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## **NOISE IMPACT ASSESSMENT REPORT - KITCHEN EXTRACTION SYSTEM**

**55 GREEN LANE, NORTHWOOD HA6 3AG**

**FOR**

**THE FARM RESTAURANT & BAR**



ISSUE STATUS: FINAL  
DATE OF ISSUE: 20/12/2023  
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## 1. EXECUTIVE SUMMARY

The Client intends to seek planning approval for the installation of mechanical plant (Kitchen Extraction System) to service the premises at 55 Green Lane, Northwood HA6 3AG.

Sound Licensing has undertaken an environmental noise survey at the site in order to determine prevailing background noise levels that are representative of the nearest noise sensitive properties, which have been identified as the second-floor residential premises directly above the site at 55 Green Lane, HA6.

The results of the noise survey are considered reasonable given the location of the measurement position and the existing noise sources in the local vicinity.

Noise calculations of the mechanical plant have been undertaken using all available details and plans provided by the client and obtaining manufacturers' specifications wherever possible. The data and information form the basis of the assessment.

Noise break-out limits for the mechanical plant have been proposed based on the methodologies of British Standard (BS) 4142:2014+A1:2019 and in accordance to Local Authority policy. A robust, worst-case assessment of the noise levels associated to the proposed mechanical plant has been undertaken.

In accordance with BS 4142:2014+A1:2019 guidance, the predicted noise impact due to the operation of the mechanical plant ***“is an indication of the specific sound source having a low impact”***. The predicted noise level of the mechanical plant at the nearest noise sensitive properties is considered to comply with the London Borough of Hillingdon Council's policy.

## 2. INTRODUCTION

The client is proposing to install a new kitchen extraction system at the side/rear of 55 Green Lane, Northwood HA6 3AG, the noise from which could have the potential to affect existing noise sensitive properties nearby.

The purposes of this report are:

- To determine prevailing environmental noise levels affecting surrounding properties due to nearby noise sources (e.g. road traffic, aircraft etc);
- Based on the above, to present noise emission limits in accordance with the requirements of BS 4142:2014+A1:2019 and Local Authority policy, and
- To undertake an assessment to demonstrate compliance with the Local Authority noise requirements.

### 3. SITE DESCRIPTION

Planning permission is being sought for the installation of a kitchen extraction system at 55 Green Lane, Northwood HA6 4AG (hereafter referred to as 'the site'). The property is a traditionally built 3-storey end of terrace building with a basement in the London Borough of Hillingdon. It is located in a mixed area comprising predominantly of commercial units at ground floor level with residential accommodation on the floors above. The site is located next to an overground rail line.

The nearest sensitive residential receptors were noted to be the second-floor windows located on the side and rear façades of 55 Green Lane at approximate distances of:

Side Façade: 6m from the fan casing and 3.5m from the discharge point of the flue.

Rear Façade: 7m from the fan casing and 2.5m from the discharge point of the flue.

The nearest sensitive receptors are identified in figure 3.1. If the noise impact assessment details that there is an indication of the specific sound source having a low impact at these premises then it can be safely assumed it will be met at other properties of equal distance and/or those further away.

Figure 3.1 shows the site highlighted in **blue** with the nearest noise sensitive premises highlighted in **red**.

**Figure 3.1** Site Location and Surrounding Land Use



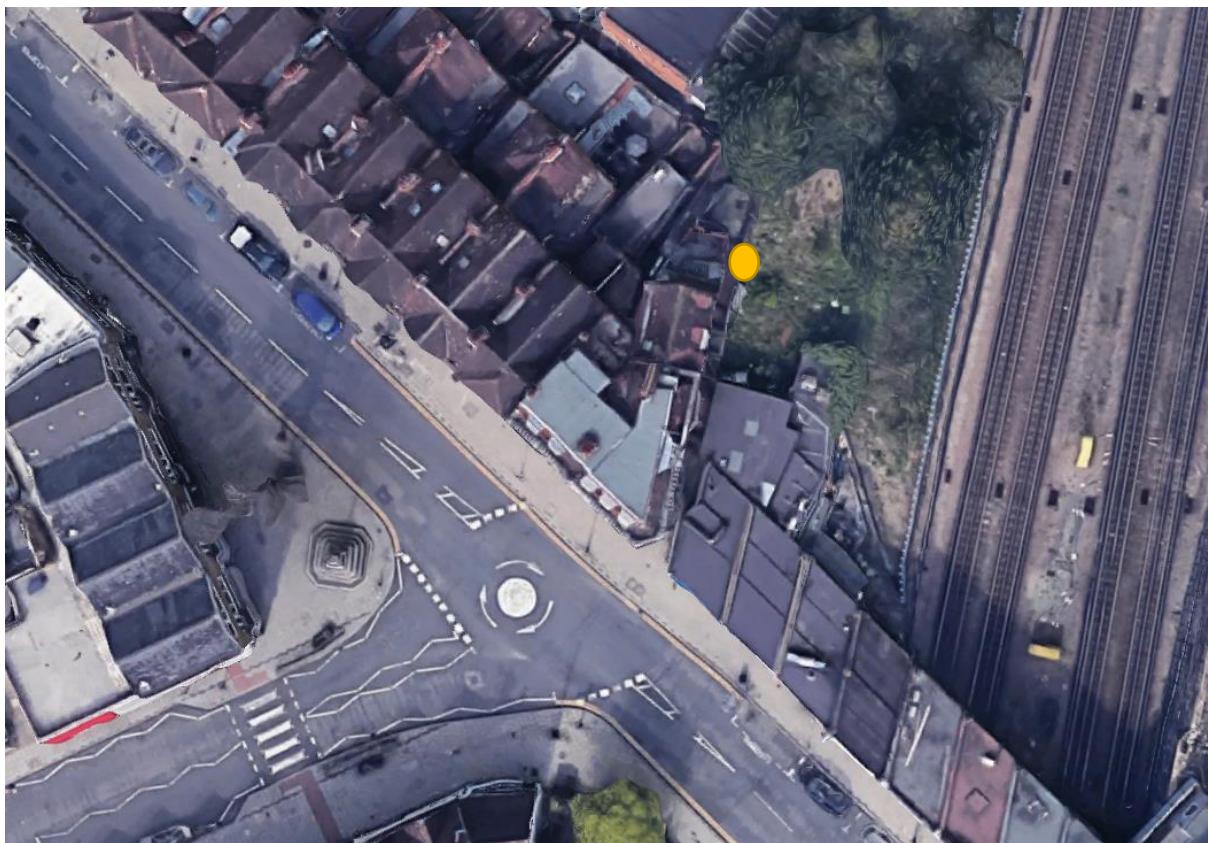
Source: Google Maps

#### 4. ENVIRONMENTAL NOISE SURVEY METHODOLOGY

An unmanned environmental noise survey was undertaken at a single measurement location at first floor level to the rear of the site. The survey was undertaken between 16:30 hours on the 5<sup>th</sup> September and 16:00 hours on the 7<sup>th</sup> September 2023. A survey at this time covers the most sensitive period of time in which the mechanical plant system may be operational.

