



Sonic Element Ltd

Acoustic Excellence by Design

Noise Impact Assessment

TECHNICAL REPORT

2 Milton Road, Gravesend, Kent DA12 2RE
--

AUTHOR : Mr. Amber Naqvi BSc(Hons) MSc MIOA MANC MAES

OUR REF : 2562 / 2 Milton Road - Rev (-)

PLANNING REF : 20240739

SIGNED :
Mr. Amber Naqvi
BSc(Hons) MSc MIOA MANC MAES

CHECKED BY :
Ned Johnson
BSc(Hons) MSc MIOA MCIEH CEnvH



DATE : 17th January 2025

SONIC ELEMENT LTD

Little Hoplands, Island Road, Hersden, Canterbury CT3 4HD

Tel: 0208 300 3092 email: info@sonicelement.co.uk www.sonicelement.co.uk

Member of The Association of Noise Consultants (ANC) & Member of Institute of Acoustics (IoA)

Mr Rajwinder Singh

2 Milton Road, Gravesend, Kent DA12 2RE

NOISE IMPACT ASSESSMENT

Document Control & Revision History		
Revision	Issue Date	Notes
(-) First Issue	17 th January 2025	For Planning Submission

This report was completed by Sonic Element Ltd based on a defined programme of work and terms and conditions agreed with the client. The report has been prepared with all reasonable skill, care, and diligence within the terms of the Contract with the Client and taking into account the project objectives, the agreed scope of works, prevailing site conditions, and the degree of manpower and resources allocated to the project. Recommendations in this report are for acoustics purposes only, and it is the responsibility of the Project Manager or Architect to ensure that all other requirements are met including (but not limited to) structure, fire, and Building Controls. Sound insulation construction requires attention to detail and good workmanship which must be monitored throughout construction. Therefore, it is imperative that manufacturer guidelines are followed extensively and periodically inspected and checked throughout the construction period, with photographic records, by the client, project managers, and building control officers for the details and materials to perform as intended. Sonic Element Ltd cannot be held responsible for non-compliance of any part of the construction, during or after construction.

Sonic Element Ltd accepts no responsibility, following the issue of the report, for any matters arising outside the agreed scope of the works. Any surveys were conducted and this report has been prepared for the private and confidential use of the client only and cannot be reproduced in whole or in part or relied upon by any third party for any use whatsoever without the express written authorisation of Sonic Element Ltd. If any third party whatsoever comes into possession of this report, they rely on it at their own risk and Sonic Element Ltd accepts no duty or responsibility to any such third party.

Unless specifically assigned or transferred within the terms of the agreement, Sonic Element Ltd retains all copyright and other intellectual property rights, on and over the report and its contents.
© Sonic Element Ltd 2025.

CONTENTS

1.0	CLIENT DETAILS.....	5
2.0	SCOPE OF THIS REPORT	5
3.0	ACCURACY AND LIMITATIONS OF THIS REPORT	5
4.0	STRUCTURE OF THIS REPORT	5
5.0	SITE DESCRIPTION	6
6.0	BASIS OF ASSESSMENT	7
6.1	British Standard 8233:2014.....	7
6.2	The Approved Document E (ADE).....	8
6.3	Noise Policy Statement for England	8
6.4	ProPG Planning & Noise	9
6.5	BS 4142:2014+A1:2019.....	10
6.6	ANC Residential Design Guide to Acoustics, Ventilation and Overheating	10
7.0	BASELINE BACKGROUND NOISE SURVEY	11
7.1	Measurement Methodology	11
7.2	Results	12
7.3	Evaluation of Results	12
8.0	PROPOSED CONVERSION & EXTENSION.....	14
8.1	Design Criteria	14
8.2	New Cavity Perimeter Walls.....	15
8.3	Acoustic Treatment to Existing Walls	15
8.4	Acoustic Treatment to Separating Floor between GF & FF	16
8.5	Acoustic Treatment to Roof & Dormer	17
8.6	Doors.....	17
8.7	Glazing	18
8.8	Ventilation.....	18

Mr Rajwinder Singh

2 Milton Road, Gravesend, Kent DA12 2RE

NOISE IMPACT ASSESSMENT

8.9	External Amenity Areas	20
9.0	SUMMARY AND CONCLUSIONS.....	21
	APPENDIX 1 – ACOUSTIC TERMINOLOGY.....	22
	APPENDIX 2 – TYPICAL ACOUSTIC TREATMENT DETAILS	24
	APPENDIX 3 – CONSTRUCTION GUIDELINES	30
	APPENDIX 4 – INSTRUMENTATION, CALIBRATION AND MEASUREMENT CONDITIONS	32
	APPENDIX 5 – MEASURED NOISE DATA	33
	APPENDIX 6 – CONSULTANTS QUALIFICATIONS & EXPERIENCE	36

NOISE IMPACT ASSESSMENT

1.0 CLIENT DETAILS

Sonic Element Ltd. has undertaken an assessment of external and internal noise for the commercial ground floor rear extension and conversion of the first and second floor to create a two-bedroom self-contained flat, on behalf of:

Mr Rajwinder Singh
40 Arthur Street
Gravesend
Kent
DA11 0PR

2.0 SCOPE OF THIS REPORT

This report sets out the results of on-site measurements and assessment of sound insulation between external sources of noise in relation to the proposed development. The impact of noise from traffic and all other activities are assessed in relation to the existing and proposed fabric of the building.

The scope of this report also includes an assessment of the impact of commercial activities in the proximity of the proposed development. We are not aware of any external plant associated with the proposed development. The impact of any such plant proposed at a later date, if applicable, will be assessed separately.

Recommendations given in this report are for acoustic purposes only. It is the Client's responsibility to ensure that any measures adopted for acoustic purposes comply with other requirements and building regulations including those related to structure, safety, and control of fire and means of escape.

3.0 ACCURACY AND LIMITATIONS OF THIS REPORT

This report relies on background noise level measurements and calculations of noise transmission over relatively large areas. Background noise at a given location can vary substantially from day to day with variations in road traffic and other sources, and propagation of noise can be strongly affected by weather, in particular wind direction and atmospheric conditions. We believe our assessment based on a typical day and night time noise survey, capturing all sources of noise and activity in the area, to be representative of typical conditions to establish the design targets for noise mitigation measures.

4.0 STRUCTURE OF THIS REPORT

This report aims to define the acoustic requirements for the proposed development. Performance specifications are established using information acquired from baseline noise measurements. Mitigation measures are proposed without compromising on the existing and the intended proposed use of the building.

All design recommendations within this report are based on BS8233:2014 and The WHO recommended criteria, The Approved Document E (ADE) of Building Regulations 2003, amendments 2004, 2010 & 2015 along with additional assessment methodology discussed in section 6.

Due to the technical nature of the report, the terminology used in this report is briefly explained in Appendix 1. Appendix 2 includes details of the proposed acoustic treatment. Appendix 3 includes important guidelines relating to acoustic construction methods. These should be particularly followed to achieve the designed performance. Appendix 4 lists the equipment used and weather conditions for the attended and unattended acoustic measurements. Appendix 5 contains the measured data at MP1 in graphic and tabulated form. Appendix 6 includes the experience and qualifications of consultants undertaking this assessment.

NOISE IMPACT ASSESSMENT

5.0 SITE DESCRIPTION

The site is located at Milton Road, in the Gravesend area of Kent. The property is mid-terrace building currently in derelict state due to fire damage suffered due to fire at no. 1 Milton Road (previously known as The New Inn) in 2022.

The front façade of the building faces Milton Road (A226), a busy road in the centre of Gravesend town centre, and the rear façades face the parking area of Royal Mail sorting office at Bull Yard accessed through Queen Street.

The area has a mix of residential and commercial properties surrounding the site.

Based on the published information, we understand the site is located within the King Street Conservation Area.

The proposed scheme involves the erection of a ground floor rear extension and conversion of the first and second floor to create a two-bedroom self-contained flat with associated front and rear dormer windows, alterations to the shop front and insertion of a new timber sash window on the front elevation.

Figure 1 below shows the location of the property, in red outline, showing the location of the application site in relation to the aforementioned roads and properties in the vicinity of the site.

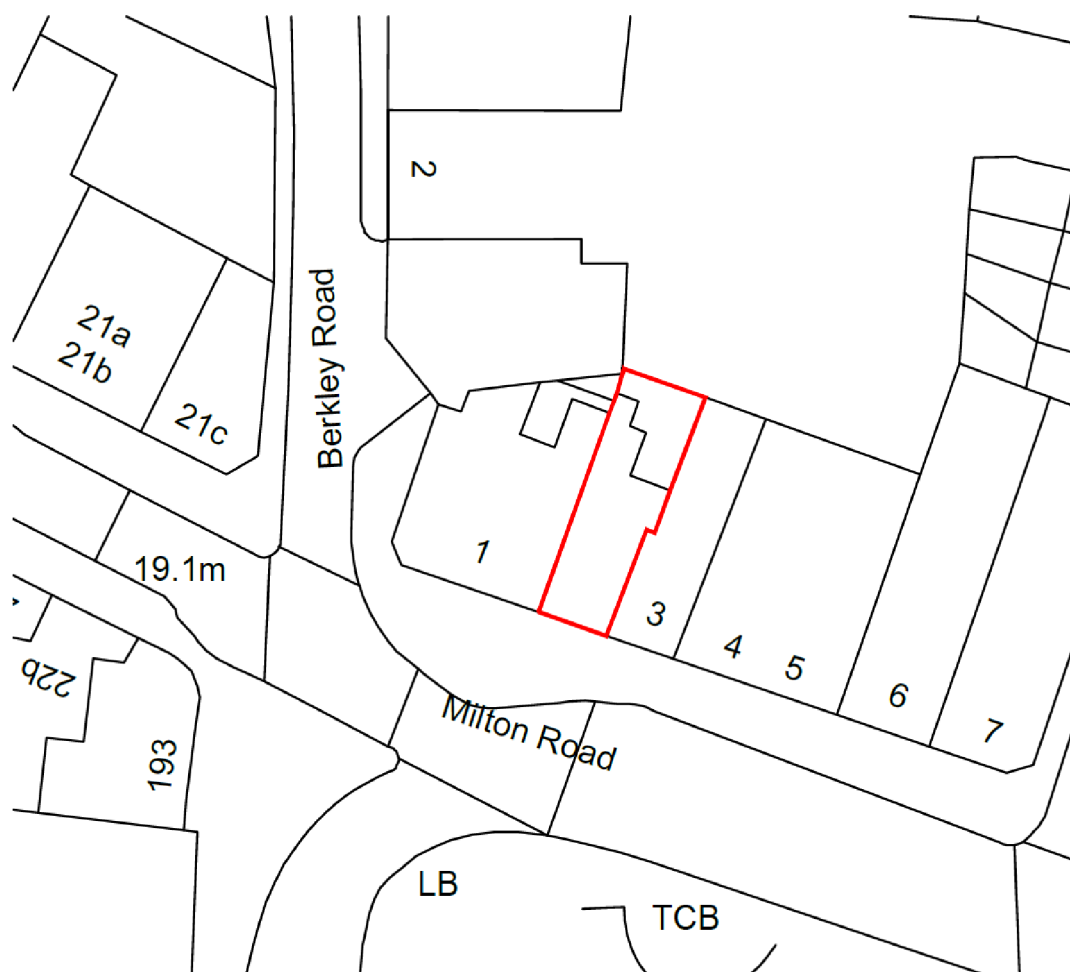


Figure 1 – Site Plan

NOISE IMPACT ASSESSMENT

6.0 BASIS OF ASSESSMENT

As part of the planning process, the local authority has requested a noise impact assessment with the following requirements, cited below for reference.

