

PEAK acoustics

A stylized graphic featuring a city skyline with various building shapes in shades of blue and purple. In the foreground, there is a soundwave graphic composed of vertical bars of varying heights, also in blue and purple tones. The entire graphic is set against a light blue background.

Noise Impact Assessment

Client: Steven Coates

Site: Land at Dale Lane, Buxton, SK17 7LA

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Project Consultant

T. Brown BSc (Hons) MIOA
Acoustic Consultant
tom@acousticsurveys.co.uk

Proofing Consultant

J. Parrott BEng (Hons) AMIOA
Acoustic Consultant
jack@acousticsurveys.co.uk

Email: sales@acousticsurveys.co.uk | **Office** 0330 043 1764

Web: www.acousticsurveys.co.uk

Peak Acoustics Ltd, Silk Point, Queen's Avenue, Macclesfield, Cheshire, SK10 2BB

Executive Summary

A noise assessment has been undertaken at the site on Dale Lane, Buxton in relation to the development of a single detached dwelling (retrospective).

Environmental noise monitoring was undertaken at the site from 1st to 2nd November 2022. Noise affecting the development was determined to be primarily from distant construction noise and passing vehicles.

A glazing and ventilation scheme has been given to ensure conditions in habitable rooms remain within the desired design criteria of BS8233:2014. The derived scheme is summarised below.

Glazing & Ventilation Scheme

Internal Space	Glazing		Ventilation	
	Minimum Performance $R_w (+C_{tr})$	Example Specification	Minimum Performance $D_{ne,W,+C_{tr}} (Open)$	Example Specification
Living Areas	30 (26)	Double Glazing – 4/16/4	32	Hit & miss trickle vent – Titon Trimvent XS13 4400EA
Bedrooms	30 (26)	Double Glazing – 4/16/4	32	Hit & miss trickle vent – Titon Trimvent XS13 4400EA
Dining Rooms	30 (26)	Double Glazing – 4/16/4	32	Hit & miss trickle vent – Titon Trimvent XS13 4400EA

An assessment of the external amenity spaces found noise levels to be within the criteria of BS8233.

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1. Introduction

1.1. Proposal

It is proposed (retrospectively) to build a 4 bedroom, 2-storey detached house at Dale Lane, Buxton hereafter referred to as 'the site'. The site prior to development was a vacant plot.

1.2. Reason for Assessment

A noise assessment is to be submitted as part of the planning application to ensure desirable noise levels are met within the habitable rooms of the proposed development and external amenity areas. The assessment aims to provide a sound insulation scheme for the development.

1.3. Planning Conditions

The applicant has received conditional planning approval, HPK/2019/051 – '*Construction of a new detached dwelling of Dale Lane*' from High Peak Borough Council. The following planning condition requires discharging:

"5. No development shall commence until a scheme for protecting the housing development hereby approved from noise, has been submitted to and approved in writing by the local planning authority. The submission for approval shall include details of windows, openings and means of ventilation in the buildings hereby approved and shall ensure the following noise levels are not exceeded:

i. An internal noise level for habitable rooms during the day (0700-2300hrs) of 35dB(A)LAeq,16hrs

ii. An internal noise level for bedrooms during the night (2300-0700hrs) of 30dB(A)LAeq,8hrs and 45dB(A)LAm_{ax}

iii. Noise levels within external living areas such as balconies, terraces and gardens during the day (0700-2300hrs) of 50dB(A)LAeq,16hrs

Where internal noise levels can only be achieved with windows shut other adequate means of ventilation shall be provided. No dwelling or residential unit, hereby approved, shall be occupied or brought into use until all works that form part of the approved scheme have been fully implemented and completed."

1.4. Assessment Guidance Documentation

Guidance on the assessment and design criteria will be drawn from BS8233:2014 - *Guidance on sound insulation and noise reduction for buildings*. Table 4 in Section 7.7.2 of this standard suggests indoor ambient noise levels for dwellings.

Additional guidance will be drawn from 'ProPG: Planning & Noise' which was published "*to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England.*"

Where necessary, mitigation recommendations will be given to comply with the requirements of the National Planning Policy Framework (2019) and the Noise Policy Statement for England (2010). Further information on all guidance documentation can be found in **Appendix H**.

2. Environmental Noise Survey

2.1. Survey Measurement

To assess the environmental noise levels affecting the proposed development, an unattended noise survey was undertaken at the site from 10:20 on the 1st November to 10:00 on the 2nd November 2022. This period was selected to capture events and noise levels on a typical weekday from the nearby industrial estate as well as noise from other nearby residential and commercial sources.

Measurements of $L_{Aeq,T}$ and L_{AFmax} were logged in 5- minute intervals in accordance with the provisions of BS7445 - 'Description and Measurement of Environmental Noise'.

2.2. Measurement Location

Monitoring position M1 is located at 1st floor level on the front façade of the dwelling. The microphone was positioned approximately 4 meters above ground level, a -3dB façade correction is applied to measurements to account for positioning close to a reflective surface (the façade).

The site and monitoring locations are shown below in **Figure 1**.

