

Acoustic South East

Design Review



Client:	Moretons Investments
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1 Summary and Conclusion

Acoustic Southeast has been instructed to assess the acoustic design relating to the proposed development. The acoustic design review will consider the following areas:

- Planning condition and Building Regulation sound insulation levels
- Separating floors/walls within the proposed development
- Planning condition and BS8233 indoor Sound levels

The development layout details can be found below

- Ground Floor
 - Commercial Unit
- 1st Floor
 - 4 Residential flats

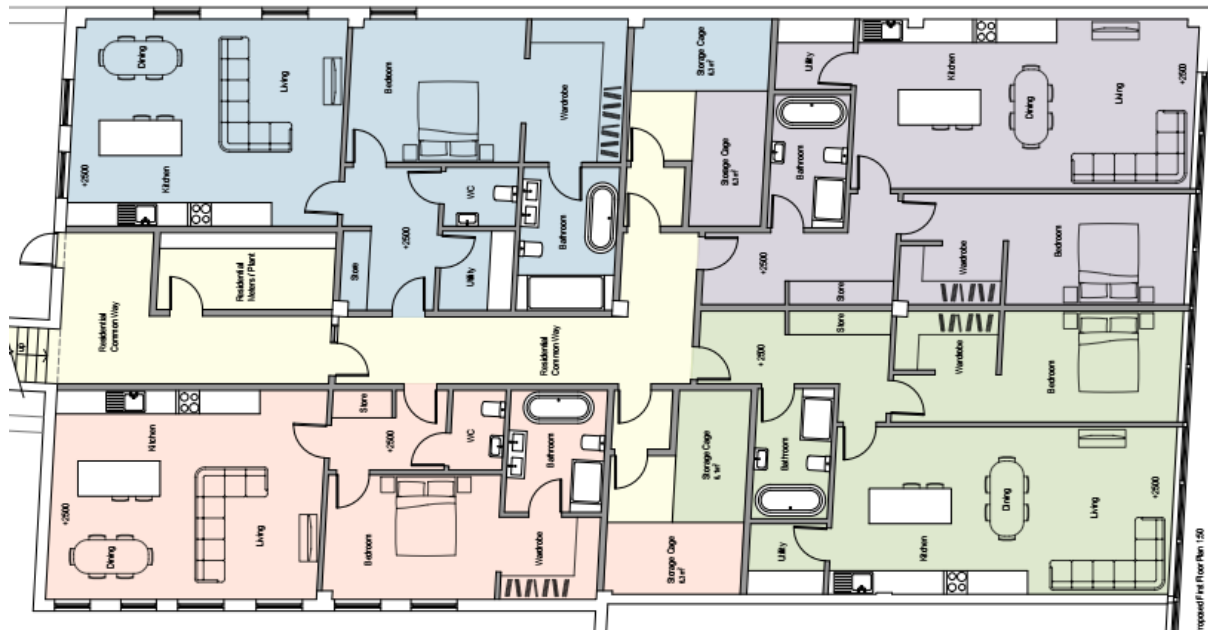


Figure 1: Layout

If recommendations in this report are followed to a good standard of workmanship the separating walls/floors should achieve the sound insulation criteria for conversion property.

It should be noted that if the products are not installed to the manufacturer's specification it can not be certain that the designs for the party floor/wall constructions will meet with the current building regulations regarding the passage of sound.

The advice has been provided in good faith to help with the development's sound insulation but no responsibility can be taken for the structural integrity of the design or for any specific levels of sound insulation achieved. The details in the report, which have been generated in terms of acoustic issues. The details should also be checked by the building control officer and other consultants (Structural engineer, fire safety consultant etc.)

2 Planning Conditions

The 1st floor apartments have gained planning approval with the following condition that relates to sound insulation:

Condition 3 – The use hereby permitted shall not commence unless and until an insulation scheme for protecting the upper floor residential units from noise has been submitted to and approved by the local planning authority. The scheme shall achieve a minimum airborne sound insulation value of 50dB (DnTw + Ctr dB) for all floors, have regard to the principles contained within the World Health Organisation community noise guidelines and ensure the standards within Table 4 of BS8233:2014 are achieved in the residential units above. Following approval and implementation of the scheme, a test for compliance shall be undertaken. All works, which form part of the approved scheme, shall be completed before the use commences.

3 Building Regulations Criteria

3.1 ADE E1 Criteria

Approved Document E of the Building Regulations (2003 Edition) specifies minimum performance values of Weighted Standardised Level Difference (DnT,w + Ctr) for airborne noise transmission through party floors and walls and Weighted Standardised Sound Pressure Level (L'nT,w) for impact sound transmission through a floor.

