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REPORT

Merkur Slots
67 Deansgate
Manchester
Noise Assessment

Client: MERKUR Slots UK Limited

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1 Introduction

1.1 Background

Archo Consulting Ltd have been appointed to undertake an assessment of sound insulation performance and potential noise impacts from patron activity for a new Merkur Slots site at 67 Deansgate, Manchester. Planning permission is being sought for 24-hour operation and as such the assessment has been undertaken in accordance with the appropriate Noise Rating (NR) criteria and night-time internal noise criteria thresholds in accordance with BS8233:2014.

An onsite inspection has been undertaken of the existing condition of the separating ceiling and walls to identify the current configuration. The resulting sound insulation performance has been calculated using INSUL Sound Insulation Prediction Software to prove compliance.

1.2 Site Context

The site is located at basement level, ground-floor and first-floor level facing out onto Deansgate. Neighbouring commercial units exist on each side of the site and on the opposite side of the street. Merkur will use both the ground-floor and first-floor levels for trading. No residential premises exist along the street and the closest noise sensitive premises to the site is the Treehouse Hotel, approximately 80 metres away.

Predictions of the sound insulation performance are provided to ensure noise impacts do not occur. Measurements of operational noise levels from an existing Merkur Cashino site have been used to assess noise breakout.

2 Guidance and Acoustic Requirements

2.1 Legislation

Noise impacts to adjacent residential premises have been calculated and assessed in accordance with the following standards:

- *British Standard (BS) 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings* (herein after referred to as BS 8233:2014).

Full details of all legislation, guidance and standards referenced for noise assessments are presented in **Appendix A**.

3 Assessment of Potential Noise Impacts – Internal Noise

3.1 Background

The following section deals with potential *internal* noise impacts exclusively:

In order to assess the current site conditions, an inspection and assessment was undertaken on the 8th September 2022. The assessment focused predominantly on the ceiling area, walls and shop front which will separate the premises from the adjacent spaces. Detailed site notes and accompanying photographs were taken to inform the assessment and are presented in **Section 3.2** below.

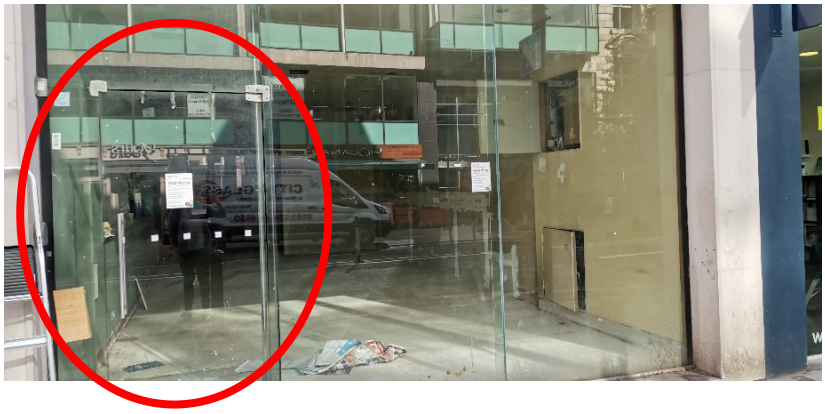
3.2 Onsite Observations

It was noted onsite that the ceiling was covered by a layer of plasterboard. The separating floor above consisted of cast concrete, the thickness of which could not be determined but is assumed to be a minimum of 101mm as this is the minimum structural requirements for concrete floors.

The separating walls were noted to be composed of brick. The entrance consisted of a single-leaf glass door mounted in glazed frontal façade.

Table 1 below presents the key findings of the onsite investigation in relation to the sound insulation performance including photos for reference:

Table 1: Site Assessment Findings and Recommendations

Site Photo	Comment
	Location: *Entrance Doors* It is recommended that acoustic perimeter seals are installed around the frame of the door and at the bottom to prevent unnecessary sound transmission to the outside. It is recommended that the door also incorporate an automatic closer system.
	Location: *Separating Floor* Ceiling mainly appears to be covered over by plasterboard. It is recommended that the connection between the separating floor and walls is sealed up using non-hardening sealant to help prevent sound transmission.
	Location: *Separating Floor* It is recommended that all holes and gaps in the ceiling, walls and board box-ups are fully sealed up to prevent any potential flanking paths.

	Location: *Separating Wall* Separating wall shows the material is made of red brick and steel beams for structural support.
	Location: *Separating Floor* Photo indicates that the ceiling also has wooden timber and still beams for support. It is recommended any penetrations are sealed up with non-hardening sealant.

3.3 Operational Noise Levels in Existing Merkur Cashino

Measurements of internal noise levels within an operational Merkur site have been made in order to assess potential noise breakout. **Table 2** below presents the measured operational noise levels within a fully operational 24-hour Merkur Cashino site at 106 Newland Avenue, Hull (made 17th March 2020).

