

# **Borg Manufacturing Facility**

## **Quarter 1 - Construction noise monitoring**

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Prepared for Borg Manufacturing Pty Ltd

February 2025

# Borg Manufacturing Facility

## Quarter 1 - Construction noise monitoring

Borg Manufacturing Pty Ltd

E241096 RP1

February 2025

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5 March 2025

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# 1 Introduction

## 1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Borg Manufacturing Pty Ltd to conduct a quarterly noise survey of construction at the Borg panel manufacturing facility (Borg, the site) located near Oberon, NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done during the day period of 19 February 2025 at four monitoring locations.

## 1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences.

**Table 1.1** Attended noise monitoring locations

Location descriptor	Description	Coordinates (MGA 55)	
		Easting	Northing
NM1	Oberon Caravan Park	764986	6267411
NM2	Intersection of Pine Street and Herborn Street	764474	6267289
NM3	127 Hazelgrove Road	766477	6268464
NM4	Intersection of Tasman Street and Earl Street	765602	6267117



Figure 1.1 Attended noise monitoring locations

## 1.3 Terminology and abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

**Table 1.2 Terminology and abbreviations**

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to approximate how humans hear noise.
$L_{Amax}$	The maximum root mean squared A-weighted noise level over a time period.
$L_{A1}$	The A-weighted noise level which is exceeded for 1 per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
$L_{A10}$	The A-weighted noise level which is exceeded for 10 percent of the time.
$L_{Aeq}$	The energy average A-weighted noise level.
$L_{A50}$	The A-weighted noise level which is exceeded for 50 per cent of the time, also the median noise level during a measurement period.
$L_{A90}$	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the “background” noise level and commonly used to derive noise limits.
$L_{Amin}$	The minimum A-weighted noise level over a time period.
$L_{Ceq}$	The energy average C-weighted noise energy during a measurement period. The “C” weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

## 2 Noise limits

### 2.1 Development consent

The most current development consent associated with activities at Borg is Development Consent SSD 7016 (the consent), most recently modified April 2024. Relevant sections of the consent are reproduced in Appendix B.1.

### 2.2 Environment protection licence

Borg holds Environment Protection Licence (EPL) No. 3035 issued by the Environment Protection Authority (EPA) most recently on 13 November 2024. Relevant sections of the EPL are reproduced in Appendix B.2.

### 2.3 Noise management plan

Noise monitoring requirements are detailed in the Borg Operational Noise Management Plan (ONMP) and Construction Noise Management Plan (CNMP). The most recent version of the ONMP and CNMP were both updated in September 2024. Relevant sections of the ONMP and CNMP are reproduced in Appendix B.3 and B.4.

### 2.4 Noise limits

Noise limits based on the consent and EPL are provided in Table 2.1.

**Table 2.1 Noise limits, dB**

Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$
All sensitive receivers	55	50	45

It should be noted that the EPL does not differentiate between construction and operational noise, requiring all noise from the premises to meet the noise limits in Table 2.1. The CNMP has a separate noise limit for Rock/Concrete Breaking activities which has been reproduced in Table 2.2.

**Table 2.2 Construction noise management levels, dB**

Location	Activity	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$
All sensitive receivers	General construction	55	50	45
	Rock/Concrete breaking	75	-	-

### 2.5 Meteorological conditions

As described in the consent, noise generated by Borg is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy (INP), as follows:

- During rain and wind speeds greater than 3 metres/second at 10 metres above ground level; or
- Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- Stability category G temperature inversion conditions.



## 3 Methodology

### 3.1 Overview

Attended environmental noise monitoring was done in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. Meteorological data was obtained from the Borg automatic weather station (AWS) which allowed correlation of atmospheric parameters with measured site noise levels.

### 3.2 Attended noise monitoring

During this survey, attended noise monitoring was conducted during the day period at each location. The duration of each measurement was 15 minutes. Atmospheric conditions were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site's contribution (if any) to measured levels. At each monitoring location, the site-only  $L_{Aeq,15\text{minute}}$  and  $L_{Amax}$  were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as IA or NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background ( $L_{A90}$ ), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate of may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured  $L_{Amax}$  has been used as a conservative estimate of  $L_{A1,1\text{minute}}$ . The EPA accepts sleep disturbance analysis based on either the  $L_{A1,1\text{minute}}$  or  $L_{Amax}$  metrics, with the  $L_{Amax}$  representing a more conservative assessment of site noise emissions.

### 3.3 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor penalties have been reported and added to measured site-only  $L_{Aeq}$  noise levels.

Low-frequency modifying factor penalties have only been applied to site-only  $L_{Aeq}$  levels if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

### 3.4 Instrumentation and personnel

Attended noise monitoring was conducted by Will Moore. Qualifications, experience and demonstration of competence is in accordance with the Approved methods and is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

**Table 3.1**      **Attended noise monitoring equipment**

Item	Serial number	Calibration due date	Relevant standard
Brüel & Kjær Type 2250 sound level meter	3008201	12 July 2025	IEC 61672-1:2002
Svantek SV36 calibrator	154613	5 June 2025	IEC 60942:2003

## 4 Results

### 4.1 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.1. Discussion as to the noise sources responsible for these measured levels is provided in Section 5 of this report.

**Table 4.1** Total measured noise levels, dB – Quarter 1 2025 <sup>1</sup>

Location	Start date and time	L <sub>Amax</sub>	L <sub>A1</sub>	L <sub>A10</sub>	L <sub>Aeq</sub>	L <sub>A50</sub>	L <sub>A90</sub>	L <sub>Amin</sub>
NM1	18/02/2025 11:49	67	57	51	49	47	46	43
NM2	18/02/2025 12:10	61	50	45	43	42	40	37
NM3	18/02/2025 10:59	57	49	45	43	43	42	39
NM4	18/02/2025 11:24	74	64	52	52	47	46	44

Notes: 1. Levels in this table are not necessarily the result of activity at site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 metres above ground. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height.

