

ぷSLR

Technical Appendix 9.1 – 9.6

Noise

Knockanarragh Wind Farm – EIAR Volume 3

Knockanarragh Wind Farm Limited

SLR Project No.: 501.00727.00088

19 March 2024

Making Sustainability Happen

A.1 Appendix 9.1 – Glossary

Table A.1 Glossary of Terms

Terminology	Description
A-weighting	a filter that weights individual frequencies of sound to better represent the frequency response of the human ear when assessing the likely effects of noise on humans
acoustic character	one or more distinctive features of a sound (e.g., tones, whines, whistles, impulses) that set it apart from the background noise against which it is being judged, possibly leading to a greater subjective effect than the level of the sound alone might suggest
ambient noise	All-encompassing noise associated with a given environment, usually a composite of sounds from many sources both far and near, often with no particular sound being dominant
attenuation	the reduction in level of a sound between the source and a receiver due to any combination of effects including distance, atmospheric absorption, acoustic screening, the presence of a building façade, etc.
background noise	the noise level rarely fallen below in any given location over any given time period. The L_{A90} indices is often used to represent the background noise level.
daytime hours	07.00 to 23.00 any day of the week. Different to the quiet daytime hours
dB	abbreviation for 'decibel'
dB(A)	abbreviation for the decibel level of a sound that has been A-weighted
decibel	the unit normally employed to measure the magnitude of sound
directivity	the property of a sound source that causes more sound to be radiated in one direction than another
equivalent continuous sound pressure level	the steady sound level which has the same energy as a time varying sound signal when averaged over the same time interval, T, denoted by $L_{\text{Aeq},\text{T}}$
frequency	the number of acoustic pressure fluctuations per second occurring about the atmospheric mean pressure (also known as the 'pitch' of a sound)
ground effects	the modification of sound at a receiver location due to the interaction of the sound wave with the ground along its propagation path from source to receiver. Described using the term 'G', and ranges between 0 (hard), 0.5 (mixed) and 1 (soft).
Hertz (Hz)	the unit used to measure the frequency of a sound, equal to cycles per second of acoustic pressure fluctuations about the atmospheric mean pressure
L _{Aeq}	the abbreviation of the A-weighted equivalent continuous sound pressure level
L _{A10}	the abbreviation of the 10-percentile exceeded sound level, often used for the measurement of road traffic noise
L _{A90}	the abbreviation of the 90-percentile exceeded sound level, often used for the measurement of background noise
noise	physically: a regular and ordered oscillation of air molecules that travels away from the source of vibration and creates fluctuating positive and negative acoustic pressure above and below atmospheric pressure.
	Subjectively: sound that evokes a feeling of displeasure in the environment in which it is heard, and is therefore unwelcomed by the receiver





Terminology	Description
noise emission	the noise emitted by a source of sound
noise immission	the sound pressure level at a receiver
night-time hours	defined by ETSU-R-97 as the hours between 23.00 and 07.00, any day
percentile exceeded sound level	the noise level exceeded for n% of the time over a given time period, T, denoted by $L_{\text{An},\text{T}}$
quiet daytime hours	defined by ETSU-R-97 as the hours between 18.00 and 23.00 Monday to Friday, 13.00 and 23.00 Saturdays and 07.00 and 23.00 Sundays
receiver	a person or property exposed to the noise being considered
respite	a period of reduced wind turbine noise immission level occurring during certain wind conditions
sound	physically: a regular and ordered oscillation of air molecules that travels away from the source of vibration and creates fluctuating positive and negative acoustic pressure above and below atmospheric pressure
	subjectively: the sensation of hearing excited by the acoustic oscillations described above (see also 'noise')
sound level meter	an instrument for measuring sound pressure level
sound power level	the total sound power radiated by a source, in decibels
sound pressure level	a measure of the sound pressure at a point, in decibels
spectrum	a description of the amplitude of a sound as a function of frequency
standardised wind speed	values of wind speed at hub height corrected to a standardised height of ten metres using the same procedure as used in wind turbine emission testing
tone	the concentration of acoustic energy into a very narrow frequency range
wind shear	the change in wind speed with height above ground



A.2 Appendix 9.2 – BASELINE SURVEY DETAILS

A.2.1 NML1 – Killacroy, Co. Meath C15 D2W0

Sound level meter position: 53°39'45.8"N 7°03'31.5"W

Equipment used at measurement location

Equipment	Description	Serial Number	Calibrated
Sound level meter	Rion NL-52	00710362	05/10/2021
Pre-amplifier	Rion NH-25	10904	05/10/2021
Microphone	Rion UC-59	19636	05/10/2021
Calibrator	Rion NC-75	34713324	05/10/2021



- Field calibration value at the start of survey: 94.0 dB @ 1kHz
- Field calibration value at the end of survey: 93.9 dB @ 1kHz
- Drift in field calibration = 0.1 dB

Description of measurement location

Situated to the north west of the proposed turbines and considered representative of dwellings nearby in the north western region.

Rural location with a noise climate that can be described as typical for rural amenity with some traffic audible on the local road, and farming activities audible, farm animals and dogs barking, natural noises such as birds singing when other noise sources abated.

The sound level meter was set up in the front garden, away from the road and the hedges. No localised sources of constant noise.

Photographs of the sound level meter at this location are provided in Plate 9-1 to Plate 9-4.

