



global environmental solutions

CSL Brisbane  
Glebe Island Berth 1  
Compliance Noise Monitoring Report

Report Number 10-4309-R56

14 April 2014

Sydney Ports Corporation  
Level 4, 20 Windmill St  
Walsh Bay NSW 2000

Version: Revision 0

# CSL Brisbane

## Glebe Island Berth 1

### Compliance Noise Monitoring Report

PREPARED BY:

SLR Consulting Australia Pty Ltd  
ABN 29 001 584 612  
2 Lincoln Street Lane Cove NSW 2066 Australia  
(PO Box 176 Lane Cove NSW 1595 Australia)  
T: 61 2 9427 8100 F: 61 2 9427 8200  
E: [sydney@slrconsulting.com](mailto:sydney@slrconsulting.com) [www.slrconsulting.com](http://www.slrconsulting.com)

#### DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
10-4309-R56	Revision 0	14 April 2014	John Sleeman	Briony Croft	John Sleeman

## TABLE OF CONTENTS

1	INTRODUCTION.....	4
2	SITE DESCRIPTION.....	4
2.1	EPA Environment Protection Licence.....	4
2.2	Measurement Locations.....	5
3	MEASUREMENT METHODOLOGY AND INSTRUMENTATION .....	6
4	RESULTS AND ANALYSIS .....	7
5	CONCLUSION .....	11

## TABLES

Table 1	Licence Noise Limits Measured in dBA	4
Table 2	Noise Survey Instrumentation	6
Table 3	Measured Noise Levels - CSL Brisbane Unloading Salt	7
Table 4	CSL Brisbane "Reference" Noise Level	8
Table 5	Assessment of Measured/Predicted Noise Levels Against LAeq(15minute) Evening Noise Limits	8
Table 6	Assessment of Predicted Noise Levels Against LAeq(evening) Noise Limits	9
Table 7	Assessment of Measured/Predicted Noise Levels Against LAeq(15minute) Night-time Noise Limits	9
Table 8	Assessment of Predicted Noise Levels Against LAeq(night) Noise Limits	9

## FIGURES

Figure 1	White Bay / Glebe Island Layout with Attended Noise Monitoring Locations	5
Figure 2	Evening Noise Limits, Predicted and Measured Noise Levels	10
Figure 3	Night-time Noise Limits, Predicted and Measured Noise Levels.	10

## APPENDICES

Appendix A	Summary of Acoustic Terminology used in the Report
Appendix B	Aerial View of the Site and Surrounds

## 1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Sydney Ports Corporation (SPC) to conduct monitoring of noise emissions during the unloading of the “CSL Brisbane” (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 auxiliary 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 at GI-1, between 8:31 pm on the 8 April and 12:44 am on 9 April 2014.

## 2 SITE DESCRIPTION

The Glebe Island Port facility is located north of the 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 previously 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 facility to the west of Glebe Island consists of 5 berths on the northern side of White Bay.

Berth GI-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 Noise Limits

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
Pyrmont	Not applicable	Not applicable	53	50	48	45	61

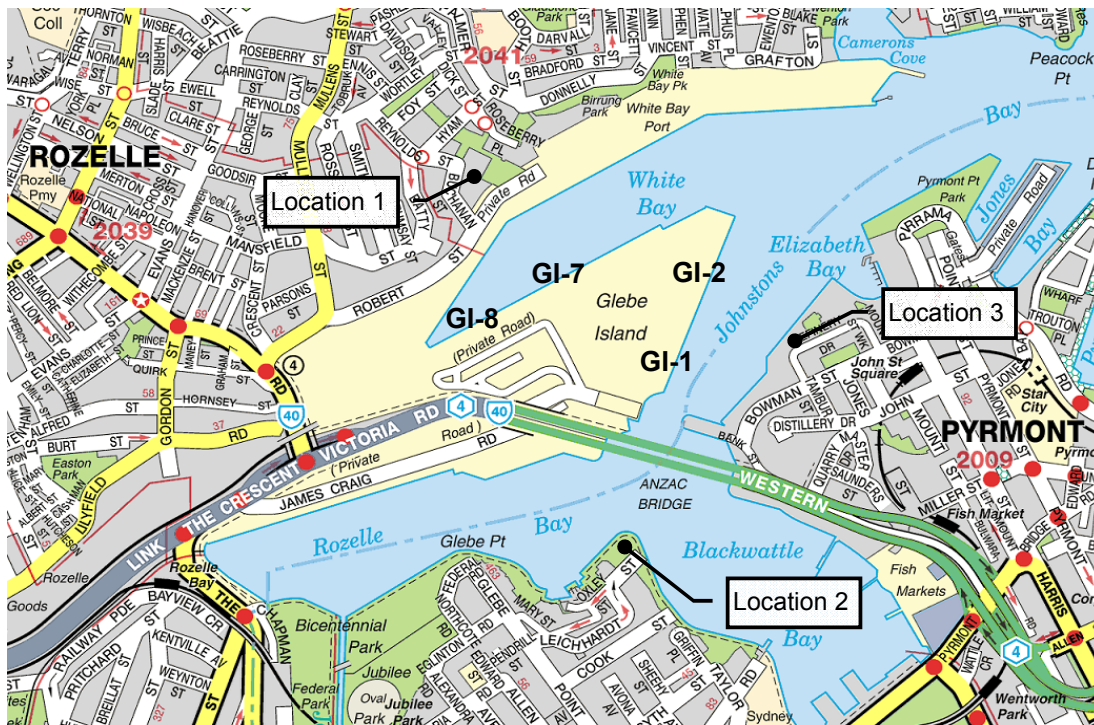
Section M7.1 of the licence requires that the licensee must arrange for an accredited acoustic consultant to monitor noise from the premises 'at the most affected noise sensitive receiver in Balmain, Glebe and Pyrmont, to determine whether the activities at the premises comply with the noise limits specified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

