
LANCASTER MALONEY MARTIN LIMITED

NOISE IMPACT ASSESSMENT REPORT

MANCHESTER COMMUNICATION ACADEMY, 2A SILCHESTER DRIVE, MANCHESTER M40 8NT

Client: Lancaster Maloney Martin Limited

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1 INTRODUCTION

- 1.1.1 By instruction from Lancaster Maloney Martin Limited ('the client'), NoiseAir was commissioned to conduct a noise impact assessment (NIA) in support of an existing planning application (ref: 138511/FO/23). The proposal is for the erection of single storey extension to existing secondary school to provide a dance studio and changing facilities, together with alterations to the parking area
- 1.1.2 The location for the proposal is: Manchester Communication Academy, 2a Silchester Drive, Manchester M40 8NT, herein referred to as the 'development site'.
- 1.1.3 This report has been commissioned with respect to discharging the condition issued by the local authority which reads as follows:

'5) a) Any externally mounted ancillary plant, equipment and servicing to be installed shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. Prior to its installation, the scheme shall be submitted to and approved in writing by the City Council as Local Planning Authority in order to secure a reduction in the level of noise emanating from the site.

b) Prior to any externally mounted ancillary plant, equipment and servicing to be installed becoming operational, an approved verification report shall be submitted to and approved in writing by the City Council as Local Planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria have been met. Any instances of non - conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

Reason - To minimise the impact of the development and to prevent a general increase in pre-existing background noise levels around the site, pursuant to saved policy DC26 of the Unitary Development Plan for the City of Manchester and policies DM1 and SP1 of the Manchester Core Strategy.'

- 1.1.4 General limitations with respect to this NIA are presented in **Appendix A**.

1.2 Site Description and development proposals

- 1.2.1 At the time of writing, the development site consists of ground level car park and grass verge.
- 1.2.2 The development site is located approximately 3.0 km northeast of Manchester city centre. The local area is predominantly residential.
- 1.2.3 The site is flanked to the west by the existing Manchester Community Academy buildings beyond which runs Rochdale Road which accommodates various vehicle types across 3 lanes on either side of the road.
- 1.2.4 To the south runs the existing car park access road which runs on to Silchester Drive which is a road that accesses the local residential estate.
- 1.2.5 The site is flanked to the east by vegetation and to the north an existing car park beyond which there is a local housing estate.
- 1.2.6 Proposals for the development site are to erect a single storey extension directly adjoining the east faced of the existing building to provide a dance studio and changing facilities, together with alterations to the parking area
- 1.2.7 It is understood that the proposed development and associated external commercial noise sources will not operate during the hours of 23:00 to 07:00.
- 1.2.8 **Figure 1** presents an aerial image of the proposed development site with respect to the local area and its context. The image also annotates the approximate location of the existing NSRs.



1.2.10 All Lancaster Maloney Martin drawings and technical data relating rooftop plant received at the time of writing are presented in **Appendix B**.

2 ASSESSMENT METHODOLOGY AND SCOPE OF WORKS

2.1 Consultation and Scope of Works

- 2.1.1 Given the condition presented in section 1 and the context of the local area, it is considered a requirement to conduct a detailed NIA on the proposed commercial noise sources presented in **Figure 2**.
- 2.1.2 The NIA presented in this report is based on site specific data collected at the development site and technical manufacturers noise data and assesses the likely impacts of the proposals with respect to existing local noise sensitive receptors (NSRs).

2.2 Assessment Criteria

- 2.2.1 Given the condition requests that the assessment should demonstrate that the proposal does not present a rating level in excess of 5 dB(A) below the prevailing background noise level, the assessment will be conducted in accordance with BS 4142:2014+A1:2019. A brief summary of the standard is provided below.

British Standard 4142:2014 (BS 4142:2014)

- 2.2.2 British Standard 4142:2014 - Methods for rating and assessing industrial and commercial sound, sets the methodology for rating and assessing sound of an industrial and commercial nature, which includes sound from fixed installations such as mechanical and electrical plant and equipment.
- 2.2.3 In BS 4142:2014, a noise rating is determined and compared with the existing local background sound level based on several more cumulative acoustic feature corrections to apply where appropriate. For example, if the noise includes a distinguishable tone, impulse, intermittency or other readily distinguishable sound characteristic, then additional cumulative penalties individually ranging from 0 to 9 dB may be applied depending on the type of noise.
- 2.2.4 BS 4142:2014 seeks to determine a “representative” background sound level, stating that “...the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods”.
- 2.2.5 The assessment of the impact depends upon the margin by which the rating level of the specific sound source exceeds the background sound level but also promotes a consideration of the context in which the sound occurs when making an assessment. BS 4142:2014 states that an initial estimate of the impact of the specific sound is made by

subtracting the measured background sound level from the rating level, while considering the following points:

- Typically, the greater this difference, the greater the magnitude of the impact;
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and,
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

2.2.6 Therefore, a BS 4142:2014 assessment may deduce a low impact where the specific sound level is below the background sound level.

3 ACOUSTIC SURVEY

3.1 Acoustic Survey Details

3.1.1 NoiseAir conducted primarily unattended fixed position noise monitoring between the 24th of May 2024 and the 28th of May 2024 at the development site (ML1).

3.1.2 ML1 is presented in **Figure 3** and described in **Table 1**.



Figure 3: Noise monitoring location – ML1.

Table 1: Summary of Noise Monitoring Locations				
Monitoring Location Number	Location Description	Time Period Monitored		Attended or Unattended Monitoring
		Start	End / Duration	
ML1	Mounted on a tripod at approximately 1.5m from local ground level	14:45 24/05/24	20:15 28/05/24	Unattended

3.1.3 ML1 was located to be representative of the prevailing background noise levels at the approximate location of the noise sensitive receptors.

3.1.4 The noise measurements were conducted using Class 1, integrating sound level meter (SLM).

3.1.5 The acoustic equipment was calibrated to comply with Section 4.2 of BS 7445-1:2003¹, before and after the noise monitoring periods.

3.1.6 Details of the SLM and associated field calibration are presented in **Table 2**.

Table 2: Summary of the SLMs used for survey and associated field calibration					
SLM (Serial Number)	Preamp (Serial Number)	Microphone (Serial Number)	Start Calibration	End Calibration	Drift
NOR140 (1403342)	NOR1209 (12943)	NOR1225 (96162)	-26.3	-26.5	0.2

3.1.7 The weather conditions were noted to be as presented in **Table 3** during the site visits at the start and end of the monitoring period.

