

Sound Licensing Ltd.
Suite 4, Broxbourne Business Centre
New River Trading Estate
Cheshunt
Herts EN8 0NL

T: +44 (0) 20 7096 1555
www.soundlicensing.co.uk
enquiries@soundlicensing.co.uk

NOISE IMPACT ASSESSMENT REPORT - KITCHEN EXTRACTION SYSTEM

20 PORTMAN ROAD, READING RG30 1EA

FOR

GOYA WORKS



ISSUE STATUS: FINAL
DATE OF ISSUE: 04/09/2023
AUTHOR: L ANKERS, AMIOA
CHECKED: M LAUEZZARI, MIOA MIOL
APPROVED: M LAUEZZARI, MIOA MIOL

Contents Page

1	Executive Summary	
2	Introduction	
3	Site Description	
4	Environmental Noise Survey Methodology	
5	External Noise Survey Results and Observations	
	5.1	Results
	5.2	Observations
6	External Noise Emission Limits	
	6.1	Local Authority Requirements
	6.2	BS 4142:2014+A1:2019
7	Proposed Kitchen Extraction System and Associated Noise Levels	
	7.1	Silencers
	7.2	Directivity
8	Noise Impact Assessment	
	8.1	Proposed Operational Hours and Background Noise Levels
	8.2	Nearest Noise Sensitive Properties
	8.3	Description of Calculation process
	8.4	Noise Level Prediction
	8.5	Vibration
9	Conclusion	
Appendix A Acoustic Terminology & References		
Appendix B Data Sheets and Figures		
Appendix C Noise Monitoring Data		
Appendix D Calculations		

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 20 Portman Road, Reading RG30 1EA.

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 first-floor residential premises at Building 1, Nightingale Way RG30.

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 Reading Borough Council's policy.

2. INTRODUCTION

The client is proposing to install a new kitchen extraction system at 20 Portman Road, Reading RG30 1EA, 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 new kitchen extraction system to service the premises at 20 Portman Road, Reading RG30 1EA (hereafter referred to as 'the site'). The property is a brick built single-storey terraced building in Reading. It is located in an industrial area comprising commercial units in the surrounding area and residential accommodation on the opposite side of Portman Road.

The nearest sensitive residential receptors were noted to be the first-floor windows located on the front façade of Building 1, Nightingale Way at approximate distances of 57m from the extraction system terminus and 65m from the air intake terminus.

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 adjacent to the nearest receptor. The survey was undertaken between 14:45 hours on the 18th August and 12:15 hours on the 21st 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 at a height of 4 metres, 3.5 metres from the nearest façade. This 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	0004702
Larson Davis 377B02	½" microphone	1	319670
Larson Davis	Pre-amplifier	1	069941
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. 13-24° Celsius), broken clouds (30 to 70% 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 $L_{Aeq,T}$	Typical Background Sound Pressure Level, dB $L_{A90,T}$
18/08/2023(15:00 to 22:00)	60-62	54
19/08/2023(05:00 to 22:00)	53-62	53
20/08/2023(05:00 to 22:00)	46-62	53
21/08/2023(05:00 to 12:30)	54-70	53

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 **53dB** $L_{A90,1hour}$.

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 Reading Borough Council. The following criteria has previously been provided by the local authority:

'The assessment shall be carried out for in accordance with BS4142:2014+A1:2019 methodology. The predicted specific sound level ($L_{Aeq,TR}$) (with reference to BS4142) as measured at a point 1 metre external to the nearest noise-sensitive façade shall be at least 10dB below the pre-existing background sound level, $L_{A90,T}$ when all plant/equipment (or any part of it) is in operation. The predicted rating level, $L_{Ar,Tr}$ (specific sound level plus any adjustment for the characteristic features of the sound as measured at a point 1 metre external to the nearest noise-sensitive façade (habitable window of a dwelling) shall not exceed the pre-existing background sound level, $L_{A90,T}$, when all plant/equipment (or any part of it) is in operation.'

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 $L_{A90,T}$	Rating Noise Level at 1m from the Nearest Residential Facade, dB $L_{Ar,T}$
18/08/2023(15:00 to 22:00)	54	43
19/08/2023(05:00 to 22:00)	53	
20/08/2023(05:00 to 22:00)	53	
21/08/2023(05:00 to 12:30)	53	

Day Time 1-hour measurements and Night Time 15-minute measurements

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 terminating through the roof 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 710/4	Outlet 88dB
Kitchen Intake Fan Motor	Ruck Fans	ELKI 6030	Inlet 85dB

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

The extraction system ducting will be 500mm standard rectangular duct work and the intake system ducting will be 600x300mm standard rectangular duct work. Both 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 and when 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 R02-8-1200 Acoustica silencer on the atmosphere side of the fan. The intake system will be fitted with an R02-8-600 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. All silencers on the extraction system should be Melinex lined.

Table 7.1.1 R02-8-1200 Silencer Attenuation

125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
5	10	19	24	23	14	6

Table 7.1.2 R02-8-600 Silencer Attenuation

125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
2	5	12	12	11	7	4

7.2 Directivity

A directivity correction should be applied as both fan duct apertures are to terminate approximately 90° to the nearest residential windows. A duct opening of 500mm has been used for the extraction system and an opening of 600x300mm has been used for the intake system. 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 500mm Directivity Attenuation

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

Table 7.2.2 600x300mm Directivity Attenuation

125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
0	2	6	7	14	16	19

Corrections have also been applied for the attenuation from duct bends*.

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

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 as required during the opening hours of the proposed business. The opening hours are from 05:00 - 22:00 hours, 7 days-a-week.

