



# VIPAC ENGINEERS & SCIENTISTS

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## TECHNICAL MEMORANDUM

|            |                                                   |              |                                 |
|------------|---------------------------------------------------|--------------|---------------------------------|
| Attention: | <b>David Griffin</b>                              | Date:        | <b>22 Jul 2010</b>              |
| Company:   | <b>Woodlawn Wind Pty Ltd</b>                      | Pages:       | <b>1 of 11</b>                  |
| Email:     | <b>David.Griffin@infigenenergy.com</b>            | Document No: | <b>50B-08-0138-TRP-771957-0</b> |
| From:      | <b>Andrew Leonard</b>                             | Reviewed By: | <b>Dr Peter Teague</b>          |
| Subject:   | <b>Woodlawn Wind Farm - Addendum Noise Impact</b> |              |                                 |

|     |       |          |            |
|-----|-------|----------|------------|
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|-----|-------|----------|------------|

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Dear Sir,

Re: **Woodlawn Wind Farm - Addendum Noise Impact**

Vipac was engaged by Woodlawn Wind Pty Ltd to undertake an additional noise prediction for the Woodlawn Wind Farm with three additional WTGs (WTGs 21, 22 and 23) than previously modelled. This report is an addendum to the previously provided noise impact assessments for the Woodlawn Wind Farm (Ref [1]).

## 1. REFERENCES

- [1] Vipac Report: "Woodlawn Wind Farm Noise Assessment– Noise Impact Assessment" Dated 21<sup>st</sup> January 2010, Document number: 50B-08-0138-TRP-423683-9
- [2] Email from Stephen Donnelly: Subject: "Noise Impact Assessment - Woodlawn 3 turbine positions" sent on 9<sup>th</sup> March 2010
- [3] Concawe Report No. 4/81: "The propagation of noise from petroleum and petrochemical complexes to neighbouring communities", Manning C.J., 1981
- [4] International Standard ISO 9613 Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996
- [5] "Capital Wind Farm: Noise Impact Assessment Report" 10 February 2006. Reference: 505608-TRP-018284-02

## 2. MODEL

Please refer to our previous report (Ref [1]) for detailed methodology, criteria determination, project and site description. The wind farm layout is shown in Appendix A.



The current noise model (as outlined in our previous report [1]) was used as a basis of our noise prediction, with the addition of the three additional turbines. As outlined within [2], three additional WTGs were added to the model and was re-run to predict the likely noise impact on the nearest residential receivers.

The additional WTG location details are outlined in Table 2-1, with the complete WTG list given in Appendix B.

| WTG Number | Original WTG Layout |              |                   |
|------------|---------------------|--------------|-------------------|
|            | Easting (m)         | Northing (m) | Elevation (m ASL) |
| 21         | 734494              | 6111447      | 840               |
| 22         | 734230              | 6111285      | 820               |
| 23         | 734132              | 6111038      | 810               |

**Table 2-1: New WTG Location Coordinates**

These changes are the only changes in the noise model as used in our assessment outlined in [1].

### 3. NOISE MODEL PREDICTIONS

An accurate Predictive Noise Model has been constructed using the validated and accepted Concawe algorithm [3] for noise propagation in different meteorological conditions. The standard ISO9613 algorithm [4] was used for predictions in neutral conditions (no wind). The noise model has been constructed using the widely recognised SoundPLAN proprietary software package.

The algorithms used in the model take into account the likely effects of atmospheric absorption, ground absorption/reflection, diffraction and attenuation by topographic features, screening effect of barriers and the propagation effect of wind speed and direction. The accuracy of the noise model is likely to be at least  $\pm 2$  dB(A) and up to the order of  $\pm 5$  dB(A).

The model incorporates the proposed locations and heights of the 23 WTG array. The model uses the manufacturer's S88 2.1MW overall warranted sound power level data for the reference wind speed of  $8\text{ms}^{-1}$ , distributed as per the published spectrum for that model, as given in [1].

The data provided by the manufacturer shows that there are no detectable tones in the sound power spectrum of the Suzlon WTGs. There are no additional significant characteristics such as impulsiveness, modulation or low frequency components. In the close vicinity of a WTG there is a slight swish-like modulation resulting from the rotor blade passing through the air and past the support tower in addition to a slight hum emanating from the WTG generator. These minor effects diminish rapidly over distance and, for an array of WTGs, are randomly mixed to form low-level background white noise.

