CROWLANDS WIND FARM
PYRENEES PLANNING SCHEME
PERMIT APPLICATION 2007/0525
ARARAT PLANNING SCHEME
PERMIT APPLICATION 2007/0562

PANEL REPORT

Nick Wimbush, Chair

Esther Kay, Member

Doug Munro, Member

18 June 2008
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1. Overview

This is the report of the Panel appointed under Sections 97E, 153 and 155 of the Planning and Environment Act 1987 to hear and consider submissions on the planning permits for the Crowlands Wind Farm.

<table>
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<th>Recommendation in Chief:</th>
<th>The Panel recommends that subject to the detailed recommendations in this report, planning permits for the Crowlands Wind Energy Facility should be issued.</th>
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| The Permit Applications:  | Pyrenees Planning Scheme Application 2007/0525 (Wind Energy Facility)  
Ararat Planning Scheme Application 2007/0562 (Wind Energy Facility) |
| The Project:             | If approved, the Crowlands Wind Farm will:  
• be located near the township of Crowlands in the Pyrenees Shire approximately 25 km north east of Ararat;  
• have up to 72 turbines of up to 146.5 m maximum height to blade tip (100 m tower and 93 m rotor diameter) across an 816 ha generator development envelope (see Figure 1 for wind farm layout);  
• have a generating capacity of up to 165.6 MW (each turbine generating up to 2.3 MW);  
• produce over 430 GWh per year of electricity from a renewable source and mitigate more than 430 kt per year of greenhouse gas emissions; and  
• have associated components including permanent wind monitoring masts, temporary construction facilities, three minor and one major substation, access tracks and internal power connections. |
<p>| The applicant:           | Energy Pacific Pty Ltd (a wholly owned subsidiary of Pacific Hydro Pty Ltd). In this report Pacific Hydro is used as the common name for the applicant. |</p>
<table>
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<tr>
<th><strong>Responsible Authority:</strong></th>
<th>Minister for Planning</th>
</tr>
</thead>
</table>
| **Significant Process Dates:** | Permit applications lodged: 21 June 2007 (Pyrenees Shire), 24 August 2007 (Ararat Rural City)  
Exhibition: Six weeks closing on 7 November 2007  
Panel Hearing Dates: 5, 6, 7, 12, 13, 14 February 2008 at Pyrenees Shire Offices, Beaufort. 1 April 2008, Planning Panels Victoria, Melbourne.  
Date of this report: 18 June 2008 |
| **Panel Members:** | The Panel was appointed on 15 November 2007 consisting of:  
Mr Nick Wimbush (Chair);  
Mr Doug Munro; and  
Ms Esther Kay. |
| **Site inspection:** | The Panel undertook an Accompanied site inspection on 13 February 2008 visiting key areas of the site and surrounds. The Panel also viewed the surrounding areas unaccompanied on a number of occasions. |
| **Appearances:** |  
- Mr Mark Gregory (Department of Planning and Community Development) for the Minister for Planning  
- Mr Tim Power from Freehills for Pacific Hydro Pty Ltd instructed by Ms Fiona Curl of Freehills Lawyers. They called evidence from:  
  - Mr Andrew Prout (surface water and erosion risk),  
  - Mr Brett Lane (flora and fauna),  
  - Mr Alan Mackinlay (site access),  
  - Mr Nigel Ashton (traffic),  
  - Mr John Glossop (planning),  
  - Mr Peter Bryant (aviation safety),  
  - Mr Christophe Delaire (noise); and  
  - Mr Allan Wyatt (visual and landscape).  
Mr Lane Crockett and Mr Roger Holloway also made submissions on behalf of Pacific Hydro. |
| Submitters (in order of receipt): | 
|----------------------------------|---|
| Mr Andre Dalton for Pyrenees Shire Council | Environment Protection Authority |
| Mr Michael Williamson for Sustainability Victoria | GWM Water |
| Mr Brendan Brown, Country Fire Authority | Thomas and Valerie Mortyn |
| Mr Frank Campbell | Mr Frank Campbell |
| Ms Helen Darbyshire | B C & R M Leslie |
| Mr Douglas Boatman | Country Fire Authority |
| Mr Walter Henning | Ms Helen Darbyshire |
| Mr Peter Start | Department of Sustainability and Environment |
| Mr Robert and Ms Isabella Burns | VicRoads |
| Mr Robert John | Mr Walter Henning, Landsborough Valley Estate |
| Mr Graeme Maconachie | Mr Greg Stafford and Ms Elaine Duxbury |
| Mr Bernard Browne | Mr Robert John |
| Mr Andrew Bradley | R S & I S Burns |
|                           | Mr Douglas and Ms Pauline Boatman |
|                           | Mr Peter Start |
|                           | Pyrenees Shire Council |
|                           | Mr Bernard Browne |
|                           | Mr Dale Clarke, Domaine Terlato and Chapoutier |
|                           | Mr Graeme Maconachie |
|                           | Ms Sandra Hawkins, Ararat Greenhouse Action Group |
|                           | Mr Jack and Ms Lynne Start |
| Key issues from submissions addressed in this report | • Landscape and visual impact  
• Flora and fauna  
• Noise  
• Transport and site access  
• Impact on the land |
Figure 1. Wind farm layout (Figure 10 in planning application)
Figure 2. Generator development envelopes
2. Planning and other approvals

This section of the Report considers the policy context for the Crowlands wind farm and focuses on the strategic and policy issues. It assesses how the application meets the objectives of the Pyrenees and Ararat Planning Schemes. The following sections of this Report include a brief appraisal of the State Planning Policy Framework (SPPF), the Municipal Strategic Statements (MSS) and Local Planning Policies, and the appropriate zone and overlay controls. It is followed by a description of the additional approvals that would be required for this project to proceed.

The submissions from the Department of Community Planning and Development, the Pyrenees Shire Council and the evidence from Mr Glossop for the applicant set out the details of the relevant planning provisions. The Panel notes that other submitters did not take issue with what was put forward in this regard. Mr John and Mr Burns also directed the Panel to the Pyrenees policy encouraging development of viticulture.

The Panel does not propose to set out the details of all the provisions that may be relevant; rather, the Panel will refer to them as appropriate. The clauses referred to this discussion are contained in the Pyrenees and Ararat Planning Schemes.1

2.1 Policy framework

2.1.1 State Planning Policy Framework

The State Planning Policy Framework (SPPF) identifies overarching policy requirements for land use and development decisions.

Sustainable development and net community benefit

Clause 11 Goals and principles of planning. An overall goal for planning is to “integrate relevant environmental, social and economic factors in the interests of net community benefit and sustainable development.”

Development should be orderly, coherent and sustainable over the longer term. Relevant planning factors should be addressed in an integrated manner so that, in general, benefits are maximised and the benefits achieved

as an outcome of the project do not create disproportionate disbenefits in other areas.

Additionally, planning is to contribute to the economic well-being of communities and the State as a whole, through facilitating decisions and resolving land use conflicts, so that each district may build on its strengths and achieve its economic potential. Where proposals cross municipal boundaries and agency jurisdictions, as this project does, then decisions must be coordinated between neighbouring municipalities and with other public bodies.

**SPPF clauses that establish the strategic context for this proposal**

Clause 15.14 *Renewable energy* promotes the provision of renewable energy, including wind energy facilities. This clause calls up the *Policy and planning guidelines for development of wind energy facilities in Victoria, 2003* (‘the Wind Farm Guidelines’).

The Crowlands wind farm would contribute over 430 GWh per annum to Victoria’s renewable energy target.

Clause 17.04 *Tourism* encourages tourism development that maximises employment and assists the State to be a competitive tourist destination.

There is some evidence that wind farms can be promoted as a tourism destination, eg. tours at the Codrington Wind Farm, which assists the local tourism economy. Refer to Section 8.5.

Clause 17.05 *Agriculture* seeks to protect the State’s agricultural base from unplanned loss and encourages sustainable agriculture.

There is no evidence that wind farms undermine agricultural activity, especially on grazing land as is found at this site, and no subdivision of land is proposed. Additional income from the wind farm operator will supplement farm income and can be used to fund farming activities as well as more sustainable farming and land management practices. Refer to Section 8.5.

**SPPF clauses relevant to assessment of this proposal**

Clause 15.01 *Protection of catchments, waterways and groundwater* requires avoidance of activities which degrade catchment soils and water sources.

The wind farm development has potential to adversely affect local soil stability in the Wimmera River Catchment and particularly the Malakoff Creek, Glenlofty Creek, Tuckers Creek, Spring Creek, Glendhu Creek and
Shays Creek sub-catchments. The geotechnical conditions require special attention to construction design and construction practices. Moving the location of one turbine (14) out of the Malakoff Creek water supply catchment will avoid or greatly reduce potential impacts on this catchment. Negotiations are also being held with an adjacent landowner (Mr Henning) to relocate part of the access track between turbines 14 and 19 from the Malakoff Creek catchment to the Glendhu Catchment which will further reduce impact.

Clause 15.04 Air quality requires protection and improvement of air quality. Wind energy provides electricity generation free of air pollution. The key issue for Crowlands is preventing dust pollution during construction activities, through appropriate road or access track treatments and active dust control measures. Refer to Section 6.

Clause 15.06 Noise abatement states that suitable project design or distance separation is needed to protect sensitive land uses and development.

The noise standard for wind farms is the NZS 6808:1998. Tests have been carried out and further testing will be required pre and post-construction. The standard can be met for existing dwellings except for two dwellings owned by participating land owners.

There are proposals for dwellings and tourist accommodation on some neighbouring properties where the noise criteria may not be met and these are discussed further in Sections 5 and 9.

Construction noise will be managed within the EPA Publication 480 Environmental Guidelines for Major Construction Sites and the EPA Noise Control Guidelines Document TG302/92.

15.07 Protection from wildfire requires avoidance of conditions that promote wildfire and installation of appropriate infrastructure and equipment to assist with fire fighting efforts.

At this site, there is a need for dedicated on-site water supply for fire fighting and clear access and egress for CFA vehicles and equipment. This needs to be coordinated with the regional and local CFA command. Refer to Section 8.6.

Clause 15.09 Conservation of native flora and fauna requires protection and conservation of biodiversity, including native vegetation and habitats for native plants and animals, and suitable control of pest plants and animals.

The biological and botanical surveys indicate the site contains limited habitat for native plants, animals and birds. However there are stony outcrops,
remnant vegetation and regenerated native vegetation within the construction areas and surrounds. The proposal must deal with potential adverse impacts on native species and avoid, minimise and offset native vegetation losses as required by Victoria’s Native Vegetation Management – A Framework for Action (Department of Natural Resources and Environment 2002). Refer to Section 4. Control of pest plants and animals will be necessary both during and following construction. Refer to Section 4.

15.11 Heritage requires the conservation of places that have natural, environmental, aesthetic, historic, cultural, scientific or social significance or other special values important for scientific and research purposes.

The site contains landforms of geomorphological interest, but these will not be devalued through the construction of the wind farm. Refer to Section 7. Glendhu Historic Reserve will be crossed by an access track as approved by Parks Victoria. The proposal will require separate approval from the Registered Aboriginal Party in accordance with the Aboriginal Heritage Regulations 2007.

Clause 18.09 Water supply, sewerage and drainage states runoff from development should not contaminate water supplies.

Construction activities can contaminate the catchment with sediments and waterborne pollutants. For this proposal, proper construction and post-construction management is the key to avoiding this problem. Refer to Section 7.

Clause 19.03 Design and built form requires development to have regard to its context and achieve good quality design.

The wind turbines, and to a lesser extent, access tracks, substations and overhead power lines will be dominant in the local landscape and in some cases will be located in close proximity to non-participating land owners. There are potential visual impacts on surrounding land owners. Refer to Sections 3 and 9.

The Panel concludes that there is strategic support for the application in the planning scheme, in terms of renewable energy, diversification of rural economic activity and potentially tourism development. State and local policy and the relevant zone guidelines provide guidance on the issues to be addressed by the applicant and this Panel. The Panel addresses these issues in the following sections of its report.
2.1.2 Local Planning Policy Framework

The Municipal Strategic Statement and Local Planning Policies include the planning objectives and policies of the municipality. The following are most relevant to this proposal:

Agriculture

_Pyrenees Planning Scheme:_ clause 21.05-1.1 *General Farming Areas*, clause 21.05-1.8 *Areas with Special Suitability for Viticulture Development*, clause 22.02 *Agricultural Policies*, clause 22.03 *Environmental Policies*, clause 22.05 *Employment Policies_. _Ararat Planning Scheme:_ clause 21.06 *Economic Development_.

Continued and sustainable agriculture is a key objective for farming areas. Agricultural practices should reduce salinity and land degradation and protect significant habitats and remnant vegetation.

The slopes of the steep land (within the Palaeozoic II, Palaeozoic III and Metamorphic land systems) in the Pyrenees Shire are appropriate for viticulture and these enterprises are encouraged (This relates to northern and eastern slopes immediately outside the wind farm site boundary).

Environmental resources and hazards

_Pyrenees Planning Scheme:_ clause 21.05-1.2 *Environmentally Sensitive Rural Areas*, 22.03 *Environmental Policies*, clause 22.06-01 *Native Vegetation Protection*, clause 21.05-1.6 *Waterways and Water Resources_. _Ararat Planning Scheme:_ clause 21.05 *Environment_.

Waterways and water catchments should be protected from vegetation, biodiversity and habitat loss, catchment degradation and water pollution.

Sensitive hilltops in Pyrenees Shire are to be protected. Significant hills, ridgelines and other key topographic features are to be preserved. Developments should maintain existing vegetation and revegetate cleared areas to reduce erosion. Proposals should consider the physical limitations of the land and associated risks. Vegetation and pasture should be retained in areas designated as environmentally sensitive, such as sensitive hilltops.

Wildfire

_Pyrenees Planning Scheme:_ clause 21.05-1.5 *Public Safety*, clause 22.06-03 *Wildfire Land Use Safety Policies_.
Wildfire is a feature of the area and new development should incorporate suitable precautions and manage fire risk. Developments should provide adequate water supply with suitable flow rates. Vehicle access and other infrastructure should support fire fighting efforts.

Employment

Pyrenees Planning Scheme: clause 22.05 Employment Policies.

Agriculture is recognised as a mainstay of the local economy. Diversification of agriculture is encouraged, including establishment of viticulture.

2.2 Planning scheme provisions

2.2.1 Zones

Rural Conservation Zone

The Rural Conservation Zone (RCZ) applies to extensive areas of environmental sensitivity in the Pyrenees Shire. It covers all ridgelines on which turbines are proposed except for T37 and possibly T36, and areas proposed for site access, substations and construction activities.

The specific purposes of the zone are:

- To conserve the values specified in the schedule to this zone.
  Panel Note: The conservation value identified in the schedule is “The protection of lands which have no or very low development potential based on land capability analysis of the former Land Conservation Council.”

- To protect and enhance the natural environment and natural processes for their historic, archaeological and scientific interest, landscape, faunal habitat and cultural values.

- To protect and enhance natural resources and the biodiversity of the area.

- To encourage development and use of land which is consistent with sustainable land management and land capability practices, and which takes into account the conservation values and environmental sensitivity of the locality.

- To provide for agricultural use consistent with the conservation of environmental and landscape values of the area.
To conserve and enhance the cultural significance and character of open rural and scenic non urban landscapes.

A Wind Energy Facility is a Section 2 use.

Mr Glossop tendered an extract of the Land Use and Development Strategy Plan, June 1997, prepared by Pyrenees Shire with Network Planning Consultants. The Plan was used as the basis for preparing the Pyrenees new format planning scheme. Figure 4 shows the ridgelines forming part of the Crowlands Wind Farm site. These are indicated as areas of steep, cleared land prone to environmental hazard. Figure 5 indicates the extent of the Environmental Rural Zone (the predecessor zone to the RCZ) and notes it is to be applied to areas with planning and environmental constraints.

Decision guidelines require consideration of:

- State and local policy.
- Land capability, environmental capacity and catchment strategies.
- Conservation of identified values.
- Protection and enhancement of the environmental, agricultural and landscape qualities of the site and its surrounds.
- Compatibility with adjoining land uses and impacts on adjoining land.
- Impacts on existing and proposed infrastructure.
- Impacts on biodiversity, flora and fauna, and habitats, and the need to revegetate land and manage pests.
- Whether an integrated land management plan is need.
- The need to minimise impacts of siting, design, height, bulk, and colours and materials on landscape features, major roads and vistas.
- The location and design of infrastructure, including roads, which minimises the visual impact on the landscape.
- Features of archaeological, historic or scientific significance or of natural scenic beauty or importance.

The application, submissions and evidence address the zone’s decision guidelines and these issues are dealt with in this Panel report.

At the Panel hearing, Mr Glossop specifically addressed the decision guideline requiring consideration of compatibility with adjoining land uses and impacts on adjoining land. Mr Glossop in evidence characterised the wind farm as a rural industry. He then suggested that residents of rural areas should not expect the same level of amenity as those in residential zones. The Panel agrees with this approach in principle but notes that not all amenity impacts are acceptable simply because they derive from the more
industrialised elements of rural activity. Rather the character, extent and accumulation of amenity impacts should be considered in each circumstance.

The impacts on particular surrounding landowners and uses are discussed in detail in Section 9.

**Farming Zone**

The FZ applies to the general farming areas in the Pyrenees Shire and Ararat Rural City. It covers areas proposed for site access.

The specific purposes of the zone are:

- To provide for the use of land for agriculture.
- To encourage the retention of productive agricultural land.
- To ensure that non-agricultural uses, particularly dwellings, do not adversely affect the use of land for agriculture.
- To encourage use and development of land based on comprehensive and sustainable land management practices and infrastructure provision.
- To protect and enhance natural resources and the biodiversity of the area.

A Wind Energy Facility is a Section 2 use.

**Public Conservation and Resource Zone**

The PCRZ applies to Glendhu Historic Reserve. One access track is proposed (where outside the road reserve). The specific purposes of the zone include:

- To protect and conserve the natural environment and natural processes for their historic, scientific, landscape, habitat or cultural values.
- To provide facilities which assist in public education and interpretation of the natural environment with minimal degradation of the natural environment or natural processes.
- To provide for appropriate resource based uses.

Parks Victoria is the public land manager and will need to agree to any access across the reserve consistent with these objectives.
### 2.2.2 Overlays

The *Environmental Significance Overlay – Schedule 1 Designated Water Supply Areas* applies to the Malakoff Creek Water Supply Catchment. Development of a turbine and ridgeline access was originally proposed, but it would be possible to relocate this development outside the catchment boundary.

The *Environmental Significance Overlay – Schedule 2 Watercourse Protection* and *Design and Development Overlay – Schedule 1 Potentially Flood-Prone Areas* apply to the Wimmera River. The only development proposed within the overlay areas is a constructed river crossing. The Wimmera Catchment Management Authority is satisfied that environmental values including water quality can be protected and that the crossing can be constructed in a manner that accommodates flood flows while providing safe passage.

The *Wildfire Management Overlay* applies to some parts of the wind farm site, including ridgelines. A Wind Energy Facility is not listed as one of the uses that triggers a need for a buildings and works permit.

The *Restructure Overlay* applies to land parcels within the site investigation area. No development is proposed that triggers a permit under this overlay.

The *Vegetation Protection Overlay 2* covers a number of possible access roads in the Ararat Rural City including the Buangor - Ben Nevis Road. A permit to remove, destroy or lop vegetation on such roads is required under the VPO. This application has not been made as part of the proposal before this Panel.

### 2.2.3 Particular provisions

*Clause 52.17 Native Vegetation* requires applicants to design proposals so that native vegetation can be avoided where possible, or alternatively losses are minimised and offset planting included. The applicant proposes altering some intersections at main roads to avoid loss of mature trees through intersection widening. Some losses will occur on ridgelines due to turbine construction. An offset plan is required and planting will be particularly important for ongoing erosion control. Refer to Section 4.

The applicant has submitted that removal of a minimum amount of native vegetation for turbine, substations and above ground cabling does not require a permit as they are ‘buildings’ and therefore exempt under the planning scheme. This issue is addressed further in Section 4.
Clause 53.32 Wind Energy Facility has been included in the planning scheme to facilitate the planning and assessment of these facilities. The Panel is satisfied that the application requirements have been met.

The provision requires decision-makers to consider, amongst other things, the Wind Farm Guidelines. The Wind Farm Guidelines highlight the need for wind farm applications to address location, grid connection, energy benefits, greenhouse gas savings, environmental values, Aboriginal heritage values, landscape values, social and economic effects, noise, blade glint, shadow flicker, overshadowing, electromagnetic interference, aviation safety, and construction and post construction management. The Panel considers the applicant has satisfactorily addressed these matters. The Panel has commented on these issues further as necessary in Section 8.

2.3 Overall conclusion on planning issues

The Panel concludes that there is strategic support for the application in the planning scheme, in terms of renewable energy, diversification of rural economic activity and potentially tourism development. State and local policy and the relevant zone guidelines provide guidance on the issues to be addressed by the applicant and this Panel. The Panel addresses these issues in the following sections of its report.

2.4 Additional approvals required

In addition to any planning permits issued by the Minister for Planning, the proposal would need to gain approvals from the following authorities before it could proceed:

Registered Aboriginal Party. Approval of a Cultural Heritage Management Plan. The applicant has begun the formal process. This Plan must be approved before a planning permit can be issued.

Parks Victoria. Access through Glendhu Historic Reserve. At the conclusion of the Panel hearing, the applicant was still in discussion with Parks Victoria about the final location of an access track through the Reserve.

VicRoads. Over dimensional loads for turbine and equipment delivery during construction. Changes to intersections to facilitate site access. Escort vehicles. At the conclusion of the Panel hearing, the applicant was still in discussion with VicRoads on these matters. Changes to intersections are proposed to avoid intersection widening that would require removal of native vegetation.
Wimmera Catchment Management Authority. Wimmera River crossing and permits for crossing of designated waterways under the *Water Act 1989*. The Authority offered no specific comments on the permit application.

Permit conditions are proposed that would require the Pyrenees and Northern Grampians Shire Councils and Ararat Rural City Council, the CFA, DSE, Parks Victoria, VicRoads and the Wimmera Catchment Management Authority to approve various management plans.
3. **Landscape assessment and visual impact**

3.1 **Background**

In considering this issue, the Panel was informed by the planning application, applicant’s submission and submissions from local residents and businesses. The Panel particularly relied on:

- Evaluation criteria in the *Policy and planning guidelines for development of wind energy facilities in Victoria*;
- Sections 8.3 and 9.2 and Part B (Vol 1) and the report titled *Landscape and Visual Assessment* (Vol 2) of the planning application;
- Draft *Visual Screening of Residences Program* management plan in Vol 1 Part B of the planning application;
- Mr Wyatt’s expert evidence;
- Applicant’s submission to the Panel Part B2;
- Other submissions which raised this issue; and
- Panel site inspections from roads surrounding the wind farm site, local towns and more distant locations and by visits to submitters’ properties.

In its evaluation, the Panel deals first with the likely effects on the broader landscape and then with those issues raised by individual landowners in proximity to proposed turbine sites who made submissions to the permit application.

3.2 **Landscape assessment**

3.2.1 **Discussion**

The wind farm proposal is set in a modified landscape of hilly rural land. The turbines are to be sited on a series of elevated ridges which are somewhat higher than those further north and west. The immediate landscape is cleared and contains evidence of agricultural activities, primarily grazing and vineyards. Buildings, towers, power lines and other infrastructure typical of rural environments are also present. There are also areas of extensive erosion within the wind farm site. Replanting is taking place to slow or control the effects of this erosion, with potential to alter the landscape character over time. The area is not designated as one of landscape significance by the Pyrenees Planning Scheme or National Trust.
High points visible from this locale include Mt Ben Nevis, Mt Cole, Mt Buangor and Mt Langhi Ghiran. The closest of these is Mt Ben Nevis which is 6 km to the south. The Pyrenees State Forest to the east is also a dominant landscape feature.

The evaluation criteria in the Wind Farm Guidelines are fairly broad. Consideration should be given to whether the landscape is protected or classified, which is not the case here. Other issues to consider include the visibility of the development from the public and private realm, the number and height of turbines, and the distances from which they will be viewed, planting or removal of planting, topography, natural features and skyline, and the presence and scale of other features such as buildings in the landscape.

Effects of turbines

The method used by Mr Wyatt to assess landscape impacts is set out in his initial report accompanying the planning application (Vol. 2). It is an approach typically used in wind farm assessments which identifies how the wind farm turbines would be seen from selected viewing locations. The assessment takes account of topography, landscape sensitivity, physical distance from wind turbine sites and the number of turbines that would be seen from any particular location.

Mr Wyatt prepared photomontages based on the layout of 72 turbines as lodged with the planning application, with each turbine having a hub height of 100 m and a total height including blades of 146.5 m. Mr Wyatt also prepared visibility analyses showing locations from which the greatest number of turbines will be visible. Based on this material:

- The entire swept rotor path of all or almost all turbines will be visible from a wide band of locations to the west of the wind farm site. This is Zone B in the visibility analysis, which Mr Wyatt identified as the most useful representation for this type of analysis (Exhibit 14, slide 11). Significant turbine numbers (with entire swept rotor path) will also be visible from areas southeast and northeast of the site.

- Turbines will be visible from the Pyrenees Highway and other roads surrounding the wind farm site, particularly where there are breaks in or lack of screening vegetation. Closer turbines will appear taller and more imposing than those on more distant ridges.

- Turbines will be highly visible from Crowlands where there is little vegetation or other features to screen views. Crowlands is the closest township, located east of the site and approximately 4 km from the nearest turbine.
- Turbines will be visible from locations at Landsborough where vegetation is less dense. The closest turbine location is approximately 5 km.
- Turbines will be visible from Ararat some 25 km away but only on a clear day and even then they will be barely visible. The Challicum Hills Wind Farm is the same distance from Ararat.
- The entire wind farm site will be visible from Mt Ben Nevis, but only from viewing points not normally accessible to the public.
- The sensitivity analysis for all photomontage views concludes there will be no more than a ‘low’ impact based on factors such as the modified condition of the landscape, existing vegetation screening, the number of viewers and distance from turbines.

No photomontage was prepared for views from Elmhurst where there are mature canopy trees in the town centre that will restrict views of the wind farm.

The small township of Eversley is located on the southern boundary of the site just off the Pyrenees Highway.

There is little question that this wind farm, if approved, will be visible from public vantage points locally and further afield. The Low impact rating provided by Mr Wyatt appears to be primarily due to the low landscape value assigned to the area and the relatively low numbers of people that will be present at some of the viewing locations. The Panel accepts that if the wind farm is approved and constructed, then inevitably it will become a feature of the landscape, that some turbines will be visible from local vantage points and that the entire sweep of turbines will be visible from more distant locations.

To take maximum advantage of local wind conditions the wind farm is proposed along the top of a distinct ridgeline. This magnifies the visibility and will ensure the wind farm can be seen from a considerable distance in many directions and makes it harder to provide screening landscaping.

However, the Panel considers that there are significant local features such as dominant local peaks which characterise this area and turbines will still appear below this ‘higher’ horizon. Thus the total landscape impact is not significant enough to warrant refusal of this proposal on landscape grounds alone.

Another way of assessing landscape effects is by using distance. According to Mr Wyatt’s methodology, turbines will be dominant in the landscape to a distance of 3 km and potentially dominant between 3 km and 8.5 km. Beyond this distance turbines will be noticeable but not dominant. As
demonstrated by submitters, whether views of the wind farm will be a positive experience will depend very much on the perceptions of the viewer.

Some submissions to this wind farm proposal opposed the project on the basis of anticipated effects on landscape values. For example, Mr Shaw characterised the Crowlands hills as being in “an extremely rare and picturesque area of Western Victoria” with proximity to the Pyrenees and Mt Cole State Parks and views to the Grampians. His concern extends beyond turbines to the construction of access trails and other project infrastructure, and to the continuing construction of wind farms in this broadly rural and natural part of Victoria.

Submissions from Domaine Terlato and Chapoutier Vineyard and Grimmer and Bradley welcome the wind farm and see benefits in its location close to their properties.

Mr Wyatt presented the Panel with a community perception study that reports attitudes from a cross section of residents in Western Victoria. This study was undertaken by his firm (ERM) and Reark Pty Ltd for Westwind Energy Pty Ltd for its Lal Lal Wind Farm proposal in western Victoria (Exhibit 23). The research reviews perception studies undertaken here and overseas and reports on the findings of interviews taken in anticipation of the Lal Lal Wind Farm.

In terms of the visual effects of wind farms, about half of respondents (53%) in the Lal Lal survey had a positive attitude to visual appearance, about a quarter had a negative response (24%) and the remainder (23%) had no opinion. Appearance was one of the main answers when asked about the disadvantages of wind farms (28%). However almost all respondents (93%) agreed that wind power is a source of clean energy that should be used even if it means changing the appearance of some landscapes. Support decreased when asked about construction of a wind farm in close proximity – to 81% if located within 10 km, 76% if located within 3 km and 68% if located within 1 km.

The study results appear to support the evidence here that residents in proximity to a wind farm proposal will have different opinions about whether the landscape will be degraded or enhanced by it. The Panel accepts that there is unlikely to be consensus on this issue at Crowlands or for other wind farms proposals. The Panel acknowledges that while important locally to residents, the Crowlands landscape is not one of special character or high significance itself. While close to higher peaks and other natural features, there was no evidence presented that major viewing locations at tourist destinations or others in the public realm would be significantly detrimentally affected. The Panel believes that the presence of
wind turbines will be acceptable, provided that appropriate colours and matt or non-reflective finishes are used as adopted for other wind farm projects.

**Other effects on landscape**

Other landscape changes will occur with development of the wind farm. In terms of construction of internal access roads, the Panel views this as an area where the applicant can reduce landscape effects by using materials that blend in with the landscape and re-grassing where possible. The substations will be located in private properties well within the site at lower elevations. Some overhead lines will be required within the site, again at lower elevations, but these are not expected to be any more visible than normal power cables. Signage should be restricted in accordance with the zone requirements and there is no signage included with the application. The zone requirements and Clause 52.05 of the Pyrenees Planning Scheme limit a business identification sign to less than 3.0 m$^2$ for the premises without discretion to increase this amount.

**Cumulative effects**

The Crowlands area is part of the Western Victoria landscape where several wind farms are being constructed, have been approved or are mooted. The longer term impact of these individual decisions on the landscape has not to the Panel’s knowledge been assessed. In terms of this proposal, the site is distant enough from other wind farms that the cumulative impact of existing or approved wind farms will be low. The closest existing wind farm is at Challicum Hills, approximately 25 km away to the south. The Lexton Wind Farm is approved but has not been constructed approximately 40 km south east and the Waubra Wind Farm is under construction approximately 50 km south east of the Crowlands site.

**3.2.2 Conclusions and recommendations**

The Panel considers that the landscape impact of the Crowlands Wind Farm will not be insignificant, but generally accept the evidence of Mr Wyatt that the landscape value of the area is not of the State or National significance that would trigger concern in terms of refusing or significantly modifying the project.

The wind farm will change the landscape values that exist, and in the minds of some this will not be a positive change. The Panel consider there are a range of measures that can be taken to reduce the landscape impact of the project and recommended accordingly.
The Panel recommends:

The turbines be finished in an ‘off-white’ non reflective finish as per Condition 3(e) in the draft Pyrenees planning permit in Appendix A of this report.

The colours and finishes of other facilities on site be selected to minimise landscape impact as per Condition 3(h) in the draft Pyrenees planning permit in Appendix A of this report and Condition 3(a) in the draft Ararat planning permit in Appendix B of this report.

Minimising visual and landscape impact of access tracks be considered in selection design and locations as per Conditions 6 and 15 in the draft Pyrenees planning permit in Appendix A of this report and Conditions 6 and 12 in the draft Ararat planning permit in Appendix B of this report.

Tracks, track edges and hardstand areas that are not required following wind farm construction be rehabilitated as per Condition 16(a)(ix) in the draft Pyrenees planning permit in Appendix A of this report and Condition 13(a)(ix) in the draft Ararat planning permit in Appendix B of this report.

3.3 Visual impacts on private land

3.3.1 Discussion

The Wind Farm Guidelines provide no clear direction on the impacts on individual visual amenity. Mr Wyatt identified that visual impacts (views of turbines) can be characterised according to the distance from the observer to the nearest wind turbine:

- Distance of less than 1.5 km – turbines will be visually dominant in the landscape from most viewing locations and will dominate the landscape in which they are sited.

- Distance between 1.5 to 3 km – turbines are highly visible and will visually dominate the landscape, and the degree of visual instruction will depend on the wind turbines’ placement within the landscape and factors such as foreground screening.

- Distance between 3 to 8.5 km – potentially noticeable and can dominate the landscape, and the degree of visual intrusion will depend on the landscape sensitivity and the sensitivity of the viewer.

The Panel is not convinced in this case that those distances are necessarily applicable given the elevated position of the turbines in the landscape with
the result that they are visible from perhaps greater distances and from more locations. However the framework is used widely in wind farm assessments and the Panel will use it to ensure a consistent approach to consideration of visual effects.

The Panel reviewed and heard submissions from non-participating landowners who are located in the most sensitive (closest) zone as well as others who are located between 1.5 to 3 km and between 3 to 8.5 km from the nearest turbine site.

Mr Wyatt prepared photomontages from either the house or property gate for submitters who expressed concerns about visual impacts from a dwelling and from other areas of their land. The Panel found these photomontages very useful coupled with the site visit to individual properties.

**Properties located within 1.5 kilometres of a turbine**

This is a series of three properties located adjacent to one another at the northern end of the wind farm site. There are similar visual issues associated with each of them.

*G Stafford and E Duxbury, 630 Landsborough – Elmhurst Road.* The property is over 52 ha with an existing house located close to the boundary with the John property. The house is oriented to the north and internal living areas face east and north. An outdoor living area faces south with direct views to turbines T13 and T14, each of which would be approximately 1.4 km distant. Other turbines would be visible but at greater distances.

There is already extensive tree planting south of the house and within the property boundary, but the photomontage prepared by Mr Wyatt indicates that parts of turbine towers and blades would be visible above the existing trees. These trees are 100 to 200 m from the house. The owners indicated reluctance to plant trees closer to the house due to fire danger. To effectively screen views of turbines, trees would need to be planted more closely than this, and additional screen planting would be required on the John property to the west to screen the next nearest turbines, T11 and T12. Screen planting would have limited effects on views from other parts of the property.

*R John, 628 Landsborough – Elmhurst Road.* The property contains two titles of 176 ha and 142 ha with the lower land planted in vineyard grapes. A house is as of right on each of the land titles. Proposed house site no 1 is located 601 m from the nearest turbine, T13. Proposed house site no 2 is located 450 m from this turbine.
Mr John estimates from the photomontage that 25 turbines would be visible within the 3 km visibility zone, and this figure was not disputed by the applicant.

Mr John would also like to ‘value add’ to his vineyard operation by constructing six cottages at four locations on the upper elevations of his land to take advantage of scenic views to the north (ie. facing away from the turbines). These sites are located at a distance between 515 m to 1.1 km from the nearest turbine (T11, T12 and T13 are the relevant turbines). Mr John has not yet applied for planning permission for these cottages.