Table 3: Summary of weather conditions noted at the start and end of the monitoring duration.		
Parameter	24 th of May 2024	28 th of May 2024
Roads (Wet / Dry)	Dry	Damp
Temperature (°C)	14	12
Wind speed (ms-1) / direction	1 / SSW	<0.5
Cloud Cover (Approx. %)	100	100
Humidity (%)	70	78

3.1.8 A-weighted² L_{90}^3 was measured to comply with the requirements of BS 4142:2014. A-weighted⁴ L_{eq}^5 and L_{Fmax}^6 noise levels were measured at ML1 to comply with the requirements of BS 8233:2014.

3.1.9 Attending the development site at the start and end of the survey monitoring period provided opportunity for observations and detailed notes to be made of the significant noise sources, which contribute to the measured levels.

ML1

Students playing basketball on the sports pitch adjacent and distant road traffic noise.

¹ BS 7445-2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures.

² An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions.

³ The noise level which is exceeded for 90% of the measurement period.

⁴ An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions.

⁵ Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.

⁶ The instantaneous maximum noise level recorded for a measurement period.

3.2 Measured Sound Levels

3.2.1 Data presented in **Figure 4** details a level vs time graph of the recorded $L_{Aeq,T}$, L_{AFmax} and $L_{A90,T}$ sound levels over 15-minute time periods for the entire monitoring duration at ML1.

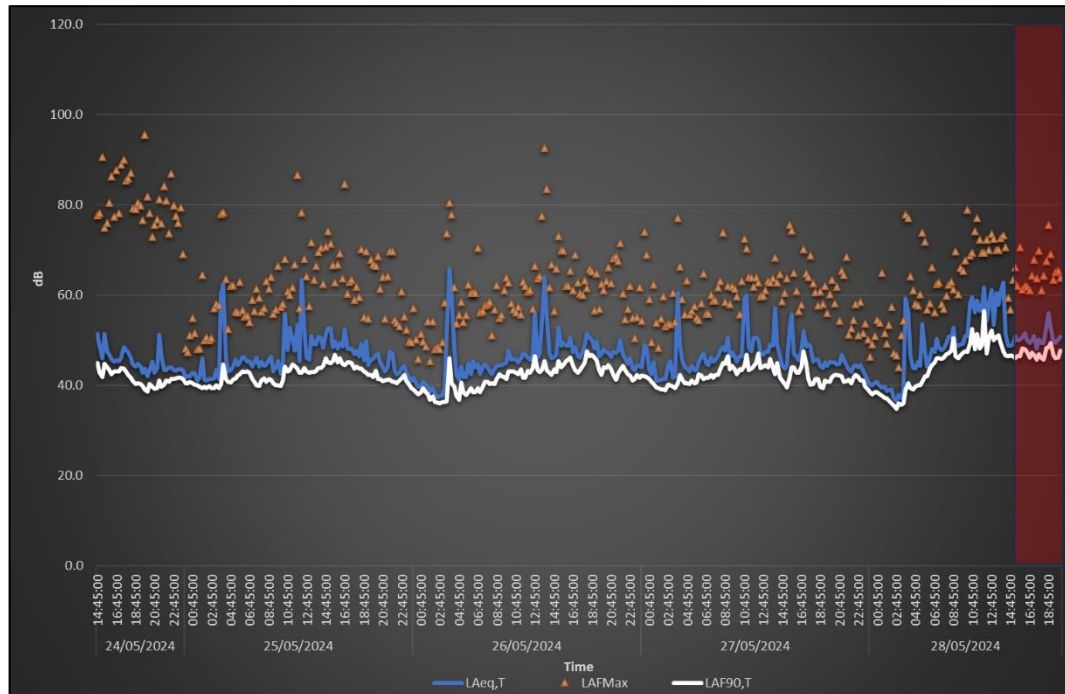


Figure 4: Level vs. time graph presenting $L_{Aeq,T}$, L_{AFmax} and $L_{A90,T}$ sound levels – ML1.

3.2.2 In accordance with BS 4142:2014, any meteorological conditions that may have influenced the measurements at ML1 have been noted and highlighted red in **Figure 4**. This data has been excluded from the dataset and all data that follows in the report is based on the reduced dataset.

3.2.3 The results for ML1 pertinent to the forthcoming assessment are presented in **Table 4**.

Table 4: Range of Measured Daytime Background Noise Levels at ML1		
Monitoring Location	Time	Measured Noise Level
		dB $L_{A90,15mins}$
ML1	07:00-23:00	38.5 – 56.5

3.3 Typical Measured Background Sound Levels

- 3.3.1 A histogram presenting the distribution of existing background sound levels for the daytime at ML1 is presented in **Figure 5**.

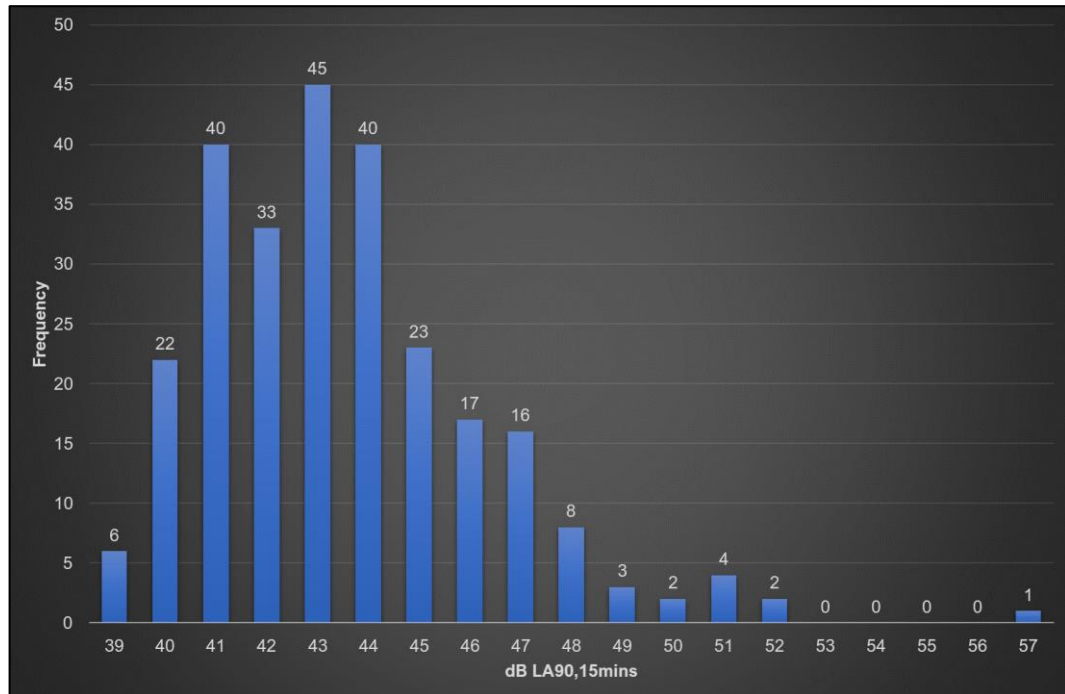


Figure 5: Histogram presenting frequency distribution of background noise readings at ML1 – Daytime.

