PEAK acoustics

Noise Impact Assessment

Client:	Nilay Keskinbicak
Site:	73 New Oxford Street, Street Centre Point, London, WC1A 1DG
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Executive Summary

A Noise Impact Assessment has been undertaken for the proposed installation of an extraction system and associated ductwork at 73 New Oxford Street, London. The units are to serve the kitchen of 'HANA Food Café' located in the basement of 73 New Oxford Street.

Measurements of the prevailing background noise climate were undertaken from Monday 14th - Tuesday 15th June 2022 at a location representative of the identified Noise Sensitive Receptors (NSRs).

The nearest or most-affected Noise Sensitive Receptors (NSRs) were identified as the private commercial properties that are in closest proximity or most exposed to the proposed location of the extraction system and associated ducting. These included windows on the first and second floor of the 'TONY&GUY Academy' directly underneath the proposed termination point of the ductwork, as well as the windows located opposite the proposed termination point nearer to the entrance of the courtyard.

Using the measured background noise survey data, a representative daytime background sound level of 45 dB was derived to represent a worst-case scenario and provide a robust assessment.

Acoustic modelling software, SoundPLAN, was utilised to calculate external sound propagation toward the NSR locations using 'ISO-9613-2-Attenuation of sound during propagation outdoors' and the manufacturer stated Sound Power Levels. Calculations inclusive of ductwork attenuation and directivity loss were also undertaken to calculate the Sound Power Level to the atmosphere at the outlet terminal.

Rating Levels at the NSR locations were indicated to be above the representative background sound level of **45 dB L_{A90}**. This indicated an *Adverse Impact* in accordance with BS4142 and corresponding to the achievement of LOAEL – Lowest Observed Adverse Effect Level in the NPSE.

Another assessment was undertaken with a representative background sound level of **56 dB $_{LA90}$** which was measured during the proposed opening hours of 12:00 – 22:00.

Contextually, it is unlikely that anyone would be occupying the property after the café closes at 22:00, indicating a *Low Impact* in accordance with BS4142 and corresponding to the achievement of 'NOEL – No Observed Effect Level' in the NPSE. No mitigation is deemed necessary.

Contents

1. Introduction

1.1 A Noise Impact Assessment has been undertaken at 73 New Oxford Street, London in relation to a proposal for the installation of an extraction system and associated ducting.

1.2 Details of the proposed external plant equipment have been provided by the applicant and are listed below:

- *1 No. BLAUBERG PRIMO 200*
- *1 No. Gebhardt DDM 7/7 E6G3405*

1.3 Manufacturer technical data sheets with noise level data for the extraction system have been sourced and are given in **Appendix G.**

1.4 The extraction system is to be installed in the basement of 73 New Oxford Street, the associated ducting will be installed to terminate at the rear of 75 New Oxford Street.

1.5 The plant equipment is associated with the kitchen of 'HANA Food Café'.

1.6 An assessment of the proposed plant equipment is to be undertaken to determine whether residents are likely to suffer a loss of amenity as a result of noise from the extraction system and associated ducting. Mitigation will be given should any potential loss of amenity be indicated.

2. Planning Policy & Guidance

2.1 Guidance for the assessment of noise affecting new residential development is given in the National Policy Framework (NPPF). Section 15 of the NPPF states:

"174. Planning policies and decisions should contribute to and enhance the natural and local environment by:
E) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of…noise pollution."

Section 185 further states:

"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:

1. *Mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
2. *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

Section 187 states:

"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities 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."

2.2 To avoid and mitigate adverse noise effects on health arising from and impacting on new development, the NPPF makes reference to NPSE. The Noise Policy Statement for England (NPSE) was published in March 2010 and covers all forms of noise other than occupational noise. For the purposes of this report, "Neighbourhood Noise" is most relevant as NPSE defined in paragraph 2.5.

"neighbourhood noise which includes noise arising from within the community such as industrial and entertainment premises, trade and business premises, construction sites and noise in the street."

2.3 The Noise Policy Statement for England (NPSE) states the following aims in paragraph 2.2.

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.

SOAEL – Significant Observed Adverse Effect Level.
This is the level above which significant adverse effects on health and quality of life occur.

3. Assessment Criteria – BS4142

3.1 The common standard for the assessment of industrial and commercial sound is ***'BS4142 – Methods for rating and assessing industrial and commercial sound'.*** The industrial noise assessment method in BS4142 is based on the difference between the measured 'background sound level' (L_{A90}), and the 'Rating Level' of the industrial source, at a noise-sensitive location (NSR). BS4142:2014 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."

