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**REPORT No EN-S-090620AJ**

**GRA Glebe Island Gypsum Terminal**

with CSL Reliance on 9 June 2020.

CONDITIONS OF COMPLIANCE WITH  
EPA ENVIRONMENT PROTECTION LICENCE

June 2020

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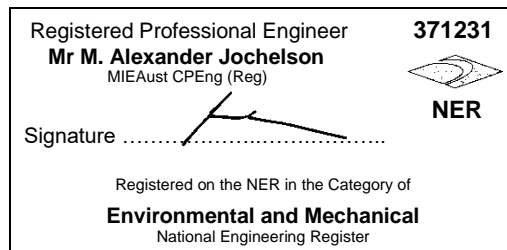
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Appendix 1: Locations of CSL Reliance at GRA Gypsum Terminal and noise measurement point at nearest residences.

Appendix 2: Summary of results of measurements and results of calculations of contributions.

Appendix 3: Possible operational scenarios and corresponding levels of noise ( $L_{Aeq, T_i}$ ).

Appendix 4: Time restrictions for unloading of ships at GRA Glebe Island Gypsum Terminal.



## EXECUTIVE SUMMARY

This report presents and discusses results of noise measurements that were carried out during unloading of CSL Reliance with each of its four cranes at GRA Glebe Island Gypsum Terminal (GLB-7), on Tuesday, 9 June 2020, between 1.00 am and 2.11 am.

The measurements were carried out by Pollution Control Consultancy and Design (PCCD) close to the nearest residential premises (the block of apartments) in 1 Batty Street, Rozelle (Appendix 1).

The purpose of the measurements was to verify compliance with former Condition L6.1 of the EPA Environment Protection Licence number: 11906 [1] issued for GRA Glebe Island Gypsum Terminal.

Appendix 2 provides a summary of the results of the measurements and calculations of the A-weighted, equivalent sound pressure level ( $L_{Aeq, Ti}$ ) emanating from each of the four cranes of CSL Reliance, and Appendix 3 provides all possible unloading scenarios with the corresponding  $L_{Aeq, Ti}$ .

Based on Appendix 3, an easy-to-use, developed by/available from Pollution Control Consultancy and Design (PCCD) MS Excel spreadsheet titled 'GRA - time restrictions for 1, 2 and 3 scenarios' will allow to calculate time restrictions for the  $L_{Aeq, Ti}$  with the accuracy to tenths of the decibel and for 1, 2 and/or 3 scenarios in each period (day, evening, night) that ensure compliance with the EPA Environment Protection Licence No 11906 [1].

Alternatively, the  $L_{Aeq, Ti}$  from Appendix 3 and time restrictions for unloading of ships at GRA Glebe Island Gypsum Terminal from Appendix 4 will allow choosing scenarios with applicable time restrictions.



## 1. NOISE CONTROL CRITERIA

In this report, the level of noise emanating from CSL Reliance during unloading at GRA Glebe Island Gypsum Terminal is assessed in terms of a former Condition L6.1 of Environment Protection Licence number: 11906 [1], which reads:

**L6.1** Noise from the premises must not exceed:

Noise Limits Measured in dB(A)							
Location	Day		Evening		Night		
	$L_{Aeq, 15 \text{ min}}$	$L_{Aeq, \text{ day}}$	$L_{Aeq, 15 \text{ min}}$	$L_{Aeq, \text{ evening}}$	$L_{Aeq, 15 \text{ min}}$	$L_{Aeq, \text{ night}}$	$L_{A1, 1 \text{ min}}$
The residence most affected by noise from the premises.	56	52	56	46	52	45	62

Based on the limits from the above table, Appendix 4 provides time restrictions for unloading of ships at GRA Glebe Island Gypsum Terminal.

According to the EPA *Noise Policy for Industry* [2], the  $L_{Aeq}$  emanating from industrial noise sources is subject to corrections (penalties) for its tonality and high low-frequency contents.

