Mayfield No. 4 Berth

Operational Noise Compliance Assessment (2020)

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02-Mar-2021

Job No.: 60620229

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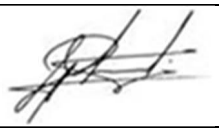
Quality Information

Document	Mayfield No. 4 Berth
Ref	60620229-RPNV-04_0
Date	02-Mar-2021
Prepared by	Philip Du
Reviewed by	Patrick Martinez

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
A	26-Feb-2021	Draft for client's comments	Patrick Martinez Associate Director - Acoustics	
0	02-Mar-2021	Final	Patrick Martinez Associate Director - Acoustics	

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1.0 Introduction

Port of Newcastle Operations Pty Ltd (PON) commissioned AECOM Australia Pty Ltd (AECOM) to carry out noise compliance measurements of associated operations at Mayfield No. 4 Berth in Newcastle, NSW.

The operations at Mayfield No. 4 Berth are one part of the overall Multi-Purpose Terminal operations at the former BHP Steelworks Main Site.

Condition 5.11 of the Consent Condition DA-293-08-00 MOD 9, dated 29 August 2013, requires that the facility demonstrates compliance with site noise limits at various noise sensitive receivers near the facility.

The major noise producing operations that take place at Mayfield No. 4 Berth are:

1. Containers being unloaded from ships onto the wharf;
2. Offloading of Ammonium Nitrate bulk-bags from ship; and
3. Containers being loaded/unloaded from trucks prior to and after ship arrival/departure.

Previous operational noise compliance assessments undertaken by AECOM (2011 to 2013) have confirmed consistent compliance from these berth operations over these three years.

Bulk fuel operations commenced in 2014 and were ceased in 2018 following commissioning of Mayfield No. 7 Berth (i.e. the measurements presented in this report were undertaken after the ceasing of bulk fuel operations). Bulk fuel operations also consistently achieved compliance as documented in four previous operational noise compliance assessments undertaken by AECOM:

1. Mayfield No. 4 Berth, Operational Noise Compliance Assessment, 60333368-RPNV-01_C, dated 24 November 2014;
2. Mayfield No. 4 Berth, Operational Noise Compliance Assessment, 60437494-RPNV-02_B, dated 11 November 2015; and
3. Mayfield No. 4 Berth, Operational Noise Compliance Assessment, 60518192-RPNV-02_B, dated 5 December 2016.
4. Mayfield No.4 Berth, Operational Noise Compliance Assessment, 60553318-RPNV-02_B, dated 18 December 2017.

Due to adverse weather conditions, the 2018 operational noise compliance assessment was undertaken based on previous years' noise measurements. The 2018 noise compliance assessment is presented in the following AECOM document:

1. Mayfield No.4 Berth, Operational Noise Compliance Assessment (2018), 60553318-RPNV-03_B, dated 15 February 2019.

As presented in previous years' operational noise compliance assessments, it is not possible to directly measure the impact of noise arising from operations at Mayfield No. 4 Berth due to the influence from extraneous noise sources at nearby receiver locations. This evaluation was confirmed as still valid during measurements undertaken during the 2020 noise monitoring period. The compliance assessment was therefore carried out using SoundPLAN noise modelling software.

This method of noise compliance assessment is in accordance with Chapter 11 of the NSW Environment protection Authority's (EPA) Industrial Noise Policy (INP). In order to determine compliance of the site operational noise emissions with the required noise limits, the assumptions of a 'reasonable' worst case operational scenario are presented, along with the predicted noise levels at the required assessment locations.

Attended noise measurements were undertaken on 17 and 18 February 2021, at the assessment receiver locations. Nearfield measurements of the vessel *Asia Pearl VII – IMO NO. 9502726* and activities associated with the offloading of ammonium nitrate bags from the vessel and onto trucks

were carried out on 18 February 2021. The results of the nearfield measurements were used as inputs for the noise modelling.

