

# DAIWAN JUSTICE

## Glebe Island Berth 1 Compliance Noise Monitoring Report

### Prepared for:

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## BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Port Authority of New South Wales (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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## DOCUMENT CONTROL

| Reference          | Date                             | Prepared            | Checked      | Authorised   |
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### APPENDICES

Appendix A Acoustic Terminology

## 1 Introduction

SLR Consulting Australia Pty Ltd (SLR Consulting) has been commissioned by the Port Authority of New South Wales (Port Authority of NSW) to conduct monitoring of noise emissions during the unloading of the “Daiwan Justice” (a bulk cargo vessel) at Glebe Island Berth 1 (GI-1), as required by Clause M4.1 of the EPA’s Environment Protection Licence (Licence No 13008). This report provides the results of the monitoring as required by Clause R3.5 of the Licence.

Noise measurements have been conducted whilst the ship was berthed at GI-1 (running ship auxiliary power unit (APU), ventilation fans) 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 with the vessel berthed during the evening and night-time, noting the unloading of bulk salt from the ship to the wharf was conducted only during daytime hours. The measurements were conducted at GI-1 between 8.46 pm 14 August 2020 and 12.46 am on 15 August 2020 after the ship arrived at 16.30 pm on 14 August 2020. Onsite measurements were also conducted on the 17 August as SLR were not able to access the project site on the same night.

Noise measurements were also conducted during the arrival of the Daiwan Justice to GI-1 between 3:39 pm and 5.20 pm on the 14 August 2020.

## 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 Berths 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 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. North of Glebe Island 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 L2, these are reproduced in **Table 1**.

**Table 1 Licence Noise Limits Measured in dBA**

| Residence Most Affected by Noise | Day            |                | Evening        |              | Night          |              |              |
|----------------------------------|----------------|----------------|----------------|--------------|----------------|--------------|--------------|
|                                  | LAeq(15minute) | LAeq(period)   | LAeq(15minute) | LAeq(period) | LAeq(15minute) | LAeq(period) | 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           |

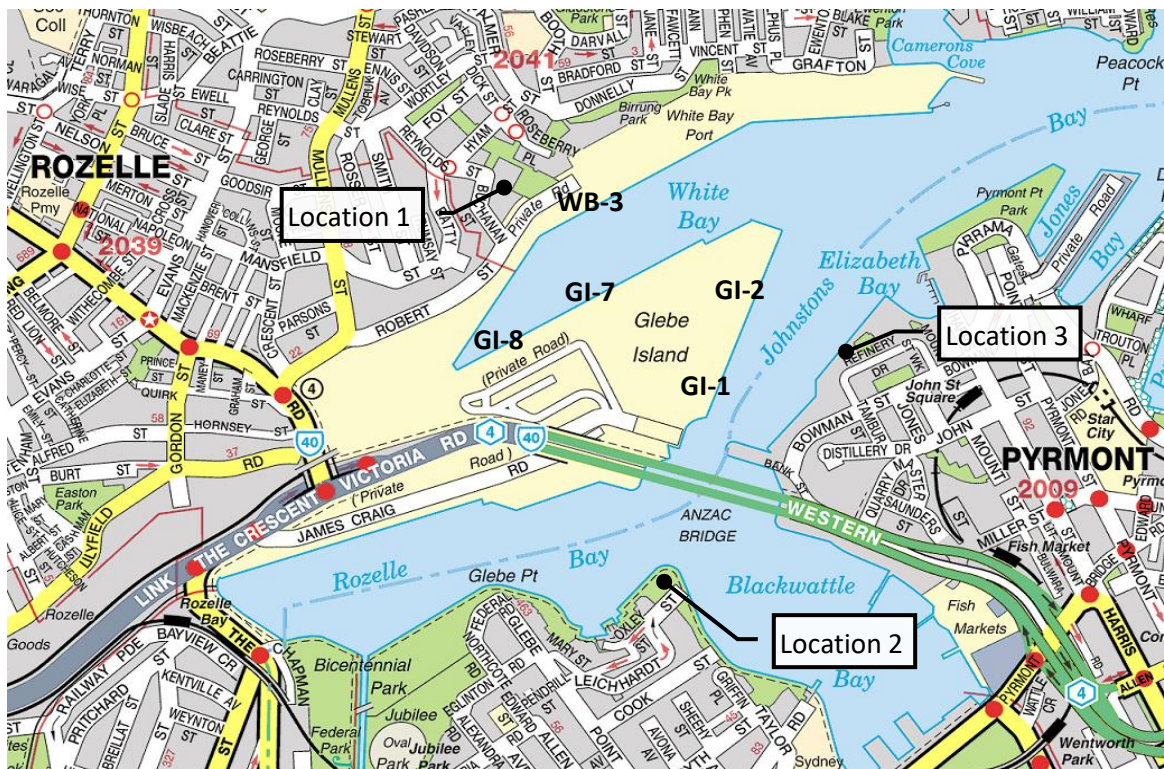
Section M4.1 of the licence requires that the licensee must arrange for an accredited acoustic consultant to monitor noise from the premises “*at the most affected noise sensitive receiver in Balmain, Glebe and Pymont, to determine whether the activities at the premises comply with the noise limits specified in condition L2*”.

