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BUILDING REGULATIONS COMPLIANCE SERVICES



REPORT TITLE: NOISE SURVEY REPORT INCLUDING ASSESSMENT OF
SCHEME OF NOISE INSULATION MEASURES FOR
RESIDENTIAL DEVELOPMENT OF
LAND AT THE REAR OF 97-99 LONDON ROAD, READING

Reading Borough Council Planning Application Reference: 201157

REPORT REFERENCE: 2208205

ISSUED TO: AMEET SINGH GHATAHORA
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DATE: 16 March 2022

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SUMMARY

- A noise survey and assessment has been carried out by JosTec for land at the rear of 97-99 London Road Reading RG1 5BY.
- The noise assessment is to be submitted to Reading Borough Council to discharge a planning approval condition.
- Day and night period noise to the development site includes contributions from road and pedestrian traffic.
- The development site is exposed to moderate overall noise levels throughout the day and night periods.
- Using results of a noise survey at the development site, a scheme of noise insulation measures is established to ensure that noise levels to inside rooms of the new dwelling comply with criteria set with reference to British Standard BS 8233:2014 *"Guidance on Sound Insulation and Noise Reduction for Buildings"*.
- Details of the noise survey, assessment and scheme of noise insulation measures are included in the report, verified by composite sound reduction indices calculation of the overall residential building envelope.

1. INTRODUCTION

JosTec has been commissioned to undertake a noise survey and assessment for a proposed new residential development of land at the rear of 97-99 London Road Reading RG1 5BY.

A scheme of noise insulation measures for the development including acoustic performance for glazing and ventilation is proposed to protect future residents of the development from external noise. This report presents results of a noise survey and assessment of the scheme and includes:

- Description of the development;
- Review of local authority noise criteria;
- Details of noise survey including subjective observations;
- Noise survey assessment;
- Assessment of scheme of noise insulation measures.

2. DEVELOPMENT DESCRIPTION

The development site is currently unoccupied land at the rear of 97-99 London Road Reading RG1 5BY located on the west side of Fatherson Road adjacent to 22 Fatherson Road, East Reading. The immediate locality comprises primarily residential dwellings on quieter roads and includes residential and commercial businesses nearby on busy A4 London Road.

The proposed development comprises erection of a two storey two-bedroom residential house. Site location plan, aerial image and drawings of the proposed development are included in Appendix A.

Overall noise levels to the site are moderate and typical of this type of suburban location. They comprise principally of contributions from road traffic along nearby A4 London Road and surrounding streets. Further details on noise levels and sources are provided in Section 4.3.

3. NOISE CRITERIA

Conditional planning permission has been granted for the development under Reading Borough Council Planning Application Reference 201157. Condition 13 of the planning approval notice for this application is copied below:

"The development hereby approved shall not be commenced (except demolition) until a detailed scheme, informed by an assessment of the current noise environment, for protecting the dwelling from the external noise environment of the area has been submitted to and approved, in writing, by the Local Planning Authority.

The scheme itself shall be designed, specified and constructed so that the sound insulation performance of the structure and the layout of the dwellings are such that the indoor ambient noise levels do not exceed the values detailed in Table 4 of BS 8233:2014 and the individual noise events do not exceed 45 dB LA,max,F more than 10 times a night.

Where opening windows will lead to an internal noise level increase of 5 dBA or greater above BS 8233:2014 recommended internal levels, the scheme shall include provision of alternative mechanical ventilation with minimum performance equivalent to a mechanical heat recovery (MVHR) system with cool air bypass as an alternative means of cooling and ventilation. Noise from the system should not result in BS8233 internal levels being exceeded.

Thereafter, the development shall not be carried out other than in accordance with the approved scheme which shall be completed before any part of the dwelling hereby approved is occupied.

REASON: These details are required due to insufficient information being contained within this submission and in order to safeguard the amenity of occupants in accordance with Policy CC8 of the Reading Borough Local Plan 2019."

Many developments similar to the proposed in Reading Borough Council and other local authorities have also approved and employed the methodology and guideline noise levels given in BS 8233:2014 "Guidance on Sound Insulation and Noise Reduction for Buildings" ("BS 8233"). BS 8233 is considered appropriate for use in this assessment and report.

