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Noise Impact Assessment Report

Upton House, Baldock Street, Royston Residential Conversion

Reference: Q04577-ENV-JRH-200122-R0

20 January 2022



The illustration features the ATSPACE logo in the center, surrounded by various icons representing construction, environmental science, and engineering. On the left, there are icons of houses, a lightbulb, and a document. In the center, there are four stylized figures wearing hard hats and safety vests, holding tools and documents. On the right, there are icons of a crane, a solar panel, a wind turbine, and a fan. The background is dark blue with white clouds.

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1. INTRODUCTION

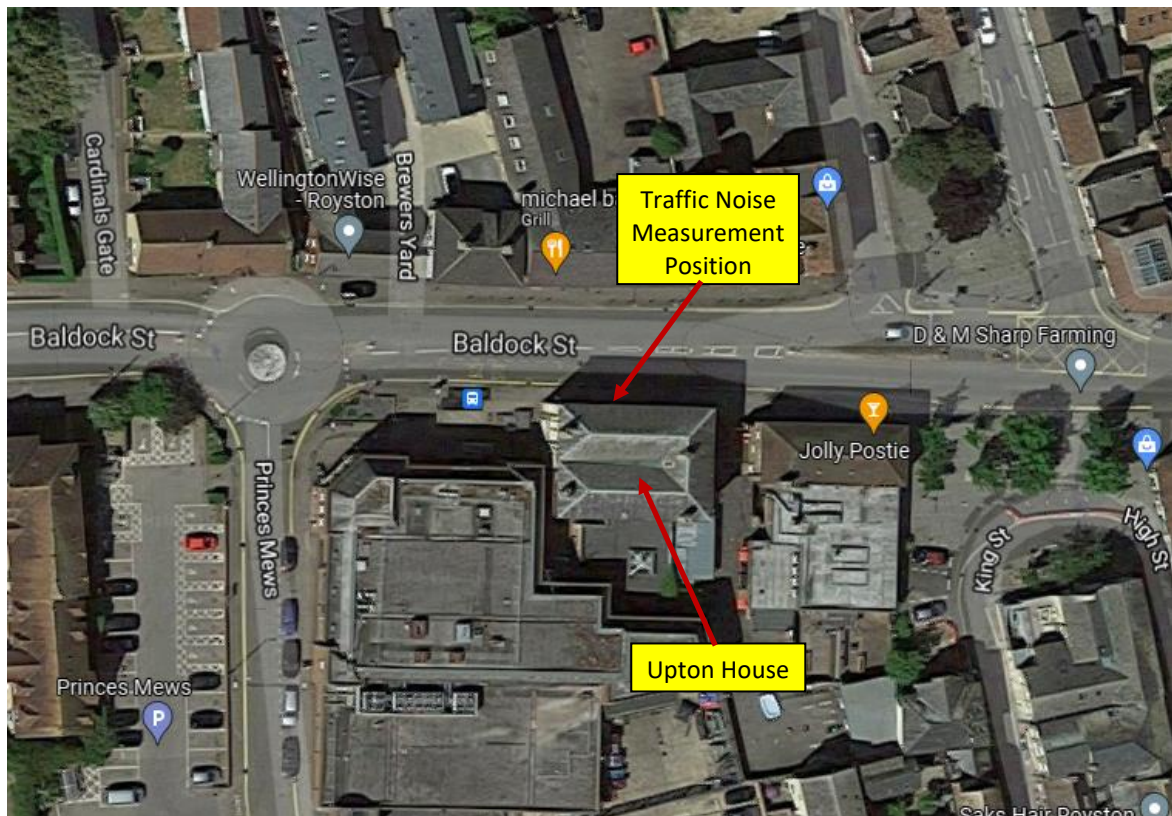
ATSPACE Ltd have been instructed to undertake an assessment of environmental noise impact at Upton House, Baldock Street, Royston, Herts, where it is proposed to convert part of the existing commercial use into 4 flats. Upton House is a Grade 2 Listed Building which fronts on to Baldock Street, a main traffic route through the centre of Royston. It is understood that the major concern for the proposed development is for Unit 3 which faces directly on to Baldock Street thus a noise survey has been carried out to assess potential traffic noise impact.

