

# Willatook Wind Farm

## Environmental Noise Assessment

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## **1 INTRODUCTION**

An environmental noise assessment for the proposed Willatook Wind Farm, located approximately 20km north of Port Fairy, Victoria has been conducted. This summary report details:

- The locations and sound power level information for the wind turbine generators (WTGs);
- An update of the background noise monitoring conducted between the 30 September and the 10 November 2010 based on a hub height of 141m;
- An update of the assessment criteria at each of the relevant receiver locations based on the updated background noise monitoring results;
- The predicted noise level at each of the relevant receiver locations;
- The cumulative effects of the Macarthur wind farm; and,
- A comparison with the assessment criteria in accordance with the relevant Shire Planning Schemes and the “Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria”, November 2017.

## **2 WIND FARM LAYOUT AND THE SURROUNDING RESIDENCES**

The assessment of the proposed Willatook Wind Farm is based on the following:

- The location and status of dwellings as summarised in Appendix A; and
- The locations of the WTGs and substation as summarised in Appendix B.

The Macarthur wind farm is operating near the proposed Willatook Wind Farm, and therefore this report also considers a cumulative assessment of the noise environment at the nearby dwellings. The location of WTGs and substations at the Macarthur wind farm are provided in Appendix C.

### 3 PLANNING POLICY

The proposed Willatook Wind Farm is in the Moyne Shire. The Moyne Shire Planning Scheme includes the follow provisions in Section 52.32 Wind Energy Facility:

*A written report(s), including ... an assessment of ... the noise impacts of the proposal prepared in accordance with the New Zealand Standard NZS6808:2010, Acoustics - Wind Farm Noise, including an assessment of whether a high amenity noise limit is applicable, as assessed under Section 5.3 of the Standard.*

And

*Before deciding on an application, in addition to the decision guidelines of Clause 65, the responsible authority must consider... Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (Department of Environment, Land, Water and Planning, November 2017).*

The Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria, November 2017 (the Guidelines) includes the following in Section 5.1.2(a):

*A wind energy facility can create noise due to the:*

- *mechanical noise produced by the wind turbine generators;*
- *movement of the rotor blades through the air; and*
- *construction noise.*

*The impact of the noise depends on the sensitivity of the surrounding land uses, existing background noise levels, topography and wind speed and direction.*

*A wind energy facility should comply with the noise limits recommended for dwellings and other noise sensitive locations in the New Zealand Standard NZS 6808:2010 Acoustics – Wind Farm Noise (the Standard).*

*The Standard specifies a general 40 decibel limit for wind farm sound levels as measured from non-stakeholder dwellings, or that the sound level should not exceed the background sound level by more than five decibels, whichever is the greater. A 45 decibel limit is recommended for stakeholder dwellings.*

*Under section 5.3 of the Standard, a ‘high amenity noise limit’ of 35 decibels applies in special circumstances. All wind farm applications must be assessed using section 5.3 of the Standard to determine whether a high amenity noise limit is justified for specific locations, following procedures outlined in clause C5.3.1 of the Standard. Guidance can be found on this issue in the VCAT determination for the Cherry Tree Wind Farm.*

## 4 ENVIRONMENTAL NOISE CRITERIA

### 4.1 Landowners without Commercial Agreements

Section 5.2 of the Standard states:

*As a guide to the limits of acceptability at a noise sensitive location, at any wind speed wind farm sound levels  $L_{A90(10min)}$  should not exceed the background sound level by more than 5 dB, or a level of 40 dB  $L_{A90(10min)}$ , whichever is the greater.*

Section 5.3 of the Standard contains provisions for residences situated in high amenity areas, deemed applicable when “a plan promotes a higher degree of protection of amenity related to the sound environment of a particular area”. In high amenity areas, the noise limit becomes the background noise level plus 5 dB(A), or a level of 35 dB(A), whichever is greater. The Standard notes that only dwellings where the predicted noise level is greater than an  $L_{A90(10\text{ min})}$  of 35 dB(A) at wind speeds of 6 m/s or lower need to be considered.

The predictions made in this report for both the Willatook Wind Farm by itself and for the combined effect of the Macarthur Wind Farm indicate that the dwellings where the noise level is greater than 35dB(A) at wind speeds of 6 m/s or lower are stakeholders. Therefore, Section 5.3 of the Standard is deemed to be not applicable to the Willatook Wind Farm.

### 4.2 Landowners with Commercial Agreements

The landowners of residences which have commercial agreements with the developer of the wind farm are termed stakeholders in this report.

It is common for the authorities to accept enhanced criteria for stakeholders. Suitable noise criteria will therefore be agreed upon between the developer and the stakeholders. These criteria are often based on the WHO Guidelines<sup>1</sup>, which recommend an indoor level of 30 dB(A) to protect against sleep disturbance. The indoor limit of 30 dB(A) equates to an outdoor noise level of 45 dB(A) with windows open, or 52 dB(A) with windows closed. It is understood that the agreed outdoor noise levels for stakeholders are all 45 dB(A) or less.

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<sup>1</sup> "WHO Guidelines for Community Noise" World Health Organisation, 1999

#### 4.3 Substation Noise

To assess substation noise the Noise from Industry in Regional Victoria Guidelines<sup>2</sup> (the NIRV) has been referenced. The NIRV specifically excludes the assessment of wind energy facilities, except for noise from substations and transmission infrastructure.

The NIRV provides recommended maximum noise levels based on the planning zone of the noise source and noise receiver. Based on the “Farming Zone” in which the substation and relevant residences are located, the most onerous (i.e. lowest) criterion is 36 dB(A) L<sub>Aeq</sub><sup>3</sup>.

#### 4.4 Construction Activity

The construction of a wind farm comprises activities such as road construction, civil works, excavation, foundation construction, electrical infrastructure works, WTG erection and quarry activity. These require processes such as heavy vehicle movements, crushing and screening, possible concrete batching, loaders, excavators, generators, cranes and rock breaking.

A detailed assessment of construction noise will be provided within a Construction Noise and Vibration Management Plan (CNVMP) prepared under the project’s construction management framework. The CNVMP will be prepared during the detailed design stage of the project when details such as scheduling, the type of equipment to be used, processes, locations and duration of activities are known.

The CNVMP will be based on the Victorian EPA’s *Publication 1254 “Noise Control Guidelines”* to ensure consistency with the purpose of Section 2 of the Noise Control Guidelines, titled “Construction and Demolition Site Noise”, being ‘*to protect nearby residential premises from unreasonable noise*’.

The Noise Control Guidelines require ‘*premises affected by noise ... (to) be considered and reasonable measures implemented to reduce (the) impact*’; including community consultation, work scheduling and noise reduction measures. The following table details “Normal Working Hours” when the above requirements need to be met and the objective criteria to be met for construction activity out of “Normal Working Hours”.

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<sup>2</sup> *Noise from Industry in Regional Victoria*, EPA Victoria, October 2011.

<sup>3</sup> This criterion corresponds to the recommended night-time (10pm to 7am) noise level for a noise source which can operate over a 24 hour period.

**Schedule: Construction and demolition site noise**

**Normal working hours**

Noise to follow the requirements above during the hours of:

7 am – 6 pm Monday to Friday

7 am – 1 pm Saturdays

**Weekend/evening work hours**

Noise level at any residential premises not to exceed background noise by:

10 dB(A) or more for up to 18 months after project commencement

5 dB(A) or more after 18 months

during the hours of:

6–10 pm Monday to Friday

1–10 pm Saturdays

7 am – 10 pm Sundays and public holidays

**Night period**

Noise inaudible within a habitable room of any residential premises during the hours of:

10 pm – 7 am Monday to Sunday

Notwithstanding the preparation of a CNVMP during the design phase, construction activity at a wind farm is seldom an issue as it typically occurs at significant separation distances from residences for short periods of time and during “Normal Working Hours”. Exceptions can occur for fixed location activities such as quarrying, batching and the like or for works which occur outside of normal working hours. The CNVMP will include a detailed assessment of these activities against the Guidelines.

## 5 ASSESSMENT

### 5.1 BACKGROUND NOISE MONITORING

To determine the background noise levels at various wind speeds, background noise monitoring was conducted near the proposed wind farm between 30 September and 10 November 2010.

The monitoring locations were selected based on preliminary predictions of the wind farm noise. Preference was given to residential locations with the highest predicted noise levels and without commercial agreements, subject to permission being granted by the landowner to place a noise logger. The background noise monitoring locations are detailed in Table 1 and shown on the layout in Appendix D.

**Table 1 - Background Noise Monitoring Locations**

Dwelling ID											
D9	D11	D15	D21	D37	D39	D49	D57	D92	D97	D113	D220

The results at the above dwellings have been applied to nearby dwellings to determine assessment criteria. The assessment criteria are provided in Table 2 below and the relationships between the measured and applied dwellings are shown in Appendix A.

The background noise was measured with "Rion NL-21" Class 2 sound level meters, which have a noise floor less than 20 dB(A). All microphones were fitted with windshields, with the microphone approximately 1.5m above ground level.

The sound level meters were laboratory (NATA) calibrated no greater than 2 years prior to the noise survey. The sound level meters were also tested using a calibrated reference sound source onsite before and after the noise monitoring.

The noise loggers were positioned at an equivalent distance from the facade of the dwelling as any significant trees at that location, whilst minimising the influence of fixed noise sources such as local domestic pumps or air conditioning units. A photograph of the logger in relation to the dwelling is shown in Appendix E.

The background noise level was measured in 10 minute intervals. During the background noise monitoring campaign, Wind Prospect measured the wind speed with a locally positioned meteorological mast, in 10 minute intervals at heights of 40m, 60m and 80m. The meteorological mast data has then been extrapolated by Wind Prospect to the hub height (141m) of the proposed WTG.

In addition to the data described above, rainfall and wind speed were measured at representative microphone positions. These measurements were used to eliminate periods where the noise levels may have been influenced by weather directly onto the microphone. Specifically, all periods of rain and periods where the wind speed at the microphone exceeded 5m/s for more than 90% of the interval were excluded.

The background noise collected at the monitoring location was correlated with the wind speed at hub height for each 10 minute period.

A least squares regression analysis of the noise and wind data has been made to determine the line of best fit. The data and regression analysis for each of the background monitoring locations are provided in Appendix F.

The criteria at each monitoring location have been calculated in Table 2 below based on the addition of 5dB to the line of best for the correlations. The criteria are only adjusted above the baseline noise level of 40 dB(A) by a small margin and this adjustment only occurs at some dwellings at higher wind speeds.

Table 2 - Criteria

Hub height wind speed	Criteria (dB(A))											
	D9	D11	D15	D21	D37	D39	D49	D57	D92	D97	D113	D220
3 m/s	40	40	40	40	40	40	40	40	40	40	40	40
4 m/s	40	40	40	40	40	40	40	40	40	40	40	40
5 m/s	40	40	40	40	40	40	40	40	40	40	40	40
6 m/s	40	40	40	40	40	40	40	40	40	40	40	40
7 m/s	40	40	40	40	40	40	40	40	40	40	40	40
8 m/s	40	40	40	40	40	41	40	40	40	40	40	40
9 m/s	40	40	40	40	41	42	40	40	40	41	40	40
10 m/s	40	41	40	40	41	43	41	40	41	42	40	40

## 6 NOISE PREDICTIONS

### 6.1 Noise Propagation Models

The noise from the WTGs and substation were modelled using both the CONCAWE<sup>4</sup> and ISO 9613<sup>5</sup> propagation models within the SoundPLAN noise modelling software. The noise propagation models are both internationally accepted noise propagation models that take into account:

- the sound power level and position of the noise sources;
- the separation between the noise sources and receivers;
- the topography between the noise sources and receivers;
- the hardness of the ground;
- atmospheric absorption at different frequencies; and,
- meteorological conditions.

