global environmental solutions

Sydney International Container Terminals

Port Botany Terminal 3

Unattended Noise Monitoring

Report Number 610.13065-R1

29 October 2013

Hutchinson Ports Australia
Level 19, BT Tower, 1 Market Street,
Sydney NSW 2000

Version: Revision 1

Sydney International Container Terminals

Port Botany Terminal 3

Unattended Noise Monitoring

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
610.13065-R1	Revision 1	16 October 2013	James Tudor	Briony Croft	Briony Croft
610.13065-R1	Revision 0	16 October 2013	James Tudor	Robert Hall	Robert Hall

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1 PURPOSE

Hutchinson Ports Australia engaged SLR Consulting Australia Pty Ltd (SLR) to provide unattended noise monitoring at six locations in the area near Port Botany Terminal 3. This document reports on the background and ambient noise levels measured at the locations during the monitoring period, and processed in accordance with guidelines contained in the EPA's NSW *Industrial Noise Policy* (INP).

2 METHODOLOGY

Unattended noise monitoring took place during the period Friday 13 September 2013 to Monday 30 September 2013. Six noise loggers, two ARL-316 environmental noise loggers and four SVAN 957 Type 1 Sound and Vibration analysers, were deployed at receiver locations specified by Hutchinson Ports.

Calibration of the equipment was checked prior to and following the measurements. Drift in calibration did not exceed ±0.5 dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates, which are provided in **Appendix A** at the end of this report. Each noise logger was fitted with a wind shield at all times during the monitoring period.

Noise loggers were collected on Monday 30 September 2013 and downloaded at the SLR Sydney Office. Measurement data was processed in accordance with the INP to obtain L_{A90} and L_{Aeq} noise levels for daytime, evening and night-time periods at the six locations.

All 15 minute intervals recorded during periods with greater than 0.5 mm of rain or 1.5 m wind speeds greater than 5 m/s have been excluded. Weather data was obtained from the Bureau of Meteorology, from the station located at Sydney Airport. Conversions of wind speeds have been made to account for the category 2 rating (water/grassland) of the airport data, compared to the category 3 rating (suburban) of weather at the locations of the monitoring. The difference in wind speed at the noise logger microphones height (1.5 m) and that of the weather station (10 m) has also been accounted for in accordance with the procedure recommended by Gowen et al in their Acoustics 2004 conference paper[1].

A summary of results is presented in **Section 5**.

3 DESCRIPTION OF MONITORING LOCATIONS

Monitoring locations were provided to SLR by Hutchinson Ports. **Figure 1** provides a map of the locations. **Table 1** displays the address of each location, and the serial number of the logger deployed at each address. **Appendix B** displays the in situ photographs of each noise logger.

[1] *Converting Bureau of Meteorology Wind Speed Data to Local Wind Speeds at 1.5 m above Ground Level*, Gowen, Karantonis and Rofail (2005), Proceedings of Acoustics 2004 Conference, Gold Coast Australia

Figure 1 Unattended Noise Monitoring Locations (1 to 6)