1.1 EPA Noise Policy for Industry

The *NSW Industrial Noise Policy* (EPA 2000) was withdrawn in November 2017 and replaced by the *Noise Policy for Industry* (EPA 2017) except as describe in the EPA document *Implementation and transitional arrangements for the Noise Policy for Industry (2017),* point 8, as presented below:

> *8. The NSW Industrial Noise Policy (2000) will continue to apply where it is referenced in existing statutory instruments (such as consents and licences), except for the NSW Industrial Noise Policy Section 4 modifying factors, which will be transitioned to the Noise Policy for Industry (2017) Fact Sheet C through a NSW Industrial Noise Policy application note. This approach has been taken because the Noise Policy for Industry (2017) modification factor approach reflects more recent understanding of the impact of tonal and low-frequency noise on the community.*

Acoustic terminology used in this report is included in Appendix A.

2.0 Assessment Noise Limits

2.1 Development Application Consent Condition noise limits

The required noise limits for each of the identified receivers is provided in Condition 5.11 of the Development Application DA 293-08-00 MOD 9, dated 29 August 2013.

Table 1 provides a summary of the applicable noise limits.

Table 1 Operational noise limits

Location	Day	Evening	Night
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$
1. 52 Arthur Street	49	38	38
2. Mayfield East Public School	47	37	37
3. 21 Crebert Street	49	39	39
4. Newcastle TAFE	44	38	38
5. 1 Arthur Street	48	33	33

Notes:

1. In accordance with the INP time of day is defined as follows:

   Day – the period from 7:00 am to 6:00 pm Mondays to Saturdays or 8:00 am to 6:00 pm on Sundays and public holidays

   Evening – the period from 6:00 pm to 10:00 pm

   Night – the period from 10:00 pm to 7:00 am Mondays to Saturdays or 10:00 pm to 8:00 am on Sundays and public holidays

2. The noise limits apply during all assessment periods under winds up to 3 metres per second (measured at 10 metres above ground level) and Pasquil stability classes from A to F.

Accordingly, AECOM assessed operational noise emissions from Mayfield No. 4 Berth based on 'reasonable' worst case operational scenarios to determine the predicted noise levels at the assessment locations as presented in Figure 1.

2.2 Environmental Protection Licence

Mayfield No. 4 Berth currently operates under NSW EPA Environment Protection Licence No. 13181 (EPL 13181), License version date 4 August 2020, however, there are no noise limits specified in EPL 13181.

2.3 Site location

The location of Mayfield No. 4 Berth and noise assessment locations identified in Condition 5.11, are shown in Figure 1.