## 2.2 Measurement Locations

The table from Section L2 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 **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:** Pymont - at ground level adjacent to and west of the Jackson’s Landing apartment building located at Refinery Drive, Pymont. This location is 220 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 bulk salt carrier were auxiliary engines and associated ventilation systems, with the ship unloading to wharf located hoppers and loading of salt into trucks from the hoppers only occurring during the day. Noise monitoring was conducted during the evening and night-time in 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 Street, Glebe, and 1.5 m above ground at Bowman Street, Pyrmont.

A “reference” measurement was conducted in close proximity to the Daiwan Justice, where the noise environment was relatively dominated by vessel 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 2699.1-1988 “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 | Instrumentation Description                             |
|------|---------------|---|
| 2270 | 3008204       | Brüel & Kjær Modular Precision Sound Level Meter        |
| 4189 | 2983643       | Brüel & Kjær 12.5 mm Pre-polarised Condenser Microphone |
| 4231 | 2022772       | Brüel & Kjær Calibrator                                 |

Given the relatively constant nature of noise related to the vessel, short-term measurements (of 15 minute duration) are usually considered to be sufficient to provide adequate information to enable an estimate of the  $L_{Aeq(15\text{minute})}$  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 night-time and the  $L_{Aeq(15\text{minute})}$  and  $L_{Aeq(night)}$  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 - Daiwan Justice Unloading Salt**

| Address                           | Start Time                 | LAeq   | LA90   | GI-1 Related LAmx Range | Comments   |
|-----------------------------------|----------------------------|--------|--------|-------------------------|--|
| Reynolds Street (Balmain/Rozelle) | 8:46 pm 14/08/20 (Evening) | 46 dBA | 44 dBA | Non observed            | Ambient dominated by Anzac Bridge Traffic, another vessel in port at White Bay and construction during the night-time period.<br>Daiwan Justice not audible during the evening/night |
|                                   | 12.31 pm 14/08/20 (night)  | 47 dBA | 44 dBA | Non observed            |  |
| Leichhardt Street (Glebe)         | 9:12 pm 14/08/20 (Evening) | 55 dBA | 54 dBA | Non observed            | Ambient dominated by Anzac Bridge Traffic.<br>Daiwan Justice not audible during the evening/night  |
|                                   | 10.47 pm 14/08/20 (night)  | 52 dBA | 51 dBA | Non observed            |  |
| Bowman Street (Pyrmont)           | 9:40 pm 24/11/19 (Evening) | 46 dBA | 45 dBA | Non observed            | Daiwan Justice was observed to be the dominant noise source.   |
|                                   | 11.16 pm 14/08/20 (night)  | 45 dBA | 44 dBA | Non observed            |  |

Note The measurement periods used were considered being representative of the 15 minute ambient.

