4.2.1 Project Feasibility

Phase 1 ~ Researched the market (identify stakeholders and potential issues)
Phase 2 ~ Introduce the Project to stakeholders and the local community

- After officially briefing the Dandaragan Council on 27 March 2008 the first series of public Information meetings were held in April 2008. These took place in Badgingarra (29/04/08) and Cervantes (30/04/08).

- The meetings were widely publicised in local and regional newspapers.

Regional Newspapers: The Countryman; The Central Midlands and Coastal Advocate; Midwest Times; Merredin-Wheatbelt Mercury.

Local Newspapers / Newsletters: The Sandpaper (Badgingarra Local News); The Red Gum Report (Dandaragan Local News); Pinnacle Papers (Cervantes Local News).

INSERT: Statement on outcomes from the Meetings.

Phase 3 ~ Updating stakeholders by providing feedback and progress updates.

One month after the Development Application has been submitted, a second series of public information meetings are planned for July 2008 in Badgingarra and Cervantes. These meetings will introduce the public to the Development Application and Environmental Report and the process for making submissions on the project. The Development Application will be available for public review and comment at this time.

The Proponents will continue ongoing community consultation and involvement in the project. The Proponents will maintain an appropriate level of visibility in the local community and amongst stakeholders whilst the Development Application is being considered.

4.2.2 Project Approval

Phase 4 ~ The Proponents will continue ongoing community consultation and involvement in the project. The Proponents will maintain an appropriate level of visibility in the local community and amongst stakeholders.

5.0 EXISTING ENVIRONMENT, POTENTIAL IMPACTS AND MANAGEMENT MEASURES

5.1 Landscape and Visual Environment

Awaiting further information GHD Report on Visual Amenity – final report expected late April / early May.

5.1.1 Existing Environment

5.1.2 Potential Impact of the Proposal

5.2 Flora; Fauna and Avian Fauna

A flora and fauna assessment, bird utilisation survey and a targeted Carnaby's Black-Cockatoo investigation have been undertaken at the proposed Badgingarra Wind Farm site to enable a level one and two bird risk assessment of the project, and an assessment of potential flora and fauna impacts.

This approach is consistent with the interim risk assessment standards for birds and wind farms issued by the Australian Wind Energy Association (AusWEA 2005). This work was carried out by Brett Lane & Associates (Ecological Research and Management); Report 7004 (1.9) dated February 2008. This Report and associated "Referral of Proposed Action" where submitted to the Federal Government pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act).

The EPBC Act is the Australian Government's central piece of environmental legislation managed by the Department of Environment, Water, Heritage and the Arts (DEWHA). It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the Act as matters of national environmental significance.

The outcome of the "Referral" is the DEWHA have advised the project "is not a controlled action" which means they do not require an Environmental Impact Statement to be prepared.

Appendix 4 provides a copy of the (Referral Action) and the full environmental report. The conclusions from the investigations carried out by Brett Lane and Associates are summarised below.

- The proposed wind farm site supports predominantly exotic pasture grasses. Some sections of the site support Kwongan heathland and grassy woodland communities, particularly along some of the ridges and steep slopes. The proposed turbine locations mostly avoid these areas. Given the predominance of cleared country, it is considered feasible to locate access tracks underground power cables and the sub station in a way that avoids any requirement to remove native vegetation. The possible exception is if turbines are located on a vegetated ridge in the southern part of the site, south of the Badgingarra National Park. Here, several specimens of Lesuer's Hakea (an EPBC Act listed threatened species) were found. The area occupied by this species is small and avoiding impacts on them is considered feasible through careful micro-siting of turbines, tracks and underground power cables.

- The site is a largely altered agricultural landscape supporting a low diversity of predominantly opportunistic and adaptable native bird species and potentially one introduced bird species. The site supports species and relative abundances of birds comparable with similar farmland settings elsewhere in Western Australia. The site supports few birds of prey and waterbirds; groups considered vulnerable to collision with operating wind turbines. Studies of wind farms in many parts of the world indicate that the rate of bird collision is between 0.04 and 4 birds per turbine per year. Rates of between 1 and 4 birds per turbine per year have been observed at Australian wind farms. The proposed Badgingarra Wind Farm had fewer birds flying at rotor swept area height than comparable wind farms in South Australia and Victoria. Therefore, collision rates would be expected to be at the lower end of the range of collision rates observed in Australia (i.e. closer to one than four birds per turbine per year).

- The collision risk to other birds from the proposed Badgingarra Wind Farm is considered to be low due to the low utilisation rates of birds compared with elsewhere. At wind farm sites elsewhere in southern Australia where surveys

have recorded higher bird utilisation rates before commissioning, collision rates have generally been less than two birds per turbine per year. This is at the lower end of results for wind farms overseas (see Section 9.2). At the proposed Badgingarra Wind Farm, the rate of bird collision is likely to be less than this and involve common farmland species of negligible conservation significance.

- The site lies within the territory of one or two pair of Wedge-tailed Eagles. Significant impacts on this species are not anticipated from the wind farm due to the low level of eagle usage.

- The Carnaby's Black-Cockatoo, a nationally endangered species, was the only threatened bird species observed on or near the wind farm site and it is expected to occur regularly in the area. Further investigations were undertaken and it was concluded that the cockatoo avoids turbines and that the probability of regular collision with wind turbines is very low. A disturbance effect was observed associated with the existing Emu Downs Wind Farm. The distance over which this effect was observed was up to 500 meters. Within the proposed Badgingarra Wind Farm site and within 500m from the outer turbines, between 400 and 1,400 hectares of potential roosting and foraging habitat may be excluded from use by the cockatoo. If turbines are located in the southern part of the site, movements between the Badgingarra National Park and roosting sites within the wind farm site to the east may be disrupted and birds foraging in the national park may need to find alternative roosts to the west (where suitable roosting habitat is available). The areas of habitat potentially affected by the project represent a very small proportion of the hundreds of thousands of hectares of potential habitat available in the region through which the species moves in the non-breeding season to the northern Swan Coastal Plain. Therefore, the risk from the project to the population is considered to be low.

- A preliminary investigation of bats indicated that no threatened species occur in the region. The results of an exploratory Anabat® ultrasonic bat detection survey at two positions on the wind farm site are presented in Appendix 3 of the Environmental Report dated February 2008.

- No threatened mammals, reptiles or frogs were recorded on the site and those present were common species and none are expected to regularly occur at the study site.

In conclusion, the effects on flora and fauna of the proposed wind farm are not expected to be of significant conservation concern. Applicable legislation and policies related to biodiversity conservation can be met, subject to careful consideration to positions of turbines and access tracks to avoid the removal of native vegetation and fauna habitat.

5.3 Surface Water

Existing Environment

The Badgingarra Site does not contain significant watercourses. Some groundwater fed wetlands exist outside the project area, to the east of the property. These wetlands serve as watering holes for cattle and as a result, are regularly disturbed.

Impact of the Proposal

It is anticipated that the main potential surface water impact would be as a result of erosion during construction activity which could result in sediment discharge into the waterways via surface runoff. Prior to commencement of construction, erosion and sediment control measures will be prepared as part of the Contractor's Environmental Management System (refer **Section 6.5**). This plan will also cover the potential issue of and mitigation measures for fugitive dust emissions. Implementation of the plan will ensure that:

- Soil disturbance is kept to a minimum;
- Exposed surfaces are covered and stabilised;
- Cleared areas are promptly rehabilitated;
- Stormwater flows are appropriately managed;
- Dust suppression measures are taken; and
- Erosion, sediment and stormwater control devices are installed and maintained in good working order.

5.4 Noise

Existing Environment

The wind farm will be located in an open rural environment on a large site with limited neighbouring residential sites. Ambient noise in the area is affected generally by farming activities, traffic, noise from stock, insects, birds and other environmental noise sources.

Ambient noise across the wind farm site is also significantly affected by the consistently high wind speeds experienced. The ambient noise is, therefore, higher than in similar rural areas which are not as exposed to the high winds.

In May 2004, the Western Australian Planning Commission released Planning Bulletin 67 titled "Guidelines for Wind Farm Development". This Planning Bulletin endorses the use of the "Wind Farms – Environmental Noise Guidelines" produced by the South Australian Environmental Protection Authority (SA Guidelines).

The SA Guidelines were first released in February 2003 and have been updated (superseded) by new "interim" guidelines of December 2007. The wind farm shall comply with these new "interim" guidelines.

The Proponents have contracted Sonus Pty Ltd (Sonus) to conduct background noise assessment at thirteen residential properties on, or adjacent to, the site. Sonus are registered acoustical engineers with extensive experience in wind farm noise monitoring and analysis.

The background noise assessment at the site was undertaken between March and May 2007. The assessment was carried out in accordance with the methodology and criteria outlined in *Draft Guidelines for the Measurement and Assessment of Noise from Wind Turbines*, South Australian Environmental Protection Authority; February 2003. The background noise level was measured at thirteen locations, each over a period of approximately three weeks in ten minute intervals.

A least squares regression analysis of the data was undertaken to determine the line of best fit. Based on this regression analysis, the background noise level at a range of wind speeds within the operating range of the wind turbine generators is shown in the table below.

Table 5 Background Noise Levels with Wind Speed

Dwelling		Wind Speed (m/s)								
		4	5	6	7	8	9	10	11	12
A	Denis Murray	29	31	33	35	38	41	43	46	47
B	Sudholz North	29	30	31	33	35	37	40	43	47
C	Deutscher South	29	29	30	31	33	35	37	39	40
D	Panizza North	27	28	31	34	38	42	46	49	51
E	Brown South West	27	33	38	41	44	47	50	53	56
F	Brown North	26	30	33	37	40	42	44	46	47
G	John Murray	24	27	30	34	37	41	44	47	49
H	Deutscher North	24	29	33	35	37	38	40	43	46
I	Brown South East	26	31	35	38	40	42	44	47	50
J	Daniel Murray	28	30	32	33	34	36	37	39	41
K	Sudholz South	28	29	31	33	36	38	41	43	46
L	Teasdale	24	27	30	33	35	37	39	40	41
M	Panizza South	30	31	33	35	37	39	42	44	46

The Sonus report titled "Badgingarra Wind Farm Background Noise Assessment" dated July 2007 is included in **Appendix 7.** Note that since the Sonus report was prepared the new "interim" SA Guidelines document has been released. Wind speed and noise regression curves for each of the thirteen residences on site are included in the Sonus report in **Appendix 7.**

Impact of the Proposal

Wind turbines produce some noise associated with the nacelle and the aerodynamics of the rotor blades. This noise increases with wind speed. It is therefore necessary, to take account of the level of background noise at different wind speeds.

