Borg Manufacturing Facility

Environmental Noise Monitoring

Prepared for Borg Manufacturing Pty Ltd

June 2024

Borg Manufacturing Facility

Environmental Noise Monitoring

Borg Manufacturing Pty Ltd

E231291 RP2

June 2024

Version	Date	Prepared by	Reviewed by	Comments
1	3/06/2024	Will Moore	Amanda Buckeridge	Draft

Approved by

Name
Position
Date

Level 3 175 Scott Street
Newcastle NSW 2300

TABLE OF CONTENTS

Appendices

Tables

Figures

1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Borg Manufacturing Pty Ltd to conduct a noise survey of operations and 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, evening and night period of 16 May 2024 at four monitoring locations. Follow up noise monitoring was done during the night period of 23 May 2024 at two 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 20 May 2022. 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 24 March 2023. 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 August 2023. Relevant sections of the ONMP and CNMP are reproduced in Appendix B.3 and B.4.

2.4 Noise limits

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

Table 2.1 Impact assessment criteria, dB

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

Construction noise criteria for each monitoring location are detailed in Table 2.2 and Table 2.3.

Table 2.2 General construction noise limits, dB

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

Table 2.3 Rock/concrete breaking noise limit, dB

Location	Day $L_{Aeq,15minute}$
All sensitive receivers	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, evening and night 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 $L_{Aeq,15minute}$ 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 $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ 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}.

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
Rion NA-28 sound level meter	30131882	23/01/2025	IEC 61672-1:2002
SVAN SV36 acoustic calibrator	140737	06/09/2024	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 2 2024 [1]

Location	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
NM1	16/05/2024 10:03	65	59	54	52	51	49	47
NM2	16/05/2024 10:26	69	55	49	48	47	45	41
NM3	16/05/2024 09:15	69	55	44	44	36	32	29
NM4	16/05/2024 09:39	64	53	48	45	44	41	39
NM1	16/05/2024 18:44	58	54	52	50	49	48	46
NM2	16/05/2024 19:07	60	53	51	49	49	47	45
NM3	16/05/2024 18:00	51	44	39	37	37	33	30
NM4	16/05/2024 18:23	54	48	44	42	41	38	34
NM1	16/05/2024 22:43	52	50	49	47	47	46	44
NM1[2]	23/05/2024 22:05	57	49	46	45	45	44	42
NM2	16/05/2024 23:04	57	48	47	46	46	45	43
NM2[2]	23/05/2024 22:28	53	47	45	44	44	41	40
NM3	16/05/2024 22:00	47	44	42	41	41	40	38
NM4	16/05/2024 22:22	47	42	41	39	38	36	35

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

2. Follow up measurement within one week of measured exceedance.

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 2 2024

Location	Start date and time	Temperature °C	Wind speed m/s	Wind direction ° Magnetic north [1]	Cloud cover 1/8s
NM1	16/05/2024 10:03	18	1.0	80	1
NM2	16/05/2024 10:26	19	<0.5	-	2
NM3	16/05/2024 09:15	11	0.8	80	2
NM4	16/05/2024 09:39	17	0.9	100	2
NM1	16/05/2024 18:44	11	<0.5	-	0
NM2	16/05/2024 19:07	12	<0.5	-	0
NM3	16/05/2024 18:00	11	<0.5	-	0
NM4	16/05/2024 18:23	6	<0.5	-	0
NM1	16/05/2024 22:43	8	<0.5	-	0
NM1[2]	23/05/2024 22:05	6	<0.5	-	0
NM2	16/05/2024 23:04	8	<0.5	-	0
NM2[2]	23/05/2024 22:28	5	<0.5	-	0
NM3	16/05/2024 22:00	10	<0.5	-	1
NM4	16/05/2024 22:22	6	<0.5	-	1

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

2. Follow up measurement within one week of measured exceedance.

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 2 2024

Location	Start date and time	Wind		Stability class	Limits apply? [1]	Limit, dB	Site level, dB [2]	Exceedance, dB [1,2]
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	$L_{Aeq,15minute}$ [4]	$L_{Aeq,15minute}$
NM1	16/05/2024 10:03	3.7	42	C	No	55	51	N/A
NM2	16/05/2024 10:26	2.4	54	B	Yes	55	47	Nil
NM3	16/05/2024 09:15	3.4	70	C	No	55	32	N/A
NM4	16/05/2024 09:39	2.6	53	A	Yes	55	35	Nil
NM1	16/05/2024 18:44	0.9	147	D	Yes	50	50	Nil
NM2	16/05/2024 19:07	0.9	139	E	Yes	50	49	Nil
NM3	16/05/2024 18:00	0.3	90	E	Yes	50	33	Nil
NM4	16/05/2024 18:23	0.6	130	E	Yes	50	41	Nil
NM1	16/05/2024 22:43	0.4	136	F	Yes	45	47	2
NM1[5]	23/05/2024 22:05	0.8	141	E	Yes	45	45	Nil
NM2	16/05/2024 23:04	0.3	115	F	Yes	45	46	1
NM2[5]	23/05/2024 22:28	0.4	127	E	Yes	45	44	Nil
NM3	16/05/2024 22:00	0.4	119	F	Yes	45	41	Nil
NM4	16/05/2024 22:22	0.7	144	E	Yes	45	39	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. Bold results in red indicate exceedance of relevant limit.
3. Degrees magnetic north, "-" indicates calm conditions.
4. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties if applicable.
5. Follow up measurement within one week of measured exceedance.

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.

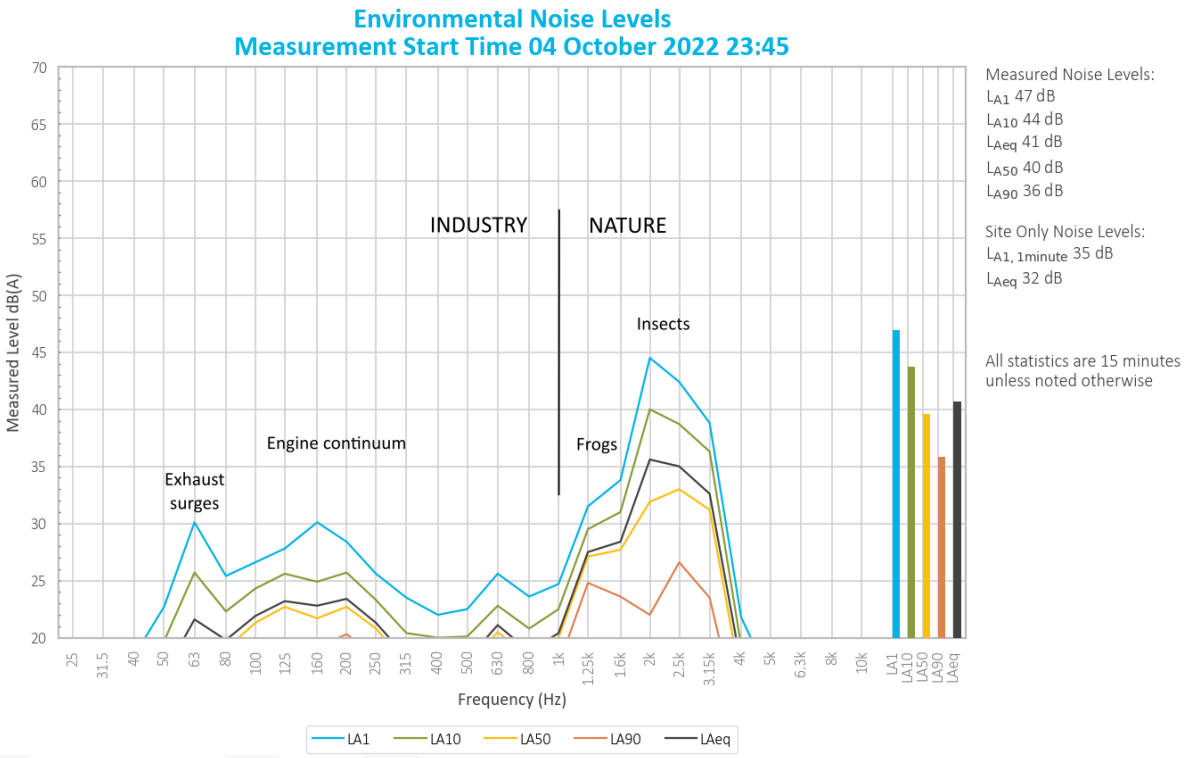

Figure 5.1 Example graph (refer to Section 5.1 for explanatory note)

