



**2 – 3 BOTLEY ROAD
FAIR OAK, EASTLEIGH
SO50 7ZH**

NOISE ASSESSMENT

FEBRUARY 2023



the journey is the reward

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NOISE ASSESSMENT

FEBRUARY 2023

Project Code:	26632 – PGBotleyRoad(N).9
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Issue Date:	February 2023
Status:	Ver. 1.0

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1 Introduction

- 1.1 Dominos Pizza UK and Ireland Limited has made a planning application for the change of use of Unit 2 and 3, Botley Road, Fair Oak from a betting shop (sui generis) to a hot food take away (sui generis). The application also seeks permission for the installation of ventilation/plant equipment and other external alteration.
- 1.2 The planning application is currently being determined by Eastleigh Borough Council (EBC). A consultation response has been provided by EMB's Pollution Control Team who have objected to the application on the grounds that:
- *“There is no demonstration on amenity impact from noise”;*
 - A noise impact assessment is required to demonstrate noise emissions from new building services plant;
 - *“.....there is no demonstration on impact to amenity from customers living above the front of house and pavement and park area from increased vehicles and frequent motorcycles”.*
 - *“There is no demonstration of how transmission on interior noise generated by the proposed kitchen and customer areas transmitted through the ceiling/floor structure will be within acceptable bounds”.*
- 1.3 Mayer Brown Limited has been instructed by Dominos Pizza UK and Ireland Limited to address the concerns expressed by EBC's Pollution Control Team.
- 1.4 This report is structured as follows:
- **Section 2** describes the location of the site and use of neighbouring buildings;
 - **Section 3** outlines the development proposals;
 - **Section 4** discusses relevant national and local planning policy and other supporting technical design standards;
 - **Section 5** presents the results of noise survey work undertaken to determine the existing noise environment at the site;
 - **Section 6** assesses plant noise emissions;
 - **Section 7** assesses operational noise transfer to adjoining flats;
 - **Section 8** assesses the impact of pizza deliveries and collections;
 - **Section 9** deals with delivery and staff management;

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- Conclusions are presented in **Section 10**.

1.5 A glossary of the acoustic terminology used in this report is attached at **Appendix A**.

2 Site Location

- 2.1 The application site is an existing retail unit of Use Class A1 located at 2 – 3 Botley Road, Fair Oak, Eastleigh. The location of the site is shown in **Figure 2.1** below.

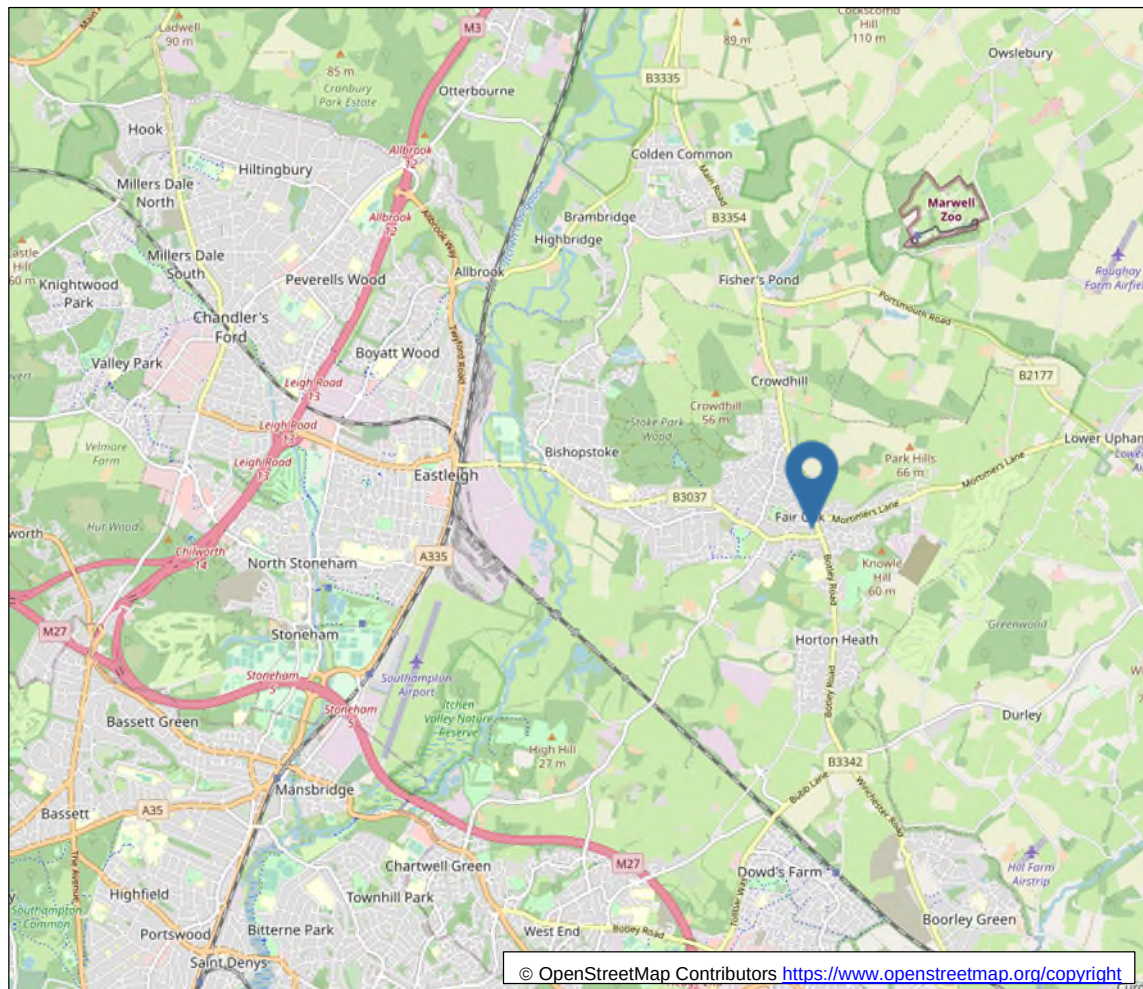


Figure 2.1: Site Location in Relation To Wider Transport Infrastructure

- 2.2 The site is located west of Botley Road and bounded by a commercial unit (The Barbers at Number One) to the north and Bakery (The Oven Door Bakery) unit to the south. Land usage on the opposing side of New Quay Road is predominantly residential.
- 2.3 The building is a two storey building with commercial uses on the ground floor and residential units on the first storey.
- 2.4 A public house (The Old George) is located approximately 40m north of the site

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2.5 **Figure 2.2** below shows the red line boundary of the site and nature of neighbouring land uses.



Figure 2.2: Site Location in Context of Neighbouring Land Uses

2.6 Generally, the site is located within an area built up of a mixture of commercial and residential properties.

3 Proposed Development

3.1 The proposed general arrangement of the takeaway is shown in **Figure 3.1** below.

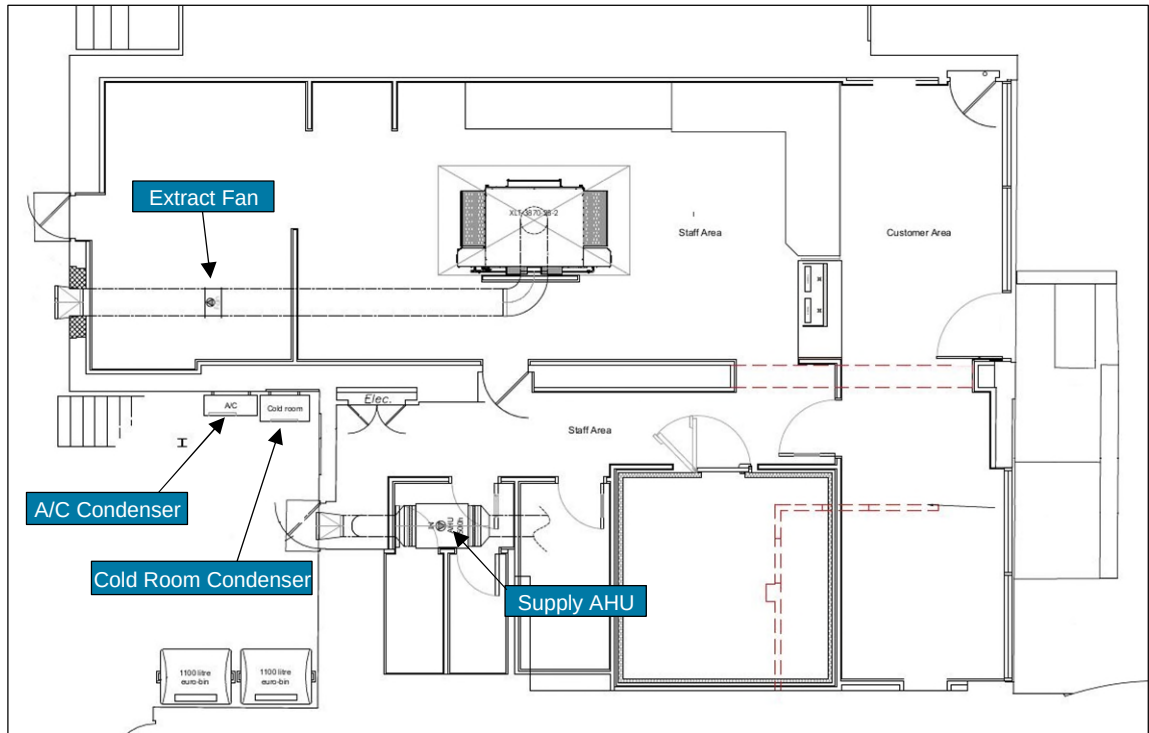


Figure 3.1: Proposed General Arrangement of Takeaway Unit

3.2 The unit will comprise a main kitchen area, ancillary welfare/storage facilities and a customer area to the front of the store accessed from Botley Road.

3.3 The proposed also include the installation of new building services plant including;

- A pizza oven extract fan - located internally within the unit and ducted to a grille on the external “rear” elevation of the unit
- A supply air handling unit – again located internally within the unit and ducted to a grille on the external “rear” elevation of the unit;
- A cold room condenser unit - located “beneath” the existing external stair case giving access to the first floor flats; and
- A air conditioning condenser unit – again, to be located “beneath” the existing external stair case giving access to the first floor flats.

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Context

- 3.4 Unit 2-3 Botley Road formerly operated as a betting (Coral bookmakers). Existing plant associated with this former use of the site was evident during a visual inspection of the site, as shown in the photographs below. An inspection of the Council's planning records indicate that this plant was authorised by virtue of planning permission granted in 2015 (EBC ref. F/15/75854).

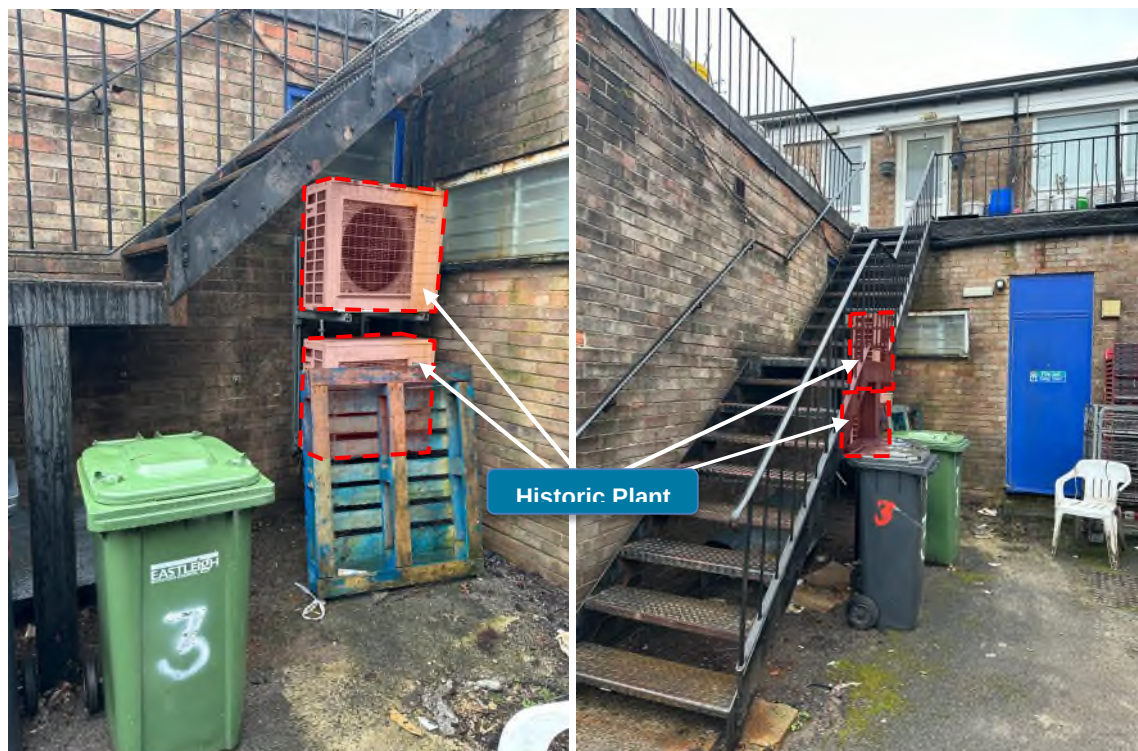


Figure 3.2: Historic Location of Condenser Units

- 3.5 We are unaware of any complaints made in relation to the existing plant. Given that the proposed condenser units are to be mounted in a similar location to the historic plant, the provision of new (appropriately attenuated) plant should not raise any particular planning concerns. Notwithstanding this, a detailed assessment of plant noise emission is presented later in this report.

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4 Planning Policy Context and Acoustic Design Criteria

National Planning Policy Framework

4.1 Current governmental guidance for the determination of planning applications is given in the “*National Planning Policy Framework*” (NPPF), published in July 2021.

4.2 Paragraph 174 of the NPPF advises:

“Planning policies and decisions should contribute to and enhance the natural and local environment by:

..... e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.

4.3 With specific regard to noise, paragraph 185 of the NPPF states:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

4.4 With regard to ‘adverse’ impacts and ‘significant adverse’ impacts, the NPPF directs the reader to the advice contained in DEFRA’s “*Noise Policy Statement for England*” (NPSE). This Policy Statement introduces the concept of a “*Significant Observed Adverse Effect Level*” (SOAEL), “*Lowest Observed Adverse Effect Level*” (LOAEL) and

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“No Observed Adverse Effect Level” (NOAEL). These are concepts aligned with toxicology outcomes derived from guidance given by the World Health Organisation.

Noise Policy Statement for England

- 4.5 Whilst the intent of the NPSE in relation to the NPPF is clear, the NPSE does not provide any quantitative threshold values for each identified level of “effect”. Indeed, the NPSE carefully highlights that:

“It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”

National Planning Practice Guidance

- 4.6 The application of national planning is amplified in the government’s “National Planning Practice Guidance” (NPPG) (July 2019). This seeks to help clarify understanding the perception of noise effects, potential outcomes of noise exposure and actions that should be taken to align decision making with the NPPF. In line with the NPPF concept of basing decision making on the identification of “adverse” or “significant adverse” impacts on health and quality of life, the NPPG aligns its guidance with the NPSE.
- 4.7 The table overleaf summarises this guidance:

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Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level (NOAEL)			
Present not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress or physiological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 4.1: PPG Noise Exposure Hierarchy Table

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- 4.8 To assist in quantifying when noise may have a particular effect, Paragraph 015 (Reference ID: 30-015-20190722) of PPG makes reference to a number of ‘industry standard’ guidance documents (including BS 8233: 2014). The paragraph does, however, clarify:

“Some of these documents contain numerical criteria. These values are not to be regarded as fixed thresholds and as outcomes that have to be achieved in every circumstance”.

Local Planning Policy

- 4.9 The Eastleigh Borough Local Plan 2016-2036 was adopted on 25 April 2022. It sets out the policies and plans to guide future development to 2036. It will be used to determine planning applications in the Borough and replaces the ‘saved’ policies in the Adopted Local Plan 2001-2011.

“Policy DM8, Pollution

Development will not be permitted if it is likely to cause loss of amenity or impact on public health or other unacceptable environmental impacts through:

- a. Air pollution (including odours or particulate emissions);*
- b. Pollution of surface, underground coastal waters or other watercourses;*
- c. Noise or vibration;*
- d. Light intrusion, both generally and with respect to the South Downs National Park’s status as an international Dark Night Skies reserve; or*
- e. Land contamination.*

...”

BS 4142

- 4.10 The consultation response from EBC’s Pollution Control Team makes specific reference to BS 4142: 2014. This standard has been superseded by a subsequent revision of the standard. The current standard is BS 4142: 2014:+A1:2019: *“Methods for Rating and Assessing Industrial and Commercial Sound”*.
- 4.11 As noted earlier, this standard provides a rating and assessment methodology for assessing the potential adverse impact of industrial and commercial noise sources on neighbouring dwellings.

