

CSG

acoustics

BULLGOGI, MANCHESTER
MAGURO LTD

PLANT NOISE IMPACT ASSESSMENT
CSGA-C2218-T1

16th September 2024

PREFACE

Project	Bullgogi Restaurant
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Table P1: Revision Details

Revision Number	Date	Details

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1 INTRODUCTION

CSG Acoustics Ltd has been appointed by MAGURO Ltd to undertake an external plant noise assessment to support a planning application for fixed plant equipment at the proposed Bullgogi Site, 6A Piccadilly Plaza, Manchester M1 4AH.

The proposals include the fit out of the commercial unit into a new restaurant space which includes new ventilation, kitchen extract and an external air conditioning unit.

In light of the above a noise assessment is required in accordance with the Manchester City Council planning policy.

The assessment includes:

- Results of a noise survey conducted at the site over a three-day period;
- Proposed plant noise limits based on the results of the noise survey and the Local Authority’s planning policy; and
- Prediction and assessment of external noise levels at the closest worst-affected noise sensitive window using CadnaA noise modelling software.

This report is technical in nature therefore, to assist the reader, explanations of the relevant terminology are presented in Appendix A.

2 EXISTING / PROPOSED SITE

The proposed location of the restaurant is in the Piccadilly Gardens area of central Manchester, a particularly busy commercial area of the city.

Bullgogi, the restaurant operator, is proposing to operate from 10:00am to 11:30pm from Sunday to Thursday, with Friday and Saturdays staying open slightly later to 11:45pm.

As part of the updating and refurbishment of the site a number of externally located fixed plant are to be located in or terminate in a dedicated second floor plant space. There are also proposals for a ground floor supply air termination to be located at high-level on the Mosley Street elevation of the site.

The following new plant is proposed:

Table 2.1: Proposed Plant Details

Unit Type	Unit Model	Termination Location	Sound Power Level dB (A)
Kitchen Extract	MUB/T 062 560EC	Exhaust – 2nd Floor Plant	86dB
		Breakout – 2nd Floor Plant	68dB
Kitchen FAI	EMF40032	2nd Floor Plant	85dB
Seating Extract	MUB/T 042	Exhaust – 2nd Floor Plant	83dB
		Breakout – 2nd Floor Plant	57dB
Seating Supply	Ecoline	Ground Floor Mosley Street	88dB
VRF Heating / Cooling	AM220AXVGGR	2nd Floor Plant	84dB

A coordinated design has been undertaken with the design team to ensure that planning noise limits are met at surrounding noise sensitive properties. In light of this Table 2.2 presents the in-line attenuation to be located in the associated duct-runs.

Table 2.2: Acoustic Attenuation Proposed to be Installed

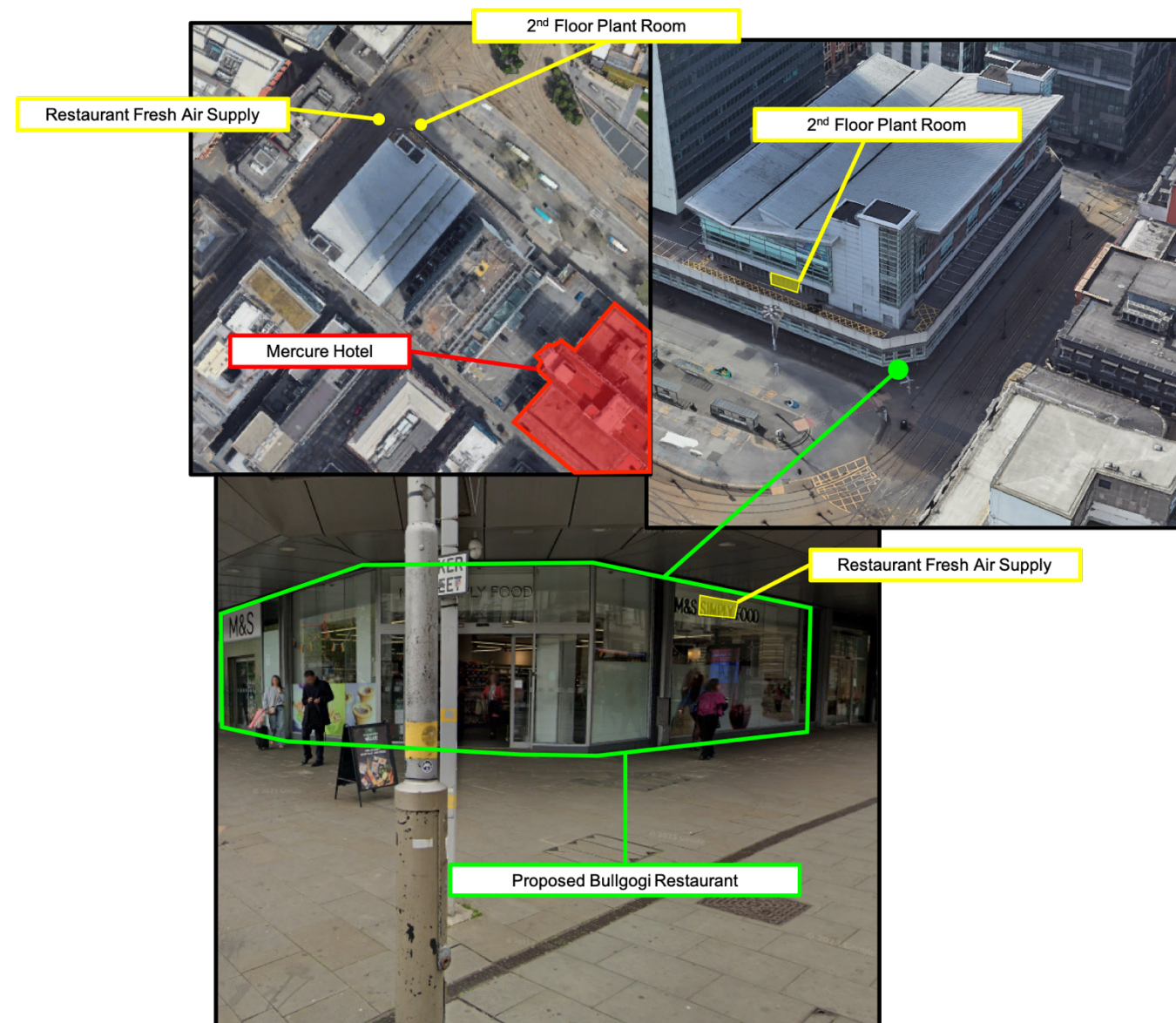
Unit	Attenuator Dims	Rw Insertion Loss
Kitchen Extract	800x800x1250	36dB
Kitchen FAI	800x800x650	25dB
Seating Extract	700x700x650	24dB
Seating Supply	700x700x1250	33dB

Full noise and attenuation data in octave bands can be found in Appendix B and C.

The nearest known noise sensitive receiver to the proposed new plant is the Mercure Hotel. Windows of which are located approximately 100 metres to the south-east above the position of the restaurant. No other closer noise sensitive receivers have been established by our online review of the area.

Figure 2.1 shows the position of the restaurant, the location of the plant on the second floor roof and the ground floor fresh air termination and the Mercure Hotel rooms.

Figure 2.1: Site, Location of Fixed Plant and Noise Sensitive Receptor (NSR)



3 GUIDANCE AND CONSULTATION

This assessment has been undertaken in accordance with National and Local planning policy for the Manchester City Council and relevant British Standards.

National Planning Policy is presented in Appendix D of this document.

3.1 LOCAL PLANNING POLICY

Manchester City Council Core Strategy

The Core Strategy Development Plan Document 2012 –2027 (the Core Strategy) was adopted by the City Council in July 2012. It is the key document in Manchester's Local Development Framework and sets out the core development principles relating to noise.

The Core Strategy refers to British Standard BS4142:2014 as a suitable assessment method. The assessment method is based on the difference between the measured background sound level without the influence of any industrial noise source and the 'rating level' of the industrial source, at the receiver location.