The typical background noise level at the measurement position during the survey is **53dB** $L_{A90,1\text{hour}}$. The design range is **43dB** $L_{Ar,T}$ at 1m from the façade of the nearest residential premises.

8.2 Nearest Noise Sensitive Properties

The nearest sensitive residential receptors were noted to be the first-floor windows located on the front façade of Building 1, Nightingale Way at approximate distances of 57m from the extraction system terminus and 65m from the air intake terminus.

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 1m from the facade of the residential property is given below. Full calculations are provided in Appendix D.

The rating noise level at 1m from the nearest sensitive receptor, with the mechanical plant operating, is predicted to be **28dB** $L_{Ar,T}$ which is **25dB(A) below** the typical background noise level (53dB $L_{A90,1\text{hour}}$).

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.

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 Reading Borough Council's policy.

APPENDIX A – Acoustic Terminology

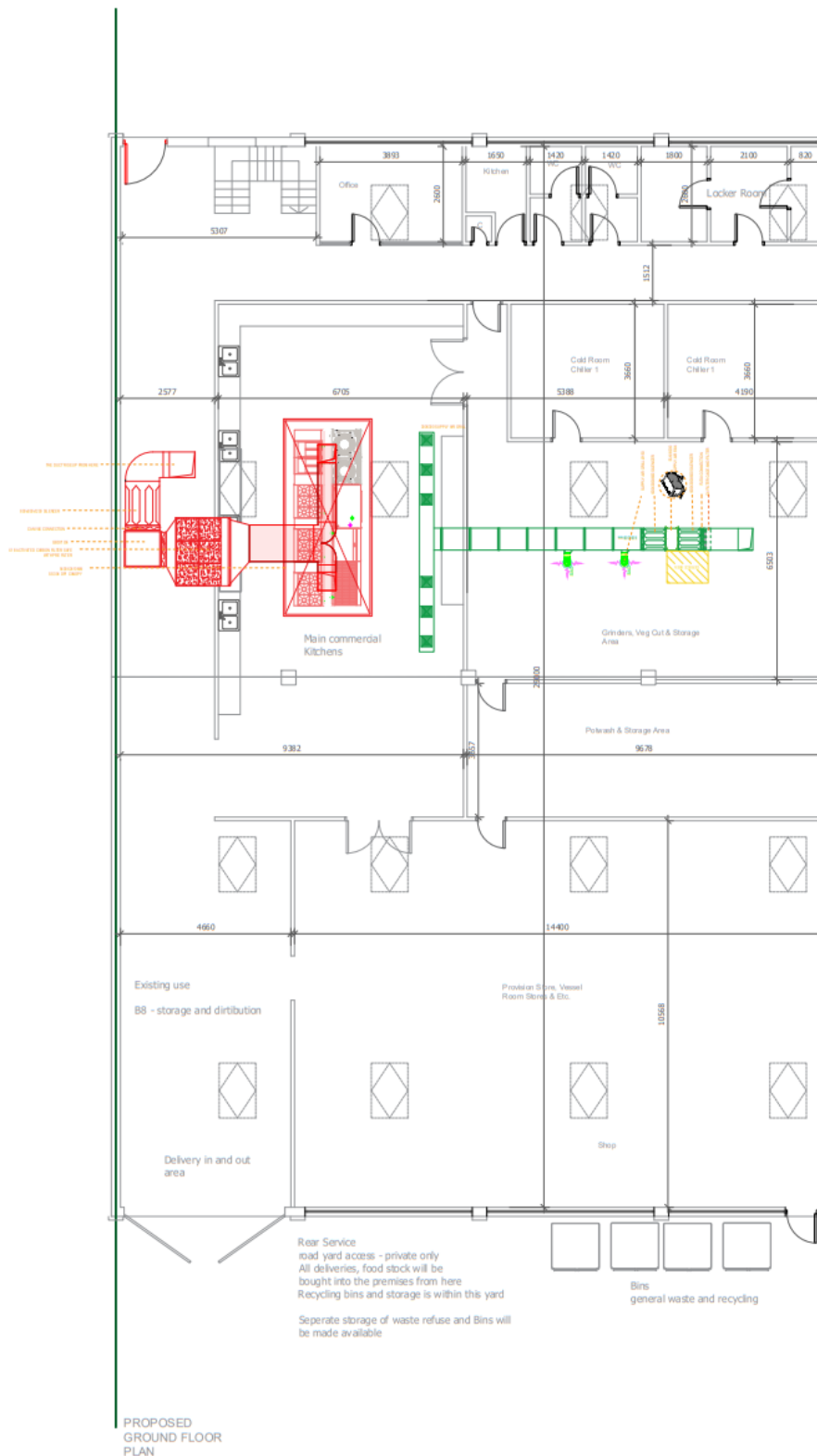
Parameter	Description
Acoustic environment	Sound from all sound sources as modified by the environment
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far
Ambient sound level, $L_a = L_{Aeq,T}$	Equivalent continuous A-weighted 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'

