



HEGGIES

REPORT 10-4309-R28

Revision 0

**CSL Thevenard
Glebe Island Berth 1
Compliance Noise Monitoring**

PREPARED FOR

Sydney Ports Corporation
207 Kent Street
SYDNEY NSW 2000

21 AUGUST 2009

HEGGIES PTY LTD

ABN 29 001 584 612

Incorporating

New Environment

Graeme E. Harding & Associates

Eric Taylor Acoustics



CSL Thevenard

Glebe Island Berth 1

Compliance Noise Monitoring

PREPARED BY:

Heggies Pty Ltd
 ABN 29 001 584 612
 2 Lincoln Street Lane Cove NSW 2066 Australia
 (PO Box 176 Lane Cove NSW 1595 Australia)
 Telephone 61 2 9427 8100 Facsimile 61 2 9427 8200
 Email sydney@heggies.com Web www.heggies.com

DISCLAIMER

Reports produced by Heggies Pty Ltd are prepared for a particular Client's objective and are based on a specific scope, conditions and limitations, as agreed between Heggies and the Client. Information and/or report(s) prepared by Heggies may not be suitable for uses other than the original intended objective. No parties other than the Client should use any information and/or report(s) without first conferring with Heggies.

The information and/or report(s) prepared by Heggies should not be reproduced, presented or reviewed except in full. Before passing on to a third party any information and/or report(s) prepared by Heggies, the Client is to fully inform the third party of the objective and scope and any limitations and conditions, including any other relevant information which applies to the material prepared by Heggies. It is the responsibility of any third party to confirm whether information and/or report(s) prepared for others by Heggies are suitable for their specific objectives.



Heggies Pty Ltd is a Member Firm of the Association of Australian Acoustical Consultants.



Quality Endorsed Company
 ISO 9001 Lic 3236
 SAI Global

Heggies Pty Ltd operates under a Quality System which has been certified by Quality Assurance Services Pty Limited to comply with all the requirements of ISO 9001:2000 "Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation and Servicing" (Licence No 3236).

This document has been prepared in accordance with the requirements of that System.

DOCUMENT CONTROL

| Reference | Status | Date | Prepared | Checked | Authorised |
|-------------|------------|----------------|--------------|------------|--------------|
| 10-4309-R28 | Revision 0 | 21 August 2009 | John Sleeman | Mark Blake | 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 | 10 |
| | ACOUSTIC TERMINOLOGY USED IN THE REPORT | 1 |
| | Typical Noise Indices | 1 |
| | Typical Noise Levels | 2 |
| | A-Weighting or dBA Noise Levels | 2 |
| | Sensitivity of People to Noise Level Changes | 2 |
| Table 1 | Licence Noise Limits Measured in dBA | 5 |
| Table 2 | Noise Survey Instrumentation | 7 |
| Table 3 | Measured Noise Levels - CSL Thevenard Unloading Salt | 7 |
| Table 4 | CSL Thevenard "Reference" Noise Level | 8 |
| Table 5 | Assessment of Measured/Predicted Noise Levels Against LAeq(15minute) Evening Noise Limits | 9 |
| 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 |
| Figure 1 | White Bay / Glebe Island Layout with Attended Noise Monitoring Locations | 6 |
| Figure 2 | Evening Noise Limits, Predicted and Measured Noise Levels | 10 |
| Figure 3 | Night-time Noise Limits, Predicted and Measured Noise Levels. | 10 |
| Appendix A | Summary of Acoustic Terminology Used in the Report | |
| Appendix B | Aerial View of the Site and Surrounds | |



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 Thevenard” (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 between 8.24 pm on the 16 August and and 1.26 am on 17 August 2008. During the measurement period, the sky was generally clear, with a slight north-westerly 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 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 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'.

