

APPENDIX B:

ACOUSTIC REPORT ADDENDUM

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Kenavon Drive, Reading
Stage 3 Acoustic Report Addendum
May 2019



Notice

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1 Introduction

MLM Acoustics has been commissioned by Berkeley Homes to provide an Addendum to Report reference MS/101307/MS/R2 Rev04 Stage 3 Acoustic Report, issued April 2017.

This Report firstly sets the relevant sound criteria and requirements that will need to be met by the future development.

Then the Report assesses the suitability of the site for residential development based on the current development proposals and the measured sound levels.

Whilst every effort has been made to ensure that this Report is easily understood, it is technical in nature; a Glossary of Terms in Appendix A is included to assist the reader.

2 Policy and Assessment Methodology

2.1 British Standard 8233

BS 8233:2014 *Guidance on Sound Insulation and Noise Reduction for Buildings* sets out the principles for planning and design in terms of noise. The proposed sequence of stages is:

- Assess the site, identify significant existing and potential noise sources, measure or estimate noise levels, and evaluate layout options;
- Determine design noise levels for spaces in and around the building(s);
- Determine sound insulation requirements, including the ventilation strategy;
- Identify internal sound insulation requirements;
- Identify and design appropriate noise control measures; and
- Establish quality control and ensure good quality workmanship.

It goes on to recommend that for noise sources outside the building, the initial appraisal should take account of the options for:

- Location of the site in relation to the noise source(s);
- Reduction of noise at source;
- Positioning of the buildings on site;
- Orientation of buildings on site;
- Provision of barriers;
- Increasing the sound insulation of the building envelope; and
- Re-planning the interior of the building.

BS 8233:2014 draws on the results of research and experience to provide information on achieving internal acoustic environments appropriate to their functions. The guideline values provided are in terms of an average (L_{Aeq}) level.

The standard advises that, for steady external noise sources, it is desirable for internal ambient noise levels to not exceed the guidance values, as detailed below in Table 1.

Table 1: BS8233:2014 Indoor Ambient Noise Levels

Activity	Location	07:00 to 23:99	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

BS8233:2014 goes on to suggest that where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions will still be achieved.

With regard to maximum noise levels, the standard identifies that regular individual noise events (such as passing trains or scheduled aircraft etc) can cause sleep disturbance. The standard does not provide a guideline design target, but simply goes on to suggest that a guideline value may be set in terms of SEL or $L_{Amax,F}$, depending upon the character and number of events per night. It goes on to suggest that more sporadic noise events could require separate values

In respect of external noise levels, the guidance in BS8233:2014 suggests that *“it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments”*. Accordingly, the design criteria adopted for this assessment will ensure that noise within external amenity areas will be adequately controlled.

BS8233:2014 provides a much more detailed narrative on noise levels in external amenity areas and acknowledges that it may not always be necessary or feasible to ensure that noise levels remain within these guideline values.

In respect of gardens and patios, BS8233:2014 states; *“however, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited”*.

In respect of balconies, roof gardens and terraces, BS8233:2014 states, *“Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses; however, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space”*.

It is clear from the narrative of BS8233:2014, that proposed development within noisy environments should be designed to ensure that the recommended internal design standards are achieved, and that noise levels in external amenity areas are designed to effectively control and reduce noise levels, although it acknowledges that in certain circumstance meeting the external design recommendations may not be feasible, or necessary, especially where the provision of such spaces is desirable for other technical, planning or policy reasons.

Based on the above, the following internal noise level criteria have been adopted for this assessment, which will ensure no adverse impact:

Table 1: Indoor Ambient Noise Levels		
Location	Time	Indoor ambient noise level L_{Aeq} , dB
Living Rooms	07:00–23:00 hours	35 dB L_{Aeq}
Bedrooms	07:00–23:00 hours	35 dB L_{Aeq}
	23:00–07:00 hours	35 dB L_{Aeq}
	and no more than 15 events exceeding	45 dB L_{Amax}
Dining Rooms	07:00–23:00 hours	40 dB L_{Aeq}
External Living Areas	07:00–23:00 hours	55 dB L_{Aeq}

3 Site Description and Development Proposals

The proposed development site is currently used as a retail park located at Kenavon Drive, Reading. The proposed site is bounded by Kenavon Drive to the North, Forbury Road (A329) to the West, the River Kennet to the South and an existing residential development to the East.

