

**Assessment of the Internal Noise
Climate within the New Housing Development at
Mayton Street, Openshaw, Manchester.**

Report Prepared for:

Ms. J. Brown.
c/o John Southworth Builders Ltd.
10 Charles Street
Dukinfield
Cheshire
SK16 4SD

Report Prepared By:

Mr. Robert Smith

Report Reference: DRUK/ACC/RS/JSBMSOM/3059

Date: 10th June 2022

Contents

- 1.0 Summary**
- 2.0 Introduction**
- 3.0 Site Description**
- 4.0 Assessment Criteria**
- 5.0 Acoustic Insulation Compliance Assessment**
 - 5.1 External Walls
 - 5.2 Glazing
 - 5.3 Ventilation
- 6.0 Noise Climate Assessment Details**
 - 6.1 Survey Times and Personnel
 - 6.2 Weather
 - 6.3 Equipment
 - 6.4 Measurement Procedure
- 7.0 Noise Survey Results**
- 8.0 Discussion and Conclusion**

Appendix 1. Glazing Validation Test Report

Appendix 2. Standardised Internal Noise Levels

1.0 Summary

Planning permission was granted in January 2020 permitting the construction of 21 new houses on a parcel of land on Mayton Street in Openshaw, Manchester. The planning permission was granted subject to the imposition of a number of conditions one of which, condition 31, related specifically to the acoustic conditions that should prevail within the completed house. In addition, planning condition 31 required that validation testing be undertaken to establish that the adopted internal noise design guide levels within the houses had been achieved.

In compliance with the requirement contained within planning condition 31, noise assessments have been conducted to assess the resulting noise levels within a small but representative sample of the typical houses on the development. The assessments were conducted within the bedrooms and the living rooms of plots 1 and 21, to assess the resulting internal noise levels. The results of the noise surveys have highlighted that the measured noise levels from the bedrooms and living rooms did not exceed the adopted design target values for the night time (2300 - 0700 hours) or daytime (0700 - 2300 hours) periods relating to either the L_{Aeq} or L_{Amax} levels as appropriate.

As the measured noise levels within plots 1 and 21 did not exceed the adopted design criteria, as such the internal noise climates within these plots may be considered as complying with the requirements of planning condition 31 and the adopted design criteria relating to the internal noise climates.

Report Prepared by:



.....
Robert Smith

2.0 Introduction

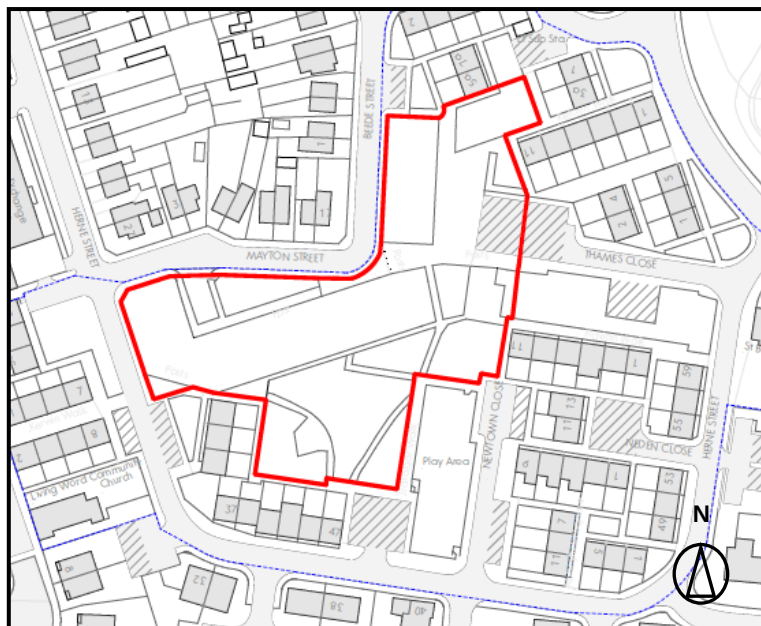
Planning permission was granted in January 2020 permitting the construction of 21 houses on a parcel of land on Mayton Street in Openshaw, Manchester. The planning permission was granted subject to the imposition of a number of conditions one of which, condition 31, related specifically to the acoustic conditions that should prevail within the completed house. In addition planning condition 31 required that validation testing be undertaken to establish that the adopted internal noise design guide levels within the houses had been achieved.

In compliance with the requirement contained within planning condition 31, noise assessments have been conducted to assess the resulting noise levels within a sample of the typical houses on the development.

3.0 Site Description

The new residential development has been built on a parcel of land on Mayton Street in Openshaw, Manchester (figure 1 overleaf and photograph 1 overleaf) which is surrounded by existing residential properties. Approximately 30 metres to the North West of the western flank of the proposed development is the existing telephone exchange building and approximately 40 metres to the south west of the western flank of the proposed development is the Christ Apostolic Church building. Approximately 80 metres to the south of the proposed development site is the A635 Ashton Old Road. Approximately 80 metres to the west of the proposed development site is the existing Mill Court apartment block with the A6010 Alan Turing Way a further 120 metres beyond.

Figure 1. Location of the proposed residential development site (edged in red), Mayton Street



Photograph 1. Mayton Street development site (viewed from the west), edged in red.



Source: GWP Architects 2019

4.0 Assessment Criteria

The requirement to provide a scheme for acoustically insulating the residential dwellings on the Mayton Street development was contained within condition 31 of the planning permission document (125474/FO/2019, dated 17th November 2020). This planning condition also contained a requirement to undertake a validation assessment of the acoustic conditions within the completed dwellings. This full text of planning condition 31 is reproduced below:

31) Before the development commences a scheme for acoustically insulating the proposed residential accommodation against road traffic noise shall be submitted to and approved in writing by the City Council as local planning authority. There may be other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises. The approved noise insulation scheme shall be completed before any of the dwelling units are occupied.

Noise survey data must include measurements taken during a rush-hour period and night time to determine the appropriate sound insulation measures necessary.

Upon completion of the development and before first occupation of the residential units, a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that the internal noise criteria has been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the internal noise criteria.

Reason: To secure a reduction in noise from traffic or other sources in order to protect future residents from noise disturbance, pursuant to policies SP1 and DM1 of the Core Strategy for the City of Manchester and saved policy DC26 of the Unitary Development Plan.