5.2 NM1

5.2.1 NM1 day period

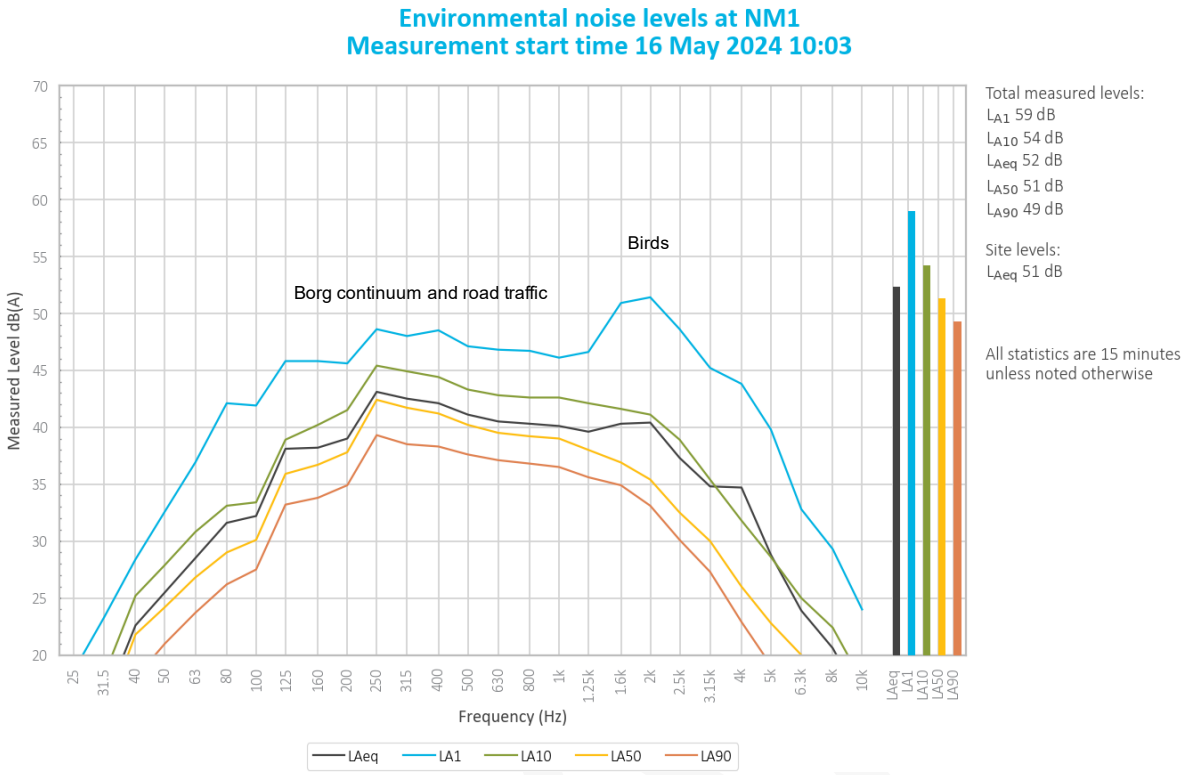

Figure 5.2 Day environmental noise levels - NM1, Oberon caravan park

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 51 dB. Impact noise was also noted.

Continuum from Borg primarily generated total measure levels. Road traffic and birds contributed to the measured L_{A1}, L_{A10} and L_{Aeq}.

5.2.2 NM1 evening period

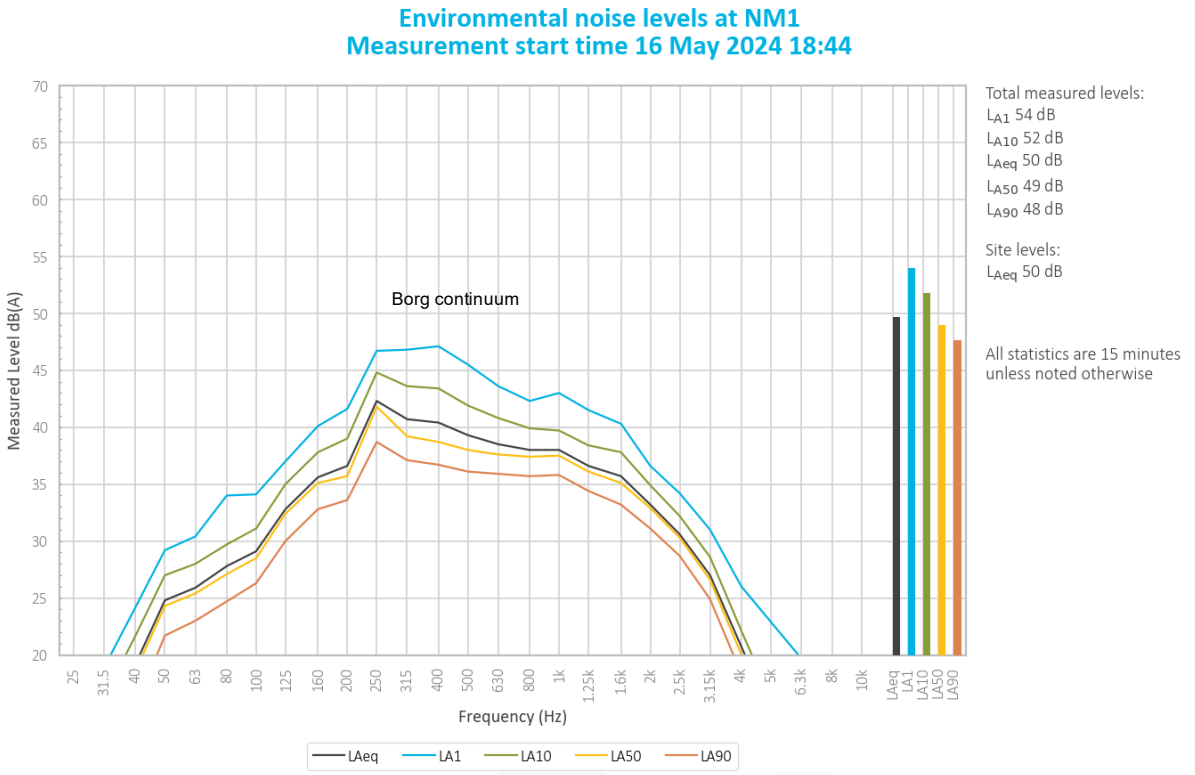

Figure 5.3 Evening environmental noise levels - NM1, Oberon caravan park

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 50 dB. Impact noise was also noted.

Continuum from Borg generated total measured levels.

Noise from road traffic was also noted.