An estimation of the impact of the specific sound can be obtained by the difference between the rating sound level and the background sound level whilst considering the following:

"A Sound Rating Level at or below the background noise level is indicative of Low Impact;

A Sound Rating Level that exceeds the background noise level by around +5dB is likely an indication of Adverse Impact, depending on the context;

A Sound Rating Level that exceeds the background noise level by around +10dB is likely an indication of Significant Adverse Impact, depending on the context;"

BS4142 further states:

"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 negligible impact, depending on the context."

3.2 Achievement of a *Low Impact* in accordance with BS4142 can be deemed to correspond to '*NOEL – No Observed Effect Level*' in the NPSE, as detailed above in Paragraph 2.3.

4. Site Location

4.1 The site is located in the basement of 73 New Oxford Street, London. The north boundary of the site meets New Oxford Street, this is an extremely busy high street lined with a variety of big-brand shops and restaurants. To the east of the site at 71 New Oxford Street, on the ground floor level is a small shop 'The Convenience Store'. On the west boundary of the site is 75 New Oxford Street which is associated with the 'TONI&GUY Academy' on the ground, first, second, third and fourth-floor levels. The 'TONI&GUY Academy' also extends into the first, second, third and fourth floors of 71 and 73 New Oxford Street. To the south of the site is Bucknall Street, this is a small road mainly used for parking and pedestrians accessing New Oxford Street. The proposed location of the extraction system and ducting is in the courtyard associated with 'TONI&GUY Academy' at the rear of 75 New Oxford Street at the basement level.