Mr John directed the Panel to the Pyrenees Planning Scheme which encourages viticultural development in the area in which his vineyard is located. Applications for other uses are required to demonstrate that they are compatible with viticulture and will not jeopardise vineyard developments on adjoining land. The Panel notes that there is no reason why the visual presence of the wind farm should interfere with viticultural activities, however, there is a perception that it could reduce associated tourism opportunities. The Panel did not receive any evidence, such as previous studies, in relation to economic effects on tourism accommodation in close proximity to wind farms.

The applicant specifically addressed Mr John’s situation in its closing submission, highlighting that this is essentially a case of the wind farm establishing first (if approved). Mr John would then need to take account of the wind farm in selecting appropriate sites for house or cottage development. This reflects a long established principle in planning practice. The applicant has indicated a willingness to work with Mr John to resolve any difficulties.

*R and I Burns, Landsborough – Elmhurst Road.* The property is 125 ha with a permit to construct a house at the elevated, southern end of the property. The property is planted in vines and there is a large shed near the house site which could be used for cellar door sales. Distances from the proposed house to the nearest turbines are 1.9 km to turbine T1, 1.7 km to T2 and 1.8 km to T3.

The Burns estimate that 25 turbines would be visible from their property within the 3 km visibility zone, that turbines would span their southern horizon and that the vertical profile of the turbines would be 50% higher than the ridgeline. The applicant did not dispute these claims.

The owners also pointed to provisions of the Pyrenees Planning Scheme which encourage viticulture in this part of the Shire. Again, the Panel is
unable to see any reason why the visible presence of turbines would interfere with crop production.

Properties located within 1.5 kilometres to 3 kilometres of a turbine

_D Shaw, Spring Flat Road, Crowlands._ This property is located along Spring Flat Road approximately 2.7 km to the nearest turbine. Mr Shaw objected to the number of turbines in proximity to the property. He did not present to the Panel nor request a Panel visit to his land.

The photomontage indicates that the main drive faces away from the farm but views to the north and east will include turbines. Screening is already present near the house with existing vegetation and a large shed. Mr Wyatt concluded the impact on this location will be Medium.

Properties located between 3 kilometres to 8 kilometres of a turbine

_T Mortyn and V Mortyn, 705 Ararat – St Arnaud Road, Crowlands._ This property is located on the main road just north of the village of Crowlands. The Panel was unable to sight a house on the land. No photomontage was prepared for location, but the photomontage prepared for views from the Crowlands church indicates that a line of turbines will be seen running north-south across the eastern horizon.

_G and D Augustin, 126 Potts Road, Landsborough._ This property is located north west of the wind farm site with south easterly and easterly views from the house and outdoor living areas, which are oriented toward the Pyrenees State Forest and Crowlands Hills. The house is on an elevated part of the land and is approximately 3.9 km from the nearest turbine.

Mrs Augustin explained to the Panel that they purchased land some years ago and purposely oriented the house toward pleasing views. They have also planted olives at a lower elevation. The photomontage shows that a substantial number of turbines will be visible above existing vegetation when looking east. The views to the northeast, to the Pyrenees Forest, will be less affected as the forest is located north of the northernmost turbine site.

Mrs Augustin was most concerned about the closest turbines nos. 1 and 2.

Ms Augustin was also concerned that rotating turbines would affect her well-being. She explained that she can see the Challicum Hills turbines from her workplace in Ararat. At times, the movement of the turbine rotors caused physical discomfort with slight dizziness and headaches. The applicant countered that this is an unusual reaction not supported by medical evidence. Mr Power tabled a planning appeal decision, Finchaven
Pty Ltd v City of South Melbourne and Others\(^2\), which discusses individual reactions to nuisance (in this case noise) and how they should be dealt with in planning decisions. The principle established by that decision is that if a use is appropriate to the zone and location, then the (excessive) sensibilities of an individual should not outweigh the interests of allowing a proposal which is suitable for the location. The Panel has sympathy with Ms Augustin’s position but notes that the Challicum Hills turbines are around 25 km from Ararat, which suggests a heightened sensitivity to turbine blade rotation. The only solution would be to screen out the turbines from views from the Augustin house.

Visual screening at this location will be difficult if the attractive views are to be retained as the land in front of the Augustin’s house slopes east and south east towards the wind farm. If the wind farm proceeds, the Augustin’s would need to determine whether the closest turbines should be screened, even if this means losing some part of their view.

**Visual screening mitigation program**

Mr Wyatt demonstrated to the Panel that planting can be effectively used to screen views of turbines from living areas such as lounge rooms and outdoor decks and verandahs. As turbines would be located at a higher elevation than the viewer, trees would be needed to effectively screen views. Where several turbines would be visible and/or spread across the horizon, then a decision must be made about which views to screen in or out though the use of planting. Screening is more difficult from outdoor areas where people move around and the view constantly changes.

The applicant prepared a Visual Screening of Residences Program (Vol 1, Part B) which provides for professional advice and planting at the applicant’s expense. The eligibility criteria as proposed would automatically cover residents within 1 km of turbines. At Crowlands, this would only include participating land owners.

Through the Panel hearing process the applicant supported visual screening for all submitters with concerns, even where the submitter lives several km from the wind farm site (eg, the Augustin’s). The Panel agrees that this service should be offered to land owners who made submissions relating to landscape and visual impact. The question is whether other land owners should also be eligible once the wind farm is constructed and the visual effects of turbines are known. Based on Panel discussions and evidence submitted at the hearing, the Panel supports automatic eligibility for all dwellings within 3 km of a turbine. This is consistent with the

\(^2\) *Finchaven Pty Ltd v City of South Melbourne* (1987) 25 APA 366
characterisation of visual impacts provided by Mr Wyatt. Given the layout and topography of the wind farm, the turbines are likely to be dominant from interior and exterior living areas unless substantial landscaping of sufficient height already exists. The applicant agreed at the hearing that it would be reasonable to offer visual screening to residents within the 3 km zone.

The visual screening program would provide three opportunities for residents to register to participate. This includes at construction commencement, upon wind farm commissioning and up to three months following commissioning. The Panel believes this is reasonable and would expect the applicant to be available to residents on a more informal basis during this period.

**Aviation obstacle lighting**

Some turbines on the wind farm may need to be lit at night with obstacle lighting to minimise hazard to aircraft flying in the area. This issue is discussed in detail in Section 8.8.

### 3.3.2 Conclusions and recommendations

The Panel considers that the Crowlands Wind Farm will be highly visible from surrounding properties for many kilometres. The greatest visual impact will be borne by properties between the wind farm and 3 km away where the turbines will be extremely dominant on the skyline if not screened by vegetation or other features.

The elevated location on a prominent ridgeline will exacerbate this effect. However the Panel does not consider that the visual impact to be borne by these properties outweighs the strong policy settings favouring renewable energy and wind energy in particular.

The Panel does consider that landscaping, where accepted, may reduce the visual impact of the wind farm when viewed from some surrounding locations and has recommended accordingly. Particular properties that the Panel has considered are discussed in Section 9.

**The Panel recommends:**

*That landscaping be offered to all dwellings within 3 km of the wind generators and those submitters beyond this distance expressing concern in relation to visual impacts in accordance with Condition 4 in the draft Pyrenees and Ararat planning permit in Appendix A and B of this report respectively.*
4. Flora and fauna

4.1 Background

The Panel has considered the following material in its assessment of the potential flora and fauna impacts of the wind farm:

- Evaluation criteria in the Wind Farm Guidelines;
- Sections 8.2 and Part B (Vol 1) of the planning application and the report *Proposed Crowlands Windfarm Flora and Fauna Investigations* in Volume 2 of the planning application;
- Draft management plans in Volume 1 Part B of the planning application;
- Mr Lane’s expert evidence;
- Applicant’s submission to the Panel Part B2;
- The Department of Sustainability and Environment’s submission (DSE);
- Other submissions which raised this issue; and
- Panel site inspections.

Flora and fauna on the site are considered in the following sections.

4.2 Flora

4.2.1 Exhibited material

A description of the flora on-site is contained in the *Proposed Crowlands Windfarm Flora and Fauna Investigations* report exhibited with the planning application. The wind farm site contains relatively large stands of remnant vegetation on the higher ground with understorey grazing while the lower slopes and flats are substantially cleared for agriculture (grazing and cropping).

The methodology for the flora surveys included a desktop survey and on-site surveys on areas most likely to be disturbed by the project. Mr Lane, in his evidence, recommended that further detailed surveys be undertaken when project details are finalised.

In summary:

- Five ecological vegetation classes (EVC) were recorded on site;
- 212 plant species were recorded, 153 indigenous and 59 exotic or non-indigenous;
- Records indicate nine Victorian rare or threatened species have been recorded within 15 km but none were found on the wind farm site itself;
- One vulnerable species (Golden Cowslips – *Diuris behrii*) under the *Advisory List of Rare and Threatened Species in Victoria* was recorded on site but outside the wind farm footprint; and
- Four *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) species potentially occur within the area although none were recorded in surveys.

The EVCs recorded and their conservation status is shown in Table 1. The recorded location of these EVCs is shown in Figures 3 to 10 of the Investigation report.

**Table 1: Ecological Vegetation Classes**

<table>
<thead>
<tr>
<th>Ecological Vegetation Class</th>
<th>Conservation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grassy Dry Forest (EVC 22)</td>
<td>Depleted in Goldfields bioregion</td>
</tr>
<tr>
<td>Herb-rich Foothill Forest (EVC 23)</td>
<td>Depleted in Goldfields bioregion</td>
</tr>
<tr>
<td>Alluvial Terraces Herb-rich Woodland (EVC 67)</td>
<td>Vulnerable in the Goldfields bioregion</td>
</tr>
<tr>
<td>Creekline Grassy Woodland (EVC 68)</td>
<td>Endangered in the Goldfield bioregion. Listed as a threatened ecological community under the Victorian <em>Flora and Fauna Guarantee Act 1988</em> (This site along Boatman Road is being avoided by the project)</td>
</tr>
<tr>
<td>Grassy Woodland (EVC 175)</td>
<td>Endangered in the Goldfield bioregion</td>
</tr>
</tbody>
</table>

Management measures for native vegetation were presented in the draft *Native Vegetation Management Plan* exhibited in Volume 1 Part B of the planning application and the Panel considers this is an appropriate management tool.

### 4.2.2 At the hearing

At the hearing Mr Lane provided evidence including a preliminary breakdown of the likely areas to be cleared and the implications of this under the Victorian *Native Vegetation Management – A Framework for Action* policy which is called up in the State Planning Policy Framework in the Pyrenees Planning Scheme. This information is shown in Table 2 (taken from Exhibit 18) and included refined EVC classes.
Table 2: Habitat Hectare Assessment

<table>
<thead>
<tr>
<th>EVC</th>
<th>Conservation significance</th>
<th>Area to be Removed (ha)</th>
<th>Habitat Hectares to be Removed</th>
<th>Target Offset (Habitat Hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grassy Dry Forest (EVC 22)</td>
<td>High</td>
<td>0.3</td>
<td>0.18</td>
<td>0.27</td>
</tr>
<tr>
<td>Grassy Dry Forest (EVC 22)</td>
<td>Medium</td>
<td>18.05</td>
<td>7.45</td>
<td>7.45</td>
</tr>
<tr>
<td>Herb-rich Foothill Forest (EVC 23)</td>
<td>High</td>
<td>0.59</td>
<td>0.39</td>
<td>0.59</td>
</tr>
<tr>
<td>Herb-rich Foothill Forest (EVC 23)</td>
<td>Medium</td>
<td>0.27</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>Alluvial Terraces Herb-rich Woodland (EVC 67)</td>
<td>Very high</td>
<td>0.13</td>
<td>0.07</td>
<td>0.14</td>
</tr>
<tr>
<td>Hillcrest Herb-rich Woodland (EVC 70)</td>
<td>Medium</td>
<td>0.22</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>19.56</strong></td>
<td><strong>8.35</strong></td>
<td><strong>8.71</strong></td>
</tr>
</tbody>
</table>

Mr Lane also tabled a series of maps with Exhibit 18 showing the distribution of vegetation against its conservation significance along the generator development envelope. These maps also indicated the conservation significance of vegetation that may be affected for access into the site, the most significant area being along the last few kilometres of Spring Flat Road. This particular issue is considered in Section 4.2.4 below.

In his written statement Mr Lane indicated that to achieve the target offset of 8.71 habitat hectares an area of 40 to 45 hectares of equivalent vegetation may need to be protected or enhanced, but that there is ‘more than adequate’ vegetation on site to achieve these targets. In his evidence he tabled a map (Figure 17 in Exhibit 18) showing 19 potential offset zones and their conservation status in support of this assertion.

Any proposals to remove very high conservation significance vegetation will require the approval of the Minister for Environment.

The Panel notes that DSE in its submissions to the two planning permits accepts that the approach taken to native vegetation is acceptable in relation to the native vegetation management framework subject to a number of conditions. The Panel generally accepts the conditions suggested by DSE subject to minor changes and has attached a set of recommended conditions in the Appendices.
4.2.3 Permit requirements for native vegetation removal

In his Part B2 submission at Section 5.2, Mr Power for the applicant advanced significant argument that a permit is not required to remove vegetation for the wind energy facility.

This argument was based on, in summary:

- The removal of native vegetation for the construction of a building is exempt from a permit under Clause 52.17 of the planning scheme;
- The wind energy facility can be considered a ‘building’;
- In the Planning and Environment Act 1987 a building can include structures and appurtenances of a building; and
- Utility services to a building are also exempt.

Mr Power went on to submit that a permit for vegetation removal (the minimum extent necessary) is therefore not required for:

- Turbines;
- Substations;
- Access ways; or
- Cabling.

The Panel finds this an interesting set of arguments that is persuasive in its logic. However, the Panel doubts that the intention of the exemptions in Clause 52.17-6 was to cover such a facility as a large wind farm as opposed to other more traditional buildings and their ancillary structures.

The difference in the Panel’s mind is the scale of clearing, in this case of 19.56 ha of remnant vegetation. It is hard to imagine another circumstance where a ‘building’ would require such a large area of vegetation removal. The Panel finds it difficult to believe that such a ‘building’ exemption for a wind energy facility was countenanced in the drafting of the exemptions in Clause 52.17-6 whereby such a large area may be cleared without a permit.

In the Panel’s mind such an exemption is inappropriate and a recommendation to the Minister for Planning that this issue be addressed is included below.

However, in the Crowlands case the issue does not need to be taken further as the applicant has applied for a permit to remove native vegetation on site and the application and hearing process have proceeded accordingly. Recommended conditions relating to vegetation removal and offset are provided in the Appendices.
4.2.4 Offsite removal of native vegetation for access

The planning application does not include application to remove vegetation on public roads for access on to the site. This may need to occur at the following locations:

- Intersection of Ararat – St Arnaud Road and Starts Road;
- Intersection of Ararat – St Arnaud Road and Glendhu Road;
- Along Spring Flat Road (and particularly the last 2 km);
- Intersection of Crowlands – Eversley Road and Mundaring Road; and
- Intersection of Pyrenees Highway and new access track to turbines 71 and 72.

Mr Power for the applicant addressed this issue in his Part B2 submission on page 19. Mr Power submitted there is a strong precedent for not including the vegetation removal for these areas for both wind farms and in other planning cases decided by VCAT.

The reasons for such an approach include that the design elements relating to traffic access have not been finalised and can not be until turbine and other components have been chosen; and that permits for vegetation removal once issued may expire prior to being executed.

The applicant’s approach however was to assess such vegetation and provide the Panel with some level of comfort that the vegetation removal, if required, can be appropriately avoided, minimised or offset as necessary and therefore would not be a significant impediment to the project as a whole.

In this case the Panel is satisfied that management of any such vegetation removal can be achieved as Mr Lane provided evidence that there is significant opportunity for offsets if required. The Panel does have some concern about the eastern section of Spring Flat Road which has a significant quantity of remnant vegetation of very high conservation significance. This may be affected by transport requirements and powerlines.

In this area the applicant suggested that some vegetation removal can be avoided by ‘zigzagging’ the powerline across the road reserve or preferably locating it in Mr Shaw’s paddock to the west, a resolution that was not agreed at the time of the hearing.

The Panel considers this permit application, when lodged, will require significant assessment by the responsible authority if this vegetation is to be removed but that in a worst case scenario there will be opportunities for offsets.
The Panel is not convinced in principle however that the vegetation removal application for access on to the site should not be made at the same time as the application for the wind energy facility.

Recent vegetation permits recommended for wind farms have taken the approach that the permit conditions do not need to specify exactly the vegetation to be cleared, but that a vegetation management and offset plan must be prepared to the satisfaction of DSE and approved by the responsible authority. This ‘secondary consent’ mechanism is generally not supported by the planning system but in this circumstance there is precedent for its use.³

In relation to expiry of permits, the applicant can apply to extend the life of the permit and this is common practice in the planning system.

In summary, the Panel considers that it is best practice for any required off site vegetation removal application to be made at the same time as the wind energy facility itself and that this application should also be considered by the Minister for Planning via the Panel process. This provides for a level of consistency in the treatment of the proposal as a whole.

4.2.5 Conclusions and recommendations

In principle the Panel considers that native vegetation on site can be managed within the terms of the Native Vegetation Management – A Framework for Action by avoiding clearing, minimising clearing and offsetting as appropriate.

The Panel also considers the requirements for protecting rare and endangered species in the Wind Farm Guidelines can be met.

The Panel makes a number of recommendations in relation to native vegetation below.

The Panel Recommends:

That the applicant prepare a Native Vegetation Management Plan incorporating a Native Vegetation Offset Plan in accordance Condition 22 in the draft Pyrenees planning permit in Appendix A of this report and Condition 19 in the draft Ararat planning permit in Appendix B of this report.

³ See Villawood Properties v Greater Bendigo CC [2005] VCAT 2703
For future wind energy facility proposal all vegetation removal permits (where required) should be applied for at the same time as the permit in chief.

4.3 Fauna

A description of the fauna survey methodology and habitat and species recorded on site is provided in the Proposed Crowlands Wind Farm Flora and Fauna Investigations report included with the planning application.

The habitats recorded on site are ridge top rocky habitat, remnant woodland habitat, cleared agricultural land and wetlands associated with drainage lines.

4.3.1 Terrestrial Fauna

Twenty six species of mammal, ten species of reptile and four species of frog have been recorded in the area or it is likely that the area supports them. Of the mammal species seven are exotic.

No reptile or frog species were recorded during surveys, the latter probably due to recent ongoing dry conditions in Victoria. Seven mammal species were recorded from the site.

The flora and fauna investigation report identifies the species in Table 3 as having particular conservation significance.

<table>
<thead>
<tr>
<th>Species</th>
<th>Conservation Status</th>
<th>Found on site</th>
<th>Likely to occur on site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brush tailed Phascogale</td>
<td>Vulnerable, listed under FFG Act 1988</td>
<td>No</td>
<td>Considered possible</td>
</tr>
<tr>
<td>Tree Goanna</td>
<td>Vulnerable, but not listed under the FFG Act 1988</td>
<td>No</td>
<td>May occur but unlikely to be encountered</td>
</tr>
<tr>
<td>Eastern Bearded Dragon</td>
<td>May be threatened</td>
<td>No</td>
<td>Likely to occur as suitable habitat exists</td>
</tr>
</tbody>
</table>

Whilst none of these species were recorded from the site, there are areas of habitat that they may occur in. General strategies aimed at avoiding vegetation clearing and creating suitable offsets where appropriate should ensure there is no net impact on available habitat and therefore species.
4.3.2 Birds

One hundred and twenty three bird species were either recorded on site or it is considered that they site may support them based on the presence of suitable habitat. Of these, six species are introduced.

During the bird utilisation surveys 42 species were recorded on site.

The flora and fauna investigation report identifies the species in Table 4 as having particular conservation significance.

Table 4: Avian fauna of conservation significance recorded in the area

<table>
<thead>
<tr>
<th>Species</th>
<th>Conservation Status</th>
<th>Found on site</th>
<th>Likely to occur on site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baillons Crake</td>
<td>Vulnerable, listed under FFG Act 1988</td>
<td>No</td>
<td>Unlikely due to lack of vegetative cover on wetlands on site</td>
</tr>
<tr>
<td>Square-tailed Kite</td>
<td>Vulnerable, listed under the FFG Act 1988</td>
<td>Possibly</td>
<td>Unconfirmed sighting during field assessment. Considered unlikely to regularly occur on site</td>
</tr>
<tr>
<td>Powerful Owl</td>
<td>Vulnerable, listed under FFG Act 1988</td>
<td>Calls heard on site</td>
<td>Yes. Level of use probably low</td>
</tr>
<tr>
<td>Speckled Warbler</td>
<td>Vulnerable, listed under FFG Act 1988</td>
<td>Yes</td>
<td>Occurs</td>
</tr>
<tr>
<td>Swift Parrot</td>
<td>Endangered, listed under FFG Act 1988, Nationally endangered, EPBC Act 1999</td>
<td>No</td>
<td>Unlikely as very little habitat occurs on site</td>
</tr>
<tr>
<td>Hooded Robin</td>
<td>Near threatened, listed under FFG Act 1988</td>
<td>Yes</td>
<td>Occurs</td>
</tr>
<tr>
<td>Brown Treecreeper</td>
<td>Near threatened, but not listed under FFG Act 1988</td>
<td>Yes</td>
<td>Occurs</td>
</tr>
<tr>
<td>Black-chinned Honeyeater</td>
<td>Near threatened, but not listed under FFG Act 1988</td>
<td>Yes</td>
<td>Occurs</td>
</tr>
<tr>
<td>Painted Honeyeater</td>
<td>Vulnerable, listed under FFG Act 1988</td>
<td>No</td>
<td>May occur but is unlikely to regularly occur</td>
</tr>
<tr>
<td>Diamond Firetail</td>
<td>Vulnerable, listed under FFG Act 1988</td>
<td>Yes</td>
<td>Occurs</td>
</tr>
<tr>
<td>White-throated Needletail</td>
<td>Listed as migratory under the EPBC Act 1999</td>
<td>Yes</td>
<td>One flock of approx. 40 birds sighted during surveys but considered unlikely to occur regularly as on the limit of range</td>
</tr>
</tbody>
</table>
Of the woodland species above, Mr Lane suggested in his evidence that these species are likely to be restricted to the native woodlands on site and thus unlikely to fly at rotor swept height. Loss of vegetation (habitat) is of concern for these species but Mr Lane suggested that the relatively small area of loss of ridgeline habitat would not be significant.

The White-throated Needletail was discussed at the hearing at some length. A flock of these EPBC listed migratory species has been recorded on site but Mr Lane in evidence said that this was unlikely to be a regular occurrence as the species is at the western limit of its range. Further, Mr Lane advised that a flock of birds of this species is a very loose flock such that a small number might be killed if struck by a turbine blade but it is very unlikely that majority of the birds would be killed as might be the case with a tight flock of birds.

Powerful Owl calls have been recorded on site and adjacent to the site in the Pyrenees State Forest. Mr Lane suggested occasional use of the site is likely but the roosting and nesting conditions are superior in the Pyrenees State Forest and the overall level of risk to the species from rotor strike is low.

In its submission DSE expressed concern in relation to potential impacts on Wedge-tailed Eagles and Powerful Owls and recommended a monitoring condition for these species. The Panel concurs with this point in relation to birds and bats more generally and has recommended accordingly.

A draft Avifauna Management Plan was exhibited in Volume 1 Part B of the planning application and the Panel considers the general management responses in this document are appropriate.

### 4.3.3 Bats

Bats were surveyed on site using Anabat recorders at ground level at six sites and at 45 m high and at ground level at two sites. The higher records were obtained at two meteorological mast sites to determine bat activity at rotor swept area (RSA).

Nine bat species and six species complexes (where individual species can not be identified) were recorded on site. Mr Lane in his report identified that the White-striped Fretail Bat was the most active followed by Gould’s Wattle Bat.

He submitted that all the species recorded were common to very common, and whilst some fatalities are likely to occur, these are likely to be confined to the most numerous species recorded on site.
None of the species identified are considered to be rare or endangered under the State or Commonwealth protected species legislation.

The Panel considers that based on the submissions and evidence before it the overall impact on bats will be minor and should not have any conservation significance for a particular species.

A draft Avifauna Management Plan including a description of the proposed methodology for avifauna mortality surveys was exhibited in Volume 1 Part B of the planning application and the Panel considers the general management responses in this document are appropriate.

The issue of aviation obstacle lighting and bats is discussed in Section 8.8.

4.3.4 Conclusions and recommendations

In general the Panel is satisfied that the overall risk to listed threatened fauna species is low and can be reduced further though appropriate environmental management measures as proposed in management plans and through conditions recommended by the Panel.

That is not to say that there will be no impact and no fauna (particularly birds and bats) mortality, but rather that the Panel is satisfied that these impacts can be kept to an acceptable level.

The Panel notes the report tabled by the applicant (Exhibit 20) relating to surveys of avian fauna mortality at the Challicum Hills wind farm. Whilst the circumstances at that site are different to Crowlands and there is very little remnant habitat, it is useful to know that empirical data from Australian wind farms is becoming available.

The Panel Recommends:

That the applicant prepare an Avifauna Management Plan in accordance with Condition 19 of the draft Pyrenees planning permit in Appendix A of this report.

4.4 Pest plants and animals

Section 8.10 of the planning application and the Proposed Crowlands Windfarm Flora and Fauna Investigations report address the issue of pest plants and animals. In summary pest plants and animals are an issue on the site and the wind farm project should not do anything to increase the problem.

Forty weed species were identified on the site and management of the construction process will need to ensure that these are not spread to areas
where they do not exist and that the overall diversity and extent of weed coverage does not increase. A draft Weed Management Plan was exhibited and the Panel considers this is an appropriate management response.

Seven feral animal species were recorded on site, these being rabbits, foxes, hares, cats, mice, sheep (feral) and rats. The Wimmera CMA has identified rabbits and foxes as the priority species. The project may improve conditions for these species by improving access into otherwise intact vegetation and providing suitable soil conditions for burrows during earthworks. A draft Pest Management Plan was exhibited and the Panel considers this is an appropriate management response.

One issue the Panel considers requires more attention is that of Phylloxera, an aphid that attacks the roots of grapevines. The site is in the Grampians – Pyrenees Phylloxera Exclusion Zone⁴, meaning that the area is declared Phylloxera free, and material (cuttings, vines, whole grapes, soil etc…) can not be brought into the area without appropriate certification.

Whilst the project does not directly affect vineyards, the movement of earthmoving equipment into the area carries some level of risk and the Panel considers a protocol should be developed with DPI to minimise any risk. ‘Pathogens’ are covered in the draft Weed Management Plan and many of the measures to do with soil handling in this section may be common to Phylloxera management, but the Panel considers it requires specific reference and has recommended accordingly.

### 4.4.1 Conclusions and recommendation

The Panel considers that whilst the project carries some risk of exacerbating pest plant and animal issues on the site, that these issues can be effectively managed via implementation of the proposed management plan regime.

The Panel considers the issue of Phylloxera requires specific mention and has recommended accordingly below.

**The Panel Recommends:**

That the pest plant and animal component of the Environmental Management Plan be developed and implemented in accordance with Condition 14 of the draft planning permit in the appendices to this report.

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5. Noise

5.1 Background

Noise from wind farm operation is a matter that is required to be considered by the Wind Farm Guidelines and hence in planning schemes. Furthermore, concerns about noise frequently arise in submissions.

Wind farm noise has been comprehensively discussed in a number of other panel reports on wind farm applications such as those for the Bald Hills Wind Farm, the Waubra Wind Farm, the Macarthur Wind Farm and the Woolsthorpe Wind Farm. It is not proposed here to repeat much of that material but rather to focus on the issues specific to this planning permit application. The reader can refer to those other reports for more detailed information. Of particular importance in this case are the poor background noise correlations that have been obtained and the implications of that for post construction noise assessment.

The following sources have been used in the drafting of this section:

- evaluation criteria in the Policy and planning guidelines for development of wind energy facilities in Victoria;
- the NZS 6808:1998 Acoustics-The Assessment and Measurement of Sound from Wind Turbine Generators;
- Section 8.11 of Part A (Vol 1) and Figure 19 of Volume 1 of the planning application;
- the report titled Crowlands Wind Farm Noise Assessment (Attachment 8 Vol 2) of the planning application;
- Mr Delaire’s expert evidence;
- applicant’s submission to the Panel Part B2; and
- other submissions which raised this issue.

The construction, operation and maintenance of a wind energy facility can create environmental noise. The focus of this chapter is the noise associated with the operation of the facility since that is the noise of most concern and that is required to be considered by the Wind Farm Guidelines. However, it is instructive to briefly present some discussion of noise sources overall in this chapter.

During construction, noise will be generated by the various construction activities. This construction activity would be expected to be spread over
two years or so and geographically spread widely across the site. Sources of noise will include the construction of about 65 km of access tracks, preparation of turbine foundations, cutting of cable trenches, bringing construction material and components on site and turbine assembly and erection. This construction noise would not be expected to be substantially different from other major construction works and from some farming activities. This noise can be managed by noise control measures which should be included in the site Management Plan. This will need to incorporate best practice for noise control and should include close consultation with adjoining land owners.

Some noise is generated from the maintenance and servicing of the wind energy facility. This would primarily involve occasional light vehicle travel to the turbines and would probably be largely indistinguishable from noise sources from normal farming activities. Greater noise might be associated with any major component replacement, but that would be expected to be uncommon. Noise from this routine wind turbine maintenance would be expected to be insignificant. A further minor source could be the electrical sub-stations on site. These are located well within the wind farm site remote from any non-contracted dwellings.

The major noise source, and the major focus for this chapter, is that from the turbines themselves. There are two principal sources of this turbine operational noise. The first, and most important, are the rotor blades themselves. These have an aerofoil shape rather like that of an aircraft wing. At full operational speed (15 rpm) the linear blade tip velocity for the illustrative REpower MM92 turbine is about 260 km/h. This can create aerodynamic noise. Developments in blade design and in turbine management control systems have made possible reductions in aerodynamic noise compared with earlier machines.

The second wind turbine noise source is the machinery for generating the electrical energy. The machinery is in the nacelle immediately behind the turbine rotor and on top of the tower. It is a secondary noise source and includes the electrical generator, pumps and fans and perhaps a gearbox depending on the turbine type. Although the nacelle is elevated at a height of 100 m, good design of the equipment and regular maintenance should ensure that it is not a major noise source. Some increase in noise is possible over time with wear of equipment. It would normally be in the operator’s interest to avoid obvious noise from the nacelle since that may be indicative of wear or even imminent equipment failure. A transformer mounted within the tower at ground level or pad mounted adjacent to the tower would not normally be a significant source of noise.
Operational aerodynamic noise from the wind farm, if approved, is likely to be one of the major ongoing concerns to adjoining land owners. It is also technically complex. For those reasons this chapter presents the noise issues in sufficient detail to provide a basis for the recommended conditions.

The Wind Farm Guidelines specify the evaluation criterion as:

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

It acknowledges that a wind farm can affect the amenity of a surrounding area due to noise and requires the applicant to assess the noise impact of the proposal according to NZS 6808:1998.

It is noted that the Wind Farm Guidelines make no reference to the zoning of the land and hence it applies to dwellings, and any other noise sensitive land uses, regardless of the zoning.

The Wind Farm Guidelines are called up by planning schemes and hence, by reference to NZS 6808:1998, provide the basis for measuring and assessing the noise from wind turbines.

NZS 6808:1998 describes, *inter alia*:

- where ambient noise should be measured and compliance needs to be shown.
- the method for measuring ambient noise, both background ie. without the wind farm, and with the wind farm operating.
- the method to be used to evaluate the measurements of noise and simultaneous wind speed.
- the method to be applied to predict the noise from the wind farm.
- how to deal with special audible characteristics.
- a noise criterion by which the acceptability of the noise from the wind farm is to be established.
- compliance monitoring and assessment.

The Panel has interpreted the noise sensitive locations in the area where noise is to be measured and compliance with the noise criterion is to be met as being those non-participating landholder dwellings and the curtilages of those dwellings that might be within the area of noise effect from the wind farm. The criteria hence do not apply to the dwellings owned by the participating landholders or to other private or public surrounding land.
Noise measurement for wind turbine noise evaluation is difficult because noise has to be measured over a wide range of wind speeds typical of turbine operation. For other purposes noise is more usually measured under calm or low wind speed conditions which is technically not so difficult. It is common experience that background noise increases with wind speed. The technique for establishing background noise is to measure noise and corresponding wind speeds and to construct a curve relating these. An important feature of this is that there is no single figure that represents background noise. Another feature is that there can be considerable data scatter, or uncertainty, in the result.

NZS 6808:1998 suggests that 10 minute $L_{95}$ noise measurements be taken at the receptor site for a period of 10 to 14 days. Average wind speed measurements are taken at the proposed wind farm site for the same 10 minute intervals and over the same period. This gives a minimum of 1440 ‘data pairs’. These are then plotted and the background noise curve constructed. This technique is designed to ensure that a wide range of wind speeds are encompassed including the whole operating wind speed range of the turbines and the critical wind speed range of about 5-8 m/s at which wind turbine noise is most likely to be audible.

The noise criterion is stated in 4.4.2 of NZS 6808:1998 as:

As a guide to the limits of acceptability, the sound level from the WTG (or windfarm) should not exceed, at any residential site, and at any of the nominated windspeeds, the background sound level ($L_{95}$) by more than 5 dBA $L_{95}$, or a level of 40 dBA $L_{95}$, whichever is the greater.

This statement of the noise criterion recognises the relationship between wind speed and wind noise. The internationally accepted indoor sound level to protect against sleep disturbance is 30-35 dBA $L_{95}$. If attenuation between outdoor and indoor sound levels of 10 dB is reasonably assumed an outdoor level of 40 dBA $L_{95}$ provides for that sleep protection. At low wind speeds where outdoor noise levels might be expected to be below 40 dBA $L_{95}$ that level is set as the criterion. At higher wind speeds where the noise level would be higher than that level a 5 dB increment on the background level is allowed. Again, it should be noted that, like the background noise, the acceptable noise criterion is not a single number, but rather a curve that links wind speed to noise.

The noise criterion is set at a level to provide protection against sleep disturbance in a dwelling; it is not set so that there will be no audible wind turbine noise under all circumstances of wind speeds and location. Indeed, The Panel note that in the Farming and Rural Conservation Zones there is no
particular constraint on noise generating activities that might be associated with the use of land for agricultural purposes.

The standard prescribes a noise spreading technique to predict, or model, likely wind farm noise at a receptor from wind turbines of known noise characteristics and how to compare this with the acceptable noise levels.

NZS 6808:1998 advises that in some circumstances wind turbines might generate tones or modulated noise that can be disturbing. It prescribes methods for assessing this and a noise penalty to be applied if these audible characteristics are present to negate their effect.

It is useful at this point to include the notion of an ‘indicative (or illustrative) turbine’. This concept has been used by the applicant, as is usual practice, and has a bearing on the assessment of noise.

The applicant has proposed the construction of a wind farm comprising 72 turbines of not greater than 146.5 m total height and using the REpower MM92 as the ‘indicative turbine’. If the proposal proceeds this machine may not be used but has been selected here as a typical turbine for use in the planning application, including the assessment of noise.

This particular machine has a maximum 2 MW power output and physically is an upwind horizontal axis turbine with 3 blades of 46 m length, ie. a rotor diameter of 92 m, and a variable operational speed between 7.6 and 15 rpm. It has particular noise characteristics, referred to as sound power levels, which are used in this noise evaluation.