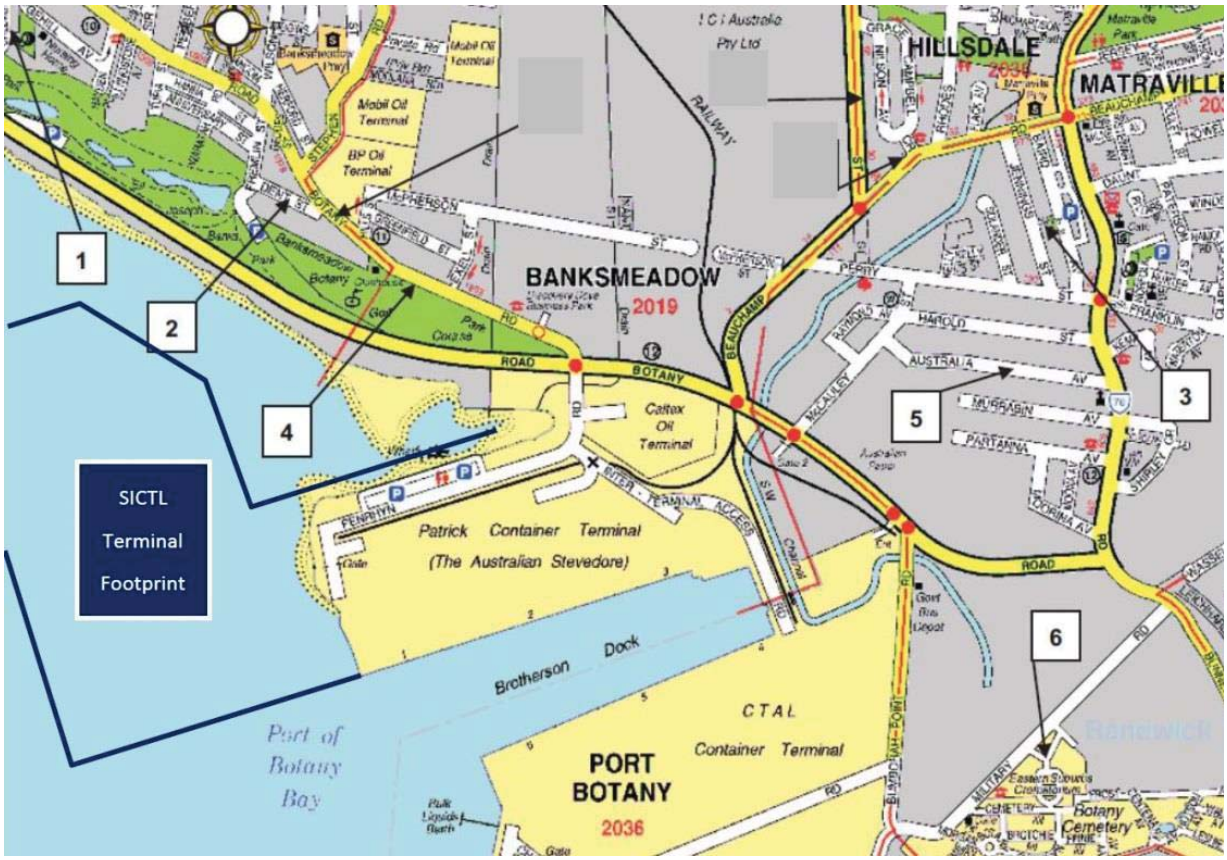

Table 1 Noise Monitoring Location Addresses and Instrumentation

Identifier	Address	Noise Logger SN	Description
R1	23 Chelmsford Ave, Botany	SVAN 957 20644	Logger deployed in front yard of the property, line of site to Chelmsford Avenue
R2	34 Dent St, Botany	ARL-316 16-207-021	Logger deployed at the back fence of the property
R3	59 Jennings St, Matraville	ARL-316 16-301-472	Logger deployed on 2nd floor balcony, overlooking Jennings Street
R4	Botany Golf Club, 1414 Botany Rd, Botany	SVAN 957 20669	Logger deployed on the roof of toilet block, adjacent to club house
R5	74 Australia Ave, Matraville	SVAN 957 23247	Logger deployed in the front yard on the fence-line to Australia Avenue
R6	Botany Cemetery, Military Road, Matraville	SVAN 957 23815	Logger deployed on crematorium roof, line of site to Military Road/Parking lot

Noise loggers at R2 and R5 were deployed in the free field with the microphone at a height of 1.5 m above ground level. The noise logger at R1 was located 2 m from the building facade at 1.5 m above the ground. Noise loggers at R3, R4 and R5 were deployed in the free field at second story heights of approximately 4.5 m above ground level.

4 GENERAL MONITORING CONDITIONS

At the times of deployment and collection, the logging locations were observed to be mostly in areas typical of suburban areas. Road traffic noise was mostly due to intermittent traffic flows on local roads and nearby main roads. The Botany golf club was observed to be most affected by road traffic noise, with relatively larger traffic flows present on both Botany Road and Foreshore Road. No obvious noise contributions were observed from industrial sources when the noise consultant was present at the logging locations; though operator attended measurements were not undertaken as part of the scope of works for the unattended monitoring.

5 MONITORING RESULTS

The results from the unattended noise monitoring are presented in **Table 2**. The reported levels have been processed from each 15 minute interval of data recorded by the loggers during the entire survey period.

Table 2 Unattended Noise Monitoring Results

Monitoring Location		Date	Time Period	RBL[1]	LAeq[2]
R1	23 Chelmsford Ave, Botany	13/09/2013 to 30/09/2013	Day	46	61
			Evening	46	60
			Night-time	40	55
R2	34 Dent St, Botany	13/09/2013 to 30/09/2013	Day	49	71
			Evening	48	56
			Night-time	43	54
R3	59 Jennings St, Matraville	13/09/2013 to 30/09/2013	Day	47	60
			Evening	46	56
			Night-time	45	53
R4	Botany Golf Club, 1414 Botany Rd, Botany	13/09/2013 to 30/09/2013	Day	56	61
			Evening	53	60
			Night-time	48	59
R5	74 Australia Ave, Matraville	20/09/2013 to 30/09/2013[3]	Day	43	54
			Evening	46	54
			Night-time	46	53
R6	Botany Cemetery, Military Road, Matraville	13/09/2013 to 30/09/2013	Day	52	59
			Evening	50	54
			Night-time	49	56

Note 1: The RBL (Rated Background Level) is representative of the average minimum background sound level, or simply the background level. It is the median value of all background levels measured in each period.