The background sound level ($L_{A90,T}$) is the sound level existing in the absence of the 'specific sound level' at the receiver location. The specific sound level ($L_{Aeq,Tr}$) from the industrial source can be subject to a certain weighting (penalty) where it displays an identifiable character (such as tonality, impulsivity, intermittency or otherwise distinctive features to provide a 'rating level' ($L_{Ar,Tr}$).

Criteria

The Manchester City Council Noise and Planning Guidance Document (2022) states the following for noise from fixed plant equipment:

"The development should be designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest sensitive location."

This assessment has assumed the nearest noise sensitive location to be the hotel rooms of the Mercure Hotel.

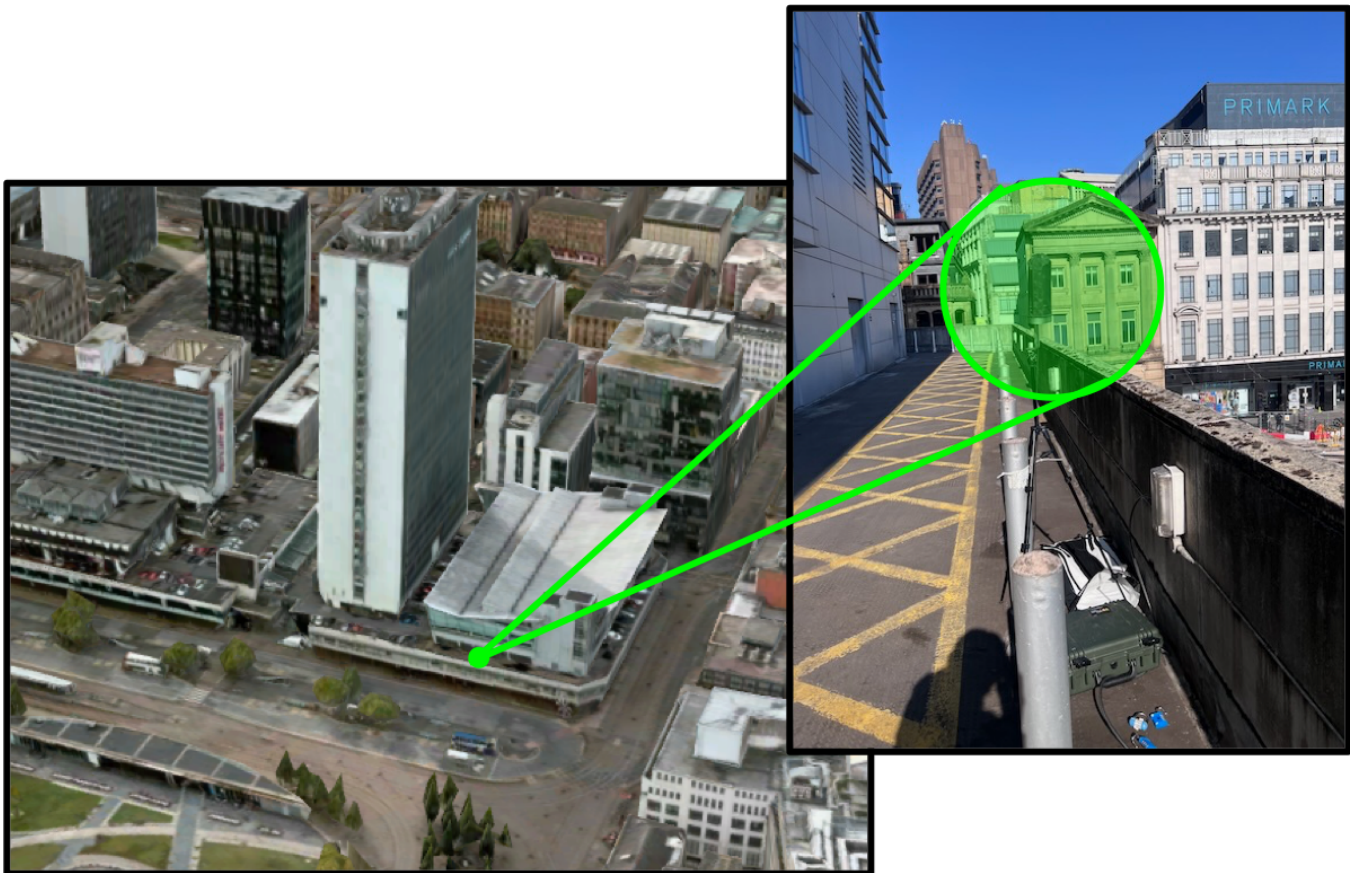
4 NOISE SURVEY

Environmental noise measurements have been carried out over a two and a half day period from 10:15 on Friday 6th September 2024 and concluding Sunday 8th September 2024 at 23:30.

Measurements were undertaken to establish the existing noise levels at the site. The survey methodology and results are set out below.

Noise measurements have been carried out at 1.5m above 2nd floor roof level; Figure 4.1 presents the measurement location.

Figure 4.1: Noise Measurement Position



The measurement location was selected to represent the background noise levels at the nearest noise sensitive properties surrounding the site.

The equipment used for the survey was as follows:

Table 4.1: Equipment

Equipment	Model	Serial No.	Certificate No.	Calibration Date
Class 1 SLM	CEL-63x	1274541	06066/1	20/01/2025
Microphone	CEL-251	2072		
Preamplifier	CEL-495	003668		
Calibrator	Cirrus - 511E	33927	06897/1	13/08/2025

