Our ref: NIA/10827/23/10963/v1 Perseverance Street

21st March 2023

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Dear Sir

NOISE IMPACT ASSESSMENT FOR A PROPOSED NEW-BUILD RESIDENTIAL CARE HOME FORMER CAR PARK TO THE WEST OF PERSEVERANCE STREET, BARNSLEY, SOUTH YORKSHIRE, S70 6HH

1.00 INTRODUCTION

1.01 Environmental Noise Solutions Limited (ENS) has been commissioned by Exemplar Health Care Services Ltd to carry out a noise impact assessment for a proposed new build residential care home at the former car park to the west of Perseverance Street, Barnsley, South Yorkshire, S70 6HH hereafter referred to as the application site).

1.02 The objectives of the noise impact assessment were to:

- Determine external noise levels at the application site
- Assess the potential impact of the external 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 future occupants of the proposed residential development from a loss of amenity due to noise

1.03 This report details the methodology and results of the assessment and provides recommendations for the building envelope (fenestration and ventilation) and boundary treatments. It has been prepared to accompany a planning application to be submitted to Barnsley Metropolitan Borough Council (BMBC).

1.04 This report has been prepared for Exemplar Health Care Services Ltd 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 Exemplar Health Care Services Ltd and ENS as to the extent to which the findings may be appropriate for their use.

1.05 A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

2.00 APPLICATION SITE SETTING AND PROPOSED RESIDENTIAL DEVELOPMENT

2.01 The application site is located to the west of Barnsley town centre, and is bound by (see Appendix 2 for a site layout):

- Existing residential dwellings to the north
- Existing residential dwellings to the south with Springfield Street beyond
- Perseverance Street to the east with public amenity beyond
- Former Co-Operative Society building to the west

2.02 Development proposals are for a three-storey residential care home with associated parking and landscaping.

3.00 BASELINE NOISE SURVEY

3.01 In order to establish external noise levels at the application site, a baseline noise survey was undertaken on Monday 13th March through to Tuesday 14th March 2023.

3.02 The following noise monitoring positions were adopted (the approximate locations of the noise monitoring positions are shown in Appendix 2 for reference):

- MP1 was located at circa 3 metres back from the nearside kerb of Perseverance Street
- MP2 was located at the southern boundary of the application site
- MP3 was located at the northern boundary of the application site

3.03 Noise measurements were made in a free field environment at 4 metres above ground level using Bruel & Kjaer 2250 Type 1 integrating sound level meters. A windshield was fitted for all measurements. The calibration of each 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.

3.04 Measurements consisted of A–weighted broadband parameters, together with linear octave band L_{eq} levels. Table 3.1 presents a summary of the measurement data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 3.1 – Summary of Noise Measurement Data

Position	Date	Time	L_{Aeq} (dB)	L_{A90} (dB)	L_{A10} (dB)	Comment
MP1	13/03/23	1014–1114	55	51	57	Dominated by road traffic on Dodworth Road with sporadic contribution from vehicles on Perseverance Street
		1403–1505	57	53	58	
		2308–2338	47	39	48	
		0129–0159	50	36	45	
Daytime noise levels measured up to 57 dB $L_{Aeq,T}$ Night-time noise levels measured up to 50 dB $L_{Aeq,T}$ Typical car pass measured at 63 dB L_{AFMax} at night Daytime and night-time background noise level 51 dB $L_{Aeq,T}$ and 36 dB $L_{Aeq,T}$ respectively						
MP2	13/03/23	1301–1401	55	52	56	Dominated by road traffic on Dodworth Road with sporadic contribution from vehicles on Perseverance Street
		1612–1713	54	52	56	
		2342–0012	45	38	45	
		0047–0117	41	38	44	
Daytime noise levels measured up to 55 dB $L_{Aeq,T}$ Night-time noise levels measured up to 45 dB $L_{Aeq,T}$ Daytime and night-time background noise level 52 dB $L_{Aeq,T}$ and 38 dB $L_{Aeq,T}$ respectively						
MP3	13/03/23	1158–1258	55	52	58	Dominated by road traffic on Dodworth Road with sporadic contribution from vehicles on Perseverance Street
		1509–1609	54	52	56	
		0014–0044	40	36	43	
Daytime noise levels measured up to 55 $L_{Aeq,T}$ Night-time noise levels measured up to 40 dB $L_{Aeq,T}$ Daytime and night-time background noise level 52 dB $L_{Aeq,T}$ and 36 dB $L_{Aeq,T}$ respectively						

3.05 Noise levels at the application site were predominantly due to road traffic Dodworth Road.

3.10 Typical daytime and night-time background noise levels in the vicinity of the site were circa **51-53 dB $L_{A90\ (15\ min)}$** and **36-39 dB $L_{A90\ (15\ min)}$** respectively.

