Our Ref: NIA/7762/18/7711/v1/Old Marsden Fire Station

19th February 2018

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SB Homes
4 Brougham Road
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HD7 6BN

Dear Sirs

NOISE IMPACT ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT
LAND AT OLD MARSDEN FIRE STATION, ADJACENT A62 MANCHESTER ROAD, MARSDEN

1.00 INTRODUCTION

1.01 Environmental Noise Solutions Limited (ENS) has been commissioned by SB Homes to undertake a noise impact assessment for a proposed residential development (27 dwelling flats) at land at Old Marsden Fire Station, adjacent A62 Manchester Road, Marsden, West Yorkshire (hereafter referred to as the application site).

1.02 The objectives of the noise impact assessment were to:

- Determine the ambient noise climate at the application site
- Assess the impact of the ambient noise climate on the proposed residential development with reference to the National Planning Policy Framework and other pertinent guidelines
- Provide recommendations for noise mitigation measures

1.03 This report details the methodology and results of the assessment and provides recommendations for the noise mitigation measures to the building envelope. It has been prepared to accompany a planning application to be submitted to Kirklees Council.

1.04 This report has been prepared for SB Homes 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 SB Homes (applicant) 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 in a predominantly residential area in Marsden village, to the west of Huddersfield town centre. Roughly rectangular in shape, the application site is bound by (see Appendix 2):

- A62 Manchester Road to the north (residential dwellings on the opposite side of the road)
- Open fields to the south
- Residential dwellings to the east
- Holme Valley Mountain Rescue Team to the west

2.02 The proposed residential development consists of (see Appendix 3)

- Block A (new) 6 dwelling flats (2 x ground, 2 x first and 2 x second)
- Block B (new) 18 dwelling flats (6 x ground, 6 x first, 6 x second / third duplex)
- Block C (part converted) 3 dwelling flats (1 x ground, 1 x first, 1 x ground / first duplex)

2.03 For reference, Block C (part converted with a new build wing) is adjacent to the A62 Manchester Road whilst Blocks A and B (wholly new build) are located into the application site further away from the road.

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3.00 BASELINE NOISE SURVEY

3.01 In order to establish the ambient noise levels at the application site, a baseline noise survey was undertaken on Tuesday 9th January 2018. For the purpose of the assessment, the following noise monitoring positions were adopted (see Appendix 2):

- MP1 was located circa 1 metre from the nearside kerb of the A62 Manchester Road (adjacent to the northern façade of the old Fire Station which is to be converted)

- MP2A, MP2B and MP2C were located at circa 13 metres, 17 metres and 37 metres, respectively, from the nearside kerb of the A62 Manchester Road (representative of the block(s) of new build dwelling flats)

3.02 Noise measurements were undertaken using Bruel & Kjaer 2250 Type 1 integrating sound level meters. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. Weather conditions throughout the survey were appropriate for monitoring.

3.03 The following table contains a summary of the noise measurement data (note: the noise measurement data at MP1 was taken in a reflective field and therefore a – 3 decibel façade enhancement has been applied in order to establish the free field level).

Table 3.1 – Baseline Noise Measurement Data

Position (Height)	Date	Time	L_{Aeq} dB	L_{A90} dB	L_{A10} dB	L_{A1} (L_{AMax}) dB	Comments
MP1 (1.5m)	09/01/18	1000–1100	68	49	71	77 (80)	A62 Manchester Road (clear line of sight) Circa 240 v/hr day Circa 40 v/hr at 2300 Circa 10 v/hr at 0000
	09/01/18	1100–1200	68	49	71	77 (82)	
	09/01/18	1200–1300	67	47	71	76 (81)	
	09/01/18	2300–2330	61	33	63	74 (80)	
	10/01/18	0005–0035	53	33	44	65 (80)	
Daytime ambient noise level circa 68 dB $L_{Aeq\ (0700–2300)}$ based on CRTN methodology Night time ambient noise level circa 59 dB $L_{Aeq\ (2300–0700)}$ based on TRL methodology							
MP2A (1.5m)	09/01/18	0857–0912	60	48	63	70 (73)	A62 Manchester Road; clear sight of road, irrespective of height
MP2A (8.0m)	09/01/18	1109–1154	60	50	63	69 (73)	
MP2A (4.0m)	09/01/18	1155–1210	58	46	61	66 (69)	
MP2A (1.5m)	09/01/18	1254–1304	58	43	61	68 (72)	
MP2A (1.5m)	10/01/18	2350–0005	45	26	45	59 (67)	
Daytime ambient noise level circa 59 dB $L_{Aeq\ (0700–2300)}$ Night time ambient noise level circa 50 dB $L_{Aeq\ (2300–0700)}$							
MP2B (8.0m)	09/01/18	1213–1223	59	49	62	65 (68)	A62 Manchester Road; no sight of road at 1.5m
MP2B (1.5m)	09/01/18	1323–1333	49	44	52	55 (57)	
Elevated position has clear sight to A62 Manchester Road (and thus comparable noise levels) Noise levels circa 10 dB lower when road screened by existing building							
MP2C (1.5m)	09/01/18	0914–0929	53	45	56	60	A62 Manchester Road; road slightly obscured at 1.5m
MP2C (5.0m)	09/01/18	1053–1103	54	46	57	62	
MP2C (8.0m)	09/01/18	1004–1049	57	47	60	64	
MP2C (1.5m)	09/01/18	2334–2349	43	27	44	55	
Position at height provides a clear line of sight to A62 Manchester Road Noise levels at lower height are circa lower due to screening from existing topography Daytime ambient noise level (at height) circa 57 dB $L_{Aeq\ (0700–2300)}$ Night time ambient noise level circa 48 dB $L_{Aeq\ (2300–0700)}$							

