



HEGGIES

REPORT 10-4309-R24

Revision 1

CSL Pacific
Glebe Island Berth 1
Compliance Noise Monitoring

PREPARED FOR

Sydney Ports Corporation
207 Kent Street
SYDNEY NSW 2000

11 DECEMBER 2008

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Incorporating

New Environment

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CSL Pacific

Glebe Island Berth 1

Compliance Noise Monitoring

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DOCUMENT CONTROL

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1 INTRODUCTION

Heggies Pty Ltd (Heggies) has been commissioned by Sydney Ports Corporation (SPC) to conduct monitoring of noise emissions during the unloading of the “CSL Pacific” (a bulk cargo vessel) at Glebe Island Berth 1 (GI-1), as required by Clause M7.1 of the EPA’s Environment Protection Licence (Licence No 13008). This report provides the results of the monitoring as required by Clause R4.1(2) of the Licence.

Noise measurements have been conducted during cargo handling operations (ship auxillary power unit (APU), ventilation fans, on board salt conveyors and unloading gantry) at three locations considered representative of the potentially most exposed residential receivers. The locations are at Balmain to the west, Glebe to the south and Pyrmont to the east of GI-1. Measurements at the three representative locations have been conducted during the loading of bulk salt from the ship to the wharf. The measurements were conducted after the ship arrived between 8.38 pm on the 30 November and 1.05 am on 1 December 2008. During the measurement period, the sky was generally clear, with a slight northerly wind.

2 SITE DESCRIPTION

The Glebe Island Port facility is located north of Anzac Bridge between Johnsons Bay and White Bay on Glebe Island. The facility occupies approximately 40 hectares of waterfront land and forms a crescent around Glebe Island, with a water frontage of about 1,400 m in length.

The facility layout comprises the following main elements:

- Two berths on the eastern side of Glebe Island designated GI-1 and GI-2, and two berths on the western side designated GI-7 and GI-8;
- Concrete/asphalt area currently used for vehicle storage; and
- Internal road continuing from Sommerville Road providing truck access to the storage areas of Docks 1 to 2.

The adjacent White Bay Island facility to the west of Glebe Island consists of 5 berths on the northern side of White Bay.

Berth 1 is located approximately at the southern end of the eastern port side of Glebe Island, as shown in



Figure 1. To the east of the site are a number of recently constructed multilevel apartments which are part of the Jackson's Landing development. West of White Bay is located the Balmain peninsula, and to the south and on the opposite side of Blackwattle Bay is located Glebe Point.

2.1 EPA Environment Protection Licence

The licence specifies noise limits in the table of Section L6.1, these are reproduced in **Table 1**.

Table 1 Licence Noise Limits Measured in dBA

The residence most affected by noise at	Day		Evening		Night		
	LAeq (15minute)	LAeq (day)	LAeq (15minute)	LAeq (evening)	LAeq (15minute)	LAeq (night)	LA1 (1minute)
Balmain	Not applicable	Not applicable	53	50	48	45	56
Glebe	Not applicable	Not applicable	53	50	48	45	60
Pymont	Not applicable	Not applicable	53	50	48	45	61

Section M7.1 of the licence requires that the licensee must arrange for an accredited acoustic consultant to monitor noise from the premises 'at the most affected noise sensitive receiver in Balmain, Glebe and Pymont, to determine whether the activities at the premises comply with the noise limits specified in condition L6.1'.