It should be noted that with airborne sound insulation it is the level difference that is being measured between rooms and the higher the result the better the insulation. With impact sound insulation it is the actual sound pressure level in the receiving room that is measured, and therefore the lower results, the better the insulation.

A summary of the acoustic requirements, for the conversion property, are as follows:

Requirements of:	Element	Airborne Sound Insulation (DnT,w + Ctr)	Impact Sound Insulation (LnT,w)
Commercial/Dwelling*	Floor	≥50dB	N/A
Bregs Dwelling/Dwelling	Wall	≥43dB	N/A

Figure 2: Building Regulations Noise Criteria

* The criteria is as detailed in planning condition 3

3.2 BS8233 Noise Criteria

Table 5 of BS8233 provides the following guideline values:

Activity	Location	Time period of day	
		07:00-23:00	23:00-07:00
Resting	Living Rooms	35dB L _{Aeq,16hour}	-
Dining	Dining Room/Area	40dB L _{Aeq,16hour}	-
Sleeping (daytime resting)	Bedroom	35dB L _{Aeq,16hour}	30dB L _{Aeq,8hour}

Table 1: BS8233 Criteria

4 Separating Floors

4.1 Commercial – 1st Floor – Main Detail

The majority of the floor area is an existing concrete slab (around 200mm min.). As ceiling heights are sufficient the best option for upgrading the floors is for a metal furring (MF) grid ceiling system to be installed. British Gypsum's "Casoline" system would be suitable although others are available:

- Any floor finish (impact sound insulation not required as commercial area on lower floor)
- Existing concrete slab
- MF ceiling
- 50-100mm Insulation
- 15mm Wallboard or 2x12.5mm Wallboard

Additional or upgraded linings and insulation may be required for thermal and/or fire safety. In terms of acoustics 50mm of Rockwool or mineral wool insulation would be required.

4.2 Commercial – 1st Floor – Infill Detail

At the rear of the building is an opening in the concrete floor slab:



Figure 3: Slab Opening

It is recommended that the timber joists (if retained) are infilled with 100mm of mineral fibre and over-boarded with 2x 12.5mm Soundbloc or Fireline. An independent frame should then be constructed that is also filled with 100mm of mineral fibre and lined with 2x 12.5mm Soundbloc or Fireline (before the main MF ceiling is completed):

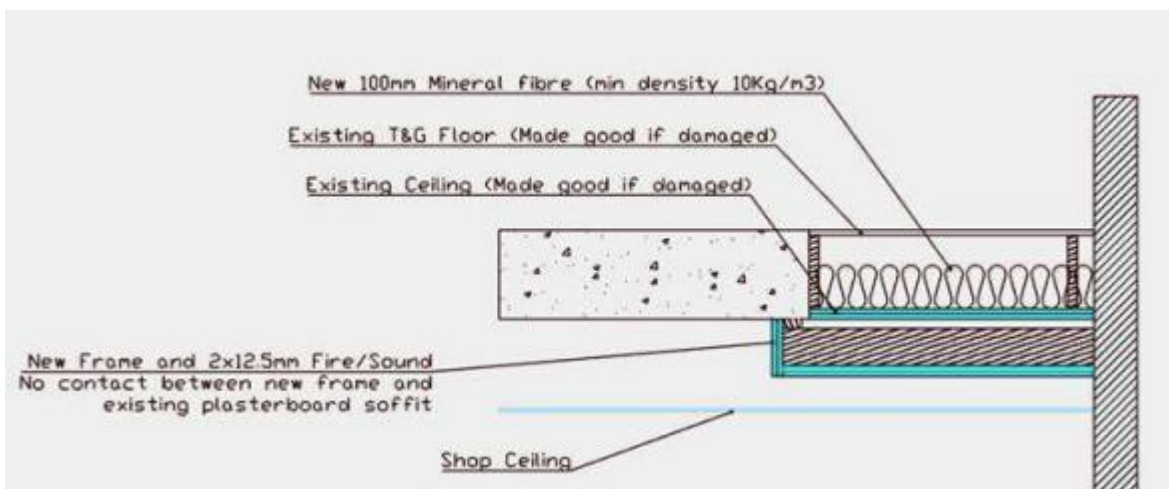


Figure 4: Infill Detail

5 Party Walls

Ideally a double frame wall should be installed between the separate dwellings and between the dwellings and the common parts of the building::

- 2x12.5mm or 2x15mm Soundbloc
- Timber/metal frame
- 10mm Min Void (no connection between frames)
- Timber/metal frame
- 50mm Mineral fibre or Rockwool
- 2x12.5mm or 2x15mm Soundbloc

The walls should be built up to concrete soffit. Boards should be staggered and for large services a plasterboard pattress detail should be completed. For smaller services Fire/Acoustic putty pads would be acceptable

6 Services

6.1 Existing SVPs and RWPs

At present there are existing services that pass through the concrete floor slab:



Figure 5: Existing Services

The services should be lagged with 25-50mm mineral wool and then be boxed in with 2 layers of plasterboard (prior to the installation of the MF ceiling).

