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15 August 2016

Michael Juttner
Senior Planner
Department of Environment, Land, Water and Planning (DELWP)
8 Nicholson Street
East Melbourne 3002

By email: michael.juttner@delwp.vic.gov.au;
Cc: james.kirby@delwp.vic.gov.au

Dear Mr Juttner

Lal Lal Wind Farm Permit PL –SP/05/0461
Permit Amendment Application
Amendment to the application after notice of application is given

1. Introduction

Jacobs Group Australia (Jacobs) are acting on behalf of WestWind Energy Pty Ltd (WestWind) in relation to the above matter.

I refer to the above planning permit for the Lal Lal Wind Farm, issued by the Minister for Planning on 30 April 2009. I also refer to WestWind's application to amend planning permit PL-SP/05/0461 (the planning permit) which was submitted on the 13 February 2015 and subsequently amended on the 23 June 2015, 21 and 30 October 2015 (Amendment Application).

In light of the difficulties in making minor amendments to wind farm permits issued by the Minister for Planning, WestWind are proposing further, final amendments to its application to amend the planning permit. These amendments to the application are being made in accordance with section 57A of the *Planning and Environment Act 1987* (the Act) as they are proposed after notice has been given under section 52.

WestWind have advised that owners of the subject land have been informed of this final amendment to the permit amendment application.

2. Amendments

In addition to the permit amendments and corrections already sought by the Amendment Application, WestWind is now seeking to:

- delete turbine YSWT-37 from the Yendon Section and reinstate YSWT-31, which was initially proposed to be deleted in the Amendment Application;
- re-position wind turbine ESWT02, 150 metres to the south of its approved location;
- remove a restriction limiting the height of the wind turbine hub above foundation level;
- replacing the rotor diameter restriction with a limit on the lowest point of the sweep of the rotor;

- clarify that the Minister for Planning is the responsible authority for various matters to be done to the satisfaction of the responsible authority;
- clarify that wind turbines should not be located within 50 metres of a non-host dwelling's title boundary;
- correct spelling mistakes in the planning permit;
- require off-site landscaping to be made available to the owners of dwellings within 4km of wind turbines; and
- remove reference to 'shadow flicker detection devices' from the proposed Amendment Application, as this condition is no longer required.

The latest amendments to the planning permit are highlighted yellow in the draft planning permit contained within Attachment A. For the avoidance of doubt, **this draft planning permit supersedes all other previous draft permits submitted** in support of the planning permit amendment.

This application is not proposing to submit plans for endorsement as future development plans will be generally in accordance with the plans referred to in Condition 1 of the permit. For reference, the plans referred to in Condition 1 are contained within Attachment B.

The final changes are discussed in further detail below.

3. Discussion and Rationale

3.1 Deletion of turbine YSWT-37 (Yendon Section)

WestWind is proposing to delete turbine YSWT-37 from the approved layout and reinstate YSWT-31. This change is illustrated in Figure 1 below.

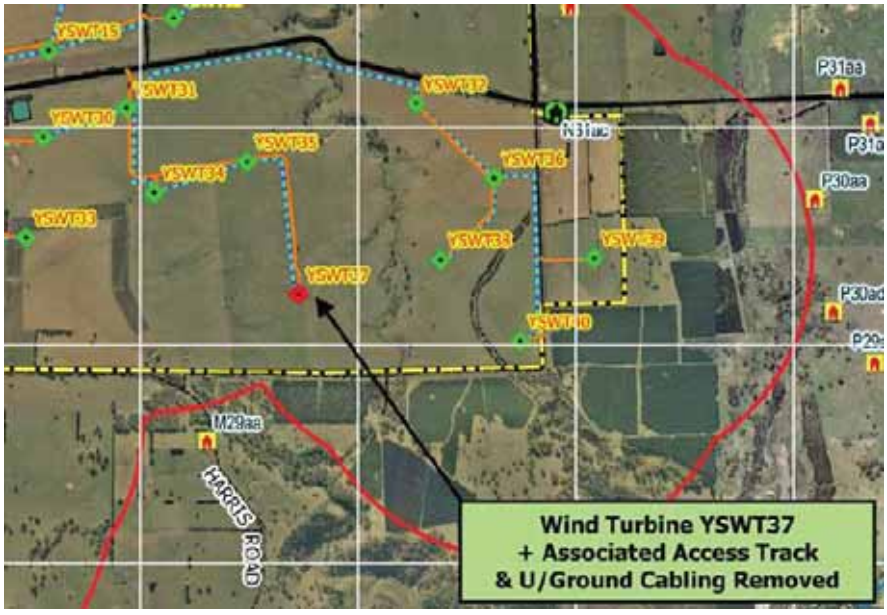

Figure 1 – Proposed removal of YSWT-31.

15 August 2016

The February 2015 permit amendment request sought to change Condition 1 of the permit to delete YSWT-31 from the project. This final amendment request simply changes draft Condition 1(k) by nominating YSWT-37 for deletion, rather than YSWT-31.

Turbine YSWT-31 is centrally located within the Yendon Section and is surrounded by wind turbines in all directions. Reinstating this turbine location will have no detrimental impact on the amenity experienced at surrounding residences.

Turbine YSWT-37 is located to the south of the Yendon Section. In its current location the turbine is 790 metres from neighbouring dwelling M29aa. Removing YSWT-37 will save in the construction of approximately 800 metres of access track and underground trenching respectively.

The removal of YSWT-37 (rather than YSWT-31) provides a better planning outcome as the potential impacts on dwelling M29aa are reduced, particularly with regard to noise and visual impacts.

As detailed below, this proposed change in layout complies with the requirements of the *Policy and Planning Guidelines for Wind Energy Facilities* (the Guidelines).

3.2 Wind turbine ESWT02.

Turbine ESWT02 is located in the north western corner of the Elaine Section of the wind farm. WestWind proposes to move this wind turbine 150 metres south of its approved location.

Figure 2 below illustrates the approved and the now proposed location of ESWT02.

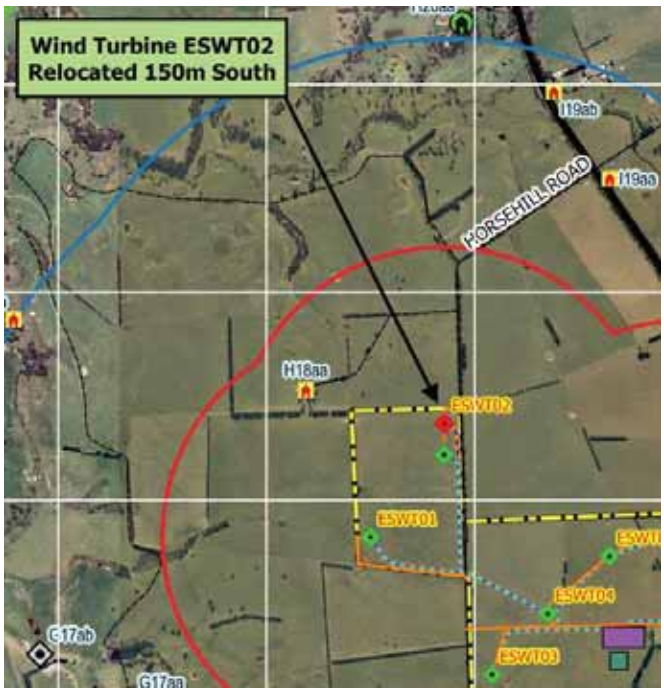

Figure 2 – Relocation of ESWT02

Moving this turbine to the south will ensure that the revised layout of the wind farm is fully compliant with the shadow flicker requirements of the Guidelines. Under the previous wind farm layout, a predicted exceedance of the maximum of 30 hours per annum of shadow flicker was occurring at dwelling H18aa. By moving this turbine, there is no longer a predicted exceedance

at this dwelling. This has been confirmed by the revised shadow flicker assessment completed by GHD. A copy of this assessment is located in Attachment C.

Neighbour consents are not required under clause 52.32-3 of the Moorabool Planning Scheme for this turbine relocation. This is because repositioning ESWT02 does not move the turbine closer to any existing dwellings within 1 kilometre of its new location. In addition, the permit condition introducing shadow flicker devices that was previously proposed as part of the Amendment Application is no longer required. This is discussed in section 3.7 below.

To facilitate this additional change, Condition 1(l) will be introduced and will read:

- *The re-positioning of wind turbine ESWT02 150 metres to the south of its approved location.*

3.3 Replacing the hub height and the rotor diameter restriction

3.3.1 Background

On 13 February 2015, when the permit amendment application was first lodged, WestWind sought to remove conditions restricting tower height and rotor diameter. The rationale for this change was to rely on the tip height of the rotor as the key parameter and to allow maximum flexibility to enable a number of wind turbines makes, models and configurations to be considered and potentially used at the Lal Lal Wind Farm.

Following the 13 February 2015 permit amendment application, DELWP outlined a preference for the changes sought (should they be approved) to be implemented by maintaining the existing conditions and increasing the rotor diameter and hub height. In response, WestWind clarified their amendment to:

- increase the maximum hub height from 85 metres to 105 metres; and
- increase the maximum rotor diameter from 95 metres to 122 metres.

Since then, WestWind has identified that the above rotor diameter limitation continues to restrict the types of wind turbine configurations that could be used. Accordingly, WestWind is reverting to the intent of its original amendment request of removing the restriction on rotor diameter whilst maintaining the maximum turbine height of 161 metres.

To facilitate the change in the planning permit, WestWind proposes to specify a minimum lower rotor limit. Figure 3 below illustrates the proposed change.

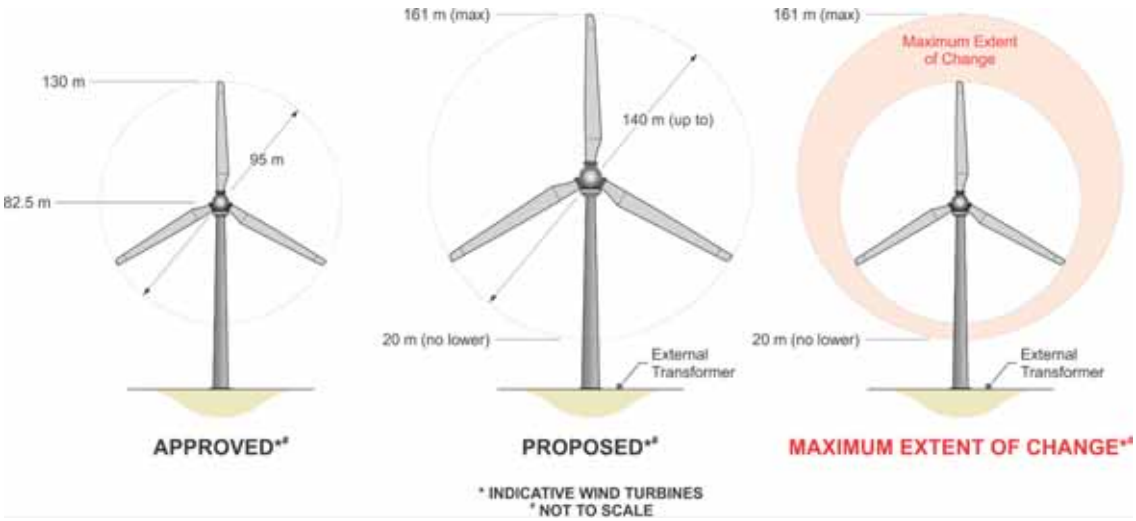

Figure 3 – Approved and proposed parameters and the extent of change.

As illustrated above, WestWind is seeking flexibility for the rotor diameter and hub height. The final hub height and rotor diameter will fit within a proposed envelope capped at a maximum height of 161 metres and at a point no lower than 20 metres above the ground.

With a maximum height of 161 metres and a lower tip height of no less than 20 metres above the ground, the maximum permissible rotor blade diameter would be in the order of 140 metres. Accordingly, the relevant assessments were revised to consider the potential for impact of this 'worst case' rotor diameter.

It is worth noting that under the current planning permit there is no lower restriction on the rotor sweep.

3.3.2 Shadow flicker

The shadow flicker assessment was revised by GHD. The revised shadow flicker assessment uses a 'Senvion 3.4M140' as a candidate turbine. The turbine configuration has a rotor diameter of 140 metres and a tip height of 161 metres. The assessment found that the amendment would comply with the shadow flicker requirements of the Guidelines if a maximum rotor diameter of 140 metres was used with a tip height of 161 metres.

3.3.3 Acoustics

Marshall Day Acoustics (Marshall Day) has also considered a maximum rotor diameter of 140 metres in their revised noise assessment. Like GHD, Marshall Day has used the Senvion 3.4M140 in their revised assessment along with the Senvion 3.2M114 and the Senvion 3.4M122.

The assessed candidate turbines comply for all dwellings to which the New Zealand Standard 6808:201 (Standard) applies under permit condition 23. Participating landholders with a written noise agreement in place are exempt from the application of the Standard. One of the three

assessed turbines (Senvion 3.4M122) has a minor exceedance of the ETSU-R-97 base noise limit[1] for a participating landholder property at J17aa.

The Marshall Day assessment demonstrates that candidate wind turbines suited to the proposed Amended Application will comply with the Guidelines. Marshall Day's revised noise assessment is located in Attachment D.

3.3.4 Landscape and visual amenity

The overall tip height of 161 metres is the key parameter in determining the landscape and visual impacts. The overall tip height determines the 'zone of visual influence' and the impacts have been assessed accordingly. Xurban has prepared two additional photomontages to illustrate the difference between the approved wind turbines parameters and an increase in height to 161 metres and a maximum rotor of 140 metres. The photomontages are located in Attachment E and one viewpoint is discussed in Figures 4, 5 and 6 below.

The additional photomontages demonstrate that the change to the height and diameter of the proposed wind turbines has a 'negligible' impact on views when compared to the approved turbine specifications. Negligible was defined in the Landscape and Visual Impact Assessment dated 29 April 2016 as a 'minute level of effect that is barely discernible over ordinary day-to-day effects'. As illustrated in the photomontages, the further changes do not increase the visual impact of the wind farm in the landscape.

Figure 4 below (prepared by ERM) shows a photomontage of wind turbines which sit within the turbine specifications that are currently approved by the existing planning permit.

Figure 5 shows a photomontage (prepared by ERM) illustrating the changes sought by the original (February 2015) planning permit amendment application. This is the photomontage which was available for viewing during the public notice period.

Figure 6 shows a photomontage (prepared by XUrban) of turbines as they are currently proposed by this post notice amendment, if the maximum parameters of a height of 161 metres and a rotor diameter of 140 metres were to be constructed.

Figure 4 – Approved.

[1] This base noise limit is provided in the Marshall Day report for informative purposes and is consistent with recommendations from the final report by *The European Working Group on Noise from Wind Turbines*.

Photomontage of 161m high wind turbines (Amended Layout - 2015)

Figure 5 – Amendment application

Photomontage of proposed layout 161m high, 140m diameter

Figure 6 – Variation to the Amendment application

3.3.5 Avifauna

The change in height of the wind turbines up to 161 metres was initially addressed in the letter of Brett Lane and Associates (BLA) dated 5 April 2016 (attached to the Jacobs Response to Objectors dated 6 May 2016). BLA observed that during bird utilisation surveys carried out on the site, no birds were seen flying over 120 metres high (although raptors are likely to fly at such heights). Whilst the change in height may increase the potential for interaction with some bird species who fly at this height, these are common species. Moreover, BLA advised that the potential for increased interaction is not likely to have a significant impact on their populations.

BLA have since assessed the impacts on birds and bats of the proposed further modifications and have considered the largest turbine model currently under consideration. This model has a rotor diameter of 140 metres, with the lowest point of the swept path located 21 metres above natural ground level.

In their revised assessment dated 15 August 2016, BLA advised that placing the Rotor Swept Area (RSA) between 21 and 161 metres above the ground would result in an increase in the number of bird and bat flights that are potentially at risk when compared to the original planning permit. However, BLA explained that the increase in 'at risk' flights does not represent an impact of conservation concern as rare and threatened species are not affected. Earlier studies confirm that none of the bird or bat species on the wind farm site are listed as rare or threatened species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the *Flora and Fauna Guarantee Act 1988*.

In addition, BLA advised that the revised layout changes will not result in any noticeable difference in bird and bat collision risk. The habitat type for the revised turbine locations is consistent with that described in BLA's previous assessment, with the site being characterised by common native birds and bats and introduced pest bird species adapted to intensively farmed agricultural landscapes.

The revised BLA assessment is located in Attachment F.

3.3.6 Proposed condition change

To facilitate this additional change in rotor diameter, Condition 2(c) of the permit is proposed to be amended to remove reference to a hub height and read:

- *The wind turbines must be mounted on a tubular steel and/or concrete towers.*

Condition 2(d) is proposed to read:

- *The lowest point of the sweep of the rotor blade tip must not be less than 20 metres above ground level at the turbine base and must not be altered or modified without the written consent of the Minister for Planning.*

The proposed wording of Condition 2(d) is consistent with the approach taken by DELWP when approving more recent wind farm permits.

It should also be noted that rotor diameter restrictions are not included on the planning permits for the following wind farm permits:

- Dundonnell Wind Farm;
- Moorabool Wind Farm;
- Cherry Tree Wind Farm; and
- Bulgana Wind Farm.

The recently approved Dundonnell Wind Farm also has a lower swept path of 23 metres specified. This is a measure to protect the local Brolga population. Importantly, Brolga and other significant (EPBC Act and FFG Act) bird and bat species are not present within either sections of the Lal Lal Wind Farm and bat habitat does not exist in the Elaine Section.

There is no lower restriction on rotor sweep on the current planning permit for Lal Lal Wind Farm. In other words, under the current permit a shorter tower could be erected resulting in a lower sweep below at or below 20 metres above natural ground level.

3.4 Minister for Planning is the responsible authority

The existing planning permit was approved by the Minister for Planning under Division 6 of Part 4 of the Act. The Minister for Planning is also the responsible authority for determining extensions of time, amendments to the planning permit and a number of other matters are required to be done to the Minister for Planning's satisfaction where specified by a permit condition.

The planning permit specifies Moorabool Shire Council as the responsible authority for the administration and enforcement of this permit.

The draft planning permit has been amended to clarify the respective roles of the Minister for Planning and the Council. These changes will assist DELWP, Council and the proponent in the preparation of the relevant secondary consents and in enforcing the planning permit.

To implement this change, the draft planning permit has been amended to replace the term 'responsible authority' with 'the Minister for Planning' in some instances.

3.5 Wind turbines within 50m of a title boundary

The words 'non-host' landholders are now proposed to be included in Condition 4(iii). This change most likely addresses an oversight in the drafting of the planning permit condition.

There are a significant number of title boundaries within the wind farm site. It is onerous to restrict the location of wind turbines in such a manner on land owned by landholders directly benefiting from wind turbine leases. Additionally, title boundaries may also change in the future resulting in confusion as to compliance with the planning permit.

The 50 metre setback remains for properties adjoining the wind farm boundary.

3.6 Offsite landscaping

The potential impact of the original permit amendment on landscape and visual impact was considered by XUrban in the Landscape and Visual Assessment Review dated 29 April 2016 (attached to the Jacobs Response to Objectors dated 6 May 2016).

XUrban assessed the height increase and noted that the increase in proposed turbine height to 161 metres would also result in the distance where wind turbines are 'highly visible and will usually dominate the landscape' extending from 1.5 - 3 kilometres as originally permitted to a distance of 1.8 - 3.6 kilometres.

XUrban's revised assessment recommends:

- *that landscape mitigation be offered to all residential properties that have a wind turbine within 4 km of their residence where wind turbines are visible. This distance is greater than the 3.6km band but recognises that the area around the house or farm sheds may extend the sensitive areas on a property*

Xurban's letter dated 11 August 2016 confirms that the above recommendation is unaffected by the proposed changes to the rotor diameter.

Accordingly, Condition 12(a) is proposed to be amended from requiring offsite landscaping from 3 kilometre to 4 kilometres.

3.7 Shadow flicker condition

As indicated above, the proposed layout and the proposed maximum rotor diameter of 140 metres fully complies with the shadow flicker requirements of the Guidelines.

While the onus on 'how' to comply with the shadow flicker requirements has always fallen to the permit holder, DELWP had sought additional comfort that shadow flicker requirements would be met. Accordingly, WestWind agreed to reference shadow flicker devices directly within the permit condition.

With the revised layout change, proposed Condition 21 no longer needs to refer to the use of 'shadow flicker detection devices.' Proposed Condition 21 now reads:

- *Shadow flicker from the wind energy facility must not exceed 30 hours per annum at any dwelling existing as at the date of this permit to the satisfaction of the Minister for Planning.*

Any dwelling may be exempt from this condition. This exemption will be given effect through a written agreement with the landowner of the dwelling and evidence of the agreement must be provided to the satisfaction of the Minister for Planning.

4. Amending the application after notice

Section 57A of the Act enables an applicant to ask the responsible authority to amend an application after notice of the application is given under section 52, if the proposed amendments are not so substantial as to warrant a new application.

As a Division 6 permit which is being amended, the responsible authority is the Minister for Planning. It is clear from the above discussion and the revised draft planning permit that the final amended changes are not substantial and do not warrant a new application.

Section 57A(7)(b) states that:

- *all objections made in relation to the original application are to be taken to be objections to the amended application.*

In other words, objections to the original permit amendment 'carry over' and become objectors to this final amendment application.

4.1 Additional notice

Section 57A(9) states that:

- *Sections 52 and 55 do not apply to an amended application.*

Accordingly, the standard referral requirements and notice provisions (including the requirement to give notice to a municipality) are not applicable to this further amendment. However, section 57B of the Act requires the responsible authority to determine:

a) whether and to whom notice should be given in respect of the amended application; and

b) if notice is to be given, the nature and extent of that notice.

Section 57B(2) of the Act states:

- *In determining whether or not notice should be given of an amended application, the responsible authority must consider whether, as a result of the amendments made to the application, the grant of the permit would cause material detriment to any person.*

To be a 'material' detriment for the purposes of the Act, the detriment must be 'real as distinct from fanciful' but a 'minor' detriment will suffice.

Extensive public notice has been provided for the amended planning permit. The proponent was directed to give notice of the Amendment Application by way of:

- Direct mail to owners and occupiers within 1km of the proposed wind farm
- Direct mail to:
  - Moorabool Shire Council
  - Civil Aviation Safety Authority
  - Corangamite Catchment Management Authority

  - Country Fire Authority – Grampians Region
  - DELWP - Grampians Region
  - Environment Protection Authority
  - Office of Aboriginal Affairs Victoria
  - Parks Victoria
  - VicRoads
- Notices in the Ballarat Courier and Moorabool News
- Erection of notices at the Railway Hotel (Elaine), Lal Lal Falls Hotel (Lal Lal) and the Bungaree Community Centre.

After considering this final application to amend the permit in the context of Section 57B(2), DELWP on behalf of the Minister for Planning will decide on whether this amendment to the current Amendment Application warrants additional public notice.

WestWind supports the Panel's Direction that 'all submitters to the current panel process are to be notified of the proposed variations' and will make a copy of this application and its supporting documents available on its website.

