

**Refurbished Restaurant
516 Wilbraham Road, Manchester, M21 9AW
Kitchen Extract Noise Impact Assessment**

REPORT REFERENCE NO. J003958-5719-TD-02

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This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.



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1.0 SUMMARY

At the request of Yane Foods Ltd, PDA has carried out a noise impact assessment in relation to the proposed new kitchen extract system to a restaurant refurbishment project located 516 Wilbraham Road, Manchester, M21 9AW.

A noise survey has been conducted at site to establish the existing acoustic climate at the nearest noise sensitive receivers (NSR's).

Noise egress from the kitchen extract has been modelled to the nearest NSR's and compared against the background noise climate in accordance with the Manchester City Council, Planning & Noise, Technical Guidance 2015 (MCCPNTG 2015).

With the inclusion of the silencers as specified in Section 5 of this report, to the kitchen outlet and inlet external terminations, noise egress from plant installations is predicted to achieve the MCCPNTG 2015 criteria.

Additionally absolute noise levels from the kitchen extract are 'low' and achieve the recommended internal and external ambient noise level criteria as detailed in WHO 1999 and BS 8233. Overall the kitchen extract is predicated to have a 'low' impact at the NSR's.

2.0 SITE DESCRIPTION

The restaurant refurbishment project is located on 516 Wilbraham Road, Manchester, M21 9AW. The proposed kitchen extract termination is indicated below.

An overview of the development is provided below:

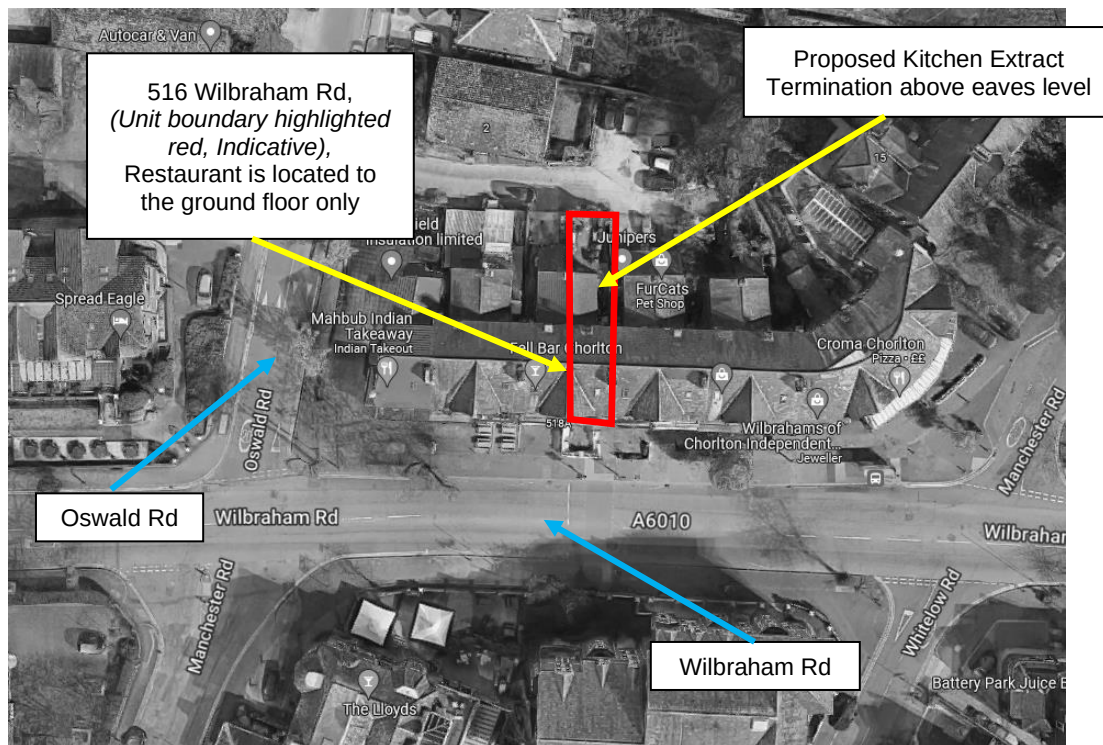


Figure 1. Site Overview (The Old Town Bake House, highlighted red)