Background noise generally assists to mask wind farm noise and increases as the wind speed increases. The turbine rotor blades do not operate in low wind speeds of less than 3.0 to 4.0 metres per second. Depending on the wind turbine selected, the blades only commence to turn when the wind speed exceeds approximately 3 metres per second. As a result, when the background noise is lowest (at low wind speeds) the wind farm does not operate and therefore emits no noise.

As the wind speed increases to approximately 3.5 metres per second, the wind turbines commence operating and some noise is generated. At higher wind speeds the level of noise is likely to increase to a maximum when the turbine is operating at its rated power (i.e. maximum power output). Background noise also increases with wind speed. Hence, as turbine noise increases with the wind speed, so does the background noise.

To ensure there are no adverse noise impacts at existing houses, it is necessary to ensure the noise generated by the turbines does not exceed the background noise by more than an acceptable amount at any given wind speed.

Wind farms need specific guidelines because wind turbines have unique noise generating characteristics and the environments surrounding wind farm sites usually have low ambient noise.

The SA Guidelines provide the most recent and current criteria to be adopted when developing a wind farm. Clause 2.2 Noise criteria – new wind farm development states in part:

> *The predicted equivalent noise level (LAeq,10), adjusted for tonality in accordance with these guidelines, should not exceed:*
>
> - *35 dB(A), or*
> - *40 dB(A) in a primary production / rural industry zone, or*
> - *the background noise(LA90,10) by more than 5 dB(A).*
>
> *Whichever is the greater, at all relevant receivers for each integer wind speed from cut-in to rated power of the WTG.*

The criteria adopted for the wind farm are summarised as the higher of 40 dB(A) or 5 dB(A) above the background noise level for all residences either on or adjacent to the wind farm.

Based on the background noise levels recorded at the thirteen residences and in line with the above criteria, the following noise limits have been derived:

Table 6 : Noise Limits determined at each dwelling and wind speed

Dwelling		Wind Speed (m/s)								
		4	5	6	7	8	9	10	11	12
A	Denis Murray – L90	29	31	33	35	38	41	43	46	47
	Criterion	40	40	40	40	43	46	48	51	52
B	Sudholz North – L90	29	30	31	33	35	37	40	43	47
	Criterion	40	40	40	40	40	42	45	48	52
C	Deutscher South – L90	29	29	30	31	33	35	37	39	40
	Criterion	House to be relocated to another location								
D	Panizza North– L90	27	28	31	34	38	42	46	49	51
		House to be relocated to another location								
E	Brown South West – L90	27	33	38	41	44	47	50	53	56
	Criterion	40	40	43	46	49	52	55	58	61
F	Brown North – L90	26	30	33	37	40	42	44	46	47
	Criterion	40	40	40	42	45	47	49	51	52
G	John Murray – L90	24	27	30	34	37	41	44	47	49
	Criterion	40	40	40	40	42	46	49	52	54
H	Deutscher North – L90	24	29	33	35	37	38	40	43	46
	Criterion	40	40	40	40	42	43	45	48	51
I	Brown South East – L90	26	31	35	38	40	42	44	47	50
	Criterion	40	40	40	43	45	47	49	52	55
J	Daniel Murray – L90	28	30	32	33	34	36	37	39	41
	Criterion	40	40	40	40	40	41	42	44	46

K	Sudholz South– L90	28	29	31	33	36	38	41	43	46
	Criterion	40	40	40	40	41	43	46	48	51
L	Teasdale – L90	24	27	30	33	35	37	39	40	41
	Criterion	40	40	40	40	40	42	44	45	46
M	Panizza South – L90	30	31	33	35	37	39	42	44	46
	Criterion	40	40	40	40	42	44	47	49	51

Predictive Noise Modelling

A specific "third party" noise modelling study based on the new interim SA guidelines of the proposed layouts has not be conducted at the time of preparing this Development Application as the turbine type had not yet been finalised and turbine models vary greatly in sound power level output. Predictive Noise Modelling will be performed after the Proponents have selected the wind turbine type.

The Proponents have included performance criteria within the tender documents requiring the turbine manufacturer's demonstrate compliance with the specified noise limits, as outlined in **Tables 7 & 8** below. Demonstration of compliance at all existing residences will be a requirement of the successful bid.

It is also necessary for the turbine manufacturer to provide a layout suited to the turbine type being offered. This layout will be in accordance with the intent of this report and any constraints as a result of the Development Application process.

If in the event that noise modelling demonstrates compliance is not achieved at a residence, the layout will be altered in order that the noise criteria are met. Modelling will be run in an iterative fashion to develop a layout achieving the desired noise level while minimising any loss to energy generation.

Preliminary Noise Modelling for Theoretical Demonstration of Compliance

In order to demonstrate the proposed layouts can achieve noise compliance at the existing residences, preliminary noise modelling has been performed using the

WindPro wind farm development software program. The WindPro noise model (based on ISO 9613-2 General guidelines) complies with the International Energy Agency (IEA) Standard for noise assessment from wind farms.

The WindPro software is used by PB Power for the design of all aspects of a wind farm project including energy yield and turbine placement. The WindPro noise modelling software has been proven to be a reasonably accurate tool for assessing noise levels from preliminary layouts. Comparison of the WindPro noise model results with third party modelling has shown close and consistent results.

Figures 3 and 4 demonstrate the predicted noise levels at each residence on the wind farm, using indicative layouts for 2MW and 3MW wind turbines. The noise modelling is based on a Vestas V90 (3MW) wind turbine and the RePower MM82 (2MW) wind turbine. They have a Sound Power Output of 107.8 dB(A) and 102.5 dB(A) respectively. The modelling has been performed for a wind speed of 8 metres per second (this is the standard approach for turbine noise modelling).

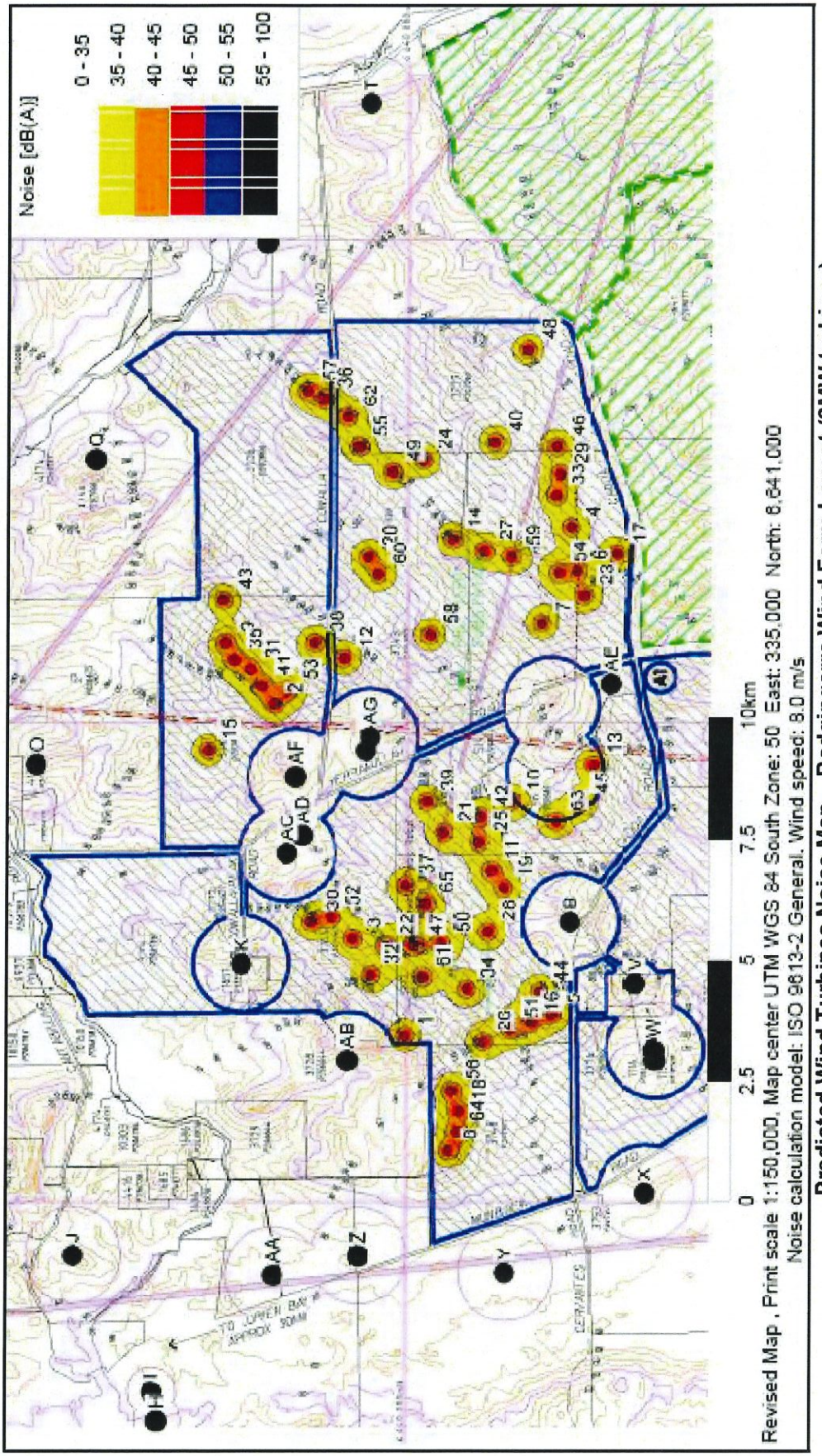


Figure 3: WindPro noise modelling contour plan – Vestas V90 WTG.

