Costa Coffee, Wilmslow Road, Withington
Noise Assessment Report

Project: Proposed Costa Coffee, Wilmslow Road, Withington

Client: Britannia Homes (GB) Ltd

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Authorised by	Ryan Swales, BSc, MIOA Director & Principal Consultant
Signature	

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RS Acoustic Engineering Ltd
76 Marple Road
Stockport
SK2 5QH
Tel: 0333 577 5152
Web: www.rsacoustic.co.uk
Email: info@rs-acoustic.co.uk

A company registered in England & Wales (No: 07604309)
Corporate Member of the Institute of Acoustics (MIOA)

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1. Introduction

1.1 RS Acoustic Engineering has been appointed by Britannia Homes (GB) Ltd to undertake a noise assessment with regard to a proposed Costa Coffee at No. 494, Wilmslow Road, Withington, Manchester, M20.

1.2 The four-storey development has been recently constructed and consists of a vacant commercial space at ground floor level and residential apartments at first, second and third floor level. The development was granted planning permission in May 2016.

1.3 As part of the proposals, three external wall-mounted condensing units will be required to serve the air-conditioning system. The condensing units will be located on the south facing elevation.

1.4 There will be no cooking of food and therefore a kitchen extract system is not necessary.

1.5 There is currently planning approval for the commercial space to operate between 07:00 and 23:00 hours Monday to Saturday and 08:00 to 20:00 hours on Sundays and bank holidays.

1.6 The manufacturer's octave band sound pressure level data has been used to determine the cumulative condenser sound level at adjacent noise sensitive receptors.

1.7 An environmental noise survey has been conducted in order to determine the typical background sound level over a number of days.

1.8 Where appropriate, reference has been made to the guidance given within BS 4142:2014 *Methods for rating and assessing industrial and commercial sound*.

1.9 Operational noise transmission through the separating party floor has also been considered and the resulting sound levels determined.

1.10 The survey and assessment was conducted by Mr Ryan Swales ($BSc_{(Hons)}$, MIOA), Principal Acoustic Consultant and Corporate Member of the Institute of Acoustics.

1.11 This report provides the survey results, details of the proposed condenser units, calculated sound levels at adjacent receptors and the corresponding impacts.

2. Assessment Guidance & Criteria

National Planning Policy Framework

2.1 The NPPF (updated July 2018) sets out the Government's planning policies for England and how these should be applied. The NPPF supersedes previous guidance notes such as PPG24.

2.2 With regard to pollution and noise, the NPPF states the following:

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

Manchester City Council, Planning & Noise (Technical Guidance)

2.3 With regard to noise from fixed plant and equipment, Manchester City Council's guidance document states the following:

'Any noise assessment needs to consider not only the overall level of noise emitted but also its particular characteristics. The noise assessment should be based on BS 4142:2014 and any application for fixed plant, equipment or machinery must demonstrate that:

Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'.

British Standard 4142:2014: Methods for rating and assessing industrial and commercial sound

2.4 The current standard describes methods for rating and assessing sound of an industrial and/or commercial nature, such as sound from manufacturing processes and fixed mechanical plant.

2.5 The methods described in the standard use outdoor sound levels to assess the likely effect of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

2.6 BS 4142 is not intended to be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels.

2.7 The standard has three different methods (subjective, objective and reference) of applying a penalty to tonal, impulsive and intermittent noises, as separate entities.

2.8 For example, the subjective method applies tonality corrections on a sliding scale between 0 dB and +6 dB, depending on whether a prominent tone is just perceptible at the receptor (+2 dB), clearly perceptible (+4 dB) or highly perceptible (+6 dB).

2.9 An additional correction of up to +9 dB may then be applied for 'impulsivity', depending on whether the impulsive sound is just perceptible at the receptor (+3 dB), clearly perceptible (+6 dB) or highly perceptible (+9 dB).

2.10 The objective and reference methods also apply a penalty on a sliding scale from 0 dB to +6 dB for a prominent discrete tone, which is identified via direct sound measurement (e.g. one-third octave band measurements).

2.11 The new standard now no longer indicates significance of noise impacts as giving rise to a '*likelihood of complaint*' but rather as an '*indication*' of varying degrees of '*adverse impact'*.

