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NOISE IMPACT ASSESSMENT REPORT - KITCHEN EXTRACTION SYSTEM

94-102 HIGH STREET, HAMPTON HILL, HAMPTON TW12 1NY

FOR

MR R CAKMAK

ISSUE STATUS: FINAL
DATE OF ISSUE: 28/09/2022
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1. EXECUTIVE SUMMARY

The Client intends to seek planning approval for a change of use to a restaurant (Class E(b) usage) as a result of which it is proposed to install mechanical plant (Kitchen Extraction System) to service the premises at 94-102 High Street, Hampton Hill, Hampton TW12 1NY.

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 third-floor residential premises at Templeton Court, TW12.

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 Richmond Upon Thames Council's policy.

2. INTRODUCTION

The client is proposing to install a new kitchen extraction system on the side façade of 94-102 High Street, Hampton Hill, Hampton TW12 1NY, 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

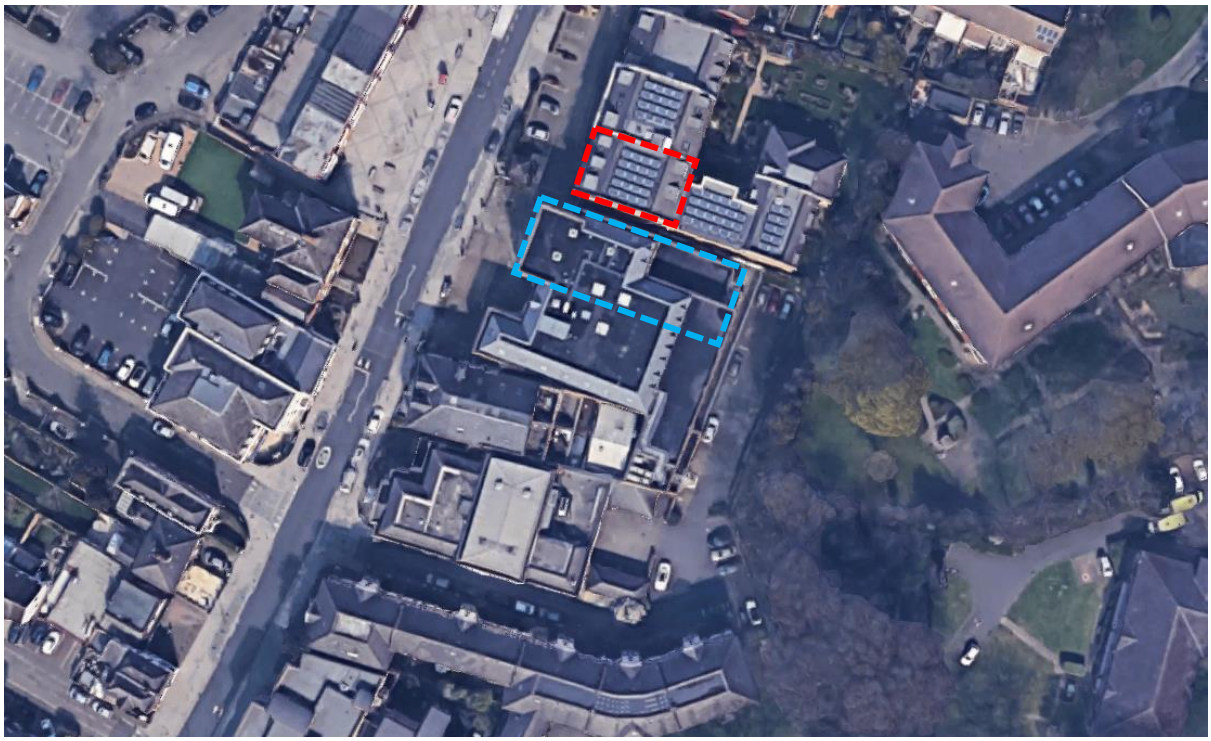
Planning permission is being sought for the change of use to a restaurant (Class E(b) usage) at 94-102 High Street, Hampton Hill, Hampton TW12 1NY (hereafter referred to as 'the site'). The property is a traditionally built three-storey building in the London Borough of Richmond Upon Thames. It is located in a mixed area comprising both commercial and residential units along the high street. All other premises within the same building as the proposed site are of commercial use.

The nearest sensitive residential receptors were noted to be the third-floor rear dormer windows located on the rear façade of Templeton Court at approximate distances of 10m from the fan casing, 6.5m 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



