



Azymuth Acoustics UK

Professional Acoustic Services

Noise Impact Assessment

Ref: AA0402RevA

Unagi Dark Kitchen

Manchester,

M3 1HJ

On behalf of

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1.0 Introduction

Azymuth Acoustics UK (AAUK) was appointed by Ken Hollingworth to provide a noise assessment in relation to a proposed dark kitchen at Park Place, Cheetham Hill, Manchester. The proposed location of the kitchen is land that was formerly part of a car park at the end of park place.

This environmental noise assessment report is intended to provide information relating to potential noise levels affecting the site, in order to support the detailed planning application for the kitchen. In particular, the report sets out the following details:

- The results of a baseline noise survey undertaken in the vicinity of the proposed development
- Reasonable assessment criteria for the analysis of survey results
- Noise limits on plant equipment to reduce likelihood of adverse impact upon the nearest residential receptor
- Discussion of patron noise at the proposed development

1.2 The proposed development

At this development there will be space for a maximum of 48 patrons to be seated, and food is either delivered by courier or collected by the customer. As such the noise from outdoor dining will be taken into account.

AAUK understands that the opening times of the restaurant will be 08:00 to 23:00, 7 days a week.

2.0 Baseline Noise Survey

2.1 Measurement Procedures

The instrumentation used for the noise survey consisted of a SvanTek 959 type 1 precision sound level meter. The equipment was calibrated before and after the noise measurements. The sound level meter measured at A-weighted (fast response) noise levels as well as octave bands noise levels for all measurement records.

Day and night noise surveys were undertaken at the proposed kitchen site to ascertain the current noise climate. Day surveys were taken between 12:57hrs and 13:17hrs on 14th April 2022 and between 16:38hrs and 18:03hrs on 21st April 2022. The night survey was taken between 22:51hrs and 00:12hrs on 21st to 22nd March 2022.

AAUK has identified the nearest residential receptor to be the apartments at 4 Park Place. This approximately 50m from the proposed development. This receptor is marked on the figure below (with an R), along with the following measurement positions:

- Position 1: Night Time Location
- Position 2: Daytime Location

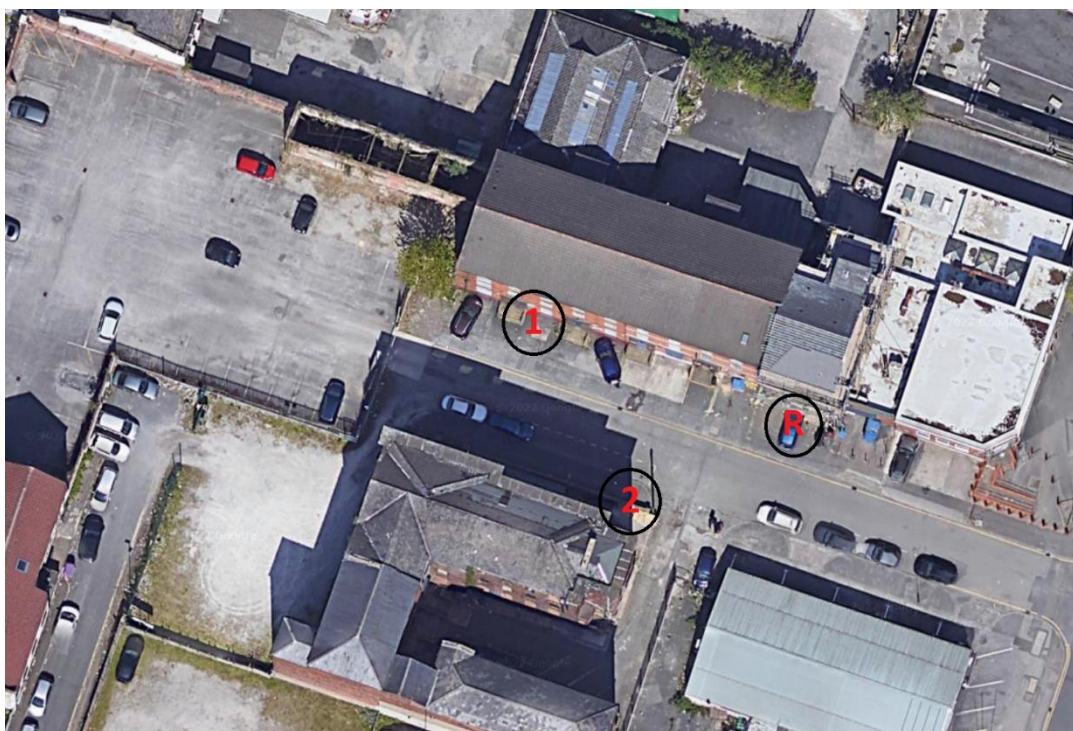


Figure 1

2.2 Results of Noise Measurements

Full results of the noise levels recorded during the survey are included in Appendix B of this report.

