

21/08/2026

Consolidated Power Projects Australia Pty Ltd  
Luke Perabo  
54-62 Ferndell Street, South Granville, NSW 2142  
Via email: lperabo@conpower.com.au

Our reference: 500-J00232-Report-20260821\_Noise Monitoring Letter Report

Dear Mr Perabo,

### **Re: Out of Hours noise monitoring conducted on 15 August 2026.**

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#### Introduction

On 29 April 2026, a letter was submitted to the Department of Planning, Housing and Infrastructure (DPHI) seeking approval to vary the standard construction hours to allow the 330 kV XLPE underground cable jointing and termination works to be undertaken outside standard construction hours.

As outlined in Section 7 of the CPP Environmental Management Strategy, written approval from the Planning Secretary must be obtained prior to undertaking any out-of-hours work (OOHW). The following requirements apply to an OOHW request:

- Conduct a noise impact assessment consistent with the requirements of the Interim Construction Noise Guideline (DECC, 2009) to accompany the OOHW approval.
- Include in the OOHW request:
  - o Details of the nature and justification for activities to be conducted during the varied construction hours.
  - o Written evidence that appropriate consultation with potentially affected sensitive receivers and notification of Councils (and other relevant agencies) has been or will be undertaken.
  - o Evidence that all feasible and reasonable noise mitigation measures have been put in place.

An Out-of-Hours Work Approval (Ref: SSD-52786213-PA-35) was subsequently issued by DPHI on 10 July 2026.

Consolidated Power Projects Australia Pty Ltd (CPP) engaged Moss Environmental Pty Ltd (Moss) to undertake attended out-of-hours noise monitoring in accordance with the requirements of the approval.

The key aspects of the approved out-of-hours work are as follows:

- The approved variation extends the standard construction hours to 7:00 am to 8:00 am and 1:00 pm to 5:00 pm on Saturdays, and 8:00 am to 5:00 pm on Sundays, for approximately eight weeks.
- Works will only be undertaken during daytime periods, with no work permitted during the evening or night-time periods.
- The noise impact assessment undertaken for the proposed works predicted that noise levels would generally remain below the applicable Noise Management Level (NML) of 45 dBA at most receivers.
- Reasonable and feasible noise mitigation measures will be implemented to minimise potential noise impacts associated with the works.

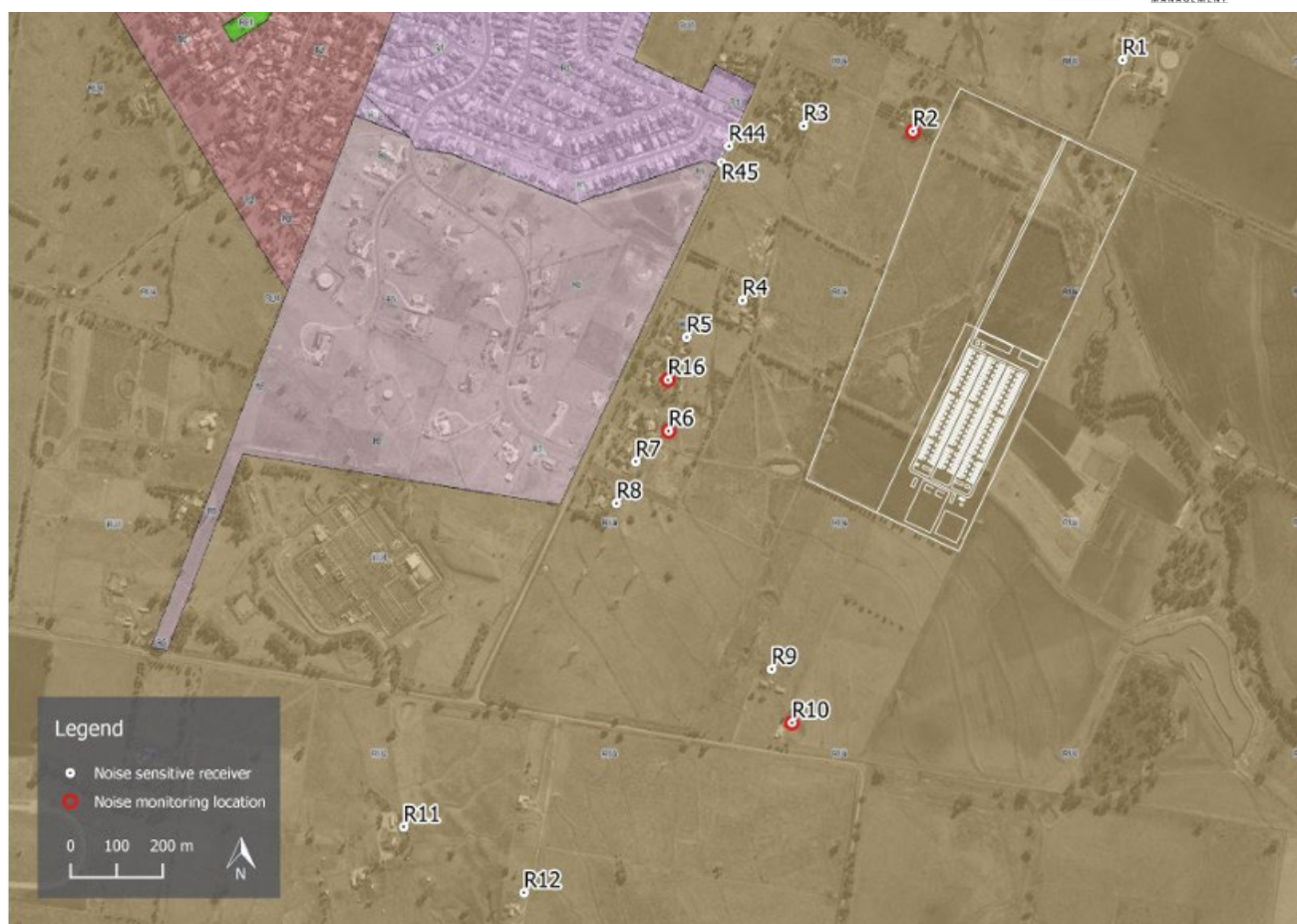
## Baseline noise monitoring results

As part of the Calala BESS EIS process, a background noise assessment was undertaken at Receptors R2, R6, R10 and R16. The locations of these receptors are shown on the map below. The results of the assessment are presented in the table below.

Table 7: Measured average rating background level and ambient noise levels

| Receiver/Period <sup>[1]</sup> | RBL L <sub>A90</sub> dB | L <sub>Aeq</sub> dB |
|--------------------------------|-------------------------|---------------------|
| <b>R2</b>                      |                         |                     |
| Day                            | 34                      | 47                  |
| Evening                        | 29                      | 44                  |
| Night                          | 24                      | 40                  |
| <b>R6</b>                      |                         |                     |
| Day                            | 29                      | 45                  |
| Evening                        | 28                      | 39                  |
| Night                          | 22                      | 36                  |
| <b>R10</b>                     |                         |                     |
| Day                            | 25                      | 45                  |
| Evening                        | 26                      | 40                  |
| Night                          | 23                      | 37                  |
| <b>R16</b>                     |                         |                     |
| Day                            | 29                      | 47                  |
| Evening                        | 28                      | 37                  |
| Night                          | 23                      | 37                  |

- 1 Day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays  
Evening – the period from 6 pm to 10 pm  
Night – the remaining periods.



In addition to the baseline noise monitoring conducted as part of the EIS, one (1) round of attended out-of-hours baseline noise monitoring was conducted on 9 August 2026 at the following receptor locations:

Receptor 8 – 111 Burgess Lane, Calala, NSW 2340  
 Receptor 9 – 781 Burgmanns Lane, Calala, NSW 2340  
 Receptor 11 – 696 Burgmanns Lane, Kingswood, NSW 2340

The results of the attended baseline noise monitoring are presented in Table 5.

*Table 1: Attended baseline noise monitoring results*

| Receptor | Date          | Start time | Duration   | LAeq, 15min (dBA) | LA90, 15min (dBA) |
|----------|---------------|------------|------------|-------------------|-------------------|
| R8       | 9 August 2026 | 13:54      | 15 minutes | 39.4              | 32.3              |
| R9       | 9 August 2026 | 13:01      | 15 minutes | 39.0              | 35.1              |
| R11      | 9 August 2026 | 13:26      | 15 minutes | 48.2              | 39.4              |

The attended baseline monitoring recorded LAeq levels ranging from 39.0 to 48.2 dBA and LA90 levels ranging from 32.3 to 39.4 dBA.

As no project construction activities were underway during the baseline noise monitoring events, the measured noise levels represent the existing acoustic baseline environment at the monitoring locations prior to commencement of the out-of-hours works.

