Noise impact assessment
Hawley Wharf Food Hall
Hawley Wharf, Water Lane, NW1 8JZ

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On behalf of: Stanley Sidings Ltd
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Document status and approval schedule

Revision	Description	Date	Approved
1	Approved for issue	12/05/2022	RV/AJ
2	Amend reference to hours at para 1.2 to show earlier closing times	16/05/2022	RV/AJ

1.0 Introduction

1.1 Big Sky Acoustics Ltd was instructed by Stanley Sidings Ltd to provide an addendum to report reference 19050864 to consider the impact of noise from the variation of hours in the food hall.

1.2 The proposal is to close no later than 23:00 Monday to Saturday; and 22:00 on a Sunday or Bank Holiday.

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

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

2.0 Existing noise climate

2.1 The existing noise climate was established during an overnight noise survey covering the existing and proposed closing times. Full details can be found in report reference 19050864.

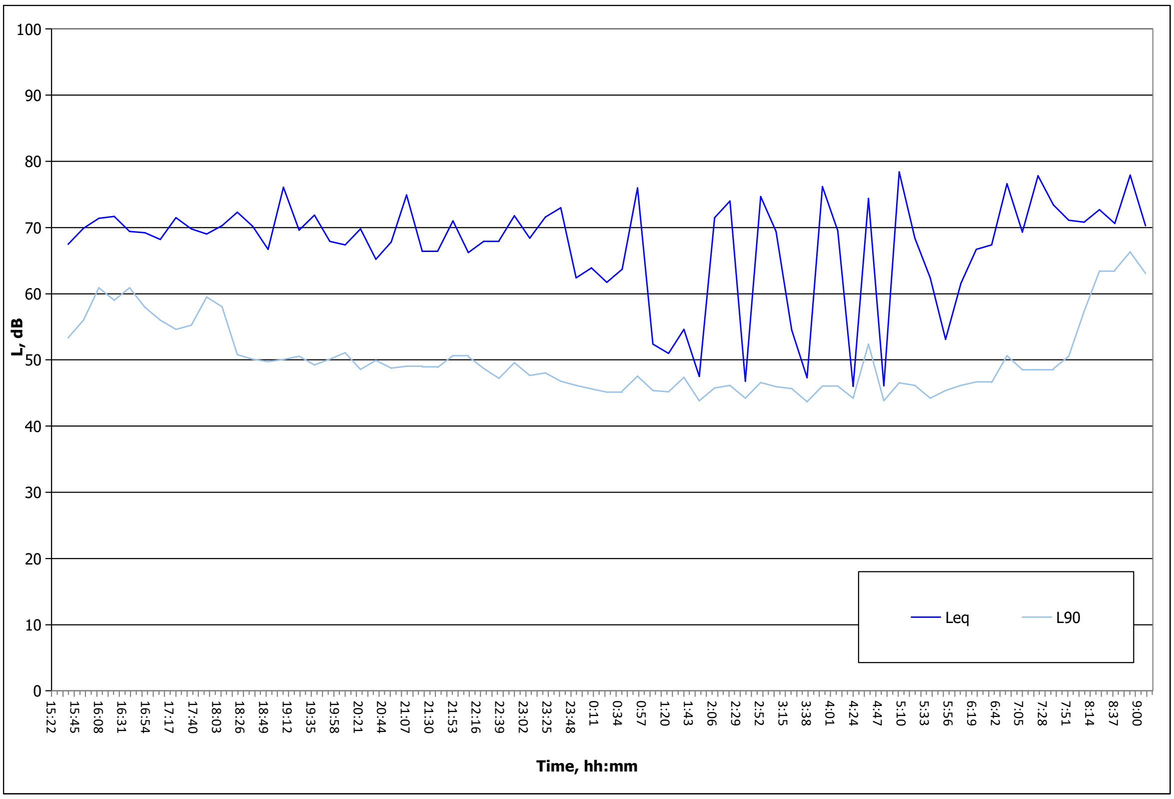

Figure 1: Logging position, fourth floor balcony of new flats: 15-minute sample periods

2.2 It must be noted that this survey was taken from one of the closest residential balconies at a time when the Hawley Wharf development was completed, but the residential properties were not occupied. Therefore, although reflective of general noise conditions at this location the measurement data does not include the nearfield sounds from occupants of the development, including normal domestic activity and plant associated with normal residential living. This baseline survey is considered to be a worst-case as it reports average noise levels that can confidently be predicted to have increased since residential occupation of the development.