3.04 Noise levels across the application site were due to road traffic on the A62 Manchester Road.

Continued from page 2

3.05 For the prediction of daytime road traffic noise, the Department of Transport's Memorandum on the Calculation of Road Traffic Noise (CRTN) explains that the following shortened measurement procedure may be used. Measurements of L_{A10} are made over any three consecutive hours between 10:00 and 17:00 hours. Using $L_{A10\ (3\ hour)}$ as the arithmetic mean of the three consecutive values of hourly L_{A10}, the $L_{A10\ (18\ hour)}$ can be calculated from the equation:

(i) $L_{A10\ (18\ hour)} = L_{A10\ (3\ hour)} - 1$ dB

(ii) $L_{Aeq\ (0700–2300)} \approx L_{A10\ (0600–0000))} - 2$ dB

3.06 Substituting (ii) into (i) gives the following approximation:

(iii) $L_{Aeq\ (0700–2300)} \approx L_{A10,\ 3\ hour} - 3$ dB

3.07 Based on the above formula, the daytime ambient noise levels at MP1 (the old Fire Station which is to be converted to dwelling flats adjacent to the A62 Manchester Road) were measured / calculated at 68 dB $L_{Aeq\ (0700–2300)}$.

3.08 Based on the above formula, the daytime ambient noise levels (at height) at MP2A, MP2B and MP2C (new build dwelling flats set back from the A62 Manchester Road) were measured / calculated at 57 to 59 dB $L_{Aeq\ (0700–2300)}$.

3.09 A study prepared by TRL Limited on behalf of the Department for Environment, Food and Rural Affairs (DEFRA) entitled 'Converting the UK Traffic Noise Index $L_{A10\ (18\ hour)}$ to EU Noise Indices for Noise Mapping' presents a methodology for calculating night time road traffic noise levels based on daytime road traffic noise level based on the following formula:

(iv) $L_{Aeq\ (23:00–07:00)} \approx 0.90 * L_{A10,\ 18\ hour} - 3.77$ (for non-motorways)

3.10 Based on the above formula, the night time ambient noise levels at MP1 (the old Fire Station which is to be converted to dwelling flats adjacent to the A62 Manchester Road) were measured / calculated at 60 dB $L_{Aeq\ (2300–0700)}$.

3.11 Based on the above formula, the night time ambient noise levels (at height) at MP2A, MP2B and MP2C (new build dwelling flats set back from the A62 Manchester Road) were measured / calculated at 48 to 50 dB $L_{Aeq\ (2300–0700)}$.

4.00 NATIONAL PLANNING POLICY FRAMEWORK (NPPF) PLANNING PRACTICE GUIDELINES ON NOISE AND OTHER RELEVANT GUIDANCE

4.01 In terms of noise impact assessment criteria, Paragraph 123 of the NPPF states that planning policies and decisions should aim to '*avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development'.*

4.02 Planning Practice Guidance specifically dealing with noise was uploaded to the Government's Planning Portal in March 2014 as an accompaniment to the NPPF. The guidance states '*… 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*'.

