Assessment of the Internal Noise Climate Within Plot 2, Upper Brow Road, Paddock Huddersfield.

Report Prepared for:

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1.0 Summary

Planning permission was obtained in December 2021 permitting the development of seven new residential dwellings on Upper Brow Road in Paddock, Huddersfield. The planning permission document contained a number of conditions one of which, condition 17, required that prior to the occupation of the development, a noise survey to demonstrate compliance with the design guide levels, relating to the internal noise climate, should be conducted.

As phase 1 of the development is approaching completion, Druk Limited was commissioned to undertake an assessment of the internal noise climate within plot 2 of the development on Upper Brow Road.

The results of the break-in noise survey have demonstrated that the internal noise climate within the study, bedroom 1 and the living room complied with the design guide values contained within the 'approved acoustic report'. Taking the results from these habitable spaces as being indicative of the wider conditions within Plot 2, it is suggested that the requirement contained within planning condition 17, relating to the internal noise climate within the dwellings, has been complied with.

In addition, and by virtue of the layout of the development, it is suggested that the results presented within this report would be genalisable to the other plots, as they are adjacent to plot 2. This being the case, it is proposed that a general compliance could be extended to these plots as well.

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2.0 Introduction

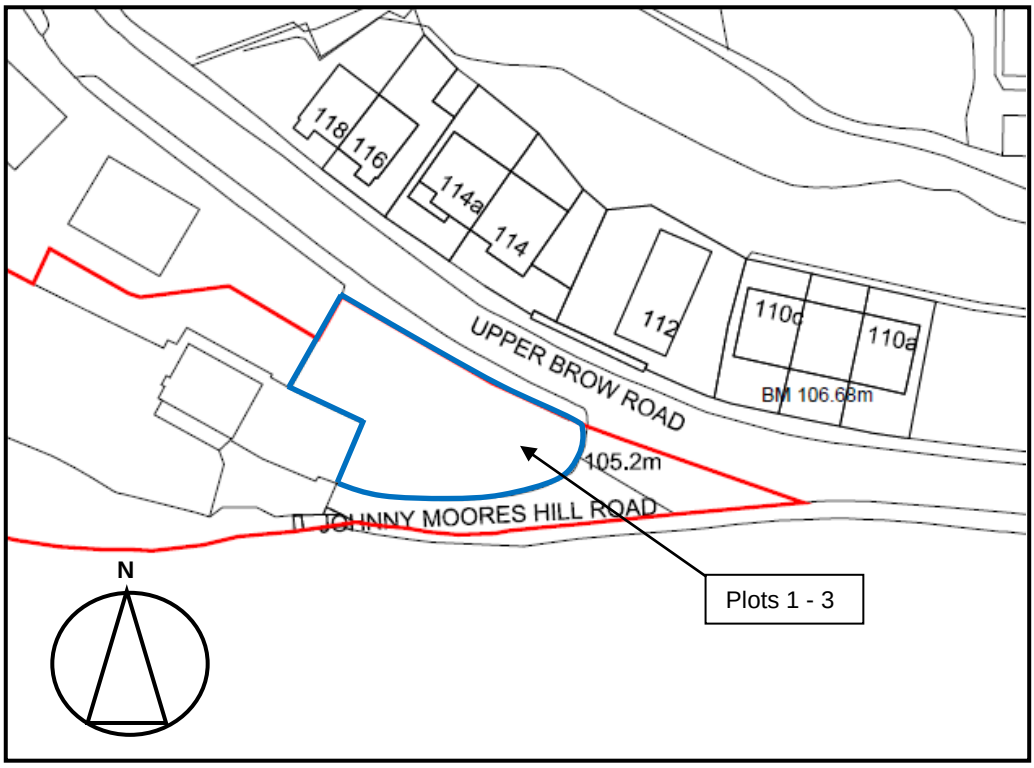
Planning permission was obtained in December 2021 permitting the development of seven new residential dwellings on Upper Brow Road in Paddock, Huddersfield. The planning permission document contained a number of conditions one of which, condition 17, required that prior to the occupation of the development, a noise survey to demonstrate compliance with the design guide levels, relating to the internal noise climate, should be conducted.

As phase 1 of the development is approaching completion, Druk Limited was commissioned to undertake an assessment of the internal noise climate within plot 2 of the development on Upper Brow Road.

3.0 Site Description

The three new dwellings forming phase 1 of the development are located to the East of Manashay Cottage on a triangle of land bounded by Upper Brow Road to the North and Johnny Moores Hill Road to the South (figure 1 below and photograph 1 overleaf). To the North of plots 1 - 3 are the existing dwellings on Upper Brow Road (photograph 2 overleaf). To the East and West of the plots 1 - 3 is Upper Brow Road and to the South of plots 1 - 3 is an area of open land falling away to the Huddersfield Narrow Canal, approximately150 metres away.

Figure 1. Location of phase 1 of the development on Upper Brow Road (edged in blue)



Photograph 1. Plots 1 - 3 Upper Brow Road, Paddock

Photograph 2. Existing dwellings on Upper Brow Road

4.0 Assessment Criteria

As previously detailed, the original planning permission granted in December 2021 contained a number of conditions relating to the development of which one, condition 17, dealt specifically with the acoustic conditions within the apartments. The full text of this condition is detailed below:

17. Before the development is first brought into use, all works which form part of the Environmental Noise Survey authored by Paul Horsley Acoustics Ltd dated 20 June 2017 Ref J2624 -

a) Shall be completed; and
b) Written evidence to demonstrate that the specified noise levels have been achieved shall be submitted to and approved in writing by the Local Planning Authority.

If it cannot be demonstrated that the noise levels specified in the aforementioned Noise Report have been achieved, then a further scheme shall be submitted for the written approval of the Local Planning Authority incorporating further measures to achieve those noise levels. All works comprised within those further measures shall be completed and written evidence to demonstrate that the aforementioned noise levels have been achieved shall be submitted to and approved in writing by the Local Planning Authority before the development is first brought into use.