Note 2: The L_{Aeq} is the energy averaged sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

Note 3: Data recorded at 74 Australia Ave, Matraville between 13-19 September was lost due to a data saving error during a battery changeover on 20 September. During the remainder of the noise logging, 7 days of valid data including weekend periods has been obtained after filtering for weather.

6 CONCLUSION

SLR Consulting Australia Pty Ltd has conducted unattended noise monitoring at 6 locations during the period 13 September to 30 September 2013.

Noise monitoring results processed in accordance with guidance contained in the INP have been outlined in **Section 3**. Background and ambient noise levels at each location have been presented.

Appendix A

Noise Logger Calibration Certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 38893 & FILT 2712

Equipment Description:	Sound Level Meter		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	20644
Microphone Type:	7052H	**Serial No:**	43548
Filter Type:	1/3 Octave	**Serial No:**	20644
Comments:	All tests passed for type 1.		
Owner:	SLR Consulting Australia Pty Ltd Lev 2, 2 Lincoln street Lane Cove, NSW 2066		
Ambient Pressure:	1003 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	71 %RH ±5% RH
Date of Calibration:	09/04/2012	**Issue Date:**	10/04/2012

Acu-Vib Test Procedure: AVP05 (SLM) & AVP06 (Filters) if applicable

CHECKED BY: AK..... **AUTHORISED SIGNATORY:** .....

Jack Kielt

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WORLD RECOGNISED ACCREDITATION

Accredited Lab. No. 9262
Acoustic and Vibration Measurements

ACU-VIB
ELECTRONICS

HEAD OFFICE
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
Tel: (02) 96808133 Fax: (02)96808233
Mobile: 0413 809806
web site: www.acu-vib.com.au

CERTIFICATE NO.: SLM 38893 & FILT 2712

The performance characteristics listed below were tested. The tests are based on the relevant clauses of A.S. 1259.1 and A.S. 1259.2 - 1990

1.	RMS Performance	clause 10.4.5
2.	Time Weighting Response, F&S	clause 10.4.2
3.	Time Weighting I	clause 10.4.3
4.	Time Weighting P	clause 10.4.4
5.	Input Attenuator Accuracy	clause 10.3.3
6.	Detector & Differential Linearity	clause 10.4.1
7.	Weighting Networks & Linearity	clause 10.2.3
8.	Overload Indication	clause 10.3.2
9.	AC Output & Weighted Noise Level	clause 11. (c). (ii) 10.3.4
10.	Time Averaging	clause 9.3.2
11.	Absolute Sensitivity	clause 10.2.2

Note: Absolute Sensitivity as found was 94.4 dB and adjusted to 94.0 dB
Uncertainty: ±0.13dB (at 95% c.l.) k=2

Where the Sound Level Meter includes an Octave Filter Set, tests based on IEC 1260: 1995 and AS/NZS 4476 - 1997 were conducted to test the following performance characteristics:

1.	Relative attenuation	clause 5.3
2.	Linearity	clause 5.5
3.	Anti-alias filters	clause 5.7
4.	Summation of output signals	clause 5.8
5.	Flat frequency response	clause 5.9

Date of Calibration: 09/04/2012 **Issue Date:** 10/04/2012

Checked by: .....

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Acoustic Research Laboratories
Proprietary Limited A.B.N. 47 050 100 804
Noise and Vibration Monitoring Instrumentation for Industry and the Environment

Sound Level Meter Test Report

Report Number : C12509

Date of Test : 14/08/2012

Report Issue Date : 15/08/2012

Equipment Tested/ Model Number: **ARL EL-316 Logger**

Instrument Serial Number: 16-207-021

Microphone Serial Number: 312717

Preamplifier Serial Number: 27519

Client Name : SLR Consulting Australia Pty Ltd

2 Lincoln Street

Lane Cove NSW 2066

Contact Name : Charles Sanhueza

Tested by : Brianna Sparre

Approved Signatory :

