

GLEBE ISLAND 7

COMPLIANCE NOISE MONITORING  
SUMMARY - ELANORA

NOVEMBER 2020

**SPOKE**  
ACOUSTICS

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GLEBE ISLAND

COMPLIANCE NOISE MONITORING SUMMARY  
ELANORA

NOVEMBER 2020

PREPARED FOR

GYPSUM RESOURCES AUSTRALIA

PREPARED BY

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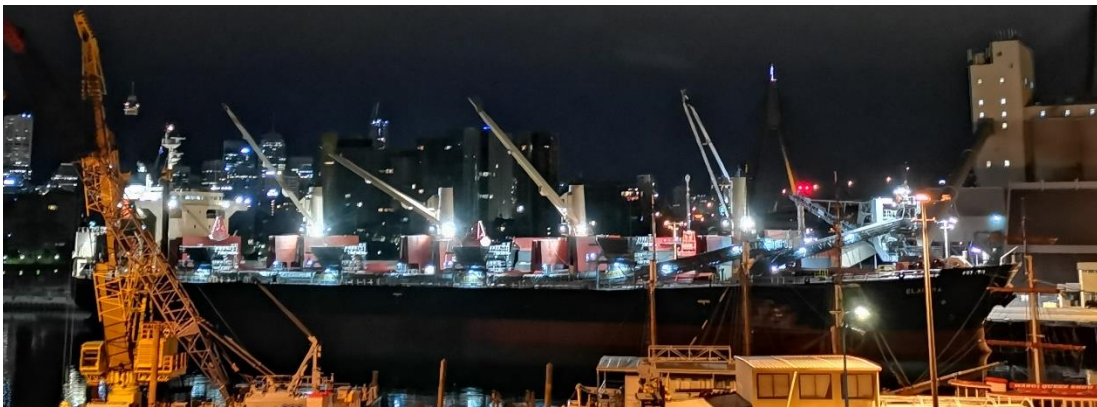
## 1 INTRODUCTION

Spoke Acoustics Pty Ltd was engaged by Gypsum Resources Australia (GRA) to complete noise measurements of the Elanora's (IMO: 9263241) visit to Glebe Island 7 in November 2020.

These noise measurements were completed to verify compliance with the EPA's former Condition L6.1 within Environment Protection Licence number 11906. This licence was issued to GRA for the Glebe Island Gypsum Terminal.

Measurements were conducted between 1:00am and 2:30am of the night starting 9 November 2020 (early morning 10 November 2020).

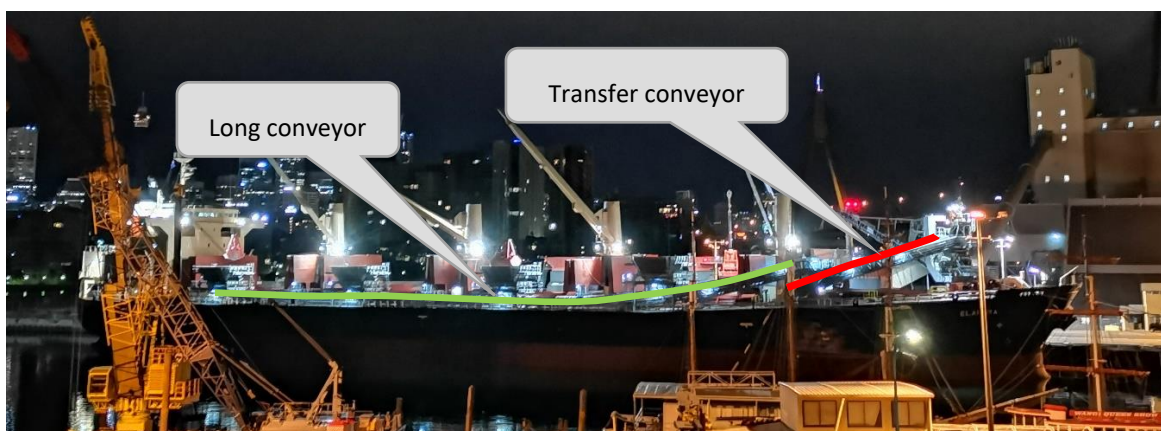
Figure 1 Elanora at Glebe Island 7 showing onboard hoppers and conveyors on starboard side



## 2 BACKGROUND AND DESCRIPTION

The vessel has four cranes with grabs which unload into one of four onboard hoppers. The hoppers and onboard conveyors are on the starboard side. These four hoppers deposit product into the long conveyor belt which runs two thirds of the vessel length until product drops onto the transfer conveyor belt. The transfer belt loads the vessel's boom. The boom during the measurements was loading the onshore hopper that is located directly above the covered landside conveyor which transfers product to the Gypsum Terminal for stockpiling.