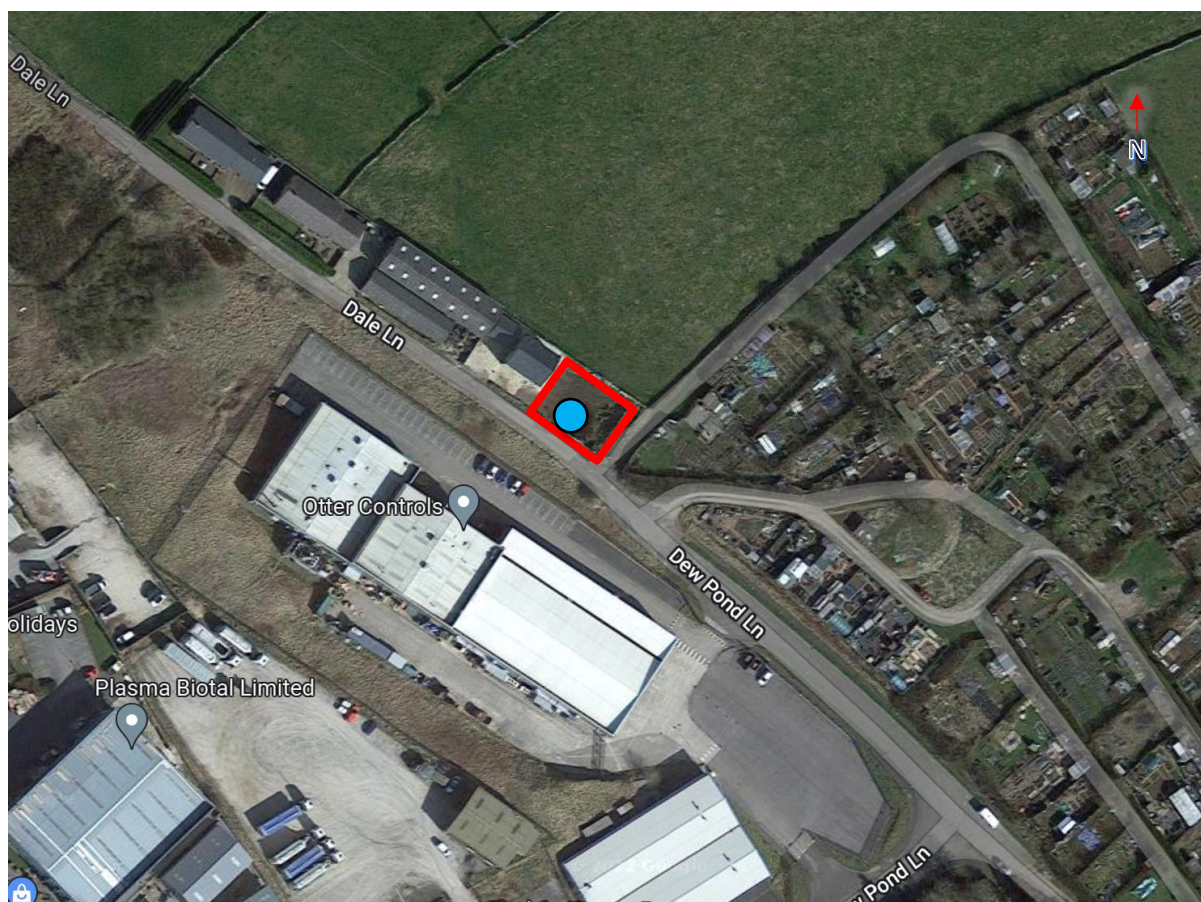


Figure 1: Site & Measurement Locations – google.com/maps

 Monitoring Location (M1)

 Site Boundary (Approx.)

2.3. Site Descriptions

The site is on Dale Lane in Buxton. To the North and East of the site there are open fields and allotments. South of the site across Dale Lane is an industrial/office building currently occupied by 'Otter Controls' who manufacture electrical appliances. Immediately adjacent to the site to the West is a derelict single storey commercial unit and beyond this, a dwelling.

2.4. Noise Affecting the Development

The primary noise source affecting the development was noted during site visits to be distance construction noise and intermittent noise from vehicles passing the site and nearby. Noise from 'Otter Controls' was minimal during site observations. It was also noted that the site has an external air source heat pump which may be a source of noise, though this wasn't operational during site visits. Secondary sources were noted as birdsong and passing dog walkers.

2.5. Environmental Noise Survey Results

The results from the noise monitoring location M1 are summarised below.

The full-time history of the noise monitoring data is given in **Appendix E**.

Table 1. – Environmental Measurement Summary

Measurement	Date(s)	Period	L _{Aeq} (dB)	Typical* L _{AFmax} (dB)
M1	1 st & 2 nd November 2022	Day (16hr Aggregate Periods)	44	-
	1 st – 2 nd November 2022	Night (8hr)	41	69

* The given 'Typical' L_{AFmax} levels are an average of the spectra of the noisiest 10 events of the night-time period.

2.6. Weather Conditions

Daytime temperatures of between 7°C and 11°C were noted during the survey with winds between 6 and 9m/s. Detailed weather conditions are given in **Appendix C**.

2.7. Measurement Equipment

Measurement equipment complies with accuracy requirements for common environmental noise measurement standards. Equipment was calibrated before and after use and no significant drift occurred during measurements. Up-to-date calibration certification can be provided upon request. A detailed equipment list is given in **Appendix B** with calibration information in **Appendix D**.

3. Internal Noise Level Assessment

3.1. Design Criteria

BS8233:2014 - *Guidance on sound insulation and noise reduction for buildings* suggests indoor ambient noise levels for dwellings in Table 4, Section 7.7.2. These are summarised below.

Table 2. – Indoor Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

BS8233 states that the guideline values given above are for ‘noise without character’, further stating:

“Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate.”

Table 4 of BS8233 also has accompanying notes that were subject to additions in ProPG. The relevant notes with the additions of ProPG are given below.

“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.”

In considering the noise climate affecting the proposed development, as discussed in Section 2.4, it is deemed appropriate to use guidelines set out in BS8233 and ProPG to ensure the internal criteria set out by the WHO for internal noise maxima L_{Amax} and internal L_{Aeq} .

3.2. Assessment Noise Levels

In the interest of a robust assessment, the loudest of the measurement intervals, subject to irregular events, are to be considered in the assessment of internal noise levels and determining the sound insulation scheme.

The resultant external noise levels for the assessment of internal ambient noise levels are summarised in the table below.

Table 3. – Assessment Noise Levels

Period	$L_{Aeq,T}$ (dB)	L_{Amax} (dB)
Daytime (1hr)	48	-
Night (1hr)	43	69

3.3. Internal Noise Calculations

Internal noise levels have been calculated to demonstrate that the dwelling can achieve the desired design criteria when appropriate glazing and ventilation systems are utilised.