## First round of OOHW noise monitoring

The monitoring was undertaken to establish noise levels associated with OOHW at selected sensitive receptor locations. Out-of-hours construction activities were undertaken at Work Area 1 during the noise monitoring period. Construction activities were limited to hand tools used to get ready for testing and cable jointing and a generator situated at the main compound. All the activities were in the cable jointing scaffold. Attended out-of-hours noise monitoring was conducted on 15 August 2026 at the following receptor locations:

Receptor 2 – 438 Calala Lane, Calala, NSW 2340  
 Receptor 4 – 57 Burgess Lane, Calala, NSW 2340  
 Receptor 9 – 781 Burgmanns Lane, Calala, NSW 2340

Monitoring was undertaken at each location for a period of 15 minutes. The monitoring results included the total LAeq and LA90 noise levels. The monitoring was undertaken in accordance with Condition 6 of the Out-of-Hours Work Approval, see condition compliance table below.

An attended 15-minute noise measurement was undertaken at Receptor R2 on 15 August 2026 at 14:40. The measured levels were LAeq,15min 46.3 dB(A), LAE 75.9 dB(A), LAFmax 61.7 dB(A) and LAF01 55.2 dB(A). During the measurement, a dog located approximately 40 metres from the monitoring position barked intermittently at approximately three-second intervals during three separate periods of approximately two minutes each. The barking was prompted by the presence of the monitoring operator and was clearly audible. Construction activities approximately 800 metres from the monitoring location were not audible to the operator. The dog barking overlapped the construction activities and potentially materially influenced the measured noise descriptors. As only summary measurement results were retained, without audio or interval time-history data, the contribution from the barking could not be reliably isolated or removed. No numerical correction has therefore been applied. The measurement has been excluded from the quantitative compliance assessment, although the original results have been retained for transparency. Conclusions regarding construction-noise compliance are based on the valid measurements obtained at the other two monitoring locations.

Table 2: Condition compliance table

| Condition No | Condition                                                                                                                                                                                                              | Report reference                                                                                                                                                                                                                                                                |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | 6. for all noise monitoring completed under the existing approval and this approval, reports are to be consistent with the requirements of Section 8.2 of the Interim Construction Noise Guideline (ICNG) and include: |                                                                                                                                                                                                                                                                                 |
| a            | details on each monitoring location, including receptor number, address and a figure showing the locations                                                                                                             | Refer to Table 3 and Figure 1                                                                                                                                                                                                                                                   |
| b            | the date and start time of each noise monitoring event                                                                                                                                                                 | Refer to Table 5                                                                                                                                                                                                                                                                |
| c            | confirmation that each attended noise monitoring event was 15 minutes in duration                                                                                                                                      | Refer to Table 5                                                                                                                                                                                                                                                                |
| d            | the parameters of the results, including total LAeq and LA90 levels for each monitoring event                                                                                                                          | Refer to Table 5                                                                                                                                                                                                                                                                |
| e            | the estimated site-only noise contribution for each monitoring event reported as an LAeq(15minute). If construction noise is not audible during monitoring, this should be stated                                      | Refer to Table 6                                                                                                                                                                                                                                                                |
| f            | details of activities and equipment in use during the attended monitoring, including a figure showing the approximate location of equipment on site                                                                    | Out-of-hours construction activities were undertaken at Work Area 1 during the noise monitoring period. Construction activities were limited to hand tools used to get ready for testing and cable jointing and a generator from the office compound.<br><br>Refer to Figure 1. |
| g            | weather conditions including wind speed and wind direction during each monitoring event. This should be both local conditions and from the nominated site weather station                                              | Refer to Table 7 and Table 8                                                                                                                                                                                                                                                    |

|   |                                                                                                                                                                           |             |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| h | a letter report must be provided to the satisfaction of the Planning Secretary within 7 days of completing each round of attended monitoring addressing the details above | This report |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|

## Acoustic Team Qualifications and Experience

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Shonelle Gleeson-Wiley</b> | Shonelle holds a Bachelor of Applied Science (Environmental Management and Tourism) and a Master of Environmental Management and is currently completing a Master of Environmental Law. She has completed the University of New South Wales General Principles of Acoustics short course (mod 1-4). She is also a Certified Environmental Practitioner (CEnvP-General) and has approximately 18 years of experience undertaking acoustic monitoring on construction projects, including noise monitoring and assessment associated with construction activities and out-of-hours works. |
| <b>Nico Brits</b>             | Nico Brits holds a Master of Science in Water Resource Management and a Bachelor of Science Honours in Environmental Management. He has over 15 years of experience in environmental consulting, including undertaking environmental impact assessments and associated environmental investigations. His experience includes noise baseline monitoring and assessment undertaken as part of environmental impact assessment and construction projects.                                                                                                                                  |

## Monitoring locations

Attended noise monitoring was undertaken at Receptors R2, R4 and R9. Monitoring locations were selected to provide representative measurements of noise levels at or in proximity to the nominated sensitive receptor locations during the approved out-of-hours works. The proposed locations have been selected based on:

- Proximity to the active work areas.
- Likely highest noise exposure.
- Coverage of Work Area 1, the area where out of hours work was undertaken.
- Accessibility and safety for attended monitoring.
- Compliance with NSW EPA 'Approved methods for the measurement and analysis of environmental noise in NSW'.

Refer to Table 3 and Figure 1 for the locations and descriptions of the monitoring locations.

Table 3: Monitoring locations

| Receptor | Address                           | Monitoring Location                                                                                                                                                                                            | Monitoring point coordinates   | Microphone height     | Distance to and type of reflective surface | Tripod and wind shield details                    |
|----------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------|--------------------------------------------|---------------------------------------------------|
| R2       | 438 Calala Lane, Calala, NSW 2340 | <p>The noise monitoring equipment was positioned 5 m from the water tank, 8 m from the house façade and 6m from trees.</p>  | 31°8'17.52"S<br>150°57'52.56"E | Between 1.2 and 1.5 m | 8 m from house facade                      | Meter was placed on a tripod and with wind shield |

|    |                                      |                                                                                                                                                                                                                                                                                                             |                                |                       |                   |                                                   |
|----|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------|-------------------|---------------------------------------------------|
|    |                                      |                                                                                                                                                                                                                                                                                                             |                                |                       |                   |                                                   |
| R4 | 57 Burgess Lane, Calala, NSW 2340    | <p>Noise monitoring was conducted at the house yard boundary due to the owner's request. The location is considered representative of a worst-case scenario due to it being approximately 80 m closer to Work Area 1.</p>  | 31°8'32.68"S<br>150°57'38.70"E | Between 1.2 and 1.5 m | None nearby       | Meter was placed on a tripod and with wind shield |
| R9 | 781 Burgmanns Lane, Calala, NSW 2340 | <p>The noise monitoring equipment was positioned 4 m from the house veranda facing Work Area 1.</p>                                                                                                                      | 31°8'57.08"S<br>150°57'38.34"E | Between 1.2 and 1.5 m | 4 m House veranda | Meter was placed on a tripod and with wind shield |

## Monitoring methodology

Attended noise monitoring was undertaken at Receptors R2, R4 and R9 on 15 August 2026. The monitoring was undertaken during the approved out-of-hours construction activities to determine noise conditions at the nominated sensitive receptor locations. Observations of audible noise sources, audible construction noise and other relevant conditions were recorded throughout each 15-minute monitoring period.