Noise impact assessment should be submitted prior to determination. This is due to the site being in a busy location adjacent to the A226 one-way system, which is heavily trafficked, with noise also associated with the late-night economy and any commercial noise sources which are likely to impact on living conditions. The noise impact assessment will determine existing baseline noise levels and set out any recommended mitigation required to not exceed BS8233:2014 and BS4142:2014. These mitigation measures could include secondary glazing or sealed units with a MVHR system, which would require consideration from the Conservation Officer on the potential impact on the heritage asset.

A brief discussion of the key sections of the relevant standards and documents used for this assessment is presented below.

6.1 British Standard 8233:2014

The scope of British Standard 8233: 2014 *Sound insulation and noise reduction for buildings – Code of practice* is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new or refurbished buildings undergoing a change of use.

The standard suggests suitable internal noise levels for residential dwellings, as shown in the table below.

Activity	Location	07:00 - 23:00 $L_{Aeq, 16 \text{ hour}}$	23:00 - 07:00 $L_{Aeq, 8 \text{ hour}}$
Resting	Living Rooms	35	-
Dining	Dining Area	40	-
Sleeping	Bedrooms	35	30

Table 1

In terms of this development, the internal noise levels have been compared to the internal noise levels in Table 1. It is suggested in this report that by meeting these noise levels the development would be classed as NOAEL.

In respect of outdoor amenity areas BS8233:2014 states:

'For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does 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. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centers or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.'

NOISE IMPACT ASSESSMENT

With respect to the night-time maximum noise levels, the World Health Organisation guidelines state:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAF max more than 10-15 times per night."

6.2 The Approved Document E (ADE)

The main parameters that are used throughout this document to express airborne and impact sound insulation of separating constructions are $D_{nT,w} + C_{tr}$ and $L'_{nT,w}$ respectively.

All specifications in this report will, therefore, be given with respect to these descriptors.

To satisfy the requirements of the Building Regulations, the minimum sound insulation performance criteria, as shown in Table 2, should be met through the separating elements between independent residential dwellings.

Dwellings - houses and flats – performance standards for separating walls, separating floors that have a separating function.

Description of Area	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	45	62
Dwelling-houses and flats formed by material change of use:		
Walls	43	-
Floors	43	64

Table 2

Airborne sound insulation for internal walls: 40dB R_w (minimum value).

6.3 Noise Policy Statement for England

The Department for Environment, Food and Rural Affairs published the *Noise Policy Statement for England* (NPSE) in March 2010. The explanatory note of NPSE defines the terms used in the NPPF:

"2.20 There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

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.

2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur."

The NPSE does not define the SOAEL numerically, stating in paragraph 2.22:

NOISE IMPACT ASSESSMENT

"2.22 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors, and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

There is no local or national guidance on how the three terms should be defined numerically.

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.

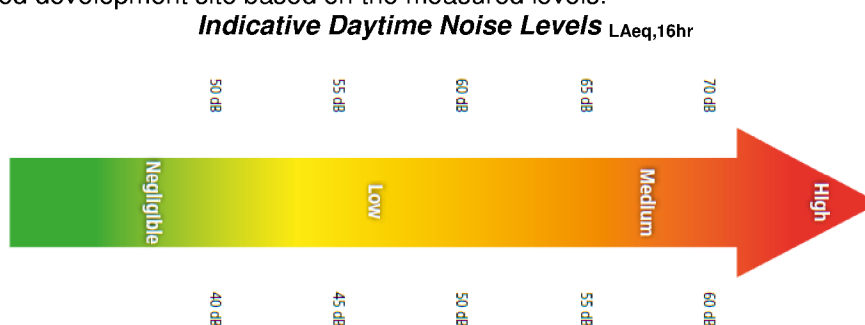
The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable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

This aim seeks, where possible, positively to improve health and quality of life through the proactive management of noise while also taking into account the guiding principles of sustainable development, 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.

6.4 ProPG Planning & Noise

Specific guidance on the assessment of noise affecting new residential development is given in ProPG. The process within the ProPG guidance for the appraisal of noise levels affecting new residential development is current 'best practice'. The assessment process can be summarised as follows:

Stage 1 – measure noise levels at the site and carry out an initial noise risk assessment of the proposed development site based on the measured levels.



Indicative Night-time Noise Levels L_{Aeq,8hr}

Stage 2 – where a higher noise risk is identified, carry out a detailed assessment including the following four considerations:

- Element 1 – the overall acoustic design and layout of the site
- Element 2 – internal noise levels in habitable areas
- Element 3 – noise levels in external amenity areas
- Element 4 – consideration of other relevant issues

Based on the results of the Stage assessment, provide a recommendation to the decision maker on whether planning permission can and should be granted.

NOISE IMPACT ASSESSMENT

6.5 BS 4142:2014+A1:2019

When considering if noise constitutes a nuisance, guidance may be taken from British Standard BS 4142:2014+A1:2019, which is a method of rating industrial noise affecting mixed residential and industrial areas and which provides a method of assessing the likelihood of complaints resulting from noise. Strictly speaking, BS 4142:2014+A1:2019 applies only to the noise of an industrial nature, but in the absence of any specific standard relating to noise from music, the underlying principle of BS 4142:2014+A1:2019 is often referred to by local authorities.

BS 4142:2014+A1:2019 essentially sets out a method of assessing the impact of noise, based on the difference between the “rating level” of the noise and the “background noise level” that would otherwise exist in the absence of the noise.

The “rating level” is derived by noise measurement at the assessment position and adding a correction of 5dB(A) if the noise has tonal elements or distinctive characteristics.

The standard suggests that the greater the difference by which the rating level exceeds the background noise the greater the likelihood of complaint. Where the noise exceeds the background by +5dB(A) it is considered to be of marginal significance, a difference of +10dB(A) gives an indication that complaints are likely and a difference of 10dB(A) below the background is an indication that complaints are unlikely.

6.6 ANC Residential Design Guide to Acoustics, Ventilation and Overheating

The ANC guide to acoustics, ventilation, and overheating provides an integrated approach to achieving good acoustic design with the ventilation requirements of Approved Document F and Approved Document O of the Building Regulations and consideration for overheating control.

This good practice document recognises the interdependence of ventilation and overheating when assessing noise, and provides a methodology for assessing the noise implications surrounding ventilation and overheating control.

NOISE IMPACT ASSESSMENT

7.0 BASELINE BACKGROUND NOISE SURVEY

7.1 Measurement Methodology

An unattended, 24-hour environmental noise survey was carried out on 14th January from 142:15 hrs till 14:15 hrs on the 15th January 2024 covering the front façade of the building. A series of continuous 15-minute background noise measurements were recorded over the aforementioned period. An attended, environmental noise survey was also carried out on 14th January 2025 from 11:00 hrs till 16.00 hrs covering the rear façade of the building. A series of continuous 1-minute background noise measurements were recorded over the aforementioned periods.

The figures below show the measurement positions marked on the existing block plan of the building and the actual measurement setup onsite.