Ambient, background and maximum noise levels ( $L_{Aeq}$ ,  $L_{A90}$  and  $L_{Max}$  respectively) were measured throughout the noise survey in continuous 15-minute periods. The approximate measurement position is indicated in **orange** on Figure 4.1 below.

**Figure 4.1** Site Plan Showing Approximate Location of Measurement Position



Source: Google Maps

The sound level meter microphone was positioned on a tripod off of the first-floor rear terrace. The position is considered to be in free-field and therefore no façade correction will be applied. The monitoring position is considered representative of background noise levels at the nearest identified noise sensitive properties. The monitoring position was chosen for equipment security reasons also.

The equipment used for the noise survey is summarised in Table 4.1.

**Table 4.1 Description of Equipment used for Noise Survey**

Equipment	Description	Quantity	Serial Number
Larson Davis Sound Expert LxT	Type 1 automated logging sound level meter	1	0004720
Larson Davis 377B02	½" microphone	1	159605
Larson Davis	Pre-amplifier	1	042612
Larson Davis CAL200	Class 1 Calibrator	1	12245

The noise survey and measurements were conducted in accordance with BS7445-1:2003 '*Description and measurement of environmental noise. Guide to quantities and procedures*'.

Weather conditions throughout the entire noise survey period were noted to be hot (approx. 14-29° Celsius), clear skies (0 to 10% cloud cover approximately) with a light wind (<5m/s). These weather conditions were checked against and confirmed by the use of the Met Office mobile application available on smart phone technology. These conditions were maintained throughout the majority of the survey period and are considered reasonable for undertaking environmental noise measurements.

The noise monitoring equipment was field calibrated before and after the noise survey period. No significant drift was recorded ( $\pm 0.3$  dB). Equipment calibration certificates can be provided upon request.

## 5. NOISE SURVEY RESULTS AND OBSERVATIONS

### 5.1 Results

A summary of the measured ambient and background noise levels during the proposed operational hours are shown in Table 5.1 below (full monitoring data can be found in Appendix C).

**Table 5.1 Measured Ambient and Typical Background Sound Pressure Levels**

Date / Period (hours)	Ambient Sound Pressure Level, dB L <sub>Aeq,1hour</sub>	Typical Background Sound Pressure Level, dB L <sub>A90,1hour</sub>
05/09/2023(16:30 to 23:30)	56-64	48
06/09/2023(08:00 to 23:30)	55-66	48
07/09/2023(08:00 to 16:00)	58-64	48

The typical background noise level at the measurement position during the survey, at the time in which the plant could be operational, is **48dB L<sub>A90,1hour</sub>**.

### 5.2 Observations

Given that the noise survey was unmanned, noise sources could not be identified. However, at the beginning and end of the survey background noise was dominated by noise from the overground rail line and existing mechanical plant. After analysis of the data no significant abnormal noise source(s) were identifiable. It is considered that the measured noise levels are reasonable given the location of the measurement position.

## 6. EXTERNAL NOISE EMISSION LIMITS

### 6.1 Local Authority Requirements

The site lies within the jurisdiction of the London Borough of Hillingdon Council. It is stated within the Local Authority SPD 'Noise Generating and Noise Sensitive Development 2016' that where the "Rating Level (LAr,Tr) is at least 5 dB(A) below the Background Level LA90" is normally acceptable.

For the purposes of this report, an assessment has been undertaken in line with BS 4142:2014+A1:2019. A design criterion of achieving a minimum 5dB(A) below the background noise level has been adopted in line with the Local Authorities policy. Taking the noise monitoring data in Section 5 and Local Authority requirements above, the following design target has been adopted for mechanical plant as provided in Table 6.1.

**Table 6.1 Maximum Noise Emission Design Target at Residential Premises**

Date / Period (hours)	Typical Background Sound Pressure Level, dB LA <sub>90,1hour</sub>	Rating Noise Level at Nearest Residential Facade, dB L <sub>Ar,T</sub>
05/09/2023(16:30 to 23:30)	48	43
06/09/2023(08:00 to 23:30)	48	
07/09/2023(08:00 to 16:00)	48	

## 6.2 BS 4142:2014+A1:2019

BS 4142:2014+A1:2019 "Methods for rating and assessing industrial and commercial sound" presents a method for assessing the significance and possible adverse impact due to an industrial noise source, based on a comparison of the source noise levels and the background noise levels, both of which are measured or predicted at a noise sensitive receiver e.g. a residential property.

The specific noise level due to the source is determined, with a series of corrections for tonality, impulsivity, intermittency or other unusual characteristic. The rating level is then compared to the background noise level and the significance of the new noise source likelihood of any adverse impact is determined in accordance with the following advice:

*"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 occur. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context. 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."*

## 7. PROPOSED KITCHEN EXTRACTION SYSTEM AND ASSOCIATED NOISE LEVELS

It is proposed to install the following items of plant at the side/rear of the premises.

**Table 7.0 Proposed Kitchen Extraction Fan Motor**

External Plant Item	Make	Model	Reference Noise Level* L <sub>w(A)</sub>
Kitchen Extract Fan Motor	Ventorn	AMF 500/1	Outlet 77dB Breakout 60dB

\*Reference sound power levels. Manufacturer's specifications are provided in Appendix B.

The ducting will be 300x350mm standard rectangular duct work. The extraction fan motor will be located externally and therefore breakout noise from the motor and noise from the duct terminus have been considered.

In reference to section 6 of this report, no penalty addition has been applied for intermittency as the system will remain on throughout the service period. Penalty additions have not been applied for tonality as manufacturers' data shows no significant characteristics, or for impulsiveness as it is considered that these characteristics will not be perceptible sufficient to attract attention at the noise receptors. Penalty additions have not been applied for any other sound characteristics as mechanical plant of this type generally do not demonstrate such features.

### 7.1 Silencer

The extraction system will be fitted with an R02-3-1500 Acoustica silencer on the atmosphere side of the fan. The silencer provides the attenuation shown in Table 7.1. All silencers should be Melinex lined.