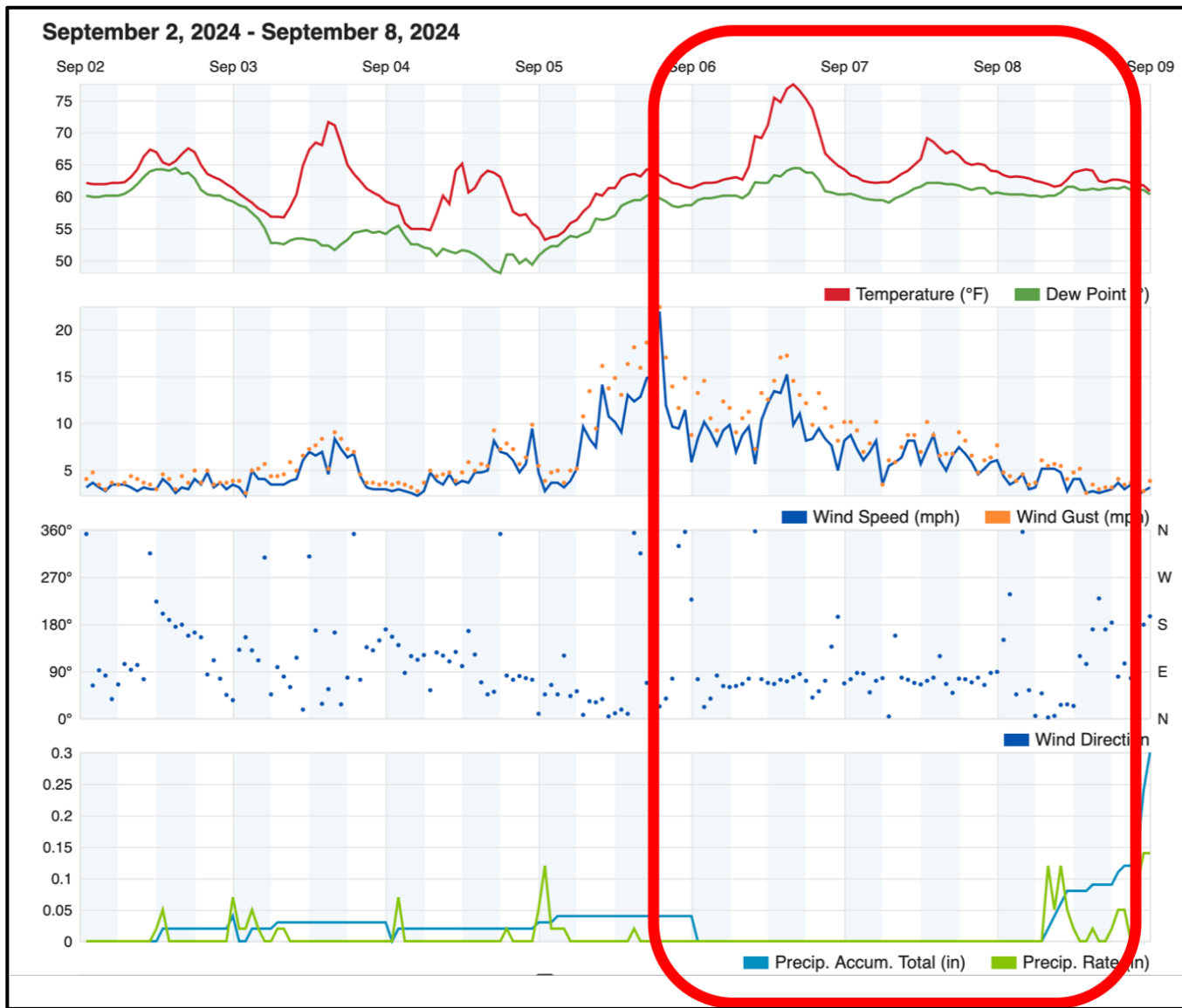
4.1 RESULTS

The noise survey was mostly unattended, with observations taken by the surveyor at the start and end of the measurements.

The weather during the survey was suitable for noise measurement for the duration of the noise survey, it being dry for the majority of the time.

A graphical summary of the weather for the period is given below. The data is from the closest weather station with available data (IMANCH162).

Figure 4.2: Weather Data for Period



Noise sources at the site include traffic on surrounding routes, and noise from surrounding pedestrians. There were no other sources of noise considered abnormal for a mixed commercial / residential location.

A summary of the time averaged ambient levels and the typical lowest measured background levels over the measurement periods are shown in Table 4.1. It should be noted that the presented lowest L_{A90} levels are based on a 5-minute measurement period.

A summary of the measured noise levels during the full measurement period is represented graphically in Appendix E.

Table 4.1: Measured Ambient and Typical Lowest Background Noise Levels

Period	Average L _{Aeq,T} – dB	Typical Lowest L _{A90} – dB
Day time (0700–1900)	68dB	59dB
Evening (1900–2300)	67dB	58dB
Night-time (2300–0700)	63dB	54dB

5 PLANT NOISE ASSESSMENT

This report is to support a planning application for a restaurant at 6A Piccadilly Plaza, Manchester M1 4AH. The restaurant includes proposals for external fixed plant and plant venting externally.

5.1 PLANT NOISE LIMITS

The plant proposed for this building will only be operational during the hours stated in Section 2 of this report. To allow suitable kitchen preparation and heating / cooling to the restaurant space the plant operation could range from 07:00–24:00.