Date : **15 August 2012**

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Acoustic Research Laboratories
Proprietary Limited A.B.N. 47 050 100 804
Noise and Vibration Monitoring Instrumentation for Industry and the Environment

Sound Level Meter Test Report

Report Number : C11647

Date of Test : 06/12/2011

Report Issue Date : 08/12/2011

Equipment Tested/ Model Number: **ARL EL-316 Logger**

Instrument Serial Number: 16-301-472

Microphone Serial Number: 102155

Preamplifier Serial Number: 26723

Client Name : SLR Consulting Australia

2 Lincoln Street

Lane Cove NSW 2066

Contact Name : Charles Sanhueza

Tested by : Adrian Walker

Approved Signatory :

Date : 8 December 2011

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: **SLM 38887 & FILT 2714**

Equipment Description:	Sound Level Meter		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	20669
Microphone Type:	7052H	**Serial No:**	43253
Filter Type:	1/3 Octave	**Serial No:**	20669
Comments:	All tests passed for type 1.		
Owner:	SLR Consulting Australia Pty Ltd Lev 2, 2 Lincoln street Lane Cove, NSW 2066		
Ambient Pressure:	1003 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	71 %RH ±5% RH
Date of Calibration:	09/04/2012	**Issue Date:**	10/04/2012

Acu-Vib Test Procedure: AVP05 (SLM) & AVP06 (Filters) if applicable

CHECKED BY: AK **AUTHORISED SIGNATORY:** .....

Jack Kidt

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web site: www.acu-vib.com.au

CERTIFICATE NO.: SLM 38887 & FILT 2714

The performance characteristics listed below were tested. The tests are based on the relevant clauses of A.S. 1259.1 and A.S. 1259.2 - 1990

1.	RMS Performance	clause 10.4.5
2.	Time Weighting Response, F&S	clause 10.4.2
3.	Time Weighting I	clause 10.4.3
4.	Time Weighting P	clause 10.4.4
5.	Input Attenuator Accuracy	clause 10.3.3
6.	Detector & Differential Linearity	clause 10.4.1
7.	Weighting Networks & Linearity	clause 10.2.3
8.	Overload Indication	clause 10.3.2
9.	AC Output & Weighted Noise Level	clause 11. (c). (ii) 10.3.4
10.	Time Averaging	clause 9.3.2
11.	Absolute Sensitivity	clause 10.2.2

Note: Absolute Sensitivity as found was 94.7 dB and adjusted to 94.0 dB
Uncertainty: ±0.13dB (at 95% c.l.) k=2

Where the Sound Level Meter includes an Octave Filter Set, tests based on IEC 1260: 1995 and AS/NZS 4476 - 1997 were conducted to test the following performance characteristics:

1.	Relative attenuation	clause 5.3
2.	Linearity	clause 5.5
3.	Anti-alias filters	clause 5.7
4.	Summation of output signals	clause 5.8
5.	Flat frequency response	clause 5.9

Date of Calibration: 09/04/2012 **Issue Date:** 10/04/2012

Checked by: .AK.....

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 38890 & FILT 2710

Equipment Description:	Sound Level Meter		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	23247
Microphone Type:	7052H	**Serial No:**	40560
Filter Type:	1/1 Octave	**Serial No:**	23247
Comments:	All tests passed for type 1.		
Owner:	SLR Consulting Australia Pty Ltd Lev 2, 2 Lincoln street Lane Cove, NSW 2066		
Ambient Pressure:	1003 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	71 %RH ±5% RH
Date of Calibration:	09/04/2012	**Issue Date:**	10/04/2012

Acu-Vib Test Procedure: AVP05 (SLM) & AVP06 (Filters) if applicable

CHECKED BY: AK **AUTHORISED SIGNATORY:** .....

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CERTIFICATE NO.: SLM 38890 & FILT 2710

The performance characteristics listed below were tested. The tests are based on the relevant clauses of A.S. 1259.1 and A.S. 1259.2 - 1990

1. RMS Performance	clause 10.4.5
2. Time Weighting Response, F&S	clause 10.4.2
3. Time Weighting I	clause 10.4.3
4. Time Weighting P	clause 10.4.4
5. Input Attenuator Accuracy	clause 10.3.3
6. Detector & Differential Linearity	clause 10.4.1
7. Weighting Networks & Linearity	clause 10.2.3
8. Overload Indication	clause 10.3.2
9. AC Output & Weighted Noise Level	clause 11. (c). (ii) 10.3.4
10. Time Averaging	clause 9.3.2
11. Absolute Sensitivity	clause 10.2.2

Note: Absolute Sensitivity as found was 94.7 dB and adjusted to 94.0 dB
Uncertainty: ±0.13dB (at 95% c.l.) k=2

Where the Sound Level Meter includes an Octave Filter Set, tests based on IEC 1260: 1995 and AS/NZS 4476 - 1997 were conducted to test the following performance characteristics:

1. Relative attenuation	clause 5.3
2. Linearity	clause 5.5
3. Anti-alias filters	clause 5.7
4. Summation of output signals	clause 5.8
5. Flat frequency response	clause 5.9

Date of Calibration: 09/04/2012 **Issue Date:** 10/04/2012

Checked by: .....