**Table 7.1 Silencer Attenuation**

63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
9	18	30	47	50	50	50	40

### 7.2 Directivity

A directivity correction should be applied as the extract fan duct aperture is to terminate approximately 120° to the nearest residential windows. A duct opening of 300x350mm has been used. The levels of attenuation (dB) at each octave frequency band (Hz) is provided in table 7.2 below.

**Table 7.2 Directivity Attenuation**

63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
0	0	5	8	13	17	22	22

### 7.3 Building Screening

Due to the positioning of the extraction system, there will be significant building screening from the motor to the rear façade and the terminus to the side facade, due to the side façade and roof line, so there will be no direct line of sight, therefore attenuation due to barrier loss has also been considered (calculations are provided in Appendix D).

Corrections have also been applied for the attenuation from duct bends (3)\* and length of the ductwork (10m)\*\*.

\* Reference: Improving Ductwork, EU project, Brussels 1999. Also same as CIBSE.

\*\* Reference data taken from CIBSE Guide B4 2016 b Ventilation Services Noise

## 8. NOISE IMPACT ASSESSMENT

This section presents calculations to predict the noise impact of the proposed kitchen extraction system, located at the site, at the nearest noise sensitive properties.

### 8.1 Proposed Operational Hours and Background Noise Levels

The kitchen extraction system will operate during the opening hours of the proposed business. The opening hours are from 08:00 - 23:30 hours, 7 days-a-week.

The typical background noise level at the measurement position during the survey is **48dB L<sub>A90,1hour</sub>**. The design range is **43dB L<sub>Ar,T</sub>** at the façade of the nearest residential premises.

### 8.2 Nearest Noise Sensitive Properties

The nearest sensitive residential receptors were noted to be the second-floor windows located on the side and rear façades of 55 Green Lane at approximate distances of:

Side Façade: 6m from the fan casing and 3.5m from the discharge point of the flue.  
Rear Façade: 7m from the fan casing and 2.5m from the discharge point of the flue.

### 8.3 Description of Calculation Process

In accordance with the methodologies of BS 4142:2014+A1:2019, calculations have been undertaken to predict noise levels in which the kitchen extraction system could be operational at its maximum level. Given the distances between the noise sources and the noise sensitive receptors, point source calculations have been used.

### 8.4 Noise Level Predictions

Calculations to predict the noise of the kitchen extraction system operating at the facade of the residential property is given below. Full calculations are provided in Appendix D.

The rating noise level at the 2<sup>nd</sup> floor side façade window, with the mechanical plant operating, is predicted to be **38dB L<sub>Ar,T</sub>** which is **10dB(A) below** the typical background noise level (48dB L<sub>A90,1hour</sub>).

The rating noise level at the 2<sup>nd</sup> floor rear façade window, with the mechanical plant operating, is predicted to be **32dB L<sub>Ar,T</sub>** which is **16dB(A) below** the typical background noise level (48dB L<sub>A90,1hour</sub>).

In accordance with BS 4142:2014+A1:2019 guidance, noise from the mechanical plant ***"is an indication of the specific sound source having a low impact". The lower the rating level is relative to the measured background level, the less likely it is that the specific sound source will have an adverse impact.***

## 8.5 Vibration

In addition to the control of airborne noise transfer, it is important to consider the transfer of noise as vibration to adjacent properties as well as any sensitive areas of the same building. Vibration from the system is not expected, however, as a precaution plant should wherever possible be installed on suitable type isolators. The fan should be installed with flexible connections to adjacent structures.

### Uncertainty

The levels of uncertainty in the data and calculations are considered to be low given the robust exercise undertaken in noise monitoring and the confidence in the data statistical analysis. Manufacturers' data for the plant is highly likely to be robust. Detailed calculations and resultant noise levels at the residential location are considered to be confidently predicted.

## 9. CONCLUSION

Sound Licensing has undertaken an environmental noise survey at the site in order to determine prevailing background noise levels that are representative of the nearest noise sensitive properties. The operation of the kitchen extraction system, in accordance with BS 4142:2014+A1:2019 guidance, indicates to creating a low impact. All worst-case scenarios have been applied to the assessment. The predicted cumulative operating noise level of the kitchen extraction system is demonstrated to comply with the London Borough of Hillingdon Council's policy.

## APPENDIX A – Acoustic Terminology

Parameter	Description
Acoustic environment	Sound from all sound sources as modified by the environment
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far
Ambient sound level, $La = LA_{eq,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T
Background sound level, $LA_{90,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing ( $20 \times 10^{-6}$ Pascals).
Equivalent continuous A-weighted sound pressure level, $LA_{eq,T}$	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$ , has the same mean-squared sound pressure as a sound that varies with time
Measurement time interval, $T_m$	Total time over which measurements are taken
Rating level, $LA_{r,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound
Reference time interval, $Tr$	Specified interval over which the specific sound level is determined
Residual sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound
Residual sound level, $La = LA_{eq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T
Specific sound level, $La = LA_{eq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr
Specific sound source	Sound source being assessed

