



Hepburn Community Wind Park

Application for Planning Permit

VOLUME 1 – Main Document

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The Hepburn Renewable Energy Association Inc.

on behalf of our 370 members is proud to submit this Application for
Planning Permit for the Hepburn Community Wind Park.

This application is the culmination of over 18 months investigation and consideration.

HREA wishes to thank Future Energy Pty Ltd for its ongoing
commitment to this worthwhile local community project.

Acknowledgements

Our thanks to the following people and organisations for their assistance:

Elizabeth Boulton

Peter Wallace Engineer Pty Ltd

Ballarat University

Marshall Day Acoustics Pty Ltd

Garrad Hassan Pacific Pty Ltd

Hardrock Geotechnical Pty Ltd

Terraculture Pty Ltd

John Cleary Planning

Table of Contents

VOLUME 1 – Main Document

Glossary

About Hepburn Renewable Energy Association Inc. and Future Energy Pty Ltd

Section 1 – Project Overview

Section 2 – Detailed Site Analysis and Design Response

Section 3 – Detailed Project Description

Section 4 – Community Ownership and Consultation

Section 5 – Energy Issues, Environmental and Other Benefits

Section 6 – Alignment with Government Policies

Section 7 – Planning Assessment

Section 8 – Conclusion

Section 9 – References

List of Tables

1.1 Energy and Environmental Benefits

2.1 Site Selection Criteria

6.1 Alignment with Council Strategy

List of Figures

2.1 Wind Park Location

3.1 Wind Park Layout

List of Plates

1.1 HREA Bus Tour to Challicum Hills Wind Farm, Ararat

VOLUME 2 – Appendices A - E

- A. Steffen Report: *Stronger Evidence but New Challenges: Climate Change Science 2001-2005*. Department of the Environment and Heritage, Australian Greenhouse Office, March 2006
- B. Landscape and Visual Assessment Study
- C. Flora Assessment Letter from Department of Sustainability and Environment
- D. Fauna Assessment
- E. Noise Assessment

VOLUME 3 – Appendices F - T

- F. Geotechnical Assessment Report
- G. Aboriginal Affairs Victoria Letter
- H. Archaeological Assessment – Desktop
- I. Archaeological Assessment – Subsurface Testing
- J. Assessment of Shadow Flicker
- K. Assessment of Electromagnetic Interference Issues
- L. Civil Aviation Safety Regulations 1998 (CASR) Subpart 139.E
- M. Civil Aviation Safety Authority Advisory Circular AC 139-08(0)
- N. Electricity Grid Connection System Study
- O. HREA Mission Statement
- P. HREA Rules
- Q. HREA – Community Forum Feedback Analysis
- R. HREA Newsletters
- S. Rotary Club of Daylesford Letter of Support
- T. Sustainability Victoria Letter of Support

Glossary

AAV	Aboriginal Affairs Victoria
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulations
Co-operative	Hepburn Wind Co-operative
dBA	Decibels (A-weighted)
DNSP	Distribution Network Service Provider
DSE	Department of Sustainability and Environment
EMP	Environmental Management Plan
EPBC Act	Environment Protection and Biodiversity Conservation Act
Future Energy	Future Energy Pty Ltd
Guidelines	Policy and planning guidelines for development of wind energy facilities in Victoria
HREA	Hepburn Renewable Energy Association Inc.
HWC	Hepburn Wind Co-operative
IPCC	Intergovernmental Panel on Climate Change
km	kilometre
kV	kilovolt
mm	millimetre
m	metre
MRET	Mandatory Renewable Energy Target
MW	megawatt
MWh	megawatt hour
nacelle	streamlined enclosure for the wind turbine generator/gearbox assembly
rpm	Revolutions per minute
SV	Sustainability Victoria
VRET	Victorian Renewable Energy Target
Wind Park	Hepburn Community Wind Park
wind turbine	wind powered generator comprising a generator/gearbox assembly, which is enclosed in a nacelle and supported on a steel tower and driven by a 3-bladed variable pitch rotor

About Hepburn Renewable Energy Association Inc. and Future Energy Pty Ltd

The proponent for the Hepburn Community Wind Park is the Hepburn Renewable Energy Association Inc., assisted by its Project Partner, Future Energy Pty Ltd. The Hepburn Community Wind Park will be owned by the Hepburn Wind Co-operative Ltd, making it Australia's first community owned wind energy facility. Proponent details are:

Hepburn Renewable Energy Association Inc. (HREA)

Hepburn Renewable Energy Association Inc. (HREA) 20 Bridport Street, Daylesford Vic 3460, Tel: 03 5348 1298, www.hrea.org.au.

HREA was incorporated in November 2005. It is a non government, community organisation operated by volunteers and has a membership which is growing consistently each month. At the date of lodgement of this application HREA has a total of 370 paid-up members.

The primary aim of the Association is to initiate a small scale wind power project in the Daylesford/Hepburn region. The Association believes a project of this size is the most environmentally appropriate and economically responsible for meeting the energy needs of our community.

The Association also aims to provide Hepburn Shire residents with the opportunity to invest in this project as it will provide both financial and social dividends for our community.

HREA Committee:

President	Per Bernard
Vice President	Scott Kinnear
Secretary	Brett Dutton
Treasurer	Allan Meers
Committee Member	Maureen Corbett
Committee Member	Phil Hanson
Committee Member	Greg Simmons
Committee Member	Jane Knight

Future Energy Pty Ltd

Future Energy Pty Ltd. (ACN 105 609 603), P. O. Box 2007, Richmond Vic 3121,
Tel: 03 9429 5629, www.futureenergy.com.au.

Future Energy is a private Australian owned company, established in July 2003. The company's area of expertise centres on the establishment of community based renewable energy projects.

Future Energy has co-ordinated and performed all necessary expert assessments and works required to develop the Wind Park to this point including the preparation of this Application for Planning Permit. It is expected to continue to co-ordinate the establishment and eventual fund raising of the Co-operative and project manage the overall Wind Park through to completion.

1 PROJECT OVERVIEW

The Victorian Government has a policy of reducing the greenhouse emissions of the State. A key part of that policy is to encourage the development of wind energy generation throughout the State.

The Hepburn Community is renowned throughout Victoria for its commitment to sustainable policies and practices.

The proposed Wind Park comprises two wind turbines, allowing it to provide sufficient renewable, greenhouse-free energy to power approximately 2,500 homes. The project will be Australia's first community owned wind farm, a model which has been applied with great success overseas.

A locally owned and managed Wind Park gives the local region a wide array of benefits. These include:

- ❑ The community is provided with a non-polluting renewable energy source which will meet a large part of its energy needs for at least 25 years.
- ❑ The enhancement of Hepburn Shire's reputation for implementing sustainable development initiatives and environmentally sound practices.
- ❑ The financial benefits remain local.
- ❑ The Wind Park will provide financial support for other community programs.
- ❑ The widespread involvement of the community in the project will lead to the development of local leadership and organisational skills.
- ❑ The Wind Park will be a great vehicle for broader community education about sustainable development and renewable energy.
- ❑ The community gains a new icon they can be proud of, which highlights the progressive and cohesive nature of the community.

1.1 *Climate Change*

The seriousness of climate change is becoming more apparent with each new report and research finding. The latest Australian review of the rate of global warming and likely impacts is provided in the Steffen Report in Volume 2. It warns global warming is accelerating and that the need to move to mitigation and adaptive strategies - such as moving away from fossil fuel based energy sources to the creation and development of renewable energy - is becoming urgent.

1.2 *Wind Energy*

Wind energy is a proven energy technology. Since the first sailing ships and windmills of over 2,000 years ago, wind energy has been successfully harnessed by mankind.

Energy is a cornerstone of our lives. Furthermore, our use of energy is increasing each and every year. Until relatively recently we have not needed to concern ourselves with the type of energy we use.

But our climate is changing. Unless every community makes significant changes to the way we generate and use our energy resources, climate change and its impacts such as severe floods and droughts, will devastate not only our economy and lifestyles but our lives.

Wind energy will be one part of the solution to the climate change challenge. The wind is a clean and inexhaustible fuel source which can be easily converted into useful energy without the global warming effects of fossil fuels.

1.3 *Government Policy*

This project directly aligns with Victorian State Government policies to diversify energy supply and develop the renewable energy sector. It also supports other objectives to increase investment in regional areas.

In particular this project dovetails well with the Hepburn Shire Council's objectives and values. It is a project that:

- ❑ Delivers an outstanding and tangible impact upon increasing sustainability and protecting the environment.
- ❑ Aligns with aims of community building.
- ❑ Encourages local investment.
- ❑ Will have a positive impact upon the tourist experience.

1.4 Site Selection

The proposed Leonards Hill site was assessed as the most appropriate within the region after careful consideration and analysis as well as discussions with the Shire Planning Department. Its key strengths are: its unobtrusive position which eliminates visual impact upon any key historical or tourist sites; its proximity to the electricity grid; and its ability to harvest strong and consistent winds. Meteorological reports and wind resource modelling attest to the suitability of the site to produce the requisite energy.

1.5 The Project Site

The Leonards Hill site is approximately 10 kilometres south of Daylesford. It is located on the eastern side of the Ballan–Daylesford Road. The site is cleared farming land used predominantly for cattle grazing as well as some potato cropping activities.

Leonards Hill forms part of the Great Dividing Range. It lies within a generally cleared corridor which follows the Ballan–Daylesford Road. The Wombat State Forest is beyond this corridor to the east and west.

1.6 The Project

The project consists of two 2 Megawatt wind turbines located on the southern side of Leonards Hill. The site is privately owned and a 25 year lease has been secured with the landowner. A 22 kilovolt (kV) powerline runs through the property and will be used as the point of connection to the grid.

The project cost is expected to be completed within approximately 18 months.

Section 3 provides a detailed description of all aspects of the project.

1.7 *Energy and Environmental Benefits*

Each wind turbine will have a rated capacity of 2 megawatts (2MW). Together they will produce up to 14,000 megawatt hours (MWh) of energy per annum. This represents an amount of energy roughly equal to all the homes in Daylesford and Hepburn Springs.

The environmental and greenhouse benefits are summarised below.

Table 1.1 – Energy and Environmental Benefits

Energy production per annum	14,000 MWh
Equivalent number of households ¹	Approx. 2,500
Greenhouse gas abatement	Approx. 14,000 tonnes of CO₂
Equivalent number of cars off the road	3,200
Equivalent number of trees planted	20,000

1: The Australian Bureau of Statistics (ABS) in 2001 records Daylesford as having 2,118 registered dwellings, which includes an allocation for transient tourists.

1.8 *Community Ownership*

The Hepburn Community Wind Park will be Australia's first community owned wind farm.

The community ownership is based on the European model where community ownership has seen decades of success.

The Hepburn Community Wind Park will be owned and operated by the Hepburn Wind Co-operative Ltd, a community owned co-operative. Profits from the operation of the

Wind Park will be distributed annually to the Co-operative members. The Co-operative will also make an annual allocation of funds to community programs.

Community ownership allows local people to become directly involved in a project which will significantly contribute to the future energy needs of Hepburn Shire. It gives individuals an opportunity to take responsibility for local energy needs and be part of the solution to climate change.

Under the Co-operative model both the control and the financial benefits of the project remain in local hands. Each member of the Co-operative will share in the profits derived from producing renewable energy over the 25 years of the project.

Locally owned renewable energy generation will reaffirm the reputation of the Hepburn Shire as a leader in taking on the climate change challenge.



Plate 1.1 – HREA Bus Tour to Challicum Hills Wind Farm, Ararat

1.9 *Planning Considerations*

A full discussion of each requirement set out within the planning framework is provided in Section 7. Below is a summary of those results.

Planning Zone

The Wind Park is located within a Farming Zone (FZ) under the Hepburn Shire Planning Scheme. Within this zone a permit is required for the installation of a wind energy facility. The site is also covered by an Environmental Significance Overlay (ESO1 – Proclaimed Catchment Protection). ESO1 requirements are relevant to soil protection during construction.

Fauna

There are no indications that significant species utilise the proposed Wind Park site. Leonards Hill does not provide suitable habitat for any significant species. Overall the proposed Wind Park poses a low risk for any of the threatened and listed species that may be found within 5km of the site.

Flora

DSE has advised that a Flora Survey Report is not required as the cleared farmland site has no value in terms of native vegetation.

Nearby Dwellings

There are no dwellings within 500 m of the Wind Park site.

There are 18 dwellings within 1 km of the Wind Park site of which two are owned by the landowner.

Landscape and Visual Impact

Landscape and visual impacts are considered to be acceptable. The turbines have been located to maximise the screening effect of Leonards Hill on neighbours.

Photo simulations suggest that the wind turbines will be barely discernible from key vantage points within Daylesford. Importantly the Wind Park will have no impact upon the visual amenity of cultural, heritage or tourist sites.

Noise Impacts

Noise modelling based upon the proposed location of the wind turbines has found that predicted noise impacts upon nearby dwellings are well within the required standard used for wind energy facilities in Victoria.

Cultural Heritage

The construction of the Wind Park will not impact on either Aboriginal or European cultural heritage.

Geotechnical

The site is well suited to construction activities associated with the Wind Park with no difficulties foreseen.

Shadow Flicker

All houses will be under the allowable limit for shadow flicker for Victorian wind energy facilities.

Blade Glint

There will be no significant impact from blade glint.

Telecommunications

There will be no impact from electromagnetic interference.

Aviation

The Wind Park does not impact nearby airfields. Civil Aviation Services Australia (CASA) have advised that, as the wind turbines have a maximum height less than 110 m above ground level, obstacle lighting will not be required.

Socio-economic

The overall socio-economic impacts of this project are overwhelmingly positive.

Environmental Management Plan

A full EMP will be developed as part of the Wind Park design. The EMP will include the works to be undertaken to remove the turbines at the end of the project life.

1.10 **Consultation**

HREA with the assistance of Future Energy has already conducted an extensive community consultation program with surrounding residents and the broader community. This has included:

- ❑ Free Wind Farm tours
- ❑ Over 50 personal home visits to local residents
- ❑ 2 public forums
- ❑ 2 Visual Assessment workshops
- ❑ Over 20 street stalls
- ❑ Displays at local festivals
- ❑ Regular newsletters
- ❑ Development of a website with detailed amounts of background information

HREA is committed to ensuring this consultation process continues throughout and beyond project completion.

1.11 **Conclusion**

This project is an outstanding opportunity for the Hepburn Shire to take a significant and tangible step towards building a sustainable community. The development of renewable energy facilities can make the largest possible contribution towards protecting the environment for future generations. The proposed site is ideal in terms of being unobtrusive yet able to access consistent strong winds and conveniently located near the existing electricity grid. The project will have positive ramifications for the entire Shire: new employment, investment in local infrastructure; upskilling of the community; provision of sustainability education; a potential increase in tourists and visitors; increased public profile; and increased investment in the region. The project benefits the environment, the community, the region and the economy.

This project has undergone rigorous risk evaluation in terms of financial and physical viability. Extensive consultation has been conducted to ensure the project has widespread community understanding and support. This is an excellent and low risk

opportunity for the Hepburn Shire to take a strong and positive step towards sustainability.

2 DETAILED SITE ANALYSIS and DESIGN RESPONSE

2.1 *Selection Process*

The site selection process was conducted over nine months with sites considered based primarily upon wind strength, environmental impact, impact upon landscape and visual amenity, and proximity to the electricity grid. The Hepburn Shire Planning Department was consulted in the initial stages for advice regarding any specific zoning constraints on potential locations throughout the Shire.

2.1.1 Site Selection Criteria

A range of initial criteria were used to assess potential sites. Each one of the criteria was assessed to the maximum extent possible at each stage of the investigations. Table 2.1 sets out the Selection Criteria. When all criteria were considered, Leonards Hill was the best site available. In particular its strengths are:

- ❑ Wind resource
- ❑ Proximity to a robust electrical connection
- ❑ Accessibility
- ❑ Planning zone suitability
- ❑ Low visual impact
- ❑ Good orientation

Table 2.1 – Site Selection Criteria

Criteria	Description
Wind resource	An early assessment using forecasting models was made of the expected wind resource.
Topographic conditions	Height above sea level; rising land, hill effect present.
Surface Roughness	Vegetation height and density, water bodies, plantations, rocky outcrops.
Geographical setting	Surrounding areas.
Current Land Use	Potential effect on current land practices.
Grid Connection	Proximity, robustness of existing grid, distance to sub-station.
Accessibility	Property access, steepness, road infrastructure, proximity to major routes.
Planning Zone	Overlays or other relevant zoning.
Safety & Infrastructure	Proximity to airfields, communications towers etc.
Proximity to residences	Number of residences within a certain distance of potential turbines.
Local visual effect	The extent of visibility from, in and around neighbouring dwellings.
Orientation	Orientation of potential turbines, the sun and nearby dwellings.
Avifauna	Presence or support for species of State, Federal or International significance.
Heritage	Aboriginal and European archaeological significance.

2.2 Site Description

The site is located on rural land at Leonards Hill, approximately 10 km south of Daylesford. The subject land is bordered by the Leonards Hill–Bullarto South Road to the north and the Ballan–Daylesford Road to the east. The hill protrudes above the Wombat State Forest, and is cleared ground presently used for grazing and some cropping. The location of the site is shown in Figure 2.1.

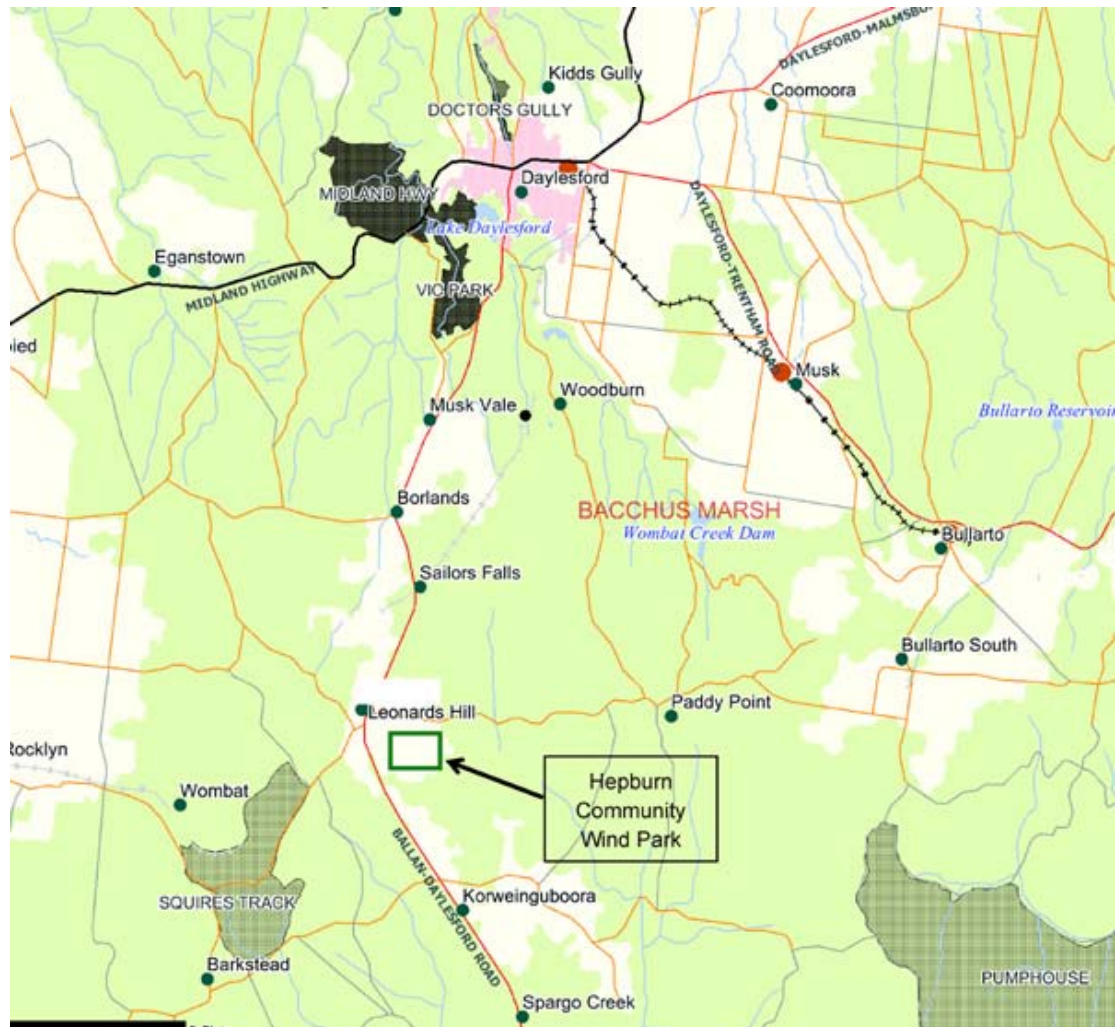


Figure 2.1 – Wind Park Location

2.3 Land Ownership

The subject land is owned by one landowner, R&N Liversidge Pty Ltd, as trustee for the R&N Liversidge Family Trust of RMB 1207, Leonards Hill, Victoria.

The legal records of the land referred to as Leonards Hill are:

- ❑ Certificate of Title Volume 9845 Folio 484
- ❑ Certificate of Title Volume 10172 Folio 201

- ❑ Certificate of Title Volume 10172 Folio 202
- ❑ Certificate of Title Volume 10172 Folio 203

2.4 Wind Energy Resource

2.4.1 Victorian Wind Atlas

Victoria's average wind resources have been modeled by the Wind Energy Research Unit of CSIRO in order to produce the Victorian Wind Atlas, by applying existing Bureau of Meteorology data to the Windscape wind resource mapping tool developed by CSIRO. The level of analytical detail in the published Wind Atlas is limited to 3 km areas. The Victorian Wind Atlas identifies the area of the site as having levels of wind suitable for the viable generation of wind energy.

2.4.2 Wind Modelling for the Site

A detailed assessment of the Wind Park site using CSIRO's Windscape wind resource mapping tool has been provided by Sustainability Victoria. This analysis demonstrates the wind regime of the Wind Park site is well above the Victorian average and is ideal for the generation of wind energy.

2.4.3 Wind Monitoring

A wind monitoring mast was installed on the site in August 2006. The mast itself is 50 metres in height with wind anemometers and direction vanes located at 20 metres and 50 metres above ground level. Initial data reinforces the original computer modelling assessment to indicate the site is ideal for wind energy generation. Over time, the collected data will be correlated with local Bureau of Meteorology data to extend the veracity of collected data. Monitoring will continue to ensure seasonal variation is captured.

2.5 Dwellings within Proximity to the Site

There are no dwellings within 500 m of the site.

There are 18 dwellings within 1 km of the Wind Park site of which two are owned by the landowner. A full discussion of each of these dwellings is provided in the Landscape and Visual Assessment in Volume 2.

2.6 Landscape Character

Leonards Hill is cleared and lies within a largely cleared corridor that follows the north–south alignment of the Ballan–Daylesford Road. Beyond this cleared corridor to the east and west lies Wombat State Forest with tall messmate forest. The cleared areas are used for agriculture and rural lifestyle properties.

2.7 Grid Connection

The power output from the Wind Park will connect into the existing 22 kilovolt (kV) distribution powerlines. A series of 22 kV distribution powerlines run across and alongside the Wind Park site. A System Study was conducted by Peter Wallace Engineer Pty Ltd to investigate the interaction of the Wind Park with the Powercor Distribution network and concluded the wind farm could operate within the requirements of the Victorian Electricity Code. These investigations were performed with the assistance of Powercor Australia Ltd. Powercor have indicated they will offer the Wind Park a full Connection Agreement.

2.8 Accessibility

The Wind Park site is very well catered for by existing transport infrastructure. The Ballan–Daylesford Road adjacent to the site is a good quality main road which currently caters easily for vehicles of all sizes. It feeds directly into the Western Freeway approximately 20 kms from the Wind Park site.

The site itself is easily accessed from the Ballan–Daylesford Road west of the turbine locations. The site has gentle undulations allowing for relatively easy movement of equipment.

2.9 Flora

The Wind Park site was inspected by the Department of Sustainability and Environment (DSE). The DSE assessed that the land has been used for grazing and cultivation for many years. Over that time exotic flora species have been introduced to the site. These activities have significantly impacted native vegetation and, as a result, little or no native vegetation now exists on the site.

The Wind Park construction process does not require the pulling down of large trees. Additionally, the Wind Park will not cause any erosion issues.

2.10 Fauna

The Centre for Environmental Management, University of Ballarat was commissioned to prepare a Fauna Assessment for the Wind Park site. The full Assessment is provided in Volume 2.

The report concludes that avifauna species moving through the landscape are likely to use the native vegetation corridors located to the east and west of the site as well as the surrounding forest rather than the cleared area where the Wind Park is situated. There are no significant wetland habitats (Ramsar wetlands and protected areas) or other wetlands within five kilometres of the Wind Park site.

2.11 Cultural Heritage

Under the Regulations of the Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*, the site falls within the boundaries of the Wurrundjeri Tribe Land Compensation and Cultural Heritage Council Incorporated. After consultation with the Hepburn Shire Council Planning Department and various State Government

authorities it was confirmed the Wurrundjeri are the relevant statutory authority for the site. It was noted however that the traditional landowners are the Dja Dja Wurrung.

An initial desktop Archaeological Assessment was completed by TerraCulture Pty Ltd and is provided in Volume 3. The Assessment examined legislative requirements for cultural heritage sites, and assessed the likelihood of the site having significance in terms of European or Aboriginal archaeology. It found that there were no Aboriginal nor historical archaeological sites known to be on or within the vicinity of the subject land. However, given that there were several significant Aboriginal and historical archaeological sites elsewhere within the Hepburn Shire, it was recommended that a field survey and sub-surface testing be undertaken on the subject land by a qualified archaeologist and an Aboriginal monitor.

The subsequent investigations were carried out by TerraCulture Pty Ltd along with a Wurrundjeri representative, Mr Bill Nicholson. A representative from the Dja Dja Wurrung was also invited to attend the on site investigations.

The field survey and sub-surface testing found no traces of either Aboriginal or European archaeological features or artefactual material.

The final assessment including the results of the on site investigations is provided in Volume 3.

2.12 Geotechnical Aspects

The general region is comprised of 'newer volcanics' and 'basalt,' and an eruption point at the apex of Leonards Hill indicates that it is an ancient volcano.

The subsurface profile of the area generally comprises shallow surface residual silts, underlain by highly reactive silty clays which grade to variably weathered basalt rock with depth. Basalt floaters and closely packed boulders may be present above the basalt rock interface.

A Geotechnical Assessment of the site was conducted by Hardrock Geotechnical Pty Ltd, and is provided in Volume 3.

The Assessment found that the Leonards Hill site was well suited to construction activities. It made the following findings:

- ❑ The natural clay soils or low capacity rock should readily accommodate the load of the Wind Park.
- ❑ No significant difficulties are expected with the construction of the wind turbine foundations.
- ❑ The pavement construction plan was considered common practice with no difficulties foreseen.

Further targeted subsurface investigations including core sampling will be conducted as part of the Wind Park's design plan phase.

3 DETAILED PROJECT DESCRIPTION

The project will comprise the installation of two turbines to a maximum height below 110 metres and associated facilities as described within this Section.

In line with common best practice within Australia the construction of the Wind Park will be contracted with the turbine manufacture on a full Engineering Procurement and Construction (EPC) contract. This is a 'turnkey' contract. This approach gives the benefit of fully utilising the engineering and project management experience and skills of the turbine manufacturer to ensure the construction of a world class Wind Park.

3.1 *Wind Turbine Generators*

The final design layout of the two turbines is in response to the site analysis as detailed in Section 2. The layout is shown in Figure 3.1.

It is intended the Wind Park will consist of two 2 MW wind turbines. The height of each wind turbine generator to the tip of the blade will be below 110 metres. The final selection of the particular wind turbine will depend upon commercial analysis, market changes and intervening technological developments. All modelling within this document is based on the Repower MM82 2 MW turbines. All modelling within this application assumes a tower height of approximately 68 metres and a blade length of approximately 41 metres.

The wind turbines are housed within nacelles which will be mounted on steel towers. The nacelle mounting allows it to pivot in all directions to ensure the blades are able to face directly into the wind at all times. The towers will have a diameter at the base of between approximately 4 and 5 metres and will taper to the top.

The wind turbines, blades and nacelle are expected to be imported whilst the towers are expected to be manufactured within Victoria.

The turbine blades rotate in a clockwise direction. The rotational speed varies with the wind between approximately 10 and 20 rpm. These turbines commence power

generation at wind speeds of approximately 3.5 metres per second, produce maximum power output at approximately 13 metres per second and cut out at wind speeds in excess of 25 metres per second.

3.2 *Reflectivity and Colour*

The Landscape and Visual Assessment Study performed by John Cleary and provided in Volume 2 recommends the use of specific coatings for the towers, turbines and blades to blend with the background and reduce visibility.

The recommendations are:

Blades and nacelle	RAL 7035 – a very pale grey-blue coating which is low reflectivity.
Tower above 10 m	Pantone 427 C – very pale grey-blue coating.
Tower below 10 m	Pantone 5773 C - pale grey-green coating.

The paint type and colours selected are considered the most unobtrusive within a landscape and as the most 'easy on the eye' to observe. These colours and paint types are also effective at reducing any glare or reflectivity from the wind turbine tower and blades.

3.3 *Engineering Design*

After Development Approval is secured the Hepburn Wind Co-operative Ltd will work with Future Energy Pty Ltd and engineering consultants to prepare the detailed Wind Park engineering design and documentation, the required tender documents and the Environmental Management Plan (refer to Section 7.11).

The Wind Park will be a turnkey contract (one contract with a turbine manufacturer to build the entire Wind Park and associated infrastructure) and will be project managed by Future Energy Pty Ltd with assistance from specialist project management consultants.

3.4 Associated Buildings and Works

A representation of the site and the location of key features is shown in Figure 3.1. The following associated buildings and works will occur as part of the Wind Park construction.

3.4.1 Grid Connection

An electricity industry specialist, Peter Wallace Engineer Pty Ltd, has completed a grid connection study in consultation with the local Distribution Network Service Provider (DNSP), Powercor Australia. The grid connection study concluded that the wind facility could operate within the requirements of customer voltage and line loading limits. The grid connection point for the assessment and agreed to by Powercor Australia is indicated in Figure 3.1.

No sub-station will be required. A small booth to house metering and control equipment and maintenance staff facilities will be located next to the point of grid connection. See Figure 3.1.

3.4.2 Underground cabling

The turbines will be connected to the local electricity grid via underground 22 kV cable. This underground cable will follow the route of the access track. The trench for the cables will measure approximately 300 mm wide and 600 mm deep and be dug alongside the access track. The layout of the access tracks can be seen in Figure 3.1

3.4.3 Foundations

Concrete foundations will be required for each wind turbine. The type of foundations will depend on the highly detailed geotechnical analysis which forms part of the wind farm engineering design phase. However the initial Geotechnical Assessment anticipates that mass pad footings will prove to be the most practicable foundation type. This type of footing comprises a below ground-level concrete mass footing approximately 2.5 m deep and 12-15 metres in diameter and does not require rock anchors.

3.4.4 Wind Monitoring Mast

The existing 50 m monitoring mast may remain on site.

3.4.5 Site Office

During construction a temporary site office will be located close to the turbine locations. The approximate position is shown in Figure 3.1.

3.4.6 Hard Standing Areas

Hard standing areas next to the base of each wind turbine will be used for turbine assembly during the construction of the Wind Park and will measure approximately 20 m by 40 m. These hard standing areas will be re-covered with topsoil after commissioning to return the area to pasture. A small concrete batching plant may be required in the event local suppliers are not able to meet the construction demand. This will be determined as part of the engineering design and EMP for the Wind Park. If required on site, the batching plant would be alongside the staging area.

3.4.7 Access Tracks

An access track will be constructed from the site entrance on the Ballan–Daylesford Road to the turbines. The route of this track is shown in Figure 3.1. The track will be approximately 5 m wide. This track will be used during the Wind Park construction and thereafter for maintenance vehicles to access each wind turbine.

The materials required for the construction of the access track are expected to be sourced locally. The detailed engineering of the track will form part of the Wind Park engineering and design phase of the project and be incorporated within the EMP.

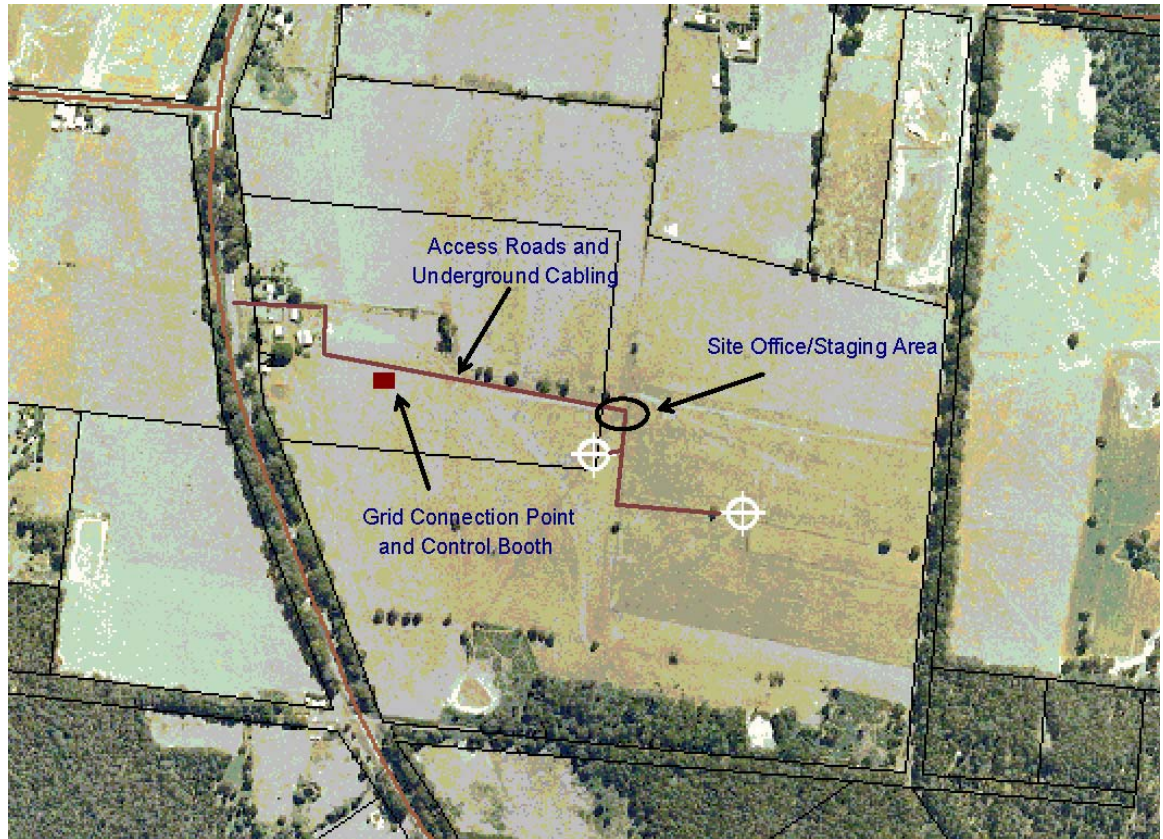


Figure 3.1 – Wind Park Layout

3.4.8 Parking Areas

The Wind Park will not require designated parking areas for its continued operation. The nature of the Wind Park site itself allows vehicles easy access to both turbine locations. The majority of ongoing visits to the Wind Park will involve general maintenance staff in 4WD cars. These visitors will simply use the areas around the turbines for parking.

3.4.9 Lighting

Under Subpart 139.E Obstacles and Hazards of the *Civil Aviation Safety Regulations 1998 (CASR)* there is no requirement to have night lighting on the turbines due to the overall height being below 110 metres.

3.5 *Micro-siting*

Prior to construction the project will undergo a complete engineering design phase as discussed in Section 3.3. During this phase, micro-siting of the turbines is required. There are many potential reasons for small changes to the initial Wind Park layout. These reasons may relate to construction issues, environmental imperatives or energy considerations. Allowance for micro-siting of each turbine by up to 100 m is required for best practice engineering design and construction. In the event of any change in the exact locations of either or both turbines due to the micro-siting process, all aspects of the Wind Park will maintain compliance with the conditions of the Development Approval.

3.6 *Construction Timeline*

The final completion date of the Wind Park will largely depend upon turbine availability. Due to the urgent and growing need for all forms of renewable energy installations around the world, currently there are quite significant worldwide delays in turbine deliveries. Notwithstanding this, it is hoped the Wind Park will be completed within 18 months of securing the Planning Permit.

The period of construction activity for the Wind Park will be approximately two months.

3.7 *Traffic*

The construction phase of the Wind Park will see an increase in local traffic. Once the Wind Park is operational the increase in traffic above present levels will not be discernible.

Traffic movements will be spread over the construction period of approximately two months. The first stage will involve truck traffic to bring materials for foundation and access track work. The second stage will involve the delivery of the turbine components. Six or seven trucks will be required to deliver each turbine (tower, nacelle and blades). The turbine components will be delivered via the Western Highway and the Ballan–Daylesford Road which is of a sufficient standard to easily handle this type of transport.

Cranes will remain on site for the installation hence will only arrive and depart once. It is intended that all deliveries are made on a 'just-in-time' basis.

Engineering, project and construction personnel will visit the site as required during the construction period. It is expected the majority of these personnel will either live locally or be staying locally during the construction period.

After construction the Wind Park will go through a period of commissioning followed by close monitoring. During this period there will be regular visits from technicians and maintenance personnel. This will decrease to an operational maintenance requirement of scheduled infrequent visits using a 4WD vehicle. These may be as often as one visit per month.

3.8 *Reinstatement*

At the completion of construction and commissioning all areas such as road verges, hard stands, staging area and the site office area will be re-covered with topsoil to return to active pasture. The access track will remain for ongoing maintenance requirements.

3.9 *Operation and Maintenance*

The operation of the Wind Park will not need anyone to be in attendance. The wind turbines automatically commence turning and producing energy as the wind reaches a cut-in speed. Likewise turbines cease turning as soon as high wind speeds are reached. Energy produced is automatically fed into the local grid and used.

The Wind Park automatically disconnects from the grid in the event of pre-determined scenarios (faults) according to the connection protocols of the local Distribution Network Service provider, Powercor Australia.

The Wind Park will be monitored remotely 24 hours per day under an agreement with the turbine manufacturer.

Under a long term maintenance agreement entered into as part of the Wind Park Construction Contract, routine scheduled maintenance will be undertaken each six

months. The maintenance function is likely to be carried out by local personnel who have received sufficient training from the turbine manufacturer. This maintenance will take approximately one day per turbine.

3.10 Decommissioning

The Lease Agreement in place with the landowner requires the owner of the Wind Park to remove the wind turbines from the land at the end of the 25 year lease period.

Additionally, the Environmental Management Plan will contain provisions to remove the turbines at the end of the final lease period.

However, depending upon the landowner's acceptance or otherwise of a new agreement, the following options may also be available:

- ❑ Continue maintaining and operating the turbines to produce renewable energy.
- ❑ Upgrade the turbines to more current technology and generate higher levels of renewable energy into the future.
- ❑ Remove the turbines in accordance with the Landowner Lease Agreement and the EMP.

It is expected a continuation or upgrade of the Wind Park at the end of the lease period will require new permits and conditions.

The procedure for the decommissioning of the Wind Park will be detailed in the EMP. It will involve the removal of the wind turbines including the towers. Access tracks would remain to assist the landowner with farming activities. The wind turbine footings would be re-covered with topsoil to return the area to pasture.

4 COMMUNITY OWNERSHIP AND CONSULTATION

4.1 *Project Objectives*

The project's objectives are to:

- ❑ Develop a community owned wind energy facility which will significantly contribute towards meeting the Hepburn Shire's present and future energy needs.
- ❑ Provide a demonstration project for uptake within other regional areas.
- ❑ Provide a long term viable investment opportunity for Hepburn Shire residents and contribute to the economic prosperity of the region.
- ❑ Promote the uptake of renewable energy to take responsibility for our own energy needs and to reduce the impact of global warming caused through using fossil fuels.

4.2 *Community Ownership Model*

Victoria has numerous successful corporately owned large scale wind farms, such as Challicum Hills (35 turbines), Codrington (14 turbines), Toora (12 turbines), Wonthaggi (6 turbines), and this year Yambuk (20 turbines). However, there is limited opportunity for Victorians to participate and directly invest in these projects because the facilities are owned by superannuation funds, private companies or government businesses.

Australia does not yet have any smaller scale community owned wind farms. Community owned wind farms have proven highly successful in Europe, U.S. and Canada. Examples of these can be found at the following websites:

- ❑ www.windshare.ca
- ❑ www.baywind.co.uk
- ❑ www.westmill.coop
- ❑ www.middlegrunden.dk

The success of community ownership throughout Europe has resulted in many communities looking to participate in this type of renewable energy development. The approach has led to increased community acceptance and support for wind energy in regional areas.

4.2.1 Community Ownership Benefits

The benefits of small scale community wind farms are:

- ❑ The community is provided with an income-generating renewable energy source, where the financial benefits remain local, rather than going towards large corporate or investment funds groups.
- ❑ The community is provided with a non-polluting renewable energy source which will meet its energy needs for at least 25 years.
- ❑ A smaller sized wind farm requires less land and hence will have less environmental impact during construction. The smaller size also reduces impacts upon visual amenity.
- ❑ It is easier to find small sites with consistently strong winds that are located close to the electricity grid.
- ❑ The wind farm is owned, controlled and supported by local communities with opportunities to contribute to a community's economy and social cohesion.
- ❑ Local control of the project increases community acceptance levels.

- ❑ The involvement of a large number of community members in the project leads to the development of local leadership and organisational skills, and the cementing of social bonds and 'sense of belonging'. This can translate into increased co-operation and collaboration in other community and business pursuits.
- ❑ The model provides a powerful vehicle for broader community education about sustainable development and renewable energy.
- ❑ The community gains a new icon they can be proud of, which highlights the progressive and cohesive nature of the community.

4.2.2 Ownership Structure and Management

Based upon examining international best practice, it is proposed that the Wind Park will be owned by the Hepburn Wind Co-operative Ltd (HWC) via a Special Purpose Vehicle (SPV) private company, Hepburn Community Wind Park Pty Ltd. The company will be 100% owned by HWC.

Under Victoria's *Co-operatives Act 1996* each Member of the Co-operative is entitled to one vote, regardless of their level of investment. This will ensure control is spread across the community.

The Hepburn Wind Co-operative (HWC) will be established in accordance with the *Victorian Co-operatives Act 1996* and be controlled by its elected Board of Directors. In accordance with *The Act* the Board will have no fewer than five elected Directors. It is expected one director will be a nominee of Future Energy Pty Ltd, to provide ongoing industry advice.

All matters relating to membership, structure, rules and management of the Co-operative will ultimately be determined by the Co-operative's Board of Directors.

4.2.3 Membership and Investment

As stated above all matters relating to membership of the Hepburn Wind Co-operative will ultimately be determined by the Co-operative's Board of Directors, however the objective is for 100% of the required funds to be sourced from local investors (Members). This will be achieved by giving priority to residents within pre-determined distances from the Wind Park. The range of Members may include individuals, businesses and superannuation funds.

After securing Development Approval, Future Energy will continue developing the project in conjunction with the Hepburn Wind Co-operative Ltd.

Future Energy will co-ordinate the preparation and distribution of a Product Disclosure Statement (previously known as a prospectus) in conjunction with the Hepburn Wind Co-operative Ltd. All financial aspects of the Wind Park will be clearly detailed in the Product Disclosure Statement.

In order to minimise any risk for Members the Product Disclosure Statement will only be issued after:

- ☐ All necessary approval processes are complete.
- ☐ Wind regime and energy output is known.
- ☐ Final grid connection agreement is secured.
- ☐ Terms for Wind Park construction, maintenance and energy sales are known.

Therefore the majority of the project risk is borne by Future Energy Pty Ltd in the stages prior to investor funds being committed.

Early financial modelling carried out by Future Energy Pty Ltd demonstrates that Members should receive an attractive overall return on their investment. This return has been enhanced as a result of the announcement of State Government funding support of \$975,000 from the Renewable Energy Support Fund (RESF) administered by Sustainability Victoria. Independent assessment of the project's financial framework, conducted by Sustainability Victoria, shows the project has a sound financial basis.

The Co-operative Rules will detail the exit process for Members who wish to curtail their membership and liquidate their investment. This process, along with all the Co-operative Rules, will be available as part of the Product Disclosure Statement.

4.3 Consultation

Whilst it is intended to conduct further consultation activities during the detailed project planning phase, HREA and Future Energy have already commenced an extensive consultation and awareness raising program with both Daylesford residents and the communities closer to the Leonards Hill site. Additionally, a core part of HREA's activities will be continued consultation and education of energy issues throughout all phases of the Wind Park's life, from planning and construction to commencement and ongoing operation.

4.3.1 HREA

One of the key methods of communicating to the public has been through the establishment of the Hepburn Renewable Energy Association (HREA). At the time of lodgement, HREA had 370 members. It is expected this may reach 500 by the end of 2006. The Association is run by a Committee which comprises eight high profile and influential community members. It provides an excellent informal communication network into the community of the Hepburn Shire. It held its Annual General Meeting on 27th April 2006.

4.3.2 Public Forums

Two public forums have been conducted as follows:

The first, at Daylesford Town Hall on 14th September 2005, was attended by at least 55 people. Of those attendees, 46 people completed a Forum Feedback Questionnaire. The results demonstrated 95% of respondents were in favour of the concept of a community owned wind farm for the Shire.

The Feedback results are provided in Volume 3.

A second forum was held at the Leonards Hill Hall on 22nd November 2005. This forum was attended by approximately 16 people.

4.3.3 Visual Assessment Workshops

Two Landscape and Visual Assessment Workshops were held on 3rd August 2006. The first workshop was specifically for residents within approximately 3 kms of the site and was held at Leonards Hill Hall at 6 pm. The second workshop was held at Daylesford Town Hall from 8 pm.

The Assessment Workshops were facilitated by Planning Consultant, John Cleary, and were attended by 34 people. Comments and feedback from the workshops were used in the formulation of the Landscape and Visual Assessment Study provided in Volume 2.

4.3.4 Website

HREA established its website at www.hrea.org.au in May 2006. The website provides background and ongoing updates on the proposal, research articles, fact sheets, links, media releases, a Q&A section, and includes an easy facility for the public to submit questions and comments.

4.3.5 Home Visits

Over 50 separate personal home visits have been made to landowners near the Wind Park site. This has enabled people living closest to the proposed Wind Park to speak directly with members of the HREA Committee to discuss all aspects of the project.

4.3.6 Information Tables

Over 20 Information Tables have been set up in the main street of Daylesford, on Saturday mornings at peak shopping time. Additionally a number of Information Tables have been set up at local festivals including Harvest, Glenfest and Chillout.

The response from visitors to the Information Tables has been one of interest and encouragement. After learning about the project at the Information table many people have subsequently signed up as members of the Association.

Additionally nearly 100% of tourists who have visited the Street Tables have indicated their very strong support for the proposed project.

4.3.7 Newspaper

Advice on the dates of public forums and general proposal information has been made available through paid newspaper notifications and letters. Over eight newspaper articles have been published on the subject of the Wind Park.

4.3.8 Information Newsletters

HREA Newsletters have been published since November 2005 and distributed to all forum attendees, members and site neighbours. All issues are available on the website and have been reproduced in Volume 3.

4.3.9 Wind Farm Tours

To allow local residents to experience the characteristics of wind turbines and wind farms for themselves, HREA organises free bus tours to the Challicum Hills wind farm. To date, approximately 130 people have gone on the wind farm tours:

- ❑ 34 people on 9th April 2006
- ❑ 37 people on 4th June 2006

- ❑ 31 people on 16th July 2006
- ❑ 29 people on 27th August 2006

HREA continues to organise regular tours. The tours are free but bookings are required by registering on the website, www.hrea.org.au or telephoning 5348 1298.

4.4 *Future Consultation Plan*

HREA plans to continue and expand the above types of consultation and communication activities. In addition, public awareness will be enhanced through the following supplementary activities:

- ❑ Further regular meetings with all residents within proximity of the Wind Park site.
- ❑ Further information briefing nights in Daylesford and around the Shire.
- ❑ Public display of this Planning Application.
- ❑ Display of information posters in public places.
- ❑ Distribution of information leaflets in main public areas.
- ❑ Publication of a PDS (prospectus).

5 ENERGY ISSUES, ENVIRONMENTAL and OTHER BENEFITS

5.1 Greenhouse

Victoria's Environmental Protection Agency (EPA) has recently conducted eco-footprint analysis to benchmark Victoria's sustainability progress against other countries. This found that Victoria has an eco-footprint of 8.1 global hectares, which is one of the worst in the world. One of the key reasons it is so high is Victoria's reliance upon energy from brown coal which has the largest impact upon creating greenhouse gases. Overall, Australia emits more greenhouse gases per capita than any other country in the developed world.

This Wind Park will assist the Shire of Hepburn to reduce its greenhouse footprint through:

Energy production per annum	14,000 MWh
Equivalent number of households ¹	Approx. 2,500
Greenhouse gas abatement	Approx. 14,000 tonnes of CO₂
Equivalent number of cars off the road	3,200
Equivalent number of trees planted	20,000

1: The Australian Bureau of Statistics (ABS) in 2001 records Daylesford as having 2,118 registered dwellings, which includes an allocation for transient tourists.

Over the 25 year life of the Wind Park, this equates to a reduction of 350,000 tonnes of CO₂.

The Wind Park may also impact greenhouse emissions through the indirect benefits associated with education and raising awareness. Programs conducted through the HREA may assist local residents to incorporate other energy saving and efficiency measures into their way of life.

5.2 *Community and Social*

The community and social benefits of the project are far-reaching and will span the lifetime of the project.

5.2.1 Community Programs

It is intended that the Hepburn Wind Co-operative will use a portion of the annual profits from the operation of the Wind Park to fund local community programs.

The nature of the programs and the amount of funding will be determined by the Co-operative Board, however the initial financial modelling conducted by Future Energy demonstrates that the Co-operative will be able to allocate significant amounts to community programs each year and still maintain a very attractive investment return to Co-operative Members.

5.2.2 Employment and Training Opportunities

The project will provide direct local employment opportunities during the construction period as well as during the operating life of the Wind Park. Other indirect employment opportunities are feasible through related activities.

With wide participation by members of the Shire, a large number of people involved in the Co-operative will develop expertise and knowledge of small scale wind farms and the wind energy industry in general. There is an opportunity to capitalise on this, as it is likely the concept will quickly be replicated throughout regional Victoria. Currently two other regional areas are investigating their own community owned wind energy. There are likely to be opportunities to conduct training for other regions and for some Members to fulfil consultancy roles. There will be ongoing employment in:

- ❑ Community education and training activities.
- ❑ Wind Park management, operation and maintenance.

There may be opportune employment in:

- ❑ General roles within the broader wind energy industry.
- ❑ Developing community co-operatives.

5.2.3 Development of Community Cohesion and Leadership

The project is initiated, funded and managed by members of the community. As such, it provides opportunities for Members to work constructively together which can increase social cohesion and help develop a feeling of connectedness and belonging amongst community members.

A key strength is that there are multiple avenues of participation available. This will maximise involvement as there is likely to be an approach that suits most people's individual needs. Roles may include:

- ❑ **Observer role.** Observing meetings and project construction, reading newsletters, or attending information sessions.
- ❑ **Participatory role.** Invest, participate in discussions/forums and wind farm tours, become a member of the HREA, attend Wind Park programs.
- ❑ **Leadership role.** Leadership roles are available at a senior level, with positions for Directors on the Co-operative Board. There will also be management and junior leadership roles in managing other aspects of the Wind Park, the Co-operative itself and the ongoing operation of HREA. Participation in such roles increases the skills, capacity and confidence of local people.

5.2.4 Increase in Social Bonds

Co-operative and shared activities amongst the community reduces social isolation and the potential negative aspects associated with this such as alienation and mental illness. There are also the benefits of synergies associated with increased interaction. This often

translates into further co-operative activities between like-minded businesses, parents and families, plus increased social activities enhancing community members' sense of well-being and enjoyment of life. A society with strong bonds provides resilience for both the Shire and the individuals and assists in making the Shire a desirable place to live.

5.3 Economic

The Wind Park will bring economic benefits to the Shire, and to individual investors.

5.3.1 Shire

The Shire will benefit economically as follows:

Tourism and Visitors

As the first community owned Wind Park within Australia, the project will draw interest from tourists with environmental concerns, plus interest from the wider society who have research or media interests. The Wind Park's profile as a demonstration project will draw attention to the Shire, providing more exposure and indirectly positively impacting upon visitor numbers. Increases in visitor numbers and tourism translates into increases in trade for local service oriented industries.

Local Purchase

During the construction and operational phases, aside from the main turbines, equipment pieces, it will be the project policy to 'buy local' wherever possible. This policy will result in the maximum possible amount of materials, services and staff being sourced from the local area. This may include the following products and services:

- ☐ Civil, electrical and general contractors
- ☐ Concrete supplies
- ☐ Construction equipment
- ☐ Earthmoving equipment
- ☐ General engineering and construction supplies
- ☐ Road construction materials
- ☐ Road construction contractors and equipment

5.3.2 Investors

Early financial modelling carried out by Future Energy Pty Ltd demonstrates Members should receive an attractive overall return on their investment. This return has been enhanced as a result of the announcement of State Government funding support of \$975,000 from the Renewable Energy Support Fund (RESF) administered by Sustainability Victoria. Independent assessment of the project's financial framework, conducted by Sustainability Victoria, shows the project has a sound financial basis.

Overall, investors are offered a sound opportunity for a solid return for a 25 year duration. This means the financial returns from this worthwhile project will be distributed to the local owners. Funds will remain local and ultimately be spent locally which results in local economic benefits.

5.3.3 Landowner

The landowner will receive a reliable annual rental return for each turbine which is indexed to inflation. This rental income adds to the local economy.

6 ALIGNMENT with GOVERNMENT POLICY

The development of the Hepburn Community Wind Park is an activity which directly supports the policies of the Commonwealth Government, the State Government and the Hepburn Shire Council. The dramatic impact it will have upon the Shire's greenhouse emissions solidly aligns the activity with Government's desire to create a sustainable society. In addition, the proposal supports numerous other objectives such as contributing to community cohesion and developing regional areas.

6.1 *Commonwealth Government*

The Federal Government's *National Greenhouse Strategy 1998* established Australia's Mandatory Renewable Energy Target (MRET). This target was set at 2% and required electricity companies to purchase new renewable energy to comply. The MRET was established to encourage the uptake of renewable energy.

6.2 *Victorian State Government*

Victorian Government policies are strongly supportive of the development of wind energy sources. Premier Bracks's statement in the *Policy and Planning Guidelines for Development of Wind Energy Facilities for Victoria* states that wind energy will be 'critical in achieving our goals for a sustainable future' and that 'we owe it to current and future generations of Victorians to ensure that we utilise this resource in the best way possible.' This support is reiterated throughout several policies:

6.2.1 **Our Environment Our Future**

Our Environment Our Future, Victoria's Environmental Sustainability Framework set the following interim targets for the State:

- ❑ Increase the share of Victoria's electricity consumption from renewable energy sources from the current 4% to 10% by the year 2016 through the new Victorian Renewable Energy Target (VRET).
- ❑ Facilitate the development of up to 1,000 megawatts of wind energy in environmentally acceptable locations throughout Victoria by 2006.

6.2.2 Renewable Energy Policy Statement

In this statement, the Victorian Government reiterates its strong commitment to sustainable development. The policy aim is to diversify Victoria's energy sources, with renewable energy making an important contribution to meeting future energy needs.

6.2.3 Victorian Greenhouse Strategy Action Plan

As part of Victoria's broader Greenhouse Strategy, a *Renewable Energy Strategy for Victoria* was developed. This aims to address barriers to renewable energy investment and to facilitate growth of the industry. It also recognises and seeks to harness the opportunity the wind energy industry brings to stimulate innovation and new employment throughout Victoria. Long term strategies such as this highlight that wind energy facilities are a part of the future for Victoria, and that the industry is poised for growth and expansion.

6.2.4 Sustainability Victoria

Sustainability Victoria (formerly SEAV) is a strong supporter of community owned wind farms in Australia.

The Renewable Energy Support Fund which is managed by Sustainability Victoria was established in 2003 to assist the development of renewable energy in the State. After extensive investigation and assessment of the Hepburn Community Wind Park, Sustainability Victoria decided to give its full support to its development.

Sustainability Victoria, on behalf of the Victorian Government, has committed \$975,000 to help with the establishment of the Hepburn Community Wind Park. A letter of support from Sustainability Victoria is provided in Volume 3.

6.3 *Hepburn Shire Council*

The Hepburn Community Wind Park will assist the Shire in:

- ❑ Realising its Vision.
- ❑ Directly supporting several stated Objectives and Strategies within the 2006-2011 Council Plan.
- ❑ Supporting objectives of the Hepburn Shire Council Tourism Policy.

6.3.1 Vision

The Council's vision is for the Hepburn Shire to be a vibrant, creative rural Shire with strong and healthy connected communities. The natural environment, productive agricultural land and rich heritage will remain valued and protected as assets for residents and visitors to appreciate and enjoy.

The Wind Park supports this vision. Firstly, the Wind Park is an excellent example of a creative community-based solution to taking responsibility for local energy needs. The project is initiated and will be funded and managed by members of the community. As such, it provides opportunities for members to work constructively together and help develop a feeling of connectedness and belonging amongst community members.

Secondly, the Wind Park supports the image of Hepburn as a socially and environmentally responsible Shire, one which values the natural environment and has made a local contribution to protecting it.

With 80% of Australia's mineral springs, the Shire is enjoyed by visitors as an area of beauty and relaxation, as a leading centre in sustainable lifestyle choices. The Wind Park enhances that reputation.

6.3.2 Specific Objectives and Strategies

The Hepburn Community Wind Park directly supports several Objectives and Strategies set out in the 2006-2011 Council Plan, as listed in Table 6.1.

Table 6.1 – Alignment with Council Strategy

No.	Objective	Alignment
1.2	Enhance community connectedness, capacity building and leadership	<p>Community connectedness strengthened by:</p> <ul style="list-style-type: none"> ❑ Widespread participation in a large community owned and managed project. <p>Leadership developed through:</p> <ul style="list-style-type: none"> ❑ Owning and managing the Wind Park, and the Co-operative. ❑ Conducting community education and Wind Park sponsored programs. ❑ The operation of the HREA (Association).
3.2	Foster and encourage leadership	The Wind Park will be the first community owned wind farm within Australia. It will demonstrate the Shire's visionary leadership in providing strategic direction, quality decision making and enhanced community leadership.
3.4	Promote and encourage innovation	Undoubtedly the status of being the first Shire to facilitate such an innovation will become a source of pride within the community, reflecting the community's strong regard for innovation and sustainable living.
4.1	Develop partnerships with educational and research organisations	<ul style="list-style-type: none"> ❑ The project requires community and government co-operation and hence develops these links. ❑ The Wind Park will incorporate community education programs. ❑ Community education on sustainability has already occurred as part of the proposed development and through HREA. (Forums, Information Tables, wind farm tours, etc). ❑ The mere existence of the Wind Park will indirectly educate Victorians about clean energy possibilities.

No.	Objective	Alignment
4.2	Promote and market the Shire	<p>The Wind Park:</p> <ul style="list-style-type: none"> ❑ Will position the Shire as the Australian leader in community owned renewable energy innovation. ❑ Will promote the Shire as being environmentally progressive. ❑ Is a vehicle for investment in local infrastructure for Shire residents. ❑ Makes a substantial contribution to building a friendly, connected and environmentally responsible community which makes the Shire an increasingly attractive place to live, work and invest.
4.3	Encourage and support diversity of economic activity and employment	<ul style="list-style-type: none"> ❑ The Wind Park is a new economic activity and source of employment for the Shire. ❑ Local staff and sub-contractors will be hired during construction and for ongoing management of the Wind Park as well as the Co-operative itself. ❑ Local businesses will supply a large percentage of the products and services required for the Wind Park. ❑ The Wind Park will bring tourists and observers to the Shire. ❑ There is potential to capitalise on education and training opportunities within the wind energy sector.
5.1	Promote and practise environmental management and sustainability	<ul style="list-style-type: none"> ❑ The Wind Park is a significant contribution to sustainable development through providing a large proportion of the Shire's energy using a sustainable resource (wind). ❑ Removes the damaging environmental impact and intensive use of limited resources created through using fossil fuel based energy sources. ❑ Reduces Shire greenhouse emissions by approximately 14,000 tonnes of CO₂ per annum.

