Appendix 8

Noise & Vibration

Appendix 8.1 –Baseline Noise Measurements

Appendix 8.2 – Equipment Calibration Certificates

Appendix 8.3 – Octave Band Sound Power Level Data for Candidate Wind Turbine (GE 5.3 158)

Appendix 8.4 – Predicted Noise Levels from Dernacart Wind Farm at Nearby Noise Sensitive Locations

ENVIRONMENTAL BALANCE IN DESIGN AND CONSTRUCTION

APPENDIX 8.1

BASELINE NOISE MEASUREMENTS

Baseline Noise Measurements

Baseline noise monitoring was undertaken at five locations: N1, N2, N3, N4 and N5 to establish the existing background noise levels in the vicinity of the proposed wind farm. These locations represent the nearest residential locations to the northwest, west, south and south east of the proposed wind farm. Land to the north and north east of the wind farm is bog and there are no noise sensitive location in these areas.

Selection of Monitoring Locations

Section 2.2.5 of the Institute of Acoustics', *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment at Rating of Wind Turbine Noise* (2013) regarding use of proxy locations states "*When choosing a location that will serve as a proxy for others, the basis for selection is that it can reasonably be claimed, from inspection and observation, to be representative of the non-surveyed locations, in line with the criteria of Section 2.5. Measurement locations outside a property's curtilage (such as an adjacent field) may be used when access to a representative property cannot be obtained, provided that such a location can be justified as being representative. No general guidance can therefore be given on the number of measurement locations as this will be site-specific*." Section 2.5 of the GPG is summarised in Table 8.1.1 with the applicability of the proxy locations selected for Dernacart Wind Farm.

Table 8.1.1: IOA GPG Section 2.5 Criteria and Applicability to Dernacart Wind Farm Monitoring Locations

Requirements of Section 2.5	Response
2.5.1 *Where possible, measurements should be made in the vicinity of a dwelling in an area frequently used for rest and recreation.*	Location N1, N4 and N5 were located within the curtilage of dwellings in the vicinity of the proposed wind farm. Location N2 was in a field approximately 18m from dwelling H46. This location is representative of the noise environment at dwelling H46. Location N3 was in field adjacent to dwellings H49 and H50. This location is representative of the noise environment at the nearby noise sensitive locations.
2.5.2 *Equipment should be placed at outdoor positions where noise levels are representative of typical 'low' levels likely to be experienced in the vicinity of a dwelling (or group of dwellings if the measurements are intended to be applied to more than one dwelling). The overriding consideration is that it can reasonably be claimed, from inspection and observation, that there are no other suitable noise-sensitive locations, in the vicinity of any selected location and close to a dwelling, where background noise levels would be expected to be consistently lower than the levels at the selected position.*	This was adhered to for all measurement locations.
2.5.3 *Ideally the position should be one which would be exposed to noise from the wind turbines whilst being best-screened from other noise sources such as nearby roads or vegetation.*	The locations were in open areas or within the curtilage of a property, set back from local roads and vegetation/ forestry where possible. Locations were chosen to have a direct line of sight to the proposed wind farm location.

Requirements of Section 2.5	Response
2.5.4 *The background surveys provide the basis for setting both daytime and night-time noise limits: the measurement position must therefore reasonably represent external areas (for daytime noise) and also building façades containing windows (for night-time noise).*	The locations being used to derive limits are representative of external areas and façade locations.
2.5.5 *In most locations, background noise levels will be determined by wind in trees and vegetation and noise sources external to the property such as traffic noise. The presence of local noise sources such as boiler flues, garden fountains, domestic drains, watercourses and farm equipment should be identified.*	There were some local noise sources described below. Location N4 was approximately 140m to a dairy farm and the night-time measurements were determined by dairy farm noise. For the purpose of assessing the noise levels across the site, the noise contribution associated with the dairy farm was removed from our analysis.
2.5.6 *Where it is not possible to exclude the influence of variable local noise sources by selection of monitoring position, it is generally possible to identify such data from inspection of noise level time histories and therefore to exclude it from the data set used to derive noise limits*	Attendance at the monitoring location during installation, checks, battery changes and equipment collection did not identify any variable noise sources. Atypical data was removed from data analysis.
2.5.7 *In all cases, microphones should be supported at a height of 1.2 – 1.5 metres above the ground and no closer than 3.5 metres to any significant reflecting surface (such as a building or fence), except the ground. The position should be within 20 metres of the dwelling unless there are particular reasons for measuring at a more distant position (such as the presence of vegetation or denial of access); if so, the reasons should be explained.*	The microphones were elevated on tripods at approximate height of 1.5 m and no closer than 3.5 m to any significant reflecting surface. Where possible the noise monitors were located within 20 m. When the noise monitors were located at more distant locations this to ensure the measurement location had a good line of sight to the proposed wind farm and was avoiding trees.
2.5.8 *A resident at a selected property may request that measurements are made at a position which is considered inappropriate; perhaps because the preferred location(s) are inconvenient (it might obstruct lawn mowing, for example). In this situation the consultant should explain clearly the reasons why the measurements could be compromised; if no agreement can be reached, an alternative property or location should be sought. The assistance of the EHO may help to resolve these situations.*	This was not an issue.

Monitoring Locations

Noise monitoring was conducted at five locations, selected for obtaining a detailed representation of the background noise levels at receptors surrounding the development. The noise level data from location N5 was high and it has been concluded that these elevated noise levels are not representative of the noise environment and as a conservative approach this information has not been analysed. Details of the five noise monitoring locations are provided in Table 8.1.2 overleaf. The position of the noise monitoring locations are shown in Figure 8.2.

Table 8.1.2: Details on the Noise Monitoring Locations

Location ID	Easting	Northing	Description	Photograph
N1	642551	712528	Located in a farmyard behind house H5 in direction of field and proposed wind farm.	Plate 8.1-1
N2	642905	711118	Located in a field approximately 18m from dwelling H46.	Plate 8.1-2
N3	645183	710422	Located in a field adjacent to noise sensitive locations H49 and H50.	Plate 8.1-3
N4	644916	709486	Located at dwelling H93, in garden facing adjacent road and approximately 6m from façade.	Plate 8.1-4
N5	643125	710671	Located at dwelling H39, in the front garden approximately 10m from the façade.	Plate 8.1-5

Location N1, at noise sensitive location H5. This location is north west of the proposed wind farm. The location was in the yard of the farm overlooking a field in the direction of the wind farm. The yard has cut grass with an open barn and small outbuildings adjacent to the yard. This was a quiet area with noise from distant road traffic and livestock in the adjacent field. The boundary of the adjacent field has trees.

Plate A8.1-1: Monitoring Location N1

Location N2, adjacent to noise sensitive location H46. The noise monitoring location was in the field behind the dwelling H46 approximately 18m from the rear façade of the dwelling. This location is south of turbine T1 and west of turbine T3 of the proposed wind farm. There were trees approximately 30m from the meter at the edge of the field. Noise observed during included occasional noise from dogs and distant traffic.

Plate A8.1-2: Monitoring Location N2

Location N3, located in a field adjacent to noise sensitive locations H49 and H50. The noise monitoring location was approximately 50 m from H49 and approximately 70 m from H50. This location is south of turbine T6 and east turbine T8 of the proposed wind farm. The site was some distance (at least 100 m) from nearby forested areas. Noise observed included occasional noise from dogs and wood cutting on the site. The site comprised cut grass and a gravelled area to the centre of the site.

Plate A6.1-4: Monitoring Location N3

Location N4, at noise sensitive location H93. The noise monitor was north of dwelling in the front garden facing the adjacent road. The road ends at the adjacent farm west of the property. This location is south of the proposed wind farm development. The lawn was mowed with some small shrubs at the boundary. There is a hedge to the north of the road that is adjacent to the noise meter. Noise observed during the survey included noise from vehicles at the property and distant road traffic noise.

Plate A8.1-4: Monitoring Location N4

Location N5, at noise sensitive location H39. This location is south and west of the proposed wind farm. The noise monitor was in the front garden of the dwelling approximately 10m from the façade. The dwelling faces a local road and there are trees and hedges along this road.

Plate A8.1-5: Monitoring Location D40

Measurement Periods

The IOA GPG states "*The duration of a background noise survey is determined only by the need to acquire sufficient valid data over the range of wind speeds. It is unlikely that this requirement can be met in less than 2 weeks.*" If insufficient wind data is collected after two weeks, the monitoring period will be extended subject to acquiring sufficient valid data over the range of wind speeds. Sufficient data was captured at all monitoring locations with a minimum of two weeks' worth of data captured at monitoring locations.