4.2 The site, proposed noise source and receptor locations are shown in Figure 1 below:

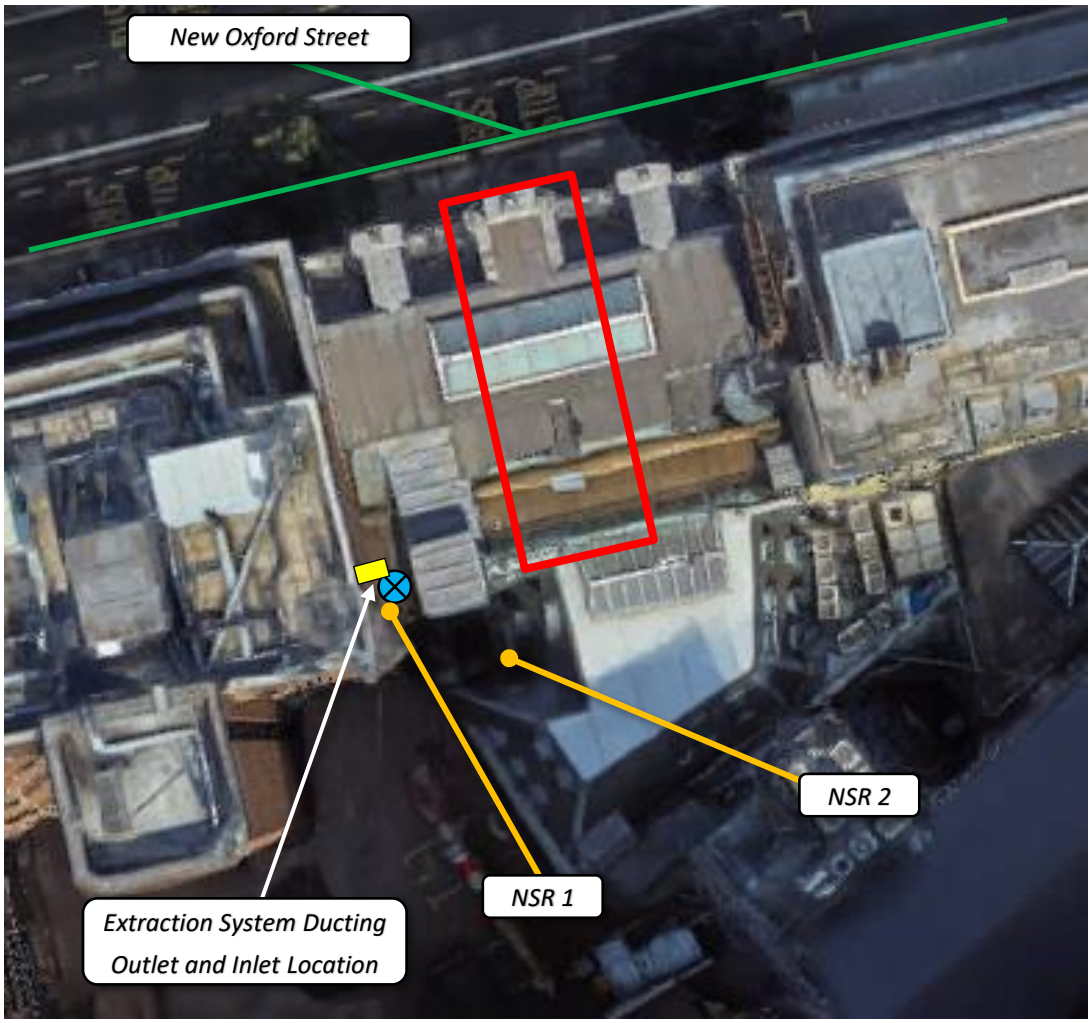


Figure 1: Site, Source & NSR Locations - https://google.com/maps

Site Boundary *(Approx.)*

Noise Sensitive Receptors (NSRs)

Extraction System and Ducting Location *(Approx.)*

Background Monitoring Location M1 *(Approx.)*

5. Noise Sensitive Receptors

5.1 The nearest or most-affected Noise Sensitive Receptors (NSRs) have been identified as the windows on the first and second floor associated with the 'TONI&GUY Academy' at 75 New Oxford Street. The windows directly underneath the proposed termination point of the ductwork will be denoted as NSR 1, the windows located nearer to the entrance of the courtyard will be denoted as NSR 2.

5.2 The NSR locations and reception points are shown in an aerial image (**Figure 1)** on Page 7.

6. Background Noise Survey

6.1 An unattended background noise survey was conducted at position M1 over a period of approximately 23 hours from Monday 14th - Tuesday 15th June 2022. Measurements of $L_{Aeq,T}$ and $L_{A90,T}$ were logged in 5-minute intervals in accordance with BS7445 - *'Description and Measurement of Environmental Noise'*.

6.2 At position M1 shown in Figure 1, the microphone was placed in the corner of the courtyard, underneath the proposed location of the extraction system's termination point. Position M1 is located within 1 meter of reflective surface therefore a correction of -3dB will be applied to the measurement data. The noise climate at this position was deemed representative of the noise climates at the nearest NSRs.

6.3 The noise climate at the monitoring position was dominated by the sound of air conditioning units and work on nearby construction sites. Water pipes and nearby workers were also noted as secondary noise sources.

6.4 Measurements were obtained using Class 1 instrumentation. Full equipment details are given in **Appendix B**.

6.5 Equipment was calibrated before and after use and no significant drift occurred during measurements. Up-to-date calibration certification can be provided upon request. Full calibration details are provided in **Appendix D**.

6.6 Daytime temperatures during the survey were noted as between 17 - 21°C with wind speeds typically at 3 m/s; deemed suitable for conducting environmental noise monitoring. Detailed meteorological information can be found in **Appendix C**

7. Background Sound Levels

7.1 The day and night-time background sound levels from measurement M1 are summarised below.

Measurement	Date(s)	Period	$L_{Aeq,T}$	$L_{A90,T}$
M1	14th – 15th June 2022	Daytime (07:00 – 23:00) (Aggregate Period)	63	56
	14th – 15th June 2022	Night-time (23:00 – 07:00)	61	53
	14th June 2022	Assessment Period (22:15 – 22:25)	-	45

Table 1: Background Noise Survey Results

7.2 The extraction system and associated ductwork are to serve the kitchen of 'HANA Food Café' located at the basement level of 73 New Oxford Street, with opening hours of 12:00 – 22:00. An assessment period of between 22:15 – 22:25 has been assessed and a level of **45 dB L_{A90}** has been selected as the representative background sound level as a worst-case scenario.

7.3 A full-time history of the survey data is shown in **Appendix E.**

8. Source Noise Levels

8.1 Details of the proposed extraction system and associated ductwork have been provided by the applicant, and include;

- *1 No. BLAUBERG PRIMO 200*
- *1 No. Gebhardt DDM 7/7 E6G3405*

8.2 Manufacturer technical data sheets with noise level data were sourced and are given in **Appendix G**.

8.3 It is to be noted that in the manufacturers' data sheet the Sound Power data for the *Gebhardt DDM 7/7 E6G3405* was expressed as a single A-weighted value.

8.4 It is also to be noted that only the Outlet data of the *BLAUBERG PRIMO 200* has been assessed due to the fan being installed internally within the basement of 73 New Oxford Street.

