

REPORT

Merkur Slots 15-19 Peel Street Barnsley Noise Assessment

Client: MERKUR Slots UK Limited

Reference: PR2001_66_FINAL

Date: 11/11/2021

Table of Contents

1	<i>Introduction</i>	2
1.1	Background	2
1.2	Site Context	2
2	<i>Guidance and Acoustic Requirements</i>	3
2.1	Legislation	3
3	<i>Onsite Inspection and Assessment</i>	4
3.1	Background	4
3.2	Onsite Observations	4
4	<i>Predicted Sound Insulation Performance and Assessment</i>	7
4.1	Operational Noise Levels in Existing Merkur Cashino	7
4.2	Site Context in Relation to Noise	7
4.3	Assessment of a 24-Hour Merkur Site (Cashino)	8
4.3.1	302-304 Hessle Road, Hull – 11th September 2020	8
	<i>Analysis of Observations</i>	8
4.3.2	48-50 Camberwell Church Street, Camberwell, London – 15th July 2021	9
	<i>Analysis of Observations</i>	9
4.3.3	45 West Street, Boston – 29th July 2021	10
	<i>Analysis of Observations</i>	10
4.4	Noise Rating (NR) Curves	11
4.5	British Standard 8233:2014	12
4.6	Sound Insulation Prediction	12
4.7	Assessment of Noise Breakout – Noise Rating	15
4.8	Assessment of Noise Breakout – BS8233:2014	16
5	<i>Conclusion</i>	18

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 15-19 Peel Street, Barnsley. Planning permission is being sought for 24-hour operation and as such the assessment has been undertaken in accordance with 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 areas where the sound insulation performance can be improved. Recommendations for improvement have been made in order to prevent noise impacts to adjacent noise sensitive receptors. The resulting sound insulation performance has been calculated using INSUL Sound Insulation Prediction Software to prove compliance.

Recommendations to mitigate potential noise flanking paths during construction have been made as well as suggestions for internal finishes to absorb operational sound.

1.2 Site Context

The site is located at ground-floor level facing out onto Peel Street. Neighbouring commercial units exist on each side of the site. The first-floor level directly above the site is currently vacant, however there is possibility that in the future it could be converted to residential use. The unit will be subdivided by constructing a new wall which will separate the application site from other ground-floor areas. Recommendations for the construction of this wall in order to prevent potential noise impacts to adjacent spaces have been made within this report.

Predictions of the sound insulation performance after implementation of recommendations and defect rectification 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 Onsite Inspection and Assessment

3.1 Background

In order to assess the current site conditions, an inspection and assessment was undertaken on the 23rd September 2021. 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.

A series of case studies of patron behaviour have been undertaken at three different operational Merkur sites which have 24-hour consent and are presented in **Section 4.3**. The studies have determined that patrons do not behave in an antisocial manner and noise impacts are considered very unlikely to occur during the evening and night-time periods.

3.2 Onsite Observations

It was noted onsite that a suspended grid ceiling was present which incorporated mineral fibre ceiling tiles. The separating floor consisted of cast concrete, the thickness of which could not be determined. However, concrete floors for residential use are required to have a minimum thickness of 101mm and therefore, this assumption has been used for the assessment, representing a worst-case scenario.

The separating walls were noted to be composed of brick. The entrance consisted of a double sliding glass door mounted in glazing.

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
	<p>Location: <i>Entrance Doors</i></p> <p>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.</p>
	<p>Location: <i>Separating Floor</i></p> <p>It is recommended that any holes or dips in the concrete are filled in with mortar to create a homogenous layer.</p>

Table 1: Site Assessment Findings and Recommendations

Site Photo	Comment
	<p>Location: <i>Separating Floor</i></p> <p>It is recommended that when the new separating wall is constructed it continues through the suspended ceiling and terminates directly at the separating floor slab. This prevents any potential sound transmission occurring through the void between the suspended ceiling and slab.</p>

4 Predicted Sound Insulation Performance and Assessment

4.1 Operational Noise Levels in Existing Merkur Cashino

Previous measurements of internal noise levels within an operational Merkur Cashino in Hull located at 106 Newland Avenue and are presented in **Table 2** below. These measurements were made in 2 locations inside the Cashino on 17th March 2020 during a particularly busy period when the machines were in operation and noise levels were at the highest. Measurements were made for 5 minutes in each location which were at opposite ends of the Cashino to gain representative operational levels. A description of acoustic terminology is provided in **Appendix B**.