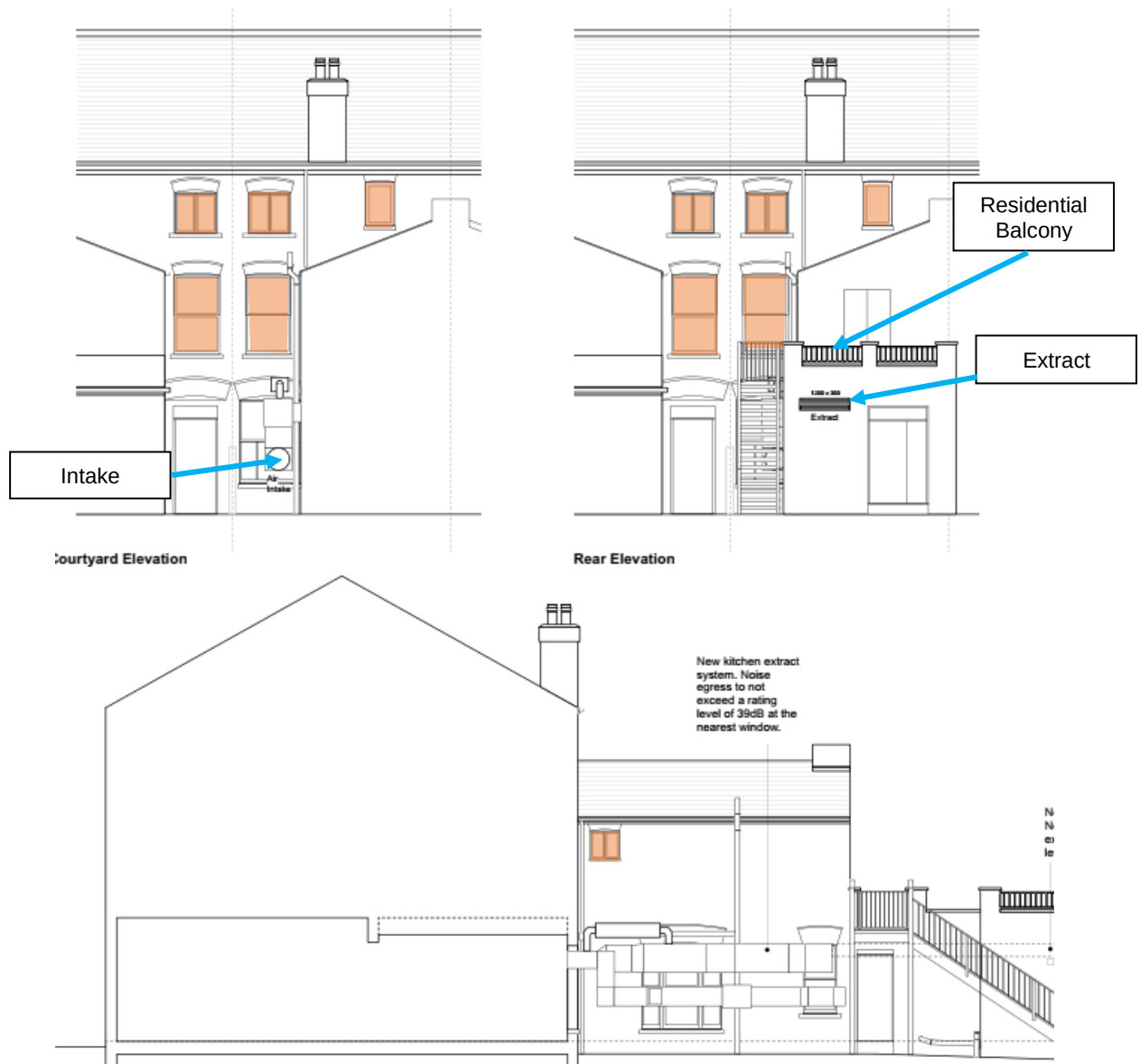


Figure 2. Kitchen Extract External Layout

Key

■ -Highlighted Windows are neighbouring residential windows

The nearest noise sensitive receivers (NSR's) to the kitchen extract have been identified as the residential properties above and adjacent to 516 Wilbraham Road. Additionally there is a residential property located to the north of the extract termination on the opposite side of the courtyard. Noise egress to this property is also included as part of the overall noise impact assessment.

