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Environmental Noise Survey

Prepared: 5th December 2023

Report No	22709-1
Client	Neil Boddinson Associates Ltd
Site	Salon 28 Market Street Lichfield WS13 6LH

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1. Quality Management

Report Number	22709 - 1
Issue	Issue 1
Prepared	5th December 2023
Prepared By	[redacted]
Authorised By	

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3. Executive Summary

3.1.1. An environmental noise assessment has been carried out for a proposed development to convert a Salon into a bar with a late license at 28 Market Street, Lichfield, WS13 6LH.

3.2. Measurement, Assessment and Evaluation

3.2.1. The survey was carried out to BS7445-1:2003[1] and BS7445-2:1991[2].

3.3. Scope

3.3.1. This report covers all aspects of the noise survey, including:

the identification of acoustic design criteria;
an objective sound pressure level survey of the existing site;
analysis of the data; and,
the design of any mitigation to meet the required internal noise criteria.

3.4. Conclusions Summary

3.4.1. An environmental noise survey has been carried out for a proposed development to convert a Salon into a bar with a late license at 28 Market Street, Lichfield, WS13 6LH.

3.4.2. Amplified music noise breakout from the bar and external fixed mechanical plant to existing residential receivers has been considered.

3.4.3. In this case, the predicted noise breakout from amplified music to the nearest residential receiver is 52dBA worst-case, which is approximately -6dB below the existing ambient noise levels during night-time external to the first floor window that overlooks the High Street. There is a low risk of this affecting the residential receptors inside the dwelling.

3.4.4. A numerical BS4142 assessment of the external fixed mechanical plant shows that the specific sound will have a low impact on existing residential receivers and, generally, the lower the rating level is relative to the background sound level, the less likely it is that the specific sound source will have an adverse impact.

[1] BS7445-1:2003 "Description and measurement of environmental noise – Part 1: Description of quantities and procedures"
[2] BS7445-2:1991 "Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use"

4. Contents

5. Background

5.1. Noise Policy Statement for England

5.1.1. The Noise Policy Statement for England (NPSE), published in March 2010, states the long-term vision of Government noise policy is to *"promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".*

5.1.2. This long-term vision is supported by the following aims; through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

Avoid significant adverse impacts on health and quality of life;
Mitigate and minimise adverse impacts on health and quality of life;
Where possible, contribute to the improvement of health and quality of life.

5.1.3. The intention is that the NPSE should apply to all types of noise apart from noise in the workplace (occupational noise).

5.2. National Planning Policy Framework

5.2.1. The National Planning Policy Framework (NPPF) was published on the 27th of March 2012 and was most recently updated on the 20th July 2021; it sets out the Government's planning policies for England and how these are expected to be applied. The framework states that the planning system should contribute to and enhance the natural and local environment by:

> *"*preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability*"*.

5.2.2. The NPPF requires that new developments be appropriate to their locations such that the effects of pollution on health have been taken into account. Planning policies and decisions should aim to:

1. avoid noise giving rise to significant adverse impacts on health and the quality of life;
2. mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development; and,
3. identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value.

5.2.3. Existing businesses near to proposed development should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

5.3. National Planning Practice Guidance

5.3.1. The National Planning Practice Guidance (PPG) is a web-based resource, launched by the Department for Communities and Local Government (DCLG) which was published on the 29th November 2016 and is regularly updated to reflect the changes made to the NPPF and make it more accessible.[3]

[3] http://planningguidance.communities.gov.uk/

5.3.2. There are a number of factors that determine whether a noise could be a concern to a receptor. These include: the absolute level of the noise and when it occurs, whether it is existing or new to the area, temporal characteristics, spectral content and the acoustic absorption in the area.

Perception	Examples of outcomes	Effect level	Action
Not noticeable	No effect	No observed effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect (NOAEL)	No specific measures required
	Lowest Observed Adverse Effect Level (LOAEL)		
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
	Significant Observed Adverse Effect Level (SOAEL)		
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very intrusive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 1 – Noise exposure hierarchy

5.3.3. It is emphasised in the PPG that the planning process should be used to mitigate and minimise the impact of noise. This could include: engineering the noise sources to be quiet, minimising the impact of noise through layout, using conditions/obligations to restrict activities, mitigating the impact in places where noise is likely to be experienced (e.g. using facade sound insulation).

PPG and Agent of Change

5.3.4. Where residential development is proposed close to existing commercial premises. Suitable mitigation measures may need to be put in place to avoid those activities having a significant adverse effect on future residents.

5.3.5. Where this is the case, the developer (or 'agent of change') would need to identify commercial premises that could cause a noise nuisance. This should include potential future noise sources that may not be present at the time a planning application is made. The agent of change will also need to mitigate and minimise noise to avoid potential significant adverse effects.

> "Adopting this approach may not prevent all complaints from the new residents/users about noise or other effects, but can help to achieve a satisfactory living or working environment, and help to mitigate the risk of a statutory nuisance being found if the new development is used as designed (for example, keeping windows closed and using alternative ventilation systems when the noise or other effects are occurring)."
>
> NPPG 009 Reference ID: 30-009-20190722 - Revision date: 22nd July 2019

5.3.6. What constitutes noise, as opposed to sound, is subjective and there is not a simple relationship between the level of a sound and the impact on those affected but could be dependent on:

- the source and absolute level of the noise;
- the time of day it occurs;
- how a new noise source and/or receiver relates to the existing sound environment; and,
- the time and frequency characteristics of the noise

5.3.7. It is emphasised in the PPG that the planning process should be used to mitigate and minimise the impact of noise. This could include:

- engineering the noise sources to be quiet;
- minimising the impact of noise through layout;
- using conditions/obligations to restrict activities; and,
- mitigating the impact in places where noise is likely to be experienced (e.g. using facade sound insulation).