With respect to the approved acoustic report detailed within planning condition 31, this relates to the Druk Limited report, reference DRUK/ACC/RS/GWPAWCOM/2794MSRA issued on the 8th January 2020. This report contained an assessment of the existing noise climate in the vicinity of the then proposed development combined with an evaluation of the likely internal noise climate within the proposed houses. The likely internal noise levels within the proposed houses were a result of the sound insulation provided by the building envelope elements combined with the measured noise levels relating to the existing noise climate.

With respect to the assessment of the desirable internal noise levels within the proposed new dwellings, guidance relating to acceptable noise levels was obtained from a number of sources including: Manchester City Council's Planning and Noise Technical Guidance document, published in December 2015, the World Health Organisation's (WHO) "Guidelines for Community Noise" document and British Standard (BS) 8233:2014 "Guidance on sound insulation and noise reduction for buildings". With reference to the guidance relating to the internal noise climates, the guidance contained within the respective documents is summarised in tables 1 - 3 below.

Table 1. Indoor ambient noise levels for dwellings (reproduced from page 16 of the Manchester City Council Technical Guidance document)

Assessment location	Time of day	$L_{Aeq,T}$	$L_{Amax,F}$
Bedrooms	Night time 2300 - 0700 hours	30dB	45dB*
Living rooms	Daytime 0700 - 2300 hours	35dB	-
Gardens and terraces	Daytime 0700 - 2300 hours	55 dB	-

* Individual noise events should not normally exceed this criterion on more than 15 occasions

Table 2. Guidelines for noise levels in specific environments (reproduced from Table 1 of the "Guidelines for Community Noise" document, (WHO 1999))

Specific environment	Critical health effect(s)	L_{Aeq} [dB(A)]	Time base [hours]	L_{Amax} fast 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	-
Inside bedrooms	Sleep disturbance, night time	30	8	45

Table 3. Indoor ambient noise levels for dwellings (reproduced from table 4 of BS8233:2014)

Activity	Location	0700 to 2300	2300 to 0700
Resting	Living room	35dB L_{Aeq} , 16 hour	-
Dining	Dining room/area	40dB L_{Aeq} , 16 hour	-
Sleeping (daytime resting)	Bedroom	35dB L_{Aeq} , 16 hour	30dB L_{Aeq} , 8 hour

With respect to the subsequent evaluation of the noise climate within the new dwellings on the Mayton Street development, the measured sound levels will be compared with the following internal and external criteria:

- Bedrooms (23:00 - 07:00 hours): 30dB L_{Aeq} and 45dB* L_{Amax}
- Bedrooms (07:00 - 23:00 hours): 35dB L_{Aeq}
- Living rooms (07:00 - 23:00 hours): 35dB L_{Aeq}

* Individual noise events should not normally exceed this criterion on more than 15 occasions

5.0 **Acoustic Insulation Compliance Assessment**

In compliance with the requirements of planning condition 31, an inspection of the building envelope elements, principally the external wall construction, the glazing and the ventilation provisions, assumed in the previous acoustic report was undertaken. All the inspections were undertaken on the 19th May 2022 and at the time all the dwellings were unoccupied.

5.1 External Walls

The proposed external wall construction evaluated in the approved acoustic report was of the following specification: timber frame structure comprising an external brick leaf and an internal 89 x 38mm CLS timber frame filled with 70mm rigid PIR insulation and lined with one layer of 9mm OSB board and one layer of 12.5mm plasterboard separated from the brick outer leaf by a 125mm cavity.

5.2 Glazing

The assessments undertaken in the approved acoustic report were based on the application of sealed unit triple glazing to all the windows. The glazing specification used in the calculations is as follows:

- 4mm pane - 20mm cavity - 4mm pane.

A validation test report for the selected glazing system, included in Appendix 1, indicates that the sound insulation of the system would be 33dB R_w .

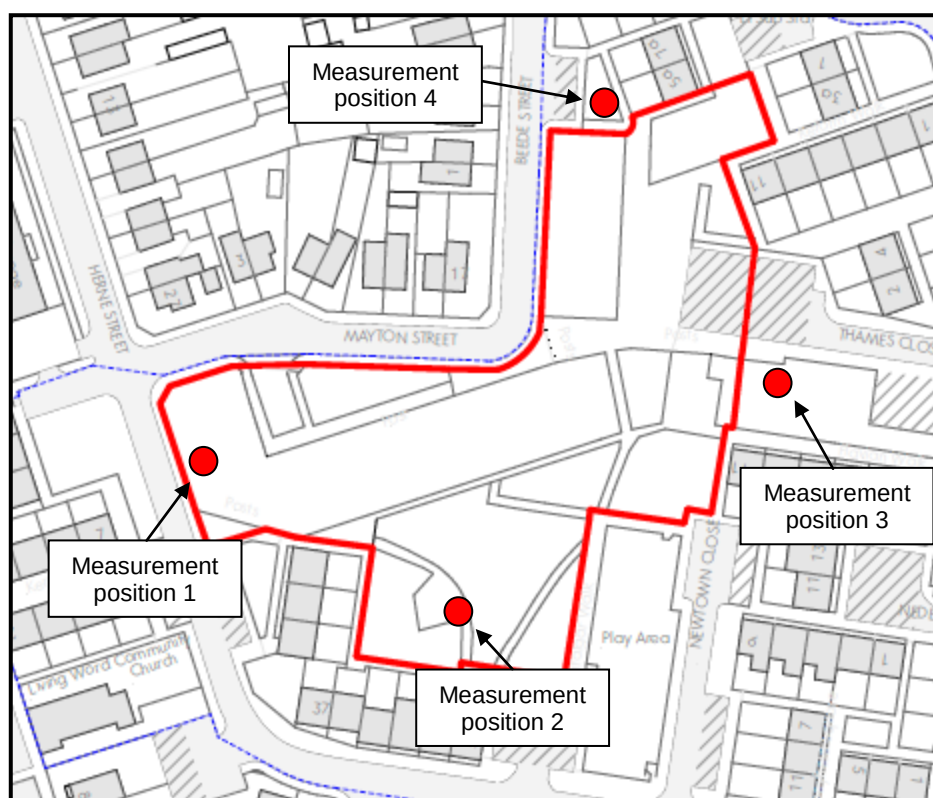
5.3 Ventilation

The houses have been provided with a passive type ventilation system comprising background ventilators mounted in the head of the window frames combined with local mechanical extract ventilation in area of high humidity. This type of provision would comply with a system 1 designation within the Approved Document F.