3.0 ASSESSMENT CRITERIA

3.1 Manchester City Council, Planning & Noise, Technical Guidance 2015 (MCCPNTG 2015)

MCCPNTG 2015 sets out MCC's noise design criteria to meet requirements of the NPPF for various types of developments.

Noise From Plant Installations

In regards to fixed plant installations MCCPNTG 2015 gives the following design criteria.

'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'

3.2 National Planning Policy Framework

National Planning Policy is guided by the National Planning Policy Framework (NPPF) updated in July 2021. With regard to Noise the Framework states the following;

Planning policies and decisions should contribute to and enhance the natural and local environment by:

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

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:

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

The terms 'significant adverse impact' and 'adverse impact' are defined in the explanatory notes of the 'Noise Policy Statement for England (NPSE)' which states;

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The notes also offer an explanation of the term ‘other adverse impacts’ as follows;

... refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

Although no specific noise limits for LOAEL and SOAEL have been defined, in 2014 the UK Government published a planning practice guidance document for noise which indicates where these limits fall with relation to the perception of noise. A summary is reproduced in Section 3.3 below; the full document is published at <https://www.gov.uk/guidance/noise--2>.

3.3 Planning Practice Guidance – Noise

The UK Planning Practice Guidance on noise offers further guidance on the typical levels which constitute the NOEL, LOAEL and SOAEL and is reproduced in the table below;

Table 1. Planning Practice Noise Level Guidance

Response	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. 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	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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 small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

3.4 BS 8233:2014 Guidance on Sound Insulation and Noise reduction for Buildings

Dwelling houses, flats and rooms in residential use

British Standard 8233:2014, Guidance on Sound Insulation and noise reduction for buildings, gives guidance on internal noise levels within dwellings, flats and rooms in residential use when unoccupied. The following criteria are for Living and Dining Rooms for daytime use and Bedrooms for night time.

Table 2. BS 8233 Recommended Indoor Ambient Noise Levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 $L_{Aeq,16hour}$	–
Dining	Dining room/area	40 $L_{Aeq,16hour}$	–
Sleeping (daytime resting)	Bedrooms	35 $L_{Aeq,16hour}$	30 $L_{Aeq,8hour}$

It should however be stressed that the above criterion relates to steady noise, in this case from road traffic etc., excluding unusual noise events departing from the typical noise character of the area.

With regard to gardens and external areas, BS 8233:2014 (Section 7.7.3.2) gives the following advice:

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 recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

3.5 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following noise levels are applicable to residential dwellings.

Table 3. WHO Guidelines for Community Noise Criteria

Specific Environment	Critical Health Effect(s)	L_{Aeq} dB	Time Base (hours) *
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	16
Inside bedrooms	Sleep disturbance, night-time	30	8

* Typically taken to be daytime/evening - 07:00 – 23:00 hours and night time 23:00 – 07:00 hours.

In addition to the above continuous equivalent noise levels, WHO guidelines indicates that exceedances of 45 dB L_{Amax} for single sound events should be limited to no more than 10 – 15 times per night, when measured with a 'fast' time weighting.

4.0 SURVEY DETAILS AND RESULTS

4.1 516 Wilbraham Rd, Restaurant Operational Hours

It is understood that the refurbished restaurant's operational hours (including the kitchen extraction system) are as follows.

16:00 – 22:00 hours Monday – Thursday
12:00 – 22:30 hours Friday – Sunday

4.2 Noise Survey Details

An ambient noise survey was carried out at site during the following period.

02/08/2022, 20:37 hours - 02/08/2022, 22:30 hours

It can be noted that the timing of the noise survey is considered to be representative of subjectively the quietest period of the day time in which the kitchen extract will operate.

All measurements were conducted in 15-minute samples by Tom Dixon of PDA.

The location for the measurement positions utilised for the noise survey is illustrated in Figure 2 below.