5.2.3 NM1 night period

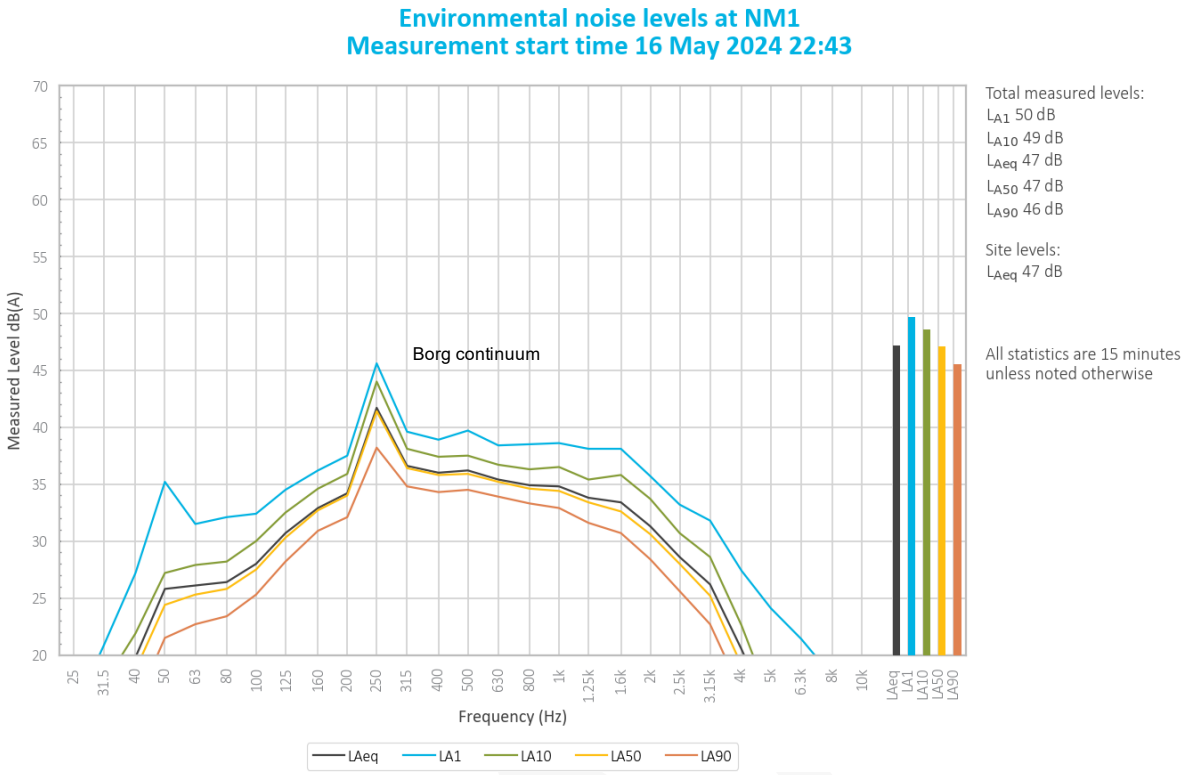

Figure 5.4 Night environmental noise levels - NM1, Oberon caravan park

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 47 dB, which exceeded the relevant limit by 2 dB.

Continuum from Borg generated total measured levels.

Noise from road traffic was also noted.

In accordance with the NMP, a follow up measurement will be conducted within one week of the initial exceedance.

5.2.4 NM1 night period – follow up measurement

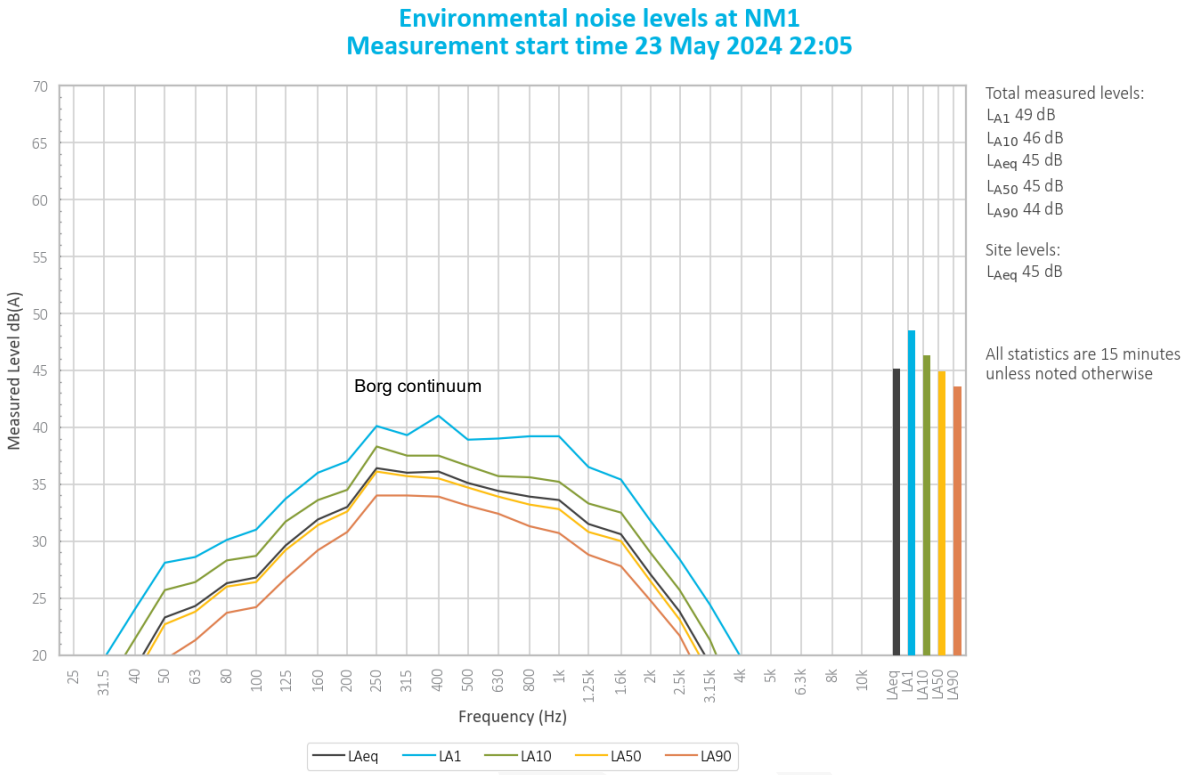

Figure 5.5 Night environmental noise levels - NM1, Oberon caravan park

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 45 dB. Impact noise was also noted.

Continuum from Borg generated total measured levels.

Noise from road traffic was also noted.

5.3 NM2

5.3.1 NM2 day period

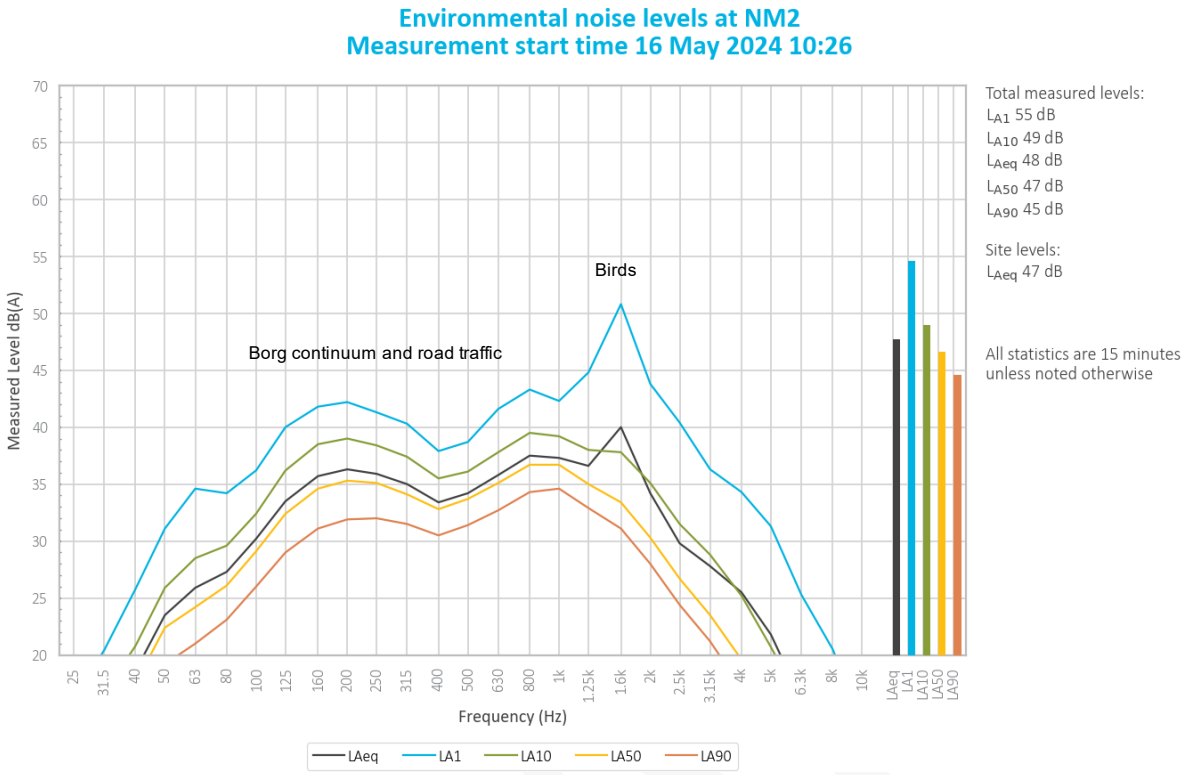

Figure 5.6 Day environmental noise levels – NM2, Intersection of Pine Street and Herborn Street

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

Continuum from Borg primarily generated total measure levels. Road traffic and birds contributed to the measured L_{A10} and L_{Aeq}. Birds primarily generated the measured L_{A1}.

