

Extensions to Turkish Cultural Centre, 9 Dolphin Street, Manchester M12 6BG:

Noise Assessment

Kocak

Echo Acoustics 08 April 2022

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EXECUTIVE SUMMARY

The results of a noise measurement survey and desk-based assessment are presented, with respect to the proposed redevelopment of the Turkish Cultural Centre, 9 Dolphin Street, Ardwick, Manchester M12 6BG to create a three storey building including use of part of the building for student accommodation.

The assessment shows that:

- The site is principally affected by transport noise from the surrounding roads and that noise from the adjacent commercial premises is negligible.
- With windows closed, suitable conditions for rest, sleep and study will be achieved in all habitable rooms.
- The opening of windows for ventilation will result in noise levels, within habitable rooms, above the guideline values presented in BS 8233.

Recommendations are made for suitable mitigation measures against external (environmental) noise ingress and for design details necessary to prevent the transmission of internal noise within the building.

The assessment concludes that, with the provision of these mitigation and design measures, internal noise conditions suitable for rest, sleep and study will be achieved and noise need not be a reason for refusal of planning permission.

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1 INTRODUCTION AND SITE DESCRIPTION

- 1.1 Echo Acoustics was commissioned by Plan8 Town Planning, on behalf of Mr Kocak, to undertake an assessment of noise affecting The Turkish Cultural Centre at 9 Dolphin Street, Ardwick, Manchester M12 6BG; the building currently encompasses both educational and residential use by students, including dining facilities. The proposals retain this use but alter the internal layout of the building and provide additional rooms for both educational and residential use.
- 1.2 The site is close to Manchester City Centre in a predominantly commercial setting but with a residential area located close by, to the north west of the site; the majority of the adjacent commercial uses comprise clothing/knitwear manufacturers, located within the neighbouring Victorian mill buildings. Very little noise arises from any of the commercial uses and the site is predominantly affected by traffic noise from the surrounding road network, particularly the A6 Ardwick Green South, Higher Ardwick with occasional contributions from traffic on Dolphin Street itself. The location of the building in the context of its surroundings is shown in Figure 1.

Figure 1 : Development area outline and surroundings



- 1.3 The proposals comprise the *“Erection of an additional storey and side extension to the existing community centre, resulting in a three storey building. The proposal includes use of part of the building for student accommodation”*.
- 1.4 It is worth noting that the building will not have outdoor amenity or garden areas.
- 1.5 This report presents the results of a noise measurement survey of external environmental noise affecting the building, with desk-based assessment of noise and its significance with respect to the proposed residential use. The desk-based assessment includes consideration of internal noise transmission between the residential and non-residential rooms. Where appropriate, a discussion of suitable noise mitigation requirements for the site.
- 1.6 A glossary of acoustic terminology is presented at Appendix A.

2 GUIDANCE

Noise – national and local policy guidance

- 2.1 Planning policies are set at both a national and local level. With respect to national policy, assessment of the suitability of a site for residential development is guided by the National Planning Policy Framework (NPPF), issued in March 2012 and amended in 2018, 2019 and 2021.
- 2.2 With regard to noise, the NPPF (“the Framework”) does not provide specific noise policies or defined noise limits, but rather is intended to enable the planning system to support the Government’s aims and objectives with respect to sustainable development, and provides “a framework within which locally-prepared plans for housing and other development can be produced” and “requires that applications for planning permission be determined in accordance with the development plan, unless material considerations indicate otherwise”.
- 2.3 None of the current local or national planning policies preclude residential development of the site.
- 2.4 Additional national planning guidance is provided in the Government’s Noise Policy Statement for England (NPSE – “the Noise Policy”), to which the Framework makes specific reference as the main source of national guidance specifically on planning and noise.
- 2.5 The Noise Policy has a long term vision to “Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development”. The vision is supported by three key aims intended to promote sustainable development with respect to noise so that “Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:
 - avoid significant adverse impacts on health and quality of life;
 - mitigate and minimise adverse impacts on health and quality of life; and
 - where possible, contribute to the improvement of health and quality of life”.
- 2.6 Health is defined by the World Health Organisation as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, and recognises the enjoyment of the highest attainable standard of health as one of the fundamental rights of every human being” and the Noise Policy makes “a distinction between ‘quality of life’ which is a subjective measure that refers to people’s emotional, social and physical well being and ‘health’ which refers to physical and mental well being”.
- 2.7 However, the Noise Policy recognises that it is not currently possible to define a single objective noise level having specific effects on people, hence the emphasis on “promoting” improvements to health and quality of life through effective management of noise, considered in the context of the wider environment and factors other than noise.
- 2.8 Additional guidance is given in the Planning Practice Guidance Note (PPG) on noise, issued in March 2014, alongside the NPPF and updated in 2018 and July 2019. This “advises on how planning can manage potential noise impacts in new development”. The PPG suggests the following noise exposure hierarchy, based on average responses to noise:

Table 1: PPG noise exposure and response hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
<i>No Observed Effect Level (NOEL)</i>			
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
<i>Lowest Observed Adverse Effect Level (LOAEL)</i>			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
<i>Significant Observed Adverse Effect Level (SOAEL)</i>			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non- auditory	Unacceptable Adverse Effect	Prevent

- 2.9 Beyond this, however, the guidance is relatively generic. It avoids specifying 'acceptable' environmental noise levels as the acceptability of a source of is both subjective and context-dependant.