Based on the above and the requirements set out in Section 3 of this report, Table 5.1 presents the proposed plant noise limit in accordance with BS4142:2014 and Manchester City Council Planning Policy.

Table 5.1: Suggested Plant Noise Emission Limits Based on Measured L_{A90}, (Free-field) dB

Location	Period	Proposed Noise Limit L _{Ar}
Nearest Noise Sensitive Receptors	07:00–24:00	53dB

Note that the limit suggested above is a rating level (L_{Ar}) and as such any design should consider the acoustic characteristics of the plant items in line with BS4142:2014.

It should be noted that the proposed units do not display characteristics whereby the acoustic corrections should be applied and as such no correction will be applied in this assessment.

Should any other items of plant be installed as part of the development, the cumulative noise from all items should not exceed the limit stated in Table 5.1.

5.2 EXTERNAL PLANT NOISE IMPACT ASSESSMENT

Noise data of the proposed plant and attenuation used in this assessment can be found in Appendix B.

Calculations based on the above have been undertaken at all surrounding building locations using CadnaA noise modelling software.

CadnaA has been set-up to include second order reflections and includes all surrounding architecture based on our onsite visual inspection and 3D views on online mapping sites. Predictions use the octave band noise levels of the units presented in Appendix D, including proposed in-duct attenuation.

Screenshots of the CadnaA noise model are presented below showing the noise levels at surrounding buildings.

Calculations based on the manufacturer noise data and proposed acoustic attenuation have been undertaken.

Figure 5.1 presents a 2D view of the predicted noise levels at all building surrounding the site.

Figure 5.1: 2D CadnaA View of Predicted Noise Levels

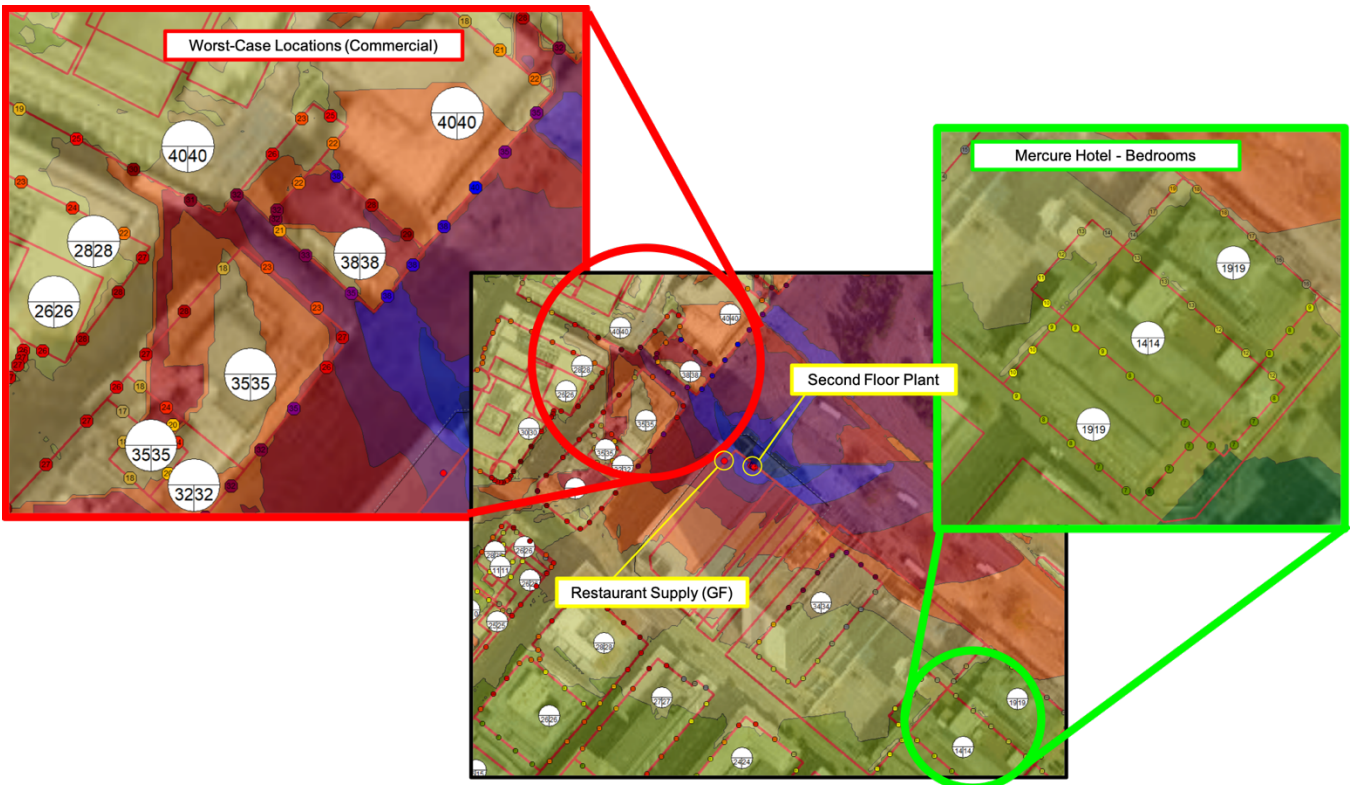
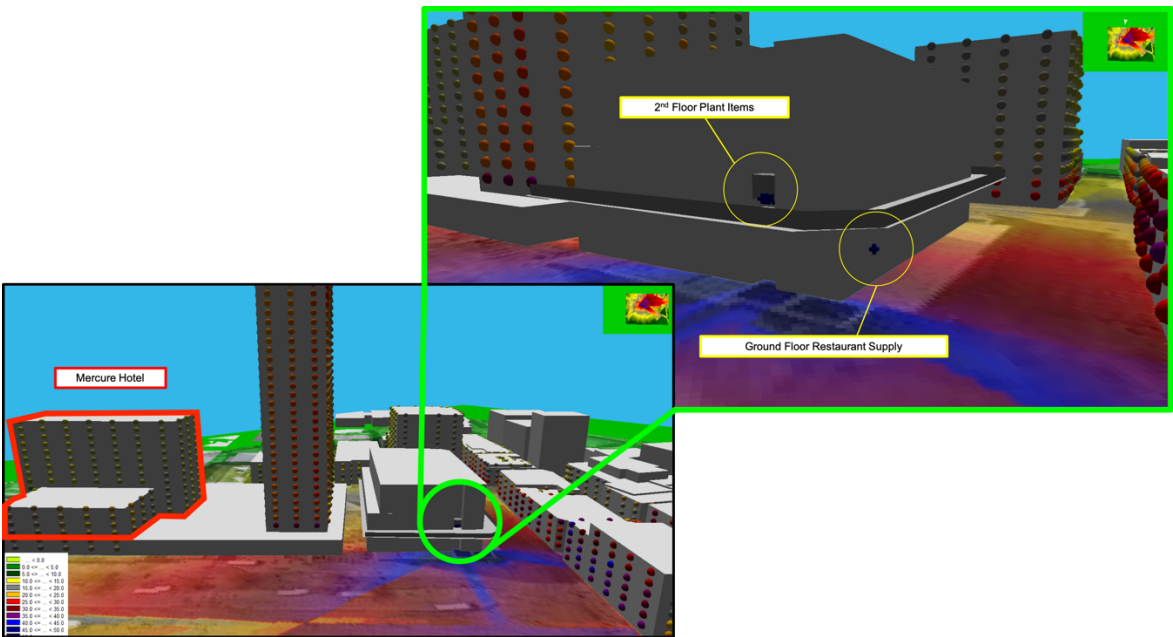