Beyond the River Kennet to the south is a commercial development comprising office uses. Beyond Forbury Road is Reading Prison and Young Offenders Institution. To the north of the site is Forbury Retail Park.

Kenavon Road is a no-through road which leads to a residential area. Forbury Road (A329) is a busy urban road which forms part of the Reading Ring road system.

The Great Western Railway is located 120m to the North of the site and is largely shielded by existing buildings.

The location of the proposed development site is identified in Figure 1.

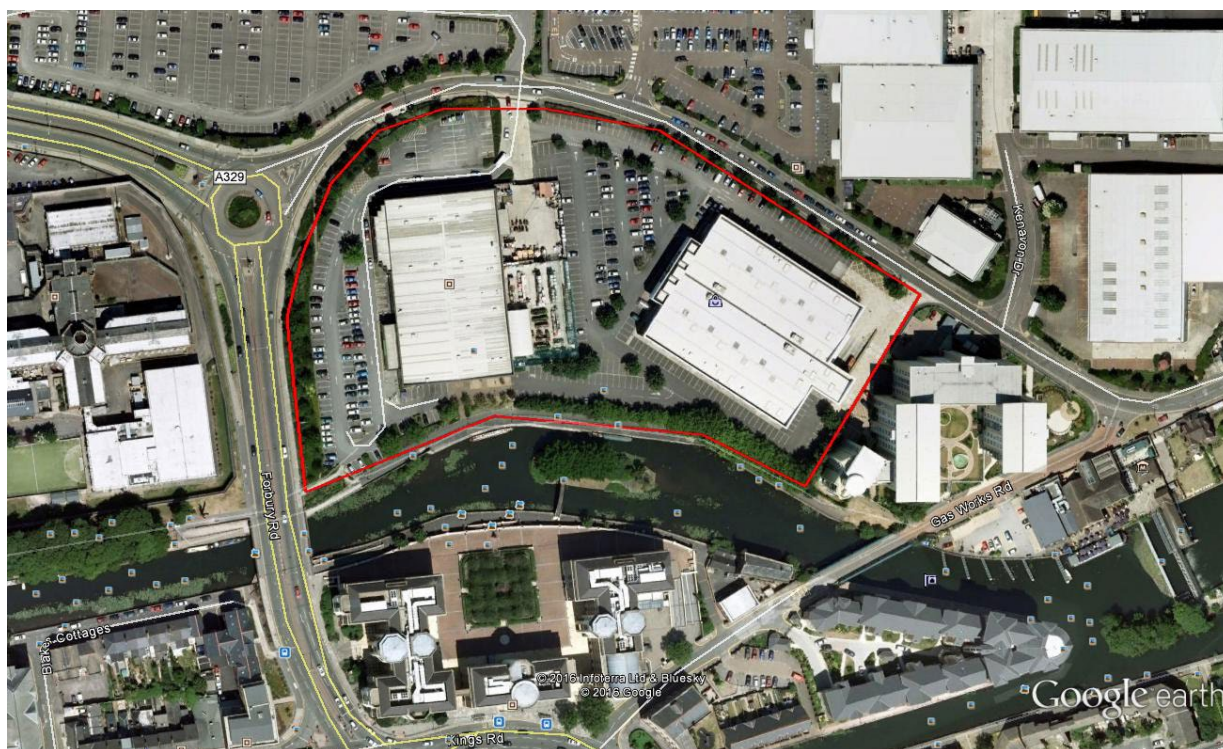


Figure 1: Site Plan

It is proposed to develop the site into 795 residential units with 1,384.6m² of commercial floor space, as depicted in Figure 2.



Figure 2 – Proposed Site Layout

The sound climate at the development site is dominated by road traffic movements along the nearby Forbury Road. It should be noted that traffic sound is much quieter during the night-time period, when traffic flows on Forbury Road are much lower. Traffic flows on Kenavon Drive are currently very low.

The nearest noise sensitive receivers are the residential properties located adjacent to the proposed development site, on the eastern boundary.

