Noise impact assessment
Unit 18 Brunswick Centre, London WC1N 1AE

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On behalf of: Ovelshield Limited t/a ICCO
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Executive summary

An assessment of the impact of noise resulting from the change of use from retail (use class A1) to a restaurant (use class A3) with ancillary takeaway sales (use class A5) at Unit 18 Brunswick Centre, London WC1N 1AE has been carried out. The assessment has included an inspection of the application site during the proposed operating hours and an inspection of a similar size of restaurant operated by the appellant at 46 Goodge Street, W1T 4LU. The site visit included continuous noise measurement at the property which was then used to assess the impact of plant noise and other activity.

No additional remedial works are required to the existing building which forms a robust and continuous envelope to contain noise from activity within. Operational procedures are proposed to manage noise from the normal commercial activity of the restaurant based on good operating practices and experience from other sites. Plant size and type is relatively low scale compared to other A3 uses in the area and the kitchen extract louvre location is proposed within the service area below ground with only low level ventilation to the front façade. Because the kitchen uses electric pizza ovens only low volume air extraction is required which was subjectively assessed as inaudible at the existing site and calculated to have no impact at the proposed site. Air handling and cooling systems have historically been operated for the former A1 use and this application does not represent an intensification of mechanical plant noise for the site. Calculations indicate that all plant complies with the Camden Council planning policy for plant noise.

The proposed use will not adversely impact on on residential amenity as activity is contained by the building, plant is small scale and contained in an area substantially separated from residential properties, operational practices to control noise will be implemented and patron departure is relatively early in the evening, in small groups as is typical for a restaurant, and into an area which is well served by public transport.

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1.0 Qualifications and experience

1.1 My name is Richard Vivian. I am the founder and Managing Director of Big Sky Acoustics Ltd. Big Sky Acoustics is an independent acoustic consultancy that is engaged by local authorities, private companies, public companies and individuals to provide advice on the assessment and control of noise.

1.2 I have a Bachelor of Engineering Degree with Honours from Kingston University, I am a Member of the Institution of Engineering & Technology, the Institute of Acoustics, the Audio Engineering Society and the Institute of Licensing.

1.3 I have over twenty-five years of experience in the acoustics industry and have been involved in acoustic measurement and assessment throughout my career. My professional experience has included the assessment of noise in connection with planning, licensing and environmental protection relating to sites throughout the UK. I have given expert evidence in the courts, at planning hearings, at licensing hearings, and at public inquiries on many occasions.

2.0 Introduction

2.1 Big Sky Acoustics Ltd was instructed by Stephen Matthews of Bidwells LLP, acting on behalf of Ovelshield Limited t/a ICCO, to carry out an assessment of the impact of noise from a proposed A3 restaurant at Unit 18 Brunswick Centre, London WC1N 1AE.

2.2 Planning permission is sought for the change of use of Unit 18 from retail (use class A1) to a restaurant (use class A3) with ancillary takeaway sales (use class A5). Planning permission is also sought for the installation of a ventilation grill to the rear elevation at lower basement level for the discharge of an internal kitchen extract system.

2.3 This report was prepared following my site visit, and inspection of the building and the surrounding area. I remained on site until after 23:00hrs. Continuous noise monitoring equipment recorded noise levels in the area and is presented in this report.

2.4 Noise measurements were also taken at other locations in the area and observations of noise generating activity were made. These included a visit to a working restaurant operated by the appellant at 46 Goodge Street in order to assess plant noise and any noise from customer activity. A large amount of noise data was gathered during the survey which is simplified and summarised in this report.

2.5 A glossary of acoustical terms used in this report is provided in Appendix A.

2.6 All sound pressure levels in this report are given in dB re: 20μPa.

3.0 Site and surrounding area

3.1 The location of the site is shown in Appendix B.

3.2 The Brunswick Centre is a residential and shopping centre in Bloomsbury. The commercial premises are at ground floor level with service areas below. Residential flats are above and set back from the shop façades. The large flat roof area, accessible only to residents, is used as a communal circulation area and play space for children.

3.3 The shopping centre was in decline at the turn of the millennium with many of the retail units unoccupied. The retail element of the centre was redecorated in 2006 and this attracted a number of major high street names to the centre. At the time of my assessment I noted that four retail units were not occupied and available to let in addition to the empty appeal site.

3.4 The units are predominantly in A1 use, with approximately 20% A3. There is also a medical centre (D1), a gym (D2) a bookmakers (sui generis) and a cinema.

Figure 1: View from in front of unit 18 looking north

3.5 At the north end of the shopping centre is a Waitrose supermarket that is open from 08:00-22:00hrs. A smaller Sainsbury's Local store is at the south end and this operates from 07:00hrs to 23:00hrs 7 days a week.

3.6 The A1 and A3 uses all close by 23:00hrs. The cinema is licensed to serve alcohol until 23:00hrs and late night refreshment until midnight. It has a total capacity of 321 seats.

3.7 The site has a Public Transport Accessibility Level (PTAL) rating of 6b (highest possible) and is located in close proximity to Russell Square underground station.

3.8 It is important when assessing the impact of noise from an individual premises in an area that the concept of *additional* noise associated with any new activity at that premises is taken into account. The incremental change to noise levels caused by the normal commercial operation of a professionally operated restaurant in an area where such a use is normal for the character of the area could be so small as to be undetectable if it is masked by the existing noise in the area.

Figure 2: View from in front of unit 18 looking south

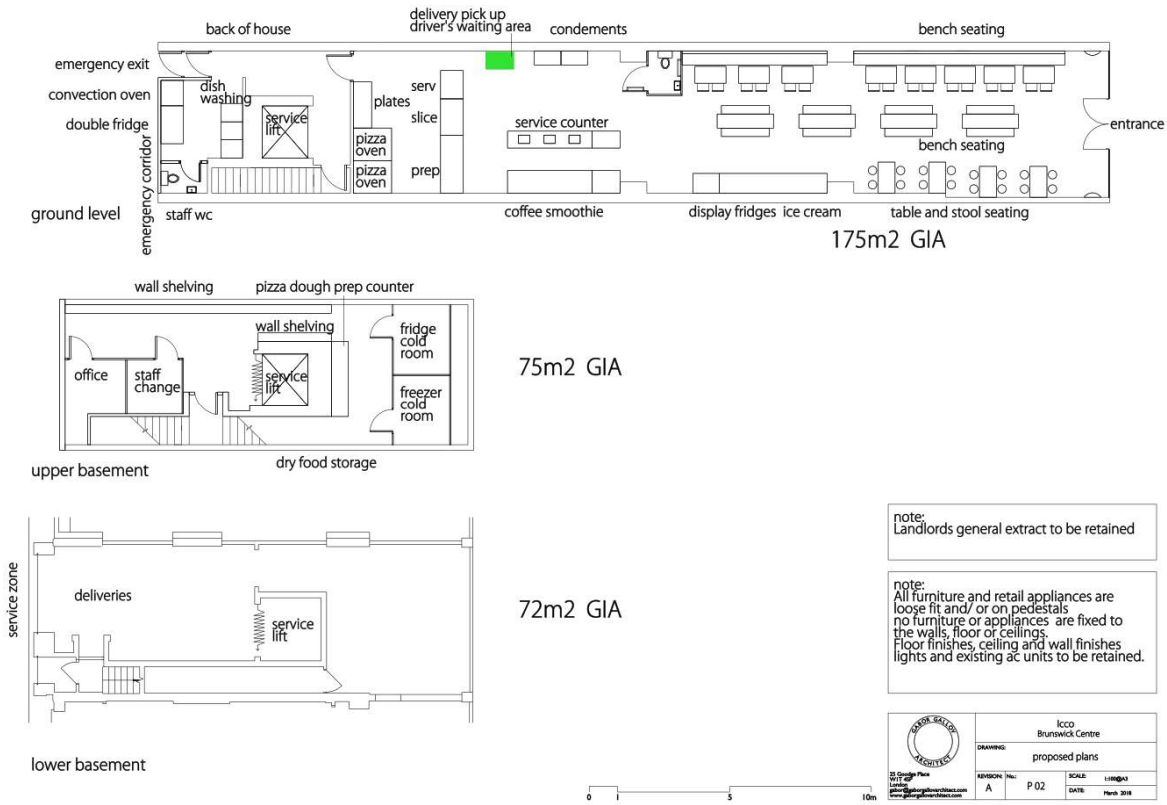


Figure 3: Proposed layout of restaurant

3.9 It is also a consideration that a bona-fide commercial premises in the area can reduce street drinkers, rough sleeping, litter and crime as the commercial operation seeks to eliminate this type of activity from the immediate area outside the premises entrance for the benefit and safety of their own customers and employees. This is achieved through good lighting, CCTV coverage, litter removal and a presence of professional personnel.