Noise Assessment

- 4.12 The assessment procedure initially compares the '**Rating Level**' of the source with the '**Background Noise Level**' when the source is not present.
- 4.13 The '**Rating Level**' (L_{Ar}) referred to is the specific noise level of the noise source under investigation (in terms of the L_{Aeq} noise index), to which corrections are applied if the noise has certain audible characteristics. The following corrections (based on a subjective assessment of noise source characteristics) is given:

Character Correction				
Feature / Perception	Tonality	Impulsivity	Intermittency	Other acoustic characteristics
Just Perceptible	+2dB	+3dB	When the specific sound has identifiable On/Off conditions that are readily distinctive. +3dB	+3dB
Clearly Perceptible	+4dB	+6dB		
Highly Perceptible	+6dB	+9dB		

Table 4.2: BS4142 Character Correction for Rating Level Calculation

- 4.14 The 'Background Noise Level' (L_{A90}) represents the noise level that is exceeded for 90% of the stated measurement period. For assessment purposes, the background noise level needs to be determined without the noise source under investigation operating.
- 4.15 The time of operation needs to be taken into account. During the day (normally taken to be 07.00 to 23.00 hours) a one-hour measurement period is considered appropriate. During the night (normally taken to be 23.00 – 07.00 hours) a 15-minute time period is normally used.
- 4.16 The following guidance is then offered based on the outcome of this initial assessment:
- 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

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sound level, this is an indication of the specific sound source having a low impact, depending on the context.

4.17 As noted in section 4, national planning policy directs that adverse noise impacts should be mitigated and reduced to a minimum and that “*significant*” noise impacts should be avoided. If the guidance of BS 4142:2014 + A1: 2019 is aligned with these objective, it can be concluded that:

- A “*significant*” noise impact (i.e. sound above a SOAEL) is likely where the rating level ($L_{A,r,T}$) of noise is 10dB or more above the background noise level ($L_{A90,T}$); and
- A “*low*” noise impact (i.e. sound above a LOAEL) is likely where the rating level does not exceed the background level.

4.18 A note accompanying the guidance of BS 4142: 2014 + A1: 2019 states:

“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.”

4.19 The initial estimate of the impact should then be modified to account for its context. Such considerations include:

- The absolute level of the sound - the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low. Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.
- Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.
- The character and level of the residual sound compared to the character and level of the specific sound.

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- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

5 Existing Noise Environment

5.1 Existing baseline noise levels at the site have been established using an automated noise survey. Noise levels were monitored at two locations shown in **Figure 5.1** below and described in **Table 5.1** overleaf.



Figure 5.1: Noise Monitoring Locations

Monitoring Location	Description
A1	To the “rear” of the site. The measurement microphone was positioned on the first-floor terrace of 2 Botley Road, approximately 1.5m above “floor” level, mounted to railings in broadly free field conditions.
A2	The measurement microphone was fixed to an existing flagpole at 1 st floor level approximately 3m above ground level. Measurements will include reflection effects of the façade of the property.

Table 5.1: Description of Noise Measurement Location

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Measurement Instrumentation

5.2 The following measurement instrumentation was used:

Description	Make	Model	Serial No.	Calibration Date
Sound Level Meter	Svantek	SVAN971	72535	04/07/2022
Microphone	ACO Pacific	7052E	68261	
Preamplifier	Svantek	SV18	72232	
Calibrator	Bruel and Kjaer	Type 4231	2513115	16/03/2022
Sound Level Logger	Con. Instr	NSRT_MK3	CnvcrdU4UXUVijngx+j xID	Traceable to in house standards

Table 5.2: Measurement Instrumentation

5.3 The sound level analysers were field calibrated prior to the survey and checked upon completion. No drift in the calibration of the meter was observed.

Survey Procedure

5.4 The sound level analyser at Position A1 was configured to measure the L_{A90} , L_{Aeq} , L_{A10} and $L_{Amax,fast}$ noise indices over consecutive 15 minute time periods. The equipment was also configured to log at a higher (1 second) resolution to assist with the discrimination of noise events, in addition to audio recordings to assist with source identification.

5.5 The sound level analyser positioned at A2, was configured to continuously log “fast” A-weighted sound pressure levels at a resolution of 1 second. The data has been post-processed using Convergence Instruments “NSRT-AutoCalc” software to determine 15 minute $L_{Aeq,15min}$ and L_{Amax} noise metrics

Measurement Results

5.6 The results of the automated noise monitoring are presented in **Figure 5.4** and **5.5** overleaf. Higher resolution copies of the time history graphs are also attached at **Appendix B**.

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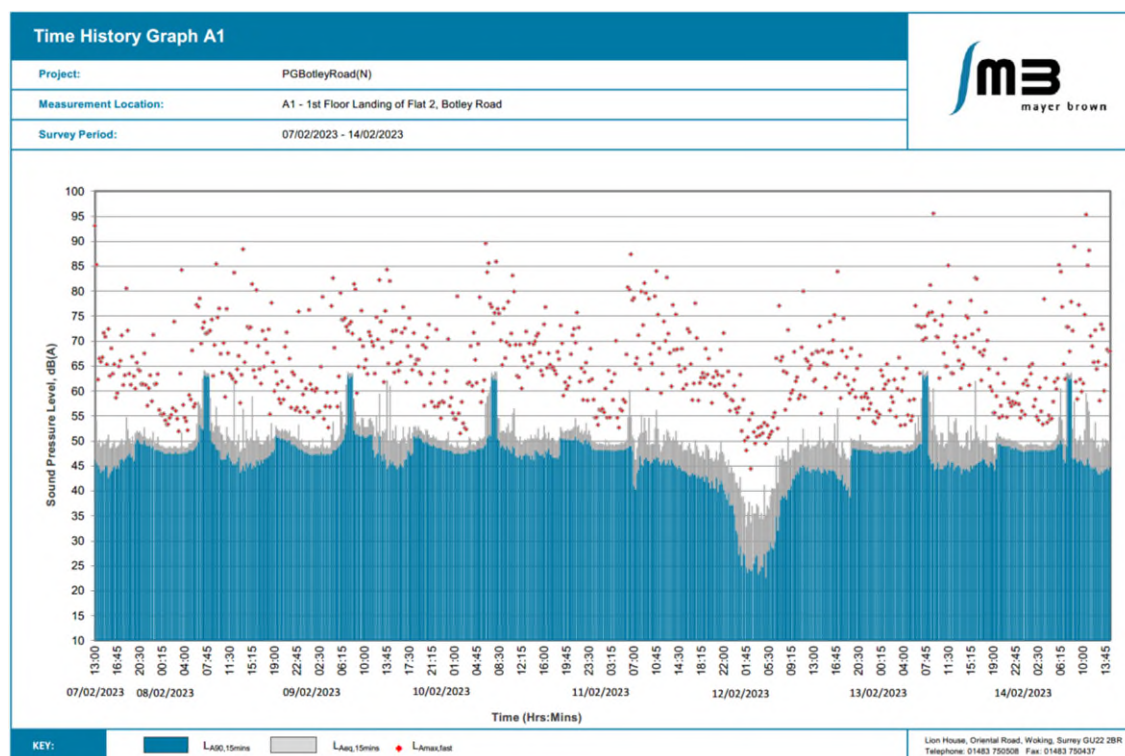


Figure 5.4: A1 Measurement Results Graph

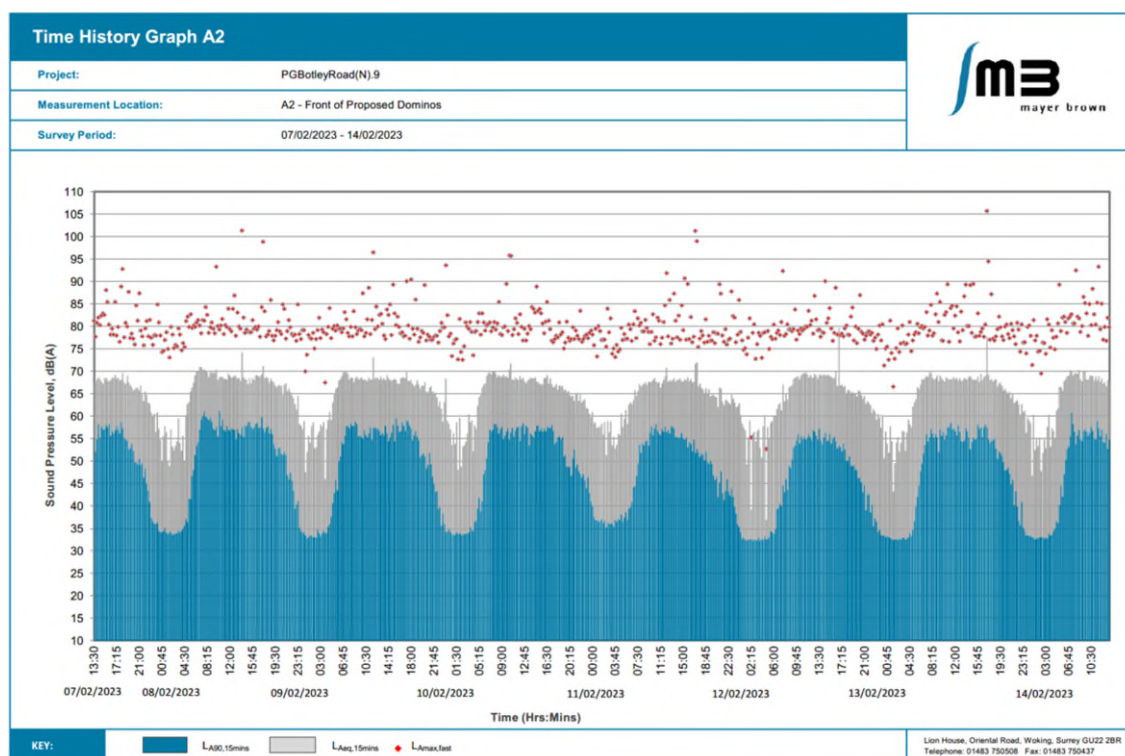


Figure 5.5: A2 Measurement Results Graph

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Automated Noise Data

5.7 The measurement data has been post-processed to determine typical daytime ($L_{Aeq,16hr}$) and night-time ($L_{Aeq,8hr}$) values. These are summarised in **Table 5.3** and **5.4** below:

A1	Day-time $L_{Aeq,16hr}$ (07:00 – 23:00)	Night-Time $L_{Aeq,8hr}$ (23:00 – 07:00)
07/02/2023	*55	51
08/02/2023	56	51
09/02/2023	56	52
10/02/2023	55	52
11/02/2023	50	40
12/02/2023	50	50
13/02/2023	55	51
14/02/2023	*57	--
*First day and last day of the monitoring are not full period, calculated using data available.		

Table 5.3: A1 Estimated Daytime $L_{Aeq,16hr}$ and Night-time $L_{Aeq,8hr}$ Noise Levels

A2	Day-time $L_{Aeq,16hr}$ (07:00 – 23:00)	Night-Time $L_{Aeq,8hr}$ (23:00 – 07:00)
07/02/2023	*67	63
08/02/2023	69	63
09/02/2023	68	63
10/02/2023	68	59
11/02/2023	67	60
12/02/2023	68	61
13/02/2023	68	63
14/02/2023	*69	--
*First day and last day of the monitoring are not full period, calculated using data available.		

Table 5.4: A2 Estimated Daytime $L_{Aeq,16hr}$ and Night-time $L_{Aeq,8hr}$ Noise Levels

Weather

5.8 Weather conditions were not actively measured during the survey, however, observations at the time of site attendances and publicly available historic online data

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indicate that weather conditions were typically characterised as set out in **Table 5.5** overleaf:

2023	Temp. (°C)	Humidity (%)	Wind Speed (kp/h)	Wind Direction	Pressure (hPa)		Rainfall (mm)
February	Avg.	Avg.	Avg.	Avg.	Max	Min	total
07	4	81	2	N	1037	1036	0
08	3	81	2	SSE	1034	1029	0
09	5	90	1	N	1035	1029	0
10	6	78	5	WSW	1036	1034	0
11	10	77	3	N	1035	1034	0
12	8	86	4	E	1036	1033	0
13	8	83	6	SE	1032	1030	0
14	8	83	3	SE	1030	1026	0

Table 5.5: Weather Conditions During Survey

Discussion

- 5.1 Noise levels at Position A2 (overlooking Botley Road) were dominated by traffic noise from Botley Road.
- 5.2 Lower levels of traffic noise were measured at Position A1 (to the rear of the unit) due to the inherent screening afforded by the intervening building. Noise levels were therefore dominated by general activity in the service yard area to the rear of the units; noise “break-out” from the bakery at no. 4 Botley Road (which was observed to operate with its rear door open) and delivery activities associated with the bakery (which are clearly evident on **Time History Graph A1**, which show a significant daily increase in noise levels at around 07.00 hours). The graphs also indicate that background noise levels may also be being influenced by existing plant in the locality (this is also confirmed from scrutiny of the audio recordings). Whilst such noise was not observed during site attendance, it would seem plausible (based on the magnitude and operating times of the plant), that this is associated with the overnight operation of plant at the bakery.

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6 Plant Noise Assessment

- 6.1 As noted in section 3, the proposed development will include the installation of an extract fan, supply air handling unit, cold room condenser and air conditioning condenser unit. The extract fan and supply air handling unit are to be located internally within the store and ducted to an external grille, whilst both condenser units will be installed externally below the existing external staircase (as illustrated in **Figures 3.1** and **3.2** earlier in this report).

Plant Noise Data

Manufacturer's noise data for the proposed plant is summarised in **Table 6.1** below:

Plant	Data	Octave Band Sound Level								dB(A)
		63	125	250	500	1k	2k	4k	8k	
Cold Room Condenser (Karbox 2464)	L _p @1m	41*	48*	52*	54*	52*	48*	43*	36*	56
Air Conditioning Condenser (Mitsubishi FDC100VNZ.TH)	L _p @ 1m	35	42	46	48	46	42	37	30	50
Supply Air Handling Unit (Air Vent Technology Model 5)	L _w (In-Duct)	77	79	73	74	77	77	74	69	82
Extract Fan (Vent Axia Black Sabre BSC500/4)	L _w (In-Duct)	80	79	76	72	75	75	68	62	80
Notes: L _p = Sound Pressure Level, dB re 20μPa L _w = Sound Power Level, dB re 1pW * = Assumed octave band value, equivalent to manufacturer's stated octave band value										

Table 6.1: Plant Noise Data

- 6.2 Manufacturer's published literature certifying the above noise data is attached at **Appendix C**.
- 6.3 It is understood that the kitchen extract fan, supply air handling unit and air conditioning condenser unit will only operate during the opening hours of the store (11am to 11pm). The cold room condenser unit could operate any time (24/7)

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Noise Sensitive Receptors

- 6.4 As noted in section 3, there are existing flats at first floor level above the existing ground floor commercial uses at Units 1-4 Botley Road. Given that all plant associated with the proposed use is to be installed (or ducted) to the rear of the property, the closest noise sensitive receptors will be the existing first floor flat.
- 6.5 **Figure 6.1** below presents a rear elevation of the building showing the plant locations and closest windows. Plant will be assessed to the “worst case” window annotated as “R1”.
- 6.6 It should however be noted that the ground floor of Unit 2 and 3 actually project beyond the first floor elevation of the building. As such, windows will not have a direct “line of sight” to any of the plant, which will be visually (and acoustically) screened by the first floor walkway outside of the flat. The locat

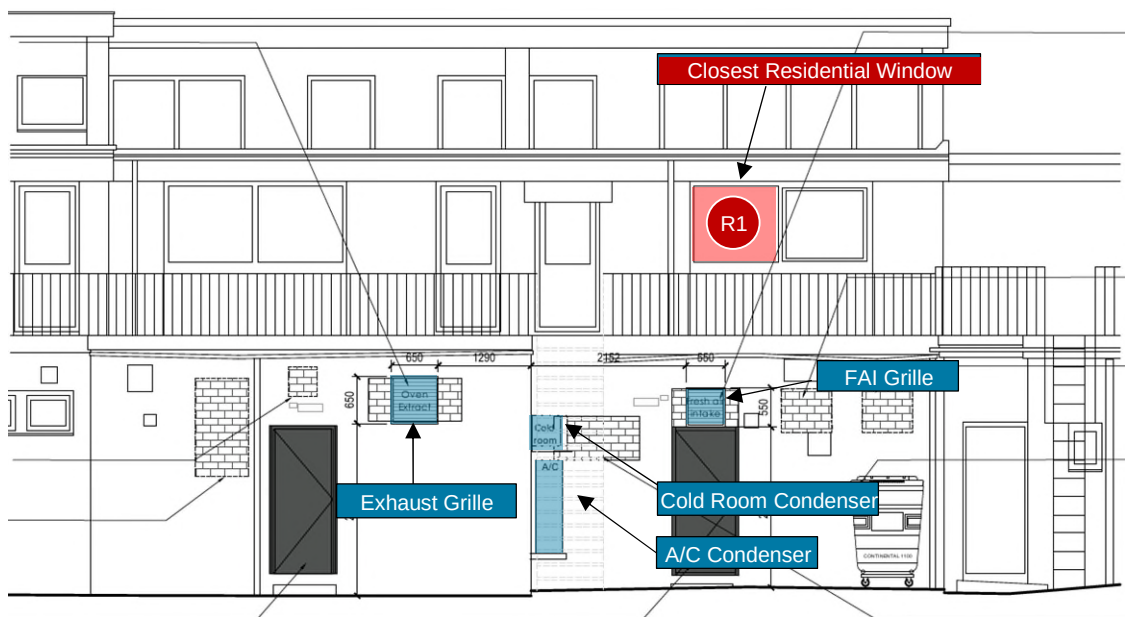


Figure 6.1: Location of Noise Sensitive Receptor: Flat Above Unit 3

Background Noise Levels

- 6.7 The measurements data obtained at Position A1 has been statistically analysed to determine “typical” daytime and night-time background (L_{A90}) noise levels. These analyses are presented in **Figures 6.3** and **6.4** overleaf.

