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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

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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.

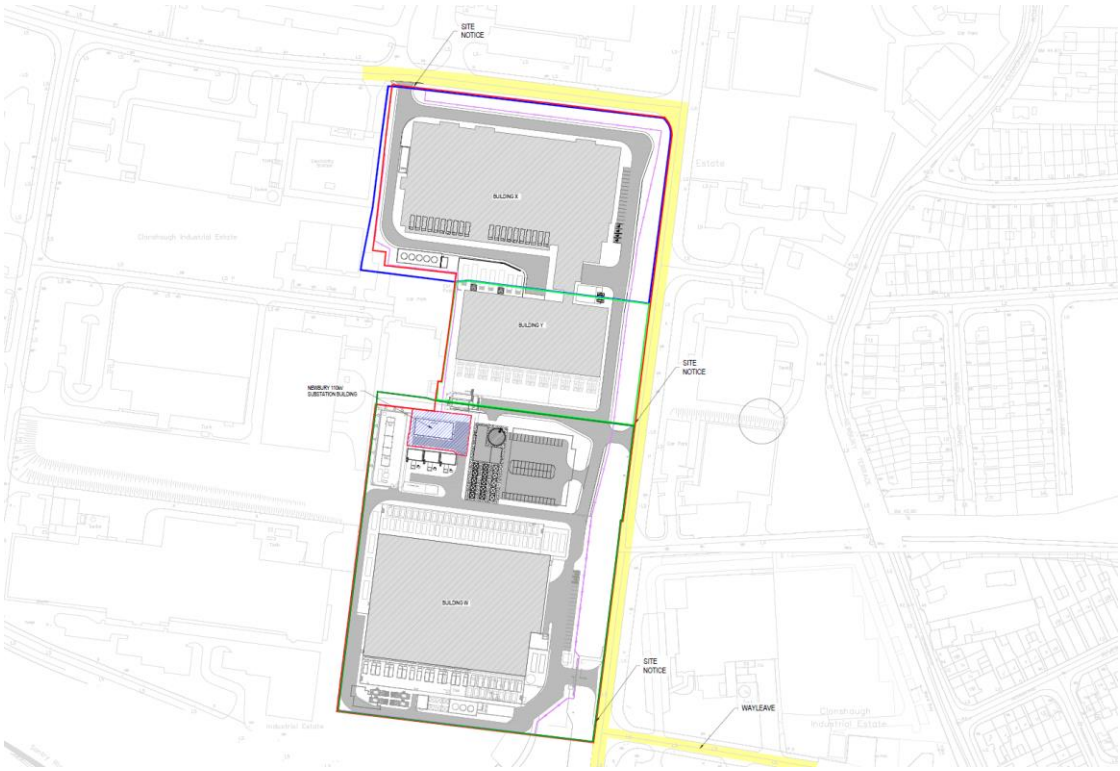

Figure 1 Site Location & Context

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 2024 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. P1186-01) 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	

G	Attended location representative of 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 10:09 to 16:39 hrs on 05 November 2024,10:38 to 17:01 hrs on 06 November 2024; and 09:54 to 14:18 hrs on 13 November 2024.
Evening 21:10 to 22:13 hrs on 13 November 2024,
Night-time 23:00 hrs on 13 November to 01:34 hrs on 14 November 2024

AWN personnel 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	186669	12814	13/01/2023	13/01/2025
Sound Level Meter	Rion	NL-52	586940	17049	20/02/2024	20/02/2026
Calibrator	Brüel and Kjaer	Type 4231	2263026	N/A	20/02/2024	20/02/2025

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 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	Date	Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				Comments	Parameter that Best Represents Specific Noise from Site (See Table 3)[1]
				$L_{Aeq,T}$	L_{AFmax}	$L_{A10,T}$	$L_{A90,T}$		
A	Day	05/11/2024	10:09	63	71	64	**61**	The noise environment during the daytime period was dominated by road traffic noise from the M50 and M1. Other noise sources included local residential traffic within the housing estate and distant construction works. No audible noise from the site was noted.	L_{A90}
		06/11/2024	12:05	62	70	64	**60**		L_{A90}
		13/11/2024	09:54	59	76	60	**58**		L_{A90}
	Evening	13/11/2024	21:10	59	74	60	**56**	The noise environment during the evening period was dominated by traffic noise from the M50 and M1. Other noted noise sources included intermittent air traffic. No audible noise from the site was noted.	L_{A90}
	Night	14/11/2024	23:09	55	65	82	**52**	The noise environment during the nighttime period was dominated by traffic from the M50 and M1. Intermittent local car pass bys and air traffic were also noted during the measurement period. No audible noise from the site was noted.	L_{A90}
		14/11/2024	00:31	53	64	55	**50**		L_{A90}
B	Day	05/11/2024	11:04	67	81	69	**63**	The noise environment during the daytime period was dominated by road traffic noise. Other noise sources included local traffic, aircraft overhead and birdsong. No audible noise from the site was noted.	L_{A90}
		06/11/2024	14:19	66	77	68	**63**		L_{A90}
		13/11/2024	10:44	65	76	67	**63**		L_{A90}
	Evening	13/11/2024	21:54	62	72	64	**59**	The noise environment during the evening period dominated by road traffic noise and aircraft overhead. No audible noise from the site was noted.	L_{A90}
	Night	13/11/2024	23:38	62	88	63	**53**	The noise environment during the night timer period dominated by road traffic noise. Intermittent aircraft was noted overhead during the first night time measurement. No audible noise from the site was noted.	L_{A90}
		14/11/2024	00:56	56	69	59	**50**		L_{A90}

[1] Parameter deemed to be representative of the specific noise level arising from the site has been highlighted in bold.