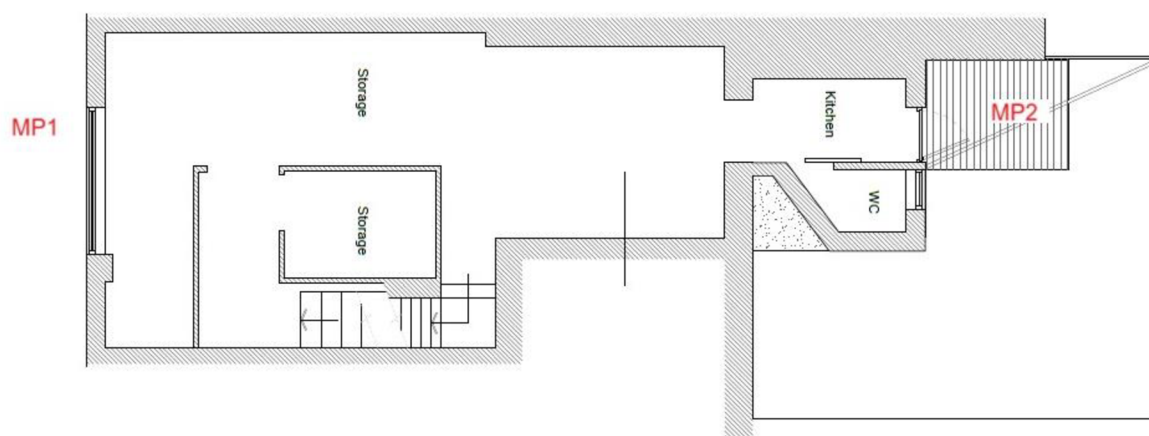


Figure 2 – Measurement positions; MP1 front and MP2 rear marked on Existing Plan

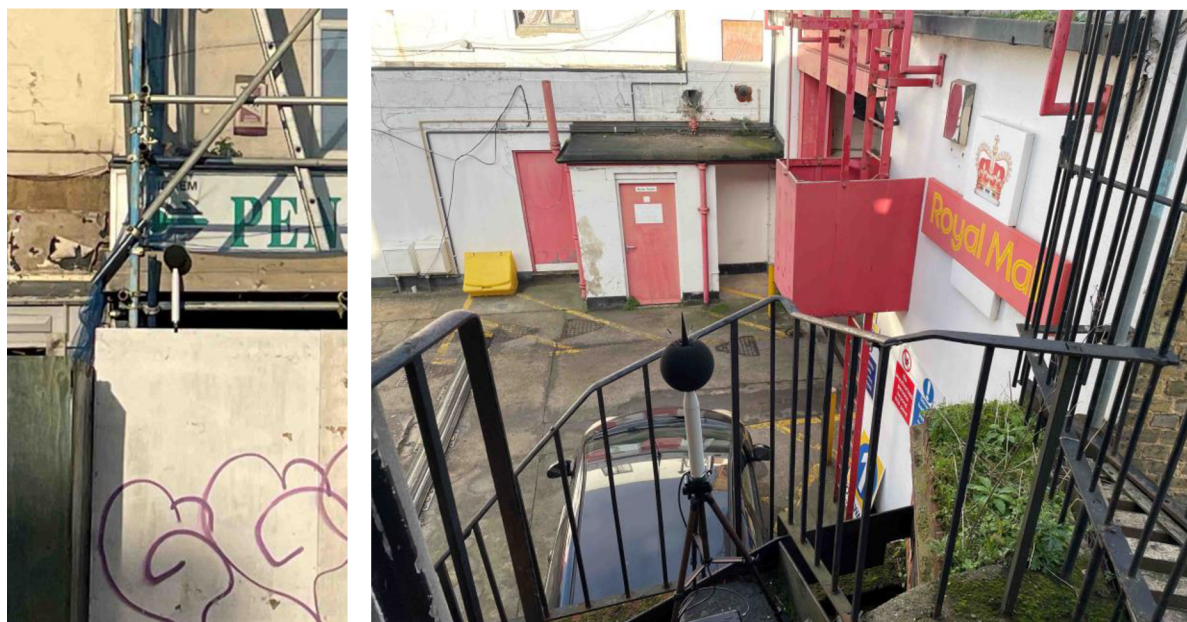


Figure 3 – Measurement positions; Actual setup at MP1 front (left) and MP2 rear (right)

The sound level meters were calibrated immediately before and after the measurements with an acoustic calibrator. The sound level meters at MP1 and MP2 were placed in an environmental case with

NOISE IMPACT ASSESSMENT

the microphone housed in the outdoor microphone enclosures, connected to the sound level meters via the extension cable. The microphone was fitted with a windshield and bird spike.

Details of equipment used, and weather conditions can be found in Appendix 4.

7.2 Results

The background noise levels at MP1 and MP2 are shown in Tables below. Level v time plot and the tabulated data for MP1 can be found in Appendix 5.

Date	Duration	L _{Aeq,T} dB	L _{A90,T} dB	Highest L _{AF} Max / Average L _{AF} Max dB
14/01/25	14:15 – 23:00	67.2	57.5	N/A
14/01/25 to 15/10/25	23:00 – 07:00	64.6	47.4	92.2 / 83.3
15/10/25	07:00 – 14:15	69.2	59.4	N/A

Table 3 – Summary of measured noise levels at MP1

Date	Duration	L _{Aeq,T} dB	L _{A90,T} dB	Highest L _{AF} Max / Average L _{AF} Max dB
14/01/2025	11:00 – 16:00	53.5	48.1	N/A

Table 4 – Summary of measured noise levels at MP2

It should be noted that within the duration of the noise survey, daytime short-term max levels of up to 99 dBA were recorded, as shown in the level v time plot in Appendix 5.

A closer analysis of the measured noise data revealed that the short-term max levels were due to the passage of vehicles with loud exhaust and some blue light - emergency vehicles activity on Milton Road. Some noise from loading and off-loading activity related to the commercial premises located in the vicinity of the site was also noted. No other unusual events appear to have occurred during the survey.

Based on the measured noise levels, the site falls into medium risk classification in terms of noise.

7.3 Evaluation of Results

The baseline noise survey recorded various noise sources including road traffic and the noise produced by the commercial activity in the vicinity of the site. In our view, the impact of commercial premises located to the rear of the site (Royal Mail car park) and other commercial premises such as the convenience store and café on Queens Street should also be considered as part of the noise impact assessment. As per information gathered on published opening hours of the aforementioned business around the site, none of these operates past 2300 hours, however there maybe nighttime activity at the aforementioned car park to the rear of the site. There is also existing HVAC plant associated to the business on Milton Road, which will be in direct line of sight to the proposed FF residential unit.

Therefore, the impact of noise generated by the aforementioned commercial premises and associated plant has been assessed in line with the BS4142:2014+A1:2019 criteria. The principles of a BS4142:2014 assessment are summarised in section 6.

The table below sets out the assessment of the potential impact of the commercial activities, in proximity of the proposed development. As there is intermittent and impulsive noise from the commercial activity at the rear car park, noises associated to loading and unloading activities associated with the convenience store, and HVAC plant associated with business on Milton Road, this

NOISE IMPACT ASSESSMENT

has been accounted for in the BS4142:2014+A1:2019 assessment and the following penalties have been added to the measured noise levels at MP2.

Commercial Activity	Correction
Correction for tonality	N/A
Correction for intermittency	+3
Correction for impulsivity	+3
Other sound characteristics	+3

Table 5 – BS 4142 Penalty & Correction

The A-weighted sound pressure level alone cannot be used to define a spectrum or to compare sounds of different frequencies for the assessment of laboratory-measured or predicted figures of construction types and materials.

Therefore, we have evaluated the frequency spectrum of the measured noise data by analyzing the histogram for the modal averaged, un-weighted (Leq, ff) overall day, night, and night-time maximum incidence free-field noise figure in octave bands, presented in the following table below. Leq, ff noise levels are taken as the continuous equivalent free-field sound pressure level outside the habitable room elements under consideration.

These correspond to the highest reliable readings taken for the day and night periods and correspond to free-field sound data outside the development with the penalties and corrections, to be used for the purposes of sound insulation design for both the front and rear façades of the development.

Octave Bands	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	A
Day-time (16hr)	74.5	62.6	61.4	62.6	65.4	62.1	56.9	69
Night-time (8hr)	65	56	55	58	62	58	49	65
Night-time Max	87	85	85	84	83	80	78	88

Table 6 – Assessment Spectrum, Un-weighted (Leq, ff)

The next section discusses the sound insulation required based on the external noise data using the detailed calculation method in Annex G of BS 8233:2014.

8.0 PROPOSED CONVERSION & EXTENSION

The proposed scheme involves ground floor rear extension to extent the retained ground floor commercial unit and conversion of the first and second floor to create a two-bedroom self-contained flat, as shown on architect's drawings, extracts of which are shown in the figures below.

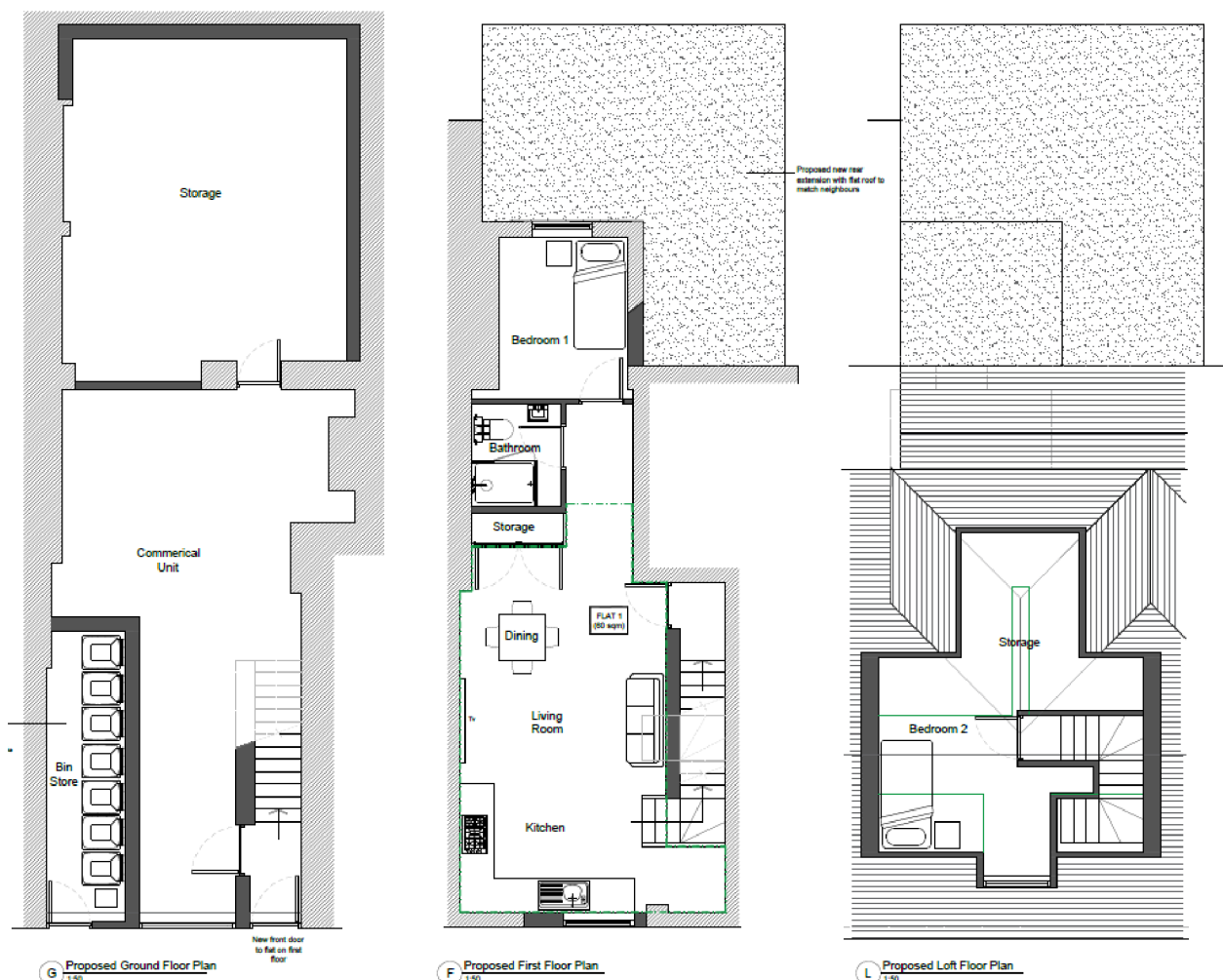


Figure 4 – Proposed General Arrangement Plans

8.1 Design Criteria

This section discusses the sound insulation requirements based on external and internal noise. The calculations are made using the detailed method in BS8233:2014 as discussed in previous sections of this report.

Based on our experience of similar developments where there are residential units adjoining or, in this case, directly stacking above the ground floor commercial unit, the local authority will be looking for an enhanced airborne sound insulation criterion compared to the minimum ADE requirements. between the commercial unit and the newly converted flat.

Based on the information gathered during the site visit, there is sufficient floor to ceiling height at ground floor level to apply the necessary acoustic treatment from below to achieve up to +7 dB enhanced sound insulation criteria between the ground and first floor.

