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NOISE IMPACT ASSESSMENT REPORT - KITCHEN EXTRACTION SYSTEM

3 ECHO SQUARE, GRAVESEND DA12 1NP

FOR

GOYA WORKS



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The preparation of this report by Sound Licensing Ltd. has been undertaken within the terms of the proposal using all reasonable skill and care. Sound Licensing Ltd accepts no responsibility for the data provided by other bodies and no legal liability arising from the use by other persons of data or opinions contained in this report.

1. EXECUTIVE SUMMARY

The Client intends to seek planning approval for the installation of mechanical plant (Kitchen Extraction System) to service the premises at 3 Echo Square, Gravesend DA12 1NP.

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 residential premises directly above the site at 3A Echo Square.

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 Gravesham Borough Council's policy.

2. INTRODUCTION

The client is proposing to install a new kitchen extraction system at the rear of 3 Echo Square, Gravesend DA12 1NP, 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 installation of a kitchen extraction system to service the premises at 3 Echo Square, Gravesend DA12 1NP (hereafter referred to as 'the site'). The property is a traditionally built three-storey terraced building with a single storey rear extension in Gravesend. The street is a mix of commercial and residential properties with generally commercial premises at ground floor level and residential premises above.

The nearest sensitive residential receptors were noted to be the first and second-floor windows located on the rear façade of 3A Echo Square at approximate distances of:

First-floor – 4.5m from the fan casing, 4m from the discharge point of the flue

Second-floor – 6.5m from the fan casing, 2m 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 14:30 hours on the 8th August and 15:00 hours on the 10th August 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_{Amax} 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 at a height of 1.5 metres on a flat roof at first-floor level, approximately 1m from any façade. The position is not considered to be in free-field and therefore a +3dB 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	0004702
Larson Davis 377B02	½" microphone	1	159519
Larson Davis	Pre-amplifier	1	042610
Larson Davis CAL200	Class 1 Calibrator	1	11706

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. 11-26° Celsius), passing clouds (30 to 50% 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 (± 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 $L_{Aeq,1hour}^*$	Typical Background Sound Pressure Level, dB $L_{A90,1hour}^*$
08/08/2023(14:30 to 00:00)	37-49	43
09/08/2023(12:00 to 00:00)	40-54	39
10/08/2023(12:00 to 15:00)	48-49	41

*Façade correction -3dB. Day Time 1-hour measurements and Night Time 15-minute measurements

The typical background noise level at the measurement position during the survey, at the time in which the plant could be operational, is **40dB** $L_{A90,1hour}$.

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 traffic noise from the local road network. 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 Local Authority, Gravesham Borough Council. In previous applications the Environmental Health department have requested that the assessment be completed in accordance with BS4142:2014+A1:2019 and that it should demonstrate that the operating noise level of the plant will be at a minimum of 10dB(A) below the assessed typical background noise level, $L_{A90,T}$.

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 10dB(A) below the typical 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 $L_{A90,1\text{hour}}$	Rating Noise Level at Nearest Residential Facade, dB $L_{Ar,T}$
08/08/2023 – 10/08/02023 (12:00 to 00:00)	40	30

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 rear of the premises.

Table 7.0 Proposed Mechanical Plant

External Plant Item	Make	Model	Reference Noise Level* $L_{w(A)}$
Kitchen Extract Fan Motor	Helios	Gigabox 560/4	Outlet 82dB
Kitchen Intake Fan Motor	Ruck Fans	ELKI 6030	Inlet 85dB

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

The extraction ducting will be 500x350mm standard rectangular duct work and the intake ducting will be 600x300mm standard rectangular duct work terminating through a louvre in the rear façade. The fan motors will be located internally and therefore only noise from the duct termini has been considered.

In reference to section 6 of this report, a penalty addition (+3dB) has been applied for intermittency as the system will be switched on & off as required. 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 Silencers

The extraction system will be fitted with an R02-3-1200 Acoustica silencer on the atmosphere side of the fan and the intake system will be fitted with an R02-4-900 Acoustica silencer on the atmosphere side of the fan. The silencers provide the attenuation shown in Table 7.1.1 and Table 7.1.2. The silencer on the extraction system should be Melinex lined.

Table 7.1.1 Extract Silencer Attenuation

125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
15	25	42	50	50	46	34

Table 7.1.2 Intake Silencer Attenuation

125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
10	16	30	37	37	30	24

7.2 Directivity

A directivity correction should be applied as both the extract and intake fan duct apertures are to terminate approximately 120° to the nearest residential windows. A duct opening of 500x350mm has been used for the extract terminus and an opening of 600x300mm has been used for the intake terminus. The levels of attenuation (dB) at each octave frequency band (Hz) are provided in Table 7.2.1 and Table 7.2.2 below.

Table 7.2.1 Extract System Directivity Attenuation

125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
2	5	10	13	20	22	22

Table 7.2.2 Intake System Directivity Attenuation

125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
2	5	10	13	20	22	22

7.3 Building Screening

Due to the positioning of both duct termini, there will be significant building screening, due to the roof line, from the nearest residential properties 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 (1)* and length of the ductwork (10m)** to the extraction system.

* 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 10:00 - 23:00 hours Monday to Friday, 10:00 to 00:00 hours on Saturday and 10:00 to 22:00 on Sunday.

The typical background noise level at the measurement position during the survey is **40dB** $L_{A90,1\text{hour}}$. The design range is **30dB** $L_{Ar,T}$ at the façade of the nearest residential premises.

8.2 Nearest Noise Sensitive Properties

The nearest sensitive residential receptors were noted to be the first and second-floor windows located on the rear façade of 3A Echo Square at approximate distances of:

First-floor – 4.5m from the fan casing, 4m from the discharge point of the flue

Second-floor – 6.5m from the fan casing, 2m 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 first-floor windows, with the mechanical plant operating, is predicted to be **27dB** $L_{Ar,T}$ which is **13dB(A) below** the typical background noise level (40dB $L_{A90,1\text{hour}}$).

The rating noise level at the second-floor windows, with the mechanical plant operating, is predicted to be **30dB** $L_{Ar,T}$ which is **10dB(A) below** the typical background noise level (40dB $L_{A90,1\text{hour}}$).

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/medium 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 Gravesham Borough Council's policy.