6.3.3 Hepburn Shire Council Tourism Policy

The Shire's Tourism Policy lists its first objective as supporting sustainable tourism.

The Hepburn Community Wind Park offers an excellent opportunity in this area. The Wind Park will be a symbol of the sustainable policies and practices of the Hepburn

community. Visitors to the Shire will learn about the need for renewable energy within a sustainable environment. Visitors to the Shire will feel they too are taking responsibility for their energy requirements.

The Wind Park may also prove to be a model for employing small scale wind energy in regional areas. It is likely that being the first community owned wind farm in Australia it will be the subject of much interest by media agencies, community groups and educational institutions. All of this will draw attention and visitors to the Hepburn Shire.

Regional areas with wind farms have enjoyed the benefits of increased visitors and tourists. There have been flow-on effects such as opportunities for tour operators, construction of visitor and interpretative centres, plus roles for educators. Community owned wind farms in Europe and Canada have been the subject of many documentaries, case studies and research articles.

The Wind Park brings another attraction to the Shire, one which is congruent with the Shire's image of being environmentally conscious and innovative, with a cohesive community and social structure.

7 PLANNING ASSESSMENT

The proposed design of the Hepburn Community Wind Park is the culmination of over 18 months investigation and assessment.

As the effects of climate change are being discussed more widely and seriously than ever before, the value of this project to the Hepburn community becomes ever greater.

This section details the various criteria for planning assessment of the Wind Park.

7.1 *Landscape and Visual Assessment*

There are no dwellings within 500 metres of the Wind Park's turbines.

A full Landscape and Visual Assessment Study has been completed by John Cleary Planning and is provided in Volume 2.

The assessment process included a number of components as follows:

- ❑ Identification of places or characteristics that the local community values highly (conducted as part of the project's community involvement program – see Section 4.3.3).
- ❑ An assessment of existing landscape values of the region.
- ❑ Definition of management aims and standards based on the objectives of key agencies, management precedents, and contemporary approaches to the management of landscape values.
- ❑ An assessment of physical changes, areas visually affected, visibility and appearance.
- ❑ An assessment of the impact that the assessed physical and visual changes will have on the landscape values of the region.
- ❑ An evaluation of the development based on the assessed impact and its compliance with objectives and standards.

- ❑ Recommendations and design guidelines (that may include modifications) outlining design treatments that will help ensure the development is appropriate for the site, that area's values, and will minimise impacts on values.

The Landscape and Visual Assessment made the following evaluations:

- ❑ The siting of the turbines has been designed to respond to the values of the area with the turbines located on the south-east side of Leonards Hill thereby maximising the distance from residences and roads.
- ❑ The Wind Park lies within a rural character type and this character will be retained but will be affected by the Wind Park structure, largely at a local level. The Wind Park will have a low effect on landscape character at a regional level. It will have a low to moderate effect on the character of a Level 2 travel route (Ballan–Daylesford Road).
- ❑ A low proportion of the significant features of the region (the high point of Leonards Hill) will be affected.
- ❑ The Wind Park will have little effect on views (i.e. will not obstruct them), access, wilderness quality and recreation values.
- ❑ The cumulative effect on the country to the south of Daylesford, from the Wind Park, is very low.
- ❑ The effect on tourism values could be positive.

The Landscape and Visual Assessment includes various recommendations including:

- ❑ The use of specific paint types and colours. These have been accepted and incorporated into the design of the Wind Park (see Section 3.2).
- ❑ Continuing to consult with nearby neighbours in relation to potential screening techniques such as providing planting of selected vegetation if reduced views are preferred.

7.2 Views of the Wind Park

One of the key reasons behind the selection of the Leonards Hill site was its minimal impact upon significant landscape values. Unlike many of the other hills within the Shire, Leonards Hill has not had a Significant Landscape Overlay placed on it.

Due to the large amounts of natural vegetation around the hill, views of the turbines will be heavily screened when close to the hill.

The best uninterrupted views of the Wind Park will be further from the hill at distances of approximately 3 kms. Some areas in Sailors Falls will provide the best views of the Wind Park.

The Landscape and Visual Assessment Study provided in Volume 2 contains photographic simulations of the Wind Park from a series of vantage points around the district.

7.2.1 Views from Close to the Wind Park

The ideal method for gaining an understanding of the potential views of the Wind Park from near the site is to assess the current views of the installed wind monitoring tower. This monitoring tower is placed relatively close to the proposed position of western turbine.

The existing monitoring tower is 50 m high and is therefore close to three quarters the height of the proposed wind turbine towers and a little less than half the height of both the wind turbine tower and turbine blade.

Much of the area around Leonards Hill will not afford views of the turbines due to the large amount of roadside vegetation along both the Ballan–Daylesford Road and the Leonards Hill–Bullarto South Road.

There are no dwellings within 500 metres of a wind turbine.

A visual assessment for each of the 18 dwellings within 1 kilometre of a wind turbine is provided in the Landscape and Visual Assessment Study in Volume 2.

7.2.2 Sailors Falls Vantage Points

Residents in Sailors Falls will see the wind turbines from certain locations. The best views are from Telegraph Road relatively close to the Ballan–Daylesford Road. A photographic simulation from Telegraph Road is included in the Landscape and Visual Assessment Study in Volume 2.

7.2.3 Daylesford Vantage Points

Daylesford is approximately 10 kms from the Wind Park. From key vantage points, Leonards Hill is quite discernable given good weather conditions. Correspondingly, in good weather conditions, it will be possible to have a clear view, if somewhat distant, of the wind turbines at the Wind Park.

7.2.4 Visitor Driving Routes

The main access routes to Daylesford and other Hepburn Shire key tourist locations are via Ballan and Woodend.

The route via Ballan (Western Highway) provides limited to non-existent views of the Wind Park due to the roadside vegetation and the Wombat State Forest in general.

The route out of Daylesford towards Ballan provides intermittent clear views of the Wind Park from areas around Sailors Falls and the Sault Reception Centre through to the Leonards Hill area.

7.3 Flora

The Department of Sustainability and Environment (DSE) has advised that a Flora Survey Report is not required as part of this application for a planning permit. This is explained as follows:

The department has inspected the subject site and found that past and present land uses (e.g. cultivation, grazing, introduction of exotic species, etc.) have had such significant impacts on native vegetation, that little or no native vegetation exists on the site (i.e. with the exception of a small area at the southern end of CA B4, which is unlikely to be impacted upon).

The letter of advice from DSE is attached in Volume 2.

7.4 Fauna

7.4.1 Background

(Below information sourced from www.AUSWEA.com.au) Wind turbines, like virtually all tall man-made structures, present a collision risk to birds and bats. The risks however are very low when compared to risks of collision with other structures such as communications towers, tall buildings and transmission towers. The impact of wind turbines on birds and bats is insignificant compared to the impact of domestic cats and the loss of habitat through development or even more dramatically, the chronic impact of ecological change due to climate change. Statistics gathered from wind farm experiences both overseas and within Australia demonstrate this.

Overseas Experience

A US study published in 2001 found that the number of bird collisions per year were as follows:

- ❑ Vehicles: 60 – 80 million
- ❑ Buildings and windows: 98 – 980 million
- ❑ Powerlines: (tens of thousands) – 174 million

- ❑ Communications Towers: Up to 50 million
- ❑ Wind Generation Activities: Up to 40,000

The study found that wind farms killed an average of 2.9 birds per turbine, per year. However this statistic included the fatalities at early wind farms which were unfortunately sited in areas of high avian usage.

Australian Experience

Australian figures are lower than overseas rates due to a lower overall quantity of night-migrating songbirds and more carefully sited wind farms.

- ❑ **Codrington Wind farm:** (14 Turbines). 4 bird deaths and 1 bat death over 3 years. None of these were rare, threatened or endangered species. Behavioral studies since opening indicate that water-birds seem adept at avoiding the turbines.
- ❑ **Stanwell's Toora Wind farm:** (12 Turbines). 6 bat deaths in 1 year, declined magpies and ravens in the area, while skylarks and gold-finches increased. Wedge-tailed eagles were regularly observed before and after operations began, but these were observed to avoid the turbines by flying around or between them, not into them. Over two years, surveys have found no evidence of significant levels of bird mortality, with the impact confined to indirect effects on common farmland birds. Impact upon bats has no conservation significance.
- ❑ **Woolnorth Wind Farm, Tasmania:** (37 Turbines). Stage 1 bird study results found mortality rates were lower than predicted. After 2003, 9 birds were reported as having collided with the wind turbines, one being a wedge-tailed eagle, which is threatened within Tasmania but not mainland Australia. Hydro Tasmania has been required to make a contribution to species recovery.

Overall, these Australian experiences repeatedly show a consistent situation of wind farms having a low impact upon birds or bats.

7.4.2 Wind Park Fauna Assessment

A Fauna Assessment was conducted by Ballarat University and is provided in Volume 2.

The Assessment found that there are no indications within the existing Atlas of Victorian Wildlife (AVW) records, or from the site assessment, that significant species utilise the proposed Wind Park site. The habitat present at the Wind Park site does not provide a suitable habitat for significant species recorded in the surrounding area. There are no indications that the Wind Park would have a significant impact on any species or species group.

Overall it was assessed that the risk associated with the Wind Park is low for threatened and listed species, birds that flock or occur in low numbers, and species or groups of species that are prone to collision with turbines or to indirect effects from wind farms.

7.5 Biodiversity

As described by DSE, the site is considered to have little or no native vegetation, whilst the Fauna Assessment found the site provides no significant habitat location for any species. Accordingly, it assessed that the development of the Wind Park will have a low impact on the biodiversity of the bio-region.

Animals, birds and plants that currently use the site (such as common farmland birds, and insects) will continue to utilise the area during construction and operation of the wind farm. Construction of the wind farm will disrupt the soil in select areas and the noise of construction may cause some birds to fly away from the site. The overall impact upon biodiversity is considered minimal and is comparable to any other construction activity or other human activities, such as vehicle use on roads, within the area.

In terms of perspective, it is important to recall that the aim of renewable energy sources is to reduce the impact of climate change, which, in comparison to wind turbines, presents a massive threat to biodiversity. As quoted in the Steffen Report (Volume 2):

The Millennium Ecosystem Assessment (MEA) projects significant and largely irreversible loss of biodiversity this century, due to a combination of direct human modification of habitat and climate change, with the latter expected to play an increasingly important role later in the century. The extinction rate, currently 100 to 1000 times greater than the background rate as shown in the fossil record, is projected to increase by more than 10 times this already high rate. The MEA reports, with medium to high certainty, that 10-30% of all mammal, bird and amphibian species are currently threatened with extinction.

7.6 Cultural Heritage Impact

The Wind Park site falls under the area of the Wurrundjeri Tribe Land Compensation and Cultural Heritage Council Incorporated for statutory purposes. However the traditional landowners of the Wind Park site are the Dja Dja Wurrung people. (Refer to letter from Department of Victorian Communities, Aboriginal Affairs Victoria provided in Volume 3.)

An Archaeological Assessment was contracted to be performed by consultant archaeologists under the monitoring of a representative from the Wurrundjeri people. However, as a matter of respect, the Dja Dja Wurrung were invited to attend the assessment.

Additionally, regular communication with Uncle Brien Nelson, a respected elder of the Dja Dja Wurrung, continues in order to ensure he is informed of all aspects of the Wind Park design and progress.

It is hoped the Dja Dja Wurrung people will continue to be involved in the Hepburn Community Wind Park.

7.6.1 Aboriginal Heritage Issues

An Archaeological Field Survey including sub-surface testing was conducted by TerraCulture Pty Ltd on 3rd August 2006 and monitored by Mr Bill Nicholson representing the Wurrundjeri Tribe Land Compensation and Cultural Heritage Council Incorporated.

Sub-surface testing was conducted around the sites of each turbine location. No traces of Aboriginal archaeological artefacts or features were recorded in either turbine area.

The Assessment recommended no further investigations were required.

7.6.2 European Heritage

The Archaeological Assessment found that no historical sites are known to be on or within the vicinity of the subject land.

As such there is no identified impact upon European heritage issues.

7.7 Noise Impact

7.7.1 General

Anyone who has visited a modern wind turbine will attest to how surprisingly quiet they are.

Advances in technology have reduced the noise that wind turbines make. The wind turbine gearbox and generator will emit some noise, and noise is also created from the ‘swoosh’ of the blades. The wind blade noise decreases in low wind periods and increases in high wind. Noise impact needs to be considered against the amount of background noise to which the listener is already subjected. Hence in high wind periods, the noise of wind itself may mask the increased noise of the wind turbine blades. Similarly the regular sounds of traffic and hums of electrical goods in homes can mask low sounds. The sound of a wind farm 100 metres away would be inaudible in many urban areas due to normal background noise. In general terms, the type of wind turbines being considered for the Wind Park are such that a normal conversation could be held at the base of a wind turbine without any need to raise one’s voice.

7.7.2 Required Standards

The *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria* state that noise levels should comply with the *New Zealand Standard NZS6808:1988 Acoustics – The Assessment and Measurement of Sound from Wind Turbine Generators* (www.standards.co.nz). This requires that for nearby dwellings, the noise of the wind farm must be below 40 decibels (dBA) or 5 dBA above background noise levels, whichever is the greater.

A full Noise Assessment has been carried out by Marshall Day Acoustics Pty Ltd and is provided in Volume 2. This Assessment found that all resident sites clearly and easily comply with the Guidelines.

7.7.3 Noise During Construction

Noise will be created through the actual construction of the Wind Park. This will be caused by truck movements and some building activities. These type of activities will only occur during normal working hours to reduce the impact upon nearby dwellings. The total construction period is expected to be approximately two months, half of which will involve very little on site activity.

7.8 Other Potential Impacts

7.8.1 Blade Glint

Blade glint occurs with reflection of the sun's rays off the turbine blades. In accordance with the recommendations contained within the Landscape and Visual Assessment (Volume 2) the blades for the Wind Park will be finished with a low-reflectivity paint. This will ensure that any potential impact from blade glint will be minimised or avoided completely.

7.8.2 Shadow Flicker

The movement of wind turbine blades can create a moving shadow, which varies in length and size depending upon the position of the sun in the sky. This rotating shadow does not turn fast enough to produce any health effects. However, it could cause a nuisance if it affects a dwelling.

Careful siting of individual wind turbines can avoid the potential for shadow flicker. Shadow flicker is largely limited to locations to the east or west of wind turbines in line with the setting and rising sun, respectively.

A draft South Australian planning bulletin on wind farms notes that shadow flicker is unlikely to be a significant issue if a separation distance of 500 metres is maintained between the turbine and any dwelling or defined urban area. There are no dwellings within 500 metres of either turbine in the Wind Park.

It is a further guideline of the *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria* that shadow flicker experienced by any dwelling must not exceed 30 hours per year.

A full Assessment of Shadow Flicker impact was carried out by Garrad Hassan Pacific Pty Ltd and is provided in Volume 3. This Assessment incorporates information about the turbine positions, locations of dwellings, the varying position of the sun in the sky throughout the year, the incidence of cloud cover and surrounding screening vegetation.

The Assessment found all dwellings comply with the Guidelines.

7.8.3 Electromagnetic Interference (EMI)

In general VHF and UHF frequency band radio signal and digital voice based technologies such as GSM and CDMA mobile are essentially unaffected by a wind farm development.

An Assessment of Electromagnetic Interference Issues was carried out by Garrad Hassan Pacific Pty Ltd and is provided in Volume 3.

It concluded that no broadcast or communication towers were identified within 1 km of the Wind Park and therefore analogue television broadcast signals will not be affected.

Additionally no point to point transmission signals were identified within 2 kms of the site and therefore the Wind Park will not interfere with any microwave communications.

There will be no impact on radio or television transmission.

7.9 Aviation Impact

7.9.1 Aviation Facilities Nearby

The Civil Aviation Safety Authority (CASA) have been consulted regarding the proposed Wind Park. CASA has advised there are no certified or registered aerodromes near the Wind Park site.

Mr Frank Leonardi, Aerodrome Engineer in the Airways and Aerodromes Branch of CASA has advised that the site is not within any Obstacle Limitations Surfaces. CASA advises therefore, that due to the top of the wind turbine structures being lower than 110 metres above ground level, there is no requirement to advise CASA. This is covered under Subpart 139.E Obstacles and Hazards of the *Civil Aviation Safety Regulations 1998* (CASR) a copy of which is provided in Volume 3.

However in keeping with *CASA Advisory Circular AC 139-08(0) April 2005 Reporting of Tall Structures* which is provided in Volume 3, notification will be made to the Royal Australian Air Force Aeronautical Information Service to include the wind turbines on their database of tall structures upon construction of the Wind Park.

7.9.2 Night Lighting

As the overall height of the wind turbines will be less than 110 metres above ground level there will be no requirement to install night lighting on the turbines.

7.10 Socio-Economic Impact

The socio-economic impacts of the Wind Park will be overwhelmingly more positive than negative. A discussion of these impacts is provided below.

7.10.1 Positive Impacts

As described earlier (Section 5), it is predicted with confidence that the Hepburn Community Wind Park will have many positive impacts upon the Shire's society and community, plus several economic benefits. In summary these include:

Community

Increased social cohesion, co-operation and local pride, via the use of a Co-operative, and through the HREA's continued community activities.

Social

Increased regional employment, opportunities for individuals to gain new skills and knowledge of the wind industry.

Economic

Increased tourism and visitors as a result of high exposure as the first Australian community owned wind farm, benefits of local employment and the 'buy local policy' of the project, benefits of increasing the skills and capacity of local residents.

7.11 Environmental Management Plan

An Environmental Management Plan (EMP) will be developed on project authorisation. Given the strong environmental concerns of the HREA, it is intended that the EMP will achieve best practice in delivering the project in the most environmentally conscious and sustainable manner. The EMP will be published on the HREA website for public viewing. The EMP will include:

- ❑ Principles of environmental management.
- ❑ Measures to mitigate environmental effects.
- ❑ Standards to be met.
- ❑ Maintenance and monitoring requirements.
- ❑ Decommissioning and rehabilitation requirements.
- ❑ Post-construction review of management measures to ensure best possible outcomes.

8 CONCLUSION

In conclusion, the Hepburn Community Wind Park presents immense benefits with very low impacts. These can be summarised as:

Impacts

- ❑ Very low impact upon visual amenity.
- ❑ Very low to negligible impact upon fauna/flora or biodiversity.
- ❑ Minor impacts upon traffic and noise during construction.
- ❑ No impacts upon heritage or Aboriginal values.
- ❑ No impact upon aviation activities.
- ❑ Widespread community support.

Benefits

- ❑ A clean source of energy for the Hepburn Shire region, for 25 years.
- ❑ Shelter the Hepburn shire from possible impacts of reductions in fossil fuel availability or increased fossil fuel prices as society seeks to implement legislative and fiscal responses to curb climate change.
- ❑ Financial benefits for individuals, landowner, and local businesses through increased local investment, employment and visitor numbers.
- ❑ Community building and opportunities for participation and leadership for community members in a local project.
- ❑ A new tourist site for the region, bringing increased visitors and profile.
- ❑ Enhanced image of Hepburn Shire as being a progressive, cohesive and environmentally friendly region.

Context

With reliable evidence that climate change is occurring and even accelerating, governments globally face the difficult task of responding to this threat. As stressed within the United Nations sponsored IPCC reports, the sooner communities and regions commence an adaptation strategy, the easier the inevitable change and transition will be. Recognising the seriousness of this situation the Victorian Government has multiple strategies and policies in place to support the development of renewable energy sources.

The model of community owned wind farms has already proven highly successful in Europe and the U.S. The two turbine Hepburn Community Wind Park fits perfectly with the reputation of the Hepburn Shire.

The Hepburn Shire is in a unique position to be the leading Australian community, taking responsibility for its own energy requirements and at the same time enhancing the Shire's profile and reputation.

9 REFERENCES

Steffen, Will, *Stronger Evidence but New Challenges: Climate Change Science 2001-2005*. Department of Environment and Heritage, Australian Greenhouse Office, March 2006

Intergovernmental Panel on Climate Change (IPCC), Third Assessment Report (TAR). *Climate Change 2001: Synthesis Report Summary for Policymakers*. Presented at the IPCC Plenary XVIII (Wembley, United Kingdom, 24-29 September 2001)

PROPOSED HEPBURN COMMUNITY WIND PARK



LANDSCAPE AND VISUAL ASSESSMENT STUDY

Prepared for
Future Energy Pty Ltd

Prepared by

JOHN CLEARY **PLANNING**

2006

PROPOSED HEPBURN COMMUNITY WIND PARK

LANDSCAPE AND VISUAL ASSESSMENT STUDY

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Contents

	Page
Part One - Introduction	1
1.1 Study Background	1
1.2 Study Area Description	1
1.3 Relevant Studies/Reports	5
1.4 Study Process and Scope	6
1.5 Definitions	8
1.6 Report Structure	9
Part Two - Landscape Values	10
2.1 Community Perceptions and Values	10
2.2 Landscape Character Classification and Description	12
2.3 Landscape Significance	18
2.4 Community Use	20
2.4.1 Circulation and Activities	20
2.4.2 Sensitivity Levels and Distance Zones	21
2.5 Views and other Sensory Characteristics	25
2.6 Wilderness Quality	25
2.7 Regional Extent of Values	26
Part Three - Planning Framework Objectives	28
3.1 Planning Framework Objectives	28
3.2 Project Landscape Management Objectives	30
Part Four - Impact Assessment	33
4.1 Development Elements and Physical Changes	33
4.2 Areas Potentially Visually Affected	33
4.3 Visibility and Appearance	36
4.4 Impact on Values	46
4.5 Recreation and Tourism Values	49
4.6 Cumulative Effect	49

Parts Five - Evaluation	50
5.1 Compliance with Planning Framework Objectives	50
5.2 Community Attitudes	54
5.3 Summary	55
Parts Six - Recommendation and Modifications	56
Parts Seven - Conclusion	57
Appendices	
1 Types of Values	58
2 Data Sources for the Assessment of Landscape Values	59
3 Sensitivity Level Criteria	60
4 View Data Variables	61
5 3D modeling/ Renderings Techniques and Accuracy	62
Bibliography	64
Illustrations	
Figures	
1. Management Process for Landscape Values	6
Maps	
1. Study Area and Site.	3
2. Landform Relief	4
3. Landscape Character and Significance.	27
4. Area Potentially Visually Affected, Buffer Distances, Residences	35
5. Neighbouring Residences	41
Plates	
1-8 Photographs looking towards the site.	14-17
9 Sailors Falls	20
10 Typical roadside vegetation	25
11-18 Photographs looking towards the site with turbines simulated.	42-45
19 Proposed colours for the turbines.	56

Part One - Introduction

1.1 Study Background

This report documents the landscape assessment and related evaluation of a wind park proposed at Leonards Hill, adjacent and east of the Ballan Daylesford Road, approximately 10 kilometres south of Daylesford. It includes:

- a summary of landscape values of the area;
- objectives and standards that apply to the management of landscape values in the area;
- an assessment of the development's visibility and appearance and the impact that will have on the landscape values of the area;
- an evaluation of the development based on the assessed impact and its compliance with objectives and standards; and
- recommendations, including modifications, that will help minimise impacts on values and achieve better compliance.

The proposal consists of two wind turbines with the maximum overall height of each wind turbine being 110m, each with an output of approximately 2MW. The turbines are to be arranged in an approximate east-west alignment on the southern shoulder of Leonards Hill. The overall capacity of the park is approximately 4MW, equivalent to supplying approximately 2,500 homes. The turbines will be connected by underground cabling and will supply electricity directly into the grid through the transmission line that runs through the Wind Park property. The location of the proposed wind park is shown on Map 1. The layout plan for the turbines and other components is provided in the wind park development application report. The proponent is the Hepburn Renewable Energy Association Inc.

Underlying this study is the recognition that landscape values are a vital component of people's enjoyment of the area and are a strong influence on people's sense of well-being and quality of life. It is also recognised that these values are a major component of recreation and tourism, and as such are a major contributor to the prosperity of the region.

This study has been undertaken to enable the proponent to understand and therefore minimise the impact of the proposal on landscape values and as a requirement to address these values in the Development Application process. It follows a preliminary assessment of the proposal, consultation, and refinement of development design.

1.2 Study Area Description

The proposed wind park is situated at Leonards Hill, in the Shire of Hepburn, approximately 10 kilometres south of Daylesford (Map 1). The wind park is located on a private landholding. The turbines are approximately 250m apart and are located on high ground to the east of the Ballan Daylesford Road. Access to the site will be from the Ballan Daylesford Road.

Leonards Hill sits forms part of the Great Dividing Range, separating the catchments that flow to the north from those that flow to the south (see Map 2). Leonards Hill is a high point (approximately 741m AHD) on the Great

Dividing Range, a broad east-west ridge, and rises approximately 50m above the surrounding country. There are other high points to the east, including Coghlands Hill, Mt Wilson, and a high ridge in Wombat State Forest north of Blakeville, which are all higher than Leonards Hill. The landform falls away to the Moorabool River in the south and more steeply into Sailors Creek in the north. Daylesford and Wombat Hill (approximately 662m AHD) are visible in the north. The landform is generally rounded ridges and rolling slopes dissected by valleys that vary from broad and flat to deep and distinct (eg. Sailors Creek valley).

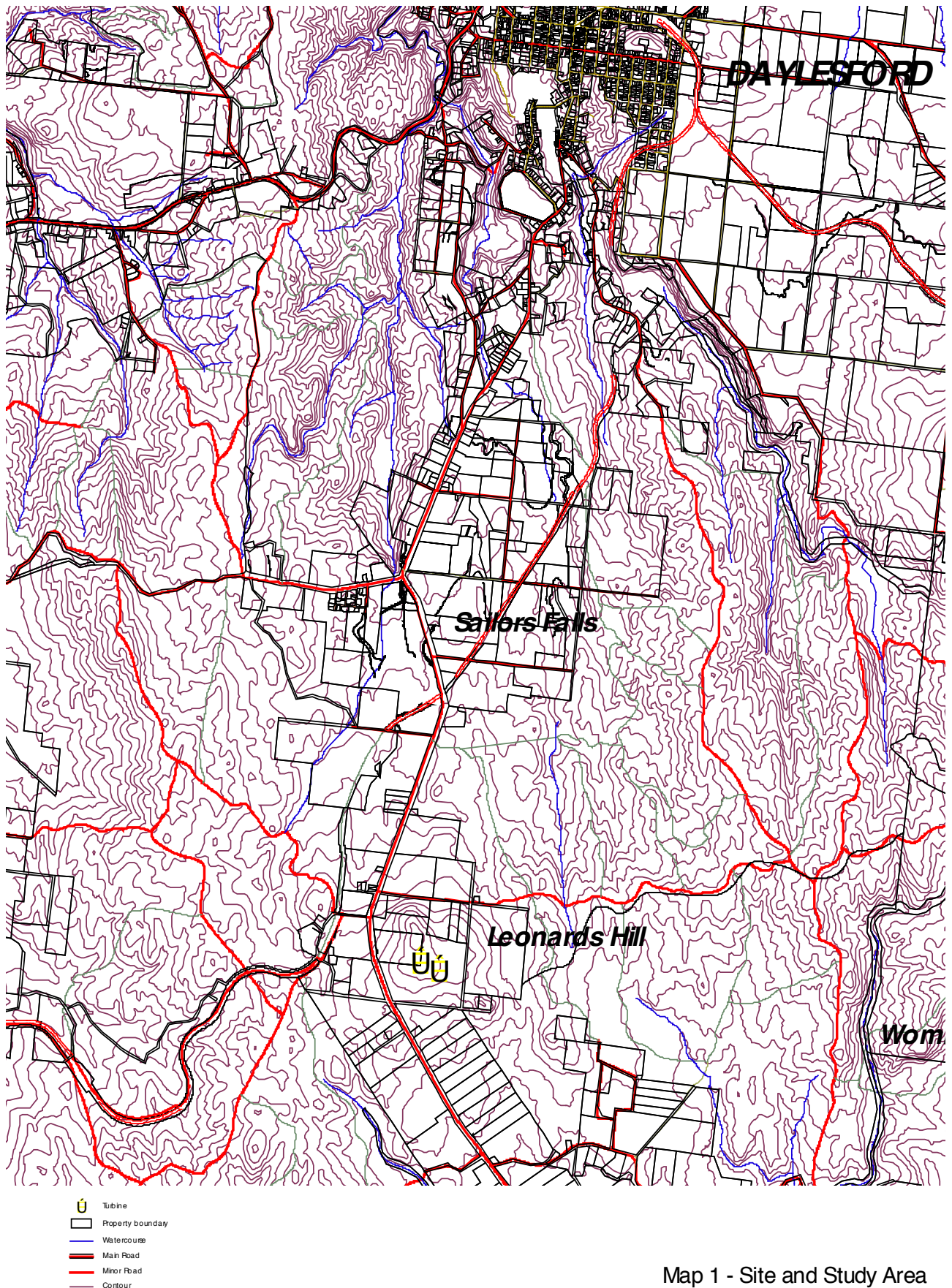
Leonards Hill is cleared and lies within a largely cleared corridor that follows the north-south alignment of Ballan Daylesford Road. Beyond this cleared corridor to the east and west lies Wombat State Forest with tall messmate forest. The cleared areas are used for agriculture and rural 'lifestyle' properties.

The rural area is generally moderately populated with greater densities of residences occurring close to the roads and in the localities of Leonards Hill, Spargo Creek and Sailors Falls. The town of Daylesford is the main population centre.

There is a public hall to the north-west of Leonards Hill and a reserve at Sailors Falls 4km to the north of the site.

The Ballan Daylesford Road runs north-south to the west of the site, connecting Daylesford with Ballan (and the freeway). There are a number of other minor link and local access roads in the area, including the Leonards Hill South Bullarto Road to the north, Barkstead Road to the west, and Liversidges Lane and Telegraph Road off Ballan Daylesford Road to the north.

Further insight relating to the study area is provided in the description of values, the photographs and maps later in this report.

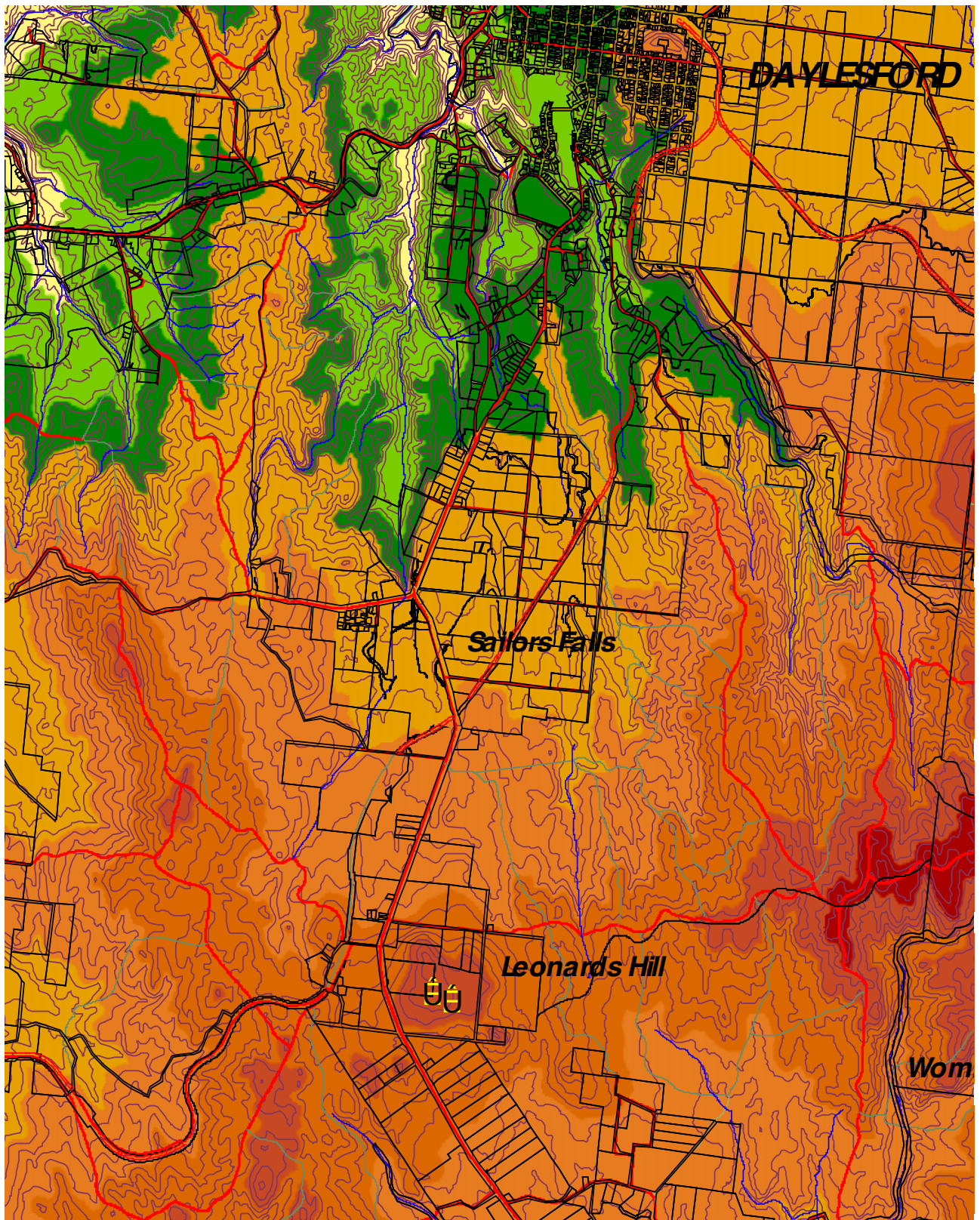


Map 1 - Site and Study Area

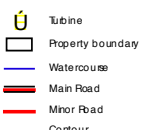
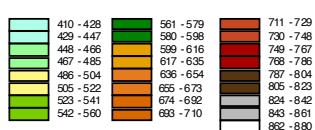
**Proposed Hepburn
Community Wind Park**

**Landscape & Visual
Assessment Study**

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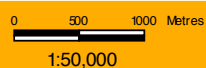


Elevation (m)



Map 2 - Landform Relief

**Proposed Hepburn
Community Wind Park**



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1.3 Relevant Studies and Reports

Policy and planning guidelines for Development of Wind Energy Facilities in Victoria

The document describes, amongst other things, a number of aspects of two sets of visual impact factors, one set that visual impact 'depends on' and the other set that visual impact 'relates to'. It also defines 'features of the landscape', the basis for evaluation of proposals, and measures to reduce impact. Evaluation, as described, depends heavily on the planning scheme objectives and overlays, and the Government's policy in support of renewable energy development. Significant Landscape Overlays are also described as the 'appropriate' method for defining values (although they do not exist for many places in Victoria) ('features', as described in the guidelines, may also overlap with values). Although there is a stated, implicit desire to minimise impacts on landscape values, there are no other explicit objectives or standards in the policy or guidelines.

Landscape Character Types of Victoria (Hammond & Leonard 1983)

This provides a description of the Landscape Character Types in Victoria. Frames of reference are provided for assessing scenic quality within these settings.

Shire Planning Scheme

These include the State Planning Policy Framework, and local policies within the Municipal Strategic Statement. They also include zones and designations for all the land within the Shire, and include a list of conforming uses, issues to be considered, and a series of overlays with objectives and decision guidelines for these overlays.

Heritage Lists

These contain various categories of listing (eg. Registered, Indicative) for places that are considered to have heritage significance.

1.4 Study Process and Scope

The study process is based on the methodologies employed in other recent similar landscape studies (see Cleary *et al* 1999, CALM 1997, John Cleary Planning 2002). It includes a number of components, as follows:

- Identification of places or characteristics that the local community valued highly (conducted as part of the project's community involvement program);
- An assessment of existing landscape values of the region;
- Definition of management aims and standards based on the objectives of key agencies, management precedents, and contemporary approaches to the management of landscape values;
- An assessment of physical changes, area visually affected, visibility and appearance;
- An assessment of the impact that the assessed physical and visual changes will have on the landscape values of the region;
- An evaluation of the development based on the assessed impact and its compliance with objectives and standards;
- Recommendations and design guidelines (that may include modifications) outlining design treatments that will help ensure the development is appropriate for the site, the area's values, and will minimise impacts on values; and
- A conclusion.

These components relate to a management process outlined in Figure 1 (below).

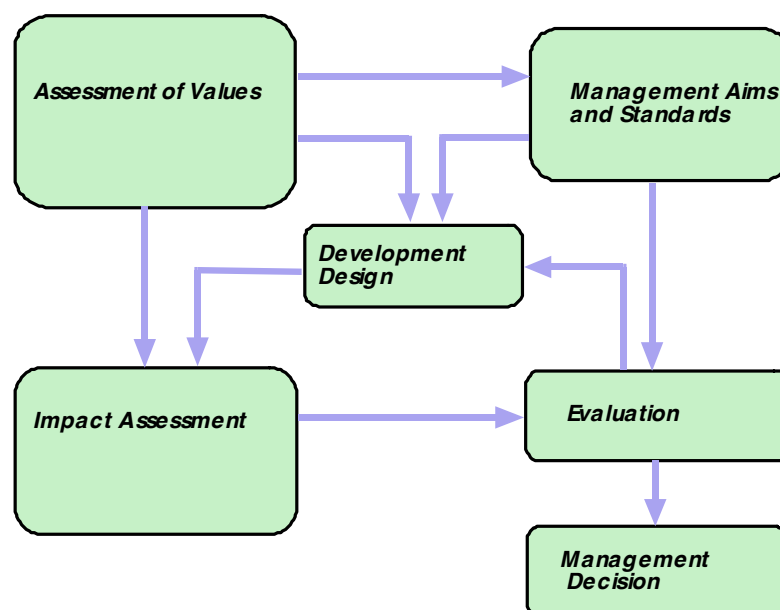


Figure 1 – Management Process for Landscape Values

The process for this study can also be expressed in terms of the following key questions:

Assessment of values

- What are the general characteristics of the area that are relevant to human experience?;
- How do people perceive the environment, which characteristics of the environment do they value most, and which do they value most for landscape reasons?;
- How do people use and experience the area?;
- How can these variables be best represented for planning purposes?;

Management aims and objectives

- What are the management and planning framework aims, objectives and standards apply to the study area?;

Impact assessment

- What types of physical changes are likely to occur as a result of development?;
- What areas will be visually affected by the proposal and what will be the visibility and appearance of the proposal from these areas?;
- Given these visual characteristics, what will be the impact on existing landscape values?;
- What will be the effect on recreation and tourism values?;
- What will be the cumulative effect?;
- What will be the effect on neighbours?;

Evaluation

- Given the impact of the proposal on landscape values, will management objectives be met?;
- What is current community sentiment in relation to the type of development proposed?;

Recommendations, design modifications and guidelines

- What planning and design principles will minimise the impact of the proposed development given the unique characteristics of both the area and the proposal?;
- If management objectives are not met, what modifications can be made to the proposal to achieve better compliance?;
- What treatments will minimise the effect on neighbours?;

Conclusion

- What is the final evaluation of the proposal given the assessment work completed and after possible modifications and recommendations are made?.

1.5 Definitions

A number of terms are commonly used in discussion of the topics covered by this report. Definitions used in this report for some of these terms are provided below.

3D Modelling is a technique, usually performed on a computer, where landform and objects are accurately and mathematically defined in three-dimensional space. This allows the reconstruction of views of these landform and objects from any location using a rendering process that applies textures to 3D forms to make them appear realistic.

Aesthetics refers to personal appreciation and enjoyment of things (eg. objects, places, and processes). It can include beauty, functional and non-functional aspects of things, and does not necessarily include visual qualities (see Appendix 1 for illustrated typology).

Area Visually Affected is the area that is within 'line of sight' of any part of the 3D form of the development.

Cross Sections depict an object or area with part of the object or area cut away to highlight the profile or shape at the plane that defines the cut.

Evaluation is the process where assessment results are examined and used to make decisions about alternative futures, usually based on given standards.

Impact Assessment is a process of determining how changes to the environment will affect landscape values.

Landscape Assessment is a process of analysing and mapping environmental characteristics and, using known criteria, determining those that contribute most to the experience and enjoyment of people.

Landscape refers to a person's perception or image of an environment (ie. it is a human construct). *Landscape Value* is the value they attach to a place based on their perception of that place. *Landscape Value* and *Visual Aesthetic Value* are often used synonymously (see Appendix 1 for illustrated typology).

Landscapes stem from perception. Through the process of perception people create their own 'landscapes', their interpretation of an environment (ie. 'their environment as they know it') (Meinig 1979, Zube et al 1982, Lowenthal 1978). There are two other main usages. The first refers to a scene (as in a landscape painting). The second refers to an area that has a common pattern of bio-physical features (as in a landscape ecology).

Perception is the process where environmental information is combined with a person's existing knowledge, emotional response and values.

Seen Area is a term used to describe the land surface that is potentially visible from a given point.

Sensory characteristics relate to the paths by which people receive environmental information (eg. vision, hearing, etc.).

Values are measures of the importance people attach to things and typically stem from perception.

Visual Absorption Capability describes or indexes an area's ability to visually absorb or sustain change based on variables such as landform, vegetation pattern and height, and existing land use.

Visual Aesthetic Value refers to the visual aspects of aesthetic value. *Aesthetic Value* refers to personal appreciation and enjoyment of things (eg. objects, places, and processes). It can include beauty, functional and non-functional aspects of things, and does not necessarily include visual qualities.

Visual characteristics relate to information received through the visual sensory path.

The terms *visual*, *aesthetics* and *landscape* are often used synonymously or combined, despite their different definitions. This study includes a *landscape* assessment that focuses on *visual characteristics* and *aesthetic values*.

1.6 Report Structure

This report is divided into 7 main parts:

- Part 1 is introductory and describes the context and nature of the study and report and briefly explains the study process.
- Part 2 includes the assessment of values.
- Part 3 defines management objectives and standards within the planning framework that relate to landscape values.
- Part 4 includes an assessment of the impact of the development on landscape values.
- Part 5 includes an evaluation of the impact of the development based on the management objectives of the area.
- Part 6 includes recommendations and design guidelines that will help minimise the impact of the development.
- Part 7 is the conclusion.

Part Two - Landscape Values

Landscape values in this study have been identified by a procedure that is commonly referred to as landscape assessment. This part of the report describes each step of the landscape assessment process and summarises the results.

The assessment (of landscape values) consists of three main components:

1. an understanding of community perceptions and values (see Section 2.1);
2. formulation of criteria that define the value types, particularly significant values (see Section 2.3);
3. systematic assessment of the study area using the defined criteria (see Section 2.2 to 2.7).

The assessment of landscape values reported here focuses on the aesthetic significance of natural features and rural use areas. Settlement areas are also included if relevant. Aesthetic significance is based largely on visual characteristics but also includes other relevant aesthetic values such as those associated with other sensory characteristics and scientific, social and historic aspects of places. These latter values are listed or described as appropriate but not assessed in this study.

The main components of aesthetic value in this assessment are landscape character, landscape significance, access, views, and wilderness quality. These categories of value reflect the key values generally identified by the community in discussions, workshops and responses to development proposals.

The assessment method attempts to address the values of neighbours, local community values, the values of the general community, and the values of the 'future' community.

These components fit into an overall landscape management structure that has been illustrated in Figure 1 (p6).

2.1 Community Perceptions and Values

Formal assessment of landscape values is based on knowledge of community perceptions and values. This knowledge can be gained from various sources, including:

- the large body of general perception research that already exists,
- perception testing of the local community,
- surveys, workshops and discussions with visitors, neighbours and the local community,
- documented community sentiment relating to past land use changes or proposals;
- survey of publications relating to the study area (to identify the values promoted, and any comment from the community), and
- formal aesthetic theory.

A comprehensive community involvement program has been conducted for the project, which included formation of a renewable energy association. Two community workshops were organised by the association in August 2006 to explore the values and concerns of the community. One workshop was held at Leonards Hill (in the hall) and the other in Daylesford. Outcomes from these workshops identified a range of values, including:

- Wombat State Forest – natural features/native vegetation;

- wildlife/local fauna – birds and bats including 2 pairs of eagles;
- The Great Divide, including symbolic and scenic values;
- Great Dividing Trail;
- historic feature, including Leonard's Hill Hall;
- rural amenity/character;
- views and rural views, including from Daylesford/Wombat Hill;
- peace and quiet, tranquillity;
- aboriginal values, sacred sites, artefacts;
- Sailors Creek source/catchment;
- natural springs and underground water;
- good catchments for dams;
- minimal development;
- seclusion;
- night sky – dark, still;
- alternative lifestyles;
- space – layers, size;
- clean air/little pollution;
- hunting birds of the forest;
- sense of place – aboriginal;
- migratory birds; and
- tourism;

These outcomes have helped get a better understanding of the types of places thought to be important, allowing validation or refinement of the criteria used to identify the most important features in the systematic assessment. They also directly help identify places that meet the criteria and can also be regarded as a direct nomination of places of value.

Understanding the range of values also helps us to classify the values, which assists with defining the assessment criteria. For example, in discussion and responses to questions relating to landscape values, people often talk about 'the local character', 'special features', access to places, views, and a 'sense of remoteness'. These have been incorporated into the assessment process as landscape character, landscape significance, access, views, and wilderness quality. Thus, the type and nature of the values assessed has been largely defined by general community sentiment.

The second main source used was community perception research conducted as part of other projects. As far as is known, there has been no community perception research relating to landscape values in the study area. There is a large body of existing research not specific to the study area that allows us to draw assumptions about aesthetic values (see reviews by Fabos and McGregor 1979, Ribe 1989, and Zube *et al* (1982). Much of this research focuses on visual aesthetic values using a psycho-physical approach to identify the relationships between environment characteristics and a person's response. While it is recognised that other, non-visual aesthetic values often play an important role in people's experience, the research relating to landscape values does not consider these to the same extent as visual values, partially due to the bias of legislative and policy requirements.

Key research (see Anderson *et al* 1976, Zube *et al* 1974, Williamson and Chalmers 1982) allows us to assume that landscape significance increases with:

- increased topographic ruggedness;
- increased naturalism;
- increased land use compatibility;

- increased presence of water forms and extent of water area and edge; and
- increased presence of outstanding natural features.

Other studies also suggest that landscape significance increases with:

- increased legibility of features;
- increased spatial definition;
- increased sympathy in land use response to natural features;
- increased pattern and texture in rural uses.

There are other studies that provide an insight into community perceptions and sentiment relating to landscape values (eg. Cleary *et al* 1999). Key conclusions include:

- that people regard landscape values as extremely important;
- that there is little correlation between features regarded as important for landscape reasons and those having important biological values;
- that people may be more likely to recognise places of landscape value than those having important biological values
- that people are more likely to regard places as important if they have first-hand experience of those places;
- that the attractions of an area are more likely to be landscape features than biological features;
- that higher levels of naturalness were more highly valued;
- that impacts that are detectable but below a visual magnitude may not be recognised by people and may not impact on their experience;
- that water features are valued highly, particularly if the water body is visually enclosed.

These assumptions can be used as an indication of the sentiment of the general community (ie. the broader community not necessarily living in the area).

Community involvement programs conducted for projects such as this can be used to identify places or characteristics that the local community values highly. This can be done either directly through questioning or workshop sessions about values, or indirectly by identifying issues and ideas for the wind park. Surveys with these topics can also be used.

The purpose of building this knowledge base in relation to landscape values is threefold:

- to understand the types of places thought to be important, allowing validation or refinement of the criteria used to identify the most important features in the systematic assessment;
- to identify places that met the criteria; and
- to provide an opportunity for direct nomination of places.

2.2 Landscape Character Classification and Description

Landscape character classification and description identifies and describes broad patterns of environmental characteristics (classifying them into types, units or sub-units) according to their relevance to human interaction. It addresses the 'local character' often referred to in community comment.

The site and study area lie within the Foothills Landscape Character Type (Leonard & Hammond 1983). This includes the higher land that flanks the Eastern Highlands. It includes the lower parts of the Great Dividing Range in the west of the State and has taller forests than the West Central Hills that stem from the better soils and higher rainfall of the area.

The photographs in Plates 1 - 8 provide an indication of the character of the study area (locations provided in Map 3).

Eight character units have been identified (Map 3). These units are:

- *Rural Hills Unit* includes the Leonards Hill high point.
- *Rural Slopes Unit* includes the remaining undulating, rural land. This unit contains scattered residences and patches of trees. Open views are available from many locations.
- *Forested Hills Unit* includes the high ridges and points with forest cover.
- *Forested Slopes Unit* includes the undulating land with forest cover.
- *Forested Valleys Unit* includes the distinct valleys with forest cover.
- *Rural Living Unit* includes the main clusters of houses.
- *Lakes Unit* includes lakes or large dams.
- *Settlement Unit* includes Daylesford.

The proposed wind park site lies within *Rural Hills Unit* and abuts the *Rural Slopes Unit*. The closest part of the *Settlement Unit* is at Daylesford, approximately 10 km to the north.



Plate 1 - Looking towards the site from Location 1, Ballan Daylesford Road south of the CFA shed.



Plate 2 - Looking towards the site from Location 2, outside the Leonards Hill Hall.



Plate 3 - Looking towards the site from Location 3, western end of Leonards Hill Bullarto South Road.



Plate 4 - Looking towards the site from Location 4, eastern end of Leonards Hill Bullarto South Road.



Plate 5 - Looking towards the site from Location 5, Ballan Daylesford Road north of the Leonards Hill Bullarto South Road.



Plate 6 - Looking towards the site from Location 6, Ballan Daylesford Road 370m north of the Leonards Hill Bullarto South Road.



Plate 7 - Looking towards the site from Location 7, Telegraph Road west of Sailors Falls.



Plate 8 - Looking towards the site from Location 8, the intersection of Central Springs Road and Ballan Daylesford Road, Daylesford.

2.3 Landscape Significance

The assessment of significance identifies features in the study area that are most important to the experience and enjoyment of people using criteria established through research, local community input, or other assessments and lists (see Section 2.1). People often call these significant features 'special features' when they talk about the values they attach to areas or the things that should be protected.

The assessment of landscape significance in this study focuses on the aesthetic significance of natural features and rural use areas. Settlement areas are also included if relevant. Aesthetic significance in this study is based largely on visual characteristics but also includes other relevant aesthetic values such as those associated with other sensory characteristics and scientific, social and historic aspects of places. These latter values are listed or described as appropriate but not assessed in this study.

Criteria for significant visual aesthetic features:

Landform	<ul style="list-style-type: none"> • High points and prominent ridge crests; • Steep slopes greater than 20 percent; • Pronounced gullies; • Features - very flat plains or plateaux, rock outcrops, cliffs, caves and distinctive dune/sand formations.
Vegetation	<ul style="list-style-type: none"> • Areas with distinctive variation in communities, structure or species; • Feature plants of impressive size, colour or form.
Water	<ul style="list-style-type: none"> • Ocean, major permanent or rocky, semi-permanent water features, rivers, estuaries, waterfalls.
Coast	<ul style="list-style-type: none"> • Indented shoreline, coves, rocky points, short beaches with rock ends, stacks, rock pools and platforms; • Gently curved shoreline with steep natural slopes or cliffs as backdrop or very wide tidal zone.
Wild life	<ul style="list-style-type: none"> • Areas with abundant, obvious wild life.

Criteria for significant visual aesthetic rural-use features:

Texture	<ul style="list-style-type: none"> Areas with strongly textured patterns for at least half the year.
Spatial definition	<ul style="list-style-type: none"> Areas where native vegetation creates a sense of spatial enclosure. Edges of blocks of remnant vegetation adjacent to spatial definition areas.
Avenue vegetation	<ul style="list-style-type: none"> Remnant or introduced planting of large trees in rows with consistent density and, where adjacent to roads, dominant trunks and canopies to road edges on both sides of the road.
Remnant vegetation	<ul style="list-style-type: none"> Paddock tree canopy cover of greater than ten percent. Continuous streamside vegetation strips with trees.
Vegetation	<ul style="list-style-type: none"> Feature plants of impressive size, colour or form.
Water	<ul style="list-style-type: none"> Large dams with native vegetation, including trees, on their edges.

Criteria for significant visual aesthetic settlement features:

Vegetation	<ul style="list-style-type: none"> Indigenous vegetation of a similar height or scale to the built form, which is visually extensive. Feature plants of impressive size, colour or form. Avenue planting.
Built Elements	<ul style="list-style-type: none"> Structures and/or settlement that have: <ul style="list-style-type: none"> a high consistency in design vernacular between adjacent built forms or across settlement areas; and a high level of responsiveness to the natural environmental setting; and a high level of visual interest, particularly at a detailed scale.
Local Experience	<ul style="list-style-type: none"> Areas that provide a variation in view types. Areas that have good levels of dedicated pedestrian access.
Landmark Structures	<ul style="list-style-type: none"> Distinctive structures with high integrity design, unique in their setting and reflect aspects of their setting.

The criteria and lists highlighted above were used to identify and map a range of significant features (Map 3), including:

- Leonards Hill;
- Sailors Falls;
- Recreation area at Sailors Falls;
- Major watercourses and adjacent vegetation;
- Leonards Hill Hall;
- The former Leonards Hill School and school house;

- The former railway line;
- Lakes;
- Large dams with forest edges; and
- Enclosed paddocks.

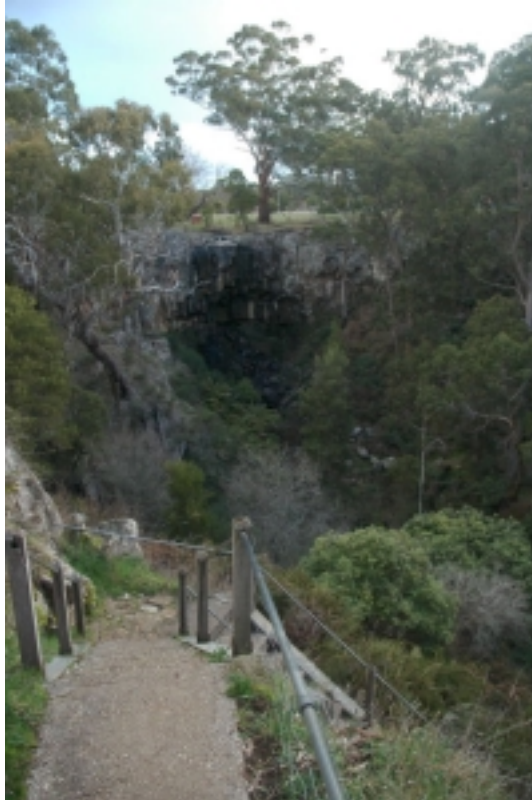


Plate 9 - Sailors Falls has aesthetic and social (recreation) significance.

A list of additional data sources for landscape significance is provided in Appendix 2, some of which relate to scientific, social and historic aspects of places.

2.4 Community Use

The assessment of community use identifies and maps the location, type and degree of community use of the area. It addresses values related to access and use that are often referred to in community comment. It includes spot (localised) use areas and access routes (air, ground, water), types of recreational and non-recreational (including industrial or residential) use, ground travel route physical characteristics (such as class, surface, markings and intended traffic type), and existing and expected volume of users. The assessment also includes the classification of use areas (sensitivity levels) and defines distance zones from these areas. These are detailed in the following sections.

2.4.1 CIRCULATION AND ACTIVITIES

Access routes

The main access road in the study area is the Ballan Daylesford Road which runs north to south, to the west of Leonards Hill. This carries local traffic and traffic from the freeway to Daylesford and is the main access to Daylesford for many tourists.

There are a number of other minor link and local access roads in the area, including the Leonards Hill South Bullarto Road to the north, Barkstead Road to the west, and Liversidges Lane and Telegraph Road off Ballan Daylesford Road to the north.

These access roads are shown on the maps in this report.

The access routes carry a mix of recreation, sightseeing/tourist, local and industrial use. It is likely that the recreation and tourism use is largely traffic coming from Melbourne to visit the regional attractions.

Localised Use Areas

Localised use (other than land use) in the study area is concentrated around residences and the town of Daylesford. There is a recreation area at Sailors Falls and a walking track down Sailors Creek. The Leonards Hill hall is an important local meeting place and has a bus stop. The locations of close neighbours have been shown on the Map 3. There are 18 residences within 1km of the turbines. A further 7 residences lie within the 1-2km zone.

2.4.2 SENSITIVITY LEVELS & DISTANCE ZONES

SENSITIVITY LEVELS

Use areas have been classified into sensitivity levels based on established criteria (see Appendix 2). Sensitivity levels are an indication of the importance of those routes to the experience of people and are established on the levels of people using the area, the type of use, and an understanding of their preferences. The criteria used to determine sensitivity levels in this study emphasise the informal or formal recognition of the type and levels of use.

There are four classification levels (1, 2, 3 and 4), with level 1 being the highest sensitivity rating. A high sensitivity level may be the result of either high levels of use or high 'sensitivity' user types.

Classification of levels focussed on the access routes (the localised use areas were generally encompassed by these). The levels were:

Level 1	-
Level 2	Ballan Daylesford Road, Sailors Falls recreation area, close neighbours, elevated residences in Daylesford.
Level 3	Leonards Hill hall.
Level 4	The remaining roads.

Distance Zones

Distance zones provide an indication of an area's spatial relationship to community use. Distance is an important variable in determining the visual magnitude of features. For example, a feature located in the foreground will generally have greater visual magnitude than a similar feature located in the middleground. It is assumed that these closer features will consequently have a greater role in determining human experience (and values) than distant features. This is often an important consideration in setting management/conservation priorities.

Distance zones can be identified and mapped based on:

- distance from travel routes and other use areas; or
- distance from a proposed development.

Six possible distance zones were considered in this study, listed as follows:

- foreground (0-300m);
- close middleground (300m-1km);
- middleground (1-3km);
- distant middleground (3-6km);
- background (6-15km);
- distant background (>15km).

These distance zones are described in the table on the following pages. The descriptions are based on a moderate sized wind farm with a nominal number of turbines - in the order of 5-20 turbines. Foreground, Close Middleground and Middleground have been mapped (see Map 4 (which includes the area potentially visually affected discussed later in this report)).

The wind park lies within the Close Middleground of a Level 2 travel route (Ballan Daylesford Road). From this distance zone the turbines can be described as 'prominent', although in this case, at the close distances, the view is at right angle to the road and the view to the turbines is of short duration.

Distance Zone Name	Distance Zone	Description	Typical visibility rating for turbines in this zone (where visible).
Foreground	0-300m	The turbines will be a dominant element in people's experience, with detailed parts of the turbines clearly visible. It is unlikely that any land cover features will screen the structures. At this distance the sound of the turbines is likely to be heard. Locations at this distance could be described as being <i>within</i> the wind park.	Dominant
Close Middleground	300m-1km	Turbines will usually form a major element in the view and will typically be visible from a large proportion of areas within this zone (except where there is major landform screening or large areas of vegetation). Turbine elements and movement can be clearly recognised. There will be a tendency for the turbines to be more dominant than other landscape elements. Focus will be on immediate foreground turbines. Will typically affect a small number of people (within this zone, eg. neighbours) to a high degree.	Prominent.
Middleground	1-3km	This is a critical zone, with a large variance in visibility, ranging from relatively prominent where close, to low visibility where distant. Turbine elements and movement can be recognised in good weather and light conditions. Observer variables (such as speed and focus/sightlines), vegetation cover, and (sometimes) atmospheric conditions, become critical in determining the obviousness of the turbines. Moderate visual magnitude. Will typically affect a moderate number of people (eg. people using roads and places in the local area) to a moderate degree.	Visible, often obvious.

