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IED LICENCE P1186-01

ANNUAL NOISE SURVEY REPORT

Technical Report Prepared For

Amazon Data Services Limited

Technical Report Prepared By

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Our Reference

237501.0343NR12

Date of Issue

30 January 2024

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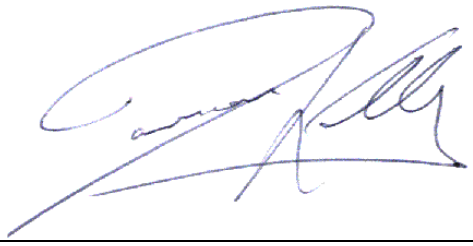
Document History

Document Reference		Original Issue Date	
237501.0343NR12		30 January 2024	
Revision Level	Revision Date	Description	Sections Affected

Record of Approval

Details	Written by	Approved by
Signature		
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Date	30 January 2024	30 January 2024

EXECUTIVE SUMMARY

AWN have been commissioned to complete a noise survey to demonstrate compliance with an Industrial Emissions Licence (IEL) (Licence Register Number: P1186-01) at the facility situated at Clonshaugh Business Park, Dublin 17.

Environmental noise surveys have been carried out at agreed locations around the boundary of the site and at noise sensitive locations in the vicinity of the site. Noise levels were measured during daytime, evening, and night-time periods.

The survey data has been analysed and it is concluded that this site is in compliance with Condition 4.5 of its Licence.

CONTENTS

1.0 INTRODUCTION

Amazon Data Services Ireland Limited operate a facility at Clonshaugh Business & Technology Park, Dublin 17 that operates under an Industrial Emissions Licence (IEL) (Licence Register Number: P1186-01) as issued by the Environmental Protection Agency (EPA).

Figure 1 shows the site location in the context of the surrounding environment.

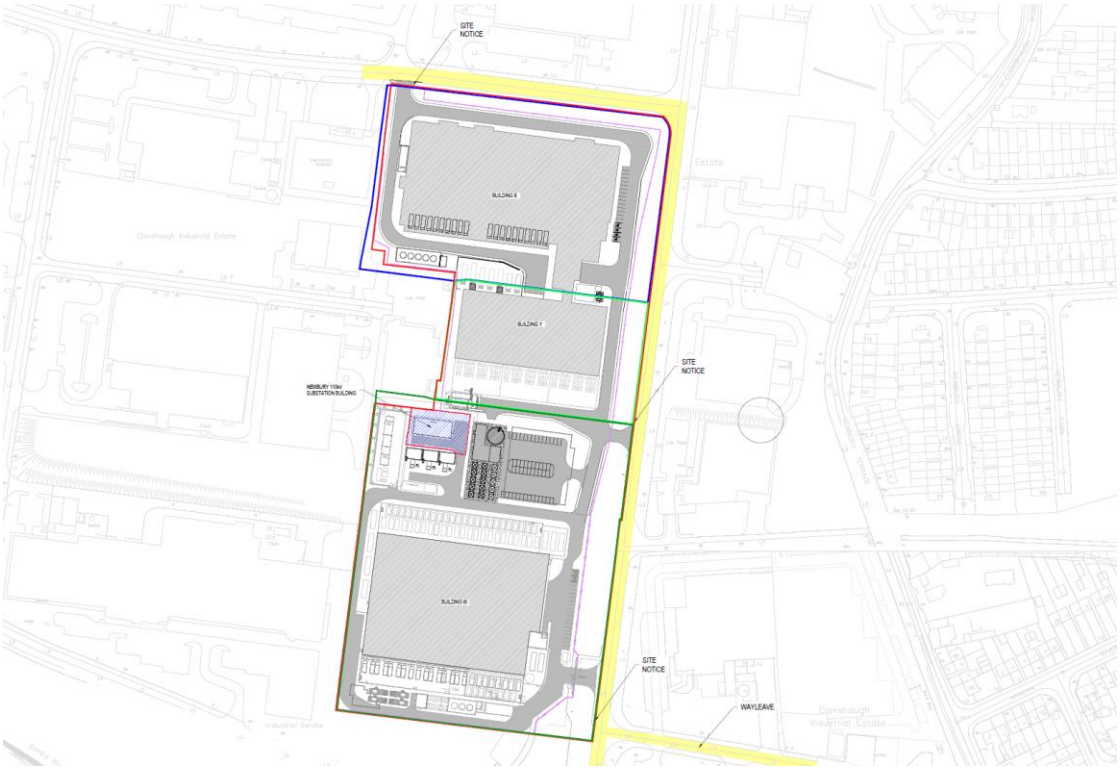

Figure 1 Site Location & Context

As part of the site's Industrial Emissions Licence (IEL), it is a requirement that environmental noise levels in the vicinity of the site are monitored on an annual basis.

This report prepared by AWN Consulting presents the results of the annual noise survey and compares the measured noise levels against the criteria set out as part of the site's IEL.

Please refer to the Glossary of Terms in Appendix A for a definition of the various acoustic terminology used in this report.

2.0 RELEVANT NOISE CRITERIA & GUIDANCE

It is a requirement of the IEL, issued by the Environmental Protection Agency (EPA) and held ADSIL that environmental noise levels in the vicinity of the site are monitored on an annual basis. Condition 4.5 of the IEL (Register No. P1173-01) states the following:

*"4.5 Noise from the installation shall not give rise to sound pressure levels measured at **the** noise sensitive locations **(NSLs)** which exceed the limit value(s)."*

Section 6.11 of the document states the following:

"6.11 Noise

6.11.1 The licensee shall carry out a noise survey of the site operations annually. The survey programme shall be undertaken in accordance with the methodology specified in the 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)' as published by the Agency.

6.11.2 Noise Management Plan

6.11.2.1 The licensee shall prepare, maintain and implement, to the satisfaction of the Agency, a Noise Management Plan.

6.11.2.2 The plan shall be submitted within two months of the date of grant of this licence.

6.11.2.3 The plan shall outline noise reduction and abatement measures.

6.11.2.4 The plan to reduce noise emissions should include the following mitigation measure(s): abatement and enclosure of operations, processes and equipment which might give rise to exceedances of noise limit values at the noise-sensitive locations.

6.11.2.5 The plan shall be prepared in accordance with the Agency's Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).

6.11.2.6 The plan shall be implemented within six months of the date of grant of this licence.

6.11.2.7 The plan shall be reviewed annually.

Schedule B4 of the licence states the following:

B.4 Noise Emissions

Daytime dB $L_{Ar,T}$ (30 minutes)	*Evening time dB $L_{Ar,T}$ (30 minutes)*	*Night-time dB $L_{Aeq,T}$ (15 minutes) Note 1*
55	*50*	*45*

Note 1: *During night time hours, there shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at the noise-sensitive locations (NSLs)*

Schedule C4 of the licence states the following:

C.4 Noise Monitoring

Period	*Minimum Survey Duration*
Daytime	*A minimum of 3 sampling periods at each noise monitoring location Note 1*
Evening-time	*A minimum of 1 sampling period at each noise monitoring location*
Night-time Note 2	*A minimum of 2 sampling periods at each noise monitoring location.*

Note 1: *Sampling period is to be the time period stated as per Schedule B.4 Noise Emissions of this licence. This applies to day, evening and night time periods.*

Note 2: *Night-time measurements should be made between 2300 and 0400hrs, Sunday to Thursday, with 2300hrs being the preferred start time,*

3.0 SURVEY DETAILS

A series of environmental noise surveys were conducted in order to quantify the existing noise environment. The surveys were conducted in general accordance with *ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise*. Specific details are set out below.

3.1 Measurement Locations

Noise measurements were conducted at five positions in the vicinity of the site. These locations are described in Table 1 and positions shown in context on Figure 2 overleaf. It was not possible to survey at Location D as shown on Figure 2 due to access and the junction of the roundabout being deemed unsafe to pull into at the time of surveying. Location B was relocated to lands outside of the Clayton Hotel due to not being able to access the original survey location during the night time periods.