The following noise monitoring requirements from the NSW EPA 'Approved methods for the measurement and analysis of environmental noise in NSW' are applicable and were incorporated into the monitoring methodology:

Table 4: Monitoring requirements

| Monitoring requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Compliance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Noise measurements for the purposes of determining compliance with a licence or consent must be based on the use of a Class 1 sound level meter as specified in AS/NZS IEC 61672.1:2019 Electroacoustics: sound level meter specifications.                                                                                                                                                                                                                                                                                                                                                  | Noise measurements were undertaken using a Rion NL-52 Class 1 sound level meter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| If you measure noise with sound level meters manufactured before 2019 you must report this, together with the standard(s) met by that instrument (for example, Australian Standard IEC 61672.1:2013 or IEC 61672.1:2004).                                                                                                                                                                                                                                                                                                                                                                    | The Rion NL-52 Class 1 sound level meter was calibrated on 29 August 2025 (see calibration certificate attached to this report as an appendix). The following relevant details were extracted from the calibration certificate: <ul style="list-style-type: none"> <li>• Calibration number: C25582-V1</li> <li>• Calibration date: 29 August 2025</li> <li>• Report issue date: 01 September 2025</li> <li>• IEC standard: 61672-3:2013</li> <li>• Equipment tested: Instrument (Serial number 00186647); Microphone (Serial number 12784); Pre-amplifier (Serial number 76697).</li> </ul> |
| Field calibration checks of the instrumentation must be carried out before and after measurements are made.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | A field calibration of the sound level meter was undertaken at the commencement and completion of the monitoring program. The acoustic calibrator used for the field calibration had a reference level of 93.9 dB at 1 kHz and was calibrated on 17 October 2025. Post monitoring in field calibration was confirmed at 93.9dB.                                                                                                                                                                                                                                                              |
| If meteorological conditions are likely to affect the measurements of noise, these must be considered and corrections applied (as appropriate), reported and justified. General advice on minimising the effects of meteorological conditions is described in section 6.3 of AS 1055:2018. Advice in relevant standards, policies and guidelines may also be appropriate, including fact sheet D of the Noise Policy for Industry.<br><br><u>Noise Policy for Industry</u><br>Do not take measurements when it is raining or when the average wind speed at microphone height exceeds 5 m/s. | Wind speed, wind direction and temperature were recorded at the beginning and end of each monitoring event using a handheld anemometer. Wind speeds did not exceed 5 m/s.                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Outdoor (free-field) measurements should be undertaken at least 3.5m from any reflecting structure (other than the ground) and at a height of 1.2–1.5m above ground level                                                                                                                                                                                                                                                                                                                                                                                                                    | The sound-level meter was placed on a tripod, which was between 1.2 to 1.5m above the ground. The monitoring points were more than 4 m away from any reflecting walls, buildings and other reflecting surfaces.                                                                                                                                                                                                                                                                                                                                                                              |
| A measurement time interval of 15 minutes with a ‘fast’ (F) time weighting must be used for statistical descriptors, unless otherwise specified.                                                                                                                                                                                                                                                                                                                                                                                                                                             | Each attended noise monitoring event was undertaken for a period of 15 minutes, consistent with the requirements of the Out-of-Hours Work Approval. Measurements included the overall A-weighted equivalent continuous sound level (LAeq) and the A-weighted sound level exceeded for 90 per cent of the monitoring period (LA90). The meter was set to ‘Fast’ time weighing.                                                                                                                                                                                                                |

## Monitoring results

The results of the attended noise monitoring are presented in Table 5.

Table 5: Attended noise monitoring results

| Receptor | Date           | Start time | Duration   | LAeq, 15min (dBA) | LA90, 15min (dBA) |
|----------|----------------|------------|------------|-------------------|-------------------|
| R2       | 15 August 2026 | 14:40      | 15 minutes | 46.3              | 38.2              |
| R4       | 15 August 2026 | 15:22      | 15 minutes | 39.6              | 33.9              |
| R9       | 15 August 2026 | 16:11      | 15 minutes | 41.0              | 26.1              |

As indicated above, the noise monitoring data at Receptor 2 has been contaminated by a dog barking and therefore, these measurements are excluded from the discussion. The attended noise monitoring recorded LAeq levels ranging from 39.6 to 41.0 dBA and LA90 levels ranging from 26.1 to 33.9 dBA.

### Site activities and Noise Contributions

Out-of-hours construction activities were undertaken at Work Area 1 during the noise monitoring period. The activities were limited to the use of hand tools. Construction noise was not audible at Receptors R2 and R9 during the monitoring periods. At Receptor R4, a reversing non-tonal beeper was audible approximately 12 minutes into the monitoring period.

Observations of other audible noise sources were also recorded throughout each 15-minute monitoring event. The observed noise sources are summarised in Table 6.

Table 6: Observed noise sources during noise monitoring

| Receptor | Observed noise sources                                                                                                                                                                                                                                                                                                                 |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R2       | Continuous, intermittent traffic noise from Calala lane; 2:50pm-2:55pm bird chirping 20m away; 2:41pm, 2:44-2:46pm, 2:54-2:55pm dog barking 30m away. No construction noise audible.                                                                                                                                                   |
| R4       | Birds in trees 40m away and overhead throughout; traffic on Calala Lane throughout; some rustling leaves on trees due to increasing wind strength, therefore monitor placed 50m and 40m away from the fence tree line to mitigate. A reversing non-tonal beeper was audible from the construction works.                               |
| R9       | 4:14pm - outside manual working by one person going on during monitoring. Shed doors shut, equipment moved; 4:18pm - vehicle left, driving past monitor; horses grazing approximately 40m away; 4:24pm - flock of galahs flew over the BESS site at the main modules, audible from monitoring location. No construction noise audible. |

Noise levels at Receptor R4 were intermittent traffic on Calala Lane and birds in the trees approximately 40 m from the monitoring location. Increasing wind strength also resulted in some rustling of leaves in the tree line. A reversing non-tonal beeper associated with the construction activities was audible approximately 12 minutes into the monitoring period. The measured LAeq,15min of 39.6 dB(A) was similar to the baseline monitoring result and below the applicable Noise Management Level of 45 dB(A). Construction noise associated with the monitored works did therefore not materially influence the measured noise levels.

Noise levels at Receptor R9 were intermittent local activities and natural noise sources. Manual work by one person was audible outside the monitoring location, including shed doors closing and equipment being moved. A vehicle was also audible passing the monitoring location at approximately 4:18 pm. Horses grazing approximately 40 m from the monitoring location and a flock of galahs flying over the BESS site were also audible during the monitoring period. Construction noise associated with the monitored works was not audible and therefore did not influence the measured noise levels.

### Weather conditions

Local weather conditions were recorded during each attended noise monitoring event using a handheld anemometer. Wind speed, wind direction and temperature were recorded at each monitoring location. General

weather conditions, including any rainfall or other relevant observations, were also recorded during the monitoring events.

Weather conditions from the nominated weather station, Tamworth Airport AWS (Station ID 055325), were also reviewed for the monitoring periods. The local observations and nominated weather station data are presented in Table 7 and Table 8, respectively.

Table 7: Local weather conditions during attended noise monitoring

| Receptor | Date           | Start time | End time | Wind speed – start | Wind direction – start | Temperature – start |
|----------|----------------|------------|----------|--------------------|------------------------|---------------------|
| R2       | 15 August 2026 | 14:40      | 14:55    | 0.70 m/s           | South-Easterly         | 23.3 °C             |
| R4       | 15 August 2026 | 15:22      | 15:37    | 1.70 m/s           | South-Easterly         | 16.7 °C             |
| R9       | 15 August 2026 | 16:11      | 16:26    | 1.43 m/s           | South-Easterly         | 23.0 °C             |

Local weather conditions recorded on 15 August 2026 indicated wind speeds ranging from 0.70 to 1.70 m/s, with winds consistently from the south-east. Temperatures ranged from 16.7°C to 23.3°C.

Weather data from the Tamworth Airport AWS (Station 055325) were also reviewed for the corresponding monitoring periods. The AWS recorded wind speeds ranging from 15 to 17 km/h, with wind directions ranging from southerly to south-easterly. The difference between the wind speeds recorded at the monitoring locations and those recorded at Tamworth Airport is considered reasonable given the different locations of the monitoring sites and weather station. Local wind conditions can be influenced by site-specific factors, including surrounding vegetation, topography and built structures, and may therefore differ from conditions recorded at the airport weather station.

Table 8: Nominated weather station conditions

| Receptor | Weather station               | Observation time | Wind speed | Wind direction        |
|----------|-------------------------------|------------------|------------|-----------------------|
| R2       | Tamworth Airport AWS (055325) | 14:30            | 17 km/h    | South, South Easterly |
| R4       | Tamworth Airport AWS (055325) | 15:30            | 17 km/h    | Southerly             |
| R9       | Tamworth Airport AWS (055325) | 13:30            | 15 km/h    | South, South Easterly |

## Conclusion

Moss conducted attended out-of-hours noise monitoring at Receptors R2, R4 and R9 on 15 August 2026. Each monitoring event was undertaken for a period of 15 minutes in accordance with the requirements of the Out-of-Hours Work Approval.

The measured LAeq,15minute noise levels at the valid monitoring locations ranged from 39.6 to 41.0 dBA, while LA90,15minute levels ranged from 26.1 to 33.9 dBA. The measured noise environment was influenced by a range of existing sources, including road traffic, birds, wind-induced rustling of vegetation and local residential activities. The monitoring result at R2 was excluded from the quantitative assessment due to intermittent dog barking, which materially influenced the measured noise levels and could not be reliably separated from the other noise sources.