Definition of Time Periods

The following periods were analysed for this report:

Daytime hours	07:00 – 23:00
Night-time hours	23:00 – 07:00

Monitoring Equipment

Baseline noise monitoring was carried out using Svantek Svan 977 and 977A Class 1 sound level meters. Details of the noise monitoring equipment are presented in Table 8.1.3. The sound level meters were fitted with 1/2" microphones. The microphones connected to the Svantek sound level meters were fitted with an oversized windshield or a UA-0237 type wind shield made from open-pored polyurethane foam with a diameter of 90mm surrounded by a secondary windshield both in keeping with ESTU W/13/00386/REP, Noise Measurements in Windy Conditions and IOA Good Practice Guidelines, 2013. Calibration certificates for each sound level meter are provided in Appendix 8.2.

Table 8.1.3: Details of Noise Monitoring Equipment

Monitoring Location	Meter Type -	Serial Number
N1	Svan 977A	34173
N2	Svan 977A	69552 36167
N3	Svan 977	34876
N4	Svan 977	69556
N5	Svan 977A	69557

The LiDAR unit was used to measure wind speed, wind direction and precipitation. This was located at (ITM E: 642333 N 712428). This data was acquired every 10 minutes simultaneously with noise data.

Monitoring Protocol

Baseline noise measurements were undertaken at five locations near the proposed wind farm. Equipment was installed between 18th September 2019 and 23rd October 2019.

The following monitoring protocol was carried out at each of the monitoring locations:

1. The sound level meters were calibrated on-site and set to log L_{A90} statistics on a fast time weighted response every ten minutes.
2. Each sound level meter microphone was mounted at 1.5 m above ground level and fitted with an enhanced windshield. Each microphone was placed at least 3.5 m from reflecting surfaces to obtain 'free field' conditions.
3. Wind speed and wind direction measurements were taken from a LiDAR Unit installed at location approximately 200 m west of N1. Wind speed was measured at a range of heights.

The standardised 10 m wind speed was obtained from the turbine hub height wind speed by correcting it to 10 m height using a ground roughness factor of 0.05 m. Roughness length (or logarithmic) shear profile:

$$U_1 = U_2 \frac{ln\left(^{H_1}/_{z}\right)}{ln\left(^{H_2}/_{z}\right)}$$

where U_1 is the wind speed to be calculated, U_2 is the measured wind speed, H_1 is the height of the measured wind speed to be calculated (10m), H_2 is the height of the measured wind speed and z is the ground roughness length (m). A roughness length of 0.05m is used to standardise hub height wind speeds to 10m height in the IEC 61400-11:2012 standard.

4. The L_{A90} statistic measurements were synchronised with the standardised 10 m height wind speeds derived from the on-site LiDAR.
5. Precipitation was also synchronised to the noise level and wind speed measurements.
6. After the monitoring was completed, the noise meters were re-tested using the calibration noise source to ensure that the meters had not drifted.

Analysis of the Baseline Data

Following collection of the site data, the following protocol was used to analyse the baseline data:

1. The raw baseline L_{A90} noise data was reviewed to determine whether there are any periods of non-consistent noise level due to equipment malfunction. If there was any data which was inconsistent, these noise level data points were removed from the raw data set and detailed in the report. There was no such data.
2. The raw noise level data was then correlated with the time synchronised wind speed and rainfall data. Preliminary data analysis was used to remove datasets (L_{A90}, wind speed and occurrence of rainfall event) which contain a rainfall event as these data sets are required to be removed from further analysis in line with best practice as outlined in the IOA Good Practice Guide and Supplementary Guidance Note 2 on Data Processing.
3. Early morning periods were also excluded to remove the dawn chorus which is not prevalent through that whole year.
4. Once the dawn chorus and rainfall events have been accounted for, the remaining data was graphed using a wind speed-based plot to establish whether there are any remaining data outliers, representing atypical noise sources or events.
5. Once the remaining data sets were found to be representative of the noise environment, they were analysed to ensure that sufficient data remained to provide sufficient data coverage over the necessary wind speeds. The IOA Good Practice Guide (May 2013) requires, as a minimum, no fewer than five valid data sets across each 1 m/s wind speed from turbine cut-in to rated power. Where integer wind speeds have less than five valid data sets, the prevailing background noise trend will not be extended beyond the range covered by adequate data sets. See Section 'Data Sets Available for Determination of Prevailing Background Noise Levels' for details.
6. A 'best fit' trend (not higher than a third order polynomial) was then derived to present the assumed prevailing background noise level at each monitoring location. See 'Results' for details.

Data Available for Determination of Prevailing Background Noise Levels

The requirement for the survey duration is dictated by the range of wind speeds to be collected. The IOA Good Practice Guide to the Application of ETSU-R-97[1] for the Assessment and Rating of Wind Turbine Noise, (May 2013) states that *"As a guideline, no fewer than 200 data points should be recorded in each of the amenity hours and night-time periods with no fewer than 5 data points in any 1 m/s wind speed bin."*

[1] Department of Trade and Industry (1996), The Assessment and Rating of Noise from Wind Farms Report ETSU-R-97

The Wind Energy Development Guidelines (Department of Environment, Heritage and Local Government, 2006) do not provide the specific periods which are represented by daytime and night-time hours, therefore the definitions from ETSU-R-97 are taken as 07:00 to 23:00 hrs for daytime and 23:00 to 07:00 hrs for night-time.

Prevailing background noise levels were derived for daytime and night-time periods. The number of valid datasets are shown in Tables 8.1.4 with wind speed ranges greyed out which did not satisfy the criteria of at least 5 data points in any 1 m/s wind speed bin.

Table 8.1.4: Number of Valid Datasets

Wind Speed (at standardised 10 m height), m/s	Valid Datasets							
	N1		N2		N3		N4	
	Day	Night	Day	Night	Day	Night	Day	Night
0	2	0	2	0	0	0	2	0
1	120	11	59	1	23	1	129	3
2	213	87	144	71	90	36	217	8
3	223	170	133	146	86	102	223	18
4	345	208	201	146	165	119	345	19
5	503	232	312	149	256	128	504	26
6	441	168	251	68	203	58	441	25
7	259	114	122	21	78	14	261	31
8	140	22	69	13	42	8	144	7
9	71	9	32	3	27	3	74	3
10	18	0	10	0	10	0	18	0
11	6	0	1	0	1	0	6	0
Total Number of Data Points	2341	1021	1336	618	981	469	2364	140

Results

In this section, the prevailing background noise level in dB L_{A90} relative to standardised 10 m height wind speeds are provided for each monitoring location as per the requirements of the survey. The prevailing background noise level is plotted as a solid line for each daytime and night-time period at each monitoring location. In all cases, the highest order of polynomial used is a third order polynomials provided lines of best fit to the scatter data.

For monitoring location N4 there was an increase in noise levels from 23:40 hrs most nights. This has been attributed to a farm approximately 140 m away. In order to use this monitoring location as a proxy location for other noise sensitive locations, periods were the increase in noise levels occurred was removed from further analysis.