In accordance with national planning guidance, appropriate sound insulation measures have been recommended in order to comply with the internal noise guidelines of BS8233:2014 'Guidance on sound insulation and noise reduction for buildings'.

2. SITE DESCRIPTION

The site location is shown in Figure 1.

Figure 1: Noise measurement position



3. ASSESSMENT METHODOLOGY

BS8233:2014 provides guidance for the control of noise in and around buildings. The guidelines provided within the document are applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building. The guidance includes appropriate internal and external noise level criteria, which are applicable to dwellings exposed to steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the following criteria set out in Table 1.

Table 1: Internal Noise Guidelines of BS8233:2014

Activity	Location	Period	
		0700 – 2300 hrs i.e. Daytime	2300 – 0700 hrs i.e. Night- time
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Room	40 dB $L_{Aeq,16hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Although not specified in BS8233, a guideline for L_{Amax} events at night is given in the WHO Noise Guidelines. This recommends that in order to minimise sleep disturbance, L_{Amax} should not exceed 45dB on more than 10-15 occasions in bedrooms during the night time period 23:00 – 07:00.

A measurement survey was carried out at the site in order to establish the required noise data at the front of the building, in terms of $L_{Aeq,16hr}$, $L_{Aeq,8hr}$ and L_{Amax} . The day and night noise levels were then used to assess the glazing and ventilation measures needed to comply with the relevant criteria.

4. NOISE MEASUREMENTS

It was not possible to carry out an external noise measurement at the front of the building outside the proposed living area of Unit 3 as the ground floor windows faced directly on to the Baldock Street pavement. However, as the room was not in use and could be left locked and unoccupied, an internal noise measurement was taken. The microphone was positioned at 1.2m above ground level at the centre of the room as shown in Figure 2. Traffic on Baldock street can be seen in the background.

Figure 2: Internal noise measurement position



levels were recorded in 5-minute samples from 10:16 on 10th December 2021 for a 24-hour period, to determine the equivalent continuous sound level, L_{Aeq} , the L_{Amax} values and the percentile L_{A90} values over the day and night time periods.

Measurements were made with calibrated, precision grade sound level meters in accordance with BS EN 60651 and BS 7445:2003. Details of the equipment used are provided in Appendix 2 – List of Measurement Equipment. The equipment was

calibration-checked before and after the survey; no significant drift was observed. The results of the survey are shown in Appendix 3 and summarised below, to the nearest 1dB:

Daytime $L_{Aeq,16hr}$ 43dB
Night time $L_{Aeq,8hr}$ 37dB
Night time L_{Amax} 59dB

The ambient noise levels were also recorded in octave band frequency levels, as shown in Table 2.

Table 2: Octave Band Frequency Levels at measurement position

(Averaged over a 6-hour period at the start of the measurement)

Frequency (Hz)	125	250	500	1000	2000
Measured L_{eq} (dB)	47.2	40.8	37.5	36.9	34.0

5. SOUND INSULATION ASSESSMENT

The BS8233:2014 internal noise guideline for living rooms is $L_{Aeq,16hr}$ 35dB. The measured level of 43dB clearly exceeds the guidance. The windows are single glazed and due to the Listed status of the building, they cannot be changed. Secondary glazing would therefore be needed to reduce the noise from external traffic. This would need specialist advice on the type of frame that would be acceptable for a Listed Building, however, the type of glass required can be assessed based on sound insulation data published by Selectaglaze Secondary Glazing.

The measured internal noise spectrum shown in table 2, was used to estimate the external noise level based on the window area comprising 25% of the façade area and assuming that the single glazing was 4mm glass. This is shown in Appendix 4 as a calculation according to BS8233:2014 Annex G2, giving a façade attenuation of 31dB. This implies an estimated external façade noise level of $L_{Aeq,16hr}$ 73dB. Thus, based on a sound reduction of R_w 29dB for 4mm glass, the facade attenuation of the room is 31dB.