## 2. TYPE, TIME AND LOCATION OF NOISE MEASUREMENTS

For this report, Pollution Control Consultancy and Design (PCCD) carried out the total of nine (9) measurements of the A-weighted equivalent sound pressure level ( $L_{Aeq, Ti}$ ) at the nearest residential premises (the block of apartments) in 1 Batty Street, Rozelle, at approximately 230 metres from CSL Reliance at GRA Glebe Island Gypsum Terminal (Appendix 1).

The measurements (Appendix 2) were carried out during operation of:

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

The measurements were carried out on Tuesday, 9 June 2020, between 1.00 am and 2.11 am (between 0100 hrs and 0211 hrs).

## 3. INSTRUMENTATION AND CALIBRATION

The measurements presented in this report were carried out with a Class 1, NATA-calibrated, Brüel and Kjær (B&K), Modular, Precision, Real-Time Sound Analyzer type: 2250, serial number: 2736240, with a ½" Prepolarized, Condenser, Free-Field Microphone type: 4189, serial number: 2831979, and with BZ7223 Frequency Analysis software.

The instrument was calibrated acoustically with a NATA-calibrated, B&K Sound Level Calibrator type 4231, serial number: 1821262, before and after the measurements.

The calibration drift was less than 1 dB and thus, according to [3], the results from the instrument are valid.



#### 4. DISCUSSION OF RESULTS OF NOISE MEASUREMENTS

CSL Reliance differs from the majority of 'gear & grab' ships, viz. together with four deck (on-board) cranes, it has four deck conveyers (two Cross Conveyers, one Boom Conveyer and one Longitudinal Conveyer), which must run whenever a crane is unloading bulk materials.

Appendix 2 provides a summary of results of the measurements of the A-weighted, equivalent sound pressure level ( $L_{Aeq, Ti}$ ) that were carried out on Tuesday, 9 June 2020, between 1.00 am and 2.11 am.

The results from Appendix 2 show that the two generators, ventilation fans, air-conditioner, conveyers and cranes contribute to the  $L_{Aeq, Ti}$  measured close to the nearest residential premises (the block of apartments) in 1 Batty Street, Rozelle. Noise from the conveyers was clearly audible and noise from the remaining sources of noise was only slightly audible.

Based on the results from Appendix 2, Appendix 3 provides results of calculations of the  $L_{Aeq, Ti}$  emanating from all possible, fifteen (15) scenarios of unloading of CSL Reliance at GRA Glebe Island Gypsum Terminal (4 CSL Reliance cranes that may operate at the same time). We note that there are little differences between the  $L_{Aeq, Ti}$  emanating from different scenarios due to the dominant noise from the conveyers, which is present during all scenarios.

The noise emanating from CSL Reliance did not have any characteristics that made it particularly annoying (impulsiveness, tonality, high low-frequency contents).

The results from Appendix 3 should be used with an easy-to-use, developed by/available from Pollution Control Consultancy and Design (PCCD), MS Excel spreadsheets titled 'GRA - time restrictions for 1, 2 and 3 scenarios', which allows to calculate time restrictions for the  $L_{Aeq, Ti}$  with the accuracy to tenths of the decibel and for 1, 2 and/or 3 scenarios in each period, i.e. day, evening, night, that ensure compliance with the EPA Environment Protection Licence number: 11906 [1].

Alternatively, the  $L_{Aeq, Ti}$  from Appendix 3 and time restrictions for unloading of ships at GRA Glebe Island Gypsum Terminal from Appendix 4 will allow choosing scenarios with applicable time restrictions.

## BIBLIOGRAPHY

- [1] Environment Protection Authority of New South Wales (EPA) - Environment Protection Licence number: 11906, issued to Gypsum Resources Australia Pty Ltd in relation to its gypsum terminal off Sommerville Road, Rozelle.
  
- [2] Environment Protection Authority of New South Wales (EPA) - *Noise Policy for Industry* (NPII) - October 2017.
  
- [3] Australian Standard: Acoustics - Description and measurement of environmental noise - Parts 1-3 (AS 1055.1-3 - 1997).
  
- [4] Australian Standard: Quantities and units - Part 7: Acoustics (AS 2900.7 - 2002).
  