4.0 Criteria

NPPF

4.1 The revised National Planning Policy Framework (NPPF) was published by the Ministry of Housing, Communities and Local Government on 24 July 2018 and sets out the government's planning policies for England and how these are expected to be applied. This revised Framework replaces the previous NPPF published in March 2012.

4.2 References to noise can be found in Section 15 titled "Conserving and enhancing the natural environment". The NPPF states at Paragraph 170 sub-paragraph (e) *"Planning policies and decisions should contribute to and enhance the natural and local environment by 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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans".*

4.3 The NPPF states at Paragraph 180 that *"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".*

4.4 The comments about *adverse impacts on health and quality of life* are referenced (in the NPPF at footnote 60) to the Noise Policy Statement for England (NPSE) published by the Department for Environment, Food & Rural Affairs in 2010. The NPSE is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.

4.5 The NPSE sets out the Government's long-term vision to *'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development'* which is supported by the following aims:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life.*

4.6 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as *'the level above which significant adverse effects on health and quality of life occur'*. The following guidance is provided within the NPSE: *'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.'

4.7 The Planning Practice Guidance (PPG) on Noise published by Ministry of Housing, Communities & Local Government in March 2014 is written to support the NPPF with more specific planning guidance on how planning can manage potential noise impacts in new development. [Note: At the time of writing this report the PPG had not been updated to reflect the July 2018 changes to the NPPF].

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. 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 Observable Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/ or attitude, 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 perceived change in the quality of life	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/ or attitude, 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 the 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
Noticeable and very disruptive	Extension and regular changes in behaviour and/ or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/ awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non auditory	Unacceptable Adverse Effect	Prevent

Figure 4: PPG Noise Exposure Hierarchy

4.8 The PPG reflects the NPSE and states at Paragraph 001 that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

4.9 The PPG clarifies at Paragraph 002 that neither the NPPF nor the NPSE expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of proposed development.

4.10 The PPG expands upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system.

4.11 Figure 4 is reproduced from PPG Paragraph 005 and summarises the noise exposure hierarchy, based on the likely average response

4.12 The PPG at Paragraph 005 considers that a noise impact with an effects level which is lower than SOAEL is acceptable but that consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise). When the significant observed adverse effect level boundary is crossed noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused. At the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be prevented from occurring.

Camden Local Plan Policies A4 and A1

4.13 The Local Plan was adopted by Council on 3 July 2017 and has replaced the Core Strategy and Camden Development Policies documents as the basis for planning decisions and future development in the borough. Noise and vibration can have a significant impact on amenity, quality of life and well being. Local Plan Policies A4 (Noise and vibration) and A1 (Managing the impact of development) seek to protect residents of both existing and new residential developments and the occupiers of other noise-sensitive developments from the adverse effects of noise and vibration.

4.14 Appendix 3 of the Local Plan supports these policies and sets out expected standard in terms of noise and vibration. A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion.

Licensing Act 2003

4.15 Camden Council has a duty under the Licensing Act 2003 to determine its policy and publish a statement of that policy.

4.16 The City Council fulfils its primary obligation under the Act to promote the four licensing objectives by having policies based on each:

- The prevention of crime and disorder
- Public safety
- The prevent of public nuisance
- The protection of children from harm

Other relevant legislation

4.17 Separately to any grant of planning permission or premises licence members of the public are protected from noise that is a nuisance.

4.18 The Environmental Protection Act 1990 part III deals with statutory nuisance which includes noise. This Act allows steps to be taken to investigate any complaints which may then result in the issuing of an abatement notice and a subsequent prosecution of any breach of the notice. A statutory nuisance is a material interference that is prejudicial to health or a nuisance.

4.19 The Clean Neighbourhoods and Environment Act 2005 deals with many of the problems affecting the quality of the local environment and provides local authorities with powers to tackle poor environmental quality and anti-social behaviour in relation to litter, graffiti, waste and noise. A fixed penalty notice can be issued when noise exceeds the *permitted level* as prescribed under the Noise Act 1996 as amended by the Clean Neighbourhoods and Environment Act 2005. The permitted noise level using A-weighted decibels (the unit environmental noise is usually measured in) is 34dBA if the underlying level of noise is no more than 24dBA, or 10dBA above the underlying level of noise if this is more than 24dBA.

British Standard 8233

4.20 BS8233:2014 states that for steady external noise sources, it is desirable that the internal ambient noise level in dwellings does not exceed the guideline values of the standard as shown below.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$

Figure 5: Indoor ambient noise levels for dwellings (from BS8233 Table 4)

World Health Organisation

4.21 Guidance on maximum noise levels is given by the World Health Organisation (WHO) in a report entitled 'Guidelines for Community Noise'[1]. This report states that to avoid negative effects on sleep, the equivalent continuous internal sound

[1] World Health Organisation. Guidelines for Community Noise, 2000

pressure level during the sleeping period should not exceed 30 dB L_{Aeq}. If the noise is not continuous, sleep disturbance has an improved correlation with maximum noise levels and effects have been observed at 45 dB L_{Amax} internally. It goes on to recommend that, at night, noise levels outside dwellings should not exceed 45 dB L_{Aeq} and maximum noise levels should not exceed 60 dB L_{Amax} so that people may sleep with bedroom windows partially open.

4.22 The WHO guidelines also state that to protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady continuous noise.

4.23 However, in a review of health effect based noise assessment methods undertaken for the DETR and undertaken jointly by the NPL and Southampton University[2], it is noted that: *"Perhaps the main weakness of both WHO-inspired documents is that they fail to consider the practicality of actually being able to achieve any of the stated guideline values".* According to the report transgression of the WHO guideline values does not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached. The report states: *"While in an ideal world it may be desirable for none of these effects to occur, in practice a certain amount of noise is inevitable in any modern industrialised society. Perhaps the main weakness of both WHO-inspired documents is that they fail to consider the practicality of actually being able to achieve any of the stated guideline values. It is important to make clear that ...exceedences do not necessarily imply an over-riding need for noise control, merely that the relative advantages and disadvantages of noise control action should be weighed in the balance. It is all a question of balance and mere exceedence of the WHO guidelines just starts to tip the scales."*

4.24 A noise incidence study was undertaken by the Building Research Establishment in 2000 and was published in 2002[3]. This study indicated that approximately 55% of the population in England and Wales are exposed to noise levels above 55 dB L_{Aeq} during the daytime. This study is considered to further support the findings of the DETR study and reinforce the apparent weakness of the WHO recommendations.

4.25 It is relevant to note that the WHO report has not been adopted into UK legislation or formal guidance; hence it remains a source of information reflecting a high level of health care with respect to noise, rather than a standard to be rigidly applied. The guideline values in the WHO report give the lowest threshold noise levels below which the occurrence rates of particular effects can be assumed to be negligible.