Out-of-hours construction activities were underway in Work Area 1 during the monitoring period and were limited to the use of hand tools. Construction noise was not audible at R2 or R9 and therefore did not influence the measured noise levels at these locations. At R4, a reversing non-tonal beeper associated with the construction activities was audible approximately 12 minutes into the monitoring period. The measured LAeq,15minute of 39.6 dBA at R4 was similar to the baseline monitoring result and below the applicable Noise



Management Level of 45 dBA. Based on the attended observations, construction noise did not materially influence the measured noise levels at the valid monitoring locations.

Local weather conditions and weather data from the nominated Tamworth Airport AWS were reviewed for the monitoring periods and are presented above.

Regards,

Author: Nico Brits  
Principal Environmental Consultant

Field technician and reviewer: Shonelle Gleeson-Willey  
Principal Environmental Consultant

Appendix A – Sound level meter calibration certification  
Appendix B – Field sheets

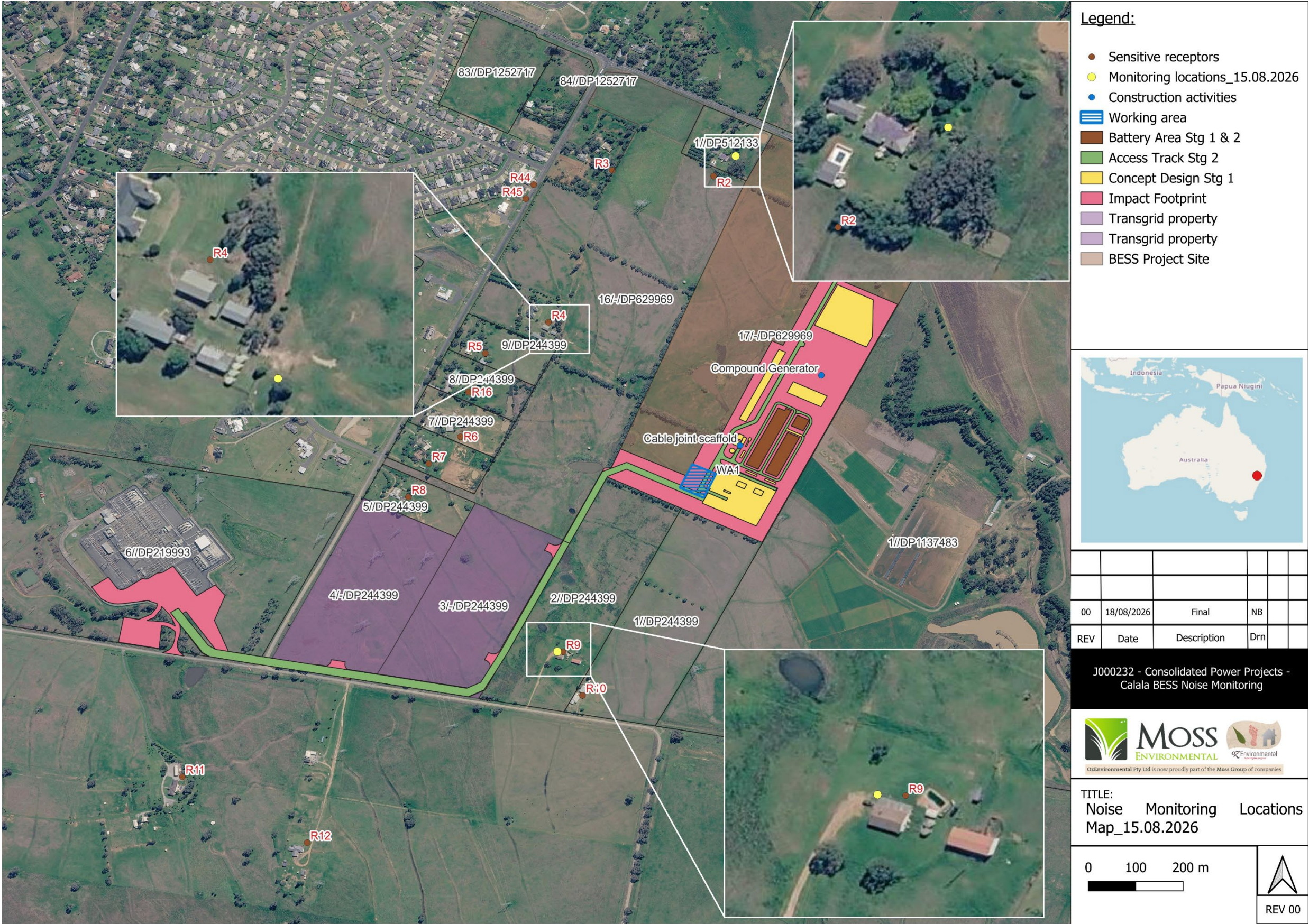


Figure 1: Noise Monitoring Locations

## Appendix A - Sound level meter calibration certification





**Acoustic  
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## Sound Level Meter

IEC 61672-3:2013

# Calibration Certificate

Calibration Number C25582-V1

|                       |                                                                                      |
|-----------------------|--------------------------------------------------------------------------------------|
| <b>Client Details</b> | Acoustic Research Labs Pty Ltd<br>Unit 36, 14 Loyalty Road<br>North Rocks, NSW, 2151 |
|-----------------------|--------------------------------------------------------------------------------------|

|                           |                     |              |               |
|---------------------------|---------------------|--------------|---------------|
| <b>Equipment Tested :</b> | <i>Manufacturer</i> | <i>Model</i> | <i>Serial</i> |
| <b>Instrument :</b>       | Rion                | NL-52        | 00186647      |
| <b>Microphone :</b>       | Rion                | UC-59        | 12784         |
| <b>Pre-amplifier :</b>    | Rion                | NH-25        | 76697         |
| <b>Firmware Version :</b> | 2.0                 |              |               |

|                                        |                                         |
|----------------------------------------|-----------------------------------------|
| <b>Pre-Test Atmospheric Conditions</b> | <b>Post-Test Atmospheric Conditions</b> |
| <b>Ambient Temperature :</b> 22.5 °C   | <b>Ambient Temperature :</b> 22.7 °C    |
| <b>Relative Humidity :</b> 40.9 %      | <b>Relative Humidity :</b> 36.6 %       |
| <b>Barometric Pressure :</b> 99.53 kPa | <b>Barometric Pressure :</b> 99.47 kPa  |

**Calibration Technician :** Jeff Yu  
**Calibration Date :** 29-Aug-2025

**Secondary Check:** Rhys Gravelle  
**Report Issue Date :** 01-Sep-2025

**Approved Signatory :**

Ken Williams

| Clause and Characteristic Tested                   | Result | Clause and Characteristic Tested                  | Result |
|----------------------------------------------------|--------|---------------------------------------------------|--------|
| 12: Acoustical Sig. tests of a frequency weighting | Pass   | 17: Level linearity incl. the level range control | N/A    |
| 13: Electrical Sig. tests of frequency weightings  | Pass   | 18: Toneburst response                            | Pass   |
| 14: Frequency and time weightings at 1 kHz         | Pass   | 19: C Weighted Peak Sound Level                   | Pass   |
| 15: Long Term Stability                            | Pass   | 20: Overload Indication                           | Pass   |
| 16: Level linearity on the reference level range   | Pass   | 21: High Level Stability                          | Pass   |

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

|                                |          |                          |           |
|--------------------------------|----------|--------------------------|-----------|
| Uncertainties of Measurement - |          |                          |           |
| Acoustic Tests                 |          | Environmental Conditions |           |
| 125Hz                          | ±0.13 dB | Temperature              | ±0.1 °C   |
| 1kHz                           | ±0.13 dB | Relative Humidity        | ±1.9 %    |
| 8kHz                           | ±0.14 dB | Barometric Pressure      | ±0.11 kPa |
| Electrical Tests               | ±0.13 dB |                          |           |

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.  
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.