External/Environmental Noise – technical guidance

- 2.10 Specific guidance on the assessment of noise from commercial uses is provided in British Standard (BS) 4142: 2014 + A1:2019 *Methods for rating and assessing industrial and commercial sound*. This guidance provides a method for determining the sound arising from industrial or commercial uses, as it affects the outside of potentially noise-sensitive buildings. From observation of the surrounding uses and in discussion with the Applicant, it is evident that very little noise arises from the surrounding commercial premises, the majority of which comprise clothing/knitwear manufacturers. It was determined that there was insufficient commercial sound affecting the building to enable, or require, detailed assessment using this standard.
- 2.11 The dominant external sound affecting the building is traffic noise; BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* gives recommendations for internal noise levels for residential and non-residential uses in order to protect residential amenity or, in this instance, the ability to concentrate and study:
- | | |
|---|------------------------|
| • Living rooms during the day | 35 dB $L_{Aeq,16hour}$ |
| • Dining rooms during the day | 40 dB $L_{Aeq,16hour}$ |
| • Bedrooms during the day | 35 dB $L_{Aeq,16hour}$ |
| • Bedrooms during the night | 30 dB $L_{Aeq,8hour}$ |
| • Staff/meeting room, training room
(study and work requiring concentration) | 35 to 45 $L_{Aeq,T}$ |
| • Place of worship, counselling, meditation, relaxation | 30 to 35 $L_{Aeq,T}$ |
- 2.12 These values can be taken to be broadly equivalent with the LOAEL in the PPG. Note that these are not specific criteria or 'target' noise levels, merely indicative recommendations which will be context-dependant. However, most Local Authorities tend to apply these guideline levels as absolute criteria.
- 2.13 In most standard modern properties, the walls and roof provide relatively high levels of sound insulation of greater than 40 dB; the weakest part of a building facade, with respect to noise, is generally the windows. Modern construction methods for new residential properties incorporate standard thermal double-glazing which, the standard suggests, will provide approximately 33 dB R_w of sound attenuation when closed. The standard does not specifically give sound attenuation values for partially open windows, although the worked example (G.1) at Annex G of the Standard indicates that a partially open window would provide 15 dB of sound attenuation.
- 2.14 With regard to maximum (L_{AFmax}) noise levels, BS 8233 (Note 4 to Table 4) states the following:
- "Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values".*

- 2.15 A study undertaken by Vallet & Vernet (1991)¹ suggests that for good sleep, indoor sound pressure levels in bedrooms should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night. The findings of this research, which was concerned with aircraft noise, are conventionally accepted as being suitable for use in the assessment of other forms of transportation noise.

Internal Noise – technical guidance (Sound Insulation criteria)

Building Regulations 2010

- 2.16 The Building Regulations 2010, Approved Document E: *Resistance to the passage of sound*, provides minimum sound insulation performance standards for separating party wall and floor constructions between adjacent dwellings (houses and flats); in this case there are no separating party walls as each apartment occupies an entire floor to itself, so only separating party floors are addressed.
- 2.17 The appropriate acoustic performance standards for apartments/flats that have been formed by a material change of use (i.e. following refurbishment), as provided at Table 0.1a of Approved Document E, are reproduced in Table 2.

Table 2: Performance standards of Approved Document E (Table 0.1a)

Dwelling-houses and flats – performance standards for separating walls, separating floors and stairs that have a separating function.		
	Airborne sound insulation $D_{nT,w}+C_{tr}$ dB (minimum values)	Impact sound insulation $L'_{nT,w}$ dB (maximum values)
Purpose built dwelling-houses and flats		
Walls	45	--
Floors and stairs	45	62
Dwelling-houses and flats formed by material change of use		
Walls	43	--
Floors and stairs	43	64

- 2.18 Approved Document E states that separating floors (as formed by a material change of use), must achieve a minimum *airborne sound insulation* performance of **43 dB $D_{nT,w}+C_{tr}$** and a maximum *impact sound insulation* performance of **64 dB $L'_{nT,w}$** (impact sound insulation applies to party floors only).
- 2.19 It should be noted that although a minimum performance of 43 dB $D_{nT,w}+C_{tr}$ is required from party floor constructions, this performance standard applies to adjacent dwellings only; no requirement exists for residential above commercial uses. Therefore, applying the 43 dB $D_{nT,w}+C_{tr}$ performance requirement will provide a conservative level of protection of the proposed residential use.
- 2.20 The Building Regulations also state that new internal walls within dwellings (e.g. to kitchens, bathrooms, toilets etc.) will need to provide a laboratory rated performance standard of at least **40 dB R_w** .

¹ Vallet M. & Vernet I. (1991) *Night noise index for aircraft noise and sleep disturbance*. Proceedings Internoise 1991, Sydney, Vol. 1 pp 207-210

- 2.21 We have no knowledge of the current construction of the separating floors so have provided suitable recommendations for construction details in order to ensure that internal noise transmission does not cause significant adverse effects for future residents of the premises.

3 METHODOLOGY

- 3.1 The assessment incorporated a measurement survey of external environmental noise affecting the building, comprising the use of 2 sound level meters to concurrently record the ambient noise levels at monitoring positions on the northern and southern sides of the building: position 1 was to the rear of the building such that it was mostly screened from any traffic noise on Dolphin Street, and was placed atop a commercial bin such that the microphone had a clear and uninterrupted line of sight with the land to the rear of the building; position 2 was close to the front door to the building with a clear and uninterrupted view of the surrounding area.
- 3.2 The measurement positions are shown in Figures 4 to 6 and comprised continuous consecutive recording of 15-minute noise and 1-second data during the day and night time from 4:00pm on Tuesday 1 March to 10:00am on Wednesday 2 March 2022.