Measurements were made during particularly busy periods when the machines were in operation and noise levels were at the highest. Measurements were made for 5 minutes at each measurement position (MP) which were at opposite ends of the venues to gain representative operational levels. A description of acoustic terminology is provided in **Appendix B**.

Table 2: Source Level Noise Measurements within an Operational Merkur Site

Site	Measurement Position	L_{Aeq}	L_{Amax}	Octave Band Levels (dB)							
				63	125	250	500	1kHz	2kHz	4kHz	8kHz
Hull	MP1	65.7	77.4	57.6	65.8	66.1	62.8	61.5	56.1	52.0	49.3
	MP2	63.1	74.2	60.3	59.9	63.6	61.1	58.3	53.9	46.5	41.0

Table 3 below presents the details of the equipment used for the measurements:

Table 3: Instrumentation

Instrument	Serial No.	Calibration Due Date
Norsonic 140 Class 1 Sound Level Meter	1406433	October 2023
Norsonic 1209 Preamplifier	21318	October 2023
Norsonic 1225 Microphone	226973	October 2023
Nor 1252 Acoustic Calibrator	31717	October 2022

During the site visit in which source noise levels were measured, the following contextual factors were noted with relation to noise:

- No sound was audible outside of the premises to the front or rear during peak operation;
- Internal noise levels were not high with normal conversations clearly audible and perceptible at normal speech level;
- Max levels were infrequent and short in duration;

- Patrons observed entering and leaving the premises during peak operation were always alone or in a pair with no loud conversation or behaviour that might cause disturbance; and,
- Patrons enter and leave quickly without loitering.

3.4 Analysis of Onsite Observations in Relation to Internal Noise Impacts

As per the inspection and noted context of the site, no noise sensitive receptors adjoin to the site but rather it is surrounded on all sides by commercial premises and storage. Commercial premises are not considered noise sensitive and, based on the site inspection, the building envelope will more than sufficiently attenuate any noise generated.

Therefore, potential impacts from internal noise transmission have been scoped out of this assessment and will not be considered further.

4 Assessment of Potential Noise Impacts – External Noise

4.1 Background

The following section deals with potential *external* noise impacts exclusively:

In order to assess potential noise impacts from patrons, a series of three case studies of patron behaviour during the night-time at existing Merkur sites with 24-hour consent has been presented to demonstrate the passive and quiet nature of patrons of AGC's across the UK. An assessment of potential noise impacts to the closest noise sensitive receptor (NSR) from noise breakout and also from people smoking on the street has also been performed.

4.2 Site Context and Observations

As per the noted site context presented in **Section 1.2**, it was confirmed that no residential units existed on the street which the site faces onto. The closest noise sensitive receptor (NSR1) to the site is the Treehouse Hotel located around 80 metres away and is indicated in **Figure 1** below:

Figure 1: Location of Site and Closest NSR

The area around the site and NSR1 is a busy and commercial in nature, resulting in high levels of background noise. The main factors affecting the noise climate were people on the street and cars on the local road network.

4.3 Assessment of a 24-Hour Merkur Site (Cashino)

In order to determine what potential noise impacts could arise from patrons during the early hours of the morning, a series of surveys have been undertaken at existing operational Merkur Sites which have 24-hour consent.

The surveys aimed to determine the typical behaviour of patrons during the most noise sensitive period of the night (after midnight) and identify if noise impacts could occur. Night-time assessments have been undertaken at 3 different venues spread-out over the UK which were granted a 24-hour consent and the outcome of the assessments is detailed below:

4.3.1 302-304 Hessle Road, Hull – 11th September 2020

The following points were noted in regard to patron behaviour:

Time window - 01:45 to 02:45:

- A total of 10 patrons entered the site during this time and 4 left;
- Patrons were generally alone or in a pair and did not generate any significant noise;
- Any noise generated by patrons was usually masked by cars passing by on Hessle road;
- Patrons were well behaved with no tendency towards shouting or other behaviour that might cause disturbance; and,
- Car pass by events were equally frequent to records of patrons generating any sound.

Analysis of Observations

It was observed that the behaviour of Cashino patrons on Hessle Road was directly comparable to that observed at Newland Avenue. Patrons were typically alone or in a couple or small group and normal-level conversation was the only sound recorded which occurred infrequently. People occasionally stood outside to smoke and had brief conversations at normal speech level with no shouting or other behaviour that might cause disturbance. It was noted that cars passing on Hessle Road generated greater L_{Amax} levels than patrons and these events occurred more frequently.