Internal arrangements of the dwellings have been submitted by the client, and drawings have been used to scale room and glazing dimensions, these and can be found in **Appendix G**.

Assessment is not required for each individual room therefore a worst-case situation will be used in which the worst affected rooms/floors will be used.

Calculations of internal ambient noise levels have been undertaken using the 'rigorous calculation' method given in Annex G2 of BS8233:2014. Full details of the calculations are provided in **Appendix F**.

4. Sound Insulation Scheme

4.1. External Building Envelope

Material build-up of the façade will significantly dictate the noise levels within the proposed dwelling. For the purposes of this report, the heavyweight construction of the façade is assumed to provide a minimum sound reduction of 49 dB R_w .

As the dwelling utilises the roof space for bedrooms, the additional material build-up is assumed at a minimum sound reduction of 39 dB R_w .

4.2. Glazing and Ventilation

The following glazing and ventilation scheme for the development has been derived with a view of achieving the internal noise level criteria given in Table 2.

Table 4. – Glazing & Ventilation Scheme

Internal Space	Glazing		Ventilation	
	Minimum Performance $R_w (+C_{tr})^{[1]}$	Example Specification ^[2]	Minimum Performance $D_{ne,W,+C_{tr}}$ (Open)	Example Specification ^[3]
Living Areas	30 (26)	Double Glazing – 4/16/4	32	Hit & miss trickle vent – Titon Trimvent XS13 4400EA
Bedrooms	30 (26)	Double Glazing – 4/16/4	32	Hit & miss trickle vent – Titon Trimvent XS13 4400EA
Dining Rooms	30 (26)	Double Glazing – 4/16/4	32	Hit & miss trickle vent – Titon Trimvent XS13 4400EA

N.B. Note that other glazing configurations and ventilators can achieve the given minimum performance requirements.

[1] The sound insulation value of the glazing should take into account the glass as well as the frame and perimeter seal.

[2] Example glazing specification format given as 'XXmm Float / 16mm Air gap / XXmm Float'

[3] It is noted that BS8233 section 7.2.2 states 'If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade

insulation or the resulting noise level'. This statement implies that the use of closed windows and an alternative means of ventilation is acceptable.

5. Internal Noise Levels

It is determined that by using mitigation as specified in **Table 4** for the building façades, the outcome summarised in the following table is achieved.

Table 5. – Internal Noise Levels

Internal Space	Noise Parameter	Internal Noise Level (dB)	Within Design Criteria?
Living Room	Daytime $L_{Aeq, 16hr}$	21	Yes
Dining Area	Daytime $L_{Aeq, 16hr}$	26	Yes
Bedroom	Daytime $L_{Aeq, 16hr}$	24	Yes
	Night-time $L_{Aeq, 8hr}$	19	Yes
	Night-time $L_{Amax, F}$	42	Yes

For the daytime assessment for living areas, the desirable limit of BS8233:2014 suggests a guideline of 35 dB $L_{Aeq, 16hr}$ for resting conditions, and up to 40 dB is considered acceptable for necessary developments.

All results, with the implementation of the derived sound insulation scheme given in **Table 4**, would place the internal daytime noise levels below 35 dB, therefore within the desired limit.

For the night-time assessment for bedrooms, BS8233:2014 suggests a desirable guideline of 30 dB $L_{Aeq, 8hr}$ for sleeping conditions, with an acceptable limit of 35 dB $L_{Aeq, 8hr}$.

Implementation of the derived sound insulation scheme given in **Table 4** would place the internal continuous night-time noise levels below 30 dB, therefore within the desirable category.

For the night-time assessment for bedrooms, ProPG suggests that individual noise events do not normally exceed 45dB $L_{Amax, F}$ more than 10 times a night.

Implementation of the derived sound insulation scheme given in **Table 4** would place the internal $L_{Amax, F}$ night-time events below 45 dB, therefore within the criteria.

6. External Amenity Areas

BS8233:2014 provides a desirable guideline of 50 dB $L_{Aeq, 16hr}$ for external amenity spaces and an acceptable guideline of 55 dB $L_{Aeq, 16hr}$ for noisier environments.

External daytime noise levels were measured on-site at position M1 (Figure 1)

Measurement Position	Noise Parameter	Garden Noise Level (dB)	BS8233 Criteria	Attenuation Required (dB)
M1	Daytime $L_{Aeq, 16hr}$	44	50 – 55 dB $L_{Aeq, 16hr}$	0

Noise levels measured on site fall well within the desirable criteria for external amenity areas from BS8233.

7. Conclusions

A noise assessment has been undertaken at the site on Dale Lane, Buxton in relation to the development of a single detached dwelling (retrospective).

Environmental noise monitoring was undertaken at the site from 1st to 2nd November 2022. Noise affecting the development was determined to be primarily from distant construction noise and passing vehicles.

A glazing and ventilation scheme has been given to ensure conditions in habitable rooms remain within the design criteria.

Internal noise levels are anticipated to be within the guidelines of BS8233 with comments from ProPG.

External amenity levels are also within the desirable criteria taken from BS8233.