NOISE IMPACT ASSESSMENT

This equates to minimum airborne sound insulation of 50 dB DnTw + Ctr. A reciprocal minimum impact sound insulation would be 57 dB LnTw.

Furthermore, in addition to the enhanced ADE design criteria, the noise break-in from the day and night-time traffic and other sources of noise will also form part of the design criteria for the proposed sound insulation of all external and internal separating elements in the building.

In the following sections, the proposed details to enhance the sound insulation of the building and the separating construction is presented to achieve the required sound insulation and mitigate against external and internal noise.

It is important that the junction between the floor, wall, and ceiling is acoustically sealed without compromising the resilient fixings. Sound insulation critical construction requires attention to detail and good workmanship which must be monitored throughout construction.

Therefore, it is imperative that the manufacturer's guidelines are followed fully. Guidelines in Appendix 3 also provide useful information to provide and maintain the acoustic integrity of the proposed construction.

8.2 New Cavity Perimeter Walls

The minimum specification of the new cavity perimeter walls is a brick outer leaf or 100mm Solid Concrete block, cavity (partially filled with insulation) 100mm solid concrete block inner leaf with insulated plasterboard lining on dabs with a skim finish.

In order to reduce vertical flanking transmission between floors, the minimum recommended block density for the inner leaf to be no less than 2200 Kg/m³ with a minimum 50mm APR 1200 insulation in the cavity, throughout, with acoustic cavity stop barriers at the floor junction.

A typical cavity wall construction is shown in the figure below. See Appendix 2 for details.

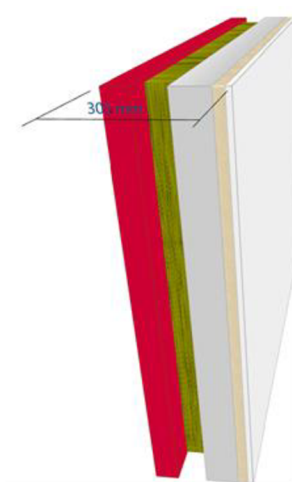


Figure 5 – Typical cavity wall makeup of new perimeter wall

8.3 Acoustic Treatment to Existing Walls

The existing walls, including walls to the adjoining properties appears to be of brick/block construction with render plaster. We do not know the exact make-up or density of these walls, however, on visual inspection, the inner leaf of the internal perimeter wall is lined with a plaster finish.

The minimum proposed acoustic treatment to upgrade the perimeter walls on all sides of the building adjoining existing party walls is to install a minimum 2 x 12.5mm SoundBloc® plasterboard (or equal

NOISE IMPACT ASSESSMENT

approved), installed on metal framing such as Gyproc liner GL1 (or equal approved) with 25mm Isover APR 1200 insulation in the cavity throughout on all sides.

Information on Gyproc lining systems can be found at <https://www.british-gypsum.com/literature/white-book/linings/gyplyner-universal>

All manufacturer guidance to be followed in full. See Appendix 2 for sound insulation data and the technical information on acoustic wall lining.

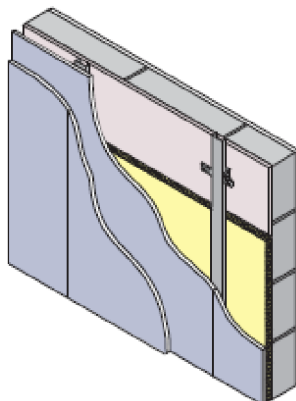


Figure 6 – Typical acoustic wall lining detail

8.4 Acoustic Treatment to Separating Floor between GF & FF

To achieve the enhanced sound insulation through the separating floors between the ground and first floor level, the minimum recommended specification for separating floors is a primary and independent acoustic suspended ceiling arrangement. Therefore, the minimum recommended acoustic treatment for the existing construction is to install 100mm Rockwool RW45A (or equal approved) insulation between the existing joist and then install 2 x 12.5mm SoundBloc® or FireLine® plasterboard (or equal approved) to the underside of existing joists on resilient bars (optional) and acoustically seal throughout.

From below, install an independent suspended ceiling on metal (MF system) or timber framing with a minimum of 100mm gap with Install 100mm Rockwool RW45A (or equal approved) insulation in the cavity with 2 x 12.5mm SoundBloc® or FireLine® plasterboard (or equal approved) to the underside of the framing. This treatment to be installed throughout on ground floor and between any associated understairs areas and communal areas.

Typical detail of a primary and independent suspended ceiling is shown in the figure below.

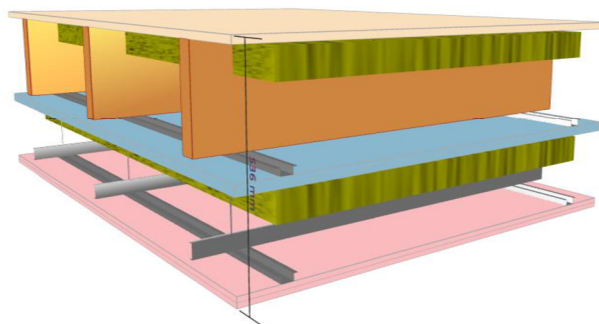


Figure 7 - Typical Primary and Independent Ceiling Construction



Figure 8 - Typical independent MF ceiling

Information on British Gypsum CasoLine MF® ceiling system can be found at <https://www.british-gypsum.com/white-book-system-selector/systems-overview/floors-and-ceilings/casoline-mf?tab0=0>. All manufactures guidance to be followed in full.

8.5 Acoustic Treatment to Roof & Dormer

To mitigate against external noise and to achieve the BS8233:2014 compliant internal noise levels at the second floor level, the minimum recommended acoustic treatment to the underside of the roof and the formation of dormers is to install a minimum of 2 x SoundBloc® plasterboard (or equal approved) with a resilient layer and mass load membrane to the underside of the joists on resilient bars to form the inner ceiling and perimeter walls of the second floor part of the flat.

See typical detail below and Appendix 2 for performance details.

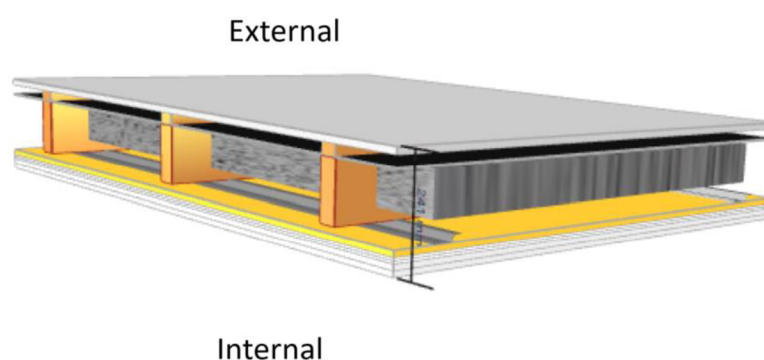


Figure 9 - Typical Roof and Dormer Construction

8.6 Doors

Interfaces between walls and all other adjacent elements should be built to ensure that the sound insulation performance of the wall is not compromised. All gaps should be tightly packed with mineral wool and all joints should be sealed with a flexible sealant, such as frame grade acoustic sealant.

Where a degree of sound insulation is deemed necessary, doors with rated acoustic performance would be required. The minimum recommended door specification for residential flat entrance doors to be minimum R_w 30 (dB). Typically, this can be achieved by a solid core timber door with high-quality acoustic perimeter and threshold seals (or equal approved).

The recommended minimum specification for all internal doors within the flats is R_w 25-27 (dB). Typically, this can be achieved by a solid core timber door, foam tape seals around the perimeter.

NOISE IMPACT ASSESSMENT

8.7 Glazing

In line with the assessment noise levels in table 6, the minimum glazing specification for all windows to be **38 dB Rw + Ctr** for both facades, to achieve the internal noise levels against known sources of noise.

This can be achieved by 10mm | 16mm argon filled gap | 8.8 Pilkington Optiphon™ acoustic laminate glass (or similar approved) double-glazed units. See appendix 2 for more details.

Glazing manufacturers and installers must provide certificates that their windows will meet the required sound insulation standard; the performance must be for the whole window and not just the glass. The full sound insulation value of any window cannot be realized if there are air gaps. These commonly occur around frames due to insecure fixing, shrinkage of wood, and poor maintenance.

A double-glazed unit must be used in a frame with good seals to realize its full insulating potential. Any gaps or poor fitting could reduce the glazing performance by up to 10 dB.

The design of the glazed units may use vents or trickle vents. Any trickle ventilators or vents to be fitted should be acoustically lined with a minimum performance of **Dn,e,w (C;Ctr) = 42 (-2;-3) dB**, in its open position.

8.8 Ventilation

It is clear from the noise survey results that internal noise levels cannot be achieved with windows opened on all facades, even partially, for both the day and night-time periods.

The BS8233:2014 states that if internal noise standards are achieved only with windows closed an alternative means of ventilation should be provided. The standard states that an open window will provide 10-15dB of sound attenuation.

Approved Document F (ADF) of the Building Regulations has four template systems for ventilation and the description of these systems is in the table below.

Ventilation System	Whole Dwelling Ventilation	Extract Ventilation	Purge Ventilation
System 1: Background ventilators and intermittent extract fans	Background ventilators (trickle vents)	Intermittent extract fans	Typically provided by opening windows
System 2: Passive stack (natural)	Background ventilators (trickle vents) and passive stack ventilation	Continuous via passive stack	Typically provided by opening windows
System 3: Continuous mechanical extract (MEV)	Continuous mechanical extract – minimum low rate Trickle vents provide inlet air	Continuous mechanical extract – minimum high rate Trickle vents provide inlet air	Typically provided by opening windows
System 4: Continuously mechanical supply and extract with heat recovery	Continuous mechanical extract – minimum low rate	Continuous mechanical extract – minimum high rate	Typically provided by opening windows

Table 7

NOISE IMPACT ASSESSMENT

In this case, a mechanical extract or supply & extract should be used as part of the ventilation strategy the noise from such systems should be controlled so as not to cause an unacceptable rise in internal noise levels. The following table proposes indoor ambient noise levels from mechanical services.