Figure 2: Noise measurement locations

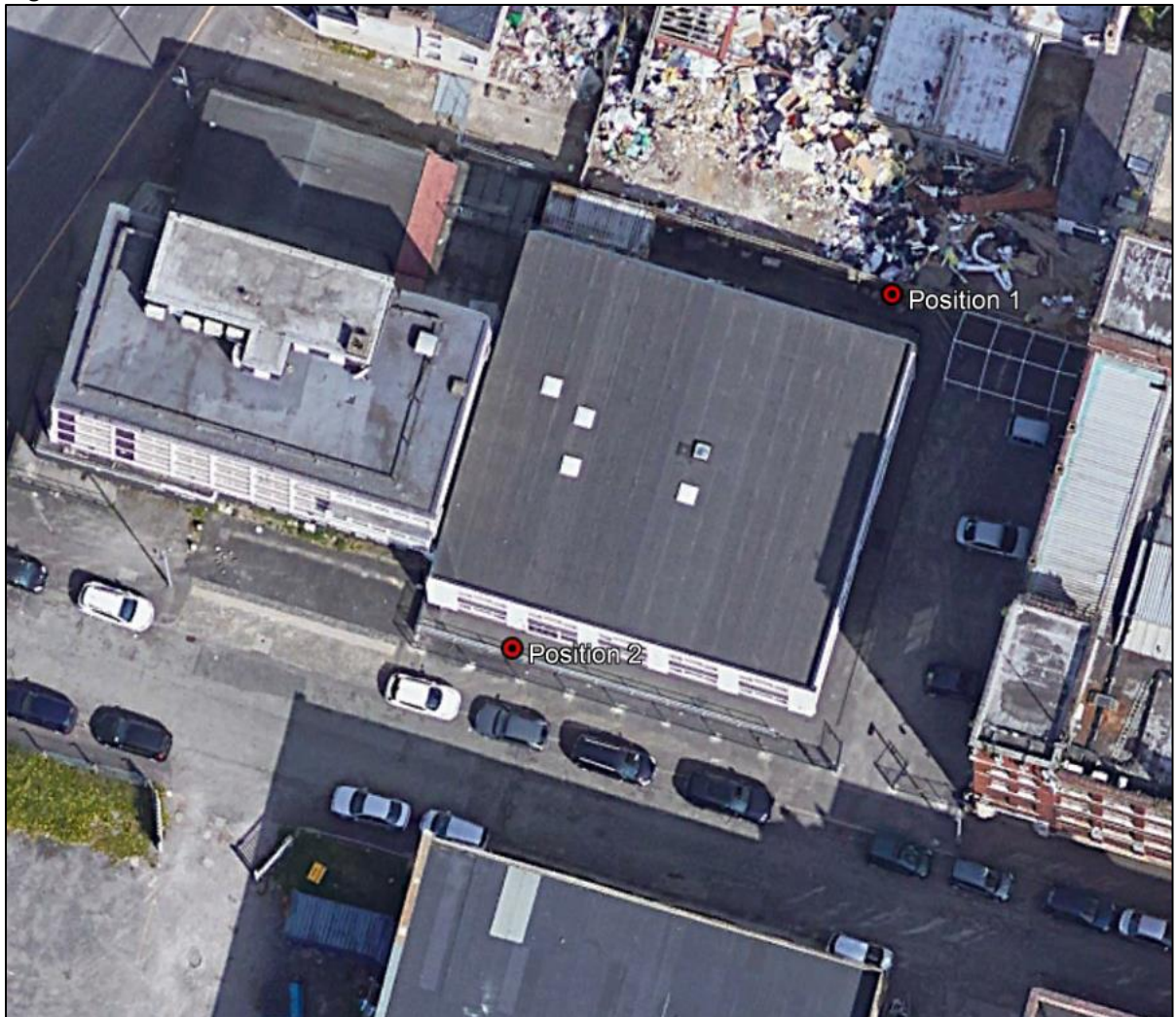
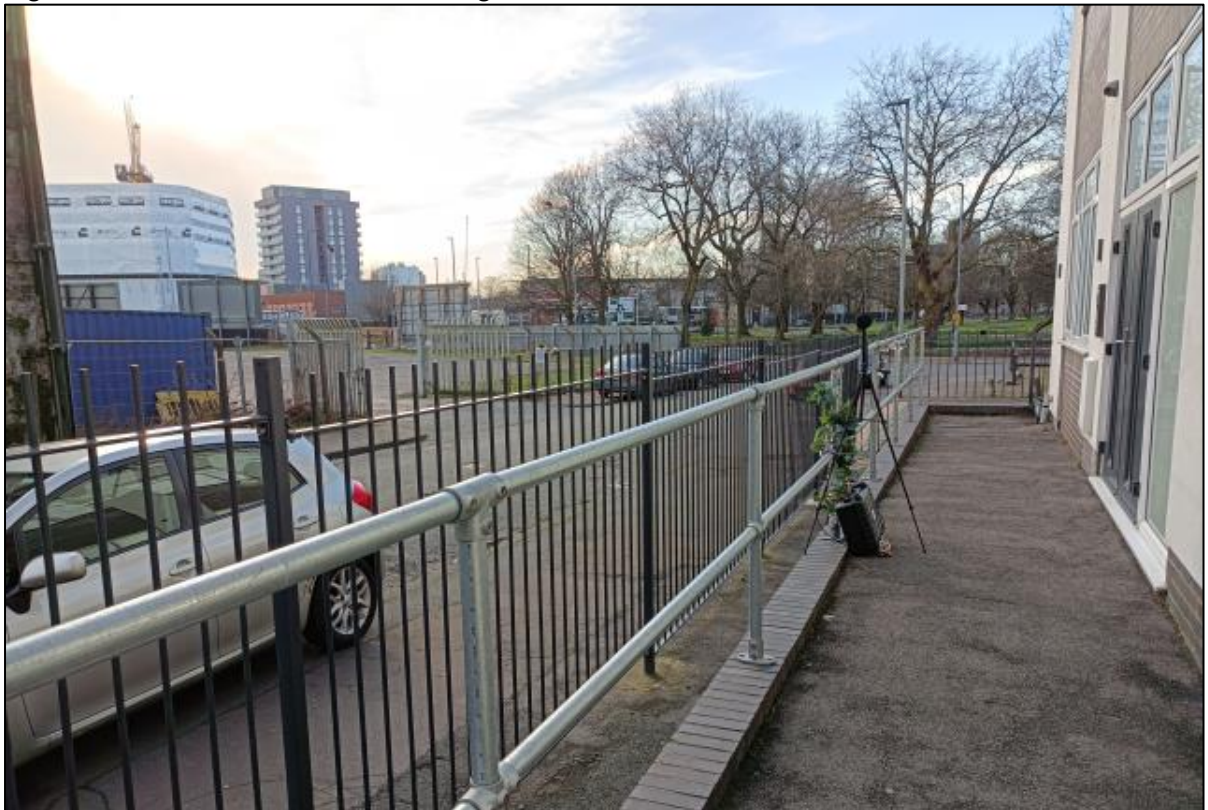