Reason: To ensure that future occupants do not suffer loss of amenity arising from noise disturbance and to accord with the aims of Policies LP24(b) and LP52 of the Kirklees Local Plan.

With respect to the Environmental Noise Survey produced by Paul Horsley Acoustics, issued in June 2017 and hereafter referred to as the 'approved acoustic report', this detailed the results of an extensive noise survey conducted over the 25 - 26th May 2017. Based on the results of the noise survey the 'approved acoustic report' detailed the building fabric sound insulation measures that would be necessary to achieve the levels detailed within table 1 of the World Health Organization's (WHO) 1999 “Guidance for Community Noise” document. The contents of the WHO document that are applicable to this development are reproduced in table 1 below.

Table 1. Summary of the applicable extracts from the WHO “Guidance for Community Noise” document

Specific Environment	Critical Health Effect(s)	L_{Aeq} dB	Time Base, hours	L_{Amax} dB
Outdoor living area	Serious annoyance, daytime and evening.	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, Indoors	Speech intelligibility and moderate annoyance daytime and evening	35	16	-
	Sleep disturbance, night time	30	8	45
Outside Bedroom	Sleep disturbance, window open (outdoor values)	45	8	60

In addition to the sound levels detailed within table 1 above, the WHO document also refers to the external noise climate and suggests the following criteria:

To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq}.

Wirth respect to the building fabric sound insulation measures that were deemed necessary to achieve the internal sound levels detailed within table 1 above, the 'approved acoustic report' specified an appropriate specification for both the glazing and background ventilators. The appropriate glazing and background ventilator specifications were contained within Section 12.2 of the 'approved acoustic report' and the relevant paragraphs are reproduced below:

Using the sound exposure levels assessed for the site the minimum recommended Rw dB rating for the glazing systems for the site should be as follows.

Period	Noise Exposure Level	Internal Living Space / Bedroom Target Level	Minimum Rw Values Required
Daytime (0700 – 2300 Hrs)	LAeq, 16 Hours – 49 dB	LAeq, 16 Hours – 35 dB	**Rw 14 dB**
Night-time (2300 – 0700 Hrs)	LAeq, 8 Hours – 42 dB LAmax - 54 dB	LAeq, 8 Hours – 30 dB LAmax - 45 dB	**Rw 12 dB** **Rw 9 dB**

Based upon generic data for glazing systems, it is possible to provide the necessary sound insulation using a glazing system consisting of a 4mm Glass – 20mm wide Argon Filled Airspace – 4mm Glass. This system has certified acoustic values of Rw 30 dB, with an R_A 30 dB and $R_{A,tr}$ 27 dB.

This is the recommendation for all elevations of the development.

The trickle ventilation system that provides both adequate background ventilation in accordance with Approved Document F1 and the minimum acoustic properties to maintain the internal noise characteristics of a closed window using a through ventilator. The Rw values quoted above do not include for the trickle vent combination within their values and as such inclusion of a standard trickle vent will diminish the Rw values quoted.

The combined acoustic properties of the acoustic trickle vent system proposed for use on this site, Greenwood 2500EA achieve a specified sound reduction of 46 Dn,e,w dB through the ventilator in the open position, assuming it is fitted though a 300mm thick wall. This level of attenuation is achieving the minimum requirements necessary to ensure that the internal noise levels inside the bedrooms are maintained for all elevations of this project. Other manufacturers could be considered provided that the Dn,e,w dB value is maintatined.

In summary the 'approved acoustic report' recommended that universal application of glazing with the following specification: 4mm pane - 20mm cavity - 4mm pane and a background) trickle ventilator of the Greenwood 2500 EA type, or another trickle ventilator with the same overall acoustic performance.

5.0 Construction Specification

Prior to conducting the noise validation survey, the glazing and ventilation units utilised on phase 1 of the development were inspected to assess their compliance with the items specified within the 'approved acoustic report'. This inspection related to the glazing and ventilation units.

5.1 Glazing

The thickness of the sealed unit glazing installed within plot 2 was measured using a Bohle Glass Check glass thickness gauge, as detailed in photograph 3 below.

Photograph 3 reveals that the thickness of the sealed unit glazing was 28mm, which would accord with the overall thickness of the glazing specified in the 'approved acoustic report'.

5.2 Ventilation

The 'approved acoustic report' specified the application of Greenwood 2500 EA type background ventilators and an inspection of the ventilators installed throughout the plot was undertaken. The inspection revealed that the Greenwood 2500 EA ventilators had been installed as recommended, photograph 4 overleaf.

Photograph 3. Measuring the thickness of the sealed unit glazing, plot 2

Photograph 4. Background ventilator specification, plot 2

6.0 Noise Climate Assessment Details

A noise survey to evaluate the internal noise climate within a selection of the habitable rooms within plot 2 of the development was undertaken. Plot 2 was selected as this property was essentially complete, whereas plots 1 and 3 were not as advanced. As all three plots were arranged in a terrace it is suggested that the results obtained within plot 2, the centre plot, would be genalisable to the plots on either side.

6.1 Survey Times and Personnel

The assessment of the internal noise climate within plot 2 was undertaken between 08:15 hours on the 11th March to 08:15 hours on the 12th March 2024.

6.2 Weather

At the commencement of the internal noise measurements, the external weather conditions were as follows:

All surfaces were damp, cloud cover was approximately 90 - 100%, the external temperature was approximately 6°C, the barometric pressure was approximately 982mb and the wind speed was less than 0.5m/s.

6.3 Equipment

The noise assessments were conducted using the equipment detailed in the table 2 overleaf.

The sound level meters were field calibrated before, after and during the surveys as necessary, during which time no significant deviation in the calibrated level was observed.

All the equipment used is calibrated by a UKAS accredited calibration laboratory.