2.12 BS 4142:2014 states that a difference of around +10 dB or more (excess of rating level above the background sound level) 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.

2.13 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.

3. Environmental Noise Survey

Survey methodology

3.1 An environmental noise survey has been conducted by RS Acoustic Engineering in order to establish the prevailing background sound levels at the site.

3.2 Continuous sound level monitoring was conducted over a 70 hour period on the south facing elevation.

3.3 The microphone was positioned out of a 2nd floor apartment window, directly adjacent to the proposed plant location.

3.4 Measurements were performed from 11:30 hours on Friday 19th through to 09:30 hours on Monday 22nd October 2018.

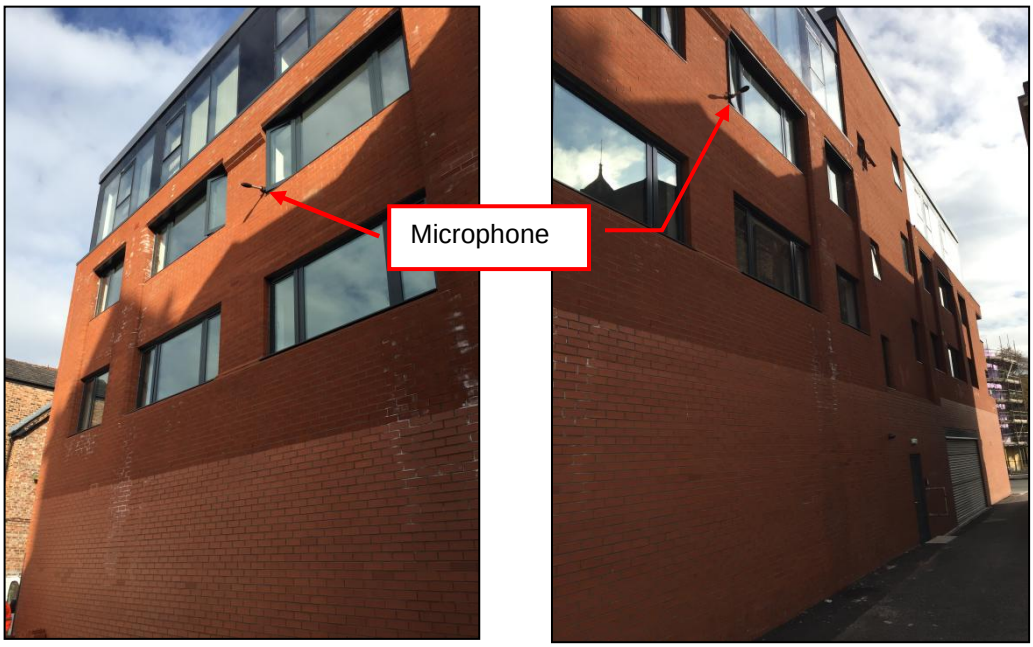
3.5 A measurement interval of 15 minutes was used throughout the survey and measurements were considered to be subject to reflections from the building facade (as opposed to free-field).

3.6 The site location, new development and survey measurement position are shown in Figures 3.1 and 3.2.

Figure 3.1 – Site location and survey measurement position (Source: Google Earth)



Figure 3.2 – Photographs showing survey measurement position



Survey equipment

3.7 The survey was performed using the following Class-1 specification equipment:

- Brüel & Kjaer 2250-Light data logging sound level meter, with microphone type 4189 and pre-amplifier type ZC0032.
- Brüel & Kjaer 4231 acoustic calibrator.

3.8 Calibration of the sound level meter and microphone used for the measurements are traceable to UKAS accredited laboratories (calibration certificates are available on request).

3.9 The calibration of both sound level meter and microphone was checked using a 1 kHz tone at 94 dB prior to and following the survey. The drift in calibration was less than 0.1 dB.

Weather conditions

3.10 The weather conditions during the survey were generally dry and fine with clear sunny spells.

3.11 Temperatures ranged between 6°C and 17°C and wind speed measurements on-site were less than 2 m/s^{-1}. The overall weather conditions were considered suitable to obtain representative measurements.

Subjective observations of the acoustic environment

3.12 The dominant noise source at the site was observed to be road traffic on Wilmslow Road.

3.13 Intermittent traffic flow along Burton Road, Parsonage Road and Copson Street also contributes to the existing noise climate at the site.