APPENDIX A – Acoustic Terminology

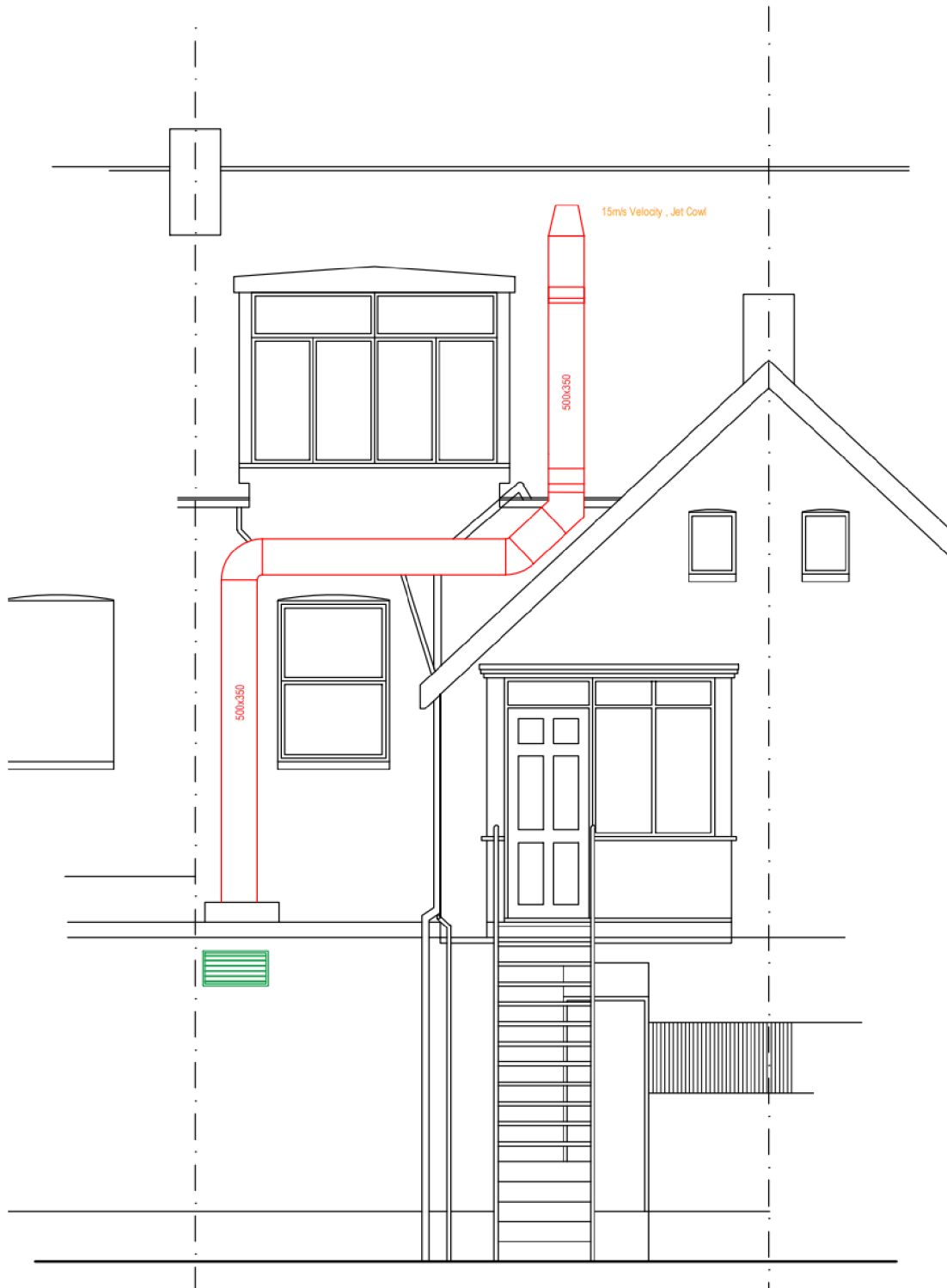
Parameter	Description
Acoustic environment	Sound from all sound sources as modified by the environment
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far
Ambient sound level, $L_a = L_{Aeq,T}$	Equivalent continuous A-weighted 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 (20×10^{-6} Pascals).
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	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, $L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound
Reference time interval, T_r	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, $L_r = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T
Specific sound level, $L_s = L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r
Specific sound source	Sound source being assessed

References:

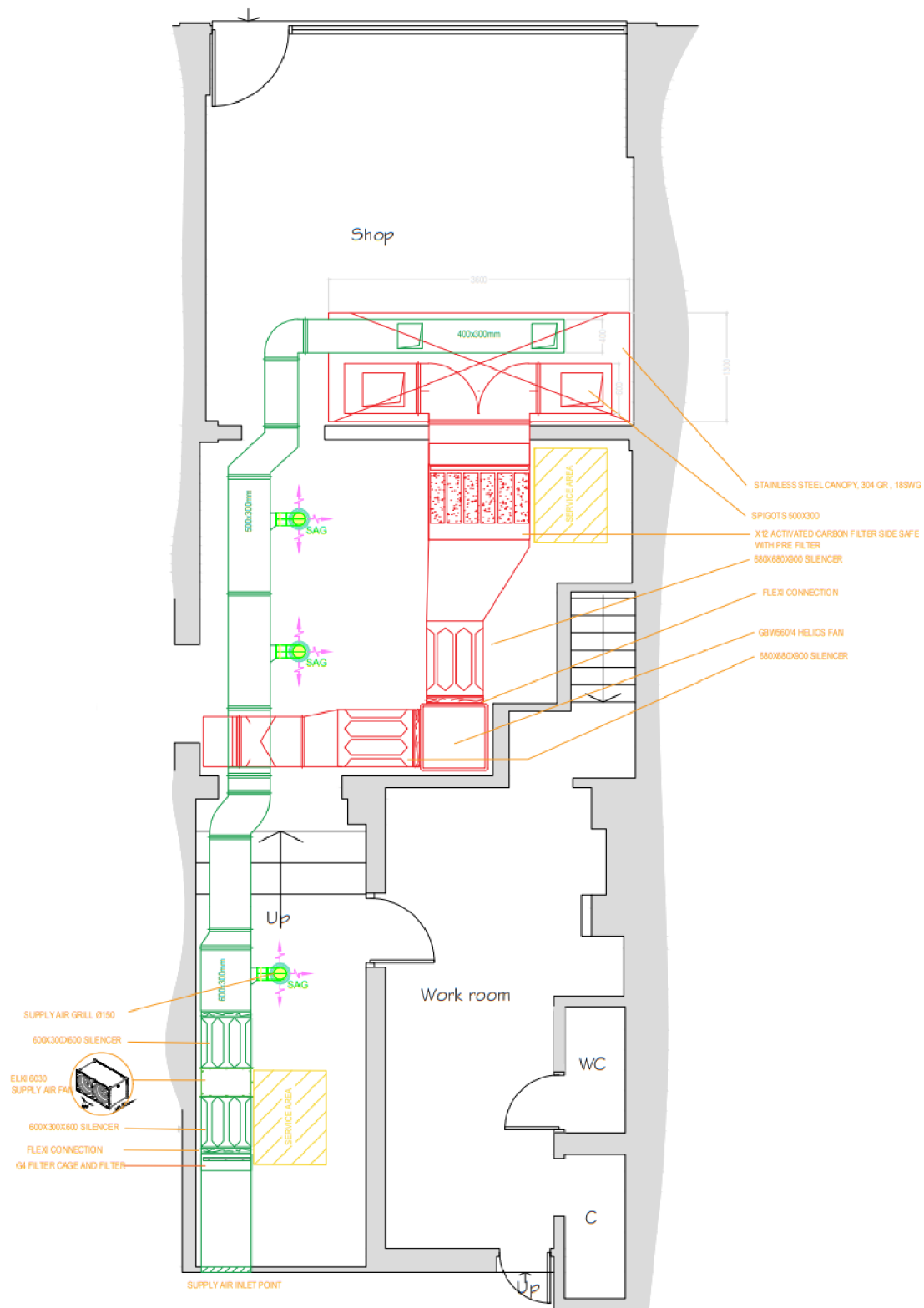
BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