Distance Zone Name	Distance Zone	Description	Typical visibility rating for turbines in this zone (where visible).
Distant Middleground	3-6km	Turbines will often tend to be a minor element at this distance. At the higher distances within this zone, vegetation will often screen views to the turbines from road even where vegetation is sparse, providing the landform is relatively flat. The visibility of the turbines will sometimes be low due to poor atmospheric/light conditions, especially at the higher distances. Observer variables (such as speed and focus/sightlines), vegetation cover, and atmospheric conditions, are critical in determining the obviousness of the turbines.	Visible.
Background	6-15km	Atmospheric conditions start to become a critical determinant of detectability notwithstanding other factors. The main turbine elements (tower and nacelle) can usually be recognised, with the blades and movement recognised in good weather and light conditions by stationary observers. Moderate to low visual magnitude. Will typically affect a moderate number of people (eg. people using roads and places in the region) to a low degree.	Recognisable, sometimes not noticed.
Distant Background	>15km	Turbines may be detected in ideal viewing conditions (eg. elevated positions, clear atmosphere, contrast lighting). Turbines are often not detected. Vegetation typically screens views in gentle terrain, even in areas that include relatively open, cleared paddocks. Low visual magnitude. Atmospheric conditions are a critical determinant of detectability. Will typically affect a low number of people (eg. people using roads and places in the region) to a low degree.	Detectable, often not noticed.

2.5 Views and other Sensory Characteristics

Sensory characteristics were examined to provide an indication of the way people receive environmental information. This part of the study focused on view characteristics. It is recognised that other sensory characteristics play an important role in some areas and for some people.

2.5.1 GENERAL VIEW EXPERIENCE

Views can be assessed and described based on a range of variables. The variables used in the field survey for this project are included in Appendix 4. These variables are considered to provide a good indication of the ability of people to read (see and identify) areas adjacent to the travel routes (as well as providing information on the nature of the immediate road environment).

The hilly terrain means that the potential for good, long-distance views is low with further hindrance being forest, roadside vegetation, and patches of vegetation usually planted along roadsides or near houses and sheds and forest areas.



Plate 10 – Typical roadside vegetation along Ballan Daylesford Road (here at the southern approach to Leonards Hill locality). This type of vegetation largely screens views to Leonards Hill from the road, other than limited segments to the west and north-west.

These patches of vegetation affect a high percentage of the roadside views in the area. For this reason, good views to the site are largely restricted to areas close to the site, although it can be seen from near Sailors Falls and the elevated parts of Daylesford.

A good indication of the nature of these views is provided in the photographs in Plates 3-22. Locations are referenced to numbers on Map 2.

The most critical views are those from high sensitivity level roads, particularly the Ballan Daylesford Road, and from neighbours' houses.

2.6 Wilderness Quality

Wilderness quality or 'sense of remoteness' is often highlighted as a value in community comment (as in the comments made in consultation for this study) and forms part of the aesthetic value of the area assessed for this study.

Wilderness Quality is an indication of the naturalness of the area and is assessed based on remoteness and bio-physical naturalness. Remoteness is based on the distance from access routes, settlement areas and disturbed areas. Bio-physical naturalness can be determined in a simple form by using remnant vegetation/cleared land mapping. These two components are combined to provide composite wilderness quality. This provides an indication of the *actual* naturalness of the area (natural land use character is the perceived character).

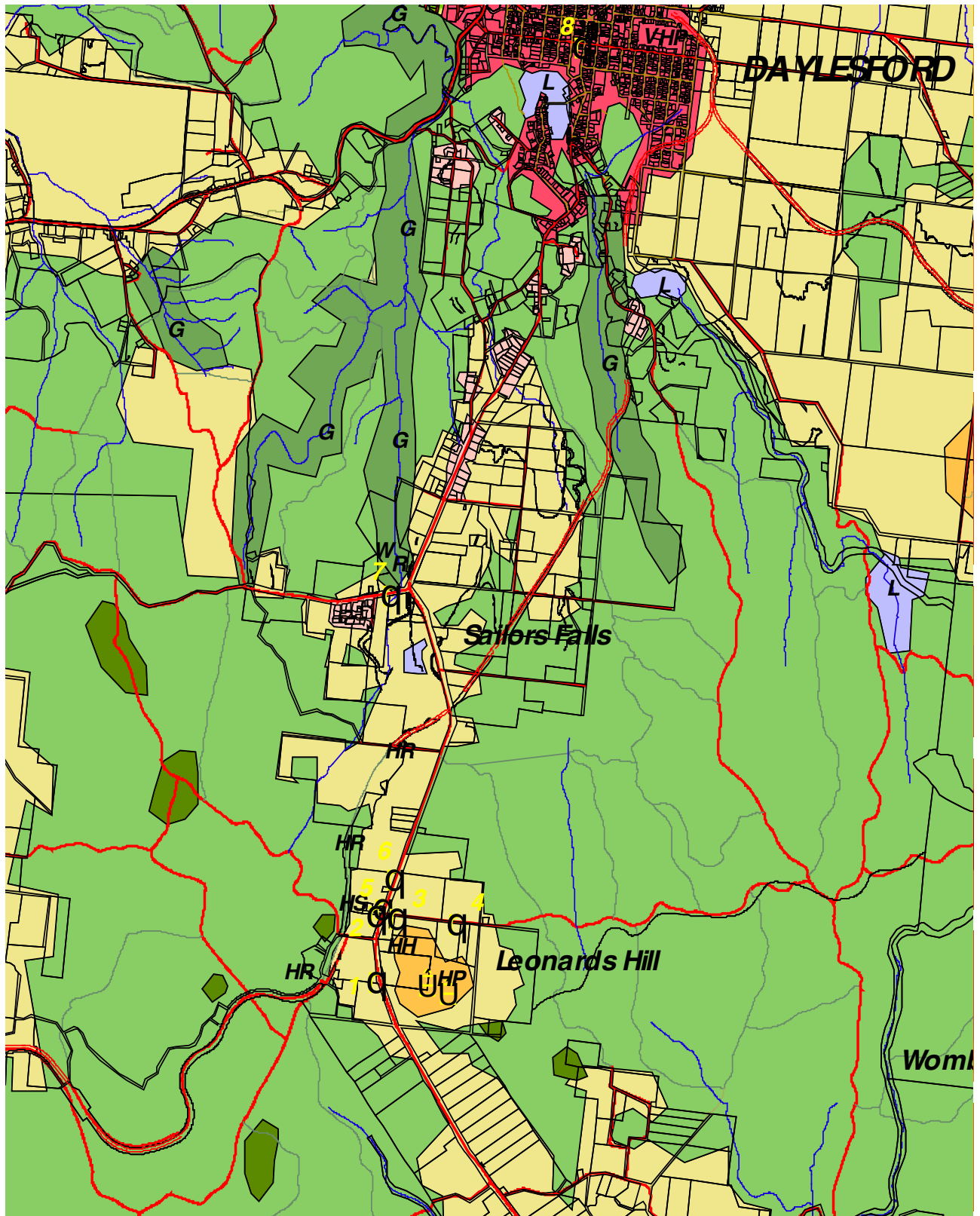
- an area might be quite disturbed in unseen areas). This approach is generally consistent with the National Wilderness Inventory procedure (Lesslie & Taylor 1995).

The site is cleared and is close to a Level 2 travel route and residences. It has low wilderness quality.

2.7 Regional Extent of Values

The degree to which values exist across a geographic area is an important consideration in determining the appropriate management/conservation of those values. A summary of the level of representation of the site's main landscape values is provided in the following table.

Value	Level Of Representation
Landscape Character	The rural landscape character of the site is well represented in the region.
Significant Features	Significance associated with landform features is moderately represented in the region. Vegetation and water features are well represented in the area around the hills. There is a relatively good representation of historic places. There are few recreation sites.
Views	There is a good range of views available in the local area and the region, including panoramic views of rural land and the higher landforms. The open views near Leonards Hill are similar to other places in the region.
Access	There is a good network of access routes, including Level 2 and 3 routes, near the site and in the region.
Wilderness Quality	Areas of relatively good wilderness quality occur in some of the forests that occur near the wind park site.



Landscape Character Units

- Rural Use High Point
- Forest High Point
- Forest Valley
- Settlement
- Lakes
- Rural Use
- Rural Living
- Forest Slope

q Key View Location

Significant Features

- HH** Historic Hall
- HP** High Point
- HR** Historic Hill
- HS** Historic School
- R** Recreation Site
- V** Vegetation
- W** Waterfall

Turbine

- Property boundary
- Watercourse
- Main Road
- Minor Road
- Contour

Map 3
Landscape Character Units,
Significant Landscape Features
Key View Locations

**Proposed Hepburn
Community Wind Park**

0 500 1000 Metres
1:50,000



**Landscape & Visual
Assessment Study**

JOHN CLEARY PLANNING

Part Three - Planning Framework Objectives

Relevant management objectives and standards are listed below. These focus on the main ways of influencing physical and aesthetic changes to the environment, including:

1. by excluding change from areas (such as areas with significant features, regardless of their location);
2. by controlling the nature of environmental change at use areas according to the nature of the use and the distance of the change from adjacent use areas;
3. by encouraging in all areas the use of planning and design principles that enhance, protect or minimise impact on landscape values.

3.1 Planning Framework Objectives

POLICY AND PLANNING GUIDELINES FOR DEVELOPMENT OF WIND ENERGY FACILITIES IN VICTORIA

The document describes two sets of visual impact factors, one set that visual impact 'depends on' and the other set that visual impact 'relates to'. It also defines 'features of the landscape', the basis for evaluation of proposals, and measures to reduce impact. Evaluation, as described, depends heavily on the planning scheme objectives and overlays, and the Government's policy in support of renewable energy development. Significant Landscape Overlays are also described as the 'appropriate' method for defining values (although they do not yet exist for many places in Victoria) (although 'features' may also overlap with values). Although there is an implicit desire to minimise impacts on landscape values, there are no other explicit objectives or standards in the policy or guidelines.

HEPBURN PLANNING SCHEME

Rural Zone (RUZ)

The wind park is located within Rural Use Zone (RUZ). Under the decision guidelines for this zone the responsible authority must consider a number of issues, including a number relevant to landscape values, as follows:

Environmental issues

- The impact of the use or development on the flora, fauna and landscape features of the locality.
- The protection and enhancement of the natural environment and the character of the area, including the retention of vegetation and fauna habitat and the need to revegetate land including riparian buffers along waterways, gullies, ridge lines, property boundaries, discharge and recharge areas.
- The impact on the character and appearance of the area or features of architectural, historic or scientific significance or of natural scenic beauty or importance.

Design and siting issues

- The design, colours and materials to be used and the siting, including the provision of development and effluent envelopes for any building or works.

- The impact of the use or development on the existing and surrounding rural uses.
- The location of any building or works with respect to the natural environment, major roads, vistas and water features and the measures to be undertaken to minimise any adverse impacts.
- The location and design of existing and proposed roads and their impact on the landscape and whether the use or development will cause significant traffic generation which will require additional traffic management programs to be initiated.
- The location and design of existing and proposed infrastructure services including gas, water, drainage, telecommunications and sewerage facilities.

Overlays

The site is covered by an Environmental Significance Overlay (ESO1 - Proclaimed Catchment Protection). The requirements of ESO1 are relevant to soil protection during construction.

Structure Plan for Muskvale Leonards Hill Corridor

The structure plan provides general guidance for development in the Muskvale Leonards Hill corridor. Relevant objectives in the Structure Plan include:

- Ensure that development proposals consider presence of rare and threatened species.
- The Shire contains significant landscape features, forest areas and views that should be protected from inappropriate development.

ADJACENT PLANNING SCHEME DESIGNATIONS

Adjacent planning scheme designations include:

- An Environmental Significance Overlay (ESO2 - Mineral Springs and Groundwater Protection) covers a large area to the north of the site.
- A Wildfire Management Overlay (WMO) covers a number of high fire hazard areas, including the northern slopes of Leonards Hill.
- A Heritage Overlay covers four sites to the north west of the wind park. These are the railway line reserve, public hall, former primary school and the former schoolhouse.
- Public Conservation and Resource Zone (PCRZ) (Shires of Hepburn and Moorabool) covers State Forest to the east and west of the site.
- Environmental Rural Zone (ERZ) (Shire of Moorabool) covers the rural corridor to the south of the site.

NATIONAL ESTATE

There are no sites close to the proposed wind park listed as registered in the Register of National Estate.

VICTORIAN HERITAGE REGISTER

There are no places on the Register close to the proposed wind park.

3.2 Project Landscape Management Objectives

Landscape management objectives have been defined for the project, covering the following landscape value components:

- Landscape Character;
- Significance;
- Access;
- Views;
- Wilderness Quality

These objectives are designed to compliment the range of planning framework policy objectives outlined in the previous section. They relate to values identified earlier in this report.

3.2.1 LANDSCAPE CHARACTER

Opportunities	Landscape character exists in all areas and offers the most potential to influence people's experience.
Constraints	Development may alter the character to such an extent that the character changes from one type to another and will need to be carefully controlled if the existing experiences are to be protected.
Objectives	<ul style="list-style-type: none"> • Changes to land use character should be minimised. • Priority for protection should be given to land use character types or areas: <ul style="list-style-type: none"> • that have high levels of naturalness; • that are not well represented; or • close to locations with high sensitivity levels (ie. Level 1 and 2). • In natural land use character areas, the character of use areas with high sensitivity levels (for example, Level 1 and 2 use areas), land use character should be protected. This means that change should not be recognised from these areas regardless of distance. As a guide, to achieve this, development will need to be unseen in distance zones less than middleground (1-3km) and very low impact in greater distance zones. Exceptions to these standards include: <ul style="list-style-type: none"> • low-impact recreation and safety facilities, which may be seen in the foreground; • changes that are evident for a short period. • In semi-natural land use character areas, change should be minor and should ensure that the natural character remains dominant, keeping in mind the cumulative effect of all development in the area. Development in these areas should be consolidated where possible. • In rural land use character areas, the character of use areas with high sensitivity levels (for example, Level 1 and 2 use areas), changes to the character type in the foreground zone should be avoided. • In cases of land use 'succession', where the land use character changes to a more developed type, the more developed type/area should include, as far as possible, pre-change characteristics of the area.

3.2.2 LANDSCAPE SIGNIFICANCE

Opportunities	These are the most distinctive features of the area and in many cases are unique. Their distinctiveness is usually apparent and may attract people.
Constraints	These features are not well represented and may need a high level of control of community use to protect their values.
Objectives	<ul style="list-style-type: none"> These features and their settings should be broadly maintained (or enhanced), focussing on their visual and physical integrity. For natural significance, priority for protection should be given to features that are not well represented. Development should generally be excluded from these areas. For well represented features, any changes should ensure large proportion of the significance is protected. For rural use significance, priority for protection should be given to features that are not well represented and features that are close to locations with high sensitivity levels (eg. Level 1 and 2). Changes to significance should be avoided in these cases.

3.2.3 VIEWS

Opportunities	<ul style="list-style-type: none"> Views are people's visual access to areas. Good views might allow people to enjoy areas that they do not, or cannot, directly visit.
Constraints	<ul style="list-style-type: none"> Good views may also allow people to see new development and land use changes.
Objectives	<ul style="list-style-type: none"> General view patterns should be broadly maintained. Unique (ie. poorly represented) types of key views should be protected. Priority for protection should be given to use areas with high sensitivity levels (eg. Level 1 and 2).

3.2.4 ACCESS

Opportunities	<ul style="list-style-type: none"> Access routes allow people to visit and enjoy areas.
Constraints	<ul style="list-style-type: none"> Access (and use) will need to be limited to protect some landscape values such as the natural land use character type, significant features, and wilderness quality.
Objectives	<ul style="list-style-type: none"> Provide sufficient access to allow people to experience and enjoy areas without impacting on other landscape values. Existing positive experiences should be maintained through the access network. Unique (ie. poorly represented) types of access should be protected. Priority for protection should be given to use areas with high sensitivity levels (eg. Level 1 and 2). Access routes should be maintained to an aesthetic standard appropriate to the sensitivity level.

3.2.5 WILDERNESS QUALITY

Opportunities	<ul style="list-style-type: none"> Areas of high quality wilderness provide for informal access via modes of travel with little or no impact. They represent the environment in its most natural state, provide a 'resource bank', and may provide the backdrop and sense of remoteness for other more used areas.
Constraints	<ul style="list-style-type: none"> Access and use will need to be limited to protect wilderness quality. Areas with moderate to high wilderness quality are not suitable for development.
Objectives	<ul style="list-style-type: none"> The extent and integrity of high quality areas should be maintained. Development should generally be excluded from high quality wilderness areas.

Part Four - Impact Assessment

4.1 Development Elements and Physical Changes

The main project elements are summarised below. The layout plan for these is provided in the wind park development application report (turbines are shown on the maps in this report).

The siting of turbines has been designed to respond to the values of the area. Turbines are located on the south-east side of Leonards Hill, maximising the distance from residences and roads.

Wind Turbines and Towers

The proposal consists of 2 wind turbines, each with an output of up to 2MW. The turbines will be mounted on tubular steel towers and will have three bladed rotors.

The total structure height will be up to 110m with a blade length of approximately 41m and a tower height of approximately 68m. The blades will rotate between 8 and 22 times per minute depending on wind speed. Each turbine has an external transformer to step the voltage up to 22 kilovolts (kV).

The location of the proposed wind park is shown on the maps in this report.

The proposed wind park area is cleared agricultural land. It is expected that stock grazing will continue.

Access Tracks

Access tracks will be built to provide construction access to the individual wind structures. It is proposed that these tracks will be 5m wide gravel.

Substation

No substation will be required for the wind park. One small metering and control booth will be located within the wind park.

Power Connection

The wind turbines will be connected to the local transmission line by underground electricity cables.

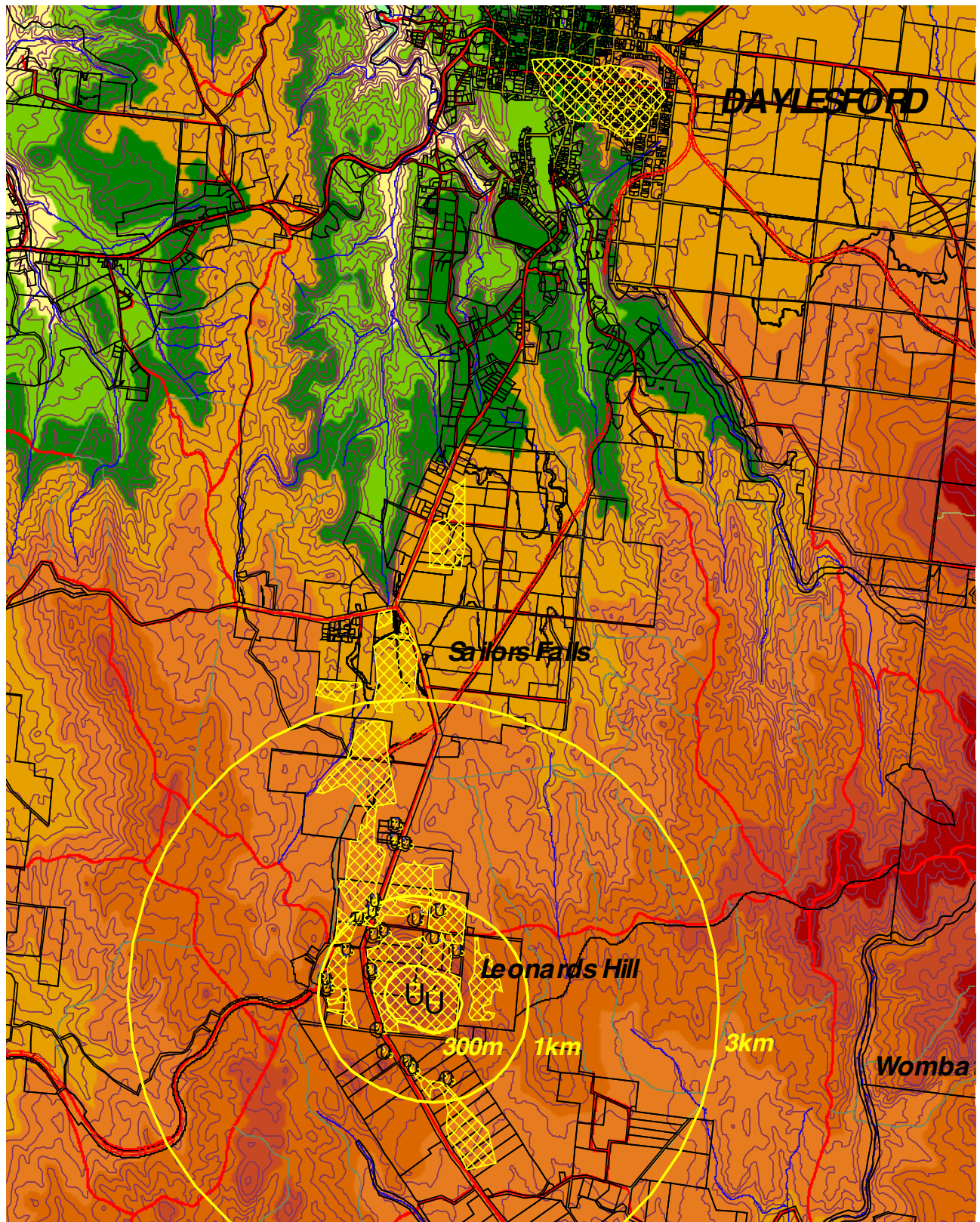
4.2 Areas Potentially Visually Affected

The extent of area visually affected by the project is determined largely by the screening ability of the vegetation and terrain, and the size and contrast of the project elements, particularly the turbines.

The areas that may be potentially visually affected by the project have been mapped (Map 4). This map shows indicative areas and has been generated from field observations and the modelling of the wind park.

Distance zones within the area affected are also illustrated on the map. As distance increases the impact of the project on areas affected will generally decrease. This is due to decreases in visual magnitude corresponding with distance (ie. twice the distance = quarter of the visual magnitude) and contrast (ie. less contrast at greater distances). At great distances the development may be technically visible but not detectable because of the small visual magnitude and low contrast. See the table in Section 2.4.2 for further explanation of these distance zones.

Given the terrain surrounding Leonards Hill (ie. relatively gentle slopes), most areas that are clear of trees will be potentially visually affected by the project. At close locations, to the north and north-west of the site, the western turbine will be more visible than the eastern turbine. As observer distance increases, the visibility of the turbines will generally tend to become similar. Where the observer distance is high, such as at Daylesford, the turbines will be very minor elements in the experience of people using those areas.



- U House
- Area Potentially Visually Affected
- Distance Zone

- Turbine
- Property boundary
- Watercourse
- Main Road
- Minor Road
- Contour

Map 4
Area Potentially Visually Affected,
Distance, Neighbouring Houses

**Proposed Hepburn
Community Wind Park**

0 500 1000 Metres
1:50,000



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4.3 Visibility and Appearance

4.3.1 GENERAL CONSIDERATIONS

The visibility and appearance of the development can be discussed in relation to a number of variables, including visual magnitude, visual contrast, and duration.

Visual magnitude is largely dependent on the size of the project component, the distance between the component and observers, and the proportion of the component visible to observers. The proportion of the component visible to the observer is largely dependent on vegetation and landform screening and the position of the observer.

The wind structures (towers and blades) are tall but slender structures and will have a relatively high visual magnitude compared to other rural structures. Their magnitude stems largely from their height rather than their overall width. Their magnitude will be greatest where they are viewed from close distances. If distance is doubled the magnitude will generally reduce to a quarter (ie. half the height by half the width). The visual magnitude will also be high where there is a lack of landform or vegetation screening resulting in a high proportion of the structure being visible.

Visual contrast is largely dependent on the colour and reflectivity of the project's components, the pattern of the component's elements, the backdrop to the component, and atmospheric and lighting conditions. Visual contrast will also be higher when the component is seen in the foreground, and lower at greater distances or when they are seen against a backdrop of similar colour and lightness. Where components are seen to breach the skyline, visual contrast can often be high.

The contrast of the turbines will depend on whether they are seen against the sky or vegetation and the time of day and the colour of the structures. Visual contrast will be reduced where the turbine is seen at greater distances or against a backdrop of similar colour and lightness to the turbine. The elevated nature of the site means that a large proportion of the turbines will be seen against the sky. If grey or similar colour towers and blades are used for the turbines, they will have low contrast when seen against a grey sky but moderate to high contrast when seen against a blue sky (notwithstanding other variables).

The shape of the towers will also contrast with most of the surrounding environment, whether built or natural.

Pattern/composition is the way the various wind park components appear to be in relation one another. This depends on the layout of the wind park, the landform, and the position of the observer.

Perceived setting also depends on the layout of the wind park, the landform, and the position of the observer. The background to the wind park is usually of most interest. For example, a natural background may increase the contrast of the turbines and may make it seem less compatible in terms of land use.

Duration simply refers to the visual lifespan of the component or its visible contrast or magnitude. It is expected that the wind park will be in place for an extended period of time. The structures and access tracks are classed as a permanent change.

Other Variables

There are a number of other variables that will affect the visibility and appearance of the wind park, including observer related variables such as observer activity including speed, typical view directions, and focal sightlines. For example, increased observer speed will generally narrow the focal area within the view, landform may help direct views away from the wind park, or, focal sightlines (for example along a road corridor) will reduce the likelihood of viewing a wind park located at right angles to

the direction of travel. No attempt has been made to measure these variables in this study. The discussion of views and the simulations are based on a stationary observer looking directly at the wind park and, as such, present the highest visibility potential.

4.3.2 VISIBILITY AND APPEARANCE FROM LOCATIONS WITHIN THE STUDY AREA

There are a number of areas within the study area that have views to the wind park, as indicated earlier, including views from residences in the area. The visibility and appearance of the site and proposed wind park will tend to be similar for many locations. From most locations, the wind park will appear to be one or two turbines on Leonards Hill, with one turbine appearing to be closer and larger magnitude. The landform of Leonards Hill and the intervening vegetation will be the two main variables affecting the visibility and appearance from each observer point.

Other factors will be the decreasing magnitude with the increasing distance, atmospheric effects, and the colour of the turbines.

The movement of the blades may attract attention, but this movement will create a more dynamic and interesting feature than when the blades are stationary.

The appearance of the proposed wind park is illustrated in the photo-simulations in Plates 14-18 on the following pages. These have been generated from the same view locations as the photographs in Plates 1-8 (see Map 2). A discussion of 3D modeling/renderings/photo-simulation techniques and accuracy is contained in Appendix 5.

Visibility and appearance from public locations

As highlighted earlier, the turbines will be visible from the Ballan Daylesford Road adjacent and north-west of the site and near Sailors Falls, from the South Bullarto Road north-east and north west of the site, from Liversidges Lane, from Barkstead Road, and from elevated parts of Daylesford that face the south.

From the closer of these locations, typically most of one turbine and the upper parts of the second turbine will be visible. The turbines will generally appear to be taller than the highest point of Leonards Hill. From most of these close view locations, foreground trees reduce the perceived scale of the turbines.

At the more distant locations, both turbines become equally visible and appear to be approximately twice the height of Leonards Hill. At these greater distances, the magnitude and contrast decrease to the point where, for example at Daylesford, it is unlikely that people will detect the turbines (ie. notice them in typical activities).

The visibility and appearance of the turbines from these locations is affected by the focus and travel characteristics of the observer. For example, people using the Ballan Daylesford Road are generally travelling at high speeds, which will increase their focus on the road corridor. The turbines are located away from the alignment of the road, so that where they are visible through gaps in the trees, people will need to turn away from the focus of the road and, where close to the site, look at right angles to the road. These views are short duration views. Short duration views over relatively limited sections of the road at right angles to the road means that the effect on the Ballan Daylesford Road will be low.

Visibility and appearance from residences

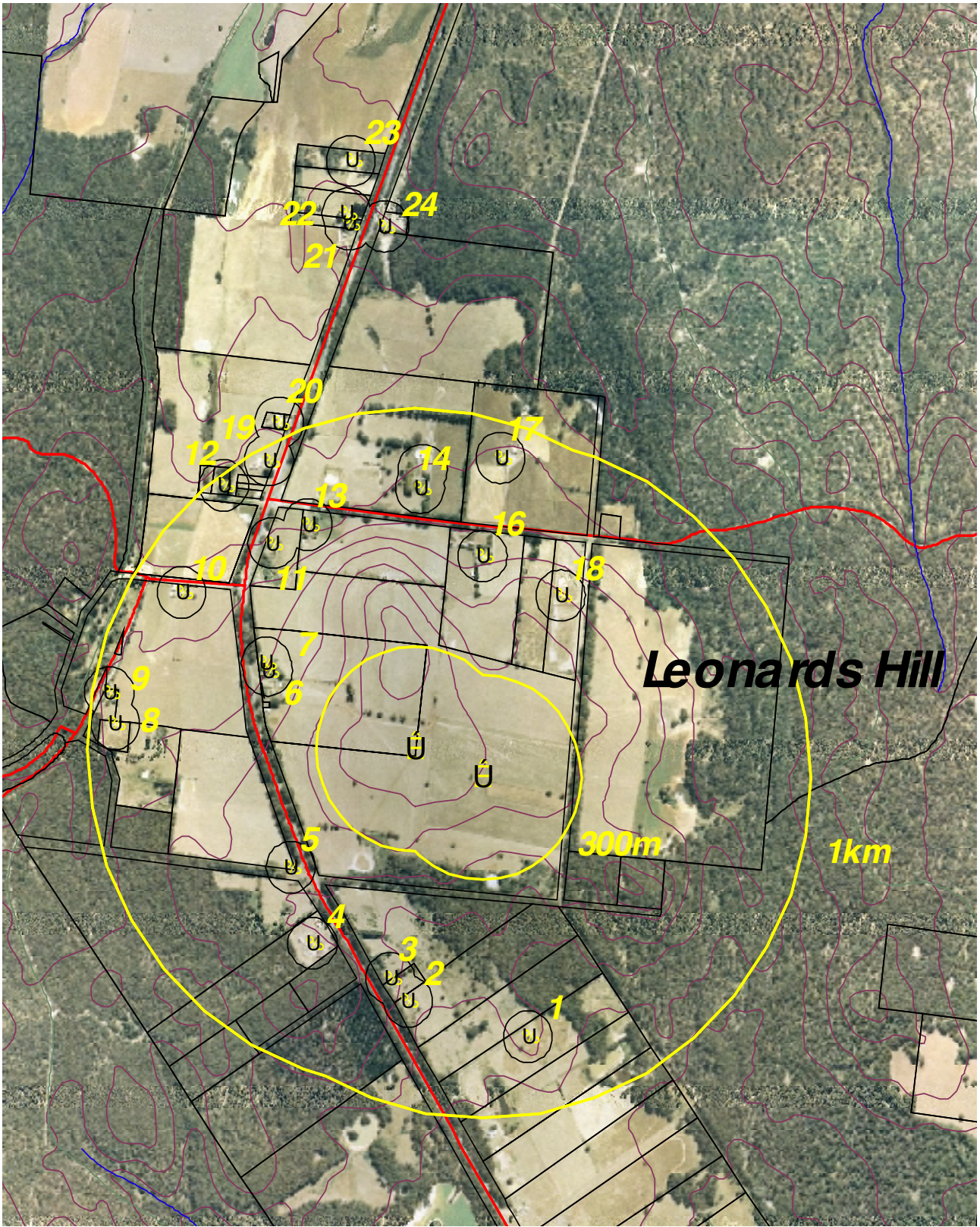
The visibility and appearance of the turbines from neighbouring residences is similar to the closer public locations. Although the residences have not been assessed in detail, an indication of the visibility and appearance of the turbines can be derived from 3D modelling/rendering from each residence, and the screening effect of vegetation and buildings that may be adjacent to the residence, based on field observations and aerial photography.

Initial assessment of the visibility and appearance of the turbines from neighbouring residences is described in the following table (see Map 5 for residence locations). Further on-site assessment may be required with residents.

Residence	Location	Visibility and Appearance
Residence 1	Located on a small south-south-easterly spur, south of the turbines, 776m from the nearest turbine, with forest to the north, between the residence and the turbines.	Tree cover provides screening - landform has little effect. The upper parts of one turbine and the blades of the other turbine may be visible above the trees.
Residences 2 and 3	Located adjacent to the Ballan Daylesford Rd, south of the turbines, with an easterly aspect, 699 and 656m respectively from the nearest turbine, with forest to the north, between the residence and the turbines.	Tree cover provides screening - landform has little effect. The upper parts of the turbines may be visible above the trees. Some trees near the houses may partially screen these views.
Residence 4 and 5	Located adjacent to the Ballan Daylesford Rd, south-west of the turbines, 653m and 519m respectively from the nearest turbine	Trees adjacent to the Ballan Daylesford Rd provide good screening and will block views to the turbines from these locations.
Residences 6 and 7 (Participating landowner)	Located adjacent to the Ballan Daylesford Rd, west-north-west of the turbines, with a westerly aspect, 509 and 525m respectively from the nearest turbine, with house-trees and the shoulder of Leonard's Hill to the east, between the residence and the turbines.	Landform and tree cover provides some screening. Some trees and sheds near the houses, and some trees higher up the slope may screen the views to the turbines.
Residences 8 and 9	Located on Barkstead Road, west of the turbines, 910m from the nearest turbine, with a north-westerly aspect, and the Ballan Daylesford Rd about half way to the turbines.	The trees of the Ballan Daylesford Rd will screen the lower parts of the turbines. A group of trees up the slope from Residence 8 will provide additional screening. Trees and other structures near the houses provide some additional screening.
Residence 10	Located on Barkstead Road, north-west of the turbines, 850m from the nearest turbine, 195m from the Ballan Daylesford Rd.	Landform and tree cover provides some screening. The trees of the Ballan Daylesford Rd will screen most of one turbine and all

Residence	Location	Visibility and Appearance
		but the upper parts of the other turbine. Trees and other structures near the house provide some additional screening
Residence 11	Located on Ballan Daylesford Rd, north-west of the turbines, with a north-westerly aspect, 747m from the nearest turbine.	Landform and tree cover provides some screening. The landform will screen most of one turbine (not the blades) and the lower part of the other turbine. Trees and other structures near the house provide additional screening. Two groups of trees up the slope provide additional screening.
Residence 12	Located on the lane to the west of the Leonards Hill Hall, north-west of the turbines, 970m from the nearest turbine.	Trees south of the buildings of this residence provide good screening and will block views to the turbines. Some the trees are deciduous and may allow views to the western turbine in winter. Without the trees, the landform blocks views to the most of the eastern tower.
Residence 13	Located on South Bullarto Rd, north-west of the turbines, with a north-westerly aspect, 738m from the nearest turbine.	Landform and tree cover provides some screening. The landform should screen all but the blades of one turbine. Trees and other structures near the house provide additional screening. Two groups of trees up the slope provide additional screening.
Residences 14 and 17	Located on the north side of South Bullarto Rd, north of the turbines, 769m and 895m respectively from the nearest turbine.	Tree cover, and to some extent landform, provides some screening. Groups of trees, including the trees on South Bullarto Rd provide screening (without tree screening, most of both turbines are likely to be visible).
Residence 16	Located on South Bullarto Rd, north of the turbines, with a northerly aspect, 606m from the nearest turbine.	Tree cover, and to some extent landform, provides screening. Trees and other structures near the house provide good screening.

Residence	Location	Visibility and Appearance
		Groups of trees up the slope provide additional screening (without tree screening, most of both turbines are likely to be visible).
Residence 18	Located on South Bullarto Rd, north of the turbines, with a northerly aspect, 589m from the nearest turbine.	Tree cover and landform provide some screening. A group of trees up the slope provides some screening (without tree screening, most of both turbines are likely to be visible). New plantings to the south-west of the residence provide good screening.
Residence 19	Located on the Ballan Daylesford Rd, north-west of the turbines, with a northerly aspect, 960m from the nearest turbine.	Visibility and appearance from in front of this residence will be similar to that shown in Plate 15 Location 5. Landform provides good screening of the eastern turbine. From the front of this residence, most of the western turbine will be visible. A large tree should screen views to the turbines from other area near and within the residence.



- Residence
- Distance Zone

- Turbine
- Property boundary
- Watercourse
- Main Road
- Minor Road
- Contour

Map 5 - Neighbouring Residences

**Proposed Hepburn
Community Wind Park**

0 100 200 Metres
1:15,000



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Plate 11 - Looking towards the site from Location 1, Ballan Daylesford Road south of the CFA shed, with the turbines simulated.



Plate 12 - Looking towards the site from Location 2, outside the Leonards Hill Hall, with the turbines simulated.



Plate 13 - Looking towards the site from Location 3, western end of Leonards Hill Bullarto South Road, with the turbines simulated.



Plate 14 - Looking towards the site from Location 4, eastern end of Leonards Hill Bullarto South Road, with the turbines simulated.



Plate 15 - Looking towards the site from Location 5, Ballan Daylesford Road north of the Leonards Hill Bullarto South Road, with the turbines simulated.



Plate 16 - Looking towards the site from Location 6, Ballan Daylesford Road 370m north of the Leonards Hill Bullarto South Road, with the turbines simulated.



Plate 17 - Looking towards the site from Location 7, Telegraph Road west of Sailors Falls, with the turbines simulated.



Plate 18 - Looking towards the site from Location 8, the intersection of Central Springs Road and Ballan Daylesford Road, Daylesford, with the turbines simulated.

4.4 Impact on Values

Key value components considered in the landscape assessment are Landscape Character, Significant Landscape Features, Access, Views, and Wilderness Quality. This section describes the impact on these values for the development stemming from the changes assessed and described in previous sections of this report. These impacts are determined and described in the following table according to a number of key questions. These questions are:

1. How is the value generally affected?
2. How much actual or perceived change will there be? (described by type, extent, degree, rating).
3. Does the change affect the extent of the value, create rarity, or affect rare features? (described by extent of change as a proportion of total extent of value, rating).
4. How does the change affect high sensitivity level use locations? (described by assigned sensitivity level and distance zone, rating).

Further considerations include:

- Change may be, for example, a high degree of change in a localised area or a low degree of change spread over a large area.
- The change to landscape character needs to take into account the change at each location, the change to areas that affect that location and the resultant dominant character;
- Based on the degree of change, priority is given to change that threatens the level of representation of the value in a broadscale context. In the case of Rural Significance, Character, Access, and Views, priority is also given to change that is close to High Sensitivity Level use areas. The level of representation of the value in these areas may also be considered. No 'Proximity to *High Sensitivity Level Use Areas*' priority or weighting is given to Natural Significance or Wilderness Quality because these values exist regardless of levels of use. Ratings for these value-priority options are usually expressed simply as High, Moderate or Low (ideally just High or Low). There is no inter-value weighting.

Where appropriate, the ratings in the table are described and rated in simple categories of High, Moderate, and Low.

Impacts on Values					
Key Impact Questions	Value				
	Landscape Character	Landscape Significance	Views	Access	Wilderness Quality
1. How is the value generally affected?	<ul style="list-style-type: none"> Landscape character will be affected in any location where there is a change in character type and the change can be seen (ie. perceived character). The change in value is generally based on visibility (ie. seen or unseen) from use areas and the public sensitivity rating of the use areas. 	<ul style="list-style-type: none"> Landscape significance will be affected wherever the project physically or visually changes these features. Physical change may remove part or all of the significant feature (eg. vegetation). Visual change can also add a project element close to the feature in a way that affects the appearance of the significant feature. The value of the feature will decrease with an increase in physical or visual effect on the area of significance. 	<ul style="list-style-type: none"> Views will be affected wherever the project (or its elements) hinders views. Impact will be greatest for key views from high sensitivity level places, where the blocking is greatest and where the views would otherwise be to significant features. 	<ul style="list-style-type: none"> Access will be affected wherever the project obstructs access. Impact will be greatest for access routes with high sensitivity levels. 	<p>Wilderness quality will be affected where the project decreases naturalness and remoteness. Wilderness quality provides an indication of the actual levels of disturbance (and a stocktake of the remaining area with these levels) rather than perceived naturalness of the area (land use character addresses that latter).</p>
2. How much actual or perceived change will there be?	<ul style="list-style-type: none"> Landscape Character will change in the vicinity of the wind park, from a Rural Use Character to a Rural Use/Mixed character. As the distance from the wind park increases, the character will be less affected. Over 3km in distance the change in character will be minor. There will be no change where the wind park is not visible. 	<ul style="list-style-type: none"> The significant natural landscape features are not physically affected. Views to the high point of Leonards Hill will be partly affected. Views to other significant features will not be affected, including rural landscape features. 	<ul style="list-style-type: none"> Views (ie. the ability to view) will not be affected. 	<ul style="list-style-type: none"> Access will not change. 	<ul style="list-style-type: none"> The area is classified as low wilderness quality and this classification will not change.

Impacts on Values					
Key Impact Questions	Value				
	Landscape Character	Landscape Significance	Views	Access	Wilderness Quality
3. Does the change affect the extent of the value, create rarity, or affect rare features?	<ul style="list-style-type: none"> The rural character of the site is extends across large parts of the region. The change affects a small proportion of this character. The character is not rare. 	<ul style="list-style-type: none"> The significance of the site also occurs in many other parts of the region. The change affects a small proportion of this type of significance. The type of significance is not rare. 	<ul style="list-style-type: none"> - 	<ul style="list-style-type: none"> - 	<ul style="list-style-type: none"> -
4. How does the change affect high sensitivity level use locations?	<ul style="list-style-type: none"> The wind park is close middle ground distance to a high sensitivity level use location (Ballan Daylesford Road) but the effect is limited to relatively small segments of the road. The effect does not represent a total change in character type (ie. it will still be largely rural). 	<ul style="list-style-type: none"> The wind park will affect the appearance of Leonards Hill as seen from short sections of the Ballan Daylesford Road. 	<ul style="list-style-type: none"> - 	<ul style="list-style-type: none"> - 	<ul style="list-style-type: none"> -

4.6 Recreation and Tourism Values

The proposed wind park does not directly affect any recreation activities. Similarly, the changes do not directly affect any existing tourism attractions.

The turbines will affect the Ballan Daylesford Road, which is the main tourist access to Daylesford from the south, but the short duration of the views, over relatively limited sections of the road, at right angles to the road, means that the effect will be low.

There may be demand to view the wind park facility. This type of demand has occurred at other wind farm facilities in Australia and has usually triggered the development of visitor access and interpretative facilities. This type of change to tourism is generally regarded as being positive.

4.7 Cumulative Effect

Cumulative effect takes into account the effect on values over a large area or an extended timeframe. A high cumulative effect will stem from the level of impact of each development and the density of these developments compared to the extent of available values. It could be possible to have a relatively high density of developments and still achieve landscape objectives if the impact on values for each development is low.

There is currently no other wind farm in the area.

This low density of development, the large extent of remaining, unaffected, similar values, and the generally low-moderate impact (for most of the landscape values) of the subject wind park suggest that cumulative effect is low in this case.

Part Five - Evaluation

An evaluation of the proposed development can be made, based on the assessed impact and the compliance of that impact with the objectives and management standards that apply to the area. In addition, there are considerations that help with the evaluation and the interpretation of the relevant policies. These considerations are:

- the degree of change;
- the threat to the level of representation of the value;
- the proximity to *High Sensitivity Level* use areas; and
- community attitudes.

The degree of change to landscape values is relatively small. The proposal does not require a lengthy overhead transmission line, which helps reduce the extent of change. The proposal does not threaten the level of representation of any of the values. Only one Level Two travel route passes near the wind park. Discussions had as part of the planning of the project indicate there is good support for the wind park amongst residents in the region. There is mixed support amongst residents close to the wind farm.

Given the limited nature of the impacts of the proposal it can be said that landscape values are generally protected across the region and that compliance with objectives is high. Some of the changes, such as the change to landscape character, cannot be much less (given the typical visibility of wind turbines).

5.1 Compliance with Planning Objectives

An indication of the compliance of the project with these sets of objectives is provided below, based on the impact assessment.

Value	Compliance with Planning Framework Objectives (see Section 3.1).
Guidelines for Development of Wind Energy Facilities in Victoria	
<ul style="list-style-type: none"> • <i>Wind turbines will not be permitted in National Parks, on land reserved under the National Parks Act, or on visually significant locations....</i> 	The wind park is located well away from any National Park.
Hepburn Planning Scheme – Structure Plan for Muskvale Leonards Hill Corridor	
<ul style="list-style-type: none"> • <i>Ensure that development proposals consider presence of rare and threatened species.</i> 	This has been addressed in the application.

Value	Compliance with Planning Framework Objectives (see Section 3.1).
Hepburn Planning Scheme - Local Policy	
<ul style="list-style-type: none"> <i>The Shire contains significant landscape features, forest areas and views that should be protected from inappropriate development.</i> 	<p>The site is outside areas identified in the significant landscape overlay. Apart from the high point of Leonards Hill, the turbines do not affect any significant landscape features (as in an SLO) or key views. There are mixed attitudes about the effect of two turbines on these values. The appearance, as seen in the photo-simulations, suggests that the turbines will not dominate these features and will be relatively compatible with the rural scenery.</p>
<ul style="list-style-type: none"> <i>Assess development applications against the landscape value and neighbourhood character values of an area where specified, having regard to ridgelines, hilltops and other significant landscape features.</i> 	<p>This assessment provides detailed assessment of the affect on landscape and character values. The two turbines will affect the appearance and character of Leonards Hill. As highlighted above, the appearance, as seen in the photo-simulations, suggests that the turbines will not dominate these features and will be relatively compatible with the rural scenery.</p>
Hepburn Planning Scheme – Rural Use Zone (RUZ)	
The wind park is within Rural Use Zone.	
<ul style="list-style-type: none"> <i>Consider The impact of the use or development on the flora, fauna and landscape features of the locality.</i> 	<p>The impact on landscape values is considered in this study. As highlighted above, the appearance, as seen in the photo-simulations, suggests that the turbines will be relatively compatible with these features and will not dominate them.</p>
<ul style="list-style-type: none"> <i>Consider The protection and enhancement of the natural environment and the character of the area</i> 	<p>The natural environment will be protected. Landscape character is protected at a regional scale. Landscape character will be changed at a local scale but will remain largely rural. As highlighted above, the appearance, as seen in the photo-simulations, suggests that the turbines will not dominate these features and will be relatively compatible with the rural scenery.</p>
<ul style="list-style-type: none"> <i>Consider The impact on the</i> 	<p>The natural environment will be</p>

<i>character and appearance of the area or features of architectural, historic or scientific significance or of natural scenic beauty or importance.</i>	protected. Landscape character will be changed at a local scale but will remain largely rural. The fabric and settings of architectural, historic and scientific features are protected. The impacts on scenic beauty are considered in this report and, while there will be some effects from the two turbines, it is considered that these values will not be dominated and are largely maintained.
<ul style="list-style-type: none"> Consider The design, colour and materials to be used and the siting 	Colours for the turbines that will minimise visual contrast are suggested in this report.
<ul style="list-style-type: none"> Consider The impact of the use or development on the existing and surrounding rural uses. 	It is expected that other land uses will continue with little effect from the two turbines.
<ul style="list-style-type: none"> Consider The location of any building or works with respect to the natural environment, major roads, vistas and water features.... 	This has been considered and the location of the two turbines has been designed to minimise impacts.
<ul style="list-style-type: none"> Consider The location and design of existing and proposed roads and their impact on the landscape.... 	The layout and construction of the proposed access roads will be largely unseen.
<ul style="list-style-type: none"> Consider The location and design of existing and proposed infrastructure services including gas, water, drainage, telecommunications and sewerage facilities. 	This has been considered in the application.

Value	Compliance with Project Landscape Management Objectives (see Section 3.2).
Landscape character	<p>This study demonstrates that there will be moderate change to rural landscape character, that this change is relatively localised, that the type of character is well represented in the region (ie. is not rare), and that there will be a low-moderate effect on high sensitivity level use areas.</p> <p><i>Moderate compliance.</i></p>
Landscape significance	<p>This study demonstrates that there will be a small change to the appearance of a significant landscape feature, that this type of feature occurs widely in the region, and that there will be a moderate-effect on high sensitivity level use areas.</p> <p><i>Moderate-High compliance.</i></p>
Views	<p>This study highlights that the two turbines will not obstruct views.</p> <p><i>High compliance.</i></p>
Access	<p>This study highlights that the two turbines will not affect access.</p> <p><i>High compliance.</i></p>
Wilderness Quality	<p>This study highlights that the two turbines will have no effect on wilderness quality.</p> <p><i>High compliance.</i></p>

5.2 Community Attitudes

Consultation has been undertaken with the local community, including two workshops held locally, which included some neighbours. This consultation has highlighted a range of values and concerns that should be addressed by the planning framework or by local assessment.

Community attitudes to the wind park included some concerns and a range of positive effects of the wind park. These are listed below.

Concerns

- visual impact;
- the effect on views, including from Daylesford/Wombat Hill;
- three turbines may be better for aesthetic balance;
- effect on main entrance to the Shire;
- height/large size;
- fire safety;
- separates community into those who support and those who do not;
- surrounding landowners do not get benefit;
- viability;
- effect on land values;
- noise and effects on peace and quiet and character of area;
- effects on birds and other wildlife, including wedge tail eagles
- effect on springs, ground water, Sailors Creek catchment;
- possibility of more turbines being added
- infrastructure required (eg. substation, cabling);
- effect on historic, aboriginal features, tourism.

Positive effects of the wind park

- demonstrates local people taking responsibility for the power consumed;
- good community involvement – good model for development;
- visually appealing structures;
- little pollution;
- compatible with open grazing land;
- part of regional style – healthy living and renewable energy.

At a more general level, other wind farm community involvement programs provide an additional insight into the nature of possible concerns relating to wind farm development. Community values, concerns, questions and ideas have been identified in phone conversations, meetings or workshops, and can be grouped under the following topics:

- construction and management of the facility;
- general impacts on the community;
- landscape and visual amenity;
- noise;
- planning;
- land values and rates; and
- physical impacts.

Comments under these topics can be categorised as follows:

- questions regarding certain aspects of the wind park made by people who seemed to be supportive of the proposal;

- concerns regarding certain aspects of the wind park made by people who seemed to be supportive of the proposal and who wanted to see their concerns addressed; and
- concerns regarding certain aspects of the wind park made by people who seemed to be unsupportive of the proposal and who thought it unlikely that their concerns could be addressed.

Typical specific concerns of local people are:

- blade glint and shadow flicker;
- general loss of visual amenity;
- proximity to houses, lifestyle blocks and the towns;
- the cumulative affect (in association with other wind farms);
- effect on possible future subdivision areas;
- effect on natural areas/scenery;
- effect on views;
- silhouetting against the sky;
- the protection of historic areas;
- noise;
- effect on views of the hills.

Many of these concerns have been addressed in this report. Some, such as noise, are addressed by other assessments. Additional, neighbour-level assessment may be undertaken to address the visual effect on neighbours.

5.3 Summary

There are a number of objectives embodied in the Local Policy and Zoning parts of the Hepburn Planning Scheme. These objectives are relatively general in nature, with a general aim of protecting landscape values and features, particularly where they are considered important or significant.

This study provides mapping and photo-simulations to indicate the visibility and appearance of the two turbines. This shows that the turbines will be visible from a relatively restricted area and, from many view locations within this area, only one turbine will be largely visible.

Importantly, the appearance, as seen in the photo-simulations, suggests that the turbines will not dominate these features and will be relatively compatible with the rural scenery and landscape features.

There are mixed community attitudes about the effect of two turbines on these values. The appearance, as seen in the photo-simulations, suggests that the turbines will not dominate these features and will be relatively compatible with the landscape values/rural scenery. Given that the proposal has only two turbines, it avoids the perceived impacts associated with the pattern of many turbines that are required for a large wind farm. Partly due to this, in this case (of only two turbines) greater emphasis is placed on the appearance of a single turbine. Many people in the community have indicated that like the appearance of a wind turbine (possibly as single turbines), describing them as 'graceful' and 'majestic'.

Some neighbours are likely to see at least one turbine (or part thereof) from close to their residences, but the effect of this will be relatively small given the scale of all the landscape features in their setting compared to the turbine.

Part Six - Recommendations and Modifications

The wind park will have moderate impact on landscape character and low impact on significance. The turbines have been located to maximise the screening effect of Leonards Hill on neighbours. The following recommendations will help ensure that impacts are minimised:

Neighbour Level Assessment

As highlighted in the previous section, neighbour level assessment may be needed to address the visual effect on neighbours. Neighbouring residences may require planting treatments and this should be based on the assessed level and nature of impact.

Colour

The blades and the upper part (above 10m) of the towers should be coated with a very pale grey-blue (RAL 7035 for the nacelle and blades, Pantone 427 C for the tower). Any associated facilities should be finished with a grey-green colour (Pantone 5773 C).

Blades RAL 7035

Tower Pantone C 427

Facilities Pantone C 5773

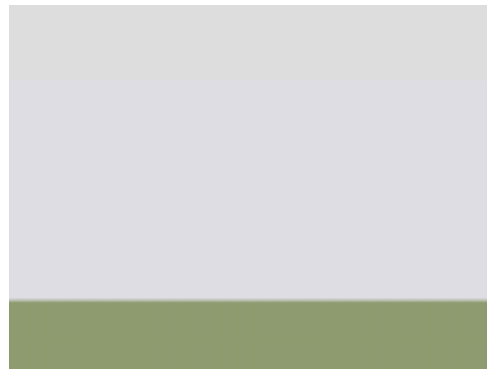


Plate 40 – Suggested colours for the turbines (The colours depicted above may vary from the intended colour due to printing).

Visitor Facilities

Visitor facilities could be considered for the wind park to cope with the people that may want to see the turbines at close quarters. A road, car parking, and a visitor interpretive facility could be developed. There could also be a walk trail to take visitors close to the turbines.

Planting

Planting may be appropriate in some locations, to screen or direct views. Neighbouring residences may require this treatment and this could be undertaken following consultation with affected neighbours and assessment of the level and nature of impact.

Roadside planting should also be investigated for key locations, in consultation with the responsible road management agency or landholders adjacent to the road.

Part Seven - Conclusion

This report summarises the landscape assessment and evaluation of a wind park proposed for Leonards Hill, which is located approximately 10 kilometres south of Daylesford.

The study finds that a range of landscape values exist in the area and has assessed them using categories that reflect the key values generally identified by the community in discussions, workshops and responses to development proposals.

The study's findings in relation to the values and the effect of the proposed wind park were as follows:

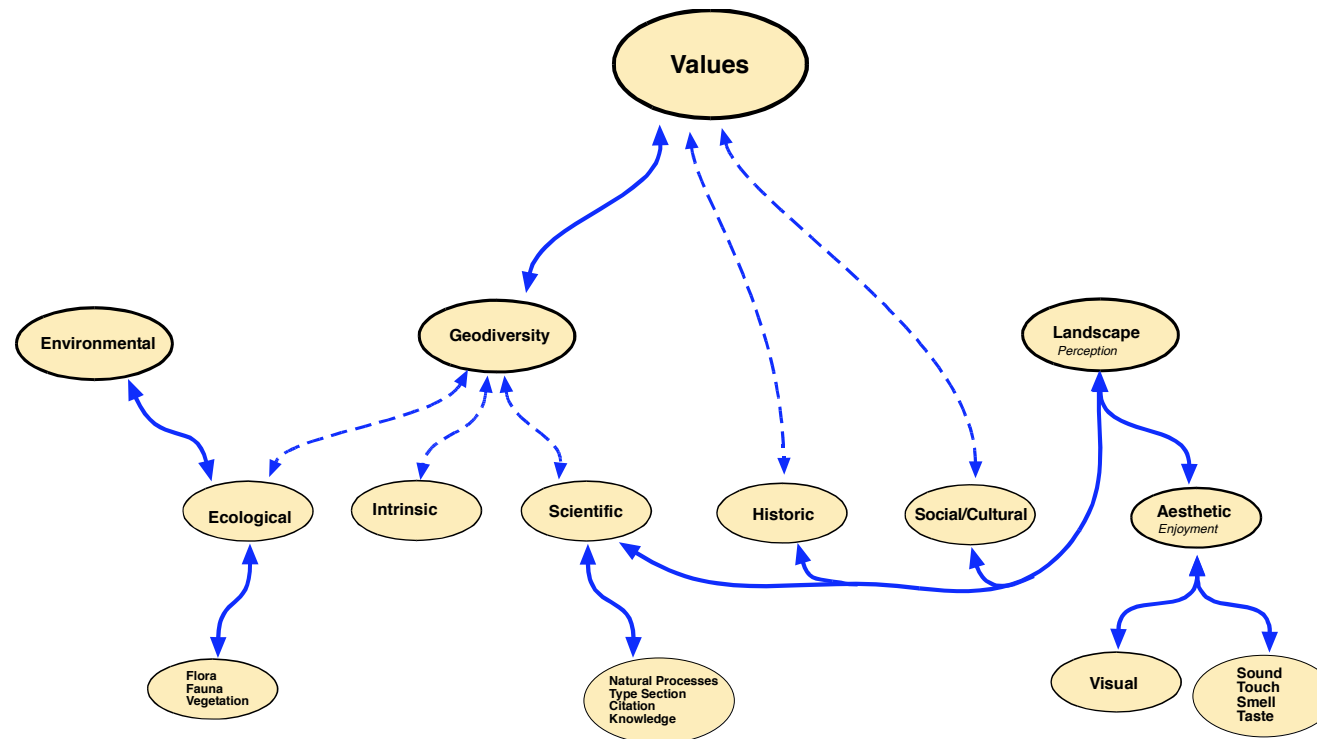
- The proposed wind park site lies within a rural character type and this character will be retained but will be affected by the two turbines at a local level. This localised effect includes changes to the character as viewed from neighbours' house/properties and from local roads.
- The high point of Leonards Hill is assessed as significant in the study and the two turbines have a relatively small effect on the appearance of this feature.
- The two turbines will affect a Level 2 Road (Ballan Daylesford Road) but the short duration of the views, over relatively limited sections of the road, at right angles to the road, means that the effect will be low.
- The turbines will be visible from a relatively restricted area and from many view locations within this area, only one turbine will be largely visible.
- The two turbines will have little affect on views (ie. will not obstruct them), access, wilderness quality and recreation values.
- The cumulative effect on the country to the south of Daylesford, of this wind park is very low.
- The effect on tourism values could be positive.

There are mixed community attitudes about the effect of two turbines on these values. The appearance, as seen in the photo-simulations, suggests that the turbines will not dominate these features and will be relatively compatible with the landscape values/rural scenery. Given that the proposal has only two turbines, it avoids the perceived impacts associated with the pattern of many turbines that are required for a large wind farm. Some neighbours are likely to see at least one turbine (or part thereof) from close to their residences, but the effect of this will be relatively small given the scale of all the landscape features in their setting compared to the turbine.

The study has evaluated these effects on landscape values using the objectives detailed in the relevant policies, strategies, scheme, overlays and listings. Given that there is only two turbines in the proposal and the limited nature of the impacts it can be said that landscape values are relatively well protected. In comparison with other wind farm developments, the effects of this proposal are very low, largely due to the low number of turbines and the consequent compatibility with the values of the area.

Appendices

Appendix 1 – Types of Values



This simply illustrates the values related to landscape management and indicates their relationship to one another.

Appendix 2 – Data Sources for the Assessment of Aesthetic Values

(Adapted from Cleary *et al* 1999)

Data									Assessment	
Lists		World Heritage List	Register of National Estate	Register of Heritage Places	Municipal Inventory	Classification List	Register of Aboriginal Sites	Maritime Archaeology Database	DNRE & Parks Victoria	Other
Significance Sub-theme	Natural	UNESCO WH Committee (Nomination doc.)	AHC	Heritage Council	Heritage Council, LGA	National Trust	AAD	Maritime Museum	Various informal, in documents	
	Natural Aesthetic									
	Cultural – Historic									
	Cultural – Social (Non Aboriginal)									
	Aboriginal									
	Maritime (Historic)									
	Scientific									

Appendix 3 - Sensitivity Level Criteria

The sensitivity levels of travel routes and use areas are an indication of the importance of those routes to the experience of people and are established on the volume of people using the area and an understanding of their preferences. The criteria for classification of sensitivity levels are summarised in the following table.