Guidance in BS 8233:2014 Section 7.7.2 *Internal ambient noise levels for dwellings* Table 4 advises it is desirable that ambient noise levels to inside residential dwellings do not exceed the guideline values shown below in Table 1:

Activity	Location	07:00 to 23:00 (day period)	23:00 to 07:00 (night period)
Resting	Living room	$\leq 35\text{dB } L_{Aeq,1\text{hour}}$	-
Dining	Dining room/area	$\leq 40\text{dB } L_{Aeq,1\text{hour}}$	-
Sleeping (daytime resting)	Bedroom	$\leq 35\text{dB } L_{Aeq,1\text{hour}}$	$\leq 30\text{dB } L_{Aeq,8\text{hour}}$

Table 1: Indoor ambient noise levels for dwellings

Note 4 to Table 4 in Section 7.7.2 of BS 8233:2014 additionally advises that regular individual noise events can cause sleep disturbance and that a guideline value may be set in terms of SEL or $L_{A\text{fmax}}$ depending on the character and number of events per night. This guidance, relating principally to night period noise from aircraft and trains, is nonetheless considered appropriate to apply an $L_{A\text{fmax}}$ criterion for bedrooms during the night period for this development.

BS 8233:2014 does not however provide any specific numerical guidance on night period $L_{A\text{fmax}}$ values for noise into bedrooms - the previous $L_{A\text{fmax}}$ limit guidance for bedrooms in BS 8233:1999 is removed from BS 8233:2014. Notwithstanding this, and in keeping with World Health Organisation Noise Guideline Values and Reading Borough Council Condition 13 specific requirements, the noise assessment in this report includes the BS 8233:1999 criterion of $L_{A\text{fmax}}$ 45dB for bedrooms during the night period.

The $L_{A\text{fmax}}$ criterion is based on individual and typical noise events not regularly exceeding $L_{A\text{fmax}}$ 45dB, it is not intended that the requirement be applicable to infrequent night period very high noise level events such as the sirens of passing emergency vehicles.

Guideline values taken from BS 8233:2014 for noise to external amenity spaces such as private residential gardens, patios and similar, applicable during the day period (07:00-23:00) as $L_{Aeq,T}$ values are given below in Table 2:

Guideline	Location	07:00 to 23:00 (day period)
Desirable	External Amenity Spaces	$\leq 50\text{dB } L_{Aeq,1\text{hour}}$
Upper Value	External Amenity Spaces	$\leq 55\text{dB } L_{Aeq,1\text{hour}}$

Table 2: External ambient noise levels for dwellings

4. NOISE SURVEY & ASSESSMENT

In order to assess the scheme for noise insulation measures proposed for the development it is necessary to determine day and night period noise levels at representative positions. Details of the noise survey carried out by JosTec are provided in the following sections.

4.1 Noise Survey Details & Procedure

A noise survey has been carried out at the development site using a logging type sound level meter from Wednesday 2nd March 2022 to Thursday 3rd March 2022. The weather included mostly dry and calm/light wind conditions during the day and also the night periods of the survey.

A primary long term unattended noise survey measurement location was selected at the development site looking at the rear of 97-99 London Road looking out towards Fatherson Road. This location was chosen to record potentially highest incident noise levels from passing road/pedestrian traffic on adjacent Fatherson Road, nearby A4 London Road and surrounding streets.

The position was achieved by arranging measurement equipment on a tripod/pole arrangement externally at ground floor level at a height of c.1.5m above ground level to provide free-field noise levels. Measurements were recorded in terms of continuous 5 minute samples of principally broadband L_{Aeq} and $L_{A_{fmax}}$ values together with octave band L_{Zeq} values over the duration of the survey.

Measurements were recorded in terms of continuous 5 minute samples of principally broadband L_{Aeq} and $L_{A_{fmax}}$ values together with octave band L_{Zeq} values over the duration of the survey.

Long-term noise survey location is indicated on the aerial image site location plan in Appendix A.

4.2 Noise Survey Instrumentation

Details of the instrumentation used for the noise survey are provided in Appendix B. The sound level meter was calibrated before and after measurements using a certified calibrator.

4.3 Noise Survey Results & Observations

Noise levels to the development site comprise principally of contributions from passing road and pedestrian traffic on A4 London Road and Fatherson Road and distant road traffic on surrounding roads.

Noise levels rise steadily from early morning to midday where they remain at their highest until the late evening/night. Levels are at their lowest between approximately 02:00 and 06:00.