3.14 There is a Sainsbury's Local on the corner of Burton Road and Wilmslow Road. From previous discussions with staff, it is understood that the opening hours are 07:00 – 23:00. The noise sources associated with the store are intermittent vehicles arriving/departing from the small car park off Burton Road and pedestrians entering/departing from the front main entrance.

3.15 Other noted sources include pedestrians, high altitude aircraft and intermittent activity from neighbouring dwellings and commercial premises.

Results summary

3.16 Table 3.1 presents a summary of the measured background L_{A90} sound pressure levels. Measured values have been rounded to the nearest whole number.

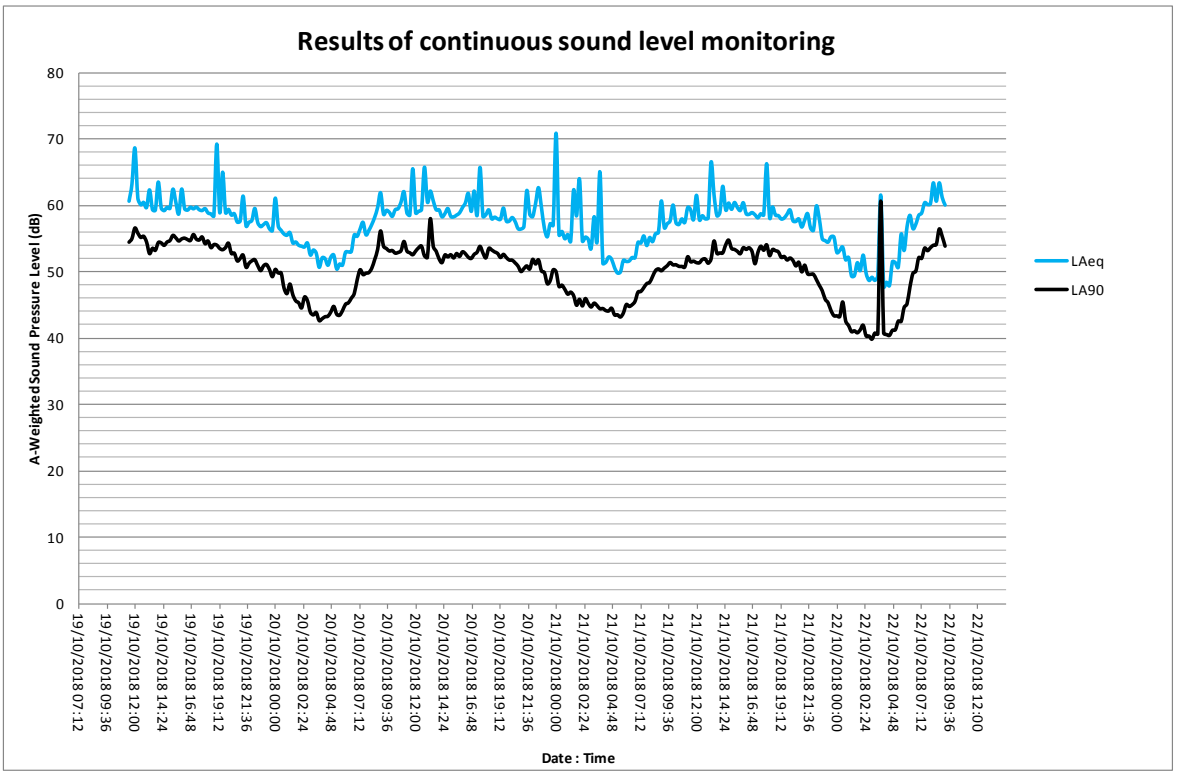
Table 3.1 – Summary of measured background L_{A90} sound pressure levels

Date	Period, Hours	Typical[1] $L_{A90,15min}$ dB	Lowest $L_{A90,15min}$ dB	Highest $L_{A90,15min}$ dB
Friday 19/10/2018 - Saturday 20/10/2018	Daytime (11:30-23:00)	55	50	57
	Night-time (23:00-07:00)	43	43	51
Saturday 20/10/2018 - Sunday 21/10/2018	Daytime (07:00-23:00)	53	49	58
	Night-time (23:00-07:00)	45	43	50
Sunday 21/10/2018 - Monday 22/10/2018	Daytime (07:00-23:00)	51	47	55
	Night-time (23:00-07:00)	41	40	61
Monday 22/10/2018	Daytime (07:00-09:30)	54	52	56

[1]Considered to be the representative background sound level (from a statistical analysis)

3.17 The results of the sound level monitoring are presented graphically in Figure 3.2. Additional survey data can be made available upon request.