#### 6.1.1 CONCAWE

The CONCAWE system categorises meteorological conditions into six categories, from Category 1 to Category 6. Category 1 represents meteorological conditions which are least conducive to noise propagation over distance and result in the lowest noise levels whilst Category 6 represents meteorological conditions which are most conducive to noise propagation over distance and result in the highest noise levels for a given operation.

For a conservative assessment, the noise model has considered meteorological conditions corresponding to Category 6 (night with no clouds and wind from each WTG to the residence under consideration) with all receivers being downwind of all WTGs, which is a conservative assumption. The noise level calculated from each WTG (for the assumption of the wind blowing from that WTG to the residence) is then added together to calculate the total noise at the residence under consideration.

The model input parameters associated with the atmospheric absorption, ground absorption and shielding used in the CONCAWE predictions are summarised below:

- atmospheric conditions at 10°C and 80% relative humidity;
- acoustically soft ground (finite acoustic impedance); and,
- a maximum barrier attenuation from topography of 2 dB.

<sup>4</sup> CONCAWE the oil companies' international study group for conservation of clean air and water – Europe "The propagation of noise from petrochemical complexes to neighbouring communities"

<sup>5</sup> ISO 9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors"

## 6.1.2 ISO 9613

ISO 9613 is a downwind model (that is, it does not provide the option of other weather categories such as an upwind scenario, which are less conducive to the propagation of noise). ISO 9613 also provides the conservative assumption of a receiver being downwind of all noise sources (as per the CONCAWE model). The model inputs have been taken from the May 2013 UK IOA Good Practice Guide<sup>6</sup>, including:

- Warranted sound power level data;
- 10°C temperature;
- 70% relative humidity;
- 50% acoustically hard ground and 50% acoustically soft ground;
- barrier attenuation of no greater than 2 dB(A);
- 4m receiver height; and,
- Application of a 3 dB(A) correction where a "concave" ground profile exists as defined by the Institute of Acoustics<sup>6</sup>.

## 6.2 Noise Sources

The noise from the wind farm has been modelled based on:

1. General Electric "GE4.8-158" WTGs with a hub height of 141m; and,
2. Transformer(s) with an overall capacity of 520MVA at the substation.

### 6.2.1 WTGs

The sound power levels of the WTGs are detailed in Table 4. The noise data are derived from the *Technical Documentation Wind Turbine Generator Systems 4.8-158 - 50 Hz "Noise\_Emission-NO\_4.8-158-50Hz\_IEC\_EN\_r02"*. The total sound power levels are understood to be the warranted levels of the proposed WTGs. The assessment is based on the GE4.8-158 not exhibiting tonality at dwellings.

**Table 4: Sound power levels for GE4.8-158**

Hub Height Wind Speed (m/s)	Sound Power Level in Octave Band Centre Frequencies (dB(A) re 1 pW)										Total Sound Power Level (dB(A) re 1 pW)
	16 Hz	32 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
4	56.7	68.0	77.2	83.0	86.0	87.8	90.7	87.4	75.6	60.0	94.8
5	57.3	68.6	77.9	83.7	86.7	88.5	91.4	88.1	76.2	60.7	95.5
6	61.3	72.6	81.9	87.7	90.7	92.4	95.3	92.0	80.2	64.6	99.4
7	64.6	76.0	85.2	91.0	94.0	95.8	98.7	95.4	83.6	68.0	102.8
<b>8 and above</b>	<b>66.7</b>	<b>78.0</b>	<b>87.2</b>	<b>93.0</b>	<b>96.0</b>	<b>97.8</b>	<b>100.7</b>	<b>97.4</b>	<b>85.6</b>	<b>70.0</b>	<b>104.8</b>

<sup>6</sup> Institute of Acoustics, A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise, May 2013

### 6.2.2 Substation

The noise from the substation has been modelled based on one or more transformers with an overall capacity of 520MVA at the substation. The noise level assumed for the transformers is equivalent to the total sound power level derived from the Australian/New Zealand Standard AS/NZS60076.10:2009, *Power transformers - Determination of sound levels* (the Transformer Standard), as summarised in Table 5.

**Table 5: 520 MVA rated transformer(s) sound power levels.**

Octave Band Centre Frequency (Hz)	Sound Power Level (dB(A) re 1 pW)
63 Hz	83
125 Hz	91
250 Hz	99
500 Hz	101
1,000 Hz	93
2,000 Hz	91
4,000 Hz	83
<b>Total</b>	<b>104</b>

## 7 PREDICTED NOISE LEVELS

### 7.1 WTG Operational Noise

Predictions of the noise from *General Electric “GE4.8-158”* WTGs with a hub height of 141m have been made. Detailed prediction results are provided in Appendix G for wind speeds from 6m/s to 10m/s for all dwellings where the noise is identified to be 30 dB(A) or above.

The CONCAWE and ISO 9613 predictions both indicate that the proposed Willatook Wind Farm complies with the *New Zealand Standard NZS6808:2010* at all dwellings of landowners without commercial agreements.

The predictions (Appendix G) also indicate that the dwellings where the noise level is greater than 35dB(A) at wind speeds of 6 m/s are stakeholders, therefore Section 5.3 of the Standard which contains provisions for residences situated in high amenity areas is not applicable to the Willatook Wind Farm.

Noise prediction contours are provided for the highest predicted noise levels out of the two models (which occurs for the CONCAWE model at 10m/s) in Appendix H.

### 7.2 Substation Noise

The noise predictions indicate that the transformer noise easily complies with the NIRV criterion of 36 dB(A) at all locations. The higher predictions out of the two models (CONCAWE) are provided in Table 6 for the closest dwellings to the substation:

Table 6: Substation Noise Predictions.

Dwelling	Predicted Noise Level dB(A)
D1	28
D2	26
D3	25
D4	25
D357	25
D7	24
D6	20

### 7.3 Summary

The predictions in Appendix G indicate that the Willatook wind farm complies with the Shire Planning Scheme and the “Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria”, November 2017.

## 8 Cumulative Noise

The cumulative noise levels from the operation of the Macarthur Wind Farm and the proposed Willatook Wind Farm have also been considered.

The cumulative noise assessment has been based on the understanding that:

1. A *Vestas "V112-3.0"* with a hub height of 84m above ground level has been installed at the Macarthur Wind Farm. The sound power levels for the "V112-3.0" are summarised in Table 7.
2. Transformers with an overall capacity of:
  - 600MVA are installed at the substation where the Macarthur Wind Farm connects into the existing Heywood to Moorabool line; and,
  - 560MVA are installed at the Macarthur Wind Farm collector substation.

The WTG noise data are derived from the following documents:

- *General Specification V112–3.0 MW 50/60 Hz “0011-9181 V05, 2011-08-16”*
- *Measurement of Noise Emission from a Vestas V112-3.0 MW mode 0 Wind Turbine; serial no 40888 “AV 177/11, DANAK 100/2860 Rev2”*

**Table 7: V112-3.0 Sound Power Levels**

Hub Height Wind Speed (m/s)	Sound Power Level in Octave Band Centre Frequencies (dB(A) re 1 pW)										Total Sound Power Level (dB(A) re 1 pW)
	16 Hz	32 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
4.2	53.3	63.7	75.5	84.2	85.4	87.8	89.8	86.6	80.7	64.8	94.5
5.6	56.1	66.5	78.3	87.0	88.2	90.6	92.6	89.4	83.5	67.6	97.3
7	59.6	69.5	83.0	89.9	91.6	94.6	95.6	94.1	86.8	70.4	100.9
8.4	62.7	72.7	86.3	91.2	95.6	98.2	99.5	97.0	90.7	76.5	104.3
9.8	65.3	74.9	88.1	94.1	97.8	100.1	100.8	98.1	92.7	78.9	106
11.2	66.7	76.4	89.2	94.6	97.5	99.9	101.6	99.1	94.4	79.9	106.5
12.7 and above	67.2	77.5	89.4	94.9	96.8	98.8	101.7	100.1	95.0	78.2	106.5

The noise levels assumed for both transformer installations are derived from the Transformer Standard, as summarised in Table 8.

**Table 8: 560 and 600 MVA rated transformer(s) sound power levels.**

Octave Band Centre Frequency (Hz)	Sound Power Level (dB(A) re 1 pW)
63 Hz	84
125 Hz	92
250 Hz	100
500 Hz	102
1,000 Hz	94
2,000 Hz	92
4,000 Hz	84
<b>Total</b>	<b>105</b>

### **8.1 Predictions**

The cumulative noise from both the WTG and substations associated with the Macarthur Wind Farm and the proposed Willatook Wind Farm has been predicted using both CONCAWE and ISO 9613. As noted above, the predicted noise level at each residence is based on the noise level from each WTG operating under the assumption of the wind blowing from that WTG to the dwelling being added together.

The highest predicted results are provided in Appendix I (which occurs at a wind speed of 10m/s) for all dwellings where the noise from the Willatook Wind Farm is identified to be 30 dB(A) or above in Section 7 of this report.

The cumulative noise level from the Macarthur Wind Farm and the proposed Willatook Wind Farm complies with the *New Zealand Standard NZS6808:2010* at all dwellings of landowners without commercial agreements in the vicinity of the Willatook Wind Farm.

Noise prediction contours are provided for the highest predicted noise levels out of the two models for the cumulative predictions (which occurs for the CONCAWE model at 10m/s) in Appendix J.

The cumulative noise level has also been predicted at a wind speed of 6m/s for comparison with the requirements of Section 5.3 of the Standard. The predictions (detailed in Appendix I) indicate that the dwellings where the noise level is greater than 35 dB(A) are stakeholders. Therefore, the provisions for residences situated in high amenity areas are not applicable when considering the cumulative noise levels from the Macarthur and proposed Willatook Wind Farms.

**Appendix A: Dwellings**

Dwelling ID	Stakeholder	Co-ordinates (UTM WGS84 54H)		Representative Background Monitoring Location	Logging at location
		Easting	Southing		
D1	Yes	602335	5778529	D15	
D2	Yes	602246	5778684	D15	
D3	Yes	602802	5778875	D15	
D4	No	603928	5778301	D15	
D6	Yes	604700	5776272	D11	
D7	No	604259	5778102	D15	
D8	No	604308	5774642	D11	
D9	No	600277	5778850	D9	YES
D10	No	599972	5778826		
D11	No	604609	5774250	D11	YES
D12	Yes	604714	5779053	D15	
D14	Yes	599033	5778440		
D15	No	606011	5777939	D15	YES
D17	No	604791	5773230	D11	
D18	OffSite	604971	5773280	D11	
D19	Yes	597843	5778423	D21	
D21	No	597296	5778566	D21	YES
D22	No	598908	5772238		
D23	No	597062	5778841	D21	
D24	No	606578	5780701	D92	
D25	No	608204	5776297	D39	
D26	No	604978	5771412	D57	
D27	No	606681	5780722	D92	
D28	Yes	607967	5774731	D39	
D29	No	598952	5771721		
D30	Yes	602398	5782866	D37	
D31	No	601378	5782881	D37	
D32	No	596659	5779424	D21	
D33	No	596389	5778961	D21	
D34	No	597821	5772016	D21	
D35	Yes	603628	5782887	D49	
D36	No	605508	5771178	D57	
D37	No	602532	5783075	D37	YES
D38	No	601400	5783065	D37	
D39	No	608650	5775371	D39	YES
D40	No	598865	5771211		
D41	No	600333	5782911	D37	
D42	No	606675	5781661	D92	
D43	No	600277	5783049	D37	
D44	Yes	595691	5778112		
D45	No	608162	5780426	D92	
D46	No	605303	5770376	D57	
D47	No	601396	5769740	D57	
D48	No	602031	5769663	D57	
D49	No	603620	5783636	D49	YES
D50	No	600934	5769676	D57	
D51	No	602984	5769547	D57	
D52	No	602095	5769509	D57	
D53	No	605345	5770163	D57	
D54	No	602873	5769447	D57	
D55	Yes	609518	5777527	D39	
D56	No	598686	5782943		
D57	No	603688	5769506	D57	YES
D58	No	606192	5783053	D92	
D59	No	609853	5776455	D39	
D60	No	609167	5779742	D113	
D61	No	603971	5769309	D57	
D62	No	598860	5769956		
D63	No	605010	5769522	D57	
D64	No	609959	5776611	D39	

