

**AKUNA**

**Glebe Island Berth 8  
Compliance Noise Monitoring Report**

**Prepared for:**

Port Authority of New South Wales  
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**SLR** 

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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
610.04309-R87-v2.0	17 February 2021	Nicholas Vandenberg	Aaron McKenzie	Aaron McKenzie
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## 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 “Akuna” (a bulk cargo vessel) at Glebe Island Berth 8 (GI-8), as required by the Glebe Island and White Bay Port Noise Policy, *Port Authority of NSW (2020)* which came into effect in January 2021.

Noise measurements have been conducted whilst the ship was berthed at GI-8 and unloading using the onboard blowers at one location considered representative of the potentially most exposed residential receiver adjacent to Batty Street during the daytime period and night-time period as required by the Port Noise Policy. In addition to this location, an additional measurement was undertaken adjacent the nearest residential receiver on the corner of Buchanan Street.

The measurements were conducted during the daytime between 10:25 and 12:06 on Thursday 28 January 2021 and during the night-time between 00:05 and 01:55 on the morning of Friday 29 January 2021.

## 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 roads 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 8 is located towards the western end Glebe Island, as shown in **Figure 1**.

**Figure 1** also identifies the nearest receiver locations for each berth as identified in Appendix H – Noise Standard, which forms part of the Port Noise Policy and the measurement locations used.

**Figure 1 Location of berths and nearest receivers to each berth**



Note: Figure referenced from Appendix H of the Port Noise Policy

## 2.1 Noise Trigger Levels and Criteria

The noise trigger levels applicable at the worst affected sensitive receiver as outlined in the Port Noise Policy is reproduced in **Table 1**.

**Table 1 Vessel Trigger Noise Level (external)**

Environmental trigger applied to vessels at berth	Assessment Location	Day LAeq(15hour) <sup>1</sup> (7am to 10pm)	Night LAeq(1hour) (10pm to 7am)	Night L <sub>max</sub> (10pm to 7am)
Glebe Island 1 and 2	All sensitive receivers near the port	60 dBA	55 dBA	65 dBA
Glebe Island 7 and 8		60 dBA	55 dBA	65 dBA
White Bay 3		60 dBA	55 dBA	65 dBA
White Bay 4 (non-cruise)		60 dBA	55 dBA	65 dBA

Note 1: This includes a 5dBA allowance in the short term for vessels that cannot meet the night time vessel trigger noise level without restrictions to unloading speeds. The 24/7 goal is the median unloading noise level for vessels which is applied as the night time vessel trigger noise level

### 3 Measurement Methodology and Instrumentation

In accordance with the Port Noise Policy, compliance with the Noise Trigger Levels is required at all sensitive receivers to the port. The nearest receivers to each berth have been identified and measurements have been subsequently undertaken at the closest receiver to assess compliance as identified in the Port Noise Policy and shown in **Figure 1**. The noise measurements were undertaken during unloading operations that consisted of blowers as well as auxiliary engines and associated ventilation systems.

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 and to satisfy the  $L_{Aeq(Period)}$  trigger level.

During attended noise monitoring ship noise emissions were observed to fluctuate particularly during the night-time period, however the overall average noise levels ( $L_{Aeq}$ ) from 15 minute measurements were generally consistent during the day time and night time periods and as such four 15minute measurements were undertaken during the daytime and three measurements undertaken during the night-time to confirm receiver noise levels at Location 1.

All acoustic instrumentation employed throughout the monitoring programme has been designed to comply with the requirements of AS IEC 61672.1 – 2013 *Electroacoustics—Sound level meters - Specifications* and carries current National Association of Testing Authorities (NATA) or manufacturer calibration certificates. Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding  $\pm 0.5$  dBA.

Noise measurements and assessments in this report have been prepared in accordance with Australian Standard AS 1055-2018 “Acoustics - Description and Measurement of Environmental Noise” and with reference to the Noise Policy for Industry (NPfI).

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

**Table 2 Noise Survey Instrumentation**

Type	Serial Number	Instrumentation Description
2270	3027586	Brüel & Kjær Modular Precision Sound Level Meter
4189	3232163	Brüel & Kjær 12.5 mm Pre-polarised Condenser Microphone
42AG	279662	GRAS Sound Level Calibrator

## 4 Results and Analysis

The results of the attended noise measurements are summarised in **Table 3**. The measured noise levels presented include noise from the ship unloading activity as well as ambient noise unrelated to GI-8.