Most current competitive machines are likely to have fairly similar characteristics. Upwind turbines with 3 blades are the industry norm, but there may be some differences in the noise generated which could have a bearing, either favourably or unfavourably, on the ambient noise.

There are understandable reasons for an applicant using this ‘indicative turbine’ approach; however, it does create a challenge. The Panel has to deal with assessing the application on the basis of a particular contemporary turbine with certain noise characteristics. But the Panel has to respond to issues that might arise from the eventual use of a different machine. This can be done through permit conditions and avoiding giving absolute weight to the ‘indicative turbine’. If the turbine selected has sound power levels greater than the ‘indicative turbine’ the noise predictions may have to be repeated, if they are less it can safely assumed that the predictions for this ‘indicative turbine’ are conservative.
The applicant retained Marshall Day Acoustics Pty Ltd to carry out the noise assessment including the background noise measurements. Mr Christophe Delaire of that company provided an expert witness statement and presented evidence to Panel.

The noise assessment is presented in 8.11 (pp 56-60) of Volume 1 of the Crowlands Wind Farm Planning and Environment Report and the detailed noise assessment in Attachment 8 of Volume 2 of that Report. Volume 1 also contains in the draft ‘Construction and worksite management plan actions for managing construction noise in Section 4.2 (pp 20-21 towards back) and a draft Noise Complaint and Evaluation Procedure in Section 10 (pp 54-66 at back). The reader is referred to these for more detailed material than is contained in this chapter. The applicant submitted that the proposed facility has been designed to comply with the noise criteria required by NZS 6808:1998 and would be operated to meet those criteria.

Few submissions were received that related to noise. The most detailed was from Mr Robert John of Malakoff Estate Vineyards. Other submitters were Robert and Isabella Burns, neighbours of Mr John, Mr Frank Campbell of Elmhurst, and Mr Graeme Maconachie of Buangor. These will be discussed in greater detail in the following section. The Department of Planning and Community Development drew the Panel’s attention to statutory obligations under the planning scheme and, by reference, to the Wind Farm Guidelines. The Environment Protection Authority informed the Panel, in a standard letter, that it can act on justified noise complaints and suggested that the Panel consider a minimum permissible noise limit of 35 dBA L95 as is used in South Australia rather than the 40 dBA L95 of NZS 6808:1998. But it noted that it had no record of noise complaints about existing wind farms in south-west Victoria.

5.2 Discussion

In this section the Panel present and discuss the major issues presented to it. The focus is, necessarily, on those issues that enable the Panel to assess if it is satisfied that the proposed wind farm will meet the noise requirements specified in the Wind Farm Guidelines and hence that lead to proposed conditions.

The noise from a wind farm is a matter of substantial importance. If it is not sufficiently controlled by design it is one of the few issues that will persist post-construction and is difficult and costly to rectify.
The Panel note that in evaluating the noise issues it was considerably aided by the expert evidence of Mr Delaire and his willingness to discuss complex technical issues.

The Wind Farm Guidelines require that noise, as an 'amenity issue' is one of the:

...matters to be considered by responsible authorities in assessing permit applications for wind energy facilities.

They clearly identify compliance with NZS 6808:1998 as the standard for that assessment.

The key aspects of the Panel’s approach to evaluating the noise assessment are:

- the identification of the likely sensitive noise receptors;
- the measurement and data analysis of the background noise at those receptors;
- the derivation of the criterion (or acceptable noise limit) curve for each receptor;
- the mathematical modelling (or prediction) of noise at the receptors from the proposed wind turbines;
- the assessment of expected compliance or otherwise of the proposed wind farm;
- post construction noise compliance monitoring and remedial action if needed; and
- response to any operational noise complaints.

Volume 1 of the Planning and Environment Report at 8.11.11 (p 60) states:

*The acoustical impact of the wind farm has been assessed in accordance with the latest guidance on wind farm noise assessment as issued by Sustainability Victoria.*

*At each of the non-stakeholder dwelling locations, the predicted noise levels from wind generators are well within criteria set by Sustainability Victoria and NZS 6808:1998 at all considered wind speeds.*

**Noise sensitive receptors**

The first issue is the identification of noise sensitive receptors. The applicant has not identified any receptors in the vicinity of the proposed wind farm other than dwellings. No evidence was brought to the Panel of other receptors and inspection of the area did not suggest any others. The applicant has stated that its understanding of the requirement for compliance
with the noise criterion is that it applies to the outside of existing non-participating landholder dwellings and the area immediately surrounding them (the curtilage) and not to the whole of land outside the site boundaries. The Panel agree with this interpretation. The Wind Farm Guidelines refer to meeting the noise levels specified for ‘dwellings’ (refer section 3(a)) in the standard. NZS 6808:1998 does not use the term ‘dwellings’, but rather ‘residential locations’ and ‘locations of interest’. There is no reference to ‘possible’ or ‘proposed’ dwellings and hence the Panel interpret the requirement to apply to dwellings that exist at the time of the planning application or proposed dwellings for which a permit has been issued as of that date. Some submitters have suggested that the whole of their property should meet the noise criteria. The Panel does not believe that is intended by the Wind Farm Guidelines.

The Panel also agrees that the criterion specified by NZS 6808:1998 should not apply to the dwellings of participating landholders. The matter of whether a less demanding criterion should be applied is discussed later. The dwellings of participating landholders are likely to be closer to wind turbines than those of non-participants. The Panel is of the view that in exchange for the financial benefit that they are receiving participating landholders must be prepared to accept some loss of noise amenity. By contrast those who are not beneficiaries should be afforded protection from noise that might cause sleep disturbance.

The applicant determined the dwellings that should be included in the assessment by running a preliminary, or screening, noise prediction and identifying the 35 dBA noise contour at a wind speed of 8 m/s (the most critical speed for wind turbine noise) at 10 m AGL (above ground level). NZS 6808:1998 says that noise assessment should be carried out at locations where the noise is calculated to exceed 35 dBA and at the nearest dwelling. The Panel agree with the value of this quantitative approach rather than using a nominal distance or assuming which dwellings to include.

The consultant has stated that this screening, done by the applicant, identified 12 dwellings. These dwellings are numbers 8, 9, 12, 15, 16, 20, 21, 22, 23, 24, 25 and 28 on the plan ‘Crowlands Wind Farm Landholders and panel submitter properties, indicative layout, electrical infrastructure, Prepared for Panel 04/02/08 and known as Exhibit 1. Our perusal of the results (Fig C1 in the consultant report) indicates that #26 should perhaps have been included. The expert witness report and the submission from the applicant indicated that two further ‘dwellings’ had been identified, #38 and 39. These are both on participating landholder properties and within a few hundred metres of proposed turbine sites, closer than any other dwellings. The Panel was informed that these buildings might be used for occasional occupancy but
are not permanently occupied, and that neither fits the requirements of being classified as a ‘dwelling’.

The Panel note that of these 15 dwellings (including those two of doubtful provenance) 8 are non-participating landholder dwellings. It is these that warrant particular attention. The Panel note that the screening identification of noise sensitive receptors seems to have picked up all dwellings within about 2 km of the nearest proposed turbine. Of these 8 non-participating landholder dwellings 3 are within the 40-45 dBA band, all grouped to the north-east of the site, and the remaining 5 are in the 35-40 dBA band and spread around the site.

A number of these dwellings were selected by the consultant for background noise monitoring. It is usual practice to monitor at a selection rather than all locations. These sites are selected on the basis of permission being granted to use them, suitable monitoring positions being available and, importantly, a similarity in the assessed ‘acoustic environment’ of dwellings so that results at non-monitored dwellings can be confidently estimated by the data from a selected monitored site. Five sites were selected plus the location of a proposed dwelling on the property of Mr Robert John. The Panel note that there is an inconsistency between Section 8.11.7 (p 59) of Volume 1 and Table 2 (p 4) of Attachment 8 of Volume 2 for the number of sites (9 versus 6) and the monitoring dates. Since results have been presented for 6 sites the Panel accepts that the latter reference is correct. These noise monitoring sites are shown in Appendix A of Attachment 8, Volume 2 of the planning application and are repeated in Figure 3.

The dwellings selected for monitoring were #8, 12, 15, 16, 22 and the proposed site marked as B1. Four of these five dwellings are those of participating landholders. For the non-participating landowner dwellings at which noise criteria compliance must be achieved the applicant indicated that, on the basis of proximity and similar adjacent vegetation, it would apply the background noise from #22 to #20, 21 and 23, and from B1 to #24, 25 and 28.
Figure 3. Noise logger locations
The Panel is disappointed that only one of the five dwellings was a non-participating stakeholder dwelling. The Panel is satisfied that background noise measurements can, with care, be translated to dwellings in similar ‘acoustic environments’. But the post-construction noise situations will differ depending on the proximity of wind turbines. The post-construction noise monitoring needed for compliance assessment will not be able to be undertaken at #22 and site B1 and translated to non-participating stakeholder dwellings #20, 21, 23, 24, 25 and 28. It is these proximate non-participating stakeholder dwellings that are critical in ascertaining compliance with NZS 6808:1998. Monitoring will have to be carried out at a selection of those dwellings.

**Background noise**

The Panel turns now to the measurement of background noise, the analysis of the data and its application to the nearby dwellings. Establishing the background noise levels are critical since this is the foundation on which the acceptable noise levels, the modelled compliance assessment, and the post-construction compliance monitoring and enforcement rests.

The noise monitoring at the six selected sites was carried out for periods of between 13 and 20 days. These were not for coincident periods but were all within February-April 2007. NZS 6808:1998 requires the collection of a minimum of 1440 10 minute ‘data pairs’ of noise and wind speed ‘averaged’ over that 10 minute interval. These monitoring periods are sufficient to meet that requirement for the minimum number of ‘data pairs’, other than for the separate analyses of night time data for which the number of data points is necessarily fewer. Wind speed data from the nearest of the three on-site wind monitoring masts, corrected to 10 m AGL and provided by the applicant was used to correlate against the noise data.

NZS 6808:1998 requires that the $L_{95}$ 10 minute noise levels in dBA be plotted against the 10 m AGL wind speed data in m/s for the corresponding time periods and the regression curve fitted to these. The regression curve is a mathematically generated line of best fit through the points that best represents the data. That regression curve describes the background noise level. The applicant has presented this information for the ‘all time’ data in Figures 1 to 6 Attachment 8, Volume 2 of the planning application and in the presentation to the Panel (Exhibit 15). In addition, arising from a direction, the information has also been presented as ‘night time’ data for the period 10 pm to 7 am. This ‘night time’ analysis is important in providing the background noise at the time when protection against noise disturbance of sleep is important. These results are presented in the expert witness statement of Mr Delaire and in Exhibit 15. Those 12 plots each show the
individual data points, the regression curve that best fits those data, and the third order polynomial equation of the curve. The reader is referred to those documents to examine that information.

An important aspect of these background noise levels is the confidence that can be had in them. It is expected that there will be some spread of data but with an increasing background noise with wind speed. NZS 6808:1998 acknowledges that for most purposes noise is measured under calm or low wind speed conditions, but in the case of wind turbines noise must be measured in the presence of wind because it is under these conditions that the turbines operate and can create noise. It states that this has the potential for fluctuations and errors due to the increased background noise levels and the effect of wind on the microphone, but that rigorous adherence to the method can produce reasonably accurate and repeatable results. If the individual results are widely scattered limited confidence can be had in the results, if they fall in a tight band much greater confidence can be had. This can conveniently be done by calculating the coefficient of determination or $R^2$. This mathematical representation of data spread is such that an $R^2$ of 1 is a perfect correlation in which case the data points are all on the regression curve and very high confidence can be had in the correlation and hence the curve in representing the relationship between the measured data. An $R^2$ of zero indicates no correlation whatever, the data points are completely scattered and no confidence can be had in any curve which might purport to show any relationship on the data. Experience on wind farm panels suggests that $R^2$ results of about 0.6 are often obtained and that gives a reasonable level of confidence in the robustness of the background noise curve. However, NZS 6808:1998 does not specify a minimum acceptable value for $R^2$.

The $R^2$ results range from 0.04 to 0.35 for all time noise and from 0.05 to 0.22 for night time noise. These correlations are poor. That is also acknowledged by the applicant and the expert witness. In fact, the correlations may be marginally worse than that calculated; some noise levels are probably lower than those reported at the minimum detection limit (the ‘noise floor’) of the noise monitoring instruments. At the request of the panel Mr Delaire has suggested a number of measures that might be taken to improve this position. These will be discussed later.

The Panel do not suggest that an error has been made in determining the background noise levels. The Panel is comfortable that the instruments have been calibrated (calibration certificates for the noise monitors were supplied), that the measurements have been made correctly in accordance with NZS 6808:1998, and that the analysis of the data has been correctly done. Mr Delaire has pointed out that there are a number of reasons that may lead to a
poor correlation. The Panel venture that an important reason may be an artefact of the NZS 6808:1998 method, in this case aggravated by the particular topography. If one was to measure noise level and 10 m AGL wind speed from co-located instruments it would be reasonable to expect a quite high correlation. In this method one is attempting a correlation between instruments that are dislocated geographically and hence in time. The anemometers are typically about 3 km from the noise monitors. It would seem possible that the wind speed on occasions may be quite different at the noise monitoring location than that at the moderately distant anemometer. In this particular situation that difference may be made greater by the topography. The anemometers are mounted on the ridge tops, the dwellings are in the valleys. The difference in altitude is typically about 150 m. which can generate a substantial difference in wind speeds. During the site inspection the Panel was made well aware of the dramatic difference of wind speeds across the proposed wind farm site.

The Panel do note that the data points are well spread across various wind speeds. This covers that important 5-8 m/s speed wind range at which turbines will be operating but background masking noise will be low and there is the greatest chance of some audibility of turbine noise, particularly at night.

Since noise compliance is critical at non-participating landowner dwellings, it would appear that the critical sites for robust background noise measurements are #12 (direct measurement), and #22 and B1 (for translation to other dwellings). These have R² results between 0.11 to 0.24 for all time noise and 0.05 to 0.22. The consequences of these poor correlations and how they might be redressed are discussed further in this report.

**Acceptable noise limits**

The acceptable noise limit is suggested by NZS 6808:1998 to be that the noise does not exceed the background sound level (L₀₅) by more than 5 dBA, or a level of 40 dBA L₉₅, whichever is the greater. Since background noise will increase with increasing wind speed this limits the noise to 40 dBA L₉₅ at low wind speeds (typically less than about 5 m/s) regardless of the background noise and then tracks at 5 dBA above the background noise curve for those higher wind speeds. Hence the acceptable noise limit for a particular location is established as a curve and is, by definition, tied to the background noise curve.

These limits are suggested in NZS 6808:1998 as a ‘guide to acceptability’. Given that the Wind Farm Guidelines do not indicate any variation from these suggested limits the Panel adopts these noise criteria for this assessment. Other wind farm panels have done similarly.
The applicant provided these acceptable noise limit curves for the six sites at which noise monitoring had been carried out, and for the ‘all-time’ and ‘night time data’ ie. twelve curves. These are plotted on the figures for background noise referred to previously.

Since night-time noise is usually less than all-time noise it would be expected that the background noise curve night would be lower than the all-time curve. The same procedure is used in both cases to develop the acceptable noise limits. The consequence of this is that the 40 dBA L₉₅ region would extend to a higher wind speed than for all-time noise and that the region with the +5 dBA increment would be at a lower level ie. the acceptable noise limit for night-time noise would usually be more demanding than that for all-time noise.

These acceptable noise limits are the definitive noise performance limits against which the modelled performance and, if constructed, the actual performance of the wind farm must be assessed.

It should be noted that an acceptable limit curve for a given location shows the maximum noise level that is allowed at that location with the wind farm operating derived from an analyses of a comprehensive set of noise and wind speed data. It does not indicate that at any particular wind speed the noise will be less than the level shown by that acceptable limit curve at all times. The variability of noise at any particular wind speed, up to 30 dBA or more as indicated by the background noise measurements, is such that the noise level with or without the wind farm operating may exceed the level shown by the curve.

For monitoring locations #8, 16, and 22 for which the coefficients of determination are particularly poor the applicant proposes that ‘…as a conservative approach, the minimum possible NZS 6808:1998 noise limit of 40 dBA will be used.’ The Panel observes that these are all participating landowner dwellings. However it is intended that the acceptable noise limit measured at #22 will be applied at non-participating landowner dwellings #20, 21 and 23. The consequence of this will be that of the non-participating landowners within the 40 dBA at 8 m/s AGL wind speed contour 3 will have a uniform 40 dBA limit applied and 4 will have a more typical curve applied with a uniform 40 dBA region moving into an ascending curve. Yet the data for that last group of 4 only engenders marginally more confidence than the former.

**Wind farm noise predictions**

NZS 6808:1998 requires that the noise impact at each of the nominated noise sensitive receptors from the proposed wind farm be mathematically
calculated i.e. modelled or predicted, and the result of that compared with the determined acceptable noise level at each of those sites. Hence compliance with the Wind Farm Guidelines requires that modelling to be done.

The modelling depends on assessing the noise propagation from each turbine to each of the identified receptors and mathematically summing those to give the total noise impact at each site. NZS 6808:1998 uses a hemispherical spreading model and specifies the equation for the calculation. That approach assumes that the noise travels uniformly out from the source diminishing in level as it spreads. The model assumes noise attenuation due to air absorption but does not include attenuation of noise at the ground, presence of intervening topography, the presence of vegetation or differences in noise reduction due to the noise frequency distribution. NZS 6808:1998 says that there is general acceptance that the approach is slightly conservative. That is, it tends to overestimate the noise level.

A critical input to the modelling is the sound level characteristic of the turbine. Those data are obtained from the turbine manufacturer.

The applicant has presented predicted noise levels in accordance with the method prescribed in NZS 6808:1998 and hence in compliance with the Wind Farm Guidelines. The applicant also used ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method for calculation. This method provides means for evaluating some of the more conservative assumptions in NZS 6808:1998. Importantly it enables a more accurate estimate to be made of the air absorption coefficient than the single value used in NZS 6808:1998, a desirable feature since larger turbines generate a greater proportion of low frequency sound power than the earlier smaller machines on which that standard is based. Air absorption of noise is related to noise frequencies. The report shows that this method indicates conservatism in the range of 0-3 dBA for the NZS 6808:1998 predictions.

These predicted noise levels have been presented graphically in the previously referenced documents (most specifically Exhibit 15) for all-time noise and for night-time noise for the nominated noise sensitive receptors.

The Panel is satisfied that the applicant has followed the appropriate procedures to predict noise from the proposed wind farm according to the prescribed NZS 6808:1998 method.

The Panel accepts that some of the simplifications in the predictive model may lead to a conclusion that the outcome is conservative. Indeed it is preferable that the predictive model be slightly conservative than otherwise. If the model were to underestimate the actual wind farm noise that might be produced, post construction noise monitoring may indicate non-compliance
with acceptable noise levels and the need to implement remedial actions then arises. The Panel is satisfied that the predictive model gives a reasonable simulation of the likely noise from the proposed wind farm within the limitations imposed by the approximations and assumptions of the method and by available data, but the Panel is cautious about ascribing to the results any substantial conservatism.

The Panel notes here that they are conscious of the substantial dependence of the predicted noise on the noise characteristics of the turbine selected for the assessment. The Panel has previously discussed the concept of an ‘indicative’ or ‘illustrative’ turbine. The Panel observes that if a machine is chosen that has higher sound power levels than the ‘indicative’ machine it may be necessary to rerun the predictive noise model. The planning application is for a machine up to 2.3 MW capacity as opposed to the 2.0 MW machine used for modelling purposes.

**Compliance with noise criteria**

The Panel comments here on the predicted results for the non-participating landowner dwellings only. It is apparent that in all cases and for both all-time and night-time noise the modelling demonstrates compliance ie. the predicted wind farm noise curve is entirely below the acceptable noise limit. The results indicate that compliance should be achieved by a margin of between about 2 and 8 dBA, the difference being largely related to the distance from the nearest turbines. The Panel concludes from these results that #26 would also be expected to comply and that dwellings at greater distances would be in substantial compliance. Those margins tend to be smallest at and up from a wind speed of about 8 m/s; the point at which a wind turbine sound power level plateaus at a maximum and at which limited background masking noise is generated. It is at about this wind speed that wind turbine noise is most likely to be audible, if it is heard at all.

The Panel is not entirely comfortable with the narrow 2-3 dBA predicted margin of compliance at 4 dwellings and notes that some of that margin could be eroded by selection of a turbine model of higher sound power levels than the ‘indicative turbine’. However, that does not alter that predicted compliance has been demonstrated as per NZS 6808:1998.

In all cases it seems that compliance is unrelated to an acceptable noise limit curve constructed from the regression curve of measured background noise. All comply with a uniform 40 dBA limit. Indeed the consultant’s report at Section 9.0 (p 15) notes:

*Although it was shown that correlation between background noise levels and wind speeds is fairly poor, noise emissions from the proposed wind...*
farm must comply with the lowest possible NZS 6808:1998 noise limit of 40 dBA at all residential properties.

This means that compliance with NZS 6808:1998 is not dependent on the background noise measurements.

Under the circumstances of these poor correlations the Panel believes that a single level of 40 dBA across the range of wind speeds should be applied as the acceptable noise limit to all non-participating landowner dwellings.

The Panel observes here that if the 35 dBA L90 rather than 40 dBA L95 limit was adopted, as EPA suggested might be considered, 6 non-participating landowner dwellings would be predicted to be non-compliant. That may have to be responded to by a substantial change to the proposal such as a reduction in size or reconfiguration of turbines.

Because of the uncertainty that exists in developing the background noise curves and hence the acceptable noise levels, and because of the relatively small predicted levels of compliance the Panel believes that two measures need to be implemented.

Firstly, if the proposal is approved and proceeds to construction, and should the actual turbine model selected have a sound power level greater than the REpower MM92 used as the ‘indicative turbine’ for modelling, the applicant should prepare a new noise prediction based on the sound power level and show that compliance should be achieved.

The second measure that the Panel suggests is a well designed and implemented post installation compliance monitoring program. It is usual to require such monitoring, but in this case its importance is made greater by the predicted relatively small compliance margins at a number of dwellings. If compliance is not being met remedial action will be required.

Cumulative impact

The Wind Farm Guidelines require:

A description of the proposal including….the cumulative effects of the proposal having regard to other existing or proposed wind energy facilities in the area. (p21)

There are no cumulative wind farm noise measures to be considered for this proposal. The nearest operating wind farm is Challicum Hills about 25 km to the south. The approved Lexton Wind Farm is about 40 km to the south-east and the approved and under construction Waubra Wind Farm is about 50 km south-east. Given the rapid attenuation of noise with distance there is no possibility of any dwelling being affected by noise from any of these wind
farms in addition to that from Crowlands, more so to the extent of possible non-compliance with the criteria of NZS 6808:1998. Wind turbine noise is likely to be negligible, other than perhaps with the unlikely occurrence of special acoustic characteristics, at distances beyond about 2,000 m from the source. Hence any cumulative effect is likely to be limited to the vicinity of wind farms within about 4 km of each other.

No submission was made on this matter. It does not warrant further consideration.

**Special audible characteristics**

The wind turbine noise generation and prediction discussed in the preceding parts of this chapter are for the noise continuously produced when the turbines are operating which, as discussed previously, is due largely to aerodynamic noise from the rotor blades and mechanical noise from the rotating machinery in the nacelle. However, it is possible for a wind farm to exhibit so-called special audible characteristics (SACs). These are audible features that are distinct from the usual noise and may sometimes be discontinuous noises repeated at regular intervals. They may include distinctive tones, impulsive sounds and modulating sound levels. This issue is described in NZS 6808:1998 and has been discussed in other wind farm panel reports.

Consideration of SACs is required by NZS 6808:1998 and hence must be considered in determining compliance with the Wind Farm Guidelines. The standard advises that the presence of any of these characteristics is likely to result in an adverse community response at lower noise levels than for noise that does not have those audible characteristics. It requires that the presence of such audible characteristics be responded to by the imposition of a 5 dB penalty. This penalty is applied by the arithmetic addition of 5 dB to the noise measured from post installation noise compliance testing.

NZS 6808:1998 notes that there is no simple objective method available to measure these special audible characteristics. It advises that subjective assessment is therefore necessary and should be supported, where possible, by objective analysis.

The Crowlands Wind Farm planning application and associated materials submitted by the applicant seem to be silent on this matter other than acknowledging the existence of this penalty and some presentation material from Mr Delaire on the van den Berg effect.

The Panel considers that it is important that SACs not be overlooked. It recognises that they could be annoying at noise sensitive receptors, most
particularly at night time, and that their identification and rectification is likely to be controversial and difficult.

The Panel is aware that over recent years considerable effort has gone into both the design of turbines and the layout of wind farms to reduce noise, including these SACs. However, the Panel understands that the considerable increase in height of turbines over recent times may have resulted in noise concerns that were not previously evident in lesser height machines. In this case these very tall turbines are to be sited along a ridge with dwellings located in the valleys. It is the Panel’s view that should this proposal proceed to implementation the applicant will need to ensure that the turbine selection and the design of the wind farm operational system is given careful attention to ensure that SACs do not occur.

In this context it is appropriate to refer to the so-called van den Berg effect. Van den Berg investigated noise effects from a wind farm near the German - Netherlands border. The Panel understands that night time noise levels were higher than anticipated and there was some modulation of noise. He linked these to periods of high atmospheric stability, Pasquill-Gifford stability classes D to F. The applicant provided no data on atmospheric stability which may have been obtainable by analyses of data from the meteorological tower. The Panel understands that the usual relationship used to convert wind speed from an elevated site to a 10 m above ground level position may not be appropriate for nocturnal high stability conditions. The Panel is not aware of any local experience supporting the existence of this van den Berg effect. In his evidence Mr Delaire illustrated the possible consequence of this effect and that under the circumstances it would not affect noise compliance.

The Panel believes that these possible, but perhaps incompletely understood, SACs can be dealt with by conditions. By developing night-time acceptable noise limits for the noise sensitive receptors and implementing a post construction monitoring program compliance can be determined. If the acceptable noise limit is exceeded, whether it is due to incorrect predictions based on incorrect wind speed estimations, high atmospheric stability or other cause, the operator will be required to bring the facility into acoustic compliance and to demonstrate that.

**Post-construction compliance assessment**

Once the facility is constructed and commissioned, or a specific stage of it is commissioned if it to be built in stages, it is essential to ensure that the operating wind farm complies with the NZS 6808:1998 noise criteria. This checking of actual performance is especially important for a wind farm for which the prediction rests on a number of assumptions and approximations.
such as noise attenuation, atmospheric stability, special audible characteristics and turbine sound power.

The results of this monitoring are to be compared with the acceptable noise limit curves for each noise sensitive receptor. Since those acceptable noise limit curves are derived from the background noise measurements the monitoring should be carried out in a way as close as possible to that used as closely as possible as that used for the background noise monitoring. Desirably, the noise monitoring needs to be carried out at the same sites, using the same anemometer locations used for the wind speed measurements, a similar time period for monitoring employed covering a similar range of wind conditions, measurements undertaken at a similar time of the year, and the regression lines fitted to the data discriminated by all time and night time noise. That is, in accord with good scientific practice that only one variable ie. the operating wind farm, be changed at a time. This ideal position cannot be achieved. In particular, as discussed under ‘Noise sensitive receptors’ monitoring needs to be carried out at a number of non-participating stakeholder dwellings which have the background noise, and hence the acceptable limit curve, determined by translation from another similar site rather than having been measured directly. Further, anemometer locations may change if the meteorological masts are relocated for wind farm operation, and the time of year for monitoring should follow completion of wind farm commissioning rather than wait for the same time of the year.

A particular difference for this post-construction monitoring, as distinct from the background monitoring, is that with the wind farm operating the presence of any special audible characteristics may require the possible application of a 5 dB penalty.

Although the applicant did not specifically comment on post construction noise monitoring the Panel expects, as a result of the discussion on possible conditions and such conditions for other wind farms, that such a monitoring program could be anticipated.

The Panel believes that a rigorous post installation noise monitoring program is essential. This is particularly so because of the small predicted margins between the acceptable noise limits and the predicted noise and that in the event, probably unlikely, of special audible characteristics occurring the penalty could remove or substantially erode those margins.

The Panel believes that as soon as the facility is commissioned compliance noise testing should be carried out. That commissioning involves the installation of all turbines, or all those in a group if the facility is constructed in stages, and any necessary work to bring them into full operational condition. The noise monitoring must be conducted as prescribed by NZS
6808:1998. If compliance is not shown, action must be taken within a specified period to bring the wind farm into compliance and monitoring repeated until compliance is demonstrated. The Panel recommends that testing be repeated about 12 months after compliance has been shown to be achieved. No further testing should be needed unless there is sound reason for believing that continuing noise compliance is not being achieved. The Panel believes that allowance needs to be made for intermediate and final noise testing if the facility should be built in stages. The size, layout and proposed electrical infrastructure suggest that staged construction may occur. In that event the detail of a noise compliance testing program would need to be submitted to the Minister for Planning for approval.

The Panel believes that post-construction noise monitoring should be carried out at #12 as background noise has been monitored there, and at a selection of #20, 21, 23, 24, 25, 26 and 28 as the nearest non-participating landowner dwellings. The focus should be on those predicted to have the highest wind turbine noise exposure. The Panel is aware that the selection depends on permission to access the locations and the availability of suitable sites near the dwellings.

The compliance noise monitoring must be carried out with all turbines operational. If during the testing one or more turbines near to any noise monitoring location has to be shut down the testing should be repeated or the data during that period discarded.

During this post installation and compliance noise testing phase particular attention should be given to listening for special audible characteristics. If suspected to be present the assistance of an independent acoustics expert should be sought to advise on this, including using whatever analytical tools might help establish the presence of such characteristics. The presence of such audible characteristics activates the 5 dBA penalty.

Compliance is determined by comparison of the regression line for the noise of the operational wind farm, adjusted if necessary with the 5 dBA penalty for any special audible characteristics present, with the acceptable noise limit curve. If the operational wind farm regression line is below the acceptable noise limit over the whole range of wind speeds compliance is demonstrated. If it is above it at any point the wind farm is non-compliant. The compliance monitoring data must be presented and analysed for all-time and night-time noise.

The above discussion of demonstrating compliance must be qualified by the poor correlation obtained between noise and wind speed for deriving the background noise. This has been discussed under ‘Background noise’. These poor correlations, or lack of robustness in the data, lead us to having
less confidence in the background noise measurements than is desirable. As has been explained previously this is not due to some deficiency in the measurements but is most probably an artefact of the measuring environment. This has not affected predicted wind turbine noise since the applicant has demonstrated that at all non-participating landowner dwellings the noise will be less than the minimum level specified in NZS 6808:1998 at all wind speeds.

But in the view of the Panel it does affect demonstrating compliance and post-construction monitoring. One might be in the position of similar poorly correlated data from the post-construction monitoring. Demonstrating compliance or non-compliance might then depend on comparing the position of two curves, one or both of which have considerable uncertainty. That could lead to some controversy. The Panel considers that to be undesirable and should be avoided.

In response to a question from the Panel Mr Delaire suggested that he saw limited value in repeating the background measurements. The Panel agrees. Since there is no evidence that any error was made with the measurements, repeating the measurements may lead to a similar outcome. In that case the effort has not improved the position. If the correlations are much improved that arguably demonstrates the poor repeatability of the method at those locations. That does not seem to help either.

The Panel sought the advice of Mr Delaire, as an expert witness, of what avenues might be possible to provide reliable post-construction monitoring to determine compliance or lack thereof. Mr Delaire provided an oral response which, at our request was provided in writing and presented by Mr Power in Exhibit 42 (Section 3.1 (o)). The advice from Mr Delaire is:

- Undertake additional pre-construction background noise monitoring, preferably at a location suitable for assessing post-construction compliance; that is, at a property located downwind from the wind farm. The pre-construction background noise levels would then be subtracted from the measured post-construction noise levels to give; ‘wind farm only’ noise levels. Compliance will be achieved if the ‘wind farm only’ noise complies with the NZ standard noise limits.

- Measure noise levels at affected residential properties located down wind from the wind farm post-construction. If the measured noise levels (wind farm noise plus background noise) comply with the NZ standard noise limits, then compliance is achieved regardless of background noise levels.
If compliance is not achieved under Option 2, proceed to a ‘shutdown test’. This consists of measuring noise from the wind farm (combined with background noise) for a range of wind speeds while operating, and then shutting down the wind farm to measure background noise levels at the same range of wind speeds. The background noise levels will be subtracted from the measured wind farm noise level to give ‘wind farm only’ noise levels. Compliance will be achieved if the ‘wind farm only’ noise complies with the NZ Standard noise limits.

Mr Delaire commented in his evidence that NZS 6808:1998 allows for correlations by wind direction. At 4.5.5 of the standard discussing correlations it states:

*It may be necessary to separately correlate background sound levels with windspeed for different wind directions and/or time of day.*

The Panel comment as follows on Mr Delaire’s advice.

1. There is no direction from the proposed wind farm that is consistently down wind. The wind roses on page 15 of Volume 1 of the Crowlands Wind Farm Planning and Environment Report show the distribution of wind directions at the three meteorological mast positions. The Panel expect that the proposal is to correlate wind directions from a particular sector that places each receptor generally down wind. The Panel observe that this would require a significantly longer monitoring period than that using wind speeds regardless of direction to obtain the minimum 1440 ‘data pairs’, and particularly so to obtain sufficient data points for the night time analysis. It is not certain that this technique will lead to better correlations, but it is consistent with attempting to obtain better coefficients of determination and with the suggestion of NZS 6808:1998.

2. Our understanding of this proposal is that, as with the predicted noise levels, is that if the regression curve is less than the NZS 6808:1998 minimum noise level of 40 dBA L95 compliance is demonstrated regardless of background noise levels. If that is not the case it would seem that non-compliance would have to be assumed notwithstanding that the noise at that site might be compliant if a more robust background noise curve was available. This seems to a carry some risk.

3. This proposal may give the greatest likelihood of obtaining robust data for determining compliance with NZS 6808:1998, but to obtain
the necessary data may require quite long periods of, at least some, turbines being shut down. The Panel observe that this turbine shutdown may not be in the interests of the operator, but neither is it in the interests of providing the maximum amount of renewable energy and reducing greenhouse gas emissions.

Our inclination is that the most prudent action may be to pursue option (1). It seems to offer some prospect of success. Importantly, since it is pre-construction it does not prevent the post-construction options (2) and/or (3) being implemented if it is not successful. As a pilot to see if this approach might be useful, the Panel suggest that the data from one or more of the six sites used for background noise monitoring might be correlated by down wind noise sector to see if higher values are obtained for the coefficients of determination.

The Panel consider it important that compliance with NZS 6808:1998 is demonstrated to ensure protection against sleep disturbance at nearby non-participating landowners’ dwellings, but the Panel is not confident that the poorly correlated background noise measurements currently provide a sufficient basis for that. However, the Panel is persuaded that methods are available to determine post-construction compliance, or non-compliance, by measurement as required by NZS 6808:1998. The Panel do not believe that it is appropriate that it recommend that a planning permit not be issued based on the uncertainty of demonstrating post-construction noise compliance. The Panel is of the view that this can be dealt with by requiring that the applicant submit a protocol for assessing compliance with NZS 6808:1998 at adjoining non-participating landowners’ dwellings with the development plans that must be to the satisfaction of the Minister for Planning and approved by him before development starts.