- 3.3.2 The selected background level to be adopted for the BS 4142:2014 assessment is 41 dB(A).

4 3D SOUND MODEL

4.1 Introduction

4.1.1 At the time of writing, the proposals for the development site are at planning stage and therefore in order to accurately conduct a NIA with respect to the new proposed noise sources it is considered that a 3D sound model should be utilised to calculate the predicted noise levels at selected receptor locations.

4.2 3D Sound Model

4.2.1 A 3D sound model has been constructed in SoundPLAN™ to calculate the predicted sound pressure levels at selected potential receiver facades. The model uses the calculation method from ISO 9613-2:1996⁷ to account for the distance between the source and receiver and any screening or reflections provided by the surrounding buildings. The model is predominantly based on the make and model of the proposed noise sources provided at the time of writing and calibrated to the subsequent manufacturers data.

4.2.2 The 3D noise model specifically includes noise from the following source:

- **Outdoor Air conditioning Unit – Mitsubishi PUZ-ZM140 KYA2–** This was modelled as a point source at approximately 0.5 m from local roof level and calibrated to manufacturers data for heating presented in **Appendix B**.
- **2 no. Extract ducts originating from Extract Fan – Vent Axia ACM 250T –** These were modelled as point sources at approximately 1.0 m from local roof level and calibrated to manufacturers data presented in **Appendix B**.
- **2 no. Extract ducts originating from Heat Recover Unit – Lossnay LGH100RX-E** – These were modelled as point sources at approximately 1.0 m from local roof level and calibrated to manufacturers data at 100% loading as presented in **Appendix B**.
- **Lossnay Enclosure** – this was modelled as a 1.2m long x 1.2m wide x 1.2m high box at roof level with area sources on the roof and 4 sides to represent the noise breakout from the enclosure. The area sources are calibrated to manufacturers data at 100% loading as presented in **Appendix B**.

4.2.3 The 3D model has incorporated topographical data and ground factor of 0.0 to represent a hard reflective surface.

4.2.4 Noise contour plots illustrating the propagation of sound from source to receptor ($L_{Aeq,T}$) condition is presented in **Figure 6**.

⁷ ISO9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation"

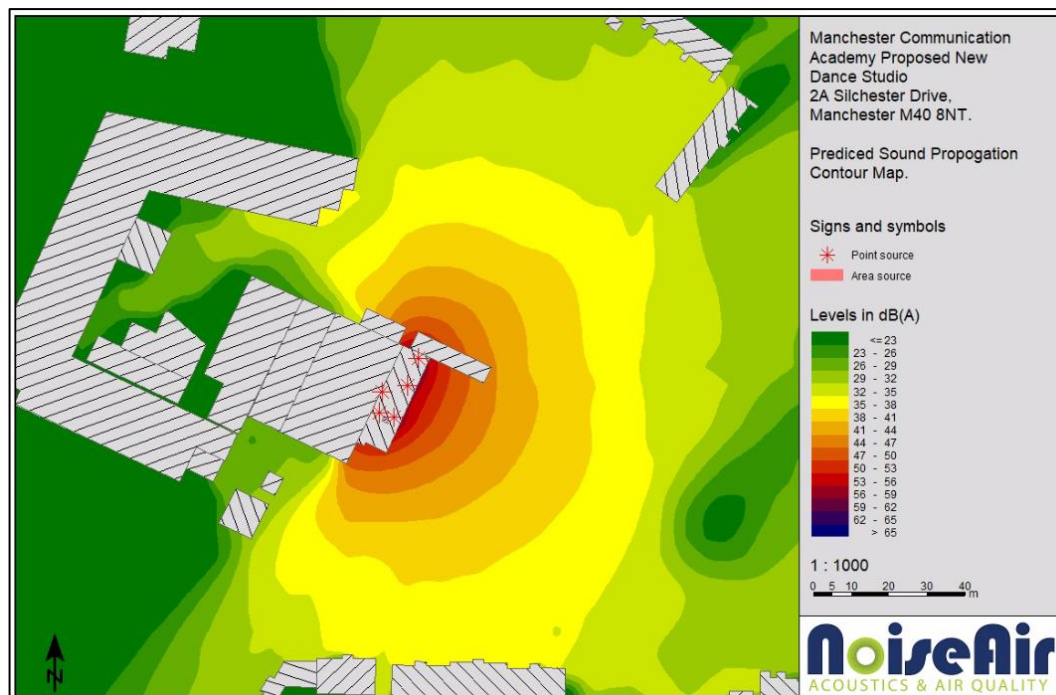


Figure 6: Noise contour plot illustration of the predicted propagation of sound from proposed noise sources to existing NSRs $L_{Aeq,T}$.

4.2.5 Selected receptors and predicted noise levels are presented in **Figure 7**.

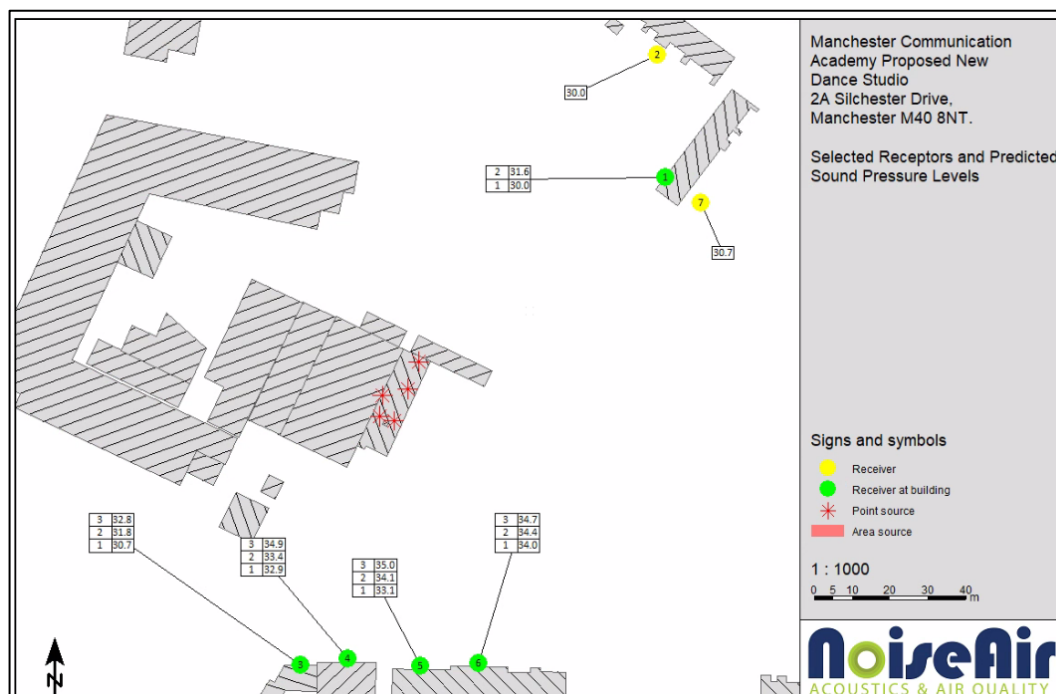


Figure 7: Illustration of the 3D sound model receptor sound pressure levels.