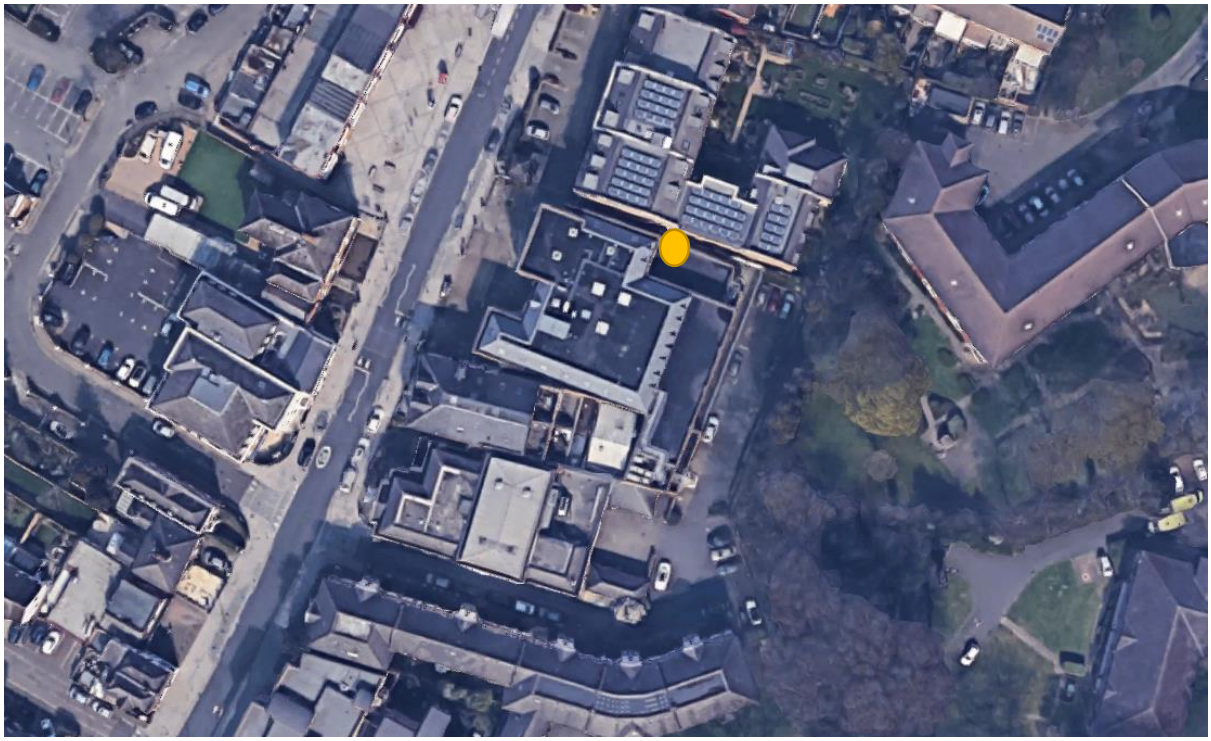
Source: Google Maps

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 12:30 hours on the 23rd September and 12:00 hours on the 26th September 2022. 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, 2 metre from the rear façade of the building at first floor level. The position is not considered to be in free-field and therefore a 2dB 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	0003814
Larson Davis 377B02	½" microphone	1	142503
Larson Davis	Pre-amplifier	1	028032
Larson Davis CAL200	Class 1 Calibrator	1	0527

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 mild (approx. 7-18° Celsius), scattered clouds (0 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 $L_{A90,1hour}$*
23/09/2022(12:30 to 23:00)	**51-57**	**46**
24/09/2022(11:00 to 23:00)	**51-57**	**46**
25/09/2022(11:00 to 22:00)	**49-53**	**45**

*Façade correction -2dB

The typical background noise level at the measurement position during the survey, at the time in which the plant could be operational, is **46dB** $L_{A90,1hour}$.

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 noise from the vehicles on 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 London Borough of Richmond Upon Thames Council.

The London Borough of Richmond upon Thames Supplementary Planning Document (SPD) Development Control for Noise Generating and Noise Sensitive Development adopted September 2018 states that for a Minimal Noise Significance Risk:

"Where the rating level of noise is below the background noise level by at least 5dB, this indicates that the proposed NGD is likely to be acceptable from a noise perspective. The Borough will seek this level of compliance in most noise sensitive areas and/or where there is a requirement to mitigate creeping background effects"

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 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 $L_{A90,1hour}$*	Rating Noise Level at Nearest Residential Facade, dB $L_{Ar,T}$
23/09/2022(12:30 to 23:00)	**46**	**41**
24/09/2022(11:00 to 23:00)	**46**	
25/09/2022(11:00 to 22:00)	**45**	

* Façade correction -2dB

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 on the side façade of the premises.

Table 7.0 Proposed Kitchen Extraction Fan Motor

External Plant Item	Make	Model	Reference Noise Level* $L_{w(A)}$
Kitchen Extract Fan Motor	Helios	GigaBox 560/4	Outlet 82dB Breakout 65dB

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

The ducting will be 300mm x 500mm 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 be switched on and 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 RSD 500/600 Helios 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

125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
4	5	9	11	9	9	6

7.2 Directivity

A directivity correction should be applied as the extract fan duct aperture is to terminate approximately 90˚ to the nearest residential windows. A duct opening of 500mm 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

125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
0	4	6	7	14	17	19

7.3 Building Screening

Due to the positioning of the kitchen extraction system, 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 (8m)**.

* Reference: Improving Ductwork, EU project, Brussls 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 11:00 - 23:00 hours Monday to Saturday and 11:00 - 22:00 hours on Sunday.

The typical background noise level at the measurement position during the survey is **46dB** $L_{A90,1hour}$. The design range is **41dB** $L_{Ar,T}$ at the façade of the nearest residential premises.

8.2 Nearest Noise Sensitive Properties

The nearest sensitive residential receptors were noted to be the third-floor rear dormer windows located on the rear façade of Templeton Court at approximate distances of 10m from the fan casing, 6.5m 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 3rd floor window, with the mechanical plant operating, is predicted to be **29dB $L_{Ar,T}$** which is **17dB(A) below** the typical background noise level (46dB $L_{A90,1hour}$).

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.