Dwelling ID	Stakeholder	Co-ordinates (UTM WGS84 54H)		Representative Background Monitoring Location	Logging at location
		Easting	Southing		
D65	OffSite	598819	5769883		
D66	No	609909	5775501	D39	
D67	No	596768	5770979		
D68	No	596933	5770807		
D69	No	597051	5770678		
D70	No	596466	5771235		
D71	No	597536	5783106		
D72	No	595723	5772081		
D73	No	595871	5771858		
D74	No	596702	5770891		
D75	No	596413	5771186		
D76	No	596647	5770921		
D77	No	596472	5771074		
D78	No	595004	5773138	D97	
D79	No	596512	5770958		
D80	No	596392	5771049		
D81	No	595402	5772281		
D82	No	597560	5769991		
D83	No	596108	5771316		
D84	No	608524	5782097		
D85	No	597946	5769696	D92	
D86	No	597122	5770286		
D87	No	595928	5771322		
D88	OffSite	594115	5778226		
D89	No	607704	5783119	D92	
D90	No	594396	5773938	D97	
D91	No	594734	5773226	D97	
D92	No	608575	5782381	D92	YES
D93	No	596941	5783291		
D94	No	610705	5774864		
D95	No	606661	5784131		
D96	No	596519	5783232		
D97	No	593563	5776286	D97	YES
D98	No	598510	5768765		
D99	No	611022	5775496		
D100	No	595569	5771044		
D101	No	595130	5771613		
D102	No	596133	5770335		
D103	No	611142	5775845		
D104	No	609711	5771619		
D105	No	611249	5775892		
D106	No	595747	5770543		
D107	No	593479	5775059	D97	
D108	No	609723	5771388		
D109	No	611140	5774320		
D110	No	598469	5768406		
D111	No	596386	5769748		
D112	No	594161	5781129		
D113	No	611320	5779629	D113	YES
D114	OffSite	606902	5768308		
D115	No	610243	5771322		
D116	No	598498	5767884		
D117	No	604292	5767261		
D118	No	593740	5781136		
D119	No	595049	5783096		
D120	No	608523	5784275		
D121	No	608425	5769023		
D122	No	597247	5768321		
D123	No	592583	5777111	D97	
D124	No	592534	5776195	D97	

**Willatook Wind Farm**  
**Environmental Noise Assessment**  
**S3522C14**  
**September 2018**

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Dwelling ID	Stakeholder	Co-ordinates (UTM WGS84 54H)		Representative Background Monitoring Location	Logging at location
		Easting	Southing		
D125	No	595222	5783462		
D126	No	599515	5786214		
D127	No	608900	5784263		
D128	No	612361	5777305		
D129	No	609597	5769643		
D130	No	604327	5766698		
D131	No	603296	5766534		
D132	No	607699	5785384		
D133	No	607803	5785350		
D134	No	611979	5773142		
D135	No	612640	5775884		
D136	No	604337	5766489		
D137	No	603169	5766320		
D138	No	604473	5766424		
D139	OffSite	592154	5779216		
D140	No	592056	5779004		
D141	No	611721	5771768		
D142	No	596663	5767721		
D143	No	609422	5784627		
D144	No	592031	5779597		
D145	No	610056	5769161		
D147	No	600808	5765982		
D148	No	593112	5782322		
D149	No	605146	5787180		
D150	No	605003	5787216		
D151	No	604971	5787248		
D152	No	591876	5779855		
D153	No	591788	5779858		
D154	No	591465	5777974	D220	
D155	No	610572	5769435		
D156	No	601814	5765707		
D157	No	598626	5766330		
D158	No	612348	5781169	D113	
D159	No	612189	5771761		
D160	No	599455	5766040		
D161	No	602126	5787694		
D162	No	613417	5777017		
D163	No	593443	5783392		
D164	No	612007	5782346		
D165	No	610174	5784744		
D166	No	602085	5787930		
D167	Check	591187	5774830		
D168	No	612133	5770930		
D169	No	591349	5779774		
D170	No	591685	5780880		
D171	No	612258	5782765		
D172	No	608545	5766808		
D174	No	612120	5783242		
D175	No	591067	5780118		
D176	No	608840	5766847		
D177	No	613732	5779679		
D178	No	603608	5788520		
D179	No	613579	5780579		
D180	No	592071	5782757		
D181	No	592121	5782846		
D182	No	613738	5773143		
D183	No	607134	5787646		
D184	No	599907	5764907		
D185	No	592349	5783465		
D186	No	607116	5787825		
D187	No	614422	5777208		

Dwelling ID	Stakeholder	Co-ordinates (UTM WGS84 54H)		Representative Background Monitoring Location	Logging at location
		Easting	Southing		
D188	No	599779	5764775		
D190	No	607261	5787927		
D191	No	599731	5764691		
D192	No	609560	5766731		
D194	No	599792	5764618		
D194	No	599792	5764618		
D195	No	590444	5780127		
D196	No	590217	5779795		
D197	No	614686	5774286		
D198	No	610108	5766706		
D199	OffSite	589671	5778413	D220	
D201	No	589903	5780251		
D202	No	591975	5784458		
D203	No	614847	5773129		
D204	No	604549	5763751		
D205	No	608894	5788067		
D206	No	615500	5776175		
D207	No	615344	5779220		
D208	No	609706	5787776		
D209	No	614905	5781032		
D210	No	604355	5763498		
D211	No	589097	5778285	D220	
D212	No	609793	5787772		
D213	No	615441	5774187		
D214	No	615442	5779237		
D215	No	591017	5783785		
D216	No	609874	5787954		
D217	No	615049	5781516		
D218	No	613376	5784675		
D219	No	588778	5778220	D220	
D220	No	588691	5776847	D220	YES
D221	No	615048	5781682		
D222	No	615330	5780951		
D223	No	609979	5788062		
D224	No	615339	5781020		
D225	No	616020	5775768		
D226	No	615422	5780789		
D228	No	616133	5776869		
D228	No	616133	5776869		
D229	No	615454	5781015		
D230	No	590098	5783115		
D231	No	615551	5780784		
D232	No	615196	5781818		
D233	No	615491	5781013		
D234	No	616174	5775981		
D235	No	615246	5781720		
D236	No	588544	5778300	D220	
D237	No	615294	5781721		
D238	No	616105	5778761		
D239	No	615416	5781501		
D240	No	615662	5780929		
D241	No	615485	5781850		
D242	No	615837	5780951		
D243	No	588434	5773893		
D244	No	615563	5781879		
D245	No	615874	5781017		
D246	No	615732	5781491		
D247	No	615862	5781130		
D248	No	615897	5781030		
D249	No	615895	5781056		
D250	No	615756	5781482		

**Willatook Wind Farm**  
**Environmental Noise Assessment**  
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Dwelling ID	Stakeholder	Co-ordinates (UTM WGS84 54H)		Representative Background Monitoring Location	Logging at location
		Easting	Southing		
D251	No	615901	5781065		
D252	No	615788	5781434		
D253	No	615785	5781486		
D254	No	615905	5781201		
D255	No	615806	5781490		
D256	No	615838	5781425		
D257	No	615892	5781294		
D258	No	615805	5781602		
D259	No	615912	5781307		
D260	No	615853	5781485		
D261	No	611554	5787723		
D262	No	616082	5780801		
D263	No	616014	5781036		
D264	No	615881	5781491		
D265	No	616195	5780573		
D266	No	588031	5778358	D220	
D267	No	615933	5781416		
D268	No	616012	5781195		
D269	No	615913	5781485		
D270	No	615929	5781442		
D271	No	615930	5781445		
D273	No	615913	5781510		
D273	No	615913	5781510		
D274	No	616003	5781253		
D275	No	615894	5781571		
D277	No	615985	5781313		
D277	No	615985	5781313		
D278	No	616035	5781190		
D280	No	615896	5781607		
D280	No	615896	5781607		
D281	No	616054	5781270		
D282	No	615987	5781469		
D283	No	615905	5781754		
D285	No	616000	5781513		
D285	No	616000	5781513		
D286	No	615998	5781546		
D287	No	611544	5787933		
D288	No	615990	5781599		
D289	No	616041	5781468		
D290	No	616006	5781572		
D291	No	615996	5781661		
D293	No	616081	5781431		
D293	No	616081	5781431		
D294	No	616153	5781267		
D295	No	587872	5774891		
D296	No	587871	5778512	D220	
D297	No	588244	5780439		
D298	No	616283	5780973		
D299	No	616262	5781057		
D300	No	616172	5781392		
D301	No	616175	5781434		
D302	No	616267	5781172		
D303	No	616165	5781481		
D304	No	616216	5781359		
D305	No	615848	5782425		
D306	No	616240	5781512		
D307	No	614942	5784303		
D308	No	589128	5783218		
D309	No	616261	5781504		
D310	No	616403	5781099		
D311	No	612233	5787665		

Dwelling ID	Stakeholder	Co-ordinates (UTM WGS84 54H)		Representative Background Monitoring Location	Logging at location
		Easting	Southing		
D312	No	614942	5784360		
D314	No	616329	5781434		
D314	No	616329	5781434		
D315	No	615056	5784252		
D316	No	615035	5784340		
D317	No	616470	5781177		
D318	No	614826	5784710		
D319	No	615095	5784330		
D320	No	616185	5782171		
D321	No	616507	5781354		
D322	No	616610	5781143		
D323	No	612350	5787961		
D324	No	616934	5780273		
D325	No	612443	5787929		
D326	No	615238	5784648		
D327	No	616904	5781159		
D328	No	617685	5777245		
D329	No	617799	5777069		
D330	No	585482	5776486		
D331	No	585505	5775332		
D332	No	585455	5776316		
D333	No	585452	5775525		
D334	No	585449	5775575		
D335	No	585511	5774843		
D336	No	585015	5776536		
D337	No	584799	5776991		
D338	No	584768	5777872		
D339	No	584713	5776081		
D340	No	584692	5777678		
D341	No	584461	5776591		
D342	No	584433	5777222		
D343	No	584390	5774946		
D344	No	584295	5775371		
D345	No	584292	5777930		
D346	No	584091	5776488		
D347	No	584067	5776895		
D348	No	584043	5776874		
D349	No	584024	5776854		
D350	No	584006	5776078		
D351	No	583895	5776613		
D352	No	583573	5776659		
D353	No	583393	5776676		
D354	No	594015	5774298	D97	
D355	No	604206	5775090		
D356	No	597839	5771804		
D357	No	602760	5778981		
D360	Check	591633	5775035		
D364	Check	608482	5781996		
D365	Check	611940	5782346		
D366	No	612381	5782754		
D373	Yes	604822	5779085		
D374	OffSite	605064	5773030		
D375	Yes	599301	5774083		
D376	Yes	609718	5777497		
D382	No	594643	5773412		
D383	No	598921	5771659		
D387	No	597028	5779040		

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**Appendix B: Willatook WTG and Substation Locations**

