

REF: L1424.1 V4

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20th June 2023

**RE: BOORLEY GREEN GATEWAY, BOTLEY
ENTERTAINMENT NOISE REVIEW – PLANNING CONDITION No 12**

Dear Mrs Frank,

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 planning has been granted subject to several conditions.

We are writing this letter with reference to Planning Condition No 12, 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 DESIGN OBJECTIVES...

1.1 Planning Condition No. 12

Eastleigh Borough Council have provided conditional acceptance to the planning application. Of relevance to this assessment is Planning Condition No. 12, which states the following.

Prior to development above slab level of Blocks B, D and E, details of the measures to be incorporated into the building design to protect against the ingress of entertainment noise from current and future activities at Botley Park Hotel shall be submitted to and approved in writing by the Local Planning Authority. The measures shall include sufficient sound insulation and provision of mechanical ventilation for habitable rooms, with the aim of achieving internal entertainment noise levels from the Botley Park Hotel not exceeding any of the following criteria:

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- 45 dB Leq, 63 Hz, 5 minutes
- 28 dB Leq, 125 Hz, 5 minutes
- 20 dBA LAeq, 1 minute

The ventilation system shall be designed to achieve noise conditioning to mask residual entertainment noise ingress and counteract the risks of neighbour noise nuisance. Prior to the first occupation of any residential unit within Blocks B, D and E, the approved measures shall be implemented, and written confirmation shall be provided to the Local Planning Authority by a competent acoustic consultant that the approved measures have been implemented satisfactorily. The approved measures shall be thereafter retained and maintained.

Reason: To protect residential amenities.

Please note that this assessment is based on entertainment noise from the nearby hotel only. Other sources of noise affecting the development are considered separately.

2.0 DESIGN ASSESSMENT...

2.1 Entertainment Noise Intrusion

2.1.1 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.

The areas affected by entertainment noise are understood to be ventilated via trickle vents in the windows.

2.1.2 Site Noise Exposure

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

The report includes the calculated sound pressure levels outside the nearest proposed dwellings at the 63 Hz and 125 Hz octave bands, and the A-weighted noise level, resulting from entertainment noise breakout from the hotel.

It is not clear as to whether the specified noise levels are calculated to a façade level (c. 1 m from the façade of the receptor) or a free field (c. > 3 m from the façade of the receptor). We have assumed that the values represent free-field conditions to account for worst case.

The specified noise levels are summarised in Table 1.

Receptor	Predicted Sound Pressure Level		
	dB L _{eq,5min}		
	63 Hz	125 Hz	A
Proposed apartments, 25m North West of the hotel conference suite	63	54	42

TABLE 1: PREDICTED EXTERNAL MUSIC NOISE LEVELS FROM HOTEL EVENTS (24 ACOUSTICS)

The calculation of an A-weighted noise level within a residential demise is dependant on the spectral content of the noise source and the spectral performance of the façade. The 24 Acoustics report does not contain spectral information for the predicted noise level at the proposed apartments. It does, however, include the spectrum of assumed internal music noise level, as summarised in Table 2.

Noise Source	Sound Pressure Level, dB Leq, 5min Octave Band Centre Frequency, Hz								A
	63	125	250	500	1k	2k	4k	8k	
Amplified Music	110	105	95	90	90	90	90	85	98

TABLE 2: ASSUMED INTERNAL MUSIC NOISE LEVEL (24ACOUSTICS)

In order to formulate a spectrum outside at the residential receptor, we have applied corrections to the spectrum at octave bands 250 Hz and above based on the spectral performance of a typical double-glazed window – assuming music breakout is dominated via the window. We have shifted the spectral correction until the A-weighted value equals that of the value of 42 dB(A) shown in Table 1.

The calculated spectrum used for the assessment is summarised in Table 3.

Receptor	Sound Pressure Level, dB Leq, 5min Octave Band Centre Frequency, Hz								A
	63	125	250	500	1k	2k	4k	8k	
Blocks B, D & E	63	54	46	29	11	2	4	0	42

TABLE 3: CALCULATED SPECTRUM AT RECEPTOR (FREE-FIELD)

For the purpose of the calculation, a +3 dB correction is to be added to the values stated in Table 3 to account for façade level conditions.

It should be noted that the entertainment 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.

2.1.3 Façade Specification

We have based the assessment on a small bedroom and a living room with an approximate volume of 29 m³ and 65 m³ respectively. These are considered to be the worst-case dimensions throughout the three blocks.

