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Michael Vine was the founder and operator of Airtight & Noisecheck Ltd for over 20years, during which time he undertook numerous Noise Impact Assessments Nationwide. He now owns and operates Vine Acoustics Ltd.

Client: Peter Ernest Homes Holdings Ltd
87 Redwig Road
Waterlooville
Hampshire

Site: Back to Fitness
270 London Road
Waterlooville
Hampshire
PO7 7ER

Report Date: 27th October 2025

Project: Calculating the predicted sound insulation of the separating floor between the commercial gym and dwellings above.

Written by: Mr. Michael D Vine ~ BSc Hons, Member of the Institute of Acoustics (MIOA)

The purpose of this assessment is to determine the calculated level of sound attenuation offered by the separating floor/ceiling above the gym area. The proposal is for a ground floor gym to be renovated and remain, with dwellings above. There are proposed residential dwellings above the gym. The separating floor will be upgraded to ensure the noise from the gym does not lead to an adverse impact in the dwellings above. Existing background noise levels have also been measured to offer a target point for the proposed floor/ceiling system

The building currently comprises of a gym on the 1st & 2nd floor and some storage areas on the floors above, which are vacant.

The gym's opening hours are 0500-2000hrs Monday to Friday, 0500-1100hrs on Saturday and 0800-100hrs on Sunday.



Site Location:

The proposed site is located at ground floor level and forms a part of a larger mixed-use development with the gym at ground floor levels and proposed residential located at upper floors.

The site is located close to the center of Waterloooville and thus exposed to typical levels of noise consistent with a small-Town Centre location.

Current Floor Detail:

The current separating floor detail comprises of something similar to:

1. Finished floor at first floor.
2. Timber Joists
3. Timber/plasterboard fixed to the underside
4. Tile & grid ceiling in front section of building (nothing further at rear)

All services are currently located within the ceiling, with the majority of the perimeter walls and columns also being exposed concrete.

No sound insulation test procedures have been performed on the current floor, but the internal levels were measured at 1st floor level both with and without music in operation. These are shown below.

The proposed measures to be installed are listed within this document, along with the predicted levels of sound attenuation to be offered (taken from other projects with similar separating elements installed).

Measured Noise Levels:

The table below shows the MNL measured at source, on site, and the Leq values as measured at 1st floor level (in 2 x locations, both with music in operation and not in operation). Further calculations will be included later to show the predicted levels at 1st floor once the separating details have been installed.

Event	31.5Hz	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz	LAeq
Gym - Music	83	80.8	86.1	73	65.7	71.5	68.6	58.6	52.6	76dBA
1 st floor Front - No Music	41.7	42.1	34.1	31.6	21.3	19.9	19.5	18.5	14.5	

Event	31.5Hz	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz	LAeq
Gym - Music	83	80.8	86.1	73	65.7	71.5	68.6	58.6	52.6	76dBA
1 st floor Back - No Music	40.3	35.1	34	24.8	20.4	17.7	15.8	15.7	17.7	

Using the figures in the table above, the current calculated Noise Rating (NR) within the 1st floor dwelling can be achieved. This is shown later in the report.

The table below gives an indication of the proposed internal levels at 1st floor once the new separating elements and mitigation measures being installed.

The proposed separating elements to be installed throughout the ground floor & 1st floor are:

1. Floating chipboard flooring
2. 10mm Isorubber
3. Existing floorboards
4. Timber joists with 100mm rw3 mineral wool insulation placed in between
5. 2 x 12.5mm fireline plasterboards
6. 50mm void
7. MF suspended ceiling mounted on acoustic hangers
8. 1 x DBX sand filled board
9. 1 x 15mm acoustic or fire rated plasterboards
10. MLV bonded between plasterboard
11. Tape & Jointed Finish
12. 75mm void
13. Tile & grid suspended ceiling with sound absorption ceiling tiles installed (Rokfon Koral or similar class A absorption tile)

The tile & grid ceiling will be installed throughout the building. The sound attenuation for the separating elements was taken from a sound insulation test performed on a conversion project and the separating detail included an MF suspended ceiling below the existing timber detail. It did not include the floating floor, sand filled board or the MLV so in reality the proposed system to be installed at this project should exceed these levels shown below and therefore reduce the impact even further.