## 2.2 Measurement Locations

The EPA licence (Section L6.1) specifies noise limits at 'the residence most affected by noise' at Balmain, Glebe and Pyrmont. Accordingly, we have measured ambient noise levels at the closest residences at these areas which are shown in **Figure 1** 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 - Pyrmont - at ground level adjacent to and west of the Jackson's Landing apartment building located at 24-32 Refinery Drive, Pyrmont. This location is 210 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 relevant activities during the unloading of the bulk salt carrier were the ship unloading to the wharf during the day, evening and night-time, and the loading of salt into trucks using front end loaders on the wharf occurring during the day. Noise monitoring is required during the evening and night-time in order to determine compliance with the noise limits which are defined only during these times.

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 Refinery Drive, Pyrmont.

A "reference" measurement was also conducted in close proximity to the CSL Brisbane, 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 vessel 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 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
2270	3003729	Brüel & Kjær Modular Precision Sound Level Meter
4189	2876827	Brüel & Kjær 12.5 mm Prepolarised Condenser Microphone
4231	2412472	Bruel & Kjaer 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 at location 2 during the evening and night-time and the LAeq(evening) and LAeq(night) source noise levels were not able to be estimated accurately based on the measurements.

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 Brisbane Unloading Salt**

Address	Start Time	LAeq	LA90	GI-1 Related LAmix Range	Comments
Reynolds Street (Balmain / Rozelle)	09:50 pm (evening)	48 dBA	48 dBA	Truck movement: 51-52 Impact noise: 54 Parking brake 56	CSL Brisbane 'just' audible. LAeq dominated by local traffic, Anzac Bridge.
	11:22 pm (night)	46 dBA	44 dBA	None observed	CSL Brisbane not audible. LAeq dominated by from local traffic and Anzac Bridge.
Leichhardt Street (Glebe)	08:31 pm (evening)	55 dBA	54 dBA	None observed	CSL Brisbane 'just' audible. LAeq dominated by noise from Anzac Bridge.
	12:44 am (night)	50 dBA	48 dBA	None observed	CSL Brisbane 'barely' audible. LAeq dominated by noise from Anzac Bridge, water noise.
Refinery Drive (Pymont)	09:17 pm (evening)	57 dBA	55 dBA	None observed	LAeq significantly influenced by CSL Brisbane engine and unloading activities plus influence from Anzac Bridge traffic and seagulls on occasion
	11:53 pm (night)	51 dBA	50 dBA	65 to 67 impact noise	LAeq significantly influenced by CSL Brisbane engine plus influence from Anzac Bridge traffic and seagulls on occasion
	12:15 am (night)	51 dBA	50 dBA	None observed	LAeq significantly influenced by CSL Brisbane engine plus influence from Anzac Bridge traffic and seagulls on occasion

Notes 1. The second measurement at Refinery Drive was located north-east of the apartment building to obtain shielding from Anzac Bridge traffic.

Two separate measurements were carried out at the representative receiver at the Balmain site at 9:50 pm and 11:22 pm. At this location, the measurement was influenced by urban hum, local and Anzac Bridge traffic. The CSL Brisbane engine was 'just' audible above the Victoria Road/City West Link/Anzac Bridge traffic noise during the first survey, and not audible during the second survey.