Operational objectives

4.26 The management team at ICCO are keen to continue to promote good relationships with both their commercial and residential neighbours as they have done at their other sites. Therefore in addition to all statutory obligations it is a primary operational objective that noise from the normal operation of the premises does not have a detrimental impact on any neighbouring properties.

4.27 An Operational Management Plan is presented at Appendix E. This document is based on good operating practices and experience from operating other sites and will be regularly reviewed and updated.

[2] Porter N D, Flindell I H and Berry B F. NPL Report CMAM 16, Health Effect Based Noise Assessment Methods: A Review and Feasibility Study, DETR, 1998

[3] DEFRA. The National Noise Incidence Study 2000/2001, 2002

5.0 Balancing planning and licensing noise conditions

5.1 The guidance issued under Section 182 of the Licensing Act 2003 is clear in its general principles (Para 1.16) that *"[licence conditions] should not duplicate other statutory requirements or other duties or responsibilities placed on the employer by other legislation"*. Therefore if the objective of the prevention of public nuisance is satisfactorily upheld because there already exist tests of nuisance through The Environmental Protection Act 1990; The Noise Act 1996; and The Clean Neighbourhoods and Environment Act 2005, then additional conditions on a premises licence that merely duplicates these statutory requirements should not be necessary according to Home Office guidance.

5.2 Similarly planning guidance has, for a long time, stated that additional planning conditions which duplicate the effect of other legislation should not be imposed, and current planning practice guidance is clear that conditions requiring compliance with other regulatory requirements will not meet the test of necessity and may not be relevant to planning.

5.3 The pragmatic approach to specifying relevant requirements for noise control conditions would be that more general noise criteria relating to the principle of use of the site are applied under the planning regime; these may include boundary noise conditions or plant operating level limits. More specific requirements relating to licensable activities such as hours of operation, the requirement for a sound system limiter or a noise management policy could be implemented through the licensing process.

6.0 Noise measurement procedure

6.1 To establish the noise levels in the area a static measurement position was set up at roof level at the front of the unit.

6.2 Additional noise measurements were made with a hand-held measurement system at other locations in the immediate area. Analysis shows good correlation between all the attended and unattended recorded noise level data at the logging position.

6.3 Noise measurements were made in continuous samples of 1-second intervals. Measurements included the L_{Aeq}, L_{A90} and L_{Amax} indices. Simultaneous octave and third octave frequency spectra were also obtained during the survey. Measurements were taken at 1.5 m above first floor level. Measurement duration was typically 5-minutes per sample. When the L_{Aeq} level quickly stabilised, shorter duration measurements were taken although no measurement was shorter than 1-minute. Throughout the course of the survey an outdoor microphone wind-shield was used.

6.4 For the purposes of this assessment all attended measurements were paused for emergency service sirens, aircraft passes and other significant short-duration noises. (The unattended logging equipment operates continuously and therefore all noise incidents are recorded on that trace).

6.5 The instrumentation used to carry out the noise measurements is detailed in Appendix C. The calibration of the measuring equipment was checked prior to and immediately following the tests and no signal variation occurred. Calibration of equipment is traceable to national standards.

6.6 The weather conditions during the survey are reported in Appendix D.

Figure 6: Noise logging position directly above front façade of unit

7.0 Existing plant at application site

7.1 The building is effectively sealed with no openable windows or evidence of passive ventilation systems. There is an existing mechanical forced air system evident at the application site and mechanical ductwork is clearly visible.

7.2 Existing grilles to the front provide a route for mechanical ventilation. The existing plant is documented at Appendix F - Existing Plant Schedule.

7.3 Within the building there are three air conditioning cassettes. At basement level in the service area there are existing air-conditioning outdoor units consisting of 1 off Toshiba RAV-SM14001AT-E and 2 off Toshiba RAV-SM1101AT-E which are shown in Figure 8.

Figure 7: Mechanical air handling ductwork (existing)

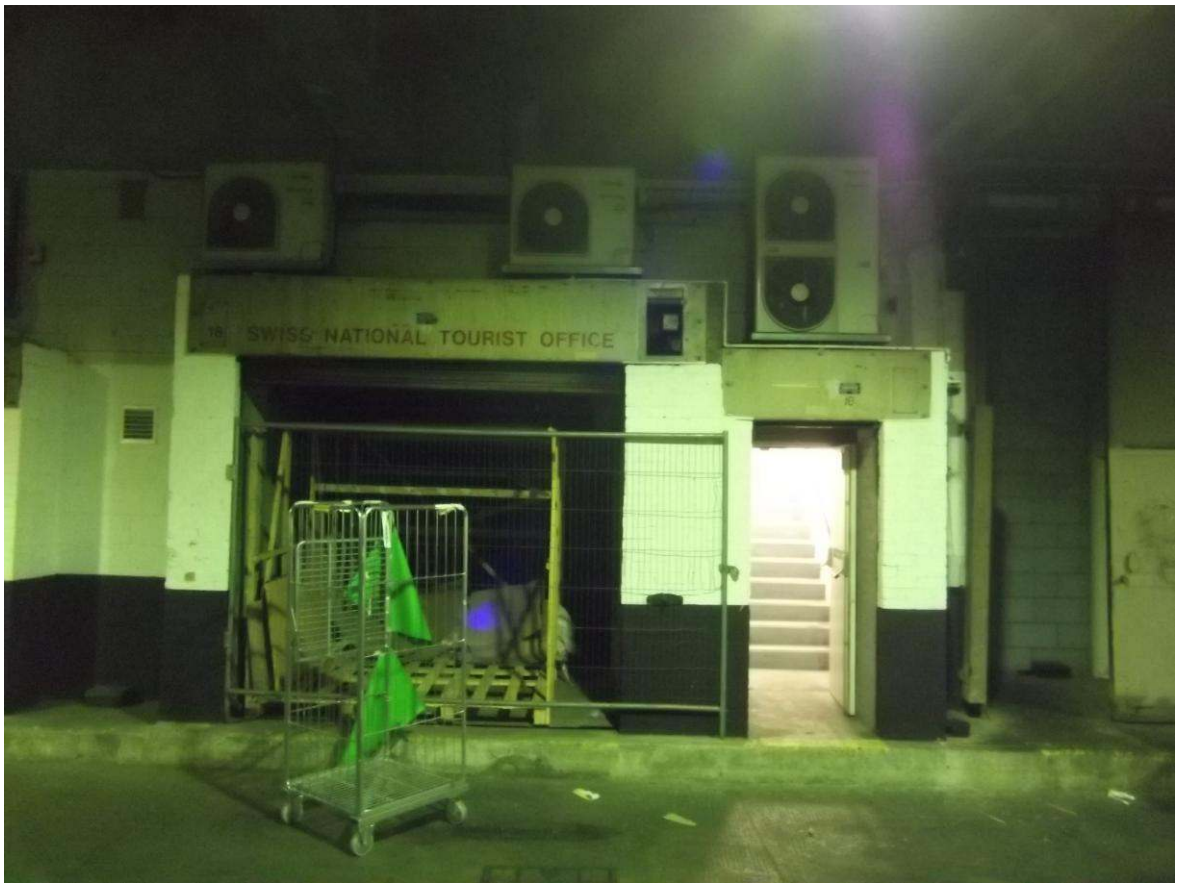


Figure 8: Air-conditioning outdoor units (existing) in basement service area

Figure 9: View looking south along service road. Note: numerous items of mechanical plant

Figure 10: View looking north along service road. Note: items of mechanical plant at other sites

8.0 Assessment of Goodge Street restaurant

8.1 ICCO have operated the pizzeria on Goodge Street since 1999. I am not aware of any noise related complaints relating to the operation of this restaurant.

8.2 It is a similar scale of operation with a customer dining area and a kitchen using electric pizza ovens with extraction. At this site the extraction ducts to the front façade. Noise level from the extract fan was subjectively detectable at circa 1m and inaudible beyond 3m.