Table 2. Equipment used during the noise survey

Equipment description	Manufacturer	Model number	Serial number
Sound level meter	Norsonic AS	Nor 140	1402738
Microphone pre-amplifier	Norsonic AS	Nor 1209	12075
Microphone	Norsonic AS	Nor 1225	72843
Acoustic calibrator	Norsonic AS	Nor 1251	31522
Sound level meter	NTI Audio	XL2-TA	A2A-10232-E
Microphone pre-amplifier	NTI Audio	MA220	5537
Microphone	NTI Audio	M2230	8636
Sound level meter	NTI Audio	XL2-TA	A2A-23832-E1
Microphone pre-amplifier	NTI Audio	MA220	141157
Microphone	NTI Audio	M2230	A26843

6.4 Measurement Procedure

With respect to the internal measurements, due regard was paid to the guidance provided within the Association of Noise Consultants (ANC) – Measurement of Sound Levels in Buildings, Version 1.0, June 2020.

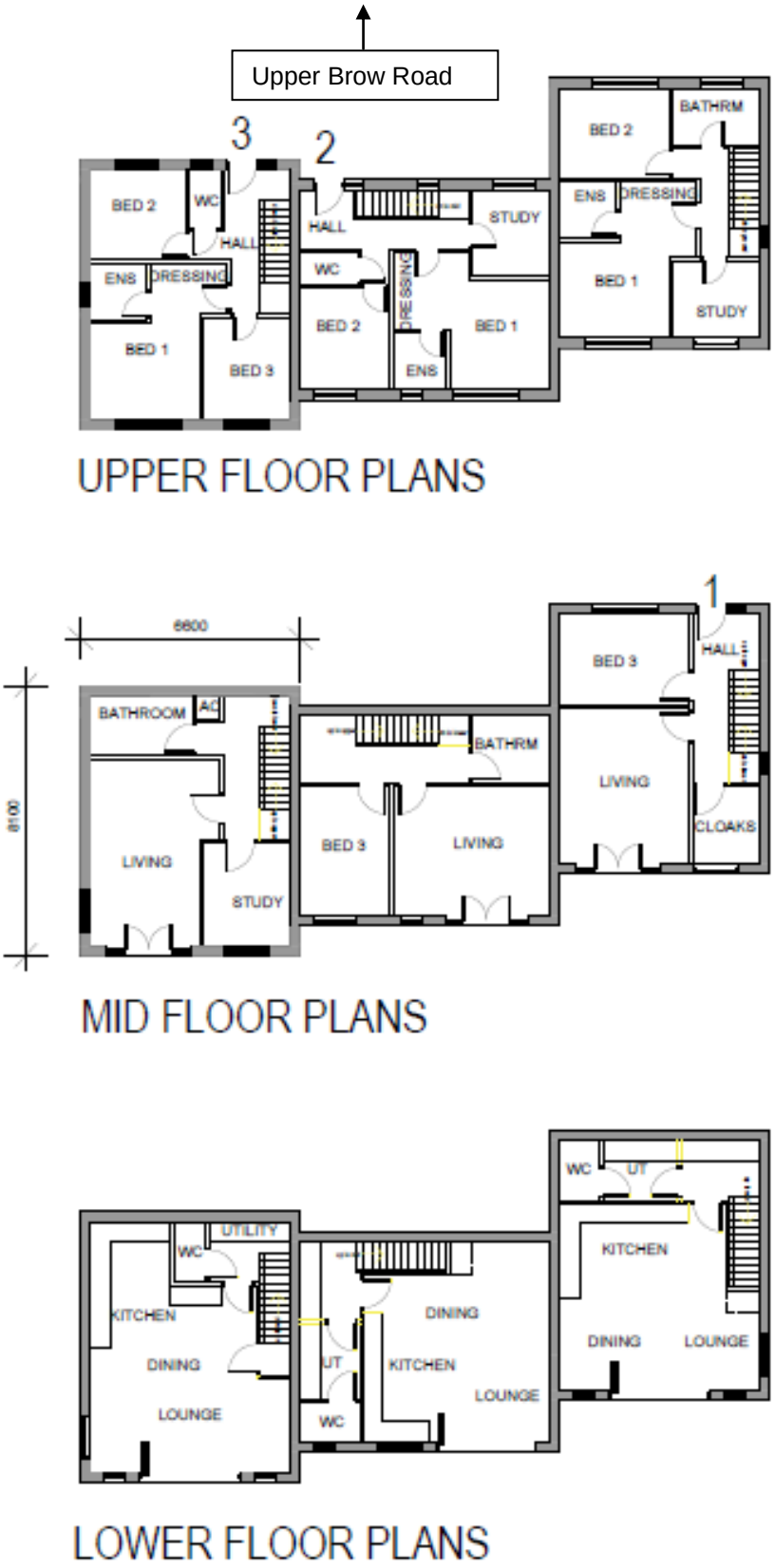
Plots 1 - 3 are three storey townhouses arranged in a terrace. The internal layout of the plots is as detailed on figure 2 overleaf. Measurements of the internal noise climate within plot 2 were made within bedroom one and the study on the top floor and the living room on the middle floor of plot 2. These rooms were selected as they overlooked both the Upper Brow Road (the study) and the area of open land to the rear (bedroom 1 and the living room) so providing an indication of the internal noise climate on both elevations of the house.

Throughout the internal noise assessments the measurement time interval was 15 minutes, the windows were closed but the ventilation provision was open and all measurements were made with the fast time weighting engaged.

During the course of the assessments, the sound level meter microphones were tripod mounted, such that they were approximately 1.2 metres above floor level and approximately 1.0 metre from the internal walls. The tripod mounted microphones were placed in positions that approximated the likely positions of the beds within the bedroom and a sofa within the living room area. The microphones were connected to the sound

level meters via 5 metre extension cables, so permitting the operator to remain outside the assessment spaces. The measurements were unmanned for their duration.