The following table summarises the results of the noise measurements undertaken at the proposed site in terms of the average daytime (07:00 to 23:00 hours) and night-time (23:00 to 07:00 hours) statistical noise levels.

Period	L _{AFMax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Day (07:00 - 23:00)	68.4	55.9	58.7	52.6	47.5
Night (23:00-7:00)	62.7	52.1	54.8	48.7	43.8

Table 1 – Summary results from the noise surveys carried out by AAUK.

2.3 Description of Noise Climate

The noise climate is dominated by road traffic using the A665 Cheetham Hill Rd. This is a busy arterial route close to Manchester city centre and connecting with the inner ring road and as such road traffic volumes are high for large parts of the day.

In addition the evening / night-time road traffic continues through until relatively late into the early hours of the morning and is likely to pick up again before normal morning rush hour.

3.0 Assessment Criteria

In order to assess the extent of any measures required in order to comply with suitable conditions relating to potential noise sources, Azymuth Acoustics UK has reviewed various guidance documents and standards, these include:

- National Planning Policy Framework (NPPF 2018)
- British Standard 8233:2014
- World Health Organisation Guidelines on Community Noise
- British Standard 4142:2014
- Manchester City Council Planning & Noise Technical Guidance (2015)

3.1 National Planning Policy Framework (NPPF) 2021

The NPPF provides guidance to local authorities taking into account noise in making planning decisions. Paragraph 185 of the National Planning Policy Framework (NPPF) states that planning policies and decisions should aim to:

- Avoid noise giving rise to significant adverse impacts on health and quality of life as a result of new development
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions

The National Planning Policy Framework states that the planning system should ‘prevent 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’.

3.2 British Standard 8233: 2014

BS 8233 provides a code of practice for the sound insulation of a variety of building types affected by general environmental noise. It provides recommendations for control of noise in and around buildings and suggests appropriate internal ambient noise level criteria / limits for a variety of different situations including residential properties.

The following table summarises the noise limits suggested by BS 8233 applying to residential properties:

Activity	Room	Good Design Range $L_{Aeq, T}$ dB	
		07:00-23:00hrs	23:00-07:00
Resting	Living Room	35	-
Dining	Dining Room / Area	40	-
Sleeping (daytime resting)	Bedroom (at night)	35	30

Table 2 – Noise Limits for Residential Properties Suggested in BS 8233.

3.3 World Health Organisation Environmental Noise Guidelines (ENG) 2018

The main purpose of the 2018 WHO guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from the following sources: transportation (road traffic, railway and aircraft), wind turbines and leisure activities.



The guidelines set out to define recommended exposure levels for environmental noise in order to protect population health. Exposure limits are average levels defined over a period of one year, measured outdoors in free field at the most exposed façade. It should be noted that the document does not provide guideline limit values for multiple noise sources in combination.

The 2018 guidelines supersede the Community Noise Guidelines from 1999. Nevertheless, the document recommends that all CNG indoor guideline values and any values not covered by the current guidelines should remain valid. As such, the following guidance would remain appropriate:

For protection against sleep disturbance inside dwellings, night time noise levels should not exceed 30dB LAeq for continuous noise and 45dB L_{Amax} for typical single sound events (which are exceeded 15 times or more per night – see ProPG Appendix A.12 for more details).

To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise (interpreted as noise from all sources combined) should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas.

It should be noted that exposure levels defined in ENG and CNG are for guidance purposes as relates potential adverse health impacts and should not be interpreted as absolute limits or regulations.

3.4 British Standard 4142:2014

British Standard 4142: 2014 “Methods for assessing and rating industrial sound” describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

- Typically, the greater the difference between background sound and industrial/commercial noise, the greater the magnitude of the impact.
- 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.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- A difference of around + 10dB or more is likely to be an indication of an adverse impact, depending on the context.

BS 4142 notes that: “Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.”

3.5 Manchester City Council Planning & Noise Technical Guidance (2015)

For Industrial & Commercial developments, Manchester City Council (MCC) suggests an assessment based upon BS 4142 is performed. From this, rating level relative to the background sound level can be used to indicate the adverse impact of the development. The lower the rating level (L_{Aeq}) relative to the background sound level (L_{A90}), the lower the likelihood of an adverse impact. The objective with regards to industrial development is as follows:



“The development should be designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location.”

A similar criterion for plant noise is also outlined:

“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.”