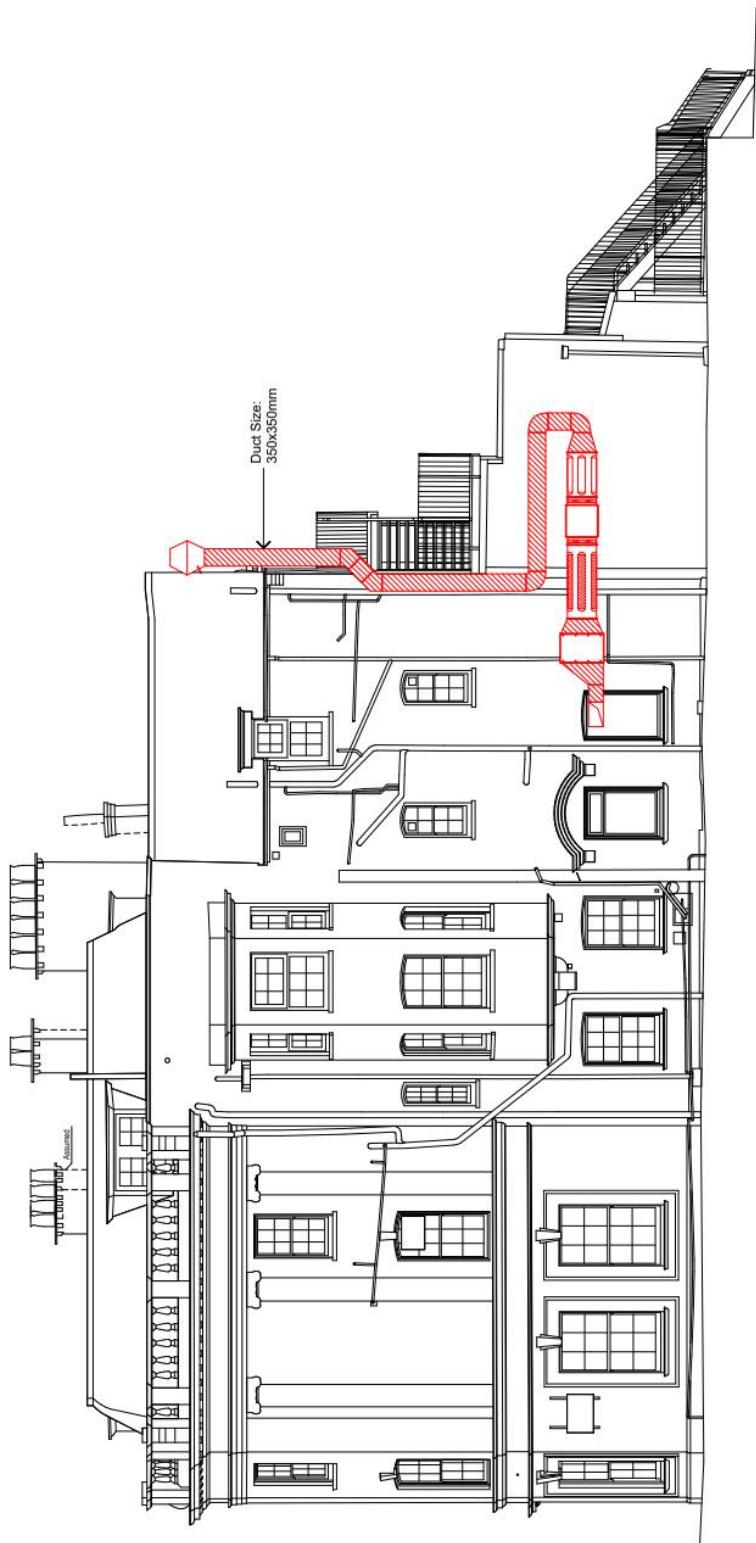
### References:

BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

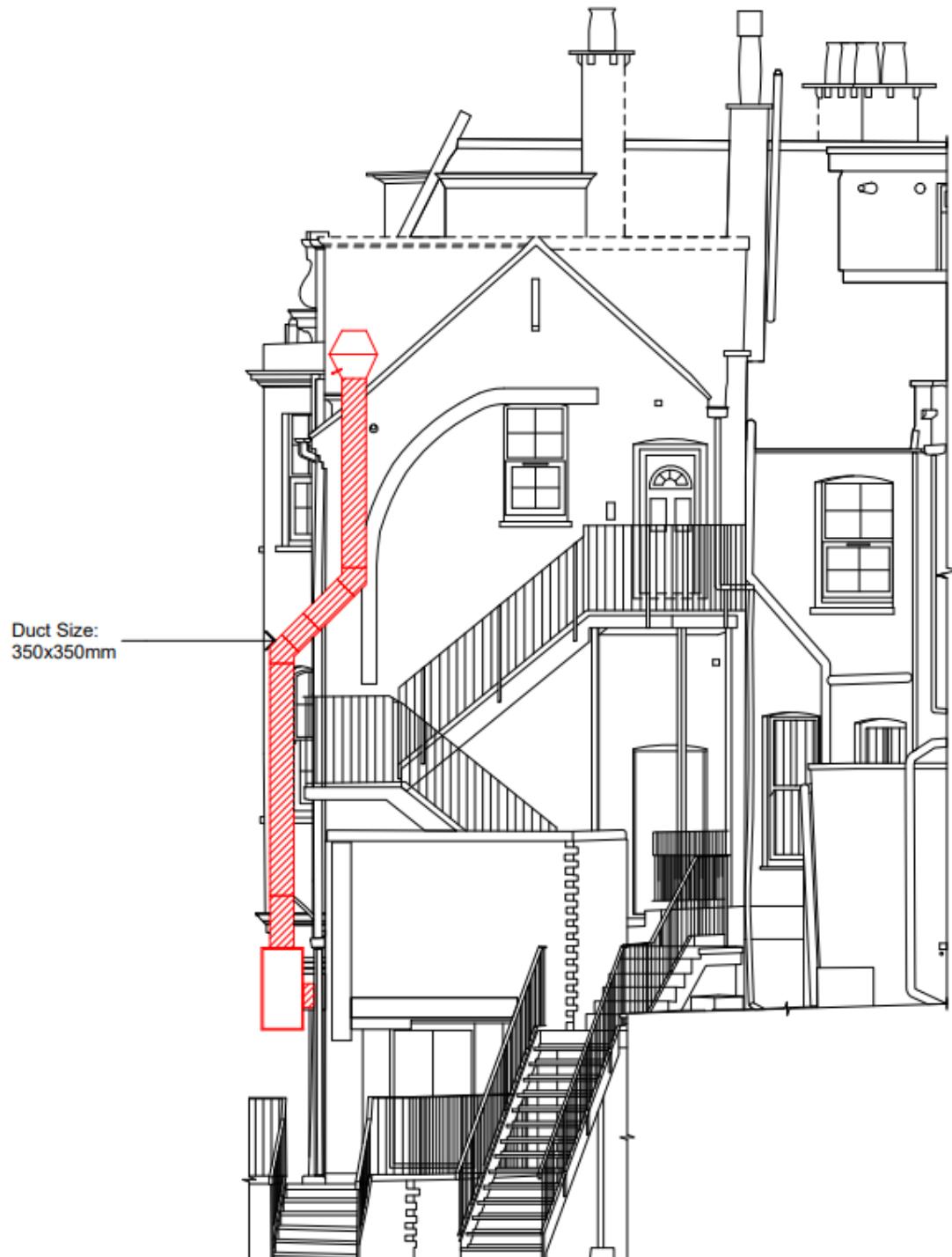
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**APPENDIX B – Data Sheets and Figures**

**Proposed Side Elevation**



**Proposed Rear Elevation**



## Ventorn AMF-500/1 Data Sheet – Extraction Fan Motor



**Silent box fan unit AMF-500/1**  
Version: 4-pol; 50 Hz; 90°-180°airflow



### Silent box fan unit AMF-500/1

Variable direction discharge, backward curved centrifugal fan.