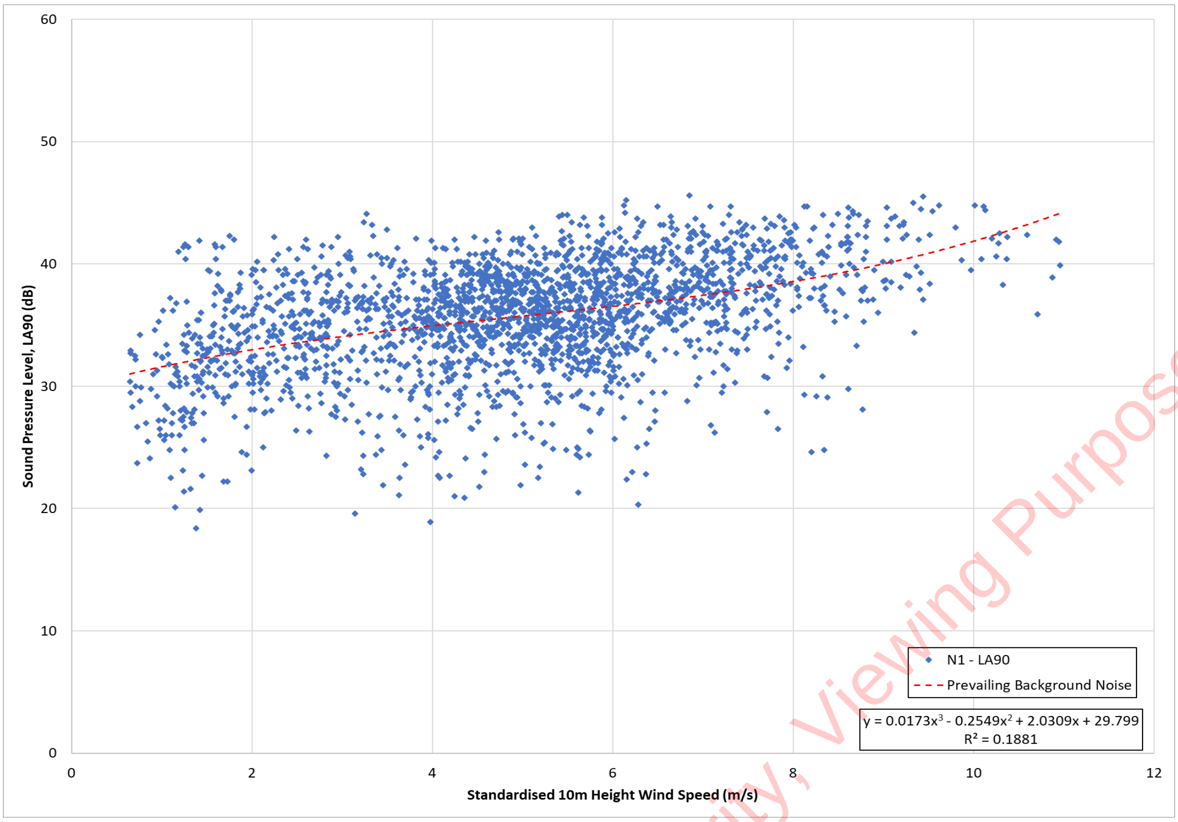

Figure A8.1: Prevailing Daytime Background (L_{A90}) Noise Levels at N1

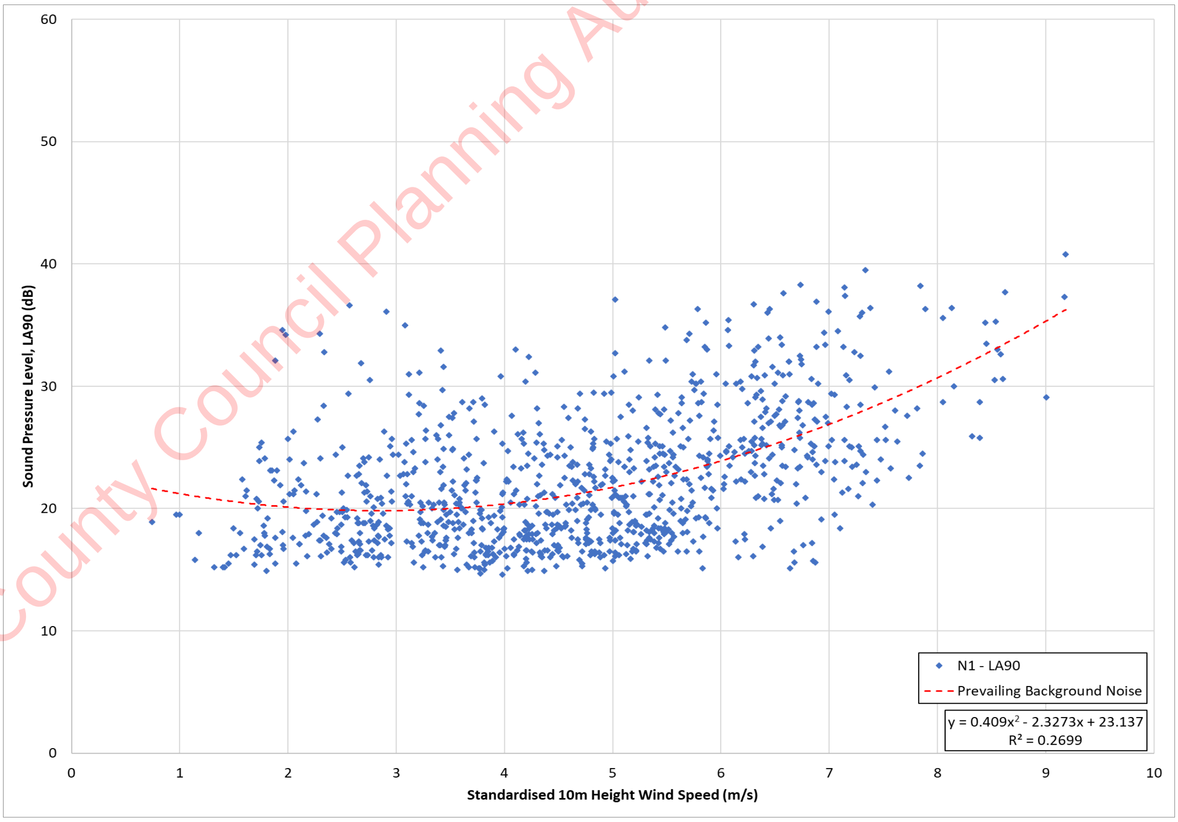

Figure A8.2: Prevailing Night-time Background (L_{A90}) Noise Levels at N1

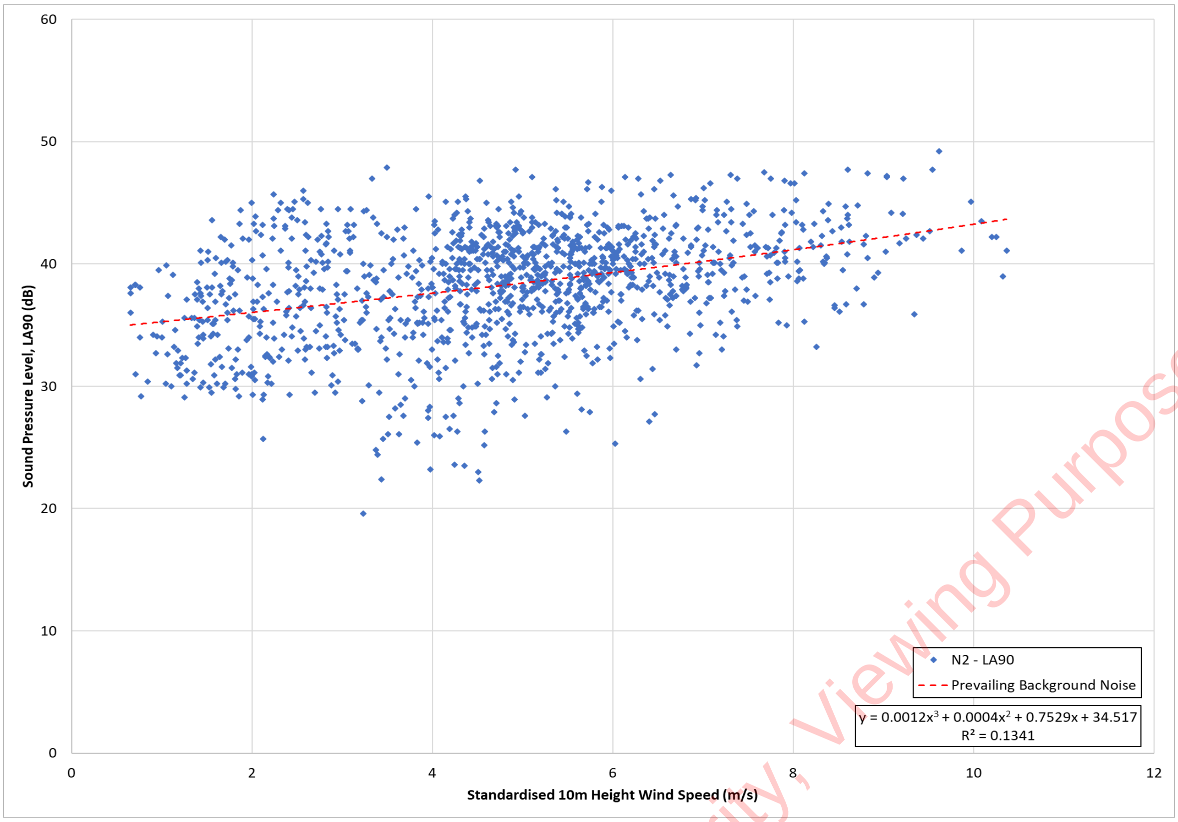

Figure A8.3: Prevailing Daytime Background (L_{A90}) Noise Levels at N2

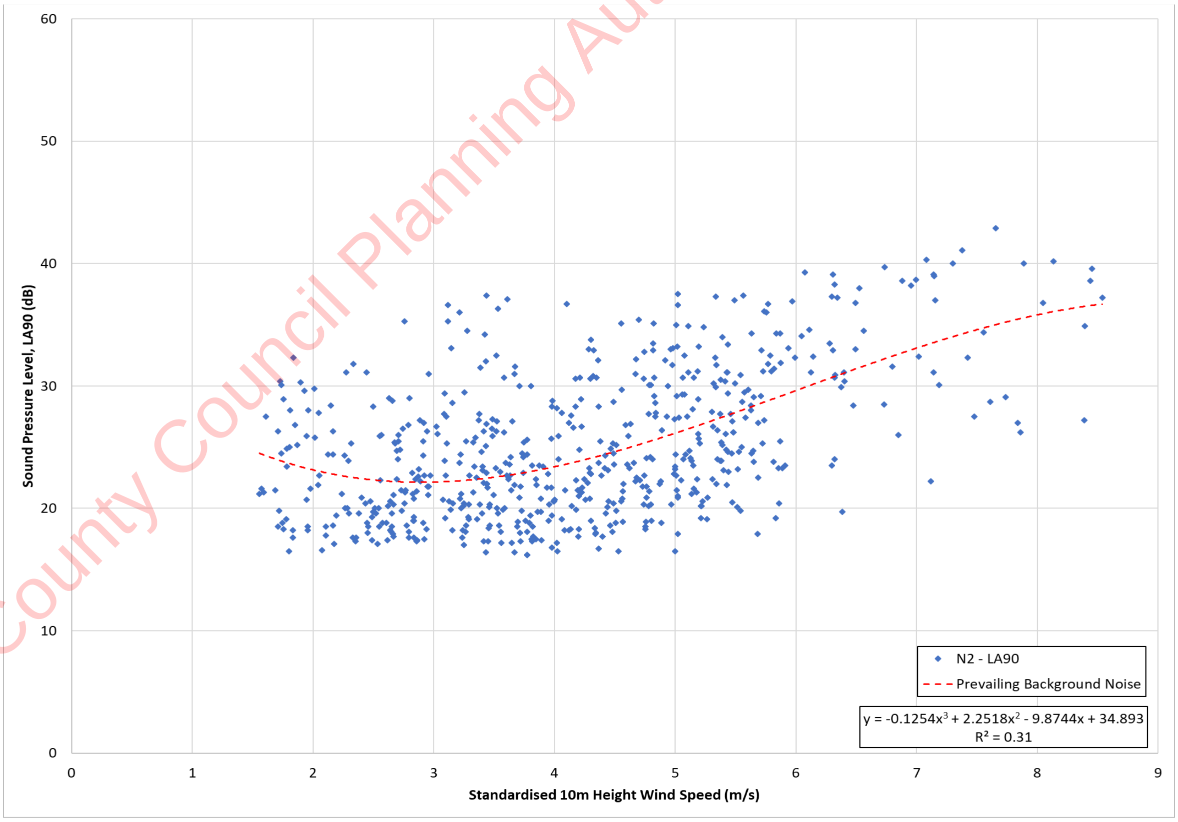

Figure A8.4: Prevailing Night-time Background (L_{A90}) Noise Levels at N2

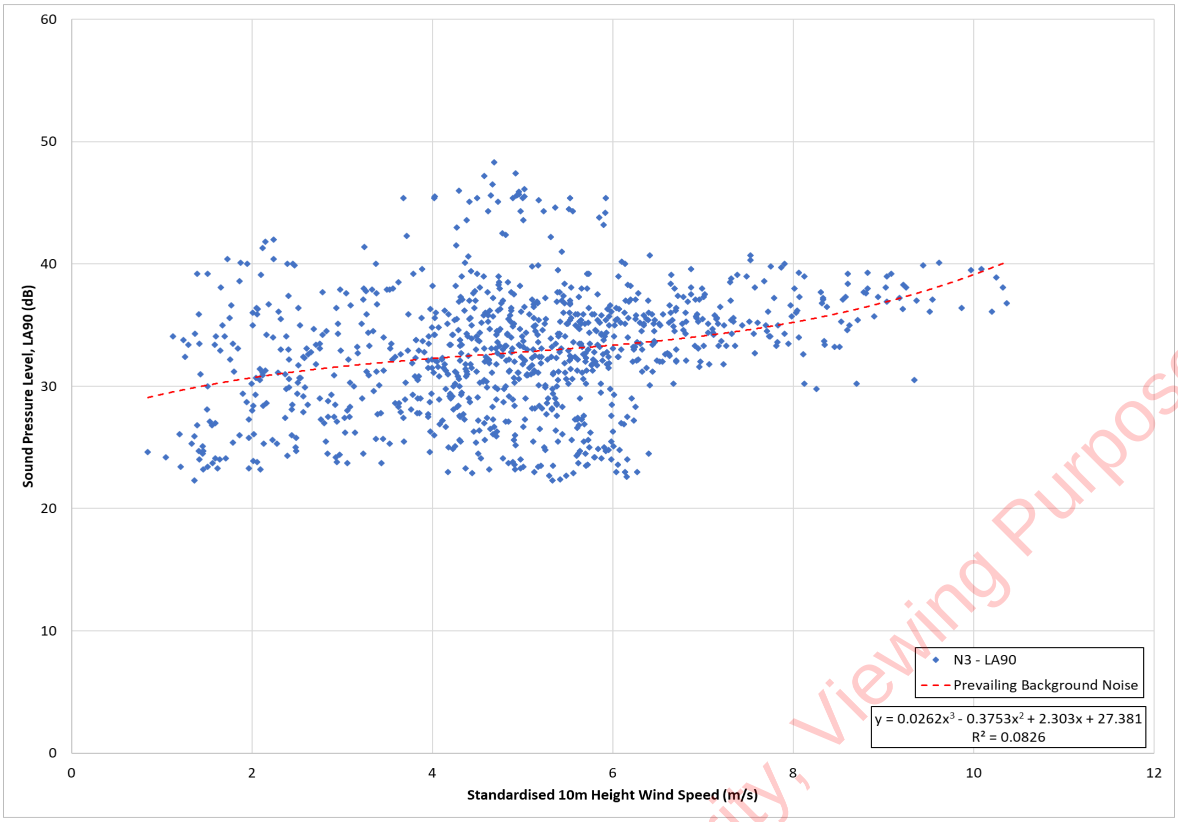

Figure A8.5: Prevailing Daytime Background (L_{A90}) Noise Levels at N3

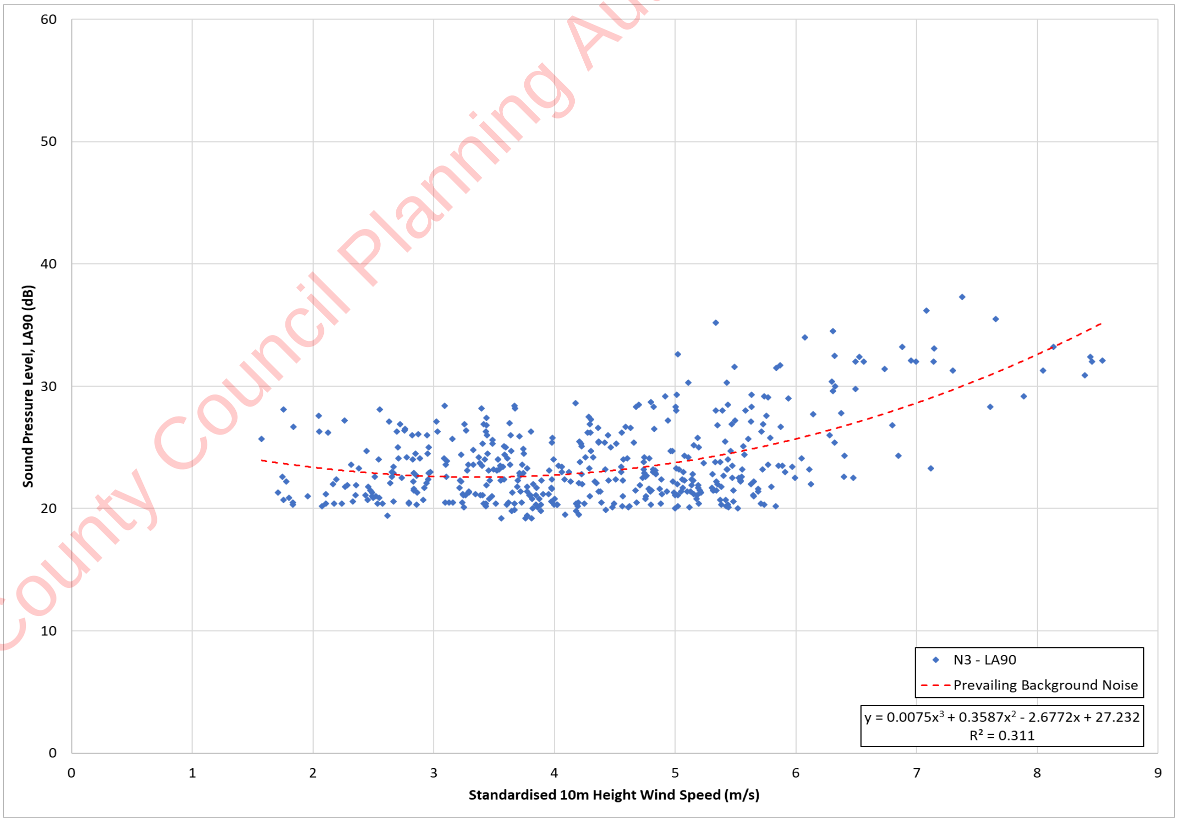

Figure A8.6: Prevailing Night-time Background (L_{A90}) Noise Levels at N3

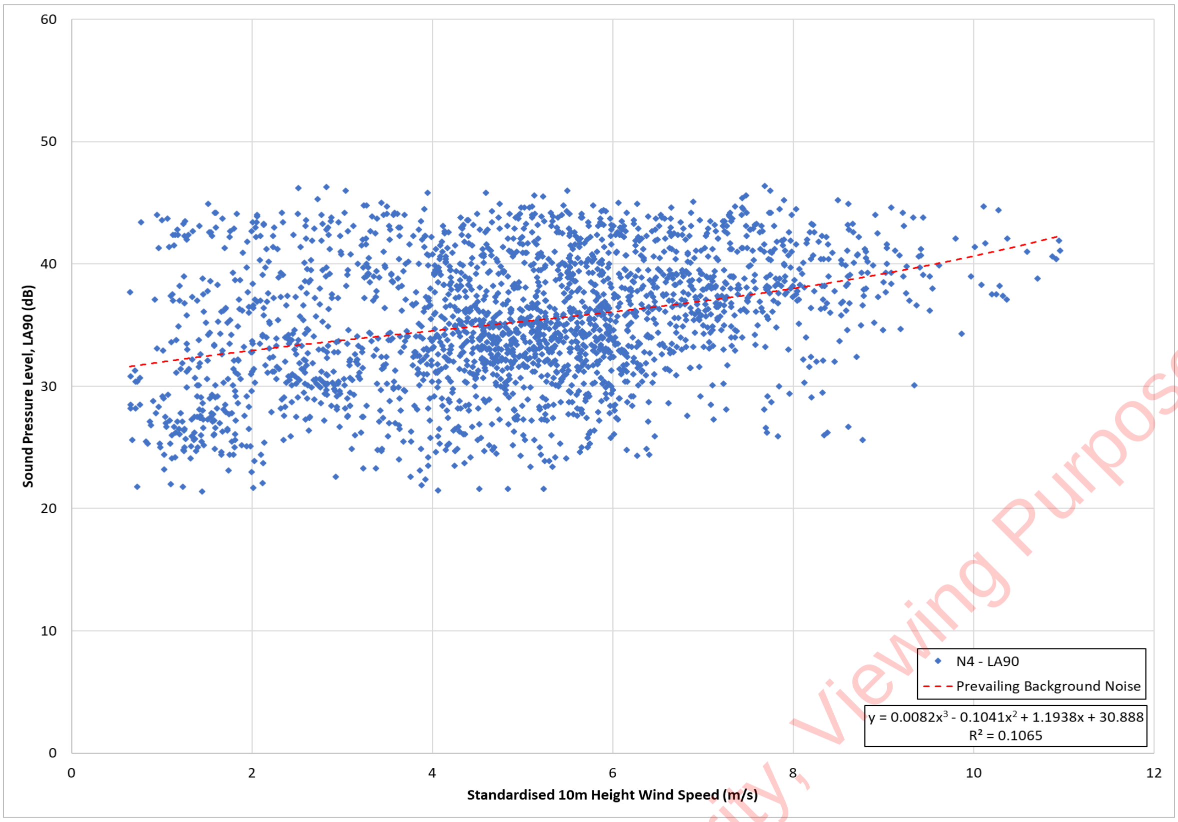

Figure A8.7: Prevailing Daytime Background (L_{A90}) Noise Levels at N4

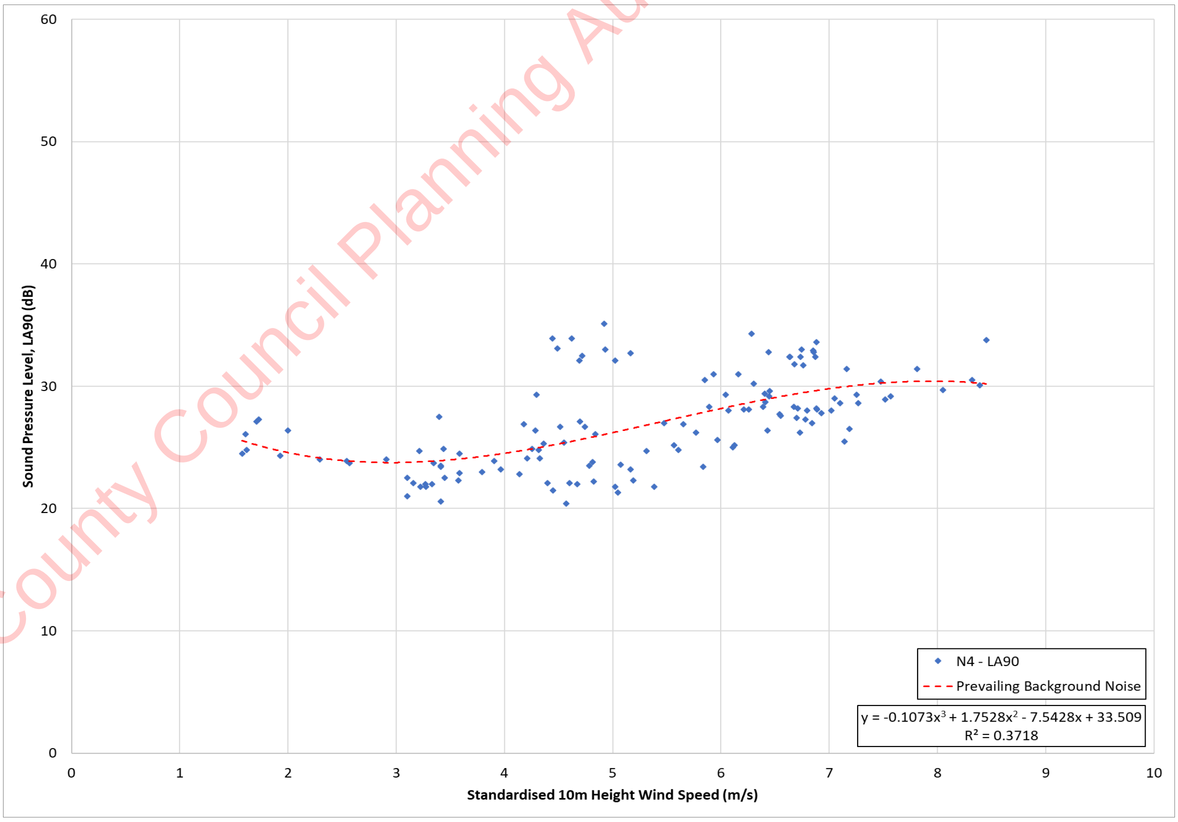

Figure A8.8: Prevailing Night-time Background (L_{A90}) Noise Levels at N4