Location	Description	Photo
A	Attended location along Turnapin Grove	
B	Attended location within the vicinity of Clayton Hotel Dublin Airport	
C	Attended location along Clonshaugh Road	
E	Attended location within housing estate to the south of Clonshaugh business park	
F	Attended location within housing estate to the south of Clonshaugh business park	

Location	Description	Photo
G	Attended location at residential properties along Clonshaugh Road and Riverside Park.	

Table 1 Measurement Locations & Descriptions

Figure 2 Noise Monitoring Locations (Source: Google Earth)

3.2 Survey Periods and Personnel

Measurements were conducted over multiple days, the measurements were carried out during the following survey periods:

Daytime 12:42 to 17:52 hrs on 15 November 2023 and 10:07 to 15:50 hrs on 28 November 2023;
Evening 19:00 to 20:15 hrs on 15 November 2023, and 21:18 to 22:31 hrs on 14 December 2023;
Night-time 23:00 hrs on 15 November to 00:24 hrs on 16 November 2023 and 23:02 hrs on 14 December to 00:51 on 15 December 2023.

Matthew Williams and David O'Donoghue (AWN) carried out all the noise survey work.

During all of the survey periods noted above, it is understood that the facility was in normal operation.

3.3 Instrumentation

The measurements were performed using the following equipment:

Type	Manufacturer	Equipment Model	Serial Number	Microphone	Calibration Date	Calibration Due
Sound Level Meter	Rion	NL-52	1076328	17212	12/09/2022	02/09/2024
Calibrator	Bruel and Kjaer	Type 4231	2394086	N/A	26/05/2023	26/05/2024
Sound Level Meter	Bruel and Kjaer	2250	3028635	3196319	12/05/2023	12/05/2025
Calibrator	Bruel and Kjaer	Type 4231	3010488	N/A	25/10/2023	24/10/2024

Table 2 Noise Monitoring Equipment Details

Each microphone was protected using a proprietary Brüel and Kjær windshield. Before and after the survey the measurement apparatus was calibrated using one of the calibrator detailed above.

Each calibrator produces a sound level of 93.8 dB re. $2x10^{-5}$ Pa, at a frequency of 1kHz. The instrumentation used was calibrated before and after use to an accuracy of ± 0.1dB. The calibration certificates for the equipment are included in Appendix B.

3.4 Procedure

Measurement periods during the daytime and evening period were 30 minutes and during the night-time period were 15 minutes, as per the IEL for the site. The results were saved to the instrument memory for later analysis where appropriate. Survey personnel noted all primary noise sources contributing to noise build-up.

4.0 NOISE SURVEY RESULTS

The $L_{Aeq,30min}$ and $L_{Aeq,15min}$ values are a type of average of the noise level during the measurement period. As the $L_{Aeq,30min}$ and $L_{Aeq,15min}$ parameters are a logarithmic average, they are especially sensitive to relatively loud noises of short duration. For example, a single passage of a vehicle or a dog barking can govern the $L_{Aeq,15min}$ value of a measurement over a period much longer than the time for which the event was audible. Therefore, where the noise emissions are steady, as plant items from the site that are in continuous operation, the $L_{A90,30min}$ and $L_{A90,15min}$ values better reflect the magnitude of these emissions.

The EPA recognises the requirement for the use of this parameter as a descriptor of noise emissions from a facility and discusses this in its guidance document NG4 *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4 2016) as follows:

> *"Subjective comments on audibility and the dominance of noise sources should be included along with difficulties in identifying sources etc. For some noise surveys, the $L_{AF90,T}$ index may be used to give a good indication of the actual noise output from the site, where the noise emissions on site are relatively steady and extraneous noises may unduly influence the measured $L_{Aeq,T}$.*
>
> *The report should clearly interpret the noise results and highlight whether noise from the activity or extraneous noise sources are the dominant contributors to the noise levels measured. This interpretation should be based on the various noise measurements and any comments included on the dominant and/or intermittent sources of noise at the various measurement locations"*

The following methodology is outlined as an appropriate method in order to arrive at an estimated specific noise level at noise sensitive locations:

Description of Site Noise		Noise Parameter that Best Represents Specific Noise from Site
Category	Subjective Impression	
A	Site noise dominant, no other significant noise sources noted.	$L_{Aeq,T}$
B	Intermittent noise from other sources (e.g. traffic, birds, wind), with underlying site noise audible.	$L_{A90,T}$ if frequent interfering noise and site noise is audible in lulls. or $L_{A50,T}$ if site noise is clearly audible (steady or variable), with occasional interference from other sources.
C	Plant barely audible (i.e. not immediately noticeable, unless actively listening)	$<L_{A90,T}$ (i.e. specific plant noise is up to 5dB lower than measured $L_{A90,T}$)
D	Plant not audible	Not Detected, ND $<<L_{A90,T}$ (10 dB or more lower than $L_{A90,T}$)

Table 3 Methodology for Determination of Site Specific Noise

The survey results are presented in terms of the following parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

Another parameter that will be commented upon in this report is the L_{ArT}.

$L_{Ar\ T}$ The L_{Aeq} during a specified time interval, plus specified adjustments for tonal character and impulsiveness of the sound.

Location	Period	Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				Comments	Parameter that Best Represents Specific Noise from Site (See Table 3)[1]
			L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}		
A	Day	10:07	62	73	63	**60**	The noise environment was dominated by traffic from the M50 and M1. Other noise sources included distant sirens and local traffic within the housing estate. No audible noise from the site was noted.	L_{AF90}
		10:39	62	71	63	**60**		L_{AF90}
		11:10	61	72	62	**59**		L_{AF90}
	Evening	21:18	59	74	61	**57**	The noise environment was dominated by traffic from the M50 and M1. Other noise sources included local traffic and pedestrians conversing close to the measurement position. No audible noise from the site was noted.	L_{AF90}
	Night	23:47	57	67	59	**52**	The noise environment was dominated by traffic from the M50 and M1. Intermittent local car pass bys were also noted during the measurement period. No audible noise from the site was noted.	L_{AF90}
		00:03	56	64	58	**52**		L_{AF90}
B[2]	Day	12:43	70	85	73	**62**	The noise environment was dominated by road traffic on the R139 close to the measurement position. No audible noise from the site was noted.	L_{AF90}
		14:40	74	99	75	**68**		L_{AF90}
		16:42	70	93	72	**66**		L_{AF90}
	Evening	19:00	71	95	72	**65**	The noise environment was dominated by road traffic on the R139 close to the measurement position. No audible noise from the site was noted.	L_{AF90}
	Night	23:00	65	77	69	**57**	The noise environment was dominated by road traffic on the R139 close to the measurement position. No audible noise from the site was noted.	L_{AF90}
		00:05	65	80	69	**55**		L_{AF90}
C	Day	13:17	65	78	67	**62**	The noise environment was dominated by road traffic on the R139 close to the measurement position. During traffic lulls noise associated with the nearby petrol station was audible. No audible noise from the site was noted.	L_{AF90}
		15:15	65	76	67	**61**		L_{AF90}
		17:22	62	75	65	**59**		L_{AF90}
	Evening	19:34	62	70	66	**57**	The noise environment was dominated by road traffic on the R139 close to the measurement position. During traffic lulls noise associated with the nearby petrol station was audible. No audible noise from the site was noted.	L_{AF90}

1 Parameter deemed to be representative of the specific noise level arising from the site has been highlighted in bold.
2 Elevated noise levels related to measurement positions close proximity to the road.