4.3.2 48-50 Camberwell Church Street, Camberwell, London – 15th July 2021

The following points were noted in regard to patron behaviour:

Time window - 01:00 to 02:00:

- Internal operational noise level measurements were made in the venue between 01:00 and 01:10 which ranged from L_{Aeq} 62.3 dB to 66.8 dB. Max levels were recorded to peak at L_{Amax} 77.2 dB;
- The ambient soundscape on Camberwell Church Street during this time was dominated by road traffic noise and was measured to be on average L_{Aeq} 66.0 dB which is considered high for night-time. No sound was audible from the venue;
- A total of 2 patrons entered the site and 4 patrons left during this time window;
- A group of 3 people left the site at 01:18 talking at normal conversation level which was barely audible against the noise from cars on the road;
- On 3 occasions people came outside for a cigarette, in the first instance the patron was alone and did not make any sound. In the second instance 2 people came out together and occasionally talked but at very low level. Again, this was masked by the road traffic noise;
- No behaviour that might cause disturbance was observed, sound from other people passing on the street who were not associated with the venue was occasionally audible.

Analysis of Observations

It was observed that the behaviour of Merkur Slots patrons on Camberwell Church Street was very normal with no significant sounds generated. The majority of people did not speak and no other behaviour that might cause disturbance was observed whatsoever. No sound was audible from the venue and the ambient noise level on the street was considered to be high due to frequent car passes.

It can be concluded that no noise impacts were generated as a result of the venue's operation and no evidence was observed to suggest that any noise impacts would occur.

4.3.3 45 West Street, Boston – 29th July 2021

The following points were noted in regard to patron behaviour:

Time window - 00:00 to 01:00:

- Internal operational noise level measurements were made in the venue between 00:20 and 00:25 which ranged from L_{Aeq} 48.7 dB to 50.9 dB. Max levels were recorded to peak at L_{Amax} 66.3 dB. It should be noted that background music was not being played at the time due to a poor wifi connection the staff confirmed;
- The ambient soundscape on West Street during this time consisted of sound from occasional passing cars, people talking outside a nearby taxi rank and a continuous hum from a condenser unit associated with a nearby shop. The ambient levels outside were measured to be on average L_{Aeq} 49.3 dB;
- A total of 2 patrons entered the site and 0 patrons left during this time window;
- 00:43 1 person comes outside for a cigarette and does not make any sound;
- No sound was audible from the venue and only audible noise came from nearby taxi rank, occasional passing cars and people passing on the street;
- No behaviour that might cause disturbance was observed and patron behaviour was the same as in other venues i.e. quiet, kept to themselves.

Analysis of Observations

It was observed that the behaviour of Merkur Slots patrons on West Street, Boston was very normal with no significant sounds generated, correlating with observations at other venues. No other behaviour that might cause disturbance was observed whatsoever. No sound was audible from the venue and the ambient noise level on the street was considered to be low in comparison to other locations.

It can be concluded that no noise impacts were generated as a result of the venue's operation and no evidence was observed to suggest that any noise impacts would occur.

4.4 Assessment Criteria - Noise Rating (NR) Curves

Noise rating curves provide a method of measuring, specifying and controlling noise levels within buildings. They consist of single figure values corresponding to individual mid-frequency octave bands. The overall single figure NR value is determined by examining which curve the highest of the individual NR values for the frequency bands falls onto. **Table 4** reproduced from 'The Little Red Book of Acoustics: A Practical Guide (Second Edition)', (published by Blue Tree Acoustics) below provides examples of typical noise levels within different buildings and spaces.

Table 4: Typical Noise Levels for Different Spaces

Location	NR Value at Octave Band Centre Frequencies							dB(A)
	63	125	250	500	1k	2k	4k	
Quiet Restaurant	60	60	60	65	65	55	50	67
Busy Restaurant	60	70	75	75	75	75	70	80
Busy Pub/Bar	80	85	85	85	85	80	70	88
Music Bar/Nightclub	110	110	100	100	95	90	85	101
Classroom	55	55	55	60	60	60	55	65

Table 5 below presents typical NR curves for different spaces:

Table 5: NR Curves for Different Spaces

Noise Rating (NR) Curve	Application
NR 25	Concert halls, broadcasting and recording studios, churches
NR 30	Private dwellings, hospitals, theatres, cinemas, conference rooms
NR 35	Libraries, museums, court rooms, schools, hospitals operating theatres and wards, flats, hotels, executive offices
NR 40	Halls, corridors, cloakrooms, restaurants, night clubs, offices, shops
NR 45	Department stores, supermarkets, canteens, general offices
NR 50	Typing pools, offices with business machines
NR 60	Light engineering works
NR 70	Foundries, heavy engineering works

The closest noise sensitive receptor to the site is the Treehouse Hotel indicated in **Figure 1** and is denoted NSR1. Hotels will typically experience very low internal noise levels, mostly from conversations and entertainment. In determining what NR criteria should be the limit to sufficiently protect the occupants, it was deemed prudent that a threshold of NR20 should be

applied as this criterion will be sufficiently low to protect the amenity of residents. This criterion has been used for previous assessments of the same nature and provided adequate protection.