Figure 3: Position 1 to rear of building



Figure 4: Position 2 at front of building



- 3.3 The day time measurement period was selected to specifically include the afternoon and morning peak-traffic periods plus the evening periods when students may be studying or resting.
- 3.4 The survey was undertaken using 2 Class 1 (IEC 61672: 2012) integrating, averaging sound level meters; a CEL 633C meter at Position 1 and an NTi XL2 meter at Position 2.
- 3.5 The northern side of the building is separated from the adjacent land by a wooden fence so the meter at Position 1 was placed on top of a commercial wheeled bin to provide a clear line of sight of the area beyond the fence. This position was more than 3.5 metres from the building façade so was a 'free-field' measurement position.
- 3.6 The meter at Position 2 had a clear line of sight of Dolphin Street and the surrounding area and was close to the building façade; the data are, therefore, *façade* noise levels which, for the purposes of the assessment of noise transmission through an *open window* can be corrected to *free-field* levels by the subtraction of 3 dB. Conversely, the *free-field* data at Position 1 must be converted to *façade* levels for the purposes of calculating noise transmission through a *closed window*.
- 3.7 Both meters were placed in locked, weather-proof cases with the microphones mounted on tripods and protected by proprietary wind-shields.
- 3.8 The meters were field-calibrated before and after the survey and no variation in calibration tone was observed.
- 3.9 The quantitative measurement data were supplemented by qualitative observation of the nature and character of the ambient noise affecting the site.
- 3.10 The weather during the surveys was dry, cold (8 – 10°C) with clear skies. Winds were light to moderate at the start of the survey but reduced through the evening and overnight to negligible or very light southerly to south-westerly air movements.
- 3.11 The desk-based assessment was undertaken with respect to the requirements of the Local Authority including reference to BS8233 and the Building Regulations 2010.

4 RESULTS, ASSESSMENT AND DISCUSSION

Results

- 4.1 The results of the noise measurement survey are summarised in Table 2. The 15-minute data for both positions are presented at Appendix B; the 1-second data are too numerous to provide in this report but are available on request.

Table 3: Summarised day and night time noise measurement data

Time period	Measured noise	
	L _{Aeq}	L _{AFmax}
<i>Position 1</i>		
16:00 - 18:00	53.6	-
18:00 - 23:00	53.6	-
23:00 - 07:00	48.4	88.4
07:00 - 10:00	53.6	-
<i>Position 2</i>		
16:00 - 18:00	58.2	-
18:00 - 23:00	58.1	-
23:00 - 07:00	52.5	81.9
07:00 - 10:00	59.5	-

External (environmental) noise assessment

- 4.1 The measurement data from Table 3 were used to calculate internal noise levels in habitable rooms with windows on each façade i.e. living, dining and bedrooms, as presented in Table 3. The calculation assumed 15 dB and 33 dB R_w of sound attenuation through an open and closed window, respectively.

Table 4: Calculated internal noise levels

Time period	Calculated noise	
	L_{Aeq}	L_{AFmax}
Windows closed		
<i>Position 1</i>		
16:00 - 18:00	23.6	-
18:00 - 23:00	23.6	-
23:00 - 07:0	18.4	58.4
07:00 - 10:00	23.6	-
<i>Position 2</i>		
16:00 - 18:00	22.7	-
18:00 - 23:00	22.6	-
23:00 - 07:0	17.0	46.4
07:00 - 10:00	24.0	-
Windows open		
<i>Position 1</i>		
16:00 - 18:00	38.6	-
18:00 - 23:00	38.6	-
23:00 - 07:0	33.4	73.4
07:00 - 10:00	38.6	-
<i>Position 2</i>		
16:00 - 18:00	37.7	-
18:00 - 23:00	37.6	-
23:00 - 07:0	32.0	61.4
07:00 - 10:00	39.0	-

- 4.2 The data in Table 4 indicate that, with windows closed, the BS 8233 guideline *ambient* noise levels will be achieved in all habitable/study rooms during both the day and night time. The night time guideline *maximum* noise level of 45 dB L_{Amax} was exceeded at both sides of the building but only twice at the rear (position 1) and once at the front (position 2).
- 4.3 However, the data indicate that, with windows open, the BS 8233 guideline noise levels for bedrooms will be exceeded during both the day and night time, although they are within the range (35 to 45 $L_{Aeq,T}$) for rooms within which day time study may be taking place.
- 4.4 Consequently, in habitable rooms used for rest, sleep and study, windows will need to remain closed to achieve the guideline values and alternative means of providing both background and cooling ventilation will be required; this can be most readily achieved through the provision of mechanical ventilation as a through-wall solution providing a minimum sound insulation value of 30 dB $D_{n,e,w}$. An example of a suitable unit is the Titon **SR700** single room heat recovery unit (HRU)² in individual bedrooms; the Titon unit provides an airborne sound insulation value of 34 dB $D_{n,e,w}$ when open (51 dB $D_{n,e,w}$ when closed), 1 dB greater than the 33 dB R_w sound insulation performance of a closed window.
- 4.5 Note that, in all cases, window should be capable of being opened.

² https://www.titon.com/uk/products/ventilation-systems/heat_recovery_mvhr/sr700-single-room-hru/

Internal noise assessment

Separating party floor construction

Acoustic suspended ceiling

- 3.12 In order to prevent vertical transmission of airborne noise, it is recommended that a suspended acoustic plasterboard ceiling is installed within the rooms on the first floor.
- 3.13 The new acoustic ceiling should consist of a minimum 2 x 12.5 mm Soundbloc plasterboard (or similar dense board) suspended via a metal-framed system.
- 3.14 It is often recommended that the minimum mass per unit area of a new acoustic ceiling is at least 20 kg/m². Using two layers of acoustic/dense plasterboard will satisfy this recommendation.
- 3.15 The acoustic plasterboard should be installed with staggered joints. The joints to the outer board layer should be sealed with tape or caulked with sealant and the perimeter edge of the ceiling boards should also be sealed with flexible sealant. Ideally, a small perimeter gap (2 – 3 mm) should be maintained to ensure the new ceiling boards do not touch the surrounding walls.
- 3.16 It is recommended that acoustic hangers are used to isolate the plasterboard from the structure.
- 3.17 Suitable acoustic hangers include British Gypsum's GAH1, Siniat's GTEC Phonissimo or Cellecta's AH50.
- [Gypframe GAH1 Acoustic Hanger for GypCeiling MF Ceiling | British Gypsum \(british-gypsum.com\)](#)
 - [AH50 - Cellecta](#)
- 3.18 The suspension depth between the joists and the top of the acoustic plasterboard should be as large as possible to improve performance.
- 3.19 It is also recommended that a minimum of 150 mm thick mineral wool insulation (e.g. Knauf's acoustic partition roll or Isover's APR1200) is placed within the cavity above the acoustic plasterboard.
- 3.20 It should be noted that down-lighting degrades the high frequency sound insulation of the ceiling. If down-lighting is required, acoustically-rated down lighters should be installed or alternatively acoustic hoods should be installed over the unit.
- 3.21 It is also recommended that an acoustically resilient layer is installed on top of the structural floor in order to increase the impact sound insulation performance.
- 3.22 As an example, Regupol 3912 would be suitable for the floor build-up ([Regupol 3912 Acoustic Underlayment - CMS Danskin](#)).
- 3.23 It is further recommended that either 19 mm Gypsum plank or 18 mm thick tongue and groove flooring board is laid on top of the resilient layer.
- 3.24 With the recommended construction, the separating floor is expected to achieve an airborne sound insulation performance of at least 45 dB $D_{nT,w}+C_{tr}$ and an impact sound insulation performance of approximately 55 to 60 dB $L'_{nT,w}$.
- 3.25 The anticipated sound insulation performance should therefore achieve the minimum requirements of Part E of the Building Regulations for separating floors.

