



REPORT 160095R1

Revision 0

Patrick Port Botany Terminal
Biannual Environmental
Noise Compliance Monitoring
May 2018

PREPARED FOR:
Patrick Port Botany Terminal
PO Box 197
Botany NSW 1455

29 May 2018



Patrick Port Botany Terminal Biannual Environmental Noise Compliance Monitoring May 2018

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Reference	Status	Date	Prepared	Checked	Authorised
160095R1	Revision 0	29 May 2018	Thomas Carney	Desmond Raymond	Rodney Stevens



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EXECUTIVE SUMMARY

Rodney Stevens Acoustics Pty Ltd (RSA) has been commissioned by Patrick's Port Botany Terminal's Environment, Sustainability & Compliance Manager to undertake environmental noise compliance monitoring for Patrick's Port Botany Terminal (PBT) operations.

This report presents the findings of the 30 April to 14 May 2018 environmental noise compliance monitoring, carried out every 6-months, for the Patrick PBCT operations.

Attended and unattended noise monitoring was carried out to determine compliance with the established noise limits at the nearest affected receivers as per EPL 6962, 13 June 2017.

Existing noise levels at the nearest receptors are considered high. Noise generated by surrounding industrial premises, localised road works, road traffic, local fauna, residential activities and aircraft activities were the primary contributors to the L_{Aeq} and L_{A1} descriptors during the daytime, evening and night-time measurements.

It was observed that operational noise was not audible at the Chelmsford Avenue, Dent Street, Botany Road, Australia Avenue and Jennings Street monitoring locations, and was just audible at the Military Road monitoring location when ambient levels were low, but the direct source was indeterminable. Based on this observation, Patrick PBT operational noise is considered to comply with the EPL day, evening and night-time noise limits.

It is a finding of this compliance assessment that the current operation will comply with the established licence limits at all locations during the daytime, evening and night-time periods.

Assessment of the measured residential noise levels indicated no annoying characteristics (tonality) were present. No sleep disturbance issues were present.



1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (RSA) has been commissioned by Patrick’s Environment, Sustainability & Compliance Manager to undertake environmental noise compliance monitoring for Patrick’s Port Botany Terminal (PBT) operations.

This report presents the findings of an environmental noise compliance monitoring for Patrick’s PBT operations.

The noise assessment has been completed with reference to the requirements of the site’s current Environment Protection Licence (EPL) No.6962 (dated 13 June 2017), Clauses L3 and E1 at specified locations.

Ambient noise monitoring was undertaken at the nearest potentially affected receivers in the vicinity of the site. Results from the unattended and attended noise monitoring have been reported.

Noise monitoring for this assessment was undertaken from 30 April to 14 May 2018. The site was operating under standard conditions during the monitoring period.

Comparison of the measured noise levels has been made to previous reported results, although it should be noted that the terminal started its automated operations in April 2015.

Specific acoustic terminology is used in this report. An explanation of common acoustic terms is provided in Appendix A.

2 SCOPE OF ASSESSMENT

The scope of work for this study was to prepare a noise compliance assessment for the existing site operations with reference to the NSW Environment Protection Authority (EPA) Environmental Protection Licence (EPL) and other relevant EPA noise guidelines and requirements.

This required the following items:

- assess the existing ambient noise environment in the areas surrounding the subject site;
- compare the measured noise levels to EPL noise limits;
- compare results to previous investigations undertaken for the subject site; and
- provide recommendations for further courses of action (where required).

3 ENVIRONMENT PROTECTION LICENCE (NOISE)

The noise emissions from the on-site operations are required to satisfy specific NSW EPA requirements outlined in the site’s EPL (Licence No. 6962).

Condition L3 Noise Limits specifies the following:

L3.1 Noise from the premises must not exceed the noise limits presented in the Table below. Note the limits represent the noise contribution at the nominated receiver locations in the table.

Table 3-1 Noise Limits – LAeq

Most affected residential location	Day LAeq (15 min)	Evening LAeq (15 min)	Night LAeq (15 min)	Night LAeq(9hours)
Chelmsford Avenue	40 dB(A)	40 dB(A)	40 dB(A)	38 dB(A)
Dent Street	45 dB(A)	43 dB(A)	43 dB(A)	43 dB(A)
Jennings Street	36 dB(A)	36 dB(A)	36 dB(A)	35 dB(A)
Botany Road	47 dB(A)	43 dB(A)	43 dB(A)	45 dB(A)
Australia Avenue	35 dB(A)	35 dB(A)	35 dB(A)	35 dB(A)
Military Road	42 dB(A)	42 dB(A)	42 dB(A)	40 dB(A)



L3.2 Noise from the premises must not exceed the noise limits presented in the Table below. Note the limits represent the noise contribution at the nominated receiver locations in the table.