6.0 Noise Climate Assessment Details

The original assessment of the existing noise climate in the vicinity of the then proposed housing development suggested that the existing local noise climate was likely to be primarily influenced by road traffic noise, with additional contributions being made by noise from the surrounding residential houses and from children playing in the play area. As a consequence four positions located on the northern, southern, easterly and westerly boundaries of the proposed development site were adopted as it was anticipated that the noise climate in these locations would be subjected to the highest levels of noise from vehicles on the surrounding roads. The approximate location of the measurement positions is detailed on figure 2 below.

Figure 2. Boundary of the proposed development detailing the approximate location of the measurement positions



For the purposes of this validation noise survey, it was considered impractical to conduct an assessment of the internal noise levels within all the houses on the development. Consequently, assessments were conducted in a sample of the houses arranged on the extremities of the development adjacent to the surrounding roads and the children's play area. This principle was adopted as it was believed that the selected houses would be exposed to the highest noise levels from the existing noise sources. Therefore, should compliance with the adopted noise design targets be demonstrated in these houses, it would be anticipated that the noise levels in the remaining houses further from these noise sources would be at least as good if not better.

As a result the internal noise assessments were conducted within plots 1 and 21 and the location of these houses is detailed on figure 3 overleaf.

Figure 3. Location of the plots used in the internal noise level validation exercise

In each house internal noise measurements were made in the two bedrooms and the living rooms.

6.1 Survey Times and Personnel

Measurements of the internal noise climate within the bedrooms of plot 21 were made between 17:00 - 07:00 hours on the 19th - 20th May 2022 and measurements within the living room were made between 16:00 - 23:00 hours on the 6th June 2022.

Measurements of the internal noise climate within the bedrooms of plot 1 were made between 17:00 - 07:00 hours on the 25th - 26th May 2022 and measurements within the living room were made between 16:00 - 23:00 hours on the 6th June 2022.

6.2 Weather

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

19th - 20th May 2022

All surfaces were dry, cloud cover ranged between 10 - 15%, the external temperature ranged between approximately 12 - 21°C, the barometric pressure was approximately 1010mb and the wind speed was approximately 0.7m/s.

25th - 26th May 2022

All surfaces were dry, cloud cover ranged between 90 - 100%, the external temperature ranged between approximately 10 - 18°C, the barometric pressure was approximately 1003mb and the wind speed was approximately 1.6m/s.

6th June 2022

All surfaces were dry, cloud cover was 100%, the external temperature was approximately 16°C, the barometric pressure was approximately 1007mb and the wind speed was less than 0.3m/s.

6.3 Equipment

The noise assessments were conducted using the equipment detailed in the table 4 below.

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 and the calibration certificates are available on request.

Table 4. Equipment used during the noise surveys

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
Sound level meter	NTI Audio	XL2-TA	A2A-10232-E
Microphone pre-amplifier	NTI Audio	MA220	5537
Microphone	NTI Audio	M2230	8636
Acoustic calibrator	Norsonic AS	Nor 1251	31522

6.4 Measurement Procedure

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

Throughout the noise assessments the measurement time interval was 60 minutes. Throughout the measurement periods the windows were closed but the ventilation openings were in their open positions. During the course of the assessments, the sound level meters were placed in positions that approximated the likely positions of the beds within the bedrooms and a sofa within the open plan living/dining room.

During the internal noise surveys the sound level meter microphones were tripod mounted, such that they were approximately 1.2 metres above floor level and approximately 1.0m from the internal walls. The microphones were connected to the sound level meters via 5 metre extension cables, so permitting the operator to remain outside the assessment spaces. All measurements were made with the 'fast' time weighting engaged.

As a result of the construction programme it was not possible to halt construction activity on the site. Consequently, there existed the possibility that undertaking validation noise measurement surveys on an active building site may have lead to the noise from the construction activity affecting the internal noise levels within the plots. The result of which would be an unrepresentative assessment of the likely internal noise levels within the houses.

With this in mind the internal noise climates within the plots were assessed at the end of the working day to minimise the potential for construction noise to affect the noise measurements. In most cases the working day ended between 16:00 - 17:00 hours.

7.0 **Noise Survey Results**

At the time of the validation noise surveys all the plots were complete, unfurnished, unoccupied and uncarpeted. As the plots were complete but not occupied or furnished, it was likely that the sound absorption of the bedrooms and living rooms would be different from that which would prevail when the dwellings were occupied and fully furnished. In order to permit the obtained results to be 'standardised', sample reverberation time measurements were made within the bedrooms and living rooms of the two plots. The mean reverberation times for the bedrooms and living/dining rooms within the respective plots are presented in Tables 5 and 6 below.

Table 5. Mean reverberation time measurements, plot 21

Room	Mean Reverberation Time, T_{20} , seconds
Living room	1.30
Bedroom 1	0.85
Bedroom 2	0.79

Table 6. Mean reverberation time measurements, plot 1

Room	Mean Reverberation Time, T_{20} , seconds
Living room	1.21
Bedroom 1	1.50
Bedroom 2	1.30

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.

The 'standardised' internal noise levels from the noise measurements surveys are summarised and presented in tables 7 and 8 below. Tables 7 and 8 also detail the maximum design guide noise levels and these are contained within parenthesis in the appropriate columns. The results of the surveys have been rounded to the nearest whole decibel. Full standardised noise data are available in Appendix 2.