One measurement was carried out at the representative receiver at the Balmain site during the evening and night-time periods at 20.46 pm and 12.31 am respectively. At this location, the measurement was dominated by another vessel in port at White Bay with influence from Anzac Bridge traffic and construction activities during the night-time period. The Daiwan Justice was not audible above other ambient noise sources.

One measurement was carried out at the representative Glebe location during the evening and night-time periods, at 9.12 pm and 10.47 pm respectively. At this location, noise from traffic on Anzac Bridge was dominating the ambient noise environment during both periods. The Daiwan Justice was not audible above the Anzac Bridge traffic noise.

One measurement was carried out at the representative Pyrmont location during the evening and night-time periods, at 9.40 pm and 11:16 pm respectively. At this location, noise from the Daiwan Justice was audible at this location with minimal influence 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 Daiwan Justice, where the noise environment was generally dominated by the vessel auxiliary power unit and ventilation system related noise.

**Table 4** presents the “reference” noise measurements carried out 70m away from significant sources on the bulk cargo vessel Daiwan Justice. The measurements were conducted on the GI-1 wharf. It was noted the main noise source from the ship was engine exhaust and ventilation fans.

**Table 4 Daiwan Justice “Reference” Noise Level**

| Reference | Location | Distance from Source | LAeq   |
|-----------|----------|----------------------|--------|
| 1         | GI-1     | ~70 m                | 53 dBA |



Calculations for the evening and night-time were performed using the reference measurements presented in **Table 4**. Predictions indicate vessel related  $L_{Aeq}$  noise levels of 32dBA at Balmain, less than 30 dBA at Glebe and 44 dBA at Pyrmont. The predicted noise levels, at Balmain and Glebe, are well below the ambient and consistent with the Daiwan Justice being not audible. At Pyrmont, the predicted noise level of 44 dBA is lower than the measured overall  $L_{Aeq}$  level of 45 dBA during the night-time.

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  $L_{Aeq}(15\text{minute})$  Evening Noise Limits**

| Prediction Location                  | Measured /Predicted $L_{Aeq}$ Noise Levels | $L_{Aeq}(15\text{ minute})$ Noise Limits | $L_{Aeq}$ (15 minute) Exceedance of Licence Limits |
|--------------------------------------|--|--|--|
| Reynolds Street (Balmain / Rozelle)  | 46/32 dBA                                  | 53 dBA                                   | No exceedance                                      |
| Leichhardt Street (Glebe)            | 55/ <30 dBA                                | 53 dBA                                   | No exceedance                                      |
| Bowman Street (Pyrmont) <sup>1</sup> | 46/44 dBA                                  | 53 dBA                                   | No exceedance                                      |

**Table 6 Assessment of Predicted Noise Levels Against  $L_{Aeq}(\text{evening})$  Noise Limits**

| Prediction Location                 | Predicted $L_{Aeq}$ Noise Levels | $L_{Aeq}(\text{evening})$ Noise Limits | $L_{Aeq}$ Exceedance of Licence Limits |
|-------------------------------------|----------------------------------|--|--|
| Reynolds Street (Balmain / Rozelle) | 32 dBA                           | 50 dBA                                 | No exceedance                          |
| Leichhardt Street (Glebe)           | <30 dBA                          | 50 dBA                                 | No exceedance                          |
| Bowman Street (Pyrmont)             | 44 dBA                           | 50 dBA                                 | No exceedance                          |