Classification	Type of Use - Existing or Formally Proposed		
	Non-recreation use rural and forest roads	Recreation and tourism	Settlement
Level 1 High Sensitivity	National & State Highways. Links between cities and major towns.	Designated tourist roads. Major recreation sites recognised formally or informally at a national or state level, including walking tracks and lookouts. Primary access to these recreation sites or multiple level 2 use areas. Travel routes or sites through or adjacent to scenic or historic areas with recognised or assessed values of national or state importance.	Places with recognised or assessed scenic or historic values of national or state importance.
Level 2 Moderate Sensitivity	Main link roads between towns and highways.	Important but undesignated tourist and recreation roads. Recreation sites of regional importance, including walking tracks and lookouts. Primary access to these recreation sites or multiple level 3 use areas. Travel routes or sites through or adjacent to scenic or historic areas with recognised or assessed values of regional importance.	Places developed to capitalise on views or attractions. Neighbours close to proposed development.
Level 3 Low Sensitivity	Minor link roads.	Local recreation use.	Residential areas other than Level 1 or 2.
Level 4 Very Low Sensitivity	Roads receiving local non-recreation use.	-	Industrial areas.

Appendix 4 - View Data Variables

The following variables were used to record and assess views:

Location	location along the access route (lat/long);
Direction of view	Angle between the centreline of view and the centreline of the road (degrees);
Angle of view	field of vision (degrees);
Filtering	heavy filtered, light filtered, open;
Vegetation height	metres;
Distance to blocked view	metres;
Cause of blocked view	vegetation, landform;
Visibility of development	visible, non-visible;
Duration of view	ongoing, spot;
Viewer position	elevation difference between viewer and subject (superior, normal, inferior)
Vegetation type	species;
Photographic record	film frame numbers;
Subject of view	landmark focus, significant feature, natural landscape character;
Access characteristics	type of use, travel mode, recreation use, volume.

Appendix 5 - 3D modeling/Rendering Techniques and Accuracy

Modelling Techniques

The techniques used for creating representations of the proposed development were as follows. Relevant digital data related to the locations, elevation and extent of existing landform and landcover features was acquired, mainly from State Government agencies. Digital data related to the proposed wind park elements was also obtained. All this data was either acquired in, or transformed into, the same coordinate system to provide spatial accuracy between different data and to ensure that the data accurately represented the features on the earth's surface in the development area. The coordinate system used was MGA 1994 Zone 55. This coordinate system is based on a horizontal cylinder (Transverse Mercator) projection, centred over the 147 degree meridian (Zone 55), of an approximation of the earth's shape ('GRS80' spheroid) moved slightly to suit Australia (the spheroid and the shift making up our local datum – GDA 1994).

A 3D model of the landform was created by generating a Digital Elevation Model (DEM) from the contours (10m interval, half interval accuracy). The DEM is simply a grid of heights and in this case these heights were generated at a 10m grid interval. The software allows the landform between these points to be defined by a variety of interpolation techniques, including splining, inverse distance weighting or kriging. The need for interpolation can be minimised by creating finer grids, although a 10m grid interval is considered appropriate given the contour interval.

Once the 3D landform model was created, existing and proposed land cover was added to the model. The aerial photograph was draped over the landform and then land cover elements placed over that. The land cover elements modelled were vegetation and the proposed buildings and roads. The vegetation was modelled using position, species, height, and density. The proposed buildings were modelled using models of notional design for the development and position, orientation and magnitude.

This rendered 3D model provides a relatively 'life-like' representation of the area with the proposed development in place. The model can be viewed from any position and these positions can be linked and animated to create 'drive-throughs' or 'fly-throughs'.

The rendered 3D model can be used as a base to create images of the area with the development simulated, described as follows. Photographs of the site can be taken from nominated positions (ie. the representative key views described in the assessment), recorded using the same coordinate system. The rendered images can be then placed over these photographs so that the position and scale can be matched and then the proposed wind turbines can be pasted to the photographs. The matching of rendered 3D images to the photographs is based on matching the position, heading and camera lens specifications in each method, matching the pixel size and elements in each image in the overlay process, and checking position and scale using measurement techniques (see below).

Both the rendered 3D models and the photo-simulations depict the development in particular atmospheric and lighting conditions. For effective representations, the conditions chosen should maximise the visibility of the development.

The accuracy of this modelling is considered to be very high and is discussed briefly in the following section.

Despite the realistic nature of this modelling some people still have difficulty either accepting the accuracy of the modelling or appreciating the scale

(small or large) of the development. Measurement of the scale of the development can help in both these cases. As described above, it also a simple way of validating the accuracy of the modelling.

Measurement of the scale of the development is based on simple trigonometric calculations. These calculations can be done for nominated view locations (eg. for the simulations in the assessment report) and are based on the distance between the camera (or observer) and the development, the height of the buildings, and the ground elevations of both these. These variables and calculations allow the buildings to be described as an angle of view, which in turn can be used to provide comparisons of scale.

Accuracy of Modelling Notes

Modern, computer-based 3D modelling is well known for its spatial accuracy and is a relatively well-established science. There are well-known and validated models for taking data of a particular form (for example, DEMs or points) in a known defined coordinate system and converting them accurately into a 3D global form. For example, some software uses a simple spherical globe, which is known to be a gross approximation of earth's shape. Other software uses spheroid/ellipsoid definitions taken from the industry-standard EPSG tables (<http://www.google.com/search?hl=en&lr=&ie=UTF-8&oe=UTF-8&q=epsg+table>), and the equally well-known USGS GCTPC (<http://www.google.com/search?hl=en&ie=UTF-8&oe=UTF-8&q=GCTPC>) library for this task. These algorithms and definitions (or similar algorithms such as the PROJ4 library <http://www.google.com/search?hl=en&lr=&ie=UTF-8&oe=UTF-8&q=PROJ4>) are the heart of virtually every GIS package. This ensures some measure of repeatability between programs (at least those that use exactly the same formula). GCTPC is used in popular GIS software (such as the range of ESRI products, for internal reprojection code). Most software that creates 3D perspective views uses well-known and validated 3D perspective camera projection algorithms. These algorithms are the basis of essentially every 3D software program out today, and are well understood and vetted. We have done some informal validations (modelling landform/objects of known dimensions, comparisons with photographs and real views of same and comparisons with results from other techniques (eg. sectional views)) to assure ourselves of their spatial correctness. Based on this, and the knowledge that the algorithms themselves are well-trusted and validated, we have confidence in the spatial accuracy of our software. It is worth noting that the software we use has a camera model that is more accurate than most industry 3D software in that it approximates the lens behaviour of a real camera, as opposed to the 'perfect' virtual cameras of most 3D software.

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Your Ref:
Our Ref: SP422002
Contact: Rod Davison
Date: 2 June 2006

David Shapero
PO Box 2007
RICHMOND VIC 3121

Dear Mr Shapero

**PROPOSED COMMUNITY WIND FARM (2 TURBINES)
AT LEONARDS HILL - HEPBURN SHIRE
CA 12B SEC 3B, CA B4 SEC Y AND LOT 1 ON TP 671, PARISH OF WOMBAT
CONSIDERATION OF IMPACTS ON NATIVE FLORA**

I refer to your recent communications with Nick Jaschenko (Biodiversity Coordinator) of this office, regarding a proposed community wind farm (two turbines), at CA 12B Sec 3B, CA B4 Sec Y and Lot 1 on TP 671, Parish Of Wombat.

The department has inspected the subject site and found that past and present land uses (eg. cultivation, grazing, introduction of exotic species, etc.) have had such significant impacts on native vegetation, that little or no native vegetation exists on the site (ie. with the exception of a small area at the southern end of CA B4, which is unlikely to be impacted upon). It has therefore been determined that, when you apply for a planning permit, you will not be required to provide a flora survey report for the site.

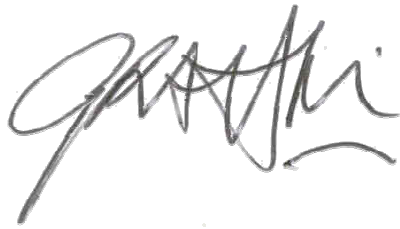
However, at the time of inspection, the department had not been provided with any details of the route proposed for grid connection powerlines, or any other off-site infrastructure. The department therefore reserves the right to request a flora survey report, if deemed necessary, for the consideration of impacts associated with off-site infrastructure.

I acknowledge receipt of the Fauna Assessment report (Centre For Environmental Management; March 2006), forwarded with your email of 17 May 2006. The department is in the process of reviewing this report and you will be further advised in due course.

If you have any questions regarding this matter please contact Rod Davison at the Ballarat office of the department on telephone (03) 5336 6756.



Yours sincerely

A handwritten signature in black ink, appearing to read 'Grant Hull', with a stylized, cursive script.

GRANT HULL

Manager Coasts and Land Use Planning
South West

Cc: Statutory Planning Services
Hepburn Shire Council
PO Box 21
DAYLESFORD 3460



**Centre for
Environmental
Management**

Report Commissioned by Future Energy

Leonards Hill Wind Park – Fauna Assessment

July 2006



Leonards Hill Wind Park – Fauna Assessment

July 2006

Report to Future Energy

by:

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CONTENTS

BACKGROUND	1
Leonards Hill Wind Park	1
Study Area.....	2
METHODS	4
Investigation area	4
Existing information	4
Field inspection.....	5
Limitations.....	5
FAUNA OVERVIEW OF LEONARDS HILL WIND PARK.....	7
Existing information	7
Field inspection.....	7
POTENTIAL FAUNA USE OF STUDY AREA	9
Fauna movement through the landscape.....	9
Fauna habitat within the study site	10
POTENTIAL THREATS TO SPECIES	11
SUMMARY OF IMPACTS	14
Further investigations	14
REFERENCES	15
APPENDIX 1 ATLAS OF VICTORIAN WILDLIFE RECORDS OF FAUNA FROM THE LEONARDS HILL REGION	16
APPENDIX 2 EPBC ACT – DATABASE OF SIGNIFICANT LOCATIONS RECORDS OF TERRESTRIAL FAUNA FROM THE LEONARDS HILL AREA.....	20
APPENDIX 3 FAUNA RECORDED FROM THE PROPOSED LEONARDS HILL WIND PARK SITE AND ITS SURROUNDS.....	22

BACKGROUND

The development of the wind energy industry in Australia is progressing rapidly and is widely considered to be an environment-friendly alternative to the production of energy using fossil fuels. Wind turbines, however, pose a risk to fauna, particularly flying forms such as birds and bats. Risks include collisions with operating wind turbines and disturbance and resulting avoidance of habitats in and near wind farms (Brett Lane & Associates 2005). Some species may be particularly vulnerable including birds of prey and owls (Brett Lane & Associates 2005).

Potential impacts on fauna form an important part of the planning, assessment and approval process for wind energy developments. In recognition of the importance of a thorough risk assessment of potential fauna impacts during development and operation of wind energy facilities, protocols have been developed to provide guidance to the most appropriate siting, design and management of wind energy facilities. For example, Wind Farms and Birds: Interim Standards for Risk Assessment (Brett Lane & Associates 2005) provides key information for both companies operating wind farms and agencies involved in the approval process on a standard approach to assessing bird impacts pre-development and post-development.

Leonards Hill Wind Park

Future Energy Pty. Ltd. is investigating the possible establishment of a small community wind park at Leonards Hill, south of Daylesford. The proposed community wind park will comprise two modern turbines and be expected to provide enough energy to power over 2,000 homes. The turbines will be situated on cleared farmland.

As an initial step in assessing the feasibility of the Leonards Hill Wind Park project, Future Energy has commissioned the Centre for Environmental Management, University of Ballarat to provide an overview of the fauna recorded from the site and surrounding areas. The overview of the site and its surrounds involved two components:

- A review of existing, available information on fauna at the site and within the surrounding region.
- An inspection of the site and the surrounding region to assess the nature of fauna habitats present and potential fauna usage of the site and its surrounds.

The objective of this overview is to provide an assessment of the fauna of the proposed wind park site and the surrounding region. In particular the overview aims to:

- Identify the potential occurrence of any significant species at the site.
- Identify fauna habitats on or near the proposed wind park site.
- Identify species that may be adversely impacted during the establishment and functioning of the wind turbines based on the results of the desktop assessment and field inspection of fauna habitats present.

This overview will provide an estimate of the potential for significant fauna impacts and identify issues requiring further investigation.

Study Area

The proposed Leonards Hill Wind Park site is located on cleared farmland at Leonards Hill, approximately 10 km south of Daylesford, on the east side of the Ballan-Daylesford Road. The farmland on which the proposed wind park occurs abuts the Wombat State Forest to the east. The extensive Wombat State Forest also occurs approximately 1-2 km west of the proposed wind park. These forests mostly support Herb-rich Foothill Forest EVC and Shrubby Foothill Forest EVC. The site occurs within the Central Victorian Uplands bioregion.

The proposed wind park site is mostly cleared farmland, presently used for cattle grazing, potato crops and hay production. Some remnant Blackwood *Acacia melanoxylon* persist along fencelines. There are two prominent vegetation corridors, running north-south, approximately 200 m to the east and 300 m west of the proposed locations of the two wind turbines. The eastern corridor is approximately 15 m in width and occurs on an unused road reserve. This corridor supports native vegetation including many large, old eucalypts. To the west, the vegetated roadside adjoining the Ballan-Daylesford Road also provides a corridor for faunal movement in the landscape. This corridor is approximately 50 m wide.

There are two small farm dams located approximately 200-300 m from the site of the proposed wind turbines.



Figure 1 View of Leonards Hill from its south-west base.

METHODS

Investigation area

The investigation area included three distinct zones:

- Zone 1 - the site of the proposed wind turbines (includes 100 m radius around wind turbines) (Figure 2).
- Zone 2 - the site of the proposed wind park (the farm land surrounding the site of the proposed wind turbines; approximately 300 m radius around proposed wind turbines) (Figure 3).
- Zone 3 - the area surrounding the proposed wind park (5 km radius around proposed wind turbines) (Figure 4).

These zones align with the guidelines identified by Brett Lane & Associates (2005) for determining the potential impact of wind farms and reflect the potential mobility of birds, and bats, within landscapes.

Existing information

Existing fauna records for the wind park site and its surrounds were sourced from the Atlas of Victorian Wildlife (AVW) (DSE 2004a). A five kilometre buffer area around the wind turbines was used and all records within this area were compiled. Records were filtered to a locational accuracy of $\leq 2'$ longitude/latitude.

The AVW contains the most complete readily accessible Victorian data on fauna location records, including Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and Flora and Fauna Guarantee Act 1988 (FFG Act) listed species, as well as threatened species within Victoria.

In addition, the EPBC Act – Database of Significant Locations (DEH – www.deh.gov.au; Accessed 1 March 2006) was searched for matters protected by the EPBC Act that may occur in the Leonards Hill area. The report generated from this search provides general guidance on matters of National Environmental Significance (NES) and other matters protected by the EPBC Act in the search area. The NES and other matters protected by the EPBC Act that are listed from a search (e.g. threatened species or ecological communities, or migratory species) are those that are predicted to occur within the area, and a general indication is provided of the likelihood of their presence. Species or communities highlighted by the search therefore have not necessarily been recorded from the search site, but may occur there if suitable habitat is present.

The Wombat State Forest Explorer was also searched for information on biodiversity values in the study area (DSE 2004b).

Field inspection

A field inspection of the proposed Leonards Hill Wind Park was undertaken on 20 February 2006. This included searches of the site of the proposed wind turbines and the proposed wind park.

The field inspection included a complete traverse of the proposed wind park site, inspecting potential fauna habitat and recording any observations of fauna. Observations of tracks, scratchings, burrows and scats were also recorded. The field inspection did not include systematic fauna surveys (e.g. trapping, spotlighting and Anabat) of the proposed wind park site.

All remnant trees within the cleared farmland (Zones 1 and 2) surrounding the proposed turbine sites (approximately 300 m radius) were inspected for potential fauna habitats and signs of fauna use.



Figure 2 Typical Zone 1 habitat

Limitations

The field inspection was conducted on a single day in February 2006 and focused predominantly on the presence of potential fauna habitat. The fauna observations recorded therefore represent only a brief snapshot of the fauna likely to use the site. The small amount of time spent at the site may not have been adequate to detect rare, cryptic, migratory or wide-ranging species. The observations, while not exhaustive, do provide a representative account of the fauna present at the site, and complement those records contained within the AVW (DSE 2004a).

Observations of fauna during the field inspection were largely limited to opportunistic sightings of species while traversing the site and its surrounds by foot. More intensive survey methods, such as bat trapping, use of Anabat detectors and call playback, could result in additional species being recorded. However, based on the fauna habitat present at the site and previous records of species observed in the district, more intensive survey is unlikely to add significantly to the current knowledge of threatened or sensitive species that may utilise the site.



Figure 3 Typical Zone 2 habitat abutting vegetated roadside corridor



Figure 4 View of landscape (Zone 3) surrounding proposed wind park site

FAUNA OVERVIEW OF LEONARDS HILL WIND PARK

Existing information

There were no existing fauna records within Zones 1 and 2 of the proposed Leonards Hill Wind Park (DSE 2004a). The AVW contained records of 71 vertebrate fauna species occurring within five kilometres of the proposed Leonards Hill Wind Park site (Zone 3). This includes 38 birds (37 native species and one introduced species), 22 mammals (18 native species and four introduced species), six reptiles, four frogs and one fish (Appendix 1).

There were no species listed as threatened in Australia under the EPBC Act recorded within five kilometres of the proposed wind park site (DSE 2004a). Two species listed as threatened in Victoria under the FFG Act have been recorded within five kilometres of the proposed wind park; Powerful Owl (also considered vulnerable in Victoria) and Mountain Galaxias (DSE 2004a). One species listed on the Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2003), the endangered Brown Toadlet, has also been recorded within five kilometres of the proposed wind park site.

The predicted species report generated from the EPBC Act – Database of Significant Locations (DEH – www.deh.gov.au; Accessed 1 March 2006) included several species not listed in the AVW search. Of these predicted occurrences, seven bird species were identified as potentially occurring in the Leonards Hill area (Appendix 2). These included the threatened Swift Parrot and Regent Honeyeater (both considered endangered under the EPBC Act), migratory species White-throated Needletail, Satin Flycatcher and Rufous Fantail and other protected species under the EPBC Act including Fork-tailed Swift and Rainbow Bee-eater. The AVW did not contain records of any of these species within 5 km of the proposed wind park (DSE 2004a).

Field inspection

A total of 29 fauna species were recorded at the proposed Leonards Hill Wind Park site and the surrounding area during the field inspection (Zones 1 and 2) (Appendix 3). This included 27 bird species and two mammal species (one native species and one introduced species) (Appendix 3).

None of the fauna species recorded during the survey are listed as threatened in Australia or Victoria.

Three bird species were recorded during the field inspection at the site of the proposed wind turbines (Zone 1): Australian Magpie, Little Raven and Welcome Swallow. These species are all common and widespread and are typical of open farmland habitats.

All species listed in Appendix 3 were observed in Zone 2. These species are common and widespread in southeast Australia (Emison *et al.* 1987). The majority of these species were observed in the patches and corridors of native vegetation located away from the site of the proposed wind turbines.

The assessment of potential fauna habitats close to the proposed wind park site (Zones 1) identified isolated trees and associated hollows as providing potential habitat for fauna (Figure 5). The value of these trees and their associated hollows to fauna at the site is likely to be reduced due to their isolation in the landscape.

A medium-sized nest was observed in a remnant eucalypt within Zone 2 which would have been constructed by an Australian Magpie or raven species.



Figure 5 Isolated remnant Blackwood *Acacia melanoxylon* within Zone 1

Two small to medium-sized farm dams are present in Zone 2. These supported little emergent vegetation or submerged coarse woody debris and therefore had limited habitat value for fauna and would not support large waterbird populations.

POTENTIAL FAUNA USE OF STUDY AREA

Wind turbines do present a collision risk to birds and bats during flight. The flight behaviour of some species may put them at particular risk. Groups of species that may be exposed to greater risk based on their flight behaviour includes birds of prey (e.g. Wedge-tailed Eagle) and waterbirds that fly in dense concentrations. The relative risk of collisions with wind turbines is lowered by the size of the proposed wind park, which comprises just two wind turbines. Landscape structure also influences the risk level associated with wind turbines. The occurrence of geographical features such as waterways, ridgelines and vegetation corridors influence the pattern of fauna movements through the landscape. The presence of landscape features, such as large wetlands and grain crops, that attract large concentrations of birds can also influence risk levels.

Fauna movement through the landscape

The geographical layout of the proposed Leonards Hill Wind Park site is unlikely to concentrate or funnel bird or bat movements towards the proposed turbine sites. Leonards Hill is 717 m a.s.l. and forms a medium-sized rise in an undulating landscape. The mound-shaped hill is isolated from surrounding rises and does not form a distinct ridge-line that are often preferred flight areas for birds of prey, such as the Wedge-tailed Eagle. There were no major drainage lines that could function as important corridors for faunal movement in close proximity to the proposed wind park site.

Potential linear corridors for fauna movement are located to the east and west of the proposed turbine sites and there are large patches of native vegetation east and west of the site. Species moving through the landscape are likely to use these corridors and surrounding forest rather than the cleared area in which the proposed wind park would be situated. Most species observed during the field inspection were within the corridors, which form part of Zone 2. The species recorded here were typical of forest and woodland habitats and would not be expected to regularly use the open farmland habitats that surround the proposed wind turbines.

The review of existing information and the field inspection identified few significant fauna habitats (i.e. those that attract high numbers of potentially susceptible species) within the area (Zones 1, 2 and 3) that could potentially increase the fauna impacts of the wind park. There are no significant wetland habitats (Ramsar wetlands and protected areas) or other wetlands within five kilometres that are likely to support significant concentrations of listed migratory species that would have a flight path affected by the proposed wind park. There is unlikely to be large concentrations of waterbirds, including communal roosts, in the area at any time.

There is some potential for large bird concentrations to occur within the site if any grain or other seed crops are planted nearby in the future. Such crops within the area surrounding the proposed wind park have the potential to attract large flocks of Sulphur-crested Cockatoos, Long-billed Corellas and Galahs, which are all common and widespread in Victoria. The susceptibility of these species to collision with wind turbines when in large flocks is unknown, but it is likely to be greater than when present in small flocks.

Fauna habitat within the study site

The land within the immediate vicinity of the proposed wind park site is farmland. At the time of survey the land within 200 m of the proposed turbines was variously used for cattle grazing, hay production and potato cropping. This land use favours open country species such as Australian Magpie and Little Raven and various other species that are common and widespread in southeast Australia.

There are a small number of remnant trees present, mostly mature Blackwood *Acacia melanoxylon* located along existing fencelines. A small proportion of these trees contained hollows which may provide shelter and breeding sites for birds, bats and arboreal mammals. These trees are isolated from the large patches and corridors of intact vegetation. Research into the use of trees by bats in rural landscapes found bat activity and bat abundance decreased as tree density decreased (Lumsden & Bennett 2005). It was found that bat activity and bat abundance was highest in areas of dense scattered trees and woodland blocks, but the ability of bats to commute across open areas enabled them to access sparsely scattered trees (Lumsden and Bennett 2005).

POTENTIAL THREATS TO SPECIES

The proposed Leonards Hill Wind Park, comprising two wind turbines, presents a low risk to fauna based on its small size and the limited habitat value that the proposed site has for fauna. The fauna habitats at the proposed wind park site are unlikely to provide suitable habitat for any significant fauna species identified in this report or species known to be at particular risk of adverse impacts associated with the development and operation of the wind park.

The Swift Parrot is considered endangered under the EPBC Act. This species mainly occurs in the Box-Ironbark forests and woodland in central and northern Victoria (DSE 2003). Gullies provide key habitats for these species in such forests. This species is known to be vulnerable to collisions with building windows in Tasmania (DSE 2003). The proposed wind park site does not provide suitable habitat for this species, but based on its nomadic nature, the Swift Parrot may move through the Leonards Hill area from time to time. The AVW did not contain any records of this species in the Leonards Hill area (DSE 2004a). The likelihood of any impact to this species associated with the proposed wind park is low.

The Regent Honeyeater is also considered endangered under the EPBC Act. This species has similar habitat preferences to the Swift Parrot, but significant declines in Victoria mean that it is now unlikely to occur in the region. The AVW did not contain any records of this species in the Leonards Hill area. The impact of the proposed wind park on Regent Honeyeater would be low.

The proposed wind park would also have an insignificant impact on other bird species protected under the EPBC Act that are predicted to occur in the Leonards Hill area (Appendix 2). Rufous Fantail and Satin Flycatcher inhabit forests, particularly dense gully habitats. The proposed wind park site does not provide suitable habitat for these species. White-throated Needletail and Fork-tailed Swift are aerial species that are rarely observed to alight and sometimes congregate in large numbers (Emison *et al.* 1987). Both species often forage very high in the air, but may also forage at lower levels feeding on insects (Emison *et al.* 1987). Therefore, based on their flight behaviour, wind turbines may present some risk to these species, however the small scale of the proposed development means any impact to these species is likely to be low even if they do fly over the area. The Rainbow Bee-eater occurs in wooded habitats in central and northern Victoria. The proposed wind park does not support suitable habitat for this species.

The Powerful Owl is considered to be vulnerable in Victoria (DSE 2003) and is listed as threatened in Victoria under the FFG Act. This species has been recorded at several locations within 5 km of the proposed wind park site. The Powerful Owl occurs in forest habitats where they favour gullies (Emison *et al.* 1987). This species hunts at night, flying through the forest canopy and preying upon arboreal mammals (Emison *et al.* 1987). The cleared farmland surrounding the proposed wind farm (Zones 1 and 2) is unlikely to provide habitat value for this species. Whilst the Powerful Owl may hunt in open farmland adjacent to forests, based on the configuration of the landscape surrounding the proposed wind farm site (Zones 2 and 3), with large patches of forest and vegetated corridors connecting major patches, the necessity for Powerful Owls to cross the site would be limited and therefore any effect would be small.

The Mountain Galaxias is listed as threatened in Victoria under the FFG Act. The Mountain Galaxias is a fish that occurs in small, flowing streams and would not be affected by the proposed wind park.

The Brown Toadlet is considered to be endangered in Victoria (DSE 2003). This species occurs in the litter layer of forests and would not be affected by the proposed wind park.

Based on their flight behaviour, birds of prey may be at increased risk of collision with wind turbines. Bird of prey species recorded within 5 km of the proposed wind park site were Brown Goshawk and Wedge-tailed Eagle. Brown Goshawks typically inhabit forests and woodlands and are rare in open farmland (Emison *et al.* 1987). This species generally catch prey on the ground or in flight among trees (Emison *et al.* 1987). The Brown Goshawk is widespread in Victoria. The Wedge-tailed Eagle occurs in a wide variety of habitats, including woodlands and open farmland. This species is often observed soaring at various heights, using updrafts associated with variable topography such as ridgelines. An individual Wedge-tailed Eagle was reported to collide with a wind turbine in Tasmania (AusWEA Fact Sheet 8: Wind Farms and Bird and Bat Impacts – www.auswea.com.au; Accessed 21 February 2006). The topography of the proposed Leonards Hill Wind Park site would present a lower likelihood of attraction to soaring Wedge-tailed Eagles as it is not a major rise in the landscape (in height or slope) and does not form a continuous ridgeline. As a result there would be less generation of the strong updraft winds that Wedge-tailed Eagles frequently use. There were four records of the Wedge-tailed Eagles within 5 km of the proposed wind park in the AVW (2004a), all greater than 2 km from the site. It is therefore unlikely that the Leonards Hill area is important to this species, or other bird of prey species, and the impacts associated with the proposed wind park would be low.

There are records of three waterbird species within 5 km of the proposed wind park. The Straw-necked Ibis has been recorded in the AVW (DSE 2004a). A small mixed-flock of Pacific Black Duck and Australian Wood Duck were observed on a farm dam within Zone 2 during the field inspection. There are no large wetland habitats within five kilometres that are likely to regularly support significant concentrations of birds that would have a flight path affected by the proposed wind park. As there are unlikely to be large concentrations of waterbirds, including communal roosts, in the area at any time, the potential impact to these species will be low.

Based on the findings of Lumsden & Bennett's (2005) investigation into the use of trees in rural landscapes by bats in northern Victoria, it is likely that some bats make use of the isolated trees present in Zones 1 and 2. Bat activity and abundance, however, is likely to be significantly less than that in surrounding areas supporting more native vegetation such as that occurring in the vegetated corridors and surrounding forests. Small numbers of bats have been reported to collide with wind turbines in Australia (AusWEA Fact Sheet 8: Wind Farms and Bird and Bat Impacts – www.auswea.com.au; Accessed 21 February 2006). Assuming that bat activity and bat abundance is significantly reduced in the open farmland area (Zones 1 and 2) for the species identified in this report as occurring in this district, the proposed wind park will have a low impact on bats.

SUMMARY OF IMPACTS

The fauna assessment conducted at the proposed Leonards Hill Wind Park provides an initial assessment of the known fauna information for the site and its surrounds that should enable further assessment of the projects feasibility. There are no indications within the existing AVW records, or from the site assessment, that significant species utilise the proposed wind park site. The habitat present at the proposed wind park site does not provide suitable habitat for significant species recorded from the area. There are no indications that the proposed wind park would have a significant impact on any species or species group. The construction and operation of the proposed wind farm will potentially impact on some fauna, including potential impacts to birds and bats, however this impact has been assessed as low in this report.

Based on this assessment of potential threats to species associated with the proposed Leonards Hill Wind Park, the development presents a low risk to fauna. This assessment is based on the qualitative risk analysis approach presented in Brett Lane & Associates (2005) that uses estimates of the level of consequence and its likelihood to assess risk. The level of consequence represents mortality of or disturbance to fauna and ranges from insignificant to significant with the likelihood of risk ranging from very rare to probable. The consequence of the proposed wind park on fauna is minor and the likelihood that these consequences or impacts could occur is rare. Therefore the risk associated with the proposed wind park is low for threatened and listed species, birds that flock or occur in low numbers and species or groups of species that are prone to collision with turbines or to indirect effects from wind farms.

Further investigations

If the proposed development proceeds and Future Energy is required to conduct operational phase fauna monitoring (in which impacts of the operation of the wind park are monitored), it will be necessary to conduct more detailed pre-operational fauna monitoring for comparative purposes (Brett Lane & Associates 2005).

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APPENDIX 1 ATLAS OF VICTORIAN WILDLIFE RECORDS OF FAUNA FROM THE LEONARDS HILL REGION

Existing database records

The table below lists vertebrate fauna species recorded in the Atlas of Victorian Wildlife (DSE 2004a) from sites within five kilometres of the proposed Leonards Hill Wind Park site.

Key to codes:

* = introduced species

Conservation status:

FFG - Flora and Fauna Guarantee Act 1988

L = listed as threatened under the Act

Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2003)

e = endangered v = vulnerable

	Species name	Common name
Birds		
	<i>Threskiornis spinicollis</i>	Straw-necked Ibis
	<i>Accipiter fasciatus</i>	Brown Goshawk
	<i>Aquila audax</i>	Wedge-tailed Eagle
	<i>Vanellus miles</i>	Masked Lapwing
	<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo
	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo
	<i>Glossopsitta concinna</i>	Musk Lorikeet
	<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet
	<i>Neophema chrysostoma</i>	Blue-winged Parrot
	<i>Cuculus pallidus</i>	Pallid Cuckoo
	<i>Cacomantis variolosus</i>	Brush Cuckoo
	<i>Chrysococcyx lucidus</i>	Shining Bronze-Cuckoo
Lv	<i>Ninox strenua</i>	Powerful Owl
	<i>Dacelo novaeguineae</i>	Laughing Kookaburra
	<i>Cormobates leucophaeus</i>	White-throated Treecreeper

	Species name	Common name
	<i>Acanthiza pusilla</i>	Brown Thornbill
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill
	<i>Acanthiza lineata</i>	Striated Thornbill
	<i>Anthochaera carunculata</i>	Red Wattlebird
	<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater
	<i>Lichenostomus melanops</i>	Yellow-tufted Honeyeater
	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater
	<i>Phylidonyris pyrrhoptera</i>	Crescent Honeyeater
	<i>Petroica multicolor</i>	Scarlet Robin
	<i>Petroica rosea</i>	Rose Robin
	<i>Pachycephala pectoralis</i>	Golden Whistler
	<i>Rhipidura fuliginosa</i>	Grey Fantail
	<i>Rhipidura leucophrys</i>	Willie Wagtail
	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
	<i>Artamus cyanopterus</i>	Dusky Woodswallow
	<i>Gymnorhina tibicen</i>	Australian Magpie
	<i>Strepera versicolor</i>	Grey Currawong
	<i>Corvus coronoides</i>	Australian Raven
	<i>Corcorax melanorhamphos</i>	White-winged Chough
	<i>Neochmia temporalis</i>	Red-browed Finch
	* <i>Carduelis carduelis</i>	European Goldfinch
	<i>Dicaeum hirundinaceum</i>	Mistletoebird
	<i>Zosterops lateralis</i>	Silvereye
Mammals		
	<i>Antechinus agilis</i>	Agile Antechinus
	<i>Antechinus swainsonii</i>	Dusky Antechinus
	<i>Trichosurus vulpecula</i>	Common Brushtail Possum
	<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum

	Species name	Common name
	<i>Petauroides volans</i>	Greater Glider
	<i>Petaurus breviceps</i>	Sugar Glider
	<i>Phascolarctos cinereus</i>	Koala
	<i>Vombatus ursinus</i>	Common Wombat
	<i>Wallabia bicolor</i>	Black Wallaby
	<i>Macropus giganteus</i>	Eastern Grey Kangaroo
	<i>Tadarida australis</i>	White-striped Freetail Bat
	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat
	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat
	<i>Chalinolobus morio</i>	Chocolate Wattled Bat
	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle
	<i>Vespadelus regulus</i>	Southern Forest Bat
	<i>Eptesicus sp.</i>	Unidentified Eptesicus
	<i>Rattus fuscipes</i>	Bush Rat
	* <i>Rattus rattus</i>	Black Rat
	* <i>Mus musculus</i>	House Mouse
	* <i>Ovis aries</i>	Sheep (feral)
	* <i>Canis vulpes</i>	Red Fox
Reptiles		
	<i>Egernia whitii</i>	White's Skink
	<i>Lampropholis guichenoti</i>	Garden Skink
	<i>Saproscincus mustelinus</i>	Weasel Skink
	<i>Niveoscincus coventryi</i>	Coventry's Skink
	<i>Eulamprus tympanum tympanum</i>	Southern Water Skink
	<i>Pseudemoia entrecasteauxii</i>	Southern Grass Skink
Frogs		
	<i>Geocrinia victoriana</i>	Victorian Smooth Froglet
e	<i>Pseudophryne bibronii</i>	Brown Toadlet
	<i>Crinia signifera</i>	Common Froglet

	Species name	Common name
Fish	<i>Litoria ewingii</i>	Southern Brown Tree Frog
	L <i>Galaxias olidus</i>	Mountain Galaxias

APPENDIX 2 EPBC ACT – DATABASE OF SIGNIFICANT LOCATIONS RECORDS OF TERRESTRIAL FAUNA FROM THE LEONARDS HILL AREA

Database records

The table lists those terrestrial fauna species predicted to occur in the Leonards Hill area based on the report generated from the EPBC Act – Database of Significant Locations (DEH – www.deh.gov.au; Accessed 1 March 2006) from the Leonards Hill area. Species that potentially occur in the area based on habitat preferences, movements or current distribution are identified.

	Species name	Common name	Potential occurrence
Threatened			
sp.			
	<i>Lathamus discolor</i>	Swift Parrot	✓
	<i>Rostratula australis</i>	Painted Snipe	
	<i>Xanthomyza phyrygia</i>	Regent Honeyeater	✓
	<i>Litoria raniformis</i>	Growling Grass Frog	
	<i>Dasyurus maculatus maculatus</i>	Spot-tailed Quoll	
	<i>Pseudomys fumeus</i>	Smoky Mouse	
	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	
	<i>Delma impar</i>	Striped Legless Lizard	
Migratory			
sp.			
	<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	
	<i>Hirundapus caudacutus</i>	White-throated Needletail	✓
	<i>Myiagra cyanoleuca</i>	Satin Flycatcher	✓
	<i>Rhipidura rufifrons</i>	Rufous Fantail	✓
	<i>Gallinago hardwickii</i>	Latham's Snipe	
Overfly			
marine area			
sp.			
	<i>Apus pacificus</i>	Fork-tailed Swift	✓
	<i>Ardea alba</i>	Great Egret	

Species name	Common name	Potential occurrence
<i>Ardea ibis</i>	Cattle Egret	✓
<i>Merops ornatus</i>	Rainbow Bee-eater	

APPENDIX 3 FAUNA RECORDED FROM THE PROPOSED LEONARDS HILL WIND PARK SITE AND ITS SURROUNDS

Site inspection records

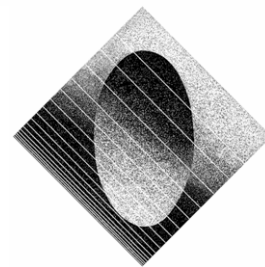
The table below lists vertebrate fauna species recorded opportunistically during a site inspection of the proposed Leonards Hill Wind Park site and its surrounds conducted on the 20 February 2006.

Key to codes:

* = introduced species

Species name	Common name
Birds	
<i>Chenonetta jubata</i>	Australian Wood Duck
<i>Anas superciliosa</i>	Pacific Black Duck
<i>Glossopsitta concinna</i>	Musk Lorikeet
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo
<i>Cacatua tenuirostris</i>	Long-billed Corella
<i>Cacatua roseicapilla</i>	Galah
<i>Platycercus elegans</i>	Crimson Rosella
<i>Hirundo neoxena</i>	Welcome Swallow
<i>Hirundo ariel</i>	Fairy Martin
<i>Rhipidura fuliginosa</i>	Grey Fantail
<i>Colluricincla harmonica</i>	Grey Shrike-thrush
<i>Acanthiza lineata</i>	Striated Thornbill
<i>Acanthiza pusilla</i>	Brown Thornbill
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill
<i>Sericornis frontalis</i>	White-browed Scrubwren
<i>Malurus cyaneus</i>	Superb Fairy-wren
<i>Cormobates leucophaeus</i>	White-throated Treecreeper
<i>Dicaeum hirundinaceum</i>	Mistletoebird
<i>Pardalotus punctatus</i>	Spotted Pardalote
<i>Zosterops lateralis</i>	Silvereye
<i>Melithreptus lunatus</i>	White-naped Honeyeater
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater

Species name	Common name
<i>Anthochaera carunculata</i>	Red Wattlebird
<i>Strepera versicolor</i>	Grey Currawong
<i>Gymnorhina tibicen</i>	Australian Magpie
<i>Corvus mellori</i>	Little Raven
<i>Pardalotus striatus</i>	Striated Pardalote
Mammals	
<i>Macropus giganteus</i>	Eastern Grey Kangaroo
<i>*Oryctolagus cuniculus</i>	Rabbit



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REPORT No.: 2006293 001 R02

PROJECT: HEPBURN COMMUNITY WIND PARK
NOISE ASSESSMENT

CLIENT: Future Energy Pty Ltd
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ATTENTION: Mr David Shapero

DATE: 10 October 2006

MARSHALL DAY ACOUSTICS

A handwritten signature in black ink, appearing to read 'P. Fearnside', with a horizontal line underneath.

Peter Fearnside
Managing Director

A handwritten signature in black ink, appearing to read 'C. Delaire', with a vertical line underneath.

Christophe Delaire
Consultant

TABLE OF CONTENTS

	Page No.
1.0 OVERVIEW	1
2.0 WIND TURBINE NOISE CRITERIA IN VICTORIA.....	2
3.0 WIND SPEED MEASUREMENTS	2
4.0 SELECTION OF RESIDENCES FOR ASSESSMENT.....	3
4.1 Prediction of noise impact using ISO9613-2:1996	
4.2 Residences to be assessed	
5.0 BACKGROUND NOISE MEASUREMENTS.....	5
6.0 OUTDOOR NOISE LEVEL CRITERIA USING NZS6808:1998.....	6
6.1 House 7	
6.2 House 18	
7.0 NOISE PREDICTIONS USING NZS6808:1998	8
7.1 Sound power of a WTG with changing wind speed	
7.2 Comparison of predicted levels with noise limits	
8.0 CONCLUSION	12
9.0 SUMMARY OF PARAMETERS.....	12
APPENDIX A SITE LAYOUT	
APPENDIX B ACOUSTIC TERMINOLOGY	
APPENDIX C METHODOLOGY OVERVIEW	
APPENDIX D ONE-THIRD OCTAVE BAND SOUND POWER SPECTRUM FOR THE REPOWER MM82-2MW	
APPENDIX E NOISE CONTOUR MAPS AT 9 M/S USING ISO9613-2:1996	
APPENDIX F PHOTOGRAPHS OF LOGGER LOCATIONS	
APPENDIX G MEASURED BACKGROUND NOISE LEVELS AND WIND SPEED	
APPENDIX H PREDICTED NOISE VS NOISE LIMITS	
APPENDIX I SUMMARY OF PARAMETERS	

DOCUMENT STATUS

Revision	Purpose	Date delivered
-	Draft issued to client	25 August 2006
R01	Issued to client	29 August 2006
R02	Draft issued to client	06 October 2006
R02	Issued to client	10 October 2006

1.0 OVERVIEW

This report, commissioned by Future Energy Pty Ltd, details the results of a noise assessment of the proposed Hepburn community wind park.

The assessment has been performed in accordance with the requirements of New Zealand Standard 6808:1998 – *Acoustics – The assessment and measurement of sound from wind turbine generators*, which is applicable in Victoria. The standard states that the noise level from a wind turbine generator or wind farm at a residential site should not exceed the background noise level (L_{A95}) by more than 5dBA or a level of 40dBA L_{A95} , whichever is greater.

Limits are therefore set using these criteria based on noise measurements of existing ambient levels at a range of wind speeds. Noise predictions are compared to these limits in order to confirm compliance or not, with the standard. Noise predictions in the New Zealand standard are based upon a simple equation that may be conservative and independent of sound spectrum, but requires the choice of an air absorption coefficient that suits the spectral content of the turbine.

The Hepburn community wind park will consist of two (2) Repower MM82-2MW wind turbine generators (WTG) with a hub height of 69m. Sound power data used to predict noise impact of these turbines has been taken from an independent test report prepared by Windtest Kaiser-Wilhelm-Koog GmbH. The test was carried out in Germany between February and March 2004 with a fully operational Repower MM82-2MW wind turbine generator.

Using the spectral sound power level of the wind turbines, an assessment was carried out using the ISO9613-2:1996 standard as implemented in SoundPLAN noise prediction software. This method includes effects of terrain, worst-case meteorological effects and ground effects and includes spectral propagation. Fourteen (14) residential sites were initially identified as potentially sensitive to noise impact. These properties were defined as any properties that have a predicted noise level of 35dBA or higher. These residential properties are the closest to the wind park. Residential sites further away will comply with the NZS6808:1998 noise limits.

Background noise monitoring was undertaken at two (2) study sites deemed representative of all the other nearest affected residential properties for a period of 14 days. Noise limits determined for the two (2) study sites can be applied to a further twelve (12) properties in close proximity, and with similar adjacent vegetation.

The method described in NZS6808:1998 has been used to calculate the predicted noise level at each residential site due to the presence of WTGs. This method requires the use of an air absorption coefficient suggested in the standard to be typically 0.005dB/m. This value can, in fact, vary according to the spectral content of the wind turbines that are being assessed. Using the initial analysis of the noise impact of the wind park carried out with ISO9613:1996 standard, it was found that an air absorption coefficient of 0.005dB/m was acceptable for predictions carried out using NZS6808:1998. This standard is already conservative in nature in that it does not include ground absorption effects, or screening effects due to terrain or buildings, and contributions from every wind turbine is included.

Comparison of the predicted noise levels and the noise limits indicates that all residential properties will comply with the NZS6808:1998 noise limits.

The site layout for the proposed wind park is presented in Appendix A.

Acoustic terminology used throughout this report is described in Appendix B.

An overview of the methodology used for this noise assessment is provided in Appendix C.

2.0 WIND TURBINE NOISE CRITERIA IN VICTORIA

Guidelines from the Victorian Government state that wind farms in Victoria must be assessed in accordance with New Zealand Standard 6808:1998. The Standard states that the noise level from a WTG or wind farm at a residential site should not exceed the background noise level (L_{A95}) by more than 5dBA or a level of 40dBA L_{A95} , whichever is greater. This should be valid for a range of wind speeds that cover the operation of the wind farm.

The Standard requires a minimum of 10 days continuous background noise monitoring at selected affected sites, together with simultaneous wind speed measurements every ten minutes.

A regression analysis is then performed to describe the relationship between the background noise level and the wind speed.

3.0 WIND SPEED MEASUREMENTS

Measurements of wind speed were taken at a tower situated on site with wind anemometers at heights of 20m and 50m and provided to us by Future Energy. Wind speed increases with height above ground, and is dependent on the shape of the velocity profile. Measurements at two or more heights can determine the shape of this profile.

For the purposes of standardising measurements and avoiding confusion regarding whether wind is measured at hub height or any other height, *NZS6808:1998* as well as most noise specification reports for WTGs use data standardised to wind speed at a height of 10m AGL.

In order to convert wind speeds measured at a height of x_2 to that of a height of x_1 AGL, the following equation which describes a velocity profile in a turbulent boundary layer, is used:

$$V(x_1) \text{ m/s} = \frac{V(x_2)}{\ln(x_2 / Z_0) / \ln(x_1 / Z_0)} \text{ m/s} \quad \text{Equation (1)}$$

Z_0 is the roughness factor which is dependent on the terrain and atmospheric stability. The wind data shows that a roughness factor of 0.2 is reasonable for this site.

Noise impact of a wind farm varies with wind speed and therefore it is also usual to choose a single wind speed as a starting point for comparison between noise impacts at different sites. In this case, the maximum impact of the wind turbines occurs at the single wind speed of 9m/s, 10m AGL where sound power of the MM82-2MW with a hub height of 69m, is at its maximum. Selection of residences for inclusion in the study is therefore based upon worst-case noise impact at a wind speed of 9m/s, 10m AGL.

For the purposes of brevity and to avoid confusion, all references to values of noise impact in this report from this point onwards, are for those that occur at a wind speed of 9m/s calculated at a height of 10m AGL, using equation (1).

4.0 SELECTION OF RESIDENCES FOR ASSESSMENT

Implicit in the New Zealand Standard NZS6808:1998, is that residences with an expected noise impact of 35dBA or more should be included in the noise assessment. The standard has a simple non-spectral prediction methodology based on hemispherical spreading and an air absorption coefficient, presumed to typically be 0.005dB/m.

However, as turbines have become larger, this value of air absorption coefficient can be too high, particularly for turbines with the greater proportions of low frequency sound power. This may result in under-predicting wind farm noise emissions. For this reason, an initial investigation using the *ISO 9613 – 2 "Acoustics – Attenuation of sound during propagation outdoors –Part 2: General method for calculation (1996)"* has been carried out to identify likely affected properties, as it incorporates a spectral air absorption algorithm.

This method uses the sound power spectrum of the turbine, and calculates propagation for each frequency band and sums the total predicted sound levels at each receiver. An outcome of this initial investigation is that a more suitable choice of air absorption coefficient can then be applied to the method in the standard to be used in the final assessment.

4.1 Prediction of noise impact using ISO9613-2:1996

The ISO9613-2:1996 method has the scope to take into account a range of factors affecting the attenuation of sound, including:

- The magnitude of the noise source in terms of sound power
- The distance between the source and receiver
- The presence of obstacles such as screens or barriers in the propagation path
- The presence of reflecting surfaces
- The hardness of the ground between the source and receiver
- Attenuation due to atmospheric absorption in one-third octave bands
- Worst-case wind affects that increase noise level.

Sound power data used to predict noise impact of these turbines have been taken from an independent test report prepared by Windtest Kaiser-Wilhelm-Koog GmbH. The test was carried out in Germany between February and March 2004 near Reußenköge with a fully operational Repower MM82-2MW wind turbine generator. The one-third octave band sound power spectrum of the MM82-2MW turbine at wind speed of 9m/s is presented in Appendix D.

A noise contour map of the wind park has been produced using proprietary sound level prediction software, SoundPLAN. The prediction algorithm used to calculate the noise contours was ISO9613-2:1996. Calculations were performed using one-third octave bands from 25Hz to 10kHz. Each turbine was modelled as a point source at hub height. All noise predictions use a receiver height of 1.5m above the local ground level. The ground was modelled as 50% hard ground. The noise contour map for the Hepburn community wind park is presented in Appendix E.

The hardness of the ground between the sources and the receivers needs to be defined in ISO9613-2:1996. 100% hard ground is considered to be fully reflective as would occur with concrete or asphalt, while 100% soft ground would be considered to absorptive and be appropriate for fields and grass. Our experience is that in country Victoria it is appropriate to assume that the ground is 50% hard/50% soft.

4.2 Residences to be assessed

All of the assessable properties can be identified as those within the 35dBA noise contour presented in Appendix E. Table 1 presents these assessable properties as well as the predicted levels according to ISO9613-2:1996. The "S" next to the reference indicates the property is owned by a stakeholder in this wind park project.

Table 1
Residential sites to be assessed

Reference	Easting	Northing	Distance to nearest turbine (m)	Predicted noise level according to ISO9613 at 9m/s (10m AGL)
1	245594	5853056	776	36dBA
2	245228	5853160	699	38dBA
3	245174	5853228	656	39dBA
4	244937	5853331	653	38dBA
5	244870	5853553	519	40dBA
6 (S)	244801	5854130	509	40dBA
7 (S)	244795	5854153	525	39dBA
10	244538	5854359	850	35dBA
11	244815	5854504	747	36dBA
13	244923	5854558	738	36dBA
14	245265	5854666	769	36dBA
16	245456	5854466	606	39dBA
17	245511	5854753	895	35dBA
18	245695	5854351	589	39dBA

5.0 BACKGROUND NOISE MEASUREMENTS

Background noise monitoring was undertaken between 5-20 September 2006 at the two (2) selected residential properties.

Table 2 lists these two (2) sites selected for background noise monitoring, as well as the remaining twelve (12) indicative sites that will share common limits.

Table 2
Background monitoring sites

House	Address	Indicative of houses
7	Ballan-Daylesford Road	1, 2, 3, 4, 5, 6, 10, 11, 12 and 13
18	Leonard Hill-South Bullarto Road	14, 16 and 17

Environmental Noise Loggers Type EL-316 and Rion NL21 were used to conduct 24 hour ambient noise level measurements. Measurements were taken at 10 minute intervals over a period of at least 14 days.

Noise loggers were placed at least 5m from the nearest dwelling in positions that were representative of the general ambient noise environment.

Photographs of logger positions are presented in Appendix F.

Daily rainfall data collected by Bureau of Meteorology at the Ballarat Station were reviewed and where rainfall is likely to have occurred, these data points were removed from the analysis. Appendix G shows the background noise and wind vs time for each study site.

6.0 OUTDOOR NOISE LEVEL CRITERIA USING NZS6808:1998

The measurement of noise from a source in the environment is normally undertaken at wind speeds below 5m/s in order to reduce the influence of windborne noise on the measurement itself. However, by the very nature of wind farms, the noise produced by turbines occur in a windy environment, at wind speeds consistently greater than 5m/s. For this reason, NZS6808:1998 was developed especially for this type of acoustic problem. The parameter L_{A95} is chosen as the compliance parameter, because it is statistically more representative of the type of noise a wind farm produces, and can take into account the background noise levels due to wind.

The New Zealand Standard NZS6808:1998 states that the background noise level at any residential site caused by a WTG or wind farm should not exceed a limit of the pre-wind farm background (L_{A95}) plus 5dBA or 40dBA, whichever is greater. The lower level of 40dBA is based upon an internationally accepted indoor level of 30-35dBA L_{Aeq} when there is no wind and assumes a reduction from outdoors to indoors, of typically 10dB with windows open.

Wind turbine noise is usually most noticeable in the lower wind speeds of 6-8m/s when the sound level produced can be comparable or greater than, the background noise generated by the wind. At greater wind speeds, the background noise due to the wind itself can mask the turbine noise, rendering it inaudible. For this reason it is important to observe the relationship between the background noise levels and wind speed, particularly at lower wind speeds.

The background sound pressure levels described in Section 5.0 are plotted against wind speed in this section. To determine the noise limits, a regression analysis of the background noise vs wind speed is performed. An investigation of a suitable regression analysis was carried out using linear, second order or third order polynomial curves. It was found that a third order polynomial had the highest correlation coefficient thus providing the best representation of the background noise levels.

Presented in the following sections are the graphs used to derive the noise limits for each of the two (2) study sites. The solid red line represents the background noise line of best fit and the solid black line represents the noise limits derived in accordance with NZS6808:1998. The equation of the line of best fit is noted on each graph as is the correlation coefficient. Both sites are surrounded by farming properties and background noise levels are likely to have been affected by farming activities. House 7 is also in close proximity to the Ballan-Daylesford Road and traffic noise is likely to have affected the background noise levels.

Wind speed can vary greatly with height above the ground. To avoid confusion, it has become an industry standard to refer to turbine operating conditions as specified at a single height of 10m above ground level (AGL). For consistency, all reference to wind speed from this point forward, refers to that at a height of 10m AGL.

6.1 House 7

The following graph shows the derived noise limits for House 7. Limits at this site also apply to other residential properties located close to the Ballan-Daylesford Road (Houses 1, 2, 3, 4, 5, 6, 10, 11, 12 and 13).

Photographs of the logger position at House 7 are presented in Figures F1 to F4 of Appendix F.

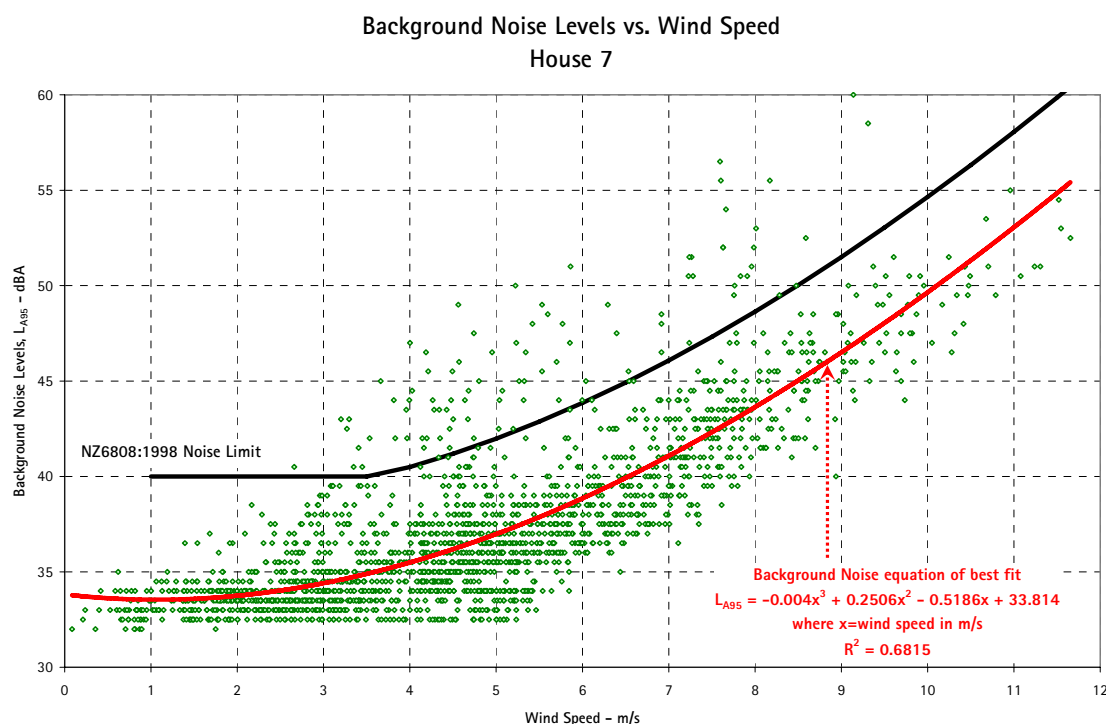


Figure 1: Noise limits at House 7

6.2 House 18

The following graph shows the derived noise limits for House 18. Limits at this site also apply to the remaining residential properties located further away from the Ballan-Daylesford Road (Houses 14, 16 and 17).

Photographs of the logger position at House 18 are presented in Figures F5 to F8 of Appendix F.

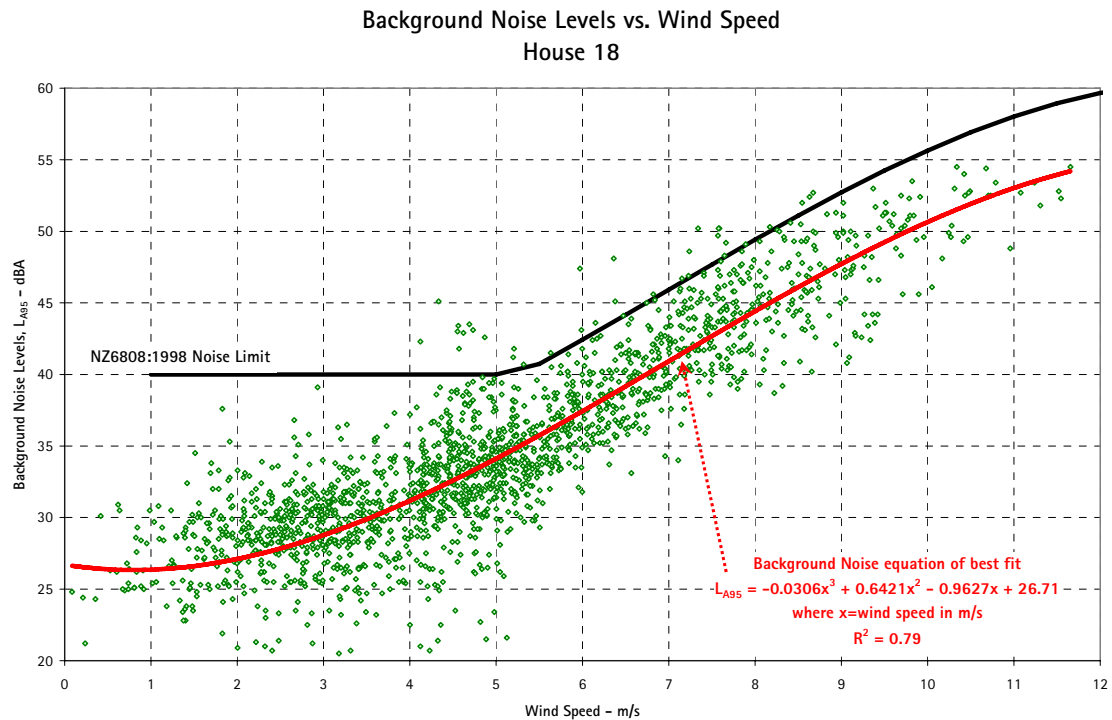


Figure 2: Noise limits at House 18

7.0 NOISE PREDICTIONS USING NZS6808:1998

Section 4.3.3 of NZS6808:1998 sets out an equation for predicting noise levels which is generally accepted as being slightly conservative (ie, over-prediction of the sound levels) and is the same as that used in International Electrotechnical Commission document IEC 1400-11. Section 4.3.3 of NZS6808:1998 which states:

"Equation 1 is based upon hemispherical spreading of the sound from the source and does not take into account attenuation due to screening effects, i.e. where there is no line of sight between the WTG and receiver locations. Acoustic absorption and reflection effects due to vegetation and ground cover are also ignored. The sound level (L_R) predicted at a distance (R) is that at 1.2m – 1.5m above the local ground level, which is assumed non-reflective. Thus, a good estimate can be derived when predicting sound propagation through free space (e.g. across open gullies), and a conservative estimate (i.e. over-prediction), for propagation across flat locations where ground absorption may be significant. For instances where the WTG is not in line of sight from the observation point, there may be an additional attenuation of up to 12dBA. The degree of attenuation will depend upon a number of factors influencing the direct and indirect sound paths between source and receivers."

The following equation is used to calculate the sound pressure levels at the residential sites as required by NZS6808:1998:

$$L_R = L_w - 10 \log(2\pi R^2) - \Delta L_A$$

where:

L_R = the sound pressure level from a single WTG at 1.2m to 1.5m above local ground level in dBA at distance R

L_w = the sound power of the WTG at 10m above ground level (AGL) in dBA.
Measured according to IEC 61400-11

R = the distance between source and receiver in metres

$$\Delta L_A = \alpha_a R$$

α_a = attenuation of sound due to air absorption, in dBA/m for broadband sound
which is typically 0.005dBA/m as suggested in NZS6808:1998.