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4.00 NATIONAL PLANNING POLICY FRAMEWORK AND OTHER RELEVANT GUIDANCE

National Planning Policy Framework

4.01 The National Planning Policy Framework (NPPF) was updated in July 2021 and sets out the Government's planning policies for England and how these are expected to be applied.

4.02 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'.

4.03 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'.

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

Noise Policy Statement for England

4.05 The Noise Policy Statement for England (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.

4.06 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.

Planning Practice Guidance – Noise

4.07 Planning Practice Guidance (PPG) is an online resource (last updated 2019) which provides additional guidance and elaboration on the NPPF. It advises that the Local Planning Authority should consider the acoustic environment in relation to:

- 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.
- Whether or not a good standard of amenity can be achieved.

4.08 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'.

4.09 The PPG also provides general advice on the typical options available for mitigating noise. It goes on to suggest 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'.

ProPG Planning and Noise: New Residential Development

4.10 ProPG Planning and Noise: New Residential Development (ProPG) was published in 2017 by the Association of Noise Consultants, Institute of Acoustics and the Chartered Institute of Environmental Health.

4.11 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 below).

Table 4.1 – Indoor Ambient Noise Levels in Dwellings

Activity	Location	Good Indoor Ambient Noise Levels	
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 $L_{AFMax\ (2300–0700)}$

4.12 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.'

4.13 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'.

4.14 This is consistent with the guidance contained within the PPG, which states that:

'… consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations'.

4.15 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 $L_{Aeq\ (0700\text{-}2300)}$ during the daytime
- ≤ 30 dB $L_{Aeq\ (2300\text{-}0700)}$ and 45 dB L_{AFMax} not regularly exceeded during the night time

4.16 With regard to external amenity, ProPG reflects the advice in BS 8233, which 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 centres 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.'

<u>BS 4142:2014+A1-2019 'Methods for Rating and Assessing Industrial and Commercial Sound</u>

4.17 British Standard BS 4142:2014+A1-2019 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS 4142) describes methods for determining, at the outside of a building, noise levels from factories or industrial premises and a method for assessing whether the noise is likely to give rise to adverse impacts, and states:

The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. Typically, the greater this difference, the greater the magnitude of the impact. For example:

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context*

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the absolute level of sound.

4.18 The rating level is described as the specific sound level (the equivalent continuous A-weighted sound pressure level at the assessment position (NSR) produced by the specific sound source over the given reference time interval) plus any adjustment for the characteristic features of the sound. The character correction relates to whether and to what degree the specific sound is assessed to have an element of tonality, impulsivity and/or characteristics that are readily distinctive against the residual acoustic environment.

4.19 The background noise level is the A–weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 percent of a given time interval, T, measured using time weighting 'F' and quoted to the nearest whole number of decibels.

4.20 The reference time interval of the specific sound is 1 hour during the day and 15 minutes at night.

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5.00 SOUND ATTENUATION SCHEME PROPOSALS

5.01 The design noise levels for road-fronting habitable rooms are as follows:

- **57 dB $L_{Aeq\ (0700\text{-}2300)}$** during the daytime
- **50 dB $L_{Aeq\ (2300\text{-}0700)}$** (and typically **63 dB L_{AFMax}**) during the night-time

5.02 In order to calculate the sound insulation requirements for road-fronting habitable rooms the Building Research Establishment (BRE) building envelope insulation calculation spreadsheet was used. This spreadsheet is based on the calculation methodology advocated in BS 8233. The spreadsheet allows input of external noise levels, room dimensions and reverberation time together with parameters for the various elements of the building envelope and calculates the internal noise level in terms of the external noise level metric (L_{Aeq} and L_{AFMax} in this case).

5.03 All habitable rooms (and noise-sensitive ancillary spaces) should be fitted with standard glazing rated at least **28 dB R_w+C** (such as 4 mm glass / 12 mm cavity / 4 mm glass).

5.04 It is understood that a mechanical ventilation strategy will be implemented within habitable rooms at the application site. Appropriate ventilation solutions include:

- A System 3 mechanical extract ventilation (MEV) system (e.g. Airflow Developments Ltd.)
- A whole house positive input ventilation (PIV) system (e.g. Nuaire Drimaster 365)
- A fully ducted mechanical ventilation system with heat recovery (MVHR)
- Individual room ventilators, such as the Titon Sonair unit (or equivalent)

5.05 Habitable rooms where the designed air permeability is tighter than (<) 5 $m^3/(h.m^2)$, 5000 mm^2 EA background ventilators may be required where MEV or PIV systems are proposed (1 no. vent per habitable room – to be confirmed with the developer). In order to maintain the sound insulation properties of the façade, any trickle vents in rooms requiring enhanced glazing should be rated at least **37 dB $D_{n,e,w}$** per 5000 mm^2 EA (vent open), such as the Greenwood 5000EAW.AC1, or equivalent.

