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Dear Angel,

PRIORY CENTRE – GREAT HALL NOISE EMISSIONS

We have updated our calculations of noise emissions from the Great Hall based on the following information;

- Roof Type 1B shown in AOC drawing 295_AD_320;
- Dormer roof Type 3 shown in AOC drawing 295_AD_320;
- Dormer walls Type EW06 shown in AOC drawing 295_AD_310;
- SF 52 Curtain walling based on test data from Senior Architectural Systems Ltd;
- Pure Commercial 30.8mm double glazed doors;
- Guardian Glass acoustic test data;
- 45dBR_w stage door

This letter summarises our recommendations and, based on the proposed constructions, with improvements where noted, sets the limiting noise level within the Great Hall to control noise emissions to meet Local Authority requirements.

Dormer Construction

We have assumed that the glazing and frame to the dormer has equivalent performance to the SF52 curtain walling.

The proposed RT3 and EW06 construction of the dormer as drawn have a predicted sound insulation performance of 42dBR_w and 54dBR_w. However, in both cases, due to the lightweight timber construction, the low frequency sound insulation performance is extremely poor (circa 10dB at 63Hz).

The following upgrades have therefore been considered within our assessment;

Dormer Roof

- Dormer roof plywood becomes 2x18mm (currently 1x18mm)
- 18mm plywood added to inner face of structural zone, with 50mm mineral wool insulation in the cavity.

Dormer Walls

- OSB increased to 2x12.5mm OSB (currently 1x12.5mm OSB)
- Facing sheet increased to 2x12mm plywood (currently 1x12mm plywood)

Glazed Doors

Based on the data received, we have assessed the relative performance of the 30.8mm double glazed units vs the 32.8mm double glazed units. There is little difference in performance, particularly at low frequency, due to the limiting factor of the frames. We have therefore based our assessment on the 30.8mm unit (38dBR_w).

Limiting Internal Levels

On the basis of the above, the limiting internal level in the Hall to meet the Local Authority's requirements is presented in Table 1, below. For reference this is compared to Suono's target internal levels as set out in their Stage 4 report.

Table 1: Hall Limiting Internal Noise Level, $dBL_{eq,5min}$

	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dBA
Limiting Internal Noise Level	91	92	96	100	100	98	96	92	105
Suono revised target	100	98	93	88	88	86	83	-	93

Discussion

It can be seen that the overall noise level target of $105dBL_{Aeq,T}$ is achievable, however, the performance is significantly restricted in the 63Hz octave band (9dB lower) and 125Hz octave band (6dB lower).

We have reviewed potential means by which the low frequency performance of the building envelope can be enhanced.

The performance of the curtain walling can potentially be improved by using mass inserts within the mullions (e.g. Siderise MI3). This, however, provides no improvement at 63Hz. The controlling factor at 125Hz would remain the glazed doors and frames, where we assume that the use of such inserts is not possible.

The low frequency performance of the Pure 30.8mm door is comparable to the performance previously used for the $45dBR_w$ Stage Door, and as such replacing the doors with solid core units does not improve low frequency performance.

As such, the limiting internal level shown in Table 1 above appears to represent the best achievable performance for the building envelope.

Noise Break-In to Great Hall

In line with Suono's requirements for the Great Hall, noise intrusion from typical maximum noise events should not exceed 10dB below the building services noise level of NR25.

Based on a typical external maximum noise level of $71dBL_{AF,max}$ as measured during the noise survey, and the proposed constructions, this does not appear to be achievable. Our predictions indicate that typical maximum noise events will not exceed NR25.

I hope this information meets your needs at the current time, but please call if you have any questions.

Yours Sincerely,

[redacted]

Susan Witterick

Director, dBx Acoustics Ltd

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