Figure 11: Oven extraction fan unit in Goodge Street façade

8.3 It is of note that this extraction system does not provide any acoustic attenuation or odour control.

8.4 Customer activity was as expected from this style of operation. There was low level background music in the customer area which was not detectable on the pavement outside the restaurant. The restaurant was at about 70% capacity (19:00-21:00hrs) with a selection of casual diners in small groups. Average noise level in the centre of the restaurant itself was 73dBA.

8.5 In a rear courtyard, which is part of the Muslim World League London Office (MWLLO) building immediately adjacent to the north of the restaurant are the air-conditioning outdoor units. The MWLLO includes offices, a mosque on the first floor and ladies' prayer room adjacent to the plant location. It is reasonable to conclude that it is a significantly more sensitive location for plant than the underground service road at the Brunswick Centre.

Figure 12: Air conditioning outdoor units. Note: not all items belong to ICCO. Prayer room at left of image.

9.0 Noise measurement analysis

9.1 Continuously recorded noise measurement data at the logging position in the Brunswick Centre is displayed in graphical form in Figure 13.

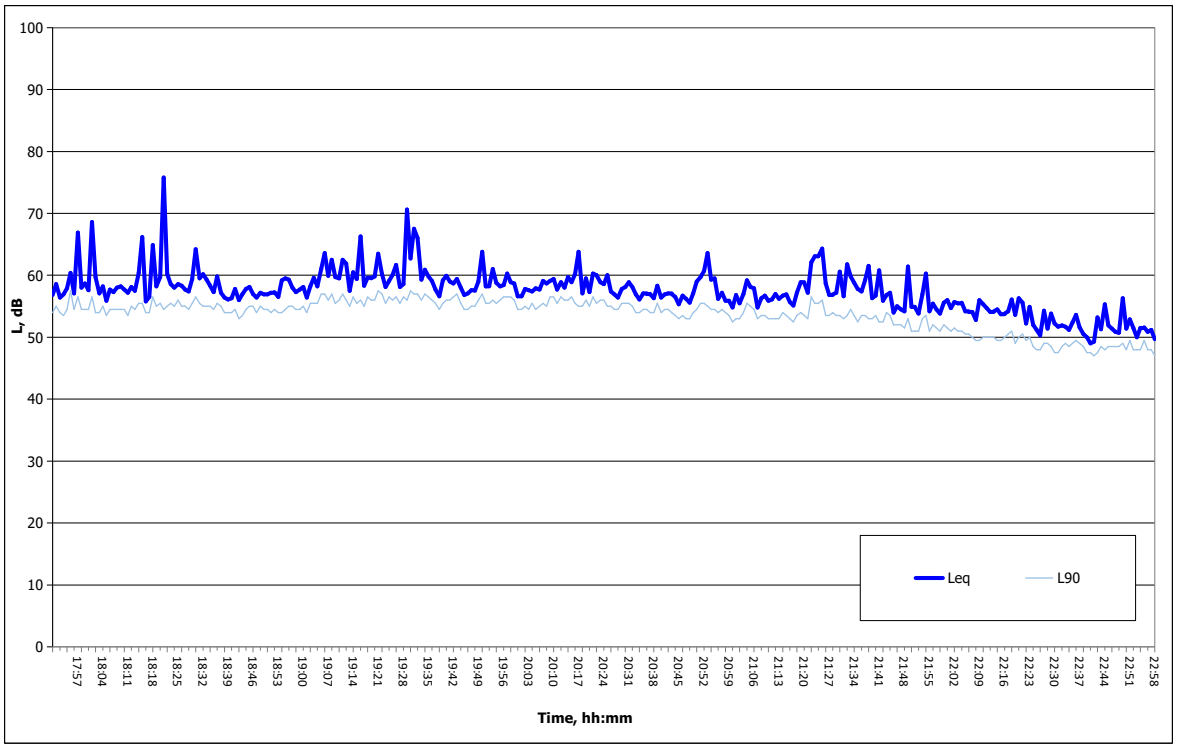


Figure 13: Continuously logged noise data at application site

9.2 The application site was closed and there was no activity in the building during the assessment period. All noise measured is attributable to existing sources in the area that are not connected with the proposed use.

9.3 Attended measurement data from the logging position location correlates with logged data. These data also correlate with library data for the area held at our offices and also from other surveys carried out for recent planning applications in the centre.

9.4 The average background noise level at the logging position was 53.6dB when reported as an L_{A90}. In the last hour (22:00hrs to 23:00hrs) it was 49.1dB.

10.0 Plant noise prediction

10.1 The proposed plant is effectively a refinement of the original air handling plant with new inlet and extract fans and attenuators for the ground floor ducted to the front façade, and an addition of a dedicated kitchen extraction system (see proposal from Fan Rescue Ltd document reference 76545) ducted to the rear service area at lower basement level.

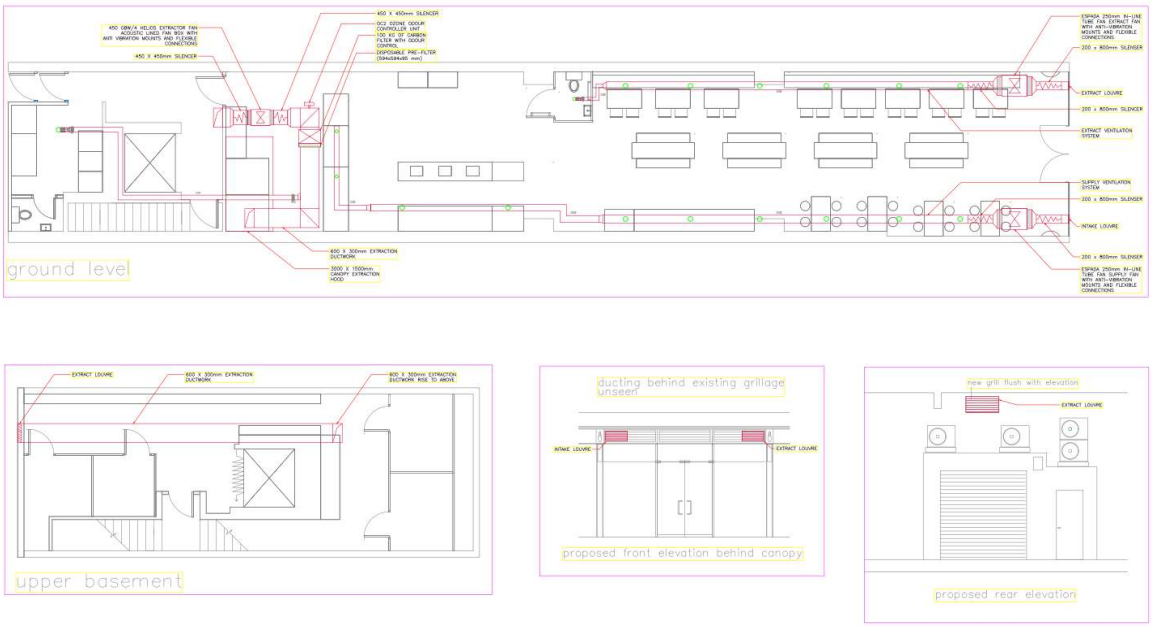


Figure 14: Proposed air handling system

10.2 The inlet and outlet louvres for the air circulation are proposed to be terminated in the existing grilles at the front façade. The kitchen extract system will be terminated in the lower basement service road with a new louvre as shown in Figure 14.

10.3 The air-handling units are demand driven, i.e. they do not operate continuously outside of the operational hours of the premises.

10.4 Air conditioning inverters are normally over specified to ensure that plant does not run at maximum capacity and therefore have a reduced life. Typically no more that 50% of the plant will operate at any one time and only then when the premises is occupied and cooling is required.