Location	Period	Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				Comments	Parameter that Best Represents Specific Noise from Site (See Table 3)[1]
			L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}		
	Night	23:18	60	72	64	**52**	The noise environment was dominated by road traffic on the R139 close to the measurement position. During traffic lulls noise associated with the nearby petrol station was audible. No audible noise from the site was noted.	L_{AF90}
		00:24	56	70	59	**50**		L_{AF90}
E	Day	11:50	52	74	60	**56**	Road traffic noise from the Oscar Traynor Road was dominant during the day time period. Other audible noise sources included local traffic and aircraft overhead.	L_{AF90}
		12:21	58	74	59	**56**		L_{AF90}
		12:52	61	86	61	**55**		L_{AF90}
	Evening	21:55	54	71	55	**51**	Road traffic noise from the Oscar Traynor Road was the dominant noise source during the evening period with other noise sources relating to intermittent local traffic close to the measurement position.	L_{AF90}
	Night	23:24	51	68	52	**48**	Road traffic noise from the Oscar Traynor Road was the dominant noise source during the nigh time period with other noise sources relating to intermittent local traffic close to the measurement position.	L_{AF90}
		00:25	49	69	51	**46**		L_{AF90}
F	Day	14:13	55	66	57	**52**	Noise environment dominated by grounds keeper doing work within Clonshaugh business park. Other noise sources included birdsong and distant road traffic noise.	L_{AF90}
		14:49	55	66	56	**52**		L_{AF90}
		15:20	51	65	52	**49**		L_{AF90}
	Evening	22:31	47	79	47	**45**	Noise environment comprised of distant road traffic noise from the Oscar Traynor road and intermittent local traffic movements. A potential tonal mechanical noise was subjectively noted from the business park during this measurement period. This was not associated with the site under review here. Note A	L_{AF90}
	Night	23:02	46	52	47	**44**	Noise environment during the night time period dominated by road noise from the Oscar Traynor Road.	L_{AF90}
		00:51	44	57	46	**43**		L_{AF90}

Location	Period	Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				Comments	Parameter that Best Represents Specific Noise from Site (See Table 3)[2]
			L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}		
G	Day	14:00	69	88	72	**63**	The noise environment during this period was made up of road traffic along the Clonshaugh Road, construction noise and pedestrians passing along past the measurement position.	L_{AF90}
		15:57	70	84	74	**63**	The noise environment during this period was made up of road traffic along the Clonshaugh Road, construction noise and pedestrians passing along past the measurement position.	L_{AF90}
		18:04	70	92	75	**60**	The noise environment during this period was made up of road traffic along the Clonshaugh Road and pedestrians passing along past the measurement position.	L_{AF90}
	Evening	20:14	67	82	72	**50**	The noise environment during this period was made up by traffic along the Clonshaugh Road, occasional aircraft overhead and noise associated with 'The Range' situated opposite the measurement position.	L_{AF90}
	Night	23:41	57	77	57	**42**	The noise environment during this period was made up of occasional road traffic along the Clonshaugh Road and mechanical noise from the Clonshaugh business park. This was not associated with the site under review here and believed to be from units closer to the measurement position. A reverse alarm was also noted within the business park during this measurement period.	L_{AF90}
		00:49	56	79	55	**41**	The noise environment during this period was made up of occasional road traffic along the Clonshaugh Road and mechanical noise from the Clonshaugh business park. This was not associated with the site under review here and believed to be from units closer to the measurement position.	L_{AF90}

Table 3 Results of Noise Monitoring Survey

Note A Review of 1/3 octave data (see Section 5.5) confirms no tonal issues identified at this location.

[2] Parameter deemed to be representative of the specific noise level arising from the site has been highlighted in bold.
[2] Elevated noise levels related to measurement positions close proximity to the road.

The Licence assigns noise limits at the nearest noise sensitive locations of 55 dB $L_{Aeq,30min,}$ 50 dB $L_{Aeq,30min}$ and 45 dB $L_{Aeq,15min}$ during the day and night time periods respectively. Furthermore, the Licence stipulates that there shall be no clearly audible tonal or impulsive character to noise emissions at any noise sensitive location.

Based on the dominance of non-site noise during the survey, and having regard to the methodology outlined in Section 4, the specific noise level at each noise sensitive location has been estimated and presented in Table 3.

Location	Period	Site Noise Category	Parameter that Represents Site Specific Noise	Estimated Specific Plant Noise, dB	Applicable Noise Limit, dB	Within ELV
A	Day	D	L_{AF90}	50	55	Yes
		D	L_{AF90}	50		Yes
		D	L_{AF90}	49		Yes
	Evening	D	L_{AF90}	47	50	Yes
	Night	D	L_{AF90}	42	45	Yes
		D	L_{AF90}	42		Yes
B	Day	D	L_{AF90}	52	55	Yes
		D	L_{AF90}	58		See Text
		D	L_{AF90}	56		See Text
	Evening	D	L_{AF90}	55	50	See Text
	Night	D	L_{AF90}	47	45	See Text
		D	L_{AF90}	45		Yes
C	Day	D	L_{AF90}	52	55	Yes
		D	L_{AF90}	51		Yes
		D	L_{AF90}	49		Yes
	Evening	D	L_{AF90}	47	50	Yes
	Night	D	L_{AF90}	42	45	Yes
		D	L_{AF90}	40		Yes
E	Day	D	L_{AF90}	46	55	Yes
		D	L_{AF90}	46		Yes
		D	L_{AF90}	45		Yes
	Evening	D	L_{AF90}	41	50	Yes
	Night	D	L_{AF90}	38	45	Yes
		D	L_{AF90}	36		Yes
F	Day	D	L_{AF90}	42	55	Yes
		D	L_{AF90}	42		Yes
		D	L_{AF90}	39		Yes
	Evening	D	L_{AF90}	35	50	Yes
	Night	D	L_{AF90}	34	45	Yes
		D	L_{AF90}	33		Yes

Location	Period	Site Noise Category	Parameter that Represents Site Specific Noise	Estimated Specific Plant Noise, dB	Applicable Noise Limit, dB	Within ELV
G	Day	D	L_{AF90}	53	55	Yes
		D	L_{AF90}	53		Yes
		D	L_{AF90}	50		Yes
	Evening	D	L_{AF90}	40	50	Yes
	Night	D	L_{AF90}	32	45	Yes
		D	L_{AF90}	31		Yes

Table 3 Estimation of Specific Noise Levels at Monitoring Locations

The exceedances noted at Location B are due to the measurement position being situated close to the carriageway edge. This resulted in elevated measured noise levels due to traffic noise including elevated L_{A90} levels. No site noise was noted to have contributed to the noise buildup during the day, evening, or night-time periods.

Whilst a 10dB reduction has been applied to the measured noise levels at this location in line with the methodology within Table 3, the estimated plant specific value is deemed to be conservative and the actual noise contribution from the facility at this location is considered to be comfortably within the relevant noise criteria outlined in the licence.

It is considered that the estimate of specific plant noise levels at all locations considered here are conservative.

In relation to Location D due to access issues it was not possible to complete noise monitoring at this location. Based on the observations and conclusions reached in relation to nearby Location B and C it is considered that the relevant noise criteria would be satisfied at this survey location.

5.0 TONAL ANALYSIS

The following guidance relating to the assessment and analysis of tonal noise associated with IEL Licenced sites is contained in the EPA document *Guidance Note For Noise: Licence Applications, Surveys and in Relation To Scheduled Activities* (NG4), 2016.

> *"A tonal noise source can normally be identified subjectively by a competent person familiar with noise impact assessments. However, prior to the application of a rating penalty the Agency would recommend that the simplified methodology for the objective identification of tones that is advocated in BS 4142: 2014: Annex C (normative): Objective method for assessing the audibility of tones in sound: One-third octave method. This methodology requires that for a prominent, discrete tone to be identified as present, the time-average sound pressure level in the one-third-octave band of interest should exceed the time-average sound pressure levels of both adjacent one-third-octave bands by some constant level difference.*
>
> *The appropriate level differences vary with frequency. They should be greater than or equal to the following values in both adjacent one-third-octave bands:*
>
> - *15dB in low-frequency one-third-octave bands (25Hz to 125Hz);*
> - *8dB in middle-frequency bands (160Hz to 400Hz), and;*
> - *5dB in high-frequency bands (500Hz to 10,000Hz).*
>
> *Care should be taken to ensure that any tones identified in the low frequency range of 25Hz to 125Hz are of a magnitude greater than the threshold of hearing at that frequency, see Appendix VI."*

The methodology discussed above uses the 1/3rd octave band measurements to assess the presence of tones. Where peaks are identified in the spectrum the level difference between the peak and the adjacent 1/3rd octave bands is used to determine if there is an audible tone present. The 1/3rd octave band measurements during the night-time periods at each survey location will be discussed in turn in the following sections. Please note that full details of the 1/3rd octave band measurements for all locations and periods are presented in Appendix B.