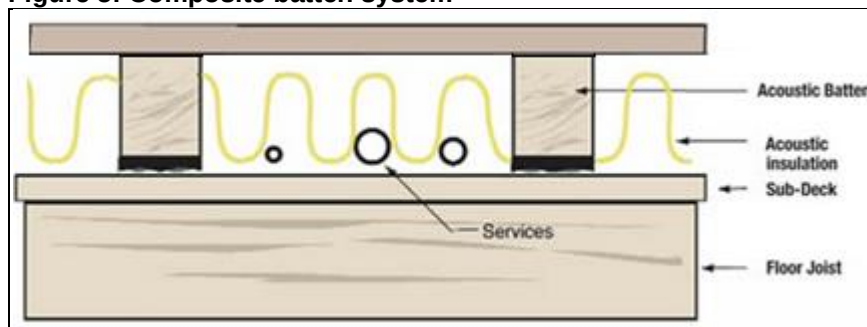
Resilient floating floor

- 3.26 Alternatively, should installing suspended acoustic ceilings be impractical, an alternative solution is to install a composite timber batten or a cradle and batten floor system.
- 3.27 Such systems provide significant improvements in acoustic performance, help to provide a level floor finish and also provide a service void for pipes etc.

Composite resilient timber batten system option

- 3.28 Suitable composite timber battens include the following:
- Monarfloor batten
 - Hush batten
 - Collecta batten
- 3.29 Timber battens are typically 40 – 45 mm deep and the pre-bonded resilient layer is typically 10 – 15 mm thick (overall batten depth 50 – 60 mm).
- 3.30 The battens should be overlaid with a minimum 18 mm thick tongue and groove flooring board (chipboard/plywood) and a layer of 19 mm Gyproc/Knauf Plank to provide additional mass.
- 3.31 To optimise performance, the timber board and gypsum based board may be fixed together (e.g. spot bonded, glued, or screwed) with joints staggered to avoid air paths.
- 3.32 It is also recommended that a minimum 250 mm thick mineral wool insulation is laid between (and not under) each flooring batten (e.g. Knauf Earthwool acoustic partition roll or Isover's APR1200). Services may be located above or below the quilt (Figure 5).

Figure 5: Composite batten system



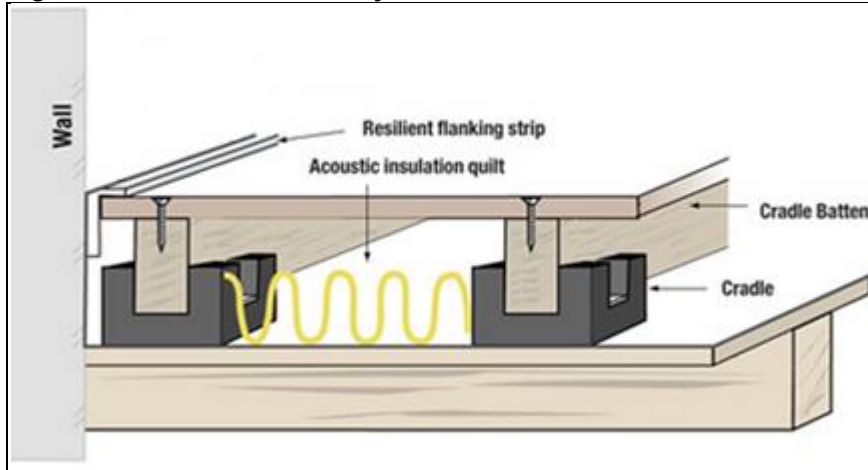
- 3.33 It should be noted that the resilient layer fitted to the battens must be continuous and either pre-bonded to the top or bottom of the batten. Any services (pipes) passing through the floor construction should not bridge the resilient layer (rigidly connect the chipboard layer with the timber sub-deck).
- 3.34 Plasterboard wall linings and internal separating walls will need to be installed prior to laying the composite battens (otherwise the weight of the wall linings would over compress the pre-bonded resilient layer).

Plastic cradle & timber batten system option

- 3.35 Suitable cradle and timber batten systems include the following:
- Monarfloor cradle system
 - Collecta cradle system
 - Hush cradle system

- 3.36 A batten depth of 45 mm is typically used with this system. The typical height of the plastic cradle with the bonded resilient layer is approximately 11 mm (overall depth 56 mm).
- 3.37 The battens should be overlaid with a minimum 18 mm thick tongue and groove flooring board (chipboard/plywood) and a layer of 19 mm Gyproc/Knauf Plank to provide additional mass.