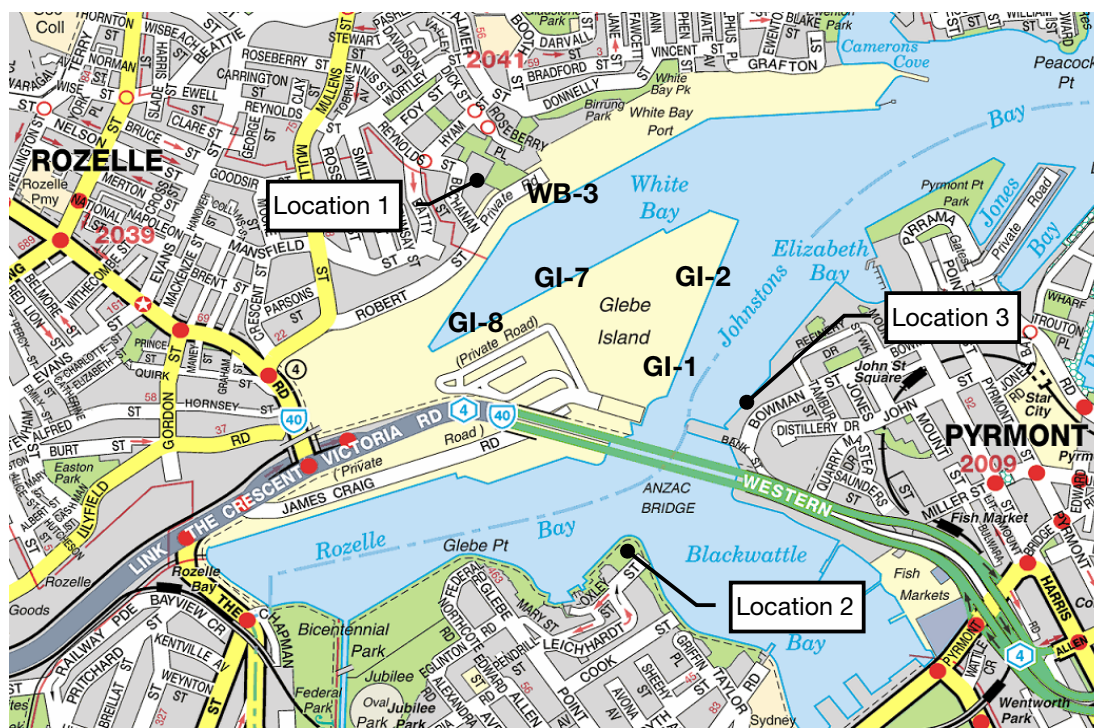
2.2 Measurement Locations

The table from Section L6.1 specifies noise limits at 'the residence most affected by noise' at Balmain, Glebe and Pymont. Accordingly, we have measured ambient noise levels at the closest residences at these areas which are shown in as follows:

- Location 1 - Balmain - at ground level adjacent to and east of the apartment building located at 1 Reynolds Street. This location is 645 m north-west of GI-1.
- Location 2 - Glebe - at ground level adjacent to and east of 53 Leichhardt St, Glebe. This location is 545 m south of GI-1.
- Location 3 - Pymont - at ground level adjacent to and west of the Jackson's Landing apartment building located at 4 Bowman Street, Pymont. This location is 200 m east of GI-1.



Figure 1 White Bay / Glebe Island Layout with Attended Noise Monitoring Locations



3 MEASUREMENT METHODOLOGY AND INSTRUMENTATION

The licence calls for LAeq (A-weighted equivalent continuous) sound pressure level measurements to be carried out at 'the residence most affected by noise' at Balmain, Glebe and Pyrmont. Furthermore, the noise monitoring is required to be undertaken over a period of sufficient duration to ensure representative results from all activities and combinations of activities that would be expected to occur. The activities during this visit of the unloading of the bulk salt carrier were ship unloading to the wharf during the day, evening and night-time, with the loading of salt into trucks using front end loaders on the wharf occurring during the day. Accordingly, noise monitoring is required during the evening and night-time on order to determine compliance with the noise limits.

Attended noise level measurements were carried out at 1.5 m above ground level at Reynolds Street, Balmain, 1.5 m above ground at Leichhardt St, Glebe, and 1.5 m above ground at Bowman Street, Pyrmont.

A "reference" measurement was conducted in close proximity to the CSL Pacific, where the noise environment was dominated by bulk cargo unloading related noise. The "reference" measurement was then used as a basis for the estimation of GI-1 activity related noise at the receivers of interest.

An equivalent ship sound power level was calculated based on the "reference" measurement and noise contributions related to the bulk cargo handling were estimated at each noise sensitive location.



In accordance with the licence the noise monitoring was undertaken in accordance with Australian Standard AS 2659.1-1988 'Guide to the use of Sound-Measuring Equipment Part 1 - Portable Sound Level Meters', and monitoring guidance was provided by the Industrial Noise Policy (INP).

All items of acoustic instrumentation employed during the noise monitoring surveys were designed to comply with the requirements of AS IEC 61672.1 2004: "Electroacoustics-Sound level meters-Specifications" and carried appropriate and current NATA (or manufacturer) calibration certificates. Calibration was checked prior to and subsequent to the noise survey. Any drift in calibration was within 0.5 dBA and therefore considered acceptable.