Two separate measurements were carried out at the representative Glebe location during cargo handling operations at GI-1, at 8:31 pm and 12:44 am. At this location, during both surveys, noise from traffic on Anzac Bridge was dominating the ambient noise environment. The CSL Brisbane engine was 'just' audible above the Anzac Bridge traffic noise.

Three separate measurements were carried out at the representative Pymont location during cargo handling operations at GI-1, at 9:17 pm, 11:53 pm and 12:12 am. At this location, during all surveys, noise from the CSL Brisbane was a significant contributor to the ambient noise environment, with additional contributions from Anzac Bridge traffic and seagulls. The noise from the CSL Brisbane engine was constant in nature. Short-term 'impact' noise events from GI-1 recorded during the evening survey were noted to be from conveyor belt movement, truck horns, hammering, and salt unloading activity. For the third survey at this location the measurement position was marginally further from the CSL Brisbane, being north east of the apartment building, to obtain shielding from Anzac Bridge traffic.

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 Brisbane where the noise environment was dominated by bulk cargo unloading related noise.

It was noted during the survey that unloading activity was stopped due to positioning of ship limiting them from unloading further. However the vessel engine was noted to be operating continuously.

**Table 4** presents the “reference” noise measurements carried out at approximately 74 m away from significant sources on the bulk cargo vessel CSL Brisbane. The measurements were conducted on the GI-1 wharf and Pymont location. It was noted the main noise source from the ship was the engine and conveyor belts above the deck which would be considered as a line source.

**Table 4 CSL Brisbane “Reference” Noise Level**

Location	Identified Source	Distance from Source	LAeq
GI-1	Engine	74 m	62 dBA
Pymont	Engine + Unloading activity – 4 cranes	210 m	57 dBA
Pymont	Engine+ Unloading activity – 2 cranes	210 m	51 dBA

Calculations for night-time when 2 cranes were unloading salt from the ship were performed using the reference measurement at 74 m presented in **Table 4**. Predictions indicate bulk cargo unloading related LAeq noise levels of 38 dBA at Balmain, 37 dBA at Glebe, and 51 dBA at Pymont. The predicted noise levels at Balmain and Glebe are well below the ambient, and consistent with the CSL Brisbane being not audible, or ‘barely audible’. At Pymont, the predicted noise level is at the measured overall LAeq level of 51 dBA with 2 cranes operational. This predicted noise level reduces to 50 dBA with the ship engine only.

Additionally, calculations were performed for the evening period (before 10 pm) when 4 cranes were unloading salt from the ship. Predictions indicate bulk cargo unloading related LAeq noise levels of 44 dBA at Balmain, 45 dBA at Glebe, and 57 dBA at Pymont.

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 Evening LAeq(15minute) 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)	48/44 dBA	53 dBA	No exceedance
Leichhardt Street (Glebe)	55/45 dBA	53 dBA	No exceedance
Bowman Street (Pymont)	57/57 dBA	53 dBA	4 dBA 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)	48/44 dBA	50 dBA	No exceedance
Leichhardt Street (Glebe)	55/45 dBA	50 dBA	No exceedance
Bowman Street (Pymont)	57/57 dBA	50 dBA	7 dBA exceedance

**Table 7 Assessment of Measured/Predicted Noise Levels Against Night-time LAeq(15minute) 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)	46/38dBA	48 dBA	No exceedance
Leichhardt Street (Glebe)	50/37 dBA	48 dBA	No exceedance
Bowman Street (Pymont)	51/51 dBA	48 dBA	3 dBA exceedance