Figure 3.2 – Graph showing results of continuous sound level monitoring



4. Assessment & Discussion

Sound level targets for new building services plant

4.1 Taking into account MCC's requirements, the sound rating level (L_{Aeq}) from all new building services plant should be at least 5 dB below the typical background sound level ($L_{A90,T}$).

4.2 BS 4142 states '*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'.*

4.3 Table 4.1 presents the applicable sound level targets for the new condenser units. It is considered prudent to use the lowest typical background sound level when determining appropriate targets.

4.4 The sound level targets should be achieved at approximately 1 metre from the nearest residential window. Where free-field measurements are undertaken, the sound level targets may be reduced by 3 dB.

Table 4.1 – Sound level targets for new building services plant

Period, Hours	Typical Background Sound Level $L_{A90,15min}$ dB	Target Rating Level $L_{Aeq,T}$ dB
Daytime (07:00-23:00)	51	46
Night-time (23:00-07:00)	41	36

4.5 The units will not operate during the night-time period and therefore the appropriate target at adjacent dwellings is 46 dB $L_{Aeq,T}$.

New building services plant, location and nearest receptors

4.6 There will be three outdoor condensing units associated with the air-conditioning system. At this stage, it is proposed that the units are installed mid-point between the ground and first floor level.

4.7 The nearest noise sensitive receptors to the outdoor condensing units are the apartments on the same south facing elevation. There are also apartments on the opposite side of the car park (directly above Sainsbury's Local).

Figure 4.1 – Proposed location of wall-mounted condensing units

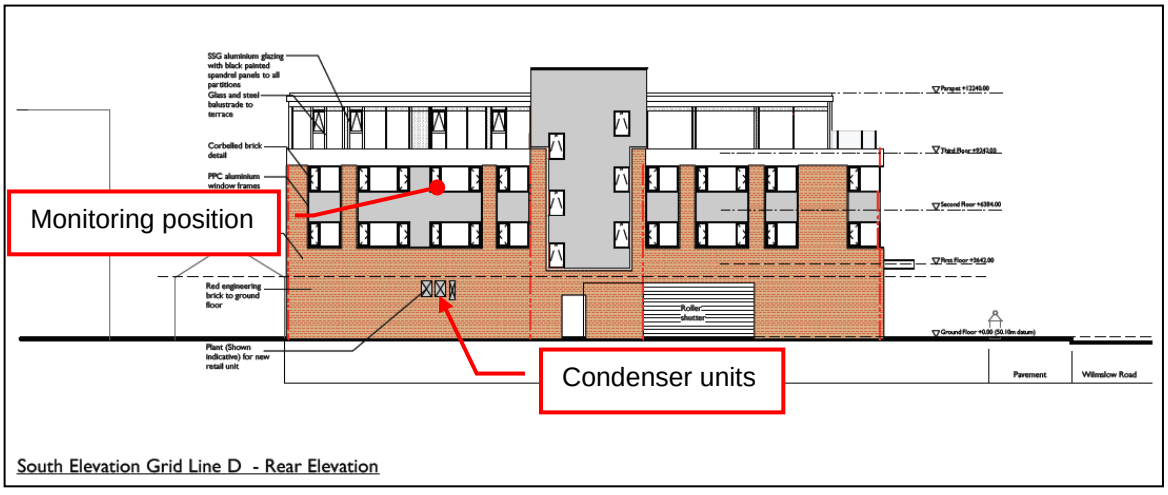
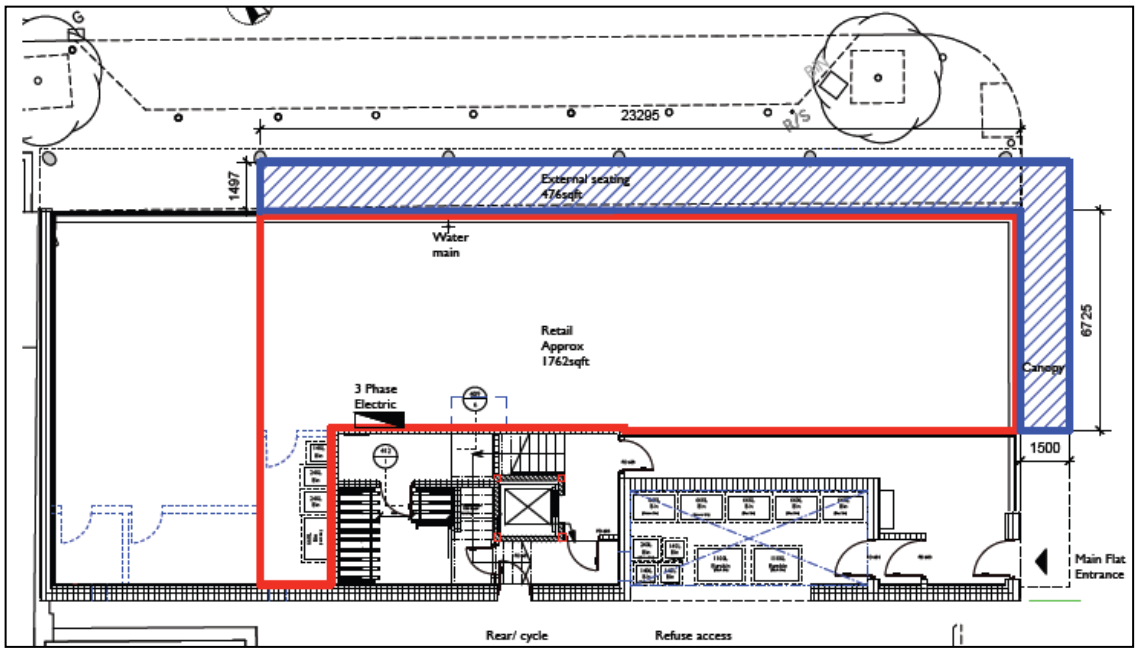