10.5 As the air conditioning outdoor units and kitchen extract outlet louvre is located at lower basement level in the underground service road, and since this plant will not be ducted to atmosphere, it is concluded that plant noise emissions will be significantly below the Camden Council planning criterion for a rating level of 10 dB below background (15dB if tonal components are present). All plant is proposed with flexible couplings and anti-vibration mounts where appropriate.

10.6 The inlet and outlet ducts for the restaurant air circulation system are terminated at the front façade behind the existing grille. This method of ventilation to the front façade is commonplace in these commercial units. The separation distance to the nearest residential window with line of sight is >30m.

10.7 There are two fans, inlet and extract and they are both low noise Fläkt Woods ESPADA 250 in-line tube fans with anti-vibration mounts and flexible connections. These are low noise level devices with the manufacturer's data quoting 32dBA breakout at 3m. Sound attenuation is provided either side of each fan unit with a 200mm diameter x 600mm circular attenuator. The specification for a Fläkt Woods 200 x 600mm silencer (ref: BDER30 020-060) is 19-22dB in the midband.

10.8 Resultant noise level at the front façade will be <10dBA and therefore inaudible. It is of note that fan noise breakout in both directions (into the atmosphere and into the restaurant) is attenuated in the same way and therefore, as the system is specified for minimal noise breakout into the restaurant space so as not to be intrusive, the corresponding level will result at the front façade and will be masked by the ambient noise level outside.

Design Manual
Mechanical Plant - attenuation with distance, point source

Date: 2-Aug-18
Report No: 1800786
Project: Unit 18 Brunswick Centre
Title: Kitchen extract

Frequency	63	125	250	500	1k	2k	4k	8k
Source Lw	51	51	59	30	37	37	37	31

Distance from source to receive: 1.0 m

Directivity factor of source (0, 3, 6 or 9): 3

0 = free space
3 = relecting plane
6 = junction of two planes
9 = junction of three planes

SPL = SWL - 20 log r - 11+ Directivity

Frequency	63	125	250	500	1k	2k	4k	8k	A
Receive Lp	43	43	51	22	29	29	29	23	30.9

Calculations								
Fan SWL	60	60	69	71	67	65	62	55
Silencer att	3	3	6	7	12	14	11	10
Filter att	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00
Duct att	6.50	6.50	3.50	1.50	1.50	1.50	1.50	1.50
Elbow att	0.00	0.00	0.00	32.00	16.00	12.00	12.00	12.00
	50.50	50.50	59.10	29.50	36.50	36.50	36.50	30.50
Duct att/m	0.65	0.65	0.35	0.15	0.15	0.15	0.15	0.15
Elbow att	0.00	0.00	0.00	8.00	4.00	3.00	3.00	3.00
Duct length, m =	10							
No of elbows =	4							

Figure 15: New plant noise prediction, kitchen extract to lower basement level

10.9 The sound pressure level above has been calculated from the manufacturer's published sound power level, SWL, at distance of *r* from the source by the equation:

$$L_p = L_W + 10 \log_{10}\left(\frac{S_0}{4\pi r^2}\right)$$

where $S_0 = 1\text{m}^2$.

10.10 Resultant sound pressure levels for all plant are tabulated in Figure 16 below. All plant is substantially below the Noise Sensitive Receptor limit level as required by the Camden Local Plan plant noise criteria.

Model	Description	Max SPL @ 1m	Distance to receptor	Obscurred from line of sight	SPL @ NSR
Air circulation - inlet	existing louvre grille at front	<11dB	>30m	Partially obscurred	<39dB
Air circulation - outlet	existing louvre grille at front	<11dB	>30m	Partially obscurred	<39dB
Kitchen extract outlet	600x300mm louvre grille in basement service area	30.9dB	>10m, no direct path	Totally obscurred in subterranean seervice road	<39dB

Figure 16: All plant conforms to Camden criteria at nearest Noise Sensitive Receptors

11.0 Predicted noise of customers leaving the site

11.1 Unlike a theatre, or sports arena where events have a definite finish time while there is a capacity crowd, the nature of a restaurant is that patrons tend to depart in small numbers and not *en masse* at the end of a staged event.

11.2 In order to assist in the understanding of actual noise levels produced by people outdoors it is important to understand the effects of the noise source (i.e. people talking) and how that noise level increases as the number of people talking increases.

11.3 Referring to data held in our own library; normal conversation is typically in the range of 55-60dBA when measured at 1 metre.

11.4 In assessing for a worst-case condition then I have considered a group of 20 people are talking outside the premises as they arrive or disperse from the site.

11.5 In normal conversation no more than 50% of them would be talking (there will be at least one listener for each talker). If we now consider people to be talking at the upper end of the normal speaking range, and look at a worst case scenarios of half of the people talking concurrently at 60dBA then in order to calculate the total noise level we logarithmically sum six sources of 60dB as follows:

$$\sum = 10\log\left(n \times 10^{\left(\frac{60}{10}\right)}\right)$$

where n is the number of people talking

11.6 The formula above gives a value for total sound pressure level for a group of 20 people to be 67dBA.

11.7 It is important to remember that this is a worst-case value, when 50% of the people are talking simultaneously and loudly. In reality general lulls in the conversation, smoking, or conversations where there are more than one listener to each talker mean that less than 50% of an average group will be talking simultaneously. I have also observed that groups standing in close proximity to each other talk with more hushed voices than groups of people spread out when, for example, seated at large tables in a pub beer garden.

11.8 67dBA is the predicted noise from a large group of 20 people talking outside when measured at 1 metre. Sound is attenuated in air and this effect is noticeable as the

listener moves away from the source. In calculating distance attenuation, the noise of people talking is assumed to be a number of discreet point sources and therefore is attenuated by 6dB with each doubling of distance. So if the noise source is 67dBA at 1 metre then at 2 metres it becomes 61dBA, at 4 metres 55dBA and at 8 metres 49dBA. Attenuation due to distance means that a separation distance of around 30 metres from the noise source to the receiver position (a residential window) will render the noise below 25dBA and subjectively inaudible.

12.0 Noise from delivery drivers

12.1 There will not be any staff delivery vehicles such as a fleet of mopeds as used by some other restaurants. All deliveries will be via Uber Eats which is the system in place at the Goodge Street restaurant. In my conversations with the manager this this method works very well. The delivery drivers only arrive when an order is ready and then quickly leave the area. Many local deliveries are made by bicycle.

12.2 The delivery system will be monitored by the management team. Specific parking locations will be used and, as at the other site, these drivers/riders will be keen to work within the constraints of ICCO in order to ensure regular work in their local area.

13.0 Assessment of plant noise levels

Noise Assessment - NPPF

13.1 There is a considerable separation between each item of plant and the noise sensitive receptors. There are no start-up noises and the plant is not tonal. All plant will be mounted on anti-vibration mounts.

13.2 This application if for modern plant to be located in a service road below ground where existing plant already operates. Therefore the plant will not have adverse impacts on health and quality of life arising from noise because of the design and controls on the plant and the physical location of the plant in an area considerably separated from noise sensitive receptors. The plant that ducts to the front façade consists of two small low level fans which will be subjectively inaudible in front of the premises and therefore of no significance at a distance of 30 metres.

13.3 The plant does not contravene the NPPF by reason of noise.

Noise Assessment - Camden Local Plan Policies A4 and A1

13.4 The pre-existing background noise level is 49dBA. The noisiest new plant is predicted to be at least 18dB below the background noise level in the service area in front of the extract grill which is substantially disconnected from the residential properties. Additional attenuation due to shielding and distance will result in plant noise which is theoretically below 0dB and entirely undetectable.

13.5 All plant is predicted to be compliant with Local Plan Policies A4 and A1.

Noise Assessment - BS 8233:2014

13.6 The internal noise level in habitable rooms will not be impacted by plant operation with windows open or closed as plant noise is predicted to be significantly below average internal levels within a residential property at this location and would therefore be subjectively inaudible.