4.03 Building Regulations Approved Document F 'Ventilation' (2010 version incorporating 2013 amendments) states '*For mainly naturally ventilated buildings, it is common to use a combination of ventilators (e. g. for dwellings it is common to use intermittent extract fans for* ***extract ventilation****, trickle ventilators for* ***whole dwelling ventilation*** *and windows for* ***purge ventilation). …*** *Purge ventilation throughout the building to aid the removal of high concentrations pollutants and water vapour released from occasional activities such as painting and decorating and or accidental releases such as smoke and burnt food or spillage of water. Purge ventilation is intermittent i.e. required only when such activities occur. Purge ventilation provisions may also be used to improve thermal comfort, although this is* ***not controlled*** *under Building Regulations*'.

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4.04 It is therefore evident that whilst ventilation may also provide a means to control thermal comfort this is not controlled under Building Regulations. Part L addresses minimising energy use due to the effects of solar gain in summer.

4.05 It is noteworthy that modern dwellings in the UK are well insulated. Insulation acts as a barrier to heat loss and heat gain. This makes a dwelling warmer in winter and cooler in summer. In a warm summer, the temperature outside a well insulated dwelling is higher than that inside the dwelling. Rather than providing thermal comfort, opening a window, simply lets warm air in thus raising the internal ambient temperature. In such a situation, the most effective means of thermal comfort is to keep windows shut.

4.06 It is therefore evident that trickle ventilators for whole dwelling ventilation are considered an alternative means of ventilation under Building Regulations Approved Document F 'Ventilation' (2010 version incorporating 2013 amendments).

4.07 In areas with higher ambient noise levels, enhanced double glazing and acoustically treated trickle ventilators are appropriate. Furthermore, some developers prefer mechanical ventilation to acoustically treated trickle ventilators although this is not mandatory under Building Regulations or the NPPF Planning Practice Guidance on Noise.

4.08 British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS 8233) sets indoor ambient noise levels from residential dwellings (see table below).

Table 4.1 – Indoor Ambient Noise Levels in Dwellings (BS 8233)

Location	Good Internal Ambient Noise Levels		Reasonable Internal Ambient Noise Levels	
Living Room	35 dB $L_{Aeq\ (0700–2300)}$	n/a	40 dB $L_{Aeq\ (0700–2300)}$	n/a
Bedroom	35 dB $L_{Aeq\ (0700–2300)}$	30 dB $L_{Aeq\ (2300–0700)}$	40 dB $L_{Aeq\ (0700–2300)}$	35 dB $L_{Aeq\ (2300–0700)}$

4.09 Note 4 to the above table states '*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_{AFMax} depending on the character and number of events per night. Sporadic noise events could require separate values'.*

4.10 In respect of events, the World Health Organisation's Guideline for Community Noise comment '*If the noise is not continuous, L_{AFMax} or SEL are used to indicate the probability of noise induced awakenings … For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFMax} more than 10-15 times per night.'*

4.11 It is evident that BS 8233 considers that night time maxima guideline values relate to discrete, individual noise events (such as aircraft or trains, etc) rather than general road traffic noise. In the case of the application site, however, consideration of the night time maximum noise levels does not have a material impact upon the glazing and ventilation specification (i.e. a similar reduction is required to L_{Aeq} as it would be to L_{AFMax}).

4.12 Note 5 to the above table states '*If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment*'.

4.13 It is evident that BS 8233 considers that adequate ventilation is provided by trickle ventilators in an open position. This is consistent with Building Regulations and the NPPF Planning Practice Guidance on Noise.

4.14 On the basis of the above, the following criteria (with windows closed and trickle vents open) are considered appropriate for the proposed residential development (and represent good resting and sleeping conditions):

:

- ≤ 35 dB $L_{Aeq\ (0700\text{-}2300)}$ in living rooms and bedrooms during the day
- ≤ 30 dB $L_{Aeq\ (2300\text{-}0700)}$ and 45 dB L_{AFMax} not normally exceeded in bedrooms during the night

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5.00 PROPOSED NOISE MITIGATION MEASURES

5.01 In order to validate the proposed noise mitigation measures, the Building Research Establishment (BRE) building envelope insulation calculation spreadsheet was used for Block C (located immediately adjacent to the A62 Manchester Road).

5.02 This spreadsheet is based on the calculation methodology advocated in British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (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} in this case).