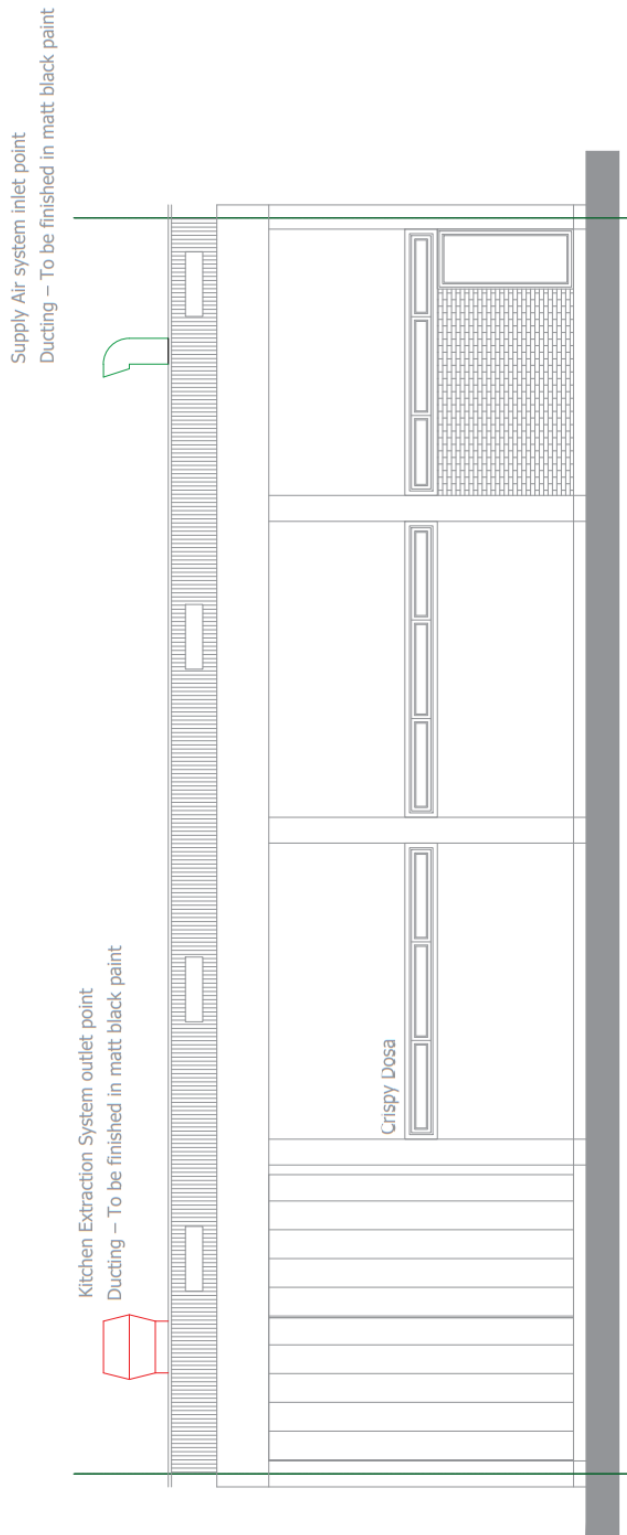
APPENDIX B – Data Sheets and Figures

Proposed Ground Floor Plan



PROPOSED
MEZZANINE FLOOR PLAN

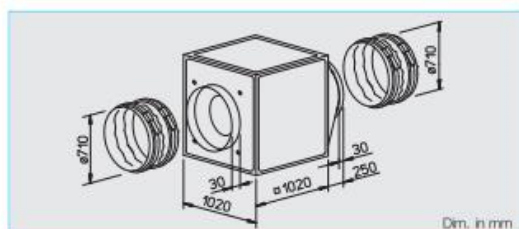
Proposed Rear Elevation



Helios Gigabox 710/4 Data Sheet – Kitchen Extraction Fan Motor

710 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.

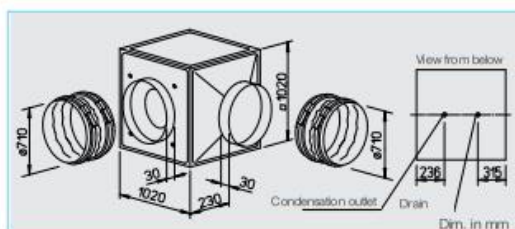
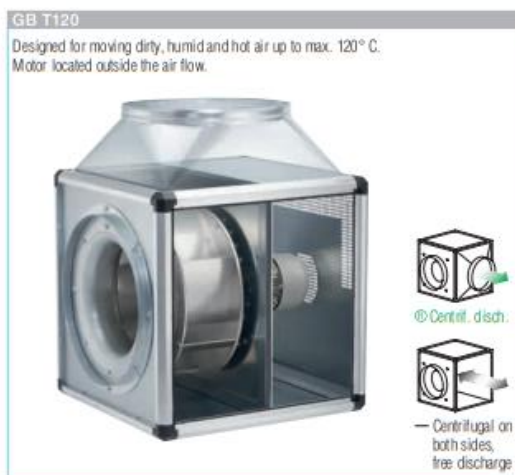
Assembly GB T120

Installation must be carried out with condensate 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 54/55. With ball bearings and interference-free as standard.