The survey instrumentation used during the studies is set out in **Table 2**.

Table 2 Noise Survey Instrumentation

Type	Serial Number	Instrument Description
2231	1323443	Brüel & Kjær Modular Precision Sound Level Meter
1625	1406825	Brüel & Kjær 1/3 - 1/1 Octave Filter Set
4165	1357396	Brüel & Kjær 12.5 mm Prepolarised Condenser Microphone
4231	7022772	Brüel & Kjær Calibrator

Given the relatively constant nature of noise related to the bulk cargo handling operations, short-term measurements (of 15 minute duration) are usually considered to be sufficient to provide adequate information to enable an estimate of the LAeq(night) noise levels at the selected residential receivers. On this occasion however, the ambient noise environment was dominated by other sources at Locations 1 and 2 the LAeq(15minute) and LAeq(night) source noise levels were not able to be estimated.

A brief description of acoustic terminology used in this report is presented in **Appendix A**.

4 RESULTS AND ANALYSIS

The results of the attended noise measurements are summarised in **Table 3**. It should be noted that the measured noise levels presented below include noise from the bulk cargo handling facility at GI -1 as well as ambient noise unrelated to the facility.

Table 3 Measured Noise Levels - CSL Pacific Unloading Salt

Address	Start Time	LAeq (15min)	LA90 (15min)	GI-1 Related LMax Range	Comments
Reynolds Street (Balmain / Rozelle)	9.39 pm	53 dBA	51 dBA	Non observed	LAeq dominated noise from the Stolt Stream bulk liquids carrier, CSL Pacific not audible.
Leichhardt Street (Glebe)	8.38 pm	54 dBA	51 dBA	Non observed	LAeq dominated noise from Anzac Bridge, CSL Pacific not audible.
	12.49 am	49 dBA	46 dBA	Non observed	LAeq dominated noise from Anzac Bridge, CSL Pacific 'barely' audible.
Bowman Street (Pyrmont)	9.08 pm	54 dBA	52 dBA	Non observed	LAeq dominated by CSL Pacific plus crickets, seagulls.
	12.04 am	53 dBA	52 dBA	Non observed	LAeq dominated by CSL Pacific plus crickets, seagulls.



One noise measurement was carried out at the representative receiver at the Balmain site at 9.39 pm. At this location, the measurement was dominated by the Stolt Stream bulk liquids vessel located at White Bay 3, and also influenced by domestic activity and on occasion seagulls. Note, due to the presence of the Stolt Stream vessel a measurement was not repeated during the night-time period at this location.

Two separate measurements were carried out at the representative Glebe location during cargo handling operations at GI-1, at 8.38 pm and 12.49 am. At this location, during both surveys, noise from traffic on Anzac Bridge was dominating the ambient noise environment. The CSL Pacific was 'barely' audible above the Anzac Bridge traffic noise.

Two separate measurements were carried out at the representative Pyrmont location during cargo handling operations at GI-1, at 9.08 pm and 12.04 am. At this location, during both surveys, noise from the CSL Pacific was the significant contributor to the ambient noise environment, with contributions also from Anzac Bridge traffic, crickets and seagulls. The noise from the CSL Pacific was constant in nature and not considered tonal. Furthermore, no short-term 'impact' noise events from GI-1 were recorded during either survey.

In order to confirm the contribution to the ambient by bulk cargo related noise, noise levels were predicted based on the reference measurements taken in close proximity of the CSL Pacific, where the noise environment was dominated by bulk cargo loading related noise.

Table 4 presents the "reference" noise measurements carried out between 15 m and 100 m away from significant sources on the bulk cargo vessel CSL Pacific. The measurements were conducted on the GI-1 wharf.

Table 4 CSL Pacific "Reference" Noise Level

Reference	Location	Distance from Source	LAeq
1	GI-1	100 m	55 dBA
2	GI-1	25 m	65 dBA
3	GI-1	15 m	65 dBA

Calculations were performed using the reference measurements presented in **Table 4**. Predictions indicate bulk cargo unloading related LAeq noise levels of 38 dBA at Balmain, 40 dBA at Glebe, and 51 dBA at Pyrmont. The predicted noise levels, at Balmain, and Glebe are well below the ambient, and consistent with the CSL Pacific being not audible, or 'barely audible'. At Pyrmont, the predicted noise level is slightly below the measured overall LAeq(15minute) level of 53 dBA. This is consistent with the expected ambient being of the order of 48 dBA at Pyrmont, in the absence of CSL Pacific unloading activity.