4.2.6 **Table 5** details the predicted noise levels at each receptor location.

Table 5: Predicted Receptor Noise Levels			
Receptor Number	Façade Facing	Floor	Daytime dB $L_{Aeq,T}$
1	NW	GF	30.0
		1.FI	31.6
2	N/A	N/A	30.0
3	N	GF	30.7
		1.FI	31.8
		2.FI	32.8
4		GF	32.9
		1.FI	33.4
		2.FI	34.9
5		GF	33.1
		1.FI	34.1
		2.FI	35.0
6		GF	34.0
		1.FI	34.4
		2.FI	34.7
7	N/A	N/A	30.7

4.3 On-time Calculation 3D Model

- 4.3.1 It is understood that the fans in the changing room are likely to be operating on demand which is when the changing room is in use before and after a class. Given this, it is reasoned that the fans will operate for approximately 15 minutes in a 1 hour reference period. Therefore, a second model includes a -6 dB correction to each octave band to account for on-time operation of the Vent Axia fans.
- 4.3.2 Noise contour plots illustrating the propagation of sound from source to receptor ($L_{Aeq,T}$) condition is presented in **Figure 8**.

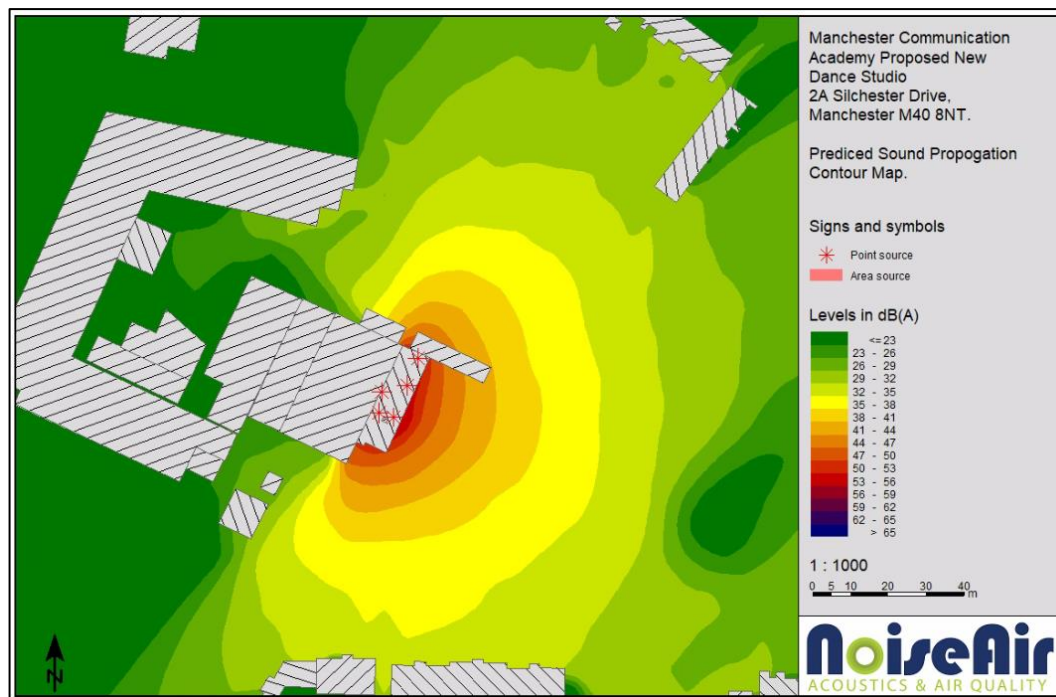


Figure 8: Noise contour plot illustration of the predicted propagation of sound from proposed noise sources to existing NSRs $L_{Aeq,T}$.

4.3.3 Selected receptors and predicted noise levels are presented in **Figure 9**.

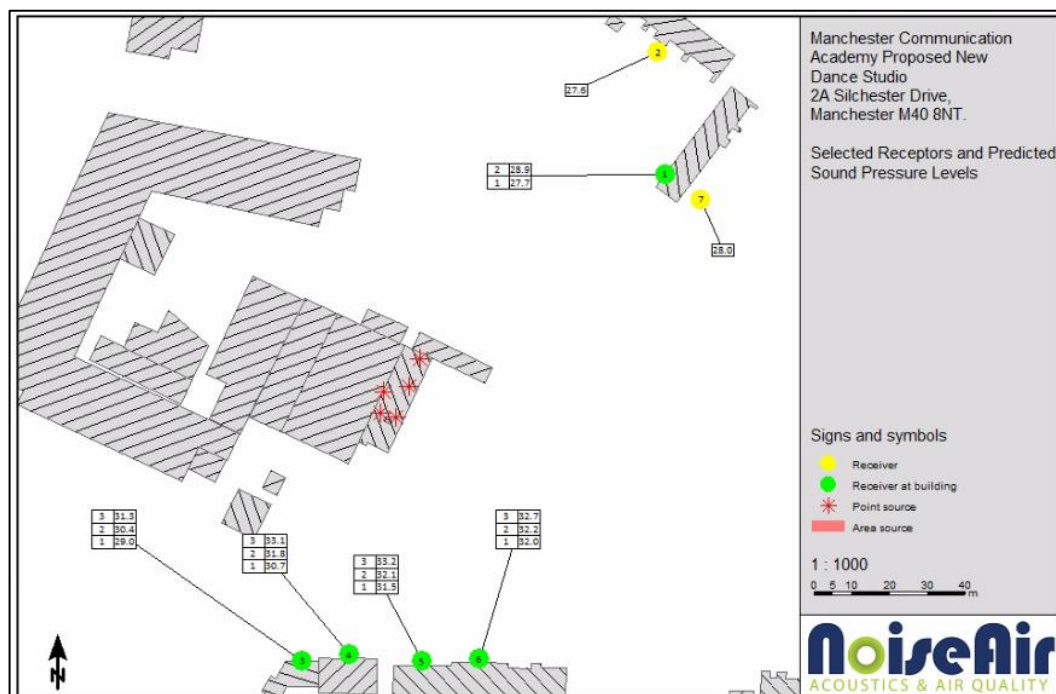


Figure 9: Illustration of the 3D sound model receptor sound pressure levels.