4 Acoustic Assessment of Residential Amenity

4.1 Acoustic Modelling

A 3D acoustic modelling exercise has been undertaken, based on the updated site plans and calibrated to the noise survey data. A plan view of the model is shown below:

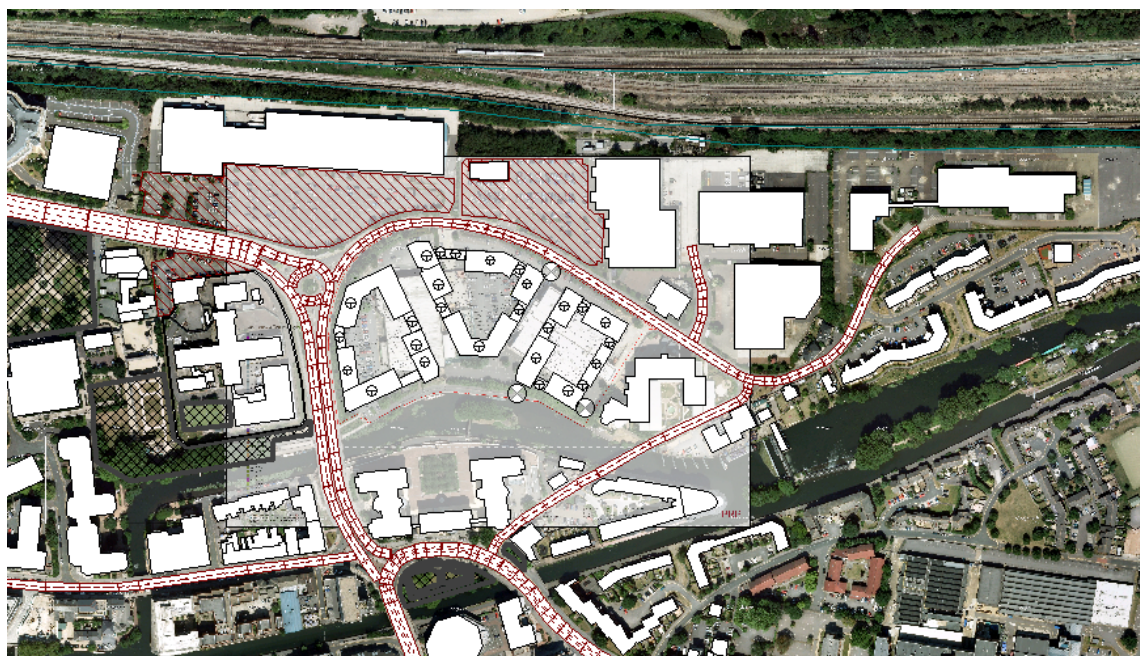


Figure 4 – Acoustic Model Layout

The modelling considers noise from the surrounding roads, railway and commercial activities. In order to calibrate the model, the output values have been compared with the survey data. For clarity, the comparison is presented below:

Table 8: Sound survey measurements & calibrated model values			
Position (see figure 3)	Period	Measured $L_{Aeq,16hour}$ (dBA)	Model $L_{Aeq,16hour}$ (dBA)
1	Day	53	55
	Night	45	43
2	Day	54	47
	Night	45	40
3	Day	68	68
	Night	63	63
4	Day	60	60
	Night	55	55

It can be seen that there is a very good correlation between locations 3 and 4, at which the noise levels are dominated by road traffic.

A ground floor noise contour plot is provided below:

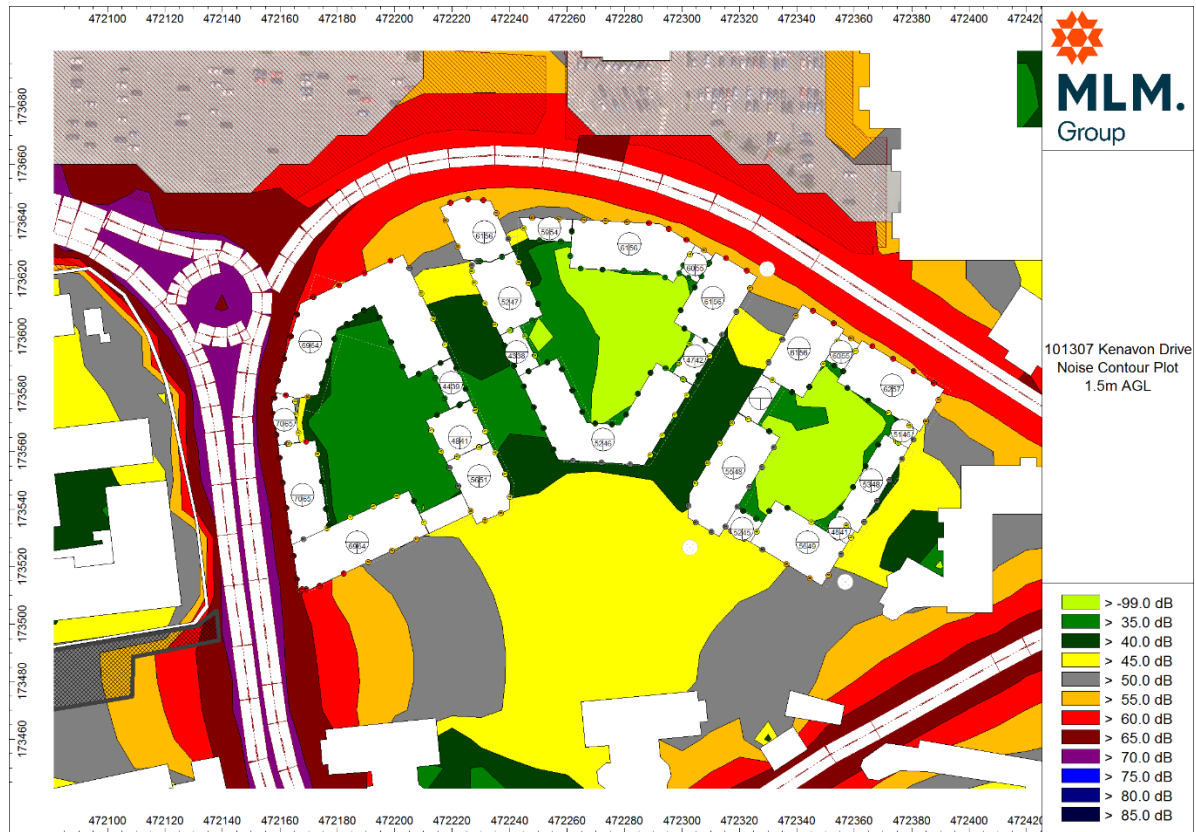


Figure 5 – Noise Contour Plot @1.5m AGL

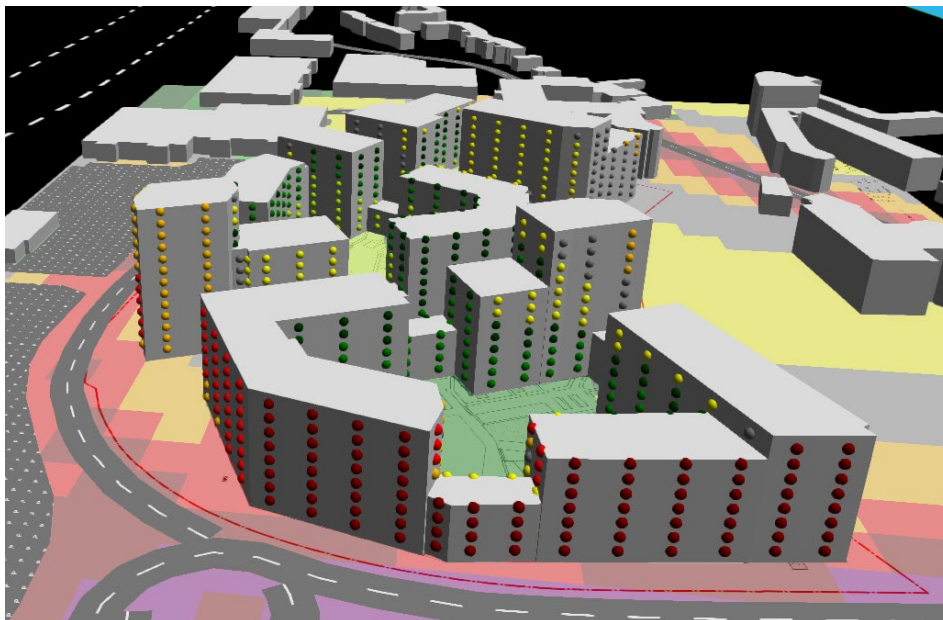


Figure 6 – View to the east

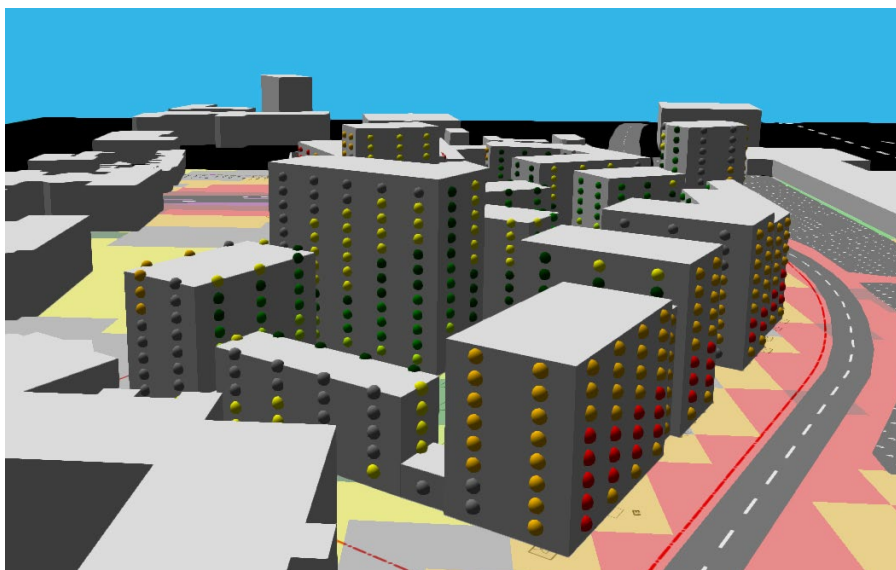


Figure 7 – View to the West

4.2 Assessment and Comments

The external sound levels on Forbury Road are high and, as such, sound control must form an integral part of the site layout. Typical worst-case façade incident sound levels are predicted to be 70 dBA during the daytime period and 65 dBA during the night-time period.

Based on these external sound levels a ventilation strategy based on the use of open windows for the majority of the year would not be suitable for properties over-looking Forbury Road and Kenavon Drive. Openable windows can be used for purge ventilation and at the resident's discretion. However, they should not need to open them for ventilation purposes. A mechanical ventilation system should therefore be considered for these facades. If additional passive ventilation is required to avoid over-heating, then this will need to be acoustically treated.

The courtyard areas of the site are subject to lower noise levels; typically less than 55 dBA during the daytime period and less than 45 dBA during the night-time period. In these areas a ventilation strategy based around openable windows and trickle vents would be acceptable.

Table 9 below sets out the generic façade (i.e. glazing/external wall/roof) and ventilation strategies for the site. For clarity and ease of understanding, these are depicted graphically in Figure 8, below.

Table 9 – Façade Zoning Requirements		
Zone	Glazing Specification dB Rw+Ctr	Typical Ventilation Type
1	39	Mechanical Ventilation with summer bypass mode. Any additional fresh air paths must be acoustically treated.
2	32	Mechanical Ventilation with summer bypass mode. Any additional fresh air paths must be acoustically treated.
3	27	Trickle Vents and Openable Windows



Figure 8 – Façade Zones

The proposed external wall constructions are understood to be as follows:

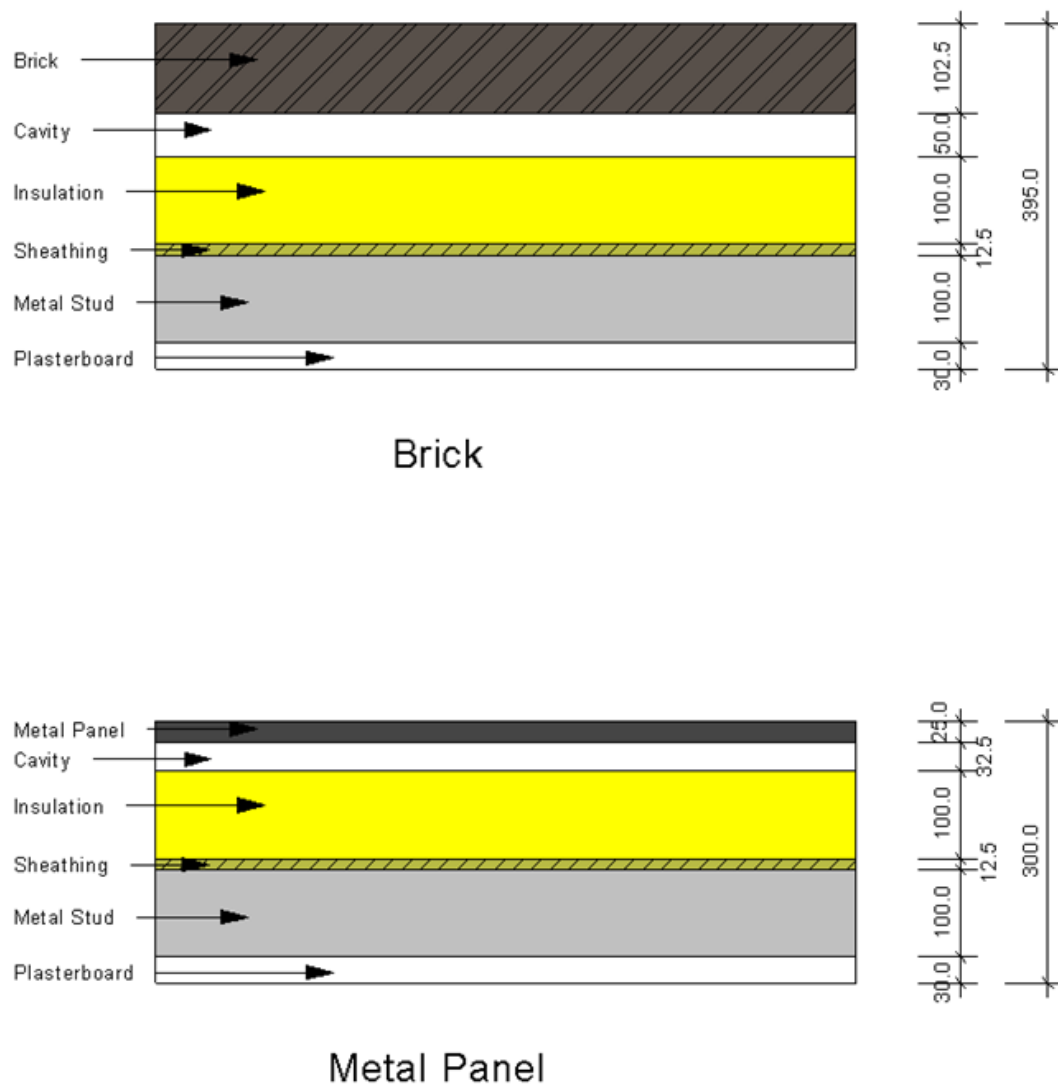


Figure 9 – Proposed External Wall Constructions

Both wall types are expected to achieve in excess of 40 dB $R_w + C_{tr}$. However, the metal clad system will exhibit a lower performance at 63 Hz and, therefore, should not be used in treatment zone 1, without any acoustic enhancements.

5 Conclusion

MLM Acoustics has been commissioned by Berkeley Homes and L&Q to provide an Addendum to Report reference MS/101307/MS/R2 Rev04 Stage 3 Acoustic Report, issued April 2017.

In the light of the findings of this Report, it is considered that although existing sound conditions are expected to be a constraint to the residential development of this site, acoustic solutions are available which should allow, in combination with careful design, compliant dwellings.

Appendix A - Glossary of Acoustic Terminology

Wording	Description
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa (20x10 ⁻⁶ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s ₁ and s ₂ is given by 20 log ₁₀ (s ₁ / s ₂). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
L _{eq,T}	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
L _{max,T}	A noise level index defined as the maximum noise level during the period T. L _{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L _{90,T}	A noise level index. The noise level exceeded for 90% of the time over the period T. L ₉₀ can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L _{10,T}	A noise level index. The noise level exceeded for 10% of the time over the period T. L ₁₀ can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.



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