Table 7. Standardised internal noise levels plot 21

Location	Date	Time period	Mean (log) L_{Aeq} , dB.	Mean (log) L_{Amax} , dB.
Living room	6 th June 2022	16:00 - 23:00	28 (35)	-
Bedroom 1	19 th May 2022	17:00 - 23:00	23 (35)	-
	19 th - 20 th May 2022	23:00 - 07:00	16 (30)	39 (45)
Bedroom 2	19 th May 2022	17:00 - 23:00	26 (35)	-
	19 th - 20 th May 2022	23:00 - 07:00	22 (30)	43 (45)

Table 8. Standardised internal noise levels plot 1

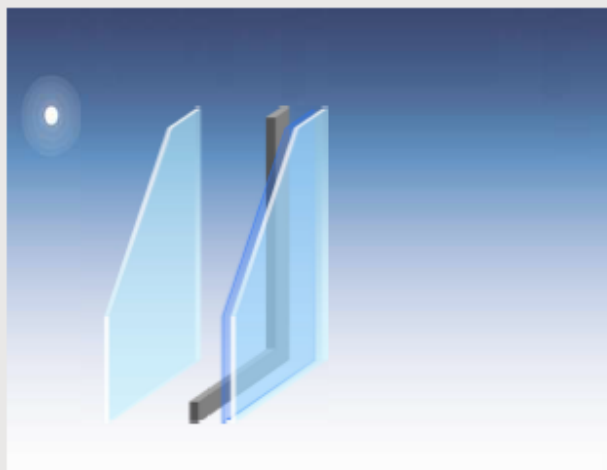
Location	Date	Time period	Mean (log) L_{Aeq} , dB.	Mean (log) L_{Amax} , dB.
Living room	6 th June 2022	16:00 - 23:00	21 (35)	-
Bedroom 1	25 th May 2022	17:00 - 23:00	24 (35)	-
	25 th - 26 th May 2022	23:00 - 07:00	18 (30)	41 (45)
Bedroom 2	25 th May 2022	17:00 - 23:00	22 (35)	-
	25 th - 26 th May 2022	23:00 - 07:00	17 (30)	38 (45)

8.0 Discussion and Conclusion

As can be seen from tables 7 and 8 above, the measured noise levels within plots 1 and 21 did not exceed the adopted design criteria and as such the internal noise climates within these plots may be considered as complying with the requirements of planning condition 31 and the adopted design criteria relating to the internal noise climates.

Appendix 1. Glazing Validation Test Report

Wednesday, February 9,



Glazing 1	PLANICLEAR 4
Cavity 1	Argon 90% 20 mm
Glazing 2	PLANITHERM TOTAL+ FG PLANICLEAR 4 mm

Last name: Michelle Carter

Country: United Kingdom

Notes:

**LUMINOUS FACTORS**

EN410 (2011-04)

Light Transmittance (TL)	79 %
Outdoor Reflectance (RLe)	13 %
Indoor Reflectance (RLi)	12 %

**THERMAL TRANSMISSION**

EN673-2011

Ug	1.2 W/(m².K)
Angle relative to the vertical	0 °

**MANUFACTURING SIZES**

Nominal Thickness	28.00 mm
Weight	20.0 kg/m²

**ACOUSTICS**

EN 12758

Acoustic simulated values

Rw (C;Ctr)	33 (-1; -5) dB
STC (ASTM E413)	34
OITC (ASTM E1332)	26

**SAFETY CLASS**

EN 12600

Pendulum Body Resistance	NPD
--------------------------	-----

**ENERGY FACTORS**

EN410 (2011-04)

Transmittance (TE)	64 %
Outdoor Reflectance (Ree)	20 %
Indoor Reflectance (Rei)	21 %
Absorptance A1 (AE1)	6 %
Absorptance A2 (AE2)	9 %

**SOLAR FACTORS**

EN410 (2011-04)

Solar Factor (g)	0.73
Shading Coefficient (SC)	0.83

**COLOR RENDERING**

Transmission (Ra)	9
Reflection (Ra)	90

**ANTI-BURGLARY**

EN 356

Burglar Resistance	NPD
--------------------	-----



Calumen calculates the photometric characteristics and thermal transmission of glass using calculation algorithms which comply with the following standards: the European standards EN 410 and EN 673, the International standard ISO9050, the Japanese standard JIS R 3106/3107 and the Korean standard KS L 2514/2525. The functional output and calculation rules of Calumen for standards EN 410 and EN 673 have been validated by TÜV Rheinland (report 11923R-11-33705). The technical performance according to these standards are provided for information only and are subject to amendment. Only the values entered in the performance declaration available on the CE marking site of Saint-Gobain Glass are official. The sound attenuation indices are measured under laboratory conditions according to the standards EN ISO 10140 and 12758. The calculated indices are provided for information only. The accuracy for Rw index lies within a range of +/-2dB. The glass thickness calculations comply with the 2012 version of the DTU39-P4 description. The USER is responsible for ensuring that the correct calculation hypotheses are entered and the DTU39 is applied appropriately for the project concerned.

Appendix 2. Standardised Internal Noise Levels

Plot 21. Bedroom 1

Mayton Street, Openshaw. Validation test results - plot 21

Break-in Noise levels (standardised levels)

19th May 2022

Bedroom 1

Octave Band Centre Frequency, Hz.	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
17:00											
<i>L</i> _{Aeq}	27	39	27	26	28	23	22	17	12	9	8
<i>L</i> _{max}	56	68	45	50	51	48	53	49	39	35	34
<i>L</i> ₁₀	29	41	30	28	31	26	25	19	13	9	8
<i>L</i> ₉₀	18	32	21	18	20	14	12	8	8	8	8
18:00											
<i>L</i> _{Aeq}	22	36	26	23	25	18	16	11	8	9	8
<i>L</i> _{max}	46	57	41	49	50	40	40	35	30	19	10
<i>L</i> ₁₀	23	39	28	25	27	19	17	13	9	9	8
<i>L</i> ₉₀	18	30	20	16	19	12	11	8	8	8	8
19:00											
<i>L</i> _{Aeq}	22	35	26	24	25	19	16	11	8	9	8
<i>L</i> _{max}	46	56	40	52	47	45	38	33	34	24	20
<i>L</i> ₁₀	23	38	29	25	27	19	18	12	8	9	8
<i>L</i> ₉₀	18	30	18	16	19	13	12	8	8	8	8
20:00											
<i>L</i> _{Aeq}	22	34	26	22	26	19	15	10	8	9	8
<i>L</i> _{max}	44	54	41	44	50	41	33	34	21	17	19
<i>L</i> ₁₀	23	36	29	23	27	19	17	11	8	9	8
<i>L</i> ₉₀	18	29	18	16	19	12	12	8	8	8	8
21:00											
<i>L</i> _{Aeq}	19	33	25	20	22	15	13	9	8	9	8
<i>L</i> _{max}	40	63	41	41	44	35	33	31	23	15	9
<i>L</i> ₁₀	21	35	29	22	24	16	15	9	8	9	8
<i>L</i> ₉₀	17	27	17	15	17	11	10	8	8	8	8
22:00											
<i>L</i> _{Aeq}	19	33	25	21	22	14	12	9	8	9	8
<i>L</i> _{max}	46	55	40	44	47	41	41	39	32	24	13
<i>L</i> ₁₀	20	36	29	22	23	15	14	9	8	9	8
<i>L</i> ₉₀	16	27	16	13	16	10	9	7	8	8	8