- [5] Malcolm J. Crocker - *Handbook of Noise and Vibration Control* - John Wiley & Sons, Inc. - 2007.





## **Pollution Control Consultancy and Design**

is a member firm of Australasian (AU and NZ) Acoustical Consultants (AAAC),

and its principal consultant is a Corporate Member of  
The Institution of Engineers, Australia (MIEAust) and Australian Acoustical Society (M.A.A.S.).

Pollution Control Consultancy and Design (PCCD) is an independent, accredited, acoustical and environmental engineering practice that was established and is managed by **Alex Jochelson**.

Alex has a Master's Degree in Mechanical Engineering (MEMech) and he is a Corporate Member, Chartered Professional Engineer of The Institution of Engineers, Australia, registered on National Professional Engineers Register under No 371231, in the categories of Environmental and Mechanical Engineering [MIEAust CPEng (Reg)].

Alex's well balanced, extensive, multi-disciplinary experience in environmental engineering includes:-

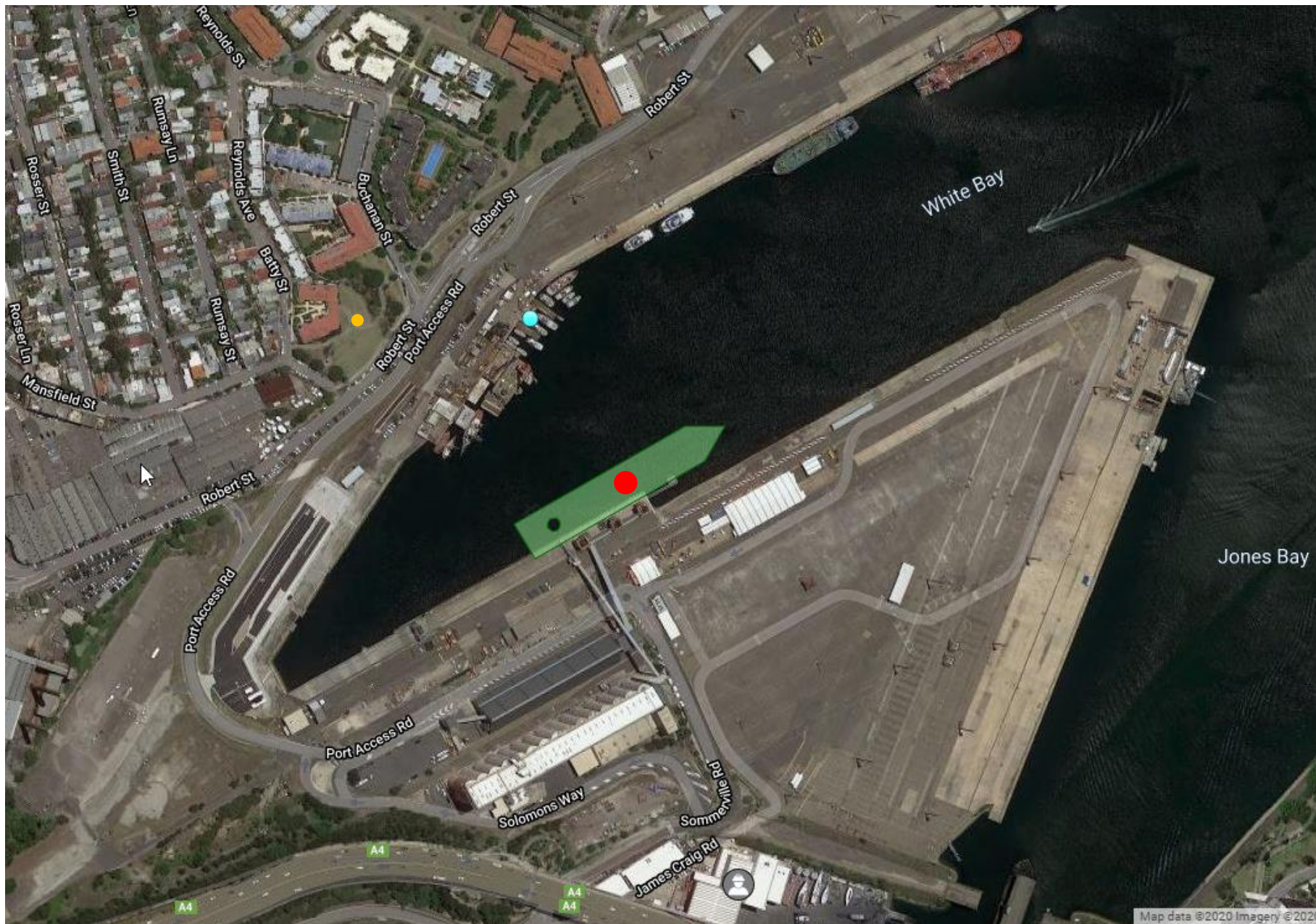
- (1) four-year industrial experience (environment protection specialist at ferro-chromium smelting plant);
- (2) four-year research and design experience (research engineer at university);
- (3) nine-year operational, industrial pollution control experience at the Environment Protection Authority of New South Wales - EPA (engineer); and
- (4) the current, since January 1995, engineering consulting experience as the principal consultant of Pollution Control Consultancy and Design (PCCD).