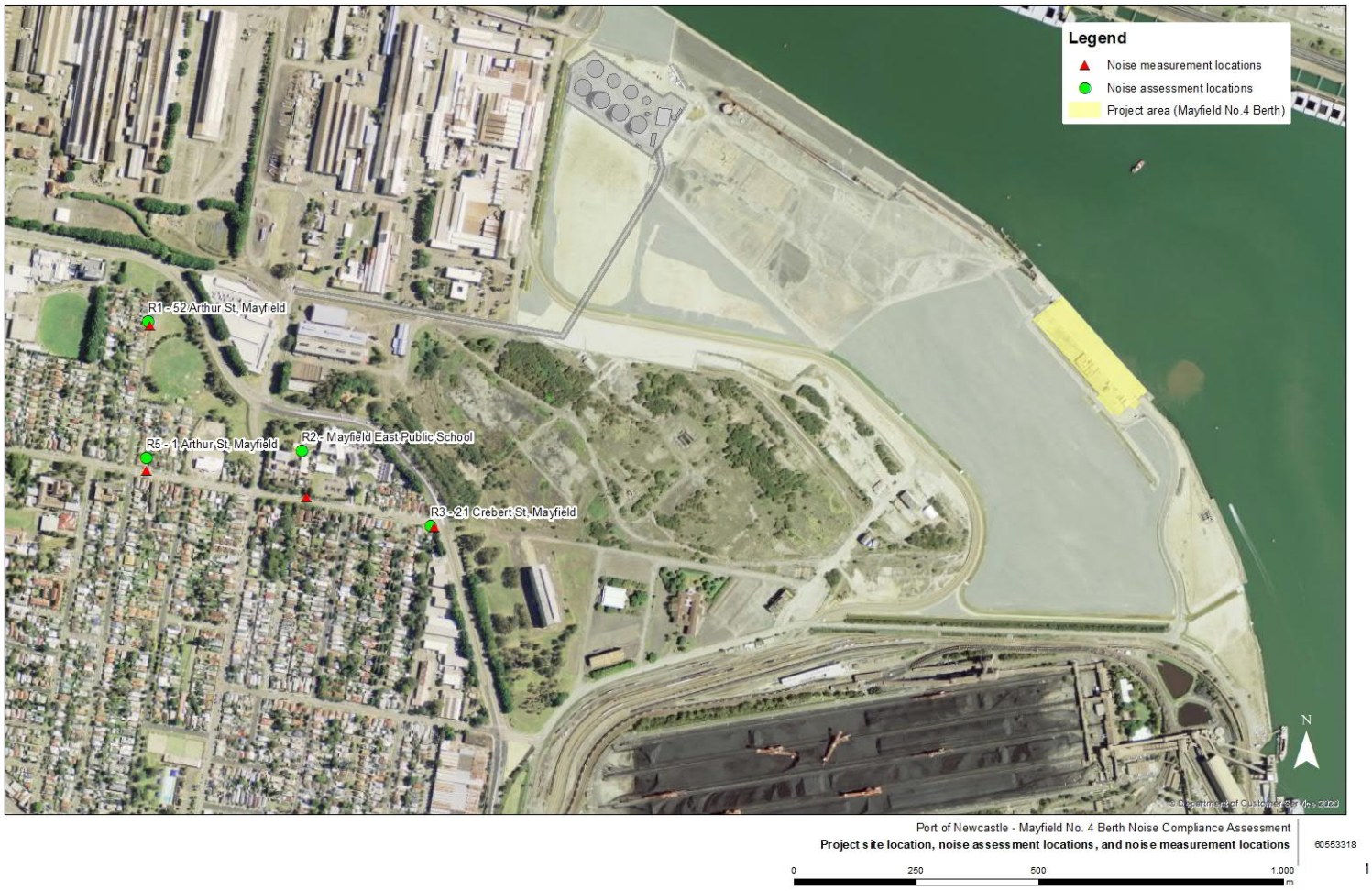

Figure 1 Site location and noise assessment locations

3.0 Measurement Methodology and Results

3.1 Compliance measurements methodology and discussion

As presented in previous years' operational noise compliance assessments for Mayfield No. 4 Berth, it is not possible to directly measure the impact of noise arising from operations at Mayfield No. 4 Berth due to the influence from extraneous noise sources at nearby receiver locations. This evaluation was confirmed as still valid during measurements undertaken during the 2020 noise monitoring period. The compliance assessment was therefore carried out using SoundPLAN noise modelling software.

This method of noise compliance assessment is in accordance of the Chapter 11 of the INP.

Attended noise measurements were undertaken at all the Condition 5.11 assessment receiver locations between 17 and 18 February 2021. It was found that noise from road traffic on Industrial Drive was dominant at the receiver locations and therefore demonstrating compliance with the Mayfield No. 4 Berth relevant noise criteria for the Development Application Consent was not possible. These measurements are presented in Table 3.

Thus, it was not possible to determine the noise contribution from Mayfield No. 4 Berth by direct measurement. The INP provides guidance in Chapter 11 as to how to review the noise emissions of a site where the existing noise levels are already high.

3.2 Instrumentation

Attended noise measurements were conducted using the equipment presented in Table 2.

Table 2 Measurement instrumentation

Equipment	Serial number
Brüel and Kjaer Type 2250	3009329

All equipment presented in Table 2 are designated as Class 1 instruments. All instruments were calibrated before and after the measurements using a Rion NC-74 calibrator (Serial Number 34283659) with a drift in calibration not exceeding ±0.5 dB.