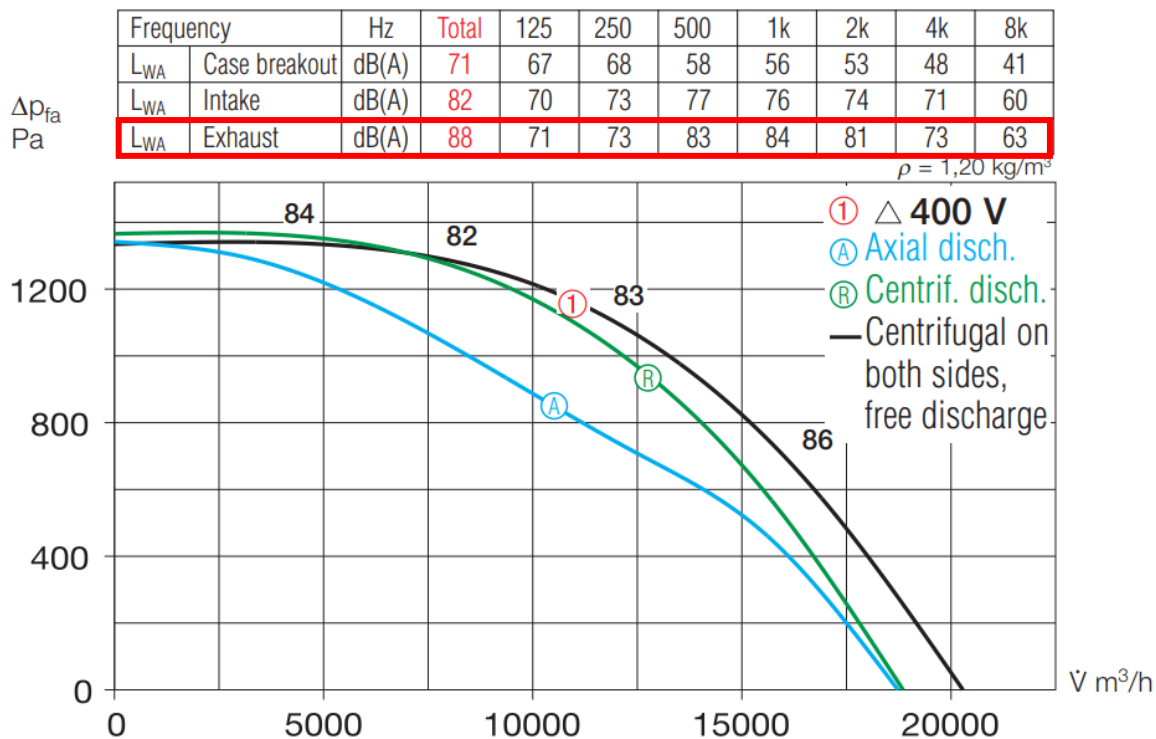
Electrical connection

Standard terminal box (IP 54/55) fitted on the motor; with GB T120 fitted on the motor support plate.

Type	Ref. no.	Air flow volume (F10)	R.P.M.	Sound press. cast breakout	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 mtd. proted. unit	Full motor protection unit using the thermal contacts
		m³/h	min⁻¹	dB(A) in 4 m	KW	A	A	No.	°C	kg	Type	Ref. no.
3 Phase motor, 3-, 400 V 50 Hz, Y/Δ wiring, protection to IP 55												
GBD 710/4	5529	20285	1465	51	5.97	10.20	—	499	70	170	—	MD 5849
2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ wiring, protection to IP 54												
GBD 710/5/6	5525	16500/19000	690/890	46	1.55/2.45	2.90/4.70	4.70	267	50	157	RDS 7	MD 5849
3 Phase motor, 3-, 400 V 50 Hz, protection to IP 54												
GBD 710/4 T120	5756	18200	1465	55	5.89	10.4	—	499	120	188	—	MD 5849