High efficiency IE2 external rotors motor and IE3 for induction rotor motors. Highest quality Electric motors with thermal protection will guarantee the long life and trouble free operation due to its construction and air cool system.

Free running High density HD backward curved Impeller is made of aluminium and dynamically balanced according to ISO10816 two plane CLASS 1.

The double skin Acoustic panels with 25 mm flame-retardant mineral wool noise and temperature insulated will help to reduce the noise level, they are easily removable which make it easy to install in any direction as well as easy to clean and maintain.

Aluminium frame and corners are highly shock-resistant.

Speed controllable 0 to 100% only by High efficiency variable frequency drive, pre-programmed and fully protecting the fan against any sort of harm.

Low sound level due to the 25mm thick acoustic panels, to absorb the noise to the highest level.

Casing and all corners are made of corrosion resistance aluminium for longer life.

Silent box fans can be used as extract and supply unit.

### Ventorn AMF-500/1 Acoustic Data

500/4	Hz	Tot	63	125	250	500	1k	2k	4k	8k
LwA Inlet	dB(A)	76	63	65	69	71	70	67	62	55
LwA Outlet	dB(A)	77	65	67	71	73	72	69	64	57
LwA Surrounding	dB(A)	60	48	50	54	56	55	52	47	40

## Acoustica R02-3-1500 Silencer Data Sheet

# R02 Rectangular Silencers



### R02 - 3 - Attenuator

Available in seven standard lengths R02 3 Rectangular Duct Mounted Silencers have excellent attenuation properties, achieved with sound absorbing infill splitters, retained in the attenuator casing by a perforated liner. The resistance to airflow is a function of the face velocity and length. It is not recommended to select the R02 3 Silencers with a face velocity above 3.5 metres per second without asking advice regarding re-generated self noise. We can advise on the selections and can perform system analysis to ensure the correct unit is specified.



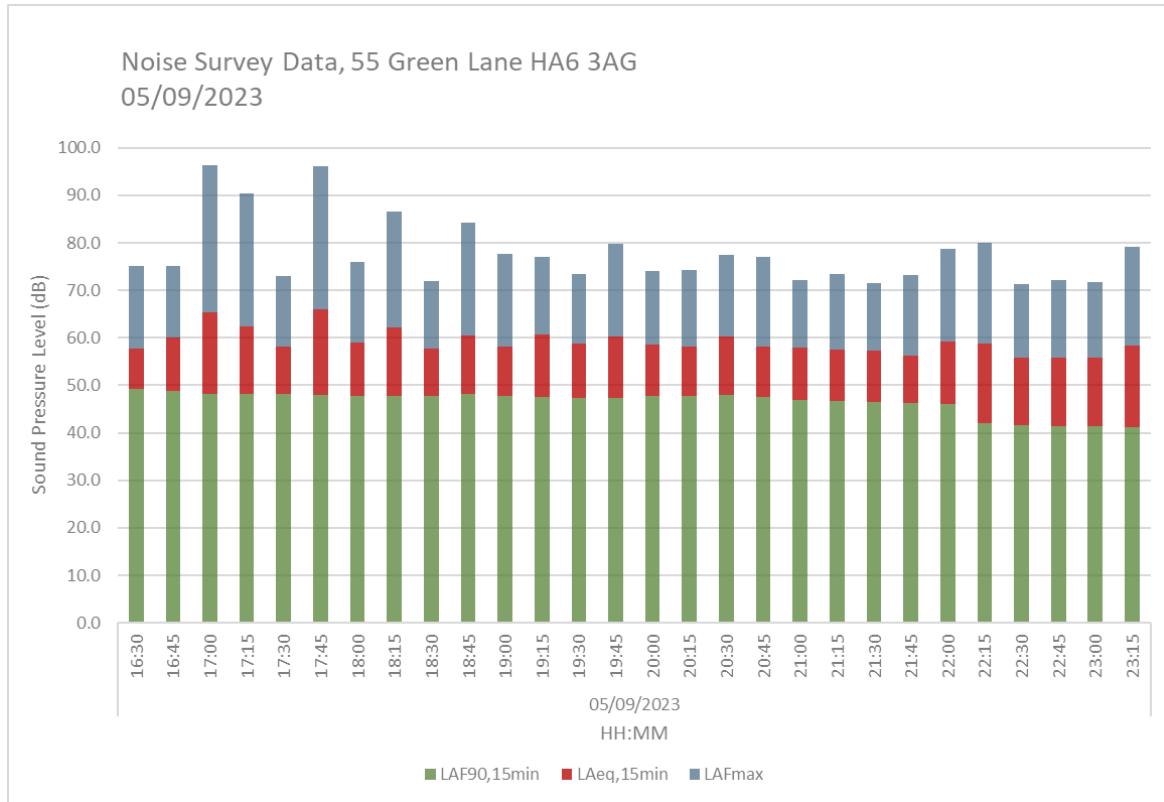
- High performance rectangular duct silencer
- Seven standard lengths
- Many connection options
- Cross section dimensions in 1mm increments
- System pressure within ducted systems to 1500 Pa
- Special lengths on request