5. No additional impact

WestWind submits that the proposed final changes, when viewed in the context of what was put on notice, are insignificant. This is on the basis that those in the immediate vicinity of the wind farm would not be subject to any greater impacts than those presented in the earlier Amendment Application of which they have already been informed. Similarly, there would be no impact on any rare or threatened species of birds or bats. These conclusions are supported by the further expert assessments outlined above.

In relation to the change in allowable rotor, it should be noted that the final changes to the planning permit do not alter the overall turbine height of 161 metres. Accordingly, the potential for a larger rotor does not change the 'zone of visual influence' any more than the original amendment. Additionally, the approved permit does not specify a minimum lowest point for the swept path of the rotor blade.

The proposed changes in turbine layout are minor and when modelled result in a now fully compliant layout with regard to noise and shadow flicker. In addition, the revised layout includes the removal of an approved turbine located 790 metres from a neighbouring dwelling.

The revised assessment by BLA confirms that neither the potential for a lower rotor nor the revised layout will change the impacts of the project on any threatened avifauna species.

6. Conclusion

The latest proposed changes to the planning permit are logical improvements to the approved Lal Lal Wind Farm.

15 August 2016

The proposed changes give effect to the Moorabool Planning Scheme and demonstrate that compliance with the Guidelines can be achieved.

Phil Burn
Senior Consultant - Environment and Planning

15 August 2016

Attachment A
Draft Planning Permit

Planning and Environment Regulations 2005 Form 11
Section 97F
PLANNING PERMIT GRANTED BY THE MINISTER UNDER
DIVISION 6 OF PART 4 OF THE PLANNING AND ENVIRONMENT ACT 1987

PLANNING PERMIT

Permit No.:PL-SP/05/0461

Planning Scheme: Moorabool Planning Scheme

Responsible Authority for Administration and Enforcement of this Permit: Moorabool Shire Council

ADDRESS OF THE LAND:

Land in Yendon, described as:
Volume 3393 Folio 558 - Lots 1,2,3,4,5 and 6 on title plan 899344L (formerly known as part of Crown Allotment 15, part of Crown Allotment 16, part of Crown Allotment 17, part of Crown Allotment 43, Crown Allotments 44 and 47, Parish of Buninyong);
Volume 4801 Folio 184 – Crown Allotment 16A Parish of Buninyong;
Volume 10242 Folio 563 Crown Allotment 1 Section 9 Parish of Lal Lal;
Volume 10242 Folio 564 Crown Allotment 2 Section 9 Parish of Lal Lal;
Volume 10242 Folio 565 Crown Allotment 3 Section 9 Parish of Lal Lal;
Volume 10242 Folio 566 Crown Allotment 1 Section 6 Parish of Lal Lal;
Volume 10242 Folio 567 Crown Allotment 2 Section 6 Parish of Lal Lal;
Volume 10242 Folio 568 Section 3 Parish of Lal Lal;
Volume 10242 Folio 569 Portion 7 Parish of Lal Lal ;
Volume 10514 Folio 926 Lot 1 on title plan 017451J (formerly known as Section 5 Parish of Kerrit Bareet);
Volume 10514 Folio 927 Section 6 Parish of Kerrit Bareet;
Volume 10514 Folio 928 Section 41 Parish of Kerrit Bareet;
Volume 10514 Folio 929 Section 42 Parish of Kerrit Bareet;
Volume 10514 Folio 930 Section 43 Parish of Kerrit Bareet;
Volume 10514 Folio 931 Crown Allotment 1 Section 2 Parish of Lal Lal ;
Volume 10514 Folio 932 Crown Allotment 2 Section 2 Parish of Lal Lal ;
Volume 10514 Folio 933 Crown Allotment 3 Section 2 Parish of Lal Lal ;
Volume 10514 Folio 934 Crown Allotment 4 Section 2 Parish of Lal Lal ;
Volume 10514 Folio 935 Crown Allotment 1 Section 4 Parish of Lal Lal ;
Volume 10514 Folio 936 Crown Allotment 2 Section 4 Parish of Lal Lal ;
Volume 10514 Folio 937 Crown Allotment 3 Section 4 Parish of Lal Lal ;
Volume 10514 Folio 938 Crown Allotment 1 Section 5 Parish of Lal Lal ;
Volume 10514 Folio 939 Crown Allotment 2 Section 5 Parish of Lal Lal;
Volume 10537 Folio 552 Crown Allotment 8 Parish of Kerrit Bareet;
Volume 10537 Folio 553 Crown Allotment 7 Parish of Kerrit Bareet;
Volume 10537 Folio 554 Crown Allotment 8A Parish of Kerrit Bareet;
Volume 06772 Folio 368 Crown Allotments 48A, 48B, 49A, and 49B Parish of Kerrit Bareet;
Volume 09739 Folio 012 Crown Allotments 48A, 48B, 49A, and 49B Parish of Kerrit Bareet;
Crown Allotment 24B Section 6A Parish of Buninyong;
Crown Allotment 43A Section 6A Parish of Buninyong
Closed road between Powerline Lane and Yendon-Egerton Road (granted in lieu of land acquired from Mr Archibold Fiken for new road);
Crown land vested in Council for Harris Road, Spreadeagle Road, Duggans Lane, McIntoshs Road and Portland Flat Road.
Crown Land vested in Council for Yendon-Egerton Road.

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Planning and Environment Regulations 2005 Form 11
Section 97F
PLANNING PERMIT GRANTED BY THE MINISTER UNDER
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Land in Elaine, described as:
Volume 01705 Folio 980 Crown Allotments 45 and 45A Parish of Narmbool;
Volume 07646 Folio 037 Crown Allotments 46 and 48 Parish of Narmbool;
Volume 01030 Folio 934 Crown Allotment 47 Parish of Narmbool;
Volume 05217 Folio 381 Crown Allotments 15A and 16A Parish of Narmbool;
Volume 00998 Folio 594 Crown Allotment 1A Parish of Narmbool;
Volume 01342 Folio 274 Crown Allotment 1B Parish of Narmbool;
Volume 00424 Folio 612 Crown Allotment 41A Parish of Narmbool;
Volume 01522 Folio 355 Crown Allotment 41H Parish of Narmbool;
Volume 08530 Folio 949 Crown Allotment 11B Parish of Narmbool;
Volume 08955 Folio 515 Lot 1 Title Plan TP439919D;
Volume 08774 Folio 991 Crown Allotments 2A, 2B, 3A and 3B Parish of Narmbool;
Volume 04214 Folio 731 Crown Allotments 41, 42, 42A, 53, 41A1, and 41A2 Parish of Narmbool;
Volume 00191 Folio169 Lot 1 on Title Plan 669519L (formerly known as part of Crown Allotment 4A Parish of Narmbool);
Volume 00191 Folio 168 Lot 1 on Title Plan 631629R (formerly known as part Crown Allotment 4A Parish of Narmbool);
Volume 01710 Folio 926 Crown Allotment 4B Parish of Narmbool);
Volume 01710 Folio 877 Crown Allotment 4CParish of Narmbool);
Volume 10905 Folio 576 Land in Plan of Consolidation 368001J;
Volume 09389 Folio 491 Crown Allotments 16 and 19 Parish of Narmbool ;
Volume 06636 Foliio129 Crown Allotment 78 and 19 Parish of Cargerie;
Volume 06001 Folio 029 Crown Allotments 13A, 14A and 14B Parish of Narmbool;
Volume 07443 Folio 503 Crown Allotment 15 Parish of Narmbool;
Crown Allotment 14C Parish of Narmbool;
Crown Allotment 14D Parish of Narmbool.
Crown Land vested in Council for Fords Lane, Murphys Road, Horsehill Road and Elaine-Blue Bridge Road

THE PERMIT ALLOWS:

Use and development of the land for a Wind Energy Facility comprising a maximum of 604 wind turbines and their associated infrastructure and other works including: the construction of access tracks; underground cabling; two permanent amenities buildings; two electrical substations; two permanent meteorological monitoring facilities and associated equipment; car parking and bicycle facilities, temporary construction facilities (including an ancillary concrete batching plant), business identification signs and alterations to access points to roads in a Road Zone.

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Section 97F
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THE FOLLOWING CONDITIONS APPLY TO THIS PERMIT:

DEVELOPMENT PLANS TO BE ENDORSED

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

The plans must show the location and layout of the wind turbines and all on-site buildings and works generally in accordance with the application plans *Section Layout – Topographic (Yendon Section) LL SM[Y] 0034 Version 3 dated* 20081014 and *Section Layout – Topographic (Elaine Section) LL SM[RE] 0032 Version 4 dated* 20081014.

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The plans must also include:

a) A list of map coordinates for each wind turbine

b) The distance of each wind turbine from the nearest point on the boundary of the subject land

c) Details of the model and rated capacity of the wind turbines to be installed

d) Elevation drawings, showing dimensions, of the wind turbines and other permanent on-site buildings (e.g. substation facilities)

e) Drawings, showing the key physical dimensions, of all on-site buildings and works including:

(i) Wind turbines

(ii) Access tracks

(iii) Internal collector network trenches

(iv) Any temporary concrete batching plant(s)

(v) The substation (including designated car parking areas, signage and landscaping), and

(vi) Any ancillary works (e.g. construction compounds and water tanks).

f) A description of the materials and finishes of the wind turbines and other permanent on-site buildings

g) A description of the location, type and intensity of any aviation obstacle lighting to be installed

h) The locations of scattered native trees and the boundaries of any patches of native vegetation, in relation to all buildings and works, in all cases where such trees and patches are within 25 metres of the buildings or works

i) A report by a suitably qualified ecological specialist after the completion of a targeted spring survey or vegetation in the vicinity of access gates Y10, Y11, E1, E8, and E3 to demonstrate that adverse impact on vegetation listed under the *Flora and Fauna Guarantee Act 1988* and the *Environment Protection and Biodiversity Conservation Act 1999* are avoided~~, and~~

j) Turbine exclusion zones centred on the transmission vectors for fixed licences of point to point transmissions to which there is a possibility of electromagnetic interference with a width equal or grater than twice the sum of the blade length and 60% of the radius of the first Fresnel zone of any licensed link. The transmission vectors and the widths of the first Fresnel zones will be determined by a suitably qualified telecommunications expert~~.~~

k) The deletion of wind turbines YSWT 04 and YSWT-37 from the Yendon Section and wind turbines ESWT-09 and ESWT-22 from the Elaine Section

l) The re-positioning of wind turbine ESWT02 150 metres to the south of its approved location; and

~~j)~~m) The final location of the electrical substation at the Elaine Section (generally in accordance with the amended application plans *Permit Amendment Layout + 1km Distance Contour – Elaine Version 2 date 20150917*).

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SPECIFICATIONS

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

a) The wind energy facility must comprise no more than ~~64~~60 wind turbines with no more than:

i. ~~40~~38 wind turbines on the land at Yendon, and

ii. ~~24~~22 wind turbines on the land at Elaine.

b) The overall maximum height of the wind turbines (to the zenith of the sweep of the rotor blade tip) must not exceed ~~130~~ 161 metres above foundation level and must not be altered or modified without the written consent of the Minister for Planning

~~c)~~ The wind turbines must be mounted on a tubular steel and/or concrete towers ~~such that the hub of the rotors does not exceed 85 metres above foundation level~~

~~d)~~ The lowest point of the sweep of the rotor blade tip must not be less than 20 metres above ground level at the turbine base and must not be altered or modified without the written consent of the Minister for Planning. ~~The diameter of the rotor of the wind turbines must not exceed 95 metres~~

~~e)~~c) The rotor of the wind turbines must have only three rotor blades

~~f)~~d) The wind turbine towers, nacelles and rotor blades must be of a non-reflective finish and colour that blends with the landscape to the satisfaction of the Minister for Planning

~~g)~~e) The colours and finishes of all other buildings and ancillary equipment on-site must be non-reflective to minimise the impact of the development on the landscape to the satisfaction of the Minister for Planning

~~h)~~f) Access tracks within the subject land must, to the satisfaction of the Minister for Planning:

i. have a surface material that will not unduly contrast with the landscape, and

ii. be designed to minimise impact on the farming activities on the land, and

iii. have an effective trafficable width of not less than 4 metres.

~~i)~~g) ~~The transformer associated with each wind turbine must be enclosed within the tower~~

~~j)~~h) All new electricity cabling associated with the internal collector network within the wind energy facility must be placed under the ground except with the further written consent of the Minister for Planning

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~~k)~~i) All wind turbines must be set back at least 50 metres from the boundary of the subject land and public roads

~~l)~~j) All wind turbines must be located such that the distance between turbines and transmission vectors for fixed licences of point to point transmissions is equal to or greater than the sum of the blade length and 60% of the radius of the first Fresnel zone of any licensed link. Except in the case of an emergency, no external lighting of infrastructure associated with the wind energy facility, other than low level security lighting and/or aviation obstacle lighting (as required by condition 2(~~o~~m)) may be installed or operated without the further written consent of the Minister for Planning

~~m)~~k) All spare parts and other equipment and materials associated with the use of the wind energy facility must be located in screened, locked storage areas that are inaccessible to the public to the satisfaction of the Minister for Planning

~~n)~~l) All turbines must be located outside the turbine exclusion zones shown on the endorsed development plan(s)

~~o)~~m) Aviation obstacle lighting may be installed but only if they meet the following requirements, except with the further written consent of the Minister for Planning,:

i. They are restricted to a pair of red medium intensity, intermittent obstacle lights on any wind turbine

ii. The lights are to be baffled so as to restrict the vertical spread of light to not more than three degrees (approximately) with not more than one degree (approximately) below the horizontal

iii. All lights within each section or stage of the wind energy facility must illuminate in unison, and

iv. The activation and de-activation of the lights is to be triggered by a luminance sensor with a trigger luminance of 50 candela per square metre (or as otherwise required by the Civil Aviation Safety Authority or law).

STAGING

3. The use and development authorised by this permit may be completed in stages as shown on the endorsed development plan(s) to the satisfaction of

the Minister for Planning. Any corresponding obligation arising under this permit (including the preparation and approval of plans) may be similarly completed in stages or parts.

LAYOUT NOT ALTERED

4. The use and development as shown on the endorsed development plan(s) or other plans to the satisfaction of the responsible authority must not be altered or modified without the written consent of the Minister for Planning, save that the micro-siting of turbines and the related tracks and reticulation lines will be regarded as generally in accordance with the endorsed development plan(s) if the ~~responsible authority~~Minister for Planning is satisfied that it will not give rise to any material adverse change in landscape, vegetation, cultural, visual, shadow or noise impacts compared to the endorsed development plan(s) and:

i. A turbine within 1 kilometre of any non-host dwelling is not moved closer to that dwelling, and

ii. The turbine location is altered by no more than 100 metres, and

iii. No turbine is located within 50 metres of a non-host title boundary or a road or within a turbine exclusion zone.

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PRELIMINARY INVESTIGATIVE WORKS

5. 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.

UPDATE OF AERONAUTICAL CHARTS

6. Not less than thirty days before the construction of any of the wind turbines starts, copies of the endorsed development plan(s) must be provided to the Royal Australian Air Force's Aeronautical Information Service to enable details of the wind energy facility to be shown on aeronautical charts of the area.

ENVIRONMENTAL MANAGEMENT PLAN

7. Before the development starts, an environmental management plan must be prepared to the satisfaction of the Minister for Planning by the wind energy facility operator in consultation with the relevant authorities including at least EPA, DSE, DPI, Corangamite CMA, Central Highlands Water, Barwon Water, Moorabool Shire Council, and the relevant waste management authority.

The environmental management plan should be based on the approach outlined in Chapter Nine of the exhibited planning application report dated March 2008.

The environmental management plan may be prepared in sections or stages.

The environmental management plan must include a copy of the development layout plans as endorsed by the Minister for Planning.

When approved, the environmental management plan will be endorsed by the Minister for Planning and will then form part of this permit.

The environmental management plan must consider and generally be in accordance with:

- EPA Publication 480: *Environmental Guidelines for Major Construction Sites*
- EPA Publication 275: *Construction Techniques for Sediment Pollution Control*
- EPA Publication 891.1: *Code of Practice, Onsite Wastewater Management*
- EPA Publication 628: *Environmental Guidelines for the Concrete Batching Industry*
- EPA Publication 347: *Bunding Guidelines*
- Australian Standard Customer Satisfaction – *Guidelines for complaints handling in organizations* (ISO 1002:2006), and
- Australian Standards Handbook HB 229 2006 *The Why and How of Complaints Handling*.

The environmental management plan should, where appropriate, address and include:

a) Hazardous Materials

   i. The identification of all hazardous materials used and or stored on-site in connection with the development and use

   ii. Procedures for the proper handling and storage of hazardous materials on-site

   iii. Design criteria for any hazardous materials storage facilities on-site, and

   iv. Contingency measures to ensure that any spills or leaks of hazardous materials are contained on-site and cleaned up in accordance with Environment Protection Authority requirements.

b) Water Contamination, Sediment and Erosion Control

   i. The identification of all construction and operational processes that could potentially lead to water contamination

   ii. The identification of appropriate storage, construction and operational methods to control any identified contamination risks

   iii. Procedures for the management of contaminated waste water

   iv. Procedures for the discharge of collected runoff

   v. Procedures to ensure that silt from batters, cut-off drains, table drains and road works is retained on the site during and after the construction stage of the project. To this end:

      - All land disturbances must be confined to a minimum practical working area and to the vicinity of the identified works areas
      - Soil to be removed must be stockpiled and separate soil horizons must be retained in separate stockpiles and not mixed, and
      - Stockpiles must be located away from drainage lines

   vi. The installation of geotextile silt fences (with sedimentation basins where appropriate) on all drainage lines from the site which are likely to receive runoff from disturbed areas

vii. Procedures to ensure that steep batters are treated appropriately for sediment pollution control

viii. A process for overland flow management to prevent the concentration and diversion of waters onto steep or erosion prone slopes, and

ix. A requirement for immediate remediation of localised erosion (specifying a response time).

c) Waste Control

i. The identification of waste reuse, recycling and disposal procedures, and

ii. Pollution management measures for stored and stockpiled materials including waste materials, litter and any other potential source of water pollution.

d) Sanitation and Wastewater

Appropriate sanitary facilities and management of the wastewater at the temporary construction compound and permanent facilities for construction works, maintenance staff, operations personnel and visitors is required.

e) Construction Practices

i. Procedures, where practical, to construct wind turbine bases, access tracks and power cabling during warmer months to minimise impacts on ephemeral wetlands, local fauna and sediment mobilisation

ii. Procedures to protect, as far as practicable, native fauna and domestic stock from being injured by or entrapped in excavations or trenches and to fill trenches as soon as practical after excavation, and

iii. Procedures for the removal of works, buildings and staging areas on completion of construction of the development.

f) Concrete Batching Plants

i. Criteria for the design of the temporary concrete batching plants

ii. Management procedures to prevent pollution of the local waterways, particularly from wash water and waste concrete materials, and

iii. Procedures for the operation and removal of any temporary concrete batching plants and for the reinstatement of the site once its use finishes.

g) Dust

Procedures to suppress dust from construction related activities.

h) Native Flora and Fauna Protection

i. Surveys by an appropriately qualified ecological specialist at an appropriate time of the year before development starts to confirm that construction footprint does not have an adverse impact on native vegetation

ii. Before any works start in the vicinity of access points gates Y10, Y11, E1, E8 and E3:

- A survey, conducted in the Spring, of vegetation in those locations must be undertaken by a suitably qualified ecological specialist
- A report by a suitably qualified ecological specialist must be submitted to the Minister and the Department of Sustainability and Environment that sets out the findings of the spring survey and, if vegetation listed under the Flora and Fauna Guarantee Act 1988 of the Environment Protection and Biodiversity Conservation Act 1999 is identified, measures to avoid or minimise adverse impacts on that vegetation must be set out

iii. Require fauna habitat to be considered if there are any changes to the location of wind energy facility infrastructure

iv. Measures to ensure the wind energy facility infrastructure does not have an adverse impact on potential habitat for the Growling Grass Frog

v. A pest animal and carrion management plan to be prepared in consultation with the Department of Sustainability and Environment and the Department of Primary Industries.

This plan must include:

- procedures for the ongoing management of pest animal populations (e.g. rabbits) and carrion (including livestock,

native animals and pest animals), to lessen the availability of potential prey for raptors within the wind energy facility site, and

- a program of early identification and eradication of pest animal populations and carrion.

i) Pest Management

A pest management plan developed in consultation with the owners of the relevant land that includes:

i. procedures to prevent the spread of weeds and pathogens from earth moving equipment and associated machinery including the cleaning of all plant and equipment before transport to the site and the use of road making material comprising clean fill that is free of weeds

ii. sowing of disturbed areas with perennial grasses or returned to cropping

iii. a protocol to ensure follow up weed control is undertaken on all areas disturbed through construction of the wind energy facility for a minimum period of 2 years following completion of the works, and

iv. procedures for the ongoing management of pest animal populations including a programme of early identification and eradication.

j) Training

A training program for construction workers, permanent employees and contractors at the wind energy facility site including a site induction program relating to the range of issues addressed by the environmental management plan.

k) Complaints Management

A complaints management plan designed in accordance with *Australian Standard Customer satisfaction – Guidelines for complaints handling in organizations* (ISO 1002:2006) having regard to the guidance provided in *The why and how of complaints handling* HB 229-2006.

The complaints management plan will include procedures for:

i. Readily accessible information on how complaints can be made free of cost to complainants

ii. Immediate acknowledgement of complaints and regular and comprehensive feedback to complainants on actions proposed, their implementation and success or otherwise

iii. Closure of complaints by agreement with complainants

iv. Establishment and maintenance of a complaint register for the recording of receipt and acknowledgement of complaints, actions taken, success or otherwise of actions and complaint closure and for the register to be available to the public during normal working hours

v. Reporting of the contents of the complaint register to the responsible authority as required, and

vi. Regular, at least annual, auditing of the implementation of the complaints management plan with audit results being reported to the responsible authority.

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l) Incident Management

i. A procedure for the establishment and maintenance of an incident register for the recording of:

- Environmental incidents
- Non-conformances, and
- Corrective actions.

ii. The register must be available for inspection by the public during normal working hours and its contents should be reported to the responsible authority as required.

REVIEW OF THE ENVIRONMENTAL MANAGEMENT PLAN

8. The environmental management plan must be reviewed at least once every 5 years, and if necessary amended, in consultation with the Minister for Planning, to reflect operational experience and changes in environmental management standards and techniques. Any amendment of the environmental management plan must be submitted to the Minister for Planning for re-endorsement.

COMPLIANCE WITH ENVIRONMENTAL MANAGEMENT PLAN

9. The use and development must be carried out in accordance with the endorsed environmental management plan described in condition 7 above to the satisfaction of the Minister for Planning.