3.6 Recommended Noise Assessment Criteria

Based on the guidance above it is recommended that a noise rating (LAeq) for the plant/commercial noise of 5dB below background (LA90) would be reasonable with the aim of minimising the impact of the noise from the proposed dwelling on the nearby residential receptors which are identified as being 4 Park Place which is located approximately 50m from the proposed site.

As such the criterion at each period is as follows:

Period	Background (LA90)	Target Noise Level at Receptor (LAeq)
Day (07:00 - 23:00)	47.5	42.5
Night (23:00-7:00)	43.8	38.8

Table 3 – Noise criteria recommended for the proposed development.

There is no statutory assessment criteria for noise from outdoors patrons; hence; the levels from diners using the outdoor space has been assessed in qualitative terms and appropriate consideration made.

4.0 Assessment of the Proposed Development

4.1 Limits on plant equipment

To achieve the targets at the nearest receptor in section 3.6, AAUK recommends a noise limit of 70dBA @ 1m.

4.2 Noise Modelling

4.2.2 Plant Noise

AAUK has produced a noise model to verify the validity of this limit, using an estimated extract fan. Once the extract has been selected it should be reviewed to determine if it achieves the target.

AAUK has assumed the extract fan will have an atmosphere connection on the west facing side of the development. This is shown on the figure below.

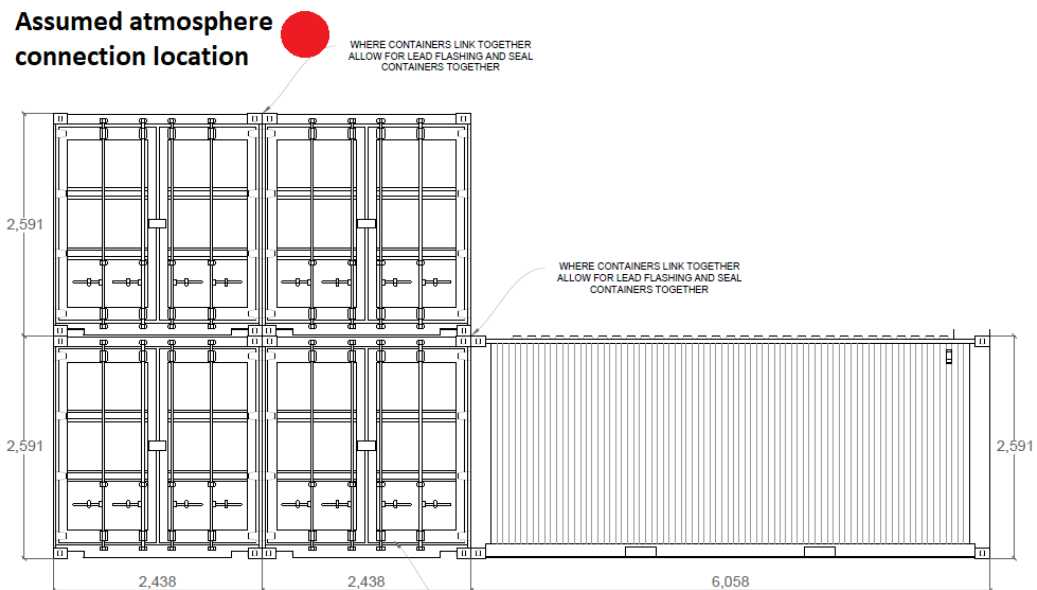


Figure 2 – Elevation drawing of the proposed development. The assumed extract louvre location is marked in red.

The estimated sound power level of the extract fan is shown below:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k	Total dBA
SPL @ 1m	72.7	76.2	73.5	71.0	66.3	58.6	53.9	48.4	72.0
Sound power level SWL	80.7	84.2	81.5	79.0	74.3	66.6	61.9	56.4	80.0

Table 4 – Example sound power spectrum for a kitchen extract.

With this extract fan sound power level, and emissions from the rollers on the front elevation (marked on the drawing below) the estimated worst case (2nd Floor) noise level at the receptor is ~33dBA. This would comply with the MCC target (5dB below background) of 38.8dB.