Figure 2. Internal layout of plots 1 - 3



7.0 Noise Survey Results

At the time of the internal noise measurements, plot 2 was complete, unfurnished and unoccupied. As a consequence it was likely that the sound absorption of the rooms used in the assessment would be different to that which would prevail when the house was occupied and furnished. In order to permit the obtained sound levels to be standardised, sample reverberation time measurements were made within the three assessed rooms within plot 2. The mean reverberation times are presented in table 3 below.

Table 3. Mean reverberation time measurements, plot 2

Room	Mean Reverberation Time, T_{20}, seconds
Study	0.93
Bedroom 1	1.19
Living room	1.26

For the purposes of the subsequent assessments the measured internal ambient noise levels will be 'standardised' to a reverberation time of 0.5 seconds, which would be typical of a furnished and occupied dwelling.

By virtue of the significant amounts of measured noise data collected during the noise surveys, tables 4 - 6 below and overleaf and graphs 1 - 3 overleaf contain summaries of the noise data from the measurement surveys. Full measured noise data are presented in tabular form in Appendix 1.

Table 4. Standardised internal sound level summary, study

	$L_{Aeq,T}$	$L_{Amax,T}$
Standard deviation, daytime	2.59	-
Daytime mean (log)	23	-
Daytime modal value	21	-
Maximum value daytime	32	-
Minimum value daytime	18	-

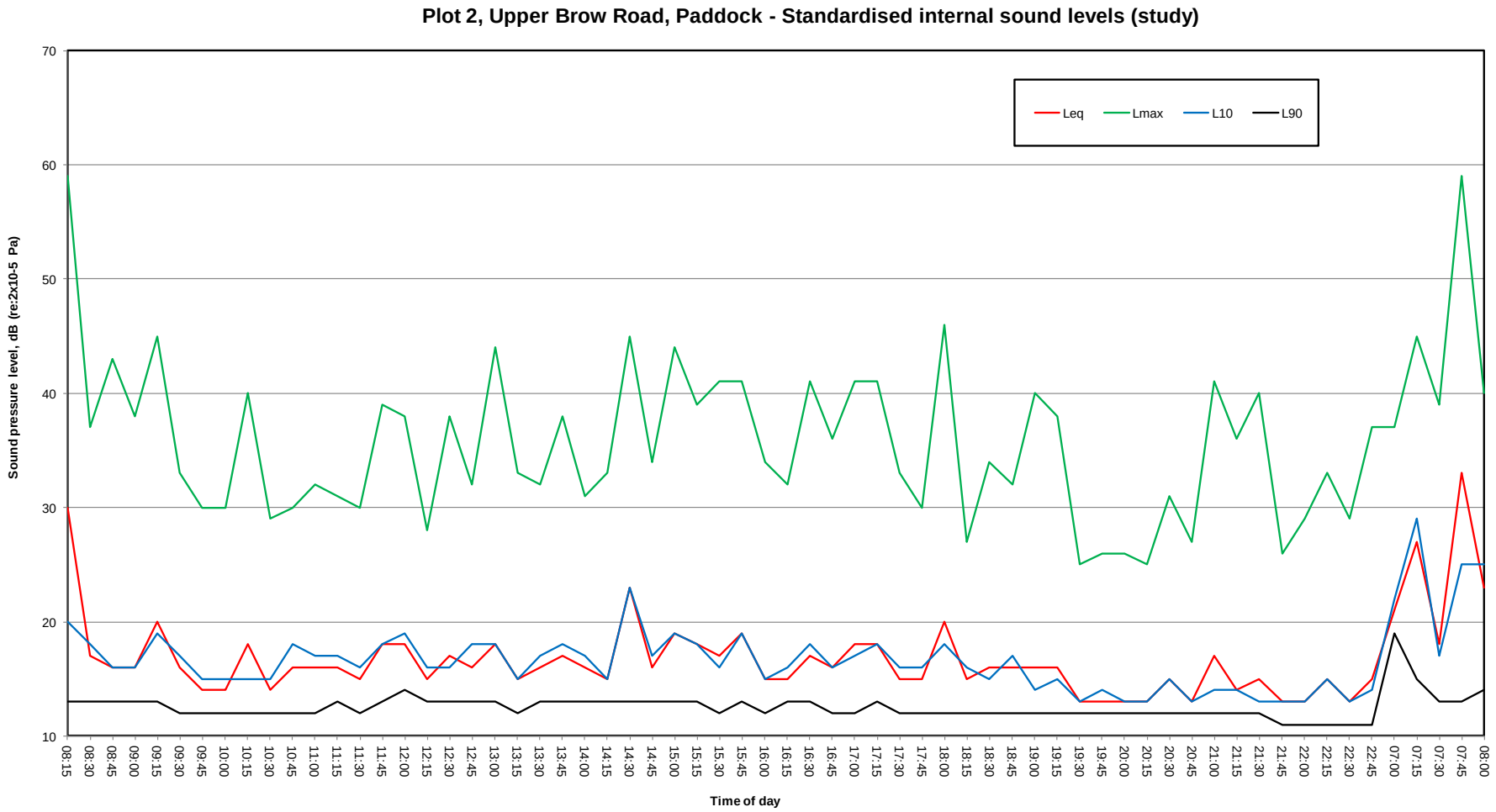
Table 5. Standardised internal sound level summary, living room

	$L_{Aeq,T}$	$L_{Amax,\ T}$
Standard deviation, daytime	2.32	-
Daytime mean (log)	21	-
Daytime modal value	20	-
Maximum value daytime	28	-
Minimum value daytime	16	-