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## Sound Level Meter IEC 61672-3:2013 Calibration Test Report

Calibration Number C25582-V1

|                                        |                     |                                                                                      |               |
|----------------------------------------|---------------------|--------------------------------------------------------------------------------------|---------------|
| <b>Client Details</b>                  |                     | Acoustic Research Labs Pty Ltd<br>Unit 36, 14 Loyalty Road<br>North Rocks, NSW, 2151 |               |
| <b>Equipment Tested :</b>              | <i>Manufacturer</i> | <i>Model</i>                                                                         | <i>Serial</i> |
| <b>Instrument Serial Number :</b>      | Rion                | NL-52                                                                                | 00186647      |
| <b>Microphone Serial Number :</b>      | Rion                | UC-59                                                                                | 12784         |
| <b>Pre-amplifier Serial Number :</b>   | Rion                | NH-25                                                                                | 76697         |
| <b>Firmware Version :</b>              | 2.0                 |                                                                                      |               |
| <b>Pre-Test Atmospheric Conditions</b> |                     | <b>Post-Test Atmospheric Conditions</b>                                              |               |
| <b>Ambient Temperature :</b>           | 22.5 °C             | <b>Ambient Temperature :</b>                                                         | 22.7 °C       |
| <b>Relative Humidity :</b>             | 40.9 %              | <b>Relative Humidity :</b>                                                           | 36.6 %        |
| <b>Barometric Pressure :</b>           | 99.53 kPa           | <b>Barometric Pressure :</b>                                                         | 99.47 kPa     |
| <b>Calibration Technician :</b>        | Jeff Yu             | <b>Secondary Check:</b>                                                              | Rhys Gravelle |
| <b>Calibration Date :</b>              | 29-Aug-2025         | <b>Report Issue Date :</b>                                                           | 01-Sep-2025   |

Approved Signatory : 

Ken Williams

| Clause and Characteristic Tested                   | Result | Clause and Characteristic Tested                  | Result |
|----------------------------------------------------|--------|---------------------------------------------------|--------|
| 12: Acoustical Sig. tests of a frequency weighting | Pass   | 17: Level linearity incl. the level range control | N/A    |
| 13: Electrical Sig. tests of frequency weightings  | Pass   | 18: Toneburst response                            | Pass   |
| 14: Frequency and time weightings at 1 kHz         | Pass   | 19: C Weighted Peak Sound Level                   | Pass   |
| 15: Long Term Stability                            | Pass   | 20: Overload Indication                           | Pass   |
| 16: Level linearity on the reference level range   | Pass   | 21: High Level Stability                          | Pass   |

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

| Uncertainties of Measurement - |          |                          |           |
|--------------------------------|----------|--------------------------|-----------|
| Acoustic Tests                 |          | Environmental Conditions |           |
| 125Hz                          | ±0.13 dB | Temperature              | ±0.1 °C   |
| 1kHz                           | ±0.13 dB | Relative Humidity        | ±1.9 %    |
| 8kHz                           | ±0.14 dB | Barometric Pressure      | ±0.11 kPa |
| Electrical Tests               | ±0.13 dB |                          |           |

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



This report applies only to the item tested and shall only be reproduced in full, unless approved in writing by Acoustic Research Labs.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.

Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

|           |                                                        |          |
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## 1. REVISION HISTORY

| Revision | Date        | Description    |
|----------|-------------|----------------|
| 1        | 01-Sep-2025 | Original Issue |

## 2. OVERVIEW

This report presents the calibration test results of a NL-52 Sound Level Meter, and associated equipment. Calibration is carried out in accordance with *IEC 61672-3:2013, Electroacoustics - Sound Level Meters - Part 3: Periodic Tests*.

Relevant clauses from this standard have been used for periodic testing in conjunction with Acoustic Research Labs internal test methods described in Section 1 of the calibration work instruction manual.

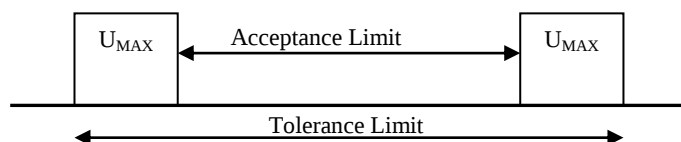
This report was generated using template version identifier of 54d10f46.

Where required, reference is made to manual version 55530 as provided by the manufacturer.

### 2.1 UNCERTAINTIES

For each test performed, the associated measurement uncertainties are derived at the 95% confidence level and are given with a coverage factor of 2.

The uncertainty applies at the time of measurement only, and takes no account of any drift or other effects that may apply afterwards. When estimating uncertainty at any later time, other relevant information should also be considered, including, where possible, the history of the performance of the instrument and the manufacturer's specifications.



Where deviations from the design goals are provided to determine conformance to performance specifications, each measurement is reported with:

The measured deviation from the design goal

Associated acceptance limits for the test

Maximum allowable uncertainty of measurement for the test

Actual expanded uncertainty for each measurement

### 2.2 DOCUMENT CONVENTIONS

Test results which highlight non-conformances relative to the standard, and the sound level meter type specified by the manufacturer have been marked with an **F** in the respective tests.

Any tests that are not required, due to sound level meter configuration, are marked N/A.

### 3. GENERAL

#### 3.1 DEVICE UNDER TEST

| <b>Equipment Tested :</b> | <i>Manufacturer</i> | <i>Model</i> | <i>Serial</i> |
|---------------------------|---------------------|--------------|---------------|
| <b>Instrument :</b>       | Rion                | NL-52        | 00186647      |
| <b>Microphone :</b>       | Rion                | UC-59        | 12784         |
| <b>Pre-amplifier :</b>    | Rion                | NH-25        | 76697         |

All results within this report correspond to Channel 1 of the device tested.

Instrument received in fair condition..

#### 3.2 ENVIRONMENTAL CONDITIONS DURING TEST

No corrections have been applied to any results obtained to compensate for the environmental conditions.

#### 3.3 CALIBRATION TESTS

Where applicable the following tests were performed in accordance with the requirements of IEC 61672-3:2013. These clauses are used to define the periodic testing of Sound Level Meters.

- Clause 10 Indication at the Calibration Check Frequency
- Clause 11 Self Generated Noise
- Clause 12 Acoustical Signal Tests of Frequency Weighting
- Clause 13 Electrical Signal Tests of Frequency Weightings
- Clause 14 Frequency and Time Weightings at 1kHz
- Clause 15 Long Term Stability
- Clause 16 Level Linearity on the Reference Level Range
- Clause 17 Level Linearity including the level range control
- Clause 18 Toneburst Response
- Clause 19 Peak C Sound Level
- Clause 20 Overload Indication
- Clause 21 High Level Stability

#### 3.4 TEST EQUIPMENT USED

All test equipment used during periodic testing are calibrated every 12months by an accredited laboratory, traceable to SI units.

The performance of all equipment during these calibrations and the effects of instrument stability are used to determine the measurement uncertainty of each reported result.

### **3.4.1 Multi-function Acoustic Calibrator**

A Bruel & Kjaer 4226 Multi-function calibrator (S/N – 2985012) was used for frequency response testing of the entire instrument (including microphone). This instrument was used as a reference calibrator and for frequency response verification.

The acoustic signal was applied by the 4226 Multi-function calibrator using a 1/2 inch microphone input.

### **3.4.2 Microphone Electrical Equivalent Circuit**

Calibration of most instrument parameters is carried out using electrical signals fed to the unit via a two-port electrical equivalent circuit of the microphone.

These signals were applied via the instrument's microphone input.

Where possible, a 13 pF capacitance dummy microphone was used during testing.

### **3.4.3 Adjustable Attenuator**

A means for varying the attenuation of electrical signals via the dummy microphone was provided by a JFW Industries dual rotary attenuator (S/N – 792819 2132). The attenuator is switchable in 1dB steps between 0dB and 60dB.

### **3.4.4 Arbitrary Function Generator**

A Keysight 33511B (S/N – MY62000827) was used to generate the required electrical signals.

### **3.4.5 Environmental Monitoring**

A MHB-382SD (S/N – AG44204) was used for measuring environmental conditions during device calibration. It is capable of providing temperature, relative humidity and pressure measurements.

## 4. CALIBRATION TEST RESULTS

### 4.1 INDICATION AT THE CALIBRATION CHECK FREQUENCY

The indication of the sound level meter at the calibration check frequency was checked by application of an acoustic signal at the reference sound pressure level and frequency.

Stated reference conditions as found in manual are

Reference Level : 94.0 dB

Reference Frequency : 1000.0 Hz

Indications before and after adjustments were recorded and are shown in Table 1 (all measurements in dB) -

**Table 1 - Check Frequency Calibration Results**

| Frequency Weighting | Initial Response | B&K 4226 Corrected | FreeField Corrected | Final Corrected Response |
|---------------------|------------------|--------------------|---------------------|--------------------------|
| A                   | 94.30            | 94.10              | 94.10               | 94.02                    |
| C                   | 94.30            | 94.10              | 94.10               | 94.02                    |
| Z                   | 94.30            | 94.10              | 94.10               | 94.02                    |

Free field adjustment data as provided by the manufacturer. Windscreen correction factors applied.

### 4.2 SELF GENERATED NOISE

#### 4.2.1 Microphone Installed

Self generated noise was measured with the microphone installed on the sound level meter, in the configuration submitted for periodic testing. The sound level meter was set to the most-sensitive level range and with frequency weighting A selected.

Ten (10) time weighted observations were made over a period of 60 seconds.

