

**MOORABOOL WIND ENERGY FACILITY  
PERMIT APPLICATION 2009012877**

**PANEL REPORT**

**SEPTEMBER 2010**

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PERMIT APPLICATION 2009012877**

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**Chris Banon, Chair**

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**Helen Martin, Member**

A handwritten signature in black ink, appearing to read "Colin Burns". The signature is cursive and somewhat stylized.

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**Colin Burns, Member**

**SEPTEMBER 2010**

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## List of Abbreviations Used

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ACMA	Australian Communication & Media Authority
AusWEA	Australian Wind Energy Association
AVW	Atlas of Victoria Wildlife
dB(A)	Decibels, A weighting
BL&A	Brett Lane Associates Pty Ltd
BOCA	Bird Observation & Conservation Australia
CASA	Civil Aviation Safety Authority
CHMP	Cultural Heritage Management Plan
DDO2	Design & Development Overlay Schedule 2
DNIRV	Draft Guideline for Noise from Industry in Regional Victoria
DPCD	Department of Planning and Community Development
DSE	Department of Sustainability and Environment
DH	Department of Health
EES	Environment Effects Statement
EMI	Electromagnetic Interference
EMP	Environmental Management Plan
ENM	Environmental Noise Model
EPA	Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation
ESO1	Environmental Significance Overlay Schedule 1
EVC	Ecological Vegetation Community
FFG	Flora and Fauna Guarantee
FZ	Farming Zone
GHP	Garrad Hassan Pacific Pty Ltd
ha	Hectare
HO	Heritage Overlay
HTC	Hydro Tasmania Consulting
km	Kilometre



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kV	Kilovolt
LPPF	Local Planning Policy Framework
Leq	Equivalent sound level (average)
L90	Sound level equalled or exceeded for 90% of the time
L95	Sound level equalled or exceeded for 95% of the time
NHMRC	National Health & Medical Research Council
MDA	Marshall Day Acoustics
MRET	Mandatory Renewable Energy Target
MSS	Municipal Strategic Statement
Mw	Megawatt
N3/89	Interim Guidelines for the Control of Noise from Industry in Country Victoria N3/89
NZ6801:1991	New Zealand Standard NZS6801:1991, <i>Acoustics – Measurement of Sound.</i>
NZ6801:2008	New Zealand Standard NZS6808:2008. <i>Acoustics – Measurement of Environment Sound.</i>
NZ6808:1998	New Zealand Standard NZS6808:1998, <i>Acoustics – The Assessment and Measurement of Sound from Wind Turbine Generators</i>
NZ6808:2010	New Zealand Standard NZS6808:2010, <i>Acoustics – Wind Farm Noise.</i>
OHS	Occupation Health and Safety
PAR	The Planning Application Report in support of the WEF (Application 2009012877)
PDA	Pre-development Assessment
PDCA	Pre-development Cumulative Assessment
RAP	Registered Aboriginal Party
RDZ1	Road Zone Category 1
SBE	Stephen Brown Environments Ltd
SEPP	State Environment Protection Policy
SEPP N1	State Environment Protection Policy (Control of Noise for Commerce Industry and Trade) No N1
SPPF	State Planning Policy Framework
SV	Sustainability Victoria

The Planning Scheme	Moorabool Planning Scheme
VCAT	Victorian Civil and Administrative Tribunal
VHR	Victorian Heritage Register
vpd	Vehicles per day
WEF	Wind Energy Facility
WEF Guidelines	Policy and Policy Guidelines for Development of Wind Energy Facilities in Victoria (revised September 2009)
WTG	Wind Turbine Generator

# 1. Summary

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We have recommended that a permit should be granted for the Moorabool WEF. In arriving at this position we have balanced competing demands in favour of net community benefit. In essence the competing demands are:

- to harness a significant source of renewable energy; and
- to protect the amenity of those effected by the WEF.

We are aware of the State Government policy objectives for the development of renewable energy and the various standards designed to provide an acceptable standard of amenity. These have both been factored into our recommendations.

In arriving at our decision we have identified the following key issues:

- greenhouse pollution abatement;
- landscape and visual impacts;
- noise impacts; and
- flora and fauna.

We have also considered other issues under the following headings:

- Safety and health;
- Traffic and management;
- Cultural heritage;
- Electro magnetic interference;
- Social impacts;
- Financial impacts;
- Other matters.

Consideration of these issues have led to specific conclusions and recommended permit conditions and the most important of these are set out below.

## **Abatement of Greenhouse Gas Pollution**

As required by Government planning policy our assessment gives considerable weight to the contribution the proposed WEF would make to increasing the supply of electricity from renewable resources and thereby reducing greenhouse gas pollution.

We accept that the Moorabool WEF would contribute significantly to renewable energy supply in Victoria and that this would result in an annual CO<sub>2</sub> equivalent abatement of approximately 700,000 tonnes.

### **Landscape and Visual Impacts**

In order to reduce impact on the most severely affected properties we have recommended the removal of three turbines BAWT04, BAWT49 and BUWT07. These recommendations were supported by the evidence of Mr S Brown, WestWind's expert on visual and landscape issues. These turbines have been selected for removal on the basis of their removal making a significant reduction in visual impact at individual properties. In circumstances where removal of individual turbines would not result in a significant reduction in impact we have not recommended any reduction in turbine numbers.

We have also endorsed the proposal to provide an opportunity for landscaping at all non-host dwellings within 3km of the WEF to be provided by the Proponent. In two cases we have also recommended landscaping requirements on host properties to reduce visual impact on specific neighbouring properties. Finally with reference to aviation night lighting we have recommended that it can be installed but not operated unless specifically required by CASA or for other identified safety reasons.

### **Noise Impacts**

We have concluded that the noise limits should be set in accordance with the New Zealand Standard NZ 6808:1998.

We recommend that:

- a new assessment that predicts compliance with NZ 6808:1998 be completed prior to the start of the development; and
- new background noise measurements be carried out at all locations where the predicted WEF sound level is 40 dB(A) or greater.

The above two requirements are to apply to cumulative impact in the event that a permit is granted for the Yaloak South WEF.

Provisions are to be made for noise assessments to be subject to an audit by an acoustics expert.

There is a raft of recommended technical permit conditions. The main thrust of these conditions is set above.

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We have also recommended the development of a State Environment Protection Policy on noise from WEFs in Victoria and that Victorian Planning Schemes be amended to ensure direct involvement of the EPA in the assessment of WEFs.

### **Flora and Fauna**

The main issue in this section is the potential impact on Wedge-tailed Eagles. We have concluded that the predicted impact on this species is acceptable.

We have also concluded that impacts on other fauna species are not significant.

With regard to removal of native vegetation we are satisfied that the provisions of the Native Vegetation Framework have been satisfied.

We recommend that the approval of the Minister for Environment and Climate Change be obtained for the removal of vegetation of 'very high' conservation significance prior to the issue of any planning permit.

### **Safety and Health**

We note in particular the public concern regarding the claims of health impacts associated with WEFs. We have concluded that on the evidence provided there is no justification for refusal of the proposal on health grounds. We do however recommend that the Victorian Government considers commissioning independent research into this issue.

### **Other Matters**

The report addresses all other issues raised. We have concluded that all other matters raised can be adequately addressed by permit conditions and we have recommended such conditions where they are appropriate or required in our view.

## 2. Overview

<b>The Permit Application:</b>	Application 2009012877  Wind Energy Facility (WEF), associated aviation safety lighting, substations, access tracks, underground cabling, building and works, removal of native vegetation, two business identification signs and alterations to an access point to a road zone category 1.
<b>The Project:</b>	The proposed WEF is in two parts separated by approximately 2.5 kilometres known as the Bungeeltap section to the north and the Ballark section to the south. The proposed WEF comprised a total of 110 turbines – 51 in the northern section and 59 in the southern section.
<b>Proponent:</b>	WestWind Energy Pty Ltd.
<b>Responsible Authority:</b>	Permit Application: Minister for Planning.  Enforcement: Shire of Moorabool.
<b>Panel Members:</b>	A Panel with the following members was appointed under Sections 97E, 153 and 155 of the <i>Planning and Environment Act 1987</i> to consider submissions and make recommendations to the Minister about the Moorabool WEF:  <ul style="list-style-type: none"> <li>- Chris Banon – chair</li> <li>- Helen Martin – member</li> <li>- Colin Burns – member</li> </ul>
<b>Panel Hearings:</b>	The Hearings were held at Ballarat in the Neighbourhood Cable Conference Centre, University of Ballarat Technology Park.  <ul style="list-style-type: none"> <li>- Directions Hearing – 5 May 2010.</li> <li>- Main Hearing – 31 May, 1-2 June, 7 June, 9-10 June &amp; 15-17 June 2010.</li> </ul>
<b>Site Inspections:</b>	Accompanied site inspections were conducted on 8 and 10 June 2010.  The Panel Members also viewed the sites and surrounding areas unaccompanied on a number of occasions.

<b>Appearances:</b>	<p><b>Department of Planning and Community Development</b> represented by Ms Mary Vanselow.</p> <p><b>WestWind Energy</b> represented by Ms Michelle Quigley SC who called the following evidence:</p> <ul style="list-style-type: none"> <li>- Mr C Delaire of Marshall Day Acoustics – noise.</li> <li>- Mr S Brown of Stephen Brown Environments – landscape &amp; visual.</li> <li>- Mr B Lane of Brett Lane &amp; Associates – flora and fauna.</li> </ul> <p><b>Moorabool Shire Council</b> represented by Ms A Reynolds who called the following evidence:</p> <ul style="list-style-type: none"> <li>- Mr A McMahon – Ecology Australia – Wedge-tailed Eagle.</li> </ul> <p><b>E, S &amp; L Olsen</b> who called the following evidence:</p> <ul style="list-style-type: none"> <li>- Mr W Huson of L Huson &amp; Associates Pty Ltd – noise.</li> </ul> <p><b>Mr &amp; Mrs J Wills</b> represented by Mr T Jacka of Jacka Lawyers who called the following evidence:</p> <ul style="list-style-type: none"> <li>- Mr W Huson of L Huson &amp; Associates Pty Ltd – noise.</li> <li>- Dr R Thorne of Noise Measurement Services – noise.</li> </ul> <p><b>Mr K Ramholdt</b></p> <p><b>Mr C Kirk</b></p> <p><b>Ms B Wehl</b></p> <p><b>Ms S Giddins</b> assisted by Donald Thomas, Noel Dean, Maggie Reid &amp; Robyn Brew</p> <p><b>Ms D Kirk</b></p> <p><b>Ms P Wallis</b></p> <p><b>Mr L Giddins</b></p> <p><b>Ms R De la Cruz</b></p> <p><b>S &amp; J Dean</b></p> <p><b>Mr R Sullivan</b></p> <p><b>S &amp; M O'Brien</b></p>
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	<p><b>Mr J Skidmore</b></p> <p><b>Ms B Leith</b></p> <p><b>Mr M Conlan</b></p> <p><b>Mr J Molesworth</b></p> <p><b>Mr G Wells</b></p> <p><b>Mr &amp; Mrs F Kearns</b></p> <p><b>Mr J Ranken</b></p>
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## **2.1 The Issues**

After considering the provisions of the Moorabool Planning Scheme, the Planning Application Report (PAR), the expert evidence, the submissions and all the material provided, we identified the following key issues:

- Greenhouse Pollution Abatement;
- Landscape and Visual Impacts;
- Noise Impacts; and
- Flora and Fauna;

In addition the following issues were also identified:

- Safety and Health;
- Traffic Management;
- Cultural Heritage;
- Shadow Flicker;
- Electromagnetic Interference;
- Social Impact;
- Financial Impact on individuals; and
- Other Matters.



## 2.2 What is Proposed?

The Planning Application Report (PAR) describes the site, its surrounds and the proposed development. Figure 1 below shows the locality of both sections of the proposed WEF.

The WEF site comprises two sections:

- the Bungeeltap section to the north is 5km south of Ballan and approximately 3kms west of the Geelong Ballan Road. It straddles the Moorabool River and it contains 51 turbines; and
- the Ballark section to the south is approximately 3kms further south and it lies between the Moorabool River and the Geelong Ballan Road. It contains 59 turbines.

The total area of land occupied by both sections is 5600 hectares which is mainly used for grazing with some cropping. The freehold land is owned by 16 different families and there are also various minor parcels of Crown land and land owned by statutory authorities.

A significant amount of adjoining land is used for timber production. Section 1.2.1 of the PAR describes this as follows:

*A significant amount of land adjoining the project site is used for timber production.*

*In the vicinity of the Bungeeltap Section, blue gum plantations are located at the end of MacDonalds Lane and to the west of Little Forest Road. The Bungal Plantation immediately adjoins the Bungeeltap Section's southern boundary.*

*Plantations are also located north and south of the Ballark Section, with a blue gum plantation located between Hamills Lane and Smith's Lane. A large area between the Ballark Section and the locality of Morrisons has been established as a pine plantation.*

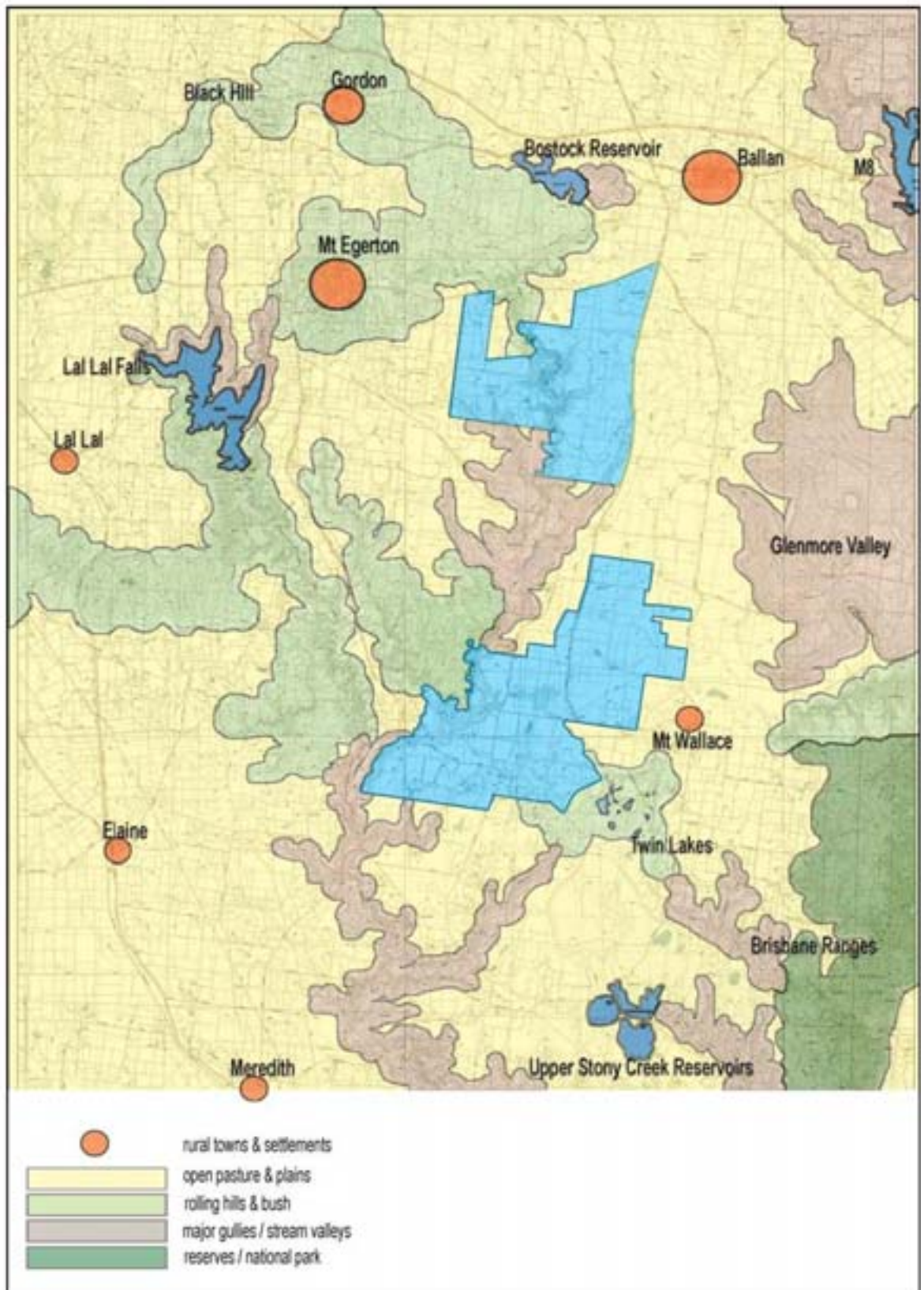
Both sites are close to State Forest as set out in Section 1.2.1 of the PAR:

### NATIONAL PARKS STATE FORESTS AND RESERVES

*The Whipstick Scrub, part of the Bungal State Forest is located to the north of the Bungeeltap Section. The Little Forest, also part of the Bungal State Forest immediately adjoins the north west corner of the Ballark Section.*

*The Lal Lal State Forest is located to the west of the southern part of the Ballark Section.*

*The Brisbane Ranges National Park is located south east of the southern part of the Ballark Section.*



**Figure 1 Landscape Character Types**  
 Extracted from PAR attachment 6 Page 10

Section 1.2.1 of the PAR also provides the following details of dwellings and settlements:

*There are 17 dwellings located on the subject site.*

*There is only one host landholder's dwelling within 500m of a proposed wind turbine. There are 29 dwellings situated between 500 and 1000 metres of any proposed wind turbine. 16 of these are host landholder dwellings.*

*There are 31 dwellings situated between 1000 and 1500 metres of any proposed wind turbine. 30 of these are neighbouring dwellings.*

*There are 90 dwellings situated between 1500 and 3000 metres of any proposed wind turbine. 89 of these are neighbouring dwellings. Refer to Figure 24 (Figure 2 in this report).*

*Key settlements to the north of the proposal include Ballan, 4.6km from the closest wind turbine and Gordon, 7.4km from the nearest wind turbine.*

*The small township of Mt Egerton is located approximately 3.9km to the west of the proposal.*

*South and east of the Ballark Section lies Mt Wallace. A number of dwellings are located along the Mt Wallace Ballark Road and the Geelong Ballan Road.*

*All dwellings in the vicinity of the proposal are located within the Farming Zone, other than those within the town boundaries of Ballan, Gordon and Mt Egerton.*

The subject land and the surrounding areas are described in the PAR as follows:

*The landscape around the subject sites is flat to very gently undulating and, as with much of the land that immediately frames them, is dominated by open pasture. However, the landscape rises to the west and north, with a mixture of hills, ridges and bush framing the Lal Lal Reservoir and small town of Mt Egerton. This rising land culminates in the two very clearly expressed volcanic cones of Mt Buninyong (20km west of the proposed wind farm), close to Buninyong township and the edge of Ballarat, and Mt Warrenheip (17.5kms from the wind farm). The less clearly articulated form of Black Hill – next to the town of Gordon – lies just over 8km north-west of the wind farm site. Although public access is provided to the top of both Mt Buninyong and Mt Warrenheip, only the former offers any real public views towards the wind farm site and its surrounds, via a lookout tower. Views from the top of Mt*

*Warrenheip are restricted by tree cover, whereas there is no public access to the top of Black Hill, despite the presence of a reservoir on its crest.*

*The proposed wind farm's setting is also notable for a number of other landscape features, including:*

- *A less elevated and prominent Mt Wallace next to the Geelong-Ballan Rd;*
- *Both the Lal Lal and Bostock water reservoirs, dug into the plains and rolling hill / bush landscapes that flank them;*
- *Glenmore Valley;*
- *The Twin Lakes south of Mt Wallace;*
- *The Monument Upper Story Reservoirs (1,2&3) near the junction of the Geelong Ballan Road and Meredith Durdidwarrah Road; and*
- *The rising foothills and bush cover of the Brisbane Ranges National Park.*

Figure 1 shows the general landscape features of the land and surrounding areas. Figure 2 shows the locations of existing houses both host landholders and neighbours with dwelling numbers. It also shows proposed turbine layout with turbine numbers.

The numbers are referred to throughout various sections of the PAR and this report for identification purposes.

The proposed turbines will each have a capacity of between 2 and 3 megawatts (MW). Depending on the turbine finally selected the WEF will have an installed capacity of between 220 and 330MW.

The PAR estimates that if 2MW turbines are installed 674,520MW hours of renewable electricity will be produced each year.

The maximum height of the turbines is 150 metres with a hub height of 98 metres and a maximum rotor diameter of 104 metres and three blades.

A detailed description of the Application is set out in the PAR. It consists of:

- 110 turbines (51 in the Bungeeltap Section and 59 in the Ballark Section);
- Associated infrastructure in each section including access track, safety lighting, underground and overhead cabling;
- Permanent anemometers;
- Amenities building;
- Temporary construction facilities including concrete batching plants;
- Buildings and works;
- Business identification signs;

- Removal of native vegetation; and
- Alterations to an access point to a road in a Road Zone Category 1.

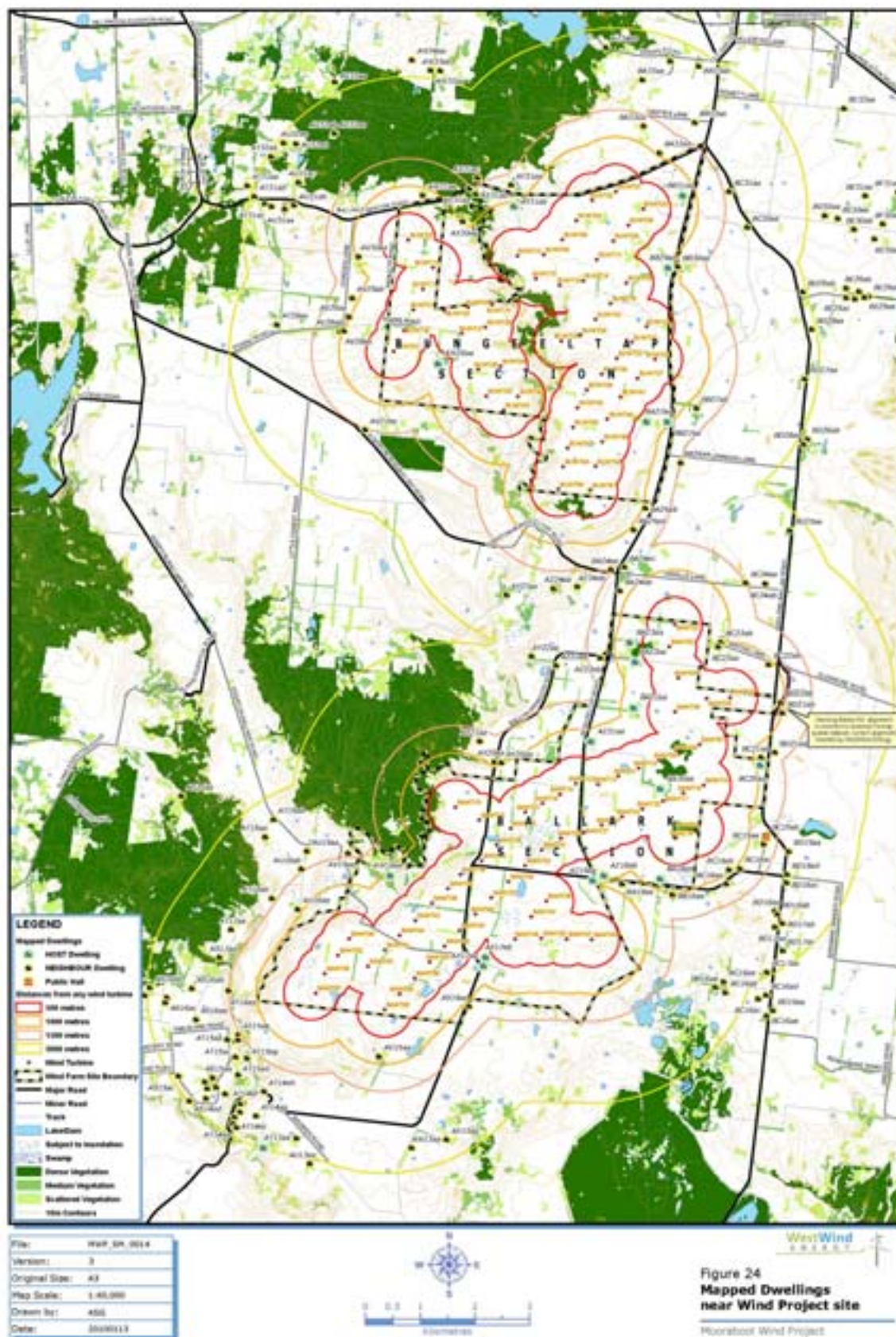


Figure 2 Mapped Dwellings near Wind Project site  
Extracted from Figure 24 of PAR

## 2.3 Host Landholders

The matter of limits to be applied at host dwellings has been considered by a number of panels in the past and the Panel considering the application for the Waubra WEF (the Waubra Panel) gave detailed consideration to the matter.

The Waubra Panel noted that the Minister for Planning in her assessment of the Bald Hills WEF stated that:

*I consider that the issue of noise amenity for stakeholder dwellings is most appropriately addressed by the inclusion of a condition on the relevant planning permit whereby the New Zealand Standard 'Acoustics – The Assessment and Measurement of Sound from Wind Turbine Generators' (NZ 6808:1998) (the 'New Zealand Standard') would not apply if appropriate agreements are reached between the wind farm operator and the stakeholder land owners on acceptable noise levels or suitable acoustic treatments at the dwellings.*

The Waubra Panel considered that in normal circumstances the normal limits should apply but recognised that exceptional circumstances can exist where the application of the normal limits is not necessary. To identify what might be considered exceptional circumstances the Waubra Panel considered the way in which amenity standards are applied in relation to other types of developments. They found that:

*Examples of these include Broiler Farms, Pig Farms, Cattle Feed Lots and a caretakers house on industrial land. With reference to rural activity the concentrated animal husbandry uses referred to above are generally consent uses in the rural zone provided the appropriate incorporated code of practice is complied with.*

*Compliance requirements in the codes of practice do not include houses on land on which the activity is carried out. They instead apply to houses outside the relevant property boundary. This is generally done by defining separation distances between the activity and off site sensitive uses.*

*In the same way in all the industrial zones accommodation uses are prohibited except for a caretaker's house. A caretaker's house is defined as:*

*"a dwelling on the same site as a building, operation, or plant, and occupied by a supervisor of that building operation or plant."*

*In these situations it is clear that different amenity standards apply to persons involved with and living on the land which contains the activity producing the loss of amenity.*

*Application of this principle to wind farms results in the premise that amenity standards for the control of noise and shadow flicker should not apply to houses on the site of wind turbines when the occupiers of such houses are engaged in activity associated with wind farms.*

*This premise appears reasonable because it is likely that such house occupiers are likely to have made a conscious decision that they are prepared to accept a total package involving financial reward for work done at the expense of some loss of amenity. There is likely to be a knowledge and acceptance of the total package involved at the time of making the choice for a particular activity and associated residence location.*

*Similar principles are involved for those persons accepting rent for turbines on the property where they live.<sup>1</sup>*

The Panel considering the Macarthur WEF found as follows:

*The PPG-WEF also states in Section 3, Amenity of the surrounding area: "A wind energy facility can affect the amenity of the surrounding area due to noise ...". The panel interprets the provision to mean that protection does not apply within the area of the wind farm itself.<sup>2</sup>*

The report of the Panel considering the Lal Lal WEF included the above quotation from the Macarthur WEF Panel and stated:

*We agree with this interpretation and endorse the exemption of host dwellings from compliance with NZ6808:1998 noise limits.<sup>3</sup>*

It is apparent that the three panels have determined that the NZ6808:1998 recommended noise limits and limits on shadow flicker should not be applied to host dwellings because such dwellings are effectively part of the WEF.

We are in agreement with the Waubra, Macarthur and Lal Lal Panels and strongly influenced by the analogous situations with other consent uses in the Farming Zone and industrial zones described by the Waubra Panel. These considerations lead us to the view that no limits should be applied at host dwellings.

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<sup>1</sup> Waubra Wind Farm Project Planning Application Numbers 05/0150 and 05/01/152–Panel Report :March 2005, Chapter 14.4

<sup>2</sup> Macarthur Wind Farm Permit Application PL-SP/05/0283–Panel Report May: 2006, Chapter 10.1.2

<sup>3</sup> Lal Lal Wind Energy Facility Planning Application SP/05/0461–Panel Report: February 2009, Chapter 6.2.3

## 2.4 Procedural Matters

The procedural matters raised in submissions at the Directions Hearing or at the Panel Hearing, included:

- notification procedures;
- the location of the Hearings;
- difficulties with Hearing timetable and preparing submissions for the Moorabool Hearing and the Yaloak South Hearing with overlapping processes;
- Minister's alleged conflict of interest;
- late submissions;
- Dr Thorne's evidence admissibility;
- roaring 40s issue;
- various issues raised by submitters between the Directions Hearing and the Panel Hearing; and
- draft Permit Conditions.

### 2.4.1 Notification Procedures

Just prior to the commencement of the Hearing the Department of Planning and Community Development (DPCD) advised that the list of addresses of landowners in Golden Plains Shire had, in error, not been provided to the applicant and accordingly no landowners in the Golden Plains Shire had been provided with written individual Section 52 notification of the proposal.

We were advised that nine landowners were involved. These owned land between 3.5km and 5km from the proposed WEF.

In addition to the individual notifications posted to landowners the Proposal was advertised in four local newspapers. It was also on display at the Council offices. There was considerable publicity, including press coverage, concerning the Proposal over a protracted period.

In all of these circumstances we came to the conclusion that sufficient notice has been given to satisfy the provisions of Section 52 of the Planning and Environment Act. Further we consider that it is most unlikely that any person owning land in the area of the proposed Moorabool WEF would not know about the Proposal.

In these circumstances we decided that no further notice was necessary.



## **2.4.2 Location of the Hearing Venue**

Several submissions were made concerning the proposal to hold the Hearings at the University of Ballarat Technology Park Cable Conference Centre. The suggestions were that this was remote from the site and would make it difficult for locals to attend the Hearing. Suggestions were made that suitable venues were available at the Fiskville CFA Regional Headquarters or at the Ballan Mechanics Hall.

We inspected both of the alternative venues proposed and came to the conclusion that neither of these was suitable for a prolonged Hearing (9 sitting days).

We also observed that the travel time from the site to the proposed venue in Ballarat was in the order of 30 to 40 minutes.

We decided to hold the Hearings at the University of Ballarat Technology Park Cable Conference Centre.

## **2.4.3 Hearing Timetable Issues**

Several submissions were made requesting that the Panel Hearing be postponed so that the Yaloak South hearing could be completed and the results published prior to commencement of the Moorabool Hearing. Others suggested that the Panel Report for the Stockyard Hill WEF should be completed and considered before Moorabool Panel Hearing started

Some of these submissions also suggested that there should be a considerable interval between the hearings to accommodate the obvious difficulties some parties were experiencing.

In light of the notification of the Moorabool dates being set out in the exhibited material and the lead time associated with the Moorabool Project we were not prepared to delay the Hearing.

## **2.4.4 Minister's Alleged Conflict of Interest**

Several submitters made representations concerning this matter and requested that we investigate the allegations.

We advised all parties, both at the Directions Hearing and at the commencement of the Panel Hearing, where the matter was again raised, that these allegations were not a matter for the Panel and that we have no power to carry out such investigations.

### **2.4.5 Late Submissions**

Several late submissions were received and these were eventually referred to us by DPCD. All such submissions have been considered along with all other submissions.

Late submissions were received and referred to us from the following:

- Department of Defence;
- Mr Ian Donovan;
- Aircraft Owners & Pilots Association; and
- Bird Observation and Conservation Australia.

### **2.4.6 Dr Thorne's Evidence Admissibility**

The Proponent made submissions to us that the evidence of Dr Thorne should not be considered as the areas covered in his witness statement are outside his area of expertise and address matters not raised previously. WestWind would have difficulty responding as their noise expert Mr Delaire was overseas during Dr Thorne's scheduled appearance.

We considered that Dr Thorne's evidence should be heard and if necessary we would recommence the Hearing at a later date or allow further submissions to address the issue of adequate opportunity for response.

There was no further request for opportunities to respond to Dr Thorne's evidence beyond the normal Proponent's right of reply.

### **2.4.7 Roaring 40s**

The Panel received correspondence from Roaring 40s, the operators of some Tasmanian wind energy facilities.

The essence of this correspondence was a complaint that the Council's expert witness on eagles, Mr McMahon, had misquoted material he reviewed from Roaring 40s.

The Council believed that the material should not have been sent to the Panel and Mr McMahon responded in writing to the allegations.

We considered Mr McMahon's evidence without the material from Roaring 40s and are not in a position to assess the accuracy or otherwise of Mr McMahon's comments about the Roaring 40s operations and see no need or benefit in being involved in this matter.

We paid no regard to any of this correspondence.

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## 2.4.8 Various Issues Raised after the Directions Hearing

Following the Directions Hearing there were a number of emails from various submitters seeking advice and directions relating to earlier directions, and or matters not previously addressed.

In each instance we responded to these numerous emails generally by either explaining earlier directions or by indicating that new matters should be raised at the commencement of the Hearing on 31 May. In several instances new issues were raised and dealt with as set out above.

## 2.4.9 Draft Permit Conditions

At the direction of the Panel, DPCD circulated draft permit conditions before the Hearing. A version with revisions proposed by the Proponent was discussed at a 'without prejudice' discussion of potential permit conditions on the last day of the Hearing. The potential conditions discussed for the WEF permit and referred to in various parts of this report are included as Appendix C. This permit will be referred to as the "Draft Permit". The permit incorporating the conditions recommended by us is included in Appendix B and is referred to in the report as the "Recommended Permit".

As explained during the Hearing our task is to recommend to the Minister on the merits of a permit issuing and to make recommendations about appropriate conditions in the event that a permit does issue. Consideration of permit conditions is not to be construed in any way that the matter of a permit issuing or not has been predetermined. Regardless of any recommendation relating to the issue of a permit we are required to make recommendations about appropriate conditions.

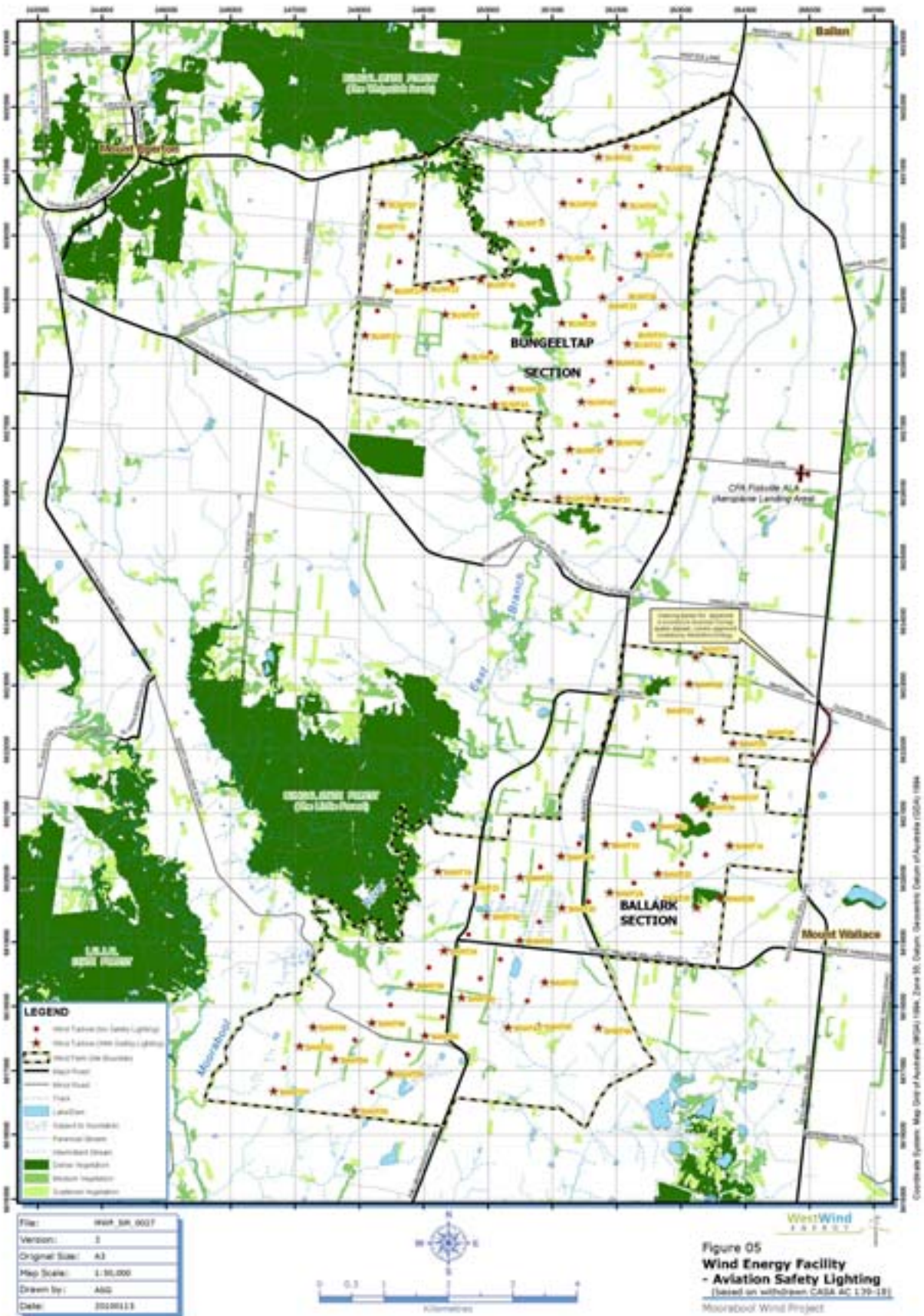
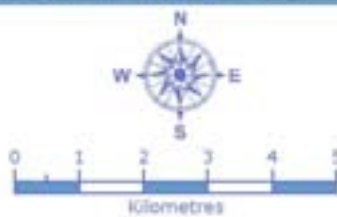


Figure 3 Aviation Safety Lighting  
Extracted from Figure 5 of PAR



File:	MWP_SM_0030
Version:	2
Original Size:	A4
Map Scale:	1:100,000
Drawn by:	ASG
Date:	20100112



**Figure 23**  
**Land Use Map**  
Moorabool Wind Project

**Figure 4** Land Use Map  
Extracted from Figure 23 of PAR

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## 3. The Planning Framework

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Planning policy reinforces broader government policy to support the development of renewable energy expressed in documents such as: The Victorian Greenhouse Strategy; the 2006 Environmental Sustainability Action Statement, *Our Environment, Our Future*; and *Victorian Renewable Energy Act 2006* (which establishes the Victorian renewable energy target [VRET] scheme).

The Planning Assessment in Section 7 of the PAR and the submissions of the Department of Planning and Community Development (DPCD) and the Proponent all documented relevant planning policy and VPP provisions. We do not propose to recite the policy provisions that apply to all applications in the State and municipality. Rather, this chapter highlights the elements of the planning framework that relate specifically to Wind Energy Facilities (WEFs) and this land in particular. Chapters assessing particular issues also consider policy relating to the issue.

### 3.1 Planning Scheme Provisions

**Clause 15.14 Renewable Energy** has the objective to promote renewable energy in a manner that ensures appropriate siting and design considerations.

Implementation measures require planning to:

- *Facilitate the consideration of wind energy development proposals;*
- *Recognise that economically viable wind energy facilities are dependent on locations with consistently strong winds over the year and that such sites may be highly localised.*

This clause calls up the consideration of Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (the WEF Guidelines) as a mandatory requirement in the consideration of WEF permits.

**Clause 52.32 - Wind Energy Facilities** requires the following matters to be considered in the assessment of applications for WEF permits:

- *The effect of the Proposal on the surrounding area in terms of noise, blade glint, shadow flicker and electromagnetic interference.*
- *The impact of the development on significant views, including visual corridors and sightlines.*

- *The impact of the facility on the natural environment and natural systems.*
- *The impact of the facility on cultural heritage.*
- *The impact of the facility on aircraft safety.*
- *The Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria, 2009.*

These matters are addressed in the relevant chapters of this report.

***The WEF Guidelines*** are called up in Clauses 15.14 and 52.03 and, as incorporated under Clause 81, they form part of the Planning Scheme. The WEF Guidelines are a key document that reinforce government policy relating to WEFs and establish a specific decision making framework for the assessment of WEF proposals that supplements more generic Planning Scheme provisions. These guidelines provide explanations of matters to be considered by responsible authorities in assessing permit applications for WEFs with clear guidelines for evaluation of individual issues.

The matters to be considered are identified as follows:

- Contribution to Government Policy and Objectives. Evaluation is required to give considerable weight to Government policy objectives in relation to the development of renewable energy;
- Landscape and visual amenity. Evaluation is to accept that WEFs will have a degree of impact on the landscape. It is suggested that Planning Scheme objectives about particular landscape values as identified in overlay controls such as Significant Landscape, Vegetation Protection and Environmental Significance are important considerations. Finally consideration of visual impact should be weighted having regard to Government's policy in support of renewable energy;
- Noise. Evaluation should ensure that the facility complies with the noise levels recommended for dwellings in the New Zealand Noise Standard<sup>4</sup>. Assessment of the Proposal to include separate correlation of sound levels with wind speed for different wind directions and/or the time of day as well as wind speed measurements at hub height of the proposed turbines. Post installation noise compliance testing is also required as a permit condition;
- Blade Glint. Evaluation should ensure that turbine blades are finished with a low reflectivity;

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<sup>4</sup> New Zealand Standard NZ 6808:1998, Acoustics -The Assessment and Measurement of Sound from Wind Turbine Generators

- 
- Shadow Flicker. Evaluation should ensure the shadow flicker experienced in the fenced garden area of a dwelling does not exceed 30 hours per year;
  - Electromagnetic Interference. Evaluation to ensure that wind turbines in the 'line of sight' between transmitters and receivers is avoided;
  - Aircraft Safety. Consultation with CASA required for proposal in specified circumstances. Evaluation should identify airstrips not identified by CASA. CASA may require appropriate safeguards to ensure aircraft safety including aviation safety lighting; and
  - Flora and Fauna. Surveys and monitoring required in consultation with DSE. Permit condition may include an Environmental Management Plan designed to minimise ongoing risks to particular species.

Applications are to contain a Site and Context Analysis and a Design Response.

Site and Context analysis to include:

- Specified site details including species of flora and fauna, landscape and notable features;
- Specified details of surrounding areas including locations of dwellings within 500 metres, landscape features and other notable characteristics of the area; and
- Location plan showing full site area, access roads and local electricity grid.

Design Response to include:

- A description of the Proposal including number location and specification of turbines, amount of electricity to be exported from site, expected greenhouse gas savings, proposed connections to electricity grid and traffic movements;
- Response to significant landscape features identified in the Planning Scheme;
- An assessment of the visual impact on the landscape and on abutting land subject to the National Parks Act 1975;
- An assessment of the impact on any species listed under the FFG Act or EPBC Act;
- An assessment of the noise impact on existing dwellings prepared in accordance with the NZ6808:1998;
- An assessment of the impacts on Aboriginal and non Aboriginal cultural heritage;
- An explanation of why the site is suitable for a WEF having regard to



- State and local planning policies contained in the Planning Scheme;
  - The contribution to increasing Victoria's diversity and security of energy supply;
  - The economic and social impacts of the Proposal;
  - The suitability of the site in comparison to other potential sites;
  - Likely amenity effects on the surrounding area due to blade glint, shadow flicker, overshadowing and electromagnetic interference;
  - Extent to which the Proposal manages potential adverse impacts
  - Impact on aircraft; and
  - The cumulative effects having regard to other existing or proposed WEFs.
- An Environmental Management Plan if appropriate addressing:
    - Principles of environmental management;
    - Environmental mitigation measures;
    - Standards to be met;
    - Monitoring requirements;
    - Decommissioning and rehabilitation; and
    - Post construction adaptive management measures where monitoring shows significant impacts on EPBC Act and FFG Act listed species.

**Clause 52.17 Native Vegetation** which establishes permit requirements for the removal of native vegetation and, like Clause 15.09, calls up the *Native Vegetation Management: A Framework for Action* as a key document in planning decisions relating to native vegetation (See Chapter 7).

**Clause 52.05 Advertising Signs** - prohibits signage exceeding three square metres in the Farming Zone.

**Clause 52.29** establishes a permit requirement to create or alter access to the Road Zone, Category 1 (RDZ1).

## 3.2 Zones

The Proposal is located in the Farming Zone (FZ) which has purposes with a strong focus on the use of land for agriculture, sustainable land management and protection of natural resources and biodiversity. Use and development of WEFs requires a permit in the zone.

The Ballark Section abuts the Geelong Ballan Road, which is a Road Zone–Category 1 (RDZ1). A planning permit is required under the provisions of Clause 52.29 for works associated with alteration to access to the RDZ1.

There is no other land within two kilometres of the proposed development that falls within zones which have purposes to provide for residential development. The closest land to the proposed development in such zones is at Mount Egerton (Rural Living Zone) some 2.1 km distant and at Ballan (Residential Zone) some 2.3 km distant.

### 3.3 Overlays

The following overlays apply to parts of the site:

- **Environmental Significance Overlay (Schedule 1) – Proclaimed Water Supply Catchments (ESO1)** applies to the whole of the subject land and requires a permit for building and works. The overlay and both water authority and Planning Scheme policies are directed at managing development to protect the quality of the potable water supply. However, the protection of water quality, which is addressed by permit conditions, was not contentious and is not discussed further in this report;
- **Design and Development Overlay (Schedule 2) Visual amenity and building design (DDO2)** applies to the whole of subject land. However the Proposal is exempt from permit requirements under this overlay as non-reflective materials will be used;
- **Wildfire Management Overlay (Schedule 6)** applies to small parts of both sections of the Proposal but a permit is not required under this overlay for use and development of the Proposal; and
- **Heritage Overlay (HO26)** applies to the Ballark Homestead and land on the Ballan Meredith Road. A permit is required for buildings and works as turbines are proposed on the land subject to this overlay.

### 3.4 Directions of Policy Framework

Planning policy is often criticised for failing to articulate clear policy intentions. In the case of renewable energy generally, and WEFs in particular, there is a consistent, unambiguous State Government policy to promote and facilitate the establishment and expansion of WEFs to reduce greenhouse emissions, reduce the long term dependency on energy from fossil fuels and increase the security and diversity of Victoria's energy

supply<sup>5</sup>. This overall policy direction is reinforced in Clause 52.32 and the WEF Guidelines which are incorporated in the Planning Scheme.

The overarching State Policy to facilitate the development of WEFs is qualified as WEFs are to be in appropriate locations with minimal impact on the amenity of the area<sup>6</sup>. However, the more specific WEF Guidelines provide further direction on how this purpose should be achieved by amplifying the performance expectations placed on proposals. The WEF Guidelines indicate the weight that should be accorded to various aspects of the evaluation, identify measures to mitigate impacts and establish criteria to be satisfied for matters such as noise and shadow flicker, and aircraft safety.

It is clear that the Planning Scheme requires our assessment to give considerable weight to the framework established by the WEF guidelines, including the evaluation criteria, the weighting of factors and the adoption of the specific standards nominated. Subsequent chapters address provisions of the WEF Guidelines that are relevant to particular issues more specifically.

In considering impacts from the WEF on residential amenity, we are also conscious that the purposes of the Farming Zone are to provide for productive agricultural use of the land and to ensure this primary function is not adversely affected by non-agricultural uses, particularly dwellings. In this zone development for residential uses (and uses that may conflict with agriculture) is not promoted and the amenity expectations of residents must be tempered by the potential impacts from agricultural activities.

### **3.5 Environment Protection and Biodiversity Conservation Act**

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides, amongst other things, for listing of nationally threatened native species and ecological communities, which are recognised as a matter of national environmental significance.

Any action that is likely to have a significant impact on listed threatened species and ecological communities must be referred to the Minister for Environment for assessment. Actions may be found to be unacceptable, or to be “controlled actions” requiring assessment under the Act or approved State processes, or may be classified as not being controlled actions provided they are done in a specified manner or in accordance with directions included in the response.

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<sup>5</sup> See Moorabool Planning Scheme Clauses 15.14-1 and 52.32 and the WEF Guidelines

<sup>6</sup> Clause 52.32 Purpose

Under delegation from the Minister, the Commonwealth Department of Environment, Water, Heritage and the Arts determined in January 2010 that the Moorabool Wind Energy Facility project is not a controlled action under the EPBC Act, provided it is undertaken in the manner set out in the decision.

DPCD provided us with a copy of the letter from the Commonwealth (Attachment 6 to DPCD's opening submission to the Hearing). It requires that implementation of the project must take measures to avoid significant impacts on listed threatened species and communities, including avoiding any occurrences of Matted Flax-lily and Spiny-rice flower plants on the proposed WEF sites and fencing of any plants of either species located within 10 metres of construction activities.

### 3.6 Victorian Environment Effects Act

The Victorian *Environment Effects Act 1978* creates a system for assessing the environmental effect of a proposed development. It provides for an Environment Effects Statement (EES) to be undertaken for public works and certain private works and submitted to the Minister for assessment.

Projects that "could reasonably be considered to have or to be capable of having a significant effect on the environment" are referred to the Minister for Planning and the Minister makes a decision whether the person proposing the project will be required to conduct an EES. The Minister may also give notice that an EES is only required if certain conditions are not met.

In July 2009, WestWind sought advice from the Minister for Planning on whether the proposed WEF required assessment under the Environment Effects Act, and provided preliminary assessments of the likely impacts on listed flora and fauna and native vegetation communities. In September 2009 it was advised that an EES was not required (A copy of the letter was included as Attachment 5 to the DPCD submission).

The main reasons given for not requiring an EES were that:

- the project site is largely cleared agricultural land and the turbine layout avoids areas of significant native vegetation;
- there is limited habitat available that is suitable for those birds of conservation significance (such as the Powerful Owl, Brolga and Wedge-tailed Eagle) that may occur in the area;
- effects on Aboriginal cultural heritage are likely to be low as the project works will avoid areas of high potential sensitivity, such as the Moorabool River;

- the effects of the proposed turbines on the visual and landscape values of the two project areas are not likely to be of regional significance and effects on adjoining areas can be evaluated through the planning process;
- the project is unlikely to have a cumulative effect in combination with other approved wind energy projects in the region; and
- the potential environmental effects of the project could be adequately assessed through the planning permit application process.

## 4. The Greenhouse Pollution Abatement

Some submitters questioned the effectiveness of wind energy in meeting community needs for base load power. They highlighted the variation in the resource, the embedded energy in the development of WEFs, as well as energy losses in the distribution of the energy produced.

Sustainability Victoria (SV) made a submission which provided advice regarding the relevant State Government policy and the status of wind energy development in Victoria. SV's submission supported the Proposal and emphasised the imperative to increase capacity to generate renewable energy given policies to abate greenhouse pollution and the economic consequences under carbon trading schemes of high carbon intensive energy production.

The amount of power a wind generator can produce is dependent upon the availability and the speed of the wind. The 2003 Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria described the term 'capacity factor' as:

*the actual output of a WEF as the percentage of time it would be operating at maximum power output.*

SV emphasised that it has conducted long term studies from other WEFs in Victoria since 2002. These studies indicate a long term average capacity factor of 32%. SV indicated that based on the wind resource a capacity factor of 35% is indicated for the Moorabool project. For 2 MW turbines this would provide an annual electricity output of 674,000 MWh and an annual CO<sub>2</sub> equivalent abatement of 707,000 tonnes.

The SV submission also provided the following information concerning the current status of wind energy projects and proposals for Victoria:

**Table 4-1 Status of Wind Energy Facilities in Victoria**

Status	Wind Energy Capacity (MW)
Operating	428
Approved	1554
Permit under consideration	2108

The submission also stated that computer modelling simulating the National Electricity Market predicted a reduction in greenhouse gas emissions of

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approximately 1.05 tonnes per year for each megawatt hour of wind generation in Victoria by 2013. SV considers 2013 as the expected commencement date for the Moorabool WEF. The computer model referred to above explicitly allowed for the changed efficiency of fossil fuel plants operating at less than full power.

Finally SV advised that under average Victorian wind conditions it takes between two and three months for a turbine to recover all the energy involved in manufacturing , installing, maintaining and decommissioning.

We accept the information provided by SV to the effect that the Moorabool WEF would contribute significantly to renewable energy output for Victoria and to the resultant reduction in greenhouse gas emissions.

As required by government and planning policy, our evaluation of the proposed WEF accords considerable weight to the contribution it would make to the government policy to increase the supply of electricity from renewable sources and thereby reduce greenhouse gas pollution.

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## 5. Landscape and Visual Impacts

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### 5.1 What are the Issues?

The issues relating to landscape and visual impacts identified by the Proponent, expert witnesses, submitters and the Panel include the following:

- effect of the Proposal on identified significant landscapes;
- visual impact at dwellings; and
- the effect of night lighting on visual amenity.

Most recent Panel reports on proposed WEF developments have considered separately the impacts on landscape values – generally accepted as relating to views from public roads, open space within townships, elevated viewpoints and key outdoor recreation sites – and the effects on the visual amenity of individual residences or groups of residences. We have adopted the same approach.

Section 5.3 covers our evaluation of the impacts of the Proposal on the public realm; section 5.4 addresses effects on the visual amenity of individual dwellings and section 5.5 deals with proposals for aviation night lighting of turbines.

### 5.2 Policy Context

The WEF Guidelines state that WEFs should not lead to unacceptable impacts on critical environmental or cultural values (those protected under Commonwealth or State legislation).

With regard to significant landscape values, the WEF Guidelines state:

*The Victorian Government recognises that the Victorian community places a high value on protecting landscapes with visual amenity due to their environmental, social and economic benefits. Strategic planning plays an important role in identifying and managing these important landscapes.*

Significant landscapes may be identified through regional or local assessments.

Part B of the WEF Guidelines deals with assessing wind energy facilities. In relation to landscape and visual amenity it says:



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*The degree to which a wind energy facility has a visual impact depends on the magnitude of the change to the landscape caused by the development taking into account:*

- *the visibility of the development*
- *the locations and distances from which the development can be viewed*
- *the significance of the landscape as described in a planning scheme overlay or a relevant strategic study referenced in the planning scheme*
- *landscape values associated with adjacent National Parks and land subject to the National Parks Act 1975, and*
- *the sensitivity of the landscape to change.*

*The visual impact of the development relates to:*

- *the number, height, scale, spacing, colour and surface reflectivity of the wind turbines*
- *the quantity and characteristics of lighting, including aviation obstacle lighting (subject to CASA requirements and advice)*
- *avoidance of visual clutter caused by turbine layout and ability to view through a cluster or array (visually well ordered series) of turbines in an orderly manner*
- *the removal or planting of vegetation*
- *the location and scale of other buildings and works including transmission lines*
- *proximity to sensitive areas, and*
- *proximity to an existing or proposed wind energy facility having regard to cumulative visual effects.*

*The features of the landscape include:*

- *the topography of the land*
- *the amount and type of vegetation*
- *natural features such as waterways, cliffs, escarpments, hills, gullies and valleys*
- *visual boundaries between major landscape types*
- *the type, pattern, built form, scale and character of development including roads and walking tracks*
- *flora and fauna habitat*

- *cultural heritage sites, and*
- *the skyline.*

The WEF Guidelines provide the following advice to the responsible authority on evaluating planning applications:

*It is accepted that wind energy facilities will have a degree of impact on the landscape.*

*In deciding whether or not the visual impact of a wind energy facility in the landscape is acceptable, it may be useful to consider planning scheme objectives for the landscape, including whether the land is subject to an Environmental Significance Overlay, Vegetation Protection Overlay, Significant Landscape Overlay or a relevant strategic study that is part of the relevant planning scheme.*

***Consideration of the visual impact of a proposal should be weighted having regard to the Government's Policy in support of renewable energy development*** [Panel emphasis].

The WEF Guidelines go on to suggest mitigation measures:

- *siting and designing to minimise impacts on views from areas used for recreation based on landscape values and from dwellings*
- *locating arrays of turbines to reflect dominant topographical and/or cultural features, such as ridgelines, the coastline, watercourses, windbreaks or transmission lines*
- *using turbine colour to reduce visual impacts from key public view points*
- *limiting night lighting to that required for safe operation of a wind energy facility and for aviation safety*
- *reducing the number of wind turbines with obstacle lights while not compromising aviation safety*
- *reducing light glare from obstacle lighting through appropriate mitigation such as baffling*
- *selecting turbines that are consistent in height, look alike and rotate the same way*
- *spacing turbines to respond to landscape characteristics*
- *undergrounding electricity lines wherever practicable*
- *minimising earthworks and provide measures to protect drainage lines and waterways*
- *minimising removal of vegetation, and*

- *avoiding additional clutter on turbines such as unrelated advertising and telecommunications apparatus.*

## 5.2.1 Moorabool Planning Scheme

### MSS

**Clause 21.02-2 – Natural environment** contains the following objective and relevant strategies:

***Objective – Non Urban Landscapes***

*To maintain and enhance the natural environment and the Shire’s rural identity and character.*

***Strategies***

...

*Recognise and protect the national, state and regional values of Werribee George State Park, Bungal State Forest, Long Forest nature Reserve, Lal Lal State Forest, Lal Lal Falls, Brisbane Ranges Lerderderg State Park, and Wombat State Forest.*

*Protect the landscape and scenic qualities of forested hill slopes, rural landscapes, and bushland setting of the Shire’s rural and urban areas.*

*Preserve high quality landscapes by not supporting development on hilltops and ridgelines.*

**Clause 21.03 – Settlement and housing**, under ‘key issues and influences’, also refers to landscapes:

*The communities and towns of Moorabool Shire have a very strong rural setting and character that is defined by the local agricultural base, spectacular scenic landscapes and diverse vegetation. There is a need to ensure that these values, which draw people to the area, are protected.*

Clause 21.03-4 contains an objective concerning landscapes and neighbourhood character:

*To ensure new development in all zones respects the existing character, landscape setting and amenity of the local area.*

Strategies listed include:

*Ensure that new development is appropriately sited, designed and constructed to blend with the surrounding landscape and protect significant landscape values, native vegetation and rural settings.*

*Discourage inappropriate development on scenic hilltops, ridge lines and areas of visual prominence.*

21.03-6 – Implementation, in discussing local policy and exercise of discretion, states:

*Where relevant require a report to accompany planning applications that explains how the siting and design of the proposal has responded to objectives and strategies of this MSS, the topography, environmental constraints, and the landscape significance and character of the area.*

*Ensure that new buildings and works are sited, designed and constructed to:*

- *minimise the removal and disturbance of native vegetation;*
- *avoid protruding above ridgelines, hill tops and tree canopies; ....*
- *avoid the use of reflective building materials such as zincalume; and*
- *use external colours, materials and finishes of subdued tones that blend with the surrounding landscape and vegetation.*

*Prevent the construction of buildings that create an appearance of bulk, scale and size in visually prominent and significant landscape areas.*

*Encourage the planting of indigenous native vegetation to assist in screening new development. ...*

### **Farming Zone**

As noted in Chapter 3 above, the Moorabool WEF site is located in the Farming Zone. The purposes of the zone focus on the productive use of the land for agriculture. Nevertheless, the decision guidelines include several considerations relating to landscape values:

*The impact of the siting, design, height, bulk, colours and materials to be used, on the natural environment, major roads, vistas and water features and the measures to be undertaken to minimise any adverse impacts. ...*

*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 & Development Overlay**

The whole WEF site is covered by a Design & Development Overlay – Schedule 2 (DDO2) which requires a permit for buildings and works. The design objectives of the DDO2 are:

- *To enhance visual amenity in rural, township and vegetated areas of the Moorabool Shire.*
- *To encourage the use of external cladding, such as non-reflective materials for building construction.*

- *To discourage the use of materials ... which could have a detrimental effect on amenity.*

Clause 2.0 of the DDO2 contains an exemption that states that a permit is not required to construct a building or to carry out works where all external walls and roof areas are clad with non-reflective materials.

## **5.3 Significant Landscapes**

### **5.3.1 Planning Application Report**

The PAR in its summary of the opportunities presented by the Moorabool WEF site stated:

*Lack of landscape features: Ensures that wind turbines can be located on the elevated plain, and not along significant hills and ridgelines. The landscapes within or around the site are not protected by a Significant Landscape Overlay.*

With regard to the MSS references to landscape protection, the Application noted:

*The proposal is consistent with the clause. As outlined in the Landscape and Visual Assessment ... the project will not impact on the values of Werribee Gorge State Park, Bungal State Forest, Long Forest Nature Reserve, Lal Lal State Forest, Lal Lal Falls, Brisbane Ranges, Lerderderg State Park and Wombat State Forest.*

*The assessment states that:*

- *significant distances and rural working landscapes establish a buffer between these features and the subject site, and that the proposed wind turbines would not be viewed in association with, let alone juxtaposed against these landscape features and would not directly affect or appreciably degrade them.*

*As the proposal uses the elevated plains there will be no impact on the landscape and scenic qualities of: forested hill slopes, hilltops and ridgelines. ...*

*The proposal will result in change to a productive working agricultural landscape, as outlined in the Landscape and Visual Assessment.*

In relation to the DDO2, the PAR pointed out that no permit was required as the Proposal would be finished in a non-reflective off white / grey colour.

