Building Design Consultancy UK Ltd
Chartered Architects
42 Forestdale, Southgate, London N14 7DX.
Tel: 020 8886 4297. Fax: 020 8886 4297

NOISE AND SOUND INSULATION REPORTS

3RD MARCH 2018

PLANNING APPLICATION FOR EXTENSION AND CONVERSION INTO RESIDENTIAL FLATS

40 - 42, MILL LANE, WEST HAMPSTEAD, LONDON NW6 1NR

In support of this application is a Noise Exposure Assessment Report dated 3rd August 2016 plus a Summary of Recommendations for Acoustic Treatment dated 10th August 2016 prepared by Clement Acoustics Ltd for the extant planning permission reference 2016/2661/P.

The appended report and recommendations demonstrates how the enhanced sound insulation together with additional mitigation measures between rooms in adjoining dwellings and noise within the commercial premises.

The appended recommendations proposes two options for dealing with the separating ceiling between the commercial ground floor premises and proposed first floor residential use. Because access to upgrade the existing ceiling is not an option for the applicant it is proposed to adopt Option 2 for the sound insulation mitigation works to be undertaken from above without disturbing the existing ceiling below the floor.

These same reports and recommendation options were also submitted to London Borough of Camden Planning as part of an application (reference 2018/0072/P) to discharge the pre-commencement conditions in pursuant to the extant planning permission reference 2016/2661/P. At the time of submitting this new planning application the allocated planning case officer advised the applicant's agent that the submitted noise and sound insulation reports and option recommendations are considered acceptable.

We would appreciate any comments or request for any further information in the event that there is anything with this application that may prevent granting consent in terms of the noise and sound insulation proposals.

202 Uxbridge Road
London
W12 7JP

Tel: +44(0)203 475 2280
Fax: +44(0)203 475 2281

info@clementacoustics.co.uk

www.clementacoustics.co.uk

40-42 MILL LANE, LONDON

NOISE EXPOSURE ASSESSMENT

Report **11384-NEA-01**

Prepared on 3 August 2016

Issued For

H Company 2 Limited

32-38 Scrutton Street

London

EC2A 4RP

committed to CSCS Platinum award

ISO 17025

ISO 9001

Institute of Acoustics sponsoring organisation

Contents

List of Attachments

1.0 INTRODUCTION

Clement Acoustics has been commissioned by H Company 2 Limited to assess the suitability of the site at 40-42 Mill Lane, London NW6 1NR for residential development in accordance with the National Planning Policy Framework published on 27 March 2012 (replacing Planning Policy Guidance 24).

Proposals are to redevelop premises above a public house to self-contained flats.

This report presents the results of environmental noise surveys undertaken in order to measure prevailing background levels and outlines any necessary mitigation measures.

2.0 SITE DESCRIPTION

The proposed development site is currently a public house, with proposals to convert the upper floors to self-contained flats. The site is located on the corner of Mill Lane and Ravenshaw Street and is bound by residential premises to the west and south. A train line is located 80m south-west from the site.

At the time of the survey, the background noise climate consists of road traffic noise Mill Lane and Ravenshaw Street, pedestrian noise and rail noise.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

A noise survey was undertaken at one position on the proposed site as shown in Figure 11384-SP1. The Location was chosen based on accessibility and in order to obtain representative noise levels due to the main observed noise sources around the site.

Continuous automated monitoring was undertaken for the duration of the survey between 13:45 on the 08th July and 12:00 on 11th July 2016.

Weather conditions were generally dry with light winds and occasional rain and therefore suitable for the measurement of environmental noise.

The measurement procedure generally complied with BS7445:1991 "*Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*".

3.2 Manual Measurements

In addition to the environmental noise survey, manual measurements were also undertaken in the location shown in the attached site plan.

Measurements were undertaken in order to investigate noise propagation around the site due to different surrounding noise sources. Manual measurements were timed such that levels equivalent to the levels measured at the survey position during the same period could be calculated.

3.3 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 977 Class 1 Sound Level Meter [*survey*],
- 1 No. 01dB Stell Black Solo Class 1 Sound Level Meter [*manual measurements*].

4.0 RESULTS

4.1 Environmental Noise Survey

The $L_{Aeq:\ 5min}$, $L_{Amax:\ 5min}$, $L_{A10:\ 5min}$ and $L_{A90:\ 5min}$ acoustic parameters were measured throughout the duration of the survey.

Measured levels are shown as a time history in Figure 11384-TH.