**Random Readings dB(A)**

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 14.60 | 14.80 | 15.00 | 14.80 | 15.00 |
| 14.90 | 14.80 | 15.00 | 15.10 | 14.80 |

Acoustic Noise Floor : 14.9 dB(A)

## 4.2.2 Electrical Input Signal Device

With the microphone replaced by the electrical input signal device and terminated as specified, the sound level meter was set to the most-sensitive level range and with frequency weightings Z, C and A selected as provided.

Ten (10) time weighted observations were made over a period of 60 seconds.

### Random Readings dB(A)

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 10.90 | 11.10 | 11.30 | 11.30 | 11.30 |
| 11.10 | 11.20 | 11.30 | 11.20 | 11.30 |

### Random Readings dB(C)

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 16.10 | 16.30 | 16.30 | 16.40 | 16.20 |
| 15.90 | 16.30 | 16.40 | 16.40 | 15.90 |

### Random Readings dB(Z)

|      |      |      |      |      |
|------|------|------|------|------|
| 22.2 | 22.4 | 23.1 | 22.4 | 23.1 |
| 22.3 | 22.2 | 23.2 | 22.5 | 22.7 |

Electric Noise Floor :

| dB(A) | dB(C) | dB(Z) |
|-------|-------|-------|
| 11.2  | 16.2  | 22.6  |

### 4.3 ACOUSTICAL SIGNAL TESTS OF A FREQUENCY WEIGHTING

The sound level meter was set to measure frequency weighting C with a FAST response. The test was carried out using a multi-function acoustic calibrator set to pressure mode.

Three (3) readings were made at each test frequency. The average of the readings was then corrected to the multi-function acoustic calibrator.

**Table 2 - Frequency Weighting C Response**

| Freq Hz | Reading 1 | Reading 2 | Reading 3 | Uncertainty (dB) |
|---------|-----------|-----------|-----------|------------------|
| 125     | 94.1      | 94.1      | 94.1      | 0.13             |
| 1 000   | 94.1      | 94.1      | 94.1      | 0.13             |
| 8 000   | 88.2      | 88.2      | 88.2      | 0.14             |

| Actual Freq Hz | B&K 4226 Corrections | Corrected Response dB(C) |         | Uncertainty (dB) |
|----------------|----------------------|--------------------------|---------|------------------|
|                |                      | Actual                   | re 1kHz |                  |
| 125.90         | -0.06                | 94.04                    | 0.02    | 0.13             |
| 1005.10        | -0.08                | 94.02                    | 0.00    | 0.13             |
| 7915.10        | 0.07                 | 88.27                    | -5.75   | 0.14             |

Adjustments were then applied to correct for free field and sound level meter body effects with data supplied by the manufacturer as per Table 3. Windscreen correction factors applied.

**Table 3 - Correction Data**

| Actual Freq (Hz) | Pressure to Freefield (dB) | Uncertainty (dB) | Body Effects (dB) | Uncertainty (dB) | WS Effects (dB) | Uncertainty (dB) |
|------------------|----------------------------|------------------|-------------------|------------------|-----------------|------------------|
| 125.90           | 0.00                       | 0.25             | 0.00              | 0.25             | 0.00            | 0.20             |
| 1005.10          | 0.00                       | 0.25             | 0.00              | 0.25             | -0.10           | 0.20             |
| 7915.10          | 3.00                       | 0.35             | 0.30              | 0.35             | 0.00            | 0.30             |

Finally, the corrected responses are normalised to the response at 1kHz and compared to the tolerance limits stated in Table 2 of IEC 61672.1-2013.

**Table 4 - Acoustic C Response**

| Actual Freq (Hz) | Corrected Response dB(C) |         | Expected Response dB(C) |                 | Deviation (dB) | P/F | Uncertainty (dB) | Maximum Permitted Uncertainty (dB) |
|------------------|--------------------------|---------|-------------------------|-----------------|----------------|-----|------------------|------------------------------------|
|                  | Actual                   | re 1kHz | re 1kHz                 | Tolerance Limit |                |     |                  |                                    |
| 125.90           | 94.04                    | 0.12    | -0.2                    | ±1.0            | 0.32           | P   | 0.43             | 0.60                               |
| 1005.10          | 93.92                    | 0.00    | 0.0                     | ±0.7            | 0.00           | P   | 0.43             | 0.60                               |
| 7915.10          | 91.57                    | -2.35   | -3.0                    | +1.5 / -2.5     | 0.65           | P   | 0.60             | 0.70                               |

#### 4.4 ELECTRICAL SIGNAL TESTS OF FREQUENCY WEIGHTINGS

Frequency weighting responses for Z, C and A were determined relative to the response at 1kHz using steady sinusoidal electrical input signals.

On the reference level range, and for each frequency weighting under test, the level of a 1kHz input signal was adjusted to yield 93dB. At test frequencies other than 1kHz, the input signal level was adjusted to compensate for the design goal attenuations as specified in Table 2 of IEC 61672.1-2013.

**Table 5 - Measured Electrical Frequency Response**

| Freq (Hz) | A Weighting (dB) | C Weighting (dB) | Z Weighting (dB) | Uncertainty (dB) |
|-----------|------------------|------------------|------------------|------------------|
| 63        | 93.0             | 92.9             | 93.0             | 0.13             |
| 125       | 92.9             | 93.1             | 93.0             | 0.11             |
| 250       | 92.9             | 93.0             | 93.0             | 0.10             |
| 500       | 93.0             | 93.1             | 93.0             | 0.10             |
| 1 000     | 93.0             | 93.0             | 93.0             | 0.10             |
| 2 000     | 93.0             | 93.1             | 93.0             | 0.10             |
| 4 000     | 93.0             | 93.0             | 93.0             | 0.10             |
| 8 000     | 93.1             | 93.1             | 93.0             | 0.10             |
| 15 850    | 91.9             | 91.8             | 93.0             | 0.13             |

Adjustments were then applied to correct for a uniform free field response and sound level meter body effects with data supplied by the manufacturer as per Table 6. Windscreen correction factors applied.

**Table 6 - Correction Data**

| Freq (Hz) | Ufreq (dB) | Uncertainty (dB) | Body Effects (dB) | Uncertainty (dB) | WS Effects (dB) | Uncertainty (dB) |
|-----------|------------|------------------|-------------------|------------------|-----------------|------------------|
| 63        | 0.10       | 0.25             | 0.00              | 0.25             | 0.00            | 0.20             |
| 125       | 0.10       | 0.25             | 0.00              | 0.25             | 0.00            | 0.20             |
| 250       | 0.10       | 0.25             | 0.00              | 0.25             | 0.00            | 0.20             |
| 500       | 0.00       | 0.25             | -0.10             | 0.25             | -0.10           | 0.20             |
| 1 000     | 0.00       | 0.25             | 0.00              | 0.25             | -0.10           | 0.20             |
| 2 000     | 0.00       | 0.25             | 0.00              | 0.25             | -0.30           | 0.20             |
| 4 000     | 0.10       | 0.25             | 0.30              | 0.25             | -0.30           | 0.20             |
| 8 000     | 0.00       | 0.35             | 0.30              | 0.35             | 0.00            | 0.30             |
| 15 850    | -0.80      | 0.45             | 0.40              | 0.35             | 0.70            | 0.30             |

Finally, the corrected responses were referenced to the response at 1kHz and compared to the tolerance limits stated in Table 2 of IEC 61672.1-2013.

**Table 7 - A Weighted Electrical Response**

| Freq<br>(Hz) | Response<br>(dB) |         | Tolerance<br>Limit<br>(dB) | P/F | Uncertainty<br>(dB) | Maximum<br>Permitted<br>Uncertainty<br>(dB) |
|--------------|------------------|---------|----------------------------|-----|---------------------|---------------------------------------------|
|              | Corrected        | re 1kHz |                            |     |                     |                                             |
| 63           | 93.10            | 0.20    | ±1.0                       | P   | 0.43                | 0.60                                        |
| 125          | 93.00            | 0.10    | ±1.0                       | P   | 0.42                | 0.60                                        |
| 250          | 93.00            | 0.10    | ±1.0                       | P   | 0.42                | 0.60                                        |
| 500          | 92.80            | -0.10   | ±1.0                       | P   | 0.42                | 0.60                                        |
| 1 000        | 92.90            | 0.00    | ±0.7                       | P   | 0.42                | 0.60                                        |
| 2 000        | 92.70            | -0.20   | ±1.0                       | P   | 0.42                | 0.60                                        |
| 4 000        | 93.10            | 0.20    | ±1.0                       | P   | 0.42                | 0.60                                        |
| 8 000        | 93.40            | 0.50    | +1.5 / -2.5                | P   | 0.59                | 0.70                                        |
| 15 850       | 92.20            | -0.70   | +2.5 / -16                 | P   | 0.66                | 1.00                                        |