Table 2: Source Level Noise Measurements within Operational Merkur Cashino

Measurement	L _{Aeq}	L _{Amax}	Octave Band Levels (dB)							
			63	125	250	500	1kHz	2kHz	4kHz	8kHz
MP1	65.7	73.6	57.6	65.8	66.1	62.8	61.5	56.1	52.0	49.3
MP2	63.1	75.0	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 at the time of the measurements (17/03/2020):

Table 3: Instrumentation

Instrument	Serial No.	Calibration Due Date at Time of Survey
Norsonic 140 Class 1 Sound Level Meter	1406433	August 2021
Norsonic 1209 Preamplifier	21318	August 2021
Norsonic 1225 Microphone	226973	August 2021
Nor 1252 Acoustic Calibrator	31717	April 2020

4.2 Site Context in Relation to Noise

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 rowdy behaviour observed; and,
- Patrons enter and leave quickly without loitering.

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 anti-social behaviour which might be associated with pubs or food takeaway's; 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 otherwise anti-social behaviour. 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 antisocial behaviour 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 antisocial behaviour 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 antisocial behaviour 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 antisocial behaviour 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 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 receptors to the site are the potential future residential units directly above which 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 Cashino / Merkur Slots sites detailed within **Section 4.1, Table 2**, it was determined that noise levels were low and without specific character (predominantly people talking and low-level sounds from machines). It is understood that the site will be operational 24-hours a day. 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.

4.6 Sound Insulation Prediction

Since the closest noise sensitive receptors to the site are the potential future residential units directly above, the separating floor is the focus of the assessment.

With reference to the site observations detailed in **Section 3** and the proposed construction of the site, INSUL Sound Insulation Prediction Software was used to calculate the sound reduction to be achieved by the ceiling once all defects detailed in **Table 1** have been rectified. The following

details were used to calculate the predicted performance which represent a conservative approach:

Shopfront:

- Single layer of 6mm glazing.

Separating Floor:

- 101mm thick cast concrete separating floor;
- 100mm thick rockwool insulation (or equivalent); and,
- Suspended grid mineral fibre ceiling (19mm thick).