Complete raw results of the 24-hour noise survey in terms of L_{Aeq} and L_{Amax} values are provided in graphical format in Appendix C. Summary average day and night period L_{Aeq} plus highest night period L_{Amax} result for the noise survey duration are shown in Table 3 below.

Day period L_{Aeq} t 07:00 - 23:00	Night period L_{Aeq} t 23:00 - 07:00	Night period L_{Amax} t 23:00 - 07:00
52.6dB	47.2dB	63.0dB

Table 3: Summary measured noise levels for day and night periods

4.4 Noise Survey Assessment

It can be seen from Table 3 that day and night period levels are moderate and the site is suitable for the proposed development providing that an appropriate specification of noise insulation is included within the scheme design to ensure compliance with the noise criteria set with reference to BS 8233:2014 as detailed in Section 3.

5. ASSESSMENT OF SCHEME FOR NOISE INSULATION MEASURES

For this development the scheme of noise insulation measures to protect against noise to inside the residential dwelling relates to the acoustic design and specification of elements of the building envelope which includes the external walls, glazing, ventilators and roof/ceiling structures.

The external walls and roof/ceiling structures to the development will by default provide a relatively high level of noise insulation and therefore as for most residential sites the dominant path for external noise to enter rooms will be via glazing and any ventilation system.

By following the rigorous calculation procedures outlined in Section G.2 of Annex G (informative) of British Standard BS 8233:2014 a specification for acoustic performance has been established and a scheme for noise insulation measures for the whole residential building envelope is assessed item by item in Sections 5.1 to 5.4 on the following pages. Assessment of noise levels to external amenity spaces of the development is provided in Section 5.5

Acoustic calculations are provided for day and night period noise intrusion into the Living/Dining Area and Master Bedroom, selected as representing worst case scenario rooms with the highest ratio of glazing to masonry, roof/ceiling system and so with potentially highest incident noise levels. Copies of calculations are provided in Appendix D.

The calculations use a spreadsheet calculation based on Section G.2 of Annex G (informative) of British Standard BS 8233:2014 and BS EN 12354-3:2000, this form of spreadsheet is used by many acoustic consultancy practices.

The calculations confirm that with the proposed scheme for noise insulation measures implemented, intrusive noise levels into rooms of the development comply with BS 8233:2014 guideline values as detailed in Section 3, Table 1. In addition, noise levels to external amenity spaces of the development comply with BS8233:2014 guideline values detailed in Section 3, Table 2.

5.1 External Walls

External walls of the proposed building are understood to be conventional insulated cavity masonry external walls with plasterboard/plaster lining to roomside:

Description	Octave Band Centre Frequency (Hz)					
	Sound Reduction Index R dB					
	125	250	500	1k	2k	4k
Insulated cavity masonry external walls, brick/cavity/block	41	45	49	57	60	60

Table 4: External wall sound insulation performance

5.2 Glazing

Values in Table 5 below show a specification for double glazing sound insulation performance for all parts of the development.

Description	Octave Band Centre Frequency (Hz)					
	Sound Reduction Index R dB					
	125	250	500	1k	2k	4k
Standard performance 4-airgap-4 double glazing, $\geq R_w$ 30dB	17	17	25	35	35	35

Table 5: Glazing sound insulation performance

5.3 Ventilation

It is anticipated that a ventilation system will need to be incorporated into the scheme design such that residents of the property are able to have background ventilation without necessarily needing to open windows.

This is typically achieved through the use of passive type "trickle" ventilators in locations that are not subject to especially high noise levels. Specification for standard non-acoustic performance type ventilators for all parts of the development is provided below in Table 6:

Description	Octave Band Centre Frequency (Hz)					
	Sound Reduction Index $D_{n,e}$ dB					
	125	250	500	1k	2k	4k
Standard non-acoustic trickle ventilator typically $\geq D_{n,e,w}$ 30dB	30	30	30	30	30	28

Table 6: Specification for ventilator sound insulation performance

5.4 Roof Structures & Associated Ceilings

The roof structure and associated ceilings are to be standard pitched timber joist insulated type with plasterboard and skim plaster finish internally room-side.