COMPLAINTS MADE TO THE RESPONSIBLE AUTHORITY

10. If a complaint is received by the responsible authority in regard to the wind energy facility the responsible authority will:

a) After consideration of the views of the complainant and the wind energy facility operator, determine if a dispute exists with a dispute being defined as a matter remaining unresolved after application of the complaints management plan

b) If a dispute is not identified, advise the complainant and the wind energy facility operator that the provisions of the complaint management plan should be utilised, and

c) If it is determined that a dispute exists, determine if there is a breach of the permit and if such a breach exists take action to enforce compliance with the permit. In determining whether a breach exists the responsible authority may require the wind energy facility operator to:

   i. Commission a suitably qualified expert to provide an opinion as to whether a breach exists, and/or

   ii. Conduct compliance testing.

ON-SITE LANDSCAPING PLAN

11. Within six months of the endorsement of the development plan referred to in Condition 1 and before the development starts, an on-site landscaping plan must be prepared and approved by the Minister for Planning. When approved, the on-site landscaping plan will be endorsed and will then form part of this permit.

The on-site landscaping plan must:

a) Include plans drawn to scale showing the extent and layout of any landscape plantings to be used to visually screen or otherwise beautify any on-site buildings or works other than the wind turbines

b) Provide details of plant species proposed to be used in the landscape plantings, including height and spread at maturity

c) Provide a timetable for implementation of all landscape plantings, and

d) Provide for maintenance and monitoring program.

OFF-SITE LANDSCAPING PLAN

12. Within six months of the endorsement of the development plans under Condition 1 of this permit, offers to carry out landscape works to mitigate the visual impact of turbines must be made available to the following parties:

a) The owners of all dwellings within 34 km of a turbine where a turbine is visible

b) The Shire of Moorabool as Committee of Management for Lal Lal Reserve

c) The Sovereign Hill Museums Association in relation to the property known as Narmbool, and

d) St Sava Orthodox Monastery.

The offers must be available up until 12 months after the commissioning of the last wind turbine of the development or relevant stage.

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13. If an offer of landscape mitigation works is accepted, an off-site landscaping plan must be prepared for the particular dwelling, by a suitably qualified person, in consultation with the owner of the property to the satisfaction of the Minister for Planning. When approved, the plan will be endorsed and will then form part of this permit.

The plan must provide details of planting and other treatments that will be used including:

a) Details of the landscaping necessary to mitigate visual impacts of the wind energy facility, including plant species to be used and the expected height and spread of plants at maturity

b) The maintenance of landscaping for a period of two years, and

c) A timetable for implementation of the landscaping works.

The landscaping as shown on the endorsed off-site landscape plans must be completed within 12 months of the endorsement of the particular plan unless otherwise agreed by the landowner.

The wind energy facility operator or developer must pay the full cost for design, implementation and maintenance of the off-site landscaping plans but any of these tasks may be undertaken or arranged by the landowner. The cost must first be agreed between the wind energy facility operator and the relevant landowner.

TRAFFIC MANAGEMENT PLAN

14. Before the development starts a traffic management plan must be prepared, in consultation with Mo~~r~~o~~r~~abool Shire Council and VicRoads, to the satisfaction of the Minister for Planning ~~for submission to and approval by the Minister for Planning~~. When approved, the plan will form part of this permit.

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The traffic management plan must:

a) Consider the use of Woolshed Road rather than Fords Lane as an access to the eastern part of the Elaine site

b) Identify all public roads and access points that will be used in the construction and operation of the wind energy facility

c) Provide for an existing conditions survey of public roads that will be used in the construction and operation of the wind energy facility including details of the suitability, design, construction standards and condition of the roads to enable, for sealed roads, the calculation of Total ESA (Equivalent Standard Axles) loading for comparison with the appropriate Austroads pavement design guide

d) Establish the appropriate existing equivalent renewal pavement design and associated costs in conjunction with Moorabool Shire Council and VicRoads and establish the calculated damage (if any) directly attributable to the wind energy facility and the amount (if any) to be reimbursed to Moorabool Shire Council

e) Include the designation of routes, operating hours and speed limits for oversize vehicles and other heavy vehicles on routes accessing the site so as to avoid interference with the passage of school buses, and to provide for resident safety and the safe management of stock

f) Provide details of any large over dimensional vehicles to be used (such as those used for the transport of the nacelles, blades and tower sections) and details of the routes to be taken, the proposed escort arrangements and requirements for over dimensional permits from VicRoads

g) Specify the need for road and intersection upgrades to accommodate any additional traffic or site access requirements, whether temporary or ongoing, and the timing of when these upgrades are to be undertaken

h) Include measures to be used to manage traffic impacts associated with the ongoing operation of the wind energy facility on the traffic volumes and flows on surrounding roads

i) Identify any areas of roadside native vegetation which need removal or pruning and the pruning practices to be followed

j) Include identification and timing of any pre-construction works

k) Include a program of regular inspections, to be carried out during the construction period, to identify the need for maintenance works necessary as a result of construction traffic

l) Include agreed criteria that will trigger repair and maintenance works, and

m) Include a program to rehabilitate roads to the pre-existing condition identified by the above surveys.

COMPLIANCE WITH TRAFFIC MANAGEMENT PLAN

15. The traffic management and road upgrade and maintenance works associated with the wind energy facility must be carried out in accordance with the traffic management plan to the satisfaction of the Minister for Planning and the cost of any works including maintenance are to be at the expense of the wind energy facility operator.

EMERGENCY RESPONSE PLAN

16. Before the development starts an emergency response plan must be prepared and approved by the Minister for Planning. When approved the

emergency response plan will be endorsed and will then form part of this permit.

The emergency response plan must be generally in accordance with "*Emergency Management Guidelines for Wind Farms"* (Country Fire Authority April 2007).

The emergency response plan must be prepared in consultation with:

- Country Fire Authority
- Victoria Police
- Rural Ambulance Victoria
- State Emergency Service, and
- Any other relevant members of the Moorabool Shire's Municipal Emergency Response Management Committee.

The emergency response plan should generally conform to "*AS 3745-2002 Emergency control organization and procedures for buildings, structures and workplaces"*, or any subsequent replacement or amendment.

The emergency response plan must include:

a) Criteria for the provision of static water supply tanks, solely for fire fighting purposes, including minimum capacities, appropriate connections and signage

b) Procedures for vegetation management, fuel control and the provision of fire fighting equipment during declared fire danger periods

c) Minimum standards for access roads and tracks, to allow access for fire fighting vehicles, including access to static water supply tanks

d) The facilitation by the wind energy facility operator, before or within 3 months after the commencement of operation, of a familiarisation visit to the site and explanation of emergency services procedures for the relevant members of the Country Fire Authority, Rural Ambulance Victoria, Victoria Police, State Emergency Service and Moorabool Shire's Emergency Response Management Committee

e) Subsequent familiarisation sessions for new personnel of those organisations as required, and

f) If requested, training of Country Fire Authority personnel in relation to suppression of wind energy facility fires.

BAT AND BIRD MANAGEMENT PLAN

17. Before the development starts a bat and bird management plan (BBMP) to the satisfaction of the Minister for Planning must be prepared in consultation with the Department of Sustainability and Environment. When approved, the plan will be endorsed and form part of the permit.

The BBMP must include:

a) A statement of the objectives and overall strategy for managing and mitigating any significant bird and bat strike arising from the wind energy facility operations

b) A monitoring program of at least two years duration from the commissioning of the last turbine including surveys during the breeding and migratory seasons to ascertain:
   (i) The presence, behaviour and movements of any Wedge-tailed Eagles, Brown Falcons or Swamp Harriers, especially breeding pairs in the vicinity of the wind energy facility
   (ii) The species, number, age, sex (if possible) and date of bird and bat strikes
   (iii) Procedures for the reporting of any bird or bat strikes to the Department of Sustainability and Environment. Any bird strikes affecting the priority species named in condition 19(b)(i) must be reported to the DSE within 7 days of becoming aware of any strike
   (iv) Seasonal and yearly variation in the number of bird and bat strikes
   (v) The efficacy of searches for carcases of birds and bats, and where practical, information on the rate of removal of carcases by scavengers, so that correction factors can be determined to enable calculations of the total number of mortalities.

c) Procedures for the regular removal of carrion (including livestock, native animals and pest animals) likely to attract raptors to areas near wind turbines

d) Requirements for periodic reporting, within agreed timeframes of the findings of the monitoring to the Department of Sustainability and Environment

e) Recommendations in relation to a mortality rate for specified species which would trigger the requirement for responsive mitigation measures to be undertaken by the proponent to the satisfaction of the Minister for Planning, and

f) Details of any responsive mitigation measures which may be implemented if the trigger mortality rate for a specified species is exceeded.

18. Following the completion of the monitoring program in accordance with the BBMP, a bat and 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.

STRATEGY FOR MONITORING AND MITIGATION MEASURES FOR IMPACTS ON ECOLOGICALLY SIGNIFICANT BATS AND BIRDS

19. In the event that impacts detected during the BBMP's monitoring program are considered by the Minister for Planning to be ecologically significant, a monitoring and mitigation measures strategy must be prepared in consultation with the Department of Sustainability and Environment to the satisfaction of the Minister for Planning. When approved the monitoring and mitigation measures strategy will be endorsed and will then form part of this permit.

The monitoring and mitigation measures strategy must include, for each species for which ecologically significant impacts have been detected:

a) Further monitoring of the 'targeted' species, and

b) Mitigation measures for 'targeted' species.

all to be implemented to the satisfaction of the Minister for Planning.

TELEVISION AND RADIO RECEPTION AND INTERFERENCE

20. Before the development starts a television and radio reception plan must be prepared to the satisfaction of the Minister for Planning. When approved, the plan will be endorsed and form part of the permit.

The television and radio reception plan must include:

a) A definition of the area to be covered by the television and radio reception plan (the defined area) based on the recommendations of a suitably qualified expert

b) A pre-construction survey to determine television and radio reception strength at locations within the defined area, completed prior to the commissioning of any turbine. The location of such monitoring is to be determined by an independent television and radio monitoring specialist appointed by the wind energy facility operator

c) A procedure for post-construction survey at any dwelling in the defined area that existed at the date of the pre-construction survey in response to any complaint received regarding the wind energy facility having an adverse effect on television or radio reception

d) A procedure for the implementation of mitigation measures at any dwelling in the defined area that existed at the date of the pre-construction survey if the post-construction survey establishes any increase in interference to reception as a result of the wind energy facility operations. The mitigation measures shall return the affected reception to pre-construction quality and be undertaken at the cost of the wind energy facility operator, all to the satisfaction of the Minister for Planning

BLADE SHADOW FLICKER

21. Shadow flicker from the wind energy facility must not exceed 30 hours per annum at any dwelling existing as at the date of this permit to the satisfaction of the Minister for Planning.

~~Any dwelling on subject land may be exempt from this condition. This exemption will be given effect through an agreement with the landowner that will apply to any occupant of the dwelling and must be registered on title~~

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Comment [BP1]: Removes reference to shadow flicker device.

Any dwelling may be exempt from this condition. This exemption will be given effect through a written agreement with the landowner of the dwelling and evidence of the agreement must be provided to the satisfaction of the ~~Minister for Planning~~.

NOISE LIMITS

22. Construction of the wind energy facility must comply with noise criteria specified in the *Interim Guidelines for Control of Noise from Industry in Country Victoria*, N3/89 at any dwelling existing on land in the vicinity of the proposed wind energy facility as at the date of the issue of this permit to the satisfaction of the Minister for Planning.

~~22.~~

23. Except as provided below in this condition, the operation of the wind energy facility must comply with New Zealand Standard 6808:2010, Acoustics – Wind Farm Noise (the Standard) as modified by this condition to the satisfaction of the Minister for Planning. The following requirements apply:

a) The operator must ensure that at any wind speed, wind farm sound levels, determined in accordance with the Standard at noise sensitive locations (as defined in the Standard) do not exceed a noise limit of 40dB LA90,10min or background (LA90,10min) plus 5dB, whichever is ~~the~~ greater.

b) ~~w~~Where special audible characteristics, including tonality, impulsive sound or excessive amplitude modulation occur, the measured noise level with the identified special audible characteristics will be modified by applying a penalty of up to + 6 dB L90 in accordance with section 5.4 of the Standard.

Any dwelling may be exempt from this condition. This exemption will be given effect through a written agreement with the landowner of the dwelling and evidence of the agreement must be provided to the satisfaction of the Minister for Planning.

~~23. Except as provided below in this condition, the operation of the wind energy facility must comply with the noise criteria specified in *NZS6808:1998 'Acoustics - The Assessment and Measurement of Sound from*~~

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~~*Wind Turbine Generators*' at any dwelling existing on land in the vicinity of the proposed wind energy facility as at the date of the issue of this permit, to the satisfaction of the Minister for Planning.~~

~~In determining compliance the following requirements apply:~~

~~a) The sound level from the wind energy facility within 20 metres of any dwelling must not exceed a level of 40dBA (L_{95}) or where the relationship between background noise levels and wind speed has been determined by the method specified in Condition 24 of this permit, the background noise level by more than 5dBA, or a level of 40dBA L_{95}, whichever is the greater~~

~~b) Compliance must be assessed separately for all time and night time. For the purpose of this requirement, night time is defined as 10.00pm to 7.00am, and~~

~~c) If the noise has a special audible characteristic and measured sound level must have a penalty of 5dBA applied.~~

~~Any dwelling on the subject land may be exempt from this condition. This exemption will be given effect through an agreement with the landowner that must apply to any occupant of the dwelling and must be registered on title. Such dwellings will be known as host dwellings.~~

NOISE COMPLIANCE TESTING

~~**24.** Before the development starts a noise compliance testing plan must be prepared by a suitably qualified acoustics expert to the satisfaction of the Minister for Planning.~~

~~When approved, the noise compliance testing plan will be endorsed be the Minister for Planning and will then form part of this permit.~~

~~The use must be carried out in accordance with the noise compliance testing plan to the satisfaction of the Minister for Planning.~~

~~The noise compliance testing plan must include:~~

~~a) A determination of the noise limits to be applied during construction using the methodology prescribed in the *Interim Guidelines for the Control of Noise from Industry in Country Victoria*, N3/89~~

b) A program of compliance testing to be implemented during the construction of the wind energy facility that:

(i) Is designed by a suitably qualified acoustic expert, and

(ii) Utilises the methodology prescribed in *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1*, to demonstrate compliance with the limits determined in (a) above.

c) A prediction, by a suitably qualified acoustic expert, of the area within which the noise level from the wind energy facility during full operation will be 35dB(A) or greater

d) Identification of all dwellings, excluding host dwellings, within the area predicted in (c) above and a statement as to whether consent from the owner of each of the identified dwellings for compliance testing has been obtained or refused

e) A method or methods of testing compliance with the noise limits prescribed in Condition 23 of this permit for each dwellings identified in (d) above for which consent for the conduct of compliance testing has been obtained.

The compliance testing method must be either:

(i) The method described in *NZS6808:1998 'Acoustics – the Assessment and Measurement of Sound from Wind Turbine Generators'* with the following criteria being met:

- The regression curves required must be derived from a data set:
  - Of at least 500 noise level/wind speed data pairs
  - Including wind speed measurements made at turbine hub height
  - Including at least 10 data pairs or 1% of the total number of data pairs whichever is the greater at wind speeds greater than 8 m/s
  - Including at least 10 data pairs or 1% of the total number of data pairs whichever is the greater at wind speeds less than 4 m/s, and

- With the percentage of data pairs that are the results of measurements made with the wind in the direction from the wind energy facility to the dwelling being equal or greater than values determined in (f) below, and
- The coefficient of determination for the regression curves will be 0.5 or greater, or

(ii) A method, designed by a suitably qualified acoustics expert, in which measurements of operating and background noise levels are measured with:

- Background noise levels being measured with all turbines that, when operating, influence the noise level at the dwelling, shut down, and
- The wind in the direction from the wind energy facility to the dwelling for at least 50% of the measurement period.

f) For each dwelling at which compliance testing is to be performed, determination of the maximum monthly proportions of the wind direction distribution that is from the wind energy facility to the dwelling, plus or minus 22.5 degrees

g) A schedule for compliance testing under which compliance testing at all identified dwelling for which consent for such testing has been obtained is performed in the 14 months following the commissioning of the last turbine in a section of the wind energy facility or a stage of the wind energy facility, if the development is in stages, and repeated between 10 and 14 months after the first compliance test

h) A procedure for the assessment, by a suitably qualified acoustics expert, of the characteristics of the noise from the wind energy facility to determine if that noise has any special audible characteristics that require the addition of 5 dB(A) to the measured operating noise levels as slowed in Condition 23 of this permit

i) A procedure under which all results of compliance testing conducted in any month are reported to the Minister for Planning by the 15th day of the following month and to the owners and occupiers of particular dwellings as soon as results relating to that particular dwelling are available, and

~~a) A procedure under which the implementation of the noise compliance testing plan is directed and supervised by a suitable qualified acoustic expert to the satisfaction of the Minister for Planning.~~

~~i)~~

24. Before the development starts, a noise compliance testing plan must be prepared by a suitably qualified acoustics expert to the satisfaction of the Minister for Planning.

When approved, the noise compliance testing plan will be endorsed by the Minister for Planning and will then form part of this permit.

The use must be carried out in accordance with the noise compliance testing plan to the satisfaction of the Minister for Planning.

For the purposes of determining compliance, the following requirements apply:

a) Acoustic compliance reports shall be prepared by a suitably qualified and experienced independent acoustic engineer to demonstrate compliance with the noise limits specified in the Standard.
b) Noise assessment positions must be located according to the Standard, and shown on a map.
c) A final compliance report must be submitted to the Minister for Planning after a 12 month period following full operation of the facility.
d) Compliance reports should be publicly available.
e) Following facility commissioning, all complaints shall be managed following procedures set out in the noise complaints management plan.

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NOISE COMPLIANCE ENFORCEMENT

~~**25.** If an exceedance of the noise limits prescribed in Condition 23 of this permit is detect the wind energy facility operator must:~~

~~a) Within 5 days of the detection of the exceedance, take sufficient actions to reduce the wind energy facility noise level at the subject dwelling as predicted using the prediction methodology contained in *NS6808:1998 'Acoustics – the Assessment and Measurement of Sound from Wind Turbine*~~

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~~*Generators'* by an amount equal to or greater than the amount of exceedance~~

~~b) Within 7 days of the detection of the exceedance, provide the responsible authority and the owner/occupier of the dwelling with:~~

~~(i) The results of the compliance testing measurements including the magnitude of the detected exceedance~~

~~(ii) Details of the actions taken to reduce the wind energy facility noise emissions, and~~

~~(iii) Evidence that the actions taken will produce a decrease in the wind energy facility noise level at the dwelling by an amount equal to the magnitude of the exceedance based on a prediction using the methodology of *NZS6808:1998 'Acoustics – the Assessment and Measurement of Sound from Wind Turbine Generators'*.~~

~~c) Continue to operate the wind energy facility with the implemented actions until approval for a different mode of operation is given by the responsible authority under the provision of (d) below~~

~~d) Within 60 days of the detection of an exceedance provide the responsible authority and owner/occupier of the dwelling with either:~~

~~(i) The result of compliance testing using the procedures prescribed in Condition 24 of this permit that demonstrate compliance, or~~

~~(ii) A program for the development and evaluation of an alternative mode of wind energy facility operation that can be reasonably be expected to result in continuing compliance with noise levels as allowed in Condition 23 of this permit.~~

~~The program will:~~

- ~~Be developed and implemented under the supervision of a suitably qualified acoustics expert~~
- ~~Include detailed descriptions of proposed actions~~
- ~~Include predictions of wind energy facility noise levels at the dwelling at each stage of the program~~

- ~~Not include any actions or combination of actions that are predicted to result in non-compliance~~
- ~~Include compliance testing using the procedures prescribed in Condition 24 of this permit both as the final step in the program and with that compliance testing being repeated after between 10 and 14 months, and~~
- ~~Include a program schedule that specifies the timing of each stage of the program~~

~~to the satisfaction of the responsible authority.~~

~~Within 10 days of receipt of the program the responsible authority will either:~~

~~a) Approve the implementation of the program, or~~

~~b) Advise the wind energy facility operator of modifications to the program that are required before approval will be granted.~~

~~If the responsible authority requires the program to be modified, the wind energy facility operator may either submit a modified program or immediately withdraw the program and conduct compliance testing using the procedures prescribed in Condition 24 of this permit.~~

~~Following implementation of the program, the wind energy facility operator may provide the responsible authority and the owner/occupier with a detailed description of an alternative mode of operation of the wind energy facility together with evidence that under that mode of operation compliance can be expected, to the satisfaction of the responsible authority. Given such information and evidence the responsible authority may approve the operation of the wind energy facility in the alternative mode and such approval will not be unreasonably withheld.~~

25. For the purposes of complaints evaluation, the following requirements apply:
    a) Post installation sound levels shall, where practical, be measured at the same locations where the background sound levels were determined (GPS coordinates and a map showing these locations is to be provided).

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b) If a non-compliance with condition 23 is detected, or an acoustic investigation is required under the noise complaints investigation and response plan endorsed under condition 26, an independent assessment report must be prepared by a suitably qualified and experienced independent acoustic engineer to:
- identify the weather or operational conditions associated with the complaint / breach
- analyse the uncertainty and confidence levels in the monitoring, and the steps taken to reduce uncertainty
- target assessment to identify the cause and remediation actions
- submit a remediation plan to the satisfaction of the Minister for Planning outlining, the investigation process, complainant communications, actions and timelines to resolve the complaint/breach
- If the complaint is not resolved through the processes outlined above, the Minister for Planning may request an independent peer review at the cost of the permit holder and on/off shut down testing to resolve uncertainty.

c) Following the initial post-construction reporting process, additional independent assessment may be requested by the Minister for Planning at any time, where complaints are received and are considered to reasonably warrant investigation.

d) If investigations indicate special audible characteristics are potentially occurring, procedures outlined in Appendix B of the Standard should be applied.

26. Before the first wind turbine is commissioned, the permit holder must prepare a noise complaint investigation and response plan to the satisfaction of the Minister for Planning.

The plan shall include:
- a process of investigation to resolve a complaint
- a requirement that all complaints will be recorded in an incidents register
- how contact details will be communicated to the public
- telephone number and email contact for complaints and queries
- details of the appropriate council contact telephone number and email address (where available)

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- a table outlining complaint information for each complaint received, including:
  - the complainant's name
  - any applicable property reference number if connected to a background testing location
  - the complainant's address
  - a receipt number for each complaint which is to be communicated to the complainant
  - the time, prevailing conditions and description of the complainant's concerns including the potential incidence of special audible characteristics
  - the processes of investigation to resolve the complaint.

A report including a reference map of complaint locations, and outlining complaints, investigation and remediation actions is to be provided on an annual basis to the satisfaction of the Minister for Planning.

The register and complaints response process shall continue for the duration of the operation of the wind energy facility and must be made available to the Minister for Planning on request.

The ~~owner of the~~ wind energy facility operator must implement and comply with the Approved Noise Complaint, Investigation and Response Plan for the duration of the operation of the wind energy facility.