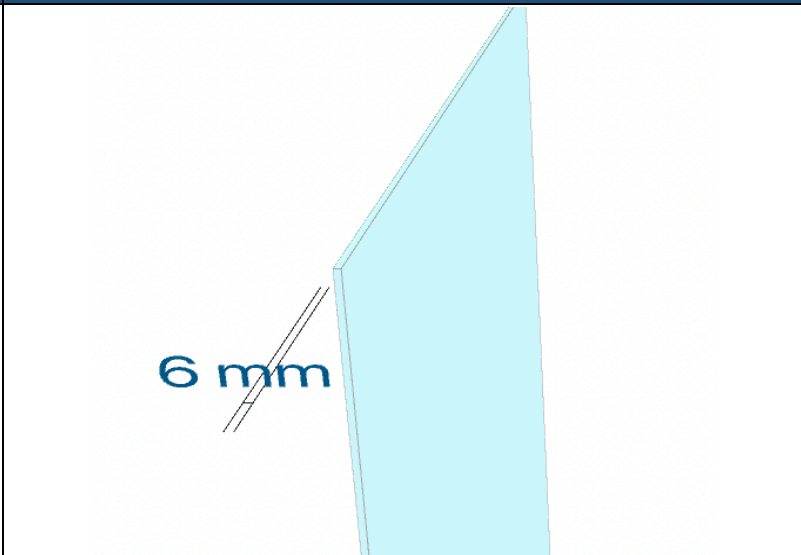
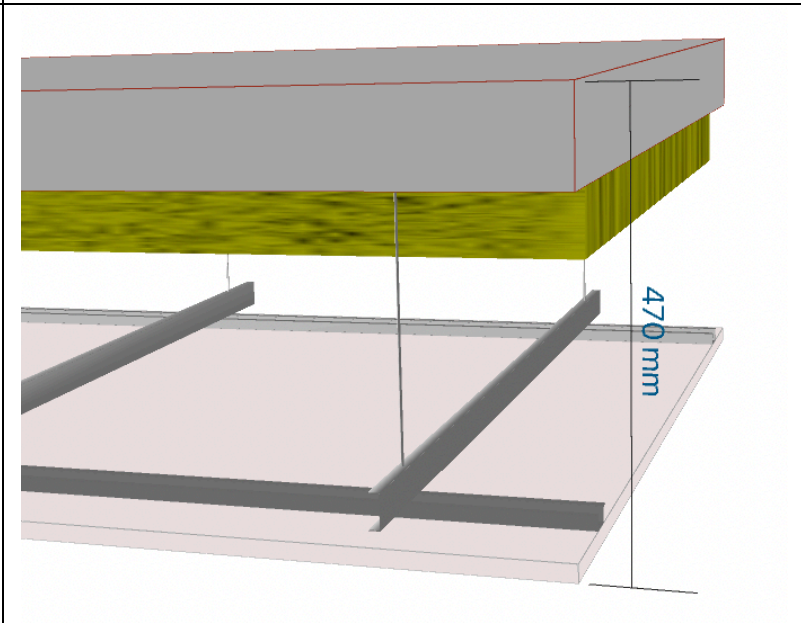
In addition to the above, it was deemed prudent to make recommendations for the new separating wall which will sub-divide the site. The configuration below is recommended, however if a different design is to be used then Archo Consulting will review and provide comments to ensure the sound insulation performance is adequate.

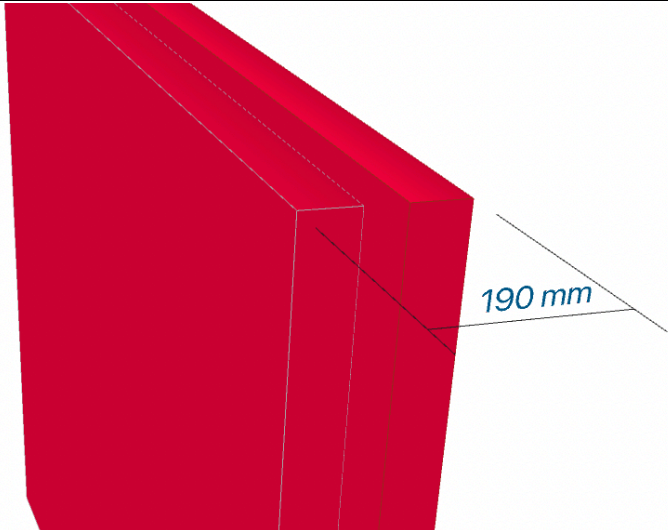
Wall:

- 2 x layer of standard 70mm thick brick; and,
- 50mm air gap between brick layers.

Using these configurations described above, INSUL Sound Insulation Prediction Software was used to calculate the performance once all defects have been rectified and is presented in **Table 7** below:

