AKUNA

White Bay 4
Compliance Noise Monitoring Report

Prepared for:

Port Authority of New South Wales
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BASIS OF REPORT

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.04309-R93-v1.0	17 March 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 of the "Akuna" (a bulk carrier vessel) at White Bay 4 (WB-4), 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 were conducted whilst the ship was berthed at WB-4 at two locations considered representative of the potentially most exposed residential receivers along Donnelly Street, Balmain during the daytime period and night-time period as required by the Port Noise Policy. It is understood that the ship was undertaking noise mitigation works whilst berthed at WB-4, and works were understood to only occur during the day-time period. No unloading activities were carried out whilst at WB-4.

In addition to the locations along Donnelly Street, an additional measurement was undertaken within Birung Park during the daytime and night-time period as a reference point. The noise levels during the daytime on Donnelly Street were disrupted by continuous local traffic and were paused between passby in order to try and only capture the ship noise.

The measurements were conducted during the daytime between 12:04 and 12:36 on 8 March 2021 and during the night-time between 00:38 and 01:39 on 9 March 2021

2 Site description

The White Bay Port Facility is located at the southern end of the Balmain peninsula. The facility occupies approximately 40 hectares of waterfront land and forms a crescent around White Bay, with a water frontage of about 2,100m.

The facility layout comprises the following main elements:

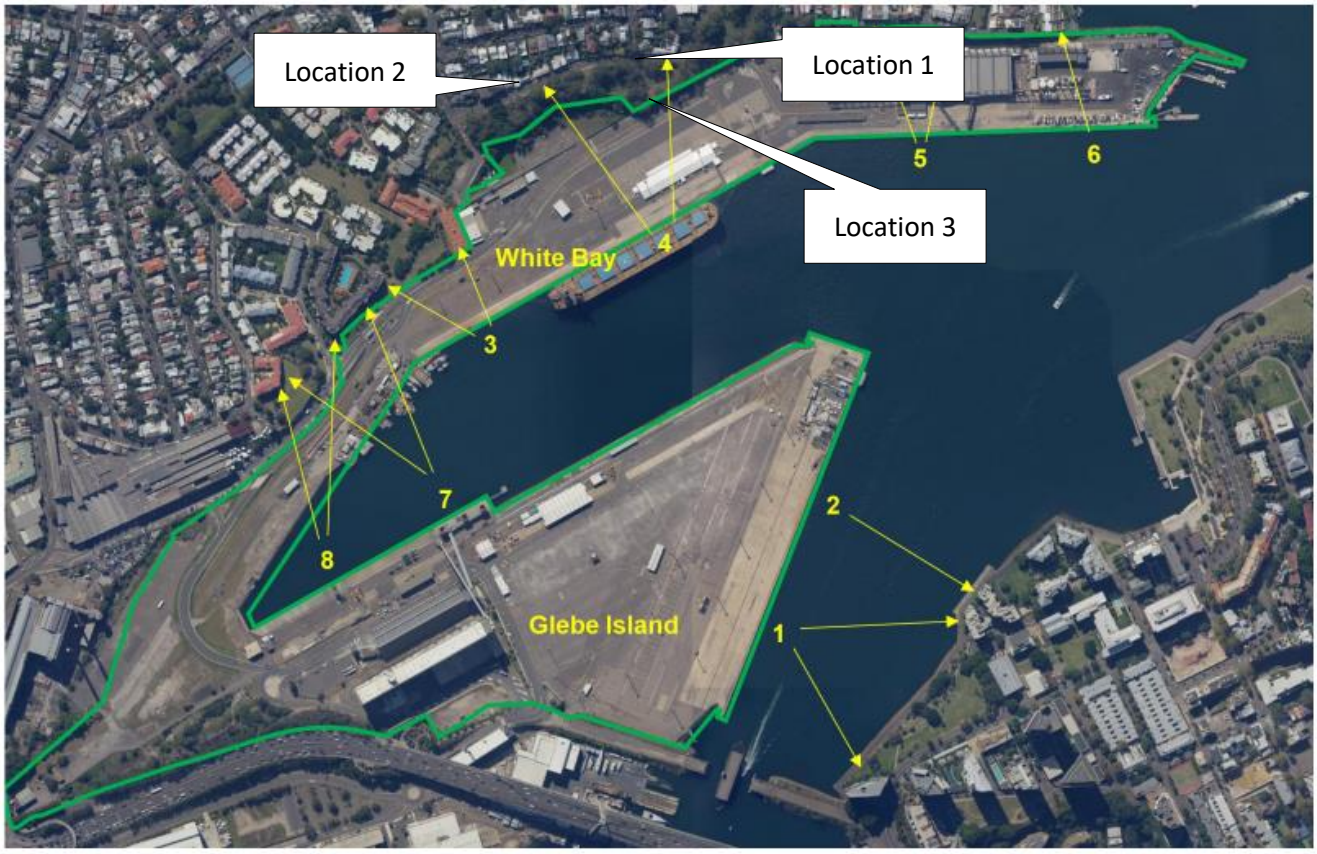
- Five multiple-use berths spread along the northern side of White Bay
- Two storage / office buildings located north of White Bay, Wharf 3
- The WBCT building and adjoining car park situated to the northeast of White Bay, Wharf 5 (WB5)
- Internal road continuing from Robert Street providing truck access to the storage areas of Docks 1 to 6.