Selectaglaze data shows that for vertical sliding secondary glazing with at least 150mm between the panes, the sound reduction would be R_w 45dB using secondary glazing of 4mm toughened glass. This in turn would give a façade attenuation of 47dB. Assuming that the secondary frame included a 4000mm² trickle vent, the façade attenuation would be reduced to 44dB and the external traffic noise level of 73dB would be reduced to 31dB, thus below the required guideline of 35dB.

6. SUMMARY

A noise survey carried out at Upton House, indicated that the noise climate in the proposed Unit 3 was due to traffic on Baldock Street. As there was no secure location to leave unattended external measurement equipment, noise levels were recorded internally, showing that existing noise levels exceed the recommended guidelines of BS8233:2014.

Based on the results of the survey and the façade/window construction, the external traffic noise level was estimated and used to assess the mitigation needed to meet the BS8233:2014 guidelines for internal noise.

Due to the Listed Building status, the existing windows cannot be changed, thus glass for secondary glazing was recommended to meet the noise guidelines but the framing and ventilation provision would need specialist advice from a company such as Selectaglaze.

APPENDIX 1 – GLOSSARY OF TERMS

Decibel (dB)

The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithm's are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to mimic the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies. An 'A' weighted value would be written as dB(A).

$L_{Aeq,T}$

The A-Weighted equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter.

$L_{A90,T}$

The A-Weighted noise level exceeded for 90% of the specified measurement period (T). This is generally taken to indicate the prevailing background noise level.

L_{Amax}

The highest A-Weighted noise level recorded during a noise event.

APPENDIX 2 – LIST OF MEASUREMENT EQUIPMENT

Measurements

SVAN 955 Sound Level Meter S/N 27330

Additional Equipment

Rion NC-74 Calibrator S/N 34167512

The above equipment fulfils IEC 61672 Class 1 and is traceable to calibration under BS7580: Part 1:1997.

The equipment was calibration-checked before and after measurement – no adverse deviation was observed.

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APPENDIX 3 - RESULTS OF NOISE MEASUREMENTS

Date & time	LAFmax [dB]	LAeq [dB]	LAeq [dB]
09/12/2021 10:16	69.3	44.0	33.3
09/12/2021 10:21	54.7	42.6	32.0
09/12/2021 10:26	51.7	42.2	32.0
09/12/2021 10:31	63.4	44.8	35.5
09/12/2021 10:36	57.7	42.8	30.2
09/12/2021 10:41	49.4	40.9	32.6
09/12/2021 10:46	51.7	41.4	30.8
09/12/2021 10:51	56.1	41.8	31.2
09/12/2021 10:56	53.8	42.5	32.3
09/12/2021 11:01	59.0	42.6	32.3
09/12/2021 11:06	70.3	49.5	30.1
09/12/2021 11:11	62.1	41.9	33.1
09/12/2021 11:16	50.3	39.4	30.6
09/12/2021 11:21	56.3	41.7	30.0
09/12/2021 11:26	55.8	40.4	31.4
09/12/2021 11:31	51.4	40.1	31.6
09/12/2021 11:36	53.7	40.2	30.8
09/12/2021 11:41	56.3	43.2	32.2
09/12/2021 11:46	61.8	44.1	31.7
09/12/2021 11:51	58.6	42.1	33.4
09/12/2021 11:56	54.1	40.6	28.7
09/12/2021 12:01	50.0	40.9	32.3
09/12/2021 12:06	55.5	41.0	31.8
09/12/2021 12:11	55.4	44.4	38.0
09/12/2021 12:16	62.2	44.3	30.3
09/12/2021 12:21	50.8	41.2	33.6
09/12/2021 12:26	53.0	41.6	34.3
09/12/2021 12:31	60.6	44.3	33.7
09/12/2021 12:36	54.8	41.7	34.3
09/12/2021 12:41	54.5	41.2	33.0
09/12/2021 12:46	56.2	42.4	33.8
09/12/2021 12:51	57.5	41.5	31.2
09/12/2021 12:56	49.1	40.1	31.3
09/12/2021 13:01	53.0	42.1	30.9
09/12/2021 13:06	58.2	42.1	32.0
09/12/2021 13:11	49.7	41.0	33.2
09/12/2021 13:16	60.7	45.2	32.6
09/12/2021 13:21	57.2	40.9	31.3
09/12/2021 13:26	59.3	42.8	31.1
09/12/2021 13:31	49.7	38.6	27.0
09/12/2021 13:36	52.2	40.8	31.1
09/12/2021 13:41	49.5	40.0	30.0
09/12/2021 13:46	48.1	40.4	33.0
09/12/2021 13:51	53.0	39.6	31.0
09/12/2021 13:56	53.6	41.9	32.4
09/12/2021 14:01	49.5	40.6	30.7
09/12/2021 14:06	50.8	40.3	30.1
09/12/2021 14:11	51.3	40.5	30.5