13.7 It is therefore predicted that external noise from the new items of plant will have no impact on average living conditions inside nearby properties, even with windows open, based on the guidance levels in BS8233.

Noise Assessment – WHO Guidelines

13.8 Assuming all worst case conditions the criteria of the WHO guidelines are met at the nearest receptor positions when considering noise from the plant detailed in this report.

14.0 Conclusions

14.1 Big Sky Acoustics Ltd was instructed by Stephen Matthews of Bidwells LLP, acting on behalf of Ovelshield Limited t/a ICCO, to carry out an assessment of the impact of noise from a proposed A3 restaurant at Unit 18 Brunswick Centre, London WC1N 1AE.

14.2 No additional remedial works are required to the existing building which forms a robust and continuous envelope to contain noise from activity within. All proposed mechanical plant complies with the Camden Council planning policy for plant noise.

14.3 The proposed use will not adversely impact on on residential amenity as activity is contained by the building, plant noise is compliant with the Local Planning Authority policy and is contained in an area substantially separated from residential properties, operational practices to control noise will be implemented and patron departure is relatively early in the evening, in small groups as is typical for a restaurant, and into an area which is well served by public transport.

Richard Vivian BEng(Hons) MIET MIOA MAES MIOL
Big Sky Acoustics Ltd

Appendix A - Terminology

Sound Pressure Level and the decibel (dB)
A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 140 dB (threshold of pain).

Frequency and Hertz (Hz)
As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz. Young people with normal hearing can hear frequencies in the range 20 Hz to 20,000 Hz. However, the upper frequency limit gradually reduces as a person gets older.

A-weighting
The ear does not respond equally to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dBA. A change of 3dBA is the minimum perceptible under normal everyday conditions, and a change of 10dBA corresponds roughly to doubling or halving the loudness of sound.

C-weighting
The C-weighting curve has a broader spectrum than the A-weighting curve and includes low frequencies (bass) so it i can be a more useful indicator of changes to bass levels in amplified music systems.

Noise Indices
When a noise level is constant and does not fluctuate over time, it can be described adequately by measuring the dB level. However, when the noise level varies with time, the measured dB level will vary as well. In this case it is therefore not possible to represent the noise level with a simple dB value. In order to describe noise where the level is continuously varying, a number of other indices are used. The indices used in this report are described below.

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

L_{Aeq} The A-weighted equivalent continuous sound pressure level. This is increasingly being used as the preferred parameter for all forms of environmental noise.

L_{Ceq} The C-weighted equivalent continuous sound pressure level includes low frequencies and is used for assessment of amplified music systems.

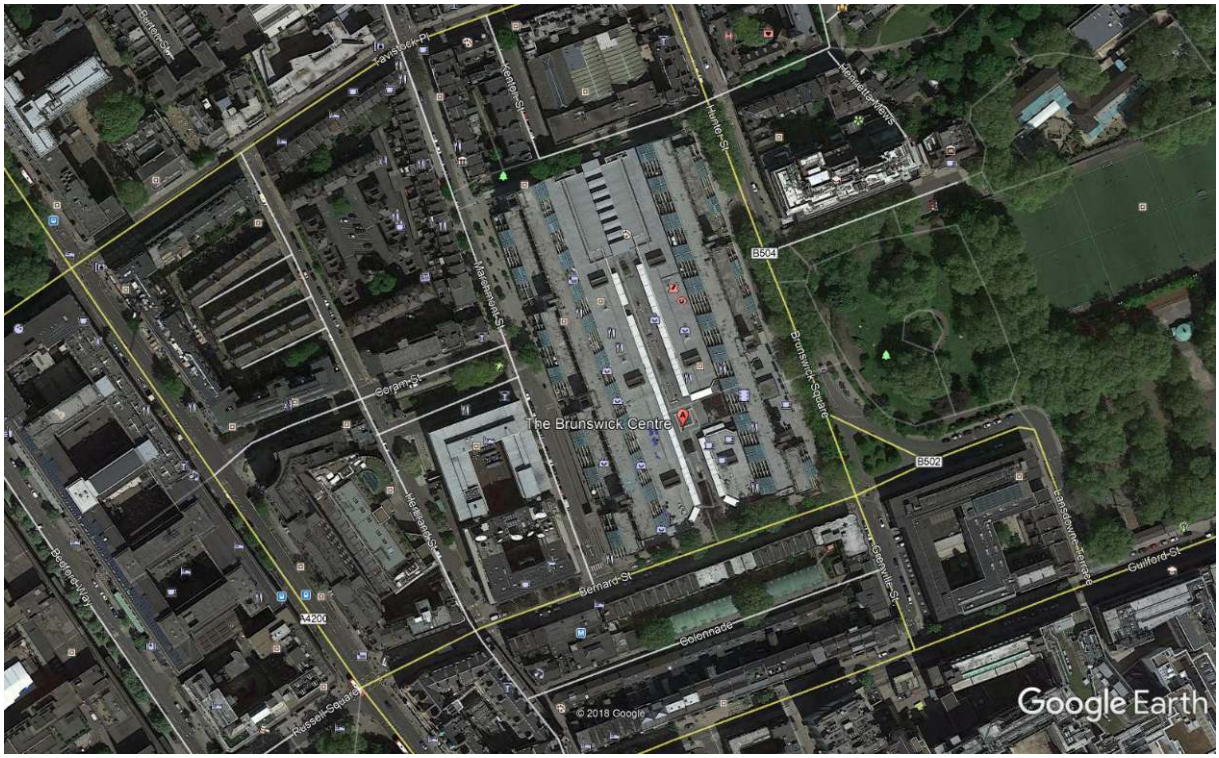
L_{Amax} is the maximum A-weighted sound pressure level during the monitoring period. If fast-weighted it is averaged over 125 ms , and if slow-weighted it is averaged over 1 second. Fast weighted measurements are therefore higher for typical time-varying sources than slow-weighted measurements.

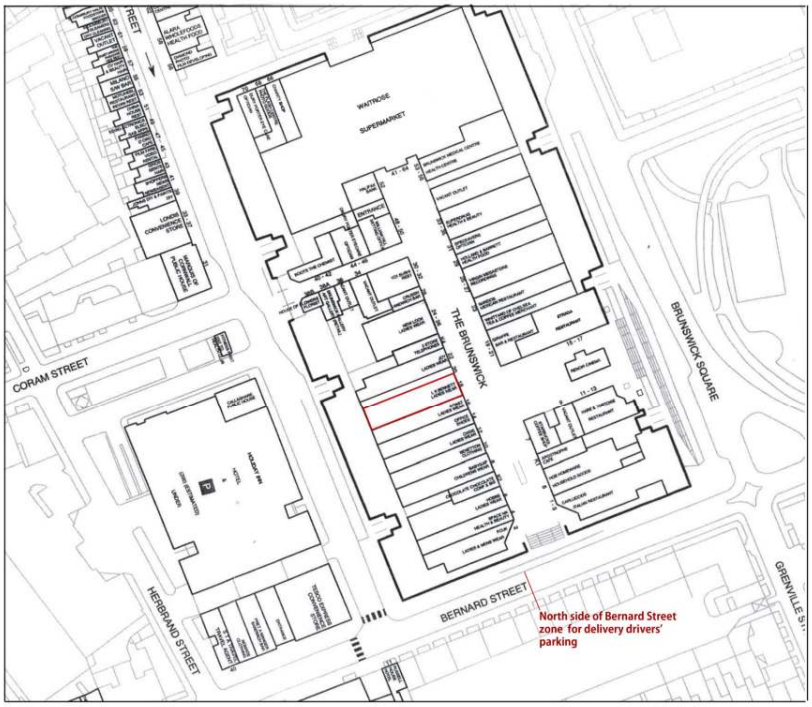
L_{A90} is the A-weighted sound pressure level exceeded for 90% of the time period. The L_{A90} is used as a measure of background noise.

