

Acoustics Report

YA201.D1

Whitehouse Club (ancillary
apartment unit)

193 Middleton Rd
Crumpsall
Manchester
M8 4JZ

Manchester, UK

Version 2.0

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21/02/22	Report updated to include details regarding flanking transmission (see Section 5)	LP

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Acronyms

ADE Approved Document E. [8](#), [12](#), [20](#), [21](#), [22](#), [25](#)

ADF Approved Document F. [10](#)

AVO Acoustics Ventilation And Overheating. [10](#), [11](#), [15](#), [16](#), [17](#), [18](#)

DEFRA Department for Environment, Food and Rural Affairs. [10](#)

IANLs Internal Ambient Noise Levels. [8](#), [10](#), [15](#), [16](#), [17](#), [18](#)

LOAEL Lowest Observed Adverse Effect Level. [9](#), [10](#)

NPPF National Planning Policy Framework. [9](#)

NPSE Noise Policy Statement for England. [9](#)

ProPG Professional Practice Guidance on Planning & Noise. [8](#), [9](#), [10](#)

SOAEL Significant Observed Adverse Effect Level. [10](#), [11](#)

SWL Sound Power Level. [13](#)

Glossary

$\Delta_{R,w}$ **weighted sound reduction improvement index** - single number value determined by the difference between the weighted sound pressure levels derived with a reference floor or wall without and with a covering or lining, over a range of frequencies (obtained in an acoustics laboratory). [20](#)

C_{tr} **correction term** applied against the sound insulation single-number values (R_w , D_w , and $D_{nT,w}$) to provide a weighting against low frequency performance. [12](#), [16](#), [17](#), [19](#), [20](#), [21](#)

$D_{n,f,w}$ **weighted flanking normalized level difference** - single-number quantity which characterizes the difference in sound pressure levels produced in two rooms by one or more sound sources in one of them, via a specific transmission path, over a range of frequencies. [21](#)

$D_{nT,w}$ **weighted standardized level difference** - single-number quantity that characterizes the difference in sound pressure levels produced in two rooms by one or more sound sources in one of them, corresponding to a reference value of the reverberation time in the receiving room, over a range of frequencies. [12](#)

L_{Aeq} **equivalent A-weighted sound pressure level** - value of the A-weighted sound pressure level in decibels (dB) of a steady sound that has the same mean-squared sound pressure as the sound under consideration that varies with time. [9](#), [16](#), [17](#), [18](#)

$L_{Aeq,16hr}$ **equivalent A-weighted continuous sound pressure level** - value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within the period 07:00-23:00 hours has the same mean-squared sound pressure as the sound under consideration that varies with time. [9](#), [10](#), [14](#), [16](#), [17](#)

$L_{Aeq,8hr}$ **equivalent A-weighted continuous sound pressure level** - value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within the period 23:00-07:00 hours has the same mean-squared sound pressure as the sound under consideration that varies with time. [9](#), [14](#), [17](#)

$L_{Aeq,T}$ **equivalent A-weighted continuous sound pressure level** - value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that,

within a specified time interval, T , has the same mean-squared sound pressure as the sound under consideration that varies with time. 9, 10

L_{AFmax} maximum A-weighted sound pressure level - value of the maximum A-weighted sound pressure level obtained using time-weighting “F”, during a specified time interval. 9, 10, 11, 17

$L'_{nT,w}$ weighted standardized impact sound pressure level - single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies. 12

R_w weighted sound reduction index - single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. 12, 16, 17, 19, 21, 22

RT reverberation time - time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped. 15

1 Introduction

A social club (Use Class D1) with an ancillary residential apartment is proposed at 193 Middleton Rd, Crumpsall, Manchester M8 4JZ.

YAcoustics Ltd has been commissioned to provide design advice for the proposed ancillary apartment unit, in line with the requirements of building regulations [Approved Document E \(ADE\)](#) [4] for sound insulation and the [Professional Practice Guidance on Planning & Noise \(ProPG\)](#) [11] for [Internal Ambient Noise Levels \(IANLs\)](#).

Suitable design solutions and recommendations have been provided accordingly.

Figure 1 shows the site location and Annex B shows the proposed architectural layout.



Figure 1 – Proposed development location

2 Planning policy and relevant criteria

2.1 ProPG guidance

The [ProPG](#) [11] sets out criteria and guidelines for noise management concerning new residential development.

The document provides noise level limits for internal and external amenity areas that are an intrinsic part of the overall design.

These limits are in line with what the [Noise Policy Statement for England \(NPSE\)](#) [3] identifies as the [Lowest Observed Adverse Effect Level \(LOAEL\)](#) and as such it is considered that by meeting these targets the aims of the [National Planning Policy Framework \(NPPF\)](#) [12] and the [NPSE](#) [3] are achieved (see Annex A).

The relevant criteria is presented as Table 1.

Table 1 – Internal and external ambient noise levels for dwellings (sources: BS 8233:2014 and ProPG:2017)

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dinning	Dinning room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (day-time resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$
			45 ¹ dB L_{AFmax}
Leisure	Gardens and balconies	50 – 55 ² $L_{Aeq,T}$	

Note: The presented noise limits relate to steady external noise sources.

1: In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB L_{AFmax} more than 10 times a night.

2: External noise level should not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments.

Section 2.27 of the [ProPG](#) states the following: "Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as “*unacceptable*” by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing “*unacceptable*” noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form."

As such, [IANLs](#) more than 10 dB above the daytime and night-time values in Table 1 are identified as the [Significant Observed Adverse Effect Level \(SOAEL\)](#).

Appendix A of the [ProPG](#) states the following: "it can be concluded that at night (23:00 to 07:00 hrs) a significant effect on sleep disturbance e.g. behavioural awakening, is likely to occur where the maximum sound level at the façade of a building **with partially open windows** is above:

- 85 dB L_{AFmax} (where the number of events exceeding this value is ≤ 20); or
- 80 dB L_{AFmax} (where the number of events exceeding this value is > 20)."

The above L_{AFmax} values and number of events are therefore identified as the [SOAEL](#) where windows are partially open.

Regarding external amenity areas, the 50 dB $L_{Aeq,T}$ limit identified in BS 8233 [6] is considered to be the [LOAEL](#) and the 66 dB $L_{Aeq,16hr}$ limit identified in the [Department for Environment, Food and Rural Affairs \(DEFRA\)](#) [7] guidance is considered to be the [SOAEL](#).

2.2 AVO guidance

Section 2.4 of [ProPG](#) refers to the importance of providing a thermal comfort/cooling strategy to reduce potential impacts of noise on future occupants of a new residential development.