**Participating landowners**

Within the 35 dBA contour determined by the preliminary noise prediction as discussed under ‘Noise sensitive receptors’ the applicant identified 5 dwellings of participating landowners. These are #8, 9, 15, 16, and 22. Background noise monitoring was carried out at all these other than #9; it was considered that that would be similar to #8.

In the consultant’s report at Attachment 8 of Volume 2 of the Crowlands Wind Farm planning application it assessed non compliance with NZS 6808:1998 at #8 and 9. The margins are, at greatest, about 4 and 2 dBA respectively. In his expert witness statement Mr Delaire added the recently identified buildings #38 and 39, which, as discussed earlier probably don’t qualify as dwellings. These exceed the standard by about 6 and 10 dBA respectively as a maximum.
The report states (p 14):

The two (20) properties exceeding NZS 6808:1998 are owned by stakeholders in the project. All existing non-stakeholders’ residential properties comply with the NZ6808:1998 noise limits.

For stakeholders, there can be some flexibility in the application of the limits from NZS6808:1998, by agreement with the stakeholder. The detailed study on which NZS6808:1998 is based is presented in the document ETSU-R-97 by the European Working Group on Noise from Wind Turbines.

In this document, the increased tolerance to noise shown by residents who gain financially from a project is given in Note 24 on Page viii of the summary by the European Working Group on Noise from Wind Turbines (ETSU-R-97). It states:

- 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.

   All stakeholders’ properties comply with the ETSU-R-97 recommended noise limits.

The Panel notes that this conclusion was modified by Mr Delaire in his expert witness statement with regard to the more recently identified dwellings #38 and #39 which exceed the ETSU-R-97 limits by about 1 and 5 dBA respectively.

In Volume 1 of the Crowlands Wind Farm planning application it says at 8.11.9 (p 59):

Certain dwellings occupied or owned by stakeholders of the project may exceed the compliance levels set by the New Zealand Standard NZS6808:1998. Where this occurs Pacific Hydro will enter into an agreement with that Landholder to allow non-compliance. As part of that agreement Pacific Hydro offers noise attenuation measures such as planting of trees and shrubs, double glazing of windows and improved insulation.

The matter of possible non-compliance with NZS 6808:1998 at a participating landowner dwelling has been touched on under ‘Noise sensitive receptors’. Participating landowners’ dwellings will often, although not always, be closer to wind turbines than other dwellings, and self-evidently, these landowners have a beneficial interest in the wind farm through the payments
made to have the turbines on their properties. Wind farm panels have adopted the position that the dwellings of such participating landowners’ should not have to meet the noise criteria of NZS 6808:1998. That is in contrast to non-participating landowners who have no financial interest in the wind farm and the criteria of NZS 6808:1998 must be met at the exterior of their dwellings.

The Panel does not believe that the Wind Farm Guidelines and the reference from that to NZS 6808:1998 requires consideration a noise limit for participating landowners’ dwellings. Nonetheless the Panel notes that all such dwellings other than #38 and 39 meet the criteria of ETSU-R-97 and all but two of those meet the criteria of NZS 6808:1998. On the evidence, the Panel discounts the buildings identified as #38 and 39 as habitable or long term occupied structures and hence not ‘dwellings’.

In line with usual practice the Panel believes that it is appropriate for the wind farm operator and the participating landowners that might be subject to noise levels that exceed the NZS 6808:1998 criteria to enter into, and register, agreements (‘Section 173 Agreements’) under the Planning and Environment Act 1987 that do not require the noise limits to be met at those locations. The arrangements, if any, between the operator and such landowners to provide any noise attenuation is not a planning matter that the Panel need concern itself with.

Submissions

The Panel has referred to submissions in section 5.1. Here the Panel discusses some of those in more detail.

Mr Frank Campbell made a written submission to the planning application. He presented his submission in person and provided further written material (Exhibit 30). In response to a request, Mr Campbell subsequently provided a list of references for some of the material included in the exhibit. Mr Campbell lives some kilometres to the south-east of the site.

Mr Campbell was critical of wind energy on a number of grounds. On noise he referred to a Massey University (NZ) study near the Tararua wind farm which reported that ‘80% of 600 households surveyed regarded the turbines as ‘intrusive’ and ‘...as many as 25% of households located 10 km away said they could still hear the wind farms’. Mr Campbell also provided a diary of a person living near a wind farm in Italy recording the noise from the turbines.

The Panel is aware that there have been instances of undesirable noise from wind farms. But the Panel is also aware that there has been much effort put
into wind turbine design and wind farm configuration to reduce noise. The development of standards for wind farm noise has also been an aspect of this wind farm noise management. The Panel does not know of any noise concerns from any of the more recent wind farms in Victoria such as Yambuk and Wonthaggi. The Panel is satisfied that design and demonstrated compliance with NZS 6808:1998, the proposed noise complaints procedure, and enforcement powers will ensure that unacceptable noise at the dwellings and curtilages of non-participating landowners is avoided. Furthermore, the Panel considers that it would not be in the interests of the applicant, or indeed the wind energy industry, to construct a facility that results in levels of noise at neighbours’ dwellings that exceed the criteria specified through the Wind Farm Guidelines or that lead to justifiable noise complaints.

Mr Robert John of Malakoff Estate Vineyards made a written submission on the planning application. He presented his submission in person and provided further thorough written material (Exhibit 35). Mr John has a vineyard adjoining the north-west of the site. At present there is no dwelling on the property.

Mr John did not express opposition to wind farms as such, but rather formally objected to the proposal because of the possible influence of a proposed number of turbines that would be adjacent to his property. He advised that 5 turbines would be within 350 to 700 m of his property and 10 within 1.5 km. The Panel observes that these closest turbines would be nearest to the southern boundary and all would be elevated along the ridge line. Mr John said that he has identified sites for a number of accommodation units along the western boundary of the site which he proposed to develop to complement his vineyard business. In addition he indicated that he has an as of right to build a house on each of his two allotments. He noted that these would all be within the 40 dBA (at a wind speed of 8 m/s at 10 m AGL) predicted noise contour. Our examination of the applicant’s material suggests that the sites would be approximately on a 41 dBA contour.

Mr John referred to Pyreenees Shire strategic documents (Exhibit 35, p 2). He said:

*The Municipal Strategic Statement in clause 21.05-1.8 makes specific reference to Viticultural Development in the area of our vineyard. The Strategic Framework Plan outlines areas close to Landsborough where our vineyard is located. The objectives set out include that the establishment and development of vineyards and associated rural industries should be facilitated and encouraged, and the development of supporting infrastructure required in association with vineyard development should be facilitated. It also requires as an implementation...*
strategy for applicants for other uses and developments in designated grape growing areas to demonstrate they are compatible with existing vineyards and will not compromise the future development of adjoining lands for vineyard purposes.

Mr John clearly indicated that he saw the development of the proposed wind farm, with regard to both noise and visual impact, as being incompatible with his planned development of his property.

Mr John suggested a preference for relocating proposed turbine sites to ensure that the 40 dBA contour falls outside his property or at least clear of nominated parts of it. He provided a drawing showing the location of the proposed units and dwellings and a proposed new 40 dBA contour that would be clear of these sites. He said that he believed that if turbines could not be relocated to achieve this revised contour the incremental costs of reducing the noise impact on proposed units and dwellings should be subject to an agreement between the applicant and himself. The Panel assumes that this might cover the additional cost of measures such as acoustic insulation. He also submitted that a shadow rental be considered.

The most south-easterly unit site nominated is the ‘position B1’ referred to previously at which the applicant determined background noise and the acceptable noise limit curve. The applicant did not prepare a noise prediction for the wind farm at this site; in response to a question it explained that it had not done so since there is no existing dwelling at that location.

The Panel inspected Mr John’s property at his request. For that inspection he had meticulously pegged out the locations of the proposed buildings and the predicted 40 dBA noise contour. The Panel understand the position put by Mr John. However, none of these proposed buildings currently exist, are under construction or apparently have detailed plans or approval. Whilst the Panel do not doubt Mr John’s intention, the Panel does not believe that it can regard these proposed sites as ‘noise sensitive receptors’ within the understanding that that refers to existing uses.

If the Panel were to recommend that turbine positions be relocated to ensure that the 40 dBA contour falls outside Mr John’s property, the Panel believe that it would have to extend that recommendation to all surrounding properties, particularly those in designated grape growing areas on the basis that they may wish to undertake such tourist type uses in future.

The Panel also comments on the 40 dBA contour. The Panel agrees that this contour is likely to intersect with Mr John’s property. But the Panel believes that the position of and the consequences of this single contour should be
interpreted cautiously. There are uncertainties in the prediction arising from assumptions and approximations in the model, and possibly some conservativeness. It also depends on the sound power level of the particular turbine model used for the modelling; if the proposal proceeds to construction a turbine with different acoustic characteristics might be selected. As an example of such changes, by reference to Figures C1 and C2 in Attachment 8 of Volume 2 of the Crowlands Wind Farm planning application, it can be seen that between the preliminary noise screening and the more detailed predictions the whole noise envelope has contracted. At position B1, using some interpolation, the predicted 8 m/s wind speed noise level has decreased from about 47 to 39 dBA (these both use ISO9613-2:1996, the more conservative NZS 6808:1998 increases these by about 2 dBA; see under ‘Wind farm noise predictions’ earlier in this chapter for discussion of ISO9613-2:1996). The Panel observes that the sites nominated by Mr John appear to follow approximately the same noise contour as #9. Noise has been predicted at this site and exceeds the criterion by 1-2 dBA.

In summary, the Panel see no policy basis to recommend relocation of turbine positions to reduce predicted noise levels at Mr John’s property. Further, on the Panel’s interpretation of the evidence presented it appears that dwellings that might be built at the sites indicated are, at most, likely to exceed the noise criterion by perhaps 2 dBA, and at best, may comply.

Mr Robert and Ms Isabella Burns made a written submission to the planning application. They presented their submission in person and provided further written material as a copy of their electronic presentation (Exhibit 36). The Burns have a vineyard adjoining the north of the site and adjacent to that of Mr John. At present there is no dwelling on the property although one is planned for which a permit has been issued.

The Burns expressed concern that their dwelling site had not been assessed for noise impact. They questioned the accuracy of the modelling, the use of 40 rather than 35 dBA as the noise criterion, and said that their planned house site would be in the 35-40 dBA band.

Most of these noise issues have been discussed elsewhere, particularly with regard to the submission from Mr John. The Panel does comment, however, that, by reference to Figures C1 and C2 in Attachment 8 of Volume 2 of the Crowlands Wind Farm planning application, it can be seen that between the preliminary noise screening and the more detailed predictions the likely noise at the Burns proposed dwelling has diminished from about 35 to 31 dBA according to ISO9613-2:1996. This translates to about 33 dBA using the more conservative NZS 6808:1998, well within the noise criterion. The Panel observes that the proposed Burns’ dwelling site appears to be on about the
same noise contour as #12. Noise has been predicted at this site and meets the criterion by about 7-8 dBA. The Panel is thus satisfied that the noise criteria will not be exceeded at the Burns’ proposed dwelling.

The potential impacts on particular surrounding properties are discussed in Section 9.

Mr Graeme Maconachie made a written submission to the planning application and presented at the hearing. Mr Maconachie is a participating landowner in the Challicum Hills Wind Farm, a facility owned by the applicant, and a prospective participating landowner of the Crowlands Wind Farm. Mr Maconachie submitted in response to questions about noise that he heard wind turbine noise only when he was downwind, and that it was not intrusive. Mr Maconachie said that he lived south of the Challicum Hills Wind Farm about 800 m from the nearest turbine and that the most common wind direction was from the north-west.

Construction noise

The construction work will inevitably generate noise from machinery, particularly heavy plant, concrete batching if that is on site, and blasting should that be required. Apart from concrete batching the noise from construction traffic and activities will not be concentrated in particular areas over the whole construction period of perhaps 1-2 years, but distributed over the site. Any noise impact on any particular non-participating landowner dwellings will hence be lessened. The applicant intends to restrict construction operating times to between 7 am and 6 pm on Mondays to Saturdays as far as possible to reduce construction noise.

The body of Volume 1 of the Crowlands Wind Farm Planning and Environment Report does not seem to discuss construction noise. However it is included in the draft Construction and Worksite Management Plan in the compendium of draft management plans at Part B of Volume 1 (4.2, p 20-21).

EPA referred implicitly to construction noise in its submission by the reference to its ability to act on justified noise complaints.

The Panel believes that the on-site concrete batching plant(s) should be situated well away from sensitive noise receptors. The Panel is aware that most construction equipment and machinery is now designed to control noise more effectively than previously and suggests that machinery used should meet contemporary noise standards and be well maintained.

The Panel expects that noise generated will not be markedly different in intensity to that from many farming activities, although the duration may be
longer. The Panel believes that construction noise will not significantly detract from the amenity of the area.

The Panel notes that a draft construction noise section has been developed. The Panel is of the view that an important aspect of construction noise management will be keeping landowners advised of activities near them that might generate noise and to inform them of a contact for any complaints.

**Noise complaints**

Wind farm planning permit applications, quite understandably, focus on compliance of the proposed wind farm with the acceptable noise limits specified in NZS 6808:1998. Panels assessing wind farm applications have generally taken the view that, notwithstanding this care in the design of the facility, the possibility of noise complaints should not be ruled out. Accordingly they have tended to recommend a detailed condition for a complaints system whereby complaints of alleged wind farm noise can be made, the justification considered objectively, and if justified, remedial action can be taken.

For this application the applicant has presented a detailed draft ‘Noise Complaint and Evaluation Procedure’ in Volume 1 of the Crowlands Wind Farm planning application at Section 10 (pp 54-66 at back).

The Panel notes this pro-active approach, the detail in that document, and the philosophical approach to dealing with possible wind farm noise complaints. The presentation of this document makes it unnecessary to provide a detailed condition for a noise complaints system, but rather a simpler condition requiring this procedure to be implemented.

The principles enunciated in the Introduction (part 10.1) to this Procedure are worth repeating here.

*The approach taken by Pacific Hydro is based on recognition that:*

- *Noise is a technically complex issue;*
- *Different people respond differently to exposure to sound of different frequencies and power levels (‘noisiness’);*
- *Noise regulations and assessments of compliance are also complex;*
- *Legal proof of compliance or non-compliance is difficult and costly and does not in itself resolve the noise concern for the complainant.*

*Pacific Hydro’s approach is that:*
· Every complaint should be acknowledged promptly and treated on its merits without undue delay;
· If information is needed to test the validity of a noise complaint that information should be gathered promptly;
· The complainant should be kept aware of the progress of the evaluation and to be informed of the outcome;
· Communications should seek to identify specific concerns so that these may be addressed in designing any necessary rectification measures;
· Pacific Hydro will use its best endeavours to ensure that valid and borderline complaints about noise are dealt with in a constructive and cooperative manner;
· Pacific Hydro recognises the rights of complainants to seek a legal ruling on the validity of their complaint.

and from part 10.2.3:

It is recognised that demonstration of compliance or non-compliance will, in some cases be difficult, costly and may not in practice address the noise that gave rise to the original complaint. For this reason the procedures are designed to allow an outcome-focussed result by negotiated agreement between the parties without necessarily pursuing the legal and technical compliance question to its limits.

The Panel endorses these principles and approach. The Panel agrees that noise is technically complex, that it has considerable subjectivity, and that a consultative and negotiated approach is much more likely to lead to a successful outcome than is a legalistic one.

The Panel recommends that the draft procedure be further developed and refined before submission to the Minister for Planning for approval. The Panel suggests that the following points might be considered. In making these suggestions it is conscious that the applicant’s submission is that Pyrenees Shire will be responsible for the enforcement of the planning permit, if issued.

- Given the likely enforcement role of Pyrenees Shire that it be consulted in finalising the procedure.
- Consideration be given to including an essentially independent person in any negotiation and mediation. A Council officer may suit that role.
- Consider being able to retain an acoustics expert with wind turbine noise experience as needed. This may be important if special acoustic characteristics have to be considered since these are essentially subjective.
In 10.4.1 also provide for facsimile, e-mail, and perhaps even text if immediate contact is needed for a particular acoustic phenomenon.

Specific mention be made of the nature of wind farm generated noise to help with describing any noise and for investigating the complaint. This might include aerodynamic noise, mechanical noises and SACs.

Consideration might be given to the use of audio recordings, including archived base line recordings as references, as a possible means of identifying any wind turbine caused noise.

If a planning permit is issued and the project proceeds to construction the existence, nature and use of the Noise Complaint and Evaluation Procedure should be made known to the occupants of all dwellings within the vicinity of the wind farm.

5.3 Conclusions and recommendations

Based on the evidence and submissions that the Panel has sighted, and on its analysis of that material, the Panel concludes that the proposed Crowlands Wind Farm should satisfy the Wind Farm Guidelines requirement that:

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

That conclusion is based on the evidence of the acceptable noise level curves developed from background noise measurements and the predicted noise from the wind farm using the indicative wind turbine model.

Hence, the Panel concludes that operational noise compliance is not an impediment to the issue of a planning permit.

However, the Panel advises that the background noise measurements do not provide a sufficiently robust basis on which to establish compliance, or non-compliance, from the post-construction noise monitoring that will have to be carried out. The applicant acknowledges this. Mr Delaire, the expert witness on noise, advised of techniques that might be used to rectify this problem and the Panel makes recommendations accordingly.

The Panel also concludes that noise monitoring should be carried out at the dwellings of a number of neighbouring non-participating landowners to ensure compliance as soon as practicable after the wind farm is commissioned. That requirement may have to reflect staged construction of the wind energy facility. If non-compliance is identified effective action to ensure compliance is required.
The Panel notes that the applicant has recognised the importance of managing construction noise for the period of building the facility. The Panel concludes that, although there will be noise from the construction activities, including traffic, that is not incompatible with otherwise allowed activities allowed in the Farming Zone and Rural Conservation Zone. This construction noise can be effectively managed through the draft construction plan prepared by the applicant.

Finally, the Panel concludes that the applicant’s noise complaints protocol should, with some refinement, be adopted and implemented.

The Panel recommends:

That noise from the proposed Crowlands wind farm be assessed and monitored in accordance with Conditions 23 – 31 in the draft Pyrenees planning permit in Appendix A of this report including:

- Compliance with the New Zealand Standard 6808:1998;
- Additional background noise monitoring;
- Post-construction noise evaluation; and
- Preparation of a noise complaint and evaluation response plan.

That EPA Publication 480 Environmental Guidelines for Major Construction Sites and Section 12 of EPA Publication TG302/92 Noise Control Guidelines be applied to construction activities as shown in Condition 16(a)(x) in the draft Pyrenees planning permit in Appendix A of this report and Condition 13(a)(x) in the draft Ararat planning permit in Appendix B of this report.

That an alternative approach to wind farm noise management should be sought that provides at least equivalent protection of sleep against wind farm noise, is less complex, less costly, less time consuming for all parties, and more certain and such an approach, if successful, be incorporated into the Wind Energy Guidelines.

That, with some further refinement, the comprehensive draft ‘Noise Complaint and Evaluation Procedure’ provided by the applicant at Crowlands be incorporated in the Wind Energy Guidelines as a good example of such a procedure.
6. Transport and site access

6.1 Background

Constructing a wind farm is a major engineering project. This necessarily requires bringing materials and personnel to the site and perhaps removing other material. These transport movements can be substantial.

For the purpose of this chapter the site is defined as the boundary of the contiguous landholdings on which it is proposed to site the wind farm. This boundary is shown in Figure 4. Transport on the site requires the construction of access tracks. These are on private property although some tracks will use road reserves that are held by the landowner under a grazing licence. This transport is described in the following section. This chapter discusses the transport on public roads that provide access to tracks on the site.

The following sources have been used in preparing this Section:

- the Policy and planning guidelines for development of wind energy facilities in Victoria;
- Chapter 8.2 of Volume 1 Part A of the planning application;
- The Access and Traffic Report in Volume 2 of the planning application;
- The expert evidence of Mr Nigel Ashton;
- Submissions from the applicant; and
- Other submissions.

For construction, operation and maintenance the applicant proposes five entry points to the site from the south-east through the west to north-west side of the site. In addition, a small number of tracks may be constructed on the eastern side at the request of the Country Fire Authority to provide emergency egress to the Landsborough - Elmhurst Road; these will not be used for wind farm construction and maintenance and will not be further discussed in this chapter.

The adjacent public roads that border the site and will provide access to the on-site tracks are Pyrenees Highway, Crowlands - Eversley Road, Ararat - St Arnaud Road and Spring Flat Road. The first three are VicRoads roads and are sealed. Spring Flat Road is a local gravelled road about 4 km in length than runs generally to the east and north from Crowlands. These roads are shown in Figure 4.
Vehicles will, of course, use other, as yet undefined, roads from their sources to join these boundary roads and hence access the on-site tracks.

6.2 Discussion

A consideration of transport issues requires a description of the materials to be moved, the vehicle types, the likely vehicle numbers and the possible sources.

The Access and Traffic Report was prepared for the applicant by Ashton Traffic Services and Mr Nigel Ashton was called as an expert witness.

Construction traffic to and from the site will consist of over-dimensional vehicles (ODV) to carry the wind turbine components and large mobile crane; heavy vehicles bringing screenings, concrete or cement (depending on whether on-site concrete batching is established), reinforcing materials, and water; and light vehicles for personnel. The types, estimated numbers and transport need of these vehicle types are discussed separately.

Under ‘Over-dimensional vehicles’ the Panel discusses a number of elements of the offsite transport routes that are common to all vehicle types, but for which these vehicles by virtue of their size or mass will determine those elements.

In the discussion that follows the Panel provides estimates from the data presented to it in an attempt to give some idea of the relative intensity of use of various vehicle types.

Over-dimensional vehicles

ODV are required to carry loads that because of some feature such as length, width, height or mass exceed the limits for normal road vehicles and require specific conditions of use. These vehicles operate under permit and must use nominated routes. The over-dimensional (OD) loads are exclusively the wind generator components and the crane required to assemble them. The prefabricated steel tower would be brought in several sections up to about 33 m in length. The nacelle (the generating machinery housing that sits on the top of the tower) weighs perhaps 60 t. The blades are characterised by their length of about 45 m.
Figure 4: Stakeholder property boundaries and track locations
Vehicles of different configurations are used for these different loads. For the heavier loads they have multiple axles (up to perhaps 15) to spread the load over the pavement. These vehicles could be up to about 50 m in length. By comparison the maximum length of a semi-trailer is 19 m and that of a B-double 25 m. A feature of these long vehicles is the turning radius which is greater than for normal vehicles. They invariably have an independently steerable rear dolly to reduce the turning circle. Nonetheless routes have to be chosen that can accommodate these turning limitations and intersections may have to be widened and crossovers specially designed. Most of these vehicle trailers will have a width of 4.2 m compared with the normal vehicle legal maximum of 2.5 m.

A very large mobile crane must be brought to the site to erect the wind turbines. This crane must be capable of lifting a load of about 60 t or more (the nacelle) to a height of slightly greater than 100 m. The crane and vehicles carrying sections of that may be over-dimensional vehicles. It is expected that the crane would need to be brought to and leave the site only once (unless the wind farm is constructed in phases) although it may occasionally need to use public roads near the site boundary to move from one construction location to another.

The permit application advises that regional transport route options have been discussed with VicRoads and local road access options have been discussed with Pyrenees Shire Council. The Panel supports this discussion with appropriate road managers but given the proximity of the site to two neighbouring council areas suggests that discussion with Northern Grampians Shire and the Ararat Rural City might also be advisable.

Mr Ashton estimates that the number of OD loads, excluding the crane, at 462. That is 924 movements in total of vehicles taking components to the site and returning unladen by the same routes.

The applicant has identified that these loads could be brought from Melbourne, Geelong or Portland or some combination of those. In response to a question from the Panel the applicant indicated that for recent wind farm constructions in western Victoria components were being brought from Portland. The Panel is aware that for the Waubra Wind Farm tower components are being made at Portland. During the hearing vehicles passed the hearing room carrying wind turbine blades, obviously destined for Waubra and possibly having originated from Portland to which these components might have been shipped. That wind farm permit holder’s web site indicates some components such as nacelles are arriving through the Port of Melbourne.
The Panel was advised that VicRoads has investigated possible routes for ODV to the site. VicRoads is responsible for issuing permits for ODV use which includes the route that must be used to ensure road safety and to protect road assets, and for providing escort vehicles for road safety.

For components brought from Portland the applicant has identified vehicles using the Mortlake - Ararat road to Ararat and thence the Pyrenees Highway and the Ararat - St Arnaud Road to Crowlands. The Panel presumes that from Portland to Ararat the route follows highways. The Panel was not made aware by the applicant or from any submission of any concern with this route.

For components that might be shipped through Melbourne or Geelong the applicant has investigated various routes and, in conjunction with VicRoads concluded that the preferred route is via the Western Highway and thence north on the Buangor - Ben Nevis Road to cross the Pyrenees Highway and thence to the Ararat - St Arnaud Road to Crowlands. Buangor - Ben Nevis Road is a local road managed by and within the municipality of the Rural City of Ararat. The letter from VicRoads submitted by the applicant identifying this road as suitable subject to a bridge inspection and refers to that assessment having been made in conjunction with Ararat Rural City. The Buangor - Ben Nevis Road is partly sealed and partly gravel.

The applicant indicated that a number of optional routes had been considered for possible transport from Melbourne or Geelong. One of these was via the Sunraysia Highway from Ballarat to Avoca and thence via the Pyrenees Highway. However, the applicant advised that this would be longer and require a difficult acute turn at the Ararat - St Arnaud Road intersection for which intersection modification would be needed. If the Buangor - Ben Nevis Road is to be avoided completely this may be so, but the Panel notes that an alternative turn may be into the northern part of the Buangor - Ben Nevis Road and thence to the Ararat - St Arnaud Road. Another option identified was to use the Sunraysia Highway to Lexton and thence local roads to the Pyrenees Highway at Amphitheatre. However this route is constrained by a 12 t load limit bridge which hence makes the route unusable unless this bridge was to be strengthened. A final option was the Western Highway to Beaufort and local roads to Amphitheatre and hence along the Pyrenees Highway as before.

It should be noted that whatever the source of the OD components all or most will approach Crowlands from the Ararat – St Arnaud Road. From that point the vehicles will access the site at any of the five access points. Some will turn left along the Ararat - St Arnaud Road to access Glendhu Road and Start's Road, some will continue straight ahead on Spring Flat Road, others
will turn left along the Crowlands - Eversley Road to Mundaring Road and some may travel further to the Pyrenees Highway and thence to Price’s Road. However, in this last case the unsuitability of the timber bridge across the Wimmera River for large loads may necessitate the small number of OD loads requiring site access via Price’s Road to use the Pyrenees Highway from the west whether the load is approaching from Ararat or the Buangor - Ben Nevis Road.

Mr Ashton has estimated the number of ODV vehicles that could be expected to use the various wind farm site access points based on the present conceptual planning. These are presented in Table 4.8 of Attachment 2 of Volume 2 of the planning application. It should be noted that the ‘in’ and ‘out’ figures for each point are not equal. The internal access tracks are being designed to avoid having to turn such vehicles where it is impractical and hence some will enter at one access point and leave at another.

The applicant had advised that it will:

…complete detailed design plans of augmentations required along VicRoads-managed roads and Council-managed roads following the selection of preferred options and approval of the planning permit. These plans will be submitted for Minister’s endorsement prior to construction.

Mr Neil Haydon, of Northern Grampians Shire Council, in questioning Mr Ashton, suggested that heavy vehicles were the principal transport consideration and that the preferred route for ODV is from Portland through Ararat. He submitted that the Buangor - Ben Nevis Road should not be used for these vehicles, citing that it is narrow, has a poor seal, part is unsealed, some native vegetation would need to be trimmed, that it had three bridges, and that it had an uncontrolled railway crossing. The Panel notes that this road is in the Ararat Rural City, not in Northern Grampians Shire.

The Panel was informed that the Ararat Rural City had received a petition from residents of Buangor - Ben Nevis Road asking that that road not be used for ODV. The applicant advised that it was considering other possible routes. The Panel notes that Buangor - Ben Nevis Road was proposed in the exhibited planning application. If another route is to be contemplated on the basis of this petition as distinct from a clear transport advantage the Panel would consider it inequitable if that was not made known to residents along that alternative route and them given a similar opportunity to express an opinion.

The Panel can understand the interest in the movement of OD loads. The vehicles are different to normal road vehicles, they are unusually long, wider than usual, carry loads that have large dimensions or are very heavy, often
have very many axles and wheels, have independent rear steering, use escort vehicles, and can require physical changes to road intersections.

Notwithstanding this interest and the focus on these vehicles the Panel believes that the number of movements of these needs to be considered in the context of other vehicle movements associated with the construction.

If the Panel assumes that the movement of these OD components were to occur uniformly over a year over the same route the vehicle movements would be about four per working day, two each way. If different sources are used that estimated ODV use would be less, for example if the tower sections came from Portland and the other components came from Melbourne the ODV movements along Buangor - Ben Nevis Road would be about two per day.

The Panel drove along a number of the roads in question that might be used for OD loads. These included the circumferential roads around the site and possible adjoining access roads. They included Spring Flat Road, the Pyrenees Highway between Ararat and Avoca, the Ararat - St Arnaud Road from the intersection with the Pyrenees Highway to Shay’s Flat - Malakoff Road, Crowlands - Eversley Road, Landsborough - Elmhurst Road between the Pyrenees Highway and Shay’s Flat - Malakoff Road, and Buangor - Ben Nevis Road. The Panel does not claim particular expertise in transport and road management, but given the appropriate attention to road safety, intersection treatments for turning, bridge strength, dust management, erosion and sediment control, rehabilitation of pavement if necessary, and prudent management of existing native vegetation, it was not apparent that any of these routes in their present condition, other than Spring Flat Road, might be particularly unsuited to the movement of the OD loads. Spring Flat Road is a local unsealed road that carries very little traffic; it is discussed separately in this Section.

A particular aspect of the off-site transport is that of crossovers which are needed on public land to allow the vehicles to leave the public road to enter the access tracks on private land. The Panel estimates that there may be five to eight of these. These are discussed separately in this section.

It is the Panel’s view that once the source of these OD components is known the transport routes to Crowlands should be established between the permit holder, the transport operator, VicRoads, and the relevant councils where local roads are involved. Native vegetation removal permits if required can then be applied for; vehicle movement permits issued; crossovers designed, approved and constructed; intersection improvements designed and made; residents along local roads advised, and other measures taken to facilitate these vehicle movements. The Panel believes that the evolving Traffic
Management Plan should reflect the detail of this off-site over dimensional transport.

The Panel also notes that the applicant has built and now operates a number of wind farms including several in Victoria. It is currently building the second stage of the Portland Wind Farm. It therefore has ‘runs on the board’ in experience in arranging and carrying out off-site movements of over-dimensional wind turbine components.

**Heavy vehicles**

The construction activities will entail bringing substantial quantities of materials to the site and possibly removing some excavated material. This task will be met by heavy vehicles of various descriptions. Unlike OD vehicles these are road legal vehicles that can operate on public roads other than where there might be a constraint due to bridge mass limits, road grades, tight curves or residential area limits or the like.

Heavy duty vehicles will be required to bring screenings for making access tracks; to bring in screenings, cement and water for making concrete on site or alternatively for bringing in concrete; to provide reinforcing rod; to carry water for track dust control, and for the transport of a range of other lower volume materials such as electrical cabling and power poles. Transformers and electrical switchgear, road construction machinery, excavation machinery and various support vehicles will have to be brought to site. Unusual among construction sites will be the need to have heavy duty tracked or rubber tyred tow vehicles to haul loads up steep tracks to the ridge.

The applicant advised the Panel in response to questioning that some material from road and turbine foundation excavation may have to be removed from site if it can not be prudently disposed of on the site. It also advised that some excavated material may be able to be used productively on site for such purposes as road base, but that would depend on the quality of the material. The Panel has assumed that taking excavated material off-site would not increase the number of truck movements by using trucks bringing quarry products to remove this material. The Panel notes that being able to use excavated material for construction will reduce off-site truck movements bringing screenings to the site.

The truck movements for bringing road making materials constitute a major part of the estimated heavy vehicle traffic. About 65 km of track needs to be constructed with gravel to a width of about 4.5 m plus batters and depth of about 40 cm. To estimate heavy vehicle movements for road construction Mr Ashton assumed that a truck and dog can be used to make deliveries to the
flat section of track but that only the truck, carrying about half the load as would be the case with the trailer, could be used on the steeper sections.

Mr Ashton estimated the number of movements onto the site as 14,582 (Table 4.6, Attachment 2 of Volume 2 of the Planning Permit Application Report). He discriminated this according to the various access points. In this case it is assumed that the vehicle will enter and leave by the same point since the interconnecting internal tracks will not be in place and turning arrangements will have to be put in place for these vehicles. The total number of vehicle movements on public roads to and leaving the site is hence twice that number i.e. about 29,000.

The Panel asked the applicant about the adequacy of the assumed track width particularly with regard to ODV, movement of the assembled crane, and the need for passing bays. The Panel also asked if the hardstand areas at each turbine had been included. In a letter to the Panel of 29 February 2008 the applicant advised that it had reassessed the truck movements needed to bring quarry materials for track construction based on these queries and other considerations. It informed the Panel that it now estimates the number of truck loads needed for this task as 18,780, or 37,560 movements. It noted that the number may be reduced if some excavated material can be used, as commented before, and that the depth of screenings on some sections of road may be able to be reduced because of an existing sound base.

The Panel notes that this is an increase of nearly 30% in these estimated quarry truck movements. The Panel is comfortable that this, about 38,000 movements, is a more reasonable estimate of the likely maximum number of truck movements for bringing this road surfacing material to site.

That number of vehicle movements can be given some context by adopting the applicant’s suggestion that this track construction might take about 6 months. If the Panel assumes 135 working days of 10 hours per day that corresponds to about 28 vehicle movements per hour or about one every two minutes. These may not, of course, all be on the same roads, but it does give an indication of the scale of this transport task and the need for thorough planning. The Panel believes that the detail of that traffic management should be in the Traffic Management Plan, or a document developed from that when the material source(s) are known.

The source of these road making materials is not currently known and hence likely transport routes cannot be identified. The quarry or quarries that might supply this material will only be known after the applicant receives a planning permit, a decision is made to proceed to construction and supply contracts have been let.
The Panel was informed that there are a number of quarries in Pyrenees Shire, and the Panel assumes also in neighbouring municipalities. The Panel expects that the route from most of these would involve some local roads and then VicRoads roads to the site to access the site tracks. Given the volume of this heavy traffic the Panel believes that when the source(s) are known:

- the permit holder should work closely with VicRoads and the appropriate municipalities to determine the preferred routes;
- as far as possible VicRoads arterial roads should be used rather than local roads;
- a detailed traffic management plan should be developed and implemented that has regard to the safety and convenience of other road users and the effective and efficient movement of these trucks;
- local roads that are to be used are surveyed for pavement condition and any needed remedial action taken before, during or after use so that the road are left in no worse condition; and
- local users of these roads are informed about the road use and the actions being taken to ensure that their needs have been considered.