All the acoustic instrumentation employed during the noise measurements comply with the requirements of Australian/New Zealand Standard AS/NZS IEC 61672.1-2019 *Electroacoustics - Sound level meters – Part 1: Specifications*.

All equipment used for this compliance assessment have valid calibration certificates.

Table 3 Attended measurements at assessment receiver locations on 17 to 18 February 2021

Location	Time of measurement	Measured noise level			Comments
		L_{A1}, dB(A)	L_{Aeq}, dB(A)	L_{A90}, dB(A)	
R1 - 52 Arthur Street	17/02/2021 10:05	60	54	48	INDUSTRIAL CONTRIBUTION: Industrial noise barely audible over traffic noise. No distinguishable industrial noise sources. TRAFFIC CONTRIBUTION: Traffic along industrial drive is dominant. Traffic passing along Crebert Street also audible. Car pass-by on Industrial Drive ~ 49-50 dB(A). Truck pass-by on Industrial Drive ~ 58-61 dB(A). OTHER: Cicadas and Crickets. Average Wind – Light to moderate, scattered clouds.
R2 - Mayfield East Public School	17/02/2021 11:00	63	51	47	INDUSTRIAL CONTRIBUTION: Slight broadband industrial hum audible in absence of traffic. Alarm audible in industrial premise to the north, 49 dBA. TRAFFIC CONTRIBUTION: Dominant noise from almost constant traffic movements on Industrial Drive with significant numbers of heavy vehicles. OTHER: Cicadas. Average Wind – Calm, Clear Sky.
R3 - 21 Crebert Street	17/02/2021 10:43	73	61	46	INDUSTRIAL CONTRIBUTION: Background constant broadband industrial hum from the north east. TRAFFIC CONTRIBUTION: Almost constant traffic on Industrial Drive was the main noise source. Truck pass-by ~ 80 dB(A), car pass-by ~ 66 dB(A). OTHER: Cicadas. Average Wind – Light to mild, scattered clouds
R5 - 1 Arthur Street	17/02/2021 10:24	58	49	45	INDUSTRIAL CONTRIBUTION: Background constant broadband industrial hum from north/north east, difficult to distinguish above road traffic noise. TRAFFIC CONTRIBUTION: Trucks on industrial drive clearly audible. Car pass-by on Industrial Drive ~50 dB(A), on Crebert Street ~60 dB(A). OTHER: Cicadas. Average Wind – Slight breeze, scattered clouds

3.3 Direct measurement results and discussion

Section 11.1.2 Notes on noise monitoring of the INP states:

Where existing noise levels are high

When compliance is being measured it may be found that, in many cases, existing noise levels are higher than noise level from the source, making it difficult to separate out the source noise level. When this happens, it may not be feasible to measure compliance at the specified location, and other methods will be needed. In these cases, measurements may be taken closer to the source and then calculated back to the specified location."

As mentioned in Section 1.0, nearfield measurements of the vessel *Asia Pearl VII – IMO NO. 9502726* were carried out and the measurement results have been used in this assessment as inputs for the compliance noise model.

It was noted during all measurements that the specific noise source being measured was the dominant noise source throughout the measurement period and the unloading operations were occurring all through the daytime and night-time periods including during the attended measurements at the assessment receiver locations.

The measurements were not impacted by the prevailing wind during the measurement periods.

3.4 Modelled high activity operational scenarios

3.4.1 Noise modelling methodology

Noise impacts from the operation of the vessel *Asia Pearl VII* at Mayfield No. 4 Berth are based upon the calculated operational source sound power levels presented in Table 4. Noise emission from the vessel's operations were predicted at the assessment receiver locations using SoundPLAN (version 8.2) noise modelling software. SoundPLAN implements a number of different calculation algorithms. The CONCAWE algorithm was used as it is especially suited to predicting noise propagation over large distances as it accounts for a range of atmospheric conditions that can significantly influence the propagation of noise over large distances.