The [Acoustics Ventilation And Overheating \(AVO\)](#) guide [14] is intended to demonstrate good acoustics design as described in the [ProPG](#), when considering [IANLs](#) guidelines.

The document suggests that the desirable [IANLs](#) as shown in Table 1 should be achieved when providing adequate ventilation as defined by [Approved Document F \(ADF\)](#) [5] whole dwelling ventilation.

However, it considers reasonable to allow higher levels of [IANLs](#) from transport sources when higher rates of ventilation are required in relation to the **overheating condition**.

Qualitative guidance on the combined effect of [IANLs](#) and duration for the overheating situation is provided in the document.

For the purpose of this assessment, the limits for [IANLs](#) during the overheating condition, as shown in Figures 2 and 3, have been considered. The [LOAEL](#) remains the same as

identified in Table 1, and the **SOAEL** varies depending on the duration for which the overheating condition occurs.

For both the day and night-time periods the L_{AFmax} value of 65 dB is identified as the **SOAEL**.

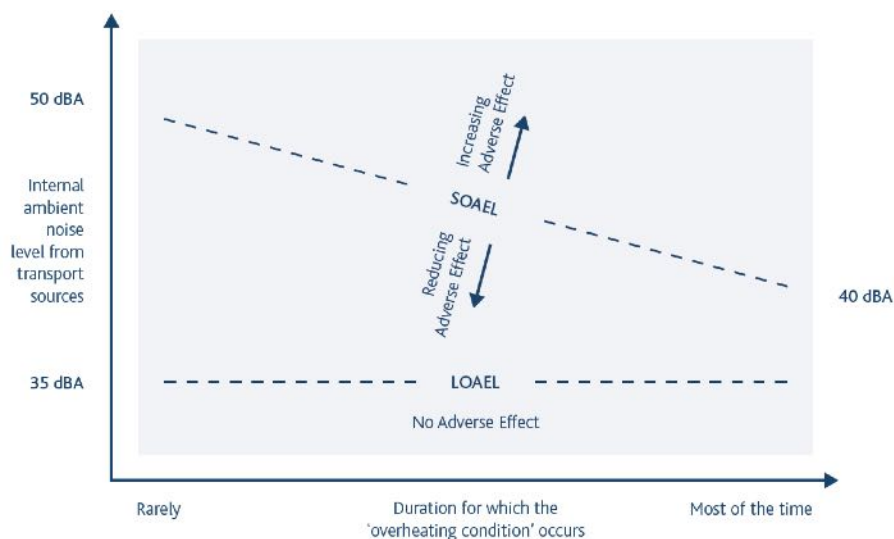


Figure 2 – **AVO** diagram indicating noise levels associated with adverse effects during the daytime

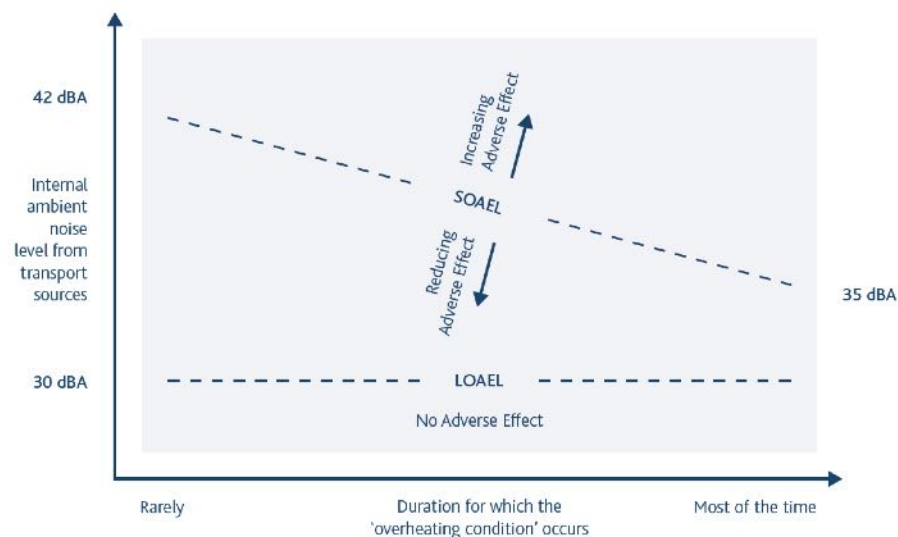


Figure 3 – **AVO** diagram indicating noise levels associated with adverse effects during the night-time

2.3 The Building Regulations - Approved Document E

For the proposed development, ADE defines criteria for the following requirements:

1. Protection against sound from other parts of the building and adjoining buildings (Requirement E1);
2. Protection against sound within a dwelling house etc (Requirement E2); and
3. Reverberation in the common internal parts of buildings containing flats or rooms for residential purposes (Requirement E3.)

The criteria stated in Tables 2 and 3 refers to Requirements E1 and E2 respectively. Regarding Requirement E3, two compliance methods are described as follows:

Method A: Cover a specified area with an absorber of an appropriate class that has been rated according to BS EN ISO 11654:1997 [2]; and

Method B: Determine the minimum amount of absorptive material using a calculation procedure in octave bands. Method B is intended only for corridors, hallways and entrance halls as it is not well suited to stairwells.

Table 2 – Dwelling-houses and flats - performance standards for separating walls, separating floors, and stairs that have a separating function (source: ADE:2010)

Type / element	Airborne sound insulation $D_{nT,w} + C_{tr}$ dB (Minimum values)	Impact sound insulation $L'_{nT,w}$ dB (Maximum values)
Purpose built dwelling-houses and flats		
Walls	45	-
Floors and stairs	45	62

Table 3 – Laboratory values for new internal walls and floors within dwelling-houses, flats and rooms for residential purposes, whether purpose built or formed by material change of use (source: ADE 2010)

Element	Airborne sound insulation R_w dB (Minimum values)
Walls	40
Floors	40

3 Facade noise

3.1 Methodology

Predictions of the noise emitted by the relevant existing transport sources at the proposed development facades have been carried out employing the same digital geometric acoustics model, which has been detailed in our previously issued reports. The model was produced based on an acoustics site survey which was initially carried out for planning purposes¹.

The proprietary software *Olive Tree Lab - Suite* developed by the Mediterranean Acoustics Research & Development (PEMARD) has been used, in line with the methodology laid out in ISO 9613-2 [1].

The input data and parameters used were the following:

- Site layout: Data of the site layout and model dimensions has been taken from the Architect drawings and from Google Earth;
- Surfaces absorption characteristics: All building surfaces absorption have been set as $\alpha = 0.1$ (0.5 dB reflection loss);
- Ground factor: Ground factor have been set as 0 (hard floor);
- Order of reflections: A reflection order of 3 has been used²;

The **Sound Power Level (SWL)** of the relevant sources have been defined based on the measured noise levels.