Location	Period	Date	Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				Comments	Parameter that Best Represents Specific Noise from Site (See Table 3)[2]
C	Day	05/11/2024	15:39	59	76	61	**58**	The noise environment during the daytime period was dominated by road traffic noise. Other noted noise sources included air traffic noise, local residential traffic within the housing estate and pedestrian activity. No audible noise from the site was noted.	L_{A90}
		06/11/2024	15:02	60	73	62	**56**		L_{A90}
		13/11/2024	11:34	62	74	65	**60**		L_{A90}
	Evening	13/11/2024	22:27	61	87	63	**56**	The noise environment during the evening period was dominated by traffic noise and intermittent air traffic. No audible noise from the site was noted.	L_{A90}
	Night	14/11/2024	00:02	57	66	59	**53**	The noise environment during the nighttime period was dominated by road traffic noise. Intermittent air traffic and wind rustles were also noted during the measurement period. No audible noise from the site was noted.	L_{A90}
		14/11/2024	01:19	55	68	58	**49**		L_{A90}
E	Day	05/11/2024	16:24	49	71	50	**45**	The noise environment during the daytime period was made up of distant road traffic noise, local vehicle movements within the housing estate, pedestrian activity and bird song. No audible noise from the site was noted.	L_{A90}
		06/11/2024	16:23	49	66	50	**46**		L_{A90}
		13/11/2024	12:56	56	65	58	**53**		L_{A90}
	Evening	13/11/2024	21:35	53	71	55	**51**	The noise environment during the evening period was made up of distant road traffic noise, local vehicle movements within the housing estate, pedestrian activity and intermittent aircraft noise. A faint mechanical exhaust noise was also noted as being audible during the evening period, however this was noted as being from an unassociated development within Clonshaugh Business Park.	L_{A90}
	Night	13/11/2024	23:22	49	60	50	**47**	The noise environment during the nighttime period was made up of distant road traffic noise, local vehicle movements within the housing estate, pedestrian activity and intermittent aircraft noise. A faint mechanical exhaust noise was also noted as being audible during the night time period, however this was noted as being from an unassociated development within Clonshaugh Business Park.	L_{A90}
		14/11/2024	00:44	48	62	49	**47**		L_{A90}

[2] Parameter deemed to be representative of the specific noise level arising from the site has been highlighted in bold.

Location	Period	Date	Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				Comments	Parameter that Best Represents Specific Noise from Site (See Table 3)[3]
F	Day	05/11/2024	10:37	53	69	55	**52**	The noise environment during the daytime period was dominated by distant road traffic noise. Other noise sources included distant sirens, local residential traffic within the housing estate and distant construction works. No audible noise from the site was noted.	L_{A90}
		06/11/2024	15:44	53	68	56	**50**		L_{A90}
		13/11/2024	12:17	58	68	60	**56**		L_{A90}
	Evening	13/11/2024	22:13	54	65	56	**52**	The noise environment during the evening period was dominated by distant road traffic noise. Other noise sources included distant sirens, intermittent aircraft overhead, and local residential traffic within the housing estate. No audible noise from the site was noted.	L_{A90}
	Night	13/11/2024	23:43	50	59	52	**48**	The noise environment during the nighttime period was dominated by distant road traffic noise. Other noise sources included distant sirens, intermittent aircraft overhead, wind rustles and occasional local residential traffic within the housing estate. No audible noise from the site was noted.	L_{A90}
		14/11/2024	01:03	48	55	50	**45**		L_{A90}
G	Day	05/11/2024	11:18	57	74	60	**49**	The noise environment during the daytime period was dominated by road traffic noise. Other noise sources included air traffic, sirens, pedestrian movements, dogs barking and birdsong. No audible noise from the site was noted.	L_{A90}
		06/11/2024	17:01	56	76	58	**50**		L_{A90}
		13/11/2024	14:18	58	72	60	**56**		L_{A90}
	Evening	13/11/2024	20:58	55	73	57	**53**	The noise environment during the evening period was dominated by road traffic noise. Other noise sources included air traffic, sirens and pedestrian movements. No audible noise from the site was noted.	L_{A90}
	Night	13/11/2024	23:00	52	62	54	**49**	The noise environment during the nighttime period was dominated by distant road traffic noise. Other noise sources included aircraft, wind rustle and HGVs within the Clonshaugh business park. No audible noise from the site was noted.	L_{A90}
		14/11/2024	00:05	50	62	51	**48**		L_{A90}

Table 3 Results of Noise Monitoring Survey

[3] Parameter deemed to be representative of the specific noise level arising from the site has been highlighted in bold.

