



**GRAB & GO FOOD FACILITY
LORETO COLLEGE, MANCHESTER**

FIXED PLANT NOISE ASSESSMENT

On behalf of:

Walter Carefoot & Sons (Construction) Ltd

GRAB & GO FOOD FACILITY LORETO COLLEGE, MANCHESTER

FIXED PLANT NOISE ASSESSMENT

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1. INTRODUCTION

- 1.1 Hepworth Acoustics was commissioned by Walter Carefoot & Sons (Construction) Ltd to carry out a noise impact assessment in connection with a planning application to discharge condition 7a of the planning permission for a 'Grab & Go' food facility at the Loreto College Campus in Manchester. Specifically, the assessment relates to external fixed plant and equipment associated with the new building.
- 1.2 The new building is located to the rear, western side of the campus off Maher Gardens, as shown in Figure 1. It will consist of a small kitchen and servery area with indoor and outdoor (covered) seating areas. The external plant, which is to provide comfort cooling within the building and will hence only operate in the daytime, is to be located to the south-west corner of the Grab & Go building near to the boundary with Maher Gardens. The nearest dwellings are opposite the site on Maher Gardens. The Grab & Go food facility layout is shown in Figure 2.
- 1.3 The noise assessment has included:
- An inspection of the site and surrounding area;
 - Measurement of the prevailing noise climate during representative daytime periods;
 - Assessment of the likely noise impact from the proposed fixed plant by reference to relevant standards and guidance; and
 - Recommendation of appropriate noise mitigation measures.
- 1.4 The various acoustics indices referred to in this report are described in Appendix A. All noise levels in the text have been rounded to the nearest decibel as fractions of a decibel are imperceptible.

2. ACOUSTIC CRITERIA

Planning Condition

- 2.1 Planning permission was granted in August 2024, reference number 140784/JO/2024 with the following condition relating to external fixed plant:

“7) a) 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 (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. Prior to commencement of the use hereby approved 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. The scheme shall be implemented in full before the use commences or as otherwise agreed in writing by the City Council as local planning authority.”

BS 4142:2014+A1:2019

- 2.2 British Standard 4142:2014+A1:2019, ‘Methods for rating and assessing industrial and commercial sound’ is the appropriate guidance for assessing the potential noise impact at residential locations from commercial and industrial sources.
- 2.3 BS 4142 requires a ‘rating’ level ($L_{Ar,Tr}$) calculated from the operation of the noise source to be compared with the background sound level ($L_{A90,T}$) which is measured in the absence of the noise source. The noise is evaluated over a 1-hour period for daytime operations (i.e. 07:00 - 23:00 hours) and 15-minute period for night-time operations (i.e. 23:00 - 07:00 hours).
- 2.4 The rating level ($L_{Ar,Tr}$) is based on the ‘specific’ sound level ($L_{Aeq,Tr}$) attributed to the operating noise source, with ‘character corrections’ added for sound sources where “*certain acoustic features can increase the significance of impact*” when present at residential locations.
- 2.5 The acoustic character corrections, where necessary, are applied to the specific sound level in order to obtain the rating level and can take into account tonality, intermittency, impulsivity and characteristics otherwise distinctive against the prevailing noise climate in the area.
- 2.6 An initial estimate of the potential noise impact from the operating noise source is determined by comparing the difference between the rating level and the background sound level.
- 2.7 Regarding the outcome of the initial estimate, BS 4142 states that:
- Typically, the greater this difference, the greater the magnitude of impact;
 - A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
 - A difference of around +5dB 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 level, the less likely it is that the operation will have an adverse impact or a significant adverse impact. Where the rating level is does not exceed the background sound level, this is an indication of the specific sound source having low impact, depending on the context.
- 2.8 BS 4142 also states in respect of background sound levels that *“it is important to ensure that values are reliable and suitably represent the particular circumstances and periods of interest... the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods”*.
- 2.9 BS 4142 states that all pertinent factors must be taken into account regarding the context in which the noise occurs, including but not limited to:
- The absolute level of sound.
 - The character and level of the residual sound compared to the character of the specific sound; and,
 - The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will incorporate design measures that ensure good internal and/or outdoor acoustic conditions such as acoustic screening.
- 2.10 The initial numerical assessment and the context are then both taken into account when determining the potential noise impact.
- 2.11 However, the planning condition requires the noise level from any externally mounted fixed plant/equipment to achieve a noise level 5 dB less than the background and no consideration is given to context in the assessment.

3. NOISE SURVEY

- 3.1 An environmental noise survey was carried out at a location that is representative of the nearest dwellings on Maher Gardens. The noise measurement location is shown in Figure 1.
- 3.2 An automated noise survey was carried out between approximately 10:00 hours on Tuesday 10 and 09:00 hours on Wednesday 11 June 2025. Construction of the building was on-going during some daytime periods on the days of the noise survey, but there were periods when no construction noise was present and hence these periods have been the focus of the assessment.
- 3.3 Field-calibration checks were carried out both before and after the survey with no variance in levels observed. Frequency analysis and audio recordings were also undertaken to assist in identifying significant noise sources. Weather conditions during the survey were suitable for environmental noise measurements.
- 3.4 The results of the noise survey are summarised in Table 2, the full results along with details of the equipment used and the weather conditions during the survey are shown in Appendix B.