Local continuum was also noted at low levels.

5.3.2 NM2 evening period

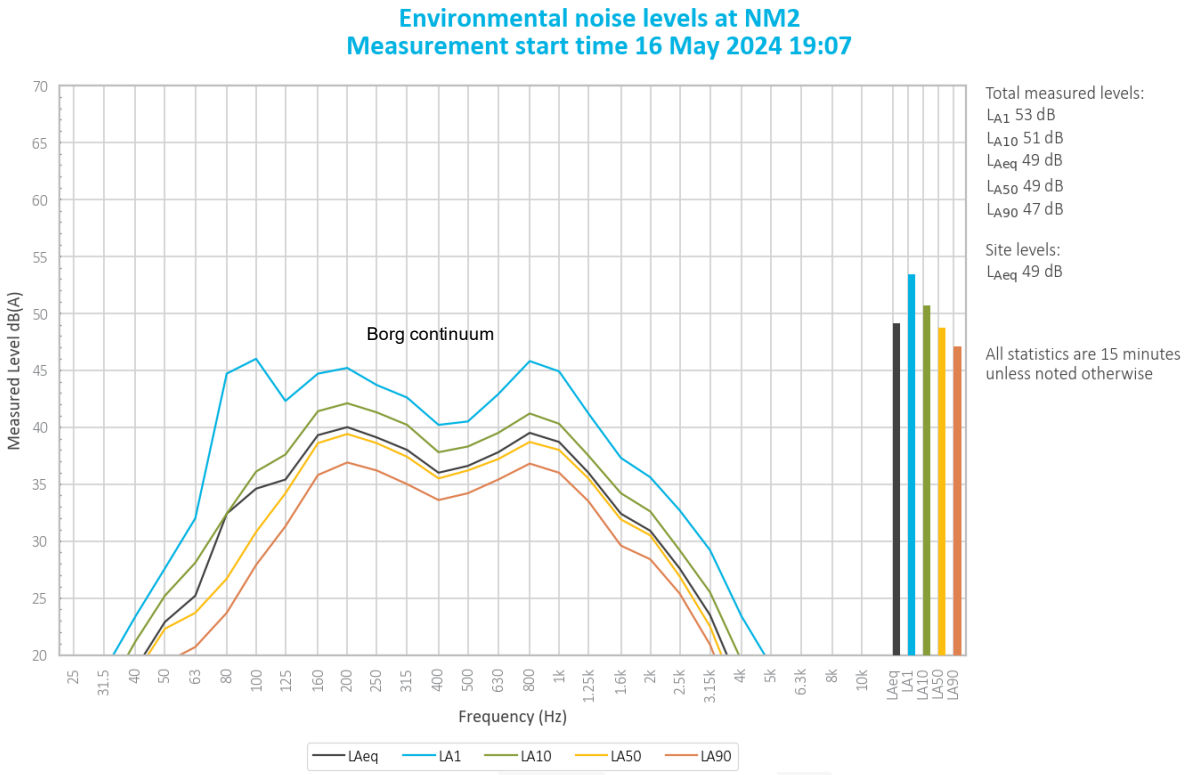

Figure 5.7 Evening environmental noise levels – NM2, Intersection of Pine Street and Herborn Street

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 49 dB. Impact noise was also noted.

Continuum from Borg generated total measured levels.

Noise from a dog and road traffic was also noted.

5.3.3 NM2 night period

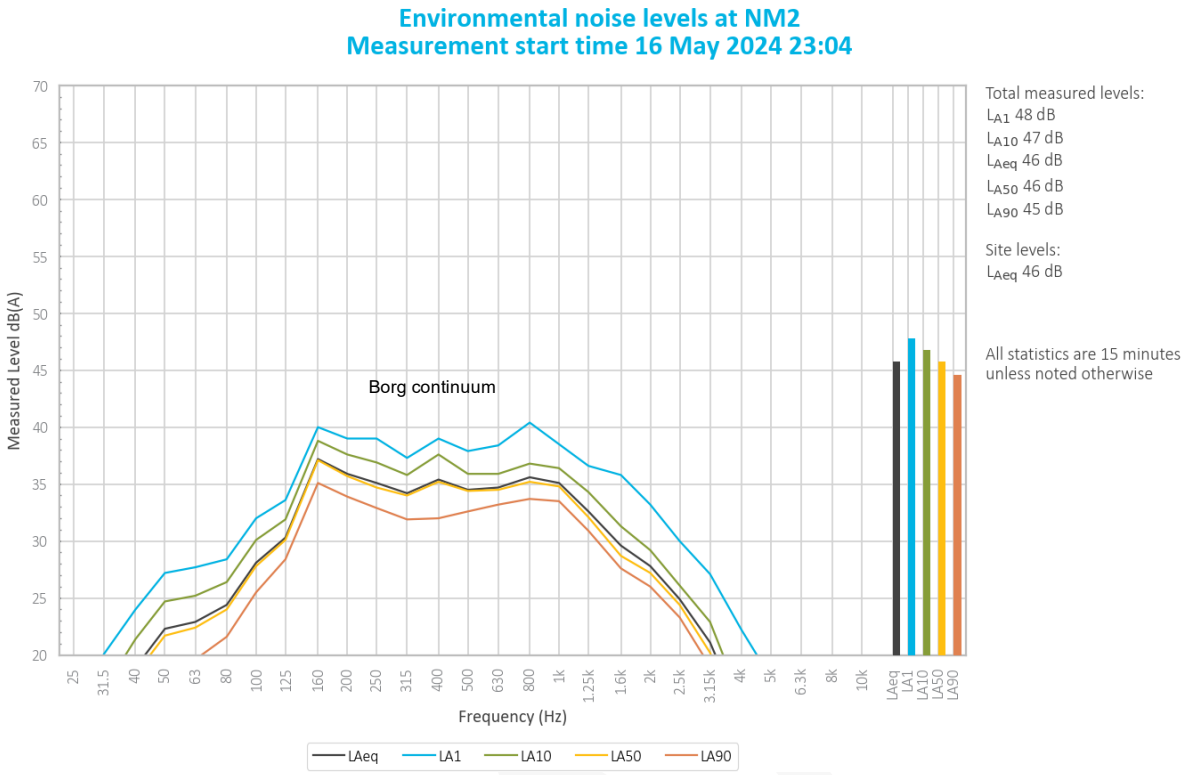

Figure 5.8 Night environmental noise levels – NM2, Intersection of Pine Street and Herborn Street

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 46 dB, which exceeded the relevant limit by 1 dB. Impact noise was also noted.

Continuum from Borg generated total measured levels.

Noise from road traffic was also noted.

In accordance with the NMP, a follow up measurement will be conducted within one week of the initial exceedance.