Figure 5.2 presents a couple of 3D view of the site, orientated facing the site in a south-easterly direction.

Figure 5.2: 3D View of CadnaA Noise Model



The images above show the units as blue crosses in the 3D images, and small red circles in the 2D images. The coloured circles at various building elevations show the predicted maximum noise levels on a specific façade (regardless of window location) and white/black circles on the 2D noise maps indicate the maximum levels at the facades.

As shown in Figure 5.1 the predicted level of the new plant items at any building elevation offsite is 40dBA as a maximum. This level is predicted at the closest building facades across Mosley Street, none of which is known to be residential / habitable rooms.

The closest habitable rooms are bedrooms located within the Mercure Hotel. The predicted worst-case noise level at this location is 19dBA.

The worst-case prediction of the primary noise route (calculation protocol) from the CadnaA noise calculation is presented in Appendix F, which includes all corrections applied in the noise model. This calculation route is for the direct pathway of the VRF (17dBA). Other calculation protocol results can be made available upon request.

Table 5.2 presents the summary planning demonstration based on the stated unit noise levels and the attenuation stated in this report.

Table 5.2: Noise Planning Demonstration – at Residential Windows

Location	Period	Predicted Noise Level	Noise Limit	Compliance Statement
Closest NSR (Mercure Hotel)	07:00–24:00	19dBA	53dB	Comply

The levels predicted are significantly below the plant noise limits and the existing lowest measured background noise levels at the NSR and therefore predicted to meet the requirements of the Local Authority.

6 CONCLUSION

CSG Acoustics Ltd has been appointed by MAGURO Ltd to undertake an external plant noise assessment to support a planning application for fixed plant equipment at the proposed Bullgogi Site, 6A Piccadilly Plaza, Manchester M1 4AH.

The proposals include the fit out of the commercial unit into a new restaurant space which includes new ventilation, kitchen extract and air conditioning units.

The assessment has been carried out in accordance with national planning guidance and the requirements of the Manchester City Council planning policy, and is based on a noise survey conducted at the site.

A prediction of the noise at the worst affected noise sensitive property has been undertaken in line with BS4142 and the operation of the plant would be considered to have a low impact on the noise climate surrounding the site.

Plant noise levels are predicted to be significantly below the plant noise limits and therefore meet the requirements of the Local Planning Authority.

Assuming the noise limits are met and with respect to the principles of the National Planning Policy Framework, the predicted noise levels will be at the LOAEL (Lowest Observed Adverse Effect Level).



APPENDICES

APPENDIX A: GLOSSARY OF TERMS

Decibel (dB) – The unit used to describe sound. A logarithmic scale is used to describe sound pressure levels and sound power levels. The logarithms used are to base 10; hence, an increase of 10dB in sound pressure level corresponds to a doubling in perceived loudness of the sound.

Sound Power Level (SWL) – This is a product of the source alone and is independent of its surroundings. It is a measure of the amount of sound power output measured in decibels.

Sound Pressure Level (SPL) – This is a function of the source and its surroundings and is a measure of the sound pressure at a point in space. The sound pressure measured or reported can be influenced by room/mounting conditions and the distance that the measurement is taken.

Octave Bands – The human ear is sensitive to sound over a range of approximately 20 Hz to 20 KHz and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands and the sound pressure level is measured in each band. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it.

"A" Weighting – A number of frequency weightings have been developed to imitate the ear's varying sensitivity to sound of different frequencies. The most commonly used weighting is the "A" weighting. The "A" weighted SPL can be measured directly or derived from octave or one-third octave band SPLs. The result is a single figure index which gives some idea of the subjective loudness of the sound, but which contains no information as to its frequency content.

Intermittency and Time-Weighting – The degree of annoyance caused by a noise also depends on its duration and intermittency of a noise. Intermittent, impulsive or repetitive noises tend to be more annoying than continuous noises. Various time-weightings have been derived to measure sounds of differing intermittences and these can be measured directly on modern equipment. The most common time-weightings in use are as follows:-

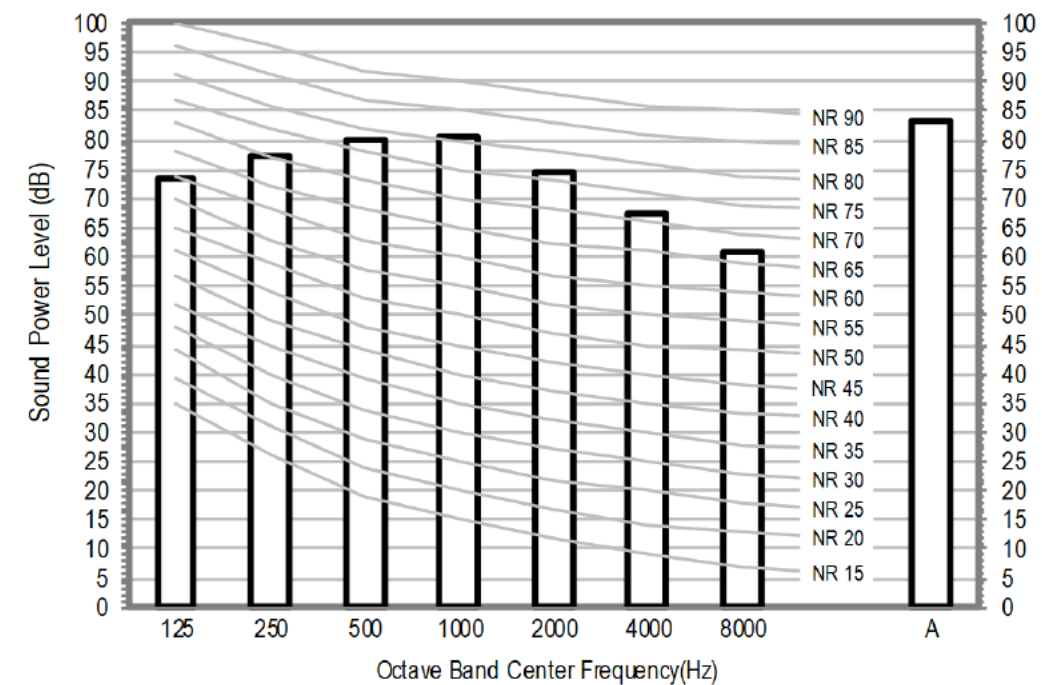
L_{90} This is the sound pressure level exceeded for 90% of the measurement period. It is widely used to measure background noise levels.