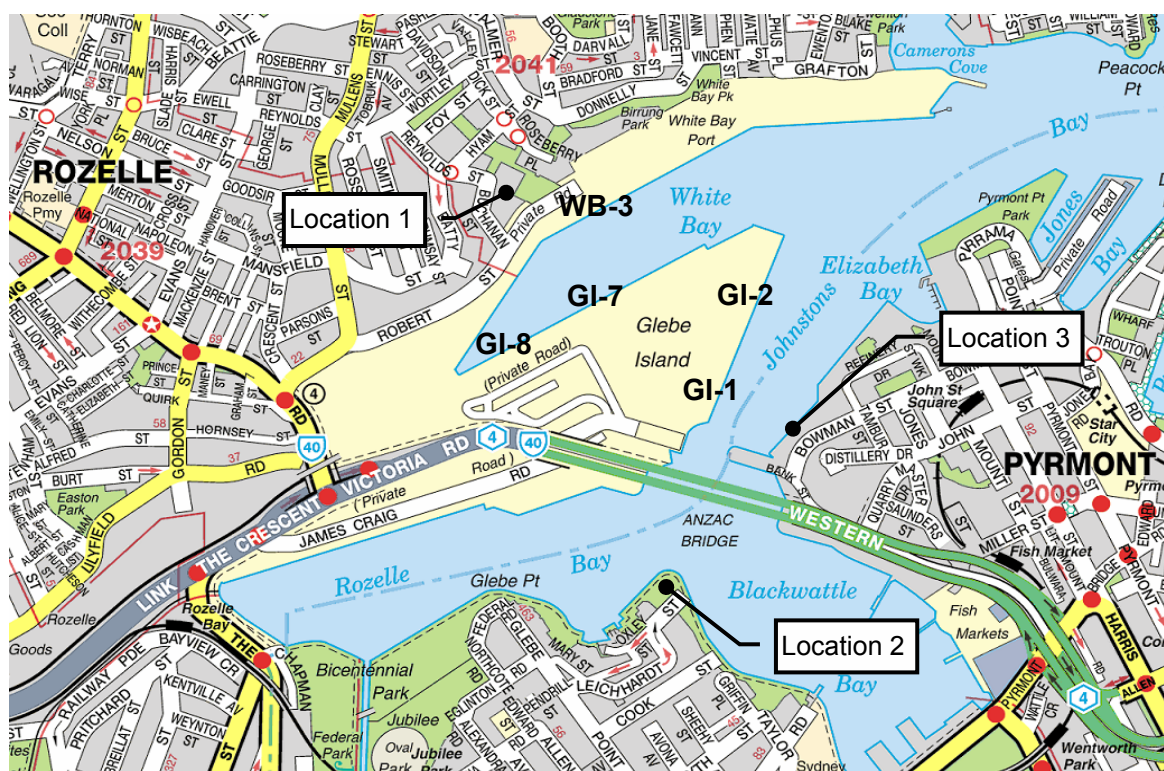
2.2 Measurement Locations

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 Thevenard, 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 |
|------|---------------|--|
| 2260 | 2414605 | Brüel & Kjær Modular Precision Sound Level Meter |
| 4193 | 2368563 | Brüel & Kjær 12.5 mm Prepolarised Condenser Microphone |
| 4231 | 1730711 | 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 during the evening and at location 2 during the evening and night-time and the LAeq(15minute) 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 Thevenard Unloading Salt

| Address | Start Time | LAeq (15min) | LA90 (15min) | GI-1 Related LAmax Range | Comments |
|--|------------|--------------|--------------|--------------------------|---|
| Reynolds Street (Balmain / Rozelle) | 9.32 pm | 46 dBA | 43 dBA | Non observed | CSL Thevenard not audible. LAeq from local traffic, Anzac Bridge |
| | 0.17 am | 41 dBA | 39 dBA | Non observed | CSL Thevenard audible. LAeq from CSL Thevenard, local traffic, Anzac Bridge, seagulls |
| Leichhardt Street (Glebe) | 8.24 pm | 56 dBA | 54 dBA | Non observed | LAeq dominated noise from Anzac Bridge, CSL Thevenard not audible. |
| | 1.11 am | 52 dBA | 50 dBA | Non observed | LAeq dominated noise from Anzac Bridge, CSL Thevenard ‘barely’ audible. |
| Bowman Street (Pyrmont) | 8.59 pm | 56 dBA | 55 dBA | Non observed | LAeq dominated by CSL Thevenard plus crickets, seagulls. |
| | 0.44 am | 55 dBA | 54 dBA | Non observed | LAeq dominated by CSL Thevenard plus crickets, seagulls. |



