TECHNICAL REPORT

BROOMFIELD RESIDENTIAL DEVELOPMENT
INWARD NOISE IMPACT ASSESSMENT
MIDLETON, CO. CORK

For:

Brian O'Kennedy & Associates
Shannon House
Church Road
Douglas
Cork

Report Prepared By:
Brian S. Johnson, MIOA
Our Reference:
23/0434R01A
Date:
4 October 2023

Tel: +353 21 242 8704
Web: www.clvconsulting.ie
Email: info@clvconsulting.ie
Address: The NSC Campus, Mahon, Cork.

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1.0 INTRODUCTION

Planning Permission is currently being sought for a new residential development proposed to be located on an existing greenfield area located adjacent to the Midleton Water Treatment Plant in Midleton, Co. Cork. The proposed development consists of 272 residential units in semi-detached, terrace and apartment block configurations as well as outdoor amenity spaces and car parking areas with associated infrastructure and ancillary spaces.

Given the proximity of the nearby wastewater treatment plant, Cork County Council have expressed concern for the potential for noise impact from the plant on the proposed development. In order to address the Council's queries and to determine whether the subject wastewater treatment plant will impart a significant noise impact on the proposed development, CLV Consulting was commissioned to conduct an inward noise impact assessment.

The following document details the results of an ambient noise monitoring survey conducted on development lands, sets out appropriate criteria in respect of inward noise impact from the identified external sources, provides a detailed account of our assessment and lists the mitigation measure recommendations that were determined as being required in order to ensure the proposed development's inward noise impacts are minimised in accordance with the established criteria limits.

2.0 PROPOSED DEVELOPMENT ELEMENTS & LAYOUT

As stated in the previous section, the subject residential development is a 272-unit development proposed to be located on an existing greenfield site just north of Midleton, Co. Cork. The Midleton Wastewater Treatment Plant is located on the western boundary of the site; however, given its area configuration as effectively extending into the development, the plant has common boundaries with the proposed development on its north, east and south sides. There are either existing or future residential developments located to the north, west and south of the proposed development and greenfield lands are located to the east.

See Figure 1 below.

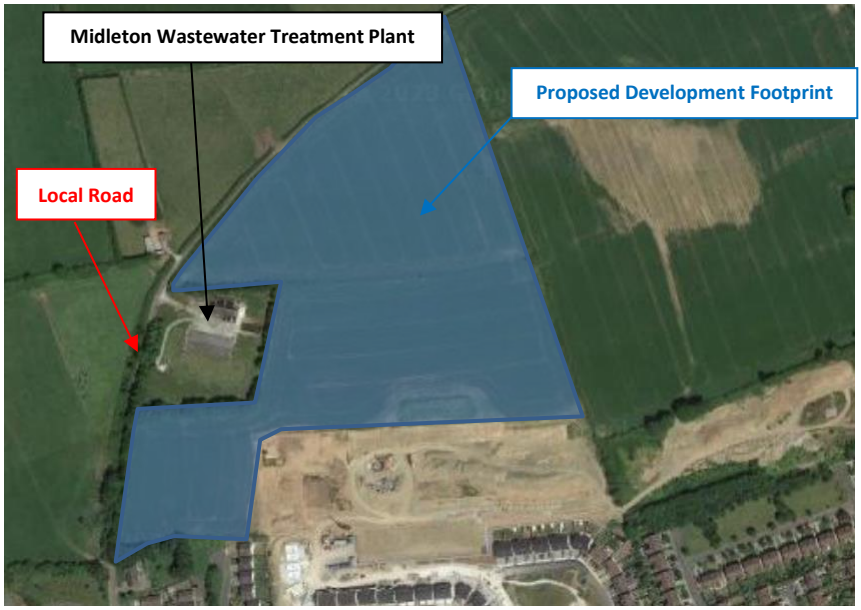

Figure 1 Proposed Development Location

The subject development is proposed to consist of 272 residential units in semi-detached, terrace and apartment block configurations. A site layout of the development is provided in Figure 2 below.