Figure 2 Elanora at Glebe Island 7 showing onboard hoppers and conveyors on starboard side



The Elanora was berthed port side to Glebe Island. The length of the vessel is 183m. The major noise sources identified by Spoke Acoustics were the cranes and handling of gypsum at the transfer conveyor.

The gypsum unloading at Glebe Island 7 is across the water from residential homes and apartments in Rozelle to the north. The nearest residences are approximately 230m away from the vessel (see Figure 3) at 1 Batty Street.

Noise monitoring was completed in the park in front of 1 Batty Street as shown in Figure 3. Wind speeds were low, between 4 to 5 knots, from the northwest, based on Fort Denison data.

Figure 3 Monitoring location



### 3 EPA ENVIRONMENT PROTECTION LICENCE

The noise limits from Section L6.1 of the Licence are reproduced in Table 1.

Table 1 EPL Noise Limits

Location	Day		Evening		Night		
	LAeq (15minute)	LAeq (period)	LAeq (15minute)	LAeq (period)	LAeq (15minute)	LAeq (period)	LAeq (1minute)
The residence most affected by noise from the premises.	56	52	56	46	52	45	62

In accordance with the EPA's Industrial Noise Policy, low frequency and tonal corrections (penalties) apply if applicable.

## 4 EQUIPMENT

Attended measurements were conducted using a Class 1 NTi XL2 sound level meter (serial number A2A12135E0) with current NATA calibration. Field calibration checks were also completed before and after the measurement with a Pulsar type 105 acoustic calibrator (serial number 81326). No drift in calibration was detected during the measurement period. The calibrator also has a current NATA calibration certificate.

## 5 METHODOLOGY

All noise measurements were completed in the park in front of 1 Batty Street. This location is elevated and representative of noise levels at the worst affected receivers.

Noise levels were completed for the following nine scenarios:

1. 2 Generators
2. 2 Generators and Ventilation Fans
3. 2 Generators and Air-Conditioner
4. 2 Generators and all 4 on-board Conveyers
5. 2 Generators, 4 Conveyers and Crane No 1
6. 2 Generators, 4 Conveyers and Crane No 2
7. 2 Generators, 4 Conveyers and Crane No 3
8. 2 Generators, 4 Conveyers and Crane No 4
9. 2 Generators

The measured noise levels are presented in Appendix A for these scenarios.

The measured data gathered from these scenarios allows the individual noise contributions from the following plant items to be derived.

1. 2 Generators
2. Ventilation Fans
3. Air-Conditioner
4. On-board Conveyers with and without product
5. Crane No 1
6. Crane No 2
7. Crane No 3
8. Crane No 4

The derived noise levels for each of these plant items have been used to estimate the noise level from all likely operational scenarios for the vessel. These operational scenario noise levels are presented in Appendix B.

We understand that GRA uses these vessel operational scenarios with a spreadsheet produced by Pollution Control Consultancy and Design (PCCD). This is titled '*GRA - time restrictions for 1, 2 and 3 scenarios*' and is used to calculate time restrictions for the  $L_{Aeq, T_i}$  with the accuracy to tenths of the decibel. The outputs allow GRA to identify which combinations of plant may be operated simultaneously so that compliance can be achieved for the 15 hour day, 4 hour evening and 9 hour night periods.

Spoke has provided a table, in Appendix C, which shows the number of minutes the vessel could operate for within each time period at various noise levels and meet compliance.

## 6 ANALYSIS AND CONCLUSIONS

Spoke Acoustics completed noise measurements between 1:00am and 2:15am on the night of 9 November (early morning 10 November) to assist GRA in meeting compliance with Environment Protection Licence (EPL) number 11906.

Noise levels from the vessel were clearly audible and measurable during the attended measurements. Measurements were paused during periods of extraneous noise where this had the potential to affect the noise reading. Extraneous noise sources included truck movements at the port and construction works at the Rozelle interchange.

The noise levels measured by Spoke and the derived levels are suitable in assisting GRA to identify operational configurations that will comply with the EPL.

The noise levels did not contain significant low frequency, tonal components or any other annoying factors. Subsequently, no penalties were applied to the measured noise levels.

Based on the measured and derived noise levels, Spoke confirms there are operational configurations that will meet the EPL noise limits for  $L_{Aeq}$ .

The potential for sleep disturbance was measured during the operation of two generators, three cranes and the onboard conveyors and hoppers. The measured noise level of  $L_{A1,1min}$  54dBA complies with the EPL sleep disturbance limit.



