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Residential Conversion 1-3 Church Street, Barnsley, S70 2AB Noise Impact Assessment

For:
Mr Peter Thompson
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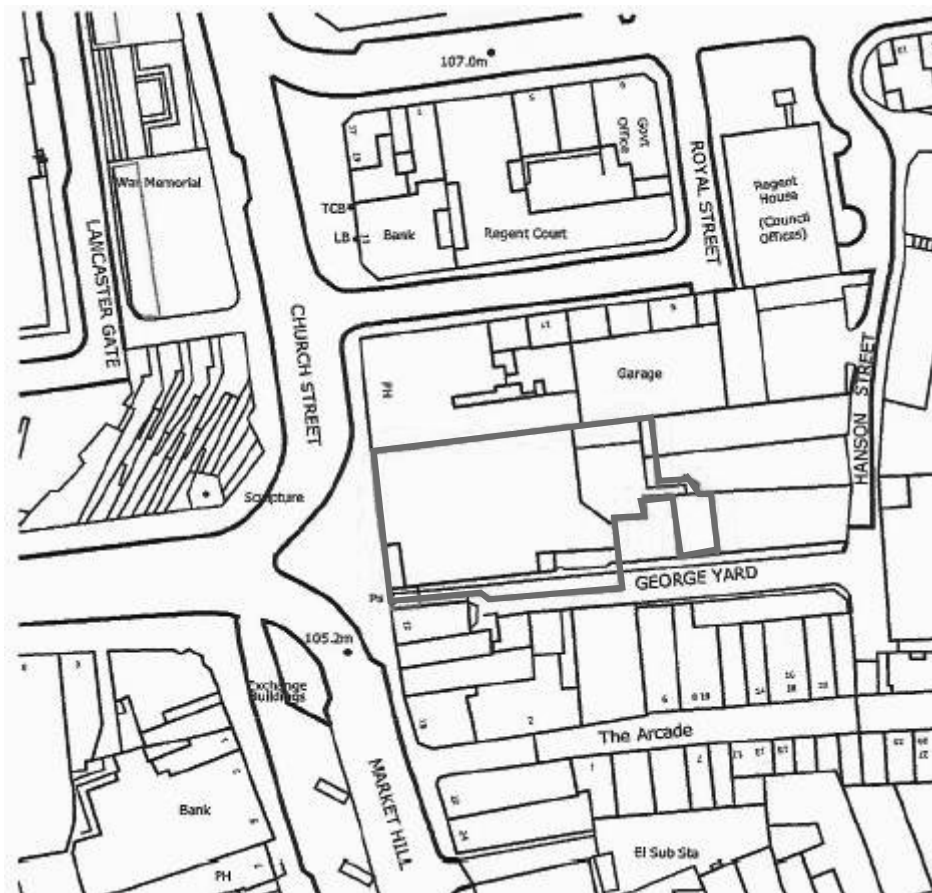
1 Introduction

- 1.1.1 Environmental Noise Solutions Ltd (ENS) has been commissioned by Mr Peter Thompson to undertake a noise impact assessment for a residential conversion of the building at 1-3 Church Street, Barnsley, S70 2AB (hereafter referred to as 'the site').
- 1.1.2 The report is intended to support a planning application to be submitted to Barnsley Metropolitan Borough Council.
- 1.1.3 The objectives of this noise impact assessment are to:
- Determine external ambient and background noise levels in the vicinity of the application site during relevant time periods.
 - Assess the potential impact of the existing ambient noise climate on the proposed residential development with reference to relevant guidelines
 - Provide recommendations for a scheme of sound attenuation works, as necessary, to protect the proposed dwellings from a loss of amenity due to noise.
- 1.1.4 This report details the methodology and results of the assessment and provides recommendations for the building envelope (fenestration and ventilation). It has been prepared to accompany the planning application to address potential areas of noise impacting on the development.
- 1.1.5 It has been prepared for Mr Peter Thompson for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult the aforementioned and ENS as to the extent to which the findings may be appropriate for their use.
- 1.1.6 A glossary of acoustic terms used in the main body of the text is contained in Appendix A.