Plasterboard ceilings below roof level are to be minimum 2 x layers (i.e.: double layer) 12.5mm type plasterboard. Values in Table 7 below show the expected minimum sound insulation performance for this type of roof and associated ceiling construction:

Description	Octave Band Centre Frequency (Hz)					
	Sound Reduction Index <i>R</i> dB					
	125	250	500	1k	2k	4k
Standard flat/pitched insulated timber joist roof with plasterboard ceiling	27	37	43	49	57	61

Table 7: Roof & ceiling sound insulation performance

5.5 External Amenity Spaces

External amenity spaces for the proposed development are private garden areas.

Noise survey results given in Section 4.3, Table 3 show existing day period noise levels to the development site to be $L_{Aeq, T} (16hr)$ 52.6dB.

The noise survey results therefore indicate that noise levels comply with the upper guidance value of 55dB $L_{Aeq, T}$ within BS 8233:2014 as described in Section 3, Table 2.

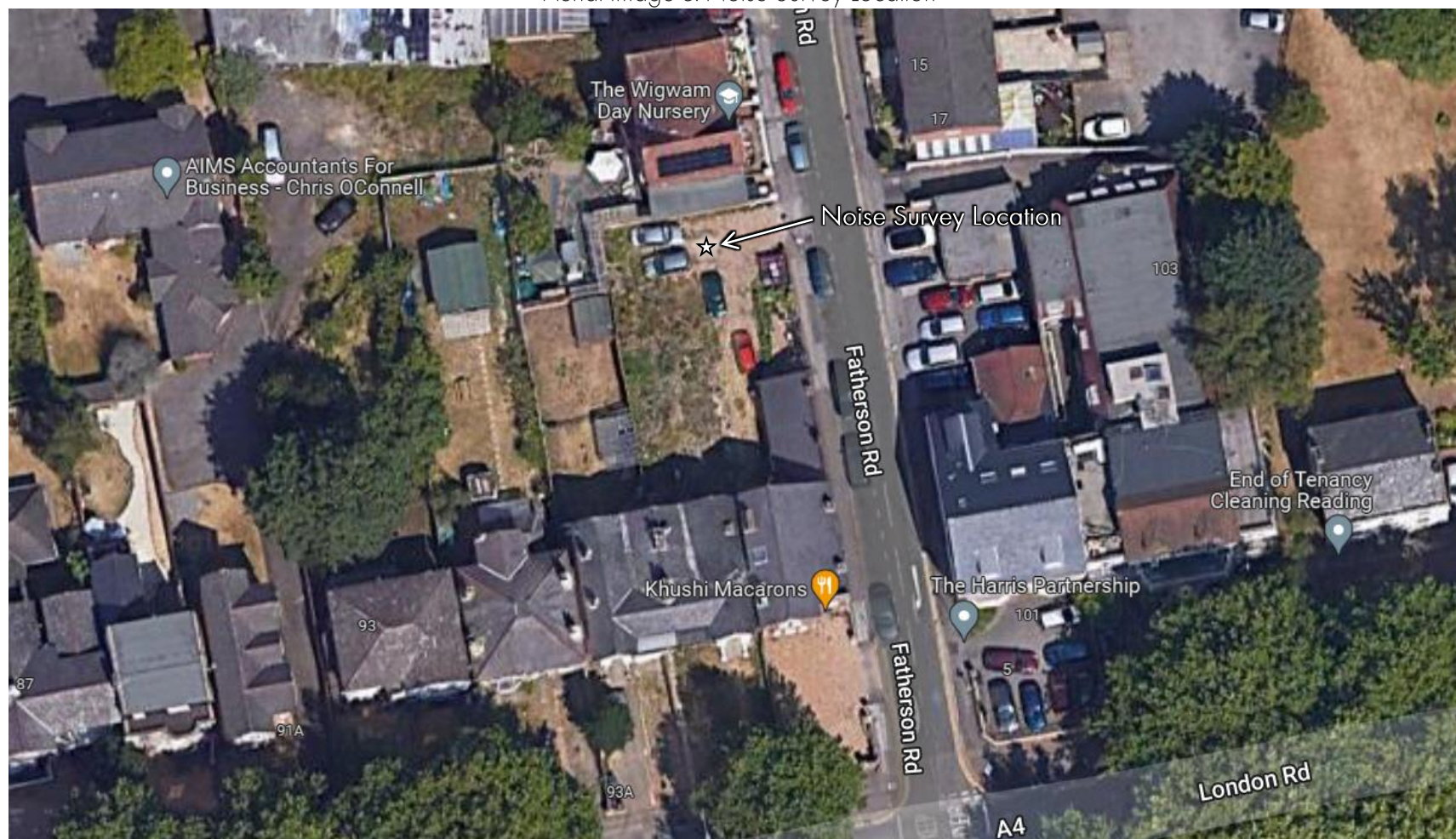
APPENDIX A

Site Location Plan



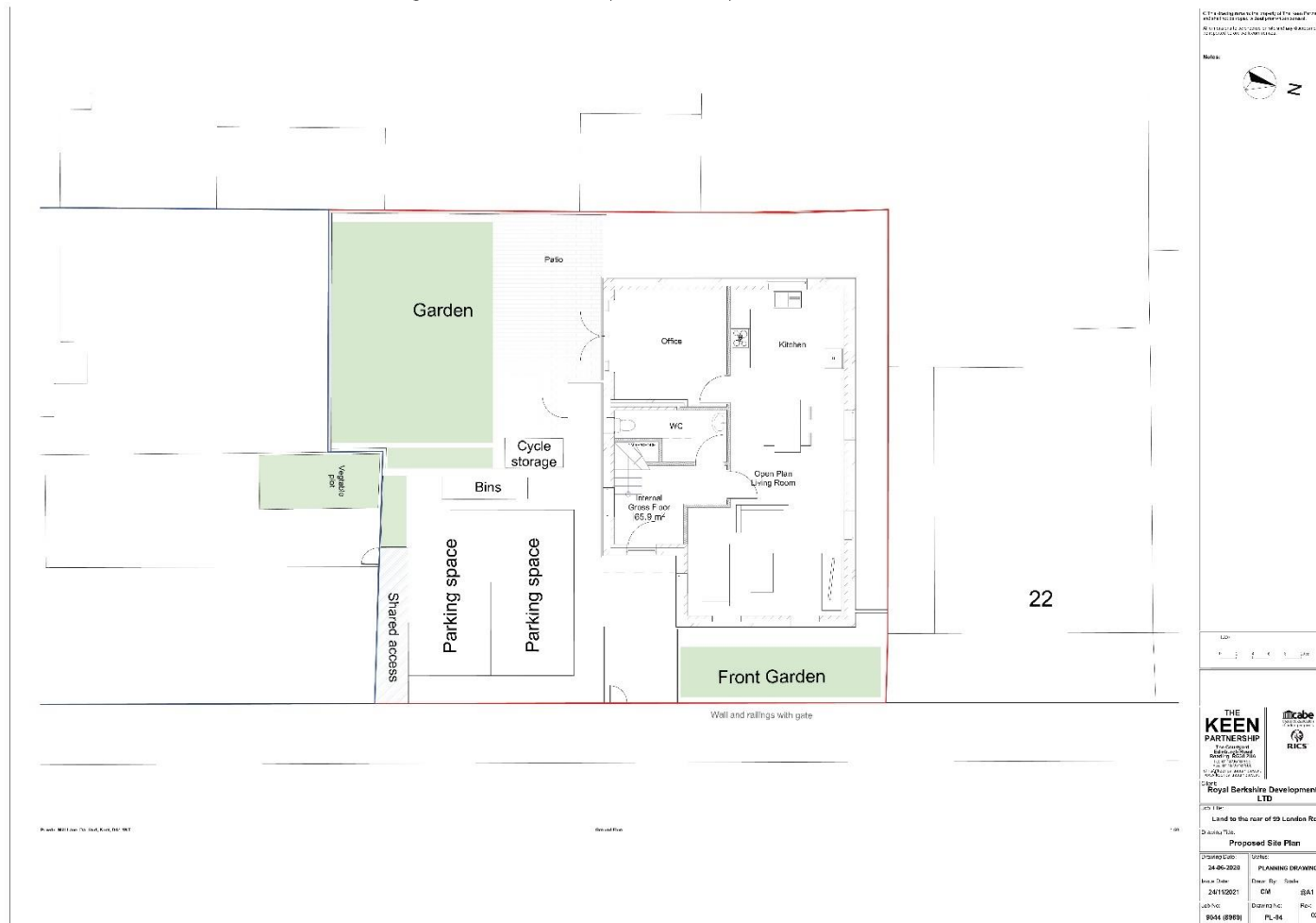
APPENDIX A

Aerial Image & Noise Survey Location



APPENDIX A

Drawings Of The Development: Proposed Ground Floor Plan



APPENDIX A

Drawings Of The Development: Proposed Floor Plans & Elevations



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All dimensions to be checked on site and any discrepancies to be reported before work commences.