APPENDIX B – Figures & Data Sheets

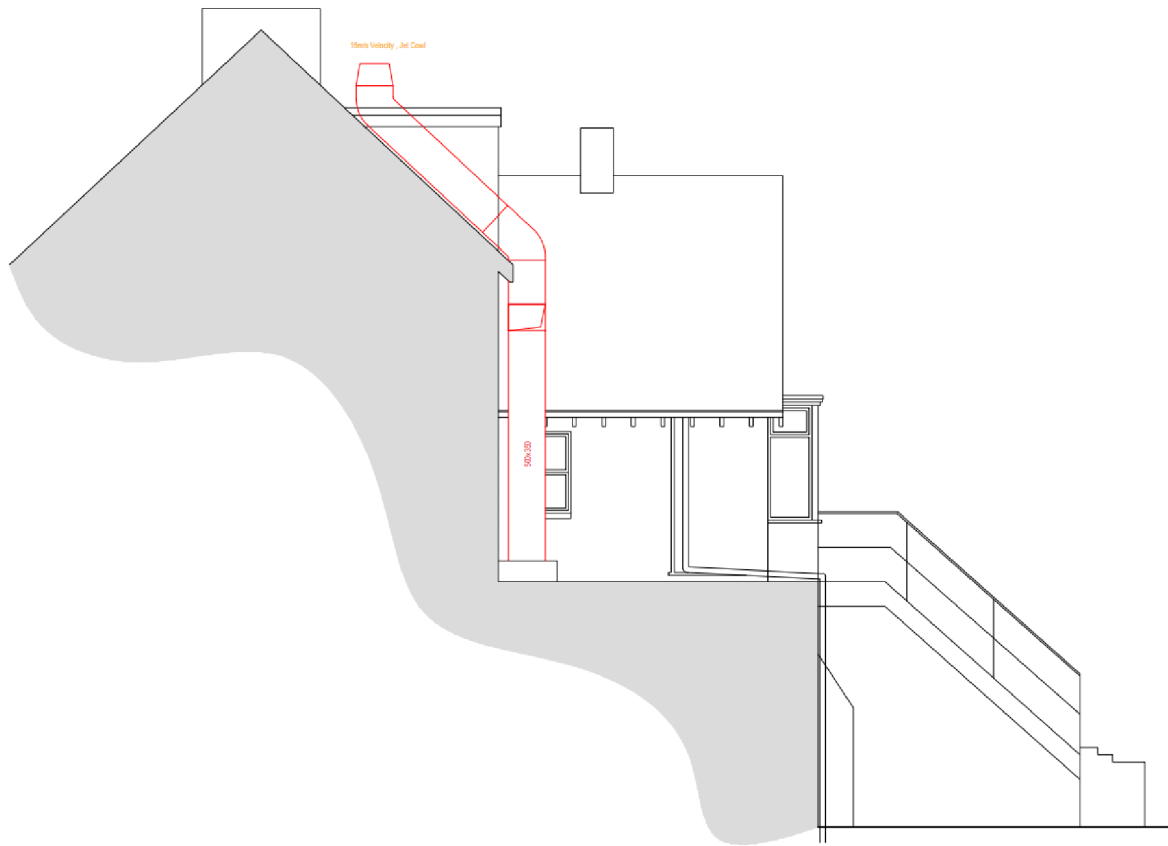
Proposed Rear Elevation



Proposed Ground Floor Plan



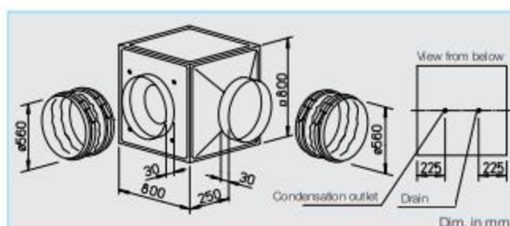
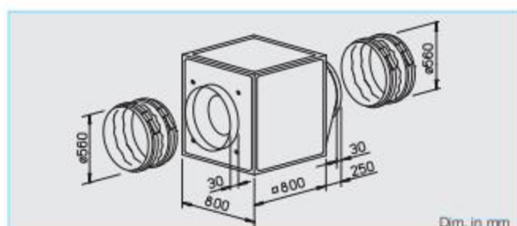
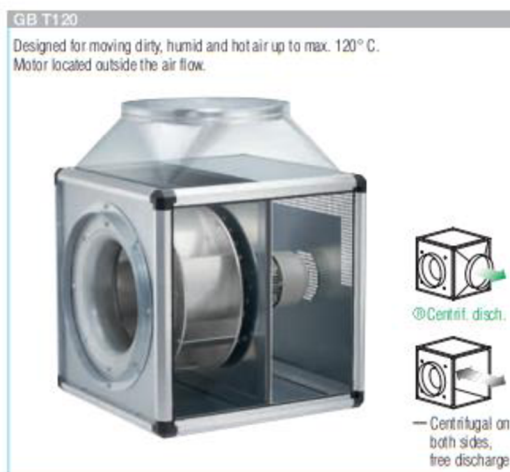
Proposed Side Elevation



Helios Gigabox 560/4 Data Sheet – Kitchen Extraction Fan Motor

560 mm ø GigaBox centrifugal fan

Helios



■ Special features of types GB T120

- Designed for moving dirty, humid and hot air volumes up to max. 120° C.
- Motor located outside of air flow.
- Temperature insulated partition panel between motor and impeller, lined with 20 mm thick, flame-retardant mineral wool.
- Easily accessible motor and impeller unit, removable without disassembling the system components.
- Inspection cover with handle, simply remove for cleaning and maintenance.
- Condensate collector with condensate spigot included in delivery. Drill hole for rain drainage (accessories) for outdoor installation is prepared.

□ Assembly GB T120

Installation must be carried out with condensation discharge showing downward. Flexible assembly by three possible centrifugal discharge directions via the discharge adapter. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

■ Feature

□ Assembly of types GB

Arbitrary installation position and flexible assembly by five possible discharge directions via the discharge adapter. For wall mounting the wall bracket (accessories) have to be used. Outdoor installation is possible using outdoor cover

hood and external weather louvers (accessories).