> "More specific factors to consider when relevant include:"
> "whether any adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time (and the effect this may have on living conditions). In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations."
> Paragraph: 006 Reference ID: 30-006-20190722 Revision date: 22nd July 2019

5.3.8. Care should be taken when considering mitigation to ensure the envisaged measures do not make for an unsatisfactory development.

5.3.9. It is possible that noise effects may be counteracted by providing: quiet facades containing habitable rooms, quiet private gardens or balconies, or quiet public amenity space within 5-minute walking distance.

6. Introduction

6.1.1. An environmental noise survey has been carried out for a proposed development to convert a Salon into a bar with a late license at 28 Market Street, Lichfield, WS13 6LH.

6.1.2. Amplified music noise breakout from the bar including external fixed mechanical plant to existing residential receivers has been considered.

6.2. Proposed Development

6.2.1. An image showing the location of the Proposed Development is given in Figure 1.

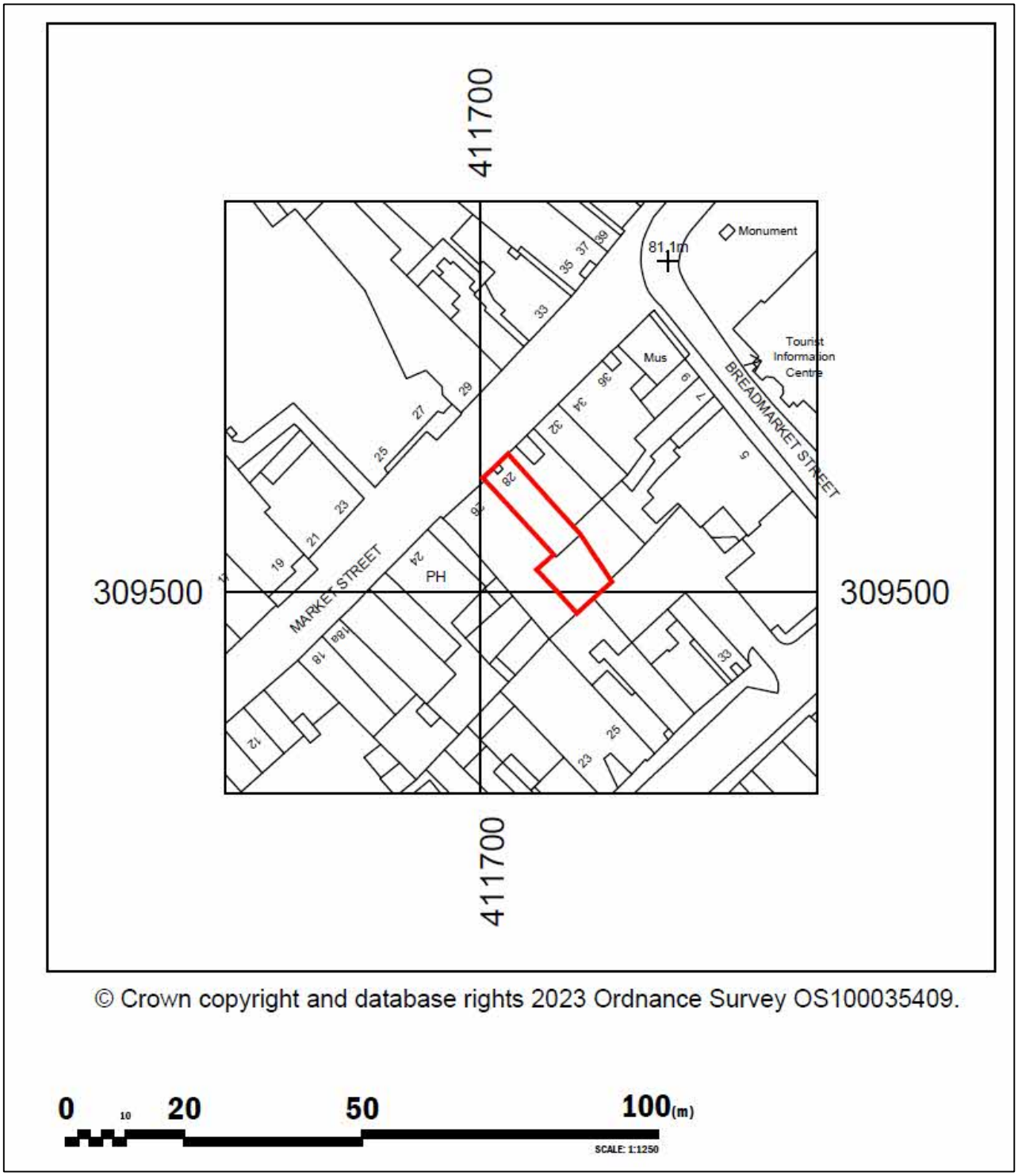


Figure 1 - Plan showing the location of the Proposed Development

6.2.2. The floor plans and elevations which include a single A/C unit at the rear of the proposed bar is shown in Figure 2.