In response to the requirements in the WEF Guidelines regarding the landscape and visual impacts of the Proposal, the planning application said:

*The proposal will not have a significant effect on key views to and from regional landscape features such as the Werribee Gorge, Brisbane Ranges National Park, the Moorabool River and Mt Warrenheip and Mt Buninyong. The assessment ... notes that proposed wind turbines would rarely be viewed in association with these key landscape features and would not directly affect them. There are few key recreational or public viewpoints which have direct views to the proposal.*

Section 7.2 of the PAR summarised the landscape and visual amenity studies carried out for the project:

- a preliminary landscape and visual assessment by Stephen Brown Environments Ltd (SBE);
- an evaluation using 32 visual simulations by Truescape Visual Reality, focusing on the impact of the wind turbines on different parts of the study area; and
- a Zone of Visual Influence model for the site, showing the theoretical number of turbines that would be visible from a particular position, without taking into account any screening effect from vegetation, buildings or other structures.

The report outlined the five landscape types that SBE identified in the study area: rural towns and settlements; open pasture and plains; rolling hills and bush; major gullies and river valleys; and reserves and National Parks. Of these, the most relevant to the WEF proposal are the open plains and pasture and the river valleys and gullies. It described them as follows:

#### *Open Plains and Pasture*

*The project site and its immediate surrounds are characterised by flat to gently rolling plains and terraces used for grazing and some cropping. This landscape generally falls from north to south ...*

*Although dissected by shelter belts and deep gorges around the East and West Branches of the Moorabool River, much of this landscape is very open and expansive. The landscape tends to be more notable for the landscape features on its margins, such as Mt Egerton and the Brisbane Ranges, rather than from features and landmarks within the project site itself.*

*Immediately south of the Ballark Section ... part of the landscape is being transformed from a pastoral landscape into one that will be dominated by timber production.*

*Development in this landscape character type is confined to a sporadic mix of farm houses and buildings with local roads, access ways, fences and powerlines. ...*

### *Major River Valleys and Gullies*

*The project site is dissected by deeply incised river valleys. Closer to the Lal Lal Reservoir, Mt Egerton and Brisbane Ranges, these river corridors are characterised by steep side escarpments with limited vegetation cover. Although shelter belts, amenity and riparian planting are noticeable around the course of the Moorabool River, these corridors are most noticeable for their articulated profile, which is at odds with the very openness of the surrounding landscapes. These are a localised landscape feature in their own right and link the two sections of the wind farm with the Brisbane Ranges and north west hill / bush landscapes, as well as the larger river corridors to the south. They are a dramatic deviation from the open pastoral landscape.*

*Farm development within this landscape tends to be sporadic, with the odd dwelling cluster within these corridors at Morrisons and Yaloak Vale / Glenmore.*

The PAR described the purpose of the viewpoint assessment, as:

*... to examine existing landscape values and sensitivities in conjunction with the relative exposure / visibility and more qualitative landscape / amenity effects of the proposal.*

All 32 viewpoints addressed effects in relation to the public domain – including roads, settlements, reserves and other publicly accessible areas – and nine of them were also located close to residential properties and gave a clear indication of the proposed WEF's anticipated impacts on a cross-section of private owners (The latter issue is addressed in section 5.4 below).

The viewpoint assessment considered: landscape values; sensitivity to wind farm development; prominence / visibility; qualitative change; cumulative effects in relation to the approved Lal Lal Wind Farm and the Yaloak South proposal; and the potential for mitigation.

Five viewpoints were assessed as having 'high' or 'moderate to high' ratings in terms of overall impacts.

The PAR discussed mitigation options and stated:

*The proposal largely satisfies the suggested impact reduction measures listed in the guidelines by:*

- sighting wind turbines on the elevated plains rather than the hilltops and ridgelines;*
- finishing wind turbines in off white / pale grey non reflective materials;*
- limiting the operation of aviation lighting;*

- selecting wind turbines which are consistent in size and spacing; \
- using an underground collector network;
- the siting of switchyards, proposed workers amenities, construction compounds and meteorological masts, in single areas away from dwellings and key public viewpoints; and
- minimising earthworks and the efficient use of access tracks and points.

*It should also be noted that there are limited views from recreational areas, such as the Brisbane Ranges National Park and Lal Lal Falls to the wind farm site. Large established shelter belts limit more local view to the proposal.*

In reporting the analysis of the impact of the proposed WEF on landscape values the PAR said:

*The assessment notes that the landscape setting for the Moorabool Wind Farm Project is ideally suited to wind farm development in that it is for the most part a working rural environment. The landscape surrounding the project site does not comprise landscape features of note with the Moorabool landscape being not particularly distinctive or obvious in its own right.*

...

*The assessment states that there is potential for some conflict between the proposal and the high country and bush landscapes in the south east of Lal Lal Reservoir and around Mt Egerton. The assessment also mentions that the proposal would compromise some of the intrinsic naturalness and rural aesthetic when travelling down the Egerton-Ballark Road corridor. However, this is not a key tourist route of any note.*

*Recreation and scenic values of Bostock Reservoir, Bungal Dam Lookout and Lal Lal Falls would not be greatly affected by the proposal. The experience of arriving at Bostock Reservoir and the Bungal Dam would be affected by the proposal to some degree.*

With regard to cumulative effects with other WEFs approved or proposed in the wider area, the PAR stated:

*The assessment notes that the combination of wind farms within and around Moorabool would result in the creation of a wider 'energy landscape' at the expense of some of the rural character.*

*The assessment notes that cumulative effects associated with the proposal would be most pronounced:*

- Near the Geelong-Ballan Road (north of Mt Wallace and south of Ballan) and Glenmore Road;



- *In the vicinity of Elaine through to Morrisons; and*
- *Both south and west of Mt Egerton (excluding Mt Egerton itself).*

*Of these, the Geelong-Ballan Road location would have a more significant effect. West of the Moorabool River and Mt Egerton, the Moorabool Wind Project would be visually subservient to the much closer Lal Lal (Yendon) wind turbines.*

*The more significant landscape features and qualities identified in the assessment, namely Werribee Gorge, Brisbane Ranges National Park, the Moorabool River and Mt Warrenheip and Mt Buninyong, together with most towns and communities would remain buffered to a significant degree from the direct effects of the Moorabool, Lal Lal and Yaloak [South] developments.*

The conclusions regarding landscape and visual impact in the PAR included:

*As a whole, the impacts of the proposal on the landscape remain relatively low which reflects the fact that neither the subject sites nor their more immediate surrounds are particularly notable in terms of landscape character and values.*

*Although a number small towns and settlements are located in relatively close proximity to the proposal, only Mt Wallace would be significantly exposed to the proposed development.*

*The proposal would appreciably change the existing rural environment visually within and around the wind farm site. It is only to be expected that some of the local community would feel that their amenity values will be affected by the proposal, albeit to varying degrees. This is manageable subject to an appropriate mitigation strategy.*

*Overall visual impacts will be both direct ... and indirect, arising from more sporadic exposure to the wider regional community passing by or through the surrounding visual catchment.*

### **5.3.2 Submissions to the Responsible Authority**

Issues raised in submissions included:

- the huge wind turbines would cause significant visual intrusion on the beautiful landscape in the Mt Egerton/Ballan area;
- Moorabool Shire was an area of outstanding natural beauty, containing spectacular gorges and valleys, undulating hills and breathtaking views;
- there was no attempt to make the proposed WEF blend with the natural landscape;
- concerns over the visual impact of the WEF from the Geelong-Ballan Road, which was used for cycling, as well as from streets in Ballan;

- 
- the powerlines required for the project would also have significant effect on the landscape;
  - concern about the number and size of turbines involved, in combination with other wind farms proposed in the district; and
  - criticisms that the landscape assessment for the project had failed to consider the community's landscape values or to determine its sense of place.

A number of submissions supporting the WEF commented that the adverse visual affects were a matter of perception and would, in any case, be limited in extent.

Moorabool Shire Council was concerned that the cumulative impact of WEFs on landscape values for those residents along the Geelong-Ballan Road and the broader area had not been appropriately considered through the preparation of a cumulative landscape impact report.

### 5.3.3 Evidence and Submissions to Hearing

Mr Stephen Brown presented expert evidence on landscape and visual amenity on behalf of the Proponent. His witness statement presented information from the background studies (summarised in the planning application) and from later work, including:

- details of the criteria used for the viewpoint analysis and the results of in terms of impact rating without mitigation and the potential for mitigation to alter this assessment (discussed more fully in section 5.4);
- an assessment of the impact of the Proposal on the various landscape character types, which concluded:
  - The most exposed settlement in terms of physical characteristics and sensitivity to WEF development was the eastern [later corrected to western] side of Mt Wallace;
  - The open plains and pasture had a limited capacity to integrate or visually absorb WEF development but lacked the intrinsic landscape values that might be compromised by such development;
  - The rolling, to dissected, nature of the terrain in the hills and bush landscape type, combined with extensive vegetation cover, would limit their exposure to the proposed WEF;
  - The major river valleys and gullies were quite self-contained and were either largely isolated from the proposed WEF or would be substantially screened from it; and
  - The proposed distribution of turbines would result in some concentration, but they were arrayed and spaced so that they would

either be seen as a part of a series of cohesive 'strings' or would read as a more lateral array of turbines, without excessive overlap or clutter.

Mr Brown's witness statement included responses to issues raised in submissions. On concerns about general landscape impacts, he reiterated that the proposed WEF would have a limited impact on the major landscape features of the wider area or within the site, including 'the central core of the main valleys, reservoirs and tracts of bush that flank the wind farm site'. He concluded:

*... while the bulk of the Moorabool landscape retains a certain rural character and related amenity value, those parts of it more directly affected by the proposed wind farm do not rate in terms of their landscape aesthetics and values – in a comparative sense.*

In response to the charge that he had failed to respect community values concerning the local landscape, he said he had been guided by the MSS and other planning provisions, including the absence of any Significant Landscape Overlay (SLO) over the WEF site.

He set out the attributes that research had found to be highly correlated with the most preferred or outstanding landscapes, including: naturalness; endemic values (sense of place); strong landscape structure and patterns; visual drama; and visual diversity. He considered that these characteristics applied to those landscapes within Moorabool Shire and adjoining areas that were either in national or state parks or subject to SLOs:

*The Brisbane Ranges National Park and Lerderderg Gorge State Park are local exemplars in this respect, whereas most of the landscape physically embraced by the Bungeeltap and Ballark Sections of the Moorabool Wind Farm lie closer to the other – working / farmland – end of the landscape spectrum.*

In discussing research elsewhere on community perceptions of WEFs, he noted that they tended to generate a highly variable range of responses, including positive reactions.

This was highlighted in a presentation to the Hearing, where a submitter described wind turbines as 'majestic, beautiful and a sign of hope and progress towards a clean energy future' (while also putting the view that personal aesthetic judgements were irrelevant).

Mr Brown concluded:

*Based on ... research findings, I have adopted the approach that wind farms and turbines will typically be perceived in a more positive way*

*when located among environs that are already degraded or highly modified, but will have a more negative effect where the existing landscape is more highly valued and a wind farm is likely to intrude, disrupt and / or modify it.*

Mr Brown noted that two additional photo-montages had been prepared to assist with evaluation of the cumulative impacts of the proposed Moorabool and Yaloak South WEFs (discussed below). He had also reviewed the landscape and visual amenity work prepared for the Yaloak South project. He stated:

*In my opinion, the combined effect of both wind farms – arising from the joint exposure of both as some locations and their sequential exposure when travelling down local roads – would be appreciable. This would be particularly so south of Ballan, in the vicinity of the Geelong-Ballan Road and / or Glenmore Road. However, such effects would be much less apparent from within the settlement of Ballan and would also ‘tail off’ south of Mount Wallace near Twin Lakes. Although the Yaloak South assessment identifies that wind farm as having an impact on views from Mt Wallace-Ballark and Bungeeltap Roads, I remain of the opinion that the more physically proximate Moorabool turbines would be much more visually dominant around these road corridors. Conversely, when looking towards the Yaloak South turbines from within the Glenmore Valley, the Moorabool turbines would not be visible. There would be no ‘overlap’ between the two wind farms until one leaves the western end of the Valley via Glenmore Road.*

*Consequently, the area of visual interaction and overlap within which the Moorabool and Yaloak [South] Wind Farms would generate a combined effect (either in relation to static viewpoints or more dynamically) is primarily focussed on the plains near Fiskville ... However, all of these boundaries are subject to variations in the local terrain and the interventions of various forms of vegetation, including shelterbelts, the planting around the Fiskville Rural Fire Training facility and farm woodlots.*

*Such effects would be most apparent in the vicinity of Geelong-Ballan Rd between Lennox’s Lane and Brisbane Ranges Road. Within this sector, the combined array of Bungeeltap, Ballark and Yaloak South turbines would enclose both sides of the main road corridor and, even though avenues of viewing, relatively free of turbines, would remain open to the north-east, south-east and – from part of Hamills Lane – south-west, this part of Moorabool would effectively become an ‘energy production landscape’.*

Mr Brown concluded that:

*... it is my view that the cumulative effects generated by the two wind farms would affect an environment that is largely amenable to such development and whose sensitivity is limited – both in respect of distribution of receiving audiences and the quality of the existing environment.*

In response to questions at the Hearing, Mr Brown made the following additional comments:

- the DDO2 appears to be focussed on a quite different form of development to a wind farm;
- he did not believe there was much variation from area to area in public attitudes to the types of landscapes that were most highly valued. However, personal meanings and attachments to landscape were much more difficult to determine;
- he had made the choice of viewpoints for the photo-montages with the intention of focussing on public realm landscape considerations rather than residential amenity, though he did want to capture the experience of arriving at and departing from houses in the area;
- he was confident of the accuracy of the Truescape montages and believed that they adequately captured the context and setting of the proposal, which he believed was important.
- the visual assessment had not specifically addressed the short-term use as concrete batching plants of the sites that would eventually become the switching yards, but the assessment of these sites had indicated that they were reasonably discreet and could be screened further by planting;
- the montage (viewpoint 32) showing the view from Mt Buninyong was dominated by turbines from the Lal Lal WEF, with those from the Moorabool Proposal on the right of the photograph. The effects of turbines were less pronounced in views towards Mt Buninyong.

Moorabool Shire's presentation to the Hearing commented that it considered that it was inappropriate and a flawed methodology to rely on the contents of planning policy as a representation of community views in relation to how local people valued the Shire's landscapes. It continued:

*Council submits that failing to undertake any targeted community consultation relating to landscape values is against the intent of the pre-application consultation intentions of the WEF guidelines. In addition, it is considered that any landscape assessment undertaken for a WEF proposal needs to understand and acknowledge those landscape features which are valued by the local community.*

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*... therefore project design has not been appropriately informed by the views of the community.*

Apart from the matters discussed above, presentations to the Hearing did not raise any new issues concerning the landscape impacts of the proposal.

#### **5.3.4 Panel Response– Significant Landscapes**

In discussing the landscape and visual impact of WEFs, we note that the WEF Guidelines focus on effects on the public realm and also require the identification of any adverse amenity impacts to be balanced against the Government's policies in favour of wind energy.

We accept the submissions of the Proponent, supported by Mr Brown's evidence, that the landscapes of the area where the Moorabool WEF is proposed are not identified as significant under any Commonwealth or State legislation.

We accept too that the area is not one much visited by tourists, and that it has few recognised landscape 'attractions' that can be appreciated from public viewing sites or that act as destinations for walkers or other visitors. We also note that the traffic volumes on most local roads are low.

Overall, we consider the SBE evaluation has characterised the landscape types in the study area appropriately and that the assessment of the likely impact of the development on them is generally accurate.

However, we consider that Mr Brown has taken a rather dismissive view of the landscape values of the immediate WEF site. The landform is generally flat to undulating, with highly scenic vistas from near the escarpments into the valleys. In the Victorian context it represents an attractive, productive and relatively diverse rural landscape that appears to us to deserve more than to be characterised as just a 'working agricultural landscape' that 'does not rate – in comparative terms'.

Several clauses from the MSS, quoted above, make reference to a broad range of landscape values in the Shire, many of which are present on the site of the proposed WEF or in its immediate surrounds. However, in view of the fact that the SLO has been applied in other parts of the Shire, the absence of an SLO over the study area must be taken to imply that its landscape values have not been assessed as significant enough to warrant protection under this overlay. In addition, although the purposes of the DDO2 indicate that visual amenity in the area should be protected and enhanced, the permit provisions in the schedule apply to a very narrow range of considerations, with which the Proposal complies.

As the PAR and Mr Brown's evidence indicate, the Moorabool WEF project – especially in combination with other approved or proposed WEFs in the general area – would lead to a significant change in the rural character of the area, to the point of turning some parts of it into what was described as 'an energy landscape'.

However, despite the comments above about the attractiveness of the area, we have concluded – in the light the policy set out in the WEF Guidelines and the zoning of the subject land – that the planning application for the Moorabool WEF should not be refused or significantly altered on the basis of its impact on landscape values as viewed from the public realm.

## **5.4 Visual Amenity at Dwellings**

### **5.4.1 Planning Application Report**

The comments from the PAR on the anticipated landscape and amenity impacts of the Moorabool WEF are summarised in section 5.3.1 above. The attached report by SBE on the landscape and visual assessment outlined the methodologies used and the results in terms of the impact on views from 32 selected viewpoints (Figure 5).

The report stated that while all the viewpoints addressed effects in relation to the public realm, nine of them – 2, 9, 10, 11, 16, 21 – 26, 28 – 30 – were also located close to residential properties and gave a clear indication of the proposed WEF's anticipated impacts on a cross-section of private owners. The report evaluated the impact ratings for each viewpoint, with and without mitigation (where relevant).

The SBE report did not discuss the impacts on the visual amenity at individual residences, but it did comment that a relatively small number of residents at Mt Wallace would be affected significantly, together with residential properties located within two to five kilometres of the proposed WEF.

The discussion in the PAR of opportunities for mitigation of impacts from the WEF mentioned the possibility of planting vegetation to screen or filter views from affected residences.

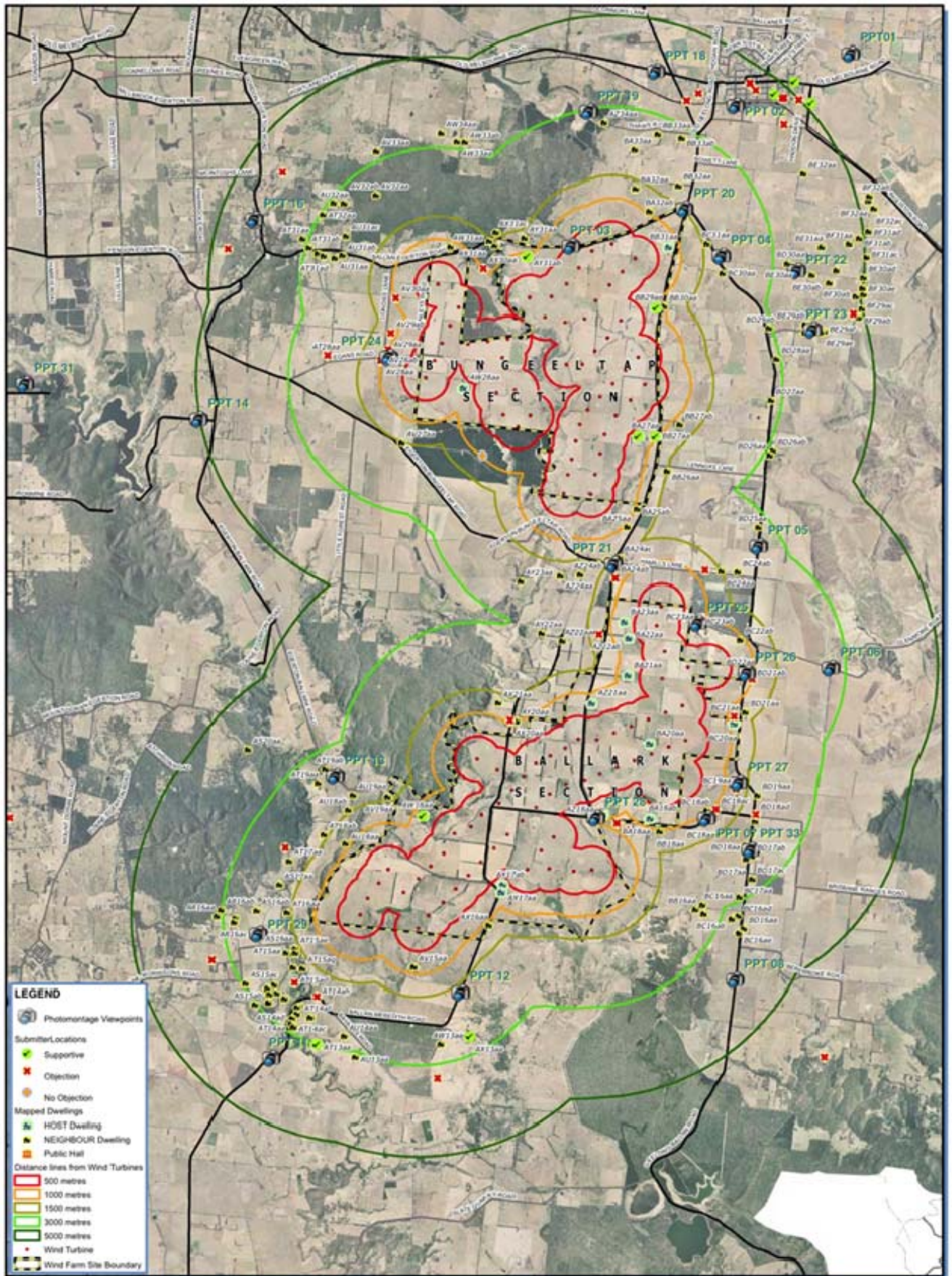


Figure 5 View Points  
Extracted from page 23 of Expert Witness Statement of Mr Stephen Brown



### 5.4.2 Submissions to the Responsible Authority

Submissions to the Responsible Authority made the following points:

- the proposed WEF would permanently destroy the landscape and visual amenity of residents in much of the surrounding area;
- the proposed development would mean that rather than seeing beautiful rural farmland, residents would be looking out onto wind energy industrial land;
- the development would detract from the serenity and beauty of individual properties and the area in general;
- submitters had chosen to relocate to the area to enjoy the aesthetic views and peaceful and enjoyable rural outlook;
- houses and gardens had been designed to take advantage of views and to frame them, not to exclude them;
- some residences would be effectively surrounded by 'monstrous' wind turbines casting shadows across the landscape and causing 'extreme visual pollution';
- the photo-montages prepared for the landscape and visual assessment did not represent the views from individual residences or residential clusters and could 'give false comfort to people who do not understand the intricacies of photo simulation and may have been misled by them';
- the cumulative effect of the proposed Moorabool WEF and the Yaloak South WEF would mean that some residents would view one wind farm out one side of their house and the other from the opposite side; and
- landscaping suggested in the PAR as a means to mitigate the visual effects would not be effective, or was not appropriate to the needs and preferences of particular submitters or the constraints applying to particular properties.

On the other hand, another submitter said that many of the houses in close proximity to the proposal were either deep in the Moorabool Valley or already had high trees close to the house that blocked their view, so that they would not see the turbines.

### 5.4.3 Evidence and Proponent's Submission to Hearing

Mr Brown, in his statement of evidence, expanded on his methodology for the assessment of landscape and visual impacts of the Moorabool WEF (as set out in the SBE report).

The evaluation considered the anticipated visual impact of the WEF on the landscape and residential properties. Truescape undertook initial mapping of visual catchments (using computer-based mapping techniques) to

determine the 'viewsheds' from which the turbines would be visible. The initial assessment of impacts on specific public viewpoints allowed Mr Brown to extrapolate to the wider area.

Additional viewpoints addressed groupings of residential properties including those in Smiths Lane, Condies Lane, Nariel Court and Bungeeltap Road South, amongst others. These included viewpoints 22-26 and 28-30. A further set of viewpoints (32-34) was added later, specifically to consider the cumulative impacts of the proposed Moorabool and Yaloak South WEFs. Mr Brown's expert witness statement said:

*These viewpoints ... were located so as to maximise exposure to the proposed turbines and were chosen because they capture both static [e.g. standing] and dynamic [e.g. driving] perceptions of the project more readily than locations within individual properties that are subject to variable levels of screening and intervention by shelterbelts, other vegetation and buildings.*

Once the locations were selected, photos were taken from these points and Truescape prepared photo-montages from them, showing the 'before' and 'after' effects of the proposed WEF on the landscape.

Mr Brown reproduced the table that listed all the indicative viewpoints (for which photo-montages were prepared) and the results of the assessment of the likely impacts of the Proposal on them – both without any mitigation action and with mitigation, where relevant. These will be considered below in relation to particular locations discussed at the Hearing.

The statement summarised work undertaken since the Application was submitted, including additional assessment of cumulative impacts with Yaloak South (discussed above in 5.3.3 in relation to the effect on broader landscape values). Mr Brown also provided some initial responses to concerns raised in submissions and included a map showing the location of photo points in relation to submitters' dwellings.

In regard to residential amenity effects, Mr Brown made the following points:

- a sizeable number of dwellings, outside the settlements, were in close proximity to the proposed WEF. These mostly comprised individual farm dwellings located within a pastoral landscape;
- existing shelterbelts and other vegetation would help to screen the WEF site from many of these properties;
- for residents within the general area bounded by the Geelong-Ballan Road to the east, Twin Lakes to the south, Ballark and Mount Egerton to the west, and Bostock Reservoir to the north, there was relatively little in

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the way of intervening ridges or screening vegetation that might reduce the Proposal's impacts on private dwellings;

- the WEF would be clearly visible from residential properties from Morrisons to Ballan (from south to north) and from the edge of the Glenmore Valley to Ballark (from east to west);
- many of the properties sat on the outer edges of the proposed WEF sections and, although they would face the turbines in one direction, avenues of viewing in other directions would remain entirely free of wind farm plant. These areas included Condies Lane, Gearys Lane, Nariel Court and around the eastern end of the Mount Wallace-Ballark Road;
- near Hamills Lane and part of the Ballan-Meredith Road, the turbines would enclose two out of the four viewing quadrants. In the case of Smiths Lane, a tree plantation immediately north of the road would compound this problem by further limiting the residents' outlooks;
- It appeared that no residents, other than on host properties, would be wholly surrounded by the proposed turbines of the Moorabool WEF. Although turbines would be prominent – even dominant – components of the future landscape, sizeable 'viewshafts' would remain free of them. This would apply to both the dwellings and the outdoor living spaces 'that are such an important adjunct to them';
- in some locations, such as around Smiths Lane and Condies Lane, the WEF would fundamentally change the outlook from a number of properties. Despite any buffering that might be available from existing or future planting, the experience of arriving and departing from the dwellings and of using local roads would still expose residents more fully to the wind farm; and
- mitigation measures would help to reduce amenity impacts, and should be sufficient both to 'downscale' the turbines and to reduce their intrusion to an acceptable level. However, such buffering and filtering 'could not hope to completely alleviate the effects'. Mitigation would be beneficial in relation to residential properties at Condies Lane, Gearys Lane, Nariel Court and around Morrisons and Dollys Creek Roads. It was less likely to be effective in Smiths Lane.

Nevertheless, he accepted that many local residents would regard the project as being intrusive.

In response to specific submissions, Mr Brown acknowledged that three properties on the western side of Mount Wallace would be appreciably affected by exposure to the proposed WEF. He said that this was reflected in the High and Moderate / High impact ratings for viewpoints 07 and 27. He continued:

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*Many of these properties are oriented away from the road corridor and wind farm site. This, together with the intervening knoll that tapers away both north and south of Mt Wallace itself, would result in the wind farm having much less visual presence and less impact, overall, than would be experienced in the immediate vicinity of Mount Wallace-Ballark Road. ... the landscape closer to the Geelong-Ballan Road is less distinctive in its own right and less susceptible to the effects of wind farm development. The flatter viewing plane from properties in that area, combined with increased viewing distance, also enhances the potential for mitigation planting to be effective ...*

Mr Brown also commented specifically on the mitigation potential of properties in Condie Lane (This is discussed in the following section).

In his discussion of the cumulative effects of the proposed Moorabool and Yaloak South WEFs, Mr Brown said that the effects would be most apparent in the vicinity of the Geelong-Ballan Road between Lennox's Lane and Brisbane Ranges Road. Parts of the area would effectively become an 'energy production landscape'.

He identified approximately six houses within this area of direct visual 'overlap', including two in Hamills Lane and two in Smiths Lane, but commented that these four were all substantially screened from the Yaloak South turbines by woodlots, shelterbelts and other planting. Some were also screened, although to a lesser degree, from the Moorabool WEF.

Ms Quigley, for the Proponent, noted that a number of submitters had made submissions about the impact of the Proposal on their visual amenity and put the view that this was an issue quite distinct from that of landscape impact in the broader and more public sense.

She canvassed discussions in previous panel reports on this issue and stated that the consensus was that residents in the Rural (now Farming) Zone could not legitimately expect the same level of amenity as that offered in other zones. The Farming Zone's purposes, she said, did not require or encourage the protection of residential amenity.

Ms Quigley said that the Bald Hills Panel Report observed that the planning system provides an underpinning of basic visual amenity standards. It referred to a test established in the Portland Wind Energy Panel Report which sought to set out a practical measure as to what those standards might be in a rural context:

*Private dwellings ... should retain outlooks that are not dominated by wind farm plant. That is not to say that a wind farm cannot affect*

*outlooks from dwellings or public places. Clearly, it may unavoidably be the case that outlooks from say 3 out of 5 habitable rooms in a dwelling or over 180 degrees of horizon from a garden may be substantially affected by development (although this does not mean that steps to mitigate such impacts should not be explored). However, it should not be acceptable in principle to dominate all available outlooks from all habitable rooms and 360 degrees of horizon from a garden, especially if a significant contributor to this effect is plant located at short range (such as switchyards or transformers).<sup>7</sup>*

She also referred to a VCAT decision<sup>8</sup> that, amongst other things, noted the following matters in its assessment:

- *the fact that wind energy facilities must be located where the wind resource is available will mean that there is inevitably some visual impact; ...*
- *visual impact on dwellings in the Farming Zone are not given any special weight in the purpose or decision guidelines of the Zone or policy;*
- *visibility does not equate to an unreasonable visual impact. ...*

Ms Quigley said that the Proponent of the Moorabool WEF recognised:

*... that there is a qualitative difference between the type of impact that may be expected from normal farming or rural activities, and the impacts of a wind energy facility, including visual appearance. Nevertheless, where a wind energy facility is permitted within the Zone, the planning scheme and case law confirm that the standard of amenity to be achieved is that supported by the planning scheme and Wind Energy Guidelines. This standard can be achieved through the use of impact mitigation measures and, if achieved, the amenity impacts on residential uses will be considered reasonable.*

A number of submitters made presentations to the Hearing that expanded on their original points concerning the likely effects of the Moorabool WEF on the amenity of their homes and properties. They stressed that on the farms and the rural-residential properties, especially those with horses, residents spent a lot of their time working outdoors, so the impact of the turbines on the house and immediate garden area was not the only concern.

The accompanied inspection on 8 June 2010 visited many of these properties and gave us an opportunity to evaluate the likely effects of the WEF on them, as well as to assess the effectiveness of the photographic simulations in

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<sup>7</sup> At pages 218-219, also quoted in *Perry v Hepburn* at para [42].

<sup>8</sup> *Perry v Hepburn* SC [2007] VCAT 1309 (27 July 2007) at paragraphs [35] to [73].

representing the likely effect from particular dwellings. We also traversed the area independently on a number of occasions and noted other areas that might be of concern.

The key houses or groups of houses identified included the following that were the subject of submissions:

- properties in Condies Lane and Egans Road, Mt Egerton;
- properties in Mt Wallace-Ballark Road, Mt Wallace;
- properties in Geelong-Ballan Road, Mt Wallace; and
- properties in Forest Road, Morrisons, and Elaine-Edgerton Road.

At the request of the panel, Mr Brown later considered several of the most affected properties in more detail and provided an assessment of whether removal of one or more turbines would assist in mitigating the effects on residents. Ms Quigley put a position on these recommendations on behalf of the Proponent in her closing submission. These properties and groups of properties are discussed below.

Other non-host properties were identified, from which a large array of turbines would be visible and where mitigation did not appear to be easy. These included:

- A group of houses on the edge of the escarpment of the Moorabool River, heading north from the corner of the Egerton-Bungeeltap Road and the Ballan-Meredith Road opposite Hamills Lane (houses BA24aa, BA25aa and BA25ab). In relation to these properties, Mr Brown commented:

*There is little point in deleting specific turbines where the effects generated by the proposal relate to exposure to multiple turbines or even the great bulk of the turbines proposed for Bungeeltap and/or Ballark.*

- Properties in Smiths Lane, one of which (house BC23aa) was recorded as being one of the closest non-host houses to a turbine (895m).

No submissions were received in relation to the houses along the Ballan-Meredith Road north of Egerton-Bungeeltap Road. A resident in Smiths Lane lodged a submission but did not object to the WEF, although asking for a condition regarding signage, to reduce the risk from traffic to small children in the area. Therefore, no specific consideration has been given to these groups of houses in this report (apart from the application of the proposed permit conditions relating to landscaping, discussed below).

#### 5.4.4 Effects on Specific Properties

##### Condies Lane and Egans Road

Submissions were received concerning three adjoining properties in Condies Lane and two nearby in Egans Road; presentations were made to the Hearing concerning three of them. The accompanied site inspection provided an opportunity to view four of the houses and their surrounds.

Mr Brown's expert witness statement included some specific commentary on this group of houses. He noted that submissions had raised concerns about the likely effectiveness of mitigation planting and commented that it was notable that most of the farmland east of Condies Road was already visually 'subdivided' and contained by rows or groups of trees. He believed that additional planting within the farm and rural-residential properties immediately east of Condies Lane could filter and, over time, screen out the effects of the WEF.

Mr Brown commented that Viewpoint 24 gave some idea of the relative scale of both existing planting and the proposed turbines; he also included a photograph showing the house at 145 Condies Lane, just in the edge of the picture that had been used for the viewpoint. The main taller body of shelterbelt planting was over one kilometre from the photo location, with an intervening row of immature vegetation only a little closer (800m).

As a result, the relationship of the vegetation in the montage to the turbines failed to convey a realistic impression of the potential effect of new mitigation planting, either much closer to the viewpoint or more pertinently, between the house and the turbines. Over time, eucalypts, perhaps in conjunction with a second layer of more solid pines or conifers, would progressively filter the lower reaches of the turbine towers, then nacelles and blades. Mr Brown acknowledged, however, that the mitigation potential for properties in Condies Lane was only moderate, as:

*... their more elevated blades and nacelles would, in all likelihood, remain visible, even prominent.*

For the most northerly of the properties, at 73 Condies Lane (house AV30aa on the Proponent's numbering system), the owners pointed out in their submissions and presentation:

- the orientation of the main rooms of the house to take advantage of the views to the east as well as to the front of the block;
- the location of outdoor entertaining areas at the rear (eastern side) of the dwelling to provide shelter from the westerly sun in summer;

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- one turbine would be only 959.5 metres from the house, right in the middle of their view to Mt Blackwood and situated in a clear paddock beyond (north) of the shelterbelt along Manleys Road;
  - aviation lighting was a major concern, as 'we truly do not want to have the resemblance of a disco effect every night' and they did not want to have to cover windows at night.

For the middle property (house AV29ab) at 145 Condis Lane, the owners said:

- some rooms, particularly those upstairs, would have clear views of turbines;
- trees near the house were too close for fire safety and would need to be removed in the relatively near future, which would worsen the visual impact;
- it would not be possible to plant too many additional trees in the paddocks without impacting on their livestock operation; and
- after viewing the montage, they could not see how there could be any meaningful screening or mitigation from high turbines, when Mr Brown had acknowledged that the upper parts would remain visible or even prominent. 'That assessment is very distressing, albeit honest'.

Mr Brown, in response to questions at the Hearing, suggested that mitigation measures might include a double row of planting (eucalypts and conifers) to help to screen the lower parts of the turbine towers over time and break up the higher views and diminish their scale. For Condis Lane in general, he said that trees needed to be near enough to the houses to be effective, but not so close that they would overshadow the dwelling or dominate the outlook.

For the house at 183 Condis Lane (house AV29aa), located just north of the location used for Viewpoint 24, the montage shows four turbines just beyond the various shelterbelts on Manleys and Egans Roads and at least seven others at varying distances beyond that. The owners pointed to:

- the lack of window coverings in some rooms, due to the health requirements of a family member, and the need to leave windows open for cross-ventilation;
- the location of septic tank disposal lines, that would limit options for planting to the south and south-east of the house and fire safety considerations that meant that trees should not be planted too close to the house;
- the fact that on their calculations, turbines would be visible from most of the major living areas and bedrooms, with seven in view from the main bedroom on the north-east corner of the house, eight from the main north-facing living room on the ground floor, seven from the upstairs



lounge and thirteen from the upstairs bedroom on the south-western corner of the house;

- the fact that most of the screening vegetation referred to by Mr Brown was on adjoining properties, over which they had no control;
- the slow growth rate of trees in the area, due to the soil type, and their lack of permanence as mitigation solutions; and
- the imposition that would be placed on them if they had to give over substantial areas of their property to planting in order to screen out the turbines (loss of land for pastoral activities, restrictions on surveillance of stock and views from the house, fire risk, increased home maintenance and changes to the water balance).

The owners of 210 Egans Road (house AV28av) pointed to their concern over aviation lighting and the fact that the screening vegetation was on a neighbouring property and they could not ensure that it would be retained.

In Mr Brown's supplementary letter to the Panel (4 June 2010) he stated that there were a number of turbines that generated or exacerbated specific private residential amenity effects in relation to a small number of properties. He believed that removal of these turbines could help to appreciably reduce impacts on these properties.

He suggested removing BUWT07, the most northerly of the array closest to Condie's Lane and Egans Road, because of its impacts on 73 Condie's Lane. He continued:

*Although turbines BUWT12, 17, 21, 26 and 31 are also located relatively close to housing in both Condie's Lane and Egans Road, existing shelterbelts and amenity planting (especially around the well-established residence at 145 Condie's Lane) and the orientation of other housing (such as that at 185 Condie's Lane) which is aligned north and south – perpendicular to views of the proposed turbines – afford a degree of mitigation already that would be augmented by additional planting.*

He also recommended specific mitigation measures for 73 Condie's Lane, including supplementing the existing eucalypts to the east of the house with a double line of new planting (eucalypts or pines, fronted by cypress or similar conifers) to add another layer of more substantial screening over time.

One of the owners of 145 Condie's Lane, in a presentation to the Hearing, supported removal of Turbine BUWT07, but asked for the others in the line – BUWT 12, 17, 21 and 26 – to be removed as well. She also sought a guarantee that the trees (shelterbelt) in Manley's Road would be protected.

Ms Quigley, in her closing submission for the Proponent, pointed out that there is no 'right to a view' protected by planning law, but acknowledged that visual amenity was part of residential amenity.

With regard to the properties in Condis Lane, she referred the Panel to Mr Brown's additional advice of 4 June 2010. She advised that the Proponent intended to work with host landholders to ensure that they retained shelterbelts on their land and suggested that a permit condition might be required to ensure that this requirement was carried forward.

### **Mount Wallace-Ballark Road**

Submissions were received concerning two houses in Mount Wallace-Ballark Road, Mt Wallace. The owners of one of the properties were away during the Hearing, but made a detailed supplementary submission in writing. The owners of the other property presented to the Hearing. The accompanied site inspection allowed the first property to be viewed from outside the fence and the second to be inspected in detail.

The submission concerning the house at 80 Mount Wallace-Ballark Road (house BC18ac) put the view that the photo-montage from Viewpoint 07 on the Mount Wallace-Ballark Road – looking north-west from the vicinity of their residence – was misleading, as the height of the turbines in relation to the landscape was not shown in the correct proportions. The nearest turbine, they calculated, would be 1.2 kilometres away. The submission included photographs from the porch on the west side of the house and from the verandah on the north side, superimposed with an impression of the number of turbines that would be visible from these vantage points, at what they believed was the correct size.

In relation to the house at 307 Mount Wallace-Ballark Road (house BA18aa) – for which the nearest photo-montage is Viewpoint 28 – the owners stated that:

- their house had host properties all around and would have turbines in almost a 360° arc around it;
- the only side of the property that would not have a view of turbines was the eastern view, and the house had no windows in that wall; and
- turbines would severely reduce their visual amenity and enjoyment of their property, which is used for horse breeding.

Mr Brown, in response to questions at the Hearing, noted that the house at 307 Mount Wallace-Ballark Road would experience a significant, but not exceptional, effect from the wind farm. Shelterbelts around the house and the horse paddocks would provide some screening.

In his 4 June letter, he recommended removal of turbine BAWT49, which was 1.16 kilometres south-west of the house at 307 Mount Wallace-Ballark Road, because of the perceived enclosure of the residence. Removal of the turbine would help to expand the area of visible open space south and east of the property that was free of turbines. He also stated:

*Consideration was also given to removing turbines north of the adjoining road [presumably Mount Wallace-Ballark Road] but as the effects generated in that direction relate to the greater mass of the turbines north-west of Mount Wallace, it would be impractical to address such effects.*

Mr Brown recommended establishing new double rows of vegetation south and west of the dwelling. He also suggested planting pines in the property across the road to the north (a host property) to close the 'gap' in the shelterbelt along the road, through which the residents would otherwise see large parts of the Ballark section of the WEF.

With regard to the house at 307 Mount Wallace-Ballark Road, Ms Quigley referred the Panel to Mr Brown's additional advice of 4 June 2010.

### **Geelong-Ballan Road**

Submissions and presentations were made in relation to two properties in Geelong-Ballan Road, between Brisbane Ranges Road and Glenmore Road. Both of these properties were visited during the accompanied site inspection. The closest photo-montages to these properties are Viewpoints 26 and 27 (north and south respectively) and the cumulative simulation of Moorabool and Yaloak WEFs (PPT33).

For 4067 Geelong-Ballan Road, on the west side of the road (house BC21aa), one of the residents was particularly concerned with the proximity of the proposed Moorabool turbines to the west and south west – within 1.1-2 kilometres of the house. They would be highly visible from the area where she worked regularly with the livestock kept on the property.

For 4152 Geelong-Ballan Road, the owners presented an extensive submission that:

- objected to the fact that the montage only showed the turbines and the meteorological masts, when there were other elements, such as transmission lines, that would also have a major effect on the visual amenity of the area;
- emphasised the cumulative impact that the Moorabool and Yaloak South WEFs would have on their property, as acknowledged by Mr Brown;

- summarised the number of turbines that would be visible from their home: from 16-25 from west-facing rooms including the main living space and bedrooms (including three Yaloak South turbines); 14 from east-facing rooms (all Yaloak South). Of these, between three and six turbines would be 100% visible from each of the main west-facing rooms;
- stated that the pine trees at the front of the property, that provided screening at present, were due to be removed on safety grounds and other areas close to the fenceline could not be planted because they were being treated to eradicate gorse; and
- expressed concerns about the planting proposals suggested by Mr Brown, due to the need to maintain surveillance of the foaling paddocks and other areas where valuable stock was kept.

Mr Brown, in response to questions at the Hearing about 4152 Geelong-Ballan Road, commented that the owners were in a difficult situation because of the orientation of the house and the fact that it would face directly out onto the Moorabool WEF to the west and were also exposed to Yaloak South on the east. The walls of the house facing the directions in which there would be no turbines had no windows. He agreed that removal of one or more turbines could be an option for amelioration.

In his letter of 4 June 2010, Mr Brown suggested removing turbine BAWT04, to the north-west, which was 997.6 metres from the house at 1452 [4152] Geelong-Ballan Road. The house faced directly towards this and other Moorabool turbines and the proposed Yaloak South turbines. While removal of BAWT04 would not entirely alleviate the cumulative effects, it would help to reduce the perceived proximity and dominance of the Moorabool project and the cumulative effects. Even if Yaloak South were not approved, he considered that removal of the Moorabool WEF turbine was justified.

Mr Brown also made detailed planting suggestions for 4152 Geelong-Ballan Road, which the owners later told the Hearing that they rejected, as they did not suit the needs of their property or business. They also asked for the removal of turbines BAWT 03, 05, 06, 08 and 14, as well as the one recommended by Mr Brown.

Ms Quigley, in her closing submission, questioned the submitters' calculation of the numbers of turbines visible and commented that the circumstances of this property did not put it into the 'extreme' situation referred to in her earlier reference to the Bald Hills and Portland panels (quoted above). She put the view that the major impacts would be from Yaloak South and turbines to the east, since the views of the Moorabool site were more effectively screened. Nevertheless, she referred the Panel to Mr Brown's additional advice.

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### **Forest Road, Morrisons, and Elaine-Edgerton Road**

The owners of the properties at 430 Forest Road, Morrisons (house AS20aa) and Elaine-Edgerton Road were concerned about the impacts on views from parts of the land that they used for recreation and relaxation, and on the outlook from a second dwelling on the Forest Road property. They requested that a number of turbines be removed from the Proposal, mainly on health grounds.

There is no photo-montage that represents the vista from any of these locations. The site inspection included visits to a number of places on these properties.

Mr Brown and Ms Quigley made no specific comments in relation to visual amenity at these properties.

#### **5.4.5 Other panels' treatment of visual amenity**

The panel report on the Lal Lal WEF (February 2009) endorsed the recommendation of the Bald Hills panel that it was important to identify all dwellings within three kilometres of any proposed wind turbine.

The Lal Lal report went on to say that the application material should include information on the number of turbines visible from each residence and the distances between dwellings and turbines. This would assist residents to understand the implications of the Proposal and would also provide a basis for assessing potential impacts on individual properties. It suggested that montages should be prepared for all properties initially assessed as likely to experience a high impact.

The report proposed that the Minister should consider amending the WEF Guidelines to require visual assessments of all properties within three kilometres of proposed turbines, identification of all turbines potentially visible from them, and provision of photomontages of views from properties or clusters of properties where the impact on visual amenity without mitigation is rated as 'high' on the initial assessment.

#### **5.4.6 Panel Response– visual amenity of dwellings**

We have considered carefully the submissions, presentations and evidence put to us and also evaluated the likely impacts on residential amenity from our own observations during site inspections (accompanied and otherwise) and the photographs of the area and individual properties taken at the time.

We have concluded that Mr Brown's initial approach to assessing the impacts on residential amenity met the letter of the WEF Guidelines and identified areas of relatively high impact in general terms. However, it did not go to the level of specific assessments of houses or groups of houses (as recommended by the Lal Lal Panel), and as a result, a number of the properties on which the effects would be felt most strongly are not well represented by the viewpoints in the photo-montages. This is particularly true of the house at 307 Mt Wallace-Ballark Road. However, we have been assisted by Mr Brown's later evaluations and recommendations concerning individual properties.

We endorse the views of the Lal Lal Panel concerning the need for assessments to consider fully the likely impacts on particular properties, rather than just focussing on the public realm.

Although we acknowledge the stress in the WEF Guidelines on balancing the amenity impacts on individuals against the Government's strong support for the development of wind energy, we do not consider that this obliges us to recommend approval – or rejection – of the whole WEF as a package. We believe that if the removal of one or more turbines makes an appreciable difference to the situation of a resident (or residents) who would otherwise experience a major loss of amenity, then this should be able to be accommodated without adverse impacts on the project as a whole.

As a result, we have adopted Mr Brown's recommendations to delete turbines BAWT04, BAWT49 and BUWT07, which are in close proximity to and highly visible from residences, in order to reduce the impact on specific properties. We note that Ms Quigley, on behalf of the Proponent, did not oppose these amendments.

We have also accepted Mr Brown's reasons for not recommending removal of larger numbers of turbines in the Bungeeltap section – as requested by submitters in Condis Lane – or the Ballark section, as requested by residents in Geelong-Ballan Road. The exposure of the properties discussed to large numbers of turbines (though at a greater distance) cannot be significantly addressed by removing a small number of them.

We have not recommended any turbines be removed from the vicinity of the property in Forest Road, Morrison's. This is because the turbines are considerably further away (more than three kilometres) and would not be visible from the main residence or the cottage. The second house may have an oblique view of turbines, but would certainly not be dominated by them, while the residential building on the upper property is only occupied intermittently.

In making our recommendations on visual amenity, we have given less emphasis to the impacts likely to be experienced by residents on parts of their properties beyond the house and its immediate surrounds, although we recognise that these will be substantial for many people.

We note that the Proponent has accepted the Draft Permit Conditions requiring an offer of landscaping mitigation to all owners within three kilometres of the site, where a turbine is visible. If the offer is accepted, a landscaping plan must be prepared and implemented for each dwelling, in consultation with owners. The Proponent will be obliged to fund the establishment of the vegetation and its maintenance for two years.

We accept that there will be circumstances where complete screening of the WEF would be impossible, but believe that the adverse visual amenity impacts on most residences can be softened over time by appropriate use of vegetation.

#### **5.4.7 Recommendations – Visual Amenity at Dwellings**

**Condition 1 of the Draft Permit Conditions should be amended to require removal of turbines BAWT04, BAWT07 and BUWT49 from the development plan to be submitted for approval.**

**An additional condition should be added following the section on Off-Site Landscaping Plans, requiring the Proponent to enter into an agreement with host landholders concerning: retention of vegetation that provides screening to the houses of non-host neighbours; and providing land for new screening vegetation to be established, as required by an off-site landscaping plan for a specific dwelling, as shown in the Recommended Permit conditions attached.**

### **5.5 Aviation Night Lighting and Visual Impact**

#### **5.5.1 Planning Application Report**

The landscape and visual assessment<sup>9</sup> that formed part of the planning application stated:

*At the time of writing, hazard lighting is not required for the proposal. However, the proponent has advised that the Moorabool Wind Project will employ 21 red aviation hazard lights on turbines that effectively define the extremities of each site ... The proponent may choose to operate*

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<sup>9</sup> Moorabool Wind Project – Landscape & Visual Impact Assessment (November 2009) Prepared by Stephen Brown Environments Ltd for WestWind Energy Pty Ltd.

*the lighting during the period 30 minutes before and after sunrise and sunset, and during conditions of reduced visibility caused by smoke, dust or haze.*

On this basis, SBE concluded:

*The hour-long lighting of turbines at twilight would change the qualities and character of the sky for a brief period of time each day. This would tend to reinforce some of the reduction of rural character already described and would lessen the sense of remoteness perhaps experienced by some local residents, but would not be intrusive. More importantly, it would have a very limited impact on the true night sky and the experience of solitude for most of each night.*

However, the PAR itself noted that although the SBE landscape and visual assessment was carried out on the basis described above, permission was now sought to light a total of 68 turbines – 30 in the Bungeeltap section and 38 in the Ballark section (as shown in Figure 5 of the PAR and included in this report as Figure 3).

## **5.5.2 Submissions to the Responsible Authority**

Submissions to the Responsible Authority included:

- strong concern about lights and their impact in an otherwise dark and uninterrupted night environment – ‘truly a horror scenario’;
- flashing lights would be highly intrusive, would be visible over a long distance and were totally unacceptable in a rural residential area;
- sunset views would be destroyed by turbines, powerlines and lights; and
- concerns about the effect of lighting on livestock, particularly horses.

## **5.5.3 Evidence and Submissions to Hearing**

Mr Brown’s expert witness report noted that he had been advised of the changes in the number of lights to be installed, but that the timing of their use was proposed to be the same as in his original report. He had undertaken a further review of the visual impacts of the lights.

He confirmed his original view that lighting at sunset and sunrise would minimise the visual intrusion of the lights and explained that colours in the landscape are more ‘washed out’ at these times, so the lights would not appear so bright against them. In contrast, in the darkness of full night, the effect of the lights would become far more pronounced, in the absence of other unnatural stimuli. He illustrated these points with photographs from wind farms in other locations.



Mr Brown continued:

*While the proposed hazard lights would still be clearly visible, [at sunrise and sunset] I regard them as being at their least 'damaging' – in terms of landscape values – during the operational sequences proposed.*

*Having said this, both the physical extent of the proposed lighting and the number of lights involved are extensive, and my own experience with both shielded and non-shielded light at [other WEFs] – both of which operate through the night – leads me to believe that the hazard lighting would still have an impact upon:*

- *the perceived solitude and rural/natural character of the night-time landscape; and*
- *perceptions of the night sky and its star field.*

*Such intrusion would be exacerbated by the attention grabbing 'on-off' flashing of the lights. ... The wind farm would therefore change the fundamental character of Moorabool's late evening and early morning skyline.*

*Yet, as I have already indicated, the timing of operational use would minimise this impact; it would also limit any direct intrusion and nuisance effects in relation to nearby dwellings. Indeed, those living closer to the proposed turbines would see their visual profile contract to just the lights at the end of each day, then disappear. As a result, it is my opinion that the lights would ultimately have quite a limited and acceptable degree of impact in relation to the night panorama, darkness, solitude and other values associated with the night 'landscape' at present.*

Mr Brown supported the draft permit conditions regarding operating the lights in unison and baffling, and recommended that reflection on adjacent blades should be minimised through the surface treatment of a small area on the back of the blade near the rotor hub.

At the Hearing, Mr Brown commented that the use of non-reflective paint is quite effective in reducing strobing – reflection of light along turning rotor blades – and in any case this effect is less obvious at twilight or at a distance from the turbines.

Submitters reiterated their concerns about aviation night lighting and pointed out that at present they do not have or do not use blinds or curtains in their living rooms or bedrooms at night and do not wish to have to do so in future. One submitter challenged Mr Brown's view that the lights would be less noticeable at sunrise and sunset and suggested that the contrast of the red lights set against the grey twilight or early morning skies would

exacerbate the visual presence and projection of the WEF and impact on numerous landholders and homeowners.

In response to a request from the Panel, Mr Brown submitted a further assessment (dated 4 June 2010) of the potential effects that might arise from the use of aviation hazard lighting throughout each night.

He discussed the extent of the receiving environments that might be affected by night-time lighting and concluded that, as well as the areas from which the WEF would be most prominent in day-time – the broad catchment stretching from Meredith to Ballan and from Mt Wallace to Ballark – the lights might make the WEF visible at night from as far away as areas south of Meredith and the Midland highway as well as north of the Western Freeway. Most of Mt Egerton, Gordon, Lal Lal, Buninyong and Ballarat would remain substantially screened by intervening terrain and bush.

*In the cases of Ballan, Elaine, Meredith and Mount Wallace, a larger number of peripheral properties, facing the wind farm sites, would be exposed to night-time lighting. Yet the greater bulk of these settlements would be screened from the turbines and lights, again by natural elements, but also by intervening houses, other domestic structures and garden vegetation at the edge of each settlement.*

He noted, from observations at other WEFs, that night lighting could be clearly visible over viewing distances up to, or even in excess of, 20 kilometres, although this was much more marked when the turbines were located on ridgelines rather than relatively flat land. The colour, layout, numbers and flashing of aviation night lights on WEFs made them highly distinctive and clearly differentiated them from other light sources. Shielding (baffling) of lights helped to reduce the impact in the 'near field' of around two kilometres from the turbines, but had little effect on their visibility from further away.

He noted the differences in topography for the Moorabool WEF site, compared with the examples he had used, but said:

*... the sorts of effects suggest that if aviation hazard lighting was to be installed at Moorabool (to the extent required in the earlier CASA [Civil Aviation Safety Authority] circular) then its impact on visual amenity would be significant.*

...

*The prominence of the night lighting, exacerbated by their flashing would also be intrusive in relation to nearby farm properties and houses, while the more general feelings of remoteness and isolation associated with parts of the Moorabool catchment – especially near the Brisbane Ranges*

*and lower stem of the Moorabool River – would also be compromised to an appreciable degree.*

*... for those residents living close to the Bungeeltap and Ballark sites, who would clearly see the main turbine structure during the day, night-time exposure would still contract to just the lights. In addition, most residents would, within their homes, curtain off the lights, so that they are likely to have little impact on the vast majority of domestic activities. Shielding of the lights should further help to prevent any 'near field' nuisance effects.*

Mr Brown also drew attention to new lighting technologies that had the potential for further attenuation of night-time lighting effects. He concluded:

*Overall, I still consider that the effects of such lighting during the hours of 'full darkness' would be appreciably greater than the effects that I have previously described in my evidence in relation to lighting at twilight and early morning, as is currently proposed by the proponent. Full night-time lighting would change the nature of the night sky within and around Moorabool. However, such effects would be less significant in relation to most local settlements than they would be in relation to the night sky as perceived by those living within, or travelling through, the local countryside. I do not, however, consider that such lighting would generate any 'nuisance effects' in relation to Moorabool's rural inhabitants.*

#### **5.5.4 Panel Response – Aviation Night Lighting and Visual impact**

We have noted the following points from the PAR and the submissions and evidence put to the Hearing:

- there is currently no requirement for aviation hazard lighting of wind turbines of the height proposed for the Moorabool WEF. (This is discussed further in Chapter 8 below);
- the Proponent wishes to install lighting as a precautionary measure in case civil aviation authorities subsequently re-institute requirements for WEFs to be lit;
- the impact of lighting, particularly for the full period of darkness, would have an appreciable impact on the night environment of the study area and areas as far away as the Midland Highway and the Western Freeway;
- the residents of the area are accustomed to a night sky without significant artificial light sources;
- the need to use curtains or blinds might conflict with personal preferences and with natural ventilation of homes, particularly in summer; and

- while the selection of lights, baffling, non-reflective treatment of blades and the like might reduce light distribution and the likelihood of strobing (which is what we have taken Mr Brown to mean when he refers to 'nuisance effects'), arrays of red, flashing lights would still be clearly visible from inside a considerable number of houses.

We have concluded that the proposal to install lighting is, effectively, a voluntary measure proposed by the Proponent in anticipation of future regulatory requirements. We have also concluded that the residents' desire for a natural night sky is understandable and reasonable: while occasional interruptions from lights from farm plant and equipment may be expected in a Farming Zone, these would normally be seasonal or intermittent, and of relatively short duration.

As a result we see no reason why residents around the proposed Moorabool WEF should be subjected to an additional and avoidable intrusion from the operation of the project. We recognise, however, that there would be operational advantages to the Proponent if the lights were installed before the turbines are erected, rather than having to retrofit them afterwards.

We have concluded that, if a permit for the project is to be issued, it should allow the installation of the lighting proposed – subject to the conditions set out in the draft planning permit – but should also include a condition that prohibits the use of the lights until the Proponent has provided the Minister for Planning with proof that such lighting is required:

- as a result of a CASA requirement; or
- by the results of a risk assessment completed by a member of the Risk Management Institution of Australasia accredited as a Certified Risk Manager that shows that operation without lighting creates an unacceptable public risk.

### **5.5.5 Recommendations – Aviation Night Lighting and Visual Impact**

**Draft Permit Condition 2(O)(iv) should be amended to provide that although aviation lighting may be installed (as specified) the lights may not be operated unless the Minister for Planning is satisfied that they are required:**

- **By the Civil Aviation Safety Authority; or**
- **In response to a risk assessment completed by a member of the Risk Management Institution of Australasia accredited as a Certified Risk Manager that shows that lighting is required to reduce the public risk to an acceptable level.**

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## 6. Noise Impacts

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### 6.1 What are the Issues?

The issues in regard to noise impacts identified by the Proponent, expert witnesses, submitters and the Panel include the following:

- the appropriate “Noise Standard” to be applied, in particular the choice between New Zealand Standard 6808:2010 *Acoustics – Wind Farm Noise* (NZ6808:2010) and New Zealand Standard 6808:1998 *Acoustics – The Assessment and Measurement of Sound from Wind Turbine Generators* (NZ6808:1998);
- the noise limits that should be set including:
  - allowances if the area is recognised as one of high acoustic amenity;
  - imposition of “penalties” for the characteristics of noise generated by wind turbines;
  - the translation of indoor noise limits to outdoor noise limits;
  - limits set to prohibit “unreasonable noise”; and
  - limits on low frequency noise and infrasound.
- The adequacy of the noise assessment provided in support of the Application, in terms of:
  - whether compliance is predicted;
  - the methodology utilised to measure and analyse background sound levels and wind speeds;
  - the selection of sites for measurement of background sound levels; and
  - modelling to provide predictions of WEF sound level for cumulative impact assessment.
- Compliance, including the need for and form of post-construction compliance monitoring and enforcement.

## 6.2 Policy Context of the Issues

The Planning Scheme states that:

- Applications for WEFs must be accompanied by, amongst other things an assessment of the noise impact of the proposal based on the New Zealand Standard NZS6808:1998, *Acoustics – The Assessment and Measurement of Sound from Wind Turbine Generators*<sup>10</sup>; and
- before deciding on an application a responsible authority must consider, amongst other things, the WEF Guidelines, an incorporated document of the Planning Scheme.<sup>11</sup>

The WEF Guidelines state that:

*A wind energy facility should comply with the noise levels recommended for dwellings in the New Zealand Standard NZ6808:1998 Acoustics – The Assessment and Measurement of Sound from Wind Turbine Generators.*

*During the assessment phase of the noise impact, particular attention to the following matters within the Standard is required:*

- *Separate correlation of background sound levels with the wind speed for different wind directions and/or the time of day (Clause 4.5.5 of the Standard); and*
- *Wind speed measurements at the hub height of the proposed turbines as recommended in the Note to Clause 4.5.6.<sup>12</sup>*

The WEF Guidelines also provide guidance regarding post installation noise compliance requiring that post installation compliance testing be required by permit condition and indicating that such testing requires particular expertise and documentation of such testing should be signed by independent, appropriately qualified and experienced person, to the satisfaction of the responsible authority.