	Ambient Noise Level $L_{Aeq,T}$	Typical Maximum Noise Level L_{Amax}
	NOISE SURVEY POSITION	
Daytime [07:00 - 23:00]	69	-
Night-time [23:00 - 07:00]	63	80

Table 4.1: Site average noise levels for daytime and night time

The levels presented in Table 4.1 are as expected considering the site location being so close to a busy junction. Provided adequate mitigation measures are put in place during the design and construction phase of the development, recommended internal noise levels can be achieved. Outline mitigation measures are described in Section 5 of this report.

Maximum noise levels shown in Table 4.1 are deemed to be 'not normally exceeded' as required for maximum internal noise level specification purposes (described in Section 5).

4.2 Manual Measurements

Manual measurements were undertaken at the positions shown in site plan 11384-SP1.

During all manual measurements, it was found that noise levels in the survey position to the front facade were sufficiently robust such that glazing calculations will be suitable for all facades. Due to the presence of the public house at ground floor level, we would recommend maintaining a high level of performance for living spaces on all facades.

5.0 NOISE EXPOSURE ASSESSMENT

5.1 Internal Noise Criteria

BS8233:2014 "*Sound insulation and noise reduction for buildings*" describes recommended acceptable internal noise levels for residential spaces during daytime and night-time hours. These levels are shown in Table 5.1.

Activity	Location	Design range $L_{Aeq,T}$ dB Daytime (07:00-23:00)	 Night-time (23:00-07:00)
Resting	Living Room	35 dB(A)	-
Dining	Dining Room/Area	40 dB(A)	-
Sleeping	Bedroom	35 dB(A)	30 dB(A)

Table 5.1: BS8233 recommended internal background noise levels

The latest revision of the document does not include a recommended maximum internal noise level. However, in order to provide a suitably robust assessment, the guidance of the previous document (1999 revision) will be used, which is based on WHO recommendations.

BS8233:1999 states that for reasonable standards in a bedroom at night, individual noise events should not normally exceed a maximum noise level L_{Amax} of 45 dB(A).

The external building fabric would need to be carefully designed to achieve these recommended internal levels.

5.2 External Building Fabric - Non Glazed Elements

It is currently assumed that the non-glazed external building fabric elements of the proposed development would be comprised of existing masonry. This would contribute towards a significant reduction of ambient noise levels in combination with a good quality window configuration, as shown in Section 5.3.

All non-glazed elements of the building facades have been assumed to provide a sound reduction performance of at least the figures shown in Table 5.2 when tested in accordance with BS EN ISO, 140-3:1995.

Element	Octave band centre frequency SRI, dB					
	125	250	500	1k	2k	4k
Non glazed element SRI	41	43	48	50	55	55

Table 5.2: Non-glazed elements assumed sound reduction performance

5.3 External Building Fabric - Specification of Glazed Units

Sound reduction performance calculations have been undertaken in order to specify the minimum performance required from glazed elements in order to achieve recommended internal noise levels shown in Table 5.1.

Calculations will be based on bedrooms, which have more onerous requirements particularly during night-time hours. Calculations have been based on mostly bedrooms with relatively higher ratios of glazing to masonry, in order to present a more onerous assessment.

This specification therefore presents the most robust assessment, for BS8233:2014 criteria for internal noise levels in a bedroom at all affected facades.

As a more robust assessment, L_{Amax} spectrum values of night-time peaks have also been considered and incorporated into the glazing calculation in order to cater for the interior limit of 45 dB L_{Amax} for individual events, as specified in BS8233:1999 and WHO guidance.

The minimum sound reduction index (SRI) value required for all glazed elements to be installed is shown in Table 5.3. The performance is specified for the whole window unit, including the frame and other design features.

Glazing Type	Required Overall Sound Reduction Performance R_w	Glazing Type - *Indicative Only*
Type A [*All Facades*]	**39 dB**	**R_W 39 dB Double Glazing System** [*eg 10mm glass/12mm gap/10mm glass*] **High Performance Acoustic Trickle Ventilator** [*Required $D_{n,e,w}$ 48dB*] Or **Mechanical Ventilation**

Table 5.3: Required glazing performance

All major building elements should be tested in accordance with BS EN ISO 140-3:1995. Sole glass performance data would not necessarily demonstrate compliance with this specification.

No further mitigation measures would be required to achieve recommended internal noise levels.

6.0 CONCLUSION

An environmental noise survey has been undertaken at 40-42 Mill Lane, London NW6 1NR in order to measure ambient noise levels in the area.

Measured noise levels have allowed an assessment of the level of exposure to noise of the proposed development site to be made. Outline mitigation measures, including a glazing specification and the use of appropriate ventilation have been recommended and should be sufficient to achieve recommended internal noise levels for the proposed development according to BS8233:2014.