4.5 British Standard 8233:2014

BS8233:2014 criteria for recommended internal noise levels (night-time) has also been referenced in order to provide a prudent assessment.

Guidance on suitable internal noise levels is provided in BS 8233:2014 (Section 7.7.2, Table 4) derived from the guidance provided by the WHO. These details recommended internal noise levels to ensure that adequate noise reduction occurs to reduce direct and flanking transmission across facade elements. Recommended internal noise levels are reproduced in **Table 6** below:

Table 6: Recommended Internal Noise Levels – BS 8233:2014

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

BS8233:2014 specifies that, in order for the above thresholds to apply, the noise source in question must have "no specific character" i.e. no tones, strong low frequency component etc. Based on the measurements made within an active Merkur site detailed within **Section 3.3**, **Table 2**, it was determined that noise levels were low and without specific character (predominantly people talking and low-level sounds from machines). The site will be operational 24-hours a day and it can be observed from **Table 6** above that the night-time (23:00 to 07:00) internal noise criteria is more stringent. Therefore, **the threshold of 30 dB $L_{Aeq,8hour}$** presented in **Table 6** above representing the BS8233:2014 night-time criteria has also been referenced for this assessment.

NANR116: 'Open / Closed Window Research

The Building Performance Centre – School of the Built Environment at Napier University published a research paper in April 2007 entitled *NANR116: 'Open/Closed Window Research' Sound Insulation Through Ventilated Domestic Windows* which detailed the measured sound attenuation which can be achieved by partially open windows with different opening areas. Different types of window were tested and the window which is common in residential buildings and achieved the lowest performance in the tests is the side swing reversable (denoted Type B in the paper). It was determined that with an opening of 200,000 mm^2 (representative of a large opening) a sound

reduction value of $D_{n,e,W}$ (C;C_{tr}) 16 (-1; -2) was achieved. **Table 7** below reproduces the octave band attenuation values for this type of window.

Table 7: Measured Attenuation for Partially Open Window

Window	Attenuation at Octave Band Centre Frequencies							Dn,e,W (C;Ctr)
	63	125	250	500	1k	2k	4k	
Side Swing Reversable (B)	20.8	13.3	12.9	18.1	12.0	18.3	20.5	16 (-1; -2)

The attenuation values presented in **Table 7** above were used to assess potential noise impacts as this represents a prudent and worst-case scenario.

4.6 Noise Impact Assessment – External

With reference to **Section 4.4** it was deemed appropriate that the limit of **NR20** can be applied for the closest residential receptor NSR1. **Table 8** below presents the values associated with the NR20 curve:

Table 8: NR20 Octave-band Values

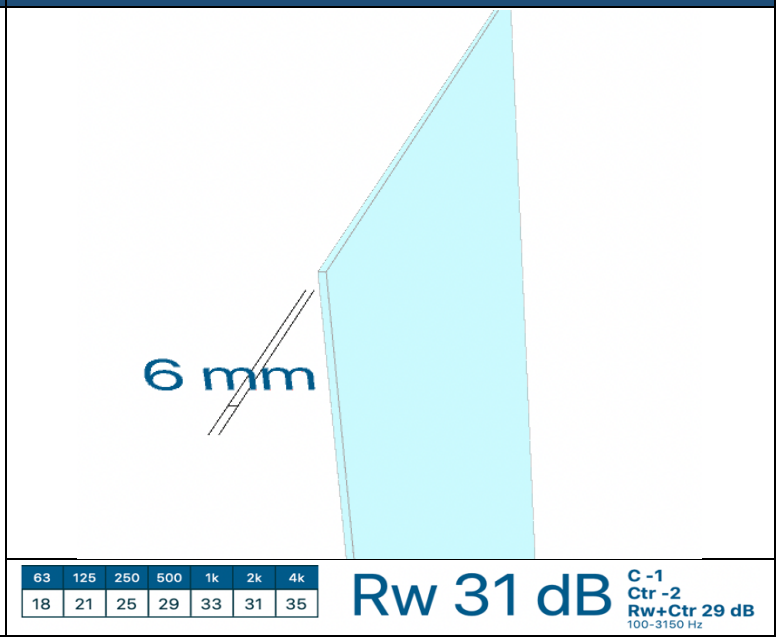
Noise Rating	Octave Band Mid-Frequency Levels (dB)							
	63	125	250	500	1000	2000	4000	8000
NR20	51.3	39.4	30.6	24.3	20	16.8	14.4	12.6

To provide a prudent and detailed approach to assessment the noise rating NSR1 was calculated using the attenuation values presented in NANR116 and reproduced in **Table 8**. The sound insulation performance of the glazed shop front was calculated using the details provided below and is presented in **Table 9**:

Shopfront:

- Single layer of 6mm glazing.