The Glebe Island facility, which includes four multiple-use berths, is located adjacent to the White Bay Port on a neighbouring peninsula south of White Bay.

White Bay 4 is located approximately in the middle of the northern side of White Bay, 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 $L_{Aeq(15hour)}$[1] (7am to 10pm)	Night $L_{Aeq(1hour)}$ (10pm to 7am)	Night L_{Amax} (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 the daytime and night-time periods.

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 be consistent with minimal variation in emissions, and as such two consecutive 15minute measurements undertaken during the night-time to confirm receiver noise levels.

One short-term noise measurement was undertaken at Location 1, however due to regular intermittent traffic along Donnelly Street, the measurement was paused regularly to exclude these pass-by's. As a result an additional 15 minute measurement was conducted in the park away from Donnelly Street to get an estimate of the noise emissions from the Akuna.

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 ±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	3029485	Brüel & Kjær Modular Precision Sound Level Meter
4189	3260622	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 as well as ambient noise unrelated to WB-4.

Table 3 Summary of Measurement Results – 8-9 March 2021

Location	Period/ Weather	Start Time	LAeq	LCeq	LCeq - LAeq	LA10	LA90	WB-4 Related LAmax	Comments
Location 1[2]	Daytime Temp: 30°C Wind: 1-2m/s NW	12:04	48	63	15	50	46	46	*Site related noise events:* Engine hum45-48 dBA **Akuna** **Estimated contribution LAeq(15hour) 45-46 dBA** *Other noise events:* Construction – 48 to 51 dBA Stick fell – 69 dBA
Location 3		12:19	53	64	12	54	51	60	*Site related noise events:* Engine hum 50-55 dBA Bang – 60 dBA **Akuna** **Estimated contribution LAeq(15hour) 50-51 dBA** *Other noise events:* Boat – 63 dBA *Wind 53 dBA* *Birds – 56 to 62 dBA* *Construction 53 dBA*
Location 3[3]	Night Temp: 22°C Wind: 0m/s	00:38	45	59	14	46	45	46	*Site related noise events:* Engine hum – 45-46 **Akuna** **Estimated contribution LAeq(1hour) 45 dBA** **LAmax 46 dBA** *Other noise events:* *occasional Traffic – 48 dBA*
Location 1	Night Temp: 22°C Wind: 0m/s	00:45	42	60	**18[1]**	43	41	43	*Site related noise events:* Engine hum – 42 dBA **Akuna** **Estimated contribution LAeq(1hour) 42 dBA** **LAmax 43 dBA** *Other noise events:* Bats – 44 to 58 dBA Ocassional Traffic – 43 to 49 dBA Faint hum from direction of silos – not mesurable
		1:01	42	60	**18[1]**	43	41	43	

Location	Period/ Weather	Start Time	LAeq	LCeq	LCeq - LAeq	LA10	LA90	WB-4 Related LAmax	Comments
Location 2	Night Temp: 22°C Wind: 0m/s	01:23	43	60	**17**[1]	43	42	43	*Site related noise events:* Engine hum – 42 to 43 dBA **Akuna** **Estimated contribution** **LAeq(1hour) 42 dBA** **LAmax 43 dBA** *Other noise events:* Bats – 45 to 59 dBA Stick falling – 48 dBA Traffic audible but not measureable.