3.0 Predicted noise of patrons leaving the site

3.1 The lowest recorded background noise measurement at residential premises during the period from 23:00hrs to midnight, expressed as L_{A90}, was 47dB (from figure 1).

3.2 Having established the existing noise climate it is helpful to compare this existing noise with the predicted noise of a group of patrons in the area outside the premises.

3.3 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.

3.4 Referring to relevant international standards[1] for human speech sound level, and also data held in our own library, normal conversation is typically in the range of 54-60dBA when measured at 1 metre. I have considered a group of 20 people are talking outside the premises as they leave at the end of the evening.

3.5 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 scenario of half of the people talking concurrently at 60dBA, then in order to calculate the total noise level we logarithmically sum 10 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

3.6 The formula above gives a value for total sound pressure level for a group of 20 people to be 70dBA[2].

3.7 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 fewer than 50% of an average group will be talking simultaneously. I have also observed that groups in close proximity talk with more hushed voices than groups of people spread out when, for example, informally seated at large tables in a pub beer garden.

[1] ISO 9921:2003 Ergonomics - Assessment of speech communication, Annex A, Table A1 shows the vocal effort of a male speaker and related A-weighted speech level (dB re 20 µPa) at 1 m in front of the mouth. The table indicates that relaxed vocal effort is 54dB, and normal vocal effort is 60dB.

[2] Alternative calculation method according to Growcott, D (Consideration of Patron Noise from Entertainment Venues, Australian Association of Acoustical Consultants Guideline, Australia, 2009) using $L_{Aeq} = 21*\log(N)+43$ gives 70.3dBA and therefore shows very close correlation

3.8 Sound is attenuated in air and this effect is noticeable as the listener moves away from the source. In a free field for every doubling of distance from a noise source the sound pressure level L_p will be reduced by 6 decibels:

$$L_{p2} - L_{p1} = 10 \log (R_2 / R_1)^2$$
$$= 20 \log (R_2 / R_1)$$

where

L_{p1} = sound pressure level at location 1 (dB)
L_{p2} = sound pressure level at location 2 (dB)
R_1 = distance from source to location 1
R_2 = distance from source to location 2
A "free field" is defined as a flat surface without obstructions.

3.9 In calculating distance attenuation, the noise of people talking is assumed to be a number of discrete point sources so if the noise source is 70dBA at 1 metre, then at 2 metres it is attenuated to 64dBA, at 4 metres 58dBA, and so on.

3.10 Attenuation due to distance means that a separation distance of 15 metres renders the sound of 20 people talking in normal conversation to be below the background noise level of 47dB L_{A90}. A further attenuation of the noise source is achieved by the insertion of any physical barrier that obscures direct line-of-sight from the receptor position to the source position.

Figure 2: View of rear of properties on Camden High Street, separation distance >45m

3.11 Inside a residential property all external noise sources are attenuated by the glazing, by the distance from the noise source to the window, and by any physical obstruction of clear line of sight to the noise source. Furthermore the average person may wish to protect themselves from the sound of all urban noise and so may choose to sleep away from windows on a façade to the street, or with their windows closed.

3.12 New residential developments in the area have been required to take into account the existing noise climate and will therefore have to provide suitable internal noise levels for normal living at a city centre location. This is typically achieved with modern glazing and ventilation systems.

3.13 It is also relevant to note that unlike a music venue, theatre, or sports arena where staged events have a defined finish time when there is a capacity crowd, the nature of these multiple smaller food-led units is that visitors numbers will peak at lunch and dinner times then, at the end of the evening, patrons drift away departing in small numbers and not *en masse*.

4.0 Conclusions

4.1 Big Sky Acoustics Ltd was instructed by Stanley Sidings Ltd to provide an addendum to report reference 19050864 to consider the impact of noise from the variation of hours in the food hall.

4.2 Unlike a music venue, theatre, or sports arena where staged events have a defined finish time when there is a capacity crowd, the nature of these small, food-led premises, all operating within framework hours, is that visitors numbers will peak at lunch and dinner times then, at the end of the evening, patrons drift away departing in small numbers.

4.3 At a separation distance of 15 metres the noise from a group of 20 people dispersing will be below the average background noise level and therefore would not impact on residential amenity.

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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 - 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.

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

Appendix C - Meteorology

22-23 October 2018	Temperature	Wind speed	Precipitation
At start	15°C	1-3ms^{-1}	None
During assessment	12°C	0-2ms^{-1}	None
At finish	13°C	2ms^{-1}	None
Additional comments: *Mild. Good measurement conditions.*			