The Panel have discussed above the heavy vehicle use for track construction. Another major heavy vehicle use that warrants some discussion is the transport of materials, other than OD loads, for the construction of the turbine foundations. Mr Ashton has assumed that each foundation will require 295 m$^3$ of concrete requiring 59 concrete trucks and 2 truck loads of reinforcing steel. He seems to have assumed, conservatively, that the foundations will be a mass concrete structure of about 10 x 10 x 3 m. If the foundations can be rock anchored less concrete will be needed. Further, he has assumed that pre-mixed concrete will be brought to the site on public roads from a batching plant. It is possible that one or more concrete batching plants will be established on the site. In that case the number of vehicles bringing screenings, sand, cement and water could be expected to be less than the number of concrete agitators since these can carry larger loads. Nonetheless, his estimate of about 4350 truck loads of concrete and reinforcing steel, and hence about 8700 vehicle movements, seems conservative and reasonable. These may enter and leave by different access points.

To again provide a simple contextual position, if the Panel assumes that turbine foundation construction follows the completion of all tracks on the site rather than proceeding in parallel through the site, that the foundation construction (and turbine erection) takes 12 months, and that the work occupies 270 ten hour days then this seems to equate to an average of about three vehicle movements per hour, about ten times less than the truck
movement rate for track construction. Considerable variation could be expected, as for instance bringing in concrete trucks for a foundation pour.

The only other significant heavy vehicle transport task appears to be that of bringing in water if all or some of that cannot be sourced on site. The applicant has estimated the need for about 19 ML of water for track construction and about 61 ML for maintenance of those tracks, especially for dust control. If the Panel assumes water is carried in 20,000 L loads the Panel estimates about 1000 loads and hence 2000 vehicle movements for track construction over six months, or an average of less than two movements per hour. For track maintenance over the twelve month construction period the Panel calculates about 3000 loads or 6000 vehicle movements and hence an average of just over two per hour on average. Of course, the need for track watering for dust suppression will vary considerably.

Although the applicant did not provide advice on other heavy vehicle movements the Panel expects that would be in the hundreds rather than the thousands, and that the major movements have been identified and estimated as well as possible at this stage.

All these heavy vehicles will use the same crossovers from public roads onto access tracks as will the ODV, but it will be those latter vehicles that, because of their size, will determine the characteristics of those crossovers.

From the data supplied by the applicant and further examination of that information the Panel estimate that during a proposed six month track construction period there would seem to be about 40,000 heavy vehicle movements of screenings and water from public roads to the site and back, or an average of about 30 per hour or one every two minutes, although not necessarily all using the same roads. Similarly the Panel estimates that for a proposed 12 month wind turbine generator construction period there would be about 16,000 vehicle movements of concrete, water and over-dimensional components or an average of about six per hour. The difference in heavy vehicle intensity is quite marked, about five times greater for the track construction.

As with ODV the applicant has local experience in designing and implementing heavy vehicle movements.

In the discussion on ODV the Panel commented that these vehicles, by virtue of their size, can be the focus of heavy vehicle attention but suggested that this might be viewed in the context of total heavy vehicle movements. From the above the Panel can see that these vehicles constitute about 1.5% of the total heavy vehicle movements of about 55,000 to and from the site over the total 18 month track and wind farm construction period.
Attention may sometimes focus on the quantity of turbine foundation materials that must be transported to a site for wind farm development; in fact it is the quantity of materials for access tracks that tends to dominate. In this case it seems something approaching 150,000 m³ of material must be brought to site for tracks and about 20,000 m³ is needed for foundations.

The Panel appreciates that the estimates made by Mr Ashton are necessarily approximate and analysis has rounded some of these data. However, the Panel is comfortable that the estimates give a reasonable indication of the size and nature of the off-site heavy vehicle transport task.

**Light vehicles**

The applicant seems to have given little attention to light vehicle movements to and from the site and no evidence was provided on any aspect of that. The Panel does not propose to consider this in detail.

The Panel notes, however, that 6.3 of Volume 1 of the Planning Permit Application Report states:

> As a rough estimate the construction stage may include up to 500 individuals, 60+ businesses and be equivalent to between 100 to 160 full time equivalent jobs over a year.

This suggests that the applicant may envisage up to several hundred personnel on site at any one time. These may include employees, contractors and tradespeople. The Panel imagines that many of these might drive to the site. The Panel envisages that it would not be intended that any more light vehicles than are absolutely essential would be allowed on the on-site access tracks where they might impede construction vehicle movements and take up valuable space on the ridges. Similarly, and in the context of this chapter, such vehicles might reduce the efficacy of heavy and over-dimensional vehicle movement on the nearby public roads.

For construction management efficiency the permit holder may need to develop a plan for reducing light vehicle use, of providing vehicle parking, and perhaps bus use to get personnel to their work place. The Panel notes that there is also a sustainability aspect in reducing single occupancy vehicle use. The Panel believes that such a light vehicle management plan should be part of the Traffic Management Plan.

The same section of the planning application referred to above says that the post construction operations phase might employ perhaps 58 individuals as about 18 full time equivalents. In that phase light vehicles would be the principal or only vehicles on site. The Panel envisages that the need for a
detailed light vehicle traffic management plan for that stage would be much less.

**Traffic volumes**

In his report Mr Ashton supplied traffic volume data for three neighbouring public roads that might be expected to carry the bulk of the project traffic. Our analysis of typical daily traffic flows, with figures rounded is:

- for the Ararat - St Arnaud Road south of the Wimmera River – 210 light vehicles, 40 heavy vehicles;
- for the Ararat - St Arnaud Road near Start’s Road – 150 light vehicles, 30 heavy vehicles; and
- for the Pyrenees Highway west of Landsborough - Elmhurst Road –, 440 light vehicles, 65 heavy vehicles.

Mr Ashton advised that no vehicle count was available for Crowlands - Eversley Road but he submitted that it would be less than 200 vehicles per day.

8.2.3 of Volume 1 of the planning application provides an analysis of the percentage increase in total traffic volumes assuming that all vehicles involved in construction pass each reference point, to give a ‘worst case’ outcome. It appears to the Panel that any increase in light vehicle movements linked to the construction may not have been included, and that whilst the analysis claims to present total vehicle changes the increase is specifically for heavy vehicles. The Panel does not find this particularly useful.

The Panel does not think a useful assessment of vehicle numbers and types can be made until sources of construction materials are known and light vehicles involved in construction are included. However, it is apparent that during the construction period, and particularly the phase of constructing the access tracks, there will be a very substantial increase in heavy vehicle use of public roads in the area.

No evidence was submitted to suggest that construction traffic would affect safety on roads in the area or impact badly on amenity.

The Panel agrees with Mr Ashton’s conclusions:

*None of the traffic volumes above will create specific traffic issues for accessing the wind farm.*

*Additional traffic volumes arising from the construction of the wind farm will also not give rise to traffic problems or congestion that unreasonably affects public safety or amenity.*
Hours of operation may need to be addressed in a project management plan to protect local amenity on Sundays and public holidays. School bus timetables may also need to be considered.

Spring Flat Road

Spring Flat Road is a public road managed by Pyrenees Shire Council that is proposed to be used to provide the route to access tracks that will lead to the central part of the ridge. It is a dead end road that is gravelled for the full length. It runs from an intersection with the Ararat - St Arnaud Road in Crowlands generally to the east and then the north for a distance of about 4 km to terminate close to the western edge of the central part of the ridge line and adjacent to the 220 kV transmission line that runs through the site.

From Crowlands it travels about 1 km generally to the north east and then turns sharply to the right. It then goes about 2 km to the east past three houses and along generally flat country. It then turns generally to the north for about another 2 km to its end. In this part it travels between properties owned by Mr Shaw who is not a participating landholder. In this section it provides access to three properties of participating landholders. These properties have some buildings but not dwellings. This section is characterised by more undulating country as it approaches the ridge, a number of creeks crossed by culverts and with active headward erosion on the western side and native vegetation lining the road.

Using this road presents a number of challenges as identified by the applicant and submitters:

- As with other access roads on private property this road will need to be constructed with a 40 cm depth of screenings to a 6 m width and perhaps wider on curves with 7-8 m wide passing bays;
- The intersection in Crowlands is on a curve but the applicant advises that there is adequate sight distance;
- The sharp bend about 1 km along the road at the intersection with Cemetery Lane will require modifications to allow ODV to use it. That will require the design to be agreed with Pyrenees Shire Council and the works paid for by the applicant;
- Mr Peter Start, who lives about 1 km east of the Cemetery Lane intersection, submitted that the high volume of traffic had the potential to cause a significant dust problem and compromise safety. He referred to previous instances of extensive use of the road and suggested that maintenance had been inadequate. The Panel notes that Mr Start did not oppose the use of Spring Flat Road in principle;
The Panel shares Mr Start’s concerns arising from the large volume of traffic that will use Spring Flat Road, particularly for access track construction, and the consequences of that. The Panel is satisfied that issues of the adequacy of the road with envisaged reconstruction for the projected traffic volume and type, and the safe management of that traffic, can be dealt with through the development of the Traffic Management Plan and its implementation;

With regard to dust suppression the Panel is conscious of the applicant’s recognition of the importance of dust control. The Panel is also aware of the applicant’s intention to water roads and perhaps use a suppressant to reduce dust. Mr Alan Mackinlay who gave expert evidence on engineering matters gave an ‘off the top of the head’ estimate of the cost of sealing to be about $50,000-$100,000 per 500 m;

The Panel considers that, given the intensity of heavy traffic and the proximity of houses to this section of unsealed road, it should be sealed. Accordingly the Panel recommends that Spring Flat Road from 250 m east of house 12 to 250 m west of house 14, a distance of approximately 1.5 km, should be sealed to a width sufficient for two heavy vehicles to pass without using the road shoulder and adequate for the use of an ODV;

A number of culverts appear to require re-construction. As with crossings of other waterways on site permits will be required from the Wimmera CMA if these are designated waterways under the Water Act;

A number of waterways show evidence of headward erosion, most commonly on the downstream side of the road. The applicant is required to ensure that its works do not increase erosion on the site, but it is not responsible for rectifying existing erosion.; and

There is substantial native vegetation along the northern section of Spring Flat Road. It would appear that vegetation trimming and removal will be needed to allow for the passage of large loads. This issue is discussed in detail in Section 4.2.4.

Crossovers

‘Crossovers’ refers to those sections of road that connect a public road to a road on private property road by crossing a road reservation. They are essential for vehicles to move from the public road network to the private access tracks that lead to the wind generator sites.

Crossovers must be approved by the appropriate road authority and designed and constructed according to their standards.
The crossovers must be placed safely eg. adequate sight distances, have suitable geometry for turning vehicles (in this case determined by the ODV), to be of adequate width, be provided with adequate drainage, and be able to be built with regard to minimising the removal of native vegetation.

A number of crossovers are proposed, either as new structures or substantial rebuilds of existing ones. These are, in sequence from south-east to north-west:
- Price’s Road. This is a local name to access to the Price property from the Pyrenees Highway;
- Mundaring Road;
- From Spring Flat Road either at its northern terminus or south of that if approval is obtained to bypass the road through private property;
- Glendhu Road; and
- Start’s Road.

Most of these access roads are typical of farming property entrances. Their use is occasional and the crossovers are sufficient in width and turning radii to accommodate normal agricultural vehicles. In most cases the present crossover has native vegetation alongside and leads to the farm entrance road which has native trees along its boundaries. Modifying these crossovers may mean removing some native vegetation. In some cases the applicant is proposing a new crossover as at Start’s Road to give better sightlines, and realignment to avoid native vegetation on the property as at Mundaring Road.

These crossover configurations are not resolved and hence VicRoads has not signed off on those four that run off its roads. That off Spring Flat Road requires a decision on whether part of that road can be bypassed before a crossover is designed and approved by Pyrenees Shire Council. Hence neither any planning aspects nor native vegetation removal issues can be decided.

Although the applicant had applied to remove native vegetation the extent of the removal needed in these areas and an assessment of the value of that vegetation has not been determined in detail. This issue is discussed further in 4.2.4.

6.3 Conclusions and recommendations

From the evidence provided to the Panel and from its inspection of the area and consideration of the issues the Panel concludes that there are no major impediments for transport of materials and personnel to the site and access to the on-site tracks. Careful planning and effective management will be
needed for successful implementation of this task. The Panel concludes that a high level of co-operation will be needed between the various parties. Although the transport task has particular features of ODV and substantial heavy vehicle use it is not essentially different in character from other major construction projects.

The Panel concludes that road safety issues, inconvenience to other road users, monitoring of road conditions and restoration needed from the heavy vehicle use, and dust management are all manageable and in large part should be addressed through the Traffic Management Plan.

Further, the Panel concludes that the clearing of native vegetation along public roads needed for the passage of ODV and the construction of crossovers, and for which no permit application has been made, needs to be progressed as part of the detailed transport design including the use of Spring Flat Road. The Panel concludes that clearing needs to be kept to a minimum consistent with safety and good engineering practice.

The Panel recommends:

A Traffic Management Plan must be prepared in accordance with Condition 10 in the draft Pyrenees planning permit shown in Appendix A of this report and Condition 8 of the draft Ararat planning permit shown in Appendix B of this report. The Traffic Management Plan must include, among other things:

- The identification of ODV routes;
- Mechanism for input and approval by VicRoads and relevant Local Councils;
- Management of project traffic in relation to local traffic and school bus routes;
- Details of any road, intersection or related infrastructure upgrades required; and
- Details and timing of pre-construction condition surveys and timetables for maintenance and post-construction restitution works.

That for between 250 m east of house 12 and 250 m west of house 14 Spring Flat Road shall be sealed to a two lane width before construction commences and shall be maintained in that condition in accordance with Condition 12 in the draft Pyrenees planning permit in Appendix A of this report.

Traffic impacts related to dust and hazardous substances spills be managed in accordance with the Environmental Management Plan proposed in Condition 16 in the draft Pyrenees planning permit in
Appendix A of this report and Condition 13 in the draft Ararat planning permit in Appendix B of this report.

The applicant considers developing a light vehicle management plan with the objective of minimising light vehicle movements in the area by utilising coaches or similar bulk passenger transport.
7. Impact on the land

7.1 Background

The previous chapter discusses off-site transport of materials and personnel and the access of these to and from the site. The focus of this chapter is the various impacts of the proposal on the land. It follows from that previous chapter because of the various activities needed to construct and operate the wind farm that have impact on the land, it is the on-site transport and the construction of the extensive network of heavy duty tracks needed to construct the wind farm that is pre-eminent. This chapter discusses the construction and operation activities and the impacts of those. In addition to transport, those activities include the construction of turbine foundations, the erection of the turbines themselves, installation of underground cabling and building the electrical sub-stations. The impacts include the use of the land itself for the wind farm, erosion, surface and groundwater quality and dust. Construction noise is a consequence of construction works although it is arguably not an impact on the land. This has been presented in Section 5.

To provide a framework to discuss these impacts and assess any consequences it is necessary to briefly describe:

- the nature of the site;
- current land use;
- the proposal;
- the geology;
- geomorphology;
- geotechnical issues;
- proposed construction activities;
- erosion and land stability;
- dust; and
- water quality and quantity.

to the extent these have a bearing on the evaluation of the permit application. The following sources have been used in preparing this Section:

- the Policy and planning guidelines for development of wind energy facilities in Victoria;
- Chapters 8.1, 8.5 and 8.6 of Volume 1 Part A of the planning application;
- the Preliminary Geotechnical Report in Volume 2 of the planning application;
7.2 Discussion

The site

In brief the ‘investigation area’ (the total area enclosed by surrounding public roads and containing the prospective wind turbine locations) was a total area of about 11,500 ha. Within that the combined area of land owned by the 17 participating landowners is about 7,500 ha. The investigation area consists of flat to undulating land encompassing a range of hills that generally runs north to south to the east of the Landsborough – Elmhurst Road and between Shay’s Creek – Malakoff Road to the north and the Pyrenees Highway in the south. These hills rise to narrow ridges and spurs which are rocky and generally steep, with gradients from 10 to 40%. These ridges rise typically to about 100 - 250 m or more above the surrounding land. It is along about 20 km of these ridges that it is proposed to construct the wind farm. It is intended that the wind turbines will be located within a so-called ‘generator development envelope’ ie. a series of discrete areas along the ridges within which turbine positions may be selected to suit site conditions. In the application documents this generator development envelope was stated to be 816 ha; at the hearing the applicant submitted a revised position and plans reducing this to 122 ha as a result of further investigation.

The site has been largely cleared of the original vegetation, although some remnant areas remain. There is some more recent revegetation. The site is near the headwaters of the Wimmera River. The river traverses the southern edge of the investigation area and creeks on the site feed into this river. To the south are Mt Buangor, Mt Cole and Mt Langi Ghiran, and to the east the Pyrenees State Forest including Mt Avoca. These areas have peaks that have greater altitudes than the subject land.

The township of Landsborough is about 6 km to the north, Elmhurst 7 km south-east, and Crowlands about 5 km south-west. The Pyrenees Highway borders the southern end of the site, the Ararat - St Arnaud Road is to the west and the Landsborough - Elmhurst Road to the east.
Present land use

The predominant land use is grazing. A number of vineyards, all owned by non-participating landowners, are located on the lower slopes. The Panel was informed that limited cropping is carried out on the flats. On the site inspection the Panel saw few livestock. Some sheep were seen but it appeared that climatic conditions may have caused de-stocking. The ridges are characterised by rocky areas, thin soil cover and limited pasture. The lower slopes and flats have been largely sown to pasture. The original vegetation areas are largely on the steeper areas and the revegetation areas tend to be distributed along the ridges and watercourses.

It is not apparent that construction of tracks and wind farm structures on the ridges will cause any loss of agricultural productivity.

On the lower slopes and flats there may be some small loss of agricultural land, but the tracks in those areas will largely follow and widen existing ones.

On the other hand, the construction of tracks is likely to lead to improved access to the farms which should improve fire management and, along with the income from rental, may give enhanced opportunities for improved farm and land management to enhance productivity, encourage greater revegetation, and lead to better erosion control.

The proposal

In essence the proposal is to construct up to 72 wind turbines of up to 146.5 m in height along the ridge lines to utilise the wind resource. Each of three turbine groups will be connected to an electrical sub-station by underground, or perhaps in some cases by overhead, cables. Those three sub-stations will be connected by overhead cables to a terminal yard located centrally in the site from which the grid connection will be made to the 220 kV Ballarat to Horsham transmission line which runs through the site.

The project requires building about 65 km of access tracks in the site from public roads. These will lead across the flatter areas and the lower slopes then ascend to the ridge and, as needed run along the ridge lines. Foundations will have to be prepared along the ridge and the turbines assembled. Special features of this proposal are the particularly steep slopes up which materials have to be moved and the erosion propensity of the site.

Other than water needed for concrete for turbine foundations and for road watering dust control during construction, the wind farm requires no water.
This is in contrast to steam fossil fuel power stations which require water for operation.

**Geology**

In this and the next two parts the Panel comments on the geoscience issues; in this part the geology of the site, in the next the geomorphology, and after that geotechnical matters. These are all relevant, and they are all distinct, albeit related, issues. It is possibly useful to provide a simple description of each.

*Geology* is the description of the surface and sub-surface rock types. In this context it provides some understanding of the likelihood of erosion and the stability of structures, be they earthen or fabricated.

*Geomorphology* is a description of the land forms. Particular land forms can often be of scientific importance. It is desirable to identify any land forms that should be protected.

*Geotechnical* considerations are about the strength of the soil and rock to sustain structures. This is important in designing turbine foundations, in determining the routes for tracks and the design of those, in avoiding landslip, and in reducing erosion.

For a description of the geology of the area reference should be made to sections 2.3, 2.4 and 3.2 of Attachment 6, Volume 2 of the Crowlands Wind Farm planning application and Figure 7 of Volume 1 of that Report. It is sufficient here to say that nearly the entire generator development envelope is sandstone and mudstone, some of which is metamorphosed, and with little soil over this rock base. The surrounding lowlands are characterised by gravel, sandy clay and silt which are erosion products from the hills. The significance of these for this report is twofold. Firstly, that the rock along the ridges offers the prospect of turbine foundation types that make the transport of concrete less than it might otherwise be, and results in stable ridge tracks to carry the necessary heavy loads. Secondly, the silty soils are very fine and erosion prone and likely to be dusty. There is substantial evidence of this erodibility.

**Geomorphology**

The report describes the site topography but does not identify aspects of geomorphological interest. To ensure that any geomorphological aspects of interest are considered and protected if possible the Panel directed the applicant to provide an assessment of the existence of any such features on the site and, if present, what measures were proposed to protect them.
The Wind Farm Guidelines do not refer specifically to geomorphology, but they do refer to weighing benefits ‘...against any possible negative effects on recognised environmental and cultural values’ (p10), avoiding ‘...any unacceptable impacts on critical environmental and cultural values’ (p 10), and a site analysis that describes ‘...any other notable features or characteristics of the area’ (p20). The Panel considers that it is appropriate to include an assessment of these geomorphological values, particularly in a site where there is a reasonable likelihood of such being present, where a substantial area is involved for the works, and at which adjustments may be able to be made to wind farm planning and construction management without compromising the development.

The applicant retained Dr Neville Rosengren to provide that information. The information was provided as an expert witness statement and a supplementary report at Exhibit 37. The Panel acknowledges that it has been substantially assisted by the response of the applicant to this request and the thoroughness of the report from Dr Rosengren. The reports are based on the witness’ knowledge of the region, reference to literature reports, and a site visit.

The conclusion of the expert witness is that, whilst the site does have geomorphological values, none of these are seriously compromised by the proposal and adequate protection from possible impacts can be provided by detailed planning and management of the construction work.

Dr Rosengren makes the point that a geomorphological assessment is not an evaluation of scenic and landscape amenity but of features of geoscience and geoheritage significance, only some of which may relate to the form and dimension of the landscape. He broadly supported the URS Preliminary Geotechnical report but commented that it does not report the occurrence of two groups of materials of geoscience significance viz. numerous quartz reefs and veins outcropping along the ridges and quartz-rich gravel deposits that flank the hills and have been derived from these reefs. Some of these reefs and deposits may be intersected by tracks, cable trenches and turbine foundations.

The Malakoff Creek Historic Area adjacent to the eastern perimeter of the investigation area was a site of alluvial gold mining and the Glendhlu Historic Reserve was also mined. The Panel understands that neither provided a substantial gold resource. These auriferous alluvial deposits seem consistent with the presence of the quartz reefs.

Dr Rosengren advised on a particular cutting exposing formations that he considers contributes significantly to an understanding of the geological evolution of the Pyrenees region and to which he would accord a
classification of regional significance. He commented that excavation for tracks may expose new examples of similar value. He also advised of some examples of intense quartz reef development, unusually wide quartz reefs, and alluvial quartz deposits of the White Hills formation, to all of which he would ascribe a local significance rating.

Dr Rosengren noted that two fault lines run approximately north - south through the area, the Landsborough and the Glendhu faults. Neither is though to be seismically active and neither there is no or little physical evidence of them at the surface.

The Panel recognises that it may not be practical for the applicant to identify, evaluate and protect all sites of geomorphological interest identified by Dr Rosengren or that might be revealed by construction works. However, the Panel believes that, as far as possible, the project design and construction works should prevent damage to presently identified sites and should implement measures to assess sites that might be exposed by works. That latter might depend on having a person on site that has some training in this field. The Panel understands from Dr Rosengren’s statement that the applicant’s representative who accompanied him on the site visit has agreed to make adjustments to the project design that protects such sites for science.

The Panel is satisfied that the proposal is compatible with maintaining those geomorphological values of the site as can be presently identified, and observes that works might reveal further sites of interest. Further, the Panel believes that the applicant can and is willing to implement measures for the protection of such sites. The Panel suggests that this be included as part of the draft Construction and Worksite Management Plan (Number 4 of the Draft Management Plans in Volume 1 of the Crowlands Wind Farm planning application.

Geotechnical issues

Geotechnical studies are needed to understand the physical characteristics of the soil and rock. This is necessary to undertake the detailed design of turbine foundations, to design the access tracks to ensure their stability, to ascertain how best to prepare cable trenches and other excavations, and to mange erosion. This last is considered separately.

The geotechnical issues are presented in Volume 1 of the Crowlands Wind Farm planning application at 8.5 (p49) and in more detail in the Preliminary Geotechnical Report at Attachment 6 of Volume 2 of that Report.

That preliminary assessment concluded that bedrock will be found close to the surface along the ridge lines, that the bedrock would be expected to have
a high allowable bearing pressure, that the strength of the rock is likely to be medium to high, and it should have fair to good rippability.

A number of consequences flow from this for the planning issues. Foremost among these is the turbine foundations. Foundation designs are usually either a gravity pad or rock anchored. The geotechnical work suggests that the latter technique may be feasible. A rock anchored foundation requires about 50% less concrete and water than the gravity type, and less spoil is generated. This would result in less truck movements to bring these materials and to remove spoil if that is necessary. The Panel have previously pointed to the greatest number of heavy vehicle movements being for screenings for track construction to provide tracks of sufficient strength to allow movements of components and materials to the ridges. From the evidence presented, the Panel surmises that if these movements to the ridges are reduced the access track thickness may be able to be reduced, and so too the truck movements for track construction.

Other considerations are that the challenging ridge tracks can be designed with knowledge of the strength of the rock and hence minimisation of the risk of erosion and slope instability; and that the nature of the rock suggests that it can be excavated with machinery and any need for blasting minimised.

These aspects above are all subject to detailed geotechnical investigations.

**Erosion**

The control of erosion that might flow from the proposal needs close consideration. The very fine soil and the steep topography lead to high erosion potential. This requires close attention to the design of the proposal, to erosion control measures both during and post construction, and to project management. This situation contrasts with most recent wind farm applications for which it seems erosion has been a matter of less significance.

The highly erodible site conditions are acknowledged by the applicant and discussed in some detail in the documents. On the steeper slopes the shallow soil cover can readily be moved down slope, a situation aggravated by loss of vegetation. Down slope and in the flatter areas the water flow has caused substantial erosion in the fine soils with large channels up to about 4 m in depth. Active headward erosion is evident. The Panel observed considerable evidence of erosion on the site inspection. Works by various groups, but notably the Wimmera Catchment Management Authority and the local Landcare group, are being undertaken to prevent further erosion and better manage that that has occurred.
It is not reasonable, or possible, to expect the applicant to take action to rectify existing erosion on the site. However, the Panel believes that it is reasonable to expect that the proposal be constructed and maintained so that further significant erosion is not caused, and that existing erosion not aggravated. The Panel hopes that some of the works needed to limit erosion from the proposal might have some accompanying benefit in managing existing erosion.

Mr Andrew Prout of URS provided an expert witness statement on erosion and was called by the applicant to give evidence. Mr Prout acknowledged the erosion in the area and the causes of that. He described measures that would have to be taken to minimise erosion resulting from the project. Importantly, he said that revegetation was important in erosion control and that the wind farm should not impede that. The Panel notes that, unlike some other wind farm proposals, there was no evidence to suggest that the applicant was opposed to revegetation in the vicinity of turbines.

All construction works proposed for the site have the potential to result in erosion during construction, and post-construction if measures are not taken to restore the disturbed land. Of the various works it is the tracks along the steeper areas and the ridges that are most likely to contribute to erosion potential and hence require the greatest attention in design and erosion control works. It should be noted that erosion control relates to prevention of erosion from exposed areas such as earthworks and stockpiles during construction in addition to erosion of the existing land surface.

Erosion control is of sufficient significance that it is discussed in some detail in consultant reports and is detailed in draft management plans. For a detailed discussion on the nature and significance of erosion in the area and the measures proposed to avoid worsening this, reference should be made to Volume 1 of the Crowlands Wind Farm planning application at the Executive Summary (p xx), 8.1.6 (p 40), 8.6 (pp 50-51), and in more detail in the Preliminary Engineering Report at Attachment 3 and the Preliminary Geotechnical Report at Attachment 6 of Volume 2 of that Report.

As part of the suite of draft management plans prepared by the applicant, the management of erosion, and the related issue of surface water run off, is presented extensively. The Panel have benefited substantially by the applicant’s recognition of the importance of erosion control at the site and the preparation of these comprehensive plans. These management plans are at part 4.3 of the draft Construction and Worksite Management Plan (Number 4 of the Draft Management Plans in Volume 1 of the Crowlands Wind Farm planning application) and the draft Land Protection Management Plan (Number 5 in that Report).
A number of submissions referred to erosion. The Wimmera Catchment Management Authority advised in its submission that it had reviewed the documents and that it had no comments to offer. The Department of Sustainability and Environment provided advice on suggested erosion control conditions in a submission. Neither body made a presentation to the Panel. Given the extent of erosion in the area, the scale and nature of the proposed project, the role and expertise of the Wimmera CMA and DSE, and the works being undertaken locally to curb erosion, the Panel believes that it would have benefited from more detailed submissions and a presentation from one or both organisations.

The EPA recommended that all construction activities should be undertaken in accordance with EPA Publications 480 Environmental Guidelines for Major Construction Sites and 275 Construction Techniques for Sediment Pollution Control which include issues of erosion control.

The Department of Sustainability and Environment (South West Office) in its submission noted that:

Soils in the area are very erosion prone and there is significant gully erosion downstream. The design, construction and maintenance of access roads will need to be adequate to ensure that runoff does not add to existing soil erosion.

DSE added that it had no objection to the granting of a permit subject to suggested conditions which include a comprehensive ‘Sediment, Erosion and Water Quality Management section’ of an Environmental Management Plan to be prepared in consultation with the Department and approved by the Minister for Planning and to which subsequent development and use must accord.

T W and V A Mortyn, W C Henning of Landsborough Valley Estate, R S and I S Burns, all neighbouring non-participating landowners, commented on erosion and expressed some concern with the consequences or implications of the proposal on that account.

Participating landowners H M Darbyshire, DA and P F Boatman and J and L Start commented on their efforts to control erosion, the first in her written submission, the second by showing the Panel the revegetation on their property during inspection, and the last in his presentation.

Central Highlands Region Water Authority did not object to the permit being granted on the basis that the proposal is outside the Malakoff Creek Water Supply Catchment. Turbine 14 is to be moved out of the catchment. The
Panel understands that the road crossing on a public road reserve through a small portion of Mr Henning’s property near turbine 14 has not yet been resolved. The applicant submitted that their preferred position is to relocate this section of road on to Mr Henning’s property on top of the ridge to avoid crossing a slope in the Malakoff Catchment. The Panel understands agreement has not yet been reached on this issue but agrees that the applicant’s preferred approach is the more desirable.

The evidence presented and the Panel’s site inspection shows very strongly the highly erodible nature of soils in the area and the presence of very significant erosion. The evidence also demonstrated to the Panel’s satisfaction that erosion from the construction of the proposed wind farm can be managed to reduce any adverse effects. However that will require substantial effort in design, in implementing erosion control measures, and in managing the project.

The Panel believes that effective erosion control of the project must involve liaison with relevant authorities including the Department of Sustainability and Environment, the Wimmera Catchment Management Authority and Pyrenees Shire Council. The Panel also suggests that there be close liaison with local landowners, both participating and non-participating and Landcare groups, who will be keen to ensure that erosion is not worsened and that their revegetation projects not compromised, and are likely to be a source of valuable local expertise.

Finally, the Panel is confident that the applicant is able to handle this erosion management challenge as indicated by it having considerable experience in the construction and management of wind farms and thereby in managing impacts on the land including erosion, and in its retention of expert advice.

Dust

Dust has been discussed in the previous chapter with regard to minimising it near dwellings where it may arise from substantially increased transport on unsealed public roads.

The fine nature of the soils in the area has been discussed under the section on erosion. Erosion is in part a consequence of these finely divided soils being mobilised by flowing water; dust is the consequence of the same soils being raised into the air when dry and mechanically disturbed or raised by wind. Just as the area, particularly the lower slopes and flat areas with deposited colluvial material, is prone to erosion when wet so too is it prone to dust when dry and disturbed.

Little was submitted to the Panel on dust management.
Dust may be generated from various construction activities, but the most likely would appear to be transport on the various tracks. The applicant has referred to building the tracks and hard stand areas with screenings, watering the surface as needed, and using dust suppressants if appropriate.

The Panel is satisfied that dust generation can be adequately controlled with good practice. The Panel expects that in some cases dust control will need to be exercised as much for occupational heath and safety issues and for protection of equipment as for environmental reasons. The Panel suggests that compliance with EPA Publication 480 Environmental Guidelines for Major Construction Sites is required. Other than where residential amenity or other sensitive uses are to be protected the Panel is reluctant to recommend dust control that requires ‘no visible dust’ or some quantitative measure. To do so seems unnecessarily burdensome and would be inconsistent with dust generation allowed from normal farming practices in the relevant zones.

The Panel believes that it is sufficient that dust be managed through the draft Management Plans and specifically the Construction and Worksite Management Plan and the Land Protection Management Plan. These may require some further development for dust control eg. use of sowing or binding agents on exposed areas in addition to regular water spraying.

**Management of excavated material**

Most wind farms generate quite small quantities of spoil from excavations. Generally access tracks do not require significant excavation. Excavated material for turbine foundations is usually spread adjacent to the excavation, covered with topsoil that has been removed and set aside and the area over the foundation and right to the turbine base, other than the access track, restored for agricultural use. Since turbines are located away from watercourses and ecologically sensitive areas that handling of the spoil seems to be a matter of good practice and agreement between the operator under the permit and the landholder in restoring the land, rather than requiring a prescriptive approach in a planning permit.

In this case, in addition to the excavation for the turbine foundations, the evidence presented to the Panel on the design and construction of the access tracks which has been discussed in this report, indicates that very substantial amounts of rocky material will need to be excavated to form the tracks to the ridge. Until the final track design is done the volume of this excavated material cannot be estimated and The Panel was given no ‘ball park’ figure of what amount might be expected.

The Panel was advised by the applicant that some of this material may be suitable for road base and could be used on site for track construction.
However, whether some of this material can be so utilised depends on its suitability for this purpose. That is unknown at this stage. Further, the Panel expects that it may depend on the need for this material because much of the tracks would seem to have to be built to access those areas where excavation is needed.

The Panel has commented in Section 6 on possible increased heavy vehicle traffic off the site if excavated material has to be taken off-site and back-loading of trucks delivering road making materials is not possible.

The Panel notes that Section 4.4 of the Construction and Worksite Management Plan (Number 4 of the Draft Management Plans in Volume 1 of the Crowlands Wind Farm planning application) discusses dealing with any contaminated soil that might be found during construction activities, but also refers to handling of ‘clean’ material from excavation or any imported to the site.

The Panel agrees that clean excavated material can be stockpiled on site subject to managing dust and surface water run-off as the applicant proposes. However, the ultimate disposal of this material needs to be considered if it is unable to be fully used on site for backfilling or road base. The Panel suggests that, if possible, it be disposed of on the contracted landowners’ properties in a way that is agreed with them and approved by the Wimmera CMA as being acceptable to maintaining surface water quality and not aggravating erosion. The Panel suggests that the management plan be modified to include the ultimate disposal of unused excavated material.

**Construction**

It is, of course, the proposed wind farm construction activities which have the potential to have impacts of various sorts on the land, and to a much lesser extent the later operation of the facility. The planning application and a number of presentations from the applicant described the construction activities. The site inspection added to the Panel’s understanding of the construction and some of the challenges of that.

Broadly the sequencing of construction activities is:

- construction of temporary site facility buildings, vehicle parks, storage areas and the like, and of fences and gates needed to control stock;
- construction of crossovers from public roads;
- construction of tracks (including the public Spring Flat Road) and turbine hard stand areas;
- preparation of turbine foundations and pouring of the concrete foundation;
- transport of major turbine components to hard stand areas;
- erection of turbines;
- erection or relocation of meteorological masts if needed;
- laying of underground cables (or laid with track construction) and overhead transmission lines;
- erection of electrical sub-stations and terminal yard;
- commissioning; and
- rehabilitation of site.