Frequency	63	125	250	500	1000	2000	4000	8000	LAeq
Internal - source (Leq)	80.8	86.1	73	65.7	71.5	68.6	58.6	52.6	76dB
DnT – offered by existing floor	45	49.5	51.9	63.8	68.9	72.4	74	75	57dB (DnT,w + Ctr)
Calculated levels in dwelling	35.8	36.6	21.1	1.9	2.6	-3.8	-15.4	-22.4	22dBA

The above table indicates that the current levels within the 1st floor dwelling (based on MNL from the venue) would be 22dBA – this is an excellent internal level and well within the required levels as listed in BS8233: 2014. The table below shows the calculated NR levels for the 1st floor dwellings.

Frequency	63	125	250	500	1000	2000	4000	8000	NC/NR
Calculated Dwelling values (Leq)	35.8	36.6	21.1	1.9	2.6	-3.8	-15.4	-22.4	
Calculated NR Curve	NR18								NR18

The calculated NR18 shows that with an MNL of 76dB, the calculated levels within the 1st floor dwellings should ensure a suitable level of internal noise ingress and the MNL should not be audible within the 1st floor flats. The above values have been compared to the existing noise levels at 1st floor with no music in operation and these are shown below.

Front Section:

Frequency	63	125	250	500	1000	2000	4000	8000	L _{Aeq}
Internal (Leq) – Measured	80.8	86.1	73	65.7	71.5	68.6	58.6	52.6	76dBA
Attenuation of ceiling (dB) - measured	45	49.5	51.9	63.8	68.9	72.4	74	75	63-6 = 57dB
Predicted Dwelling Leq values	35.8	36.6	21.1	1.9	2.6	-3.8	-15.4	-22.4	22dBA
Measured BGN Levels (1 st floor)	42.1	34.1	31.6	21.3	19.9	19.5	18.5	14.5	29dBA
Difference	-6.3	2.5	-10.5	-19.4	-17.3	-23.3	-33.9	-36.9	N/A

The above table concludes that the calculated internal L_{Aeq} within the dwellings will be below the current L_{Aeq} measured at 1st floor level, by -7dB. Each calculated frequency is below the background noise levels measured at source, apart from 125Hz which indicates that the level will be 2.5dB above the BGN level. This is not a big amount, but it should be reduced to be below the background noise levels.

This could be done at source, by reducing the MNL at that frequency by 3dB. Furthermore, the front section will have a further tile & grid ceiling installed below the acoustic ceiling and 2 x layers of MLV (floor & ceiling), so these additions should ensure the further reductions are achieved by the extra mitigation measures.

Rear Section:

Frequency	63	125	250	500	1000	2000	4000	8000	L _{Aeq}
Internal (Leq) – Measured	80.8	86.1	73	65.7	71.5	68.6	58.6	52.6	76dBA
Attenuation of ceiling (dB) - measured	45	49.5	51.9	63.8	68.9	72.4	74	75	63-6 = 57dB
Predicted Dwelling Leq values	35.8	36.6	21.1	1.9	2.6	-3.8	-15.4	-22.4	22dBA
Measured BGN Levels (1 st floor)	35.1	34	24.8	20.4	17.7	15.8	15.7	17.7	26dBA
Difference	-0.7	2.6	-3.7	-18.5	-15.1	-19.6	-31.1	-40.1	N/A

The above table concludes that the calculated internal L_{Aeq} within the dwellings will be below the current L_{Aeq} measured at 1st floor level, by -4dB. Each calculated frequency is below the background noise levels measured at source, apart from 125Hz which indicates that the level will be 2.6dB above the BGN level. This is not a big amount, but it should be reduced to be below the background noise levels.

The client will be installing a noise limiter to the ground floor gym, and this will be set to 70dB which is a lot less than the levels current used, so this will ensure the above criteria is achieved.