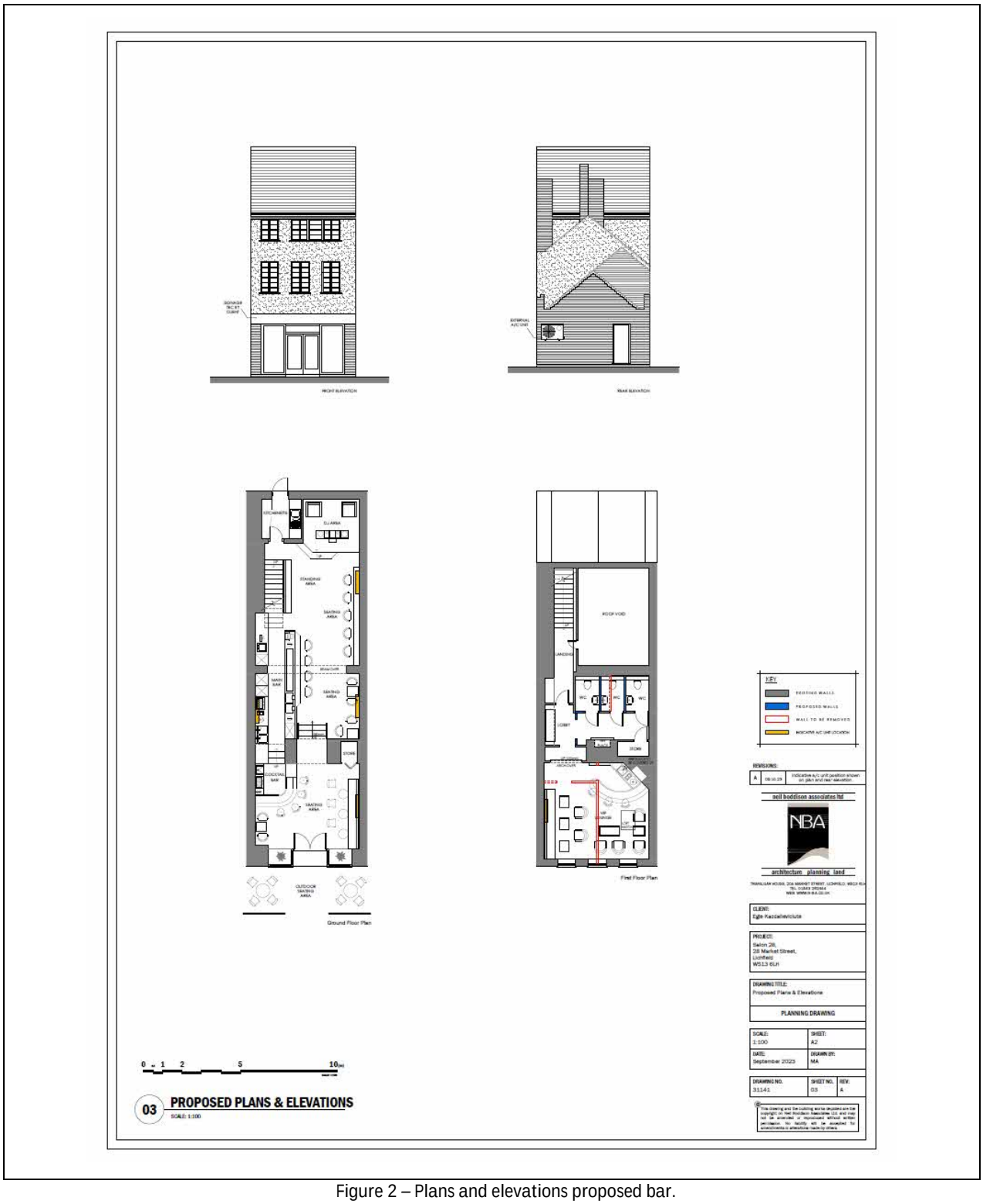


Figure 2 – Plans and elevations proposed bar.

6.2.3. It is expected that amplified music will be located on ground floor based on the standing area/DJ area indicated on the plans.

6.3. Existing Residential Receivers

6.3.1. The nearest existing residential receivers have been identified to be flats along the front including the rear next to the proposed development. This is shown on a google street view in Figure 3 and aerial view in Figure 4, see red arrow.

Figure 3 - Nearest existing residential receivers

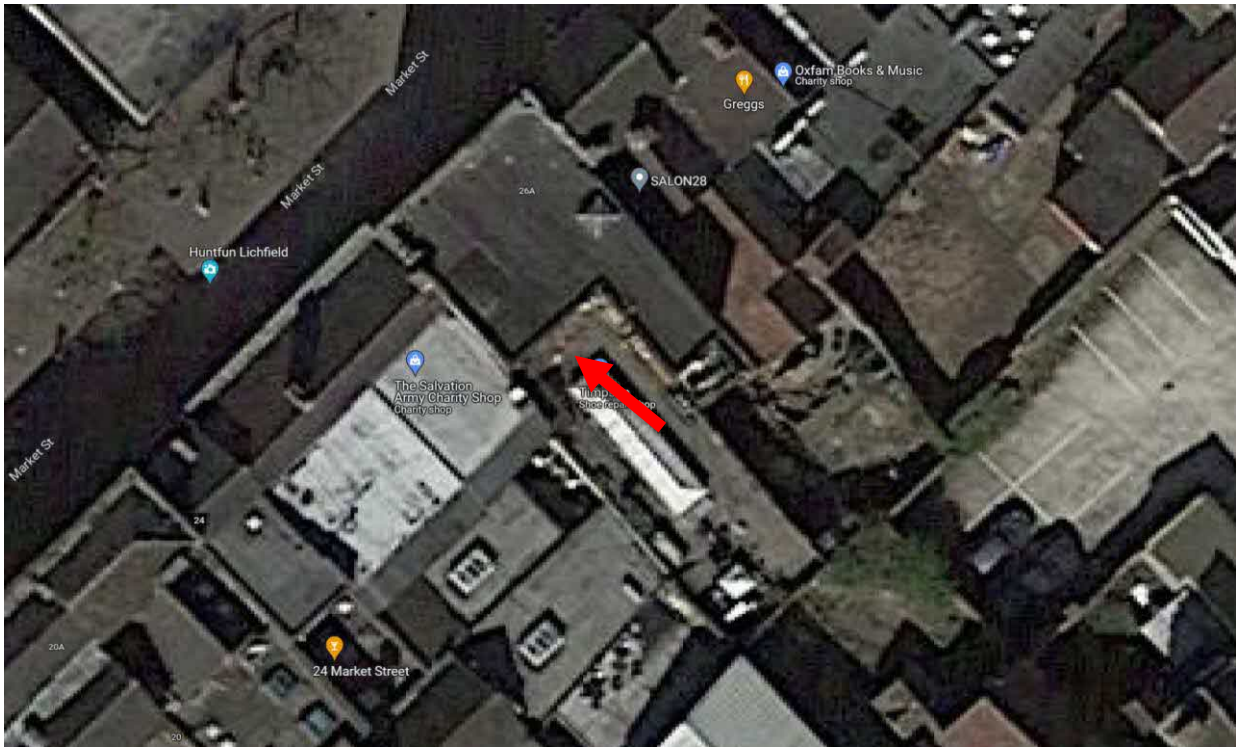


Figure 4 – Nearest residential receivers at the rear

6.4. Noise Climate

6.4.1. At the time of the survey visits, the survey technician noted that the noise climate was dominated by noise from High St activity and surrounding road networks.