DECOMISSIONING

~~26.~~ 27. The wind energy facility operator must, no later than one month after all wind turbines have permanently ceased to generate electricity, notify the Minister for Planning in writing of the cessation of the use. Within a further six months of this date, the wind energy facility operator, or in the absence of the operator, the owner of the land on which the relevant turbines(s) is/are located, must prepare a decommissioning plan to the satisfaction of the Minister for Planning. When approved, the decommissioning plan will become part of this permit.

~~27.~~ 28. The decommissioning plan must provide for the following:

a) The removal of all above ground operational equipment

b) The removal and clean up of any residual spills or contamination

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c) The rehabilitation of all storage, construction, access tracks and other areas affected by the project closure or decommissioning, if not otherwise useful to the on-going management of the subject land

d) A decommissioning traffic management plan

e) A post decommissioning revegetation management plan

The decommissioning plan must be implemented to the satisfaction of the Minister for Planning within 24 months of approval of the plan or within such other timeframe as may be specified by the Minister.

BUSINESS IDENTIFICATION SIGNS

~~28.~~ 29. The total advertisement area to each business identification sign must not exceed 3 square metres.

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EXPIRY

~~29.~~ 30. This permit will expire if one of the following circumstances applies:

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(i) the development is not started within 4 years of the date of this permit;

(ii) the development is not completed within 8 years of the date of this permit.

The Minister for Planning, as responsible authority, may extend the periods referred to if a request is made in writing before the permit expires, or within three months afterwards.

Notes:

For the purpose of this permit, a host means the land holder of a property with a contract in respect of the installation of associated wind turbines on that person's property.

Planning and Environment Regulations 2005 Form 11
Section 97F
PLANNING PERMIT GRANTED BY THE MINISTER UNDER
DIVISION 6 OF PART 4 OF THE PLANNING AND ENVIRONMENT ACT 1987

Date Issued:

Signature for the Minister

THIS PERMIT HAS BEEN AMENDED AS FOLLOWS

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THIS PERMIT HAS BEEN CORRECTED AS FOLLOWS

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Planning and Environment Regulations 2005 Form 11
Section 97F
PLANNING PERMIT GRANTED BY THE MINISTER UNDER
DIVISION 6 OF PART 4 OF THE PLANNING AND ENVIRONMENT ACT 1987

IMPORTANT INFORMATION ABOUT THIS PERMIT

WHAT HAS BEEN DECIDED?

The Minister has granted and issued a permit under Division 6 of Part 4 of the **Planning and Environment Act 1987**.

WHEN DOES A PERMIT BEGIN?

A permit operates—

- from the date specified in the permit; or
- if no date is specified, from the date on which it was issued.

WHEN DOES A PERMIT EXPIRE?

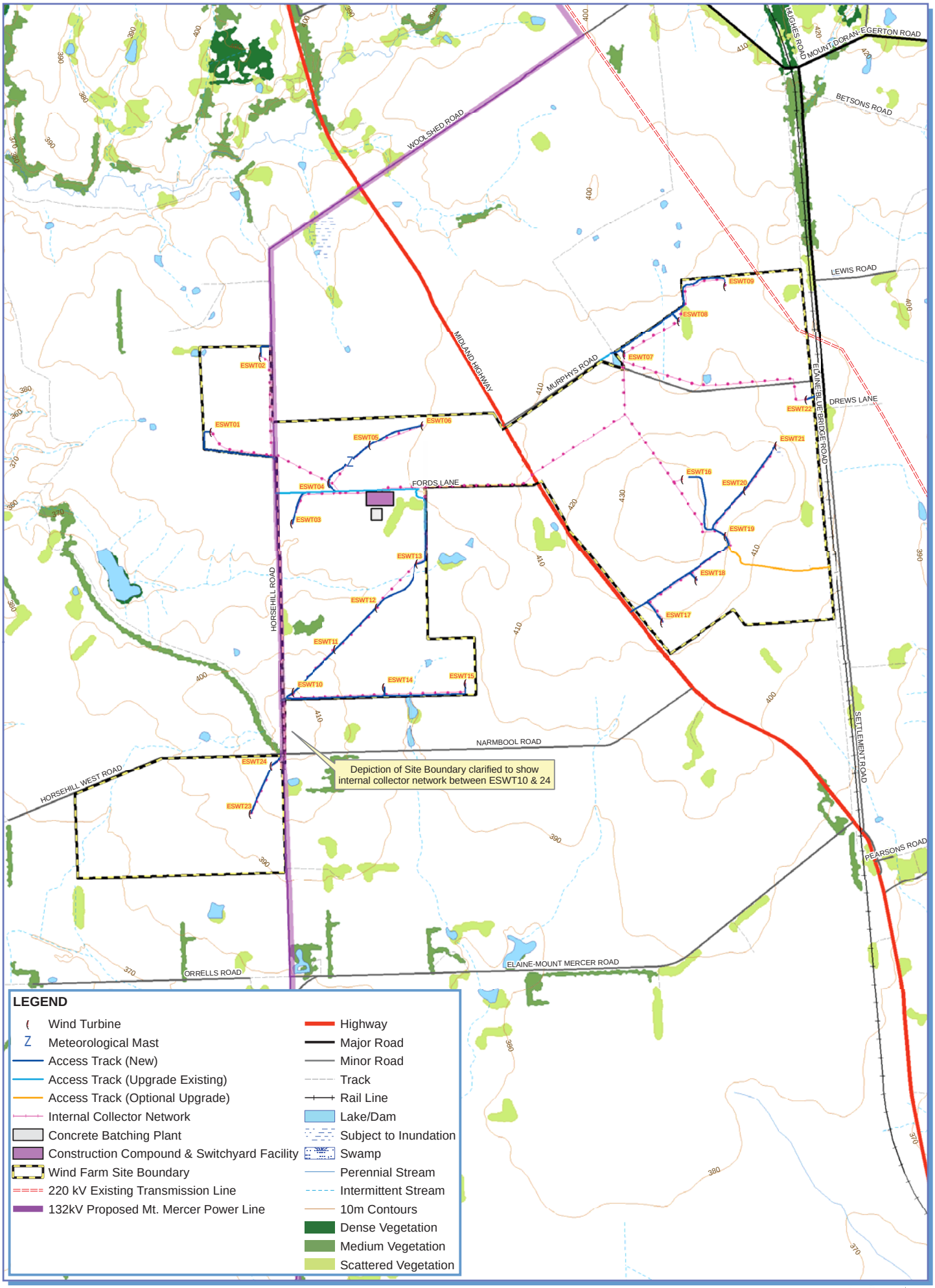
1. A permit for the development of land expires if—
   - the development or any stage of it does not start within the time specified in the permit; or
   - the development requires the certification of a plan of subdivision or consolidation under the **Subdivision Act 1988** and the plan is not certified within two years of the issue of the permit, unless the permit contains a different provision; or
   - the development or any stage is not completed within the time specified in the permit, or, if no time is specified, within two years after the issue of the permit or in the case of a subdivision or consolidation within 5 years of the certification of the plan of subdivision or consolidation under the **Subdivision Act 1988**.
2. A permit for the use of land expires if—
   - the use does not start within the time specified in the permit, or if no time is specified, within two years after the issue of the permit; or
   - the use is discontinued for a period of two years.
3. A permit for the development and use of land expires if—
   - the development or any stage of it does not start within the time specified in the permit; or
   - the development or any stage of it is not completed within the time specified in the permit, or, if no time is specified, within two years after the issue of the permit; or
   - the use does not start within the time specified in the permit, or, if no time is specified, within two years after the completion of the development; or
   - the use is discontinued for a period of two years.
4. If a permit for the use of land or the development and use of land or relating to any of the circumstances mentioned in section 6A(2) of the **Planning and Environment Act 1987**, or to any combination of use, development or any of those circumstances requires the certification of a plan under the **Subdivision Act 1988**, unless the permit contains a different provision—
   - the use or development of any stage is to be taken to have started when the plan is certified; and
   - the permit expires if the plan is not certified within two years of the issue of the permit.
5. The expiry of a permit does not affect the validity of anything done under that permit before the expiry.
6. In accordance with section 97H of the **Planning and Environment Act 1987**, the Minister is the responsible authority in respect to any extension of time under section 69 in relation to this permit.

WHAT ABOUT APPEALS?

The permit has been granted and issued by the Minister under Division 6 of Part 4 of the **Planning and Environment Act 1987**. Section 97M provides that Divisions 2 and 3 of that Part and section 149A do not apply in relation to an application referred to the Minister under this Division, a permit issued under this Division or an amendment of a permit issued under this Division. The effect of this is that the Minister's decision is final.

15 August 2016

Attachment B
Plans referred to in Condition 1 of the permit.
Submitted with the original planning permit application.



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Map Scale:	1:25,000
Drawn by:	ASG
Date:	20081014

NOTE: This map has been prepared for Planning Panels Victoria, and is a reproduction of that included in the Lal Lal Wind Farm Planning Permit Application Report, with a minor change to the site boundary only.

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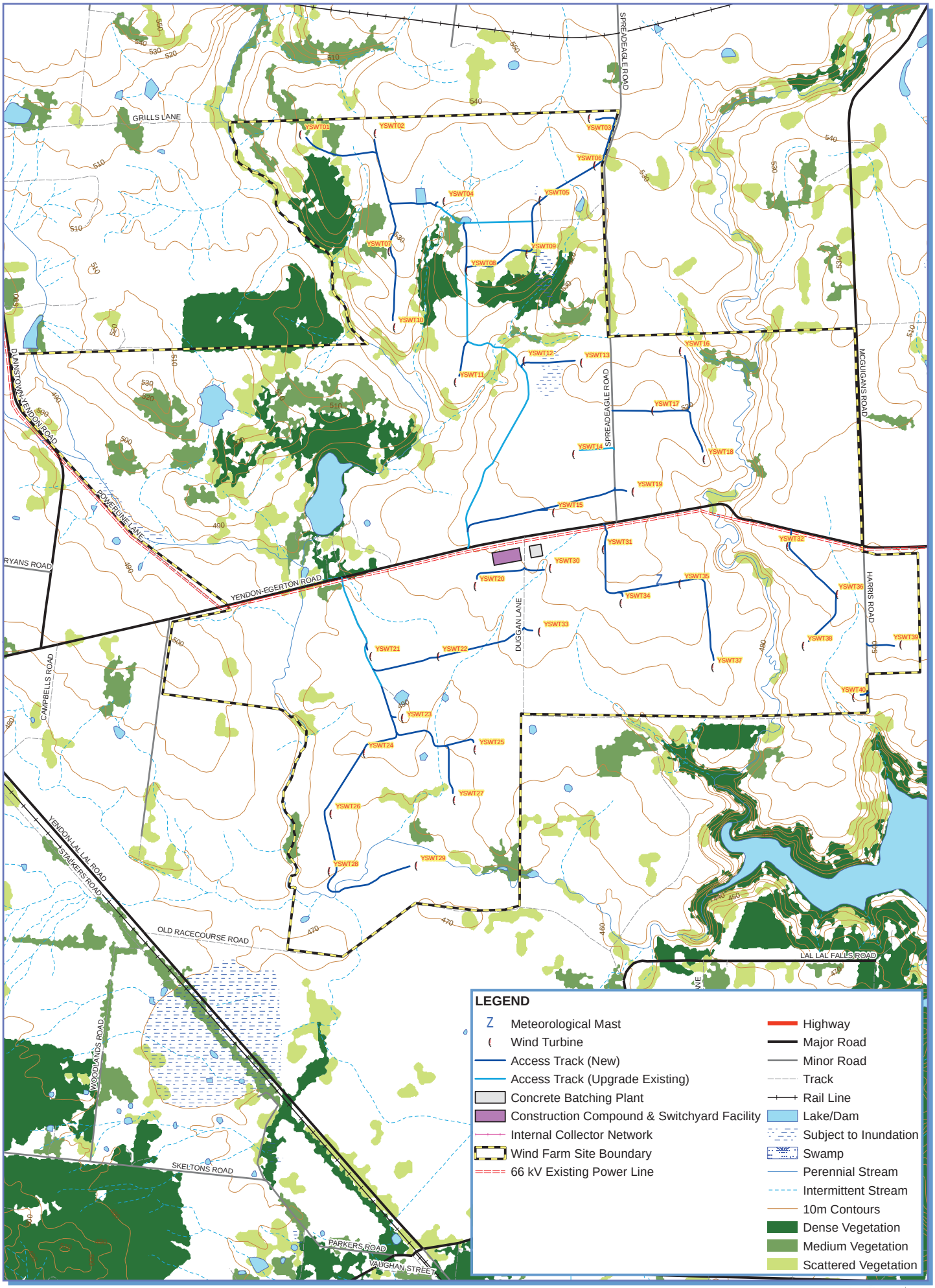
WestWind ENERGY

Section Layout - Topographic (Elaine Section)

Lal Lal Wind Farm



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Original Size:	A3
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Drawn by:	ASG
Date:	20081014

NOTE: This map has been prepared for Planning Panels Victoria, and is a reproduction of that included in the Lal Lal Wind Farm Planning Permit Application Report, with minor changes to wind turbine locations as a result of cultural heritage sub-surface testing. For further information see 'Map and List of WTG movements_CHMP sub-surface testing_20080926.pdf', previously supplied to Planning Panels Victoria on 26/09/2008.

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Kilometres

WestWind ENERGY

Section Layout - Topographic (Yendon Section)

Lal Lal Wind Farm

15 August 2016

Attachment C
Revised Shadow Flicker Assessment

Memorandum

10 August 2016

To	West Wind Energy Pty Ltd		
Copy to			
From	Kieran Jacka	Tel	8687 8285
Subject	Lal Wind Farm Shadow Flicker Assessment Scenario August 2016	Job no.	31/34301

Confidential and subject to legal professional privilege

1 Scope of Work

GHD has been requested to undertake a shadow flicker assessment for West Wind Energy Pty Ltd for the proposed Lal Lal Wind Farm in Western Victoria.

GHD has previously provided a shadow flicker assessment report, dated 15 October 2015.

On 25 July 2016, GHD was instructed[1] to undertake a new shadow flicker assessment based on a 140m wind turbine rotor diameter and revised turbine layout co-ordinates.

GHD was asked to revise the assessment based on the Senvion 3.4M140 turbine operating at 91m hub-height.

On 5 August 2016, GHD was instructed[2] to make a further revision to the assessment, with the following adjustments to the turbines:

- Removal of turbine YSWT37; and
- Reinstating YSWT31 from the approved permit PL-SP/05/0461.

The results of our assessment are provided in this brief report.

2 Methodology

The following methodology was used:

1. Review updated information for the wind farm, including:
   - Updated turbine layout co-ordinates;
   - Updated turbine make/model including changes in hub height and rotor diameter; and
   - Confirmation of residences (sensitive receivers) designations and coordinates.
2. Uploading generic geographic information into industry-standard WindPRO (v2.9) modelling software
3. Selection of shadow flicker calculation parameters (as per Section 5 below).

[1] Letter, Herbert Smith Freehills (acting for West Wind) to GHD, 25 July 2016, and attachments.

[2] Email, Herbert Smith Freehills (acting for West Wind) to GHD, 5 August 2016, and attachments.

GHD Level 8, 180 Lonsdale Street Melbourne VIC 3000 Australia
T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

4. Run WindPRO shadow flicker module.
5. Review results
6. Reporting

3 Lal Lal Wind Farm

Lal Lal Wind Farm is a 60 turbine project split into two areas, located approximately 90km West of Melbourne, 15km East of Ballarat township.

Figure 1 shows the site layout of the wind farm and surrounding dwellings, of which there are 68 dwellings mapped within 2km of the site.

4 Standards

The Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria outlines that shadow flicker needs to be considered in the development of a wind farm … "*where this is more likely to be an issue for turbines located to the east or west of a dwelling"*. This document refers to the draft Australian National Wind Farm Development Guidelines (July, 2010) for specific guidance. These guidelines set strict limits on the levels of acceptable shadow flicker effect, utilising two methods:

- A theoretical "worst case" scenario limited to a maximum of 30 hours per year; and
- A "realistic case" scenario, which considers meteorological parameters, limited to a maximum of 10 hours per year.

The standard practice for shadow flicker simulation, from GHD experience, is to model the worst case potential scenario in the first instance. As per the Guidelines, a limit of 30 hours per year ("worst case") is taken to represent the significant threshold in this report.

Once the results of the worst case scenario are analysed, further assessment *may* be advisable – in cases of exceedance of the 30 hours limit – to model the more realistic scenario.

Based on these guidelines GHD has adopted the following parameters:

Parameter	Limit/Description
Shadow flicker limit	30 hours per year at the receptor
Receptor height	1.5m
Zone of influence of shadows	20% of sun covered by blade with a distance limit of 265 x Max Blade Chord (m)
Maximum angle to the Sun	3 degrees

5 Inputs and Assumptions

The shadow flicker assessment was based on the following inputs:

- Turbine characteristics updated from Herbert Smith Freehills and WestWind;
- 10m digital contour information sourced in GIS format;
- Residential dwellings in GIS format, confirmed by WestWind;
- Location of a row of trees west of receptor J17ab, digitized from Google Earth Pro as advised by WestWind. WestWind provided details trees were 2m high.
- GIS data provided in coordinate system GDA 1994, MGA Zone 55 and assumed to be accurate and reliable.

Key assumptions used in model:

Parameter	Limit/Description
Turbine model	Senvion 3.4M140 turbine.
Turbine Hub Height	91m
Turbine Rotor Diameter	140m
Turbine Tip Height	161m
Max Chord Length	4m as per direction from WestWind Energy Pty Ltd
Turbine orientation and rotation	Worst case scenario: Turbines are always perpendicular to the incident direction of the sunlight and always rotating. Distances between the rotor plane and the tower axis are negligible.
Maximum Distance of Influence	256 x Max Chord Length (4m). Therefore 1024m
Receptor mode	Greenhouse mode for receivers: The receptors do not face any particular direction, but instead will face all directions. This is most appropriate as the actual properties of the receptors – e.g. location and positioning of windows - are unknown.

6 Results

6.1 Worst Case Scenario Results

A table showing the results of the modelled shadow flicker for the Worst Case Scenario for each dwelling (receptor) is shown in Appendix A. A summary of these results is shown in Table 1. Figure 2 shows the locations of the dwellings with exceedances.

Table 1 Hours of Shadow Flicker for Worst Case

Shadow hours per year	Number of dwellings
0 hours	59
0 - 30 hours	4
30 - 50 hours	2
Greater than 50 hours	3
Total Number of Dwellings Assessed	68

Appendix B contains the Main Results detailed output from the WindPRO software.

After initial simulations, the results from WindPRO indicate that the total shadow flicker ("worst case") exceeded the maximum allowable limit of 30 hours per year at five receptors (dwellings). Of these five, all are either Host Dwellings (L17aa, L17ab, J17aa and N31ac) or a Participating Neighbours (J17ab).

The highest number of shadow flicker hours for a Neighbour Dwelling was found at dwelling H18aa, with 29.28 shadow flicker hours per year in the "worst case" scenario. This is within the acceptable limit of 30 hours/year as per the 2010 Draft Australian Standard Guidelines.

No changes to results have been observed from the previous assessment performed in July 2016.

6.2 Limitations of Results

The results presented in this report are presented for the "worst case" scenario only. Having derived no results in excess of 30 hours at any Neighbour Dwellings, the "realistic" scenario modelling step was not deemed necessary.

All Host Dwellings and Participating Neighbours modelled for shadow flicker in this report have been assumed to be exempt from meeting Planning Permit conditions of 30 hours'/year limit.

Any further changes to the turbine hub height, blade dimensions or rotor diameter from those stated in this report would alter the results.

As noted earlier, 10m elevation contours were used in preference to the 1m contours in the model for consistency reasons as the 1m contours provided by West Wind didn't extend to all receptor locations. If 1m contours were extended to encompass all receptors, the heights of turbines and receptors would be adjusted to be more accurate and, as a result, would cause a slight alteration to the modelled results. This difference would not, in GHD's view, result in any significant alteration of the key findings of this report.

7 Conclusion

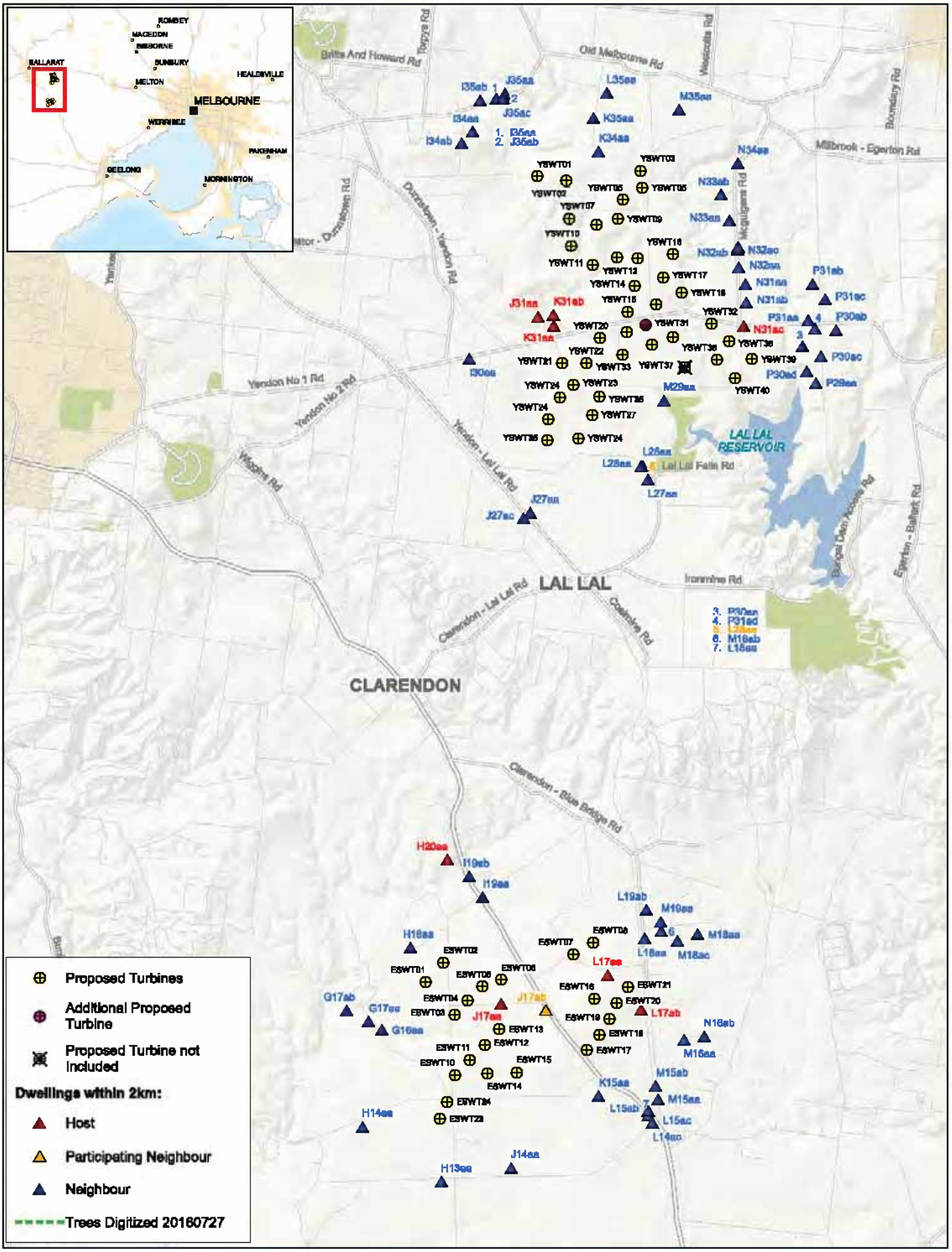
Of the 68 dwellings surrounding the wind farm, five dwellings were found to be above the maximum allowable shadow flicker limit of 30 hours per year. All five are Host Dwellings or Participating Neighbours. All remaining neighbouring dwellings were found to be within the acceptable limit of 30 hours/year according to the 2010 Draft Australian Standard Guidelines.