8.5 The given sound power is tabulated below.

Unit	Para.	63	125	250	500	1k	2k	4k	8k	dBA
BLAUBERG PRIMO 200 (Outlet)	Lw	*53*	60	71	71	71	68	60	49	**77**
Gebhardt DDM 7/7 E6G3405 (Inlet)	Lw	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	**81**

Table 2: Extraction System Noise Levels

9. Noise Modelling

9.1 Before noise modelling, calculations have been undertaken to predict the noise attenuation through the ductwork from the fan position. The calculation uses methods given in Sound Research Laboratories Ltd, 'Noise controlling in building services' and considers the following:

- *Duct Loss*
- *End Reflections*
- *Bend Loss*
- *Directivity Loss*

9.2 Calculations of the above are detailed in **Appendix G.**

9.3 The Specific Sound Level is denoted L_{As} and is the A-weighted, equivalent noise level at the NSR locations. Specific Sound Levels have been calculated for the cumulative operation of all extraction equipment using industry-standard acoustic modelling software 'SoundPLAN'. This software uses ISO-9613-2 - *Attenuation of sound during propagation outdoors* and the model takes into account the following key factors:

- *Topography from Google Maps/Elevations*
- *Geometric divergence of sound*
- *Atmospheric absorption of sound*
- *Ground absorption*
- *A light downwind correction toward the NSRs*
- *Surrounding structures and objects which may reflect or block sound toward the NSRs*
- *The height of the NSRs (e.g., First, second or third-floor reception point)*

9.4 The noise model input parameters were as follows:

Parameter	Input
Reflection Order	3
Ground Absorption Factor	G = 0
Air pressure	1013.3 mbar
Relative Humidity	70.0 %
Temperature	10.0°C

Table 3: Calculation Input Parameters

10. Specific Sound Levels

10.1 The Specific Sound Levels (L_{As}) have been calculated to the receptor locations shown in Figure 1 and described in Section 5. The Specific Sound Levels are tabulated below.

Location	Specific Sound Level, dB L_{As}
NSR 1 (First Floor Window)	50
NSR 2 (First Floor Window)	44

Table 4: Specific Sound Levels

10.2 A noise map showing external sound propagation is shown in **Appendix F**.

11. Rating Levels

11.1 In accordance with BS4142, the Specific Sound Levels may be corrected for characteristics that make the sound more noticeable at the NSR location such as tonality, impulsivity and intermittency. Section 9.2 of BS4142 gives commentary on these characteristics and appropriate penalties:

> ***"Tonality***
> *For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.*
>
> ***Impulsivity***
> *A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.*
>
> ***Other sound characteristics***
> *Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.*
>
> *NOTE 2 Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.*
>
> ***Intermittency***
> *When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."*

11.2 Extraction systems such as this have the potential to produce sound with perceptible tonal components but, due to the frequent operation of nearby air conditioning units it is unlikely to be noticeable, a 2dB correction has been applied for tonality as a precaution.

11.3 The extraction system will be operating continuously throughout the opening hours and will produce no impulsive, intermittent, or other characteristics; no further penalties are to be applied.

11.4 The resultant Rating Levels are summarised below:

Location	Specific Sound Level, dB L_{As}	Total BS4142 Character Corrections	Rating Level, dB L_{Ar}
NSR 1 (First Floor Window)	50	+ 2	52
NSR 2 (First Floor Window)	44	+ 2	46

Table 5: Rating Levels

12. Rating Levels Vs Background

12.1 The Rating Levels are to be compared to the representative background during 22:15 – 22:25 to determine the noise impact for a worst-case scenario in accordance with BS4142.

A Sound Rating Level at or below the background noise level is indicative of Low Impact;

A Sound Rating Level that exceeds the background noise level by around +5dB is likely an indication of Adverse Impact, depending on the context;

A Sound Rating Level that exceeds the background noise level by around +10dB is likely an indication of Significant Adverse Impact, depending on the context;

12.2 The indicated noise impact at the identified Noise Sensitive Receptors is summarised below:

Location	Rating Level, dB L_{ar}	Background Sound Level, dB L_{A90}	Difference, dB	Noise Impact
NSR 1 (First Floor Window)	52	45	+7	*Adverse Impact*
NSR 2 (First Floor Window)	46	45	+1	*Low Impact*

Table 6: Noise Impact

12.3 The noise impact of the outlet of the extraction system at NSR 1 is indicative of an *Adverse Impact* in accordance with BS4142.

13. Rating Levels Vs Background with Contextual Factors

13.1 The Rating Levels are to be compared to the representative background sound level of **56 dB L_{A90}** which was measured during the proposed opening hours of 12:00 – 22:00 specified in *Table 1,* to determine the noise impact in accordance with BS4142.