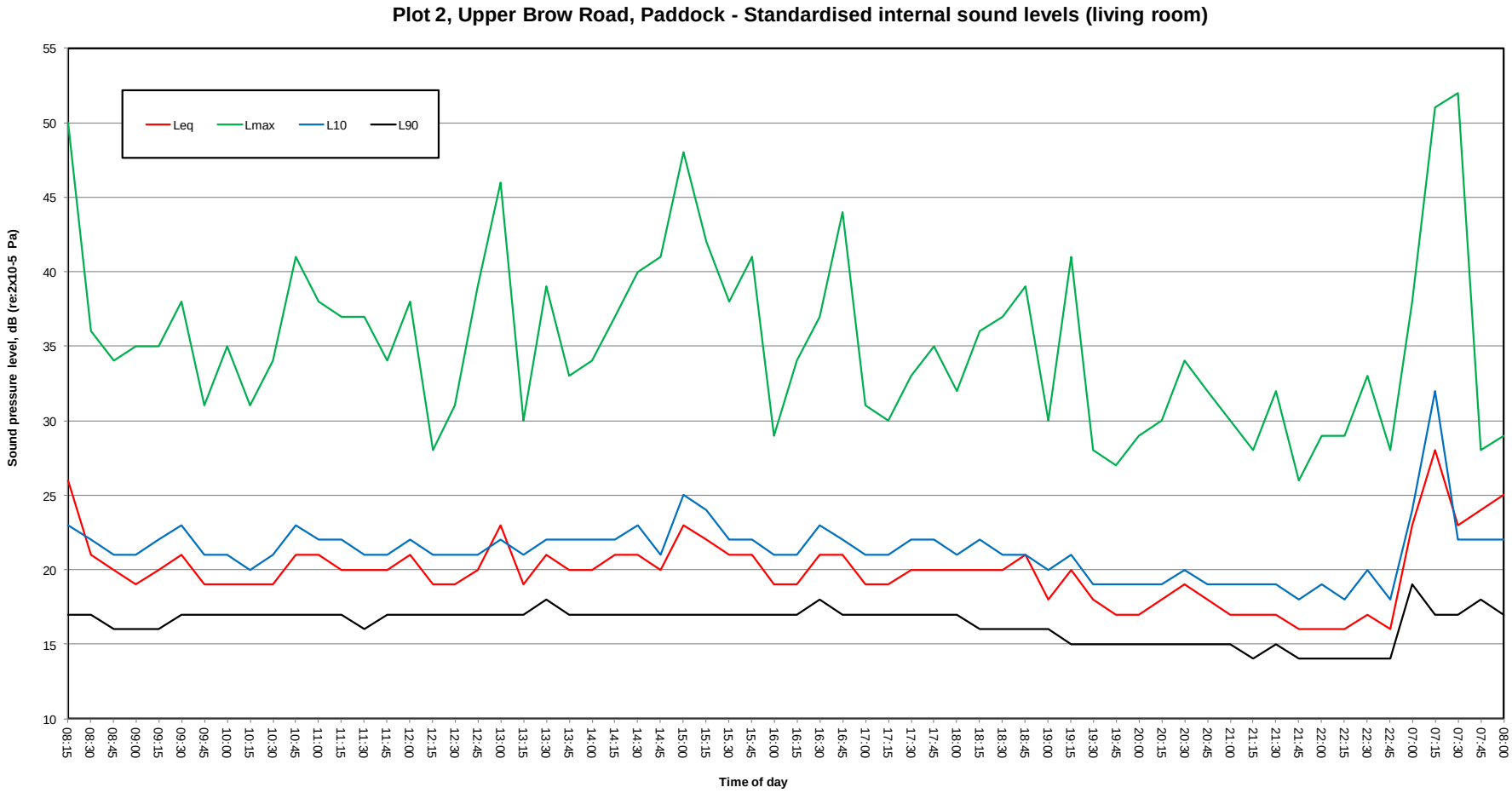
Table 6. Standardised internal sound level summary, bedroom 1

	$L_{Aeq,T}$	$L_{Amax,\ T}$
Standard deviation, daytime	3.73	7.07
Standard deviation, night time	3.20	6.02
Daytime mean (log)	20	45
Night time mean (log)	16	32
Daytime modal value	16	41
Night time modal value	12	28
Maximum value daytime	33	59
Minimum value daytime	13	25
Maximum value night time	28	39
Minimum value night time	12	16

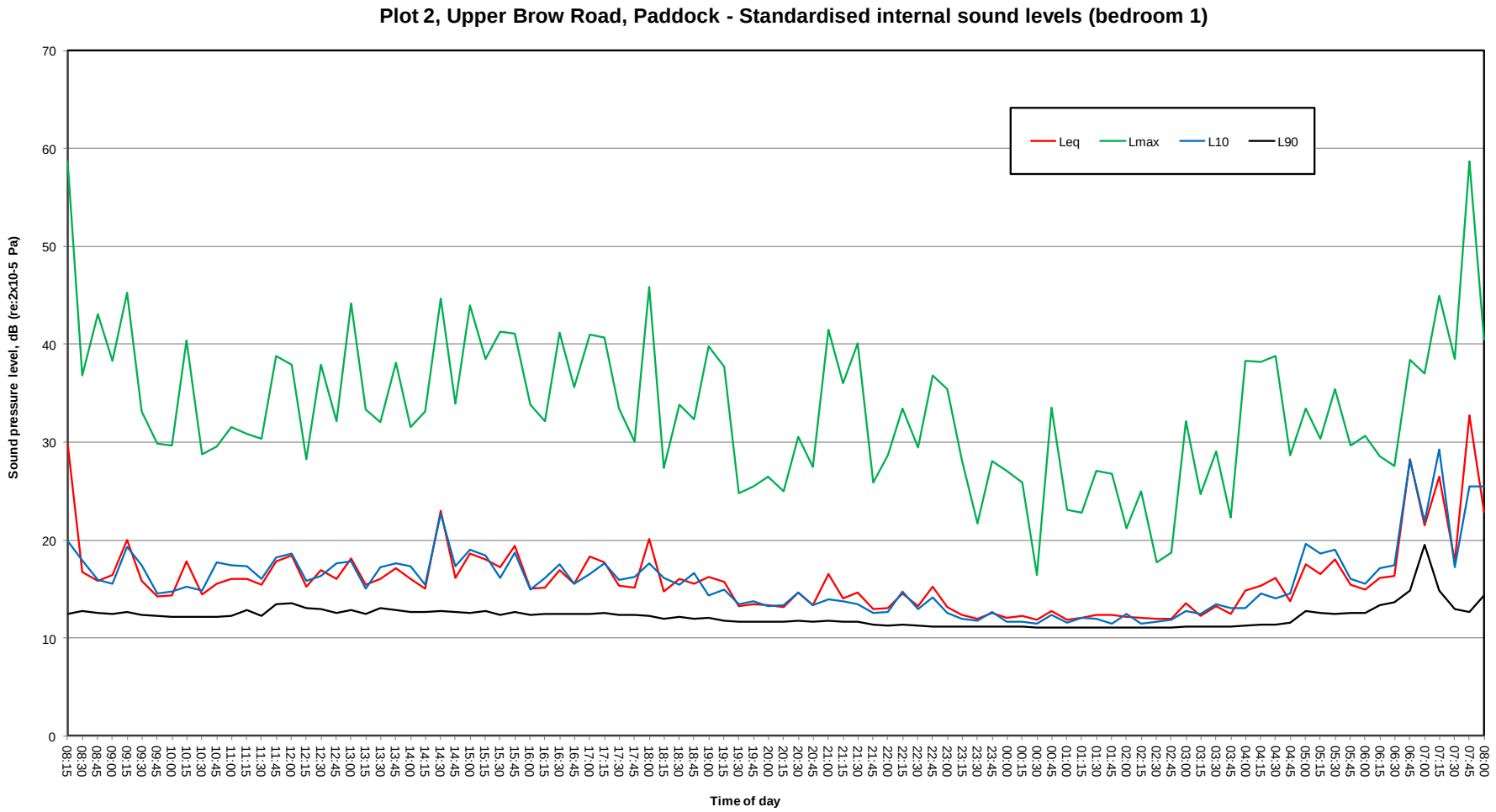
Graph 1. Standardised sound level summary, study, plot 2



