Noise Impact Assessment Report

Seaview, South Street, Lancing

28th May 2019

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Author	Date	Checked	Date	Description
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1.0 EXECUTIVE SUMMARY:

An environmental noise survey has been carried out at Seaview, South Street, Lancing, West Sussex, BN15 8AU. The site is in an area comprising of a mix of commercial and residential units along the A2025. Noise modelling indicates that noise levels inside the living areas and bedrooms comply with BS8233 and WHO guidance levels. They will be achieved by using double glazed windows and acoustic trickle ventilators.

The following internal noise levels are projected:

Day Time - 35dB $L_{Aeq(16hr)}$

Night-Time – 25dB $L_{Aeq(8hr)}$

2.0 INTRODUCTION

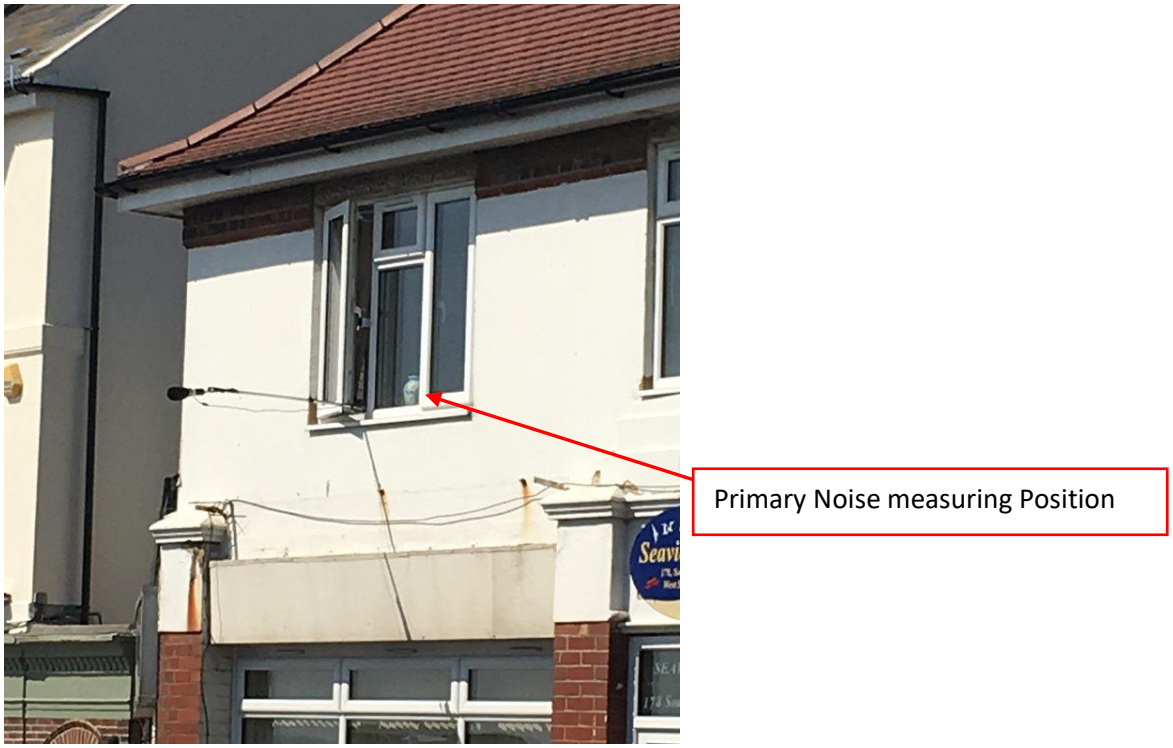
DAA Group has been appointed to carry out a' Noise Impact Report' at Seaview, South Street, Lancing, West Sussex, BN15 8AU. The purpose of the report is to address the concerns of Adur District Council "**The development hereby permitted shall not be commenced until an acoustic assessment has been carried out to ascertain the exact noise exposure of the property to traffic noise (and shall include any necessary measures to protect habitable rooms from excess noise)**" in line with Adur Local Plan 2016. We will also outline noise mitigation measures to demonstrate that the internal noise levels within the residential units will conform to the indoor ambient noise levels for dwellings identified by BS8233: 2014: 'Guidance on Sound Insulation and Noise Reduction for Buildings'.

A baseline acoustic survey was conducted by DAA to establish the current external ambient noise levels at the development.

3.0 EXTERNAL NOISE SURVEY METHODOLOGY.

Primary noise measurements were taken at approximately 1.0 meter outside the glazing of one of the proposed flats on the 1st floor.

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3.1 Unattended noise monitoring.

Noise measurements were logg8d over a 24hr period between 10:35am and 11:05am on Thursday 23rd May to Friday 24th May 2019

The results are summarized in Figure 2 and Table 4 in the appendix.

3.2 Attended noise monitoring.

Sample noise measurements were recorded at the other end of the property along South Street.

3.3 Weather.

A history of the weather conditions during the survey was obtained from a Davis Vantage weather station.