4.3.4 **Table 5** details the predicted noise levels at each receptor location.

Table 6: Predicted Receptor Noise Levels			
Receptor Number	Façade Facing	Floor	Daytime dB $L_{Aeq,T}$
1	NW	GF	27.7
		1.FI	28.9
2	N/A	N/A	27.6
3	N	GF	29.0
		1.FI	30.4
		2.FI	31.3
4		GF	30.7
		1.FI	31.8
		2.FI	33.1
5		GF	31.5
		1.FI	32.1
		2.FI	33.2
6		GF	32.0
		1.FI	32.2
		2.FI	32.7
7	N/A	N/A	28.0

5 SITE NOISE RISK ASSESSMENT

5.1 Introduction

- 5.1.1 Given the potential impact of noise from the commercial sources at roof level, a BS 4142:2014 has been conducted with respect to existing local receptors.

5.2 BS 4142:2014 + A1:2019 Assessment.

Background Sound Level

- 5.2.1 The typical background sound level adopted for this assessment is 41 dB $L_{AF90,15mins}$.

Specific Sound Level

- 5.2.2 With reference to **Table 5** the worst case façade and outdoor amenity receptor is 33 dB(A) and 28 dB(A) at receptors 5 and 7, respectively.

Character Corrections

- 5.2.3 Given the assessment is at planning stage, a subjective assessment of the character of the noise is not possible. Based on NoiseAir experience of assessing similar extract system, the following character corrections are applied:

- **Tonality** – +2 dB(A). Tonal character is typically associated with the noise from air conditioning condensers and mechanical fans however given the difference between the specific sound and the background level of at least 8 dB(A), the tonal component likely at source is likely to be just perceptible at the receptor.
- **Impulsivity** – Impulsive character is typically associated with crashes and bangs; the proposed noise sources is not likely to be associated with these impulsive sounds and therefore a correction is not applicable.
- **Intermittency** – It is understood that the noise sources will be operated based on demand and therefore likely to have intermittent character at source. However, given the difference between the specific sound and the background level of at least 8 dB(A), the intermittent character likely at source is likely to be masked by the prevailing $L_{Aeq,T}$.

Initial Assessment

- 5.2.4 The BS 4142:2014 initial assessment based on the calculated noise levels with respect to the worst case NSR façade and outdoor amenity receptor is presented in **Table 7**.

Table 7: BS 4142:2014 Initial Assessment at worst affected receptor facade		
Quantity	Sound level	
	dB	
	Facade	Outdoor Amenity Receptor
Typical Background Sound Level, $L_{A90,15mins}$	41	
Worst Case Specific sound level, $L_{Aeq,1hour}$	33	28
Acoustic feature correction	+2	
Rating Level	35	30
Excess of Rating Level over Background Sound Level	-6	-11
Initial Assessment impact	Low	

BS 4142:2014 Assessment Context, uncertainty and recommendations

- 5.2.5 The initial assessment presented in **Table 7** predicts that the proposed operations present a low impact at the NSRs. **Table 7** also indicates that the predicted rating level is 6 dB(A) below the prevailing background noise level.

Uncertainty

- 5.2.6 Uncertainty of measurements can have a significant effect on the outcome and findings of an assessment and therefore such constraints are documented and discussed below.
- 5.2.7 The SLM used was a Norsonic Class 1 SLM, it is generally recognised that Class 1 SLM's offer an uncertainty of ± 1.0 dB(A). The instrumentation used for the survey has been calibrated by UKAS approved laboratories.
- 5.2.8 The sound levels measured (which include busier and quieter periods) are considered typical for the area.
- 5.2.9 Wind speeds during the measurement period adopted for the assessment were typically less than 5 ms⁻¹ and the effect of wind generated noise is not considered to have a significant impact on this assessment.
- 5.2.10 The specific noise level at the worst case NSR has been calculated using a 3D sound model, however a conservative assessment of background levels and rating levels has been conducted.
- 5.2.11 It is therefore considered that in this instance the uncertainty of the calculations may have minimal influence on the outcome of this assessment, however no further steps are required to increase confidence in the results.

Recommendations

- 5.2.12 Commercial systems like the ones proposed are typical of an increase in noise with age. Given this, it is recommended that the system is serviced at regular intervals such that the noise levels predicted in this assessment do not elevate.
- 5.2.13 It is recommended that given the predicted low impact outcome of the BS 4142:2014 assessment and that the predicted rating level does not exceed 5 dB(A) below the prevailing background noise level, the condition stated in section 1 should be partially discharged.
- 5.2.14 The condition requests a verification report which subject to the outcome would facilitate the full discharge of the condition.
- 5.2.15 If the post installation BS 4142:2014 assessment demonstrates that the rating level does not exceed 5 dB(A) below the prevailing background noise it is reasoned that this would be sufficient evidence to fully discharge the condition.

6 CONCLUSIONS

- 6.1.1 NoiseAir has conducted a noise impact assessment with respect to the proposed development and external commercial noise sources at the location: Manchester Communication Academy, 2a Silchester Drive, Manchester M40 8NT.
- 6.1.2 A BS 4142:2014 assessment has been conducted with respect to the noise impact of the proposed external commercial noise sources on existing noise sensitive receptors.
- 6.1.3 The assessment indicates that a low impact is likely and that the rating level is not likely to exceed 5 dB(A) below the prevailing background noise level. As such, it is recommended that the condition stated in section 1 is partially discharged.
- 6.1.4 Post installation, the condition requests that a verification assessment is conducted. Subject to the outcome demonstrating that the rating level does not exceed 5 dB(A) below the prevailing background noise level, it is reasoned that the condition should be fully discharged.

APPENDIX A - REPORT LIMITATIONS

This Report is presented to Lancaster Maloney Martin Limited may not be used or relied on by any other person or by the client in relation to any other matters not covered specifically by the scope of this report.

Notwithstanding anything to the contrary contained in the report, NoiseAir Limited is obliged to exercise reasonable skill, care and diligence in the performance of the services required by Lancaster Maloney Martin Limited and NoiseAir shall not be liable except to the extent that it has failed to exercise reasonable skill, care and diligence, and this report shall be read and construed accordingly.