- Any data measured during, or within 30 minutes of rainfall; and
- Data showing a temporary increase in noise clearly not related to wind speed:
 - Saturday 8/10/22 11:50 to 12:00 (UTC)
 - Saturday 8/10/22 13:50 to 15:30 (UTC)











A.2.2 NML2 – Newtown, Co. Westmeath. C15 WF29

Sound level meter position: 53°38'42.3"N 7°02'16.5"W

Equipment	Description	Serial Number	Calibrated
Sound level meter	LD-LxT1L	0005978	30/08/22
Pre-amplifier	Larson Davis	070009	30/08/22
Microphone	PCB	425452	30/08/22
Calibrator	Larson Davis	9175	30/08/22

Equipment used at measurement location

- Field calibration value at the start of survey: 114.0 dB @ 250Hz
- Field calibration value at the end of survey: 114.0 dB
- Drift in field calibration = 0.0 dB

Description of measurement location

•

@ 250Hz

Situated to the east of the proposed turbines, off the N52. This location is considered representative of dwellings near to the section of the N52 south of Clonmellon.

Rural location with a noise climate that can be described as typical for rural amenity with some traffic audible on the local road, and farming activities audible, farm animals and dogs barking, natural noises such as birds singing when other noise sources abated.

The sound level meter was set up in the side garden of the property, away from the road and the hedges. No localised sources of constant noise as the boiler is located behind the house and not in regular use currently. The property doesn't have any equipment that is constantly running.

Photographs of the sound level meter at this location are provided in Plate 9-5 to Plate 9-8.

- Any data measured during, or within 30 minutes of rainfall; and
- Data showing a temporary increase in noise clearly not related to wind speed:
 - Saturday 1/10/22 14:50 to 15:30 (UTC)











A.2.3 MNL3 – Rosmead, Co. Westmeath R32 R2R2

Sound level meter position: 53°38'49.9"N 7°02'53.7"W

Equipment	Description	Serial Number	Calibrated
Sound level meter	LD-LxT1L	0006602	30/08/22
Pre-amplifier	Larson Davis	042683	30/08/22
Microphone	PCB	168567	30/08/22
Calibrator	Larson Davis	9175	30/08/22

Equipment used at measurement location

- Field calibration value at the start of survey: 114.0 dB @ 250Hz
- Field calibration value at the end of survey: 114.0 dB @ 250Hz
- Drift in field calibration = 0.0 dB

Description of measurement location



Situated in between the two groups of proposed turbines, off the L5542. This locations is considered representative of dwellings near the central region and those situated north west of the southern turbine cluster.

Noise climate can be described as rural amenity with natural noises such as birds and wind disturbed vegetation, distant and passing road traffic noise could be heard. Resident at this location park their vehicles at the back of the house approximately 15m away from the sound level meter. All data was inspected and excluded where vehicle noise was evident.

The sound level meter was set up in the side garden, away from the road and the hedges. No localised sources of constant noise as the boiler is located behind the house and not in regular use currently. The farm doesn't have any equipment that is constantly running.

Photographs of the sound level meter at this location are provided in Plate 9-9 to Plate 9-12.

- Any data measured during, or within 30 minutes of rainfall; and
- Data showing a temporary increase in noise clearly not related to wind speed:
 - Friday 16/09/22 18:50 to 19:10 (UTC)
 - Sunday 18/09/22 07:20 to 07:40 and 13:20 to 14:10 (UTC)
 - Sunday 25/09/22 08:00 to 08:30 (UTC)
 - Monday 10/10/22 17:10 to 19:30 (UTC)
 - Wednesday 12/10/22 18:20 to 23:10 (UTC)











A.2.4 NML4 – Clonarney. N91 CK46

Sound level meter position: 53°38'00.1"N 7°04'27.8"W

Equipment used at measurement location

Equipment	Description	Serial Number	Calibrated
Sound level meter	LD-LxT SE	0006600	28/09/21
Pre-amplifier	Larson Davis		28/09/21
Microphone	PCB		28/09/21
Calibrator	Larson Davis	9175	30/08/22

- Field calibration value at the start of survey: 114.0 dB @ 250Hz
- Field calibration value at the end of survey: 113.9 dB @ 250Hz
- Drift in field calibration = 0.1 dB

Description of measurement location

Situated to the west of the southern cluster of proposed turbines, off the L1532. This location is considered representative of dwellings in the area off the same road.

The sound level meter was set up in the rear garden of the property approximately 20 m from the back of the property. There were no localised sources of constant noise, position was on the open lawn.

Noise climate can be described as rural amenity with natural noises such as birds and wind disturbed vegetation, distant and passing road traffic noise could be heard.

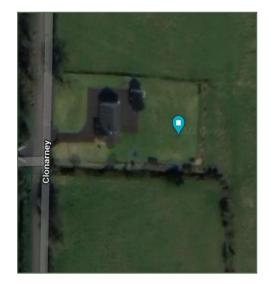
A rain gauge was installed at this location. This instrument uses tipping bucket with magnetic switch technology and measures a minimum rain volume of 0.20 mm.

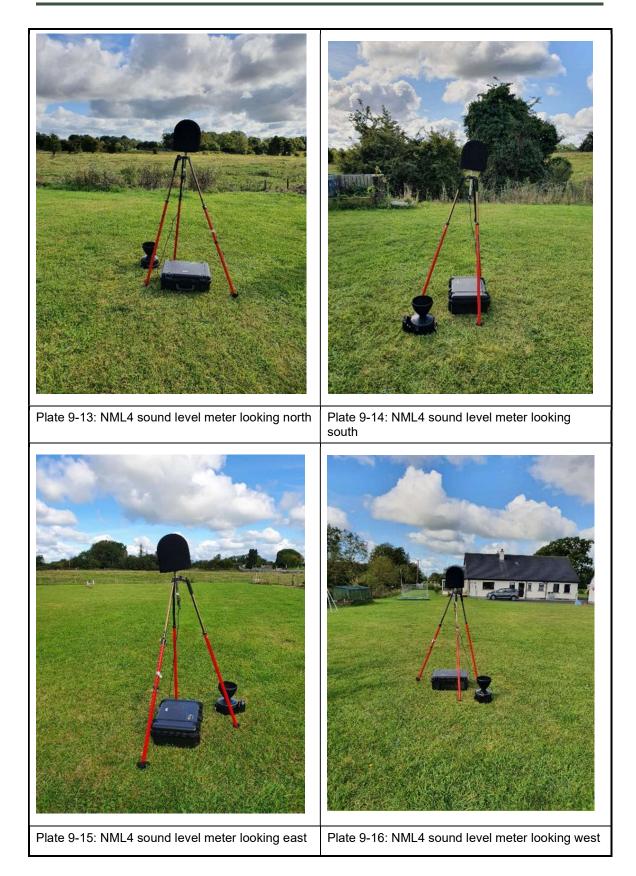
Photographs of the sound level meter at this location are provided in Plate 9-13 to Plate 9-16.