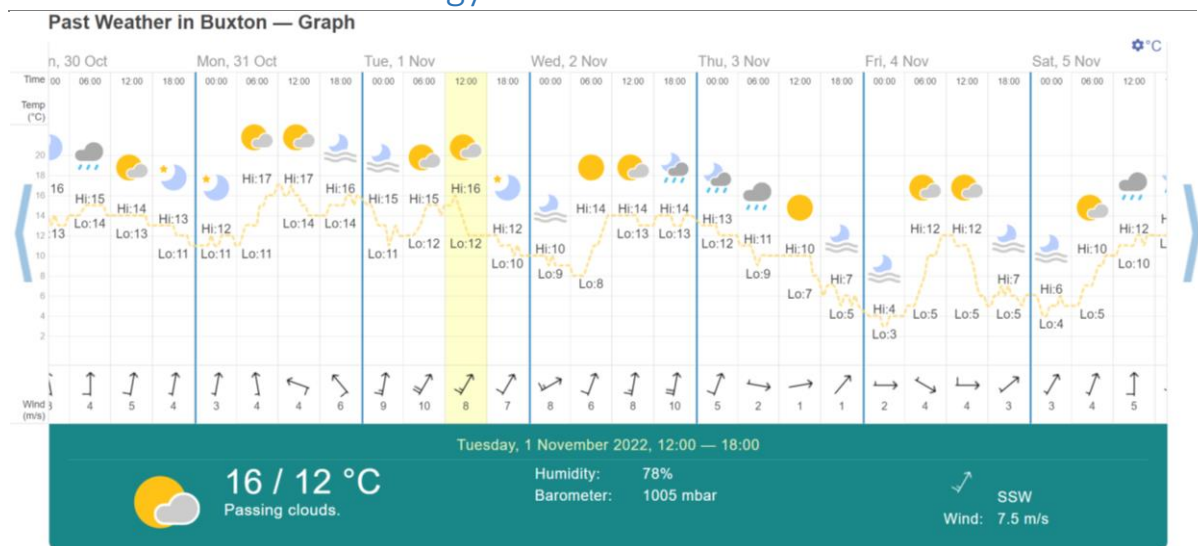
APPENDIX A – Measurement Details

Measurement(s)	Kit	Start Date	Start Time	End Date	End Time
M1	A3	01/11/22	10:20	02/11/22	10:00

APPENDIX B - Equipment Details

Kit	Equipment	Make	Model	Class	Serial Number
A3	Sound Meter	Svantek	971	1	41980
A3	Pre-Amp	Svantek	SV18	1	44331
A3	Microphone	ACO	7052E	1	60249
1	Calibrator	Svantek	SV33A	1	90273

APPENDIX C - Meteorology Details

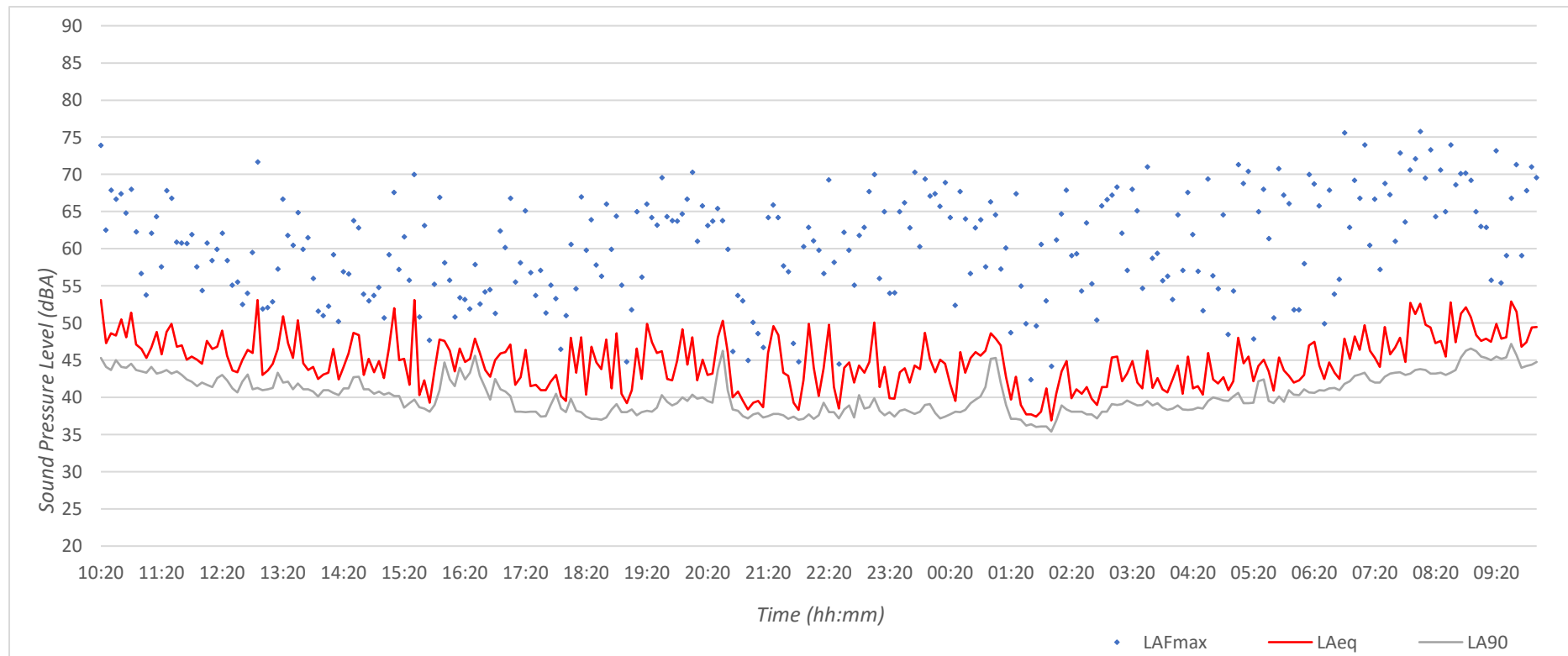


APPENDIX D - Calibration Details

Kit	Calibrator Ref Level (dB)	Deviation Before (dB)	Deviation After (dB)
A3	113.9	0.40	0.57

APPENDIX E – Noise Survey Time History

Environmental Noise Measurement M1 Time History: 01/11/2022 – 02/11/2022

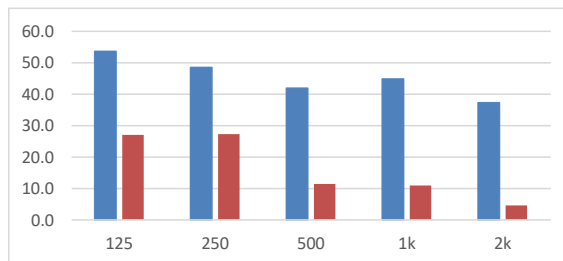


APPENDIX F – BS8233 Rigorous Design Calculations

1. Living Room - Day - LAeq

Room Properties		Sound Insulation Properties							
Room Width (m)	3.7	Freq. Hz	63	125	250	500	1k	2k	4k
Room Depth (m)	4.8	Wall, dB R _{W+Ctr}	38	41	45	45	54	58	60
Room Height (m)	2.4	Roof, dB R _{W+Ctr}	38	41	45	45	54	58	60
Glazed Area (m ²)	2.0	Glazing, dB R _{W+Ctr}	22	24	18	26	40	45	39
Is dwelling within roof?	☒	Vents, D _{n,e,w+Ctr}	30	34	27	37	35	34	35