Table 1

Day	Date	Temp °C	Humidity %	Wind Speed (ms^{-1})	Precipitation (mm)
Thursday	23/052019	16max / 9min	60max/ 55min	Av: 5	0
Friday	24/05/2019	17max/ 9min	80max/ 65min	Av: 4	0

4.0 SITE PLAN.

Figure 1.



	Site
	Primary Noise Measuring Position
	Secondary Test Cross St

5.0 SURVEY EQUIPMENT

The noise data was obtained using the following instruments:

Instrument manufacturer: Cirrus Research plc

Model: CR831B Precision Computing sound level meter

Serial number: C19278FF

Microphone type: MK:224

Serial number: 20041086

Cirrus CK:508 Outdoor Kit.

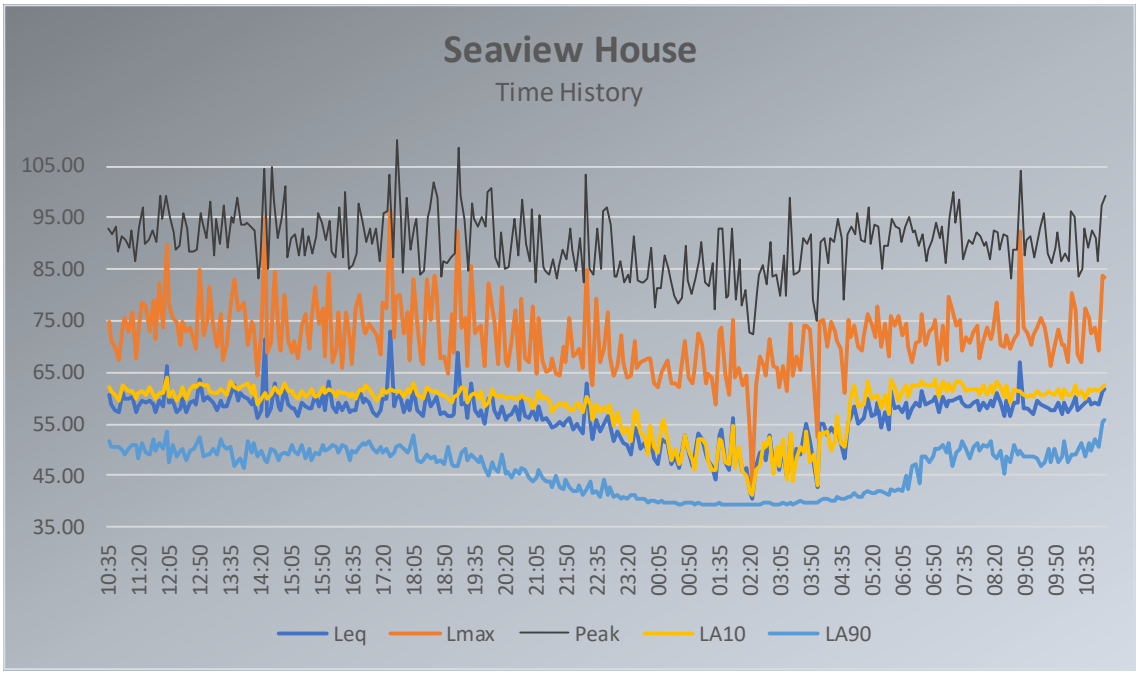
Type 1 Acoustic Calibrator.

CEL 490 Type 1. Precision computing sound and level meter was used for sample measurements. Serial No:056154.

Measurements were obtained using the 'F' time weighting and A-weighting frequency network. The equipment was calibrated before and after the survey with no deviation noted.

6.0 SURVEY RESULTS

Figure 2 Background Noise Climate:



Daily ambient $L_{Aeq,T}$ noise levels have been obtained using logarithmic energy based, averaging.

The mean maximum $L_{Amax,F}$ and background LA90, T daily noise levels have been obtained using arithmetic averaging.

Table 2. Average Daytime & Night- Time Noise Climate:

Period	Leq, (15min)
Daytime (07.00 – 19.00)	71
Night-Time (23.00 – 07.00)	52

7.0 NOISE CRITERIA.

7.1 Local Authority Requirements.

The noise assessment has been carried out to take account of Adur Local Plan 2016

7.2 BS 8233:2014:

Review of *BS8233:2014.*

British Standard Code of Practice BS8233:2014 'Sound insulation and noise reduction for buildings' provides recommended guideline value for internal noise levels within dwellings which are similar in scope to guideline values contained within the World Health Organisation Guidelines for Community Noise 1999 (WHO).

7.2.1 Indoor ambient noise levels for dwellings.

Activity	Location	07:00 to23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,\ 16hour}$	
Dining	Dining room/area	40 dB $L_{Aeq,\ 16hour}$	
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,\ 16hour}$	30 dB $L_{Aeq,\ 8hour}$

The WHO guideline noise criteria set an internal sleep disturbance noise limit of 45dB $L_{A(max,F)}$ which should not be exceeded on a regular basis.