5.1 Location A

Figure 3 graphs the 1/3rd L_{Zeq} octave band measurements taken at Location A during the night period. No potential tonal components were identified during the post survey analysis of the recorded spectral data.

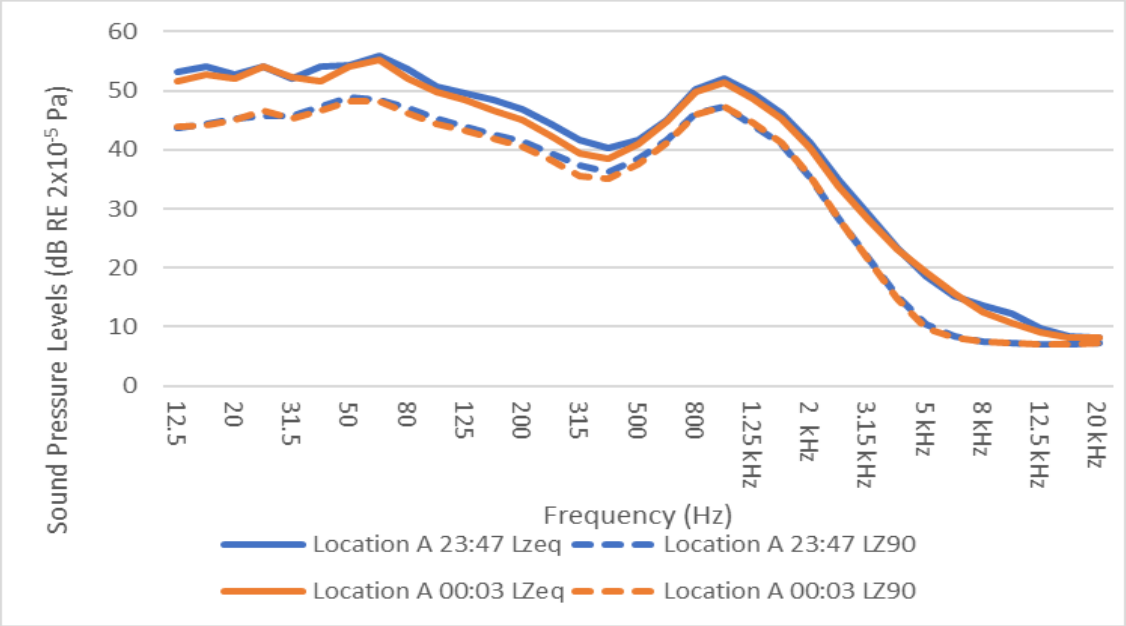

Figure 3 1/3rd Octave Band Levels at Location A

5.2 Location B

Figure 4 graphs the 1/3rd L_{Zeq} and L_{Z90} octave band measurement taken at Location B during the night period. The slight differentials in the measured L_{Zeq} data are due to an aircraft being noted in the first measurement and not present within the second measurement. No potential tonal components were identified within the L_{Z90} data during the post survey analysis of the recorded spectral data.

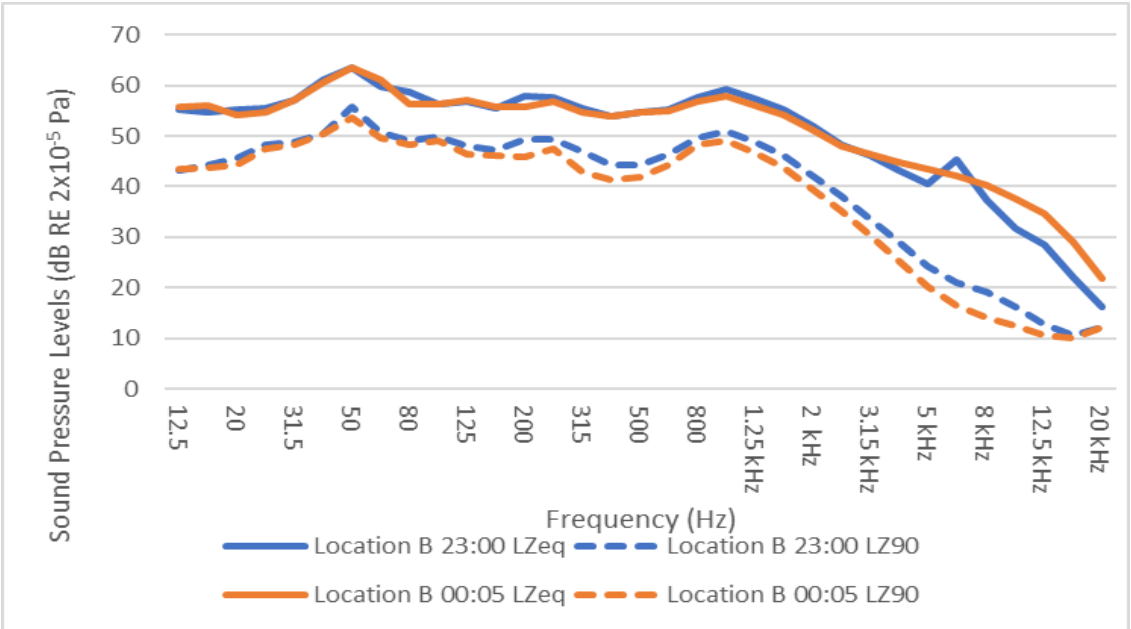

Figure 4 1/3rd Octave Band Levels at Location B

5.3 Location C

Figure 5 graphs the 1/3rd octave band measurements taken at Location C during the night period. No potential tonal components were identified during the post survey analysis of the recorded spectral data.

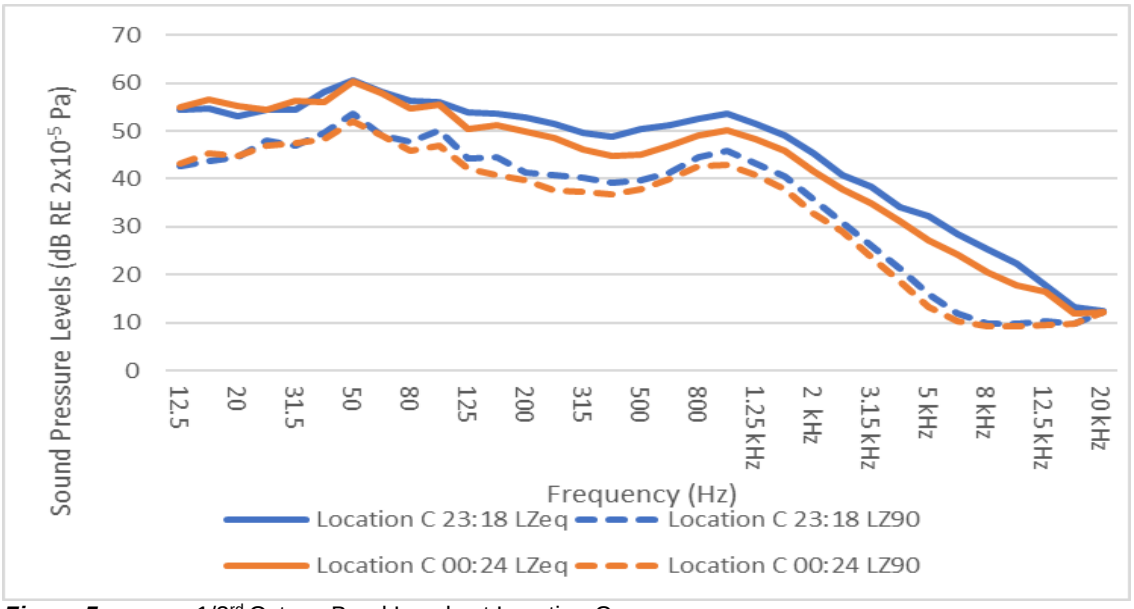

Figure 5 1/3rd Octave Band Levels at Location C

5.4 Location E

Figure 6 graphs the 1/3rd L_{Zeq} octave band measurements taken at Location A during the night period. No potential tonal components were identified during the post survey analysis of the recorded spectral data.