2 Site Layout

- 2.1.1 The proposal for the site comprises of the conversion of the 1st floor of the building into an apartment (see Appendix C for site layout plan).
- 2.1.2 The property sits above a public house (Butterfield's) at the intersection of Church Street and Shambles Street. The street is within the town centre, with Barnsley Town Hall opposite and is mainly commercial at ground level with restaurants, bars and coffee shops on the front and to the rear on the lane leading to George Yard.
- 2.1.3 The site is indicated by the red boundary in Figure 2-1 below, the noise monitoring positions used in the survey are given in Appendix B.

Figure 2-1: Location Plan



3 Assessment Guidance

3.1 National Planning Policy Framework

3.1.1 The National Planning Policy Framework (NPPF)¹ was updated in September 2023 and sets out the Government's planning policies for England and how these are expected to be applied.

3.1.2 Where issues of noise impact are concerned the NPPF provides brief guidance in paragraph 174 where it states that planning policies and decisions should contribute to and enhance the natural and local environment by:

'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of.....noise pollution'.

3.1.3 Paragraph 185 advises that:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should.....mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life'.

3.1.4 With regard to extant community noise sources and the potential to affect proposed new developments, Paragraph 187 states that:

'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

3.1.5 The NPPF also refers to the 2010 DEFRA publication, the Noise Policy Statement for England (NPSE) which reinforces and supplements the NPPF.

3.2 Noise Policy Statement for England

3.2.1 The Noise Policy Statement for England² (NPSE) sets out the long-term vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development. This long-term vision is supported by the following aims:

- Avoid significant adverse impacts on health and quality of life
- Mitigate and minimise adverse impacts on health and quality of life
- Where possible, contribute to the improvement of health and quality of life

¹ National Planning Policy Framework. Ministry of Housing, Communities and Local Government (2023)

² Noise Policy Statement for England. Government Department for Environment, Food and Rural Affairs (2010)

3.2.2 The NPSE describes the following levels at which noise impacts may be identified:

- NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise
- LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected
- SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur

3.2.3 According to the explanatory notes in the statement, where a noise level falls between the lowest observable adverse effect level (LOAEL) and a level which represents a significant observable adverse effect level (SOAEL):

‘...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.’

3.3 Planning Practice Guidance on Noise

3.3.1 Planning Practice Guidance³ (PPG) is an online resource providing additional guidance and elaboration on the NPPF. It advises that:

‘Plan making and decision making need to take into account the acoustic environment and in doing so consider:

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.’*

3.3.2 In line with the Explanatory Note of the NPSE, the PPG references the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

‘...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation’.

3.3.3 The PPG also provides general advice on the typical options available for mitigating noise, suggesting that Local Plans may include noise standards applicable to proposed developments within the Local Authority’s administrative boundary, although it states that:

‘Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed’.

3 Planning Practice Guidance on Noise (<http://planningguidance.planningportal.gov.uk/blog/guidance/noise/>). Ministry of Housing, Communities and Local Government (2019)

3.4 ProPG Planning and Noise: New Residential Development

- 3.4.1 ProPG Planning and Noise: New Residential Development (ProPG)⁴ was published in 2017 by the Association of Noise Consultants, Institute of Acoustics and the Chartered Institute of Environmental Health.
- 3.4.2 Stage 2: Element 2 of ProPG sets indoor ambient noise levels for residential dwellings based on the guidance contained in British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS 8233), see Table 3-2.

Table 3-2: Indoor Ambient Noise Levels in Dwellings

Activity	Location	Indoor Ambient Noise Level Targets	
Resting	Living Room	35 dB L_{Aeq} (0700-2300)	-
Dining	Dining Room/Area	40 dB L_{Aeq} (0700-2300)	-
Sleeping (daytime resting)	Bedroom	35 dB L_{Aeq} (0700-2300)	30 dB L_{Aeq} (2300-0700) 45 dB $L_{Amax,F}$ (2300-0700)

- 3.4.3 Note 4 to the above table states:

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

- 3.4.4 Note 5 to the above table states:

'Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.'

