

APPROVED AMUSEMENT ARCADES, WELLINGTON HOUSE, 39 PICCADILLY, MANCHESTER
NOISE IMPACT ASSESSMENT

On behalf of:
Luxury Leisure Ltd

APPROVED AMUSEMENT ARCADES, WELLINGTON HOUSE, 39 PICCADILLY, MANCHESTER

NOISE IMPACT ASSESSMENT

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1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by Luxury Leisure Ltd to carry out a noise impact assessment in connection with an application to discharge Conditions 5 and 6 of planning consent ref. 118338/FO/2017 for a change of use of Wellington House, 39 Piccadilly, Manchester to accommodate amusement arcades.

1.2 Conditions 5 and 6 state:

"5) Before the development commences a scheme for acoustically insulating the adjoining offices (including in the floors above) against noise from within the premises and for managing noise from people congregating externally to smoke shall be submitted to and approved in writing by the City Council as local planning authority. The approved noise insulation scheme shall be completed before the use commences. Prior to occupation a post completion report to verify that all of the recommended mitigation measures have been installed shall be submitted and agreed in writing by the City Council as local planning authority and any non compliance suitably mitigated in accordance with an agreed scheme prior to occupation.

6) Prior to occupation a scheme for the acoustic insulation of any externally mounted ancillary equipment to ensure that it achieves a background noise level of 5dB below the existing background (La90) in each octave band at the nearest noise sensitive location shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the equipment. The approved scheme shall be implemented prior to occupancy and shall remain operational thereafter. "

1.3 The noise assessment has included:

- An inspection of the site and surrounding area;
- Measurement of noise levels during representative periods of the daytime and night/early morning;
- Recommendation of appropriate mitigation measures.

1.4 The approved amusement arcades are to be located on the ground and first floors of Wellington House. The building is located on the corner of Piccadilly Gardens and Lever Street, and backs onto Back Piccadilly in Manchester city centre. We understand the main entrance will be on the Piccadilly Gardens elevation.

- 1.5 There are residential apartments on Lever Street to the rear of the building. We understand that Travelodge has planning permission for an extension to their premises which will include the adjoining building to Wellington House.
- 1.6 Wellington House adjoins existing commercial premises to west on Piccadilly Gardens, but the proposed layout shows that no trading areas will directly adjoin these commercial premises, with communal and ancillary areas located along the party wall. There are, offices directly above the proposed amusement arcades on the second floor of Wellington House.
- 1.7 We understand no new external fixed plant/equipment is proposed for the development. The proposed site layout is shown in Figure 1.
- 1.8 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 NOISE SURVEY

Noise Survey

- 2.1 Automated noise measurements were carried out at one location to the rear of the building overlooking Back Piccadilly to be representative of the quietest elevation of the building.
- 2.2 The noise measurements were carried out by installing an automatic data-logging sound level meter with a microphone mounted on a pole protruding from a first-floor window, the microphone being approximately 1 metre outside the window. The noise measurements were taken continuously between approximately 12:00 hours on Friday 21 until 12:00 hours on Monday 24 September 2018.
- 2.3 The noise survey was carried out using a Rion NA-28 'Type 1' sound level meter (s/n: 00960036). Calibration checks were carried out both before and after the measurement periods with no variance in levels noted. Frequency analysis was also carried out.
- 2.4 Weather conditions during the survey were Generally dry (heavy showers on Friday and Sunday during the daytime), mild and breezy (generally <5 m/s).
- 2.5 The results of the noise survey are summarised in Table 1 and the full results are shown in Appendix II.

Table 1: Summary of measured noise levels (dB)

Location	L _{Aeq,15 mins}	L _{A90,15 mins}
First floor window to the rear	53 – 73	50 – 65

- 2.6 In spite of the measurements location being on the quietest façade of the building, noise levels measured at the site were high and due to road traffic and pedestrians.

Sound Insulation Testing

- 2.7 Sound level difference testing was also carried out to establish the existing acoustic separation between the first-floor space and the second floor office space.
- 2.8 The testing was carried out by generating high levels of pink noise directly within the first-floor space using a sound source and loudspeaker. The resulting source noise levels were measured in the space along with the transmitted noise levels in the second-floor offices above. Background noise levels (i.e. the prevailing noise levels in the absence of the transmitted noise) were also measured in

second-floor offices. The measurements were taken as a series of short term third octave band noise measurements.

- 2.9 During the testing, there was a lightweight mineral tile lay-in grid suspended ceiling in place in the first-floor space that would provide minimal sound insulation. We understand that the proposed fit-out will include a new ceiling which will provide at least as much sound insulation. Using the results of the measurements, it has been possible to calculate the existing level of sound insulation between the first and second floor spaces as follows:

Table 2: Calculated sound level difference values (dB)

Location	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
1 st floor to 2 nd floor	40	49	59	67	69	71	75

- 2.10 The sound insulation performance values shown in Table 2 are very good and we consider this is due to the separating floor being formed of dense concrete deck with a raised access floor on the second floor.