Noise Levels, dB



External Level	47.6 dB LAeq
Internal Level	20.6 dB LAeq
Insertion Loss	27.0 dB LAeq

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	30(26)	dB R _{W(+Ctr)}	Double Glazing 4 / 16 / 4
Ventilation	32	D _{n,e,w+Ctr}	Hit & miss trickle vent Titon Trimvent XS13 4400EA

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	63	125	250	500	1k	2k	4k
Term 1	0.001126	0.00045	0.00225	0.00022	0.00036	0.000448	0.000356
Term 2	0.001421	0.0009	0.00357	0.00057	2.3E-05	7.12E-06	2.84E-05
Term 3	0.000123	6.2E-05	2.5E-05	2.5E-05	3.1E-06	1.23E-06	7.75E-07
Term 4	0	0	0	0	0	0	0
Internal, dB L _{eq}	33.6	27.0	27.2	11.4	10.9	4.6	-2.1
Internal, dB LAeq	7.4	10.9	18.6	8.2	10.9	5.8	-1.1

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Hit & miss trickle vent

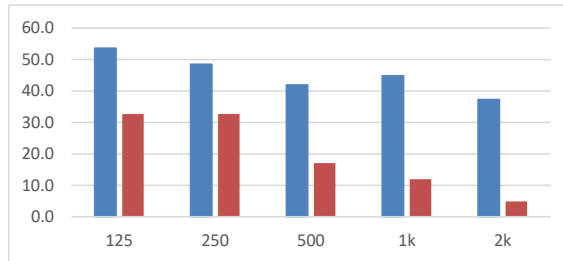
Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_s}{S} 10^{\frac{-D_{s1}}{10}} + \frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}} + \frac{S_{ev}}{S} 10^{\frac{-R_{ev}}{10}} + \frac{S_{tr}}{S} 10^{\frac{-R_{tr}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

2. Dining Area - Day - LAeq

Room Properties		Sound Insulation Properties							
Room Width (m)	3.2	Freq. Hz	63	125	250	500	1k	2k	4k
Room Depth (m)	5.0	Wall, dB R _{w+Ctr}	38	41	45	45	54	58	60
Room Height (m)	2.4	Roof, dB R _{w+Ctr}	38	41	45	45	54	58	60
Glazed Area (m ²)	10.0	Glazing, dB R _{w+Ctr}	22	24	18	26	40	45	39
Is dwelling within roof?	☒	Vents, D _{n,e,w+Ctr}	30	34	27	37	35	34	35

Noise Levels, dB



External Level	47.6 dB LAeq
Internal Level	25.5 dB LAeq
Insertion Loss	22.1 dB LAeq

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	30(26)	dB R _{w(+Ctr)}	Double Glazing 4 / 16 / 4
Ventilation	32	D _{n,e,w+Ctr}	Hit & miss trickle vent Titon Trimvent XS13 4400EA

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	63	125	250	500	1k	2k	4k
Term 1	0.001302	0.00052	0.0026	0.00026	0.00041	0.000518	0.000412
Term 2	0.008216	0.00518	0.02064	0.00327	0.00013	4.12E-05	0.000164
Term 3	-4.79E-05	-2E-05	-1E-05	-1E-05	-1.2E-06	-4.79E-07	-3.02E-07
Term 4	0	0	0	0	0	0	0
Internal, dB L _{eq}	38.5	32.5	32.6	17.1	11.8	4.8	-1.0
Internal, dB LAeq	12.3	16.4	24.0	13.9	11.8	6.0	0.0

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Hit & miss trickle vent

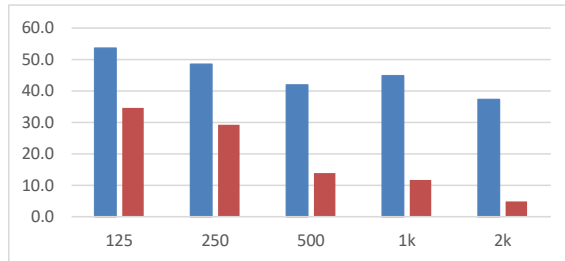
Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{-\frac{D_{0,0}}{10}} + \frac{S_{01}}{S} 10^{-\frac{R_{01}}{10}} + \frac{S_{02}}{S} 10^{-\frac{R_{02}}{10}} + \frac{S_{03}}{S} 10^{-\frac{R_{03}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

3. Bedroom Daytime LAeq

Room Properties		Sound Insulation Properties							
Room Width (m)	2.8	Freq. Hz	63	125	250	500	1k	2k	4k
Room Depth (m)	3.7	Wall, dB R _{w+Ctr}	38	41	45	45	54	58	60
Room Height (m)	2.4	Roof, dB R _{w+Ctr}	22	27	37	43	48	52	56
Glazed Area (m ²)	1.4	Glazing, dB R _{w+Ctr}	22	24	18	26	40	45	39
Is dwelling within roof?	✓	Vents, D _{n,e,w+Ctr}	30	34	27	37	35	34	35

Noise Levels, dB



External Level	47.6 dB LAeq
Internal Level	24.2 dB LAeq
Insertion Loss	23.4 dB LAeq

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	30(26)	dB R _{w(+Ctr)}	Double Glazing 4 / 16 / 4
Ventilation	32	D _{n,e,w+Ctr}	Hit & miss trickle vent Titon Trimvent XS13 4400EA