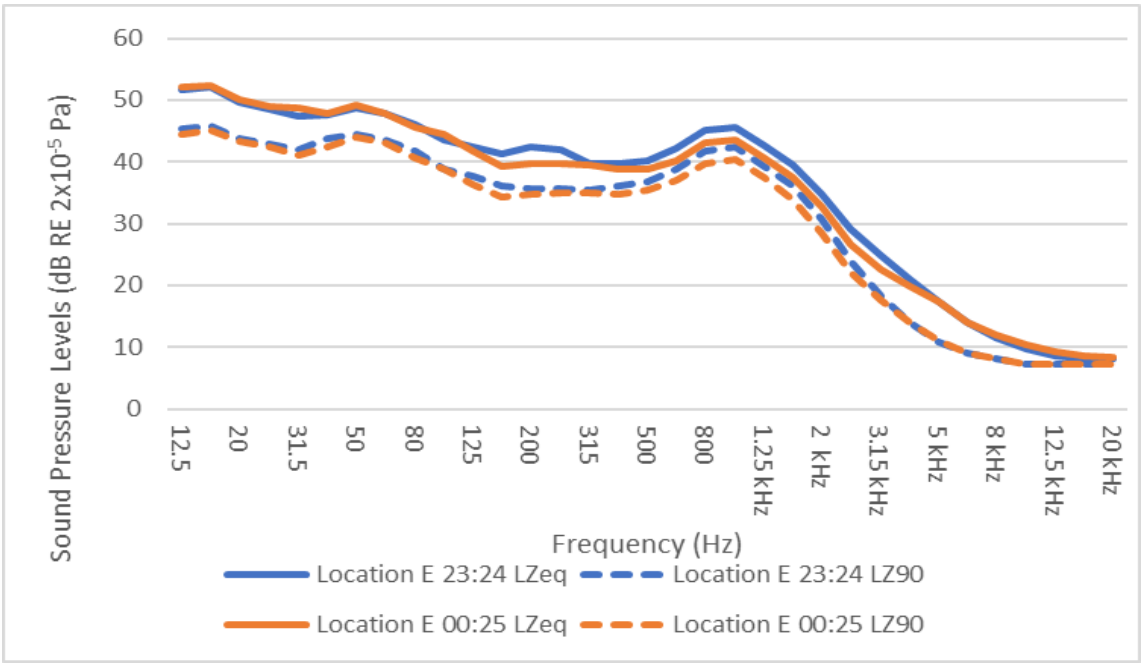

Figure 6 1/3rd Octave Band Levels at Location E

5.5 Location F

Figure 7 graphs the 1/3rd octave band measurements taken at Location F during the night period. No potential tonal components were identified during the post survey analysis of the recorded spectral data.

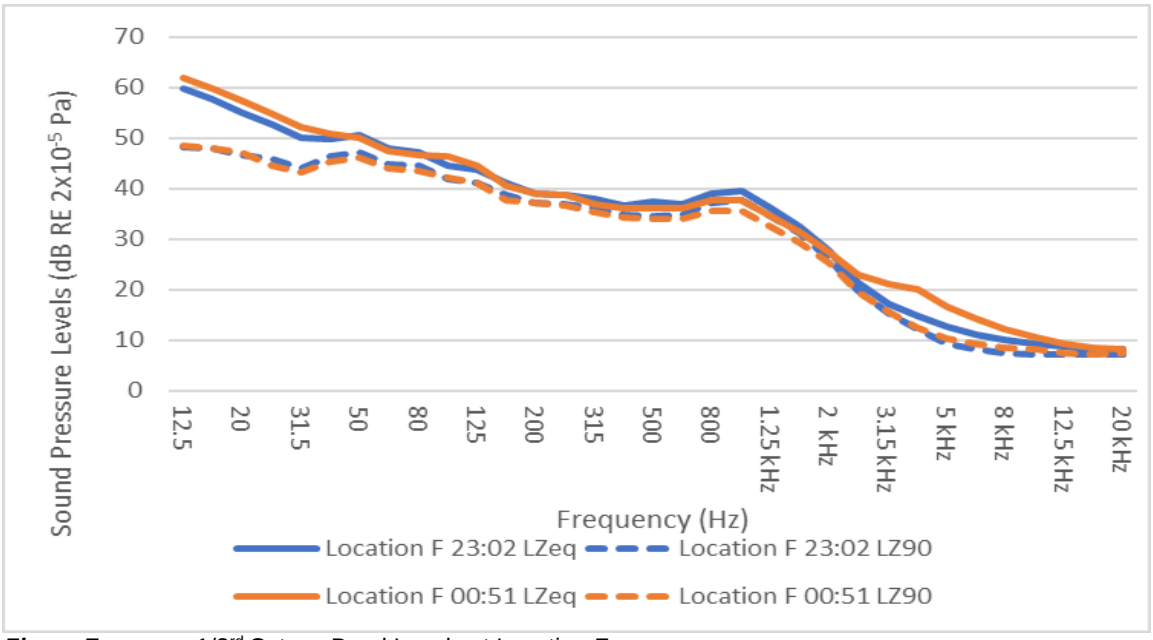

Figure 7 1/3rd Octave Band Levels at Location F

5.6 Location G

Figure 8 graphs the 1/3rd octave band measurements taken at Location G during the night period. A tonal spike is noted in the L_{Zeq} data at 12.5 kHz during the first round of night time measurements. This is attributed to a reverse alarm noted within the Clonshaugh Business Park.

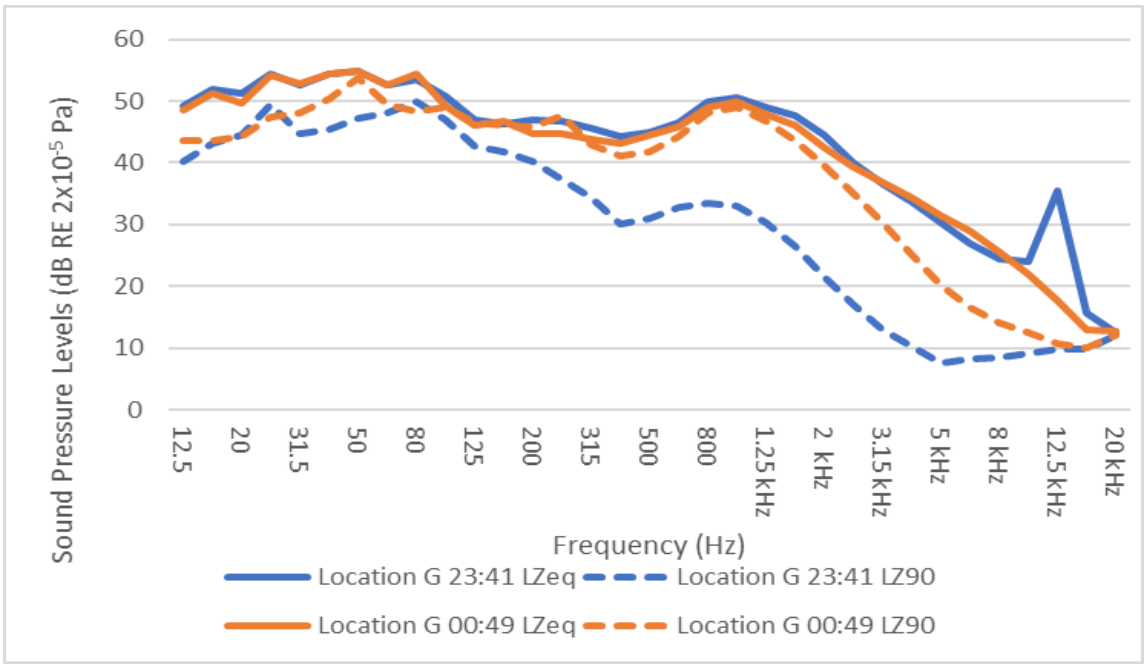

Figure 8 1/3rd Octave Band Levels at Location G

6.0 CONCLUSION

Attended noise monitoring has been carried out at five of the nearest noise sensitive locations located in the vicinity of the site. Noise levels were measured during daytime and night-time periods in accordance with the procedures outlined in the Agency's *Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) 2016*.