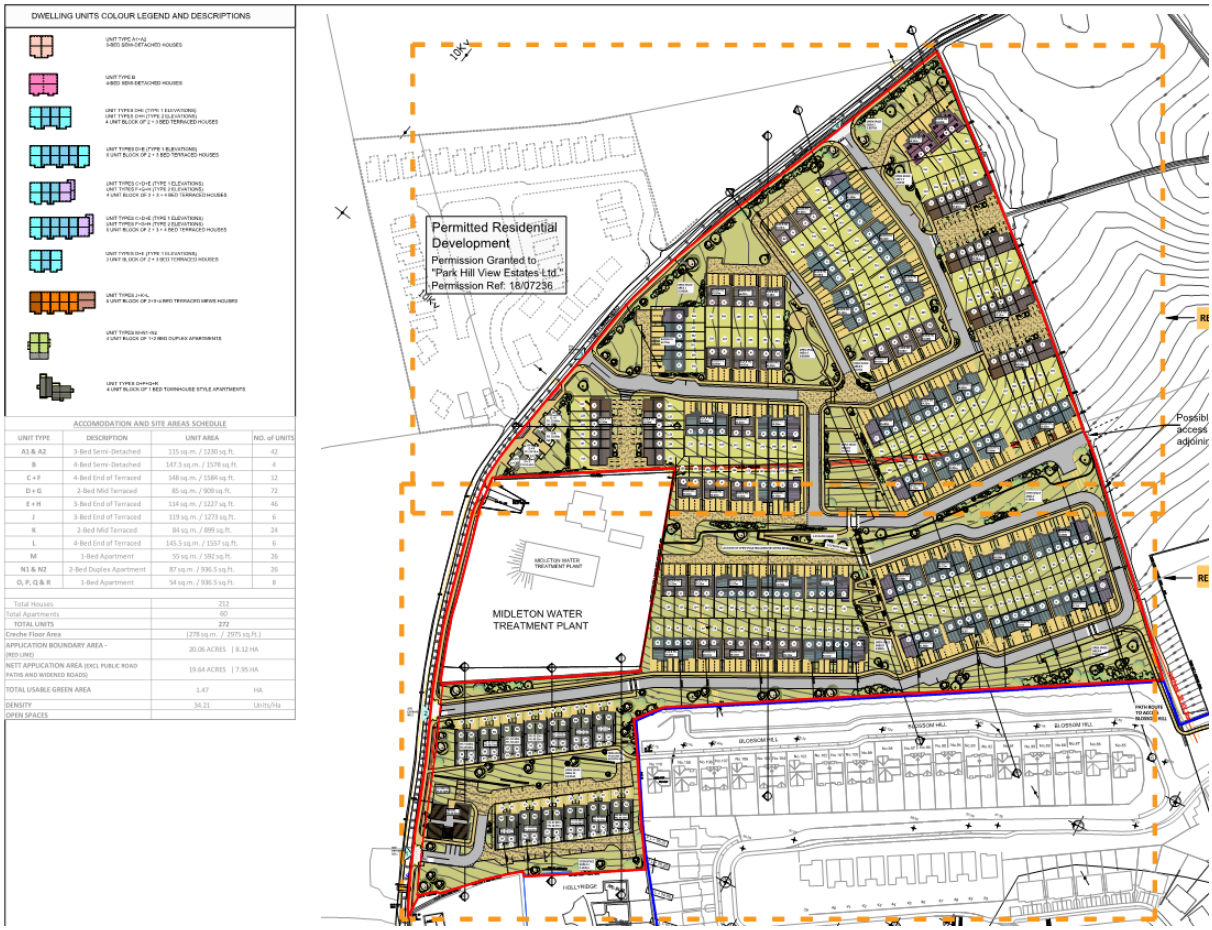

Figure 2 Proposed Development Layout

3.0 NOISE MONITORING SURVEY

An environmental noise monitoring survey was conducted in order to quantify the level of noise emissions from the wastewater treatment plant at the proposed development site. The survey was conducted in general accordance with *ISO 1996-2: 2017: Acoustics - Description, measurement and assessment of environmental noise.*

Specific details are set out in the following sections.

3.1 Measurement Location

Given that the Midleton Wastewater Treatment Plant was the only noise source of any significance identified in the vicinity of the proposed development site, it was therefore only necessary to conduct measurements in the vicinity of the plant. The measurement location was chosen so that it was in the vicinity of the nearest dwelling to the plant with a direct line of sight to all of its potential external noise producing areas.