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	63	125	250	500	1k	2k	4k
Term 1	0.000585	0.00023	0.00117	0.00012	0.00019	0.000233	0.000185
Term 2	0.001314	0.00083	0.0033	0.00052	2.1E-05	6.59E-06	2.62E-05
Term 3	0.000125	6.3E-05	2.5E-05	2.5E-05	3.2E-06	1.25E-06	7.92E-07
Term 4	0.009727	0.00308	0.00031	7.7E-05	2.4E-05	9.73E-06	3.87E-06
Internal, dB L _{eq}	42.9	34.6	29.2	13.8	11.6	4.8	-1.8
Internal, dB LAeq	16.7	18.5	20.6	10.6	11.6	6.0	-0.8

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Tiled, pitched roof
Glazing	Double Glazing
Vents	Hit & miss trickle vent

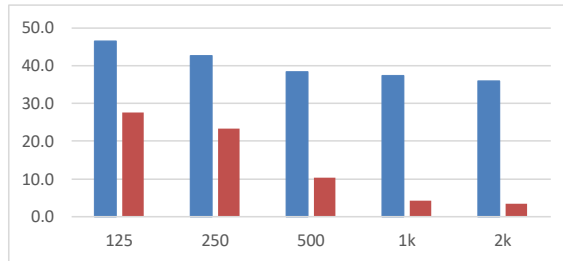
Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{-\frac{D_{0,0}}{10}} + \frac{S_{01}}{S} 10^{-\frac{R_{01}}{10}} + \frac{S_{02}}{S} 10^{-\frac{R_{02}}{10}} + \frac{S_{03}}{S} 10^{-\frac{R_{03}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

4. Bedroom Night-time LAeq

Room Properties			Sound Insulation Properties						
Room Width (m)	2.8	Freq. Hz	63	125	250	500	1k	2k	4k
Room Depth (m)	3.7	Wall, dB R _{w+Ctr}	38	41	45	45	54	58	60
Room Height (m)	2.4	Roof, dB R _{w+Ctr}	22	27	37	43	48	52	56
Glazed Area (m ²)	1.4	Glazing, dB R _{w+Ctr}	22	24	18	26	40	45	39
Is dwelling within roof?	✓	Vents, D _{n,e,w+Ctr}	30	34	27	37	35	34	35

Noise Levels, dB



External Level	42.8 dB LAeq
Internal Level	19.1 dB LAeq
Insertion Loss	23.7 dB LAeq

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	30(26)	dB R _{w(+Ctr)}	Double Glazing 4 / 16 / 4
Ventilation	32	D _{n,e,w+Ctr}	Hit & miss trickle vent Titon Trimvent XS13 4400EA

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	63	125	250	500	1k	2k	4k
Term 1	0.000585	0.00023	0.00117	0.00012	0.00019	0.000233	0.000185
Term 2	0.001314	0.00083	0.0033	0.00052	2.1E-05	6.59E-06	2.62E-05
Term 3	0.000125	6.3E-05	2.5E-05	2.5E-05	3.2E-06	1.25E-06	7.92E-07
Term 4	0.009727	0.00308	0.00031	7.7E-05	2.4E-05	9.73E-06	3.87E-06
Internal, dB L _{eq}	40.4	27.5	23.4	10.2	4.3	3.4	-2.5
Internal, dB LAeq	14.2	11.4	14.8	7.0	4.3	4.6	-1.5

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Tiled, pitched roof
Glazing	Double Glazing
Vents	Hit & miss trickle vent

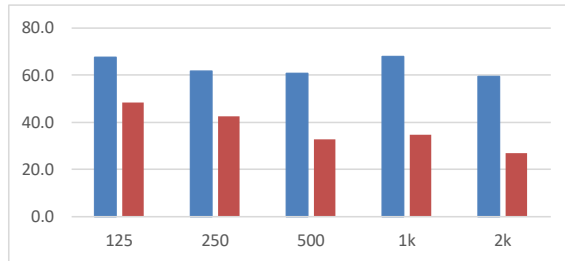
Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{-\frac{D_{0,0}}{10}} + \frac{S_{01}}{S} 10^{-\frac{R_{01}}{10}} + \frac{S_{02}}{S} 10^{-\frac{R_{02}}{10}} + \frac{S_{03}}{S} 10^{-\frac{R_{03}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

5. Bedroom Night-time LAmax

Room Properties			Sound Insulation Properties						
Room Width (m)	2.8	Freq. Hz	63	125	250	500	1k	2k	4k
Room Depth (m)	3.7	Wall, dB R _{w+Ctr}	38	41	45	45	54	58	60
Room Height (m)	2.4	Roof, dB R _{w+Ctr}	22	27	37	43	48	52	56
Glazed Area (m ²)	1.4	Glazing, dB R _{w+Ctr}	22	24	18	26	40	45	39
Is dwelling within roof?	✓	Vents, D _{n,e,w+Ctr}	30	34	27	37	35	34	35

Noise Levels, dB



External Level	68.9 dB LAmax
Internal Level	41.5 dB LAmax
Insertion Loss	27.4 dB LAmax

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	30(26)	dB R _{w(+Ctr)}	Double Glazing 4 / 16 / 4
Ventilation	32	D _{n,e,w+Ctr}	Hit & miss trickle vent Titon Trimvent XS13 4400EA

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	63	125	250	500	1k	2k	4k
Term 1	0.000585	0.00023	0.00117	0.00012	0.00019	0.000233	0.000185
Term 2	0.001314	0.00083	0.0033	0.00052	2.1E-05	6.59E-06	2.62E-05
Term 3	0.000125	6.3E-05	2.5E-05	2.5E-05	3.2E-06	1.25E-06	7.92E-07
Term 4	0.009727	0.00308	0.00031	7.7E-05	2.4E-05	9.73E-06	3.87E-06
Internal, dB L _{eq}	63.2	48.5	42.3	32.7	34.7	26.8	25.0
Internal, dB LAeq	37.0	32.4	33.7	29.5	34.7	28.0	26.0