5.03 For the purpose of the assessment, the following model inputs have been used:

- **Enhanced Glazing and Ventilation to Façade Adjacent to A62 Manchester Road**
- Ambient noise level up to 68 dB $L_{Aeq\ (0700–2300)}$
- First Floor Bedroom (Worst Case) circa $3m^2$ glazing and $30m^3$ room volume
- Enhanced double glazing rated ≥ 37 dB R_w i.e. 10 mm glass / 12 mm cavity / 6 mm glass
- Acoustic wall ventilator rated ≥ 45 dB D_{new} per $8000mm^2$ open (1 per habitable room) or mechanical ventilator compliant with NIR 1975 (1 per habitable room)

5.04 The Building Research Establishment (BRE) building envelope insulation calculation spreadsheet outputs reproduced in Appendix 4 demonstrate:

- Circa 35 decibels reduction with a Ryton AAC125HPCWL acoustic wall vent
- Circa 38 decibels reduction with a Titon Sonair acoustic wall vent (mechanical)

5.05 For reference standard double glazing with standard trickle vents (an allowable solution in accordance with the National Planning Policy Framework Planning Practice Guidance on Noise, Building Regulations Approved Document F 'Ventilation' and BS 8233) provides at least 27 decibels reduction from outside to inside.

5.06 The proposed noise mitigation measures are summarised in the following table.

Table 5.1 – Proposed Noise Mitigation Measures

Location	Ambient Noise Level	Reduction Required	Glazing and Ventilation Specification
Fire Station A62 Facade	68 dB $L_{Aeq\ (0700–2300)}$ 59 dB $L_{Aeq\ (2300–0700)}$ 80 dB $L_{AFMax\ (2300–0700)}$	33 dB $L_{Aeq\ day}$ 29 dB $L_{Aeq\ night}$ 35 dB $L_{AFMax\ night}$	Enhanced double glazing ≥ 37 dB R_w* Acoustic wall vents ≥ 45 dB D_{new} per 8000 mm^{2}** or mechanical*** to rooms not ventilated from quiet side
Other facades fully screened and/or set back	< 59 dB $L_{Aeq\ (0700–2300)}$ < 50 dB $L_{Aeq\ (2300–0700)}$ < 68 dB $L_{AFMax\ (2300–0700)}$	24 dB $L_{Aeq\ day}$ 20 dB $L_{Aeq\ night}$ 23 dB $L_{AFMax\ night}$	Standard double glazing rated ≥ 29 dB R_w Standard trickle vents rated ≥ 33 dB D_{new} per 4000 mm^2

* Such as 10 mm glass / (6–20 mm air cavity) / 6 mm glass
** Such as Ryton AAC125HPCWL acoustic wall vent
*** Such as Titon Sonair acoustic wall vent

6.00 CONCLUSIONS

6.01 A noise impact assessment has been undertaken for a proposed residential development at the Old Marsden Fire Station, adjacent to the A62 Manchester Road, Marsden. The principal noise source at the site is A62 Manchester Road traffic.

6.02 A scheme of noise mitigation measures (enhanced glazing and acoustically treated ventilation to the buildings adjacent to the A62 Manchester Road) has been established in order to protect the proposed residential development from the ambient noise climate in accordance with the requirements of the National Planning Policy Framework and other pertinent guidance. On this basis, the ambient noise climate is not considered to represent a constraint to the proposed residential development.

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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,

Jonathan Rigg
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)

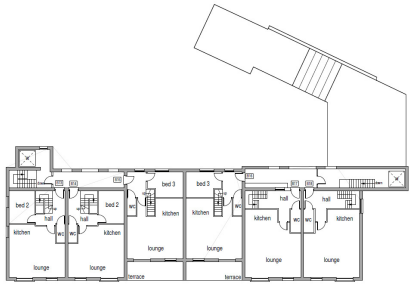
Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_W is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix 2
Site Location Plan (and Noise Monitoring Positions)

Appendix 3
Proposed Site Layout Plan (● denotes rooms requiring acoustically treated ventilation)

A1

Proposed buildings B and C first floor layout (1:200).



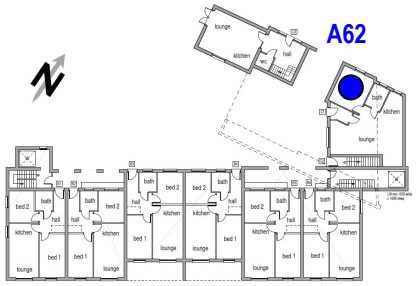
Proposed buildings B and C second floor layout (1:200).

Schedule of accommodation.

