PEAK acoustics

Noise Impact Assessment

Client:	Diego Rosales Sosa
Site:	66 Belsize Lane, Camden, NW3 5BJ
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Executive Summary

A Noise Impact Assessment has been undertaken for the proposal of the installation of an extraction system with associated ductwork at the rear of 66 Belsize Lane. The unit is to serve the internal components of the kitchen associated with 'Cinder' located at 66 Belsize Lane.

Measurements of the prevailing background noise climate were undertaken from Monday 6th – Tuesday 7th 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 residential properties that are in closest proximity or most exposed to the proposed location of the extraction system and ducting. These were determined to be the flats located at 64 and 66 Belsize Lane, London.

Using the measured background noise survey data, a representative daytime background sound level of 44 dB was derived for the 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. Only 1 No. of the proposed BDER – 44 (050-090) Silencers has been modelled; this is explained in Section 9.3.

A BS4142 assessment of the plant equipment indicated a *Low Impact* at all NSR locations, with Rating Levels 3 dB above the representative background sound levels whilst acknowledging relevant context, corresponding to the achievement of 'NOEL – No Observed Effect Level' in the NPSE. No further mitigation was deemed necessary.

Contents

1. Introduction

1.1 A Noise Impact Assessment has been undertaken at 66 Belsize Lane, London in relation to the proposal for the installation of an extraction system and associated ductwork.

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

- *1 No. 50 MaXfan Compac*
- *2 No. BDER – 44 (050-090) – Silencer*
- *1 No. EMTEC PAC30 Fan Enclosure*

1.3 It should be noted that only 1 No. BDER – 44 (050-090) Silencer has been modelled within this assessment, this is explained in Section 9.3.

1.4 Manufacturer Technical data sheets with noise level data for the extraction system and silencer have been provided by the client and are given in **Appendix G.**

1.5 The extraction system is to be installed at the rear of 66 Belsize Lane.

1.6 The extraction system is associated with the kitchen of 'Cinder' located at 66 Belsize Lane.

1.7 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. 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 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 at 66 Belsize Lane, London. Belsize Lane is a moderately busy road with a variety of mixed-use properties being utilised for commercial purposes on the ground floor and residential purposes on the floors above. To the north of the site is Belsize Crescent, a residential road that leads onto a small mews lined with residential properties that back onto the western border of the site. The southern elevation of 66 Belsize Lane butts up to another property with commercial uses on the ground floor, and residential uses in the basement, first floor and second floor. The building that meets the northern elevation of the site is also a mixed-use property being utilised similarly. The eastern boundary of the site meets Belsize Lane and is seen to be used frequently by people passing through the area or by locals for shopping and socialising.

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

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

Site Boundary *(Approx.)*
Noise Sensitive Receptors (NSRs)
Extraction System 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 flats at 66 Belsize Lane, denoted as NSR 1. The flats located at 64 Belsize Lane have also been identified as receptors, denoted as NSR 2.

5.2 The closest habitable room windows of these properties will be considered as specific reception points in calculations.

5.3 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 from Monday 6th June – Tuesday 7th June 2022.

6.2 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'*.

6.3 At position M1 shown in Figure 1, the microphone was placed on a platform outside of the ground-floor kitchen window associated with 'Cinder' at 66 Belsize Lane. Position M1 is located as far away from any reflective surfaces to avoid any reflections from interfering with the noise data. The noise climate at this position was deemed representative of the noise climates at the nearest NSRs.

6.4 The noise climate at the monitoring position was dominated by nearby air conditioning units and occasionally some noise from the staff within the kitchen. Faint traffic noise was also noted as a secondary noise source.

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

6.6 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**.

6.7 Daytime temperatures during the survey were noted as between 13 - 20°C with wind speeds typically between 2 - 4 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	6th – 7th June 2022	Daytime (07:00 – 23:00)	63	44
	6th – 7th June 2022	Night-time (23:00 – 07:00)	59	43

Table 1: Background Noise Survey Results

7.2 The extraction system and associated ductwork are to serve the internal components of the kitchen associated with 'Cinder' at 66 Belsize Lane. The extraction system, therefore, has the potential to operate throughout their opening times of 12:00 – 14:30 at lunchtimes, and 17:00 – 21:30 for dinner service. The extraction system also has the potential to operate between 8:00 – 12:00 due to the workers coming in early to prepare food before service starts.