Figure 4.2 – Ground floor plan



4.8 The distance from the condenser units to the nearest residential window is assumed to be approximately 2 metres.

4.9 The condenser model types are understood to be as follows:

- Daikin RZASG 125M: sound pressure level of 44 dBA at 1 metre.
- Daikin RXM 60M: sound pressure level of 49 dBA at 1 metre.
- Daikin RXM 35M: sound pressure level of 49 dBA at 1 metre.

4.10 The octave-band sound pressure levels for each unit are presented in Tables 4.2 to 4.4.

4.11 The condenser unit sound level data is also presented graphically in Appendix B.

Table 4.2 – Daikin RZASG 125M - octave band sound pressure levels (dB)

Octave Band Centre Frequency (Hz)							
63	125	250	500	1000	2000	4000	8000
49	48	47	42	38	33	26	24

Table 4.3 – Daikin RXM 60M - octave band sound pressure levels (dB)

Octave Band Centre Frequency (Hz)							
63	125	250	500	1000	2000	4000	8000
53	53	51	47	46	40	35	26

Table 4.4 – Daikin RXM 35M - octave band sound pressure levels (dB)

Octave Band Centre Frequency (Hz)							
63	125	250	500	1000	2000	4000	8000
53	53	51	49	45	40	36	29

Predicted condenser sound levels at adjacent receptors

4.12 It is assumed that all three units will operate simultaneously and continuously. This assessment is therefore a worst-case scenario.

4.13 Table 4.5 presents a calculation summary for the condenser units taking into consideration the sound pressure spectrum, directivity factor and distance separation. Tabulated values have been rounded to the nearest whole number.