We have selected a bedroom with the larger c 1.9 m² window. The Juliet balcony doors serving the living rooms have been approximately measured at 3 m².

With reference to the 24 Acoustics report, the area expected to be affected by entertainment noise is Zone A. This is indicated in the appendix and the fenestration zones are further described in our report ref. L1424.2.

The sound insulation offered by the building envelope is dictated by numerous elements, such as the sound reduction performance of the wall, window and trickle vent, and each has a different relative area.

To convert the Sound Level Difference into a Sound Reduction Index requires details of the façade and the relative areas of each element (e.g. window, wall etc) together with the room dimensions and finishes. The internal room parameters used in our assessment are summarised in Table 4.

Room Type	Approximate Element Areas (m ²)				Approx. Room Volume (m ³)	Average Reverberation Time 63-8k Hz (s)
	Wall	Window	Juliet Balcony Door	Vent Opening		
Bedroom	5	1.9	--	0.005	29	0.5
Living Room	21	1.9	3	0.005	65	0.5

TABLE 4: ROOM GEOMETRY USED IN ASSESSMENT

The proposed façade constructions for each fenestration zone are described in Table 5.

Location	Performance Rating	Proposed Construction Description
Zone A		
Walls	56 dB R_w+C_{tr}	100 mm external brick, 100 mm cavity part filled with 50 mm fibrous insulation, 100 mm lightweight internal blockwork, 1 No layers of 12.5 mm standard plasterboard.
Windows	34 dB R_w+C_{tr}	Sealed double glazed unit in a 10 mm standard glass, 18 mm airspace, 8.8 mm laminated glass configuration. Data provided by Guardian Glass.
Juliet Balcony Door	33 dB R_w+C_{tr}	Acoustically rated Juliet balcony door system to achieve 33 dB R_w+C_{tr} .
Ventilation	37 dB $D_{new}+C_{tr}$	Acoustically rated ventilator in the open position. The design proposal is understood to contain a single Greenwoods 5000EA trickle vent per room.

TABLE 5: PROPOSED CONSTRUCTION DESCRIPTIONS

The detailed sound reduction performances of the above constructions in 1/1 octave bands between 63 Hz and 8 kHz are summarised in Table 6.

Element	Sound Reduction Index R (dB) at each 1/1 Octave Band Centre Frequency (Hz)								R _w (C _{tr})
	63	125	250	500	1000	2000	4000	8000	
Walls	37	49	50	55	63	70	74	74	56 dB R _w +C _{tr}
Windows (10/18/8.8PVB) ¹	24 ²	29	33	40	42	46	53 ²	53 ²	34 dB R _w +C _{tr} ⁴
Juliet Balcony Door	19 ³	24 ³	28 ³	35 ³	37 ³	41 ³	48 ³	48 ³	33 dB R _w +C _{tr}
Ventilation	32	39	38	31	44	43	40	40 ²	37 dB D _{new} +C _{tr}

TABLE 6: ACOUSTIC PERFORMANCE SPECIFICATION OF PROPOSED CONSTRUCTION ELEMENTS

¹ Assessment based on information provided by Guardian Glass.

² Octave bands based on our own proprietary predictions.

³ Minimum specifications to be achieved.

⁴ Single figure value based on Guardian Glass info when including suggested tolerance.

The above proposals for acoustic performance should be considered for acceptability with all other design and planning constraints before inclusion in construction issue drawings or being released for procurement.

Within our calculations we have included a correction to the sound insulation performance of the façade elements to account for site installation and construction tolerance of -3 dB. The specifications are therefore considered to be laboratory measured performances.

The laboratory-based specification of building elements should be ascertained by testing and have been undertaken in a laboratory accredited to undertake sound insulation testing to BS EN ISO 10140-5 (e.g. UKAS or equivalent). All testing should have been undertaken in accordance with BS EN ISO 10140 Part 1 and Part 2 or equivalent. For the avoidance of doubt the laboratory measured performance of windows and Juliet doors shall include the effects of the framing as well as the glass. We recommend this be confirmed by the chosen manufacturer prior to installation.

2.1.4 Building Envelope Performance

We have estimated the acoustic performance of the proposed external wall and compared it against the requirement of each octave band, summarised in Table 7 (Lounge) and Table 8 (Bedroom).