**Table 4.2** Measured atmospheric conditions – Quarter 1 2025

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction ° Magnetic north <sup>1</sup>	Cloud cover 1/8s
NM1	18/02/2025 11:49	19	0.9	272	2
NM2	18/02/2025 12:10	23	1.0	280	3
NM3	18/02/2025 10:59	19	1.3	295	1
NM4	18/02/2025 11:24	19	1.4	300	1

Notes: 1. "-" indicates calm conditions at monitoring location.

### 4.2 Site only noise levels

#### 4.2.1 Modifying factors

There were no modifying factors, as defined in the NPfI, applicable during the survey.

## 4.2.2 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the site AWS. Limits are applicable if weather conditions were within specified parameters during each measurement.

**Table 4.3 Site noise levels and limits – Quarter 1 2025**

Location	Start Date and Time	Wind		Stability Class	Limits apply? <sup>1</sup>	Limits, dB	Site levels, dB	Exceedances, dB <sup>1</sup>
		Speed m/s	Direction <sup>3</sup>			L <sub>Aeq,15minute</sub>	L <sub>Aeq,15minute</sub> <sup>2</sup>	L <sub>Aeq,15minute</sub>
NM1	18/02/2025 11:49	3.0	283	A	Yes	55	47	Nil
NM2	18/02/2025 12:10	2.7	315	A	Yes	55	37	Nil
NM3	18/02/2025 10:59	2.9	259	A	Yes	55	42	Nil
NM4	18/02/2025 11:24	2.6	314	B	Yes	55	44	Nil

- Notes:
1. Noise emission limits are applicable if weather conditions were within parameters specified in Section 3.3. N/A in exceedance column indicates that limits were not applicable due to weather conditions.
  2. Site-only L<sub>Aeq,15minute</sub> includes modifying factor penalties if applicable.
  3. Degrees magnetic north, “-” indicates calm conditions.

# 5 Discussion

## 5.1 Noted noise sources

During attended monitoring, the time variations (temporal characteristics) of noise sources are considered in each measurement via statistical descriptors. From these observations, summaries have been derived for the location and provided in this section. Statistical 1/3 octave-band analysis of environmental noise was undertaken and the following figures display frequency ranges of various noise sources at each location for  $L_{A1}$ ,  $L_{A10}$ ,  $L_{Aeq}$ ,  $L_{A50}$ , and  $L_{A90}$  descriptors. These figures also provide, graphically, statistical information for these noise levels.

An example is provided as Figure 5.1, where frogs and insects are seen to be generating noise at frequencies above 1000 Hz, while industrial noise is observed at frequencies less than 1000 Hz.

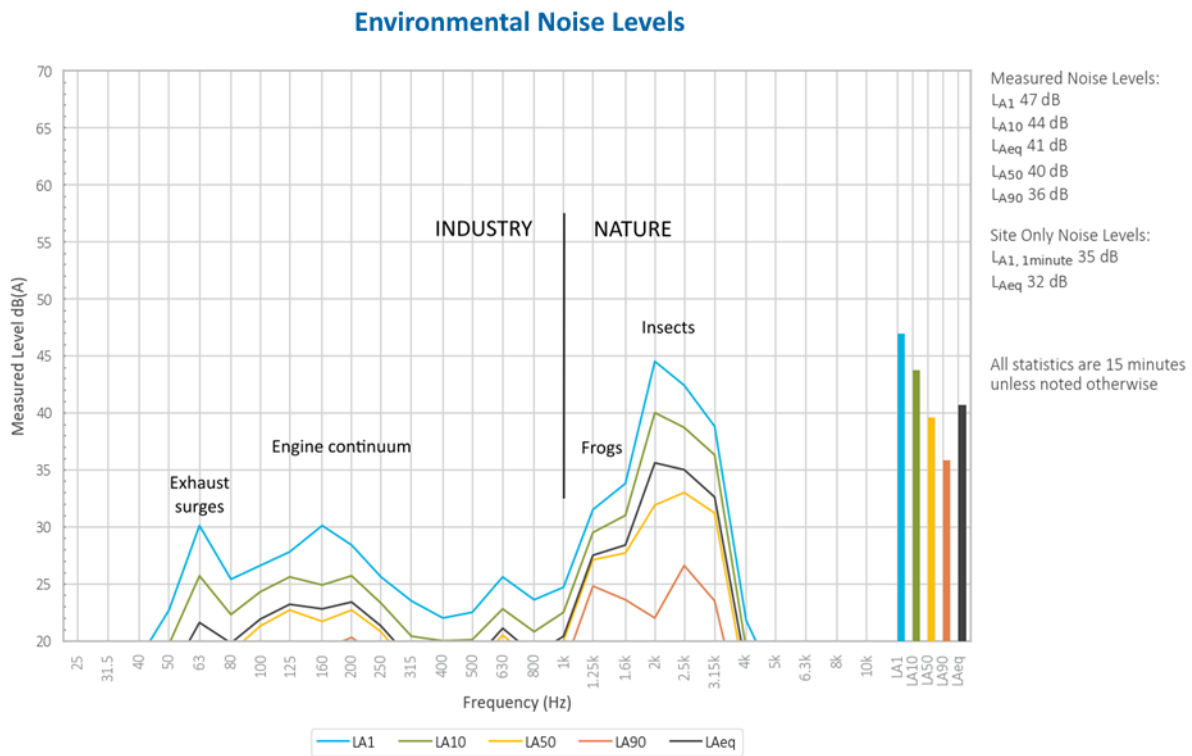
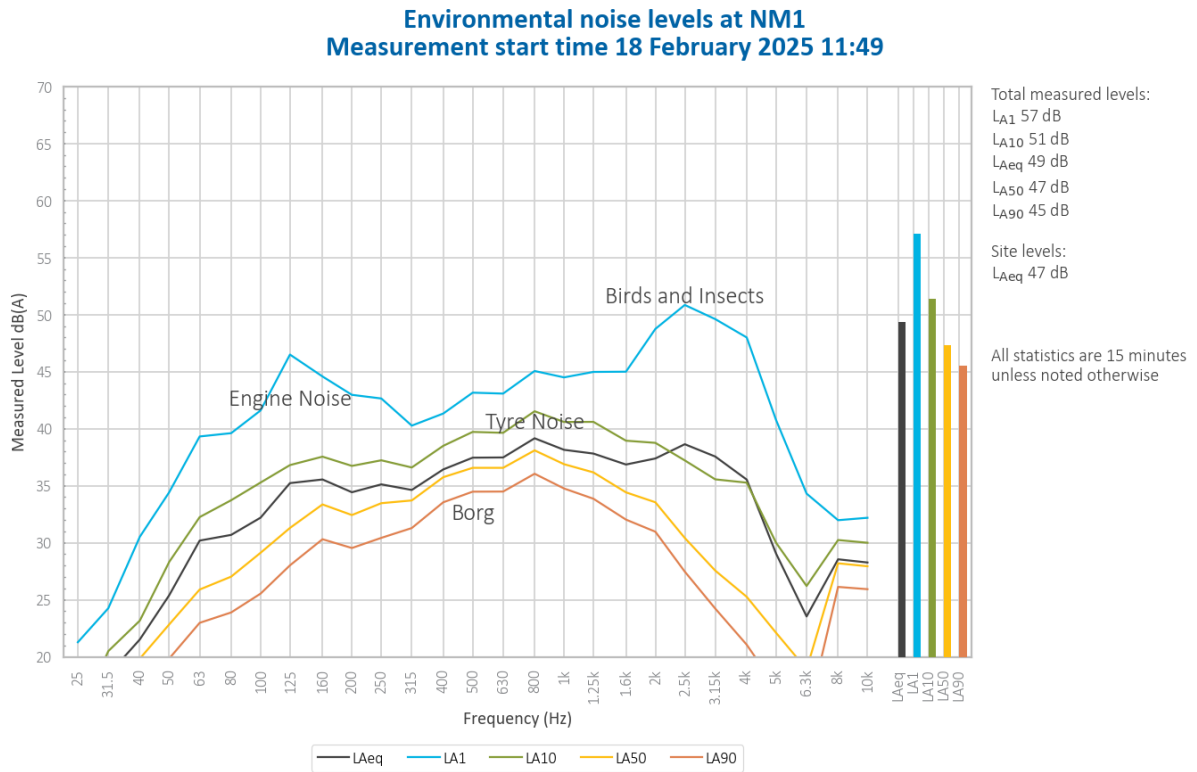