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_{A90}	51	55	Yes
		D	L_{A90}	50		Yes
		D	L_{A90}	48		Yes
	Evening	D	L_{A90}	46	50	Yes
	Night	D	L_{A90}	42	45	Yes
		D	L_{A90}	40		Yes
B	Day	D	L_{A90}	53	55	Yes
		D	L_{A90}	53		Yes
		D	L_{A90}	53		Yes
	Evening	D	L_{A90}	49	50	Yes
	Night	D	L_{A90}	43	45	Yes
		D	L_{A90}	40		Yes
C	Day	D	L_{A90}	48	55	Yes
		D	L_{A90}	46		Yes
		D	L_{A90}	50		Yes
	Evening	D	L_{A90}	46	50	Yes
	Night	D	L_{A90}	43	45	Yes
		D	L_{A90}	39		Yes
E	Day	D	L_{A90}	35	55	Yes
		D	L_{A90}	36		Yes
		D	L_{A90}	43		Yes
	Evening	D	L_{A90}	41	50	Yes
	Night	D	L_{A90}	37	45	Yes
		D	L_{A90}	37		Yes
F	Day	D	L_{A90}	42	55	Yes
		D	L_{A90}	40		Yes
		D	L_{A90}	46		Yes
	Evening	D	L_{A90}	42	50	Yes
	Night	D	L_{A90}	38	45	Yes
		D	L_{A90}	35		Yes
G	Day	D	L_{A90}	39	55	Yes
		D	L_{A90}	40		Yes
		D	L_{A90}	46		Yes
	Evening	D	L_{A90}	43	50	Yes
	Night	D	L_{A90}	39	45	Yes
		D	L_{A90}	38		Yes

Table 3 Estimation of Specific Noise Levels at Monitoring Locations

No exceedances in relation to noise for the site have been noted.

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.

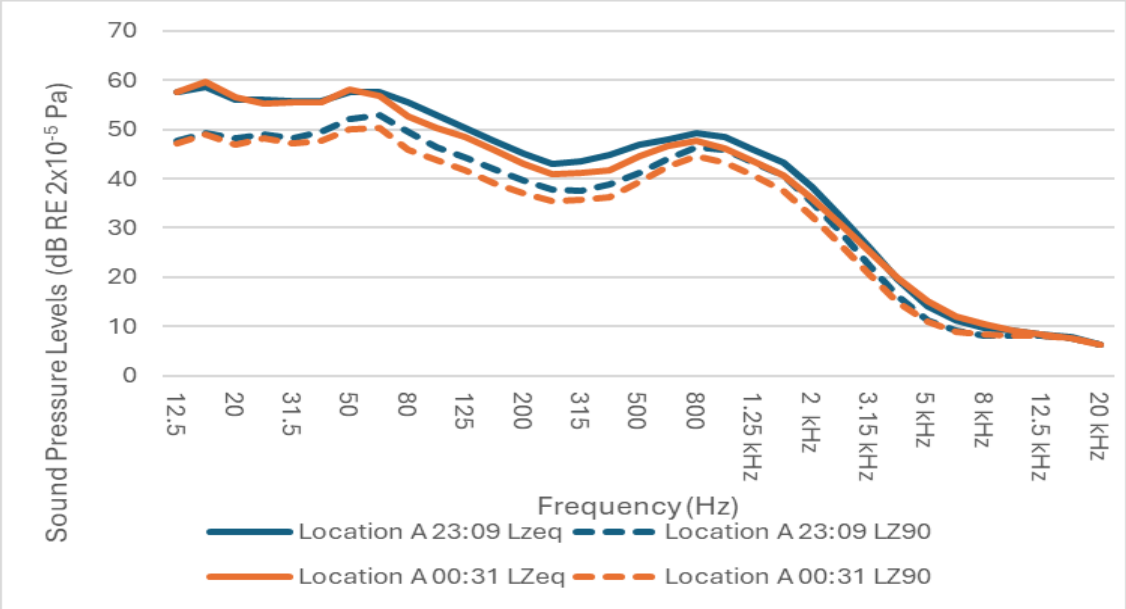

Figure 3 1/3rd Octave Band Levels at Location A

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 emergency vehicle sirens (not site related) 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.

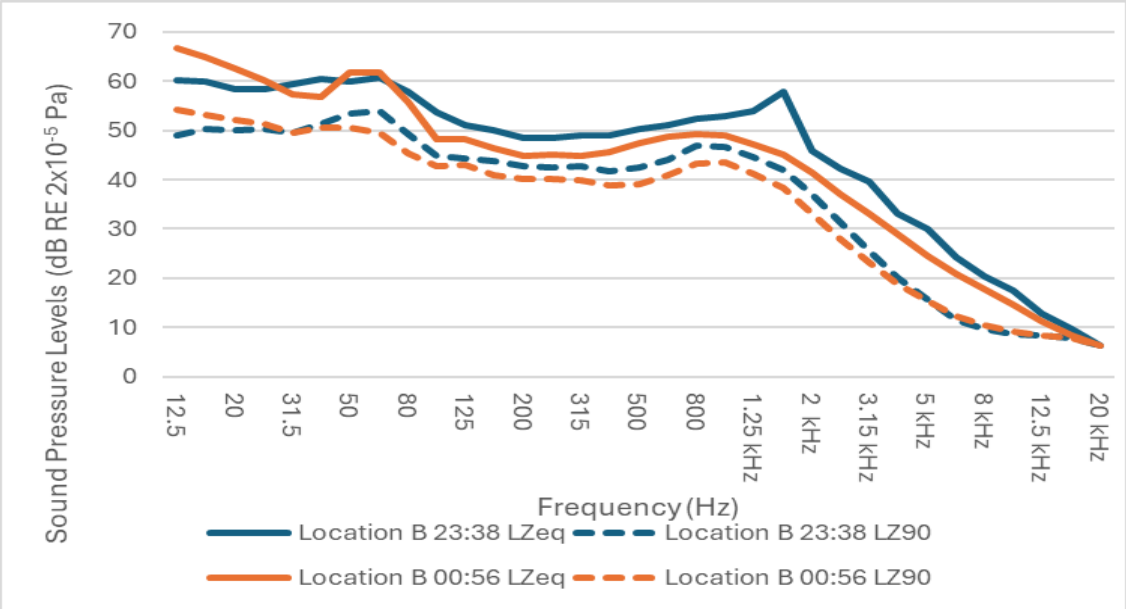

Figure 4 1/3rd Octave Band Levels at Location B

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.