Table 7: Predicted Sound Insulation Performance

Element	Illustration														
Shopfront	 <p>6 mm</p> <table border="1" data-bbox="630 1003 925 1052"> <thead> <tr> <th>63</th> <th>125</th> <th>250</th> <th>500</th> <th>1k</th> <th>2k</th> <th>4k</th> </tr> </thead> <tbody> <tr> <td>18</td> <td>21</td> <td>25</td> <td>29</td> <td>33</td> <td>31</td> <td>35</td> </tr> </tbody> </table> <p>Rw 31 dB C -1 Ctr -2 Rw+Ctr 29 dB 100-3150 Hz</p>	63	125	250	500	1k	2k	4k	18	21	25	29	33	31	35
63	125	250	500	1k	2k	4k									
18	21	25	29	33	31	35									
Ceiling	 <p>470 mm</p> <table border="1" data-bbox="630 1702 925 1758"> <thead> <tr> <th>63</th> <th>125</th> <th>250</th> <th>500</th> <th>1k</th> <th>2k</th> <th>4k</th> </tr> </thead> <tbody> <tr> <td>37</td> <td>54</td> <td>57</td> <td>58</td> <td>67</td> <td>75</td> <td>82</td> </tr> </tbody> </table> <p>Rw 65 dB C -1 Ctr -4 Rw+Ctr 61 dB 100-3150 Hz</p>	63	125	250	500	1k	2k	4k	37	54	57	58	67	75	82
63	125	250	500	1k	2k	4k									
37	54	57	58	67	75	82									

Element	Illustration														
Wall	 <table border="1" data-bbox="635 929 928 990"> <tr> <td>63</td> <td>125</td> <td>250</td> <td>500</td> <td>1k</td> <td>2k</td> <td>4k</td> </tr> <tr> <td>30</td> <td>46</td> <td>56</td> <td>60</td> <td>73</td> <td>78</td> <td>92</td> </tr> </table> <p>Rw 66 dB C-1 Ctr -6 Rw+Ctr 60 dB 100-3150 Hz</p>	63	125	250	500	1k	2k	4k	30	46	56	60	73	78	92
63	125	250	500	1k	2k	4k									
30	46	56	60	73	78	92									

4.7 Assessment of Noise Breakout – Noise Rating

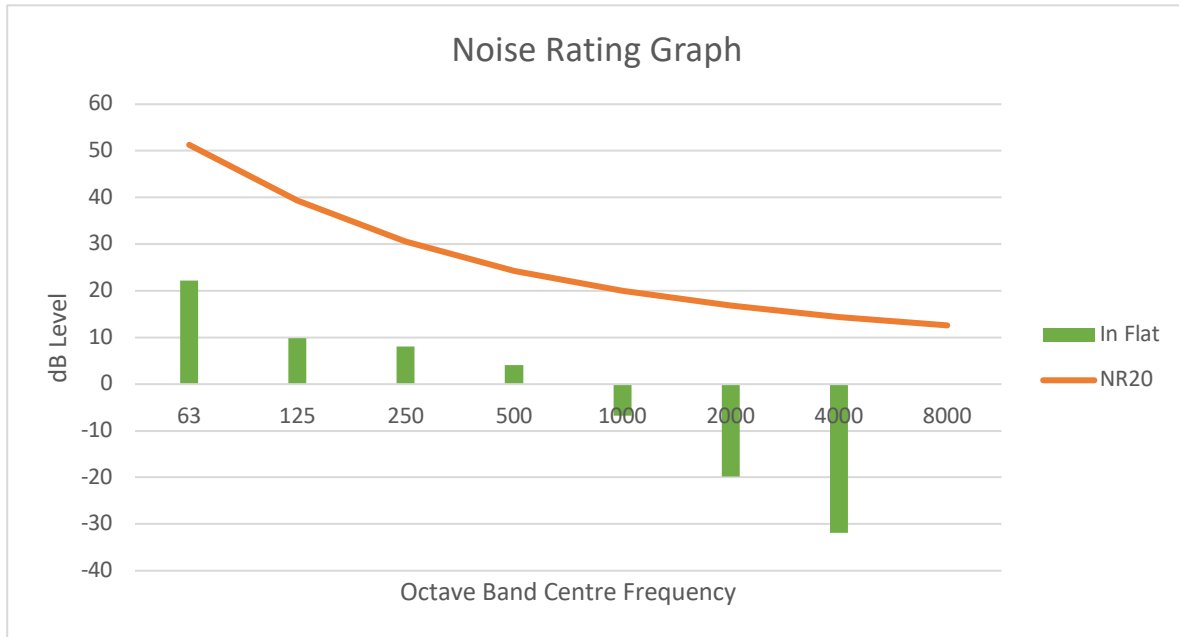
With reference to **Section 4.4** it was deemed appropriate that the limit of **NR20** can be applied for the closest residential receptors. **Table 8** below presents the values associated with the NR20 curve:

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

Using the predicted sound reduction achieved by the separating floor presented in **Table 7** and using the measured noise data from an active Cashino site presented in **Table 2** the NR curve inside the potential future first-floor residential units was predicted. This was undertaken by logarithmically averaging the measured noise data from **Table 2**. **Figure 1** below presents the predicted NR curve plotted against the NR20 curve:

Figure 1: Predicted NR curve against NR20



It can be observed from **Figure 1** above that the predicted NR curve within the potential future residential receptors will be below the **NR20** curve values. Therefore, provided that all defects detailed in **Table 1** have been adequately satisfied, the limit of NR20 is predicted to be achieved.

4.8 Assessment of Noise Breakout – BS8233:2014

With reference to **Table 2**, the measured operational noise levels within a Merkur Cashino during peak times ranged between L_{Aeq} 63.1 dB to 65.7 dB with L_{Amax} levels peaking at 75.0 dB. **Table 9**

below details the predicted noise levels at the closest noise sensitive receptor (measured to be approximately 3 metres from entrance).

Table 9: Predicted Noise Levels

Source Noise Level	Element	Calculated Sound Reduction from Element	Resulting Noise Level in Closest Residential Unit	BS8233:2014 Criteria	Comment
L _{Aeq} 65.7 dB	Ceiling	65.0 dB	+0.7 dB	30.0 dB	Compliant with BS8233:2014
L _{Amax} 75.0 dB			+10.0 dB		Compliant with BS8233:2014
L _{Aeq} 65.7 dB	Shopfront	31.0 dB	+10.2 dB*	30.0 dB	Compliant with BS8233:2014
L _{Amax} 75.0 dB			+19.5 dB*		Compliant with BS8233:2014
L _{Aeq} 65.7 dB	Wall	66.0 dB	-0.3 dB	30.0 dB	Compliant with BS8233:2014
L _{Amax} 75.0 dB			+9.0 dB		Compliant with BS8233:2014

* Note: calculated over a 3-metre distance and applying -15dB to account for a partially open window in accordance with BS8233:2014.

It can be observed from **Table 9** above that, once all rectification work has been completed, the predicted noise levels at the closest noise sensitive receptors are significantly below BS8233:2014 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.

It is recommended that consideration be given to inclusion of soft internal finishing such as fabric panelling to further reduce internal noise levels.

5 Conclusion

A site inspection and assessment of sound insulation performance has been undertaken for the new Merkur Slots site located at 15-19 Peel Street, Barnsley. The site will be operational 24-hours a day.

The inspection has identified the current configuration and areas in which the sound insulation performance can be improved. All defects, site photos and recommendations for rectification are presented in **Table 1** of this report.

Based on the configuration of the separating elements and the identified areas of improvement, the sound insulation performance was calculated using INSUL Sound Insulation Prediction Software and presented in **Table 7**.

An assessment of noise breakout was undertaken using source noise measurements previously obtained from a Merkur site in Hull during peak operation and is presented in **Table 9**. The assessment showed that the separating elements will attenuate noise levels sufficiently to comply with the criteria of NR20 and also the criteria stipulated within BS8233:2014 for internal habitable rooms in the closest residential unit. This is conditional upon rectification of all defects identified in **Table 1**. Once all defects identified in **Table 1** have been rectified the site will be suitable for 24-hour operation.

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 unlikely that noise impacts will occur due to patrons leaving and entering the site.

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 2019

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 and in February 2019 and this document now forms the basis of the Government’s planning policies for England and how these should be applied.

Paragraph 170 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 180 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 L_{Amax} 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.

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 μ Pa, 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.
LAm _{ax}	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.