The modelled assumptions used in this study – in particular the turbine locations and turbine dimension – need to be noted and read in conjunction with this report. Future changes to these metrics will have a direct impact on the results presented in this report.

Regards

Kieran Jacka
Principal Renewable Energy Consultant

Figures



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

WestWind Energy Pty Ltd
Lal Lal Wind Farm Shadow Flicker Assessment

Job Number 31-34301
Revision B
Date 10 Aug 2016

Site Layout - August 2016

Figure 1

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

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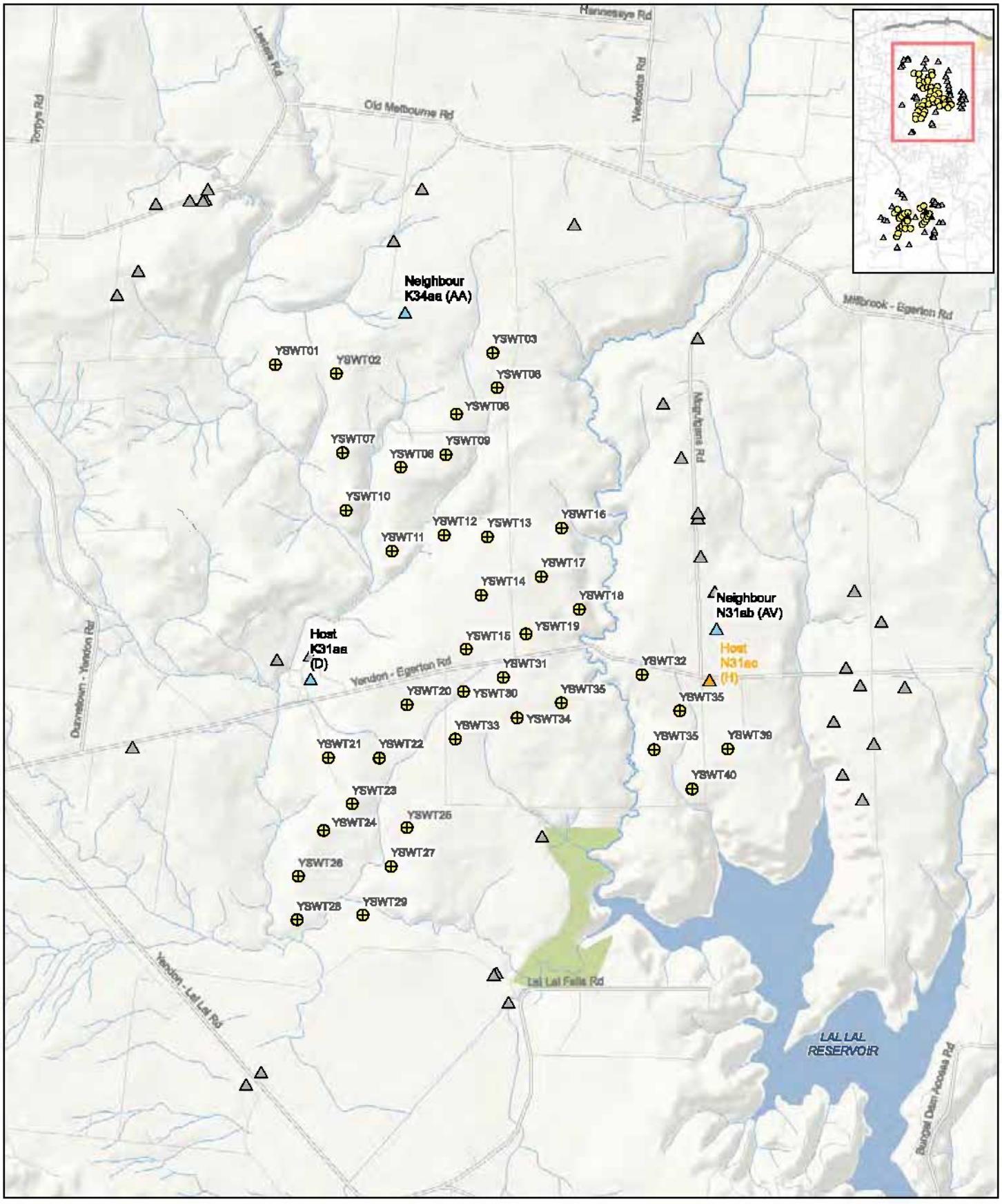
Data source: Turbines and Dwellings supplied by client, base data supplied from DSE (Jan 2015). Created by:cillingworth



Shadow Flicker hours per year

- 0 hrs/yr
- 0 - 30 hrs/yr
- 30 - 50 hrs/yr

Proposed Turbines (11/07/2016)

Please refer to Appendices for more detailed results of exceedances from WindPRO modelling software

Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

WestWind Energy Pty Ltd
Lal Lal Wind Farm Shadow Flicker Assessment Revision

Job Number 31-34301
Revision B
Date 10 Aug 2016

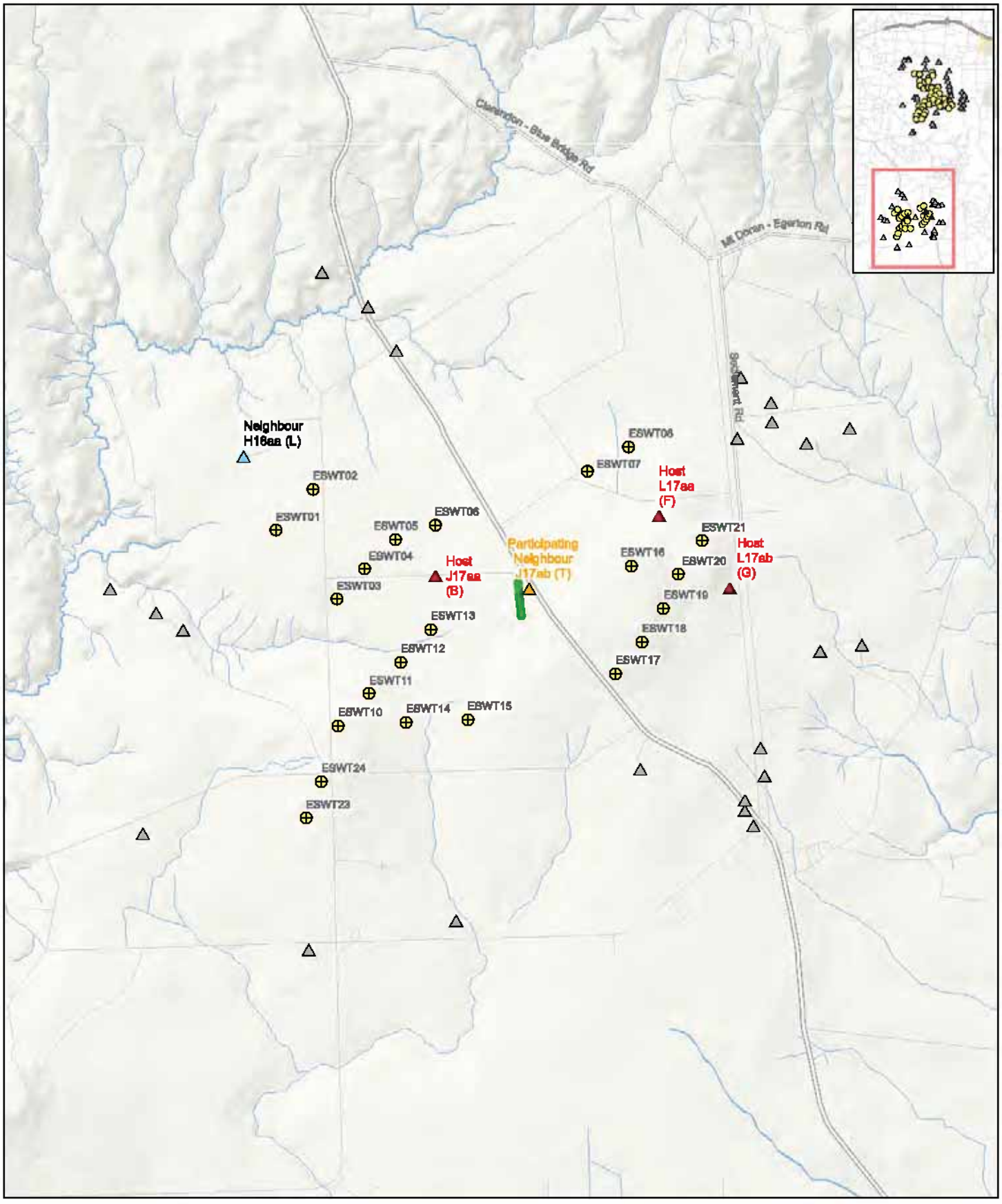
North Site - August 2016
Shadow Flicker Exceedances - Worst Case Scenario

Figure 2

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

G:\31\34301\GIS\Maps\Working\31_34301_003_ShadowFlickerExceedances_rev0.mxd

Data source: Turbines and Dwellings supplied by client, base data supplied from DSE (Jan 2015). Created by:cillingworth



Shadow Flicker hours per year

- 0 hrs/yr
- 0 - 30 hrs/yr
- 30 - 50 hrs/yr
- > 50 hrs/yr
- Proposed Turbines (11/07/2016)
- Trees Digitized from Google Earth Pro

Please refer to Appendices for more detailed results of exceedances from WindPRO modelling software

Paper Size A4

0 500 1,000 2,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

WestWind Energy Pty Ltd
Lal Lal Wind Farm Shadow Flicker Assessment Revision

Job Number 31-34301
Revision B
Date 10 Aug 2016

South Site - August 2016
Shadow Flicker Exceedances - Worst Case Scenario **Figure 2**

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

G:\31\34301\GIS\Maps\Working\31_34301_003_ShadowFlickerExceedances_revB.mxd

Data source: Turbines and Dwellings supplied by client, base data supplied from DSE (Jan 2015). Created by:cillingworth

Appendix A – Total Shadow Flicker hours per year for all Receptors

(Blue highlighting indicates where dwelling has exceeded shadow flicker limit of 30hrs/year)

Property Name (West Wind)	Windpro ID	Status	Modelled Shadow Flicker hours:min/year
H20aa	A	Host	
J17aa	B	Host	**188:23**
J31aa	C	Host	
K31aa	D	Host	**26:56**
K31ab	E	Host	
L17aa	F	Host	**50:54**
L17ab	G	Host	**144:49**
N31ac	H	Host	**39:17**
G17aa	I	Neighbour	
H13aa	J	Neighbour	
H14aa	K	Neighbour	
H18aa	L	Neighbour	**29:17**
I19aa	M	Neighbour	
I30aa	N	Neighbour	
I34aa	O	Neighbour	
I34ab	P	Neighbour	
I35aa	Q	Neighbour	
I35ab	R	Neighbour	
J14aa	S	Neighbour	
J17ab	T	Participating Neighbour	**38:06**
J27aa	U	Neighbour	
J27ac	V	Neighbour	
J35aa	W	Neighbour	
J35ab	X	Neighbour	

Property Name (West Wind)	Windpro ID	Status	Modelled Shadow Flicker hours:min/year
J35ac	Y	Neighbour	
K15aa	Z	Neighbour	
K34aa	AA	Neighbour	**21:16**
K35aa	AB	Neighbour	
L14ac	AC	Neighbour	
L15aa	AD	Neighbour	
L15ab	AE	Neighbour	
L18aa	AF	Neighbour	
L19ab	AG	Neighbour	
L27aa	AH	Neighbour	
L28aa	AI	Neighbour	
L35aa	AJ	Neighbour	
M15aa	AK	Neighbour	
M15ab	AL	Neighbour	
M16aa	AM	Neighbour	
M18aa	AN	Neighbour	
M18ab	AO	Neighbour	
M18ac	AP	Neighbour	
M19aa	AQ	Neighbour	
M29aa	AR	Neighbour	
M35aa	AS	Neighbour	
N16ab	AT	Neighbour	
N31aa	AU	Neighbour	
N31ab	AV	Neighbour	**5:15**
N32aa	AW	Neighbour	
N32ab	AX	Neighbour	
N32ac	AY	Neighbour	

Property Name (West Wind)	Windpro ID	Status	Modelled Shadow Flicker hours:min/year
N33aa	AZ	Neighbour	
N33ab	BA	Neighbour	
N34aa	BB	Neighbour	
P29aa	BC	Neighbour	
P30aa	BD	Neighbour	
P30ab	BE	Neighbour	
P30ac	BF	Neighbour	
P30ad	BG	Neighbour	
P31aa	BH	Neighbour	
P31ab	BI	Neighbour	
P31ac	BJ	Neighbour	
P31ad	BK	Neighbour	
L15ac	BL	Neighbour	
I19ab	BM	Neighbour	
G17ab	BN	Neighbour	
G16aa	BO	Neighbour	
L28aa	BP	Neighbour	

Appendix B – Main Results Output from WindPRO

Project:
34301_LalLal_RevB_20160809

Description:
Vic wind farm in Lal Lal near Ballarat
model including obstacle of trees.
search distance 1024m
remove receptor BO (not a dwelling)
2016/08/09 revision with slight
change in receptors:
- Removal of turbine YSWT37; and
- Reinstating YSWT31

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9/08/2016 1:16 PM / 1
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145 Ann Street
BRISBANE QLD 4000
61 7 4720 0463
Chris Davies / Christopher.Davies@ghd.com
Calculated:
9/08/2016 1:06 PM/2.9.285

SHADOW - Main Result

Calculation: RevB - B worst case scenario - 1km - obstacle

Assumptions for shadow calculations

Maximum distance for influence	1,024	m
Minimum sun height over horizon for influence	3	°
Day step for calculation	1	days
Time step for calculation	1	minutes

The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: elevation_10m.wpo (5)
Obstacles used in calculation
Eye height: 1.5 m
Grid resolution: 5.0 m

Scale 1:400,000
New WTG Shadow receptor

WTGs

UTM (south)-WGS84 Zone: 55

	East	North	Z [m]	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]
1	233,500	5,817,822	392.7	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
2	233,852	5,818,217	391.6	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
3	234,084	5,817,161	390.9	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
4	234,351	5,817,454	395.2	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
5	234,648	5,817,731	398.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
6	235,025	5,817,868	399.9	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
7	236,483	5,818,385	407.2	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
8	236,876	5,818,621	404.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
9	234,095	5,815,947	410.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
10	234,393	5,816,255	398.2	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
11	234,695	5,816,555	393.4	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
12	234,986	5,816,872	397.3	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
13	234,746	5,815,979	393.3	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
14	235,337	5,816,007	397.7	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
15	236,903	5,817,482	430.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
16	236,754	5,816,449	418.6	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
17	237,003	5,816,752	424.7	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
18	237,212	5,817,071	420.6	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
19	237,353	5,817,401	420.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
20	237,579	5,817,722	420.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
21	233,785	5,815,068	397.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
22	233,936	5,815,414	407.3	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
23	235,749	5,834,082	520.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
24	236,335	5,834,001	532.6	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
25	237,834	5,834,197	540.5	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
26	237,479	5,833,611	530.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
27	237,872	5,833,859	527.1	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
28	236,389	5,833,239	526.5	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
29	236,950	5,833,099	530.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
30	237,383	5,833,222	530.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
31	236,427	5,832,689	510.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
32	236,867	5,832,295	501.8	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
33	237,362	5,832,449	511.1	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
34	237,778	5,832,435	518.6	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
35	237,722	5,831,876	516.3	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
36	237,577	5,831,353	509.7	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
37	238,492	5,832,517	516.3	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
38	238,291	5,832,052	515.7	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1

To be continued on next page...

Project:
34301_LalLal_RevB_20160809

Description:
Vic wind farm in Lal Lal near Ballarat
model including obstacle of trees.
search distance 1024m
remove receptor BO (not a dwelling)
2016/08/09 revision with slight
change in receptors:
- Removal of turbine YSWT37; and
- Reinstating YSWT31

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145 Ann Street
BRISBANE QLD 4000
61 7 4720 0463
Chris Davies / Christopher.Davies@ghd.com
Calculated:
9/08/2016 1:06 PM/2.9.285

SHADOW - Main Result

Calculation: RevB - B worst case scenario - 1km - obstacle

...continued from previous page

	UTM (south)-WGS84 Zone: 55				WTG type						
	East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	RPM
			[m]					[kW]	[m]	[m]	[RPM]
39	238,663	5,831,739	510.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
40	238,151	5,831,503	510.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
41	237,011	5,830,822	493.5	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
42	236,257	5,830,315	483.3	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
43	236,743	5,830,314	484.1	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
44	236,485	5,829,872	490.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
45	236,209	5,829,620	480.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
46	237,009	5,829,643	480.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
47	235,970	5,829,179	470.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
48	236,860	5,829,275	475.4	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
49	235,956	5,828,763	470.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
50	236,585	5,828,803	470.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
51	237,553	5,830,953	500.7	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
52	239,265	5,831,110	510.8	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
53	237,473	5,830,494	490.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
54	238,063	5,830,698	506.4	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
55	238,489	5,830,840	505.7	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
56	239,624	5,830,764	503.8	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
57	239,378	5,830,392	492.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
58	240,083	5,830,399	500.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
59	239,743	5,830,020	490.1	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1
60	237,935	5,831,086	510.0	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 ...	Yes	SENVION	3.4M140-3,400	3,400	140.0	91.0	12.1

Shadow receptor-Input

	UTM (south)-WGS84 Zone: 55								
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	233,938	5,820,296	400.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
B	235,026	5,817,386	400.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
C	235,760	5,831,259	480.1	2.0	1.5	1.0	0.0	90.0	"Green house mode"
D	236,084	5,831,076	480.5	2.0	1.5	1.0	0.0	90.0	"Green house mode"
E	236,079	5,831,300	480.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
F	237,170	5,817,965	414.4	2.0	1.5	1.0	0.0	90.0	"Green house mode"
G	237,848	5,817,275	404.8	2.0	1.5	1.0	0.0	90.0	"Green house mode"
H	239,908	5,831,068	509.5	2.0	1.5	1.0	0.0	90.0	"Green house mode"
I	232,345	5,817,030	380.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
J	233,813	5,813,799	378.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
K	232,224	5,814,915	377.7	2.0	1.5	1.0	0.0	90.0	"Green house mode"
L	233,189	5,818,529	390.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
M	234,649	5,819,546	386.6	2.0	1.5	1.0	0.0	90.0	"Green house mode"
N	234,381	5,830,418	500.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
O	234,437	5,834,986	542.8	2.0	1.5	1.0	0.0	90.0	"Green house mode"
P	234,231	5,834,755	540.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
Q	234,926	5,835,662	539.5	2.0	1.5	1.0	0.0	90.0	"Green house mode"
R	234,605	5,835,628	538.7	2.0	1.5	1.0	0.0	90.0	"Green house mode"
S	235,221	5,814,079	380.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
T	235,924	5,817,263	415.6	2.0	1.5	1.0	0.0	90.0	"Green house mode"
U	235,611	5,827,300	470.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
V	235,470	5,827,188	470.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
W	235,101	5,835,765	534.8	2.0	1.5	1.0	0.0	90.0	"Green house mode"
X	235,080	5,835,665	538.7	2.0	1.5	1.0	0.0	90.0	"Green house mode"
Y	235,054	5,835,659	540.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
Z	236,990	5,815,534	401.6	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AA	236,991	5,834,590	544.7	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AB	236,884	5,835,273	547.1	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AC	238,074	5,814,991	388.6	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AD	237,993	5,815,139	389.9	2.0	1.5	1.0	0.0	90.0	"Green house mode"

To be continued on next page...

Project:
34301_LalLal_RevB_20160809

Description:
Vic wind farm in Lal Lal near Ballarat
model including obstacle of trees.
search distance 1024m
remove receptor BO (not a dwelling)
2016/08/09 revision with slight
change in receptors:
- Removal of turbine YSWT37; and
- Reinstating YSWT31

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145 Ann Street
BRISBANE QLD 4000
61 7 4720 0463
Chris Davies / Christopher.Davies@ghd.com
Calculated:
9/08/2016 1:06 PM/2.9.285

SHADOW - Main Result

Calculation: RevB - B worst case scenario - 1km - obstacle

...continued from previous page

UTM (south)-WGS84 Zone: 55

No.	East	North	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
AE	237,993	5,815,237	390.6	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AF	237,913	5,818,705	400.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AG	237,955	5,819,290	400.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AH	237,982	5,827,972	460.8	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AI	237,867	5,828,259	460.4	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AJ	237,151	5,835,770	552.4	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AK	238,182	5,815,469	390.6	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AL	238,142	5,815,735	393.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AM	238,711	5,816,662	390.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AN	238,991	5,818,801	400.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AO	238,248	5,818,860	400.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AP	238,584	5,818,659	400.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AQ	238,239	5,819,045	400.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AR	238,304	5,829,565	480.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AS	238,613	5,835,432	560.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AT	239,115	5,816,724	386.6	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AU	239,957	5,831,913	519.6	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AV	239,974	5,831,555	515.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AW	239,820	5,832,252	521.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AX	239,795	5,832,616	529.1	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AY	239,798	5,832,667	530.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
AZ	239,635	5,833,198	530.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BA	239,461	5,833,716	530.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BB	239,792	5,834,345	540.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BC	241,371	5,829,923	491.5	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BD	241,097	5,830,670	502.1	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BE	241,778	5,830,993	510.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BF	241,481	5,830,456	504.8	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BG	241,181	5,830,156	492.7	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BH	241,214	5,831,184	504.5	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BI	241,297	5,831,922	512.9	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BJ	241,554	5,831,622	509.9	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BK	241,352	5,831,017	507.3	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BL	238,074	5,814,990	388.5	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BM	234,381	5,819,964	380.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BN	231,912	5,817,260	370.3	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BO	232,610	5,816,865	380.0	2.0	1.5	1.0	0.0	90.0	"Green house mode"
BP	237,842	5,828,237	460.6	2.0	1.5	1.0	0.0	90.0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	0:00	0	0:00
B	118:23	188	1:04
C	0:00	0	0:00
D	26:56	63	0:35
E	0:00	0	0:00
F	50:54	92	0:42
G	144:49	199	1:07
H	39:17	65	0:50
I	0:00	0	0:00
J	0:00	0	0:00
K	0:00	0	0:00
L	29:17	60	0:38
M	0:00	0	0:00

To be continued on next page...