Date & time	LAFmax [dB]	LAeq [dB]	LAeq [dB]
09/12/2021 14:16	53.9	40.1	32.1
09/12/2021 14:21	49.7	40.0	31.9
09/12/2021 14:26	49.6	40.7	30.4
09/12/2021 14:31	53.4	40.8	33.1
09/12/2021 14:36	55.7	42.5	36.3
09/12/2021 14:41	49.7	40.3	31.8
09/12/2021 14:46	56.2	42.5	34.5
09/12/2021 14:51	54.9	41.3	33.1
09/12/2021 14:56	50.4	41.1	32.0
09/12/2021 15:01	67.5	46.3	31.8
09/12/2021 15:06	52.8	40.9	31.4
09/12/2021 15:11	53.1	41.3	32.9
09/12/2021 15:16	54.6	41.4	31.2
09/12/2021 15:21	55.7	41.7	31.3
09/12/2021 15:26	50.6	41.5	32.0
09/12/2021 15:31	59.6	45.2	33.9
09/12/2021 15:36	50.1	41.0	34.5
09/12/2021 15:41	50.7	41.2	32.8
09/12/2021 15:46	50.1	41.4	32.6
09/12/2021 15:51	59.8	41.1	31.9
09/12/2021 15:56	50.5	41.0	33.3
09/12/2021 16:01	65.6	43.0	31.8
09/12/2021 16:06	53.1	41.4	32.3
09/12/2021 16:11	50.1	40.9	33.1
09/12/2021 16:16	60.4	41.4	31.7
09/12/2021 16:21	61.6	43.6	33.3
09/12/2021 16:26	51.2	41.9	32.5
09/12/2021 16:31	63.9	47.8	33.0
09/12/2021 16:36	53.0	41.5	32.7
09/12/2021 16:41	56.3	43.5	33.9
09/12/2021 16:46	54.7	41.3	31.8
09/12/2021 16:51	54.2	41.8	33.4
09/12/2021 16:56	58.8	44.0	34.1
09/12/2021 17:01	65.6	43.5	34.8
09/12/2021 17:06	57.6	43.9	34.3
09/12/2021 17:11	57.3	41.8	32.7
09/12/2021 17:16	52.3	41.6	32.4
09/12/2021 17:21	50.5	40.9	31.9
09/12/2021 17:26	61.8	44.5	33.0
09/12/2021 17:31	61.3	43.3	32.9
09/12/2021 17:36	53.3	42.5	32.8
09/12/2021 17:41	50.9	40.7	32.0
09/12/2021 17:46	50.2	41.0	33.5
09/12/2021 17:51	50.4	40.8	31.3
09/12/2021 17:56	57.4	41.8	32.2
09/12/2021 18:01	55.8	43.1	36.3
09/12/2021 18:06	51.3	42.2	32.7
09/12/2021 18:11	48.8	39.9	30.5