Table 3-2 Noise Limit – Night

Most affected residential location	Night $L_{A1}(1min)$
Chelmsford Avenue	53 dB(A)
Dent Street	55 dB(A)
Jennings Street	55 dB(A)
Botany Road (North Golf Club)	55 dB(A)
Australia Avenue	55 dB(A)
Military Road	55 dB(A)

L3.3 For the purposes of Conditions L3.1 and L3.2

- *Day* is defined as the period from 7 am to 6 pm Monday to Saturday and 8 am to 6 pm Sundays and Public Holidays.
- *Evening* is defined by the period from 6 pm to 10 pm on any day.
- *Night* is defined as the period from 10 pm to 7 am Monday to Saturday and 10 pm to 8 am Sundays and Public Holidays.

L3.4 For the purposes of Condition L3.1 noise from the premises must be measured or computed at the most affected point on or within the residential boundary.

L3.5 For the purpose of Condition L3.1, if a residential dwelling is located more than 30m from the residential boundary, noise from the premises must be measured or computed at the most affected pointed within 30m of the dwelling.

L3.6 Noise from the premises is to be measured at one metre from the dwelling façade to determine compliance with the L_{A1} (one minute) noise limits in condition L3.2.

L3.7 The noise limits specified in condition L3.1 and L3.2 apply under the following meteorological conditions:

- (a) wind speeds up to 3 m/s at 10 m above ground level
- (b) temperature inversion conditions of up to 1.5 degrees C/100 m.

Condition E1 Noise Monitoring and Compliance Reporting specifies the following:

E1.1 The licensee must undertake noise monitoring as follows:

- (a) The noise monitoring must be undertaken within 6 months of the commencement of operations on the new extension – Lot 202, DP 1183399; and
- (b) The noise monitoring must verify the assumptions and the noise limits as outlined in the Port Botany Container Terminal Expansion Noise Assessment (2003), part of the Environment Impact Assessment submitted in accordance with the Environmental Planning and Assessment Act 1979 for the approved container terminal development.

E1.2. Every 6 months after the commencement of operations of the new extension – Lot 202, DP 1183399, the Licensee must undertake a periodic noise monitoring program consisting of the attended and unattended monitoring and provide a report within one month after the completion of the monitoring to the EPA's Manager, Sydney Industry at PO Box 668 Parramatta NSW 2124 containing the following information:

- (a) Unattended monitoring data for a continuous period of no less than two weeks;
- (b) Attended monitoring data during the period outlined in subsection (a);



- (c) Monitoring data from locations specified in Conditions L3.1 and L3.2;
- (d) An assessment of the noise levels against Condition L3 including trend analysis; and
- (e) Details of any feasible and reasonable noise mitigation measures that have been or are proposed to be implemented further reduce noise levels below the limits prescribed in this licence.

4 SITE IDENTIFICATION

4.1 Location and Operation

Road (Inter-modal Access Road) in Port Botany NSW 2036. Foreshore Road and Botany Road are located to the north of the site and Brotherson Dock to the south. Figure 3-1 provides an overview of the site context. On 2 April 2015 the terminal replaced its manual straddle fleet with automated straddles (AutoStrads™).

The site operates 24 hours a day, seven days a week. Operations undertaken within the site boundary include:

- *Truck processing and container exchange activities.* Road transport trucks enter the Terminal along Penrhyn Road. The trucks access the applicable truck grid where they are either loaded or unloaded by an AutoStrad. Four truck weighbridges are utilised on the site. An empty container exchange area is positioned parallel to Penrhyn Road (eastern side of the terminal). Road transport trucks enter the Terminal from Penrhyn Road via Gate B110 and unloaded by heavy forklifts.
- *Rail siding activities.* Freight locomotives are serviced along the rail siding parallel to Penrhyn Road (northern side of the site). Locomotives enter the site from the north-east. Loading and unloading of rolling stock is undertaken by reach stackers. Trucks are loaded / unloaded of containers and drive back and forth from the rail siding to the truck grid on the opposite side of the rail siding.
- *Automated container yard activities.* Containers transit through the terminal via the automated yard. Current operations provide a storage capacity of approximately 5,000 ground slots, with an average of 4,000–8,000 containers located in the yard at any one time (depending on the time of year). The containers are manoeuvred through the automated yard, and to and from trucks at the truck grid via the use of AutoStrads. Approximately forty AutoStrads are available for use throughout the automated at any given time.
- *Quay crane activities.* Vessels are currently serviced at the site by eight quay cranes on Brotherson Dock. The cranes load and unload vessels with containers transferred to and from the automated container yard by AutoStrad.
- *Maintenance Activities.* Routine maintenance on equipment and plant is carried out in the purpose-built workshop, and when required on mobile plant in-situ e.g. quay cranes.