Figure 5.1 Example graph (refer to Section 5.1 for explanatory note)

5.2 NM1

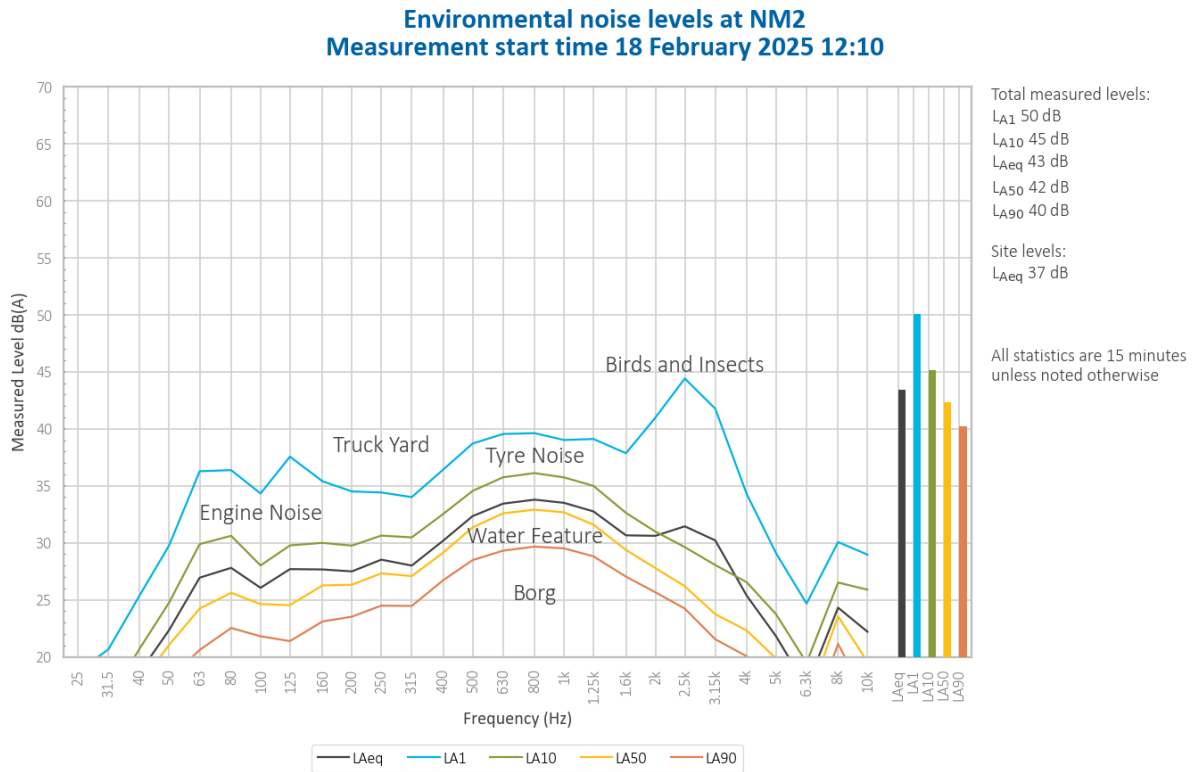


**Figure 5.2 Environmental Noise Levels - NM1, Oberon caravan park**

A continuum from Borg was audible throughout the measurement, generating a site-only  $L_{Aeq}$  of 47 dB.

Birds, engine noise, and road traffic tyre noise generated the measured  $L_{A1}$  and contributed to the measured  $L_{A10}$  and  $L_{Aeq}$ . Continuum from Borg contributed to the measured  $L_{Aeq}$  and generated the measured  $L_{A50}$  and  $L_{A90}$ .