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 Richmond Upon Thames 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 = LAeq,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, LA90,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 ($20x10^{-6}$ Pascals).
Equivalent continuous A-weighted sound pressure level, LAeq,T	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time
Measurement time interval, Tm	Total time over which measurements are taken
Rating level, LAr,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, Lr = LAeq,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, Ls = LAeq,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

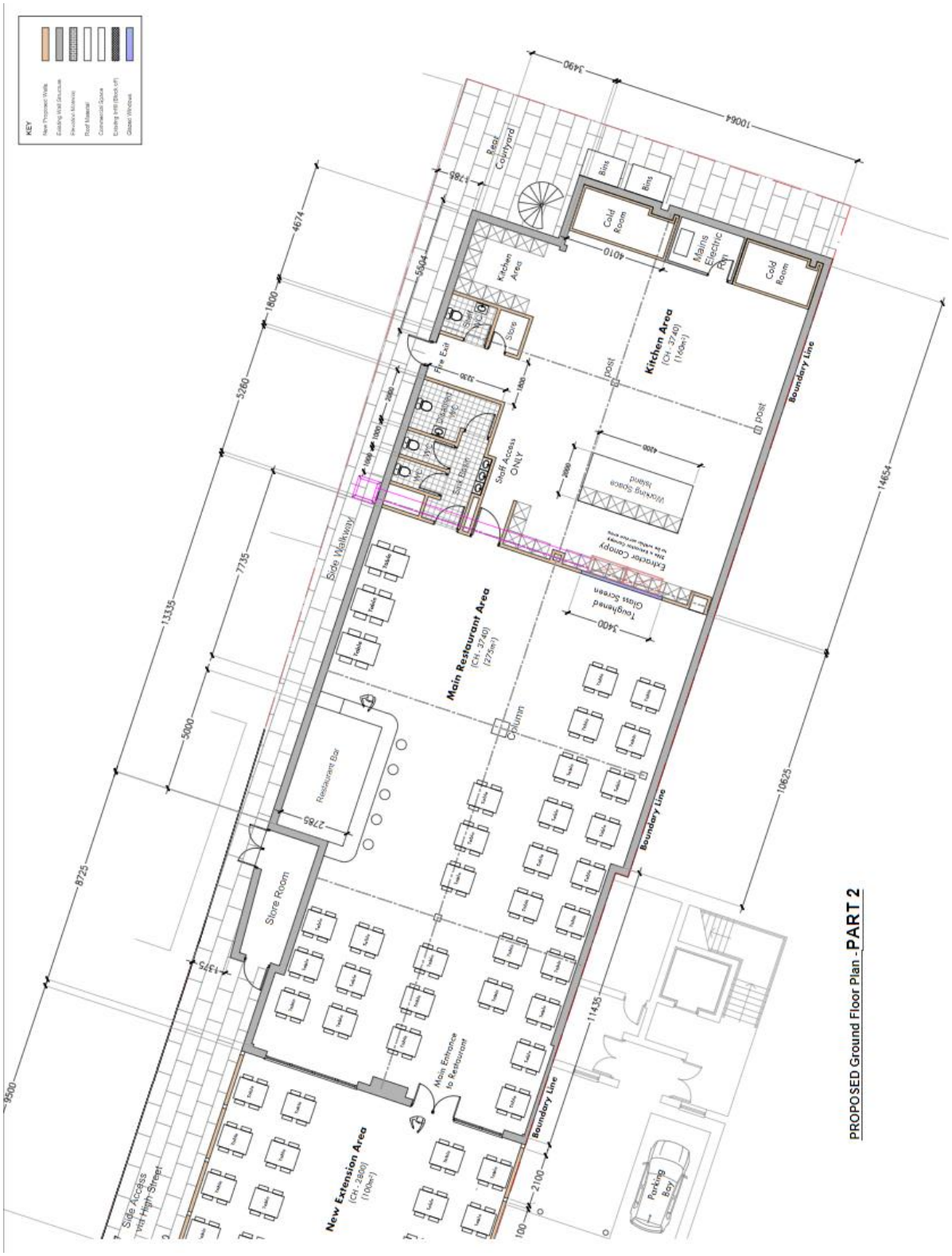
References:

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

APPENDIX B – Data Sheets and Figures

Proposed Elevations

Proposed Ground Floor Plan



Helios Gigabox 560/4 Data Sheet

560 mm ø GigaBox centrifugal fan

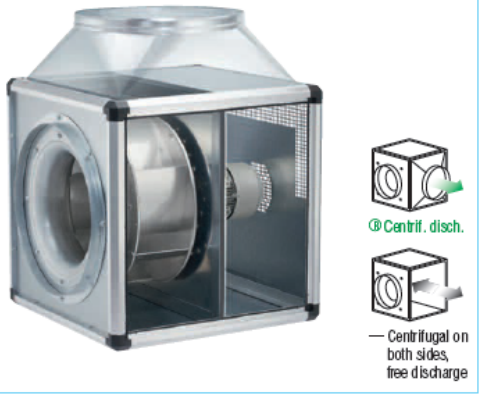
Helios

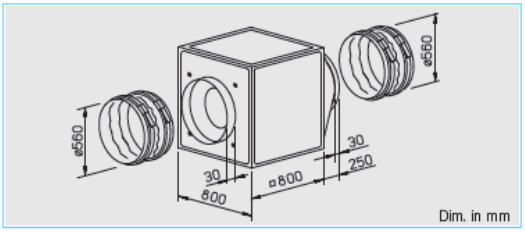
GB

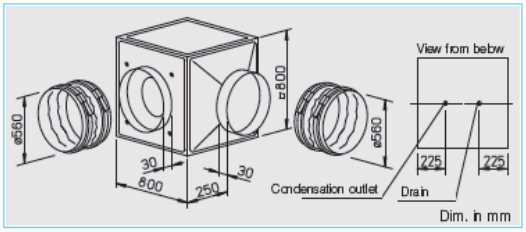
Arbitrary installation position and flexible assembly by five possible discharge directions.

GB T120

Designed for moving dirty, humid and hot air up to max. 120° C.
Motor located outside the air flow.







■ **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.