The assumed prevailing noise levels at the four noise monitoring locations are presented in Table 8.1.5. Also presented is a worst-case envelope based on the lowest average levels at the various wind speeds. In some instances, the prevailing background noise is higher at lower wind speeds, in keeping with the IOA guidelines, the lowest derived background noise level is adopted for all wind speeds below where this derived minimum occurs. Furthermore, the derived prevailing background noise polynomial curve was not extended beyond the range covered by adequate data points. Where a noise limit is required at higher wind speeds; it was restricted to the highest derived point.

Table 8.1.5: Prevailing Background Noise

Location	Period	Prevailing Background Noise $L_{A90,10min}$ (dB) at Standardised 10 m Height wind speed (m/s)									
		2	3	4	5	6	7	8	9	10	11
N1 (D5)	Daytime	33.0	34.1	35.0	35.7	36.5	37.5	38.6	40.0	41.9	44.3
	Night-time	19.8*	19.8	20.4	21.7	23.9	26.9	30.7	35.3	35.3§	35.3§
N2 (D45)	Daytime	36.0	36.8	37.6	38.4	39.3	40.2	41.2	42.2	43.3	43.3§
	Night-time	22.2*	22.2	23.4	26.1	29.6	33.1	35.8	35.8§	35.8§	35.8§
N3 (D50)	Daytime	30.7	31.6	32.3	32.8	33.3	34.1	35.2	36.8	39.1	39.1§
	Night-time	22.6*	22.6	22.7	23.8	25.7	28.6	32.6	35.8§	35.8§	35.8§
N4 (D138)	Daytime	32.9	33.8	34.5	35.3	36.1	37.0	38.0	39.2	40.6	42.3
	Night-time	23.8*	23.8	24.5	26.2	28.2	29.8	30.4	30.4§	30.4§	30.4§
Envelope	Daytime	30.7	31.6	32.3	32.8	33.3	34.1	35.2	36.8	39.1	39.1§
	Night-time	19.8*	19.8	20.4	21.7	23.9	26.9	30.4	30.4§	30.4§	30.4§

* - lowest derived background noise level is adopted for all wind speeds below where this derived minimum occurs. For example, at monitoring location N1 the lowest derived background noise level occurs at a wind speed of 3 m/s. The trend line fitted to noise data showed a higher noise level at 2 m/s. Therefore, using this criterion, the noise level at 2 m/s has been assumed to be equal to that of the noise level at 3 m/s.