- 3.4.5 The NPPF PPG requires that the character of the noise is taken into account. In relation to commercial noise impacting on the development, Annex B of BS 8233 describes methods for assessing the acceptability of a noise spectrum for a given application through the use of Noise Rating (NR) curves.
- 3.4.6 This is a graphical method for assigning a single-number rating to a noise spectrum, and many local authorities have a requirement to comply with **NR30** in habitable rooms during the daytime and **NR25** in bedrooms at night where commercial noise may be present.
- 3.4.7 In relation to music noise from impacting the front of the development, additional guidance is taken from 'Planning and Noise: Technical Guidance' produced by Manchester City Council (MCC).
- 3.4.8 The guidance suggests that music noise levels (MNLs) in the 63 Hertz and 125 Hertz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47 dB and 41 dB (L_{eq}), respectively.
- 3.4.9 On the basis of the above, the following criteria (with windows closed and an alternative means of ventilation provided) are considered appropriate for the proposed residential development and considered to represent good resting and sleeping conditions:
- ≤ 35 dB L_{Aeq} (0700-2300) and NR30 (commercial noise) in habitable rooms during the daytime
 - ≤ 30 dB L_{Aeq} (2300-0700) and NR25 (commercial noise) in bedrooms during the night-time
 - ≤ 47 dB L_{eq} (63 Hz) and ≤ 41 dB L_{eq} (125 Hz) (music noise) in bedrooms during the night time
 - 45 dB L_{AFMax} not regularly exceeded in bedrooms during the night-time

⁴ 'ProPG Planning and Noise: New Residential Development (ProPG)', 2017. Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH)

4 Noise Survey and Results

- 4.1.1 In order to assess the current external noise levels at the subject site, a noise survey was undertaken over the course of Friday 15th to Monday 18th September 2023.
- 4.1.2 For the purposes of the noise assessment, a single noise monitoring location (MP1) was adopted, located out of the living room window on the northern façade overlooking the street (see Appendix B for monitoring location).
- 4.1.3 Noise measurements were made using a Bruel & Kjaer 2250 Type 1 integrating sound level meter. A windshield was fitted for all external measurements. The calibration of the measurement system was verified immediately before and after the survey using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. Weather conditions throughout the survey were appropriate for monitoring with dry weather and windspeed $< 5 \text{ ms}^{-1}$.
- 4.1.4 Measurements consisted of A-weighted broadband parameters, together with linear octave band L_{eq} levels. Table 4-1 presents a summary of the measurement data for each measurement session, rounded to the nearest decibel. As measurements were taken in proximity to a façade, all measurements have been adjusted by - 3 dB.

Table 4-1 – Summary of Noise Measurement Data

Location	Date	Time (hh:mm)	Length (hh:mm)	$L_{Aeq,T}$ (dB)	$L_{Amax,F}$ (dB)	$L_{A90,T}$ (dB)	$L_{A10,T}$ (dB)	Comment
MP1 (Window)	15/09/2023	16:30	06:30	72	100	65	75	Noise from pub below dominating levels over the evening period. External loudspeakers mounted in proximity to window. Levels drop down from 2300 to 0200 period then relatively quiet night-time until morning rush hour.
		23:00	08:00	60	*82	40	64	
	16/09/2023	07:00	16:00	72	99	59	76	
		23:00	08:00	67	*85	43	72	
	17/09/2023	07:00	16:00	65	96	54	67	
		23:00	08:00	56	*76	39	59	
	18/09/2023	07:00	07:20	65	87	57	67	
* 11th highest $L_{Amax,F}$ over the night-time period								

- 4.1.5 The ambient noise environment impacting on the front of the development (MP1) was controlled by commercial (public house) activity on the street which extended into the night-time periods over the weekend of monitoring. The most significant factor was noise from the speakers mounted externally to the public house.
- 4.1.6 No significant noise was noted impacting on the rear of the development during the survey, with the dominant noise source being that of traffic and commercial activity passing down the alley.
- 4.1.7 Average external noise levels to the front of the building were in the range of 65 to 72 dB $L_{Aeq,(0700-2300)}$ daytime and 56 to 67 dB $L_{Aeq,(2300-0700)}$ at night (significantly louder on Friday/Saturday), with typical $L_{Amax,F}$ over the night-time periods ≤ 85 dBA.
- 4.1.8 The worst-case noise level measurements from the 2nd night over the period of 2300-0000 (75 dBA $L_{Aeq,1hr}$) is robustly adopted for the assessment of entertainment noise impacting the development.
- 4.1.9 Table 4.2 presents the octave band frequency data for this worst-case night-time measurement, rounded to the nearest decibel.