13.2 The indicated noise impact at the identified Noise Sensitive Receptors is summarised below:

Location	Rating Level, dB L_{ar}	Background Sound Level, dB L_{A90}	Difference, dB	Noise Impact
NSR 1 (First Floor Window)	52	56	-4	*Low Impact*
NSR 2 (First Floor Window)	46	56	-10	*Low Impact*

Table 7: Contextual Noise Impact

13.3 The noise impact at the outlet of the extraction system during the proposed opening hours is indicative of a *Low Impact* in accordance with BS4142.

13.4 Contextually, it is unlikely that anyone would be occupying the property after the café closes at 22:00 as the building denoted NSR 1 and NSR 2 are used for commercial and educational purposes, indicating a *Low Impact* in accordance with BS4142 and corresponding to the achievement of 'NOEL – No Observed Effect Level' in the NPSE.

13.5 No mitigation is deemed necessary.

14. Conclusion

14.1 A Noise Impact Assessment has been undertaken at 73 New Oxford Street, London, in relation to the proposal of the installation of an extraction system and associated ductwork.

14.2 Measurements of the background noise climate were undertaken from Monday 14th – Tuesday 15th June 2022 at a position deemed representative of the identified Noise Sensitive Receptors (NSRs).

13.3 The nearest or most-affected Noise Sensitive Receptors were identified as windows on the first and second floor of the 'TONY&GUY Academy' directly underneath the proposed termination point of the ductwork, as well as the windows located opposite the proposed termination point nearer the entrance of the courtyard.

14.4 Rating Levels at the NSR locations were indicated to be above the representative background sound level of **45 dB L_{A90}**. This indicated an *Adverse Impact* in accordance with BS4142 and corresponding to the achievement of LOAEL – Lowest Observed Adverse Effect Level in the NPSE.

14.5 Another assessment was undertaken with a representative background sound level of **56 dB L_{A90}** which was measured during the proposed opening hours of 12:00 – 22:00.

14.6 Contextually, it is unlikely that anyone would be occupying the property after the café closes at 22:00, indicating a *Low Impact* in accordance with BS4142 and corresponding to the achievement of 'NOEL – No Observed Effect Level' in the NPSE. No mitigation is deemed necessary.

15. Uncertainty

15.1 The background monitoring equipment is subject to a 1dB error margin, however, calibration before and after measurements allows the drift within the margin to be monitored and thus demonstrates that minimal drift occurred throughout the measurements.

15.2 Uncertainty can arise in the prediction of noise propagation from and around flat reflective surfaces, such as the surrounding structures present on site. This has been reduced to a

minimum by utilising an acoustic modelling software that uses the validated method, ISO-9613-2, as described in BS4142.

15.3 Uncertainty in the calculated specific sound levels is further reduced by utilising manufacturer-given sound power levels.

APPENDIX A – Measurement Details

Measurement	Kit	Start Date	Start Time	End Date	End Time
M1	A4	14/06/2022	12:20	15/06/2022	11:45

APPENDIX B - Equipment Details

Kit	Equipment	Make	Model	Class	Serial Number
A4	Sound Meter	Svantek	971	1	60688
A4	Pre-Amp	Svantek	SV18	1	62781
A4	Microphone	ACO	7052E	1	66703
3	Calibrator	Svantek	SV33A	1	43086