The noise model was run for the maximum power (106.0 dB(A)) setting for all of the Suzlon WTGs. The model was run with these sound power settings for neutral and wind-affected propagation conditions from 4 to  $12\text{ms}^{-1}$ .

Rated power is  $14\text{ms}^{-1}$ ; however, Suzlon data was only provided for up to  $12\text{ms}^{-1}$ . However, this is considered not to be an issue as the WTG sound power level is quite constant above  $10\text{ms}^{-1}$  whereas the criterion continues to increase. Therefore, the gap between predicted levels and criterion increases as wind



speed increases beyond  $10 \text{ ms}^{-1}$ ; hence, given that the criterion is easily satisfied at  $12 \text{ ms}^{-1}$ , it therefore will be easily met at 13 and  $14 \text{ ms}^{-1}$ .

Predicted  $L_{Aeq}$  noise levels (rounded to the nearest 0.5 dB(A)) have been determined for all non relevant and relevant receivers and are tabulated in Table 3-1 and Table 3-2 respectively for the worst case wind scenario at  $8 \text{ ms}^{-1}$ . The criterion level which would be applicable is also given in the table. The relevant World Health Organisation (WHO) guideline level of 45 dB(A) for unreasonable interference or sleep disturbance as outlined in [1] is also given in the table.

**Table 3-1: Predicted Noise Levels ( $L_{Aeq}$  dB(A)) for Non-Relevant Sites at  $8 \text{ ms}^{-1}$  wind speed**

| Receiver      | Criteria, dB(A) | Neutral Meteorological Conditions - $8 \text{ m/s}$ , dB(A) | Worst Case Meteorological Conditions $8 \text{ m/s}$ , dB(A) |
|---------------|-----------------|-------------------------------------------------------------|--------------------------------------------------------------|
| Woodlawn Farm | 45              | 25.5                                                        | 29.5                                                         |
| Kalva         | 45              | 24                                                          | 27                                                           |
| Cowley Hills  | 45              | 27                                                          | 31                                                           |
| Pylara        | 45              | 26.5                                                        | 30                                                           |

**Table 3-2: Predicted Noise Levels ( $L_{Aeq}$  dB(A)) for Relevant Sites at Different Wind Speeds**

| Relevant Receiver                   | Wind speed $\text{ms}^{-1}$ |      |      |      |      |      |      |      |      |
|-------------------------------------|-----------------------------|------|------|------|------|------|------|------|------|
|                                     | 4                           | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
| <b>Criterion : Torokina</b>         |                             |      |      |      |      |      |      |      |      |
| <i>Criterion</i>                    | 35                          | 35   | 36   | 37   | 38   | 39   | 40   | 42   | 44   |
| Torokina                            | 27.5                        | 28.5 | 30   | 30   | 30.5 | 31   | 31   | 31   | 31   |
| Bernallah                           | 16                          | 17   | 18.5 | 19   | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 |
| <b>Criterion : Bonnie Doon (G7)</b> |                             |      |      |      |      |      |      |      |      |
| <i>Criterion</i>                    | 35                          | 35   | 35   | 37   | 40   | 43   | 46   | 50   | 53   |
| Bonnie Doon                         | 24.5                        | 25.5 | 26.5 | 27   | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| Nardoo                              | 21.5                        | 22.5 | 23.5 | 24   | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 |
| Wroxham                             | 24.5                        | 25   | 26.5 | 27   | 27   | 27.5 | 27.5 | 27.5 | 27.5 |
| Rosehill                            | 21.5                        | 22.5 | 24   | 24   | 24.5 | 25   | 25   | 25   | 25   |
| Hilltop Farm                        | 22.5                        | 23   | 24.5 | 25   | 25.5 | 25.5 | 25.5 | 25.5 | 25.5 |
| Hamptons                            | 21.5                        | 22.5 | 24   | 24   | 24.5 | 24.5 | 25   | 25   | 24.5 |
| La Lee                              | 3.5                         | 4.5  | 6    | 6.5  | 7    | 7    | 7    | 7    | 7    |
| Myolena                             | 23                          | 24   | 25.5 | 25.5 | 26   | 26.5 | 26.5 | 26.5 | 26.5 |
| <b>Criterion : Kildare</b>          |                             |      |      |      |      |      |      |      |      |
| <i>Criterion</i>                    | 35                          | 35   | 36   | 37   | 39   | 40   | 42   | 44   | 46   |
| Kildare                             | 27.5                        | 28   | 29.5 | 29.5 | 30   | 30.5 | 30.5 | 30.5 | 30.5 |
| Willandra                           | 23                          | 24   | 25.5 | 25.5 | 26   | 26.5 | 26.5 | 26.5 | 26.5 |
| Ellareagh                           | 20                          | 21   | 22.5 | 22.5 | 23   | 23.5 | 23.5 | 23.5 | 23.5 |
| Hollymount                          | 17.5                        | 18.5 | 20   | 20   | 20.5 | 21   | 21   | 21   | 21   |
| Linden Park                         | 18.5                        | 19   | 20.5 | 21   | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 |
| <b>Criterion: Glendale</b>          |                             |      |      |      |      |      |      |      |      |