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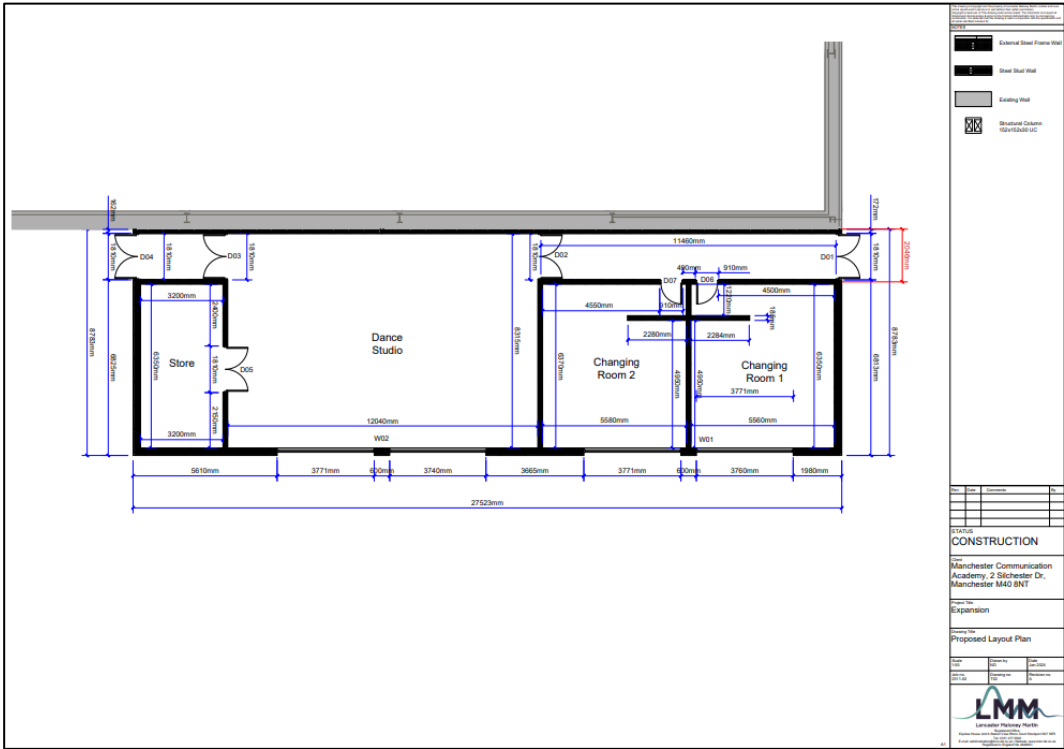
The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from who it has been requested and that such information is accurate. Information obtained by NoiseAir Limited has not been independently verified by NoiseAir Limited unless otherwise stated in the report and should be treated accordingly.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

Where / if estimates and projects are made within this report, are made based on reasonable assumptions as of the date of this report, such statements however by their very nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. NoiseAir Limited specifically does not guarantee or warrant any estimates or projects contained in this report.

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APPENDIX B – DRAWINGS AND TECHNICAL DATA

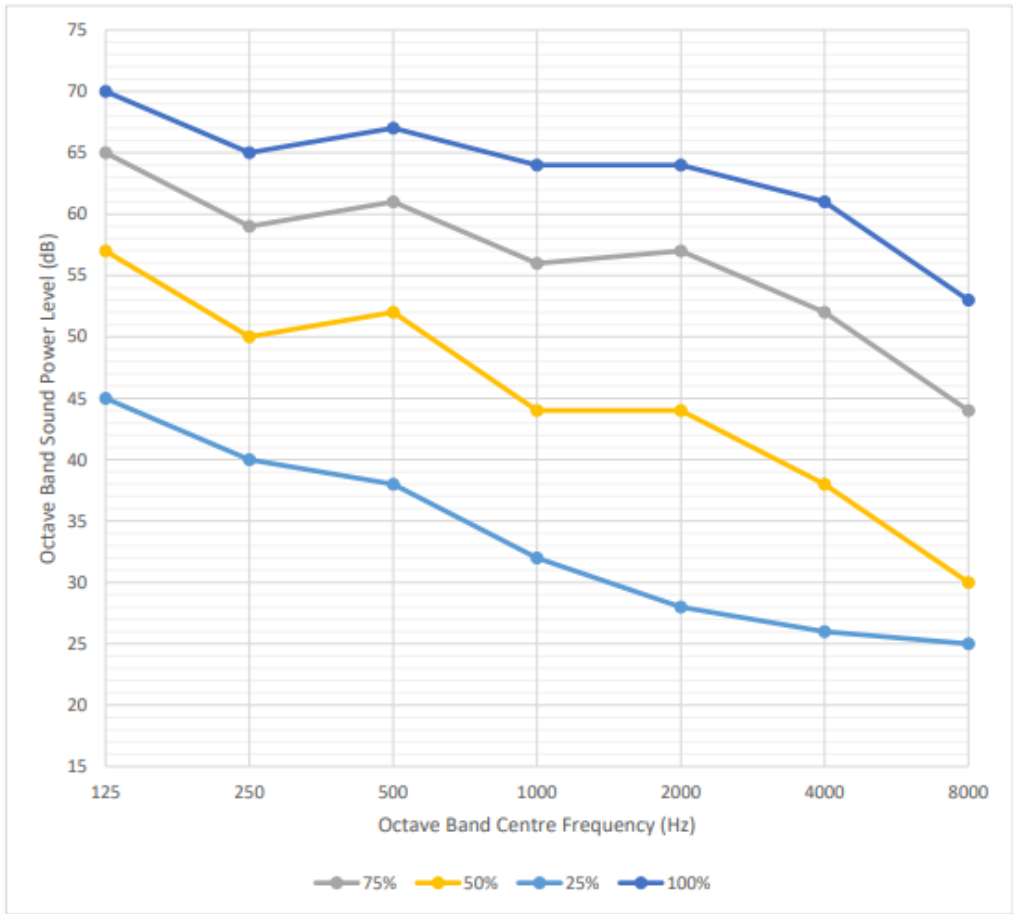


Lossnay Extract Noise Data



Model LGH-100RVX3-E
Measurement In-Duct

Sound power octave band based on reference data calculated at standard operating conditions. The data represents the outlet (supply) duct which is the loudest duct.
Measurements below 15dB are shown as <15 in the table and omitted from the graph.