Figure 4 shows the developed digital geometric acoustics model.

¹ See report nos. YA201.P1 and YA201.P2.2 for details.

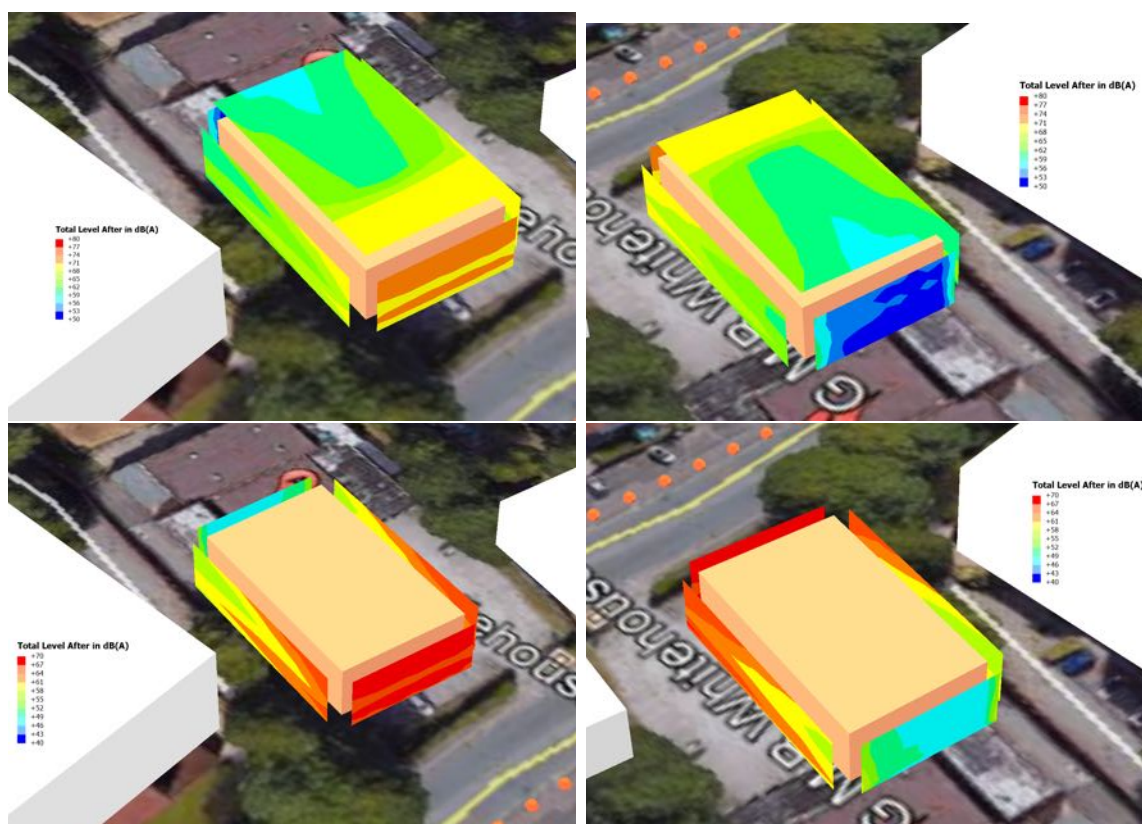
² A suitable reflection order has been determined based on the specific site geometry and the source-receiver positions.



Figure 4 – 3D view of the digital geometric acoustics model

3.2 Results

The calculated day and night-time facade noise levels are presented as Figure 5.

Figure 5 – $L_{Aeq,16hr}$ (top) and $L_{Aeq,8hr}$ (bottom) noise maps

4 Internal ambient noise levels

4.1 Impacts with open windows

The difference between free field and internal ambient noise levels through a partially open window is approximately 13 dB [11].

Based on this assumption and the noise levels shown in Figure 5, to achieve suitable IANLs, windows are required to remain closed and to provide sufficient insulation. Therefore, appropriate facade and ventilation solutions have been calculated.

4.2 Facade acoustic requirements

4.2.1 Methodology

To determine facade and ventilation solutions to achieve suitable IANLs within each relevant space, the methodology laid out in BS 8233 [6], BS EN ISO 12354-3 [10] and the guidance included in the AVO guide [14] for overheating ventilation have been considered.

The Overheating Risk - Early Stage Tool [13] produced by the Good Homes Alliance has been used to determine the proposed development risk of overheating.

The calculations have been carried out for rooms that represent a worst-case for each facade aspect. Such rooms are exposed to the highest noise levels and have the most significant ratio of facade area to the room volume.

The dimensions and characteristics of each radiating surface (i.e. windows, external walls) and room volumes have been provided by the architect - see Annex B.

An average reverberation time RT of 0.5 seconds was considered adequate due to the average room volumes and surface finishes characteristics.

Noise break-in through masonry elements is considered to be negligible.

According to the information received, it is considered that the ventilation strategy consists of continuous mechanical supply and extract with heat recovery.

Annex C, includes details for the calculations carried out.

4.2.2 Kitchen/living room

Ventilation design case

Calculations indicate that the kitchen/living room area requires glazing with a minimum performance of 34 dB R_w+C_{tr} (e.g. 6 mm glass pane + 16 mm cavity with argon + 8.8 mm laminated glass).

The anticipated IANLs, with such solutions in place, would be 33 dB $L_{Aeq,16hr}$.

The solution above does not constitute a ventilation strategy design, which is the responsibility of the mechanical engineer.

Overheating design case

The overheating assessment (early-stage tool) indicates a medium risk of overheating for the kitchen/living room area.

With a partially open window (13 dB attenuation) the IANLs during the day would be 57 dBA, and as such, opening windows **is not** considered to be a suitable solution for mitigating overheating.

Mechanical cooling can be used to manage thermal comfort in conjunction with the ventilation system.

The AVO guide recommends that mechanical noise to control overheating is limited to 35 dB L_{Aeq} to prevent an adverse reaction from most occupants. Therefore, such limits should be considered when selecting specific units.

The mentioned solutions are considered standard mitigation measures in controlling overheating but must be assessed by the mechanical engineer.

4.2.3 Office

Ventilation design case

Calculations indicate that the office area requires glazing with a minimum performance of 28 dB R_w+C_{tr} (e.g. 10 mm glass pane + 16 mm cavity + 4 mm glass pane).

The anticipated IANLs, with such solutions in place, would be 33 dB $L_{Aeq,16hr}$.

The solution above does not constitute a ventilation strategy design, which is the responsibility of the mechanical engineer.