Notes:

Overall gross internal floor area:
174.3m²

1:100

0 1 2 3 4 5 m

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Client:
Royal Berkshire Developments LTD

Job Title:
Land to the rear of 99 London Rd

Drawing Title:
Proposed Drawings

Drawing Date: **24-06-2020** Status: **PLANNING DRAWINGS**

Issue Date: **24/11/2021** Drawn By: **CM** Scale: **@A3**

Job No: **9044 (8989)** Drawing No: **PL-07** Rev: **02**

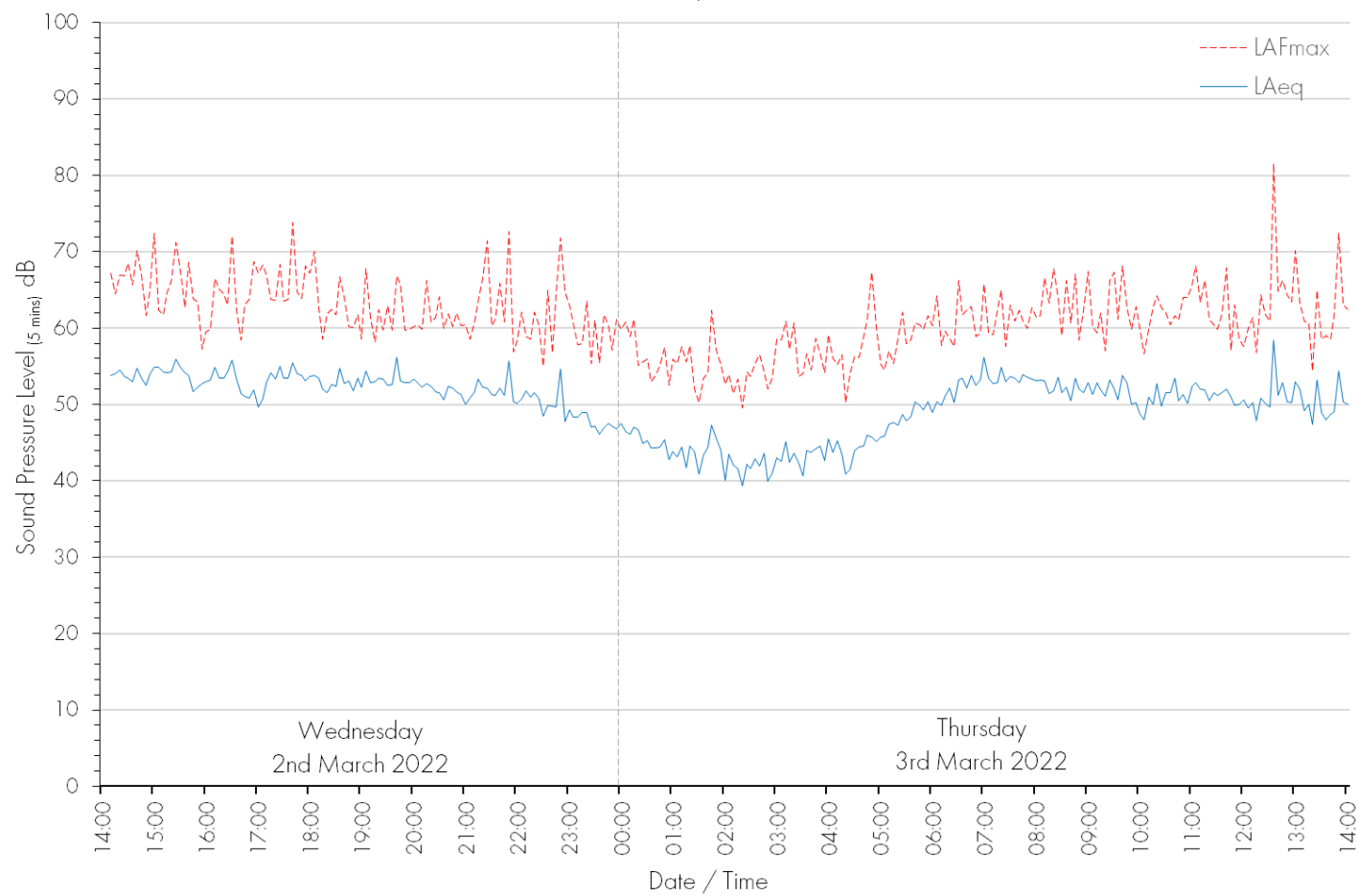
APPENDIX B

Noise Survey Instrumentation

- Svantek Class 1 noise monitoring station model 307 serial number 100911 with integrated preamplifier plus ST30A microphone serial number 101444
- Svantek calibrator model SV33B serial number 109969