		Sound power (dB) Octave band centre frequency (Hz)						
		125	250	500	1000	2000	4000	8000
Fan setting	100%	70	65	67	64	64	61	53
	75%	65	59	61	56	57	52	44
	50%	57	50	52	44	44	38	30
	25%	45	40	38	32	28	26	25

Issued by Mitsubishi Electric UK

MELVEST Version
Date

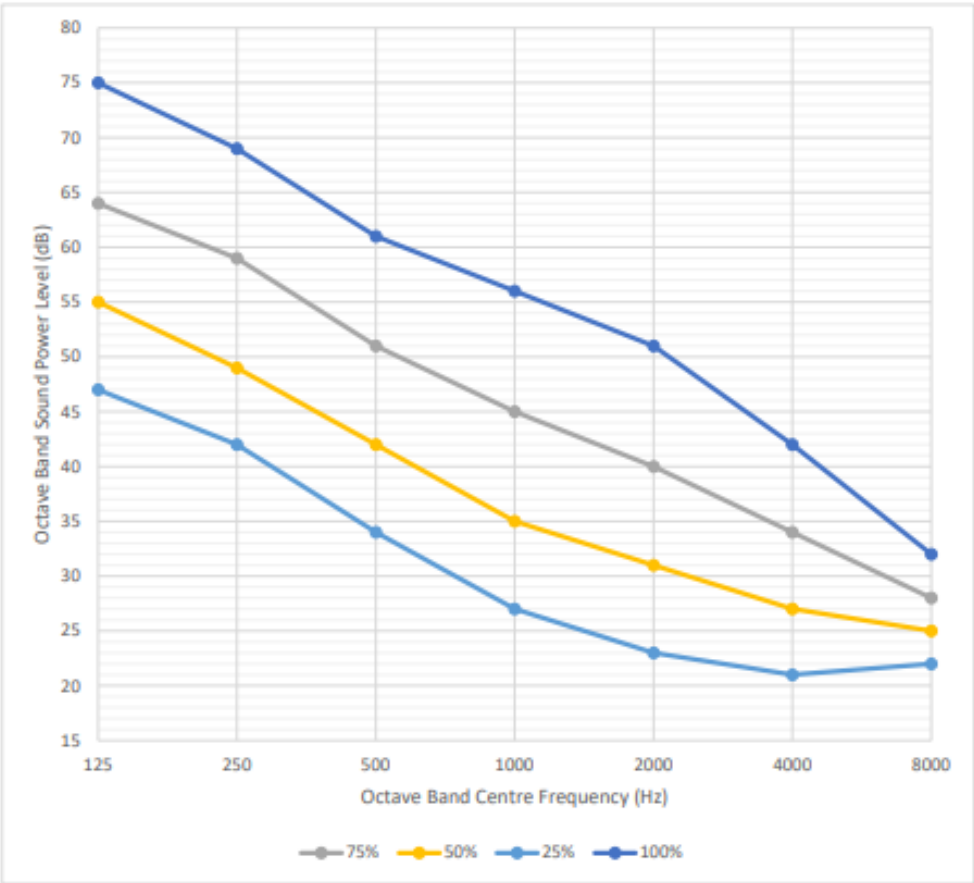
N/A
Feb-24

Lossnay Enclosure Noise Data



Model LGH-100RVX3-E
Measurement Case Radiated Breakout

Sound power octave band test based on ISO 3744:2010 at standard operating conditions. For duty point specific data contact Mitsubishi Electric.
Measurements below 15dB are shown as <15 in the table and omitted from the graph.



		Sound power (dB) Octave band centre frequency (Hz)						
		125	250	500	1000	2000	4000	8000
Fan setting	100%	75	69	61	56	51	42	32
	75%	64	59	51	45	40	34	28
	50%	55	49	42	35	31	27	25
	25%	47	42	34	27	23	21	22

Issued by Mitsubishi Electric UK

MELVEST Version ver1.2.1
Date Feb-24

Vent Axia Noise Data

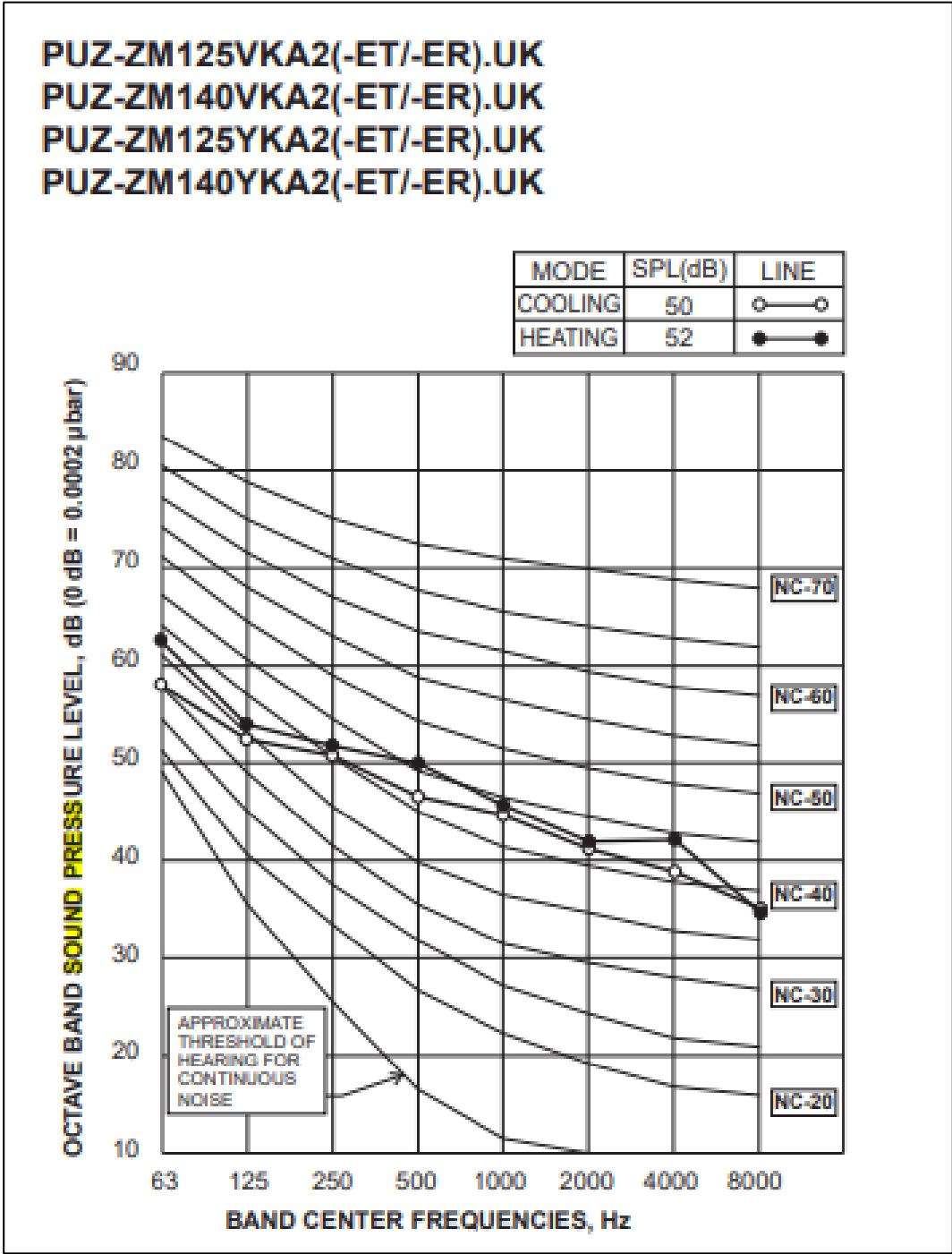
Dia.	Stock Ref.	Poles	r.p.m	IP Rating	Curve Ref.	l/s @ Pa					S.C. Amps	F.L.C Amps	dB(A) @ 3m
						0	100	200	300	400			
250	17110010	2	2720	IP54	1	450	410	350	120	40	0.8	1	53
315	17112010	2	2840	IP54	2	650	610	540	460	150	1.2	1.6	56