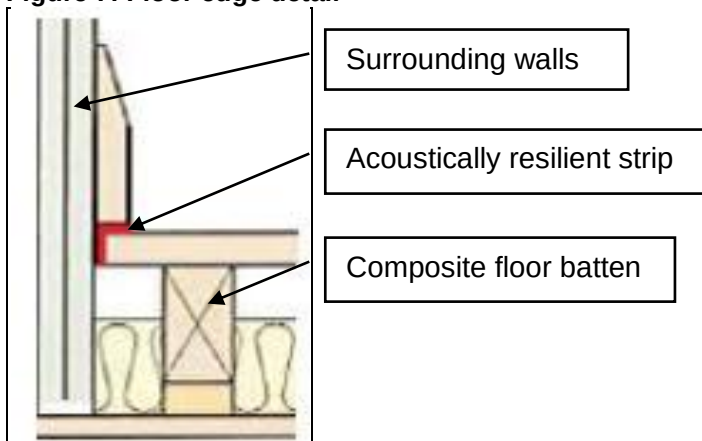
Figure 6: Cradle and batten system



Resilient flanking strips

- 3.38 A small gap (5 – 6 mm) should be left between the edge of the timber deck and the surrounding walls and a resilient flanking strip should be installed within the gap to provide acoustic isolation.
- 3.39 For guidance, suitable flanking strips include:
- Collecta flanking strips
 - Monarfloor flanking band
 - Hush Acoustics flanking strip
- 3.40 A small gap (e.g. 5 mm) should also be left between the skirting board and the timber deck and the gap should be filled with a flanking strip or flexible sealant.

Figure 7: Floor edge detail



Anticipated performance following enhancement

- 3.41 On the basis of the recommendations given, the party floor construction is expected to provide an airborne sound insulation performance of at least 43 dB $D_{nT,w}+C_{tr}$ and an impact sound insulation performance of approximately 55 to 60 dB $L'_{nT,w}$.

Service penetrations

- 3.42 Any pipes/services that penetrate the separating floor should be enclosed for their full height in each room.
- 3.43 The enclosure should be constructed from two layers of British Gypsum Soundbloc or Fireline plasterboard. The enclosure should also be lined with 25 – 50 mm thick mineral wool or alternatively wrap the pipe within the enclosure.
- 3.44 A small gap (5 mm) should be maintained between the service enclosure and the floor base and the gap sealed with flexible sealant. Similarly, the small gap between the enclosure and the ceiling boards should also be sealed with flexible sealant.

Separating party wall construction

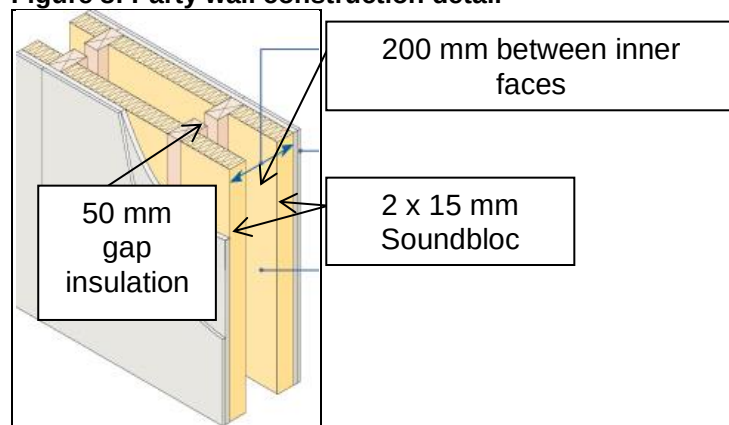
Separating wall between first floor study area and adjacent bedsits

- 3.45 It is recommended that the existing brickwork walls at first floor level are lined with either a fully independent or virtually independent wall lining system. The existing window openings should be fully blocked/bricked up prior to lining.
- 3.46 The wall lining should comprise of a minimum 2 x 12.5 mm thick dense plasterboard (e.g. Soundbloc or Fireline board) with 50 mm thick mineral wool insulation fitted between studs.
- 3.47 A suitable example would be the GypLyner Universal metal-framed wall lining system:
- [GypLyner Single Wall Lining System | British Gypsum \(british-gypsum.com\)](https://www.british-gypsum.com)
- 3.48 It should be noted that the greatest level of flanking attenuation is achieved via a fully independent wall lining system.
- [GypLyner Independent Wall Lining System | British Gypsum \(british-gypsum.com\)](https://www.british-gypsum.com)
- 3.49 The supporting framework for the linings can be constructed from metal studs and floor/ceiling channels or alternatively from timber (e.g. 3" x 2" timber battens).
- 3.50 Where metal is preferred, the independent frame can be constructed from Gypframe floor and ceiling channels with Gypframe 'I' studs friction-fitted vertically within the channel sections to form the framework. There should be a gap of at least 10 mm between the metal frame and the existing masonry (to prevent bridging).

Separating walls between bedsits

- 3.51 A suitable separating wall construction would be a twin-framed timber or metal stud construction comprising 2 x 15 mm Soundbloc each room side, minimum distance of 200 mm between internal linings and 50 mm thick mineral wool insulation (batts or quilt) fixed to each frame (100 mm of insulation in total).
- 3.52 The minimum distance between the two frames should always be at least 50 mm.

Figure 8: Party wall construction detail



3.53 For a slightly improved acoustic performance, a twin-framed metal stud construction could be used:

- GypWall Quiet 'IWL'

3.54 Again, two layers of 15 mm Soundbloc should be used each room side and a stud size of 70 mm should be suitable. 100 mm-thick mineral wool insulation should be used within the cavity and a minimum gap of 50 mm should be maintained between the frames.

3.55 A single layer of 9 mm plywood may be included within the build-up if required (for structural stability and mechanical fixings).

3.56 The separating wall should be full height (i.e. taken up past the line of new suspended ceilings).

3.57 Party walls on the 2nd floor will need to be taken to the underside of the roof (and not stop at ceiling level).

3.58 To maintain acoustic performance, electrical sockets/switches should be enclosed (clad) at the back using the same plasterboard thickness and type as the wall lining.

3.59 Holes in the plasterboard should always be neatly cut and flexible sealant should be applied to the edges to maximise acoustic performance.

Internal stud walls

3.60 Internal walls (to washrooms, stores) will need to achieve a laboratory rated sound insulation performance of at least 40 dB R_w .