The noise modelling includes:

- Ground topography;
- Buildings and structures;
- Noise sources as point sources or industrial buildings (to simulate the ship hull noise emission); and
- Ground absorption.

The noise model outputs were compared with attended noise measurement results presented in Table 3.

Based upon the attended measurements, site observations and discussion with PON personnel, 'reasonable' worst case operational scenarios were established and modelled for the operations during the day, evening and night assessment periods, as per the requirements of Condition 5.11.

The sound power level inputs presented in Table 4 were used in the model, and adjusted for duration and frequency of operations in accordance with Table 5. The plant item sound power levels were determined from the attended noise measurements of typical operations made on site. In order to determine compliance with the recommended noise limits, the predicted noise levels for each operational scenario were determined at each of the assessment locations. The results are presented in Section 3.5.

Modelling was undertaken using SoundPLAN noise modelling software. The assessment of each scenario considers a 'reasonable' worst case 15 minute operational period. The assumptions made for modelling purposes with regards to the equipment operating and the duration and frequency of operation during each 15 minute assessment period are presented in Table 5.

All assessment scenarios were modelled using a Pasquill stability class of D for the day-time assessment period and a Pasquill stability class of F for the evening and night-time assessment periods. A worst case source to receiver wind of 3 m/s for day, evening and night periods was assessed as per the Condition 5.11 requirements. The worst case predicted noise levels from either worst case wind or from worst case temperature inversion scenario are presented in Table 6.

Table 4 Mayfield No. 4 Berth plant items sound power levels

Plant item/operation	Sound power level, dB(A)
3 Forklift loading/unloading/dropping onto truck	108
Forklift in operation	95[1]
Ship in dock – Main Exhaust	107
Ship in dock – EGR vent	97
Ship crane in operation	106
Truck Idle	103
Truck take off	104

Notes:

1. Sound power levels reported in 2019 were used as the measurements conducted for this report were deemed to be weather affected (i.e. high wind) at the distance that the measurement was conducted.

Table 5 Offloading of Ammonium Nitrate bags from ship assessment scenario

Plant item/operation	Number of plant	Total duration (minutes)
Forklift loading loading/unloading truck	3	5
7 tonne forklift in operation	3	15
Ship in dock - Bow	1	15
Ship in dock – EGR vent	1	15
Ship crane in operation	1	15
Truck idle	4	15
Truck accelerate	2	15 second acceleration period when on No. 4 Berth

3.5 Predicted operational noise levels

Table 6 presents the predicted noise levels at each of the assessment locations during the offloading of ammonium nitrate bags operational scenario and determine compliance with the noise limits presented in Section 1.1.

Table 6 Offloading of Ammonium Nitrate bags from ship

Location	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)
	Day			Evening			Night		
1. 52 Arthur Street	36	49	Yes	36	38	Yes	36	38	Yes
2. Mayfield East Public School	33	47	Yes	33	37	Yes	34	37	Yes
3. 21 Crebert Street	38	49	Yes	38	39	Yes	38	39	Yes
4. Newcastle TAFE	31	44	Yes	31	38	Yes	32	38	Yes
5. 1 Arthur Street	26	48	Yes	26	33	Yes	26	33	Yes

The results presented in Table 6 indicate that the predicted noise impact at each of the five sensitive receiver locations complies with the required noise limits for all time periods.

4.0 Conclusion

Port of Newcastle Operations Pty Ltd (PON) commissioned AECOM Australia Pty Ltd (AECOM) to carry out noise compliance assessment measurements of associated operations at the Mayfield No. 4 Berth in Newcastle, NSW.

Condition 5.11 of the Consent Condition DA-293-08-00 MOD 9, dated 29 August 2013, requires that the facility demonstrates compliance with site noise limits at various noise sensitive receivers near the facility.