8.0 DESIGN IMPLICATION & MITIGATION.

8.1 Main Source of Noise at The Site.

The predominant noise at this location is traffic noise. The site is situated on the A2025. It is about 20m from a mini roundabout adjoining the A259.

The site is located within an area comprising of a mix of commercial and residential units.

8.2 Additional Noise Sources to be considered.

Secondary noise sources consist of the Hotel/Public House (The New Sussex Hotel) and the restaurant Meze-Meze) either side of the site. (Separate brief).

8.3 Noise associated with the night- time economy.

The main noise associated with the night -time economy is traffic noise and pedestrians visiting the neighboring commercial properties.

The resultant noise forms part of the local noise ambiance and is included in the sample environmental noise survey.

8.4 Noise Mitigation Measures.

The acoustic modelling indicates that the internal noise levels will be within the guidelines of BS8233:2014.

This is based on double glazed windows with acoustic trickle ventilators as used in the specification below:

- a min U-value of 1.600W/m²K for windows
- To be low E double-glazed. Glazing to be min 4mm panes, have 16mm air gap between or 12mm Argon filled
- Windows/Roof-lights to provide min 8000sq mm controllable background ventilation via trickle vents within frame. Windows/Roof-lights to provide ventilation at least 1/20th of floor area when open.

Glazing Type	Sound Reduction (Rw)	Specification
Double	31	4/16/4

8.4.1 Noise Impact Review.

Noise levels inside the property has been calculated in accordance with BS8233:

Day Time – 35dB LAeq(16hr)

Night -Time – 25dB LAeq(8hr)

Reference: Noise Impact Review calculations - Appendix C.

9.0 CONCLUSIONS.

An environmental noise survey has been carried out at Seaview, South Street, Lancing, West Sussex, BN15 8AU.

Satisfactory noise levels inside the living areas and bedrooms complying with BS8233 and WHO guidance levels, will be achieved by using double glazed windows and acoustic trickle ventilators.

Appendix A. MEASUREMENT RESULTS.

Table 4.