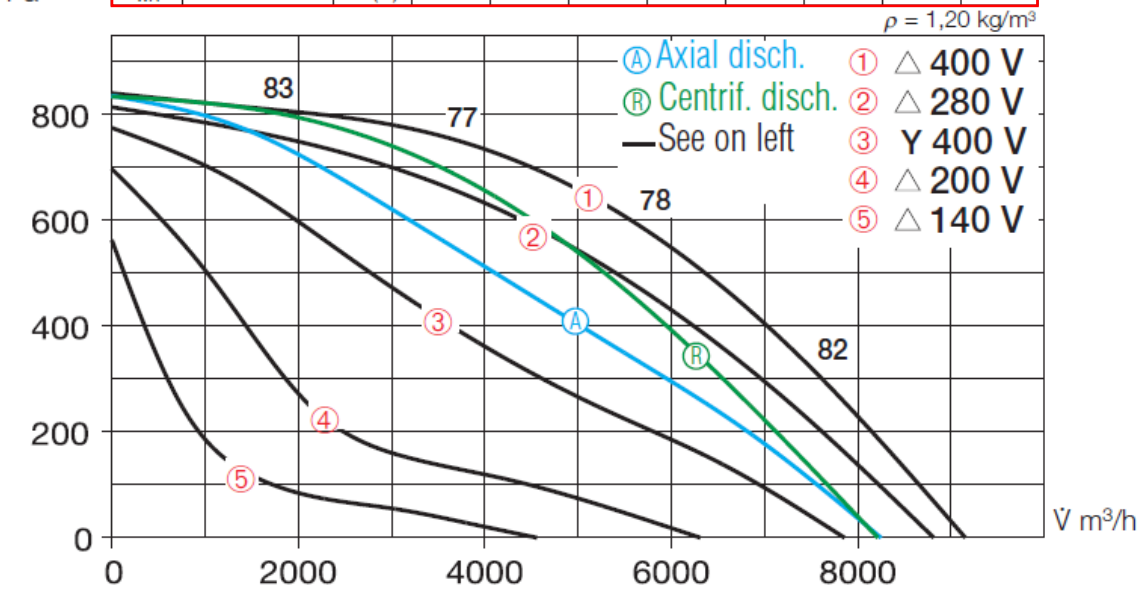
Type	Ref. no.	Air flow volume (FID)	R.P.M.	Sound press. case breakout	Motor power (nominal)	Current Full load	Current speed controlled	Wiring diagram	Maximum air flow temperature Full load	Maximum air flow temperature controlled	Weight (net)	5 step transformer controller with mot. protect. unit	Ref. no.	5 step transformer controller without mot. protect. unit	Ref. no.	Full motor protection unit using the thermal contacts	Ref. no.
		V m³/h	min⁻¹	dB(A) in 4 m	kW	A	A	No.	+°C	+°C	kg	Type		Type		Type	
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	45	92	MWS 10	1946	TSW 10	1498	MW[1)]	1579
2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/△ wiring, protection to IP 54																	
GBD 560/6/6	5522	7800/9000	705/845	35	0.51/0.80	0.90/1.85	1.90	867	60	60	80	RDS 4	1316	TSD 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	45	90	RDS 7	1578	TSD 7,0	1504	MD	5849
2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/△ 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	120	105	RDS 7	1578	TSD 7,0	1504	MD	5849

1) incl. operation switch

Helios Gigabox 560/4 Acoustic Data

GBW 560/4

Frequency		Hz	Total	125	250	500	1k	2k	4k	8k
L_{WA}	Case breakout	dB(A)	65	62	61	51	50	48	44	38
L_{WA}	Intake	dB(A)	76	63	68	69	71	69	64	57
L_{WA}	Exhaust	dB(A)	82	71	73	76	77	74	70	61



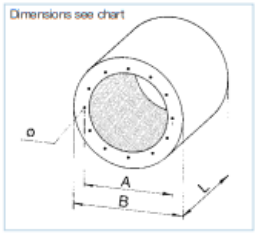
Helios RSD 500/600 Silencer Data Sheet

Helios — Flanged circular attenuator RSD

■ **Specification – Installation**
Casing made of galvanised steel, acoustically lined with high quality mineral wool covered with cloth to prevent erosion. Dimensions and tapped flange holes of all sizes fit fan's nominal diameter (R 20). Tapped holes in accordance to DIN 24155, Pt. 2.

■ **Insertion loss**
To increase the attentuation, several attenuators can be installed in-line.