WTG ID	Rotor Diameter (m)	Hub Height (m)	Co-ordinates (UTM WGS84 54H)	
			Easting	Southing
1	158	141	606513	5776121
2	158	141	605938	5776159
3	158	141	603931	5781257
4	158	141	603800	5781947
5	158	141	598943	5776057
6	158	141	599407	5775372
7	158	141	600016	5775489
8	158	141	603580	5780392
9	158	141	599454	5776016
10	158	141	605932	5775521
11	158	141	607696	5778174
12	158	141	598381	5777198
13	158	141	606437	5775526
14	158	141	603271	5781298
15	158	141	598253	5775606
16	158	141	597700	5775580
17	158	141	596569	5775256
18	158	141	596043	5775235
19	158	141	594621	5777395
20	158	141	597147	5775238
21	158	141	596786	5776973
22	158	141	597400	5776907
23	158	141	597785	5774929
24	158	141	606024	5776744
25	158	141	608153	5778350
26	158	141	597167	5776066
27	158	141	601117	5775665
28	158	141	601914	5775901
29	158	141	603386	5772848
30	158	141	600720	5772511
31	158	141	600684	5775423
32	158	141	602473	5776733
33	158	141	602504	5775435
34	158	141	601357	5776117
35	158	141	601917	5776886
36	158	141	602010	5774502
37	158	141	600595	5774199
38	158	141	600563	5774844
39	158	141	601833	5777572
40	158	141	598438	5776513
41	158	141	603918	5780648
42	158	141	595421	5775350
43	158	141	603113	5775982
44	158	141	601769	5775291
45	158	141	602441	5774790
46	158	141	601447	5774837
47	158	141	602543	5773999
48	158	141	606545	5776755
49	158	141	607232	5778063
50	158	141	603086	5780846
51	158	141	604320	5781918
52	158	141	604519	5780121
53	158	141	597893	5777039

WTG ID	Rotor Diameter (m)	Hub Height (m)	Co-ordinates (UTM WGS84 54H)	
			Easting	Southing
54	158	141	602258	5776198
55	158	141	601151	5774477
56	158	141	603291	5781934
57	158	141	608715	5778170
58	158	141	596316	5776164
59	158	141	595956	5775917
60	158	141	596160	5776895
61	158	141	595414	5776645
62	158	141	595408	5775981
63	158	141	598746	5774929
64	158	141	597767	5774246
65	158	141	598264	5774909
66	158	141	607090	5775103
67	158	141	607092	5774401
68	158	141	607090	5773750
69	158	141	604493	5781217
70	158	141	595586	5777179
71	158	141	598744	5775586
72	158	141	597939	5776337
73	158	141	600900	5772930
74	158	141	601502	5772930
75	158	141	602107	5772925
76	158	141	602891	5772896
77	158	141	601344	5772490
78	158	141	601950	5772493
79	158	141	602628	5772493
80	158	141	595057	5777406
81	158	141	607482	5773748
82	158	141	597524	5776248
83	158	141	602082	5773755

Substation	Transformer Size (MVA)	Co-ordinates (UTM WGS84 54H)	
		Easting	Southing
1	520	602718	5777432

**Appendix C: Macarthur WTG Locations**

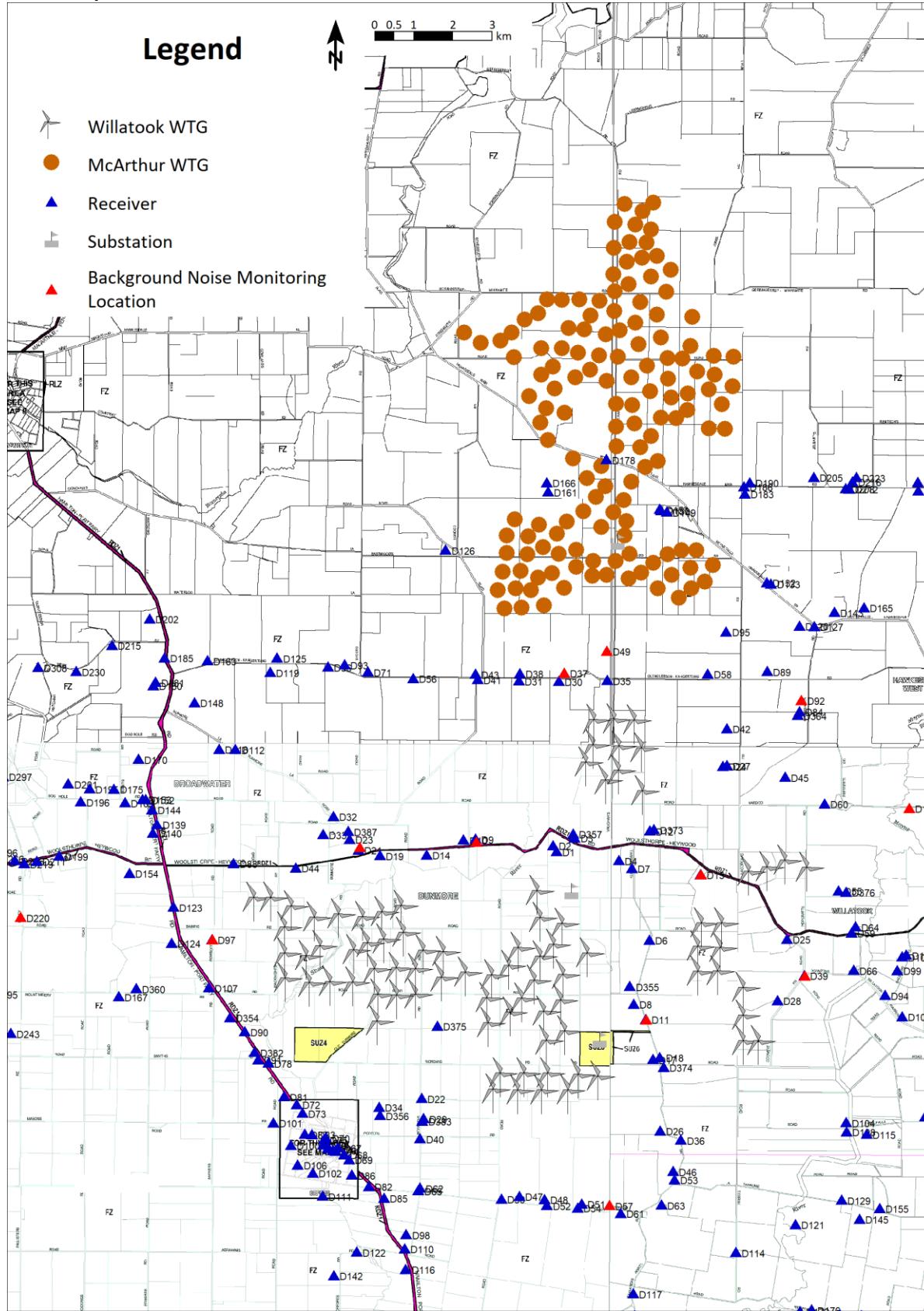
WTG ID	Co-ordinates (UTM WGS84 54H)	
	Easting	Southing
1	605750	5785789
2	601868	5792281
3	601893	5786890
4	604750	5794414
5	602250	5790914
6	604130	5793590
7	604635	5794080
8	602645	5791905
9	604915	5788508
10	604176	5785516
11	602478	5791382
12	604525	5793690
13	605177	5786132
14	605135	5792823
15	601622	5786594
16	602891	5791269
17	605275	5785614
18	604806	5785912
19	605267	5790134
20	604900	5793739
21	606848	5791164
22	601446	5784774
23	603816	5792337
24	604811	5795092
25	606225	5789339
26	602022	5784837
27	604650	5790939
28	602600	5786964
29	603342	5787591
30	604900	5792239
31	606325	5785864
32	601925	5789489
33	602350	5786664
34	605462	5785029
35	600913	5791585
36	606550	5789964
37	602096	5792628
38	603434	5792592
39	601425	5785714
40	602768	5788576
41	605775	5785264
42	604075	5795064
43	605000	5789614
44	604532	5794879
45	603256	5785583
46	606346	5791189
47	606225	5790339
48	603194	5790841
49	606628	5789334
50	603950	5791839
51	605388	5789603
52	602843	5786246
53	605800	5792189
54	602078	5789857
55	604350	5792039
56	601692	5785217
57	605184	5790612

WTG ID	Co-ordinates (UTM WGS84 54H)	
	Easting	Southing
58	603485	5788383
59	603793	5793272
60	601200	5791783
61	601875	5785539
62	605691	5790232
63	606125	5785439
64	604350	5794539
65	602927	5792632
66	603483	5786834
67	605250	5793389
68	602475	5792623
69	605674	5789808
70	602000	5786314
71	603580	5787871
72	605900	5786239
73	602122	5789040
74	605000	5791664
75	601300	5785264
76	604325	5789464
77	601251	5791157
78	602839	5785809
79	603826	5794609
80	604075	5786614
81	604745	5789145
82	605554	5791126
83	603214	5792216
84	604200	5794089
85	604198	5786147
86	603600	5791739
87	602532	5785280
88	604173	5793021
89	603114	5788070
90	604057	5787521
91	603619	5790555
92	604475	5792564
93	603850	5785964
94	603050	5791864
95	601956	5791386
96	604250	5787989
97	606832	5790420
98	604250	5790639
99	602550	5789739
100	604499	5785663
101	604725	5790289
102	600975	5785689
103	603797	5793941
104	604750	5793214
105	602231	5785649
106	605169	5791134
107	603875	5788889
108	605925	5790789
109	604125	5786977
110	602817	5790644
111	604275	5789939
112	603280	5785967
113	603900	5791164
114	606375	5790714

WTG ID	Co-ordinates (UTM WGS84 54H)	
	Easting	Southing
115	602300	5790364
116	604425	5791489
117	603863	5789387
118	603616	5785614
119	601075	5786164
120	603421	5791207
121	603790	5787209
122	599992	5791790
123	604923	5785264
124	601075	5786614
125	605750	5791439
126	604480	5788863
127	601525	5792114
128	603825	5792839
129	601650	5790164
130	601277	5787030
131	602393	5786140
132	603855	5789973
133	601011	5784754
134	604600	5788364
135	601950	5790714
136	600848	5785222
137	600410	5791526
138	605525	5786239
139	601598	5786136
140	603026	5787232

Substation	Transformer Size (MVA)	Co-ordinates (UTM WGS84 54H)	
		Easting	Southing
1	600	603441	5773653
2	560	603891	5786337