| Relevant Receiver                                         | Wind speed ms <sup>-1</sup> |      |      |      |      |      |      |      |      |
|-----------------------------------------------------------|-----------------------------|------|------|------|------|------|------|------|------|
|                                                           | 4                           | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
| <i>Criterion</i>                                          | 35                          | 35   | 35   | 37   | 40   | 42   | 44   | 47   | 49   |
| Glendale                                                  | 27.5                        | 28   | 29.5 | 29.5 | 30   | 30.5 | 30.5 | 30.5 | 30.5 |
| Richmond Grove                                            | 24.5                        | 25   | 26.5 | 27   | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| Bracken Ridge                                             | 22                          | 23   | 24.5 | 24.5 | 25   | 25   | 25.5 | 25.5 | 25   |
| Kandahar                                                  | 8                           | 9    | 10.5 | 11   | 11.5 | 11.5 | 12   | 12   | 11.5 |
| <b>Criterion: Sunnybrook [ref: Capital Wind Farm EIS]</b> |                             |      |      |      |      |      |      |      |      |
|                                                           | 35                          | 35   | 35   | 36   | 37   | 39   | 40   | 42   | 43   |
| G10                                                       | 19                          | 20   | 21.5 | 22   | 22   | 22.5 | 22.5 | 22.5 | 22.5 |
| G8 Sunnybrook                                             | 16.5                        | 17.5 | 19   | 19   | 19.5 | 20   | 20   | 20   | 20   |
| G9 Sunnybrook                                             | 15.5                        | 16   | 17.5 | 18   | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 |
| G11 La Granja                                             | 19                          | 20   | 21.5 | 22   | 22   | 22.5 | 22.5 | 22.5 | 22.5 |
| G12 Narine Green                                          | 16.5                        | 17   | 18.5 | 19   | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 |
| G13                                                       | 19                          | 20   | 21.5 | 21.5 | 22   | 22.5 | 22.5 | 22.5 | 22.5 |
| G14                                                       | 19                          | 20   | 21.5 | 21.5 | 22   | 22.5 | 22.5 | 22.5 | 22.5 |
| G15                                                       | 19                          | 19.5 | 21   | 21.5 | 22   | 22   | 22   | 22   | 22   |
| G16                                                       | 20.5                        | 21.5 | 23   | 23   | 23.5 | 24   | 24   | 24   | 24   |
| G17                                                       | 19                          | 20   | 21.5 | 21.5 | 22   | 22   | 22.5 | 22.5 | 22   |
| <b>Criterion: Gray [ref: Capital Wind Farm EIS]</b>       |                             |      |      |      |      |      |      |      |      |
|                                                           | 35                          | 35   | 35   | 35   | 36   | 37   | 39   | 40   | 42   |
| McLaughlin                                                | 17                          | 18   | 19.5 | 19.5 | 20   | 20.5 | 20.5 | 20.5 | 20.5 |
| Clear View                                                | 17.5                        | 18.5 | 20   | 20   | 20.5 | 21   | 21   | 21   | 21   |
| Mingary                                                   | 16                          | 17   | 18   | 18.5 | 19   | 19   | 19.5 | 19.5 | 19   |
| Ugov                                                      | 19.5                        | 20.5 | 21.5 | 22   | 22.5 | 22.5 | 22.5 | 22.5 | 22.5 |
| Gray                                                      | 17                          | 17.5 | 19   | 19.5 | 20   | 20   | 20   | 20   | 20   |
| <b>Criterion: Euroka [ref: Capital Wind Farm EIS]</b>     |                             |      |      |      |      |      |      |      |      |
|                                                           | 35                          | 35   | 35   | 36   | 37   | 38   | 40   | 41   | 43   |
| Widgemoor                                                 | 17.5                        | 18.5 | 20   | 20   | 20.5 | 21   | 21   | 21   | 21   |
| Kullingrah (Euroka)                                       | 18.5                        | 19.5 | 21   | 21   | 21.5 | 22   | 22   | 22   | 22   |

The predicted noise levels at all relevant receivers achieve the appropriate criteria at all wind speeds. Colour noise contour plots have been generated for the maximum power setting (for neutral and 8ms<sup>-1</sup> worst case wind propagation scenarios), covering the surrounding area. These are shown in Appendix C.