7.3 For the BS4142 assessment, a level of **44 dB** L_{A90} has been selected due to the extraction system only operating throughout the daytime hours.

7.4 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. 50 MaXfan Compac*

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

8.3 The given sound power data is given below.

Unit	Para.	63	125	250	500	1k	2k	4k	8k	dBZ	dBA
50 MaXfan Compac (Outlet)	Lw	*85*	79	90	89	86	86	81	79	**95**	**92**
50 MaXfan Compac (Case Breakout)	Lw	*75*	61	68	66	61	58	59	55	**77**	**68**

Table 2: Extraction System Noise Levels

9. Silencer Attenuation

9.1 Details of the proposed silencer have also been provided by the applicant, and include

- *2 No. BDER – 44 (050-090)*

9.2 Manufacturer technical data sheets can be found in **Appendix H.** The given attenuation data is displayed below.

	Attenuation (dB)							
Unit	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
BDER – 44 (050-090)	*5*	4	8	25	16	12	15	12

Table 3: Proposed Silencer Attenuation

9.3 Site plans provided by the applicant, seen in **Appendix I**, show that two silencers are to be installed on the ducting of the extraction system; one located before and one after the extraction fan.

9.4 It should be noted that the silencer placed before the extraction fan will have no attenuating effects on the level of noise emanating from the extraction outlet or the extraction fan. Therefore, only the use of the single silencer located nearest to the outlet of the extraction system will be used throughout the modelling process.

10. Extraction Fan Enclosure Attenuation

10.1 Details of the extraction fan enclosure have also been provided by the applicant, and include

- *1 No. EMTEC PAC30 Fan Enclosure*

10.2 Manufacturer technical data sheets can be found in **Appendix H.** The given attenuation data is displayed below.

	Attenuation (dB)							
Unit	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
EMTEC PAC30	*13*	17	23	30	34	41	42	41

Table 4: Proposed Enclosure Attenuation

11. Noise Modelling

11.1 Prior to noise modelling, calculations have been undertaken to predict the noise attenuation through ductwork from the fan position. The calculation uses methods given in Sound Research Laboratories Ltd, “Noise control in building services" and takes into account the following:

- *Duct Loss*
- *End Reflections*
- *Angular Directivity*

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

11.3 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 the extraction system 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:

- *Geometric divergence of sound*
- *Atmospheric absorption of sound*
- *Ground absorption*
- *Losses through ductwork*
- *Directivity Effects*
- *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)*

11.4 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 5: Calculation Input Parameters

11.5 It should be noted that only 1 No. of the proposed BDER – 44 (050-090) Silencers has been modelled, this is explained in Section 9.3.

12. Specific Sound Levels

12.1 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 – Third Floor Flat (66 Belsize Lane)	44
NSR 2 - Third Floor Flat (64 Belsize Lane)	45

Table 6: Specific Sound Levels

12.2 It is to be noted that the data displayed in *Table* 6 is representative of the noise level at the worst affected NSRs.

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

13. Rating Levels

13.1 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."*

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

13.3 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.

13.4 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 – Third Floor Flat (66 Belsize Lane)	44	+ 2	46
NSR 2 - Third Floor Flat (64 Belsize Lane)	45	+ 2	47

Table 7: Rating Levels

14. Rating Levels Vs Background

14.1 The Rating Levels are to be compared to the representative background sound level to determine the noise impact 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;

14.2 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 – Third Floor Flat (66 Belsize Lane)	46	44	+ 2	*Low Impact*
NSR 2 - Third Floor Flat (64 Belsize Lane)	47	44	+ 3	*Low Impact*

Table 8: Noise Impact

14.3 The noise impact at all receptor positions is indicative of a *Low Impact* in accordance with BS4142. No further mitigation is deemed necessary.