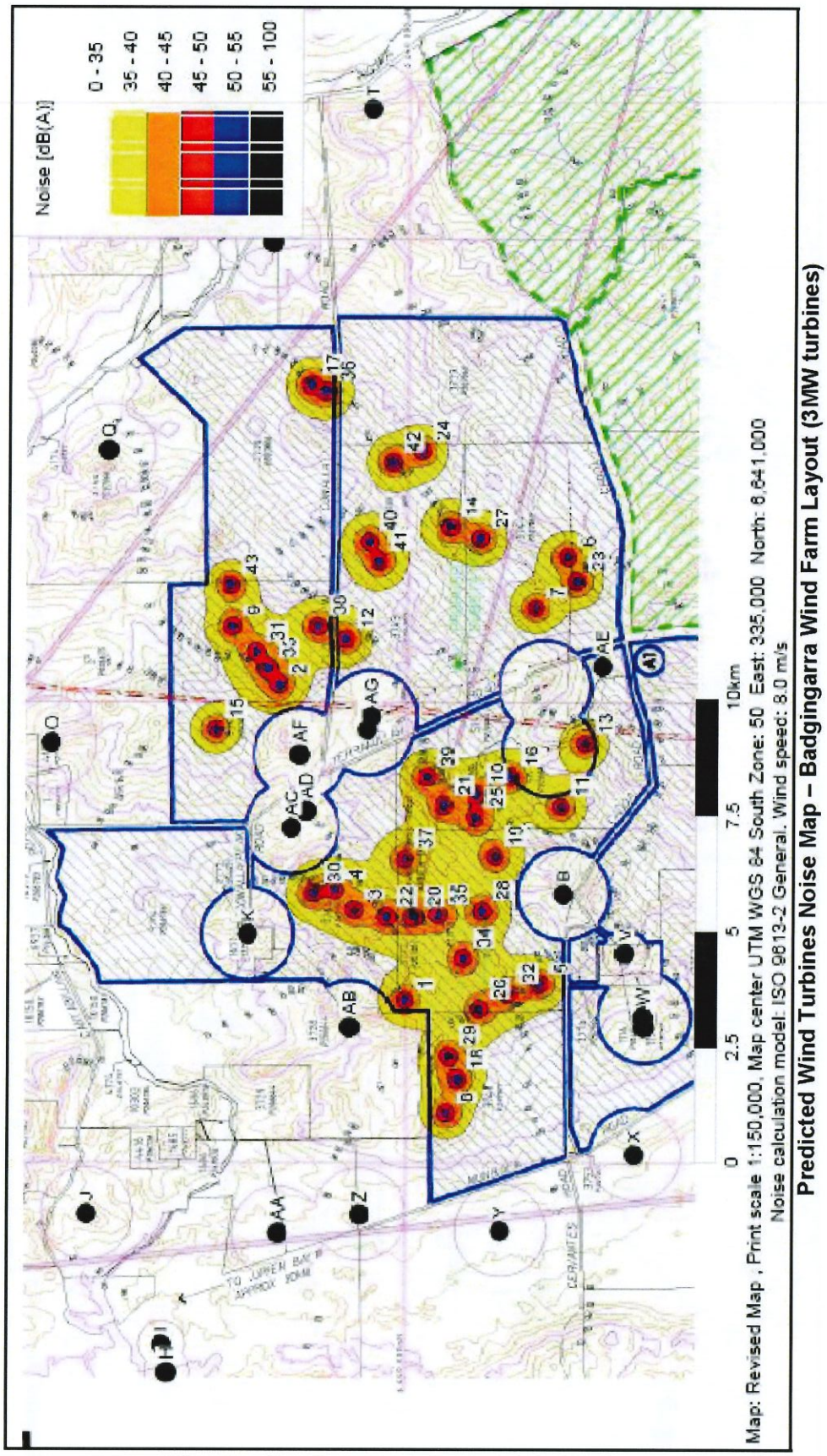


Figure 4: WindPro noise modelling contour plan – RePower MM82 WTG.

The predicted noise levels for the Vestas V90 (3MW) and the RePower MM82 (2MW) WTGs at each dwelling and integer wind speed are tabled below.

Table 7: Predicted noise levels with the Vestas V90 WTG at each dwelling and wind speed

Dwelling		Wind Speed (m/s)								
		4	5	6	7	8	9	10	11	12
A	Denis Murray - Criterion	40	40	40	40	43	46	48	51	52
	Predicted	34.1	33.6	33	32.5	31.9	31.4	30.8	30.3	29.7
B	Sudholz North - Criterion	40	40	40	40	40	42	45	48	52
	Predicted	39.5	39	38.4	37.9	37.3	36.8	36.2	35.7	35.1
C	Deutscher South	House to be relocated to another location								
D	Panizza North	House relocated to another location								
E	Brown South West - Criterion	40	40	43	46	49	52	55	58	61
	Predicted	39.4	38.9	38.3	37.8	37.2	36.7	36	35.6	35
F	Brown North - Criterion	40	40	40	42	45	47	49	51	52
	Predicted	38.9	38.4	37.8	37.3	36.7	36.2	36	35.1	34.5
G	John Murray - Criterion	40	40	40	40	42	46	49	52	54
	Predicted	33.9	33.3	32.8	32.2	31.7	31.1	31	30	29.5
H	Deutscher North - Criterion	40	40	40	40	42	43	45	48	51
	Predicted	36.9	36.4	35.8	35.3	34.7	34.2	34	33.1	32.5
I	Brown South East - Criterion	40	40	40	43	45	47	49	52	55
	Predicted	39.4	38.9	38.3	37.8	37.2	36.7	36	35.6	35

J	Daniel Murray - Criterion	40	40	40	40	40	41	42	44	46
	Predicted	38.9	38.3	37.8	37.2	36.7	36.1	36	35	34.5
K	Sudholz South - Criterion	40	40	40	40	41	43	46	48	51
	Predicted	27.3	26.8	26.2	25.7	25.1	24.6	24	23.5	22.9
L	Teasdale - Criterion	40	40	40	40	40	42	44	45	46
	Predicted	39.1	38.6	38	37.5	36.9	36.4	36	35.3	34.7
M	Panizza South - Criterion	40	40	40	40	42	44	47	49	51
	Predicted	30.3	29.8	29.2	28.7	28.1	27.6	27	26.5	25.9

Table 8 : Predicted noise levels with the RePower MM82 WTG at each dwelling and wind speed

Dwelling		Wind Speed (m/s)								
		4	5	6	7	8	9	10	11	12
A	Denis Murray - Criterion	40	40	40	40	43	46	48	51	52
	Predicted	20.3	26.8	28.8	29.8	30.8	31.3	31.3	31.3	31.3
B	Sudholz North - Criterion	40	40	40	40	40	42	45	48	52
	Predicted	27	33.5	35.5	36.5	37.5	38	38	38	38
C	Deutscher South	House to be relocated to another location								
D	Panizza North	House to be relocated to another location								
E	Brown South West - Criterion	40	40	43	46	49	52	55	58	61
	Predicted	24.6	31.1	33.1	34.1	35.1	35.6	35.6	35.6	35.6
F	Brown North - Criterion	40	40	40	42	45	47	49	51	52
	Predicted	24.4	30.9	32.9	33.9	34.9	35.4	35.4	35.4	35.4

G	John Murray - Criterion	40	40	40	40	42	46	49	52	54
	Predicted	20.1	26.6	28.6	29.5	30.5	31	31	31	31
H	Deutscher North - Criterion	40	40	40	40	42	43	45	48	51
	Predicted	21.9	28.4	30.4	31.4	32.4	32.9	32.9	32.9	32.9
I	Brown South East - Criterion	40	40	40	43	45	47	49	52	55
	Predicted	24.8	31.3	33.3	34.2	35.2	35.7	35.7	35.7	35.7
J	Daniel Murray - Criterion	40	40	40	40	40	41	42	44	46
	Predicted	24.3	30.8	32.8	33.8	34.8	35.3	35.3	35.3	35.3
K	Sudholz South - Criterion	40	40	40	40	41	43	46	48	51
	Predicted	13.4	19.9	21.9	22.9	23.9	24.4	24.4	24.4	24.4
L	Teasdale - Criterion	40	40	40	40	40	42	44	45	46
	Predicted	24	30.5	32.5	33.5	34.5	35	35	35	35
M	Panizza South - Criterion	40	40	40	40	42	44	47	49	51
	Predicted	16.4	23	25	25.9	26.9	27.4	27.4	27.4	27.4

Tables 7 and 8 above demonstrate compliance with the limits defined in **Table 6.** At the reference wind speed of 8 m/s, the highest sound levels calculated for the 3MW layout were at the Sudholz North residence and were predicted to be 39.5 dB(A), which is below the proposed limit of 40 dB(A).

It should be noted the above modelling has been performed to demonstrate that in general terms, the sound levels to be experienced at residences located on the wind farm, and adjacent to the wind farm, will comply with the SA Guidelines.

This modelling exercise is not aimed at taking the place of expert third party modelling as this will be performed after a turbine is selected and a final layout is derived. The SA Guidelines will still define the criteria to be achieved.

5.5 Electro-Magnetic Interference

The Principals commissioned PB Power (PB) to carry out an Electro-Magnetic Interference (EMI) study for the proposed Badgingarra Wind Farm, Western Australia. PB's report is part of a Feasibility Study requested by the Principals and details the assumptions, findings, recommended practices and supporting background information for this EMI study. A copy of the report is included in **Appendix 8.**

Two wind farm layouts were developed by PB designed for a nominal installed capacity of 130MW utilising typical 2MW (RePower MM82) and 3MW (Vestas V90) turbines. The 2MW layout contains 65 turbines, whereas the 3MW layout contains 43 turbines.