Helios Gigabox 710/4 Acoustic Data

GBD 710/4

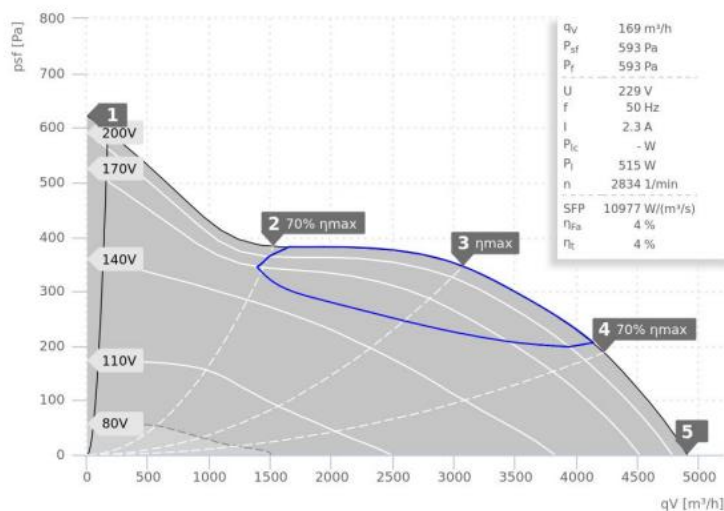


Ruck Fans ELKI 6030 Data Sheet – Kitchen Intake Fan Motor

DATA SHEET

ELKI 6030 E2 11 | 127740

ruck.eu
VENTILATOREN



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

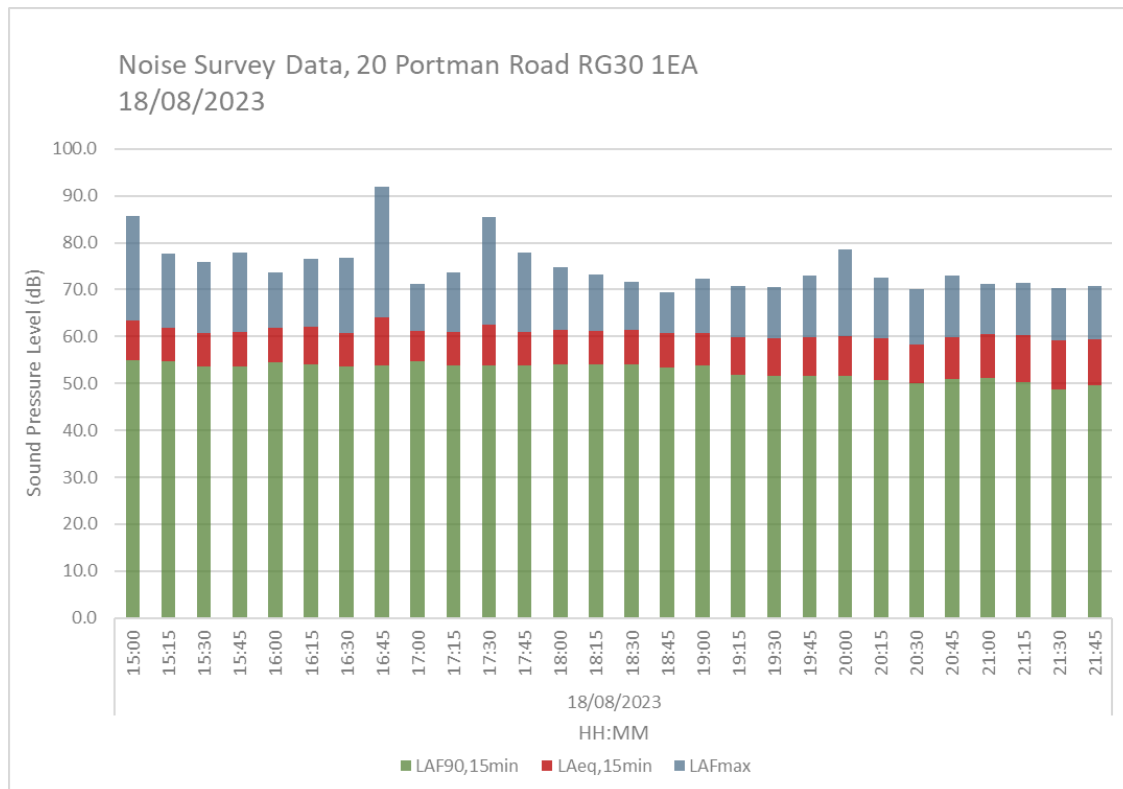
— ErP compliant range

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

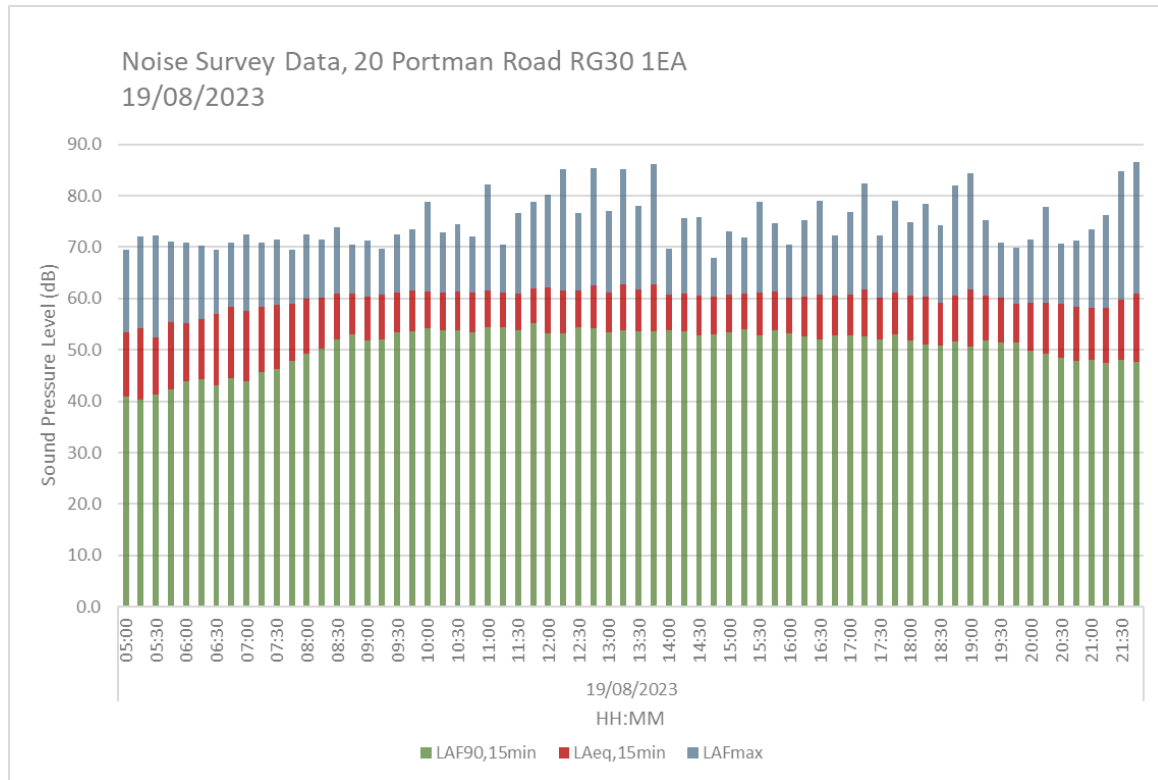
Sound power (L _W) dB(A)		Medium Frequency Band								
		Σ	63	125	250	500	1k	2k	4k	8k
Inlet	L _{WA5}	85	-	64	74	79	80	78	75	68
Outlet	L _{WA6}	87	-	67	73	81	83	81	76	70
Housing radiation	L _{WA2}	68	58	57	62	61	61	59	53	44

