

Acoustic Memo - Noise Impact Assessment
Orchard House SEND School (formerly Varley Street)
Manchester
M40 8EF

Stroma Built Environment Ltd.
SBE Ref: OPP-92896 – AC - 3v1

Introduction

Stroma Built Environment (SBE) has been appointed by Kier (client) to undertake a noise impact assessment relating to Planning Condition 20, which is stated below:

"a) The premises shall be acoustically insulated and treated to limit the breakout of noise in accordance with a noise study of the premises and a scheme of acoustic treatment that has been submitted to and approved in writing by the City Council as local planning authority. The scheme shall be implemented in full before the use commences. Where entertainment/music noise is proposed the L_{Aeq} (entertainment noise) shall be controlled to 5 dB below the L_{A90} (without entertainment noise) in each octave band at the façade of the nearest noise sensitive location, and internal noise levels at structurally adjoined residential properties in the 63 Hz and 125 Hz octave frequency bands shall be controlled so as not to exceed (in habitable rooms) 47 dB and 41 dB ($L_{eq,5min}$), respectively.

"b) Prior to occupation of the development a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultants report. The report shall also undertake post completion testing to confirm that acceptable criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria."

The purpose of this memo is to consider operational and activity noise generated within the building in relation to the requirements of Condition 20. Noise will be considered at the closest noise sensitive receptor (NSR) which is residential properties on Sawley Road to the north of the school building, as shown in Figure 1 below. SBE have attempted to consult with the local authority to confirm the requirements of the assessment, however at the time of writing no response has been received.

The development is an SEN school. The building is provided with a mechanical ventilation strategy meaning that windows will typically remain closed. A typical classroom would have a noise level of 60-75 dB L_{Aeq} , when in use, however, the small class sizes associated with SEN teaching would result in lower noise generated. Based on these levels, this will not be audible from outside the building when windows are closed. When windows are open, which is likely only during the hottest parts of the summer, noise levels from would be around 30 dB L_{Aeq} at the NSR, which is 20 dB below the background noise level.

There is no music accommodation within the school, however the Main Hall will include fixed sound amplification equipment. A desktop assessment of breakout noise from the Main Hall has been carried out to determine the potential impact on the nearest noise sensitive receptors, which are dwellings directly opposite along Sawley Road as indicated in Figure 1.

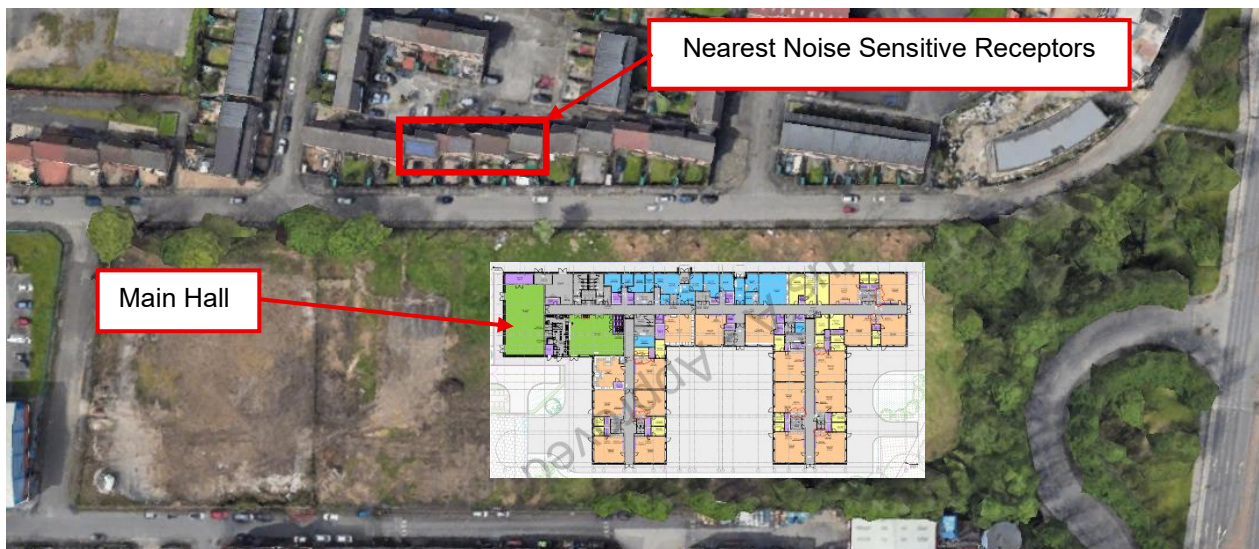


Figure 1: Site overview

Background noise levels have been previously established in the SBE Planning Stage Impact Noise Assessment (reference: OPP - 092958 AC 1v1) and are reproduced in Table 1 below. Condition 20 states that entertainment noise levels should be controlled to be at least 5 dB below the measured background noise level at the façade of the nearest noise Sensitive receptors. As shown in Table 1, the noise level criterion at the NSR facades will be 45 dB.

Table 1: BS 4142:2014 rating level limit

Time Period	Representative Background Noise Level, $L_{A90,T}$ (dB)	Planning Condition 20 Criterion, L_{Aeq} (dB)
Daytime (07:00 – 23:00)	50	≤ 45

Noise Impact Assessment

To assess the noise break-out of the Main Hall, the room dimensions, building façade construction, ventilation strategy, internal room finishes, and acoustic treatment has been reviewed. The Main Hall will use a hybrid ventilation system, with roof-mounted windcatchers. The Hall is also specified to feature Class-C acoustic absorption to the metal deck ceiling and 51.84m² of Class-A acoustic panels, which have also been considered within the calculations.