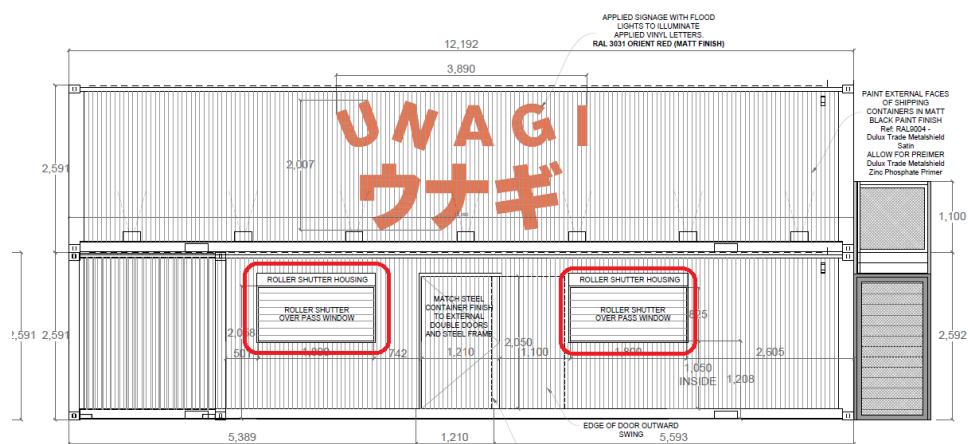


Figure 3 – Elevation drawing showing the rolling shutters assumed to be a noise source.

The below noise contour map shows the impact of this development upon the surrounding area.

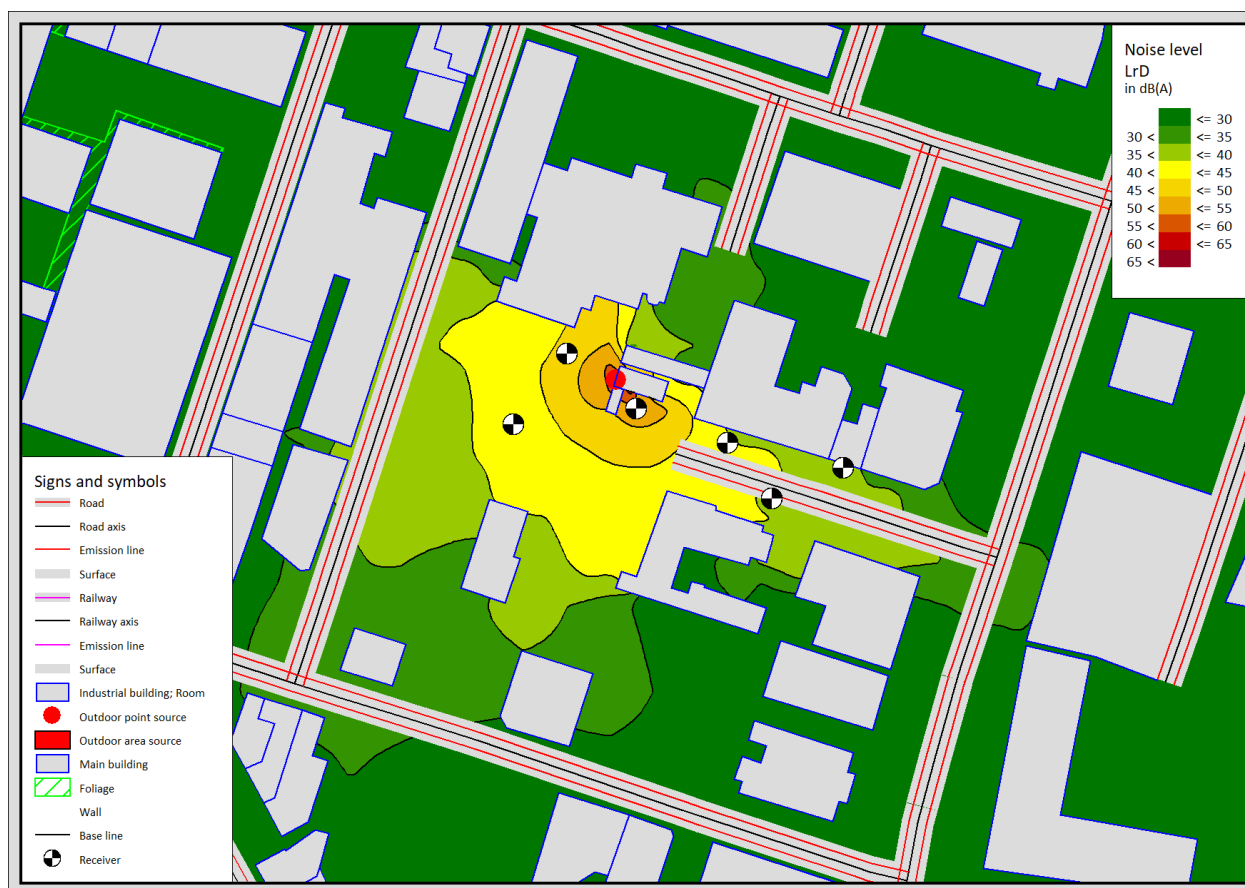


Figure 4 – Noise contour map showing the impact of the plant at the proposed development (as per details above) on the surrounding area.