### 3.1. Cumulative Noise Impacts

#### Capital Wind Farm

We note that the Capital Wind Farm is located to the south west of the proposed Woodlawn Wind Farm. As the noise impact of the Woodlawn Wind Farm is relatively low (i.e. less than 30dB(A)) it can be assumed that the noise impact on the south west and westerly residences will be dominated by Capital Wind Farm.



**Table 3-3: Predicted Noise Levels ( $L_{Aeq}$  dB(A)) for Non-Relevant Sites at  $8\text{ms}^{-1}$  wind speed with capital wind farm impact**

| Receiver      | Worst Case Meteorological Conditions $8\text{m/s}$ , dB(A) |
|---------------|------------------------------------------------------------|
| Woodlawn Farm | 29.5                                                       |
| Kalva         | 27                                                         |
| Cowley Hills  | 31                                                         |
| Pylara        | 30                                                         |

**Table 3-4: Predicted Noise Levels ( $L_{Aeq}$  dB(A)) for Relevant Sites at  $8\text{ms}^{-1}$  Wind Speeds with the influence of Capital Wind Farm**

| Relevant Receiver                   | Wind speed $\text{ms}^{-1}$ |      |      |      |      |      |      |      |      |
|-------------------------------------|-----------------------------|------|------|------|------|------|------|------|------|
|                                     | 4                           | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
| <b>Criterion : Torokina</b>         |                             |      |      |      |      |      |      |      |      |
| <i>Criterion</i>                    | 35                          | 35   | 36   | 37   | 38   | 39   | 40   | 42   | 44   |
| Torokina                            | 30.0                        | 31.0 | 32.5 | 32.5 | 33.0 | 33.5 | 33.5 | 33.5 | 33.5 |
| Bernallah                           | 26.5                        | 27.0 | 28.5 | 28.5 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| <b>Criterion : Bonnie Doon (G7)</b> |                             |      |      |      |      |      |      |      |      |
| <i>Criterion</i>                    | 35                          | 35   | 35   | 37   | 40   | 43   | 46   | 50   | 53   |
| Bonnie Doon                         | 31.0                        | 32.0 | 33.0 | 33.0 | 34.0 | 33.5 | 33.5 | 33.5 | 33.5 |
| <b>Nardoo**</b>                     | 35.0                        | 35.5 | 37.0 | 37.0 | 37.5 | 37.5 | 38.0 | 38.0 | 37.5 |
| Wroxham                             | 32.0                        | 33.0 | 34.0 | 35.0 | 35.5 | 35.5 | 35.5 | 35.5 | 35.5 |
| Rosehill                            | 29.0                        | 30.0 | 31.0 | 31.5 | 32.0 | 32.0 | 32.0 | 32.0 | 32.0 |
| Hilltop Farm                        | 28.0                        | 28.5 | 30.0 | 30.5 | 31.0 | 31.0 | 31.0 | 31.0 | 31.0 |
| Hamptons                            | 26.0                        | 27.0 | 28.5 | 28.5 | 29.0 | 29.0 | 29.5 | 29.5 | 29.5 |
| La Lee                              | 23.0                        | 24.0 | 25.5 | 25.5 | 26.0 | 26.5 | 26.5 | 26.5 | 26.5 |
| Myolena                             | 27.5                        | 28.5 | 29.5 | 30.0 | 30.5 | 30.5 | 30.5 | 30.5 | 30.5 |
| <b>Criterion : Kildare</b>          |                             |      |      |      |      |      |      |      |      |
| <i>Criterion</i>                    | 35                          | 35   | 36   | 37   | 39   | 40   | 42   | 44   | 46   |
| Kildare                             | 27.5                        | 28.0 | 29.5 | 29.5 | 30.0 | 30.5 | 30.5 | 30.5 | 30.5 |
| Willandra                           | 23.0                        | 24.0 | 26.0 | 25.5 | 26.0 | 26.5 | 26.5 | 26.5 | 26.5 |
| Ellareagh                           | 20.5                        | 21.5 | 23.0 | 23.0 | 23.5 | 24.0 | 24.0 | 24.0 | 24.0 |
| Hollymount                          | 18.0                        | 19.0 | 20.5 | 20.5 | 21.0 | 21.5 | 21.5 | 21.5 | 21.5 |
| Linden Park                         | 19.0                        | 19.5 | 21.0 | 21.5 | 22.0 | 22.0 | 22.0 | 22.0 | 22.0 |
| Lachlan Park                        | 10.5                        | 11.5 | 12.5 | 13.0 | 13.5 | 14.0 | 14.0 | 14.0 | 14.0 |
| <b>Criterion: Glendale</b>          |                             |      |      |      |      |      |      |      |      |
| <i>Criterion</i>                    | 35                          | 35   | 35   | 37   | 40   | 42   | 44   | 47   | 49   |
| Glendale                            | 28.0                        | 28.5 | 30.0 | 29.5 | 30.5 | 31.0 | 31.0 | 30.5 | 30.5 |
| Richmond Grove                      | 25.0                        | 25.5 | 27.0 | 27.5 | 28.0 | 28.0 | 28.0 | 27.5 | 27.5 |
| Bracken Ridge                       | 23.0                        | 24.0 | 25.5 | 25.0 | 25.5 | 26.0 | 26.0 | 26.0 | 25.5 |
| Kandahar                            | 22.0                        | 23.0 | 24.0 | 24.5 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |



| Relevant Receiver                                         | Wind speed ms <sup>-1</sup> |             |             |             |             |             |             |             |      |
|-----------------------------------------------------------|-----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------|
|                                                           | 4                           | 5           | 6           | 7           | 8           | 9           | 10          | 11          | 12   |
| Kalbilli                                                  | 28.0                        | 28.5        | 30.0        | 29.5        | 30.5        | 31.0        | 31.0        | 30.5        | 30.5 |
| <b>Criterion: Sunnybrook [ref: Capital Wind Farm EIS]</b> |                             |             |             |             |             |             |             |             |      |
|                                                           | 35                          | 35          | 35          | 36          | 37          | 39          | 40          | 42          | 43   |
| G10                                                       | 32.5                        | 33.0        | 34.5        | 34.5        | 35.0        | 35.5        | 35.5        | 35.5        | 35.5 |
| <b>G8 Sunnybrook**</b>                                    | <b>36.0</b>                 | <b>37.0</b> | <b>38.0</b> | <b>38.0</b> | <b>38.5</b> | 39.0        | 39.0        | 39.0        | 39.0 |
| <b>G9 Sunnybrook**</b>                                    | <b>37.0</b>                 | <b>37.5</b> | <b>39.0</b> | <b>39.0</b> | <b>39.5</b> | <b>39.5</b> | 40.0        | 40.0        | 40.0 |
| G11 La Granja                                             | 32.5                        | 33.0        | 34.5        | 34.5        | 35.0        | 35.5        | 35.5        | 35.5        | 35.5 |
| G12 Narine Green                                          | 32.5                        | 33.0        | 34.5        | 35.0        | 35.0        | 35.5        | 35.5        | 35.5        | 35.5 |
| G13                                                       | 29.5                        | 30.0        | 31.5        | 31.5        | 32.0        | 32.5        | 32.5        | 32.5        | 32.5 |
| G14                                                       | 30.0                        | 30.5        | 32.0        | 32.0        | 32.5        | 33.0        | 33.0        | 33.0        | 33.0 |
| G15                                                       | 30.0                        | 30.5        | 32.0        | 32.0        | 32.5        | 32.5        | 33.0        | 33.0        | 32.5 |
| G16                                                       | 29.5                        | 30.0        | 31.5        | 31.5        | 32.0        | 32.5        | 32.5        | 32.5        | 32.5 |
| G17                                                       | 29.5                        | 30.5        | 32.0        | 32.0        | 32.5        | 32.5        | 32.5        | 32.5        | 32.5 |
| <b>Criterion: Gray [ref: Capital Wind Farm EIS]</b>       |                             |             |             |             |             |             |             |             |      |
|                                                           | 35                          | 35          | 35          | 35          | 36          | 37          | 39          | 40          | 42   |
| McLaughlin                                                | 20.5                        | 21.5        | 23.0        | 23.0        | 23.5        | 24.0        | 24.0        | 24.0        | 24.0 |
| Clear View                                                | 26.5                        | 27.5        | 28.5        | 29.0        | 29.5        | 29.5        | 29.5        | 29.5        | 29.5 |
| Mingary                                                   | 25.0                        | 25.5        | 27.0        | 27.0        | 27.5        | 28.0        | 28.0        | 28.0        | 28.0 |
| Ugov                                                      | 31.0                        | 32.0        | 33.0        | 33.5        | 34.0        | 34.0        | 34.0        | 34.0        | 34.0 |
| Gray                                                      | 24.0                        | 24.5        | 26.0        | 26.5        | 27.0        | 27.0        | 27.0        | 27.0        | 27.0 |
| <b>Criterion: Euroka [ref: Capital Wind Farm EIS]</b>     |                             |             |             |             |             |             |             |             |      |
|                                                           | 35                          | 35          | 35          | 36          | 37          | 38          | 40          | 41          | 43   |
| Widgemoor                                                 | 31.5                        | 32.5        | 33.5        | 34.0        | 34.5        | 34.5        | 34.5        | 34.5        | 34.5 |
| <b>Kullingrah (Euroka)**</b>                              | <b>39.0</b>                 | <b>40.0</b> | <b>41.0</b> | <b>41.5</b> | <b>42.0</b> | <b>42.0</b> | <b>42.0</b> | <b>42.0</b> | 42.0 |