### Insertion Loss (dB) - Centre Band Frequency

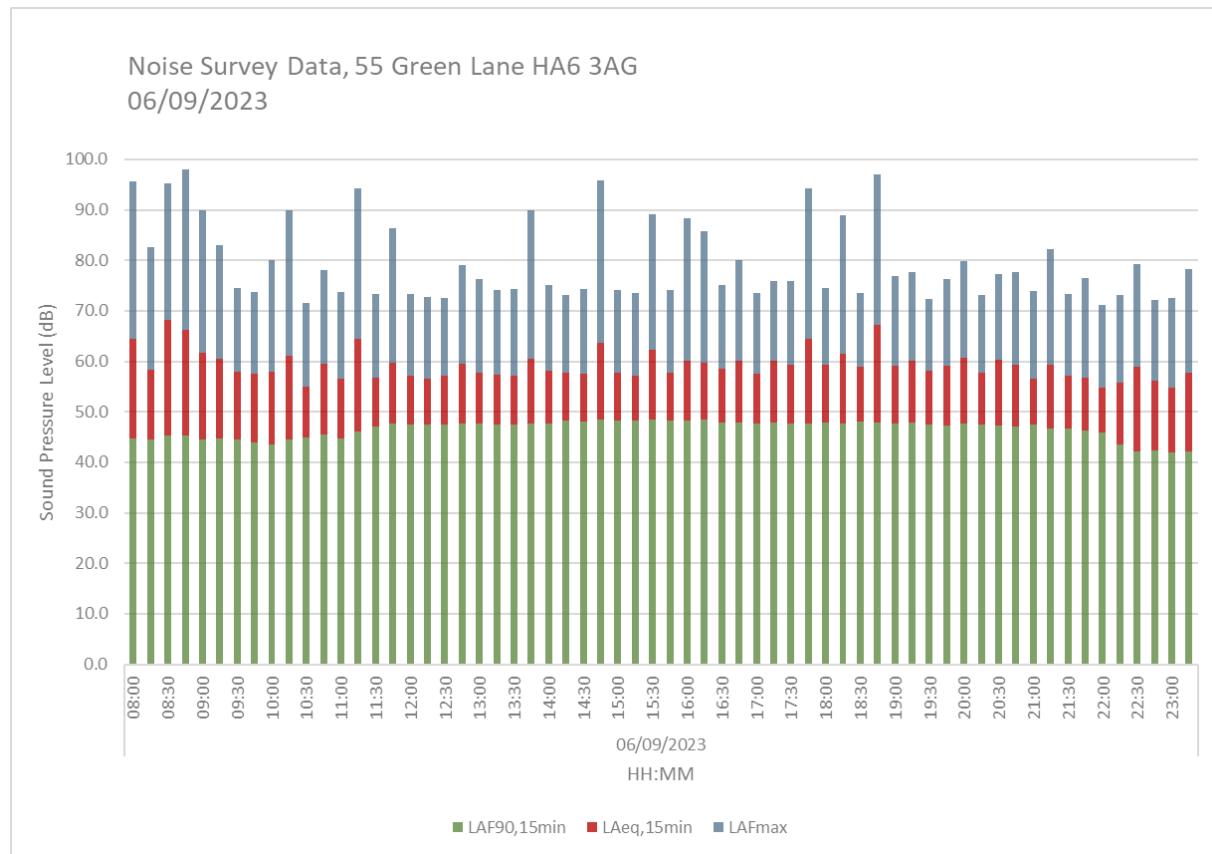
Product Code	Length (mm)	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
R02 - 3 - 600	600	6	9	13	25	31	32	24	20
R02 - 3 - 900	900	7	12	18	33	42	42	37	28
R02 - 3 - 1200	1200	8	15	25	42	50	50	46	34
R02 - 3 - 1500	1500	9	18	30	47	50	50	50	40
R02 - 3 - 1800	1800	10	20	35	49	50	50	50	52
R02 - 3 - 2100	2100	12	23	40	50	50	50	50	49
R02 - 3 - 2400	2400	13	26	40	50	50	50	50	50

Insertion loss data is derived from continual testing to BS4718 and other standards in independent UKAS certified laboratories, which includes where appropriate, re-generated or self noise testing in both forward and reverse flow conditions. If you request system analysis from our technicians all predictions will be assessed using the relevant certified insertion loss data together with relevant dynamic corrections.