5.06 Trickle ventilators are not required where MVHR is used.

5.07 See Appendix 3 for annotated glazing/ventilation markup and Appendix 5 for selected BRE calculation spreadsheets.

5.08 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

- When selecting a glazing system to satisfy the requirements outlined above, it is important to ensure that the R_w + C value is achieved (rather than simply the R_w value). Published R_w values tend to be higher than corresponding R_w + C values; therefore, incorrect selection could result in an overestimation of sound reduction performance which in turn could result in higher internal noise levels

- It is the responsibility of the mechanical ventilation supplier to ensure that the noise generated by the ventilation units is compliant with the internal noise level targets

- The opening and free area of the ventilation units should be checked by a mechanical service engineer before designs are finalised. Should the equivalent open area be insufficient to meet the minimum requirements of ADF, it may be necessary to increase the number of units per habitable room. Where this applies, the required sound reduction of the ventilation units may need to be increased accordingly

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5.09 Daytime ambient noise levels throughout the application site are **≤ 55 dB $L_{Aeq\ (0700\text{-}2300)}$**. Such levels are at the desirable value described in ProPG/BS 8233 for gardens. On this basis, there is no issue with respect to external amenity.

Noise Associated with Fixed Installations (Mechanical and Electrical Plant)

5.13 It is understood that the development will include air source heat pumps (ASHPs). However, details of the proposed type, location and number of mechanical and electrical plant items are not available at this stage. It is therefore considered appropriate to specify suitable noise limits to which any such plant items should conform.

5.14 These limits should take account of the background noise level at the nearest noise sensitive receptor. For reference, daytime and night-time background levels in the vicinity of the site were **51 dB $L_{A90\ (15\ min)}$** and **36 dB $L_{Aeq\ (15\ min)}$** respectively.

5.15 It is considered that the operation of any fixed installations of mechanical and electrical plant items can be controlled by a suitably worded planning condition, which would typically be as follows:

The cumulative noise rating level associated with fixed installations of mechanical and electrical plant items should not exceed the appropriate background noise level at the nearest existing residential dwelling.

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6.00 CONCLUSIONS

6.01 A noise impact assessment has been undertaken for a proposed new-build residential care home, former carpark to the west of Perseverance Street, Barnsley, South Yorkshire, S70 6HH.

6.02 The noise environment at the application site was dominated by road traffic on Dodworth Road (A628), with sporadic contribution from vehicles on Perseverance Street.

6.03 A scheme of sound insulation works has been developed to protect the proposed residential development from the ambient noise climate.

6.04 Appropriate planning conditions and management controls can be adopted in order to mitigate noise impacts from fixed installations (ASHPs).

I trust the foregoing is sufficient for your needs. Should you have any queries regarding the above, please do not hesitate to contact me.

Yours sincerely

Simon Jefferson BSc (Hons)
MIOA, Diploma in Acoustics & Noise Control
For Environmental Noise Solutions Limited

cc File

Appendix 1
Glossary of Acoustic Terms

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 µPa 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:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 µPa).

A-weighting Network

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.

Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events which occur over different lengths of time.