Report by

Jamie Newton

Checked by

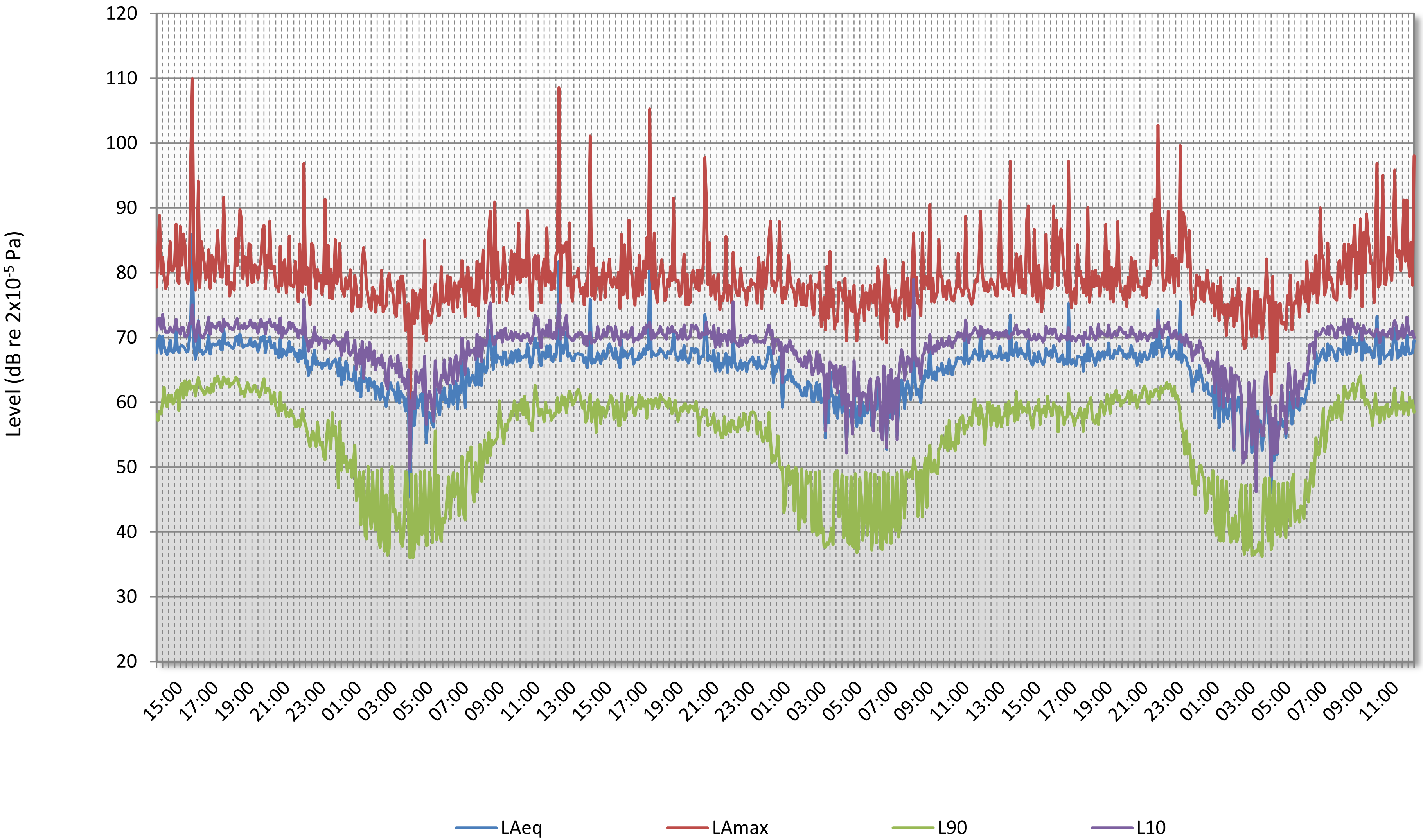
Matt Markwick AMIOA

11384-SP1 Indicative site plan indicating noise monitoring position

Date: 03 August 2016

40-42 Mill Lane, London

Environmental Noise Time History
08 July 2016 to 11 July 2016



11384-TH1

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

clement acoustics

10 August 2016

Ref: 11384-ADR-01

H Company 2 Ltd
32-38 Scrutton Street
London
EC2A 4RP

Clement Acoustics Ltd
202 Uxbridge Road
London
W12 7JP
Tel: +44(0)203 475 2280
Fax: +44(0)203 475 2281

Dear Sirs,

11384: 40-42 MILL LANE, LONDON

Further to your recent enquiry, we are pleased to present you with a summary of our recommendations for the acoustic treatment of the floor between the existing commercial unit and proposed residential apartments at the above project.