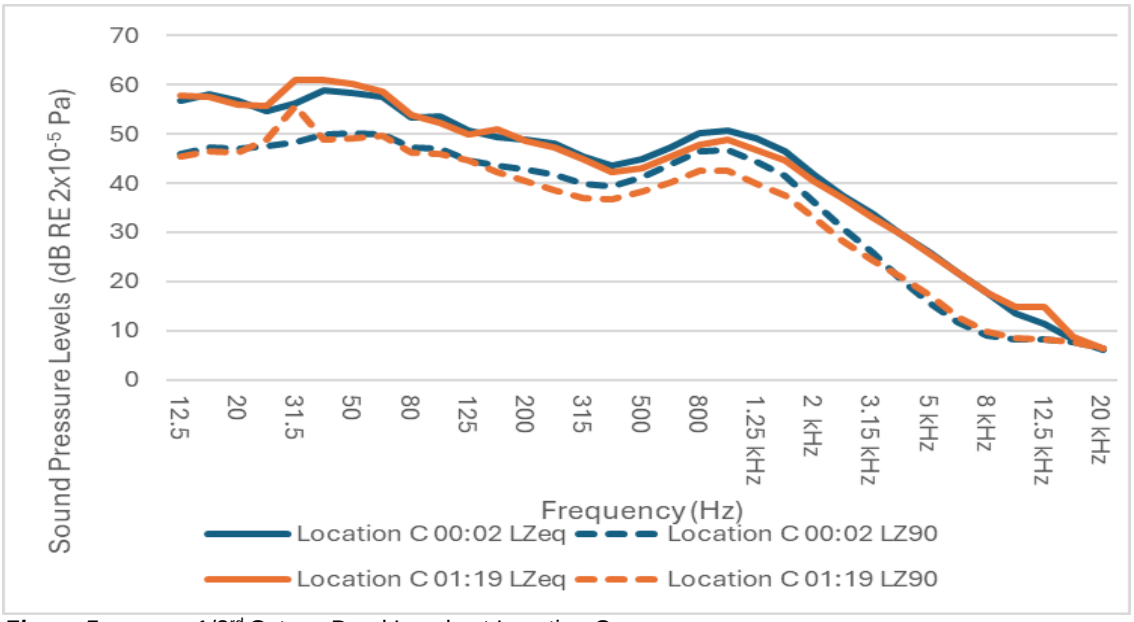

Figure 5 1/3rd Octave Band Levels at Location C

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.

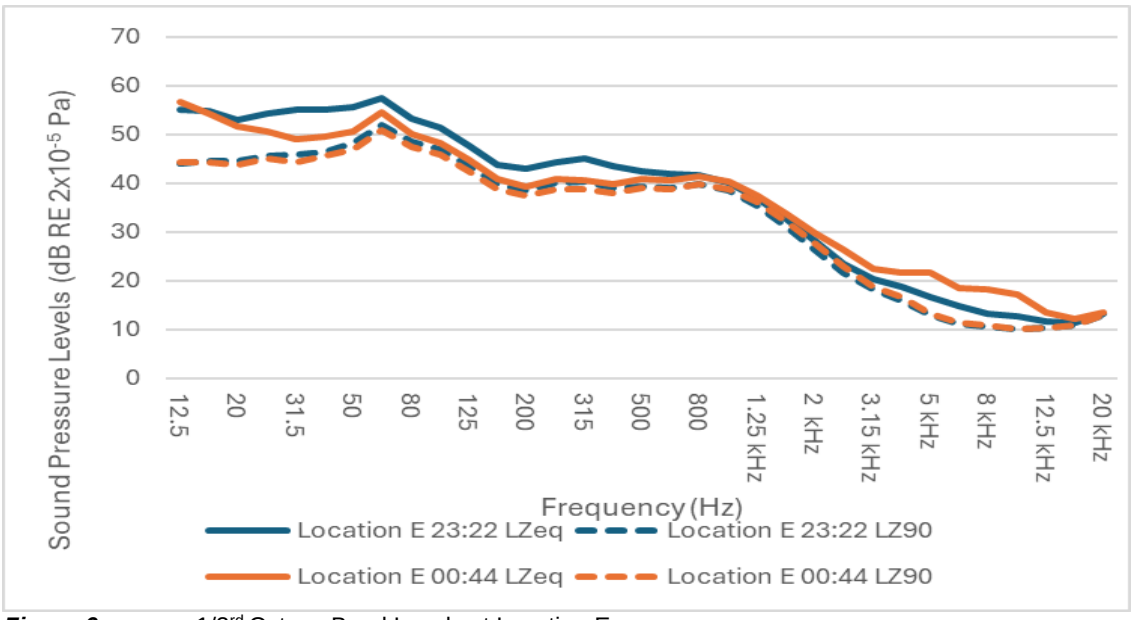

Figure 6 1/3rd Octave Band Levels at Location E

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.