Ventilation Condition	Possible ADF System	Desirable Internal Ambient Noise Levels from Mechanical Services
ADF- Whole Dwelling Ventilation	System 3 System 4	Bedrooms $\leq L_{Aeq}$ 26dB Living Rooms $\leq L_{Aeq}$ 30dB
ADF- Extract Ventilation	System 1 System 3 System 4	Bedrooms $\leq L_{Aeq}$ 26dB Living Rooms $\leq L_{Aeq}$ 30dB Bathroom/WC/Kitchen $\leq L_{Aeq}$ 45dB
ADF- Purge Ventilation	Manually controlled fan exchanging a minimum of 4 air changes per hour	No desirable noise levels are proposed

Table 8

In addition to the ADF systems, there are further passive ventilation design options to provide increased thermal comfort without opening windows. The options are to install plenum or attenuated windows, which due to their design for allowing airflow into the room provide a higher level of sound reduction in comparison to standard opening windows. A second option is the use of attenuated vents in the building structure. These vents are built into the structure of the building and are much larger than trickle vents, allowing a higher degree of passive ventilation. The following table sets out examples of passive ventilators, which provide enhanced sound insulation.

The table is taken from the ANC-AVO Guidance.

Design Option	Description	Approximate level difference	Improvement relative to a window providing a similar amount of ventilation
Standard opening windows	Windows are sufficiently open to provide a ventilation free-area equivalent to 2% of the floor area	13dB	0
Attenuated or plenum windows	Dual windows (spaced by around 200mm) with staggered openings and absorptive linings to the cavity reveals. Various other configurations are also possible	17 – 23dB	4 – 10dB
Attenuated vents/louvers	Ventilation openings with integral means of attenuation sound. Typically, this may be acoustic louvers or acoustically lined ducts/plena	17 – 29dB	4 – 16dB

Table 9

To maintain suitable internal noise levels, the minimum required ventilation should be provided when windows are closed. Windows should not be sealed, but openable for times when purge ventilation is required (examples given in Approved Document F including purging of fumes from burnt food when cooking, or removal of fumes when painting).

NOISE IMPACT ASSESSMENT

To stairwells, no specific acoustic measures would be necessary, and standard trickle vents would be appropriate. Ventilation to habitable rooms will require acoustically treated ventilation.

System 4 type, MVHR is designed to provide each flat, in this case, each room with a whole house supply and extract ventilation. This comprises of mechanical unit/s that provide both supply and extract to each apartment individually; whereby inlet and outlet ducts would need to be run to the façade or in a riser to the roof. This type of system can also be incorporated with heat recovery built in if desired.

If heat recovery is to be used, then a summer override switch is advisable. Some systems switch to boost mode when wet rooms or kitchens within individual rooms/flats are in use. This can potentially lead to noise levels in bedrooms increasing above the criteria when the bathroom or kitchen is used and boost mode is operational. To combat this there are three options:

- Use separate fans for bedrooms and bathrooms/kitchens, to avoid an increase in noise levels throughout the flat when one room is used and to give greater controllability.
- The system can be designed with a manual override switch to avoid this boost mode occurring at night.

As an alternative to a ducted MVHR unit, information on an acoustically attenuated ventilator for habitable room such as Titon Sonair is included in Appendix 2 for reference. This type of system maybe also be suitable for this development.

8.9 External Amenity Areas

There is no external amenity area associated with the proposed development.

Mr Rajwinder Singh

2 Milton Road, Gravesend, Kent DA12 2RE

NOISE IMPACT ASSESSMENT

9.0 SUMMARY AND CONCLUSIONS

Sonic Element Ltd. has undertaken an assessment of external and internal noise on behalf of Mr Rajwinder Singh. Sonic Element Ltd. is a member organisation of the Association of Noise Consultants and all our consultants and engineers are full and corporate members of The Institute of Acoustics.

The property for which this report has been prepared is known as 2 Milton Road, Gravesend. The environmental noise measurements were carried out on the 14th January 2025.

The assessment is based on BS8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings, The WHO guidelines and Part E of Building Regulations – The Approved Document E and planning requirement of the local authority relating to the proposed development.

Acoustic treatment to upgrade the existing fabric of the building and the formation of all new building elements is proposed to mitigate against the noise break-in from external sources of noise to provide internal noise levels to comply with the BS8233:2014 and WHO recommended levels.

Based on the noise data acquired by direct measurement, if the proposed façade and internal acoustic treatment is installed with due care, as per guidance included in Appendix 3 of this report, the required enhanced acoustic separation criteria will be met and the noise break-in from external sources of noise will be controlled to meet NPSE NOEL conditions.

APPENDIX 1 – ACOUSTIC TERMINOLOGY

Decibel (dB) – This is the unit used to measure sound level. The range of human hearing from the quietest detectable sound to the threshold of pain is very large. If a normal linear scale of measurement were used, it would have to range from 20 μPa to 200,000,000 μPa . Using such large figures would be unmanageable and for this reason, sound pressure levels are expressed on a logarithmic scale, which corresponds to the almost logarithmic response of the ear and which compresses the range to a manageable 0dB to 140dB.

Sound Pressure Level (Lp or SPL) – This is a function of the source and its surroundings and is a measure in decibels of the total instantaneous sound pressure at a point in space. The SPL can vary both in time and in frequency. Different measurement parameters are therefore required to describe the time variation and frequency content of a given sound. These are described below.

Frequency – This refers to the number of complete pressure fluctuations or cycles that occur in one second. Frequency is measured in Hertz (Hz). The rumble of thunder has a low frequency, while a whistle has a high frequency. The sensitivity of the ear varies over the frequency range and is most sensitive between 1KHz and 5KHz.

'A' Weighting – The sensitivity of the human ear varies with frequency, some frequencies sound louder than others. The 'A'-weighting curve represents the nonlinear frequency response of the human ear and is incorporated in an electronic filter used in sound level meters. Measurements using an 'A'-weighting filter makes the meter more sensitive to the middle range of frequencies, which approximates to the response of the ear and the subjective loudness of the sound. Sound level measurements using 'A'-weighting will include the subscript A, e.g. dB(A).

Statistical Analysis - These figures are normally expressed as LN, where L is the sound pressure level in dB and N is the percentage of the measurement period. The LN figure represents the sound level that is exceeded for that percentage of the measurement period. L90 is commonly used to give an indication of the background level or the lowest level during the measurement period. L10 may be used to measure road traffic noise.

Leq,T - The equivalent continuous sound level is used to measure sound that varies with time. The Leq,T is the notional equivalent steady sound level, which contains the same acoustic energy as the actual varying sound level over the period of measurement. Because the averaging process used is logarithmic, the Leq,T level tends to be dominated by the higher sound levels measured.

Octave and Third Octave Bands - The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of the noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third-octave bands provide a fine resolution by dividing each octave band into three bands. For example, third-octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

Level Difference, D - This is defined as the difference in decibels between the average sound pressure level in a source room on one side of a separating structure and the average sound pressure level in a receiving room on the other side. The level difference is an absolute measure of the sound insulation of a separating structure.

Standardised Level Difference, D_{nT} - This is a measure of the level difference, corresponding to a reference value of the reverberation time in the receiving room. A correction term of ten times the common logarithm (to base 10) of the ratio of the actual reverberation time to the reference reverberation time is added to the level difference, D. For residential dwellings the reference reverberation time is 0.5s. The D_{nT} is measured in decibels. It is used as an airborne noise measurement parameter in sound insulation tests.

NOISE IMPACT ASSESSMENT

Reverberation Time, T - The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level, once the noise source has stopped. It is measured in seconds. Often a 60 dB decay can not be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

Standardised Impact Sound Pressure Level, L'_{nT} - This is a measure of the average noise level in a receiving room generated by use of a standard impact source on a separating floor reduced by a correction term corresponding to a reference value of the reverberation time. A correction of ten times the common logarithm (to base 10) of the ratio of the actual reverberation time to the reference reverberation time is subtracted from the received average noise level. For residential dwellings the reference reverberation time is 0.5s. The L'_{nT} is measured in decibels. It is used as an impact noise measurement parameter in sound insulation tests.

Airborne Single Number Quantity Weighting - This is a weighting procedure defined in BS EN ISO 717, Part 1 for converting third octave band R , R' , D and D_{nT} values to a single number quantity denoted as R_w , R'_w , D_w or $D_{nT,w}$. It is a decibel value.

Impact Single Number Quantity Weighting - This is a weighting procedure defined in BS EN ISO 717, Part 2 for converting third octave band L'_{nT} values to a single number quantity denoted in $L'_{nT,w}$. It is a decibel value.

Spectrum Adaptation Term C_{tr} - This is a correction factor calculated from the measured R_w , R'_w , $D_{nT,w}$ and the corresponding third octave band R , R' and D_{nT} values. It uses a set of weighting levels in third octave bands derived from a road traffic noise spectrum. It is applied to airborne test results and is measured in dB.

Noise Rating (NR) - The 'A' weighted sound pressure level cannot be used to define a spectrum or to compare sounds of different frequencies. NR curves convey frequency information in a single-figure index. This is done by defining the highest measured or specified sound pressure level at each frequency for each curve. To measure the noise rating of a given environment, the SPL is measured in octave or one-third octave bands and the noise rating is then the highest NR curve touched by the measured levels. The following table lists the 1/1 octave band frequency values from NR0 to NR100.

Noise Rating Curves (NR) in Octave Bands									
Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000
NR0	55.4	35.5	22	12	4.8	0	-3.5	-6.1	-8
NR5	58.8	39.4	26.3	16.6	9.7	5	1.6	-1	-2.8
NR10	62.2	43.4	30.7	21.3	14.5	10	6.6	4.2	2.3
NR15	65.6	47.3	35	25.9	19.4	15	11.7	9.3	7.4
NR20	69	51.3	39.4	30.6	24.3	20	16.8	14.4	12.6
NR25	72.4	55.2	43.7	35.2	29.2	25	21.9	19.5	17.7
NR30	75.8	59.2	48.1	39.9	34	30	26.9	24.7	22.9
NR35	79.2	63.1	52.4	44.5	38.9	35	32	29.8	28
NR40	82.6	67.1	56.8	49.2	43.8	40	37.1	34.9	33.2
NR45	86	71	61.1	53.6	48.6	45	42.2	40	38.3
NR50	89.4	75	65.5	58.5	53.5	50	47.2	45.2	43.5
NR55	92.9	78.9	69.8	63.1	58.4	55	52.3	50.3	48.6
NR60	96.3	82.9	74.2	67.8	63.2	60	57.4	55.4	53.8
NR65	99.7	86.8	78.5	72.4	68.1	65	62.5	60.5	58.9
NR70	103.1	90.8	82.9	77.1	73	70	67.5	65.7	64.1
NR75	106.5	94.7	87.2	81.7	77.9	75	72.6	70.8	69.2
NR80	109.9	98.7	91.6	86.4	82.7	80	77.7	75.9	74.4
NR85	113.3	102.6	95.9	91	87.6	85	82.8	81	79.5
NR90	116.7	106.6	100.3	95.7	92.5	90	87.8	86.2	84.7
NR95	120.1	110.5	104.6	100.3	97.3	95	92.9	91.3	89.8
NR100	123.5	114.5	109	105	102.2	100	98	96.4	95