The locations of communication services around Badgingarra were obtained from the Australian Communications and Media Authority (ACMA) website. An area within a 25 km radius from the centre of the proposed wind farm was assessed. The towers identified are solely those for which licences are registered with the ACMA, and include land mobile/paging as well as low frequency (LF), medium frequency (MF), and microwave point-to-point or omni-direction services.

As general design practice, PB recommends a minimum exclusion zone of 200-500 m around the telecommunication towers and avoidance of the first Fresnel zone for all radio paths1.

A telecommunication facility (site ID 30746) utilised by Electricity Networks Corporation (Western Power) is located within the proposed wind farm site. The nearest turbine from the 2MW layout is 506 m from this telecommunication facility, with the nearest turbine from the 3MW layout being at a distance of 531 m (i.e. both layouts have turbines further than the recommended 500 m from the nearest facility).

None of the turbines in either layout lie within the first Fresnel zone of any beam associated with this tower, with the nearest turbine base in the 2MW and 3MW layouts being 82 m and 85 m from the Fresnel zone, respectively.

The Fresnel zone is calculated relative to the frequency of the signal and distance from the transmitting tower.

Western Power has been contacted in regards to this tower and advised they do not have any setback requirements from their towers, but rather they are interested in ensuring the continued integrity of all radio communications. It is recommended that the Principals work with Western Power throughout development to ensure any services utilising this tower are unaffected both by the proximity of the turbines to the telecommunications tower, and the proximity of one of the turbines in each proposed layout to the first Fresnel zone.

To PB's knowledge the abovementioned design setbacks have been imposed on the design and construction of at least one major wind farm in the southern hemisphere (Tararua wind farm in New Zealand), and originate from overseas practices.

Outside the site, the nearest telecommunication facility to the wind farm is Shire Site High Hill Farm (site ID 30750), situated at a distance of approximately 4.6 km from the nearest turbine.

Potential direct line of sight issues for television signals were identified and PB expect an on-site signal interference study, relating to proof of television signals pre and post construction, may be required – unless consultation with stakeholders confirms there should be no problems expected due to the relative locations of signal transmitters, the wind farm and residences.

The nearest licensed airports (Cervantes and Jurien Bay, both approximately 18 km from the proposed site) are outside the Civil Aviation Safety Authority (CASA) 15 km distance requirement for advising new structures.

PB's recommendations as set out in their report can be summarised as follows:

1. *Do not locate a WTG within the first Fresnel zone of a fixed radio beam.*

Note: None of the proposed wind turbine locations are within the first Fresnel zone of any nearby telecommunication beams.

2. *Specify special conditions on encroachment during construction and maintenance if a WTG is required near the first Fresnel zone of a fixed telecommunication beam.*

Note: Based on the existing wind farm layout, further design work is required at Badgingarra at this time (the first Fresnel zone of a beam on site may be encroached during construction hence measures may need to be put in place

during construction and major maintenance to avoid interruption to this telecommunication beam).

3. *Do not encroach within the near field of a microwave antenna. This region extends out to 100m at 1800 MHz.*

Note: This recommendation has been adhered to in the layouts design using available information about such antennas in the area.

4. *Do not obstruct the line of sight between a Land Mobile base and a built up area served by that base station.*

Note 1: Based on the current knowledge of the site, PB has not identified any major area of concern. Formal consultation is required.

5. *Do not obstruct the line of sight between a Television broadcast station and a built up area within 3 km of the WTG.*

Note: Based on the current knowledge of the site, PB has identified a potential area of concern for dwellings to the northwest of the proposed wind farm, however not all dwelling coordinates have been supplied and formal consultation is required (with the ACWA) to determine the source of the television reception at dwellings in this region.

6. *Undertake additional analysis to determine the possibility of reflection or scattering effects if a WTG has a significant flat metal surface.*

Note: As the proposed WTG type has no significant flat metal surfaces, reflection or scattering effects are unlikely.

5.6 Waste Management

Existing environment

Current waste disposal issues in the project areas are associated with the ongoing use of the land for agricultural or rural residential purposes.

Impact of the proposal

Development of the wind farm will involve the establishment of temporary construction sites to accommodate the equipment, components, lay-down areas, ablution facilities and personnel required.

During construction and operation, the sites will be closely managed to avoid adverse impacts from solid or hazardous wastes. This will include:

- The use of recyclable materials where possible;
- Provision of on-site waste collection bins;
- Separate storage and disposal of regulated and hazardous wastes;
- Waste minimisation and management training to all site employees; and
- Regular removal of all waste construction material from the site on completion.

5.7 Shadow Flicker

The Principals commissioned PB to carry out a wind turbine shadow flicker study for the proposed Badgingarra Wind Farm, Western Australia. PB's work is part of the Feasibility Study undertaken by the Principals. The report details the assumptions, findings, recommended practices and supporting background information for this study. A copy of the report is included in **Appendix 9.**

Two wind farm layouts were developed by PB and designed for a nominal installed capacity of 130MW utilising typical 2MW (RePower MM82) and 3MW (Vestas V90) turbines. The 2MW layout contains 65 turbines, whereas the 3MW layout contains 43 turbines.

Shadow flicker is a regular fluctuation of light levels caused when the shadow of a rotating wind turbine is passing over a particular location. The main situation in which the effect can be noticed is when the shadow is passing over the window of a building, causing a fluctuation in light levels inside the building. This may be unpleasant for the occupants of the building. The effect may be noticeable in open spaces, particularly when close to a turbine, but to a much lesser extent due to the higher levels of indirect light. Another potential effect that is researched and commented herein is that of high frequency stroboscopic light potentially setting off epileptic seizures.

The potential occurrence of shadow flicker can be predicted for specified locations, based on the turbine locations, terrain, and the known path of the sun through the sky. The theoretical (worst case) amount of shadow flicker occurrences was calculated for all dwelling locations provided by the Principals, and realistic occurrences were assessed for the dwellings that had the greatest theoretical occurrences.

The theoretical assessment provides information on the potential effects, which is quantified in terms of total annual duration of shadow flicker, the maximum duration in a single day, and distances to turbines. The realistic occurrences are determined by taking into account the amount of time the sun is hidden by clouds, the turbine orientations, and the nature, use, screening, and geometry of the dwellings.

The Sustainable Energy Authority Victoria (SEAV)2 guideline of 30 hours per year for realistic shadow flicker experienced at each dwelling has been widely used in Australia and is employed in this assessment.

All dwellings experience a maximum theoretical shadow flicker of less than 30 hours per year. These dwellings are owned by landowners that are either involved in the wind farm or are the neighbouring landowners. Since the maximum theoretical shadow flicker hours for all dwellings are calculated to be well below the 30 hours per year limit, the realistic shadow flicker hours are not calculated for this study. The realistic occurrences are expected to be much less than the theoretical values.

5.8 Aboriginal Heritage and Post Contact Cultural Heritage

Biosis Research Pty Ltd (Natural and Cultural Heritage Consultants) was commissioned to undertake a two stage cultural heritage assessment for a proposed Wind Farm at Badgingarra, Western Australia. The first stage, already completed, was a heritage desktop assessment (Biosis Research 2007) and is included in Appendix 10. The second, and current stage, is a broad area survey, aimed at identifying landforms of potential archaeological sensitivity to assist in sensitive design of the Wind Farm to avoid impacting on cultural heritage sites. This report can be found in **Appendix 11**. They were also commissioned to undertake an Ethnographic Survey which is included in **Appendix 12**.

The aim of the cultural heritage desktop study was to research known Indigenous and post-contact historical archaeological sites and places and to predict the likelihood of other, as yet unrecorded sites and places in the study area. As a result of the desktop study, no registered Aboriginal archaeological sites were identified in the study area.

However, as yet unrecorded sites were expected to be present in the study area in association with particular landforms, namely springs, the banks of waterways and many ephemeral drainage channels, the uppermost sand deposits within the dunes, hard pan surfaces between the dunes (dune deflations) and prominent hills or escarpments similar to Table Hill, Cowalla Peak and High Hill indicated on topographic mapping.

Correspondingly, there were no recorded historical sites listed for the study area, though the background research indicated that there may be some limited

evidence pertaining to the occasional use by people post-1840s settlement of the region, such as stock tracks. It was more likely however that historical sites will relate to the 1950s settlement of the study area, in the form of existing sheds, homesteads and stations, associated farming structures and features such as outbuildings, rubbish dumps, windmills and sheep-dips. These settlement features are likely to be located within the 1000 metre residence buffer nominated by Stanwell.

A major recommendation of the desktop assessment was that a survey be conducted of the study area to test and refine the site prediction model with the purpose of more specifically identifying landforms of archaeological sensitivity.

The Biosis Research Report contains the results of the field survey which is summarised in this Application.

The Indigenous site research is conducted within the context of the State *Aboriginal Heritage Act 1972*, and seeks to provide the proponents with advice on how to mitigate against impacts on Indigenous sites, and their obligations under the Act, particularly Section 18 which deals with activities that may disturb Aboriginal heritage sites. The project has also been carried out in accordance with the *Heritage Act of Western Australia Act, 1990.*

5.8.1 Results – Aboriginal Heritage

5.8.1.1 Archaeological Sites

Two Aboriginal Archaeological sites (BWF1 and BWF2) were recorded within the study area.

5.8.1.2 Areas of Potential Archaeological Sensitivity

Areas of potential archaeological sensitivity within the study area include recorded sites BWF1 and BWF2, catchments, creeks springs, soaks and rivers within a buffer of 250m and areas of partially disturbed or undisturbed escarpments within a buffer of 100m (see Figure 4 of Biosis Report in Appendix 10).

BWF 1

BWF1 comprised a quartz artefact scatter on the northern face of an eroding lateritic gravel escarpment 1 kilometre east of Cowalla Peak. A white quartz scraper tool was recorded on the northern slope approximately 25 metres from the highest escarpment point. Three small

quartz flakes were recorded 20 metres higher up on the same face of the gravel escarpment slope.