Mayton Street, Openshaw. Validation test results - plot 21

Break-in Noise levels (standardised levels)

19th - 20th May 2022

Bedroom 1

Octave Band Centre Frequency, Hz.	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
23:00											
<i>L</i> _{Aeq}	17	33	24	15	18	11	10	7	8	9	8
<i>L</i> _{max}	31	54	41	31	33	26	25	24	12	10	9
<i>L</i> ₁₀	18	36	28	18	20	13	12	8	8	9	8
<i>L</i> ₉₀	15	26	15	11	14	8	8	7	8	8	8
00:00											
<i>L</i> _{Aeq}	17	31	24	21	20	12	9	7	8	9	8
<i>L</i> _{max}	45	48	39	54	49	42	37	21	17	12	8
<i>L</i> ₁₀	17	33	28	17	19	11	10	8	8	9	8
<i>L</i> ₉₀	15	25	14	11	13	8	7	7	8	8	8
01:00											
<i>L</i> _{Aeq}	16	30	24	13	15	9	8	7	8	9	8
<i>L</i> _{max}	33	47	36	31	33	25	29	26	20	13	11
<i>L</i> ₁₀	17	33	28	15	17	10	9	8	8	9	8
<i>L</i> ₉₀	15	25	12	10	12	7	7	7	8	8	8
02:00											
<i>L</i> _{Aeq}	16	29	24	13	16	9	9	7	8	9	8
<i>L</i> _{max}	34	50	37	32	39	30	26	25	12	14	11
<i>L</i> ₁₀	17	31	28	15	17	10	9	8	8	9	8
<i>L</i> ₉₀	15	24	13	10	12	7	7	7	8	8	8
03:00											
<i>L</i> _{Aeq}	16	28	23	15	15	9	8	7	8	9	8
<i>L</i> _{max}	44	44	34	37	34	37	39	36	34	37	35
<i>L</i> ₁₀	16	31	28	15	17	10	9	8	8	9	8
<i>L</i> ₉₀	15	23	13	11	13	8	7	7	8	8	8
04:00											
<i>L</i> _{Aeq}	16	30	24	16	16	10	8	7	8	9	8
<i>L</i> _{max}	32	49	35	30	39	28	22	19	11	13	11
<i>L</i> ₁₀	17	33	28	18	18	12	10	8	8	9	8
<i>L</i> ₉₀	15	23	13	11	13	8	7	7	8	8	8
05:00											
<i>L</i> _{Aeq}	16	30	24	14	16	9	8	7	8	9	8
<i>L</i> _{max}	31	52	40	29	33	28	25	23	13	9	10
<i>L</i> ₁₀	17	32	28	16	17	10	9	8	8	9	8
<i>L</i> ₉₀	15	24	13	12	13	8	7	7	8	8	8
06:00											
<i>L</i> _{Aeq}	16	31	24	16	17	10	9	7	8	9	8
<i>L</i> _{max}	38	49	35	35	31	32	35	32	23	12	9
<i>L</i> ₁₀	18	34	28	17	18	12	11	8	8	9	8
<i>L</i> ₉₀	16	25	15	13	15	9	8	7	8	8	8

Plot 21. Bedroom 2

Mayton Street, Openshaw. Validation test results - plot 21												
Break-in Noise levels (standardised levels)												
19th - 20th May 2022												
Bedroom 2												
Octave Band Centre Frequency, Hz.		dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
17:00												
<i>L</i> _{Aeq}		29	42	32	30	30	23	24	22	14	11	8
<i>L</i> _{max}		57	71	56	55	56	49	52	52	41	30	17
<i>L</i> ₁₀		29	40	34	32	31	23	24	21	13	10	8
<i>L</i> ₉₀		20	30	26	22	23	17	14	10	9	10	8
18:00												
<i>L</i> _{Aeq}		27	35	31	29	30	21	23	20	12	10	8
<i>L</i> _{max}		57	54	52	61	64	47	46	44	35	20	11
<i>L</i> ₁₀		29	38	33	30	30	23	25	22	12	10	8
<i>L</i> ₉₀		21	29	25	21	23	17	15	11	9	10	8
19:00												
<i>L</i> _{Aeq}		27	34	30	31	29	21	20	19	13	10	8
<i>L</i> _{max}		57	54	42	64	61	48	42	50	46	19	8
<i>L</i> ₁₀		27	37	33	31	30	22	23	19	11	10	8
<i>L</i> ₉₀		20	28	24	20	22	16	13	10	9	10	8
20:00												
<i>L</i> _{Aeq}		24	33	30	28	28	20	18	13	10	10	8
<i>L</i> _{max}		50	55	49	50	49	42	48	38	35	27	19
<i>L</i> ₁₀		24	36	32	29	28	20	18	14	9	10	8
<i>L</i> ₉₀		19	27	23	19	22	16	12	8	9	10	8
21:00												
<i>L</i> _{Aeq}		22	32	28	25	26	18	15	11	9	10	8
<i>L</i> _{max}		50	60	47	44	51	45	47	40	37	24	14
<i>L</i> ₁₀		23	34	31	28	27	19	16	12	9	10	8
<i>L</i> ₉₀		19	26	22	18	22	16	11	8	9	10	8
22:00												
<i>L</i> _{Aeq}		23	32	28	27	27	18	14	11	9	10	8
<i>L</i> _{max}		47	54	43	53	54	37	38	33	26	22	13
<i>L</i> ₁₀		23	35	31	29	28	18	15	11	9	10	8
<i>L</i> ₉₀		19	26	22	18	22	16	11	8	9	10	8

Mayton Street, Openshaw. Validation test results - plot 21

Break-in Noise levels (standardised levels)