5.3.4 NM2 night period – follow up measurement

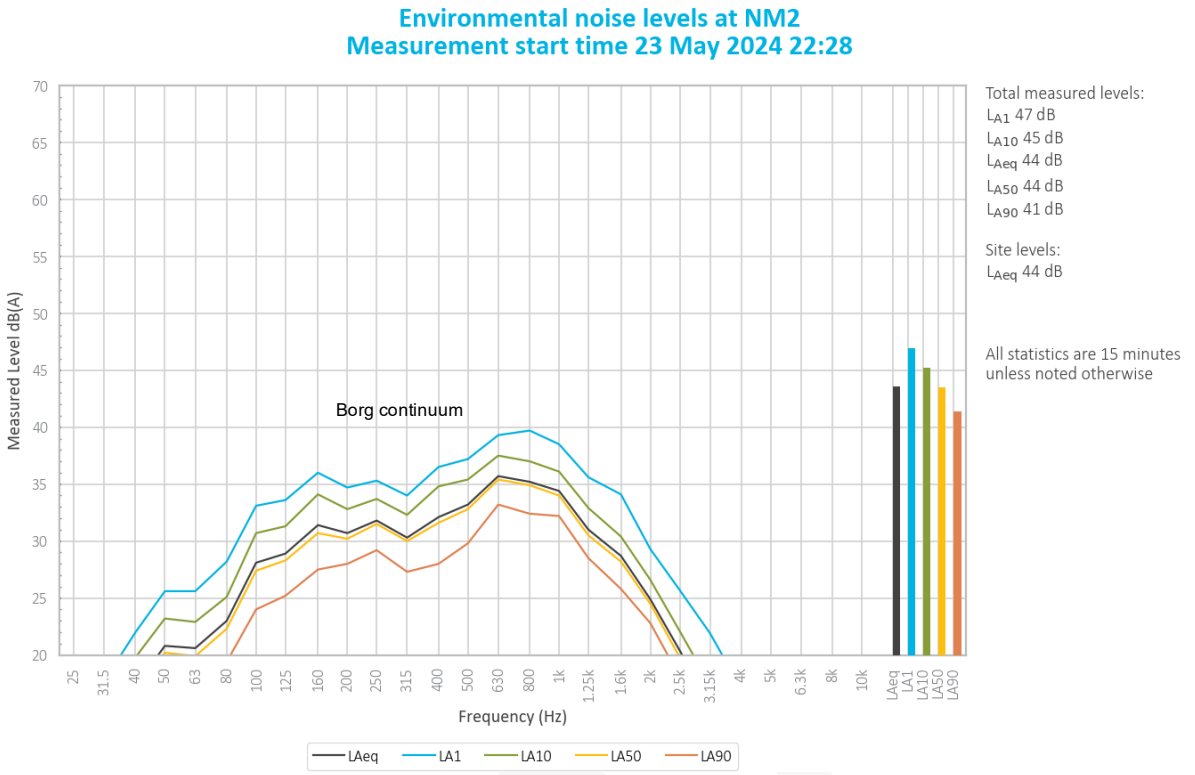

Figure 5.9 Night environmental noise levels – NM2, Intersection of Pine Street and Herborn Street

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 44 dB. Impact noise was also noted.

Continuum from Borg generated total measured levels.

Impact noise from another construction activity and noise from road traffic was also noted.

5.4 NM3

5.4.1 NM3 day period

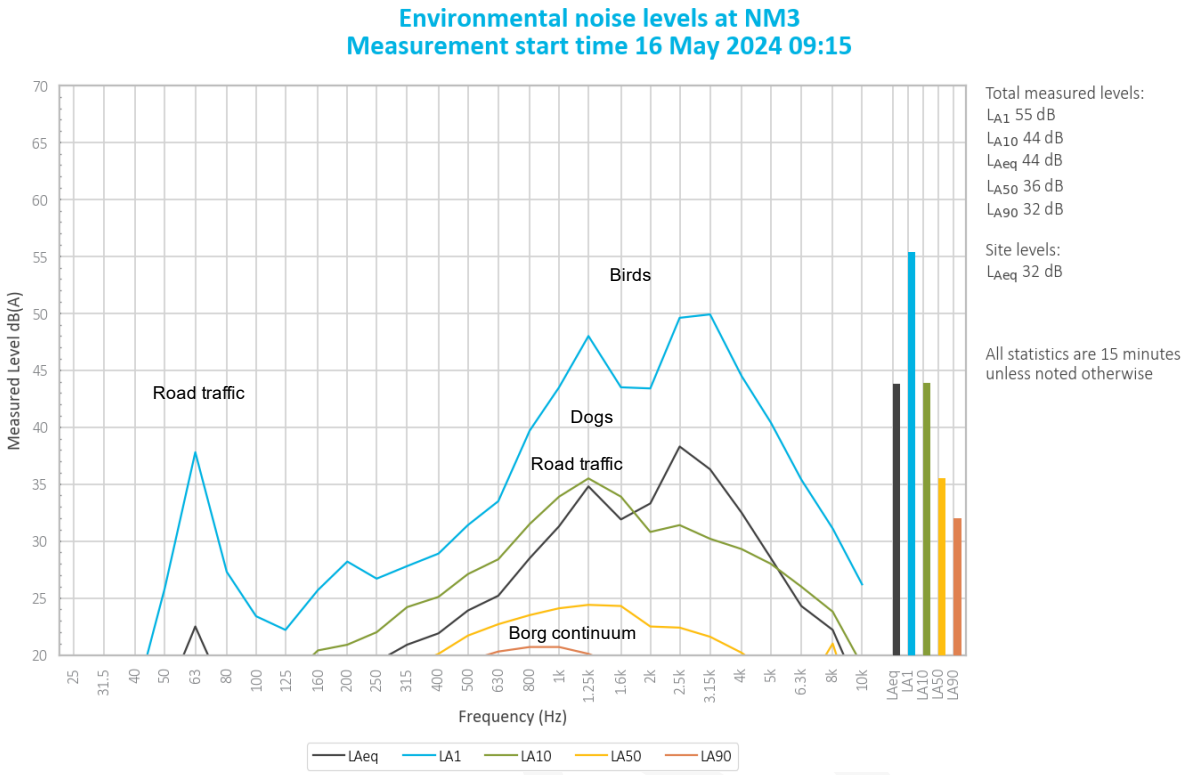

Figure 5.10 Day environmental noise levels – NM3, 127 Hazelgrove Road

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 32 dB.

Birds generated the measured L_{A1} and contributed to the measured L_{A10} and L_{Aeq}. Dogs contributed to the measured L_{A10} and L_{Aeq}. Road traffic contributed to the measured L_{A10}, L_{Aeq} and L_{A50}. Continuum from Borg generated the measured L_{A90}.

Noise from a breeze in nearby foliage and cattle was also noted.