This site is moderately significant given the records of previously recorded sites within the region (see Figure 3). The location of this quartz scatter within an eroding natural escarpment east of Cowalla Peak is moderately significant on the basis that the Aboriginal use of the site was more likely to have been incidental for resource gathering or as a view shed over the surrounding landscape rather than for temporary camping. A possible association between the flakes higher up on the eroding slope and the tool further down suggests a discrete knapping event or series of short-term occupation events.

BWF 2

BWF2 was a single grey quartz notched tool occurrence recorded in a disturbed context 1 kilometre west of BWF1. The Aboriginal artefact was located in dune sand which had been disturbed by a bulldozer in the making of a temporary or incomplete dam. The disturbed artefact was situated within a hundred metres south of an unnamed ephemeral drainage line from an upper tributary of Hill River catchment south-west of Cowalla Peak (Figure 4 of Biosis Report in Appendix 10).

Site BWF2 is moderately significant in that it potentially indicates the location of a potential campsite in a lower-lying catchment landform within the study area and in proximity to Cowalla Peak a notable landform.

The following summary of significance has been based on the results of the archaeological survey, an understanding of regional Aboriginal sites patterning, and from comment and input from the relevant Aboriginal groups.

Community or Cultural Value	Archaeological or Scientific Value
BWF Site 1: Moderate	Moderate
BWF Site 2: Moderate	Moderate

5.8.1.3 Potential Impacts

It should be noted that potential impacts can only be discussed in broad terms as the proponents have yet to develop a preferred, detailed design for turbines and associated infrastructure.

5.8.2 Results – Historical Archaeological Sites

5.9.2.1 Archaeological Sites

No historic archaeological sites were recorded within the study area. As identified property residences with 500m and 1000m WTG restriction boundaries were excluded from the study area these areas were not assessed.

5.8.2.2 Areas of Potential Archaeological Sensitivity

There may be evidence still pertaining to the occasional use by people post 1840s settlement of the region, however this will likely be poorly preserved and in the form of stock tracks used to transport wool to Jurien Bay.

The 1950s settlement of the study area is represented in the existing homesteads and stations in the study area. Post war settlement resulted in the construction of tin sheds first used by the settlers followed by more permanent homesteads built later in the 1950s. Associated farming structures and features such as outbuildings, concrete water tanks, rubbish dumps, windmills, stock fences and sheep-dips will also be present. Any such buildings will be unlikely to pre-date the 1950s, and will reflect the movement of people into lands formerly considered infertile.

5.8.2.3 Potential Impacts

The Badgingarra study area has some, limited potential to impact on historical sites and places. No historical built features or archaeological sites have been identified in the study area. Historical features associated with early settlement are expected to be very limited in the study area due to its late development (1950s). Occupation from this period will be in the form of existing homesteads and stations, which will not be impacted by the proposed Wind Farm based on the minimum set-back from dwellings of 1000 metres nominated by the proponents.

5.8.3 Management Recommendations

1. Avoid impacting on BWF Sites 1 and 2. Design the proposed wind farm layout to avoid any impact on these sites, and minimise the disturbance risk at these locations during construction.

2. Design the proposed wind farm infrastructure to minimise disturbance wherever possible across landforms of potential archaeological sensitivity – near catchments, creeks springs, soaks, rivers, prominent undisturbed escarpments and within a buffer of at least 250 metres from these areas (see Figure 4 of Biosis Report in Appendix 10 for buffered areas of archaeological potential). Where possible avoid placing turbines and associated infrastructure including tracks within these locations.

3. Incorporate proposed tracks and services within current farm disturbances such as existing farm tracks and ground disturbances wherever possible.

4. Conduct further, detailed survey in areas of the study area not previously surveyed, if these areas are likely to be impacted by turbines/infrastructure and if they have been identified as potentially sensitive for archaeological sites (see Figure 4 of Biosis Report in Appendix 10).

5. Include a cultural heritage interpretation panel within the display in the current Emu Downs Wind Farm car park, involving the Yued in its development and construction.

6. The Cadda Downs camp (west of Cadda Springs, which is outside the current study area; see Figure 4) has been identified as a likely camping location and listed as an ethnographic site on the Department of Indigenous Affairs (DIA) Site Register. Should the currently excluded property and Cadda Spring east of the recorded Cadda Downs Camp be included within the proposed wind farm layout in the future, it is recommended that an archaeological survey of Cadda Spring and surrounding landforms be undertaken.

7. Conduct further consultation with the Yued during all phases of the project.

8. Monitoring of ground disturbance during construction is a likely follow on from any further survey, in areas of potential sensitivity.

5.8.4 Results – Post Contact Cultural Heritage

A series of databases and information sources were accessed to determine whether any recorded sites were listed for the study area for the purposes of the desktop report. These comprised:

- WAHC State Site Register
- Shire of Dandaragan Municipal Inventory of Heritage Places
- Australian Heritage Commission (Register of the National Estate)
- Commonwealth Heritage List, National Heritage List and World Heritage List
- National Trust

The relevant 1:100 000 topographic map (Hill River #1937) was also inspected. The Shire of Dandaragan's Municipal Inventory was inspected at the Heritage Council of Western Australia (HCWA) with the assistance of the HWCA's of George Pappas and Vicky Thomas on 4 April 2007.

The purpose of the historical research was to identify the post-contact history of, and potential for heritage places within, the study area. This was done by examining available heritage databases, local historical texts and historical maps and plans.

5.8.4.1 Recorded Heritage Places in the Region

There are no recorded sites listed for the study area on any Commonwealth or State heritage databases. The following section examines the relevant databases and discusses those sites closest to the study area, with the aim of characterising the regional heritage and providing a framework to assist with determining a site prediction model for the study area.

5.8.4.2 State Heritage Register (SHR)

Only one place is listed within the Shire that is classified as being of State significance – the Mogumber (Moore River) Mission and cemetery. The mission is the site of buildings, structures, a gazetted cemetery and camping places relating to the Moore River Native Settlement (1917-1951), which then became the Mogumber Methodist Mission (1951-1967). The mission was one of the major settlements in the State for the enforced relocation of Aboriginal children under the *Aborigines Act 1905* from 1915-1951.

A further two places are currently being assessed against the HCWA State Heritage Register criteria. These are the Yathroo Homestead and Outbuildings on Dandaragan Road, and the Kayanaba Homestead Group on Kayanaba Road. The Yathroo buildings include a homestead, book keeper's house, cool room, machinery and storage shed, barn, stables, slaughterhouse, stone walls, flour mill site and lime kiln, which were constructed from 1855.

The Kayanaba Homestead group (#5806) is also a collection of buildings of pastoral function, with a manager's house built in 1882, a work men's hut, school room, slaughterhouse, various farm sheds of stone, cottages, a lime kiln and interestingly, the ruins of a small timber grand stand where the annual horse race was held.

None of these places nominated or listed on the SHR are in the current study area.

5.8.4.2 Shire of Dandaragan Municipal Inventory (MI)

A large number of places (over 50) are listed on the Shire of Dandaragan's Municipal Inventory (MI), all of which have heritage significance. The sites cover a variety of eras and types, ranging from significant community buildings (churches, schools, post and telegraph office, halls etc), sites associated with early pastoral settlement and expansion (homesteads and associated outbuildings), pastoral features (cattle yards and stock routes), early industry (mine sites, processing sites) and other notable natural and built features. **None of the listed MI sites are found in the current study area.**

5.8.4.3 Register of the National Estate

There are no recorded sites listed for the study area on the Register of the National Estate (RNE).

The closest RNE sites is the Badginagarra National Park, which is listed as being a significant location for wildflowers, including many rare plant species such as excellent populations of black kangaroo paw.

5.8.4.4 National Trust (WA) Register

There are no places listed by the National Trust in the study area. A search of the Heritage Council of Western Australia's Register was carried out, as

this lists the Heritage Register, as well as other heritage lists including those on the National Trust Register.

5.8.4.5 Historical Archaeological Site Prediction Model

Examination of the relevant topographic maps, local histories and the desktop historical research during the desktop report (Biosis Research Pty. Ltd.: 2007) indicates that there are no recorded historical features present in the study area, but that unrecorded built features may be present.

Such sites are likely to relate to two periods in the history of the study area; the pre-1950s early settlement period, and the post-1950s period of agricultural expansion.

Any sites associated with the early, post 1840s settlement of the region are likely to be very scarce, as although the Hill River area at Badgingarra (northern section of the study area) was initially surveyed in the 1880s and the first freehold land purchased by William McNamara in 1895, it remained largely isolated and undeveloped. During this time there were very few improvements to the region, and the most likely heritage sites or places might include early stock routes or tracks, used from shepherds taking their wool to Jurien Bay for loading on the clippers bound for England (BAC 1998: 11). Apparently a stock track ran along the Hill River that may encroach into the study area. However if present there would be little evidence of it today.

The second phase of occupation relates to the post-1950s when parcels of land around Badgingarra were offered for sale, firstly in September 1952 when the then Midland Railway Company auctioned some 24,000 acres, and then by the Lands Department who made further releases in subsequent years. It was during the 1950s that large tracts of the sand plains region were first held in private hands. The settlement of the study area will likely include the tin sheds first used by the settlers, followed by homesteads built later in the 1950s. Associated farming structures and features such as out-buildings, rubbish dumps, windmills, sheep-dips etc will also be present. Any such buildings will be unlikely to pre-propose the 1950s, and will reflect the movement of people into lands formerly considered infertile.

Collectively the homesteads are likely to have local significance for their association with early pioneers, and the opening up of, the sand plain country.

5.8.5 Ethnographic Survey

In May 2007, an ethnographic site survey for Aboriginal heritage was carried out at the designated survey area of a proposed wind farm north of Bibby Road, approximately 7 kms due west of Badgingarra.

The survey was commissioned by Enthalpy Pty. Ltd. on behalf of Stanwell Corporation Limited and Griffin Windfarm 2 Pty. Ltd. in order to progress the Badgingarra Wind Farm Project in compliance with the requirements of the W.A. *Aboriginal Heritage Act* 1972.