19th - 20th May 2022

Bedroom 2

Octave Band Centre Frequency, Hz.	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
23:00											
<i>L</i> _{Aeq}	21	32	27	23	26	17	13	10	9	10	8
<i>L</i> _{max}	48	51	41	46	52	43	41	35	32	30	23
<i>L</i> ₁₀	22	36	30	25	27	18	14	11	9	10	8
<i>L</i> ₉₀	19	25	20	17	22	16	10	7	9	10	8
00:00											
<i>L</i> _{Aeq}	25	30	27	32	31	18	13	10	9	10	8
<i>L</i> _{max}	44	48	45	42	46	44	38	34	23	13	9
<i>L</i> ₁₀	22	31	30	25	28	18	13	10	9	10	8
<i>L</i> ₉₀	19	24	19	19	23	16	10	7	9	10	8
01:00											
<i>L</i> _{Aeq}	21	29	25	22	26	17	12	9	9	10	8
<i>L</i> _{max}	40	50	38	39	42	38	35	30	22	17	14
<i>L</i> ₁₀	22	31	29	24	27	17	13	10	9	10	8
<i>L</i> ₉₀	19	24	18	17	23	16	10	7	9	10	8
02:00											
<i>L</i> _{Aeq}	21	28	25	23	26	17	12	8	9	10	8
<i>L</i> _{max}	37	47	39	39	40	31	32	26	13	11	8
<i>L</i> ₁₀	22	30	29	24	28	17	13	10	9	10	8
<i>L</i> ₉₀	19	23	18	18	23	16	10	7	9	10	8
03:00											
<i>L</i> _{Aeq}	21	27	25	23	25	17	12	9	9	10	8
<i>L</i> _{max}	43	41	43	41	41	39	37	35	35	23	12
<i>L</i> ₁₀	22	29	28	25	27	17	13	9	9	10	8
<i>L</i> ₉₀	19	22	18	18	23	16	10	7	9	10	8
04:00											
<i>L</i> _{Aeq}	21	29	25	24	25	17	12	9	9	10	8
<i>L</i> _{max}	43	47	40	44	43	40	38	36	26	21	13
<i>L</i> ₁₀	21	31	28	27	26	17	13	10	9	10	8
<i>L</i> ₉₀	19	23	20	18	22	16	10	7	9	10	8
05:00											
<i>L</i> _{Aeq}	21	29	26	26	26	17	12	11	9	10	8
<i>L</i> _{max}	43	53	45	42	40	40	37	36	36	25	14
<i>L</i> ₁₀	23	31	29	29	27	17	14	13	10	10	8
<i>L</i> ₉₀	19	23	19	20	23	16	10	8	9	10	8
06:00											
<i>L</i> _{Aeq}	21	30	26	26	25	17	13	10	9	10	8
<i>L</i> _{max}	40	49	39	40	41	38	35	30	22	15	9
<i>L</i> ₁₀	23	32	29	30	27	17	15	12	9	10	8
<i>L</i> ₉₀	19	24	20	20	23	16	10	8	9	10	8

Plot 21. Living room

Mayton Street, Openshaw. Validation test results - plot 21												
Break-in Noise levels (standardised levels)												
6th June 2022												
Living room												
Octave Band Centre Frequency, Hz.		dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
16:00												
<i>L</i> _{Aeq}		22	26	21	16	13	10	13	13	15	16	18
<i>L</i> _{max}		38	44	42	37	34	35	32	32	28	21	19
<i>L</i> ₁₀		22	31	19	17	14	10	15	13	15	16	18
<i>L</i> ₉₀		21	15	12	13	9	8	11	12	15	16	18
17:00												
<i>L</i> _{Aeq}		26	33	22	20	25	21	19	18	17	17	18
<i>L</i> _{max}		43	54	46	46	37	31	33	40	33	29	23
<i>L</i> ₁₀		23	35	21	20	16	12	17	15	16	16	18
<i>L</i> ₉₀		21	14	14	13	9	8	12	13	15	16	18
18:00												
<i>L</i> _{Aeq}		27	29	27	26	19	15	19	19	19	21	23
<i>L</i> _{max}		44	53	54	53	47	32	36	36	28	27	23
<i>L</i> ₁₀		27	27	25	24	20	17	21	20	19	20	22
<i>L</i> ₉₀		25	18	18	18	13	13	16	17	19	20	22
19:00												
<i>L</i> _{Aeq}		27	32	32	31	27	20	19	18	19	21	23
<i>L</i> _{max}		47	55	53	51	49	42	40	39	29	22	23
<i>L</i> ₁₀		28	34	35	33	27	19	21	18	19	20	22
<i>L</i> ₉₀		25	21	21	20	14	13	15	17	18	20	22
20:00												
<i>L</i> _{Aeq}		27	34	34	31	25	20	20	18	20	21	23
<i>L</i> _{max}		51	54	56	52	45	41	42	43	46	42	28
<i>L</i> ₁₀		28	36	36	33	27	19	21	18	19	20	22
<i>L</i> ₉₀		25	23	23	21	15	13	16	17	19	20	22
21:00												
<i>L</i> _{Aeq}		28	36	35	32	26	19	19	19	20	21	23
<i>L</i> _{max}		50	62	62	54	47	41	44	44	43	36	24
<i>L</i> ₁₀		28	38	38	34	28	20	20	19	19	21	22
<i>L</i> ₉₀		25	24	23	21	16	14	16	17	19	20	22
22:00												
<i>L</i> _{Aeq}		31	39	41	37	36	21	20	20	22	21	23
<i>L</i> _{max}		62	62	72	69	68	47	49	51	54	39	30
<i>L</i> ₁₀		29	42	39	36	31	21	20	19	19	21	22
<i>L</i> ₉₀		25	29	27	25	19	15	16	17	19	20	22