Date	Time	Leq	Lmax	Peak	LA10	LA90	Date	Time	Leq	Lmax	Peak	LA10	LA90
23/05/2019	10:35	60.50	74.70	92.70	62.10	51.80	23/05/2019	22:55	55.00	68.00	93.60	58.60	42.60
23/05/2019	10:40	58.90	71.20	91.90	61.50	50.50	23/05/2019	23:00	51.50	64.50	83.60	54.60	40.70
23/05/2019	10:45	57.70	70.00	93.10	60.50	50.50	23/05/2019	23:05	53.60	66.30	83.40	57.30	41.30
23/05/2019	10:50	57.10	67.40	88.50	59.60	50.40	23/05/2019	23:10	52.20	72.30	86.50	54.30	40.30
23/05/2019	10:55	60.90	74.00	91.40	62.50	49.90	23/05/2019	23:15	51.20	66.80	82.60	53.10	40.80
23/05/2019	11:00	59.70	75.60	90.70	62.00	49.10	23/05/2019	23:20	51.00	64.10	83.80	54.10	40.50
23/05/2019	11:05	59.90	72.90	89.30	61.40	50.00	23/05/2019	23:25	49.20	64.50	82.40	51.60	41.30
23/05/2019	11:10	60.30	76.60	92.40	61.30	50.80	23/05/2019	23:30	54.40	70.90	91.50	57.80	41.30
23/05/2019	11:15	57.20	67.60	86.40	59.70	51.10	23/05/2019	23:35	53.40	65.70	82.90	57.20	40.60
23/05/2019	11:20	58.40	72.60	93.30	61.00	48.30	23/05/2019	23:40	50.30	67.10	82.60	53.10	40.30
23/05/2019	11:25	59.40	78.50	97.00	61.20	51.20	23/05/2019	23:45	51.40	67.40	82.60	52.90	40.30
23/05/2019	11:30	59.00	77.80	89.90	60.50	49.40	23/05/2019	23:50	49.40	67.60	83.20	49.10	39.90
23/05/2019	11:35	59.60	72.80	90.60	62.10	49.00	23/05/2019	23:55	52.30	67.70	89.30	54.80	40.10
23/05/2019	11:40	58.70	78.90	92.50	60.80	51.90	24/05/2019	00:00	48.40	62.80	77.70	50.50	40.20
23/05/2019	11:45	57.40	71.60	90.20	59.70	49.80	24/05/2019	00:05	47.30	62.00	81.40	49.40	39.70
23/05/2019	11:50	59.50	82.10	99.20	60.90	51.20	24/05/2019	00:10	52.10	65.20	81.30	54.90	40.10
23/05/2019	11:55	58.50	73.50	94.80	61.10	50.10	24/05/2019	00:15	51.60	65.70	87.80	55.70	39.80
23/05/2019	12:00	66.20	89.70	99.30	63.80	53.40	24/05/2019	00:20	51.40	67.30	85.20	52.10	39.70
23/05/2019	12:05	59.10	78.30	95.00	60.40	47.70	24/05/2019	00:25	47.30	62.70	83.30	48.00	39.60
23/05/2019	12:10	59.50	75.40	92.30	61.20	50.80	24/05/2019	00:30	48.60	62.80	79.90	50.30	39.60
23/05/2019	12:15	57.10	74.80	88.70	59.60	48.60	24/05/2019	00:35	46.60	62.20	78.30	47.20	39.50
23/05/2019	12:20	57.90	70.40	89.70	60.60	49.90	24/05/2019	00:40	48.70	65.50	79.60	48.00	39.40
23/05/2019	12:25	59.70	74.70	95.80	62.00	50.10	24/05/2019	00:45	52.90	71.00	89.70	52.90	39.60
23/05/2019	12:30	57.40	73.10	92.80	59.70	47.80	24/05/2019	00:50	49.60	64.10	82.80	49.80	39.60
23/05/2019	12:35	59.30	73.80	88.40	61.90	49.70	24/05/2019	00:55	47.00	63.00	80.10	48.10	39.60
23/05/2019	12:40	59.50	71.20	88.30	62.50	50.00	24/05/2019	01:00	48.60	65.60	83.00	46.10	39.20
23/05/2019	12:45	58.80	69.60	88.90	62.00	50.90	24/05/2019	01:05	53.20	72.70	86.80	51.90	39.70
23/05/2019	12:50	63.50	84.80	96.00	63.00	52.50	24/05/2019	01:10	52.20	70.20	90.20	52.10	39.40
23/05/2019	12:55	59.60	72.10	94.10	62.60	48.50	24/05/2019	01:15	49.10	62.90	82.50	50.90	39.30
23/05/2019	13:00	60.20	75.30	91.10	62.50	49.00	24/05/2019	01:20	47.80	64.80	81.80	47.90	39.30
23/05/2019	13:05	59.70	81.50	98.20	61.30	49.20	24/05/2019	01:25	46.90	64.00	86.20	46.10	39.20
23/05/2019	13:10	59.00	74.00	87.50	60.90	50.20	24/05/2019	01:30	44.10	58.70	77.20	46.00	39.20
23/05/2019	13:15	57.60	69.80	94.60	61.10	49.00	24/05/2019	01:35	52.70	72.80	92.90	52.00	39.90
23/05/2019	13:20	59.40	76.30	89.90	61.80	51.90	24/05/2019	01:40	53.90	73.70	92.80	51.50	39.30
23/05/2019	13:25	58.50	67.40	97.30	61.40	50.90	24/05/2019	01:45	47.60	64.90	79.50	47.70	39.40
23/05/2019	13:30	58.40	70.30	89.10	60.50	50.20	24/05/2019	01:50	45.90	60.70	79.70	47.20	39.30
23/05/2019	13:35	60.80	77.60	95.20	63.10	50.40	24/05/2019	01:55	56.20	75.10	93.00	54.70	39.40
23/05/2019	13:40	62.40	83.00	94.00	62.20	47.00	24/05/2019	02:00	47.10	63.80	79.20	46.60	39.30
23/05/2019	13:45	59.40	77.10	99.00	61.70	48.00	24/05/2019	02:05	49.70	65.80	86.80	50.40	39.50
23/05/2019	13:50	60.90	77.40	93.50	62.20	48.40	24/05/2019	02:10	45.70	62.40	78.00	45.70	39.40
23/05/2019	13:55	60.30	78.50	93.60	62.40	46.30	24/05/2019	02:15	46.40	64.40	80.90	45.00	39.30
23/05/2019	14:00	59.90	70.30	94.10	62.80	51.80	24/05/2019	02:20	41.50	52.20	72.80	41.70	39.30
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23/05/2019	14:25	71.50	94.80	104.50	61.00	48.00	24/05/2019	02:45	47.90	64.30	82.00	50.40	39.80
23/05/2019	14:30	56.50	68.90	85.00	59.70	47.50	24/05/2019	02:50	52.70	71.60	90.40	52.50	39.60
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23/05/2019	17:50	57.20	72.50	84.40	60.30	50.00	24/05/2019	06:10	59.20	74.50	93.10	62.60	44.80
23/05/2019	17:55	59.60	76.70	99.00	61.70	49.50	24/05/2019	06:15	56.20	69.90	95.30	60.40	42.40
23/05/2019	18:00	57.80	67.40	88.70	61.00	50.10	24/05/2019	06:20	58.00	67.00	92.00	62.30	47.00
23/05/2019	18:05	61.60	83.00	93.20	62.80	52.60	24/05/2019	06:25	59.10	70.80	92.60	62.30	47.30
23/05/2019	18:10	57.80	74.40	94.60	60.60	47.80	24/05/2019	06:30	58.20	71.10	89.60	62.50	43.60
23/05/2019	18:15	57.00	67.40	84.00	60.30	47.70	24/05/2019	06:35	61.30	76.30	91.90	63.10	48.60
23/05/2019	18:20	56.50	66.60	84.80	60.00	47.90	24/05/2019	06:40	58.90	70.30	86.60	62.30	48.60
23/05/2019	18:25	61.50	82.90	95.10	62.00	49.20	24/05/2019	06:45	59.10	72.80	88.60	62.30	47.60
23/05/2019	18:30	58.30	75.00	96.50	61.20	48.20	24/05/2019	06:50	59.50	73.60	90.70	62.40	48.80
23/05/2019	18:35	59.50	83.70	101.70	61.30	48.50	24/05/2019	06:55	60.20	75.20	94.10	63.50	50.10
23/05/2019	18:40	60.30	80.80	98.90	61.30	47.60	24/05/2019	07:00	57.20	66.70	91.10	60.30	50.10
23/05/2019	18:45	57.00	67.60	83.50	60.50	47.80	24/05/2019	07:05	60.20	73.90	93.40	63.10	51.10
23/05/2019	18:50	57.40	68.10	86.70	60.70	47.30	24/05/2019	07:10	58.40	67.50	86.30	61.40	49.40
23/05/2019	18:55	56.70	64.90	86.30	59.70	50.60	24/05/2019	07:15	59.50	79.50	95.30	62.80	51.20
23/05/2019	19:00	56.60	76.10	87.20	59.30	47.10	24/05/2019	07:20	59.60	77.10	99.80	61.50	46.70
23/05/2019	19:05	57.00	68.90	88.00	60.30	46.90	24/05/2019	07:25	59.80	74.00	94.00	63.10	49.60
23/05/2019	19:10	68.80	92.20	108.60	60.70	46.80	24/05/2019	07:30	60.20	75.30	98.30	63.20	50.00
23/05/2019	19:15	58.80	73.70	99.40	62.20	49.50	24/05/2019	07:35	59.30	69.20	86.90	62.90	51.70
23/05/2019	19:20	59.30	75.70	94.90	61.80	50.20	24/05/2019	07:40	58.30	71.70	89.50	61.20	50.00