5.4.2 NM3 evening period

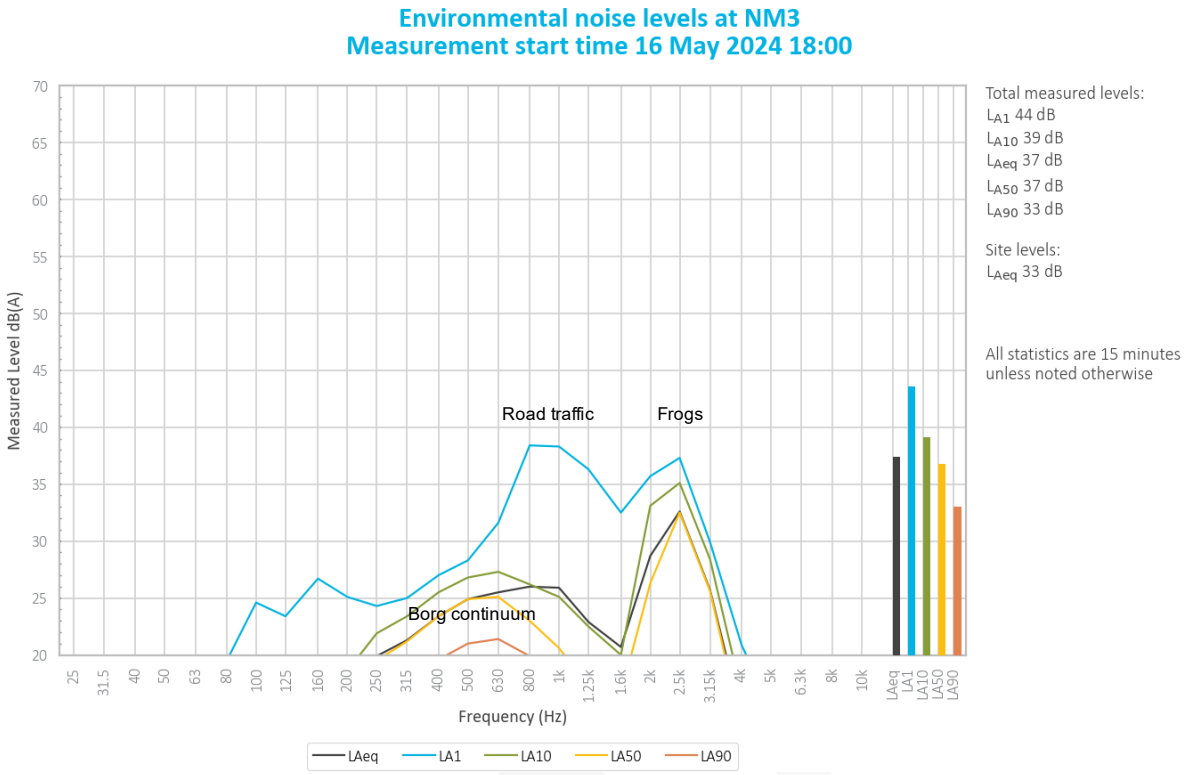

Figure 5.11 Evening environmental noise levels – NM3, 127 Hazelgrove Road

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 33 dB.

Frogs generated total measured levels. Road traffic contributed to the measured L_{A1}.

5.4.3 NM3 night period

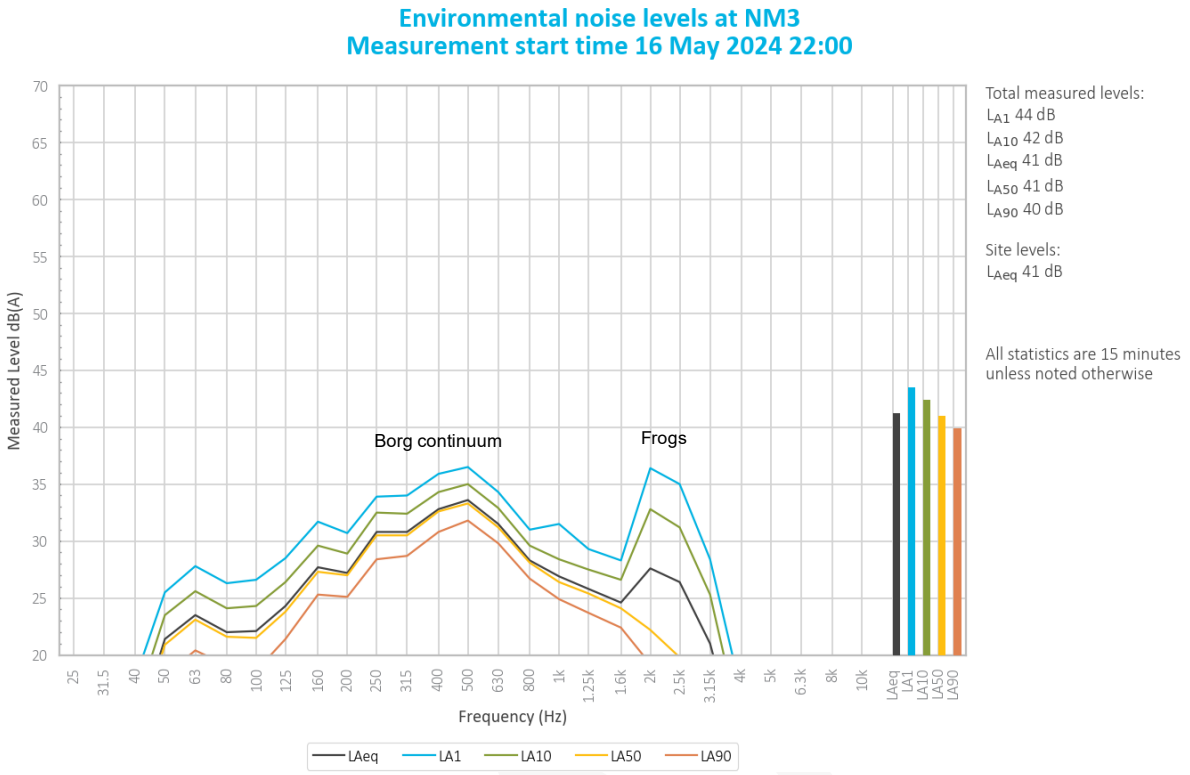

Figure 5.12 Night environmental noise levels – NM3, 127 Hazelgrove Road

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 41 dB.

Continuum from Borg primarily generated total measured levels. Frogs contributed to the measured L_{A1} and L_{A10}.

Noise from road traffic was also noted.

5.5 NM4

5.5.1 NM4 day period

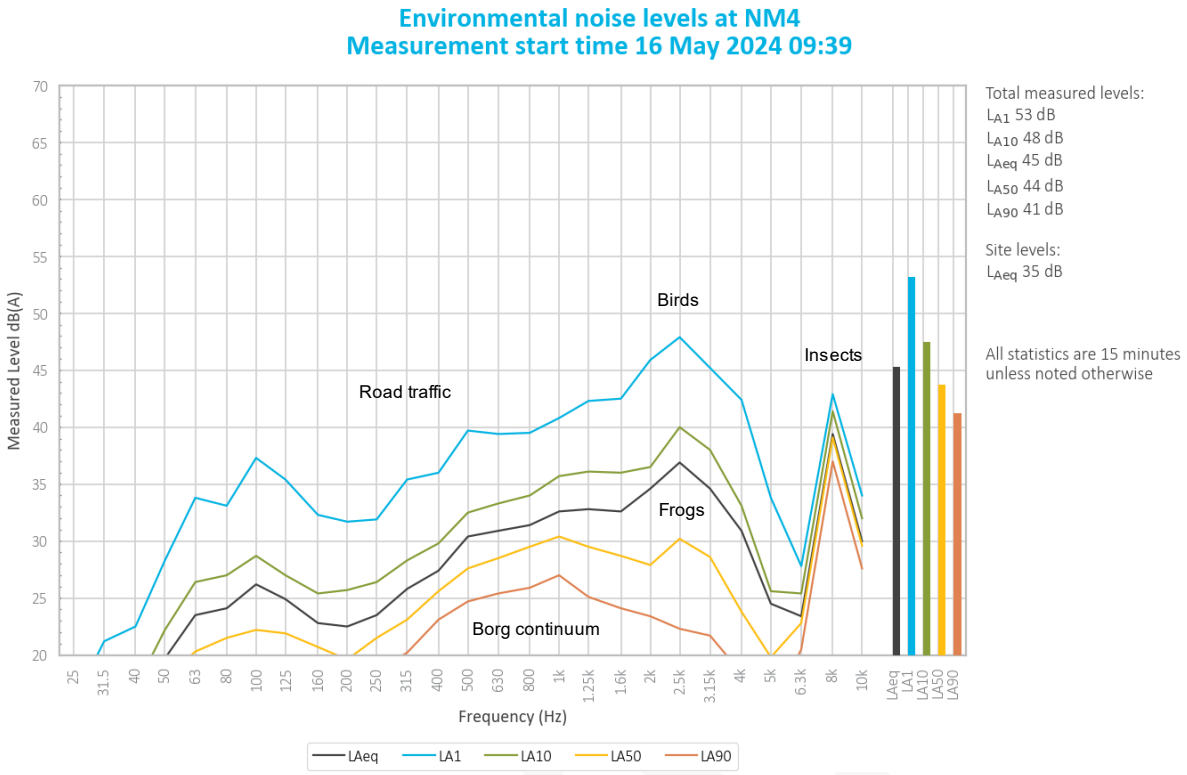

Figure 5.13 Day environmental noise levels – NM4, intersection of Tasman Street and Earl Street

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 35 dB.

Insects primarily generated total measured levels. Birds contributed to the measured L_{A1}, L_{A10} and L_{Aeq}. Road traffic and frogs contributed to the L_{A10}, L_{Aeq} and L_{A50}.