It should be noted that many of the above activities will be undertaken at various parts of the site simultaneously, and that the facility may be constructed and commissioned in stages.

Few of these need specific discussion. The activity that requires closest consideration is the design and construction of the on-site tracks. The applicant provided substantial material on this and called Mr Alan Mackinlay as an expert witness. The particular issues here are the difficult terrain in which to construct tracks to move heavy vehicles and ODV (sometimes both) and the erodibility of the soils.

The nature of loads and estimated number of vehicle movements has been discussed in the previous section. Unlike most wind farm sites that panels have previously considered the particular issue here is the very steep slopes that are encountered in getting to the ridges and the consequent challenge in constructing tracks that are accessible by the heavy and long vehicles needed. In some parts slopes are greater than 40%.

In essence the applicant proposes to construct 13 ridge access tracks that would provide access to tracks along the ridge tops. These ridge access tracks lead off the 5 feeder roads discussed in the previous chapter that come off the public roads. These are shown in Figure 4. These ridge access tracks will, as far as possible follow existing farm tracks. Generally they will track across flat land then into the lower slopes before ascending the steep slopes to the ridge. The total track length proposed is about 65 km.

As far as possible these tracks would follow ridge lines to minimise erosion concerns, but in some cases side cut across hills will be necessary.

The Panel agrees with the applicant’s submission that the tracks have to provide safe access, that they have to allow efficient transport, that earthworks need to be minimised, erosion risk managed, and the visual impact of hillside scarring avoided as much as possible.
In his expert evidence Mr Mackinlay described the track design issues and the current status of the development of that design. He discussed the needed horizontal and vertical curvatures to accommodate the long loads, the widening of roads that necessitates on curves, and because of the inability to turn vehicles on the ridge the need to have some tracks as single direction.

The Preliminary Engineering Report at Attachment 3 of Volume 2 of the Crowlands Wind Farm planning application describes construction issues and provides preliminary track layouts. Of note is that some sections of track have grades greater than 30% and a few sections greater than 40%. The report indicates a preference for grades of 10% with 20% as a maximum. It acknowledged that climbing such grades would require the use of a tracked or heavy rubber tyred towing vehicle.

Mr Mackinlay, and subsequently Mr Power for the applicant, provided further track diagrams with some changes, including showing cut and fill and refined generator envelopes. These are in Mr Mackinlay’s expert witness statement and Exhibit 38. In his evidence Mr Mackinlay stated that it was desirable to reduce the maximum track gradient to 25% and he envisaged the use of a rubber tyred tow vehicle for steep grades to minimise track damage.

It was apparent to the Panel that whilst considerable work has been done on the track design this is still a ‘work in progress’. For this proposal the access track design and environmental management has greater importance and challenge than in many previous wind farm proposals. The Panel is satisfied that tracks can be constructed to safely and efficiently to access the ridges and with manageable environmental effects. If a planning permit is issued the Panel believes that further detailed design is needed, including on erosion management, before final plans can be submitted to the Minister for Planning. These final plans need to be generally consistent with what has been exhibited and considered by the Panel.

The other construction issue that the Panel comments on is the electrical cables. Typically wind farms connect each turbine to a sub-station or terminal yard by underground cable and then by overhead connection above ground. In this case it is proposed to connect each of three groups of turbines to a sub-station by underground cables, and from each of those sub-stations to a terminal yard by overhead lines. A short connection will then feed from the terminal yard to the 220 kV grid transmission line that runs through the site.

Cable trenches can be an erosion risk. The applicant has suggested that the cables might be run in trenches beneath the tracks rather than beside them,
that where desirable the trenches might be backfilled with cement stabilised soil, or in some cases overhead lines used. Dr Neville Rosengren has suggested that caution might be needed if trenching is considered in some areas that might be prone to landslip.

The Panel is not persuaded that cables need be underground throughout the site, more so if that leads to an unacceptable erosion risk. In most cases the visual impact of above ground lines would be low. It is not appropriate, or possible, for the Panel be prescriptive on this issue. The Panel believes that the construction of these electrical connections should be specified in the final plan submitted to the Minister and prepared, as with other construction issues, in consultation with the WCMA and DSE.

7.3 Conclusions and recommendation

It is clear that the project does have some impact on the land. It is inevitable that the construction activities will involve building tracks, turbine foundations, cable trenches and various ancillary structures.

From the material presented to the Panel and the inspection of the site it is quite apparent that much of the site has some fragility in that it has been substantially cleared and is prone to erosion.

However, from the Panel’s consideration of the evidence it concludes that, with care, adverse effects can be controlled. The greatest risk is erosion and the applicant has devoted substantial attention to addressing the control of that. The Panel is satisfied that the construction works will use only a small area of pasture, that erosion can be well controlled, that dust can be managed, that the works will not use surface or groundwater from the site, that water quality will not be adversely effected, that sites of geoscience interest will not be endangered, that waste materials will be removed from the site, and that any contamination of soil is unlikely and at worst would be localised and would be cleaned up. In addition to these physical issues some of the tracks are an impact on the land that will have a visual effect. This will be particularly so for tracks that have to be in cut across the face of hills.

The care needed in minimising impacts on the land must start with careful project planning and design, involve the development of management plans, include significant consultation, and extend to implementation of those measures. The Panel concludes that these actions are necessary if impacts are to be minimised.

Finally, the Panel concludes that the project can have some positive outcomes on impacts on the land. The network of tracks will provide for improved access for fire prevention works and for fire fighting, and access will be
enhanced for better land management practices including revegetation and erosion control.

The Panel Recommends:

That to effectively manage impacts on the land, the Traffic Management Plan, Environmental Management Plan, and Native Vegetation Management Plans as proposed in the draft permit conditions in Appendix A and B to this report be developed and implemented.
8. Other Issues

8.1 Greenhouse gas abatement

8.1.1 Background

In considering this issue, the Panel relied on:
- Submission by Sustainability Victoria;
- Appendix 1 of the Policy and planning guidelines for development of wind energy facilities in Victoria; and
- Section 7 (Vol 1) of the planning application.

8.1.2 Discussion

The applicant has used Appendix 1 of the Wind Farm Guidelines to estimate greenhouse gas savings when the wind farm is fully operational. These figures assume straight substitution of wind power for fossil fuel based generation such as brown coal.

Based on the annual output estimate of 432,674 MWh, the applicant has calculated greenhouse gas savings using Appendix 1 (1.3 times factor). This equates to 560,000 tonnes of CO₂ emissions displaced annually.

The amount of wind power that would be generated is sufficient to provide electricity to over 81,000 households (annual output/5.33 – Appendix 1).

The Appendix 1 calculation for greenhouse gas savings does not take into account variations in output by different electricity generators, eg. brown and black coal, natural gas. These output variations are dependent on patterns of customer demand for electricity and reflect when generators come on line or increase their capacity. Sustainability Victoria now uses more recent work it commissioned from McLennan Magasanik Associates to calculate CO₂ savings. This method models the National Electricity Market (NEM) and calculates the marginal CO₂ savings projected to be gained as incremental amounts of wind power (each wind farm) become operational. Using this method provides a more conservative outcome (1.09 times factor) than Appendix 1.

Sustainability Victoria submitted that a figure of 1 tonne CO₂ is reasonable, thus making the savings from the wind farm in the order of 432,000 tonnes of CO₂ emissions annually.
This order of savings should be considered within the broader context of Victoria’s targets for renewal energy (10% from renewables by 2030) and greenhouse abatement (60% reduction on 2000 levels by 2050).

The Crowlands Wind Farm will contribute an estimated 19.4% of the Victorian Renewable Energy Target and will have a capacity factor of 34.3%.

8.1.3 Conclusion

The Panel concludes that this wind farm would make a significant contribution to greenhouse gas abatement through the government’s wind energy program. The Panel makes no recommendations on this issue.

8.2 Cultural heritage (Aboriginal and European)

8.2.1 Background

In considering this issue, the Panel relied on:

- Submission by the Department of Sustainability and Environment; and
- Sections 8.7, 8.8 and 8.9 and Part B (Vol 1) and the Report on Preliminary Cultural Heritage Investigation (Vol 2) of the planning application.

8.2.2 Discussion

The wind farm proposal is located almost wholly on private land, the exceptions being use of local gazetted roads and access via the Glendhu Historic Reserve managed by Parks Victoria on behalf of the Victorian Government. It is noted that Glendhu Historic Reserve could be subject to a Native Title claim at some point in the future.

Aboriginal cultural heritage

According to the preliminary cultural heritage investigations, there are no known or recorded Aboriginal sites on private land or in Glendhu Historic Reserve. Initial site investigations, however, revealed evidence of occupation along creek lines on the lower slopes.

Aboriginal cultural heritage arrangements changed in May 2007 with implementation of the Aboriginal Heritage Regulations 2007, administered by Aboriginal Affairs Victoria. A Cultural Heritage Management Plan is required and this process had already begun at the time of the Panel hearing. A draft Aboriginal Cultural Heritage Management Plan was included with the planning application (Vol 1, Part B) but the Panel has not formed a view about this as the Registered Aboriginal Party will provide the expertise to
evaluate the format and content of the Plan under the new arrangements. The Plan must be approved before any planning permit can issue.

**European cultural heritage**

A number of recorded or locally identified post-contact (European) cultural heritage sites exist in the vicinity of the wind farm site. Some of these could potentially be affected, most likely during construction through intersection widening and by oversized vehicles and haulage of equipment. The proposed Historic Sites Cultural Heritage Management Plan (Vol 1, Part B) lists five sites that could potentially be affected and indicates that either disturbance will be avoided or Heritage Victoria will be notified if disturbance is anticipated. However, the Panel notes that disturbance should be able to be avoided through careful planning and construction management.

The Glendhu Historic Reserve in the centre of the wind farm site is the only post-contact cultural heritage site that would be directly affected by wind farm development. Access to ridgelines is proposed along the gazetted government road that bisects the Reserve. Access may also involve use of an existing informal road that cuts through the Reserve, and this would need to be regraded and widened.

The DSE response to the Pyrenees Shire planning application (dated 31 October 2007) indicates that at that time, the only access across the Reserve that was being contemplated was via the Government road. This has now changed, and the applicant advised the Panel at its hearing that it has had discussions with Parks Victoria in relation to other options (informal access road). Subject to agreement by Parks Victoria, the Panel has not identified any impediments to use of these roads in relation to cultural heritage.

8.2.3 **Conclusions and recommendation**

The Panel concludes that there are no cultural heritage impediments to development of the wind farm, subject to:

- Approval of a Cultural Heritage Management Plan pursuant to the *Aboriginal Heritage Regulations* 2007;
- Approval by Parks Victoria of any access requirements through Glendhu Historic Reserve; and
- Avoidance of damage to sites of heritage significance, including those identified in the applicant’s draft Historic Sites Cultural Management Plan, through construction activities, including transport of wind turbine components and other materials to and from the site.
The Panel recommends:

A condition in accordance with Condition 16 in the draft Pyrenees planning permit in Appendix A to this report and Conditions 13 in the draft Ararat planning permit in Appendix B of this report should be applied to ensure preparation and approval of an Environmental Management Plan incorporating non-indigenous cultural heritage management. The Plan should be approved by Pyrenees Shire Council, Ararat Rural City Council, DSE and Parks Victoria.

8.3 Shadow flicker

8.3.1 Background

In considering this issue, the Panel relied on:
- Evaluation criteria in the Wind Farm Guidelines; and
- Section 8.12 and Figure 20 (Vol 1) of the planning application.

8.3.2 Discussion

The Wind Farm Guidelines establish the evaluation criteria for shadow flicker:

\[
\text{The shadow flicker experienced at any dwelling in the surrounding area must not exceed 30 hours per year as a result of the operation of the wind energy facility.}
\]

The most vulnerable dwellings are those to the east or west of wind turbines. The applicant’s evaluation indicates that shadow flicker will not exceed 30 hours per year at any dwelling. Figure 20 of the planning application indicates substantial separation distance between the extent of the modelled 30 hour zone and all dwellings, both within and outside the wind farm site.

8.3.3 Conclusion and recommendation

The Panel is satisfied that sufficient separation between turbines and dwellings would exist to avoid excessive shadow flicker.

The Panel recommends:

A condition in accordance with Condition 32 in the draft Pyrenees planning permit in Appendix A to this report should be applied to ensure the shadow flicker standard is met during the life of the wind farm.
8.4 Blade glint

8.4.1 Background

In considering this issue, the Panel relied on:

- Evaluation criteria in the Wind Farm Guidelines; and
- Section 8.13 (Vol 1) of the planning application.

8.4.2 Discussion

The Wind Farm Guidelines establish the evaluation criteria for blade glint:

Blades should be finished with a surface treatment of low reflectivity to ensure that glint is minimised.

The applicant intends to use towers and blades that are covered with a matt non-reflective paint coating. The blades will also have a matt PVC non-reflective coating along the leading edge of the blade. The applicant advises that this is the standard international practice for minimizing the effect of blade glint.

8.4.3 Conclusion and recommendation

The Panel is satisfied that blade glint can be managed through selection of appropriate finishes for turbine blades.

The Panel recommends:

A condition in accordance with Condition 3 in the draft Pyrenees planning permit in Appendix A of this report should be applied to ensure that matt non-reflective paint or coating is selected for turbine blades to avoid blade glint.

8.5 Economic and social impacts

8.5.1 Background

In considering this issue, the Panel relied on:

- Section 6.3 (Vol 1) of the planning application;
- Applicant’s submissions to the Panel; and
- Other submissions.
8.5.2 Discussion

There are a range of economic and social effects that have arisen as issues during this and other wind farm hearings. The Panel notes that unlike some wind farm proposals, the Panel saw no evidence of social division within the community due to this particular wind farm application. The submitters who attended the hearing, whether attending to speak in favour of the proposal, to raise a concern or simply to observe, were professional and courteous to the Panel and to one another. There were several comments acknowledging the efforts of the applicant’s representatives to sort through issues, even where these had not yet been resolved. Only one presentation to the Panel opposed the wind farm entirely.

The main issues raised by submitters included:
- land devaluation;
- diversification of local economic activity;
- Council rates; and
- applicant’s investment in a community fund.

Land devaluation

Land devaluation was raised in the context that the wind farms would potentially decrease land values or desirability of surrounding properties. No evidence was presented to support this claim. In some cases the Panel sensed that submitters were referring to fears that they would value their own properties less if the wind farm were constructed.

The applicant in submissions pointed to the conclusion of numerous previous Panels, beginning with the Bald Hills EES Panel, that land values are not a relevant consideration. The Panel notes that the wind farm development will not result in a form of planning blight that might have negative economic effects on the Crowlands area or the wider district. Instead, there will be significant investment in a non-polluting energy generator.

However, to accommodate this concern, which arises in most wind farm applications, the applicant provided evidence from three land value studies conducted in the USA, UK and Western Australia. All of these studies concluded that land values were not affected by wind farm construction.

Diversification of local economic activity

Construction of the wind farm will potentially have positive effects on the local economy in a number of ways.
The applicant anticipates that at the construction stage, there will be 100 to 160 full-time equivalent jobs over a year, involving up to 500 individuals and 60 businesses. During the operations stage, there will be approximately 18 full-time equivalent positions.

During construction, the applicant aims to spend 40% of its construction budget on regional and local supplies and services. To this end, the applicant has been in discussions with the Pyrenees Shire and other local agencies.

Mr Bradley from the Grampians Region Industry Capability Network (Victoria) indicated that one of the organisation’s purposes is to facilitate local industry participation in major projects. The organisation has held briefing sessions for local businesses about the wind farm project with some 30 businesses indicating interest. Examples include earth moving and fencing companies, waste disposal services and accommodation. Mr Bradley indicated that local skills may be able to be employed in ongoing maintenance activities. He also noted the direct and indirect spin off economic benefits of manufacturing and service industry investment.

If the wind farm project proceeds, the Panel encourages the applicant to take advantage of local skills and businesses where possible.

The applicant is committed to using the wind farm as a focus for local tourism and educational activities. The Challicum Hills wind farm tours were raised during the hearing. These have complemented tourism in that area. It is possible that something similar might evolve at this location.

The construction of the wind farm will return rents to participating land owners. This will increase farm income and provide funds for reinvestment in farm operations.

**Municipal rates**

All proposed wind farm turbines are located within the Pyrenees Shire. Current legislation provides for a payment in lieu of municipal rates. Using the 2005 base, this will equate to a base payment of $40,000 plus $900 per MW of installed capacity. The Shire will gain annual rates of about $189,000 before indexation. Pyrenees Shire advised the Council that these monies will be added to general revenue. This Shire does not have a policy of determining annual expenditure based on the geographic source of funds.

**Community fund**

In common with most wind farm operators, Pacific Hydro operates a Sustainable Communities Fund which is available to communities in the
vicinity of operational wind farms. This is a voluntary initiative and is not regulated by a planning permit approval.

The applicant provided information indicating that funding is available to projects that provide lasting benefit to local communities. Supported projects include health and welfare programs, education and training, environmentally-based community programs, sport and recreation, and culture and arts.

8.5.3 Conclusion

The wind farm has potential to add to the economic opportunities in Crowlands and surrounding communities through increased employment and tourism and its indirect benefits, increased municipal rates and opportunities for funding of community initiatives. There is no evidence that wind farms will result in a loss of land value. The Panel makes no recommendations in relation to social and economic matters.

8.6 Wildfire and hazards

8.6.1 Background

In considering this issue, the Panel relied on:
- Section 9.5 (Vol 1) of the planning application;
- Submission from the Country Fire Authority (CFA); and
- Applicant’s submission to the Panel, Part B2.

8.6.2 Discussion

The planning application states that the CFA and SES have both been consulted about the wind farm proposal. The applicant anticipates a permit condition requiring familiarisation visits for both organisations including explanation of emergency procedures.

The CFA lodged an initial submission to the planning application setting out a number of issues and further possible permit conditions that are applicable to the proposal. These centre on access via internal roads (both location and design), water supply and fuel/vegetation management. The CFA also sought requirements for lightning rods on all turbines, undergrounding of cables, dedicated monitoring of internal turbine temperatures with automatic shutdown device and development of an emergency management plan.

At the Panel hearing, the main point of difference between the applicant and the CFA appeared to be the provision of access tracks from the east and
northeast to the ridges on which turbines are to be located. Essentially the CFA is seeking improved access and egress to and from fire fighting activities to the Landsborough – Elmhurst Road. From the applicant’s perspective, it does not need these access points for wind farm construction and maintenance, preferring instead to access the site from the western slopes and to avoid visual impacts (from the east) that would be created if these additional access roads were to be constructed.

The Panel has sympathy with the CFA position. Once the wind farm is constructed, it will represent a valuable infrastructure asset that will need protection in case of local or more widespread bush fire. The CFA is concerned about efficient access of its vehicles and volunteers to fight any fire and to ensure that alternative egress is available to avoid volunteers (and potentially wind farm contractors or staff) becoming trapped.

The Panel believes that given the fire prone nature of the area, this issue needs resolution between the applicant, DSE, the Pyrenees Shire and the CFA. While there will be increased visual presence, this must be balanced against protection of property and safety. It may be that funds other than the applicant’s funds can be found to improve the eastern access tracks. In any event, a course of action needs to be agreed between the parties.

The CFA requested 4 m wide internal access roads with passing bays every 200 m. The applicant’s position, based on advice from Mr Ashton, is that passing bays every 200 m will not be needed.

The CFA also requested that five water supply tanks be provided with a dedicated water supply. These would be located at each of the four substations and at a northern point in the wind farm site. The applicant agrees that a static, dedicated supply should be provided and maintained, but prefers the number and location to be negotiated rather than fixed in any permit condition if a permit were to issue.

The CFA also requested ground fuel (vegetation) management within defined locations. The applicant pointed out that some of the land nominated may not be under its direct control. The Panel believes that good vegetation management should be maintained during the fire season. This may need to be negotiated between the applicant and participating land owners as a condition of any lease.

In terms of the other requirements listed by the CFA, there was no opposition put to them, and therefore the Panel agrees they should be included in the project design and operational plans.
The Panel notes that many of the CFA’s requirements can be encapsulated in the emergency management plan requested by that organisation. This plan is to be developed using the current version of the *Emergency Management Guidelines for Wind Farms* prepared by the CFA. If subject to CFA approval, which the Panel supports, then such a plan would allow further negotiation between the applicant and the CFA on the range of matters raised in submissions.

### 8.6.3 Conclusions and recommendations

Fire risk and fire management should be properly recognised in this location. The risk of a fire starting at the wind farm site is similar to that of other rural enterprises. The issue of safe access to and from the site in case of fire, including bushfire, still needs resolution. There are other aspects also requiring further discussion. The Panel considers these can be resolved via negotiation within the framework provided by appropriate permit conditions.

The Panel recommends:

*That a Wildfire and Emergency Response Plan be prepared to the satisfaction of the Country Fire Authority in accordance with Condition 18 of the draft Pyrenees planning permit in Appendix A of this report and Condition 18 of the draft Ararat planning permit in Appendix B of this report.*

*That The Country Fire Authority have input to track design and location to ensure fire access requirements are met in accordance with Condition 14 of the draft Pyrenees planning permit in Appendix A of this report and Condition 11 of the draft Ararat planning permit in Appendix B of this report.*

### 8.7 Telecommunication interference

#### 8.7.1 Background

In considering this issue, the Panel relied on:

- Evaluation criteria in the Wind Farm Guidelines; and
- Section 9.3 and Part B (Vol 1) and the report titled *Investigations of Possible Impacts on Broadcasting and Radiocommunications Services* (Vol 2) of the planning application.
Discussion

The Wind Farm Guidelines establish the evaluation criteria for electromagnetic interference:

*The siting of turbines in the ‘line of sight’ between transmitters and receivers should be avoided.*

Lee Derrick & Associates undertook an evaluation of potential interference based on the turbine layout included in the planning application, existing broadcast sites and experience overseas. This desk top study identified that:

- UHF analogue TV pictures may be disrupted within 3 km of turbines where the turbine is within a +/- 20 degree angle of the TV aerial’s direction of nominal reception;
- VHF analogue TV pictures could be disrupted in close proximity to a turbine;
- Digital TV pictures would not normally be affected unless signal strength is below some minimum threshold (eg. at the limits of the service area);
- Interference with mobile phone service is not anticipated;
- Interference with MW and FM sound broadcasting is not expected beyond 10 m of a turbine (ie. not at dwellings);
- Mobile radio and other radiocommunications in the area are not expected to be significantly impacted. CB Radio and 2-way radio could experience interference in the immediate vicinity of a turbine (eg. at the base) but this would be remedied by minor repositioning; and
- No air service communications will be affected.

Where TV interference exists, the remedy would be to upgrade and/or reposition the aerial, convert to digital TV or introduce satellite services. The Panel’s view is that although the desk top study indicates that television reception is most at risk, radio and mobile phone reception should also be addressed by the applicant.

The applicant intends to target properties within the 3 km zone outside the wind farm. The Department of Planning and Community Development suggested through its draft permit conditions that this distance should be 5 km. The Panel agrees that 5 km is a more reasonable approach. Rather than conducting a detailed pre-construction survey, the applicant signalled its intention to provide information to interested individuals about the post-construction mitigation process. This is further outlined in the proposed mitigation procedures for Telecommunications Complaint and Evaluation Procedure (Vol 1, Part B). The Panel believes that a general pre-construction survey would be beneficial to both the applicant and others to establish a pre-construction baseline condition.
The proposed Telecommunications Complaint and Evaluation Procedure would provide greater certainty to all parties if:

- DPCD and the Minister have the opportunity to review the ‘valid’ and ‘non valid’ criteria before approving the Telecommunications Complaint and Evaluation Procedure;
- Potential complainants have access to these criteria;
- It is clear to those outside the 5 km zone that they have the opportunity to raise issues with the wind farm operator and that any complaints be registered and acted upon;
- Potential mitigation action for valid complaints is spelled out; and
- A time limit is set for resolving complaints.

8.7.3 Conclusions and recommendation

The preliminary investigation indicates that post-construction interference is most likely to affect TV services within 3 km of turbines, however, the Panel concludes based on advice from the Department of Planning and Community Development that a 5 km distance would be more reasonable. A proposed Telecommunications Complaint and Evaluation Procedure would set out the means by which the applicant intends to register, investigate and remedy complaints. This provides a good basis for complaint handling and should be improved with additions and clarifications.

The Panel recommends:

That to effectively manage potential post-construction telecommunications interference, the draft Telecommunications Complaint and Evaluation Procedure be further developed, including clarification of eligibility for the complaint and evaluation program, complaint criteria and potential mitigation measures the applicant will undertake, a time limit for resolving complaints and public access to the final Procedures. These actions should be undertaken in accordance Conditions 34-37 of the draft Pyrenees planning permit in Appendix A of this report.

8.8 Aviation Safety Lighting

8.8.1 Background

In considering this issue, the Panel has drawn on material from the following sources:

- Evaluation criteria in the Wind Farm Guidelines;
- Section 9.6 of Part A Volume 1 of the planning application;
- Mr Bryant’s expert evidence;
- Peter Bryant ‘42 Turbine Lighting Plan’ (Exhibit 7);
- Applicant’s submission to the Panel Part B1;
- Correspondence from the Civil Aviation Safety Authority (CASA) and the Aerodrome Manager at Ararat;
- Other submissions which raised this issue; and
- Panel site inspections.

Mr Power in his B1 submission for the applicant outlined in extensive detail at Section 2.2 the CASA regulatory framework for obstacle lighting. The essence of this submission is that whilst CASA has an advisory role through its Advisory Circular AC139-18(0) Obstacle Marking and Lighting of Windfarms (‘the Circular’), CASA does not have any specific regulatory power to require the Crowlands Wind Farm to be lit.

However, the Circular suggests that CASA may determine that an obstacle is a ‘hazard to aviation’ if not lit and hold both the wind farm developer and planning decision maker responsible in the event of an accident.

The Circular also specifies the intensity, spacing and operation of obstacle lighting on wind farms.

The applicant’s in principle position is that night lighting is not required and it called expert evidence from Mr Bryant to support this position. Two lighting layout plans were exhibited with the planning application. It was Mr Bryant’s evidence that neither of these plans met the criteria in the CASA Advisory Circular. The Panel notes that the layouts showed substantially fewer turbines being lit.

In response Mr Bryant prepared a turbine lighting plan to meet the criteria in the Circular and this indicated 42 turbines of the 72 proposed would need to be lit along the wind farm length. This document was tabled as Exhibit 7 in the hearing.

Mr Bryant also prepared a safety case for the wind farm. His conclusion (Option 1) was that due to the particular topographical characteristics of the site, night lighting would not be required. CASA did not accept this position.

Mr Bryant then submitted Option 2 for lighting to CASA which consisted of:
- night lighting is not required due to the surrounding topography (unlit) being higher than the proposed wind farm (including the Pyrenees Range and Ben Nevis), the fact that there is already an unlit wind farm to the south and there is a low level of aviation traffic in the area; and
- day lighting in poor visibility (smoke, fog etc…) is warranted.
Mr Bryant and the applicant submitted that this Option 2 scenario would meet CASA criteria but a response had not been received from CASA at the time of the Panel hearing.

Mr Henning raised the issue of the turbines being a constraint to aerial spraying. Mr Bryant in his evidence responded by saying that the turbines would not be a constraint but aerial spray operators would need to plan their operations to work in the vicinity with the knowledge that the turbines exist.

8.8.2 Discussion

The Panel accepts Mr Power’s submission that CASA can not require aviation lighting to be installed. However, it has been recent practice that turbines over 110m to blade tip are installed with medium intensity aviation lighting and it is the Panel’s understanding that this will occur, for example, at the Waubra Wind Farm currently under construction.

At Crowlands however, the Panel accepts the safety case put forward by Mr Bryant that the wind farm does not need to be lit at night. Having reviewed Mr Bryant’s evidence and viewed the site and surrounds, it appears to the Panel that the wind farm location is such that in an arc to the north, east, south and south east there are many substantial natural and built unlit features that are significantly higher than the wind farm. For example, there is an unlit transmission tower south east of the wind farm which is 168 m above ground level. The top of this structure is 1,215 m above mean sea level, as opposed to the highest blade tip in the wind farm at 777.5 m above mean sea level.

Mr Bryant argued that in night flying conditions pilots are required to stay above the height determined by the high ground in the area which in this case is much higher than the wind farm. During the day however when pilots are flying under ‘see and avoid’ conditions, lighting the wind farm in low visibility conditions will assist pilots to see the wind farm.

It could be argued that lighting the wind farm at lower heights than the surrounding higher features may actually increase risk for pilots approaching from the west if they see the lit obstacles and assume they are the highest point in the locality.

Thus the Panel’s primary recommendation below is that the wind farm not be lit at night but lighting be provided for daytime low visibility conditions. In contrast to night lighting that would have a very minor visual impact. That being said, the Panel considers it must provide some comment on what may occur if the lighting is used at night in terms of visual impact and impact on night flying fauna.
Visual impact

Aviation lighting has been discussed in many recent wind farm Panel reports including Ryan Corner, Hawkesdale, Oaklands Hill and Woolsthorpe. However, no large wind farm has yet been constructed with aviation lighting in Victoria to allow for impact assessment in local conditions.

The Waubra Wind Farm is being constructed north of the Western Highway near Ballarat which will have 48 turbines lit with obstacle lighting. In the recent assessment released by the Minister for Planning on the Ryan Corner Wind Farm, this Waubra Wind Farm is mentioned as possibly being a useful location to determine community responses to such lighting.

The Ryan Corner Panel Report also identifies the issue of night lighting in dark rural landscapes and indicates that this is an impact that has not been effectively assessed.

Some wind farms have been lit in other states, and indeed two members of this Panel (Mr Wimbush and Mr Munro) have travelled to South Australia to view the lights on the Mt Millar Wind Farm.

In the absence of any specific criteria for the visual impact of obstacle lighting, it remains a highly subjective issue. Mr Wyatt, in his evidence suggests that the impact of lighting is not significant when compared with other local light sources and when viewers are inside houses.

The Panel considers this work a useful input into the process, but it is not definitive and in the Panel’s mind tends to downplay the potential visual impact of night lighting, particularly to those who are already opposed to the views of the wind farm during the day.

If the 42 turbines are lit, there are adjacent properties that may have 10-20 lit turbines in view from outside areas on the property, and given the elevated position of the turbines at Crowlands, the lights will be visible (if not bright) from many kilometres away.

The issue of night time lighting is one of the visibility of the flashing red lights *per se*, and the possibility that there will be illumination of blades in horizontal positions.

The Panel does not consider that in the light of Government Policy on wind farms, that aviation night lighting will on its own be a reason to refuse this wind farm. However, the Panel considers that any lighting that is installed must be shielded to the maximum extent possible under the relevant CASA Circular and the minimum allowable number of lights used.
Impact on night flying fauna

Mr Lane addressed the issue of birds and bats and aviation lighting in his evidence. Mr Lane submitted that whilst there have been bird and bat collisions related to night lighting overseas, this is due to the presence of night migrating species in large numbers and the use of white lights.

His conclusion was that the impact on night flying fauna should be minimal and the risk can be reduced by using red lights and reducing the flashing period of the lights.

The Panel considers that this issue should not be significant but has recommended a monitoring condition to confirm the low level of risk.

8.8.3 Conclusions and recommendation

The Panel accepts the arguments in Mr Bryant’s evidence that aviation safety lighting should be installed on 42 turbines but only used for lighting the wind farm in poor visibility during the daytime. That is, the turbines do not need to be lit at night. The Panel has recommended accordingly.

However, the Panel is also aware that if CASA does declare the wind farm a ‘hazard to aviation’, then night lighting may be required. In these circumstances, the principles that should apply are to minimise the number of lights, limit their intensity to the minimum allowed under the Circular and undertake the measures to reduce light spill allowed in the Circular.

Measures to minimise any ecological impact on night flying fauna should also be considered.

The Panel recommends:

That if aviation lighting is to be installed, mitigation measures for visual impact and wildlife ecology are taken in accordance with Condition 8 in the draft Pyrenees planning permit in Appendix A of this report.
9. Impact on particular properties

9.1 Background

Wind farms often have a range of off-site environmental impacts, the criteria for assessment of such being contained in the Wind Farm Guidelines and more broadly in the planning scheme and Planning and Environment Act 1987. The Crowlands Wind Farm is no different, with a range of off-site impacts being present such as visual and landscape impact, noise and traffic.

The in-principle findings of this Panel is that these off-site impacts at Crowlands either fall within the terms of the Wind Farm Guidelines or can be mitigated to reduce their impacts to an acceptable level and that a permit should be issued.

That said, the Panel wishes to comment on a number of issues related to particular properties that may bear a disproportionate level of impact due to their proximity to the wind farm and particular topographic circumstances.

The properties are those located north and east of the wind farm along the Landsborough – Elmhurst Road:

- The Burns property – the Burns’ made a written submission and appeared at the hearing. The Panel inspected their property. The Burns have a vineyard and an approved planning permit for a dwelling;
- The John property – Mr John made a written submission and appeared at the hearing. The Panel inspected his property. Mr John has a vineyard and can build two houses on the property as of right. He also proposes tourist accommodation;
- The Stafford/Duxbury property – The owners made a written submission and the Panel inspected the property. A dwelling exists on this property; and
- The Henning property. Mr Henning made a written submission and appeared at the hearing. Mr Henning has a vineyard.

The Panel wishes to consider these further in relation to noise and visual impact (both day and night if aviation lighting is installed). The Panel also considers in the Section the Shaw property on Spring Flat Road.
9.2 Discussion

9.2.1 Burns property

The Burns property runs south from the Shays Flat – Malakoff Road. The Panel is satisfied that at the Burns house site (permit issued) the noise criteria in the New Zealand Standard (NZS 6808:1998) will not be exceeded. The modelled 40 dBA noise contour provided in the evidence of Mr Delaire covers approximately 20% of the Burns property in the south west corner.

In relation to visual impact, the Panel considers that the impact on the Burns property will be significant with a large number of turbines visible to the south on an elevated ridge, the nearest being approximately 1.6 km away.

If a number of the turbines are lit for aviation safety (discussed in Section 8.8) then this will also impact on the Burns property, particularly given that the Burns are sensitive to the daytime landscape impacts. In this location the rear of the turbines (where aviation lights are normally located) will be oriented towards this property due to the prevailing winds. This situation will also apply to the other properties on the eastern side of the wind farm.

At this property the Panel considers that there are reasonable prospects for screening the turbines from the proposed house site, partly with existing vegetation around the existing shed on site and partly from new plantings if the Burns choose to accept landscaping from the applicant.

Turbines will be highly visible from the work areas of the property but the Panel gives this aspect less weight than visibility from a dwelling. The Panel considers the visual impact of the wind farm whilst engaged in a rural activity (eg maintaining a vineyard, moving sheep etc…) is less significant than visual impact upon a dwelling where the primary focus is on rest and relaxation. This approach has been adopted in other Panel reports (eg Mt Mercer Wind Farm).

Notably, the proposed house site also has opportunities for significant views away from the wind farm, to the north.