As mentioned in Section 3.0, the prediction method outlined in NZS6808:1998, does not consider the spectral content of the WTG noise emissions. Spectral content can be important as some larger modern WTGs emit noise with significant low frequency content. Low frequency sound attenuates at a relatively slow rate in air; hence the initial proposed atmospheric absorption coefficient of 0.005dBA/m may be too high.

Therefore, in order to derive a more appropriate atmospheric absorption coefficient, predictions from NZS6808:1998 method are rerun using a reducing value of air attenuation until the predicted levels are similar to those from results using ISO9613-2:1996 as presented in Section 3.1. It was found that for this project, a value of $\alpha_a = 0.005\text{dBA/m}$ gave good agreement between NZS6808:1998 predictions and ISO9613-2:1996.

Results for predicted noise levels according to NZS6808:1998 for assessable residences are shown in Table 3; with comparison levels calculated using ISO9613-2:1996. The noise levels calculated from the NZ Standard will be used in the comparison with the NZS6808:1998 noise limits.

Table 3
Predicted noise levels for assessable residences at reference conditions using
ISO9613-2:1996 and NZS6808:1998

Reference	Predicted noise level according to ISO9613-2 at 9m/s (10m AGL)	Predicted noise level according to NZS6808, 0.005dBA/m at 9m/s (10m AGL)
1	36dBA	37dBA
2	38dBA	39dBA
3	39dBA	40dBA
4	38dBA	40dBA
5	40dBA	42dBA
6 (S)	40dBA	42dBA
7 (S)	39dBA	41dBA
10	35dBA	36dBA
11	36dBA	37dBA
13	36dBA	38dBA
14	36dBA	38dBA
16	39dBA	41dBA
17	35dBA	36dBA
18	39dBA	41dBA

We can see from Table 3 that the correlation between ISO9613-2:1996 and NZS6808:1998 is good to within 1-2dB, with NZS6808:1998 being the more conservative method in all cases where there is a difference.

7.1 Sound power of a WTG with changing wind speed

In order to carry out a thorough analysis of the impact of the wind park, predicted noise levels must be calculated for the full range of wind speeds. Once the noise impact of the WTGs is calculated for one wind speed, the "power profile" represented in Figure 3 is applied across the range of wind speeds to give a solution.

The sound power vs wind speed has been sourced from an independent test report prepared by Windtest Kaiser-Wilhelm-Koog GmbH. The WTG sound power levels are only available slightly above 9m/s which is the speed at which 95% of the power output is produced.

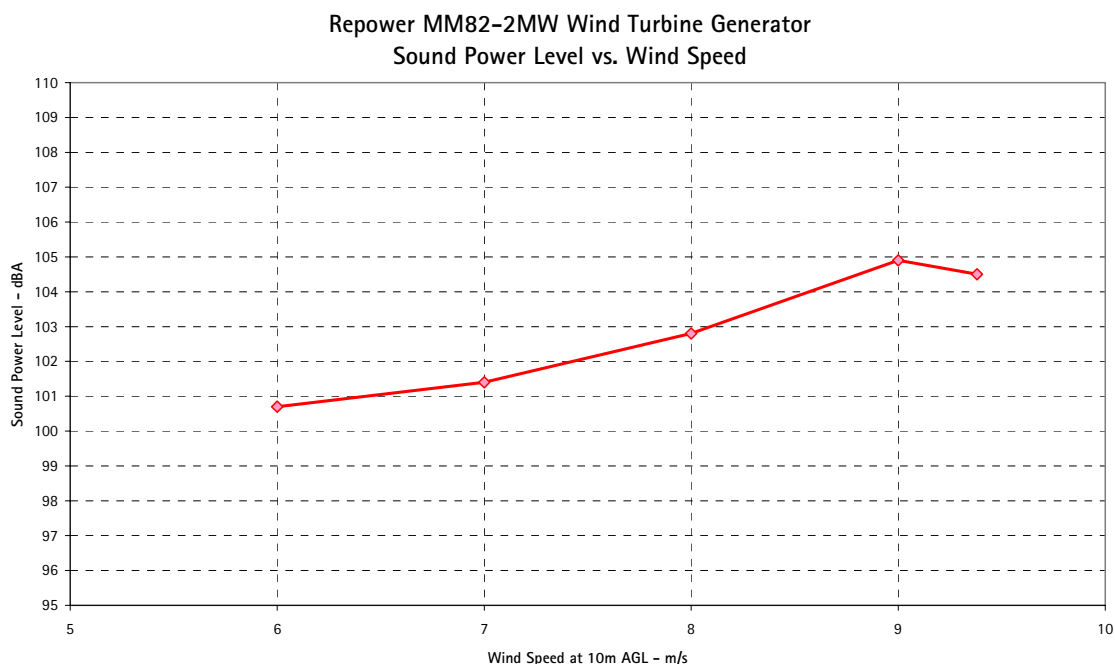


Figure 3: Sound power level vs wind speed for the Repower MM82-2MW

Sound power levels in Figure 3 have been measured for a hub height of 59m. The proposed hub height of the selected WTG is 69m. The WTG sound power levels at 10m AGL for this hub height will only increase marginally compared to those presented in Figure 3 and will not affect the outcome of the assessment.

7.2 Comparison of predicted levels with noise limits

Table 4 shows the comparison of predicted noise levels calculated according to NZS6808:1998 compared with lowest possible noise limit at the reference wind condition of 9m/s at 10m AGL.

A plot of predicted noise levels against the NZS6808:1998 noise limits at each of the two (2) study sites are presented in Figures H1 and H2 of Appendix H for the range of wind speeds over which the wind park is operational. Compliance occurs if the line of predicted noise levels remains below the limit line and non-compliance occurs when the predicted noise level line rises above the limit line.

Table 4
Predicted noise level at reference conditions at assessed residences

Reference	L _{Aeq} level due wind park	Noise limit	Compliance
1	37dBA	52dBA	✓
2	39dBA	52dBA	✓
3	40dBA	52dBA	✓
4	40dBA	52dBA	✓
5	42dBA	52dBA	✓
6 (S)	42dBA	52dBA	✓
7 (S)	41dBA	52dBA	✓
10	36dBA	52dBA	✓
11	37dBA	52dBA	✓
13	38dBA	53dBA	✓
14	38dBA	53dBA	✓
16	41dBA	53dBA	✓
17	36dBA	53dBA	✓
18	41dBA	53dBA	✓

Note: ✓=compliance ✗ = non-compliance

All residential properties comply with the NZS6808:1998 noise limits.

8.0 CONCLUSION

In this report, suitable noise limits were determined for the external noise level of each of the fourteen (14) assessable residential sites near the proposed Hepburn community wind park. Using the New Zealand Standard for wind farms (NZS6808:1998) noise limits were set depending on the relationship between measured existing (pre-wind farm) background noise levels and wind speed.

The predicted noise levels at each residential site were calculated in accordance with NZS6808:1998 and confirmed using a more complex spectral method found in ISO9613-2:1996. These predicted levels were compared with the appropriate noise limits. This comparison was made over a range of wind speeds.

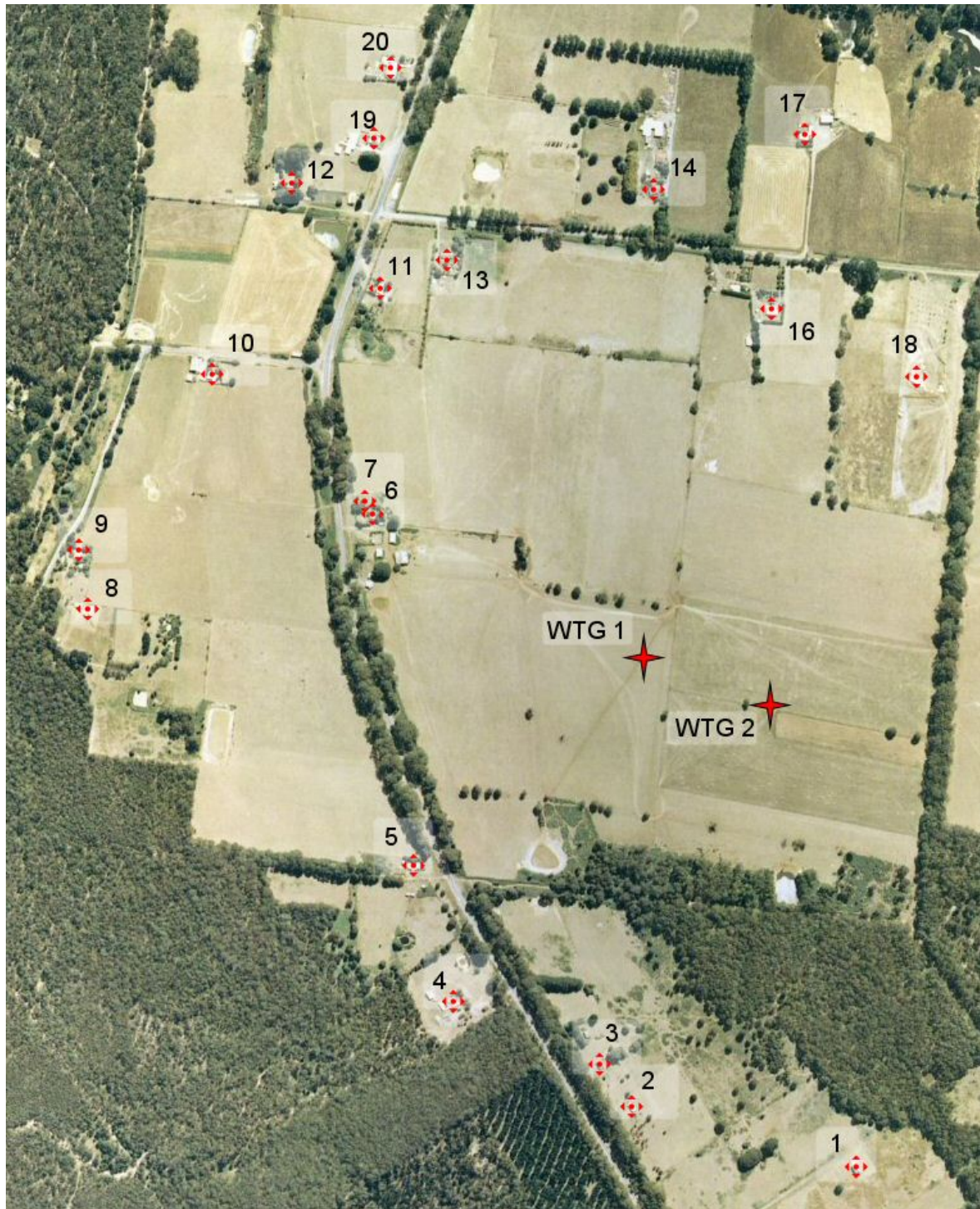
It was found that all residential sites complied with the NZS6808:1998 noise limit.

9.0 SUMMARY OF PARAMETERS

Documentation of relevant parameters as required by NZS6808:1998 is contained in Appendix I.

APPENDIX A

SITE LAYOUT



APPENDIX B

ACOUSTIC TERMINOLOGY

dBA	Unit of overall noise level, in A-weighted decibels. The A-weighting approximates the average human response over the entire frequency range.
L_{eq}	Continuous or semi-continuous noise levels are described in terms of the equivalent continuous sound level (L_{eq}). This is the constant sound level over a stated time period which is equivalent in total sound energy to the time-varying sound level measured over the same time period. This is commonly referred to as the average noise level and is generally measured in dBA.
L_{Aeq}	The "A" weighted equivalent continuous sound level.
L_{95}	Background noise levels are described in terms of the level exceeded for 95% of the measurement period (L_{95}). This value can be referred to as the minimum level and is generally measured in dBA. Note that the New Zealand Standard here uses the slightly more conservative L_{95} rather than L_{90} which is more commonly used in Australia. By definition, L_{95} is slightly lower than L_{90} .
L_w	Sound power level. The measure of acoustic power radiated by a sound source.

APPENDIX C

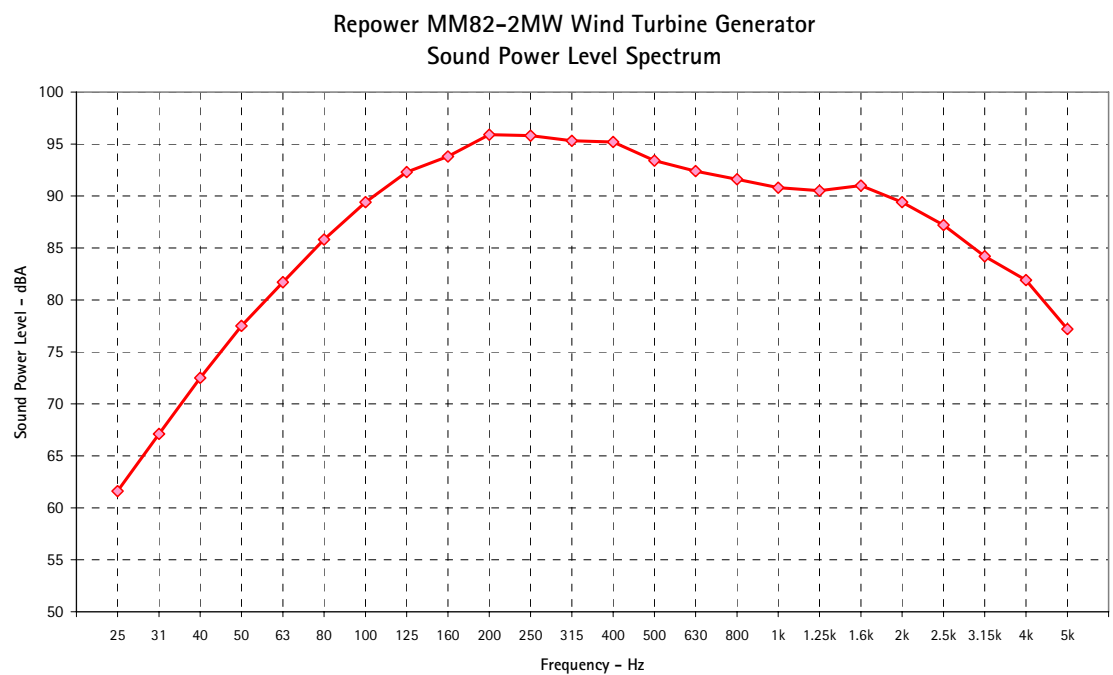
METHODOLOGY OVERVIEW

The methodology used for this noise assessment is composed of the following:

- Identification of noise-sensitive residences
 - Wind farm noise predictions using ISO9613-2:1992
 - Implicit in NZS6808:1998, noise compliance is achieved automatically for residential properties below 35dBA.
- Determination of the noise criteria
 - Background noise monitoring for a minimum of 14 days
 - Correlation of background noise levels with wind speed
 - Noise levels from a wind farm should not exceed the background noise level by more than 5dBA or a level of 40dBA, whichever is the greater over a range of wind speeds covering the operation of the wind farm.
- Prediction of the wind farm noise emissions
 - Use of ISO9613:1992 and NZS6808:1998 predictions to determine appropriate air absorption value
 - Predict wind farm noise emissions in accordance with NZS6808:1998 to assess compliance with the noise limit.
- Assessment of compliance.
- If compliance is not achieved, recommendation of ways to achieve compliance.

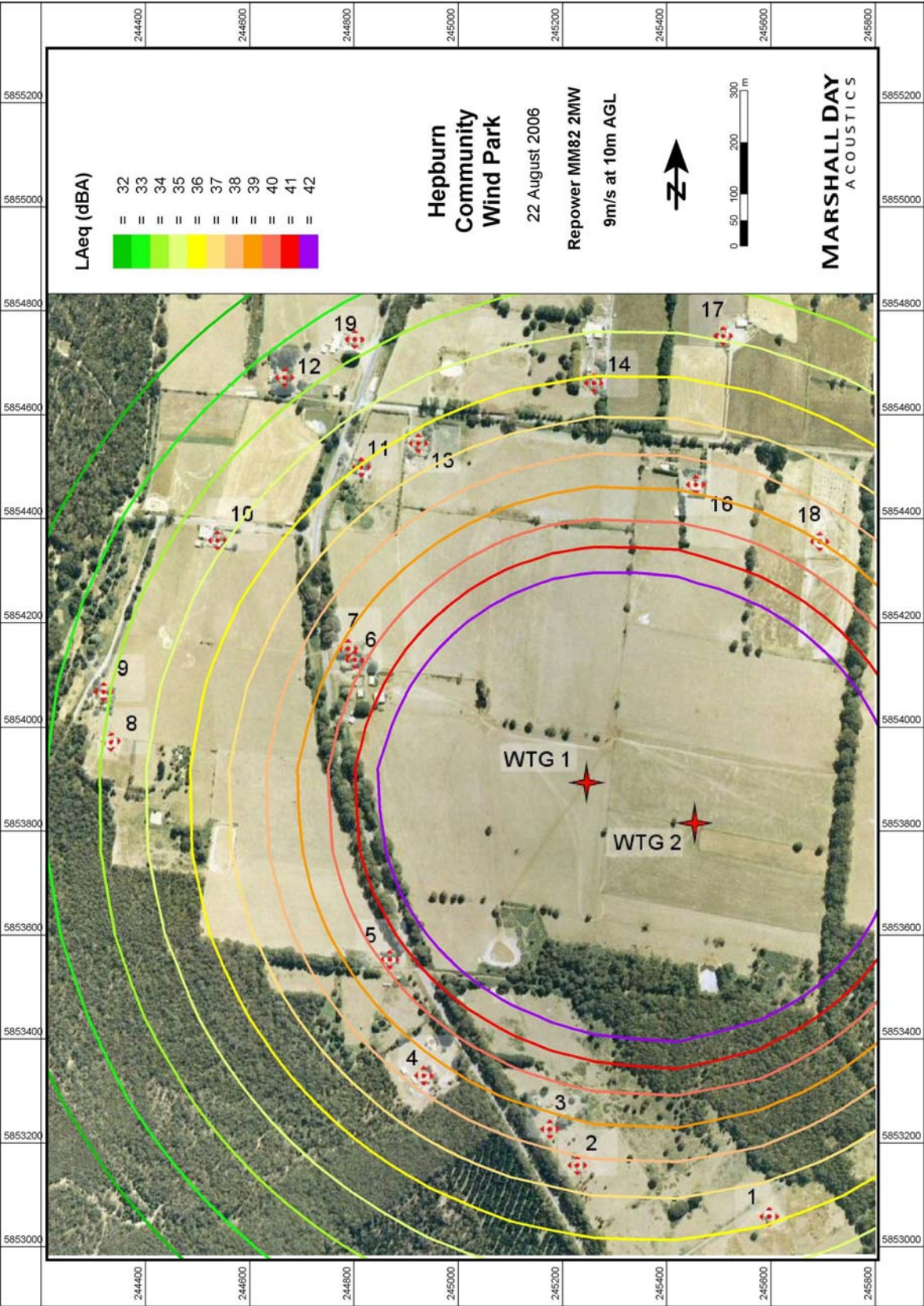
APPENDIX D

ONE-THIRD OCTAVE BAND SOUND POWER SPECTRUM FOR THE REPOWER MM82-2MW



APPENDIX E

NOISE CONTOUR MAPS AT 9M/S USING ISO9613-2:1996



APPENDIX F

PHOTOGRAPHS OF LOGGER LOCATIONS



Figure F1 – Photograph of logger location at House 7, North



Figure F2 – Photograph of logger location at House 7, East



Figure F3 – Photograph of logger location at House 7, South



Figure F4 – Photograph of logger location at House 7, West



Figure F5 – Photograph of logger location at House 18, North



Figure F6 – Photograph of logger location at House 18, East



Figure F7 – Photograph of logger location at House 18, South



Figure F8 – Photograph of logger location at House 18, West

APPENDIX G

MEASURED BACKGROUND NOISE LEVELS AND WIND SPEED

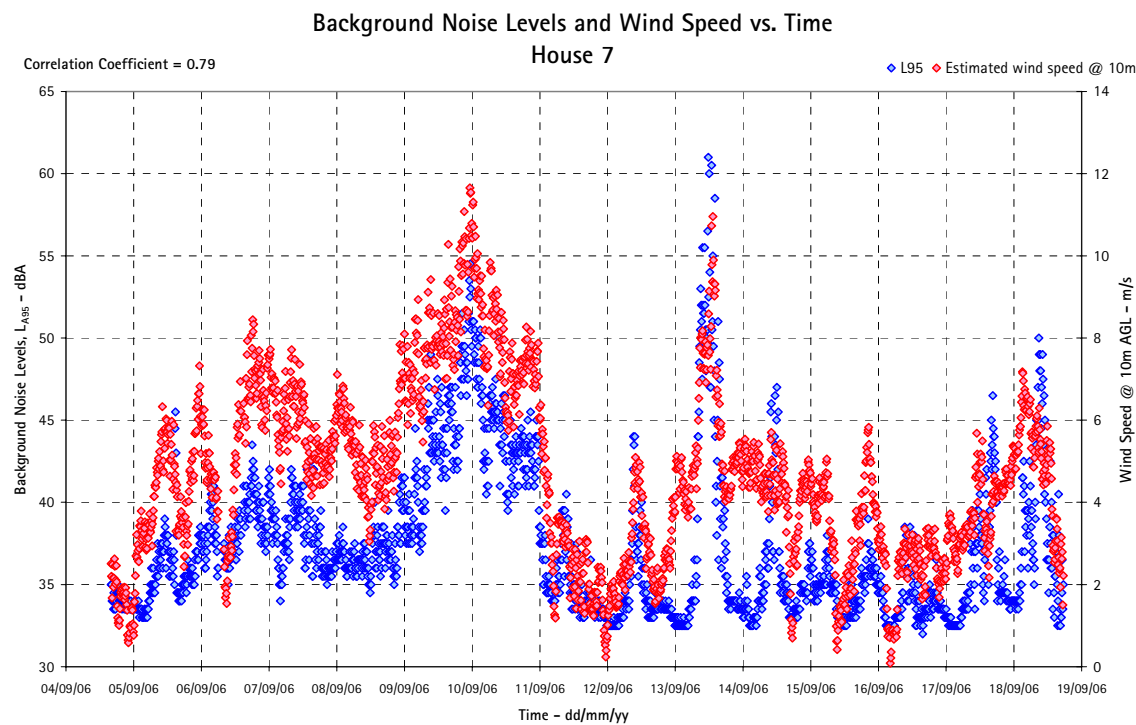


Figure G1 - Background Noise Level and Wind Speed vs Time – House 7

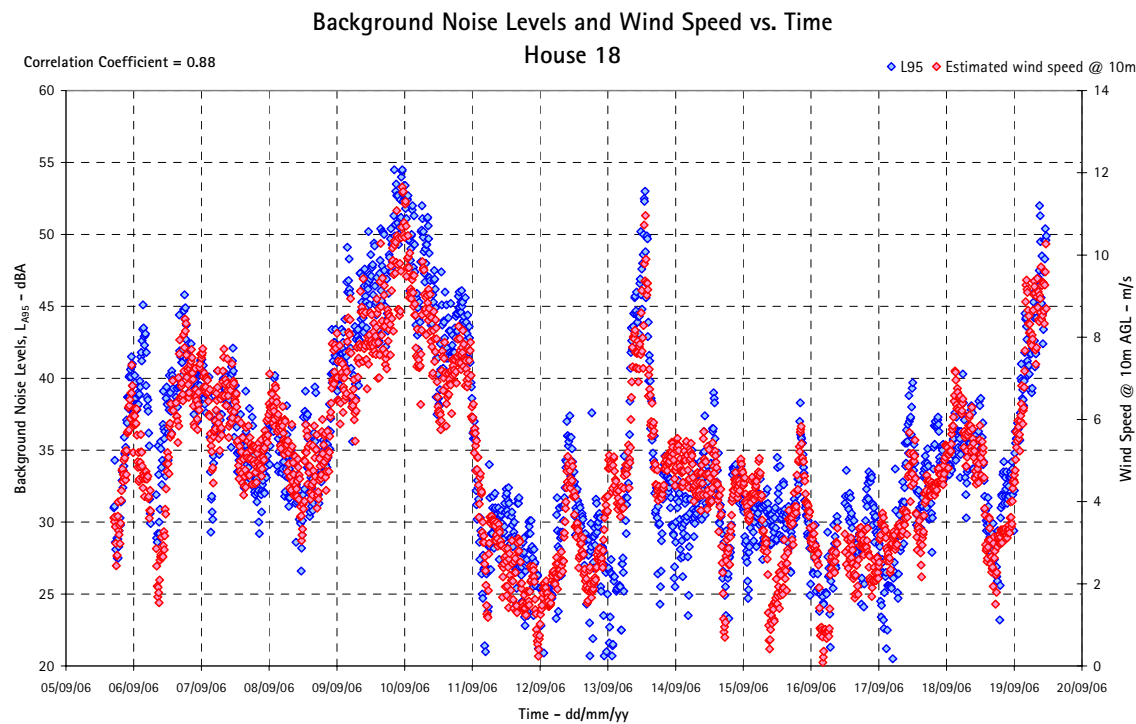


Figure G2 - Background Noise Level and Wind Speed vs Time – House 18

APPENDIX H

PREDICTED NOISE VS NOISE LIMITS

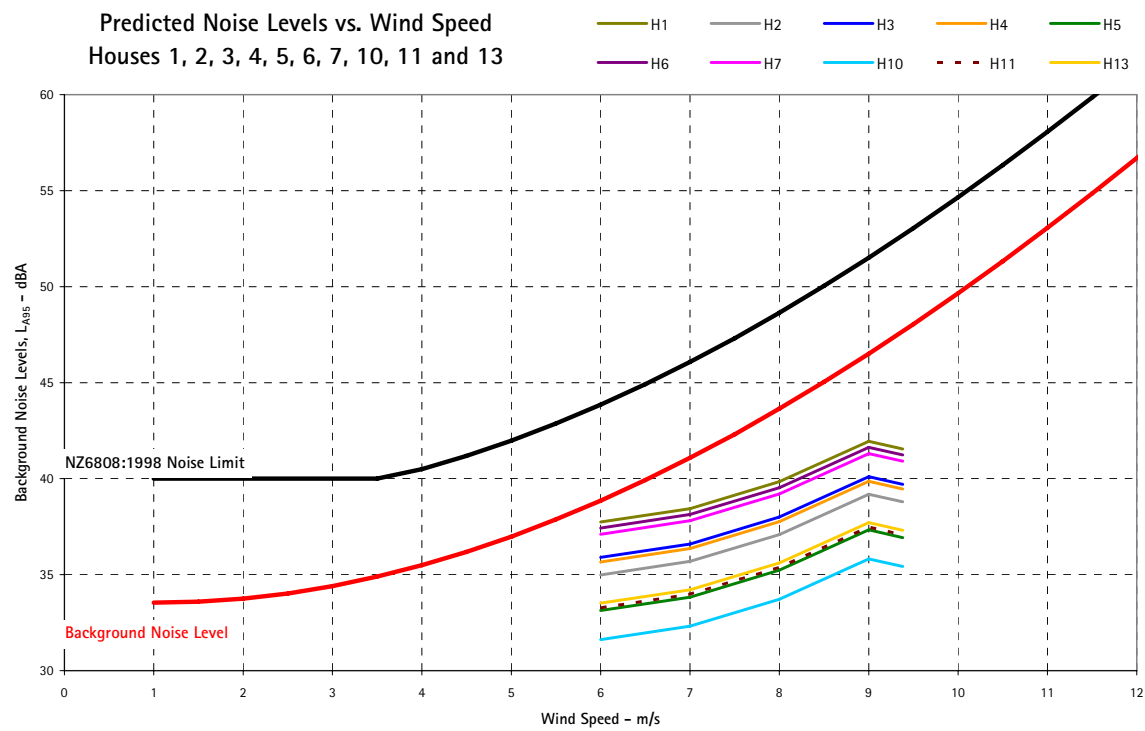


Figure H1 - Predicted WTG noise vs noise limits at House 7

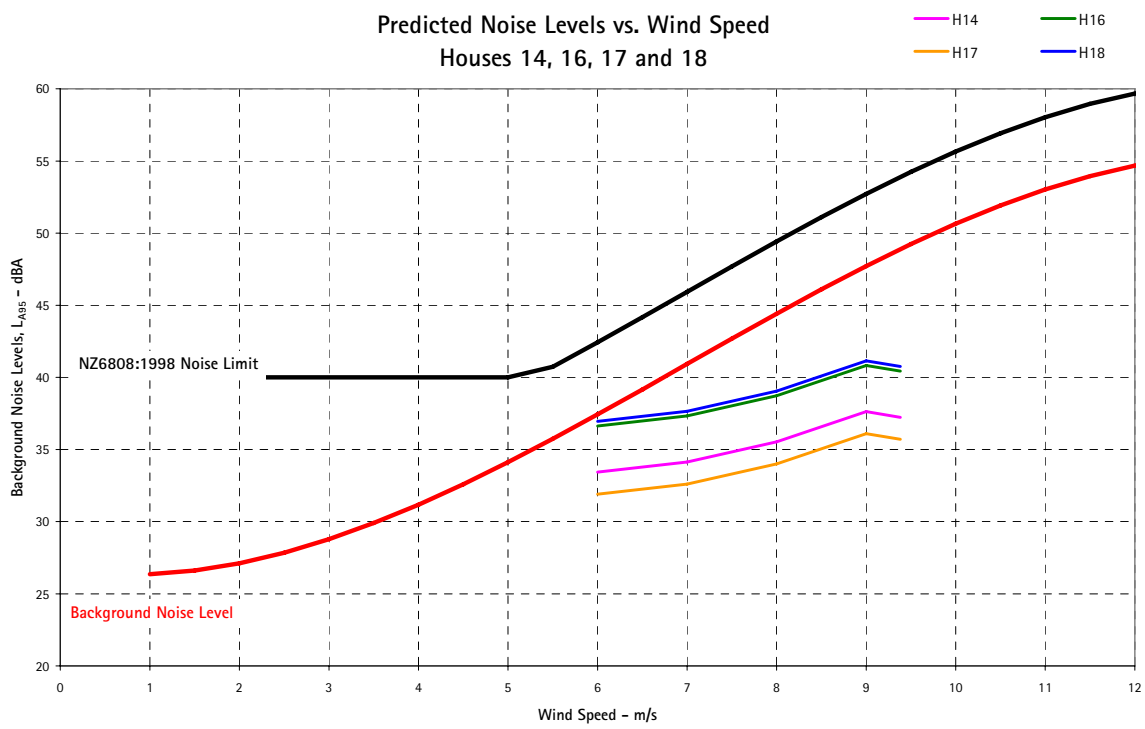


Figure H2 - Predicted WTG noise vs noise limits at House 18

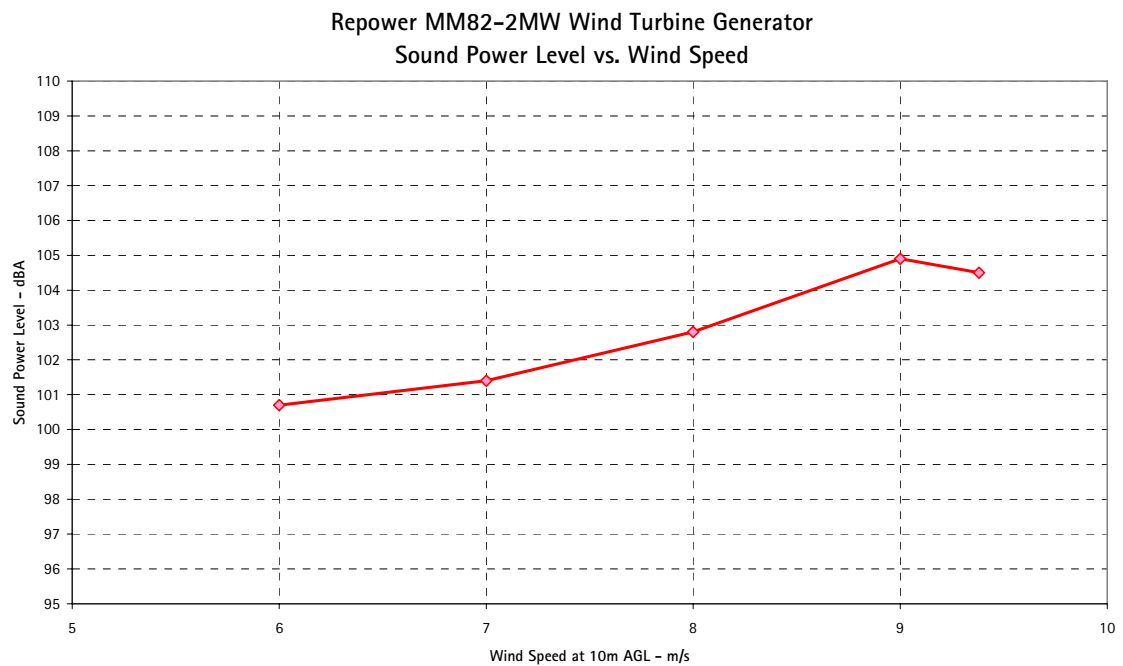
APPENDIX I

SUMMARY OF PARAMETERS

Parameters are summarized in accordance with documentation specification shown in Section 6 of NZS6808:1998.

Parameters for noise prediction

(a) WTG sound power level at 10m AGL



- (b) Air absorption model: ISO9613-1:1996, $\alpha_a = 0.005\text{dBA/m}$
- (c) Sound Attenuation due to screening – nil absorption due to screening
- (d) Source and method of calculation – NZS6808:1998
- (e) Make and model of WTG – Repower MM82-2MW
- (f) Hub height of WTG – sixty nine (69) metres
- (g) Coordinates – MGA94 Zone 55.

WTG coordinates

WTG	Eastings	Northings
1	245250	5853900
2	245457	5853817

Residential site coordinates

Reference	Eastings	Northings
1	245594	5853056
2	245228	5853160
3	245174	5853228
4	244937	5853331
5	244870	5853553
6	244801	5854130
7	244795	5854153
8	244335	5853974
9	244317	5854066
10	244538	5854359
11	244815	5854504
12	244666	5854673
13	244923	5854558
14	245265	5854666
16	245456	5854466
17	245511	5854753
18	245695	5854351
19	244805	5854747
20	244835	5854858
21	245049	5855439
22	245041	5855470
23	245054	5855624
24	245157	5855432

Parameters for background measurement

- (a) Monitoring equipment – Environmental Noise Loggers Type EL-316 and Rion NL21 were used to conduct 24hr ambient noise level measurements.
- (b) Anemometry equipment – Calibrated Riso P2546A anemometers and Vector instruments W200P wind vanes @ 20m and 50m AGL
- (c) Location of monitoring equipment – more than 5m from existing residence in accordance with NZS6808:1998, see photos in APPENDIX F.
- (d) Atmospheric conditions – see wind data, APPENDIX G.
- (e) Time and duration of measurement – Measurements were taken at 10 minute intervals over a minimum period of 14 days.

(f) Averaging period – 10 minute intervals for all measurements, coordinated on the hour.

(g) Position of wind speed measurement AGD66 Zone 55H

Eastings	Northings
245146	5853703

(h) Number of data pairs = approximately 2000 for each site

(i) Regression analysis – Least squared third order polynomial regression

(j) Regression analysis graphical outputs: see Section 6.0

H A R D R O C K



G E O T E C H N I C A L
CONSULTING GEOTECHNICAL ENGINEERS

Geotechnical Assessment Report

RE: Proposed wind turbine development at:

Leonards Hill, Ballan-Dayelsford Road.

HardRock

Geotechnical

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Distribution: - Future Energy Pty Ltd

Date: 27/10/2006

File No.: 060775



Introduction:

A 'desk top' study was undertaken in order to provide an initial geotechnical assessment of the proposed Hepburn Community Wind Park. Information provided indicates that two turbines are proposed on the southern slope of Leonards Hill adjacent to the Ballan-Daylesford Road. Relevant geological maps were examined with the purpose of providing feasibility foundation and pavement advice for the proposed construction of the wind turbines.

Scope of the Study:

The study is limited to a desk top review only.

The scope of this report is to provide comments on the anticipated foundation systems and pavement options, based on experience in the region and geology, as interpreted from appropriate maps.

Site investigation work will be required to confirm the assumptions made in this report and for any design purpose.

Site Description:

The site of the proposed wind turbines is located approximately 10km south of Daylesford on the eastern side of the Ballan-Daylesford Road, corner of Leonards Hill Bullarto South Road. The site of the proposed turbines is located on the southern slopes of Leonards Hill. The site appears to be a gently sloping hill with a moderate fall away from the hill top/ridge line and appears to be moderately drained.

From the photographs provided the site appears to generally comprise cleared agricultural land. The site appears to be generally grassed with a few scattered trees.

Subsurface Conditions:

Regional geology

The area of the proposed wind turbine development lies within the 'Geological Survey of Victoria' Daylesford Sheet (1:50,000). The geology of the turbine site identified on the geological map comprises Quaternary 'Newer Volcanics' – 'Basalt: dominantly tholeiite to mildly to mildly alkalic olivine basalt: localised lava flows partly confined in palaeovalleys; youngest flows have stony surfaces.'

An eruption point is marked at the apex of Leonards Hill on the 'Geological Survey of Victoria' Daylesford Sheet (1:50,000), indicating that the hill is a ancient volcano,

Discussion:

Anticipated subsurface conditions

The Newer Volcanics formation is identified around the wind farm development site, and is expected to dominate its subsurface characteristics.

It is expected that the hill top location of the proposed wind turbines is representative of a smaller erupting volcano (now distinct).

The subsurface profile is expected to comprise shallow surface residual silts, underlain by highly reactive silty clays which grade to variably weathered basalt rock with depth. The depth to bedrock may be variable and numerous disccret basalt floaters and closely packed boulders may be present above the basalt rock interface.



The subsurface geology will need to be confirmed through direct sampling methods.

Foundation options

It is understood that loading conditions are relatively light for wind turbine structures, with overturning movements usually the critical loading condition in the order of 200kPa (peak edge pressures). Either the natural clay soils or low capacity rock should readily accommodate such loads. Foundations will be founded at a depth such that there will be no instability to the foundations. The foundations will not impact on the stability of the adjacent ground.

It is expected that a mass pad footing will provide the most practicable foundation type for the structure.

It is expected that no significant difficulties will be associated with the construction of the wind turbine foundation.

Pavements

Subgrade properties within the Quaternary 'Newer Volcanics' may be poor. Some form of subgrade improvement may be required. This could include in situ lime/cement stabilisation upon which the pavement is constructed or placement of a geo-fabric on the stripped surface upon which the pavement is constructed. This is common practice and foresee no difficulties in pavement construction.

Report notes

This report contains information for the feasibility stage of the proposed development. Detailed geotechnical site investigation and reporting will be required for design purposes.

During the construction period land may be disturbed and exposed to erosion. Erosion and sediment runoff can be minimised/controlled by adopting good construction practices referenced below (1), (2) and (3).

Further information regarding geotechnical site investigation reports is referenced below (6).

Should there be any further queries please do not hesitate to contact this office for further advice.

Yours Faithfully,
HardRock Geotechnical Pty Ltd

Matthew Buckle BE.(Geo.)BSc.MIE Aust.
(Geotechnical Engineer)



References

- (1) Environment Protection Authority. 1996 *Environmental Guidelines for Major Construction Sites*. Best Practice Environmental Management.
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Department for Victorian Communities

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23 October 2006

Mr David Schapero
Future Energy P/L
PO Box 2007
RICHMOND VIC 3121

Dear Mr Schapero

HEPBURN WIND ENERGY FARM, LEONARDS HILL – ABORIGINAL ORGANISATIONS

As discussed, the responsible organisation for the area of the proposed Hepburn Wind Energy Farm at Leonards Hill, for the purposes of the Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*, is the Wurundjeri Tribe and Land Compensation Cultural Heritage Council Inc.

Please note that the Ballarat and District Aboriginal Co-operative Ltd has no responsibilities in this location under the Commonwealth act.

The location also falls with the traditional area of the Dja Dja Wrung (Jaara Jaara) people. As such they may have interests in any Aboriginal cultural heritage issues that may arise concerning the location. Information on Aboriginal interests relating to the project area may be obtained by contacting Mr Russell Smith, Northwest Regional Cultural Heritage Program, on (03) 5442 4947.

Yours sincerely

MATTHEW PHELAN
Heritage Registrar
Aboriginal Affairs Victoria

ARCHAEOLOGICAL DESKTOP ASSESSMENT OF THE PROPOSED HEPBURN COMMUNITY WINDFARM

A **Letter Report** prepared for *Future Energy*

Chris Kaskadanis

July 2006

TerraCulture Pty Ltd
Suite 3/83 Station Street
Fairfield VIC 3078

This Report is Produced on 100% Recycled Paper

INTRODUCTION

This letter report is a brief archaeological desktop assessment of the proposed Hepburn Community Windfarm located approximately 10km south of Daylesford. The subject land is bounded by South Bullarto-Leonards Hill Road to the north and Daylesford-Ballan Road/Sailors Creek Road to the east (MAP 1). The aim of this letter report is to provide a review of the landforms within the Hepburn Shire, and to determine if there are any known sites in or close to the subject land. A search of the relevant heritage registers: *Aboriginal Affairs Victoria* and *Heritage Victoria* has revealed that although there are several significant Aboriginal and Historic sites located within the Hepburn Shire, there are no known sites located on or within the vicinity of the subject land.

LEGISLATIVE PROTECTION FOR CULTURAL HERITAGE SITES

All heritage legislation is subordinate to the Coroner's Act 1985 in relation to the discovery of human remains.

Victoria has both State and Commonwealth legislation providing protection for Aboriginal cultural heritage. With the exception of human remains interred after the year 1834, the *State Archaeological and Aboriginal Relics Preservation Act 1972* provides blanket protection for all material relating to the past Aboriginal occupation of Australia, both before and after European occupation. This includes individual artefacts, scatters of stone tools, rock art sites, ancient camp sites, human burials, trees with slabs of bark removed (for the manufacture of canoes, shelters, etc.) and ruins and archaeological deposits associated with Aboriginal missions or reserves. The Act also establishes administrative procedures for archaeological investigations and the mandatory reporting of the discovery of Aboriginal sites. Aboriginal Affairs Victoria (AAV) administers the *Archaeological and Aboriginal Relics Preservation Act 1972*.

In 1987, Part IIA of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* was introduced by the Commonwealth Government to provide protection for Aboriginal cultural property in Victoria. Immediately after enactment, the Commonwealth delegated the powers and responsibilities set out in Part IIA to the Victorian Minister Responsible for Aboriginal Affairs. The legislation is administered on a day-to-day basis by AAV.

The Commonwealth Act prohibits anyone from defacing, damaging, interfering with or endangering an Aboriginal place unless the prior consent of the local Aboriginal community has been obtained in writing. The Schedule to the Act lists local Aboriginal communities and each community's area is defined in the Regulations so that the whole of Victoria is covered. Further information on the State and Commonwealth legislation protecting Aboriginal heritage in Victoria and the role of Aboriginal Affairs Victoria (AAV) Heritage Services Branch can be obtained from:

Aboriginal Affairs Victoria
Heritage Services Branch
PO Box 515
East Melbourne Vic 3002
Phone: (03) 9616 2923

ABORIGINAL COMMUNITY

Under the Regulations of the Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act* 1984, the study area falls within the boundaries of the *Wurundjeri* Tribe Land Compensation and Cultural Heritage Council Incorporated (*Wurundjeri* for short). Under the heritage legislation, the *Wurundjeri* are the **statutory authority** for Aboriginal cultural heritage sites in the study areas. The boundary of the *Wurundjeri* is defined in detail in the *Aboriginal and Torres Strait Islander Heritage Protection Regulations* 1984 Statutory Rules 1984 No. 176 as amended (Schedule 4 – Community areas in relation to local Aboriginal communities in Victoria) (see Appendix for relevant extracted pages from the Act). The *Wurundjeri* boundary is described as “Area 23” in pages 72 – 82 of the Act. They can be contacted at:

Megan Goulding
Interim C.E.O.
Wurundjeri Tribe Land Compensation
& Cultural Heritage Council Incorporated
PO Box 516, Carlton North, Victoria
Phone: (03) 9388 2561

At the same time, as the subject land is in close proximity to the boundary of the Ballarat and District Aboriginal Co-operative Ltd, this community may also have an interest in any cultural heritage issues. This community is described as “Area 1” in pages 13 – 17 of the Act (see Appendix). Technically, *Wurundjeri* should be contacted first, although, in personal communication with Megan Goulding (Thursday 13th July 2006), she recommended that the proponent should also contact the Ballarat and District Aboriginal Co-operative Ltd as this Aboriginal community has a vested interest in the region. The Ballarat and District Aboriginal Co-operative Ltd can be contacted at:

Ballarat and District Aboriginal Co-operative Ltd
5 Market Street
Ballarat Vic 3350
PO Box 643
Ph: (03) 5331 5344

GEOMORPHOLOGY

The subject land falls within a geological sub-division of the ‘West Victorian Uplands’ known as the ‘Dissected Uplands’. This region extends from Ballarat and Gisborne in the south to Bendigo and St. Arnaud in the north (Cochrane *et al.* 1991:70). The geomorphology of the area is comprised of Lower Palaeozoic Granodiorite and Folded Sandstone and Shales. Essentially, these landforms consist of basaltic flows and river alluvium (Cochrane *et al.* 1991:70). This region provided rich resources for Aboriginal subsistence strategies in the way of wooded environments, swamps, waterways and lagoons, and stone quarries. In addition, such landforms have been subject to extensive gold mining throughout the mid-1850s and early-1900s.

ABORIGINAL ARCHAEOLOGY

At the time of European occupation there were at least sixteen clans within the *Djadja wurrung* Language Group. Essentially, these clans were comprised of extended family groups of around 10 to 30 individuals, and spoke a slightly variable dialect of the *Djadja wurrung* language (Cockbill and Clark 2000:17). According to Clark (1990:153), the area around Daylesford was occupied in the 19th Century by the clan named as *Munal gundidj*.

Ethnographic observations described the *Djadja wurrung* as a powerful 'tribe' and that a source of stone within their 'country' was procured for making axes (Parker in Morrison 1971:22; see also Massola 1973).

A 15km-radius search of Aboriginal cultural heritage places at *Aboriginal Affairs Victoria* around Daylesford located 27 registered places (Pre- and Post-Contact). Most of these sites are located north of Daylesford. Site types include: Artefact Scatters, Aboriginal Places, Earth Features, Stone Features, Quarries, Scarred Trees, and Burials/Human Remains. A further 10km-radius search around Sailors Falls found no archaeological sites, and none on the subject land.

HISTORICAL ARCHAEOLOGY

An extensive statewide study of historic gold mining was conducted by the Department of Natural Resources and Environment (DNRE) (1999). This study identified 48 sites (41 Heritage Inventory, 7 Heritage Register) located within the *Hepburn (and Daylesford) Mining District* that are related to *shallow alluvial mining* (shaft sinking, puddling, sluicing and dredging); *deap lead mining* (tunneling and shaft sinking); *quartz reefing* (tunneling, shaft sinking and open cutting); and, the re-treatment of ore through chlorination and cyaniding. No Historical sites are known to be on or within the vicinity of the subject land.

RECOMMENDATIONS

In light of the results, there are several significant Aboriginal and Historical archaeological sites located within the Hepburn Shire; therefore, there is the potential for archaeological material to be found within the boundaries of the subject land. The recommendation is that a field survey be undertaken on the subject land by a qualified archaeologist and an Aboriginal monitor, targeting areas of disturbance or erosion that may reveal archaeological features and artefactual material.

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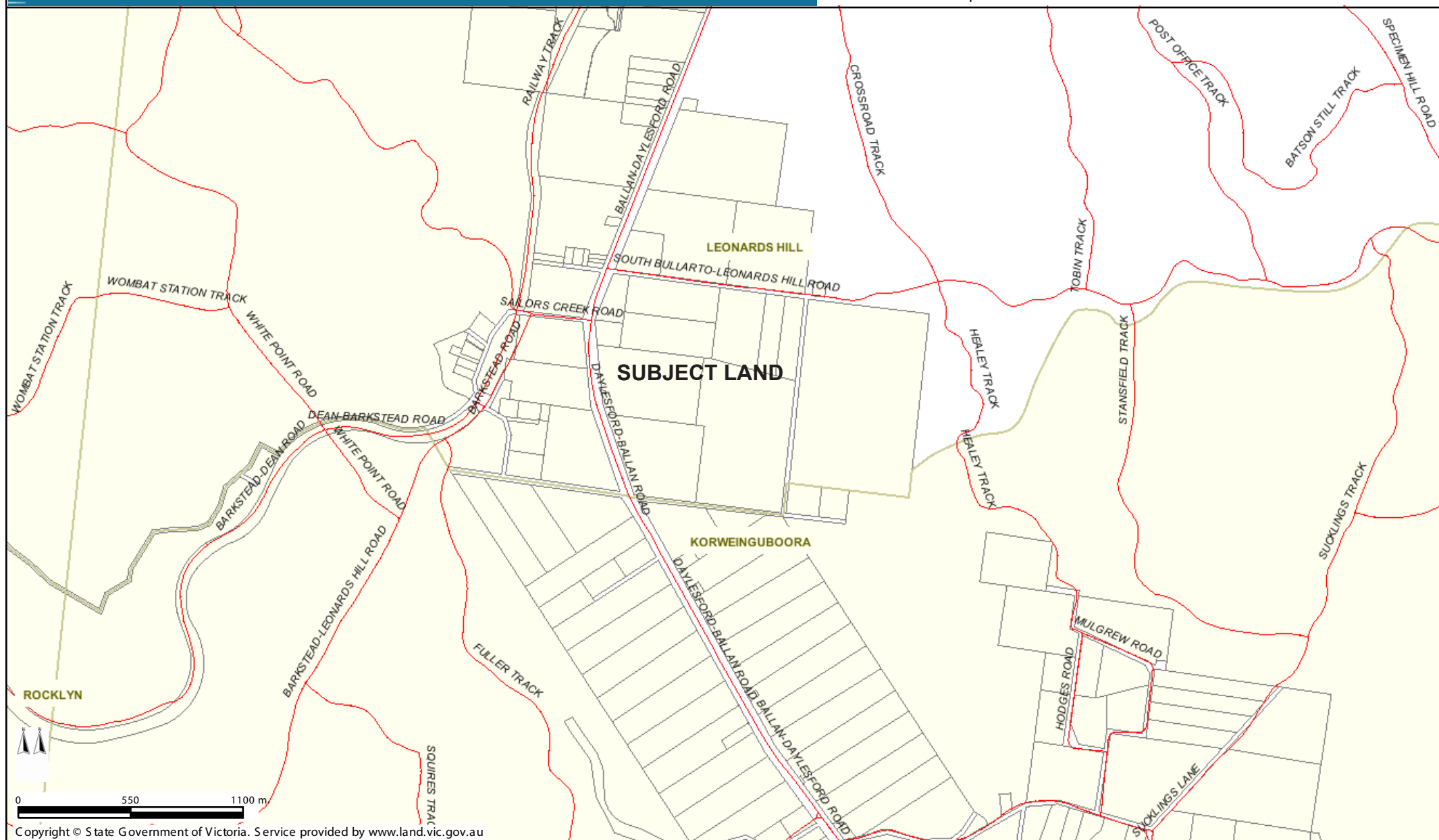
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MAPS



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Map 1 Location of the Proposed Hepburn Community Wind Farm

Scale 1:25,000

Printed: May 25, 2006

Appendix



Aboriginal and Torres Strait Islander Heritage Protection Regulations 1984

Statutory Rules 1984 No. 176 as amended

made under the

*Aboriginal and Torres Strait Islander Heritage Protection
Act 1984*

This compilation was prepared on 1 July 2004
taking into account amendments up to SR 2004 No. 176

Prepared by the Office of Legislative Drafting,
Attorney-General's Department, Canberra

Schedule 4 Community areas in relation to local Aboriginal communities in Victoria

(regulation 3A)

COMMUNITY AREAS IN RELATION TO LOCAL ABORIGINAL COMMUNITIES IN VICTORIA

Notes

1. The community area boundaries described in this Schedule are represented graphically in a computer-based map of the State of Victoria. The map is maintained by the office of the Minister responsible for Aboriginal Affairs (Victoria) in Melbourne. Printed maps may be viewed at that office on written request.
2. In the following descriptions:
 - (a) all references to local government areas and boundaries are to those that existed before 1993, when a major program of local government reform was introduced in Victoria; and
 - (b) 'kms' means kilometres; and
 - (c) all bearings are measured clockwise from true north.

AREA 1: BALLARAT AND DISTRICT ABORIGINAL CO-OPERATIVE LTD.

The boundary of Area 1 begins in Kyneton at the junction of the Calder Highway and Ebdon Street and continues progressively:

- north-westerly along the Calder Highway to its junction in Malmsbury with the Malmsbury-Daylesford Road
- south-westerly along that road to its junction with the Drummond Vaughan Road

-
- generally westerly then northerly along that road through the township of Glenluce to its junction with the Vaughan Springs Road
 - generally westerly and north-westerly along that road through the townships of Vaughan and Yapeen to its junction with the Midland Highway
 - southerly along that highway for approximately 2.5 kms to its junction with the Newstead-Guildford Road in Guildford
 - generally west-north-westerly along that road to its junction with the Daylesford-Newstead Road in Strangways
 - north-westerly along that road to its junction with the Pyrenees Highway in Newstead
 - generally west-north-westerly along that highway to its junction with the Bendigo-Maryborough Road in Maryborough
 - north-north-easterly along that road to its junction with the Maryborough-Dunolly Road in Havelock
 - north-north-westerly along that road through the township of Bet Bet to Dunolly where it becomes the Dunolly-Moliagul Road at its junction with the Bridgewater-Dunolly Road
 - generally north-westerly along the Dunolly-Moliagul Road through the township of Inkerman to its junction with the Bendigo-St Arnaud Road in Moliagul
 - generally north-westerly and then westerly along that road to its junction with the Sunraysia Highway in St Arnaud
 - north-westerly along that highway for approximately 800 metres to its junction with the Wimmera Highway
 - south-westerly along that highway to its junction with the Ararat-St Arnaud Road in Moolerr

-
- generally southerly along that road, through Navarre township, to its junction with the Pyrenees Highway
 - south-westerly along that highway to its junction with the Western Highway in Ararat
 - easterly along that highway for approximately 4 kms to its junction with the Geelong Road
 - south-easterly along that road, past Ballyrogan and across the Eurambeen-Streatham Road, to its junction with the Beaufort-Carranballac Road at approximately E.700720 N.5844120
 - southerly, westerly, south-westerly and again southerly along that road to its junction with the Mount William Road
 - generally south-easterly along that road to its junction with the Skipton Road approximately 1 kilometre north-west of Skipton township
 - south-easterly along that road to the Glenelg Highway
 - easterly along that highway for approximately 1 kilometre to its junction with the Skipton-Rokewood-Geelong Road
 - south-easterly along that road to its junction with the Cressy Road approximately 1.2 kms east of the bridge over the Woady Yaloak River at Pitfield
 - southerly along that road and the Werneth Main Road to Werneth
 - south-easterly along the Cressy-Werneth Road to its junction with the Colac-Ballarat Road
 - generally northerly along that road through Rokewood and Dereel to its junction with the Buninyong Shire-Leigh Shire boundary
 - easterly along that boundary to its junction with the Buninyong Shire-Bannockburn Shire boundary at the Yarrowee River

-
- easterly along that boundary to its junction with the Meredith-Mt Mercer Road
 - southerly and then easterly along that road to its junction with the Midland Highway at Meredith
 - northerly along that highway for approximately 0.5 kms to its junction with the Ballan-Meredith Road
 - northerly along that road for approximately 0.4 kms to its junction with the Meredith-Durridwarrah Road
 - east-north-easterly along that road to its junction with the Geelong-Ballan Road at Durridwarrah
 - south-easterly along that road to its junction with the Staughton Vale Road
 - northerly along that road to its junction with the Bacchus Marsh-Balliang Road
 - northerly along that road to its junction with the Geelong-Bacchus Marsh Road
 - northerly along that road to its junction with the Bacchus Marsh-Gisborne Road
 - northerly along that road to its junction with Carrolls Road at Bullengarook
 - along that road to its junction with Firth Road
 - generally north-westerly along that road and the Trentham-Bullengarook Road to Trentham
 - generally south-westerly along the Greendale-Trentham Road to its junction with the Ballan Shire-Kyneton Shire boundary

-
- generally westerly along that boundary to its junction with Daylesford and Glenlyon Shire boundary
 - westerly along that boundary to its junction with the Ballan-Daylesford Road, approximately 1.2 kms south of Leonards Hill
 - northerly along that road to its junction with the Midland Highway in Daylesford
 - north-easterly along that highway for approximately 2.2 kms to its junction with the Malmsbury-Daylesford Road
 - north-easterly along that road to its junction in the township of Denver with the road to Spring Hill
 - generally south-easterly along that road to the settlement of Spring Hill
 - on a direct 58° bearing north-east from the eastern boundary of that settlement to the junction of the Calder Highway and the Redesdale Kyneton Road in Kyneton, to the point where the boundary began.

AREA 1A: BANGERANG CULTURAL CENTRE CO-OPERATIVE LTD

Part A: The boundary of the Bangerang Cultural Centre being Lot 1 of Crown Allotments 79A and 80B, Parish of Shepparton, County of Moira and being the land in Certificate of Title Volume 8910 Folio 987.

Part B: The boundary of Part B of Area 1A begins at the junction of Omeo Creek and the Murray River, approximately 600 metres north of Tom Groggin Station homestead, and continues progressively:

- west-south-westerly to the summit of Mt Pinnibar
- south-south-westerly to the summit of Mt Gibbo

**AREA 23: WURUNDJERI TRIBE LAND COMPENSATION AND
CULTURAL HERITAGE COUNCIL INCORPORATED**

Part A: The Coranderrk Aboriginal Cemetery, approximately 3 kms south of Healesville at approximately E.368100 N.5827700, in the Parish of Gracedale, County of Evelyn, containing 2656 square metres and shown hatched and cross-hatched in Schedule 2 to the **Aboriginal Lands Act 1991** (Victoria).

Part B: The former Army School of Health, approximately 2 kms south of Healesville at approximately E.369700 N.5828600, being Crown Allotments 119A, 121, 123 and part of Crown Allotments 120 and 122, Parish of Gracedale, County of Evelyn, and being the balance of land in Certificate of Title Volume 10115 Folio 942.