Overheating design case

The overheating assessment (early-stage tool) indicates a low risk of overheating for the kitchen/living room area.

With a partially open window (13 dB attenuation) the **IANLs** during the day would be 54 dBA, and as such, opening windows **is not** considered to be a suitable solution for mitigating overheating.

Mechanical cooling can be used to manage thermal comfort in conjunction with the ventilation system.

The **AVO** guide recommends that mechanical noise to control overheating is limited to 35 dB L_{Aeq} to prevent an adverse reaction from most occupants. Therefore, such limits should be considered when selecting specific units.

The mentioned solutions are considered standard mitigation measures in controlling overheating but must be assessed by the mechanical engineer.

4.2.4 Bedrooms

Ventilation design case

Calculations indicate that all bedrooms require glazing with a minimum performance of 30 dB $R_w + C_{tr}$ (e.g. 10 mm glass pane + 16 mm cavity + 4 mm glass pane).

The anticipated maximum **IANLs**, with such solutions in place, would be 31 dBA $L_{Aeq,16hr}$, 27 dB $L_{Aeq,8hr}$ and 40 dB L_{AFmax} (10th loudest event).

The solution above does not constitute a ventilation strategy design, which is the responsibility of the mechanical engineer.

Overheating design case

The overheating assessment (early-stage tool) indicates a medium to high risk of overheating for bedrooms.

The anticipated **IANLs** with a partially open window (13 dB attenuation) to control overheating would be 54 dBA during the day and 50 dBA at night with L_{AFmax} levels up to 63 dB, and as such opening windows **is not** considered to be a suitable solution for mitigating overheating.

Mechanical cooling can be used to manage thermal comfort in conjunction with the ventilation system.

The AVO guide recommends that mechanical noise to control overheating is limited to 30 dB L_{Aeq} for bedrooms to prevent an adverse reaction from most occupants while falling asleep, and therefore, such limits should be considered when selecting specific units.

The mentioned solutions are considered standard mitigation measures in controlling overheating but must be assessed by the mechanical engineer.

4.3 Ventilation strategy

As presented in Figure 6 and as previously noted, the proposed ventilation strategy consists of a continuous mechanical supply and extract system with *Verplas* flexible insulated ducts.

It can be seen that the supply/discharge points are located on the noisiest facades of the development and as such, to comply with the required IANLs limits, a 1.5 m *Verplas* duct silencer is required for each duct, i.e. WLS01, WLS02, WLS05 and WLS06.

NOTE 1: To be effective in practice, the silencer must be placed flushed against the facade wall .

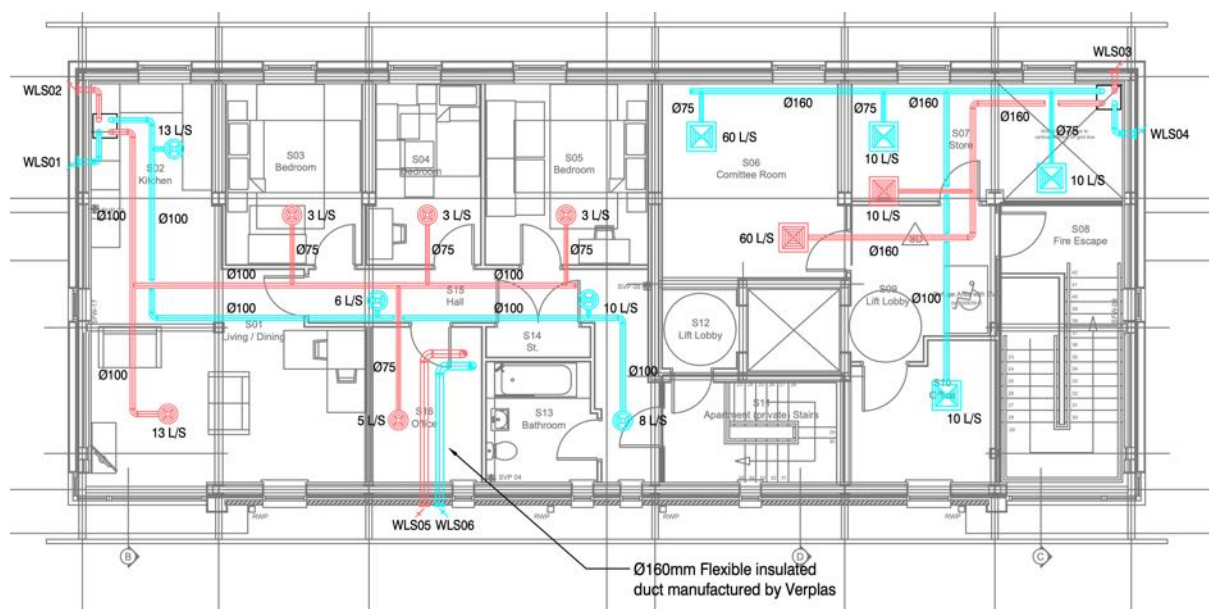


Figure 6 – Proposed ventilation strategy

5 Internal sound insulation

To determine the suitability of the proposed walls and floors constructions and advise alternative solutions where required, the proprietary software SON Architect¹ which carries out calculations in line with the methodology laid out in BS EN ISO 12354-1/2:2017 [8] [9] was used.

Details regarding the accuracy of the methodology employed are presented in BS EN ISO 12354-1:2017 as follows:

"The calculation models predict the measured performance of buildings, assuming good workmanship and high measurement accuracy. The accuracy of the prediction by the models presented depends on many factors: the accuracy of the input data, the fitting of the situation to the model, the type of elements and junctions involved, the geometry of the situation and the workmanship. It is therefore not possible to specify the accuracy of the predictions in general for all types of situations and applications. Data on the accuracy have to be gathered in the future by comparing the results of the model with field measurements from a variety of different buildings. However, some indications can be given.

The main experience in the application of similar models has been so far with buildings where the basic structural elements are homogeneous, i.e. brick walls, concrete, gypsum blocks, etc. In those situations, the prediction of the single number rating by the detailed model is on average correct (no bias error) with a standard deviation of 1,5 dB to 2,5 dB (the lower value if all aspects are taken into account, the larger to complex situations and when neglecting the structural reverberation time)."

5.1 Separating walls

The separating walls highlighted in Figure 7 require a minimum sound insulation of 54 dB $R_w + C_{tr}$. The indicated build-up can typically provide such performance.

Examples of suitable proprietary systems are as follows:

Siniat RSP 038

British Gypsum GypWall Quiet SF (A316009)

¹ The software SON Architect is developed by Sound of Numbers S.L.