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<sup>10</sup> Moorabool Planning Scheme Clause 52.32-2

<sup>11</sup> Moorabool Planning Scheme Clause 52.32-3

<sup>12</sup> WEF Guidelines Section 4.9.1, sub-section 3 (a)

## 6.3 What Noise Standards Should Apply?

### 6.3.1 Planning Application Report

The PAR included a noise impact assessment conducted by Marshall Day Acoustics Pty Ltd and a report on that assessment was included as Attachment 7 to the PAR.

For the purpose of the noise assessment the Proponent and its consultants assumed that NZ6808:1998 was the applicable standard.

### 6.3.2 Evidence and Submissions

While both the Planning Scheme and the WEF Guidelines refer to NZ6808:1998, on the 1 March 2010 Standards New Zealand published a revision of that standard, NZ6808:2010. A significant number of written submissions suggested that the revised standard should be applied on the basis that it was more up to date.

The question of the appropriate standard was also considered by the Victorian Civil and Administrative Tribunal (VCAT) in *The Sisters Wind Farm v Moyne Shire Council* (VCAT Reference P2107/2009). In what is now commonly known as “the Sisters decision” the tribunal found that:

*With respect to the appropriate standard to apply we accept Ms Marshall’s submission that under the Interpretation of Legislation Act 1984 the reference to the 1998 New Zealand Standard in the Policy Guideline and the Planning Scheme should be read as a reference to the 2010 New Zealand Standard.<sup>13</sup>*

In light of this situation we directed DPCD to address the issue of the relevant noise standard and to advise us as to the appropriate standard. All other parties were invited to address the issue in their submissions.

DPCD’s submission at the Hearing included the following:

*Clause 52.32 of the planning scheme requires an assessment of noise impacts based on New Zealand Standard NZS6808:1998 and requires responsible authorities to consider the ‘Policy and planning guidelines for the development of wind energy facilities in Victoria’ (2009). To reduce amenity impacts from noise, the guidelines recommend that wind*

<sup>13</sup> VCAT Reference No P2107/2009 *The Sisters Wind Farm vs Moyne SC* Reasons Para 17

*energy facilities comply with the noise levels recommended in NZ6808:1998.*<sup>14</sup>

*The 1998 New Zealand standard is used in the guidelines on the basis that it was the most comprehensive document that provided an absolute noise level for wind farm performance. As the guidelines are an incorporated document under clause 81.01 of the planning scheme, it is a legal requirement for a wind energy facility to be assessed against the 1998 New Zealand standard. The panel may wish to use relevant contextual matter in a discretionary way, particularly for matters not covered in NZS6808:1998,*<sup>15</sup>

The Proponent presented a detailed analysis of the Sisters decision and concluded that:

- a) *In summary, it is the proponent's submission that the relevant standard to be applied to the Proposal is NZS1998:6808.*
- b) *In our view, the Sisters case was wrongly decided in relation to the application of NZS6808:2010 and in the way NZS6808:2010 was applied, and the decision should be given no weight by the Panel. It is noted that it appears the Tribunal did not have the benefit of full submissions and argument in relation to the key legal and technical issues involved and the relevant Tribunal members are not legal members.*
- c) *In general, it is appropriate for this Panel to follow the assessment approaches and decisions of other Panels and the Tribunal in order to achieve the goal of consistency stated in the Wind Energy Guidelines.*
- d) *However, in no way can it be said that the Sisters decision sets a precedent which would limit this Panel. The reasons for this are:*
  1. *this Panel, like the Tribunal, is not bound to follow a decision of the Tribunal; and*
  2. *more importantly, there is no precedent value in The Sisters decision as it is patently wrong at law.*<sup>16</sup>

The Proponent's submission was that:

1. *the Tribunal was incorrect in determining that NZS6808:2010 should be applied under the Interpretation of Legislation Act 1987;*

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<sup>14</sup> DPCD Submission to Moorabool Wind Energy Facility Panel, Para 143

<sup>15</sup> DPCD Submission to Moorabool Wind Energy Facility Panel, Para 144

<sup>16</sup> Submission to Panel Part A – regulatory framework, Freehills for WestWind Energy , Section 10.7



2. *despite this, a responsible authority can have regard to extraneous documents such as NZS6808:2010 if they are considered to be a 'relevant matter'. NZS6808:2010 should be given minimal weight given that clause 52.32 and the Policy and planning guidelines for development of wind energy facilities in Victoria (September 2009) ('Wind Energy Guidelines') refer specifically to NZS6808:1998;*
3. *however, even if NZS6808:2010 were applicable in Victoria, the way it was applied and interpreted by the Tribunal in the Sisters decision was wrong on legal and acoustic grounds<sup>17</sup>.*

A number of submissions presented at the Hearing suggested that NZ6808:2010 should be applied in preference to NZ6808:1988 because the revised standard was more up to date and would provide a greater degree of amenity protection. In addition we were provided with a copy of an email from Mr Geoff Howard MLA for Ballarat East to one of the submitters stating:

*I include the following media release for your interest.*

*Minister Madden's office advises today that the advisory committee to be appointed will act in a similar way to a panel and the decision on Yaloak will run alongside the Moorabool application being considered by a panel.*

*This means that there will be opportunity for the community to respond and the decisions to permit will not be taken without reference to each other.*

*I am also advised that the latest New Zealand noise standards will be taken into account as will the National guidelines even though they are yet to be finalised and approved.*

*Regards*

*Geoff Howard*

*MLA Ballarat East<sup>18</sup>*

Several submissions also included reference to guidelines used in other jurisdictions, such as the South Australian EPA Guidelines, that it was contended establish lower noise limits.

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<sup>17</sup> Submission to Panel Part A – regulatory framework, Freehills for WestWind Energy, Section 10 (b)

<sup>18</sup> Email Geoff Howard MLA to Deeplake Stud, 18<sup>th</sup> May 2010

The evidence provided by Mr Delaire indicated that the noise assessment completed for the Application had been completed in accordance with NZ6808:1998, as is required by the WEF Guidelines, but he also provided evidence that the Proposal is predicted to comply with noise limits specified in NZ6808:2010.

The acoustic evidence provided by Mr Huson and Dr Thorne did not address the question of whether NZ6808:2010 should be preferred over NZ6808:1998 but concentrated on the interpretation and adequacy, or otherwise, of both versions and suggested alternative approaches and methodologies.

In addition to the submissions and evidence provided directly, we were also advised that the Mortlake Wind Farm Panel had provided parties to that hearing the opportunity to provide written submissions on the application of NZ6808:1998 compared to the application of NZ6808:2010. We were provided with copies of those written submissions and while some of the material provided was detailed, it did not include any different views to those expressed directly to us.

### **6.3.3 Panel Response – Noise Standards**

In considering the issue of the noise standard to be applied we are mindful of the task before us, which is to advise the Responsible Authority, in this case the Minister, on matters relevant to consideration of the Application. The matters to be considered and how they should be considered, are defined in the Planning Scheme. While there may be varying views as to the appropriateness of certain provisions in the Planning Scheme, such matters are not up for consideration by responsible authorities in the course of dealing with planning permit applications. The role of responsible authorities is to deal with planning permit applications in accordance with the provisions of the relevant planning scheme, not to amend those provisions. As a result our primary task is to provide the Minister with advice in regard to conformance with the relevant provisions of the Planning Scheme.

Having defined what we see as our primary task, we also recognise that it is open to us to suggest that aspects of the Planning Scheme provisions could be improved, however, any such suggestions must be made separately from our recommendations in regard to the Application under consideration.

In regard to noise standards, both the Planning Scheme and the WEF Guidelines make specific reference to NZ6808:1998.

While evidence and information in submissions were received criticising the New Zealand standards and suggesting alternative standards, there was no

challenge to the proposition that the Planning Scheme requires assessment of applications and setting of noise limits in accordance with one or other of the New Zealand standards.

As a result, dealing with the Application does not require consideration of recommendations and suggestions that guidelines used in other jurisdictions or alternative approaches and methods should be applied. Such recommendations and suggestions could well be relevant if the matter under consideration was the provisions of the Planning Scheme however this is clearly not the case.

There is, however, the question as to whether the revised standard NZ6808:2010 should be applied rather than NZ6808:1998. We see this question as a legal rather than an acoustic question and it appears that the adoption of NZ6808:2010 would require the acceptance of an interpretation of the *Interpretation of Legislation Act* 1984 that meant that the New Zealand standard should be considered a “subordinate instrument” as defined in that Act. While it is apparent that VCAT, in the Sisters decision, made such an interpretation the decision has been appealed to the Supreme Court of Victoria. We therefore take the view that the matter remains undetermined in a legal sense and we will not attempt to make a legal determination because:

- we do not possess the required qualifications or expertise to make such determinations; and
- we have not been provided with evidence in support of both sides of the legal argument.

In the absence of a legal determination of this matter we consider that the views of the Minister as the Responsible Authority represented by DPCD should prevail, that is:

*As the guidelines are an incorporated document under clause 81.01 of the planning scheme, it is a legal requirement for a wind energy facility to be assessed against the 1998 New Zealand standard<sup>19</sup>.*

We note that this may be seen as contrary to the advice given by Mr Geoff Howard MLA to a submitter, however, we give significantly more weight to the advice provided by DPCD representing the Responsible Authority to that of Mr Howard, particularly in light of the fact that, while Mr Howard’s email indicates that he is advised that NZ6808:2010 is to be taken into account, the source of this advice is unclear and “taken into account” does not necessarily mean it supersedes NZ6808:1998.

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<sup>19</sup> DPCD Submission to Moorabool Wind Energy Facility Panel, Para 144

Submissions favouring the application of NZ6808:2010 are based on the following:

- the revised standard is more up to date; and
- application of the revised standard would result in a greater degree protection of amenity

While there is no doubt that the revised standard is a more modern document, no evidence is available in regard to its application since it is apparent that it is yet to be applied in Victoria or for that matter in New Zealand.

The evidence provided and information in submissions indicates that the perception of additional protection of amenity available through the application of the revised standard is based on the provisions for the designation of an area as one of high amenity and the setting of lower limits for such areas.

We note that, while NZ6808:2010 contains significantly more guidance in regard to high amenity areas and prescribes limits for such areas, NZ6808:1998 also includes the following:

*Nothing in this Standard prevents the Territorial Local Authority from specifying an alternative compliance level (at dwellings or noise sensitive areas) on a site by site basis, taking into account individual circumstances and characteristics (e.g. distance to WTG(s), other sound sources, amenity values, etc.)<sup>20</sup>*

It is therefore apparent that, under NZ6808:1998, the setting of a limit lower than that set out in the standard – 40 dB(A) at dwellings or background noise level + 5dB(A) for areas of high amenity - is possible. It is therefore evident that, irrespective of which New Zealand standard is adopted, lower noise limits may be applied if the impacted area is considered to require additional protection. This matter is considered in detail later in this report.

We are of the view that the choice of NZ6808:1998 over NZ6808:2010 in this case will not make a significant difference to the limits applied.

It is noted that while both the DPCD and the Proponent are clearly of the view that NZ6808:1998 is the relevant standard, they both consider that some regard can be given to NZ6808:2010 if it considered a “relevant document”, particularly for matters not covered in NZ6808:1998. We agree with these views.

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<sup>20</sup> NZ6808:1998 Clause 4.4.4

### 6.3.4 Conclusion – Noise Standard

Having considered the issue of which noise standards should be applied, we conclude that:

**The Planning Scheme requires assessment of the Application and the setting of noise limits in accordance with NZ6808:1998.**

## 6.4 Noise Limits

### 6.4.1 Appropriate Noise Limits

#### Planning Application Report – Appropriate Noise Limits

It was noted in the PAR that the WEF Guidelines state that a WEF should comply with the noise levels recommended for dwellings in NZ6808:1988 and that:

*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 (L95) by more than 5 dBA or a level of 40 dBA L95 whichever is the greater.<sup>21</sup>*

The PAR also makes reference to limits recommended in the final report of the European Working Group on Noise from Wind Turbines (ETSU-R-97) to be applied at host dwellings. The noise assessment report, included as attachment 7 to the PAR, quotes the ETSU-R-97 as follows:

*The Noise Working Group recommends that both day and night-time lower fixed limits can be increased to 45dBA and that consideration should be given to increasing the permissible margin above background where the occupier of the property has some financial involvement in the wind farm.<sup>22</sup>*

#### Evidence and Submissions – Appropriate Noise Limits

A considerable number of the written submissions to the Responsible Authority suggested that alternative limits to those specified in NZ6808:1998 should be set, including the limits specified in:

- the Interim Guidelines for the Control of Noise from Industry in Country Victoria (N3/89); and
- the draft guideline for Noise from Industry in Regional Victoria (DNIRV).

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<sup>21</sup> Planning Application Report, page 97

<sup>22</sup> Moorabool Wind Farm Noise Impact Assessment, Marshall Day Acoustics Pty Ltd, Section 6, page 41

Dr Thorne's evidence included a recommendation that limits on noise emissions should not be based on numerical representation of sound levels but impacts should be limited by:

- the imposition of buffer distances between turbines and dwellings;
- a requirement that the WEF not cause "unreasonable noise" at any dwelling; and
- a requirement that the sound from a WEF must not be audible or perceptible within a dwelling.

Dr Thorne also recommended that, if numerical representations of sound levels are required then, in addition to unreasonable noise and audibility/perceptibility requirements:

- at average wind speeds above 3 m/s at dwellings the WEF sound level should not exceed 35 dB(A)  $L_{eq}$ ; and
- at average wind speed below 3 m/s the combined background and WEF sound levels should not exceed 30 dB(A)  $L_{eq}$ .

Mr Delaire's evidence was that N3/89 is not applicable to WEFs as the limits set are for low wind conditions so as to exclude the effect of wind noise on vegetation. In addition the Proponent submitted that, for the same reasons, the DNIRV specifically excludes WEFs.

In response to the noise limits recommended by Dr Thorne it was the Proponent's submission that:

*The evidence of Dr Thorne argues that the noise levels set in accordance with NZS6808:1998 will nevertheless result in an unreasonable noise impact. It is well recognised that compliance with the noise standard prescribed in the Wind Energy Guidelines does not mean that wind turbines will be completely inaudible at adjacent residential dwellings. The NZS6808:1998 is based on sound levels necessary to avoid sleep disturbance, and is designed to produce an acceptable level of acoustic amenity.<sup>23</sup>*

Several submitters also suggested that the use of ETSU-R-97 for the setting of noise limits is not appropriate because it is a departure from the requirement of the Planning Scheme that limits be set in accordance with NZ6808:1998.

### **Panel Response – Appropriate Noise Limits**

We consider the question of appropriate noise limits to be answered by the result of the previous discussion in regard to the applicable standard. We have no doubt that the Planning Scheme specifies the use of the limits

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<sup>23</sup> Submission to Panel Part C – Impact assessment, Freehills for WestWind Energy , Section 1.3 (a)

recommended in NZ6808:1998 and do not believe the Responsible Authority can or should contradict the Planning Scheme.

We also accept Mr Delaire's evidence, which was not challenged, that N3/89 and DNIRV are not applicable to WEFs except that we consider that N3/89 should be applied during the construction phase, as it is applicable to activities that will be undertaken then.

We also consider that the application of the noise limits recommended by Dr Thorne would be in contravention of the provisions of the Planning Scheme, which would not be appropriate.

In regard to the use of ETSU-R-97 in the setting of noise limits at host dwellings we agree with the submissions that this would be a departure from the requirements of the Planning Scheme.

The matter of limits to be applied at host dwellings is considered in detail in Section 2.3 of this report and, in line with our conclusion that limits should not be applied at host dwellings, we are of view that no noise limits should be set at host dwellings with the exception of dwellings at which the WEF sound level is the product of noise emissions from more than one WEF. Our consideration of limits at such dwellings is detailed in Section 6.4.5 of this report.

We acknowledge Mr Delaire's suggestion of the ETSU-R-97 recommended limit, however, do not see the need for such limits when amenity protection at host dwellings is effectively a matter between the host and the WEF operator.

## **6.4.2 Special Audible Characteristics**

### **Evidence and Submissions – Special Audible Characteristics**

While not strictly a suggestion of alternative limits, it was also suggested that a penalty should be applied to predicted and measured wind turbine sound levels because of the existence of special audible characteristics in the noise emitted from WEFs.

Several submissions included descriptions of phenomena observed at other WEFs that may affect the level and character of noise emissions, including:

- amplitude modulation;
- wake induced turbulence;
- stable air; and
- the so called van der Berg effect.

Dr Thorne's evidence was that:

- based on studies conducted at other WEFs, noise from WEFs has characteristics that are known to cause nuisance and annoyance above that which might be indicated by the sound level alone; and
- the noise from the proposed WEF, in fact all WEFs, should be assumed to have special audible characteristics.

Mr Delaire emphasised the fact that the provisions of NZ6808:1998 in regard to penalties for special audible characteristics were for known characteristics. It was Mr Delaire's evidence that, while the various phenomena mentioned in submissions and evidence are possibilities, their likelihood and frequency of occurrence could not be predicted and hence they could not be considered to be known characteristics.

The Proponent submitted that:

*..., the existence of a known special audible characteristic cannot be determined until a turbine has been finally selected. The 5dBA penalty would be applied at that time when the pre-construction [we think this is intended to be post-construction] noise assessments are undertaken.<sup>24</sup>*

### **Panel Response – Special Audible Characteristics**

In regard to the matter of “penalties” for special audible characteristics we note that NZ6808:1998 makes reference to such characteristics in the section headed “Guide to acceptable limits” and the relevant clause states that:

*Predicted or measured  $L_R$  levels from WTGs with known special audible characteristics shall be adjusted by adding +5 to the level.<sup>25</sup>*

It is clear from this statement that the intention of the standard is not an adjustment to the limits but rather an adjustment to the predicted or measured wind turbine sound levels.

The question that remains is whether the penalty provided for in NZ6808:1998 should be applied to predicted and/or measured WEF sound levels.

In the case of measured WEF sound levels it is clear that the imposition of a penalty will depend on an assessment of whether special audible characteristics are present during the operation of the WEF. The matter of assessment of the presence of special audible characteristics during compliance testing is discussed in detail later in this report.

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<sup>24</sup> Submission to Panel Part C – impact assessment, Freehills for WestWind Energy, Section 1.4 (d)

<sup>25</sup> NZ6808:1998 Clause 4.4.3



In the case of predicted WEF sound levels the application of a penalty will depend on whether special audible characteristics are known to exist.

We note that the evidence provided is that there is a possibility that the noise emitted from the WEF will have special audible characteristics but prediction of the extent, if any, of such characteristics is not possible at this time. As a result we do not accept that the special audible characteristics can be considered to be “known”, at this stage.

The evidence provided in support of the existence of special audible characteristics in the noise emitted from WEFs is based on the results of investigations at WEFs, however, there is no evidence that the turbines or turbine layouts and configurations at these WEFs are the same or even similar to that proposed for the Moorabool WEF. We are aware that the characteristics of the noise emitted depend on the selected turbine, the turbine layout and configuration so the characteristics of the noise emitted will vary from one WEF to another. We do not believe it would be appropriate to impose penalties on predicted sound levels for characteristics that may or may not be present.

It is important to note that not imposing penalties for special audible characteristics to predicted sound levels does not place people at risk of being subjected to noise with such characteristics without a commensurate effective reduction in permissible sound level. If turbines were installed that produced noise with special audible characteristics then the 5 dB(A) penalty would be applied to the measured WEF sound level. In such circumstances measured WEF sound level at dwellings would have to be below 35 dB(A) or background plus 5 dB(A) whichever is the greater. This may well require a significant reduction in the power generated and hence revenue from the facility. The likelihood of this occurring is in the hands of the operator, who would also suffer the consequences, which is as it should be.

### **6.4.3 High Amenity Area**

#### **Evidence and Submissions – High Amenity Area**

It was suggested in a number of the written submissions to the Responsible Authority that the area potentially affected by the proposed WEF should be considered a high amenity area and, as a result, provided with a greater degree of protection from acoustic impacts. Frequent references were made in these submissions to the provisions contained in NZ6808:2010 that allowed for designation of an affected area as one of high amenity and the setting of a limit of 35 dB(A) or background plus 5 dB(A) whichever is the greater.

The evidence provided by Mr Delaire included his views that:

- NZ6808:2010 was not applicable in this case; and
- if NZ6808:2010 were to be considered applicable, in order for an area to be considered as one requiring additional protection, it needed to be designated as a “High Amenity Area” in a “district plan”.

Mr Delaire also provided the results of an analysis of background and predicted WEF sound levels, utilising the guidance provided in NZ6808:2010, to show that the area surrounding the proposed WEF would not be considered as a high amenity area under that standard.

Mr Huson’s evidence included the following statement:

*In certain circumstances the target noise criteria described in NZS6808:2010 is reduced from 40 dB(A) minimum to 35 dB(A) and I believe that this would be the case for the dwellings surrounding the Moorabool and Yaloak South wind farms.<sup>26</sup>*

Dr Thorne’s evidence included his opinion that dwellings on his clients’ property should be considered to be in a high amenity area and also noted that in NZ6808:2010:

*No definition of ‘high amenity’ is provided as each area is established according to New Zealand District Plans.<sup>27</sup>*

Dr Thorne expressed the views that:

- guidance in regard to high amenity areas is provided by N3/89 that classifies background sound levels as low if they are 25 dB(A) or less at night or 30 dB(A) or less in the day; and
- dwellings at which these criteria are met can be considered to be in a low-noise locale.

Dr Thorne also relied on the VCAT Sisters case, which decided that:

*We further find that the area impacted by the Sisters proposal is a quiet location as evidenced by the background noise level measurements made by the applicant which were below 35 dB(A) at wind speeds up to 6 m/s.<sup>28</sup>*

Dr Thorne concluded from N3/89 and the Sisters decision that:

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<sup>26</sup> Expert Witness Statement of William Leslie Huson, Page 3

<sup>27</sup> Statement of Evidence of Dr Robert Thorne, Section 7.3, Page 21

<sup>28</sup> VCAT Reference No P2107/2009 The Sisters Wind Farm vs Moyne SC Reasons Para 17

*... a lower background (L90) compliance level of 35 dB(A) is appropriate for the Willis dwellings.<sup>29</sup>*

A number of submitters expressed the view that the area potentially affected by the proposed WEF should be considered a high amenity area and therefore provided additional protection. The arguments submitted were based on the following:

- measured background sound levels are extremely low;
- the existing quiet environment is the reason they choose to live in the area and is much valued;
- the analysis provided by Mr Delaire purporting to be in accordance with the guidance provided in NZ6808:2010 on the determination of high amenity areas was flawed due to bias in the selection of dwellings considered and the non-representative background sound level measurements; and
- the currently permitted use of the land requires high amenity.

The Proponent submitted that it is important to note that acoustic amenity is not addressed in the objectives of the Farming Zone although noise is a relevant environmental consideration in the decision guidelines. The Proponent referred to the report of the Bald Hills Panel which provided the results of a review of other panels and VCAT consideration of the matter of reasonable expectations of residents in the Rural Zone (now superseded by the Farming Zone) indicating that their conclusions are such that land in the Farming Zone cannot be considered to be in a high amenity area.

It was the Proponent's submission that:

*Put simply, the issue of acoustic amenity for residents in the Farming Zone is answered by the question: Does the Proposal comply with NZ6808:1998 or not?<sup>30</sup>*

### **Panel Response – High Amenity Area**

In determining the question of whether lower noise limits should be set on the basis of the existing amenity and use of potentially affected dwellings careful consideration must be given to the relevant provision of NZ6808:1998. That is:

*Nothing in this Standard prevents the Territorial Local Authority from specifying an alternative compliance level (at dwellings or noise sensitive areas) on a site by site basis, taking into account individual*

<sup>29</sup> Statement of Evidence of Dr Robert Thorne, Section 7.6, Page 22

<sup>30</sup> Submission to Panel Part C – Impact assessment, Freehills for WestWind Energy , Section 1.2 (f)

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*circumstances and characteristics (e.g. distance to WTG(s), other sound sources, amenity values, etc.)*<sup>31</sup>

In order to consider this provision it is necessary to interpret “Territorial Local Authority” to mean “Responsible Authority” in the Victorian context and it is clear that a responsible authority may set different limits to those recommended in NZ6808:1998 on a site by site basis. It is noted that “amenity values” is included in the list of matters that might be considered in determining if different noise limits should be set.

NZ6808:1998 does not provide any further guidance as to how to make a determination of whether and how different noise limits should be set, however it has been suggested that the guidance provided in N3/89, the “precedent” provided by the VCAT Sisters decision or the guidance provided in NZ6808:2010 should be used to determine if the dwellings should be considered to be in areas of high amenity.

While it is acknowledged that N3/89 indicates that background sound levels less than 25 dB(A) at night or 30 dB(A) during the day are considered to be very low, we are not convinced of the equivalence of “very low background sound levels” and “high amenity”. We see considerable dangers in using criteria set for one purpose for a different purpose. N3/89 specifies that if background sound levels are not very low then the limits should be set using the procedures of *State Environment Protection Policy N-1* (SEPP N1). If the background sound levels are very low, as is defined in N3/89, then the use of SEPP N1 procedures would result in limits that are lower than those specified in N3/89 for such conditions. The purpose of the minimum limits in N3/89 is to prevent extremely low and inappropriate limits being set. This is a vastly different purpose than that of characterising a location as one of high amenity to determine if high amenity limits should be set.

We do not think it appropriate to designate non-host dwellings in this case as being in a high amenity area on the basis of very low background sound levels as defined in N3/89.

We note and agree with the Proponent’s submission that we, or the Responsible Authority, are not bound by decisions of VCAT and while we make no judgement on the interpretation of the law in the Sisters decision we note that the decision has not been finally determined as it is currently the subject of an appeal to the Supreme Court of Victoria. While it is understood that VCAT determined that NZ6808:2010 was the relevant standard the material presented to us provides no indication that VCAT utilised the

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<sup>31</sup> NZ6808:1998 Clause 4.4.3

guidance provided in NZ6808:2010 in determining that high amenity noise limits should be set.

The fact that the Sisters decision does not set a precedent for us, the existing doubt in regard to the status of the decision and the methodology applied in determining whether high amenity noise limits were justified leads us to the view that the Sisters decision is not helpful in our consideration of this matter.

While we are of the view that the appropriate standard to be applied is NZ6808:1998, we acknowledge that that standard provides no guidance in regard to the question at hand and accept the advice of the Responsible Authority that consideration may be given to the guidance provided in NZ6808:2010 in the absence of guidance in NZ6808:1998.

NZ6808:2010 includes:

#### *HIGH AMENITY AREAS*

*The wind farm noise limit of 40 dB  $L_{A90(10 \text{ min})}$  in 5.2 is appropriate for the protection of sleep, health and amenity of residents at most noise sensitive locations. In special circumstances at some sensitive locations a more stringent noise limit may be justified to afford a greater degree of protection of amenity during evening and night-time. A high amenity noise limit should be considered where a plan promotes a higher degree of protection of amenity related to the sound environment of a particular area, for example where evening and night-time noise limits in the plan for general sound sources are more stringent than 40 dB  $L_{Aeq(15 \text{ min})}$  or 40 dBA  $L_{10}$ . A high amenity noise limit should not be applied in any location where background sound levels, assessed in accordance with section 7, are already affected by other specific sources, such as road traffic sound.<sup>32</sup>*

NZ6808:2010 defines “plan”, through reference to the *New Zealand Resource Management Act 1991*, as a “regional plan” or “district plan” which we interpret to mean Planning Scheme in the current context. It therefore follows that the guidance provided by NZ6808:2010 is that a high amenity noise limit should be considered where the Planning Scheme promotes a higher degree of protection of acoustic amenity.

The dwellings in question are located in the Farming Zone under the Planning Scheme and a review of the purposes of the Farming Zone reveals

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<sup>32</sup> New Zealand Standard Acoustics –Wind farm noise (NZS6808:2010) Clause 5.3.1

no reference to the protection of amenity at dwellings. This is understandable when the stated purposes of the zone are mainly concerned with the facilitation of the use of the land for agriculture. The purposes do include the encouragement of the application of sustainable land management practices and the protection and enhancement of natural resources and biodiversity but the protection of residential amenity is not included.

It might therefore be argued, as the Proponent and Mr Delaire have, that the guidance provided by NZ6808:2010 is that high amenity noise limits should be considered only if the Planning Scheme promotes a higher degree of protection of amenity and no such promotion is included in the Planning Scheme.

We find this argument quite persuasive, however as an additional check on the application of the guidance provided by NZ6808:2010 we will also consider other aspects of that guidance.

NZ6808:2010 provides a method of assessment to determine if a high amenity noise limit may be justified. The method described includes the calculation of the average difference between measured background and predicted post installation sound levels, calculated by the addition of the background and predicted WEF sound levels. NZ6808:2010 suggests that if the average difference for evening or night-time is less than 8 dB then a high amenity noise limit is unlikely to be justified and conversely if the difference is greater than 8 dB then a high amenity noise limit is likely to be justified.

Mr Delaire provided the results of the calculations of the average evening and night-time differences for a total of 12 dwellings and those results varied between 0.9 and 6.5 dB with none being greater than 8 dB.

Mr Delaire's analysis of this matter was criticised in submissions on the following bases:

- host dwellings had been excluded from the analysis; and
- where measurements of background sound levels had been made in the spring and summer months the dwellings had been excluded.

We consider that the restriction of the analysis to non-host dwellings to be appropriate since it is not proposed to set NZ6808:1998 limits, or any other noise limits, at host-dwellings.

We have reviewed the selection of dwellings for inclusion in the analysis and find that all non-host dwellings at which background measurements were made for the purpose of the noise assessment of the Moorabool WEF have been included.

One submission provided graphical presentations of background and predicted wind turbine sound levels showing the predicted sound levels to be greater than 8 dB and it was indicated that background sound level measurements for the dwellings were made in October. The report on the noise assessment provided with the Application lists the dwellings at which background sound levels were measured and the dates on which those measurements were made in Table 3 of that report which shows that measurements made in October were at dwellings AX16aa and BA21aa. Dwelling AX16aa is to be leased by the Proponent and unoccupied for the life of the project while dwelling BA21aa is a host dwelling. As a result it is not proposed to set noise limits at these dwellings therefore the question of high amenity limits at these dwellings does not arise.

We are satisfied that Mr Delaire's analysis utilises all relevant and available data and clearly demonstrates that if the guidance provided by NZ6808:2010 in regard to the setting of high amenity limits is followed then the setting of such limits is unlikely to be justified at any non-host dwelling.

In summary it can be said that if the guidance provided by NZ6808:2010 was followed then we would find that the setting of high amenity noise limits at any of the dwellings in the vicinity of the proposed WEF was unlikely to be justified because:

- the area is not recognised in the Planning Scheme as one of high amenity; and
- even if the above point is ignored, the acoustic evidence does not justify the setting of high amenity noise limits.

We acknowledge the fact that this analysis of the existing amenity at dwellings conflicts significantly with the assessments made by the residents. It was made abundantly clear to us that those residents place an extremely high value on the amenity that they enjoy and existing sound levels are a part of that amenity.

While we understand and accept that the acoustic environment in which the residents live and work is of significant importance to those residents, the protection that can be given to that environment is limited to that provided for by the Planning Scheme. This is not a decision we make but a circumstance we must accept.

The Planning Scheme places all of the dwellings in the Farming Zone and the protection of amenity that is available is defined in the stated purposes and Decision Guidelines of that zone and the provisions of clause 52.32 of the Planning Scheme, which contain particular provisions for WEFs.

As discussed previously the purposes of the Farming Zone do not include anything relating to residential amenity and a review of the Decision Guidelines of the zone finds them to also be silent on the matter.

The purpose of the particular provisions relating to WEFs does make reference to amenity, however the Decision Guidelines require responsible authorities to consider the WEF Guidelines in making a decision on an application and those guidelines specify noise limits by reference to NZ6808:1998.

It is evident that the residents' use of the land for what are essentially residential purposes is allowed but not protected under the Planning Scheme, save for the requirement that the WEF sound levels not exceed the NZ6808:1998 noise limits. While this may not be seen, by the residents, as a satisfactory position we cannot find an alternative position without amendment of the Planning Scheme, which is not a matter under consideration.

One submission suggested that the particular use of the land for the operation of an indoor equestrian facility required classification of the land as a high amenity area so as to protect the existing use of the land. Our consideration of this submission, and submissions in response by the Proponent, lead us to the view that the alleged impacts on the operation of the indoor equestrian facility are not related to impacts on the acoustic environment. We are of the view that the submitter seeks to use the possibility of high acoustic amenity provisions as a device to lower impacts other than that of noise.

In any case the protection of the acoustic amenity for existing land uses is limited by that provided in the Planning Scheme, which, as discussed above, is restricted to a requirement on the WEF not to exceed the NZ6808:1998 noise limits.

#### **6.4.4 Indoor Sound Levels**

##### **Evidence and Submissions – Indoor Sound Levels**

Mr Huson also raised another issue in regard to the applicable noise limits stating his opinion that real target sound level of NZ6808:1998 is an indoor sound level of 30 dB(A) and that the use of a 10 dB(A) allowance for the attenuation from indoor to outdoor locations was not necessarily appropriate. Evidence was provided of circumstances where the measured attenuation was significantly less than 10 dB(A) and Mr Huson suggested that determination of an indoor limit requires the application of an



attenuation curve in octave bands, preferably obtained from measurements on potentially exposed dwellings, for a typical dwelling.

In response Mr Delaire stated that:

*It is internationally accepted that noise reduction from outside to inside through an open window is 10dBA. Therefore in accordance with the WHO guidelines, outdoor noise levels should not exceed 40dBA to avoid sleep disturbance.<sup>33</sup>*

### **Panel Response – Indoor Sound Levels**

While we accept Mr Huson evidence that the extent of attenuation that occurs from outside to inside a dwelling varies with a number of factors and may be more or less than an assumed 10 dB(A), we do not accept his assertion that the only fixed limit specified in NZ6808:1998 is a 30 dB(A) indoor sound level.

It is acknowledged that NZ6808:1998 states that the noise limits set are based on an internationally accepted indoor sound level of 30 to 35 dBA  $L_{eq}$ , commonly used to protect against sleep disturbance. However, it is also clear that NZ6808:1998 specifies that the translation of this to an outdoor noise limit results in an outdoor limit of 40 dB(A)  $L_{95}$ .

Since the Planning Scheme requirement is that limits be set in accordance with NZ6808:1998 and the only limits suggested by NZ6808:1998 are the background sound level  $L_{95}$  plus 5 dB(A) or 40 dB(A)  $L_{95}$ , whichever is the greater, then derivation of those limits is irrelevant to the question of whether the assessments have been completed in accordance with NZ6808:1998. To complete such an assessment, the measurement or assumption of the attenuation between the outside and inside of dwellings are unnecessary as they have been made by the authors of NZ6808:1998 in deriving the limits and are therefore not a subject for debate.

Mr Huson's criticism of the assessment in this regard is not in fact criticism of the assessment but a criticism of NZ6808:1998. We make no judgement in regard to the validity of Mr Huson's criticism of NZ6808:1998 as such judgements are unnecessary and irrelevant to the question at hand.

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<sup>33</sup> Expert Witness Statement of Christophe Frederic Delaire, Annexure I – Sleep Disturbance

## 6.4.5 Limits on Cumulative Impact

### The Planning Application Report – Limits on Cumulative Impact

It was noted in the report on the cumulative impact assessment that NZ6808:1998 does not specifically require the cumulative effects of multiple proposed WEFs to be assessed and, as a result, no guidance is offered as to appropriate limits at sensitive receptors (dwellings) affected by more than one WEF. The report made reference to a draft New Zealand Standard DZ6808 Acoustics – Wind farm noise v2.5 Public Comment Draft and used the guidance in that document to come to the following conclusion and recommendation:

*It is considered that the noise limits established for a residential property should be absolute, meaning that the cumulative noise emissions from both wind farms should satisfy the NZS6808:1998 noise limits at each dwelling.*

*This approach is recommended for the Yaloak South and Moorabool Wind Farms and has been used in this noise impact assessment.<sup>34</sup>*

### Evidence and Submissions – Limits on Cumulative Impact

This matter was not the subject of evidence or submissions provided.

### Panel Response – Limits on Cumulative Impact

We are of the view that the level of protection of acoustic amenity at a dwelling should be the same whether the WEF sound level at the dwelling is the result of two WEFs rather than a single WEF. We therefore agree with and accept the recommendation of Marshall Day that the noise limits at all dwellings be the NZ6808:1988 recommended noise limits.

It is also necessary to consider the matter of host dwellings in the context of dwellings at which the WEF sound level is the product of two WEFs rather than a single WEF.

While it would be possible for an agreement between a landowner and WEF operator to make reference to include sound from the other WEF, it should not be assumed that because a landowner has entered into an agreement with one WEF operator then agreement to accept a greater sound level from the other WEF exists.

In this case five dwellings at which the predicted WEF sound level from the two WEFs is greater than 35 dB(A), were identified. Of the five dwellings

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<sup>34</sup> Moorabool and Yaloak South Wind Farms Cumulative Noise Impact Assessment, Marshall Day Acoustics, Section 2.2

one is a host dwelling of the proposed Moorabool WEF, one a host dwelling of the proposed Yaloak South WEF and the remaining three non-host dwellings. In such circumstances where the number of dwellings is small and predictions are that compliance will be achieved at all the dwellings, the Panel considers that to avoid confusion none of the dwellings should be considered to be host dwellings and the NZ6808:1998 recommended limits should be set at all five dwellings.

## 6.4.6 Buffer Distances

### Evidence and Submissions – Buffer Distances

It was the Shire of Moorabool's submission in relation to impacts associated with noise that:

*Currently, there is a current lack of appropriate research undertaken regarding the impact on human health from exposure to particular special audible characteristics. Therefore Council submits that a precautionary separation distance of 2km should be applied between wind turbines and sensitive land uses (e.g. Residential).<sup>35</sup>*

Dr Thorne's evidence included the view that noise impacts should be limited so as to prevent nuisance and annoyance and based on his experience and the results of investigations at other WEFs this could be achieved if a separation between wind turbines and dwellings of 2 km was maintained and wind turbines were prohibited within 3.5 km of a dwelling unless noise mitigation works were undertaken at the dwelling.

Mr Delaire provided evidence of the consideration of buffer distance by authorities in France, Canada and NSW with the following results:

- |        |  |
|--------|--|
| France | Definition of a buffer distance of 1.5 km does not reflect the reality of exposure to noise and does not seem relevant.        |
| Canada | The minimum buffer distance should be between 550 and 1500 metres to achieve the requirements of the Ontario Noise Guidelines. |
| NSW    | A 2 km buffer distance recommended by a Parliamentary Committee but without scientific evidence.                               |

The imposition of buffer distances between turbines and dwellings was supported in a number of submissions at the Hearing.

<sup>35</sup> Moorabool Shire Council Submission, Section 5.1, Page 10.

In regard to the proposal by Council for a 2 km buffer the Proponent submitted that:

- *This would mean different noise levels at different neighbours*
- *This has not been introduced in any Australian state and comparisons with overseas examples must and can only be judged on the scope of the planning regimes of those respective jurisdictions*
- *In any case, this is not required by the NZ Standard.*<sup>36</sup>

### **Panel Response – Buffer Distances**

The suggestions made in evidence and submissions that noise impacts at dwellings should be limited by the imposition of buffer distances between turbines and dwellings are not accepted for the following reasons:

- we cannot identify any rigorous logical means by which an appropriate buffer distance could be set. We note that Dr Thorne bases his views on the concepts of nuisance and annoyance “measured” by the complaint history at WEFs in New Zealand and elsewhere, however we also note that Dr Thorne acknowledges that nuisance and annoyance depends on turbine selection and WEF design and that his evidence and other submissions include examples of nuisance and annoyance at locations beyond his suggested buffer distances;
- while we note that in other jurisdictions buffer distances have been set we are not at all convinced that such buffer distances relate directly or solely to the limitation of acoustic impacts. For example it is noted that the extract of the report of NSW *Legislative Council General Purpose Standing Committee No 5- Inquiry into Rural Wind Farms*, provided by the Shire of Moorabool, makes no reference to noise but instead recommends setting buffer distance as a means of providing certainty for residents that might be expected to reduce stress and anxiety; and
- WEF sound levels at a dwelling depend on a range of factors which include but are not limited to distance. As a result the WEF sound level at a set distance will vary with direction hence setting of a buffer distance alone would allow dwellings at similar distances to be subjected to different noise levels.

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<sup>36</sup> Submission to Panel - Reply, Freehills for WestWind Energy , Section 3.12

## 6.4.7 Low Frequency Noise and Infrasound

### Evidence and Submissions - Low Frequency Noise and Infrasound

Dr Thorne provided information on the potential effects of low frequency sound and infrasound on audibility and perception and suggested the following as a recommended permit condition:

*The sound, including low frequency and infrasound, of the wind farm shall not be audible or perceptible within a dwelling or noise sensitive place. As a guide to audibility and perceptibility, the sound shall be non-modulating and shall not exceed the 20 phon equal loudness level contour (ISO226:2003 Acoustics-Normal equal loudness contours) and 75 dB (unweighted) in the 5 Hz to 20 Hz one-third octave bands.*

Mr Huson, along with a significant number of submitters, expressed concern in regard to the potential impacts of low frequency and infrasound and provided information indicating that WEFs are a source of emissions at these frequencies.

The evidence provided by Mr Delaire on the subject of low frequency and infrasound was that:

- infrasound is created by a wide range of naturally occurring and man made sources;
- human perception of sound energy in the infrasound frequency range is much less acute than other frequency bands requiring significant energy levels for human perception; and
- the available literature indicates that wind turbines produce low levels of low frequency and infrasound.

Mr Huson acknowledged that the WEF Guidelines specify the use of NZ6808:1998 for the setting of noise limits however he also expressed the view that, due to the low frequency sound from wind turbines at distances around 2 km and above, consideration should be given to an indoor noise level target less than 30 dB(A),  $L_{eq}$ .

### Panel Response - Low Frequency Noise and Infrasound

While the potential for impacts of low frequency noise and infrasound on human health are discussed elsewhere in this report, the questions requiring resolution at this stage include the following:

- Will low frequency noise and infrasound be emitted from the proposed WEF and if so what levels might be expected?

- Is there a need to control (i.e. impose limits on) low frequency noise and infrasound levels at sensitive receptors and if so how would such levels be set?

We accept that both low frequency noise and infrasound will be emitted from the proposed WEF.

We also accept Mr Delaire's evidence that low frequency noise is accounted for in the A weighting used in the NZ6808:1998 assessment methodology, a proposition that was not challenged.

While a significant amount of qualitative evidence has been provided indicating that the levels of infrasound will be "low", "not significant" or "imperceptible", little evidence has been provided on what might be considered to be an acceptable level. We are aware that one of the few jurisdictions in which a limit has been set on infrasound levels is in Denmark where an indoor level of 85 dB(G) has been set and generally accepted as appropriate. By way of comparison, the data from a British WEF provided by Mr Huson indicates that, in that case, the measured level of infrasound from the WEF was of the order of 35 dB(G). Estimates of infrasound levels at sensitive receptors in the literature are generally less than 60 dB(G) so, on balance, it is considered reasonable to conclude that the infrasound levels at sensitive receptors in this case will be well below the Danish limit.

We acknowledge the fact that there is considerable debate on matters relating to infrasound, however the information and evidence presented to us is not sufficient to make any definitive determination on the levels of such "sound" at dwellings in the vicinity of the proposed Moorabool WEF or the impact that they may have. As a result we can find no logical basis for the setting of limits on levels of infrasound.

We note that NZ6808:1998 includes the following note:

*WTGs may produce sound at frequencies below (infrasound) and above (ultrasound) the audible range. Ultrasound attenuates rapidly over moderate distances. Reference to overseas studies on infrasound reveals that:*

- a) Sound spectra for modern WTGs indicate that compliance with the limits in this Standard (clause 4.4.2) will ensure that infrasound pressure levels will be well below the threshold of perception.*
- b) Any potential adverse effect of infrasound would occur at levels greater than the threshold of perception.<sup>37</sup>*

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<sup>37</sup> NZ6808:1998 – Note to clause 1.3

NZ6808:2010, which can be seen as the result of a more recent and up to date examination of the matter, includes a similar statement that infrasound levels will be below the threshold of human perception and adds the following:

*Claims have been made that low frequency sound and vibration from wind turbines have caused illness and other adverse physiological effects among very few people worldwide living near wind farms. The paucity of evidence does not justify at this stage, any attempt to set a precautionary limit more stringent than those recommended in 5.2 and 5.3.<sup>38</sup>*

As a result of the information provided in NZ6808:1998, which is the relevant standard, and the guidance provided by NZ6808:2010, we are not concerned at our inability to recommend limits of low frequency sound and infrasound.

#### **6.4.8 Conclusions and Recommendations- Noise Limits**

It is concluded that:

**The applicable noise limits should be those recommended in NZ6808:1998;**

**Noise limits do not need to be set at host dwellings except for dwellings at which the WEF sound level is the product of noise emissions from more than one WEF at which noise limits should be set as if they were non-host dwellings;**

**WEF sound cannot be said to have known special audible characteristics prior to assessment of the sound actually emitted from the WEF, post construction, therefore the imposition of a penalty on predicted WEF sound levels would be inappropriate;**

**If a post construction assessment of the sound from the WEF reveals special audible characteristics a penalty of 5 dB(A) will be applied to the measured WEF sound levels, as is specified in NZ6808:1998;**

**The setting of noise limits below those recommended in NZ6808:1998 for reasons based on the existing acoustic amenity or land use at dwellings cannot be justified;**

**The noise limits recommended in NZ6808:1998 are outdoor noise limits of background sound level  $L_{95}$  plus 5 dB(A) or 40 dB(A)  $L_{95}$ , whichever is the greater;**

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<sup>38</sup> NZ6808:2010 – Clause 5.5.2

**The noise limits recommended in NZ6808:1998 should be applied to the combined WEF sound level of the proposed Moorabool and Yaloak South WEFs;**

**The imposition of buffer distances between turbines and dwellings would be ineffective and inappropriate; and**

**A logical basis for the setting of limits on low frequency sound and infrasound cannot be identified and the current state of knowledge provides no reason for the setting of such limits.**

It is recommended that:

**Any permit issued include conditions that require:**

- **Compliance with the limits specified in Condition 46 of the Recommended Permit, being the limits recommended in NZ6808:1998, i.e. outdoor noise limits of background sound level  $L_{95}$  plus 5 dB(A) or 40 dB(A)  $L_{95}$ , whichever is the greater with such compliance being required at all dwellings excepting those exempted under Condition 41 of the Recommended Permit, i.e. host dwellings at which the WEF sound level is the product of the Moorabool WEF alone.**
- **Compliance with these limits determined for both all-time (24 hour period) and night-time.**

## **6.5 The Adequacy of the Noise Assessments Provided**

The following noise assessments have been provided:

- the “Application Assessment” providing an assessment of the proposed Moorabool WEF. A report on this assessment was included in the PAR as Attachment 7;
- a “Revised Assessment” providing a re-assessment of the proposed Moorabool WEF with wind speeds being adjusted to hub height. Details of this assessment were included in Mr Delaire’s expert witness statement; and
- a “Cumulative Assessment” providing an assessment of the combined impact of the proposed Moorabool and Yaloak South WEFs. A report on this was included in the PAR as Attachment 7a.

Both the Application Assessment and the Revised Assessment were said by the Proponent and its acoustic consultant to have been completed in accordance with NZ6808:1998. The Cumulative Assessment was said by the Proponent and Mr Delaire to be in general accordance with NZ6808:1998 but with appropriate modifications.



The claim of accordance with NZ6808:1998 was challenged in evidence and submissions on a wide range of grounds and each of the issues raised and a number identified by us are detailed below.

In the following consideration of the issues raised the Revised Assessment is considered to be a replacement for the Application Assessment, includes aspects of the Application Assessment that are common to both assessments and will be referred to as “the Assessment”.

### **6.5.1 Height of Wind Speed Measurements**

#### **The Planning Application Report – Height of Wind Speed Measurements**

Wind speed measurements used in the Application Assessment were made at a height of 10 metres above ground level.<sup>39</sup>

#### **Evidence and Submissions – Height of Wind Speed Measurements**

A number of written submissions made to the Responsible Authority stated that the WEF Guidelines require the measurement of wind speeds at hub height, in this case 80 metres.

It was stated in Mr Delaire’s expert witness report that the Application Assessment had been conducted so as to be compliant with the WEF Guidelines published in 2003 which did not require reference to hub height wind speed. Since the measurements had been made, a revised version of the WEF Guidelines had been published and hub height wind speed measurements are now required. As a result, a re-assessment (the Revised Assessment) has been completed and the results of that re-assessment were presented in Mr Delaire’s expert witness report.

For the Revised Assessment estimates of hub height wind speeds were made by GL Garrad Hassan based on the measurements made at 10 metres and measured variations of wind speed with height at varying times of the day and wind directions.

The results of the Revised Assessment show the predicted WEF sound levels to be:

- below the 24 hour limits for all non-host dwellings (as per the Application Assessment);
- above the night-time limits at 4 of the 48 non-host dwellings (one in the Application Assessment); and

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<sup>39</sup> Moorabool Wind Farm Noise Impact Assessment – Marshall Day Acoustics, Section 3.2

- above the ETSU-R-97 noise limit at one of the 16 host dwellings.

A similar re-assessment of the cumulative impact of the proposed Moorabool and Yaloak South WEFs was also presented and showed that conclusions drawn from the original assessment were unchanged.

### **Panel Response – Height of Wind Speed Measurements**

We note that:

- The WEF Guidelines state that:

*During the assessment phase of the noise impact, particular attention to the following matters within the Standard is required:*

- *Wind speed measurements at the hub height of the proposed turbines as recommended in the Note to Clause 4.5.6<sup>40</sup>; and*

The Note to Clause 4.5.6 of NZ6808:1998 includes:

*The wind speed should be monitored on the windfarm site and measured preferably at the WTG hub height.*

There is no doubt that the WEF Guidelines require wind speed measurements at hub height, however it is also noted that:

- the current WEF Guidelines were published in September 2009 and are a revision of guidelines published in May 2003;
- the May 2003 version of the WEF Guidelines did not include any particular reference to the height of wind speed measurements; and
- wind speed measurements made for the purpose of the Application Assessment were commenced on 20 July 2009 and completed on 30 October 2009.

It is apparent that at the time the wind speed measurements were commenced there was no specific requirement for such measurements to be made at hub height. As a result the majority of the measurements made, which were made at a height of 10 metres, were made in accordance with the WEF Guidelines of the time.

While the wind speed measurement results have subsequently been adjusted and are now purported to represent hub height wind speeds, they cannot be said to be in complete accordance with the requirements of the WEF Guidelines as those requirements are for measurements at hub height rather than calculated values.

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<sup>40</sup> Planning and Policy Guidelines for the Development of Wind Energy Facilities in Victoria, September 2009 – Part B, Section 4.9, 3(a)

Despite this, it is considered reasonable to accept the validity of the calculated hub height wind speeds for the purpose of the assessment. We are satisfied that the Proponent has used its best endeavours to satisfy the requirements of the Planning Scheme in this regard. The fact that the requirement for measurement of wind speed at hub height did not exist at the time when the measurements were commenced makes the approach taken reasonable and a requirement to repeat the whole process for reason of height of wind speed measurements before considering the Application would be unfair.

We would take a different view in regard to this matter in considering the requirements of any future assessment that may be required. We are firmly of the view that any such assessment must be completed in strict accordance with the WEF Guidelines, which clearly requires wind speeds to be measured at hub height.

## 6.5.2 Turbine Capacity

### The Planning Application Report – Turbine Capacity

The Assessment assumed the use of Enercon E92 turbines although it is clear that the Application is such that, if approved, turbines of a different make, model and generating capacity may be ultimately selected.

### Evidence and Submissions – Turbine Capacity

Written submissions made to the Responsible Authority noted that the WEF sound level predictions are based on a 2 MW turbine while the Application is for turbines with a generating capacity of up to 3MW and suggested that this should invalidate the assessment.

Mr Delaire addressed this matter in his expert witness report stating that:

*Using 3MW turbines would not negate the need for compliance with the noise levels set in accordance with the NZ Standard. However, turbines with greater power output may not necessarily produce more noise.*

*I consider that it would be appropriate for a permit for the Moorabool Wind Farm to include a condition requiring that, prior to the commencement of the development, the developer must have a suitably qualified acoustics expert prepare a report to the satisfaction of the Minister for Planning demonstrating that turbines have been selected (ie model and power output) that will comply with the noise levels*

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*recommended in the NZ Standard as required by the Victorian Wind Energy Guidelines.*<sup>41</sup>

### **Panel Response – Turbine Capacity**

We do not consider the use of indicative turbines for the Assessment and the Cumulative Assessment as a matter that influences the adequacy of those assessments for the following reasons:

- if the assessments were considered adequate in all other respects, then they would provide the required support of a reasonable expectation of compliance if the indicative turbine is ultimately selected;
- there is ample evidence that noise emissions from wind turbines are not directly related to generating capacity, therefore:
  - it is impossible to apply a penalty to the predicted sound levels on a logical basis; and
  - the selection of a turbine of greater generating capacity with the same or even lower noise emissions is a possibility and it would be wrong to prevent such selection; and
- the ultimate selection of a different turbine, which may have different generating capacity or noise emissions, would have no bearing on the performance required in terms of WEF sound levels at dwellings. While the developer of the WEF would be free to select a different turbine, they would be extremely foolish to select a turbine that resulted in sound levels at dwellings in excess of the limits applied. If they did so the turbines could not be operated at full capacity. The risk associated with turbine selection in regard to noise is therefore totally with the developer.

Having said that the Assessment and the Cumulative Assessment are not flawed by the selection of the indicative turbine, it is considered sensible that any future assessment that may be required should be based on the turbine actually proposed to be installed, if the final turbine selection has been made.

### **6.5.3 Background Sound Measurement Locations**

#### **The Planning Application Report – Background Sound Measurement Locations**

The Assessment utilised the method described in NZ6808:1998 to identify dwellings at which the predicted WEF sound level was 35 dB(A) or greater and designated the 67 such dwellings as “Assessable Dwellings”.

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<sup>41</sup> Expert Witness Statement of Christophe Frederic Delaire, Section 4.5

Locations for background sound level measurements were made from the 67 Assessable Dwellings with 27 locations being selected as follows:

*These sites were selected by MDA in consultation with WestWind and are considered to be representative of the most affected houses surrounding the proposed site. It should be noted that logging was not conducted at some neighbour properties that were originally selected for noise monitoring, as the owners did not wish to participate.<sup>42</sup>*

The Cumulative Assessment identified five dwellings at which the predicted WEF sound levels (from both WEFs) are 35 dB(A), or greater. Of the five dwellings so identified, background sound level measurements were made on behalf of the Proponent at three while the measurements at the other two were made on behalf of the Yaloak South proponent.

The predicted WEF sound level from the proposed Moorabool WEF alone at each the five dwellings is greater than 35 dB(A) although one is a Moorabool host dwelling. The WEF sound level from the proposed Yaloak South WEF at four of the five dwellings is 35 dB(A) or greater.

### **Evidence and Submissions – Background Sound Measurement Locations**

Written submissions to the Responsible Authority pointed to the fact that background sound levels had not been measured at all Assessable Dwellings and questioned the validity of utilising the results of background sound measurements at one dwelling to establish the noise limits at another.

Evidence provided by Dr Thorne was highly critical of the methods used to predict WEF sound levels and therefore select Assessable Dwellings, however the criticisms provided were of NZ6808:1998 rather than the Assessment.

The concerns about background sound levels not being measured at all Assessable Dwellings and the use of measurements of background sound levels at one dwelling to set noise limits at another were repeated in submissions at the Hearing.

It was Mr Delaire's evidence that it was unnecessary to measure background sound levels at all Assessable Dwellings because;

- compliance with NZ6808:1998 recommended limits at dwellings at which the predicted WEF sound level was less than 40 dB(A) could be predicted

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<sup>42</sup> Moorabool Wind Farm Noise Impact Assessment – Marshall Day Acoustics, Section 5.0

without reference to background sound levels since the limit cannot be less than 40 dB(A); and

- it is common and accepted practice to consider background sound levels measured at one dwelling to be representative of the background sound levels at another dwelling at a similar location and surrounded by similar vegetation.

The Proponent outlined the process used to select sites for background measurements to illustrate that it had been open, transparent and guided by acoustic experts.

### **Panel Response – Background Sound Measurement Locations**

The guidance provided by NZ6808:1998 in regard to locations for measurement of background sound levels is as follows:

*This Standard recommends that background sound level measurements be carried out where predicted sound levels of 35 dBA or higher are calculated for the relevant locations. It is recommended that measurement positions be selected to include locations at or within the nearest affected residential property boundary, (the notional boundary – if a rural property), and near the location of representative positions for any other residential locations within the vicinity of a WTG or windfarm.<sup>43</sup>*

In determining whether this recommendation of NZ6808:1998 has been followed, it is considered appropriate to limit the evaluation to non-host dwellings since it is not proposed to apply noise limits to host dwellings.

Examination of the Assessment shows that:

- the prediction is that 48 non-host dwellings will be subject to WEF sound levels of 35dB(A) or greater;
- measurements of background sound levels were not made at any of the three nearest non-host dwellings although it is claimed that background sound levels at the third nearest are fairly represented by the results of measurements made at a different but nearby dwelling;
- measurements of background sound levels were made at 9 of the 48 non-host dwellings with background sound levels at four additional non-host dwellings being said to be represented by measurements at nearby dwellings; and
- for all non-host dwellings where the predicted maximum WEF sound level is 40 dB(A), or greater, background sound levels were either

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<sup>43</sup> NZ6808:1998 Clause 4.5.1

measured or it is said can be inferred from measurements taken at nearby dwellings.

It is clear that the NZ6808:1988 recommendation that background sound level measurements be made at the nearest non-host dwelling has not been followed; however, this does not mean that the Assessment is unable to provide a prediction of compliance at this particular dwelling. If the predicted maximum WEF sound level at the particular dwelling is less than 40 dB(A), that is below the lowest limit that can be applied under NZ6808:1998, if no allowance is given for particular protection of amenity then it is evident that a prediction of compliance at the dwelling is provided by the Assessment.

In the same way, background sound level measurements are not required to predict compliance at any of the dwellings at which the maximum WEF sound level is predicted to be less than 40 dB(A).

It should be noted that while predictions of compliance can be achieved at such dwellings, the prediction of compliance is not the only reason why measurements of background sound levels are required. Adequate measurements of background sound levels are also required if the post-construction compliance testing is to be performed using NZ6808:1998 methodology. This matter is discussed in detail later in this report, however, for the purposes of the prediction of compliance, the measurement of background sound levels at all dwellings at which the maximum wind WEF sound level is predicted to be 40 dB(A) or greater can be considered sufficient.

In this case, maximum WEF sound levels are predicted to be 40 dB(A) or greater at seven dwellings, background sound levels have been measured at five of these dwellings and it is claimed that the background sound levels at the other two are fairly represented by the measurements taken at neighbouring dwellings.

We also note that background sound levels have been measured at all dwellings considered in the Cumulative Assessment.

On the basis of the evidence and submissions that we received in regard to the variations between measurements made at neighbouring dwellings we are not convinced that background sound levels at one dwelling should be used to represent those at another. Background sound levels are largely a function of the interaction of the wind with obstacles such as buildings and vegetation, which are unique to each dwelling. The classification of dwellings as being the same with respect to the interaction of the wind with buildings and vegetation is somewhat subjective and, as a result, risky and

can be expected to be an ongoing topic of debate, particularly in the post-construction compliance testing.

We are of the view that, ideally, an adequate noise assessment must include measurement of background sound levels at all dwellings at which the predicted wind turbine sound level is 40 dB(A), or greater. Without such measurements a definitive prediction of compliance cannot be made.

The only circumstance where a noise assessment for which background sound level measurements are not made at all dwellings at which the predicted maximum WEF sound level is 40 dB(A), or greater, can be considered adequate is when access to such a dwelling is refused by the owner and/or occupier of the dwelling.

Any future assessment that may be required should satisfy these requirements.

#### **6.5.4 Measurement of Low Background Sound Levels**

##### **Evidence and Submissions - Measurement of Low Background Sound Levels**

Mr Huson's expert witness statement included the following in regard to the equipment used for background sound level measurements:

*Sound level meters (Loggers) have an electrical noise floor below which reducing sound pressure levels will not register any change. It is apparent from the measurements taken using the EL-316 that there is a noise floor of approximately 23 dB(A). The noise floors can be seen in the charts of Figures 3 to 56 and Figures 10.5 to 10.8 of the Marshall Day Acoustics reports for Moorabool and Yaloak South respectively. The use of sound measurement equipment having a noise floor around 23 dB(A) in rural areas where ambient sound levels are very low (often below 16 dB(A) in low wind conditions) can produce misleading results that can, if not removed, have a significant effect upon the subsequent analysis described in NZS6808, where a trend curve is required to be generated from the background measurement data. Figures 10.5 and 10.6 for House number 38 show the most obvious noise floor clipping.*

Dr Thorne's expert witness statement included the following:

*In my view, a background sound level survey taken using an ARL 215 or 315/316 sound logger will not measure true 'quiet' background levels as it can not go below 24 dB(A) and at this level it is recording the inherent noise within the electronics of the system. It is standard practice to select a sound level meter that has a very low inherent noise floor.*



At the Hearing a submitter provided a manufacturer's brochure on the ARL 315/316 noise loggers, which were used for background sound level measurements, that showed the recommended measurement range to be 30 to 120 dB(A).