Table 4.5 – Condenser sound pressure level at adjacent receptors

	Octave Band Centre Frequency (Hz)							
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Daikin RZASG 125M L_{eq} dB	49	48	47	42	38	33	26	24
Daikin RXM 60M L_{eq} dB	53	53	51	47	46	40	35	26
Daikin RXM 35M L_{eq} dB	53	53	51	49	45	40	36	29
Cumulative sound pressure L_{eq} dB	**57**	**57**	**55**	**52**	**49**	**43**	**39**	**32**
Directivity factor dB	0	0	0	0	0	0	0	0
Distance attenuation dB	-6	-6	-6	-6	-6	-6	-6	-6
A-weighting correction dB	-26	-16	-9	-3	0	+1	+1	-1
Resulting level dB	**25**	**35**	**40**	**43**	**43**	**38**	**34**	**25**
A-weighted specific sound level $L_{Aeq,T}$ = 48 dB								

4.14 The calculation results indicate a cumulative specific sound pressure level of approximately 48 dB $L_{Aeq,T}$ at the nearest residential window.

4.15 It is prudent to assume that a tonal sound component may be just perceptible at adjacent apartments with windows fully open and therefore a correction (penalty) of +2 dB is considered appropriate (in line with the BS 4142 subjective method).

4.16 On this basis, the corresponding sound rating level is 50 dB $L_{Ar,T}$.

- Specific sound level of 48 dB $L_{Aeq,T}$ + 2 dB penalty = 50 dB $L_{Ar,T}$.

4.17 A further acoustic penalty for impulsive sound or intermittency is considered unnecessary.

4.18 The typical background sound level was 51 dB $L_{A90,15min}$ during the Sunday daytime and therefore the applicable target is a rating level of 46 dB $L_{Ar,T}$.

4.19 The cumulative sound rating level for the condenser units is therefore 4 dB above the daytime noise target.

4.20 At a separation distance of at least 4 metres from the nearest window, the cumulative sound rating level for the proposed condenser units is expected to satisfy the daytime target (by ≈2 dB).

4.21 It is therefore recommended that the condenser units are repositioned so that a minimum distance of 4 metres is maintained to the nearest window. The units may need to be positioned at low-level near to the corner of the building or alternatively near to the cycle store access door.

4.22 At a distance of at least 4 metres, the cumulative rating level will be notably below the typical background sound level. With regard to an assessment of the likely impacts, BS 4142 states:

'*The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs...'*

'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'.

4.23 On this basis, the proposed condensing units are expected to have a negligible impact at the adjacent apartments.

Vibration control

4.24 It is recommended that suitable anti-vibration (resilient) mounts are fitted to the condenser units in order to eliminate the potential for structure-borne noise. Without appropriate anti-vibration mounts, vibration levels from the condenser units could potentially become audible as structure-borne noise.

Operational noise transmission through the party floor

4.25 The party floor construction between the ground floor retail unit and first floor apartments is currently as follows:

- 60 mm Agilia screed (80 kg/m^2), 6 mm acoustic resilient layer, 150 mm concrete planks (300 kg/m^2).

4.26 The party floor is expected to provide an airborne sound insulation performance in the region of 45 to 50 dB $D_{nT,w}+C_{tr}$ (the floor has to achieve a minimum performance of 45 dB $D_{nT,w}+C_{tr}$ to satisfy Part E of the Building Regulations).

4.27 Sample measurements conducted within an existing Costa Coffee store (Telegraph Road, Heswall, Wirral) indicate equivalent continuous sound levels in the range of 59 to 71 dB $L_{Aeq,60sec}$.

4.28 Taking into consideration the sound insulation provided by the separating floor (assumed to be circa 45 dB $D_{nT,w}+C_{tr}$), the corresponding sound level within the first floor apartments is expected to be in the region of 14 to 26 dB $L_{Aeq,60sec.}$

4.29 The resulting sound level will therefore be notably below the daytime sound level target of 35 dB $L_{Aeq,16hour}$ for bedrooms and living rooms.

4.30 Furthermore, since the daytime sound level within apartments is expected to be in the region of 35 dB $L_{Aeq,16hour}$ due to passing road traffic (with windows closed), operational noise from Costa Coffee will be acoustically masked by road traffic noise and is therefore highly unlikely to cause disturbance in the apartments above.

Noise from deliveries

4.31 It is understood that there will be a single delivery each day for food related items and a single delivery each day for milk (excluding Sundays).

4.32 On this basis and taking into consideration the existing site noise levels, it is expected that the brief and intermittent noise from two deliveries will result in negligible impacts.

5. Conclusion

5.1 The typical background sound level has been determined by continuous sound level monitoring over 70 hours at the nearest residential apartments.