**Table 7 Assessment of Measured/Predicted Noise Levels Against  $L_{Aeq}(15\text{minute})$  Night-time Noise Limits**

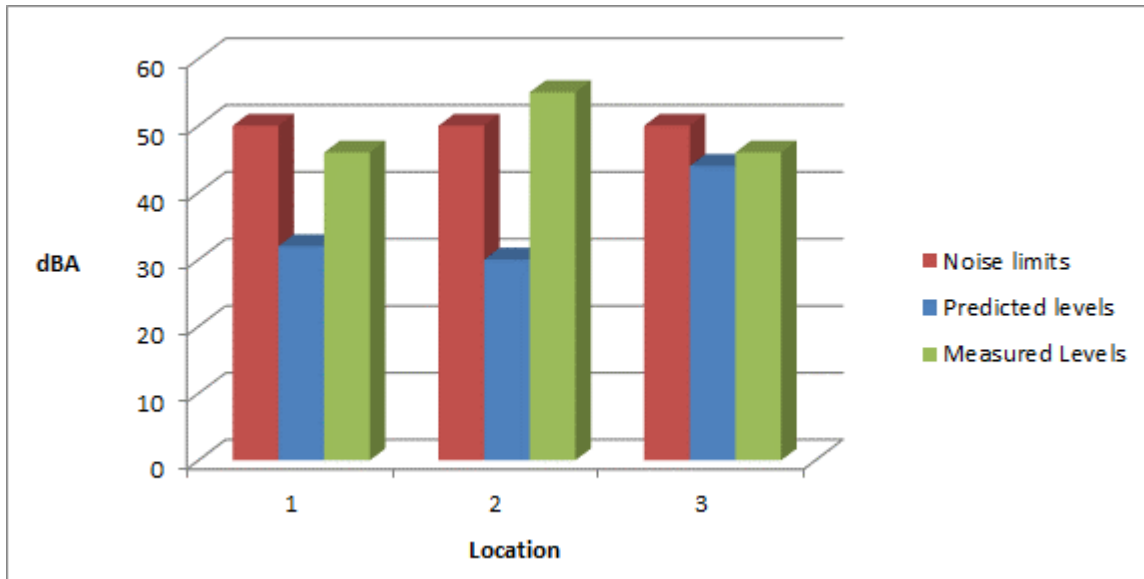
| Prediction Location               | Measured/Predicted $L_{Aeq}$ Noise Levels | $L_{Aeq}(15\text{ minute})$ Noise Limits | $L_{Aeq}$ (15 minute) Exceedance of Licence Limits |
|-----------------------------------|---|--|--|
| Reynolds Street (Balmain/Rozelle) | 47/32 dBA                                 | 48 dBA                                   | No exceedance                                      |
| Leichhardt Street (Glebe)         | 52/<30 dBA                                | 48 dBA                                   | No exceedance                                      |
| Bowman Street (Pyrmont)           | 45/44 dBA                                 | 48 dBA                                   | No exceedance                                      |