23/05/2019	19:25	56.00	66.30	84.50	59.10	48.10	24/05/2019	07:45	58.40	70.70	90.70	61.80	48.20
23/05/2019	19:30	62.90	85.70	97.90	60.60	49.00	24/05/2019	07:50	59.30	73.10	90.00	61.70	50.70
23/05/2019	19:35	57.70	72.40	94.60	61.00	48.20	24/05/2019	07:55	59.50	73.90	92.10	61.90	51.20
23/05/2019	19:40	56.40	73.80	93.30	59.80	47.40	24/05/2019	08:00	57.60	67.60	91.50	60.60	49.70
23/05/2019	19:45	57.80	73.90	95.20	61.20	48.70	24/05/2019	08:05	59.20	71.00	89.70	62.30	50.80
23/05/2019	19:50	55.10	66.40	93.10	58.40	46.30	24/05/2019	08:10	58.00	73.70	90.10	60.80	50.60
23/05/2019	19:55	59.80	82.30	100.00	59.10	45.10	24/05/2019	08:15	59.40	71.30	86.80	62.40	51.60
23/05/2019	20:00	60.10	77.30	100.80	61.70	47.50	24/05/2019	08:20	58.50	72.90	92.60	60.90	49.00
23/05/2019	20:05	57.70	75.10	87.20	60.50	46.30	24/05/2019	08:25	61.00	78.60	92.00	63.30	48.40
23/05/2019	20:10	56.20	66.50	85.40	60.40	45.70	24/05/2019	08:30	59.00	70.40	88.90	62.20	49.80
23/05/2019	20:15	58.20	81.40	92.30	60.50	49.00	24/05/2019	08:35	56.70	70.00	91.60	60.20	45.30
23/05/2019	20:20	55.80	66.80	85.10	60.00	45.30	24/05/2019	08:40	59.50	72.20	91.50	62.40	48.70
23/05/2019	20:25	56.60	66.30	85.30	60.40	45.60	24/05/2019	08:45	56.40	69.50	83.10	59.30	47.60
23/05/2019	20:30	56.80	71.20	91.90	60.40	44.70	24/05/2019	08:50	59.20	71.50	88.60	61.80	50.80
23/05/2019	20:35	58.40	77.00	94.70	59.70	46.10	24/05/2019	08:55	59.20	72.70	88.60	61.20	49.20
23/05/2019	20:40	55.90	65.30	87.60	59.90	45.40	24/05/2019	09:00	67.00	92.20	103.90	61.30	49.80
23/05/2019	20:45	60.00	79.10	98.50	60.80	46.60	24/05/2019	09:05	57.90	73.80	87.50	60.80	48.50
23/05/2019	20:50	56.40	67.60	89.90	59.80	46.00	24/05/2019	09:10	57.90	72.50	90.50	60.20	48.80
23/05/2019	20:55	56.30	66.80	86.40	60.00	44.40	24/05/2019	09:15	57.30	70.40	91.40	60.60	48.80
23/05/2019	21:00	57.80	77.90	96.80	58.10	43.80	24/05/2019	09:20	56.90	72.10	87.20	60.20	48.50
23/05/2019	21:05	55.70	64.60	82.40	60.00	44.70	24/05/2019	09:25	59.40	73.60	90.90	61.30	48.30
23/05/2019	21:10	58.50	75.40	95.50	61.50	46.10	24/05/2019	09:30	58.60	75.40	92.80	60.60	46.90
23/05/2019	21:15	55.90	67.20	85.50	59.70	44.60	24/05/2019	09:35	58.50	73.80	95.90	60.50	47.40
23/05/2019	21:20	56.10	65.10	84.70	60.20	44.00	24/05/2019	09:40	58.00	69.30	87.90	61.20	50.20
23/05/2019	21:25	54.90	65.40	84.00	59.10	43.90	24/05/2019	09:45	57.60	66.10	86.20	60.90	47.60
23/05/2019	21:30	54.20	67.80	87.10	57.20	42.80	24/05/2019	09:50	57.60	69.80	89.30	60.70	50.00
23/05/2019	21:35	54.50	64.90	83.30	58.40	44.80	24/05/2019	09:55	59.20	73.30	92.30	61.80	47.70
23/05/2019	21:40	55.30	64.40	85.50	59.20	42.90	24/05/2019	10:00	56.80	70.40	86.50	59.70	48.50
23/05/2019	21:45	54.70	69.80	88.80	58.40	42.20	24/05/2019	10:05	59.20	70.20	88.20	61.90	51.80
23/05/2019	21:50	55.30	67.10	86.80	59.30	44.20	24/05/2019	10:10	57.40	66.80	86.50	60.60	47.60
23/05/2019	21:55	56.10	75.70	92.90	57.50	42.60	24/05/2019	10:15	58.30	80.50	96.10	60.80	49.10
23/05/2019	22:00	53.90	67.90	88.60	57.70	42.00	24/05/2019	10:20	60.30	77.10	95.10	62.60	49.20
23/05/2019	22:05	55.00	68.80	84.80	59.30	42.10	24/05/2019	10:25	57.70	68.60	83.60	60.70	49.90
23/05/2019	22:10	54.30	69.40	91.00	58.60	43.10	24/05/2019	10:30	58.50	66.90	85.10	61.40	51.40
23/05/2019	22:15	53.20	65.90	82.40	57.30	41.40	24/05/2019	10:35	59.20	77.50	92.90	59.90	48.80
23/05/2019	22:20	62.80	84.70	103.40	60.40	42.50	24/05/2019	10:40	59.90	75.40	89.00	61.70	51.30
23/05/2019	22:25	54.90	65.10	85.20	58.70	43.80	24/05/2019	10:45	58.60	72.40	92.40	61.50	49.90
23/05/2019	22:30	51.90	62.50	84.10	55.90	41.60	24/05/2019	10:50	59.10	73.70	91.10	61.70	52.00
23/05/2019	22:35	55.70	79.40	92.90	58.80	41.80	24/05/2019	10:55	58.80	69.10	86.40	61.50	50.70
23/05/2019	22:40	53.60	66.80	85.20	57.40	41.00	24/05/2019	11:00	61.20	83.70	97.20	62.20	55.40
23/05/2019	22:45	55.00	69.40	96.20	58.50	44.10	24/05/2019	11:05	61.80	83.40	99.20	62.60	55.60
23/05/2019	22:50	56.40	76.70	97.00	57.40	41.40							