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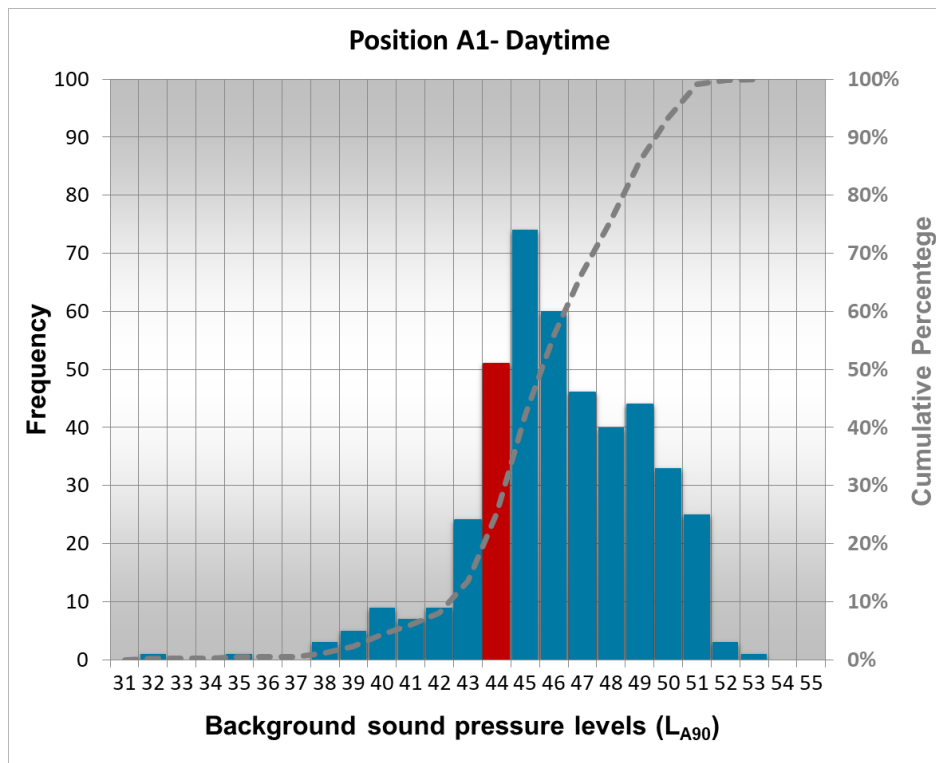


Figure 6.2: A1 - L_{A90} Statistical Analysis – Daytime

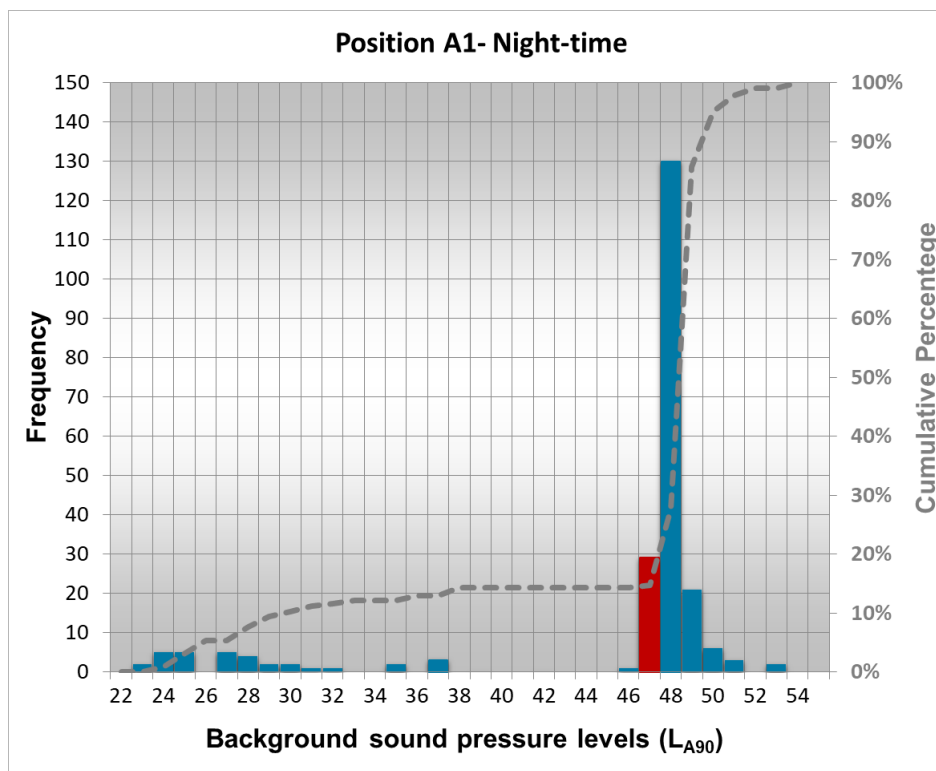


Figure 6.3: A1 - L_{A90} Statistical Analysis – Night-time

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- 6.8 The statistical distribution for daytime hours (07.00 to 23.00 hours) shows a relatively normal distribution of measured values, from which a value of **44dB** L_{A90} is considered to be representative background noise level.
- 6.9 The distribution of results for the night-time period show a rather unusual distribution of sound levels, with a value of **48dB** L_{A90} being exceeded for around 85% of the time, but with some distribution of significantly lower noise levels (30dB L_{A90}). This “skewed” dataset results from existing plant influencing the measurements (as noted in paragraph 5.2 above). This finding clearly gives rise to some awkwardness when seeking to establish an appropriate design target, since if the full dataset is assessed, this implies a night-time design target that would be higher than the daytime value, but conversely if criteria are set on the basis of background noise levels characterising the site when existing plant is not operating, would imply very low levels of background noise.
- 6.10 In order to provide a pragmatic and practicable approach to ensuring noise emissions from new plant associated with the proposed development, it is considered relevant to refer to the guidance of BS 4142: 2014 + A1: 2019 which requires the “context” of any assessment to be considered. Context can include such matters as the absolute magnitude of the noise, the character of the noise relative to existing environment and the likely sensitivity of a receptor taking account of any existing embedded mitigation.
- 6.11 A consideration of the absolute magnitude of noise is considered to be particularly apposite for this site, given that existing night-time background noise levels (when existing plant is operating) are low. In such circumstances, BS 4142 notes:
- “....For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*
- Where background sound levels and rating sound levels are low, absolute level might be as, or more, relevant that the margin by which the rating level exceeds the background. This is especially true at night.....”*
- 6.12 Whilst the current version of BS 4142 does not provide a quantitative definition as to what constitute a “low” level of background noise, the earlier (1997) version of the standard suggests a value of 30dB L_{A90} would be considered to be a very low background noise level. It follows that the night-time background noise levels measured when existing plant operating can be considered low. It is therefore likely to be more

Noise Assessment

appropriate to consider setting a night-time noise emissions limit as an absolute value, rather than a value that is relative to a low level of background noise.

6.13 The World Health Organisation's *"Night Noise Guidelines for Europe"* include specific guidance on "absolute" magnitudes of noise that represent a night-time LOAEL value, i.e. a night-time value of 40dB $L_{Aeq,8hour}$. It is important to note that WHO includes in its definition of 'community noise', sources such as *"road, rail and air traffic, industries, construction and public work, and the neighbourhood"*. It is therefore clear that WHO guidance does not specifically exclude industrial noise from the sources intended to be captured by stated guideline values.

6.14 Notwithstanding this and in order to ensure a rigorous indicator, it is considered appropriate to align absolute design targets with the numerical guidance values indicated by the WHO, using:

- Use a shorter measurement reference period which will help provide a more appropriate measure of any intermittent periods of industrial activity (e.g. adopting the reference assessment periods promoted in BS 4142: 2014 (i.e. a one hour assessment period during the daytime and a 15 minute assessment period during the night); and
- Apply corrections to account for the character of the noise (e.g. tonality, intermittency, etc.). Again, the guidance of BS 4142 is considered to represent an appropriate methodology for applying such corrections.

Plant Noise Assessment

6.15 Calculations have been undertaken in general accordance with *"ISO:9613- 2:1996 – The attenuation of sound during propagation outdoors: Part 2 General Method of Calculation"* and are based on manufacturers technical datasheets, aerial photography and general site observations regarding building heights and other features that may influence noise propagation.

6.16 Corrections have been applied to account for directivity of the noise source relative to the receiver, where these are 'off axis'.

6.17 To ensure a robust assessment, daytime calculations assume that all plant will operate simultaneously and continuously. Night-time calculations assume the extract fan, fresh air supply fan and air conditioning units will not be operating, but the cold room condenser unit will operate continuously through the night.

Noise Assessment

- 6.18 The proposed oven extract system is to be fitted with an attenuator offering the following minimum insertion loss performance:

Recommended Dynamic Octave Band Sound Pressure Level Insertion Loss							
63	125	250	500	1k	2k	4k	8k
5	11	19	29	36	37	29	18

Table 6.2: Recommended Attenuator for Oven Extract System

- 6.19 The fresh air supply fan system should also be fitted with an atmospheric side attenuator offering the following minimum insertion loss performance:

Recommended Dynamic Octave Band Sound Pressure Level Insertion Loss							
63	125	250	500	1k	2k	4k	8k
6	13	23	37	43	44	35	20

Table 6.3: Recommended Attenuator for Kitchen Supply System

- 6.20 In order to minimise potential reflections and noise build up from the external walls, it is recommended that an acoustically absorptive wall lining is applied to the external walls, as shown in **Figure 6.5** below.

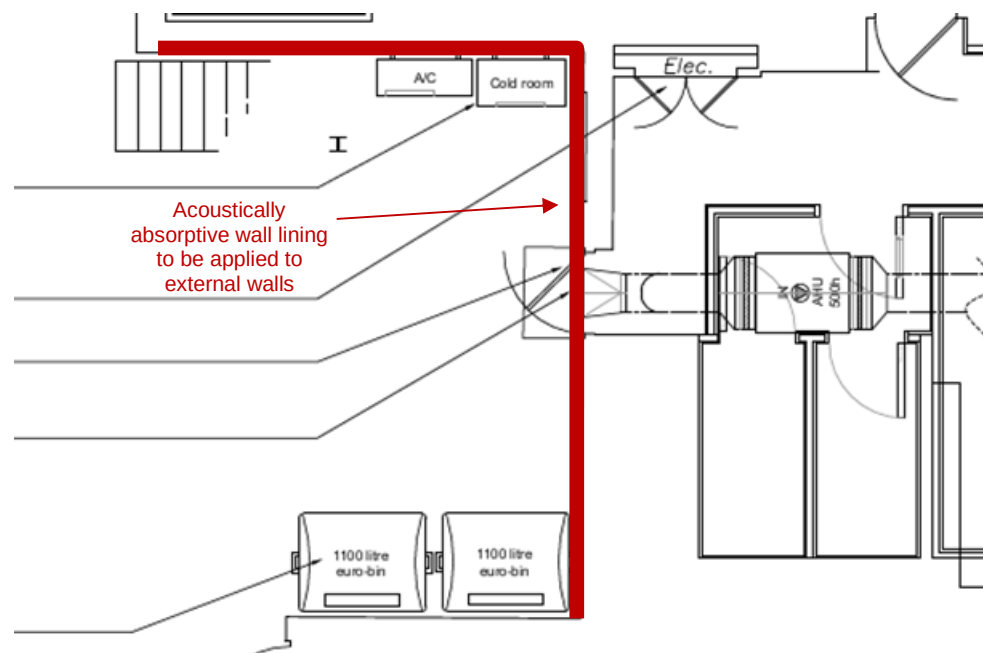


Figure 6.5: Recommended Acoustically Absorptive Wall Lining

Noise Assessment

6.21 An outline specification for the wall lining is attached at **Appendix D**.

Predicted Noise Levels

6.22 With the above noise control implemented, the following noise levels are calculated at the adopted receptor locations. Given the magnitude of the noise and character of existing noise levels, it is considered unlikely that the calculated specific plant sound levels will have a character that will serve to attract attention.

Assessment Time	Predicted Rating Noise Level, $L_{Aeq,T}$ dB
Daytime (07.00 to 23.00 hours)	37
Night-time (23.00 to 07.00 hours)	35

Table 9.4: Daytime Predicted Noise Levels

6.23 Summary calculations supporting the above are attached at **Appendix E**.

Daytime

6.24 The predicted rating sound level is 37dB $L_{Ar,T}$.

6.25 The representative daytime background sound level determined from the noise monitoring was 44dB $L_{A90,T}$.

6.26 The predicted sound level is therefore 7dB(A) lower than the background noise levels. Plant noise emissions are therefore considered to be below a LOAEL and consistent with “no observed adverse effect” when viewed in the context of governmental planning practice guidance.

Night-time

6.27 The predicted rating sound level is 33dB $L_{Ar,T}$.

6.28 The predicted sound level is 7dB(A) lower than the value of 40dB(A) indicated in WHO guidelines as a LOAEL for night-time noise. It is therefore concluded that night-time noise would also be consistent with a “no observed adverse effect” level.

6.29 The above conclusion would also appear to be supported by the fact that the actual background noise levels at the site are in the order of 48dB $L_{A90,T}$ for over 85% of the period covered by our noise monitoring (due to noise emissions from existing plant). It follows that for the majority of the time, noise emissions from the proposed building services systems will actually be 15dB(A) lower than the background noise level that currently characterises the site for over 85% of the time.

Noise Assessment

Vibration Isolation

- 6.30 In order to minimise the risks of vibration and structureborne sound transmission from the proposed plant, it is recommended that:
- All plant is installed on proprietary anti-vibration mountings offering a minimum isolation efficiency of 95% under proposed operating conditions;
 - Flexible connections are made between fans and ductwork;
 - Ductwork suspended from the first floor structure and fixed to external walls are resiliently supported to avoid vibration transmission;
 - Duct penetrations are appropriate sealed to minimise flanking sound transmission/vibration transmission;
 - Electrical connections to plant are made via looped flexible conduit.

Noise Assessment

7 Operational Noise

- 7.1 This section addresses EBC's concern in relation to the transmission of airborne noise from the takeaway unit into the residential flat above.

Source Noise Levels

- 7.2 In order to determine existing 'source' noise levels that may be generated by the proposed use, noise monitoring was undertaken at an existing, operational Dominos takeaway at 73 Stoney Lane, Winchester, 2022 6EW.
- 7.3 Automated noise monitoring was undertaken over a notional five-day period between approximately 11:00 hours on Friday 3 February 2023 to 12:45 hours on Tuesday 07 February 2023, i.e. covering a complete weekend period when the restaurant was likely to be busiest.
- 7.4 Noise levels were monitored in the main kitchen area with the measurement microphone fixed to an delivery preparation station positioned approximately 2m above ground floor level.

Instrumentation

- 7.5 The following instrumentation was use for the survey;

Description	Make	Model	Serial No.	Calibration Date
Sound Level Analyser	Svantek	SVAN971A	121150	15/07/2021
Microphone	ACO Pacific	7152	81385	
Preamplifier	Svantek	SV18A	121283	
Calibrator	Brueel and Kjaer	Type 4231	2513115	16/03/2022

Table 7.1: Measurement Instrumentation

- 7.6 The measurement equipment is fully calibrated to national traceable standards, with current calibration certificates available upon request.
- 7.7 The sound level analyser was checked prior to the survey and the field calibration checked upon completion. No drift was found to have occurred.

Survey Procedure

- 7.8 The sound level analyser was configured to measure the L_{A90} , L_{Aeq} , L_{A10} and $L_{Amax,fast}$ noise indices over consecutive 15 minute time periods, together with corresponding

Noise Assessment

octave band frequency spectra to provide more detailed information regarding the frequency characteristics of measured sound levels. The meter was also configured to log noise levels at a higher (1 second) resolution to enable identification of noise “events” within the time history profiling and make contemporaneous audio recordings to assist with discriminating the source of such events.

- 7.9 Based on discussions with management of restaurant, the peak trading period during the period surveyed occurred on Saturday evening between approximately between 18.00 to 20.00 hours. This is clearly evident in **Figure 6.1** below which shows the measured variation of noise levels over the complete day for Saturday 4th February 2023.