- Every day between 18:10 and 18:50 (UTC) as a regular spike in noise noted
- Any data measured during, or within 30 minutes of rainfall; and
- Data showing a temporary increase in noise clearly not related to wind speed













A.2.5 NML5 – Robinstown Great, Co. Westmeath N91 K763

Sound level meter position: 53°37'31.7"N 7°04'25.3"W

Equipment	Description	Serial Number	Calibrated
Sound level meter	LD-LxT1L	0006263	30/08/22
Pre-amplifier	Larson Davis	042643	30/08/22
Microphone	PCB	313723	30/08/22
Calibrator	Larson Davis	9175	30/08/22

Equipment used at measurement location

- Field calibration value at the start of survey: 114.0 dB @ 250Hz
- Field calibration value at the end of survey: 114.0 dB @ 250Hz
- Drift in field calibration = 0.0 dB

Description of measurement location



Situated to the south west of the proposed turbines, off the N52 north of Delvin. This location is considered representative of dwellings nearby off the section of the N52 north of Delvin.

The noise climate at this location was influenced by nearby national secondary road N52 traffic noise and natural sources such as vegetation, birds and cattle.

The sound level meter was installed in the rear garden in open space away from any sources of constant noise or mature vegetation.

Photographs of the sound level meter at this location are provided in Plate 9-17 to Plate 9-20.

- Any data measured during, or within 30 minutes of rainfall; and
- Data showing a temporary increase in noise clearly not related to wind speed









A.2.6 NML6 – Crowenstown, Co. Westmeath N91 F721

Sound level meter position: 53°38'03.2"N 7°02'13.1"W

Equipment	Description	Serial Number	Calibrated
Sound level meter	Rion NL-52	00710359	05/10/2021
Pre-amplifier	Rion NH-25	10901	05/10/2021
Microphone	Rion UC-59	19633	05/10/2021
Calibrator	Rion NC-75	34713324	05/10/2021

Equipment used at measurement location

- Field calibration value at the start of survey: 93.6 dB @ 1kHz
- Field calibration value at the end of survey: 93.8 dB @ 1kHz
- Drift in field calibration = 0.2 dB

Description of measurement location

Situated to the south east of the proposed turbines, off the L5525. This location is considered to be representative of dwellings to the south east of the proposed development.

Rural location with a noise climate that can be described as typical for rural amenity with some traffic audible on the local road, and farming activities audible, farm animals and dogs barking, natural noises such as birds singing when other noise sources abated.

The sound level meter was set up in the rear garden of the property approximately 8 m from the side of a building and the hedgerow. There were no localised sources of constant noise, position was on the open lawn. Residents were also in the process of constructing an outhouse as can be seen in Plate 9-23. Any extraneous noise was excluded.

Photos of the sound level meter at this location are provided in Plate 9-21 to Plate 9-24.

- Any data measured during, or within 30 minutes of rainfall; and
- Data showing a temporary increase in noise clearly not related to wind speed:
 - Wednesday 21/09/22 16:50 to 18:00 (UTC)
 - Wednesday 28/09/22 16:50 to 18:10 (UTC)
 - Thursday 29/09/22 16:50 to 17.50 (UTC)
 - Friday 30/09/22 16:50 to 18:00 (UTC)
 - Saturday 1/10/22 11:50 to 18:00 (UTC)
 - Sunday 2/10/22 13.10 to 14.20 (UTC)
 - o Thursday 6/10/22 16:50 to 18.30 (UTC)
 - Friday 7/10/22 17:50 to 18.50 (UTC)
 - Saturday 8/10/22 15.30 to 16:00 (UTC)
 - Monday 10/10/22 16:50 to 18.10 (UTC)
 - Tuesday 11/10/22 17:20 to 18:00 (UTC)