It was submitted by the Proponent that the removal of data subject to the noise floor, as was suggested by Mr Huson, would raise the resultant noise limits and that the measurements made by Dr Thorne with a low noise floor instrument produced similar results to those conducted by Marshall Day.

### **Panel Response – Background Sound Measurement Locations**

Examination of the data provided with the Assessment clearly demonstrates that the results of background sound levels were, at various locations and times, influenced by the noise floors of the noise loggers used.

There was no challenge made to this proposition but the matters that were subject to debate included:

- whether the equipment used was different to that required to be in accordance with NZ6808:1998; and
- the impact of what might be considered to be the invalid data at low background noise levels on the assessment.

On the first of these matters, it is noted that NZ6808:1988 at (Clause 4.5.6) states that background sound level measurements shall be conducted in accordance with NZ6801. NZ6801 makes no reference to the noise floors of instruments but, in regard to sound level meters, states that:

*Sound level metres shall comply with the relevant IEC specifications, preferably class 1, but at least class 2, as given in IEC specifications relevant for each instrument.<sup>44</sup>*

The instruments used for the measurement of background sound levels included both class 1 and class 2 (previously referred to as Type 1 and Type 2) instruments and therefore meet the requirements of NZ6808:1998 as far as the sound level meters used are concerned.

In regard to the impact of the measurement range of the sound level meters used, we make the following observations:

- the plots of background sound level vs. wind speed provided in the report on the Assessment show that background sound levels at or below the noise floors of the instruments only occur at wind speeds below 4 m/s;

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<sup>44</sup> New Zealand Standard – Measurement of Environmental Sound NZS6801:2008 Clause 5.1.1

- under the NZ6808:1998 the limit is not influenced by the background sound levels unless they are greater than 35dB(A) and the background sound level/wind speed plots show that the background sound levels reach the 35 dB(A) at around 7 m/s;
- the effect of the inability of the sound level meters to measure low noise levels on the regression curve defining the relationship between background sound levels and wind speed is that background sound levels are underestimated with the extent of such underestimation being at a maximum at low wind speeds and reducing with increasing wind speed.

While it is not possible to precisely quantify the extent of the underestimation we are confident that in the critical wind speed range of 7 to 9 m/s the underestimation is small and highly unlikely to exceed 0.5 dB(A).

To provide an indication of the impact on the Assessment, the sensitivity of the Assessment, in terms of the number of dwellings at which non-compliance is predicted, has been determined by adjusting background sound levels downward by various amounts. The results of this analysis are shown in the following table.

**Table 6-1 Sensitivity of Assessment to Background Sound Levels**

Adjustment to Background Sound Level $L_{95}$ dB(A)	Number of Non-Host Dwellings at which non-compliance is predicted	
	24 Hour Limits	Night Time Limits
0	0	4
0.05	0	4
0.10	0	4
0.15	0	4
0.20	0	4
0.25	0	4
0.30	1	4
0.35	1	4
0.40	1	4
0.45	1	4
0.50	1	4

It can be seen from the above table that, providing the underestimation of background sound levels resulting from the noise floors of the instrument used is less than 0.3 dB(A), which is considered reasonable, there would be no change in the prediction of compliance at dwellings.

It is therefore clear that:

- the use of instruments with a noise floor of around 23 dB(A) is not a contravention of NZ6808:1998; and
- if low noise floor instruments had been used the results of the assessment would not have been significantly affected.

### **6.5.5 Sound Measurement Equipment Verification and Calibration**

#### **Evidence and Submissions – Sound Measurement Equipment Verification and Calibration**

It was Mr Huson's evidence that the noise loggers used require calibration before deployment and after collection, however no details of such calibration have been provided.

It was submitted at the Hearing that NZ6808:1998, through its reference to NZ6801, requires calibration (field check) of sound measuring instruments immediately before and at the completion of measurement periods. A copy of a report of noise logger results was provided at the Hearing and it was noted the report indicated that the checks required had not been conducted.

It was also noted that no information has been provided on instrument verification.

#### **Panel Response – Sound Measurement Equipment Verification and Calibration**

While there is no doubt that NZ6808:1998 requires measurements to be taken in accordance with NZ6801 the precise meaning of this reference to NZ6801 must be determined. We were provided with a copy of the relevant sections of NZS6801:1991 however we also note that the "Related Documents" section of NZ6808:1998 includes:

*The users of this Standard should ensure that their copies of the above mentioned New Zealand Standards or of overseas Standards approved as suitable for use in New Zealand are the latest revisions or include the latest amendments.*

Standards New Zealand's website shows that the latest revision of NZ6801 is NZS6801:2008.

Examination of NZ6801:2008 shows that the following are required:

- periodic verification on instruments by an accredited laboratory and a report or certificate traceable to national Standard for each major component;

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- calibration of instruments at least every two years and every year of calibrators used for field checks;
  - a check of the sensitivity of the instrument system (field check) at least before and after each set of measurements with the results of such checks being stored with measurement data;
  - field checks at regular intervals during extended measurement periods (e.g. greater than one day); and
  - considering measurements made between field checks showing a variation of more than 1 dB to be invalid.

No evidence or information has been presented to us that would enable us to determine if the required instrument verification and calibration has been conducted. We are asked by the Proponent to rely on the fact that the measurements were made by suitably qualified and experienced people and it is reasonable to say such an approach has been considered acceptable in the consideration of noise assessments of other WEF applications.

As a result, we do not consider the assessments in this case to be invalid for the reason of a lack of evidence of instrument verification and calibration, however, we do believe that the provision of such evidence should not be difficult and would add some confidence in the reported results.

On the matter of the required field checks, the information provided clearly shows that, at least in one case, the post measurement field check was not conducted as is required. While this provides no indication of how often such departures from the standard occurred, it does reduce our level of confidence in the approach of accepting the validity of the results on the basis that the measurements were made by suitably qualified and experienced people.

On the information available to us it is impossible to determine the impact that such departures from the required procedure may have had on the assessment overall. While we consider it unlikely that the impact would be sufficient to change the assessment as whole, we believe that even the suspicion of such departures has a significant impact on the credibility of the assessment.

## 6.5.6 Positioning of Background Sound Measurement Equipment

### Planning Application Report – Positioning of Background Sound Measurement Equipment

The report on the Assessment included in the PAR provided details of the positioning of the background sound measurement equipment by way of photographs.

### Evidence and Submissions – Positioning of Background Sound Measurement Equipment

It was submitted at the Hearing that background sound monitoring had not been conducted in accordance with NZ6808:1998, due to the placement, in some cases, of noise monitors in close proximity to trees and other vegetation.

In response to these issues the Proponent stated that:

*Overall, the noise logging was carried out by a suitably qualified noise expert, who had to make judgement calls on the appropriateness of locating loggers. In doing so they take into account a range of factors, including the location of proposed turbines, the location of trees and other potential obstructions, and security of the devices;<sup>45</sup>*

Mr Huson also pointed out that the background sound level/wind speed for one dwelling was highly anomalous in that it appeared to show two separate instrumental noise floors and as a result was simply wrong.

The Proponent provided a photograph of the noise monitoring equipment at the particular dwelling that illustrated the fact that the equipment had been interfered with by the placement of a plastic container over the microphone. It was suggested that this interference was the reason for the anomalous results.

### Panel Response – Positioning of Background Sound Measurement Equipment

It is noted that NZ6808:1998 states that:

*The locations for sound level measurements shall be more than 5 metres from any significant vertical reflecting surface, or other structures or objects (such as trees, powerlines etc.) so that the “natural” wind sound*

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<sup>45</sup> Submission to Panel Reply – Impact assessment, Freehills for WestWind Energy , Section 3.2

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*generated at or near the microphone is excluded as far as possible from the measurements.<sup>46</sup>*

Our examination of the photographs included in the Assessment leads us to the view that in 6 of the 27 cases the requirement of NZ6808:1998 in regard to the location of monitors has not been met. In each of the six cases the monitoring equipment was located close to trees and/or other vegetation. This would result in the measured sound levels being higher than in the general vicinity of the dwelling due to the noise created by the wind passing through the leaves of the vegetation.

Our examination of the photographs illustrating the positioning of the monitors at the five dwellings at which assessments were made as part of the Application Cumulative Assessment shows that in two cases the positioning was inappropriate.

We accept that interference to the noise monitoring equipment at one dwelling is the reason for the anomalous results but agree with submitters that the fact that the data were used for the assessment regardless of the obvious anomalies represents extremely bad practice and should not be accepted.

While we note the Proponent's submission that the equipment was positioned by acoustic experts and Mr Huson's evidence that finding suitable locations is sometimes difficult and requires judgements to be made, we find that in the majority of cases where the photographs show equipment in what might be considered to be in inappropriate positions, the same photographs show alternative and more appropriate positions that could have been used. It appears that either insufficient attention has been paid to the matter of equipment position or concerns with the security of the equipment have outweighed acoustic considerations.

We find that, at least in some cases, the background measurements have not been made in accordance with NZ6808:1998 due to the inappropriate positioning of the measuring equipment and, to a degree, this invalidates the Assessment.

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<sup>46</sup> NZ6808:1998 Clause 4.5.2

## 6.5.7 Background Sound Level/Wind Speed Data Pair requirements

### Planning Application Report – Background Sound Level/Wind Speed Data Pair Requirements

The report on the Assessment indicates that the number of data pairs collected range from 1500 to 2100.

### Evidence and submissions – Background Sound Level/Wind Speed Data Pair Requirements

Mr Huson's expert witness statement included the following:

*NZS6808:1998 suggests that approximately 1440 data pairs for wind speed and background noise should be adequate to implement the procedures of the standard.*

*If the data is split into night time periods, as shown in figures 1 to 26 of the Marshall Day Acoustics report, then much less than 1440 data pairs will remain for each measurement location at night. This data will be reduced further by the removal of data close to the instrument noise floor and sampling errors will increase.<sup>47</sup>*

### Panel response – Background Sound Level/Wind Speed Data Pair Requirements

There is no doubt that the correlations of background sound levels with wind speed for night-time have been derived from less data pairs than is mentioned in NZ6808:1998, however, our examination of NZ6808:1998 shows that the number of background sound level/wind speed data pairs that are required is not in fact specified and the only specific requirement is that:

*Data should be obtained for the windspeed range of 5 m/s – 8 m/s, i.e. slightly above the typical cut-in windspeed of currently commercially available WTGs<sup>48</sup>*

In the Note to Clause 4.5.6, the suggestion is made that:

*It is expected that, at least, 10 to 14 days of continuous monitoring will be required to give a suitable range of data. Typically, this will result in excess of 1440 data points which should be plotted against the appropriate corresponding windspeed data.*

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<sup>47</sup> Expert Witness Statement of William Leslie Huson Page 10

<sup>48</sup> NZ6808:1998 Clause 4.5.6

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In our view this suggestion does not amount to a prescription of 1440 or any other number of data pairs but is rather an indication of the amount of data pairs required in the typical situation.

The number of data pairs actually required to satisfactorily define the relationship will depend on the strength of the relationship. This will be determined by the influence of other factors on the background sound level. If an extreme, and unrealistic, case is considered where the only factor that influences background sound level is wind speed, the relationship could be defined by a handful of data pairs providing the appropriate range of wind speeds was covered. On the other hand it is possible that all of the other factors influencing background noise levels are sufficient to completely mask the effect of wind speed then a relationship between background sound level and wind speed could not be determined irrespective of the number of data pairs available.

Given an appropriate coverage of the wind speed range, the adequacy of the relationship is best measured by the value of the coefficient of determination ( $R^2$ ) which provides an indication of how well the relationship is defined. The greater the impact of wind speed on background noise level relative to the impact of other factors the smaller number of data pairs required to give a particular  $R^2$  value.

It is relevant to note that the Draft Permit includes conditions, which were not challenged by any of the parties, requiring the background sound level/wind speed relationships to be used in the application of NZ6808:1998 for noise compliance testing to be based on 500 or more data pairs with a  $R^2$  value of 0.5 or greater.

The following table shows the  $R^2$  values for the correlations of data for each of the non-host dwellings at which background sound level measurements were made:



**Table 6-2 Correlation Coefficient of Background Sound/Wind Speed Regressions**

Dwelling	R <sup>2</sup> Value	
	24 Hour	Night-time
AU18aa	0.80	0.85
AV19aa	0.77	0.83
AV30aa	0.70	0.66
AX30aa	0.75	0.75
AY20aa	0.75	0.77
BA24ac	0.78	0.86
BA25ab	0.82	0.86
BB30aa	0.72	0.89
BC21aa	0.72	0.57
BC23ab	0.79	0.80
BD22aa	0.69	0.70
AU18aa	0.80	0.85

It can be seen from the table above that the R<sup>2</sup> values indicate satisfactory correlations and those for the night-time regressions are similar and, if anything higher, than those for the 24-hour data.

It should be noted that the suggestion made in NZ6808:1998 in regard to the number of data pairs required is for a 24-hour analysis and no suggestion of data pair requirement number is made in regard to night-time analysis. The use of less than 1440 data pairs for analysis of night-time only data cannot therefore be considered to be not in accordance with NZ6808:1998.

The R<sup>2</sup> values obtained provide an illustration of why specification of the number of data pairs would not be sensible as similar or better correlations for night-time were obtained with less data pairs. The reason for this is that the impact of other factors on background sound levels is less variable during the night than for a 24 hour period, resulting in less data scatter.

The amount of data pairs used to define the background sound level/wind speed relationships for night-time is considered adequate on the basis of the adequacy of the relationships defined as indicated by the R<sup>2</sup> values.

## 6.5.8 Data Analysis

### Planning Application Report – Data Analysis

The Assessment includes regression analysis of measured background sound levels and wind speed for both 24 hour periods and night defined as 10:00 pm to 7:00 am for each of the 27 dwellings at which background sound levels were measured. In the majority of cases the data was fitted to a 3<sup>rd</sup> order polynomial with a 2<sup>nd</sup> order polynomial being used in a small number of cases.

### Evidence and submissions – Data Analysis

It was Mr Huson's evidence that better definitions of the relationships between background sound levels and wind speed would have been obtained if a technique known as "bin analysis" had been applied. This technique, which Mr Huson noted is described in NZ6808:2010, enables errors due to low numbers of data points at particular wind speeds to be quantified and a better representation of the relationship to be obtained.

Mr Huson also questioned what he considered the apparent assumption that a 3<sup>rd</sup> order polynomial was the best choice to describe the relationships and while acknowledging that NZ6808:1998 does not specify the type of regression he noted that other standards specify 2<sup>nd</sup> order polynomials.

### Panel Response – Data Analysis

While we acknowledge Mr Huson's evidence that, in his opinion, more sophisticated and better methods were available for the analysis of background sound level/wind speed relationships we note that he did not suggest that the use of such methods was a requirement of NZ6808:1998.

We also note that the worked example appended to NZ6808:1998 includes the fitting of a 3<sup>rd</sup> order polynomial equation to the data which is precisely what has been done in this case.

We see no reason to question whether the assessments have been completed in accordance with NZ6808:1998 on the basis of the method applied to complete the regression analysis.

## 6.5.9 Seasonality

### Evidence and Submissions - Seasonality

It was Mr Huson's evidence that the background sound level data shows lower sound levels at a dwelling at which measurements were made in

October compared with the measured sound levels at an adjacent dwelling made in November and that this difference indicates that background sound levels vary from season to season.

A submission made at the Hearing used the background sound level data used in the Assessment to illustrate what the submitter considered was a variation in background sound levels with the season and it was submitted that such seasonality should be taken into account in determining noise limits.

The Proponent submitted that seasonality was not a matter required to be considered under NZ6808:1998 and that Mr Delaire had given evidence that, at another site, extensive monitoring showed no correlation between background sound levels and seasons.

### **Panel Response - Seasonality**

While we acknowledge that the information presented shows that, in general, background sound levels recorded in July/August were higher than those recorded in October/November/December we are not convinced that this difference necessarily demonstrates a seasonal effect.

We note that NZ6808:1998 has no requirement to consider seasonal variations in background sound levels and while the WEF Guidelines provide guidance on factors that should be considered in particular, including wind direction and time of day, those factors do not include seasons. It is therefore apparent that the fact that seasonal variations in background sound levels have not been taken into account presents no challenge to the proposition that the assessments have been conducted in accordance with NZ6808:1998 and the WEF Guidelines.

The reason why there is no requirement to consider seasonal variations in background sound levels could be that no such variations exists. This proposition is supported by:

- the evidence of Mr Delaire including the results of an investigation conducted at Portland and reported in a paper presented at a conference in Denmark; and
- the possible reasons of the differences in background sound levels at different dwellings are many and varied making comparisons to identify the impact of a particular variable, in this case the season, difficult. While the information presented shows that higher background sound levels were recorded in July/August, the reason for this cannot be definitively identified.

While the above does not necessarily provide definitive proof that there is no seasonal variation in background sound levels, the mechanisms by which seasonal variations may occur require further consideration.

Background sound levels at dwellings are largely determined by the following:

- wind speed;
- wind direction; and
- the extent of leafy vegetation.

There is no doubt that each of these factors vary with the season, however it is noted that:

- the Assessment takes account of variations in wind speed;
- while the Assessment does not take account of wind direction, it is a requirement of the WEF Guidelines that wind direction should be the subject of particular attention; and
- the extent of leafy vegetation is expected to be greater in spring and summer than in winter but the higher background sound levels were recorded in winter.

We therefore find that, providing an assessment takes appropriate account of wind direction, any seasonal variations in background sound levels will also be taken into account.

## **6.5.10 Prediction of WEF Sound Levels**

### **Planning Application Report – Prediction of WEF Sound Levels**

The Assessment included predictions of WEF sound levels at dwellings for two purposes:

- predictions of maximum WEF sound levels to identify Assessable Dwellings; and
- predictions of WEF sound levels at Assessable Dwellings over a range of wind speeds to enable comparison with limits to be imposed.

The Assessment utilised the following:

- the sound propagation model provided in NZ6808:1998;
- turbine sound power levels of the Enercon E82 turbines provided and guaranteed by the turbine manufacturer;
- the octave band sound power level spectrum of the Enercon E82 turbine; and
- air absorption coefficients for each octave band specified in ISO9613-1:1993.

The Cumulative Assessment included predictions of WEF sound levels resulting from emissions from the combination of both of the proposed Moorabool and Yaloak South WEFs. These predictions were:

- made using the same sound propagation model used in the Assessment; and
- used to:
  - identify the five dwellings at which predicted combined WEF sound levels are 35 dB(A), or greater; and
  - predict combined WEF sound levels at each of the five dwellings over a range of wind speeds.

The predicted combined WEF sound levels at four of the five dwellings were found to be below the relevant noise limits while the predicted level at one dwelling was above the night-time limit.

The report on the Cumulative Assessment noted that the NZ6808:1998 noise prediction methodology assumes that dwellings are downwind from all turbines and while such an assumption may be appropriate in the assessment of a single WEF it is overly conservative when the dwelling is between two facilities. The prediction method was refined by the use of aspects of the CONCAWE methodology to account for the difference in noise propagation with wind direction. Additional predictions were made assuming both easterly and westerly winds, that is, from one WEF to the dwellings and on to the other WEF. The results of these additional predictions showed reductions from the initial predictions and the combined WEF sound levels below all relevant limits at all dwellings.

### **Evidence and Submissions – Prediction of WEF Sound Levels**

It was Mr Delaire's evidence that the sound propagation model used was that specified in NZ6808:1998 and that it is generally accepted as being conservative due to:

- the assumption that the dwelling is directly downwind of all turbines; and
- there being no allowance for attenuation other than air absorption.

It was Dr Thorne's evidence that:

- the sound propagation model used is not suitable for prediction of WEF sound levels from a complex WEF such as the proposed Moorabool WEF since the model is only suitable for the preliminary assessment of a single turbine as it does not allow for interactions between turbines nor varying meteorological conditions or topography;

- the predictions provided in the assessments should not be considered conservative; and
- the use of a more realistic model could be expected to identify more dwellings as Assessable Dwellings and predict non-compliance at a larger number of such dwellings.

Mr Huson also criticised the sound propagation model used for its inability to account for meteorological conditions and suggested that the Australian developed Environmental Noise Model (ENM) was more appropriate. Mr Huson stated that:

*The ENM is a noise model widely accepted by authorities across all states of Australia and it has been used in numerous environmental impact assessments of the past 20 years.<sup>49</sup>*

Mr Huson presented the results of a modelling exercise using the ENM to predict the WEF sound level at one dwelling assuming the following:

- A wind speed of 8 m/s from the WEF to the dwelling;
- ground adsorption of "Grass: rough pasture"; and
- slightly higher air absorption than used in the Application and Revised Assessments.

Mr Huson's prediction was of a WEF sound level of 50.5 dB(A) compared with that of the Assessment of around 40 dB(A).

Mr Huson stated that:

*If a noise model such as ENM or one that includes wind shear (with direction) and temperature gradient effects were used in wind farm assessments then the 35 dB(A) contour around a proposed site would be much larger and more representative of the real impact area. Properties owned by the Willis family would easily fall within the 35 dB(A) contour and would require background survey work to derive a noise compliance curve.<sup>50</sup>*

Mr Delaire provided additional evidence on predicted and measured WEF sound levels at four sites located at two operating WEFs in Victoria. The information provided showed the predicted levels to be mostly higher than the measured WEF sound levels, particularly in the critical wind speed range of 4 to 8 m/s.

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<sup>49</sup> Supplementary Expert Witness Statement of William Leslie Huson, Page 5

<sup>50</sup> Supplementary Expert Witness Statement of William Leslie Huson, Page 8

Both Dr Thorne and Mr Huson challenged the contention made in the Cumulative Assessment that the sound propagation model provided in NZ6808:1998 is conservative and Mr Huson criticised the use of CONCAWE on a number of grounds.

Mr Delaire stated that the use of CONCAWE methodology for the Cumulative Assessment was limited to the aspects representing the effect of wind direction on sound propagation and in all other aspects the modelling utilised the model described in NZ6808:1998.

### **Panel Response – Prediction of WEF Sound Levels**

While we accept Dr Thorne's and Mr Huson's evidence that more complex models, of which there are a considerable number, can be used to more completely represent sound propagation, the primary question we face is not which model should be used but has the modelling been completed in accordance with NZ6808:1998.

We are in no doubt that the use of "simple model" described in NZ6808:1998 in the assessment satisfies this primary requirement.

Our review of Mr Huson's evidence indicates that the variation between his prediction and that included in the Assessment is due in large part to the assumptions made in regard to inputs to the model including wind speed, wind direction and ground absorption rather than the model itself. This illustrates a disadvantage of more complex models in that there is more scope for variation in the model output as a result of the scope provided to the modeller to determine the inputs.

In contrast the simple model provides little scope for inputs to be varied and can therefore be expected to produce consistent results irrespective of the modeller. While a model with such characteristics may not produce the most accurate predictions the consistency provided enables WEFs to be assessed consistently.

In the context of setting the requirements for approval, consistency is more important than accuracy. The consequence of any lack in accuracy will ultimately be borne by the developer of the WEF as they will be required to comply with the prescribed limits, irrespective of the accuracy of the predictions. The use of a simple model providing consistent predictions means that all WEF proponents need to jump the same hurdle. Arguments about the accuracy of the model and whether it is conservative or not are about the height of the hurdle and are matters for discussion in relation to the provisions of the Planning Scheme rather than the merits of an application for a planning permit.

We therefore find that the sound propagation model used in the Assessment is appropriate for the purpose.

We note and accept Mr Delaire's evidence that predicted WEF sound levels using the method described in NZ6808:1998, which assumes wind from all turbines to the dwelling simultaneously, is not suitable for a dwelling located between two WEFs.

Our acceptance of this evidence combined with the knowledge that downwind noise propagation is greater than upwind propagation means that predictions made using the method described in NZ6808:1998 must be higher than those made using a model that utilises the method described in NZ6808:1998 but takes account of the variation of noise propagation with wind direction.

While Mr Huson raised the issue of the use of CONCAWE in the context of the cumulative impact assessment, his suggestion of the use of an alternative model is not of specific relevance to the cumulative impact but the more general question of the appropriate model to be used for any WEF sound level prediction.

We accept the modelling completed for the Cumulative Assessment as using the method described in NZ6808:1998 with appropriate adjustment to take account of the influence of wind direction on noise propagation and consider such an approach to be appropriate for cumulative impact assessment.

### **6.5.11 Wind Direction**

While not raised in submissions, we question whether the particular attention to the correlation of background sound levels with wind speed for different wind directions required by the WEF Guidelines has been given.

#### **Evidence and Submissions – Wind Direction**

We asked Mr Delaire if he considered that the particular attention to the correlation of background sound levels with wind speed for different wind directions required by the WEF Guidelines had been given.

In response Mr Delaire stated that no attention had been given because there was no evidence of wind direction effects in the data obtained. Mr Delaire indicated that if a significant wind direction effect was present the data would indicate the existence of more than one background sound level/wind speed relationship and this was not the case.



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## **Panel Response – Wind Direction**

In the absence of any evidence to the contrary, we accept the evidence of Mr Delaire that attention has been paid to the need for separate correlations of background sound levels with wind speed in that the data was considered and found not to indicate any wind direction effect and therefore, in this case a need for such separate correlations does not exist. As a result we do not consider that the adequacy of the Assessment is challenged on the grounds that separate correlations have not been made.

We note however that the correlations of background sound levels with wind speed determined for the assessments may not be suitable for use in compliance testing.

The Draft Permit includes conditions, accepted by the Proponent, that specify certain criteria that background sound level/wind speed correlations must satisfy in order to be used for compliance testing using the method described in NZ6808:1998. The criteria include the regression curves being derived from data sets in which a particular percentage of the data pairs are the results of measurements made when the wind direction is from the WEF to the dwelling.

The purpose of this specification is to provide correlations that can be used for compliance testing in the period of time in which the likelihood of the wind direction being from the WEF to the dwelling is at a maximum and hence the WEF sound level at the dwelling is also at a maximum. This enables compliance testing under likely worst case conditions which can provide demonstration of compliance under all conditions.

While such a requirement need not necessarily be imposed on the correlations used for a pre-development assessment, if the correlations do not satisfy the requirement then, at the least, the data will need to be re-analysed and additional measurements of background sound levels, wind speed and wind direction may be necessary to produce correlations that can be used in compliance testing.

### **6.5.12 Are the Noise Assessments Provided Adequate?**

#### **Planning Scheme Provisions - Adequacy of Noise Assessments**

The requirements of the Planning Scheme in regard to noise assessment can be seen as:

- the requirements created by Clause 52.32-2 of the Planning Scheme for noise assessment completed in accordance with NZ6808:1998; and

- through the reference in Clause 52.32-3 of the Planning Scheme to the WEF Guidelines:
  - the assessment must pay particular attention to separate correlation of background sound levels with wind speed for different wind directions and time of day and measurements of wind speed at hub height; and
  - the assessment must provide a prediction of compliance.

It is our interpretation that the aim of the provisions of the Planning Scheme in regard to noise assessment is to prevent a WEF from being constructed and operated unless there is a reasonable expectation that compliance can and will be achieved. Furthermore, the Planning Scheme defines what must be done to achieve this aim, that is, an assessment in accordance with NZ6808:1998, paying particular attention to the matters referred to in the WEF Guidelines, which provides a prediction of compliance. It therefore follows that if such an assessment is provided then the required reasonable expectation is created.

In determining whether an assessment is adequate there are two fundamental questions:

- Does the assessment include a prediction of compliance with NZ6808:1998 recommended limits? and
- Has the assessment been completed in accordance with NZ6808:1998 and the requirements of the WEF Guidelines?

The requirements of the assessment are no more than both of these questions being able to be answered in the affirmative.

### **Do the Assessments Include Predictions of Compliance?**

#### *Evidence and Submissions*

Mr Delaire's evidence on the predictions included in the Assessment was that the following is predicted:

- *Compliance with 24 hour NZ Standard noise limits is achieved at all neighbour's residential properties*
- *Compliance with night-time NZ Standard noise limits is achieved at forty-four (44) of the forty eight (48) neighbour's residential properties<sup>51</sup>*

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<sup>51</sup> Expert Witness Statement of Christophe Frederic Delaire, Section 4.3

In recognition of the predicted non-compliances Mr Delaire stated in his expert witness statement that:

*To achieve compliance with the NZ Standard night-time noise limits at all neighbour's properties in the vicinity of the Moorabool Wind Farm a noise management plan may need to be implemented to reduce noise emissions from selected wind turbines during selected wind conditions and time of day<sup>52</sup>*

Mr Delaire's evidence also included further information on a typical noise management plan and the following statements:

*Due to the conservatism of the NZ Standard prediction method, noise management plans may not be required once the wind farm is built. This can be demonstrated by post-construction noise monitoring.*

*I have predicted noise emissions from the proposed Moorabool Wind Farm using less conservative and more realistic assumptions to demonstrate that a noise management plan may not be required.<sup>53</sup>*

In regard to the cumulative impact of the proposed Moorabool and Yaloak South WEFs, it is Mr Delaire's evidence that compliance is predicted at all relevant dwellings.

### ***Panel Response***

Leaving aside any questions of the validity of the assessments, it is accepted that the Cumulative Assessment includes a prediction of compliance but it is clear that the Assessment does not.

As a result of the predicted non-compliances the Assessment cannot be considered to support a reasonable expectation of compliance and this in itself could be considered as sufficient reason to refuse the Application on the grounds that it does not meet the requirements of the Planning Scheme.

It is the Proponent's submission that the predicted non-compliances could be overcome by the application of a noise management plan.

While we accept that the development and implementation of such a plan is feasible, we do not accept the view that the development should be allowed to proceed before an assessment conducted in accordance with NZ6808:1998 that includes a prediction of compliance is provided.

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<sup>52</sup> Expert Witness Statement of Christophe Frederic Delaire, Section 4.3

<sup>53</sup> Expert Witness Statement of Christophe Frederic Delaire, Section 4.4

In our view the critical requirement is that an assessment meeting the requirements of the WEF Guidelines be provided prior to the start of the proposed development and that this requirement can be satisfied without refusing the Application. We therefore would not recommend refusal on the grounds that an assessment showing a prediction of compliance has not been provided as such a prediction can be required prior to the start of development.

Our recommended approach is to include a condition in any permit issued that requires an assessment to be provided, prior to the start of the development, that includes a prediction of compliance at all non-host dwellings for both 24-hour and night-time limits with both the prediction and the limits being determined in accordance with NZ6808:1988 and any additional requirements that may be considered necessary. We refer to such an assessment as the "Pre-development Assessment".

We are mindful that this approach will require some type of secondary consent, which is not a preferred approach; however, we have given careful consideration to how the matter of consent could be dealt with and believe we have devised a practical and workable solution. This matter is discussed further after consideration of the adequacy of the assessments and the requirements of a Pre-development Assessment.

We accept that the Cumulative Assessment includes a prediction of compliance.

### **Have the Assessments been Completed in Accordance with NZ6808:1998 and the Requirements of the WEF Guideline?**

#### *Evidence and Submissions*

While the Proponent and its acoustic expert consider that the Assessment is in accordance with NZ6808:1998, it has been submitted that for a variety of reasons, detailed previously, that this is not the case.

#### *Panel Response*

Having considered the various criticisms of the assessments we classify those criticisms into the following categories:

- That the assessments have not been completed in accordance with NZ6808:1998, which include:
  - The selection of locations for background sound level measurements;
  - The positioning of sound level measuring equipment;

- 
- Verification and calibration of sound level measuring equipment; and
  - Background sound level/wind speed data pair requirements;
  - That the assessments do not meet the requirements of the WEF Guidelines in relation to:
    - height of wind speed measurements; and
    - the attention given to separate correlations of background sound level with wind speed for different wind directions;
  - That the assessments could have been completed in a better way, including:
    - the modelling technique used to predict WEF sound levels;
    - the techniques used for analysis of background sound level/wind speed data;
    - the use of an indicative rather than a selected turbine; and
    - allowance for variations in background sound level with the season.

Criticisms of the third category do not go to the question at hand, however, since we have already determined that the inadequacy of the Assessment is such that a Pre-development Assessment should be required, the matters in the third category may be considered in determining the requirements for the Pre-development Assessment.

In regard to the matters in the second category we have determined that neither are reasons to consider the assessments inadequate.

While we are of the view that the selection of locations for background sound level measurements for the Assessment was not in accordance with NZ6808:1998 we do not consider this to be a fatal flaw in that the selection made did not prevent a prediction of compliance.

We find that the evidence is that the Assessment has not been completed in accordance with NZ6808:1998 by virtue of the positioning of sound measurement equipment in some cases and doubts in regard to conduct of field checks of the instrumentation before and after measurements.

In the case of the Cumulative Assessment we also find that some of the background sound level measurements made are invalid because of the positioning of the sound measuring equipment. As a result we consider the Cumulative Assessment to be inadequate and believe that a Pre-Development Cumulative Assessment should be required.

### 6.5.13 The Pre-Development Assessments

Two pre-development assessments should be required:

- an assessment of the proposed Moorabool WEF alone, this is the Pre-development Assessment (PDA); and
- an assessment of the proposed Moorabool and Yaloak South WEFs combined when both are operating, this is the Pre-development Cumulative Assessment (PDCA).

#### Requirements of the Pre-development Assessment

The PDA needs to be completed in accordance with NZ6808:1998 and to address the following additional matters:

- all aspects of the PDA must be conducted by a suitably qualified and experienced acoustic expert;
- the PDA must use the model described in Clause 4.3 of NZ6808:1998 for:
  - Identification of all dwellings at which the predicted maximum WEF sound level is 35 dB(A) or greater; and
  - Predict WEF sound levels at dwellings so identified over a range of wind speeds of at least 4 to 12 m/s.

Attenuation due to air absorption may be determined by a method that accounts for the spectral content of the turbine noise emissions providing the method used does not predict an overall attenuation rate greater than 0.005 dB(A) per metre;

- the PDA must utilise the results of wind speed measurements at hub height;
- background sound level measurements should be required to be made at, at least, all locations where the predicted maximum WEF sound level is 40 dB(A) or greater except if the owner of a dwelling refuses permission for such measurements to be taken;
- since the PDA would not be required to be completed until the development is about to be commenced it can be expected that the final turbine selection would have been made and the WEF layout finalised. The PDA should therefore be based on the actual turbine and WEF layout;
- if it is necessary to apply a noise management plan to obtain a prediction of compliance then the PDA needs to include details of the proposed plan including evidence of the predicted impact of its application; and
- the PDA should be required to either:
  - specifically address the matter of separate correlations of background sound levels with wind speed for different wind

directions by determining such correlations or providing an explanation of why such correlations are not required; or

- include correlations of background sound levels with wind speed determined from data meeting the specifications include in the Recommended Permit for such correlations to be used for compliance testing using the methodology described in NZ6808:1998.

### **Requirements of the Pre-development Cumulative Assessment**

The requirement for a PDCA is, of course, subject to the grant of a permit for the Yaloak South WEF. If and when such a permit is granted then the need for a PDCA is triggered and the requirements of the PDCA include all of those listed above for the PDA with the modifications listed below.

- the sound propagation model described in Clause 4.3 of NZ6808:1998 may be modified to account for the effect of wind direction on sound propagation so that predictions of WEF sound levels with the wind direction being from the Moorabool WEF to dwellings;
- allowance is required for the situation where the Moorabool WEF is to be developed and the turbine selection and wind farm layout for the Yaloak South WEF has not been finalised. In such circumstances the turbine sound power levels and WEF layout for the Yaloak South WEF specified in the Cumulative Assessment could be used; and
- the specifications of data to be used for correlations of background sound level with wind speed would be such that wind direction specification is from the Moorabool WEF to the dwelling.

### **Responsibility for Completing the Pre-development Cumulative Assessment**

Since the PDCA requires input from two WEF proponents and may be required by both proponents it would seem fair and reasonable that the responsibility for completion of the PDCA should be shared between the two proponents. We have given considerable thought to the development of a regime under which such sharing of responsibility is required; however we have not been able to devise such a regime. We cannot identify a means by which requirements can be placed on the proponent of the Yaloak South WEF through a permit for the Moorabool WEF.

While we are aware that the application for a permit for the Yaloak South WEF is currently being considered and it is possible that a permit issued for the Yaloak South WEF could include a requirement for a PDCA, we do not believe that this can or should be assumed. It is therefore necessary to include requirements for a PDCA in any permit issued for the Moorabool

WEF that ensure a PDCA can and will be completed irrespective of whether input from the Yaloak South WEF proponent is provided.

On the other hand, the quality of the PDCA completed would be enhanced by cooperation between the two WEF proponents and the Proponent of the Moorabool WEF should be encouraged to use its best endeavours to obtain such cooperation.

If the proposed Moorabool WEF is the first to be developed then, in order to complete the PDCA the Moorabool WEF Proponent would require, at a minimum, the following from the Yaloak South WEF proponent:

- specification of the make and model of the turbines to be installed by the Yaloak South WEF; and
- specification of the Yaloak South WEF layout (turbine locations).

While information on these aspects is available from the Yaloak South WEF application material, the possibility exists for the details to change as a result of conditions included in any permit issued for the Yaloak South WEF or by decision of the Yaloak South WEF proponent on turbine selection or micro-siting of turbines. Ideally specifications would be as close as possible to that which will be built at Yaloak South; however, such information would be only available by agreement between the proponents.

It is considered necessary to provide a default position for the situation where agreement between the proponents cannot be reached and that position is use of the turbine and WEF layout specified in the Yaloak South WEF application, as modified by any condition included in the permit issued for the Yaloak South WEF.

This information would enable the modelling to be performed to identify assessable dwellings, those at which the predicted combined WEF sound level is 35 dB(A) or greater and the dwellings at which measurement of background sound levels must be made, those at which the predicted combined WEF sound level is 40 dB(A), or greater.

It would then be the responsibility of the Moorabool WEF Proponent to obtain the required results of measurements of background sound levels, wind speeds and wind direction and this could be achieved by a combination of:

- the results of measurements made for the PDA of the Moorabool WEF;
- the results of measurements made by the Yaloak South WEF proponent; and
- additional measurements performed for the purpose of the PDCA.



While it might be expected that the provision of data by the Yaloak South WEF proponent would be made possible by agreement between the proponents, the responsibility for obtaining all the required data would remain with the Moorabool WEF Proponent with any shortfall of data being made up by additional measurements.

If the proposed Yaloak South WEF is the first to be developed then the requirements placed on the Moorabool WEF Proponent will depend on the conditions included in any permit issued for the Yaloak South WEF.

If the permit for the Yaloak South WEF contains equivalent conditions requiring a pre-development cumulative impact assessment then a PDCA would have already been completed and the Moorabool WEF Proponent may be able to gain access to the completed PDCA through negotiation with the Yaloak South WEF proponent.

If such access cannot be negotiated or a PDCA has not been completed by the Yaloak South WEF proponent, the possibility exists that a dwelling or dwellings may be identified at which background sound level measurements are required but cannot be made without shutting down part or all of the Yaloak South WEF.

While NZ6808:1998 does not provide any guidance on this matter, this absence of guidance leads us to the guidance provided in NZ6808:2010 which at Clause 5.6.3 states:

*Where a new wind farm will impact on the same noise sensitive locations as an existing wind farm, the assessment of background sound should exclude wind farm sound generated by all existing wind farms. This means that the wind farm sound from another wind farm shall not be considered as part of the background sound level in determining noise limits for subsequent developments.*

*C5.6.3 Where it is not possible or practical to cease operation of an existing wind farm for the purposes of measuring background sound levels to satisfy 5.6.3, the background sound level can be estimated by subtracting the predicted existing wind farm sound level from measured sound levels. In some instances there may be publicly available information on the existing wind farm sound level and pre-existing background sound levels, which may assist this estimation.*

If this guidance is followed, which we believe would be appropriate, sound level measurements could be made at a dwelling, or dwellings and the correlation of those measurements with wind speed together with the

predicted Yaloak South WEF sound levels could be used to calculate the background sound level/wind speed equation required to establish limits.

Overall it can be said responsibility for the PDCA must be taken by the Moorabool WEF Proponent and that the PDCA must be based on the best available information. This does not remove the possibility of contributions by the Yaloak South WEF proponent, in fact the requirement to use the best available information places an obligation on the Moorabool WEF Proponent to do what it can to obtain such contributions.

### **Evaluation of Pre-development Assessments**

It is essential that pre-development assessments are completed in strict compliance with the conditions included in any issued permit. To ensure that this is the case such assessments must be subject to evaluation.

A frequently used means of ensuring the quality of such assessments is to require them to be completed by a suitably qualified and experienced person to the satisfaction of the responsible authority. We note however that in this case this approach has failed to produce an adequate noise assessment for inclusion in the PAR.

There is no doubt that Marshall Day Acoustics staff would be considered to be suitably qualified and experienced but the testing of their assessment through review by other acoustic experts and consideration by submitters has shown the assessment to be inadequate.

While it would be normal to require pre-development assessments to be to the satisfaction of the responsible authority, whether that be the Minister or Council, we have significant concerns in regard to the resources available to and the capability of the responsibility authority to make a rigorous evaluation of what in some parts is a highly technical matter. As a result there would be a significant risk that the rigorous evaluation that we consider necessary would not be undertaken.

To overcome this problem we believe that the pre-development assessments should be the subject of an audit by an independent acoustic expert with that expert being required to certify that the pre-development assessments provide predictions of compliance and have been completed in accordance with the appropriate standards and specifications included in the permit.

We suggest the following:

- the conduct of the assessments be subject to an audit and an audit report be submitted to the Minister with the assessments;

- the audit be conducted by a suitably qualified and experienced member of the Association of Australian Acoustical Consultants, not associated with the people or companies completing the assessments; and
- the audit must include but not be necessarily limited to:
  - sound power data utilised for prediction of WEF sound levels at dwellings;
  - selection of dwellings for assessment;
  - compliance with NZ6808:1988 in regard to background sound level measurement including the requirement of compliance with NZ6801;
  - the noise propagation model utilised; and
  - satisfaction of the criteria specified for the background sound level/wind speed correlation data.

It is considered that pre-development assessments that provide predictions of compliance and that have been audited and certified by an independent acoustic expert could be taken as adequate, without technical evaluation by the Minister.

#### **6.5.14 Conclusions and Recommendations – Adequacy of Noise Assessments Provided**

It is concluded that:

**The noise assessment provided with the Application as modified by the evidence presented to the Panel does not satisfy the requirements of the Planning Scheme and the WEF Guidelines because:**

- **A prediction of compliance with the noise limits specified in NZ6808:1998 is not provided; and**
- **The assessment has not been completed in accordance with the WEF Guidelines and NZ6808:1998 in relation to:**
  - **The selection of locations for measurement of background sound levels;**
  - **The positioning of noise monitoring equipment relative to that of trees and vegetation; and**
  - **Anomalous background sound level and wind speed data at one location.**

**Suggestions that the noise assessment provided has not been completed in accordance with NZ6808:1998 due to the following are not supported:**

- **The measurement of wind speeds at a height other than hub height;**

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- The use of an indicative turbine with a generating capacity of 2MW;
  - The inability of the measurement devices used to measure low sound levels;
  - The lack of evidence of verification and calibration of measurement devices;
  - The number of data pairs used to determine background sound level/wind speed correlations; and
  - The fact that no account has been taken of seasonal variations in background sound levels.

The cumulative noise assessment provided with the PAR is not accepted as adequate due to:

- The location of noise monitoring equipment relative to that of trees and vegetation; and
- Anomalous background sound level and wind speed data at one location.

A noise assessment completed in accordance with the WEF Guidelines and NZ6808:1998 that includes a prediction of compliance is required prior to the start of the development.

A cumulative noise assessment utilising background sound level measurements made in accordance with NZ6808:1998 that includes a prediction of compliance is required prior to the start of development.

It is recommended that:

Any permit issued include conditions requiring that, prior to the start of development:

- A pre-development noise assessment be completed in accordance with NZ6808:1998 with the modified and additional criteria specified in Condition 42 of the Recommended Permit;
- A pre-development cumulative noise assessment be completed in general accordance with NZ6808:1998 and the modified and additional criteria specified in Condition 43 of the Recommended Permit; and
- Both the assessments referred to in the previous two dot points be the subject of an audit by an acoustic expert as specified in Condition 44 of the Recommended Permit.

## **6.6 Post construction Compliance Testing**

### **6.6.1 The Planning Application Report – Post Construction Compliance Testing**

The PAR makes little reference to compliance testing but does recognise that such testing will be performed by stating that:

*If the assessment of post construction noise monitoring highlights any cumulative impacts it may be necessary to implement noise management settings for specific turbines at selected wind speeds and directions<sup>54</sup>*

### **6.6.2 Evidence and Submissions – Post Construction Compliance Testing**

A number of written submissions to the Responsible Authority expressed concern that noise limits would not be complied with and that noise impacts would be unacceptable.

The only reference to compliance testing in Mr Delaire's expert witness report is similar to that in the PAR indicating that the requirement, or otherwise for a noise management plan will be determined from the results of post construction testing.

Both Mr Huson and Dr Thorne expressed concern with the setting of noise limits based on the background sound levels measured for the Application Assessment for reasons discussed previously.

Dr Thorne's evidence included severe criticism of the compliance testing methodology provided in NZ6808:1998. He indicated his view that it did not provide a method for separating background noise from WEF noise thus preventing the consideration of WEF sound levels.

While evidence and submissions on the matter of compliance testing were limited to the above, the discussion that occurred in relation to permit conditions included consideration of the conditions relating to compliance testing in the Draft Permit.

It should be noted that the Proponent has indicated acceptance of the conditions in the Draft Permit.

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<sup>54</sup> Planning Application Report, Page 100

### 6.6.3 Panel Response – Post Construction Compliance Testing

While we accept the views of Mr Huson, Dr Thorne and others that at least some of the correlations of background sound level with wind speed should not be used to define limits due to inadequacies in the measurement techniques, we do not accept the view that the methodology for compliance testing provided in NZ6808:1998 cannot and should not be used.

We note the compliance testing regime specified in the Draft Permit, which has been accepted by the Proponent, allows the use of NZ6808:1998 methodology, with certain refinements, and we consider such an approach to be appropriate.

We consider that the following aspects of the compliance regime specified in the Draft Permit require further consideration:

- Special audible characteristics;
- Compliance testing at dwellings impacted by more than one WEF; and
- Quality assurance.

#### Special Audible Characteristics

Much of the evidence and information in submissions provided in relation to special audible characteristics were detailed previously and while there was considerable debate on the application of a 5 dB(A) penalty to predicted WEF sound levels there was general agreement that, if special audible characteristics are present in the WEF sound post construction then the penalty should be applied to measured WEF sound levels.

Dr Thorne suggested that the penalty should be applied unless the WEF operator provides proof that the WEF sound does not have special audible characteristics and offered the following as a definition of modulation.

*....the definition of modulation is a change in the measured unweighted LZeq turbine sound level of 3 dB (represented by a rise and subsequent fall in peak-trough sound energy levels each of more than 3 dB) occurring within a 2 second period not less than 5 times in any one minute and 6 minutes in any hour.<sup>55</sup>*

While NZ6808:1998 makes it clear that a 5 dB penalty is to be applied to measured WEF sound levels if special audible characteristics are present, the guidance provided in regard to determining whether such characteristics are present is much less definitive. NZ6808:1998 states that:

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<sup>55</sup> Statement of Evidence of Dr Robert Thorne, Recommendation 5, Page 4

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*At present there is no simple objective procedure available to quantify special audible characteristics, and subjective assessment is therefore necessary, supported by objective evidence (e.g. frequency analysis) where appropriate<sup>56</sup>*

In a note, NZ6808:1998 states that:

*The objective method for determining whether a sound exhibits a tonal character shall be that used in IEC DIS 1400-11 for assessing wind turbine tonal character close to the turbine, i.e. The Joint Nordic Method.<sup>57</sup>*

No guidance in regard to objective assessment of amplitude modulation is provided in NZ6808:1998.

While the approach commonly applied to this matter is to require an assessment of the characteristics of the WEF sound by a suitably qualified and experienced person, which is the approach taken in the Draft Permit, we are concerned with the subjective nature of such assessments.

We consider NZ6808:2010 to be a potential source of appropriate guidance as the revised standard is considerably more expansive on the matter than NZ6808:1998.

NZ6808:2010 has similar provisions to NZ6808:1998 that recognise the possibility of special audible characteristics and provide for a penalty of up to 6 dB to measured WEF sound levels if such characteristics are present. Unlike NZ6808:1998, NZ6808:2010 specifies how assessments for special audible characteristics shall be conducted in its Appendix B.

With respect to tonality NZ6808:2010 offers a simplified test method and a reference test method. In regard to the simplified test method it is stated that it may be carried out using one-third octave-band measurement equipment but if it does not indicate tonality it may still be necessary to use the reference method to confirm the presence or absence of tonality.

The reference method is that prescribed in Annex C to ISO 1996-2:2007 or an equivalent method.

It is stated in NZ6808:2010 that no appropriate objective test for amplitude modulation has been standardised however an “Interim test method” is offered. The interim test method is described as follows:

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<sup>56</sup> NZ6808:1998, Clause 5.3.1

<sup>57</sup> NZ6808:1998, Note to Clause 5.3.2

### *B3.2 Interim test method*

*... modulation special audible characteristics are deemed to exist if the A-weighted peak to trough levels exceeds 5 dB on a regular varying basis, or if the measured third-octave band peak to trough levels exceed 6 dB on a regular basis in respect of the blade pass frequency.<sup>58</sup>*

The note to this clause states:

*This method is considered to be an adequate interim test that has been used in New Zealand. It is envisaged that appropriate objective tests for modulation special audible characteristics will be developed in the future to replace B3.2 or provide a more robust objective method than B3.2<sup>59</sup>*

We are of the view that as far as is possible the presence of special audible characteristics should be determined by objective measures.

We consider that in regard to tonality the assessment method used in IEC DIS 1400-11, as suggested in NZ6808:1998 or the method prescribed in Annex C to ISO 1996-2:2007, as suggested in NZ6808:2010, would be suitable for such assessments. We do not believe the simplified test method described in NZ6808:2010 to be suitable because, as is indicated in the standard, the results of this test are not definitive.

While we note that NZ6808:2010 indicates that a standardised test is not available, we are of the view that the assessment of the presence of modulation should utilise specific criteria. We see the alternatives available as the Interim test method specified in NZ6808:2010 and the definition of modulation suggested by Dr Thorne.

We find ourselves unable to choose between the two alternatives on scientific or technical grounds however the NZ6808:2010 method is favoured as it is seen as the product of consideration by a range of experts involved in the development of the standard as opposed to the view of one expert.

It is noted that NZ6808:2010 indicates an expectation that more appropriate tests for modulation will be developed in the future and will replace the interim test method. In this circumstance it would be appropriate for permit conditions to specify that the assessment of modulation utilise the interim test method as specified in NZ6808:2010 unless a more appropriate method is prescribed in future versions of that standard.

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<sup>58</sup> NZ6808:2010 – Appendix B, Clause B3.2

<sup>59</sup> NZ6808:2010 – Appendix B, Note C5.3.1



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## **Compliance at Dwellings Impacted by Two or More WEFs.**

The Cumulative Assessment considered the potential impact on the acoustic environment of the combination of the proposed Moorabool WEF and the proposed Yaloak South WEF. The assessment produced the following conclusion and recommendation that were not the subject of challenge and which we accept:

- five dwellings, one a Moorabool WEF host, one a Yaloak South host and three non-host dwellings, were identified as being potentially affected by the two WEFs; and
- limits applied to the combined WEF sound level at dwellings potentially impacted by the two WEFs should be the NZ6808:1998 recommended limits.

The questions that are of concern are related to the determination of the individual components of what should be a shared responsibility for compliance, including compliance tests, at the relevant dwellings.

Ideally the work required to be done and any financial impact that results in the conduct of compliance testing and maintaining compliance should be shared equitably between the two WEF operators.

The areas of shared responsibility that need to be considered are:

- compliance testing; and
- actions to be taken on detection of a non-compliance.

### ***Compliance Testing***

While NZ6808:1998 is not directly applicable to compliance testing of the cumulative impact of more than one WEF, the fact that it is proposed to apply the same limits at dwellings that are subject to impacts from the two WEFs as are to be applied at dwellings impacted by a single WEF suggests the compliance testing requirements for the former case should be similar to that in the latter. Those requirements include measurement of background sound levels at all dwellings where the predicted WEF sound levels are 35 dB(A) or greater and measurement of operating sound levels at the same locations.

The conditions we propose in regard to the completion of a PDCA will result in background sound level measurements being made at some of the relevant dwellings, however such measurements may not be suitable for compliance testing because the conditions relating to the PDCA:

- only require background sound levels to be measured at dwellings at which the predicted WEF sound level is 40 dB(A) or greater, rather than 35 dB(A), or greater; and
- the specification of the data sets to be used in determining correlations of background sound level with wind speed differs to that required for compliance testing.

This could create a situation where compliance testing is required at a dwelling and correlations of background sound levels with wind speed are not available and cannot be determined without shutting down at least part of the WEF.

We consider the most appropriate way of avoiding this situation is to modify the requirements of the PDCA described previously to include:

- a requirement for background sound level measurements at all dwellings at which the predicted combined WEF sound level is 35 dB(A) or greater;
- a requirement for the data sets used to determine the correlations between background sound level and wind speed to meet the criteria set for the data sets to be used to determine correlations to be used for compliance testing.

The question of responsibility for compliance testing is complicated by the fact that the conditions of any permit that may be issued for the Yaloak South WEF are unknown and we see no way of placing an obligation on the operators of the Yaloak South WEF by way of a permit for the Moorabool WEF.

We see no options but to place the responsibility for compliance testing at all dwellings impacted by the two WEFs on the operator of the Moorabool WEF.

It may well be that any permit issued for the Yaloak South WEF will also include conditions requiring compliance testing at the dwellings impacted by both WEFs and if this turns out to be the case then shared responsibility is likely to be negotiated.

The essential requirement is that the compliance testing be done and the only available means to us of ensuring that it is done is to place a requirement on the operator of the Moorabool WEF.

### *Actions on Detection of Non-compliance*

It might be suggested that limits lower than the NZ6808:1998 recommended limits should be set on the sound levels from the individual WEFs such that the combined WEF sound level at the dwelling, when both the WEFs are operating at their individual limit, is at the NZ6808:1998 recommended limit.

While this approach is simple and straight forward and appears to be fair and equitable it is seriously flawed for two reasons:

- a practical means of measuring the WEF sound level of the individual WEFs at a dwelling without shutting part or all of one of the WEFs down cannot be identified; and
- it could produce an inequitable result requiring one WEF operator to reduce its noise emissions because the other WEF is producing more noise than expected.

We are also of the view that since the WEF sound level at a dwelling is the product of noise of both WEFs then both WEFs should be required to take responsibility and action if a reduction of the WEF sound level is required.

Condition 42 of the Draft Permit, which is also included in the Recommended Permit, prescribes the actions required by a WEF operator in the event of a detection of a non-compliance. The same actions should be required if a non-compliance is detected at a dwelling at which the WEF sound level is contributed to by both WEFs, the only difference is that the responsibility for the action must be shared between the two WEF operators.

We are of the view that the conditions in any permit issued should provide the opportunity for the two WEF operators to come to agreement as to the actions that need to be taken and report jointly as required, however, the conditions must also allow for the event of a failure of the operators to come to such an agreement.

In such circumstance it is considered appropriate that the Moorabool WEF operator takes responsibility for half of the magnitude of the non-compliance.

### **Quality Assurance for Compliance Testing**

We note that the WEF Guidelines specify that:

- compliance assessments must be certified by an acoustic engineer;
- appropriate documentation signed by an independent, appropriately qualified and experienced person must be provided; and
- the certifier must be able to demonstrate the necessary independence, qualifications and experience for the task to the responsible authority

While the above must be accepted as a requirement, in light of the problems identified with the assessments provided in support of the Application, we are concerned that satisfying these requirements may not be sufficient to ensure adequate compliance testing and provide the necessary confidence in the result obtained.

We are aware that the Responsible Authority may not possess the expertise and resources to determine whether compliance testing has been conducted in the manner required and therefore believe that the work involved in conducting compliance testing should be subject to an independent audit, in a similar way to that recommended in relation to pre-development assessment.

#### **6.6.4 Conclusions and Recommendations – Post Construction Compliance Testing**

It is concluded that:

**Assessment of the presence of special audible characteristics in WEF sound at dwellings should, as far as is possible, be assessed by objective methods and suitable objective methods for assessment of tonality and modulation are available from the New Zealand Standards.**

**The conditions relating to compliance testing contained in the Draft Permit provide an appropriate compliance testing regime for a single WEF.**

**The requirements of the pre-development cumulative noise assessment should include correlations of background sound levels with wind speed that are suitable for use in compliance testing for all dwellings at which the predicted WEF sound level is 35 dB(A), or greater.**

**The development and implementation of the compliance testing plans should be subject to an independent audit.**

It is recommended that:

**Any permit issued should provide that:**

- **Before the development starts a noise compliance testing plan be prepared that includes all the items specified in Condition 47 of the Recommended Permit;**
- **Before the development starts the noise compliance testing plan be reviewed by an independent acoustic expert as specified in Condition 48 of the Recommended Permit with plan and a report on the review to be submitted to the Minister for Planning for approval; and**
- **Implementation of the noise compliance monitoring plan be the subject of an audit by an independent acoustic expert as specified in Condition 49 of the Recommended Permit**

## 6.7 The Planning Scheme in Regard to WEF Noise

We understand that our primary task is to provide recommendations in regard to the Application for the Moorabool WEF and that assessment of the Application must be completed in compliance with the provisions of the Planning Scheme, which include the WEF Guidelines. We believe we have fulfilled this task but, in addition, we wish to provide some comment on the adequacy, or otherwise, of the regulatory framework in relation to noise from WEFs. The comments we provide below are not meant to and should not affect the consideration of this Application; however they may be of use in any future consideration of the regulatory framework for WEFs.

The specific requirements for development and use of land for WEFs are contained in Clause 52.32 of the Planning Scheme and the particular noise related requirements are:

- an assessment of the noise impacts of the Proposal on existing dwellings prepared in accordance with NZ6808:1998 must accompany an application; and
- that the responsible authority considers the WEF Guidelines before deciding on an application.

The WEF Guidelines repeat the application requirement in regard to noise and provide guidance on the assessment of applications including the need for WEFs to comply with the limits recommended in NZ6808:1998.

During our consideration of the Application for the Moorabool WEF we received extensive evidence and information in submissions that questioned the validity of some aspects of NZ6808:1998 and suggestions that application of the limits recommended in NZ6808:1988 would not provide adequate protection of acoustic amenity.

While we considered such challenges to the validity and effectiveness of NZ6808:1998 to be challenges to the Planning Scheme, and therefore irrelevant to the consideration of the Application, the validity of some of the criticism of NZ6808:1998 should not be dismissed.

The evidence and information provided to us was not sufficient for us to make any determinations as to the validity or effectiveness of NZ6808:1998 as we were only presented with one side of the argument. In the main, the Proponent, justifiably, took the position that such matters were irrelevant to the consideration of the Application. Our comments are therefore limited to the framework provided by the Planning Scheme.

It is understood that the application of NZ6808:1998 in Victoria originates in its use being advocated by proponents of early wind energy developments.

This was followed by its acceptance as a useful standard, capable of protecting acoustic amenity, by VCAT, Panels and Advisory Committees. Subsequently NZ6808:1998 became a reference document in Victorian planning schemes and the WEF Guidelines. While this explains how and why the references to NZ6808:1988 are now part of the regulatory framework, the time that has passed since the publication of the standard and its adoption in Victoria, means that its use should be the subject of a review to determine if it remains appropriate.

There is no doubt that since the publication of NZ6808:1998 there have been considerable advancements in the techniques available for the prediction of WEF sound at sensitive receptors, as evidenced by the fact that the revision of the standard, NZ6808:2010, suggests a more sophisticated modelling technique. In addition various other models are available that purport to provide more accurate predictions.

In addition, it should now be possible to evaluate the effectiveness of the limits recommended in NZ6808:1998 in providing the balance required between the needs of the wind energy industry and the protection of amenity.

A review of the appropriateness of NZ6808:1998, which it is expected would include consideration of other approaches, could well result in the identification of an approach that is considered to be superior. This, however, would not be enough. It would not in itself change the current situation in which assessment and enforcement of what are highly technical issues is left to planning authorities that do not have the required expertise and resources to fulfil these roles. In fact the situation may be worsened if more sophisticated and complex techniques are adopted.

The current situation should be compared with that applying to the control of noise from industry other than WEFs.