**Table 8 Assessment of Predicted Noise Levels Against  $L_{Aeq}(\text{night})$  Noise Limits**

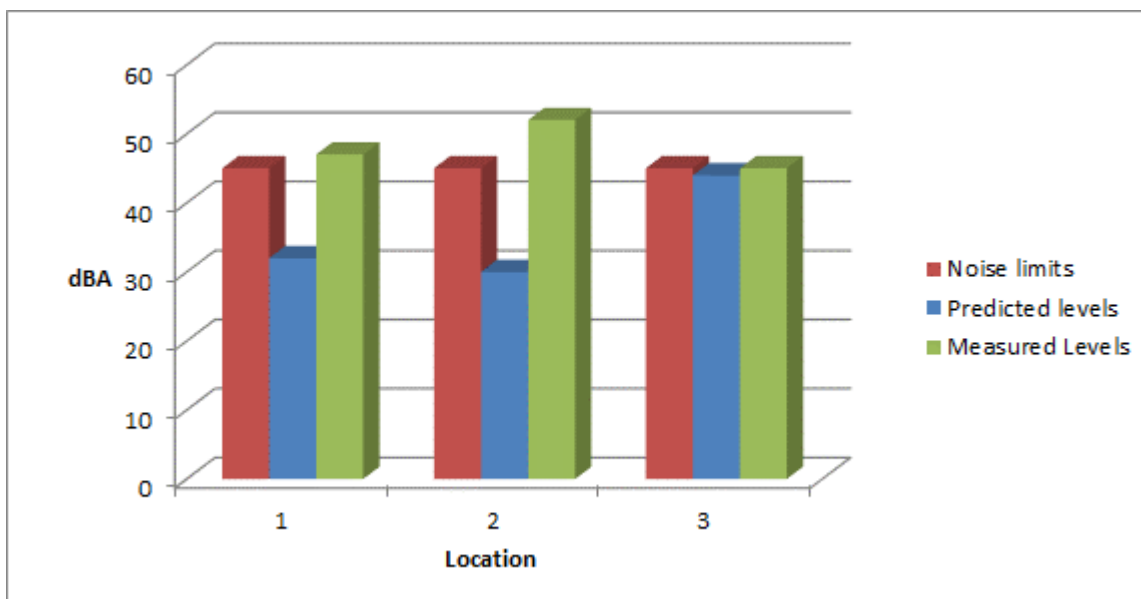
| Prediction Location               | Predicted $L_{Aeq}$ Noise Levels | $L_{Aeq}(\text{night})$ Noise Limits | $L_{Aeq}$ Exceedance of Licence Limits |
|-----------------------------------|----------------------------------|--------------------------------------|--|
| Reynolds Street (Balmain/Rozelle) | 32 dBA                           | 45 dBA                               | No exceedance                          |
| Leichhardt Street (Glebe)         | <30 dBA                          | 45 dBA                               | No exceedance                          |
| Bowman Street (Pyrmont)           | 44 dBA                           | 45 dBA                               | No exceedance                          |

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 Pyrmont respectively.

**Figure 2 Evening Noise Limits, Predicted and Measured Noise Levels**



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



Clause R3.5.3(v) of the Licence requires details of any remedial action. In this instance, no remedial action by the Port Authority as no unloading activities were being undertaken at night.

## 5 Daiwan Justice Arrival

As requested by the Port Authority, additional measurements were undertaken during the arrival of the Daiwan Justice to GI-1. The noise measurements were undertaken prior to the arrival of the Daiwan Justice commencing from 3:39 pm until 5:20 pm after the tug boats had left.

The results from the measurements are presented in **Table 9**.

**Table 9 Daiwan Justice Arrival**

| Start time | LAeq (15 min) | LA90 (15 min) | Description (maximum noise events)  |
|------------|---------------|---------------|---|
| 3:39 pm    | 52            | 48            | <b>Prior to Daiwan Justice arriving</b><br>Ambient – Generally dominated by traffic, pedestrians and Boat   |
| 4:00 pm    | 50            | 48            | Traffic - 48 to 57 dBA<br>Boat – 52 to 65 dBA<br>Pedestrian gate – 50 to 73 dBA<br>Ship horn 55 dBA – Not confirmed if this was Daiwan Justice or other vessel.         |
| 4:18 pm    | 53            | 49            | <b>Daiwan Justice Arriving</b><br>Tug boats – 52 to 59 dBA  |
| 4:33 pm    | 54            | 52            | Pedestrian – 59 to 75 dBA<br>Other boats – 53 to 57 dBA<br>Construction – 57 dBA  |
| 4:48 pm    | 55            | 52            | <b>Daiwan Justice Tying up</b><br>Tugs – 53 to 54 dBA<br>Other boats – 56 to 61 dBA<br>Chain noise – 56 dBA<br>Residential gate 70 -75 dBA<br>Started to rain slightly. |
| 5:05 pm    | 54            | 51            | <b>Daiwan Justice – Tug boats had left</b><br>Daiwan justice audible but generally dominated by traffic noise<br>Resident – 51 dBA<br>Daiwan Justice Anchor – 64 dBA    |

### 5.1 Discussion

Prior to the arrival of the Daiwan Justice, the ambient noise levels were dominated by traffic on Anzac Bridge along with pedestrian and unrelated boat traffic, generating noise levels up to 73 dBA.