5.2 Appropriate plant noise targets have been determined at the nearest residential windows.

5.3 The typical background sound level was 51 dB $L_{A90,15min}$ during the Sunday daytime and therefore the appropriate plant noise target is a rating level of 46 dB $L_{Ar,T}$.

5.4 For the proposed indicative plant location (south facing elevation), the predicted cumulative sound rating level for the condenser units is approximately 4 dB above the daytime noise target at the nearest apartment window.

5.5 It is recommended that the condenser units are positioned so that a minimum distance of 4 metres is maintained to the nearest apartment window.

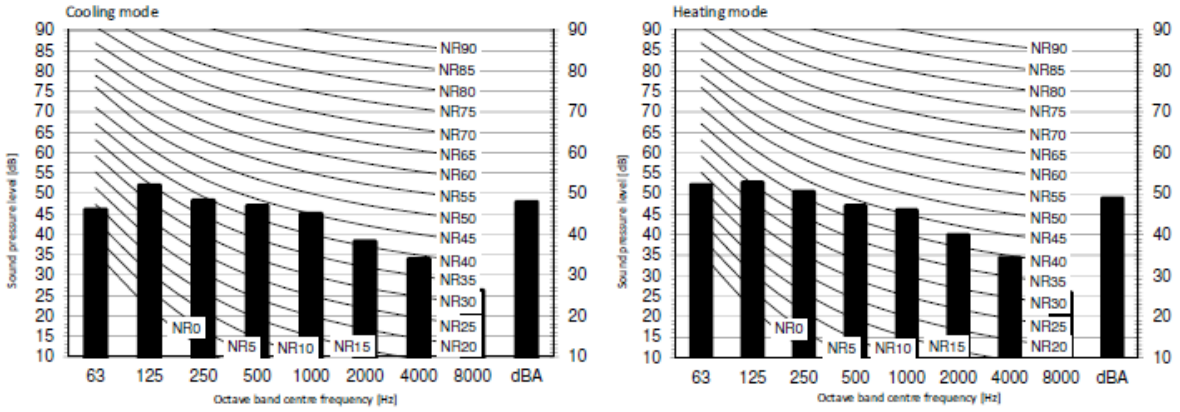
5.6 At a separation distance of at least 4 metres, the cumulative sound rating level for the proposed condenser units is expected to satisfy the daytime noise target and will therefore be notably below the typical daytime background sound level.

5.7 On this basis, the proposed condensing units are expected to have a negligible impact at the adjacent apartments.

5.8 The separating party floor construction is expected to sufficiently attenuate operational noise transmission from the ground floor unit.

Appendix A
Condenser sound level data

RXM60M



Legend

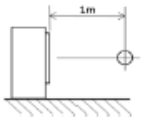
dBA = A-weighted sound pressure level (A scale according to IEC).