**Table 8 - C Weighted Electrical Response**

| Freq<br>(Hz) | Response<br>(dB) |         | Tolerance<br>Limit<br>(dB) | P/F | Uncertainty<br>(dB) | Maximum<br>Permitted<br>Uncertainty<br>(dB) |
|--------------|------------------|---------|----------------------------|-----|---------------------|---------------------------------------------|
|              | Corrected        | re 1kHz |                            |     |                     |                                             |
| 63           | 93.00            | 0.10    | ±1.0                       | P   | 0.43                | 0.60                                        |
| 125          | 93.20            | 0.30    | ±1.0                       | P   | 0.42                | 0.60                                        |
| 250          | 93.10            | 0.20    | ±1.0                       | P   | 0.42                | 0.60                                        |
| 500          | 92.90            | 0.00    | ±1.0                       | P   | 0.42                | 0.60                                        |
| 1 000        | 92.90            | 0.00    | ±0.7                       | P   | 0.42                | 0.60                                        |
| 2 000        | 92.80            | -0.10   | ±1.0                       | P   | 0.42                | 0.60                                        |
| 4 000        | 93.10            | 0.20    | ±1.0                       | P   | 0.42                | 0.60                                        |
| 8 000        | 93.40            | 0.50    | +1.5 / -2.5                | P   | 0.59                | 0.70                                        |
| 15 850       | 92.10            | -0.80   | +2.5 / -16                 | P   | 0.66                | 1.00                                        |

**Table 9 - Z Weighted Electrical Response**

| Freq<br>(Hz) | Response<br>(dB) |         | Tolerance<br>Limit<br>(dB) | P/F | Uncertainty<br>(dB) | Maximum<br>Permitted<br>Uncertainty<br>(dB) |
|--------------|------------------|---------|----------------------------|-----|---------------------|---------------------------------------------|
|              | Corrected        | re 1kHz |                            |     |                     |                                             |
| 63           | 93.10            | 0.20    | ±1.0                       | P   | 0.43                | 0.60                                        |
| 125          | 93.10            | 0.20    | ±1.0                       | P   | 0.42                | 0.60                                        |
| 250          | 93.10            | 0.20    | ±1.0                       | P   | 0.42                | 0.60                                        |
| 500          | 92.80            | -0.10   | ±1.0                       | P   | 0.42                | 0.60                                        |
| 1 000        | 92.90            | 0.00    | ±0.7                       | P   | 0.42                | 0.60                                        |
| 2 000        | 92.70            | -0.20   | ±1.0                       | P   | 0.42                | 0.60                                        |
| 4 000        | 93.10            | 0.20    | ±1.0                       | P   | 0.42                | 0.60                                        |
| 8 000        | 93.30            | 0.40    | +1.5 / -2.5                | P   | 0.59                | 0.70                                        |
| 15 850       | 93.30            | 0.40    | +2.5 / -16                 | P   | 0.66                | 1.00                                        |

## 4.5 FREQUENCY AND TIME WEIGHTINGS AT 1KHZ

A steady sinusoidal electrical input signal of 1kHz at the reference sound pressure level was applied to the reference level range.

The deviations of the indicated level of C and Z frequency weightings were recorded, along with the deviations of the indication of A weighted time averaged, and SLOW weighted response.

**Table 10 - Frequency and Time Weighting Results**

| Frequency Weighting | Time Weighting | Response (dB) | Deviation (dB) | P/F | Tolerance Limit (dB) | Uncertainty (dB) | Maximum Permitted Uncertainty (dB) |
|---------------------|----------------|---------------|----------------|-----|----------------------|------------------|------------------------------------|
| A                   | Fast           | 94.0          | 0.0            | P   | ±0.2                 | 0.10             | 0.20                               |
|                     | Leq            | 94.0          | 0.0            | P   | ±0.2                 | 0.10             | 0.20                               |
|                     | Slow           | 94.0          | 0.0            | P   | ±0.2                 | 0.10             | 0.20                               |
| C                   | Fast           | 94.0          | 0.0            | P   | ±0.2                 | 0.10             | 0.20                               |
| Z                   | Fast           | 94.0          | 0.0            | P   | ±0.2                 | 0.10             | 0.20                               |

## 4.6 LONG-TERM STABILITY

Long-term stability was tested by comparing a steady sinusoidal electrical signal applied at the start, and at the end of testing. The applied signal level was set to the reference level and frequency and was maintained constant. The difference between the indicated levels was recorded.

**Table 11 - Frequency and Time Weighting Results**

| Signal Level (mV) | Initial Response (dB) | Final Response (dB) | Deviation (dB) | P/F | Tolerance Limit (dB) | Uncertainty (dB) | Maximum Permitted Uncertainty (dB) |
|-------------------|-----------------------|---------------------|----------------|-----|----------------------|------------------|------------------------------------|
| 54.9              | 94                    | 94.0                | 0.0            | P   | ±0.1                 | 0.10             | 0.10                               |

#### 4.7 LEVEL LINEARITY ON THE REFERENCE LEVEL RANGE

Level linearity was tested with a steady sinusoidal electrical signal at a frequency of 8kHz, with the meter set to display frequency weighted A, FAST response.

The starting point for level linearity testing was set to 94.0dB as stated in the instruction manual.

Level linearity was measured in 5dB steps of increasing input signal level from the starting point up to within 5dB of the stated upper limit, then at 1dB steps up to (but not including) the first indication of overload.

**Table 12 - Level Linearity - Increasing**

| Ideal (dB) | Response (dB) | Deviation (dB) | Tolerance Limit (dB) | P/F | Uncertainty (dB) | Maximum Permitted Uncertainty (dB) |
|------------|---------------|----------------|----------------------|-----|------------------|------------------------------------|
| 94.0       | 94.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 99.0       | 99.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 104.0      | 104.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 109.0      | 109.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 114.0      | 114.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 119.0      | 119.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 124.0      | 124.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 129.0      | 129.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 131.0      | 131.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 132.0      | 132.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 133.0      | 133.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 134.0      | 134.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 135.0      | 135.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 136.0      | 136.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 137.0      | 137.0         | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |

Overload indication at 138.0dB.

Level linearity test was the continued in 5dB steps of decreasing input signal level from the starting point up to within 5dB of the stated lower limit, then at 1dB steps up to (but not including) the first indication of under range.

**Table 13 - Level Linearity - Decreasing**

| Ideal (dB) | Response (dB) | Deviation (dB) | Tolerance Limit (dB) | P/F | Uncertainty (dB) | Maximum Permitted Uncertainty (dB) |
|------------|---------------|----------------|----------------------|-----|------------------|------------------------------------|
| 94.0       | 94.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 89.0       | 89.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 84.0       | 84.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 79.0       | 79.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 74.0       | 74.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 69.0       | 69.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 64.0       | 64.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 59.0       | 59.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 54.0       | 54.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 49.0       | 49.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 44.0       | 44.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 39.0       | 39.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 34.0       | 34.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 30.0       | 30.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 29.0       | 29.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 28.0       | 28.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 27.0       | 27.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 26.0       | 26.0          | 0.0            | ±0.8                 | P   | 0.1              | 0.3                                |
| 25.0       | 24.9          | -0.1           | ±0.8                 | P   | 0.1              | 0.3                                |

Under range indication at 24.0dB.

## 4.8 TONEBURST RESPONSE

The response of the sound level meter to short-duration signals was tested on the reference range with 4kHz tone bursts.

The tone bursts were generated from a steady sinusoidal signal at a level of 135.0dB.

**Table 14 - FAST Weighted Response**

| Burst Length | Response dB(A) | Deviation (dB) | Tolerance Limit (dB) | P/F | Uncertainty (dB) | Maximum Permitted Uncertainty (dB) |
|--------------|----------------|----------------|----------------------|-----|------------------|------------------------------------|
| 200ms        | 134.0          | 0.0            | ±0.5                 | P   | 0.1              | 0.3                                |
| 2ms          | 117.0          | 0.0            | +1.0 / -1.5          | P   | 0.1              | 0.3                                |
| 0.25ms       | 107.9          | -0.1           | +1.0 / -3            | P   | 0.1              | 0.3                                |

**Table 15 - SLOW Weighted Response**

| Burst Length | Response dB(A) | Deviation (dB) | Tolerance Limit (dB) | P/F | Uncertainty (dB) | Maximum Permitted Uncertainty (dB) |
|--------------|----------------|----------------|----------------------|-----|------------------|------------------------------------|
| 200ms        | 127.6          | 0.0            | ±0.5                 | P   | 0.1              | 0.3                                |
| 2ms          | 108.6          | 0.6            | +1.0 / -3            | P   | 0.1              | 0.3                                |

**Table 16 - Sound Exposure Level Response**

| Burst Length | Response dB(A) | Deviation (dB) | Tolerance Limit (dB) | P/F | Uncertainty (dB) | Maximum Permitted Uncertainty (dB) |
|--------------|----------------|----------------|----------------------|-----|------------------|------------------------------------|
| 200ms        | 128.0          | 0.0            | ±0.5                 | P   | 0.1              | 0.3                                |
| 2ms          | 108.0          | 0.0            | +1.0 / -1.5          | P   | 0.1              | 0.3                                |
| 0.25ms       | 98.9           | -0.1           | +1.0 / -3            | P   | 0.1              | 0.3                                |

## 4.9 PEAK C RESPONSE

Indication of Peak C sound level was tested on the least sensitive level range. Test signals used were -

A single complete cycle of an 8kHz sinusoid, starting and stopping at zero crossings

Positive and negative half cycles of a 500Hz sinusoid, starting and stopping at zero crossings.