Background research at the Heritage and Culture Division, Department of Indigenous Affairs, established that no registered Aboriginal heritage sites are located within the designated survey areas.

The survey was conducted by Bob Chown on 19 May 2007 in the company of Matt Schlitz (Archaeologist, Biosis Research), with Aboriginal spokespersons who are knowledgeable of the heritage of the area and who represent the Yued Native Title Claimant (NTC) group (WC97/71). The six representatives of Yued NTC group who participated were: Fred Mogridge, Charlie Shaw, Colin Headland, Mal Ryder, Dolores Flowers and Dorinda Barron. Brendan Moore (Field Officer) of the South West Aboriginal Land & Sea Council (Yued's representative body) also attended the survey.

During the survey one previously unrecorded site of cultural significance ('Cadda Downs Camp') was reported by the Aboriginal spokespersons within the designated survey areas.

The report makes a number of recommendations for the protection of Aboriginal heritage values in the survey area as follows:

The recommendations are based on research of registered sites and previous studies and surveys in the region, on consultations with recognised Indigenous heritage spokespersons and on the findings of a comprehensive survey.

1. That the proponents erect a public sign or plaque at the site of the current Emu Downs Wind Farm car park which recognizes the traditional owners of the land and their culture. Charlie Shaw agreed to be the contact for the group who would decide on the wording for the sign and requested that the developer contact him at the appropriate time.

2. That the proponents should avoid all creeks and waterways when locating the turbines.

3. That the proponents extend an opportunity to Yued spokespersons to undertake a visit to the location of Cadda Spring at some future unspecified time when permission from the private owners is obtained for access onto the property.

4. That the site identified by the Yued Spokespersons during the course of this survey be registered at the DIA Sites Registry, with the name 'Cadda Downs Camp'.

5. That the proponents should avoid the newly reported site referred to as 'Cadda Downs Camp' when locating the turbines.

6. That the proponents should to take adequate measures to inform all personnel and contractors of their responsibilities and obligations to protect Aboriginal heritage sites under the W.A. *Aboriginal Heritage Act* 1972.

5.8.6 Report Distribution

The Biosis Research Pty Ltd Reports have been distributed to:

- Proponents - Stanwell Corporation Limited, Griffin Wind Farm 2 Pty Ltd.
- Enthalpy Pty. Ltd (Pre-Feasibility Study Manager)
- Worley Parsons Komex (Environmental Manager for Pre-Feasibility Study)
- Yued Native Title Working Group
- South West Aboriginal Land and Sea Council
- Department of Indigenous Affairs
- Heritage Council of Western Australia

It is noted that Archaeological reports and the management recommendations contained therein are independent of the DIA, the relevant Aboriginal communities and Heritage Council of WA (HCWA).

Although the findings of a consultant's report will be taken into consideration, recommendations in relation to managing heritage place should not be taken to imply automatic approval of those actions by DIA, the Aboriginal communities or HCWA.

Further consultation will take place through the processing of the Development Application and referral to various agencies.

5.9 Traffic and Transport

5.9.1 Existing Environment

The proposed site is accessible from Yerramullah Road, Cadda Road, Cowalla Road, Cowalla Peak Road and Bibby Road. All roads are unsealed gravel local roads apart from Bibby Road.

Bibby Road comes under the jurisdiction of Main Roads Western Australia whilst maintenance of the unsealed gravel roads is the responsibility of the Shire of Dandaragan.

The main access to the site is proposed to be from Yerramullah Road at a point approx. 3kms north of the intersection with Cadda Road. The majority of deliveries are expected to travel from the Brand Highway onto Cadda Road, turn right into Yerramullah Road and right onto the site.

The main arterial road connecting Perth to the towns further north of the site is the Brand Highway. The Brand Highway is a major road currently utilised by heavy haulage vehicles servicing the mining, oil and gas industries.

A "Report on Road Condition for Badgingarra Wind Farm" has been prepared by Rural Road Services and is included in **Appendix 13.**

5.9.2 Construction

Construction of the wind farm will require transportation of both imported and locally produced components. The number and type of loads required are

dependent on a number of factors and will only be confirmed once the manufacturer and model of WTG have been selected.

The Proponents propose to utilise existing roads and create on-site access roads. All on-site access roads will be constructed to a suitable standard catering for the requirements of all delivery and construction vehicles.

Transportation of large equipment to site will involve traffic escorts. Imported equipment will arrive at the ports of Geraldton and Fremantle. Because equipment and components will arrive in shipments, deliveries to site will also occur in concentrated "bursts".

The intersection of Cadda Road and the Brand Highway is suitable to allow access for long vehicles in its present state. Cadda Road has been identified as a road train route by Main Roads W.A.

Cowalla Road will not be used to traffic large vehicles as the pavement is not considered adequate and would break up on a regular basis if traffic volumes were to increase dramatically.

The Report from Rural Road Services in **Appendix 13** addresses a range of topics for consideration and implementation by the Shire of Dandaragan, Main Roads W.A. and the Proponents.

Based on the Vestas V90 WTG, significant deliveries of plant and materials include:

- An estimated 17,000 m^3 of concrete for the footings. Deliveries of raw materials to the temporary concrete batching plant will involve a range of tip trucks, semi-trailers, bulk tankers, and B-doubles transporting cement, aggregate, and sand.
- A substation comprising a switchyard and control room will be located on the site. Prefabricated buildings, transformers, high voltage electrical cables and other electrical equipment will all be delivered on low-loaders and semi trailers.
- Sand and gravel for site roads and electrical trenches may be sourced from neighbouring properties.
- Each tower and turbine installation will require:
    - four truck movements for the tower sections (total weight 160t)
    - one truck movement per two embedded sleeves

- three truck movements for the blades (44m long)
- one truck movement for the nacelle (70t)
- one truck movement for the rotor (41t)
- one truck movement for the steel reinforcement for each two footings
- One-off movements for the construction period include:
- The transportation of site cranes involving one 650T crawler crane, one 250T crawler crane, three 100T hydraulic cranes plus a range of rough terrain cranes and personnel vehicles to support the cranes.

Other ancillary deliveries for construction infrastructure e.g. tool stores, miscellaneous equipment, and site office and storage shed construction will occur throughout the project.

It should be noted these figures are only estimates and will depend on the manufacturer, the model of WTG selected, and the source of the components or equipment.

A Traffic Management Plan will be prepared by the WTG supplier prior to construction covering the specific traffic and transport details for the project.

5.9.3 Operation

Wind Farm Operation and Maintenance Traffic

During the operational phase, it is envisaged that only limited vehicle movements will be required and most maintenance activities would be performed by conventional maintenance vehicles (light 4wd).

Tourism and Visitation Traffic

The Visitors Viewing Area at the Emu Downs Wind Farm will remain the main source of information about both wind farms. The Proponents propose that no new signage is erected directing traffic towards the new wind farm site.

The Proponents do not propose to actively market this facility to tourism as the Emu Downs Wind Farm has adequate display facilities and car parking.

6.0 ENVIRONMENTAL MANAGEMENT

6.1 Introduction

6.2 The Proponents Approach to Environmental Management

Griffin Energy is focused on becoming a leading power supplier in the Western Australian energy market by providing a reliable, competitive and sustainable electricity source from a balanced blend of coal fired, gas and renewable energy assets and technologies. As part of The Griffin Group, Griffin Energy recognises that excellence in environmental performance is critical to our business success.

Where possible we aim to capitalise on the opportunities that arise in the conduct of our business to provide an overall environmental benefit within our community.

We are committed to ensuring our activities are ecologically sustainable through the efficient use of natural resources and the minimisation of waste and pollution. We also strive to reduce our environmental footprint though the adoption of innovative technologies and management programmes.

Appropriate management systems will be in place to identify, evaluate and mitigate impacts of developments and ongoing operations. Our environmental initiatives will be properly resourced and supported by training and awareness programmes to enable the maintenance of required environmental standards and the achievement of objectives and improvement targets.

Griffin will comply with all applicable statutes and regulations and commit to implementing environmental best practice on an ongoing basis.

6.3 Environmental Management System Development

For generation assets being established or operated at host sites there is an expectation that the design, construction and operation of that site will also comply with the proponents Environmental Management System (EMS) framework. This is achieved through four general steps:

- During the Feasibility Study phase an Environmental Assessment is undertaken by the proponents and/or industry consultant. Significant risk issues are identified according to the proponents' risk management framework;

- Contract negotiation includes a specific proponent designed EMS requirement clause;
- Continuous Environmental Performance Assessment during construction and final commissioning with submission of Detailed Control Plans or Environmental Management Plans in accordance with the contract and/or permit conditions; and
- During operation, implementation of an EMS framework which monitors operational performance and identifies new risks.

The following actions are considered part of the operation and construction of the EMS:

- Accurate and correct compliance with environmental laws and regulations and a contribution to a strategic endeavour for the control of nationwide environmental problems e.g. by making environmental covenants;
- All employees undertake environmental awareness training;
- Integrate environmental protective measures in day-to-day activities and facility procedures;
- Develop programs to check compliance with the EMP or EMS;
- Prevent or limit the generation and accumulation of waste; and
- Keep abreast of social and technological developments.
- Keep abreast of social and technological developments.

6.4 Risk Management

The Proponents will undertake a number of risk management measures to ensure the development and operation of the wind farm does not result in any unacceptable environmental impacts. The potential risk level as defined is a function of consequence and likelihood when there are no operational controls in place as defined in **Table 9**.

Table 9: Risk Classification Table

Likelihood	Consequence				Risk Ranking
	Moderate	Severe	Major	Catastrophic	VH = Very High Risk
Certain	S	H	VH	VH	H = High Risk
Likely	M	S	H	VH	S = Significant Risk
Possible	L	M	S	H	M = Moderate Risk
Rare	L	L	M	S	L = Low Risk

Potential issues typically relevant to the development of a wind farm are listed in **Table 10** while the controls associated with these issues are summarised in **Table 11**. Note these tables are preliminary only and will be further developed in conjunction with the selected contractor for the design, supply and construction of the wind farm.