5.5.2 NM4 evening period

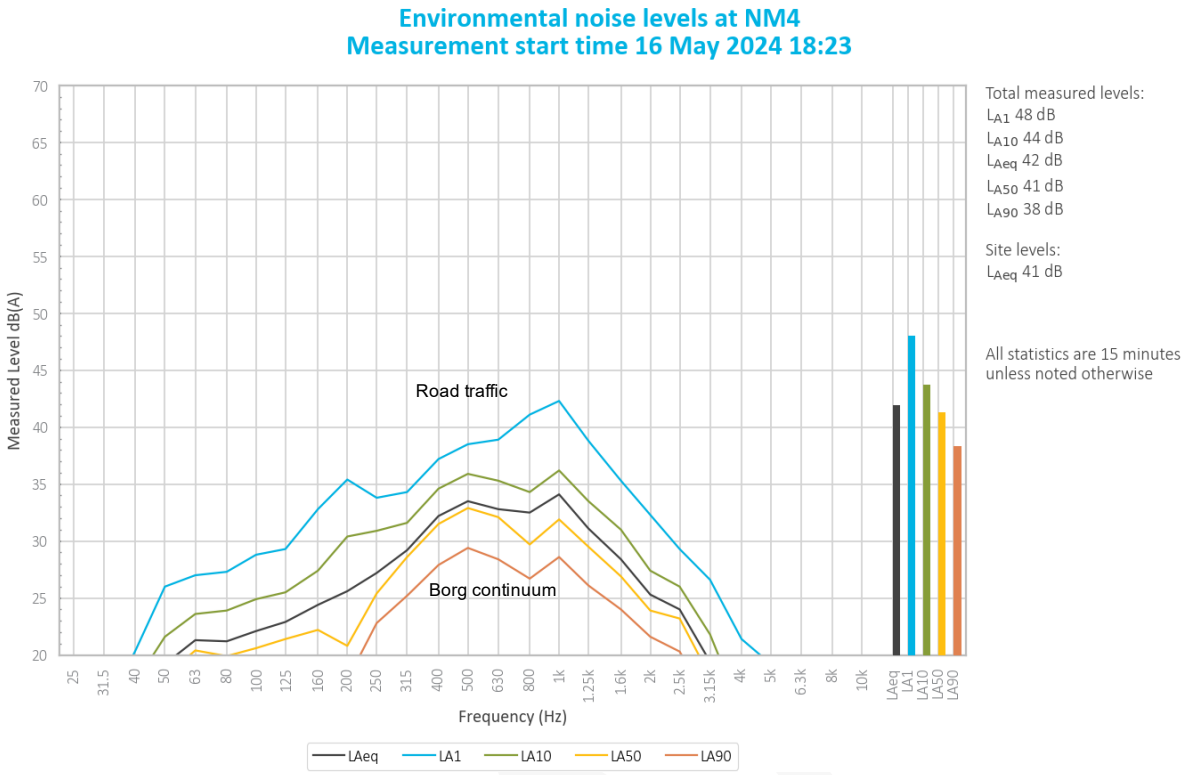

Figure 5.14 Evening environmental noise levels – NM4, intersection of Tasman Street and Earl Street

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 41 dB.

Road traffic generated the measured L_{A1} and L_{A10}, and contributed to the L_{Aeq}. Continuum from Borg generated the measured L_{A50} and L_{A90}, and contributed to the L_{Aeq}.

Noise from an aeroplane and frogs was also noted.

5.5.3 NM4 night period

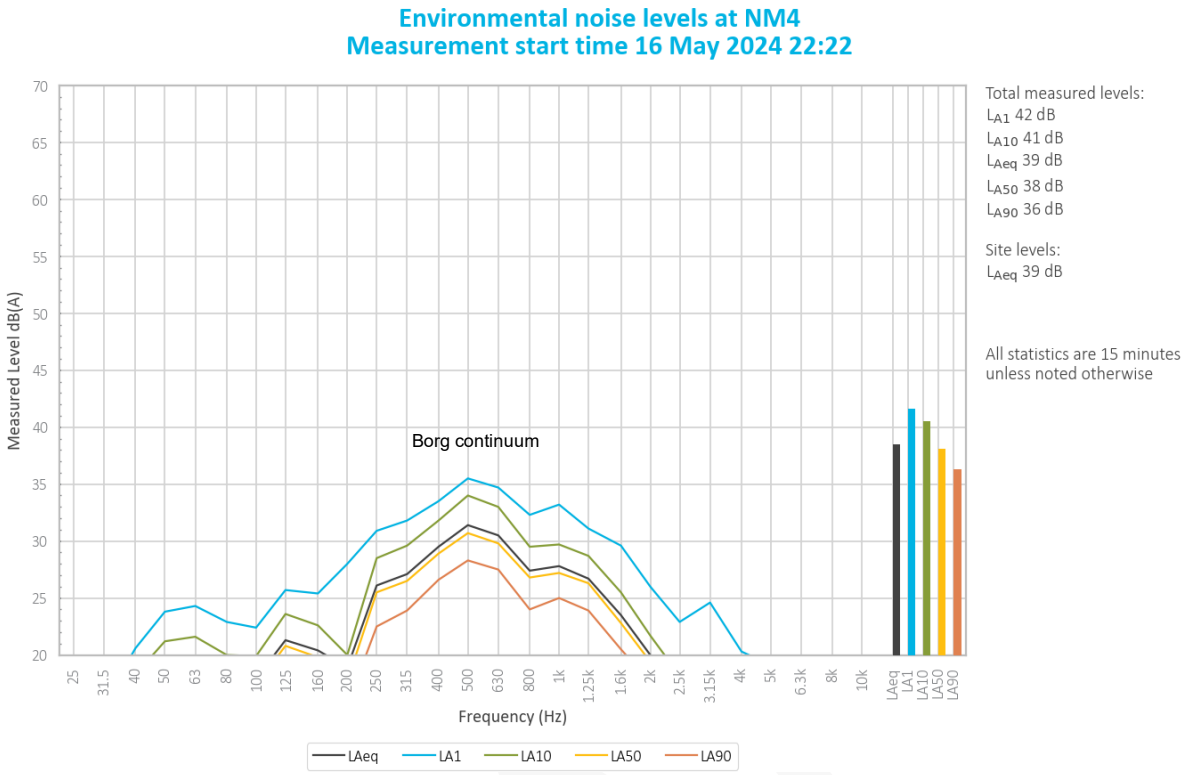

Figure 5.15 Night environmental noise levels – NM4, intersection of Tasman Street and Earl Street

A continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 39 dB.

Continuum from Borg generated measured noise levels.

Noise from dogs and road traffic was also noted.

6 Summary

EMM was engaged by Borg Manufacturing Pty Ltd to conduct a noise survey of operations and 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, evening and night period of 16 May 2024 at four monitoring locations.

Noise levels from site complied with relevant limits at all monitoring locations during the survey, except at NM1 and NM2 monitoring locations during the night period.

During the night measurement at NM1 starting at 22:43 on 16 May 2024 a continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 47 dB, which exceeded the relevant limit by 2 dB.

During the night measurement at NM2 starting at 23:04 on 16 May 2024 a continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 46 dB, which exceeded the relevant limit by 1 dB. Impact noise was also noted.

In accordance with the NMP, a follow up measurement was conducted within one week of the initial exceedances.

During the follow up measurement at NM1 starting at 22:05 on the 23 May 2024, a continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 45 dB. Impact noise was also noted.

During the follow up measurement at NM2 starting at 22:23 on the 23 May 2024, a continuum from Borg was audible throughout the measurement, generating a site-only L_{Aeq} of 44 dB. Impact noise was also noted.