# GLOSSARY

TERM	DESCRIPTION
Representative noise level	<p>A representative noise level is the typical noise level from a vessel during its visit and excludes short term events which may be louder.</p> <p>The typical noise level from a vessel occurs from a combination of ventilation, air conditioning systems and onboard power generators.</p> <p>Higher short term noise levels may occur during arrival/departure or due to a change in an operational procedure. These are not representative of the longer term noise exposure from the vessel while in port. Where they are unreasonable they may be addressed by amending the vessel's procedures.</p>
dBA	<p>The term dBA is an abbreviation which indicates the noise levels have been expressed in decibels (dB) using an A-weighting filter which approximates how the human ear perceives the loudness of complex noise sources with both low frequency (chugging of engines), medium (fans and engine exhaust flow) and higher frequency aspects.</p>
Environment Protection Licence (EPL)	<p>The NSW Environment Protection Authority may issue an EPL relating to operations that are outlined in the NSW Protection of the Environment Operations Act. The EPL may provide noise limits for assessment and detail operational actions that must undertaken when the licenced activity occurs.</p>
L <sub>Aeq</sub> , L <sub>A90</sub> , L <sub>A50</sub> and L <sub>A10</sub>	<p>In general, noise levels in any location vary continuously and any sound level meter will show this changing decibel level on the display. To make sense of the range in noise levels that may occur within a standard time period, various statistics are used in acoustics.</p> <p>The simplest are the L<sub>A90</sub>, L<sub>A50</sub> and L<sub>A10</sub> descriptors. The number in each of these descriptors indicates the percentage of time that noise levels exceed the indicated value. For example an L<sub>A90</sub> is the noise level that was exceeded 90% of the time, and L<sub>A50</sub> is the noise level that was exceeded 50% of the time (also the median) and L<sub>A10</sub> is the noise level that was exceeded 10% of the time.</p> <p>The L<sub>Aeq</sub> is more complex to derive from changing noise levels and is an averaging process. The averaging process results in a single equivalent number for the measurement period that has the same total sound energy as the changing noise levels over the time period.</p>
Adverse wind and rain	<p>Conditions are described as adverse when noise levels from wind or rain are high enough to influence noise measurement. Adverse noise may result from direct noise generation on the microphone or from wind and rain impacting other items such as the ground, pavements, structures, vegetation etc.</p>
Noise logger	<p>A noise logger is an automated sound level meter which repeatedly saves noise statistics for defined noise sampling periods. In NSW statistics are usually obtained for every 15 minute period each day starting at midnight.</p>
Class 1	<p>Sound level meters are available with different levels of accuracy. A class 1 instrument is a high precision instrument suitable for acoustic measurement of noise levels at the White Bay Cruise Terminal. To achieve a Class 1 rating the meter must comply with Standard IEC61672. Most meters that are available through retail electronics stores (including smartphone apps with claimed calibration curves) are not accurate or stable enough to achieve a class rating.</p>

# GLOSSARY

T E R M	D E S C R I P T I O N
	Testing by Spoke Acoustics has found that noise levels measured using smartphone apps may commonly be wrong by 8dBA or more.
NATA calibration certificate	The sound level meter must have a current calibration certificate issued by a National Association of Testing Authorities (NATA) accredited laboratory for noise measurements to be valid in Australia. The certificate confirms that the meter is in good working order and complies with Standard IEC61672 and others as relevant.
Field calibration	A field calibration is conducted with a hand held acoustic calibrator and confirms the meter is working correctly and also permits minor adjustments to account for significant changes in temperature and atmospheric pressure.
Acoustic calibrator	An acoustic calibrator is used to conduct a field calibration. For the calibration to be valid the calibrator must have a current calibration certificate issued by a National Association of Testing Authorities (NATA) accredited laboratory.

## APPENDIX A – MEASURED NOISE LEVELS

<b>Operational Situation</b>	<b>L<sub>Aeq, Ti</sub> measured</b>	<b>Contribution of</b>	<b>L<sub>Aeq, Ti</sub> contribution</b>	<b>Notes</b>
2 Generators	43.7	-	<b>43.7</b>	-
2 Generators and Ventilation Fans	44.1	Ventilation Fans	<b>33.5</b>	-
2 Generators and Air-Conditioner	45.0	Air-Conditioner	<b>39.1</b>	-
2 Generators and all 3 on-board Conveyers	-	Conveyors with product	<b>44.4</b>	
2 Generators and all 3 on-board Conveyers	46.5	Conveyors empty	<b>43.3</b>	
2 Generators, 3 Conveyers and Crane No 1	49.3	Crane No 1	<b>45.3</b>	-
2 Generators, 3 Conveyers and Crane No 2	50.3	Crane No 2	<b>47.5</b>	-
2 Generators, 3 Conveyers and Crane No 3	49.5	Crane No 3	<b>45.8</b>	-
2 Generators, 3 Conveyers and Crane No 4	50.1	Crane No 4	<b>47.1</b>	-
2 Generators	43.5	2 Generators	<b>43.5</b>	-

Note: Noise levels of conveyors with product were derived from noise level differences with cranes operating before and after product reached the transfer conveyor.