15. Conclusion

15.1 A Noise Impact Assessment has been undertaken at 66 Belsize Lane in relation to the proposal of the installation of an extraction system and associated ductwork.

15.2 Measurements of the background noise climate were undertaken from 6th June 2022 – 7Th June 2022 at a position deemed representative of the identified Noise Sensitive Receptors (NSRs).

15.3 The nearest or most-affected Noise Sensitive Receptors were identified as the residential properties located at 64 and 66 Belsize Lane.

15.4 External sound propagation toward the receptors was calculated using 'SoundPLAN', ISO-9613-2, manufacturer stated sound power levels and calculations inclusive of ductwork attenuation and directivity loss. Only 1 No. of the proposed BDER – 44 (050-090) Silencers has been modelled; this is explained in Section 9.3.

15.5 Rating Levels were indicated to be above the representative background sound level at the NSR locations, indicating a *Low Impact* in accordance with BS4142, corresponding to the achievement of 'NOEL – No Observed Effect Level' in the NPSE. No further mitigation was deemed necessary.

16. Uncertainty

16.1 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.

16.2 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.

16.3 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	A2	06/06/2022	12:05	07/06/2022	07:40

APPENDIX B - Equipment Details

Kit	Equipment	Make	Model	Class	Serial Number
A2	Sound Meter	Svantek	971	1	40305
A2	Pre-Amp	Svantek	SV12L	1	32484
A2	Microphone	ACO	7052E	1	56663
3	Calibrator	Svantek	SV33A	1	43086

APPENDIX C - Meteorology Details

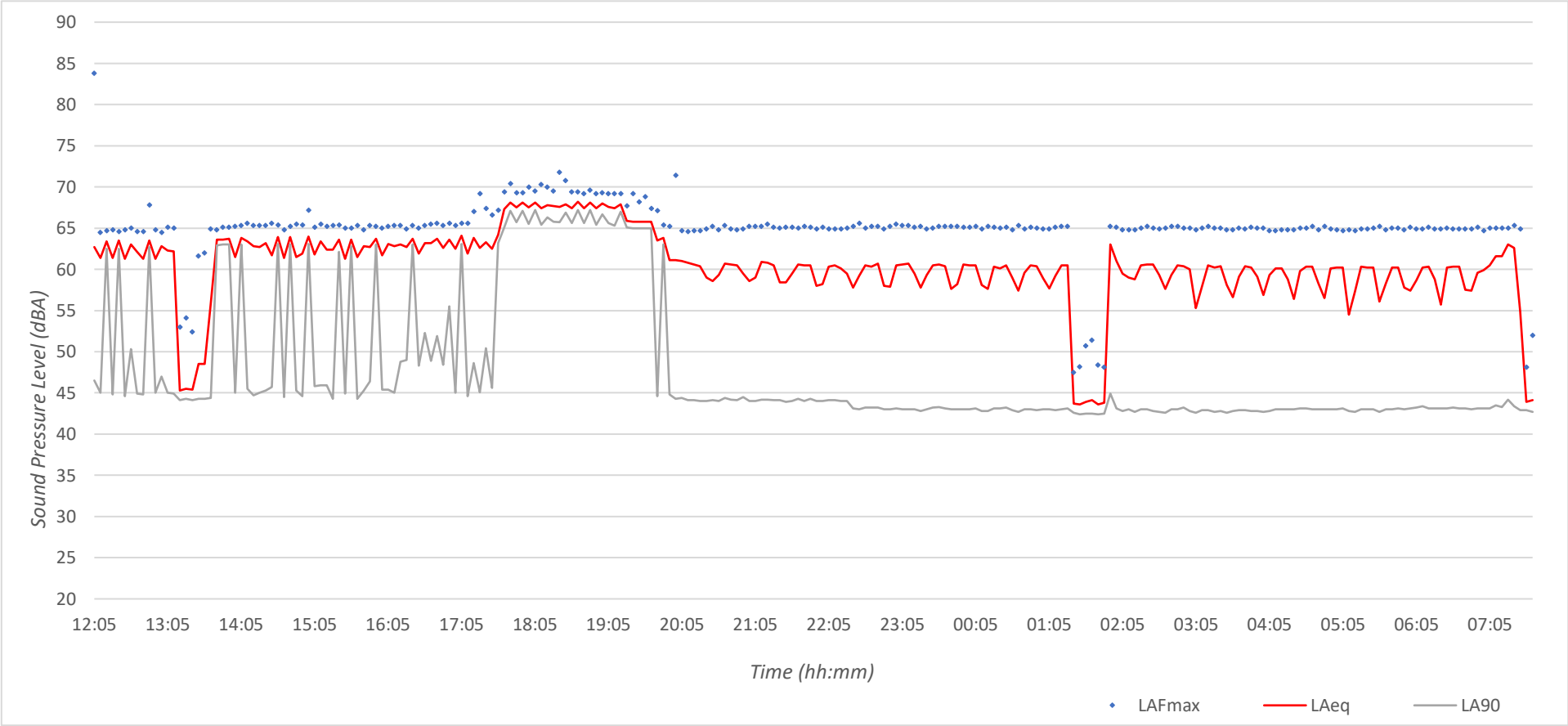
Date	Temp C°	Wind Speed m/s	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
06/06/2022	13	4	SE	83	7	7/8
07/06/2022	20	2	NNE	71	0.0	2/8