Appendix B ACOUSTIC TERMINOLOGY

B.1 WEIGHTED DECIBEL, dB(A)

The unit generally used for measuring environmental, traffic or industrial noise is the A-weighted sound pressure level in decibels, denoted dB(A). The weighting is based on the frequency response of the human ear and has been found to correlate well with human subjective reactions to various sounds. An increase or decrease of approximately 10 dB corresponds to a subjective doubling or halving of the loudness of a noise, and a change of 2 to 3 dB is subjectively barely perceptible.

B.2 EQUIVALENT CONTINUOUS SOUND LEVEL, LAeq

Another index for assessment for overall noise exposure is the equivalent continuous sound level, L_{Aeq}. This is a notional steady level which would, over a given period, deliver the same sound energy as the actual time-varying sound over the same period.

B.3 MAXIMUM NOISE LEVEL, LAmax

The maximum noise level identified during a measurement period. Experimental data has shown that the human ear does not generally register the full loudness of transient sound events of less than 125 ms in duration.

B.4 NOISE RATING, NR

Noise ratings are used as a single figure criterion for specifying services noise in buildings. Each noise rating value has an associated spectrum of defined values in each third or octave frequency band. To determine the noise rating of a room the measured spectrum is compared to a set of noise rating curves. The highest NR curve that crosses any single frequency band of the measurement determines the noise rating for the room.