■ Specification of both types

□ Casing

Self-supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel, lined with 20 mm thick temperature insulating and flame-retardant mineral wool. Intake cone for ideal inflow as well as spigot and flexible sleeve (for the respective max. permissible air flow temperature) for duct connection. With discharge adapter (from square to circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks.

□ Impeller

Smooth running backward curved aluminium centrifugal impeller highly efficient and direct driven. Energy efficient with a low noise development. Dynamically balanced together with the motor to DIN ISO 1940 Pt.1 – class 6.3.

□ Motor

Maintenance-free external rotor motor or IEC-standard motor protected to IP 54. With ball bearings and interference-free as standard.

□ Electrical connection

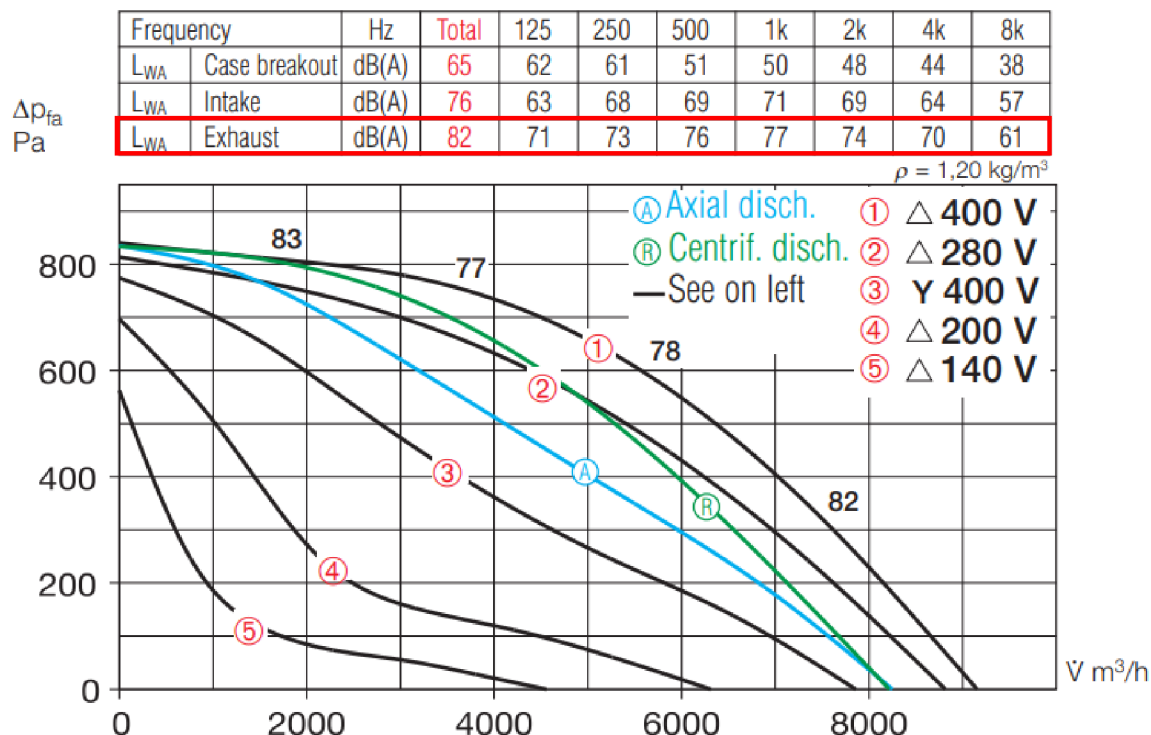
Standard terminal box (IP 54) fitted on the motor; with GB T120 fitted on the motor support plate.

Type	Ref. no.	Air flow volume (FID)	RPM	Sound pressure level (dB(A) in 4 m)	Motor power (nominal)	Current (full load)	Current (speed controlled)	Wiring diagram	Maximum air flow temperature (full load controlled)	Weight (net)	5 step transformer controller with mot. protect. unit	Full motor protection unit using the thermal contacts
		m³/h	min⁻¹		kW	A	A	No.	°C	kg	Type Ref. no.	Type Ref. no.
1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 54												
GBW 560/4	5508	9123	1409	45	1.83	7.93	10.4	867	45	92	MWS 10 1946	TSW 10 1498 MW 1) 1579
2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ wiring, protection to IP 54												
GBD 560/6/5	5522	7800/9000	705/885	35	0.51/0.80	0.90/1.85	1.90	867	60	80	RDS 4 1316	TSO 3.0 1502 MD 5849
GBD 560/4/4	5521	11500/13000	1110/1350	44	1.70/2.60	2.80/4.80	4.90	867	55	90	RDS 7 1578	TSO 7.0 1504 MD 5849
2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ wiring, protection to IP 54												
GBD 560/4/4 T120	5778	11520/12300	1250/1400	48	1.85/2.50	3.20/6.80	6.80	520	120	105	RDS 7 1578	TSO 7.0 1504 MD 5849

1) incl. operation switch

Helios Gigabox 560/4 - Acoustic Data Sheet

GBW 560/4



Acoustica R02-3-1200 Silencer Data Sheet

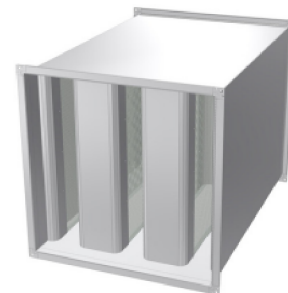
R02 Rectangular Silencers



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

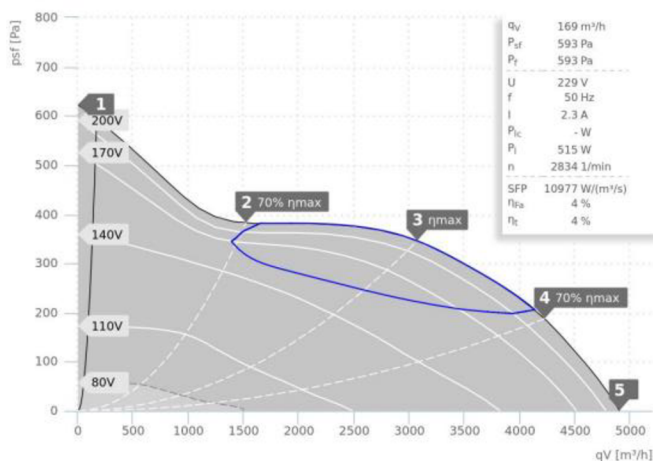
Insertion loss data is derived from continual testing to BS4718 and other standards in independent UKAS certified laboratories, which includes where appropriate, re-generated or self noise testing in both forward and reverse flow conditions. If you request system analysis from our technicians all predictions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