Plot 1. Bedroom 1

Mayton Street, Openshaw. Validation test results - plot 1												
Break-in Noise levels (standardised levels)												
25th May 2022												
Bedroom 1												
Octave Band Centre Frequency, Hz.		dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
17:00												
<i>L</i> _{Aeq}		26	34	36	27	25	22	22	18	14	10	7
<i>L</i> _{max}		53	55	52	42	40	41	45	48	46	34	27
<i>L</i> ₁₀		27	36	38	28	27	23	22	18	12	7	6
<i>L</i> ₉₀		21	27	30	21	20	16	17	12	7	7	5
18:00												
<i>L</i> _{Aeq}		26	33	35	24	23	20	22	18	12	9	7
<i>L</i> _{max}		52	61	64	49	45	49	44	44	43	41	37
<i>L</i> ₁₀		26	35	37	26	24	21	22	18	11	7	6
<i>L</i> ₉₀		20	26	29	19	18	14	16	11	7	7	5
19:00												
<i>L</i> _{Aeq}		23	31	33	23	21	18	20	15	10	8	6
<i>L</i> _{max}		52	52	55	40	41	45	48	46	41	40	40
<i>L</i> ₁₀		24	33	35	25	23	19	20	15	11	7	6
<i>L</i> ₉₀		19	24	28	18	16	13	15	10	6	7	5
20:00												
<i>L</i> _{Aeq}		23	30	32	22	21	17	19	15	8	8	6
<i>L</i> _{max}		50	53	51	43	40	40	47	42	39	32	21
<i>L</i> ₁₀		23	31	32	23	21	17	19	14	9	7	6
<i>L</i> ₉₀		17	23	26	17	15	12	13	8	6	7	5
21:00												
<i>L</i> _{Aeq}		20	29	31	21	20	15	16	11	7	7	6
<i>L</i> _{max}		51	61	58	49	53	46	47	41	31	20	11
<i>L</i> ₁₀		21	29	32	22	20	15	17	11	7	7	6
<i>L</i> ₉₀		17	23	26	16	15	11	12	8	6	7	5
22:00												
<i>L</i> _{Aeq}		20	28	31	20	18	13	15	12	9	8	6
<i>L</i> _{max}		43	60	55	44	46	42	33	33	24	13	9
<i>L</i> ₁₀		19	29	31	21	19	13	15	9	6	7	6
<i>L</i> ₉₀		16	23	26	16	14	10	11	6	6	7	5

Mayton Street, Openshaw. Validation test results - plot 1												
Break-in Noise levels (standardised levels)												
25th - 26th May 2022												
Bedroom 1												
Octave Band Centre Frequency, Hz.		dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
23:00												
<i>L</i> _{Aeq}		17	26	29	20	17	11	12	7	6	7	6
<i>L</i> _{max}		34	52	57	37	33	29	22	18	14	9	7
<i>L</i> ₁₀		18	28	30	21	18	12	13	8	6	7	6
<i>L</i> ₉₀		15	22	26	16	14	9	10	6	6	7	5
00:00												
<i>L</i> _{Aeq}		17	27	28	19	17	11	11	7	6	7	6
<i>L</i> _{max}		40	54	59	44	42	38	31	27	17	22	7
<i>L</i> ₁₀		17	27	30	20	18	12	12	7	6	7	6
<i>L</i> ₉₀		14	21	24	15	13	8	8	5	6	7	5
01:00												
<i>L</i> _{Aeq}		18	25	26	17	15	10	12	12	10	8	6
<i>L</i> _{max}		42	43	44	32	42	44	31	27	18	17	9
<i>L</i> ₁₀		16	26	28	18	16	10	11	7	6	7	6
<i>L</i> ₉₀		14	20	23	14	11	6	6	5	6	7	5
02:00												
<i>L</i> _{Aeq}		15	24	26	16	14	9	9	7	7	7	6
<i>L</i> _{max}		41	43	43	32	34	34	35	36	30	24	13
<i>L</i> ₁₀		16	26	27	17	15	10	10	7	6	7	6
<i>L</i> ₉₀		13	20	22	13	11	6	6	4	6	7	5
03:00												
<i>L</i> _{Aeq}		18	26	26	16	14	10	11	12	10	8	6
<i>L</i> _{max}		42	42	39	31	41	33	37	36	28	24	31
<i>L</i> ₁₀		16	28	28	17	15	10	10	7	6	7	6
<i>L</i> ₉₀		14	22	23	13	11	6	6	5	6	7	5
04:00												
<i>L</i> _{Aeq}		19	26	26	16	15	10	9	15	12	10	7
<i>L</i> _{max}		41	45	37	33	31	32	38	34	32	31	23
<i>L</i> ₁₀		21	27	28	18	16	10	9	17	14	8	5
<i>L</i> ₉₀		14	22	23	13	12	6	6	5	6	7	5
05:00												
<i>L</i> _{Aeq}		19	27	29	18	17	15	13	11	12	8	6
<i>L</i> _{max}		42	50	47	35	40	41	36	35	28	30	29
<i>L</i> ₁₀		19	29	30	20	19	13	13	9	12	8	6
<i>L</i> ₉₀		14	23	25	15	13	8	7	5	7	7	5
06:00												
<i>L</i> _{Aeq}		21	30	33	23	22	17	15	10	10	8	6
<i>L</i> _{max}		41	54	56	43	39	38	36	32	22	13	7
<i>L</i> ₁₀		22	31	35	25	23	17	16	10	12	8	5
<i>L</i> ₉₀		17	25	28	18	16	12	12	7	7	7	5

Plot 1. Bedroom 2

Mayton Street, Openshaw. Validation test results - plot 1												
Break-in Noise levels (standardised levels)												
25th May 2022												
Bedroom 2												
Octave Band Centre Frequency, Hz.		dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
17:00												
<i>L</i> _{Aeq}		25	44	37	29	25	20	20	16	10	7	6
<i>L</i> _{max}		47	58	67	58	50	38	35	36	31	22	22
<i>L</i> ₁₀		27	39	39	31	27	23	23	19	13	7	7
<i>L</i> ₉₀		20	30	32	23	20	16	16	11	7	7	6
18:00												
<i>L</i> _{Aeq}		25	35	36	27	23	19	20	19	10	7	6
<i>L</i> _{max}		53	56	61	43	41	36	49	50	34	16	7
<i>L</i> ₁₀		26	37	39	29	25	21	22	17	11	7	7
<i>L</i> ₉₀		19	28	31	22	19	14	15	10	7	7	6
19:00												
<i>L</i> _{Aeq}		21	33	34	25	21	17	17	12	8	7	6
<i>L</i> _{max}		43	53	56	46	40	34	42	32	23	16	8
<i>L</i> ₁₀		23	35	37	27	23	19	19	14	9	7	7
<i>L</i> ₉₀		18	27	30	21	18	13	14	9	7	7	6
20:00												
<i>L</i> _{Aeq}		21	32	33	24	21	15	16	11	7	7	6
<i>L</i> _{max}		45	60	57	51	47	42	41	32	25	14	10
<i>L</i> ₁₀		22	34	35	25	22	17	18	14	8	7	7
<i>L</i> ₉₀		17	26	28	19	16	11	12	8	6	7	6
21:00												
<i>L</i> _{Aeq}		19	31	32	23	20	13	13	9	7	7	6
<i>L</i> _{max}		41	58	55	47	45	34	30	31	32	13	9
<i>L</i> ₁₀		20	33	34	24	21	15	15	10	7	7	7
<i>L</i> ₉₀		16	26	28	19	15	10	11	7	6	7	6
22:00												
<i>L</i> _{Aeq}		18	31	32	22	18	12	13	10	7	7	6
<i>L</i> _{max}		47	56	54	40	35	32	39	44	38	17	8
<i>L</i> ₁₀		19	33	34	23	20	13	14	9	6	7	7
<i>L</i> ₉₀		16	26	28	18	15	9	10	6	6	7	6