A.3 Appendix 9.3 – MEASURED BACKGROUND NOISE GRAPHS

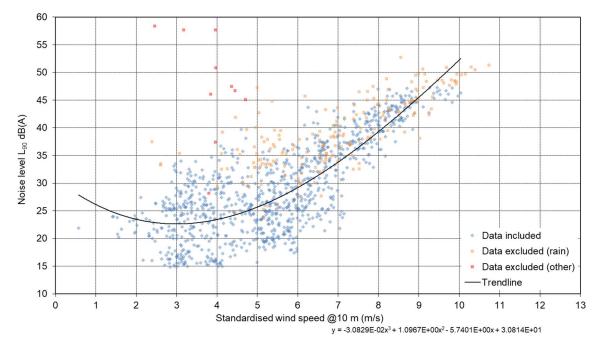


Figure 9-1: Background Noise Measured at NML1 during the Quiet Daytime

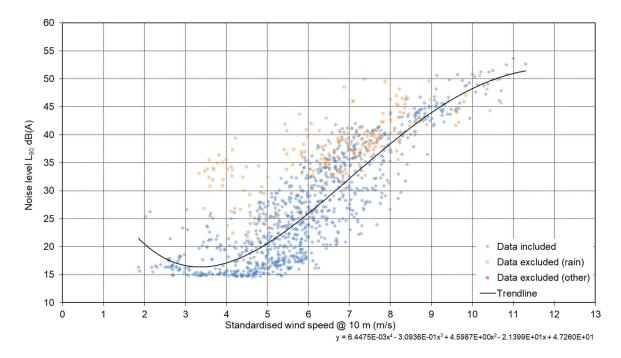


Figure 9-2: Background Noise Measured at NML1 during the Night-time





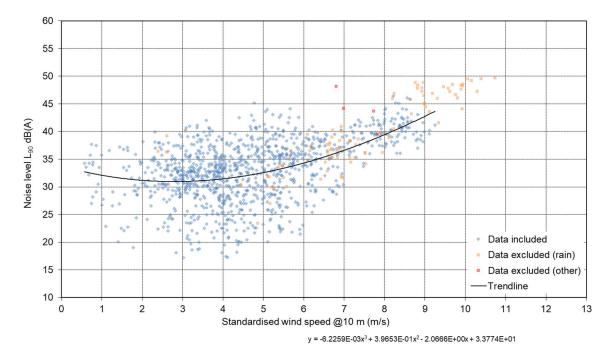


Figure 9-3: Background Noise Measured at NML2 during the Quiet Daytime

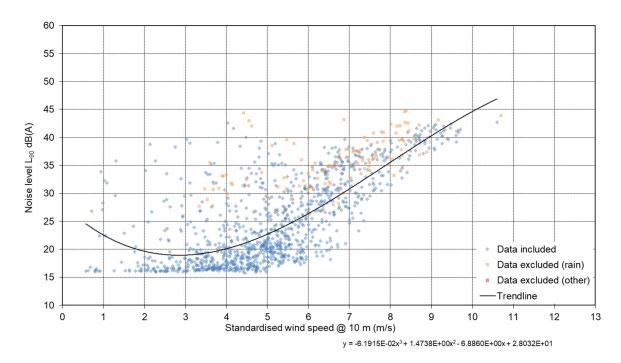


Figure 9-4: Background Noise Measured at NML2 during the Night-time





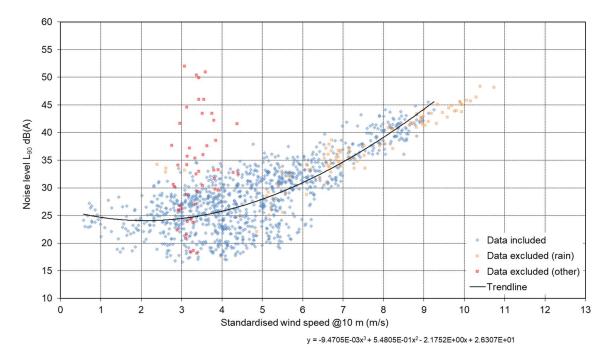


Figure 9-5: Background Noise Measured at NML3 during the Quiet Daytime

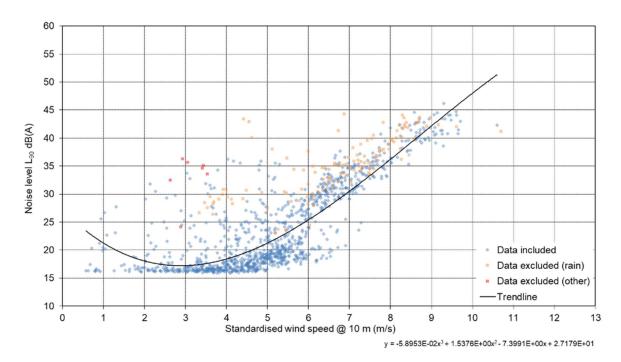