3.61 Suitable constructions include:

- 1 x 15 mm Wallboard each side of a 75 mm x 38 mm timber stud with 25 mm mineral wool cavity insulation (40 dB R_w).
- 1 x 12.5 mm Soundbloc each side of a 75 mm x 38 mm timber stud with 25 mm mineral wool insulation (40 dB R_w).
- 1 x 15 mm Fireline each side of a 75 mm x 38 mm timber stud with 25 mm mineral wool insulation (41 dB R_w).
- 1 x 15 mm Wallboard each side of a 70 mm metal 'C' stud with 25 mm mineral wool insulation (43 dB R_w).
- 1 x 12.5 mm Soundbloc each side of a 70 mm metal 'C' stud with no mineral wool insulation (40 dB R_w).

- 1 x 15 mm Fireline each side of a 70 mm metal 'C' stud with no mineral wool insulation (41 dB R_w).

Door-set constructions & acoustic performance

- 3.62 Approved Document E states that main entrance doors to flats should achieve a minimum laboratory rated sound insulation performance of 29 dB R_w .
- 3.63 A performance of 29 dB R_w can be typically achieved with a 43 – 56 mm thick solid-core fire door of at least 25 kg/m² mass closing onto a rebated frame with wipe or compression acoustic door seals to head, jambs and threshold.
- 3.64 To achieve 29 dB R_w , a substantial door frame with an effective stop should be used which may for example typically consist of a 90 mm x 40 mm section, with stops of at least 15 mm.
- 3.65 Good quality acoustic seals are essential in achieving the performance standard and will also help with regard to fire safety. The exclusion of perimeter sealing is likely to result in a reduction in performance of approximately 5 to 10 dB. A doorset without sealing would therefore provide a reduced sound insulation performance in the region 20 to 25 dB R_w .
- 3.66 As an example, for seals along the head and jambs, 'batwing' seals (e.g. Lorient LAS1010, LAS1015 and LAS1212) work well as they fit in the corner of the frame and continue past door locks and hinges. They will often be used in combination with a 'double fin seal' such as the LAS1011 Firtree.
- 3.67 For threshold seals, either an automatic drop-threshold seal can be used (e.g. Lorient IS8040) or alternatively a fixed threshold seal such as the IS8060 can be used in combination with an aluminium threshold plate.
- 3.68 The following suppliers provide high performance acoustic seals for internal doors:
 - Lorient UK
 - Norseal

5 SUMMARY & CONCLUSION

- 5.1 The assessment has shown that the site is principally affected, day and night, by transport noise from the surrounding road network.
- 5.2 Noise from the adjacent commercial premises is negligible.
- 5.3 The assessment has shown that, with windows closed, suitable conditions for rest, sleep and study will be achieved in all habitable rooms.
- 5.4 However, the opening of windows for ventilation will result in noise levels, within habitable rooms, above the guideline values presented in BS 8233; suitable means of providing both background and cooling ventilation have been recommended thereby negating the need to open windows for ventilation.
- 5.5 Suitable design recommendations are made with respect to the prevention of internal noise transmission between rooms.
- 5.6 The assessment concludes that, with the provision of these mitigation and design measures, internal noise conditions suitable for rest, sleep and study will be achieved and noise need not be a reason for refusal of planning permission.

6 APPENDICES

Appendix A: Glossary of acoustic terms

Ambient noise: the noise from all sources, both near and far, at any given time. Conventionally defined using the A-weighted equivalent continuous noise level (L_{Aeq}) [see below].

Background noise level (dB L_{A90}): In the UK, the 90th percentile noise level (L_{A90}) is generally used to define 'background' noise. This is a statistical parameter describing the noise level that is exceeded for 90% of the measurement or assessment time. Its value lies in the fact that it is a statistical value, towards the lower end of a measured range of data, and which is relatively 'stable' i.e. not adversely affected by occasional high-energy noise events.

Decibel (dB): a unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 micro-Pascals (μPa), the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.

dB(A) / A-weighting: decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change (in steady noise) of 3 dB(A) is the minimum perceptible under normal conditions and a change of 10 dB(A) corresponds roughly to halving or doubling the *loudness* of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).

$L_{Aeq,T}$: the equivalent continuous sound level - the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). L_{Aeq} is used to describe many types of noise and can be measured directly with an integrating sound level meter.

L_{Amax} : the maximum single-event noise level attained during a measurement period.

Noise: any audible sound. Often defined as unwanted sound. Can be damaging to hearing if it is too loud or can be just annoying if it interferes with the normal enjoyment of others.

Sound / sound pressure: a fluctuation in air pressure over the static ambient pressure.

Sound pressure level: the sound pressure relative to a standard reference pressure of 20 μPa (20×10^{-6}) on the decibel scale.

Appendix B: Noise measurement data

Table 5: Measured noise data, position 1

Date	Time	Measured noise (dB)	
		L _{Aeq}	L _{AFmax}
01/03/2022	16:00:00	53.6	67.9
01/03/2022	16:15:00	53.9	67.5
01/03/2022	16:30:00	55.4	77.0
01/03/2022	16:45:00	53.8	73.1
01/03/2022	17:00:00	52.2	59.8
01/03/2022	17:15:00	53.8	70.5
01/03/2022	17:30:00	52.7	66.7
01/03/2022	17:45:00	52.2	61.6
01/03/2022	18:00:00	52.5	58.2
01/03/2022	18:15:00	52.8	70.7
01/03/2022	18:30:00	52.0	67.7
01/03/2022	18:45:00	52.0	63.2
01/03/2022	19:00:00	52.8	62.0
01/03/2022	19:15:00	53.3	66.1
01/03/2022	19:30:00	59.1	92.5
01/03/2022	19:45:00	52.5	78.6
01/03/2022	20:00:00	53.6	71.3
01/03/2022	20:15:00	59.9	78.9
01/03/2022	20:30:00	51.9	69.3
01/03/2022	20:45:00	50.9	59.2
01/03/2022	21:00:00	50.3	63.7
01/03/2022	21:15:00	51.4	61.3
01/03/2022	21:30:00	50.3	61.7
01/03/2022	21:45:00	50.8	59.7
01/03/2022	22:00:00	52.0	70.8
01/03/2022	22:15:00	50.8	62.0
01/03/2022	22:30:00	50.6	64.8
01/03/2022	22:45:00	50.8	62.8
01/03/2022	23:00:00	53.6	86.8
01/03/2022	23:15:00	50.4	68.8
01/03/2022	23:30:00	48.4	61.8
01/03/2022	23:45:00	48.7	62.0
02/03/2022	00:00:00	48.6	61.1
02/03/2022	00:15:00	48.6	60.5
02/03/2022	00:30:00	47.4	57.3
02/03/2022	00:45:00	54.0	88.4
02/03/2022	01:00:00	46.3	60.2
02/03/2022	01:15:00	45.8	54.7