5.3 NM2

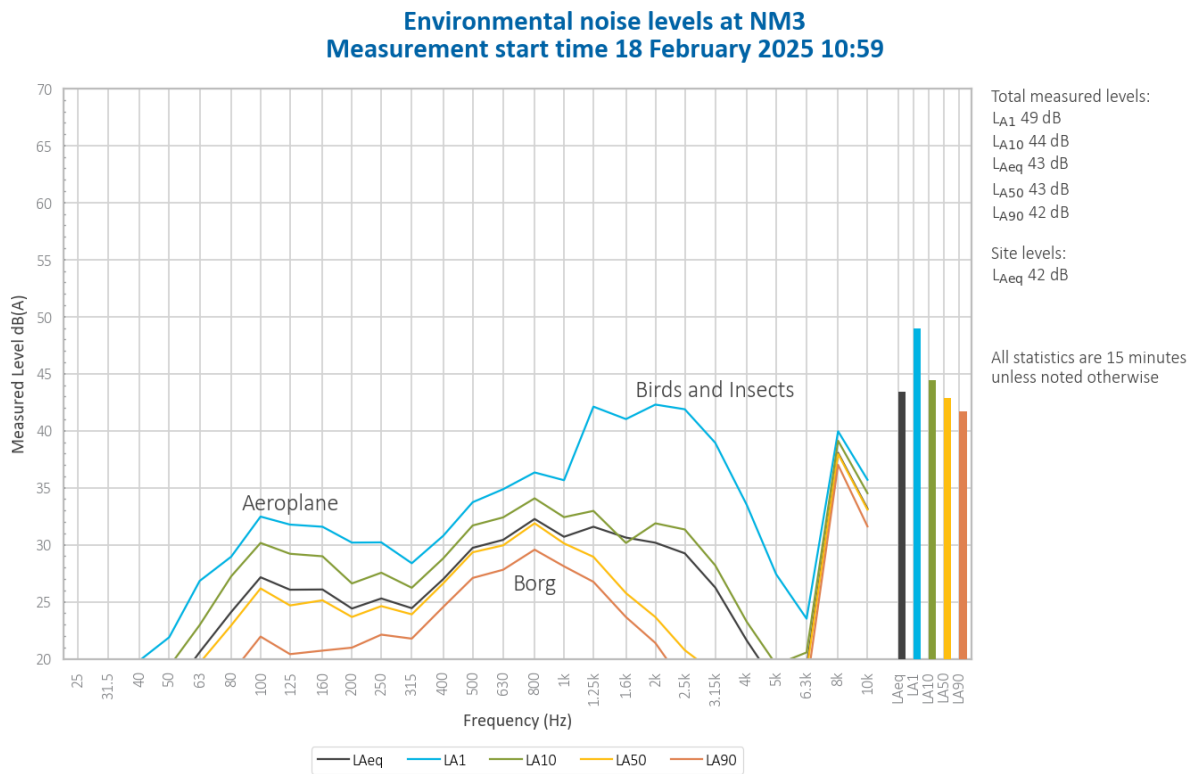


**Figure 5.3 Environmental Noise Levels – NM2, Intersection of Pine Street and Herborn Street**

A continuum from Borg was audible throughout the measurement, generating a site-only  $L_{Aeq}$  of 37 dB.

Birds generated the measured  $L_{A1}$  and  $L_{A10}$  and contributed to the  $L_{Aeq}$ . Road traffic engine noise also contributed to the  $L_{A1}$ ,  $L_{A10}$ , and the  $L_{Aeq}$ . Continuum from Borg and the nearby truck yard primarily generated the measured  $L_{A50}$  and  $L_{A90}$  and contributed to the  $L_{Aeq}$ . A nearby water feature and tyre noise from the major road also contributed to the measured  $L_{A50}$  and  $L_{A90}$ .

5.4 NM3



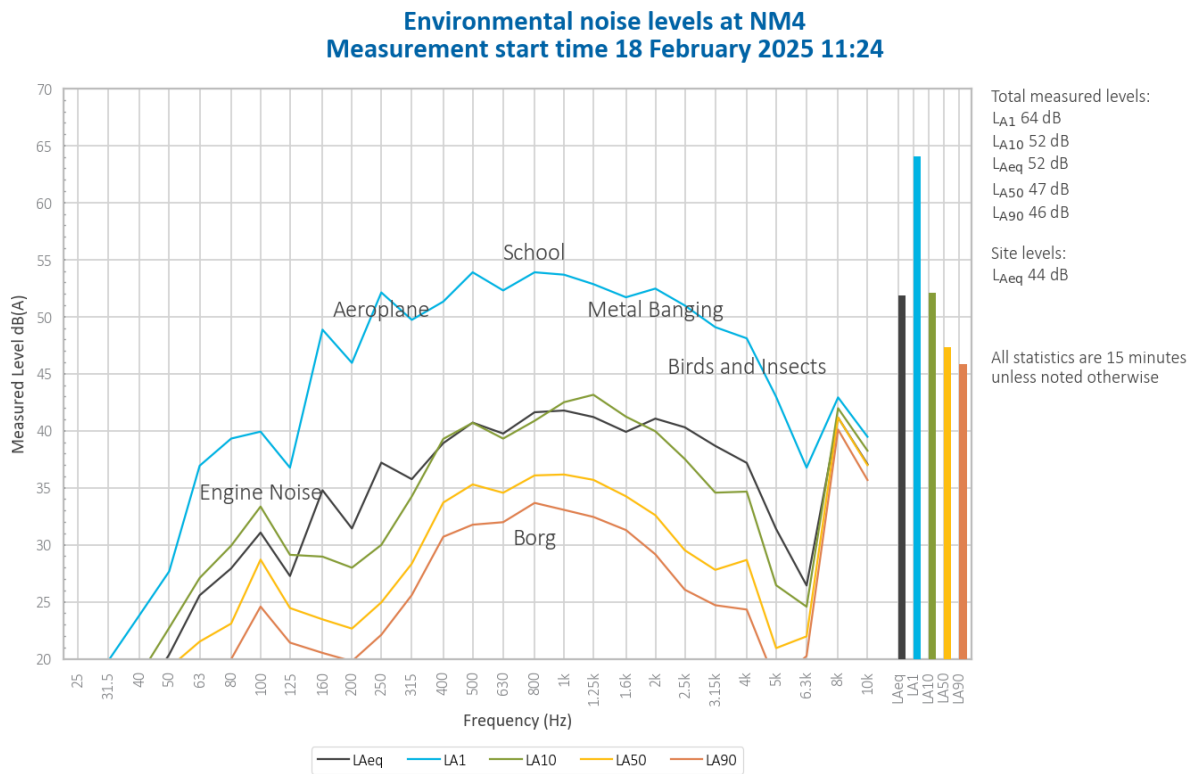
**Figure 5.4 Environmental Noise Levels – NM3, 127 Hazelgrove Road**

A continuum from Borg was audible throughout the measurement, generating a site-only  $L_{Aeq}$  of 42 dB.