Although no planning conditions are currently known, we would recommend achieving a particularly high level of airborne sound insulation based on the use of the commercial unit as a Public House. In order to ensure a high level of airborne sound insulation is achieved, we would recommend the typical airborne sound insulation criteria stipulated in Approved Document E of the Building Regulations should be improved upon by at least 10dB.

The following sections describe our review and any necessary amendments to the proposed constructions in order to meet the above criterion.

1.0 SOUND INSULATION DESIGN CRITERIA

1.1 Standard Building Regulations

In order to satisfy the requirements for Approved Document E of the building regulations, the minimum sound insulation performance criteria, as shown in Table 1, should be met by all floor and wall constructions (i.e. separating elements between different residential dwellings). For this development, the less stringent requirements for change of use developments apply.

	Design Criteria	
Element	**Airborne**	**Impact**
Floor	$D_{nT,w} + C_{tr} \geq 45$ dB for new build $D_{nT,w} + C_{tr} \geq 43$ dB for conversions	$L'_{nT,w} \leq 62$ dB for new build $L'_{nT,w} \leq 64$ dB conversions
Wall	$D_{nT,w} + C_{tr} \geq 45$ dB for new build $D_{nT,w} + C_{tr} \geq 43$ dB for conversions	-

Table 1 Approved Document E design criteria for party elements

1.2 Recommended Target

In order to comply with the guidance suggested above, the criteria highlighted in Table 1 should be improved upon by at least 10dB.

This equates to an airborne sound insulation performance of at least $D_{nTw} + C_{tr}$ 53 dB, which would be comparable with an uncorrected performance in the region D_{nTw} 60-65 dB.

2.0 PROPOSED FLOOR SYSTEM

The proposed floor build-up between the ground floor Public House and proposed first floor residential units will be based on the existing timber joists. It is not currently known is access to upgrade the ceiling of the ground floor will be possible, two options have therefore been proposed as shown below.

2.1 Option 1: Upgraded Ceiling

In order to achieve the high level of airborne sound insulation required, we would recommend the use of an independent ceiling framework, below a plasterboard ceiling fixed to the existing joists.

We would first recommend filling the void between the joists with mineral wool, thickness 100mm, density 45kg/m3. A ceiling should then be formed on the joists from 2 layers of 15mm British Gypsum SoundBloc or similarly dense plasterboard.

We would then recommend installing an independent timber or metal framework system a minimum of 150mm below the newly formed ceiling, with support provided by the surrounding walls. Acoustic hangers can be used to provide support from the joists where necessary for larger ceiling spans. The 150mm void should also be filled with mineral wool, thickness 50mm, density 45kg/m3.

A further layer of 15mm plasterboard (British Gypsum SoundBloc or similar) should then be fixed to the independent support system.

Above the joists, a timber deck should be installed on the joists to provide a continuous layer, with gaps between boards sealed using flexible setting mastic. Retained floorboards can form this decking layer, provided all gaps are sealed and any missing or damaged boards replaced.

We would then recommend use of a product such as Cellecta Deckfon ScreedBoard 28, installed on timber decking. ScreedBoard 28 comprises 28mm thick interlocking panels, to introduce mass to the floor without the need for wet cement or screed.

The final floor system should therefore be formed of the following:

- Floor finish,
- 28mm ScreedBoard 28 layer,
- Timber decking installed on joists,
- 200mm timber joists, with 100mm mineral wool in void,
- 2 layers of 15mm SoundBloc or similar,
- Minimum 150mm void, with 50mm mineral wool infill,
- Independent ceiling framework,
- 1 layer of 15mm SoundBloc or similar.

The above construction would be considered an improvement on Robust Details construction E-FT-5, which comprises a similar above-joist construction, but only a resilient bar and fixed suspended ceiling. The proposed independent ceiling has significantly improved isolation, and would therefore be expected to outperform the Robust Details construction.

Modelling the system is proprietary sound insulation software INSUL suggests an airborne sound insulation performance of R_w 74 dB, $R_w + C_{tr}$ 62 dB. Applying an onerous correction to translate this into an onsite performance results in a predicted airborne sound insulation performance of D_{nTw} 66 dB, $D_{nTw} + C_{tr}$ 54 dB.

2.2 Option 2: Retained Ceiling

If access to upgrade the existing ceiling is not possible, works must be undertaken from above. It is assumed the existing ceiling is either lathe and plaster or plasterboard, fixed direct to the joists.