APPENDIX C - Meteorology Details

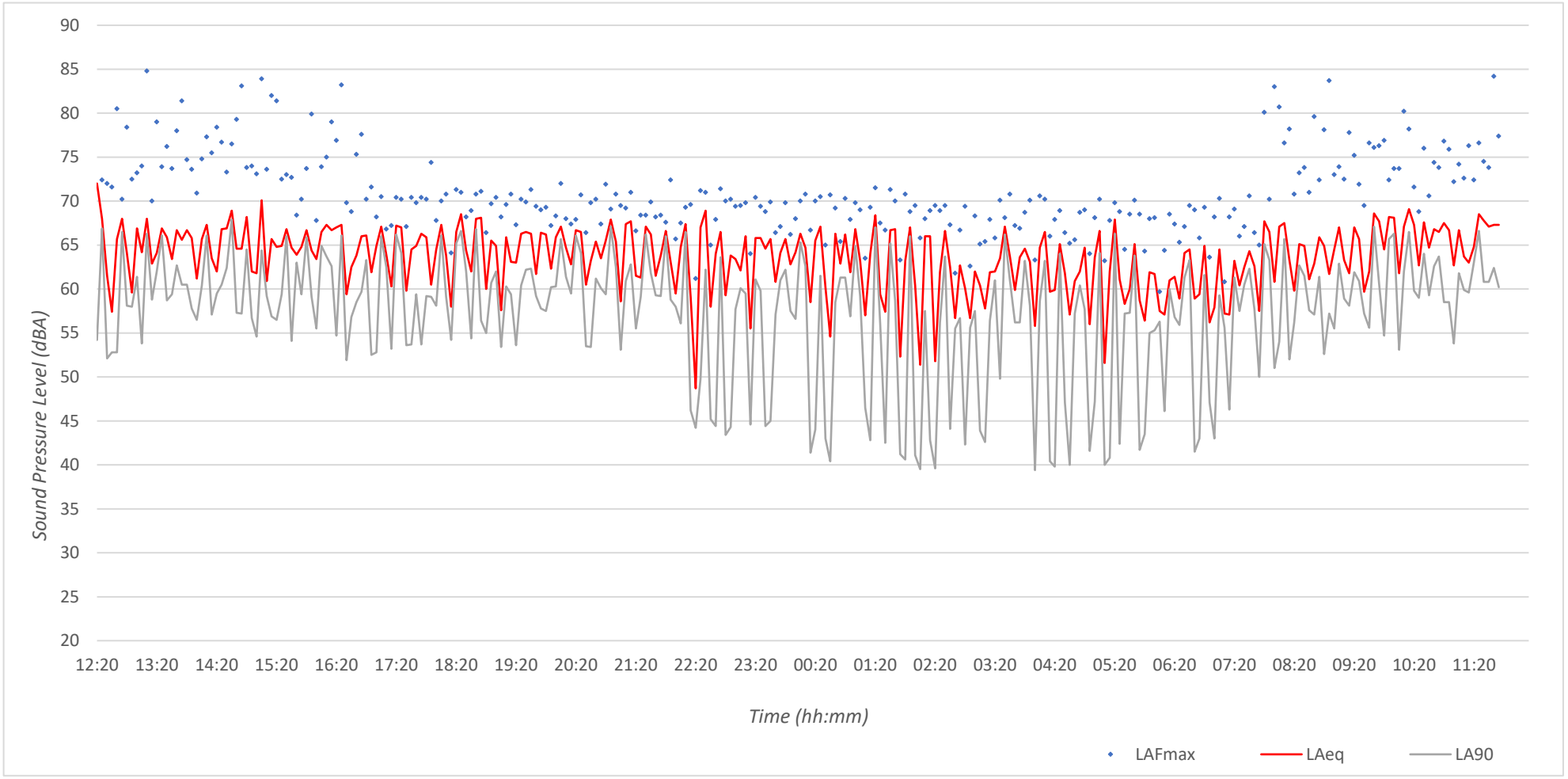
Date	Temp C°	Wind Speed m/s	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
14/06/2022	17	3	SSE	48	7.0	5/8
15/06/2022	21	3	NW	43	0.0	0/8

APPENDIX D - Calibration Details

Measurement	Calibrator Ref Level (dB)	Deviation Before (dB)	Deviation After (dB)
M1	113.9	-1.00	-0.99