### **Services provided by Pollution Control Consultancy and Design**

Pollution Control Consultancy and Design (PCCD) provides a comprehensive range of services covering all major aspects of the environment protection: air, noise and water pollution control. These services include:-

- a) air, noise and water pollution measurement, assessment and engineering control;
- b) environmental reviews and audits;
- c) environmental management programs (EMPs);
- d) pollution reduction programmes (PRPs);
- e) environment protection policy and strategy;
- f) submissions to and negotiations with the Environment Protection Authority, Department of Planning, Department of Mineral Resources, Sydney Water, Liquor Administration Board and Local Councils;
- g) "environment impact statements" and "statements on environmental effects" for development consents;
- h) applications for pollution control approvals and licences;
- i) compliance audits for environment protection approvals and licences, and development consents;
- j) interpretation of technical requirements of environment protection legislation;
- k) expert witness services for Land and Environment Court and local courts;
- l) proposals of environmentally acceptable and safe operational conditions and procedures;
- m) development of operational manuals for pollution control systems;
- n) process and functional design of air, noise and water pollution control systems;
- o) selection of optimal pollution control technology, equipment and systems;
- p) supervision of construction, commissioning, operation and maintenance of pollution control systems; and
- q) troubleshooting existing air, noise and water pollution control systems.





Locations of CSL Reliance at Berth 7 of Glebe Island (GLB-7, red dot)  
and noise measurement point close to nearest residences (block of apartments) in 1 Batty Street, Rozelle (orange dot).

Measurement	Operational Situation	L <sub>Aeq, Ti</sub> measured	Contribution of	L <sub>Aeq, Ti</sub> contribution	Notes
1	2 Generators	46.7	-	-	-
2	2 Generators and Ventilation Fans	48.8	Ventilation Fans	<b>47.9</b>	-
3	2 Generators and Air-Conditioner	47.1	Air-Conditioner	<b>45.7</b>	-
4	2 Generators and all 4 on-board Conveyers	51.9	4 on-board Conveyers	<b>51.5</b>	predominant source of noise
5	2 Generators, 4 Conveyers and Crane No 1	52.8	Crane No 1	<b>45.5</b>	-
6	2 Generators, 4 Conveyers and Crane No 2	53.1	Crane No 2	<b>46.9</b>	-
7	2 Generators, 4 Conveyers and Crane No 3	52.9	Crane No 3	<b>46.0</b>	-
8	2 Generators, 4 Conveyers and Crane No 4	53.1	Crane No 4	<b>46.9</b>	-
9	2 Generators	46.6	2 Generators	<b>41.5</b>	-