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Date & time	LAFmax [dB]	LAeq [dB]	LAeq [dB]
09/12/2021 18:16	54.9	42.4	31.7
09/12/2021 18:21	52.9	42.7	33.5
09/12/2021 18:26	56.4	42.4	31.7
09/12/2021 18:31	51.3	41.7	32.3
09/12/2021 18:36	50.7	41.5	30.8
09/12/2021 18:41	49.8	39.9	28.5
09/12/2021 18:46	51.4	41.3	32.8
09/12/2021 18:51	50.0	41.3	29.3
09/12/2021 18:56	51.6	39.1	31.5
09/12/2021 19:01	57.2	43.1	33.8
09/12/2021 19:06	50.5	40.1	28.0
09/12/2021 19:11	52.0	42.4	28.9
09/12/2021 19:16	53.3	41.9	31.0
09/12/2021 19:21	49.8	40.9	32.0
09/12/2021 19:26	50.7	41.7	32.4
09/12/2021 19:31	52.3	41.6	26.7
09/12/2021 19:36	65.2	50.4	28.9
09/12/2021 19:41	52.8	41.5	29.1
09/12/2021 19:46	52.1	41.1	28.8
09/12/2021 19:51	51.6	41.4	31.0
09/12/2021 19:56	54.4	40.1	30.4
09/12/2021 20:01	56.3	41.1	32.4
09/12/2021 20:06	56.2	42.6	30.0
09/12/2021 20:11	58.6	41.9	28.1
09/12/2021 20:16	63.8	43.2	28.5
09/12/2021 20:21	51.3	40.1	29.0
09/12/2021 20:26	52.9	41.3	27.7
09/12/2021 20:31	58.1	41.8	28.3
09/12/2021 20:36	88.1	58.6	30.7
09/12/2021 20:41	50.5	38.8	30.2
09/12/2021 20:46	52.7	39.1	27.0
09/12/2021 20:51	50.1	38.3	25.9
09/12/2021 20:56	51.2	40.2	29.1
09/12/2021 21:01	55.2	39.2	27.8
09/12/2021 21:06	53.5	39.9	27.6
09/12/2021 21:11	50.8	39.6	27.9
09/12/2021 21:16	51.8	37.9	25.9
09/12/2021 21:21	53.5	40.4	27.2
09/12/2021 21:26	55.2	41.0	25.3
09/12/2021 21:31	53.8	42.1	31.1
09/12/2021 21:36	54.4	42.5	25.9
09/12/2021 21:41	53.4	41.2	24.9
09/12/2021 21:46	55.2	42.5	26.9
09/12/2021 21:51	55.1	40.0	29.6
09/12/2021 21:56	51.7	39.8	27.0
09/12/2021 22:01	53.1	39.1	21.9
09/12/2021 22:06	52.1	39.1	24.9
09/12/2021 22:11	66.8	46.3	27.0
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09/12/2021 22:21	48.4	33.8	22.3
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09/12/2021 22:31	49.8	38.4	23.5
09/12/2021 22:36	55.3	40.3	22.7
09/12/2021 22:41	52.4	39.3	24.0
09/12/2021 22:46	54.0	39.0	25.7
09/12/2021 22:51	53.2	38.5	25.6
09/12/2021 22:56	54.9	42.7	29.1
09/12/2021 23:01	53.2	40.8	27.9
09/12/2021 23:06	55.3	42.7	26.9
09/12/2021 23:11	54.9	42.7	29.1
09/12/2021 23:16	53.5	38.6	20.7
09/12/2021 23:21	54.4	40.8	23.6
09/12/2021 23:26	57.1	39.2	21.7
09/12/2021 23:31	51.5	36.8	20.4
09/12/2021 23:36	51.3	36.6	19.4
09/12/2021 23:41	51.7	37.2	19.5
09/12/2021 23:46	55.8	41.1	19.5
09/12/2021 23:51	55.0	35.9	19.8
09/12/2021 23:56	51.4	34.7	19.3
10/12/2021 00:01	53.3	36.9	19.2
10/12/2021 00:06	52.3	37.4	19.6
10/12/2021 00:11	51.4	35.2	19.6
10/12/2021 00:16	56.2	41.2	19.6
10/12/2021 00:21	49.7	34.0	20.2
10/12/2021 00:26	54.2	34.8	19.1
10/12/2021 00:31	53.1	37.1	19.2
10/12/2021 00:36	59.4	40.1	19.4
10/12/2021 00:41	54.2	37.1	19.2
10/12/2021 00:46	44.4	28.5	19.2
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10/12/2021 01:11	52.1	30.9	19.1
10/12/2021 01:16	50.1	32.3	19.2
10/12/2021 01:21	40.9	26.4	19.1
10/12/2021 01:26	54.2	36.3	19.2
10/12/2021 01:31	54.2	32.3	19.1
10/12/2021 01:36	39.4	25.0	19.1
10/12/2021 01:41	54.1	32.5	19.1
10/12/2021 01:46	51.6	34.5	19.1
10/12/2021 01:51	52.4	35.0	19.1
10/12/2021 01:56	30.2	17.7	19.1
10/12/2021 02:01	49.0	27.7	19.1
10/12/2021 02:06	44.9	26.2	19.1
10/12/2021 02:11	30.5	16.8	19.1
10/12/2021 02:16	54.2	31.6	19.1
10/12/2021 02:21	52.3	32.1	19.1
10/12/2021 02:26	45.9	27.5	19.1
10/12/2021 02:31	33.7	17.8	19.1
10/12/2021 02:36	31.8	17.4	19.1
10/12/2021 02:41	34.8	20.1	19.1