APPENDIX D - Calibration Details

Measurement	Calibrator Ref Level (dB)	Deviation Before (dB)	Deviation After (dB)
M1	113.9	2.03	2.04

APPENDIX E – Noise Survey Results

Measured Background Sound Levels Time History (M1): Monday 6TH June – Tuesday 7th June 2022



APPENDIX F – Grid Noise Map

Grid Noise Map for Proposed Location of Extraction System and Associated Ductwork

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 - Top floor flat at 66 Belsize Lane

Ductwork Details		
Type of duct	Unlined Circular Duct	
Circular Diameter	*mm*	500
	mm	
	mm	
Total Ductwork Length	*m*	10.5
Bend Type	Square Vaned / Radiused / Curved	
No. Bends	0	

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(Z)	dB(A)
In duct Sound Power Level	*dB Lw*	85	79	90	89	86	86	81	79	95	**92**
Pre-defined Loss	*dB*	0	0	0	0	0	0	0	0		
Duct Loss	*dB*	-1	-1	-1	-1	-2	-2	-2	-2		
Bend Loss	*dB*	0	0	0	0	0	0	0	0		
End Reflections	*dB*	-9	-5	-2	0	0	0	0	0		
Angular Directivity	*dB*	-2	-3	-5	-8	-10	-11	-11	-11	dB(Z)	dB(A)
Ducted Lw to Atmosphere	*dB Lw*	73	70	82	80	74	73	68	66	86	**81**

APPENDIX H – Manufacturer Technical Data Sheets

Proposed Silencer: BDER-44 (050-090)

BDER-44 size - length		Attenuation (dB) Mid frequency (Hz)							
		63	125	250	500	1000	2000	4000	8000
050	-090	5	4	8	25	16	12	15	12