There will also be separating ceilings installed between the proposed residential dwellings

- Isorubber
- Chipboard flooring
- Timber joists with existing ceiling
- MF suspended ceiling installed throughout the development – ensure void maintained on acoustic hangers
- 60kg/m³ placed on top of MF suspended ceiling – ensuring air gap
- 2 x 15mm sound/fire plasterboard fixed to ceiling
- 2.5mm mass loaded vinyl (MLV) bonded between plasterboards
- Plaster Finish

The above system offers elevated levels of mass and isolation and should ensure prominent levels of sound reduction. The space above the MF suspended ceiling will also offer a service void for plumbing & electricity cables etc. The mass loaded vinyl is a high-performance internal vinyl system that will improve the mass of the system:

<chrome-extension://efaidnbmninnibpcapjcgicfindmkaj/https://my.assets-library.com/m/5037c4eb661522d7/original/TDS-TECSOUND-SY.pdf>

The acoustic hangers ensure elevated levels of isolation between layers:

https://www.ikoustic.co.uk/products/isolation-clips/muteclip-mp/?gad_source=1&gad_campaignid=21941725374&gbraid=0AAAAADldXRQ5LiYlwCYbXwuLvXfgn-lwS&gclid=Cj0KCQjww4TGBhCKARIsAFLXndTFkGq22L8MsqOliPCsAHANS9t7yrJl8FUdJuGn5Qc624mrFKD5dtlaAsJPEALw_wcB#tab-downloads

There will be new, dry-lined party walls built for between the co-living rooms at the rear of the development. The proposed details will be something similar to:

1. 2 x acoustic/fire rated plasterboard (recommended upgrade to bond MLV between)
2. Resilient bars
3. 38mm Timber stud with rw3 mineral wool insulation between
4. Ply fixed to back of stud
5. Cavity
6. 38mm timber studs with rw3 mineral wool insulation between
7. Resilient bars
8. 2 x acoustic/fire rated plasterboard

Acoustic sealant should be applied to each and every layer during the build. It is essential that the party wall is erected completely first from the concrete structure (above & below), the separating ceiling is then installed up to the party wall with the partitions & perimeter wall lining then being built after the ceiling has been installed.

The installation of sockets on these walls should be limited, and this is the reason for the OSB to be included. Any penetration through the party wall should be reduced.

It is advised that no dot & dab is installed at all on the project, dot & dab does not help with the acoustic performance of the building but rather can hinder it. If dot & dab walls are installed then this could increase the possibility of flanking transmission up the perimeter of the building.

Perimeter wall detail:

The possibility of flanking transmission (whereby noise travels up the perimeter of the building around the separating floor/ceiling void) should be considered. It is understood that the building needs perimeter treatment to improve the thermal performance of the building. It is essential that this is installed in the correct way, especially at the junction with the separating ceiling. It is important that the new acoustic ceiling is installed first and then the perimeter detail installed thereafter. This will ensure the acoustic ceiling offers complete separation between structures and there is not a sound transmission path up the perimeter of the building. If thermal upgrades are not required then something like the following could be implemented:

- Existing masonry detail
- Maintain Cavity
- Erect an independent wall lining with rw3 between studs
- 1 x 15mm acoustic plasterboard fixed to resilient studs
- Plaster Finish

Due to the thermal status of the building, the perimeter details may need to be amended to suit both thermal and acoustic conditions required for the building façade.

For clarity, lightweight blocks are not recommended for acoustic purposes, but it is accepted that they may be required for thermal purposes. If this is the case then further measures to the perimeter detail may be required to ensure flanking transmission is reduced.

The lower frequencies are critical when the venues play music and as such the client should ensure they adopt a strict and robust music policy and ensure they monitor the lower frequencies and reduce them wherever possible.

There are some general installation policies to follow and things to avoid:

- Avoid dot and dab completely on the build – some is mentioned on the perimeter of the building
- Ensure every hole is filled in each layer of the specification
- Completely isolate all steels
- Complete and maintain the integrity of the separating floors & walls
- When using resilient bars, use the correct length screws so you don't fix into the studs
- Avoid standard wall board
- Stagger all plasterboard joints
- Tape or seal all plasterboard joints
- Avoid spotlights if possible
- Avoid any sockets on timber party walls (if they are installed you can get either putty pads or build a box behind the sockets)
- Stagger these sockets so they are not directly back-to-back
 - Ensure all service voids are filled and isolated
- Ensure all mortar joints are completely filled
- Ensure there are no dry joints on separating elements
- Ensure all joints in every aspect of the building are sealed
- Ensure the correct diameter holes are drilled for service pipes
- Ensure these holes are then filled.