4.2.3 Patron Noise

Since there will be seating at the proposed development, AAUK has produced a model of the worst-case impact of the dining area upon the surrounding area.

It must be stressed that there is no criteria for assessment of crowd noise, and that the model is based upon previous data recorded by AAUK. For reference, the data used is included below.

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k	Total dBA
Typical level in a dining/cafe area during busy periods $L_{Aeq,5min}$	73	74	75	79	75	72	67	80	73

Table 5 – Estimate (based on previous measurements) of likely level, typical bar and restaurant.

The noise levels in the model were informed by the time histogram below, assuming maximum noise level during peak hours and noise level around half of that during non-mealtimes.

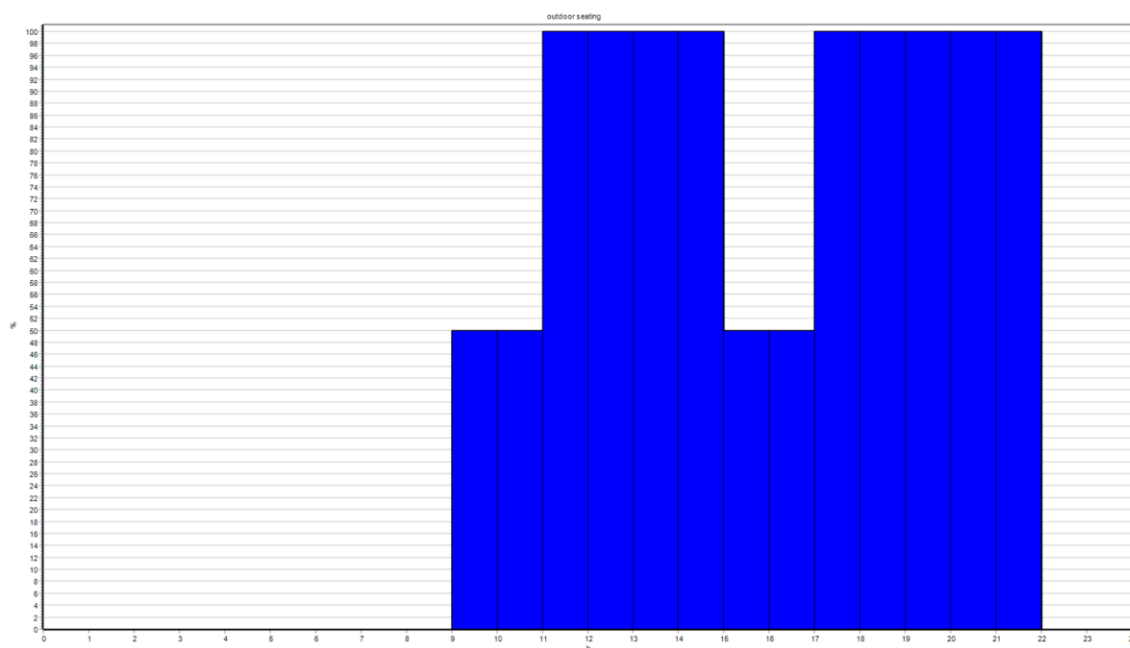


Figure 5 - Time histogram used to inform crowd noise.

The worst-case noise level at the nearest receptor has been estimated to be ~50dBA. This is ~2dB above the background sound level (L_{A90}) at the site during operating hours (daytime only), and ~5-6dB below ambient sound level (L_{Aeq}) at this location.

The noise contour map showing the effect of patron noise (worst-case) upon the surrounding area.