Birds and insects generated the measured  $L_{A1}$  and contributed to the  $L_{A10}$ ,  $L_{Aeq}$  and  $L_{A50}$ . An overhead aeroplane contributed to the  $L_{A10}$  and  $L_{Aeq}$ . Continuum from Borg contributed to the  $L_{A50}$  and generated the measured  $L_{A90}$ .



5.5 NM4



**Figure 5.5 Environmental Noise Levels – NM4, Intersection of Tasman Street and Earl Street**

A construction continuum from Borg was audible throughout the measurement, generating a site-only  $L_{Aeq}$  of 44 dB.

Road traffic engine noise and an aeroplane contributed to the  $L_{A1}$ . Kids at the nearby school, birds and insects generated the  $L_{A10}$  and contributed to the measured  $L_{A1}$ ,  $L_{Aeq}$ ,  $L_{A50}$  and  $L_{A90}$ . Continuum from Borg contributed to the measured  $L_{Aeq}$ ,  $L_{A50}$  and  $L_{A90}$ .

Noise from birds and dogs were also noted.

## 6 Summary

EMM was engaged by Borg Manufacturing Pty Ltd to conduct a quarterly noise survey of construction at the Borg panel manufacturing facility. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done during the day period of 19 February 2025 at four monitoring locations.

Noise levels from site complied with relevant limits at all monitoring locations during the Quarter 1 2025 survey.

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# Appendix A

Noise perception and examples

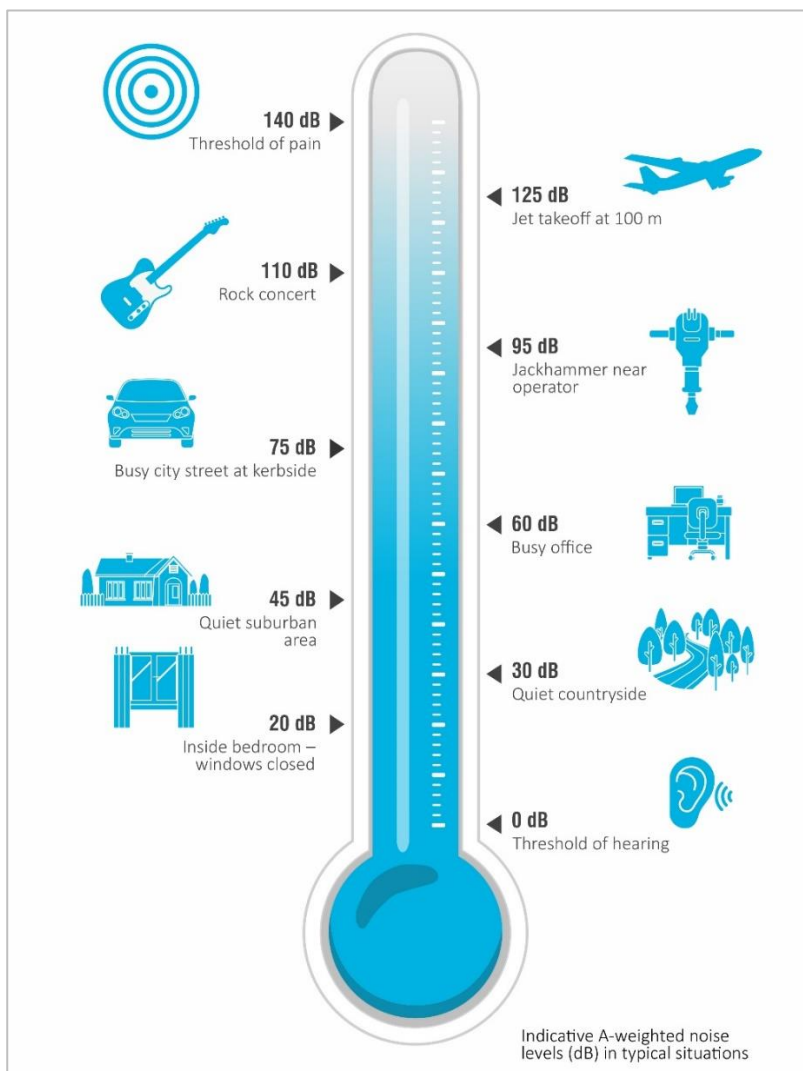
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## A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

**Table A.1 Perceived change in noise**

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or quarter) as loud



**Figure A.1 Common noise levels**

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# Appendix B

Regulator documents

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## B.1 Development consent SSD 7016

### NOISE

#### Hours of Work

B13 The Applicant must comply with the hours detailed in **Table 1**, unless otherwise agreed in writing by the Secretary.

**Table 1: Hours of Work**

Activity	Day	Time
Earthworks and Construction	Monday – Friday Saturday	7 am to 7 pm 8 am to 1 pm
Operation	Monday – Sunday	24 hours

B14 Works outside of the hours identified in Condition B13 may be undertaken in the following circumstances:

- works that are inaudible at the nearest sensitive receivers;
- works agreed to in writing by the Secretary;
- for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
- where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

#### Construction Noise Management Plan

B15 The Applicant must prepare a Construction Noise Management Plan (CNMP) for the Project to manage construction noise. The plan must form part of the CEMP required by Condition C1 and must:

- be prepared by a suitably qualified and experienced noise expert;
- be approved by the Secretary prior to the commencement of construction of the Project;
- describe procedures for achieving the noise limits in **Table 2**;
- describe the measures to be implemented to manage noisy works such as rock/concrete breaking activities, in close proximity to sensitive receivers;
- include strategies that have been developed with the community for managing noisy works;
- describe the community consultation undertaken to develop the strategies in e) above; and
- include a complaints management system that would be implemented for the duration of the Project.