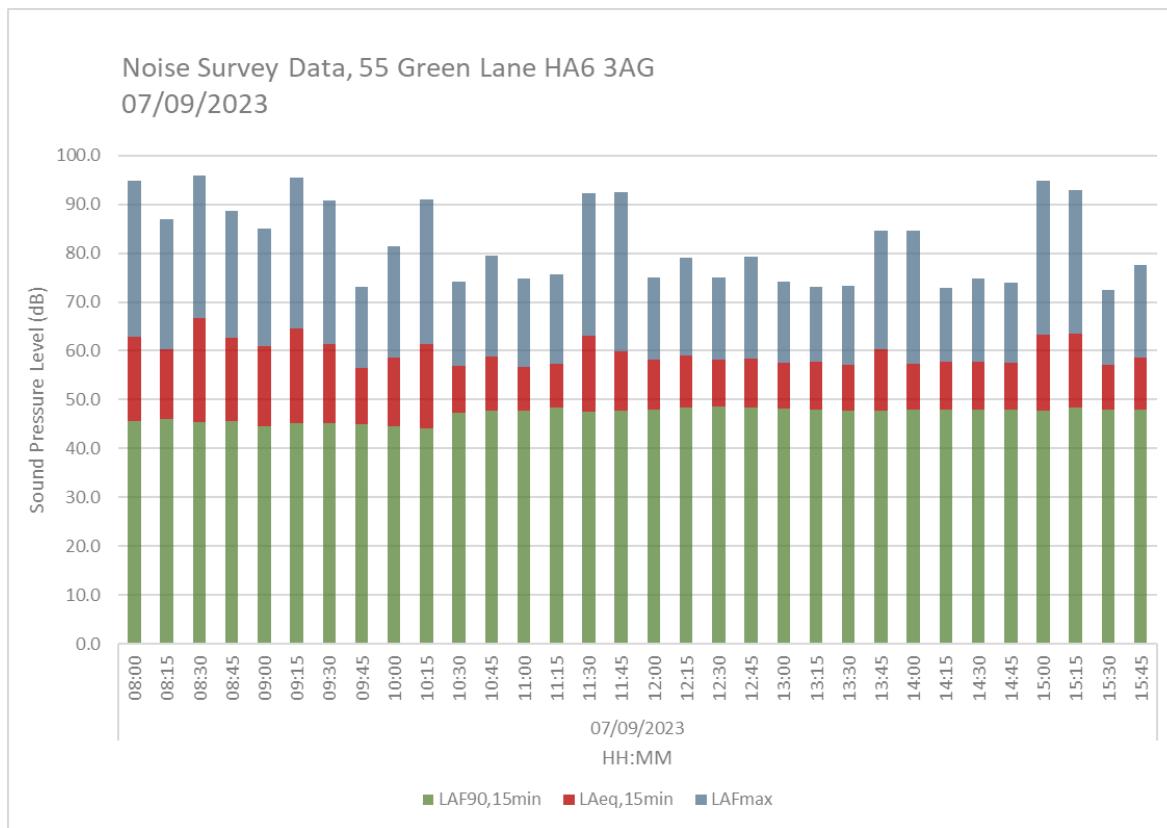
**APPENDIX C – Noise Monitoring Data**



Date	Time	$L_{Aeq,15min}$	$L_{AFmax}$	$L_{AF90,15min}$	$L_{Aeq,1hour}$	$L_{AF90,1hour}$
05/09/2023	16:30	57.7	75.1	49.3	59.1	49.1
	16:45	60.2	75.0	48.8		
	17:00	65.3	96.4	48.1	63.9	48.1
	17:15	62.4	90.5	48.2		
	17:30	58.1	73.1	48.1	60.2	47.9
	17:45	66.0	96.1	47.9		
	18:00	59.1	75.9	47.7	59.6	47.5
	18:15	62.2	86.5	47.8		
	18:30	57.7	72.0	47.7	58.9	47.8
	18:45	60.6	84.3	48.2		
	19:00	58.2	77.7	47.7	57.3	46.6
	19:15	60.6	77.0	47.6		
	19:30	58.8	73.3	47.4	57.6	43.3
	19:45	60.3	79.9	47.4		
	20:00	58.5	74.0	47.8		
	20:15	58.1	74.2	47.7		
	20:30	60.3	77.5	48.0		
	20:45	58.2	77.1	47.6		
	21:00	58.0	72.3	46.9		
	21:15	57.5	73.4	46.7		
	21:30	57.2	71.6	46.4		
	21:45	56.3	73.3	46.3		
	22:00	59.2	78.7	46.1		
	22:15	58.7	79.9	42.1		
	22:30	55.8	71.4	41.6		
	22:45	55.7	72.2	41.5		
	23:00	55.9	71.7	41.5		
	23:15	58.4	79.2	41.2		



Date	Time	L <sub>Aeq,15min</sub>	L <sub>AFmax</sub>	L <sub>AF90,15min</sub>	L <sub>Aeq,1hour</sub>	L <sub>AF90,1hour</sub>	Date	Time	L <sub>Aeq,15min</sub>	L <sub>AFmax</sub>	L <sub>AF90,15min</sub>	L <sub>Aeq,1hour</sub>	L <sub>AF90,1hour</sub>	
06/09/2023	08:00	64.4	95.5	44.8	65.5	45.0	06/09/2023	16:00	60.0	88.3	48.3	59.6	48.2	
	08:15	58.4	82.7	44.6				16:15	59.7	85.8	48.5			
	08:30	68.2	95.3	45.3				16:30	58.4	75.1	47.9			
	08:45	66.2	97.9	45.3				16:45	60.0	80.0	47.9			
	09:00	61.7	89.9	44.6	59.8	44.5		17:00	57.5	73.4	47.7	61.2	47.8	
	09:15	60.5	83.1	44.8				17:15	60.1	76.0	47.9			
	09:30	58.0	74.4	44.5				17:30	59.3	75.9	47.7			
	09:45	57.5	73.7	44.0				17:45	64.5	94.3	47.7			
	10:00	57.9	80.0	43.6	58.9	44.8		18:00	59.4	74.4	47.9	63.2	47.9	
	10:15	61.1	90.0	44.6				18:15	61.4	88.9	47.6			
	10:30	55.0	71.6	45.0				18:30	59.0	73.6	48.0			
	10:45	59.5	78.1	45.6				18:45	67.2	96.9	47.9			
	11:00	56.5	73.8	44.8	60.6	46.5		19:00	59.0	76.8	47.6	59.2	47.6	
	11:15	64.4	94.2	46.0				19:15	60.1	77.6	47.9			
	11:30	56.7	73.3	47.1				19:30	58.1	72.4	47.5			
	11:45	59.8	86.3	47.6				19:45	59.1	76.3	47.3			
	12:00	57.1	73.3	47.5	57.8	47.5		20:00	60.7	79.9	47.6	59.7	47.4	
	12:15	56.5	72.8	47.4				20:15	57.7	73.1	47.5			
	12:30	57.2	72.6	47.5				20:30	60.2	77.3	47.2			
	12:45	59.5	79.1	47.6				20:45	59.4	77.6	47.1			
	13:00	57.7	76.2	47.7	58.4	47.6		21:00	56.5	73.8	47.4	57.5	46.7	
	13:15	57.3	74.2	47.5				21:15	59.3	82.3	46.7			
	13:30	57.2	74.2	47.5				21:30	57.1	73.4	46.6			
	13:45	60.6	90.0	47.7				21:45	56.8	76.5	46.2			
	14:00	58.2	75.1	47.6	60.2	48.1		22:00	54.8	71.1	45.9	56.7	43.7	
	14:15	57.8	73.2	48.2				22:15	55.8	73.1	43.5			
	14:30	57.6	74.4	48.0				22:30	59.0	79.3	42.1			
	14:45	63.7	95.8	48.4				22:45	56.1	72.2	42.3			
	15:00	57.7	74.1	48.3	59.2	48.3		23:00	54.8	72.5	41.9			
	15:15	57.1	73.5	48.2				23:15	57.8	78.3	42.2			
	15:30	62.2	89.1	48.4										
	15:45	57.7	74.1	48.3										



Date	Time	L <sub>Aeq,15min</sub>	L <sub>AFmax</sub>	L <sub>AF90,15min</sub>	L <sub>Aeq,1hour</sub>	L <sub>AF90,1hour</sub>
07/09/2023	08:00	62.9	94.9	45.7	63.8	45.7
	08:15	60.4	86.9	46.1		
	08:30	66.8	96.0	45.5		
	08:45	62.6	88.6	45.6		
	09:00	60.9	85.0	44.6		
	09:15	64.6	95.4	45.3		
	09:30	61.5	90.7	45.2		
	09:45	56.4	73.0	44.9		
	10:00	58.6	81.4	44.6		
	10:15	61.4	91.0	44.2		
	10:30	57.0	74.1	47.4		
	10:45	58.8	79.4	47.8		
	11:00	56.6	74.8	47.8		
	11:15	57.2	75.7	48.3		
	11:30	63.2	92.2	47.5		
	11:45	59.9	92.4	47.7		
	12:00	58.3	75.0	48.0		
	12:15	59.1	79.0	48.4		
	12:30	58.2	74.9	48.5		
	12:45	58.5	79.2	48.4		
	13:00	57.4	74.2	48.1		
	13:15	57.7	73.2	48.0		
	13:30	57.2	73.4	47.7		
	13:45	60.2	84.5	47.8		
	14:00	57.4	84.7	47.9		
	14:15	57.8	72.9	47.9		
	14:30	57.9	74.8	47.9		
	14:45	57.5	74.0	48.0		
	15:00	63.2	94.9	47.8	61.5	48.0
	15:15	63.6	92.9	48.3		
	15:30	57.1	72.5	48.0		
	15:45	58.6	77.6	47.9		

## APPENDIX D – Calculations

### 2<sup>nd</sup> Floor Side Façade Windows

Attenuation per double distance required =  
( 6dB for LpA recommended)