APPENDIX 2 – TYPICAL ACOUSTIC TREATMENT DETAILS

Sound Insulation Prediction (v9.0.22)

Program copyright Marshall Day Acoustics 2017

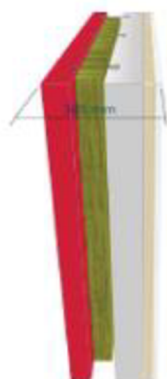
Margin of error is generally within $R_w \pm 3$ dB

- Key No. 6509



Initials: Sonic Element Ltd

Notes:



R_w	55 dB
C	0 dB
Ctr	-2 dB

Mass-air-mass resonant frequency = 20 Hz

Panel Size = 2.7 m x 4.0 m

Partition surface mass = 320 kg/m²

System description

Panel 1 : 1 x 70 mm Brick

Frame: Butterfly Tie (90 mm x 45 mm), Stud spacing: 600 mm; Cavity Width 50 mm, 1 x Fibreglass (10kg/m³) Thickness: 75 mm

Panel 2 : 1 x 100 mm Concrete Block

+ 1 x 15 mm Gypoc Wallboard 15mm

+ 1 x 25.9 mm Kingspan KS1000 RW 30/40mm

freq.(Hz)	R(dB)	R(dB)
50	40	
63	43	42
80	45	
100	47	
125	48	48
160	50	
200	51	
250	51	50
315	48	
400	47	
500	47	48
630	50	
800	54	
1000	57	56
1250	60	
1600	64	
2000	67	66
2500	71	
3150	74	
4000	78	77
5000	81	

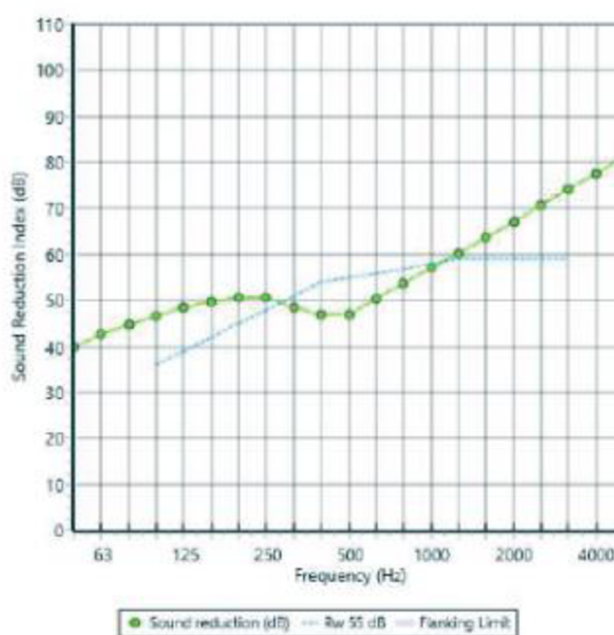


Figure 10 – New Cavity Walls

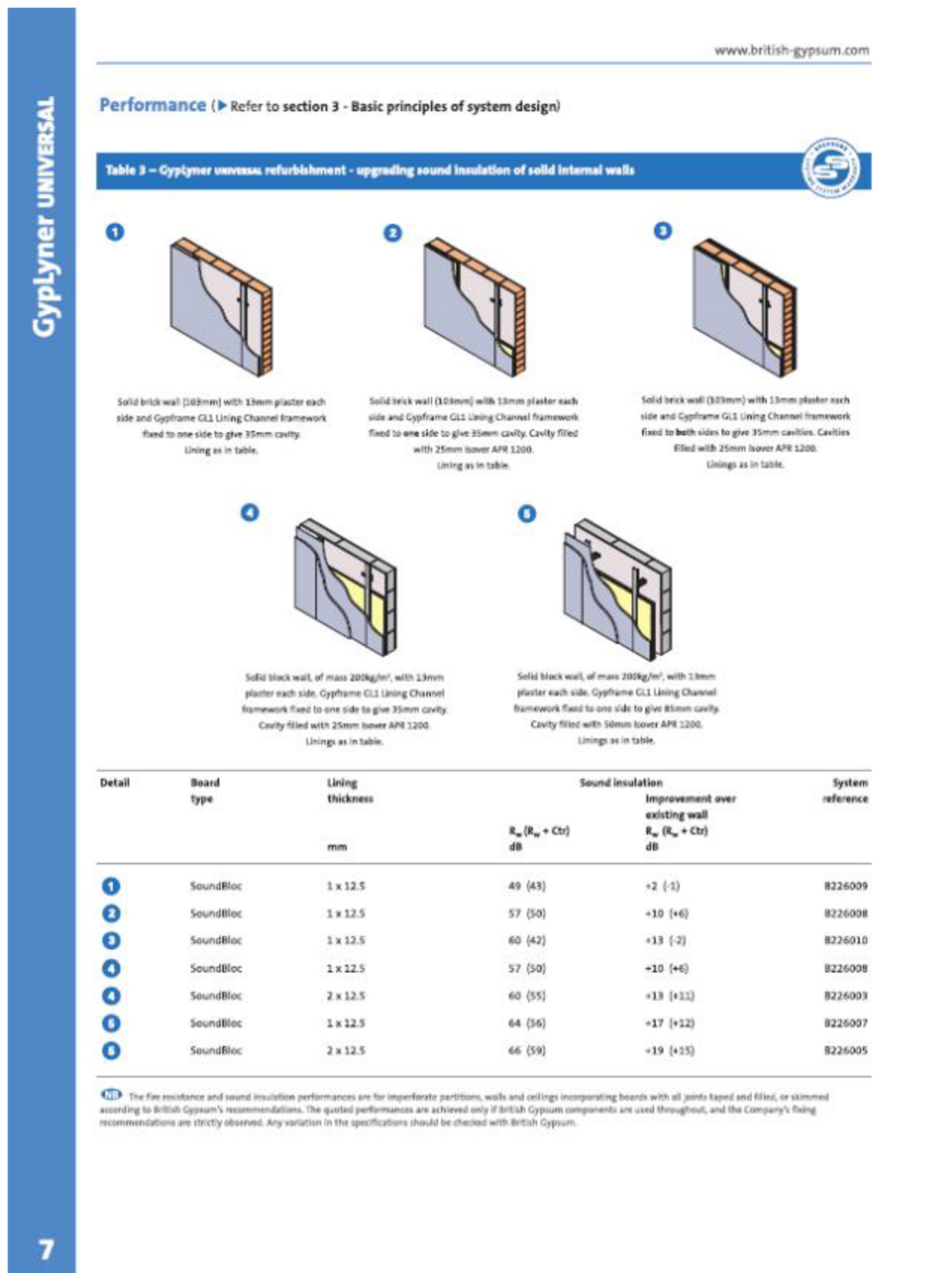


Figure 11 –Acoustic Wall Lining to Perimeter Walls

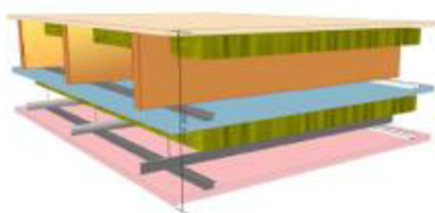
Sound Insulation Prediction (v9.0.22)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within $R_w \pm 3$ dB
- Key No. 6509

Initials: Sonic Element Ltd



Notes:



R_w 61 dB
C -1 dB
Ctr -3 dB

Mass-air-mass resonant frequency = ≈ 0 Hz, 0 Hz

Panel Size = 2.7 m x 4.0 m

Partition surface mass = 53.7 kg/m²

System description

Panel 1 : 1 x 17.5 mm Plywood

Frame: Solid Joist with resilient rail (2.5E2 mm x 45 mm), Stud spacing: 600 mm; Cavity Width 268 mm, 1 x Fibreglass (10kg/m³) Thickness: 75 mm
Panel 2 : 2 x 12.5 mm Siniat GTEC dB Board 12.5mm

Frame: Suspended Light Steel Grid (2E2 mm x 45 mm), Stud spacing: 600 mm; Cavity Width 200 mm, 1 x Fibreglass (10kg/m³) Thickness: 75 mm
Panel 3 : 2 x 12.5 mm Siniat GTEC Fire Board 12.5mm

freq.(Hz)	R(dB)	R(dB)
50	20	
63	38	25
80	44	
100	47	
125	49	49
160	51	
200	53	
250	54	54
315	56	
400	57	
500	59	59
630	60	
800	61	
1000	61	61
1250	60	
1600	64	
2000	64	64
2500	63	
3150	65	
4000	72	68
5000	74	

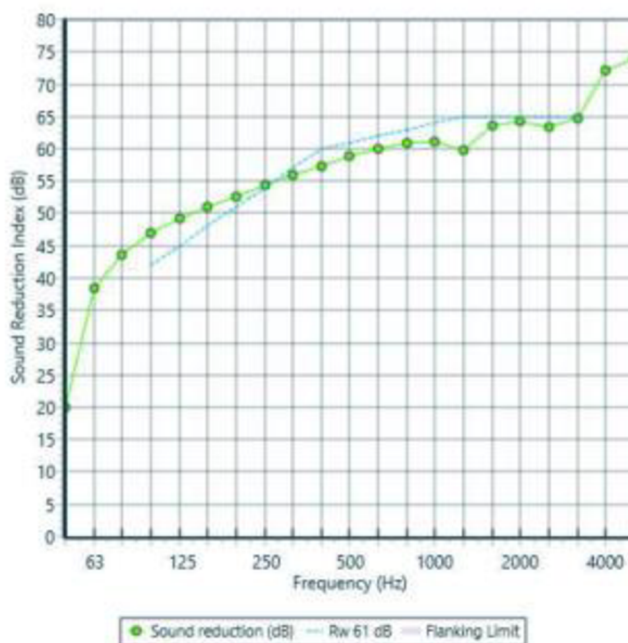


Figure 12 – Typical Separating Floor Detail GF & FF

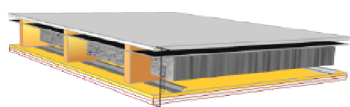
Mr Rajwinder Singh

2 Milton Road, Gravesend, Kent DA12 2RE

NOISE IMPACT ASSESSMENT

Sound Insulation Prediction (v10.0.3)

Program copyright Marshall Day Acoustics 2017 | Margin of error is generally within $R_w \pm 3$ dB



