



Ref: P4393/L01/PJK

11 June 2024

## 6 Loom Street, Manchester

### Technical Note – Internal Validation Measurements

|              |                     |
|--------------|---------------------|
| Prepared by: | Paul Knowles (MIOA) |
| Checked by:  | Naveen Simha (MIOA) |

#### 1.0 Introduction

- 1.1 Acoustic and Engineering Consultants Ltd (AEC) has been appointed by Forshaw Group to undertake noise measurements and prepare a technical note to review whether Condition 8 placed on the scheme by Manchester City Council (MCC), can be discharged.

- 1.2 Condition 8 states:

*“8) (a) The development hereby approved shall be carried in accordance with Noise Assessment-AEC Report: P4393/R1d/RDC, stamped as received by email on 15 October 2021 and Application for Approval of Details reserved by Condition Form, stamped as received by the City Council, as Local Planning Authority on 7 September 2021. The noise insulation scheme shall be completed before the first occupation of dwelling.*

*(b) Upon completion of the development and before first occupation of the residential unit, 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 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. A verification report and measures shall be agreed until such a time as the development complies with part (a) of this planning condition.*

*Additionally, where entertainment noise is a factor in the noise climate the sound insulation scheme shall be designed to achieve internal noise levels in the 63Hz and 125Hz octave centre frequency bands so as not to exceed (in habitable rooms) 47dB and 41dB, respectively.*

*Reason - To secure a reduction in noise from nearby commercial uses and other noise generating uses in order to protect future residents from noise nuisance, pursuant to policies SP1, H1 and DM1 of the Core Strategy*

- 1.3 As stated in AEC Report: P4393/R1d/RDC, there was no entertainment noise sources affecting the habitable rooms in the development, therefore, this has not been considered further.

## 2.0 Noise Measurements and Assessment

### Criteria

- 2.1 As stated in AEC Report: P4393/R1d/RDC the required internal noise level limits to be achieved within residential developments are outlined in MCC document 'Planning & Noise – Technical Guidance' (2015) (PNTG)<sup>1</sup>. Section 3.6.1.1 of PNTG states:

*“Manchester City Council has adopted the following internal limits for residential properties:*

- Bedroom (night-time – 23.00 – 07.00) 30dB<sub>L<sub>Aeq</sub></sub> (individual noise events should not normally exceed 45dB<sub>L<sub>Amax, F</sub></sub> by more than 15 times);*
- Living Rooms (daytime – 07.00 – 23.00) 35dB<sub>L<sub>Aeq</sub></sub>.”*

### Measurements

- 2.2 Noise levels were measured by AEC between Friday 07 and Monday 10 June 2024 in the first floor bedroom.
- 2.3 The measurements were undertaken in general accordance with the Association of Noise Consultants guidance “Measurement of Sound Levels in Buildings” issued in June 2020. The calibration certificates for the measurement equipment used by AEC is presented in Appendix A.
- 2.4 As the development is ventilated via acoustic trickle ventilators, the measurements were undertaken with these open but with windows closed.
- 2.5 The daytime and night-time internal ambient noise levels measured during the survey are presented in Table 2.1, along with the criteria for comparison purposes.