Typically, Environmental Management Plans (EMPs) will be developed for those issues having a risk rating of significant or above – refer **Figure 5.**

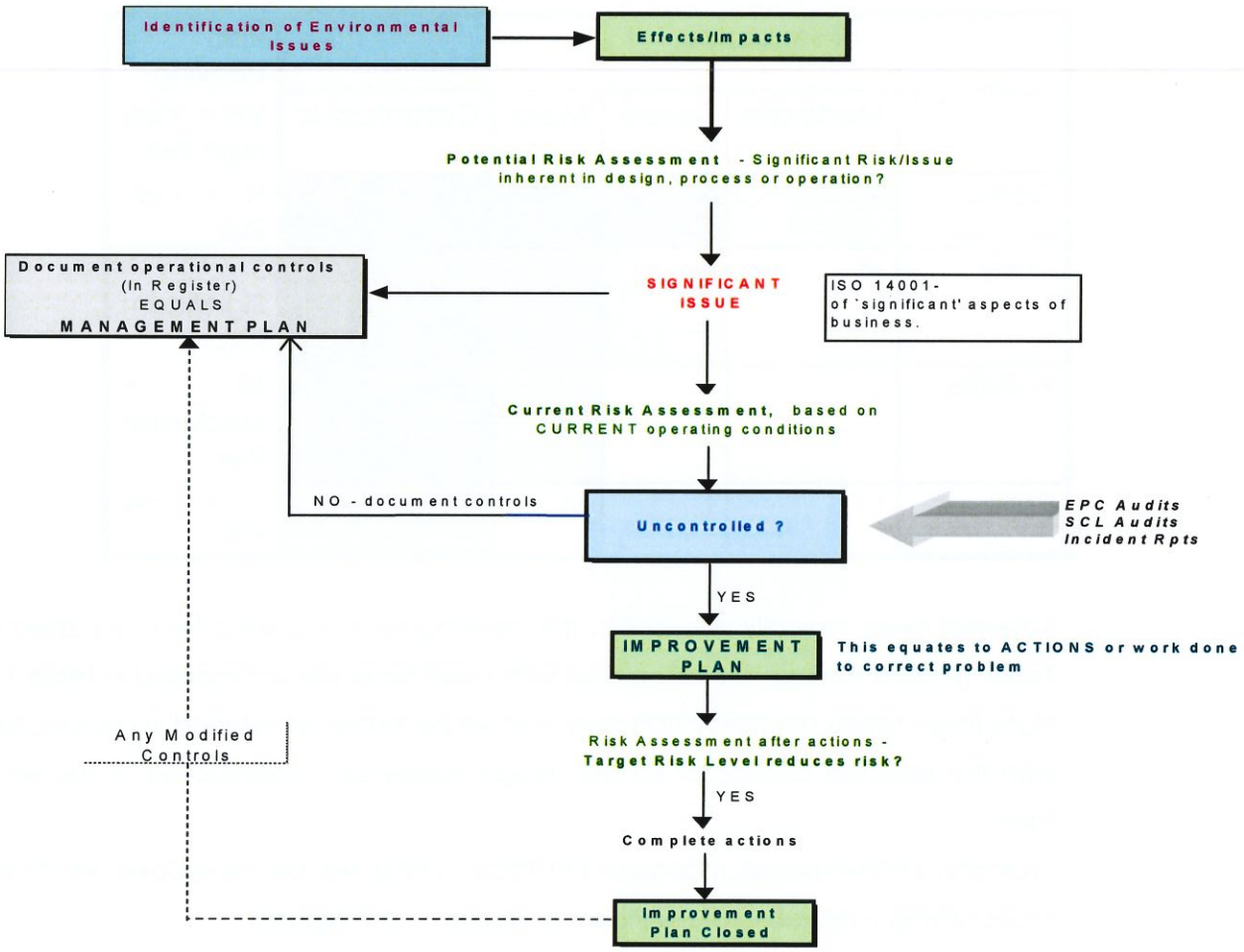


Figure 5: Overview of Proponents' Risk Management Process

6.5 Construction Environmental Management Plan

As a result of the tendering process for the supply of turbines, the Proponents will select an EPC Contractor (Engineer, Procure and Construct) for the development of the wind farm. The contractor will be responsible for all facets of the site design in consideration of the Proponents requirements.

The EPC Contractor will be required to develop an Environmental Management System (EMS) for the construction of the wind farm in-line with requirements outlined in the site specification documentation provided to the EPC Contractor during the tendering phase.

The contractor will be required to submit the EMS to the Proponents for approval prior to the commencement of any construction, the EMS will include the following:

- Identification of all environmental issues with respect to the construction of the wind farm;
- Risk assessment of all environmental issues associated with the development;
- Development of control information for all issues; and
- Development of Environmental Management Plans (EMPs). The requirement for specific EMPs will be determined by:

    - An issue having pre-control risk rating of "significant" or above,
    - Development Permit Conditions,
    - Licence conditions,
    - Regulation.

Other elements of the EMS will include:

- The Contractors Environmental Policy,
- Responsibility Matrix (including subcontractors),
- General statutory requirements of the local, state and federal governments applicable,
- Incident and complaint management including example forms and procedure,
- Site Induction Program including Emu Downs Access Protocols; and
- An agreed audit program.

The EPC contractor will be supplied with preliminary issues and control information already developed by the Proponents. A preliminary overview of the controls for issue management is provided in the next section.

6.6 Environmental Issues and Controls Summary

This section presents a summary of the environmental and social factors relevant to the project and how the Proponents intend to manage and minimise the impacts on the environment.

Table 10 identifies the issues relevant to this project, describes the issue and potential impacts and makes reference to the section in **Table 11** that describes the control measures that will be adopted to minimise the impact.

Risk assessment will be conducted for the issues and Environmental Management Plans will be produced for issues with a significant risk rating or above or as per regulator requirements. These control measures will form the basis of the site Environmental Management System to be developed for the site prior to construction.

Environmental Management

Table 10

Construction Phase

Issue	Description of Issue	Potential Impact of Issue	Control refer to Table 11
Erosion / water-way contamination	Access track, hard-stand and other disturbed areas will need to be rehabilitated to prevent future erosion.	Run-off from construction site activities and track construction, carrying sediment into water-courses.	B
Dust	Dust arising from exposed surfaces due to traffic or erosion for construction spoil heaps etc.	Annoyance for residents, smothering of vegetation (reduced growth rate +/- less palatability for fauna).	B
Visual Amenity	During construction heavy vehicles and cranes will be on site and will be visible to landowners and the public.	Possible objection to the intrusion into the visible skyline by construction equipment (cranes). This is a temporary impact.	A
Noise	Site works noise during the construction phase will be caused by foundation excavations, movement of earthmoving and construction site vehicles and vehicles used to deliver equipment to the site.	Local persons may take issue with vehicular traffic volumes and construction site activities that may cause some temporary loss of noise amenity.	C
Fauna & Flora	Disturbance of flora and fauna due to construction	Damage to vegetation, importation of weeds species,	E

Environmental Management

Table 10

Construction Phase

Issue	Description of Issue	Potential Impact of Issue	Control refer to Table 11
	of the wind farm.	disturbance to stock.	
Transport	Heavy vehicle traffic will increase on local roads in association with the movement of construction vehicles.	Increased traffic noise, minor inconvenience to traffic flows.	C
Cultural Heritage	Presence of artefacts of cultural significance.	Any disturbance by works which may damage archaeologically significant items.	D
Waste Management	Need to minimise wastes, and recycle where possible. Wastes include: packaging, metal, ablution waste.	Visual degradation of the site due to accumulation of waste materials, contamination of site, Impact upon stock.	F
Chemicals, Oils & Lubricants	Possible release to waterways or land.	Contravenes legislation and may cause environmental harm.	G
Fire	With construction activities, there is an increased risk of grass fires.	A grass fire may damage property and cause harm to the environment.	I

Operational Phase			
Issue	Description of Issue	Potential Impact of Issue	Control refer to Table 11
Visual impact	Completed structures can visually impact on the land-form and rural scenery.	Visual amenity of area compromised and subsequent impact on tourism. Amenity impact on neighbours.	A
Shadows and shadow flicker	Shadows cast from the turbine and its blades.	The shadow may pass over the top of a property during early morning and late afternoon and cause annoyance.	K
Fauna	The possibility exists that birds and bats may be injured or killed by collisions with the wind turbine tower or rotor blades.	Increased bird mortality as a direct effect of the operation of the wind farm.	E,J
Noise	Noise from rotor blades.	May disturb nearby residents and result in complaints.	C
Noise	Localised increase due to tourist traffic in the wind farm vicinity.	More local noise.	C
Electromagnetic Interference	The towers may result in electromagnetic interference.	The wind turbines and the towers have the potential to cause degradation in signal quality received at some locations.	L
Chemicals, Oils	Spillage of lubricants from turbines, particularly	Contravenes legislation and may cause Environmental	F,G, H

Operational Phase			
Issue	Description of Issue	Potential Impact of Issue	Control refer to Table 11
& Lubricants	during maintenance Possible release to waterways or land. Inappropriate storage.	harm.	

Table 11 Environmental Management System -Controls List For the Proposal

Note: All of these controls will be covered in the Site Environmental Management Plan to be developed in conjunction with the contractor developing the site.

Ref	Control	General Control Practices to be Applied to Site
A.	**Visual Amenity**	**Design** ❑ Minimum 1000 metre buffer distance from occupied residences. ❑ Minimum 750 metre buffer distances from WR Carpenter employee accommodation. ❑ Turbines coloured off-white in line with manufacturers standard specifications. **Construction** ❑ Where appropriate for construction timing and purposes, materials will be stored at the turbine hardstand area. Appropriately bunded chemicals, onsite ablution facilities and car parking will be stored/located in the contractor lay down area. The lay down area shall be located in a position that is inaccessible to the public. - Restricting access along access roads to the construction site. All vehicles, materials and equipment not required at the construction site shall be located in the contractor's lay down area. ❑ Prompt removal from site and contractor's lay down area of all surplus construction materials, chemicals and equipment no longer required. ❑ "Just in Time" site inventory will reduce equipment visual impact. **Operation** ❑ Night and security lighting if required will be kept to a minimum.