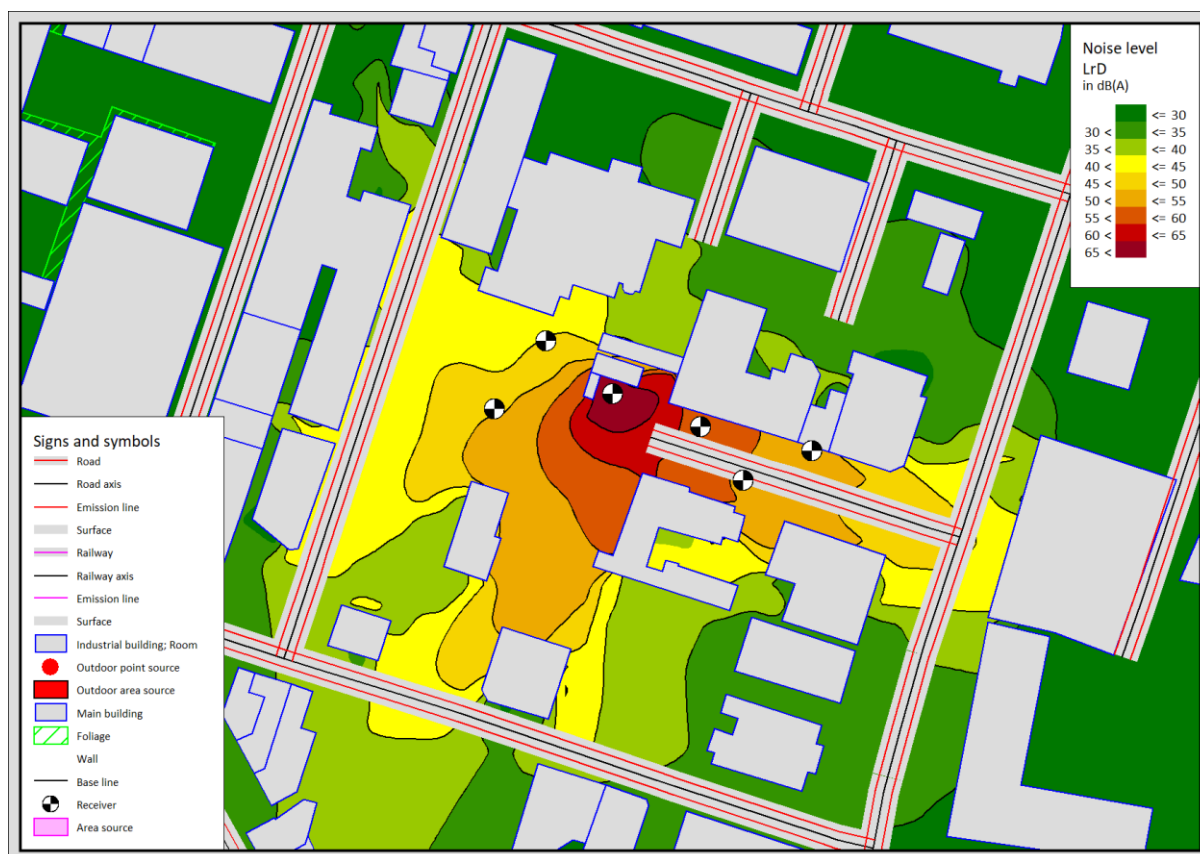


Figure 6 – Noise contour map showing the impact of the activity noise at the proposed development (as per details above) on the surrounding area.

4.2.4 Combined Impact

AAUK has also calculated the combined impact of both patron and plant noise upon the local area. This too is estimated to produce a noise level of ~50dBA at the nearest residential receptor. This is entirely dominated by the example patron noise.

The noise contour for this scenario is included below.