In the case of industry in metropolitan Melbourne, permissible noise levels from industry are specified in SEPP N1 which also provides methods for establishing those levels and testing compliance. While it could be said that in the case of WEFs, NZ6808:1998 does the same, the significant difference is that SEPP N1 is the law and the Victorian Environment Protection Authority (EPA) has responsibility, and the expertise required, for enforcement.

It is also noted that, under Clause 62.02-8 of the Planning Scheme, the EPA is a referral authority for an application for an Industry or Workshop with adverse amenity potential, whereas the EPA is not a referral authority for WEF applications.

Outside metropolitan Melbourne noise from industry is not controlled by a State Environment Protection Policy (SEPP). However, the EPA has published N3/89, which provides guidelines for setting permissible noise levels from industry. It is understood that N3/89 will be replaced by guidelines for *Noise from Industry in Regional Victoria* (NIRV), a draft of which has been issued by the EPA for public comment and review. N3/89 and the NIRV, when issued, do not and will not have the force of law of SEPP N1 but will be applied by approval bodies when considering statutory applications and approvals. This is a similar circumstance to that applying to WEFs but N3/89 and the NIRV, when issued, have greater relevance to Victoria than a New Zealand Standard is likely to have. In addition, and importantly the EPA can be called on to provide advice on the Application and enforcement of the guidelines.

There are two major components missing from the framework currently available for the control of noise from WEFs in Victoria:

- prescribed methodologies for setting noise limits, assessing applications and testing compliance, developed for Victorian conditions; and
- the involvement of the main government authority with acoustic expertise, i.e. the EPA, in the assessment of proposals and compliance testing and enforcement.

We see a significant need for the development of procedures to be applied for the control of noise from WEFs in Victoria. This would provide the opportunity for development of what might be described as best practice balancing of the needs of the industry and the community, would increase the level of confidence within the community in the regulatory process and would put the up dating of procedures in the hands of the State.

It is suggested that the development of such procedures would be led by a government department or authority with expertise in acoustics, in all likelihood the EPA, and the development would involve:

- evaluation of the effectiveness of the limits recommended in NZ6808:1998 in providing the appropriate degree of protection of acoustic amenity;
- investigation of the procedures applied in other jurisdictions in Australia and throughout the world; and
- consultation with a wide range of stakeholders including the wind generation industry, acoustic professionals, local government and the community.

Ideally the product of this development would be a SEPP for the control of noise from WEFs in Victoria, providing clear and unequivocal instruction as to the requirements to be met, assessable and enforceable by the EPA.

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An alternative, that is not favoured but may be considered, would be the publication, by the EPA, of a guideline and references to that guideline in the Planning Scheme and the WEF Guidelines in place of the existing references to NZ6808:1998.

It is also suggested that the Planning Scheme requires amendment to make the EPA a referral authority for all WEF applications. If a SEPP is produced then the EPA would take primary responsibility for enforcement, however, if the requirements are published as an EPA guideline, then it may be necessary to require by permit condition that compliance testing be conducted to the satisfaction of the EPA. These modifications would ensure adequate involvement of the EPA.

### **6.7.1 Recommendation – the planning scheme in regard to WEF noise**

It is recommended that

**Consideration is given to:**

- **The development of a State Environment Protection Policy on noise from WEFs in Victoria; and**
- **The amendment of Victorian planning schemes and the WEF Guidelines to ensure the direct involvement of the EPA in the assessment of WEF applications and the enforcement of SEPP and/or permit conditions relating to noise.**



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## 7. Flora and Fauna

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### 7.1 What are the Issues

The following issues relating to the impact of the Moorabool WEF on flora and fauna have been identified:

- potential effects on the Wedge-tailed Eagle;
- effects on species listed under the EPBC Act and/or the *Flora and Fauna Guarantee Act 1988* (FFG Act), including:
  - the Powerful Owl;
  - Brolga; and
  - other birds, including waterbirds and migratory birds; and
- removal of native vegetation.

#### 7.1.1 Policy Context of the Issues

The major components of the policy context have been discussed in Chapter 3 above.

##### Wind Energy Guidelines

The WEF Guidelines state:

*... in assessing a proposed development, any risk to a protected bird species needs to be carefully assessed and adaptive management applied where relevant.*

The site analysis and reports must include an assessment of the impact of the Proposal on any species, including birds and bats, listed under the FFG Act or the EPBC Act. The assessment section (Part B) provides decision guidelines for responsible authorities. With regards to flora and fauna, the focus is on listed species.

##### Australian Wind Energy Association Interim Guidelines on Birds & Wind Farms

Neither the Planning Scheme nor the WEF Guidelines reference or call up the application of the Australian Wind Energy Association's interim standards

for risk assessment of the effect of wind farms on birds (AusWEA 2005)<sup>60</sup>. We have concluded that these standards are a form of industry self-regulation that set out a logical and commonly accepted methodology for assessing the impact of WEFs on birds.

## 7.2 Wedge-tailed Eagle

### 7.2.1 Planning Application Report – Wedge-tailed Eagle

The PAR described the response to site conditions and alternative designs considered for the Moorabool WEF, including a change from the original project (involving 128 turbines) to the current 110-turbine Proposal. One of reasons for the change was:

*recommendations in relation to the Wedge-tailed Eagle, in particular moving wind turbines further from the escarpment of the East Branch of the Moorabool River.*

In the section dealing with constraints, the Wedge-tailed Eagle was identified as a constraint, with the following comment:

*Wind turbines have been located a minimum of 300m from the escarpment of the Moorabool River and removed from areas of above average utilisation.*

In responding to the requirements of the MSS (Clause 21.02-3, Biodiversity) the application report stated:

*The proposal will not impact on bird or bat species.*

Section 7.2 of the PAR discussed in detail the investigations undertaken by Brett Lane and Associates Pty Ltd (BL&A) for the project.

Regarding Wedge-tailed Eagles, it said:

*... The site supports only a few birds of prey or waterbirds, groups considered vulnerable to collision with operating wind turbines. Wedge-tailed Eagle utilisation was low ...*

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<sup>60</sup> Wind Farms and Birds: Interim Standards for Risk Assessment (July 2005). Prepared for the Australian Wind Energy Association by Brett Lane and Associates Pty Ltd.

## 7.2.2 Submissions – Wedge-tailed Eagle

A large number of submissions to the Responsible Authority raised issues relating to Wedge-tailed Eagles:

- Effects on birds of prey, particularly the Wedge-tailed Eagle, due to the risk of disturbance, loss of life and habitat loss. One submitter wrote:

*An eagle is a protected species, and each of us has a duty of care and guardianship towards its safe being. I value the presence of the majestic eagles on our property, its loss would be like the spirit of the land had died [Submission 63].*

- The cumulative impact of WEFs on native fauna.

Bird Observation & Conservation Australia (BOCA), in a late submission, put the view that the surveys undertaken by BL&A were inadequate and did not provide a solid, scientific basis for assessing the potential long-term impacts of the project on avifauna.

BOCA was critical of the Wedge-tailed Eagle surveys, on the grounds of limited extent both in area and in time. The submission noted that the Wedge-tailed Eagle is a highly territorial species and that the dynamics of the population in the landscape surrounding the WEF site should be examined thoroughly. In BOCA's view, there was a need to develop new collision risk models that accounted for the complexities of eagle behaviour.

DSE also detailed concerns relating to Wedge-tailed Eagle and cumulative impacts. It had specific concerns about the completeness of the dataset used, lack of sufficient detail about how the layout avoided areas of higher eagle utilisation, lack of collision risk modelling specific to the site and the absence of a population viability analysis.

DSE was not satisfied that the cumulative impacts of a number of WEFs in close proximity had been properly assessed and described in the Application documentation.

The Moorabool Shire Council's submission also raised the issue of cumulative impact assessment, particularly with regard to the Moorabool WEF and the Yaloak South proposal. Council believed that there would be an unreasonable detrimental impact on the regional population of the Wedge-tailed Eagle.

WestWind, a May 2010 response to DSE's submission, noted the department had not raised its concerns with the company in their most recent meeting

(March 2010). In particular, no problems had been identified with the Wedge-tailed Eagle assessments.

### 7.2.3 Expert Witness Evidence and Supplementary Statements – Wedge-tailed Eagle

The Proponent called Mr Brett Lane, of BL&A to appear as an expert witness.

In his witness statement, he summarised the conservation status of the Wedge-tailed Eagle as follows:

*The Wedge-tailed Eagle is a common and widespread species in Victoria and it occurs in a range of habitat types, including forests, woodlands, timbered farmlands and open country ...*

*The Victorian population of this species is not listed as threatened ... [either at State or Commonwealth level]. The Tasmanian subspecies (found nowhere on the mainland) is listed as endangered.*

He noted that the mainland Wedge-tailed Eagle represents a very mobile national population. Banded birds have been recorded as travelling very long distances.

Mr Andrew McMahon, of Ecology Australia, was called by Moorabool Shire Council to provide a peer review of the studies relating to potential impacts on the Wedge-tailed Eagle.

He drew attention to the concept of ‘species of concern’ in the AusWEA 2005 interim standards, pointing out that these include “species that exhibit behaviour that puts them at risk of regular collision with operating wind farms, e.g. soaring birds of prey” and did not need to be threatened species.

The major matters of difference between the experts in their original witness statements (and Mr McMahon’s supplementary statement) were:

- whether the survey methodologies used for the proposed Moorabool WEF provided a strong enough basis to assess the likely impact of the project on Wedge-tailed Eagles, and whether they conformed to the AusWEA 2005 interim standard in regard to:
  - the basis for calculation of bird utilisation rates for the Wedge-tailed Eagle;
  - the specifications for a Level 2 risk assessment for species of concern, if one was required. The AusWEA interim standards recommend a Level 2 assessment for any species for which the initial (Level 1) assessment indicates a medium or higher level of residual risk; and

- whether collision risk modelling should have been carried out for the Wedge-tailed Eagle.
- whether a population viability analysis could or should be carried out for Wedge-tailed Eagles in Victoria; and
- whether the studies had given appropriate consideration to the cumulative impacts of two or more WEF proposals in the general area.

The following sections discuss: the survey methodology used in the studies supporting the Application; the collision risk modelling carried out subsequently; and the issue of cumulative impact.

#### **7.2.4 Survey Methodologies – Wedge-tailed Eagle**

Four types of survey were utilised to evaluate Wedge-tailed Eagle use of the site. These included: desktop surveys of relevant databases and previous research; a preliminary point-based survey of Wedge-tailed Eagles within the site and surrounding region in October 2008; a bird utilisation survey in March 2009; and a targeted survey of Wedge-tailed Eagles, also in March 2009.

Mr McMahon raised issues concerning the calculation of the bird utilisation rate for Wedge-tailed Eagles (used in the PAR). Despite saying originally that he considered the point count methodology used to collect data on the utilisation and behaviour of Wedge-tailed Eagles satisfied the AusWEA 2005 interim standards, he later modified this opinion and advised Council that he had identified problems with seasonality, coverage and Level 2 surveys.

##### **Bird Utilisation Rate - Wedge-tailed Eagle**

The bird utilisation survey - for all birds on the site and in adjacent areas – was undertaken in March 2009. Mr Lane summarised the findings of the survey, as it related to Wedge-tailed Eagles, as follows:

*The Wedge-tailed Eagle was the most commonly observed raptor on the wind farm site. ... The utilisation rate of the wind farm site by eagles based on observing six birds during the formal count amounts to 0.026 birds per hectare per hour.*

He went on to say that:

- the utilisation rate of Wedge-tailed Eagles at other WEF sites studied by BL&A in Victoria and eastern South Australia ranged from 0.001 to 0.44 birds per hectare per hour. The highest figure was for the original Yaloak WEF, some 5-10 kilometres east of the Moorabool WEF site;

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- sightings of eagles were all from observation points near the escarpment. No eagle was observed flying or soaring over the points located in the open paddocks away from the escarpment; and
  - it was likely that the eagles observed belonged to two families: one group of four in the southern section of the WEF site and a pair in the north.

Mr McMahon noted that the AusWEA standards for a Level 2 assessment required that the bird utilisation rate should be calculated from seasonal surveys. Therefore, the rate should have taken into account all the observations of eagles during the preliminary survey, the general bird utilisation survey and the targeted Wedge-tailed Eagle survey.

He considered that the low utilisation rate from the earlier surveys had been used to imply that there was a low risk to eagles in the area, whereas later observations showed that more than six eagles used the area and might do so regularly as part of their home range or for foraging.

Mr Lane responded that the figure based on the Wedge-tailed Eagles observed during the general bird utilisation survey had been used because it was comparable with rates calculated for the original Yaloak proposal. The later observations of larger numbers of eagles during the targeted survey could not be included because the methodology for that survey was different.

### **Level 2 Assessment**

After initial observations in October 2008, a Level 2 bird risk assessment was triggered for the Wedge-tailed Eagle as a species of concern. A targeted survey in March 2009 included fixed observation points and a roaming survey, covering the WEF site and the area within 10 kilometres of its boundaries.

Wedge-tailed Eagles were mostly observed over escarpments and forest edges. Observations and flight paths were mapped. No nest sites were identified.

Mr Lane concluded, on the basis of all the observations of Wedge-tailed Eagles, that their use of the Moorabool WEF site was not comparable to that at Yaloak.

Mr McMahon's criticisms of the survey methodology revolved around:

- Coverage: this was seen as insufficient to identify and map areas of high, moderate and low Wedge-tailed Eagle use or to reliably inform any modifications to the location of turbines. The scientific basis for choosing a 300m setback was not clear;

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- Length of observation periods in relation to the behaviour of the target species: 20-minute counts might not be long enough for eagles, as soaring by one bird could stimulate soaring by others;
  - Survey effort: the survey effort was not sufficient to support the view that the utilisation rate of the Moorabool site was substantially lower than that recorded at Yaloak;
  - Failure to locate nest sites: the studies should have located and mapped nest sites and applied a buffer distance around them (even though this is not required by AusWEA 2005);
  - Location of survey points, particularly in relation to observed environmental gradients: survey points should have been located along transects that extended from the escarpment out into the plain. He considered that the Moorabool WEF site and Yaloak are very similar landscape types as they relate to Wedge-tailed Eagles, providing uplifts and thermals, rural landscapes for foraging and substantial remnants of native vegetation for nest sites; and
  - Seasonality: the AusWEA standards indicated that seasonal surveys should be carried out for species of concern. For Wedge-tailed Eagles there should be at least two seasonal surveys, in breeding and non-breeding seasons.

Mr Lane stated initially that his surveys conformed to the AusWEA 2005 interim standards, but later acknowledged that the methodology used for the Wedge-tailed Eagle targeted surveys was not completely faithful to them. The spacing of observation points was tailored to the characteristics of the bird, which is large, visible over long distances and can have movement tracks as long as 1.8 km. Closely spaced observation points may not have been as useful for eagles.

With regard to Mr McMahon's specific points, he responded as follows:

- Coverage: Because the Moorabool site was more extensive than that now proposed for Yaloak South the survey points were not as close together, but more frequent observations were taken;
- Observation periods: The 20-minute counts started at a fixed time, so any eagles recorded could have been at the beginning, middle or end of a multiple flight sequence at any time during the period;
- Survey effort: 15 days in 2008-2009 were spent specifically quantifying and mapping eagle utilisation of the site. All flights were mapped and the beginning and end points of observations recorded for 97 bird-flights;
- Nest sites: The surveys had failed to locate any active eagle nests, nor had any been identified to him. An active nest would elevate the utilisation rate and therefore the risk to the eagles. However, experience elsewhere

indicated that eagles would continue to nest quite close to turbines and to utilise the area in the same way. He also commented that there was at present no scientific basis for application of buffer distances from nests for the mainland Wedge-tailed Eagle;

- Location of survey points: Survey points varied in distance from the escarpment – including four sites less than 100 metres from the escarpment and seven within two kilometres – and utilisation was found to be highest by far at the point closest to and including the escarpment. The landform of the Moorabool WEF site was relatively uniform, with the only important gradient being the escarpment. Also, use of flight path mapping overcame the need for gradient surveys; and
- Seasonality: The Level 1 analysis, in spring 2008, indicated that a peak season survey was warranted for eagles and this was carried out in autumn 2009. Monitoring at Yaloak indicated that late summer-early autumn was the season in which peak eagle activity was likely to occur.

Mr Lane commented that the habitat on most of the site is of little value for the Wedge-tailed Eagle.

He also noted that micro-siting of turbines might have an effect in some areas where there are steep gradients in usage. This would need to be taken into account in assessing any changes that might be proposed in the future.

### **Need for Level 3 Assessment – Collision Risk Modelling**

In response to issues raised in submissions, Mr Lane made the following statement in his expert witness report:

*We concluded that a Level 3 assessment (including collision risk modelling) was not warranted due to low utilisation rates for Wedge-tailed Eagles on the site and the corresponding low risk to the species. .... A Level 3 assessment would generally be required where a significant proportion of the population of a threatened species has the potential to pass over the site on a regular basis. This is not the case at the Moorabool wind farm site. Rather, the mainland Australian population of the Wedge-tailed Eagle has been estimated at tens of thousands of pairs and an equivalent number of immature birds and non-breeders ...[Panel emphasis]*

Nevertheless, he advised:

*While our assessment remains that collision risk modelling is not warranted at this site, WestWind has agreed to DSE's recent request at our meeting on 6 May 2010 to conduct collision risk modelling based on a 90% avoidance rate.*



He also commented that DSE has not required collision risk modelling for Wedge-tailed Eagles in other cases where BL&A's studies found similar bird utilisation rates.

Mr McMahon, in his expert witness statement, supported DSE's view that collision risk modelling should have been carried out for the project. This would also help to assess the cumulative impacts of the proposed Moorabool and Yaloak South WEFs. He later told the Hearing that the 90% avoidance rate specified by DSE for the collision risk modelling was very low and appeared to have no scientific basis; the commonly used figure was 95%.

BOCA, in its late submission, called for improvements in modelling for assessing the risk to eagles, pointing to the need to:

*... develop collision risk models that account for the complexity of Wedge-tailed Eagle behaviour and population dynamics.*

The results of the collision risk modelling are discussed in section 7.2.5 below.

### **Population Viability Analysis – Wedge-tailed Eagle**

In response to DSE's comments on the absence of a population viability analysis, Mr Lane said that he considered that data on mainland Wedge-tailed Eagles was insufficient to carry out such analysis and that the process would be quite complicated.

Mr McMahon supported the suggestion from DSE that a Wedge-tailed Eagle population viability assessment was desirable, although he acknowledged problems associated with definition of the area and population to be studied, when dealing with a widespread species.

DSE's written submission to the Hearing said that it had advised the Proponent that no population viability analysis would be required if a collision risk model based on a 90% avoidance rate was provided.

### **Panel Response – Survey Methodologies – Wedge-tailed Eagle**

The Panel has considered carefully the submissions received and the evidence put forward by Mr Lane and Mr McMahon with regard to the adequacy of the surveys undertaken to assess the likely impact of the Moorabool WEF on the Wedge-tailed Eagle population of the site and its surrounds.

In assessing these matters we note, as mentioned above, that the AusWEA 2005 interim standards are a statement of good practice adopted by the

industry. We have concluded that detailed compliance with them is not mandatory.

We also note that DPCD, when advising that an Environmental Effects Statement was not required for the project, stated as one of its reasons the fact that there is limited habitat available that is suitable for those birds of conservation significance, including the Wedge-tailed Eagle, which may occur in the area.

Casual observations made by the Panel, on individual and accompanied inspections of the area, have confirmed that Wedge-tailed Eagles are seen frequently in the area of the Moorabool WEF site and even more frequently in the Yaloak/Parwan Valleys (Glenmore Valley), the general area of the original Yaloak proposal. We also noted that the topography of the two areas is significantly different, with the Glenmore Valley being much broader than those of Moorabool River and its tributaries, and the gradients to the escarpment being generally less steep.

We accept that Wedge-tailed Eagle use of the Moorabool site might be underestimated by the bird utilisation rate calculated from the overall bird survey, but note that the targeted studies also indicated that the resident and transient population of the Moorabool WEF site – a very extensive area – is relatively limited.

On the basis of evidence and submissions presented on: the non-threatened status of the mainland Wedge-tailed Eagle; its prevalence in Victoria generally; the results of observations of its occurrence on the Moorabool WEF site and in the adjoining area; and the fact that no active nest sites were found during the BL&A studies or identified to us, we have concluded that the survey methods adopted by BL&A – even where they did not conform absolutely to the AusWEA 2005 standards – were appropriate.

Carrying out a population viability analysis for Wedge-tailed Eagles, as originally suggested by DSE, appears to us to be a task well beyond what could reasonably be expected from individual proponents. It should be done on a regional basis – at least for western Victoria and possibly for the whole State. Decisions on survey design would need to be authoritative and purpose-specific monitoring of the target population would probably be required, to ensure that inputs were consistent. It is likely that only government agency or a research institution would have the resources to undertake such a study.

## 7.2.5 Methodology for and Results of Collision Risk Modelling – Wedge-tailed Eagle

The purpose of collision risk modelling was described by DSE as follows:

*Collision risk modelling is used to estimate the likely number of deaths caused by an operating wind farm over a set period of time. This estimate can then be used to better assess the likely impact of the proposed wind farm on bird or bat populations.*

DSE's representatives – Mr Dekker and Mr Hill – advised the Hearing on 9 June that the department considered that the collision risk modelling being prepared by BL&A should be peer reviewed before being used to assess the impact of the proposal. They acknowledged that this had not been discussed when WestWind agreed to have the modelling prepared, but said it had been conveyed to the Proponent on the previous day.

DSE wanted it established clearly that the Moorabool WEF location is not an important site for the eagles that might put the regional population at risk.

Council advised that it intended to commission Mr McMahon to review the results of the modelling. DSE confirmed that the department would accept a peer review from Ecology Australia as satisfying their requirements.

DSE, in its presentation, stated that the 90% avoidance rate for the collision risk modelling was chosen because the mortality rates observed at the WEF at Woolnorth in Tasmania appeared to be around 92-93%. The 95% avoidance rate used previously derived from overseas work and was very speculative.

Mr Lane's memorandum on the collision risk modelling (dated 9 June 2010) explained the methodology used. Its core was a model produced by Band et al., used to assess WEF impacts on birds in Britain and Europe. BL&A adapted it by modifying inputs to more accurately reflect the distribution of Wedge-tailed Eagles across the site. This enabled the model to distinguish the comparative risk of individual turbines.

Mr Lane stressed that modelling is a decision support tool and should not inform decisions in isolation. Knowledge of the usual behaviour and habitat use of a site by a species of concern as well as quantitative observations should be given considerable weight. He noted that familiarity with the Yaloak site over many years provided a basis for his assertion that the Wedge-tailed Eagle use of the Moorabool WEF site differed quantitatively and qualitatively from that of the area further east.

The results of the collision risk modelling indicated that at a 90% avoidance rate, the mortality of Wedge-tailed Eagles would be 0.95 birds per year, with an upper limit (95% confidence) of 1.20 per year. At a 95% avoidance rate, the equivalent figures would be 0.48 deaths per year or an upper limit of 0.60 per year. In summary, BL&A concluded that, as a long-term average, one Wedge-tailed Eagle may be affected every one or two years.

In his supplementary appearance at the Hearing on 15 June Mr Lane made the following additional comments (summarised later in his memorandum dated 16 June 2010):

- the inputs to the collision risk model included the use of what he described verbally as “Kernel home-range mapping”. This allowed the expected Wedge-tailed Eagle utilisation rates for different areas of the site to be derived, using the flight paths mapped during the targeted surveys;
- the confidence limit is an important feature of the model. It allowed the number of observations to be taken into account. More observations lead to a narrower confidence limit;
- it was difficult to compare the results of the modelling for the original Yaloak WEF proposal with the predictions for the Moorabool WEF, because of significant differences in the models used; and
- the loss of one or two eagles every 1-2 years is a comparatively low rate compared to the original Yaloak assessment. He concluded that the predicted impact would not prejudice the species’ Victorian population.

Mr McMahon, in his comments on the results of the modelling, stated explicitly that he had not evaluated the model or the way in which BL&A had combined two different components (the Band model and Kernel home-range mapping). He noted that this was best left to others with that particular expertise.

Mr McMahon’s key concerns with the collision risk modelling were:

- use of data not collected for modelling, and arguably inadequate for the purpose, and retrofitting it; and
- the absence of explicit assumptions, qualifications and limitations of the model.

He described the Kernel density estimators as “amongst the best and most widely accepted methods for home range analysis”. However, the BL&A data was not collected for this purpose. The ability to draw reliable conclusions depended on the accuracy of the estimated home range, which required data to be collected uniformly across the study area, indexed against time and space, attached to individuals or breeding pairs and collected in sufficiently large quantities. He considered that the BL&A

analysis did not demonstrate how the observations used met these requirements and set out a number of steps that were required to do so.

DSE's letter to the Panel (21 June 2010) after the Hearing concluded that the BL&A report on the modelling did not identify whether the data used met the standards required for this purpose. It supported Mr McMahon's recommendations about the steps needed to verify the data and ensure that the appropriate standards had been met. The letter advised that, until the data had been verified, the department did not have confidence in using BL&A's collision risk estimates. It continued:

*The department requested collision risk modelling in order to have some confidence in assessing the potential impacts of this proposal on the Wedge tailed Eagle. As Ecology Australia's peer review is unable to corroborate the conclusions reached by BLA, the department is unable to provide a conclusive view of potential impacts of this proposal on Wedge-tailed Eagle.*

*The department recommends that BLA respond to the points raised in Ecology Australia's peer review of their collision risk modelling, outlining in detail how their work satisfies each of the required assumptions that input data must meet. Without this, the department is of the view that the potential impact of the Moorabool wind energy facility on Wedge-tailed Eagles has not been adequately addressed.*

Mr Lane, responding on behalf of the Proponent to the comments of Mr McMahon and DSE on the modelling, made a number of key points:

- BL&A records all flight data on eagles and other species of concern in a manner that generates records suitable for the application of spatial statistical methods, including recording the time and location of the beginning and end of flights. He would have recommended against undertaking modelling if he had concerns about the capacity of the data to be used for this purpose;
- DSE was aware, when it requested the collision risk modelling, of the information that BL&A had collected in 2008 and 2009 and did not raise any concerns about its validity or its adequacy as a basis for modelling;
- DSE failed to provide appropriate policy direction in relation to impact acceptability benchmarks and its expectations of data to be used for them. Its only specification was the 90% avoidance rate, with which the collision risk modelling complied;
- Mr McMahon and (implicitly) DSE had made incorrect assumptions about the way in which the Kernel home-range mapping techniques were used. The purpose of the analysis was not to undertake a home-range analysis, but to develop a utilisation distribution using the Kernel

estimation method. This did not require attribution of data to particular birds, pairs or groups;

- the input data used was valid because: it was based on flight paths observed by skilled observers; observations were made from a set of points from which, collectively, the whole WEF site was visible; equal survey effort was applied to each point and visits were made at different times of the day; and eagle flight data had been recorded in a manner that generated records suitable for the application of spatial statistical methods;
- the targeted Wedge-tailed Eagle survey was timed to coincide with peak eagle activity and the 97 flight paths recorded during the Moorabool surveys were considered appropriate; and
- the assumptions used in the model were provided in the 9 June 2010 memorandum.

### **Panel Response– Collision Risk Modelling – Wedge – tailed Eagle**

While recognising that the model used for the collision risk modelling has not been peer reviewed, we have been assisted by the results of the exercise and by Mr Lane's responses to issues raised by the other parties.

We note that some of the information and rebuttal provided in Mr Lane's final letter to the Panel – in particular, the way in which he had used the Kernel density estimators – could with advantage have been included in the original memorandum on the modelling process and its results. However, we also recognise the short time he had available to produce a summary of the outputs of the modelling for discussion in the Hearing.

On the basis of the information provided in the original surveys and the collision risk modelling, we have concluded that the Moorabool WEF does not present an unacceptable risk to Wedge-tailed Eagles on the site or in the adjoining areas.

In closing our discussion of the collision risk modelling, we feel compelled to comment on the disregard for procedural fairness that DSE has shown in its dealings with this aspect of the Proposal.

The requirement for collision risk modelling was apparently not included in any of its original advice to the Proponent, but was raised instead in its submission to the Minister for Planning as the Responsible Authority.

WestWind agreed, at a meeting in early May, to undertake the modelling. DSE did not mention at that time any requirement for peer review. Instead, this was conveyed to the Proponent in the middle of the Hearing, a move that Ms Quigley rightly described as "outrageous" in process terms.

Finally, we accept Mr Lane's point that DSE was well aware of the nature of the data collected by BL&A during its surveys. This being so, we question why the department encouraged the Proponent to commission Mr Lane to use this information as the basis for collision risk modelling, if it had doubts about its adequacy for that purpose.

## 7.2.6 Cumulative Impact – Wedge-tailed Eagle

### Submissions and Evidence

As noted above, various submissions, including that of DSE, raised issues regarding the potential cumulative impact of a number of WEFs in the same general area. DSE said:

*It should be noted that the department does not expect the proponent to assess the impact of other proposals, rather that they should assess how their project does or does not add to the overall impact of development in the area, and if the project meets the target of "zero net impact" or not.*

Mr McMahon pointed out the proximity of the Moorabool WEF site to the proposed Yaloak South WEF site, where a high number of juvenile eagles and 'floaters' were known to congregate. He suggested that a survey outside the study area (at least a 20 km radius) was required to understand the dynamics of the local population.

Mr McMahon claimed that BL&A's 2008 report had discounted the possibility of eagles moving into the Moorabool area from the east and the 2009 report had not discussed the issue. However, an eagle had been recorded soaring and circling above the junction of the Glenmore and Geelong-Ballan Roads, which made it highly likely that eagles moved between the two sites (Statements at the Hearing from residents in the intervening area supported this view).

Mr McMahon concluded that four operating WEFs in the same general area would constitute a material risk to Wedge-tailed Eagles.

Mr Lane confirmed the assessment in the background reports that eagles were unlikely to come into the area from Yaloak, because there had been very few observations of birds flying from the east. Wedge-tailed Eagles used specific areas of the Moorabool site and used it in a particular way.

He did not consider that there was a major risk that the cumulative impact of the four proposed WEFs in the area would result in it becoming a "sink" or that they would have a significant effect on the regional population. However, he acknowledged that the WEFs would remove some birds occasionally.

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The DSE representatives stated at the Hearing that the requirement for “zero net impact” set out in the department’s submissions had really only been used for Brolga to date. It was possible that it might in future be applied to Wedge-tailed Eagles or other species of interest.

### **Panel Response– Cumulative Impact – Wedge-tailed Eagle**

It is unfortunate, given the resources applied to collision risk modelling, that the results of the work for the Moorabool and Yaloak South WEFs are not directly comparable. However, we recognise that this would have required the Proponent to commission a different consultant, at considerable additional cost, and that the results would not have been available in time to be presented to the Hearing.

We share the concern of the recent Lal Lal WEF Panel (February 2009) about the potential for cumulative impacts from the increasing number of WEFs that may be constructed in the general area of Moorabool Shire and surrounding municipalities. We also endorse the proposal from that panel for the Commonwealth Government and DSE to establish a co-ordinated system of monitoring the actual impact of WEFs on birds and bats.

We have not accepted the proposal from DSE that the project should demonstrate a zero net impact on all fauna species in the area, regardless of their conservation status. We have taken this as a statement of the department’s philosophical position, rather than something that should be applied rigorously in decision-making under the present regulatory framework.

Overall, we recognise that the Moorabool WEF, in conjunction with nearby projects (should these be approved and constructed) would represent a measurable risk to the Wedge-tailed Eagle population of the district. However, we do not consider, on current indications, that this level of impact is unacceptable or would put the regional population at serious risk of long-term decline.

We have noted Mr Lane’s suggestions (in his written reports) on matters to be included in requirements for the proposed Bird and Bat Management Plan to address risks to Wedge-tailed Eagles, and have concluded that they are already encompassed in the Draft Permit and accepted by the Proponent. However, the draft conditions do not address the issue raised by Mr Lane at the Hearing, namely the need for a condition to prevent micro-siting of turbines closer to areas of high Wedge-tailed Eagle use. This has been added to the Recommended Permit.



Mr McMahon also provided detailed suggestions for conditions concerning the requirements of the Bird and Bat Management Plan. His major points covered: the need for monitoring procedures to comply with the AustWEA interim standards and to be designed in consultation with experts on the target species, e.g. Wedge-tailed Eagles and bats; concerns about the specified duration of monitoring; protocols for approval of cessation of monitoring; and the need for surveys to cover the non-breeding season, as well as the breeding and migratory periods. We consider that, for the most part, these are matters of detail that should be resolved in the consultations with DSE, prior to the preparation of the management plan.

During the 'without prejudice' session discussing the Draft Permit conditions, the requirements for the Bird and Bat Management Plan were also addressed. Issues raised included:

- the need for monitoring to start by the time substantial numbers of turbines were operational – DSE suggested 30% of the total number – and to continue for at least two years after the completion of each stage of the WEF;
- whether the provisions of the Draft Permit conditions relating to carrion management were repetitive and should be rationalised; and
- whether specific provision needed be made for a survey point to be located at the north-east corner of the Ballark section of the proposed WEF.

We have adopted DSE's suggestion concerning the starting point for monitoring and recommend that the specified monitoring period of two years must follow from the completion of each stage of the WEF. We have also concluded that some of the provisions for carrion management under the Bird and Bat Management Plan are superfluous, given the requirements for the Environmental Management Plan. We do not consider any specific condition is required regarding the location of monitoring points, though we agree that the nominated site is an obvious location for monitoring of potential cumulative impacts with the Yaloak South WEF.

### **7.2.7 Recommendations – Wedge-tailed Eagle**

**Condition 4 of the Draft Permit conditions should be amended to include a provision that:**

- **No turbine will be moved to a position less than 300 metres from the escarpment of the Moorabool River.**

**Condition 15 (h) of the Draft Permit conditions should be amended to ensure that the provisions relating to the pest animal and carrion management plan include the requirements on carrion management**

contained in condition 34 (which sets out requirements for the Bird and Bat Management Plan) and these matters should be deleted from condition 34.

Condition 34 should also be amended to provide that the monitoring program under the Bird and Bat Management Plan should start from when 30 per cent of the total number of turbines are operational and should continue until two years from the completion of each stage of the facility.

## **7.3 Listed Avifauna Species**

### **7.3.1 Powerful Owl**

#### **Planning Application Report-Powerful Owl**

Reports by BL&A submitted as part of the Application considered the potential impact of the Moorabool WEF on species listed under the EPBC Act and/or the FFG Act. With regard to the Powerful Owl it stated:

*... the Powerful Owl may occur within the remnant woodland to the south-west [of the study area]. The latter species would very rarely use the wind farm site, as it lacks suitable habitat.*

#### **Submissions – Powerful Owl**

Several submissions raised concerns about the adequacy of the background studies in regard to the Powerful Owl, and the likely impact of the WEF on the species.

#### **Expert Witness Evidence - Powerful Owl**

Mr Lane, in his expert witness report, noted:

- treed habitats near the WEF site provide habitat for the Powerful Owl;
- the Powerful Owl is considered vulnerable and is listed under the FFG Act. Records of the species from the region were from the Brisbane Ranges National Park and the Little Forest, considerable distances from the WEF site;
- the Powerful Owl inhabits open and tall wet sclerophyll forests with sheltered gullies and old growth forest with dense understorey, but is also found in dry forests. The species requires large old trees with hollows for nesting;
- the forest to the west of the study area comprises suitable habitat for the owl but the site itself would not support the species;

- individuals, such as dispersing juveniles, might use the valleys when moving between more extensive habitats nearby, but this was likely to be irregular; and
- in the absence of records from within the site or close to its borders, coupled with the fact that there was no suitable habitat, a targeted survey for this species was considered unnecessary, since the risk from the project was assessed as low.

He concluded that, on the basis of discussions with DSE personnel following tabling of the department's original submission:

*... it is our understanding that DSE agrees that it is unlikely that the Powerful Owl will hunt within the site because of the lack of habitat and distance from the Bungal forest. As a result, it is our understanding that DSE no longer considers that the risks to the Powerful Owl are great enough to warrant further targeted survey work.*

### **Submissions to the Hearing & Responses - Powerful Owl**

Submitters at the Hearing provided evidence of the existence, in close proximity to the WEF site, of an area containing a considerable number and density of remnant large old trees, with hollows that would provide suitable habitat for possums and other prey for the Powerful Owl.

Mr Hill, of DSE, said that Powerful Owls rarely hunt far from wooded areas, though they may use Red Gum woodlands with 6-12 trees per hectare. A Powerful Owl pair would occupy a territory of several thousand hectares. On the basis of DSE's information and the BL&A research, there was no suitable habitat for the Powerful Owl on the Moorabool WEF site, although they might range over it occasionally.

The submitters reported having seen owls – which they thought were Powerful Owls – feeding around haystacks in the area on winter evenings. Mr Lane responded that he thought it would be usual for them to do so very often. Owls in farmland were more likely to be Boobooks or Barn Owls.

Council, in its submission to the Hearing, expanded on the concerns it expressed previously about this species:

*It is Council's submission that the permit applicant has failed to comply with the WEF Guidelines, by not undertaking a specific targeted survey and impact assessment for the Powerful Owl; and therefore failing to demonstrate that the proposed WEF will not lead to unacceptable impacts on critical environmental values.*

In response to a suggestion (in an article tabled by Council) that Powerful Owl's might sometimes depend on avian prey, which might lure them into open areas, Mr Lane pointed out that the study where this was observed was carried out in degraded Box-Ironbark forest, which might not provide sufficient habitat for the owls' preferred prey species. In the Moorabool area, there were plenty of hollow trees suitable for small mammals.

The Council pointed out the lack of night-time survey work that might have identified any Powerful Owl use of the site and put the view that this was inconsistent with the WEF Guidelines. It also identified a WEF proposal at Lexton – which it said was in a similar setting to the Moorabool site – where BL&A had carried out a targeted Powerful Owl survey and wanted the same requirement applied.

Mr Lane, in a memorandum (dated 16 June 2010) tabled at the Hearing, noted that at Lexton, Powerful Owls had been recorded in a number of places close to the WEF site and that the landscape was approximately 50% forested. The context did not resemble that of Moorabool. No further investigations of the Powerful Owl were warranted in the present case.

DSE's submission to the Hearing confirmed that they had advised the Proponent that it did not consider the risks to the Powerful Owl to be sufficient to warrant further targeted survey work. This decision was based on the owl's behaviour, likely movements, the habitat provided by the Bungala State Forest and the separation distances between the forest and proposed turbines.

### **Panel Response - Powerful Owl**

The Panel, on the information available, endorses the view of DSE and Mr Lane that risks to the Powerful Owl from the Moorabool WEF are likely to be low and a targeted survey is not required.

## **7.3.2 Brolga**

### **Planning Application Report - Brolga**

Reports by BL&A submitted as part of the Application considered the potential impact of the Moorabool WEF on species listed under the EPBC Act and/or the FFG Act. With regard to the Brolga it stated:

*Although one record of the Brolga was found in the AVW [Atlas of Victorian Wildlife], this species does not regularly inhabit the site or the wider region, due to lack of extensive wetland habitat.*

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## Submissions - Brolga

Several submissions were apprehensive of impacts on Brolga from the WEF.

The initial DSE submission advised that the department had records of return visits by a pair of Brolga to wetlands in the southern section of the subject land.

## Expert Evidence - Brolga

Mr Lane's expert evidence noted that the Brolga is considered to be vulnerable in Victoria and is listed under the FFG Act. The Victorian Brolga population consists of approximately 600 birds, the majority of which are found in the south-west of the State.

He identified a need for further studies of the movements of Brolga in south-western Victoria to gain a better understanding of movement between breeding sites and flocking sites.

Only two records were found of a Brolga sightings within 20 kilometres of the proposed Moorabool WEF, the latest of them in 2005. Mr Lane visited the site located within the footprint of the WEF. He found it to be a broad swale of grassland in a former wetland basin, which had been permanently drained in the 1980s. It was now dominated by terrestrial vegetation species. It was therefore unlikely to support breeding by the Brolga and did not need to be subject to any mitigation measures. The other site was approximately five kilometres east of the WEF.

Mr Lane said habitat suitable to support the Brolga regularly was not present in the study area and the surrounding region did not support a significant population or regular breeding or flocking sites for this species. He concluded:

*It is our understanding that DSE agrees that no further survey work is required for Brolga and no Brolga mitigation buffers are warranted at this wind farm site.*

## Submissions at the Hearing - Brolga

In its supplementary submission, presented to the Hearing, DSE stated that its initial concern was sparked by records of return visits of a pair of Brolga on part of the subject land, since 2006. However:

*... after further consideration the department advised that the records were likely to be incidental visits, and not nest or breeding sites, as the sites are highly modified. On this basis, the department has advised WestWind that no further survey work will be required.*

## Panel Response - Brolga

We accept the advice of Mr Lane and DSE that the study area and its surrounds do not provide regular habitat for Brolga and that no further investigations are required.

### 7.3.3 Other Listed Avifauna Species

#### Planning Application Report – Other Listed Avifauna Species

The PAR stated:

##### *Birds*

*The project site supports a low diversity and abundance of common, predominantly opportunistic and adaptable native and introduced bird species, which is in line with observations from similar farmland settings elsewhere in southern Australia. The site supports only a few birds of prey or waterbirds, groups considered vulnerable to collision with operating wind turbines. ... The proposed Moorabool Wind Project is broadly comparable in terms of bird habitat characteristics and setting to other wind farms in southern Australia. No threatened species of birds were observed on or near the site and the use of the site by migratory species is likely to be very low.*

##### *Bats*

*Nine bat species were recorded as being active within the site. Bat activity was confined to the vegetated areas along the Moorabool River and as wind turbines are sited away from these areas, impacts to bat species are unlikely to be significant.*

#### Submissions – Other Listed Avifauna Species

Several submitters, including Moorabool Shire Council, raised issues relating to other listed species of avifauna:

- impacts on bird species in the wider area, such as Red-tailed Black Cockatoo, Black Falcon, migratory birds such as ducks, ibis, snipe, quail, and water birds, that might have their migration pathways reduced; and
- impacts on nocturnal avifauna including bats.

BOCA, in its late submission, was concerned about the lack of recognition of the potential habitat value of wetlands and seasonally inundated sites. It pointed out that the March 2009 bird survey was carried out at the end of an exceptionally dry period.

BOCA identified a number of proposed turbine locations that were in or adjacent to areas subject to inundation and suggested that they might provide habitat for wetland avifauna, including those such as Latham's Snipe that are listed under the EPBC or FFG Acts. It recommended additional surveys conducted over a wide area, in spring and summer when seasonal migrants are likely to be present and following significant rainfall events.

### **Expert Evidence – Other Listed Avifauna Species**

Mr Lane, in his expert witness statement, said that there were no records of the Black Falcon in the area within 10 kilometres of the Moorabool WEF site and only one (old) record within 20 kilometres. Birds might pass through the area occasionally but it was unlikely that the species would be affected significantly by the proposed wind project.

Mr Lane was not in a position to comment on the BOCA submission, as it was not referred to the Panel until near the end of the Hearing.

However, the original BL&A report made the following comments concerning Latham's Snipe: it had only been recorded once, in 1990, from an unspecified locality in the search region; it was possible that it might occur occasionally in vegetated habitats along the Moorabool River; numbers were unlikely to be significant due to the lack of extensive wetland habitats capable of supporting the species.

With regard to bats, Mr Lane concluded:

*The bat fauna in many aspects is similar to that recorded from other wind farms in similar settings. Impacts are expected to be low as turbines are located in areas away from large remnant patches of native vegetation that supports higher levels of bat activity.*

### **Panel Response– Other Listed Avifauna**

In the absence of any expert evidence to the contrary, or any expressions of concern from DSE, we accept Mr Lane's opinion that the impacts on other listed species of avifauna, including bats, are expected to be low.

We acknowledge the point made by BOCA regarding the dry conditions at the time of the bird surveys and the potential for wetland species and migratory birds to use seasonally inundated wetlands that might not have been identifiable in March 2009. However, the evidence provided on the vegetation of the study area leads us to conclude that the majority of these sites are likely to have been significantly altered and to be dominated by introduced grasses and other exotic species. It is, therefore, probable that

they would provide short-term locations for species of interest, rather than being part of their core habitat.

We endorse Mr Lane's suggestion, noted above, that the permit conditions should include a requirement for the power cabling across the Moorabool River (to avoid cultural heritage sites) to be marked with an appropriate product to improve its visibility to birds.

During the 'without prejudice' session on the Draft Permit Conditions, there was discussion about the species of avifauna that should be identified as priority species in the requirements for the Bird and Bat Management Plan. All parties agreed that the Wedge-tailed Eagle should be mentioned specifically and DSE also requested inclusion of the Powerful Owl. Council pointed out the owl would be covered by the requirements of the FFG Act. At the risk of stating the obvious, we have decided to add a provision that the surveys for the Bird and Bat Management Plan, in addition to Wedge-tailed Eagles, should include all species of avifauna listed under either the FFG Act or the EPBC Act.

#### **7.3.4 Recommendations – Other Listed Avifauna**

**Condition 2 (j) of the Draft Permit Conditions should be amended to include a provision that:**

- **Overhead cabling may be used within the river valley of the Moorabool River east branch between turbines BUWT34 and BUWT29 as shown on the plans referred to in condition 1 and must be marked with an appropriate product to improve its visibility to birds.**

**Condition 34 (b)(i) of the Draft Permit Conditions should be amended to read:**

- **The presence, behaviour and movements of any Wedge-tailed Eagles, especially breeding pairs in the vicinity of the wind farm, or other avifauna listed under the *Flora and Fauna Guarantee Act 1988* or the *Environment Protection and Biodiversity Conservation Act 1999*.**

**Condition 34 (b)(iii) of the Draft Permit Conditions should be amended to:**

- **Delete 'Wedge-tailed Eagles' and replace this with 'the priority species named in condition 34 (b)(i).**



## 7.4 Other Listed Fauna

One submission expressed concerns about the impact of project works, including excavation, on wildlife such as frogs and reptiles. It pointed to the location of a large number of turbines in areas that originally supported the Plains Grassy Wetland ecological vegetation community.

Mr Lane's expert witness report stated that the desktop fauna assessment identified records of the following threatened species (other than birds) within 10 kilometres of the WEF: six species of mammal, one species of reptile, two species of frog, two fish species, and one species of insect. The proposed WEF site might potentially provide habitat for them. However, the later more detailed assessment indicated that none were considered likely to occur within or to be significantly affected by the WEF.

Under the requirements notified by the Commonwealth in response to the EPBC referral, a targeted survey was carried out for the Golden Sun Moth, a nationally threatened species.<sup>61</sup> No Golden Sun Moths were found.

The Panel accepts the evidence of Mr Lane that the Moorabool WEF will not have a significant impact on listed fauna.

## 7.5 Native Vegetation

### 7.5.1 Policy Context – Native Vegetation

#### Moorabool Planning Scheme

The most relevant section of the SPPF is **Clause 15.09, Conservation of native flora and fauna**. This contains the objective:

*To assist the protection and conservation of biodiversity, including native vegetation retention and provision of habitats for native plants and animals and control of pest plants and animals.*

Under the general implementation requirements it provides, amongst other things, that:

*Decision-making by planning and responsible authorities should: ...*

- *Assist the conservation of the habitats of threatened and endangered species and communities as identified under the Flora and Fauna Guarantee Act 1988, including communities under-represented in*

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<sup>61</sup> Moorabool Wind Project Golden Sun Moth Targeted Survey (November 2009) Prepared for WestWind Energy Pty Ltd by Brett Lane and Associates Pty Ltd.

*conservation reserves such as native grasslands, grassy woodlands and wetlands.*

- *Address potentially threatening processes identified under the Flora and Fauna Guarantee Act 1988. ...*

*Planning and responsible authorities must have regard to Victoria's Native Vegetation Management – A Framework for Action (Department of Natural Resources and Environment 2002). If a permit is required to remove native vegetation ... responsible authorities should follow the three-step approach as defined in the Framework. This is achieved firstly, as a priority, by avoiding the removal of native vegetation; secondly, if the removal of native vegetation cannot be avoided, by minimising the loss of native vegetation through appropriate consideration in planning processes and expert input into project design or management; and thirdly, by identifying appropriate offset actions. ...*

**Clause 21.02-4** aims to positively enhance biodiversity in Moorabool Shire. The following strategies are listed:

- *Require land use change and development to retain native vegetation and to minimise topsoil disturbance.*
- *Require an increase in sustainable rural land management practices (in particular weed and pest management) when supporting land use change or development within rural areas.*
- *Maintain protect, and enhance the biodiversity values of important roadsides, particularly those within the surrounds of the state and national parks or forests.*

**As noted in Clause 52.17, Native Vegetation**, calls up the application of Victoria's Native Vegetation Management Framework (as described above). The conservation significance of the affected vegetation and its status under the FFG Act are major considerations in determining whether to permit removal of native vegetation. Under the Framework, removal of vegetation of "very high" conservation significance requires the approval of the Minister for the Environment. Offsets proposed must be in accordance with criteria set out in the Framework.

**Clause 52.32 Wind Energy facilities** requires, amongst other things, consideration of the impact of the facility on the natural environment and natural systems.

## **7.5.2 Planning Application Report – Native Vegetation**

The application report (p.47) describes the rationale for site selection for the Moorabool WEF. Key points include 'limited environmental constraints'. This was further elaborated (page 48) as an opportunity:

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*Agricultural use has left most of the site cleared of native vegetation and significant fauna species. This allows the development of a layout which can maximise exploitation of the wind resource.*

The report also deals with the compliance of the Proposal with Clause 52.17, Native Vegetation, and comments:

*The proposal involves the removal of a small amount of native vegetation to improve access to the site. The removal of this vegetation cannot be avoided. ...*

It then gave details of the offsets required, discussed below in relation to the evidence of Mr Lane, and continued:

*The provision of a long term managed offset will conserve and enhance the native vegetation in the area. ...*

The following section of the PAR (p.79), in relation to the conservation status of native vegetation, stated:

*Native vegetation proposed for removal will involve:*

- **0.42** hectares from habitat zones supporting the EPBC Act listed community, Natural Temperate Grassland of the Victorian Volcanic Plain;
- **0.13** hectares from habitat zones supporting the EPBC Act listed community, Grassy Eucalypt Woodland of the Victorian Volcanic Plain;
- **0.58** hectares from habitat zones supporting the FFG Act listed Western (Basalt) Plains Grassland Community.

*Vegetation is classified as being High and Very High conservation significance. ...*

*Brett Lane and Associates have identified the following FFG Act protected flora values recorded on public land in the study area: [10 flora species and one vegetation community].*

Section 7.2 of the PAR details the flora and fauna investigations undertaken by BL&A for the project. These included:

- an overview investigation of potential flora and fauna issues affecting the site;
- a flora survey of the WEF site and adjoining roadsides. Native vegetation was mapped and its conservation significance determined. This information was used in the detailed design of the project; and

- a targeted flora survey of the project's proposed development footprint<sup>62</sup> to identify listed threatened flora species and ecological communities. It focussed on EPBC-listed communities and listed flora species under the EPBC Act or the FFG Act.

A habitat hectare and net gain assessment was carried out to determine the extent and quality of native vegetation that might need to be removed and thus the areas of offsets that would be required.<sup>63</sup> A separate offset plan was also prepared<sup>64</sup>, but did not form part of the PAR.

The findings from the various studies undertaken by BL&A were summarised in the PAR as follows:

#### *Native Vegetation Types*

*The project site lies within the Victorian Volcanic Plains Bioregion. The flora survey observed that vegetation consisted of Riparian Woodland, Creekline Herb Rich Woodland, Plains Grassy Wetland, Valley Grassy Forest and Plains Grassy Woodland. [EVC numbers provided in the report] Much of the site has been altered from its natural state, and has and continues to be cropped or grazed by sheep and cattle. Much of the site has been cleared of surface rocks and the main areas of native vegetation were found along the banks and escarpments of the east branch of the Moorabool River and along roadsides. ...*

#### *Targeted species*

*Some proposed access tracks and underground cable routes intersect with the critically endangered, EPBC Act-listed, vegetation community Natural Temperate Grassland of the Victorian Volcanic Plain. Seventeen colonies of the endangered, EPBC Act-listed Matted Flax-lily were recorded in the study area, on or near access tracks and/or underground cable routes. No other listed species were recorded during the targeted flora survey. ...*

*Based on the presence of suitable habitat, the EPBC-listed Spiny Rice-flower is considered likely to occur in the study area. However, no individuals were recorded during the current targeted survey, indicating that it is unlikely to be present. The assessment recommends that a further target survey be undertaken within the development footprint prior to works commencing between the months of April and August.*

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<sup>62</sup> Moorabool Wind Project Targeted Flora Survey (November 2009) Prepared for WestWind Energy Pty Ltd by Brett Lane and Associates Pty Ltd.

<sup>63</sup> Moorabool Wind Project Habitat Hectare Assessment and Net Gain Analysis (November 2009) Prepared for WestWind Energy Pty Ltd by Brett Lane and Associates Pty Ltd.

<sup>64</sup> Moorabool Wind Project Offset Plan (February 2010) Prepared for WestWind Energy Pty Ltd by Brett Lane and Associates Pty Ltd.

### 7.5.3 Submissions – Native Vegetation

Submissions raised issues relating to native vegetation:

- the “significant amount of native vegetation earmarked to ... go”, through the project itself and road upgrades required, plus the vegetation likely to be removed for powerlines (We note that the powerlines to connect the site to the external power grid do not form part of this Application.);
- the cumulative impact of WEFs on vegetation, with calls for further investigation, including a flora and fauna audit; and
- risks of increased spread of noxious weeds through construction activity and the dispersal of seeds (such as Serrated Tussock or Patterson’s Curse) by wind turbines.

DSE, in response to a referral under Section 55 of the *Planning and Environment Act*, expressed concerns relating to native vegetation.

Whilst acknowledging that the Application adequately addressed the Native Vegetation Framework, the department noted that as some of the vegetation is of “very high” conservation significance, the approval of the Minister for Environment must be obtained (preferably before a permit is granted) and a like for like offset must be identified and initiated prior to commencement of any clearing works.

### 7.5.4 Expert Evidence and Submissions to the Hearing – Native Vegetation

Mr Lane’s expert evidence and presentation to the Hearing summarised the information contained in the various background reports. He made the following points:

- surveys for native vegetation were undertaken across a number of months, in different seasons, between December 2008 and April 2010. It was therefore very unlikely that a patch of native vegetation had been missed in the study area;
- based on the habitats present and the fact that most of the land within the proposed WEF boundary is a grazed agricultural landscape, it was unlikely that any listed threatened flora species were present within the footprint of the WEF. However, road reserves within the study area were found to support a number of threatened and protected species;
- a total of 0.74 hectares of native vegetation would need to be removed for the Moorabool WEF. This represented a very limited incremental loss of native vegetation in the region and in any event, a net gain in native vegetation would be required; and

- he was confident that suitable offset sites could be found for the vegetation of very high conservation significance. There were Plains Grassy Woodland and Plains Grassland Sites available through Trust for Nature and other brokers and several large properties in western Victoria were in the process of being covenanted.

Mr Lane's expert witness report included a summary of the native vegetation that would need to be removed, and the offsets required. Offsets are calculated by assessing the condition of the native vegetation to be removed (in Habitat Hectares, which may, for heavily altered sites, be substantially less than the land area covered by the vegetation). The area needed to achieve 'net gain' is determined by applying a multiplier that increases with the conservation significance of the vegetation. For the Moorabool WEF, the following offsets would be required:

- **0.05** habitat hectares for the removal of 0.02 habitat hectares (0.07ha) of Very High conservation significance Higher Rainfall Plains Grassy Woodland (EVC 55\_63);
- **0.47** habitat hectares for the removal of 0.24 habitat hectares (0.44ha) of Very High conservation significance Heavier-soils Plains Grassland (EVC 132\_61);
- **0.04** habitat hectares for the removal of 0.02 habitat hectares (0.07ha) of High conservation significance Higher Rainfall Plains Grassy Woodland (EVC 55\_63) or Very High conservation significance of another vegetation type in the same bioregion; and
- **0.06** habitat hectares for the removal of 0.04 habitat hectares (0.16ha) of High conservation significance Heavier-soils Plains Grassland (EVC 132\_61) or Very High conservation significance of another vegetation type in the same bioregion.

*An area within the Bungeeltap Section has been identified which, subject to further investigation, may assist in meeting this offset requirement.*

...

Mr Lane noted that part of the vegetation required to be removed involved communities listed under the FFG Act and/or the EPBC Act. This included:

- 0.29 Habitat Hectares of the EPBC-listed Natural Temperate Grassland of the Victorian Volcanic Plain; and
- 0.04 Habitat Hectares of the EPBC-listed Grassy Eucalypt Woodland of the Victorian Volcanic Plain.

These communities were represented in the study area by the Higher Rainfall Plains Grassy Woodland and the Heavier-soils Plains Grassland EVCs. The Heavier Soils Plains Grassland also formed part of the FFG-listed Western (Basalt) Plains Grassland Community.

Mr Lane noted that the removal from public land of threatened species or communities or protected flora under the FFG Act required a licence under the Act. A licence would need to be obtained from DSE.

One submitter, in presenting to the Hearing, said that it was disappointing to think that even a small amount of the natural temperate grassland would need to be removed to accommodate the project. She suggested that the Application should be refused in order to protect the character of the landscape and make sure that this fragile environment was protected from any more destruction.

DSE, in its presentation to the Hearing, advised that it was satisfied that the Application adequately addressed the requirements of the Framework and avoided native vegetation or minimised the amount needing to be removed. It pointed out, however, that the Framework indicated that removal of vegetation of very high conservation significance would only be permitted in exception circumstances and that the approval of the Minister for Environment and Climate Change was required.

The DSE supplementary submission asked the Panel to recommend that the Minister for Planning defer issue of a planning permit for removal of native vegetation of very high conservation until the Minister for Environment had approved that removal.

It was put to the DSE representatives that an alternative could be to include a condition that no native vegetation of very high conservation significance could be removed until the approval of the Minister for Environment had been obtained and an offset plan to the satisfaction of DSE had been prepared. The DSE representatives thought this might imply that the decision had been taken out of their Minister's hands. They undertook to clarify the department's preference.

DSE's supplementary submission also commented on BL&A's draft offset plan. It said that the offsets proposed did not meet the requirements for 'like for like' for vegetation of very high conservation significance, in that the vegetation gains proposed were not equal to the vegetation loss, in terms of habitat and vegetation type. Documentation showing that all avenues had been exhausted would be required before the department would be willing to consider an offset proposal that did not meet the 'like for like' requirement.

DSE later put forward its preferred method for handling the approval for removal of native vegetation of very high conservation significance:

*This department requests the Panel, in its report, to recommend that in the event the Minister for Planning intends to grant a permit for the wind energy facility, he provide for the Minister for Environment and Climate Change to consider approval of the removal and offsetting proposals for the very high conservation significance native vegetation components prior to issuing a permit.*

### 7.5.5 Panel Response – Native Vegetation

The following discussion is based on Mr Lane’s advice that the total area of native vegetation that would need to be removed for the Moorabool WEF is 0.74 hectares (or 0.33 habitat hectares), all of it from EPBC and / or FFG listed communities.

We note that, while this information is consistent with the figures provided in one section of the PAR, it does not help to clarify the statement (quoted in section 7.5.2 above), which implied that a total of 1.13 hectares of native vegetation would need to be removed from EPBC and/or FFG-listed communities. Given that the Offsets Report was prepared on the basis of 0.74 hectares, we have assumed that the 1.13 hectares used in the Application report was incorrect.

For the sake of clarity, we have reformatted the information on native vegetation to be removed, the equivalent habitat hectares and the offsets required into the table below.

**Table 7.1 – Native vegetation removal and offsets required**

EVC	Conservation significance	Area (ha)	Habitat Hectares	Offset required (ha)
Higher Rainfall Plains Grassy Woodland (EVC 55_63)	Very high	0.07	0.02	0.05
Heavier-soils Plains Grassland (EVC 132_61)	Very high	0.44	0.24	0.47
Higher Rainfall Plains Grassy Woodland (EVC 55_63)	High	0.07	0.02	0.04
Heavier-soils Plains Grassland (EVC 132_61)	High	0.16	0.04	0.06
Total		0.74	0.32	0.62

The Panel has concluded, on the basis of the PAR and expert evidence, that the amount of native vegetation proposed to be removed has been minimised, in accordance with the Native Vegetation Framework.



The location and nature of offsets remains to be clarified, but on the basis of the information provided, it seems likely that the appropriate 'net gain' can be achieved. In any case, removal of vegetation cannot take place until the offset plan is approved.

We note the advice of DSE that, under the Native Vegetation Framework, the approval of the Minister for Environment and Climate Change is required before any vegetation of 'very high' conservation significance can be removed.

DSE's preferred process to deal with this issue is analogous to that which operates under other State legislation – for example, the *Aboriginal Heritage Act 2006* or the *Coastal Management Act 1995* – where a development that triggers the need for an approval or consent cannot be given a planning permit until that approval or consent is granted.

While the Native Vegetation Framework, as an adopted Government policy, does not have the force of a legislated provision, we have accepted DSE's position that the approval of the Minister for Environment and Climate Change should not be treated by means of a secondary consent.