\*\* Denotes non relevant noise receivers for Capital Wind Farm.

For the residential receivers at the western and southwestern area of the Woodlawn Wind Farm, we note that noise levels from Capital Wind Farm WTGs are dominant. Noise associated with the Capital Wind Farm project is to be assessed separately from the Woodlawn assessment, and is covered in the Capital Wind Farm Noise Impact Assessment. We note that several receivers associated with the Capital Wind Farm project (i.e. non-relevant receivers for Capital Wind Farm (CWF)) are non relevant receivers for the Woodlawn Wind Farm Project. The noise impact on these receivers (indicated by \*\* in Table 3-4) by Woodlawn Wind Farm is negligible, as the noise levels at these receivers are dominated by CWF. Any noise at these receivers due to the Capital Wind Farm is to be treated as outlined in [5]. Therefore, all noise at all relevant receiver locations for both Capital Wind Farm and Woodlawn Wind Farm meet the stipulated requirements. The receivers to the north, east and southeast of the site are unaffected by noise from Capital Wind Farm.



Woodlawn Wind Pty Ltd

50B-08-0138-TRP-771957-0

Woodlawn Wind Farm - Addendum Noise Impact

Page 7 of 11

We trust that the information provided is satisfactory. However, if you have any queries or require further information, please do not hesitate to contact us.