#### Operational Noise Limits

B16 The Applicant must ensure that noise generated by the Development does not exceed the noise limits in **Table 2**.

**Table 2: Noise Limits dB(A)**

Location	Day	Evening	Night
	L <sub>Aeq</sub> (15 minute)	L <sub>Aeq</sub> (15 minute)	L <sub>Aeq</sub> (15 minute)
All sensitive receivers	55	50	45

**Note:** Noise generated by the Development is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.

#### Noise Mitigation

B17 The Applicant must ensure all noise attenuation measures already installed for the Existing Development are maintained in good working order for the life of the Development.

## Operational Noise Management Plan

- B18 Within 6 months of the date of this consent, the Applicant must prepare an Operational Noise Management Plan (ONMP) for the Existing Development, to manage operational noise to the satisfaction of the Secretary. The ONMP must form part of the OEMP required by Condition 0 and be prepared in accordance with Condition 0. The ONMP must:
- (a) be prepared by a suitably qualified and experienced noise expert;
  - (b) describe the measures that will be implemented to minimise noise from the Existing Development including:
    - (i) all reasonable and feasible measures being employed on site;
    - (ii) maintain equipment to ensure it is in good order;
    - (iii) traffic noise is effectively managed;
    - (iv) the noise impacts of the Existing Development are minimised during any meteorological conditions when the noise criteria in this consent do not apply;
    - (v) compliance with the relevant conditions of this consent;
  - (c) includes a noise monitoring program that:
    - (i) must be carried out until otherwise agreed to in writing by the Secretary;
    - (ii) is capable of evaluating the performance of the Existing Development; and
    - (iii) includes a protocol for determining exceedances of the relevant conditions of this consent and responding to complaints; and
  - (d) include a procedure for implementing noise mitigation measures, should the Applicant be directed by the EPA or the Secretary, or should non-compliances be detected.
- B19 Prior to the commencement of operation of the Project, the Applicant must update the ONMP required under Condition 0, to incorporate the Project and its management, to the satisfaction of the Secretary. The updated plan must be prepared in accordance with the requirements of Condition 0, and must incorporate the following:
- (a) description of the noise monitoring program to measure the performance of the Development against this consent and the EPL; ~~and~~
  - (b) description of any additional measures that would be implemented for the Development to ensure compliance with the noise limits in Condition 0 and the EPL; ~~and~~
  - (c) ~~details of the noise attenuation measures for the gas turbine and ancillary equipment associated with the particleboard material handling area; and~~
  - (d) ~~details of the noise attenuations measures for the materials handling equipment approved for installation and operation under SSD 7016 MOD 3.~~

## Noise Verification

- B20 Within 3 months of commencement of operation of the Project, the Applicant must undertake a noise verification study for the Development to the satisfaction of the Secretary. The study must:
- (a) be undertaken by a suitably qualified expert;
  - (b) include an analysis of compliance with noise limits specified in Condition 0;
  - (c) demonstrate achievement of the sound power levels in Table 12 of the *Borg Panels Timber Panel Processing Facility Noise and Vibration Impact Assessment*, dated May 2016 and prepared by Global Acoustics;
  - (d) include an outline of management actions to be taken to address any exceedances of the limits specified in Condition 0; and
  - (e) describe the contingency measures in the event management actions are not effective in reducing noise levels to an acceptable level.

Within 1 month of completing the study, the Applicant must submit a report outlining the findings of the study to the Secretary and the EPA.

- B20A Within three months of the commissioning of the gas turbines and ancillary equipment, the Applicant must undertake a noise verification study for the Department to the satisfaction of the Secretary. The study must:
- (a) be undertaken by a suitably qualified expert; and
  - (b) include an analysis of compliance with noise limits specified in Condition B16;
  - (c) include an outline of management actions to be taken to address any exceedances of the limits specified in Condition B16; and
  - (d) describe the contingency measures in the event management actions are not effective in reducing noise levels to an acceptable level.
- B20B Within three months of commissioning the materials handling equipment approved for installation and operation under SSE 7016 MOD 3, the Applicant must undertake a Noise Verification Study for the Department to the satisfaction of the Secretary. The Study must:
- (a) be undertaken by a suitably qualified expert;
  - (b) include an analysis of compliance with noise limits specified in Condition B16;
  - (c) include an outline of management actions to be taken to address any exceedances of the limits specified in Condition B16; and
  - (d) describe the contingency measures in the event management actions are not effective in reducing noise levels to an acceptable level.
- B21 Should the noise verification study indicate the Development has not complied with the noise limits in Condition 0 and applicable EPL requirements, or where the verification indicates that greater impacts than predicted in the EIS may arise, a detailed investigation and an outline of any management measures necessary to prevent exceedances must be submitted to the Secretary and the EPA, as part of the study.



## B.2 Environmental protection licence

### L4 Noise limits

L4.1 Noise from the premises must not exceed:

- a) 55 dB(A)  $L_{Aeq(15\text{ minute})}$  during the day (7am to 6pm); and
- b) 50 dB(A)  $L_{Aeq(15\text{ minute})}$  during the evening (6pm to 10pm); and
- c) at all other times 45 dB(A)  $L_{Aeq(15\text{ minute})}$ , except as expressly provided by this licence.

Where  $L_{Aeq}$  means the equivalent continuous noise level – the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

L4.2 To determine compliance with condition L4.1, noise must be measured at or computed for Oberon High School or any other noise sensitive locations (such as a residence/school). A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "NSW Industrial Noise Policy (EPA, January 2000)".

L4.3 The noise limits set out in condition L4.1 apply under all meteorological conditions except for the

following:

- a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
- b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Stability category G temperature inversion conditions.