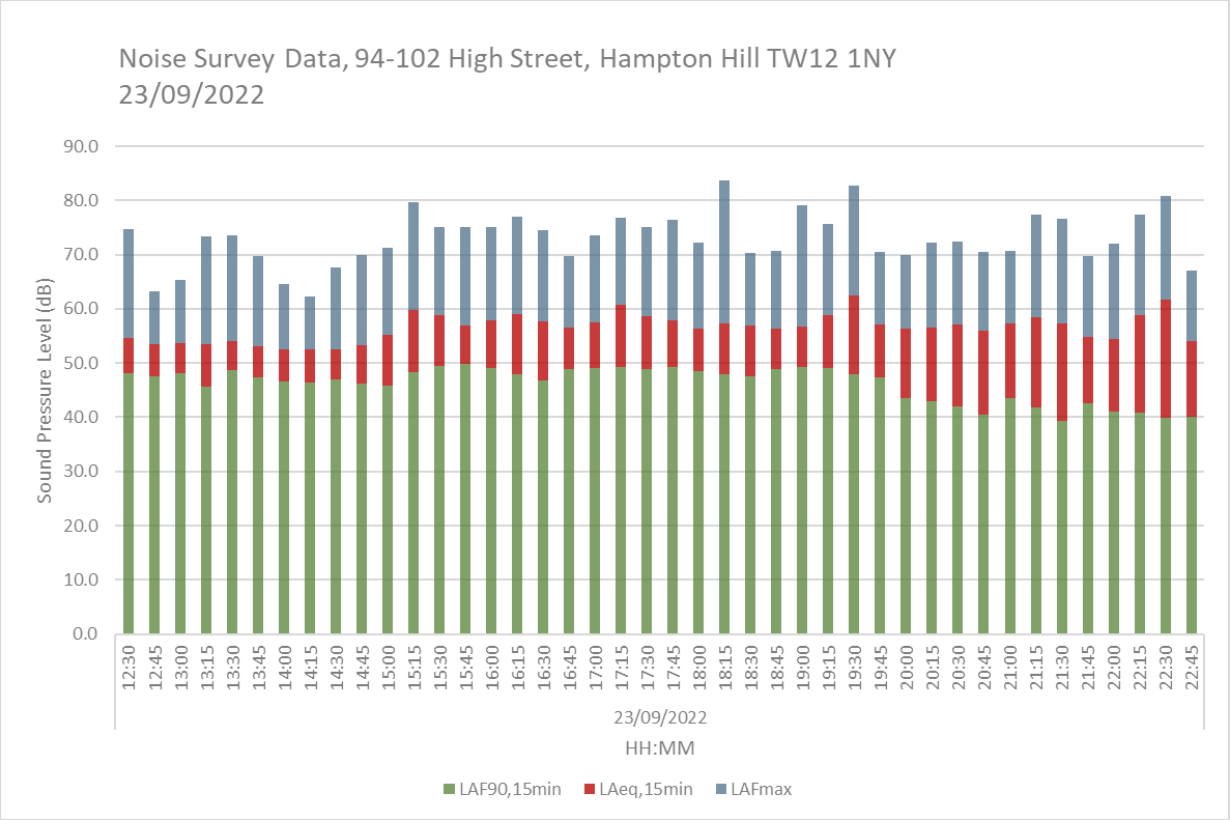
■ **Pressure drop**
The resistance of the RSD attenuators is very low. When designing the system consider twice the pressure drop of rigid ducting.