APPENDIX C

Noise Survey Results



APPENDIX D

Building Envelope Acoustic Calculations

BS EN ISO 12354-3 BUILDING ENVELOPE SOUND INSULATION CALCULATION

SAMPLE ROOM : Living/Dining

NOISE CONDITION : Daytime 16 hour Leq 52.6dBA free field level

Equivalent Free-Field External Sound Pressure Level Outside Sample Room:							
Daytime 16hr (7am - 11pm)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,ff	52.6	52	50	48	49	45	39
Building Envelope Details For Sample Room:							
Element	Area (m²) or Vent No	Element Specification / Description					
Walls	39.2	Conventional insulated cavity masonry external walls, brick/cavity/block					
Windows	5.4	4-airgap-4 double glazing ≥ Rw30dB					
Doors	0.0	None to room					
Roof & associated ceiling	45.4	Standard flat/pitched timber joist roof with insulation in loft & plasterboard ceilings					
Ventilators	6	Standard non-acoustic trickle ventilator typically ≥ Dn,e,w 30dB					
Element Sound Reduction Index:							
		dB at Octave Band Centre Frequency					
Element	Area (m²) or Vent No	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Walls	39.2	41	45	49	57	60	60
Windows	5.4	17	17	25	35	35	35
Doors	0.0						
Roof & associated ceiling	45.4	27	37	43	49	57	61
Ventilators (Dn,e)	6	30	30	30	30	30	28
Overall Sound Reduction All Elements Combined		-25.4	-27.0	-30.5	-31.6	-31.6	-29.7
Sample Room Volume (m³):		113.4					
Sample Room Building Envelope Surface Area (m²):		90.0					
Sample Room Characteristics:							
		Reverberation Time (seconds) at Octave Band Centre Frequency					
Sample Room Type:	Living Room	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Reverberation Time In Furnished Sample Room		0.40	0.40	0.35	0.30	0.30	0.30
Calculated Internal Sound Pressure Level In Sample Room:							
Daytime 16hr (7am - 11pm)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,2	27.2	32.2	28.8	22.8	22.6	17.7	13.7

APPENDIX D

Building Envelope Acoustic Calculations

BS EN ISO 12354-3 BUILDING ENVELOPE SOUND INSULATION CALCULATION

SAMPLE ROOM : Master Bedroom

NOISE CONDITION : Daytime 16 hour Leq 52.6dBA free field level

Equivalent Free-Field External Sound Pressure Level Outside Sample Room:							
Daytime 16hr (7am - 11pm)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,ff	52.6	52	50	48	49	45	39
Building Envelope Details For Sample Room:							
Element	Area (m ²) or Vent No	Element Specification / Description					
Walls	17.2	Conventional insulated cavity masonry external walls, brick/cavity/block					
Windows	1.7	4-airgap-4 double glazing ≥ Rw30dB					
Doors	0.0	None to room					
Roof & associated ceiling	16.8	Standard flat/pitched timber joist roof with insulation in loft & plasterboard ceilings					
Ventilators	3	Standard non-acoustic trickle ventilator typically ≥ Dn,e,w 30dB					
Element Sound Reduction Index:							
		dB at Octave Band Centre Frequency					
Element	Area (m ²) or Vent No	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Walls	17.2	41	45	49	57	60	60
Windows	1.7	17	17	25	35	35	35
Doors	0.0						
Roof & associated ceiling	16.8	27	37	43	49	57	61
Ventilators (Dn,e)	2	30	30	30	30	30	28
Overall Sound Reduction All Elements Combined		-26.0	-27.9	-31.3	-32.3	-32.4	-30.4
Sample Room Volume (m ³):		42.0					
Sample Room Building Envelope Surface Area (m ²):		35.7					
Sample Room Characteristics:							
		Reverberation Time (seconds) at Octave Band Centre Frequency					
Sample Room Type:	Bedroom	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Reverberation Time In Furnished Sample Room		0.30	0.30	0.20	0.20	0.20	0.20
Calculated Internal Sound Pressure Level In Sample Room:							
Daytime 16hr (7am - 11pm)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,2	25.0	30.6	27.0	19.9	20.4	15.5	11.5