Ruck Fans ELKI 6030 E2 Data Sheet – Kitchen Intake Fan Motor

DATA SHEET

ELKI 6030 E2 11 | 127740

ruck
VENTILATOREN



- ETALINE duct fans
- Galvanized metal housing
- Speed controllable
- Integrated thermal switch
- Fan section removable

— ErP compliant range

Operating Point		1	2	3	4	5
Current I	A	2,3	1,9	2,4	2,5	2,3
Power consumption P ₁	W	529	427	541	563	521
Rotation speed n	1/min	2826	2884	2826	2817	2840
SWL inlet L _{WA5}	dB(A)	85	81	80	81	83
SWL outlet L _{WA6}	dB(A)	87	84	82	82	85
SWL housing break out L _{WA2}	dB(A)	68	66	63	62	65

Sound power (L _W) dB(A)		Medium Frequency Band								
		Σ	63	125	250	500	1k	2k	4k	8k
Inlet	L _{WA5}	85	-	64	74	79	80	78	75	68
Outlet	L _{WA6}	87	-	67	73	81	83	81	76	70
Housing radiation	L _{WA2}	68	58	57	62	61	61	59	53	44

ELKI 6030 E2 11 127740	
Voltage U _N	230 V 1~
Current I _{max}	3,3 A
Ambient temperature t _A	55 °C
Conveyed medium temperature t _M	55 °C
Speed Control	V
Motor protection	TMI
Insulation class motor	F
Weight	25,7 kg
Number of poles	2
IP motor	IP00
IP terminal box	IP44
IP complete unit	IPX4
Min. operating temperature	-25 °C

Acoustica R02-4-900 Silencer Data Sheet – Kitchen Intake System

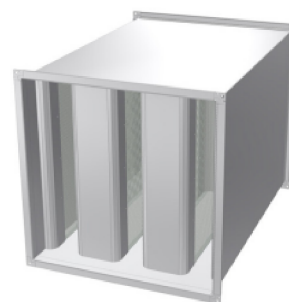
R02 Rectangular Silencers



R02 - 4 - Attenuator

Available in seven standard lengths R02 4 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 4 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