The following list is guidance on the products to use to try and improve sound attenuation at the site.

- Insulation - Rockwool RW3 mineral wool slab insulation is 60kg/m³ and is 1200x600mm slabs with varying thickness, ensure the insulation doesn't encounter the original ceiling.
- Fireline/Acoustic plasterboard (15mm fireline/soundbloc plasterboard) - British Gypsum
- British Gypsum resilient bars
- Acoustic and fire sealant, this should be used on all holes and gaps
- Ensure all trades understand the importance of correct workmanship and they take care when laying every layer
- Ensure the correct length screws are used when fixing plasterboard to resilient bars, it is essential that they only fix into the bars and not through the bars into the joists or studs.
- Ensure the insulation covers every inch of the ceiling or wall void assuring complete separation
- Ensure the leaves of the party walls do not touch one another
- Ensure flexible closers are fixed into cavities with perimeter walls.

It is essential that the separating elements are installed in the correct manner and at the correct time.

The following should apply:

1. Install the separating (party) walls first so that will create separation between the rooms both horizontally and vertically – between the building structures (and especially between floor joists)
2. Install the separating ceiling throughout the dwellings & communal space
3. Install internal partitions to the underside of the acoustic ceiling
4. Install any wall linings to perimeter of building once the separating acoustic ceiling has been installed so complete separation can be achieved.

Steel Encasement:

If there are any steels present or to be introduced, then these need to be properly isolated and none of the encasement should contact the steel. This will reduce the sound transmission path through the steel and the structure beyond. A system like the suspended ceiling detail will be required, it is essential that the steels are insulated and then encased, ensuring the encasement does not contact the steel at all.

New Partitions:

If there are to be any new partitions installed then these should be installed after the acoustic ceilings have been installed, this will ensure complete separation between the partitions and existing ceiling and will also reduce the possibility of structure borne sound transmission through the building elements. The purpose of the acoustic ceiling is to offer complete separation between structures to improve sound attenuation.

Conclusion:

The level and standard of workmanship when installing these elements is essential to achieving the highest possible level of sound attenuation and great care and attention should be taken when installing these systems.

The workmanship must be of a high standard on this development, and it is essential that every aspect of sound transmission is observed, understood, and treated. It is essential that the party walls get built first to ensure acoustic & fire separation (especially between and around the separating floor joists – if any) (not applicable in this development), then the ceilings get built into the party walls and existing perimeter details, then the internal partitions and perimeter internal wall linings get built to the underside of the ceiling to ensure separation between structures. The perimeter details are included to reduce the possibility of flanking transmission.

The ceiling systems at ground floor level are paramount to the project and sound insulation testing will be required to indicate the final performance of the separating ceiling detail. The addition to the possible acoustic floor deck, MLV and acoustic hangers will aid the performance.

Isolation and mass are key elements of this project and great care must also be applied to the perimeter as well as the direct transmission routes. Lightweight blocks should be avoided during construction (if not then upgrades required). Dot & dabbed plasterboard often increases the possibility of flanking transmission and therefore it is recommended that this detail is not used at any point of the development.

The recommended systems have been assessed numerous times and achieve prominent levels of attenuation. However, due to the thermal demands of the building some acoustic materials will not be installed and thus the importance of the sound transmission paths become even more important. There are a possibility of lightweight/more streamlined systems and the fact that the building is listed. Such measures and constraints may not offer prominent levels of sound attenuation so great care and attention must be adopted in these cases.

It is essential that wherever possible prominent levels of mass and isolation are applied to the systems, this may be difficult in some areas, but great care and attention must be adopted on site. The workmanship of each element is essential in getting the best results and all aspects must be inspected and the integrity maintained throughout the build process.

This document includes some systems that offer prominent levels of sound attenuation and some recommendations from an acoustic standpoint.

This document & guidance design is based on experience of these systems and previous sites. Vine Acoustics does not accept any responsibility for any failed testing upon completion of works.