Table 4.2: Night-Time Octave Band Frequency Data – Music / Patron Noise

Location	Octave Band dB L _{eq}								dB L _{Aeq}
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
MP1	77	82	74	71	70	67	56	52	77

4.2 Sound Insulation Test of Existing Separating Floor

- 4.2.1 In order to determine the sound insulation performance of the existing separating floor, airborne sound insulation testing was undertaken for all third octave frequency bands between 100–3150 Hertz. Two source positions were used. The spatial average sound pressure level was obtained for each source position in both source and receiving rooms using a swept microphone technique (continuously moving). An averaging time of 30 seconds was used for each microphone sweep. Reverberation time measurements were undertaken using one loudspeaker position and an interrupted source. The average of six decay measurements for each frequency band was determined from three fixed microphone positions with two readings in each case. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, with no drift in calibration level noted.
- 4.2.2 The airborne sound insulation of the existing separating floor is summarised in the following table (with the graphical results reproduced in Appendix D). For reference, $D_{nT,w}$ is a single-number quantity which characterizes the airborne sound insulation of the separating element between the source and receiving rooms as defined in BS EN ISO 717-1.

Table 4.3 – Sound Insulation Test Results of Separating Floor

Source Room	Receiving Room	$D_{nT,w}$
Ground Floor Existing Pub	First Floor Proposed Dwelling Flat	60 dB

- 4.2.3 The airborne sound insulation of the existing separating floor is 60 dB $D_{nT,w}$, which is relatively high.

5 Noise Assessment

5.1 Design Noise Levels

5.1.1 Design noise levels for the front façade are taken from the typical levels measured during the monitoring periods. Therefore, design noise levels used in the assessment for the front façade are:

- ≤ 72 dB $L_{Aeq,16hr}$ during the daytime
- ≤ 67 dB $L_{Aeq,8hr}$ during the night-time
- Up to 75 dB $L_{Aeq,1hr}$ during the night-time (entertainment noise)
- Typically 85 dB $L_{Amax,F}$ during the night-time

5.2 Scheme of Sound Attenuation

5.2.1 Calculations have been performed to determine the configuration of glazing required to satisfy the internal criteria given above. Calculations incorporate the measured external noise level data and the noise ingress calculation methodology outlined in Annex G.2 of BS8233:2014. Room and façade dimensions are based on provided drawings and calculated for each apartment from the provided drawings.

5.2.2 Due to the high noise levels and the nature of the external noise climate, it is recommended that the proposed flat is provided with a decentralised mechanical extract ventilation (dMEV) system using continuously-running kitchen and bathroom extracts on a 'trickle' rate.

5.2.3 In order to satisfy the internal noise level criteria detailed in Section 3, habitable rooms throughout the flat should be provided with a scheme of secondary glazing. The secondary glazing should consist of a **10 mm** pane of glass in a separate frame to create a (minimum) **200 mm** cavity from the existing glazing.

5.2.4 The existing single glazed frames should be made good (no gaps etc.) and the top and side reveals formed between the existing window and the secondary glazing should be lined with an acoustically absorbent tile.

5.2.5 The sound insulation performance of a secondary glazed unit (in conjunction with the existing single glazed window) is expected to be at least **45 dB $R_w + C_{tr}$** .

5.2.6 The following example calculation demonstrate that bedrooms throughout the development will readily achieve compliance with the internal criteria contained in Section 3 with the provision of glazing and ventilation as specified.