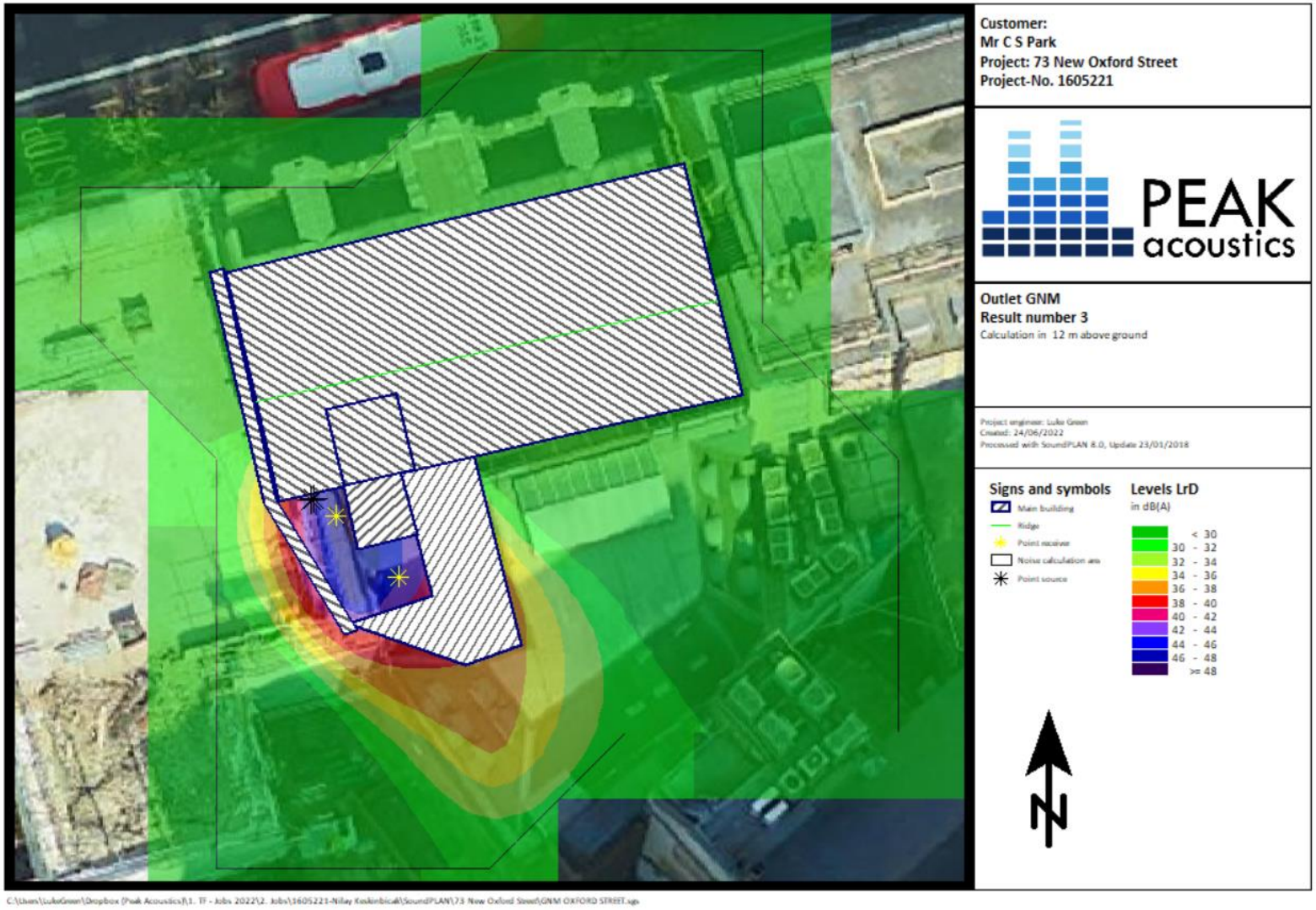
APPENDIX E – Noise Survey Results

Measured Background Sound Levels Time History (M1): Monday 14th June – Tuesday 15th June 2022



APPENDIX F – Grid Noise Map

Grid Noise Map for Outlet



APPENDIX G – Duct Work Calculations

Atmosphere Side Calculation	
Name	Calcuation of kitchen extraction system to nearest NSR
Start Point	Extraction Fan Outlet
End Point	NSR 1 - Rear of 75 New Oxford Street

Ductwork Details		
Type of duct	Unlined Circular Duct	
Circular Diameter	*mm*	240
	mm	200
	mm	
Total Ductwork Length	*m*	29.07
Bend Type	Square Vaned / Radiused / Curv	
No. Bends	4	

Radiating Condition & Receiver Details		
Situation Type	Vertical Stack	
Terminal Type	Circular	
Terminal Diameter	*mm*	500
	mm	
	mm	
Angle of Receiver to Source	*Θ°*	0-45
Source Location	Q=1 (Free Field)	
Distance to Receiver	*m*	1

Frequency	Hz	63	125	250	500	1k	2k	4k	8k	dB(A)
In duct Sound Power Level	*dB Lw*	53	64	71	71	71	68	60	49	**77**
Pre-defined Loss	*dB*	0	0	0	0	0	0	0	0	
Duct Loss	*dB*	-2	-3	-3	-5	-7	-7	-7	-7	
Bend Loss	*dB*	0	0	0	0	-4	-8	-12	-12	
End Reflections	*dB*	-14	-9	-5	-2	0	0	0	0	
Angular Directivity	*dB*	-2	-3	-5	-8	-10	-11	-11	-11	dB(A)
Ducted Lw to Atmosphere	*dB Lw*	35	49	58	56	50	42	30	19	61