L4.4 For the purpose of condition L4.3:

- a) Data recorded by the meteorological station identified as EPA Licence Point 26 must be used to determine meteorological conditions; and
- b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

### M7 Other monitoring and recording conditions

M7.1 Noise monitoring to determine compliance with condition L4 must be carried out at least once annually during the day, evening, and night time hours specified by L4.1 at the location(s) specified under condition L4.2 or at the nearest residence, and be undertaken in accordance with Australian Standard AS 2659.1 (1998) Guide to use of sound measuring equipment - portable sound level meters, and the compliance monitoring guidance provided in the NSW Industrial Noise Policy.

### 7.3 Attended Noise Monitoring

Attended noise monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows the most accurate determination of the contribution, if any, to measured noise levels by the source of interest.

Operational noise impacts are potentially greatest at night when background levels are typically low and the allowable levels are correspondingly low, and, this is the period when noise propagation enhancement is most likely.

The Environmental Manager can, in certain circumstances for verification purposes, undertake attended noise monitoring. A suitably qualified noise expert will undertake annual attended noise monitoring (see 7.3.1 below).

#### 7.3.1 Compliance Monitoring

Compliance monitoring at each location identified in Table 6 will be undertaken once per year during the day, evening and night periods (pending weather and operational constraints) with results compared to noise criteria in Table 3. Compliance monitoring should be conducted during the winter period as this season represents the likely worst-case season due to temperature inversions.

Any exceedance of a noise criterion recorded during annual compliance noise monitoring is to be investigated. The acoustic consultant undertaking the attended monitoring is to contact the Environment Manager as soon as practicable to advise of the recorded results. If exceedance of limits is demonstrated follow-up monitoring is to be undertaken within one week of the exceedance. The regular monitoring frequency will be resumed if no further exceedances are measured.

Annual compliance monitoring is to be undertaken by a suitably qualified noise expert. Appropriate techniques should be applied to determine noise contributions from the facility in isolation (in the absence of all extraneous noise sources). These techniques could include, but are not limited to:

- Pausing the sound level meter during extraneous noise events, for example, when a dog is barking or road traffic noise is clearly audible and affecting the measurements;
- Using frequency filtering techniques where certain frequencies of noise are excluded from the measurements; or
- Using other noise descriptors such as  $L_{A90}$  or  $L_{A50}$  to filter extraneous noise events.

The facility should be fully operational at the time of monitoring.

Operational noise performance is reported as detailed in Section 9.

## 7.4 Monitoring Locations

Four representative locations have been chosen for monitoring as summarised in Table 6. Refer to Figure 2 for these locations.

**Table 5 Noise Monitoring Locations**

Location ID	Monitoring Location
NM1	Oberon Caravan Park
NM2	Intersection Pine Street and Herborn Street
NM3	127 Hazelgrove Road
NM4	Intersection Tasman Street and Earl Street

Noise management levels for each monitoring location are provided in Table 3. Where these are exceeded from operational noise sources, the exceedance should be investigated (as discussed in Section 9) to determine the cause and any necessary mitigation.

## 7.5 Meteorological Conditions

Monitoring should be undertaken on days of light winds (<5 m/s) and no rain. Wind speed is to be monitored using a hand held wind speed monitor or can be sourced from the site meteorological weather station. Rain and too much wind will elevate the noise level. If there is no choice but to monitor in inclement weather, note the conditions.

Meteorological data is obtained from the Australian Panels weather station (EPA Point 26). This data allows correlation of atmospheric parameters and measured noise levels. Atmospheric condition measurement at ground level is also undertaken during attended monitoring.

## 10 ONMP Review

In accordance with Development Consent SSD 7016 Condition C10, this ONMP will be reviewed and if necessary revised within 3 months of an:

- Approval of a modification;
- Submission of an incident report under Condition C13;
- Approval of an Annual Review under Condition C11; or
- Completion of an audit under Condition C15.

Revisions to the ONMP will be submitted to the Secretary DPE for approval.

## 5 Construction Noise Management Levels

Construction activities will be undertaken simultaneously with regular operation of the existing site. Australian Panels propose to generally restrict site noise emission from both construction and operational tasks combined to comply with operational noise criteria conditioned in Development Consent SSD 7016 and EPL 3035.

Following consideration of the ICNG (**Section 2.6**), Development Consent (SSD 7016) conditions (**Section 2.2**), EPL 3035 (**Section 2.4**) and the measured background noise levels (refer Global Acoustics, May 2016), **Table 6** summarises the Noise Management Levels (NMLs) for all residential receivers.

**Table 6 – Operation and Construction Noise Management Levels**

Location	Activity	Day	Evening	Night
		(7am-6pm)	(6pm-10pm)	(10pm-7am)
		LAeq (15 min)	LAeq (15 min)	LAeq (15 min)
All residential receivers	General Construction	55	50	45
	Rock/ Concrete Breaking	75		

Work outside approved construction hours are not expected, however unforeseen constraints relating to delivery of materials or equipment, or other technical requirements, may see some activities undertaken outside approved hours. Where required, out of hours works will be undertaken to meet the noise management levels in **Table 6**.

Development Consent SSD 7016 Condition B14 requires non-standard construction hour work to be inaudible at the nearest sensitive receivers. The Development Consent takes precedence over the ICNG and will be adopted in this plan.

In this instance, “inaudible” means the activity is not discernible from general operation activities.

## 7.2 Monitoring Frequency

### 7.2.1 Compliance Monitoring

The following compliance monitoring, to be undertaken during construction by a suitably qualified noise expert, is recommended for the project:

- Periodic attended noise monitoring at the potentially most affected residences during the day period, with a frequency of once per quarter, during the construction phase of the Project; and
- If exceedance of limits is demonstrated, additional mitigation controls are to be implemented, and follow-up monitoring undertaken by a suitably experienced person within one week of the exceedance.

Construction noise performance is reported as detailed in **Section 10**.

## 7.2.2 Management Monitoring

In addition to quarterly compliance monitoring, off-site management noise monitoring by suitably trained site personnel should be undertaken regularly, particularly during periods of meteorological enhancement and on commencement of new construction activities or areas, to ensure relevant noise criteria are adhered to.