We would first recommend filling the void between the joists with mineral wool, thickness 100mm, density 45kg/m3. The floor may need to be lifted in order to do this.

A timber deck should be installed on the joists to provide a continuous layer, with gaps between boards sealed using flexible setting mastic. Retained floorboards can form this decking layer, provided all gaps are sealed and any missing or damaged boards replaced.

In order to introduce mass and isolation above the joists, we would recommend the use of a mass barrier floor on an isolated mount system.

We would recommend the use of mounts such as Mason EAFM 50mm Mounts, installed at distributed points based on load requirements. A manufacturer such as Mason Industries UK should be contacted in order to ensure the correct placement of mounts. The 50mm void formed by the mounts should be half filled with mineral wool, density 45kg/m3.

We would then recommend forming a floor on the mounts, consisting of 18mm cement particle board on the mounts, 19mm Gyproc Planks on top and finally 18mm plywood to take the final floor finish.

All floor layers above the mounts should be isolated from the surrounding walls using a flanking strip.

The final floor system should therefore be formed of the following:

- Floor finish,
- 18mm plywood
- 19mm Gyproc Plank,
- 18mm cement particle board,
- 50mm resilient mounts, with 25mm mineral wool in void,
- Timber decking
- 200mm timber joists, with 100mm mineral wool in void,
- Existing ceiling.

The above construction would be expected to perform in excess of the recommended airborne sound insulation criteria.

3.0 PROPOSED CLADDING SYSTEMS

Another element to consider is the potential for noise from the Public House to transmit through flanking paths including continuous external walls and any continuous structural columns.

In these instances, we would recommend forming an isolated cladding formed of an isolating mounting clip, such as the Mason WIC Wall Tie. This is a 38mm clip, used to fix a supporting stud to a structural element whilst maintaining a degree of isolation.

The WIC Wall Ties should be used to support minimum 48mm studs, with the total 78mm void filled with 25mm mineral wool, density 45kg/m3. An inner wall lining should then be formed from two layers of 12.5mm British Gypsum SoundBloc or similar.

4.0 JUNCTION DETAILING

At the perimeter of plasterboard layers, a small gap (up to 5mm) should be left, sealed using non-hardening silicone mastic

5.0 DUCTS AND PIPEWORK

Where pipes and ducts pass through adjacent dwellings, there is a possibility for flanking noise through the pipework itself.

In order to minimise the effects of this, we would recommend following the below advice:

- Where pipework runs through stacked bathrooms, we would recommend first lagging the pipework in mineral wool (25mm thick, minimum density 25Kg/m^3), before boxing in with a single layer of SoundBloc plasterboard or similar,
- Where pipework will penetrate through living spaces (eg combined Lounge/Kitchen), we would recommend lagging as above, but boxing in with a double layer of SoundBloc plasterboard or similar.

Where pipework penetrates through a separating wall or floor, it should be ensured that there is no rigid contact, but an airtight seal should be achieved using non-hardening mastic. Any fire stopping should also allow for a flexible, rather than rigid contact.

For ductwork that is within a single flat (eg kitchen extract fan running to the rear elevation of the same flat), no acoustic criteria need to be met. However, we would recommend boxing in ductwork with a single layer of 12.5mm SoundBloc plasterboard in order to allow amenable operation.

6.0 COMMUNAL DOORS

For doorsets within communal areas (eg from stairwell to corridor), no particular acoustic performance is deemed necessary.

Where doors are specified between communal areas and residential rooms, the following guidance is given in Approved Document E of the Building Regulations:

> *Ensure that any door has good perimeter sealing (including the threshold where practical) and a minimum mass per unit area of 25 kg/m^2 or a minimum sound reduction index of 29 dB R_w*

7.0 REVERBERATION IN COMMON PARTS

The simplest way to treat common parts for reverberation is by following Method A, as defined in Approved Document E of the Building Regulations.

Method A recommends that surface area of ceilings in common parts should be treated with a Class C (or better) absorber. For stairwells, this applies to the underside of landings, rather than the underside of stairs

8.0 GENERAL

It should be noted that where junctions are sealed with mastic, the mastic does not need to be specifically 'acoustic'. Provided the mastic is silicone-based and remains flexible when set (i.e. does not crack) it is acceptable for use.

The sound insulation performance predictions and advice provided in this document are based on the assumption that there will be no major mistakes in workmanship regarding the acoustic detailing and finishing of the party elements proposed in this development.

We trust that the above information is sufficient to your requirements and remain available should you have any further questions.

Yours Sincerely,

Duncan Martin MIOA

Clement Acoustics Ltd