A comparison of the predicted noise levels with the noise limits listed in the Licence Conditions are presented in **Table 5** and **Table 6** for the evening and **Table 7** and **Table 8** for the night-time.

**Table 5 Assessment of Measured/Predicted Noise Levels Against LAeq(15minute) Evening Noise Limits**

Prediction Location	Measured/Predicted LAeq Noise Levels	LAeq(15 minute) Noise Limits	LAeq (15 minute) Exceedance of Licence Limits
Reynolds Street (Balmain / Rozelle)	53/38 dBA	53 dBA	No exceedance
Leichhardt Street (Glebe)	54/40 dBA	53 dBA	No exceedance
Bowman Street (Pymont)	54/51 dBA	53 dBA	No exceedance

Table 6 Assessment of Predicted Noise Levels Against LAeq(evening) Noise Limits

Prediction Location	Measured / Predicted LAeq Noise Levels	LAeq(evening) Noise Limits	LAeq Exceedance of Licence Limits
Reynolds Street (Balmain / Rozelle)	53/38 dBA	50 dBA	No exceedance
Leichhardt Street (Glebe)	54/40 dBA	50 dBA	No exceedance
Bowman Street (Pymont)	54/51 dBA	50 dBA	1 dBA exceedance

Table 7 Assessment of Measured/Predicted Noise Levels Against LAeq(15minute) Night-time Noise Limits

Prediction Location	Measured/Predicted LAeq Noise Levels	LAeq(15 minute) Noise Limits	LAeq (15 minute) Exceedance of Licence Limits
Reynolds Street (Balmain / Rozelle)	38 dBA ¹	48 dBA	No exceedance
Leichhardt Street (Glebe)	49/40 dBA	48 dBA	No exceedance
Bowman Street (Pymont)	53/51 dBA	48 dBA	3 dBA exceedance

Notes 1. Due to dominance of the ambient by the Stolt Stream no night-time measurements were conducted.

Table 8 Assessment of Predicted Noise Levels Against LAeq(night) Noise Limits

Prediction Location	Measured / Predicted LAeq Noise Levels	LAeq(evening) Noise Limits	LAeq Exceedance of Licence Limits
Reynolds Street (Balmain / Rozelle)	38 dBA	45 dBA	No exceedance
Leichhardt Street (Glebe)	49/40 dBA	45 dBA	No exceedance
Bowman Street (Pymont)	53/51 dBA	45 dBA	6 dBA exceedance

Notes 1. Due to dominance of the ambient by the Stolt Stream no night-time measurements were conducted

The results of the tables are also presented graphically in **Figure 2** and **Figure 3**.