R_w 60 dB

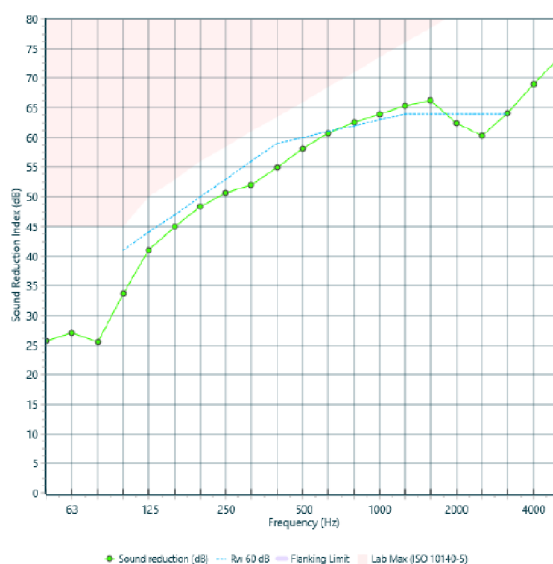
C -3 dB

Ctr -9 dB

System description

Panel 1 1 x 14 mm Roofing tiles
Frame Timber stud (25 mm x 40 mm), Stud spacing 600 mm, Cavity Width 25 mm + (Empty cavity)
Panel 2 1 x 2 mm Nuraply waterproof membrane
Frame Solid Joist with resilient rail (132 mm x 45 mm), Stud spacing 600 mm, Cavity Width 150 mm + 100 mm Rockwool (120kg/m³)
Panel 3 1 x 12.5 mm Particle Board + 2 x 12.5 mm Gyproc SoundBloc 12.5mm
Details Panel Size 2.7 m x 4.0 m, Partition surface mass = 77.6 kg/m², Mass-air-mass resonant frequency = 31 Hz, 254 Hz

freq (Hz)	R(dB)	Roct (dB)
50	26	
63	27	26
80	26	
100	34	
125	41	37
160	45	
200	48	
250	51	50
315	52	
400	55	
500	58	57
630	61	
800	63	
1000	64	64
1250	65	
1600	66	
2000	62	62
2500	60	
3150	64	
4000	69	67
5000	73	



- Key No. 6509 | Initials: | File Name:Roof and Dormer.dlx

Figure 13 – Typical Roof & Dormer Detail

Sound insulation data for Pilkington Optiphon™

Glass	Sound reduction index (dB)									
	Octaveband Centre Frequency (Hz)						R _w (C; C _{tr})	R _w	R _w +C	R _w +C _{tr}
	125	250	500	1000	2000	4000				
Single glazing										
6.8 mm Pilkington Optiphon™	22	26	31	37	40	40	36 (-1; -4)	36	35	32
8.8 mm Pilkington Optiphon™	27	29	34	38	40	43	37 (0; -2)	37	37	35
10.8 mm Pilkington Optiphon™	26	30	35	39	40	46	38 (-1; -3)	38	37	35
12.8 mm Pilkington Optiphon™	29	32	36	41	42	51	40 (-1; -3)	40	39	37
16.8 mm Pilkington Optiphon™	31	33	38	41	43	54	41 (-1; -3)	41	40	38
Insulating glass units										
6 mm / 16 mm argon / 6.8 mm Pilkington Optiphon™	21	28	37	48	48	54	40 (-2; -6)	40	38	34
6 mm / 16 mm argon / 8.8 mm Pilkington Optiphon™	25	27	38	48	47	55	41 (-2; -6)	41	39	35
8 mm / 16 mm argon / 8.8 mm Pilkington Optiphon™	21	30	39	47	50	55	42 (-3; -8)	42	39	34
10 mm / 16 mm argon / 8.8 mm Pilkington Optiphon™	28	31	42	45	50	58	44 (-2; -6)	44	42	38
10 mm / 20 mm argon / 8.8 mm Pilkington Optiphon™	28	36	43	47	49	58	46 (-2; -6)	46	44	40
8.8 mm Pilkington Optiphon™ / 16 mm argon / 12.8 mm Pilkington Optiphon™	28	36	45	53	56	64	48 (-2; -7)	48	46	41
10.8 mm Pilkington Optiphon™ / 24 mm argon / 16.8 mm Pilkington Optiphon™	35	41	48	53	55	65	52 (-2; -6)	52	50	46
12.8 mm Pilkington Optiphon™ / 20 mm argon / 16.8 mm Pilkington Optiphon™	35	45	49	50	54	65	51 (-1; -4)	51	50	47

Measurements undertaken in accordance with BS EN ISO 10140 and R_w (C; C_{tr}) determined in accordance with BS EN ISO 717-1.

For insulating glass units, there is little difference in the sound insulation for cavity widths in the range 6 to 16 mm.

To calculate performance data for Pilkington products, please use our Spectrum online calculator at <https://spectrum.pilkington.com/>

For glass combinations to achieve an R_w value higher than 52 dB, please contact us for more details.

Figure 14 – Glazing Specification

Note: The proposed construction was modelled utilising sound insulation modelling software Insul™ (Marshall Day Acoustics). The software quotes error margins of ± 3dB for airborne and ± 5dB for impact predictions. It should be noted that modelled results are given as a weighted sound reduction index, R_w, as predictions are considered under laboratory conditions. Predictive modelling of separating elements for sound insulation is a useful tool in predicting sound insulation performance, however, there is a degree of uncertainty of the number of variables that affect performance in the real world. The recommendations in this report have taken into account the margin of error and the uncertainty to meet the required criteria.

Sonair
Acoustic (sound attenuating) filtered air supply units



For use fitted through walls

Sonair provides mechanical input ventilation when switched on, when switched off provides background trickle ventilation which includes a controllable shutter.

Sonair is a wall mounted input fan featuring touch control with an LCD display.

- Sonair F+ ventilates and cleans the air
- Independently tested by the BRE
- Exceptional sound attenuation (up to 56dB*)
- Air cleaning
- Low energy



Features & Benefits

- Meets guidelines for occupant accessibility
- Increase occupant awareness of system operation
- Discreet design
- Supplied with a flexible cable and a 13 amp plug

Performance

Full test details available on request
Input airflow rate (m³/h) – 28-225

Acoustic D_{s,w} (*) – 55/56* (Sonair F+).

*depends on filter

Tested to the 'Noise Insulation Regulations'.

Background ventilation rate of 2500EA when the unit is switched off and the shutter is open.

Product	Product Code
Sonair F+ including G3/ISO Coarse 45% Filter	S103SAUK
Sonair Filter G3/ISO Coarse 45%	F211
Sonair Filter F6/ISO ePM2.5 50%	F209



Figure 15 – Acoustic Data for Localised Ventilation System for Habitable Rooms

APPENDIX 3 – CONSTRUCTION GUIDELINES

Need for good workmanship

The sound insulation of a wall relies as much on the detailed construction as on the materials. In this building, we are proposing to use lightweight acoustic material and detailing to provide very high levels of sound insulation. In such critical applications, small errors or imperfections can have a surprisingly large effect on sound insulation. For example, a crack only 300 mm long by 6 mm wide can reduce the sound level difference between two rooms from 50 to 42 dB at high frequencies.

For this reason, a high standard of workmanship will be required. Only operatives trained in this type of work should be used, and the Contractor should operate a rigorous quality control and inspection procedure. The following notes are for the guidance of the Contractor only and are additional to the requirements set out in the architect, structural engineer and manufacturers specification. In the event of any apparent conflict between this document and the specifications, the contractor should seek guidance from the architect.

Materials

Blocks, brickwork, and plasterboard should be of the mass and type specified. Broken, cracked, chipped, or otherwise defective blocks, bricks, and boarding material should not be used.

Construction and configuration

All acoustically critical walls should be built full-height to the structural soffit. The join with the soffit should be detailed for expansion joints described below. Apertures not shown on the drawings should not be made, and walls should not be chased or cut without the consent of the acoustics consultant and architect. Lintels and other elements incorporated in the depth of the wall should be of at least the same surface mass as the rest of the wall.

No debris should be allowed to fall into the cavity between leaves of any acoustically critical double-leaf wall.

Joins with door frames, window frames, and other elements

It is important that there are no weaknesses or gaps at these points. Individual details will depend on the type of frame or door set used. Door and window suppliers will normally provide proposals for constructions to maintain the acoustic integrity of the door sets and windows. Proposed details should be submitted by the contractor for design team approval.

In general, all such joins should be airtight. Any gaps of more than 15 mm should be completely filled with grout, and smaller gaps should be tightly packed with mineral wool and sealed with a continuous non-hardening mastic bead at least 15 mm deep.

Expansion joints

Expansion, movement, or similar joints should only be incorporated as approved by the architect or structural engineer. These should be less than 15 mm wide, tightly packed with mineral wool, and sealed on either side of the wall with a continuous non-hardening mastic bead at least 15 mm deep. The joint should be completely airtight on both sides.

If the joint is in a single-skin wall, or if two joints are back-to-back in a double-skinned wall, a cover plate of 3 mm steel or material of similar mass may be required on one side, depending on the precise location. Such joins should be referred to the acoustics consultant for further guidance.

Services and electrical penetration - General principles

Where ducts, pipes, conduits, or other services pass through walls, floors, ceilings, or partitions in these rooms, openings should be the minimum size necessary to allow installation. After installation, gaps should

NOISE IMPACT ASSESSMENT

be filled with mortar or grout, and an airtight seal should be achieved around the penetration using a dense, non-hardening mastic.

Ductwork penetrations without fire dampers

Remove any acoustic and (if permitted) thermal lagging over the thickness of the wall. Size holes to not more than 15 mm clearance around the duct, using masonry, grout, or mortar of the same density as the wall material to achieve this if necessary. Tightly pack remaining gaps with medium density mineral fibre and cover the exposed surface with 12 mm plasterboard or other sheet material of similar density, cut to within 5 mm of the duct. Seal this facing material to the duct with dense non-setting mastic.

Ductwork penetrations with fire dampers

Install the fire damper and bed into the wall using masonry, grout, or mortar of the same density as the wall material, over the full depth of the wall. If the overall depth of the wall exceeds the length of the fire damper, after the duct is fixed to the fire damper, seal around the duct as for ductwork penetrations without fire dampers.

Pipework penetrations

For small pipes (30 mm or less diameter) where no movement between the pipe and the wall is expected, provided that the hole is no more than 50 mm diameter, pack medium density mineral fibre tightly around the pipe to the full depth of the wall and seal with non-hardening mastic. For all other pipes, install a solid pipe sleeve of inside diameter between 20 mm and 40 mm greater than the outside diameter of the pipe, and of length no less than the thickness of the wall. Bed this into the wall using masonry, grout, or mortar of the same density as the wall, to the full depth of the wall. Tightly pack the gap between the sleeve and the pipe with medium density mineral fibre and seal with non-hardening mastic.