Table 9: Predicted Sound Insulation Performance – Glazing

Element	Illustration
Shopfront	

The distance from the site to NSR1 was measured to be 80 metres which is a very significant enough distance for any noise break-out to attenuate sufficiently and the assessment has been undertaken to demonstrate this.

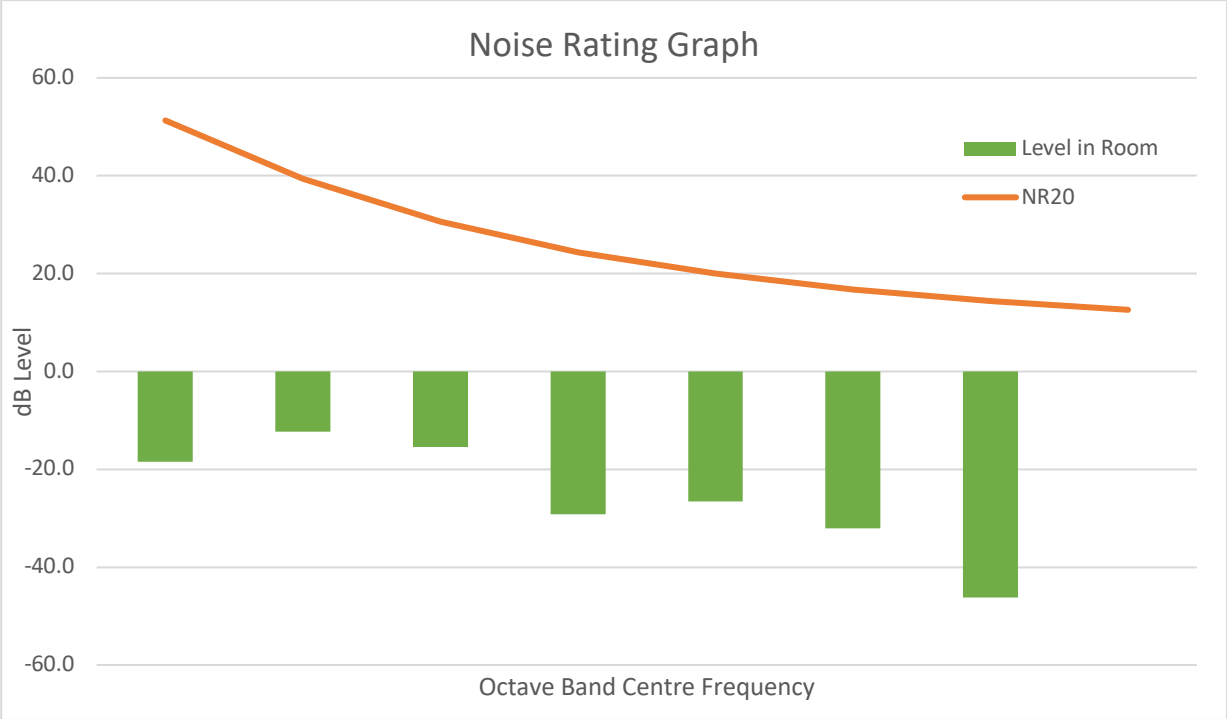
The octave band noise level incident at the window of NSR1 was calculated over a 80-metre distance and the NR curve inside the room predicted. **Table 10** below presents the results of the assessment:

Table 10: Predicted NR level at Closest Receptor

Element	63	125	250	500	1k	2k	4k	Single Figure L_{Aeq}, dB
Predicted Noise Level at Window	2.3	0.9	-2.6	-11.1	-14.6	-13.8	-25.6	-
Attenuation of Partially Open Window	20.8	13.3	12.9	18.1	12.0	18.3	20.5	-
Calculated NR in Room	**-18.5**	**-12.4**	**-15.5**	**-29.2**	**-26.6**	**-32.1**	**-46.1**	**-9.8**

Figure 2 below presents the calculated NR curve from **Table 10** plotted against the NR20 curve:

Figure 2: Predicted NR curve against NR20



It can be observed from **Table 10** and **Figure 2** above that the calculated NR curve within NSR1 will be well below both the **NR20** curve values and the night-time threshold of 30 dB stipulated within BS8233:2014. This prediction does not account for the screening that would be achieved by the buildings between NSR1 and the site which will effectively reduce any sound transmission even further.

4.7 Assessment of Max Levels

Previous versions of BS8233:2014 stated that noise levels should not regularly exceed 45dB within bedrooms during the night-time. BS8233:2014 states that a partially open window can achieve a reduction of -15 dB and combining this with the internal threshold of 45 dB provides a façade limit of 60 dB.