If any services are removed the hole in the slab should be filled in with concrete (possibly with ply to support the infill area)

6.2 Services Generic Advice

In general it would be better to route soil pipes on the outside of the building. However it is understood that this may not be possible in this case. The following applies to any services that pass from one floor to another or that pass through a separating wall.

- Pipes and ducts that penetrate a floor separating habitable rooms in different flats should be enclosed for their full height in each flat. The enclosure should be constructed of two layers of board material having a combined mass per unit area of at least 16kg/m². (2x12.5mm plasterboard)
- Either line the enclosure, or wrap the duct or pipe within the enclosure, with 25 mm unfaced mineral wool.
- Soil pipes should be fixed to the masonry wall with a resilient material between the pipe and collar support bracket.

7 Indoor Sound Level Assessments

7.1 External Sound Level

For this initial assessment sound levels from previous Montague street projects have been used (the levels were averages for three separate multi-day surveys. The levels across the three locations are fairly similar):

Building No.	Day	Night
100-108	57	50
30	55	48
22	56	45
Ave:	56	48

Figure 6: Montague Street Sound Surveys

It is assumed that the sound level at the rear of the property will be at a similar level or lower. There are existing heat pumps at the rear of the adjacent building as shown below:



Figure 7: Existing Plant

Assuming the units are at the higher end of the noise level range would result in a sound power level of around 70dBA. The closer units are around 8m from room windows with the further units being around 10m away. Ignoring barrier attenuation, but adding a 3dB correction for reflections) results in a total sound level of around 49dBA. As these are AC units (not cellar coolers) they will likely only operate during the day. The predicted level should be below the existing environmental sound levels.

7.2 Condition Criteria

The planning condition does not contain specific numbers but does state that “*ensure the standards within Table 4 of BS8233:2014 are achieved*” Based on Table 4 of BS8233/WHO the maximum internal noise level for each area is as follows:

- Bedrooms ≤35/30dBA Day/Night (Inside)
- Lounges ≤35dBA Day (Inside)

7.3 Required Sound Reduction

In order for the BS8233 and WHO criteria to be achieved the building envelope will have to achieve the following levels of sound insulation (SRI). For the L_{Amax} SRI the sound reduction is based on achieving an average of no more than 10 events over 45dBA per night (ProPG criteria). The required sound reduction levels are detailed in the table below:

Room	Ext level dBA Day/Night	Required Sound Reduction	
		07:00-23:00	23:00-07:00
Lounge	56	21	-
Bedroom	56/48	21	18

Figure 8: Required Sound Reduction

7.4 Mitigation Measures

As this report has been completed at an early stage only generic mitigation measures have been recommended. During the detailed design phase specific measures will be incorporated into the design so the criteria can be achieved. To help with specifying the mitigation measures the following table has been copied from the AVOG guide. The table estimates the sound façade reduction values for different glazing and ventilation scenarios:

Table B-2 Potential level differences associated with different ventilation Systems from ADF

Ventilation System from ADF	Cont. equiv. (L _{Aeq}) or events (L _{AFmax})	Level Difference, external free field level – internal reverberant level, dB	
		Typical windows and vent	Higher acoustic performance windows and vent
1, 2	L _{Aeq}	21	31
	L _{AFmax}	22	35
3 (with trickle vent)	L _{Aeq}	23	33
	L _{AFmax}	24	38
4 (no trickle vent)	L _{Aeq}	27	38
	L _{AFmax}	31	45

Figure 9: AVOG Table B2

7.5 Glazing & Ventilation

For the bedrooms and lounges facing onto Montague Street, in order to achieve the levels in table 5 above, secondary glazing may need to be installed (As it is understood that the existing single glazed windows will be retained).

For the rear façade the maximum sound reduction required is only 21dB. Based on the AVOG table standard double glazing should be acceptable (existing windows could be retained or modified so the R_w+C_{tr} achieves at least 31dB).

7.6 Testing

Before the units are occupied it is understood that an indoor survey will be required based on the wording of the condition:

Following approval and implementation of the scheme, a test for compliance shall be undertaken. All works, which form part of the approved scheme, shall be completed before the use commences.