Part C: With the exclusion of the Camp Jungai property, which is surrounded by the community area of the Wurundjeri Tribe Land Compensation and Cultural Heritage Council Incorporated, approximately 3 kms north-north-west of Rubicon township at approximately E.397700 N.5870850, being the land in Certificate of Title Volume 9707 Folio 404 and noted on the Current Record Plan of Banyarmbite (B735), the boundary of Part C of Area 23 begins at the point where the Princes Freeway crosses the Bunyip River approximately 1 km west of Longwarry North, and continues progressively:

- westerly along that freeway until it becomes the Princes Highway
- westerly along that highway, through Pakenham and Berwick townships, to its junction with Heatherton Road in Dandenong
- due south from that junction for approximately 750 metres to the point where Joffre Street crosses Yarraman Creek
- generally southerly along Yarraman Creek to its junction with Mile Creek
- generally southerly along Mile Creek to its junction with Dandenong Creek
- generally southerly along Dandenong Creek to its junction with Mordialloc Creek

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- generally westerly along Mordialloc Creek to the southern point of the mouth of the Creek on the coast of Port Phillip Bay
 - south-westerly to the low water mark on the northern tip of the north-western island of the Mud Island group
 - north-north-westerly from the Mud Island group to the southern point of the mouth of the Werribee River
 - generally north-westerly along the mid-line of that river to the eastern end of the Melton Reservoir
 - generally north-westerly along the northern shore of that reservoir to its western end
 - generally westerly along the Werribee River to where it is crossed by the Geelong-Bacchus Marsh Road
 - northerly along that road to its junction with the Bacchus Marsh-Gisborne Road in Bacchus Marsh
 - northerly along that road to its junction with Carrolls Road in Bullengarook
 - along that road to its junction with Firth Road
 - generally north-westerly along that road and the Trentham-Bullengarook Road to Trentham
 - generally south-westerly along the Greendale-Trentham Road to its junction with the Ballan Shire-Kyneton Shire boundary
 - generally westerly along that boundary to its junction with the Ballan Shire-Daylesford and Glenlyon Shire boundary
 - westerly along that boundary to its junction with the Ballan-Daylesford Road, approximately 1.2 kms south of Leonards Hill
 - northerly along that road to its junction with the Midland Highway in Daylesford
 - north-easterly along that highway for approximately 2.2 kms to its junction with the Malmsbury-Daylesford Road

-
- north-easterly along that road to its junction with the road to Spring Hill in the township of Denver
 - generally south-easterly along that road to the settlement of Spring Hill
 - 58° north-east from the eastern boundary of that settlement to the junction of the Calder Highway and Ebden Street in Kyneton
 - northerly along Ebden Street, which becomes the Redesdale Road, to its junction on the northern boundary of Kyneton township with the road to Pipers Creek
 - easterly along that road to its junction with the Kyneton-Baynton Road
 - north-easterly along that road to its junction with the road to Sidonia and the road to Pastoria East
 - easterly along the Kyneton-Baynton Road through Pastoria East
 - generally north-easterly along that road to Baynton
 - generally easterly along the road to Emu Flat
 - generally easterly along the road to Pyalong
 - easterly along the road to Glenaroua
 - generally east-north-easterly along the road to Tallarook to its junction with the road to Hilddene, approximately 6.5 kms west of Tallarook
 - north-easterly along that road to its junction with the Seymour-Tooborac Road
 - easterly along that road to its junction with the Hume Freeway
 - southerly along that freeway to its junction with the road from Glenaroua to Tallarook
 - south-easterly along that road to its junction with the Upper Goulburn Road in Tallarook

-
- easterly along that road to its junction with the Goulburn Valley Highway in Trawool township
 - north-westerly along that highway to its junction with the Highlands Road in Seymour
 - easterly along that road to its junction with the Hughes Creek Road
 - generally north-easterly along that road to the settlement of Tarcombe
 - generally north-north-easterly along the Ponkeen Creek Road to its junction with the Longwood-Gobur Road approximately 4 kms south-east of Old Longwood
 - generally easterly then south-easterly along that road to its junction with the Creightons Creek Road approximately 1.7 kms south of Creightons Creek township
 - northerly along that road through Creightons Creek to its junction with the Longwood-Mansfield Road approximately 5.5 kms north of that township
 - easterly along that road to its junction with the Euroa-Mansfield Road
 - north-easterly from that junction to the northern boundary of the settlement of Sheans Creek on the Euroa-Strathbogie Road
 - northerly along Baileys Road to its junction with the Faithfuls Creek-Sheans Gully Road
 - generally north-easterly then northerly along that road to its junction with Dunnings Road
 - north-easterly along that road to its junction with the Balmattum Road
 - north-easterly along that road to its junction with McClellan Lane
 - north-north-westerly along that lane to its termination on the south side of the Hume Freeway road reservation

-
- north-north-westerly to the Hume Freeway at approximately 2.3 kms south-west of the Harrys Creek Road bridge
 - north-easterly along that freeway to where it diverges from the line of the Hume Highway approximately 1.5 kms south-west of Baddaginnie
 - north-easterly along the route of that highway to Baddaginnie township
 - north-easterly along the Baddaginnie-Benalla Road for approximately 1 km to its junction with Kelleher Road
 - southerly along that road to its junction with the Warrenbayne Road
 - southerly and then south-easterly along that road, which becomes the Swanpool-Warrenbayne Road after crossing the Benalla-Warrenbayne Road, to its junction with the Midland Highway
 - southerly along that highway for approximately 1.8 kms to its junction with the Lima Road
 - southerly along that road through Lima to its junction with the Swanpool-Lima Road
 - easterly along that road to its junction with the Midland Highway
 - northerly along that highway for approximately 700 metres to its junction with the Swanpool Road
 - easterly along that road to Moorngag
 - generally southerly through Samaria via Samaria Road, which connects with Sawyer Road
 - easterly along that road to its junction with the Tatong-Tolmie Road in Wrightley
 - generally southerly and south-easterly along the Tatong-Tolmie Road to its junction with the Mansfield-Whitfield Road in Toombullup

-
- south-westerly along that road for approximately 3.7 kms to its junction with the Spring Creek Road
 - south-easterly along that road to its junction with the Old Tolmie Road in Tolmie township
 - south-westerly along that road, through Barwite to its junction with Graves Road
 - south-westerly along that road to its junction with the Mansfield-Mount Buller Road
 - westerly for approximately 1.2 kms along that road to its junction with the Mansfield-Woods Point Road
 - generally southerly along that road to its junction with the Jamieson-Licola Road in Jamieson township
 - generally south-easterly along the Jamieson-Licola Road for approximately 40 kms to its junction with the Barkly River Jeep Track, approximately 1 km south-east of Mt Skene
 - south-south-easterly to the summit of Mt Shillinglaw
 - south-south-westerly to the summit of Mt Singleton
 - south-westerly for approximately 3.5 kms to the Walhalla Road at approximately E.443800 N.5835300
 - southerly along that road, through the townships of Walhalla and Erica, to its junction with the Old Sale Road in Moe
 - easterly along that road for approximately 500 metres to where it crosses Narracan Creek
 - southerly along that creek to where it is crossed by the Moe-Thorpdale Road between Coalville and Narracan
 - southerly along that road through Narracan and Narracan East to its junction with the Morwell-Thorpdale Road
 - westerly along that road to the main crossroads in Thorpdale
 - southerly along the Mirboo North-Thorpdale Road to Mirboo North

-
- generally north-westerly along the Grand Ridge Road to its junction with the Leongatha-Mirboo Road
 - south-westerly along that road to its junction with the Leongatha-Yarragon Road
 - generally northerly along the Leongatha-Yarragon Road to its junction with the Princes Highway
 - generally northerly along the Yarragon-Shady Creek Road to its junction with the Warragul Shire-Narracan Shire boundary at approximately E.415150 N.5782200, approximately 4 kms east-south-east of Buln Buln East
 - northerly along that boundary to its junction with the Buln Buln Shire boundary
 - north-easterly then northerly along the Buln Buln Shire-Narracan Shire boundary to its junction with Shady Creek at approximately E.416200 N.5789300, approximately 2.3 kms north-north-east of the summit of Springsure Hill
 - generally north-westerly along that creek to where it is crossed by the Neerim East Road
 - generally northerly then north-westerly along that road to its junction with the Main Neerim Road
 - northerly along that road to its junction with the Yarra Junction-Noojee Road
 - easterly along that road to its junction with the Mount Baw Baw Road and the Loch Valley Road in Noojee
 - generally northerly along the Loch Valley Road to its junction with the Toorongo Road
 - generally easterly and north-easterly along the Toorongo Road, through the settlements of Loch Valley, Toorongo and Myrrhee, to the junction of that road and the Nine Mile Road
 - northerly along that road to its junction with the Warburton-Woods Point Road

-
- easterly along that road to its junction with the Mansfield-Woods Point Road in Matlock
 - generally northerly along that road to the northern boundary of Gaffneys Creek township
 - north-westerly to the southern boundary of Enoch Point township
 - north-north-westerly along the Enoch Point Road to its junction with the Eildon-Jamieson Road
 - generally westerly along that road to its junction with Dry Creek Road approximately 3.1 kms east-north-east of the summit of Mount Torbreck
 - west-north-westerly from that junction to the southern boundary of Rubicon township
 - north-westerly through that township along the Rubicon Road to its junction with the Taggerty-Thornton Road
 - generally south-westerly and westerly along that road to where it crosses the Maroondah Highway in Taggerty township
 - northerly along that highway for approximately 100 metres to where it crosses the Acheron River
 - northerly along the mid-line of that river to its junction with Connelly Creek
 - southerly along that creek for approximately 500 metres to where it is crossed by the Maroondah Highway, approximately 200 metres north of the Acheron township boundary
 - southerly along that highway to its junction with the Connelly Creek Road
 - westerly then south-westerly along that road for approximately 9.3 kms to its junction with the Crystal Creek Road at approximately E.381850 N.5868070
 - generally north-westerly along that road for approximately 9.5 kms to its junction with the Link Road at approximately E.378000 N.5875070

-
- generally westerly along that road to its junction with the Black Range Road
 - generally northerly along that road to its junction with the Scrubby Creek Road
 - northerly along that road to its junction with the Whanregarwen Road, approximately 40 metres south-east of where Whanregarwen Road crosses Scrubby Creek
 - south-westerly from that junction to the junction of Langs Road and the Limestone Road at approximately E.366450 N.5876700 in the settlement of Limestone
 - north-westerly along that road through Cheviot to its junction with the Goulburn Valley Highway approximately 1.6 kms east of Yea
 - westerly along that highway through Yea to its junction with the Whittlesea-Yea Road
 - generally south-westerly along that road through Flowerdale and Kinglake West to its junction with the Wallan-Whittlesea Road in Whittlesea
 - north-westerly along that road for approximately 1 km to its junction with the Glenburnie Road
 - westerly along that road through Eden Park to its junction with the Broadford-Epping Road approximately 850 metres south of Merriang
 - southerly along that road, through Woodstock where it becomes the Epping Road
 - southerly along that road to its junction with Rufus Street in Epping
 - easterly and north-easterly along that street to its junction with Greenbrook Drive
 - north-easterly along that drive to its junction with McDonalds Road

-
- easterly along that road to its junction with the Plenty Road and Gorge Road in Morang South
 - easterly along Gorge Road to where it crosses the Plenty River and becomes Kurrak Road
 - generally easterly along that road to its junction with the Yan Yean Road
 - southerly along that road to its junction with the Diamond Creek Road
 - generally easterly along that road to where it crosses Diamond Creek
 - southerly along that creek to where it is crossed by Main Road in Eltham
 - south-westerly along that road approximately 550 metres to its junction with Fitzsimons Lane
 - southerly along that lane to its junction with Anderson Street, Porter Street and Williamsons Road in Templestowe
 - southerly along Williamsons Road to its junction with Doncaster Road
 - easterly along that road to where it becomes Mitcham Road
 - south-easterly along that road to its junction with the Maroondah Highway
 - generally north-easterly along that highway to its junction with Dorset Road
 - southerly along that road to its junction with the Burwood Highway
 - easterly along that highway to its junction with the Mount Dandenong Tourist Road and Monbulk Road
 - east-south-easterly along Monbulk Road to its junction with the Belgrave-Gembrook Road in Belgrave
 - generally east-south-easterly along that road to its junction with the Beaconsfield-Emerald Road in Emerald

-
- generally south-south-easterly along that road approximately 6.2 kms to its junction with the Bourkes Creek Road
 - easterly and then south-easterly along that road to its junction with the Healesville-Koo-wee-rup Road in Pakenham Upper
 - generally northerly along that road approximately 800 metres to its junction with the Gembrook Road
 - generally north-north-easterly along that road to its junction with the Beenak East Road in Gembrook
 - easterly then northerly along that road to its junction with the Back Creek Road at Whites Corner
 - east-south-easterly for approximately 100 metres to an upper tributary of Back Creek at approximately E.375730 N.5800400
 - generally easterly along Back Creek to its junction with the Bunyip River
 - southerly along the Bunyip River to where it is crossed by the Princes Freeway approximately 1 km west of Longwarry North, at the point where the boundary began.

AREA 24: YORTA YORTA NATION ABORIGINAL CORPORATION

The boundary of Area 24 begins at the junction of the Murray River and the Yarran Creek on Gunbower Island, at approximately E.251600 N.6041330, and continues progressively:

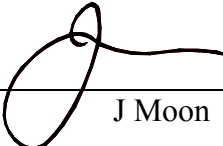
- generally south-easterly then northerly then easterly upstream along the Victoria-New South Wales border to the eastern tip of Lake Mulwala, at approximately E.426150 N.6011200
- west-north-westerly to the Murray Valley Highway at approximately E.424500 N.6011600
- generally westerly along that highway to its junction with the Waaia-Bearii Road
- southerly along that road to its junction with the Nathalia-Katamatite Road



**ASSESSMENT OF
ELECTROMAGNETIC
INTERFERENCE ISSUES
FOR THE PROPOSED
HEPBURN COMMUNITY WIND PARK**

Client	Future Energy
Contact	David Shapero
Document No	2553/PR/001
Issue No	D
Status	FINAL
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Date	12 October 2006

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Acceptance of this document by the client is on the basis Garrad Hassan Pacific Pty Ltd are not in any way to be held responsible for the application or use made of the findings of the results from the analysis and that such responsibility remains with the client.

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B	4 Oct 2006	Results of broader review
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CONTENTS

	Page
1 EXECUTIVE SUMMARY	1
2 DESCRIPTION OF THE WIND FARM SITE	2
3 PROXIMATE RADIOCOMMUNICATIONS	3
3.1 Communication towers	3
3.2 Fixed licences of Point to Point type around the proposed Wind Farm Site	3
3.3 Fixed licences of Point to Multipoint type around the wind farm site	4
3.4 Other licence types around the wind farm site	4
3.5 Analogue Broadcast Television	4
3.6 Mitigation	6
4 CONCLUSIONS AND RECOMMENDATIONS	7
REFERENCES	8
LIST OF TABLES	9
LIST OF FIGURES	9

1 EXECUTIVE SUMMARY

Future Energy Pty Ltd. (FE) is developing the Hepburn Community Wind Park in Victoria. Garrad Hassan Pacific Pty Ltd (GH) have been requested to carry out an independent assessment of any potential electromagnetic interference (EMI) issues with respect to Fixed Licences of the Point to Point type in the microwave frequency range. Information relating to nearby radio communications licences has been obtained from the Australian Communications and Media Authority (ACMA) and analysed.

In general VHF and UHF frequency band radio signals, and digital voice based technologies such as GSM and CDMA mobile, are essentially unaffected by a wind farm development. This includes land mobile repeaters, radio, the audio component of analogue television and mobile phones.

If not properly designed for, wind farms can however interfere with both analogue television broadcast signals and microwave signals. Analogue broadcast signals (generally described as point to area) are still commonly used to transmit domestic television, while microwave links (generally described as point to point) are often used for line of sight connections for data, voice and video. The interference mechanisms are different for each of these, and hence, there are different ways to avoid interference.

For broadcast signals (point to area) interference can generally be avoided by placing the wind turbines distant from the broadcast tower. A clearance of at least 1 km is recommended. No broadcast or communications towers have been identified within 1 km of the wind farm site.

Wind turbines can cause interference, or diffraction, of point to point signals. However it is possible to design around this issue, as the path and interference zone of point to point signals is generally well known. No Fixed licences of Point to Point type have been identified within 2 km of the proposed turbine locations and therefore the proposed wind turbine locations are not expected to interfere with any existing Fixed licences of Point to Point type.

2 DESCRIPTION OF THE WIND FARM SITE

The Hepburn Community Wind Park is located in Victoria, approximately 10 kms south of Daylesford. The development consists of two wind turbines. Figure 1 shows the location of the site.

The topography of the site is largely hilly and is located on a broad ridgeline running northeast to southwest and is located at the western end of the Great Dividing Range. The elevation of the immediate surrounding area spans from approximately 620 m to 740 m. The turbines are located immediately to the south of the highest hill on the site, which has an elevation of 740 m.

3 PROXIMATE RADIOCOMMUNICATIONS

3.1 Communication towers

An image of the ACMA database was obtained from ACMA on 14 June 2006. The currency of the image was 24 February 2006. From the database there are 166 radiocommunication towers within a nominal 50 km of the Hepburn Community Wind Park turbines. 50 km has been selected as a reasonable distance to ensure that all transmission vectors are captured in the licence survey. These telecommunication towers locations are shown in Figure 2 relative to the proposed Hepburn Community Wind Park.

Wind farms, if not properly sited or designed, can interfere with both television broadcast signals and microwave signals. The interference mechanisms are different for each of these, and hence, there are different ways to avoid interference.

For broadcast signals, which are usually omni-directional or point to area, interference can generally be avoided by placing the wind turbines distant from the broadcast tower. A clearance of at least 1 km is recommended.

No communications tower, broadcast or otherwise, has been identified within 1 km of the Hepburn Community Wind Park turbines.

3.2 Fixed licences of Point to Point type around the proposed Wind Farm Site

Wind turbines can also cause interference, or diffraction, of point to point signals. However it is possible to design around this issue as the path and interference zone of microwave signals are generally well known.

The criteria used for avoiding diffraction effects of point to point signals are normally based on an exclusion zone of circular cross-section around the direct path from the transmitter to the receiver (often called boresight). This exclusion zone is defined in terms of Fresnel zones. The n^{th} Fresnel zone is comprised of all points for which, if the radio signal travelled in a straight line from the transmitter to the point and then to the receiver, the additional path length compared to the straight transmitter-receiver path equals $\frac{n \cdot \lambda}{2}$, where λ = wavelength.

The usual requirement is that 60% of the 1st Fresnel zone should be unobstructed by large, static objects, such as buildings. However, for the varying geometry of a wind turbine, a more conservative approach is taken and the exclusion zone around a signal should at least include the entire 1st Fresnel zone. The radius of the 1st Fresnel zone varies along the length of the signal, and is given by:

$$R_{F2} = \sqrt{\frac{\lambda d_1 d_2}{D}}$$

Where d_1 is the distance from the transmitter

d_2 is the distance from the receiver

D is the distance from transmitter to receiver, i.e. $d_1 + d_2 = D$

The registered communications licences for each tower according to the ACMA database were analysed to determine the transmission paths of licences that may potentially experience interference from wind turbines (i.e. for frequencies greater than UHF). The paths resulting from the towers analysed are shown graphically in Figure 3. It can be seen that not all of the identified transmission towers have a Fixed licence of Point to Point type transmission vector. Some towers have no active licences associated with them, and some towers are used solely for point to area style transmissions (e.g. some Country Fire Authority (CFA) towers).

A review of the ACMA database shows there are no Fixed licences of Point to Point type passing over the proposed wind farm site and in fact the nearest licence passes some 2.8 km away from the turbines.

3.3 Fixed licences of Point to Multipoint type around the wind farm site

Fixed licences of the Point to Multipoint type are a variation of Point to Point type. The difference between them is administrative. A Point to Point type permits the communication between two static sites, where the locations of the sites are detailed in the licence register.

The Point to Multipoint type allows for communication between one or more static site(s) and multiple points or between the points. The Point to Multipoint type is usually licensed for a defined operational area.

Administratively, the ACMA database details the location of the static station for a Fixed licence of Point to Multipoint type. Hence, the location of the transmission vectors is not readily identifiable. A review of Fixed licences of Point to Multipoint type was undertaken and 11 licences were identified within 50 km of the proposed turbines. These licences are shown in Figure 4. The details of the licence holders as per the ACMA database are provided in Table 1.

3.4 Other licence types around the wind farm site

A review of the ACMA database for other licences with transmission frequencies of the UHF band or higher was conducted. The licences identified can broadly be described as base to mobile station style communication, and include radio broadcasting, commercial and private mobile telephony. These licences are shown in Figure 5, and a summary of the licence classes of those identified are provided in Table 2. These licence types are generally not affected by the presence of wind turbines any more than other effects such as terrain, vegetation and other forms of signal shielding. Should reception difficulty be encountered, the amelioration method consists of the user simply moving to receive a clearer signal.

3.5 Analogue Broadcast Television

For television broadcast signals, which are point to area signals, interference from wind turbines is dependant on many factors including:

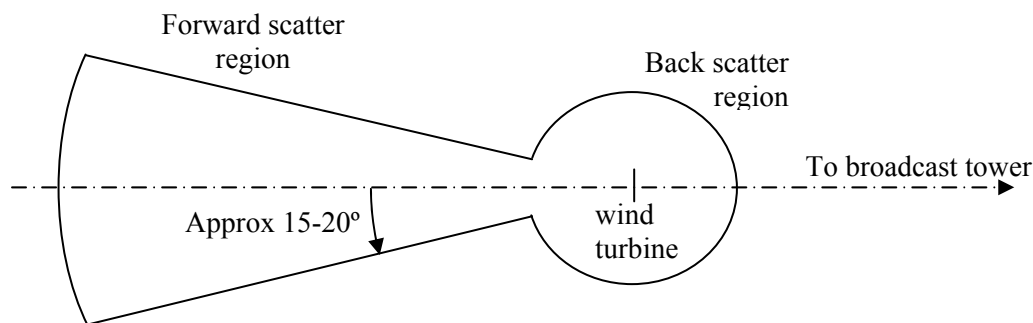
- proximity of wind turbines to television broadcast tower;
- proximity of wind turbines to receivers (dwellings);
- the rotor blade material, rotor speed and the rotor blade direction (always into the wind);
- type of receiving antenna (e.g. directional and height);
- frequency and power of the television broadcast signal.

The first item in the list above has the largest potential impact on broad scale analogue television interference, and can generally be avoided by placing the wind turbines distant from the broadcast tower. It is suggested that turbines are situated at least 500 metres from any broadcast tower [1], however GH recommend a clearance of at least 1 km. According to the ACMA database there are no broadcast television sites within this proximity (1 km) to the proposed site.

The Broadcast Transmitter Data database was interrogated to identify broadcasters nearby to the proposed Wind Park, with those found shown in Figure 6.

With no Broadcast television towers within 1 km of the proposed wind turbines, it is expected that broad scale television interference will not occur with the proposed wind farm. There may, however, be local interference issues particular to individual houses and around the wind turbines.

A wind turbine has the potential to scatter analogue television waves both forward and back. Forward scatter will only occur if a wind turbine is located approximately between the dwelling and the broadcast site. The forward scatter region is as shown in the figure below, and generally does not extend further than 5 km for the worst combination of factors. Interference may extend beyond 5 km if the dwellings are screened from the broadcast tower, but do have line-of-sight to the wind turbines. The effect of the forward scatter is to potentially cause the brightness of the television picture to vary with the rotation of each blade. Modern television sets usually incorporate Automatic Gain Compensators (AGC) which act to lessen or eliminate variations in picture gain or brightness.



Potential analogue television interference zones around a wind turbine

Back scattered signals arrive at the dwelling delayed relative to the source signal from the broadcast tower. The back scatter region is as shown in the figure above, and generally does not extend further than 500 m. If a dwelling is within 500 m of a wind turbine and its receiving antenna is not sufficiently directional to discriminate between the original and delayed signal, then pulsating ghost or secondary signal may appear on the television screen.

Based on information provided by FE, GH have been advised there will be no dwellings within 500 m of the wind turbines for the proposed Hepburn Community Wind Park [2, 3]. This being the case, the occurrence of television backscatter at any near neighbouring dwelling is not anticipated to be an issue at the Hepburn Community Wind Park.

Television interference mechanisms rely on many factors (as previously mentioned) and are complex to calculate. Previous experience has shown that even after great effort has been put

into performing such calculations, they tend to have limited accuracy, and would require field validation after the wind farm is operational.

As an alternative, it is best to identify those dwellings or areas that are most likely to experience potential analogue television interference based on the forward and back scatter regions. This usually results in only a few areas of potential impact. Those most likely to experience any interference may require an assessment of their TV reception prior to any wind farm operation. After the wind farm is operational any incidences of television interference would be monitored as part of normal consultations with the local community. As television interference from wind turbines is readily identifiable, appropriate mitigation measures (discussed below) can be readily taken if required.

3.6 Mitigation

In the event that TV interference is an issue after wind farm commissioning, there are several amelioration options available, in approximate order of cost;

1. Pointing the householder's TV antenna directly towards their existing transmitter;
2. Tuning householder's antenna into alternative sources of the same or suitable TV signal;
3. The installation of more directional and/or higher gain antenna at the affected residence;
4. The installation of a digital set top box (and UHF antenna if required) depending on signal availability and strength;
5. The installation of cable/satellite TV at the affected residences;
6. Installation of a TV relay station.

The introduction of digital television to Australia provides a promising amelioration avenue for affected residences, as digital television is essentially unaffected by wind turbines. There are currently digital TV broadcast locations covering the proposed wind farm site. There are five free to air stations broadcast from Lookout Hill to the southwest and four free to air stations broadcasting from Mt Alexander to the north.

4 CONCLUSIONS AND RECOMMENDATIONS

Broadcast towers and transmission paths around the proposed Hepburn Community Wind Park were investigated to see if EMI would be an issue for the current proposals. No point to point transmission paths have been identified to cross the site.

Several Point to Multipoint type Fixed licences were identified proximate to the proposed site. Given the nearest Point to Multipoint licence base station is some 22 km from the proposed turbine locations, it is unlikely that there will be any conflict with these transmissions.

Television interference mechanisms are complex to calculate and can have limited predictive accuracy. Television interference around wind turbines is generally limited to less than 1km and potentially up to 5 km from the wind turbines, and is a function of the visibility of the wind turbines and the transmitter from the receptor.

Wind farm interference to television is readily identifiable. Those most likely to experience any interference may require an assessment of their TV reception prior to any wind farm operation. Should TV interference be observed after wind farm commissioning, options for rectification of TV signal to residences include;

1. Pointing the householders TV antenna directly towards their existing transmitter;
2. Tuning householders into alternative sources of the same or suitable TV signal;
3. The installation of more directional and/or higher gain antenna at the affected residences;
4. The installation of a digital set top box (and UHF antenna if required) depending on signal strength;
5. The installation of cable/satellite TV at the affected residences;
6. Installation of a TV relay station.

REFERENCES

- 1 Hall S.H., "The Assessment and Avoidance of Electromagnetic Interference due to Windfarms", *Wind Engineering*, **16** [6], 1992, pp326-338.
- 2 E-mail from D.Shapero of FE to G.White of GH, 3 August 2006.
- 3 E-mail from D. Shapero of FE to G.White of GH, 3 October 2006.

LIST OF TABLES

Table 1	Details of Point to Multipoint licences within 50 km of Hepburn Community Wind Park.	10
Table 2	Details of other licences identified within 50 km of Hepburn Community Wind Park for frequencies greater than 500 MHz.	11

LIST OF FIGURES

Figure 1.	Location of proposed Hepburn Community Wind Park.	12
Figure 2.	Location of identified communication sites proximate to Hepburn Community Wind Park.	13
Figure 3.	Identified transmission vectors for Fixed licences of Point to Point type proximate to Hepburn Community Wind Park.	14
Figure 4.	Identified base stations for Fixed licences of Point to Multipoint type proximate to Hepburn Community Wind Park.	15
Figure 5.	Location of general point to area style licences for frequencies greater than 500 MHz.	16
Figure 6.	Location of broadcast towers proximate to Hepburn Community Wind Park.	17

ACMA Licence No.	Site ID	AMG Location	Contact Details
204996	55528	54 752085 5838490	K B Consultancy Pty Ltd PO Box 354 BALLARAT VIC 3353
1140420	36275	54 752011 5838451	Regional Internet Australia Pty Ltd PO Box 1982 TOWNSVILLE QLD 4810
1140846	133637	54 750887 5840305	Broadstorm Wireless Broadband Pty Ltd 54 East Concourse BEAUMARIS VIC 3193
1308885	301164	54 749900 5837190	Harness Racing Board PO Box 184 MOONEE PONDS VIC 3039
1308885	301164	54 749900 5837190	Harness Racing Board PO Box 184 MOONEE PONDS VIC 3039
1311442	11706	55 266700 5839845	Telstra Corporation Ltd (Trading Name) Gasnet Australia Locked Bag 2563 ADELAIDE SA 5001
1311442	11706	55 266700 5839845	Telstra Corporation Ltd (Trading Name) Gasnet Australia Locked Bag 2563 ADELAIDE SA 5001
1311720	11726	54 761145 5836865	Telstra Corporation Ltd (Trading Name) Gasnet Australia Locked Bag 2563 ADELAIDE SA 5001
1311720	11726	54 761145 5836865	Telstra Corporation Ltd (Trading Name) Gasnet Australia Locked Bag 2563 ADELAIDE SA 5001
1312338	11748	55 237325 5901305	Goulburn Murray Water Cairn Curren Area PO Box 165 TATURA VIC 3616
1312338	11748	55 237325 5901305	Goulburn Murray Water Cairn Curren Area PO Box 165 TATURA VIC 3616

Table 1 Details of Point to Multipoint licences within 50 km of Hepburn Community Wind Park.

Licence Type	Licence Category	Number of Instances
PTS	PMTS Class B	126
Spectrum	800 MHz Upper Band	48
Spectrum	500 MHz Lower Band	48
Spectrum	500 MHz Upper Band	78
Radiodetermination	Radiodetermination	4
Land Mobile	Land Mobile System - > 30MHz	48
Broadcasting	Broadcast Service	42
Spectrum	1.8 GHz Upper Band	14
Spectrum	800 MHz Lower Band	2
Amateur	Amateur Repeater	6
Fixed	Point to Point (900MHz STL)	2
Spectrum	2.3 GHz MDS B Band	28
Spectrum	3.4 GHz Lower Band	3
Spectrum	3.4 GHz Upper Band A	1
Spectrum	31 GHz Band	4
Spectrum	28 GHz Band	10

Table 2 Details of other licences identified within 50 km of Hepburn Community Wind Park for frequencies greater than 500 MHz.

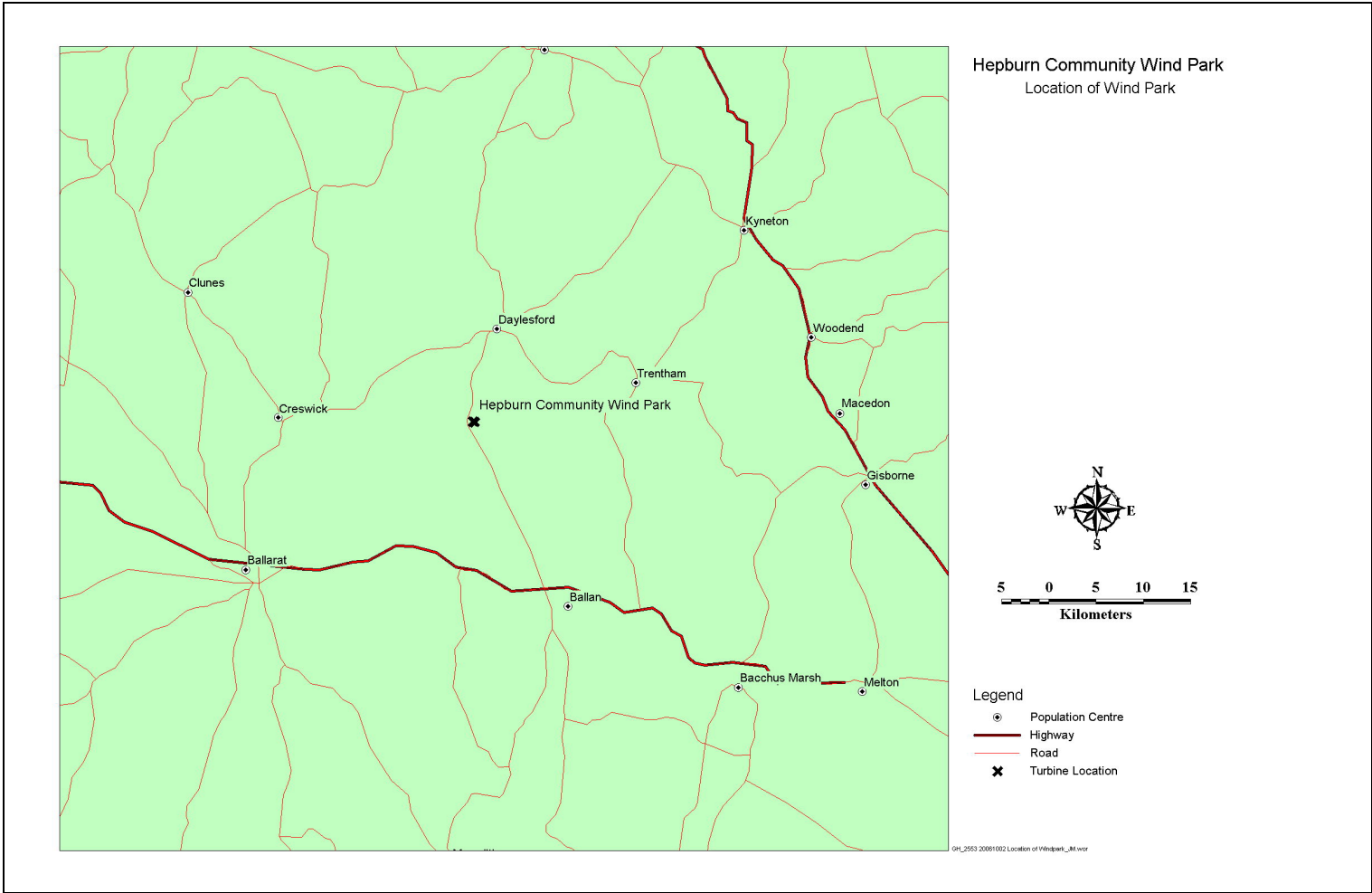


Figure 1. Location of proposed Hepburn Community Wind Park.

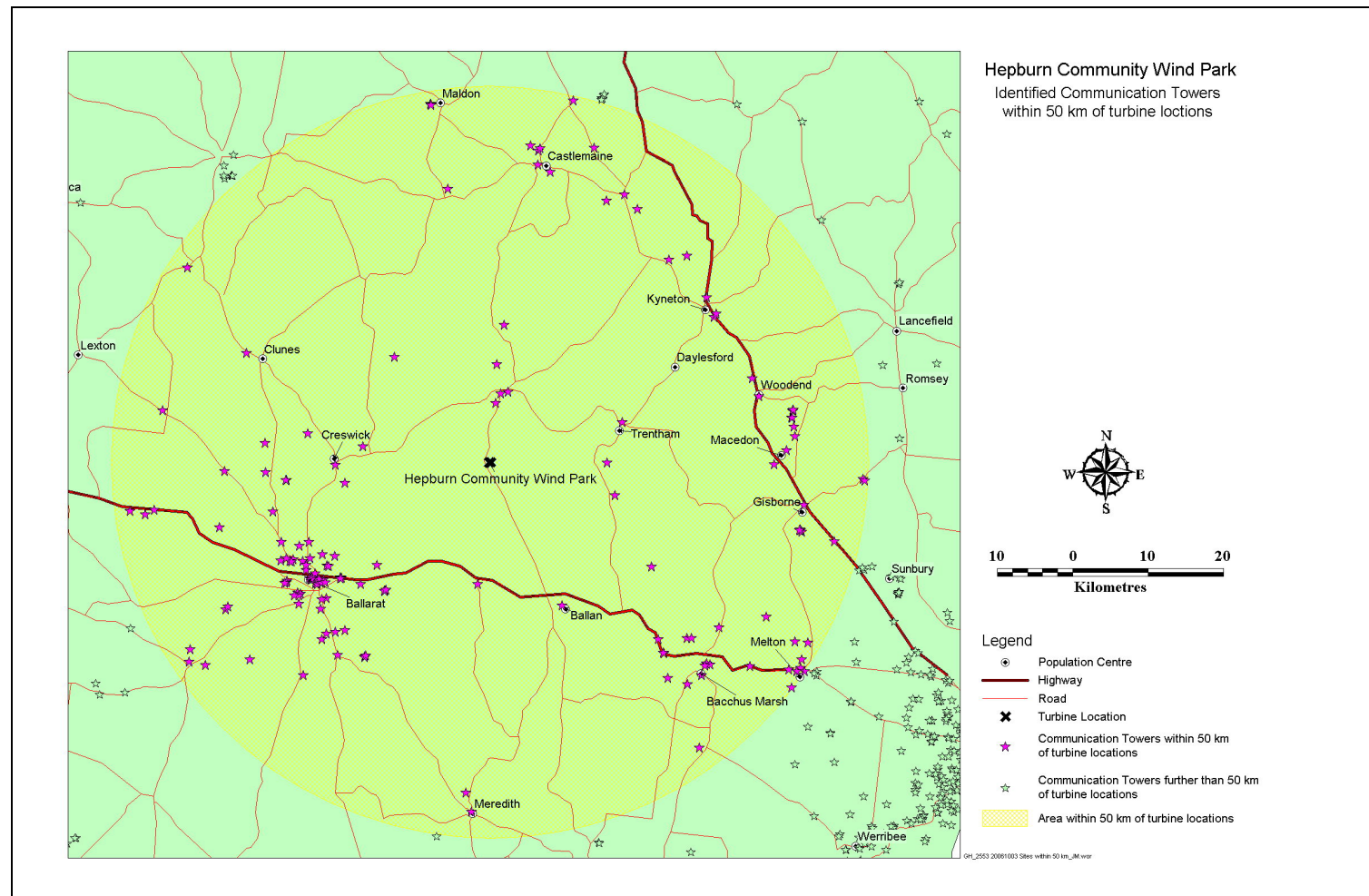


Figure 2. Location of identified communication sites proximate to Hepburn Community Wind Park.

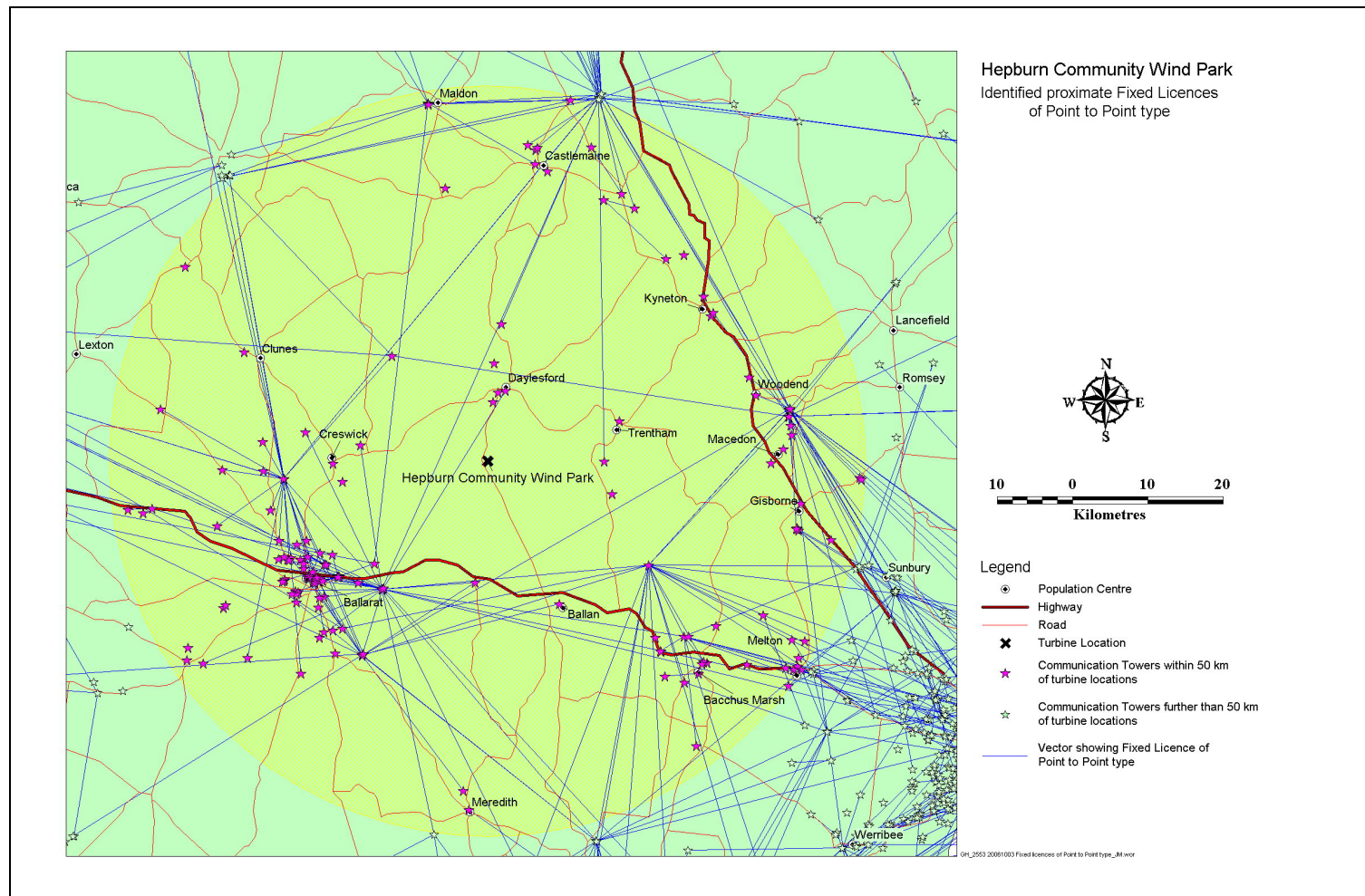


Figure 3. Identified transmission vectors for Fixed licences of Point to Point type proximate to Hepburn Community Wind Park.

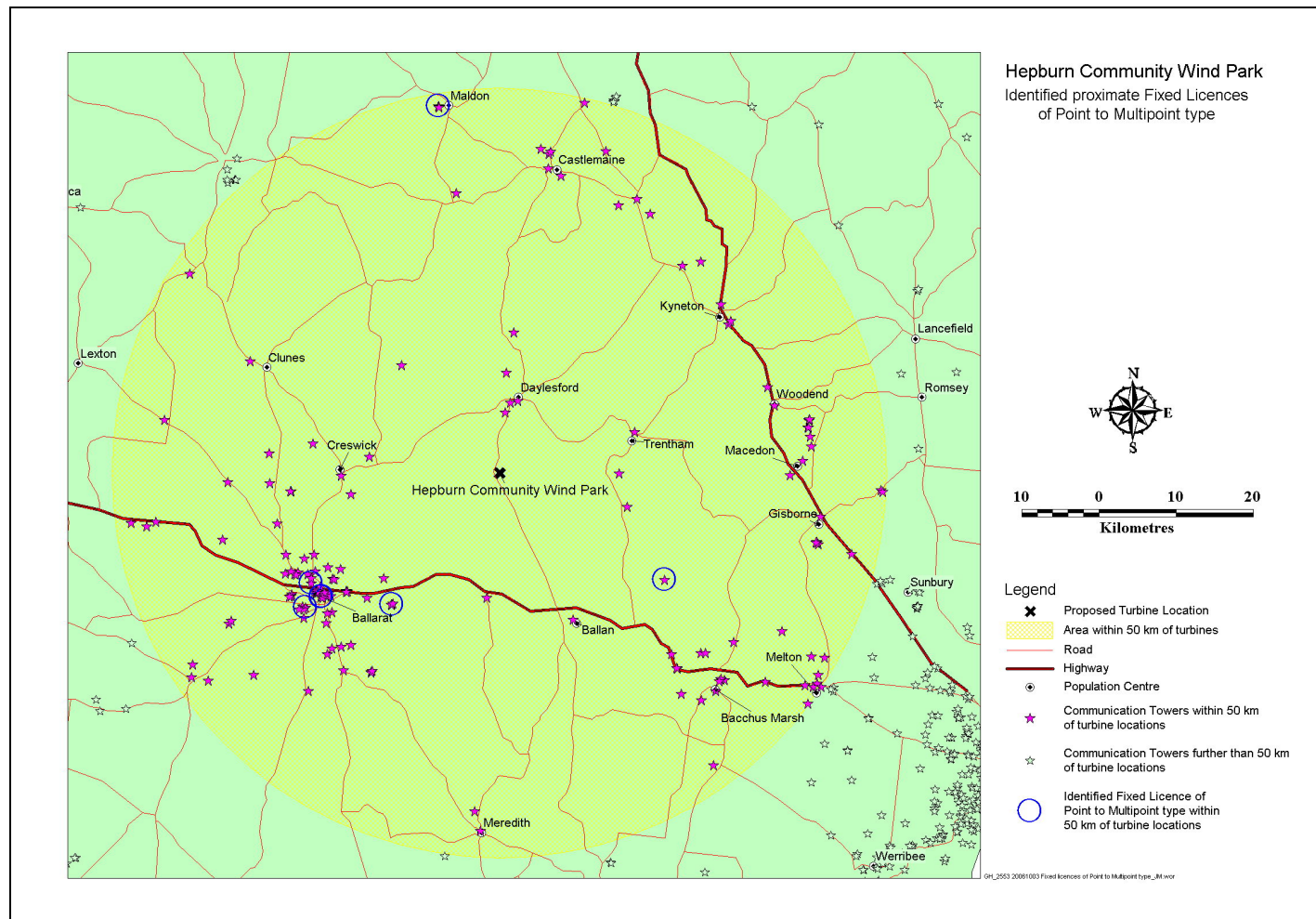


Figure 4. Identified base stations for Fixed licences of Point to Multipoint type proximate to Hepburn Community Wind Park.

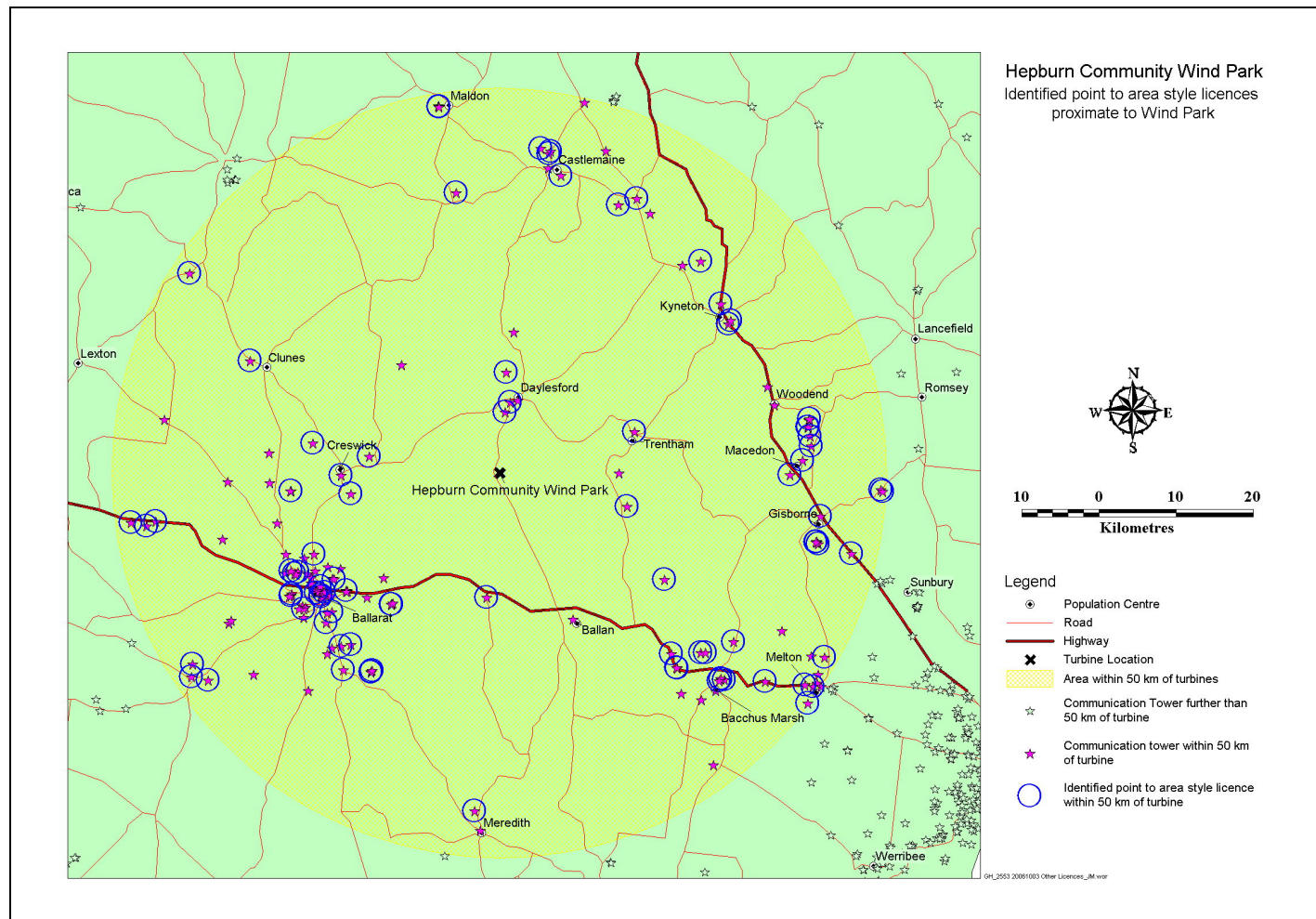


Figure 5. Location of general point to area style licences for frequencies greater than 500 MHz

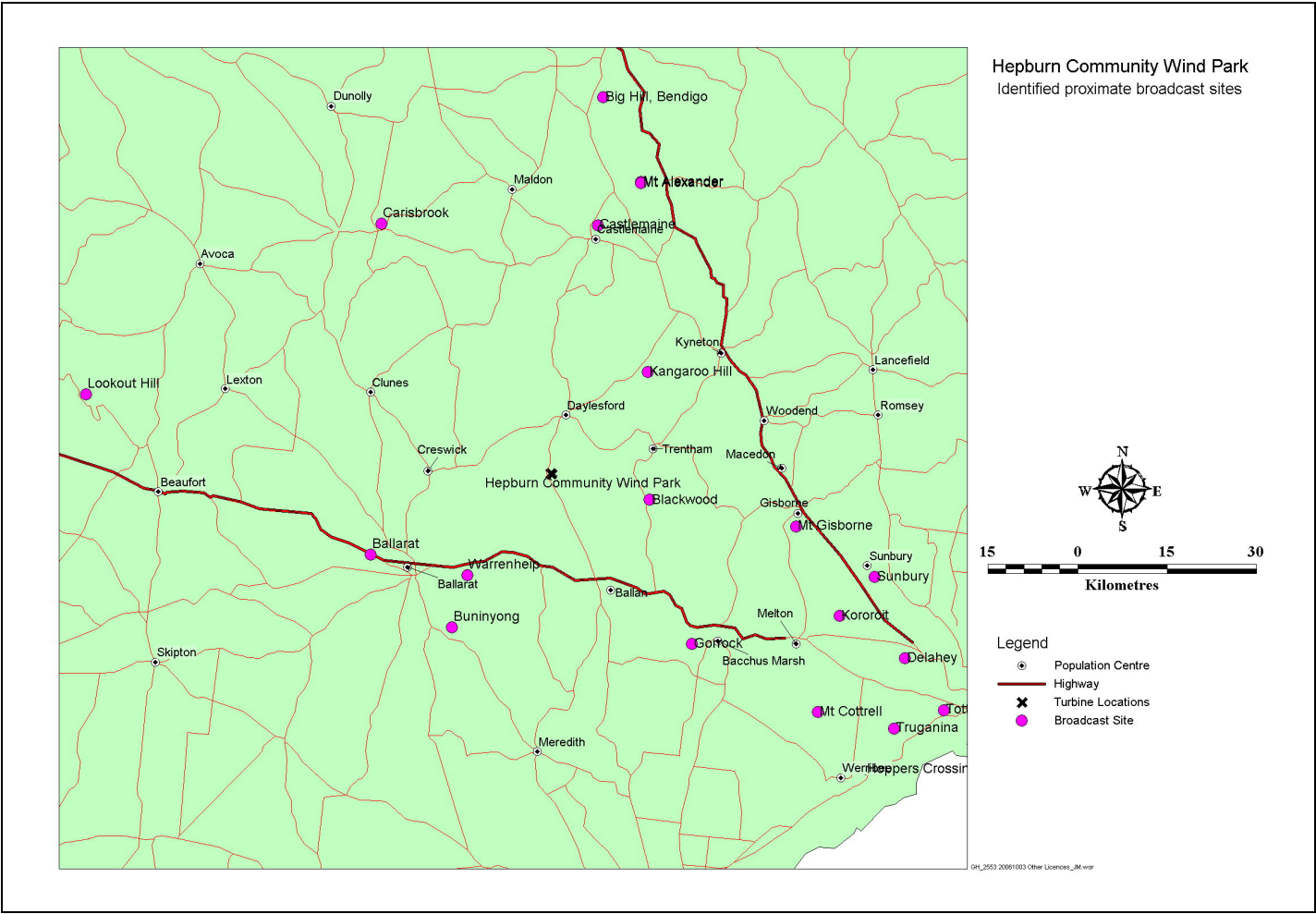


Figure 6. Location of broadcast towers proximate to Hepburn Community Wind Park.

Subpart 139.E Obstacles and hazards

139.350 Monitoring of airspace

- (1) The operator of a certified aerodrome or a registered aerodrome must monitor the airspace around the aerodrome for infringement of the obstacle limitation surfaces by:
 - (a) any object, building or structure; or
 - (b) any gaseous efflux having a velocity exceeding 4.3 metres per second.
- (2) The monitoring must be in accordance with the standards set out in the Manual of Standards.

139.355 Establishment of obstacle limitation surfaces

An aerodrome operator must ensure that obstacle limitation surfaces are established for the aerodrome in accordance with the standards set out in the Manual of Standards.

139.360 Notice of obstacles

- (1) An aerodrome operator must take all reasonable measures to ensure that obstacles at, or within the vicinity of, the aerodrome are detected as quickly as possible.
- (2) If the operator becomes aware of the presence of an obstacle, the operator must:
 - (a) tell the NOTAM Office immediately; and
 - (b) give the NOTAM Office details of:
 - (i) the height and location of the obstacle; and
 - (ii) amended declared distances and gradients, if applicable.

Penalty: 10 penalty units.

- (3) If the operator becomes aware of any development or proposed construction near the aerodrome that is likely to create an obstacle, the operator must:
 - (a) tell CASA as soon as practicable; and
 - (b) give to CASA details of the likely obstacle.

Penalty: 10 penalty units.

139.365 Structures 110 metres or more above ground level

A person who proposes to construct a building or structure the top of which will be 110 metres or more above ground level must inform CASA of that intention and the proposed height and location of the building or structure.

Penalty: 10 penalty units.

139.370 Hazardous objects etc

- (1) CASA may determine, in writing, that:
 - (a) an obstacle, or any proposed development or other proposed construction that is likely to create an obstacle; or
 - (b) a building or structure the top of which is 110 metres or more above ground level; or
 - (c) a proposed building or structure the top of which will be 110 metres or more above ground level;is, or will be, a hazardous object because of its location, height or lack of marking or lighting.
- (2) CASA may determine, in writing, that a gaseous efflux having a velocity exceeding 4.3 metres per second is, or will be, a hazard to aircraft operations because of the velocity or location of the efflux.
- (3) If CASA makes a determination under subregulation (1) or (2), it must:
 - (a) publish in AIP or NOTAMS particulars of the hazardous object or gaseous efflux to which the determination relates; and
 - (b) give written notice of the determination in accordance with subregulation (4).
- (4) CASA must give a copy of the notice:
 - (a) in the case of a hazardous object that is a proposed building or structure:
 - (i) to the person proposing to construct the building or structure; and
 - (ii) to the authority or, if applicable, one or more of the authorities whose approval is required for the construction; and
 - (b) in any other case, if a person who owns or is in occupation or control of the hazardous object, or owns or is in control of the installation that produces the gaseous efflux, can reasonably be identified — to that person.



Advisory Circular

AC 139-08(0)

APRIL 2005

REPORTING OF TALL STRUCTURES

CONTENTS

1. References	1
2. Purpose	1
3. Status of this AC	1
4. Background	2
5. Why Report Tall Structures	2
6. What are the Aviation Regulations That Apply to Tall Structures?	3
7. What do I Need to Report?	3
8. Where will the Information be Held?	3
9. How do I Report?	4
Attachment A Tall Structure Report Form	5

1. REFERENCES

- CASR 139.360 and CASR 139.365
- MOS – Part 139-Aerodromes, Chapter 7-Obstacle Restriction and Limitation, Section 7.1 – General
- Airports (Protection of Airspace) Regulations 1996

2. PURPOSE

2.1 The purpose of this AC is to provide some guidance to those authorities and persons involved in the planning, approval, erection, extension or dismantling of tall structures so that they may understand the vital nature of the information they provide.

2.2 Information on tall structure is held centrally by the Royal Australian Air Force (RAAF) Aeronautical Information Service (AIS) who maintain a tall structure database. Information is also provided to a range of aviation organisations so that they can be identified on aeronautical charts, etc.

3. STATUS OF THIS AC

3.1 This is the first AC to be issued on this subject, however the content of this AC updates information previously published in CAAP 89W-2(0) — Reporting of Tall Structures.

Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Where an AC is referred to in a 'Note' below the regulation, the AC remains as guidance material.

ACs should always be read in conjunction with the referenced regulations.

4. BACKGROUND

4.1 The Australian aviation community has identified a need to have information on tall structures available for publication on aeronautical charts.

4.2 The RAAF Aeronautical Information Service (AIS) has been assigned the task of maintaining a database of tall structures, the top measurement of which is:

- 30 metres or more above ground level — within 30 kilometres of an aerodrome; or
- 45 metres or more above ground level elsewhere

4.3 The database of tall structures will generally capture more information than what is required to be reported by the regulations.

4.4 The database will also be available for use by mapping agencies such as Australian Surveying and Land Information Group, and domestic and international aviation organisations.

5. WHY REPORT TALL STRUCTURES

5.1 Inadvertent collision with tall structures is a significant cause of aircraft accidents involved in low level flying operations. The risk posed by a tall structure to aircraft safety can be minimised if information on the tall structure is conveyed to pilots so that they can fly at a safe margin above the structure.

5.2 Low level flying operations are typically conducted during:

- approach, landing and take-off operations
- specialist flying activities (such as crop-dusting, cattle mustering, pipeline inspection, fire-fighting)
- search and rescue operations
- military low-level flying operations

5.3 Except for approach, landing and take-off operations (which are normally conducted in the vicinity of an aerodrome) low level operations can be conducted anywhere across Australia (subject to regulatory conditions/limitations).

5.4 In addition to the safety of aircraft operations, an inadvertent collision with a tall structure poses a number of other risks:

- business continuity if the services provided from the tall structure are unavailable e.g. communications services
- costs associated with the erection of a new structure
- liability issues

5.5 In the event of an aircraft hitting a tall structure, the role of persons and/or organisations associated with the operation of the tall structure would be a matter for the courts.

6. WHAT ARE THE AVIATION REGULATIONS THAT APPLY TO TALL STRUCTURES?

6.1 CASR 139.360 requires the operator of a certified or registered aerodrome to notify CASA of any development or proposed construction in the vicinity of the aerodrome (normally 15km) that is likely to be a hazard to air navigation.

6.2 In the vicinity of major capital city airports, the *Airports (Protection of Airspace) Regulations 1996* also apply. Under these regulations, the operator of such an aerodrome has to notify the Department of Transport and Regional Services (DOTARS) of any potential infringement to the prescribed airspace established for that aerodrome. DOTARS has the power to prohibit or limit erection of tall structures within the prescribed airspace of a Federal Airport covered by the *Airports (Protection of Airspace) Regulations*.

6.3 In areas remote from an aerodrome, CASR 139.365 requires the owner of a structure (or proponents of a structure) that will be 110m or more above ground level to inform CASA. This is to allow CASA to assess the effect of the structure on aircraft operations and determine whether or not the structure will be hazardous to aircraft operations.

7. WHAT DO I NEED TO REPORT?

7.1 Details should be provided on the construction, extension or dismantling of tall structures the top of which is:

- 30 metres or more above ground level (within 30 kilometres of an aerodrome); and
- 45 metres or more above ground level elsewhere.

7.2 Information provided to the database should be accurate and readily interpreted. The “TALL STRUCTURE REPORT FORM” at Attachment A has been designed to help owners and/or developers in this respect.

8. WHERE WILL THE INFORMATION BE HELD?

8.1 The information on all tall structures is held in a central database that is managed by the RAAF AIS.

9. HOW DO I REPORT?

9.1 Information on tall structures and any queries in regard to the database should be directed to:

Aeronautical Data Officer

RAAF AIS (VBM-M2)

Victoria Barracks

St Kilda Road

Southbank Vic 3006

Tel: (03) 9282 6282

Fax: (03) 9282-6695

Email: ais.charting@defence.gov.au

9.2 To assist all organisations to provide all of the necessary and complete information, use of the standard “Tall Structure Report” form attached to this AC (Attachment A) is encouraged.