§ - noise level restricted to the highest derived point.

APPENDIX 8.2

EQUIPMENT CALIBRATION CERTIFICATES

Certificate of Calibration

Issued to	Fehily Timoney & Company J5 Plaza North Park Business Park North Road Dublin 11
Attention of	John Mahon

Certificate Number	**173660**
Item Calibrated	Svantek SVAN 977 Sound Level Meter with ACO 7052E Microphone
Serial Number	34173 (SLM) and 54691 (Microphone)
Client ID Number	#3
Order Number	6308
Date Received	20 Oct 2017
NML Procedure Number	AP-NM-09

Method

The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters*. This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).

Calibration Standards

Norsonic 1504A Calibration System incorporating:
SR DS360 Signal Generator, No. 0735 [Cal Due Date: 18 Nov 2017]
Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 07 Nov 2017]
B&K 4134 Measuring Microphone, No. 0742 [Cal Due Date: 18 Jan 2018]
B&K 4228 Pistonphone, No. 0741 [Cal Due Date: 08 Jan 2018]
B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 15 May 2018]

Calibrated by	David Fleming	Approved by	Paul Hetherington
Date of Calibration	31 Oct 2017	Date of Issue	01 Nov 2017

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

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NSAI

National Metrology Laboratory

Certificate of Calibration

Issued to	Fehily Timoney & Company J5 Plaza North Business Park North Road Dublin 11
Attention of	John Mahon

Certificate Number	**180300**
Item Calibrated	Svantek SVAN 977 Sound Level Meter with ACO 7052E Microphone
Serial Number	34876 (SLM) and 56429 (Microphone)
Client ID Number	#2
Order Number	6252
Date Received	24 Jan 2018
NML Procedure Number	AP-NM-09

Method

The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters*. This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).

Calibration Standards

Norsonic 1504A Calibration System Incorporating:
SR DS360 Signal Generator, No. 0735 [Cal Due Date: 21 Dec 2018]
Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 17 Nov 2018]
B&K 4134 Measuring Microphone, No. 0743 [Cal Due Date: 28 Apr 2019]
B&K 4228 Pistonphone, No. 0740 [Cal Due Date: 21 Mar 2019]
B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 15 May 2018]

Calibrated by	David Fleming	Approved by	Paul Hetherington
Date of Calibration	31 Jan 2018	Date of Issue	31 Jan 2018

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

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ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
27 °C	30%	1005 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	87	Signal generator
2.	SVANTEK	SVAN 912A	6120	Sound & Vibration Analyser
3.	KEITHLEY	2000	0910165	Digital multimeter
4.	SVANTEK	SV33	48878	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DYTRAN	3233A	1175	Reference accelerometer

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.
2. The acoustic calibration was performed using the Sound Calibrator and is traceable to the GUM (Central Office of Measures) reference standard - sound level calibrator type 4231 No 2292773.
3. The vibrational calibration was performed using the Back-to-Back Comparison method and is traceable to the GUM (Central Office of Measures) reference standard - accelerometer type 8305 No 1435233.
4. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
5. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Krzysztof Czachor ....

Test date: 2018-06-08

SVANTEK

ISO9001 certified

FACTORY CALIBRATION DATA OF THE *SVAN 977A No. 69552*

with preamplifier SVANTEK type SV12L No. 73511 and microphone ACO PACIFIC type 7052E No. 69543

SOUND LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER function; Characteristic: A; f_{sin}=1 kHz; Input signal =110.9 dB;

Range	Low (120dB)	High (137dB)
Indication [dB]	114.0	114.0
Error [dB]	0.0	0.0

2. CALIBRATION* (acoustical)

LEVEL METER function; Range: High; Reference frequency: 1000 Hz; Sound Pressure Level: : **113.99** dB.

Characteristic	Correct value [dB]	Indication [dB]	Error [dB]
Z	113.99	114.04	0.05
A	113.99	114.04	0.05
C	113.99	114.04	0.05

Calibration measured with the microphone ACO PACIFIC type 7052E No. 69543. Calibration factor: -0.76 dB.

3. LINEARITY TEST* (electrical)

LEVEL METER function; Range: Low; Characteristic: A; f_{sin}= 31.5 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0
Error [dB]	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.0

LEVEL METER function; Range: Low; Characteristic: A; f_{sin}= 1000 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	120.0
Error [dB]	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	0.0	0.0	-0.0

LEVEL METER function; Range: Low; Characteristic: A; f_{sin}= 8000 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	119.0
Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0

LEVEL METER function; Range: High; Characteristic: A; f_{sin}= 31.5 Hz

Nominal result LEQ [dB]	35.0	36.0	37.0	38.0	40.0	60.0	80.0	97.0
Error [dB]	0.1	0.1	0.0	0.0	0.0	0.0	-0.0	0.0

LEVEL METER function; Range: High; Characteristic: A; f_{sin}= 1000 Hz

Nominal result LEQ [dB]	35.0	36.0	37.0	38.0	40.0	60.0	80.0	100.0	120.0	137.0
Error [dB]	0.1	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0

LEVEL METER function; Range: High; Characteristic: A; f_{sin}= 8000 Hz

Nominal result LEQ [dB]	35.0	36.0	37.0	38.0	40.0	60.0	80.0	100.0	120.0	136.0
Error [dB]	0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0

4. TONE BURST RESPONSE*

LEVEL METER function; Characteristic: A; f_{sin}= 4000 Hz; Burst duration: 2 s

Range: **Low**; Steady level nominal result = 117dB

Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	Indication [dB]	117.0	116.9	116.0	114.8	112.2	108.7	105.8	102.9	99.0	96.0	92.9	89.9
		Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
	Slow	Indication [dB]	115.0	113.0	109.6	106.8	103.9	100.0	97.0	94.0	90.0	-	-	-
		Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	Indication [dB]	117.0	114.0	110.0	107.0	104.0	100.0	97.0	94.0	90.0	87.0	83.9	80.9
		Error [dB]	0.0	-0.0	0.0	-0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
29 °C	37%	1005 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	127	Signal generator
2.	SVANTEK	SVAN 912A	9537	Sound & Vibration Analyser
3.	KEITHLEY	2000	0910165	Digital multimeter
4.	SVANTEK	SV33	48878	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DYTRAN	3233A	1376	Reference accelerometer

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.
2. The acoustic calibration was performed using the Sound Calibrator and is traceable to the GUM (Central Office of Measures) reference standard - sound level calibrator type 4231 No 2292773.
3. The vibrational calibration was performed using the Back-to-Back Comparison method and is traceable to the GUM (Central Office of Measures) reference standard - accelerometer type 8305 No 1435233.
4. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
5. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Krzysztof Kubeł ....

Test date: 2018-06-01

SVANTEK

ISO9001 certified

FACTORY CALIBRATION DATA OF THE *SVAN 977A No. 69556*

with preamplifier SVANTEK type SV12L No. 72145 and microphone ACO PACIFIC type 7052E No. 69608

SOUND LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER function; Characteristic: A; f_{sin}=1 kHz; Input signal =110.9 dB;

Range	Low (120dB)	High (137dB)
Indication [dB]	114.0	114.0
Error [dB]	0.0	0.0

2. CALIBRATION* (acoustical)

LEVEL METER function; Range: High; Reference frequency: 1000 Hz; Sound Pressure Level: : **113.99** dB.

Characteristic	Correct value [dB]	Indication [dB]	Error [dB]
Z	113.99	114.02	0.03
A	113.99	114.02	0.03
C	113.99	114.02	0.03

Calibration measured with the microphone ACO PACIFIC type 7052E No. 69608. Calibration factor: 0.63 dB.