Electrical services

For small conduits (30 mm or less diameter) where no movement between the conduit and the wall is expected, provided that the hole is no more than 50 mm diameter, pack medium density mineral fibre tightly around the conduit to the full depth of the wall and seal with non-hardening mastic.

Alternatively, you may use proprietary fire seal penetration blocks subject to approval by the architect, M&E, and acoustics consultants.

For trunking and large conduits, size holes to not more than 15 mm clearance around the trunking, using masonry, grout or mortar of the same density as the wall material to achieve this if necessary. Tightly pack remaining gaps with medium density mineral fibre and cover the exposed surface with 12 mm plasterboard or other sheet material of similar density, cut to within 12 mm of the duct. Seal this facing material to the duct with dense non-setting mastic.

After the wiring installation is complete, close any gaps within the trunking by tightly ramming pugging bags containing dry sand into the conduit on both sides of the wall.

NOISE IMPACT ASSESSMENT

APPENDIX 4 – INSTRUMENTATION, CALIBRATION AND MEASUREMENT CONDITIONS

Instrumentation Description	Manufacturer	Type	Serial Number	Calibration
MP1				
Type1 Data Logging Sound Level Meter	Svantek	971	111626	Calibration on 27/06/2023
Type 1 ½" Condenser Microphone	ACO Pacific	7052E	80033	Calibration on 27/06/2023
Preamp	Svantek	SV18	112631	Calibration on 27/06/2023
MP2				
Type1 Data Logging Sound Level Meter	Sventek	971	100676	Calibration on 09/03/2023
Type 1 ½" Condenser Microphone	ACO Pacific	7052E	79073	Calibration on 09/03/2023
Preamp	Svantek	SV18	103792	Calibration on 09/03/2023
Calibrator				
Acoustic Calibrator	B&K 4231	B&K	2039392	Calibration on 23/06/2024

Table 10

The sound level meters, including the extension cables, were applicable, were calibrated prior to and on completion of the survey. No significant change was noted (no more than 0.2 dB).

Weather conditions	Dry and clear skies on 14 th and overcast conditions on 15 th Jan, south-westerly wind direction and wind speeds between 2 – 4 m/s, air temperature between 9 to 4 °C
Calibration level	93.8 dB @ 1 kHz
Person in charge of measurements	Mr. Amber Naqvi BSc(Hons) MSc MIOA MANC MAES
Principal sound sources	Road traffic noise, general urban noise and commercial activity noise
Measurement parameters	LAeq, LAFmax, LA90 and Octave band LZeq, LZFmax in 1 & 15 min periods

Table 11

APPENDIX 5 – MEASURED NOISE DATA

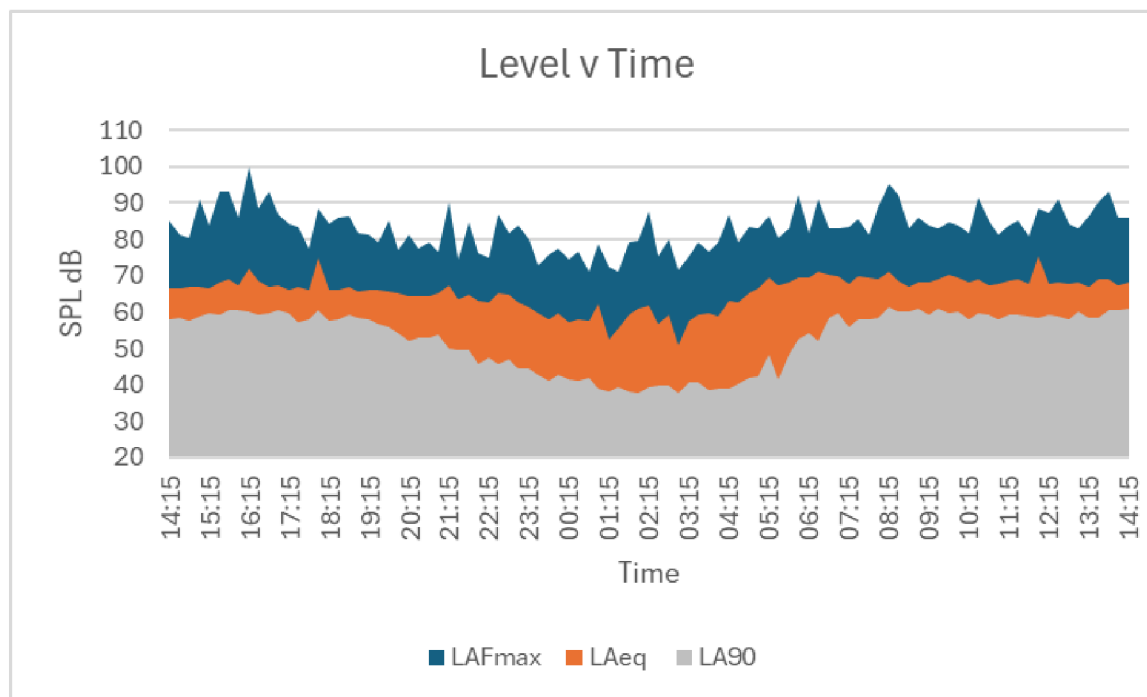


Figure 16 – Level v Time Plot for Measured Noise Data at MP1

Start date & time	LAFmax	LAeq	LA90
14:15	84.9	66.4	58.2
14:30	81.1	66.6	58.3
14:45	80.4	67.1	57.7
15:00	91.2	67	58.9
15:15	83.8	66.4	59.7
15:30	93.2	68.2	59.3
15:45	93.3	69	60.6
16:00	85.9	67.5	60.4
16:15	99.8	71.8	60.1
16:30	88.5	68.7	59.2
16:45	93.3	66.9	59.8
17:00	86.8	67.3	60.4
17:15	84.3	66.1	59.6
17:30	83.3	66.7	57.1
17:45	77.3	66.1	57.9
18:00	88.3	74.9	60.5
18:15	84.1	66.2	57.4
18:30	86.1	65.9	58.1
18:45	86.4	66.8	59.3
19:00	81.6	65.5	58.4
19:15	81.4	66.1	57.9
19:30	79.3	66.2	56.7

Mr Rajwinder Singh

2 Milton Road, Gravesend, Kent DA12 2RE

NOISE IMPACT ASSESSMENT

	19:45	85.2	65.7	56
	20:00	77.1	65.1	54.4
	20:15	81.2	64.5	52
	20:30	77.3	64.5	53.1
	20:45	79.2	64.2	52.9
	21:00	76.8	65.1	53.8
	21:15	90.1	67.4	49.9
	21:30	74.7	63.5	49.5
	21:45	84.5	64.6	49.6
	22:00	76.3	62.9	45.8
	22:15	75.1	62.7	47.6
	22:30	87	65.4	45.7
	22:45	81.6	64.7	47
	23:00	83.8	62.5	44.6
	23:15	79.9	61.6	44.3
	23:30	72.9	59.8	42.8
	23:45	75.7	58	41.3
	00:00	77.3	59.7	42.7
	00:15	74.4	57.2	41.6
	00:30	76.7	58.2	41.2
	00:45	71.2	57.8	42.1
	01:00	78.9	62.1	39
	01:15	72.3	52.4	38.3
	01:30	71.1	55.6	39.4
	01:45	79	59.3	38.1
	02:00	79.5	61	37.6
	02:15	87.8	61.9	39.6
	02:30	75.2	56.6	39.7
	02:45	80.1	59.2	39.9
	03:00	71.6	50.8	37.8
	03:15	75.3	57.6	40.5
	03:30	79.1	59.1	40.6
	03:45	76.6	59.7	38.6
	04:00	79	58.8	38.9
	04:15	86.7	63.1	39
	04:30	79	62.5	40.2
	04:45	83.2	65.4	41.8
	05:00	82.9	66.4	42.3
	05:15	86.5	69.3	48.1
	05:30	80.4	67.3	41.6
	05:45	82.9	68.1	48.5
	06:00	92.2	69.5	52.6
	06:15	81.8	69.5	54.2
	06:30	91	71.3	52.3
	06:45	82.8	70.2	58.4

NOISE IMPACT ASSESSMENT

	07:00	83	69.7	59.7
	07:15	83.4	67.9	56
	07:30	85.4	69.8	58.1
	07:45	81.2	69.4	58.2
	08:00	88.7	69.1	58.3
	08:15	95.4	71	61.4
	08:30	92.2	68.5	60
	08:45	82.8	67.1	60.2
	09:00	86	68.2	61.1
	09:15	83.8	68.2	59.4
	09:30	83	69	61.1
	09:45	84.8	70.2	59.9
	10:00	84	69.3	60.1
	10:15	81.7	68.1	58.2
	10:30	91.3	68.9	59.8
	10:45	85.3	67.5	59.3
	11:00	81.1	67.9	58.2
	11:15	83.9	68.6	59.3
	11:30	85.1	69.1	59.4
	11:45	81	67.8	58.9
	12:00	88.6	75.3	58.5
	12:15	87.1	67.9	59.3
	12:30	91.2	68.3	59
	12:45	84.4	67.8	58
	13:00	83	68.3	60
	13:15	86.4	67	58.6
	13:30	90	69.1	58.4
	13:45	93.3	69	60.6
	14:00	85.9	67.5	60.4
	14:15	86	68.2	61.1

Table 12 - Tabulated Measured Un-Corrected Noise Data at MP1

Mr Rajwinder Singh

2 Milton Road, Gravesend, Kent DA12 2RE

NOISE IMPACT ASSESSMENT

APPENDIX 6 – CONSULTANTS QUALIFICATIONS & EXPERIENCE

The experience of practitioner undertaking this noise assessment, Mr Amber Naqvi BSc(Hons) MSc MIOA MANC MAES has more than 25 years of experience in all matters related to architectural acoustic design and detailing. He has a Master's Degree in Acoustics. In his professional capacity, he is responsible for developing the acoustic design of the project from the scheme stage and carry out acoustic testing and measurements at pre-defined stages of the project right down to the final commissioning stage. He has hands-on experience in all aspects of acoustic design of commercial and residential projects, in particular acoustic isolation, interior acoustic elements, and electro-acoustic systems to the current industry standards. Mr Naqvi is a corporate member of Institute of Acoustics since 1997 and sits on the certification committee of the Association of Noise Consultants.

The consultant responsible for the internal audit of this report, Mr Ned Johnson MSc MIOA, MCIEH CEnvH is the senior consultant who has over 18 years of expertise and experience in noise control and acoustics. Ned is a member of the Institute of Acoustics, a registered Environmental Health Professional, and a Chartered Environmental Health Practitioner with a Master's Degree and the Institute of Acoustics Diploma in Acoustics and Noise Control.