6	dB			Metres					
Enter Distance =				6					
Frequency Hz									
	63	125	250	500	1000	2000	4000	8000	Total
	74.2	66.1	62.6	59.2	55	50.8	46	41.1	75.25
Total LW	74.2	66.1	62.6	59.2	55.0	50.8	46.0	41.1	75.25
'A' Weight	26.2	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	48.0	50.0	54.0	56.0	55.0	52.0	47.0	40.0	61.29
LPA at New Dist'	24.49	26.49	30.49	32.49	31.49	28.49	23.49	16.49	37.78
LPA After Insert	24.49	26.49	30.49	32.49	31.49	28.49	23.49	16.49	37.78

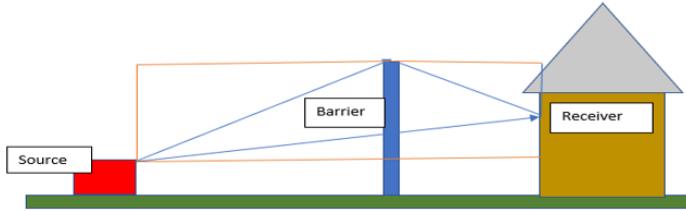
**Kitchen Extraction Fan Motor Breakout @ 6m = 38dB L<sub>Aeq,T</sub>**

### Building Screening Attenuation Calculation – Kitchen Extraction Terminus

Applicable where barrier breaks line of sight between source and receiver

Example Illustration of Barrier Attenuation

	Metres
Source to Barrier	3.5
Receiver to Barrier	0.1
Source to Receiver	3.5



Path Difference	0.1
Source to Barrier	3.5
Receiver to Barrier	0.1
Source to Receiver	3.5

Frequency Hz	63	125	250	500	1000	2000	4000	8000
Barrier Correction	5.7	6.5	7.7	9.5	11.7	14.2	17.0	19.8

Attenuation per double distance required =  
( 6dB for LpA recommended)

6	dB			Metres					
Enter Distance =				3.5					
Frequency Hz									
	63	125	250	500	1000	2000	4000	8000	Total
	91.2	83.1	79.6	76.2	72	67.8	63	58.1	92.25
Total LW	91.2	83.1	79.6	76.2	72.0	67.8	63.0	58.1	92.25
'A' Weight	26.2	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	65.0	67.0	71.0	73.0	72.0	69.0	64.0	57.0	78.29
LPA at New Dist'	46.16	48.16	52.16	54.16	53.16	50.16	45.16	38.16	59.45
SILENCER	9	18	30	47	50	50	50	40	
DUCT BENDS (3)	0	2	14	19	9	7	7	7	
DUCT LENGTH, 10m	10	7	3	2	2	2	2	2	
DIRECTIVITY 120°	0	0	5	8	13	17	22	22	
SCREENING	6	6	8	9	12	14	17	20	
LPA After Insert	21.43	14.33	-7.54	-30.94	-32.83	-40.04	-52.79	-52.67	22.21

**Kitchen Extraction Terminus @ 3.5m = 22dB L<sub>Aeq,T</sub>**

<u>Adding dB</u>							
Levels to be added (Max. of eight)							
Enter values	38	22	0	0	0	0	0
Total = 38.1 dB							

**Cumulative Sound Pressure Level @ 2<sup>nd</sup> Floor Side Façade Window = 38dB L<sub>Ar,T</sub>**

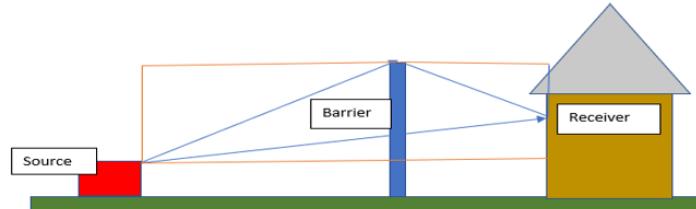
### 2<sup>nd</sup> Floor Rear Façade Window

#### Building Screening Attenuation Calculation – Kitchen Extraction Fan Motor

Applicable where barrier breaks line of sight between source and receiver

Example Illustration of Barrier Attenuation

		Metres
Source to Barrier		2.1
Receiver to Barrier		5.2
Source to Receiver		7



Path Difference	0.3
-----------------	-----

Frequency Hz	63	125	250	500	1000	2000	4000	8000
Barrier Correction	7.2	8.7	10.7	13.1	15.8	18.6	21.6	24.5

Attenuation per double distance required =  
( 6dB for LpA recommended)

	6	dB			Metres	
	Enter Distance =					7
	Frequency Hz					
	63	125	250	500	1000	2000
	74.2	66.1	62.6	59.2	55	50.8
Total LW	74.2	66.1	62.6	59.2	55.0	50.8
'A' Weight	26.2	16.1	8.6	3.2	0	-1.2
LWA (Power)	48.0	50.0	54.0	56.0	55.0	52.0
LPA at New Dist'	23.16	25.16	29.16	31.16	30.16	27.16
SCREENING	7	9	11	13	16	19
LPA After Insert	15.99	16.48	18.46	18.04	14.36	8.52
						Total
						41.1
						75.25
						41.1
						75.25
						1.1
						61.29
						40.0
						22.16
						15.16
						36.45
						25
						24.04

**Kitchen Extraction Fan Motor Breakout @ 7m = 24dB L<sub>Aeq,T</sub>**

Attenuation per double distance required =  
( 6dB for LpA recommended)

	6	dB			Metres				
	Enter Distance =					2.5			
	Frequency Hz								
	63	125	250	500	1000	2000	4000	8000	Total
	91.2	83.1	79.6	76.2	72	67.8	63	58.1	92.25
Total LW	91.2	83.1	79.6	76.2	72.0	67.8	63.0	58.1	92.25
'A' Weight	26.2	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	65.0	67.0	71.0	73.0	72.0	69.0	64.0	57.0	78.29
LPA at New Dist'	49.07	51.07	55.07	57.07	56.07	53.07	48.07	41.07	62.36
SILENCER	9	18	30	47	50	50	50	40	
DUCT BENDS (3)	0	2	14	19	9	7	7	7	
DUCT LENGTH, 10m	10	7	3	2	2	2	2	2	
DIRECTIVITY 120°	0	0	5	8	13	17	22	22	
LPA After Insert	30.07	23.74	3.09	-18.57	-18.25	-22.92	-32.92	-29.92	30.98

Kitchen Extraction Terminus @ 2.5m = 31dB L<sub>Aeq,T</sub>

<u>Adding dB</u>									
Levels to be added (Max. of eight)									
Enter values	24	31	0	0	0	0	0	0	0
Total = 31.8 dB									

Cumulative Sound Pressure Level @ 2<sup>nd</sup> Floor Rear Façade Window = 32dB L<sub>Ar,T</sub>