Case	1/1 Octave Band Centre Frequency (Hz)								dB(A)
	63	125	250	500	1000	2000	4000	8000	
Sound Pressure Level at Façade (dB $L_{eq,T}$)	63	54	46	29	11	2	4	0	42
Façade Level Correction (dB)	+3	+3	+3	+3	+3	+3	+3	+3	+3
Composite Sound Reduction Index of envelope (dB R)	27	32	35	35	44	49	51	51	--
Reverberation Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Tolerance (dB)	±3	±3	±3	±3	±3	±3	±3	±3	±3
Target Internal Noise Level Requirement (dB $L_{eq,T}$)	45	28	--						20
Predicted Internal Noise Level (dB $L_{eq,T}$)	37	23	12	0	0	0	0	0	13
Acceptable?	Yes	Yes	--						Yes

TABLE 7: ESTIMATED ENTERTAINMENT NOISE INSIDE RESIDENTIAL DWELLING (LOUNGE)

Case	1/1 Octave Band Centre Frequency (Hz)								dB(A)
	63	125	250	500	1000	2000	4000	8000	
Sound Pressure Level at Façade (dB $L_{eq,T}$)	63	54	46	29	11	2	4	0	42
Façade Level Correction (dB)	+3	+3	+3	+3	+3	+3	+3	+3	+3
Composite Sound Reduction Index of envelope (dB R)	26	33	34	30	43	49	46	46	--
Reverberation Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Tolerance (dB)	±3	±3	±3	±3	±3	±3	±3	±3	±3
Target Internal Noise Level Requirement (dB $L_{eq,T}$)	45	28	--						20
Predicted Internal Noise Level (dB $L_{eq,T}$)	36	20	11	0	0	0	0	0	11
Acceptable?	Yes	Yes	--						Yes

TABLE 8: ESTIMATED ENTERTAINMENT NOISE INSIDE RESIDENTIAL DWELLING (BEDROOM)

Our assessment has shown the proposed façade to be capable of achieving the entertainment noise level limits inside the residential dwellings.

2.2 Noise Masking

The dwellings affected by entertainment noise are understood to be ventilated via trickle vents in the windows and are not provided with mechanical ventilation systems.

3.0 CONCLUSIONS...

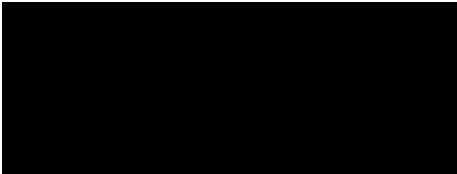
We have undertaken a review of Blocks B, D and E of the Boorley Green Gateway development in relation to entertainment breakout noise from a nearby conference facility.

We have compared the results against a set of internal noise level targets provided as part of the conditioned planning consent.

We are of the opinion that subject to the recommendations included within this assessment, the design is capable of achieving the entertainment noise level limits, as summarised in Table 7 and Table 8.

I hope this covers all required points at this stage, but please advise if you require anything further.

Yours sincerely,
For Red Twin Limited



Gavyn Bache B.Sc.(Hons) PgD MIOA
Associate

APPENDIX A – PLAN MARK UPS...

Location	Performance Rating	Proposed Construction Description
Zone A		
Walls	56 dB R_w+C_{tr}	100 mm external brick, 100 mm cavity part filled with 50 mm fibrous insulation, 100 mm lightweight internal blockwork, 1 No layers of 12.5 mm standard plasterboard.
Windows	34 dB R_w+C_{tr}	Sealed double glazed unit in a 10 mm standard glass, 18 mm airspace, 8.8 mm laminated glass configuration. Data provided by Guardian Glass.
Juliet Balcony Door	33 dB R_w+C_{tr}	Acoustically rated Juliet balcony door system to achieve 33 dB R_w+C_{tr} .
Ventilation	37 dB $D_{new}+C_{tr}$	Acoustically rated ventilator in the open position. The design proposal is understood to contain a single Greenwoods 5000EA trickle vent per room.
Zone B		
Walls	56 dB R_w+C_{tr}	100 mm external brick, 100 mm cavity part filled with 50 mm fibrous insulation, 100 mm lightweight internal blockwork, 1 No layers of 12.5 mm standard plasterboard.
Windows	34 dB R_w+C_{tr}	Sealed double glazed unit in a 10 mm standard glass, 18 mm airspace, 8.8 mm laminated glass configuration ¹ . Data provided by Guardian Glass.
Juliet Balcony Door	21 dB R_w+C_{tr}	Acoustically rated Juliet balcony door system to achieve 21 dB R_w+C_{tr} .
Ventilation Openings	35 dB $D_{new}+C_{tr}$	Acoustically rated ventilator in the open position. The design proposal is understood to contain a single Munster M335 AV17 trickle vent per room.