7. Assessment Criteria

7.1. BS4142:2014

7.1.1. BS4142 provides methods for rating and assessing specific sound sources of an industrial and/or commercial nature, which includes: industrial and manufacturing processes, fixed services plant, sound generated by the loading/unloading of goods and sound from mobile plant/vehicles associated with industrial/commercial premises (e.g. fork-lift trucks). The assessment location is outside a residential receptor.

7.1.2. The standard is specifically precluded from being used to assess the likely impact inside a building or from the assessment of various sound sources for which other (more relevant) guidance exists, including: music/entertainment noise, noise from people and construction noise.

7.1.3. The foundation of the assessment is to establish the following quantities, either by measurement or prediction:

Ambient sound: The overall sound at the assessment location

Residual sound: The ambient sound without the specific sound source operating

Specific sound: The ambient sound with the specific sound source operating, corrected for residual sound

Background sound: Residual sound present for 90% of the time

7.1.4. How these quantities relate to the sound that would be measured during a survey has been illustrated in Figure 5.

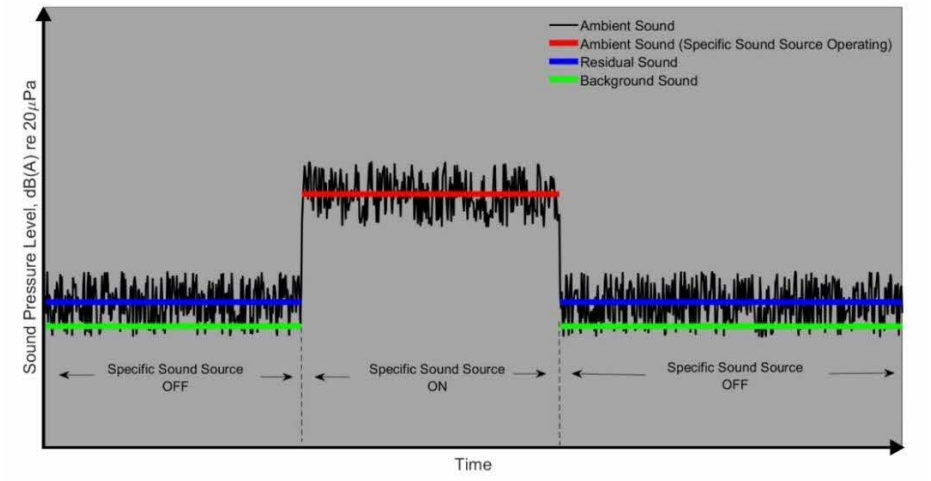


Figure 5 – Diagrammatic illustration of the definitions of ambient, residual, specific and background sound

7.1.5. Once the specific sound level has been determined, this must be corrected for the presence of acoustic features that are audible at the assessment location to determine the rating level:

Rating Level = Specific Sound Level + Character Corrections

7.1.6. Normally it is possible to carry out a subjective assessment of characteristics, based on the following correction guidelines:

Tonality: +2dB for a 'just perceptible' tone, +4dB for 'clearly perceptible', and rising to +6dB for 'highly perceptible' tones.

Impulsivity (rapidity of change and overall chance in level): +3 dB for 'just perceptible' impulsivity, +6dB for 'clearly perceptible', rising to +9 dB for 'highly perceptible' impulsivity.

Intermittency: if the on/off-time of the specific sound is readily distinctive at the noise- sensitive receivers, +3dB.

7.1.7. It should be noted that. where one feature is clearly perceived as dominant, it may be appropriate to apply a single correction. Where multiple features are likely to affect perception and response, each should be added arithmetically.

7.1.8. An estimate of the magnitude of the impact is evaluated by subtracting the measured background sound level at the assessment location from the rating level

Assessment Level = Rating Level – Background Sound Level

7.1.9. Typically, the greater the difference between the background and rating level, the greater the magnitude of impact, although BS 4142 emphasises that this is highly context-specific. As an initial estimate, BS4142 states that:

A difference (between the background and rating level) of around +10 dB or more is likely to be indicative of significant adverse impact, depending on context

A difference (between the background and rating level) of around +5 dB or more is likely to be indicative of adverse impact, depending on context

Where the rating level does not exceed the background level, this is an indication that the specific sound will have a low impact, depending on context

7.1.10. Where the initial estimate of the impact needs to be modified due to the context, other factor should be considered, including: absolute sound levels, the character and level of the residual sound and the sensitivity of the receiver, which includes the effect of building façade sound insulation.

7.2. Guideline Internal Sound Levels

7.2.1. BS8233:2014 draws on the results of research and experience to provide information on the design of buildings that have internal acoustic environments appropriate to their function. The standard provides guideline internal values for dwellings for steady external noise sources. These have been summarised in Table 2.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35dB $L_{Aeq,16hour}$	-
Dining	Dining Room	40dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$

Table 2 – BS8233:2014 guideline values for internal ambient noise levels from steady external noise sources

7.2.2. The guideline values are issued by the World Health Organisation (WHO) and assume normal diurnal fluctuations in external noise. They are expected to be achieved based on normal annual data and not in all circumstances. For example, it is normal to exclude occasional events such as fireworks night or New Year's Eve.