We have concluded that if approval of the Moorabool WEF is supported, advice to the Minister for Planning should include a recommendation that the permit be issued once any other statutory approvals or consents required are obtained.

The need for DSE to approve the offset plan can be handled, as proposed in the Draft Permit Conditions, through a condition that no native vegetation can be removed until a net gain offset plan has been prepared to the satisfaction of the Department of Sustainability and Environment.

The Draft Permit Conditions originally tabled by DPCD included a requirement for a native vegetation spring survey, which also set out actions to be taken and further consents needed if any EPBC or FFG-listed vegetation was identified. The Proponent proposed to delete these conditions, on the grounds that the flora surveys for the project had been carried out in spring. DSE did not oppose the deletion of these conditions and we agree that a general survey is not required.

However, we note and endorse the suggestion made by BL&A and included in the PAR, that the permit conditions should contain a requirement for a targeted survey for the Spiny Rice-flower, to be carried out between April and August within the development footprint, prior to any works commencing.

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## 7.5.6 Recommendations – Native Vegetation

Approval from the Minister for Environment and Climate Change for the removal of vegetation of 'very high' conservation significance be obtained prior to the issue of any permit.

The following provisions should be included in the Recommended Permit Conditions:

Prior to commencement of the native vegetation removal a report by a suitably qualified ecological specialist must be submitted to the Minister and the Department of Sustainability and Environment that sets out the findings of a targeted survey for the Spiny Rice Flower, carried out between April and August within the development footprint of the project. If any occurrence of the species is identified, measures to avoid or minimise adverse impacts on it must be set out. The report must also review the net gain offset requirements in accordance with *Native Vegetation Management: A Framework for Action (DSE 2002)*.

If it is proposed to removal or destroy vegetation identified in the survey required by the previous condition of this permit, further consent in writing must be obtained from the Department of Sustainability and Environment.

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## 8. Safety and Health

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### 8.1 What are the Issues

The issues relating to safety and health identified by the Proponent, expert witnesses, submitters and the Panel include the following:

- the fire risks including lightning strikes;
- aviation safety including night lighting; and
- health impacts.

### 8.2 Fire and Lightning Strike

Some submitters expressed concern about risk of fire from the WEF and potential interference with fire fighting activities. Concerns were also raised regarding fire insurance and appropriate construction standards to ensure fire safety. HVP Plantations identified the need for adequate protection of their plantations from bushfires.

The Proponent's submission on this issue noted:

- the CFA Fiskville has been consulted and it does not share these concerns;
- the CFA Emergency Management Guidelines for WEFs address fire risks;
- the CFA guidelines state *'the standard distance of 300 metres between wind turbines would allow aircraft to operate around a wind farm given the appropriate weather and terrain condition'*. Wind turbines for the Proposal exceed this separation distance by a substantial margin; and
- conditions requested by the CFA are accepted by the Proponent and are included in the Draft Permit.

An Emergency Response Plan, required by the Draft Permit, is to be prepared in consultation with the Country Fire Authority (CFA), and others. It will address the provision of static water supply tanks solely for fire fighting purposes, vegetation management, fuel control, the provision of fire fighting equipment during declared fire danger periods; access for fire fighting vehicles and familiarisation of WEF staff and emergency services personnel.

With reference to appropriate construction standards to ensure fire safety we note that the CFA Emergency Management Guidelines identify that there *cannot be a guarantee that an installation involved in electricity generation can*

*never malfunction and cause a fire, the potential for fire of wind turbines is inherently low.*

The concerns raised by HVP Plantations are adequately addressed by the Draft Permit Conditions.

We endorse the inclusion of these conditions in the Recommended Permit and are satisfied that they adequately address the risk from fire or lightning strike.

## **8.3 Aviation Safety Including Night Lighting**

### **8.3.1 Policy and Regulatory Framework**

The WEF Guidelines require consideration of aircraft safety including the views of the Civil Aviation Safety Authority (CASA) where the proposal:

- is within 30kms of a declared airfield or aerodrome;
- infringes the obstacle limitations surface around a declared aerodrome; or
- includes a building or structure the top of which will be 110 metres or more above natural ground level (height of a wind turbine is that reached by the tip of the turbine blade above ground level).

There are no declared airfields or aerodromes within 30kms of the proposed WEF.

In the past CASA has advised proponents with turbines heights in excess of 110 metres that night lighting of some turbines within the WEF is required. The proponent has been advised that this limit is likely to be increased to 150 metres and that as a result CASA is unlikely to require night lighting of any of the turbines.

CASA has also apparently advised that:

*Proponents of structures less than 150 metres in elevation may wish to exercise a duty of care to local aviators who may be concerned about wind turbines in the vicinity of their aeroplane landing area.*

The Proponent has included in the Application provisions for aviation night lighting in accordance with CASA's earlier requirements. The turbines proposed to be so lit are shown in Figure 3.

The Proponent further advised that operation of the lights is likely to be restricted to just before and after sunset and sunrise and during aerial operations in the area, for example crop dusting or during specific conditions such as smoke or dust in daylight and the like.

The Application, however, is clear that the night lighting is not necessarily restricted to these conditions.

### 8.3.2 The Planning Application Report

Aircraft safety issues are addressed in Section 7.2 of the PAR. Attachment 4 of the PAR is an assessment of the safety impact of the WEF on Civil and Military Aviation by consultants Rehbein AOS. The conclusion of this report is that there are no safety issues and that generally night lighting of the turbines is not necessary because the turbines will not be obstacles to aircraft operating at night. Nevertheless the report recommends hazard lighting should be installed and operated as described above.

### 8.3.3 Submissions

CASA has not objected to the WEF and neither has the Department of Defence with respect to any impact on military flying operations and possible interference with Defence communications and radars.

Two late submissions raised issues concerning aircraft safety.

The Aircraft Owners and Pilots Association of Australia raised several concerns that all WEFs *constitute a hazard to all things that fly*. In particular they have concerns regarding:

- hazards associated with air disturbance and turbulence associated with groups of turbines;
- interference with aerial water bombing activities associated with bush fires (this concern was expressed by several objectors); and
- interference with agricultural activities such as crop dusting.

An other submitter, an experienced private pilot, raised concerns that loopholes in the CASA regulations have been exploited. He believes that the tips of the blades should be lit. To do otherwise he claims ignores the intent of the CASA regulations. He also has similar concerns to those raised in the Aircraft Owners and Pilots Association submission.

The CFA has indicated that a spacing of 300 metres between turbines is adequate to allow for aircraft operations associated with bushfires.

### 8.3.4 Panel Response – Aviation Safety

The material presented indicates that the Proposal satisfies CASA, the Department of Defence and the CFA aviation safety requirements. The technical report in Attachment 4 to the PAR assesses safety issues and

concludes that there are unlikely to be any hazards to aviation. This report however does advise that confirmation be sought from Air Services Australia regarding any concerns about impact on radar or radio performance. The report indicates that investigations carried out by Rehbein AOS, as part of their research, showed that any impact will not be of operational significance.

We have also noted that the written advice from CASA referred to in the PAR and listed as being included in Attachment 4 is in fact not included.

The PAR does indicate that the content of the CASA letter is such that no objections are raised. For completeness sake however the CASA response as well as the advice from Air Services Australia should be provided.

We are satisfied on the basis of the material supplied that aircraft safety associated with the proposed WEF is not an issue. Refer to Section 5.5 of this report for additional specific recommendations concerning lighting of turbines.

### **8.3.5 Recommendations - aviation safety including night lighting**

**That prior to the issue of a permit the CASA referral response be provided to the Minister for Planning.**

**That prior to the issue of a permit a response be sought from Air Services Australia regarding interference with radio and radar navigational installations. In the event that a positive response is not provided then appropriate modifications to the WEF be made to the satisfaction of the Minister.**

## **8.4 Health**

### **8.4.1 Background**

Health effects from WEFs have attracted publicity in recent times primarily as a result of concerns expressed by persons living or working in proximity to the Waubra WEF.

### **8.4.2 Evidence and Submissions**

Health issues were raised by a number of submitters and the experience of persons associated with Waubra was frequently referred to.

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Ms S Giddins made a submission which included material from Waubra residents, three of which attended and told us of their experiences at Waubra in support of Ms Giddins submission.

The three persons appearing on behalf of Ms Giddins were Mr D Thomas, Mrs M Reid and Ms R Brew. Ms Giddins submitted 22 statutory declarations from Waubra residents all of which claimed that their health has been severely impacted as a result of the WEF. The symptoms described by the Waubra residents included:

- headaches;
- nausea;
- sleep deprivation;
- giddiness;
- stress;
- heart palpitations;
- anxiety attacks;
- ringing in the ears; and
- high blood pressure.

The symptoms vary from person to person but most referred to headaches and loss of sleep. We were also provided with statutory declarations from two residents near the Cape Bridgewater WEF.

A submitter who owns land on the north side of the Ballan - Egerton Road opposite the proposed WEF advised that he experienced similar symptoms to those described above when he visited the Waubra site for work.

The distance between the residents making the statements and the turbines is quite varied with a maximum of about 3.5 kilometres but most considerably less.

We were also provided with a tape containing a transcript of an ABC Radio interview with a Dr Nina Pierpont, a Canadian doctor. Dr Pierpont has written a book that claims turbine infrasound and low frequency noise result in what she calls 'Wind Turbine Syndrome'. She claims that many people living within 2 kilometres of wind turbines get sick as a result of 'Wind Turbine Syndrome'. The radio interview was about her book and experiences that led to the book.

Several objectors called Dr Robert Thorne as an expert witness. He is an acoustic expert and his evidence is discussed in Chapter 6 of this report.

Dr Thorne however also provided evidence concerning health effects and he is a Doctor of Philosophy in Health Science from Massey University and accordingly he has some claim to expertise in the health area.

Dr Thorne's evidence was that:

- *The operation of the wind farm should not cause unreasonable noise. "Unreasonable noise" is a sound or vibration that is:*
  - *Annoying to a reasonable person;*
  - *Injurious to personal comfort or health, including sleep disturbance;*
  - *A disturbance to the quiet enjoyment of land including the grazing of stock or keeping of animals;*
  - *Observed to have a detrimental affect on wildlife or the environment.*
- *The sound, including low frequency and infrasound, of the wind farm shall not be audible or perceptible within a dwelling or noise sensitive place.*

We were provided with correspondence from WorkSafe to the Berrybank WEF Panel. This correspondence arose as a result of a query from the Berrybank Panel to WorkSafe regarding the health effects of Wind Energy facilities. The WorkSafe letter contained the following advice:

*WorkSafe Victoria has met with other government agencies regarding the possible health effects of wind energy facilities.*

*The Victorian Department of Health (DH) has examined both the peer-reviewed and validated scientific research and also looked at the health aspects of the current planning process.*

*The DH has determined that the weight of evidence indicates that there are no direct health effects from noise (audible and inaudible) at the levels generated by modern wind turbines. Numerous international reviews on low frequency and infrasound noise, and case studies of actual wind farm noise emissions, have demonstrated that:*

- *There is insignificant infrasound generated from modern wind turbines; and*
- *Levels of low frequency sound emitted from modern wind turbines are not at a level that would lead to direct health effects.*

*The Victorian Chief Health Officer, Dr John Carnie, has also referred this matter to the National Health & Medical Research Council (NHMRC) for further consideration and advice.*



*WorkSafe is reliant upon information from DH, Victoria's principle [sic] health authority, regarding possible adverse effects of low-frequency, sub-audible noise.*

*As the regulator of workplace safety, WorkSafe will monitor the NHMRC's response to the matters referred and, as necessary and appropriate, address OHS issues that may emerge as a result.*

*I recommend that you liaise directly with the DH for an update on this matter.*

Following that correspondence and after the Hearing was completed we became aware of a document dated July 2010 published by the Australian Government National Health and Medical Research Council (NHMRC) entitled 'Wind Turbines and Health – A Rapid Review of Evidence'.

The purpose of this document is to 'present findings from a rapid review of the evidence from current literature on the issue of wind turbines and potential impacts on human health'.

The Rapid Review comes to the following conclusion:

*The health effects of many forms of renewable energy generation, such as wind farms, have not been assessed to the same extent as those from traditional sources. However, renewable energy generation is associated with few adverse health effects compared with the well documented health burdens of polluting forms of electricity generation (Markandya & Wilkinson, 2007).*

*This review of the available evidence, including journal articles, surveys, literature reviews and government reports, supports the statement that: 'There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines'.*

Ms Quigley in her closing submission for the Proponent said:

- *There is no demonstrated evidence of a causal connection between the operation of a wind energy facility and human health before this Panel.*
- *Unsubstantiated allegations by wind farm opponents from Waubra are seriously challenged by the operator of the Waubra wind farm.*
- *There was no opportunity for cross-examination of these co-submitters.*
- *We also refer to the WorkSafe letter to the Berrybank Panel which is annexed to the witness statement of Mr Delaire.*

### 8.4.3 Panel Response - Health

It is clear that noise can be annoying and it follows that in some cases such annoyance can lead to medical concerns, including sleep disturbance, headaches and the like. It is for these reasons that noise limits are established for all sorts of land uses including WEFs.

It is also clear that compliance with noise limits specified will not result in “no annoyance” to all residents.

Evidence from Marshall Day clearly indicated that compliance with the noise limits specified in the Wind Energy Guidelines would not result in all residents experiencing no noise annoyance.

The noise limits are designed to ensure that noise is kept to a level that is considered satisfactory by regulatory authorities and this clearly may not result in ‘no annoyance’. We have addressed the issue of compliance with noise limits and the appropriate limits in Chapter 6.

Turning to the claimed health effects from infrasound and low frequency noise we have material from residents and workers at Waubra and Cape Bridgewater which clearly indicates that in their view their health has been severely compromised by the WEF. We have no reason to doubt the sincerity of the statements lodged. We also observed the levels of distress amongst some submitters not yet experiencing a WEF but clearly suffering significant distress at the mere thought of such a facility.

We also noted the comments made in a report by Professor Dunt submitted by Mr Jacka on behalf of a submitter. In that report Professor Dunt said his research indicated that those opposed to WEFs appear to suffer more adverse health effects than those who are not.

The statements from the Waubra residents are not evidence that WEFs cause adverse health effects. This is especially the case when these statements are viewed in context with Professor Dunt’s conclusions and with the obvious distress of residents not yet experiencing a WEF.

We have before us advice from WorkSafe and the recently released NHMRC review that there is no credible published evidence of causal connection between operation of a WEF and human health.

We appreciate that the findings of the NHMRC were released after the Hearing finished and parties have had no opportunity to comment. The conclusions in this document however are quite clear and are now in the public domain and in our view, while not being determinative in this matter, neither should they be ignored.

We also acknowledge the fact that NHMRC was reviewing the effect of health on WEFs was discussed at the Hearing and some submitters suggested that we should defer our report until this review was completed.

In our view the NHMRC findings are significant in that they indirectly illustrate the real difficulty that exists in this matter, and that is, while there is no published positive evidence that connects health to WEF there is equally no independent published evidence that establishes or leads to the reverse conclusion.

In the absence of any direct evidence linking adverse health to WEFs there is no alternative but to find in support of the WEF. The WorkSafe letter conveys the Victorian Health Department's view about evidence and the NHMRC report confirms this view.

This however does not address the question of the need for independent research. In our view there would be merit in such research in order to resolve the health issue once and for all.

#### **8.4.4 Conclusions and Recommendations - Health**

##### **Conclusion**

**We are not convinced on the evidence presented that there is a causal relationship between WEFs and general health effects described to us as being experienced at Waubra and elsewhere.**

**It follows that we have not heard evidence that would prevent the issue of a permit for the Moorabool WEF on this issue. However, in the interest of allaying the community concern expressed at the Hearing it would be beneficial for the Government to consider commissioning independent research into this issue.**

##### **Recommendation**

**That the Victorian State Government consider commissioning independent research into the possible connection between health issues and Wind Energy Facilities.**

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## **9. Traffic Management**

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### **9.1 What are the Issues?**

The issues relating to traffic management identified by the Proponent, expert witnesses, submitters and the Panel include the following:

- Will the existing and proposed road network cope with the identified traffic loads during construction and operational modes?
- Will there be any unreasonable impacts on local amenity or safety as a result of the WEF generated traffic?
- What needs to be done to the road network to ensure its adequacy if a permit is granted for the WEF?
- Requirements for upgrading existing access onto the Geelong-Ballan Road.

### **9.2 Planning Application Report**

The assessment of the traffic implications of the WEF was included in the PAR with additional material provided from Cardno Grogan Richards in Attachment 3.

This material estimated that the total traffic increase would be 128 laden truck movements per day for a three month period. This three month period would cover the construction of the internal access tracks and the hard stand areas at each turbine. It would also allow for commencement of construction of the turbines including over dimensional vehicles.

After the initial three month period the turbine construction would continue over a further 15 month period and would gradually decrease to an operational level of 5 vehicles per day.

During the initial three month period the majority of the traffic would be quarry trucks however allowance for the special vehicles with over dimensional loads was also included.

The Cardno Grogan Richards Report estimates the number of additional truck movements per day on each affected road and compares that to existing levels. This information is shown in the following table, extracted from the Cardno Grogan Richards Report in attachment 3 to the PAR.

These figures represent estimated peak volumes of truck traffic. The figures are calculated on an assumption of seven day a week operation.

The report then considers the existing peak traffic volumes and makes an assumption that all of the daily truck movements will be in between 7.00am and 8.00am and out between 3 – 4.00pm. It is then considered that this will avoid the existing traffic peaks between 8.00am and 11.00am and 4.00pm and 5.00pm.

**Table 9-1 Estimated Number of Additional Truck Movements per Day**

Road	Estimated No. Additional Daily Truck Movements (Laden and unladen)	Existing Daily Traffic (weekdays)
Geelong-Ballan Road	250	396
Ballan-Egerton Road	60	390
Manleys Road	30	9
Ballan-Meredith Road	124	122
Mount Wallace-Ballark Road	66	Not provided

The PAR identifies the routes for over dimensional vehicles and the necessary intersection upgrades. These are:

- Mt Wallace-Ballark Road / Geelong-Ballan Road;
- Mt Wallace-Ballark Road / Ballan-Meredith Road;
- Ballan-Egerton / Ballan-Geelong / Ballan-Meredith Road;
- Manleys Road / Ballan-Egerton Road;
- Egans Road / Egerton-Bungeeltap Road; and
- Egans Road and Manleys Road.

A Traffic Management Plan is proposed which amongst other matters will identify necessary road up-grades and maintenance works at the Proponent's expense, designate routes, operating hours and speed limits for oversize and other heavy vehicles.

The Traffic Management Plan is to be prepared in consultation with VicRoads and the Moorabool Shire Council and to the satisfaction of the Minister for Planning.

The Cardno Grogan Richards report concludes that, based on the assumptions detailed above, the existing access roads to and from the subject sites can accommodate the expected truck volumes.

### 9.3 Submissions

The submissions raised a range of issues about traffic including:

- the capacity of roads is inadequate to accommodate the additional heavy traffic;
- operating hours for truck traffic are unsatisfactory and should be altered to accommodate local land users;
- the description of the Ballan-Egerton Road as having pavement width of around 8 metres is inaccurate;
- one submitter stated that the proposed upgrading of the entrance opposite their property may interfere with their property access requirements and should be subject to a “safety audit”;
- Moorabool Shire Council was generally satisfied with the proposed arrangements for road upgrading and maintenance at the Proponent’s expense; and
- a resident in Smiths Lane requested a sign be erected at the junction with the main road stating ‘ No access to turbines’. The suggestion was based on potential traffic volumes and safety issues associated with small children living in the lane.

### 9.4 Panel Response – Traffic Management

We accept the traffic figures estimated in the Cardno Grogan Richards Report however we consider it is highly unlikely that truck traffic delivering large volumes of road construction material to various parts of the land is likely to be made up of inbound laden truck traffic between 7 and 8.00am and outbound empty truck traffic between 3 and 4.00pm. Such a process would involve the trucks unloading in the morning and then staying on site all day, unused, and then departing empty at night - a most unlikely and unusual scenario. It is more likely that road making material will be carted in during the course of the working day by a number of trucks each doing several trips. There is likely to be some concentration first thing in the morning and last thing at night. Other than that we anticipate that the road making quarry truck traffic, which forms the vast majority of the truck traffic, will be evenly spaced throughout the day.

Given the low levels of existing traffic on all the roads we do not consider that any of the roads will be over utilised. The Geelong-Ballan Road currently carries 396 vehicles per day. The Proposal is estimated to produce an additional 256 truck movements per day for three months. The extra movement spread over an eight hour working day amounts to 32 extra movements per hour. The figures decrease from this highest usage road. There will be a significant increase in traffic for about a three month period,

and this will cause some inconvenience to local residents, but the time of inconvenience will be limited.

The Proponent has not indicated any specific hours of operation or number of days worked per week. We understand that to equate to long hours and seven day a week operations. We believe these matters in so far as they relate to traffic movements are best addressed in the Traffic Management Plan and the recommended conditions as drafted achieve this. Without specific guidance we recognise that restrictions on hours and number of days worked per week result in longer periods of inconvenience for local road users. On balance we are inclined to the view that heavy construction traffic should not extend outside daylight hours and should be limited to six days per week. We propose that the conditions be altered to reflect these particular limits of construction. We do not consider that construction of the WEF in its self is likely to have amenity impacts, this especially the case given the requirement for construction noise to comply with *State Environment Protection Policy (Control of Noise from Industry in Country Victoria No N3)*. Accordingly we do not believe any additional conditions to control construction are necessary beyond that relating to construction traffic.

The submitter is correct in observing that the pavement on the Ballan-Egerton Road is not eight metres wide. In fact it is generally a standard six metre wide sealed rural road. It is unfortunate that the description on the Cardno Grogan Richards report is incorrect. However the issue of adequate road width is more significant than the question of the inaccurate description.

In our view the existing road is sufficiently wide to cater for the projected construction traffic. In saying this we recognise that there are horizontal and vertical alignment constraints and some improvements may be required. We are however generally satisfied that this road is adequate and the necessary isolated improvements can be addressed in the Traffic Management Plan.

Another submitter expressed concern regarding the possible impact on existing access arrangements on a property in the Geelong-Ballan Road involving trucks transporting horses and the lack of consultation concerning this issue. The submitter (a civil engineer) has expertise in the area of road design and she provided to us an email from Mr Philip Jordan of Road Safety International suggesting that a road safety audit is appropriate. The submitter also wants the final design to be submitted to her with a copy of the audit.

It is correct to say that the detail of this access point has not yet been designed. It is also true that in appropriate circumstances VicRoads requires safety audits of access points onto roads under their control. The Geelong-

Ballan Road is under the care and management of VicRoads and they have indicated that the applicant must prepare design drawings to VicRoads' approval. The need for a safety audit is a matter for VicRoads to determine. In the normal course of events it would be usual for the submitters to be able to view the design drawings of the access way immediately opposite their property and there is no reason why this should not occur.

We have no reason to believe that when the access point is designed and the plans submitted to VicRoads due regard will not be given to the existing access arrangements relating to the submitter's property. There is also no reason to believe that VicRoads will not take such matters into account. The submitter is quite at liberty to advise VicRoads of her concerns and to draw VicRoads attention to any particular design aspects she considers appropriate.

We are not inclined to impose particular conditions about this entrance way because we consider:

- the access location is not particularly difficult;
- VicRoads is the authority responsible for approving this access; and
- the submitter can advise VicRoads directly of any particular concerns.

With reference to the location of appropriate signage at intersections we believe that this is an appropriate matter for the Traffic Management Plan and we have included a recommendation to ensure that it is addressed at that time.

## 9.5 Recommendations

**The permit conditions relating to the Traffic Management Plan should be amended so as to ensure that:**

- **Construction traffic except for sedan and light commercial vehicles should not operate outside daylight hours and should be limited to six days per week; and**
- **Appropriate signage is included in the issues considered in the plan.**



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## 10. Cultural Heritage

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### 10.1 What are the Issues?

The following issues relating to the impacts of the Moorabool WEF on cultural heritage have been identified:

- impact on the heritage values of the Ballark homestead; and
- completeness of the heritage assessment in the PAR.

### 10.2 Policy and Regulatory Framework

The SPPF (Clause 15.11) requires responsible authorities to conserve and protect places of natural or cultural value from inappropriate development. The places relevant to the proposed WEF include:

- *Places of Aboriginal cultural heritage significance and historical and archaeological sites.*
- *Sites associated with the European discovery, exploration and settlement of Victoria.*
- *Important buildings, structures, parks, gardens, sites, areas, landscapes, towns and other places associated with the historic and cultural development of Victoria, including places associated with pastoral expansion, gold mining, industrial development and the economic expansion and growth of Victoria.*

The SPPF also requires responsible authorities to take account of:

- the Victorian *Aboriginal Heritage Act 2006*; and
- the recommendations of the Victoria Heritage Council and the provisions of the *Heritage Act 1995*.

The MSS in Clause 21.06 identifies that heritage values are important. It contains an objective to preserve, promote and enhance places of heritage significance.

The *Aboriginal Heritage Act 2006* imposes regulatory requirements that can result in the need for a Cultural Heritage Management Plan (CHMP) to be prepared and approved prior to a planning permit being granted. The PAR acknowledges that a CHMP is required in this case. It is in the course of preparation.

The WEF Guidelines in Section 4.8 set out the application requirements for WEFs. These include:

- a site analysis that includes identification of sites of cultural heritage significance, both in relation to the site itself and in the surrounding area; and
- written reports that include an assessment of the impacts upon Aboriginal and non-Aboriginal cultural heritage. The reports should also explain why the site is suitable for the WEF having regard to, amongst other things, to 'the extent to which the Proposal has been designed to manage any potential adverse impacts'.

### 10.3 Planning Application Report

With regard to Indigenous heritage, the PAR stated (page 49) that:

*Development is avoiding areas of cultural heritage sensitivity. The Cultural Heritage Management Plan process may result in minor amendments (micro-siting) to the layout to ensure no disturbance to any new areas identified of cultural heritage significance.*

In relation to non-Indigenous heritage (page 67) it said:

*The proposal will not impact on any heritage place. The proposal will not affect the heritage values of Ballark Homestead.*

The heritage assessment<sup>65</sup> included with the PAR recorded that the brief was to provide a preliminary assessment as to the likely presence of existing Aboriginal cultural values on land near Ballan and the issues associated with them. Nevertheless, the report went on to say:

*The desktop review involved a search of the site registries at Aboriginal Affairs Victoria (AAV) and Heritage Victoria (HV) to determine whether there were any previously recorded Aboriginal or historic archaeological sites within the study area. Searches were also conducted of other relevant heritage databases, including local government heritage overlays, the Register of the National Trust and the National Heritage Register.*

The report outlined the pre and post-contact history of the study area and summarised the findings of previous archaeological surveys.

It noted that 11 [although the table shows 12] previously recorded Aboriginal archaeological sites were located in the vicinity of the study area.

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<sup>65</sup> Heritage Insight Pty Ltd (2008) Preliminary Heritage Assessment, Moorabool Wind Project near Ballan, Victoria. Confidential assessment prepared for WestWind Energy P/L by Bianca Di Fazio

No places on the Victorian Heritage Register (VHR) or the Heritage Inventory lay within the study area. There were three places listed under the Heritage Overlay in the Moorabool Planning Scheme: Ballark Homestead (HO26) on the Ballan-Meredith Road; Bungeeltap Homestead (HO31) on the Egerton-Bungeeltap Road and the Emily Park Homestead (HO32) on Meredith Road.

In relation to historic archaeological (and cultural) values, the report pointed to the absence of any places recorded on the VHR or the Heritage Inventory. It noted the three places listed under the HO and commented:

*There is a possibility that previously unrecorded historic archaeological sites may occur within the study area, both associated with the buildings listed above and in other locations. These sites are most likely to be associated with mining and pastoral activities.*

In relation to Aboriginal archaeological sites, the cultural heritage report concluded:

*Overall, the initial assessment of the site is that the risk of locating significant Aboriginal archaeological sites on the property is high. The study area contains a major watercourse (the Moorabool River) which is likely to have been of significance to Aboriginal people as a resource base. It is possible that contemporary Aboriginal communities may have an interest in any natural values attached to the site, particularly if there are any areas which contain resources that are of significance to Aboriginal people.*

The report considered management issues relating to both Indigenous and non-Indigenous sites of cultural heritage significance.

It noted the need for a Cultural Heritage Management Plan (CHMP) if major earthworks were to be carried out in areas of cultural heritage sensitivity (defined under the Aboriginal Heritage Regulations) and advised that this should be commenced early and carried out in stages, to allow its findings to be reflected in detailed project proposals.

With regard to historic archaeological places, it noted that there are no registered sites within the study area but continued:

*However, there has been very little systematic archaeological survey within the specific property in question and it is possible that historical archaeological sites may be located during any future investigation for the windfarm.*

The report then stated that, if the sites were listed on the Heritage Inventory, consent from Heritage Victoria (HV) would be required to remove them, in

the event that they were impacted on by any future WEF [We note that this is correct, but also misleading: a permit under the Heritage Act is required for the disturbance or removal of **any** historic archaeological relics, whether or not they are recorded on the Heritage Inventory].

The cultural heritage report went on to note that, in addition to fieldwork carried out for a CHMP, a field survey for historic archaeological sites would be required if the project were to proceed. HV must be notified of the intent to conduct the survey and advised of the results.

The report recommended that any impacts on the three homesteads listed under the HO should be avoided and that an archaeological survey would be required for any works carried out in the vicinity of these.

## **10.4 Evidence and Submissions**

### **Non-Indigenous Heritage**

A submission from Heritage Victoria (HV), an agency of the (DPCD), raised concerns about whether the heritage assessments for the project had taken account of non-Indigenous cultural heritage values and sites.

Heritage Victoria recommended that an assessment should be undertaken to identify any places included on the Victorian Heritage Register or the Heritage Inventory, under the Heritage Act. It also suggested the need for a survey to determine if any previously unrecorded historical archaeological sites might be located in the subject area.

DPCD, in its opening submission to the Hearing, advised that there were no places on the Victorian Heritage Register located within the proposed WEF area or its environs. One place within the WEF area that was listed under the HO in the Moorabool Planning Scheme was Ballark Homestead, Ballan-Meredith Road (HO26). DPCD provided an extract from the HO Schedule and Moorabool Shire Council tabled a map showing the areas covered by the HO and a full version of the schedule.

The DPCD submission also stated that no Statement of Significance exists for Ballark Homestead, although Moorabool Shire has engaged consultants to commence a heritage study for the western parts of the Shire, which will prepare statements of significance for listed places that are currently without them.

The mapping for HO26 covers an extensive area of the property. Two wind turbines are located within this area, so a permit is required to construct these turbines and carry out works associated with them. Tree controls

apply to the property in the HO schedule, but the Application specifies that no trees are to be removed in this location.

Despite the absence of a citation for HO26, Ms Vanselow, for DPCD, suggested to the Panel that only the homestead and its surrounding gardens were significant, rather than the full extent of the land title that has been mapped under the HO. Ms Quigley also put this view in her opening submission (Document 7):

*The Heritage Overlay covers the Ballark Homestead and aims to ensure the conservation of Ballark Homestead and the surrounding gardens.*

Ms Quigley, in her further submission Part B – impact assessment (Document 17) stated:

***European cultural heritage***

*The Proposal will not adversely impact any recognised historic place.*

*The submission from Heritage Victoria (#1) noted a concern that the cultural heritage assessment may only have considered indigenous heritage, rather than heritage protected under the Heritage Act 1995 (Vic). It is submitted that the Heritage Insight Reports included in the Application Report clearly demonstrate that the requirements of the Heritage Act 1995 (Vic) have been considered and that a preliminary assessment of non-indigenous heritage has been undertaken to an appropriate level. Potential impacts to heritage protected by the Planning Scheme have also been assessed. Further, we note that Heritage Victoria have not sought to be heard before the Panel.*

***Historical places within and near the Site***

*... There is one historic place within the Ballark Section of the Site that is subject to the Heritage Overlay in the Planning Scheme, Ballark Homestead (HO26, located on the Ballan-Meredith Road). The Heritage Overlay has been applied to the whole of the land title, rather than just to the house and garden area that are the subject of the heritage values.*

*It is proposed that two turbines, BAWT42 and BAWT44, will be constructed within the land subject to the Heritage Overlay. However, these are not in the vicinity of the heritage house and garden and it is submitted that the Proposal will not adversely impact on the heritage values of Ballark Homestead.*

*There are two additional historic places located between the two sections of the Site:*

- Bungeeltap Homestead on the Egerton-Bungeeltap Road which is subject to Heritage Overlay HO31 in the Planning Scheme, is listed*

*on the Register of the National Trust (B1103) and the Register of the National Estate (3938); and*

- *Emily Park Homestead on Meredith Road, which is subject to Heritage Overlay HO32 in the Planning Scheme and is listed on the Register of the National Trust (B3156).*

*.... The Heritage Insight Reports found that impacts to these heritage places should be avoided. No works are proposed in the vicinity of these buildings.*

*Council has also referred the Panel to Yaloak Estate Homestead on the Geelong-Ballan Rd (HO45). No works are proposed in the vicinity of that property.*

*... Should a permit be issued for the Proposal, a further heritage survey would be carried out at an appropriate time.*

### **Indigenous Cultural Heritage**

No submissions addressed the issue of Indigenous cultural heritage.

DPCD advised us that the Proponent had submitted to Aboriginal Affairs Victoria a notice of intent to prepare a Cultural Heritage Management Plan (CHMP), as required under the Aboriginal Heritage Act. A CHMP is required because all or part of the activity area is an area of cultural heritage significance and the activity is a high impact activity, under the terms of the Act and its Regulations.

Ms Quigley, for the Proponent, advised in her opening submission that field work undertaken in preparation of the CHMP had resulted in a number of small changes to the proposed location of infrastructure to avoid discovered Aboriginal artefacts. These included: small adjustments to the location of eight turbines; realignment of two access tracks; and the use of an overhead powerline to cross the east branch of the Moorabool River in the Bungeeltap Section in order to elevate the cable above identified Indigenous cultural heritage sites.

No expert evidence was provided to the Panel on matters relating to cultural heritage significance.

## **10.5 Panel Response – Cultural Heritage**

No submissions were made to us anticipating any adverse impacts from the WEF on the heritage values of Ballark Homestead (HO26), Bungeel Tap [as it is shown in the schedule] Homestead (HO31) or Emily Park Homestead (HO32). The latter two properties are located between the two sections of the proposed Moorabool WEF and no turbines are proposed on land forming

part of these heritage places. Yaloak Homestead (HO45), located to the east of the Geelong-Ballan Road, is also in the environs of the WEF but is not proposed for any development under the Application.

Whilst we were originally inclined – in the absence of a citation or statement of significance – to question the assertion that the heritage significance of Ballark Homestead (HO26) is confined to the house, its outbuildings and its surrounding gardens, our inspection of the property indicated that this appears to be a reasonable assumption. The inspection did not indicate that the wider landscape setting of the homestead and its garden was likely to be identified as a major feature of the heritage significance of the place.

The residence is on the top of a small knoll and is surrounded by its garden. The land on which the turbines are proposed is in the valley, some distance from the house and at a lower elevation, and would be screened from view by the garden. While it is possible that some evidence exists in various parts of the property of earlier constructions (huts, walls, fences, etc.) this is likely to be site specific and, if present, should have been identified during sub-surface investigations carried out for the CHMP.

## 10.6 Conclusions and Recommendations

Having considered this issue we conclude that:

- **The Application has fulfilled the requirements of the WEF Guidelines in relation to cultural heritage assessment.**
- **The preliminary assessment that accompanied the Application identified the key issues with regard to the cultural heritage values – both Indigenous and non-Indigenous – of the WEF site and its environs and provided appropriate advice on the survey and permit processes required.**
- **Investigations for the preparation of a CHMP under the Aboriginal Heritage Act have led to appropriate modifications to the Application, in terms of micro-siting of turbines and an amendment to proposals for treatment of electricity cables when crossing the east branch of the Moorabool River. There is potential for further adjustments as additional information becomes available.**
- **Erection of two turbines in the locations proposed for BAWT 42 and 44 is unlikely to have an adverse effect on the cultural heritage significance of Ballark Homestead (HO26) and a permit under the Heritage Overlay should be approved.**

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## 11. Shadow Flicker

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### 11.1 What are the Issues?

The issues in regard to shadow flicker identified by the Proponent, submitters and the Panel are:

- the potential impacts on residential amenity of shadow flicker and blade glint; and
- the Proposal's compliance with the requirements of the Planning Scheme specified by reference to the WEF Guidelines.

### 11.2 Policy Context of the Issue

The WEF Guidelines state that the application requirements include, amongst other things, an explanation of:

*Likely amenity effects on the surrounding area due to blade glint, shadow flicker, overshadowing and electromagnetic interference.<sup>66</sup>*

The WEF Guidelines include the following guidance in regard to evaluation by responsible authorities:

*The shadow flicker experienced immediately surrounding the area of a dwelling (garden fenced area) must not exceed 30 hours per year as a result of the operation of the wind energy facility.<sup>67</sup>*

*Blades should be finished with a surface treatment of low reflectivity to ensure that glint is minimised.<sup>68</sup>*

### 11.3 Planning Application Report

The PAR acknowledges the requirements of the WEF Guidelines in regard to shadow flicker and refers to an assessment carried out by the Proponent using WinPRO 2.0 software which it is said can provide accurate predictions of shadow flicker.

A report on the Proponent's shadow flicker assessment was appended to the PAR as Attachment 10. That report:

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<sup>66</sup> WEF Guidelines, Section 4.8 page 26

<sup>67</sup> WEF Guidelines, Section 4.9.1, sub-section 3 (c)

<sup>68</sup> WEF Guidelines, Section 4.9.1, sub-section 3 (b)



- described a preliminary assessment, based on highly conservative assumptions in regard to the distance at which shadows are detectable and the proportion of days that are cloud-affected, that identified 3 non-host dwellings at which the predicted exposure to shadow flicker was more than the 30 hours per annum;
- stated that the preliminary assessment is overly conservative because of the following assumptions:
  - the frequency of cloudy affected days, 0% assumed but estimated from Bureau of Meteorology records at the Ballarat Aerodrome, to be 49.56%;
  - the distance from turbines at which shadows can be detected, 2000m assumed when evidence suggests 500m;
  - the position of the turbines, assumed to be facing away or toward all dwellings at all times; and
  - the effects of shielding by buildings or vegetation, assumed to be none;
- stated that, taking into account the frequency of cloudy days, the prediction is for no non-host dwelling to be subjected to more than 30 hours exposure to shadow flicker per annum, with the maximum predicted exposure at a non-host dwelling being 16.91 hours per annum.

This prediction is said to be conservative because of the assumptions listed above, with the exception of that regarding the frequency of cloudy days, remain.

The report also included predictions and analysis of shadow flicker at host dwellings; however these are not discussed here as it is considered to be a matter between the Proponent and the host landowners.

In regard to blade glint, the PAR acknowledged the requirement of the WEF Guidelines for blades to be finished with a surface treatment of low reflectivity and indicated that such surface treatment of blades was proposed.

## 11.4 Evidence and Submissions

A considerable number of written submissions to the Responsible Authority expressed concern over the possibility of being effected by shadow flicker with some expressing the view that no such impact should be allowed.

The Proponent's submission at the Hearing addressed the matter of shadow flicker, summarising the contents of the PAR and the appended report.

The Proponent advised that the assessment provided had not taken into account the requirement of the 2009 revision of the WEF Guidelines to consider the garden areas immediately surrounding dwellings and that as a result the report had been peer reviewed by Hydro Tasmania Consulting (HTC). A report by HTC on the peer review was provided at the Hearing.

As part of the peer review HTC undertook shadow flicker modelling using an alternative software program but the same input data as was used in the preliminary modelling undertaken by the Proponent, except that:

- receptor areas were considered to be that within 50 metres of dwellings, which HTC consider to be an appropriate response to the WEF Guidelines' requirement to consider the "garden fenced area" associated with a dwelling; and
- an updated version of the proposed turbine layout was used and revised locations of a number of dwellings.

The results of HTC's shadow flicker modelling identified 5 non-host dwellings and associated areas that were predicted to be exposed to more than 30 hours per annum of shadow flicker, based on the highly conservative assumption of no cloudy days. This compares with the results of the modelling conducted by the Proponent that identified 3 such non-host dwellings.

HTC noted that the method adopted by the Proponent to account for cloud cover was widely used but considered that the application of monthly values of cloud cover, as opposed to annual, to monthly shadow flicker durations provided more accurate predictions. HTC applied their recommended method and found that exposure at all non-host dwellings would be less than 30 hours per annum with the maximum predicted exposure at any dwelling being 18.33 hours per annum, which compares with the 19.91 predicted by the Proponent. The major difference in the predictions is understood to be the change in receptor definition to include an area around each dwelling.

HTC agreed with the Proponent that blade glint would not be a significant issue providing non reflective surface finishes were applied to blades, as is proposed.

A submission provided at the Hearing challenged the credibility of the shadow flicker predictions on the basis that:

- some of the changes in inputs (turbine dwelling locations) between the original assessment and the peer review were the result of errors by the Proponent;

- five non-host dwellings are predicted to receive more than 30 hours of shadow flicker per annum; and
- reliance on vegetation for mitigation is unacceptable because trees and plantings are not permanent structures, susceptible to disease and drought and in some cases are not in the control of residents.

The Proponent submitted that:

*The draft permit conditions circulated by DPCD include a condition specifying that shadow flicker at a non-host dwelling existing at the date of the permit must not exceed 30 hours annually but that the limit may be exceeded at host dwellings provided that an agreement is registered on title. The Proponent agrees that this is appropriate.<sup>69</sup>*

## 11.5 Panel Response – Shadow Flicker

Consideration of shadow flicker is a relatively straight forward matter as there is a clear guideline provided on the requirements, less than 30 hours of exposure per annum, and the ability for predictions to be made.

While the original shadow flicker assessment provided with the PAR was flawed in that it did not consider areas surrounding dwellings, as is required by the revised WEF Guidelines, we find that the work done in the course of the peer review by HTC has overcome this flaw and we are content to rely on the predictions made by HTC. Those predictions are that the maximum exposure to shadow flicker in the area surrounding any non-host dwelling is conservatively estimated to be 18 hours, 20 minutes, well below the maximum allowed by the WEF Guidelines.

We agree with the submission that the credibility of the Proponent's shadow flicker assessment is affected by the apparent errors, however, since we are not relying on the Proponent's assessment, its credibility is not a critical issue.

The comments made in regard to the reliance on vegetation for mitigation are valid and would be of concern if the shadow flicker prediction were based on the effectiveness of such mitigation. This however is not the case, as the modelling does not assume any such screening of impact.

The claim that 5 non-host dwellings will be subject to more than 30 hours of shadow flicker per annum is incorrect as the data quoted was for predictions without the impact of cloud.

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<sup>69</sup> Submission to Panel Part B –Impact Assessment, Freehills for WestWind Energy, Section 7.4

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## 11.6 Conclusions and recommendations

It is concluded that:

**Limiting exposure to shadow flicker at non-host dwellings to less than 30 hours per annum would provide adequate protection from such effects and there is no discernible reason why compliance would not be achieved.**

**The coverage of blades with a non-reflective surface finish would eliminate any significant adverse impacts of blade glint.**

It is recommended that:

**Any permit issued should include:**

- **Condition 40 of the Recommended Permit, which requires exposure of any non-host dwelling to not exceed 30 hour per annum; and**
- **Include item (e) of Condition 2 of the Recommended Permit, which specifies that blades must have a non-reflective surface finish.**

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## 12. Electromagnetic Interference

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### 12.1 What are the Issues?

The issues relating to electromagnetic interference (EMI) identified by the Proponent, submitters and the Panel are:

- the potential for EMI to telecommunications including:
  - mobile telephones;
  - television;
  - microwave signals; and
  - radio signals; and
- ensuring that action is taken to mitigate, if not eliminate EMI that does occur.

### 12.2 Policy Context of the Issue

The WEF Guidelines state that the application requirements include, amongst other things, an explanation of:

*Likely amenity effects on the surrounding area due to blade glint, shadow flicker, overshadowing and electromagnetic interference.<sup>70</sup>*

The WEF Guidelines also include the following guidance in regard to evaluation by responsible authorities:

*The potential for electromagnetic interference from the generation of electricity from a wind energy facility should be minimised, if not eliminated, through appropriate turbine design and siting.*

***Evaluation by the responsible authority***

*The siting of wind turbines in the 'line of sight' between transmitters and receivers should be avoided.<sup>71</sup>*

### 12.3 Planning Application Report

The PAR acknowledges the requirement of the WEF Guidelines to minimise, if not eliminate, the potential for EMI through appropriate turbine design

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<sup>70</sup> WEF Guidelines, Section 4.8 page 26

<sup>71</sup> WEF Guidelines, Section 4.9.1, sub-section 3 (d)

and siting and refers to an investigation into EMI issues conducted by Garrad Hassan Pacific Pty Ltd (GHP).

A report on the investigation by GHP was appended to the PAR as Attachment 2.

The GHP investigation consisted of the following:

- identification of all telecommunications towers within a 100 km of the proposed WEF site from the ACMA database with 728 such towers being identified;
- determination of the transmission paths of fixed licences of the point to point type that may experience interference with five such licences being identified;
- identification of fixed licences of the point to multipoint type that have the potential to experience interference with six licences being identified, each held by Telstra Corporation Ltd/Gasnet Australia;
- identification of “other licence types” in the area, broadly described as base to mobile station type communication including radio broadcasting and mobile telephony;
- determination of the area in which the potential exists for interference to analogue television reception with 235 dwellings being identified as being within the area; and
- specification of measures available for mitigation of adverse impacts as follows:
  - definition of turbine exclusion zones around point to point transmission paths;
    - consultation with point to multipoint licensees to establish the extent of services provided to identify any need for further detailed design;
    - identification of interference to analogue television broadcasts, post construction, with a range of options being available for reinstatement of TV signals including:
      - realignment, relocation and upgrading of antenna at dwellings;
      - tuning into alternative sources of the same or suitable TV signal;
      - installation of cable/satellite TV at affected dwellings; and
      - installation of a TV relay station.

GHP state that interference to digital television signals from wind turbines does not occur and, with respect to radio broadcasting and commercial and private mobile telephony, the GHP report states:

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*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 obstruction.<sup>72</sup>*

The PAR states that:

*WestWind Energy has used the information provided by Garrad Hassan in preparing the wind farm layout, which avoids all point to point communications links.<sup>73</sup>*

and

*It should be noted that if approved, the project would be constructed after analogue television signals have been replaced by digital television signals.<sup>74</sup>*

## **12.4 Evidence and submissions**

A number of written submissions to the Responsible Authority expressed concerns in regard to any interference with telecommunications that may occur with particular emphasis on the need for uninterrupted access to such communications in times of emergency such as fires, road accidents and sickness. These concerns were reiterated in submissions by a number of parties at the Hearing.

The Proponent's submission at the Hearing restated the results of the GHP report and indicated that the Proposal includes the implementation of the recommendations of GHP.

In relation to television broadcasts, the Proponent stated that since analogue television will be replaced by digital television by 2011 and digital television is essentially unaffected by wind turbines, the requirement of the Draft Permit for extensive pre-construction monitoring of television and radio interference is more than should be required. The Proponent suggested that the conditions in the permit conditions proposed by DPCD should be replaced with those in Proponents Draft Permit Conditions which they said were the same as an earlier draft described as the DPCD's model permit.

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<sup>72</sup> Assessment of Electromagnetic Interference Issues for Proposed Moorabool Wind Project – Garrad Hassan, 3 April 2009, Section 4

<sup>73</sup> Planning Application Report, Page 101

<sup>74</sup> Planning Application Report, Page 101

## 12.5 Panel Response – Electromagnetic Interference

We accept and agree with all the written submissions and those made directly to us in regard to the importance of telecommunications of all types to the welfare of residents in the area. The important question, however, is the extent to which such communications would be affected by the proposed WEF and we are satisfied that the Proposal is such that adverse impacts will be minimal and capable of complete mitigation.

In regard to interference with point to point signals, we are satisfied that the Proposal does not include the location of turbines such that interference will occur. In any case, the Draft Permit includes conditions that require the definition of zones in which a turbine may cause interference and prohibition of the location of turbines within such zones. These conditions were accepted by the Proponent and are included in the Recommended Permit.

We are also satisfied that the mitigation measures recommended by GHP are sufficient to protect communications made through point to multipoint systems and accept GHP's statement that interference with other types of communication links including mobile telephony and digital television will not occur.

In regard to television and radio reception, we are satisfied that the required mixture of mitigation measures are available to overcome any problems identified post construction, however, we consider it important to ensure that appropriate action is taken in a timely manner.

We note the Proponent's submission in regard to permit conditions specifying the requirements in relation to television and radio reception, suggesting different conditions to those in the original conditions proposed by DPCD. We have considered the relevant DPCD conditions and those suggested by the Proponent and included in the Draft Permit Conditions with the following results:

Both sets of conditions require the same fundamental elements, that is:

- the designation of an area within which television and radio reception will be considered, the "defined area";
- identification of locations within the defined area where pre-construction monitoring will be performed;
- post construction monitoring at any dwelling in the defined area for which a complaint is received in regard to the impact of the WEF on television or radio reception; and
- a requirement that if post-construction monitoring demonstrates an increase in interference, as a result of the operation of WEF, mitigation



measures are taken to return the affected reception to pre-construction quality.

The draft permit provided by DPCD requires the preparation of a television reception plan including each of the aspects listed above, before the development starts, with the plan being endorsed and forming part of the permit. The Proponent's suggested conditions do not require such a plan but rather requires individual actions.

We do not see this difference in approach as a critical matter as we believe the end result would be the same; however, the approach taken in the draft permit provided by DPCD is favoured because of its consistency with the way the permit deals with such requirements for plans in other areas.

The approach taken to the designation of the defined area in the draft permit provided by DPCD is to have that area based on recommendations of a suitably qualified expert while the conditions suggested by the Proponent specify the area to be that within 5 km of any wind turbine.

We note that the plans prepared by GHP of the area where the potential exists for interference to analogue TV, which are overestimates as they were prepared on the basis of turbines being located on the site boundary, show the area extending to less than 5 km and in some directions less than 1 km.

The designation of area by distance from turbines is easily understood and if that distance is 5 km then the area of potential impact would certainly be covered. The disadvantage of such an approach is the potential to unnecessarily raise concerns in the minds of residents that some adverse impact can be expected. Since the area of potential impact can be readily defined by a suitably qualified expert and such an expert will be required to determine the monitoring locations in any case, we favour the approach taken in the draft permit provided by DPCD.

Both sets of conditions require pre-construction surveys of television and radio reception strength at locations within the defined area with those locations being determined by an independent television and radio monitoring specialist. The conditions suggested by the Proponent add a further specification to the locations by including "non-stakeholder dwellings" with "non-stakeholder" being defined as "the land holder of an abutting property without a contract in respect of the installation of associated wind turbines on that person's property".

We believe the additional definition of the locations for pre-construction monitoring to be appropriate but prefer the term "non-host" to "non-stakeholder".

Both sets of conditions also require post-construction surveys at dwellings in response to complaint and mitigation measures if interference from the WEF is demonstrated by such surveys. The only difference between the requirements of the two sets of conditions in regard to these aspects is that the Draft Permit requires plans for each to be prepared and approved prior to the start of the development whereas the conditions suggested by the Proponent simply require the actions to be taken. Again, we favour the approach taken in the draft permit provided by DPCD for reasons of consistency.

Overall we can identify little difference between the effects of the two sets of conditions both in terms of the work required by the WEF developer and the level of protection provided against adverse impact.

During the course of the discussion of permit conditions, it was noted that conditions relating to television and radio reception made no mention of mobile telephone reception and the Proponent indicated satisfaction with the addition of telephone to the conditions.

We have included conditions in the Recommended Permit that reflect our findings detailed above.

## 12.6 Conclusions and Recommendations

Having considered this issue we conclude that:

**Adverse impacts of electromagnetic interference from the proposed WEF are expected to be minimal and effective mitigation is available and forms part of the Proposal.**

It is recommended that:

**Any permit issued should include:**

- **A requirement for specification of turbine exclusion zones, to be defined by a suitably qualified expert and the television, telephone and radio reception condition as per Conditions 1(i), 2(k) of the Recommended Permit; and**
- **Condition 39 of the Recommended Permit, which specifies the requirement for and of Television, Radio and Telephone reception plan.**

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## 13. Social Impact

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### 13.1 What are the Issues

The issues relating to social impact identified by the Proponent, expert witnesses, submitters and the Panel include the following:

- Were consultative processes adequate?
- Were conclusions about community acceptance of the Proposal based on a sound understanding of community perceptions?; and
- Are potential social impacts acceptable?

### 13.2 Policy Framework

The WEF Guidelines provide that an assessment of a WEF should:

*Endeavour to balance environmental, social and economic matters in favour of net community benefit and sustainable development<sup>75</sup>.*

The WEF Guidelines also recommend pre-application consultation with the community and host landholders. The Guidelines provide guidance as to how this should be done as well as reference to:

- *Best Practice Guidelines for Implementation of Wind Energy Projects in Australia – Australian Wind Energy Association (Auswind)*
- *Effective Engagement Kit – Department of Sustainability and Environment*

### 13.3 The Planning Application Report

The PAR in Chapter 4 documents the informal consultative process which involved:

- Information pack delivered to all existing dwellings within 3 kilometres of the proposed turbine locations with a total of 139 packs being delivered. This pack contained:
  - a proposed layout plan and site constraints such as communication links and native vegetation;
  - an introductory brochure setting out proposal details, key factors, further consultation processes, indicative project time lines, project manager contact details, website details;

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<sup>75</sup> Section 4.6 of WEF Guidelines

- details of the approval process;
  - invitation to meet with WestWind and discuss the project, and to receive further information – includes a standard self-addressed envelope;
  - illustration of a wind turbine; and
  - WestWind DVD Myths and Facts;
- Neighbourhood meetings – all residents within 1.5 kilometres were visited by representatives of WestWind;
  - Where requested, WestWind met with all residents within 3 kilometres of the Proposal. In total 49 residents were met with and 50 calling cards were left;
  - A bus tour to Waubra WEF was conducted on 13 September 2009 (Sunday). An invitation was sent to all residents on Proponent’s list of residents. Three non-host landholders attended. The Proponent believes many more residents visited Waubra privately;
  - Information Flyer – 1500 information flyers were sent to all PO Boxes and road side mail delivery addresses within 5 kilometres of the project. The flyer contained brief facts about the project and details of where further information could be obtained and included and how to get onto the WestWind mail out list;
  - An information session was held on 11 November 2009 at Ballan Mechanics Institute from 1.30pm to 7.00pm. 30 persons attended. All persons on the WestWind mailing list were invited and the meeting was also advertised in the Moorabool Leader and the Moorabool News;
  - The WestWind website was updated as the project progressed. All information supporting the Application is available on the website; and
  - Project Updates – these were issued as the project developed to all persons on the WestWind mailing list which contains 64 individuals.

There was no study of community perceptions carried out specific to this project.

## 13.4 Submissions

Several submissions were received which stated:

*WestWind community consultation has been unfair, misleading and conducted in a manner which has resulted in long lasting community division and significant hostility within the community.*

During the course of the Hearing we heard on several occasions that the Proposal had divided the community and there was clearly tension between host landholders and some of their neighbours. Those opposed to the WEF

indicated that these divisions were very significant, deeply felt and an important community issue.

We were also told on many occasions that the process of absorbing the large amount of technical material in a short period of time was unreasonable and this issue was exacerbated by the parallel proposal with similar time lines at Yaloak South.

### **13.5 Panel Response – Social Impact**

We recognise that it is not easy for the community to digest the extensive and complex technical information presented as part of the Application. We also recognise the difficulties encountered by some persons as a result of two WEF proposals being current with similar time frames.

We do not have a solution to these difficulties except to observe that in spite of these difficulties we received a number of thorough submissions which clearly indicated a good understanding of the material. We appreciate that preparation of these submissions comes at a cost.

On the material provided to us we do not agree that the consultative process has been inadequate.

There is often a misunderstanding about what a consultative process involves. The first objective is to inform. Feed back from this information should then be used in some cases to modify and adjust the proposal.

At the consultative stage the judgement as to how much adjustment to the initial proposal should be made must of necessity rest with the Proponent.

In the final analysis overall judgement about the Proposal is made by others however the consultative phase is about informing and voluntary adjustment. In many instances those opposed to a proposal take the view that “the consultative process” is not done properly if their views about a proposal are not accepted. This is not a correct interpretation of what a consultative approach is for.

There is no doubt that there is serious difference of view about the merits of WEFs between neighbours. It is also likely that these differences of opinion lead to social divisions within the community. Such divisions are fostered by the income earned from turbines by host landholders and the absence of such income for non-host landholders who at the same time suffer the consequence of proximity to the turbines.

We have no way of assessing the long term effects of divisions in the community. What is clear however is that they do currently exist.

What is also clear is that the consultative process has informed the community and the formal exhibition and panel process has allowed those affected by the Proposal to present their views.

Many residents on both sides have taken the opportunity to make submissions and to appear at the Panel Hearings.

We now have the task of balancing the various impacts with the overall broader community benefit and we are satisfied that we have been provided with the information required to complete this task.

## **13.6 Conclusion**

**In our view the community consultation was carried out in a satisfactory manner and satisfies the recommended procedures in the WEF Guidelines.**

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## 14. Financial Impacts on Individuals

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### 14.1 What are the Issues?

The issues relating to financial impacts on individuals identified by the Proponent, expert witnesses, submitters and the Panel include the following:

- impacts on property values; and
- future development opportunities

### 14.2 Impacts on Property Values

#### 14.2.1 Submissions

Several submissions expressed concern about devaluation of their property as a result of degraded landscape values, noise impacts and the like.

We were not provided with any evidence supporting their contention that property values would be decreased as a result of the proposed WEF.

#### 14.2.2 Panel Response – Property Values

Land values are not a relevant planning consideration in deciding an application for a planning permit. In the absence of any evidence concerning this matter and the accepted principle of land values not being a relevant consideration we are not in a position to make any recommendations or findings on this issue.

Previous Panels have addressed this issue on many occasions with similar conclusions and we adopt the approach of the Bald Hills Panel which said:

*.....the Panel makes clear that the inconclusive nature of evidence and submissions is not a concern, as valuation considerations would not have been relevant to a permit decision, as a matter of law. Further, it is concluded law that the only basis for the provisions of compensation in the Victorian planning system is where land is reserved for a public use. Even if losses were demonstrated, the Panel would have no basis for recommendations that specify compensatory measures should be provided to individual property owners.*

## **14.3 Future Development Opportunities**

### **14.3.1 Submissions**

We received one submission concerning land on the Ballan-Egerton Road adjacent to the Bungeeltap Section.

This landowner advised that he owns five allotments, each less than 40 hectares in area all in the Farming Zone. We were advised that planning applications to construct dwellings on each of these lots had recently been submitted to the Council. We were provided with copies of these applications and it is apparent that in each case the house site is well within the predicted 40dB(A) noise contour and accordingly may be impacted by the proposed WEF to an extent beyond that proposed to be permitted.

The house sites have clearly been selected with no thought to amenity impact from the WEF. It is clear that each lot has the potential for significantly improved siting so as to decrease amenity impact from the WEF and these opportunities have not been taken.

Council's representative advised that the provisions of the Planning Scheme did not support approval of dwellings on small lots in the Farming Zone, unless they were related to agricultural use of the land. However, Council had discretion to grant a permit if it considered that an application had merit.

The Proponent made no submission concerning these applications.

It is clear that if permits are issued for these dwellings prior to the issue of a permit for the WEF then there is likely to be an impact on the WEF from a noise compliance perspective. At the time of preparation of this report we are not aware if the applications for permits have been determined nor are we aware as to the Proponent's position regarding these applications.

In these circumstances we propose to consider the Application for the WEF on the basis that there is no current permit for the five dwellings and there may never be. Equally dwellings may never be built even if a permit does issue. We also observe that the applications for the dwellings were lodged 5 May 2010 which is well after the WEF Proposal was lodged and exhibited.

It is our view that if a permit is issued for the WEF and adjoining landowners subsequently seek permits for additional dwellings then a consideration of such applications should reasonably take into account the proposed WEF, in addition to the usual considerations associated with building dwellings on undersized allotments in the Farming Zone. It is also our view that any



decision regarding applications lodged after the WEF application was lodged should also take account of the WEF Proposal.

In such circumstances the WEF operator would be entitled to object and the “agent of change<sup>76</sup>” principle applies to later conflicting uses.

A different set of circumstances prevail when additional houses can be built close to the WEF as of right. We received a submission from the Council expressing concern regarding this matter. We requested the Proponent to identify the land to which such circumstances might apply. This was completed and a map was provided which identified all the land in allotment sizes greater than 40 hectares adjacent to the proposed WEF.

A perusal of this map shows that in each case a significant part of the land is outside the 40dB(A) contour and outside the allowable level of shadow flicker.

The question then becomes one of what steps if any should be taken to ensure that any future dwellings on these parcels of land are built in such a location as to ensure that the appropriate amenity standards are met.