Figure 2 Evening Noise Limits, Predicted and Measured Noise Levels

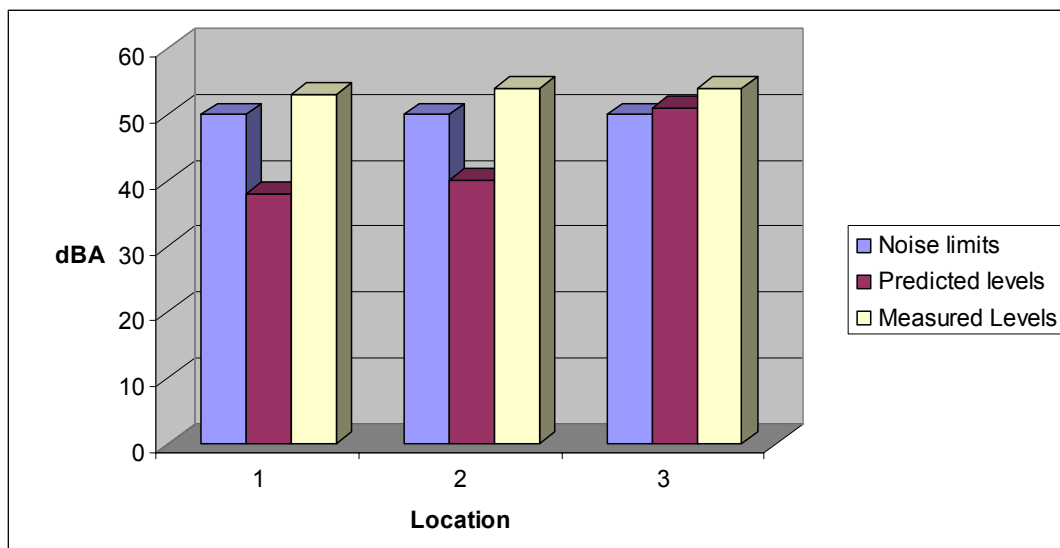
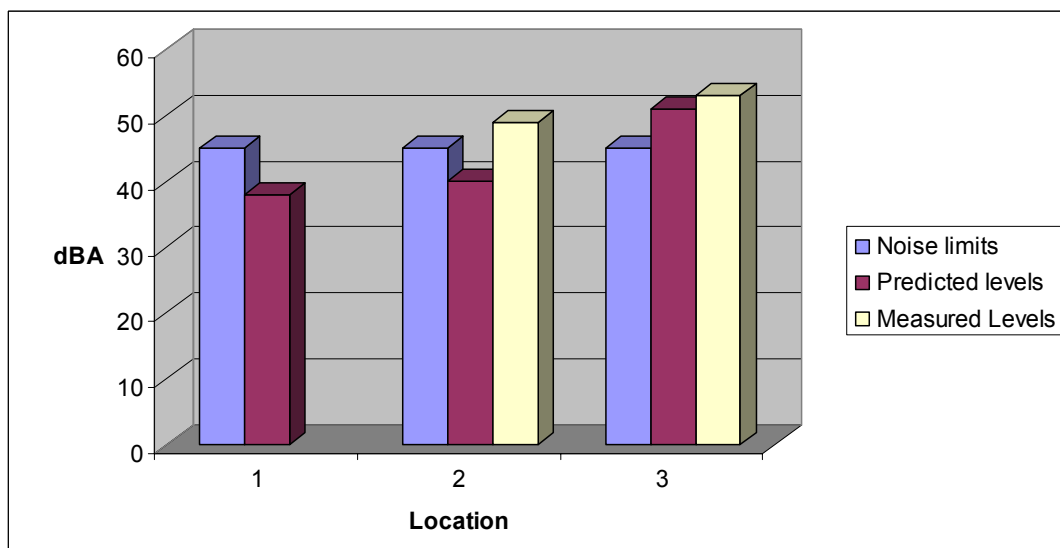


Figure 3 Night-time Noise Limits, Predicted and Measured Noise Levels.



Clause R4.1(2)(v) of the Licence requires details of any remedial action. In this instance no remedial action was taken, as the SPC received no complaints from the community regarding noise from the CSL Pacific activity at GI-1.



5 CONCLUSION

Noise measurements were carried out during the CSL Pacific bulk cargo handling operations between 8.38 pm on the 30 November and 1.05 am on 1 December 2008. A reference noise measurement was also carried out in close proximity of the CSL Pacific vessel, where the noise environment was dominated by the GI-1 based bulk cargo handling noise sources. The reference level was then used to predict noise levels at the representative receivers in the absence of other surrounding activity related noise.

However, it was found that $L_{Aeq(15\text{minute})}$ predicted noise level exceeds the Licence imposed noise limit at the representative location in Pyrmont by 6 dBA. Measured noise levels were 2 dBA higher than predicted, as a result of contributions from other sources such as Anzac Bridge traffic, crickets and seagulls.

The measured L_{Aeq} noise levels at Balmain were dominated by the Stolt Stream vessel at WB-3 and at Glebe by traffic from the Anzac Bridge. Consequently, at both the Balmain and Glebe residential locations, the $L_{Aeq(15\text{ min})}$ and the $L_{Aeq(\text{evening/night})}$ contribution to the ambient by the CSL Pacific could not be measured, for comparison with the Licence conditions. The predicted noise levels from the CSL Pacific bulk cargo unloading activities comply with the licence noise limits at both these locations.

Bulk cargo terminal related maximum (L_{Amax}) noise levels were not observed to cause exceedances at any of the representative monitoring locations for the duration of attended measurements.