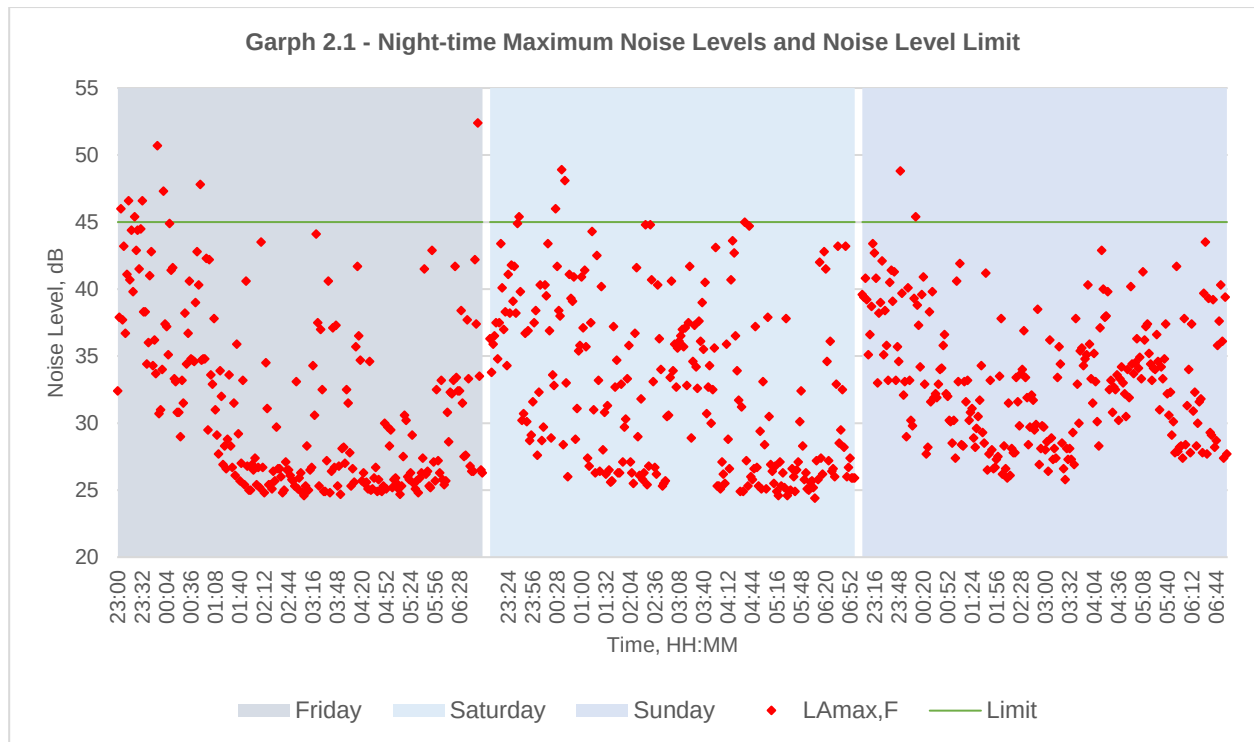
**Table 2.1 – Measured Internal Ambient Noise Levels and Criteria**

| Period            | Noise Level, dB <sub>L<sub>Aeq</sub></sub> , T |          |                           |          |
|-------------------|------------------------------------------------|----------|---------------------------|----------|
|                   | Daytime (0700 – 2300h)                         |          | Night-time (2300 – 0700h) |          |
|                   | Measured Level                                 | Criteria | Measured Level            | Criteria |
| Friday            | 29 <sup>1</sup>                                | ≤ 35     | -                         | -        |
| Friday / Saturday | -                                              | -        | 26                        | ≤ 30     |
| Saturday          | 29                                             | ≤ 35     | -                         | -        |
| Saturday / Sunday | -                                              | -        | 25                        | ≤ 30     |
| Sunday            | 28                                             | ≤ 35     | -                         | -        |
| Sunday / Monday   | -                                              | -        | 26                        | ≤ 30     |

<sup>1</sup> 1300-2300h

- 2.6 The above demonstrates that the ambient noise level requirements were achieved during both the daytime and night-time periods.
- 2.7 The maximum noise levels measured during the three night-time periods over two-minute sampling times are presented in Graph 2.1, below. The night-time maximum noise level criteria of 45dB<sub>L<sub>Amax, F</sub></sub> is also presented on the graph for reference purposes.

<sup>1</sup> PNTG was updated in October 2022 after the project had been granted planning permission.



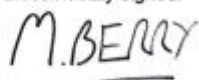
2.8 Based on the above dataset, there were fewer than 15 exceedances of 45dBL<sub>AFmax</sub>, during the three night-time periods, therefore, the requirements have been achieved.

### Summary

2.9 The above assessment demonstrates that internal ambient and maximum noise levels comply with the requirements of Condition 8.

2.10 As a result, Condition 8 can be discharged.

## Appendix A – Calibration Certificates

| <h3>CERTIFICATE OF CALIBRATION</h3>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                     |                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ISSUED BY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Cirrus Research plc |                                                                                                                                                                                                                                                                                                        |
| DATE OF ISSUE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 18 January 2024     | CERTIFICATE NUMBER 206751                                                                                                                                                                                                                                                                              |
| <div style="display: flex; align-items: center;"><div style="width: 40px; height: 40px; background-color: red; margin-right: 10px;"></div><div><b>Cirrus Research plc</b><br/>Acoustic House<br/>Bridlington Road<br/>Hunmanby<br/>North Yorkshire<br/>YO14 0PH<br/>United Kingdom</div></div>                                                                                                                                                                                                                                                                                                                                            |                     | <div style="border: 1px solid black; padding: 5px; text-align: center;">Page 1 of 2</div> <div style="border: 1px solid black; padding: 5px;">Approved signatory<br/>M. Berry<br/>Electronically signed:<br/></div> |
| <h3>Sound Level Meter : IEC 61672-3:2013</h3>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                                                                                                                                                                                                                                                                                                        |
| <b>Instrument information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                                                                                                                                                                                                                                                                                                        |
| Manufacturer:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Cirrus Research plc | Notes:                                                                                                                                                                                                                                                                                                 |
| Model:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | CR:171B             |                                                                                                                                                                                                                                                                                                        |
| Serial number:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | G078287             |                                                                                                                                                                                                                                                                                                        |
| Class:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1                   |                                                                                                                                                                                                                                                                                                        |
| Firmware version:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3.2.3254            |                                                                                                                                                                                                                                                                                                        |
| <b>Test summary</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                     |                                                                                                                                                                                                                                                                                                        |
| Date of calibration: 17 January 2024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |                                                                                                                                                                                                                                                                                                        |
| The calibration was performed respecting the requirements of ISO/IEC 17025:2017.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |                                                                                                                                                                                                                                                                                                        |
| Periodic tests were performed in accordance with procedures from IEC 61672-3:2013.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                     |                                                                                                                                                                                                                                                                                                        |
| <b>The sound level meter submitted for testing successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |                                                                                                                                                                                                                                                                                                        |
| However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to determine that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013. |                     |                                                                                                                                                                                                                                                                                                        |
| <b>Notes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                     |                                                                                                                                                                                                                                                                                                        |
| <hr/> <small>This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.</small> <hr/>                          |                     |                                                                                                                                                                                                                                                                                                        |