Graph 2. Standardised sound level summary, living room, plot 2



Graph 3. Standardised sound level summary, bedroom 1, plot 2



7.1 External Recreation Areas

Measurements of the external noise climate were not made at the time of the internal noise climate surveys. However the results presented within the 'approved acoustic report' will be used to assess the likely external noise levels in the gardens serving the houses, which are located on Johnny Moores Hill Road. In this position the rear gardens are partially shielded from the road traffic on Upper Brow Road. Although the results presented with the 'approved acoustic report' were obtained in 2017, with the exception of the three new dwellings, it is understood that no other changes to the locality have occurred in the intervening period. With reference to the new development's ability to influence the noise climate, as the houses are unoccupied it is highly unlikely that they would influence the local noise climate.

With this in mind the table of results presented within section 10 of the 'approved acoustic report' are reproduced in table 7 below.

Table 7. Table of results extracted from section 10 of the approved acoustic report

Survey Location	Data ID	LAmax dB	LAeq dB	LA10 dB	LA90 dB	Survey Duration	Survey Date	Start Time	Source Description
1	1	52.7	43.5	45.0	41.2	01:00:00.00	25-05-2017	09:31:22	Distant traffic audible. Birdsong. Aircraft. Passing train. Industrial plant audible but low.
1	2	64.3	48.0	51.0	42.8	01:00:00.00	25-05-2017	10:31:22	
1	3	59.6	50.2	51.8	48.2	01:00:00.00	25-05-2017	11:31:22	
1	4	63.5	49.4	50.2	45.9	01:00:00.00	25-05-2017	12:31:22	
1	5	50.9	46.5	48.4	44.4	01:00:00.00	25-05-2017	13:31:22	
1	6	57.1	48.0	49.4	46.2	00:15:00.00	25-05-2017	20:01:06	Distant traffic audible. Birdsong.
1	7	58.6	48.3	50.4	44.5	00:15:00.00	25-05-2017	21:06:11	
1	8	55.1	47.5	50.4	43.1	00:15:00.00	25-05-2017	22:38:19	
1	9	48.1	32.7	34.4	29.1	00:15:00.00	26-05-2017	00:20:37	Distant traffic dominant. Low water flow audible.
1	10	54.1	40.3	42.0	29.2	00:15:00.00	26-05-2017	01:47:10	Distant traffic dominant. Low water flow audible. 1 No passing train.
1	11	52.1	42.8	47.1	33.5	00:15:00.00	26-05-2017	01:30:08	Distant traffic dominant. Low water flow audible. 1 No passing train.
1	12	48.1	40.1	44.2	33.9	00:15:00.00	26-05-2017	02:41:14	Distant traffic dominant. Low water flow audible.
1	13	48.5	41.1	44.9	33.2	00:15:00.00	26-05-2017	03:00:22	Distant traffic dominant. Low water flow audible.

Taking the measured L_{Aeq} results obtained over the five hour period between 09:31 - 14:31 hours, this would result in a mean (log) sound level for the period of 48dB.

8.0 Discussion

With reference to the design guide values presented within section 4 of this report and reproduced from the 'approved acoustic report', the guidance relating to the internal noise climate suggests that the daytime noise climate should not exceed 35dB L_{Aeq} within habitable rooms and 30dB L_{Aeq} within bedrooms at night. With reference to external recreation areas the adopted guidance within the 'approved acoustic report' suggests this should not exceed 50dB L_{Aeq} with 55 dB L_{Aeq} being regarded as a maximum level.

With respect to the measured levels form this assessment of the internal noise climate, the standardised sound levels obtained from the noise surveys in the study, bedroom 1 and the living room of plot 2, are presented within tables 4 - 6 above. The results highlight that in all cases the obtained levels complied with the design guide values specified within the 'approved' acoustic report'. Turning to the external noise climate, the results form the original noise survey demonstrate that the external noise climate again complies with the design guide values contained within the 'approved acoustic report'. In addition the site inspection highlighted that the installed glazing and background ventilation again complied with the recommended measures, contained within the 'approved acoustic report'

Consequently, it is proposed that the requirement to provide "*written evidence to demonstrate that the specified noise levels have been achieved shall be submitted to and approved in writing by the Local Planning Authority*", has been met and that this would be applicable to the other plots.

