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The following technical letter serves to summarise our findings of a review into the noise impact assessment for a recording studio ref: 17186-NIA-01-RevA undertaken by Clement Acoustics dated 15/12/2021.

Concise Appraisal of Assessment as Understood

The assessment currently undertaken discusses noise transmission to the neighbouring property via external noise breakout. An assumed noise sensitive receiver window has been identified in the assessment at a distance of 4m from the recording studio windows which forms the basis of all calculations undertaken. From discussions with our Client, it has been confirmed that the closest noise sensitive receivers to the studio space in question are the patio doors immediately adjacent at basement level.

Noise has been predicted to this receiver based on anticipated sound insulation performance of external elements, including glazed and non-glazed external building fabric. This has been assessed based on internal source noise levels of 92dB(A) as recorded at a similar site, the reference for these source levels is not provided and it cannot be verified that the noise levels used are representative of the studio use in question. It is stated in the report that noise levels in the recording studio space should be limited by use of a noise limiter set to this defined level, however in practice this would be difficult to maintain, as acoustic instruments in performance can exceed this value. Furthermore, it is suggested that no drums will be used in the studio. While there is no way to objectively confirm the likelihood of this, it would be expected in any

recording studio assessment that provision would be made to accommodate percussion as part of a robust assessment of a worst-case scenario.

Similarly, it is stated that much lower levels would be expected in the mixing/control room, with frequent use of headphones. Operating hours are limited in the assessment to daytime hours (07:00-23:00). Both elements, while suggested with good intent, are unlikely to occur in the real-world use of a recording studio. Inherently, mixing and mastering cannot be undertaken on headphones only. It is also well renowned that as an industry, late night/early morning sessions are commonplace.

The results of the assessment undertaken show that noise levels received at the receiving window comply with the proposed noise emissions criteria determined following the guidance of BS4142:2014. Furthermore, it is stated that compliance with BS8233:2014 recommended internal noise levels can be maintained, with receiver windows partially open.

Guidance and Standards Referenced

The assessment refers to BS4142:2014 '*Methods for rating and assessing industrial and commercial sound*', and BS8233:2014 '*Guidance on sound insulation and noise reduction for buildings*'. BS4142 is the standard used to define the likelihood and severity of impact on existing noise sensitive receivers as a result of newly introduced industrial noise sources. These can include fixed mechanical plant, factories, or similar industry.

BS8233:2014 is a useful standard in specification for internal acoustics, as it provides guidance on many aspects of sound insulation and performance targets. The standard provides guidance on internal noise levels for resting conditions in residential properties, which have been referenced in the report currently under review. The noise levels stated though only strictly apply to noise received from anonymous external sources, such as road traffic noise. Specific noise sources, or those which are easily identifiable as a disturbance may require lower targets in order to ensure that disturbance is minimised.

Technical Aspects and Discrepancies

While the report generally addresses its purpose in a competent manner, there are a number of technical issues which should be addressed. These directly affect the stated outcome of the assessment.

Calculations

Appendix B, which shows calculations undertaken for noise breakout, follows standard practice in terms of the calculation procedure. This however states a 'measured sound reduction index of facade', defined for the calculation with a spectral sound reduction index. There is however no indication of the origin for these

values, as the report body refers to calculated performance of the glazed and non-glazed elements, neither of which correlate to the values used in the calculation.

This point does not necessarily impact the assessment in a negative aspect, as the calculated performance of the various elements substantially exceeds the 'measured' values presented. If measurements of the external building fabric have been undertaken however, then the methodology and findings of these measurements should be included in the report for clarity.

Assuming for this purpose that the closest noise sensitive receiver is indeed 4m away from the studio window, the correction applied for distance in this instance is not suitable. The correction has been applied considering the source of breakout as a single point source, ie. A correction of $20 \cdot \log(R1/R2)$. In this instance however, as the breakout surface is substantially larger than the distance to the receiver, a more representative propagation correction would be to consider the source as a broad surface. For the purposes of estimation, this would be considered between a point source propagation ($20 \cdot \log(R1/R2)$), and a line source propagation ($10 \cdot \log(R1/R2)$). The resulting impact of this is that the propagation correction is likely to be overestimated in this instance by a margin of 3-6dB.

This would result in a rating noise level of at least 48dB(A) at the noise sensitive window located 4m from the studio windows, including the penalties applied for BS4142 according to the original assessment.

Corrections According to BS4142:2014.

Considering BS4142 as the most relevant standard to assess noise disturbance in this instance in the absence of further guidance, a number of corrections may be applied as penalties when considering the characteristics of the received sound. As correctly identified in the report, these penalties apply for audible tonality, impulsivity, intermittency, and distinctiveness. There appears to be some typographical error, or misunderstanding of the corrections to be applied in this instance, as it is stated that '*maximum penalty of 3dB for tonality has been applied in order to present a robust assessment*', while it is stated that the maximum penalty for tonality to be applied is 6dB.

Tonality can be defined where a noise source exhibits octave band noise levels 6dB greater than neighbouring octave bands. The level of correction applied is then dependant on the audibility of the received characteristic.

In this case, the received noise level exhibits moderate low frequency tonality once propagated to the receiver. A penalty of 2dB would be appropriate for this characteristic.

Additional penalties should however be added, for example, 3dB for distinctiveness, and 3dB for intermittency. This would be justified in this instance as the noise source is inherently not continuous, and would be audible as a new noise source to the area.

The resulting impact of the above would be summarised as follows.

Specific noise level predicted at window 4m from source: 45dB(A)

Rating level defined by specific noise level + penalties for BS4142 characteristics: $45+2+3+3 = 53\text{dB(A)}$

Noise break-in via open windows

Noise break-in has been estimated based on a correction of 15dB across all frequency bands for a partially open window. The resulting value has been compared with internal resting noise levels recommended in BS8233:2014 of 30dB(A) for night-time resting conditions.

The industry accepted correction for estimation of noise reduction offered by a partially open window is 10-15dB, as opposed to the 15dB stated. This helps to account for variations in aperture created by the open window, and should be considered in any robust assessment.

Without this correction considered, the internal noise levels would be predicted to be at least 38dB(A) according to the corrected Appendix B calculation. With the additional 5dB in consideration, noise levels received in the receiving space would be **38-43dB(A)** with windows partially open, substantially exceeding the internal noise levels recommended for resting conditions according to BS8233:2014.

Limitations of Assessment, and Additional Study Required

The main element missing from the current assessment is any consideration of the party wall between the mixing/control room and the neighbouring residence.

While it is stated that noise levels would be lower in the control room than in the live room, no noise limits have been defined for this space, and no study has been undertaken to predict noise levels received through the party wall.

In order to robustly assess the likelihood and severity of disturbance to the neighbouring receivers, a sound insulation test of the party wall should be undertaken. This should then inform the specification of remedial measures to the party wall, and the specification of a sound limiter to be installed in the control room space, which should be secured in a tamper proof casing to ensure that noise levels do not exceed those likely to cause disturbance.

We trust that the above information is sufficient with regards to answering the key issues raised.

Yours sincerely,

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