<b>Operational Situation</b>	<b>L<sub>A1, 1min</sub> measured</b>
2 Generators, 3 cranes and all 3 conveyors	53.5

## APPENDIX B – ESTIMATED NOISE LEVELS FOR OPERATIONAL SCENARIOS

Conveyers	Ventilation Fans	Air-conditioner	Generators	Crane No 1	Crane No 2	Crane No 3	Crane No 4	Scenarios	L <sub>Aeq, 15 min</sub>
44.4	33.5	39.1	43.7	45.3				Crane No 1	49.8
44.4	33.5	39.1	43.7		47.5			Crane No 2	50.7
44.4	33.5	39.1	43.7			45.8		Crane No 3	50.0
44.4	33.5	39.1	43.7				47.1	Crane No 4	50.5
44.4	33.5	39.1	43.7	45.3	47.5			Cranes No 1 and No 2	51.8
44.4	33.5	39.1	43.7	45.3		45.8		Cranes No 1 and No 3	51.3
44.4	33.5	39.1	43.7	45.3			47.1	Cranes No 1 and No 4	51.7
44.4	33.5	39.1	43.7		47.5	45.8		Cranes No 2 and No 3	51.9
44.4	33.5	39.1	43.7		47.5		47.1	Cranes No 2 and No 4	52.3
44.4	33.5	39.1	43.7			45.8	47.1	Cranes No 3 and No 4	51.8
44.4	33.5	39.1	43.7	45.3	47.5	45.8		Cranes No 1, No 2 and No 3	52.8
44.4	33.5	39.1	43.7	45.3	47.5		47.1	Cranes No 1, No 2 and No 4	53.1
44.4	33.5	39.1	43.7	45.3		45.8	47.1	Cranes No 1, No 3 and No 4	52.7
44.4	33.5	39.1	43.7		47.5	45.8	47.1	Cranes No 2, No 3 and No 4	53.2

## APPENDIX B - ESTIMATED NOISE LEVELS FOR OPERATIONAL SCENARIOS

44.4	33.5	39.1	43.7	45.3	47.5	45.8	47.1	Cranes No 1, No 2, No 3 and No 4	53.8
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Conveyers	Ventilation Fans	Air-conditioner	Generators	Crane No 1	Crane No 2	Crane No 3	Crane No 4	Scenarios	L <sub>Aeq, 15 min</sub>
44.4		39.1	43.7	45.3				Crane No 1	49.7
44.4		39.1	43.7		47.5			Crane No 2	50.6
44.4		39.1	43.7			45.8		Crane No 3	49.9
44.4		39.1	43.7				47.1	Crane No 4	50.4
44.4		39.1	43.7	45.3	47.5			Cranes No 1 and No 2	51.7
44.4		39.1	43.7	45.3		45.8		Cranes No 1 and No 3	51.2
44.4		39.1	43.7	45.3			47.1	Cranes No 1 and No 4	51.6
44.4		39.1	43.7		47.5	45.8		Cranes No 2 and No 3	51.9
44.4		39.1	43.7		47.5		47.1	Cranes No 2 and No 4	52.2
44.4		39.1	43.7			45.8	47.1	Cranes No 3 and No 4	51.7
44.4		39.1	43.7	45.3	47.5	45.8		Cranes No 1, No 2 and No 3	52.7
44.4		39.1	43.7	45.3	47.5		47.1	Cranes No 1, No 2 and No 4	53.0

## APPENDIX B - ESTIMATED NOISE LEVELS FOR OPERATIONAL SCENARIOS

Conveyers	Ventilation Fans	Air-conditioner	Generators	Crane No 1	Crane No 2	Crane No 3	Crane No 4	Scenarios	L <sub>Aeq</sub> , 15 min
44.4		39.1	43.7	45.3		45.8	47.1	Cranes No 1, No 3 and No 4	52.6
44.4		39.1	43.7		47.5	45.8	47.1	Cranes No 2, No 3 and No 4	53.1
44.4		39.1	43.7	45.3	47.5	45.8	47.1	Cranes No 1, No 2, No 3 and No 4	53.8