To provide a prudent and worst-case approach, an assessment of potential noise impacts from measured L_{Amax} levels has been undertaken for the scenario when the entrance door is briefly open for customers to enter and leave. The highest measured L_{Amax} levels presented in **Table 2** were used and, assuming the partially open door achieves the same attenuation values as a partially open window (presented in **Table 7**), the predicted L_{Amax} level at NSR1 (80 metres away) was calculated. **Table 11** below presents the results of the assessment:

Table 11: Predicted L_{Amax} Level Incident at First-Floor Window

Element	63	125	250	500	1000	2000	4000	Single Figure L_{Aeq}, dB
Source Noise L_{Amax} Levels	71.1	77.5	76.6	75.5	72.4	68.3	66.5	77.4
Shop front Attenuation (door open)	20.8	13.3	12.9	18.1	12.0	18.3	20.5	-
Level Outside	50.3	64.2	63.7	57.4	60.4	50.0	46.0	-
Level at Window	**12.3**	**26.1**	**25.6**	**19.3**	**22.4**	**12.0**	**8.0**	**30.3**

It can be seen in **Table 11** above that, assuming an absolute and unlikely worst-case scenario, predicted max levels at the closest residential window are significantly below the criteria stipulated by BS8233. It should be noted that machines generating the max levels are never located near the door but further inside the venues and therefore, max levels emanating from the periodically open door will realistically be much lower.

Based on the results of the noise breakout assessment, the distance and screening between and site and NSR1 and the worst-case assessment of max levels it can be concluded that noise impacts to NSR1 are considered highly unlikely to occur.

4.8 Assessment of Patron Noise – Smoking

Based on the site observations undertaken at different active Merkur sites with 24-hour consent detailed in **Section 4.3** it was observed that, at each of the sites, patrons were very quiet when entering and leaving the site and were typically alone or in a pair. It should be noted that the site in Camberwell had a residential unit directly above, the occupants of which have never complained about the AGC. When patrons who chose to smoke were observed coming out of the venue (**Section 4.3.2** and **4.3.3**) they generated little to no sound which was imperceptible against the ambient noise level of the area.

However, to provide a prudent and worst-case scenario approach to assessing potential noise impacts, an assessment of potential noise from patrons who choose to smoke talking loudly outside the front of the site has been undertaken.

During the initial site visit to a Merkur Cashino venue in Hull (pre-covid) two patrons were recorded talking moderate to loudly outside the venue for a duration of around 1 minute. This level was measured to be 69.4 dBA which is representative of loud conversation. Using this measured level an assessment was undertaken of potential noise impacts at the closest residential window NSR1. To assess a worst-case scenario, it was assumed that 3 patrons were outside and all talking at the same time and same level i.e. 69.4 dBA. **Table 12** below presents measured octave band noise levels from the speech event:

Table 12: Measured Attenuation for Partially Open Window

Noise Event	Octave Band Mid-Frequency Levels (dB)								
	63	125	250	500	1k	2k	4k	8k	dB(A)
People Talking Loudly	80.6	79.3	69.2	67.0	62.5	58.2	50.8	44.1	69.4

Patrons who choose to smoke will almost certainly smoke directly outside the venue as this is what has been observed during the site visits and is logical given that they will likely go back in after. The buildings between the site front and NSR1 provide incredibly adequate screening from any noise sources directly in front of the site as demonstrated in **Section 4.6** and **Section 4.7**. Therefore, to provide a prudent and worst-case approach to assessment it has been assumed that patrons are standing away from the front of the site so the path of the sound from conversation to NSR1 is less obstructed by the buildings. **Figure 3** below presents the location of the patrons in relation to NSR1:

Figure 3: Location of Site and Noise Sensitive Receptor (NSR1)

The distance between the patrons and NSR1 was conservatively measured to be 80 metres. Previous versions of BS8233:2014 stated that noise levels should not regularly exceed 45dB within bedrooms during the night-time. BS8233:2014 states that a partially open window can achieve a reduction of -15 dB and combining this with the internal threshold of 45 dB provides a façade limit of 60 dB.

Using the information detailed above, an assessment was undertaken of potential noise impacts to NSR1 at night-time. **Table 13** below presents the results of the assessment:

Table 13: Predicted Noise Levels

Source Noise Level of Each Patron (dBA)	No. of Patrons Talking	Distance (Metres)	Predicted Level at NSR1	Comment
69.4	3	80	26.1	Below 60 dBA threshold

4.9 Analysis of Results

Operational Noise

It can be observed from **Table 10** that the predicted noise levels at the closest noise sensitive receptor NSR1 is significantly below NR20 and BS8233:2014 criteria for internal habitable rooms during the night-time. It should be noted that this assessment represents a worst-case scenario and in practise noise levels will likely be lower. The worst-case scenario assessment of max levels when the front door is open presented in **Table 11** demonstrates that predicted noise levels at NSR1 are significantly below BS8233 criteria. It can be concluded that, given the measured internal operational noise levels and noted construction of the site, noise impacts as NSR1 are considered highly unlikely to occur.