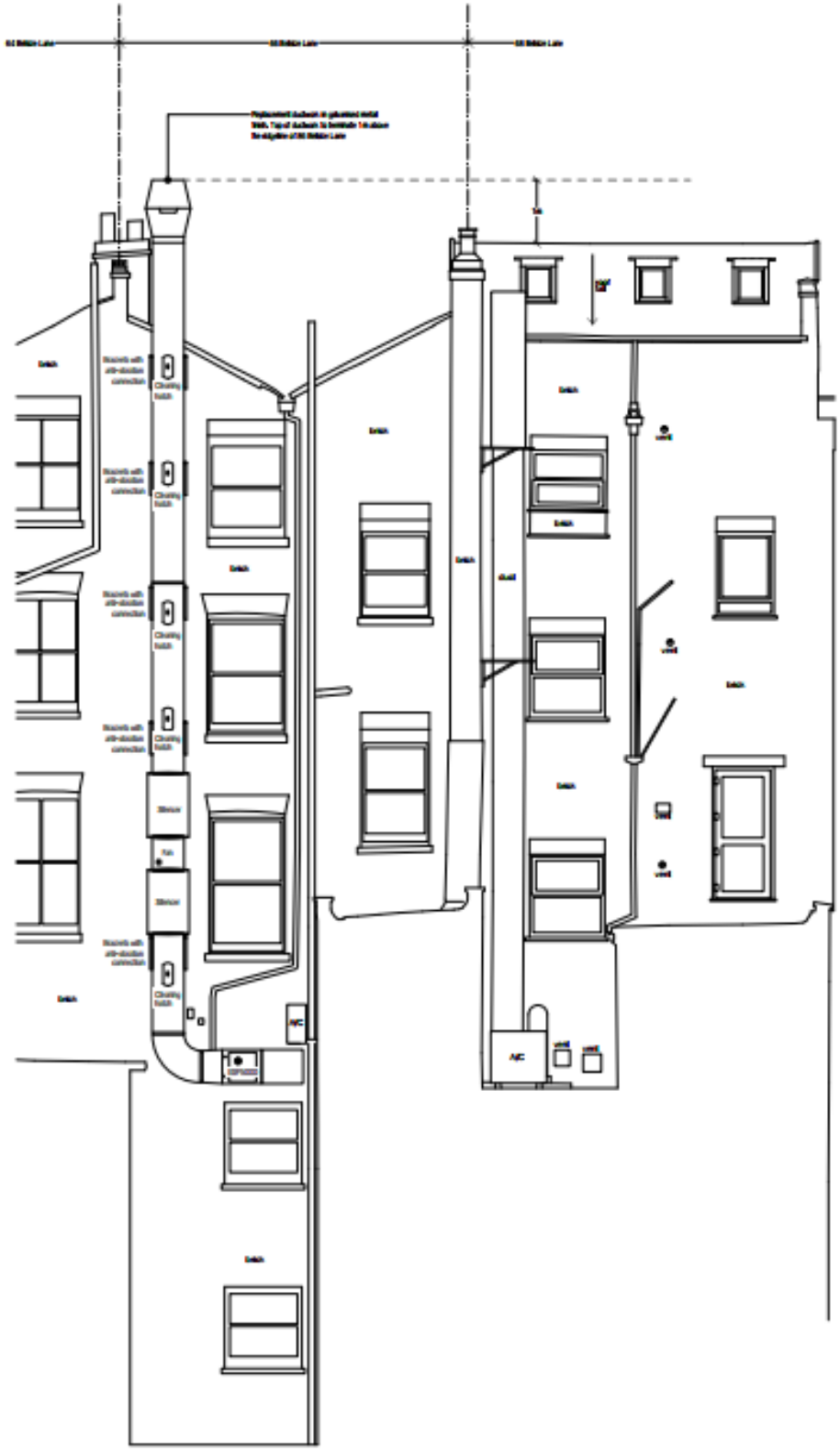
50 MaXfan Compac

Fan Description	Ps Sound data at	Pa Static		Sound Spectrum (Hz)								Overall	
				63	125	250	500	1k	2k	4k	8k	Lw*	LpA @ 3m**
50 MaXfan Compac	2.63 m3/s	400	Inlet*	83	79	87	88	86	85	81	78	94	71
50 MaXfan Compac	2.63 m3/s	400	Outlet*	85	79	90	89	86	86	81	79	95	72
50 MaXfan Compac	2.63 m3/s	400	Breakout*	75	61	68	66	61	58	59	55	77	48

Proposed Extraction Fan Enclosure – EMTEC PAC30

Acoustic Panel Type	**Sound Reduction Index in dB at Octave Band Centre Frequencies (Hz)**								
	63*	125	250	500	1k	2k	4k	8k*	Rw
PAC 40	15	17	25	35	39	45	47	46	37 (-2;-7)
PAC 40HD	19	22	27	37	44	50	53	52	40 (-2;-6)
PAC 30	13	17	23	30	34	41	42	41	33 (-1;-5)

APPENDIX I – Site Plans



APPENDIX J – 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.