7.2.3. For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$ with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In such cases, the lowest practicable levels should be achieved in external amenity areas but the development should not be prohibited.

8. Survey

8.1. Measurement Locations

8.1.1. Fixed position monitoring took place at two positions to determine the existing ambient sound levels. The monitoring positions are shown in Figure 6.

Figure 6 - Noise monitoring locations on site

8.1.2. The measurement instrumentation used during the survey is detailed in the appendix. The acoustic equipment was calibrated to comply with Section 4.2 of BS7445-1:2003[4] before and after the surveys. The calibration details are also detailed in the appendix.

8.2. Meteorology

8.2.1. During the survey the weather information was noted. This is summarised in Table 3.

	22nd November 2023	23rd November 2023
Roads(Wet/Dry)	Dry	Dry
Wind Speed (ms^{-1})/Direction	3 / W	4-6 / W

Table 3 - Meteorological data noted during the survey

[4] BS7445-1:2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures"

8.3. Measurement and Timescale

8.3.1. Unattended monitoring was carried out between 22nd November 2023 and 23rd November 2023. The measurements that have been made are summarised in Table 4.

Monitoring position	Date	Type	Quantity
1	22nd November 2023 – 23rd November 2023	Fixed/unattended	$L_{Aeq,5\text{-}min}$
2	22nd November 2023 – 23rd November 2023	Fixed/unattended	$L_{A90,15\text{-}min}$

Table 4 – Measurements made at the site of the Proposed Development

8.3.2. Sound pressure measurements were subsequently averaged into hourly, daytime and night-time periods. The acoustic measurements and their interpretation have been in accordance with BS 7445: Parts 1, and 2[5]. All sound pressure levels are in dB (re 20μPa).

8.4. Results Summary

Average Sound Pressure Levels

8.4.1. The fixed position external measurement results are summarised in Table 5.

Measurement location	Daytime dB, $L_{Aeq,16hr}$	Night-time dB, $L_{Aeq,8hr}$
1	60.7	57.9

Table 5 - Summary of the external sound pressure levels measured

Background Sound Levels

8.4.2. Figure 7 and Figure 8 shows the results of the data analysis in terms of the frequency of occurrence of each data value during the daytime and the night-time respectively.

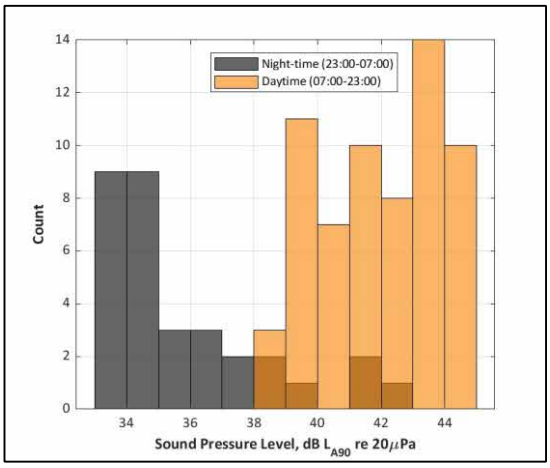


Figure 7 – Distribution of background sound levels during the daytime (07:00-23:00) and night-time period (23:00-07:00)

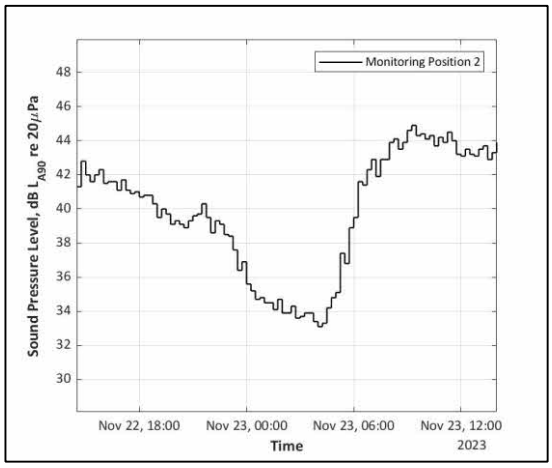


Figure 8 – Time history showing the background sound levels measured during the monitoring period

8.4.3. Figure 7 shows the background sound levels ranged between 38dB $L_{A90,15\text{-}min}$ and 45dB $L_{A90,15\text{-}min}$ during the daytime period and 33dB $L_{A90,15\text{-}min}$ to 43dB $L_{A90,15\text{-}min}$ at night-time.

8.4.4. The typical background sound level has been taken to be 43dB $L_{A90,15\text{-}min}$ during the daytime and 34dB $L_{A90,15\text{-}min}$ for the night-time. These were taken from Position 2 worst case.

[5] BS7445-2:1991 "Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use"

9. 3D Noise Model

9.1.1. A 3D noise model has been constructed using SoundPLAN™ in order to calculate the noise breakout from amplified music on the ground floor to the existing receivers and noise emissions from external mechanical plant 1m from the facades of the existing residential receivers.

9.1.2. The calculation procedure has been used from ISO9613-2:1996[6] to predict the propagation of sound from source to receiver, taking into account distance, screening, and atmospheric and ground conditions.

9.2. Noise breakout from amplified music

9.2.1. The internal sound pressure level on ground floor has been set to 85dB(A) based on the 'discothèques' library entry given in SoundPLAN. The sound data has been taken from 'The Journal of the Acoustical Society of America 147, EL215 (2020) for Indoor sound level spectra of public entertainment premises for rating airborne sound insulation' which is likely to be a worst-case assessment.

9.2.2. The existing ground floor glazing located on the front of the development has been assumed to be single-pane. The sound reduction performance for the glazing has been set to 28dB R_w based on Saint-Gobain octave band performance database for a 3mm thick single glass pane.

9.2.3. The sound reduction performance for the door located at the rear of the development has been set to 25dB R_w. This is based on the performance data provided in SoundPLAN library for a 'Steel door single leaf with seal'.