NOTE 1: These walls are required to be built from the upper side to the underside of the base floor in such a way that any floating floors and ceiling boards **are non-continuous between the residential apartment and other areas of the development.**

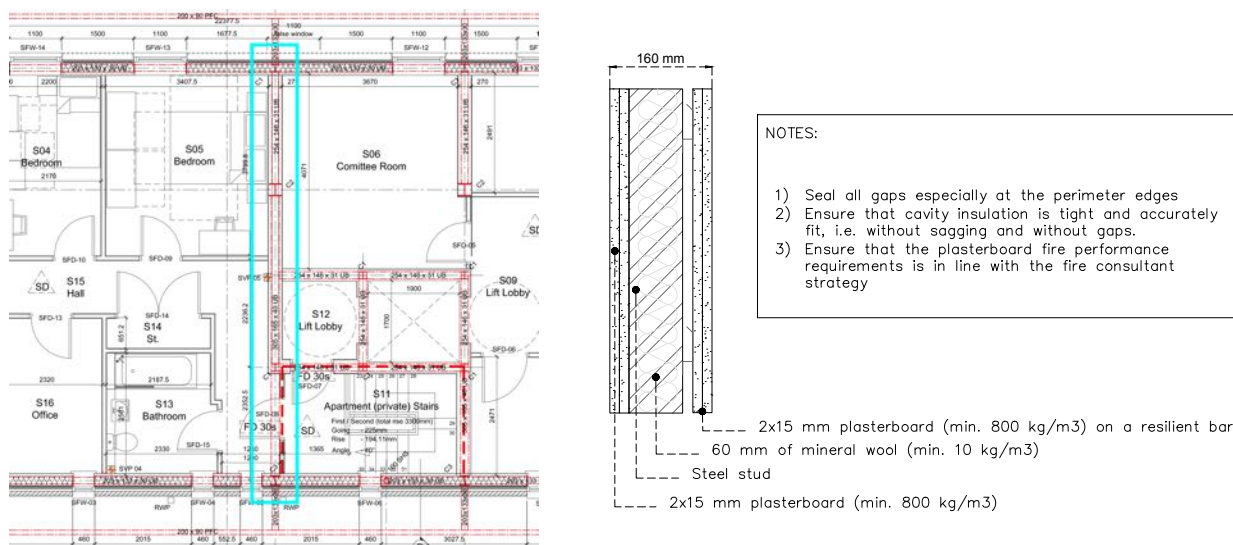


Figure 7 – Requirements for separating walls

5.2 Floors

It is understood that the proposed base floor construction consists of 150 mm concrete on profiled metal decking.

In order to achieve the airborne sound insulation and impact noise levels required by Building Regulations [ADE](#), a floating floor is required. Suitable floating floors may consist of:

1. A 60 mm screed on top of a resilient layer affording at least 6 dB $\Delta_{R,w} + C_{tr}$; or
2. 18 mm chipboard + 19 mm plasterboard plank on an acoustic batten or cradle, forming a minimum cavity of 50 mm fully filled with mineral wool (minimum 10 kg/m³).

Examples of suitable proprietary acoustics systems:

[Pliteq GenieMat FF25](#) (under-screed resilient layer)

[Regupol E48](#) (under-screed resilient layer)

JCW Acoustic Cradle System.

JCW 50C Acoustic Batten System.

NOTE 1: it is crucial that the floating floor **does not directly touch the surrounding elements** and as such the use of an isolation gap layer is required at its perimeter.

NOTE 2: floating floors **must be executed to be non-continuous** between apartment units and other areas of the development.

5.3 Facade flanking transmission

It is understood that the development includes curtain walling elements within the facade build-up, running continuously between the building common areas and the apartment unit. Flanking transmission through elements such as mullions and transoms need to be controlled not to undermine the required sound insulation between rooms.

The minimum necessary acoustic flanking insulation is 55 dB $D_{n,f,w} + C_{tr}$. This performance can be achieved with a unitised curtain walling system, cavity barriers between the slab edge and the curtain wall, and at least two transoms between rooms.

If a stick system is used, mullions running vertically between apartments need to be broken at floor level and joined with a profile infill.

NOTE 1: We recommend that the appointed facade contractor is consulted regarding this matter and provides laboratory acoustic test data to support their proposal, which shall be issued to ourselves for review.

5.4 Apartment internal partitions

Building Regulations [ADE](#) requires that partitions within apartments provide a minimum acoustic resistance of 40 dB R_w .

An example of a suitable typical construction is presented as Figure 8.

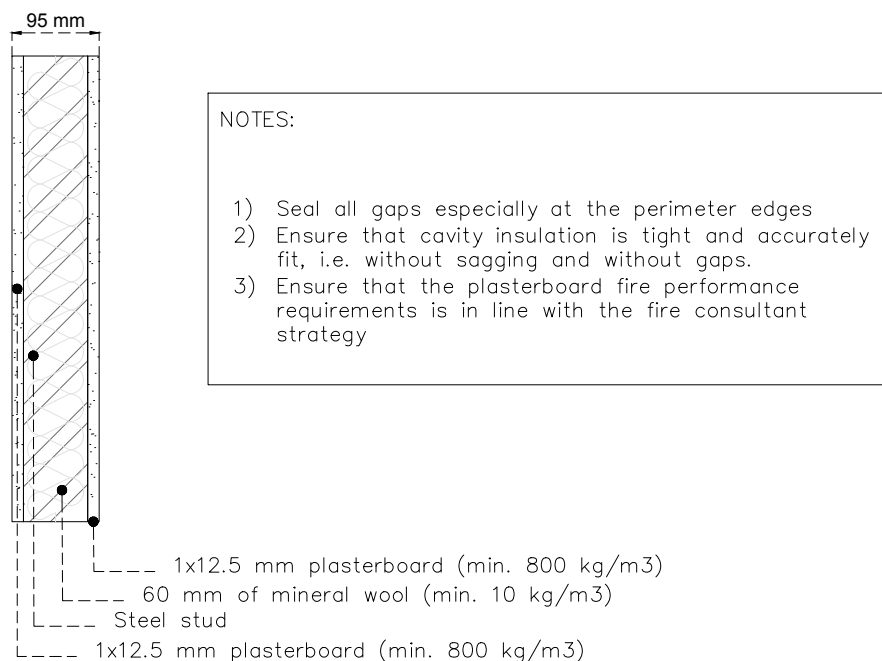


Figure 8 – Example of a suitable internal partition construction

Examples of suitable proprietary systems:

[Siniat RCP 002](#)

5.5 Roof

It is understood that the proposed roof consists of a Kingspan KS 1000 RW insulated panel and a dropped ceiling consisting of 2x15 mm of plasterboard. To minimise flanking transmission between the residential apartment and other building areas, the ceiling plenum requires 100 mm of mineral wool insulation.