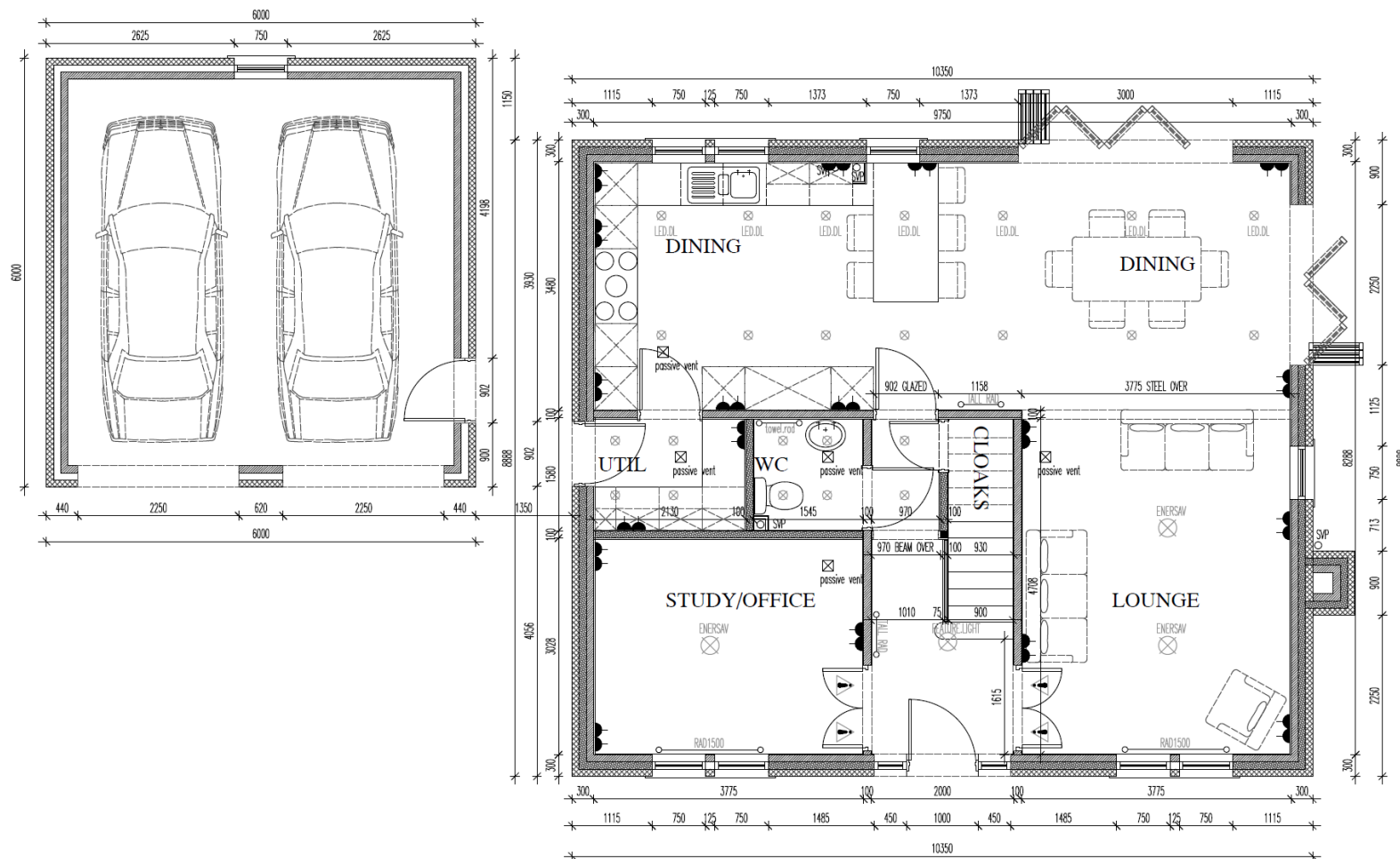
Façade Components

Wall	Brick and block, 75mm cavity
Roof	Tiled, pitched roof
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_o}{S} 10^{-\frac{D_{o,2}}{10}} + \frac{S_{wi}}{S} 10^{-\frac{R_{wi}}{10}} + \frac{S_{ce}}{S} 10^{-\frac{R_{ce}}{10}} + \frac{S_{tr}}{S} 10^{-\frac{R_{tr}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