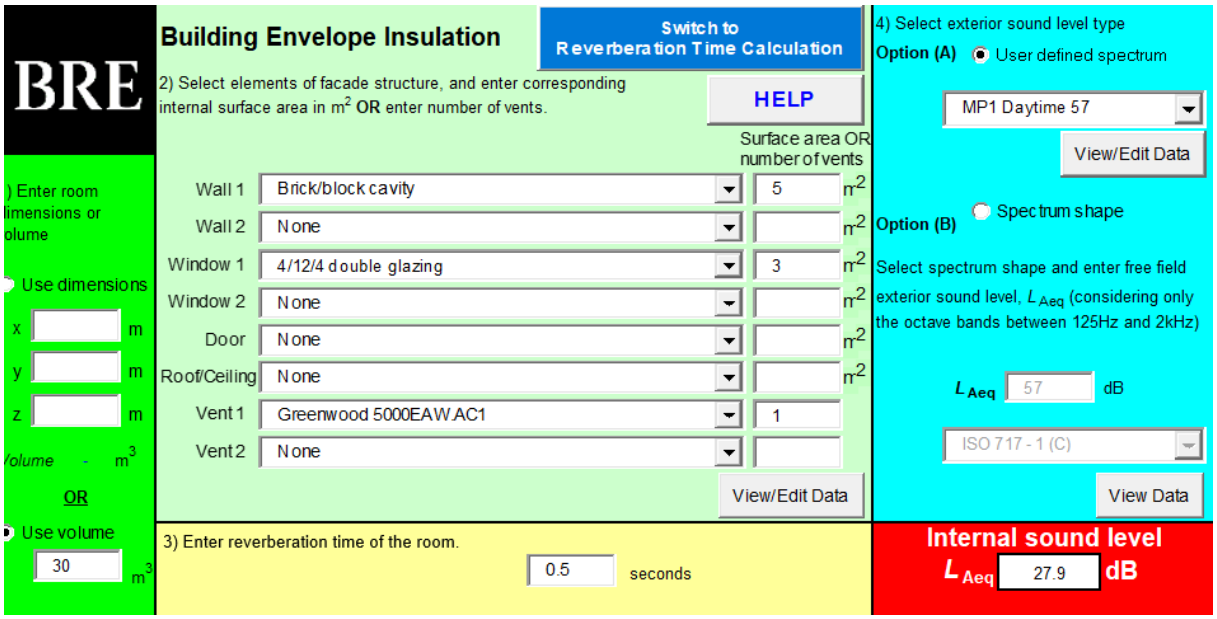
Weighted Sound Reduction Index (R_W)

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).

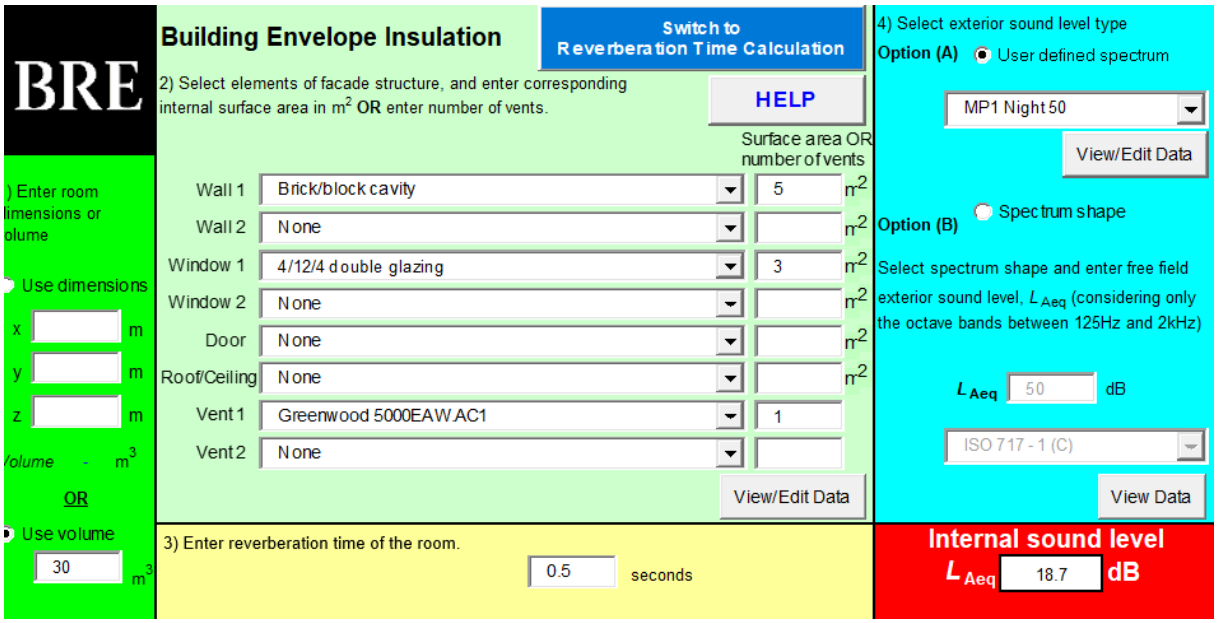
Appendix 2 – Site Location Plan and Approximate Noise Monitoring Positions

Appendix 3
BRE Calculation Spreadsheets

Daytime Ambient Noise Levels – Habitable rooms fronting towards Perseverance Street



Night-Time Ambient Noise Levels – Bedrooms fronting towards Perseverance Street



Appendix 3
BRE Calculation Spreadsheets

Night-time Maximum Noise Levels – Bedrooms fronting towards Perseverance Street