On balance we are of the view that no steps are necessary. We arrive at this view because any future landowners of such land intending to build will be able to observe the turbines because at that stage they are likely to have been built. In these circumstances it is most likely that a prudent potential house builder would make enquiries about amenity impacts and in any event would be able to directly observe such impacts prior to building.

It is possible that a new purchaser may decide to build during the period between the issue of a permit for the WEF and commencement of actual construction. It is theoretically possible, though unlikely in our view, that such a person may not be aware of the Proposal. We do not see any ready solution to such a set of circumstances but take comfort in the unlikely occurrence of such a set of circumstances.

It is also possible that smaller parcels of land can be consolidated without the need for a permit resulting in the consolidated lot meeting the default lot size which avoids the need for a planning permit to use the land for a dwelling. Our comments above concerning as of right dwellings on lots over 40 hectares in area apply equally to this situation.

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<sup>76</sup> In circumstances where an operating WEF currently complies with relevant standards such as noise and shadow permit applications for new residences are not likely to result in requirements for the WEF to change its operation.

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We also note that as a result of the application of the Environment Significance Overlay Schedule 1 planning permits are required for construction of dwellings (as apposed to use of the land for a dwelling) on all lots in this area regardless of size. This overlay does not address any of the issues relating to WEFs but simply by virtue of requiring a permit for development it provides an opportunity for all potential house builders to be alerted to the presence of the WEF.

In the long term the application of an appropriate overlay to draw attention to the predicted amenity standards and to discourage dwellings is a worthwhile consideration. This issue was considered by the Lal Lal WEF Panel and we adopt their recommendation set out below.

### **14.3.2 Recommendation**

**DPCD consider in a broader review of the planning framework for WEFs the merits of applying an overlay to highlight locations where it is predicted that amenity standards cannot be met and discourage dwellings in locations where amenity standards are unlikely to be satisfied.**

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## 15. Other Matters

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### 15.1 What are the Issues?

We have identified the following issues not addressed elsewhere in this report:

- Grid Connection;
- Concrete Batching Plant Locations;
- Decommissioning; and
- Water Catchment Areas.

### 15.2 Grid Connections

#### 15.2.1 Planning Application Report and Submissions

Some submissions expressed concern that additional power lines necessary to connect the proposed WEF to the existing grid were not part of the Application and should have been.

The PAR includes some details of how the WEF may be connected to the grid. Two options are discussed.

- Option 1 is to upgrade the existing 66KV that runs from the Ballarat Terminal Station at Warrenheip to the Bacchus Marsh substation. This line currently passes between the two sections of the proposed WEF.

It is possible that this upgrade will be necessary to connect the Yendon section of the Proponents Lal Lal WEF facility to the grid and/or to respond to consumer demand in the Bacchus Marsh area. The upgrade may involve two sets of three wires rather than the existing one set of three wires or it may involve replacing poles and wires to increase the voltage to 132KV.

- Option 2 involves the construction of a new 132KV power line south of the Ballark section through to the Elaine section of the Lal Lal WEF. The route would use existing road reservations wherever possible.

The PAR provides details of a 132KV mono-pole and insulators.

In both options it is our understanding that the works would be carried out by the relevant power company with the proponents involvement being limited to a financial contribution.

## 15.2.2 Panel Response – Grid Connections

There have been considerable discussions in previous Panel reports relating to statutory control of power lines and we do not intend to cover this ground in this report.

In summary we accept, as did the Lal Lal Panel, that:

- *The 'grid connection' is the point at the site at which the electricity generated by the WEF is transferred to the distribution network; and*
- *The powerlines involved at 66KV and 132KV are not part of the WEF, are minor utility installations as defined in the planning scheme and as such do not require planning permission.*

We consider that the PAR provides sufficient details of the electricity grid connection options to satisfy the WEF Guideline requirements relating to infrastructure requirement descriptions.

Concerns relating to possible routes of the grid connections are beyond the scope of our brief however we do note that the impact of options described in the PAR for connection to the grid is not likely to be significant.

## 15.3 Concrete Batching Plant Locations

### 15.3.1 Planning Application Report and Submissions

There were concerns expressed regarding the location of the temporary concrete batching plants, the lack of detail provided in the Application and the length of time the plants will be operational.

The PAR describes the batching plant components. Material submitted by the proponent during the Hearing indicated that two plants are proposed, one for each section. These are to be located adjacent to the switchyard and construction compounds as follows:

- Bungeeltap Section - approximately 800 metres west of Bungeeltap Road and approximately 1.4km south of Ballan Egerton Road; and
- Ballark Section – north east of the intersection of the Ballan Meredith Road and Mount Wallace Ballark Road.

The Proponent pointed out that providing temporary concrete batching plants results in reduction in traffic because while the concrete components still need to be transported to the temporary plant sites they do result in the finished product not being transported from existing plants at Ballan or Ballarat.

### 15.3.2 Panel Response – Concrete Batching Plants

The proposed permit includes a requirement for plans to be generally in accordance with Plan No SM0011 Version 4 which shows the location of the proposed batching plants. The proposed conditions require the preparation of an Environmental Management Plan (EMP) to the satisfaction of the Minister. This EMP would be required to provide details of the concrete batching plans including construction operation and eventual removal. The EMP would also need to give consideration to and ensure compliance with *EPA Publication 628 – Environmental Guidelines for the Concrete Batching Industry*.

The provision of local concrete batching plants is a sensible proposal and will result in less amenity impact and traffic than the alternative of transporting concrete from Ballan or Ballarat.

The proposed location of the plants as described above is reasonable and relatively remote from all parties expressing concern in their submissions.

We are satisfied that the locations are appropriate and that the conditions as set out in Appendix B adequately address this issue.

## 15.4 Decommissioning

### 15.4.1 Planning Application Report and Submissions

Several submissions were received expressing concern that there was no certainty regarding removal of the development in the event that it became unused after 25 years.

The Shire of Moorabool expressed the view that the proposed permit condition addressing decommissioning should include a provision requiring an agreement under Section 173 of the Planning and Environment Act to the effect that the landowners would be ultimately responsible for removal. Such an agreement would be registered on the title of the individual landowners.

The PAR sets out that:

*Once the wind farm has permanently ceased operation, the site will be completely decommissioned and returned to the original condition or 'repowered'.*

The PAR also explains that repowering is an option once the original turbines reach the end of their life. This can involve repowering the original structures or demolition and replacement with new turbines.

Alternatively the site can cease being used as a WEF and be decommissioned.

Decommissioning according to the PAR includes:

*Foundations would be ground down to below the surface and topsoil put back in place. The bulk of the foundation would remain. Hard stands and access tracks are also removed unless a host landowner elects to have the access track in place.*

The PAR also explains that the operator of the WEF:

*Has a contractual obligation to the host landholder to return the property to its original state to allow for the agricultural use of the land as it existed prior to the wind farm.*

The major issue of concern is to ensure that, in the event of the WEF ceasing to operate, the turbines are demolished and the appropriate ground restoration carried out. The concerns relate to how this can be ensured in the event that the WEF operator, may for a variety of reasons, not fulfil its obligations.

The Proponent indicated that in practical terms the scrap value of the turbines and towers would lead to decommissioning and removal.

#### **15.4.2 Panel Response - Decommissioning**

We understand the concerns raised. The issue of scrap value does not provide absolute certainty of removal. For example it is possible that the valuable parts could be removed and the concrete towers remain.

Other Panels have considered the merits of a decommissioning bond but such a proposal has not been applied to other WEFs. One of the difficulties is to arrive at an appropriate figure given the unknown scrap value and the quantum of any net costs at some future date that may be many decades away.

The permit condition that has been applied in other WEF permits is the same as proposed in this case. It involves making the operator responsible in the first instance and in the event of default the obligation then falls to the individual landowner.

This is a legitimate enforceable permit condition and we do not see how a Section 173 Agreement as proposed by the Council would add to this condition.

We are satisfied that the Draft Permit Condition adequately addresses decommissioning issues and that condition has been included in the Recommended Permit.

## **15.5 Water Catchment Issues**

### **15.5.1 Planning Application Report and Submissions**

The Council raised concerns that the Land Capability Assessment did not adequately address the issue of waste disposal because the number of persons catered for was inadequate.

Several submitters raised general issues concerning water catchments issues including:

- groundwater interference from foundations due to depth and number of foundations;
- blasting impact on groundwater;
- drying out of soil due to turbine operation;
- water extraction from Moorabool River to make concrete; and
- construction impacts on water quality.

The site of the proposed WEF is within the Upper Barwon Special Water Supply Catchment area and is covered by ESO1, which applies to proclaimed water supply catchments in Moorabool Shire.

A Land Capability Assessment for onsite waste water management has been prepared by Colin McClelland and Associates and included as Attachment 5 to the PAR. This has been based on five visiting casual workers. It makes no provision for construction workers.

The conclusions of this assessment are that the waste generated can be adequately disposed of onsite by a variety of methods.

Barwon Water has responded as a referral authority and has advised that there is no objection subject to specified conditions. The conditions specified include list of issues that need to be considered in the EMP.

The Land Capability Assessment only addressed disposal of waste water and did not address the general issues listed above.

## 15.5.2 Panel Response – Water Catchment Issues

Our examination of the conditions specified by Barwon Water and the Draft Permit shows that the Draft Permit includes all of the conditions required by Barwon Water albeit in a different form.

It is true, as identified by Council, that the Land Capability Assessment is based on five maintenance workers and that during construction there will need to be many more workers on site. Barwon Water conditions include a requirement that the EMP must address the construction period. Other conditions also refer to the need for appropriate temporary facilities during construction.

We are satisfied that appropriate waste disposal measures can be provided and that the Draft Permit Conditions will ensure that this occurs. We do not consider that there needs to be any additional conditions.

We were not provided with any evidence concerning the general issues relating to groundwater, drying of soil or extraction of water from the Moorabool River.

We note that the foundations proposed though substantial are not likely to be of a depth that would interfere with groundwater. Extraction of water from the Moorabool River for construction, if it is proposed, would be subject to a licence from the appropriate authority. From our observations of other wind turbines there is not likely to be an impact at ground level on soil moisture content.

Accordingly we are satisfied other concerns raised about water catchments are not significant issues and do not warrant any additional conditions from those in the Draft Permit.



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## **16. Discussion on Permit Conditions**

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At the end of the Public Hearings a 'without prejudice' discussion was held on appropriate permit conditions that should apply to any permit that might issue. To facilitate these discussions we requested DPCD to prepare a draft set of conditions and then requested the Proponent to amend these to their satisfaction. The proponent's set of conditions were used as a starting point and are included in Appendix C and are referred to as the 'Draft Permit Conditions'.

Several issues were raised during the course of this discussion. Most of these have been addressed in the earlier chapters of this report. Some however have not and in some cases these discussions and our own considerations have resulted in changes to the recommended permit conditions. The matters raised concerning permit conditions not elsewhere addressed are now discussed.

### **Offset of 2 km**

There were several submissions to the effect that all turbines within 2 km of non-host dwellings should be deleted.

We do not agree that this is appropriate. Instead we consider the measures required to achieve compliance with the required amenity standards will produce appropriate separation between the WEF and non-host dwellings.

### **Blade Length**

There was a suggestion that the maximum blade length should be specified as a permit condition.

We do not consider this necessary because the maximum height to the tip of the blade is specified as 150 metres. Other outcomes provide for consideration of specific models of turbine and we consider the Draft Permit Conditions to be adequate.

### **Complaints Management Plan**

The Draft Permit Conditions include, in the Environmental Management Plan, a requirement for a Complaints Management Plan. The suggestion was made that the Complaints Management Plan would be better contained in a stand alone condition otherwise it would only apply to environmental issues

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and there will be complaints about matters not associated with the environment.

On balance we think that there is merit in including the requirement for a Complaints Management Plan in the Environmental Management Plan.

### **Off-Site Landscaping Issues**

The Draft Permit Conditions included a requirement for the Council to provide a list of names and addresses to all owners within three kilometres of a turbine. The Council expressed concern regarding this condition with regard to privacy issues.

We do not consider such a condition appropriate but appreciate the Proponent's difficulty in sourcing names and addresses.

We have included a condition in the Recommended Permit requiring the Proponent to demonstrate that their best endeavours have been used to contact the appropriate land owners.

Several submitters requested that the condition requiring offsite landscaping should include reference to maintenance responsibility, fencing, weed control and the like necessary to facilitate the landscaping. We agree with these suggestions and have included appropriate conditions in the Recommended Permit.

### **Identification of Intersections with Arterial Roads**

The Council requested that the Draft Permit Condition requiring a Traffic Management Plan should include provision for the plan to identify the intersections requiring upgrading and we agree with this. An appropriate condition is included in the Recommended Permit.

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## 17. Recommendations

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Based on the reasons set out in this Report, we recommend:

### 1) Recommendation in Chief

That once all relevant statutory approvals or consents are obtained and subject to the draft permit conditions contained in Appendix B, a planning permits be issued for the Moorabool Wind Energy Facility:

The recommended permit conditions are the conditions first proposed by DPCD as amended by the Proponent (Draft Permit Conditions see Appendix C) and further amended to take account of the recommendations 2 to 8 below

### 2) Landscape and Visual Impact

Condition 1 of the Draft Permit Conditions should be amended to require removal of turbines BAWT04, BAWT07 and BUWT49 from the development plan to be submitted for approval.

An additional condition should be added following the section on Off-Site Landscaping Plans, requiring the Proponent to enter into an agreement with host landholders concerning: retention of vegetation that provides screening to the houses of non-host neighbours; and providing land for new screening vegetation to be established, as required by an off-site landscaping plan for a specific dwelling, as shown in the Recommended Permit conditions attached.

Draft Permit Condition 2(O)(iv) should be amended to provide that although aviation lighting may be installed (as specified) the lights may not be operated unless the Minister for Planning is satisfied that they are required:

- by the Civil Aviation Safety Authority; or
- in response to a risk assessment completed by a member of the Risk Management Institution of Australasia accredited as a Certified Risk Manager that shows that lighting is required to reduce the public risk to an acceptable level.

### 3) Noise

Any permit issued include conditions that require:

- Compliance with the limits specified in Condition 46 of the Recommended Permit, being the limits recommended in NZ6808:1998, i.e. outdoor noise limits of background sound level  $L_{95}$  plus 5 dB(A) or 40 dB(A)  $L_{95}$ , whichever is the greater with such compliance being required at all dwellings excepting those exempted under Condition 41 of the Recommended Permit, i.e. host dwellings at which the WEF sound level is the product of the Moorabool WEF alone.
- Compliance with these limits determined for both all-time (24 hour period) and night-time.

Any permit issued include a conditions requiring that, prior to the start of development:

- A pre-development noise assessment be completed in accordance with NZ6808:1998 with the modified and additional criteria specified in Condition 42 of the Recommended Permit;
- A pre-development cumulative noise assessment be completed in general accordance with NZ6808:1998 and the modified and additional criteria specified in Condition 43 of the Recommended Permit; and
- Both the assessments referred to in (a) and (b) above be the subject of an audit by an acoustic expert as specified in Condition 44 of the Recommended Permit.

Any permit issued should provide that:

- Before the development starts a noise compliance testing plan be prepared that includes all the items specified in Condition 47 of the Recommended Permit;
- Before the development starts the noise compliance testing plan be reviewed by an independent acoustic expert as specified in Condition 48 of the Recommended Permit with plan and a report on the review to be submitted to the Minister for Planning for approval; and
- Implementation of the noise compliance monitoring plan be the subject of an audit by an independent acoustic expert as specified in Condition 49 of the Recommended Permit.

#### 4) Fauna

Condition 4 of the Draft Permit conditions should be amended to include a provision that:

- No turbine will be moved to a position less than 300 metres from the escarpment of the Moorabool River.

Condition 15 (h) of the Draft Permit conditions should be amended to ensure that the provisions relating to the pest animal and carrion management plan include the requirements on carrion management contained in condition 34 (which sets out requirements for the Bird and Bat Management Plan) and these matters should be deleted from condition 34.

Condition 34 should also be amended to provide that the monitoring program under the Bird and Bat Management Plan should start from when 30 per cent of the total number of turbines are operational and should continue until two years from the completion of each stage of the facility.

Condition 2 (j) of the Draft Permit Conditions should be amended to include a provision that:

- Overhead cabling may be used within the river valley of the Moorabool River east branch between turbines BUWT34 and BUWT29 as shown on the plans referred to in condition 1 and must be marked with an appropriate product to improve its visibility to birds.

Condition 34 (b)(i) of the Draft Permit Conditions should be amended to read:

- The presence, behaviour and movements of any Wedge-tailed Eagles, especially breeding pairs in the vicinity of the wind farm, or other avifauna listed under the *Flora and Fauna Guarantee Act 1988* or the *Environment Protection and Biodiversity Conservation Act 1999*.

Condition 34 (b)(iii) of the Draft Permit Conditions should be amended to:

- Delete 'Wedge-tailed Eagles' and replace this with 'the priority species named in condition 34 (b)(i).

## 5) Flora

The following provisions should be included in the Recommended Permit Conditions:

Prior to commencement of the native vegetation removal a report by a suitably qualified ecological specialist must be submitted to the Minister and the Department of Sustainability and Environment that sets out the findings of a targeted survey for the Spiny Rice Flower, carried out between April and August within the development footprint of the project. If any occurrence of the species is identified, measures to avoid or minimise adverse impacts on it must be set out. The report must also review the net gain offset requirements in accordance with *Native Vegetation Management: A Framework for Action (DSE 2002)*.

If it is proposed to removal or destroy vegetation identified in the survey required by the previous recommendation further consent in writing must be obtained from the Department of Sustainability and Environment.

## 6) Traffic

The permit conditions relating to the Traffic Management Plan should be amended so as to ensure that:

- Construction traffic except for sedan and light commercial vehicles should not operate outside daylight hours and should be limited to six days per week; and
- Appropriate signage is included in the issues considered in the plan.

## 7) Shadow Flicker

Any permit issued should include:

- Condition 40 of the Recommended Permit, which requires exposure of any non-host dwelling to shadow flicker to not exceed 30 hour per annum; and
- Include item (e) of Condition 2 of the Recommended Permit, which specifies that blades must have a non-reflective surface finish.

## 8) **Electro magnetic Interference**

Any permit issued should include:

- A requirement for specification of turbine exclusion zones, to be defined by a suitably qualified expert and the television, telephone and radio reception condition as per Conditions 1(i), 2(k) of the Recommended Permit; and
- Condition 39 of the Recommended Permit, which specifies the requirement for and of Television, Radio and Telephone reception plan.

## 9) **Procedural Matters to be addressed prior to any permit issue**

That prior to the issue of a permit the CASA referral response be provided to the Minister for Planning.

That prior to the issue of a permit a response be sought from Air Services Australia regarding interference with radio and radar navigational installations. In the event that a positive response is not provided then appropriate modifications to the WEF be made to the satisfaction of the Minister.

## 10) **Recommendations to State Government or DPCD**

DPCD consider in a broader review of the planning framework for WEFs the merits of applying an overlay to highlight locations where it is predicted that amenity standards cannot be met and discourage dwellings in locations where amenity standards are unlikely to be satisfied. Consideration is given to:

- The development of a State Environment Protection Policy on noise from WEFs in Victoria; and
- The amendment of Victorian planning schemes and the WEF Guidelines to ensure the direct involvement of the EPA in the assessment of WEF applications and the enforcement of SEPP and/or permit conditions relating to noise.

That the Victorian State Government consider commissioning independent research into the possible connection between health issues and Wind Energy Facilities.

## **Appendix A: List of Written Submissions**

Submission No	Submitter
1	Dept of Planning and Community Development
2	Ranken J & C
3	Farrow S & R
4	Vella L Rose
5	Dudley D & T
6	De la Cruz R
7	Kannegiasser D & MacDonald A
8	Wray L N
9	Saric D
10	Saric A
11	Saric R
12	Saric V
13	Ranken J
14	Wray M
15	Cassar E & M
16	Marshall J
17	Raymond S
18	Ranken S
19	Saric M
20	Farrell A
21	Ranken B
22	Bachelor L
23	Zeng L
24	Ciopicz H
25	Xuereb G & J
26	Sidwell W & B
27	Barren P & Owen Dr C
28	SP Ausnet (N McLeod)
29	Irving J
30	Young M & R



Submission No	Submitter
31	Lombard A
32	Ramholdt K
33	Giddins S
34	Archer E E
35	Greenwood Y
36	Russell Clarke P & J
37	Wallia L
38	Wallis G
39	Brown C
40	Crawley C
41	Robinson M
42	Stacey P & K
43	Seter K
44	Wallis P
45	Kirk D
46	Sullivan R
47	VicRoads (D O'Sullivan)
48	Kirk C
49	Wild C
50	Wild J
51	Davies S
52	Giddins G
53	Industry Capability Network
54	Rosch F & K
55	Giddins L S
56	Hall J
57	Lloyd M
58	Olsen E S & L
59	Lloyd B H
60	Muldoon M C
61	Degenhardt P
62	Brown P
63	Brown G

Submission No	Submitter
64	Kearns A T
65	Kearns F X
66	Zagari G & Palmieri A
67	Skidmore M
68	Skidmore J
69	Barwon Water (M Maloof)
70	Dean S & J
71	Egan J E
72	Evans M
73	Wood I
74	Molesworth L
75	Leith B A
76	Young E
77	Young C
78	O'Brien M
79	Molesworth J
80	Young S
81	Young P
82	Wehl B
83	Jacka Lawyers
84	O'Brien S
85	Wells A
86	Warner J
87	Wells G
88	Grant R A
89	Humphries P
90	Brickley N & K
91	HVP Plantations (W Williams)
92	Conlan M
93	Moorabool SC (G Alford)
94	Sustainability Victoria (M Williamson)
95	Stewart J
96	Warner K

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Submission No	Submitter
97	Wells L
98	DSE ( G Brooks)
99	Department of Defence (J Kerwan) Late
100	R & R Taylor Late
101	I Donovan Late
102	Aircraft Owners and Pilots Association Late
103	Bird Observation & Conservation Australia Late

## **Appendix B: Recommended WEF Permit**

Planning and Environment Regulations 2005 Form 11  
Section 97F  
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**PLANNING  
PERMIT**

**Permit No.:**2009012877

**Planning Scheme:** Moorabool Planning Scheme

**Responsible Authority for Administration and  
Enforcement of this Permit:** Moorabool Shire  
Council

**ADDRESS OF THE LAND:**

**Ballark Section**  
Lots 1, 2, 3, 4 & 5 TP249737  
Lot 1 TP551968  
Crown Allotment 68O  
Lot 1 LP217210  
Lot 2 LP217210  
Lot 3 LP217210  
Lot 2 PS521826  
Crown Allotments 65A, 65B, 66A, 66B, 67, 67A, 67B, 68K, 68K1, 68L, 68M,  
Parish of Bungeeltap  
Lots 1, 2, & 3, TP375916  
Lots 1, 2, 3, 4, 5 & 6 TP841547  
Lot 1 TP741519  
Lot 1 PS521826  
Lot 1 TP326429  
Lot 1 TP427675  
Crown Allotment 19D Parish of Ballark  
Lots 1, 2, 3 & 4 TP214503  
Lots 1, 2, & 3 TP431757  
Lots 1, 2, 3 & 4 TP943416  
Crown Portion 1 Parish of Ballark  
Crown Portion 6 Parish of Ballark  
Crown Portion 7 Parish of Ballark  
Crown Portion 18 Parish of Ballark  
Crown Portion 21 Parish of Ballark  
Crown Portion 22 Parish of Ballark  
Lot 9 LP5646  
Crown Allotment 66A Parish of Ballark  
Crown Allotment 66B Parish of Ballark  
Lot 10 LP5646  
Lot 1 TP100451  
Lots 1 & 2 TP133721  
Lot 3 LP213701  
Channel Reserve LP5646  
Crown Land vested in Council for Ballan-Meredith Road  
Crown Land vested in Council for Banks Road  
Crown Land vested in Council for Bungeeltap Road South  
Crown Land vested in Council for Egerton-Ballark Road  
  
Crown Land vested in Council for Mount Wallace-Ballark Road  
Unused Road Reserve Lot 1 TP612464  
Unused Road Reserve Crown Allotment 19D Parish of Ballark  
Unused Road Reserve Crown Allotment 8A Parish of Bungeeltap

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**Bungeeltap Section**

Crown Allotment 8A Section 28 Parish of Gorong

Crown Allotments 8 & 9 Section 28 Parish of Gorong

Lot 1 TP132727

Lots 1, 2, 3 & 4 TP132738

Lot 1 PS519828

Lot 2 PS519828

Lot 1 TP322737

Lot 1 PS404971

Lot 2 PS404971

Lot 3 PS404971

Lot 4 PS404971

Lot 5 PS404971

Crown Allotment 76B Parish of Bungal

Lot 1 LP119479

Lot 2 LP119479

Crown Allotments 75 & 75A Parish of Bungal

Crown Allotments 52, 55, 67 & K Parish of Bungal

Crown Allotments 29 & J Parish of Bungal

Lot 1 TP884577

Lots 1, 2, & 3 TP884534

Lots 1 & 2 TP884532

Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 & 11 TP853292

Lot 6 PS404971

Barwon Water (Channel Reserve) Lots 7, 8, 9, 10, 11 & 12 TP671194 – Volume  
8335 Folio 085

Crown Land vested in Council for Ballan-Egerton Road

Crown Land vested in Council for Ballan-Meredith Road

Crown Land vested in Council for Egans Road Crown Land vested in Council  
for McDonalds Lane

Crown Land vested in Council for Manleys Road

VicRoads road Geelong-Ballan Road

**THE PERMIT ALLOWS:**

**The use and development of a wind energy facility and associated infrastructure and other works including: aviation safety lighting, substations, access tracks, underground and overhead cabling, permanent anemometers, amenities buildings, car parking and bicycle facilities, temporary construction facilities including concrete batching plant, buildings and works, removal of native vegetation, two business identification signs and alterations to an access point to a Road Zone Category 1.**

**THE FOLLOWING CONDITIONS APPLY TO THIS PERMIT:**

### **DEVELOPMENT PLANS TO BE ENDORSED**

1. Before the development starts, development plans must be prepared to the satisfaction of the Minister for Planning. The plans must be drawn to scale with dimensions and three copies must be provided. The plans may be submitted for approval in stages or for a particular grouping of wind turbines within the subject land. When approved, the plans will be endorsed by the Minister for Planning and will then form part of this permit.

The plans must show the location and layout of the wind turbines and all on-site buildings and works generally in accordance with the plans titled MWP\_SM\_0011, Version 4, 20 May 2010, except that turbines BUWT07, BAWT04 and BAWT49 should be deleted from the plans.

The plans must also include:

- a) A list of map coordinates for each wind turbine
- b) The distance of each wind turbine from the nearest point on the boundary of the subject land
- c) Details of the model and rated capacity of the wind turbines to be installed
- d) Elevation drawings, showing dimensions, of the wind turbines and other permanent on-site buildings (e.g. substation facilities)
- e) Drawings, showing the key physical dimensions, of all on-site buildings and works including:
  - (i) Wind turbines
  - (ii) Access tracks
  - (iii) Internal collector network trenches
  - (iv) Any temporary concrete batching plant(s)
  - (v) The substations (including designated car parking areas, signage and landscaping), and
  - (vi) Any ancillary works (e.g. construction compounds and water tanks).
- f) A description of the materials and finishes of the wind turbines and other permanent on-site buildings
- g) A description of the location, type and intensity of any aviation obstacle lighting to be installed

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- h) The locations of scattered native trees and the boundaries of any patches of native vegetation, in relation to all buildings and works, in all cases where such trees and patches are within 25 metres of the buildings or works
- i) Turbine exclusion zones:
  - (i) Centred on the transmission vectors for fixed licences of point to point transmissions to which there is a possibility of electromagnetic interference with a width equal or greater than twice the sum of the blade length and 60% of the radius of the first Fresnel zone of any licensed link. The transmission vectors and the widths of the first Fresnel zones will be determined by a suitably qualified telecommunications expert, and
  - (ii) The area that is less than 300 metres from the escarpment of the Moorabool River East Branch.

## **SPECIFICATIONS**

### **2. The wind energy facility must meet the following requirements:**

- a) The wind energy facility must comprise no more than 107 wind turbines with no more than:
  - (i) 50 wind turbines on the land known as the Bungeeltap section, and
  - (ii) 57 wind turbines on the land known as the Ballark section.
- b) The overall maximum height of the wind turbines (to the zenith of the sweep of the rotor blade tip) must not exceed 150 metres above foundation level.
- c) The wind turbines must be mounted on tubular steel and/or concrete towers.
- d) The rotor of the wind turbines must have only three rotor blades
- e) The wind turbine towers, nacelles and rotor blades must be of a non-reflective finish and colour that blends with the landscape to the satisfaction of the Minister for Planning
- f) The colours and finishes of all other buildings and ancillary equipment on-site must be non-reflective to minimise the impact of the development on the landscape to the satisfaction of the Minister for Planning
- g) Access tracks within the subject land must, to the satisfaction of the Minister for Planning:



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- (i) have a surface material that will not unduly contrast with the landscape, and
  - (ii) be designed to minimise impact on the farming activities on the land, and
  - (iii) have an effective trafficable width of not less than 4 metres.
- h) The transformer associated with each wind turbine must be enclosed within the tower
- i) All new electricity cabling associated with the internal collector network within the wind energy facility must be placed under the ground except as set out in condition 2j) or with the further written consent of the Minister for Planning
- j) Overhead cabling may be used within the river valley of the Moorabool River east branch between turbines BUWT34 and BUWT29 as shown on the plans referred to in condition 1 and must be marked with an appropriate product to improve its visibility to birds.
- k) Except in the case of an emergency, no external lighting of infrastructure associated with the wind energy facility, other than low level security lighting and/or aviation obstacle lighting may be installed or operated without the further written consent of the Minister for Planning
- l) All spare parts and other equipment and materials associated with the use of the wind energy facility must be located in screened, locked storage areas that are inaccessible to the public to the satisfaction of the Minister for Planning
- m) All turbines must be located outside the turbine exclusion zones shown on the endorsed development plan(s)
- n) Aviation obstacle lighting may be installed but only if they meet the following requirements, except with the further written consent of the Minister for Planning:
  - (i) They are restricted to a pair of red medium intensity, intermittent obstacle lights on any wind turbine
  - (ii) The lights are to be baffled so as to restrict the vertical spread of light to not more than three degrees (approximately) with not more than one degree (approximately) below the horizontal
  - (iii) All lights within each section or stage of the wind energy facility must be designed to illuminate in unison, and

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- (iv) The lights may be not be activated unless the Minister for Planning is satisfied that they are required:
- As a result of a CASA requirement; or
  - By the results of a risk assessment completed by a Member of the Risk Management Institution of Australasia accredited as a Certified Risk Manager that shows that operation without lighting creates an unacceptable public risk

### STAGING

3. The use and development authorised by this permit may be completed in stages as shown on the endorsed development plan(s) to the satisfaction of the Minister for Planning. Any corresponding obligation arising under this permit (including the preparation and approval of plans) may be similarly completed in stages or parts.

### LAYOUT NOT ALTERED

4. The use and development as shown on the endorsed development plan(s) or other plans to the satisfaction of the responsible authority must not be altered or modified without the written consent of the Minister for Planning save that the micro-siting of turbines and the related tracks and reticulation lines will be regarded as generally in accordance with the endorsed development plan(s) if the Minister for Planning is satisfied that it will not give rise to any material adverse change in landscape, vegetation, cultural, visual, shadow or noise impacts compared to the endorsed development plan(s) and:
- a) A turbine within 1 kilometre of any non-host dwelling is not moved closer to that dwelling, and
  - b) The turbine location is altered by no more than 100 metres, and
  - c) No turbine is located within:
    - (i) 100 metres from a Road Zone Category 1 or land in a Public Acquisition Overlay to be acquired for a road
    - (ii) 40 metres from a Road Zone Category 2
    - (iii) 20 metres from any other road
    - (iv) 5 metres from any other boundary.
    - (v) 100 metres from a dwelling not in the same ownership

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- (vi) 100 metres from a designated natural waterway, wetlands or flood plain or
  - (vii) within a turbine exclusion zone or
  - (viii) less than 300 metres from the escarpment of the Moorabool River east branch, and.
- d) Surveys are carried out by an appropriately qualified ecological specialist at an appropriate time of the year before development starts to confirm that construction footprint does not have an adverse impact on native vegetation, and
  - e) Fauna habitat is considered if there are any changes to the location of wind energy facility infrastructure.

#### **PRELIMINARY INVESTIGATIVE WORKS**

For the purposes of this permit, the carrying out of preliminary investigative works, including geotechnical investigations, for the purposes of gathering data or making other assessments necessary or desirable in order to prepare the development plan or other plans specified in this permit, is not considered to be commencement of the development.

#### **VEGETATION REMOVAL WORKS**

- 5. Prior to commencement of the native vegetation removal a report by a suitably qualified ecological specialist must be submitted to the Minister and the Department of Sustainability and Environment that sets out the findings of a targeted survey for the Spiny Rice Flower, carried out between April and August within the development footprint of the project. If any occurrence of the species is identified, measures to avoid or minimise adverse impacts on it must be set out. The report must also review the net gain offset requirements in accordance with *Native Vegetation Management: A Framework for Action (DSE 2002)*.
- 6. If it is proposed to remove or destroy vegetation identified in the survey required by condition 5 of this permit, further consent in writing must be obtained from the Department of Sustainability and Environment.
- 7. Before works start, temporary fencing or tape must be installed around areas of native vegetation to be retained, to the satisfaction of the responsible authority.

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8. Works must not cause damage to native vegetation stands to be retained. Vehicular access beneath large trees and habitat trees must be prevented.
9. Tree trimming operations must be undertaken using the natural target pruning 'three cut method' as described in the 'Roadside Handbook: An Environmental Guide for Road Construction and Maintenance' (VicRoads 2006).

**NET GAIN OFFSET PLAN**

10. Before removal of native vegetation starts, a net gain offset plan must be prepared by a suitably qualified ecological specialist and submitted to and approved by the Department of Sustainability and Environment. Once approved, the plan will be endorsed and will then form part of the permit. The offset plan must include the following:
  - a) Details of the proposed offsets which will achieve a net gain in quality and quantity of native vegetation in accordance with the principles and guidelines associated with the *Native Vegetation Management: A Framework for Action (DSE 2002)* or as otherwise approved by the Department of Sustainability and Environment
  - b) Fully dimensioned plans (drawn to an appropriate scale), which clearly show the locations, boundaries and title details of all offset sites. The plans must also clearly show the boundaries of any different management zones and the location of any proposed fencing
  - c) Type of offsets to be provided at each location
  - d) Details of revegetation including number of trees, shrubs and other plants, species mix and density (consistent with the characteristics of the relevant Ecological Vegetation Class)
  - e) Methods of managing and restoring the vegetation, including revegetation, such as fencing, weed control, enhancement planting and other habitat management actions
  - f) Pest plant and animal control methods
  - g) A statement of the need to source local seed stock and options available for sourcing of local seed
  - h) A statement of the need for revegetation works to be carried out by a suitably qualified ecological specialist

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- i) Methods of permanent protection for the offsets, such as the registration on title of an agreement under Section 173 of the *Planning and Environment Act 1987*, an agreement under Section 69 of the *Conservation Forests and Lands Act 1987*, or a covenant under section 3A of the *Victorian Conservation Trust Act 1972*
  - j) Persons responsible for implementing and monitoring the offset plan
  - k) A schedule of management actions, which documents how the net gain outcomes will be achieved within a 10 year timeframe
11. Prior to the commencement of native vegetation removal, all offset sites must be legally secured by means of the registration of an on-title agreement or covenant to the satisfaction of the Department of Sustainability and Environment and the responsible authority
12. All actions specified in the endorsed offset plan must be completed within the specified timeframes, to the satisfaction of the Department of Sustainability and Environment and the responsible authority
13. The disturbed roadside areas shall be revegetated as soon as practicable to minimise soil erosion

#### **UPDATE OF AERONAUTICAL CHARTS**

14. Not less than thirty days before the construction of any of the wind turbines starts, copies of the endorsed development plan(s) must be provided to the Royal Australian Air Force's Aeronautical Information Service to enable details of the wind energy facility to be shown on aeronautical charts of the area.

#### **ENVIRONMENTAL MANAGEMENT PLAN**

15. Before the development starts, an environmental management plan must be prepared to the satisfaction of the Minister for Planning by the wind energy facility operator in consultation with the relevant authorities including at least EPA, DSE, DPI, Corangamite CMA, Barwon Water, Moorabool Shire Council, and the relevant waste management authority.

The environmental management plan should be based on the approach outlined in Attachment 11 of the exhibited planning application report dated January 2010.

The environmental management plan may be prepared in sections or stages.

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The environmental management plan must include a copy of the development layout plans as endorsed by the Minister for Planning.

When approved, the environmental management plan will be endorsed by the Minister for Planning and will then form part of this permit.

The environmental management plan must consider and generally be in accordance with:

- EPA Publication 480: *Environmental Guidelines for Major Construction Sites*
- EPA Publication 275: *Construction Techniques for Sediment Pollution Control*
- EPA Publication 891.1: *Code of Practice, Onsite Wastewater Management*
- EPA Publication 628: *Environmental Guidelines for the Concrete Batching Industry*
- EPA Publication 347: *Bunding Guidelines*
- Australian Standard Customer Satisfaction – *Guidelines for complaints handling in organizations* (ISO 1002:2006), and
- Australian Standards Handbook HB 229 2006 *The Why and How of Complaints Handling*.

The environmental management plan should, where appropriate, address and include:

a) Hazardous Materials

- (i) The identification of all hazardous materials used and or stored on-site in connection with the development and use
- (ii) Procedures for the proper handling and storage of hazardous materials on-site
- (iii) Design criteria for any hazardous materials storage facilities on-site, and
- (iv) Contingency measures to ensure that any spills or leaks of hazardous materials are contained on-site and cleaned up in accordance with Environment Protection Authority requirements.

b) Water Contamination, Sediment and Erosion Control

- (i) The identification of all construction and operational processes that could potentially lead to water contamination

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- (ii) The identification of appropriate storage, construction and operational methods to control any identified contamination risks
  - (iii) Procedures for the management of contaminated waste water
  - (iv) Procedures for the discharge of collected runoff
  - (v) Procedures to ensure that silt from batters, cut-off drains, table drains and road works is retained on the site during and after the construction stage of the project. To this end:
    - All land disturbances must be confined to a minimum practical working area and to the vicinity of the identified works areas
    - Soil to be removed must be stockpiled and separate soil horizons must be retained in separate stockpiles and not mixed, and
    - Stockpiles must be located away from drainage lines
  - (vi) The installation of geotextile silt fences (with sedimentation basins where appropriate) on all drainage lines from the site which are likely to receive runoff from disturbed areas
  - (vii) Procedures to ensure that steep batters are treated appropriately for sediment pollution control
  - (viii) A process for overland flow management to prevent the concentration and diversion of waters onto steep or erosion prone slopes, and
  - (ix) A requirement for immediate remediation of localised erosion (specifying a response time).
- c) Waste Control
- (i) The identification of waste reuse, recycling and disposal procedures, and
  - (ii) Pollution management measures for stored and stockpiled materials including waste materials, litter and any other potential source of water pollution.
- d) Sanitation and Wastewater
- (i) Appropriate sanitary facilities and management of the wastewater at the temporary construction compound and permanent facilities for construction works, maintenance staff, operations personnel and visitors is required.

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e) Construction Practices

- (i) Procedures, where practical, to construct wind turbine bases, access tracks and power cabling during warmer months to minimise impacts on ephemeral wetlands, local fauna and sediment mobilisation
- (ii) Procedures to protect, as far as practicable, native fauna and domestic stock from being injured by or entrapped in excavations or trenches and to fill trenches as soon as practical after excavation, and
- (iii) Procedures for the removal of works, buildings and staging areas on completion of construction of the development.

f) Concrete Batching Plants

- (i) Criteria for the design of the temporary concrete batching plants
- (ii) Management procedures to prevent pollution of the local waterways, particularly from wash water and waste concrete materials, and
- (iii) Procedures for the operation and removal of any temporary concrete batching plants and for the reinstatement of the site once its use finishes.

g) Dust

Procedures to suppress dust from construction related activities.

h) Pest Management

- (i) A pest animal and carrion management plan to be prepared in consultation with the Department of Sustainability and Environment and the Department of Primary Industries.

This plan must include:

- a program of early identification and eradication of pest animal populations (e.g. rabbits), and
- procedures for the ongoing management of pest animal populations and regular removal of carrion (including livestock, native animals and pest animals), to lessen the availability of potential prey for raptors within the wind energy facility site.



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- (ii) A weed and pathogen management plan developed in consultation with the owners of the relevant land that includes:
- procedures to prevent the spread of weeds and pathogens from earth moving equipment and associated machinery including the cleaning of all plant and equipment before transport to the site and the use of road making material comprising clean fill that is free of weeds
  - sowing of disturbed areas with perennial grasses or returned to cropping
  - a protocol to ensure follow up weed control is undertaken on all areas disturbed through construction of the wind energy facility for a minimum period of 2 years following completion of the works, and

i) Training

A training program for construction workers, permanent employees and contractors at the wind energy facility site including a site induction program relating to the range of issues addressed by the environmental management plan.

j) Complaints Management

A complaints management plan designed in accordance with the requirements set out in condition No 22 of this permit

k) Incident Management

- (i) A procedure for the establishment and maintenance of an incident register for the recording of:
- Environmental incidents
  - Non-conformances, and
  - Corrective actions.
- (ii) The register must be available for inspection by the public during normal working hours and its contents should be reported to the responsible authority as required.

### **REVIEW OF THE ENVIRONMENTAL MANAGEMENT PLAN**

16. The environmental management plan must be reviewed at least once every 5 years, and if necessary amended, in consultation with the Responsible Authority, to reflect operational experience and changes in environmental management standards and techniques. Any amendment of the environmental management plan must be submitted to the Minister for Planning for re-endorsement.

### **COMPLIANCE WITH ENVIRONMENTAL MANAGEMENT PLAN**

17. The use and development must be carried out in accordance with the endorsed environmental management plan described in condition 7 above to the satisfaction of the Responsible Authority.

### **BARWON WATER REQUIREMENTS**

18. The waste treatment system for the amenities facilities and any temporary facilities provided during construction phases should not exceed the following maximum limits;

- 20mg/L BOD; 30 mg/L suspended solids; if subsurface irrigation systems and
- 20 mg/L BOD; 30 mg/L suspended solids 10 E coli organisms / 100 ml for surface irrigation systems.

19. All effluent must be restricted to and disposed of within the 100 metres of the treatment facility and or within the boundary of any land title in accordance with the *“State Environment Protection Policy – Waters of Victoria”* and the *Victorian EPA Code of Practice for onsite Wastewater Management*.

20. The wastewater systems are supplied, constructed and installed in accordance with the relevant manufacturer’s specifications. No modifications or variations to the system may be made unless approved by the Victorian Environmental Protection Authority (the “EPA”).

21. Operations and maintenance of the system shall be in strict accordance with the EPA approval requirements and the manufacturer’s specifications.

## COMPLAINTS MANAGEMENT

22. A complaints management will be designed in accordance with *Australian Standard Customer satisfaction – Guidelines for complaints handling in organizations* (ISO 1002:2006) having regard to the guidance provided in *The why and how of complaints handling* HB 229-2006 and will include procedures for:
- a) Readily accessible information on how complaints can be made free of cost to complainants
  - b) Immediate acknowledgement of complaints and regular and comprehensive feedback to complainants on actions proposed, their implementation and success or otherwise
  - c) Closure of complaints by agreement with complainants
  - d) Establishment and maintenance of a complaint register for the recording of receipt and acknowledgement of complaints, actions taken, success or otherwise of actions and complaint closure and for the register to be available to the public during normal working hours
  - e) Reporting of the contents of the complaint register to the responsible authority as required, and
  - f) Regular, at least annual, auditing of the implementation of the complaints management plan with audit results being reported to the responsible authority.

## COMPLAINTS MADE TO THE RESPONSIBLE AUTHORITY

23. If a complaint is received by the responsible authority in regard to the wind energy facility the responsible authority will:
- a) After consideration of the views of the complainant and the wind energy facility operator, determine if a dispute exists with a dispute being defined as a matter remaining unresolved after application of the complaints management plan
  - b) If a dispute is not identified, advise the complainant and the wind energy facility operator that the provisions of the complaint management plan should be utilised, and
  - c) If it is determined that a dispute exists, determine if there is a breach of the permit and if such a breach exists take action to enforce compliance with the permit. In determining whether a breach exists the responsible authority may require the wind energy facility operator to:

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- (i) Commission a suitably qualified expert to provide an opinion as to whether a breach exists, and/or
- (ii) Conduct compliance testing (except where the dispute relates to noise and the schedule for noise compliance testing required by condition 47 has not finished).

**ON-SITE LANDSCAPING PLAN**

**24.** Within six months of the endorsement of the development plan referred to in Condition 1 and before the development starts, an on-site landscaping plan must be prepared and approved by the Minister for Planning. When approved, the on-site landscaping plan will be endorsed and will then form part of this permit.

The on-site landscaping plan must:

- a) Include plans drawn to scale showing the extent and layout of any landscape plantings to be used to visually screen or otherwise beautify any on-site buildings or works other than the wind turbines
- b) Provide details of plant species proposed to be used in the landscape plantings, including height and spread at maturity
- c) Provide a timetable for implementation of all landscape plantings, and
- d) Provide for maintenance and monitoring program.

**OFF-SITE LANDSCAPING PLAN**

**25.** Within six months of the endorsement of the development plans under Condition 1 of this permit, offers to carry out landscape works to mitigate the visual impact of turbines must be made available to the owners of all dwellings within 3 km of a turbine where a turbine is visible. Every reasonable effort, to the satisfaction of the Minister of Planning must be made to contact the relevant owners.

The offers must be available up until 12 months after the commissioning of the last wind turbine of the development or relevant stage.

**26.** If an offer of landscape mitigation works is accepted, an off-site landscaping plan must be prepared for the particular dwelling, by a suitably qualified person, in consultation with the owner of the property to the satisfaction of the Minister for Planning. When approved, the plan will be endorsed and will then form part of this permit.

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The plan must provide details of planting and other treatments that will be used including:

- a) Evidence and explanation of the consultation that has occurred with the owners of the affected property to which the plan relates
- b) Details of the landscaping necessary to mitigate visual impacts of the wind energy facility, including plant species to be used and the expected height and spread of plants at maturity
- c) A schedule of fencing, weed maintenance and other works necessary to facilitate the landscaping
- d) A schedule of recommended maintenance of landscaping to be undertaken for a period of two years. Such maintenance should be the responsibility of the WEF operator unless otherwise agreed by the land owner, and
- e) A timetable for implementation of the landscaping works.

The landscaping as shown on the endorsed off-site landscape plans must be completed within 12 months of the endorsement of the particular plan unless otherwise agreed by the landowner.

The wind energy facility operator or developer must pay the full cost for design and implementation of the off-site landscaping plans, including fencing if required, and the cost of the recommended two year maintenance but any of these tasks may be undertaken or arranged by the landowner. The cost must first be agreed between the wind energy facility operator and the relevant landowner.

**RETENTION OR ESTABLISHMENT OF SCREENING VEGETATION ON  
HOST PROPERTIES**

**27.** The proponent must require the owners of host properties to enter into an agreement that provides that:

- a) No shelterbelts, woodlots or other vegetation which assists in screening the view of turbines on a host properties from non-host dwellings will be removed or substantially reduced in extent except as required by a public authority or if the report of a qualified arborist demonstrates that the vegetation presents a risk of personal injury or damage. If vegetation needs to be removed in one of these circumstances, owners must undertake to advise the operator of the facility, who must consult with the affected neighbours about replacement of the vegetation and must fund its establishment.

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- b) Host owners must be prepared to make available specified areas of land for establishment of new vegetation to provide screening to neighbour dwellings, as identified in an off-site landscaping plan applying to a particular dwelling.

**TRAFFIC MANAGEMENT PLAN**

28. Before the development starts a traffic management plan must be prepared, in consultation with Moorabool Shire Council and VicRoads, for submission to and approval by the Minister for Planning. When approved, the plan will form part of this permit.

The traffic management plan must:

- a) If the proposed Yaloak South wind energy facility has been issued a planning permit and construction of the two facilities are scheduled to overlap, include a plan for consultation between the two permit holders, Moorabool Shire Council and VicRoads as to the appropriate approach to each of the matters in conditions 28b)-o).
- b) Identify all public roads and access points that will be used in the construction and operation of the wind energy facility.
- c) Provide for an existing conditions survey of public roads that will be used in the construction and operation of the wind energy facility including details of the suitability, design, construction standards and condition of the roads to enable, for sealed roads, the calculation of Total ESA (Equivalent Standard Axles) loading for comparison with the appropriate Austroads pavement design guide
- d) Establish the appropriate existing equivalent renewal pavement design and associated costs in conjunction with Moorabool Shire Council and VicRoads and establish the calculated damage (if any) directly attributable to the wind energy facility and the amount (if any) to be reimbursed to Moorabool Shire Council
- e) Include the designation of routes and speed limits for oversize vehicles and other heavy vehicles on routes accessing the site so as to avoid interference with the passage of school buses, and to provide for resident safety and the safe management of stock
- f) Limit construction traffic, except sedans and light commercial vehicles, to operating hours during daylight hours Monday to Saturday inclusive

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- g) Provide details of any large over dimensional vehicles to be used (such as those used for the transport of the nacelles, blades and tower sections) and details of the routes to be taken, the proposed escort arrangements and requirements for over dimensional permits from VicRoads
- h) The local roads identified in this Traffic Management Plan that will be used to exit onto the arterial roads must be constructed to allow for the vehicle path and sealed back a minimum of 20 metres from edge of seal of the arterial road
- i) Specify the need for road and intersection upgrades including signage to accommodate any additional traffic or site access requirements, whether temporary or ongoing, and the timing of when these upgrades are to be undertaken
- j) Include measures to be used to manage traffic impacts associated with the construction and ongoing operation of the wind energy facility (including temporary speed zones and times of operation in accordance with VicRoads 'Roadworks Signing Code of Practice') on the traffic volumes and flows on surrounding roads
- k) Identify any areas of roadside native vegetation which need removal or pruning and the pruning practices to be followed
- l) Include identification and timing of any pre-construction works
- m) Include a program of regular inspections, to be carried out during the construction period, to identify the need for maintenance works necessary as a result of construction traffic
- n) Include agreed criteria that will trigger repair and maintenance works, and
- o) Include a program to rehabilitate roads to the pre-existing condition identified by the above surveys.

**ROADWORKS REQUIREMENTS (VICROADS)**

**29.** Prior to the start of the development the developer must:

- a) Submit final detailed construction drawings of the altered intersections including line marking to be approved by VicRoads
- b) Prepare a specification for the works in accordance with the relevant sections of the VicRoads' Standard Specification For Roadworks

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- c) Submit construction drawings and location of the new access (GB1) from the Geelong-Ballan Rd for approval
30. Prior to commencing any works in, on, under or over the arterial road reserve, the developer must first apply for, and receive written consent from VicRoads for those works in accordance with section 63 of the *Road Management Act 2004*.
31. All roadworks to intersections and access point GB1 must be completed to the satisfaction of VicRoads prior to the commencement of construction works.
32. All works to intersections and access point GB1 must be at the developer's cost.
33. The contractor must be VicRoads approved or prequalified at R1 level.

**COMPLIANCE WITH TRAFFIC MANAGEMENT PLAN**

34. The traffic management and road upgrade and maintenance works associated with the wind energy facility must be carried out in accordance with the traffic management plan to the satisfaction of the Minister for Planning and, subject to condition 28 (a), the cost of any works including maintenance attributed to the wind energy facility are to be at the expense of the wind energy facility operator.

**EMERGENCY RESPONSE PLAN**

35. Before the development starts an emergency response plan must be prepared and approved by the Minister for Planning. When approved the emergency response plan will be endorsed and will then form part of this permit.

The emergency response plan must be generally in accordance with "*Emergency Management Guidelines for Wind Farms*" (Country Fire Authority April 2007).

The emergency response plan must be prepared in consultation with:

- Country Fire Authority
- Victoria Police
- Rural Ambulance Victoria
- State Emergency Service, and



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- Any other relevant members of the Moorabool Shire's Municipal Emergency Response Management Committee.

The emergency response plan should generally conform to "AS 3745-2002 *Emergency control organization and procedures for buildings, structures and workplaces*", or any subsequent replacement or amendment.

The emergency response plan must include:

- a) Criteria for the provision of static water supply tanks, solely for fire fighting purposes, including minimum capacities, appropriate connections and signage
- b) Procedures for vegetation management, fuel control and the provision of fire fighting equipment during declared fire danger periods
- c) Minimum standards for access roads and tracks, to allow access for fire fighting vehicles, including access to static water supply tanks
- d) The facilitation by the wind energy facility operator, before or within 3 months after the commencement of operation, of a familiarisation visit to the site and explanation of emergency services procedures for the relevant members of the Country Fire Authority, Rural Ambulance Victoria, Victoria Police, State Emergency Service and Moorabool Shire's Emergency Response Management Committee
- e) Subsequent familiarisation sessions for new personnel of those organisations as required, and
- f) If requested, training of Country Fire Authority personnel in relation to suppression of wind energy facility fires.

### **BAT AND BIRD MANAGEMENT PLAN**

**36.** Before the development starts a bat and bird management plan (BBMP) to the satisfaction of the Minister for Planning must be prepared in consultation with the Department of Sustainability and Environment. When approved, the plan will be endorsed and form part of the permit.

The BBMP must include:

- a) A statement of the objectives and overall strategy for managing and mitigating any significant bird and bat strike arising from the wind energy facility operations

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- b) A monitoring program of at least two years duration that starts when 30% of the total number of turbines are in operation and continues for two years from the commissioning of the last turbine in each stage, including surveys during the breeding, non-breeding and migratory seasons to ascertain:
- (i) The presence, behaviour and movements of any Wedge-tailed Eagles, especially breeding pairs in the vicinity of the wind energy facility, or other avifauna species listed under the *Flora and Fauna Guarantee Act 1988* or the *Environment Protection and Biodiversity Conservation Act 1999*
  - (ii) The species, number, age, sex (if possible) and date of bird and bat strikes
  - (iii) Procedures for the reporting of any bird or bat strikes to the Department of Sustainability and Environment. Any bird strikes affecting the priority species identified in condition 36(b)(1) must be reported to the DSE within 7 days of becoming aware of any strike
  - (iv) Seasonal and yearly variation in the number of bird and bat strikes
  - (v) The efficacy of searches for carcasses of birds and bats, and where practical, information on the rate of removal of carcasses by scavengers, so that correction factors can be determined to enable calculations of the total number of mortalities.
- c) Requirements for periodic reporting, within agreed timeframes of the findings of the monitoring to the Department of Sustainability and Environment.
- d) Recommendations in relation to a mortality rate for specified species which would trigger the requirement for responsive mitigation measures to be undertaken by the proponent to the satisfaction of the Minister for Planning, and
- e) Details of any responsive mitigation measures which may be implemented if the trigger mortality rate for a specified species is exceeded.

37. Following the completion of the monitoring program in accordance with the BBMP, a bat and bird monitoring report must be prepared by the

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applicant setting out the findings of the monitoring program to the satisfaction of the Minister for Planning.

**STRATEGY FOR MONITORING AND MITIGATION MEASURES FOR IMPACTS ON ECOLOGICALLY SIGNIFICANT BATS AND BIRDS**

38. In the event that impacts detected during the BBMP's monitoring program are considered by the Minister for Planning to be ecologically significant, a monitoring and mitigation measures strategy must be prepared in consultation with the Department of Sustainability and Environment to the satisfaction of the Minister for Planning. When approved the monitoring and mitigation measures strategy will be endorsed and will then form part of this permit.

The monitoring and mitigation measures strategy must include, for each species for which ecologically significant impacts have been detected:

- a) Further monitoring of the 'targeted' species, and
- b) Mitigation measures for 'targeted' species.

all to be implemented to the satisfaction of the Minister for Planning.

**TELEVISION, RADIO AND TELEPHONE RECEPTION INTERFERENCE**

39. Before the development starts a television, radio and telephone reception plan must be prepared to the satisfaction of the Minister for Planning. When approved, the plan will be endorsed and form part of the permit.

The television, radio and telephone reception plan must include:

- a) A definition of the area to be covered by the television, radio and telephone reception plan (the defined area) based on the recommendations of a suitably qualified expert
- b) A pre-construction survey to determine television, radio and telephone reception strength at selected locations within the defined area, completed prior to the commissioning of any turbine. The location of such monitoring will include non-host dwellings as defined below and other location to be determined by an independent television and radio monitoring specialist appointed by the wind energy facility operator

Note: For the purpose of this condition, a non-host means the land holder of an abutting property without a contract in respect of the installation of associated wind turbines on that persons property.

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- c) A procedure for post-construction survey at any dwelling in the defined area that existed at the date of the pre-construction survey in response to any complaint received regarding the wind energy facility having an adverse effect on television or radio or telephone reception, and
- d) A procedure for the implementation of mitigation measures at any dwelling in the defined area that existed at the date of the pre-construction survey if the post-construction survey establishes any increase in interference to reception as a result of the wind energy facility operations. The mitigation measures shall return the affected reception to pre-construction quality and be undertaken at the cost of the wind energy facility operator, all to the satisfaction of the Responsible Authority.

**BLADE SHADOW FLICKER**

- 40.** Shadow flicker from the wind energy facility must not exceed 30 hours per annum at any dwelling existing as at the date of this permit to the satisfaction of the Minister for Planning.

Any dwelling on subject land may be exempt from this condition. This exemption will be given effect through an agreement with the landowner that will apply to any occupant of the dwelling and must be registered on title.

**EXEMPTION FROM NOISE CONDITIONS**

- 41.** Any dwelling on the subject land may be exempt from the following noise related conditions except:

- a) If a permit is issued for the proposed Yaloak South wind energy facility, no dwelling may be exempt from the requirements of Conditions 44 or 45 of this permit.
- b) If the Yaloak South wind energy facility is operational no dwelling may be exempt from the requirements of Conditions 47 to 52, inclusive, of this permit.

Exemptions will be given effect through an agreement with the landowner that must apply to any occupant of the dwelling and must be registered on title. Such dwellings will be known as host dwellings. Dwellings that are not so exempted will be known as non-host dwellings.

## PRE-DEVELOPMENT NOISE ASSESSMENTS

42. Before the development starts a pre-development noise assessment of the wind energy facility must be completed to the satisfaction of the Minister for Planning. The pre-development noise assessment must be completed in accordance with New Zealand Standard NZS6808:1998 *Acoustics - The Assessment and Measurement of Sound from Wind Turbine Generators (NZ6808:1998)* and satisfy the following criteria:

- a) All aspects of the assessment must be conducted by a suitably qualified and experienced acoustic expert
- b) Predictions of wind energy facility sound levels must be made using:
  - (i) The sound propagation model described on Clause 4.3 of NZ6808:1998 except that attenuation due to air absorption may be determined by a method that accounts for the spectral content of turbine noise emissions providing the method used does not predict an overall attenuation rate greater than 0.005 dB(A) per metre
  - (ii) Sound power levels for the turbine make and model specified in the endorsed plan required under condition 1 of this permit
  - (iii) The turbine layout and dimensions shown in the endorsed plan required under condition 1 of this permit
  - (iv) The combined sound level of all turbines in full operation or some alternative mode of operation described in a noise management plan that includes
    - Details of the proposed mode of operation, and
    - Predictions of the effect of the implementation of the noise management plan on noise emissions from the wind energy facility.
- c) Measurements of background sound levels made simultaneously with measurements of wind speed and wind direction in accordance with NZ6808:1998 at, at least, all locations where the predicted wind energy facility sound level is 40 dB(A), or greater.

This requirement may be waived at particular dwellings if a genuine attempt to obtain landowner consent for such measurements at that dwelling is unsuccessful. In such circumstances evidence of attempt made to obtain consent must be provided

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- d) All wind speed measurements made at the proposed turbine hub height
  - e) Data sets used to determine the correlations of background sound levels with wind speed that meet the following criteria:
    - (i) At least 500 noise level/wind speed data pairs
    - (ii) Including at least 10 data pairs or 1% of the total number of data pairs whichever is the greater at wind speeds greater than 8 m/s
    - (iii) Including at least 10 data pairs or 1% of the total number of data pairs whichever is the greater at wind speeds less than 4 m/s.
  - f) All correlations of background sound level with wind speed shall have a coefficient of determination ( $R^2$  value) of 0.5 or greater
  - g) A noise limit of 40 dB(A) at all wind speeds at dwellings where the criteria in (e) and (f) above cannot be met, and
  - h) The inclusion of:
    - (i) Separate correlations of background sound levels with wind speed for different directions or
    - (ii) An explanation of why such correlations are not required or
    - (iii) Correlations of background sound levels with wind speed from data sets that satisfy the criteria specified in Condition 47 part (f), of this permit.
- 43.** If a permit has been issued for the proposed Yaloak South wind energy facility then before the development starts a pre-development cumulative noise assessment of the wind energy facility and the Yaloak South wind energy facility must be completed to the satisfaction of the Minister for Planning. The pre-development cumulative noise assessment must be completed in accordance with criteria specified in condition 42 of this permit except for the following:
- a) The sound propagation model used may modified to account for the effect of wind direction on sound propagation to enable predictions of the combined wind energy facility sound levels with the wind direction being from wind energy facility to dwellings and on to the Yaloak South wind energy facility;
  - b) The wind energy facility developer will use its best endeavours to obtain:

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- (i) Sound power levels for the turbine make and model installed or to be installed at the Yaloak South wind energy facility, and
- (ii) The layout and dimensions of the constructed or to be constructed Yaloak South wind energy facility.