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Date & time	LAFmax [dB]	LAeq [dB]	LAeq [dB]
10/12/2021 02:46	27.5	18.7	19.1
10/12/2021 02:51	24.9	17.4	19.1
10/12/2021 02:56	50.4	30.8	19.1
10/12/2021 03:01	54.3	35.1	19.2
10/12/2021 03:06	27.7	18.5	19.1
10/12/2021 03:11	53.0	32.6	19.2
10/12/2021 03:16	45.1	29.8	19.2
10/12/2021 03:21	40.3	24.2	19.1
10/12/2021 03:26	46.3	28.3	19.1
10/12/2021 03:31	46.5	29.1	19.1
10/12/2021 03:36	55.0	34.0	19.1
10/12/2021 03:41	51.3	34.1	19.1
10/12/2021 03:46	50.8	29.9	19.1
10/12/2021 03:51	29.3	16.6	19.1
10/12/2021 03:56	27.9	18.0	19.1
10/12/2021 04:01	52.5	31.9	19.1
10/12/2021 04:06	31.7	17.1	19.1
10/12/2021 04:11	47.1	27.3	19.1
10/12/2021 04:16	51.2	29.2	19.1
10/12/2021 04:21	32.2	18.4	19.1
10/12/2021 04:26	45.6	26.1	19.1
10/12/2021 04:31	47.5	30.3	19.1
10/12/2021 04:36	51.2	33.2	19.1
10/12/2021 04:41	49.3	34.0	19.3
10/12/2021 04:46	55.6	35.5	19.1
10/12/2021 04:51	52.4	32.3	19.1
10/12/2021 04:56	49.6	33.4	19.3
10/12/2021 05:01	45.0	30.4	19.2
10/12/2021 05:06	49.3	34.0	19.5
10/12/2021 05:11	44.8	27.8	19.2
10/12/2021 05:16	42.3	27.5	19.2
10/12/2021 05:21	56.1	36.7	19.4
10/12/2021 05:26	50.2	35.5	19.9
10/12/2021 05:31	54.0	36.5	20.8
10/12/2021 05:36	57.6	41.5	22.0
10/12/2021 05:41	51.7	36.9	20.7
10/12/2021 05:46	50.2	36.9	20.5
10/12/2021 05:51	50.4	38.1	22.1
10/12/2021 05:56	53.5	39.7	21.6
10/12/2021 06:01	52.4	37.4	19.9
10/12/2021 06:06	57.7	40.7	21.5
10/12/2021 06:11	51.7	37.0	21.8
10/12/2021 06:16	55.2	40.4	25.4
10/12/2021 06:21	52.5	39.0	28.6
10/12/2021 06:26	58.5	47.0	23.1