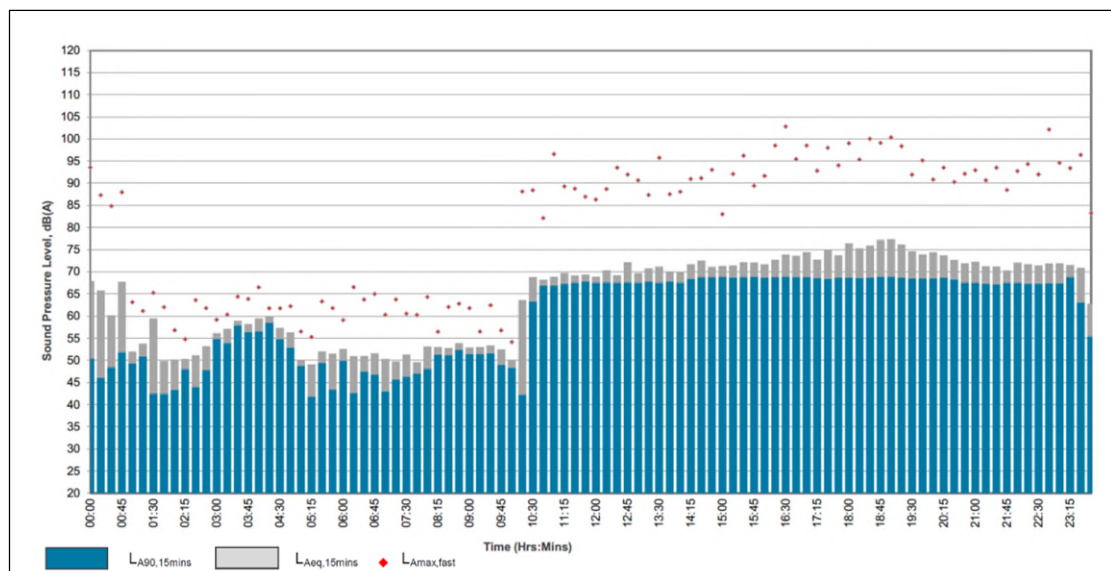


Figure 7.1: Measurement Results - A1

- 7.10 Contemporaneous audio recordings made during the survey confirm that noise levels measured are generally dominated by the general “hum” of the kitchen extract system and pizza oven as well as employee and customer conversational noise, and food service activities.
- 7.11 In order to provide a robust assessment the data has been analysed to identify the ‘loudest’ 15 minute period recorded during the duration of the survey. As such it is proposed to adopt the following typical source noise levels for assessing noise from the restaurant.

Noise Assessment

Measured Octave Band Sound Level (dB) L _{Aeq,15mins}								
63	125	250	500	1k	2k	4k	8k	"A"
73	76	74	73	72	71	68	65	77

Table 7.2: Operational Noise Levels for Takeaway

Existing Sound Insulation

- 7.12 In order to determine existing levels of sound insulation between the ground floor of the proposed Dominos unit and the residential unit above, a sound insulation test was undertaken in general accordance with the methodology of BS EN ISO 140-4:1998 *"Acoustics - Methods of Measurement of Sound Insulation in Buildings and of Building Elements. Part 4: Field Measurements of Airborne Sound Insulation Between Rooms"* and Annex B of Approved Document E of the Building Regulations 2010 (as amended).
- 7.13 The test used the existing betting shop as the "source" room and the living room of the flat above as the "receive" room.
- 7.14 The following instrumentation was used:

Equipment	Manufacturer	Type	Serial No.	Laboratory Calibration Date
Sound Level Analyser	NTi	XL2-TA	A2A-13108-E0	16/03/2022
Preamplifier	NTi	MC230A	6832	
Microphone	NTi	M2230A	A14228	
Calibrator	Brüel and Kjaer	Type 2231	24651766	
Cabinet Speaker	ProSound	N89EE	171010	n/a
Signal Generator	NTi	Minirator	G2P-RAFPS-G0	n/a

Table 7.3: Airborne Sound Insulation Test Equipment

Test Procedure

- 7.15 The loudspeaker was located within the "source" room and fed with "pink noise". The resulting sound pressure levels were then measured within the "source" room and within the "receive" room on the opposite side of the floor under test. Two sound source locations were used to seek to provide as diffuse a sound field as possible. Five static microphone measurement positions were used in the "source" room and in the "receive"

Noise Assessment

room for each of the three sound source locations. Each set of results was averaged in accordance with the test standard.

- 7.16 Background noise levels and reverberation times were also measured within the “receive” room. The reverberation time measurements were undertaken in accordance with BS EN 20354:1993. The measurements were undertaken using the “gated” output of the signal noise generator to provide bursts of “pink noise” from which the reverberation decay times are calculated. For the sound pressure level measurements the analyser was set to average the L_{eq} sound pressure level over a ten second period.

Test Results

- 7.17 Based on the average measured source and receive sound pressure levels and reverberation time measurements, the “Standardised Level Differences (D_{nT})” over the frequency range 100 to 3150Hz have been calculated. The measurement results have then been “weighted” in accordance with BS EN ISO 717-1:1997: “Acoustics - Rating Of Sound Insulation in Buildings and of Building Elements: Part 1: Airborne Sound Insulation”. The following airborne sound insulation values were measured:

Ref.	Measured Airborne Sound Insulation, $D_{nT,w} + C_{tr}$ (dB)
Test 1	57
Note: The measurement is considered to be provide a conservative result, being at the “limit of measurement” due to existing background noise levels characterising the receive rooms at the time of the sound insulation testing.	

Table 7.4: Airborne Sound Insulation Test Results

Discussion

The Building Regulations 2010

- 7.18 Requirement E1 of Approved Document E of the Building Regulations 2010 (as amended) requires that:

“Dwelling-houses, flats and rooms for residential purposes shall be designed and constructed in such a way that they provide reasonable resistance to sound from other parts of the same building and from adjoining buildings.”

- 7.19 In Section 0, the Regulations state:

“In the Secretary of State’s view the normal way of satisfying Requirement E1 will be to build separating walls, separating floors, and stairs that have a separating

Noise Assessment

function, together with the associated flanking construction, in such a way that they achieve the sound insulation values shown in Tables 0.1a...

7.20 It is understood that the flats above the proposed Dominos store would have been originally constructed as residential dwellings and would therefore have been created in line with Requirement E1 of Approved Document E.

7.21 Approved Document E prescribes the following minimum airborne sound insulation standard for party walls and separating floors:

Structure	Airborne sound insulation $D_{nT,w} + C_{tr}$ (dB) (minimum values)
Floors	45

Table 7.5: Approved Document E Performance Requirements

7.22 The airborne sound insulation tests therefore indicate that the sound insulation from the partying floor determined from the test provides a level of sound insulation that exceeds the minimum ADE requirements for “new build” separating floors by 12dB. In subjective terms, this would mean that the existing separating floor provides a performance that is twice as good as the minimum ADE requirement.

Sound Transmission

7.23 In addition to providing context regarding the sound insulation performance of the separating structure, consideration can also be given to the resulting magnitude of operational noise from the takeaway into the flat. This is summarised in Table 7.6 below:

	Measured Octave Band Sound Level (dB) $L_{Aeq,15mins}$					
	125	250	500	1k	2k	4k
Source Level, $L_{eq,15mins}$	76	74	73	72	71	68
Measured Sound Level Difference, $D_{n,T}$	43	47	53	52	58	55
Receive Level in Flat, $L_{eq,15mins}$	33	27	20	20	13	13

Table 7.6: Calculation of Noise Transfer to 1st Floor Flat

7.24 The above values equate to an overall sound level of 25dB(A).

Noise Assessment

- 7.25 Guidance in BS 8233: 2014: “Guidance on Sound Insulation and Noise Reduction” for dwellings recommends that internal noise levels in dwellings do not exceed a level of 35dB $L_{Aeq,16hour}$ (daytime) and 30dB $L_{Aeq,8hour}$ (night-time).
- 7.26 In light of the above it can be concluded that the existing separating structure between the Units 2 and 3 and the first floor flat above should provide adequate sound insulation that should effectively reduce operational noise from the proposed takeaway unit to acceptable levels.

Site Inspection

- 7.27 A superficial inspection of the separating floor comprised of a suspended mineral fibre ceiling system suspended to a concrete slab above.
- 7.28 **Figures 8.1** below and overleaf provide a photographic record of the observed floor/ceiling structures.

Figure 8.1: In-situ Floor Structure

Mineral fibre ceiling
suspended below solid
concrete slab.



- 7.29 The fit-out proposals for the proposed takeaway unit would retain a similar approach to construction and this similar levels of sound insulation to those tested between the existing betting shop and first floor flat can be expected.

Noise Assessment

8 Delivery Noise Assessment

- 8.1 The consultation response provided by EBC's Pollution Control Team raises specific concern relating to noise associated with pizza deliveries and customer collections.
- 8.2 It is understood that all pizza deliveries will leave via the front of the shop and will be made by drivers using cars (not motorcycles/mopeds).
- 8.3 The delivery and customer collection numbers used in the assessment have been taken from the Mayer Brown Transport Assessment and represent the typical 'worst case' busiest 1-hour period, and therefore should provide a worst-case scenario for the magnitude of impact. The delivery number used within the assessment are presented in **Table 8.1** below:

Time	Number of Vehicles (Delivery)	Number of Vehicles (Collection)	Total
18:00-19:00	33	16	49

Table 8.1: Proposed Delivery Numbers

- 8.4 Noise levels for the single noise event associated with a delivery have been previously measured by Mayer Brown's noise team and the values are presented below in **Table 10.2** below:

Activity	Measured Sound Level @ 3m L_{AE}
Car engine start / pulling away	64
Car door open/close	71

Table 8.2: Single Event Level Associated with Customer Deliveries

- 8.5 The L_{AE} noise index represents the total amount of sound energy associated with an individual noise event and allows the equivalent sound level ($L_{Aeq,T}$) for a known number of events to be calculated.
- 8.6 The calculations have been corrected for distance and screening where appropriate.

Noise Assessment

- 8.7 For the purposes of this assessment, noise levels have been assessed on the first floor windows of the flat immediately above the takeaway and is considered to represent an absolute worst case scenario.
- 8.7 Calculations have been undertaken assuming that all delivery vehicles will pull up, and leave along the lay-by off Botley Road, directly outside the proposed Dominos Pizza store, and thus directly below the window of the flat. The distance between the kerb of the Botley Road lay-by and window of flat 2 Botley Road is taken to be approximately 4m. It should be noted that this assessment is therefore considered to represent a 'worst case' scenario as it is likely that delivery vehicles will park at varying greater distances from the point of calculation. Any increase from the assumed distance used within the calculation will therefore result in greater distance losses to the receiver position.
- 8.8 The total 'worst case' sound level from delivery related car activity incident on Flat 2 Botley Road is calculated to be 55dB $L_{Aeq, 1hour}$.
- 8.9 Noise measurements undertaken at Position A2 overlooking Botley Road indicate that existing sound level during the "peak" hours of trading for Dominos Pizza (18.00 – 19.00 hours) is 66dB $L_{Aeq, 1hour}$. This level was measured at the façade of the building; free-field values (to enable comparison with the calculated delivery activity noise) are assumed to be 3dB(A) lower than this, i.e. 63dB(A).
- 8.10 It can therefore be seen that noise associated with additional use of the Botley Road lay-by associated with the delivery and collection of Dominos Pizza is 8dB lower than the existing ambient noise levels. It can also be concluded that the noise associated with the operation of Dominos Pizza would increase existing ambient noise levels by less than 1dB(A). It is generally accepted that that average human ear cannot perceive a sound level change of less than 3dB(A).
- 8.11 It is therefore concludes that residents living in the vicinity of the Dominos takeaway should not perceive any change to existing ambient noise levels characterising the locality and noise is unlikely to be perceived as being obtrusive in the context of the existing noise environment (which is dominated by traffic noise on Botley Road).
- 8.12 Whilst traffic noise levels reduce by around 5dB(A) during the later evening, it is equally material to note that during the later evening period the number of deliveries and

Noise Assessment

collection also reduce significantly, as shown in **Figure 8.1** below, extracted from the “Trips and Parking Technical Note” supporting the application.

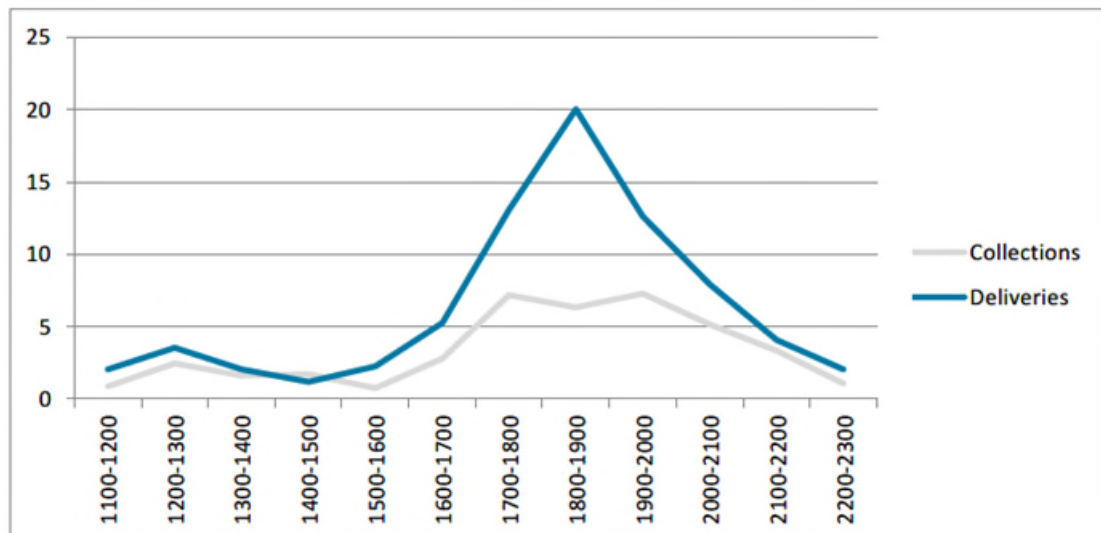


Figure 8.1: Expected Trip Generation

- 8.13 In terms of the maximum ($L_{Amax,fast}$) noise index, additional vehicle parking events are calculated to generate a maximum sound level of 64dB $L_{Amax,fast}$. Noise measurements indicate existing $L_{Amax,fast}$ sound levels of up to 79dB during the “peak” hours of Dominos Saturday trading. This again reinforces the above conclusion that noise associated with additional delivery activities would not be significant in the context of existing ambient noise levels currently experienced by residents of Botley Road.
- 8.14 It should also be noted that the above assessment assumes that one order will result in one delivery movement. Whilst this ensures for a robust ‘worst case’ assessment, it should be recognised that not all orders will result in singular deliveries.
- 8.15 Additional analysis has been undertaken by Mayer Brown’s Transport Planning Department that identifies the varying number of deliveries per order across two, 7 day periods. Table 10.2 below presents the percentage of orders in 1 delivery movement.

Noise Assessment

Eastleigh – Chandler’s Ford Domino’s Pizza (23/01/2023 – 29/01/2023)	
Orders in Single Bag Run (%)	75
Orders in Double Bag Run (%)	24
Orders in Triple Plus Bag (%)	1

Table 9.12: Percentage of Orders Per Delivery Movement

Eastleigh – Chandler’s Ford Domino’s Pizza (30/01/2023 – 05/02/2023)	
Orders in Single Bag Run (%)	87
Orders in Double Bag Run (%)	13
Orders in Triple Plus Bag (%)	0

Table 9.13: Percentage of Orders Per Delivery Movement

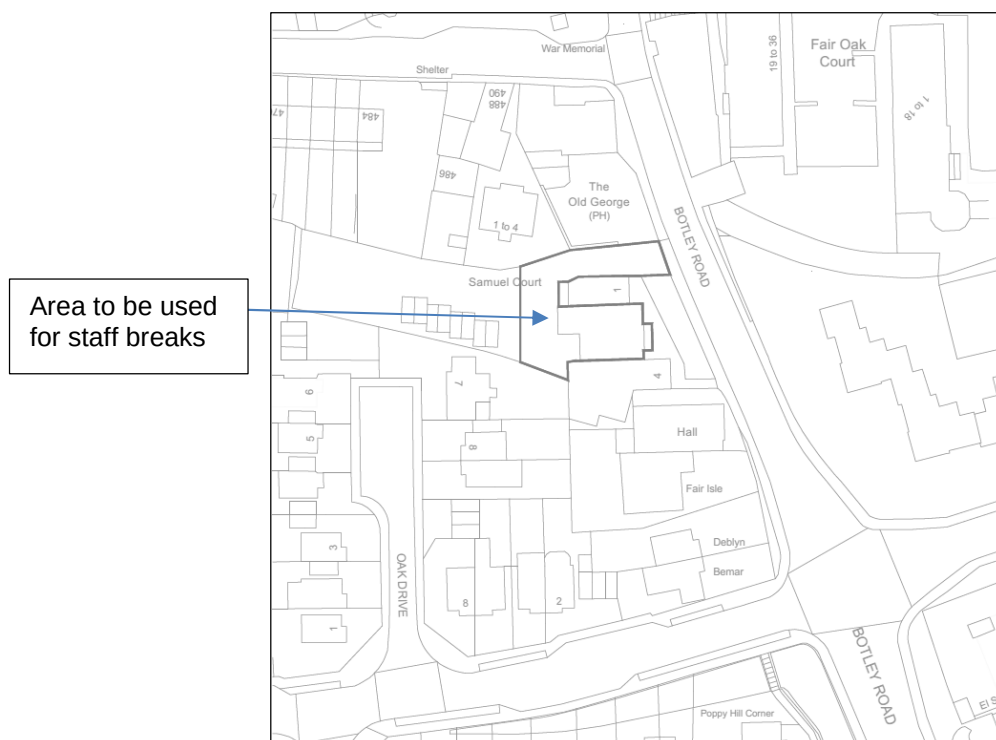
Conclusions

The above ‘worst case’ assessment concludes that noise associated with additional vehicular movements along the Botley Road lay-by should be insignificant in the context of the existing noise climates characterising Botley Road.

It is therefore concluded that the proposed increase in vehicular movements should not have an adverse impact on the amenity of existing dwellings in the vicinity of the site, and would thus comply with both governmental noise and planning policy objectives.