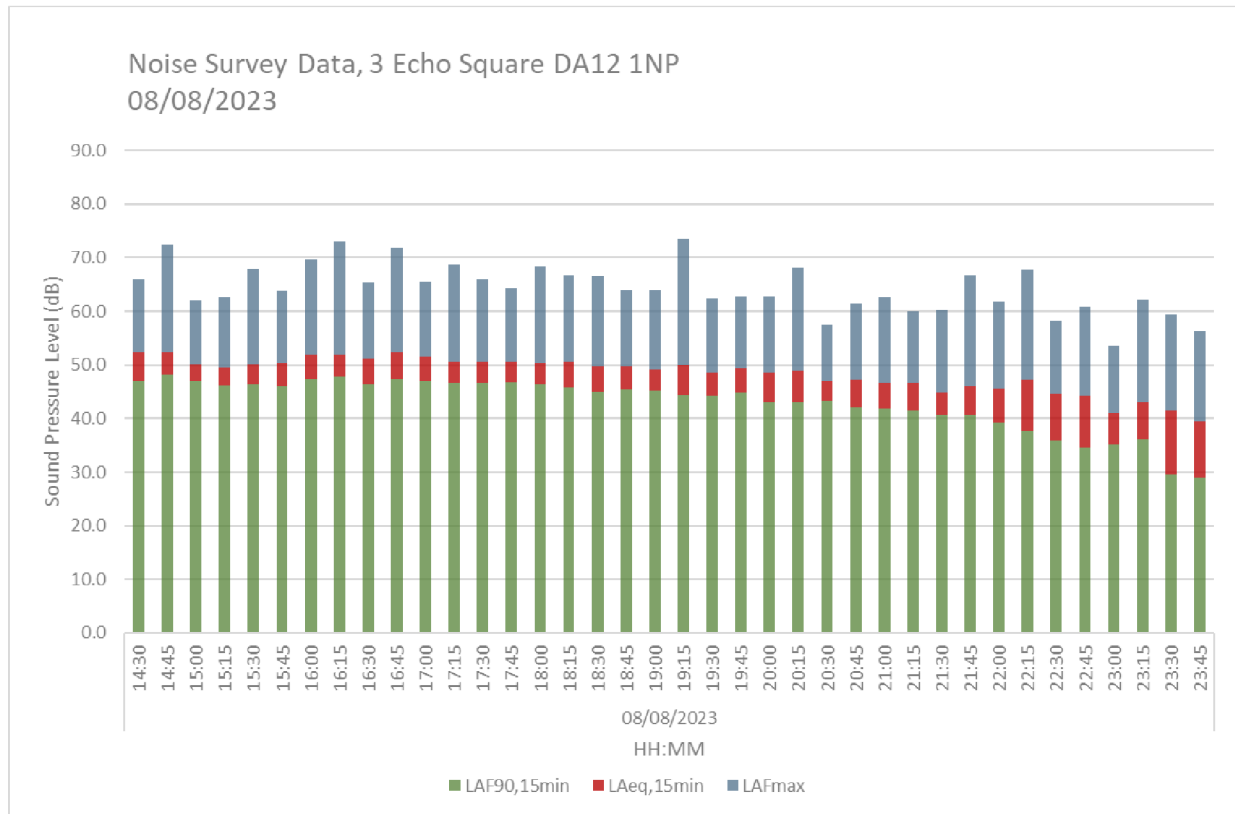


Insertion Loss (dB) - Centre Band Frequency

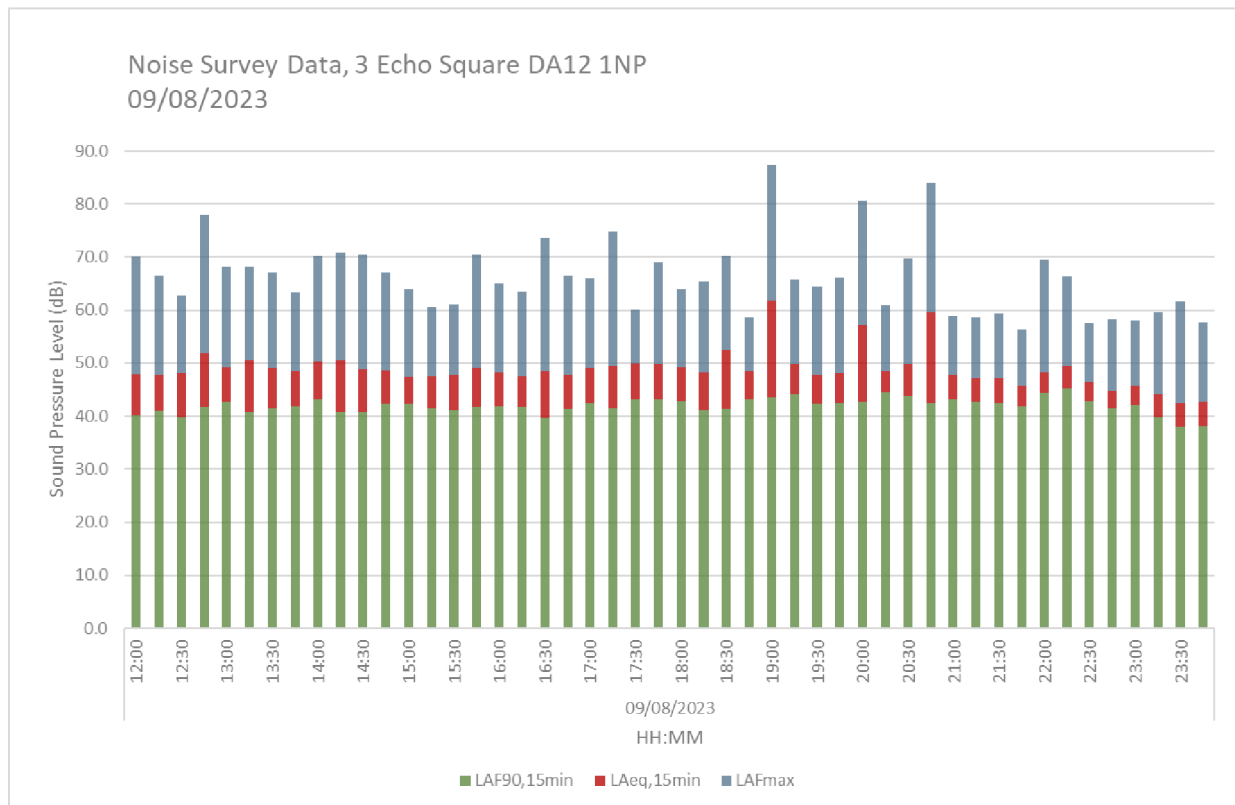
Product Code	Length (mm)	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
R02 - 4 - 600	600	5	8	12	23	30	30	23	18
R02 - 4 - 900	900	6	10	16	30	37	37	30	24
R02 - 4 - 1200	1200	7	13	22	38	47	47	40	29
R02 - 4 - 1500	1500	8	16	26	42	49	49	45	32
R02 - 4 - 1800	1800	9	18	31	46	50	49	47	34
R02 - 4 - 2100	2100	11	20	36	50	50	50	50	41
R02 - 4 - 2400	2400	12	22	40	50	50	50	50	47

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.

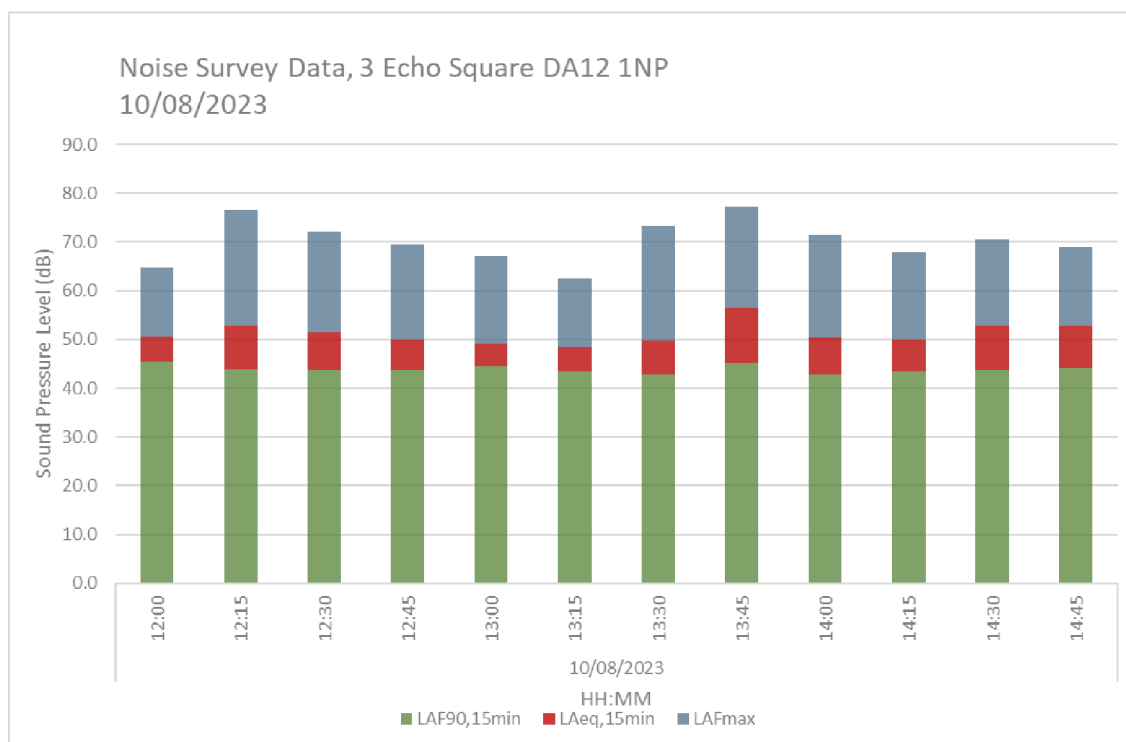
APPENDIX C – Noise Monitoring Data



Date	Time	L _{Aeq,15min}	L _{AFmax}	L _{AF90,15min}	L _{Aeq,1hour}	L _{AF90,1hour}	Date	Time	L _{Aeq,15min}	L _{AFmax}	L _{AF90,15min}	L _{Aeq,1hour}	L _{AF90,1hour}		
08/08/2023	14:30	52.3	65.9	46.9	52.3	47.6	08/08/2023	20:00	48.5	62.7	43.1	48.0	42.9		
	14:45	52.3	72.5	48.2				20:15	49.0	68.1	43.0				
	15:00	50.1	62.0	46.9				20:30	47.0	57.5	43.3				
	15:15	49.6	62.5	46.1	50.1	46.3		20:45	47.1	61.5	42.0	46.0	41.1		
	15:30	50.2	67.9	46.3				21:00	46.6	62.6	41.8				
	15:45	50.4	63.7	45.9				21:15	46.5	60.0	41.4				
	16:00	51.9	69.6	47.3	51.9	47.2		21:30	44.8	60.2	40.6	45.6	37.2		
	16:15	51.9	73.1	47.7				21:45	45.9	66.7	40.6				
	16:30	51.2	65.3	46.4				22:00	45.6	61.7	39.2				
	16:45	52.4	71.9	47.3	50.8	46.7		22:15	47.2	67.8	37.7				
	17:00	51.6	65.6	47.0				22:30	44.6	58.3	35.9				
	17:15	50.6	68.7	46.5				22:45	44.3	60.8	34.6				
	17:30	50.6	66.0	46.5	50.1	45.7		23:00	41.1	53.5	35.1				
	17:45	50.5	64.3	46.7				23:15	43.0	62.2	36.2				
	18:00	50.4	68.3	46.4				23:30	41.4	59.4	29.7				
	18:15	50.5	66.7	45.8	49.3	44.7		23:45	39.5	56.3	29.0				
	18:30	49.8	66.6	45.1											
	18:45	49.8	64.0	45.5											
	19:00	49.2	64.0	45.2											
	19:15	50.0	73.5	44.5											
	19:30	48.5	62.3	44.2											
	19:45	49.4	62.8	44.8											