**Table 3 Summary of Measurement Results – 28 January 2021 and 29 January 2021**

Location	Period/ Weather	Start Time	LAeq	LCeq	LA10	LA90	GI-8 Related LAmx	Comments
Location 1	Day-time 2-3m/s WSW Slight rain 20°C	10:25 am 28/01/21	58	68	59	56	66	<i>Site related noise events:</i> Ship hum/squeal – 56-57 dBA Air release 60 to 66 dBA <b>Akuna</b> <b>Estimated contribution</b> <b>LAeq(15hour) 56-57 dBA</b> <i>Other noise events:</i> Birds – 60 to 76 Plane – 60 dBA Construction 60 dBA Truck engine 62 dBA WB activity – 58 to 65 dBA
		10:55 am 28/01/21	58	69	59	57	60	
		11:11 am 28/01/21	57	68	59	56	62	
		11:51 am 28/01/21	58	70	60	57	63	
Location 1	Night-time 0.5m/s at start, increased to 3-4m/s at 12:50 Slight rain at times after 1am 20°C	00:05 pm 29/01/21	60	66	63	56	70	<i>Site related noise events:</i> Tone – 56 to 73 Engine noise Audible <b>Akuna</b> <b>Estimated contribution</b> <b>LAeq(1hour) 60 dBA</b> <b>LAmx 73 dBA</b> <i>Other noise events:</i> Traffic ~ 50ish at times Animal – 61 dBA
		00:25 am 29/01/21	60	65	62	56	68	
		00:40 am 29/01/21	60	75	62	56	73	
Location 2	Night-time 2-3 m/s E 20°C Slight rain at times	00:05 am 29/01/21	52	66	55	48	60	<i>Site related noise events:</i> Tone and engine noise 50 to 60 dBA Air release up to 60 Engine noise Audible <b>Akuna</b> <b>Estimated contribution</b> <b>LAeq(1hour) 52-53 dBA</b> <b>LAmx 60 dBA</b> <i>Other noise events:</i> -

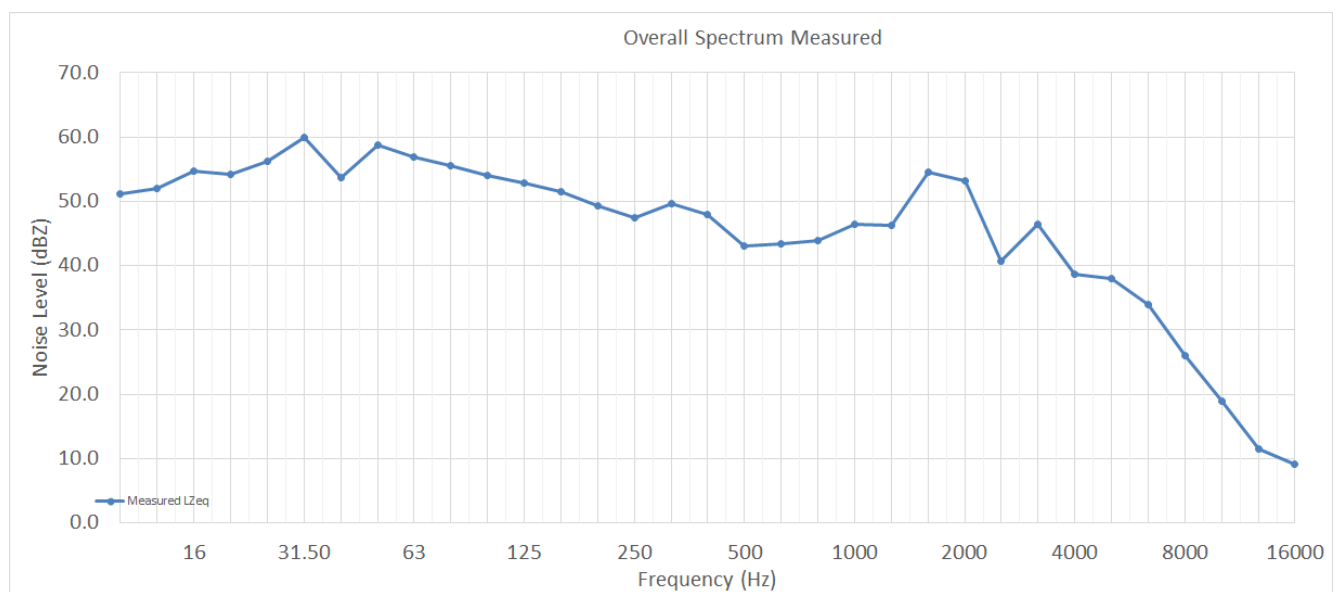
Noise levels at location 2 have the potential to be higher at a greater elevation due to shielding effects on the ground level at this location from other buildings at White Bay. Nonetheless it is likely to be less than the noise level measured at Location 1.