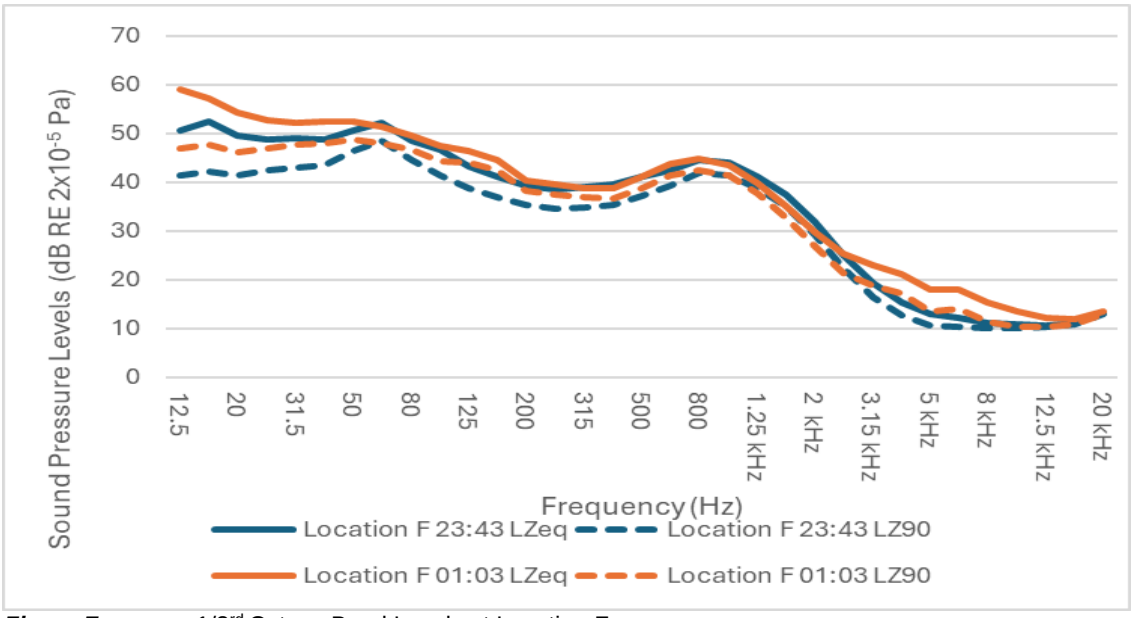

Figure 7 1/3rd Octave Band Levels at Location F

5.6 Location G

Figure 8 graphs the 1/3rd octave band measurements taken at Location F during the night period. No potential tonal components were identified during the post survey analysis of the recorded spectral data.