Date	Time	L _{Aeq,15min}	L _{AFmax}	L _{AF90,15min}	L _{Aeq,1hour}	L _{AF90,1hour}	Date	Time	L _{Aeq,15min}	L _{AFmax}	L _{AF90,15min}	L _{Aeq,1hour}	L _{AF90,1hour}
09/08/2023	12:00	47.9	70.1	40.2	49.2	40.7	09/08/2023	18:00	49.2	63.8	42.8	50.0	42.3
	12:15	47.7	66.5	40.9				18:15	48.3	65.4	41.2		
	12:30	48.1	62.7	39.9				18:30	52.5	70.3	41.4		
	12:45	51.8	77.9	41.7				18:45	48.4	58.7	43.3		
	13:00	49.3	68.2	42.7	49.4	41.8		19:00	61.9	87.4	43.5	56.5	43.1
	13:15	50.6	68.3	40.8				19:15	49.7	65.7	44.1		
	13:30	49.1	67.1	41.6				19:30	47.8	64.5	42.2		
	13:45	48.4	63.3	41.9				19:45	48.1	66.2	42.4		
	14:00	50.3	70.3	43.2	49.7	41.9		20:00	57.1	80.7	42.7	56.0	43.4
	14:15	50.6	70.8	40.7				20:15	48.4	60.9	44.6		
	14:30	48.9	70.5	40.7				20:30	49.7	69.7	43.7		
	14:45	48.7	67.1	42.3				20:45	59.6	84.0	42.4		
	15:00	47.3	63.9	42.3	48.0	41.7		21:00	47.8	58.8	43.2	47.0	42.6
	15:15	47.6	60.5	41.6				21:15	47.1	58.6	42.7		
	15:30	47.7	61.0	41.2				21:30	47.2	59.4	42.4		
	15:45	49.0	70.5	41.8				21:45	45.6	56.4	41.9		
	16:00	48.3	65.1	41.9	48.0	41.3		22:00	48.2	69.6	44.3	47.5	43.7
	16:15	47.5	63.5	41.8				22:15	49.4	66.3	45.2		
	16:30	48.5	73.7	39.7				22:30	46.5	57.5	42.9		
	16:45	47.8	66.6	41.4				22:45	44.7	58.2	41.5		
	17:00	49.1	65.9	42.4	49.6	42.6		23:00	45.7	58.0	42.0		
	17:15	49.4	74.8	41.6				23:15	44.2	59.5	39.9		
	17:30	49.9	60.2	43.2				23:30	42.5	61.6	37.9		
	17:45	49.8	69.0	43.2				23:45	42.6	57.6	38.1		



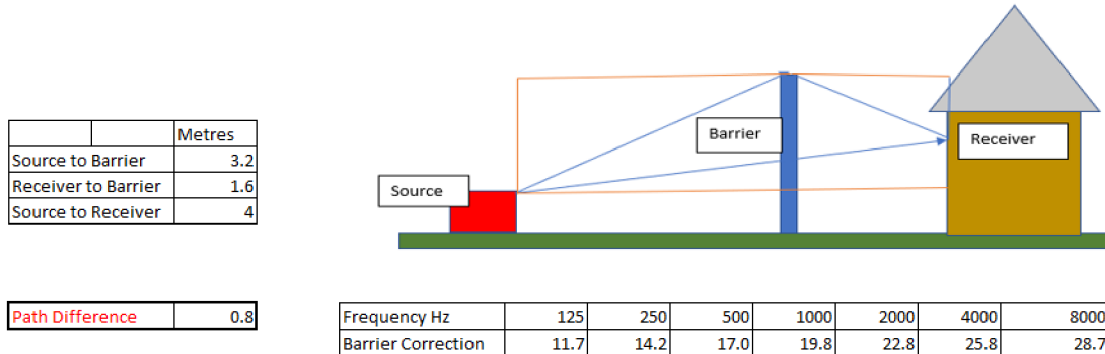
Date	Time	L _{Aeq,15min}	L _{AFmax}	L _{AF90,15min}	L _{Aeq,1hour}	L _{AF90,1hour}
10/08/2023	12:00	50.6	64.6	45.5	51.3	44.2
	12:15	52.8	76.5	43.8		
	12:30	51.4	72.0	43.6		
	12:45	49.9	69.5	43.6		
	13:00	49.1	67.0	44.5	52.4	44.1
	13:15	48.4	62.5	43.4		
	13:30	49.8	73.3	42.9		
	13:45	56.5	77.3	45.2		
	14:00	50.4	71.4	42.9	51.6	43.5
	14:15	50.0	67.9	43.4		
	14:30	52.7	70.6	43.7		
	14:45	52.7	69.0	44.0		

APPENDIX D – Calculations

First-Floor

Applicable where barrier breaks line of sight between source and receiver

Example Illustration of Barrier Attenuation



Building Screening Attenuation Calculation – Kitchen Extraction Terminus

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

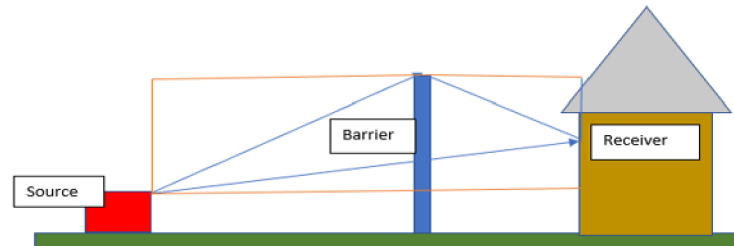
	6	dB				Metres	
	Enter Distance =					4	
	Frequency Hz						
	125	250	500	1000	2000	4000	8000
	87.1	81.6	79.2	77	72.8	69	62.1
Total LW	87.1	81.6	79.2	77.0	72.8	69.0	62.1
'A' Weight	16.1	8.6	3.2	0	-1.2	-1	1.1
LWA (Power)	71.0	73.0	76.0	77.0	74.0	70.0	61.0
LPA at New Dist'	51.00	53.00	56.00	57.00	54.00	50.00	41.00
SILENCER	15	25	42	50	50	46	34
SCREENING	11.7	14.2	17.0	19.8	22.8	25.8	28.7
DUCT BENDS (1)	1	6	8	4	3	3	3
DUCT LENGTH, 10m	7	3	2	2	2	2	2
DIRECTIVITY 120°	2	5	10	13	20	22	22
LPA After Insert	14.34	-0.20	-22.96	-31.84	-43.78	-48.75	-48.75