The results of the survey confirm that site specific noise levels (i.e. noise attributable to activities within the IEL boundary) fall within the specified emission limit values for noise as set out in the licence.

APPENDIX A
GLOSSARY OF ACOUSTIC TERMINOLOGY

ambient noise The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.

background noise The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{A90,T}$).

dB Decibel. The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro pascals (20 µPa).

ELV Emission Limit Value, i.e. the limit applied in the EPA licence for the site.

free-field These are conditions in which the radiation from sound sources is unaffected by the presence of any reflecting boundaries or the source itself. In practice, it is a field in which the effects of the boundaries are negligible over the frequency range of interest. In environmental noise, true free-field measurement conditions are seldom achieved and generally the microphone will be positioned at a height between 1.2 and 1.5 metres above ground level. To minimise the influence of reflections, measurements are generally made at least 3.5 metres from any reflecting surface other than the ground.

L_{Aeq} This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources, such as traffic, on the background.

L_{AFmax} The maximum rms A-weighted sound pressure level occurring within a specified time period. Measured using the “Fast” time weighting.

L_{AFmin} The minimum rms A-weighted sound pressure level occurring within a specified time period. This parameter was measured using the “Fast” time weighting.

APPENDIX A
GLOSSARY OF ACOUSTIC TERMINOLOGY (CONT)

L_{AF50} Refers to those A-weighted noise levels in the top 50 percentile of the sampling interval; it is the level which is exceeded for 50% of the measurement period. It is used to determine the intermittent high noise level features of locally generated noise and usually gives an indicator of the level of road traffic. This parameter was measured using the "Fast" time weighting.

L_{AF90} Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to describe a background level. This parameter was measured using the "Fast" time weighting.

1/3 octave Frequency analysis of sound such that the frequency spectrum is subdivided into bands of one–third of an octave each.

A-weighting The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

APPENDIX B – ONE THIRD OCTAVE BAND CENTRE FREQUENCY DATA L_{Zeq}

Location	Period	Time	Measured Noise Level, (dB L_{90} re. $2x10^{-5}$ Pa) at 1/3rd Octave Frequency Band (Hz)																																		
			12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
A	Day	10:07	62	66	62	61	61	61	65	64	60	58	58	56	54	51	50	49	50	53	56	56	54	50	45	41	36	33	31	28	24	19	15	13	9
		10:39	61	65	62	61	61	61	64	64	62	60	60	58	55	52	51	50	51	53	56	56	53	50	45	46	37	32	29	24	20	15	12	10	8
		11:10	62	65	62	61	61	61	65	65	63	61	60	58	55	52	51	49	51	53	55	55	53	49	45	40	35	31	29	25	22	19	14	12	9
	Evening	21:18	55	57	55	56	57	56	58	60	57	54	53	51	49	47	44	43	45	48	53	55	52	49	45	40	35	31	27	23	19	15	13	10	9
	Night	23:47	53	54	53	54	52	54	54	56	54	51	50	49	47	44	42	40	42	45	50	52	50	46	41	35	29	23	19	15	14	12	10	8	8
		00:03	52	53	52	54	52	52	54	55	52	50	48	47	45	42	39	39	41	45	50	51	49	45	40	34	28	23	19	16	13	11	9	8	8
B	Day	12:43	70	69	67	69	71	72	73	73	69	65	65	64	63	63	61	60	61	61	62	62	61	60	57	55	53	51	49	48	45	46	39	38	27
		14:40	65	65	64	65	67	70	74	74	70	66	67	66	65	65	65	63	63	63	64	66	66	67	59	58	58	54	53	51	50	48	45	42	35
		16:42	60	60	61	66	67	70	72	71	67	66	67	66	64	63	65	63	61	60	62	62	61	59	56	53	52	50	48	45	43	40	38	36	25
	Evening	19:00	59	60	60	61	63	67	70	69	66	64	69	65	64	67	63	63	61	61	62	63	61	59	56	53	52	49	46	44	42	39	35	29	22
	Night	23:00	55	55	55	56	57	61	64	60	59	56	57	56	58	58	56	54	55	55	58	59	57	55	52	48	46	43	41	45	37	32	29	22	16
		00:05	56	56	54	55	57	61	63	61	56	56	57	56	56	57	55	54	55	55	57	58	56	54	51	48	46	45	43	42	40	38	35	29	22
C	Day	13:17	77	76	74	72	72	71	72	70	65	63	61	59	59	58	56	54	55	56	58	59	56	54	50	47	44	42	40	38	39	34	31	27	21
		15:15	66	65	64	65	65	66	67	68	64	61	60	58	58	57	55	53	54	55	58	58	56	53	50	46	44	40	38	36	33	30	28	22	17
		17:22	57	58	60	64	65	65	66	64	62	60	58	56	56	55	52	50	51	53	55	56	54	51	48	44	41	37	33	31	41	31	33	30	25
	Evening	19:34	55	57	57	60	61	62	64	63	61	59	57	55	56	55	52	51	52	53	56	56	54	52	48	44	41	37	34	32	28	24	21	17	13
	Night	23:18	54	55	53	55	55	58	61	58	56	56	54	54	53	52	50	49	50	51	53	54	52	49	45	41	38	34	32	29	25	22	18	13	13
		00:24	55	57	55	54	56	56	60	58	55	55	50	51	50	49	46	45	45	47	49	50	48	46	42	38	35	31	27	24	20	18	17	12	12
E	Day	11:50	62	62	60	59	60	60	62	62	60	59	58	56	53	51	50	50	51	52	53	51	48	44	39	35	31	29	26	24	21	21	15	19	9
		12:21	60	60	58	58	59	59	62	61	59	57	56	54	51	50	50	49	50	51	52	51	48	45	40	36	32	28	25	22	19	16	13	10	9
		12:52	60	61	59	59	61	60	64	60	59	59	57	56	53	51	51	50	50	51	52	51	49	46	43	54	53	38	34	31	30	25	18	14	11
	Evening	21:55	61	59	57	56	55	56	60	54	50	50	49	48	46	45	44	44	44	45	47	48	46	43	40	35	33	31	28	30	23	19	16	11	9
	Night	23:24	52	52	50	49	48	48	49	48	46	44	43	41	42	42	40	40	40	42	45	46	43	40	35	29	25	21	17	14	12	10	9	8	8
		00:25	52	52	50	49	49	48	49	48	46	44	42	39	40	40	40	39	39	40	43	44	41	38	33	27	23	20	17	14	12	11	9	9	8