Figure 9-6: Background Noise Measured at NML3 during the Night-time



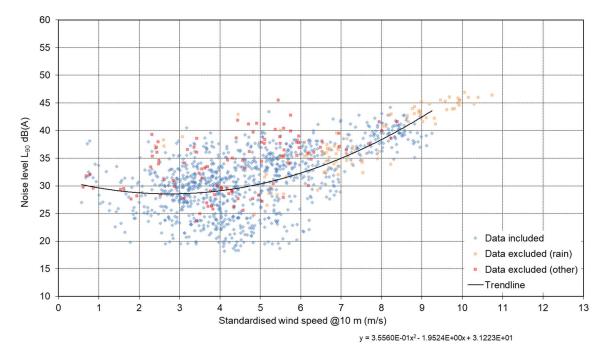


Figure 9-7: Background Noise Measured at NML4 during the Quiet Daytime

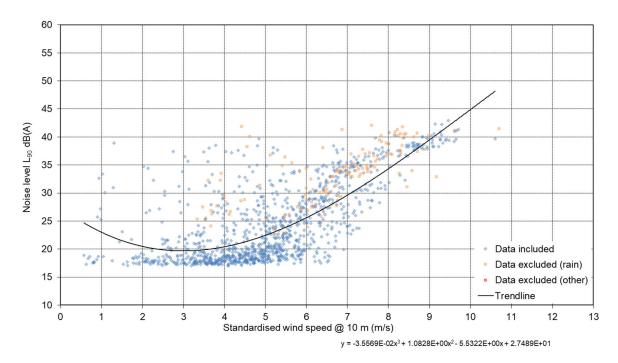


Figure 9-8: Background Noise Measured at NML4 during the Night-time





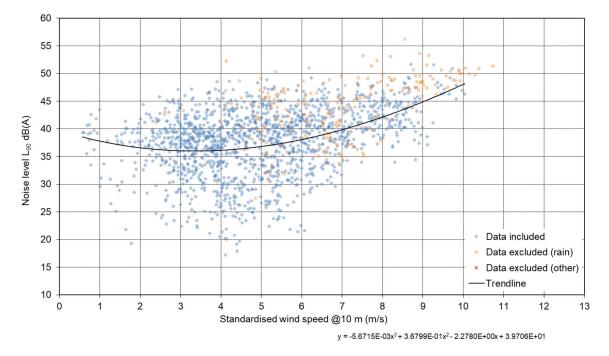


Figure 9-9: Background Noise Measured at NML5 during the Quiet Daytime

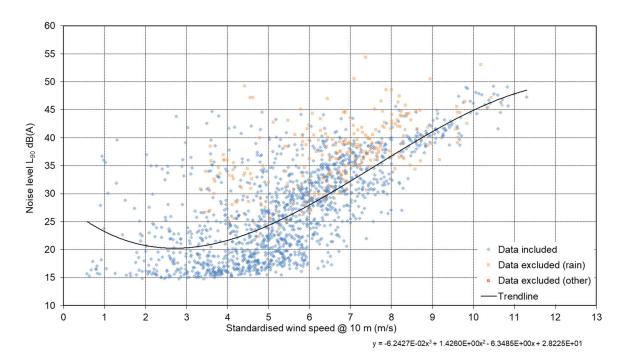


Figure 9-10: Background Noise Measured at NML5 during the Night-time





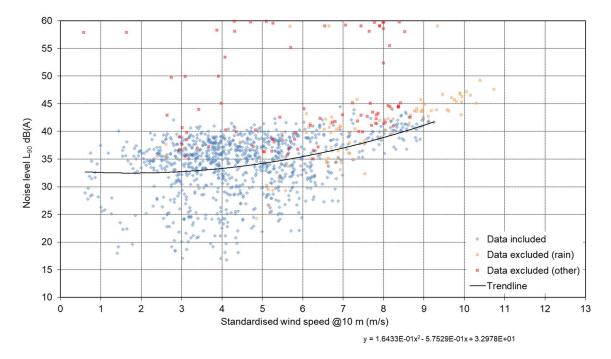


Figure 9-11: Background Noise Measured at NML6 during the Quiet Daytime

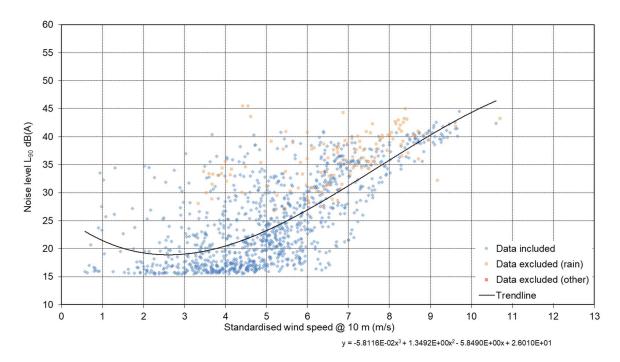
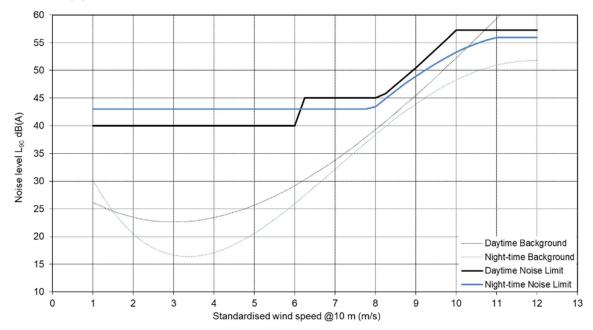