Patrons Smoking

It can be observed from **Table 13** above that predicted worst-case scenario levels at NSR1 are significantly below the external criteria of 60 dBA for the night-time.

Given that these events were observed at different Merkur sites across the country to occur infrequently (if at all) and combined with the worst-case predicted level being lower than this threshold it can be concluded that noise impacts from patrons outside the venue are considered very unlikely to occur.

Section 4.3 demonstrates that patrons of these venues showed no tendency towards shouting or other behaviour that might cause disturbance when outside, entering or leaving the venue. Therefore, noise impacts from patrons are considered highly unlikely to occur.

It is recommended that patrons are asked to remain silent when outside the venue through signs and staff encouragement and that they stay close to the building.

5 Unpredictable Noise Events and Recommended Control Measures

5.1 Observations at Other Merkur Sites

Based on observations at other active Merkur sites with 24-hour consent and the similar procedures that have been implemented, random noise events are considered unlikely to occur and the chance of such an event occurring from other people in the area unrelated to the site is equal.

It was observed at other Merkur sites and noted from conversations with the management that the venues normally have a strong circle of regulars who are known to the staff. This means they are unlikely to disobey house rules or go against staff requests.

5.2 Control Measures

Notwithstanding the results of the previous section, it is recommended that the following procedures are implemented by management and staff to mitigate any potential noise impacts. It should be noted these measures are implemented at other Merkur venues with 24-hour consent with a great deal of success:

- Signs are included inside and outside the premises encouraging patrons to respect the neighbours and keep noise levels to a minimum when entering and leaving the site;
- Staff encourage those who go outside to smoke to not talk and stay as close to the building as possible;
- If any noise generating behaviour is observed then staff are to ask the person to respect the neighbours. If instances continue then the individual should be asked to leave;

6 Conclusion

Internal Noise

A site inspection and assessment has been undertaken at 67 Deansgate, Manchester.

The inspection has identified the current configuration and site photos are presented in **Table 1** of this report. The site inspection revealed that no noise sensitive receptors adjoined directly to the site and instead it was surrounded by commercial premises and storage.

Based on the configuration of the separating elements, the measured operational noise levels and the lack of noise sensitive receptors adjoining to the premises, internal noise impacts were scoped out of the assessment.

External Noise

A series of case studies of patron behaviour have been undertaken for three different Merkur sites with 24-hour consent to assess if noise impacts could occur. One of the sites had a residential unit directly above. The studies concluded that patrons are nearly always alone or in a pair, very quiet and do not behave in a way that would cause disturbance to others.

An assessment of potential noise breakout to the closest noise sensitive receptor NSR1 was undertaken using source noise measurements made within an existing site during peak operation and is presented in **Table 10**. The assessment showed that the front façade will attenuate noise levels sufficiently to comply with the criteria of NR20 and BS8233:2014 criteria for internal habitable rooms at NSR1. An assessment of max levels has demonstrated that under a worst-case and unlikely scenario, when the door is periodically open, predicted levels at NSR1 are significantly below the criteria prescribed in BS8233.

An assessment of potential noise impacts from patrons smoking outside has been undertaken. The study concluded that predicted worst-case noise levels are significantly below the external 60 dBA threshold during the night-time stipulated in WHO and referenced within BS8233. Recommendations to control and manage any unpredictable noise instances which have been proven to be very unlikely due to observations made at operational 24-hour sites have been presented.

The assessment concludes that external noise impacts are considered highly unlikely to occur and, based on the outcome of the assessment, the site is suitable for 24-hour operation.

Unpredictable Noise Events

Based on the site assessments of patron behaviour in Hull, Camberwell and Boston during the most noise sensitive period of the night detailed in **Section 4.3,** it is considered highly unlikely that noise impacts will occur due to patrons leaving and entering the site. Patrons are typically regulars from the local area and are unlikely to be inclined to disobey the rules or staff members.

The assessment concludes that noise impacts from unpredictable noise events from patrons are considered very unlikely to occur.

Appendix A – Legislation

Legislative Framework and Planning Policy

National Legislation Environmental Protection Act 1990

Section 79 of the Act defines statutory nuisance with regard to noise and determines that local planning authorities have a duty to detect such nuisances in their area.

The Act also defines the concept of "Best Practicable Means" (BPM):

> *" 'practicable' means reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications;*
> *the means to be employed include the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and structures;*
>
> *the test is to apply only so far as compatible with any duty imposed by law; and*
> *the test is to apply only so far as compatible with safety and safe working conditions, and with the exigencies of any emergency or unforeseeable circumstances."*

Section 80 of the Act provides local planning authorities with powers to serve an abatement notice requiring the abatement of a nuisance or requiring works to be executed to prevent their occurrence.