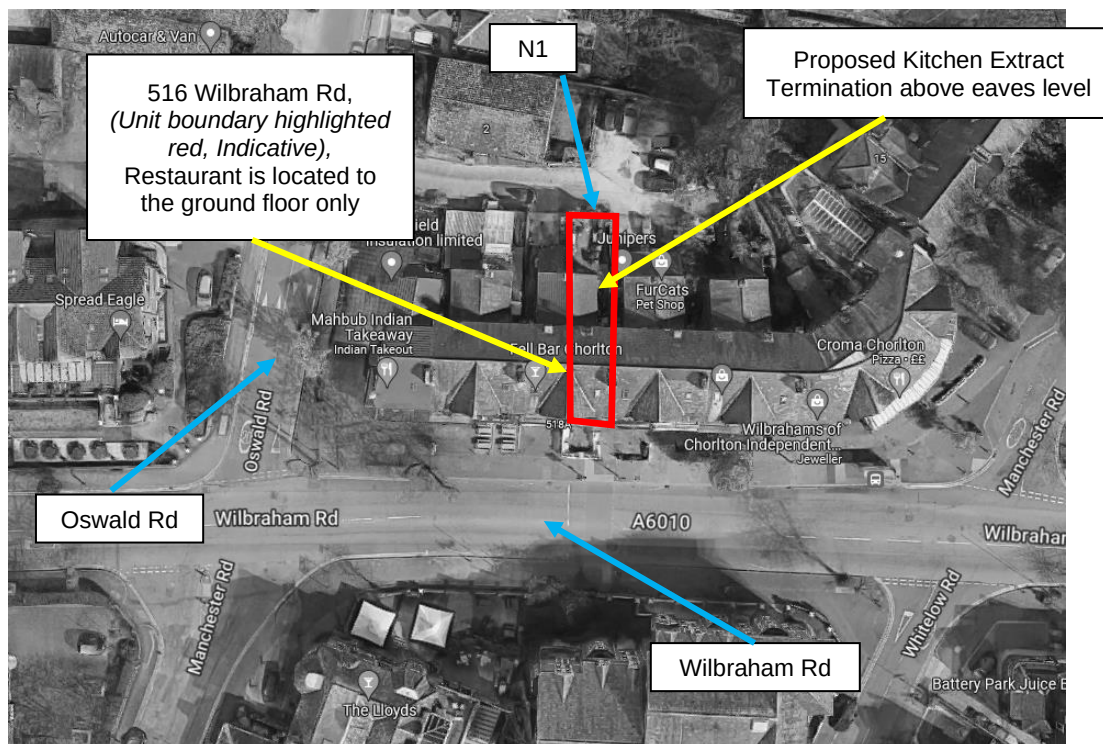


Figure 3. Noise Survey Monitoring Positions (Site boundary Highlighted Red, Indicative)

Key

N1-Noise monitoring position adjacent to site boundary and NSR boundaries

All noise measurements were conducted utilising the following equipment:

Rion NL52 (SN- 00810316) - Sound Level Meter

In accordance with IEC 61672-1:2002 the sound level meter has a Class 1 frequency response and can operate as an integrating sound level meter with statistical functions.

The sound level meter was set to measure 'A' weighted, broadband and various statistical parameters. The meter was field calibrated both before and after each measurement, in addition to this a valid calibration certificate is held for the meter and calibrator. It was ensured that the sound level meter was fitted with a windshield at all times. Measurements were conducted at 1.2m above the ground level.

Weather

Typical weather conditions throughout the survey were as follows:

Temperature- 24°C
Wind - 0.6s (W)
Cloud - 100%
Rain - dry, no rain

4.3 Noise Sources & Notes

While attending site the ambient noise climate was noted to be dominated by traffic noise to Wilbraham Road. There was very intermittent traffic to Oswald Road which was judged to not significantly affect the ambient noise climate. Other noise sources observed included some pedestrian noise, some noise from within nearby residences and some noise from external patrons to the 'Spread Eagle' Pub to the west of the site.

4.4 Noise Survey Results

The full results of the noise survey are presented below:

Table 4. N1, Noise Monitoring Positions, Survey Results

Time Period (hh:mm)	L _{Aeq,15-minute} dB	L _{A90,15-minute} dB
20:37	48	44
20:52	49	45
21:07	50	45
21:22	49	44
21:37	50	45
21:52*	47	42
22:06	48	44
22:21**	47	43

Notes

*Measurement is of a 13-minute sampling period. Measurement was briefly paused while a car parked nearby to the meter.