9 Deliveries and Servicing

- 9.1 It is understood that the proposed takeaway will be serviced approximately three times a week. Service vehicles will deliver to the site after the highway network PM peak, and before the AM peak. Once at the site the vehicle would be parked for the shortest time required to unload, typically 30 minutes, and only one vehicle would be on site at any one time. As noted earlier, the results of the noise monitoring indicate that existing commercial units are serviced at more regular intervals than will be required to service the proposed Dominos unit. As such, servicing activities are not considered to give rise to a significant adverse effect.
- 9.2 EBC's Pollution Control Team have also raised concerns regarding the potential impact of staff activities. It is considered that such impacts can be readily minimised through standard "good practice" management of the store, including:
- Ensuring the rear door the premises is closed, other than when accessing of existing the premises;
 - Staff breaks take advantage of the natural screening that can be provided by the existing buildings, e.g. moving away from the rear door of the unit and using the area areas "behind" the ground floor extensions, as illustrated below;



Noise Assessment

The above should also minimise the risk of an adverse effects if employees wish to smoke, etc;

- Ensuring that staff are aware of their residential neighbours and do not behave in an inconsiderate manner;
- Preventing the use of radios or other devices to play music during break-times;
- Avoiding the disposing of waste/recycling at more noise sensitive times of the day.

Noise Assessment

10 Conclusions

- 10.1 An environmental noise survey has been undertaken to determine existing noise levels characterising the site.
- 10.2 National and local planning policy requirements are discussed.
- 10.3 An assessment of noise from the proposed plant has been undertaken. Calculations are presented to demonstrate that noise emissions from the plant should not have have an adverse impact on the amenity of existing residential properties neighboring the site.
- 10.4 An assessment of operational noise transmission “through” the separating floor construction to the existing flats above the proposed takeaway has been undertaken. Acoustic testing on the existing separating floor indicates that this offers a high level of sound insulation (around 12 dB, or subjectively, twice as good) as the minimum performance requirements of Approved Document E of the Building Regulations, 2010 as amended. The measured sound insulation performance has been used to quantify levels of operational sound transmission which confirms noise should be controlled in line with appropriate guideline values (e.g. BS 8233: 2014).
- 10.5 An assessment of noise from pizza deliveries and collections has been undertaken. The above ‘worst case’ assessment concludes that noise associated with additional vehicular movements along the Botley Road lay-by should be insignificant in the context of the existing noise climates characterising Botley Road. It is therefore concluded that the proposed increase in vehicular movements should not have an adverse impact on the amenity of existing dwellings in the vicinity of the site, and would thus comply with both governmental noise and planning policy objectives.
- 10.6 Noise associated with the servicing of the store and staff breaks has been considered. It is concluded that impact can be satisfactorily minimised through appropriate good practice management controls.
- 10.7 It is therefore concluded that the proposed change of use and associated development complies fully with national and local planning policy objectives.

APPENDIX A:
Glossary of Acoustic Terminology

General

A vibrating surface or turbulent fluid flow will cause pressure fluctuations in the surrounding air. These pressure fluctuations are perceived by the human ear as "sound".

Measurement Units

The human ear can detect sound pressures as low as about 20 µPa, and can tolerate (for short periods) sound pressures as high as 200 Pa, an amplitude range of 10 million times. To take account of this huge amplitude range, sound pressure levels (often written in "acoustic shorthand" as SPL or Lp) are quantified using a logarithmic scale, the decibel (dB) scale. This is based on a reference pressure of 20µPa, thus a sound pressure of 20µPa would equate to 0dB and a pressure of 200Pa would equate to 140dB.

Frequency (Pitch) Characteristics

The sound received at any particular location is not solely influenced by the sound pressure level, the frequency characteristics (pitch) of the noise is also an important factor. Noise audible to a human (with "normal" hearing), typically covers the frequency range 20 Hertz to 20,000 Hertz, Hertz (Hz) are defined as the number of times the sound pressure fluctuates in one second. "Low" pitched sounds fluctuate less times per second than "high" pitched sounds. Whilst humans are capable of detecting a wide range of frequencies, the ear is not equally sensitive to all frequencies – the ear is most sensitive at frequencies towards the middle of the audible range and less sensitive to the lower and higher frequencies.

To take account of this frequency response, sound pressure fluctuations are normally quantified by applying a frequency-weighting network or filter which simulates the frequency response of the ear. In essence, this means that more significance is given to the frequencies at which the ear is most sensitive and less significance to those at which the ear is less sensitive. Noise measurements relating to human reaction are generally made using an "A-weighting" network. These measurements are reported as A-weighted decibels or dB(A). The A-weighted sound pressure level is written in "acoustic shorthand" as L_A.

Variation of Sound with Time

It will be appreciated that the sound pressure level of most noise sources will fluctuate with time. In order to take account of the way in which the human ear perceives noise, it is normal for the sound pressure level to be quantified using a time weighting network, to mimic the speed of response of the human ear. The standardised setting for most types of noise is a "Fast" time weighting.

The manner in which sound fluctuates with time can also influence the subjective manner in which noise is perceived. Noise can be continuous (showing no significant variation with time as in the case of a fan), intermittent (i.e. the noise is transient in it's nature, such as a train pass-by) or impulsive (i.e. there is a sudden build up of noise - this can range from "clanking" types sounds as might be experienced next to railway goods yard or a high energy discharge such as an explosion)

Measurement of Sound

Sound pressure levels are measured using equipment comprising a pressure-sensitive microphone, associated amplifier, frequency weighting network, time weighted network and output indicator. In its simplest form this is a small hand-held instrument called a sound level meter. More sophisticated instrumentation (a sound level analyser) is also available which allows the real-time output of the frequency characteristics of the sound to be quantified.

Comparison of Sound Levels

To put the significance of noise measurement into context, the following Table presents the A-weighted sound pressure level of some typical sources:

Sound Pressure Level, dB(A)	Typical Noise Source . Activity
160	Saturn Rocket Taking Off
140	Military Jet Taking Off at 30m
100	Nightclub
90	Heavy goods vehicle driving past at 7m
80	Busy urban road
70	Domestic vacuum cleaner at 3m
60	Busy office environment
55	Normal speech at 1m
40	Whispered conversation at 2m
30	Bedroom at night (BS 8233: 1999)
20	Remote country location
0	Threshold of hearing – a very eery silence

Addition of Sound Levels

It is important to note that the use of a logarithmic scale to describe noise does not allow normal arithmetic addition. This means that two noise sources each generating a level of, say, 60dB(A) will not generate a combined sound level of 120dB(A). The values must be added logarithmically, which would actually yield a combined sound level of 63dB(A) in this example.

Subjective Perception of Sound Levels Changes

With regard to the human perception of sound level changes, the human ear:

- Cannot generally perceive a sound level difference of less than 3dB(A)
- Will perceive a sound level difference of 4-5dB(A) as "noticeable"
- Will perceive a sound level difference of 10dB(A) as a doubling (or halving) of loudness.

Acoustic Terminology

As stated previously, most sources of noise will fluctuate with time. In order to characterize such noise, it is therefore normal to represent the noise climate using a variety of noise parameters and statistical indices. The most commonly adopted noise parameters are described below:

$L_{Aeq,T}$

This is the equivalent continuous A-weighted sound level measured over a specified time period “T”. This is the notional continuous sound level which, over the time T, contains the same amount of energy as the actual fluctuating sound being measured. This parameter is widely accepted as being the most appropriate noise descriptor for most environmental noise and the effects of noise on humans.

$L_{Amax,fast}$

This is maximum A-weighted sound pressure measured with a fast frequency response recorded during the stated measurement period. It is typically used to characterise the highest sound level caused during a noise event.

$L_{A90,T}$

This is the A-weighted sound pressure level exceeded for 90% of the specified time period “T”. It is normally used to describe the underlying background noise level of an environment since it inherently excludes the effects of transient noise sources.

Noise Rating (NR) Level

When describing noise from building services installations, it is common to express noise levels in terms of a Noise Rating (NR) Level. The NR level is determined by plotting the measured frequency spectrum of a noise against a series of reference curves, which roughly approximate to equal loudness values. This method permits higher sound levels at low frequencies corresponding to the sensitivity of the human ear. The NR level is defined as the value of the highest curve “touched” by the plotted frequency spectrum. For typical sources of building services noise, the overall A-weighted sound level is numerically around 5-6dB higher than the NR level of the noise.

Airborne Sound Insulation Measurement Parameters

The ability of a building element to reduce airborne noise can be described by a number of different parameters relevant to both laboratory and on-site performance evaluation. In general, the higher these values, the better the resistance of the construction to the transmission of airborne sound. The most commonly used parameters include:

R_w

The “**Weighted Sound Reduction Index**” (R_w) is a single value measure of the intrinsic sound reduction capabilities of a construction, as measured in an acoustic laboratory. Measurement values are determined in accordance with the BS EN ISO 10140 series of standards and weighted in accordance with BS EN ISO 717-1: 2013.

R'_{w}

The “**Weighted Apparent Sound Reduction Index**” (R'_{w}) is a single value measure of the apparent sound reduction capabilities of a construction, when installed on-site (which will normally be some way lower than the laboratory value due to less favourable installation conditions, the quality of workmanship, etc.). Measurement values are determined in accordance with the BS EN ISO 10140 series of standards and weighted in accordance with BS EN ISO 717-1: 2013. In practice, the R'_{w} of a construction can only be reliably determined if “direct” sound transfer through the partition can confidently be taken as the dominant noise transfer path (i.e. there is no “flanking” sound transmission).

D_w

The “**Weighted Sound Level Difference**” (D_w) is a single value measure of the on-site sound reduction between two rooms. This value inherently includes “direct” sound transmission through any separating construction and “flanking” transmission through other building elements.

Measurement values are determined in accordance with BS EN ISO 140-4: 1998 (for Building Regulations compliance purposes) or BS EN ISO 16283-1: 2014 and weighted in accordance with BS EN ISO 717-1: 2013.

$D_{nT,w}$

The “**Weighted Normalised Flanking Level Difference**” ($D_{nT,w}$) is a single figure measure of the sound reduction between two rooms solely due to sound transmission through a specified flanking path. This parameter is frequently used to provide an indication of the sound reduction capabilities of suspended ceiling and raised access floor constructions where there is common void between adjacent rooms or as a measure of sound that may be transmitted between rooms through external curtain walling. Measurements are undertaken in accordance with BS EN ISO 10848-2: 2017 and weighted in accordance with BS EN ISO 717-1: 2013.

Impact Sound Insulation Measurement Parameters

Some building elements also have the potential to generate “impact” noise, for example due to human “footfall” on floor structures, or the impact of rainfall on lightweight roofing components. A variety of parameters are again available to define the amount of noise likely to be generated. In general, the lower these values, the less sound the construction will generate as a result of impacts. Typical measurements parameters include:

$L_{nT,w}$

The “**Standardised Impact Sound Pressure Level**” is a “single number” rating describing the intrinsic impact sound insulation capabilities of a construction (such as a floor system) as measured in an acoustic laboratory. Values are determined in a vertical sound transmission suite by locating a “tapping machine” in the upper room of the suite and measuring the amount of sound radiated by the floor in the room below. Measurement values are determined in accordance with the BS EN ISO 10140 series of standards and weighted in accordance with BS EN ISO 717-2: 2013.

$L_{nT,w}$

The “**Normalised Flanking Impact Sound Pressure Level**” is a “single number” rating describing the amount of flanking sound that would be transmitted to an adjoining space (separated by a partition) due to impacts on the test sample. It is, for example, used to indicate the amount of noise that may be generated due to footfall noise on a raised access floor system. Values are determined in a horizontal sound transmission suite by locating a “tapping machine” one side of a separating partition built off the test sample and measuring the amount of noise radiated by the floor in the adjoining space on the other side of the partition. Measurement values are determined in accordance with BS EN ISO 10848-2: 2017 and weighted in accordance with BS EN ISO 717-2: 2013.

Room Acoustic Measurements

T

The “**Reverberation Time**” (T) of a room is defined as the time taken for the sound energy produced by a source (Time (RT)) to decay by 60 dB after the source has been switched off. The reverberation time of a space can be calculated by considering the volume of the room and the areas and sound absorption qualities of room surface finishes. Small, “soft” rooms tend to give low reverberation times, whilst large, “hard” rooms tend to give long reverberation times.

α_p

The “**Practical Acoustic Absorption Coefficient**” (α_p) is a measure of how much sound energy is absorbed by a building element at a particular frequency, as measured in accordance with BS EN ISO 354: 2003.

α_w

The “**Weighted Absorption Coefficient**” (α_w) is a single figure measure of the overall sound absorption capabilities of a building element determined in accordance with BS EN ISO 11654: 1997.

APPENDIX B:
Automated Noise Monitoring Results

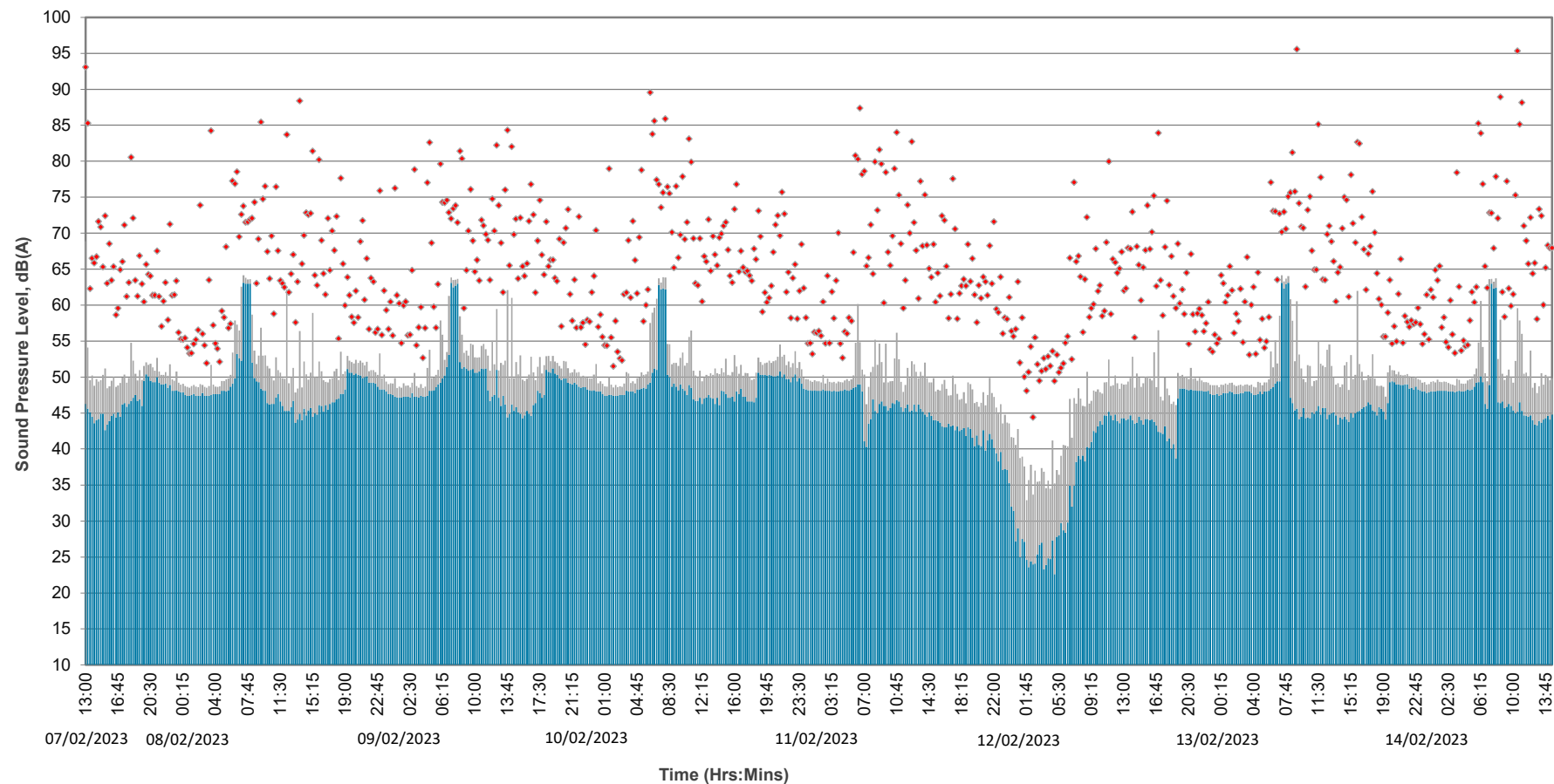
Time History Graph A1



Project: PGBotleyRoad(N)

Measurement Location: A1 - 1st Floor Landing of Flat 2, Botley Road

Survey Period: 07/02/2023 - 14/02/2023



KEY:

$L_{A90,15mins}$ $L_{Aeq,15mins}$ ♦ $L_{Amax,fast}$

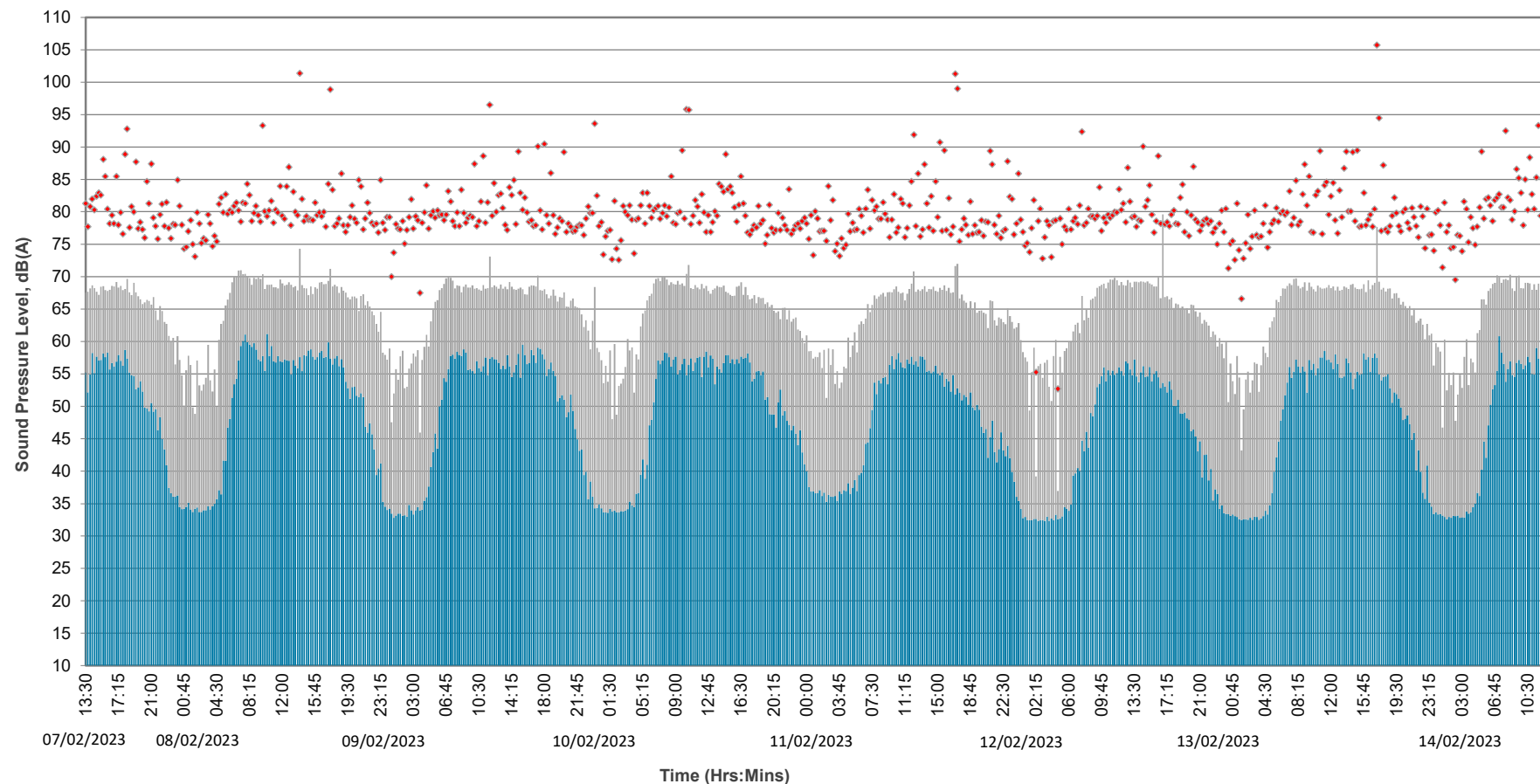
Lion House, Oriental Road, Woking, Surrey GU22 2BR
Telephone: 01483 750508 Fax: 01483 750437

Time History Graph A2

Project: PGBotleyRoad(N).9

Measurement Location: A2 - Front of Proposed Dominos

Survey Period: 07/02/2023 - 14/02/2023



KEY:

$L_{A90,15mins}$ $L_{Aeq,15mins}$ ◆ $L_{Amax,fast}$

Lion House, Oriental Road, Woking, Surrey GU22 2BR
Telephone: 01483 750508 Fax: 01483 750437

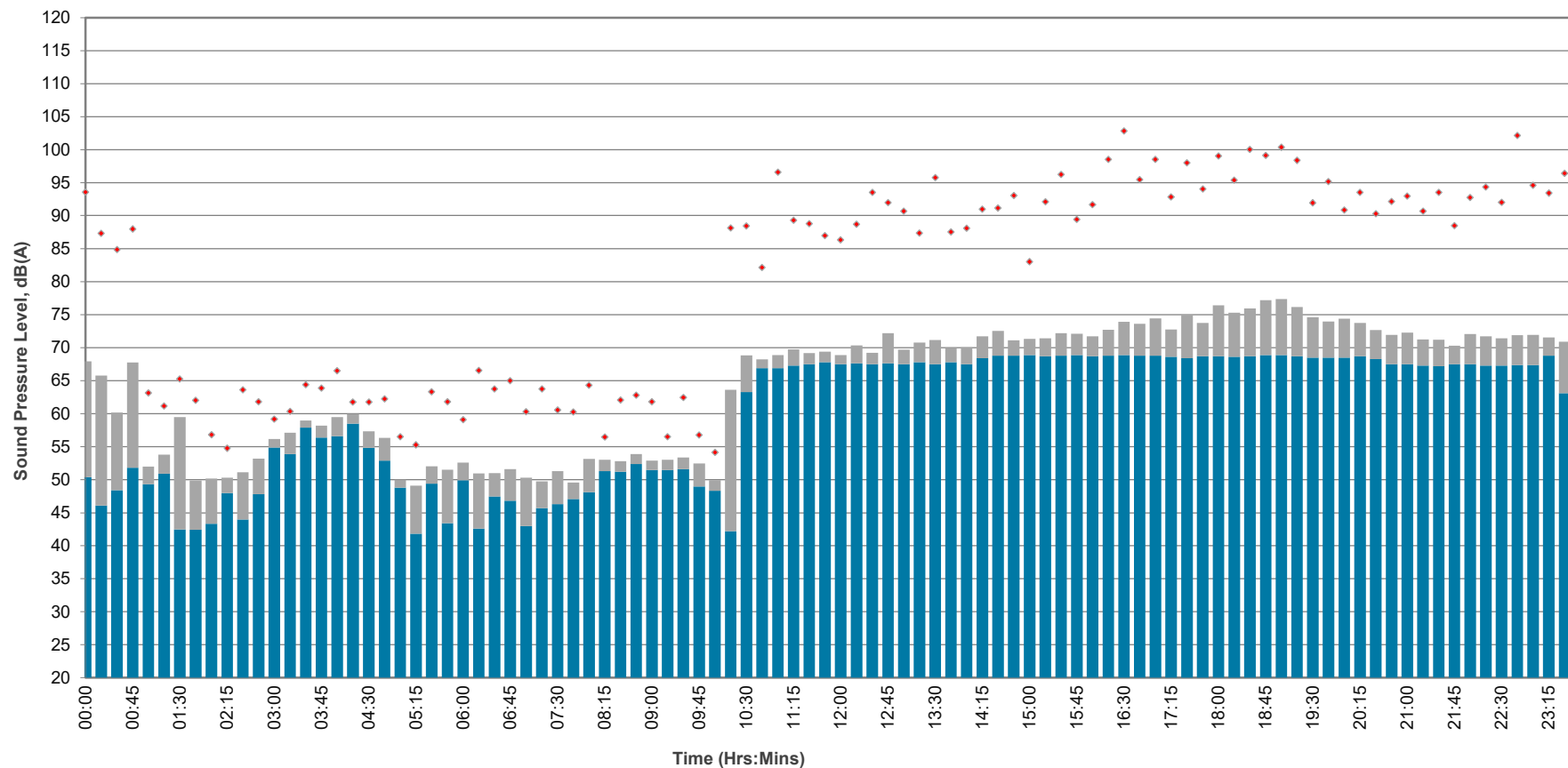
Time History Graph A1



Project: PGBotleyRoad(N).9

Measurement Location: A1

Survey Period: 03/02/2023 - 07/02/2023



KEY:

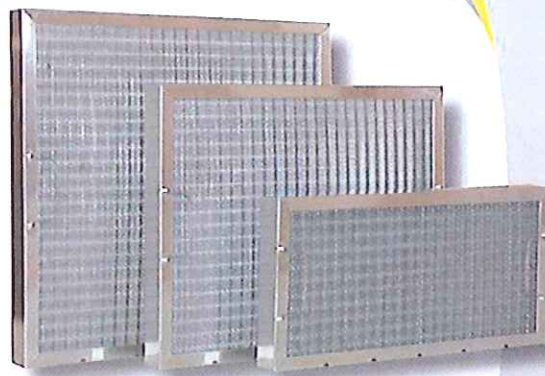
LA90,15mins LAeq,15mins LAmax,fast

Lion House, Oriental Road, Woking, Surrey GU22 2BR
Telephone: 01483 750508 Fax: 01483 750437

APPENDIX C:
Manufacturer's Noise Specification Data



Model GF Mesh Grease Filters



GENERAL DESCRIPTION

These filters are designed for use in commercial kitchens and ventilation from food preparation areas where their primary function is to reduce grease carry over from the cooking area.

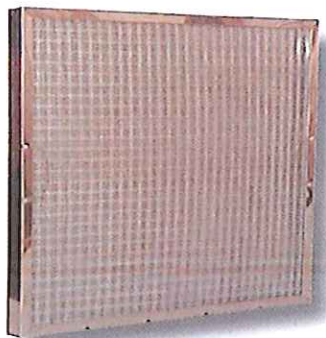
These Filters are rated at 1.5m/sec - where the pressure drop is 15Pa for 45mm filters and less than 10Pa for 20mm filters.

Construction

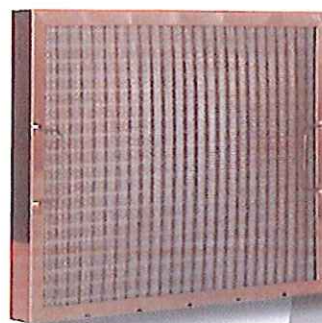
These filters are made from rolled channel frames, with safety edges. Sandwiched between the frame edges are layers of interwoven expanded mesh.

These Filters are available in the frame finishes below - mesh choice is either Galvanised Steel or Stainless Steel.

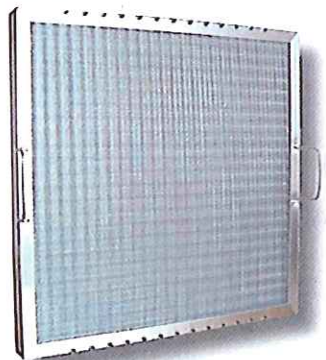
Stainless Steel



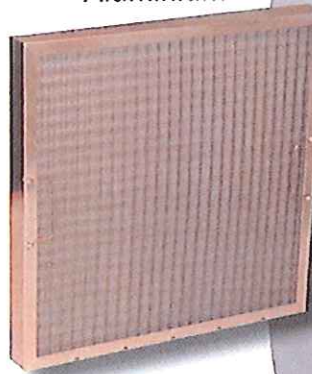
Brushed Stainless Steel



Galvanised Steel



Aluminium



ENVIRONMENT



EMS 81914
BS EN ISO 14001:2004

QUALITY



FM 29257
BS EN ISO 9001:2000

Jasun Filtration Plc
Riverside House, Parrett Way
Bridgwater, Somerset.
TA6 5LB
United Kingdom

Tel.: +44 (0) 1278 452277
Fax: +44 (0) 1278 450873
Info@jfilters.com
[Http://www.jfilters.com](http://www.jfilters.com)


G3

Type 90 Panel Filter

GENERAL DESCRIPTION

The Type 90 panel filter is a disposable product offering a basic level of filtration, or pre-filtration in HEVAC applications.

Construction

This product is constructed by bonding a pad of smartglass fibre into a water repellent AquaKote® card frame

Filter Efficiency to BS EN 779		G3
Filter Thickness	Rated Airflow	Initial Pressure Drop
20mm	1.5m/sec	18Pa
45mm	2.0m/sec	50Pa
Final Recommended Pressure Drop		150Pa

Features

The Frame is made from AquaKote card which has

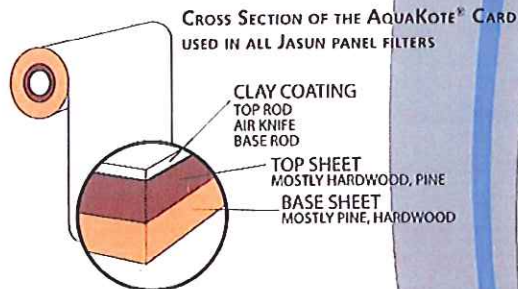
- Superior tear resistance when wet
- Great dry tear resistance and
- Manufactured from a renewable source.

The Glass Fibre media

- Is made from a recycled products
- Has a graduated density to provide great depth loading of dirt
- Is available any size
- Is Takified to provide improved efficiency
- Is very inexpensive



CROSS SECTION OF THE
GLASS FIBRE MEDIA USED IN
TYPE 90 PANEL FILTERS



ENVIRONMENT



EMS 81914
BS EN ISO 14001:2004

QUALITY



FM 29257
BS EN ISO 9001:2000

Jasun Filtration Plc
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 Bridgwater, Somerset.
 TA6 5LB
 United Kingdom

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 Fax: +44 (0) 1278 450873
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<http://www.jfilters.com>



G4

V Line Pleated Panel Filter

GENERAL DESCRIPTION

The V Line pleated Panel filter is a standard capacity disposable product offering a better than basic level of filtration, or pre-filtration in HEVAC applications. This product is made using patented Kimberly Clark media which delivers a constant level of filtration over its life.

Construction

This product is constructed by bonding a pleat pack of Intrepid V Line media into a water repellent AquaKote card frame

Features

The Frame is made from AquaKote card which has

- Superior tear resistance when wet
- Great dry tear resistance and
- Manufactured from a renewable source.

The Patented Kimberley Clark Intrepid media

- Has a Graduated Density for even dirt loading, resulting in greater dust holding
- Hydrophobic – so will not load with moisture in the air
- Has a constant efficiency due to its extra electrostatic charge
- Superior Efficiency V's Particle size (see table)
- Has a low pressure drop
- Is made from continuous fibres so will not shed

Hi Magnification photo showing the cross section of the Intrepid media



Coarse
↓ Airflow
Fine



POWERED BY
INTREPID
Filtration Media

Filter Efficiency to BS EN 779		G4
Rating to ASHRAE 52.2 Test Standard		Merv 8
Filter Thickness	Rated Airflow	Initial Pressure Drop
20mm	1.5m/sec	60Pa
45mm	2.0m/sec	62Pa
95mm	2.5m/sec	80Pa
Final Recommended Pressure Drop		250Pa

Test Comparing Filtration efficiency V's different sized particles. Intrepid Media V's Cotton Polyester Filters

Particle Size Rang(mm)	Initial Fractional Efficiency(%)	
	V Line Intrepid	The "best" Cotton Poly Alternative
0.3-0.4	7	2
0.4-0.55	15	6
0.55-0.7	28	11
0.7-1.0	41	19
1.0-1.3	52	24
1.3-1.6	58	28
1.6-2.2	63	32
2.2-3.0	67	36
3.0-4.0	70	37
4.0-5.5	71	38
5.5-7.0	72	38
7.0-10.0	73	39

ENVIRONMENT



EMS 81914
BS EN ISO 14001:2004

QUALITY

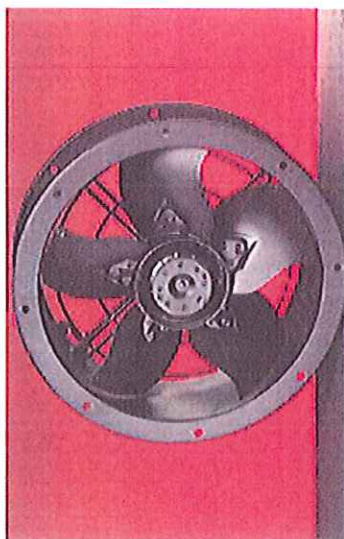


FM 29257
BS EN ISO 9001:2000

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info@jfilters.com
http://www.jfilters.com

VENT-AXIA BLACK SABRE SLIM CASE SICKLE FANS (BSC)



- ✓ Sizes 250 to 710 dia are protected to IP54.
- ✓ Motor Insulation Class F up to +70°C
- ✓ 450 to 710 dia, 3 phase motors, 2 speed as standard.
- ✓ All weather epoxy paint finish.
- ✓ Standard Thermal Overload Protection (S.T.O.P.).
- ✓ Performance tested to BS 848 Part 1.
- ✓ 5 Year Guarantee.

BLACK SABRE CASE MOUNTED SICKLE FANS
Black Sabre Sickle bladed fans are the latest addition to the Vent-Axia range offering improved pressure characteristics over axial units and lower sound levels. The advanced blade design and purpose built motor ensure excellent reliability and speed control.

CONSTRUCTION

The Black Sabre range share the same case lengths as the Cased axial range making them fully interchangeable and total compatibility with the full range of Vent-Axia Accessories. The strong and compact short case is constructed from rolled steel plate, electro welded and protected with a tough, epoxy paint finish. Casing dimensions are to DIN 24151 and flange dimensions are to ISO 6580. Manufacture is controlled to BS EN ISO 9001. The compact motor/impeller unit is robustly supported within the casing by electro welded and epoxy coated steel rod mounting supports for ease of installation and service access. Suitable for all weather outdoor environments.