5.6 Entrance doors

Building Regulations [ADE](#) requires that entrance doors to apartment units provide a minimum acoustic resistance of 29 dB R_w , or a minimum mass of 25 kg/m².

Examples of suitable proprietary door systems:

[Huet Club 30](#)

Examples of suitable proprietary perimeter seals:

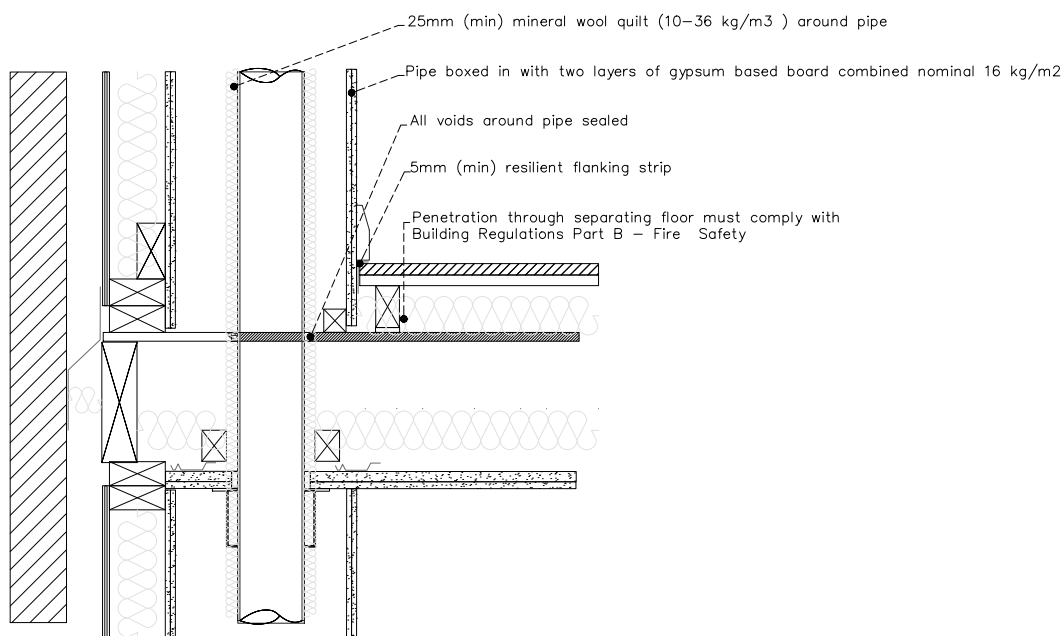
Lorient batwing perimeter seal

NOTE 1: If non-proprietary doors with a minimum mass of 25 kg/m^3 are used, acoustic perimeter seals (all sides including threshold) are required not to undermine its performance.

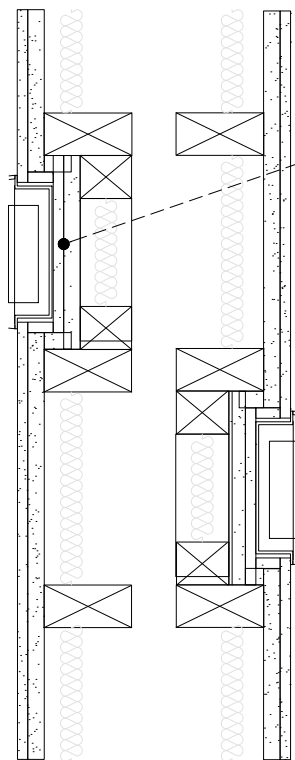
5.7 Execution details

The following key execution details are crucial in safeguarding acoustic integrity:

Building services penetrations



Electrical outlets



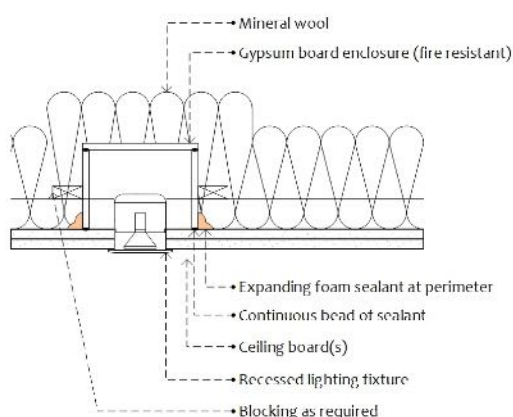
Provide two or more layers of gypsum-based board (total nominal mass per unit area 22 kg/m²) to enclose electrical boxes

Stagger sockets, switches, etc. on each side of the wall such that they are not positioned in opposite bays

Alternatively, fire resistant putty pads or other proprietary liner may be used with sockets, provided:

- They achieve a laboratory performance of no worse than $\Delta R_w + C_{tr} = -1\text{dB}$
- They are installed in accordance with the manufacturer's instructions

Ceiling light enclosures



6 Reverberation control

In line with the requirements set out by [ADE](#) for reverberation control - as stated in Section [2](#) - acoustically absorbent finishes are needed in common areas to minimise occupational noise build-up and its transfer to adjacent areas.

Following the requirements of Method A, it is recommended that Class C absorption¹ is applied to the ceiling of the lift lobby adjacent to the residential apartment and that Class D absorption is applied to the combined area of the stair treads, the upper surface of the intermediate landings, the upper surface of the landings (excluding ground floor) and the ceiling area on the top floor.

Various absorbent finishes can be employed depending on the desired aesthetics. Some of the most common types of absorption solutions are the following:

Painted plaster: [Fellert](#), [Baswaphon](#), [Claro](#), [Mikropor M](#) and [Sonaspray](#);

Fabric: [Fabritrak](#), [Soft Cells](#), [Acoustic Pearls](#);

Perforated timber: [Decoustics](#), [Gustafs](#), [Topakustik](#); and

Perforated plasterboard: [British-Gypsum](#).

¹ With reference to the classification system set out in BS EN ISO 11654 [\[2\]](#).

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Annexes

ANNEX A – National Planning Policy

A.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework [12] sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced.

In regards to noise, Paragraphs 170, 180, 204 and 205 state the following:

170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

204. Planning policies should:

- g) when developing noise limits, recognise that some noisy short-term activities, which may otherwise be regarded as unacceptable, are unavoidable to facilitate minerals extraction.

205. When determining planning applications, great weight should be given to the benefits of mineral extraction, including to the economy. In considering proposals for mineral extraction, minerals planning authorities should:

- c) ensure that any unavoidable noise, dust and particle emissions and any blasting vibrations are controlled, mitigated or removed at source, and establish appropriate noise limits for extraction in proximity to noise sensitive properties.