Location	Period	Time	Measured Noise Level, (dB L_{90} re. $2x10^{-5}$ Pa) at 1/3rd Octave Frequency Band (Hz)																																	
			12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
F	Day	14:13	57	57	58	60	59	59	60	59	64	58	55	59	54	49	46	45	47	48	48	46	44	40	38	37	34	29	25	23	21	10	9	8	8
		14:49	56	57	56	62	61	59	59	61	65	59	55	58	51	48	44	43	44	46	47	46	43	41	39	39	36	30	26	23	17	13	10	9	8
		15:20	57	57	56	59	59	56	57	56	59	53	49	49	45	42	40	40	42	44	45	44	40	36	32	29	26	22	18	15	13	11	10	9	8
	Evening	22:31	62	59	57	55	53	52	51	49	48	46	44	41	39	39	38	37	37	39	41	40	39	36	29	23	20	18	18	15	14	10	9	8	8
	Night	23:02	60	58	55	53	50	50	51	48	47	45	44	41	39	39	38	37	37	37	39	39	36	33	28	21	17	15	13	11	10	9	9	8	8
		00:51	62	60	57	55	52	51	50	48	47	46	44	41	39	39	37	36	36	36	38	38	35	32	28	23	21	20	17	14	12	11	9	8	8
G	Day	14:00	65	64	62	65	66	70	71	69	68	68	66	64	63	63	62	59	59	59	61	62	60	59	56	53	50	48	45	43	40	40	38	38	25
		15:57	57	60	60	65	68	69	72	74	70	67	66	62	61	61	60	58	59	60	62	63	62	60	57	53	51	48	45	43	40	38	42	42	41
		18:04	55	59	60	63	66	68	68	65	66	66	64	62	60	60	61	60	59	60	62	63	62	60	57	54	52	51	48	45	43	41	40	43	32
	Evening	20:14	54	57	57	59	61	62	64	62	61	57	57	55	55	56	55	54	56	57	60	61	60	58	55	51	48	45	42	39	37	39	33	29	24
	Night	23:41	49	52	51	54	53	54	55	53	54	51	47	46	47	47	46	44	45	47	50	51	49	48	45	40	37	34	30	27	25	24	35	16	13
		00:49	49	51	50	54	53	54	55	53	54	49	46	47	45	45	44	43	44	46	49	50	48	46	43	39	37	34	31	29	26	22	18	13	13

APPENDIX B – ONE THIRD OCTAVE BAND CENTRE FREQUENCY DATA L_{Z90}

Location	Period	Time	Measured Noise Level, (dB L_{90} re. $2x10^{-5}$ Pa) at 1/3rd Octave Frequency Band (Hz)																																	
			12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
A	Day	10:07	56	58	57	57	57	57	59	59	56	54	54	52	50	48	46	45	47	51	54	54	51	48	42	36	30	23	16	11	8	7	7	7	7
		10:39	55	57	57	57	57	57	59	59	57	55	54	52	51	48	46	45	47	51	54	54	51	48	42	36	30	23	16	11	8	7	7	7	7
		11:10	55	57	57	56	57	56	58	59	56	54	53	52	50	47	46	45	47	50	53	53	51	47	42	35	29	22	15	10	8	7	7	7	7
	Evening	21:18	48	49	49	50	50	51	53	53	51	49	47	46	45	42	39	39	41	45	50	52	49	45	40	33	26	19	12	9	8	7	7	7	7
	Night	23:47	44	44	45	46	46	47	49	48	47	45	44	43	41	39	37	36	39	42	46	47	44	41	35	28	22	15	10	8	7	7	7	7	7
		00:03	44	44	45	47	45	47	48	48	46	44	43	42	40	38	36	35	38	41	46	47	45	41	36	28	21	15	10	8	7	7	7	7	7
B	Day	12:43	56	57	57	62	64	64	64	62	61	57	57	57	57	57	55	53	54	55	57	57	56	54	52	48	46	42	39	36	32	28	23	17	14
		14:40	56	56	56	58	60	62	65	64	61	59	59	59	59	59	57	56	57	57	59	60	59	57	54	51	48	45	42	39	35	32	26	19	14
		16:42	53	53	55	60	61	63	65	64	61	59	59	57	58	58	56	54	55	55	57	58	57	55	52	48	46	44	41	38	35	32	27	21	15
	Evening	19:00	49	51	53	55	56	59	62	60	58	56	57	57	56	58	55	53	54	55	57	58	57	55	52	48	45	41	37	34	30	26	20	14	13
	Night	23:00	43	44	46	48	49	50	56	51	49	50	48	47	49	49	47	44	44	46	50	51	49	46	42	38	34	29	24	21	19	16	13	11	12
		00:05	44	44	44	48	48	50	54	50	48	49	47	46	46	48	43	41	42	44	48	49	47	44	40	35	30	25	20	17	14	13	11	10	12
C	Day	13:17	59	60	59	60	62	62	62	61	59	57	56	54	54	54	52	50	51	53	56	56	53	51	47	43	39	36	32	28	24	20	15	12	13
		15:15	55	56	56	58	59	60	61	61	58	56	55	54	54	53	51	49	50	52	54	55	53	50	46	41	37	34	29	25	20	15	12	10	12
		17:22	49	51	53	58	59	59	61	59	58	55	54	52	51	50	48	46	48	49	52	53	51	48	44	40	35	31	27	23	18	14	12	10	12
	Evening	19:34	46	48	50	53	55	55	57	56	54	52	50	49	49	49	46	45	45	47	50	51	49	46	42	38	34	30	25	20	16	12	11	10	12
	Night	23:18	43	44	45	48	47	50	54	49	48	50	44	44	41	41	40	39	40	41	45	46	43	41	36	31	26	21	16	12	10	10	10	10	12
		00:24	43	45	45	47	47	48	52	49	46	47	42	41	40	38	37	37	38	40	43	43	41	38	33	29	24	19	13	10	9	9	10	10	12
E	Day	11:50	55	55	54	55	54	53	55	55	52	50	49	47	46	44	45	45	47	49	50	49	46	42	36	30	24	18	13	9	8	7	7	7	7
		12:21	54	55	54	53	53	53	55	55	52	50	49	48	46	44	45	45	47	49	50	49	46	42	36	30	24	18	13	9	8	7	7	7	7
		12:52	54	54	54	55	56	53	54	54	51	49	49	47	46	44	44	44	46	48	49	48	45	41	36	30	24	18	13	9	8	7	7	7	7
	Evening	21:55	49	48	47	47	46	46	47	47	45	42	41	39	38	38	38	38	39	41	44	45	43	40	35	29	23	18	13	10	8	8	7	7	8
	Night	23:24	45	46	44	43	42	44	44	44	42	39	38	36	36	36	35	36	37	39	42	42	39	36	31	24	18	14	11	9	8	7	7	7	7
		00:25	44	45	43	42	41	43	44	43	41	39	36	34	35	35	35	35	36	37	40	40	37	34	28	22	18	14	11	9	8	7	7	7	7

Location	Period	Time	Measured Noise Level, (dB L_{90} re. $2x10^{-5}$ Pa) at 1/3rd Octave Frequency Band (Hz)																																	
			12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
F	Day	14:13	52	52	51	55	55	52	52	51	53	47	47	46	44	42	41	40	43	45	46	45	41	37	32	27	22	18	14	11	9	7	7	7	7
		14:49	51	52	51	56	57	52	52	53	58	49	47	49	45	43	40	39	41	44	45	44	41	37	34	31	27	21	17	12	9	7	7	7	7
		15:20	51	51	51	54	55	52	52	52	52	46	44	43	40	38	37	36	39	42	43	42	38	34	29	23	19	14	11	8	7	7	7	7	7
	Evening	22:31	50	49	48	46	45	46	47	45	44	41	41	39	37	37	36	35	35	35	38	38	35	31	27	20	15	12	10	8	8	7	7	7	7
	Night	23:02	48	48	46	46	44	46	47	45	45	42	41	39	37	37	36	35	35	35	37	38	34	31	26	20	15	12	9	8	7	7	7	7	7
		00:51	49	48	47	45	43	45	46	44	44	42	41	38	37	36	35	34	34	34	36	36	32	29	25	19	15	12	10	9	8	8	7	7	7
G	Day	14:00	50	51	52	57	57	59	66	59	61	61	57	58	57	56	54	51	52	53	54	55	53	52	49	46	43	40	37	33	29	24	18	13	13
		15:57	48	51	53	58	60	60	62	62	64	60	59	57	55	55	55	52	53	53	54	55	54	51	48	45	42	38	34	31	27	23	18	13	13
		18:04	46	49	51	56	55	56	58	55	59	58	53	51	50	50	49	48	49	50	52	53	52	51	47	43	40	35	31	26	23	19	14	11	12
	Evening	20:14	43	47	47	52	50	51	52	52	52	47	47	48	44	43	41	39	40	41	44	45	42	39	35	30	25	21	17	14	11	10	10	10	12
	Night	23:41	40	43	44	49	45	45	47	48	50	47	43	42	40	37	34	30	31	33	33	33	30	27	22	17	13	10	8	8	8	9	10	10	12
		00:49	40	42	43	49	44	46	49	48	49	45	42	43	38	36	33	30	30	32	32	31	28	24	20	16	13	10	8	8	8	9	10	10	12