Two separate measurements were carried out at the representative receiver at the Balmain site at 9.32 pm and 0.17 am. At this location, the measurement was influenced by urban hum, local and Anzac bridge traffic, and on occasion noise from the elevated Anzac bridge flags due to wind.

Two separate measurements were carried out at the representative Glebe location during cargo handling operations at GI-1, at 8.24 pm and 1.11 am. At this location, during both surveys, noise from traffic on Anzac Bridge was dominating the ambient noise environment. The CSL Thevenard 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 8.59 pm and 0.44 am. At this location, during both surveys, noise from the CSL Thevenard was the significant contributor to the ambient noise environment, with contributions also from Anzac Bridge traffic, crickets and seagulls. The noise from the CSL Thevenard 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 Thevenard, where the noise environment was dominated by bulk cargo loading related noise.

Table 4 presents the "reference" noise measurements carried out between 58 m and 176 m away from significant sources on the bulk cargo vessel CSL Thevenard. The measurements were conducted on the GI-1 wharf. It was noted the main noise source from the ship was the enclosed conveyor, above the deck for typically 50 percent of the ship length and this a line source.

Table 4 CSL Thevenard "Reference" Noise Level

| Reference | Location | Distance from Source | LAeq |
|-----------|----------|----------------------|--------------|
| 1 | GI-1 | 175 m | 57 dBA |
| 2 | GI-1 | 125 m | 60 to 61 dBA |
| 3 | GI-1 | 58 m | 66 to 67 dBA |

Calculations were performed using the reference measurements presented in **Table 4**. Predictions indicate bulk cargo unloading related LAeq noise levels of 40 dBA at Balmain, 44 dBA at Glebe, and 54 dBA at Pyrmont. The predicted noise levels, at Balmain, and Glebe are well below the ambient, and consistent with the CSL Thevenard being not audible, or 'barely audible'. At Pyrmont, the predicted noise level is slightly below the measured overall LAeq(15minute) level of 55 dBA. This is consistent with the expected ambient being of the order of 48 dBA at Pyrmont, in the absence of CSL Thevenard 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) | 46/40 dBA | 53 dBA | No exceedance |
| Leichhardt Street (Glebe) | 56/44 dBA | 53 dBA | No exceedance |
| Bowman Street (Pyrmont) | 56/54 dBA | 53 dBA | 1 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) | 46/40 dBA | 50 dBA | No exceedance |
| Leichhardt Street (Glebe) | 56/44 dBA | 50 dBA | No exceedance |
| Bowman Street (Pyrmont) | 56/54 dBA | 50 dBA | 4 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) | 41/40dBA | 48 dBA | No exceedance |
| Leichhardt Street (Glebe) | 52/44 dBA | 48 dBA | No exceedance |
| Bowman Street (Pyrmont) | 55/54 dBA | 48 dBA | 6 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) | 41/40 dBA | 45 dBA | No exceedance |
| Leichhardt Street (Glebe) | 52/44 dBA | 45 dBA | No exceedance |
| Bowman Street (Pyrmont) | 55/54 dBA | 45 dBA | 9 dBA exceedance |