See Figure 3 on the following page.

Figure 3 Site Layout Showing Approximate Position of Measurement Location

3.2 Survey Periods

Noise monitoring was conducted over the course of a typical three day weekday period from 13:00hrs on 3 April to 13:00hrs on 6 April 2023.

The meteorological conditions that were observed at Cork Airport on the days of the survey periods are detailed in Table 1.

Date	Time Period	Wind		Temperature	Precipitation?
		Avg. Speed	Directional Range		
3 April	Daytime	4 - 9 m/s	SSE	8 - 10 °C	None
	Night Time	3 - 5 m/s	SSE	7 - 8 °C	None

Date	Time Period	Wind		Temperature	Precipitation?
		Avg. Speed	Directional Range		
4 April	Daytime	3 - 7 m/s	SSW - SSE	8 - 10 °C	≈ 2mm
	Night Time	3 - 6 m/s	SW	9 - 10 °C	< 1mm
5 April	Day Time	2 - 6 m/s	SW - NW	8 - 14 °C	< 1mm
	Night Time	3 - 4 m/s	WSW - WNW	6 - 7°C	Trace
6 April	Day Time	1 - 6 m/s	WSW - N	6 - 13°C	Trace

Table 1 Meteorological Conditions During the Noise Surveys

3.3 Personnel & Instrumentation

Brian S. Johnson (CLV) managed the noise level monitoring. He is an internationally experienced acoustic consultant who has been working in the fields of architectural / building acoustics and noise control since 1994. He has been based in America, Europe, Asia and Australia and is a member of the Institute of Acoustics. Brian also has extensive knowledge in the field of environmental acoustics and holds a Certificate of Competence in Environmental Noise Measurements from the Institute of Acoustics.

The measurements were conducted using an NTI Audio Type XL2 Sound Level Meter (Serial #A2A-18085-E0). It was fitted with a 90mm windshield and was check calibrated both before and after the survey using a Casella Cel 120 Acoustic Calibrator (Serial #5072087). The microphone was positioned approximately 1.4m above the ground.

The calibration certificates for the sound level meter and calibrator are provided in Appendices B & C respectively at the rear of this document.

3.4 Procedure

Measurements were conducted continuously over the full extent of the survey period. The sound level meter was set to average over periods that were one hour in duration and record audio continuously. The results were saved to the instrument for later download and analysis.

3.5 Measurement Parameters

The statistical noise monitoring results are presented in terms of the following five 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_{Amax} is the instantaneous maximum sound level measured during the sample period.
- L_{Amin} is the instantaneous minimum sound level measured during the sample period.
- L_{A10} is the sound level that is exceeded for 10% of the sample period.
- 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.

3.6 Monitoring Results

The full hourly survey results for all quantities are detailed in Appendix A. However, the average daytime ($L_{Aeq,16hr}$) and night time ($L_{Aeq,8hr}$) noise levels are summarised in Table 2 below.

Day	Daytime ($L_{Aeq,16hr}$)	Night Time ($L_{Aeq,8hr}$)
Monday (3 April)	51.2	38.7
Tuesday (4 April)	53.8	39.7
Wednesday (5 April)	49.5	39.6
Thursday (6 April)	50.0	-
Average	**51.7**	**39.4**

Table 2 Summary of Daytime & Night Time Average Noise Levels

Following a review of the audio files, it is critical in this instance to note that the primary contributor to the measured ambient noise levels was wind generated noise. There were also intermittent contributions from the nearby construction sites and occasional vehicular pass by events on the adjacent local road. However, at no point was there any noise emissions from the wastewater treatment plant that were audible above the ambient noise level.

We understand from the curator of the wastewater treatment plant that the only significant source of noise are fans that operate during the backwash cycle at around 10:00hrs each day. However, these noise events were not identifiable in the audio files and the noise levels measured during the 09:00 - 10:00hrs and 10:00 - 11:00hrs periods were not statistically different than any of the other daytime measurement periods.

4.0 PROPOSED DEVELOPMENT INTERNAL / EXTERNAL NOISE CRITERIA

There is no Irish Standard containing guidance that is applicable to noise emissions from wastewater treatment plants. In the absence of such standards, best practice dictates that the potential noise impact of the proposed development is assessed against appropriate British and / or International Standards. Appropriate criteria based on best practice guidance for both internal and external noise level criteria are therefore detailed in the following sections.