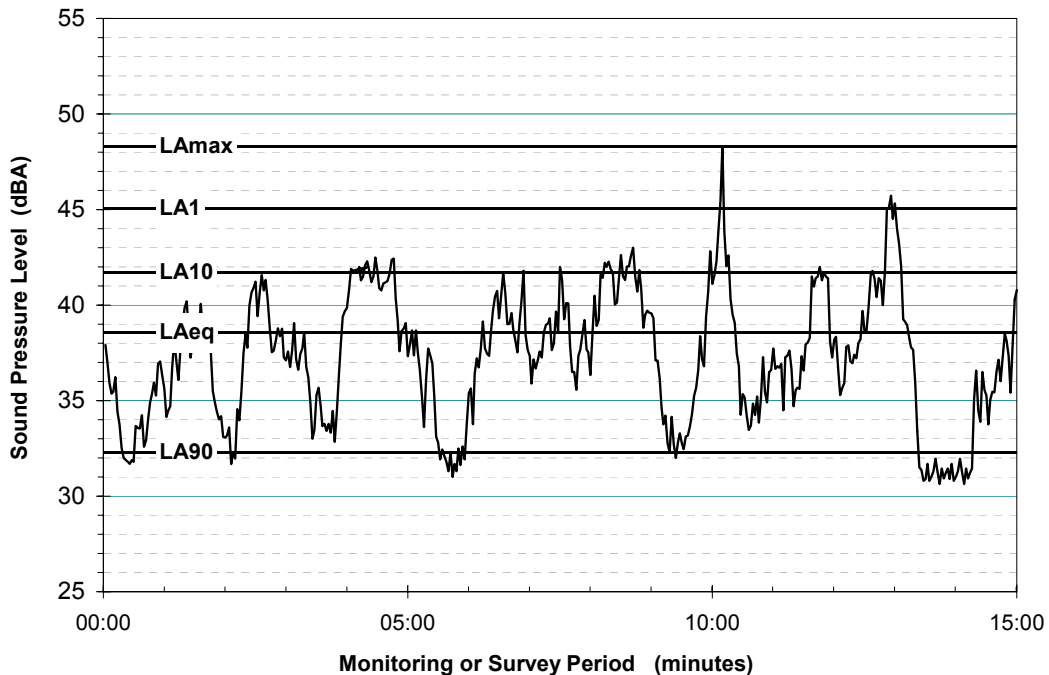
ACOUSTIC TERMINOLOGY USED IN THE REPORT

Typical Noise Indices

This Report makes repeated reference to certain noise level descriptors, in particular the LA10, LA90 and LAeq and LAm_{ax} noise levels.

- The LA10 is the A-weighted sound pressure level exceeded 10% of a given measurement period and is utilised normally to characterise typical maximum noise levels.
- The LAeq is essentially the average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound over the same measurement period. The LAeq(15hour) is the measurement parameter used to describe the road traffic noise level over the entire daytime (7.00 am to 10.00 pm) period. The LAeq(9hour) is the measurement parameter used to describe the road traffic noise level over the entire night-time (10.00 pm to 7.00 am) period. Similarly, the LAeq(1hour) is the measurement parameter used to describe the road traffic noise level during the loudest 1-hour period during the daytime or night-time periods.
- The LA90 noise level is the A-weighted sound pressure level exceeded 90% of a given measurement period and is representative of the average minimum background sound level (in the absence of the source under consideration), or simply the “background” level.
- The LAm_{ax} noise level is the maximum A-weighted noise level associated with road traffic movements.

Graphical Display of Typical Noise Indices



Typical Noise Levels

The following table presents examples of typical noise levels.

Typical Noise Levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerb side of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to Quiet
50	General Office	
40	Inside private office	Quiet to
30	Inside bedroom	Very quiet
20	Unoccupied recording studio	Almost silent

A-Weighting or dBA Noise Levels

The overall level of a sound is usually expressed in terms of dBA, which is measured using the “A-weighting” filter incorporated in sound level meters. These filters have a frequency response corresponding approximately to that of human hearing. People’s hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the “loudness” of that sound. Different sources having the same dBA level generally sound about equally as loud, although the perceived loudness can also be affected by the character of the sound (eg the loudness of human speech and a distant motorbike may be perceived differently, although they are of the same dBA level).

Sensitivity of People to Noise Level Changes

A change of up to 3 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness



Aerial View of the Area Showing Measurement Locations



View of the CSL Pacific from Pymont.