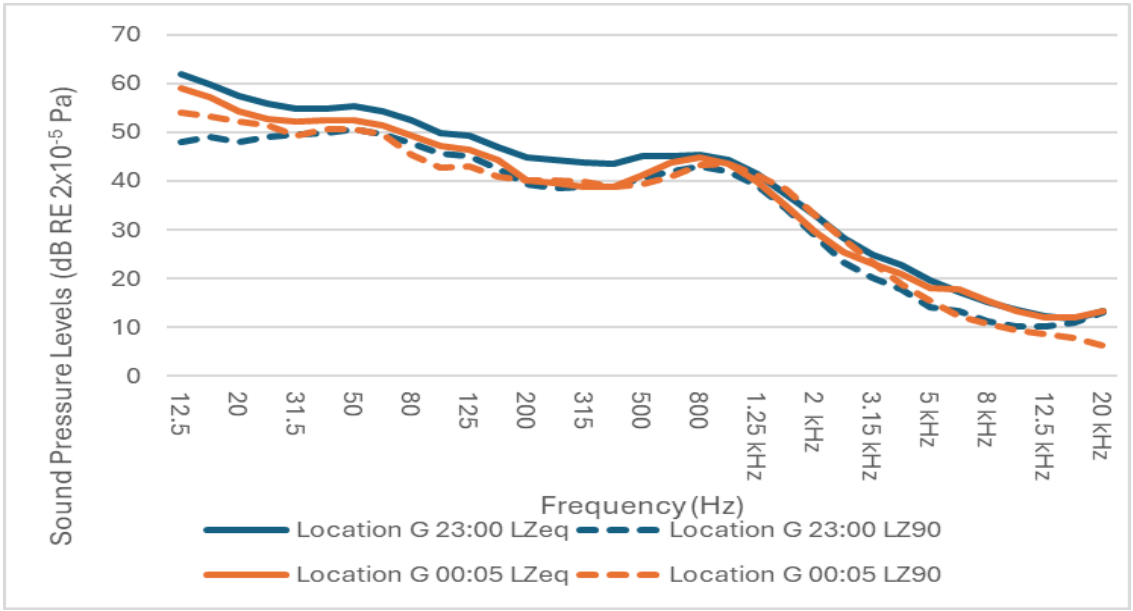

Figure 8 1/3rd Octave Band Levels at Location G

6.0 CONCLUSION

Attended noise monitoring has been carried out at six of the nearest noise sensitive locations located in the vicinity of the site. Noise levels were measured during daytime, evening 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_{eq} 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	10:09	65	66	63	63	61	63	66	64	59	56	55	52	49	46	46	48	52	55	58	57	55	52	46	42	39	36	33	31	28	20	16	13	13
		12:05	65	65	63	61	62	63	65	64	59	56	54	50	48	47	45	47	51	54	57	56	54	51	46	42	38	35	32	28	24	19	16	13	14
		09:54	64	65	62	62	61	63	65	63	59	58	56	51	49	47	48	50	51	53	53	52	50	46	41	37	36	34	31	32	33	26	28	20	15
	Evening	21:10	58	60	58	59	59	59	60	60	58	55	53	51	49	48	48	49	51	51	53	52	49	46	41	35	29	22	18	13	11	9	9	8	6
	Night	23:09	58	59	56	56	56	56	58	58	56	53	50	48	45	43	44	45	47	48	49	48	46	43	38	32	26	20	14	11	10	9	9	8	6
		00:31	58	60	57	55	56	56	58	57	53	50	49	46	43	41	41	42	45	47	48	46	44	41	36	31	25	20	15	12	11	9	8	8	6
B	Day	11:04	63	64	63	63	64	66	67	69	68	63	71	60	56	55	54	53	54	57	59	60	59	58	56	52	50	47	45	43	41	40	37	32	25
		14:19	62	63	62	62	64	65	69	69	65	61	59	57	57	55	54	54	56	58	59	59	57	55	52	48	45	42	38	36	33	31	27	25	16
		10:44	66	65	64	64	65	67	69	68	64	60	59	57	56	56	56	56	57	58	58	58	56	54	51	47	43	39	37	35	33	31	30	29	21
	Evening	21:54	63	62	61	63	61	61	63	64	60	55	55	54	52	52	52	51	52	54	55	56	54	52	48	43	39	34	30	26	23	20	17	16	8
	Night	23:38	60	60	58	58	59	60	60	61	58	54	51	50	49	49	49	49	50	51	52	53	54	58	46	42	40	33	30	24	20	18	13	10	6
		00:56	67	65	63	60	57	57	62	62	56	48	48	46	45	45	45	46	47	49	49	49	47	45	41	37	33	29	25	21	18	15	11	9	6
C	Day	15:39	58	60	60	62	63	65	67	66	62	60	58	59	56	54	51	49	49	50	52	52	49	47	44	42	40	37	34	44	38	30	27	24	16
		15:02	60	61	61	62	63	65	67	66	62	61	59	57	56	55	52	50	50	51	52	52	49	47	44	42	40	37	34	31	30	27	27	30	24
		11:34	63	64	64	65	64	67	70	67	64	63	61	59	57	55	55	53	53	54	55	55	53	51	48	44	41	39	36	33	31	28	30	28	18
	Evening	22:27	60	59	58	60	58	59	62	65	65	61	60	59	57	52	51	51	55	52	54	54	52	50	46	42	38	34	30	26	22	19	21	11	6
	Night	00:02	57	58	57	55	56	59	58	58	53	54	51	50	49	48	45	44	45	47	50	51	49	47	42	38	34	30	26	22	18	14	11	8	6
		01:19	58	58	56	56	61	61	60	59	54	52	50	51	49	47	45	42	43	45	48	49	47	45	40	37	33	30	26	22	18	15	15	9	6
E	Day	16:24	54	55	54	56	55	57	56	53	51	49	52	46	43	39	40	38	38	39	40	42	40	39	32	31	28	27	24	20	20	13	12	11	13
		16:23	54	53	53	55	54	55	55	51	48	47	43	41	39	37	37	36	38	39	42	43	40	38	33	31	28	25	24	22	18	13	11	11	13
		12:56	59	58	57	58	56	56	57	58	55	54	54	53	47	47	51	51	51	50	50	48	44	39	34	30	25	24	23	21	18	14	12	11	13
	Evening	21:35	60	59	58	60	57	54	55	57	54	53	51	46	45	47	47	47	46	46	47	46	43	39	35	31	27	25	23	21	18	15	13	12	13
	Night	23:22	55	55	53	54	55	55	56	57	53	51	48	44	43	44	45	43	42	42	42	40	37	33	28	23	20	19	17	15	13	13	12	11	13
		00:44	57	54	52	51	49	50	50	54	50	48	45	41	39	41	41	40	41	40	41	40	38	34	30	26	22	22	22	19	18	17	13	12	13