**Summary of results of measurements and results of calculations of contributions.**



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>	
51.5	47.9	45.7	41.5	45.5				Crane No 1	<b>54.6</b>	<b>1</b>
51.5	47.9	45.7	41.5		46.9			Crane No 2	<b>54.8</b>	<b>2</b>
51.5	47.9	45.7	41.5			46.0		Crane No 3	<b>54.7</b>	<b>3</b>
51.5	47.9	45.7	41.5				46.9	Crane No 4	<b>54.8</b>	<b>4</b>
51.5	47.9	45.7	41.5	45.5	46.9			Cranes No 1 and No 2	<b>55.3</b>	<b>5</b>
51.5	47.9	45.7	41.5	45.5		46.0		Cranes No 1 and No 3	<b>55.2</b>	<b>6</b>
51.5	47.9	45.7	41.5	45.5			46.9	Cranes No 1 and No 4	<b>55.3</b>	<b>7</b>
51.5	47.9	45.7	41.5		46.9	46.0		Cranes No 2 and No 3	<b>55.4</b>	<b>8</b>
51.5	47.9	45.7	41.5		46.9		46.9	Cranes No 2 and No 4	<b>55.5</b>	<b>9</b>
51.5	47.9	45.7	41.5			46.0	46.9	Cranes No 3 and No 4	<b>55.4</b>	<b>10</b>
51.5	47.9	45.7	41.5	45.5	46.9	46.0		Cranes No 1, No 2 and No 3	<b>55.8</b>	<b>11</b>
51.5	47.9	45.7	41.5	45.5	46.9		46.9	Cranes No 1, No 2 and No 4	<b>55.9</b>	<b>12</b>
51.5	47.9	45.7	41.5	45.5		46.0	46.9	Cranes No 1, No 3 and No 4	<b>55.8</b>	<b>13</b>
51.5	47.9	45.7	41.5		46.9	46.0	46.9	Cranes No 2, No 3 and No 4	<b>55.9</b>	<b>14</b>
51.5	47.9	45.7	41.5	45.5	46.9	46.0	46.9	Cranes No 1, No 2, No 3 and No 4	<b>56.3</b>	<b>15</b>

Possible operational scenarios and corresponding levels of noise (L<sub>Aeq, Ti</sub>) - all sources of noise.



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>	
51.5		45.7	41.5	45.5				Crane No 1	53.6	1
51.5		45.7	41.5		46.9			Crane No 2	53.8	2
51.5		45.7	41.5			46.0		Crane No 3	53.7	3
51.5		45.7	41.5				46.9	Crane No 4	53.8	4
51.5		45.7	41.5	45.5	46.9			Cranes No 1 and No 2	54.4	5
51.5		45.7	41.5	45.5		46.0		Cranes No 1 and No 3	54.3	6
51.5		45.7	41.5	45.5			46.9	Cranes No 1 and No 4	54.4	7
51.5		45.7	41.5		46.9	46.0		Cranes No 2 and No 3	54.5	8
51.5		45.7	41.5		46.9		46.9	Cranes No 2 and No 4	54.6	9
51.5		45.7	41.5			46.0	46.9	Cranes No 3 and No 4	54.5	10
51.5		45.7	41.5	45.5	46.9	46.0		Cranes No 1, No 2 and No 3	55.0	11
51.5		45.7	41.5	45.5	46.9		46.9	Cranes No 1, No 2 and No 4	55.1	12
51.5		45.7	41.5	45.5		46.0	46.9	Cranes No 1, No 3 and No 4	55.0	13
51.5		45.7	41.5		46.9	46.0	46.9	Cranes No 2, No 3 and No 4	55.2	14
51.5		45.7	41.5	45.5	46.9	46.0	46.9	Cranes No 1, No 2, No 3 and No 4	55.6	15

Possible operational scenarios and corresponding levels of noise (L<sub>Aeq, Ti</sub>) - all sources of noise, except ventilation fans.