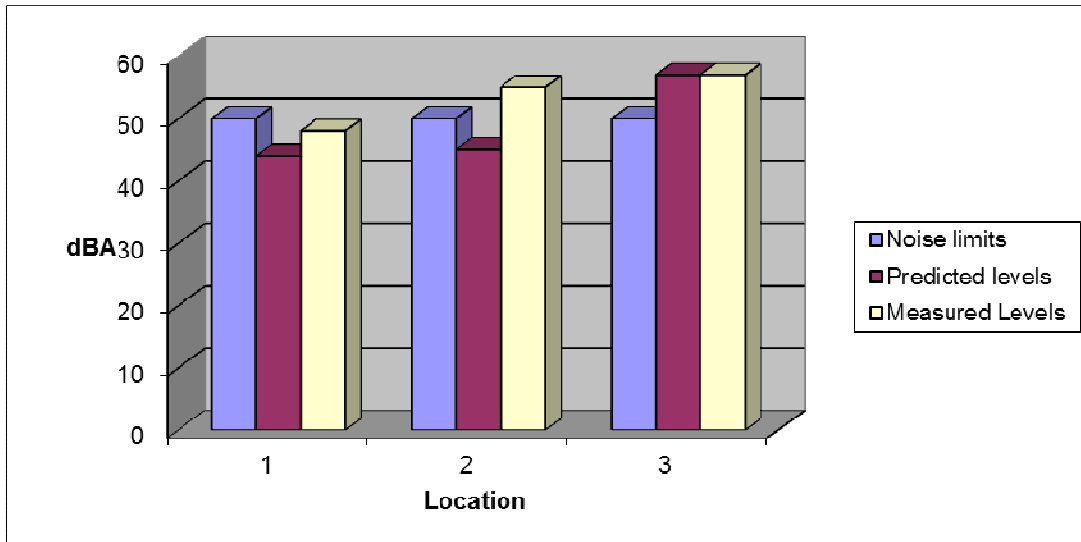
**Table 8 Assessment of Predicted Noise Levels Against LAeq(night) Noise Limits**

Prediction Location	Measured / Predicted LAeq Noise Levels	LAeq(night) Noise Limits	LAeq Exceedance of Licence Limits
Reynolds Street (Balmain / Rozelle)	46/36 dBA <sup>1</sup>	45 dBA	No exceedance
Leichhardt Street (Glebe)	50/35 dBA <sup>1</sup>	45 dBA	No exceedance
Bowman Street (Pymont)	51/50 dBA <sup>1</sup>	45 dBA	5 dBA exceedance

Notes: 1. The predicted noise levels assume ship engine only with no crane salt unloading operations.

The results in the tables are also presented graphically in **Figure 2** and **Figure 3** with Locations 1, 2 and 3 referring to Balmain, Glebe and Pymont respectively.

**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, SLR were advised of a complaint during the evening, and confirmed to Sydney Ports that the licence imposed limits were exceeded. The unloading of salt using 4 cranes ceased, and was recommenced later at approximately midnight using 2 cranes. SLR advised Sydney Ports with 2 cranes the licence imposed limits were still exceeded, and the salt unloading ceased for the remaining night-time period.

## 5 CONCLUSION

Noise measurements were carried out during the CSL Brisbane bulk cargo handling operations between 8:31 pm and 12:44 am on 8 April and 9 April 2014. A reference noise measurement was also carried out in close proximity of the CSL Brisbane vessel, where the noise environment was dominated by the GI-1 based bulk cargo handling related 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.

At Pymont during the evening, the loading activity consisted of 4 crane operation, and the predicted and measured  $L_{Aeq(15minute)}$  noise level exceeded the Licence imposed noise limit by 4 dB at the representative location in Pymont. The predicted  $L_{Aeq(Evening)}$  noise level exceeded the noise limit by 7 dBA. During the night-time survey at Pymont, the loading activity initially consisted of 2 crane operation, and the measured  $L_{Aeq(15minute)}$  noise level exceeded the Licence imposed noise limit by 3 dB. Following the night-time attended measurements, the unloading of salt was stopped, and the corresponding predicted  $L_{Aeq(Night)}$  noise level exceeds the noise limit by 5 dBA.

At Glebe and Balmain during the evening, the ambient noise environment was found to be dominated by traffic from the Anzac Bridge as well as rain related noise. The  $L_{Aeq(15minute)}$  and the  $L_{Aeq(Evening)}$  contribution to the ambient from the CSL Brisbane could not be measured at either location for comparison with the Licence conditions. Predicted evening noise levels at Glebe and Balmain from the CSL Brisbane comply with the licence noise limits at these locations. Similarly at these two locations during the night-time ambient noise environment was dominated by traffic from the Anzac Bridge. The  $L_{Aeq(15minute)}$  and the  $L_{Aeq(Night)}$  contribution to the ambient by the CSL Brisbane could not be measured for comparison with the Licence conditions. Predicted noise levels at Balmain and Glebe from the CSL Brisbane bulk cargo unloading activities comply with the licence noise limits at these locations.

Bulk cargo terminal related maximum ( $L_{Amax}$ ) noise levels measured at Pymont exceeded the Licence imposed noise limit by 6 dB. No terminal related maximum noise levels were measured at Balmain or Glebe.