Table 5.1: Break-In Assessment for Habitable Rooms (room volume = 72 m³)

	Octave Frequency Band (Hz)								L_{Aeq}
	63	125	250	500	1000	2000	4000	8000	
MP1 2300–0000 (Music Noise)	77	82	74	71	70	67	56	52	75
Masonry Building Envelope (12 m ²)	38	41	45	45	54	58	58	58	
10 / 200 / 6 (2.2 m ²)	32	35	46	46	46	56	65	65	
Total Façade Reduction	-39	-42	-53	-53	-53	-63	-72	-72	
10 log (S/A)	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	
External to Internal Correction	+3	+3	+3	+3	+3	+3	+3	+3	
INTERNAL NOISE LEVEL	37.6	39.3	20.9	17.3	17.1	4.1	-16.3	-19.8	25
NR25	55	44	35	29	25	22	20	18	
Compliant	✓	✓	✓	✓	✓	✓	✓	✓	
MCC Music Noise Criteria	47	41							
Compliant	✓	✓							

5.2.7 The significant glazing specification required to achieve compliance with the MCC music noise criteria will readily mitigate other noise from general road traffic and commercial activity.

5.2.8 The following points should be noted:

- The glazing recommendations apply to the window within a sealed unit. It is the responsibility of the window supplier to ensure that the window frame does not compromise the performance of the glazing.
- Internal noise levels due to mechanical ventilation plant should not exceed 26 dB(A) in bedrooms and 30 dB(A) in living rooms

5.3 Internal Noise Transfer

5.3.1 For shops and offices, the likely noise sources are comparable to normal domestic use and, as a consequence, the minimum performance requirements set out in ADE 2003 is considered appropriate. Many local authorities adopt ADE 2003 in such cases.

5.3.2 However, for food and drink establishments, the likely noise sources include a (potentially much larger) number of people, staff serving, cleaning tables, music etc. and a higher standard of sound insulation is considered appropriate. Many local planning authorities adopt sound insulation of the order of 60 dB $D_{nT,w}$.

5.3.3 For reference, the 60 dB $D_{nT,w}$ standard is used by Whitbread Premier Inns (who offer a good night's sleep guarantee) where hotel bedrooms are above the hotel's restaurant and bar.

5.3.4 As evidenced in Section 4.2 and Appendix D, the existing separating floor between the proposed flat and the underlying public house currently achieves 60 dB $D_{nT,w}$ and should therefore be adequate to address internal noise transfer.

6 Summary and Conclusions

- 6.1.1 A noise impact assessment has been undertaken for the proposed residential conversion of 1-3 Church Street, Barnsley, S70 2AB.
- 6.1.2 The noise environment at the subject site is generally controlled by commercial activity on Church Street, with noise extended in the night-time periods, particularly over the weekend. Noise to the rear is not considered to lead to any loss of internal amenity.
- 6.1.3 A scheme of enhanced sound insulation works has been proposed to protect the proposed residential development from the ambient noise climate in order to achieve satisfactory internal noise levels.

Appendix A – Abbreviations and Definitions

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μ Pa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_o)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_o = reference sound pressure (20 μ Pa).

A-weighting

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T , has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T . $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T . L_{A90} is typically taken as representative of background noise.

$L_{AF \max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Single Event Level / Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, regardless of the event duration. This allows for comparison between different noise events which occur over different lengths of time.