Conveyers	Ventilation Fans	Air-conditioner	Generators	Crane No 1	Crane No 2	Crane No 3	Crane No 4	Scenarios	$L_{Aeq, 15 \text{ min}}$	
51.5	47.9		41.5	45.5				Crane No 1	<b>54.0</b>	<b>1</b>
51.5	47.9		41.5		46.9			Crane No 2	<b>54.2</b>	<b>2</b>
51.5	47.9		41.5			46.0		Crane No 3	<b>54.1</b>	<b>3</b>
51.5	47.9		41.5				46.9	Crane No 4	<b>54.2</b>	<b>4</b>
51.5	47.9		41.5	45.5	46.9			Cranes No 1 and No 2	<b>54.8</b>	<b>5</b>
51.5	47.9		41.5	45.5		46.0		Cranes No 1 and No 3	<b>54.7</b>	<b>6</b>
51.5	47.9		41.5	45.5			46.9	Cranes No 1 and No 4	<b>54.8</b>	<b>7</b>
51.5	47.9		41.5		46.9	46.0		Cranes No 2 and No 3	<b>54.9</b>	<b>8</b>
51.5	47.9		41.5		46.9		46.9	Cranes No 2 and No 4	<b>55.0</b>	<b>9</b>
51.5	47.9		41.5			46.0	46.9	Cranes No 3 and No 4	<b>54.9</b>	<b>10</b>
51.5	47.9		41.5	45.5	46.9	46.0		Cranes No 1, No 2 and No 3	<b>55.3</b>	<b>11</b>
51.5	47.9		41.5	45.5	46.9		46.9	Cranes No 1, No 2 and No 4	<b>55.5</b>	<b>12</b>
51.5	47.9		41.5	45.5		46.0	46.9	Cranes No 1, No 3 and No 4	<b>55.3</b>	<b>13</b>
51.5	47.9		41.5		46.9	46.0	46.9	Cranes No 2, No 3 and No 4	<b>55.5</b>	<b>14</b>
51.5	47.9		41.5	45.5	46.9	46.0	46.9	Cranes No 1, No 2, No 3 and No 4	<b>55.9</b>	<b>15</b>

Possible operational scenarios and corresponding levels of noise ( $L_{Aeq, Ti}$ ) - all sources of noise except air-conditioner.



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>	
51.5			41.5	45.5				Crane No 1	52.8	1
51.5			41.5		46.9			Crane No 2	53.1	2
51.5			41.5			46.0		Crane No 3	52.9	3
51.5			41.5				46.9	Crane No 4	53.1	4
51.5			41.5	45.5	46.9			Cranes No 1 and No 2	53.8	5
51.5			41.5	45.5		46.0		Cranes No 1 and No 3	53.6	6
51.5			41.5	45.5			46.9	Cranes No 1 and No 4	53.8	7
51.5			41.5		46.9	46.0		Cranes No 2 and No 3	53.9	8
51.5			41.5		46.9		46.9	Cranes No 2 and No 4	54.0	9
51.5			41.5			46.0	46.9	Cranes No 3 and No 4	53.9	10
51.5			41.5	45.5	46.9	46.0		Cranes No 1, No 2 and No 3	54.5	11
51.5			41.5	45.5	46.9		46.9	Cranes No 1, No 2 and No 4	54.6	12
51.5			41.5	45.5		46.0	46.9	Cranes No 1, No 3 and No 4	54.5	13
51.5			41.5		46.9	46.0	46.9	Cranes No 2, No 3 and No 4	54.7	14
51.5			41.5	45.5	46.9	46.0	46.9	Cranes No 1, No 2, No 3 and No 4	55.2	15

Possible operational scenarios and corresponding levels of noise (L<sub>Aeq, Tt</sub>) - all sources of noise except ventilation fans and air-conditioner.



L <sub>Aeq</sub> emanating from a ship	Time restrictions (operation for only)		
	Day	Evening	Night
	(7 am - 6 pm)	(6 pm - 10 pm)	(10 pm - 7 am)
56 dB(A)	263 minutes	24 minutes	43 minutes
55 dB(A)	331 minutes	30 minutes	54 minutes
54 dB(A)	416 minutes	38 minutes	68 minutes
53 dB(A)	524 minutes	48 minutes	86 minutes

**NOTE:** to calculate time restrictions for the L<sub>Aeq, T1</sub> with tenths and for 1, 2 and/or 3 scenarios in a period (day, evening and night), instead of using Appendix 4, use MS Excel spreadsheet titled 'GRA - time restrictions for 1, 2 and 3 scenarios' developed by/available from Pollution Control Consultancy and Design (PCCD).



## NOTES