Project:
34301_LalLal_RevB_20160809

Description:
Vic wind farm in Lal Lal near Ballarat
model including obstacle of trees.
search distance 1024m
remove receptor BO (not a dwelling)
2016/08/09 revision with slight
change in receptors:
- Removal of turbine YSWT37; and
- Reinstating YSWT31

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9/08/2016 1:16 PM / 4
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145 Ann Street
BRISBANE QLD 4000
61 7 4720 0463
Chris Davies / Christopher.Davies@ghd.com
Calculated:
9/08/2016 1:06 PM/2.9.285

SHADOW - Main Result

Calculation: RevB - B worst case scenario - 1km - obstacle

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
N	0:00	0	0:00
O	0:00	0	0:00
P	0:00	0	0:00
Q	0:00	0	0:00
R	0:00	0	0:00
S	0:00	0	0:00
T	38:06	114	0:32
U	0:00	0	0:00
V	0:00	0	0:00
W	0:00	0	0:00
X	0:00	0	0:00
Y	0:00	0	0:00
Z	0:00	0	0:00
AA	21:16	60	0:28
AB	0:00	0	0:00
AC	0:00	0	0:00
AD	0:00	0	0:00
AE	0:00	0	0:00
AF	0:00	0	0:00
AG	0:00	0	0:00
AH	0:00	0	0:00
AI	0:00	0	0:00
AJ	0:00	0	0:00
AK	0:00	0	0:00
AL	0:00	0	0:00
AM	0:00	0	0:00
AN	0:00	0	0:00
AO	0:00	0	0:00
AP	0:00	0	0:00
AQ	0:00	0	0:00
AR	0:00	0	0:00
AS	0:00	0	0:00
AT	0:00	0	0:00
AU	0:00	0	0:00
AV	5:15	30	0:14
AW	0:00	0	0:00
AX	0:00	0	0:00
AY	0:00	0	0:00
AZ	0:00	0	0:00
BA	0:00	0	0:00
BB	0:00	0	0:00
BC	0:00	0	0:00
BD	0:00	0	0:00
BE	0:00	0	0:00
BF	0:00	0	0:00
BG	0:00	0	0:00
BH	0:00	0	0:00
BI	0:00	0	0:00
BJ	0:00	0	0:00
BK	0:00	0	0:00
BL	0:00	0	0:00
BM	0:00	0	0:00
BN	0:00	0	0:00
BO	0:00	0	0:00
BP	0:00	0	0:00

Project:
34301_LalLal_RevB_20160809

Description:
Vic wind farm in Lal Lal near Ballarat
model including obstacle of trees.
search distance 1024m
remove receptor BO (not a dwelling)
2016/08/09 revision with slight
change in receptors:
- Removal of turbine YSWT37; and
- Reinstating YSWT31

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145 Ann Street
BRISBANE QLD 4000
61 7 4720 0463
Chris Davies / Christopher.Davies@ghd.com
Calculated:
9/08/2016 1:06 PM/2.9.285

SHADOW - Main Result

Calculation: RevB - B worst case scenario - 1km - obstacle

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Worst case [h/year]	Expected [h/year]
1	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (183)	0:00	
2	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (184)	29:17	
3	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (185)	16:21	
4	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (186)	33:48	
5	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (187)	68:14	
6	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (188)	0:00	
7	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (189)	50:54	
8	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (190)	0:00	
9	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (191)	0:00	
10	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (192)	0:00	
11	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (193)	0:00	
12	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (194)	21:41	
13	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (195)	0:00	
14	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (196)	0:00	
15	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (197)	35:36	
16	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (198)	0:00	
17	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (199)	1:54	
18	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (200)	72:46	
19	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (201)	67:27	
20	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (202)	0:00	
21	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (203)	0:00	
22	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (204)	0:00	
23	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (205)	0:00	
24	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (206)	0:00	
25	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (207)	21:16	
26	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (208)	0:00	
27	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (209)	0:00	
28	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (210)	0:00	
29	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (211)	0:00	
30	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (212)	0:00	
31	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (213)	0:00	
32	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (214)	0:00	
33	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (215)	0:00	
34	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (216)	0:00	
35	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (217)	0:00	
36	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (218)	0:00	
37	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (219)	0:00	
38	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (220)	0:00	
39	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (221)	0:00	
40	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (222)	0:00	
41	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (223)	26:56	
42	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (224)	0:00	
43	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (225)	0:00	
44	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (226)	0:00	
45	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (227)	0:00	
46	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (228)	0:00	
47	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (229)	0:00	
48	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (230)	0:00	
49	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (231)	0:00	
50	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (232)	0:00	
51	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (233)	0:00	
52	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (234)	44:32	
53	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (235)	0:00	
54	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (236)	0:00	
55	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (237)	0:00	
56	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (238)	0:00	
57	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (240)	0:00	
58	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (241)	0:00	
59	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (242)	0:00	
60	SENVION 3.4M140 3400 140.0 !O! hub: 91.0 m (TOT: 161.0 m) (244)	0:00	

15 August 2016

Attachment D
Revised Noise Assessment

MARSHALL DAY Acoustics

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Collingwood VIC 3066
Australia
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ABN: 53 470 077 191
www.marshallday.com

12 August 2016

Herbert Smith Freehills
101 Collins Street
Melbourne VIC 3000

Attention: Jennifer Meeks

Dear Jennifer

LAL LAL WIND FARM: REVISED WIND FARM NOISE LEVEL PREDICTIONS

INTRODUCTION

Marshall Day Acoustics Pty Ltd (MDA) prepared a noise impact assessment report for the Lal Lal Wind Farm in accordance with New Zealand Standard 6808:2010 *Acoustics – Wind farm noise* (NZS6808:2010), as required by the Victorian Government's *Policy and planning guidelines for development of wind energy facilities in Victoria*[1], on 11 September 2015 (the MDA Report[2]). The assessment detailed in the MDA Report was based on a wind farm layout comprising sixty (60) turbines, with a Senvion 3.2M114 turbine nominated as a candidate turbine for the purposes of assessing wind farm sound levels.

On behalf of WestWind Energy Pty Ltd (WestWind), Herbert Smith Freehills (HSF) instructed MDA to revise the noise assessment for the Lal Lal Wind Farm detailed in the MDA Report considering the following changes:

- An amended sixty (60) wind turbine layout, dated 3 August 2016
- New octave band sound power data, provided by Senvion, for the candidate 3.2M114 turbine model
- Consideration of two (2) additional candidate turbine models with larger rotor diameters: the Senvion 3.4M122 and Senvion 3.4M140
- An additional participating property (J17ab)

The methodology used for this revised noise assessment is generally consistent with that detailed in the MDA Report. Variations from the MDA Report methodology are noted in the text below.

---

1 The MDA Report referenced the June 2015 version of the Victorian Government's *Policy and planning guidelines for development of wind energy facilities in Victoria.* These guidelines have since been revised and the latest version, dated January 2016 includes additional guidance regarding the application of the high amenity area noise limits. These changes do not affect the determination of the noise criteria presented in the MDA Report and therefore are not addressed in this document.

2 MDA Report 002 2015386ML dated 11 September 2015

NOISE CRITERIA

Noise limits

As detailed in Section 6.3 of the MDA Report, the NZS6808:2010 base noise limit of 40 dB L_{A90} has been used in this assessment for non-participating properties.

For participating properties, clause 23 of the proposed planning permit conditions[3] specifies the following:

> *Any dwelling may be exempt from* [complying with the noise limits detailed in Condition 23]*. This exemption will be given effect through a written agreement with the landowner of the dwelling and evidence of the agreement must be provided to the satisfaction of the Minister for Planning.*

WestWind has advised that agreements have been signed between WestWind and all participating landowners. Whilst these dwellings are therefore exempt for noise limits according to Condition 23 of the Planning Permit, a recommended base noise limit of 45 dB L_{A90} is referenced in this noise assessment for participating properties. This base noise limit is provided for informative purposes and is consistent with recommendations from the final report by *The European Working Group on Noise from Wind Turbines* (ETSU-R-97).

Special audible characteristics

Section 5.4.2 of NZS 6808:2010 requires the following:

> *Wind turbine sound levels with special audible characteristics (such as tonality, impulsiveness and amplitude modulation) shall be adjusted by arithmetically adding up to +6dB to the measured level at the noise sensitive location.*

Consistent with Section 5.4 of NZS 6808:2010, clause 23.b of the proposed planning permit conditions requires that, in the event that special audible characteristics are identified, a penalty would be applied to the measured wind farm noise levels during any post-construction noise monitoring surveys.

While the standard and Planning Permit emphasise the assessment of special audible characteristics during the post-construction measurement phase of a project, an assessment of tonality is possible pre-construction, using tonality assessments carried out according to IEC61400-11[4].

[3] Submitted with the amendment application dated October 2015

[4] IEC 61400 -11 *Wind turbine generator systems - Part 11: Acoustic noise measurement techniques*

SITE LAYOUT

Turbines

The proposed wind farm layout comprises sixty (60) turbines which are to be divided into two (2) primary turbine clusters:

- Yendon section: Thirty-eight (38) turbines
- Elaine section: Twenty-two (22) turbines

The amended turbine layout involves the following:

- Relocating one (1) turbine (ESWT02 by 150 m)
- Removing one (1) turbine (YSWT37)
- Reinstating one (1) turbine (YSWT31)

The coordinates of the wind turbines are tabulated in Appendix A.

Three (3) candidate turbine models are considered as part of this revision of predicted wind farm noise levels, as detailed in Table 1.

Table 1: WTG manufacturer specifications

Detail	Senvion 3.2M114	Senvion 3.2M122	Senvion 3.4M140
Rated power (MW)	3.2	3.4	3.4
Rotor Diameter (m)	114	122	140
Hub Height (m)	104	100	91
Orientation	Upwind	Upwind	Upwind
Serrated trailing edge	No	No	Yes
Highest sound power L_{WA} dB	105.2*	105.5*	105.0*
Tonal audibility[+] (at wind speeds ≥ 6 m/s @10 m AGL[#])	$\Delta L_{a,k}$ <0 dB	$\Delta L_{a,k}$ <0 dB	$\Delta L_{a,k}$ <2 dB

* Guaranteed sound power level, including a 1 dB margin to account for uncertainties
[+] Tonality is discussed further below
[#] Above ground level (AGL)

Receivers

Twenty (20) receivers have been identified by the proponent in the vicinity of the proposed wind farm, including seven (7) participating properties. All twenty (20) receivers are included in this revised noise assessment. Their location coordinates are tabulated in Appendix A.

TURBINE DATA

Referenced documents

Sound power levels used in the assessment have been sourced from the documents presented in Table 2, for each of the candidate turbine models.

Table 2: Turbine sound power level reference documents

Model	Reference document
Senvion 3.2M114	
Overall sound power level	Senvion document No. SD-3.2-WT.PC.00-C-B-EN *Power Curve & Sound Power Level [3.2M114VG/50Hz]* dated 29 February 2016
Octave band sound power levels	Senvion document No. GI-3.2-WT.PO.07-A-A-EN *Octave & Third Octave Band Data [3.2M114VG/50Hz] General Information,* dated 15 February 2016
Tonality	DNV-GL document No. GLGH-4286 14 12058 293-S-0002-A *Summary of results of a noise emission measurement in accordance with IEC 61400-11 Ed. 2.1* dated 23 July 2014
Senvion 3.4M122	
Overall sound power level	Senvion document No. SD-3.10-WT.PC.00-B-B-EN *Power Curve & Sound Power Level 3.4M122NES [3400kW/50Hz],* dated 8 July 2016
Octave band sound power levels	Senvion document No. GI-3.5-WT.PO.04-A-B-EN *Octave & Third Octave Band Data [3.0M122/50Hz] General Information,* dated 9 December 2015
Tonality	DNV-GL document No. GLGH-4286 15 13366 258-S-0004-B *Summary of results of a noise emission measurement in accordance with IEC 61400-11 Ed. 2.1* dated 23 June 2015
Senvion 3.4M140	
Overall sound power level	Senvion document No. SD-3.20-WT.PC.01-A-B-EN *Power Curve & Sound Power Level [3.4M140/50Hz],* dated 2 June 2016
Octave band sound power levels	Senvion document No. GI-3.5-WT.PO.04-A-B-EN *Octave & Third Octave Band Data [3.0M122/50Hz] General Information,* dated 9 December 2015
Tonality	Senvion document No. SD-3.20-WT.PC.01-A-B-EN *Power Curve & Sound Power Level [3.4M140/50Hz],* dated 2 June 2016

Sound power levels

The Senvion documents noted above state that the reported sound power levels are guaranteed levels excluding measurement uncertainty. For the current assessment, 1 dB has been added to the guaranteed levels as a nominal allowance for measurement uncertainty. The resulting profile of A-weighted sound power levels as a function of hub height wind speed, are presented in Figure 1, for each of the candidate turbine models.

Figure 1: Guaranteed sound power level vs. hub height wind speed

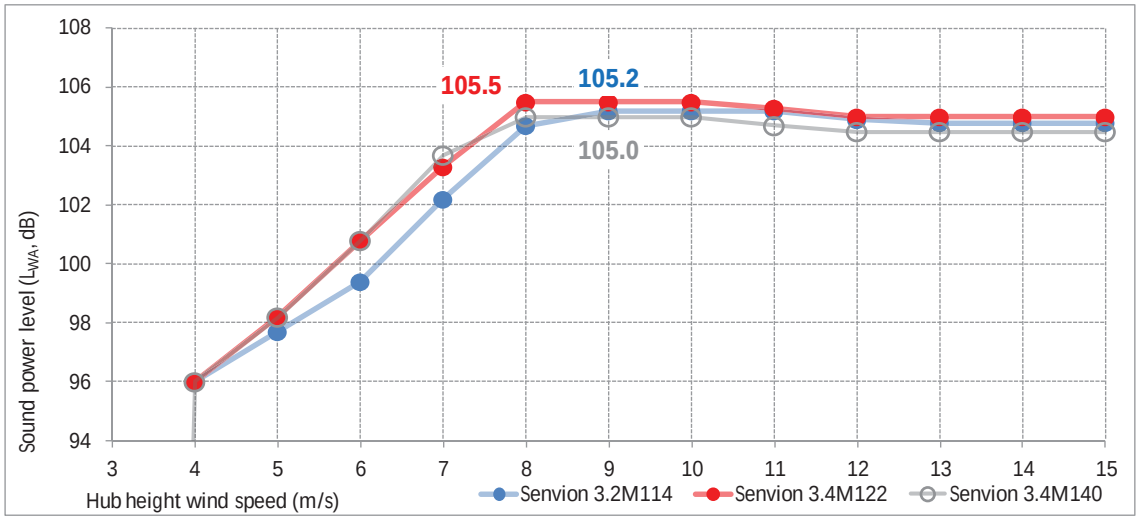
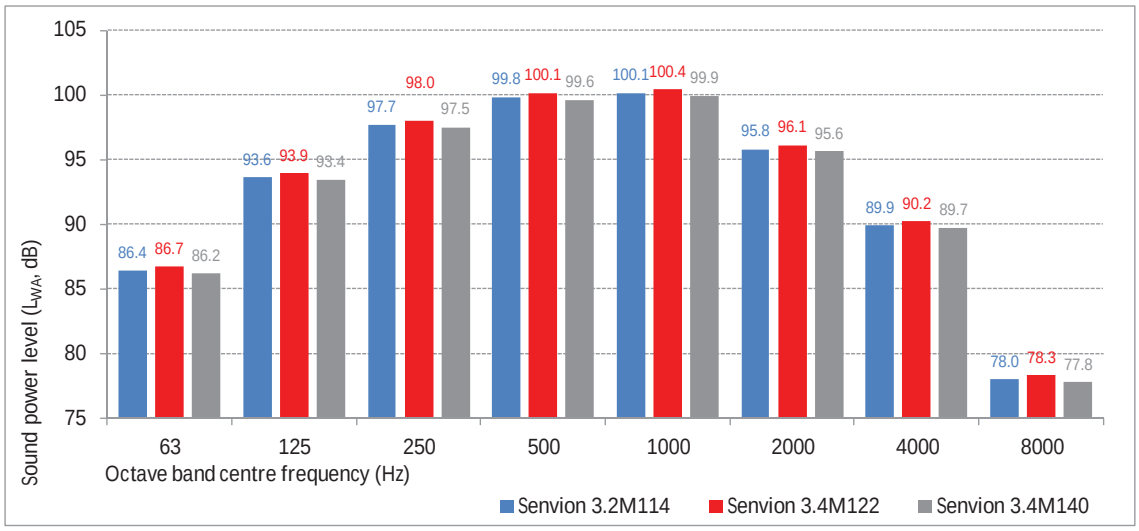


Figure 2 below presents octave band sound power levels corresponding to the highest overall sound power level for each of the candidate turbines. The values presented in the figure are based on octave band data from the Senvion documents which has been linearly scaled for agreement with the overall levels. Tabular octave band sound power levels are also presented in Appendix C.

Figure 2: A-weighted octave band sound power level spectra



The following items are also noted regarding the octave band sound power levels:

- Data for the Senvion 3.4M122 candidate turbine is based on information provided by Senvion for the 3.0M122 turbine. It is understood that there is sufficient similarity between these two variants of the M122 series of turbines that the 3.0M122 octave band data can be considered as representative of the spectral content for the 3.4M122.
- Data for the Senvion 3.4M140 candidate turbine is also based on information provided by Senvion for the 3.0M122 turbine. Senvion has provided the following statement about this matter:

  The octave data for the 3.4M140 is not yet available. For this reason we have given the octave data for the 3.0M122 to be scaled to the appropriate sound power level for the 3.4M140. However, the 3.0M122 octave data is for a turbine without serrations. The 3.4M140 will come with serrations. Serrations reduce the SPL as reflected in the guaranteed SPL and they also act to shift the spectrum to higher frequencies. As higher frequencies don't propagate as effectively using octave data for a turbine will be conservative in predicting the noise levels at residences.

Tonality

Tonal audibility

IEC 61400-11:2006 requires the reporting of identified tones where the tonal audibility, $\Delta L_{a,k}$ is greater than or equal to -3.0 dB. This reporting requirement relates to a range of standardised wind speeds between 6 and 10 m/s at 10 m above ground level (AGL).

It is important to note that the IEC 61400-11:2006 reporting requirement does not necessarily reflect expected levels of audibility or annoyance from the assessed tones. Work by Zwicker and FastI[5] indicates that:

- $\Delta L_{a,k}$ = -2 dB is approximately the audibility threshold for a tone
- Where $\Delta L_{a,k}$ < 0 dB, the tone, while perhaps audible, is generally unlikely to cause significant issues.

On this basis it is considered that, where $\Delta L_{a,k}$ < 0 dB, identified tones are unlikely to be problematic at the IEC 61400-11:2006 assessment location, which is typically within a few hundred metres of a turbine.

It should also be noted that the level of tonal audibility at the IEC 61400-11:2006 assessment location does not directly inform levels of tonal audibility at neighbouring receivers, which are typically located further away from wind turbines. Levels of tonal audibility at more distant locations depend on a range of dynamic factors including the frequency of the tonal character, the intervening terrain and its influence of sound propagation at different frequencies, the ambient noise environment at the receiver location and the weather conditions during any particular period. While the complexity of these factors mean it is difficult to infer tonal audibility levels at receiver locations based on levels assessed at the IEC 61400-11:2006 measurement location, the following guidance generally applies:

- Where a tone is not considered audible in close proximity of a turbine (IEC 61400-11:2006 assessment location), it is unlikely that it would be audible at neighbouring receivers
- Where tonal audibility $\Delta L_{a,k}$ < 0 dB at the sound power level measurement location, it is generally expected that tonality will not be a significant issue at receiver locations which are located further from the turbine
- Where tonal audibility $\Delta L_{a,k}$ > 0 dB at the IEC 61400-11:2006 , the likelihood of there being tonal characteristics to wind farm noise at receiver locations is less certain and has the potential to vary over time.

Candidate turbines

A tonal audibility performance commitment has been provided for each candidate turbine as part of the Senvion documentation detailed in Table 1. It is understood that the commitments relate to tonality assessment at the IEC 61400-11:2006 sound power level measurement location. The commitments state that there will be no tonal audibility ($\Delta L_{a,k}$) at levels higher than 0-2 dB for wind speeds greater than or equal to 6 m/s at 10 m AGL.

Additional information relating to each candidate turbine is outlined below.

[5] FastI, H, Zwicker, E, (2007) *Psycho-acoustics*, Berlin, Springer

Senvion 3.2M114

The Senvion document presenting the overall sound power levels for the Senvion 3.2M114 states the following:

There is no tonal audibility $\Delta L_{a,k} > 0$ dB (for $v_{10} \geq 6$ m/s).

Additionally, the tonality document[6] referenced in Table 2 for this candidate turbine model includes tonality test results for wind speeds in the range of 5-9 m/s referenced at 10 m AGL[7]. These results are summarised in Table 3.

Table 3: Summary of test report tonality results

Wind Speed m/s at 10m AGL	Tone audibility, $\Delta L_{a,k}$ (dB)	Frequency (Hz)
5	-7.08	180
6	-9.66	1,640
7	-8.20	1,440
8	-2.83	98
9	-3.69	98

For the current works, based on the above, no penalty for special audible characteristics for tonality is considered relevant to wind farm noise levels predicted using the Senvion 3.2M114 candidate turbine.

Senvion 3.4M122

The Senvion documents presenting the overall sound power level for the Senvion 3.4M122 state the following:

There is no tonal audibility $\Delta L_{a,k} > 2$ dB (for $v_{10} \geq 6$ m/s).

As detailed above, where tonal audibility $\Delta L_{a,k} > 0$ dB at the IEC 61400-11:2006 measurement location, the likelihood of there being tonal characteristics to wind farm noise at receiver locations is less certain and has the potential to vary over time.

A penalty for the special audible characteristic of tonality does not necessarily apply in the case of audibility but rather a tone must be sufficiently audible, as quantified by the assessment methods detailed in NZS 6808:2010. For the tonal audibility performance commitment from Senvion ($\Delta L_{a,k} \leq 2$ dB), there is some potential that tonality will be sufficiently audible to qualify for a special audible characteristics penalty at neighbouring receiver locations. However, the magnitude of any potential audibility is difficult to quantify at this stage of the assessment.

[6] DNV-GL document No. GLGH-4286 14 12058 293-S-0002-A *Summary of results of a noise emission measurement in accordance with IEC 61400-11 Ed. 2.1* dated 23 July 2014

[7] Approximately equivalent to a wind speed range of 7.4-13.3 m/s at hub height using the standard IEC 61400-11:2006 roughness length of 0.05 m

The tonality document[8] referenced in Table 2 for this candidate turbine model details results of a tonal audibility assessment for a related turbine model, the Senvion 3.0M122 turbine model. The referenced document includes tonality test results for wind speeds in the range of 5-7 m/s referenced at 10 m AGL[9]. These results are summarised in Table 4.