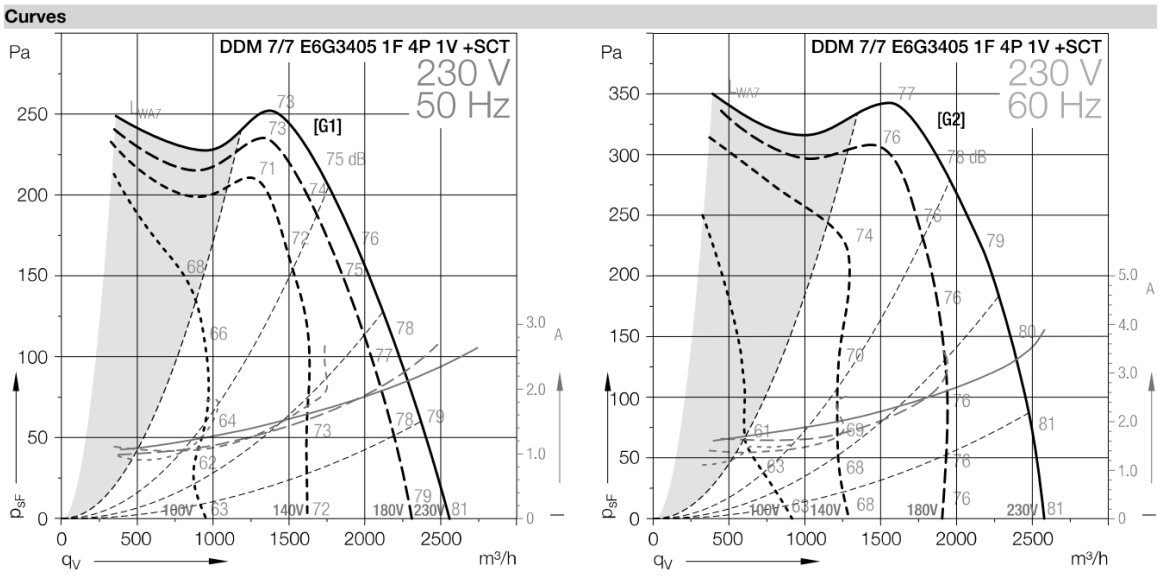
APPENDIX H – Manufacturer Technical Data Sheets

BLAUBERG PRIMO 200

PRIMO 200

Sound power level, A-weighted	Total	Octave frequency bands [Hz]								LpA 3 m	LpA 1 m
		63	125	250	500	1000	2000	4000	8000		
L_{WA} to inlet [dBA]	**74**	45	60	68	69	68	66	60	49	**54**	**64**
L_{WA} to outlet [dBA]	**77**	53	64	71	71	71	68	60	49	**56**	**66**
L_{WA} to environment [dBA]	**70**	45	51	63	66	65	62	53	42	**50**	**60**

Gebhardt DDM 7/7 E6G3405



APPENDIX I – Acoustic Terminology

To aid the understanding of acoustic terminology and the relative difference between noise levels the following background information is provided.

We perceive sound when the ear detects fluctuations in air pressure (sound waves), which are then processed by the brain and perceived as sound. Humans can hear an incredibly wide range of sound intensities ranging from jet engines to fingertips lightly brushing against each other. This range is quantified using a logarithmic scale called the decibel scale (dB). The comfortable range of the decibel scale typically ranges from 0dB (the threshold of hearing) to around 140dB. Here are some examples of common environments and their typical noise levels.

Noise Level	Environment
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a moving car
60 to 70 dB(A)	Typical high street
100 to 110 dB(A)	Fire alarm at 1 metre away
140 dB(A)	Threshold of pain

Terminology

dB (decibel) – A unit used to quantify the pressure level of sound. Defined as 20 times the logarithm of the ratio between the root-mean-square pressure of a given sound field and a reference pressure level ($2x10^{-5}$ Pa – threshold of hearing).

$L_{Aeq,\,T}$ – The equivalent continuous sound pressure level over a stated period. It quantifies a fluctuating sound level over a given period as the equivalent continuous sound level over which the same amount of acoustic energy is contained over. This is A-weighted in order to assess human perception.

L_{A90} – The sound level exceeded 90% of the time. Typically used to describe background noise the L_{90} is regarded as the 'average minimum level' and quantifies the common sound level of a fluctuating sound field i.e. the sound level that occurs 90% of the time. Alternatively, L_{10} describes the sound level exceeded 10% of the time and therefore quantifies the 'average maximum level' of sound which is often used during the calculation of road traffic noise.

A-Weighting – A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

R_w – The Weighted Sound Reduction Index (R_w) is a number used to rate the effectiveness of a soundproofing system or material.