9.2.2 John property

The noise impacts of the wind farm are discussed at length in Section 5, and in particular the technical difficulties in relation to predicting and monitoring noise to ensure the Wind Farm Guidelines (and more particularly NZS 6808:1998) are met.
The John property is on two titles (37-S/PP2672 – ‘west title’ and 46-S/PP2672 ‘east title’). Approximately 50% of the west title is covered by Mr Delaire’s 40 dBA modelled noise contour. Approximately 10% of the east title is covered by the same contour.

The noise impacts on this property have been covered in some detail in Section 5, but the Panel wishes to highlight a number of key planning issues. Firstly, the issue of ‘as of right’ dwellings on these titles, and secondly the issues around the proposed tourist accommodation dwelling proposed by Mr John.

The tourist accommodation issue is clear in planning terms. There is no live proposal or existing permit for this use and if Mr John wishes to apply for a permit in the area affected by the 40 dBA contour, the potential noise impact from the wind farm will need to be considered.

The as of right dwelling on the east title is less clear. It was put to the Panel that Mr John may build a dwelling on this property without requiring planning approval given the size of the allotment. The applicant did not disagree with this. Mr John can also build a house on the west title but this is further from the wind farm.

As described in Section 5, on the site inspection Mr John pointed out his preferred house location on the east title, within the 40 dBA modelled noise contour and only approximately 400 - 500 m from the nearest turbine (13). The benefits of this site for a house location were apparent, being high in the landscape with commanding views to the north and east.

The house site also overlooks the Stafford/Duxbury dwelling approximately 500 m away.

That Mr John can build a house without a planning permit was not contested. The issue in the Panel’s mind however is if Mr John chooses to build in this location and subsequently suffers noise in excess of the NZS 6808:1998 criteria, then who is at fault?

The Panel notes, and discussed in detail in Section 5, that the proposed house site is only just inside the 40 dBA contour and it is by no means certain that the NZS 6808:1998 will be exceeded. Nevertheless it is possible that the two parties who have both met their obligations under the planning system may be caught in a position of conflict.

The Panel does not consider that this issue alone should result in the wind farm permit not being issued, but does consider it an unsatisfactory situation.
The Panel is given some comfort by the fact that the east and west titles of the John Property do contain considerable opportunities for development outside the 40 dBA contour.

The John property will potentially also suffer considerable visual impact from the wind farm during the day and at night if turbines are lit. As with the Burns property however, there are opportunities for very attractive views to the north and west and upslope strategic landscaping could be employed to partially screen the turbines if Mr John so desires.

9.2.3 Stafford/Duxbury property

At the Stafford/Duxbury dwelling the Panel is satisfied that the noise criteria in the NZS 6808:1998 will not be exceeded and post construction monitoring is recommended to confirm this. The 40 dBA modelled contour does cover approximately 20% of the property in the south west corner.

As discussed in Section 3, two turbines in particular are relatively close to the dwelling and will be visually dominant on the western skyline. Some screening of these turbines may be possible but will require planting near the house which will impact on the overall western view and may increase fire risk to the dwelling (any proposed landscaping of other properties will also need to be considered in terms of fire risk).

The dwelling has good views to the east and north away from the wind farm.

9.2.4 Henning property

The Henning property does not have a residence but approximately 80% of the property is covered by the modelled 40 dBA noise contour (ie noise over 80% of the property may exceed NZS 6808:1998).

Whilst a dwelling does not exist on this property and Mr Henning did not indicate that one is proposed, the Panel is concerned that such a large proportion of a neighbouring property may be ‘quarantined’ from some future use and development.

It is not uncommon for modelled noise predictions to affect neighbouring properties as evidenced in the properties above, but it is uncommon for it to affect such a large proportion. This may preclude or at least compromise consideration of Section 2 Permit required uses from the higher attractive landscapes on the Henning property.

Again the Panel is clear that in planning terms this does not weigh against the proposal per se as nothing, to the Panel’s knowledge, is being considered
in this area. It does however raise in the Panel’s mind issues of equity and fairness in that Mr Henning may be prevented from taking future opportunities on the majority of his property.

9.2.5 **Shaw property**

Mr Shaw on Spring Flat Road made a written submission to the Panel on landscape and habitat grounds and made reference to the impact of construction but he did not appear at the Panel hearing.

Mr Shaw’s dwelling is well outside the 40 dBA noise contour as is most of his property except a portion on the eastern edge.

Mr Shaw however will be subject to significant medium range (closest turbine approximately 3 km away) visual impact with turbines to the north, east and south of his dwelling. If night lighting is used many of the lit turbines will also be visible.

There are opportunities to provide screening landscaping at this property if Mr Shaw chooses, but this may impact on his attractive views to the Crowlands Hills east of his property.

Mr Shaw also raised the issue of construction impacts, and this is dealt with in detail in Section 6.

9.3 **Conclusion and recommendation**

The Panel considers the assessment of the project against the Wind Farm Guidelines has resulted in a clear achievement of the criteria in those guidelines.

In a net community benefit sense, there is a strong case for recommending approval of the project as its contribution to reducing greenhouse gas emissions, or at least slowing the increase in greenhouse gas emissions, can not be in doubt.

Mr Power for the applicant in his B2 submission at Section 13 summarises the net community benefit case which the Panel generally accepts and the Panel has framed its primary recommendation accordingly.

That said, there is often with wind farms a sense that some surrounding land owners are required to accommodate the wind farm but in the process bear a disproportionate load of the off site impacts only because by chance they happen to live nearby.
The strong support for wind energy in the planning system may suggest that such situations are unfortunate but will be unavoidable in some circumstances and net community benefit is the only criteria that counts. The Panel considers that this is selling the planning system short and that ways should be explored to either reduce potential impact or benefit share with surrounding landowners who are likely to suffer a significant level of amenity or potentially financial loss.

Such an approach would likely increase the support for wind farms, and particularly among those who may feel the most impact, that is the immediately adjoining landowner.

The Panel is acutely aware that ‘compensation’ is not payable in relation to existing properties and new land uses in rural areas elsewhere in the planning system and it is not suggesting that compensation itself is the answer. Indeed in other wind farm Panels submitters (objectors) have made it abundantly clear that even if compensation was offered it would not be accepted.

Whilst there are undoubtedly people who object to wind farms on principle and do not want them at a landscape scale anywhere, that is generally not the case at Crowlands and the property owners mentioned above (most of whom presented to the Panel) were eminently reasonable in their approach and articulate in arguing on their particular issues.

It must also be said that the applicant in this case has handled itself particularly well and the Panel is left with the sense that whilst there may still be considerable disagreement on some aspects, there is no lack of goodwill between parties.

The Panel considers that resolution of a framework for more formally dealing with affected neighbours, whilst undoubtedly difficult, is worth pursuing. It notes that such recommendations have been made previously in Panel reports (eg Mt Mercer).

The Panel recommends:

The Minister for Planning consider the development of a protocol for the wind energy industry in dealing with adjoining non-project landowners who may be significantly affected by visual impact, modelled noise contours or other impacts.
10.  Planning permit conditions

10.1  Draft permit conditions – Pyrenees Shire Council

Draft planning permit conditions for the Pyrenees Planning Scheme permit application 2007/0525 are attached in Appendix A. These are based on a draft set of conditions prepared and circulated by the Department of Planning and Community Development and then discussed in a ‘without prejudice’ basis at the end of the Panel hearing.

The Panel has reviewed and further modified the draft conditions in the light of its considerations in this report.

10.2  Draft permit conditions – Ararat Rural City Council

Draft planning permit conditions for the Ararat Planning Scheme permit application 2007/0562 are attached in Appendix B. The Panel’s approach with these recommended conditions has been to use the Pyrenees set in Appendix A as the basis and remove some sections that will not be relevant in the Ararat permit.

The Panel has left the ‘endorsed plans’ Condition 1 in both permits exactly the same in the expectation that one set of plans would be prepared and endorsed covering the whole project across both municipalities.

10.3  Cross boundary issues

Whilst the great majority of the project and wind generators will be in Pyrenees Shire, there are some elements that occur just in Pyrenees Shire, some just in Ararat Rural City and some in both Council areas.

This situation has arisen as there are a number of property titles that cross the municipal boundary and occur in both Ararat Rural City and Pyrenees Shire. These are explained in correspondence from the applicant dated 29 February 2008 and are property titles 17(d), 17(c), 17(b), 17(a) and 14 (c) shown in Figure 5.

To ensure consistency and as discussed in Section 10.1 and 10.2 above, the permit conditions recommended by the Panel are broadly similar. Where requirements cover issues in both Council areas (for example the Environmental Management Plan) the Panel considers one document should
be prepared to meet the requirements of both Councils to ensure consistency and minimise duplication.

As per submissions from the applicant, the land description for each permit should specify for each of these cross boundary titles that the permit applies only to the portion of land within the relevant municipality.

10.4 Permit condition enforcement

In correspondence dated 29 February 2008 at Section 6, the applicant made submissions as to who would be responsible for enforcing the permit conditions.

Mr Power submitted that once the permit is issued, the relevant local Council would be responsible for enforcement. This issue was also discussed during the hearing and Mr Dalton for Pyrenees Shire agreed that they would be responsible for enforcing the permit within their area of jurisdiction.

The Panel notes the submissions on this issue but makes no finding or recommendation. If the permit is issued by the Minister for Planning, permit enforcement can be resolved in future if required.

10.5 Amended permit

In correspondence to the Minister for Planning dated 12 March 2008, the applicant wrote requesting a number of changes to the permit application, largely related to refining the relevant land descriptions to be attached to the permit.

The Minister’s delegate responded on 26 March 2008 confirming that the matters would be considered following receipt of the Panel report. The Panel has thus not considered these matters further.
Figure 5: Property titles crossing municipal boundary
11. **Conclusions and summary of recommendations**

The Panel has considered the range of impacts that may occur, both positive and negative from the construction of the Crowlands Wind Energy Facility. The Panel concludes that in the light of policies on renewable energy and planning, there is no significant impediment to the project proceeding and a permit should be issued.

The Panel has identified a number of areas where mitigation measures are required and these have been recommended through the body of this report and reflected in planning permit conditions where appropriate. A summary of the recommendations follows.

**Recommendation in Chief**

The Panel recommends:

1. That subject to the detailed recommendations in this report, planning permits for the Crowlands Wind Energy Facility should be issued.

**Landscape and Visual Impact**

The Panel recommends:

2. The turbines be finished in an ‘off-white’ non reflective finish as per Condition 3(e) in the draft Pyrenees planning permit in Appendix A of this report.

3. The colours and finishes of other facilities on site be selected to minimise landscape impact as per Condition 3(h) in the draft Pyrenees planning permit in Appendix A of this report and Condition 3(a) in the draft Ararat planning permit in Appendix B of this report.

4. Minimising visual and landscape impact of access tracks be considered in selection design and locations as per Conditions 6 and 15 in the draft Pyrenees planning permit in Appendix A of this report and Conditions 6 and 12 in the draft Ararat planning permit in Appendix B of this report.
5. Tracks, track edges and hardstand areas that are not required following wind farm construction be rehabilitated as per Condition 16(a)(ix) in the draft Pyrenees planning permit in Appendix A of this report and Condition 13(a)(ix) in the draft Ararat planning permit in Appendix B of this report.

6. That landscaping be offered to all dwellings within 3 km of the wind generators and those submitters beyond this distance expressing concern in relation to visual impacts in accordance with Condition 4 in the draft Pyrenees and Ararat planning permit in Appendix A and B of this report respectively.

Flora and Fauna

The Panel recommends:

7. That the applicant prepare a Native Vegetation Management Plan incorporating a Native Vegetation Offset Plan in accordance Condition 22 in the draft Pyrenees planning permit in Appendix A of this report and Condition 19 in the draft Ararat planning permit in Appendix B of this report.

8. For future wind energy facility proposal all vegetation removal permits (where required) should be applied for at the same time as the permit in chief.

9. That the applicant prepare an Avifauna Management Plan in accordance with Condition 19 of the draft Pyrenees planning permit in Appendix A of this report.

Noise

The Panel recommends:

10. That noise from the proposed Crowlands wind farm be assessed and monitored in accordance with Conditions 23 – 31 in the draft Pyrenees planning permit in Appendix A of this report including:
   ▪ Compliance with the New Zealand Standard 6808:1998;
   ▪ Additional background noise monitoring;
   ▪ Post-construction noise evaluation; and
   ▪ Preparation of a noise complaint and evaluation response plan.

11. That EPA Publication 480 Environmental Guidelines for Major Construction Sites and Section 12 of EPA Publication TG302/92 Noise Control Guidelines be applied to construction activities as
shown in Condition 16(a)(x) in the draft Pyrenees planning permit in Appendix A of this report and Condition 13(a)(x) in the draft Ararat planning permit in Appendix B of this report.

12. That an alternative approach to wind farm noise management should be sought that provides at least equivalent protection of sleep against wind farm noise, is less complex, less costly, less time consuming for all parties, and more certain and such an approach, if successful, be incorporated into the Wind Energy Guidelines.

13. That, with some further refinement, the comprehensive draft ‘Noise Complaint and Evaluation Procedure’ provided by the applicant at Crowlands be incorporated in the Wind Energy Guidelines as a good example of such a procedure.

Traffic and Access

The Panel recommends:

14. A Traffic Management Plan must be prepared in accordance with Condition 10 in the draft Pyrenees planning permit shown in Appendix A of this report and Condition 8 of the draft Ararat planning permit shown in Appendix B of this report. The Traffic Management Plan must include, among other things:

- The identification of ODV routes;
- Mechanism for input and approval by VicRoads and relevant Local Councils;
- Management of project traffic in relation to local traffic and school bus routes;
- Details of any road, intersection or related infrastructure upgrades required; and
- Details and timing of pre-construction condition surveys and timetables for maintenance and post-construction restitution works.

15. That for between 250 m east of house 12 and 250 m west of house 14 Spring Flat Road shall be sealed to a two lane width before construction commences and shall be maintained in that condition in accordance with Condition 12 in the draft Pyrenees planning permit in Appendix A of this report.

16. Traffic impacts related to dust and hazardous substances spills be managed in accordance with the Environmental Management Plan proposed in Condition 16 in the draft Pyrenees planning permit in
Appendix A of this report and Condition 13 in the draft Ararat planning permit in Appendix B of this report.

17. The applicant considers developing a light vehicle management plan with the objective of minimising light vehicle movements in the area by utilising coaches or similar bulk passenger transport.

Land Impacts

The Panel recommends:

18. That to effectively manage impacts on the land, the Traffic Management Plan, Environmental Management Plan, and Native Vegetation Management Plans as proposed in the draft permit conditions in Appendix A and B to this report be developed and implemented.

Cultural Heritage

The Panel recommends:

19. A condition in accordance with Condition 16 in the draft Pyrenees planning permit in Appendix A to this report and Conditions 13 in the draft Ararat planning permit in Appendix B of this report should be applied to ensure preparation and approval of an Environmental Management Plan incorporating non-indigenous cultural heritage management. The Plan should be approved by Pyrenees Shire Council, Ararat Rural City Council, DSE and Parks Victoria.

Shadow Flicker

The Panel recommends:

20. A condition in accordance with Condition 32 in the draft Pyrenees planning permit in Appendix A to this report should be applied to ensure the shadow flicker standard is met during the life of the wind farm.

Blade Glint

The Panel recommends:

21. A condition in accordance with Condition 3 in the draft Pyrenees planning permit in Appendix A of this report should be applied to ensure that matt non-reflective paint or coating is selected for turbine blades to avoid blade glint.
Wildfire and Emergency Response

The Panel recommends:

22. That a Wildfire and Emergency Response Plan be prepared to the satisfaction of the Country Fire Authority in accordance with Condition 18 of the draft Pyrenees planning permit in Appendix A of this report and Condition 18 of the draft Ararat planning permit in Appendix B of this report.

23. That The Country Fire Authority have input to track design and location to ensure fire access requirements are met in accordance with Condition 14 of the draft Pyrenees planning permit in Appendix A of this report and Condition 11 of the draft Ararat planning permit in Appendix B of this report.

Telecommunications Interference

The Panel recommends:

24. That to effectively manage potential post-construction telecommunications interference, the draft Telecommunications Complaint and Evaluation Procedure be further developed, including clarification of eligibility for the complaint and evaluation program, complaint criteria and potential mitigation measures the applicant will undertake, a time limit for resolving complaints and public access to the final Procedures. These actions should be undertaken in accordance Conditions 34-37 of the draft Pyrenees planning permit in Appendix A of this report.

Aviation Lighting

The Panel recommends:

25. That if aviation lighting is to be installed, mitigation measures for visual impact and wildlife ecology are taken in accordance with Condition 8 in the draft Pyrenees planning permit in Appendix A of this report.

Impacts on Particular Properties

The Panel recommends:

26. The Minister for Planning consider the development of a protocol for the wind energy industry in dealing with adjoining non-project landowners who may be significantly affected by visual impact, modelled noise contours or other impacts.
PYRENEES PLANNING SCHEME - 2007/0525

CROWLANDS WIND ENERGY FACILITY

DRAFT PLANNING PERMIT CONDITIONS

THE FOLLOWING CONDITIONS APPLY TO THIS PERMIT:

DEVELOPMENT PLANS

1. Before the development starts, development plans to the satisfaction of the Minister for Planning must be submitted to and approved by the Minister for Planning. The plans may be submitted for approval in stages or for a particular grouping of wind generators within the site. When approved, the plans will be endorsed by the Minister for Planning and will then form part of this permit. The plans must be drawn to scale with dimensions and three copies must be provided.

The plans must show the location, set backs to property boundaries, layout and dimensions of all on-site buildings and works including all wind generators, access tracks, underground and overhead cables, any temporary concrete batching plants, sub-stations, the terminal yard, operation and maintenance buildings, meteorological masts, landscaping, any designated car parking areas, any signage, and ancillary works, such as construction compounds and water tanks, and off-site road works.

The plans must be generally in accordance with the application plans as identified in the plan titled ‘Crowlands Wind Farm Preferred access tracks, electrical and ancillary infrastructure. Turbine location as exhibited’ dated February 2008 and tabled in the Panel hearing as Exhibit 5 but modified to show:

a) the modified generator development envelopes identified by the green lines on the fifteen 1:5,000 contour maps tabled as Exhibit 38 in the Panel hearing dated February 2008;

b) any necessary adjustment to the layout:
   (i) to ensure that clearing of native vegetation is avoided or minimised;
   (ii) to ensure that ground disturbance associated with the construction of the wind energy facility does not adversely impact on drainage lines or areas of heightened erosion risk;
(iii) to ensure that areas of significant fauna habitat identified by a qualified ecologist engaged to inspect site works are avoided;
(iv) to ensure that areas of geomorphological significance are protected;
(v) which includes the proposed location of access tracks to all of the generator locations, the 66 kV substations and the 220 kV terminal yard; and
(vi) to ensure that any indigenous or non-indigenous archaeological site identified by the on-site archaeological survey, and required to be protected, is avoided.

c) global positioning system coordinates for each generator;
d) details of the model and capacity of the wind generators to be installed;
e) the location, size, type and intensity of any aviation lighting including any directional screening as required by Condition 8;
f) details of the location of all electrical cabling associated with the collector network within the wind energy facility;
g) elevations, materials and finishes of the wind generators and other buildings and works;
h) the relocation of generator 14 out of the area of the Pyrenees Planning Scheme Environmental Significance Overlay – Schedule 1 Proclaimed Water Supply Catchments except with the further approval of Central Highlands Region Water Authority;
i) details of any safety signage required for the wind energy facility.

2. The use and development as shown on the endorsed plans must not be altered or modified without the written consent of the Minister for Planning; except that, where a wind generator is located within the modified generator development envelope identified by the green lines on the fifteen 1:5,000 contour maps tabled as Exhibit 38 in the Panel hearing dated February 2008 and annexed to this permit, this will be regarded as generally in accordance with the endorsed plans if the Minister for Planning is satisfied that the relocation will not give rise to a material change to assessed landscape, vegetation, cultural heritage, visual amenity, shadow flicker, noise or aviation impacts when compared to those of the endorsed plans.
SPECIFICATIONS

3. The wind energy facility must meet the following requirements:

   a) the wind energy facility must comprise no more than 72 upwind wind generators;

   b) the maximum height of the wind generators (to the tip of the rotor blade when vertical) must not exceed 146.5 metres above natural ground level;

   c) wind generators must be mounted on a tubular steel and/or concrete tower with a height of no greater than 100 metres;

   d) each wind generator is to have not more than three rotor blades, with each blade having a length of no greater than 46.5 metres;

   e) the wind generator towers, nacelles and rotor blades must be ‘off white’ and must be of a non-reflective finish to the satisfaction of the Minister for Planning;

   f) the wind generators must contain lightning protection;

   g) the wind generators must contain internal fire protection systems to the satisfaction of the Minister for Planning;

   h) the colours and finishes of all other buildings and ancillary equipment must be such as to minimise the impact of the development on landscape to the satisfaction of the Minister for Planning;

   i) all wind energy facility infrastructure within the site must be sited, designed and constructed to minimise impacts on overland water flows, soil erosion, the landscape value of the site, environmentally sensitive areas, sites of geomorphological value, cultural heritage and, where appropriate, the farming activities on the land and on the adjoining land to the satisfaction of the Minister for Planning;

   j) all new electricity cabling associated with the collector network within the wind energy facility connecting to the 66 kV substation must be placed under the ground except where this will result in significant adverse impacts on soil and land. Such exceptions need to be documented and submitted to the Minister for Planning for approval prior to construction;
k) the electricity cabling connecting the 66 kV substations to the 220 kV terminal yard may be overhead lines to the satisfaction of the Minister for Planning; and

l) except with written agreement of neighbouring owners all wind generator towers must be set back at least 150 metres from property boundaries of non-stakeholders.

LANDSCAPE/VISUAL AMENITY

4. Before any generator is commissioned:

a) a program of voluntary landscape mitigation works to the satisfaction of the Minister for Planning must be made available to the owners of dwellings existing as at 20 June 2007 within 3 kilometres of the nearest generator and to the Augustin dwelling at 126 Potts Road West Landsborough and the Shaw dwelling at 267 Spring Flat Road Crowlands. If the wind energy facility is developed in stages landscaping should be offered to the owners of dwellings within 3 kilometres of the nearest generator in each stage;

b) a program of voluntary landscape mitigation works to the satisfaction of the Minister for Planning must be made available to the Mortyn’s at 705 Ararat – St Arnaud Road Crowlands; and

c) as part of that program, an off-site landscaping plan must be prepared in consultation with the landowners specified in Condition 4(a) and 4(b) to the satisfaction of the Minister for Planning for submission to and approval by 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 or other treatments that will be used to reduce the visual impact of the wind generators at the dwellings.

The off-site landscape plan must include:

(i) details of the plant species to be used, including the height and spread of plants at maturity or a description of other works; and

(ii) a timetable for implementation of the landscaping works.

5. The landscaping as shown on the endorsed landscape plans required by Condition 4 must be completed to the satisfaction of the Minister for Planning within 12 months of the completion of the development or any
relevant stage of it, or to such other timetable as agreed with the landowner and approved by the Minister for Planning, at the cost of the operator of the wind energy facility.

6. All access tracks associated with the wind farm should, as far as is practicable, be constructed with surface material that will not unduly contrast with the landscape to the satisfaction of the Minister for Planning.

LIGHTING

7. Except in the case of an emergency, no external lighting of infrastructure associated with the wind energy facility, other than low level security lighting or aviation safety lighting in accordance with Conditions 1(e) and 8 may be installed or operated without the further written consent of the Minister for Planning.

AIRCRAFT SAFETY LIGHTING

8. If obstacle lighting for aviation safety is to be installed, it must meet the following conditions to the satisfaction of the Minister for Planning:

a) the number of lit turbines be kept to the minimum required such that the wind farm is not declared a hazardous object to aviation by the Civil Aviation Safety Authority and be no more than 42;

b) the aviation safety lighting is restricted to two red medium intensity lights on any turbine;

c) the individual lighting installations be in accordance with the CASA Advisory Circular 139-18(0) and the CASA Manual of Standards, particularly Chapter 9;

d) the impact minimisation features allowed under the documents in Conditions 8(c) be installed including, but not limited to:

(i) treatment of the rear of the blade to minimise reflection of aviation lights;

(ii) shielding of the lights on the top and bottom such that the maximum intensity of light is limited to a beam of 3 degrees, with only 0.5 degrees of this beam width below the horizontal; and

(iii) all lights on the wind farm synchronised to flash in unison.
9. Before the development starts the permit holder shall submit an **Aircraft Safety Plan** for the site that shows how Condition 8 will be complied with and under what conditions obstacle lighting will operate. This plan must be submitted to, approved and endorsed by the Minister for Planning. Once endorsed the aviation safety plan will form part of the permit.

**TRAFFIC MANAGEMENT**

10. Before the development starts a **Traffic Management Plan**, prepared in consultation with, and to the satisfaction of, VicRoads, the Ararat Rural City, Pyrenees Shire and Northern Grampians Shire Councils must be submitted to and approved by the Minister for Planning.

11. When approved, the plan will be endorsed by the Minister for Planning. The Traffic Management Plan must include those elements identified in the draft **Traffic Management Plan** in Part B, Volume 1 of the planning application and the following:

   a) an existing conditions survey of public roads in the vicinity of the wind energy facility that may be used for access, including details of the suitability, design and construction standard of such roads;

   b) the designation of appropriate construction and transport vehicle routes to the wind energy facility;

   c) the designation of vehicle access points to the wind energy facility from surrounding roads, including main road access points to local access roads. For access to the site from arterial roads, details of the location, type of culverts/endwalls, angle of the access to road reserve, radius of the bellmouth to suit the length of the vehicle, sealing of access and sight distances must be included for approval by VicRoads;

   d) the designation of operating hours and speed limits of vehicles on relevant routes accessing the site so as to avoid the time and routes of passage of school buses, and to provide for resident safety;

   e) any necessary pruning of street planting or roadside vegetation to provide for transport of materials to the site, and pruning practices to be followed;
f) the designation of vehicle access ways and car parking areas.

g) the requirements for Over Dimensional Load permits and escorting of long or large loads along roads in the area;

h) the need for road intersection upgrades to accommodate an additional traffic or site access requirements, whether temporary or ongoing;

i) the need for general road and signage upgrades to accommodate additional volumes of traffic;

j) a timetable for implementation of any pre-construction works identified to be undertaken;

k) a timetable for identifying and implementing any post-construction restitution works identified at the completion of construction;

l) a timetable of regular inspections to be carried out during the construction period to identify maintenance works necessary as a result of construction traffic;

m) the use and development must be carried out in accordance with the endorsed Traffic Management Plan and the cost of any works to repair damage and maintain roads are to be at the expense of the permit holder.

Note: Any native vegetation removal required as a result of implementation of the Traffic Management Plan on public road reserves may require separate planning permission.

12. Prior to the construction of the wind energy facility, Spring Flat Road shall be upgraded and sealed to two lane width from 250 m east of House 12 to 250 m west of house 14 (house numbers referenced from the Exhibit 1 plan titled ‘Crowlands Wind Farm Landholders and panel submitter properties, indicative layout, electrical infrastructure’ dated 4 February 2008) and maintained in that condition until construction is completed.

13. Prior to the commencement of the traffic management works the permit holder must provide evidence to VicRoads that the developer/developer’s contractor has a public liability insurance for at least $10 million for the duration of any proposed works on roads that are under the control or management of VicRoads.

14. Access and egress tracks must be located and constructed in accordance with access track location and design plans which have been prepared in
consultation with the Country Fire Authority and which have been submitted to and approved by the Minister for Planning.

15. The layout and construction methods of access tracks must where practical and to the satisfaction of the Minister for Planning:

   a) be sited and designed to minimise impacts on overland water flows, soil erosion, the landscape value of the site, environmentally sensitive areas, sites of geomorphological value and cultural heritage;

   b) minimise the extent to which any tracks (including cut and fill associated with the tracks) is visible from the Pyrenees Highway, Crowlands – Eversley Road, Ararat – St Arnaud Road, Shays Flat – Malakoff Road and Landsborough – Elmhurst Road; and

   c) have addressed any comment on the layout and design of the access tracks provided by the Country Fire Authority.

ENVIRONMENTAL MANAGEMENT PLAN

16. Before the development starts, an Environmental Management Plan must be prepared to the satisfaction of the Minister for Planning, in consultation with the Department of Sustainability and Environment, Pyrenees Shire and Ararat Rural City Councils and other agencies as specified in this condition or as further directed by the Minister for Planning. The Environmental Management Plan must be based on the plans in Volume 1 Part B of the Application Report dated June 2007 and in particular the Construction and Worksite Management Plan, the Land Protection Management Plan, the Historical Sites Cultural Heritage Management Plan, the Pest Management Plan and the Weed Management Plan. The Environmental Management Plan must be submitted to the Minister for Planning for approval. The Environmental Management Plan may be prepared in sections or stages. 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 address the issues in points a to j below:

   a) construction and work site management including:

      (i) the identification of all potential contaminants stored on site;

      (ii) the identification of all construction and operational processes that could potentially lead to water contamination;
(iii) the identification of appropriate storage, construction and operational methods to control any identified contamination risks;
(iv) procedures for pollution management;
(v) the identification of waste re-use, recycling and disposal procedures;
(vi) a management plan for the concrete batching plant(s) to prevent pollution of local waterways particularly from wash water and waste concrete materials;
(vii) appropriate sanitary facilities for construction and maintenance staff;
(viii) the identification of stockpile and storage sites, vehicle/machinery parking areas and set access routes for vehicles to eliminate creation of multiple tracks;
(ix) details as to how hardstand areas and tracks which are not required for the ongoing use of the wind energy facility will be rehabilitated after the construction of the wind energy facility has finished;
(x) procedures for managing construction noise in accordance with the EPA Environmental Guidelines for Major Construction Sites (Bulletin 480) and the EPA Noise Control Guidelines TG302-92.

b) any blasting proposed. This issue must be addressed only if blasting is proposed to be undertaken at the site as part of the construction of the wind energy facility. The Environmental Management Plan must include the following:
(i) name and qualification of the person responsible for blasting;
(ii) a description of the location of where the explosives will be used, and the location of every licensed bore on any property with an adjoining boundary within 1km of the location of the blasting;
(iii) a requirement for the identification and assessment of any potentially sensitive site within 1 km of the location of the blasting, including the procedure for pre-blast and post-blast qualitative measurement or monitoring at such site;
(iv) the procedure for site clearance and post blast reoccupation;
(v) the procedure for the storage and handling of explosives;
(vi) a requirement that blasting only occur after at least 24 hours prior notification in writing of the intention to undertake blasting has been given to all adjoining
neighbours of the proposal with a property boundary within 1 km of the location of the proposed blasting; and

(vii) a requirement that blasting only be undertaken between the hours of 8am and 4pm. No blasting may occur on a Sunday.

c) hydrocarbon and hazardous substances management including:
   (i) procedures for any on-site storage of fuels, lubricants or waste oil;
   (ii) no hydrocarbons and hazardous substances are to be stored on land within the Environmental Significance Overlay (Schedule 1); and
   (iii) contingency measures to ensure that any chemical or oil spills are contained on-site and cleaned up in accordance with Environment Protection Authority requirements.

d) geomorphology management including:
   (i) procedures to protect those sites of geomorphological significance identified in the expert evidence statement of Dr Neville Rosengren dated 23 January 2008; and
   (ii) procedures to have sites of potential geomorphological significance revealed during excavation evaluated and protected if necessary.

e) non-indigenous heritage and archaeology management including:
   (i) procedures to ensure that before any buildings or works commence in association with the development, the identified non-Aboriginal heritage locations identified in the report titled ‘Report on Preliminary Cultural Heritage Investigation’ written by Dr Heather Builth dated April 2007, must be protected from any buildings and works in accordance with the recommendations contained in that report;
   (ii) a survey conducted by a qualified archaeologist which locates, records and assesses non-indigenous archaeological places and objects on those parts of the site which have the potential to be affected by the wind energy facility. This must include land that may be disturbed by associated works such as generator footings, access tracks, buildings, services and/or possible erosion arising from such works;
   (iii) protocols for construction activities which have the potential to affect sites identified by the survey in Condition 16(e)(ii); and
   (iv) protocols for protecting and reporting the discovery of any human remains in accordance with the requirements of the
Victoria Police, the Victorian State Coroners Office and Aboriginal Affairs Victoria.

f) pest animal management. This section of the Environmental Management Plan must be prepared in consultation with the Department of Sustainability and Environment and the Department of Primary Industries. It must include:
   (i) procedures to control and prevent the spread of pest animals, particularly by negating opportunities for the sheltering of pests;
   (ii) a protocol and procedures to prevent the importation of the grape vine pest Phylloxera to the area; and
   (iii) follow-up pest animal control for all areas disturbed by the wind energy facility construction works for a period of two years following the completion of constructing the wind energy facility or, if the facility is developed in stages, within two years following completion of that stage.

g) pest plant management. This section of the Environmental Management Plan must be prepared in consultation with the Department of Primary Industries. It must include:
   (i) procedures to prevent the spread of weeds and pathogens to and from the site 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 plant species as appropriate to the location; and
   (iii) that follow-up weed control is undertaken on all areas disturbed through construction of the wind energy facility for a minimum period of two years following constructing the wind energy facility or, if the facility is developed in stages, within two years following completion of that stage.

h) sediment, erosion and water quality management including:
   (i) incorporation of control measures outlined in Environment Protection Authority publication No. 480 Environmental Guidelines for Major Construction Sites;
   (ii) procedures to ensure that silt from batters, cut-off drains, table drains and road works is retained on the works site during and after the construction stage of the project. 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. Stockpiles must be located away from drainage lines and in locations which minimise their visibility from the Pyrenees Highway, Crowlands – Eversley Road, Ararat – St Arnaud Road, Shays Flat – Malakoff Road and Landsborough – Elmhurst Road;

(iii) procedures to contain any contaminated or turbid run-off during and after construction of the wind energy facility;

(iv) procedures to suppress dust arising from construction-related activities. Appropriate measures may include water spraying of roads and stockpiles, stabilising surfaces, temporary screening and/or wind fences, modifying construction activities during periods of heightened winds and revegetating exposed areas as soon as practicable;

(v) procedures to ensure that steep batters are treated in accordance with Environment Protection Authority recommendations detailed in the ‘Construction Techniques for Sediment Pollution Control’ No 275, May 1991;

(vi) procedures for managing and discharging waste water;

(vii) the installation of geotextile silt fences (with sedimentation basins where appropriate) on all drainage lines from the site which are likely to receive run-off from disturbed areas;

(viii) criteria for the siting of any temporary concrete batching plant(s) associated with the development of the wind energy facility and the procedure for its removal and reinstatement of the site once its use finishes. The establishment and operation of any temporary concrete batching plant must be in accordance with the Environment Protection Authority’s Environmental Guidelines for the Concrete Batching Industry, Publication No. 628;

(ix) a process for overland flow management to prevent the concentration and diversion of waters onto the site or erosion prone slopes;

(x) pollution management measures for management of stored and stockpiled materials including waste materials, litter and any other potential source of water pollution; and

(xi) siting of concrete batching plant and any on-site wastewater treatment and disposal fields at least 100 metres from any watercourse.

i) A training program for construction workers and permanent employees or 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) A program for monitoring and reporting including a register of environmental incidents, non-conformances, complaints and corrective actions.

k) A timetable for implementation of all programs and works identified in the Environmental Management Plan.