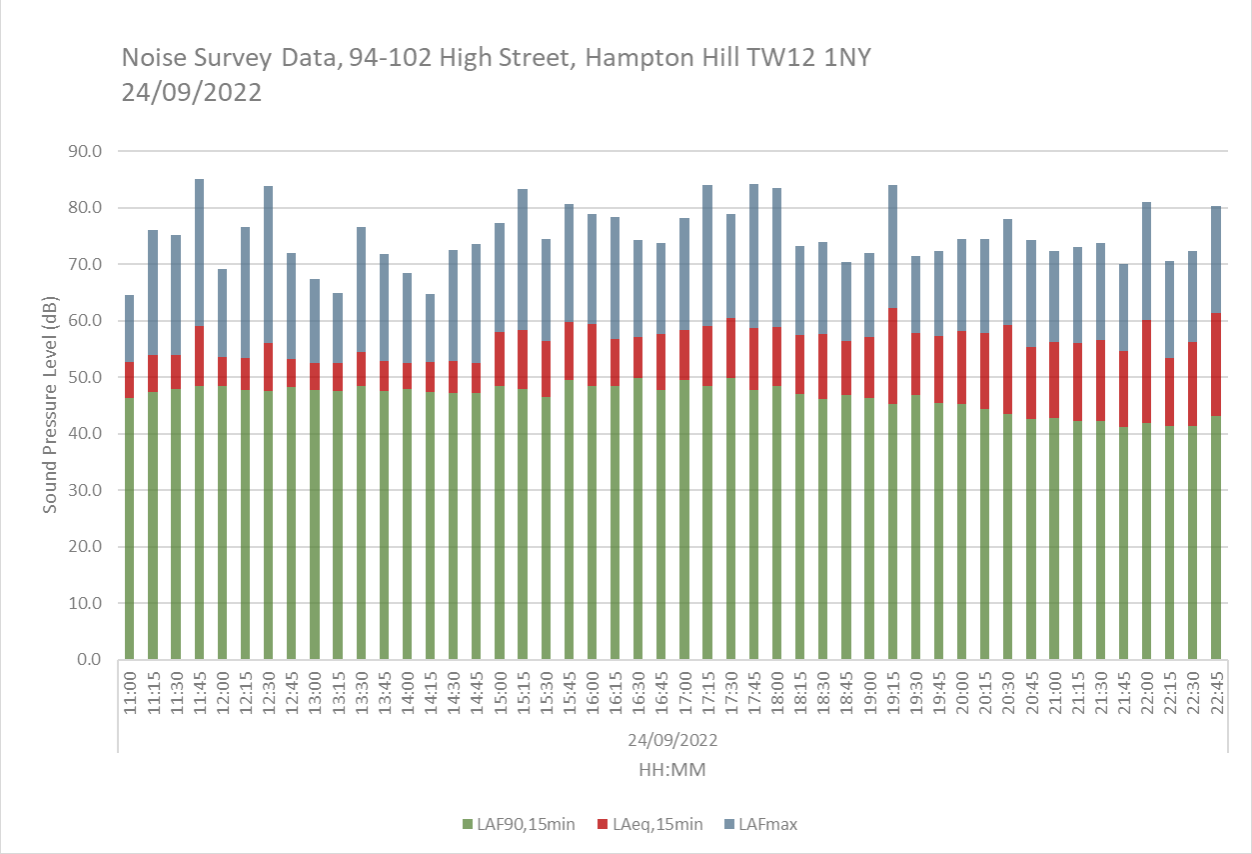
RSD

Type Nominal-ø	Ref.No.	Basic length	Dimensions in mm L	A	B	Hole ø	Nominal weight kg	Insertion loss level D_E dB 125	250	500	1000	2000	4000	8000	Average attenuation
RSD 280/ 400	8740	1	400	322	454	8 x M 8	10	4	5	8	14	9	8	6	8
RSD 280/ 800	8741	2	800	322	454	8 x M 8	18	7	9	16	28	18	17	14	14
RSD 280/1200	8742	3	1200	322	454	8 x M 8	25	9	12	23	37	23	20	16	18
RSD 315/ 400	8743	1	400	356	504	8 x M 8	11	3	3	7	13	8	7	5	5
RSD 315/ 800	8744	2	800	356	504	8 x M 8	19	6	8	14	26	16	12	9	12
RSD 315/1200	8745	3	1200	356	504	8 x M 8	28	9	12	21	36	18	17	14	18
RSD 355/ 400	8746	1	400	395	564	8 x M 8	13	3	4	7	11	7	6	4	6
RSD 355/ 800	8747	2	800	395	564	8 x M 8	23	6	7	13	22	14	12	8	11
RSD 355/1200	8748	3	1200	395	564	8 x M 8	33	8	11	17	29	18	15	10	17
RSD 400/ 400	8749	1	400	438	564	12 x M 8	12	3	4	6	9	7	5	3	6
RSD 400/ 800	8750	2	800	438	564	12 x M 8	21	6	6	12	18	13	12	8	9
RSD 400/1200	8751	3	1200	438	564	12 x M 8	30	7	10	14	22	18	13	9	15
RSD 450/ 400	8752	1	400	487	634	12 x M 8	17	4	5	8	10	8	7	5	8
RSD 450/ 800	8753	2	800	487	634	12 x M 8	27	6	7	13	18	13	12	9	11
RSD 450/1200	8754	3	1200	487	634	12 x M 8	38	8	10	18	23	17	14	10	15
RSD 500/ 600	8755	1	600	541	714	12 x M 8	27	4	5	9	11	9	9	6	8
RSD 500/ 900	8756	2	900	541	714	12 x M 8	36	6	8	14	16	13	13	9	12
RSD 500/1200	8757	3	1200	541	714	12 x M 8	45	8	11	22	24	17	16	12	17