Sound Data

Dia.	Spectrum	125	250	500	1k	2k	4k	8k	dB(A) @ 3m
250	Inlet	34	54	61	65	67	66	55	72
250	Outlet	39	64	68	71	70	66	55	78
250	Breakout	34	41	43	46	46	42	37	54
315	Inlet	45	60	66	68	69	67	56	75
315	Outlet	47	69	73	74	72	66	57	79
315	Breakout	38	41	46	50	49	46	41	58

Vent-Axia

Mitsubishi Condenser Noise data



APPENDIX C - GLOSSARY

A-weighted sound pressure, p_A	Value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network. <i>NOTE: The A-weighting network modifies the electrical response of a sound level meter with frequency in approximately the same way as the sensitivity of the human hearing system.</i>
A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure in decibels (dBA).
Acoustic environment	Sound from all sound sources as modified by the environment [BS ISO 12913-1:2013].
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. <i>NOTE: The ambient sound comprises the residual sound and the specific sound when present.</i>
Ambient sound level, $L_a = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T <i>NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.</i>
Background sound	Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location.
Background sound level, $L_{A90,T}$ (BS 4142:2014)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Break-in	Noise transmission into a structure from outside.
Break-out	Noise transmission from inside a structure to the outside.
Cross-talk	Noise transmission between one room and another room or space via a duct or other path.
C_{tr}	Correction term applied against the sound insulation single-number values (R_w , D_{w1} and $D_{nT,w}$) to provide a weighting against low frequency performance. <i>NOTE: The reference values used within the C_{tr} calculation are based on urban traffic noise.</i>
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ (BS 4142:2014)	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time.
Equivalent sound absorption area of a room, A	Hypothetical area of a totally absorbing surface without diffraction effects, expressed in square metres (m ²), which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration
Facade level	Sound pressure level 1 m in front of the façade. <i>NOTE: Facade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the facade.</i>
Free-field level	Sound pressure level away from reflecting surfaces. <i>NOTE: Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e., not 3.5 m from the reflecting surface in the direction of the source). Estimates of noise from aircraft overhead usually include a correction of 2 dB to allow for reflections from the ground.</i>

Impact sound pressure level, L_i	Average sound pressure level in a specific frequency band in a room below a floor when it is excited by a standard tapping machine or equivalent.
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants. <i>NOTE: The location(s) within the room at which the ambient indoor noise is to be measured or calculated ought to be considered.</i>
Measurement time interval, T_m (BS 4142:2014)	Total time over which measurements are taken. <i>NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.</i>
Noise criteria	Numerical indices used to define design goals in a given space.
Noise rating, NR	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves.
Normalised impact sound pressure level, L_n	Impact sound pressure level normalized for a standard absorption area in the receiving room. <i>NOTE: Normalised impact sound pressure level is usually used to characterize the insulation of a floor in a laboratory against impact sound in a stated frequency band.</i>
Octave band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.
Percentile level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting "F", which is exceeded for $N\%$ of a specified time interval.
Reference time interval, T_r (BS 4142:2014)	Specified interval over which the specific sound level is determined. <i>NOTE: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h.</i>
Residual sound (BS 4142:2014)	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, $L_r = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T .
Rating level, L_{A,r,T_r}	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise. <i>NOTE: This is used in BS 7445 and BS 4142 for rating industrial noise, where the noise is the specific noise from the source under investigation.</i>
Reverberation time, T	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped.
Sound exposure level, L_{AE}	Level of a sound, of 1 s duration, that has the same sound energy as the actual noise event considered.
Sound level difference, D	Difference between the sound pressure level in the source room and the sound pressure level in the receiving room.
Sound pressure, p	Root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound.
Sound pressure level, L_p	Quantity of sound pressure, in decibels (dB).
Sound reduction index, R	Laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,T_r}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .
Specific sound source (BS 4142:2014)	Sound source being assessed.
Standardised impact sound pressure level, L'_{nT}	Impact sound pressure level normalized to a reverberation time in the receiving room of 0.5 s.
Standardised level difference, D_{nT}	Difference in sound level between a pair of rooms, in a stated frequency band, normalized to a reference reverberation time of 0.5 s for dwellings.
Groundborne noise	Audible noise caused by the vibration of elements of a structure, for which the vibration propagation path from the source is partially or wholly through the ground. <i>NOTE Common sources of ground-borne noise include railways and heavy construction work on adjacent construction sites.</i>
Structure-borne noise	Audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements. <i>NOTE Common sources of structure-borne noise include building services plant, manufacturing machinery and construction or demolition of the structure.</i>
Third octave band	Band of frequencies in which the upper limit of the band is 2% times the frequency of the lower limit.
Weighted level difference, D_w	Single-number quantity that characterizes airborne sound insulation between rooms, but which is not adjusted to reference conditions. <i>NOTE Weighted level difference is used to characterize the insulation between rooms in a building as they are. Values cannot normally be compared with measurements made under other conditions (see BS EN ISO 717-1).</i>
Weighted normalised impact sound pressure level, $L'_{n,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or
Weighted standardised impact sound pressure level $L'_{nT,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted standardised level difference, $D_{nT,w}$	Single-number quantity that characterizes the airborne sound insulation between rooms.

Symbols

D_w	Weighted level difference (dB)
D_{nT}	Standardized level difference (dB)
$D_{nT,w}$	Weighted standardized level difference (dB)
L_{Amax}	Maximum noise level (dB)
L_{Ar,T_r}	Rating level (dB)
L_n	Normalised impact sound pressure level (dB)
L'_{nT}	Standardised impact sound pressure level (dB)
$L'_{nT,w}$	Weighted standardised impact sound pressure level (dB)
$L'_{n,w}$	Weighted normalised impact sound pressure level (dB)
L_p	Sound pressure level (dB)
L_{pA}	A-weighted sound pressure level (dB)
$L_{AN,T}$	Percentile level (dB)
L_{AE}	Sound exposure level (dB)
$L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level (dB)
p	Sound pressure (Pa)
p_A	A-weighted sound pressure (dB)
$p_{A(t)}$	Instantaneous A-weighted sound pressure (Pa)

R	Sound reduction index (dB)
R_w	Weighted sound reduction index (dB)
T	Time interval (also used for reverberation time) (s)
t_0	Reference time interval (s)

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