Appendix D: Layout



**Appendix E: Noise Logger Locations**

D9 – 2790 Woolsthorpe-Heywood Rd



D11 – 473 Tarrone North Rd



D15 – 2169 Woolsthorpe-Heywood Rd



D21 – 3082 Woolsthorpe-Heywood Rd



D37 – 930 Kangertong Rd



D39 – 3 Coomete Rd



D49 – 842 Kangertong Rd



D57 – 1168 Tarrone Lane



D92 – 54 Bar-U Rd



D97 – 119 Rowbottoms Rd



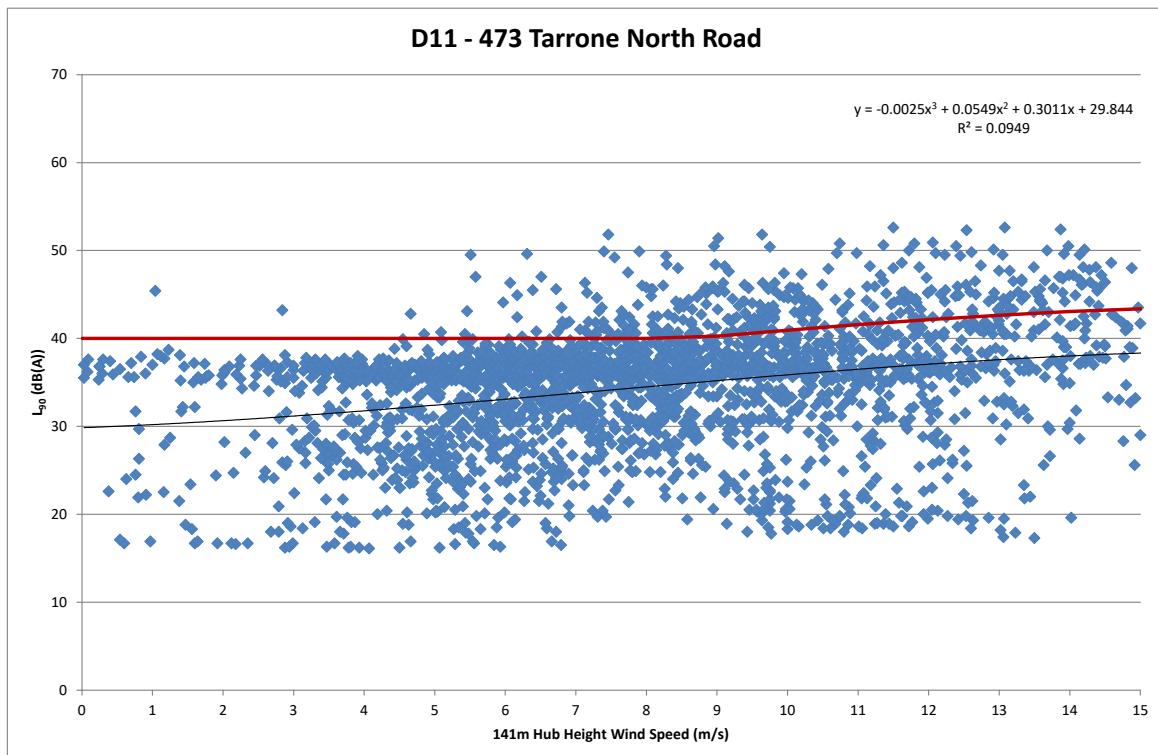
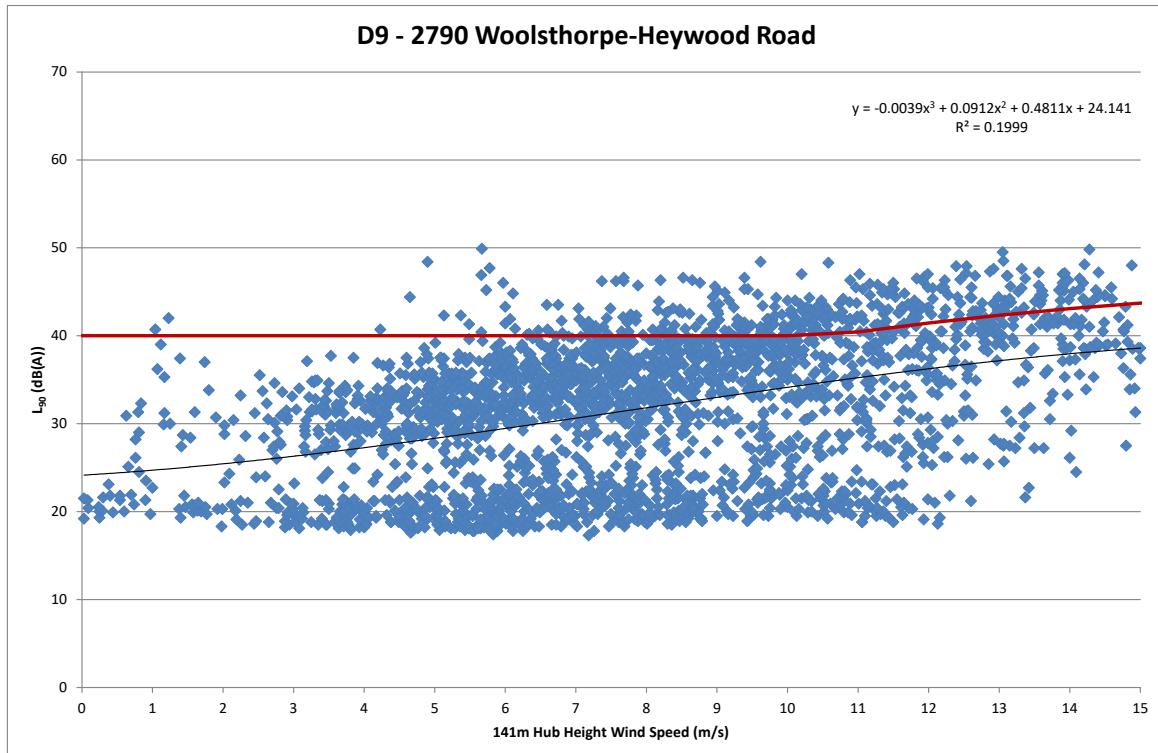
D113 – 459 Nardoo Rd

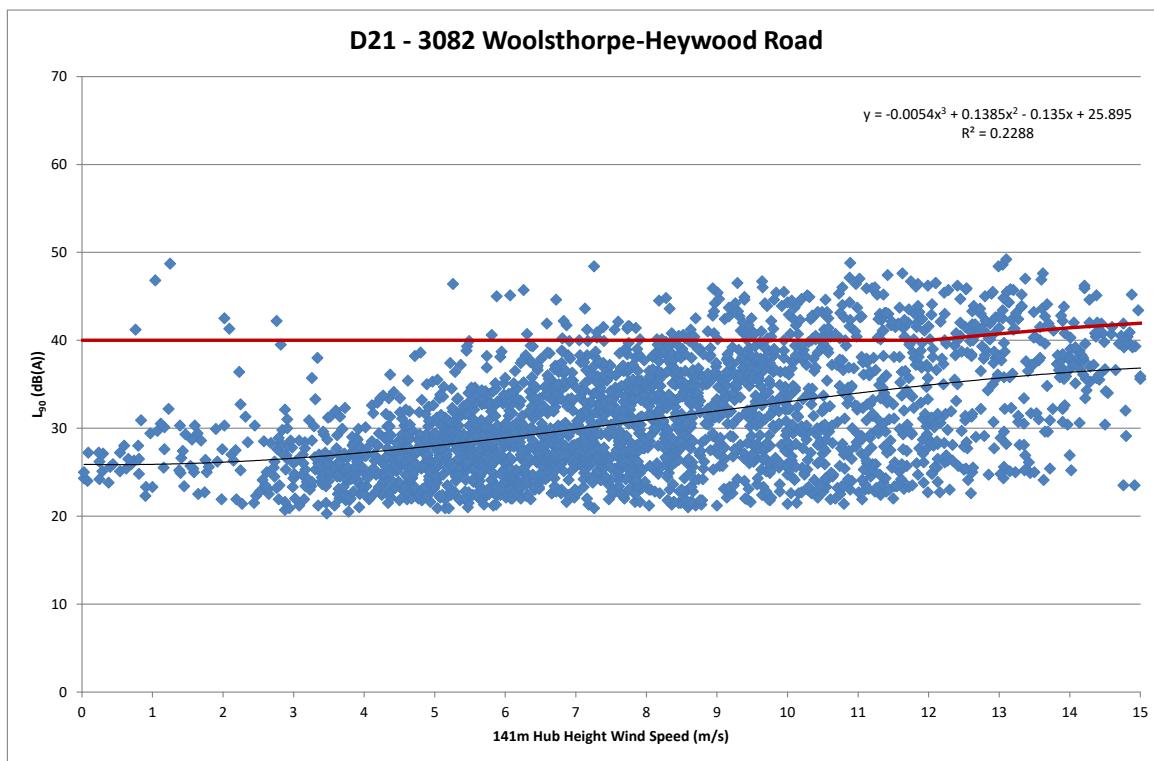
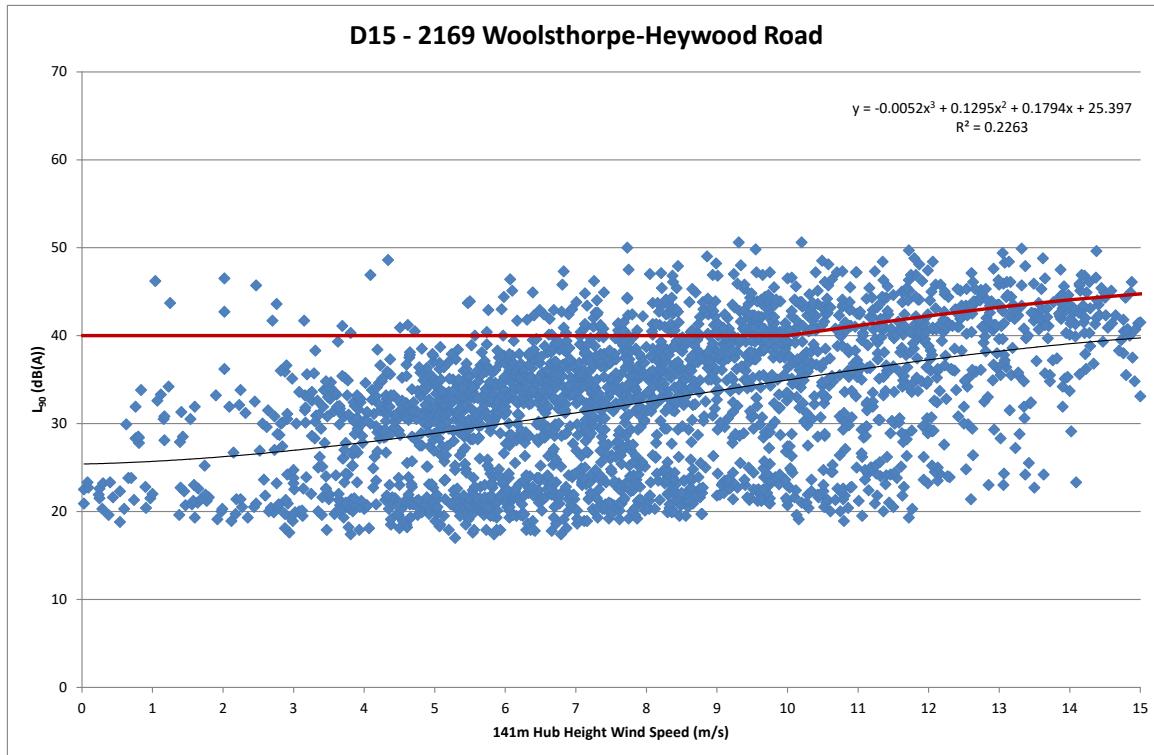