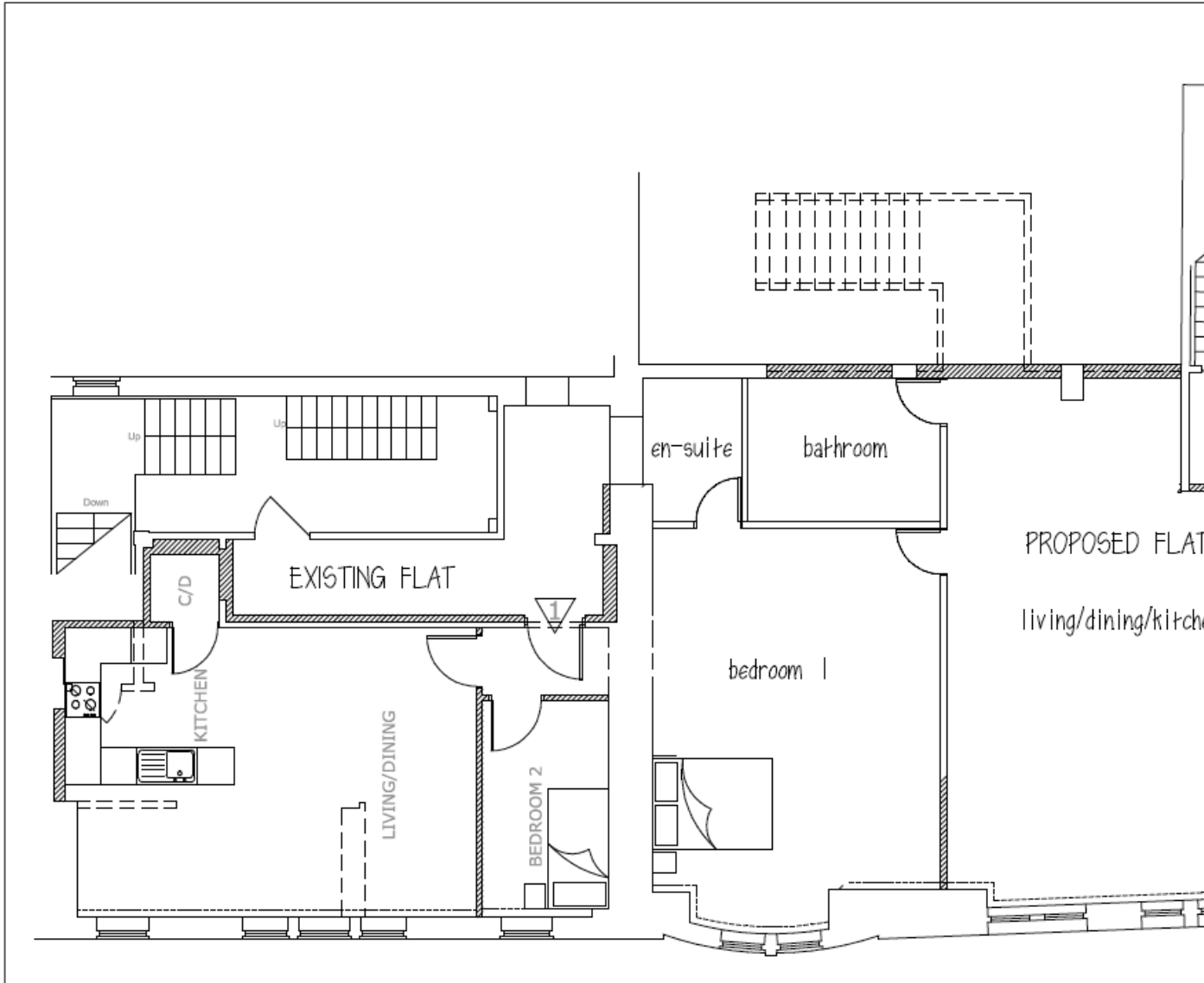
Weighted Sound Reduction Index (R_w)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_w is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix B – Noise Measurement Position



Appendix C – Site Layout Plan



Appendix D – Sound Insulation Test Result

Standardized level difference according to ISO 140-4
Field measurements of airborne sound insulation between rooms

Rating according to ISO 717-1

$D_{nT,w}$ (C; Ctr) = 60 (-3; -9) dB

Evaluation based on field measurement results obtained in one-third octave bands by an engineering method.

Freq (Hz)	Test D_{nT} values (dB)		
	curve	test	
100	41	39.4	
125	44	34.7	
160	47	41.5	
200	50	46.4	
250	53	48.9	#
315	56	54.3	
400	59	60.2	
500	60	59.3	
630	61	63.0	
800	62	63.6	
1000	63	64.8	#
1250	64	66.6	#
1600	64	≥69.5	*
2000	64	69.8	#
2500	64	69.4	#
3150	64	71.4	#

indicates background corrected
* indicates limit of measurement

Construction details:
N/A

Individual Test D_{nT} Results

Standardized level difference, D_{nT} (dB)

Frequency (Hz)

Test Reference Number: 144/01

Date of test:	Signature of tester:	Source Room:	Vol (m3)	Receiver Room:	Vol (m3)
18/09/2023		Pub	180+	Kitchen/Living room	112