Source Noise Levels

- 2.11 In order to carry out an assessment of the potential impact of noise associated with the approved amusement arcades, noise measurements have been carried out in the existing Admiral premises at Piccadilly Plaza during the afternoon on Friday 21 September 2018 which we understand is reasonably representative of a typical busy period.
- 2.12 The source noise measurements have included, background music, customers/staff talking, slot machines operating, coin drops etc. The $L_{Aeq,T}$ noise levels ranged from 65 to 72 dB and the maxima where between 70 and 84 dB $L_{Amax,F}$. The peak $L_{Amax,F}$ measured in the existing premises will be used to assess the impact from the amusement arcades and is shown in Table 3.

Table 3: Measured $L_{Amax,F}$ noise level inside amusement arcade (dB)

Period	Octave Band Centre Frequency (Hz)							A
	63	125	250	500	1k	2k	4k	
Measured noise level inside arcade	73	70	75	74	83	74	73	84

3.0 NOISE ASSESSMENT

- 3.1 There are no specific standards or guidelines which can be used to assess noise from amusement arcades. However, in terms of the potential noise impact of the proposed premises, it is considered that potential noise transmission and break-out from building need to be assessed.
- 3.2 Using source noise levels measured at the existing premises (shown in Table 3), the potential worst-case daytime noise transmission from the first-floor trading area to the second-floor offices directly above have been calculated.

Noise Transmission within the building

- 3.3 Using the measured sound level difference values set out in Table 2, we have calculated the following potential worst-case transmitted $L_{\max,F}$ noise levels from the amusement arcades in the second floor offices above.

Table 4: Calculated worst case transmitted $L_{\max,F}$ noise levels (dB)

Location	Octave Band Centre Frequency (Hz)							A
	63	125	250	500	1k	2k	4k	
Second Floor Offices	33	21	16	6	14	2	-2	17

- 3.4 Table 4 shows that the resulting worst-case transmitted peaks of noise levels will be 17 dB $L_{\max,F}$. This is a very low level of noise.
- 3.5 The British Council of Offices Guide (2005) recommends that external noise, is controlled to no more than NR 35 dB in cellular offices and NR 40 dB in open plan offices. These are equivalent to noise levels of 41 and 46 dB $L_{Aeq,T}$ inside the offices respectively. The calculations show that transmitted peaks of noise are well below these criteria and average noise levels (in terms of $L_{Aeq,T}$) would be significantly below these values.

Noise Break-out from the building

- 3.6 Noise levels from amusement arcade breaking-out through the building envelope to the windows of the second floor offices have also been considered. The calculation considers the sound reduction performance of the various elements of the first floor façade and corrections for distance attenuation. It is assumed that all windows will be closed. Calculated $L_{\max,F}$ noise levels would be 6 dB

below the lowest $L_{A90,15\text{mins}}$ background noise level measured during the survey. Noise levels would be even lower at the nearest residential dwellings on Lever Street.

- 3.7 We therefore conclude that there will be no unacceptable noise impact from operation of the amusement arcades on the adjoining offices and no special noise control measures are warranted.