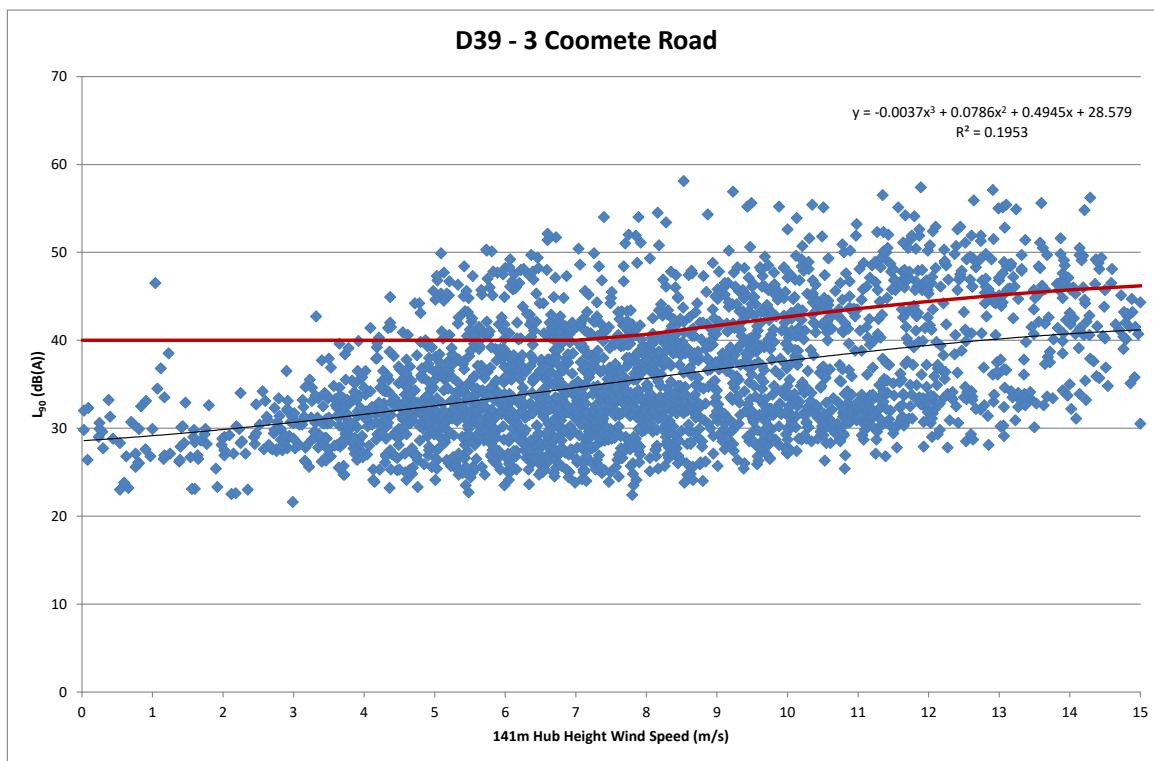
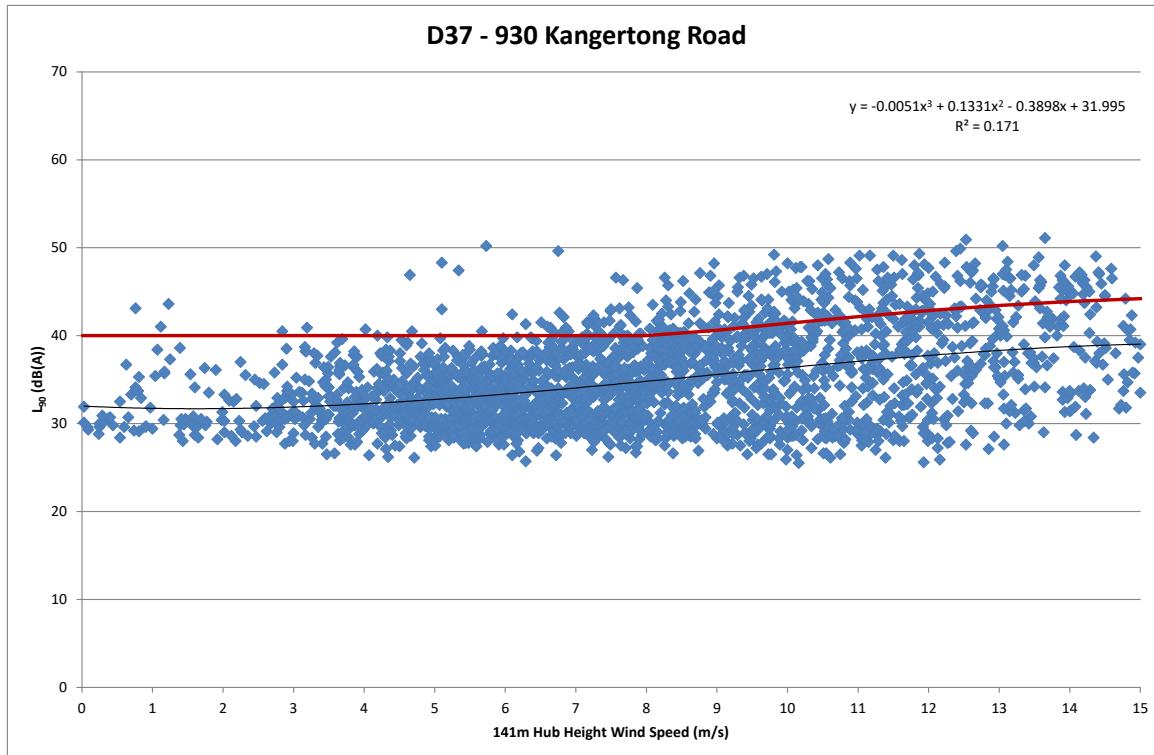
D220 – Muddy Dam Rd

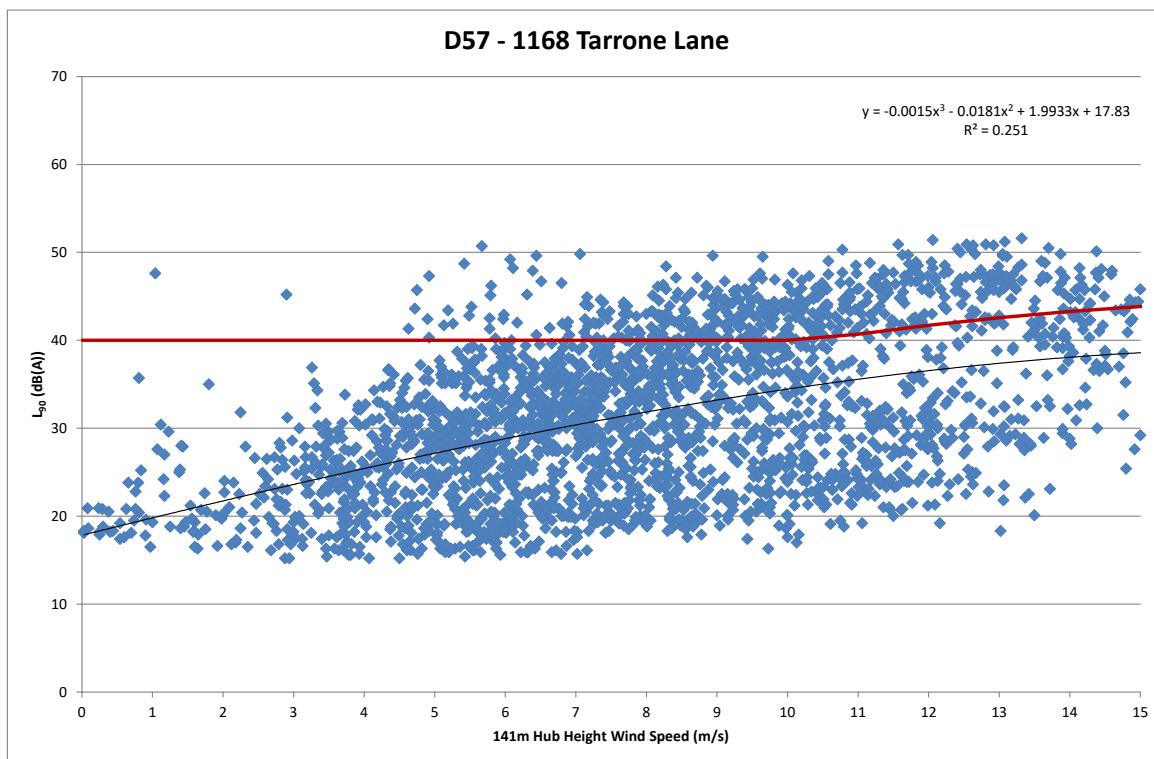
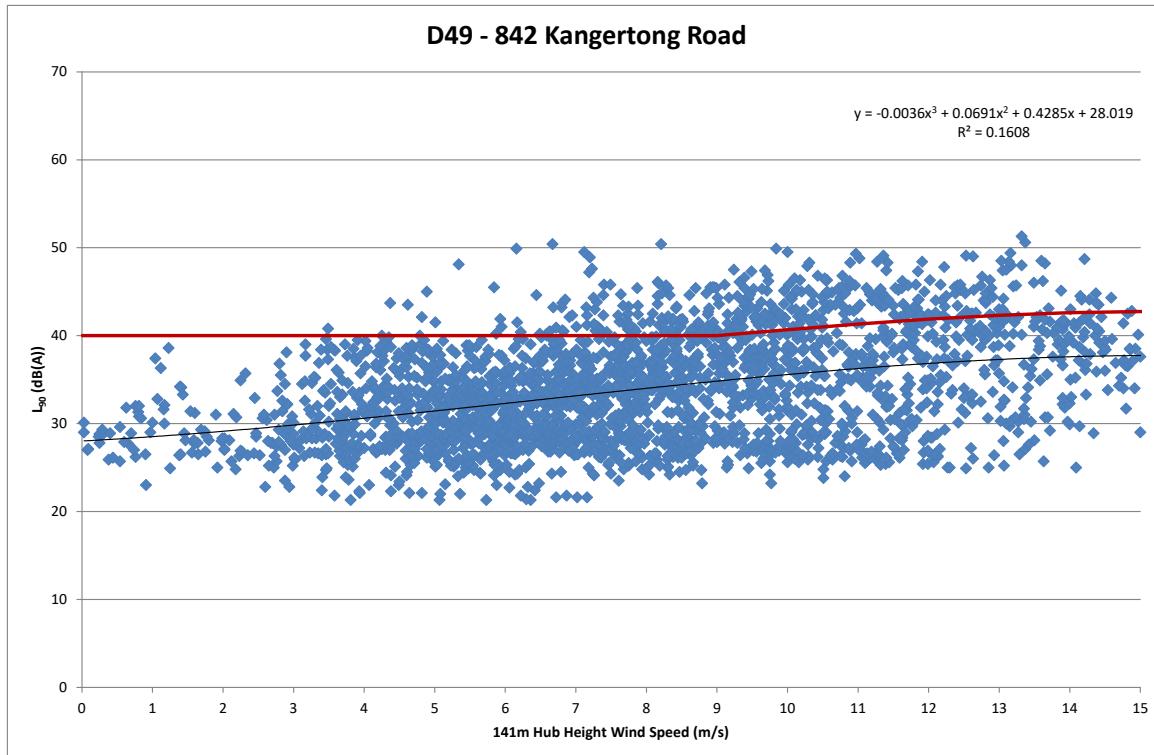