9.0 Conclusion

Measurements of the internal noise climate resulting from external noise break-in, have been made within plot 2 on Upper Brow Road in Paddock. The results of the break-in noise survey have demonstrated that the internal noise climate within the study, bedroom 1 and the living room complied with the design guide values contained within the 'approved acoustic report'. As such, it is suggested that the requirement contained within planning condition 17, relating to the internal noise climate within the dwellings, has been complied with.

In addition, and by virtue of the layout of the development it is suggested that the results presented above would be genalisable to the other plots, as they are adjacent to plot 2. This being the case, it is proposed that a general compliance could be extended to these plots as well.

Appendix 1. Standardised Internal Noise Levels

Study, standardised internal noise levels

Time	$L_{Aeq\ 5\ mins}$	$L_{Amax,\ 5\ mins}$	$L_{A10,\ 5\ mins}$	$L_{A90,\ 5\ mins}$
08:15	30	60	23	18
08:30	22	37	23	18
08:45	21	35	22	18
09:00	21	36	22	18
09:15	21	36	22	18
09:30	22	38	23	18
09:45	21	31	22	19
10:00	21	38	22	18
10:15	21	33	22	18
10:30	21	35	22	18
10:45	22	39	24	18
11:00	22	40	24	18
11:15	22	36	23	19
11:30	22	40	22	18
11:45	21	35	22	18
12:00	22	39	23	19
12:15	21	30	22	18
12:30	21	32	22	18
12:45	21	36	22	19
13:00	23	42	23	19
13:15	21	33	22	19
13:30	22	34	23	19
13:45	21	30	22	19
14:00	22	35	23	19

Time	$L_{Aeq\ 5\ mins}$	$L_{Amax,\ 5\ mins}$	$L_{A10,\ 5\ mins}$	$L_{A90,\ 5\ mins}$
14:15	22	33	23	19
14:30	24	39	25	19
14:45	22	39	23	19
15:00	23	43	25	19
15:15	23	41	25	19
15.30	22	38	23	18
15:45	22	44	23	19
16:00	21	34	22	18
16:15	21	33	21	19
16:30	22	38	24	19
16:45	22	43	22	18
17:00	20	32	21	18
17:15	21	31	21	18
17:30	21	34	22	18
17:45	20	32	21	18
18:00	21	35	22	18
18:15	21	36	22	18
18:30	21	36	22	18
18:45	22	42	22	17
19:00	20	28	21	18
19:15	21	39	22	17
19:30	19	28	20	17
19:45	18	25	19	16
20:00	19	29	20	17

Time	$L_{Aeq\ 5\ mins}$	$L_{Amax,\ 5\ mins}$	$L_{A10,\ 5\ mins}$	$L_{A90,\ 5\ mins}$
20:15	19	31	20	17
20:30	20	33	21	17
20:45	19	32	20	17
21:00	19	27	19	17
21:15	19	28	20	16
21:30	19	32	20	16
21:45	18	26	19	16
22:00	18	27	19	16
22:15	19	31	20	16
22:30	19	37	21	16
22:45	20	30	23	15
23:00	17	27	17	15
23:15	17	26	18	15
23:30	17	25	17	15
23:45	16	24	17	15
00:00	17	28	17	15
00:15	16	25	17	15
00:30	16	24	16	15
00:45	16	25	17	15
01:00	16	24	17	15
01:15	17	28	17	15
01:30	18	36	17	15
01:45	16	25	16	15
02:00	17	31	18	15

Time	$L_{Aeq\ 5\ mins}$	$L_{Amax,\ 5\ mins}$	$L_{A10,\ 5\ mins}$	$L_{A90,\ 5\ mins}$
02:15	16	25	16	15
02:30	16	28	17	15
02:45	16	23	17	15
03:00	17	29	17	15
03:15	16	24	17	15
03:30	17	27	18	15
03:45	17	24	17	15
04:00	17	30	18	15
04:15	17	28	18	15
04:30	18	27	19	15
04:45	18	27	19	16
05:00	20	37	22	17
05:15	23	38	26	17
05:30	24	40	24	18
05:45	21	34	23	18
06:00	21	36	22	18
06:15	21	34	23	19
06:30	22	34	23	19
06:45	23	38	25	20
07:00	23	33	23	21
07:15	31	50	34	20
07:30	21	35	22	18
07:45	32	58	25	18
08:00	26	40	25	21

Living room, standardised internal noise levels

Time	$L_{Aeq\ 5\ mins}$	$L_{Amax,\ 5\ mins}$	$L_{A10,\ 5\ mins}$	$L_{A90,\ 5\ mins}$
08:15	26	50	23	17
08:30	21	36	22	17
08:45	20	34	21	16
09:00	19	35	21	16
09:15	20	35	22	16
09:30	21	38	23	17
09:45	19	31	21	17
10:00	19	35	21	17
10:15	19	31	20	17
10:30	19	34	21	17
10:45	21	41	23	17
11:00	21	38	22	17
11:15	20	37	22	17
11:30	20	37	21	16
11:45	20	34	21	17
12:00	21	38	22	17
12:15	19	28	21	17
12:30	19	31	21	17
12:45	20	39	21	17
13:00	23	46	22	17
13:15	19	30	21	17
13:30	21	39	22	18
13:45	20	33	22	17
14:00	20	34	22	17

Time	$L_{Aeq\ 5\ mins}$	$L_{Amax,\ 5\ mins}$	$L_{A10,\ 5\ mins}$	$L_{A90,\ 5\ mins}$
14:15	21	37	22	17
14:30	21	40	23	17
14:45	20	41	21	17
15:00	23	48	25	17
15:15	22	42	24	17
15.30	21	38	22	17
15:45	21	41	22	17
16:00	19	29	21	17
16:15	19	34	21	17
16:30	21	37	23	18
16:45	21	44	22	17
17:00	19	31	21	17
17:15	19	30	21	17
17:30	20	33	22	17
17:45	20	35	22	17
18:00	20	32	21	17
18:15	20	36	22	16
18:30	20	37	21	16
18:45	21	39	21	16
19:00	18	30	20	16
19:15	20	41	21	15
19:30	18	28	19	15
19:45	17	27	19	15
20:00	17	29	19	15