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

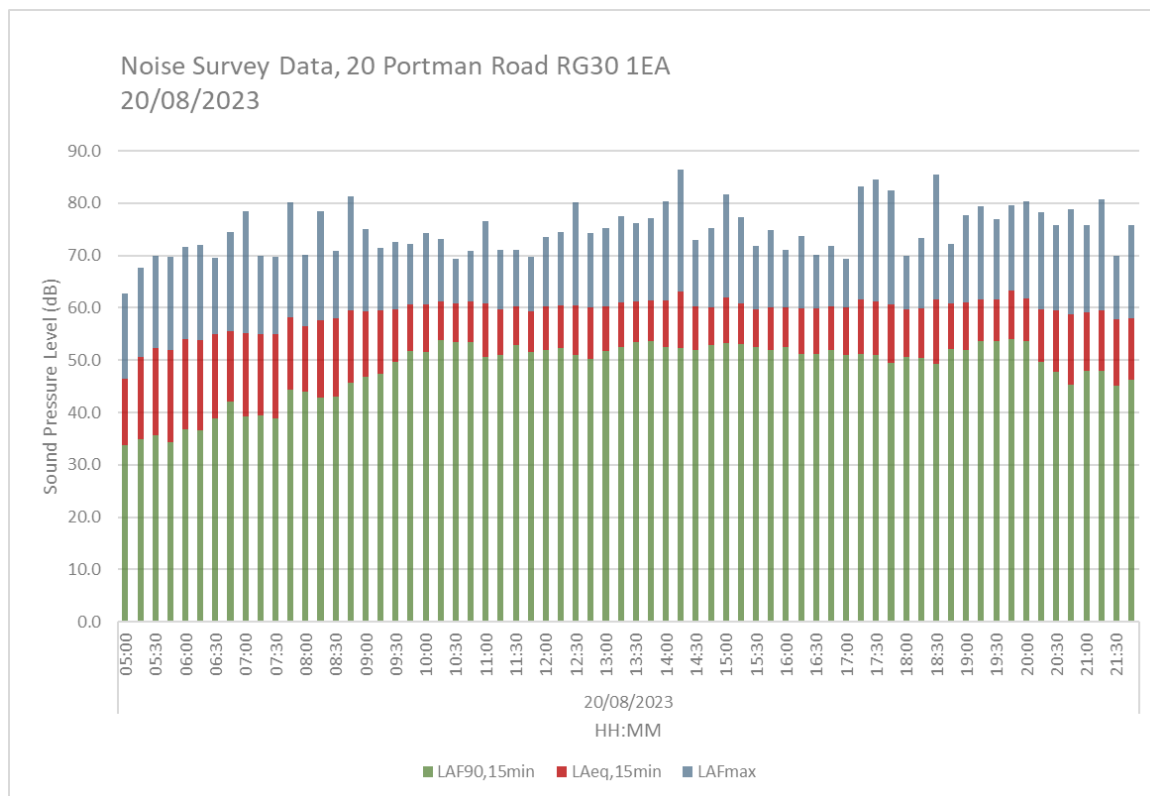
APPENDIX C – Noise Monitoring Data



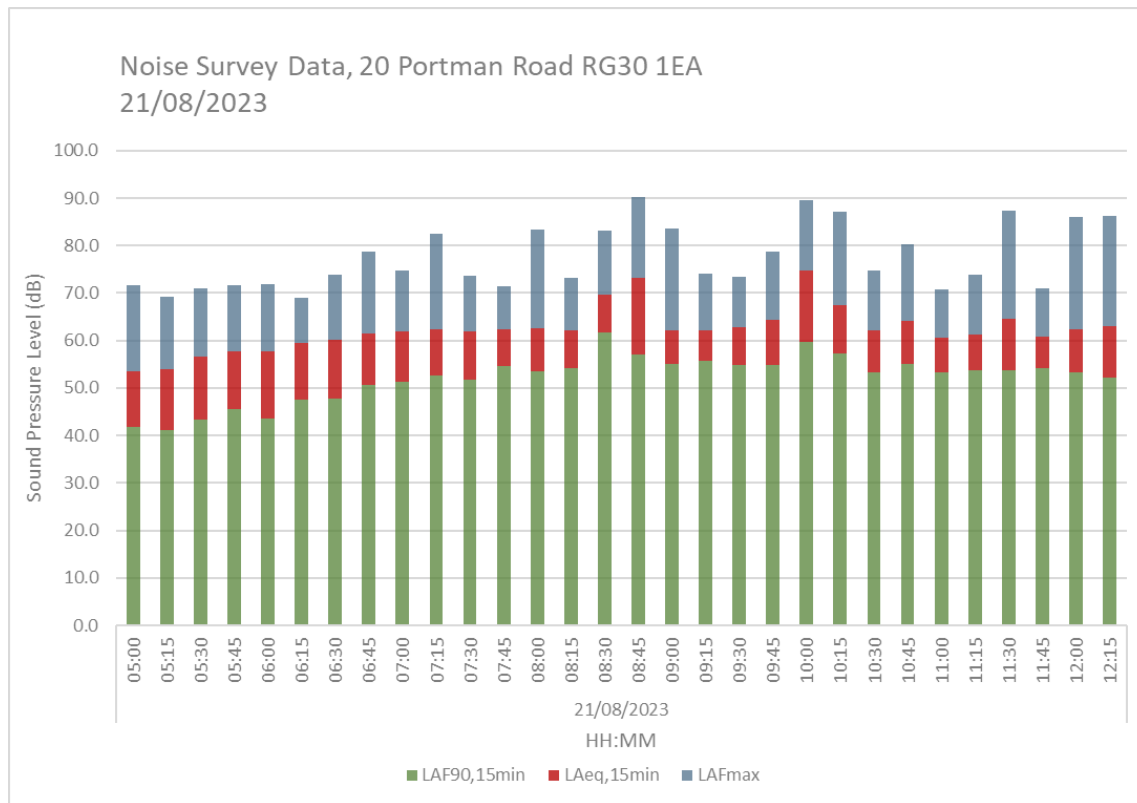
Date	Time	L _{Aeq,15min}	L _{AFmax}	L _{AF90,15min}	L _{Aeq,1hour}	L _{AF90,1hour}
18/08/2023	15:00	63.5	85.8	54.9	61.9	54.3
	15:15	61.9	77.7	54.8		
	15:30	60.7	75.9	53.7		
	15:45	60.9	77.9	53.6		
	16:00	61.9	73.6	54.5	62.3	54.0
	16:15	62.1	76.5	54.1		
	16:30	60.7	76.7	53.5		
	16:45	64.0	91.9	53.8		
	17:00	61.2	71.1	54.7	61.5	54.1
	17:15	61.0	73.7	53.8		
	17:30	62.6	85.4	53.8		
	17:45	61.1	77.9	53.9		
	18:00	61.3	74.7	54.1	61.2	53.9
	18:15	61.3	73.1	54.1		
	18:30	61.4	71.7	54.0		
	18:45	60.8	69.4	53.4		
	19:00	60.8	72.2	53.9	60.1	52.3
	19:15	59.9	70.9	51.8		
	19:30	59.6	70.6	51.5		
	19:45	59.8	73.0	51.6		
	20:00	60.2	78.7	51.6	59.5	50.9
	20:15	59.6	72.6	50.7		
	20:30	58.3	70.1	50.1		
	20:45	59.8	73.0	51.0		
	21:00	60.6	71.2	51.1	60.0	50.0
	21:15	60.4	71.5	50.2		
	21:30	59.3	70.4	48.6		
	21:45	59.4	70.8	49.7		