Location	Period	Time	Measured Noise Level, (dB L_{eq} 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	10:37	67	65	63	61	58	57	57	56	52	50	48	46	44	42	41	41	43	46	48	47	44	41	37	33	30	27	27	24	21	18	15	13	14
		15:44	63	62	60	59	57	56	57	56	52	50	48	45	44	44	41	41	43	45	46	46	45	42	39	36	33	30	26	23	20	16	13	12	13
		12:17	61	62	59	58	58	58	60	59	57	56	54	52	49	46	52	50	50	51	52	51	48	44	39	34	30	27	27	21	18	16	13	13	13
	Evening	22:13	53	54	54	59	55	54	53	54	52	50	47	45	43	42	43	44	45	46	49	48	45	41	36	29	24	21	19	18	20	13	11	11	13
	Night	23:43	51	53	50	49	49	49	51	52	48	47	43	41	39	38	39	40	41	42	45	44	41	37	32	25	19	15	13	12	11	11	11	11	13
		01:03	51	53	49	46	44	46	47	49	45	42	40	37	36	36	36	37	39	41	42	42	39	34	29	24	22	17	15	14	13	13	11	11	13
G	Day	11:18	55	57	58	59	59	60	61	60	57	54	53	52	51	51	49	47	46	46	48	50	48	45	43	40	38	35	39	34	30	29	22	22	15
		17:01	55	56	55	57	58	60	62	60	57	55	54	51	51	50	48	46	47	47	48	49	47	45	42	39	37	34	32	35	37	34	23	21	24
		14:18	60	60	61	60	60	61	63	61	59	57	55	54	52	51	50	49	51	52	52	51	48	45	41	39	37	33	30	28	27	22	20	20	14
	Evening	20:58	63	61	59	58	58	58	58	56	55	53	51	50	48	46	46	46	47	49	50	49	45	42	37	34	32	29	25	24	22	19	16	14	14
	Night	23:00	62	60	57	56	55	55	55	54	53	50	49	47	45	44	44	44	45	45	45	44	41	37	33	28	25	23	20	17	15	14	12	12	13
		00:05	59	57	54	53	52	52	53	51	49	47	46	44	40	40	39	39	41	44	45	44	40	35	30	25	23	21	18	18	15	13	12	12	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	10:09	56	57	56	57	56	57	60	59	54	52	50	47	44	42	42	45	49	53	56	55	53	50	45	40	36	31	26	21	16	12	11	11	13
		12:05	57	57	56	56	56	57	60	59	55	52	50	47	45	43	42	44	48	52	54	54	52	49	44	40	35	31	27	23	18	13	11	11	13
	Evening	09:54	55	57	56	57	56	57	60	58	54	52	50	47	45	43	44	46	48	50	52	51	48	44	39	34	29	24	18	14	12	10	10	11	13
		21:10	49	50	50	53	52	52	54	55	52	49	48	46	43	42	42	44	46	48	51	50	48	45	39	33	26	19	13	10	9	8	8	8	6
	Night	23:09	48	49	48	49	48	49	52	53	50	46	44	42	40	38	38	39	41	44	46	46	43	41	35	29	23	16	11	9	8	8	8	8	6
		00:31	47	49	47	48	47	48	50	50	46	44	42	39	37	35	36	36	39	43	45	43	41	38	32	27	21	15	11	9	8	8	8	8	6
B	Day	11:04	53	55	55	56	57	59	60	63	63	57	61	56	51	51	49	49	50	52	55	57	55	53	51	47	44	41	37	34	31	26	21	15	14
		14:19	54	55	55	56	57	58	61	61	58	55	53	52	51	51	50	50	52	54	56	56	54	52	49	45	42	38	34	30	26	21	16	13	13
		10:44	57	57	57	58	58	59	61	61	56	54	52	50	50	51	52	52	54	55	56	56	54	52	48	43	39	34	30	25	21	17	13	12	13
	Evening	21:54	51	51	52	56	54	54	56	56	53	48	47	46	46	47	47	47	48	49	52	52	50	48	43	37	31	25	20	16	13	11	9	8	6
	Night	23:38	49	50	50	50	50	51	53	54	49	45	44	44	43	43	43	42	43	44	47	47	45	42	37	31	26	20	16	11	10	9	8	8	6
		00:56	54	53	52	51	49	51	51	50	45	43	43	41	40	40	40	39	39	41	43	44	41	38	33	28	23	19	15	12	11	9	9	8	6
C	Day	15:39	50	52	53	56	57	59	61	59	56	55	53	51	50	49	46	44	44	45	48	49	46	43	40	37	34	31	27	24	20	16	12	11	13
		15:02	52	53	54	56	57	59	61	59	56	55	53	52	51	50	47	45	45	46	48	49	46	43	40	36	34	31	27	24	20	16	13	11	13
		11:34	55	56	56	58	57	58	61	60	57	56	54	53	51	50	48	47	48	50	52	52	50	48	44	40	36	32	28	24	20	15	12	11	13
	Evening	22:27	48	49	50	53	52	52	54	53	51	50	47	45	44	43	42	42	44	46	49	50	48	45	40	35	30	24	19	14	10	9	8	8	6
	Night	00:02	46	47	47	48	48	50	50	50	47	47	45	44	43	42	40	39	41	44	47	47	44	42	36	31	26	20	16	12	9	8	8	8	6
		01:19	46	47	46	49	56	49	49	50	46	46	45	42	40	39	37	37	38	40	42	42	40	37	33	28	24	21	17	13	10	9	8	8	6
E	Day	16:24	46	47	48	50	49	49	51	48	46	43	41	39	36	35	36	34	35	36	38	38	36	32	28	23	19	15	12	11	10	10	10	11	13
		16:23	46	46	47	50	49	50	51	48	45	44	41	38	36	34	35	34	36	37	39	39	36	33	29	25	22	20	16	13	11	10	10	11	13
		12:56	49	50	50	51	50	51	53	53	52	50	48	45	43	43	45	46	47	47	47	46	42	37	31	25	20	18	15	12	11	10	10	11	13
	Evening	21:35	46	47	47	53	49	48	50	52	50	48	45	41	41	43	44	43	43	44	45	44	41	37	31	25	20	17	14	12	11	10	10	11	13
	Night	23:22	44	45	45	46	46	46	48	52	49	47	43	40	38	40	40	39	39	39	40	39	35	31	26	22	18	16	13	11	11	10	10	11	13
		00:44	44	44	44	45	44	46	47	51	47	46	42	39	37	39	39	38	39	39	40	39	36	32	28	23	19	17	13	11	11	10	10	11	13