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

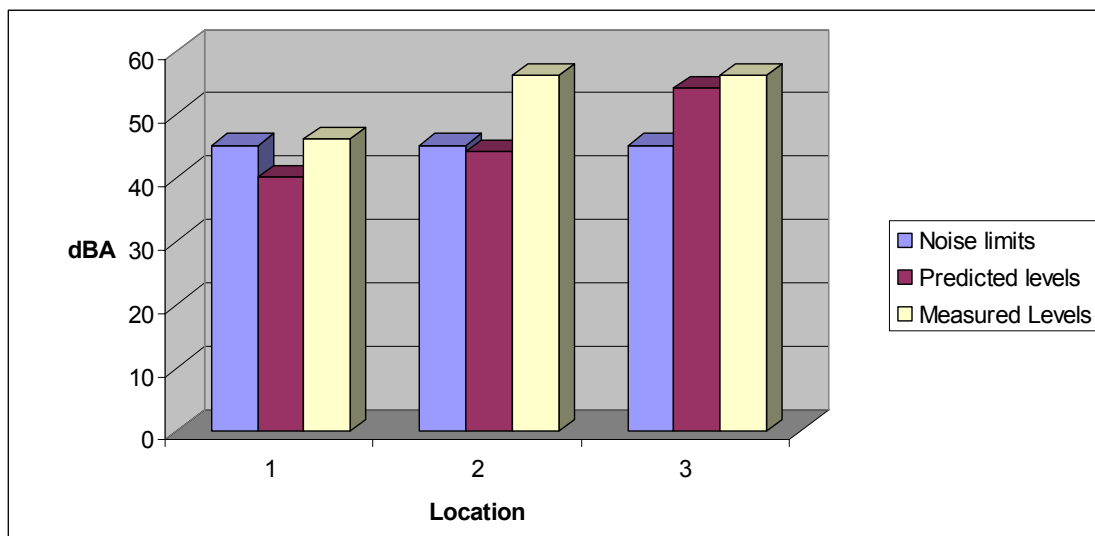
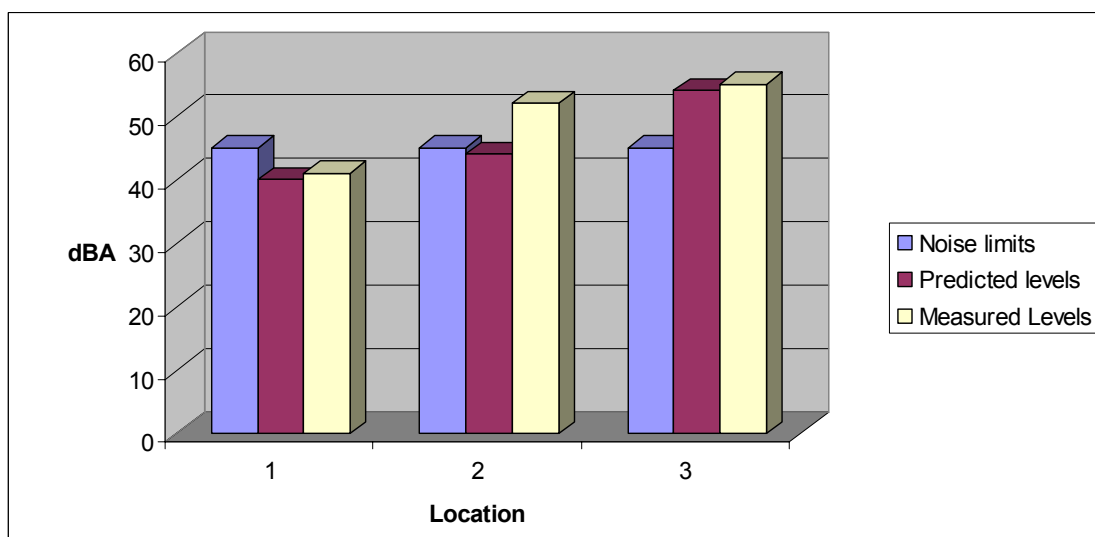


Figure 3 Night-time Noise Limits, Predicted and Measured Noise Levels.



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 Thevenard activity at GI-1.