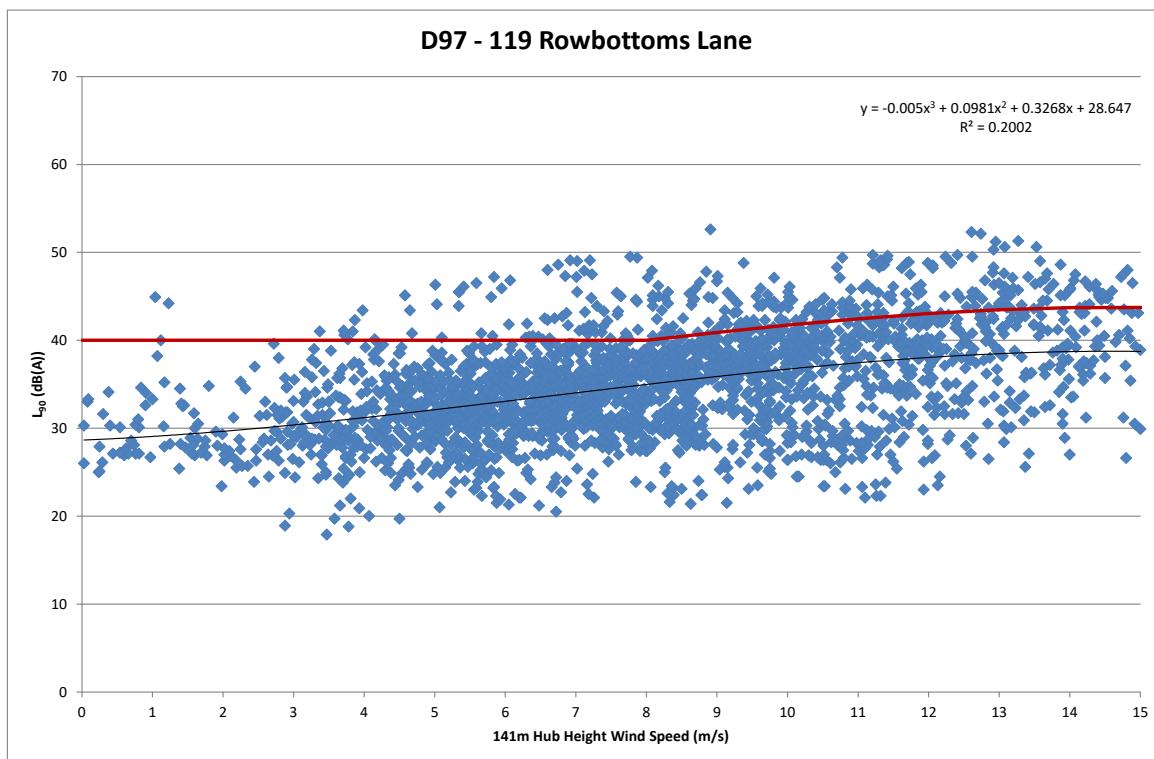
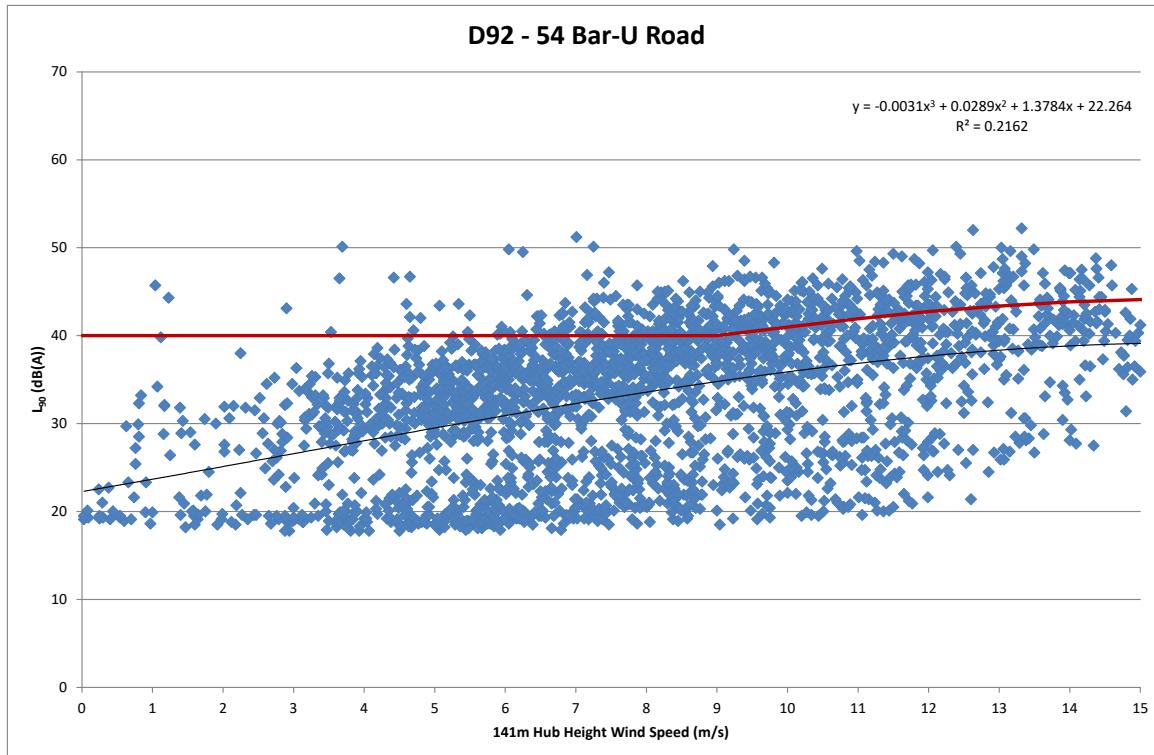
**Appendix F: Background Noise Monitoring Results**

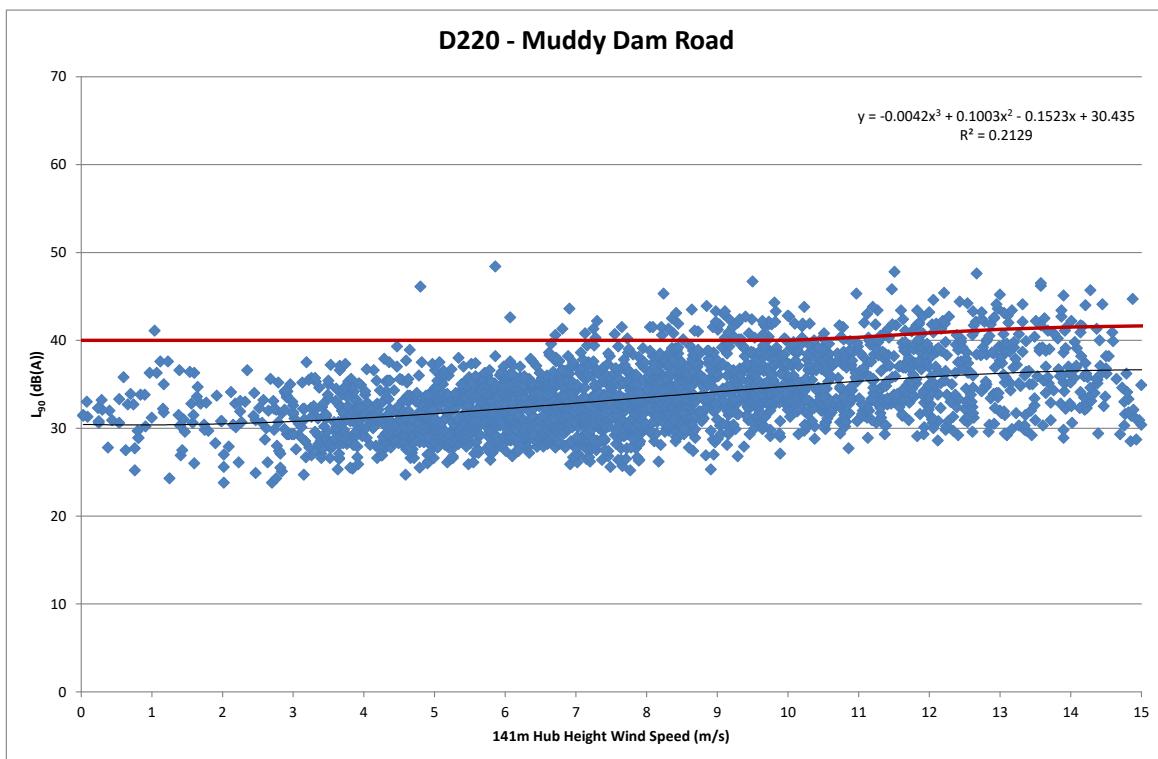
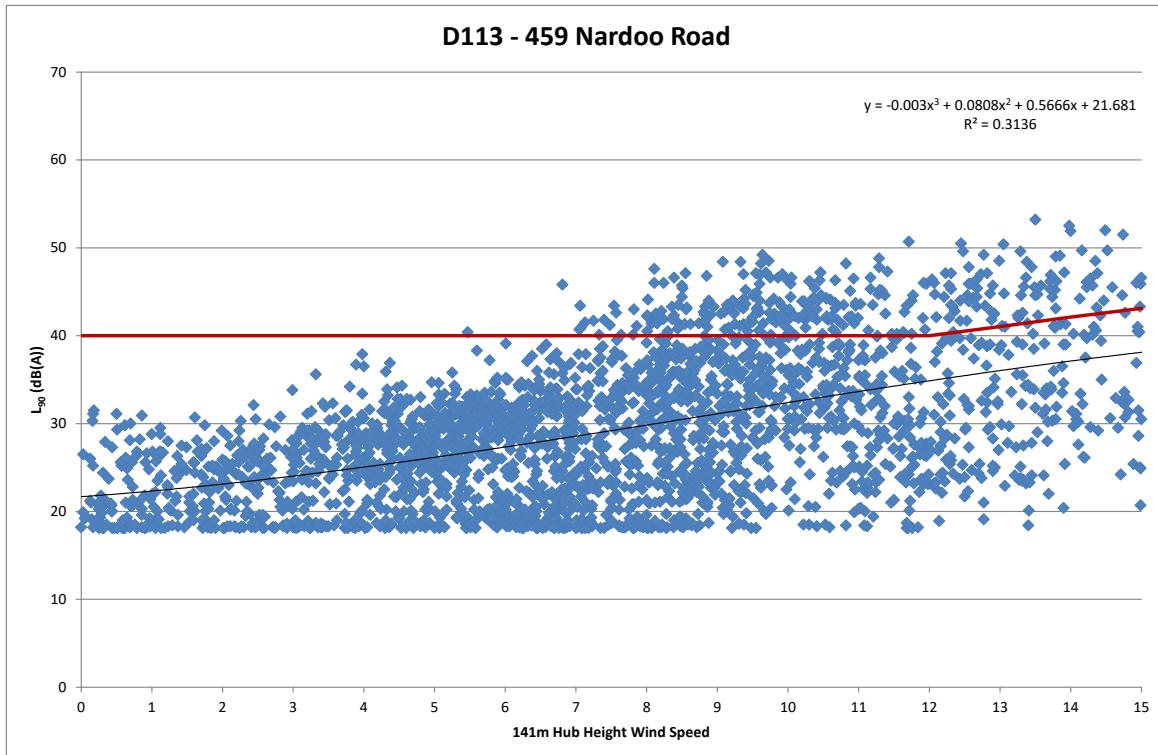