**Measurement is of a 9-minute sampling period

With reference to the noise survey results (Table 4) the typical background noise level has been evaluated as 44 dBA (the modal L_{A90} level recorded during the noise survey). Therefore noise egress from the proposed kitchen extract in accordance with the MCCPNTG 2015 criteria is required to not exceed a rating level of 39 dBA (44 – 5 dB) at the nearest residential property.

5.0 NOISE IMPACT ASSESSMENT

5.1 Noise From Kitchen Extract

It is understood that the proposed kitchen extract system consists of the following fan units to both the extract and intake terminations:

- System Air, MUB 042 500D4, Fan unit
- External intake and extract ductwork termination area, 0.36m²

Our calculations indicate that to achieve the MCCPNTG 2015 criteria the silencers to both the intake and extract terminations should achieve the following minimum insertion losses.

Table 5. Kitchen External Extract & Intake Silencers, Minimum Insertion Losses

Typical Product	Octave Band Insertion Losses dB							
	63	125	250	500	1000	2000	4000	8000
Eco-Attenuator EAK 20 H/V/900 Silencer	8	14	21	36	43	43	43	34

The above silencer (or acoustic equivalent) should be installed to external terminations of both the inlet and outlet of the kitchen extract system.

The following L_w's for the fan unit are provided by the manufacturers.

Table 6. Kitchen Extract L_w's

	A-weighted Octave Band L _w 's, dB								dBA
	63	125	250	500	1000	2000	4000	8000	
Inlet	50	70	73	77	78	75	74	64	83
Outlet	52	71	74	78	79	76	75	66	84

Equivalent L_w's for the noise breaking out of the kitchen extract ductwork have been calculated by applying corrections to the L_w's for the fan unit to account for the insertion losses of the upgraded silencer (as detailed in Table 5), insertion losses for the 90° radial bend in duct work to the extract termination, attenuation through the duct length (fan to extract termination) and the end-loss reflection of the ductwork termination.

The resultant L_w's are presented in Table 7 below.

Table 7. Noise Break-out from Kitchen Extract, Inlet & Outlet Terminations, L_w's

	Octave Band L _w 's, dB								dBA
	63	125	250	500	1000	2000	4000	8000	
Inlet	57	66	58	42	34	30	28	31	53
Outlet	55	64	57	42	32	27	27	31	51

In addition to noise from the fan outlet and inlet the following levels are quoted by the manufacturer for noise which breaks-out of the fans casing.

Table 8. Kitchen Extract, Fan Casing Break-out L_w's

A-weighted Octave Band Levels L _w 's, dB								
63	125	250	500	1k	2k	4k	8k	dBA
30	51	48	46	49	49	42	29	56

5.2 Noise Egress To NSR

The L_w 's for noise break out from the kitchen outlet and inlet terminations and the fan casing breakout as presented in Tables 7 & 8 have been used to inform a Sound Plan (SP) computer model which predicts the external noise levels at the nearest residential receivers. This software has been set up to model the sources by taking into account for all reflections and shielding around the site. Please note that the calculations follow the methodology detailed within ISO 9613-2 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation.