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}		
19/08/2023	05:00	53.4	69.5	41.0	58.5	46.1	19/08/2023	14:00	60.7	69.7	53.8	60.7	53.3		
	05:15	54.2	72.0	40.3				14:15	61.0	75.6	53.6				
	05:30	52.5	72.3	41.3				14:30	60.6	75.9	52.8				
	05:45	55.4	71.2	42.3				14:45	60.4	68.0	53.0				
	06:00	55.2	70.8	43.9				15:00	60.8	73.1	53.5	61.1	53.6		
	06:15	56.0	70.2	44.3				15:15	61.1	71.9	54.1				
	06:30	57.0	69.5	43.2				15:30	61.1	78.9	52.8				
	06:45	58.4	70.8	44.4				15:45	61.3	74.7	53.9				
	07:00	57.6	72.5	43.9				16:00	60.2	70.5	53.2	60.5	52.7		
	07:15	58.5	70.9	45.6				16:15	60.4	75.2	52.6				
	07:30	58.8	71.6	46.2				16:30	60.9	78.9	52.1				
	07:45	59.0	69.5	47.9				16:45	60.6	72.2	52.9				
	08:00	60.0	72.6	49.2				17:00	60.7	76.8	52.9	61.0	52.7		
	08:15	60.2	71.4	50.3				17:15	61.8	82.4	52.7				
	08:30	61.0	73.8	52.0				17:30	60.2	72.3	52.0				
	08:45	61.0	70.5	53.0				17:45	61.2	79.0	53.1				
	09:00	60.5	71.3	51.9				18:00	60.6	74.9	51.8	60.2	51.3		
	09:15	60.7	69.7	52.1				18:15	60.3	78.5	51.0				
	09:30	61.2	72.5	53.4				18:30	59.2	74.2	50.8				
	09:45	61.6	73.4	53.6				18:45	60.6	81.9	51.7				
	10:00	61.3	78.8	54.2				61.2	53.9	19:00	61.8	84.4	50.6	60.5	51.3
	10:15	61.2	72.8	53.9						19:15	60.5	75.3	51.8		
	10:30	61.3	74.4	53.8						19:30	60.1	70.8	51.4		
	10:45	61.1	72.1	53.5						19:45	58.9	70.0	51.4		
	11:00	61.6	82.1	54.4				61.4	54.5	20:00	59.1	71.6	49.8	58.9	48.9
	11:15	61.2	70.4	54.5						20:15	59.3	77.9	49.2		
	11:30	61.0	76.7	53.8						20:30	58.9	70.6	48.4		
	11:45	61.9	78.9	55.2						20:45	58.3	71.3	47.8		
	12:00	62.2	80.1	53.3				62.0	53.9	21:00	58.3	73.5	48.1	59.5	47.8
	12:15	61.5	85.2	53.3						21:15	58.2	76.2	47.5		
	12:30	61.5	76.7	54.5						21:30	59.8	84.7	48.0		
	12:45	62.5	85.4	54.2						21:45	60.9	86.6	47.7		
	13:00	61.2	77.0	53.4	62.1	53.7									
	13:15	62.7	85.2	53.9											
	13:30	61.7	78.0	53.7											
	13:45	62.8	86.2	53.6											



