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30th June 2022

**RE: BOORLEY GREEN GATEWAY, BOTLEY
BREEAM HEA 05**

Dear Ms Edgington,

I am writing following your request to undertake a review of the acoustic design for the above project.

We understand that the development includes the construction of mixed-use retail and residential units and that the retail aspects of the scheme are subject to the BREEAM credit scheme.

We are writing this letter with reference to BREEAM HEA 05, described in the below sections.

The specifications described should be regarded as detailing the minimum construction to achieve suitable acoustic performance. Where products are named, it should be noted that equivalent alternative products may be selected and used.

1.0 ACOUSTIC PERFORMANCE CRITERIA...

1.1 Relevant Guidance Documents

We have considered the criteria defined in the BREEAM UK credit scoring system for new construction. Under the Health and Wellbeing section HEA05 of the Scheme Document SD5076 – 2014 for shell and core retail buildings, there is one credit available – achieved as follows

HEA05 First Credit

Indoor ambient noise levels comply with the design ranges given in BS 8233:2014 unless otherwise stated below. Where the room types below are present, the appropriate criteria for ambient noise levels, sound insulation and acoustic privacy must also be achieved.

It is our interpretation that only indoor ambient noise levels are required to comply in order to achieve the single credit available as retail spaces are not specifically referred to “below”.

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This is further justified within the shell and core compliance notes section of the document, which states the following,

Indoor ambient noise criteria:

All criteria relevant to the building type and function apply.

Sound insulation and reverberation criteria:

These criteria are not applicable.

2.0 ACOUSTIC PERFORMANCE REQUIREMENTS...

2.1 Internal Ambient Noise Levels

For sealed buildings being ventilated via mechanical systems, it is common for noise ingress due to external sources to be relatively much quieter than the building services noise.

The performance values provided in the guidance documents for internal noise are recommended to be considered further by the building services engineers. We have included a suggested tolerance of 3 dB to allow for a part contribution from external noise to the total noise level within the completed offices.

The guidance given in BS8233:2014 for minimum and maximum internal noise levels are as follows for department stores and restaurants.

BS8233:2014

Department Store	50-55 dB(A) $L_{Aeq,T}$
Restaurant	40-55 dB(A) $L_{Aeq,T}$

The dB(A) level can be approximated as 6 dB higher than the equivalent NR (Noise Rating) level used for designing building services provided there are no significant low frequency components.

Regarding the lower design range, the standard goes on to state the following,

In some cases, such as open-plan offices and restaurants, a moderate noise level might provide masking for acoustic privacy in shared spaces without causing disturbance, so upper and lower noise levels should be considered.

Where the internal noise level is too low, artificial noise can be used to bring the noise level up.

3.0 DESIGN ASSESSMENT...

3.1 Internal Ambient Noise Levels

3.1.1 Assessment Method

In predicting the level of noise internally to compare with the criteria we have followed the methodology set out in BS EN 12354-3:2000 *Building Acoustics – Estimation of Acoustic Performance of Buildings from the Performance of Elements Part 3: Airborne Sound Insulation Against Outdoor Sound*.

The accuracy of the adopted method for estimation of level difference is stated within the standard to be “on average correct”, with the single number ratings displaying a standard deviation of about 1.5 dB while for individual octave band the deviation will be larger up to 3 dB.

Within the method, it is also possible to include an allowance for flanking and on-site degrade of performance; however, it is rare to have data which is reliable for doing so. It is common practice therefore to include a 3 dB degrade for façade elements to perform differently to their predicted or laboratory measured performance. We have based our assessment on this principle.

We understand the retail accommodation will be ventilated via a mechanical system. As a result, the façade openings and windows are considered to be closed for the purposes of the design assessment.

3.1.2 Site Noise Exposure

The assessment has been based on noise information provided to us. The data has been taken from the 24Acoustics report: R7472-1 Rev 2 Date: 12 June 2020.

The report summarises the results of a survey conducted in the vicinity of the retail spaces on the existing, pre-development site. These noise levels are summarised in Table 1

Date (August 2018)	Daytime Level (23:00 – 23:00) dB	Night Time Level (23:00 – 07:00) dB
	$L_{Aeq,16hour}$	$L_{Aeq,8hour}$
Monday 20 th	50	40
Tuesday 21 st	50	40
Wednesday 22 nd	49	42
Thursday 23 rd	51	44
Friday 24 th	52	45
Saturday 25 th	47	41
Sunday 26 th	56	49
Monday 27 th	49	40
Tuesday 28 th	48	-
Typical Value	50	43

TABLE 1: EXTERNAL SOUND PRESSURE LEVELS TAKEN FROM 24ACOUSTICS SURVEY

It is unclear as to whether the levels specified in the table are free-field or façade level. As a worst case, we have assumed them to be free-field, incurring a +3 dB correction to façade level for use in this assessment.

We have based the assessment on the highest 16-hour period taken from the survey of 59 dB $L_{Aeq,16hour}$ when also including the façade level correction.

It should be noted that the noise levels have been based on information provided to us by others. We therefore accept no liability for the accuracy of this information or omissions and cannot guarantee the predictions that have been derived from it.

3.1.3 Derivation of a Façade Specification

We have derived an overall specification for the acoustic performance of the external façade due to external noise sources, which is summarised in Table 2.

Floor	Room Type	Total Noise Level Limit dB(A) L_{Aeq}	Maximum Noise from External Sources dB(A) L_{Aeq}	Minimum Level Difference dB(A) D_{Atr}	Minimum Composite Façade Specification R'_w+C_{tr} (dB)
Ground Floor	Department Store	50-55	52	7	8
	Restaurant	40-55	52	7	8

TABLE 2: SUMMARY OF TOTAL FAÇADE PERFORMANCE REQUIREMENTS

The retail façades are understood to be formed of glazing and masonry. The glazing is considered to be of a relative area to the external wall whereby the performance will largely dictate the overall composite level difference. We anticipate the most basic of double glazing to provide sufficient noise reduction from external sources. For reference, the acoustic performance of 4/16/4 glazing is c. 26 dB R_w+C_{tr} , some 18 dB above the minimum composite performance requirement.

BS 8233:2014 notes that that the minimum design range should be considered. It is for this reason that mechanical systems may be necessary to increase internal noise levels to meet the minimum design range, depending on the final intended usage of the space.

Should it transpire that the retail areas are to be ventilated via openable windows, we can follow the guidance from the World Health Organisation which states an open window will reduce the external noise level measured 2 m from the façade by 10 to 15 dB(A). Napier University has conducted extensive research into the effects of window openings and concluded a similar level of attenuation, with dependencies on the type of opening, of between 12-18 dB(A) to traffic noise.

The minimum level difference requirement of 7 dB D_{Atr} is expected to be readily achieved even using the lowest estimated reduction of 10 dB through an openable window.

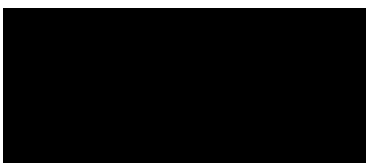
4.0 CONCLUSIONS...

We have derived a set of acoustic design objectives and reviewed the proposed retail development of the Boorley Green Gateway scheme. We have considered internal noise levels only, in accordance with BREEAM HEA 05.

We are of the opinion that the reviewed design will offer a suitable acoustic performance to achieve the one BREEAM HEA 05 credit subject to the design recommendations stated.

I trust this covers all the necessary information at this stage. If you require anything further, please don't hesitate to contact me.

Yours sincerely,
For Red Twin Limited



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