With the arrival of the Daiwan Justice, noise levels were driven by the acceleration from the tug boats, which consisted of intermittent noise levels between 52 dBA and 59 dBA whilst the tugs assisted the Daiwan Justice to a stop and into the Berth.

The only significant impulsive noise associated with the arrival was when the ship pulled its anchor, which generated an L<sub>max</sub> of 64 dBA.

It should be noted that various ships passed through the area during the arrival generating noise levels up to 61 dBA, particularly when trying to get past the thrust of the tug boats.

The overall ambient noise level throughout the monitoring period increased as the traffic volume increased on Anzac Bridge. This resulted in the later measurements detailed in **Table 9** being generally controlled by traffic noise, with noise related to the Daiwan Justice only intermittently audible.

When comparing the noise levels measured during the arrival with the noise levels measured during the evening and night-time surveys, the noise associated with the arrival was at times up to 15 dB louder. Whilst the noise levels associated with the arrival of the ship were noticeably louder than when the ship is berthed, the ambient noise levels during the daytime period, which is when the ship arrived are also significantly higher. This results in noise levels associated with the arrival of the Daiwan Justice being of a similar magnitude to that of the ambient daytime noise levels.

## 6 Conclusion

Noise measurements were carried out during the Daiwan Justice being berthed and during the evening and night-time periods between 8.35 pm on the 14 August 2020 and 12.46 am on the 15 August 2020. A reference noise measurement was also carried out in close proximity of the Daiwan Justice vessel, where the noise environment was generally 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.

At Pyrmont, during the evening and night-time the Daiwan Justice was audible with minimal influence from Anzac Bridge traffic and other ambient noise. Predicted evening and night-time noise levels at Pyrmont from the Daiwan Justice bulk cargo unloading activities comply with the licence noise limits at this location and correlate well with the estimated contribution.

At Balmain, the evening and night-time the ambient noise environment was dominated by Anzac Bridge traffic, nearby construction and another ship berthed at White Bay. The Daiwan Justice was not audible at this location. Predicted evening and night-time noise levels at Balmain from the Daiwan Justice bulk cargo unloading activities comply with the licence noise limits at this location.

At Glebe, the evening and night-time ambient noise environment was dominated by traffic from the Anzac Bridge. The Daiwan Justice was not audible at this location. Predicted evening and night-time noise levels at Glebe from the Daiwan Justice 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 an exceedance of the licence imposed noise limits at Balmain, Glebe or Pyrmont during the evening and night-time measurement periods.

# APPENDIX A

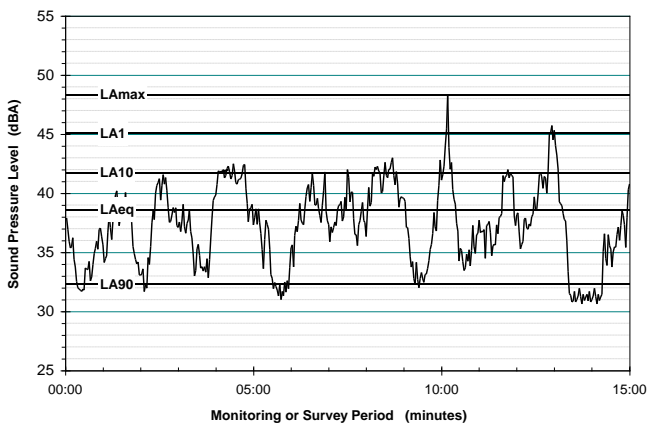
## Acoustic Terminology

## Typical Noise Indices

This Report makes repeated reference to certain noise level descriptors, in particular the LA10, LA90 and LAeq and Lmax 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 Lmax 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              |
| 50                         | General Office                             | Quiet                 |
| 40                         | Inside private office                      | Quiet                 |
| 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.

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