4.1 External Noise Level Criteria

Guideline criteria for external noise levels in the proposed development external amenity areas can be found in both *BS 8233 Guidance on Sound Insulation and Noise Reduction for Buildings* and *ProPG: Planning & Noise (Professional Guidance on Planning & Noise for New Residential Developments)* guidance documents.

Both of these documents state that ambient noise levels in external areas should ideally not be above **50 - 55dB L_{Aeq}.**

4.2 Internal Noise Level Criteria

Appropriate guidance for internal noise levels within residential buildings is contained within *BS8233 (2014): Guidance on Sound Insulation and Noise Reduction for Buildings*. This British Standard sets out recommended noise limits for indoor ambient noise levels in residential spaces as detailed in Table 3 below.

Activity	Room Type	Design Criterion $L_{Aeq,T}$ (dB)	
		Daytime (07:00 - 23:00hrs)	Night Time (23:00 - 07:00hrs)
Resting / Sleeping Conditions	Living Rooms	35dB $L_{Aeq,16hr}$	-
	Bedrooms	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$

Table 3 Recommended Indoor Ambient Noise Levels from *BS8233 (2014)*

In summary, the following internal noise level criteria would therefore apply to all of the proposed development's building internal spaces:

- Daytime Periods (07:00 to 23:00 hours) 35dB $L_{Aeq,16hr}$
- Night Time Periods (23:00 to 07:00 hours) 30dB $L_{Aeq,8hr}$

5.0 EXTERNAL NOISE LEVEL ASSESSMENT

The measured daytime noise levels at the proposed development boundary with the wastewater treatment plant are compared with the external noise level criteria established in Section 4.1 in Table 4 below.

Location	ProPG 2017 External Noise Level Criteria Range (dB $L_{Aeq,16h}$)	Measured Daytime Ambient Noise Level Range (dB $L_{Aeq,16h}$)		Acceptable?
		Range	Average	
Development Boundary w/ Wastewater Plant	50 - 55	50 - 54	52	✓

Table 4 Comparison of Measured Daytime Ambient Noise Levels at Development Boundary with Wastewater Treatment Plant (dB $L_{Aeq,16h}$)

Noise levels in the ranges determined above would all be within the BS 8233 / ProPG external design criteria range of 50 - 55dB L_{Aeq} for external areas.

It is important to note in this instance that noise emissions from the wastewater treatment plant were determined to be an insignificant contributor to the measured ambient noise levels and would therefore be well below this range. It should also be noted that the measurement location at the proposed development's shared boundary would also be considered worst case given that most of the remaining development buildings would be further away and either full or partially shielded from the plant by the development buildings themselves.

Given the above measurement / assessment results, the existing external ambient noise environment can be confirmed as being within an acceptable range. There are therefore no supplemental noise mitigation measures that would be required or even of benefit in this instance.

6.0 INTERNAL NOISE LEVEL ASSESSMENT

It was determined from our noise monitoring survey that noise levels along the proposed development's boundary with the wastewater treatment plant are in the range of 51 - 53dB $L_{Aeq,16hr}$ and 39 - 40 dB $L_{Aeq,8hr}$ during daytime and night time periods respectively. These ambient noise levels are relatively quiet and would therefore not require any significant mitigation measures in this instance. However, we have considered each building element for sake of completeness.

External Wall Constructions

Although the proposed development building external wall constructions are not known at this stage, assuming a construction with a minimum performance specification of 40dB R_w is provided (such as a minimum 100mm thick solid masonry or brick wall), they would be sufficient to reduce external ambient noise levels to well below the internal design criteria.

Roof Constructions

Similarly, the roof constructions of the proposed development buildings should be sufficient from a noise insulation standpoint if they have a minimum performance specification of 35dB R_w. A performance of this order can easily be achieved with most lightweight roof constructions, especially with a finished plasterboard ceiling or attic space.

External Glazing Constructions

In respect of external glazing, a uniform minimum glazing specification can be recommended for all the proposed development buildings in this instance due to the lack of significant noise sources in the vicinity.

The recommended specification is summarised in Table 4 below.