Operations should be modified accordingly as required when exceedance or potential exceedances are measured. Modifications may include, but are not limited to, erection of temporary barriers or screens, temporary shutdown of equipment until adverse weather conditions change, or relocating equipment to less sensitive areas when feasible to do so.

## 7.3 Monitoring Locations

Four representative locations have been chosen for monitoring as summarised in **Table 8**. Refer to **Figure 2** for these locations.

**Table 8 – Noise Monitoring Locations**

Location ID	Monitoring Location
NM1	Oberon Caravan Park
NM2	Intersection Pine Street and Herborn Street
NM3	127 Hazelgrove Road
NM4	Intersection Tasman Street and Earl Street

Noise management levels for each monitoring location are provided in **Table 6**. Where these are exceeded by construction-related noise sources, the exceedance should be investigated (as discussed in **Section 10**) to determine the cause and any necessary mitigation.

### 7.3.1 Instrumentation

The following requirements should be observed whilst monitoring:

- Before commencing monitoring, ensure the Sound Level Meter's (SLM) laboratory calibration is current (refer to the sticker on the unit).
- If unsure about the functions of the SLM, refer to the instruction sheet in the case. The Environmental Manager should be trained in the use of the SLM and training documents kept on file.
- Ensure the windscreen is attached and that the SLM settings include a windscreen factor, the SLM is set to A-weighted and fast response.
- Prior to and completing the measurement, the SLM should be field calibrated using the supplied calibrator. Ensure that the pre and post measurements do not differ by more than 0.5 dB(A).

### 7.3.2 Weather Conditions

Monitoring should be undertaken on days of light winds (<5 m/s) and no rain. Wind speed is to be monitored using a hand held wind speed monitor. Rain and too much wind will elevate the noise level. If there is no choice but to monitor in inclement weather, note the conditions on the field sheet.

NMLs listed in Table 6 apply under all meteorological conditions except for the following:

- Wind speeds greater than 3 metres/second at 10 metres above ground level; or
- Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- Stability category G temperature inversion conditions.

Weather conditions measured at the site weather station should be used to determine applicability of meteorological exclusion rules.

### 7.3.3 Construction Noise Monitoring Procedure

Monitoring should be undertaken for a duration of 15 minutes at each location. More than one 15-minute measurement can be undertaken at each location.

The following information should be recorded in accordance with *AS 1055.2—1997 Acoustics—Description and measurement of environmental noise*. The field sheet for noise monitoring should capture the following details:

- Date and time of measurement;
- Details of the measurement positions, instrumentation used and types of analyses made;
- Weather conditions at each monitoring location, recorded at 1.8 metres above ground level, during the measurements (wind direction, wind velocity, relative humidity, temperature, recent precipitation, cloud cover (oktas));
- Description of the noise being investigated as well as operating conditions of the sound source(s) under investigation;
- Noise due to other sources including normal and possibly unusual noises;
- Statistical noise metric results including  $L_{A1}$ ,  $L_{A10}$ ,  $L_{Aeq}$  and  $L_{A90}$  due to all noise sources during the measurement period;
- Estimated or calculated  $L_{Aeq (15min)}$  attributable to Borg noise sources (in the absence of extraneous noise sources) during the measurement period;
- Associated observations (vibrations, amplitude or frequency modulation or similar).

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# Appendix C

Calibration certificates

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C.1 Calibration certificates

**CERTIFICATE OF CALIBRATION**  
CERTIFICATE NO: **C50057**

**EQUIPMENT TESTED :** Acoustic Calibrator

**Manufacturer:** Svantek  
**Type No:** SV36      **Serial No:** 154613  
**Class:** 1  
**Owner:** EMM Consulting  
Level 4, 20 Chandos Street  
St Leonards NSW 2065

**Tests Performed:** Measured Output Pressure level, Frequency & Distortion  
**Comments:** See Details and Class Tolerance overleaf.

**CONDITION OF TEST:**

<b>Ambient Pressure</b>	1004 hPa $\pm 1$ hPa	<b>Date of Receipt :</b>	05/06/2024
<b>Temperature</b>	23 °C $\pm 1$ ° C	<b>Date of Calibration :</b>	05/06/2024
<b>Relative Humidity</b>	44 % $\pm 5$ %	<b>Date of Issue :</b>	05/06/2024

**Acu-Vib Test Procedure:** AVP02 (Calibrators)  
Test Method: AS IEC 60942 - 2017

**CHECKED BY:** .....  
**AUTHORISED SIGNATURE:** .....  
*Hain See*

Accredited for compliance with ISO/IEC 17025 - Calibration  
Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.  
This report applies only to the item identified in the report and may not be reproduced in part.  
The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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**NATA**  
WORLD RECOGNISED  
ACCREDITATION  
Accredited Laboratory  
No. 9262  
Acoustic and Vibration  
Measurements

Page 1 of 2 Calibration Certificate  
AVCERT02.1 Rev.2.0 14.04.2021





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## Sound Level Meter IEC 61672-3:2013 Calibration Certificate

Calibration Number C23471

<b>Client Details</b>	EMM Consulting Ground Floor Suite 01, 20 Chandos Street
<b>Equipment Tested/ Model Number :</b>	Type 2250
<b>Instrument Serial Number :</b>	3008201
<b>Microphone Serial Number :</b>	2888134
<b>Pre-amplifier Serial Number :</b>	16037
<b>Firmware Version :</b>	N/A
<b>Pre-Test Atmospheric Conditions</b>	<b>Post-Test Atmospheric Conditions</b>
<b>Ambient Temperature :</b> 23.1 °C	<b>Ambient Temperature :</b> 24.3 °C
<b>Relative Humidity :</b> 44 %	<b>Relative Humidity :</b> 44.1 %
<b>Barometric Pressure :</b> 101.6 kPa	<b>Barometric Pressure :</b> 101.3 kPa
<b>Calibration Technician :</b> Max Moore	<b>Secondary Check:</b> Rhys Gravelle
<b>Calibration Date :</b> 12 Jul 2023	<b>Report Issue Date :</b> 17 Jul 2023
<b>Approved Signatory :</b>	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	±0.014 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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