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 39644 & FILT 0093

Equipment Description:	Sound & Vibration Analyzer		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	23815
Microphone Type:	7052E	**Serial No:**	52495
Filter Type:	1/3 Octave	**Serial No:**	23815
Comments:	All tests passed for type 1. (See over for details)		
Owner:	SLR Consulting Australia Pty Ltd Level 2, 2 Lincoln Street Lane Cove, NSW 2066		
Ambient Pressure:	1011 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	51% ±5%
Date of Calibration:	07/05/2013	**Issue Date:**	09/05/2013

Acu-Vib Test Procedure: AVP05 (SLM) & AVP06 (Filters)

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CERTIFICATE NO.: SLM 39644 & FILT 0093

The performance characteristics listed below were tested. The tests are based on the relevant clauses of A.S. 1259.1 and A.S. 1259.2 - 1990

1.	RMS Performance	clause 10.4.5
2.	Time Weighting Response, F&S	clause 10.4.2
3.	Time Weighting I	clause 10.4.3
4.	Time Weighting P	clause 10.4.4
5.	Input Attenuator Accuracy	clause 10.3.3
6.	Detector & Differential Linearity	clause 10.4.1
7.	Weighting Networks & Linearity	clause 10.2.3
8.	Overload Indication	clause 10.3.2
9.	AC Output & Weighted Noise Level	clause 11. (c). (ii) 10.3.4
10.	Time Averaging	clause 9.3.2
11.	Absolute Sensitivity	clause 10.2.2

Note: Absolute Sensitivity as found was 94.1 dB and adjusted to 94.1 dB
Least Uncertainty: ±0.13dB (at 95% c.l.) k=2

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1.	Relative attenuation	clause 5.3

Least uncertainty for relative attenuation (at 95% c.l.) k=2:
±0.1 dB for attenuation equal to an less than 6 dB
±0.3 dB for RA from above 6 dB to 18 dB
±0.6 dB for RA from above 18 dB to 80 dB

Date of Calibration: 07/05/2013 **Issue Date:** 09/05/2013

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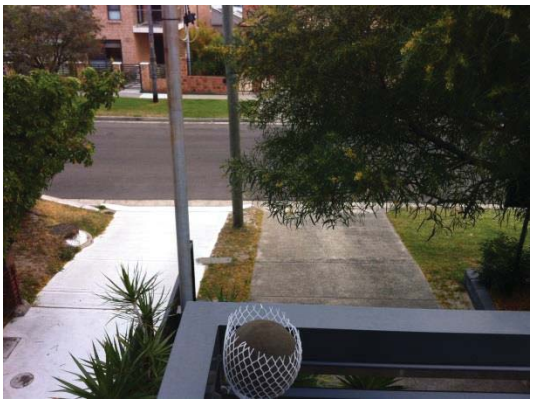
Noise Logger In Situ Photographs

1 23 Chelmsford Ave, Botany (20644)

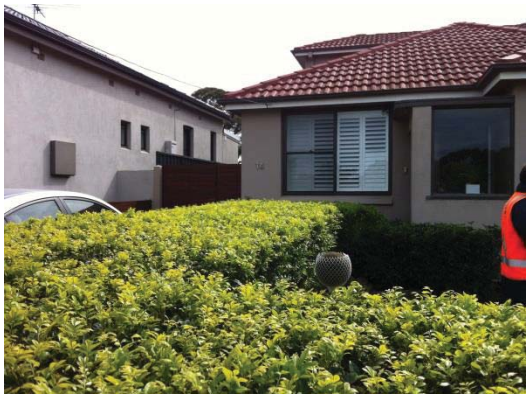
2 34 Dent St, Botany (16-207-021)

3 59 Jennings St, Matraville (16-301-472)



4 Botany Golf Club (20669)

5 74 Australia Ave, Matraville (23247)



6 Botany Cemetery (23815)