4.2 Adjacent Land Use

Areas surrounding the site comprises industrial, port relate, commercial, residential and recreational land uses, as described below.

4.2.1 Industrial and Commercial Uses

The main industrial land uses adjacent to the terminal are the Hutchison Ports Australia container terminal (formerly Sydney International Container Terminal (SICTL)), Caltex Oil Terminal and DP World Sydney Terminal. A number of additional industrial sites are located in the vicinity of the site, including the Orora Recycling, Orica, BOC, Air Liquid, Mobil and British Petroleum Oil Terminals, Savino Del Bene Australia, Warehouse Solutions International and Owens Transport. The Botany Industrial Park is located approximately one kilometre from the site.



Sydney (Kingsford Smith) Airport, Sydney's major domestic and international airport, is located approximately five kilometres west of the site. The Discovery Cove Business Park, a commercial business centre, is located in the vicinity of the Patrick PBT on Botany Road.

A goods freight rail line operates from Port Botany and services Patrick PBT, Hutchinson's container terminal, DP World Container Terminal, QUBE and Veolia. The Line links with the metropolitan freight and intermodal terminal Storage for goods occurs at the Cooks River and Botany Goods Yards, at Patrick PBT, Hutchinson's container terminal, DP World Container Terminal and various nearby haulage and container handling facilities e.g. Sydney Haulage.

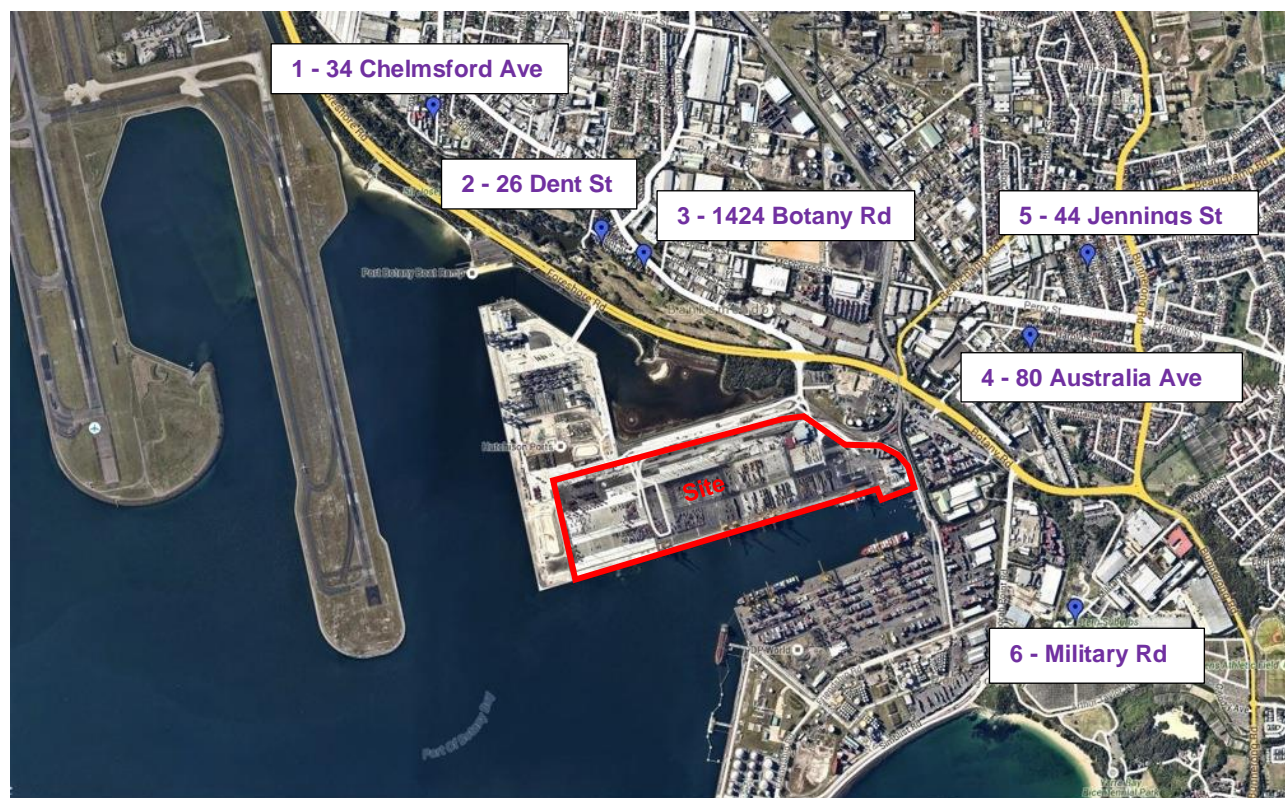
4.2.2 Residential, Recreation and Open Space Uses