9.2.4. The existing brick walls have been assumed to be at least 240mm. The sound reduction performance for the brick walls has been set to 56dB R_w based on the performance data provided in SoundPLAN library.

9.2.5. The results of the model have been illustrated in noise contour map in Figure 9.

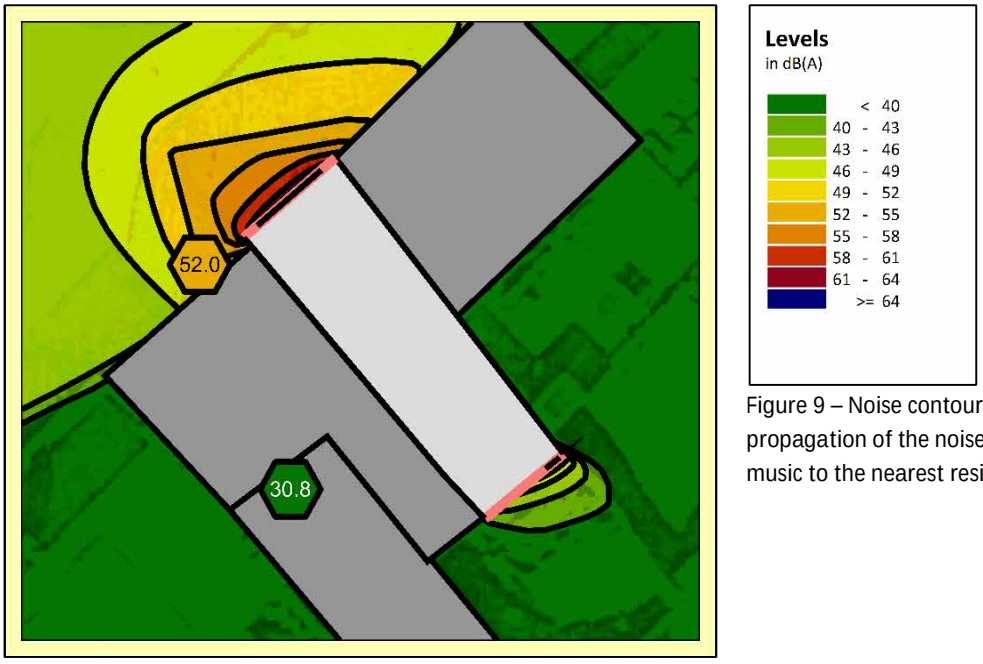


Figure 9 – Noise contour plot illustrating the propagation of the noise breakout from amplified music to the nearest residential receiver

9.2.6. In this case, the predicted noise breakout from amplified music to the nearest residential receiver is 52dBA worst-case, which is approximately -6dB below the existing ambient noise levels during night-time external to the first floor window that overlooks the High Street. There is a low risk of this affecting the residential receptors inside the dwelling.

[6] ISO9613-2:1996 "Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation"

9.3. Noise from external fixed mechanical plant

9.3.1. At this stage in the development the make/model of the single A/C unit located at the rear of the development is unknown. In this situation, a commercial single A/C unit by Mitsubishi has been selected as a representative system to allow a prediction of noise impact to be carried out and the sound power level is based on manufacturers data used for the purposes of the assessment. The sound power level of the Mitsubishi A/C unit is 67dB L_w (Manufacturers data can be found in the appendix). The results of the model have been illustrated in noise contour map in Figure 10.

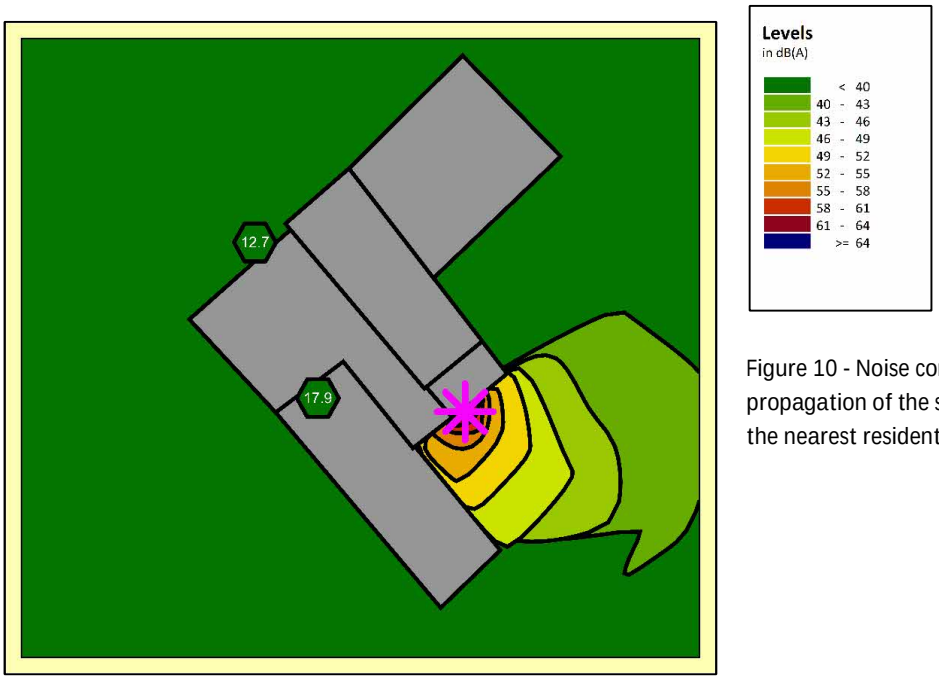


Figure 10 - Noise contour plot illustrating the propagation of the specific sound from source to the nearest residential

9.3.2. In this case, the worst-case specific sound level is 18 dBA (rounded to the nearest whole number). This has been used for the purposes of the BS4142:2014 assessment.