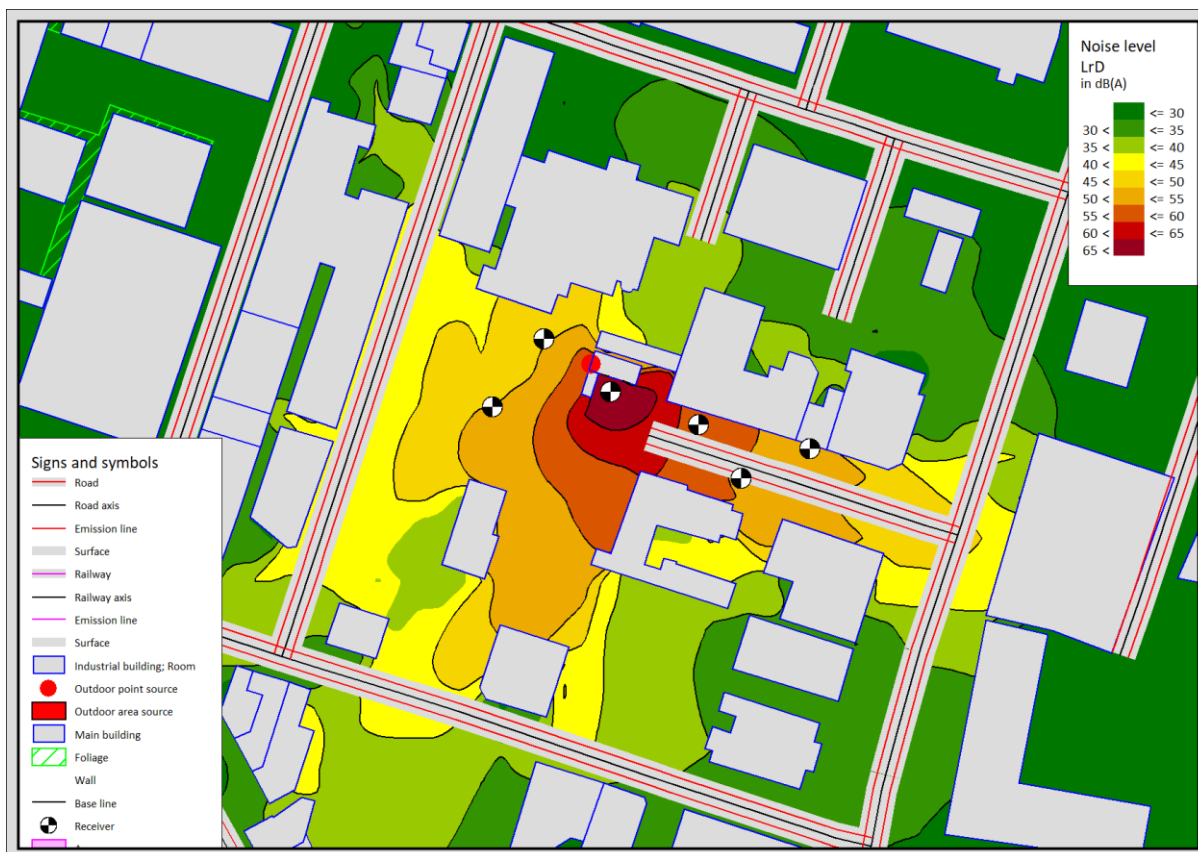


Figure 7 - Noise contour map showing the impact of the plant and activity noise at the proposed development (as per details above) on the surrounding area.

4.3 Assessment of the Plant Noise

An assessment of these proposals has been carried out as per BS 4142. This is speculative and operates on the data from the night-time measurements (the worst case e.g., if the fan were to be left on after opening hours for a short period during cleaning).

Location	Results	Values	Commentary
4 Park Place	Noise level @ 1m from the atmosphere connection	$L_{Aeq} = 72\text{dBA}$	A generic extract fan has been provided
	Residual Sound Level	$L_{Aeq,5mins} = 52.1$	Average taken from night-time measurements
	Background Sound Level	$L_{A90, 5mins} = 43.8$	Average background sound level from night-time measurements
	Estimated Sound Level @ 50 metres from source	$L_{Aeq} = 33\text{dB}$	Taken from the calculations based upon estimates
	Acoustic feature correction	+ 0 dB	The sound is purely speculative at present, and as such the required correction cannot be determined. It is assumed the sound will not be tonal nor impulsive
	Rating Level	$(33 + 0) = 33\text{ dB}$	As above
	Background Sound Level	$L_{A90, 5mins} = 44\text{dB}$	
	Excess of rating over background sound level	$(33 - 44)\text{ dB} = -9\text{dB}$	As per clause 11 of BS4142
	Assessment indicates no adverse impact		The excess of the rating level over the background sound level is showing a negative result. This indicates that there will be no adverse noise impact.

Table 6 - Calculated impact of the extract fans from the proposed development on 4 park place as per BS 4142

As can be seen in the table above, an extract fan within the proposed limit will meet the MCC criteria at night (the more stringent requirement).

5.0 Summary

The proposed development is a kitchen intended for food deliveries and outdoor dining, operating from 08:00-23:00 7 days a week.

AAUK recommends the development achieves a noise level of 38dB or less at the nearest noise sensitive receptor as per MCC criteria. To achieve this a noise limit of sound pressure level of 70dBA @ 1m from the atmosphere connection is recommended.

The resulting noise level (predicted to be 33dBA) at the nearest noise sensitive receptor will be at least 5dB below the background sound level (44dB $L_{A90, 5min}$) at the nearest noise sensitive receptor and as such will comply with the Manchester City Council Planning advice.

Any specific proposed kitchen extract fan unit or other items such as refrigeration plant should be reviewed (via the methods outlined in BS 4142) to determine whether it complies with the recommended 70dBA @ 1m noise limit.

There is no standard to assess potential noise from an area for outdoor seated diners, however at operating hours AAUK estimates the worst-case sound to exceed background by ~2dB. During this period, it would remain below ambient levels. The level of impact associated with this is deemed to be fairly minimal given the character of the area and the high volume of road traffic noise that is already present along Cheetham Hill Road.

Appendix A – Glossary of Acoustic Terms

Decibel (dB)

This is the unit used to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro Pascal to 100 Pascal).

dB (A)

This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. A-weighting) to compensate for the sensitivity of the human ear to sound of different frequencies. The A-weighting curve is implemented in sound level meters using an electronic filter that approximately corresponds to the frequency response of the ear.

Octave Band Noise Level

The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz. The ear is also generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum can be divided into frequency bands. The most commonly used frequency bands are octave bands, in which the mid-frequency of each band is twice that of the band below it.