5 CONCLUSION

Noise measurements were carried out during the CSL Thevenard bulk cargo handling operations between 8.24 pm on the 16 August and 1.26 am on 17 August 2009. A reference noise measurement was also carried out in close proximity of the CSL Thevenard 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 9 dBA. Measured noise levels were 1 dBA higher than predicted, as a result of contributions from other sources such as Anzac Bridge traffic, crickets and seagulls.

The measured $L_{Aeq(15\text{minute})}$ noise levels at Balmain were 41 dBA, hence the CSL Thevenard bulk cargo handling operations comply with the noise limit at this location. This was confirmed by the predicted noise levels.

At Glebe the ambient noise environment was dominated by traffic from the Anzac Bridge and the $L_{Aeq(15\text{min})}$ and the $L_{Aeq(\text{evening/night})}$ contribution to the ambient by the CSL Thevenard could not be measured, for comparison with the Licence conditions. Predicted noise levels at Glebe from the CSL Thevenard bulk cargo unloading activities comply with the licence noise limits at this location.

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.

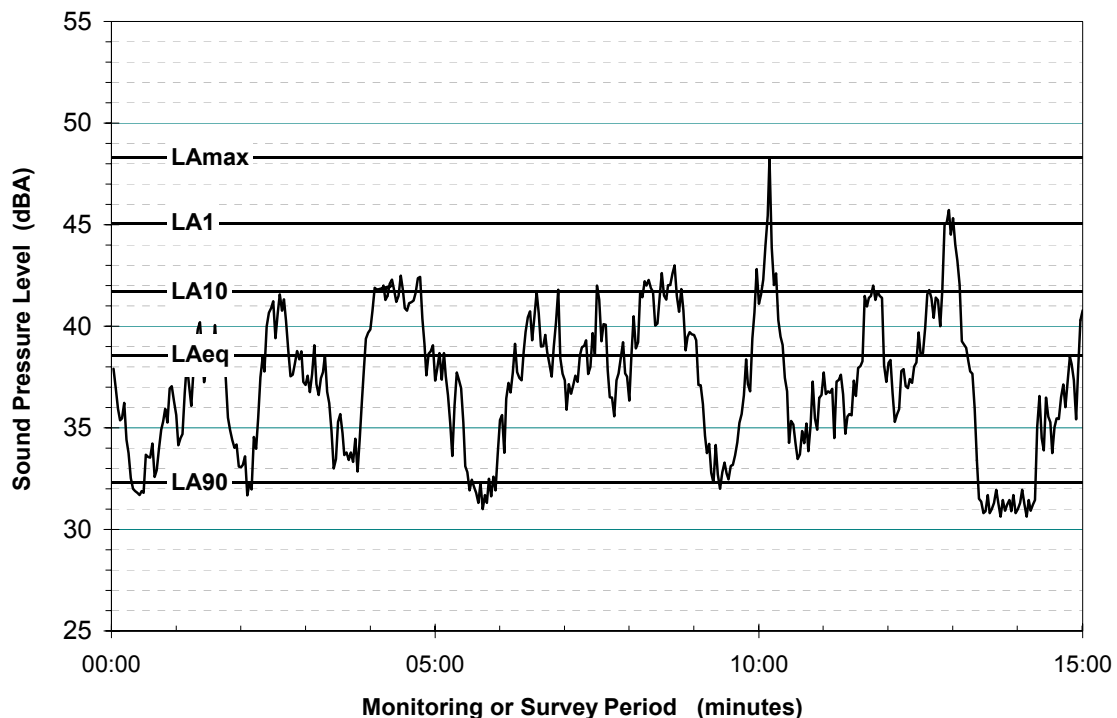
ACOUSTIC TERMINOLOGY USED IN THE REPORT

Typical Noise Indices

This Report makes repeated reference to certain noise level descriptors, in particular the LA10, LA90 and LAeq and LAmax 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 LAmax 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