L_{eq} The equivalent continuous noise level is often used to measure intermittent noise. It is defined as the notional steady noise level that would contain the same acoustic energy as the varying noise. Because the averaging process used is logarithmic, the L_{eq} level tends to be dominated by the higher noise levels measured.

APPENDIX B: MANUFACTURERS NOISE DATA

Samsung VRF

4) AM220AXVGGR/EU



Kitchen Extract

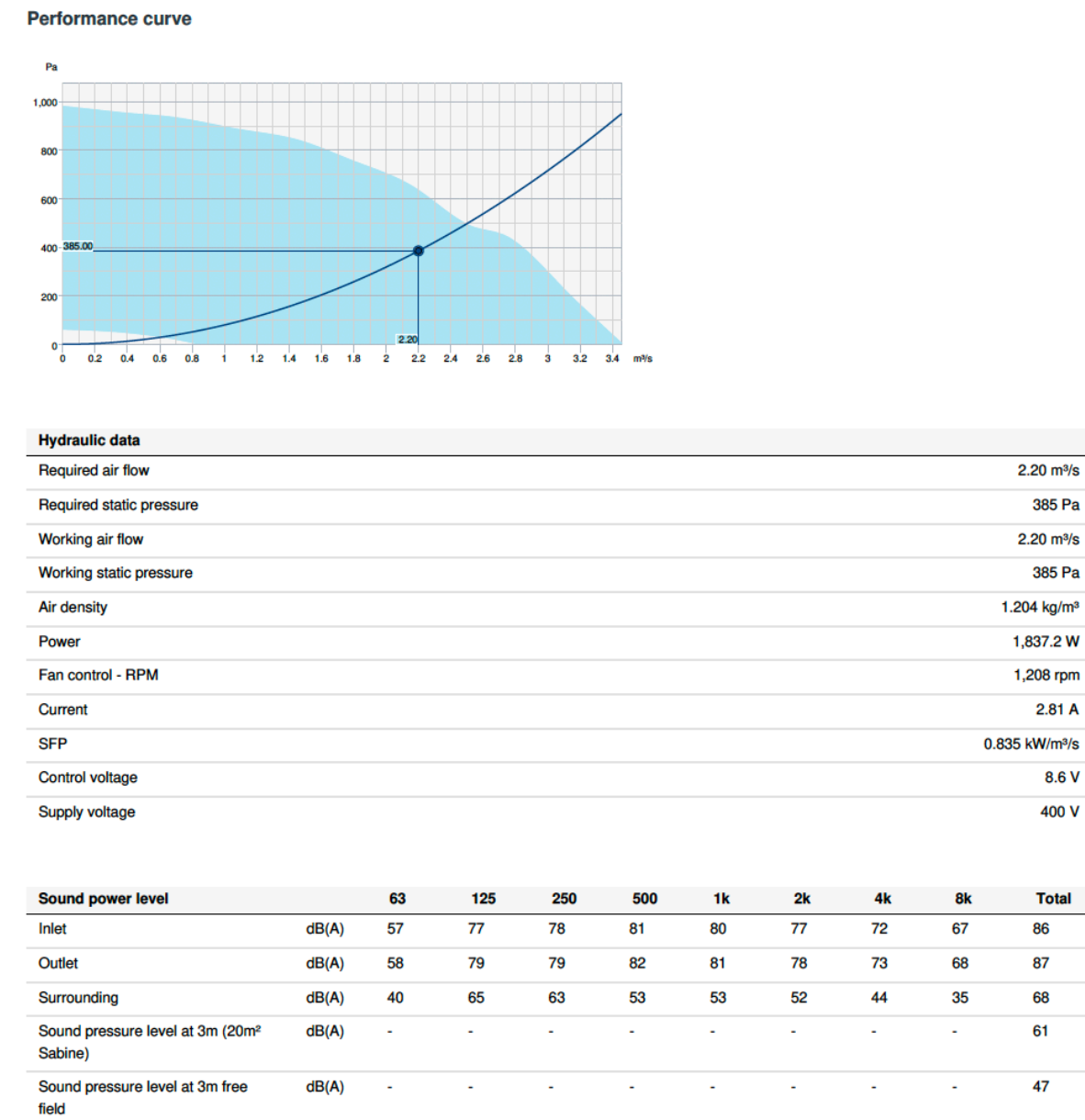


MUB/T-S 062 560EC

Performance

Item Number: #454833

KITCHEN EXTRACT FAN



Kitchen Supply

Domestic & Commercial

Sales Tel: 0844 856 0590

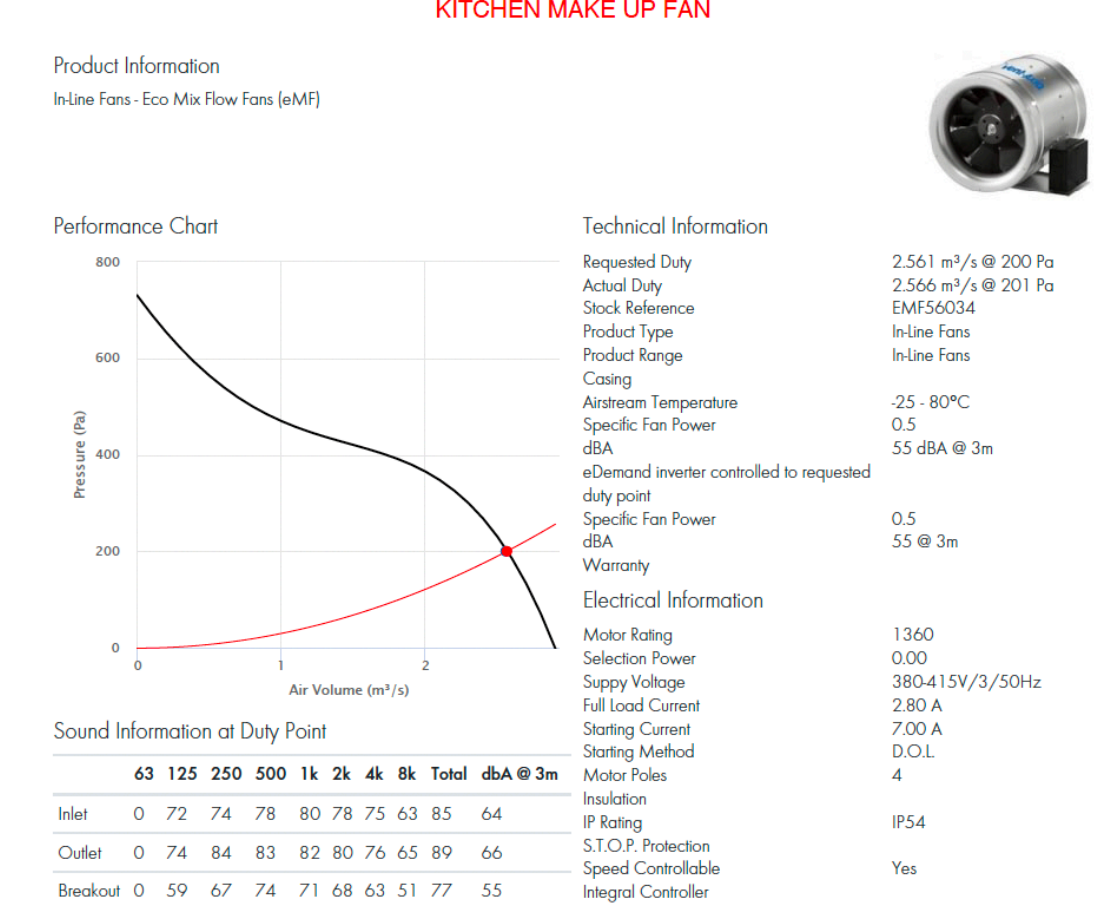
Tech Support Tel: 0844 856 0590

Industrial

Sales Tel: 0844 856 0594

Tech Support Tel: 0844 856 0595





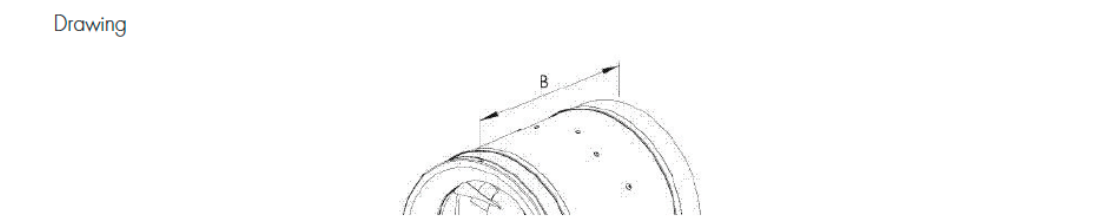
Sound Power Level Spectra dB (re 10⁻¹² Watts)

For ducted units, sound power is given as In Duct with end reflections added.

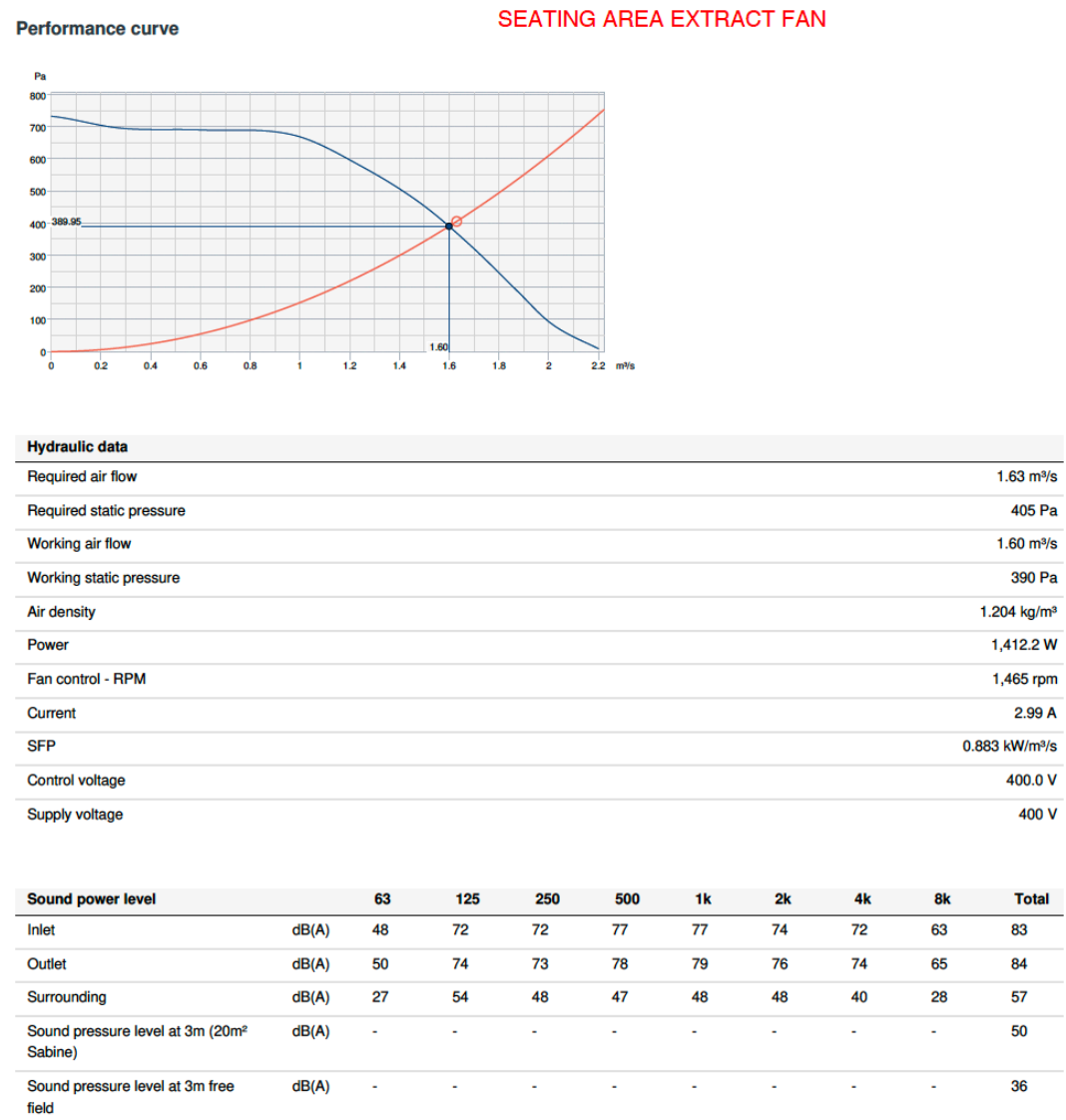
Stated dB(A) levels at 3m with spherical propagation at a reference level of 2 x 10⁻¹² Pa