Residential land uses are located to the east, north-east and north-west site, and include the suburbs of Botany, Banksmeadow, and Matraville. Residential receivers to the north-east and north-west are located from between 750 metres and 1,000 metres away. These residential areas identified are considered to be nearest to Patrick PBT facility.

The nearest schools, as measured from the Terminal's northern point, are Banksmeadow Primary and Matraville Primary. Both are located 1.6 kilometres away.

There are a number of recreational areas in the surrounding suburbs, including several areas of open space.

Figure 4-1 Ambient noise monitoring locations (local context)





5 NOISE MONITORING METHODOLOGY

A brief outline of the methodology applied to the measurement of the existing ambient noise environment has been detailed below.

5.1 Instrumentation

Background noise level measurements were carried out using a SVANTEK 979 Type 1 Precision Sound Level Meter (serial 34075) (operator attended noise monitoring), Acoustic Research Laboratories' statistical Environmental Noise Loggers, Type RION NL-42 (serial numbers 710677, 572558, 546393, 133013, 572559 and 572542) for long-term unattended noise monitoring. The instruments comply with Australian Standard *AS 1259 Acoustics – Sound Level Meters*.

All instrument sets were calibrated by a NATA accredited laboratory. A copy of the instrument sets calibration certificates has been included in Appendix H of this report.

The microphones were positioned approximately 1.5 m above ground level and were fitted with windsocks. Each instrument was calibrated before and after the measurement period to ensure the reliability and accuracy of the instrument. There were no significant variances observed in the reference signal between the pre-measurement and post-measurement calibrations.

The instruments were set on A-weighted, fast response and logged noise levels over fifteen minute statistical intervals. Observations were recorded during logger establishment for unattended noise monitoring and during the measurement interval for attended noise monitoring.

5.2 Measurement Locations

Locations consistent with those previously reported for the area were specifically referenced from the Patrick PBT biannual noise compliance studies, and as specified in Conditions L3.12 and L3.2 of the latest EPL (dated 13 June 2017).

The monitoring program comprised of monitoring at a total of six locations. These locations are shown in Figure 4-1. Information obtained during the noise monitoring program provides an adequate characterisation of the existing ambient noise profiles for the local area.

A description of each noise monitoring location is as follows.

5.2.1 Location 1: 34 Chelmsford Avenue, Botany

The unattended noise logger was located in the front yard of the residential property (facing the subject site). The noise logger was deployed approximately 2 metres from the front façade of the residential building, at a height of 1.5 metres above ground. Due to security reasons the logger was not able to be deployed at the front (western) boundary which is the nearest boundary to the subject site. The location was approximately 1,800 metres from the northwest boundary of the Patrick PBT site and approximately 2,170 metres from the berth docks. Attended monitoring was also carried out at this location.

Road traffic on Foreshore Road and Chelmsford Avenue, industry noise from the intervening Hutchison's container terminal, aircraft noise from Sydney Airport and residential construction in the vicinity are the main noise contributors observed as influencing the local ambient noise environment.

5.2.2 Location 2: 26 Dent Street, Botany

The unattended noise logger was located in the backyard of the residential property (facing the subject site). The noise logger was deployed approximately 10 m from the rear façade of the property, at a height of 1.5 metres above ground. The location was approximately 950 metres from the northwest boundary of the Patrick PBT site and approximately 1,350 metres from the berth docks. Attended monitoring was also carried out at this location.

Road traffic on Foreshore Road and Dent Street and the nearby Hutchison's container terminal, industrial activity and residential activity in the vicinity are the part noise contributors observed as influencing the local ambient noise environment.