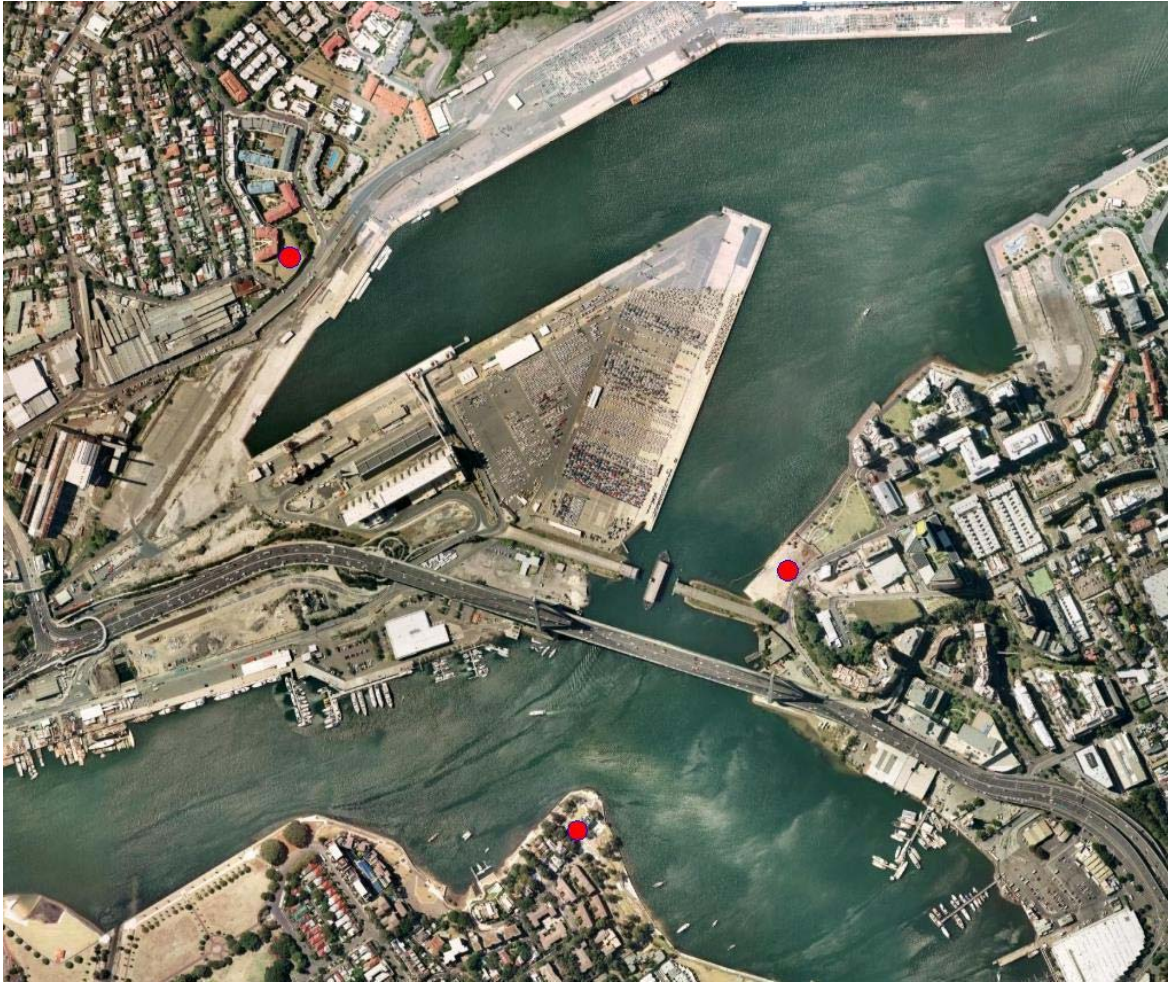
| Sound Pressure Level (dBA) | Typical Source | Subjective Evaluation |
|----------------------------|--|-----------------------|
| 130 | Threshold of pain | Intolerable |
| 120 | Heavy rock concert | Extremely noisy |
| 110 | Grinding on steel | |
| 100 | Loud car horn at 3 m | Very noisy |
| 90 | Construction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