Conveyers	Ventilation Fans	Air-conditioner	Generators	Crane No 1	Crane No 2	Crane No 3	Crane No 4	Scenarios	L <sub>Aeq</sub> , 15 min
44.4	33.5		43.7	45.3				Crane No 1	49.4
44.4	33.5		43.7		47.5			Crane No 2	50.4
44.4	33.5		43.7			45.8		Crane No 3	49.6
44.4	33.5		43.7				47.1	Crane No 4	50.2
44.4	33.5		43.7	45.3	47.5			Cranes No 1 and No 2	51.6
44.4	33.5		43.7	45.3		45.8		Cranes No 1 and No 3	51.0
44.4	33.5		43.7	45.3			47.1	Cranes No 1 and No 4	51.4
44.4	33.5		43.7		47.5	45.8		Cranes No 2 and No 3	51.7
44.4	33.5		43.7		47.5		47.1	Cranes No 2 and No 4	52.1

## APPENDIX B - ESTIMATED NOISE LEVELS FOR OPERATIONAL SCENARIOS

Conveyers	Ventilation Fans	Air-conditioner	Generators	Crane No 1	Crane No 2	Crane No 3	Crane No 4	Scenarios	L <sub>Aeq, 15 min</sub>
44.4	33.5		43.7			45.8	47.1	Cranes No 3 and No 4	51.5
44.4	33.5		43.7	45.3	47.5	45.8		Cranes No 1, No 2 and No 3	52.6
44.4	33.5		43.7	45.3	47.5		47.1	Cranes No 1, No 2 and No 4	52.9
44.4	33.5		43.7	45.3		45.8	47.1	Cranes No 1, No 3 and No 4	52.5
44.4	33.5		43.7		47.5	45.8	47.1	Cranes No 2, No 3 and No 4	53.0
44.4	33.5		43.7	45.3	47.5	45.8	47.1	Cranes No 1, No 2, No 3 and No 4	53.7

Conveyers	Ventilation Fans	Air-conditioner	Generators	Crane No 1	Crane No 2	Crane No 3	Crane No 4	Scenarios	L <sub>Aeq, 15 min</sub>
44.4			43.7	45.3				Crane No 1	49.3
44.4			43.7		47.5			Crane No 2	50.3
44.4			43.7			45.8		Crane No 3	49.5
44.4			43.7				47.1	Crane No 4	50.1
44.4			43.7	45.3	47.5			Cranes No 1 and No 2	51.5
44.4			43.7	45.3		45.8		Cranes No 1 and No 3	50.9

## APPENDIX B - ESTIMATED NOISE LEVELS FOR OPERATIONAL SCENARIOS

Conveyers	Ventilation Fans	Air-conditioner	Generators	Crane No 1	Crane No 2	Crane No 3	Crane No 4	Scenarios	L <sub>Aeq</sub> , 15 min
44.4			43.7	45.3			47.1	Cranes No 1 and No 4	51.4
44.4			43.7		47.5	45.8		Cranes No 2 and No 3	51.6
44.4			43.7		47.5		47.1	Cranes No 2 and No 4	52.0
44.4			43.7			45.8	47.1	Cranes No 3 and No 4	51.5
44.4			43.7	45.3	47.5	45.8		Cranes No 1, No 2 and No 3	52.5
44.4			43.7	45.3	47.5		47.1	Cranes No 1, No 2 and No 4	52.8
44.4			43.7	45.3		45.8	47.1	Cranes No 1, No 3 and No 4	52.4
44.4			43.7		47.5	45.8	47.1	Cranes No 2, No 3 and No 4	52.9
44.4			43.7	45.3	47.5	45.8	47.1	Cranes No 1, No 2, No 3 and No 4	53.6



## APPENDIX C – TIME RESTRICTIONS (MAXIMUM MINUTES OF OPERATION)

<b>L<sub>Aeq</sub> emanating from vessel, dBA</b>	<b>Time restrictions (Maximum minutes of operation)</b>		
	<b>Day</b>	<b>Evening</b>	<b>Night</b>
	(7 am - 6 pm)	(6 pm - 10 pm)	(10 pm - 7 am)
56	263 minutes	24 minutes	43 minutes
55	331 minutes	30 minutes	54 minutes
54	416 minutes	38 minutes	68 minutes
53	524 minutes	48 minutes	86 minutes
52	No limit	60 minutes	108 minutes
51	No limit	76 minutes	136 minutes
50	No limit	96 minutes	171 minutes
49	No limit	120 minutes	215 minutes
48	No limit	151 minutes	271 minutes
47	No limit	191 minutes	341 minutes
46	No limit	No limit	429 minutes
45	No limit	No limit	No limit