Figure 9-12: Background Noise Measured at NML6 during the Night-time







A.4 Appendix 9.4 – WIND FARM NOISE LIMITS

Figure 9-13: Noise Limit at NML1

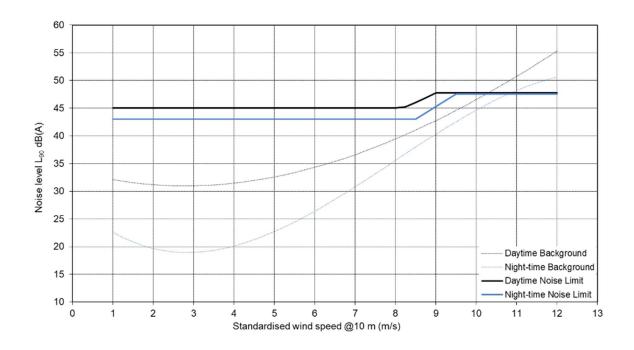


Figure 9-14: Noise Limit at NML2



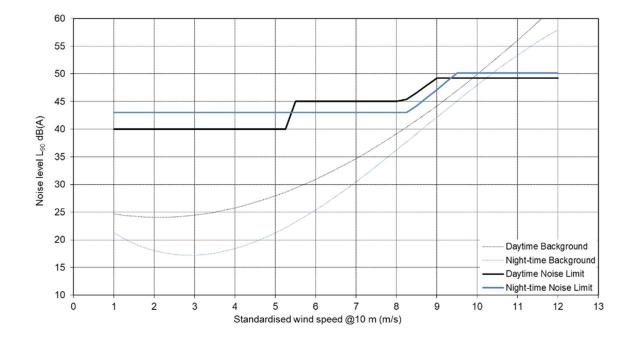


Figure 9-15: Noise Limit at NML3

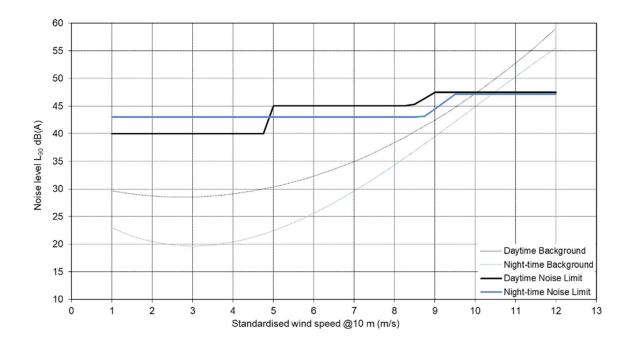


Figure 9-16: Noise Limit at NML4





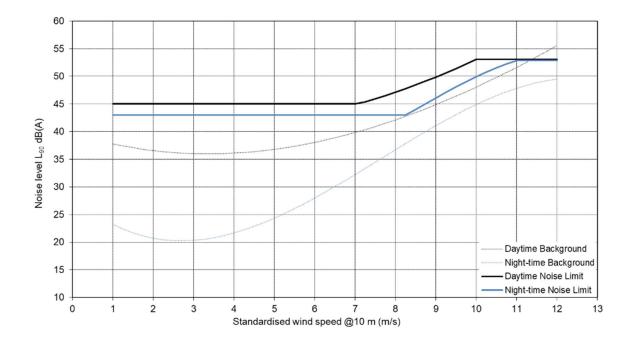


Figure 9-17: Noise Limit at NML5

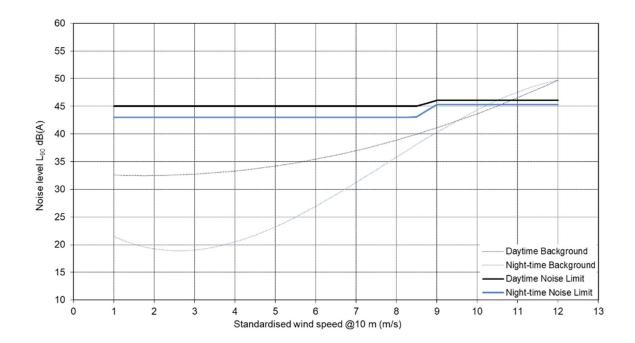


Figure 9-18: Noise Limit at NML6





A.5 Appendix 10.5 – WIND SPEED CALCULATIONS

The IOA GPG¹ requires that noise data recorded every 10 minutes are related to standardised ten metre wind speeds experienced at the hub height of the turbines, at a location on the wind farm representative of the wind farm. These wind speeds can be either measured directly at the turbine hub height or derived by calculation from measurements at two heights, with measurements at the upper height not less than 60% of the turbine hub height and measurements at least 15 metres below that. These are referred to as 'Method A' or 'Method B' in the IOA GPG which describes these as the preferred methods to use. IOA GPG Supplementary Guidance Note SGN4 provides additional guidance on these methods.

The site of the proposed development has a temporary LiDAR remote sensing measuring system installed which measured wind conditions at various heights as follows:

38m,

69m,

89m,

101m,

109m,

121m, and

164m

The nearest measurement heights to the proposed hub heights of 97.5m and 99m are 89m and 101m. Data captured at these heights were interpolated to a height of 98m as representative of hub height wind speeds during each 10 minute period.

Wind speeds are standardised to a height of ten metres assuming a reference ground roughness length of 0.05 metres as described in the IOA GPG SGN4, Equation 1, reproduced below. This approach is of the same form as that given in BS EN 61400 11:2003 for calculating ten metre wind speeds related to hub height wind speeds when providing source noise emission data for wind turbines.

$$v_{10} = v_{hh} \times \left(\frac{\ln \left[\frac{10}{z_0} \right]}{\ln \left[\frac{h_{hub}}{z_0} \right]} \right)$$

By using this method, measured background noise levels were correlated to ten metre wind speeds calculated from wind speeds at hub height. Any likely difference in the shear profile during the 24 hours of the day will be accounted for within the method and be reflected in the resulting standardised ten metre wind speed data. The method used to calculate ten metre wind speeds from those at hub height is the same as that used when deriving noise emission data for the turbines. Because the same method has been used, direct comparison of background noise levels, noise limits and predicted turbine noise immission levels may be undertaken. This method is consistent with guidance published in the IOA GPG.

¹ A Good Practice Guide to the Application of ETSU R 97 for the Assessment and Rating of Wind Turbine Noise, M. Cand, R. Davis, C. Jordan, M. Hayes, R. Perkins, Institute of Acoustics, May 2013.



A.6 Appendix 9.6 – CALIBRATION CERTIFICATES

15 Middle Pavement Nottingham NG17DX



Date of Issue: 05 October 2021

Calibrated at & Certificate issued by: ANV Measurement Systems

CERTIFICATE OF CALIBRATION



Certificate Number: UCRT21/2223

Calibrated at & Ce	rtificate issued by:							
ANV Measuremen	t Systems		Page	1	of	2	Pages	
E-Mail: info@noise Web: www.noise-a	642846 Fax 01908 642814 -and-vibration.co.uk	Approved S B. Giles	Signatory	90 (D)	B	V	1	
Customer	SLR Consulting Limited 2nd and 3rd Floors							

Order No	422-17278							
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator							
Identification	Manufacturer	Instrument	Туре	Serial No. / Version				
	Rion	Sound Level Meter	NL-52	00710359				
	Rion	Firmware		2.0				
	Rion	Pre Amplifier	NH-25	10901				
	Rion	Microphone	UC-59	19633				
	Rion	Calibrator	NC-75	34713324				
		Calibrator adaptor t	ype if applicab	le NC-75-022				
Performance Class	1							
Test Procedure	TP 10. SLM 61	1672-3:2013						
	Procedures from	IEC 61672-3:2013 were	e used to perfor	n the periodic tests.				
Type Approved to IEC	61672-1:2013	Yes						
		ere is public evidence tha n evaluation tests of IEC		uccessfully completed the				
Date Received	05 October 202	21 A	NV Job No.	UKAS21/10653				
Date Calibrated	05 October 202	21						

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of patternevaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	Dat	ed			Certificate	No.	Laboratory				
	Init	ial Calibratio	on								
This certificate is issue	ed in	accordance	with	the	laboratory	accreditation	requirements	of	the	United	Kingdom
Accreditation Service. It	10.000		1								

ment realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.