10. BS4142 Assessment

10.1. Rating Level

10.1.1. The single proposed A/C unit has not been installed; it is, therefore, not possible to make a subjective judgment of the character of the specific sound. Character corrections have been applied based on experience of similar items of plant.

Tonality

10.1.2. Most items of heating, ventilation and air conditioning plant have rotating components that would be likely to produce modest tones. However, due to the distance and screening from existing buildings and other plant associated in the area it is not expected to be perceivable or change the character of sound in the area at nearest existing residential receivers. Therefore, no penalty for tonality has been applied.

Impulsivity

10.1.3. The items of plant would be expected to emit continuous sound. No correction has been made for impulsivity.

Intermittency

10.1.4. It is possible that the fixed plant will not operate 100% of the time. However, in any 1-hour daytime or 15-min night-time reference period the plant would not be expected to switch on and off more than once. Therefore, no correction for intermittency has been made.

10.2. Assessment

10.2.1. The BS4142 assessment is detailed in Table 6.

	Level, dB	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Background sound level, dB $L_{A90,15min}$	43	34
Specific sound level, dB(A)	18	18
Acoustic feature corrections		
Tonality	0	0
Impulsivity	0	0
Intermittency	0	0
Rating level		
Specific sound level + corrections	18	18
Assessment Level		
Rating level – Background sound level	-25	-16
"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"		

Table 6 - The assessment procedure from BS4142

11. Conclusions

11.1.1. An environmental noise survey has been carried out for a proposed development to convert a Salon into a bar with a late license at 28 Market Street, Lichfield, WS13 6LH.

11.1.2. Amplified music noise breakout from the bar including external fixed mechanical plant to existing residential receivers has been considered.

11.1.3. In this case, the predicted noise breakout from amplified music to the nearest residential receiver is 52dBA worst-case, which is approximately -6dB below the existing ambient noise levels during night-time external to the first floor window that overlooks the High Street. There is a low risk of this affecting the residential receptors inside the dwelling.

11.1.4. A numerical BS4142 assessment of the external fixed mechanical plant shows that the specific sound will have a low impact on existing residential receivers and, generally, the lower the rating level is relative to the background sound level, the less likely it is that the specific sound source will have an adverse impact.

11.1.5. We strongly recommend that this report be passed to the local planning authority for approval prior to any works being carried out.

12. Appendix

APPENDIX A: Summary Information

Required ISO Test Report Information (cross referenced where required)			
		Measurements carried out to:	Analysed to:
A	Standards	BS 7445-1: 2003 BS 7445-2: 1991	BS 8233:2014 BS 4142:2014
B	Organisation performed the measurements	noise.co.uk Ltd, The Haybarn, Newnham Grounds, Kings Newnham Lane, Bretford, Coventry, CV23 0JU.	
C	Name of Client	Neil Boddinson Associates Ltd	
D	Full site address	Salon 28 Market Street Lichfield, WS13 6LH	
E	Date of surveys	Survey Date: 22nd November 2023 – 23rd November 2023	
F	Description & identification of Proposed Development	It is proposed to develop the site for commercial use	
G	Brief Description of details of Procedure & equipment	See Section 5 of this report.	

APPENDIX B: Technical Appendix

12.1.1. Measurements were made using the following equipment:

Monitoring Position	Sound Level Meter (Serial Number)	Calibrator (Serial Number)
1	Norsonic 140 (1407446)	Norsonic 1251 (33826)
2	Norsonic 140 (1405560)	Norsonic 1251 (33824)

12.1.2. The equipment has traceable calibration. The sound level meter was calibrated immediately prior to and immediately after the measurements were carried out.

Sound Level Meter	Before	After
Norsonic 140 (1407446)	114.0 dB	114.0 dB
Norsonic 140 (1405560)	114.0 dB	114.0 dB

12.1.3. There was no adverse deviation.

APPENDIX C: Manufacturers data (PUZ-ZM71VHAR1)

Air Conditioning | **Product Information**

PCA-M R32
Ceiling Suspended System
Power Inverter Heat Pump (Single Phase)