A.2 Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England [3] long term vision is to *"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development"*.

The NPSE states the three following policy aims:

First Aim:

Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development;

Second Aim:

Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development;

Third Aim:

Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The NPSE uses two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. These are extended to the concept of a significant observed adverse effect level as follows:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development (paragraph 1.8).

The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

The third aim seeks, where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development (paragraph 1.8), recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.

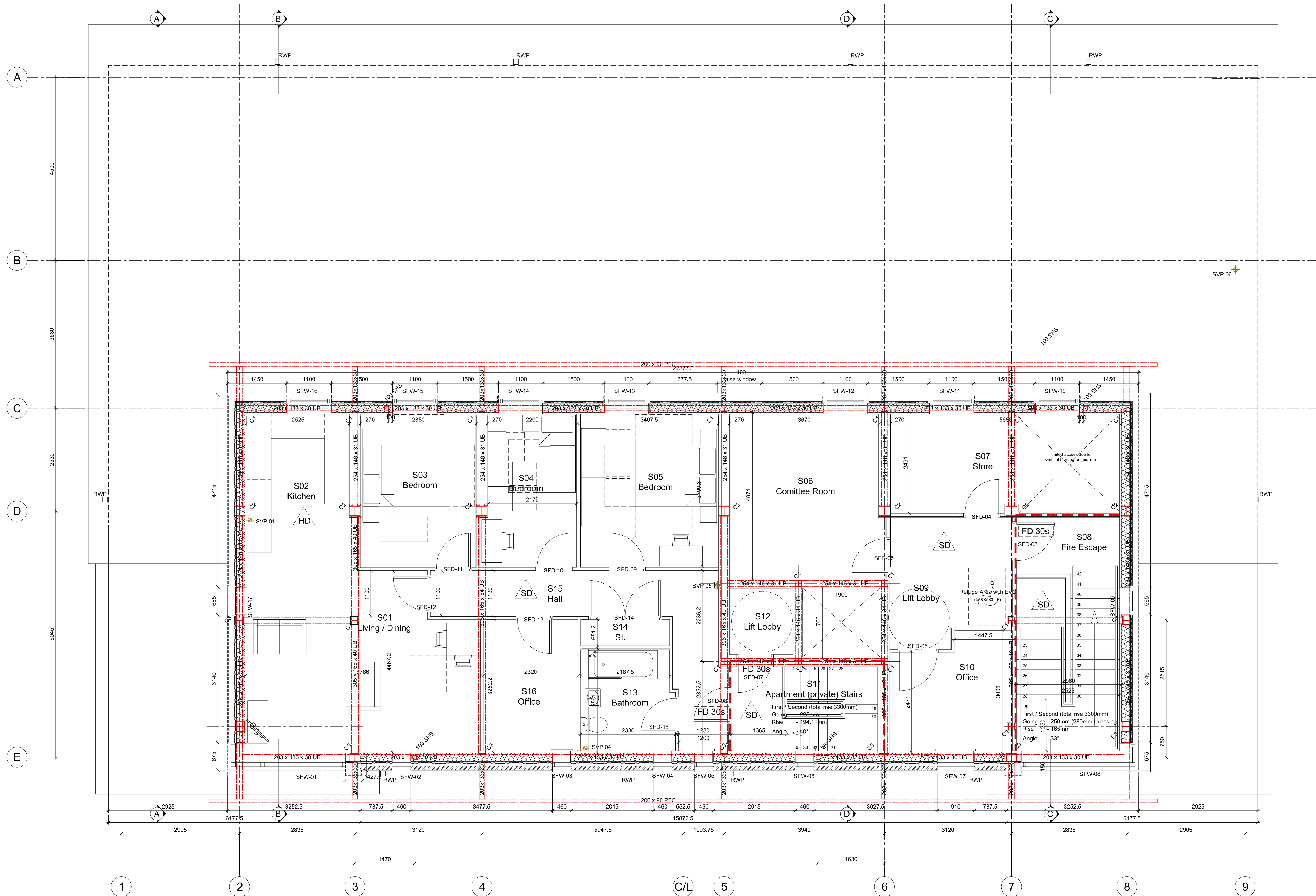
ANNEX B – Proposed architectural plan

FIRE STRATEGY - KEY

Individual apartment to include stand alone BS5839 part 6 fire alarm

- FD 30s** Fire door with 30 mins fire rating and smoke seal
- SD** Smoke Detector
- SDH** Smoke Detector at high level within roof void (where void is over 600mm)
- HD** Heat Detector Fitted in Kitchens
- Protected area to provide 60 mins fire protection

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ANNEX C – Calculation details

ROOM DETAILS	
ID	Kitchen + living room
Type	Living room/dinning room
Volume (m3)	72.0
Wall (m2)	11.0
Window 1 (m2)	1.6
Window 2 (m2)	3.8
Roof (m2)	0.0
Wall vent (m2)	0.0
No. of passive vents	0.0
Element total area (m2)	16.4

TERM	DESCRIPTION	Rw (C;Ctr)	Octave band mid frequency in Hz							GLOBAL dB(A)
			63	125	250	500	1000	2000	4000	
LAeq,16hrs	External ff noise	-	49	53	55	58	67	65	56	70
RT (s)	RT (s)	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	-
Abs. Area (m2)	Abs. Area (m2)	-	14	14	14	14	14	14	14	-
10log A	10log A	-	12	12	12	12	12	12	12	-

R (Wall)	Cladding + 12 mm s board + 210 mm cavity with mineral wool + 2x15 mm plasterboard on res bars	57 (-3; -9)	26	42	47	52	57	55	61	-
R (Window 1)	12.8 mm Pilkington Optiphon	39 (0; -2)	26	30	32	37	39	41	51	-
R (Window 2)	12.8 mm Pilkington Optiphon	39 (0; -2)	26	30	32	37	39	41	51	-
R (Roof)	n/a	-	100	100	100	100	100	100	100	-
Dne (Ventilator 1)	n/a	-	100	100	100	100	100	100	100	-
Dne (Ventilator 2)	n/a	-	100	100	100	100	100	100	100	-
R (Vent)	n/a	-	100	100	100	100	100	100	100	-

R (Facade)	All façade elements	-	26	34	37	42	44	45	55	-
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LAeq,16hrs	IANLs	-	27	22	22	20	27	23	5	32
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ROOM DETAILS	
ID	Office
Type	Bedroom
Volume (m3)	18.2
Wall (m2)	5.5
Window 1 (m2)	1.1
Window 2 (m2)	0.0
Roof (m2)	0.0
Wall vent (m2)	0.0
No. of passive vents	0.0
Element total area (m2)	6.6