CERTIFICATE OF CALIBRATION **Certificate Number**

UKAS Accredited Calibration Laboratory No. 0653

UCRT21/2223							
Pane	2	of	2	Darles			

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated. SLM instruction manual title NL-52/NL-42 Description for IEC 61672-1 SLM instruction manual ref / issue No. 56034 21-03 Source Rion Date provided or internet download date 19 March 2021 Case Corrections Wind Shield Corrections Mic Pressure to Free Field Corrections Uncertainties provided Yes Yes Yes Total expanded uncertainties within the requirements of IEC 61672-1:2013 YES Specified or equivalent Calibrator Specified Customer or Lab Calibrator Customers Calibrator Calibrator adaptor type if applicable NC-75-022 Calibrator cal. date 05 October 2021 Calibrator cert. number UCRT21/2215 Calibrator cal cert issued by Lab 0653 Calibrator SPL @ STP 93.95 dB Calibration reference sound pressure level Calibrator frequency 1000.00 Hz Calibration check frequency Reference level range Sinale dB Accessories used or corrected for during calibration -Extension Cable & Wind Shield WS-15 Note - The Extension Cable was used between the SLM and the pre-amp for this calibration. Environmental conditions during tests Start End 23.40 0.30 °C Temperature 23 20 + Humidity 39.4 38.3 3.00 %RH ± 99.21 0.03 kPa Ambient Pressure 99 24 ± Indication at the Calibration Check Frequency Initial indicated level 94.0 dB Adjusted indicated level 94.0 dB Uncertainty of calibrator used for Indication at the Calibration Check Frequency ± 0.10 dB Self Generated Noise Microphone installed -Less Than 17.0 dB A Weighting UR = Under Range indicated Microphone replaced with electrical input device Weighting C UR UR dB 15.6 dB dB UR 11.8 22.8

Self Generated Noise reported for information only and not used to assess conformance to a requirement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

Calibrated by: B. Bogdan END

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MEASUREMEN		, CERTIFICA OF CALIBRATIO	Ha	
Date of Issue: 05 Calibrated at & Certifici ANV Measurement Sys Beaufort Court 17 Roebuck Way Milton Keynes MK5 8H Telephone 01908 6428 E-Mail: info@noise-and- Web: www.noise-and- Acoustics Noise-and Vietation Lt	ate issued by: stems HL 146 Fax 01908 6428 J-vibration.co.uk ribration.co.uk	Approved 14 B. Giles	ate Number: U Page 1 Signatory	of 2 Pages
Customer	SLR Consulting 2nd and 3rd Flo 15 Middle Pave Nottingham NG1 7DX	g Limited		
Order No. Description Identification	422-17278 Sound Level M <i>Manufacturer</i> Rion Rion Rion Rion	eter / Pre-amp / Microph Instrument Sound Level Meter Firmware Pre Amplifier Microphone Calibrator Calibrator adaptor typ	<i>Type</i> NL-52 NH-25 UC-59 NC-75	d Calibrator Serial No. / Version 00710362 2.0 10904 19636 34713324 NC-75-022
Performance Class Test Procedure Type Approved to IE	C 61672-1:2013 If YES above the	IEC 61672-3:2013 were u Yes re is public evidence that th	, ne SLM has succe	
3:2013, for the envir available, from an evaluation tests perfi level meter fully con	05 October 202 05 October 202 ter submitted for to onmental condition independent testin ormed in accordan	21 esting has successfully is under which the tests ing organisation respons ince with IEC 61672-2:20	V Job No. U completed the p were performed sible for approv 13, to demonstr IEC 61672-1:20	IKAS21/10653 beriodic tests of IEC 61672- J. As evidence was publicly ring the results of pattern- ate that the model of sound 013, the sound level meter 3.

Previous Certificate	Dated	Certificate No.	Laboratory
	Initial Calibration		
This certificate is issue	ed in accordance with the	ne laboratory accreditation	n requirements of the United Kingdom
Accreditation Service. It	provides traceability of me	easurement to the SI syster	n of units and/or to units of measurement
realised at the National	Physical Laboratory or oth	er recognised national me	trology institutes. This certificate may not
be reproduced other that	n in full, except with the pr	ior written approval of the is	ssuing laboratory.



CERTIFICATE OF CALIBRATION Certificate Number

UKAS Accredited Calibration Laboratory No. 0653

	UCR	T21/22	20	
Pane	2	of	2	Panes

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

	inual tit	le NL-52/NL-4	2 Desc	ription for II	EC 61672	2-1				
SLM instruction ma	inual re	f / issue	1	vo. 56034 2	1-03	Source	Rion			
Date provided or in	ternet o	download date		19 March 2	021					
		Case Corrections	Wind	d Shield Co	rrections	Mic Pre	ssure to	o Free F	ield C	orrection
Uncertainties provid	ded	Yes		Yes				Yes		
Total expanded und			irement	ts of IEC 61	672-1:20	13 YE\$	S			
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Calibrator adaptor t		applicable		NC-75-02	Contraction of the local sectors of the local secto					
Calibrator cal. date			C)5 October :						
Calibrator cert. num				UCRT21/2	215					
Calibrator cal cert is	ssued b	by Lab		0653						
Calibrator SPL @ S	STP			93.95	dB	Calibration	referen	ice sour	nd pres	sure leve
Calibrator frequenc	y			1000.00	Hz	Calibration	check f	requent	су	
Reference level rar	nge			Single	dB					
Reference level ran Accessories used c		cted for during cali	bration			able & Winc	l Shield	WS-15		
	or corre			- Ext	ension Ca				5	
Accessories used c	or corre on Cab	le was used betwe		- Ext	ension Ca					63
Accessories used c Note - The Extension	or corre on Cab	le was used betwe		- Ext SLM and th	ension Ca	p for this ca				1
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Self Generated Noise reported for information only and not used to assess conformance to a requirement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