Yours sincerely,

**VIPAC ENGINEERS & SCIENTISTS LTD –**

Andrew Leonard  
Project Engineer

**Attachments:**

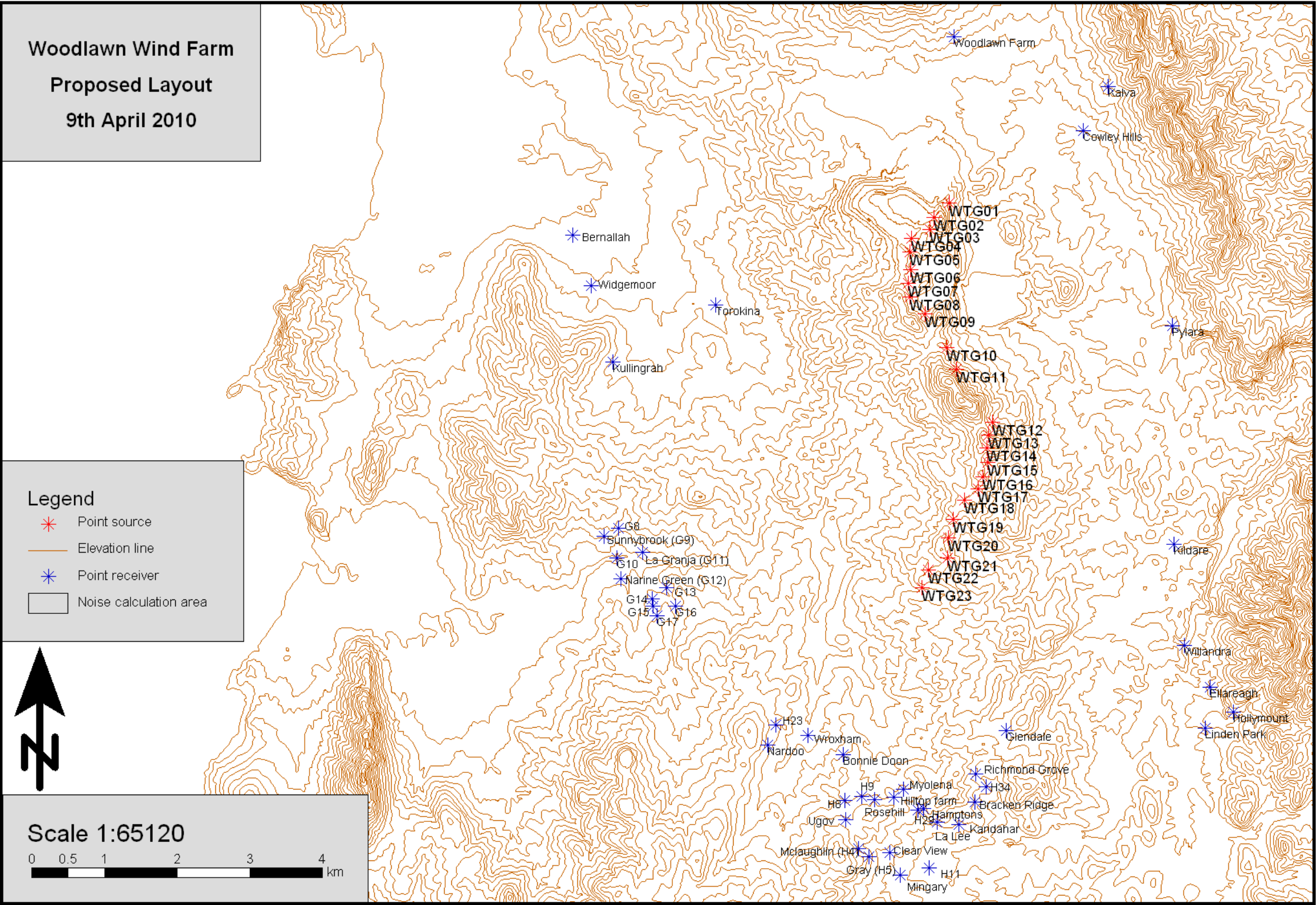
**Appendix A - Turbine Layout Map**

**Appendix B - Turbine Layout List**

**Appendix C - Grid Noise Maps**



APPENDIX A     TURBINE LAYOUT MAP





## APPENDIX B TURBINE LAYOUT LIST

| <b>Proposed Wind Turbine Generators (WTGs)</b>    |                |                 |
|---------------------------------------------------|----------------|-----------------|
| <b>WTG No.</b>                                    | <b>Easting</b> | <b>Northing</b> |
| WTG01                                             | 734514         | 6116326         |
| WTG02                                             | 734307         | 6116126         |
| WTG03                                             | 734248         | 6115958         |
| WTG04                                             | 733992         | 6115838         |
| WTG05                                             | 733966         | 6115656         |
| WTG06                                             | 733977         | 6115412         |
| WTG07                                             | 733944         | 6115218         |
| WTG08                                             | 733969         | 6115036         |
| WTG09                                             | 734178         | 6114806         |
| WTG10                                             | 734481         | 6114335         |
| WTG11                                             | 734615         | 6114043         |
| WTG12                                             | 735106         | 6113311         |
| WTG13                                             | 735057         | 6113136         |
| WTG14                                             | 735028         | 6112956         |
| WTG15                                             | 735041         | 6112762         |
| WTG16                                             | 734969         | 6112563         |
| WTG17                                             | 734906         | 6112397         |
| WTG18                                             | 734724         | 6112248         |
| WTG19                                             | 734571         | 6111984         |
| WTG20                                             | 734502         | 6111723         |
| <b>Additional Proposed Wind Turbine Generator</b> |                |                 |
| WTG21                                             | 734494         | 6111447         |
| WTG22                                             | 734230         | 6111285         |
| WTG23                                             | 734132         | 6111038         |

## APPENDIX C GRID NOISE MAPS