TERM	DESCRIPTION	Rw (C;Ctr)	Octave band mid frequency in Hz							GLOBAL dB(A)
			63	125	250	500	1000	2000	4000	
LAeq,16hrs	External ff noise	-	46	50	52	55	64	62	53	67
RT (s)	RT (s)	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-
Abs. Area (m2)	Abs. Area (m2)	-	6	6	6	6	6	6	6	-
10log A	10log A	-	8	8	8	8	8	8	8	-

R (Wall)	n/a	-	100	100	100	100	100	100	100	-
R (Window 1)	6 mm / (6-16mm) / 6 mm laminated	33 (-2; -5)	16	20	19	30	39	37	46	-
R (Window 2)	n/a	-	100	100	100	100	100	100	100	-
R (Roof)	n/a	-	100	100	100	100	100	100	100	-
Dne (Ventilator 1)	n/a	-	100	100	100	100	100	100	100	-
Dne (Ventilator 2)	n/a	-	100	100	100	100	100	100	100	-
R (Vent)	n/a	-	100	100	100	100	100	100	100	-

R (Facade)	All façade elements	-	24	28	27	38	47	45	54	-
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LAeq,16hrs	IANLs	-	26	26	29	21	21	21	3	33
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ROOM DETAILS	
ID	bedroom_S03
Type	Bedroom
Volume (m3)	26.0
Wall (m2)	6.8
Window 1 (m2)	1.9
Window 2 (m2)	0.0
Roof (m2)	0.0
Wall vent (m2)	0.0
No. of passive vents	0.0
Element total area (m2)	8.7

TERM	DESCRIPTION	Rw (C;Ctr)	Octave band mid frequency in Hz							GLOBAL dB(A)
			63	125	250	500	1000	2000	4000	
L _{Aeq} ,16hrs	External ff noise	-	46	50	52	55	64	62	53	67
L _{Aeq} ,8hrs	External ff noise	-	42	46	48	51	60	58	49	63
RT (s)	RT (s)	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-
Abs. Area (m2)	Abs. Area (m2)	-	8	8	8	8	8	8	8	-
10log A	10log A	-	9	9	9	9	9	9	9	-

R (Wall)	n/a	-	100	100	100	100	100	100	100	-
R (Window 1)	10 mm / (6-16mm) / 4 mm	35 (-2; -5)	20	24	21	32	37	42	43	-
R (Window 2)	n/a	-	100	100	100	100	100	100	100	-
R (Roof)	n/a	-	100	100	100	100	100	100	100	-
D _{ne} (Ventilator 1)	n/a	-	100	100	100	100	100	100	100	-
D _{ne} (Ventilator 2)	n/a	-	100	100	100	100	100	100	100	-
R (Vent)	n/a	-	100	100	100	100	100	100	100	-

R (Facade)	All façade elements	-	27	31	28	39	44	49	50	-
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L _{Aeq} ,16hrs	IANLs	-	23	23	28	20	24	17	7	31
L _{Aeq} ,8hrs	IANLs	-	19	19	24	16	20	13	3	27

ROOM DETAILS	
ID	bedroom_S04
Type	Bedroom
Volume (m3)	20.1
Wall (m2)	5.5
Window 1 (m2)	1.9
Window 2 (m2)	0.0
Roof (m2)	0.0
Wall vent (m2)	0.0
No. of passive vents	0.0
Element total area (m2)	7.4

TERM	DESCRIPTION	Rw (C;Ctr)	Octave band mid frequency in Hz							GLOBAL dB(A)
			63	125	250	500	1000	2000	4000	
L _{Aeq} ,16hrs	External ff noise	-	46	50	52	55	64	62	53	67
L _{Aeq} ,8hrs	External ff noise	-	42	46	48	51	60	58	49	63
RT (s)	RT (s)	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-
Abs. Area (m2)	Abs. Area (m2)	-	6	6	6	6	6	6	6	-
10log A	10log A	-	8	8	8	8	8	8	8	-

R (Wall)	n/a	-	100	100	100	100	100	100	100	-
R (Window 1)	10 mm / (6-16mm) / 4 mm	35 (-2; -5)	20	24	21	32	37	42	43	-
R (Window 2)	n/a	-	100	100	100	100	100	100	100	-
R (Roof)	n/a	-	100	100	100	100	100	100	100	-
D _{ne} (Ventilator 1)	n/a	-	100	100	100	100	100	100	100	-
D _{ne} (Ventilator 2)	n/a	-	100	100	100	100	100	100	100	-
R (Vent)	n/a	-	100	100	100	100	100	100	100	-

R (Facade)	All façade elements	-	26	30	27	38	43	48	49	-
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L _{Aeq} ,16hrs	IANLs	-	24	24	29	21	25	18	8	32
L _{Aeq} ,8hrs	IANLs	-	20	20	25	17	21	14	4	28

ROOM DETAILS	
ID	bedroom_S05
Type	Bedroom
Volume (m3)	31.0
Wall (m2)	8.2
Window 1 (m2)	1.9
Window 2 (m2)	0.0
Roof (m2)	0.0
Wall vent (m2)	0.0
No. of passive vents	0.0
Element total area (m2)	10.0

TERM	DESCRIPTION	Rw (C;Ctr)	Octave band mid frequency in Hz							GLOBAL dB(A)
			63	125	250	500	1000	2000	4000	
L _{Aeq} ,16hrs	External ff noise	-	46	50	52	55	64	62	53	67
L _{Aeq} ,8hrs	External ff noise	-	42	46	48	51	60	58	49	63
RT (s)	RT (s)	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-
Abs. Area (m2)	Abs. Area (m2)	-	10	10	10	10	10	10	10	-
10log A	10log A	-	10	10	10	10	10	10	10	-

R (Wall)	n/a	-	100	100	100	100	100	100	100	-
R (Window 1)	10 mm / (6-16mm) / 4 mm	35 (-2; -5)	20	24	21	32	37	42	43	-
R (Window 2)	n/a	-	100	100	100	100	100	100	100	-
R (Roof)	n/a	-	100	100	100	100	100	100	100	-
D _{ne} (Ventilator 1)	n/a	-	100	100	100	100	100	100	100	-
D _{ne} (Ventilator 2)	n/a	-	100	100	100	100	100	100	100	-
R (Vent)	n/a	-	100	100	100	100	100	100	100	-

R (Facade)	All façade elements	-	27	31	28	39	44	49	50	-
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L _{Aeq} ,16hrs	IANLs	-	22	22	27	19	23	16	6	30
L _{Aeq} ,8hrs	IANLs	-	18	18	23	15	19	12	2	26

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