TABLE 9: PROPOSED CONSTRUCTION DESCRIPTIONS

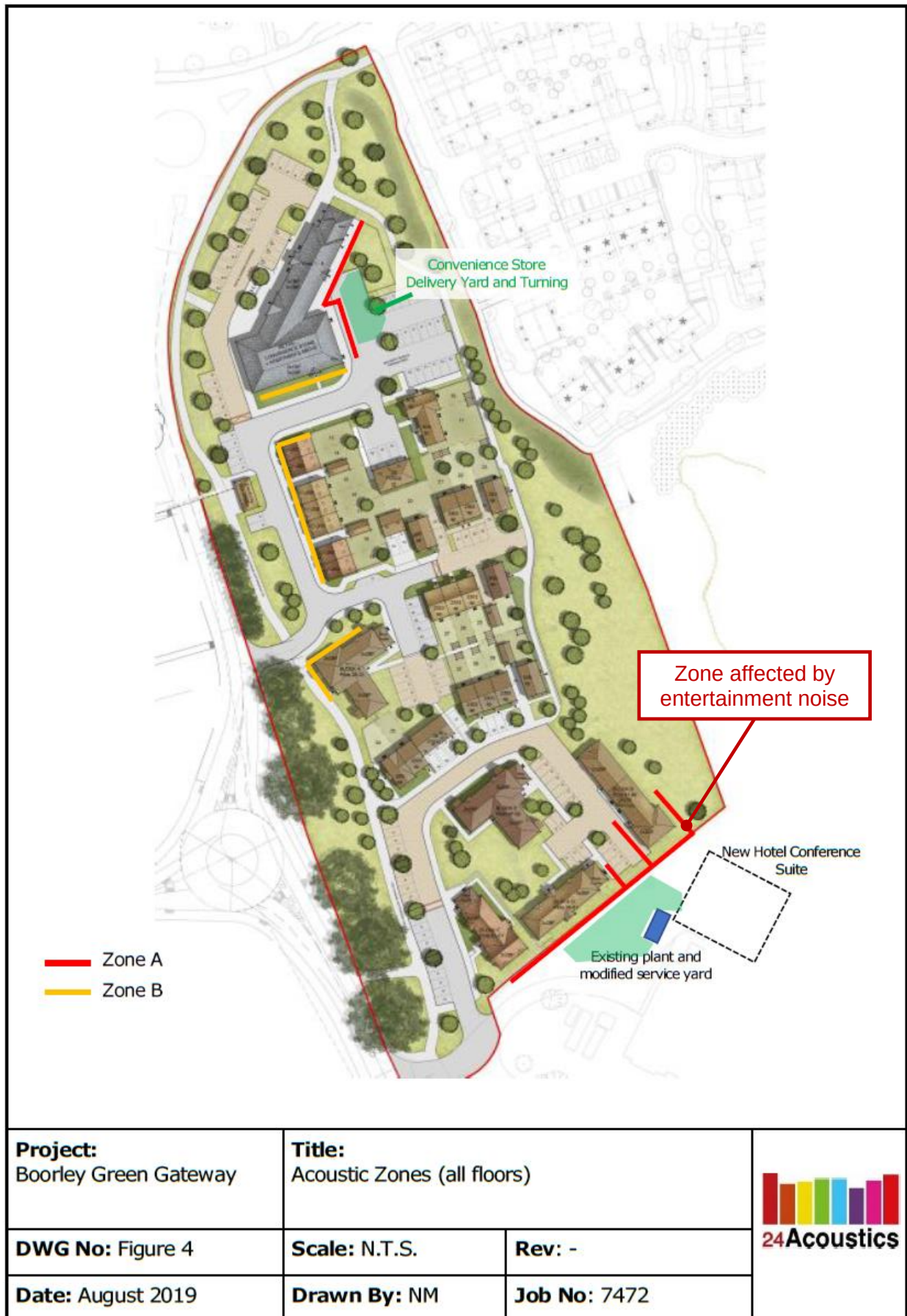


FIGURE 1: FENESTRATION ZONES A & B FAÇADE SPECIFICATION MARK-UP (24 ACOUSTICS)