The Control of Pollution Act 1974

Section 60 of the Act provides powers to Local Authority Officers to serve an abatement notice in respect of noise nuisance from construction works.

Section 61 provides a method by which a contractor can apply for 'prior consent' for construction activities before commencement of works. The 'prior consent' is agreed between the Local Authority and the contractor and may contain a range of agreed working conditions, noise limits and control measures designed to minimise or prevent the occurrence of noise nuisance from construction activities. Application for a 'prior consent' is a commonly used control measure in respect of potential noise impacts from major construction works.

National Policy Guidance
National Planning Policy Framework 2021

The National Planning Policy Framework (NPPF) was introduced in March 2012 replacing the former Planning Policy Guidance 24: Planning and Noise. It was revised in July 2018, in February 2019 and most recently In July 2021. This document now forms the basis of the Government's planning policies for England and how these should be applied.

Paragraph 174 e) of the National Planning Policy Framework (NPPF) states that 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...."*

Furthermore, 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:*

1. *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:*
2. *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,*
3. *c) Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."*

The NPPF also refers to the Noise Policy Statement for England (NPSE) (Defra, 2010).

Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) document was published by Defra in 2010 and paragraph 1.7 states three policy aims:

> *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
> *avoid significant adverse impacts on health and quality of life;*

> *mitigate and minimise adverse impacts on health and quality of life; and, where possible, contribute to the improvement of health and quality of life."*

The first two points require that significant adverse impact should not occur and that, where a noise level falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect:

> *"...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."* (Paragraph 2.24, NPSE, March 2010).

Section 2.20 of the NPSE introduces key phrases including "Significant adverse" and "adverse" and two established concepts from toxicology that are being applied to noise impacts:

> *"NOEL – No Observed Effect Level*
> *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*
> *LOAEL – Lowest Observed Adverse Effect Level*
> *This is the level above which adverse effects on health and quality of life can be detected".*

Paragraph 2.21 of the NPSE extends the concepts described above and leads to a significant observed adverse effect level – SOAEL, which is defined as the level above which significant effects on health and quality of life occur.

The NPSE states:

> "*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*". (Paragraph 2.22, NPSE, March 2010).

Furthermore paragraph 2.22 of the NPSE acknowledges that:

> "*further research is required to increase understanding of what may constitute a significant adverse effect on health and quality of life from noise*".

National Planning Practice Guidance for Noise

The National Planning Practice Guidance for Noise (NPPG Noise, December 2014), issued under the NPPF, states 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.

Guidance

The following guidance has been used for the purpose of the noise and vibration assessment:

British Standard (BS) 7445: Parts 1 and 2 - Description and measurement of environmental noise
This Standard provides details of the instrumentation and measurement techniques to be used when assessing environmental noise, and defines the basic noise quantity as the continuous A-weighted sound pressure level (LAeq). Part 2 of BS 7445 replicates ISO standard 1996-2.

BS8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings

Provides a methodology to calculate the noise levels entering a building through facades and façade elements and provides details of appropriate measures for sound insulation between dwellings. It includes recommended internal noise levels which are provided for a variety of situations.

World Health Organisation (WHO) (1999) Guidelines for community noise

These guidelines present health-based noise limits intended to protect the population from exposure to excess noise. They present guideline limit values at which the likelihood of particular effects, such as sleep disturbance or annoyance, may increase. The guideline values are 50 or 55dB LAeq during the day, related to annoyance, and 45 dB LAeq or 60dB LAmax at night, related to sleep disturbance.

British Standard (BS) 4142:2014 – Method for rating and assessing industrial and commercial sound

BS 4142 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

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Appendix B – Description of Acoustic Terms

Term	Description
Noise sensitive receptors	People, property or designated sites for nature conservation that may be at risk from exposure to noise and vibration that could potentially arise as a result of the proposed development/project
Noise and Vibration study area	The area assessed for noise and vibration impacts during this assessment
Baseline scenario	Scenarios with the proposed development/project not in operation
Decibel (dB)	A unit of noise level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 µPa, the threshold of normal hearing is 0dB, and 140dB is the threshold of pain. A change of 1dB is only perceptible under controlled conditions. Under normal conditions a change in noise level of 3dB(A) is the smallest perceptible change.
dB(A)	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
LAeq,T	The equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). LAeq,T is used to describe many types of noise and can be measured directly with an integrating sound level meter.
LA10,T	The A weighted noise level exceeded for 10% of the specified measurement period (T). LA10 is the index generally adopted to assess traffic noise
LA90, T	The A weighted noise level exceeded for 90% of the specified measurement period (T). In BS 4142: 2014 it is used to define the 'background' noise level.
LAmax	The maximum A-weighted sound pressure level recorded during a measurement.

Term	Description
Rw	Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies.
Sound Reduction Index (SRI)	Laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.