Octave Band Centre Frequency (Hz)						dB R_w	Typical Glazing Configuration
125	250	500	1k	2k	4k		
20	20	29	35	36	40	32	6mm glass - 12mm air space - 8mm glass

Table 4 Development Building Glazing Sound Insulation Performance Requirements, SRI (dB)

It should be noted that the performance values detailed in Table 4 should be specified and that the glazing configuration detailed is merely a typical example which can be expected to afford these performance values. Alternative products with an equivalent or better performance would also provide sufficient sound insulation.

External Entry Doors

Another design element consideration is the external entry doors. The entry doors for all residential buildings should be selected with the minimum performance specification of **30dB R_w**.

Acoustic test data should be obtained from the façade supplier to confirm that all primary window and external door constructions to be supplied perform to the required acoustic specifications as given above.

Trickle Vents

It is also important that the sound insulation performance of trickle vents do not significantly compromise the integrity of the window performance. Provision should therefore be made for provision of trickle vents in development building façades that achieve minimum sound reduction value of **25dB $D_{n,e,w}$ in the opened position**.

Summary

Assuming all of the above mitigation measures are properly incorporated into the proposed development design, the established BS 8233 internal noise level criteria should be comfortably achieved and the magnitude of the inward noise impact from the Midleton Wastewater Treatment plant would therefore be considered negligible.

7.0 SUMMARY OF NOISE IMPACT

7.1 External Noise Impact Summary

Ambient noise levels in the vicinity of the proposed development boundary with the Midleton Wastewater Treatment plant ranged between 50 - 54dB $L_{Aeq,16hr}$ during daytime periods. Noise levels of this order were confirmed as being within the BS 8233 / ProPG external design criteria range of 50 - 55dB L_{Aeq} for external residential areas. Noise emission contributions from the wastewater treatment plant to these ambient noise levels were determined to be insignificant.

Based on the above findings, no supplemental noise mitigation measures were deemed as being required or even of benefit to the proposed development in this instance. The existing ambient noise level environment is therefore suitable for the proposed development.

7.2 Internal Noise Impact Summary

Appropriate guidance for internal noise levels within residential buildings was taken from *BS 8233 (2014): Guidance on Sound Insulation and Noise Reduction for Buildings* as follows:

- Daytime (07:00 to 23:00 hours) 35dB $L_{Aeq,16hr}$
- Night-time (23:00 to 07:00 hours) 30dB $L_{Aeq,8hr}$

Given the above criteria requirements together with the measured external ambient noise levels, the following mitigation measures were recommended for the proposed development buildings:

- Provision of minimum 40dB R_w external walls for all residential building facades.
- Provision of minimum 35dB R_w roof constructions for all residential building roofs.
- Provision of minimum 32dB R_w acoustic glazing specifications for all residential building facades.
- Provision of minimum 30dB R_w external entry doors for all residential buildings.
- Provision of minimum 25dB $D_{n,e,w}$ acoustic trickle vents for all residential building facades (in the opened position).

Assuming the above mitigation measures are properly incorporated into the development design, the established BS 8233 internal noise level criteria should be comfortably achieved and the magnitude of the inward noise impact from all external sources on the proposed development would therefore be considered negligible.