Time	$L_{Aeq\ 5\ mins}$	$L_{Amax,\ 5\ mins}$	$L_{A10,\ 5\ mins}$	$L_{A90,\ 5\ mins}$
20:15	18	30	19	15
20:30	19	34	20	15
20:45	18	32	19	15
21:00	17	30	19	15
21:15	17	28	19	14
21:30	17	32	19	15
21:45	16	26	18	14
22:00	16	29	19	14
22:15	16	29	18	14
22:30	17	33	20	14
22:45	16	28	18	14
23:00	15	27	16	13
23:15	14	21	16	13
23:30	14	24	16	13
23:45	14	23	16	14
00:00	18	49	17	14
00:15	14	27	15	13
00:30	14	24	15	13
00:45	15	38	16	13
01:00	14	20	15	13
01:15	17	34	17	13
01:30	14	23	15	13
01:45	14	24	15	13
02:00	16	30	17	13

Time	$L_{Aeq\ 5\ mins}$	$L_{Amax,\ 5\ mins}$	$L_{A10,\ 5\ mins}$	$L_{A90,\ 5\ mins}$
02:15	14	26	15	13
02:30	15	27	16	13
02:45	14	27	15	13
03:00	14	25	16	13
03:15	14	24	16	13
03:30	15	25	16	13
03:45	15	23	16	13
04:00	16	28	17	14
04:15	15	27	17	14
04:30	16	24	18	14
04:45	17	29	19	15
05:00	20	39	22	16
05:15	24	40	26	16
05:30	20	33	22	16
05:45	20	33	22	17
06:00	20	37	22	17
06:15	20	32	22	18
06:30	21	33	23	18
06:45	22	32	24	19
07:00	23	38	24	19
07:15	28	51	32	17
07:30	23	52	22	17
07:45	24	28	22	18
08:00	25	29	22	17

Bedroom 1, standardised internal noise levels

Time	$L_{Aeq\ 5\ mins}$	$L_{Amax,\ 5\ mins}$	$L_{A10,\ 5\ mins}$	$L_{A90,\ 5\ mins}$
08:15	30	59	20	13
08:30	17	37	18	13
08:45	16	43	16	13
09:00	16	38	16	13
09:15	20	45	19	13
09:30	16	33	17	12
09:45	14	30	15	12
10:00	14	30	15	12
10:15	18	40	15	12
10:30	14	29	15	12
10:45	16	30	18	12
11:00	16	32	17	12
11:15	16	31	17	13
11:30	15	30	16	12
11:45	18	39	18	13
12:00	18	38	19	14
12:15	15	28	16	13
12:30	17	38	16	13
12:45	16	32	18	13
13:00	18	44	18	13
13:15	15	33	15	12
13:30	16	32	17	13
13:45	17	38	18	13
14:00	16	31	17	13

Time	$L_{Aeq\ 5\ mins}$	$L_{Amax,\ 5\ mins}$	$L_{A10,\ 5\ mins}$	$L_{A90,\ 5\ mins}$
14:15	15	33	15	13
14:30	23	45	23	13
14:45	16	34	17	13
15:00	19	44	19	13
15:15	18	39	18	13
15.30	17	41	16	12
15:45	19	41	19	13
16:00	15	34	15	12
16:15	15	32	16	13
16:30	17	41	18	13
16:45	16	36	16	12
17:00	18	41	17	12
17:15	18	41	18	13
17:30	15	33	16	12
17:45	15	30	16	12
18:00	20	46	18	12
18:15	15	27	16	12
18:30	16	34	15	12
18:45	16	32	17	12
19:00	16	40	14	12
19:15	16	38	15	12
19:30	13	25	13	12
19:45	13	26	14	12
20:00	13	26	13	12

Time	$L_{Aeq\ 5\ mins}$	$L_{Amax,\ 5\ mins}$	$L_{A10,\ 5\ mins}$	$L_{A90,\ 5\ mins}$
20:15	13	25	13	12
20:30	15	31	15	12
20:45	13	27	13	12
21:00	17	41	14	12
21:15	14	36	14	12
21:30	15	40	13	12
21:45	13	26	13	11
22:00	13	29	13	11
22:15	15	33	15	11
22:30	13	29	13	11
22:45	15	37	14	11
23:00	13	35	13	11
23:15	12	28	12	11
23:30	12	22	12	11
23:45	13	28	13	11
00:00	12	27	12	11
00:15	12	26	12	11
00:30	12	16	12	11
00:45	13	33	12	11
01:00	12	23	12	11
01:15	12	23	12	11
01:30	12	27	12	11
01:45	12	27	11	11
02:00	12	21	12	11

Time	$L_{Aeq\ 5\ mins}$	$L_{Amax,\ 5\ mins}$	$L_{A10,\ 5\ mins}$	$L_{A90,\ 5\ mins}$
02:15	12	25	11	11
02:30	12	18	12	11
02:45	12	19	12	11
03:00	14	32	13	11
03:15	12	25	12	11
03:30	13	29	13	11
03:45	12	22	13	11
04:00	15	38	13	11
04:15	15	38	15	11
04:30	16	39	14	11
04:45	14	29	15	12
05:00	18	33	20	13
05:15	17	30	19	13
05:30	18	35	19	12
05:45	15	30	16	13
06:00	15	31	16	13
06:15	16	29	17	13
06:30	16	28	17	14
06:45	28	38	28	15
07:00	21	37	22	19
07:15	27	45	29	15
07:30	18	39	17	13
07:45	33	59	25	13
08:00	23	40	25	14