APPENDIX D

Building Envelope Acoustic Calculations

BS EN ISO 12354-3 BUILDING ENVELOPE SOUND INSULATION CALCULATION

SAMPLE ROOM : Master Bedroom

NOISE CONDITION : Night-time 8 hour Leq 47.2dBA free field level

Equivalent Free-Field External Sound Pressure Level Outside Sample Room:							
Night-time 8hr (11pm - 7am)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,ff	47.2	46	44	43	44	39	33
Building Envelope Details For Sample Room:							
Element	Area (m²) or Vent No	Element Specification / Description					
Walls	17.2	Conventional insulated cavity masonry external walls, brick/cavity/block					
Windows	1.7	4-airgap-4 double glazing ≥ Rw30dB					
Doors	0.0	None to room					
Roof & associated ceiling	16.8	Standard flat/pitched timber joist roof with insulation in loft & plasterboard ceilings					
Ventilators	1	Standard non-acoustic trickle ventilator typically ≥ Dn,e,w 30dB					
Element Sound Reduction Index:							
		dB at Octave Band Centre Frequency					
Element	Area (m²) or Vent No	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Walls	17.2	41	45	49	57	60	60
Windows	1.7	17	17	25	35	35	35
Doors	0.0						
Roof & associated ceiling	16.8	27	37	43	49	57	61
Ventilators (Dn,e)	3	30	30	30	30	30	28
Overall Sound Reduction All Elements Combined		-25.6	-27.2	-29.9	-30.6	-30.7	-28.7
Sample Room Volume (m³):		42.0					
Sample Room Building Envelope Surface Area (m²):		35.7					
Sample Room Characteristics:							
		Reverberation Time (seconds) at Octave Band Centre Frequency					
Sample Room Type:	Bedroom	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Reverberation Time In Furnished Sample Room		0.30	0.30	0.20	0.20	0.20	0.20
Calculated Internal Sound Pressure Level In Sample Room:							
Night-time 8hr (11pm - 7am)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,2	20.9	25.7	22.3	15.9	16.7	11.8	7.9

APPENDIX D

Building Envelope Acoustic Calculations

BS EN ISO 12354-3 BUILDING ENVELOPE SOUND INSULATION CALCULATION

SAMPLE ROOM : Master Bedroom

NOISE CONDITION : Night-time 8 hour L_{fmax} 63dBA free field level

Equivalent Free-Field External Sound Pressure Level Outside Sample Room:							
Night-time 8hr (11pm - 7am)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
	Lfmax,ff	63.0	62	60	58	60	55
Building Envelope Details For Sample Room:							
Element	Area (m²) or Vent No	Element Specification / Description					
Walls	17.2	Conventional insulated cavity masonry external walls, brick/cavity/block					
Windows	1.7	4-airgap-4 double glazing ≥ Rw30dB					
Doors	0.0	None to room					
Roof & associated ceiling	16.8	Standard flat/pitched timber joist roof with insulation in loft & plasterboard ceilings					
Ventilators	1	Standard non-acoustic trickle ventilator typically ≥ Dn,e,w 30dB					
Element Sound Reduction Index:							
		dB at Octave Band Centre Frequency					
Element	Area (m²) or Vent No	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Walls	17.2	41	45	49	57	60	60
Windows	1.7	17	17	25	35	35	35
Doors	0.0						
Roof & associated ceiling	16.8	27	37	43	49	57	61
Ventilators (Dn,e)	3	30	30	30	30	30	28
Overall Sound Reduction All Elements Combined		-25.6	-27.2	-29.9	-30.6	-30.7	-28.7
Sample Room Volume (m³):		42.0					
Sample Room Building Envelope Surface Area (m²):		35.7					
Sample Room Characteristics:							
		Reverberation Time (seconds) at Octave Band Centre Frequency					
Sample Room Type:	Bedroom	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Reverberation Time In Furnished Sample Room		0.30	0.30	0.20	0.20	0.20	0.20
Calculated Internal Sound Pressure Level In Sample Room:							
Night-time 8hr (11pm - 7am)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
	Lfmax,2	36.7	41.5	38.1	31.7	32.5	27.6