APPENDIX A

FULL NOISE MONITORING RESULTS

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	$L_{Aeq,(1hr)}$	L_{AFmax}	L_{AFmin}	L_{AF10}	L_{AF90}
03/04/2023	13:00	14:00	**49.7**	69.4	44.1	51.5	46.5
03/04/2023	14:00	15:00	**50.7**	76.6	43.5	51.1	46.3
03/04/2023	15:00	16:00	**54.1**	80.4	44.7	54.7	47.8
03/04/2023	16:00	17:00	**56.3**	88.2	45.5	54.6	48.1
03/04/2023	17:00	18:00	**49.7**	76.6	42.6	51.5	45.3
03/04/2023	18:00	19:00	**50.6**	84.2	38.5	46.8	41.4
03/04/2023	19:00	20:00	**52.7**	83.2	37.3	45.2	39.6
03/04/2023	20:00	21:00	**42.1**	67.8	35.8	42.5	38.6
03/04/2023	21:00	22:00	**41.2**	56.1	35.2	43.6	37.6
03/04/2023	22:00	23:00	**41.5**	56.3	33.5	44.1	37.5
03/04/2023	23:00	00:00	**40.9**	62.6	32.0	42.4	34.9
04/04/2023	00:00	01:00	**37.4**	57.7	30.4	39.3	32.9
04/04/2023	01:00	02:00	**35.7**	49.2	30.0	38.2	32.5
04/04/2023	02:00	03:00	**35.6**	46.9	29.1	37.6	32.7
04/04/2023	03:00	04:00	**37.0**	65.9	29.7	38.6	32.7
04/04/2023	04:00	05:00	**37.6**	57.6	31.8	39.8	34.6
04/04/2023	05:00	06:00	**38.8**	54.5	31.8	40.6	35.8
04/04/2023	06:00	07:00	**42.1**	66.7	37.0	43.3	39.7
04/04/2023	07:00	08:00	**47.8**	76.1	40.0	49.7	42.5
04/04/2023	08:00	09:00	**47.8**	72.7	42.7	49.4	44.8
04/04/2023	09:00	10:00	**47.8**	70.1	42.0	49.3	44.5
04/04/2023	10:00	11:00	**50.6**	81.0	39.6	47.5	42.4
04/04/2023	11:00	12:00	**47.6**	67.5	41.5	49.1	44.5
04/04/2023	12:00	13:00	**52.8**	87.2	41.7	50.2	44.3
04/04/2023	13:00	14:00	**48.8**	72.7	40.7	49.7	43.9
04/04/2023	14:00	15:00	**49.7**	75.1	41.6	50.9	44.2
04/04/2023	15:00	16:00	**58.3**	88.0	43.8	54.6	46.9
04/04/2023	16:00	17:00	**54.9**	84.3	43.4	53.3	46.5
04/04/2023	17:00	18:00	**50.4**	75.0	41.4	51.2	43.9
04/04/2023	18:00	19:00	**62.7**	91.5	40.2	48.5	43.4
04/04/2023	19:00	20:00	**48.3**	78.2	40.1	47.7	42.8
04/04/2023	20:00	21:00	**44.7**	71.1	38.3	46.4	41.2
04/04/2023	21:00	22:00	**42.8**	55.8	36.6	45.0	39.5
04/04/2023	22:00	23:00	**41.1**	56.0	33.6	42.9	37.3
04/04/2023	23:00	00:00	**43.5**	60.7	34.5	46.2	37.5
05/04/2023	00:00	01:00	**41.1**	57.4	32.7	44.0	36.2
05/04/2023	01:00	02:00	**37.1**	64.4	30.2	39.3	33.3
05/04/2023	02:00	03:00	**36.3**	52.2	30.6	38.0	33.6
05/04/2023	03:00	04:00	**36.3**	53.7	30.3	38.0	33.6
05/04/2023	04:00	05:00	**36.4**	48.5	30.9	38.1	34.0
05/04/2023	05:00	06:00	**38.0**	54.6	31.5	39.7	35.1
05/04/2023	06:00	07:00	**42.0**	61.8	34.7	42.7	38.6
05/04/2023	07:00	08:00	**47.7**	71.0	38.9	49.6	42.3