14. The Environmental Management Plan must be reviewed and if necessary amended in consultation with the Pyrenees Shire and Ararat Rural City Councils to the satisfaction of the Minister for Planning every 5 years from the date of approval to reflect completion of many of the elements, operational experience and changes in environmental management standards and techniques. The revised plan must be submitted to the Minister for Planning for approval.

15. The use and development must be carried out in accordance with the endorsed Environmental Management Plan.

CROWN LAND

16. Before the development starts, the applicant must provide written agreement, to the Department of Sustainability and Environment, to become the Responsible Road Authority under the Road Management Act 2004 for the life of the wind farm, in respect to any access roads which will traverse Crown land and are not within a gazetted Government road reserve.

17. Prior to commencing the construction or upgrade of any access roads or other infrastructure on Crown land which is not a gazetted Government road reserve, the applicant must:

a) meet any requirements resulting from the notification of this proposal under the Native Title Act 1993 (Commonwealth);

b) obtain the written consent of the Department of Sustainability and Environment.

WILDFIRE AND EMERGENCY RESPONSE

18. A Wildfire Prevention and Emergency Response Plan must be prepared in consultation with and to the satisfaction of the Country Fire Authority, the Department of Sustainability and Environment, and the Pyrenees Shire and Ararat Rural City Councils. This plan must include:
a) criteria for the provision of static water supply tanks or dams for fire fighting purposes, including minimum capacities, appropriate connections and signage;

b) criteria for access to designated water supply sources for fire fighting vehicles;

c) procedures for vegetation management, fuel control and the provision of fire fighting equipment during declared fire danger periods; and

d) the facilitation by the operator, before or within 3 months after the commencement of the operation of any part of the wind energy facility, of a familiarisation visit to the site and explanation of emergency services procedures for the Country Fire Authority, Rural Ambulance Victoria, Pyrenees Shire and Ararat Rural City Councils Municipal Emergency Management Committee and Victoria Police.

AVIFAUNA

19. Before the development starts, an Avifauna Management Plan to the satisfaction of the Minister for Planning must be prepared in consultation with the Department of Sustainability and Environment, and must be submitted to and approved by the Minister for Planning. When approved the plan will be endorsed and will then form part of the permit. The use must thereafter accord with the endorsed plan. The Avifauna Management Plan must be based on the Avifauna Management Plan in Volume 1, Part B of the planning application and include:

a) a statement of the objectives and overall strategy for managing and mitigating any significant bird strike arising from the wind energy facility operations;

b) a monitoring program of at least two years duration from the commissioning of the last generator including surveys during the breeding season to ascertain:

(i) the presence, behaviour and movements of priority species, being Powerful Owls and Wedge-tailed Eagles, especially breeding pairs in the vicinity of the wind energy facility;

(ii) the species, number, age, sex (if possible) and estimated date of bird strikes;

(iii) bird strike rates at lit versus unlit turbines if aviation safety lighting is installed;

(iv) procedures for the reporting of any bird strikes to the Department of Sustainability and Environment.
strikes affecting the priority species in 19(b)(i) above must be reported to the Department of Sustainability and Environment within 7 days of becoming aware of the strike;

(v) seasonal and yearly variation in the number of birds strikes;

(vi) the efficacy of searches for carcasses of birds, 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; and

(vii) procedures for the regular removal of carrion (including livestock, native animals and pest animals) likely to attract raptors to areas near generators.

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 the species in 19(b)(i) above which would trigger the requirement for responsive mitigation measures to be undertaken by the proponent to the satisfaction of the Minister for Planning;

e) details of any responsive mitigation measures which may be implemented if the trigger mortality for a specified species is exceeded; and

f) a strategy to offset any impacts detected during monitoring in the event that these impacts are considered excessive by the Minister for Planning, to be approved to the satisfaction of the Minister for Planning.

20. Following the completion of the monitoring program in accordance with the Avifauna Management Plan, an Avifauna Monitoring Report must be prepared by the applicant setting out the findings of the monitoring program to the satisfaction of the Minister for Planning.

21. In the event that impacts detected during the two year monitoring program are considered by the Minister for Planning to be ecologically significant, further targeted monitoring and species-specific mitigation measures must be developed in consultation with the Department of Sustainability and Environment and approved by the Minister for Planning. The approved strategy must be implemented to the satisfaction of the Minister for Planning.
NATIVE VEGETATION

22. Before the development starts, a Native Vegetation Management Plan must be prepared to the satisfaction of the Minister for Planning, in consultation with the Department of Sustainability and Environment. The plan must be based on the Native Vegetation Management Plan in Volume 1 Part B of the Application Report dated June 2007. The Native Vegetation Management Plan may be prepared in sections or stages. When approved by the Minister for Planning the plan will be endorsed and will then form part of this permit. The Native Vegetation Management Plan must include a detailed site layout plan showing the locations of scattered native trees and patches of native vegetation where they may be affected by buildings and works. The plan must ‘avoid’ and ‘minimise’ the need for removal of native vegetation in accordance with the principles of Victoria’s Native Vegetation Management – A Framework for Action (DNRE 2002). The Native Vegetation Management Plan must include a Native Vegetation Offset Plan which contains:

a) quantification of native vegetation losses;

b) details of the proposed offsets which will achieve a net gain in quality and quantity of native vegetation;

c) 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;

d) type of offsets to be provided for each location;

e) 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);

f) methods of managing and restoring the vegetation, such as fencing, weed control, enhancement planting and other habitat management actions;

g) pest plant and animal control methods;

h) a statement of the need to source local seed stock and options available for sourcing of local seed;
i) a statement of the need for revegetation works to be carried out by a suitably qualified ecological specialist;

j) methods of permanent protection for the offsets, such as the registration on title of a covenant under section 3A of the Victorian Conservation Trust Act 1972, or an agreement under Section 173 of the Planning and Environment Act 1987, or an agreement under section 69 of the Conservation Forests and Lands Act 1987, or (subject to agreement) transfer of the land to the responsible authority or the Crown;

k) persons responsible for implementing and monitoring the offset plan; and

l) a schedule of offset management actions.

NOISE

23. Except as provided for below in this condition the operation of the wind energy facility must comply with the noise criteria specified in NZS 6808:1998 ‘Acoustics - The Assessment and Measurement of Sound from Wind Turbine Generators’ at any non-participating stakeholder dwelling existing in the vicinity of the wind energy facility at 20 June 2007 when measured by the method specified in that standard. In determining compliance the following shall apply;

a) the sound level from the operating wind energy facility when measured outdoors within 10 metres of any such dwelling shall not exceed the background sound level (Lₚₜ) by more than 5 dBA or a level of 40 dBA Lₚₜ, whichever is the greater. Compliance shall be assessed separately for all-time data and for night-time data. Night time is defined as 10 pm to 7 am; and

b) if the sound has a special audible characteristic the measured sound level shall have a penalty of 5 dB applied.

This condition does not apply at any dwelling existing on land on which one or more turbines of the wind energy facility is located ie. a dwelling on participating landowner’s land, or at an existing dwelling of a non-participating landowner for which an agreement has been reached by which that landowner accepts that noise levels in outdoor areas of the dwelling may exceed the standard. In those cases the operator under the permit must enter into an agreement with the Minister for Planning as the responsible authority and the registered proprietor of the subject land pursuant to Section 173 of the Planning and Environment Act 1987.
24. Before the development commences the holder of this permit shall prepare a detailed proposal to the satisfaction of the Minister for Planning to obtain robust background noise measurements at a selection of non-participating landowner dwellings in the vicinity of the proposed wind farm. If this proposal requires background noise measurements before construction commences those measurements shall be made, and if successful, those results will provide the background noise measurements which shall be submitted to the Minister for Planning for approval.

25. If background noise measurements can only be obtained post-construction that shall be done as soon as possible after commissioning, and if successful, those results will provide the background noise measurements which shall be submitted to the Minister for Planning for approval.

26. If robust background measurements are obtained the acceptable noise limit curve derived from those background noise curves shall provide the references at the relevant dwellings for post-construction compliance testing. If reliable background noise curves can not be obtained, and in the interim until such measurements are made, an acceptable noise limit of 40 dBA L_{50} as a presumptive criterion shall apply across the range of operating wind speeds.

27. A post-construction noise monitoring and compliance assessment program must be undertaken by the operator under the permit. The initial compliance noise monitoring program must commence within two months of the commissioning of the last turbine in the wind energy facility or, if the facility is constructed and commissioned in groups of turbines, separate programs at the dwellings in the vicinity of each group within two months of the commissioning of each group. The monitoring must be carried out in accordance with the method in NZS 6808:1998.

Should one or more wind turbines in the facility not be operating at the time of measurement the operator under the permit shall demonstrate to the satisfaction of the Minister for Planning that that would have an immeasurably small effect on the measured result.

The noise monitoring must be carried out by an independent expert with relevant wind turbine noise experience and, as far as possible the monitoring organisation should be NATA (National Association of Testing Authorities) accredited and the monitoring instruments calibrated by a NATA accredited organisation.

28. The results of the post-construction noise monitoring program(s) of Condition 27 and a statement of compliance or otherwise must be
provided to the Minister for Planning within 45 days of the end of each monitoring program.

29. Should the results show non-compliance the holder of this permit must submit to the Minister for Planning a detailed program to bring the facility into compliance. On approval, that program shall be implemented and on its completion noise monitoring shall be repeated to demonstrate compliance and the results provided to the Minister for Planning within 45 days of the completion of the program.

30. Noise monitoring shall be repeated commencing not less than 10 months and not greater than 12 months after the commencement of the program in Conditions 27 or 29 as applicable. Should that further noise monitoring program demonstrate compliance with the noise criteria no further monitoring shall be required unless otherwise determined by the Minister for Planning.

31. Before the use begins the operator under the permit must prepare a detailed noise complaint evaluation and response plan generally in accordance with the draft Noise Complaint and Evaluation Procedure in Volume 1 Part B Section 10 of the Crowlands Wind Farm planning application to the satisfaction of the Minister for Planning.

BLADE SHADOW FLICKER

32. Shadow flicker from the wind energy facility must not exceed 30 hours per annum at any dwelling existing at 20 June 2007.

The operation of the wind energy facility is not required to comply with this condition at any dwelling on land on which part of the wind energy facility is erected. This exemption will be given affect through an agreement with the landowner that shall apply to any occupant of the dwelling.

33. Before generation of electricity at the wind energy facility commences, details of a complaint evaluation and response process must be submitted to and approved by the Minister for Planning to assess any alleged breach of Condition 32.

TELEVISION AND RADIO RECEPTION AND INTERFERENCE

34. Before the development starts, a Telecommunications Complaint and Evaluation Procedure must be prepared to the satisfaction of the Minister for Planning, in consultation with the Department of Sustainability and Environment. The procedure must be based on the draft
Telecommunications Complaint and Evaluation Procedure in Volume 1 Part B of the planning application dated June 2007. When approved by the Minister for Planning the Procedure will be endorsed and will then form part of this permit. In addition to those elements contained in the Telecommunications Complaint and Evaluation Procedure included in the application, the plan must clarify:

a) the standard area to which the Procedure applies to be 5 km from any turbine;

b) the Procedure recognises complaints about television, radio and mobile phone reception;

c) the ‘valid’ and ‘invalid’ complaint criteria that will be used to evaluate complaints;

d) potential mitigation action for valid complaints;

e) a time limit for resolving complaints;

f) consideration of reception complaints beyond the 5 km zone; and

g) how the endorsed Procedure document will be made available to the public

35. A pre-construction survey must be carried out to the satisfaction of the Minister for Planning to determine television, radio and mobile phone reception strength at selected locations up to 5 km from all wind generators. The location of such monitoring is to be determined by an independent and appropriate monitoring specialist appointed by the operator under this permit.

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, radio or mobile phone reception at any dwelling, business or community facility in the area which existed at the date of the pre-construction survey, a post-construction survey must be carried out at that location.

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 in accordance with the endorsed Telecommunications Complaint and Evaluation Procedure 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.

SECURITY

38. All site and wind generator access points and electrical equipment must be locked and made inaccessible to the general public to the satisfaction of the Minister for Planning. Public safety warning signs must be located on all towers and infrastructure at appropriate locations to the satisfaction of the Minister for Planning.

AVIATION SAFETY CLEARANCES

39. Within 14 days of endorsement by the Minister for Planning, copies of the endorsed plans must be provided to CASA, the Department of Defence and to any organisation responsible for providing air ambulance services in the area, to enable details of the wind energy facility to be shown on aeronautical charts of the area.

PRELIMINARY INVESTIGATIVE WORKS

40. 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.

STAGING

41. 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, and any corresponding obligation arising under this permit (including the preparation and approval of plans) may be similarly completed in stages or parts.

DECOMMISSIONING

42. The wind energy facility operator must, without delay, notify the Minister for Planning in writing as soon as all of the wind generators have permanently ceased to generate electricity. Within 12 months of this date, the wind energy facility operator must undertake the following to the satisfaction of the Minister for Planning within such timeframe as may be specified by the Minister:

a) remove all above ground non-operational equipment;
b) remove and clean up any residual spills;
c) clean up and restore all storage, construction and other areas associated with the use, development and decommissioning of the wind energy facility, if not otherwise useful to the on-going management of the land;
d) restore all access tracks and other areas affected by the project closure or decommissioning, if not otherwise useful to the on-going management of the land;
e) submit a decommissioning traffic management plan to the Minister for Planning and, when approved by the Minister for Planning, implement that plan; and
f) submit a post-decommissioning revegetation management plan to the Minister for Planning and, when approved by the Minister for Planning, implement that plan.

EXPIRY

43. This permit will expire if one of the following circumstances applies:

   (i) the development is not started within 3 years of the date of this permit;

   (ii) the development is not completed within 6 years of the date of this permit.

The Minister for Planning may extend the periods referred to if a request is made in writing before the permit expires, or within three months afterwards.

PERMIT NOTES:

1. A permit under the Water Act 1989 will be required from the relevant Catchment Management Authority for any works deemed to be on a waterway.

2. The movement of Over Dimensional Loads is required to be approved by VicRoads – contact Mr Paul Frost – Team Leader Traffic Safety Services (Tel: 03 5225 2578 or mobile 0417 483 421). Contact should be made from an early date.

3. Prior to commencing work within any declared road reserve the developer must meet the requirements of the Road Management Act 2004 with respect to notifying and seeking consent from VicRoads to undertake works in the road reserve. The ‘consent’ from VicRoads requires the applicant to complete an ‘Application for Consent’ form and submit to VicRoads for approval.
Appendix B: Draft Ararat Planning Permit
ARARAT PLANNING SCHEME - 2007/0562
CROWLANDS WIND ENERGY FACILITY
DRAFT PLANNING PERMIT CONDITIONS

THE FOLLOWING CONDITIONS APPLY TO THIS PERMIT:

DEVELOPMENT PLANS

1. Before the development starts, development plans to the satisfaction of the Minister for Planning must be submitted to and approved by the Minister for Planning. The plans may be submitted for approval in stages or for a particular grouping of wind generators within the site. When approved, the plans will be endorsed by the Minister for Planning and will then form part of this permit. The plans must be drawn to scale with dimensions and three copies must be provided.

The plans must show the location, set backs to property boundaries, layout and dimensions of all on-site buildings and works including all wind generators, access tracks, underground and overhead cables, any temporary concrete batching plants, sub-stations, the terminal yard, operation and maintenance buildings, meteorological masts, landscaping, any designated car parking areas, any signage, and ancillary works, such as construction compounds and water tanks, and off-site road works.

The plans must be generally in accordance with the application plans as identified in the plan titled ‘Crowlands Wind Farm Preferred access tracks, electrical and ancillary infrastructure. Turbine location as exhibited’ dated February 2008 and tabled in the Panel hearing as Exhibit 5 but modified to show:

a) the modified generator development envelopes identified by the green lines on the fifteen 1:5,000 contour maps tabled as Exhibit 38 in the Panel hearing dated February 2008;

b) any necessary adjustment to the layout:
   (i) to ensure that clearing of native vegetation is avoided or minimised;
(ii) to ensure that ground disturbance associated with the construction of the wind energy facility does not adversely impact on drainage lines or areas of heightened erosion risk;

(iii) to ensure that areas of significant fauna habitat identified by a qualified ecologist engaged to inspect site works are avoided;

(iv) to ensure that areas of geomorphological significance are protected;

(v) which includes the proposed location of access tracks to all of the generator locations, the 66 kV substations and the 220 kV terminal yard; and

(vi) to ensure that any indigenous or non-indigenous archaeological site identified by the on-site archaeological survey, and required to be protected, is avoided.

c) global positioning system coordinates for each generator;

d) details of the model and capacity of the wind generators to be installed;

e) the location, size, type and intensity of any aviation lighting including any directional screening as required by Condition 8;

f) details of the location of all electrical cabling associated with the collector network within the wind energy facility;

g) elevations, materials and finishes of the wind generators and other buildings and works;

h) the relocation of generator 14 out of the area of the Pyrenees Planning Scheme Environmental Significance Overlay – Schedule 1 Proclaimed Water Supply Catchments except with the further approval of Central Highlands Region Water Authority;

i) details of any safety signage required for the wind energy facility.

2. The use and development as shown on the endorsed plans must not be altered or modified without the written consent of the Minister for Planning; except that, where a wind generator is located within the modified generator development envelope identified by the green lines on the fifteen 1:5,000 contour maps tabled as Exhibit 38 in the Panel hearing dated February 2008 and annexed to this permit, this will be regarded as generally in accordance with the endorsed plans if the Minister for Planning is satisfied that the relocation will not give rise to a material change to assessed landscape, vegetation, cultural heritage, visual
amenity, shadow flicker, noise or aviation impacts when compared to those of the endorsed plans.

SPECIFICATIONS

3. The wind energy facility must meet the following requirements:

a) the colours and finishes of all other buildings and ancillary equipment must be such as to minimise the impact of the development on landscape to the satisfaction of the Minister for Planning;

b) all wind energy facility infrastructure within the site must be sited, designed and constructed to minimise impacts on overland water flows, soil erosion, the landscape value of the site, environmentally sensitive areas, sites of geomorphological value, cultural heritage and, where appropriate, the farming activities on the land and on the adjoining land to the satisfaction of the Minister for Planning.

LANDSCAPE/VISUAL AMENITY

4. Before any generator is commissioned:

a) a program of voluntary landscape mitigation works to the satisfaction of the Minister for Planning must be made available to the owners of dwellings existing as at 20 June 2007 within 3 kilometres of the nearest generator. If the wind energy facility is developed in stages landscaping should be offered to the owners of dwellings within 3 kilometres of the nearest generator in each stage;

b) as part of that program, an off-site landscaping plan must be prepared in consultation with the landowners specified in Condition 4(a) to the satisfaction of the Minister for Planning for submission to and approval by 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 or other treatments that will be used to reduce the visual impact of the wind generators at the dwellings.

The off-site landscape plan must include:

(i) details of the plant species to be used, including the height and spread of plants at maturity or a description of other works; and

(ii) a timetable for implementation of the landscaping works.
5. The landscaping as shown on the endorsed landscape plans required by Condition 4 must be completed to the satisfaction of the Minister for Planning within 12 months of the completion of the development or any relevant stage of it, or to such other timetable as agreed with the landowner and approved by the Minister for Planning, at the cost of the operator of the wind energy facility.

6. All access tracks associated with the wind farm should, as far as is practicable, be constructed with surface material that will not unduly contrast with the landscape to the satisfaction of the Minister for Planning.

LIGHTING

7. Except in the case of an emergency, no external lighting of infrastructure associated with the wind energy facility, other than low level security lighting may be installed or operated without the further written consent of the Minister for Planning.

TRAFFIC MANAGEMENT

8. Before the development starts a Traffic Management Plan, prepared in consultation with, and to the satisfaction of, VicRoads, the Ararat Rural City, Pyrenees Shire and Northern Grampians Shire Councils must be submitted to and approved by the Minister for Planning.

9. When approved, the plan will be endorsed by the Minister for Planning. The Traffic Management Plan must include those elements identified in the draft Traffic Management Plan in Part B, Volume 1 of the planning application and the following:

   a) an existing conditions survey of public roads in the vicinity of the wind energy facility that may be used for access, including details of the suitability, design and construction standard of such roads;

   b) the designation of appropriate construction and transport vehicle routes to the wind energy facility;

   c) the designation of vehicle access points to the wind energy facility from surrounding roads, including main road access points to local access roads. For access to the site from arterial roads, details of the location, type of culverts/endwalls, angle of the access to road reserve, radius of the bellmouth to suit the length of the vehicle, sealing of access and sight distances must be included for approval by VicRoads;
d) the designation of operating hours and speed limits of vehicles on relevant routes accessing the site so as to avoid the time and routes of passage of school buses, and to provide for resident safety;

e) any necessary pruning of street planting or roadside vegetation to provide for transport of materials to the site, and pruning practices to be followed;

f) the designation of vehicle access ways and car parking areas.

g) the requirements for Over Dimensional Load permits and escorting of long or large loads along roads in the area;

h) the need for road intersection upgrades to accommodate an additional traffic or site access requirements, whether temporary or ongoing;

i) the need for general road and signage upgrades to accommodate additional volumes of traffic;

j) a timetable for implementation of any pre-construction works identified to be undertaken;

k) a timetable for identifying and implementing any post-construction restitution works identified at the completion of construction;

l) a timetable of regular inspections to be carried out during the construction period to identify maintenance works necessary as a result of construction traffic;

m) the use and development must be carried out in accordance with the endorsed Traffic Management Plan and the cost of any works to repair damage and maintain roads are to be at the expense of the permit holder.

Note: Any native vegetation removal required as a result of implementation of the Traffic Management Plan on public road reserves may require separate planning permission.

10. Prior to the commencement of the traffic management works the permit holder must provide evidence to VicRoads that the developer/developer’s contractor has a public liability insurance for at least $10 million for the duration of any proposed works on roads that are under the control or management of VicRoads.
11. Access and egress tracks must be located and constructed in accordance with access track location and design plans which have been prepared in consultation with the Country Fire Authority and which have been submitted to and approved by the Minister for Planning.

12. The layout and construction methods of access tracks must where practical and to the satisfaction of the Minister for Planning:

   a) be sited and designed to minimise impacts on overland water flows, soil erosion, the landscape value of the site, environmentally sensitive areas, sites of geomorphological value and cultural heritage;

   b) minimise the extent to which any tracks (including cut and fill associated with the tracks) is visible from the Pyrenees Highway; and

   c) have addressed any comment on the layout and design of the access tracks provided by the Country Fire Authority.

ENVIRONMENTAL MANAGEMENT PLAN

13. Before the development starts, an Environmental Management Plan must be prepared to the satisfaction of the Minister for Planning, in consultation with the Department of Sustainability and Environment, Pyrenees Shire and Ararat Rural City Councils and other agencies as specified in this condition or as further directed by the Minister for Planning. The Environmental Management Plan must be based on the plans in Volume 1 Part B of the Application Report dated June 2007 and in particular the Construction and Worksite Management Plan, the Land Protection Management Plan, the Historical Sites Cultural Heritage Management Plan, the Pest Management Plan and the Weed Management Plan. The Environmental Management Plan must be submitted to the Minister for Planning for approval. The Environmental Management Plan may be prepared in sections or stages. 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 address the issues in points a to j below:

   a) construction and work site management including:

      (i) the identification of all potential contaminants stored on site;

      (ii) the identification of all construction and operational processes that could potentially lead to water contamination;
(iii) the identification of appropriate storage, construction and operational methods to control any identified contamination risks;
(iv) procedures for pollution management;
(v) the identification of waste re-use, recycling and disposal procedures;
(vi) a management plan for the concrete batching plant(s) to prevent pollution of local waterways particularly from wash water and waste concrete materials;
(vii) appropriate sanitary facilities for construction and maintenance staff;
(viii) the identification of stockpile and storage sites, vehicle/machinery parking areas and set access routes for vehicles to eliminate creation of multiple tracks;
(ix) details as to how hardstand areas and tracks which are not required for the ongoing use of the wind energy facility will be rehabilitated after the construction of the wind energy facility has finished;
(x) procedures for managing construction noise in accordance with the EPA Environmental Guidelines for Major Construction Sites (Bulletin 480) and the EPA Noise Control Guidelines TG302-92.

b) any blasting proposed. This issue must be addressed only if blasting is proposed to be undertaken at the site as part of the construction of the wind energy facility. The Environmental Management Plan must include the following:
(i) name and qualification of the person responsible for blasting;
(ii) a description of the location of where the explosives will be used, and the location of every licensed bore on any property with an adjoining boundary within 1km of the location of the blasting;
(iii) a requirement for the identification and assessment of any potentially sensitive site within 1 km of the location of the blasting, including the procedure for pre-blast and post-blast qualitative measurement or monitoring at such site;
(iv) the procedure for site clearance and post blast reoccupation;
(v) the procedure for the storage and handling of explosives;
(vi) a requirement that blasting only occur after at least 24 hours prior notification in writing of the intention to undertake blasting has been given to all adjoining neighbours of the
proposal with a property boundary within 1 km of the location of the proposed blasting; and

(vii) a requirement that blasting only be undertaken between the hours of 8am and 4pm. No blasting may occur on a Sunday.

c) hydrocarbon and hazardous substances management including:

(i) procedures for any on-site storage of fuels, lubricants or waste oil;

(ii) no hydrocarbons and hazardous substances are to be stored on land within the Environmental Significance Overlay (Schedule 1); and

(iii) contingency measures to ensure that any chemical or oil spills are contained on-site and cleaned up in accordance with Environment Protection Authority requirements.

d) geomorphology management including:

(i) procedures to protect those sites of geomorphological significance identified in the expert evidence statement of Dr Neville Rosengren dated 23 January 2008; and

(ii) procedures to have sites of potential geomorphological significance revealed during excavation evaluated and protected if necessary.

e) non-indigenous heritage and archaeology management including:

(i) procedures to ensure that before any buildings or works commence in association with the development, the identified non-Aboriginal heritage locations identified in the report titled 'Report on Preliminary Cultural Heritage Investigation' written by Dr Heather Builth dated April 2007, must be protected from any buildings and works in accordance with the recommendations contained in that report;

(ii) a survey conducted by a qualified archaeologist which locates, records and assesses non-indigenous archaeological places and objects on those parts of the site which have the potential to be affected by the wind energy facility. This must include land that may be disturbed by associated works such as generator footings, access tracks, buildings, services and/or possible erosion arising from such works;

(iii) protocols for construction activities which have the potential to affect sites identified by the survey in Condition 16(e)(ii); and

(iv) protocols for protecting and reporting the discovery of any human remains in accordance with the requirements of the
Victoria Police, the Victorian State Coroners Office and Aboriginal Affairs Victoria.

f) pest animal management. This section of the Environmental Management Plan must be prepared in consultation with the Department of Sustainability and Environment and the Department of Primary Industries. It must include:
   (i) procedures to control and prevent the spread of pest animals, particularly by negating opportunities for the sheltering of pests;
   (ii) a protocol and procedures to prevent the importation of the grape vine pest Phylloxera to the area; and
   (iii) follow-up pest animal control for all areas disturbed by the wind energy facility construction works for a period of two years following the completion of constructing the wind energy facility or, if the facility is developed in stages, within two years following completion of that stage.

g) pest plant management. This section of the Environmental Management Plan must be prepared in consultation with the Department of Primary Industries. It must include:
   (i) procedures to prevent the spread of weeds and pathogens to and from the site 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 plant species as appropriate to the location; and
   (iii) that follow-up weed control is undertaken on all areas disturbed through construction of the wind energy facility for a minimum period of two years following constructing the wind energy facility or, if the facility is developed in stages, within two years following completion of that stage.

h) sediment, erosion and water quality management including:
   (i) incorporation of control measures outlined in Environment Protection Authority publication No. 480 Environmental Guidelines for Major Construction Sites;
   (ii) procedures to ensure that silt from batters, cut-off drains, table drains and road works is retained on the works site during and after the construction stage of the project. 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. Stockpiles must be located away from drainage lines and in locations which minimise their visibility from the Pyrenees Highway;

(iii) procedures to contain any contaminated or turbid run-off during and after construction of the wind energy facility;

(iv) procedures to suppress dust arising from construction-related activities. Appropriate measures may include water spraying of roads and stockpiles, stabilising surfaces, temporary screening and/or wind fences, modifying construction activities during periods of heightened winds and revegetating exposed areas as soon as practicable;

(v) procedures to ensure that steep batters are treated in accordance with Environment Protection Authority recommendations detailed in the ‘Construction Techniques for Sediment Pollution Control’ No 275, May 1991;

(vi) procedures for managing and discharging waste water;

(vii) the installation of geotextile silt fences (with sedimentation basins where appropriate) on all drainage lines from the site which are likely to receive run-off from disturbed areas;

(viii) criteria for the siting of any temporary concrete batching plant(s) associated with the development of the wind energy facility and the procedure for its removal and reinstatement of the site once its use finishes. The establishment and operation of any temporary concrete batching plant must be in accordance with the Environment Protection Authority’s Environmental Guidelines for the Concrete Batching Industry, Publication No. 628;

(ix) a process for overland flow management to prevent the concentration and diversion of waters onto the site or erosion prone slopes;

(x) pollution management measures for management of stored and stockpiled materials including waste materials, litter and any other potential source of water pollution; and

(xi) siting of concrete batching plant and any on-site wastewater treatment and disposal fields at least 100 metres from any watercourse.

i) A training program for construction workers and permanent employees or 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) A program for monitoring and reporting including a register of environmental incidents, non-conformances, complaints and corrective actions.

k) A timetable for implementation of all programs and works identified in the Environmental Management Plan.

14. The Environmental Management Plan must be reviewed and if necessary amended in consultation with the Pyrenees Shire and Ararat Rural City Councils to the satisfaction of the Minister for Planning every 5 years from the date of approval to reflect completion of many of the elements, operational experience and changes in environmental management standards and techniques. The revised plan must be submitted to the Minister for Planning for approval.

15. The use and development must be carried out in accordance with the endorsed Environmental Management Plan.

CROWN LAND

16. Before the development starts, the applicant must provide written agreement, to the Department of Sustainability and Environment, to become the Responsible Road Authority under the Road Management Act 2004 for the life of the wind farm, in respect to any access roads which will traverse Crown land and are not within a gazetted Government road reserve.

17. Prior to commencing the construction or upgrade of any access roads or other infrastructure on Crown land which is not a gazetted Government road reserve, the applicant must:

a) meet any requirements resulting from the notification of this proposal under the Native Title Act 1993 (Commonwealth);

b) obtain the written consent of the Department of Sustainability and Environment.

WILDFIRE AND EMERGENCY RESPONSE

18. A Wildfire Prevention and Emergency Response Plan must be prepared in consultation with and to the satisfaction of the Country Fire Authority, the Department of Sustainability and Environment, and the Pyrenees Shire and Ararat Rural City Councils. This plan must include:
a) criteria for the provision of static water supply tanks or dams for fire fighting purposes, including minimum capacities, appropriate connections and signage;

b) criteria for access to designated water supply sources for fire fighting vehicles;

c) procedures for vegetation management, fuel control and the provision of fire fighting equipment during declared fire danger periods; and

d) the facilitation by the operator, before or within 3 months after the commencement of the operation of any part of the wind energy facility, of a familiarisation visit to the site and explanation of emergency services procedures for the Country Fire Authority, Rural Ambulance Victoria, Pyrenees Shire and Ararat Rural City Councils Municipal Emergency Management Committee and Victoria Police.

NATIVE VEGETATION

19. Before the development starts, a Native Vegetation Management Plan must be prepared to the satisfaction of the Minister for Planning, in consultation with the Department of Sustainability and Environment. The plan must be based on the Native Vegetation Management Plan in Volume 1 Part B of the Application Report dated June 2007. The Native Vegetation Management Plan may be prepared in sections or stages. When approved by the Minister for Planning the plan will be endorsed and will then form part of this permit. The Native Vegetation Management Plan must include a detailed site layout plan showing the locations of scattered native trees and patches of native vegetation where they may be affected by buildings and works. The plan must ‘avoid’ and ‘minimise’ the need for removal of native vegetation in accordance with the principles of Victoria’s Native Vegetation Management – A Framework for Action’ (DNRE 2002). The Native Vegetation Management Plan must include a Native Vegetation Offset Plan which contains:

a) quantification of native vegetation losses;

b) details of the proposed offsets which will achieve a net gain in quality and quantity of native vegetation;

and

c) 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;

d) type of offsets to be provided for each location;

e) 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);

f) methods of managing and restoring the vegetation, such as fencing, weed control, enhancement planting and other habitat management actions;

g) pest plant and animal control methods;

h) a statement of the need to source local seed stock and options available for sourcing of local seed;

i) a statement of the need for revegetation works to be carried out by a suitably qualified ecological specialist;

j) methods of permanent protection for the offsets, such as the registration on title of a covenant under section 3A of the Victorian Conservation Trust Act 1972, or an agreement under Section 173 of the Planning and Environment Act 1987, or an agreement under section 69 of the Conservation Forests and Lands Act 1987, or (subject to agreement) transfer of the land to the responsible authority or the Crown;

k) persons responsible for implementing and monitoring the offset plan; and

l) a schedule of offset management actions.

SECURITY

20. All site and wind generator access points and electrical equipment must be locked and made inaccessible to the general public to the satisfaction of the Minister for Planning. Public safety warning signs must be located on all towers and infrastructure at appropriate locations to the satisfaction of the Minister for Planning.
PRELIMINARY INVESTIGATIVE WORKS

21. 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.

STAGING

22. 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, and any corresponding obligation arising under this permit (including the preparation and approval of plans) may be similarly completed in stages or parts.

DECOMMISSIONING

23. The wind energy facility operator must, without delay, notify the Minister for Planning in writing as soon as all of the wind generators have permanently ceased to generate electricity. Within 12 months of this date, the wind energy facility operator must undertake the following to the satisfaction of the Minister for Planning within such timeframe as may be specified by the Minister:

a) remove all above ground non-operational equipment;

b) remove and clean up any residual spills;

c) clean up and restore all storage, construction and other areas associated with the use, development and decommissioning of the wind energy facility, if not otherwise useful to the on-going management of the land;

d) restore all access tracks and other areas affected by the project closure or decommissioning, if not otherwise useful to the on-going management of the land;

e) submit a decommissioning traffic management plan to the Minister for Planning and, when approved by the Minister for Planning, implement that plan; and
f) submit a post-decommissioning revegetation management plan to the Minister for Planning and, when approved by the Minister for Planning, implement that plan.

EXPIRY

24. This permit will expire if one of the following circumstances applies:

(i) the development is not started within 3 years of the date of this permit;

(ii) the development is not completed within 6 years of the date of this permit.

The Minister for Planning may extend the periods referred to if a request is made in writing before the permit expires, or within three months afterwards.

PERMIT NOTES:

1. A permit under the Water Act 1989 will be required from the relevant Catchment Management Authority for any works deemed to be on a waterway.

2. The movement of Over Dimensional Loads is required to be approved by VicRoads – contact Mr Paul Frost – Team Leader Traffic Safety Services (Tel: 03 5225 2578 or mobile 0417 483 421). Contact should be made from an early date.

3. Prior to commencing work within any declared road reserve the developer must meet the requirements of the Road Management Act 2004 with respect to notifying and seeking consent from VicRoads to undertake works in the road reserve. The ‘consent’ from VicRoads requires the applicant to complete an ‘Application for Consent’ form and submit to VicRoads for approval.
# Appendix C: List of Tabled Documents

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