L_{Aeq}

This is the equivalent steady sound level in dB (A) containing the same acoustic energy as the actual fluctuating sound level over a given time period.

Reverberation Time (RT or sometimes T₃₀ or T₆₀)

This is the time taken for the reverberant sound energy in an enclosure to decay one millionth of its equilibrium value, i.e. by 60 dB, after the source has been switched off, is known as the reverberation time. The reverberation time is frequency dependent and it is customary to measure its value in octave or one-third octave bands. Reverberation occurs when sound waves are repeatedly reflected from each surface of the room.

Sound Reduction Index (SRI)

Difference measured between the amount of energy flowing towards the wall in the source room and the total amount of energy flowing towards the wall in the source room and the total amount of energy entering the receiving room (usual range 100 - 3150 Hz for one third octave band values). The SRI varies with frequency and is measured in a laboratory in either octave or one-third octave bands.

$SRI = L1 - L2 + 10 \log (S/A)$, where:

L1 = Noise level in the source room

L2 = Noise levels in the receiving room

S = Surface area of test specimen

A = Equivalent acoustic absorption area in the receiving room

Weighted Sound Reduction Index (R_w)

This is a weighted single figure descriptor of the sound insulation performance of a partition measured under laboratory conditions. The procedure used to quantify the R_w is to compare the sound reduction index (SRI) in each of the one-third octave bands from 100Hz to 3150Hz against a set of standard reference curves.



Appendix B – Noise Survey Data

Position	Date & Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
1	21/03/2022 22:56	58.5	51.1	54.5	49.7	44.4
	21/03/2022 23:01	59.8	51.2	54.5	49.3	45
	21/03/2022 23:06	76.6	58.1	58.4	51.7	45.6
	21/03/2022 23:11	59.6	51.8	55.6	50.1	43.5
	21/03/2022 23:16	68.6	52.3	54.6	50.4	43
	21/03/2022 23:21	61.9	51.7	54.5	50.4	46.1
	21/03/2022 23:26	67.6	53	56.1	50.5	45.2
	21/03/2022 23:26	56.7	48.4	52.4	45.5	43.6
	21/03/2022 23:32	61.2	51.3	55.1	48.9	44.4
	21/03/2022 23:37	60.7	51.9	55.2	50.5	45.2
	21/03/2022 23:42	65.6	51.7	55	48	43.8
	21/03/2022 23:47	60.7	51.2	55.2	48.9	43.5
	21/03/2022 23:52	60.8	50.6	54.4	48.1	43.5
	21/03/2022 23:57	61.2	49.5	53.3	46.2	42
	22/03/2022 00:02	61.3	51	55	47	42.7
	22/03/2022 00:07	60.3	49.8	53.3	46.9	42.5
	22/03/2022 00:11	59.9	49.6	53.6	46.1	40.6
2	14/04/2022 12:57	73.2	55.8	57.7	54.3	49.5
	14/04/2022 13:02	72.1	56.5	58.2	54.5	50.7
	14/04/2022 13:07	76.3	56.7	58.5	54.9	51
	14/04/2022 13:12	72.3	57.5	59.7	57.1	51.9
	14/04/2022 13:17	74.4	59.6	60.7	59.2	57.8
	14/04/2022 13:22	67.3	59.7	61.1	59.4	58
	20/04/2022 16:38	62.4	52.9	57	50	42.8
	20/04/2022 16:43	61.4	51.3	55.7	47.9	43
	20/04/2022 16:48	62.1	52.9	56.9	50.2	44.8
	20/04/2022 16:53	63.1	52.7	57.1	48.3	41.5
	20/04/2022 16:58	65.6	55.4	59.4	52.8	46
	20/04/2022 17:03	71.6	55.5	59.1	51.3	45.2
	20/04/2022 17:08	65	54.6	59	50.8	45.3
	20/04/2022 17:13	66.5	55.6	59.5	52.8	47.1
	20/04/2022 17:18	65.6	54.8	58.8	51.9	47
	20/04/2022 17:23	64.7	54.9	58.8	51.7	48
	20/04/2022 17:28	65.5	54.1	58.5	49.8	45.6
	20/04/2022 17:33	66.9	53.7	57.8	50.8	44.6
	20/04/2022 17:38	85.3	56.8	59.1	51.9	44.9
	20/04/2022 17:43	66.9	54.6	58.5	51	47.1
	20/04/2022 17:48	65.8	55.5	59.5	52.8	45.5
	20/04/2022 17:53	67.2	54.8	58.9	51.3	47.1
	20/04/2022 17:58	66.2	55.3	59.2	52.2	45.8
	20/04/2022 18:03	75.1	58	60.5	55	49.3

Table B1: Results of baseline noise survey