Table 4: Summary of test report tonality results for Senvion 3.0M122

Wind Speed m/s at 10m AGL	Tone audibility, $\Delta L_{a,k}$ (dB)	Frequency (Hz)
5	-3.04	150
6	-13.37	276
7	-2.42	1,438

Senvion has advised that the tonal characteristics of the 3.0M122 and 3.4M122 are likely to be comparable and that, in the absence of directly measured data for the candidate turbine, tonal audibility assessment for the 3.0M122 is suitable to inform the likely tonal characteristics of the Senvion 3.4M122. On this basis, and given the results presented in Table 4, no penalty for special audible characteristics for tonality has been applied to wind farm noise levels predicted using the Senvion 3.4M122.

The uncertainty that the Senvion commitment introduces into the assessment should, however, be noted.

Senvion 3.4M140

In document No. SD-3.20-WT.PC.01-A-B-EN, Senvion states the following regarding the 3.4M140 turbine:

> *There is no tonal audibility $\Delta L_{a,k} > 2$ dB (for $V_{10} \geq 6$ m/s).*

For the current works, as discussed for the Senvion 3.4M122 turbine model, no penalty for special audible characteristics for tonality has been applied to wind farm noise levels predicted using the Senvion 3.4M140.

The uncertainty that the Senvion commitment introduces into the assessment should, however, be noted.

Applicability of a penalty for special audible characteristics

As noted in the Noise Criteria Section above, clause 23.b of the proposed planning permit conditions requires that, in the event that special audible characteristics are identified, a penalty would be applied to the measured wind farm noise levels during any post-construction noise monitoring surveys. Notwithstanding this, an assessment of tonality is possible pre-construction, using manufacturer's performance commitments and tonality assessments carried out according to IEC 61400-11 such as those detailed in preceding subsections.

For the current revised noise assessment, based on the information provided by the manufacturer for the three (3) candidate turbine models, no penalty for special audible characteristics for tonality has been applied to this assessment. However, for the 3.4M122 and 3.4M140 candidate turbines, the manufacturer's performance commitments introduce uncertainty into the assessment of potential tonality.

Notwithstanding the above, it is envisaged that the procurement contract for the site would stipulate that the turbines must not produce emissions which would attract a penalty for tonality when assessed in accordance with the relevant noise criteria and any associated conditions of consent.

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[8] DNV-GL document No. GLGH-4286 15 13366 258-S-0004-B *Summary of results of a noise emission measurement in accordance with IEC 61400-11 Ed. 2.1* dated 23 June 2015

[9] Approximately equivalent to a wind speed range of 7.4-10.4 m/s at hub height using the standard IEC 61400-11:2006 roughness length of 0.05 m

PREDICTIONS

Noise from the Lal Lal Wind Farm has been predicted using ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors Part 2: General method of calculation* (ISO 9613-2:1996) as implemented in version 7.4 of SoundPLAN and taking into account the recommendations detailed in the UK Institute of Acoustics *A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise* dated May 2013.

The following key details are noted:

- Turbine hub height: As detailed in Table 1
- Receiver heights: 1.5 m
- Ground characterisation: G = 0.5
- Atmospheric conditions: T = 10°C and RH = 70 %
- Terrain elevation sourced from VicMap (downloaded July 2016)

A fuller summary of the prediction methodology is provided in Appendix B.

RESULTS

Predicted noise levels, corresponding to the highest sound power levels detailed in Table C1 of Appendix C are provided in Table 5 for each of the candidate turbine models.

Table 5: Highest predicted noise levels at all assessed properties - L_{A90}, dB

Receiver	Base noise limit	Senvion 3.2M114	Senvion 3.4M122	Senvion 3.4M140
Elaine Section				
H18aa	40	38.7	39.0	38.6
J17aa (P)	45	45.0	45.3	44.9
J17ab (P)	45	40.5	40.8	40.3
K15aa	40	36.6	36.9	36.4
L17aa (P)	45	44.3	44.6	44.1
L17ab (P)	45	43.2	43.5	43.0
L18aa	40	36.7	37.0	36.6
L19ab	40	33.8	34.1	33.6
M18ab	40	34.3	34.6	34.1
M19aa	40	33.6	33.9	33.4

Receiver	Base noise limit	Senvion 3.2M114	Senvion 3.4M122	Senvion 3.4M140
Yendon Section				
J31aa (P)	45	38.7	39.0	38.5
K31aa (P)	45	40.8	41.1	40.6
K31ab (P)	45	40.1	40.4	39.9
K34aa	40	39.4	39.8	39.3
M29aa	40	39.5	39.8	39.3
N31aa	40	38.2	38.5	38.0
N31ab	40	39.7	40.0	39.6
N32aa	40	37.7	38.0	37.5
N32ab	40	36.8	37.1	36.6
N32ac	40	36.6	37.0	36.5

Note: Shaded cell(s) exceed the base noise limit
(P) Participating property

The following can be seen from Table 5:

- Senvion 3.2M114:

  Predicted noise levels from the Lal Lal Wind Farm comply with the base noise limits at all assessed properties.

- Senvion 3.4M122:

  Predicted noise levels from the Lal Lal Wind Farm comply with the base noise limits at all assessed non-participating properties.

  Predicted noise levels from the Lal Lal Wind Farm exceed the informative base noise limit at one (1) assessed participating properties (J17aa) by 0.3 dB.

- Senvion 3.4M140:

  Predicted noise levels from the Lal Lal Wind Farm comply with the applicable base noise limits at all assessed properties.

  As noted above, the octave band data used for the 3.4M140 is based on the octave band spectrum from a 3.0M122 turbine. Whilst the 3.4M140 is designed with serrated blades, the data for the 3.0M122 relates to a model without serrated blades. Senvion has advised that the addition of serrations on the blades is likely to reduce the low frequency sound power level content of the turbine and increase the high frequency content. This may in turn lead to a greater portion of a turbine's sound power being reduced during propagation to neighbouring receivers due to atmospheric absorption which generally has greater effect in the high frequency range. This could then result in lower predicted noise levels at receiver locations.

  Notwithstanding this, with the currently available information it is not possible to reliably predict the magnitude of any change in noise levels from serrated blades at receiver locations. This is because sound power level data for the 3.4M140 with serrated blades is unavailable.

CONCLUSION

This revised noise assessment has demonstrated that predicted wind farm noise levels for all three (3) candidate turbines, Senvion 3.2M114, 3.4M122 and 3.4M140, are able to comply with the NZS 6808:2010 base noise limit of 40 dB L_{A90} at all non-participating receiver locations.

The assessment also demonstrates that predicted wind farm noise levels for all three (3) candidate turbines are able to comply with the informative ETSU-R-97 base noise limit of 45 dB L_{A90} at all participating properties with the exception of property J17aa, where levels exceed the base limit by0.3 dB when using the 3.4M122 turbine model. WestWind has advised, however, that agreements have been signed between WestWind and all participating landowners. In accordance with clause 23 of the proposed planning permit conditions, they are therefore exempt them from compliance with the noise limits.

The results of this revised noise assessment are considered to demonstrate the viability of the proposed wind farm to satisfy the acoustic requirements of the Victorian Government's Policy and planning guidelines for development of wind energy facilities in Victoria.

However, it is also noted that octave band sound power levels and tonality assessment information for two of the candidate turbines, the 3.4M122 and 3.4M140, are not based on direct measurement results and are therefore subject to greater uncertainty tolerances. Where either of these candidate turbines is selected for installation at the wind farm in the future, the wind farm noise assessment should be revisited using direct measurement data for octave band sound power levels and tonality. Ultimately, potential special audible characteristics will be accounted for during the post-construction noise assessment of compliance with NZS 6808:2010 at all neighbouring participating properties.

Yours faithfully

MARSHALL DAY ACOUSTICS PTY LTD

Christophe Delaire

Associate

APPENDIX A WIND FARM LAYOUT

A1 Turbine Coordinates – MGA94 Zone 55

Turbine	Easting	Northing	Turbine	Easting	Northing
ESWT01	233500	5817822	YSWT10	236427	5832689
ESWT02	233853	5818217	YSWT11	236867	5832295
ESWT03	234084	5817161	YSWT12	237362	5832449
ESWT04	234351	5817454	YSWT13	237778	5832435
ESWT05	234648	5817731	YSWT14	237722	5831876
ESWT06	235025	5817868	YSWT15	237577	5831353
ESWT07	236483	5818385	YSWT16	238492	5832517
ESWT08	236876	5818621	YSWT17	238291	5832052
ESWT10	234095	5815947	YSWT18	238663	5831739
ESWT11	234393	5816255	YSWT19	238151	5831503
ESWT12	234695	5816555	YSWT20	237011	5830822
ESWT13	234986	5816872	YSWT21	236257	5830315
ESWT14	234746	5815979	YSWT22	236743	5830314
ESWT15	235337	5816007	YSWT23	236485	5829872
ESWT16	236903	5817482	YSWT24	236209	5829620
ESWT17	236754	5816449	YSWT25	237009	5829643
ESWT18	237003	5816752	YSWT26	235970	5829179
ESWT19	237212	5817071	YSWT27	236860	5829275
ESWT20	237353	5817401	YSWT28	235956	5828763
ESWT21	237579	5817722	YSWT29	236585	5828803
ESWT23	233785	5815068	YSWT30	237553	5830953
ESWT24	233936	5815414	YSWT31	237935	5831086
YSWT01	235749	5834082	YSWT32	239265	5831110
YSWT02	236335	5834001	YSWT33	237473	5830494
YSWT03	237834	5834197	YSWT34	238063	5830698
YSWT05	237479	5833611	YSWT35	238489	5830840
YSWT06	237872	5833859	YSWT36	239624	5830764
YSWT07	236389	5833239	YSWT38	239378	5830392
YSWT08	236950	5833099	YSWT39	240083	5830399
YSWT09	237383	5833222	YSWT40	239743	5830020

A2 Receiver Coordinates – MGA94 Zone 55

Property	Easting	Northing	Distance to nearest turbine (m)	Nearest turbine
Elaine Section				
H18aa	233189	5818529	740	ESWT02
J17aa (P)	235026	5817386	492	ESWT06
J17ab (P)	235924	5817263	1,008	ESWT16
K15aa	236990	5815534	950	ESWT17
L17aa (P)	237170	5817965	486	ESWT21
L17ab (P)	237848	5817275	520	ESWT20
L18aa	237913	5818705	1,043	ESWT21
L19ab	237955	5819290	1,273	ESWT08
M18ab	238248	5818860	1,324	ESWT21
M19aa	238239	5819045	1,431	ESWT08
Yendon Section				
J31aa (P)	235760	5831259	1,071	YSWT21
K31aa (P)	236084	5831076	787	YSWT21
K31ab (P)	236079	5831300	1,006	YSWT21
K34aa	236991	5834590	887	YSWT02
M29aa	238304	5829565	1,163	YSWT34
N31aa	239957	5831913	1,065	YSWT32
N31ab	239974	5831555	843	YSWT32
N32aa	239820	5832252	1,269	YSWT18
N32ab	239795	5832616	1,310	YSWT16
N32ac	239798	5832667	1,318	YSWT16

(P) Participating property

APPENDIX B PREDICTION METHODOLOGY

Detail	Description
Software	Proprietary noise modelling software SoundPLAN version 7.4 (current release)
Method	International Standard ISO 9613-2:1996 *Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation* (ISO 9613-2). Adjustments to the ISO 9613-2 method are applied on the basis of the guidance contained in the UK Institute of Acoustics publication *A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise* (UK good practice guide).
Source characterisation	Each wind turbine is modelled as an incoherent point source of sound positioned at the proposed hub height of the turbines. The total sound of the wind farm is then calculated on the basis of simultaneous operation of all wind turbines and summing the contribution of each.
Terrain data	10 m elevation contours downloaded from VicMap in July 2016
Terrain effects	Adjustments for the effect of terrain are determined and applied on the basis of the UK good practice guide.
Ground conditions	Ground factor of G = 0.5 The ground around the site corresponds to acoustically soft conditions (G=1) according to ISO 9613-2. The adopted value of G = 0.5 assumes that 50% of the ground cover is acoustically hard (G = 0) to account for variations ground porosity and provide a cautious representation of ground effects.
Atmospheric conditions	Temperature 10°C and relative humidity 70 % This represents conditions which result in relatively low levels of atmospheric sound absorption, consistent with recommended values in NZS 6808:2010. The calculations are based on sound speed profiles[10] which increase the propagation of sound from each turbine to each receiver location, whether as a result thermal inversions or wind directed toward each calculation point. The primary consideration for wind farm noise assessment is wind speed and direction. The noise level at each calculation point is assessed on the basis of being simultaneously downwind of every wind turbine at the site. Other wind directions in which part or the entire wind farm is upwind of the receiver will result in lower noise levels. In some cases, it is not physically possible for a receiver to be simultaneously downwind of each turbine and the approach is therefore conservative in these instances.
Receiver heights	1.5 m AGL

[10] The sound speed profile defines the rate of change in the speed of sound with increasing height above ground

APPENDIX C SOUND POWER LEVEL DATA

C1 Guaranteed sound power levels +1 dB uncertainty vs. hub height wind speed – L_{WA} dB

Hub height wind speed m/s	4	5	6	7	8	9	10	11	12	13	14	15
Senvion 3.2M114	96.0	97.7	99.4	102.2	104.7	105.2	105.2	105.2	104.9	104.8	104.8	104.8
Senvion 3.4M122	96.0	98.2	100.8	103.3	105.5	105.5	105.5	105.3	105.0	105.0	105.0	105.0
Senvion 3.4M140	96.0	98.2	100.8	103.7	105.0	105.0	105.0	104.7	104.5	104.5	104.5	104.5

C2 Octave band sound power levels – L_{WA} dB

Frequency Hz	63	125	250	500	1000	2000	4000	8000	A
Senvion 3.2M114	86.4	93.6	97.7	99.8	100.1	95.8	89.9	78.0	105.2
Senvion 3.4M122*	86.7	93.9	98.0	100.1	100.4	96.1	90.2	78.3	105.5
Senvion 3.4M140*	86.2	93.4	97.5	99.6	99.9	95.6	89.7	77.8	105.0

* Based on octave band spectral information for the Senvion 3.0M122 turbine

15 August 2016

Attachment E
Revised Landscape and Visual Impact Assessment

XURBAN

11 August 2016

Herbert Smith Freehills
101 Collins Street
Melbourne, Vic 3000
Australia

Attention Ms Michelle Keen – Special Counsel
Email: Michelle.Keen@hsf.com

Reference No: 15040 / L3b

RE: Lal Lal Wind Farm – Proposed amendments to rotor diameter

Dear Michelle,

Further to your instructions, the letter below sets out my assessment as to the visual impact of an increase in wind turbine rotor diameter to either 126 m, 130 m, 136 m or 140 m from the 82 m diameter rotor that was modelled for the original permit application. The permit was issued for a rotor diameter of 95 m.

I have prepared photomontages which illustrate the variation between the approved layout (130 m high and 82 m diameter) and the proposed modification (161m high, 140 m diameter). The wind farm has also had minor amendments since the earlier photomontages were prepared. These were:

- Removal of turbine YSWT37;
- Reinstating YSWT31 from the approved permit PL-SP/05/0461; and
- ESWT02 has moved approximately 150 m south.

ERM have previously prepared a set of photomontages which compared the approved layout (130 m high and 82 m diameter) and an alternative wind turbine (161m high, 122 m diameter) for the proposed amendment application dated October 2015.

Copies of both these sets of photomontages are attached.

Findings

The photomontages illustrate that whilst there is a change to the height and diameter of the proposed wind turbines, such a change to either a 122m diameter or to a 140m diameter has a negligible impact on views. It therefore follows that a change to a 126 m, 130 m or 136 m diameter would similarly result in a negligible change to the level of visual impact.

Negligible was defined in the Visual Impact Methodology ('Landscape and visual assessment' dated 29th April 2016, Chapter 4,) as a "*minute level of effect that is barely discernible over ordinary day-to-day effects*."

Looking at the difference between the photomontages depicting wind turbines at 130 m and at 161 m high and with rotor diameters that vary from 82 m (approved) to 122 m and then 140 m with the same background and lighting, the difference in visual impact is negligible. Similar differences will occur in different light situations with no change in the height or rotor diameter. Similar variation in the scale will also be apparent if a viewer moved forward or backward from the viewpoint locations.

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Visual assessment

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The real visual impact of the wind farm is the presence of tall vertical structures with sweeping blades in a landscape that is typically a rural landscape. This impact was assessed by the Panel with respect to the original application and the impact was, on balance, found to be acceptable.

The level of impact bought about by the proposed modifications and as shown in the photomontages would not alter the impact levels that were assessed in the LVIA and considered by the Panel. There is a slight change in the degree of impact, but one which does not alter the quantum of the impact, that is the impact would not change from low to medium, or from medium to high.

Therefore, the alteration of the rotor diameter (to either 126 m, 130 m, 136 m or 140 m) is considered to have a negligible visual impact above that of the approved wind farm.

Potential residential impact

The approval was also subject to landscape mitigation measures being offered to affected residential properties within 3 km.

With the proposed amendment increasing the heights of the proposed wind turbines to 161 m, it would be appropriate if the distance within which landscape mitigation was offered was increased. Mathematically that increase would be to 3.6 km, however it is my recommendation that landscape mitigation be offered to residential properties within 4 km of the nearest visible wind turbine.

This recommendation regarding residential landscape mitigation measures is unaffected by the proposed changes to the rotor diameter.

If you have any queries, please do not hesitate to contact me.

Yours sincerely,

for XURBAN

Allan Wyatt – *Landscape Architect*

Photomontage of approved layout 130m high, 82m diameter

Photomontage of proposed layout 161m high, 140m diameter

XURBAN

Urban Design
Landscape Architecture
Visual Assessment

Suite 1103, 408 Lonsdale Street,
Melbourne Victoria 3000

P: 61 3 9642 8040
E: allan.wyatt@xurban.com.au

Viewpoint House G17AA

Location data reference:
Grid Datum: GDA94 Zone 54

Easting: 761084
Northing: 5817299
Ground level: approximately 383m
Distance to nearest wind turbine: approximately 1.3 km

Notes:

Photomontage of 'Approved layout 130m high, 82m diameter' prepared by ERM on the 27/02/08, Project No. 0058176, Drawing No 9

Project:
LAL LAL WIND FARM

Drawing:
Narmbool Reception Centre
Approved & proposed

COMPARATIVE VIEW

Date: 27 July 2016 Project No: 15040

Drawing No: **VP G17AA** Revision No:

Photomontage of approved layout 130m high, 82m diameter

Photomontage of proposed layout 161m high, 140m diameter

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Viewpoint D

Location data reference:
Grid Datum: GDA94 Zone 55

Easting: 238488
Northing: 5828213
Ground level: approximately 469m
Distance to nearest wind turbine: approximately 1.9 km

Notes:

Photomontage of 'Approved layout 130m high, 82m diameter' prepared by ERM on the 27/02/08, Project No. 0058176, Drawing No 3a.

Project:
LAL LAL WIND FARM

Drawing:
Lal Lal Falls

COMPARATIVE VIEW

Date: 9 August 2016

Project No: 15040

Drawing No: **VP D**

Revision No:

Photomontage of approved layout 130m high, 82m diameter

Photomontage of proposed layout 161m high, 140m diameter

XURBAN

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Melbourne Victoria 3000

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E: allan.wyatt@xurban.com.au

Viewpoint D

Location data reference:
Grid Datum: GDA94 Zone 55

Easting: 238488
Northing: 5828213
Ground level: approximately 469m
Distance to nearest wind turbine: approximately 1.9 km

Notes:

Photomontage of 'Approved layout 130m high, 82m diameter' prepared by ERM on the 27/02/08, Project No. 0058176, Drawing No 3a.