Mayton Street, Openshaw. Validation test results - plot 1

Break-in Noise levels (standardised levels)

25th - 26th May 2022

Bedroom 2

Octave Band Centre Frequency, Hz.	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
23:00											
<i>L</i> _{Aeq}	17	30	32	21	17	11	11	7	6	7	6
<i>L</i> _{max}	33	52	53	39	35	30	26	20	13	11	8
<i>L</i> ₁₀	18	32	34	23	19	12	13	8	6	7	7
<i>L</i> ₉₀	15	26	28	18	15	9	9	6	6	7	6
00:00											
<i>L</i> _{Aeq}	16	30	31	21	16	10	10	7	6	7	6
<i>L</i> _{max}	40	53	61	41	35	36	32	27	32	19	11
<i>L</i> ₁₀	17	32	33	23	18	11	11	7	6	7	7
<i>L</i> ₉₀	14	25	27	18	14	8	7	6	6	7	6
01:00											
<i>L</i> _{Aeq}	15	29	29	20	15	9	9	6	6	7	6
<i>L</i> _{max}	33	41	47	33	32	30	29	23	19	10	11
<i>L</i> ₁₀	17	31	31	22	16	10	10	7	6	7	6
<i>L</i> ₉₀	14	24	25	16	12	7	6	6	6	7	6
02:00											
<i>L</i> _{Aeq}	15	28	27	18	14	9	8	6	6	7	6
<i>L</i> _{max}	39	44	42	37	39	37	33	32	26	21	14
<i>L</i> ₁₀	16	30	30	20	16	10	9	7	6	7	6
<i>L</i> ₉₀	14	24	24	14	12	6	6	6	6	7	6
03:00											
<i>L</i> _{Aeq}	15	29	29	17	14	9	8	6	6	7	6
<i>L</i> _{max}	31	40	42	32	34	27	23	22	18	8	7
<i>L</i> ₁₀	16	32	31	19	16	10	10	7	7	7	6
<i>L</i> ₉₀	14	25	26	14	12	7	6	6	6	7	6
04:00											
<i>L</i> _{Aeq}	17	30	29	18	17	11	9	11	8	7	6
<i>L</i> _{max}	39	44	42	40	40	36	31	32	24	19	10
<i>L</i> ₁₀	19	32	31	20	18	11	11	14	9	7	6
<i>L</i> ₉₀	14	26	25	15	14	8	6	6	6	7	6
05:00											
<i>L</i> _{Aeq}	18	31	31	20	18	12	12	9	8	7	6
<i>L</i> _{max}	42	50	50	41	39	39	36	35	27	15	7
<i>L</i> ₁₀	19	33	33	21	20	13	13	10	9	7	6
<i>L</i> ₉₀	15	26	27	17	16	9	8	6	6	7	6
06:00											
<i>L</i> _{Aeq}	21	33	35	25	22	17	15	10	8	7	6
<i>L</i> _{max}	40	53	58	46	40	38	31	31	17	11	7
<i>L</i> ₁₀	23	35	37	28	25	19	17	11	9	7	6
<i>L</i> ₉₀	17	28	30	20	18	12	11	7	6	7	6

Plot 1. Living room

Mayton Street, Openshaw. Validation test results - plot 1												
Break-in Noise levels (standardised levels)												
6th June 2022												
Living room												
Octave Band Centre Frequency, Hz.		dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
16:00												
<i>L</i> _{Aeq}		21	34	25	21	24	16	14	10	11	12	14
<i>L</i> _{max}		50	59	52	47	45	44	48	37	33	21	14
<i>L</i> ₁₀		21	36	26	23	26	16	12	9	10	11	13
<i>L</i> ₉₀		17	21	15	11	17	8	6	7	9	11	13
17:00												
<i>L</i> _{Aeq}		22	36	26	25	26	17	13	10	11	12	14
<i>L</i> _{max}		49	60	58	56	56	42	40	33	31	18	17
<i>L</i> ₁₀		21	38	26	22	24	17	12	9	10	11	13
<i>L</i> ₉₀		16	21	14	10	16	7	6	7	9	11	13
18:00												
<i>L</i> _{Aeq}		24	38	25	27	30	17	13	11	11	12	14
<i>L</i> _{max}		52	64	50	55	58	42	42	42	39	31	32
<i>L</i> ₁₀		21	38	27	23	26	16	11	9	10	11	13
<i>L</i> ₉₀		17	21	15	11	17	7	6	7	9	11	13
19:00												
<i>L</i> _{Aeq}		19	34	25	21	22	12	9	9	10	12	14
<i>L</i> _{max}		43	59	56	49	48	37	31	30	29	16	14
<i>L</i> ₁₀		19	36	25	21	22	12	10	9	10	11	13
<i>L</i> ₉₀		16	20	14	10	13	6	5	7	9	11	13
20:00												
<i>L</i> _{Aeq}		19	32	25	21	20	13	9	9	10	12	14
<i>L</i> _{max}		46	58	52	44	52	43	35	37	32	25	14
<i>L</i> ₁₀		19	32	25	23	21	11	9	10	10	11	13
<i>L</i> ₉₀		16	18	11	8	12	6	5	7	9	11	13
21:00												
<i>L</i> _{Aeq}		19	44	30	22	19	12	8	8	10	12	14
<i>L</i> _{max}		41	60	52	47	43	40	31	30	25	16	15
<i>L</i> ₁₀		19	34	33	24	20	11	8	8	10	11	13
<i>L</i> ₉₀		16	16	10	8	11	6	5	7	9	11	13
22:00												
<i>L</i> _{Aeq}		19	33	26	22	21	11	8	8	10	12	14
<i>L</i> _{max}		46	55	46	52	53	35	36	33	30	24	14
<i>L</i> ₁₀		18	33	29	22	18	10	8	8	10	12	13
<i>L</i> ₉₀		16	15	13	8	9	5	5	7	9	11	13