The façade build-up comprises of 102mm clay brick, 200mm cavity with 150mm slab insulation, 12mm sheathboard, 150mm cavity with 150mm insulation, 2x 12.5mm Gypsum plasterboard. This buildup has been calculated using Insul software (version 10.0.6) to give a sound reduction of approximately 65 dB R_w . The glazing to the Main Hall façade has been specified within the SBE report to be rated at a minimum or 32 dB R_w .

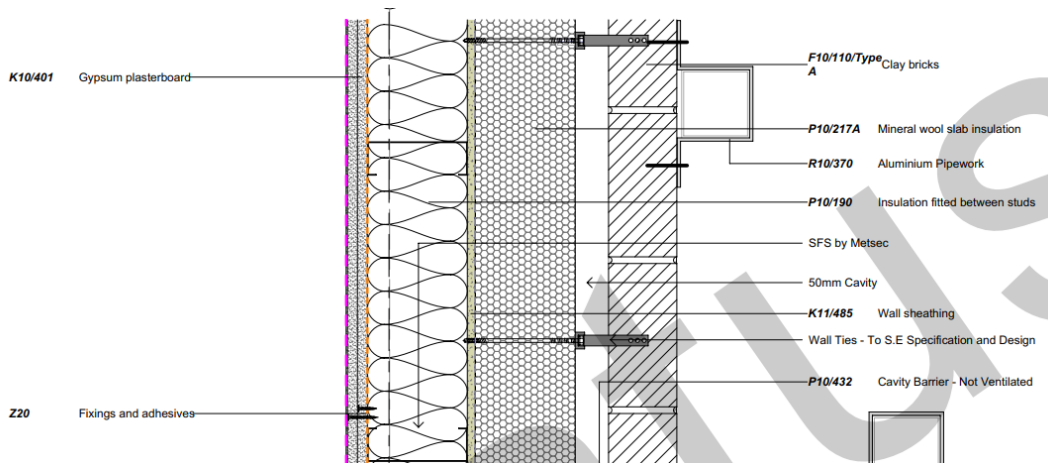


Figure 2: Façade build-up (drawing reference: VAR-JMA-ZZ-ZZ-DR-A-21401-A5-C6_External Wall Plan Details) dated 28/02/2025

Based on the PA System specification an internal reverberant sound pressure level of 85 dB has been calculated based upon the Main Hall's dimensions, internal finishes, and acoustic treatment. A breakout sound level of the Main Hall has been calculated by using the composite sound reduction index of the Main Hall façade, glazing, rooftop windcatcher sound reduction data based on 15 dB $D_{n,e,w}$ for a passive non acoustic unit, and the distance between the Main Hall and the façade of the nearest noise sensitive receptor under the scenarios of the Main Hall windows closed and windows open during hotter summer periods.

The assessment outcome is summarised in Table 2.

Table 2: Noise impact assessment outcome

Calculated Main Hall internal reverberant noise level, L_{Aeq} (dB)	Planning Condition 20 Criterion, L_{Aeq} (dB)	Calculated noise level at the NSR façade with Hall windows closed, L_{Aeq} (dB)	Calculated noise level at the NSR façade with Hall windows open, L_{Aeq} (dB)
85	≤ 45	25	37

The breakout noise level of the Main Hall is calculated to be 25 dB at the façade of the NSR with windows closed and 37 dB with windows open, which is 25 dB and 13 dB below the representative background noise level respectively, and indicates that the breakout noise level will have no impact on the existing background noise level at the NSRs.

On the basis of the findings outlined above, compliance with Planning Condition 20 is demonstrated. The condition also specifies internal noise level criteria for structurally adjoining properties, of which are none and this requirement should be considered compliant by default.

The planning condition also states that post-completion testing is required to confirm the criteria is met. Given the breakout noise levels are calculated to be sufficiently below the background noise levels at the NSRs, it is considered that validation testing is not necessary.

Glossary

Sound pressure level and the decibel, dB

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. The decibel is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Frequency and hertz, Hz

Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz. The human range of hearing is commonly accepted to be 20 Hz to 20,000 Hz. Additionally, an octave can be used to describe the interval between a frequency in Hz and either half or double that frequency.

Frequency weighting

Different weighting networks can be applied to a given sound level in each stated octave band by a specified amount, in order to better represent the response of the human ear. The most commonly used weighting network is the 'A' weighting, and the letter 'A' will be included within a descriptor to indicate that the value has been 'A' weighted, e.g. $L_{Aeq,T}$ or L_{A90} . An 'A' weighted noise level may also be written as dB(A). Other weightings less commonly used are 'C' and 'D' weighting.

Noise indices

When a noise level varies with time, the measured 'A' weighted dB level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple 'A' weighted dB value. In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The various indices used are described as below:

$L_{Aeq,T}$	The 'A' weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period, T
L_{Amax}	The maximum 'A' weighted noise level that was recorded during the monitoring period.
L_{A10}	The 'A' weighted noise level that was recorded for at least 10% of the monitoring period.
L_{A90}	The 'A' weighted noise level that was recorded for at least 90% of the monitoring period, usually taken as the underlying 'background' noise level.

Sound reduction index, R

This describes the sound transmitted through a material or building element, such as a wall, door or window. It is measured in a laboratory with suppressed flanking transmission. The ' R ' value is used to denote the differences at each third octave or octave band, with a single figure 'weighted' value to describe an overall performance. All values are described using the decibel.

R_w	Weighted single figure sound reduction index
$R_w + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise
R'_w	The 'apparent sound reduction index', a field measurement to obtain the sound reduction index of a material or element, with all effects of site installation accepted.