Kitchen Extraction Terminus @ 4m = 14dB $L_{Aeq,T}$

Applicable where barrier breaks line of sight between source and receiver

Example Illustration of Barrier Attenuation

	Metres
Source to Barrier	0.3
Receiver to Barrier	4.8
Source to Receiver	4.5



Path Difference	0.6
-----------------	-----

Frequency Hz	125	250	500	1000	2000	4000	8000
Barrier Correction	10.7	13.1	15.8	18.6	21.6	24.5	27.5

Building Screening Attenuation Calculation – Kitchen Intake Terminus

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

	6	dB					Metres	
							Enter Distance =	
							4.5	
	Frequency Hz							
	125	250	500	1000	2000	4000	8000	Total
	80.1	82.6	82.2	80	76.8	74	69.1	88.00
Total LW	80.1	82.6	82.2	80.0	76.8	74.0	69.1	88.00
'A' Weight	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	64.0	74.0	79.0	80.0	78.0	75.0	68.0	84.89
LPA at New Dist'	42.98	52.98	57.98	58.98	56.98	53.98	46.98	63.87
SILENCER	10	16	30	37	37	30	24	
SCREENING	10.7	13.1	15.8	18.6	21.6	24.5	27.5	
DIRECTIVITY 120*	2	5	10	13	20	22	22	
LPA After Insert	20.28	18.86	2.18	-9.65	-21.57	-22.54	-26.52	22.68

Kitchen Intake Terminus @ 4.5m = 23dB $L_{Aeq,T}$

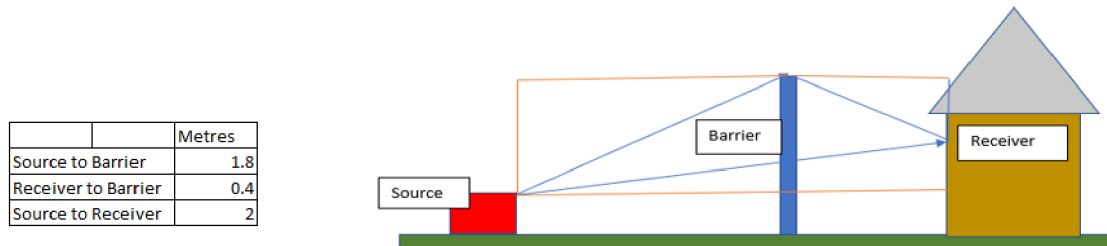
Adding dB								
Levels to be added (Max. of eight)								
Enter values	14	23	0	0	0	0	0	0
Total = 23.6 dB								

Cumulative Sound Pressure Level @ First-Floor Windows + Intermittency (3dB) = 27dB $L_{Ar,T}$

Second-Floor

Applicable where barrier breaks line of sight between source and receiver

Example Illustration of Barrier Attenuation



Path Difference	0.2
-----------------	-----

Frequency Hz	125	250	500	1000	2000	4000	8000
Barrier Correction	7.7	9.5	11.7	14.2	17.0	19.8	22.8

Building Screening Attenuation Calculation – Kitchen Extraction Terminus

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

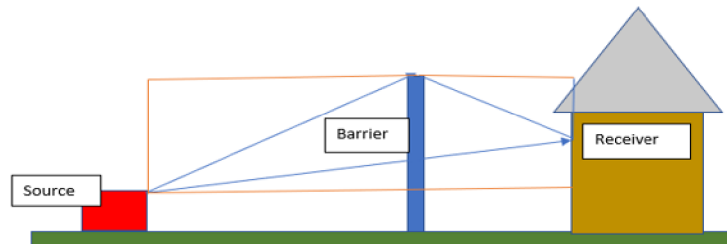
ion per double distance required = 5dB for LpA recommended)			6	dB			Metres	
			Enter Distance =				2	
	Frequency Hz							
	125	250	500	1000	2000	4000	8000	Total
	87.1	81.6	79.2	77	72.8	69	62.1	89.13
Total LW	87.1	81.6	79.2	77.0	72.8	69.0	62.1	89.13
'A' Weight	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	71.0	73.0	76.0	77.0	74.0	70.0	61.0	82.01
LPA at New Dist'	56.96	58.96	61.96	62.96	59.96	55.96	46.96	67.97
SILENCER	15	25	42	50	50	46	34	
SCREENING	7.7	9.5	11.7	14.2	17.0	19.8	22.8	
DUCT BENDS (1)	1	6	8	4	3	3	3	
DUCT LENGTH, 10m	7	3	2	2	2	2	2	
DIRECTIVITY 120°	2	5	10	13	20	22	22	
LPA After Insert	24.24	10.50	-11.71	-20.25	-32.00	-36.88	-36.82	24.42

Kitchen Extraction Terminus @ 2m = 24dB L_{Aeq,T}

Applicable where barrier breaks line of sight between source and receiver

Example Illustration of Barrier Attenuation

	Metres
Source to Barrier	0.3
Receiver to Barrier	6.4
Source to Receiver	6.5



Path Difference	0.2
-----------------	-----

Frequency Hz	125	250	500	1000	2000	4000	8000
Barrier Correction	7.7	9.5	11.7	14.2	17.0	19.8	22.8

Building Screening Attenuation Calculation – Kitchen Intake Terminus

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

ion per double distance required = 5dB for LpA recommended)			6	dB			Metres	
			Enter Distance =				6.5	
	Frequency Hz							
	125	250	500	1000	2000	4000	8000	Total
	80.1	82.6	82.2	80	76.8	74	69.1	88.00
Total LW	80.1	82.6	82.2	80.0	76.8	74.0	69.1	88.00
'A' Weight	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	64.0	74.0	79.0	80.0	78.0	75.0	68.0	84.89
LPA at New Dist'	39.80	49.80	54.80	55.80	53.80	50.80	43.80	60.68
SILENCER	10	16	30	37	37	30	24	
SCREENING	7.7	9.5	11.7	14.2	17.0	19.8	22.8	
DIRECTIVITY 120*	2	5	10	13	20	22	22	
LPA After Insert	20.08	19.34	3.14	-8.41	-20.16	-21.04	-24.98	22.78

Kitchen Intake Terminus @ 6.5m = 23dB $L_{Aeq,T}$

Adding dB								
Levels to be added (Max. of eight)								
Enter values	24	23	0	0	0	0	0	0
Total = 26.6 dB								

Cumulative Sound Pressure Level @ Second-Floor Windows + Intermittency (3dB) = 30dB $L_{Ar,T}$