Richard Macfarlane

Acting Executive Manager

Aviation Safety Standards

ATTACHMENT A TALL STRUCTURE REPORT FORM

To: Aeronautical Data Officer
Date:
Tel: (03) 9282 6282
Fax: (03) 9282-6695
Email: ais.charting@defence.gov.au

NOTIFICATION OF New
Removal of
Change made to Tall Structures
(Delete As Appropriate)

LOCATION and DESCRIPTION OF STRUCTURE

Site Name: _____

Identification of the Structure (if known) e.g. Company Reference No.	State or Territory
--	--------------------

Site Address:

Nearest town or prominent landmark: _____ Locality or feature name: _____

Municipality / Shire Council: Postcode:

Description (type) of structure:

(e.g. 45m Guyed Mast, 38m Concrete Monopole, 60m Lattice Tower, Lighthouse, Beacon, Building, Chimney, Elevated Tank)

Owner of structure:

SURVEY DATA

Survey Datum: (Note: The use of the wrong datum will misplace obstructions by around 200 m)

WGS 84 / GDA 94

11

AGD 66

7

AGD 84

7

Latitude: S Longitude: E

(Degrees, minutes and seconds to 1/100th of a second) (if available) (DD:MM:SS.SS) or (DD.DDDD)

Or UTM Grid Reference: Easting / X (m) Northing / Y (m)

Zone: _____ Positional Accuracy \pm (metres) (if available) : _____

Date of last survey (if known): _____ / _____ / _____ Year of erection: _____ / _____ / _____

Height of structure: _____ Height Accuracy \pm FT (if available): _____

Ground level elevation* at the base of the Structure (if known): _____

Height from ground level to the top most point of the obstruction in metres (including all antennae, aerials and other attachments) : _____

Elevation* to the top of the structure in metres, including all antennae, aerials and other attachments: _____

Note: *Elevation values are referenced to Mean Sea Level (AMSL) or the Australian Height Datum (AHD) and values are requested in feet or to 1/10th of a metre.

Value Code: How was the data captured? (1) (2) (3) (4) (5) (6) (*Please circle*)

- | | |
|------------------------------|---------------------------|
| 1. 1st order survey | 2. Stereo photogrammetric |
| 3. Mono photogrammetric | 4. Chart/map derived |
| 5. Handheld GPS (non survey) | 6. Reported |

Guy-wire footprint: _____ metres (*Lateral distance from structure*)

MARKING

Obstacle marking (e.g. painted red or orange and white) Yes / No

Obstacle lighting (e.g. flashing red obstacle light) Yes / No

Other obstacle markers (e.g. orange balls on guy wires) Yes / No

Is the Obstacle Permanent or Temporary ? Perm / Temp

If Temporary, what is the intended removal date:

_____ / _____ / _____

OTHER REMARKS

CONTACT DETAILS

Name of person making report: _____

Organisation and position within organisation: _____

Tel or Fax contact : Tel: . _____ Fax: _____

Email: _____

ELECTRONIC SUBMISSION OF DATA

An online Vertical Obstruction Report Form is available at www.raafais.gov.au/obstr_form.htm or via the RAAF Web site at www.raafais.gov.au
☐ Products ☐ Vertical Obstruction Report Form.

SITE SKETCH

Site sketch showing the proximity to roads, streets, tracks, buildings, creeks, trig points and any other suitable or relevant features to locate the obstruction.



Will forward details to AIS website:

Yes / No

If you are able to provide RAAF AIS with site drawings or construction plans in a zipped format, it would add to data integrity and completeness whilst lessening the need to make follow up calls to confirm any missing data.

Attachment Data can be sent to: ais.charting@defence.gov.au



Peter Wallace Engineer Pty Ltd
Electric Power Engineering Services

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LEONARDS HILL WIND FARM

SYSTEM STUDIES VOLTAGE, REACTIVE, FEEDER LOADING, FAULT LEVELS (Revised)

Peter Wallace
Consulting Engineer
Peter Wallace Engineer Pty Ltd

19 April 2006

LEONARDS HILL WIND FARM SYSTEM STUDIES VOLTAGE, REACTIVE, FEEDER LOADING AND FAULT LEVELS

EXECUTIVE SUMMARY

The interaction of the proposed Leonards Hill wind farm with the Powercor distribution network has been investigated. The investigation was carried out to determine the operational measures necessary to ensure the wind farm would operate within the requirements of the Victorian Electricity Distribution Code. The studies indicated that the wind farm could operate within the requirements for customer voltage and line loading.

CONCLUSIONS

- 1 The wind farm should be operated at a power factor of 0.90 absorbing to ensure the voltage changes for variations in generation level would not cause disturbance to customers.
- 2 With the wind farm operating at a power factor of 0.90 absorbing, the variation in voltage for generation changing from zero to 4MW in normal operation would be up to about 1.7%.
- 3 The change in voltage for a trip of the full 4MW of wind farm generation would be up to 1.8%. A trip of both turbines at full generation would be a rare event.
- 4 The change in voltage for a typical change in generation of about 25% would be up to about 0.3%.
- 5 These changes in voltage should not disturb customer supply.
- 6 The loading of the feeder due to wind farm operation would be well within the feeder rating.
- 7 The infeed of fault current from the wind farm would cause a small increase in the three phase and single phase to ground fault currents.

LEONARDS HILL WIND FARM SYSTEM STUDIES VOLTAGE, REACTIVE, FEEDER LOADING AND FAULT LEVELS

1.0 SYSTEM CONNECTION

The connection of the proposed Leonards Hill wind farm to the BAN_11 22kV feeder on the Powercor network is indicated by Figure 1. This diagram includes the points on the feeder for which the Powercor data indicated a load supplied directly from the feeder or from a T connected to the feeder.

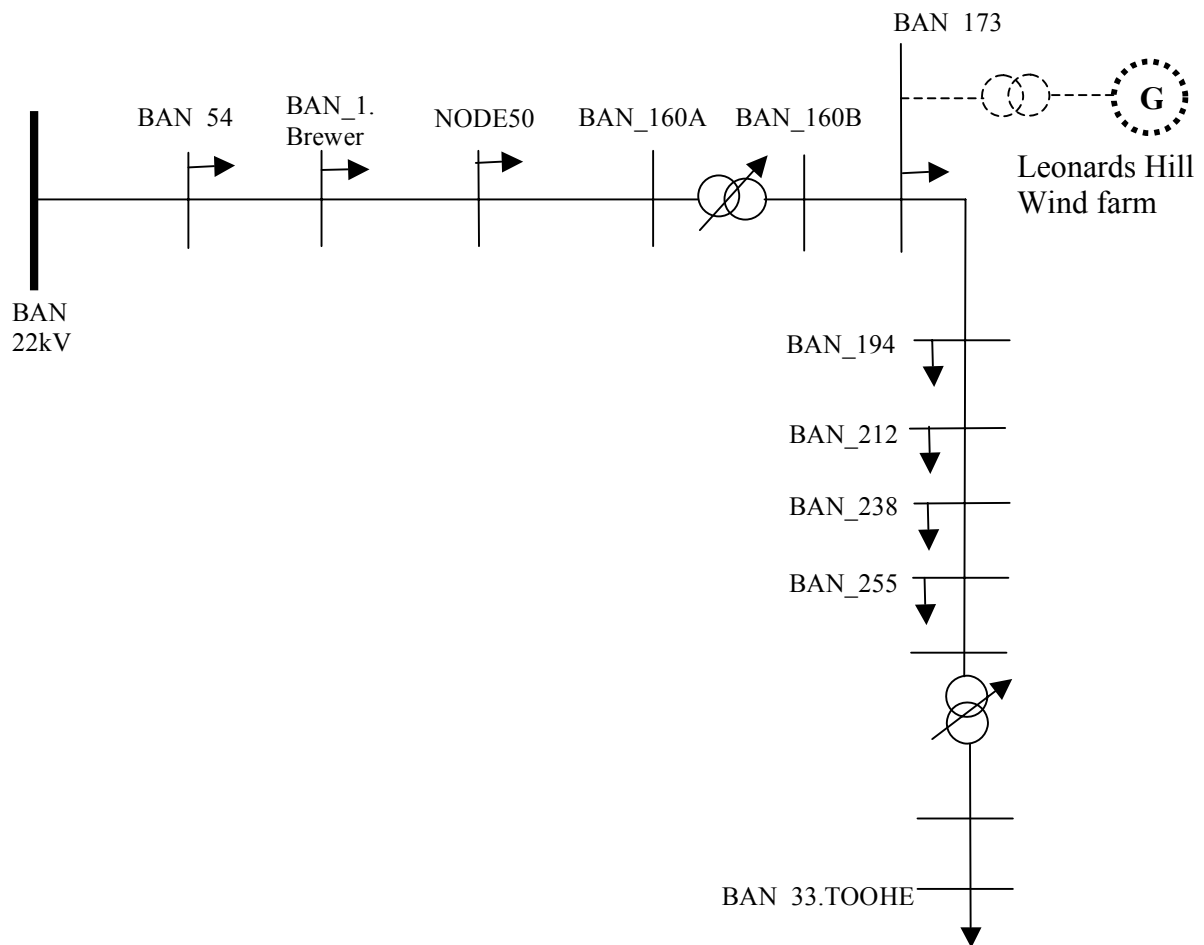


Figure 1 Connection of Leonards Hill Wind Farm to Powercor Feeder BAN_11

2.0 BASIS OF STUDIES

2.1 Feeder Model

The feeder was modeled using data supplied by Powercor. This data comprised:-

- impedances of feeder sections
- feeder current ratings

2.2 External System Model

The external system was modeled using the Thevenin impedance obtained from the fault current data supplied by Powercor. This impedance enabled the voltage change for sudden generation changes (eg generation trip) to be determined.

2.3 System Loads

The loads were modeled using data supplied by Powercor for maximum demand. This data included load currents and power factors. The loads for minimum demand were obtained for 30% of the maximum demand. The loads were modeled with some voltage sensitivity to enable determination of the effect of sudden changes in generation. The model used was 60% constant load and 40% constant impedance. This model is commonly used by Powercor Networks. The constant impedance component of the load was adjusted according to the bus voltages to ensure the total load current corresponded to the value provided by Powercor. An investigation of various load models indicated that the voltage profile was basically independent of the load model. The model used facilitates solution with PSSE. The loads are shown in Table 1.

Load Point	Amps	Pf	tan phi	V pu	MVA	MW	MVAr
Node54	8.8	0.88	0.539743	1.00	0.34	0.30	0.16
BAN_1.Brewer	9.5	0.9	0.484322	0.96	0.35	0.31	0.15
Node50	16	0.9	0.484322	0.93	0.57	0.51	0.25
BAN_173	51.6	0.9	0.484322	1.02	2.01	1.81	0.87
BAN_194	2.8	0.9	0.484322	50.00	5.33	4.80	2.33
BAN_212	22.4	0.9	0.484322	1.01	0.86	0.78	0.38
BAN_238	3.5	0.9	0.484322	1.00	0.13	0.12	0.06
BAN_255	101.4	0.9	0.484322	0.99	3.83	3.44	1.67
BAN_33	17.9	0.9	0.484322	0.99	0.68	0.61	0.29
Total MW/MVAr						12.67	6.15
Regulator change in current	22.1						
Total amps	256						

Table 1 BAN_11 Feeder Loads

The substation demand corresponding to high loading of BAN_11 was obtained from substation load characteristic data supplied by Powercor. This substation demand was used to determine the substation transformer tap.

2.4 Wind Farm Generation

The wind farm generation was modeled as two 2MW wind turbines. The generators were connected to the system by separate 22kV/690Volt transformers.

2.6 Transformer and regulators

The zone substation transformer was represented by the voltage/load regulation characteristic. The regulators were represented by their reactance, tapping range and voltage/load regulation characteristic.

2.7 Regulatory Requirements

The wind farm performance was examined for satisfaction of the requirements of the Victorian Electricity Distribution Code (VEDC.)

3.0 WIND FARM ELECTRICAL ARRANGEMENT

The electrical arrangement proposed for the wind farm is indicated in Figure 2.

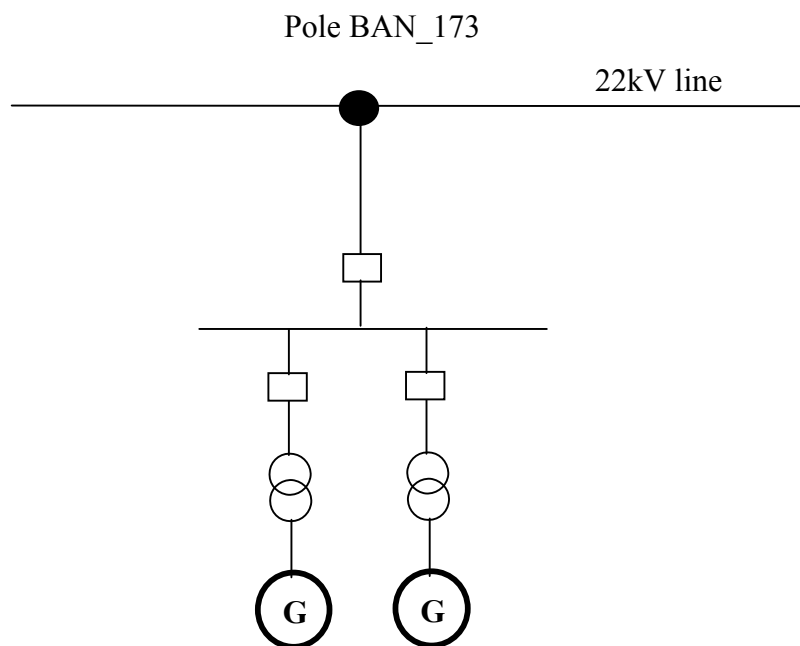


Figure 2 Wind Farm Electrical Arrangement

4.0 VOLTAGE AND REACTIVE CONTROL

4.1 Basis of Voltage Control Design

The voltage conditions and reactive control were investigated on the basis that the wind farm should only cause a minor change in the customer supply voltages to avoid disturbance to customer supply. The power output of the wind farm causes a voltage rise at the wind farm. This can be compensated by causing the wind farm to import reactive power.

On this basis, the feeder voltage profiles were determined for a range of generator operating power factors.

4.0 VOLTAGE AND REACTIVE CONTROL

4.2 Steady State Conditions - High Load

The results of studies for high load conditions are shown in Tables A1, A2, A3 in Appendix A. The results are shown graphically in Figures A1, A2, A3 in Appendix A.

a) Wind farm operating at 1.00 power factor at the 22kV connection point (Figure A1)

- With zero generation the feeder voltage falls from about 1.03 pu at the zone substation to about 0.93 pu at NODE50 and to about 0.925 pu at the Bungaree regulator at BAN_160A.
- With 4MW generation operating at unity power factor, the feeder voltage at BAN_160A would increase from 0.925 with no generation to about 0.97 ie an increase of about 4.5%.
- With zero generation, the Bungaree regulator would restore the voltage at BAN_160 to about 1.035 pu,
- As the generation increases, the Bungaree regulator would detect a reduction in the flow through the regulator and would therefore reduce the target voltage for the regulator tap changer.
- The voltage at points supplied from the regulator would be affected by the voltage at BAN_160A and the regulator tap boost,
- This would result in the voltage at BAN160B being reduced to about 1.015 pu ie a reduction of 2%. Similar reductions in voltage would occur for the voltages at points supplied from the feeder after the regulator.
- The network supplied from the Muskvale regulator was modeled as a single load at BAN_33 as indicated in the Powercor data. The flow through the regulator would be unaffected by the generation. The voltage at points supplied from the Muskvale regulator would be affected by the voltage determined by the Bungaree regulator. The voltage at BAN_33 would change from about 0.995 with zero generation to about 0.98 with 4MW of generation, a change of about 2%.

b) Wind farm operating at 0.90 and 0.95 power factor at the 22kV connection point

(Figures A2, A3)

The voltage change of 4% for loads supplied from NODE50 with operation at a power factor of 1.00 could cause an excessive disturbance to customer supply. The operation of the wind farm was therefore examined for operation at power factors of 0.95 and 0.90 at the 22kV connection point.

4.3 Steady State Conditions - Low Load

The results of studies for high load conditions are shown in Tables B1, B2, B3 in Appendix B. The results are shown graphically in Figures B1, B2, and B3 in Appendix B.

The results of studies at light load indicate that the variation in voltage is less than for high load. Operation with power factors from 0.90 to 1.00 with full 4MW generation would cause a variation in the voltage at BAN_160A ranging from 3% to 0.9%. This is consistent with the case from high load for operation of the wind farm with a power factor of 0.90 at the 22kV connection point.

4.0 VOLTAGE AND REACTIVE CONTROL

4.4 Steady State Conditions - Effect on Feeder Voltage of Varying Generator Power Factor (Generator absorbing reactive)

The effect of causing the wind farm to absorb reactive on the voltage at the critical location ie BAN160A is shown in Figures 3 and 4. These figures indicate that the most severe case is high load. For high load, the voltage change from zero to 4MW of generation could be reduced from 4.5% for a power factor of 1.00 to about 2.7% for a power factor of 0.95 absorbing and 1.7% for a power factor of 0.90 absorbing.

The wind turbine generation would typically vary between zero to full generation over a reasonably prolonged period eg an hour and customers would not see this change in a short time. Operation at 0.90 power factor absorbing is preferable to reduce the voltage change from 4.5% to 1.7%. More commonly, the generation could change by about 25% or 0.5MW over a matter of minutes. With operation with a power factor of 0.90 absorbing, this would produce a change in voltage of about 0.4% which would not normally cause any disturbance to customer perceptions of supply quality.

Operation at a power factor of 0.90 at the connection point is within the inherent capability of commercial wind turbines and is proposed as a requirement for the wind turbines.

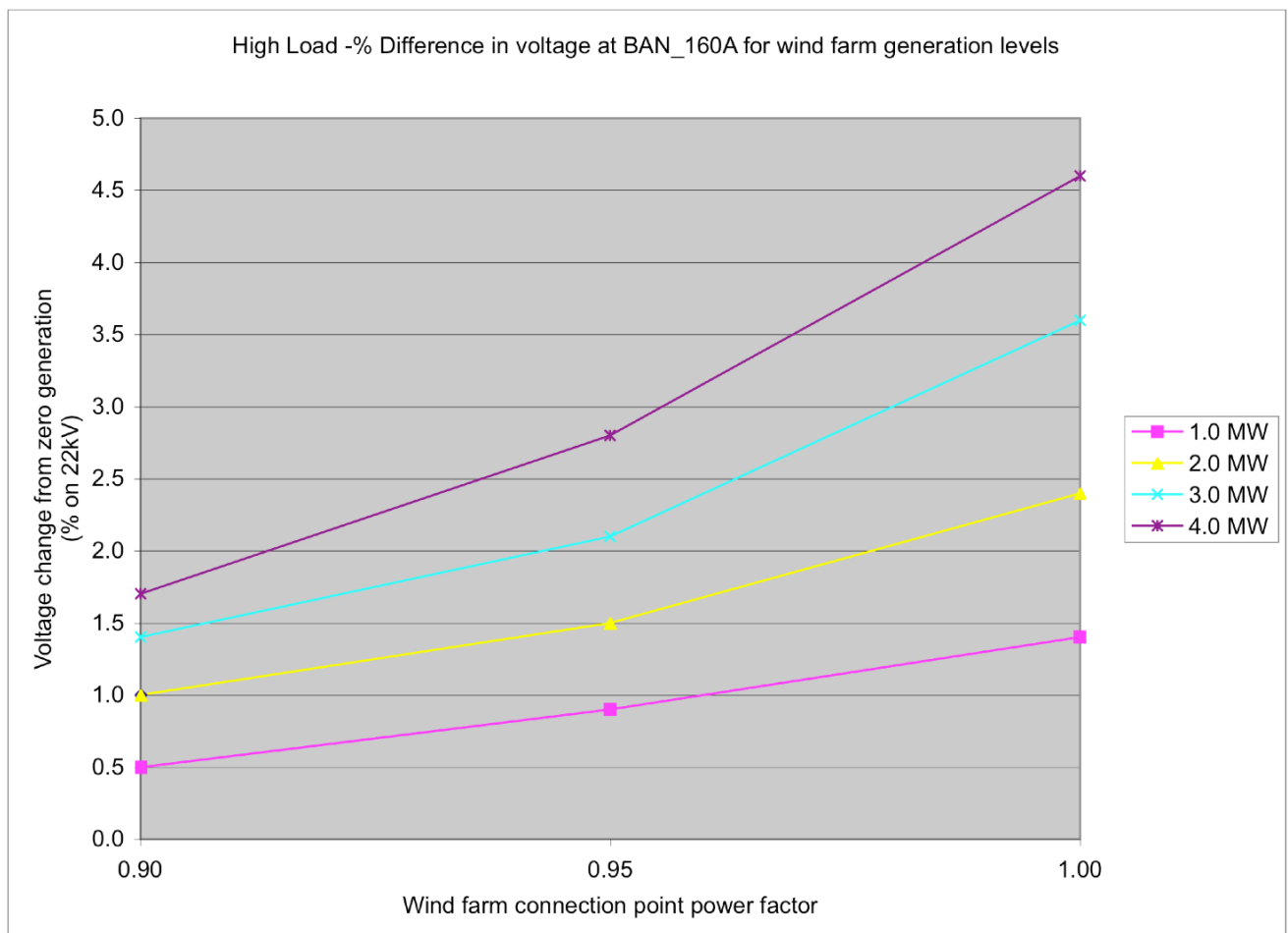


Figure 3

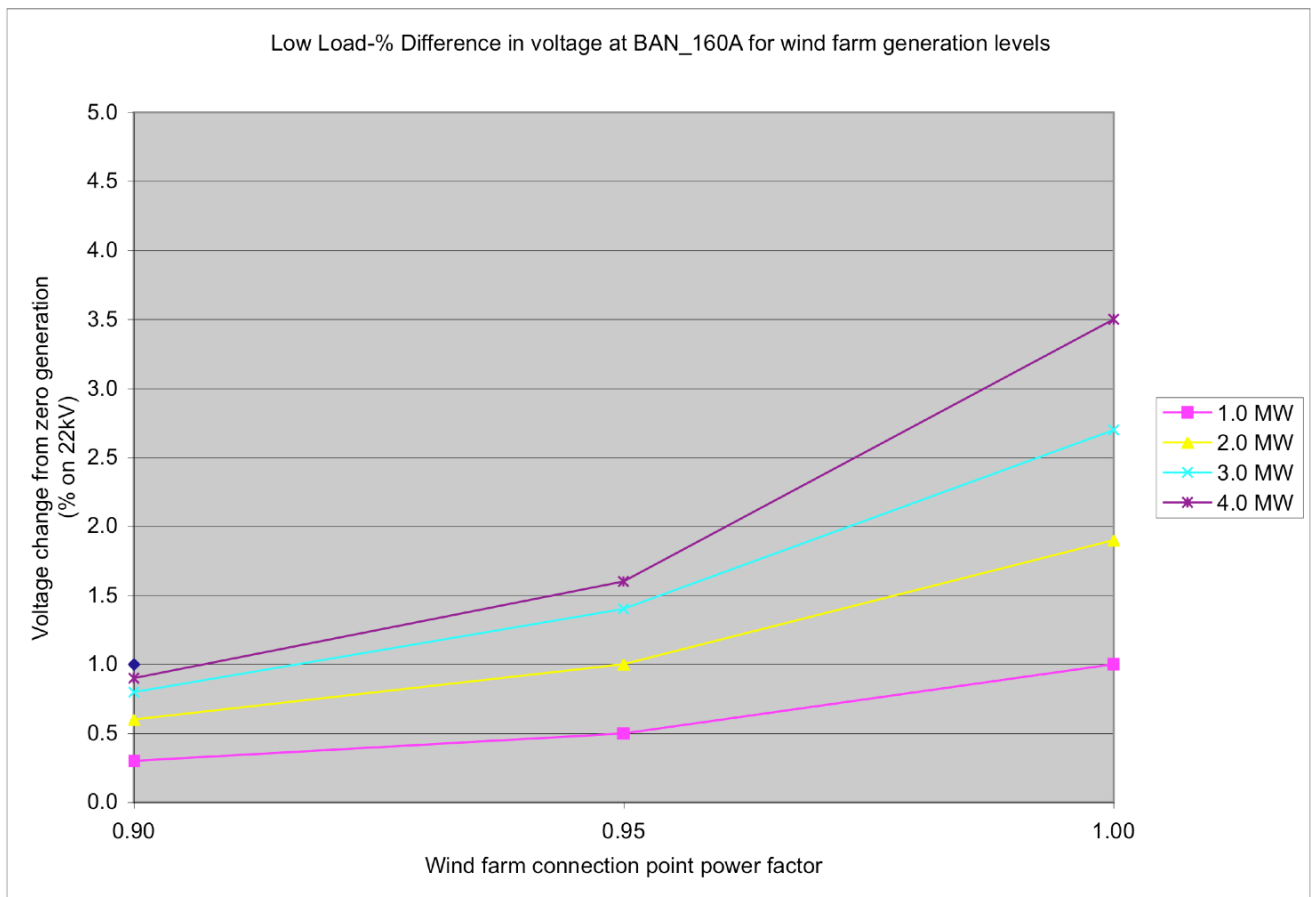


Figure 4

4.5 Effect of Generation Loss

The effects on feeder voltages of tripping the fully loaded generation at a power factor of 0.90 is shown on Table 2.

Load Level	Change in Voltage for Wind Farm trip (% 22kV)			
	Zone Sub	BAN_160A	BAN_255	BAN_33
Trip one wind turbine				
High Load	-0.1	-0.7	-0.9	0.8
Low Load	+0.2	-0.8	-0.6	-0.6
Trip 2 wind turbines				
High Load	-0.2	-1.3	-1.8	-1.7
Low Load	+0.2	-0.8	-1.1	-1.1

Note -ve voltage reduction, +ve voltage increase

Table 2

In general, tripping of either or both turbines at full power output would only occur for a fault in the turbine or turbine transformer. This operation would therefore be expected to be a rare event. The voltage change for tripping of the wind farm under typical generation levels would be about 40% of the values in Table 2 ie less than 1%.

5 LINE LOADING

The loading of feeder would be maximum for full 4MW generation and minimum load. The load sections affected are those from the connection point to the zone substation. The most critical section is from the connection point at BAN_173 to the regulator at BAN_160B. The loading on this section for the critical low load and high generation condition would be about 95 amps. This is well within the summer rating of 127 amps.

The loading on other feeder sections between BAN160A and the zone substation would be less critical because the current would be less and in most sections of the feeder, the conductor rating is higher.

There should therefore be no need for generation curtailment under high ambient temperature conditions.

6 FAULT LEVELS

The impact of the wind farm on fault levels at points along feeder BAN_11 are shown in Table 3. The wind farm was connected to the feeder by a 22kV/690V transformer connected DY ie the zero sequence network was open circuit.

Location	Three Phase (amps)		Single Phase to Ground (amps)	
	No Wind Farm	With Wind Farm	No Wind Farm	With Wind Farm
BAN_Zone Sub	10042	10472	11644	12022
BAN_54	4003	4447	2613	2728
BAN_1.Brewer	2437	2905	1423	1513
NODE_50	1887	2371	1088	1176
BAN_160	1791	2277	1037	1125
BAN_173	1640	2130	956	1045
BAN_194	1499	1905	869	943
BAN_212	1396	1741	798	861
BAN_238	1264	1542	711	761
BAN_255	1182	1423	658	701
BAN_33.TOOHE	1049	1235	574	608
BAN_143	710	794	373	389
BAN_183	661	733	345	359

Table 3

Note Wind Farm with 4MW at Leonards Hill

APPENDICES

Appendix A	High Load
Appendix B	Low Load

Appendix A	High Load
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Table A1	1.00 power factor
Table A2	0.95 power factor
Table A3	0.90 power factor

Figure A1	1.00 power factor
Figure A2	0.95 power factor
Figure A3	0.90 power factor

BAN 11 22kV Feeder - High Demand - 1.0pf

	Loading				Voltages (pu 22kV)													
Condition	P_LH	Q_LH	P_BN	Q_BN	BN_ZN	BN_54	BN_1.BR	ND_50	BN_160A	BN_160B	BN_173	BN_194	BN_212	BN_238	BN_255	BN_33	TAP	TAP
	MW	MVAr	MW	MVAr	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	REG_1	REG_2
Sys-normal	0.0	0.0	61.2	27.5	1.032	0.995	0.958	0.930	0.923	1.037	1.026	1.019	1.011	1.003	0.997	0.995	0.890	0.970
Sys-normal	0.5	0.0	60.6	27.4	1.033	0.998	0.963	0.936	0.930	1.033	1.022	1.015	1.007	0.999	0.993	0.992	0.900	0.970
Sys-normal	1.0	0.0	60.1	27.2	1.034	1.000	0.967	0.942	0.937	1.028	1.019	1.011	1.003	0.995	0.989	0.988	0.910	0.970
Sys-normal	1.5	0.0	59.6	27.3	1.035	1.003	0.972	0.948	0.941	1.027	1.018	1.010	1.002	0.994	0.989	0.987	0.917	0.970
Sys-normal	2.0	0.0	59.0	27.2	1.035	1.005	0.975	0.953	0.947	1.024	1.016	1.008	1.000	0.992	0.987	0.985	0.925	0.965
Sys-normal	2.5	0.0	58.5	27.2	1.036	1.008	0.979	0.958	0.953	1.023	1.015	1.007	0.999	0.991	0.985	0.984	0.932	0.970
Sys-normal	3.0	0.0	57.9	27.1	1.037	1.010	0.983	0.963	0.959	1.020	1.012	1.005	0.997	0.989	0.983	0.982	0.940	0.965
Sys-normal	3.5	0.0	57.4	27	1.038	1.012	0.987	0.968	0.964	1.017	1.010	1.003	0.995	0.987	0.981	0.979	0.948	0.965
Sys-normal	4.0	0.0	56.9	27	1.038	1.014	0.990	0.973	0.969	1.015	1.009	1.001	0.993	0.985	0.979	0.978	0.955	0.965

Table A1 High Feeder Demand, Generation Power Factor 1.00**BAN 11 22kV Feeder - Low Demand - 0.95pf**

	Loading				Voltages (pu 22kV)													
Condition	P_LH	Q_LH	P_BN	Q_BN	BN_ZN	BN_54	BN_1.BR	ND_50	BN_160A	BN_160B	BN_173	BN_194	BN_212	BN_238	BN_255	BN_33	TAP	TAP
	MW	MVAr	MW	MVAr	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	REG_1	REG_2
Sys-normal	0.0	0.00	17.9	7.9	1.012	1.002	0.992	0.984	0.982	1.013	1.009	1.007	1.005	1.002	1.001	1.000	0.970	0.990
Sys-normal	0.5	-0.16	17.4	8.1	1.012	1.003	0.994	0.987	0.985	1.007	1.004	1.002	1.000	0.997	0.996	0.995	0.978	0.990
Sys-normal	1.0	-0.33	16.9	8.2	1.012	1.004	0.995	0.989	0.987	1.005	1.003	1.001	0.998	0.996	0.994	0.994	0.982	0.990
Sys-normal	1.5	-0.50	16.4	8.4	1.012	1.004	0.996	0.991	0.990	1.002	1.000	0.997	0.995	0.993	0.991	0.990	0.988	0.990
Sys-normal	2.0	-0.67	15.9	8.6	1.012	1.005	0.998	0.993	0.992	1.002	1.000	0.998	0.996	0.993	0.992	0.991	0.990	0.990
Sys-normal	2.5	-0.80	15.4	8.7	1.012	1.006	0.999	0.995	0.995	0.995	0.993	0.991	0.989	0.986	0.985	0.984	1.000	0.990
Sys-normal	3.0	-1.00	14.9	8.9	1.012	1.006	1.000	0.997	0.996	0.996	0.995	0.993	0.991	0.988	0.987	0.986	1.000	0.990
Sys-normal	3.5	-1.16	14.4	9.1	1.012	1.007	1.001	0.998	0.998	0.998	0.998	0.996	0.993	0.991	0.989	0.989	1.000	0.990
Sys-normal	4.0	-1.30	13.9	9.2	1.012	1.007	1.002	1.000	1.001	1.000	1.000	0.998	0.996	0.994	0.992	0.991	1.000	0.990

Table A2 High Feeder Demand, Generation Power Factor 0.95

Note Abbreviations in column titles

P_LH - Power Leonards Hill

Q_LH - Reactive Leonards Hill

BN - BAN

ND - NODE

BR - Brewer

REG - Regulator – tap on sending side

BAN 11 22kV Feeder - Low Demand - 0.90pf

Condition	Loading				Voltages (pu 22kV)												TAP	
	P_LH	Q_LH	P_BN	Q_BN	BN_ZN	BN_54	BN_1.BR	ND_50	BN_160A	BN_160B	BN_173	BN_194	BN_212	BN_238	BN_255	BN_33	TAP	
	MW	MVAr	MW	MVAr	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	REG_1	REG_2
Sys-normal	0.0	0.00	17.9	7.9	1.012	1.002	0.992	0.984	0.982	1.013	1.009	1.007	1.005	1.002	1.001	1.000	0.970	0.990
Sys-normal	0.5	-0.25	17.4	8.2	1.012	1.002	0.993	0.985	0.984	1.007	1.004	1.002	0.999	0.997	0.995	0.995	0.977	0.990
Sys-normal	1.0	-0.50	16.9	8.4	1.012	1.003	0.993	0.987	0.985	1.005	1.003	1.000	0.998	0.996	0.994	0.993	0.980	0.990
Sys-normal	1.5	-0.75	16.4	8.6	1.012	1.003	0.994	0.988	0.986	1.002	1.000	0.998	0.996	0.993	0.991	0.991	0.984	0.990
Sys-normal	2.0	-1.00	15.9	8.9	1.011	1.003	0.994	0.989	0.988	1.000	0.999	0.996	0.994	0.992	0.990	0.989	0.987	0.990
Sys-normal	2.5	-1.25	15.4	9.1	1.011	1.003	0.995	0.990	0.989	0.989	0.987	0.985	0.983	0.980	0.979	0.978	1.000	0.990
Sys-normal	3.0	-1.50	14.9	9.4	1.011	1.003	0.995	0.990	0.990	0.990	0.988	0.986	0.984	0.981	0.980	0.979	1.000	0.990
Sys-normal	3.5	-1.75	14.4	9.7	1.011	1.003	0.995	0.991	0.991	0.990	0.990	0.987	0.985	0.983	0.981	0.980	1.000	0.990
Sys-normal	4.0	-2.00	13.9	10.0	1.010	1.003	0.995	0.992	0.991	0.991	0.991	0.988	0.986	0.984	0.982	0.982	1.000	0.990

Table A3 High Feeder Demand, Generation Power Factor 0.90

Note Abbreviations in column titles

P_LH - Power Leonards Hill

Q_LH - Reactive Leonards Hill

BN - BAN

ND - NODE

BR - Brewer

REG - Regulator – tap on sending side

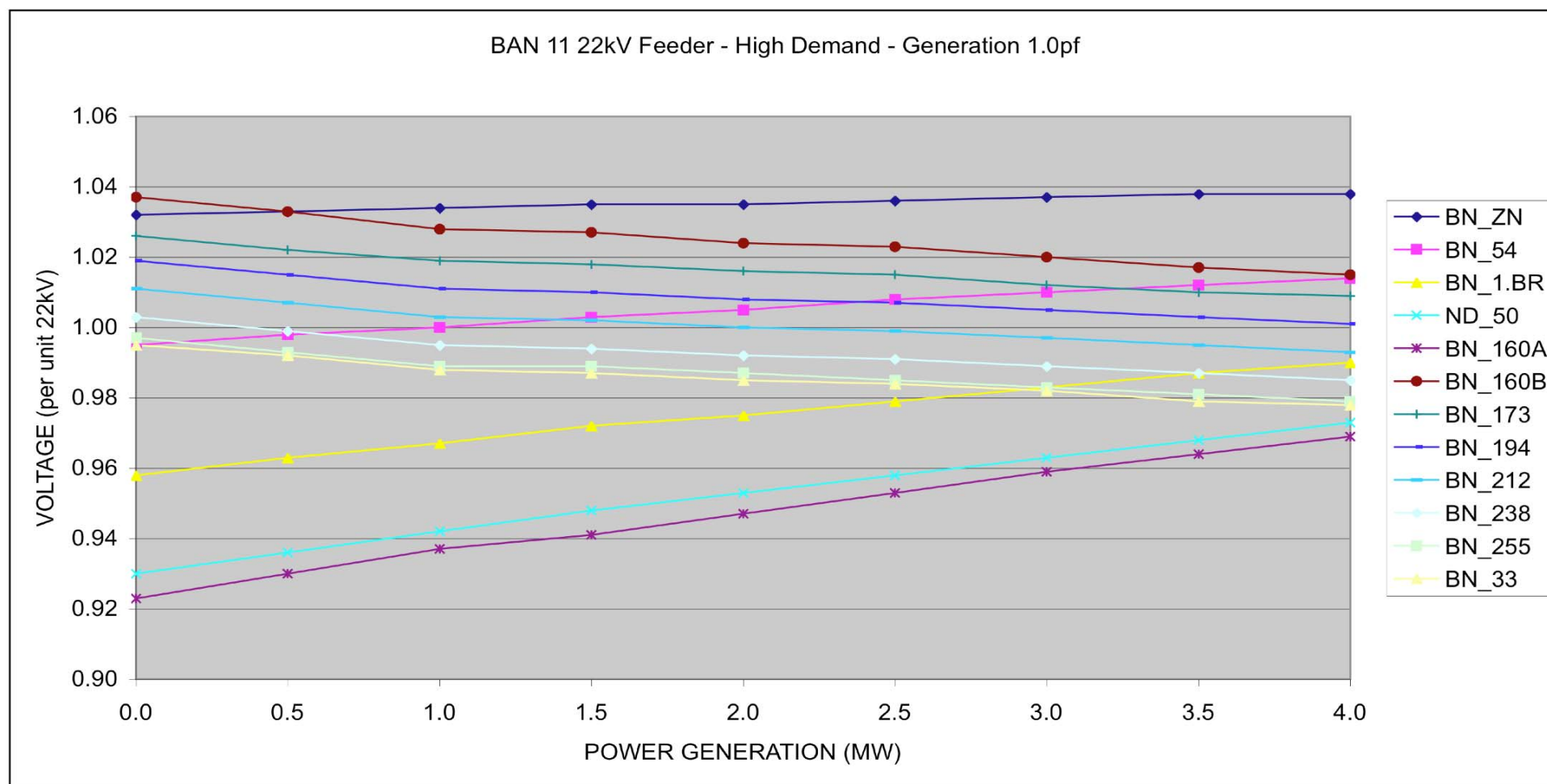


Figure A1

Note Abbreviations in legend titles
 BN for BAN
 ND for NODE
 BR for Brewer

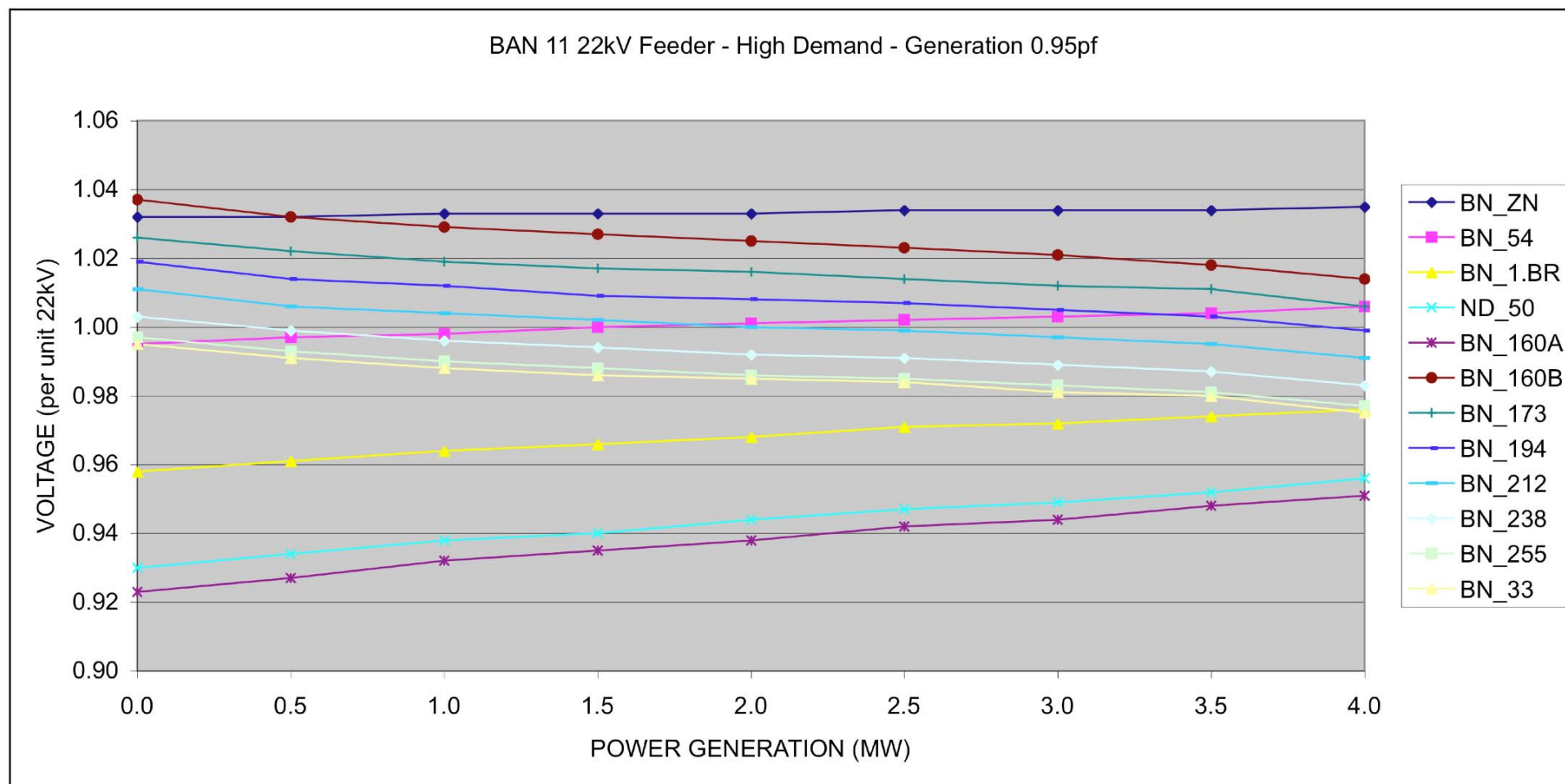


Figure A2

Note Abbreviations in legend titles
 BN for BAN
 ND for NODE
 BR for Brewer

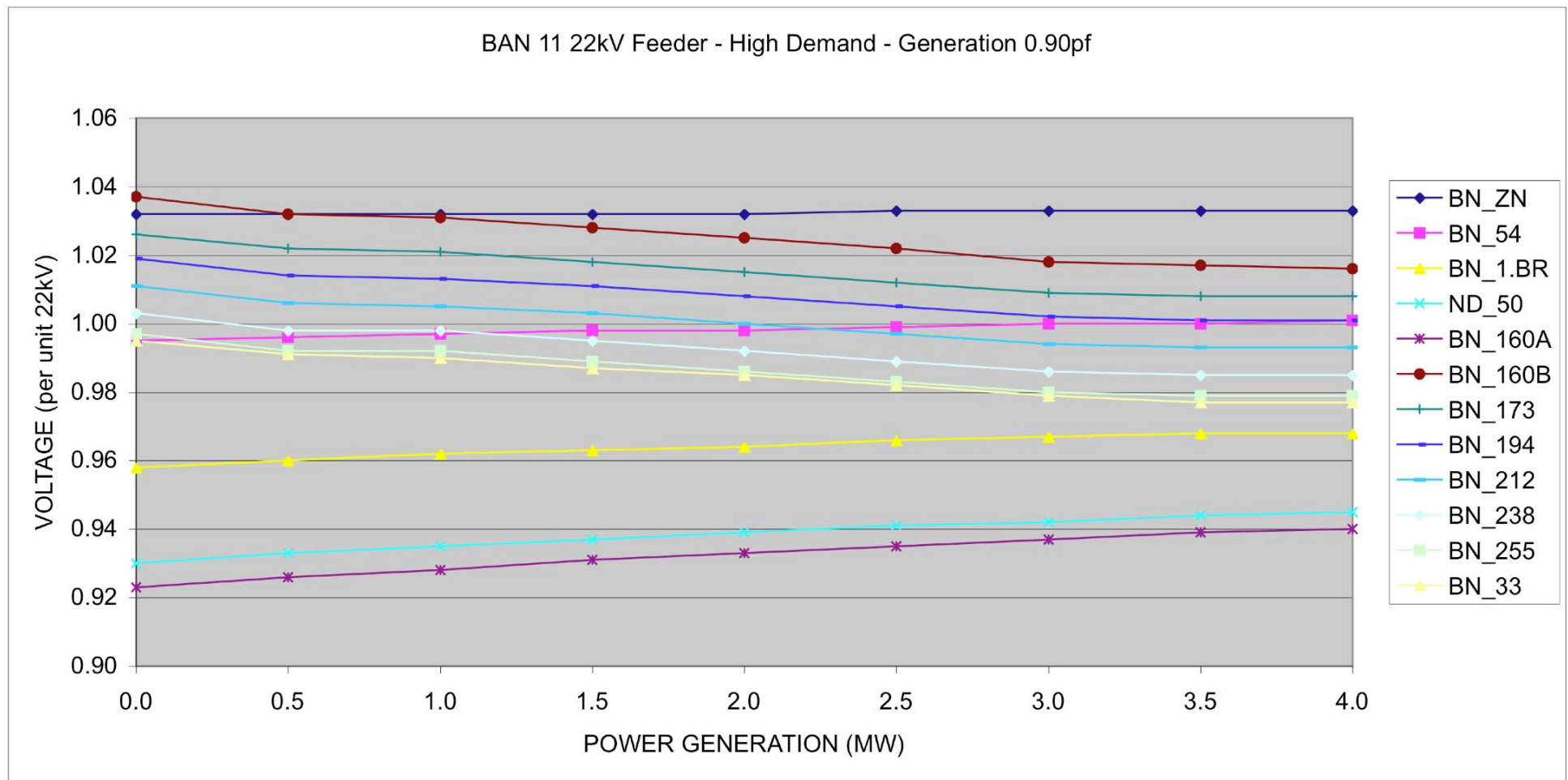


Figure A3

Note Abbreviations in legend titles
 BN for BAN
 ND for NODE
 BR for Brewer

Appendix B Low Load

Table B1	1.00 power factor
Table B2	0.95 power factor
Table B3	0.90 power factor

Figure B1	1.00 power factor
Figure B2	0.95 power factor
Figure B3	0.90 power factor

BAN 11 22kV Feeder - Low Demand - 1.0pf

	Loading				Voltages (pu 22kV)														
Condition	P_LH	Q_LH	P_BN	Q_BN	BN_ZN	BN_54	BN_1.BR	ND_50	BN_160A	BN_160B	BN_173	BN_194	BN_212	BN_238	BN_255	BN_33	TAP	TAP	
	MW	MVAr	MW	MVAr	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	REG_1	REG_2	
Sys-normal	0.0	0.0	17.9	7.9	1.012	1.002	0.992	0.984	0.982	1.013	1.009	1.007	1.005	1.002	1.001	1.000	0.970	0.990	
Sys-normal	0.5	0.0	17.4	7.9	1.013	1.004	0.995	0.989	0.987	1.007	1.004	1.002	1.000	0.997	0.996	0.995	0.980	0.990	
Sys-normal	1.0	0.0	16.9	7.9	1.013	1.006	0.998	0.993	0.992	1.007	1.005	1.002	1.000	0.998	0.996	0.995	0.985	0.990	
Sys-normal	1.5	0.0	16.4	7.9	1.014	1.007	1.001	0.997	0.996	1.001	1.000	0.997	0.995	0.993	0.991	0.990	0.995	0.990	
Sys-normal	2.0	0.0	15.9	7.9	1.014	1.009	1.004	1.001	1.001	1.000	1.000	0.997	0.995	0.993	0.991	0.990	1.000	0.990	
Sys-normal	2.5	0.0	15.4	7.9	1.014	1.011	1.007	1.005	1.005	1.005	1.004	1.002	1.000	0.997	0.996	0.995	1.000	0.990	
Sys-normal	3.0	0.0	14.9	7.9	1.015	1.012	1.010	1.009	1.009	1.009	1.009	1.007	1.004	1.002	1.000	1.000	1.000	0.990	
Sys-normal	3.5	0.0	14.4	7.9	1.015	1.014	1.012	1.012	1.013	1.013	1.013	1.011	1.009	1.007	1.005	1.004	1.000	0.990	
Sys-normal	4.0	0.0	14.0	7.9	1.016	1.015	1.015	1.016	1.017	1.017	1.018	1.016	1.013	1.011	1.009	1.009	1.000	0.990	

Table B1 Low Feeder Demand, Generation Power Factor 1.00**BAN 11 22kV Feeder - Low Demand - 0.95pf**

	Loading				Voltages (pu 22kV)													
Condition	P_LH	Q_LH	P_BN	Q_BN	BN_ZN	BN_54	BN_1.BR	ND_50	BN_160A	BN_160B	BN_173	BN_194	BN_212	BN_238	BN_255	BN_33	TAP	TAP
	MW	MVAr	MW	MVAr	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	REG_1	REG_2
Sys-normal	0.0	0.00	17.9	7.9	1.012	1.002	0.992	0.984	0.982	1.013	1.009	1.007	1.005	1.002	1.001	1.000	0.970	0.990
Sys-normal	0.5	-0.16	17.4	8.1	1.012	1.003	0.994	0.987	0.985	1.007	1.004	1.002	1.000	0.997	0.996	0.995	0.978	0.990
Sys-normal	1.0	-0.33	16.9	8.2	1.012	1.004	0.995	0.989	0.987	1.005	1.003	1.001	0.998	0.996	0.994	0.994	0.982	0.990
Sys-normal	1.5	-0.50	16.4	8.4	1.012	1.004	0.996	0.991	0.990	1.002	1.000	0.997	0.995	0.993	0.991	0.990	0.988	0.990
Sys-normal	2.0	-0.67	15.9	8.6	1.012	1.005	0.998	0.993	0.992	1.002	1.000	0.998	0.996	0.993	0.992	0.991	0.990	0.990
Sys-normal	2.5	-0.80	15.4	8.7	1.012	1.006	0.999	0.995	0.995	0.995	0.993	0.991	0.989	0.986	0.985	0.984	1.000	0.990
Sys-normal	3.0	-1.00	14.9	8.9	1.012	1.006	1.000	0.997	0.996	0.996	0.995	0.993	0.991	0.988	0.987	0.986	1.000	0.990
Sys-normal	3.5	-1.16	14.4	9.1	1.012	1.007	1.001	0.998	0.998	0.998	0.998	0.996	0.993	0.991	0.989	0.989	1.000	0.990
Sys-normal	4.0	-1.30	13.9	9.2	1.012	1.007	1.002	1.000	1.001	1.000	1.000	0.998	0.996	0.994	0.992	0.991	1.000	0.990

Table B2 Low Feeder Demand, Generation Power Factor 0.95

Note Abbreviations in column titles

P_LH - Power Leonards Hill

Q_LH - Reactive Leonards Hill

BN - BAN

ND - NODE

BR - Brewer

REG - Regulator – tap on sending side

BAN 11 22kV Feeder - Low Demand - 0.90pf

Condition	Loading				Voltages (pu 22kV)												TAP	
	P_LH	Q_LH	P_BN	Q_BN	BN_ZN	BN_54	BN_1.BR	ND_50	BN_160A	BN_160B	BN_173	BN_194	BN_212	BN_238	BN_255	BN_33	TAP	
	MW	MVAr	MW	MVAr	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	pu	REG_1	REG_2
Sys-normal	0.0	0.00	17.9	7.9	1.012	1.002	0.992	0.984	0.982	1.013	1.009	1.007	1.005	1.002	1.001	1.000	0.970	0.990
Sys-normal	0.5	-0.25	17.4	8.2	1.012	1.002	0.993	0.985	0.984	1.007	1.004	1.002	0.999	0.997	0.995	0.995	0.977	0.990
Sys-normal	1.0	-0.50	16.9	8.4	1.012	1.003	0.993	0.987	0.985	1.005	1.003	1.000	0.998	0.996	0.994	0.993	0.980	0.990
Sys-normal	1.5	-0.75	16.4	8.6	1.012	1.003	0.994	0.988	0.986	1.002	1.000	0.998	0.996	0.993	0.991	0.991	0.984	0.990
Sys-normal	2.0	-1.00	15.9	8.9	1.011	1.003	0.994	0.989	0.988	1.000	0.999	0.996	0.994	0.992	0.990	0.989	0.987	0.990
Sys-normal	2.5	-1.25	15.4	9.1	1.011	1.003	0.995	0.990	0.989	0.989	0.987	0.985	0.983	0.980	0.979	0.978	1.000	0.990
Sys-normal	3.0	-1.50	14.9	9.4	1.011	1.003	0.995	0.990	0.990	0.990	0.988	0.986	0.984	0.981	0.980	0.979	1.000	0.990
Sys-normal	3.5	-1.75	14.4	9.7	1.011	1.003	0.995	0.991	0.991	0.990	0.990	0.987	0.985	0.983	0.981	0.980	1.000	0.990
Sys-normal	4.0	-2.00	13.9	10.0	1.010	1.003	0.995	0.992	0.991	0.991	0.991	0.988	0.986	0.984	0.982	0.982	1.000	0.990

Table B3 Low Feeder Demand, Generation Power Factor 0.90

Note Abbreviations in column titles

P_LH - Power Leonards Hill

Q_LH - Reactive Leonards Hill

BN - BAN

ND - NODE

BR - Brewer

REG - Regulator – tap on sending side

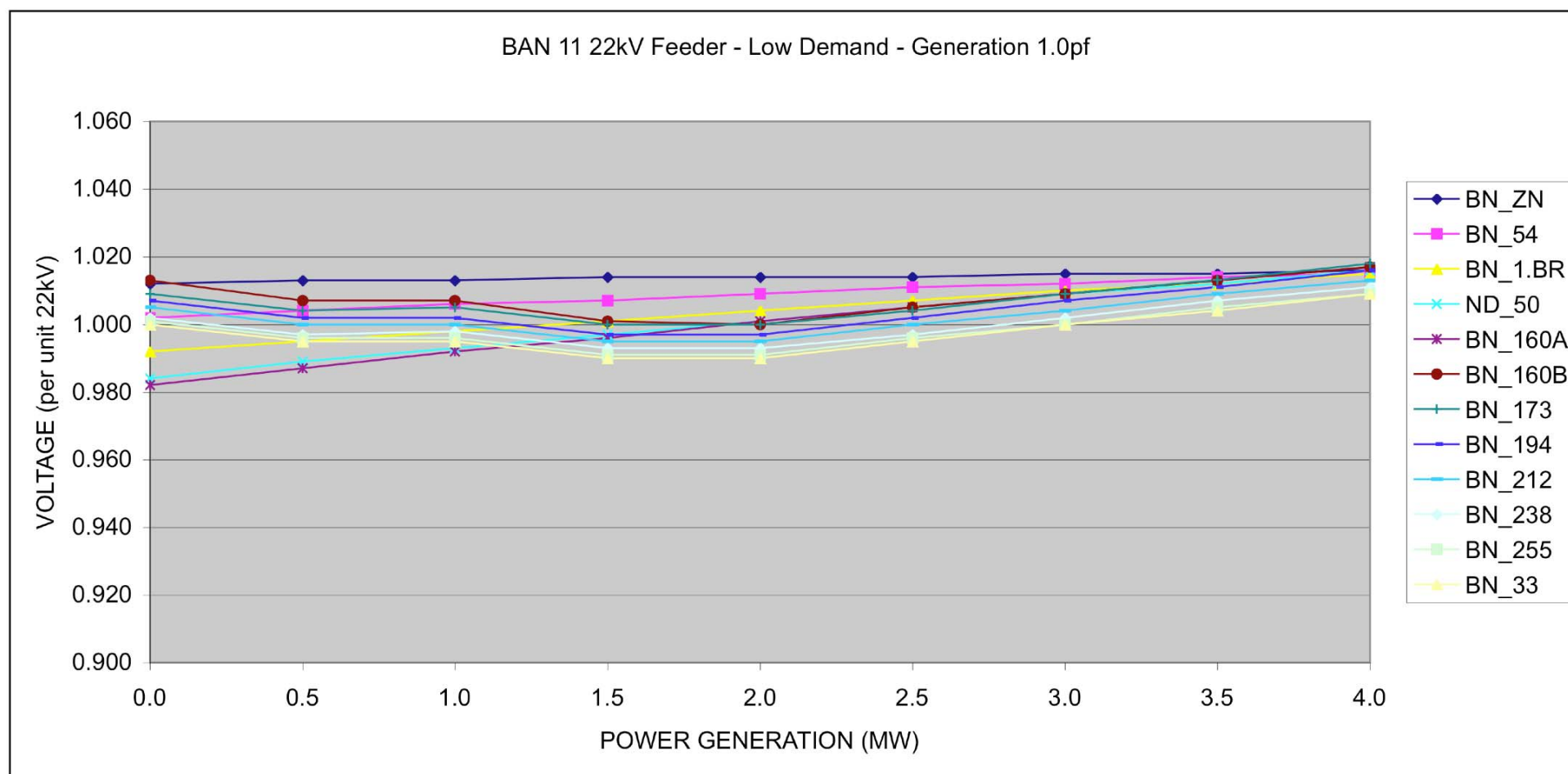


Figure B1

Note Abbreviations in legend titles
 BN for BAN
 ND for NODE
 BR for Brewer

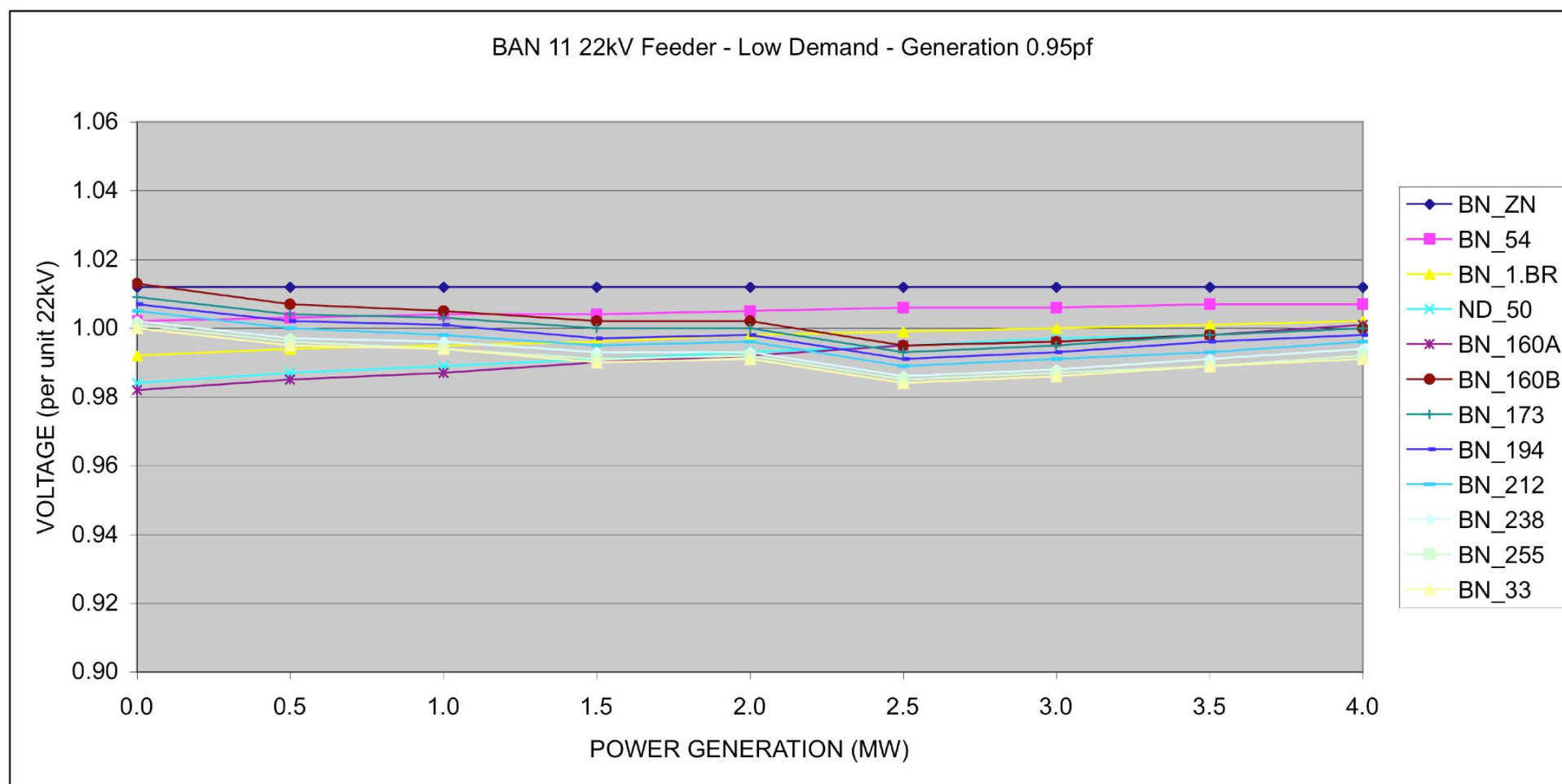


Figure B2

Note Abbreviations in legend titles
 BN for BAN
 ND for NODE
 BR for Brewer

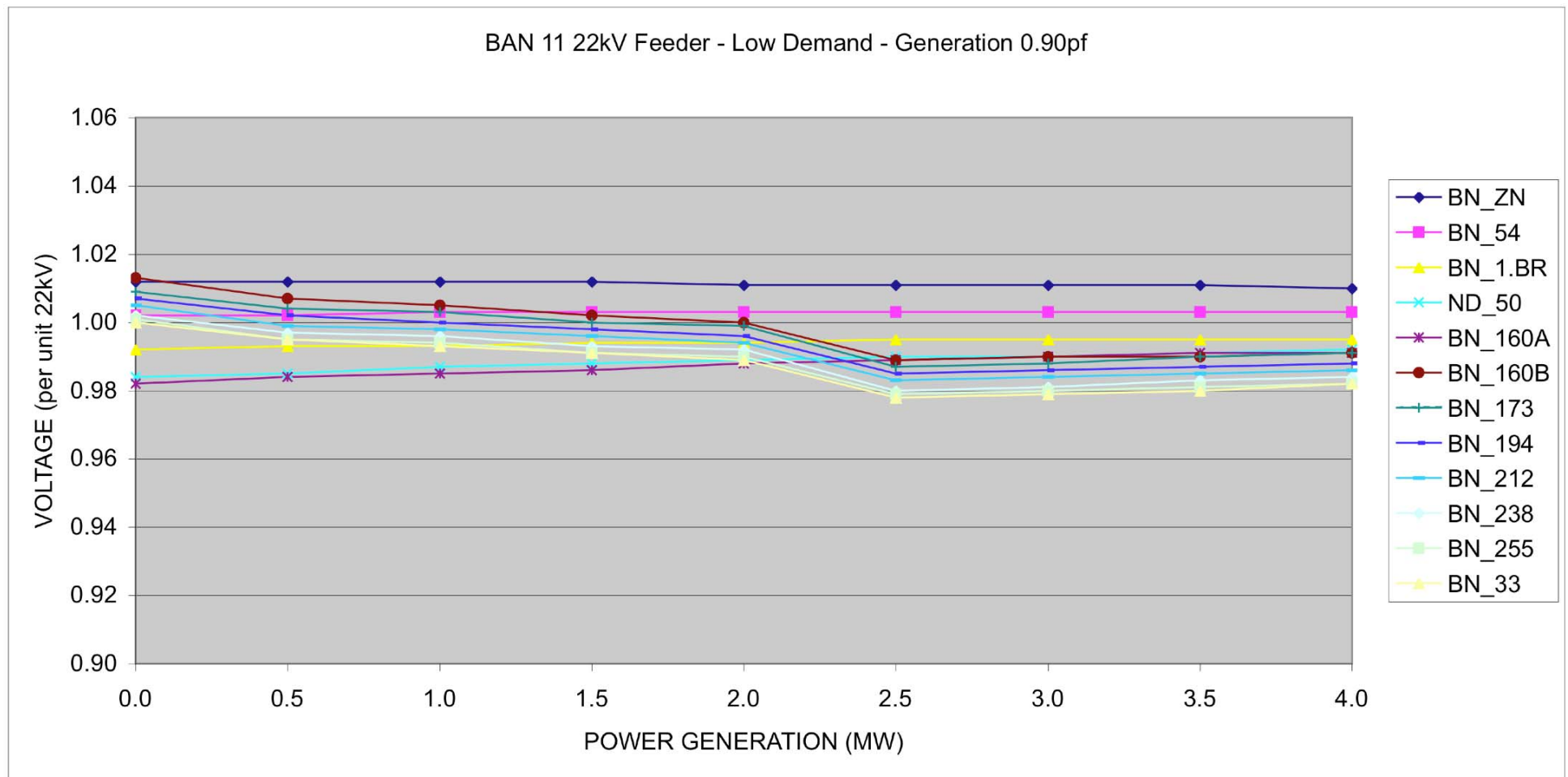


Figure B3

Note Abbreviations in legend titles
 BN for BAN
 ND for NODE
 BR for Brewer



MISSION STATEMENT

WHO ARE WE?