A Scale

B High-tap

Low-tap

Location of microphone



Cooling — Total dB

A	B
dBA	48

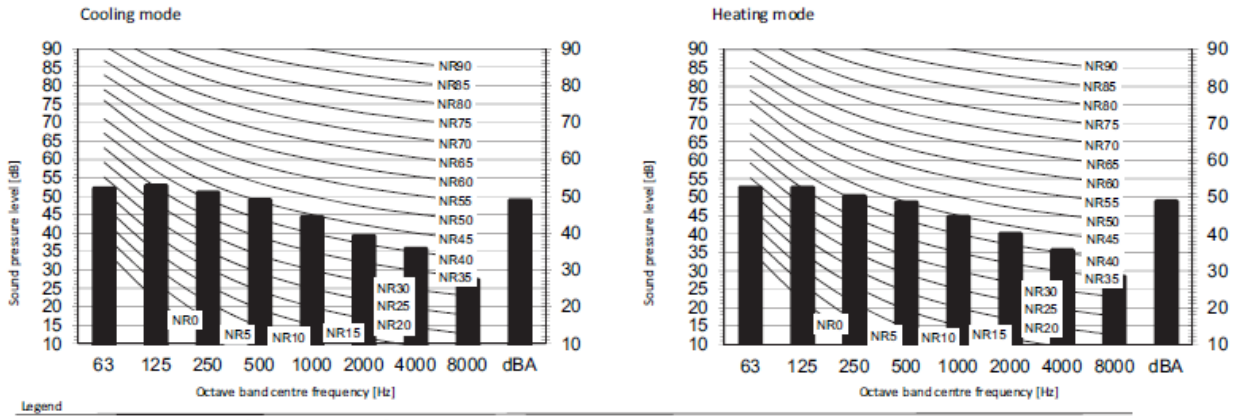
Heating — Total dB

A	B
dBA	49

Notes

1 Background noise already taken into account.
2 Operating conditions: power source 220-240 V/ 220 V 50/60 Hz; JIS standard
3 Operating noise varies depending on operation and ambient conditions.
4 The operation noise measuring method is in accordance with JISC9612.
5 Measuring location: anechoic chamber

RXM35M



Legend

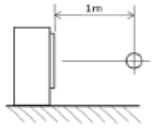
dBA = A-weighted sound pressure level (A scale according to IEC).

A Scale

B High-tap

Low-tap

Location of microphone



Cooling — Total dB

A	B
dBA	49

Heating — Total dB

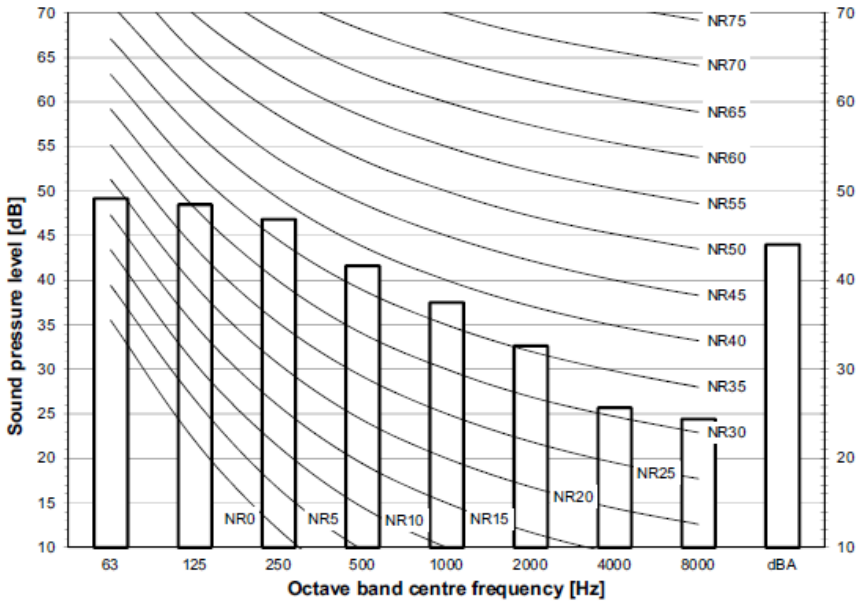
A	B
dBA	49

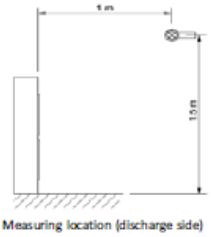
Notes

1 Background noise already taken into account.
2 Operating conditions: power source 220-240 V/220 V 50/60 Hz; JIS standard
3 Operating noise varies depending on operation and ambient conditions.
4 The operation noise measuring method is in accordance with JISC9612.
5 Measuring location: anechoic chamber

3D099855A

AZAS125MV1
AZAS125MY1
RZASG125MV1
RZASG125MY1





Measuring location (discharge side)

Notes
- Data is valid at free field condition.
- Data is valid at nominal operation condition.
- dBA = A-weighted sound pressure level (A scale according to IEC).
- Reference acoustic pressure 0 dB = 20 µPa

Appendix B
Assessment terminology

Assessment terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$Pa).
dB(A)	The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc, according to the parameter being measured.
Acoustic environment	Sound from all sources as modified by the environment.
Ambient sound level	The totally encompassing sound in a given situation at a given time; it is usually composed of sound from many sources, near and far.
Background sound level	The sound level in the absence of a specific noise source under consideration (e.g. plant/machinery), measured as $L_{A90,T}$.
Residual sound	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.
Specific sound source	Sound source being assessed.
Specific sound level	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T.
Rating level $L_{Ar,T}$	Specific sound level plus any adjustment for the characteristic features of the sound.