Ref	Control	General Control Practices to be Applied to Site
B.	**Sediment & Dust control**	**Design** ❑ The siting of all infrastructure to be sensitive to topographic effects reducing the erosion potential of the site. ❑ Construction ❑ Erosion, Dust & Sediment control management plan for inclusion in the Environmental Management System. ❑ Rehabilitation to be done in areas for stabilisation where sediment is not controlled by drainage system. ❑ Vehicle washing on site will be carried out in a controlled area. ❑ Access tracks to be watered where dust is causing a nuisance. **Operation** ❑ Any areas that have been rehabilitated from construction are to be monitored. If exposure results then the area is to be rehabilitated.

Ref	Control	General Control Practices to be Applied to Site
C.	**Noise impact**	**Design** ❑ Background noise assessment conducted to provide a design guide and design limits for noise at residential sites. ❑ Design of Layout so as to minimise noise impact – modelling of final turbine layout to ensure compliance with the imposed limit. ❑ Ensure that a buffer distance is used from occupied residences – minimum 1000 metres from neighbouring residences and 750 metres from WR Carpenter employee accommodation. ❑ Design of turbine layout to incorporate noise modelling to meet agreed standard. **Construction** ❑ Hours of operation. Operating hours for any significant noise generating activity will generally be between 7am and 6pm Monday to Sunday. Work may be required outside these times eg due to weather constraints and cranage of equipment in the evening to avoid day-time winds. ❑ Very noisy work. Any work where the adjusted measured noise level of any single source or activity is likely to exceed 75 dB(A) at the boundary of the nearest noise sensitive area is to be conducted within standard working hours. ❑ Maintenance. Equipment and machinery will be maintained in good working order with particular attention to silencers and lubrication of moving parts to manufacturer specifications. ❑ Transport of equipment to site will generally be conducted during standard hours of operation. **Operation** ❑ Turbine Sound Power Output performance testing (guarantee from suppliers). ❑ Monitoring of noise at neighbouring residences if complaints received. ❑ Appropriate remedies to be implemented after consultation

Ref	Control	General Control Practices to be Applied to Site
D.	**Cultural and European Heritage Value**	**Design** ❑ Design of the layout to consider the findings of any archaeological assessment. **Construction** ❑ Once the turbine layout has been finalised, an archaeological survey of the infrastructure sites will be commissioned. Any recorded sites will be documented and alternative locations or routes would be considered in order to avoid disturbing the site. ❑ Should disturbance be unavoidable, then an S18 request will be made to the Minister for Indigenous Affairs. ❑ Before construction, project personnel will be introduced to Aboriginal Heritage, so that they will be able to recognise material that would constitute a likely site. ❑ During construction, should an Aboriginal site be found, works will either cease in the area of concern and an application will be made under S. 18 of the Aboriginal Heritage Act or the Proponents will call on the archaeologist to survey a new route. The Proponents expect that this will not be required, as the archaeological survey should uncover any historical sites.

Ref	Control	General Control Practices to be Applied to Site
E.	**Terrestrial Fauna & Flora**	**Design** ❑ Turbine layout will consider vegetation extent and will avoid all significant remnant vegetation. ❑ Where clearing is necessary (widening of the site access track and the viewing area access track) a comprehensive survey will be performed to ensure no species of significance will be impacted. **Construction** Staff and Contractors will ensure: ❑ There will be no vegetation removal without the prior consent of the project manager. ❑ Rocks, boulders, tree hollows etc. are relocated to provide on-site habitat. ❑ No animals are fed or have access to food scraps and rubbish. ❑ Firearms and hunting are prohibited. ❑ Pits or holes are protected to prevent stock or native fauna wandering into them. ❑ Contractor to ensure weed and pest species, dust, erosion, sedimentation, wastewater, contaminants and fire are all be managed according to measures outlined. ❑ Consultation with landowner management to minimise stock impacts

Ref	Control	General Control Practices to be Applied to Site
F.	**Waste Management**	**Construction** At a minimum produce an EMP that addresses the following: ❑ Provision of collection bins. Collection bins should each be clearly defined as 'Conventional Waste', "Recyclable material" and 'Regulated Waste'. Collection bins shall be serviced as necessary by a contractor licensed to receive such waste. ❑ Recyclable materials will be used over non-recyclable materials wherever possible. ❑ Regulated and hazardous (fuel, batteries, oil) wastes will be separately stored and appropriately disposed of. ❑ Waste contractors must provide certification records verifying their registrations and points of lawful disposal for wastes. ❑ No wastes will be burnt or buried on-site. ❑ Empty containers containing hazardous materials unsuitable for reuse must be rinsed and punctured prior to disposal at the landfill. ❑ Empty drums containing liquid hazardous material will be stored according to Australian Standards and collected by a licensed transporter and dispatched to a licensed facility for recycling. ❑ Records will be maintained by the EPC Contractor of all waste generated and removed from the premises. ❑ Waste minimisation and management training will be provided to all site employees during inductions. ❑ All waste construction material shall be removed from the work site on completion. **Operation** ❑ Recyclable materials will be used over non-recyclable materials wherever possible. ❑ Regulated and hazardous (fuel, batteries, oil) wastes will be separately stored and appropriately disposed of.

Ref	Control	General Control Practices to be Applied to Site
G.	**Chemicals, flammables and oils**	**Construction** ❑ Contractors and staff will ensure: - MSDSs are readily available for all employees and contractors: - Storage areas for chemicals, fuels and hazardous materials are clearly designated and are bunded if quantities exceed 20 L have an impervious floor and covering;. - Appropriate signage using HAZCHEM codes is visible at all storage areas ; - All containers of chemicals/hazardous materials are clearly labelled; - Flammable materials and fuels are stored away from sources of ignition; and - All site employees are provided with induction training, which outlines the range of materials to be used on site, their storage methods, location, handling methods in the event of spills, their toxicity and fire control requirements. ❑ All chemical and fuel storage and handling will be in compliance with relevant Australian Standards and guidelines including: - AS 1216 Classification, Hazard Identification and Information Systems for Dangerous Goods; - AS 1678 Emergency Procedure Guides – Transport; - AS 1940 Storage and Handling of Flammable and Combustible Liquids; - AS 2187 Storage, Transport and Use of Explosive Substances (known as SAA Explosives Code). - AS 2508 Safe Storage and Handling Information Cards for Hazardous Materials. - ANZECC/NHMRC – Guidelines for the assessment and management of contaminated sites

Ref	Control	General Control Practices to be Applied to Site
H.	**Water Quality**	**Design** ❑ Design of turbine layout and other infrastructure will consider any watercourses, drainage lines, topography etc. **Construction** ❑ Implementation of sediment and erosion control measures. ❑ Siting of laydown areas and other temporary infrastructure to avoid impacts on any watercourses or drainage lines. **Operation** ❑ All disturbed areas will be rehabilitated to minimise sediment loss through erosion.
I.	**Fire**	**Construction** ❑ Prior to construction a Project Execution Plan will be developed including Occupational Health and Safety requirements and Emergency Response procedures. A site vehicle will be part utilised for the purpose of fire fighting, in the event that a fire should occur. To minimize this risk, fire hazards will form a part of the induction process that all of the construction workforce will attend. Close liaison will be maintained between agriculture property operating personnel and construction personnel at all times and response protocols developed prior to commencement of construction. **Operation** ❑ WR Carpenter has available on site at Emu Downs fire fighting equipment, including fire fighting tanks and water hoses (Jen-ell 800L slip on) designed to be fitted to farm vehicles. All staff are trained in fire fighting techniques and competent to use the equipment. In the event of an emergency the Griffin Group also would make available additional resources, including personnel and equipment from within the organisation.

Ref	Control	General Control Practices to be Applied to Site
J	**Birds and Bats**	**Design** ❑ Regional assessment for types of birds and bats in the region surrounding the wind farm site. This is performed early to assess the sites suitability for the development of a wind farm. ❑ Site utilisation assessment to determine bird and bat movement across the site to feed into turbine layout. ❑ Avoidance of vegetation and major fly-ways. ❑ Use of non-lattice type turbine towers. **Operation** ❑ No lighting of towers at night. ❑ Post-construction mortality monitoring.

Ref	Control	General Control Practices to be Applied to Site
K	**Shadow Flicker**	**Design** ❑ Assess likely occurrence of shadow flicker at residences. This assessment will feed into the turbine layout to ensure flicker time is satisfactory. **Operation** ❑ Confirm the magnitude of any impact from shadow flicker and if necessary, undertake appropriate measures to mitigate. ❑ Use of "Flicker Timers" to decrease the amount of flicker at a residence where shadow flicker appears to be excessive.
L	**Electromagnetic Interference**	**Design** ❑ 100m Minimum distance from communication tower ❑ Turbines will not be positioned to interfere with telecommunication towers microwave link (directional). ❑ Pre EMI survey at sensitive residence. **Operation** ❑ If received, complaints will be addressed in a timely manner as appropriate.

6.7 Fire Management Plan

A Fire Management Plan has been prepared (refer to Appendix 14) to overview the approach to fire management during the design, construction and operations phases. This document is still "draft" and will be finalised once the wind turbine has been selected and layout for the site finalised.

The Fire management Plan will be finalised prior to work commencing on site.

7.0 CONCLUSION

This report has demonstrated that approval for the development of the Badgingarra Wind Farm is warranted subject to reasonable and relevant conditions.

This report demonstrates that the Wind Farm proposal is acceptable under Local and State Planning requirements that economic and social benefits in the form of tourism, job creation and use of local goods and services may be derived, and that environmental and other impacts are not significant and are capable of being managed.

On the basis of the above and the details provided within this report and its appendices, it is requested that the Shire, after consultation with appropriate Referral Agencies, grant Planning Approval for the proposed development.

8.0 REFERENCES

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