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}
20/08/2023	05:00	46.4	62.8	33.7			20/08/2023	14:00	61.4	80.4	52.6	61.4	52.4
	05:15	50.6	67.6	34.8				14:15	63.1	86.5	52.3		
	05:30	52.3	69.9	35.6				14:30	60.3	72.9	51.9		
	05:45	52.0	69.7	34.4				14:45	60.1	75.3	52.8		
	06:00	54.0	71.6	36.7				15:00	62.0	81.6	53.3	60.7	52.7
	06:15	53.9	72.0	36.6				15:15	60.8	77.3	53.1		
	06:30	55.0	69.5	38.8				15:30	59.8	71.9	52.5		
	06:45	55.6	74.4	42.1				15:45	60.1	74.9	51.9		
	07:00	55.1	78.5	39.3	56.1	41.2		16:00	60.1	71.1	52.6	60.0	51.8
	07:15	54.9	70.0	39.4				16:15	59.8	73.7	51.2		
	07:30	55.0	69.8	38.8				16:30	59.8	70.1	51.2		
	07:45	58.2	80.3	44.4				16:45	60.3	71.8	52.0		
	08:00	56.6	70.2	44.0	58.1	44.0		17:00	60.1	69.3	51.0	60.9	50.7
	08:15	57.6	78.4	42.9				17:15	61.6	83.3	51.1		
	08:30	58.0	71.0	43.0				17:30	61.2	84.5	50.9		
	08:45	59.6	81.4	45.6				17:45	60.7	82.5	49.4		
	09:00	59.3	75.1	46.9	59.8	49.4		18:00	59.7	70.0	50.7	60.6	50.8
	09:15	59.5	71.5	47.3				18:15	59.9	73.3	50.5		
	09:30	59.8	72.6	49.6				18:30	61.6	85.5	49.3		
	09:45	60.6	72.3	51.8				18:45	60.9	72.3	52.1		
	10:00	60.7	74.3	51.6	61.0	53.1		19:00	61.1	77.8	52.0	62.0	53.4
	10:15	61.2	73.3	53.8				19:15	61.6	79.4	53.7		
	10:30	60.8	69.4	53.4				19:30	61.7	76.9	53.7		
	10:45	61.2	70.9	53.4				19:45	63.3	79.7	54.0		
	11:00	60.8	76.6	50.7	60.1	51.6		20:00	61.8	80.4	53.7	60.1	50.2
	11:15	59.7	71.0	51.0				20:15	59.7	78.3	49.7		
	11:30	60.4	71.1	52.8				20:30	59.4	75.9	47.7		
	11:45	59.4	69.7	51.6				20:45	58.7	78.9	45.4		
	12:00	60.2	73.5	52.0	60.3	51.4		21:00	59.2	75.8	47.9	58.7	47.0
	12:15	60.5	74.4	52.3				21:15	59.4	80.8	47.9		
	12:30	60.5	80.1	50.9				21:30	57.9	69.9	45.2		
	12:45	60.1	74.3	50.3				21:45	58.0	75.8	46.3		
	13:00	60.3	75.3	51.8	61.0	53.0							
	13:15	61.0	77.5	52.6									
	13:30	61.3	76.2	53.5									
	13:45	61.4	77.1	53.7									



Date	Time	L _{Aeq,15min}	L _{AFmax}	L _{AF90,15min}	L _{Aeq,1hour}	L _{AF90,1hour}
21/08/2023	05:00	53.5	71.7	41.9		
	05:15	54.1	69.2	41.1		
	05:30	56.5	70.9	43.4		
	05:45	57.7	71.6	45.6		
	06:00	57.8	71.8	43.6		
	06:15	59.5	69.0	47.6		
	06:30	60.1	73.9	47.7		
	06:45	61.4	78.7	50.7		
	07:00	61.8	74.7	51.4	62.1	52.8
	07:15	62.3	82.5	52.6		
	07:30	61.9	73.5	51.7		
	07:45	62.3	71.5	54.6		
	08:00	62.5	83.4	53.6	69.2	58.0
	08:15	62.2	73.1	54.2		
	08:30	69.6	83.1	61.8		
	08:45	73.2	90.2	57.0		
	09:00	62.2	83.6	55.0	62.9	55.1
	09:15	62.1	74.0	55.7		
	09:30	62.8	73.5	54.9		
	09:45	64.3	78.6	54.9		
	10:00	74.7	89.5	59.7	69.9	57.0
	10:15	67.5	87.1	57.3		
	10:30	62.1	74.8	53.4		
	10:45	64.1	80.2	55.1		
	11:00	60.6	70.9	53.2	62.2	53.7
	11:15	61.2	73.8	53.7		
	11:30	64.6	87.4	53.8		
	11:45	60.8	70.9	54.2		
	12:00	62.4	86.0	53.2	62.7	52.7
	12:15	63.1	86.3	52.2		

APPENDIX D – Calculations

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

ion per double distance required = 6dB for LpA recommended)			6	dB			Metres	
			Enter Distance =				56	
	Frequency Hz							
	125	250	500	1000	2000	4000	8000	Total
	87.1	81.6	86.2	84	79.8	72	64.1	91.58
Total LW	87.1	81.6	86.2	84.0	79.8	72.0	64.1	91.58
'A' Weight	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	71.0	73.0	83.0	84.0	81.0	73.0	63.0	88.00
LPA at New Dist'	28.16	30.16	40.16	41.16	38.16	30.16	20.16	45.16
SILENCER	5	10	19	24	23	14	6	
DUCT BENDS (2)	1.3	7.9	10.6	5.3	4.0	4.0	4.0	
DIRECTIVITY 90°	0	4	6	7	14	17	19	
LPA After Insert	21.84	8.24	4.60	4.88	-2.80	-4.80	-8.80	22.21

Kitchen Extraction System Terminus @ 56m = 22dB L_{Aeq,T}

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

ion per double distance required = 5dB for LpA recommended)			6	dB			Metres	
			Enter Distance =				64	
	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'	20.00	30.00	35.00	36.00	34.00	31.00	24.00	40.89
SILENCER	2	5	12	12	11	7	4	
DUCT BENDS (1)	1	6	8	4	3	3	3	
DIRECTIVITY 90°	0	2	6	7	14	16	19	
LPA After Insert	17.00	17.00	9.00	13.00	6.00	5.00	-2.00	21.33

Kitchen Intake System Terminus @ 64m = 21dB L_{Aeq,T}

Adding dB								
Levels to be added (Max. of eight)								
Enter values	22	21	0	0	0	0	0	0
Total = 24.6 dB								

Cumulative Sound Pressure Level @ 1m from Nightingale Way + Intermittency (3dB) = 28dB L_{Ar,T}