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	10:37	55	54	53	52	51	50	52	51	48	46	44	42	41	39	38	39	41	43	46	45	43	39	35	30	25	21	19	16	15	13	12	11	13
		15:44	53	53	51	51	51	51	53	51	48	46	44	42	40	39	38	38	40	42	44	44	41	37	33	28	24	21	17	15	13	12	11	11	13
		12:17	52	53	52	52	52	52	54	54	51	50	49	46	44	43	44	46	47	49	50	49	46	42	37	31	25	19	15	13	12	11	11	11	13
	Evening	22:13	52	43	44	46	52	48	46	48	49	46	43	40	39	38	38	38	39	41	43	46	46	43	39	34	27	21	16	12	11	10	10	10	11
	Night	23:43	41	42	41	43	43	43	46	48	44	41	39	37	35	35	35	35	37	39	42	41	39	35	29	23	16	13	11	10	10	10	10	11	13
		01:03	40	41	39	40	39	40	42	45	41	38	37	34	33	32	32	34	35	37	38	38	35	31	25	20	15	12	11	10	10	10	10	11	13
G	Day	11:18	48	49	50	53	53	53	54	52	51	48	47	46	43	41	38	36	37	38	40	42	40	38	34	31	28	25	22	19	16	13	11	11	13
		17:01	48	48	49	51	52	53	54	52	51	49	47	46	44	43	40	37	38	39	41	43	41	40	36	32	29	26	22	19	15	13	11	11	13
		14:18	50	51	51	53	53	55	57	54	52	51	49	49	47	46	46	46	48	49	50	49	45	42	36	32	29	25	21	18	16	13	12	11	13
	Evening	20:58	49	50	49	51	51	51	52	51	50	47	46	45	43	41	42	42	44	46	48	47	43	39	33	26	22	19	16	14	12	11	11	11	13
	Night	23:00	48	49	48	49	50	50	51	50	48	46	45	43	39	39	39	39	41	42	43	42	39	34	29	23	20	18	14	13	11	10	10	11	13
		00:05	47	48	46	47	48	48	49	48	47	44	44	42	38	37	37	37	39	41	43	41	38	33	27	21	19	17	13	14	11	10	10	11	13

APPENDIX C
CALIBRATION CERTIFICATES FOR MONITORING EQUIPMENT

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 13 January 2023 **Certificate Number: UCRT23/1052**

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.	DOD/22/Cal045			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	00186669
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	76819
	Rion	Microphone	UC-59	12814
	Brüel & Kjær	Calibrator	4231	2263026
		Calibrator adaptor type if applicable		UC 0210
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	09 January 2023	ANV Job No.	UKAS23/01009	
Date Calibrated	13 January 2023			

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*
	12 May 2022	UCRT22/1643	0653

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number
UCRT23/1052

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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	Equivalent	
Customer or Lab Calibrator	Customers Calibrator	
Calibrator adaptor type if applicable	UC 0210	
Calibrator cal. date	10 January 2023	
Calibrator cert. number	UCRT23/1036	
Calibrator cal cert issued by Lab	0653	
Calibrator SPL @ STP	93.96 dB	Calibration reference sound pressure level
Calibrator frequency	999.97 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	23.12	23.41	± 0.30 °C
Humidity	42.7	43.7	± 3.00 %RH
Ambient Pressure	99.44	98.89	± 0.03 kPa

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 17.2 dB A Weighting

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A			C			Z		
	11.9	dB	UR	15.6	dB	UR	21.8	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 R 1

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 20 February 2024 **Certificate Number: UCRT24/1277**

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.	2358			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	00586940
	Rion	Firmware		2.1
	Rion	Pre Amplifier	NH-25	87059
	Rion	Microphone	UC-59	17049
	Brüel & Kjær	Calibrator	4231	2263026
		Calibrator adaptor type if applicable		UC 0210
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	19 February 2024	ANV Job No.	UKAS24/02147	
Date Calibrated	20 February 2024			

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*
	17 March 2022	UCRT22/1382	0653

CERTIFICATE OF CALIBRATION	Certificate Number UCRT24/1277
UKAS Accredited Calibration Laboratory No. 0653	Page 2 of 2 Pages

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	Equivalent		
Customer or Lab Calibrator	Customers Calibrator		
Calibrator adaptor type if applicable	UC 0210		
Calibrator cal. date	20 February 2024		
Calibrator cert. number	UCRT24/1274		
Calibrator cal cert issued by Lab	0653		
Calibrator SPL @ STP	93.95	dB	Calibration reference sound pressure level
Calibrator frequency	999.97	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	22.74	22.02	± 0.30 °C
Humidity	57.6	52.1	± 3.00 %RH
Ambient Pressure	101.45	101.40	± 0.03 kPa

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 22.6 dB A Weighting

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A			C			Z		
	11.6	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.

Prior to calibration the instrument's main PCB was replaced and the meter was realigned.

..... END .....

Calibrated by: K. Zablocki R 1

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 20 February 2024

Certificate Number: UCRT24/1274

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

Approved Signatory

K. Mistry

Customer	AWN Consulting Limited The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin D17 XD90, Ireland
Order No.	2358
Test Procedure	Procedure TP 1 Calibration of Sound Calibrators
Description	Acoustic Calibrator

Identification

Manufacturer	*Instrument*	*Model*	*Serial No.*
Brüel & Kjær	Calibrator	4231	2263026

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.	UKAS24/02147
Date Received	19 February 2024
Date Calibrated	20 February 2024

Previous Certificate

Dated	10 January 2023
Certificate No.	UCRT23/1036
Laboratory	0653

CERTIFICATE OF CALIBRATION	Certificate Number UCRT24/1274
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

93.95 ± 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	0.46	±	0.04 % Distortion

During the measurements environmental conditions were

Temperature	22	to	25	°C
Relative Humidity	41	to	49	%
Barometric Pressure	101.5	to	101.6	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: B. Bogdan R 2