If despite the wind energy facility developer's best endeavours, this information cannot be obtained, data contained within Planning Permit Application No 2010/002 lodged with the Moorabool Shire Council on 2 December 2009 as may have been modified by conditions included in any permit issued in response to that application, may be used;

- c) The results of measurements made of background sound level made simultaneously with measurements of wind speed and wind direction in accordance with NZ6808:1998 at, at least, all locations where the predicted combined wind energy facility sound level is 35 dB(A), or greater will be obtained and used in pre-development cumulative noise assessment.

This requirement may be waived if genuine attempts to obtain landowner consent for such measurements are unsuccessful. In such circumstances evidence of attempts made to obtain consent must be provided, and

- d) The inclusion of correlations of background sound levels with wind speed from data sets that satisfy the criteria specified in Condition 47 part (f) of this permit.

**44.** The developer of the wind energy facility shall appoint a suitably qualified and experienced acoustics expert, or experts, to audit the conduct of both pre-development noise assessments (the assessments). The expert(s) so appointed will:

- a) Be independent of the wind energy facility developer and the acoustic expert(s) completing the assessments
- b) Be an employee or associate of a member of the Association of Australian Acoustical Consultants or be a Fellow of the Australian Acoustical Society
- c) Conduct audits of the assessments considering, at least:
  - (i) The sound power data utilised for prediction of wind energy facility sound levels at dwellings
  - (ii) The selection of dwellings for assessment

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- (iii) Compliance with NZ6808:1988 in regard to background sound level measurement including the requirement of compliance with New Zealand Standard NZS6801 *Acoustics- Measurement of Environmental Sound* (NZ6801)
  - (iv) The noise propagation models utilised, and
  - (v) Satisfaction of the criteria specified in this permit for the correlations of background sound level with wind speed.
- d) Provide audit reports to the Minister for Planning that include certification that the assessments:
- (i) Have been completed in accordance with NZS6808:1998 and other criteria specified in this permit, and
  - (ii) Provide predictions of compliance with the noise limits specified in this permit at all non-host dwellings.

## NOISE LIMITS

45. Construction of the wind energy facility must comply with noise criteria specified in the *Interim Guidelines for Control of Noise from Industry in Country Victoria*, (N3/89) at any dwelling existing on land in the vicinity of the proposed wind energy facility as at the date of the issue of this permit to the satisfaction of the Minister for Planning.

46. The operation of the wind energy facility both alone and in combination with the Yaloak South wind energy facility, if constructed, must comply with the noise criteria specified in NZ6808:1998 at any dwelling existing on land in the vicinity of the proposed wind energy facility as at the date of the issue of this permit.

In determining compliance the following requirements apply:

- a) The sound level from the wind energy facility, or facilities, within 20 metres of any dwelling must not exceed a level of 40dBA (L95) or where the relationship between background noise levels and wind speed has been determined by the method specified in Condition 47 part (f)(i) of this permit, the background noise level by more than 5dBA, or a level of 40dBA L95, whichever is the greater
- b) Compliance must be assessed separately for all-time and night time. For the purpose of this requirement, night time is defined as 10.00pm to 7.00am.



## NOISE COMPLIANCE TESTING

47. Before the development starts a noise compliance testing plan must be prepared by a suitably qualified acoustics expert to the satisfaction of the Minister for Planning.

When approved, the noise compliance testing plan will be endorsed by the Minister for Planning and will then form part of this permit.

The use must be carried out in accordance with the noise compliance testing plan to the satisfaction of the Minister for Planning.

The noise compliance testing plan must include:

- a) A determination of the noise limits to be applied during construction using the methodology prescribed in the *Interim Guidelines for the Control of Noise from Industry in Country Victoria, N3/89*
- b) A program of compliance testing to be implemented during the construction of the wind energy facility that:
  - (i) Is designed by a suitably qualified acoustic expert, and
  - (ii) Utilises the methodology prescribed in *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1*, to demonstrate compliance with the limits determined in (a) above.
- c) A prediction, by a suitably qualified acoustic expert, of:
  - (i) The area within which the noise level from the wind energy facility during operation in the operational mode assumed for the pre-development noise assessment required by condition 42 of this permit will be 35dB(A) or greater, and
  - (ii) If a permit has been issued for the Yaloak South wind energy facility, the area within which the noise level from the wind energy facility and the Yaloak South wind energy facility during operation of both wind energy facilities in the operational modes assumed for the pre-development cumulative noise assessment required by condition 43 of this permit will be 35dB(A) or greater.
- d) Identification of all dwellings, excluding host dwellings, within the area predicted in c) (i) above and all dwellings within the area predicted in c) (ii) above and a statement as to whether consent from the owner of each of the identified dwellings for compliance testing has been obtained or refused

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- e) A method or methods of determining if the noise from the wind energy facility, or facilities has a special audible characteristic and measured sound level must have a penalty of 5dBA applied. The methods will include:
- (i) For tonality – That referred to in the note to 5.3.2 of NZS6808:1998 or the “Reference Method” referred to in Appendix B (B2.3) of New Zealand Standard NZS6808:2010 *Acoustics – Wind Farm Noise* (NZS6808:2010)
  - (ii) For Amplitude Modulation – The “Interim Test Method” referred to in Appendix B (B3.2) of NZS6808:2010;
- f) A method or methods of testing compliance with the noise limits prescribed in Condition 46 of this permit for each dwelling identified in (d) above for which consent for the conduct of compliance testing has been obtained.

The compliance testing method must be either:

- (i) The method described in NZ6808:1998 with the following additional criteria being met:
  - The correlations of sound levels with wind speed must be derived from data sets:
    - Of at least 500 noise level/wind speed data pairs
    - Including wind speed measurements made at turbine hub height
    - Including at least 10 data pairs or 1% of the total number of data pairs whichever is the greater at wind speeds greater than 8 m/s
    - Including at least 10 data pairs or 1% of the total number of data pairs whichever is the greater at wind speeds less than 4 m/s
    - With the percentage of data pairs that are the results of measurements made with the wind in the direction from the wind energy facility to the dwelling being equal or greater than values determined in (g) below, and
  - The coefficient of determination for the regression curves will be 0.5 or greater, or

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- (ii) A method, designed by a suitably qualified acoustics expert, in which measurements of operating and background noise levels are measured with:
    - Background noise levels being measured with all turbines that, when operating, influence the noise level at the dwelling, shut down, and
    - The wind in the direction from the wind energy facility to the dwelling for at least 50% of the measurement period.
  - g) For each dwelling at which compliance testing is to be performed, determination of the maximum monthly proportions of the wind direction distribution that is from the wind energy facility to the dwelling, plus or minus 22.5 degrees
  - h) A schedule for compliance testing under which compliance testing at all identified dwellings for which consent for such testing has been obtained is performed in the 14 months following the commissioning of the last turbine in a section of the wind energy facility or a stage of the wind energy facility, if the development is in stages, and repeated between 10 and 14 months after the first compliance test
  - i) A procedure under which all results of compliance testing conducted in any month are reported to the Minister for Planning by the 15<sup>th</sup> day of the following month and to the owners and occupiers of particular dwellings as soon as results relating to that particular dwelling are available, and
  - j) A procedure under which the implementation of the noise compliance testing plan is directed and supervised by a suitable qualified acoustic expert to the satisfaction of the Minister for Planning.
- 48.** The developer of the wind energy facility shall appoint a suitably qualified acoustic expert, or experts to provide a review of the noise compliance testing plan prior to its submission to the Minister for Planning. The expert(s) so appointed will:
- a) Satisfy the criteria contained (a) and (b) of condition 44 of this permit
  - b) Review the noise compliance testing plan and provide a report to the Minister for Planning, submitted in conjunction with the noise compliance testing plan, which provides the results of the review and an opinion as to whether implementation of the plan can be reasonably

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expected to satisfy the requirements of this permit in regard to compliance testing.

- 49.** The developer of the wind energy facility shall appoint a suitably qualified acoustic expert or experts to audit the implementation of the noise compliance assessment plan. The expert(s) so appointed will:
- a) Satisfy the criteria contained (a) and (b) of condition 4 of this permit
  - b) Conduct audits of the implementation of the noise compliance testing plan, including consideration of, at least:
    - (i) The complete and timely implementation of the noise compliance testing plan
    - (ii) Compliance with NZ6808:1988 in regard to sound level measurements including the requirement of compliance with NZ6801, and
    - (iii) Satisfaction of the criteria specified in this permit for the conduct of compliance testing.
  - c) Provide audit reports to the Minister for Planning that include certification that:
    - (i) The noise compliance testing has been completed in accordance with NZS6808:1998 and other criteria specified in this permit
    - (ii) Compliance has been demonstrated or, if this is not the case, the estimated quantum by limits have been exceeded can be relied upon.

**NOISE COMPLIANCE ENFORCEMENT**

- 50.** If an exceedence of the noise limits prescribed in Condition 6 of this permit is detected the wind energy facility operator must:
- a) Within 5 days of the detection of the exceedence:
    - (i) If the exceedence is at a dwelling not included in the assessment required by Condition 3 of this permit, take sufficient actions to reduce the wind energy facility noise level at the subject dwelling, as predicted using the prediction methodology utilised for the assessment required by Conditions 2, by an amount equal to or greater than the amount of exceedence

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- (ii) If the exceedence is at a dwelling included in the assessment required by Condition 3 of this permit and the Yaloak South wind energy facility is in operation:
          - Use best endeavours to come to agreement with the operator of the Yaloak South wind energy facility to take joint actions immediately to reduce the wind energy facility noise level at the subject dwelling, as predicted using the prediction methodology utilised for the assessment required by Conditions 3, by an amount equal to or greater than the amount of exceedence or
          - If no such agreement can be reached take sufficient actions to reduce the wind energy facility noise level at the subject dwelling, as predicted using the prediction methodology utilised for the assessment required by Conditions 3, by an amount equal to or greater than half of the amount of exceedence; and
          - Satisfy the remaining requirements of this condition with the amount of the exceedence deemed to be half of that measured.
- b) Within 7 days of the detection of the exceedence, provide the responsible authority and the owner/occupier of the dwelling with:
  - (i) The results of the compliance testing measurements including the magnitude of the detected exceedence
  - (ii) The results of attempts to negotiate agreement with the operator of the Yaloak South wind energy facility on actions taken, if such agreement is relevant
  - (iii) Details of the actions taken to reduce the wind energy facility noise emissions, and
  - (iv) Evidence that the actions taken will produce a decrease in the wind energy facility noise level at the dwelling by an amount equal to the magnitude of the exceedence based on a prediction using the methodology utilised for the relevant pre-development assessment.
- c) Continue to operate the wind energy facility with the implemented actions until approval for a different mode of operation is given by the responsible authority under the provision of (d) below
- d) Within 60 days of the detection of an exceedence provide the responsible authority and owner/occupier of the dwelling with either:

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- (i) The results of compliance testing and an audit of that testing using the methods satisfying the criteria prescribed in Condition 47 part (f) and Condition 49 of this permit that demonstrate compliance, or
- (ii) A program for the development and evaluation of an alternative mode or modes of wind energy facility operation that can be reasonably be expected to result in continuing compliance with noise levels specified in Condition 46 of this permit.

The program will:

- Be developed and implemented under the supervision of a suitably qualified acoustics expert
- Include detailed descriptions of proposed actions;
- Include predictions of wind energy facility noise levels at the dwelling at each stage of the program
- Not include any actions or combination of actions that are predicted to result in non-compliance
- Include compliance testing using method(s) satisfying the criteria prescribed in Condition 47 part (f) and Condition 49 of this permit both as the final step in the program and with that compliance testing being repeated after between 10 and 14 months
- Include a program schedule that specifies the timing of each stage of the program, and
- Have been reviewed by a suitable qualified acoustic expert satisfying the criteria contained (a) and (b) of condition 4 of this permit with a report on that review that provides the author's opinion in regard to a reasonable expectation that the implementation of the program will not result in non-compliance

Within 10 days of receipt of the program and the report on the review of the program, the responsible authority may

- Approve the implementation of the program, or
- Advise the wind energy facility operator of modifications to the program that are required before approval will be granted.

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If no response is provided by the responsible authority within 10 days then the program will be deemed to be approved.

If the responsible authority requires the program to be modified, the wind energy facility operator may either submit a modified program or immediately withdraw the program and conduct compliance testing using methods satisfying the criteria prescribed in Condition 47 part (f) and Condition 49 of this permit.

Following implementation of the program, the wind energy facility operator may provide the responsible authority and the owner/occupier with a detailed description of an alternative mode of operation of the wind energy facility together with evidence that under that mode of operation compliance can be expected, to the satisfaction of the responsible authority. Given such information and evidence the responsible authority may approve the operation of the wind energy facility in the alternative mode and such approval will not be unreasonably withheld.

## **DECOMMISSIONING**

**51.** The wind energy facility operator must, no later than one month after all wind turbines have permanently ceased to generate electricity, notify the Responsible Authority in writing of the cessation of the use. Within a further six months of this date, the wind energy facility operator, or in the absence of the operator, the owner of the land on which the relevant turbines(s) is/are located, must prepare a decommissioning plan to the satisfaction of the Responsible Authority. When approved, the decommissioning plan will become part of this permit.

**52.** The decommissioning plan must provide for the following:

- a) The removal of all above ground operational equipment
- b) The removal and clean up of any residual spills or contamination
- c) The rehabilitation of all storage, construction, access tracks and other areas affected by the project closure or decommissioning, if not otherwise useful to the on-going management of the subject land
- d) A decommissioning traffic management plan

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e) A post decommissioning revegetation management plan

The decommissioning plan must be implemented to the satisfaction of the Minister for Planning within 24 months of approval of the plan or within such other timeframe as may be specified by the Minister.

### **BUSINESS IDENTIFICATION SIGNS**

53. The total advertisement area to each business identification sign must not exceed 3 square metres.

### **EXPIRY**

54. This permit will expire if one of the following circumstances applies:

- (i) the development is not started within 5 years of the date of this permit;
- (ii) the development is not completed within 10 years of the date of this permit.

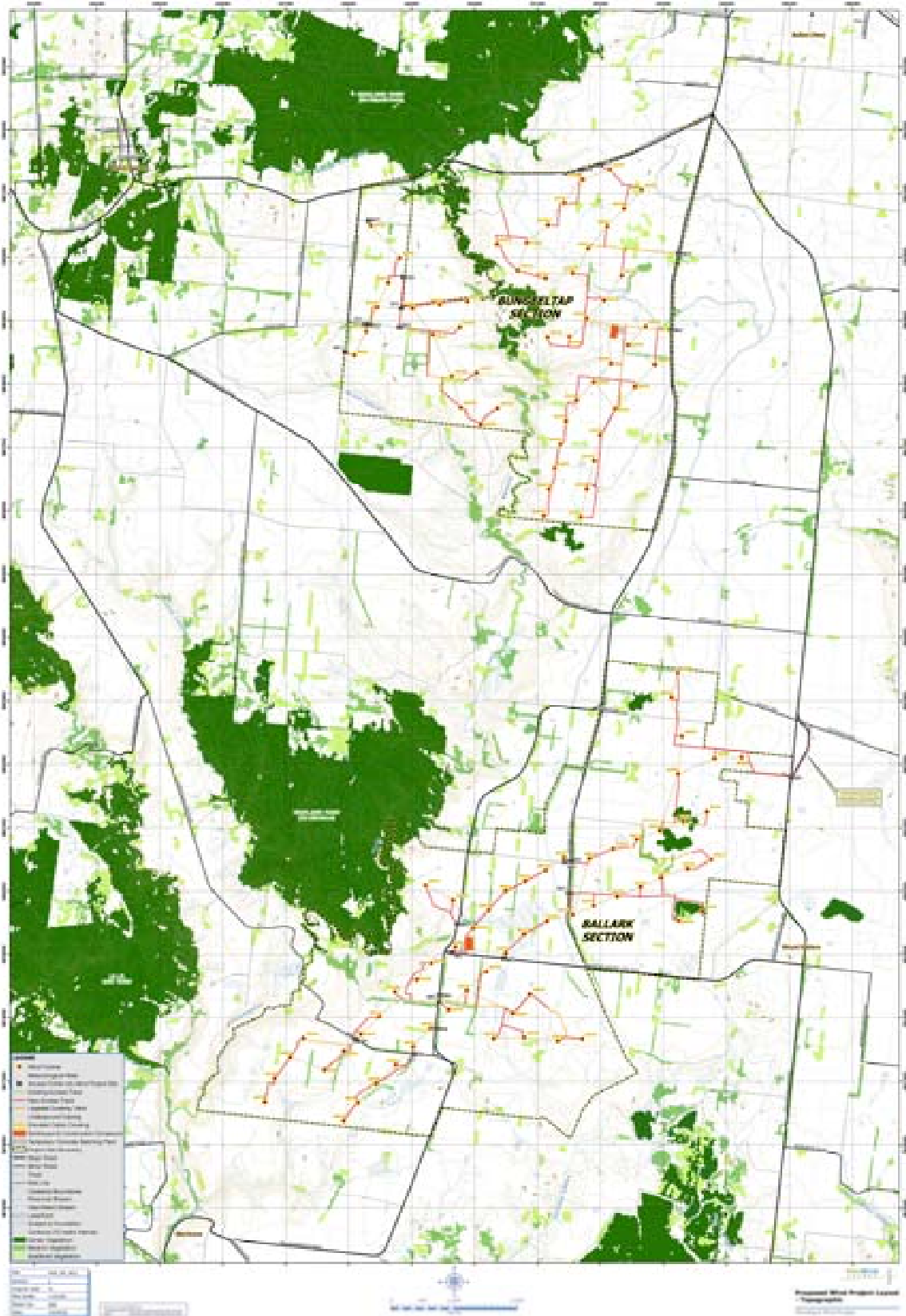
The Minister for Planning, as responsible authority, may extend the periods referred to if a request is made in writing before the permit expires, or within three months afterwards.

### **Notes:**

**For the purpose of this permit, a host means the land holder of a property within the subject land with a contract in respect of the installation and operation of the wind energy facility.**



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**Development Plan Referred to in Recommended Permit Conditions  
Plan Tabled at Panel Hearing by WestWind**

## **Appendix C: Draft Permit Conditions**

Planning and Environment Regulations 2005 Form 11  
Section 97F  
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**PLANNING  
PERMIT**

**Permit No.:**2009012877

**Planning Scheme:** Moorabool Planning Scheme

**Responsible Authority for Administration and  
Enforcement of this Permit:** Moorabool Shire  
Council

**ADDRESS OF THE LAND:**

**Ballark Section**  
Lots 1, 2, 3, 4 & 5 TP249737  
Lot 1 TP551968  
Crown Allotment 68O  
Lot 1 LP217210  
Lot 2 LP217210  
Lot 3 LP217210  
Lot 2 PS521826  
Crown Allotments 65A, 65B, 66A, 66B, 67, 67A, 67B, 68K, 68K1, 68L, 68M,  
Parish of Bungeeltap  
Lots 1, 2, & 3, TP375916  
Lots 1, 2, 3, 4, 5 & 6 TP841547  
Lot 1 TP741519  
Lot 1 PS521826  
Lot 1 TP326429  
Lot 1 TP427675  
Crown Allotment 19D Parish of Ballark  
Lots 1, 2, 3 & 4 TP214503  
Lots 1, 2, & 3 TP431757  
Lots 1, 2, 3 & 4 TP943416  
Crown Portion 1 Parish of Ballark  
Crown Portion 6 Parish of Ballark  
Crown Portion 7 Parish of Ballark  
Crown Portion 18 Parish of Ballark  
Crown Portion 21 Parish of Ballark  
Crown Portion 22 Parish of Ballark  
Lot 9 LP5646  
Crown Allotment 66A Parish of Ballark  
Crown Allotment 66B Parish of Ballark  
Lot 10 LP5646  
Lot 1 TP100451  
Lots 1 & 2 TP133721  
Lot 3 LP213701  
Channel Reserve LP5646  
Crown Land vested in Council for Ballan-Meredith Road  
Crown Land vested in Council for Banks Road  
Crown Land vested in Council for Bungeeltap Road South  
Crown Land vested in Council for Egerton-Ballark Road  
  
Crown Land vested in Council for Mount Wallace-Ballark Road  
Unused Road Reserve Lot 1 TP612464  
Unused Road Reserve Crown Allotment 19D Parish of Ballark  
Unused Road Reserve Crown Allotment 8A Parish of Bungeeltap

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**Bungeeltap Section**

Crown Allotment 8A Section 28 Parish of Gorong

Crown Allotments 8 & 9 Section 28 Parish of Gorong

Lot 1 TP132727

Lots 1, 2, 3 & 4 TP132738

Lot 1 PS519828

Lot 2 PS519828

Lot 1 TP322737

Lot 1 PS404971

Lot 2 PS404971

Lot 3 PS404971

Lot 4 PS404971

Lot 5 PS404971

Crown Allotment 76B Parish of Bungal

Lot 1 LP119479

Lot 2 LP119479

Crown Allotments 75 & 75A Parish of Bungal

Crown Allotments 52, 55, 67 & K Parish of Bungal

Crown Allotments 29 & J Parish of Bungal

Lot 1 TP884577

Lots 1, 2, & 3 TP884534

Lots 1 & 2 TP884532

Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 & 11 TP853292

Lot 6 PS404971

Barwon Water (Channel Reserve) Lots 7, 8, 9, 10, 11 & 12 TP671194 – Volume  
8335 Folio 085

Crown Land vested in Council for Ballan-Egerton Road

Crown Land vested in Council for Ballan-Meredith Road

Crown Land vested in Council for Egans Road Crown Land vested in Council  
for McDonalds Lane

Crown Land vested in Council for Manleys Road

VicRoads road Geelong-Ballan Road

**THE PERMIT ALLOWS:**

**The use and development of a wind energy facility and associated infrastructure and other works including: aviation safety lighting, substations, access tracks, underground and overhead cabling, permanent anemometers, amenities buildings, car parking and bicycle facilities, temporary construction facilities including concrete batching plant, buildings and works, removal of native vegetation, two business identification signs and alterations to an access point to a Road Zone Category 1.**

**THE FOLLOWING CONDITIONS APPLY TO THIS PERMIT:**

## **DEVELOPMENT PLANS TO BE ENDORSED**

1. Before the development starts, development plans must be prepared to the satisfaction of the Minister for Planning. The plans must be drawn to scale with dimensions and three copies must be provided. The plans may be submitted for approval in stages or for a particular grouping of wind turbines within the subject land. When approved, the plans will be endorsed by the Minister for Planning and will then form part of this permit.

The plans must show the location and layout of the wind turbines and all on-site buildings and works generally in accordance with the plans titled MWP\_SM\_0011, Version 4, 20 May 2010.

The plans must also include:

- a) A list of map coordinates for each wind turbine
- b) The distance of each wind turbine from the nearest point on the boundary of the subject land
- c) Details of the model and rated capacity of the wind turbines to be installed
- d) Elevation drawings, showing dimensions, of the wind turbines and other permanent on-site buildings (e.g. substation facilities)
- e) Drawings, showing the key physical dimensions, of all on-site buildings and works including:
  - i. Wind turbines
  - ii. Access tracks
  - iii. Internal collector network trenches
  - iv. Any temporary concrete batching plant(s)
  - v. The substations (including designated car parking areas, signage and landscaping), and
  - vi. Any ancillary works (e.g. construction compounds and water tanks).
- f) A description of the materials and finishes of the wind turbines and other permanent on-site buildings
- g) A description of the location, type and intensity of any aviation obstacle lighting to be installed

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- h) The locations of scattered native trees and the boundaries of any patches of native vegetation, in relation to all buildings and works, in all cases where such trees and patches are within 25 metres of the buildings or works
- i) Turbine exclusion zones centred on the transmission vectors for fixed licences of point to point transmissions to which there is a possibility of electromagnetic interference with a width equal or greater than twice the sum of the blade length and 60% of the radius of the first Fresnel zone of any licensed link. The transmission vectors and the widths of the first Fresnel zones will be determined by a suitably qualified telecommunications expert.

## **SPECIFICATIONS**

- 2. The wind energy facility must meet the following requirements:
  - a) The wind energy facility must comprise no more than 110 wind turbines with no more than:
    - i. 51 wind turbines on the land known as the Bungeeltap section, and
    - ii. 59 wind turbines on the land known as the Ballark section.
  - b) The overall maximum height of the wind turbines (to the zenith of the sweep of the rotor blade tip) must not exceed 150 metres above foundation level.
  - c) The wind turbines must be mounted on tubular steel and/or concrete towers.
  - d) The rotor of the wind turbines must have only three rotor blades
  - e) The wind turbine towers, nacelles and rotor blades must be of a non-reflective finish and colour that blends with the landscape to the satisfaction of the Minister for Planning
  - f) The colours and finishes of all other buildings and ancillary equipment on-site must be non-reflective to minimise the impact of the development on the landscape to the satisfaction of the Minister for Planning
  - g) Access tracks within the subject land must, to the satisfaction of the Minister for Planning:
    - i. have a surface material that will not unduly contrast with the landscape, and

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- ii. be designed to minimise impact on the farming activities on the land, and
  - iii. have an effective trafficable width of not less than 4 metres.
- h) The transformer associated with each wind turbine must be enclosed within the tower
- i) All new electricity cabling associated with the internal collector network within the wind energy facility must be placed under the ground except as set out in condition 2j) or with the further written consent of the Minister for Planning
- j) Overhead cabling may be used within the river valley of the Moorabool River east branch between turbines BUWT34 and BUWT29 as shown on the plans referred to in condition 1.
- k) All wind turbines must be located such that the distance between turbines and transmission vectors for fixed licences of point to point transmissions is equal to or greater than the sum of the blade length and 60% of the radius of the first Fresnel zone of any licensed link.
- l) Except in the case of an emergency, no external lighting of infrastructure associated with the wind energy facility, other than low level security lighting and/or aviation obstacle lighting may be installed or operated without the further written consent of the Minister for Planning
- m) All spare parts and other equipment and materials associated with the use of the wind energy facility must be located in screened, locked storage areas that are inaccessible to the public to the satisfaction of the Minister for Planning
- n) All turbines must be located outside the turbine exclusion zones shown on the endorsed development plan(s)
- o) Aviation obstacle lighting may be installed but only if they meet the following requirements, except with the further written consent of the Minister for Planning:
  - i. They are restricted to a pair of red medium intensity, intermittent obstacle lights on any wind turbine
  - ii. The lights are to be baffled so as to restrict the vertical spread of light to not more than three degrees (approximately) with not more than one degree (approximately) below the horizontal

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- iii. All lights within each section or stage of the wind energy facility must illuminate in unison, and
- iv. The lights may be activated as necessary for aviation safety or as otherwise required by the Civil Aviation Safety Authority or law.

### STAGING

- 3. The use and development authorised by this permit may be completed in stages as shown on the endorsed development plan(s) to the satisfaction of the Minister for Planning. Any corresponding obligation arising under this permit (including the preparation and approval of plans) may be similarly completed in stages or parts.

### LAYOUT NOT ALTERED

- 4. The use and development as shown on the endorsed development plan(s) or other plans to the satisfaction of the responsible authority must not be altered or modified without the written consent of the Minister for Planning save that the micro-siting of turbines and the related tracks and reticulation lines will be regarded as generally in accordance with the endorsed development plan(s) if the responsible authority is satisfied that it will not give rise to any material adverse change in landscape, vegetation, cultural, visual, shadow or noise impacts compared to the endorsed development plan(s) and:
  - i. A turbine within 1 kilometre of any non-host dwelling is not moved closer to that dwelling, and
  - ii. The turbine location is altered by no more than 100 metres, and
  - iii. No turbine is located within:
    - a. 100 metres from a Road Zone Category 1 or land in a Public Acquisition Overlay to be acquired for a road
    - b. 40 metres from a Road Zone Category 2
    - c. 20 metres from any other road
    - d. 5 metres from any other boundary.
    - e. 100 metres from a dwelling not in the same ownership
    - f. 100 metres from a designated natural waterway, wetlands or flood plain or
    - g. within a turbine exclusion zone.



### **PRELIMINARY INVESTIGATIVE WORKS**

For the purposes of this permit, the carrying out of preliminary investigative works, including geotechnical investigations, for the purposes of gathering data or making other assessments necessary or desirable in order to prepare the development plan or other plans specified in this permit, is not considered to be commencement of the development.

### **VEGETATION REMOVAL WORKS**

5. Before works start, temporary fencing or tape must be installed around areas of native vegetation to be retained, to the satisfaction of the responsible authority.
6. Works must not cause damage to native vegetation stands to be retained. Vehicular access beneath large trees and habitat trees must be prevented.
7. Tree trimming operations must be undertaken using the natural target pruning 'three cut method' as described in the 'Roadside Handbook: An Environmental Guide for Road Construction and Maintenance' (VicRoads 2006).

### **NET GAIN OFFSET PLAN**

8. Before removal of native vegetation starts, a net gain offset plan must be prepared by a suitably qualified ecological specialist and submitted to and approved by the Department of Sustainability and Environment. Once approved, the plan will be endorsed and will then form part of the permit. The offset plan must include the following:
  - a) Details of the proposed offsets which will achieve a net gain in quality and quantity of native vegetation in accordance with the principles and guidelines associated with the *Native Vegetation Management: A Framework for Action (DSE 2002)* or as otherwise approved by the Department of Sustainability and Environment.
  - b) Fully dimensioned plans (drawn to an appropriate scale), which clearly show the locations, boundaries and title details of all offset sites. The plans must also clearly show the boundaries of any different management zones and the location of any proposed fencing.
  - c) Type of offsets to be provided for each location.

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- d) Details of revegetation including number of trees, shrubs and other plants, species mix and density (consistent with the characteristics of the relevant Ecological Vegetation Class).
  - e) Methods of managing and restoring the vegetation, including revegetation, such as fencing, weed control, enhancement planting and other habitat management actions.
  - f) Pest plant and animal control methods.
  - g) A statement of the need to source local seed stock and options available for sourcing of local seed.
  - h) A statement of the need for revegetation works to be carried out by a suitably qualified ecological specialist.
  - i) Methods of permanent protection for the offsets, such as the registration on title of an agreement under Section 173 of the *Planning and Environment Act 1987*, an agreement under Section 69 of the *Conservation Forests and Lands Act 1987*, or a covenant under section 3A of the *Victorian Conservation Trust Act 1972*.
  - j) Persons responsible for implementing and monitoring the offset plan.
  - k) A schedule of management actions, which documents how the net gain outcomes will be achieved within a 10 year timeframe.
9. Prior to the commencement of native vegetation removal, all offset sites must be legally secured by means of the registration of an on-title agreement or covenant to the satisfaction of the Department of Sustainability and Environment and the responsible authority.
  10. All actions specified in the endorsed offset plan must be completed within the specified timeframes, to the satisfaction of the Department of Sustainability and Environment and the responsible authority.
  11. The disturbed roadside areas shall be revegetated as soon as practicable to minimise soil erosion.

#### **UPDATE OF AERONAUTICAL CHARTS**

12. Not less than thirty days before the construction of any of the wind turbines starts, copies of the endorsed development plan(s) must be provided to the Royal Australian Air Force's Aeronautical Information Service to enable details of the wind energy facility to be shown on aeronautical charts of the area.

## ENVIRONMENTAL MANAGEMENT PLAN

13. Before the development starts, an environmental management plan must be prepared to the satisfaction of the Minister for Planning by the wind energy facility operator in consultation with the relevant authorities including at least EPA, DSE, DPI, Corangamite CMA, Barwon Water, Moorabool Shire Council, and the relevant waste management authority.

The environmental management plan should be based on the approach outlined in Attachment 11 of the exhibited planning application report dated January 2010.

The environmental management plan may be prepared in sections or stages.

The environmental management plan must include a copy of the development layout plans as endorsed by the Minister for Planning.

When approved, the environmental management plan will be endorsed by the Minister for Planning and will then form part of this permit.

The environmental management plan must consider and generally be in accordance with:

- EPA Publication 480: *Environmental Guidelines for Major Construction Sites*
- EPA Publication 275: *Construction Techniques for Sediment Pollution Control*
- EPA Publication 891.1: *Code of Practice, Onsite Wastewater Management*
- EPA Publication 628: *Environmental Guidelines for the Concrete Batching Industry*
- EPA Publication 347: *Bunding Guidelines*
- Australian Standard Customer Satisfaction – *Guidelines for complaints handling in organizations* (ISO 1002:2006), and
- Australian Standards Handbook HB 229 2006 *The Why and How of Complaints Handling*.

The environmental management plan should, where appropriate, address and include:

- a) Hazardous Materials
  - i. The identification of all hazardous materials used and or stored on-site in connection with the development and use

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- ii. Procedures for the proper handling and storage of hazardous materials on-site
  - iii. Design criteria for any hazardous materials storage facilities on-site, and
  - iv. Contingency measures to ensure that any spills or leaks of hazardous materials are contained on-site and cleaned up in accordance with Environment Protection Authority requirements.
- b) Water Contamination, Sediment and Erosion Control
- i. The identification of all construction and operational processes that could potentially lead to water contamination
  - ii. The identification of appropriate storage, construction and operational methods to control any identified contamination risks
  - iii. Procedures for the management of contaminated waste water
  - iv. Procedures for the discharge of collected runoff
  - v. Procedures to ensure that silt from batters, cut-off drains, table drains and road works is retained on the site during and after the construction stage of the project. To this end:
    - All land disturbances must be confined to a minimum practical working area and to the vicinity of the identified works areas
    - Soil to be removed must be stockpiled and separate soil horizons must be retained in separate stockpiles and not mixed, and
    - Stockpiles must be located away from drainage lines
  - vi. The installation of geotextile silt fences (with sedimentation basins where appropriate) on all drainage lines from the site which are likely to receive runoff from disturbed areas
  - vii. Procedures to ensure that steep batters are treated appropriately for sediment pollution control
  - viii. A process for overland flow management to prevent the concentration and diversion of waters onto steep or erosion prone slopes, and
  - ix. A requirement for immediate remediation of localised erosion (specifying a response time).

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- c) Waste Control
  - i. The identification of waste reuse, recycling and disposal procedures, and
  - ii. Pollution management measures for stored and stockpiled materials including waste materials, litter and any other potential source of water pollution.
- d) Sanitation and Wastewater
  - iii. Appropriate sanitary facilities and management of the wastewater at the temporary construction compound and permanent facilities for construction works, maintenance staff, operations personnel and visitors is required.
- e) Construction Practices
  - i. Procedures, where practical, to construct wind turbine bases, access tracks and power cabling during warmer months to minimise impacts on ephemeral wetlands, local fauna and sediment mobilisation.
  - ii. Procedures to protect, as far as practicable, native fauna and domestic stock from being injured by or entrapped in excavations or trenches and to fill trenches as soon as practical after excavation, and
  - iii. Procedures for the removal of works, buildings and staging areas on completion of construction of the development.
- f) Concrete Batching Plants
  - i. Criteria for the design of the temporary concrete batching plants
  - ii. Management procedures to prevent pollution of the local waterways, particularly from wash water and waste concrete materials, and
  - iii. Procedures for the operation and removal of any temporary concrete batching plants and for the reinstatement of the site once its use finishes.
- g) Dust

Procedures to suppress dust from construction related activities.

h) Native Flora and Fauna Protection

- i. Surveys by an appropriately qualified ecological specialist at an appropriate time of the year before development starts to confirm that construction footprint does not have an adverse impact on native vegetation
- ii. Require fauna habitat to be considered if there are any changes to the location of wind energy facility infrastructure
- iii. A pest animal and carrion management plan to be prepared in consultation with the Department of Sustainability and Environment and the Department of Primary Industries.

This plan must include:

- procedures for the ongoing management of pest animal populations (e.g. rabbits) and carrion (including livestock, native animals and pest animals), to lessen the availability of potential prey for raptors within the wind energy facility site, and
- a program of early identification and eradication of pest animal populations and carrion.

i) Pest Management

A pest management plan developed in consultation with the owners of the relevant land that includes:

- i. procedures to prevent the spread of weeds and pathogens from earth moving equipment and associated machinery including the cleaning of all plant and equipment before transport to the site and the use of road making material comprising clean fill that is free of weeds
- ii. sowing of disturbed areas with perennial grasses or returned to cropping
- iii. a protocol to ensure follow up weed control is undertaken on all areas disturbed through construction of the wind energy facility for a minimum period of 2 years following completion of the works, and
- iv. procedures for the ongoing management of pest animal populations including a programme of early identification and eradication.

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j) Training

A training program for construction workers, permanent employees and contractors at the wind energy facility site including a site induction program relating to the range of issues addressed by the environmental management plan.

k) Complaints Management

A complaints management plan designed in accordance with *Australian Standard Customer satisfaction – Guidelines for complaints handling in organizations* (ISO 1002:2006) having regard to the guidance provided in *The why and how of complaints handling* HB 229-2006.

The complaints management plan will include procedures for:

- i. Readily accessible information on how complaints can be made free of cost to complainants
- ii. Immediate acknowledgement of complaints and regular and comprehensive feedback to complainants on actions proposed, their implementation and success or otherwise
- iii. Closure of complaints by agreement with complainants
- iv. Establishment and maintenance of a complaint register for the recording of receipt and acknowledgement of complaints, actions taken, success or otherwise of actions and complaint closure and for the register to be available to the public during normal working hours
- v. Reporting of the contents of the complaint register to the responsible authority as required, and
- vi. Regular, at least annual, auditing of the implementation of the complaints management plan with audit results being reported to the responsible authority.

l) Incident Management

- i. A procedure for the establishment and maintenance of an incident register for the recording of:
  - Environmental incidents
  - Non-conformances, and
  - Corrective actions.

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- ii. The register must be available for inspection by the public during normal working hours and its contents should be reported to the responsible authority as required.

#### **REVIEW OF THE ENVIRONMENTAL MANAGEMENT PLAN**

14. The environmental management plan must be reviewed at least once every 5 years, and if necessary amended, in consultation with the Minister for Planning, to reflect operational experience and changes in environmental management standards and techniques. Any amendment of the environmental management plan must be submitted to the Minister for Planning for re-endorsement.

#### **COMPLIANCE WITH ENVIRONMENTAL MANAGEMENT PLAN**

15. The use and development must be carried out in accordance with the endorsed environmental management plan described in condition 7 above to the satisfaction of the Minister for Planning.

#### **BARWON WATER REQUIREMENTS**

16. The waste treatment system for the amenities facilities and any temporary facilities provided during construction phases should not exceed the following maximum limits;
  - 20mg/L BOD; 30 mg/L suspended solids; if subsurface irrigation systems; and
  - 20 mg/L BOD; 30 mg/L suspended solids 10 E coli organisms / 100 ml for surface irrigation systems.
17. All effluent must be restricted to and disposed of within the 100 metres of the treatment facility and or within the boundary of any land title in accordance with the *“State Environment Protection Policy – Waters of Victoria”* and the *Victorian EPA Code of Practice for onsite Wastewater Management*.
18. The wastewater systems are supplied, constructed and installed in accordance with the relevant manufacturer’s specifications. No modifications or variations to the system may be made unless approved by the Victorian Environmental Protection Authority (the “EPA”).
19. Operations and maintenance of the system shall be in strict accordance with the EPA approval requirements and the manufacturer’s specifications.



### **COMPLAINTS MADE TO THE RESPONSIBLE AUTHORITY**

20. If a complaint is received by the responsible authority in regard to the wind energy facility the responsible authority will:
- a) After consideration of the views of the complainant and the wind energy facility operator, determine if a dispute exists with a dispute being defined as a matter remaining unresolved after application of the complaints management plan
  - b) If a dispute is not identified, advise the complainant and the wind energy facility operator that the provisions of the complaint management plan should be utilised, and
  - c) If it is determined that a dispute exists, determine if there is a breach of the permit and if such a breach exists take action to enforce compliance with the permit. In determining whether a breach exists the responsible authority may require the wind energy facility operator to:
    - i. Commission a suitably qualified expert to provide an opinion as to whether a breach exists, and/or
    - ii. Conduct compliance testing (except where the dispute relates to noise and the schedule for noise compliance testing required by condition 46 has not finished).

### **ON-SITE LANDSCAPING PLAN**

21. Within six months of the endorsement of the development plan referred to in Condition 1 and before the development starts, an on-site landscaping plan must be prepared and approved by the Minister for Planning. When approved, the on-site landscaping plan will be endorsed and will then form part of this permit.

The on-site landscaping plan must:

- a) Include plans drawn to scale showing the extent and layout of any landscape plantings to be used to visually screen or otherwise beautify any on-site buildings or works other than the wind turbines
- b) Provide details of plant species proposed to be used in the landscape plantings, including height and spread at maturity
- c) Provide a timetable for implementation of all landscape plantings, and
- d) Provide for maintenance and monitoring program.

## **OFF-SITE LANDSCAPING PLAN**

22. Within six months of the endorsement of the development plans under Condition 1 of this permit, offers to carry out landscape works to mitigate the visual impact of turbines must be made available to the owners of all dwellings within 3 km of a turbine where a turbine is visible. The Shire of Moorabool shall make owners' details available to the permit holder free of charge.

The offers must be available up until 12 months after the commissioning of the last wind turbine of the development or relevant stage.

23. If an offer of landscape mitigation works is accepted, an off-site landscaping plan must be prepared for the particular dwelling, by a suitably qualified person, in consultation with the owner of the property to the satisfaction of the Minister for Planning. When approved, the plan will be endorsed and will then form part of this permit.

The plan must provide details of planting and other treatments that will be used including:

- a) Details of the landscaping necessary to mitigate visual impacts of the wind energy facility, including plant species to be used and the expected height and spread of plants at maturity
- b) A schedule of recommended maintenance of landscaping to be undertaken by the land owner for a period of two years, and
- c) A timetable for implementation of the landscaping works.

The landscaping as shown on the endorsed off-site landscape plans must be completed within 12 months of the endorsement of the particular plan unless otherwise agreed by the landowner.

The wind energy facility operator or developer must pay the full cost for design and implementation of the off-site landscaping plans and the cost of the recommended 2 year maintenance but any of these tasks may be undertaken or arranged by the landowner. The cost must first be agreed between the wind energy facility operator and the relevant landowner.

## **TRAFFIC MANAGEMENT PLAN**

24. Before the development starts a traffic management plan must be prepared, in consultation with Moorabool Shire Council and VicRoads, for submission to and approval by the Minister for Planning. When approved, the plan will form part of this permit.

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The traffic management plan must:

- a) If the proposed Yaloak South wind energy facility has been issued a planning permit and construction of the two facilities are scheduled to overlap, include a plan for consultation between the two permit holders, Moorabool Shire Council and VicRoads as to the appropriate approach to each of the matters in conditions 28b)-o).
- b) Identify all public roads and access points that will be used in the construction and operation of the wind energy facility.
- c) Provide for an existing conditions survey of public roads that will be used in the construction and operation of the wind energy facility including details of the suitability, design, construction standards and condition of the roads to enable, for sealed roads, the calculation of Total ESA (Equivalent Standard Axles) loading for comparison with the appropriate Austroads pavement design guide
- d) Establish the appropriate existing equivalent renewal pavement design and associated costs in conjunction with Moorabool Shire Council and VicRoads and establish the calculated damage (if any) directly attributable to the wind energy facility and the amount (if any) to be reimbursed to Moorabool Shire Council
- e) Include the designation of routes, operating hours and speed limits for oversize vehicles and other heavy vehicles on routes accessing the site so as to avoid interference with the passage of school buses, and to provide for resident safety and the safe management of stock
- f) Provide details of any large over dimensional vehicles to be used (such as those used for the transport of the nacelles, blades and tower sections) and details of the routes to be taken, the proposed escort arrangements and requirements for over dimensional permits from VicRoads
- g) The local roads identified in the Moorabool Wind Project – CG108784 report that will be used to exit onto the arterial roads must be constructed to allow for the vehicle path and sealed back a minimum of 20 metres from edge of seal of the arterial road.
- h) Specify the need for road and intersection upgrades to accommodate any additional traffic or site access requirements, whether temporary or ongoing, and the timing of when these upgrades are to be undertaken

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- i) Include measures to be used to manage traffic impacts associated with the construction and ongoing operation of the wind energy facility (including temporary speed zones and times of operation in accordance with VicRoads 'Roadworks Signing Code of Practice') on the traffic volumes and flows on surrounding roads
- j) Identify any areas of roadside native vegetation which need removal or pruning and the pruning practices to be followed
- k) Include identification and timing of any pre-construction works
- l) Include a program of regular inspections, to be carried out during the construction period, to identify the need for maintenance works necessary as a result of construction traffic
- m) Include agreed criteria that will trigger repair and maintenance works, and
- n) Include a program to rehabilitate roads to the pre-existing condition identified by the above surveys.

**ROADWORKS REQUIREMENTS (VICROADS)**

- 25. Prior to the start of the development the developer must:
  - a) Submit final detailed construction drawings of the altered intersections including line marking to be approved by VicRoads.
  - b) Prepare a specification for the works in accordance with the relevant sections of the VicRoads' Standard Specification For Roadworks.
  - c) Submit construction drawings and location of the new access (GB1) from the Geelong-Ballan Rd for approval.
- 26. Prior to commencing any works in, on, under or over the arterial road reserve, the developer must first apply for, and receive written consent from VicRoads for those works in accordance with section 63 of the *Road Management Act 2004*.
- 27. All roadworks to intersections and access point GB1 must be completed to the satisfaction of VicRoads prior to the commencement of construction works.
- 28. All works to intersections and access point GB1 must be at the developer's cost.
- 29. The contractor must be VicRoads approved or prequalified at R1 level.

### COMPLIANCE WITH TRAFFIC MANAGEMENT PLAN

30. The traffic management and road upgrade and maintenance works associated with the wind energy facility must be carried out in accordance with the traffic management plan to the satisfaction of the Minister for Planning and, subject to condition 28a), the cost of any works including maintenance attributed to the wind energy facility are to be at the expense of the wind energy facility operator.

### EMERGENCY RESPONSE PLAN

31. Before the development starts an emergency response plan must be prepared and approved by the Minister for Planning. When approved the emergency response plan will be endorsed and will then form part of this permit.

The emergency response plan must be generally in accordance with "*Emergency Management Guidelines for Wind Farms*" (Country Fire Authority April 2007).

The emergency response plan must be prepared in consultation with:

- Country Fire Authority
- Victoria Police
- Rural Ambulance Victoria
- State Emergency Service, and
- Any other relevant members of the Moorabool Shire's Municipal Emergency Response Management Committee.

The emergency response plan should generally conform to "*AS 3745-2002 Emergency control organization and procedures for buildings, structures and workplaces*", or any subsequent replacement or amendment.

The emergency response plan must include:

- a) Criteria for the provision of static water supply tanks, solely for fire fighting purposes, including minimum capacities, appropriate connections and signage
- b) Procedures for vegetation management, fuel control and the provision of fire fighting equipment during declared fire danger periods
- c) Minimum standards for access roads and tracks, to allow access for fire fighting vehicles, including access to static water supply tanks

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- d) The facilitation by the wind energy facility operator, before or within 3 months after the commencement of operation, of a familiarisation visit to the site and explanation of emergency services procedures for the relevant members of the Country Fire Authority, Rural Ambulance Victoria, Victoria Police, State Emergency Service and Moorabool Shire's Emergency Response Management Committee
- e) Subsequent familiarisation sessions for new personnel of those organisations as required, and
- f) If requested, training of Country Fire Authority personnel in relation to suppression of wind energy facility fires.

**BAT AND BIRD MANAGEMENT PLAN**

32. Before the development starts a bat and bird management plan (BBMP) to the satisfaction of the Minister for Planning must be prepared in consultation with the Department of Sustainability and Environment. When approved, the plan will be endorsed and form part of the permit.

The BBMP must include:

- a) A statement of the objectives and overall strategy for managing and mitigating any significant bird and bat strike arising from the wind energy facility operations
- b) A monitoring program of at least two years duration from the commissioning of the last turbine including surveys during the breeding and migratory seasons to ascertain:
  - (i) The presence, behaviour and movements of any Wedge-tailed Eagles, especially breeding pairs in the vicinity of the wind energy facility
  - (ii) The species, number, age, sex (if possible) and date of bird and bat strikes
  - (iii) Procedures for the reporting of any bird or bat strikes to the Department of Sustainability and Environment. Any bird strikes affecting Wedge-tailed Eagles must be reported to the DSE within 7 days of becoming aware of any strike
  - (iv) Seasonal and yearly variation in the number of bird and bat strikes
  - (v) The efficacy of searches for carcasses of birds and bats, and where practical, information on the rate of removal of carcasses by scavengers, so that correction factors can be determined to enable calculations of the total number of mortalities.

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- c) Procedures for the regular removal of carrion (including livestock, native animals and pest animals) likely to attract raptors to areas near wind turbines
  - d) Requirements for periodic reporting, within agreed timeframes of the findings of the monitoring to the Department of Sustainability and Environment
  - e) Recommendations in relation to a mortality rate for specified species which would trigger the requirement for responsive mitigation measures to be undertaken by the proponent to the satisfaction of the Minister for Planning, and
  - f) Details of any responsive mitigation measures which may be implemented if the trigger mortality rate for a specified species is exceeded.
33. Following the completion of the monitoring program in accordance with the BBMP, a bat and bird monitoring report must be prepared by the applicant setting out the findings of the monitoring program to the satisfaction of the Minister for Planning.

**STRATEGY FOR MONITORING AND MITIGATION MEASURES FOR IMPACTS ON ECOLOGICALLY SIGNIFICANT BATS AND BIRDS**

34. In the event that impacts detected during the BBMP's monitoring program are considered by the Minister for Planning to be ecologically significant, a monitoring and mitigation measures strategy must be prepared in consultation with the Department of Sustainability and Environment to the satisfaction of the Minister for Planning. When approved the monitoring and mitigation measures strategy will be endorsed and will then form part of this permit.

The monitoring and mitigation measures strategy must include, for each species for which ecologically significant impacts have been detected:

- a) Further monitoring of the 'targeted' species, and
- b) Mitigation measures for 'targeted' species.

all to be implemented to the satisfaction of the Minister for Planning.

**TELEVISION AND RADIO RECEPTION AND INTERFERENCE**

35. A pre-construction survey must be carried out to the satisfaction of the Minister for Planning to determine television and radio reception strength

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at selected locations within 5kms of any wind turbine including non-stakeholder dwellings. The location of such monitoring is to be determined to the satisfaction of the Minister for Planning by an independent television and radio monitoring specialist appointed by the operator under this permit.

Note: For the purpose of this condition, a non-stakeholder means the land holder of an abutting property without a contract in respect of the installation of associated wind turbines on that person's property.

36. If, following commencement of the operation of the wind energy facility, a complaint is received regarding the wind energy facility having an adverse effect on television or radio reception at the site of any dwelling in the area which existed at the date of the pre-construction survey, a post-construction survey must be carried out at the dwelling.
37. If the post-construction survey establishes any increase in interference to reception as a result of the wind energy facility operations, the wind energy facility operator must undertake measures to mitigate the interference and return the affected reception to pre-construction quality at the cost of the wind energy facility operator and to the satisfaction of the Minister for Planning.

#### **BLADE SHADOW FLICKER**

38. Shadow flicker from the wind energy facility must not exceed 30 hours per annum at any dwelling existing as at the date of this permit to the satisfaction of the Minister for Planning.

Any dwelling on subject land may be exempt from this condition. This exemption will be given effect through an agreement with the landowner that will apply to any occupant of the dwelling and must be registered on title.

#### **NOISE LIMITS**

39. Construction of the wind energy facility must comply with noise criteria specified in the *Interim Guidelines for Control of Noise from Industry in Country Victoria, N3/89* at any dwelling existing on land in the vicinity of the proposed wind energy facility as at the date of the issue of this permit to the satisfaction of the Minister for Planning.



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40. Except as provided below in this condition, the operation of the wind energy facility must comply with the noise criteria specified in NZS6808:1998 'Acoustics - The Assessment and Measurement of Sound from Wind Turbine Generators' at any dwelling existing on land in the vicinity of the proposed wind energy facility as at the date of the issue of this permit, to the satisfaction of the Minister for Planning.

In determining compliance the following requirements apply:

- a) The sound level from the wind energy facility within 20 metres of any dwelling must not exceed a level of 40dBA (L<sub>95</sub>) or where the relationship between background noise levels and wind speed has been determined by the method specified in Condition 42 of this permit, the background noise level by more than 5dBA, or a level of 40dBA L<sub>95</sub>, whichever is the greater.
- b) Compliance must be assessed separately for all-time and night time. For the purpose of this requirement, night time is defined as 10.00pm to 7.00am, and
- c) If the noise has a special audible characteristic the measured sound level must have a penalty of 5dBA applied.

Any dwelling on the subject land may be exempt from this condition. This exemption will be given effect through an agreement with the landowner that must apply to any occupant of the dwelling and must be registered on title. Such dwellings will be known as host dwellings.

#### NOISE COMPLIANCE TESTING

41. Before the development starts a noise compliance testing plan must be prepared by a suitably qualified acoustics expert to the satisfaction of the Minister for Planning.

When approved, the noise compliance testing plan will be endorsed by the Minister for Planning and will then form part of this permit.

The use must be carried out in accordance with the noise compliance testing plan to the satisfaction of the Minister for Planning.

The noise compliance testing plan must include:

- a) A determination of the noise limits to be applied during construction using the methodology prescribed in the *Interim Guidelines for the Control of Noise from Industry in Country Victoria*, N3/89

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- b) A program of compliance testing to be implemented during the construction of the wind energy facility that:
- i. Is designed by a suitably qualified acoustic expert, and
  - ii. Utilises the methodology prescribed in *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1*, to demonstrate compliance with the limits determined in (a) above.
- c) A prediction, by a suitably qualified acoustic expert, of the area within which the noise level from the wind energy facility during full operation will be 35dB(A) or greater
- d) Identification of all dwellings, excluding host dwellings, within the area predicted in (c) above and a statement as to whether consent from the owner of each of the identified dwellings for compliance testing has been obtained or refused
- e) A method or methods of testing compliance with the noise limits prescribed in Condition 45 of this permit for each dwellings identified in (d) above for which consent for the conduct of compliance testing has been obtained.

The compliance testing method must be either:

- i. The method described in *NZS6808:1998 'Acoustics – the Assessment and Measurement of Sound from Wind Turbine Generators'* with the following criteria being met:
  - The regression curves required must be derived from a data set:
    - Of at least 500 noise level/wind speed data pairs
    - Including wind speed measurements made at turbine hub height
    - Including at least 10 data pairs or 1% of the total number of data pairs whichever is the greater at wind speeds greater than 8 m/s
    - Including at least 10 data pairs or 1% of the total number of data pairs whichever is the greater at wind speeds less than 4 m/s, and
    - With the percentage of data pairs that are the results of measurements made with the wind in the direction from the wind energy facility to the dwelling being equal or greater than values determined in (f) below, and

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- The coefficient of determination for the regression curves will be 0.5 or greater, or
- ii. A method, designed by a suitably qualified acoustics expert, in which measurements of operating and background noise levels are measured with:
  - Background noise levels being measured with all turbines that, when operating, influence the noise level at the dwelling, shut down, and
  - The wind in the direction from the wind energy facility to the dwelling for at least 50% of the measurement period.
- f) For each dwelling at which compliance testing is to be performed, determination of the maximum monthly proportions of the wind direction distribution that is from the wind energy facility to the dwelling, plus or minus 22.5 degrees
- g) Identification of any dwellings in (d) above at which predictions indicate the noise levels in condition 45 may not be achieved at all wind speeds and directions, and preparation of a noise management plan that:
  - i. identifies wind speeds and directions or times of day during which compliance may not be achieved; and
  - ii. identifies operational procedures to reduce noise levels at those wind speeds and directions or times of day to the levels required by condition 45.
- h) A schedule for compliance testing under which compliance testing at all identified dwelling for which consent for such testing has been obtained is performed in the 14 months following the commissioning of the last turbine in a section of the wind energy facility or a stage of the wind energy facility, if the development is in stages, and repeated between 10 and 14 months after the first compliance test
- i) A procedure for the assessment, by a suitably qualified acoustics expert, of the characteristics of the noise from the wind energy facility to determine if that noise has any special audible characteristics that require the addition of 5 dB(A) to the measured operating noise levels as required in Condition 45 of this permit.
- j) A procedure under which all results of compliance testing conducted in any month are reported to the Minister for Planning by the 15<sup>th</sup> day of the following month and to the owners and occupiers of particular

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dwelling as soon as results relating to that particular dwelling are available, and

- k) A procedure under which the implementation of the noise compliance testing plan is directed and supervised by a suitable qualified acoustic expert to the satisfaction of the Minister for Planning.

## NOISE COMPLIANCE ENFORCEMENT

42. If an exceedence of the noise limits prescribed in Condition 46 of this permit is detected the wind energy facility operator must:

- a) Within 5 days of the detection of the exceedence, take sufficient actions to reduce the wind energy facility noise level at the subject dwelling as predicted using the prediction methodology contained in *NS6808:1998 'Acoustics – the Assessment and Measurement of Sound from Wind Turbine Generators'* by an amount equal to or greater than the amount of exceedence.
- b) Within 7 days of the detection of the exceedence, provide the responsible authority and the owner/occupier of the dwelling with:
  - i. The results of the compliance testing measurements including the magnitude of the detected exceedence
  - ii. Details of the actions taken to reduce the wind energy facility noise emissions, and
  - iii. Evidence that the actions taken will produce a decrease in the wind energy facility noise level at the dwelling by an amount equal to the magnitude of the exceedence based on a prediction using the methodology of *NZS6808:1998 'Acoustics – the Assessment and Measurement of Sound from Wind Turbine Generators'*.
- c) Continue to operate the wind energy facility with the implemented actions until approval for a different mode of operation is given by the responsible authority under the provision of (d) below
- d) Within 60 days of the detection of an exceedence provide the responsible authority and owner/occupier of the dwelling with either:
  - i. The result of compliance testing using the procedures prescribed in Condition 46 of this permit that demonstrate compliance, or
  - ii. A program for the development and evaluation of an alternative mode of wind energy facility operation that can be reasonably be

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expected to result in continuing compliance with noise levels as allowed in Condition 41 of this permit.

The program will:

- Be developed and implemented under the supervision of a suitably qualified acoustics expert
- Include detailed descriptions of proposed actions
- Include predictions of wind energy facility noise levels at the dwelling at each stage of the program
- Not include any actions or combination of actions that are predicted to result in non-compliance
- Include compliance testing using the procedures prescribed in Condition 46 of this permit both as the final step in the program and with that compliance testing being repeated after between 10 and 14 months, and
- Include a program schedule that specifies the timing of each stage of the program

to the satisfaction of the responsible authority.

Within 10 days of receipt of the program the responsible authority will either:

- a) Approve the implementation of the program, or
- b) Advise the wind energy facility operator of modifications to the program that are required before approval will be granted.

If the responsible authority requires the program to be modified, the wind energy facility operator may either submit a modified program or immediately withdraw the program and conduct compliance testing using the procedures prescribed in Condition 46 of this permit.

Following implementation of the program, the wind energy facility operator may provide the responsible authority and the owner/occupier with a detailed description of an alternative mode of operation of the wind energy facility together with evidence that under that mode of operation compliance can be expected, to the satisfaction of the responsible authority. Given such information and evidence the responsible authority may approve the operation of the wind energy facility in the alternative mode and such approval will not be unreasonably withheld.

## **DECOMMISSIONING**

43. The wind energy facility operator must, no later than one month after all wind turbines have permanently ceased to generate electricity, notify the Minister for Planning in writing of the cessation of the use. Within a further six months of this date, the wind energy facility operator, or in the absence of the operator, the owner of the land on which the relevant turbines(s) is/are located, must prepare a decommissioning plan to the satisfaction of the Minister for Planning. When approved, the decommissioning plan will become part of this permit.
44. The decommissioning plan must provide for the following:
- a) The removal of all above ground operational equipment
  - b) The removal and clean up of any residual spills or contamination
  - c) The rehabilitation of all storage, construction, access tracks and other areas affected by the project closure or decommissioning, if not otherwise useful to the on-going management of the subject land
  - d) A decommissioning traffic management plan
  - e) A post decommissioning revegetation management plan.

The decommissioning plan must be implemented to the satisfaction of the Minister for Planning within 24 months of approval of the plan or within such other timeframe as may be specified by the Minister.

## **BUSINESS IDENTIFICATION SIGNS**

45. The total advertisement area to each business identification sign must not exceed 3 square metres.

## **EXPIRY**

46. This permit will expire if one of the following circumstances applies:
- i. the development is not started within 5 years of the date of this permit;
  - ii. the development is not completed within 10 years of the date of this permit.

The Minister for Planning, as responsible authority, may extend the periods referred to if a request is made in writing before the permit expires, or within three months afterwards.

**Notes:**

**For the purpose of this permit, a host means the land holder of a property within the subject land with a contract in respect of the installation and operation of the wind energy facility.**