Calibrated by: B. Bogdan





Calibrati	S on	MTS Cali The Grange B Belasis Billinghan En Telephone:	Avenue n TS23 1 gland	Centre, LG,		
CERTIFICAT	TE O	F CALIBR	ATIO	N	Page 1 o	f 11 pages
					Approved Signa	tory:
Issued by: MTS Ca	librati	on Ltd			, approved engine	0.4
					RA	JL
Date of Issue: 30 August 2	2022	Certificate Number:	37315	_		Tony Sherri
		Sound Leve	Mete	er		
Sound Level					1672-3: 2013	Class 1
Client: Environmental Measurem			Instrumen		Larson Davis	
Unit 12, Tallaght Business Whitestown Business Par			Instrumen Serial Nur		LxT1L 0005978	
Co.Dublin 24, Ireland			Scharwan	iner.	0003378	
		Associated Equipment		Make	Model	Serial number
		Preamplatier	Lars	on Davis	PRMLxT1L	070009
		Microphone		PCB	377802	325452
		Calibrator Calibrator supplied by		on Davis this calibration	CAL200	9175
		enter and supprise by	in to lot	E 10 0010-300		
		and the second se			The results only apply to the or IEC 61672-3:2013	the second se
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Data of leaves					101 0	€/` T
Date of Issue: 31 August 2	2022	Certificate Number:	37311			Tony Sherri
		Sound Leve		-		
Sound Level	Meter	Periodic Te	sts to	EN 6	1672-3: 2013	Class 1
Client: Environmental Measurem Unit 12, Tallaght Business Whitestown Business Par	s Centre		Instrumen Instrumen Serial Nun	t Model:	Larson Davis LxT1L 0006602	
Co.Dublin 24, ireland		Associated Equipment Preamplifier Microphone Calibrator Calibrator supplied by	Lars	Make Ion Davis PCB Ion Davis this calibration	Model PRMLXT1L 377802 CAL200	Serial number 042683 168567 9175
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Calibration Certificate

Customer: Environmental Measurement Unit 12 Tallaght Business Centre Whitestown Business Park Dublin, 24, Ireland

Model Number Serial Number Test Results	LxT SE 000660 Pass		Procedure Number Technician Calibration Date Calibration Due	Ron H		
Initial Condition	As Man	ufactured	Temperature	23.76	°C	± 0.25 °C
Description	Class 1	Expert LxT Sound Level Meter re Revision: 2.404	Humidity Static Pressure	50.2 85.46	%RH kPa	
Evaluation Metho	od	Tested electrically using Larson D simulate microphone capacitance sensitivity of 23.6 mV/Pa.				
Compliance Stan	dards	Compliant to Manufacturer Specifi Calibration Certificate from proceed		dards whe	n combi	ned with
		IEC 60651:2001 Type 1 IEC 60804:2000 Type 1 IEC 61252:2002 IEC 61672:2013 Class 1 IEC 61260:2001 Class 1	ANSI S1.4-2014 Class ANSI S1.4 (R2006) Tyj ANSI S1.25 (R2007) ANSI S1.43 (R2007) T ANSI S1.43 (R2009) C	pe 1 ype 1		

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017. Test points marked with a **‡** in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert Lxt, 1770,01 Rev O Supporting Firmware Version 4.0.5, 2019-09-10

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa

ARSON DAVIS - A PCB PIEZOTRONICS DIV. 681 West 820 North Yrovo, UT 84601, United States '16-684-0001





D0001.8407 Rev E

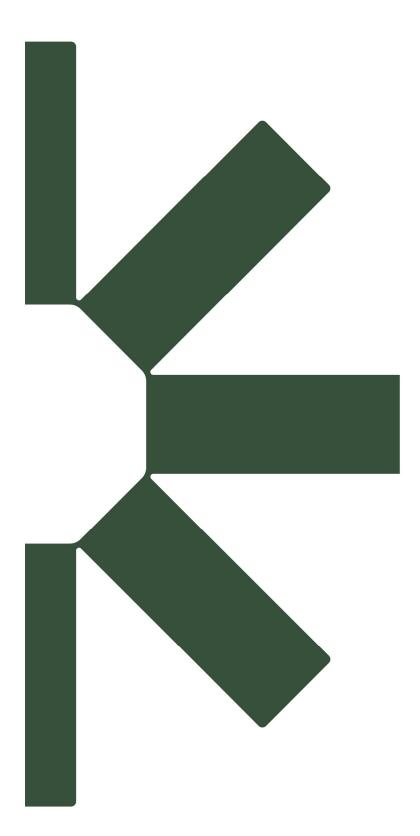


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MT Calibrati		Billingham	land	LG,		
CERTIFICAT	TE O	F CALIBR	ATIO	N	Page 1 o	f 11 pages
					Approved Signa	tory:
Issued by: MTS Ca	libratio	on Ltd				Sh-
Date of Issue: 30 August 2	2022	Certificate Number:	37318			Tony Sherr
	:	Sound Leve	I Mete	er		
Sound Level	Meter	Periodic Te	sts to	EN 6	1672-3: 2013	Class 1
Client: Environmental Measurem Unit 12, Tallaght Busines Whitestown Business Par Co.Dublin 24, Ireland	s Centre		Instrumen Instrumen Serial Nun	t Model:	Larson Davis LxT1L 0006263	
coloubilit 24, irelatio		Associated Equipment Preamplifier Microphone Calibrator Calibrator supplied by	Lars	Make on Davis PCB on Davis this calibration	Model PRMLxT1L 377B02 CAL200	Serial number 042543 313723 9175
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Making Sustainability Happen