APPENDIX C
CALIBRATION CERTIFICATES FOR MONITORING EQUIPMENT

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 02 September 2022 **Certificate Number: UCRT22/2054**

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

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Approved Signatory

K. Mistry

Customer	AWN Consulting Limited The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin, D17 XD90 Ireland			
Order No.	2243			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	01076328
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	76545
	Rion	Microphone	UC-59	17212
	Rion	Calibrator	NC-75	34313057
		Calibrator adaptor type if applicable		NC-75-022
Performance Class	1			
Test Procedure	TP 10. SLM 61672-3:2013 *Procedures from IEC 61672-3:2013 were used to perform the periodic tests.*			
Type Approved to IEC 61672-1:2013	Yes *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013*			
Date Received	01 September 2022	ANV Job No.	UKAS22/09555	
Date Calibrated	02 September 2022			

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 pattern-evaluation 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	*Dated*	*Certificate No.*	*Laboratory*
	21 August 2020	UCRT20/1795	0653

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number
UCRT22/2054

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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	01 September 2022	
Calibrator cert. number	UCRT22/2051	
Calibrator cal cert issued by Lab	0653	
Calibrator SPL @ STP	93.99 dB	Calibration reference sound pressure level
Calibrator frequency	1000.00 Hz	Calibration check frequency
Reference level range	Single 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	
Temperature	23.43	23.53	± 0.30 °C
Humidity	59.6	59.3	± 3.00 %RH
Ambient Pressure	100.37	100.31	± 0.03 kPa

Indication at the Calibration Check Frequency			
Initial indicated level	94.4 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	18.9	dB	A Weighting
Microphone replaced with electrical input device -				UR = Under Range indicated

Weighting	A			C			Z		
	11.2	dB	UR	15.1	dB	UR	20.9	dB	UR

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

END

Calibrated by: PB/BB R 1

MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 26 May 2023

Certificate Number: UCRT23/1711

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

B. Bogdan

Customer	AWN Consulting Limited The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin D17 XD90, Ireland			
Order No.	2308			
Test Procedure	Procedure TP 1 Calibration of Sound Calibrators			
Description	Acoustic Calibrator			
Identification	*Manufacturer*	*Instrument*	*Model*	*Serial No.*
	Brüel & Kjær	Calibrator	4231	2394086

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No.	UKAS23/05369	
Date Received	26 May 2023	
Date Calibrated	26 May 2023	
Previous Certificate	*Dated*	03 May 2022
	Certificate No.	UCRT22/1594
	Laboratory	0653

CERTIFICATE OF CALIBRATION	Certificate Number UCRT23/1711
UKAS Accredited Calibration Laboratory No. 0653	Page 2 of 2 Pages

Measurements

The sound pressure level generated by the calibrator in its WS2 configuration was measured five times by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below. It is corrected to the standard atmospheric pressure of 101.3 kPa (1013 mBar) using original manufacturers information.

Test Microphone	*Manufacturer*	*Type*
	Brüel & Kjær	4134

Results

The level of the calibrator output under the conditions outlined above was

93.90 ± 0.10 dB rel 20 µPa

Functional Tests and Observations

The frequency of the sound produced was	999.97	±	0.12 Hz
The total distortion was	0.47	±	0.04 % Distortion

During the measurements environmental conditions were

Temperature	22	to	23	°C
Relative Humidity	46	to	56	%
Barometric Pressure	102.1	to	102.2	kPa

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.

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

..... END .....

Note:

Calibrator adjusted prior to calibration?	NO	
Initial Level	N/A	dB
Initial Frequency	N/A	Hz

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

None

Calibrated by: K. Zablocki R 1

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 12 May 2023

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Certificate Number: UCRT23/1647

Page 1 of 3 Pages

Approved Signatory

K. Mistry

CUSTOMER	AWN Consulting Limited The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin D17 XD90 Ireland
ORDER No	2298 Job No UKAS23/03245
DATE OF RECEIPT	31 March 2023
PROCEDURE	Calibration Engineer's Handbook, section 25: periodic testing of sound level meters to IEC 61672-3:2006 (BS EN 61672-3:2006) as modified by UKAS TPS 49
IDENTIFICATION	Sound level meter Brüel & Kjær type 2250 serial No 3028635 connected via a preamplifier type ZC 0032 serial No 29471 to a half-inch microphone type 4189 serial No 3196319. Associated calibrator Brüel & Kjær type 4231 serial No 3010488 with one-inch housing and adapter type UC 0210 for half-inch microphone.
CALIBRATED ON	12 May 2023

CERTIFICATE OF CALIBRATION

UKAS ACCREDITED CALIBRATION LABORATORY No 0653

Certificate No UCRT23/1647

The sound level meter was set up using the type 4231 sound calibrator supplied; it was set to frequency weighting A, and initially read 93.6 dB. It was then adjusted to read 94.0 dB (corresponding to 94.0 dB at standard atmospheric pressure). This reading was derived from Calibration Certificate no. UCRT22/2203 supplied by this laboratory and manufacturers' information on the free-field response of the sound level meter. The calibration check frequency was 1 kHz. The final microphone sensitivity calculated and stored by the instrument was 47.68 mV/Pa.

Procedures from IEC 61672-3:2006 (BS EN 61672-3:2006) as modified by UKAS TPS 49 were used to perform the periodic tests.

RESULTS

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006 (BS EN 61672-3:2006), for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2 : 2003 (BS EN 61672-2 : 2003), to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1 : 2002 (BS EN 61672-1 : 2003), the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1 : 2002 (BS EN 61672-1 2003).

The self-generated noise recorded with the microphone replaced by the electrical input device was:

13.1 dB (A) 13.8 dB (C) 18.2 dB (Z) 26.3 dB (Z, Extended low frequency range)

The environmental conditions recorded at the start and end of testing were:

Start: 22 to 23 ºC, 48 to 58 %RH and 101.4 to 101.5 kPa
End: 21 to 23 ºC, 50 to 60 %RH and 101.4 to 101.5 kPa

Technical information including adjustment data specified in the manufacturers' Instruction Manual BE 1712-19 (2012) and User Manual BE 1713-24 (2009) has been used to carry out this verification. These data include manufacturer-specified uncertainties.

Publicly-available evidence has been found that the B&K 2250 sound level meter design has successfully undergone pattern evaluation in accordance with IEC 61672-2:2002 (BS EN 61672-2:2003) by Physikalisch-Technische Bundesanstalt (PTB), an independent testing organisation responsible for pattern approvals.

All measurement data are held at ANV Measurement Systems for a period of at least six years.

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.

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 25 October 2023

Certificate Number: UCRT23/2403

Calibrated at & Certificate issued by:
ANV Measurement Systems
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Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

K. Mistry

Customer	AWN Consulting The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin 17 Ireland			
Order No.	2338			
Test Procedure	Procedure TP 1 Calibration of Sound Calibrators			
Description	Acoustic Calibrator			
Identification	*Manufacturer*	*Instrument*	*Model*	*Serial No.*
	Brüel & Kjær	Calibrator	4231	3010488

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No.	UKAS23/10731	
Date Received	25 October 2023	
Date Calibrated	25 October 2023	
Previous Certificate	*Dated*	10 October 2022
	Certificate No.	UCRT22/2203
	Laboratory	0653