Noise from customers congregating externally

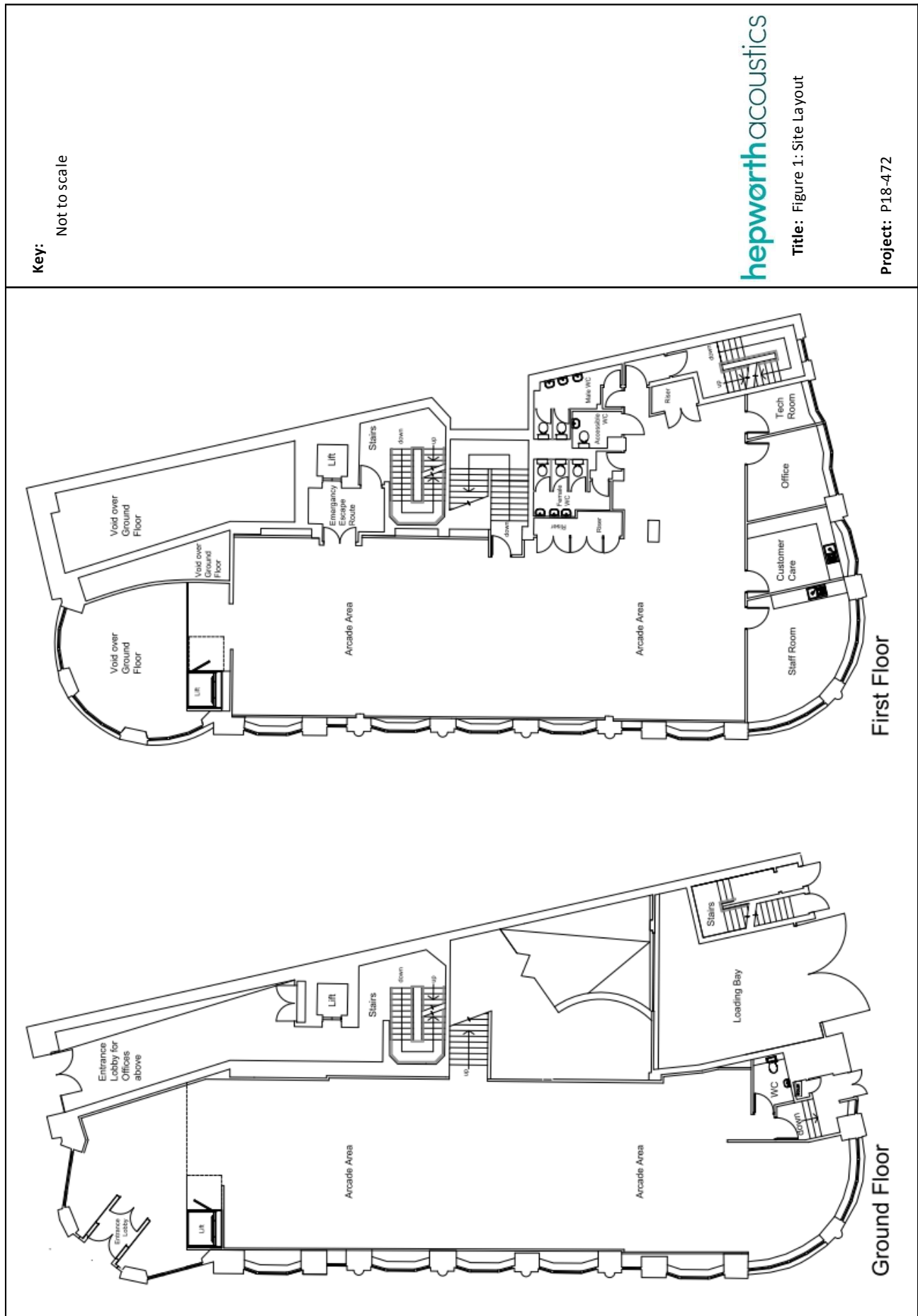
- 3.8 It is noted that this area of Piccadilly Gardens remains busy during the day and evening into the night-time. Noise from the small number of amusement arcade customers that might be expected to congregate externally (i.e. to smoke) would be very unlikely to have any significant effect on the noise climate of the area. Nevertheless, the potential noise impact from this source can be controlled by an appropriate noise management plan.

Building Services Equipment Noise

- 3.9 As set out in Section 1, there are no new external items of equipment proposed as part of the development. New condensers are to be located in the basement car park and the existing AHU equipment on the roof will also be used.
- 3.10 We therefore conclude that there will be no unacceptable noise impact from external equipment and no special noise control measures are warranted. As such, condition 6 can be discharged with no requirement for any specific noise mitigation measures.

4.0 SUMMARY AND CONCLUSION

- 4.1 Hepworth Acoustics Ltd has carried an assessment in connection with an application to discharge Conditions 5 and 6 of the planning permission for the change of use of Wellington House, 39 Piccadilly, Manchester to amusement arcades.
- 4.2 This assessment has involved carrying out a baseline noise monitoring survey to establish the existing noise climate outside the quietest elevation of the building, and sound insulation testing to establish the existing acoustic separation between the amusement arcades and the adjoining offices above.
- 4.3 There is to be no new external plant or equipment at the site and so Condition 6 can be discharged without the need to consider any specific noise mitigation measures.
- 4.4 The potential noise impact of trading noise originating in the amusement arcades has been assessed on the adjoining offices above. Transmitted noise levels via the separating floor and noise break-out via the windows will be very low and no noise impact is expected. As such, no specific sound insulation measures are considered necessary.
- 4.5 On this basis, planning conditions 5 and 6 can be discharged without the need for any specific noise mitigation measures.



Appendix I: Noise Units & Indices

Sound and the decibel

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 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive 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 dB(A) or dBA.

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 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

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

L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.

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

Appendix II: Noise Survey Results

Date(s): Friday 21 to Monday 24 September 2018

Equipment: Rion NA-28 'Type 1' sound level meter (serial no. 00960036) with pole, windshield and calibrator

Weather: Generally dry (heavy showers on Friday and Sunday during the daytime), mild and breezy (generally <5 m/s)

All levels in dB(A)

Location : First Floor to Rear of Wellington House