3. LINEARITY TEST* (electrical)

LEVEL METER function; Range: Low; Characteristic: A; f_{sin}= 31.5 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0
Error [dB]	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0

LEVEL METER function; Range: Low; Characteristic: A; f_{sin}= 1000 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	120.0
Error [dB]	0.1	0.1	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0

LEVEL METER function; Range: Low; Characteristic: A; f_{sin}= 8000 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	119.0
Error [dB]	0.1	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0

LEVEL METER function; Range: High; Characteristic: A; f_{sin}= 31.5 Hz

Nominal result LEQ [dB]	35.0	36.0	37.0	38.0	40.0	60.0	80.0	97.0
Error [dB]	0.1	0.1	0.0	0.0	0.0	-0.0	-0.0	0.0

LEVEL METER function; Range: High; Characteristic: A; f_{sin}= 1000 Hz

Nominal result LEQ [dB]	35.0	36.0	37.0	38.0	40.0	60.0	80.0	100.0	120.0	137.0
Error [dB]	0.1	0.1	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0

LEVEL METER function; Range: High; Characteristic: A; f_{sin}= 8000 Hz

Nominal result LEQ [dB]	35.0	36.0	37.0	38.0	40.0	60.0	80.0	100.0	120.0	136.0
Error [dB]	0.1	0.1	0.0	0.1	0.0	-0.0	-0.0	0.0	-0.0	0.0

4. TONE BURST RESPONSE*

LEVEL METER function; Characteristic: A; f_{sin}= 4000 Hz; Burst duration: 2 s

Range: **Low**; Steady level nominal result = 117dB

Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	Indication [dB]	117.0	116.9	116.0	114.4	112.2	108.7	105.8	102.9	99.0	96.0	92.9	89.9
		Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
	Slow	Indication [dB]	115.0	113.0	109.6	106.8	103.9	100.0	97.0	94.0	90.0	-	-	-
		Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	Indication [dB]	117.0	114.0	110.0	107.0	104.0	100.0	97.0	94.0	90.0	87.0	83.9	80.9
		Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
29 °C	37%	1005 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	127	Signal generator
2.	SVANTEK	SVAN 912A	9537	Sound & Vibration Analyser
3.	KEITHLEY	2000	0910165	Digital multimeter
4.	SVANTEK	SV33	48878	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DYTRAN	3233A	1376	Reference accelerometer

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.
2. The acoustic calibration was performed using the Sound Calibrator and is traceable to the GUM (Central Office of Measures) reference standard - sound level calibrator type 4231 No 2292773.
3. The vibrational calibration was performed using the Back-to-Back Comparison method and is traceable to the GUM (Central Office of Measures) reference standard - accelerometer type 8305 No 1435233.
4. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
5. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Krzysztof Kubeł .... Test date: 2018-06-01

SVANTEK ISO9001 certified

FACTORY CALIBRATION DATA OF THE *SVAN 977A No. 69557*

with preamplifier SVANTEK type SV12L No. 72140 and microphone ACO PACIFIC type 7052E No. 69617

SOUND LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER function; Characteristic: A; f_{sin}=1 kHz; Input signal =110.9 dB;

Range	Low (120dB)	High (137dB)
Indication [dB]	114.0	114.0
Error [dB]	0.0	0.0

2. CALIBRATION* (acoustical)

LEVEL METER function; Range: High; Reference frequency: 1000 Hz; Sound Pressure Level: : **113.99** dB.

Characteristic	Correct value [dB]	Indication [dB]	Error [dB]
Z	113.99	113.97	-0.02
A	113.99	113.97	-0.02
C	113.99	113.97	-0.02

Calibration measured with the microphone ACO PACIFIC type 7052E No. 69617. Calibration factor: 0.02 dB.

3. LINEARITY TEST* (electrical)

LEVEL METER function; Range: Low; Characteristic: A; f_{sin}= 31.5 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0
Error [dB]	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0

LEVEL METER function; Range: Low; Characteristic: A; f_{sin}= 1000 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	120.0
Error [dB]	0.1	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0

LEVEL METER function; Range: Low; Characteristic: A; f_{sin}= 8000 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	119.0
Error [dB]	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0

LEVEL METER function; Range: High; Characteristic: A; f_{sin}= 31.5 Hz

Nominal result LEQ [dB]	35.0	36.0	37.0	38.0	40.0	60.0	80.0	97.0
Error [dB]	0.1	0.1	0.1	0.0	0.0	-0.0	-0.0	0.0

LEVEL METER function; Range: High; Characteristic: A; f_{sin}= 1000 Hz

Nominal result LEQ [dB]	35.0	36.0	37.0	38.0	40.0	60.0	80.0	100.0	120.0	137.0
Error [dB]	0.1	0.1	0.0	0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0

LEVEL METER function; Range: High; Characteristic: A; f_{sin}= 8000 Hz

Nominal result LEQ [dB]	35.0	36.0	37.0	38.0	40.0	60.0	80.0	100.0	120.0	136.0
Error [dB]	0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0

4. TONE BURST RESPONSE*

LEVEL METER function; Characteristic: A; f_{sin}= 4000 Hz; Burst duration: 2 s

Range: **Low**; Steady level nominal result = 117dB

Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	Indication [dB]	117.0	116.9	116.0	114.4	112.2	108.7	105.8	102.9	99.0	95.9	92.9	89.9
		Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
	Slow	Indication [dB]	115.0	112.9	109.6	106.8	103.9	100.0	97.0	94.0	90.0	-	-	-
		Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	Indication [dB]	117.0	114.0	110.0	107.0	104.0	100.0	97.0	94.0	90.0	86.9	83.9	80.9
		Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1

AcSoft Calibration
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CALIBRATION CERTIFICATE

Date of issue: 09-08-2018 **Certificate No:** 14010137-2 **Page:** 1/7

OBJECT OF CALIBRATION	Sound level meter type SV977, No 36167, manufacturer Svantek with preamplifier type SV12L, No 47685, manufacturer Svantek and microphone type 7052E, No 55967, manufacturer ACO.
APPLICANT	NVM Ireland 1st Floor, Unit 13 Boyne Business Park, Drogheda, Co Louth, Ireland
CALIBRATION METHOD	Method described in instruction IN-02 "Calibration of the sound level meter", issue number 11 date 27.01.2016, written on the basis of international standard EN IEC 61672-3:2013Electroacoustics. Part 3: Periodic tests.
ENVIRONMENTAL CONDITIONS	Temperature: (23.8 - 23.9) °C Ambient pressure: (1000.92 – 1002.62) hPa Relative humidity: (46.3 – 47.7) %
DATE OF CALIBRATION	09-08-2018
UNCERTAINTY OF MEASUREMENTS	Uncertainty of measurement has been evaluated in compliance with EA-4/02:2013. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor k = 2.
CONFORMITY WITH REQUIREMENTS	On the basis of the calibration results, it has been found that, the sound level meter meets metrological requirements specified in the standard IEC 61672-1:2013 Electroacoustics – Sound level meters. Part 1: Specifications, for class 1.
CALIBRATION RESULTS	**The sound level meter submitted for testing has successfully completed the Class 1 periodic tests of IEC 61672-3:2013 (BS EN 61672-3:2013), for the environmental conditions under which the tests were performed.** The results are presented on pages 2 to 7 of this certificate (including measurement uncertainty).
APPROVED BY	B. Hunt

APPENDIX 8.3

OCTAVE BAND SOUND POWER LEVEL DATA FOR CANDIDATE WIND TURBINE (GE 5.3 158)

Table 8.3.1 A-Weighted Octave Band Sound Power Level Data for GE 5.3 158 – Normal Operation

Normal Operation A-weighted Octave Band Spectra [dB]													
Hub height wind speed [m/s]		**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Standardized wind speed at 10 m height for a hub height of 101 m [m/s]		2.8	3.5	4.2	4.9	5.6	6.3	7	7.7	8.4	9	9.7	10.4
Standardized wind speed at 10 m height for a hub height of 120.9 m [m/s]		2.7	3.4	4.1	4.8	5.4	6.1	6.8	7.5	8.2	8.8	9.5	10.2
Standardized wind speed at 10 m height for a hub height of 150 m [m/s]		2.6	3.3	4	4.6	5.3	6	6.6	7.3	7.9	8.6	9.3	9.9
Standardized wind speed at 10 m height for a hub height of 161 m [m/s]		2.6	3.3	3.9	4.6	5.2	5.9	6.6	7.2	7.9	8.5	9.2	9.8
Frequency (Hz)	**16**	53.9	54	56.3	59.4	62	64.5	64.5	64.5	64.5	64.5	64.5	64.0
	32	67.4	67.3	69.6	72.8	75.5	78.0	78.0	78.0	78.0	78.0	78.0	78.0
	63	76.3	77.1	79.2	82	84.6	87.2	87.2	87.2	87.2	87.2	87.2	87.2
	125	83	85	87.1	89	91	92.6	92.6	92.6	92.6	92.6	92.6	92.6
	250	86.8	88.7	91.8	94.1	96.1	97.2	97.2	97.2	97.2	97.2	97.2	97.2
	500	87.2	87.7	91.7	95.5	98.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
	1000	87.6	87	90.6	95.1	98.7	101.3	101.3	101.3	101.3	101.3	101.3	101.3
	2000	86.4	86.4	88.7	92.4	95.9	99.1	99.1	99.1	99.1	99.1	99.1	99
	4000	80.9	82.2	84	86.6	89.1	91.7	91.7	91.7	91.7	91.7	91.7	91.7
	8000	65.1	67.2	69.6	72.4	74.6	76.0	76.0	76.0	76.0	76.0	76.0	76.0
Total Sound Power Level (dB)		**93.8**	**94.5**	**97.6**	**101.0**	**103.9**	**106.0**	**106.0**	**106.0**	**106.0**	**106.0**	**106.0**	**106.0**

APPENDIX 8.4

PREDICTED NOISE LEVELS FROM DERNCART WIND FARM AT NEARBY NOISE SENSITIVE LOCATIONS

Table 8.4.1 presents the predicted noise levels (L_{A90}) from Dernacart Wind Farm at noise sensitive locations for Standardised 10m height wind speeds of 3 to 7 m/s (to cut-out). Commercial receptors, derelict and uninhabited dwellings were not considered.