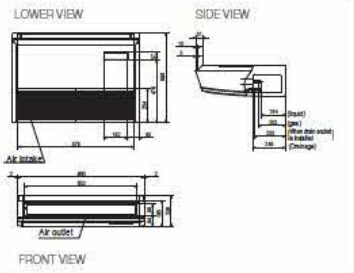
R32

POWER INVERTER

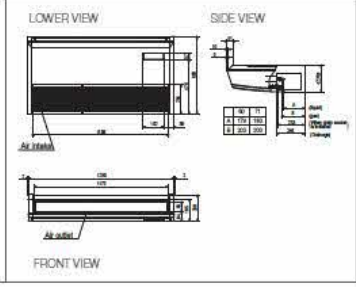
PCA-M INDOOR UNITS		PCA-M50KA	PCA-M60KA	PCA-M71KA	PCA-M100KA	PCA-M125KA	PCA-M140KA
CAPACITY (kW)	Heating (nominal)	5.5 (2.5-6.6)	7.0 (2.8-8.2)	8.0 (3.5-10.2)	11.2 (4.5-14.0)	14.0 (5.0-16.0)	16.0 (5.7-18.0)
	Cooling (nominal)	5.0 (2.3-5.6)	6.1 (2.7-6.7)	7.1 (3.3-8.1)	9.5 (4.9-11.4)	12.5 (5.5-14.0)	13.4 (6.2-15.0)
	Heating (UK)	4.7 (2.15-5.6)	5.95 (2.4-6.95)	6.8 (3.0-8.65)	9.5 (3.85-11.9)	11.9 (4.25-13.6)	13.6 (4.85-15.3)
	Cooling (UK)	4.6 (2.1-5.15)	5.5 (2.5-6.15)	6.55 (3.05-7.45)	9.2 (4.5-10.5)	11.5 (5.05-12.9)	12.9 (5.7-13.8)
SHF (nominal)		0.79	0.81	0.76	0.77	0.72	0.72
COP / EER (nominal)		4.04 / 4.00	4.01 / 4.01	3.71 / 3.88	3.71 / 4.10	3.54 / 3.25	3.61 / 3.40
SCOP (ηsh) / SEER ηsc) (BS EN14825)		4.2 / 6.7	4.1 / 6.5	4.2 / 6.7	4.3 / 6.4	4.3 (168.8%) / 6.2 (251.0%)	4.4 (173.5%) / 6.2 (248.9%)
ErP ENERGY EFFICIENCY CLASS	Heating/Cooling	A+ / A++	A+ / A++	A+ / A++	A+ / A++	-	-
AIRFLOW (l/s)	Lo-Mi1-Mi2-Hi	167-183-217-250	250-267-283-317	267-283-300-333	367-400-433-467	383-417-450-483	400-433-483-533
PIPE SIZE mm (in)	Gas/ Liquid	12.7 (1/2") / 6.35 (1/4")	15.88 (5/8") / 9.52 (3/8")	15.88 (5/8") / 9.52 (3/8")	15.88 (5/8") / 9.52 (3/8")	15.88 (5/8") / 9.52 (3/8")	15.88 (5/8") / 9.52 (3/8")
SOUND PRESSURE LEVEL (dBA)	Lo-Mi1-Mi2-Hi	32-34-37-40	33-35-37-40	35-37-39-41	37-39-41-43	39-41-43-45	41-43-45-48
SOUND POWER LEVEL (dBA)		60	60	62	63	65	68
DIMENSIONS (mm)	Width x Depth x Height	960 x 680 x 230	1280 x 680 x 230	1280 x 680 x 230	1600 x 680 x 230	1600 x 680 x 230	1600 x 680 x 230
WEIGHT (kg)		26	32	32	37	38	40
ELECTRICAL SUPPLY		Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit
FUSE RATING (BS88) - HRC (A)		6	6	6	6	6	6
INTERCONNECTING CABLE No. CORES		4	4	4	4	4	4
WIRED REMOTE CONTROLLER REFERENCE		PAR-40MAA	PAR-40MAA	PAR-40MAA	PAR-40MAA	PAR-40MAA	PAR-40MAA
WIRELESS REMOTE CONTROLLER REFERENCE		PAR-SL94B	PAR-SL94B	PAR-SL94B	PAR-SL94B	PAR-SL94B	PAR-SL94B

PUZ-ZM OUTDOOR UNITS		PUZ-ZM50VKA	PUZ-ZM60VHA	PUZ-ZM71VHAR1	PUZ-ZM100VKAR1	PUZ-ZM125VKAR2	PUZ-ZM140VKAR2
SOUND PRESSURE LEVEL (dBA)	Heating/Cooling	46 / 44	49 / 47	49 / 47	51 / 49	52 / 50	52 / 50
SOUND POWER LEVEL (dBA)	Cooling	65	67	67	69	70	70
WEIGHT (kg)		46	70	70	116	116	118
DIMENSIONS (mm)	Width x Depth x Height	809 x 300 x 630	950 x 330 + 25 x 943	950 x 330 + 25 x 943	1050 x 330 + 40 x 1338	1050 x 330 + 40 x 1338	1050 x 330 + 40 x 1338
ELECTRICAL SUPPLY		220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz
PHASE		Single	Single	Single	Single	Single	Single
SYSTEM POWER INPUT (kW)	Heating/Cooling (nominal)	1.361 / 1.25	1.745 / 1.521	2.156 / 1.829	3.018 / 2.317	3.954 / 3.846	4.432 / 3.941
	Heating/Cooling (UK)	1.21 / 1.06	1.55 / 1.29	1.92 / 1.55	2.41 / 1.99	3.51 / 3.26	3.94 / 3.35
STARTING CURRENT (A)		5.0	6.0	6.0	13.0	13.0	13.0
SYSTEM RUNNING CURRENT (A)	Heating/Cooling (MAX)	5.95 / 5.37 [13.4]	7.43 / 6.48 [19.4]	9.23 / 7.81 [19.4]	12.97 / 9.97 [27.2]	16.87/ 16.46 [27.3]	18.76 / 16.66 [28.9]
FUSE RATING (BS88) - HRC (A)		16	25	25	32	32	40
MAINS CABLE No. CORES		3	3	3	3	3	3
MAX PIPE LENGTH (m)		50	55	55	100	100	100
MAX HEIGHT DIFFERENCE (m)		30	30	30	30	30	30
CHARGE REFRIGERANT (kg) / CO_2 EQUIVALENT (t) - R32 (GWP 675) - 30m		2.00 / 1.35	2.80 / 1.89	2.80 / 1.89	4.00 / 2.70	4.00 / 2.70	4.00 / 2.70
MAX ADDITIONAL REFRIGERANT (kg) / CO_2 EQUIVALENT (t) - R32 (GWP 675)		0.30 / 0.20	0.80 / 0.54	0.80 / 0.54	2.80 / 1.89	2.80 / 1.89	2.80 / 1.89

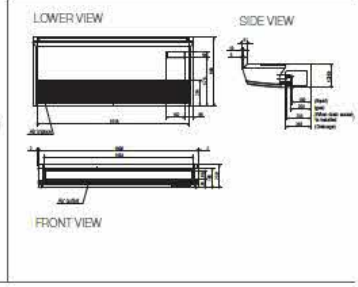
PCA-M50KA DIMENSIONS



PCA-M60/71KA DIMENSIONS



PCA-M100/125/140KA DIMENSIONS



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Note: The fuse rating is for guidance only. Please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R513A (GWP:631), R454B (GWP:466), R1234ze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No.626/2011 from IPCC 3rd edition, these are as follows: R410A (GWP:1975), R32 (GWP:550), R407C (GWP:1650) or R134a (GWP:1300).

Effective as of May 2020

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