Project:
LAL LAL WIND FARM

Drawing:
Lal Lal Falls

PANORAMA COMPARISON

Date: 9 August 2016

Project No: 15040

Drawing No: **VP D**

Revision No:

WestWind ENERGY

WestWind Energy

PHOTOMONTAGES - 2015

Lal Lal Wind Farm

April 2015

0058176 Photomontages

Existing View (2008 Photography)

World Trade Centre
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Facsimile +61 3 9696 8022
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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 235541
Northing: 5839463
Elevation: 572

Distance to nearest turbine (approved layout): 5.3 Km
Distance to nearest turbine (amended layout): 5.3 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

Viewpoint A

View from west bound weighbridge rest area on Western Highway looking south over Bungaree Township

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPA - 1	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

ERM

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Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 235541
Northing: 5839463
Elevation: 572

Distance to nearest turbine (approved layout): 5.3 Km
Distance to nearest turbine (amended layout): 5.3 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

1. - April 2015 - Photomontage (2008) with 130 m high wind turbines (approved layout - 2008) and comparative photomontage showing 161m high wind turbines (amended layout - 2015)

Lal Lal Windfarm

For: West Wind Energy

Viewpoint A

View from west bound weighbridge rest area on Western Highway looking south over Bungaree Township

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPA - 2	Drawn by:	ML
Revision No:	1	Reviewed by:	AW

Existing View (2008 Photography)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 228848
Northing: 5828312
Elevation: 750

Distance to nearest turbine (approved layout): 7.0 Km
Distance to nearest turbine (amended layout): 7.0 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

Viewpoint B

from Alexander Bell Memorial Tower lookout platform (Mount Buninyong) looking northeast

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPB - 1	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

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Environmental Resources Management Australia

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Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 228848
Northing: 5828312
Elevation: 750

Distance to nearest turbine (approved layout): 7.0 Km
Distance to nearest turbine (amended layout): 7.0 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

1. - April 2015 - Photomontage (2008) with 130 m high wind turbines (approved layout - 2008) and comparative photomontage showing 161m high wind turbines (amended layout - 2015)

Lal Lal Windfarm

For: West Wind Energy

Viewpoint B

from Alexander Bell Memorial Tower lookout platform (Mount Buninyong) looking northeast

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPB - 2	Drawn by:	ML
Revision No:	1	Reviewed by:	AW

Existing View (2008 Photography)

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Environmental Resources Management Australia

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Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 236508
Northing: 5826183
Elevation: 474

Distance to nearest turbine (approved layout): 2.6 Km
Distance to nearest turbine (amended layout): 2.6 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

Viewpoint C (Left)

From Lal Lal township looking north to north east from edge of town

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPC - 1	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 236508
Northing: 5826183
Elevation: 474

Distance to nearest turbine (approved layout): 2.6 Km
Distance to nearest turbine (amended layout): 2.6 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

1. - April 2015 - Photomontage (2008) with 130 m high wind turbines (approved layout - 2008) and comparative photomontage showing 161m high wind turbines (amended layout - 2015)

Lal Lal Windfarm

For: West Wind Energy

Viewpoint C (Left)

From Lal Lal township looking north to north east from edge of town

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPC - 2	Drawn by:	ML
Revision No:	1	Reviewed by:	AW

Existing View (2008 Photography)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 236508
Northing: 5826183
Elevation: 474

Distance to nearest turbine (approved layout): 2.6 Km
Distance to nearest turbine (amended layout): 2.6 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

Viewpoint C (Right)

From Lal Lal township looking north to north east from edge of town

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPC - 3	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 236508
Northing: 5826183
Elevation: 474

Distance to nearest turbine (approved layout): 2.6 Km
Distance to nearest turbine (amended layout): 2.6 Km

Drawing size: A0

Revision No: -

1. - April 2015 - Photomontage (2008) with 130 m high wind turbines (approved layout - 2008) and comparative photomontage showing 161m high wind turbines (amended layout - 2015)

Lal Lal Windfarm

For: West Wind Energy

Viewpoint C (Right)

From Lal Lal township looking north to north east from edge of town

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPC - 4	Drawn by:	ML
Revision No:	1	Reviewed by:	AW

Existing View (2008 Photography)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 238488
Northing: 5828213
Elevation: 469

Distance to nearest turbine (approved layout): 1.9 Km
Distance to nearest turbine (amended layout): 1.9 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

Viewpoint D (left)

From Lal Lal Falls Picnic Area near northwestern table

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPD - 1	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 238488
Northing: 5828213
Elevation: 469

Distance to nearest turbine (approved layout): 1.9 Km
Distance to nearest turbine (amended layout): 1.9 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

1. - April 2015 - Photomontage (2008) with 130 m high wind turbines (approved layout - 2008) and comparative photomontage showing 161m high wind turbines (amended layout - 2015)

Lal Lal Windfarm

For: West Wind Energy

Viewpoint D (left)

From Lal Lal Falls Picnic Area near northwestern table

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPD - 2	Drawn by:	ML
Revision No:	1	Reviewed by:	AW

Existing View (2008 Photography)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 238488
Northing: 5828213
Elevation: 469

Distance to nearest turbine (approved layout): 1.9 Km
Distance to nearest turbine (amended layout): 1.9 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

Viewpoint D (right)

From Lal Lal Falls Picnic Area near northwestern table

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPD - 3	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

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Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 238488
Northing: 5828213
Elevation: 469

Distance to nearest turbine (approved layout): 1.9 Km
Distance to nearest turbine (amended layout): 1.9 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

1. - April 2015 - Photomontage (2008) with 130 m high wind turbines (approved layout - 2008) and comparative photomontage showing 161m high wind turbines (amended layout - 2015)

Lal Lal Windfarm

For: West Wind Energy

Viewpoint D (right)

From Lal Lal Falls Picnic Area near northwestern table

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPD - 4	Drawn by:	ML
Revision No:	1	Reviewed by:	AW

Existing View (2008 Photography)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 238657
Northing: 5828247
Elevation: 445

Distance to nearest turbine (approved layout): 1.9 Km
Distance to nearest turbine (amended layout): 1.9 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

Viewpoint E

Lal Lal Falls lookout looking towards waterfall scenic view

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPE - 1	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 238657
Northing: 5828247
Elevation: 445

Distance to nearest turbine (approved layout): 1.9 Km
Distance to nearest turbine (amended layout): 1.9 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

1. - April 2015 - Photomontage (2008) with 130 m high wind turbines (approved layout - 2008) and comparative photomontage showing 161m high wind turbines (amended layout - 2015)

Lal Lal Windfarm

For: West Wind Energy

Viewpoint E

Lal Lal Falls lookout looking towards waterfall scenic view

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPE - 2	Drawn by:	ML
Revision No:	1	Reviewed by:	AW

Existing View (2008 Photography)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 237792
Northing: 5815430
Elevation: 397

Distance to nearest turbine (approved layout): 1.4 Km
Distance to nearest turbine (amended layout): 1.4 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

Viewpoint G (left)

View taken from the north of Elaine on the Midland Highway (north of level rail crossing)

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPG - 1	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 237792
Northing: 5815430
Elevation: 397

Distance to nearest turbine (approved layout): 1.4 Km
Distance to nearest turbine (amended layout): 1.4 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

1. - April 2015 - Photomontage (2008) with 130 m high wind turbines (approved layout - 2008) and comparative photomontage showing 161m high wind turbines (amended layout - 2015)

Lal Lal Windfarm

For: West Wind Energy

Viewpoint G (left)

View taken from the north of Elaine on the Midland Highway (north of level rail crossing)

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPG - 2	Drawn by:	ML
Revision No:	1	Reviewed by:	AW

Existing View (2008 Photography)

ERM

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Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 237792
Northing: 5815430
Elevation: 397

Distance to nearest turbine (approved layout): 1.4 Km
Distance to nearest turbine (amended layout): 1.4 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

Viewpoint G (right)

View taken from the north of Elaine on the Midland Highway (north of level rail crossing)

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPG - 3	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

ERM

Environmental Resources Management Australia

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Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 237792
Northing: 5815430
Elevation: 397

Distance to nearest turbine (approved layout): 1.4 Km
Distance to nearest turbine (amended layout): 1.4 Km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

1. - April 2015 - Photomontage (2008) with 130 m high wind turbines (approved layout - 2008) and comparative photomontage showing 161m high wind turbines (amended layout - 2015)

Lal Lal Windfarm

For: West Wind Energy

Viewpoint G (right)

View taken from the north of Elaine on the Midland Highway (north of level rail crossing)

Project No:	0058176	Date:	22/04/2015
Drawing No:	VPG - 4	Drawn by:	ML
Revision No:	1	Reviewed by:	AW

Existing View (2008 Photography)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 239928
Northing: 5831550
Elevation: 515

Distance to nearest turbine (approved layout): 0.7 km (out of view) 1.2 km (nearest visible)
Distance to nearest turbine (amended layout): 0.7 km (out of view) 1.2 km (nearest visible)

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

House N31AB
on McGuigan's Road

Project No:	0058176	Date:	22/04/2015
Drawing No:	N31AB - 1	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

ERM

Environmental Resources Management Australia

World Trade Centre
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Facsimile +61 3 9696 8022
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Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 239928
Northing: 5831550
Elevation: 515

Distance to nearest turbine (approved layout): 0.7 km (out of view) 1.2 km (nearest visible)
Distance to nearest turbine (amended layout): 0.7 km (out of view) 1.2 km (nearest visible)

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

Lal Lal Windfarm

For: West Wind Energy

House N31AB
on McGuigan's Road - view west

Project No:	0058176	Date:	22/04/2015
Drawing No:	N31AB - 2	Drawn by:	ML
Revision No:		Reviewed by:	AW

Existing View (2008 Photography)

World Trade Centre
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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 55

Easting: 759350
Northing: 5812680
Elevation: 411

Distance to nearest turbine (approved layout): 3.7 km
Distance to nearest turbine (amended layout): 3.7 km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

House F12AA

View northeast from peak of Larundel Hill, Orrells Road

Project No:	0058176	Date:	22/04/2015
Drawing No:	F12AA - 1	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

World Trade Centre
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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 54

Easting: 759350
Northing: 5812680
Elevation: 411

Distance to nearest turbine (approved layout): 3.7 km
Distance to nearest turbine (amended layout): 3.7 km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

1. - April 2015 - Photomontage (2008) with 130 m high wind turbines (approved layout - 2008) and comparative photomontage showing 161m high wind turbines (amended layout - 2015)

Lal Lal Windfarm

For: West Wind Energy

House F12AA

View northeast from peak of Larundel Hill, Orrells Road

Project No:	0058176	Date:	22/04/2015
Drawing No:	F12AA - 2	Drawn by:	ML
Revision No:	1	Reviewed by:	AW

Existing View (2008 Photography)

World Trade Centre
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ERM

Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 54

Easting: 761084
Northing: 5817299
Elevation: 383

Distance to nearest turbine (approved layout): 1.3 km
Distance to nearest turbine (amended layout): 1.3 km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

House G17AA

View east from Narmbool Reception Centre Gardens

Project No:	0058176	Date:	22/04/2015
Drawing No:	G17AA - 1	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

ERM

Environmental Resources Management Australia

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Facsimile +61 3 9696 8022
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Location data reference:

Grid Datum: MGA94 Zone 54

Easting: 761084
Northing: 5817299
Elevation: 383

Distance to nearest turbine (approved layout): 1.3 km
Distance to nearest turbine (amended layout): 1.3 km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

Lal Lal Windfarm

For: West Wind Energy

House G17AA

View east from Narmbool Reception Centre Gardens

Project No:	0058176	Date:	22/04/2015
Drawing No:	G17AA - 2	Drawn by:	ML
Revision No:		Reviewed by:	AW

Existing View (2008 Photography)

ERM

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 54

Easting: 761075
Northing: 5830838
Elevation: 529

Distance to nearest turbine (approved layout): 4.6 km
Distance to nearest turbine (amended layout): 4.6 km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

- Existing view from 2008 photography to compare with photomontage

Lal Lal Windfarm

For: West Wind Energy

House F30AA

View east from house F30aa, on Buchanans Lane

Project No:	0058176	Date:	22/04/2015
Drawing No:	F30AA - 1	Drawn by:	ML
Revision No:		Reviewed by:	AW

Photomontage of 130m high wind turbines (Approved Layout - 2008)

Photomontage of 161m high wind turbines (Amended Layout - 2015)

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Environmental Resources Management Australia

Location data reference:

Grid Datum: MGA94 Zone 54

Easting: 761075
Northing: 5830838
Elevation: 529

Distance to nearest turbine (approved layout): 4.6 km
Distance to nearest turbine (amended layout): 4.6 km

Drawing size: A0

0 2.5 5 10
kilometers

Revision No: -

1. - April 2015 - Photomontage (2008) with 130 m high wind turbines (approved layout - 2008) and comparative photomontage showing 161m high wind turbines (amended layout - 2015)

Lal Lal Windfarm

For: West Wind Energy

House F30AA

View east from house F30aa, on Buchanans Lane

Project No:	0058176	Date:	22/04/2015
Drawing No:	F30AA - 2	Drawn by:	ML
Revision No:	1	Reviewed by:	AW

15 August 2016

Attachment F

Revised Avifauna Assessment

BL&A Brett Lane & Associates Pty. Ltd.
Ecological Research & Management

15th August 2016 BL&A Report 6150 (10.3)

Herbert Smith Freehills
L42, 101 Collins Street
Melbourne, Vic. 3000

Attention: Jennifer Meek (Solicitor)
By email — Jennifer.Meek@hsf.com (phone 03 9288 1409)

Dear Jennifer,

RE: LAL LAL WIND FARM: AMENDMENT TO LAYOUT VERSION 3
BL&A PROJECT NO. 6150.9

At your request, I have assessed the differences in impacts on birds and bats of revised proposed turbine dimensions and minor adjustments to the turbine layout contained in a variation of the amendment application dated 30 October 2015 (Amendment Application). These revisions include placing the Rotor Swept Area (RSA) between 21 and 161 metres above the ground, as well as the following layout changes:

- Relocating turbine ESWT02 a further 150 metres south from its permitted location;
- Removal of turbine YSWT37; and
- Reinstating YSWT31 from the approved permit PL-SP/05/0461.

This letter sets out my findings having reviewed the changes proposed and compared the 'original amended layout' (30th October 2015) with this 'revised layout'. For completeness, this is contrasted with the 'permitted layout' (2008) involving smaller turbines (i.e. 40 to 120 metre RSA). Layout change impacts are considered first, followed by RSA height changes.

Impacts of layout changes

Based on a review of the plans for the original amended layout and the revised layout, the changes in the Yendon Section of the project involve the reinstatement of one turbine, YSWT31, just south of the Yendon – Egerton Road, and the removal of YSWT37, north of Harris Road. In the Elaine Section of the project, the change involves the relocation of one turbine 150 metres south, immediately west of Horsehill Road, closer to Turbine ESWT01. These changes will not change the habitat affected by the modified layout, which is still situated in open, cleared, improved pasture grazed by livestock, mostly sheep.

The bird and bat fauna of the site is characterised by common, widespread, native birds and bats, and introduced pest bird species that are adapted to intensively farmed agricultural landscapes (BL&A 2008). The revised layout involves changes within this habitat type at sites that are not different in terms of their bird and bat fauna. These changes therefore do not change the conclusions I reached in my original assessment of

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impacts. These minor layout changes alone will not result in any noticeable difference in bird and bat collision risk between the original amended layout and the revised layout.

Changes in turbine size and height

This assessment of the difference in bird and bat impacts of a change in turbine dimensions is based on the information below.

- Data from Bird Utilisation Surveys previously undertaken at Lal Lal Wind Farm during November 2006 and March 2007 (Brett Lane & Associates 2008).
- Average data on bird flight heights for ten proposed wind farm sites around southern Australia monitored by Brett Lane & Associates Pty Ltd in similar agricultural settings to the Lal Lal site, including a number of sites in south western Victoria.

Initial studies for birds at the wind farm were based on an 80 metre tower with an RSA between 40 and 120 metres above the ground (blade diameter 80 metres and hub height of 80 metres) (Brett Lane & Associates 2008). When bird field work was undertaken, bird flight height data were not collected in smaller height intervals than the proposed heights of the zone below, at and above RSA height. Subsequent to this, BL&A has been collecting more precise bird flight height data at a range of wind farm sites in south eastern Australia in similar agricultural landscapes to the Lal Lal Wind Farm. This has involved observing bird flight heights and recording flight height in 10 metre intervals up to 60 metres above the ground then in 20 metre intervals up to 140 metres above the ground. Above 140 metres, judging flight height precisely is problematic.

Studies for bats at Lal Lal did not involve recording bat activity at height, only from ultrasonic bat call recorders recording from ground level.

Changes in the proposed height of the wind turbines and Rotor Swept Area (RSA) considered at the Lal Lal Wind Farm in the original amended layout were:

- a larger turbine than the permitted layout, namely one with an RSA between 39 and 161 metres above the ground (blade diameter 122 metres), as per the original amendment application of October 2015.

For the current, revised layout, a larger turbine has been assessed, as follows:

- a larger turbine with an RSA between 21 and 161 metres above the ground (blade diameter of 140 metres).

The change in blade length in the revised layout changes the area of the RSA. The revised layout would have a larger RSA surface area than the RSA in the original amended layout and an RSA area larger again than the permitted layout. The impacts on birds and bats of the proposed changes are discussed below.

Both the original amended layout and the revised layout turbine designs are compared with the original, permitted layout turbine design, then with one another.

Birds are considered first, followed by bats.

Birds

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The original bird impact assessment for the Lal Lal Wind Farm identified that common, widespread bird and bat species dominated the fauna of the area where wind turbines were proposed (BL&A 2008). Inspection of the site on 4th August 2016 revealed that nothing has changed in terms of the land use and ecological character of the site to indicate that the mix and abundance of birds would be any different from that found during the bird utilisation surveys at the site in 2006 - 07. Therefore, the conclusion reached as part of the original assessment – namely that the site is not home to any regular or significant numbers of any threatened bird or bat species listed on the EPBC Act, the FFG Act or DELWP's Advisory Lists of threatened fauna – still holds.

The increase in RSA from the permitted 5,027 m^2 up to the revised 15,616 m^2 will increase the airspace occupied by the turbine blades by approximately three times. The consequences of this for bird collision are described below based on the information presented in the tables attached to this letter. The tables include the following variables:

- The height range from ground level to >140 metres above the ground where bird were observed flying during bird utilisation surveys;
- The area in square metres of the plane that represents the survey area corresponding to the turbine dimensions (i.e. the RSA diameter times the height in metres) (SA), and in particular the area of that plane at each height zone (SAh);
- The percentage of bird flights observed at each height zone (%H) based on findings from bird utilisation surveys at 10 (pre-development) wind farm sites in south–eastern Australia (BL&A, unpubl. data);
- The number of bird flights that would pass through this plane assuming a total number of flights through the survey plane averaging one per square metre (SN) and the number of these flights at each height zone (SNh), based on %H and (i.e. SNh = %H x SN);
- The area of the RSA plane (RSA) at each of the height zones (RSAh);
- The percentage of the plane that represents the survey area occupied by the RSA plane at each of the height zones (%RSAh) (i.e. %RSAh = RSAh/SAh);
- The number of flights that pass through the RSA plane at each height zone (Nh) (i.e. Nh = %RSAh x SNh); and
- The total number of flights through the RSA (N) (i.e. N = sum (Nh for each height zone)).

These calculations have been summarised in the tables attached to this letter, including:

- Table 1: Permitted layout turbine design;
- Table 2: Revised layout turbine design; and
- Table 3: Original amended layout turbine design.

The ratio of N (the total number of flights through the RSA area) for the original amended layout and the revised layout to N for the permitted layout was compared. Note that it is the ratio that is pertinent to the comparison of turbine design options, not the flight numbers in the tables as these have been based on an assumed rate of bird activity.

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The rate is an assumption used for the purpose of calculating the ratio, not for determining absolute impacts on bird numbers.

The revised layout turbine design represents an impact on birds approximately four times the impact of the permitted layout turbine design, primarily due to a change to the minimum (lower) height of the RSA into a zone of greater bird activity (i.e. 20 to 40 metres above the ground). The turbine design for the original amended layout of October 2015, represents an increase in impact on birds of 1.3 times that of the permitted layout turbine design, partly but not completely offset by the reduction in number of turbines from 64 to 60. Compared with the original amended layout turbine design, the revised layout turbine design represents an increase in impact on birds of about three times, with layout changes not making any difference.

Notwithstanding the increased potential for collision resulting from the revised layout turbine design, the birds affected are common and widespread native and introduced pest bird species the impacts on which will be of no conservation concern. Raptors are unlikely to be affected to the same degree compared with other birds as many more of them fly above 40 metres (where the RSA has been assessed in all considered layouts and turbine dimensions).

Bats

The initial bat surveys in December 2007 and January 2008 at the proposed Lal Lal Wind Farm were focussed on the Yendon section of the proposed Wind Farm as this section contained established native vegetation. The Elaine section of the proposed wind farm is devoid of native vegetation and thus was unlikely to hold rich bat populations. Accordingly this was not surveyed.

A total of nine species of bats were recorded during the initial surveys at the proposed Lal Lal Wind Farm. No species of bat listed on the EPBC Act or FFG Act were recorded in the bat surveys. The bat surveys at Lal Lal did not involve recording bats at height. The bats most likely to be affected by the wind farm were considered to be the most abundant bat species in the area.

The flight height profile of bats in SE Australia has not yet been comprehensively documented. Notwithstanding this, recording at height elsewhere in south eastern Australia (BL&A, unpubl. records) shows that typically fewer species and many fewer calls are recorded 50 metres above the ground than at ground level.

It is recognised that some species, notably the White-striped Freetail Bat and Gould's Wattled Bat fly higher on average than other species and recent evidence from mortality monitoring from 1,700 turbine searches across ten wind farm sites in south eastern Australia shows that these two species collide with turbines more often than species recorded at lower levels (BL&A unpublished data).

Thus, the revised layout turbines at the Lal Lal Wind Farm may have the implications described below.

- Decreasing the minimum RSA level will lead to a proportional increase in the risk to bats exposed to potential collision risk. This impact will be on the common species recorded at Lal Lal during site investigations not on bat species listed as threatened or endangered as these were not recorded in the area and no habitat occurs that is suitable for their consistent occurrence.

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- Increasing the RSA area will result in a proportionate increase in the mortality of bats, in particular those bats often recorded flying at RSA height, including the White-striped Freetail Bat and Gould's Wattled Bat. These are both common species and not listed as threatened or endangered. These impacts will not lead to any significant decline in their wider populations.

Conclusion

This increased potential for collision arising from the revised layout turbine design is not considered of conservation concern as it affects common, widespread bird and bat species adapted to agricultural landscapes. Increases of up to approximately four times in the numbers of bird flights potentially at risk compared with the impacts of the original, permitted turbine dimensions do not represent an impact of conservation concern as rare and threatened species are not affected. Raptors are unlikely to be affected to the same degree compared with other birds as many more of them fly above 40 metres (where the RSA has been assessed in all considered layouts and turbine dimensions). The proposed changes in layout and turbine design in the revised layout will not significantly change the impacts of the project on threatened bird and bat species of conservation concern as none occurs in the area consistently or in significant numbers.

I hope the foregoing is informative. If you have any enquiries please do not hesitate to call me.

Yours sincerely,

Brett Lane

Principal Consultant
Brett Lane & Associates Pty. Ltd.

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References

Brett Lane & Associates Pty Ltd. 2008. Proposed Lal Lal Wind Farm, flora and fauna investigations, Consultant's report prepared for WestWind Energy Pty Ltd, Report No., 6150 (3.5), February 2008.

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Table 1: Permitted layout turbine design (RSA 40 to 120 metres above the ground)

H	%H	SAh	Nh	RSAh	%RSAh	Nh
Ht range (m)	% flights*	Area at Ht (sq. m)	No. flights	Area of 80 m diam. Turbine (sq. m)	% area at RSA	No. flights
0-10	18	800	2,318			
10-20	23	800	2,962			
20-30	20	800	2,576			
30-40	13	800	1,674			
40-50	14	800	1,803	363	45	817
50-60	6	800	772	620	78	598
60-80	4	1,600	515	1,531	96	492
80-100	1	1,600	128	1,531	96	123
100-120	0	1,600	0	983	61	0
120-140	1	1,600	128		0	0
>140	0	1,680	0.000			
Total	SA =12,880		RSA = 5,027		N = 2,032	

*BL&A unpublished data from 10 similar wind farm sites in south eastern Australia

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Table 2: Revised layout turbine design (RSA 21 to 161 metres above ground)

H	%H	SAh	Nh	RSAh	%RSAh	Nh
Ht range (m)	% flights *	Area at Ht (sq. m)	No. flights	Area of 80 m diam. Turbine (sq. m)	% area at RSA	No. flights
0-10	18	1,400	4,057			
10-20	23	1,400	5,184			
20-30	20	1,400	4,508	488	35	1,571
30-40	13	1,400	2,930	861	62	1,802
40-50	14	1,400	3,156	1,080	77	2,434
50-60	6	1,400	1,352	1,241	89	1199
60-80	4	2,800	902	2,752	98	886
80-100	1	2,800	225	2,772	99	223
100-120	0	2,800	0	2,752	98	0
120-140	1	2,800	2,250	2,321	83	187
>140	0	2,940	00	1,349	46	0
Total	SA =22,540		RSA = 15,616			N = 8,303

*BL&A unpublished data from 10 similar wind farm sites in south eastern Australia

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Table 3: Original amended layout turbine design (RSA 39 to 161 metres above ground)

H	%H	SAh	Nh	RSAh	%RSAh	Nh
Ht range (m)	% flights*	Area at Ht (sq. m)	No. flights	Area of 80 m diam. Turbine (sq. m)	% area at RSA	No. flights
0-10	18	1,200	3,485			
10-20	23	1,200	4,453			
20-30	20	1,200	3,872			
30-40	13	1,200	2,517			
40-50	14	1,200	2,710	420	35	949
50-60	6	1,200	1,161	730	61	707
60-80	4	2,400	774	2,270	95	732
80-100	1	2,400	193	2,390	100	193
100-120	0	2,400	0	2,270	95	0
120-140	1	2,400	194	2,270	95	183
>140	0	2,560	0	1,150	45	0
Total	SA =19,360		RSA = 11,500			N = 2,763

*BL&A unpublished data from 10 similar wind farm sites in south eastern Australia.

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