Appendix A
Noise perception and examples

EMM
creating opportunities

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

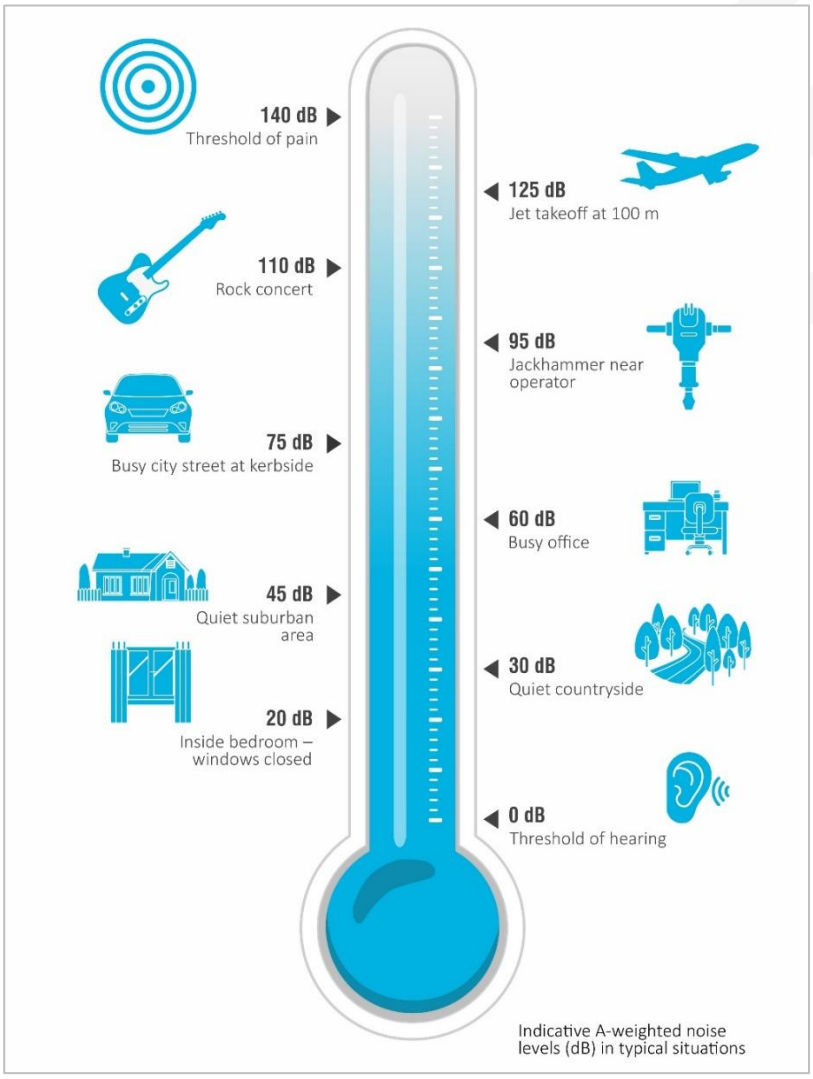

Figure A.1 Common noise levels

Appendix B
Regulator documents

EMM
creating opportunities

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:
(a) works that are inaudible at the nearest sensitive receivers;
(b) works agreed to in writing by the Secretary;
(c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
(d) 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:
(a) be prepared by a suitably qualified and experienced noise expert;
(b) be approved by the Secretary prior to the commencement of construction of the Project;
(c) describe procedures for achieving the noise limits in **Table 2**;
(d) describe the measures to be implemented to manage noisy works such as rock/concrete breaking activities, in close proximity to sensitive receivers;
(e) include strategies that have been developed with the community for managing noisy works;
(f) describe the community consultation undertaken to develop the strategies in e) above; and
(g) 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 $L_{Aeq(15\ minute)}$	Evening $L_{Aeq(15\ minute)}$	Night $L_{Aeq(15\ minute)}$
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 C4 and be prepared in accordance with Condition C9. 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 B18, 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 B18, 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 B16 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 B16;

(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 B16; 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 B16 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.

B26 Within 3 months of commissioning the two cogeneration units, the Applicant, in consultation with the EPA, must undertake post-commissioning noise monitoring of the cogeneration units to demonstrate the operation of the cogeneration units do not exceed the noise criteria at sensitive receivers as described in Section 7.0 of *Gas Fire Co-generators Noise Impact Assessment* prepared by Vipac Engineers and Scientists, dated 2 July 2015.

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.

B27 Should the post-commissioning emissions verification study indicate the two cogeneration units have not demonstrated compliance with the NIA, 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) $L_{Aeq(15\ minute)}$ during the day (7am to 6pm); and
b) 50 dB(A) $L_{Aeq(15\ minute)}$ during the evening (6pm to 10pm); and
c) at all other times 45 dB(A) $L_{Aeq\ (15\ minute)}$, 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.

B.3 Operations noise management plan

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.

7.3.1 Compliance Monitoring

It is proposed to conduct compliance monitoring for the Existing Development at each location 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 regular attended noise monitoring is to be investigated. The acoustic consultant undertaking the attended monitoring is to contact the Environment Officer 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.

Attended compliance monitoring is to be undertaken by a suitably qualified noise expert. Appropriate techniques should be applied to determine noise contributions from the Existing Development 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 Existing Development 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 6 – 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. 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 Borg Panels weather station (EPA Identification 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 DP&E for approval.

B.4 Construction noise management plan

5 Construction Noise Management Levels

Construction activities will be undertaken simultaneously with regular operation of the existing site. Borg 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 (7am-6pm) LAeq (15 min)	Evening (6pm-10pm) LAeq (15 min)	Night (10pm-7am) 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 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. All site environment officers 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.

Appendix C
Calibration certificates

EMM
creating opportunities

C.1 Calibration certificates

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C23032

Client Details	EMM Consulting Level 3/175 Scott Street Newcastle NSW 2300
Equipment Tested/ Model Number :	Rion NA-28
Instrument Serial Number :	30131882
Microphone Serial Number :	04739
Pre-amplifier Serial Number :	11942
Firmware Version :	2.0

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	24°C	**Ambient Temperature :**	23.5°C
Relative Humidity :	47.3%	**Relative Humidity :**	46.1%
Barometric Pressure :	100.14kPa	**Barometric Pressure :**	100.16kPa

Calibration Technician :	Shaheen Boaz	**Secondary Check:**	Dylan Selge
Calibration Date :	23 Jan 2023	**Report Issue Date :**	25 Jan 2023

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	*Pass*
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.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13dB*	*Temperature*	*±0.1°C*
1kHz	*±0.13dB*	*Relative Humidity*	*±1.9%*
8kHz	*±0.14dB*	*Barometric Pressure*	*±0.014kPa*
Electrical Tests	*±0.13dB*		

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.

PAGE 1 OF 1

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C37305

EQUIPMENT TESTED : Sound Level Calibrator

Manufacturer:	Svantek
Type No:	SV36 **Serial No:** 140737
Class:	1
Owner:	EMM Consulting Level 3, 175 Scott Street Newcastle NSW 2300
Tests Performed:	Measured Output Pressure level, Frequency & Distortion
Comments:	See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	1005	hPa ±1 hPa	**Date of Receipt :**	06/09/2023
Temperature	24	°C ±1° C	**Date of Calibration :**	06/09/2023
Relative Humidity	35	% ±5%	**Date of Issue :**	06/09/2023

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

CHECKED BY: .....

AUTHORISED SIGNATURE: ..... Hein Soe

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%.

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

Acu-Vib Electronics
CALIBRATIONS SALES RENTALS REPAIRS

Head Office & Calibration Laboratory
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

Australia

SYDNEY
Ground floor 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE
Level 3 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE
Level 1 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

CANBERRA
Suite 2.04 Level 2
15 London Circuit
Canberra City ACT 2601

ADELAIDE
Level 4 74 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE
Suite 8.03 Level 8
454 Collins Street
Melbourne VIC 3000
T 03 9993 1900

PERTH
Suite 9.02 Level 9
109 St Georges Terrace
Perth WA 6000
T 08 6430 4800

Canada

TORONTO
2345 Yonge Street Suite 300
Toronto ON M4P 2E5
T 647 467 1605

VANCOUVER
60 W 6th Ave
Vancouver BC V5Y 1K1
T 604 999 8297

linkedin.com/company/emm-consulting-pty-limited

emmconsulting.com.au