Table 1: Summary of Measured Noise Levels (dB)

Period	$L_{Aeq,15mins}$	$L_{A90,15mins}$
Daytime including construction noise (10:30 – 17:00 hours)	49 – 69	45 – 63
Daytime/evening, no activities on site (17:00 – 19:00 hours)	51 – 56	45 – 46

- 3.5 The noise climate in the area was associated with distant road traffic and birdsong when construction activities were not taking place.
- 3.6 Therefore, periods where construction activities were not taking place have been used to determine the representative background sound levels for the daytime/evening period. The adopted representative background sound level is 45 dB $L_{A90,T}$, which is the average, median and modal value over the two hour daytime/evening period. Therefore, based on requirements of the condition the adopted noise limit is 40 dB $L_{Aeq,T}$.

4. NOISE ASSESSMENT

4.1 The following manufacturer's noise emission data has been provided by the M&E consultant, and are as follows:

- Samsung VRF Condenser model AM080AXVGGR/EU - 73 dB L_{WA} ;

4.2 The noise from the proposed new equipment when operating will be of a steady continuous nature (when operating) with no tonal or impulsive features, however it is likely to be intermittent due to the on-demand nature of its operation, therefore a +3 dB acoustic feature penalty has been applied, in line with BS 4142 guidelines. Based upon the above, a numerical assessment of potential impact for the daytime/evening period in line with the requirements of the planning condition is set out in Table 2, considering only attenuation of sound over distance:

Table 2: Assessment of equipment noise at the nearest dwellings (dB)

Description	Noise level
Calculated Specific Sound Level outside dwelling	41
Character correction	+3
Rating level at dwelling (L_{A,r,T_r})	44
Adopted Noise Limit (background minus 5 dB)	40
Difference	+4

4.3 The results in Table 3 show that the rating level from the condensing equipment will be 4 dB above the adopted noise limit as set out in the planning condition.

4.4 It is worth noting that the calculated rating level would be 1 dB below the representative background sound level and 10 dB below the existing residual noise level. In terms of the initial BS 4142 assessment this indicates a 'low' impact not amounting to an adverse impact.

4.5 Nevertheless, the criterion of the planning condition is not met and therefore mitigation measures will be necessary to reduce the noise impact. We estimate that a 2.2m high acoustic fence will reduce the noise from the equipment by at least 6 dB outside the nearest dwelling on Maher Gardens, thereby reducing the rating level outside the dwelling to below the 40 dB noise limit.

4.6 The recommended acoustic fencing must be imperforate (i.e. have no holes or gaps) with double-rebated boards or joint cover strips, have a surface mass no less than 10 kg/m² and, if constructed of timber, be at least 20mm thick, and incorporate effective gravel boards. For the avoidance of doubt the location of the necessary acoustic fence is indicated in Figure 2.

4.7 Subject to the recommended acoustic fence, the requirements of Condition 7a will be met.

5. SUMMARY

- 5.1 Hepworth Acoustics Ltd has carried out a noise impact assessment in connection with external fixed plant and equipment to be installed in connection with the approved Grab & Go food facility at Loreto College Campus Manchester.
- 5.2 The fixed plant includes air conditioning condensing unit located in the northwestern corner of the site.
- 5.3 The results of a background noise survey have been used to assess the potential noise impact of the equipment.
- 5.4 Noise calculations have been carried out for the proposed equipment which demonstrate that the requirements of Condition 7a can be achieved subject to the installation of an acoustic fence around the equipment.
- 5.5 It is therefore concluded that, subject to installation of an appropriate acoustic fence, noise from the operation of the proposed equipment to be installed at the approved development would not result in any unacceptable impact, thereby protecting residential amenity.



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Key:

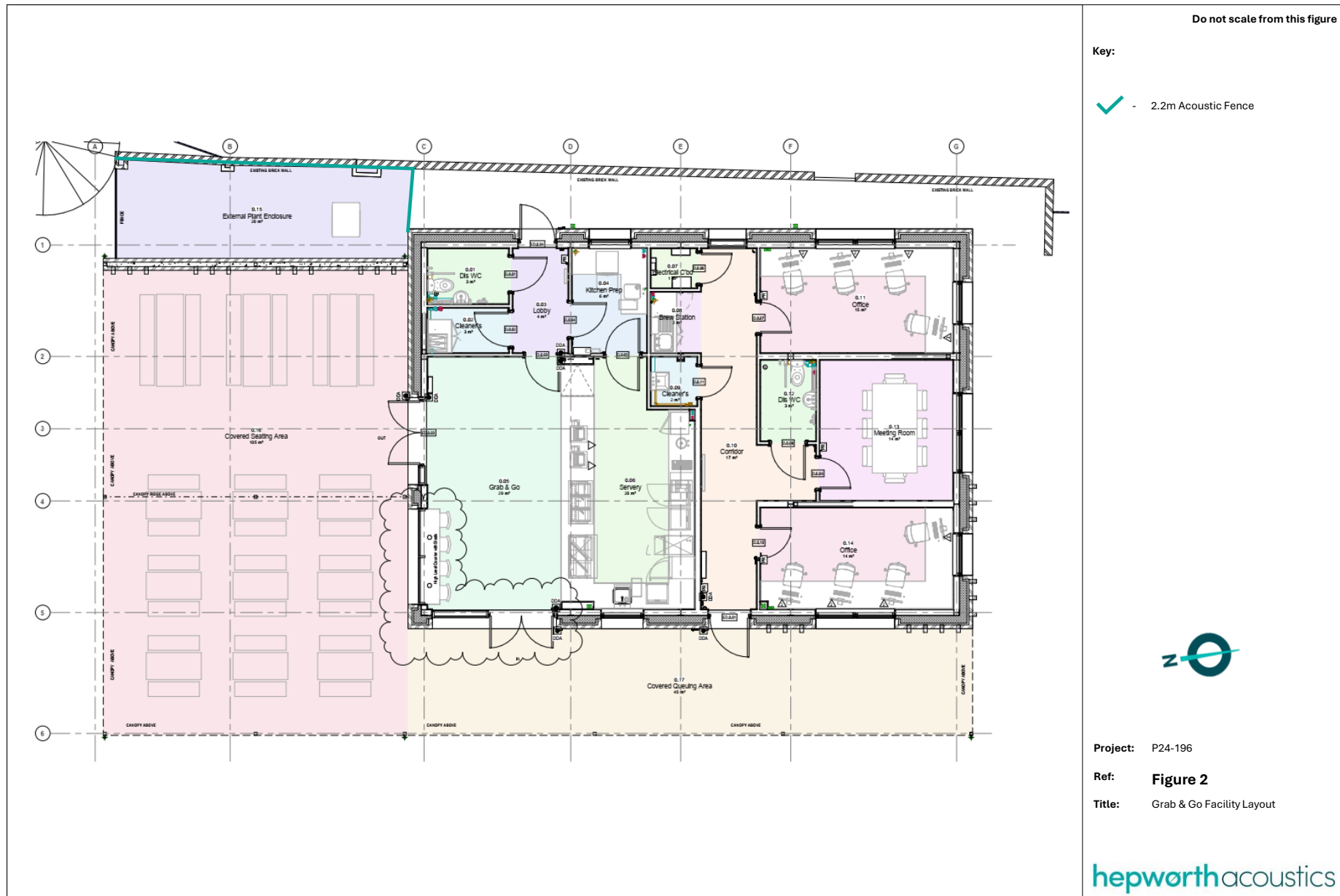
- Noise Measurement Position
- Approx Location of building
- Approx Location of fixed plant

Project: P24-196

Ref: **Figure 1**

Title: Site location & Noise Measurement Position

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APPENDIX A: ACOUSTICS UNITS & INDICES

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. There are also a number of ways to describe sound insulation performance.

The indices used in this report are described below:

- L_w** **Sound Power Level:** A logarithmic ratio between a sound power quantity and a reference value of 10^{-12} W. Sound power is a measure of the total acoustic energy output of a source and is independent of location. Sound power is what gives rise to a sound pressure level at a specific point away from the source.
- L_{wA}** **A-weighted Sound Power Level:** The Sound Power Level (L_w) adjusted to account for the average human hearing response at difference frequencies for a moderate sound power range.
- $L_{Aeq,T}$** **A-weighted Equivalent Continuous Sound Level:** An average of the total sound pressure measured over a specified time period (T). In other words, $L_{Aeq,T}$ is the level of a steady sound which has the same total A-weighted sound pressure as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for most forms of environmental noise.
- L_{Amax}** **Maximum A-weighted Sound Level with Fast Time-weighting:** The maximum A-weighted sound pressure level during the measurement period, using the Fast time-weighting of 125ms. L_{Amax} used in this report refers throughout to L_{AFmax} with the Fast time weighting, denoted L_{AFmax} or $L_{Amax,f}$ in other documents but L_{Amax} in BS 8233:2014 standard notation.
- $L_{A90,T}$** **A-weighted 90 Percentile Level:** The A-weighted sound level exceeded for 90% of a measurement time period (T). $L_{A90,T}$ is generally used as a measure of Background Sound Level.
- $L_{Ar,Tr}$** **Rating Level:** An A-weighted value most commonly used in BS 4142 assessments, which is the sound level of the noise source under assessment, at the assessment location, evaluated over the reference assessment period (T_r) and includes numerical adjustments for the characteristic features of the sound.

APPENDIX B: NOISE SURVEY RESULTS

Date(s)	Tuesday 10 – Wednesday 11 June 2025
Equipment	NTi Audio XL2-TA ‘Class 1’ sound analyser (s/n: A2A-20228-E0) with associated calibrator(s) and tripod(s)/environmental outdoor monitoring kit(s)
Weather	6 – 16 °C, overcast with clear skies later, dry, N to E wind <3 m/s

Chart(s) overleaf

Location 1: Southern boundary of the site