Optional Accessories

Part No	Description
444173	eDemand 3 phase inverter
VM560	EMF Fast Clamp 560mm

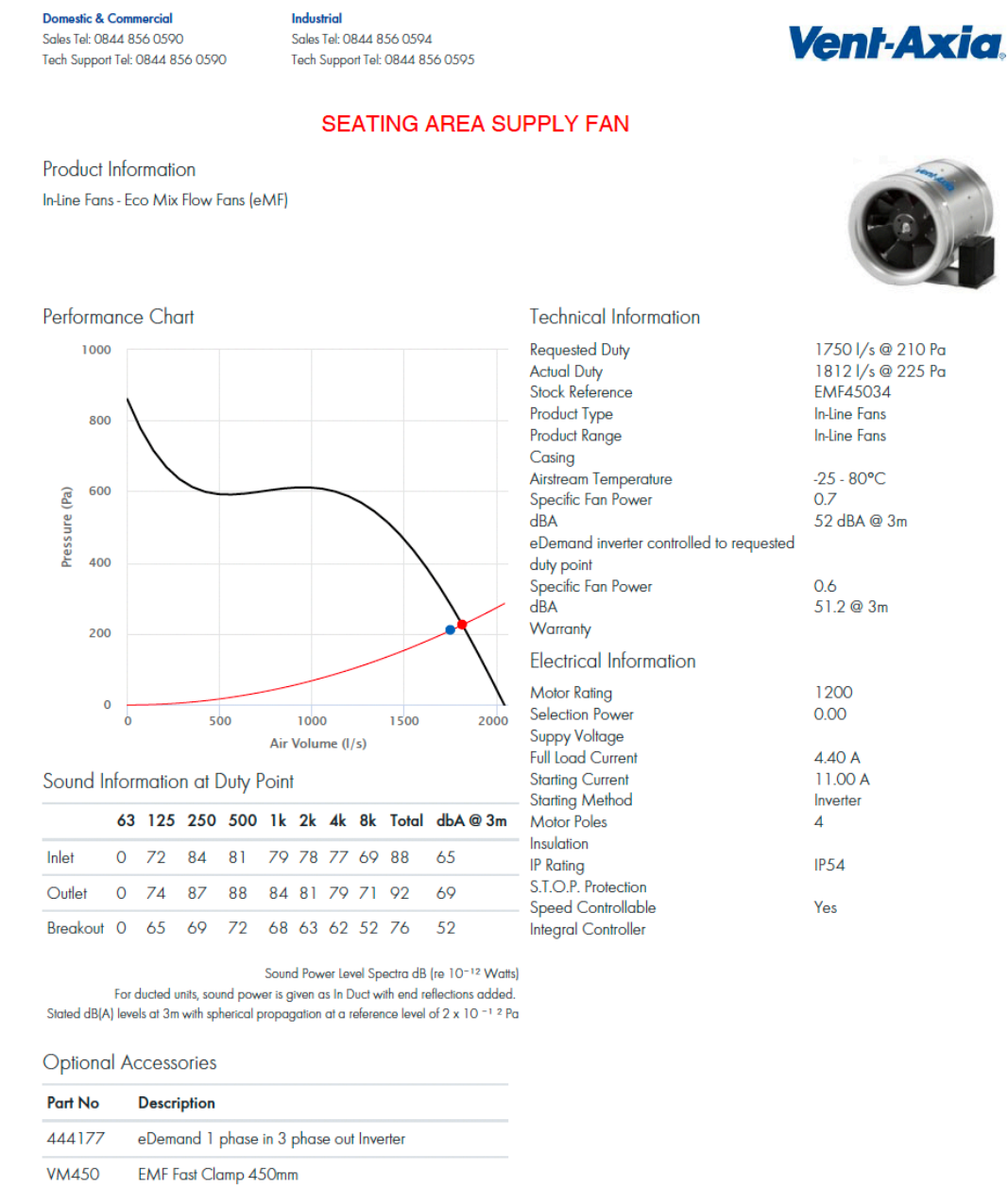


Restaurant Extract



Article name: MUB/T 042 500D4 | Product link: <https://shop.systemair.com/en-GB/productPermalink?p=522958> | Item Number: 235441 | Variant: 400V 3~ 50Hz | Document type: Product card | Created at: 07.04.2024 | Generated by: Systemair Online Catalogue | Language: English

Restaurant Supply



Optional Accessories

Part No	Description
444177	eDemand 1 phase in 3 phase out Inverter
VM450	EMF Fast Clamp 450mm

Drawing

APPENDIX C: ATTENUATORS

Kitchen Extract

800x800x 1250mm

63	125	250	500	1000	2000	4000	8000	HZ
7	15	24	39	45	40	23	17	dB

Seating Area Extract

700 x 700 x 650mm

63	125	250	500	1000	2000	4000	8000	HZ
4	9	15	22	28	24	16	13	dB

Make Up Air Fan

800 x 800 x 650mm – 2 nos

63	125	250	500	1000	2000	4000	8000	HZ
4	10	15	23	27	27	15	10	dB

Fresh Air Fan (Seating)

700X700X1250mm – 2 nos

63	125	250	500	1000	2000	4000	8000	HZ
5	12	23	36	41	36	23	18	dB

APPENDIX D: PLANNING POLICY AND GUIDANCE

National Planning Policy

National Planning Policy Framework and the Noise Policy Statement for England

The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) on 27th March 2012 and upon its publication, the majority of planning policy statements and guidance notes were withdrawn, including Planning Policy Guidance 24 Planning and Noise, which previously presented the government’s overarching planning policy on noise.

The NPPF contains four aims, which are set out at paragraph 123 in Section 11 of the document, titled *Conserving and enhancing the natural environment*:

*“Planning policies and decisions should aim to:
Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them cause of changes in nearby land uses since they were established; and
Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

The Department for Environment Food and Rural Affairs published the Noise Policy Statement for England (NPSE) in March 2010. The explanatory note of NPSE defines the following terms used in the NPPF:

*“NOEL – No Observed Effect Level
This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
LOAEL – Lowest Observed Adverse Effect Level
This is the level above which adverse effects on health and quality of life can be detected.
2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.
SOAEL – Significant Observed Adverse Effect Level
This is the level above which significant adverse effects on health and quality of life occur.”*

The NPSE does not define any of the above effect levels numerically.

The NPSE presents the Noise Policy Aims as:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy and sustainable development:

- Avoid significant adverse impacts on health and quality of life;*
- Mitigate and minimise adverse impacts on health and quality of life; and*
- Where possible, contribute to the improvement of health and quality of life.”*

It can be seen that the first two bullet points are similar to Section 11 of the NPPF, with a third aim that seeks to improve health and quality of life. The NPSE later expands on the Noise Policy Aims, stating:

“2.23 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development (paragraph 1.8).

2.24 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

2.25 This aim (the third aim), seeks where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development (paragraph 1.8), recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.”

It is clear that noise described in the NPSE as SOAEL that would lead to significant adverse effects should be avoided, although there is no definition as to what constitutes a significant adverse effect. Similarly, noise should be mitigated where it is high enough to lead to adverse effects, termed the LOAEL, but not so high that it leads to significant adverse effects.

Local Planning Policy

British Standard 4142

British Standard (BS) 4142: 2014 *Methods for rating and assessing industrial and commercial sound* is intended to be used to assess whether noise from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises is likely to give rise to complaints from people residing in nearby dwellings.

The procedure contained in BS4142 for assessing the likelihood of complaints is to compare the “*specific sound level*”, which is the measured or predicted sound level from the source in question immediately outside the dwelling, with the background sound level.

NOTE 1 of paragraph 8.1.4 states that when determining the background sound level for the assessment;

“A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value”

BS4142 provides various corrective methods depending on if the sound source is tonal (0 to +6dB), impulsive (0 to +9dB) or distinctive (0 to 3dB), which can be applied.

“The likelihood of noise provoking complaints is assessed by subtracting the background noise level from the rating noise level. BS4142 states:

a) Typically, the greater this difference, the greater the magnitude of the impact.

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

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) 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.

NOTE 2 Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.”

In the context of the NPPF, it is considered that a situation between where BS4142 suggests a low impact (specific sound levels below the measured background noise level) and an indication of significant adverse impact (specific sound levels exceed +10dB above the measured background noise level) would equate to the Lowest Observed Adverse Effect Level (LOAEL).