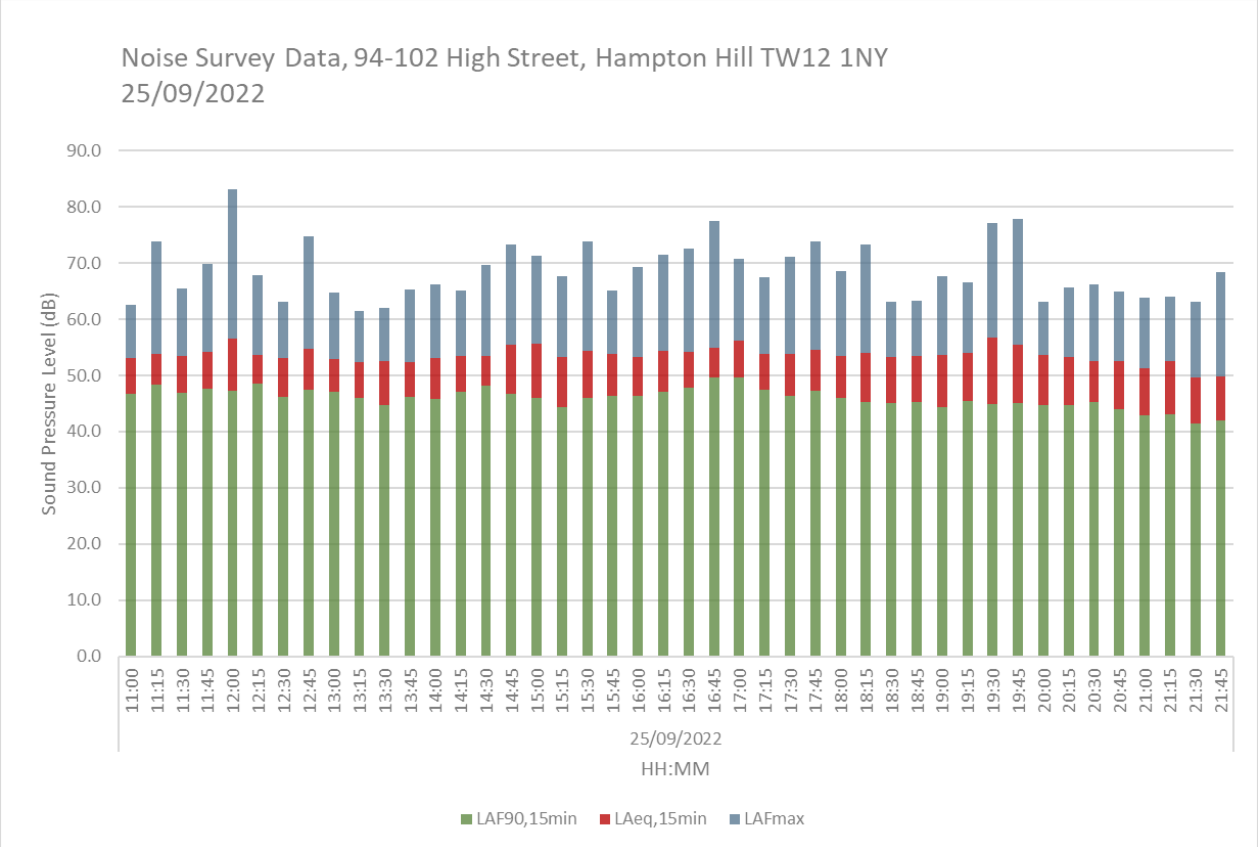
APPENDIX C – Noise Monitoring Data



Date	Time	$L_{Aeq,15min}$	L_{AFmax}	$L_{AF90,15min}$	$L_{Aeq,1hour}$	$L_{AF90,1hour}$	Date	Time	$L_{Aeq,15min}$	L_{AFmax}	$L_{AF90,15min}$	$L_{Aeq,1hour}$	$L_{AF90,1hour}$
23/09/2022	12:30	54.7	74.7	48.2	54.1	47.9	23/09/2022	18:00	56.3	72.2	48.4	56.7	48.2
	12:45	53.4	63.3	47.5				18:15	57.3	83.6	47.9		
	13:00	53.6	65.3	48.2	53.5	47.6		18:30	56.8	70.3	47.5		
	13:15	53.4	73.3	45.6				18:45	56.3	70.7	48.8		
	13:30	54.0	73.5	48.6				19:00	56.8	79.0	49.3	59.4	48.5
	13:45	53.1	69.8	47.4				19:15	58.8	75.6	49.0		
	14:00	52.4	64.5	46.5	52.7	46.5		19:30	62.4	82.6	47.9		
	14:15	52.6	62.2	46.4				19:45	57.1	70.5	47.4		
	14:30	52.6	67.6	46.9				20:00	56.4	70.0	43.5	56.5	42.3
	14:45	53.2	69.9	46.2				20:15	56.5	72.3	42.9		
	15:00	55.1	71.2	45.9	58.0	48.7		20:30	57.1	72.5	41.9		
	15:15	59.8	79.6	48.3				20:45	56.0	70.5	40.4		
	15:30	58.8	75.1	49.5				21:00	57.2	70.7	43.6	57.1	42.1
	15:45	56.9	75.2	49.9				21:15	58.5	77.3	41.7		
	16:00	57.9	75.1	49.0	57.8	48.2		21:30	57.3	76.7	39.4		
	16:15	58.9	76.9	47.9				21:45	54.8	69.7	42.6		
	16:30	57.7	74.5	46.8				22:00	54.4	72.0	41.0	58.4	40.4
	16:45	56.4	69.6	48.9				22:15	58.9	77.4	40.8		
	17:00	57.5	73.6	49.1	58.9	49.1		22:30	61.7	80.8	39.8		
	17:15	60.8	76.7	49.3				22:45	54.1	67.0	40.0		
	17:30	58.6	75.1	48.8									
	17:45	57.9	76.4	49.2									



Date	Time	$L_{Aeq,15min}$	L_{AFmax}	$L_{AF90,15min}$	$L_{Aeq,1hour}$	$L_{AF90,1hour}$	Date	Time	$L_{Aeq,15min}$	L_{AFmax}	$L_{AF90,15min}$	$L_{Aeq,1hour}$	$L_{AF90,1hour}$
24/09/2022	11:00	52.7	64.6	46.3	55.7	47.6	24/09/2022	17:00	58.4	78.3	49.5	59.2	49.0
	11:15	54.0	76.0	47.4				17:15	59.1	84.0	48.5		
	11:30	54.0	75.3	48.0				17:30	60.5	78.9	49.9		
	11:45	59.1	85.0	48.4				17:45	58.6	84.3	47.8		
	12:00	53.5	69.2	48.5	54.2	48.0		18:00	58.9	83.5	48.4	57.7	47.2
	12:15	53.5	76.6	47.7				18:15	57.5	73.2	47.1		
	12:30	56.1	83.9	47.6				18:30	57.7	73.9	46.1		
	12:45	53.2	72.0	48.3				18:45	56.5	70.4	46.8		
	13:00	52.5	67.4	47.7	53.2	47.8		19:00	57.2	72.0	46.3	59.2	46.0
	13:15	52.6	64.9	47.6				19:15	62.3	84.0	45.2		
	13:30	54.5	76.6	48.4				19:30	57.8	71.5	46.9		
	13:45	52.9	71.8	47.5				19:45	57.4	72.3	45.5		
	14:00	52.5	68.5	48.0	52.7	47.5		20:00	58.2	74.6	45.2	57.9	44.1
	14:15	52.8	64.8	47.4				20:15	57.9	74.5	44.4		
	14:30	52.9	72.5	47.3				20:30	59.3	78.0	43.5		
	14:45	52.5	73.6	47.2				20:45	55.4	74.2	42.7		
	15:00	58.0	77.4	48.4	58.3	48.3		21:00	56.2	72.4	42.8	55.9	42.2
	15:15	58.4	83.2	48.0				21:15	56.1	73.0	42.3		
	15:30	56.3	74.5	46.6				21:30	56.5	73.7	42.2		
	15:45	59.7	80.7	49.6				21:45	54.7	70.1	41.2		
	16:00	59.4	78.9	48.4	57.8	48.7		22:00	60.1	81.0	41.9	58.8	42.0
	16:15	56.8	78.3	48.5				22:15	53.5	70.5	41.4		
	16:30	57.1	74.3	49.9				22:30	56.2	72.3	41.4		
	16:45	57.6	73.8	47.8				22:45	61.4	80.2	43.1		