## CERTIFICATE OF CALIBRATION

Certificate Number:  
**206751**

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### Environmental conditions

The following conditions were recorded at the time of the test:

**Before** Pressure: 98.58 kPa Temperature: 21.7 °C Humidity: 36.6 %  
**After** Pressure: 98.58 kPa Temperature: 21.7 °C Humidity: 38.6 %

### Test equipment

| Equipment             | Manufacturer    | Model    | Serial number  |
|-----------------------|-----------------|----------|----------------|
| Signal Generator      | SIGLENT         | SDG1032X | SDG1XDDQ8R6309 |
| Attenuator            | Cirrus Research | ZE 952   | 93892          |
| Environmental Monitor | Comet           | T7510    | 16966334       |

### Additional instrument information

Instruction manual:

Reference level range: Single range

Pattern approval: No

Source of pattern approval: -

#### Preamplifier

Model: MV-200F

Serial number: 5719F

#### Microphone

Model: MK.224

Serial number: 206255A

### Test results summary

| Test                                   | Result   |
|----------------------------------------|----------|
| Toneburst response                     | Complies |
| Electrical noise-floor                 | Complies |
| Linearity                              | Complies |
| Electrical Frequency weightings        | Complies |
| Frequency and time weightings at 1 kHz | Complies |
| C-weighted peak                        | Complies |
| Overload indication                    | Complies |
| High level stability                   | Complies |
| Long-term stability                    | Complies |
| Acoustic Frequency weightings          | Complies |

## CERTIFICATE OF CALIBRATION

ISSUED BY                      Cirrus Research plc  
DATE OF ISSUE              10 January 2024      CERTIFICATE NUMBER 206756



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

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Test engineer:  
D. Swahell  
Electronically signed:

### Microphone

#### Microphone capsule

Manufacturer: Cirrus Research plc  
Model: MK224  
Serial Number: 206255A

#### Calibration procedure

Date of calibration: 10 January 2024  
Open circuit: 32.9 mV/Pa  
Sensitivity at 1 kHz: -29.7 dB rel 1 V/Pa

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 a National Measurement Institute.

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

#### Environmental conditions

Pressure: 102.60 kPa  
Temperature: 21.0 °C  
Humidity: 39.0 %

## CERTIFICATE OF CALIBRATION

Certificate Number:

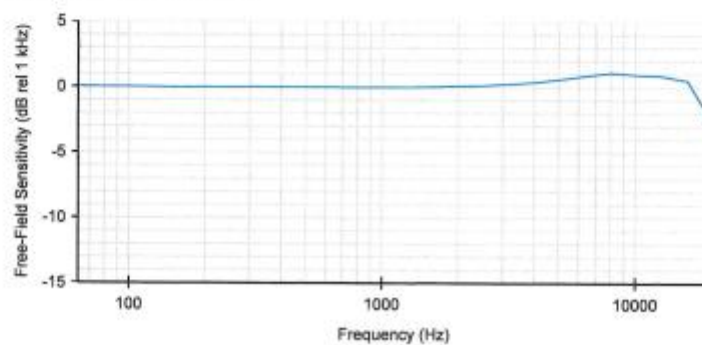
**206756**

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Free-Field Frequency Response : Tabular