Date	Time	Measured noise (dB)	
		L _{Aeq}	L _{AFmax}
02/03/2022	01:30:00	46.2	62.8
02/03/2022	01:45:00	46.1	61.6
02/03/2022	2:00:00	46.1	58.1
02/03/2022	02:15:00	46.7	60.2
02/03/2022	02:30:00	45.4	55.8
02/03/2022	02:45:00	46.1	59.5
02/03/2022	03:00:00	46.1	61.8
02/03/2022	03:15:00	45.4	56.8
02/03/2022	03:30:00	46.0	63.0
02/03/2022	03:45:00	45.1	56.1
02/03/2022	04:00:00	46.3	56.3
02/03/2022	04:15:00	46.3	55.1
02/03/2022	04:30:00	46.2	57.4
02/03/2022	04:45:00	46.5	59.4
02/03/2022	05:00:00	47.4	58.5
02/03/2022	05:15:00	48.4	58.5
02/03/2022	05:30:00	49.0	64.8
02/03/2022	05:45:00	49.2	57.6
02/03/2022	06:00:00	49.9	60.5
02/03/2022	06:15:00	51.8	70.1
02/03/2022	06:30:00	51.7	61.8
02/03/2022	06:45:00	52.6	68.6
02/03/2022	07:00:00	53.4	69.0
02/03/2022	07:15:00	53.1	66.7
02/03/2022	07:30:00	52.4	61.8
02/03/2022	07:45:00	52.8	63.6
02/03/2022	08:00:00	53.5	60.6
02/03/2022	08:15:00	53.6	64.2
02/03/2022	08:30:00	54.2	66.1
02/03/2022	08:45:00	55.3	71.9
02/03/2022	09:00:00	53.6	64.1
02/03/2022	09:15:00	53.0	60.4
02/03/2022	09:30:00	54.1	68.4
02/03/2022	09:45:00	53.7	62.0

Table 6: Measured noise data, position 2

Date	Time	Measured noise (dB)	
		L _{Aeq}	L _{AFmax}
01/03/2022	15:54:34	70.2	93.6
01/03/2022	16:00:00	57.6	74.7
01/03/2022	16:15:00	60.0	79.4
01/03/2022	16:30:00	58.6	79.3
01/03/2022	16:45:00	58.4	84.1
01/03/2022	17:00:00	57.2	69.8
01/03/2022	17:15:00	57.6	72.9
01/03/2022	17:30:00	58.1	77.7
01/03/2022	17:45:00	57.2	71.7
01/03/2022	18:00:00	58.1	74.2
01/03/2022	18:15:00	58.1	75.6
01/03/2022	18:30:00	56.8	76.1
01/03/2022	18:45:00	57.5	77.1
01/03/2022	19:00:00	58.2	70.7
01/03/2022	19:15:00	58.2	72.7
01/03/2022	19:30:00	56.9	75.6
01/03/2022	19:45:00	56.1	68.0
01/03/2022	20:00:00	57.2	75.6
01/03/2022	20:15:00	65.9	87.2
01/03/2022	20:30:00	57.0	77.1
01/03/2022	20:45:00	55.0	71.5
01/03/2022	21:00:00	55.8	76.5
01/03/2022	21:15:00	57.7	81.1
01/03/2022	21:30:00	55.5	75.9
01/03/2022	21:45:00	55.1	66.9
01/03/2022	22:00:00	56.7	72.5
01/03/2022	22:15:00	55.8	70.3
01/03/2022	22:30:00	55.2	68.9
01/03/2022	22:45:00	56.1	76.7
01/03/2022	23:00:00	53.6	66.1
01/03/2022	23:15:00	53.9	72.4
01/03/2022	23:30:00	54.0	70.8
01/03/2022	23:45:00	53.6	69.4
02/03/2022	00:00:00	54.1	70.3
02/03/2022	00:15:00	52.5	66.9
02/03/2022	00:30:00	51.7	64.0
02/03/2022	00:45:00	52.5	74.3
02/03/2022	01:00:00	50.2	67.8
02/03/2022	01:15:00	49.4	65.4
02/03/2022	01:30:00	49.2	62.2

Date	Time	Measured noise (dB)	
		L _{Aeq}	L _{AFmax}
02/03/2022	01:45:00	49.9	64.2
02/03/2022	02:00:00	48.6	65.8
02/03/2022	02:15:00	49.2	67.2
02/03/2022	02:30:00	48.1	65.4
02/03/2022	02:45:00	49.5	65.6
02/03/2022	03:00:00	49.6	66.1
02/03/2022	03:15:00	48.9	66.2
02/03/2022	03:30:00	49.6	64.2
02/03/2022	03:45:00	48.7	65.1
02/03/2022	04:00:00	48.9	64.0
02/03/2022	04:15:00	49.1	65.3
02/03/2022	04:30:00	49.6	68.1
02/03/2022	04:45:00	49.8	63.5
02/03/2022	05:00:00	50.4	66.3
02/03/2022	05:15:00	51.2	66.4
02/03/2022	05:30:00	52.5	66.4
02/03/2022	05:45:00	53.4	65.5
02/03/2022	06:00:00	53.9	67.9
02/03/2022	06:15:00	59.1	81.9
02/03/2022	06:30:00	56.0	72.3
02/03/2022	06:45:00	57.2	68.2
02/03/2022	07:00:00	59.7	82.3
02/03/2022	07:15:00	58.6	77.2
02/03/2022	07:30:00	57.2	69.7
02/03/2022	07:45:00	59.3	77.5
02/03/2022	08:00:00	58.6	68.5
02/03/2022	08:15:00	59.3	77.8
02/03/2022	08:30:00	59.8	75.1
02/03/2022	08:45:00	62.6	84.8
02/03/2022	09:00:00	60.1	74.4
02/03/2022	09:15:00	58.7	71.9
02/03/2022	09:30:00	59.0	69.6
02/03/2022	09:45:00	58.7	68.3