Example noise levels:

Source/Activity	Indicative noise level dBA
Threshold of pain	140
Police siren at 1m	130
Chainsaw at 1m	110
Live music	96-108
Symphony orchestra, 3m	102
Nightclub	94-104
Lawnmower	90
Heavy traffic	82
Vacuum cleaner	75
Ordinary conversation	60
Car at 40 mph at 100m	55
Rural ambient	35
Quiet bedroom	30
Watch ticking	20

Appendix B - Site location





Appendix C - Instrumentation

All attended measurements were carried out using a Cirrus type CR:171B integrating-averaging sound level meter with real-time 1:1 & 1:3 Octave band filters and audio recording conforming to the following standards: IEC 61672-1:2002 Class 1, IEC 60651:2001 Type 1 I, IEC 60804:2000 Type 1, IEC 61252:1993 Personal Sound Exposure Meters, ANSI S1.4-1983 (R2006), ANSI S1.43-1997 (R2007), ANSI S1.25:1991. 1:1 & 1:3 Octave Band Filters to IEC 61260 & ANSI S1.11-2004.

Unattended measurements were carried out using a Svan type 971 integrating-averaging sound level meter with real-time 1:1 & 1:3 Octave band filters conforming to the following standards: IEC 61672-1:2002 Class 1. 1:1 & 1:3 Octave Band Filters to IEC 61260.

The calibration of the measuring equipment was checked prior to and immediately following the tests and no signal variation occurred. Calibration of equipment is traceable to national standards. The following instrumentation was used during the survey:

Description	
Cirrus sound level meter	type CR:171B
Cirrus pre-polarized free-field microphone	type MK:224
Cirrus microphone pre-amplifier	type MV:200E
Cirrus class 1 acoustic calibrator	type CR:515
Svan sound level meter	type 971
ACO pre-polarized free-field microphone	type 7052E
Svan microphone pre-amplifier	type SV18

Appendix D - Meteorology

10 July 2018	**Temperature**	**Wind speed**	**Precipitation**
At start	21°C	0 ms^{-1}	None
During assessment	19°C	0-1 ms^{-1}	None
At finish	17°C	0-0.5ms^{-1}	None
Additional comments: Dry, still, warm.			

Appendix E - Operational Management Plan

Operational Management Plan
Unit 18, Brunswick Centre

METHOD STATEMENT

All units shall adhere to the following operating principles.

Core menu:

ICCOs are traditional Italian pizzerias located in the heart of London. ICCO first opened in 1999. Since then we have built a solid reputation with customers, reviewers and bloggers. The concept centres on serving delicious fresh pizzas with prices that offer exceptional value for money. The dough is prepared on site every morning by our chefs and with a theatre kitchen customers can see fresh ingredients added to the pizza bases. With 18 different pizzas and most priced around the £5 mark, we have built up an army of loyal customers (over 300,000 pizzas sold from our two branches in 2017 – over 1.5 million since we started). We opened ICCO because we wanted to prove that it was possible to serve fresh pizza at a reasonable price rather than the extortionate prices readily seen on the high street.

It is authentic, cheap and delicious – a far cry from the monotonous Italian chain restaurants owned by venture capitalists.

Waste:

We shall remove waste from the shop at regular intervals throughout the day to the waste store shown on the attached plan. Waste is then removed from the building at regular intervals throughout the day.

Opening hours:

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Opening hours	7:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM	9:00 AM	9:00 AM
Closing hours	23:00 PM	23:00 PM	23:00 PM	23:00 PM	23:00 PM	23:00 PM	23:00 PM

Cleaning frequency:

Constantly throughout the day

Recycling policy:

Plastics and glass recycled

Extract:

Equipment Detail: Please see attached (ICCO Tech letter P-76545 document)

In addition the vent is equipped with special filters (please see attached Carbon filter & 24x24x4 prefilter documents).

We use an electric oven, DONATELLO 6 X 6 ELECTRIC PIZZA OVEN (please see Cuppone-Donatello-Ovens document) because it is highly energy efficient. We will have two of these twin ovens in operation.

We do not use any gas and perform no cooking other than the electric pizza oven.

The oven will have an operational extraction hood which will be vented out of the building to the service are as depicted in our Extraction Plan

Music:

We play music such that it is inaudible outside the shop and only during the customer trading times.

Alcohol:

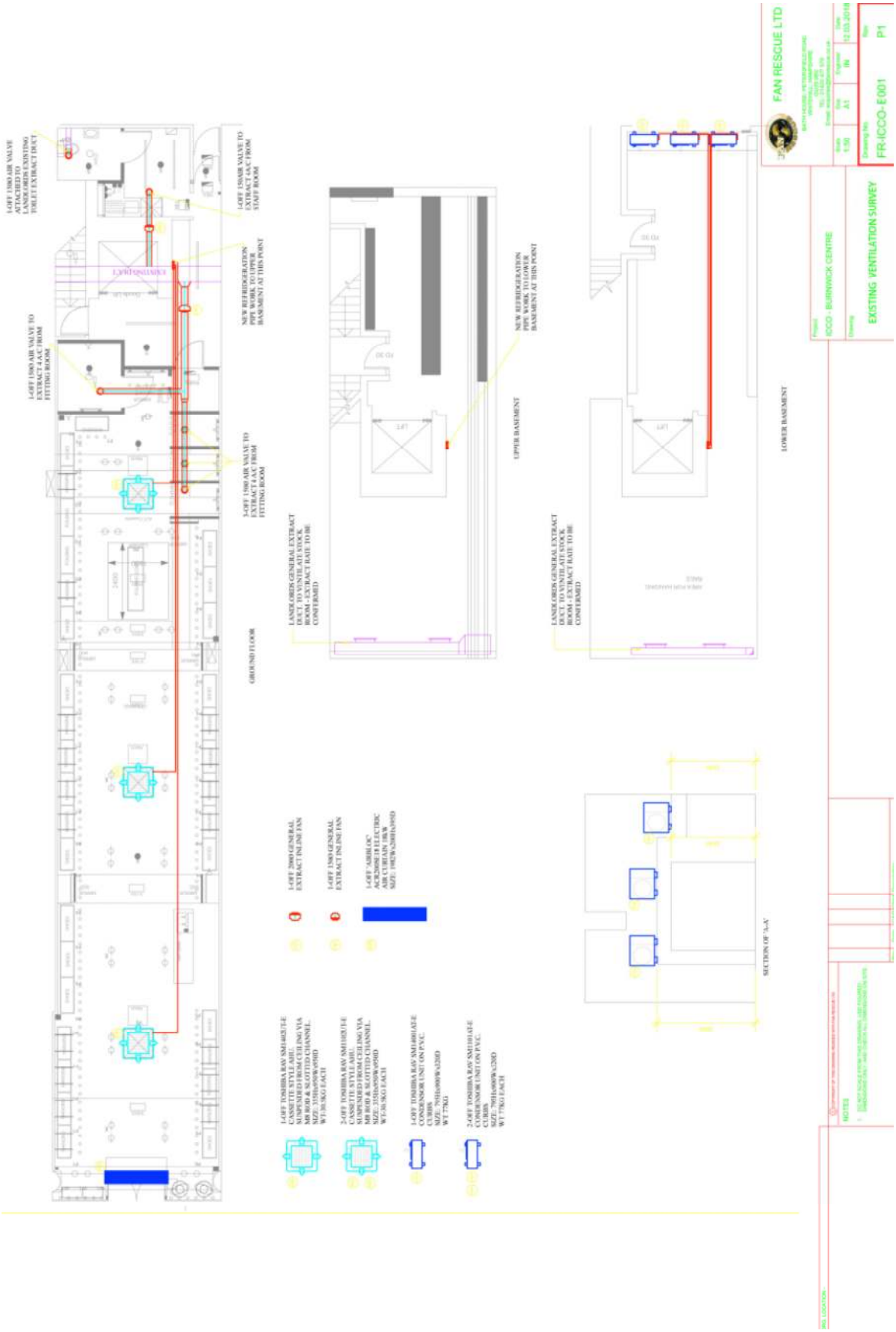
We do not sell any, either on or off the premises.