| Frequency (Hz) | Free-Field Sensitivity (dB rel 1 kHz) | Actuator Response (dB) |
|----------------|---------------------------------------|------------------------|
| 63             | 0.06                                  | -0.19                  |
| 80             | 0.05                                  | -0.09                  |
| 100            | 0.05                                  | -0.04                  |
| 125            | 0.04                                  | -0.01                  |
| 160            | 0.00                                  | -0.02                  |
| 200            | 0.02                                  | 0.02                   |
| 250            | 0.01                                  | 0.01                   |
| 315            | 0.03                                  | 0.01                   |
| 400            | 0.00                                  | 0.00                   |
| 500            | 0.01                                  | -0.00                  |
| 630            | 0.00                                  | -0.00                  |
| 800            | -0.00                                 | -0.02                  |
| 1 000          | 0.00                                  | -0.02                  |
| 1 250          | 0.01                                  | -0.04                  |
| 1 600          | 0.04                                  | -0.07                  |
| 2 000          | 0.10                                  | -0.09                  |
| 2 500          | 0.16                                  | -0.15                  |
| 3 150          | 0.25                                  | -0.26                  |
| 4 000          | 0.40                                  | -0.43                  |
| 5 000          | 0.61                                  | -0.64                  |
| 6 300          | 0.88                                  | -1.08                  |
| 8 000          | 1.12                                  | -1.96                  |
| 10 000         | 0.98                                  | -3.72                  |
| 12 500         | 0.91                                  | -5.60                  |
| 16 000         | 0.54                                  | -7.41                  |
| 20 000         | -2.39                                 | -11.44                 |

Free-Field Frequency Response : Graphical

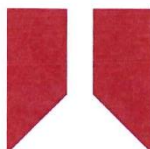


## CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 18 January 2024

CERTIFICATE NUMBER 206780



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

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Approved signatory

M.Berry

Electronically signed:

M.BERRY

### Sound Calibrator : IEC 60942:2003

#### Instrument information

Manufacturer: Brüel & Kjær

Notes:

Model: 4230

Serial number: 1441331

Class: 1

#### Test summary

Date of calibration: 18 January 2024

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC60942\_2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

The sound calibrator has been shown to conform to the Class 1 requirements for periodic testing, described in Annex B of IEC 60942:2003 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

However, as public evidence was not available, from a testing organisation responsible for pattern approval, to demonstrate that the model of sound calibrator conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, no general statement or conclusion can be made about conformance of the sound calibrator to the requirements of IEC 60942:2003.

Notes:

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a coverage probability of approximately 95%.

## CERTIFICATE OF CALIBRATION

Certificate Number:

**206780**

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### Environmental conditions

The following conditions were recorded at the time of the test:

Pressure: 99.81 kPa

Temperature: 25.4 °C

Humidity: 39.3 %

### Test equipment

| Equipment             | Manufacturer   | Model | Serial number |
|-----------------------|----------------|-------|---------------|
| Distortion Meter      | Keithley       | 2015  | 0994818       |
| Acoustic Calibrator   | Brüel and Kjær | 4231  | 2610257       |
| Environmental Monitor | Comet          | T7510 | 21962628      |

### Initial Results

|                | Expected | Sample 1      | Sample 2      | Sample 3      | Average       | Deviation | Tolerance    | Uncertainty |
|----------------|----------|---------------|---------------|---------------|---------------|-----------|--------------|-------------|
| Level (dB)     | 94.00    | 94.04         | 94.03         | 94.03         | <b>94.03</b>  | 0.03      | ±0.40        | 0.11 dB     |
| Distortion (%) | < 3.00   | 0.87          | 0.83          | 1.03          | <b>0.91</b>   | 0.91      | +3.00        | 0.13 %      |
| Frequency (Hz) | 1000.0   | <b>1020.4</b> | <b>1020.2</b> | <b>1021.0</b> | <b>1020.5</b> | 20.5      | <b>±10.0</b> | 0.1 Hz      |

The measured quantities or deviations (as applicable), extended by the expanded combined uncertainty of measurement, must not exceed the corresponding tolerance.

### Adjusted Results

|                | Expected | Sample 1      | Sample 2      | Sample 3      | Average       | Deviation | Tolerance | Uncertainty |
|----------------|----------|---------------|---------------|---------------|---------------|-----------|-----------|-------------|
| Level (dB)     | 94.00    | 94.05         | 94.04         | 94.05         | <b>94.05</b>  | 0.05      | ±0.40     | 0.11 dB     |
| Distortion (%) | < 3.00   | 0.90          | 0.93          | 0.93          | <b>0.92</b>   | 0.92      | +3.00     | 0.13 %      |
| Frequency (Hz) | 1000.0   | <b>1004.4</b> | <b>1005.0</b> | <b>1004.4</b> | <b>1004.6</b> | 4.6       | ±10.0     | 0.1 Hz      |

End of results