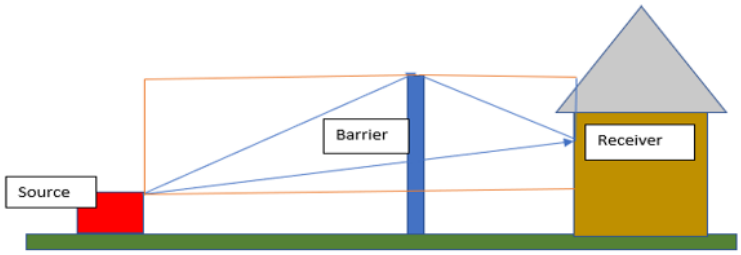
Date	Time	$L_{Aeq,15min}$	L_{AFmax}	$L_{AF90,15min}$	$L_{Aeq,1hour}$	$L_{AF90,1hour}$	Date	Time	$L_{Aeq,15min}$	L_{AFmax}	$L_{AF90,15min}$	$L_{Aeq,1hour}$	$L_{AF90,1hour}$
25/09/2022	11:00	53.1	62.6	46.7	53.6	47.4	25/09/2022	17:00	56.2	70.8	49.7	54.7	47.9
	11:15	53.8	73.9	48.3				17:15	53.9	67.5	47.5		
	11:30	53.4	65.4	46.9				17:30	53.9	71.2	46.3		
	11:45	54.2	69.9	47.7				17:45	54.5	73.8	47.2		
	12:00	56.5	83.0	47.3	54.7	47.5		18:00	53.5	68.5	46.0	53.5	45.4
	12:15	53.7	67.9	48.6				18:15	53.9	73.4	45.3		
	12:30	53.2	63.1	46.1				18:30	53.2	63.1	45.1		
	12:45	54.7	74.8	47.5				18:45	53.4	63.3	45.2		
	13:00	52.9	64.7	47.0	52.6	46.0		19:00	53.7	67.7	44.3	55.2	44.9
	13:15	52.4	61.5	45.9				19:15	54.1	66.5	45.4		
	13:30	52.6	61.9	44.8				19:30	56.8	77.2	44.9		
	13:45	52.3	65.3	46.1				19:45	55.4	77.8	45.0		
	14:00	53.2	66.2	45.8	53.9	47.0		20:00	53.6	63.0	44.7	53.1	44.7
	14:15	53.5	65.2	47.1				20:15	53.3	65.6	44.7		
	14:30	53.4	69.7	48.1				20:30	52.6	66.2	45.3		
	14:45	55.4	73.3	46.8				20:45	52.6	64.8	43.9		
	15:00	55.6	71.2	45.9	54.3	45.7		21:00	51.3	63.8	42.9	51.0	42.4
	15:15	53.3	67.6	44.4				21:15	52.5	64.0	43.0		
	15:30	54.3	73.8	46.0				21:30	49.6	63.0	41.5		
	15:45	53.9	65.1	46.3				21:45	49.9	68.3	42.0		
	16:00	53.2	69.2	46.4	54.2	47.9							
	16:15	54.4	71.4	47.0									
	16:30	54.1	72.6	47.8									
	16:45	54.9	77.5	49.7									

APPENDIX D – Calculations

Building Screening Attenuation Calculation – Extraction Terminus

Applicable where barrier breaks line of sight between source and receiver

Example Illustration of Barrier Attenuation



	Metres
Source to Barrier	2.8
Receiver to Barrier	4.5
Source to Receiver	6.5

Path Difference	0.8

Frequency Hz	125	250	500	1000	2000	4000	8000
Barrier Correction	11.7	14.2	17.0	19.8	22.8	25.8	28.7

Attenuation per double distance required = (6dB for LpA recommended)	6	dB	Enter Distance =			Metres 6.5	

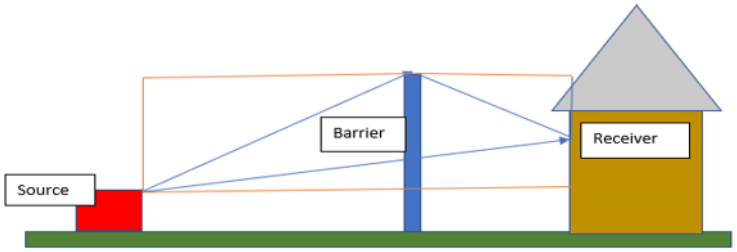
	Frequency Hz							
	125	**250**	**500**	**1000**	**2000**	**4000**	**8000**	Total
	87.1	81.6	79.2	77	72.8	69	62.1	89.13
Total LW	87.1	81.6	79.2	77.0	72.8	69.0	62.1	89.13
'A' Weight	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	71.0	73.0	76.0	77.0	74.0	70.0	61.0	82.01
LPA at New Dist'	46.80	48.80	51.80	52.80	49.80	45.80	36.80	57.81
SILENCER	4	5	9	11	9	9	6	
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, 8m	3	2	1	1	1	1	1	
DIRECTIVITY 90°	0	4	6	7	14	17	19	
LPA After Insert	**26.94**	**17.19**	**11.04**	**10.16**	**0.22**	**-9.76**	**-20.75**	**27.56**

Extraction System Terminus @ 6.5m = 28dB $L_{Aeq,T}$

Building Screening Attenuation Calculation – Extraction Motor Casing

Applicable where barrier breaks line of sight between source and receiver

Example Illustration of Barrier Attenuation



		Metres
Source to Barrier		8.2
Receiver to Barrier		4.5
Source to Receiver		10

Path Difference	2.7

Frequency Hz	125	250	500	1000	2000	4000	8000
Barrier Correction	16.3	19.1	22.1	25.0	28.0	31.0	34.0

Attenuation per double distance required = (6dB for LpA recommended)	6	dB			Metres	
		Enter Distance =			10	

	Frequency Hz							
	125	**250**	**500**	**1000**	**2000**	**4000**	**8000**	Total
	78.1	69.6	54.2	50	46.8	43	39.1	78.70
Total LW	78.1	69.6	54.2	50.0	46.8	43.0	39.1	78.70
'A' Weight	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	62.0	61.0	51.0	50.0	48.0	44.0	38.0	65.00
LPA at New Dist'	34.07	33.07	23.07	22.07	20.07	16.07	10.07	37.07
SCREENING	16.3	19.1	22.1	25.0	28.0	31.0	34.0	
LPA After Insert	**17.80**	**13.95**	**1.02**	**-2.95**	**-7.94**	**-14.94**	**-23.95**	**19.40**

Extraction System Casing Breakout @ 10m = 19dB $L_{Aeq,T}$

Adding dB

Levels to be added (Max. of eight)

Enter values	28	19	0	0	0	0	0	0

Total = **28.6** dB

Cumulative Sound Pressure Level @ Nearest Sensitive Receptor = 29dB $L_{Ar,T}$