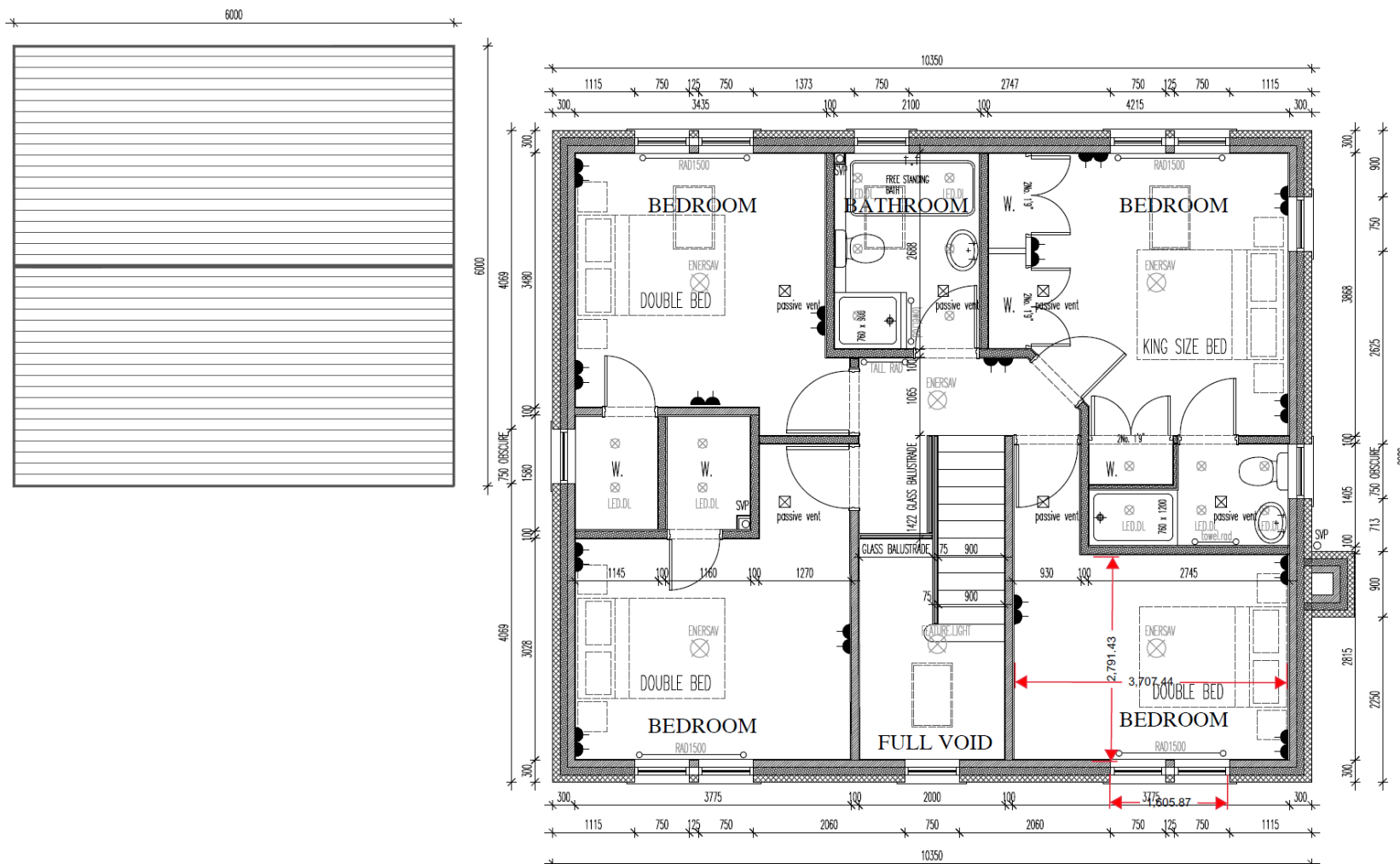
APPENDIX G – Site Plans



PROPOSED GROUND FLOOR PLAN 1:50
NEW DWELLING, DALE LANE, BUXTON

PROPOSED 01A

DALE LANE, BUXTON



PROPOSED FIRST FLOOR PLAN 1:50 NEW DWELLING, DALE LANE, BUXTON

PROPOSED 02A

DALE LANE, BUXTON

APPENDIX H – Legislation, Policy and Guidance

Guidance for the assessment of noise affecting new residential development is given in the National Planning Policy Framework (NPPF). Section 15 of the NPPF states:

“174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

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

Section 185 further states:

“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:

- 1. Mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- 2. Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

Section 187 states:

“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.”

To avoid and mitigate adverse noise effects on health arising from and impacting on new development, the NPPF makes reference to NPSE. The Noise Policy Statement for England (NPSE) was published in March 2010 and covers all forms of noise other than occupational noise.

The Noise Policy Statement for England (NPSE) states the following aims in paragraph 2.2.

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.

The NPSE does not define the SOAEL numerically, stating in paragraph 2.22:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the "NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

There is no local or national guidance on how the three terms should be defined numerically, it is for the assessor to collate and interpret appropriate guidance on noise, such as may be found in British Standards, and correlate the guidance with the concepts of NOEL, LOAEL and SOAEL.

BS8233:2014 - *Guidance on sound insulation and noise reduction for buildings* suggests indoor ambient noise levels for dwellings in Table 4, Section 7.7.2. These are summarised below.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

BS8233 states that the guideline values given above are for 'noise without character', further stating:

"Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate."

Table 4 of BS8233 also has accompanying notes that were subject to additions in ProPG. The relevant notes with the additions of ProPG are given below.

"NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. 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. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events."

"NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

APPENDIX I – Acoustic Terminology

To aid the understanding of acoustic terminology and the relative difference between noise levels the following background information is provided.

We perceive sound when the ear detects fluctuations in air pressure (sound waves), which are then processed by the brain and perceived as sound. Humans can hear an incredibly wide range of sound intensities ranging from jet engines to fingertips lightly brushing against each other. This range is quantified using a logarithmic scale called the decibel scale (dB). The comfortable range of the decibel scale typically ranges from 0dB (the threshold of hearing) to around 140dB. Here are some examples of common environments and their typical noise levels.

Noise Level	Environment
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a moving car
60 to 70 dB(A)	Typical high street
100 to 110 dB(A)	Fire alarm at 1 meter away
140 dB(A)	Threshold of pain

Terminology

dB (decibel) – A unit used to quantify the pressure level of sound. Defined as 20 times the logarithm of the ratio between the root-mean-square pressure of a given sound field and a reference pressure level (2×10^{-5} Pa – threshold of hearing).

$L_{Aeq, T}$ – The equivalent continuous sound pressure level over a stated period. It quantifies a fluctuating sound level over a given period as the equivalent continuous sound level over which the same amount of acoustic energy is contained over. This is A-weighted in order to assess human perception.

L_{Amax} – the maximum RMS A-weighted sound pressure level occurring within a specified time period; the time weighting is typically either Fast or Slow.

A-Weighting – A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

R_w – The Weighted Sound Reduction Index (R_w) is a number used to rate the effectiveness of a soundproofing system or material.

$D_{n,e,w}$ – The Weighted Sound Reduction Index specifically for ventilators.

C_{tr} – C_{tr} is a spectrum adaptation term which method is defined in BS EN ISO 717. The standard uses a reference curve to determine the weighted value of airborne sound insulation. The spectrum adaptation terms C and C_{tr} may be used to take into account different source spectra. ' C_{tr} ' is the A-weighted urban traffic noise spectrum.