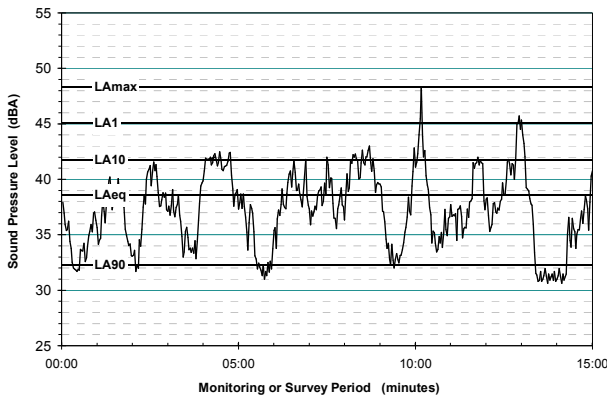
ACOUSTIC TERMINOLOGY USED IN THE REPORT

**Typical Noise Indices**

This Report makes repeated reference to certain noise level descriptors, in particular the LA10, LA90 and LAeq and LAmix 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(period) is the measurement parameter used to describe the average sound level over the period. For daytime the period is 7 am to 6 pm, for evening 6 pm to 10 pm, and for night-time 10 pm to 7 am.
- 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 LAmix is simply the maximum noise level and is often represented by the LA1(1min), being the level exceeded 1% of 1 minute, ie the noise level exceeded for 0.6 of a second.

**Graphical Display of Typical Noise Indices**



**Typical Noise Levels**

The following table presents examples of typical noise levels.

**Typical Noise Levels**

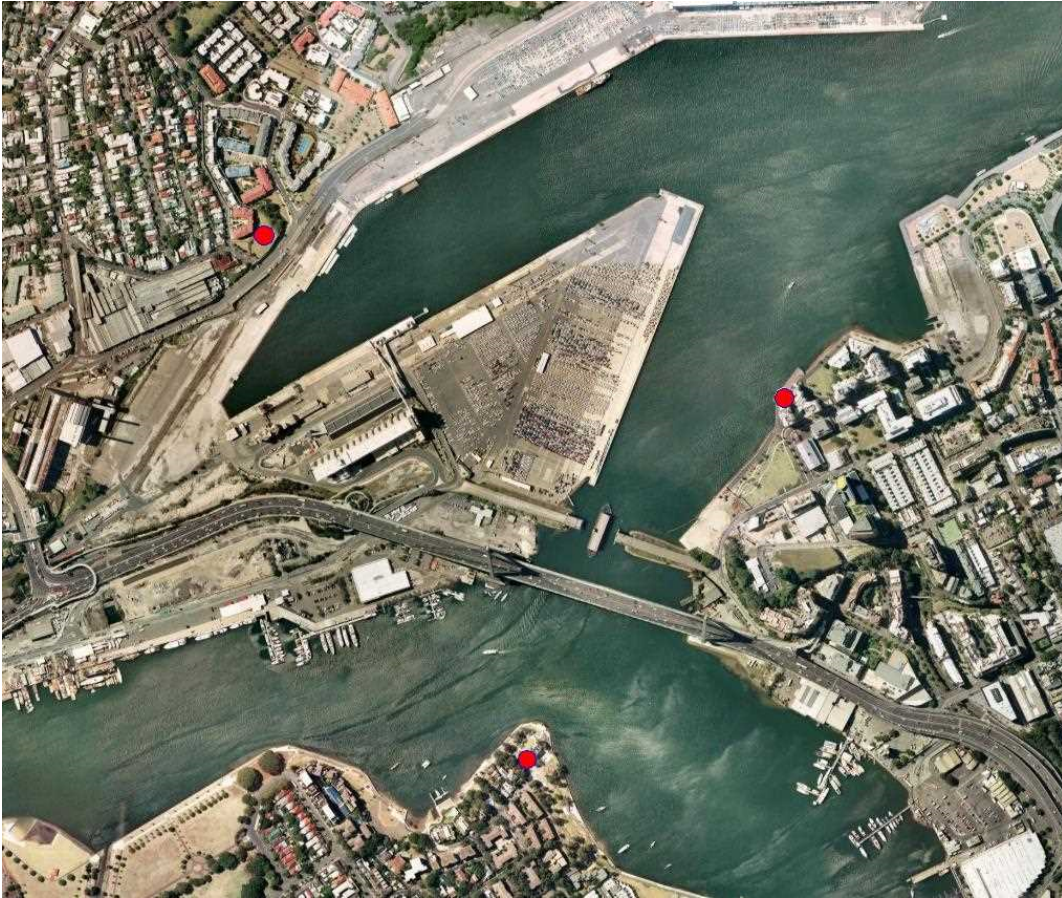
Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerb side of busy street	Loud
70	Loud radio or television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