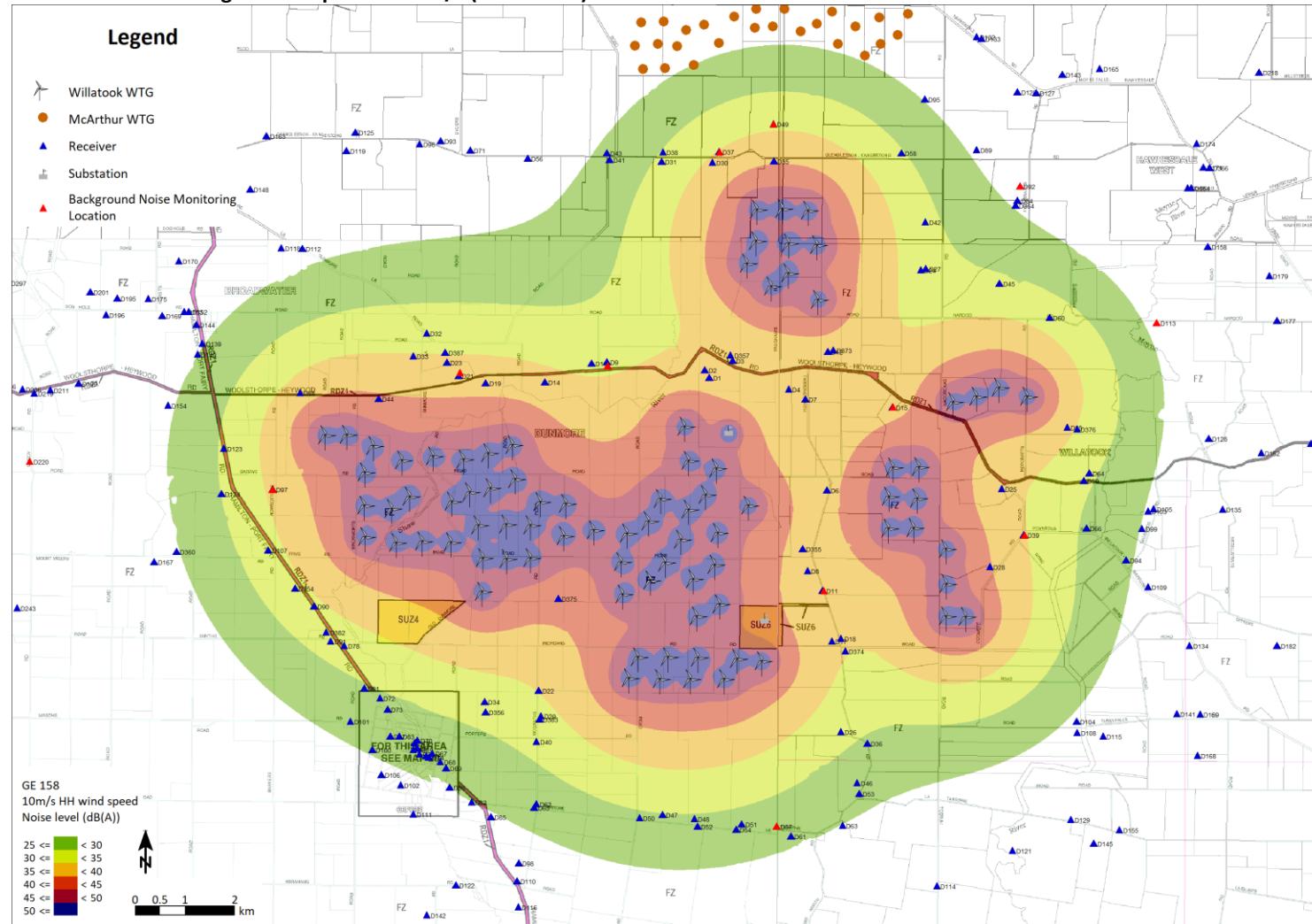




**Appendix G: Noise Predictions**

Dwelling ID	6m/s			7m/s			8m/s			9m/s			10m/s		
	Criteria	CONCAWE	ISO-9613												
D1	Agreement	34	33	Agreement	36	36	Agreement	38	37	Agreement	38	37	Agreement	38	37
D2	Agreement	33	32	Agreement	36	35	Agreement	37	37	Agreement	37	37	Agreement	37	37
D3	Agreement	32	32	Agreement	35	34	Agreement	37	36	Agreement	37	36	Agreement	37	36
D4	40	32	31	40	34	34	40	36	36	40	36	36	40	36	36
D6	Agreement	34	33	Agreement	37	36	Agreement	39	38	Agreement	39	38	Agreement	39	38
D7	40	31	31	40	34	33	40	36	35	40	36	35	40	36	35
D8	40	33	31	40	36	35	40	38	37	40	38	37	41	38	37
D9	40	29	29	40	32	32	40	34	34	40	34	34	40	34	34
D10	40	29	29	40	32	32	40	34	34	40	34	34	40	34	34
D11	40	32	31	40	35	34	40	37	36	40	37	36	41	37	36
D12	Agreement	32	31	Agreement	35	34	Agreement	37	36	Agreement	37	36	Agreement	37	36
D14	Agreement	32	31	Agreement	35	34	Agreement	37	36	Agreement	37	36	Agreement	37	36
D15	40	34	32	40	37	35	40	39	37	40	39	37	40	39	37
D17	40	31	30	40	34	33	40	36	35	40	36	35	41	36	35
D18	40	30	29	40	34	33	40	36	35	40	36	35	41	36	35
D19	Agreement	33	32	Agreement	36	35	Agreement	38	37	Agreement	38	37	Agreement	38	37
D21	40	32	31	40	36	34	40	38	36	40	38	36	40	38	36
D22	40	30	29	40	33	32	40	35	34	40	35	34	40	35	34
D23	40	31	30	40	34	33	40	36	35	40	36	35	40	36	35
D24	40	28	27	40	31	30	40	33	32	40	33	32	41	33	32
D25	40	32	30	40	35	34	41	37	36	42	37	36	43	37	36
D26	40	26	26	40	29	29	40	31	31	40	31	31	40	31	31
D27	40	27	27	40	31	30	40	33	32	40	33	32	41	33	32
D28	Agreement	35	33	Agreement	38	37	Agreement	40	39	Agreement	40	39	Agreement	40	39
D29	40	28	28	40	32	31	40	34	33	40	34	33	40	34	33
D30	Agreement	31	29	Agreement	34	32	Agreement	36	34	Agreement	36	34	Agreement	36	34
D31	40	26	25	40	29	29	40	31	31	41	31	31	41	31	31
D32	40	28	27	40	31	31	40	33	33	40	33	33	40	33	33
D33	40	30	29	40	33	32	40	35	34	40	35	34	40	35	34
D34	40	27	27	40	30	30	40	32	32	40	32	32	40	32	32
D35	Agreement	34	33	Agreement	38	36	Agreement	40	38	Agreement	40	38	Agreement	40	38
D36	40	24	25	40	27	28	40	29	30	40	29	30	40	29	30
D37	40	30	28	40	33	32	40	35	34	41	35	34	41	35	34
D38	40	25	25	40	28	28	40	30	30	41	30	30	41	30	30
D39	40	30	29	40	33	32	41	35	34	42	35	34	43	35	34
D40	40	26	26	40	30	30	40	32	32	40	32	32	40	32	32
D42	40	26	26	40	29	29	40	31	31	40	31	31	41	31	31
D44	Agreement	36	34	Agreement	39	37	Agreement	41	39	Agreement	41	39	Agreement	41	39
D45	40	26	25	40	29	29	40	31	31	40	31	31	41	31	31
D47	40	24	25	40	28	28	40	30	30	40	30	30	40	30	30
D48	40	24	25	40	27	28	40	29	30	40	29	30	40	29	30
D49	40	29	27	40	32	31	40	34	33	40	34	33	41	34	33
D50	40	24	25	40	27	28	40	29	30	40	29	30	40	29	30
D55	Agreement	31	29	Agreement	34	33	Agreement	36	35	Agreement	36	35	Agreement	36	35
D58	40	25	25	40	28	28	40	30	30	40	30	30	41	30	30
D59	40	26	25	40	29	28	41	31	30	42	31	30	43	31	30
D60	40	28	26	40	31	30	40	33	32	40	33	32	40	33	32
D64	40	25	25	40	29	28	41	31	30	42	31	30	43	31	30
D72	40	24	25	40	27	28	40	29	30	40	29	30	40	29	30
D73	40	23	24	40	27	28	40	29	30	40	29	30	40	29	30
D78	40	27	27	40	30	30	40	32	32	41	32	32	42	32	32
D81	40	24	25	40	27	28	40	29	30	40	29	30	40	29	30
D88	40	32	31	40	36	34	40	38	36	40	38	36	40	38	36
D90	40	29	28	40	32	31	40	34	33	41	34	33	42	34	33
D91	40	27	26	40	30	30	40	32	32	41	32	32	42	32	32
D97	40	31	29	40	34	32	40	36	34	41	36	34	42	36	34
D107	40	28	27	40	31	30	40	33	32	41	33	32	42	33	32
D123	40	25	25	40	29	28	40	31	30	41	31	30	42	31	30
D124	40	25	25	40	28	28	40	30	30	41	30	30	42	30	30
D354	40	28	27	40	32	31	40	34	33	41	34	33	42	34	33
D355	40	33	32	40	37	35	40	39	37	40	39	37	40	39	37
D356	40	26	26	40	29	30	40	31	32	40	31	32	40	31	32
D357	40	32	32	40	35	34	40	37	36	40	37	36	40	37	36
D373	Agreement	32	31	Agreement	35	34	Agreement	37	36	Agreement	37	36	Agreement	37	36
D374	40	30	29	40	33	32	40	35	34	40	35	34	40	35	34
D375	Agreement	37	35	Agreement	40	38	Agreement	42	40	Agreement	42	40	Agreement	42	40
D376	Agreement	29	28	Agreement	33	31	Agreement	35	33	Agreement	35	33	Agreement	35	33
D382	40	27	27	40	30	30	40	32	32	40	32	32	40	32	32
D383	40	28	28	40	31	31	40	33	33	40	33	33	40	33	33
D387	40	30	29	40	33	32	40	35	34	40	35	34	40	35	34

Appendix H: "GE4.8-158" WTGs at hub height wind speed of 10m/s (CONCAWE)



**Appendix I: Cumulative Noise Predictions at 10m/s**

Dwelling ID	6m/s Cumulative			10m/s Cumulative		
	Criteria	CONCAWE	ISO-9613	Criteria	CONCAWE	ISO-9613
D1	Agreement	34	33	Agreement	38	38
D2	Agreement	33	33	Agreement	37	37
D3	Agreement	32	32	Agreement	37	37
D4	40	32	32	40	36	36
D6	Agreement	34	33	Agreement	39	38
D7	40	31	31	40	36	36
D8	40	34	35	41	38	38
D9	40	29	29	40	34	35
D10	40	29	29	40	34	34
D11	40	33	35	41	38	38
D12	Agreement	32	31	Agreement	37	37
D14	Agreement	32	31	Agreement	37	36
D15	40	34	32	40	39	37
D17	40	32	34	41	37	37
D18	40	32	33	41	36	36
D19	Agreement	33	32	Agreement	38	37
D21	40	32	31	40	38	36
D22	40	30	29	40	35	34
D23	40	31	30	40	36	35
D24	40	28	28	41	33	34
D25	40	32	30	43	37	36
D26	40	27	28	40	32	32
D27	40	27	28	41	33	34
D28	Agreement	35	33	Agreement	40	39
D29	40	28	28	40	34	33
D30	Agreement	32	32	Agreement	39	39
D31	40	29	30	41	37	37
D32	40	28	27	40	33	33
D33	40	30	29	40	36	35
D34	40	27	27	40	32	32
D35	Agreement	35	34	Agreement	41	40
D36	40	25	27	40	30	31
D37	40	32	32	41	39	39
D38	40	30	30	41	38	38
D39	40	30	29	43	35	34
D40	40	26	27	40	32	32
D42	40	27	27	41	33	34
D44	Agreement	36	34	Agreement	41	39

Dwelling ID	6m/s Cumulative			10m/s Cumulative		
	Criteria	CONCAWE	ISO-9613	Criteria	CONCAWE	ISO-9613
D45	40	26	26	41	32	32
D47	40	25	26	40	30	30
D48	40	24	25	40	30	30
D49	40	32	32	41	40	40
D50	40	24	25	40	29	30
D55	Agreement	31	29	Agreement	36	35
D58	40	28	29	41	35	36
D59	40	26	25	43	31	30
D60	40	28	27	40	33	32
D64	40	25	25	43	31	30
D72	40	24	25	40	29	30
D73	40	23	25	40	29	30
D78	40	27	27	42	32	32
D81	40	24	25	40	29	30
D88	40	32	31	40	38	36
D90	40	29	28	42	34	33
D91	40	27	26	42	32	32
D97	40	31	29	42	36	34
D107	40	28	27	42	33	32
D123	40	25	25	42	31	30
D124	40	25	25	42	30	30
D354	40	28	27	42	34	33
D355	40	34	34	40	39	38
D356	40	26	27	40	31	32
D357	40	32	32	40	37	36
D373	Agreement	32	31	Agreement	37	37
D374	40	31	32	40	36	36
D375	Agreement	37	35	Agreement	42	40
D376	Agreement	29	28	Agreement	35	33
D382	40	27	27	40	32	32
D383	40	28	28	40	33	33
D387	40	30	29	40	35	34

sonus.

Appendix J: Cumulative “GE4.8-158” WTGs at hub height wind speed of 10m/s (CONCAWE)