IMPELLERS

The motors and impellers are factory matched, statically and dynamically balanced to VDI 2060 Quality Class G6.3.

MOTORS

The external rotor motors are specifically designed and styled for this range of fan. Ball bearings are greased for life. Sizes 250-710 motors are

Cased mounted fans (ex-stock) are supplied for extract use (Form 'B' running).

TERMINAL BOX

An IP65 terminal box is supplied with all models with 20mm and PGH entry offering protection against dust and water jets from any angle.

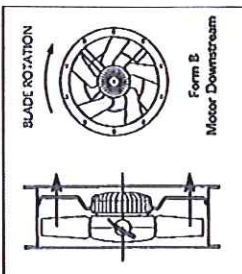
PERFORMANCE

The fan performance is in accordance with tests to BS 848 Part 1.

SOUND LEVELS

Fan sound levels, measured in a reverberant chamber in accordance with BS 848 Part 2. Published dB(A) figures are free field sound pressure levels at 3m with spherical propagation at a reference level of 2 x 10⁻¹²Pa (20 micro-Pascal). The sound power level spectra figures are dB with a reference level of 10⁻¹² Watts (1 pico-watt). To ensure minimum noise levels during speed control, an auto transformer speed control is recommended.

FORM OF RUNNING



ACCESSORIES

A full range of accessories is available with the Sabre Slim Cased Sickle fans:
Electronic Speed Controllers.
Auto Transformer Speed Controllers.
Inverter Speed Controller, where permissible.
D.O.L. Starters.
Ancillary Packs.
Flexible Connections.
Mounting Feet.
Coupling Flanges.
Anti-Vibration Mounts.
Attenuators.

BLACK SABRE SLIM CASE SICKLE FANS (BSC)

Vent-Axia BLACK SABRE SLIM CASE SICKLE FANS PERFORMANCE GUIDE

4 POLE

m³/s at Pa

Stock Part No	IP	25	50	75	100	125	150	175	200	225	250	300	350	400	450	Motor kW	FLC Amps	FLC dBA
1 phase BSC215-14	IP54	0.581	0.532	0.483	0.381	0.222	0.179	0.123	0.057							0.12	2.12	0.53
3 phase BSC215-14	IP54	0.584	0.535	0.485	0.382	0.223	0.180	0.123	0.057							0.13	2.26	0.46
1 phase BSC255-14	IP54	0.784	0.721	0.638	0.554	0.453	0.358	0.198	0.116							0.12	2.20	0.55
3 phase BSC255-14	IP54	0.835	0.770	0.682	0.592	0.488	0.382	0.225	0.175	0.002						0.15	2.52	0.56
1 phase BSC400-14	IP54	1.555	1.458	1.291	1.062	0.803	0.662	0.363								0.32	6.40	1.60
3 phase BSC400-14	IP54	1.558	1.458	1.291	1.062	0.803	0.662	0.363								0.36	6.40	1.10
1 phase BSC450-14	IP54	1.976	1.895	1.720	1.602	1.495	1.390	0.960	0.742	0.640	0.508	0.383	0.114			0.63	11.20	2.80
3 phase BSC450-14	IP54	1.976	1.891	1.781	1.667	1.514	1.326	0.890	0.748	0.642	0.508	0.382	0.113			0.59	7.80	1.30
1 phase BSC500-14	IP54	2.667	2.576	2.463	2.301	2.140	1.945	1.682	1.271	1.087	0.915	0.766	0.469	0.229	0.085	15.20	38.0	5.9
3 phase BSC500-14	IP54	2.708	2.615	2.500	2.336	2.173	1.975	1.788	1.590	1.384	0.929	0.778	0.576	0.222	0.097	11.40	1.90	
1 phase BSC560-14	IP54	3.472	3.337	3.179	3.021	2.840	2.615	2.344	2.029	1.816	1.574	1.372	0.744	0.383	1.30	24.00	6.00	63
3 phase BSC560-14	IP54	3.579	3.440	3.277	3.114	2.928	2.686	2.417	2.092	1.866	1.617	1.398	0.767	0.395	1.40	15.00	2.50	
1 phase BSC630-14	IP54	3.682	3.643	3.449	3.278	2.983	2.699	2.440	2.176	1.782	1.551	1.380	0.925	1.30	22.80	5.70	67	
3 phase BSC630-14	IP54	3.998	3.858	3.677	3.463	3.231	2.975	2.770	2.450	2.185	1.789	1.557	1.385	0.925	1.40	15.00	2.50	

6 POLE

450 3 phase BSC450-36	IP54	1.570	1.480	1.374	1.261	1.114	0.724	0.553	0.388	0.279						0.23	3.42	0.57	46
500 3 phase BSC500-36	IP54	2.336	2.196	2.045	1.894	1.770	1.487	1.002	0.813	0.569	0.348	0.177				0.27	3.72	0.62	48
560 3 phase BSC560-36	IP54	3.091	2.928	2.777	2.590	2.370	2.138	1.859	1.571	1.022	0.743	0.464				0.45	5.40	0.90	54
630 3 phase BSC630-36	IP54	3.486	3.277	3.068	2.812	2.566	2.224	2.045	1.720	1.255	0.873	0.464				0.74	9.00	1.50	58
710 1 phase BSC710-16	IP54	4.311	4.013	3.652	3.269	2.840	2.088	1.616	1.230	1.037	0.766	0.578				0.90	16.00	4.00	60
3 phase BSC710-16	IP54	4.444	4.137	3.765	3.370	2.928	2.583	1.666	1.371	1.069	0.790	0.524				1.00	15.00	2.60	

8 POLE

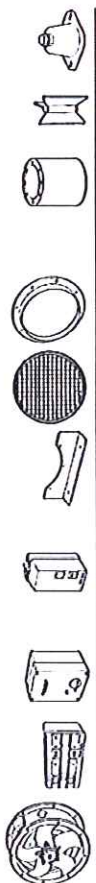
710 3 phase BSC710-36	IP54	3.280	2.887	2.071	1.170	0.306	0.201									0.46	7.80	1.30	50
-----------------------	------	-------	-------	-------	-------	-------	-------	--	--	--	--	--	--	--	--	------	------	------	----

S.C. = STARTING CURRENT
F.L.C. = FULL LOAD CURRENT

NOTE: All * models are supplied with 2 speed connection motors as standard. (Sizes 450-630 dia. are 4/6 pole, 710 are 6/8 pole).
DELTA Δ (HIGH SPEED)
STAR * (LOW SPEED)

ONLY SELECT THE FANS TYPED IN RED WHEN CONFIDENT OF YOUR SYSTEM RESISTANCE DATA.

**VENT-AXIA
BLACK SABRE SLIM CASE SICKLE FANS
ACCESSORIES**



Stock	Electronic connector	Auto transformer	D.O.L. starters & overload	Mounting feet	Inlet wire guard	Coupling tangs	Aural ancillary pack	Caused attenuator	Caused aural vibration	Ani-
Stock	Stock	Stock	Ref. No.	Ref. No.	Stock	Ref. No.	Ref. No.	Ref. No.	Ref. No.	Ref. No.
BSCT15-14	WT03 03 102M	103 14 101	103 11 240 - 103 12 007	105 03 315	105 05 315	105 06 315	105 12 315	105 14 315	105 15 315	105 23 033
BSCT15-14	-	103 14 301	103 11 415 - 103 12 007	105 03 355	105 05 355	105 06 355	105 12 355	105 14 355	105 15 355	105 23 033
BSCT35-14	WT03 03 102M	103 14 103	103 11 240 - 103 12 007	105 03 400	105 05 400	105 06 400	105 12 400	105 14 400	105 15 400	105 23 033
BSCT35-14	-	103 14 301	103 11 415 - 103 12 007	105 03 450	105 05 450	105 06 450	105 12 450	105 14 450	105 15 450	105 23 033
BSCT40-14	WT03 03 102M	103 14 103	103 11 240 - 103 12 007	105 03 500	105 05 500	105 06 500	105 12 500	105 14 500	105 15 500	105 23 033
BSCT40-14	-	103 14 301	103 11 415 - 103 12 011	105 03 560	105 05 560	105 12 560	105 14 560	105 15 560	105 15 560	105 23 033
BSCT50-14	WT03 03 102A	103 14 103	103 11 240 - 103 12 040	105 03 600	105 05 600	105 06 600	105 12 600	105 14 600	105 15 600	105 23 033
BSCT50-14	-	103 14 301	103 11 415 - 103 12 018	105 03 630	105 05 630	105 06 630	105 12 630	105 14 630	105 15 630	105 23 033
BSCT50-14	WT03 03 106A	103 14 105	103 11 240 - 103 12 018	105 03 630	105 05 630	105 06 560	105 12 560	105 14 560	105 15 560	105 23 033
BSCT50-14	-	103 14 304	103 11 415 - 103 12 027	105 03 560	105 05 560	105 12 560	105 14 560	105 15 560	105 15 560	105 23 033
BSCT50-14	-	-	103 11 240 - 103 12 040	105 03 630	105 05 630	105 06 630	105 12 630	105 14 630	105 15 630	105 23 033
BSCT50-14	-	-	103 11 240 - 103 12 070	105 03 630	105 05 630	105 06 630	105 12 630	105 14 630	105 15 630	105 23 033
BSCT50-14	-	-	103 11 415 - 103 12 040	105 03 710A	105 05 710	105 06 710A	105 12 710A	105 14 710A	105 15 710A	105 23 033
BSCT50-14	-	103 14 301	103 11 415 - 103 12 007	105 03 450	105 05 450	105 06 450	105 12 450	105 14 450	105 15 450	105 23 033
BSCT50-14	-	103 14 301	103 11 415 - 103 12 011	105 03 500	105 05 500	105 06 500	105 12 500	105 14 500	105 15 500	105 23 033
BSCT50-14	-	103 14 301	103 11 415 - 103 12 011	105 03 560	105 05 560	105 06 560	105 12 560	105 14 560	105 15 560	105 23 033
BSCT50-14	-	103 14 301	103 11 415 - 103 12 018	105 03 630	105 05 630	105 06 630	105 12 630	105 14 630	105 15 630	105 23 033
BSCT50-14	-	103 14 301	103 11 240 - 103 12 018	105 03 710A	105 05 710	105 06 710A	105 12 710A	105 14 710A	105 15 710A	105 23 033
BSCT50-14	WT03 03 106A	103 14 105	103 11 240 - 103 12 018	105 03 630	105 05 630	105 06 630	105 12 630	105 14 630	105 15 630	105 23 033
BSCT50-14	-	103 14 301	103 11 415 - 103 12 040	105 03 710A	105 05 710	105 06 710A	105 12 710A	105 14 710A	105 15 710A	105 23 033
BSCT50-14	-	103 14 304	103 11 415 - 103 12 040	105 03 710A	105 05 710	105 06 710A	105 12 710A	105 14 710A	105 15 710A	105 23 033

AN INVERTER SPEED CONTROL KIT IS AVAILABLE FOR:

ESC 560-34 - 103 20 302 09
ESC 630-34 - 103 20 302 09

NOTE: When speed control is required a 5-step auto transformer is recommended to ensure low noise levels.

11/10/2019 11:11 AM - model was compared with 2 model difference connection model in standard (5/100 450 to 630 are 4/5 Paol)

When speed control is required on all other models a step auto transformer speed controller is recommended, to ensure low noise levels.

Guards: Some installations may occur where additional safety parts are needed, to ensure safety in operation. For example, the unit may be fitted at the inlet or outlet end of a ducted ventilation system, thereby exposing the impeller/motor to unguarded access. In this event, the installer must fit a safety device conforming to current regulations. These guards are available as an optional extra.

BLACK SABRE SLIM CASE SICKLE FANS (BSC)

Vent-Axia. BLACK SABRE SLIM CASE SICKLE FANS SOUND DATA

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

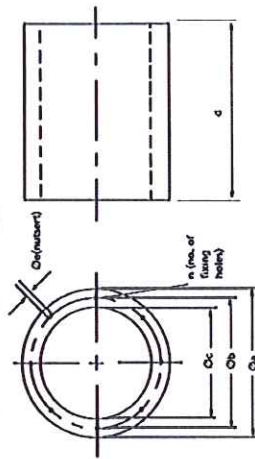
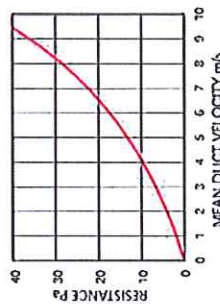
4 POLE

Dis		63	125	250	500	76	2k	4k	8k	dBA @ 3m
8 POLE	BSC215/4	Inlet	77	66	65	63	60	56	46	47
		Outlet	77	72	66	63	60	56	46	47
	BSC352/4	Inlet	78	73	61	64	65	63	58	49
		Outlet	78	73	61	64	65	63	58	49
	BSC400/4	Inlet	79	76	70	65	68	67	56	50
		Outlet	79	76	70	65	68	67	56	50
	BSC450/4	Inlet	79	78	71	68	70	68	64	55
		Outlet	79	78	71	68	70	68	64	55
	BSC500/4	Inlet	80	79	76	72	75	75	68	61
		Outlet	80	79	76	72	75	75	68	61
	BSC560/4	Inlet	82	81	80	79	79	77	74	65
		Outlet	82	81	80	79	79	77	74	65
6 POLE	BSC620/4	Inlet	83	85	82	83	84	80	79	66
		Outlet	83	85	82	83	84	80	79	66
	BSC450/6	Inlet	76	69	64	63	62	55	45	46
		Outlet	76	69	64	63	62	55	45	46
	BSC500/6	Inlet	79	70	69	66	65	61	52	48
		Outlet	79	70	69	66	65	61	52	48
	BSC560/6	Inlet	80	71	75	73	70	66	55	57
		Outlet	80	71	75	73	70	66	55	57
	BSC620/6	Inlet	81	71	80	79	73	67	56	61
		Outlet	81	71	80	79	73	67	56	61
	BSC710/6	Inlet	81	72	81	80	76	69	58	63
		Outlet	81	72	81	80	76	69	58	63
8 POLE	BSC710/8	Inlet	85	70	81	83	68	53	53	50
		Outlet	75	70	70	69	69	53	53	50

Note: The above Sound Power Level Spectra is for B-Form Running Fans.

Published dBA figures, are free field sound levels at 3m, with spherical propagation at a reference level of 2×10^{-4} Pa. The sound power level spectra figures are dB with reference of 10⁻¹² Watts.

To ensure minimum noise levels during speed control, an auto transformer speed controller is recommended.

RESISTANCE GRAPH FOR CASED
ATTENUATOR FITTED WITH POD

CASED AXIAL ATTENUATOR

Stock	α_a	α_b	α_c	d	α_a^*	n	$\lg$	Fitted with pod	Free area
Ref. No.							α_a^*	$\lg$ approx	m^2 without pod
105 14 315	415	355	315	475	M8	3	22	32	0.07793
105 14 355	455	395	355	540	M8	8	30	44	0.09098
105 14 400	500	450	400	600	M10	8	47	60	0.12566
105 14 450	550	500	450	675	M10	8	59	73	0.15904
105 14 500	600	560	500	750	M10	12	59	87	0.19625
105 14 560	660	620	560	840	M10	12	70	102	0.24650
105 14 630	730	690	630	940	M10	12	82	120	0.31172
105 14 710A	814	770	710	1070	M10	16	100	132	0.39567

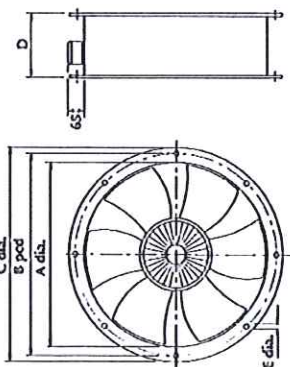
• Threaded hole to take bolt.

For Insertion Losses see page 49.

VENT-AXIA

BLACK SABRE SLIM CASE SICKLE FANS DIMENSIONS (mm)

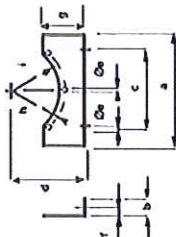
DIMENSIONS (mm)



Stock Ref. No.	OA	OB	OC	D	OE	No. Holes	Weight kg
BSC 315	315	355	396	170	10	8	10.5
BSC 355	355	395	426	170	10	8	13
BSC 400	400	450	487	170	12	8	15.5
BSC 450	450	500	537	180	12	8	20.5
BSC 500	500	550	585	180	12	12	32
BSC 560	560	620	655	240	12	12	31
BSC 630	630	690	725	240	12	12	38
BSC 710/4	710	770	806	350	12	16	65
BSC 710/6	710	770	806	340	12	16	65

Please note: Dimension D is 240mm on 6-pole & 350mm on 4-pole version.