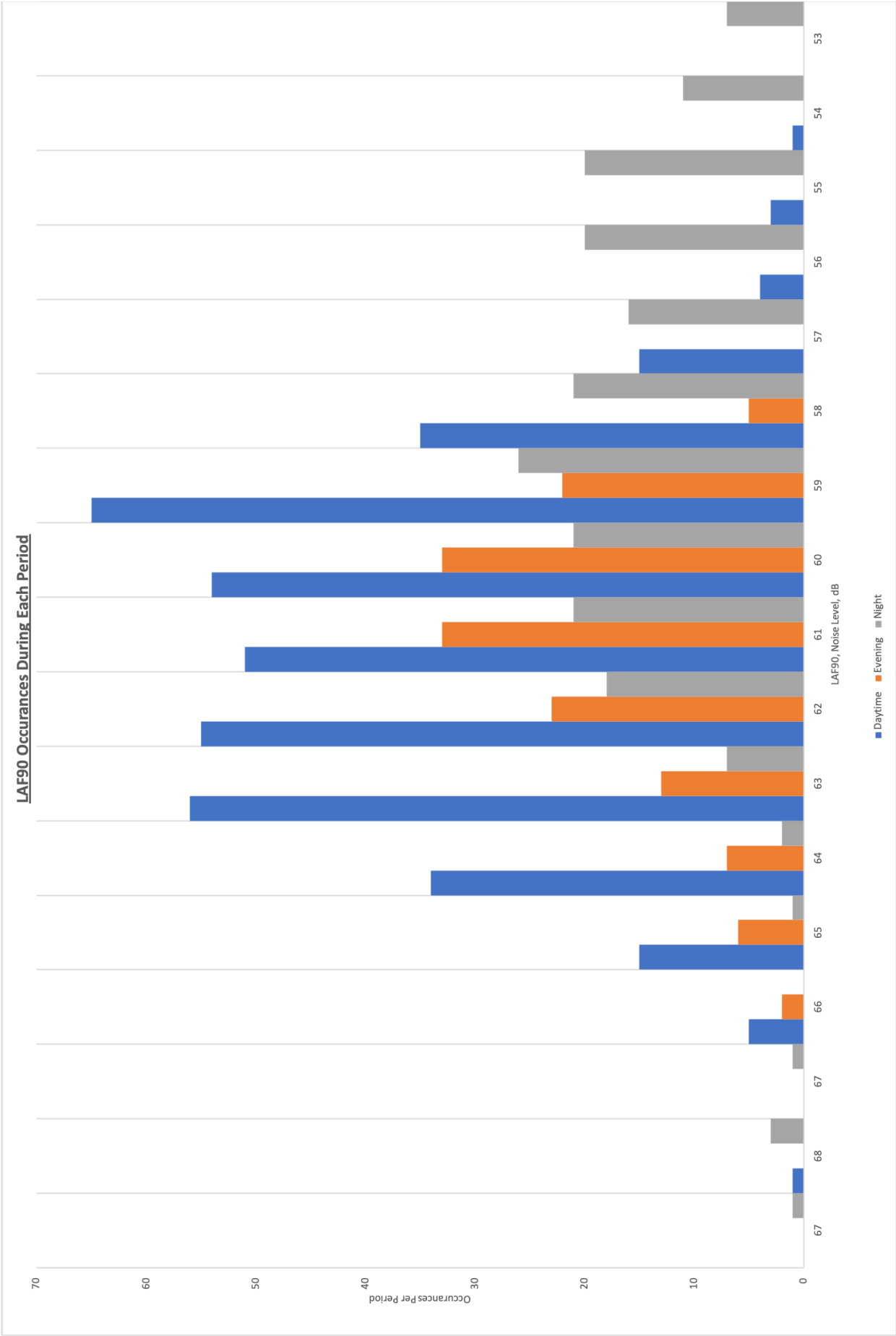
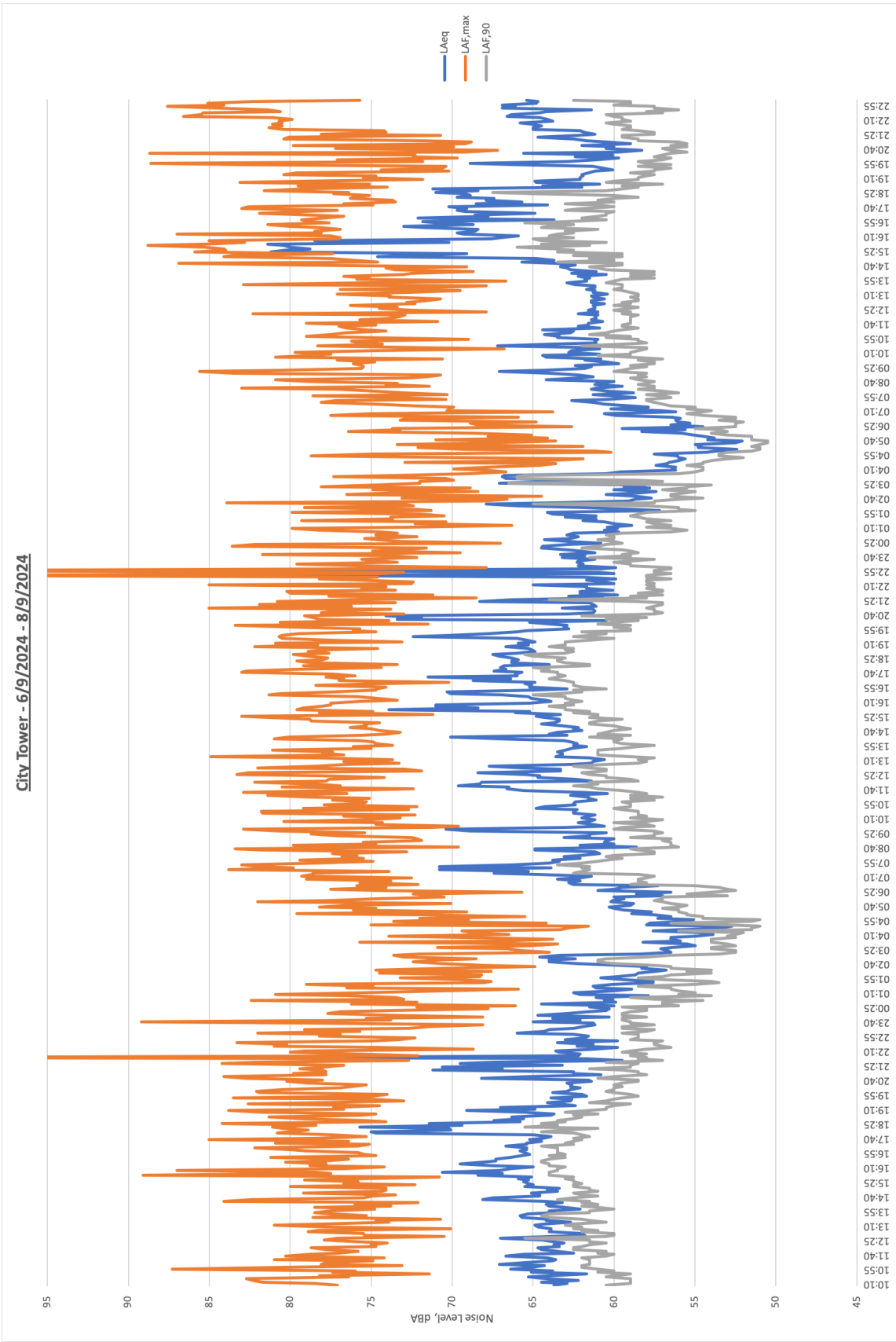
Noise levels that are more than 10dB below the measured background would equate to the No Observed Effect Level (NOEL).

Setting plant noise limits in accordance with the requirements of the LA will result in noise levels between the LOAEL and the NOEL.

This assessment is carried out over a one-hour period for the daytime and a fifteen-minute period for the night-time. Day or night are not defined in the standard but it states that night should cover the times when the general adult population are preparing for sleep or are actually sleeping. For the purposes of this assessment, it is assumed that daytime and night-time are 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively.

BS4142 has been referenced in setting noise limits for any fixed plant proposed as part of the proposed development.

APPENDIX E: NOISE MEASUREMENT DATA



APPENDIX F: CALCULATION PROTOCOL VRF

Point Source, ISO 9613, Name: "VRF", ID: ""																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1	30550512.86	5926018.46	9.00	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	51.7	0.0	-3.0	0.0	0.0	5.2	0.0	0.0	-93.3
1	30550512.86	5926018.46	9.00	0	DEN	63	-26.2	0.0	0.0	0.0	0.0	51.7	0.0	-3.0	0.0	0.0	6.2	0.0	0.0	-81.1
1	30550512.86	5926018.46	9.00	0	DEN	125	57.9	0.0	0.0	0.0	0.0	51.7	0.0	-1.3	0.0	0.0	8.1	0.0	0.0	-0.6
1	30550512.86	5926018.46	9.00	0	DEN	250	69.4	0.0	0.0	0.0	0.0	51.7	0.1	-1.5	0.0	0.0	10.8	0.0	0.0	8.3
1	30550512.86	5926018.46	9.00	0	DEN	500	76.8	0.0	0.0	0.0	0.0	51.7	0.2	-1.5	0.0	0.0	13.7	0.0	0.0	12.8
1	30550512.86	5926018.46	9.00	0	DEN	1000	80.0	0.0	0.0	0.0	0.0	51.7	0.4	-1.5	0.0	0.0	16.3	0.0	0.0	13.1
1	30550512.86	5926018.46	9.00	0	DEN	2000	76.2	0.0	0.0	0.0	0.0	51.7	1.0	-1.5	0.0	0.0	18.9	0.0	0.0	6.1
1	30550512.86	5926018.46	9.00	0	DEN	4000	68.0	0.0	0.0	0.0	0.0	51.7	3.5	-1.5	0.0	0.0	21.1	0.0	0.0	-6.9
1	30550512.86	5926018.46	9.00	0	DEN	8000	59.9	0.0	0.0	0.0	0.0	51.7	12.6	-1.5	0.0	0.0	23.0	0.0	0.0	-25.9
1	30550512.86	5926018.46	9.00	0	DEN	A	83.1	0.0	0.0	0.0	0.0	51.7	0.6	-1.5	0.0	0.0	15.3	0.0	0.0	17.1