Table 8.4.1 Predicted Noise Levels (L_{A90}) from Dernacart Wind Farm at Noise Sensitive Locations for Standardised 10m Wind Speeds of 3 to 7 m/s (to cut-out)

Location ID	Easting	Northing	Description	Predicted Noise Level (dB L_{A90}) at Standardised 10m Height Wind Speeds (m/s)				
				3	4	5	6	7 (to cut-out)
H1	641980	712890	Residential	21.7	24.8	29.3	32.4	33
H2	642289	712373	Residential	25.9	29	33.6	36.9	37.6
H3	642342	712300	Residential	26.7	29.8	34.4	37.8	38.4
H4	642355	712452	Residential	26.2	29.3	33.9	37.2	37.9
H5	642538	712511	Residential	27.6	30.7	35.3	38.7	39.4
H6	642465	712570	Residential	26.5	29.6	34.2	37.6	38.2
H7	642471	712596	Residential	26.4	29.5	34.1	37.5	38.1
H8	642489	712610	Residential	26.4	29.6	34.2	37.5	38.1
H9	642522	712638	Residential	26.5	29.6	34.2	37.6	38.2
H10	642415	712718	Residential	25.1	28.3	32.9	36.2	36.8
H11	642458	712785	Residential	25	28.1	32.7	36	36.6
H12	642602	712968	Residential	24.5	27.6	32.2	35.5	36.1
H13	642615	713067	Residential	23.8	27	31.5	34.7	35.3
H14	642598	713024	Residential	24	27.2	31.7	35	35.6
H15	642634	713106	Residential	23.6	26.8	31.3	34.5	35.1
H16	642711	713078	Residential	24.1	27.2	31.8	35	35.6
H17	642724	713175	Residential	23.4	26.6	31.1	34.3	34.9
H18	642702	713224	Residential	23	26.2	30.6	33.9	34.5
H19	642747	713256	Residential	22.9	26.1	30.6	33.8	34.4
H20	642763	712835	Residential	26.4	29.5	34.1	37.5	38.1
H21	642821	712839	Residential	26.6	29.7	34.4	37.7	38.3
H22	642235	711872	Residential	26.2	29.3	33.9	37.3	37.9
H23	641921	711498	Residential	23.4	26.6	31.1	34.3	34.9
H24	642151	711301	Residential	24.7	27.9	32.4	35.6	36.2
H25	642107	711284	Residential	24.3	27.5	32	35.3	35.9
H26	642018	711283	Residential	23.7	26.9	31.4	34.6	35.2
H27	642871	710084	Residential	24.2	27.4	31.9	35.1	35.7
H28	642895	710108	Residential	24.4	27.6	32.1	35.3	35.9
H29	642919	710125	Residential	24.6	27.8	32.3	35.5	36.1
H30	642966	710201	Residential	25.2	28.4	32.9	36.1	36.7
H31	643055	710196	Residential	25.6	28.8	33.3	36.6	37.2
H32	642975	710241	Residential	25.4	28.6	33.1	36.4	37
H33	642971	710265	Residential	25.5	28.7	33.2	36.5	37.1
H34	642962	710284	Residential	25.6	28.7	33.3	36.5	37.1
H35	642946	710310	Residential	25.6	28.8	33.3	36.6	37.1
H36	643012	710323	Residential	26	29.2	33.7	37	37.6
H37	642970	710333	Residential	25.8	29	33.5	36.8	37.4
H38	642974	710371	Residential	26	29.2	33.7	37	37.6

Location ID	Easting	Northing	Description	Predicted Noise Level (dB L_{A90}) at Standardised 10m Height Wind Speeds (m/s)				
				3	4	5	6	7 (to cut-out)
H39	643130	710657	Residential	28.5	31.6	36.2	39.6	40.2
H40	643075	710701	Residential	28.4	31.5	36.2	39.5	40.1
H41	643102	710713	Residential	28.7	31.8	36.4	39.8	40.4
H42	642743	710830	Residential	27	30.2	34.8	38.1	38.7
H43	642712	710872	Residential	27.1	30.2	34.8	38.1	38.7
H44	642702	711011	Planning Application	27.7	30.9	35.5	38.8	39.4
H45	642937	710979	Residential	29.3	32.4	37.1	40.5	41.1
H46	642923	711100	Residential	30.1	33.2	37.8	41.3	41.9
H47	642929	711095	Residential	30.1	33.2	37.9	41.3	41.9
H48	643421	709903	Residential	26.1	29.3	33.8	37.1	37.7
H49	645164	710361	Residential	29	32.2	36.8	40.2	40.8
H50	645249	710373	Residential	28.5	31.6	36.3	39.6	40.2
H51	645265	710411	Residential	28.6	31.7	36.4	39.7	40.3
H52	645285	710465	Residential	28.8	31.9	36.5	39.9	40.5
H53	645308	710509	Residential	28.9	32	36.6	40	40.6
H54	646173	710421	Residential	23.1	26.3	30.7	33.9	34.5
H55	642838	713842	Residential	19.7	22.9	27.2	30.3	30.8
H56	643290	713718	Residential	20.7	23.9	28.3	31.4	32
H57	641979	713358	Residential	19.8	23	27.3	30.4	31
H58	641956	713189	Residential	20.4	23.5	27.9	31	31.6
H59	641934	713052	Residential	20.8	24	28.4	31.5	32.1
H60	641953	713000	Residential	21.1	24.3	28.7	31.8	32.4
H61	641555	712371	Residential	20.7	23.9	28.3	31.4	32
H62	641984	711262	Residential	23.5	26.7	31.1	34.3	34.9
H63	641915	711198	Residential	22.9	26.1	30.6	33.7	34.3
H64	641784	711071	Residential	21.9	25.1	29.5	32.7	33.2
H65	641748	711039	Residential	21.7	24.9	29.3	32.4	33
H66	641710	710982	Residential	21.4	24.6	28.9	32.1	32.6
H67	642187	710536	Residential	22.7	25.9	30.3	33.5	34.1
H68	642058	710547	Residential	22.1	25.3	29.7	32.9	33.4
H69	642528	710351	Residential	23.7	26.9	31.4	34.6	35.2
H70	642605	710203	Residential	23.5	26.7	31.2	34.3	34.9
H71	642642	710143	Residential	23.4	26.6	31.1	34.3	34.8
H72	642717	710088	Residential	23.6	26.8	31.2	34.4	35
H73	642544	710198	Residential	23.2	26.4	30.9	34	34.6
H74	642568	710153	Residential	23.2	26.4	30.8	34	34.5
H75	642565	710068	Residential	22.8	26	30.4	33.6	34.2
H76	642609	710082	Residential	23.1	26.3	30.7	33.9	34.4
H77	642567	709924	Residential	22.3	25.5	29.9	33	33.6
H78	643088	709750	Residential	23.7	26.9	31.4	34.6	35.1
H79	643106	709753	Residential	23.8	27	31.5	34.7	35.2
H80	643299	709515	Residential	23.4	26.6	31.1	34.3	34.8

Location ID	Easting	Northing	Description	Predicted Noise Level (dB L_{A90}) at Standardised 10m Height Wind Speeds (m/s)				
				3	4	5	6	7 (to cut-out)
H81	643322	709481	Residential	23.3	26.5	31	34.2	34.7
H82	643419	709191	Residential	22.1	25.3	29.7	32.8	33.4
H83	643492	709181	Residential	22.2	25.4	29.8	33	33.6
H84	643694	709348	Residential	23.8	26.9	31.4	34.7	35.2
H85	643434	708993	Residential	21.1	24.3	28.7	31.8	32.3
H86	643811	708817	Residential	20.8	24	28.4	31.5	32.1
H87	643845	708806	Residential	20.8	24	28.4	31.5	32
H88	643755	708795	Residential	20.6	23.8	28.2	31.3	31.9
H89	645434	709136	Residential	21.1	24.3	28.6	31.8	32.3
H90	645427	709195	Residential	21.4	24.6	28.9	32.1	32.6
H91	645049	709414	Residential	23.7	26.9	31.4	34.6	35.2
H92	645067	709537	Residential	24.4	27.6	32.1	35.3	35.9
H93	644908	709469	Residential	24.5	27.7	32.2	35.5	36.1
H94	646252	710399	Residential	22.6	25.8	30.2	33.4	33.9
H95	646267	710388	Residential	22.5	25.7	30.1	33.2	33.8
H96	645378	710603	Residential	28.9	32	36.7	40	40.7