The level of the steady 8kHz sinusoid was adjusted to display 133.0dB(C).

**Table 17 - Single Cycle Response**

| Response<br>Peak C | Deviation<br>(dB) | Tolerance<br>Limit<br>(dB) | P/F | Uncertainty<br>(dB) | Overload<br>Peak C | Maximum<br>Permitted<br>Uncertainty<br>(dB) |
|--------------------|-------------------|----------------------------|-----|---------------------|--------------------|---------------------------------------------|
| 136.0              | -0.4              | ±2.0                       | P   | 0.22                | N                  | 0.35                                        |

**Table 18 - Half Cycle Response**

| Signal<br>Orientation | Response<br>Peak C<br>(dB) | Deviation<br>(dB) | Tolerance<br>Limit<br>(dB) | P/F | Uncertainty<br>(dB) | Maximum<br>Permitted<br>Uncertainty<br>(dB) |
|-----------------------|----------------------------|-------------------|----------------------------|-----|---------------------|---------------------------------------------|
| Positive              | 135.1                      | -0.3              | ±1.0                       | P   | 0.1                 | 0.35                                        |
| Negative              | 135.1                      | -0.3              | ±1.0                       | P   | 0.1                 | 0.35                                        |

No overload was noted during Peak C testing.

#### 4.10 OVERLOAD INDICATION

The overload indication was tested on the least sensitive level range, with the sound level meter set to display frequency weighted A, time averaged values.

Positive and negative half cycle sinusoidal electrical signals at 4kHz were used. The test began at an indicated time averaged level of 137.0dB(A).

Using the positive half cycle signal, the signal level was increased in steps of 0.5dB up to, but not including, the first indication of overload. The level of the input signal was then increased in steps of 0.1dB until the first indication of overload. These steps were repeated using the negative half cycle signal.

**Table 19 - Overload Indication**

| Signal Orientation | Overload Response (dB) | Difference (dB) | Tolerance Limit (dB) | P/F | Uncertainty (dB) | Maximum Permitted Uncertainty (dB) |
|--------------------|------------------------|-----------------|----------------------|-----|------------------|------------------------------------|
| Positive           | 135.5                  | 0.0             | ±1.5                 | P   | 0.10             | 0.25                               |
| Negative           | 135.5                  |                 |                      |     |                  |                                    |

Overload indication was verified.

Overload latch indication was verified.

#### 4.11 HIGH LEVEL STABILITY

High level stability was tested by measuring the response of the meter to high signal levels. The result was evaluated as the difference between the A-Weighted indicated levels in response to a steady 1kHz signal applied over 5 minutes.

**Table 20 - FAST Weighted Response**

| Time Weighting | Initial Response (dB) | Final Response (dB) | Deviation (dB) | Tolerance Limit (dB) | P/F | Uncertainty (dB) | Maximum Permitted Uncertainty (dB) |
|----------------|-----------------------|---------------------|----------------|----------------------|-----|------------------|------------------------------------|
| Fast           | 137.0                 | 137.0               | 0.0            | ±0.1                 | P   | 0.10             | 0.10                               |
| Slow           | N/A                   | N/A                 | N/A            | ±0.1                 | N/A | 0.10             | 0.10                               |
| Leq            | 137.0                 | 137.0               | 0.0            | ±0.1                 | P   | 0.10             | 0.10                               |

## Appendix B – Field sheets



## Noise Monitoring Field Sheet

**Project:** Calala BESS

| Field               | Details |
|---------------------|---------|
| Receptor Number     | _____   |
| Address             | _____   |
| Date                | _____   |
| Start Time          | _____   |
| Finish Time         | _____   |
| Monitoring Duration | _____   |

### Weather Conditions

| Parameter          | Observation                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature        | _____                                                                                                                                                          |
| Wind Speed         | _____                                                                                                                                                          |
| Wind Direction     | _____                                                                                                                                                          |
| Rainfall           | <input type="checkbox"/> None <input type="checkbox"/> Drizzle <input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy |
| General Conditions | _____                                                                                                                                                          |

### Noise Observations

**Dominant noise sources observed:**

---

---

---

**Other / extraneous noise sources:**

---

---

---

**Construction/project activities audible:**

☐ No      ☐ Yes

If yes, describe:

---

---

**Field Notes**

---

---

---

---

Monitoring undertaken by: \_\_\_\_\_

Signature: S. Glee



RION

SOUND LEVEL METER  
NL-52

WS None

Manual

15min

5

00:15:00

Measurement finished

Save data?  
[Address 0496]

Cancel

L<sub>Aeq</sub>

46.3

dB

L<sub>A</sub>

75.9

dB

L<sub>A</sub>max

61.7

dB

L<sub>A</sub>min

32.0

dB

L<sub>A</sub>F01

55.2

dB

08/16/14 14:58:11

## Noise Monitoring Field Sheet

**Project:** Calala BESS

| Field               | Details |
|---------------------|---------|
| Receptor Number     | _____   |
| Address             | _____   |
| Date                | _____   |
| Start Time          | _____   |
| Finish Time         | _____   |
| Monitoring Duration | _____   |

### Weather Conditions

| Parameter          | Observation                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature        | _____                                                                                                                                                          |
| Wind Speed         | _____                                                                                                                                                          |
| Wind Direction     | _____                                                                                                                                                          |
| Rainfall           | <input type="checkbox"/> None <input type="checkbox"/> Drizzle <input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy |
| General Conditions | _____                                                                                                                                                          |

### Noise Observations

**Dominant noise sources observed:**

---

---

---

**Other / extraneous noise sources:**

---

---

---

**Construction/project activities audible:**

☐ No      ☐ Yes

If yes, describe:

---

---

**Field Notes**

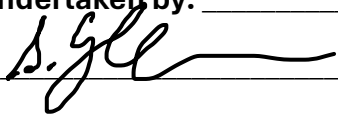
---

---

---

---

Monitoring undertaken by: \_\_\_\_\_

Signature: 



RION

SOUND LEVEL METER  
NL-52

OS Nong  
Manual 15min 05 00:15:00  
019  
20 40 60 80 100 120

|         |      |    |
|---------|------|----|
| LAF10   | 42.2 | dB |
| LAF50   | 37.2 | dB |
| LAF30   | 33.9 | dB |
| LAF10,0 | 33.3 | dB |

START



## Noise Monitoring Field Sheet

**Project:** Calala BESS

| Field               | Details |
|---------------------|---------|
| Receptor Number     | _____   |
| Address             | _____   |
| Date                | _____   |
| Start Time          | _____   |
| Finish Time         | _____   |
| Monitoring Duration | _____   |

### Weather Conditions

| Parameter          | Observation                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature        | _____                                                                                                                                                          |
| Wind Speed         | _____                                                                                                                                                          |
| Wind Direction     | _____                                                                                                                                                          |
| Rainfall           | <input type="checkbox"/> None <input type="checkbox"/> Drizzle <input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy |
| General Conditions | _____                                                                                                                                                          |

### Noise Observations

**Dominant noise sources observed:**

---

---

---

**Other / extraneous noise sources:**

---

---

---

**Construction/project activities audible:**

☐ No      ☐ Yes

If yes, describe:

---

---

**Field Notes**

---

---

---

---

Monitoring undertaken by: \_\_\_\_\_

Signature: S. Glee



RION

SOUND LEVEL METER  
NL-52

WS None

Manual

15min

5

00:15:00

Measurement finished

Save data?  
[Address 0496]

Cancel

L<sub>Aeq</sub>

46.3

dB

L<sub>A</sub>E

75.9

dB

L<sub>A</sub>F<sub>max</sub>

61.7

dB

L<sub>A</sub>F<sub>min</sub>

32.0

dB

L<sub>A</sub>F01

55.2

dB

08/16/14 14:58:11