### 4.1.1 Modifying Factors

The Port Noise Policy (Appendix F, Vessel Noise Guideline) makes reference to the NSW Environment Protection Authority NPfl (EPA 2017) for the assessment of annoying characteristics such as tonal noise.

The noise level measured at Location 1 during the night-time had noticeable tones at 1.6kHz, 2kHz and 3.15kHz. As the tones at 1.6kHz and 2kHz are in the adjacent bands, these do not specifically trigger for a penalty in accordance with the NPfl, however the tone at the 3.15kHz band exceeds the bands on either side by 6-7dB and therefore trigger a penalty of +5dB to be applied. A figure showing the spectrum from the first measurement is shown in **Figure 2**.

**Figure 2 Location 1 – Night-time Spectrum**



No modification factors for low frequency as defined in the NPfl were triggered for the measurements undertaken. The third measurement at Location 1 during the night-time period was influenced by wind effects which resulted in an elevated  $L_{Ceq}$  not attributed to the ship operations and therefore does not trigger a penalty for low frequency noise.

The average noise levels were observed to be generally constant over consecutive measurements, although fluctuations in the loudness of the audible tone were observed throughout each measurement and may be attributed to variations in operation or load of the ship mechanical plant. Fluctuation in loudness were not observed to be attributed to equipment cycling on and off.

Further measurements should be undertaken on the next occasion the ship is unloading at Glebe Island to confirm if a penalty is to be applied for tonality.



## 5 Performance Assessment

### 5.1 Operations

Results of the operator attended noise measurements compared with the Vessel Noise Trigger Levels are given in **Table 4**.

**Table 4 Compliance Assessment**

Location	Estimated GI-8 Contribution			Vessel Noise Trigger Levels			Compliance	
	Day LAeq(15hour)	Night LAeq(1hour)	Night LAm <sub>ax</sub>	Day LAeq(15hour)	Night LAeq(1hour)	Night LAm <sub>ax</sub>	Day	Night
Location 1	56-57 dBA	65 dBA <sup>1</sup>	73 dBA	60 dBA	55 dBA	65 dBA	Yes	<b>No</b>
Location 2	-	52-53 dBA	60 dBA	60 dBA	55 dBA	65 dBA	-	Yes

Note 1: Includes 5dB penalty for tonality in accordance with the NPfl as detailed in **Section 4.1.1**.

**Table 4** indicates that compliance with the Vessel Noise Trigger Level was achieved at the nearest sensitive receiver location during the daytime period. However, during the night time period noise levels were observed to exceed the Vessel Noise Trigger Level by up to 10dB at Location 1.

## 6 Conclusion

Noise measurements were carried out whilst the Akuna was undertaking unloading activities at GI-8 during the day-time on the 28 January 2021 and night-time period on the 29 January 2020 after the ship arrived and had commenced unloading operations.

Noise measurements undertaken at Location 1 and Location 2 indicate that compliance with the Vessel Noise Trigger Levels have been achieved including unloading operations, during the daytime and at Location 2 during the night-time.

The measured noise levels exceeded the LAeq trigger levels at Location 1 during the night-time by 10 dB (including a 5dB penalty for tonality as defined in the NSW Noise Policy for Industry) and the LAm<sub>ax</sub> trigger level by 8dB.

# APPENDIX A

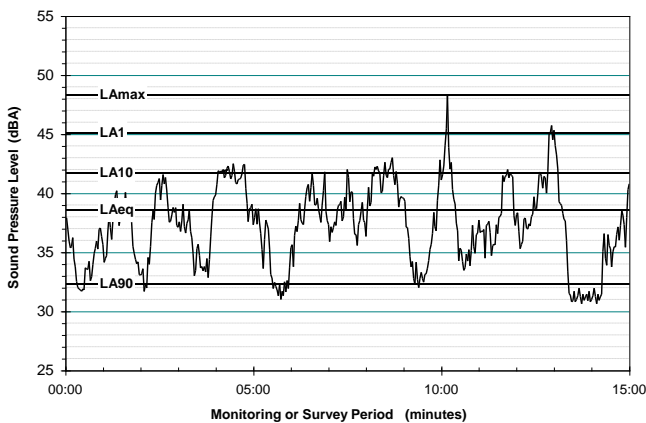
## Acoustic Terminology

## 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 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.

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