ACCESSORY DIMENSIONS (mm)

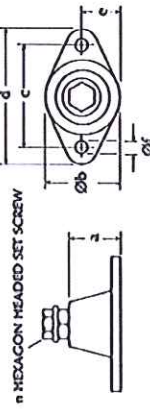


INLET WIRE GUARD 'K' factor less 0.25

Ref. No.	OA	b
105 06 315	380	3
105 06 355	420	3
105 06 400	475	3
105 06 450	525	3
105 06 500	595	3
105 06 560	655	3
105 06 630	725	3
105 06 710	784	5

MOUNTING FEET

Ref. No.	a	b	c	d	e	f	g	h	i
105 03 315	275	24	274	10	14	115	127.5	167	
105 03 355	303	24	290	10	14	125	137.5	187	
105 03 400	348	24	340	10	14	135	150	213	
105 03 450	384	24	375	10	14	145	165	238	
105 03 500	425	24	415	10	14	155	180	268	
105 03 560	475	24	455	10	14	165	195	310	
105 03 630	520	24	500	10	14	175	215	353	
105 03 710A	710	40	610	435	13	18	240	365	

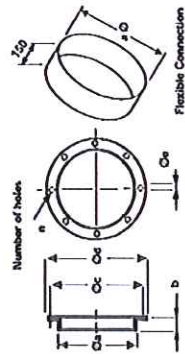


ANTI-VIBRATION MOUNTS

Ref. No.	a	b	c	d	e	f	g	h	i	Max Head kg
105 22 003	27	37	54	67	115.5	7	N/A	23		
105 22 005	27	37	54	67	115.5	7	N/A	26		
105 22 133	35	57	76	95	285.5	10.5	N/A	91		

COUPLING FLANGE

Ref. No.	OA	b	OC	OD	OE	n
105 06 315	386	20	365	315	10	8
105 06 355	426	20	395	355	10	8
105 06 400	487	20	450	400	12	8
105 06 450	537	20	500	450	12	8
105 06 500	595	20	560	500	12	8
105 06 560	655	20	620	560	12	12
105 06 630	725	20	690	630	12	12
105 06 710A	800	40	770	710	12	16

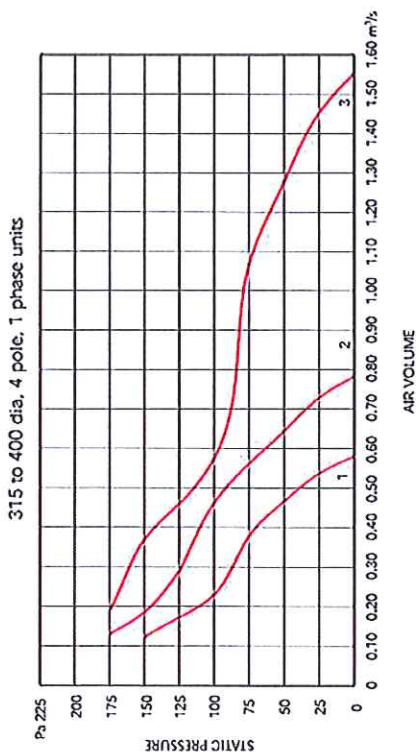


Number of holes

Flexible Connection

Vent-Axia

BLACK SABRE SLIM CASE SICKLE FANS PERFORMANCE CURVES



AIR VOLUME

315 to 400 dia, 4 pole, 3 phase units

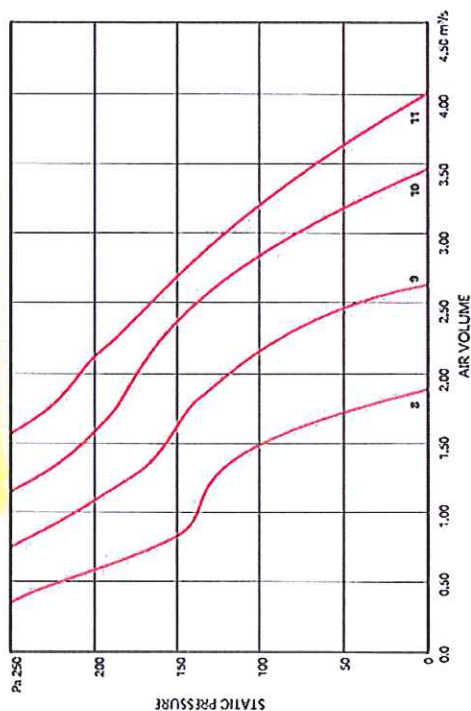


AIR VOLUME

Vent-Axia

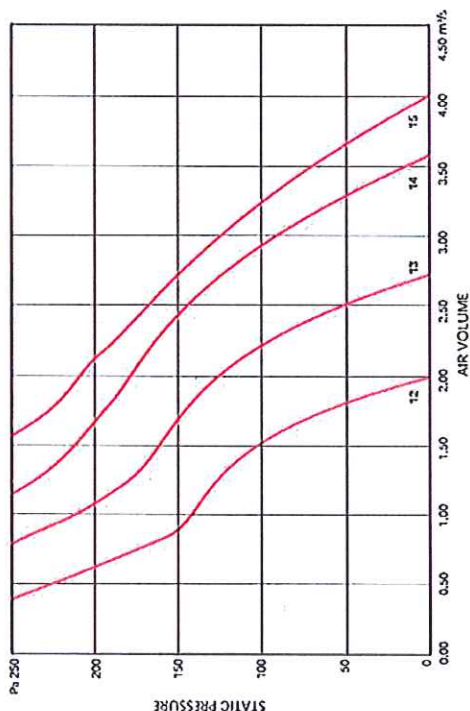
BLACK SABRE SLIM CASE SICKLE FANS PERFORMANCE CURVES

450 to 630 dia, 4 pole, 1 phase units



Size	450/3ph	500/3ph	560/3ph	630/3ph
8	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0

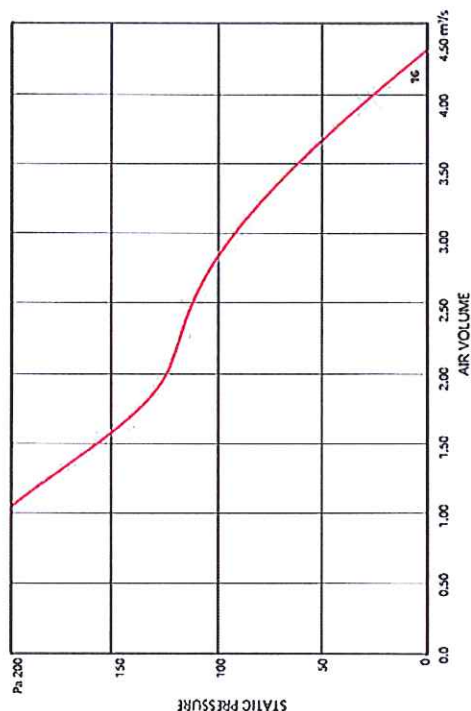
450 to 630 dia, 4 pole, 3 phase units



Size	450/3ph	500/3ph	560/3ph	630/3ph
12	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0

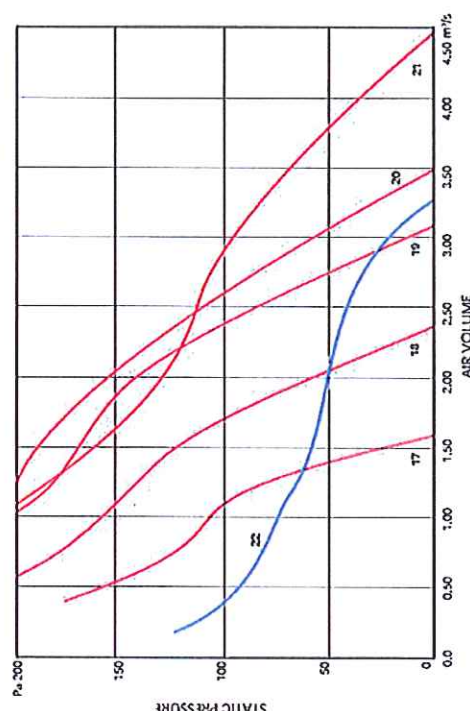
BLACK SABRE SLIM CASE SICKLE FANS PERFORMANCE CURVES

710 dia, 6 pole, 1 phase units

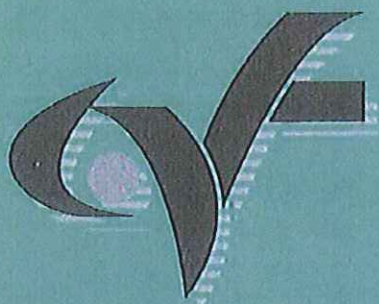


Size	710/1ph
16	0.0

450 to 710 dia, 6 pole 3 phase & 710 dia 8 pole 3 phase units



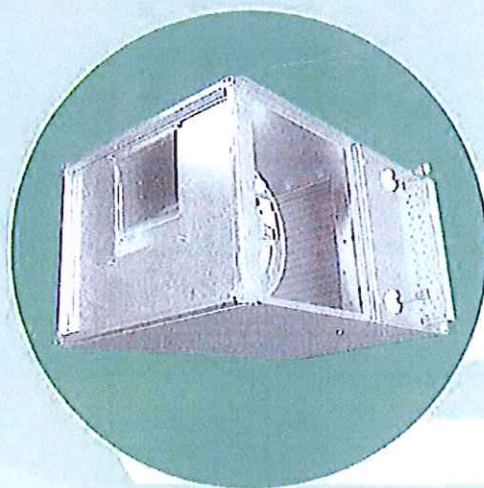
Size	450/3ph	500/3ph	560/3ph	630/3ph	710/6 Pole/3ph	710/8 Pole/3ph
17	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	0.0



AIR VENT
TECHNOLOGY

QUALITY RANGE

WATER HEATED AIR HANDLING UNITS



Internal and external
versions available

Thermal protection on motor

All models fully speed
controllable

Integral mounting points
for quick and simple
installation

SOUND LEVELS

Sound Levels: Induct sound levels dB ref 10⁻¹²W PWL

All sound data measured at full speed

Model	SPL dBA	Centre Frequency (Hz)							
		63	125	250	500	1K	2K	4K	8K
1	44	61	70	70	59	62	54	51	47
2	47	65	73	68	67	67	62	59	52
3	51	76	79	73	73	73	67	65	67
4	49	71	73	66	71	71	69	66	62
5	54	77	79	73	74	77	77	74	69
6	52	75	77	71	73	75	74	71	67
7	52	78	80	72	74	74	73	72	66

* At 1 metre from side of casing

CONTROL PANELS

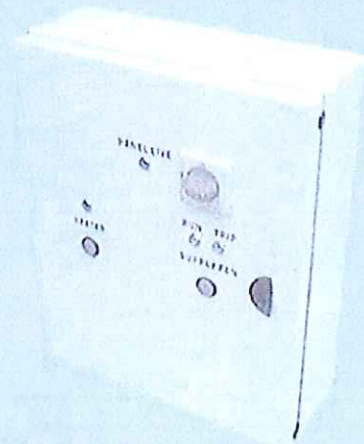
Designed with quick and easy installation in mind, external wiring is kept to a minimum.

A Mains supply is taken to the panel door interlocked isolator and then outputs are taken to the fan, heater and safety circuits.

A duct sensor is supplied (or room if required) pre-wired to the panel with 10m of cable.

Switches on the front of the panel allow control of the fan and heater. All outputs to the fan are protected via an MCB.

The whole panel can be controlled via a fire alarm contact or a seven day time clock to turn off and on in a controlled manner.



APPENDIX D:
Noise Propagation Calculation Sheets

CALCULATION SHEET	CS1	RECEPTOR	R1
PROJECT	Unit 2-3, Botley Road, Fair Oak		



Mitsubishi FDC100VNX.TH	Octave Band Sound Level							
	63Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz
Source Noise Level, Lp @ 1m	35	42	46	48	46	42	37	30
Directivity Correction, D _c	2	2	2	2	2	2	2	2
Geometric Divergence, A _{div} (Distance = 4m)	12	12	12	12	12	12	12	12
Atmospheric Absorption, A _{atm}	0	0	0	0	0	0	0	0
Ground Attenuation, A _{gr}	0	0	0	0	0	0	0	0
Barrier Attenuation, A _{bar}	5	5	5	5	6	7	8	10
Miscellaneous Attenuation, A _{misc}	0	0	0	0	0	0	0	0
Reflections	0	0	0	0	0	0	0	0
Lp Condenser Unit	16	23	27	29	26	21	15	6
Component Noise Level	30 dB(A)							

Karbox 2464	Octave Band Sound Level							
	63Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz
Source Noise Level, Lp @ 1m	41	48	52	54	52	48	43	36
Directivity Correction, D _c	2	2	2	2	2	2	2	2
Geometric Divergence, A _{div} (Distance = 4m)	12	12	12	12	12	12	12	12
Atmospheric Absorption, A _{atm}	0	0	0	0	0	0	0	0
Ground Attenuation, A _{gr}	0	0	0	0	0	0	0	0
Barrier Attenuation, A _{bar}	5	6	7	8	10	12	15	18
Miscellaneous Attenuation, A _{misc}	0	0	0	0	0	0	0	0
Reflections	0	0	0	0	0	0	0	0
Lp Condenser Unit	22	28	31	32	28	22	14	4
Component Noise Level	33 dB(A)							

Extract Fan	Octave Band Sound Level							
	63Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz
Source Noise Level, Lw	80	79	76	72	75	75	68	67
Directivity Correction, D _c	1	1	2.5	6	8.5	8	8	8
Geometric Divergence, A _{div} (Distance = 10m)	20	20	20	20	20	20	20	20
Atmospheric Absorption, A _{atm}	0	0	0	0	0	0	0	0
End Reflection, A _{gr}	8	4	1	0	0	0	0	0
Barrier Attenuation, A _{bar}	5	6	7	8	10	12	15	18
Miscellaneous Attenuation, A _{misc}	5	11	19	29	36	37	29	18
Reflections	0	0	0	0	0	0	0	0
Lp Extract Fan	41	37	27	9	1	-2	-4	3
Component Noise Level	23 dB(A)							

Fresh Air Supply Fan	Octave Band Sound Level							
	63Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz
Source Noise Level, Lw	77	79	73	74	77	77	74	69
Directivity Correction, D _c	1	1	2.5	6	8.8	8	8	8
Geometric Divergence, A _{div} (Distance = 4m)	20	20	20	20	20	20	20	20
Atmospheric Absorption, A _{atm}	0	0	0	0	0	0	0	0
Ground Attenuation, A _{gr}	8	4	1	0	0	0	0	0
Barrier Attenuation, A _{bar}	5	6	7	8	10	12	15	18
Miscellaneous Attenuation, A _{misc}	6	13	23	37	43	44	35	20
Reflections	0	0	0	0	0	0	0	0
Lp Extract Fan	37	35	20	3	-5	-7	-4	3
Component Noise Level	20 dB(A)							

	Octave Band Sound Level							
	63Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz
Octave Band Noise Levels	43	40	34	34	30	25	18	10
TOTAL NOISE LEVEL	35 dB(A)							

CALCULATION SHEET	CS1	RECEPTOR	R1
PROJECT	Units 2-3, BotleyRoad, Fair Oak		



Karbox 2464	Octave Band Sound Level							8kHz
	63Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	
Source Noise Level, Lp @ 1m	41	48	52	54	52	48	43	36
Directivity Correction, D _c	2	2	2	2	2	2	2	2
Geometric Divergence, A _{div} (Distance = 4m)	12	12	12	12	12	12	12	12
Atmospheric Absorption, A _{atm}	0	0	0	0	0	0	0	0
Ground Attenuation, A _{gr}	0	0	0	0	0	0	0	0
Barrier Attenuation, A _{bar}	5	6	7	8	10	12	15	18
Miscellaneous Attenuation, A _{misc}	0	0	0	0	0	0	0	0
Reflections	0	0	0	0	0	0	0	0
Lp Condenser Unit	22	28	31	32	28	22	14	4
Component Noise Level	33 dB(A)							

	Octave Band Sound Level							8kHz
	63Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	
Octave Band Noise Levels	22	28	31	32	28	22	14	4
TOTAL NOISE LEVEL	33 dB(A)							

APPENDIX E:
Acoustic Performance Specification f
or Acoustic Wall lining

Specification For Acoustic Wall Lining

The acoustic wall lining shall maintain the following minimum acoustic absorption coefficients:

Absorption Coefficient (α)					
125	250	500	1k	2k	4k
5	6	8	11	12	12

The supplier shall submit appropriate test information demonstrating compliance with the above absorption performance. Some tolerance to stated values may be acceptable subject to agreement with the Project Acoustic Consultant.

The wall lining shall be constructed as follows:

- The acoustic lining is to be supplied in the minimum thickness stated and shall be inorganic glass fibre material with a minimum density of 48 kg/m³. The absorbent internal lining shall be faced with glass fibre cloth or other infill protection membrane and retained by perforated galvanised mild steel sheet having an open area preferably in excess of 20%, or expanded metal.
- The acoustic media shall not comprise materials which are generally composed of mineral fibres, either man made or naturally occurring, which have a diameter of 3 microns or less and a length of 200 microns or less or which contain any fibres not sealed or otherwise stabilised to ensure that fibre migration is prevented.
- Provision shall be made to prevent settling of the acoustic medium. The panels shall be suitably weather protected. In particular panels shall have drain holes as required to avoid soaking of the acoustic medium.
- The lining shall extend from 150mm above ground level to the top of the fencing (approximately 2,000mm).
- All available portions of the area designed to receive the acoustic liner shall be completely covered. All joints shall be neatly butted and there shall be no interruptions or gaps.
- The acoustic liner shall be secured with mechanical fasteners which shall compress the liner sufficiently to hold it firmly in place.
- The acoustic louvres shall be supplied suitably protected from damage during transit and/or storage at site.
- The louvres shall be in all ways suitable for external use and the environmental conditions likely to be experienced at the site.