We are a group of Hepburn Shire residents who share an interest in the use of sustainable energy, including wind-generated electricity within our community.

In particular, we believe a suitably-sized wind energy project would be beneficial to the long-term health and resilience of our community.

WHAT ARE OUR AIMS?

Our primary aim is to initiate a small-scale wind-power project (of no more than 2 turbines) in the Daylesford / Hepburn region. We believe a project of this size is the most environmentally appropriate and economically responsible in meeting the energy needs of our community.

We also aim to provide Hepburn Shire residents with the opportunity to invest in this project as the project will provide both financial and social dividends for our community.

HOW WILL WE ACHIEVE OUR AIMS?

We will achieve our aims by:

- Acting independently of energy developers and local government while seeking their input, as appropriate;
- Creating transparent mechanisms by which issues raised at meetings are thoroughly researched and relevant information is provided to participants;
- Inviting and researching opposing views to wind energy developments; and
- Assessing community interest for investing in a wind-power project and defining the criteria for such an investment.

Management Committee

Hepburn Renewable Energy Association Inc

November 2005

**ASSOCIATIONS
INCORPORATION
ACT (1981)**

Schedule 5

**RULES OF THE
HEPBURN
RENEWABLE ENERGY
ASSOCIATION**

RULES OF

THE HEPBURN RENEWABLE ENERGY ASSOCIATION

1. *Name*

The name of the incorporated association is The Hepburn Renewable Energy Association (in these Rules called "the Association").

2. *Definitions*

(1) In these Rules, unless the contrary intention appears-

"Act" means the **Associations Incorporation Act 1981**;

"committee" means the committee of management of the Association;

"financial year" means the year ending on 30 June;

"general meeting" means a general meeting of members convened in accordance with rule 12.

"member" means a member of the Association;

"ordinary member of the committee" means a member of the committee who is not an officer of the Association under Rule 21;

"Regulations" means regulations under the Act;

"relevant documents" has the same meaning as in the Act.

(2) In these Rules, a reference to the Secretary of an Association is a reference--

(a) if a person holds office under these Rules as Secretary of the Association--to that person; and

(b) in any other case, to the public officer of the Association.

3. *Alteration of the rules*

These Rules and the statement of purposes of the Association must not be altered except in accordance with the Act.

4. *Membership, entry fees and subscription*

(1) A person who applies and is approved for membership as provided in these Rules is eligible to be a member of the Association on payment of the Application Fee and Annual Subscription Fee payable under these Rules.

(2) A person who is not a member of the Association at the time of the incorporation of the Association (or who was a member at that time but has ceased to be a member) must not be admitted to membership unless-

- (a) he or she applies for membership in accordance with sub-rule (3); and
- (b) the admission as a member is approved by the committee.

(3) An application of a person for membership of the Association must-

- (a) be made in writing in the form set out in Appendix 1; and
- (b) be lodged with a member of the Management Committee together with the sum payable under these Rules as the application fee and the first year's annual subscription.

(4) As soon as practicable after the receipt of an application, the Secretary must refer the application to the committee.

(5) The committee must determine whether to approve or reject the application.

(6) If the committee approves an application for membership, the Secretary must, as soon as practicable-

- (a) notify the applicant in writing or by email of the approval for membership; and

(7) The Secretary must, within 28 days after receipt of the amounts referred to in sub-rule (6), enter the applicant's name in the register of members.

(8) An applicant for membership becomes a member and is entitled to exercise the rights of membership when his or her name is entered in the register of members.

(9) If the committee rejects an application, the committee must, as soon as practicable, notify the applicant in writing that the application has been rejected.

(10) A right, privilege, or obligation of a person by reason of membership of the Association-

- (a) is not capable of being transferred or transmitted to another person; and
- (b) terminates upon the cessation of membership whether by death or resignation or otherwise.

(11) The application fee is the relevant amount set out in Appendix 4.

(12) The annual subscription is the relevant amount set out in Appendix 4 and is payable in advance on or before 1 July in each year.

5. *Register of members*

(1) The Secretary must keep and maintain a register of members containing-

- (a) the name and address of each member; and

- (b) the date on which each member's name was entered in the register.
- (2) The register is available for inspection free of charge by any member upon request.
- (3) A member may make a copy of entries in the register.

6. *Ceasing membership*

- (1) A member of the Association who has paid all moneys due and payable by a member to the Association may resign from the Association by giving one month's notice in writing to the Secretary of his or her intention to resign.
- (2) After the expiry of the period referred to in sub-rule (1)--
 - (a) the member ceases to be a member; and
 - (b) the Secretary must record in the register of members the date on which the member ceased to be a member.

7. *Discipline, suspension and expulsion of members*

- (1) Subject to these Rules, if the committee is of the opinion that a member has refused or neglected to comply with these Rules, or has been guilty of conduct unbecoming a member or prejudicial to the interests of the Association, the committee may by resolution--
 - (a) fine that member an amount not exceeding \$500; or
 - (b) suspend that member from membership of the Association for a specified period; or
 - (c) expel that member from the Association.
- (2) A resolution of the committee under sub-rule (1) does not take effect unless--
 - (a) at a meeting held in accordance with sub-rule (3), the committee confirms the resolution; and
 - (b) if the member exercises a right of appeal to the Association under this rule, the Association confirms the resolution in accordance with this rule.
- (3) A meeting of the committee to confirm or revoke a resolution passed under sub-rule (1) must be held not earlier than 14 days, and not later than 28 days, after notice has been given to the member in accordance with sub-rule (4).
- (4) For the purposes of giving notice in accordance with sub-rule (3), the Secretary must, as soon as practicable, cause to be given to the member a written notice-

- (a) setting out the resolution of the committee and the grounds on which it is based; and
 - (b) stating that the member, or his or her representative, may address the committee at a meeting to be held not earlier than 14 days and not later than 28 days after the notice has been given to that member; and
 - (c) stating the date, place and time of that meeting; and
 - (d) informing the member that he or she may do one or both of the following-
 - (i) attend that meeting;
 - (ii) give to the committee before the date of that meeting a written statement seeking the revocation of the resolution;
 - (e) informing the member that, if at that meeting, the committee confirms the resolution, he or she may, not later than 48 hours after that meeting, give the Secretary a notice to the effect that he or she wishes to appeal to the Association in general meeting against the resolution.
- (5) At a meeting of the committee to confirm or revoke a resolution passed under sub-rule (1), the committee must-
- (a) give the member, or his or her representative, an opportunity to be heard; and
 - (b) give due consideration to any written statement submitted by the member; and
 - (c) determine by resolution whether to confirm or to revoke the resolution. (6) If at the meeting of the committee, the committee confirms the resolution, the member may, not later than 48 hours after that meeting, give the Secretary a notice to the effect that he or she wishes to appeal to the Association in general meeting against the resolution.
- (7) If the Secretary receives a notice under sub-rule (6), he or she must notify the committee and the committee must convene a general meeting of the Association to be held within 21 days after the date on which the Secretary received the notice.
- (8) At a general meeting of the Association convened under sub-rule (7)--
- (a) no business other than the question of the appeal may be conducted; and
 - (b) the committee may place before the meeting details of the grounds for the resolution and the reasons for the passing of the resolution; and
 - (c) the member, or his or her representative, must be given an opportunity to be heard; and
 - (d) the members present must vote by secret ballot on the question whether the resolution should be confirmed or revoked.

(9) A resolution is confirmed if, at the general meeting, not less than two-thirds of the members vote in person, or by proxy, in favour of the resolution. In any other case, the resolution is revoked.

8. *Disputes and mediation*

(1) The grievance procedure set out in this rule applies to disputes under these Rules between-

- (a) a member and another member; or
- (b) a member and the Association.

(2) The parties to the dispute must meet and discuss the matter in dispute, and, if possible, resolve the dispute within 14 days after the dispute comes to the attention of all of the parties.

(3) If the parties are unable to resolve the dispute at the meeting, or if a party fails to attend that meeting, then the parties must, within 10 days, hold a meeting in the presence of a mediator.

(4) The mediator must be-

- (a) a person chosen by agreement between the parties; or
- (b) in the absence of agreement-
 - (i) in the case of a dispute between a member and another member, a person appointed by the committee of the Association; or
 - (ii) in the case of a dispute between a member and the Association, a person who is a mediator appointed or employed by the Dispute Settlement Centre of Victoria (Department of Justice).

(5) A member of the Association can be a mediator.

(6) The mediator cannot be a member who is a party to the dispute.

(7) The parties to the dispute must, in good faith, attempt to settle the dispute by mediation.

(8) The mediator, in conducting the mediation, must--

- (a) give the parties to the mediation process every opportunity to be heard; and
- (b) allow due consideration by all parties of any written statement submitted by any party; and
- (c) ensure that natural justice is accorded to the parties to the dispute throughout the mediation process.

(9) The mediator must not determine the dispute.

(10) If the mediation process does not result in the dispute being resolved, the parties may seek to resolve the dispute in accordance with the Act or otherwise at law.

9. *Annual general meetings*

(1) The committee may determine the date, time and place of the annual general meeting of the Association.

(2) The notice convening the annual general meeting must specify that the meeting is an annual general meeting.

(3) The ordinary business of the annual general meeting shall be-

(a) to confirm the minutes of the previous annual general meeting and of any general meeting held since that meeting; and

(b) to receive from the committee reports upon the transactions of the Association during the last preceding financial year; and

(c) to elect officers of the Association and the ordinary members of the committee; and

(d) to receive and consider the statement submitted by the Association in accordance with section 30(3) of the Act.

(4) The annual general meeting may conduct any special business of which notice has been given in accordance with these Rules.

10. *Special general meetings*

(1) In addition to the annual general meeting, any other general meetings may be held in the same year.

(2) All general meetings other than the annual general meeting are special general meetings.

(3) The committee may, whenever it thinks fit, convene a special general meeting of the Association.

(4) If, but for this sub-rule, more than 15 months would elapse between annual general meetings, the committee must convene a special general meeting before the expiration of that period.

(5) The committee must, on the request in writing of members representing not less than 5 per cent of the total number of members, convene a special general meeting of the Association.

(6) The request for a special general meeting must--

(a) state the objects of the meeting; and

(b) be signed by the members requesting the meeting; and

(c) be sent to the address of the Secretary.

(7) If the committee does not cause a special general meeting to be held within one month after the date on which the request is sent to the address of the Secretary, the members making the request, or any of them, may convene a special general meeting to be held not later than 3 months after that date.

(8) If a special general meeting is convened by members in accordance with this rule, it must be convened in the same manner so far as possible as a meeting convened by the committee and all reasonable expenses incurred in convening the special general meeting must be refunded by the Association to the persons incurring the expenses.

11. *Special business*

All business that is conducted at a special general meeting and all business that is conducted at the annual general meeting, except for business conducted under the rules as ordinary business of the annual general meeting, is deemed to be special business.

12. *Notice of general meetings*

(1) The Secretary of the Association, at least 14 days, or if a special resolution has been proposed at least 21 days, before the date fixed for holding a general meeting of the Association, must cause to be sent to each member of the Association, a notice stating the place, date and time of the meeting and the nature of the business to be conducted at the meeting.

(2) Notice may be sent--

(a) by electronic transmission ; or

(b) if the member requests, by prepaid post to the address appearing in the register of members.

(3) No business other than that set out in the notice convening the meeting may be conducted at the meeting.

(4) A member intending to bring any business before a meeting may notify in writing, or by electronic transmission, the Secretary of that business, who must include that business in the notice calling the next general meeting.

13. *Quorum at general meetings*

(1) No item of business may be conducted at a general meeting unless a quorum of members entitled under these Rules to vote is present at the time when the meeting is considering that item.

(2) Five members personally present (being members entitled under these Rules to vote at a general meeting) constitute a quorum for the conduct of the business of a general meeting.

(3) If, within half an hour after the appointed time for the commencement of a general meeting, a quorum is not present-

(i) in the case of a meeting convened upon the request of members--the meeting must be dissolved; and

(ii) in any other case--the meeting shall stand adjourned to the same day in the next week at the same time and (unless another place is specified by the Chairperson at the time of the adjournment or by written notice to members given before the day to which the meeting is adjourned) at the same place.

(4) If at the adjourned meeting the quorum is not present within half an hour after the time appointed for the commencement of the meeting, the members personally present (being not less than 3) shall be a quorum.

14. Presiding at general meetings

(1) The President, or in the President's absence, the Vice-President, shall preside as Chairperson at each general meeting of the Association.

(2) If the President and the Vice-President are absent from a general meeting, or are unable to preside, the members present must select one of their number to preside as Chairperson.

15. Adjournment of meetings

(1) The person presiding may, with the consent of a majority of members present at the meeting, adjourn the meeting from time to time and place to place.

(2) No business may be conducted at an adjourned meeting other than the unfinished business from the meeting that was adjourned.

(3) If a meeting is adjourned for 14 days or more, notice of the adjourned meeting must be given in accordance with rule 12. (4) Except as provided in sub-rule (3), it is not necessary to give notice of an adjournment or of the business to be conducted at an adjourned meeting.

16. Voting at general meetings

- (1) Upon any question arising at a general meeting of the Association, a member has one vote only.
- (2) All votes must be given personally or by proxy.
- (3) In the case of an equality of voting on a question, the Chairperson of the meeting is entitled to exercise a second or casting vote.
- (4) A member is not entitled to vote at a general meeting unless all moneys due and payable by the member to the Association have been paid, other than the amount of the annual subscription payable in respect of the current financial year.

17. Poll at general meetings

- (1) If at a meeting a poll on any question is demanded by not less than 3 members, it must be taken at that meeting in such manner as the Chairperson may direct and the resolution of the poll shall be deemed to be a resolution of the meeting on that question.
- (2) A poll that is demanded on the election of a Chairperson or on a question of an adjournment must be taken immediately and a poll that is demanded on any other question must be taken at such time before the close of the meeting as the Chairperson may direct.

18. Manner of determining whether resolution carried

If a question arising at a general meeting of the Association is determined on a show of hands-

(a) a declaration by the Chairperson that a resolution has been-

- (i) carried; or
- (ii) carried unanimously; or
- (iii) carried by a particular majority; or
- (iv) lost; and

(b) an entry to that effect in the minute book of the Association--

is evidence of the fact, without proof of the number or proportion of the votes recorded in favour of, or against, that resolution.

19. Proxies

- (1) Each member is entitled to appoint another member as a proxy by notice given to the Secretary no later than 24 hours before the time of the meeting in respect of which the proxy is appointed.

(2) The notice appointing the proxy must be--

(a) for a meeting of the Association convened under rule 7(7), in the form set out in Appendix 2; or

(b) in any other case, in the form set out in Appendix 3.

20. *Committee of Management*

(1) The affairs of the Association shall be managed by the committee of management.

(2) The committee--

(a) shall control and manage the business and affairs of the Association; and

(b) may, subject to these Rules, the Act and the Regulations, exercise all such powers and functions as may be exercised by the Association other than those powers and functions that are required by these Rules to be exercised by general meetings of the members of the Association; and

(c) subject to these Rules, the Act and the Regulations, has power to perform all such acts and things as appear to the committee to be essential for the proper management of the business and affairs of the Association.

(3) Subject to section 23 of the Act, the committee shall consist of--

(a) the officers of the Association; and

(b) a minimum of two and a maximum of six ordinary members--

each of whom shall be elected at the annual general meeting of the Association in each year.

21. *Office holders*

(1) The officers of the Association shall be--

(a) a President;

(b) a Vice-President;

(c) a Treasurer; and

(d) a Secretary.

(2) The provisions of rule 23, so far as they are applicable and with the necessary modifications, apply to and in relation to the election of persons to any of the offices referred to in sub-rule (1).

(3) Each officer of the Association shall hold office until the annual general meeting next after the date of his or her election but is eligible for re-election.

(4) In the event of a casual vacancy in any office referred to in sub-rule (1), the committee may appoint one of its members to the vacant office and the member appointed may continue in office up to and including the conclusion of the annual general meeting next following the date of the appointment.

22. Ordinary members of the committee

(1) Subject to these Rules, each ordinary member of the committee shall hold office until the annual general meeting next after the date of election but is eligible for re-election.

(2) In the event of a casual vacancy occurring in the office of an ordinary member of the committee, the committee may appoint a member of the Association to fill the vacancy and the member appointed shall hold office, subject to these Rules, until the conclusion of the annual general meeting next following the date of the appointment.

23. Election of officers and ordinary committee members

(1) Nominations of candidates for election as officers of the Association or as ordinary members of the committee must be--

(a) made in writing, signed by two members of the Association and accompanied by the written consent of the candidate (which may be endorsed on the form of nomination); and

(b) delivered to the Secretary of the Association not less than 7 days before the date fixed for the holding of the annual general meeting.

(2) A candidate may only be nominated for one office, or as an ordinary member of the committee, prior to the annual general meeting.

(3) If insufficient nominations are received to fill all vacancies on the committee, the candidates nominated shall be deemed to be elected and further nominations may be received at the annual general meeting.

(4) If the number of nominations received is equal to the number of vacancies to be filled, the persons nominated shall be deemed to be elected.

(5) If the number of nominations exceeds the number of vacancies to be filled, a ballot must be held.

(6) The ballot for the election of officers and ordinary members of the committee must be conducted at the annual general meeting in such manner as the committee may direct.

24. *Vacancies*

The office of an officer of the Association, or of an ordinary member of the committee, becomes vacant if the officer or member--

- (a) ceases to be a member of the Association; or
- (b) becomes an insolvent under administration within the meaning of the Corporations Law; or
- (c) resigns from office by notice in writing given to the Secretary.

25. *Meetings of the committee*

- (1) The committee must meet at least 3 times in each year at such place and such times as the committee may determine.
- (2) Special meetings of the committee may be convened by the President or by any 4 members of the committee.

26. *Notice of committee meetings*

- (1) Written notice of each committee meeting must be given to each member of the committee at least 2 business days before the date of the meeting.
- (2) Written notice must be given to members of the committee of any special meeting specifying the general nature of the business to be conducted and no other business may be conducted at such a meeting.
- (3) The notices noted in (1) and (2) of this Rule may be delivered by email.

27. *Quorum for committee meetings*

- (1) Any 4 members of the committee constitute a quorum for the conduct of the business of a meeting of the committee.
- (2) No business may be conducted unless a quorum is present.
- (3) If within half an hour of the time appointed for the meeting a quorum is not present--
 - (i) in the case of a special meeting--the meeting lapses;

(ii) in any other case--the meeting shall stand adjourned until the Secretary has obtained agreement amongst no less than 4 committee members for a subsequent meeting date.

(4) The committee may act notwithstanding any vacancy on the committee.

28. Presiding at committee meetings

At meetings of the committee-

(a) the President or, in the President's absence, the Vice-President presides; or

(b) if the President and the Vice-President are absent, or are unable to preside, the members present must choose one of their number to preside.

29. Voting at committee meetings

(1) Questions arising at a meeting of the committee, or at a meeting of any sub-committee appointed by the committee, shall be determined on a show of hands or, if a member requests, by a poll taken in such manner as the person presiding at that meeting may determine.

(2) Each member present at a meeting of the committee, or at a meeting of any sub-committee appointed by the committee (including the person presiding at the meeting), is entitled to one vote and, in the event of an equality of votes on any question, the person presiding may exercise a second or casting vote.

30. Removal of committee member

(1) The Association in general meeting may, by resolution, remove any member of the committee before the expiration of the member's term of office and appoint another member in his or her place to hold office until the expiration of the term of the first-mentioned member.

(2) A member who is the subject of a proposed resolution referred to in sub-rule (1) may make representations in writing to the Secretary or President of the Association (not exceeding a reasonable length) and may request that the representations be provided to the members of the Association.

(3) The Secretary or the President may give a copy of the representations to each member of the Association or, if they are not so given, the member may require that they be read out at the meeting.

31. *Minutes of meetings*

The Secretary of the Association must keep minutes of the resolutions and proceedings of each general meeting, and each committee meeting, together with a record of the names of persons present at committee meetings.

32. *Funds*

(1) The Treasurer of the Association must-

(a) collect and receive all moneys due to the Association and make all payments authorised by the Association; and

(b) keep correct accounts and books showing the financial affairs of the Association with full details of all receipts and expenditure connected with the activities of the Association.

(2) All cheques, drafts, bills of exchange, promissory notes and other negotiable instruments must be signed by two members of the committee.

(3) The funds of the Association shall be derived from application fees, annual subscriptions, donations and such other sources as the committee determines.

(4) The Association may choose to establish a public fund as per Clause 37.

33. *Seal*

(1) The common seal of the Association must be kept in the custody of the Secretary.

(2) The common seal must not be affixed to any instrument except by the authority of the committee and the affixing of the common seal must be attested by the signatures either of two members of the committee or, of one member of the committee and of the public officer of the Association.

34. *Notice to members*

Except for the requirement in rule 12, any notice that is required to be given to a member, by on behalf of the Association, under these Rules may be given by-

(a) delivering the notice to the member personally; or

(b) sending it by prepaid post addressed to the member at that member's address shown in the register of members; or

(c) facsimile transmission; or

(d) electronic transmission.

35. *Winding up*

In the event of the winding up or the cancellation of the incorporation of the Association, the assets of the Association must be disposed of in accordance with the provisions of the Act. If the Association establishes a public fund then in the case of the winding up of the fund the provisions of Clause 42 apply.

36. *Custody and inspection of books and records*

- (1) Except as otherwise provided in these Rules, the Secretary must keep in his or her custody or under his or her control all books, documents and securities of the Association.
- (2) All accounts, books, securities and any other relevant documents of the Association must be available for inspection free of charge by any member upon request.
- (3) A member may make a copy of any accounts, books, securities and any other relevant documents of the Association.

37. *Establishment of the Public Fund*

The Association may choose to establish and maintain a public fund to be called the Hepburn Renewable Energy Association Public Fund, for the specific purpose of supporting the environmental objects/purposes of the Hepburn Renewable Energy Association. The Fund if established is to receive all gifts of money or property for this purpose and any money received because of such gifts must be credited to its bank account. The Fund must not receive any other money or property into its account and it must comply with subdivision 30-E of the *Income Tax Assessment Act 1997*.

38. *Requirements of the Public Fund if established*

The Association must inform the Department responsible for the environment as soon as possible if:

- it changes its name or the name of its public fund; or
- there is any change to the membership of the management committee of the public fund; or
- there has been any departure from the model rules for public funds located in the Guidelines to the Register of Environmental Organisations.

39. Ministerial Rules

If the Association establishes a public fund then the Association agrees to comply with any rules that the Treasurer and the Minister with responsibility for the environment may make to ensure that gifts made to the fund are only used for its principal purpose.

40. Not-for-Profit

If the Association establishes a public fund then the income and property of the Association shall be used and applied solely in promotion of its objects and no portion shall be distributed, paid or transferred directly or indirectly by way of dividend, bonus or by way of profit to members, directors, or trustees of the Association.

41. Conduit Policy

If the Association establishes a public fund then any allocation of funds or property to other persons or organisations will be made in accordance with the established purposes of the Association and not be influenced by the preference of the donor.

42. Winding-up

If the Association establishes a public fund then in case of the winding-up of the Fund, any surplus assets are to be transferred to another fund with similar objectives that is on the Register of Environmental Organisations.

43. Statistical Information

If the Association establishes a public fund then the Statistical information requested by the Department on donations to the Public Fund will be provided within four months of the end of the financial year.

If the Association establishes a public fund then an audited financial statement for the Association and its public fund will be supplied with the annual statistical return. The statement will provide information on the expenditure of public fund monies and the management of public fund assets.

HEPBURN RENEWABLE ENERGY ASSOCIATION

MEMBER APPLICATION FORM

The Hepburn Renewable Emery Association was established by a group of local residents. The Association believes our community can take responsibility for our own energy needs and at the same time help to protect our environment from climate change.

APPLICANT DETAILS

Applicant Name:

Address:

.....

Telephone: Home..... Work..... Mobile

.....

Email:

(Please Note: All communications will be sent by email)

I, the above named Applicant hereby apply to become a member of the Hepburn Renewable Energy Association ("the Association")

In the event of my admission as a member, I agree to be bound by the rules of the Association for the time being in force.

I enclose my Annual Subscription Fee of \$10

Additionally, I would like to make a donation to the Association of: \$.....

Name of Applicant

Name of Witness

Signature of Applicant

Signature of Witness

Date

Date

Office Use Only					
Subscription Fee received	Amount \$10	Association Officer:		Date:	
Donation received					

APPENDIX 2

**FORM OF APPOINTMENT OF PROXY FOR MEETING OF
ASSOCIATION CONVENED UNDER RULE 7(7)**

I,
(*name*)

of
(*address*)

being a member of The Hepburn Renewable Energy Association

appoint
(*name of proxy holder*)

of
(*address of proxy holder*)

being a member of that Incorporated Association, as my proxy to vote for me on my behalf at the appeal to the general meeting of the Association convened under rule 7(7), to be held on-

.....
(*date of meeting*)

and at any adjournment of that meeting.

I authorise my proxy to vote on my behalf at their discretion in respect of the following resolution (insert details of resolution passed under rule 7(1)).

.....
Signed

.....
Date

APPENDIX 3

FORM OF APPOINTMENT OF PROXY

I,
(name)

of
(address)

being a member of The Hepburn Renewable Energy Association

appoint
(name of proxy holder)

of
(address of proxy holder)

being a member of that Incorporated Association, as my proxy to vote for me on my behalf at the annual/special* general meeting of the Association to be held on

.....
(date of meeting)

and at any adjournment of that meeting.

My proxy is authorised to vote in favour of/against* the following resolution (insert details of resolution).

.....
Signed

.....
Date

* Delete if not applicable

APPENDIX 4

SCHEDULE OF FEES

<i>Fee</i>	<i>Amount</i>
Application fee	\$0
Annual subscription fee	\$10

NOTES

"SCHEDULE 1

PREPARATION OF FINANCIAL STATEMENTS BY PRESCRIBED ASSOCIATIONS--AUSTRALIAN ACCOUNTING STANDARDS

Australian Accounting Standard Number	Name of Australian Accounting Standard	Issued
AASB 1018 (replaces AAS 1)	Statement of Financial Performance	June 2002
AAS 4	Depreciation	August 1997
AAS 5	Materiality	September 1995
AAS 6	Accounting Policies	March 1999
AAS 8	Events Occurring After Reporting Date	October 1997
AAS 15	Revenue	June 1998
AAS 17	Leases	October 1998
AAS 28	Statement of Cash Flows	October 1997
AAS 36	Statement of Financial Position	October 1999
AASB 1041 (replaces AAS 38)	Revaluation of Non-Current Assets	July 2001



Hepburn Renewable Energy Association Inc.

Leonards Hill Community Newsletter

December 2005

This Newsletter

This community newsletter is to keep you up to date on investigations into a small community owned wind park in the Leonards Hill area. The Hepburn Renewable Energy Association Inc. is keen to keep the community up to date with planning progress. This newsletter contains:

- An invitation to a free tour of the Challicum Hills Wind Farm (transport provided);
- An overview of the Association and activities to date;
- A list of the questions raised during the community meeting at Leonards Hill Hall on Tuesday 22nd November 2005 as well as in personal meetings and phone conversations together with brief answers to those questions;
- An overview of the planning process that would be applied to the Leonards Hill Community Wind Park if an application is lodged.

The Association

Early this year a group of people in the Daylesford – Hepburn Springs area came together to discuss ways in which the local community could take responsibility for their own energy needs and reduce our dependence on polluting greenhouse energy. Out of these early meetings the idea of a small community owned wind park in the area was born.

In September of this year a Community Forum was held in Daylesford which over 50 people attended. The concept of a small community owned wind park of 1 or 2 modern wind turbines was presented to the Forum. It was explained that the concept is based on many successful examples overseas. Two modern wind turbines would produce enough power for over 2,000 homes – enough for nearly all of Daylesford and Hepburn Springs. Being community owned the returns remain in the local district.

The feedback from the meeting showed that 95% of attendees were in favour of the idea. It also showed that the majority of attendees wanted to make sure the issues surrounding wind turbines are fully investigated and that community consultation should continue throughout the process. The Hepburn Renewable Energy Association is committed to continuing consultation to achieve the best possible result for the community.

The Association has been receiving assistance from Future Energy Pty Ltd, a company which specialises in setting up community wind parks. After extensive investigation of sites in the area, Leonards Hill proved to be the best option for the type of community owned wind park being planned. The Association then immediately began contacting the closest neighbours to meet with them personally and ensure they were the first to be fully informed of the proposal. Unfortunately not all neighbours have had the time to meet with us. If we have not personally visited you please contact us.

The Leonards Hill Residents Meeting

A meeting was held for the residents in the immediate area to Leonards Hill to discuss the details of the proposal. There were many important questions raised during the meeting and during the past weeks. These are collated and answered in this newsletter so that all residents are kept up to date.

People at the meeting were also invited to tour the Challicum Hills Wind Farm, to see and hear wind turbines in action.

The Wind Farm TOUR

Most people at the meeting had never had the chance to see a modern wind turbine up close. Therefore we decided to organise a Tour of the Challicum Hills Wind Farm near Ararat for any interested residents.

The Tour will leave from Leonards Hall at 10:00 am on Sunday 11th December 2005. There is no charge.

Please contact Per Bernard on 5348 1298 or imagine@netconnect.com.au to reserve your place.

The Planning Process

In terms of the project planning, work is only just beginning. Apart from initial site investigations, and the Community Forum held in Daylesford, the current consultation is the first major work on the project and will help guide a preliminary layout for the wind farm. The Association is keen to make sure that the community is involved in all aspects of the project.

The community input together with the technical studies will determine the feasibility of the project and the layout of the turbines. If the project is feasible then a planning application will be lodged with the Hepburn Shire Council. After an application is lodged, it would be advertised and there will be a period for people to make comment on the development application.

The Application will be assessed in accordance with the Victorian Government's 'Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria'. This document can be accessed at www.seav.sustainability.vic.gov.au. A copy of the flowchart from this policy is at the end of this Newsletter.

Your ongoing feedback is needed

The Association is grateful for the time and comments people have provided on the project to date. If you have anything to add or any comments on the notes in this newsletter, please contact:

Per Bernard Phone: 5348 1298 or Email: imagine@netconnect.com.au

Questions answered

All the questions asked at the meeting or during other conversations have been listed here and answered as well as possible at this stage of the planning.

How many wind turbines are being proposed?

The proposal is for two turbines.

Will there be more in the future?

No. Due to the separation required between turbines and the constraints of the existing power lines, the site can only accommodate two turbines.

How high are the towers and blades as proposed?

The planning application must state the maximum size of the towers and blades. No decision has been taken regarding the application however current planning applications in various locations in Victoria state tower heights of between 60 and 80 metres and blade lengths of up to 40 metres.

Is the proposed site pinpointed yet?

The actual locations of the turbines cannot be exactly pinpointed at this early stage. However, they would not be on the very top of the hill. They would be placed further towards the back (south) of the hill.

How far underground do the concrete foundations go?

The foundations will vary depending upon the turbine and the local geotechnical conditions. However most concrete foundations are approximately 2.5 m deep. In addition rock anchors may be attached to rock 15 meters below ground.

A map with visibility shaded areas would be good for locals

The Association will endeavour to have such a map completed. Additionally we will be calling on people nearby the site to demonstrate the level of visibility from specific properties.

There may be Wedge Tailed Eagle nests on the hill

Under the Victorian Guidelines any impact on local fauna must be considered. International experience shows that the level of bird mortality associated with modern wind turbines is not significant. Nevertheless, the likelihood of any risk to protected bird species needs to be carefully assessed as part of the planning process.

How noisy are wind turbines anyway?

Modern wind turbines are amazingly quiet. People who actually visit modern wind turbines are invariably surprised to find that the noise output is so low as to be not significant.

The Victorian Policy states that the noise limit is 40dba or 5dba above background noise levels, whichever is the higher. The Association must comply with these standards in the design and development of a wind farm. In a rural environment, even without a wind farm, ambient noise levels can vary from 20dBA (very quiet) when there is no wind noise, up to 60dBA, typically when it is a very windy day. It is therefore not possible to define acceptable levels when referring to noise in a windy setting. That is why the NZ standard sets limits that vary as wind speed rises.

It should be noted that when the wind speeds are less than 3.5m/s, the turbines do not produce power and therefore no noise (unlike other noise sources typical of industry). On completely windless days, therefore, the tranquillity that is part of a windless day is retained. If the background is say 25dBA, which is very low, it will remain so.

As wind speed rises, people would be surprised to find that normal wind noise in vegetation and building structures can be quite significant (up to 60dBA). Usually, the noise from turbines is completely masked by the wind noise in the environment. When, for a particular reason, it is windy up at the turbine but not so at ground level, the limit set by the standard is lower than for areas where background noise due to wind is high. Sometimes the turbines are audible, particularly when the wind blows from a turbine to a resident, and that resident is experiencing low wind levels. When this happens, the standard protects the resident from sleep disturbance inside a house with an open window.

Industrialisation of the landscape is an issue

We believe each individual will have a personal opinion on the appearance of wind turbines.

The article in the Advocate was misleading claiming 90% of Daylesford are in support of a wind project.

The Daylesford Advocate misreported the Press Release which clearly stated that 95% of the people at the Forum were in favour of 1 or 2 community owned wind turbines. The Ballarat Courier correctly reported it.

If most locals oppose the proposal will the proposal proceed to planning stage?

At this stage the decision to lodge a planning application has not been made. The Association is very keen to speak with everyone in the local area to ensure each person has the opportunity to gain a full understanding of the proposal as well as greater knowledge of modern wind turbines and their potential effects on surrounding residents. We appreciate the effort residents have made up to this point.

What is a reasonable distance from the project to assess people's attitude?

The issue of how close residents need to live to have an input created quite a bit of discussion. Ultimately, the Council will make their own decision regarding who can make submissions about a planning application. At this stage the Association has decided to send this Newsletter to all residents within a radius of approximately 3 kms from the site. Unfortunately, the Council has been unable to supply details of residents in that area so this Newsletter has been delivered by letter-box drop. If you were missed and have been handed this Newsletter by another person, please let us know so we ensure you receive information in the future.

Misleading dialogue in local discussion by Per and David implying that some locals support the project.

Per and David apologise if anyone has felt their comments were misleading. Their intention was not to mislead in any way. Initial discussions with some local people indicated they were quite comfortable with the concept.

Does land tax go up?

Any increase in rates and taxes will be paid for by the Wind Park.

What impact comes from blade glint?

Modern wind turbines are specially painted to reduce blade glint to extremely low levels. Therefore this is not considered to be a significant problem with modern wind farms. Nevertheless the planning application must assess any effect.

Is there any electro magnetic radiation produced and what will this do to cows?

The wind turbines are connected to each other and then to the existing local grid lines by a 22 kV line. This is the same as the existing local grid lines on and around Leonard's Hill. Cows happily co-exist with wind turbines all over the world. The towers are not fenced and completely safe - animals can graze right up next to the turbine without any problems.

Will turbines affect land value for future sale?

The most comprehensive international research available has found that wind turbines have no effect on land values. Experience in Australia to date is fairly limited however evidence suggests there is no effect on values.

An in-depth, government-funded study completed in the USA in 2003 shows that a view of a wind farm does

not decrease, but may actually increase the value of a property. The only Australian study is an informal one on the Esperance wind farm at Salmon Beach, a premier Western Australia residential area. The residential area was built after the wind farm but still showed a strong trend of increasing house prices throughout the estate over the ensuing years. In fact, local residents complained about a proposal to decommission the wind farm at the end of its design life.

In June 2003 an article in the Portland Observer attributes an improvement in the interest in land in western Victoria to the Portland Wind Energy Project. More recently it can also be seen that Real Estate Agents are using wind farms as a selling point in their property descriptions. A leading Real Estate Agent in Ararat had a description of a property on their web site and used views of Ararat's Chalicum Hills wind farm as a selling feature (Spalding McCutcheon Real Estate Web Site, 2004).

The development of a wind farm does not change the zoning of the area, as the use of the land for farming will continue uninterrupted.

Do rock anchors affect water streams underground?

We cannot find any evidence of this throughout the world. Full geotechnical engineering assessments are performed prior to construction of a wind turbine.

What direction does power flow from the turbines into the grid and why?

Generally, the power from the turbines flows to where it is being used. If the demand from users is in one direction then the power produced by the turbines will flow in that direction. In the case of this proposal, the energy demand from Daylesford and the surrounding area will mean that the power will flow to Daylesford in nearly all circumstances.

How much money will the turbines cost and who will fund them?

The approximate cost of a turbine is \$3.5 m. As much of this as possible will be funded from the local areas. Overseas experience has shown that people are very proud to own a part of a local wind park. Funds raised have exceeded all expectations. The Co-operative structure being adopted for this project will ensure that even if not all the funds are raised locally control will still remain in local hands.

Recent studies are showing that wind is not the answer for the future so why go into it now?

The overwhelming evidence around the world does not show this. Governments all over the world see wind energy as one part of the solution to supplying our energy and reducing greenhouse gases and climate change. These governments are increasingly setting higher and higher targets for more wind energy.

No coal fired or conventional technology power stations have been closed due to wind turbines so why will it help?

World demand for energy has been increasing steadily and it is believed it will continue to do so. Across the world, the installation of wind energy has certainly resulted in fewer new coal fired power stations being built.

What's in it for ME?

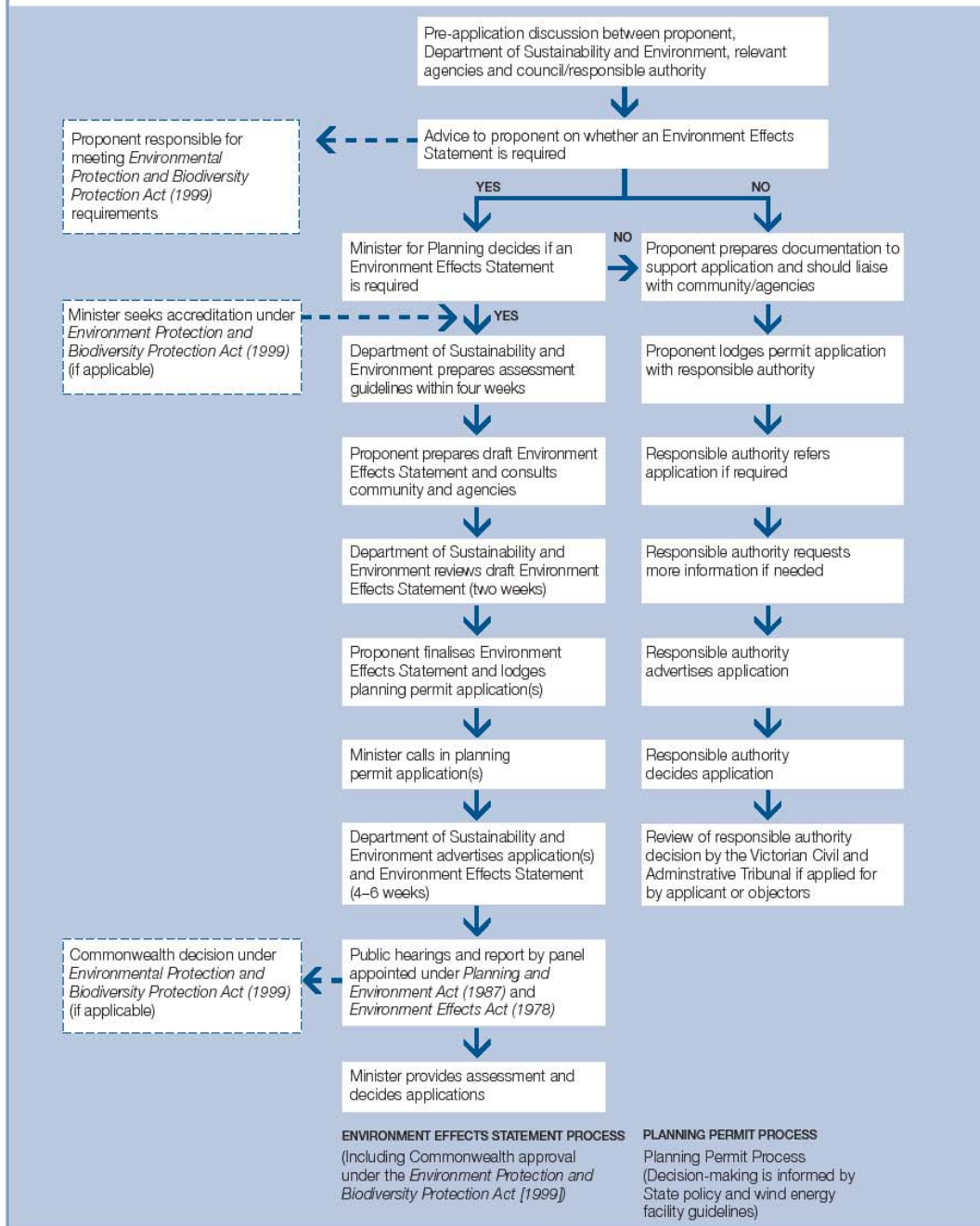
The Association believes the community as a whole will benefit by taking an active responsibility for its own energy needs and making a real contribution to protecting us from climate change. Additionally the Association proposes to establish a Community Fund which will receive funds annually from the wind park. These funds will be managed and allocated for spending by the local community.

Attachment A



18

THE ASSESSMENT PROCESS FLOWCHART FOR A WIND ENERGY FACILITY:



Source: The Victorian Government's 'Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria'

The full document can be downloaded at <http://www.seav.sustainability.vic.gov.au> , or contact **Information Victoria** on 1300 366 356 or the **Planning Information Centre** 9655 8830.



NEWS ON THE WIND

April 2006

Association continues to grow

Thanks to everyone who came to our first Association picnic. It was a good day with lots of open discussion about the project.

Thanks to you, The Association now has over **180 members!** Welcome to all members, old and new. Our high membership shows the outstanding support for a community owned wind park in our area. This membership will be an important consideration for Council when we apply for planning permission. As always we need more members so spread the word. An application form is attached to this Newsletter so **sign up a friend!**



HREA Information Stand at Glenfest

Community Wind

The project is progressing well. There are many technical studies which need to be completed before we can apply to Council for a permit. These studies are being co-ordinated by our project partner, Future Energy Pty Ltd. So far, the results of the studies have been better than expected. The Association and Future Energy are meeting with Council to discuss all the details of the Planning Application which we hope to lodge formally during this financial year.

A full update will be given at the Annual General Meeting.

First Annual General Meeting

With our membership growing so well, the Committee has decided The Association should hold its first Annual General Meeting. We think its a great time for all members to get a detailed update on our progress and for new people to join the Committee for the next exciting stage.

The Agenda will cover:

- ☐ Update on progress and timetable.
- ☐ Nomination and Election of Committee positions.
- ☐ Establishing the Co-operative.

The AGM will be at

7:00 pm
27th April 2006
Senior Citizens Hall

Website launch

Lots of members have suggested we need a website. Well, it's nearly here! We will start with a fairly simple site and add to it as we get your feedback. If you have any suggestions please let us know. Of course a good website needs a webmaster to maintain it. If you can be that webmaster please let us know. It would be a terrific help to the Association. We will email you with the site details soon.

Tour a Wind Farm

At the picnic quite a few people put their hand up to go on a bus tour of a working wind farm. This will be a great chance to learn more about wind energy. We'll be able to walk right up to a wind turbine which is an amazing experience. A tour has been organised for

Sunday 9th April 2006

The bus will leave from the **Neighbourhood Centre in Camp Street at 10:00 am** and be back by 1:30 pm.

Please invite family and friends. The tour is free for members with a voluntary donation for non-members. There is limited room so **PLEASE RESERVE YOUR SPOT** as soon as possible (details below).

Contact

Per Bernard
President

Tel: 5348 1298

Email: imagine@netconnect.com.au



NEWS ON THE WIND

July 2006

From The President

Thanks to you, The Association will reach **300** members soon. Thank you for letting HREA express the **concern** our community has for global warming, and our **vision** that, together, our community can **make a real difference**. Together we aim to create a positive model for the rest of Victoria to follow.

Our concern for the Earth and global warming, including noticeable changes to weather patterns is stimulated in different ways - through scientific research, media reports, government policy or discussion with friends. In response we form an ethical opinion. And it's here that the communities of Daylesford, Hepburn and surrounding areas, are making a big difference.

The Hepburn Community Wind Park will produce the equivalent energy of nearly 2,500 households and will enable our communities to take responsibility for reducing our greenhouse emissions.

This is a unique response in Australia. As we go through the process, we are constantly reminded of how unique our vision is and have been met with a great deal of excitement and support from residents and bureaucrats.

So far we haven't tried to spread the good news further afield. But news of our project is slowly spreading and neighbouring communities have been inspired and are approaching us to share the model with them.

An important part of our vision is to share ideas to encourage renewable energy and also reduce energy use. In each newsletter we will discuss ideas that you might like to act on. In this Newsletter we discuss a simple way each one of us can support renewable energy (please read the section on Encouraging Renewable Energy on the last page).

Thanks to all our members for their support and to those who have been able to give some of their time. As a community we are creating something truly awesome.

Per Bernard

Website Launch – We Have Lift-off !

The Association Website was publicly launched with a recent article in The Advocate. You will find our new website at:

www.hrea.org.au

It will be kept updated so that you will be able to find any information you are looking for, such as upcoming wind farm tours etc.

Association Forges Ahead



Thanks to you our membership now totals 282. With our expanded Committee of 10 people we have organised ourselves into three sub-committees comprising Communications, Project and Corporate.

These sub-committees allow us to assist our Project Partner, Future Energy Pty Ltd as it continues preparing the Planning Application to go to the Hepburn Shire Council (see Project Update on the next page).

Next Wind Farm Tour

Sunday 16th July, 2006

Members & non-members welcome.
(See last page for details)



Project Update

Our Project Partner, Future Energy Pty Ltd is continuing with the development of the Hepburn Community Wind Park. At present this involves the preparation of the permit application to be submitted to the Hepburn Shire Council.

The application must be accompanied by a wide range of expert reports to ensure it satisfies with the Shire's planning requirements, State guidelines as well as other State and Federal legislation.

To date, Future Energy has commissioned a number of reports and assessments for the final permit application. These include:

Flora – the local office of the Department of Sustainability and Environment have assessed the Leonards Hill site and are satisfied there will be negligible impact on flora.

Fauna – a full report was commissioned from Ballarat University to assess any impact on birds, bats and general fauna. The detailed report concluded that any impact on local fauna will be low or not significant.

Archaeological and Heritage – An initial assessment has been completed which shows there are no known significant cultural heritage or archaeological sites on Leonards Hill. Future Energy will now consult with local community representatives and local indigenous groups for further information.



Electrical grid connection – a leading electrical engineering consultant has completed the feasibility study. It demonstrates that the local lines around Leonards Hill are ideal for connecting a small wind farm such as this. The local distributor, Powercor, has agreed that the connection should pose few problems.

Geotechnical – the initial report concludes the geological conditions of Leonards Hill should not pose any problems for the construction of two wind turbines.

Visual – a study of the visual impact of the two wind turbines is being prepared. This will include an assessment of the visibility of the wind park from various locations as well as photo simulations.

Noise – an initial assessment has been completed which demonstrates the wind park will be within the standard required. A complete acoustic engineering assessment is being prepared.

Get Involved !



We are attempting to provide you with information via these newsletters on a more regular basis.

However we have only a small group of people doing a large amount of work. We have a great Committee but we can use all the help we can get. So if you have some time to lend a hand with any of the areas listed below, please contact us:

- ☐ Street Stalls
- ☐ Newsletter
- ☐ Organising Functions
- ☐ Organising Bus Tours
- ☐ Website Maintenance

Your details

So that we can make sure you receive all the latest information, please advise us of any change in your contact details.



Encouraging Renewable Energy

Until we have completely made the switch to using only renewable energy, i.e. no more fossil fuel power plants, we must be vigilant.

We can all take action today to make a difference. A simple step to support renewable energy industry is to purchase **green power** from your retailer.

Most electricity retailers now offer customers the choice of buying green power. When you select to buy green power, your retailer must purchase the equivalent amount of energy from renewable sources.

Most retailers also offer customers the choice of how much of their energy will be renewable – from 10% up to 100%. Some retailers even allow you to choose the “mix” of renewable energy types – hydro, wind, solar or a combination.

The cost of buying green power depends on the percentage you select and will vary between retailers. Some retailers offer 10% green power at no extra cost. The cost of buying 100% Green Power can cost around an extra \$5 per week.

As with most things we purchase the devil is often in the detail. Some companies advertise the sale of green power however their energy is sourced from old hydro plants and does very little to encourage new renewable energy. For this reason the **Green Power™** accreditation system has been established.

Green Power™ accreditation means you can be sure the energy you are buying will be sourced from new renewable energy projects, thereby increasing the uptake of renewable energy in Australia.

More information about Green Power™ can be found at: <http://www.greenpower.gov.au>

Purchasing green power is one way you can encourage renewable energy. **It's easy to do.** Just telephone your retailer or visit their website.

In upcoming newsletters we will share ideas on reducing your personal energy use. If you would like to contribute to this section please contact us.

Government Policy

The State Government has a policy which it took to the last election of increasing Victoria's **Renewable Energy Target to 10% by the year 2010**. It is currently at about 4%.

The Government is reviewing their VRET policy and is considering watering it down to 10% by **2016**.

It is important that the Government understands how much support there is in the community for taking real action on Climate Change.

Please let them know you support there original policy of 10% by 2010 by writing to the Premier, senior Ministers or your local member.

Or you can easily send a prepared letter via the Environment Victoria website at

<http://www.envict.org.au/getactive.php?c=5>

**YOUR ACTION NOW
WILL MAKE A DIFFERENCE!**

Next Wind Farm Tour



Due to popular request, we are running another Wind Farm tour to the Challicum Hills Wind Farm. Details are:

Sunday 16th July, 2006

Coach leaves **Daylesford Neighbourhood House in Camp St at 10am** and returns to Daylesford at 3pm.

BYO Lunch, afternoon tea will be provided.

For Bookings Contact

Per Bernard
President

Tel: 5348 1298

Email: imagine@netconnect.com.au



SPECIAL ANNOUNCEMENT

10th August 2006

State Government Supports Community Wind Park

Yesterday we received fantastic news – the State Government has approved a grant of nearly \$1 million to support the Hepburn Community Wind Park!

Congratulations to you !

This is a really important milestone and is a great boost for the project. A lot of hard work has been put in by everyone and particular thanks goes to Future Energy who has worked for 18 months pursuing this grant.

However most importantly, we thank each of you for joining HREA, giving your support and believing in the vision.

Our role is to help the community determine and study whether it wants a community owned wind park in its back yard. This news is amazing but we must remember it is only one step in the process. We must lodge a planning application to Council soon and allow the community and Council to decide. Therefore, your continued support is very important and much appreciated.

We believe this project is vital to taking responsibility for our own energy needs and reducing our greenhouse footprint. As you know, we believe it is one step amongst many that we will need to take. We see this project as a great way to help us with other initiatives, in particular, encouraging the reduction of energy use throughout our community.

We were very keen to share this good news with our members first. We will announce the news to the wider community in the Daylesford Advocate next week.

The actual grant of \$975,000 will be made available through the Renewable Energy Support Fund which is managed by Sustainability Victoria. It is to help with the development of the project, the establishment of the Co-operative, the fund raising and, finally, the construction of the Wind Park. Of course there is a lot of work to be done by us and Future Energy to reach the required milestones for the grant to be paid.

We will continue to work hard on the project and keep you informed of our progress.

Congratulations

Per Bernard
President



ROTARY CLUB OF DAYLESFORD

2006 - 2007 President: **Bronwen Scarffe** Secretary: **Kim Shields**

August 9th.

Hepburn Shire Council
76 Vincent Street
Daylesford VIC 3460

Dear Mayor and Councilors

We write to you in relation to the Hepburn Community Wind Park and to express our support for this outstanding community initiative.

It is now clearly evident that Climate Change is the most serious challenge faced by world communities. Climate change threatens our way of life and that of future generations. We believe all communities need to take responsibility for their energy use both now and into the future.

The ultimate solution to Climate Change will involve a combination of actions all working together to reduce our greenhouse emissions. Foremost among these solutions will be to increase our use of renewable energy

Equally the drive to increase our energy efficiency and to use less energy in our daily lives, both at home and work, will be cornerstones to our success in meeting this challenge.

We therefore commend to you the Hepburn Renewable Energy Association's vision of developing renewable energy for our community whilst at the same time supporting reductions in energy usage.

We believe the Hepburn Community Wind Park will become an icon of the Hepburn Shire for both residents and visitors to our area. It will be a symbol of the environmental credentials and concerns of our community.

We support the principles of the Hepburn Community Wind Park and hope that the Hepburn Shire Council decide to lend your support to this excellent community initiative.

Yours sincerely
President Bronwen Scarffe
On behalf of the Board and members.

Weekly Meeting: Wednesday 6.30 pm. for 7.00 pm. Daylesford Bowling Club
Chartered 1953 Incorporated. District 9800, Rotary International, Victoria, Australia
PO Box 23 Daylesford 3460 Email daylesford@rotaryd9800.org Home Page www.rotaryd9800.org/daylesford



26 October 2006

Hepburn Shire Council
76 Vincent Street
Daylesford Vic 3460

Re. Hepburn Community Wind Park

I write to confirm Sustainability Victoria's support for the Hepburn Community Wind Park proposal at Leonard's Hill.

Future Energy Pty Ltd and the Hepburn Renewable Energy Association successfully applied to Sustainability Victoria for financial support of \$975,000 toward this project from the State Government's Renewable Energy Support Fund.

Sustainability Victoria believes that the Hepburn Community Wind Park would establish the first community-owned wind facility in Victoria and supports the projects because it will provide a powerful demonstration of a community taking practical action to reduce greenhouse gas emissions through investing in a local renewable energy generator.

The potential benefits of community ownership of renewable energy projects such as the Hepburn Community Wind Park are:

- > increased community involvement with renewable energy development;
- > financial benefits available to local community investors; not just landowners and developers;
- > greater acceptance by rural communities of wind or other renewable power generation in their area.

As part of our evaluation of the funding submission, Sustainability Victoria conducted thorough due diligence and risk assessments covering the proponent and the project's technical and financial performance.

Sustainability Victoria confirmed that the Hepburn Community Wind Park would:

- > based on current cost estimates be financially viable and provided a real return to community investors;
- > produce renewable energy of about 14,000 MWh per year, which is sufficient for about 2000 homes;
- > reduce greenhouse gas emissions by between 13,500 tonnes and 15,100 tonnes per year;

Sustainability Victoria has been impressed by the open and professional approach of Future Energy and the Hepburn Renewable Energy Association and the strength of their co-operative working relationship

On the basis that the project proceeds, Sustainability Victoria will seek to promote the project with media releases, case studies and other events that would highlight the Hepburn and Daylesford community.

Yours sincerely,



John Edgoose

Senior Project Manager – Renewable Energy

Direct 8626 8730

Fax 9663 1007

Email john.edgoose@sustainability.vic.gov.au

CC David Shapero, Future Energy