ADDITIONAL NOTE

Deliveries:

We have a specified area on the shop floor where Delivery drivers will wait to pick up their order so as not to make any disturbance outside of our premises. This area is highlighted on our Proposed Floor plan rev A document. The drivers from our two delivery partners Deliveroo and UberEats will operate exactly how they do so already in the Centre with some of the other A3 operators and will park their cycles/mopeds outside of the Centre on the North side of Berners Street. They will then walk to our Unit in order to collect the order from inside. The on-street delivery vehicle parking area is shown on our Block Location plan rev A document.

Appendix F – Existing Plant Schedule



Appendix G – Proposed extract fan data

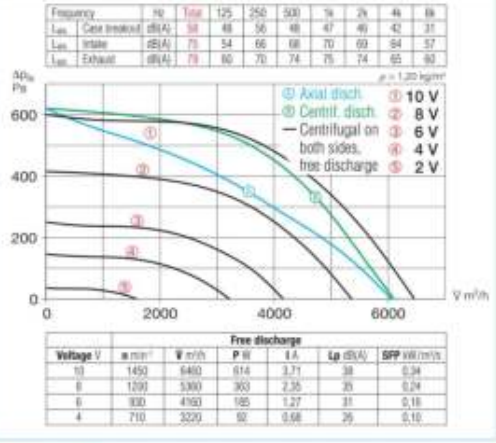
Helios EC green Vent

GigaBox EC centrifugal fans 450 mm ø

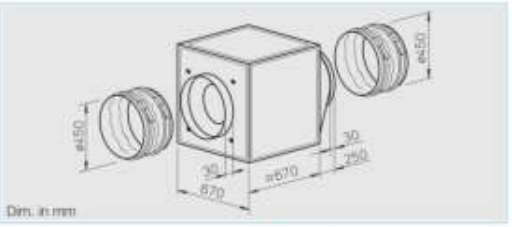
GB EC

Arbitrary installation position and assembly in five possible discharge directions.

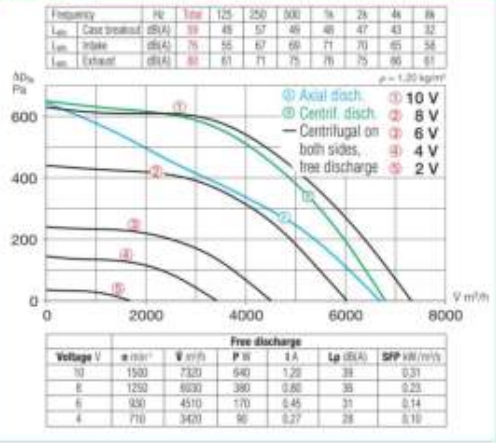
GBW EC 450



Free discharge						
Voltage V	n min⁻¹	V̇ m³/h	P W	I A	Lp dB(A)	SFP kW/(m³/s)
10	1450	6460	614	3.71	38	0.34
8	1200	5300	363	2.35	35	0.24
6	930	4160	185	1.27	31	0.18
4	710	3220	92	0.68	26	0.10



GBD EC 450



Free discharge						
Voltage V	n min⁻¹	V̇ m³/h	P W	I A	Lp dB(A)	SFP kW/(m³/s)
10	1580	7320	640	1.20	39	0.31
8	1250	6030	380	0.80	35	0.23
6	930	4510	170	0.45	31	0.14
4	710	3420	90	0.27	28	0.10

Specification

Casing

Self-supporting frame construction made from hollow aluminium profiles. Lined with 20 mm thick double-walled side panels made from galvanised sheet steel, sound and thermally insulated with flame-retardant mineral wool. Intake cone for ideal airflow, spigot and flexible connector for duct connection. With discharge adapter (from square to circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning with standard crane hooks.

☐ **Impeller**

Impeller and remaining design see description on page 241.

Accessories

Anti vibration mounts for installation indoors. 1 set = 4 pcs.
SDD-U Ref. no. 5627

Wall bracket for wall mounting.
GB-WK 450 Ref. no. 5626

External weather louvre to cover exhaust opening.
GB-WSG 450 Ref. no. 5639

Outdoor cover hood for protected outdoor installation.
GB-WSD 450 Ref. no. 5748

Condensate collector with condensate spigot (centre) for pipe connection.
GB-KW 450 Ref. no. 5644

EC green Vent **60% Saving *** * with speed control

☐ **Accessory details** Page

Universal control system, electronic controller, speed-potentiometer 539 on

Type	Ref. no.	Connection ø	Air flow volume (FID)	R.P.M.	Sound press. case breakout	Motor power	Current	Wiring diagram	max. air flow temperature	Weight net approx.	Universal control system		Speed-potentiometer flush		surface	
		mm	V m³/h	min⁻¹	dB(A) in 4 m	kW	A	No.	+ °C	kg	Type	Ref. no.	Type	Ref. no.	Type	Ref. no.
Single phase motor, 1~, 230 V, 50/60 Hz, EC motor, protection to IP 54																
GBW EC 450	5811	450	6460	1450	38	1.00	5.70	976	50	55.0	EUR EC 2) 3)	1347	PU 24 1)	1736	PA 24 1)	1737
Three phase motor, 3~, 400 V, 50/60 Hz, EC motor, protection to IP 54																
GBD EC 450	5812	450	7320	1500	39	1.00	1.80	976	55	52.0	EUR EC 2) 3)	1347	PU 24 1)	1736	PA 24 1)	1737

1) several EC fans can normally be connected 2) alternative electronic differential pressure/temp. controller (EDR/ETR, No. 1437/1438) or three-step speed switch (SU/SA, No. 4266/4267), see accessories

Appendix H – Proposed attenuator data

ACOUSTICA

ACOUSTICA MANUFACTURING LTD

T 01794 528 350 E info@aco-on.com W aco-on.com

R02 6

R02 6 RECTANGULAR SILENCER

Available in **eight** standard lengths R02 6 Rectangular Duct Mounted Silencers have excellent attenuation properties, achieved with sound absorbing infill splitters, retained in the attenuator casing by a perforated liner.

The resistance to airflow is a function of the face velocity and length. It is not recommended to select the R02 6 silencers with a face velocity above 6 metres per second without asking advice regarding re-generated self noise. We can advise on the selections and can perform system analysis to ensure the correct unit is specified.

- High performance rectangular duct silencer
- Eight standard lengths
- Many connection options
- Cross section dimensions in 1mm increments
- System pressure within ducted systems to 1500 Pa
- Special lengths on request

INSERTION LOSS (db) - CENTRE BAND FREQUENCY

PRODUCT CODE	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
R02 6-600	2	3	6	7	12	14	11	10
R02 6-900	3	6	11	19	24	24	15	11
R02 6-1200	4	7	15	26	29	32	20	14
R02 6-1500	5	8	19	33	39	39	25	17
R02 6-1800	6	10	21	36	45	45	28	19
R02 6-2100	7	13	25	43	50	50	33	21
R02 6-2400	7	15	28	49	50	50	38	25

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

RESISTANCE TO AIRFLOW (Pa)

FACE VELOCITY M/S	2.5	3.0	4.0	5.0	6.0
R02 6-600	12	16	23	43	63
R02 6-900	12	16	24	44	64
R02 6-1200	13	17	25	45	67
R02 6-1500	13	17	25	46	68
R02 6-1800	13	18	26	47	72
R02 6-2100	14	19	27	51	74
R02 6-2400	15	19	28	54	78