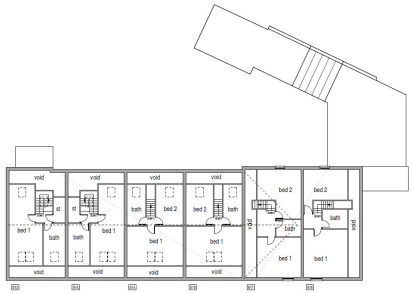
Building A.
6 No 2 Bed flats @ 55.8m² (600 sq ft).

Building A.
8 No 2 Bed flats @ 55.8m² (600 sq ft).
4 No 2 Bed duplex flats @ 91m² (978 sq ft).
2 No 3 Bed duplex flats @ 91m² (978 sq ft).

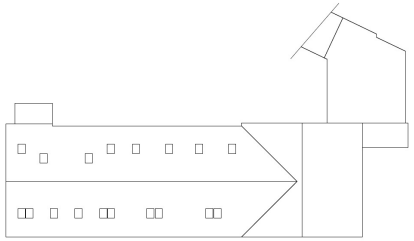
Building C.
2 No 1 Bed flats @ 65m² (700 sq ft).
1 No 2 Bed flats @ 90m² (967 sq ft).



Proposed buildings B and C ground floor layout (1:200).



Proposed buildings B and C third floor layout (1:200).

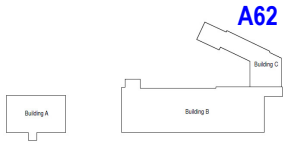


Proposed buildings roof layout (1:200).

Proposed building A ground floor layout (1:200).

Proposed building A first floor layout (1:200).

Proposed building A second floor layout (1:200).



Key plan (1:500).

Proposed residential development at The Old Fire Station, Marsden.

Client: SB Homes.

William Best RIBA
The Chapel House
22, Pole Gate, Scammonden.
HD3 3FW.
Tel 01484 845896.

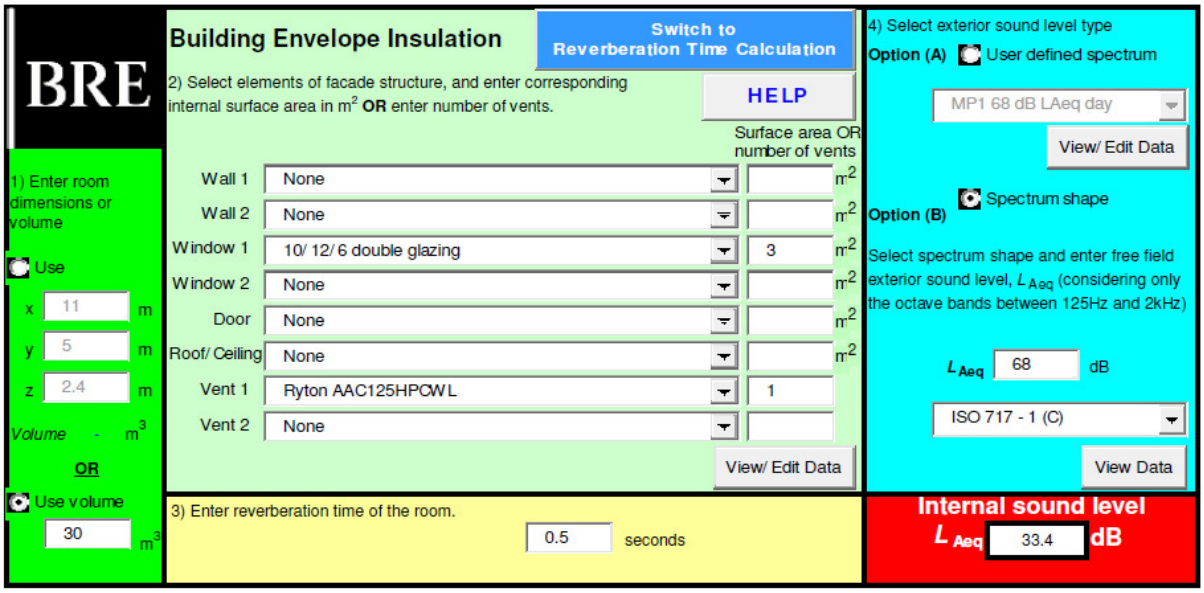
Drawing: Layout Plans.

Scale: 1:200	Drawn by	Date
	SAM	02/02/18.

Drawing No: 2017/438/104.

Appendix 4
Noise Break In Calculations

Circa 35 dB reduction with enhanced glazing (37 dB Rw) and acoustic wall vent (Ryton)



Circa 38 dB reduction with enhanced glazing (37 dB Rw) and acoustic wall vent (Titon)