The single figure noise rating is read at the 1 kHz band.

B.5 SOUND LEVEL DIFFERENCE (D)

The sound insulation required between two spaces may be determined by the sound level difference needed between them. A single figure descriptor which characterises a range of frequencies, the weighted sound level difference, D, is sometimes used (BS EN ISO 717-1). This parameter is not adjusted to reference conditions.

The standardized level difference, Dn, T is a measure of the difference in sound level between two rooms, in each frequency band, where the reverberation time in the receiving room has been normalised to 0.5 s. This parameter measures all

transmission paths, including flanking paths.

The weighted standardized level difference, DnTw, is a measure of the difference in sound level between two rooms, which characterises a range of frequencies and is normalised to a reference reverberation time

B.6 SOUND REDUCTION INDEX (R)

The sound reduction index (or transmission loss) of a building element is a measure of the loss of sound through the material, i.e. its attenuation properties. It is a property of the component, unlike the sound level difference which is affected by the common area between the rooms and the acoustic of the receiving room. The weighted sound reduction index, Rw, is a single figure description of sound reduction index characterising a range of frequencies, which is defined in BS EN ISO 717-1: 1997. The Rw is calculated from measurements in an acoustic laboratory

B.7 STATISTICAL NOISE LEVELS (L_{A90}, (T) L_{A1}, (T) L_{A10}, (T) etc.)

For levels of noise that vary widely with time, for example road traffic noise, it is necessary to employ an index which allows for this variation. The L_{A10} is the level exceeded for ten per cent of the time under consideration, has historically been adopted in the UK for the assessment of road traffic noise. The LA90 is the level exceeded for ninety per cent of the time, has been adopted to represent the background noise level. The L_{A1} the level exceeded for one per cent of the time, is representative of the maximum levels recorded during the sample period. A weighted statistical noise levels are denoted LA10, dB LA90, dB. etc. The reference time (T) is normally included, e.g. LA10, (5min), & LA90, (8hr).

B.8 TYPICAL NOISE LEVELS

Typical noise levels are given in the following table.

Noise Level dB(A)	Example
130	Threshold of pain
120	Jet aircraft take-offs at 100 m
110	Chain saw at 1 m
100	Inside disco
90	Heavy lorries at 5 m
80	Kerbside of busy street
70	Loud radio (in typical domestic room)
60	Office or restaurant
50	Domestic fan heaters at 1m
40	Living room
30	Ventilation Noise in Theatre
20	Remote countryside on still night
10	Sound insulated test chamber
0	Threshold of hearing.

Appendix C NOISE IMPACT REVIEW.

Table 4. Day Time Model

35dB $L_{Aeq(16hr)}$

Room Width	4	**Area**	**48**	**$L_{eq,2}$**	**35**
Room Height	3	**RT**	**0.5**		
Room Depth	4	**A**	**15.5**	**S**	**29.2**
		A_0	**10**		
Mid-Octave Freq (Hz)	**125**	**250**	**500**	**1k**	**2k**
$L_{eq,ff}$	**72**	**67**	**65**	**62**	**61**
Vent $D_{n,e}$	**30**	**30**	**32**	**32**	**30**
$(A_0/S)*10(-D_{n,e}/10)$	0.00034	0.00014	0.00009	0.00009	0.00014
	S_{wi}	**1.2**			
WindowR_{wi}	**24**	**20**	**25**	**35**	**38**
$(S_{wi}/S)*10(-R_{wi}/10)$	0.00007	0.00017	0.00005	0.00001	0.00000
	S_{ew}	**12**			
Wall R_{ew}	**41**	**45**	**46**	**53**	**59**
$(S_{ew}/S)*10(-R_{ew}/10)$	0.00001	0.00001	0.00000	0.00000	0.00000
	S_{rr}	16			
Roof R_w	**37**	**42**	**45**	**50**	**56**
$(S_{it}/S)*10(-R_{it}/10)$	0.00005	0.00001	0.00001	0.00000	0.00000
Internal SPL	**43.9**	**37.4**	**32.1**	**27.1**	**27.8**
A-Weighting	-16.1	-8.6	-3.2	0	1.2
A-Weighted levels	**27.8**	**28.8**	**28.9**	**27.1**	**29.0**

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Table 5. Night Time Model.