The major noise producing operations that take place at Mayfield No. 4 Berth are:

1. Containers being unloaded from ship onto the wharf;
2. Offloading of Ammonium Nitrate bulk-bags from ship; and
3. Container being loaded/unloaded from trucks prior to and after ship arrival/departure.

The noise impacts from 'reasonable' worst case operations of Mayfield No. 4 Berth were assessed at the five receiver locations specified in Condition 5.11 of the Consent Condition DA-293-08-00 MOD 9, dated 29 August 2013 which are representative of noise sensitive receiver locations in the surrounding area.

Attended measurements on 17 and 18 February 2021established that it is not possible to determine the noise contribution from Mayfield No. 4 Berth by direct measurement at the assessment receiver locations. As direct measurement of noise from the premises was shown to be impractical, noise modelling using SoundPLAN software was used to determine compliance. This is in accordance with Chapter 11 of the NSW Industrial Noise Policy.

During the site visit, nearfield measurements of the vessel *Asia Pearl VII – IMO NO. 9502726*and activities associated with the offloading of ammonium nitrate bags from the vessel and onto trucks was carried out. The results of the nearfield measurements were used as inputs for the noise modelling in order to demonstrate compliance with the facility's noise limits.

Day, evening and night-time noise emissions were predicted at each of the required assessment locations and compared against the site noise limits. In accordance with the requirements of Condition 5.11 all scenarios were modelled using a Pasquill stability class of D for the day period and a Pasquill stability class of F for the evening and night periods, and a worst case source to receiver wind of 3 m/s for the day, evening and night periods was incorporated into the modelling.

The results of the modelling concluded that compliance is achieved at the five required assessment locations during all assessment periods.

Appendix A

Acoustic Terminology

Appendix A Acoustic Terminology

The following is a brief description of acoustic terminology that may have been used in this report.

Sound power level	The total sound emitted by a source
Sound pressure level	The amount of sound at a specified point
Decibel [dB]	The measurement unit of sound
A Weighted decibels [dB(A])	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows:

0dB(A)	Threshold of human hearing
30dB(A)	A quiet country park
40dB(A)	Whisper in a library
50dB(A)	Open office space
70dB(A)	Inside a car on a freeway
80dB(A)	Outboard motor
90dB(A)	Heavy truck pass-by
100dB(A)	Jackhammer/Subway train
110 dB(A)	Rock Concert
115dB(A)	Limit of sound permitted in industry
120dB(A)	747 take off at 250 metres

Frequency [f]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.
Equivalent continuous sound level [L_{eq}]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
L_{max}	The maximum sound pressure level measured over the measurement period
L_{min}	The minimum sound pressure level measured over the measurement period
L_{10}	The sound pressure level exceeded for 10% of the measurement period. For 10% of the measurement period it was louder than the L_{10}.

L_{90}	The sound pressure level exceeded for 90% of the measurement period. For 90% of the measurement period it was louder than the L_{90}.
Ambient noise	The all-encompassing noise at a point composed of sound from all sources near and far.
Background noise	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L_{90} sound pressure level is used to quantify background noise.
Traffic noise	The total noise resulting from road traffic. The L_{eq} sound pressure level is used to quantify traffic noise.
Day	The period from 0700 to 1800 h Monday to Saturday and 0800 to 1800 h Sundays and Public Holidays.
Evening	The period from 1800 to 2200 h Monday to Sunday and Public Holidays.
Night	The period from 2200 to 0700 h Monday to Saturday and 2200 to 0800 h Sundays and Public Holidays.
Assessment background level [ABL]	The overall background level for each day, evening and night period for **each day** of the noise monitoring.
Rating background level [RBL]	The overall background level for each day, evening and night period for the **entire length** of noise monitoring.
Weighted sound reduction index [R_w]	A single figure representation of the air-borne sound insulation of a partition based upon the R values for each frequency measured in a laboratory environment.

*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 *"Acoustics – Glossary of terms and related symbols"*, the EPA's Noise Policy for Industry and the EPA's NSW Road Noise Policy.