Note 1: Low frequency noise component identified if compared to NPfI.

Note 2: Only short term noise measurements were taken at this location due to the continuous traffic along Donnelly Street.

Note 3: Only short term noise measurements were taken at this location to provide a reference for the noise levels for the daytime period.

4.1.1 Modifying Factors

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

The Port Noise Policy does not currently have a method for assessing low frequency noise. Low frequency noise impacts from shipping are currently under investigation and will be reviewed following collection of a database of ship low frequency noise data by the port authority.

If a low frequency penalty was to be applied in accordance with the NPfI, then a 5dB penalty would be triggered for the night-time measurements of the Akuna(as per **Table 3**). Further measurements should be undertaken on the next occasion the ship is at Glebe Island/White Bay to confirm the presence of low frequency noise.

Furthermore, the noise levels were also observed to be generally constant and therefore were not considered to be intermittent as defined in the NPfI.

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 WB-4 Contribution			Vessel Noise Trigger Levels			Compliance	
	Day $L_{Aeq(15hour)}$	Night $L_{Aeq(1hour)}$	Night L_{Amax}	Day $L_{Aeq(15hour)}$	Night $L_{Aeq(1hour)}$	Night L_{Amax}	Day	Night
Location 1	45 dBA	42 dBA	43 dBA	60 dBA	55 dBA	65	Yes	Yes
Location 2	-	42 dBA	43 dBA	60 dBA	55 dBA	65	-	Yes
Location 3	50 dBA	45 dBA	46 dBA	60 dBA	55 dBA	65	NA[1]	NA[1]

Note 1: Not a residential location. Approximately a 3dB correction is required over distance to correct to the nearest residential receiver which is consistent with the noise levels measured during the night-time period.

Table 4 indicates that compliance with the Vessel Noise Trigger Level was achieved at the nearest sensitive receiver locations during the daytime and night-time periods. The noise levels during the daytime were influenced by ambient traffic noise and potentially have greater influence from the ship due to operations occurring at the time and observations of various hatches being open on the ship resulting in a greater estimated contribution during the daytime than night-time. The noise levels measured during the night-time are therefore considered to be more representative of the accommodation generators used whilst the ship is not unloading.

6 Conclusion

Noise measurements were carried out whilst the Akuna was berthed at WB-4 during the daytime and night-time periods on the 8 March 2021 and 9 March 2021. It is understood no unloading operations will be taking place whilst berthed at WB-4.

Noise measurements undertaken at Location 1 and 2 indicate that compliance with the Vessel Noise Trigger Levels have been achieved including unloading operations, during all measurement periods.

APPENDIX A

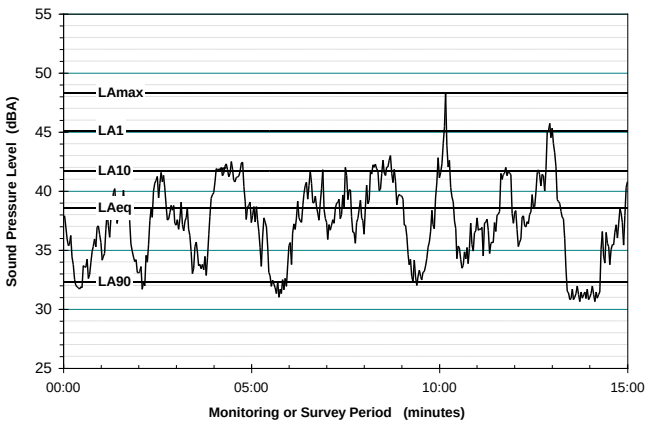
Acoustic Terminology

Typical Noise Indices

This Report makes repeated reference to certain noise level descriptors, in particular the L_{A10}, L_{A90} and L_{Aeq} and L_{Amax} noise levels.

- The L_{A10} 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 L_{Aeq} 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 $L_{Aeq(period)}$ 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 L_{A90} 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 L_{Amax} is simply the maximum noise level and is often represented by the $L_{A1(1min)}$, 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
130 120 110	Threshold of pain Heavy rock concert Grinding on steel	Intolerable Extremely noisy
100 90	Loud car horn at 3 m Construction site with pneumatic hammering	Very noisy
80 70	Kerb side of busy street Loud radio or television	Loud
60 50	Department store General Office	Moderate to Quiet
40 30	Inside private office Inside bedroom	Quiet to 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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