Date & time	LAFmax [dB]	LAeq [dB]	LAeq [dB]
10/12/2021 06:31	52.5	40.8	25.3
10/12/2021 06:36	53.1	40.7	26.2
10/12/2021 06:41	51.6	41.0	30.5
10/12/2021 06:46	58.3	42.8	29.4
10/12/2021 06:51	55.1	47.1	40.8
10/12/2021 06:56	49.6	42.6	40.1
10/12/2021 07:01	53.3	41.9	30.2
10/12/2021 07:06	52.5	41.4	32.2
10/12/2021 07:11	51.4	41.6	32.3
10/12/2021 07:16	51.4	40.8	29.8
10/12/2021 07:21	65.7	46.8	32.3
10/12/2021 07:26	56.5	42.6	30.2
10/12/2021 07:31	50.8	42.1	32.5
10/12/2021 07:36	63.7	48.9	38.2
10/12/2021 07:41	52.1	43.0	33.5
10/12/2021 07:46	54.7	42.6	32.4
10/12/2021 07:51	53.8	43.1	33.9
10/12/2021 07:56	56.6	43.7	36.3
10/12/2021 08:01	52.7	42.3	32.7
10/12/2021 08:06	52.7	43.0	31.9
10/12/2021 08:11	52.6	42.0	30.9
10/12/2021 08:16	60.9	43.1	33.3
10/12/2021 08:21	53.1	43.8	33.3
10/12/2021 08:26	55.7	43.5	32.2
10/12/2021 08:31	56.0	43.2	33.5
10/12/2021 08:36	54.6	44.8	35.6
10/12/2021 08:41	54.7	42.9	34.4
10/12/2021 08:46	52.4	43.2	34.3
10/12/2021 08:51	60.4	43.4	31.6
10/12/2021 08:56	59.7	42.2	33.0
10/12/2021 09:01	55.3	43.0	33.5
10/12/2021 09:06	51.7	39.7	31.5
10/12/2021 09:11	58.3	38.4	29.9
10/12/2021 09:16	54.8	38.6	30.2
10/12/2021 09:21	60.3	40.0	33.7
10/12/2021 09:26	59.2	43.6	32.3
10/12/2021 09:31	51.7	37.5	31.1
10/12/2021 09:36	54.4	42.8	34.3
10/12/2021 09:41	56.0	41.2	32.0
10/12/2021 09:46	53.7	43.3	34.2
10/12/2021 09:51	51.1	41.6	32.6
10/12/2021 09:56	62.5	40.9	30.1
10/12/2021 10:01	59.9	41.3	33.5
10/12/2021 10:06	59.9	43.5	32.4
10/12/2021 10:11	51.7	41.0	31.5

22/01/2022

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APPENDIX 4 – FAÇADE SOUND INSULATION CALCULATIONS

BS8233:2014 Annexe G2 - Rigorous Calculation of Façade Sound Insulation							
Upton House Unit 3 Living Room							
Facade area		24.0					
Window Area		6.0					
Ceiling/Roof		0.0					
Room Vol.		121.7					
Frequency (Hz)		125	250	500	1000	2000	L _{Aeq}
Measured Leq		66.5	63.6	63.8	69.8	68.3	72.9
Ventilator Dne	Trickle vent	25	25	26	32	35	
Window R	Single 4mm	17	20	26	32	33	
Wall R	Masonry Cavity	40	44	45	51	56	
Ceiling/Roof R		28	34	40	45	49	
Absorption		11	14	16	16	15	
Vent		0.001317	0.001317	0.001046	0.000263	0.000132	
		-28.8	-28.8	-29.8	-35.8	-38.8	
Windows		0.004986	0.002499	0.000628	0.000158	0.000125	
		-23.0	-26.0	-32.0	-38.0	-39.0	
Ext. Wall		0.000075	0.000030	0.000024	0.000006	0.000002	
		-41.3	-45.3	-46.3	-52.3	-57.3	
Ceiling/roof		0.000001	0.000000	0.000000	0.000000	0.000000	
		-61.8	-67.8	-73.8	-78.8	-82.8	
Composite R		-22.0	-24.1	-27.7	-33.7	-35.9	
Abs. Correction		3.4	2.3	1.8	1.8	2.0	
Leq (int)		47.9	41.8	37.9	37.9	34.5	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	
L _{Aeq} (internal)		31.8	33.2	34.7	37.9	35.7	42.1
Façade Atten.		30.8 dB					

22/01/2022