25 dB $L_{Aeq(8hr)}$

Room Width	4	**Area**	**48**	**$L_{eq,2}$**	**25**
Room Height	3	**RT**	**0.5**		
Room Depth	4	**A**	**15.5**	**S**	**29.2**
		A_0	**10**		
Mid-Octave Freq (Hz)	**125**	**250**	**500**	**1k**	**2k**
$L_{eq,ff}$	**62**	**57**	**55**	**52**	**51**
Vent $D_{n,e}$	**30**	**30**	**32**	**32**	**30**
$(A_0/S)*10(-D_{n,e}/10)$	0.00034	0.00014	0.00009	0.00009	0.00014
	S_{wi}	**1.2**			
WindowR_{wi}	**24**	**20**	**25**	**35**	**38**
$(S_{wi}/S)*10(-R_{wi}/10)$	0.00007	0.00017	0.00005	0.00001	0.00000
	S_{ew}	**12**			
Wall R_{ew}	**41**	**45**	**46**	**53**	**59**
$(S_{ew}/S)*10(-R_{ew}/10)$	0.00001	0.00001	0.00000	0.00000	0.00000
	S_{rr}	16			
Roof R_w	**37**	**42**	**45**	**50**	**56**
$(S_{it}/S)*10(-R_{it}/10)$	0.00005	0.00001	0.00001	0.00000	0.00000
Internal SPL	**33.9**	**27.4**	**22.1**	**17.1**	**17.8**
A-Weighting	-16.1	-8.6	-3.2	0	1.2
A-Weighted levels	**17.8**	**18.8**	**18.9**	**17.1**	**19.0**

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D – CALIBRATION CERTIFICATES

Certificate of Calibration

Cirrus Research plc
dedicated to noise measurement

Equipment Details

Instrument Manufacturer	Cirrus Research Plc
Instrument Type	CR:511E
Description	Acoustic Calibrator
Serial Number	42922

Calibration Procedure

The acoustic calibrator detailed above has been calibrated to the published data as described in the operating manual. The procedures and techniques used to follow the recommendations of the IEC standard Electroacoustics – Sound Calibrators IEC 60942:2003, IEC 60942:1997, BS EN 60942:1998 and BS EN 60942:2003 where applicable.. The calibrator's main output is 94.00 dB (1 Pa) and this was set within the 0.01 dB resolution of the test system, i.e. one hundredth of a decibel. Numbers in {parenthesis} refer to the paragraph in IEC 60942.

Calibration Traceability

The calibrator above was calibrated against the calibration laboratory standards held by Cirrus Research plc. These are traceable to International Standards {A.0.6}. The standards are:

Microphone Type	B&K 4192	Serial Number	1920791	Calibration Ref.	S6450
Pistonphone Type	B&K 4220	Serial Number	613843	Calibration Ref.	S6388

Calibration Climate Conditions

The climatic test conditions were all maintained within the permitted limits of IEC 60942:1997.

Temperature	{B.3.2}	Permitted band 15°C to 25°C
Humidity	{B.3.2}	Permitted band 30% to 90% RH
Static Pressure	{B.3.2}	Permitted band 85 kPa to 105 kPa
Ambient Noise Level	{B.3.3.6}	Max permitted level 64 dB(Z)

Measurement Results

The figures below are the Calibration Laboratory test limits for this model calibrator and have a smaller tolerance than those permitted in IEC 60942.

94 dB Output	94.00 dB	Permitted band	93.95 to 94.05dB
104 dB Output	103.97 dB	Permitted band	103.80 to 104.30dB
Frequency	998 Hz	Permitted band	990 to 1010Hz

Uncertainty

With an uncertainty coefficient of k=2, i.e. a 95% confidence level, the uncertainty of each measure is

94 dB Output	± 0.13 dB	104 dB Output	± 0.14 dB
Frequency	± 0.1 Hz	Level Stability	± 0.04 dB

Calibrated by

Calibration Date 25 January 2018

Calibration Certificate Number 256670

This Calibration Certificate is valid for 12 months from the date above.

Cirrus Research plc, Acoustic House, Bridlington Road, Hunmanby, North Yorkshire, YO14 0PH
Telephone: +44 (0) 1723 891655 Fax: +44 (0) 1723 891742
Email: sales@cirrusresearch.co.uk

Certificate of Calibration

Cirrus Research plc
dedicated to noise measurement

Certificate Number: **116451**

Date of Issue: **25 January 2018**

Microphone Capsule

Manufacturer: **Cirrus Research plc** Serial Number: **20042566**
Model Number: **MK:224**

Calibration Procedure

The microphone capsule detailed above has been calibrated to the published data as described in the operating manual of the associated sound level meter (where applicable).

The frequency response was measured using an electrostatic actuator in accordance with BS EN 61094-6:2005 with the free-field response derived via standard correction data traceable to the National Physical Laboratory, Middlesex, UK.

The absolute sensitivity at 1 kHz was measured using an acoustic calibrator conforming to IEC 60942:2003 Class 1.

Date of Calibration: **23 January 2018**
Open Circuit Sensitivity at 1 kHz: **52.7 mV/Pa** / **-25.6 dB rel 1 V/Pa**

Environmental Conditions

Pressure: **100.00 kPa**
Temperature: **21.0 °C**
Humidity: **33.0 %**

Calibration Laboratory

Laboratory: Cirrus Research plc
Acoustic House, Bridlington Road, Hunmanby
North Yorkshire, YO14 0PH, United Kingdom

Test Engineer: Debra Swalwell

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