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	$L_{Aeq,(1hr)}$	L_{AFmax}	L_{AFmin}	L_{AF10}	L_{AF90}
05/04/2023	08:00	09:00	**48.3**	69.4	42.6	49.6	45.1
05/04/2023	09:00	10:00	**49.4**	72.6	41.8	50.7	44.2
05/04/2023	10:00	11:00	**46.9**	71.8	41.0	48.5	43.1
05/04/2023	11:00	12:00	**57.5**	86.6	41.0	50.3	44.5
05/04/2023	12:00	13:00	**47.9**	70.3	42.9	49.2	45.0
05/04/2023	13:00	14:00	**53.2**	81.9	41.9	51.9	44.7
05/04/2023	14:00	15:00	**47.0**	73.0	39.4	48.9	42.2
05/04/2023	15:00	16:00	**49.9**	71.2	40.3	51.9	45.2
05/04/2023	16:00	17:00	**48.8**	70.5	41.1	51.0	44.4
05/04/2023	17:00	18:00	**46.1**	67.3	35.6	49.1	38.6
05/04/2023	18:00	19:00	**42.6**	66.0	32.3	45.5	36.6
05/04/2023	19:00	20:00	**38.7**	72.3	30.4	38.8	33.0
05/04/2023	20:00	21:00	**38.0**	53.9	30.6	40.1	33.9
05/04/2023	21:00	22:00	**41.7**	66.6	32.5	41.5	36.1
05/04/2023	22:00	23:00	**37.4**	50.0	32.1	39.0	35.3
05/04/2023	23:00	00:00	**37.6**	48.4	32.4	39.5	34.8
06/04/2023	00:00	01:00	**36.7**	53.2	31.1	37.9	33.6
06/04/2023	01:00	02:00	**35.2**	51.9	30.2	36.7	33.1
06/04/2023	02:00	03:00	**34.9**	47.1	29.5	36.7	32.5
06/04/2023	03:00	04:00	**36.2**	54.1	32.1	37.6	34.3
06/04/2023	04:00	05:00	**36.7**	46.8	31.5	38.4	34.3
06/04/2023	05:00	06:00	**39.7**	55.1	33.6	41.6	36.3
06/04/2023	06:00	07:00	**45.8**	70.2	35.3	45.6	37.9
06/04/2023	07:00	08:00	**47.5**	69.7	38.6	49.9	41.1
06/04/2023	08:00	09:00	**51.8**	71.0	41.9	53.0	45.0
06/04/2023	09:00	10:00	**50.8**	68.3	40.6	53.6	45.6
06/04/2023	10:00	11:00	**49.2**	74.7	39.0	50.8	42.1
06/04/2023	11:00	12:00	**49.2**	71.4	39.6	51.5	43.5
06/04/2023	12:00	13:00	**50.2**	70.2	39.0	53.3	41.6

APPENDIX B

SOUND LEVEL METER CALIBRATION CERTIFICATE

Manufacturer Calibration Certificate

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3. All tests are traceable in accordance with ISO/IEC 17025.

This model of sound level meter submitted for periodic testing successfully completed the applicable pattern-evaluation tests given in IEC 61672-2. The pattern approval certificate is available at www.nti-audio.com/XL2.

Sound Level Meter

Manufacturer	NTi Audio		
Type	XL2-TA	S/N	A2A-18085-E0
Firmware	V4.21		
Reference Level Range	mid		
Microphone Model	M2230		
Preamplifier	MA220	S/N	8866
Microphone Capsule	MC230A	S/N	A18367
Performance class	Class 1		
Customer Inventory Nr.			

Customer

Date 20 August 2020

Certificate UK-20-054

Results **PASSED**
(for detailed report see next pages)

Operator

David Young

NTi Audio UK Ltd • Office 33C Julians Road • Stevenage
Hertfordshire, SG1 3ES, UK • uk@nti-audio.com

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APPENDIX C

ACOUSTIC CALIBRATOR CALIBRATION CERTIFICATE

NSAI
National Metrology Laboratory

Certificate of Calibration

Issued to	CLV Consulting The NSC Campus Mahon Co. Cork
Attention of	Niall Vaughan

Certificate Number	204549
Item Calibrated	Casella CEL-120/1 Acoustic Calibrator
Serial Number	5072087
ID Number	None
Order Number	PO24112020N2
Date Received	01 Dec 2020
NML Procedure Number	AP-NM-13
Method	The above calibrator was allowed to stabilize for a suitable period in laboratory conditions. It was then calibrated by measuring the sound pressure level generated in its measuring cavity (half-inch configuration). The calibrator's operating frequency was also measured.
Calibration Standards	Norsonic 1504A Calibration System incorporating: Agilent 34401A Multimeter, No. 0736 [Cal due date: 24 Apr 2021] B & K 4134 Measuring Microphone, No. 0743 [Cal due date: 27 May 2022] B & K 4228 Pistonphone, No. 0741 [Cal due date: 26 May 2022]

Calibrated by	David Fleming	Approved by	Paul Hetherington
Date of Calibration	09 Dec 2020	Date of Issue	10 Dec 2020

CIPM MRA

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

Glas Naíon | Baile Átha Cliath 11 | Eire
Glasnevin | Dublin 11 | Ireland T+ 353 1 808 2609 | F+353 1 808 2603 | NSAI.ie

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