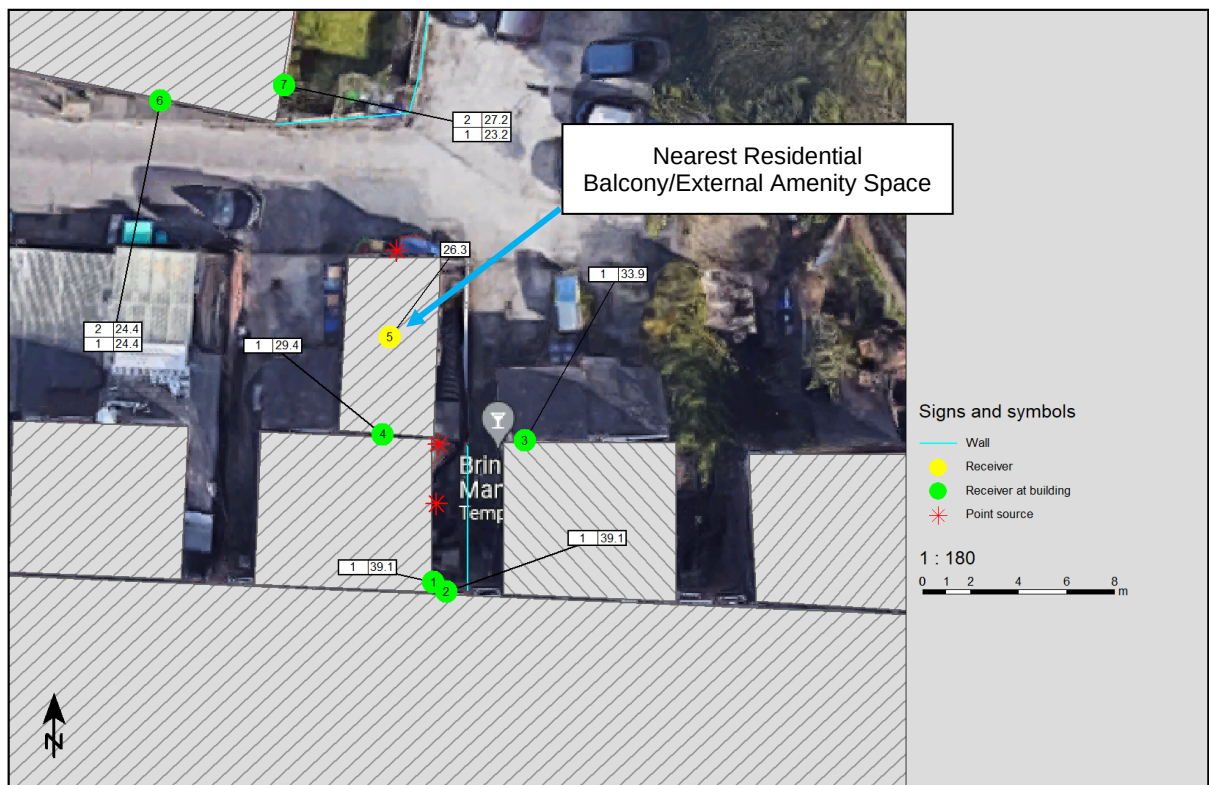


Figure 4. SoundPlan (SP), Overview

Noise egress to the worst affected residential receiver in regards to noise emanating from the kitchen extract system has been calculated as 39 dBA. This achieves the MCCPNTG 2015 criteria for plant-based noise sources (39 dBA based on a criteria set 5dB below the existing background).

It can be noted that based on an open window noise egress from the proposed plant is not expected to exceed the recommended 35 dBA (daytime) or 30 dBA (night-time) internal noise level criteria (BS 8233 & WHO 1999) for bedrooms. Further to the above it should be considered that there are no external balconies (amenity spaces) to the nearest residential windows to consider. The nearest residential balcony is illustrated in Figure 4. It can be noted that noise egress from the kitchen extract system at this position is considerably lower (26 dBA) than noise egress to the nearest residential windows due to the acoustic shielding provided by the intervening buildings at this position. Noise from the kitchen extract at the nearest external amenity area is therefore 24 dB below the recommended WHO1999 & BS8233 50 dBA criteria amenity spaces and 18 dB below the existing background (44 dBA).

Overall therefore the proposed kitchen extract is predicted to have a 'low' impact on the existing acoustic environment.



6.0 CONCLUSION

At the request of Yane Foods Ltd, PDA has carried out a noise impact assessment in relation to the proposed new kitchen extract system to a restaurant refurbishment project located 516 Wilbraham Road, Manchester, M21 9AW.

A noise survey has been conducted at site to establish the existing acoustic climate at the nearest noise sensitive receivers (NSR's).

Noise egress from the kitchen extract has been modelled to the nearest NSR's and compared against the background noise climate in accordance with the Manchester City Council, Planning & Noise, Technical Guidance 2015 (MCCPNTG 2015).

With the inclusion of the silencers as specified in Section 5 of this report, to the kitchen outlet and inlet external terminations, noise egress from plant installations is predicted to achieve the MCCPNTG 2015 criteria.

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APPENDIX I – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of noise, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB L_{Aeq} . Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq} . It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB L_{An} . It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) L_{max} , dB L_{Amax} , etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq} , L_{90} , L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.