The ambient noise setting was consistent with that of an urban noise environment. Road traffic noise from Botany Road and Foreshore Road were dominant noise sources for the area.

5.2.3 Location 3: 1424 Botany Road, Botany

The unattended noise logger was located at the rear of the residential property (facing the subject site). The noise logger was deployed approximately 10 m from the rear façade of the property, at a height of 1.5 metres above ground. The location was approximately 850 metres from the northwest boundary of the Patrick PBT site and approximately 1,200 metres from the berth docks. Attended monitoring was also carried out at this location.

Road traffic on Foreshore and Botany Roads, industrial activity in the area and the nearby Hutchison's container terminal are the part noise contributors observed as influencing the local ambient noise environment.

The ambient noise setting was consistent with that of an urban noise environment. Road traffic noise from Botany Road and Foreshore Road were dominant noise sources for the area.

5.2.4 Location 4: 80 Australia Avenue, Matraville

The logger was positioned at the front of the property, facing Australia Avenue. The location was considered indicative of the nearest potentially affected noise catchment area and positioned with an acceptable distance of separation from the nearby industrial buildings. Attended noise monitoring was also carried out at this location.

The monitoring location has a separation distance of approximately 900 metres from the eastern boundary of the site.

The noise monitoring location was typical of an urban noise environment affected by local traffic and intervening industrial premises between the subject site and the monitoring location (refer to Figure 4-1). The intervening industrial premises to the residences on Australia Avenue are Orora Recycling facility and Sydney Haulage Container facility.

5.2.5 Location 5: 44 Jennings Street, Matraville

Noise logging was conducted in the front yard of 44 Jennings Street. This location has previously been a source of complaints regarding noise emissions from the Patrick PBT site and was not part of the original biannual noise compliance monitoring. As part of Conditions L3.1 and L3.2 of the EPL version 13 June 2017, unattended and attended noise monitoring were conducted at this location. The unattended noise logger was located at the rear of the front yard of the residential property. Attended noise monitoring was also undertaken at this location.

The monitoring location is at a separation distance of approximately 1,100 m from the site's eastern boundary.

The noise monitoring location was typical of an urban noise environment mainly affected by local road traffic and intervening industrial premises between the subject site and the monitoring location (refer to Figure 4-1). Intervening industries observed to be contributing to the local ambient noise environment are Orora Recycling facility and Sydney Haulage Container facility.

5.2.6 Location 6: Military Road, Matraville

Unattended and attended noise monitoring was undertaken within the Eastern Suburbs Crematorium. The noise logger was placed along the south-eastern fence of the site. Attended noise measurements were obtained from the same location.

The monitoring location has a separation distance of approximately 1,000 metres from the south boundary of the site.

Local traffic and intervening industries, such as DP World Container Terminal, P&O Trans Australia facility and Warehouse Solution International facility and activity associated with the crematorium are main noise contributors observed as influencing the local ambient noise environment.



5.3 Meteorological Conditions

Attended noise monitoring results were not affected by adverse meteorological conditions based on real-time local observations during the monitoring period.

Any unattended noise monitoring data affected by inclement weather has been removed from the assessment with reference to the Bureau of Meteorology's (BOM) daily rainfall data.

6 AMBIENT NOISE MONITORING

Unattended noise monitoring was undertaken for a period of not less than 2 weeks as per Condition E1.2 of the EPL, between Monday 30 April and Monday 14 May 2018 at Locations 1 to 6 as indicated in Figure 4-1.

Attended noise monitoring at all locations was undertaken during the daytime period on Monday 14 May 2018, evening period on Thursday 3 May 2018 and night-time period on Thursday 10 May and Friday 11 May 2018.

Local meteorological conditions were satisfactory during the attended monitoring programme.

Observations made as part of these studies categorise the local noise environment as being urban/urban with industrial interface. Observations of existing noise sources support this definition and are described as follows:

- an 'urban hum' is a distinct feature of the ambient noise environment;
- the primary noise source for the area is traffic noise originating from heavy and passenger vehicles travelling along major and local traffic routes; and
- noise from multiple industrial sources is audible at several of the monitoring locations.

Residential activity and local fauna such as birds, bats and insects were also sporadically audible. Aircraft noise was frequently audible. Noise emissions from train warning bells, installed at Goods Railway Line between the Caltex and the Patrick PBT was also audible. Truck engines, engine brakes, forklifts and reversing beepers from surrounding roads and nearby industrial facilities were frequently audible during the monitoring. Night time road works were audible at some locations during evening and night time periods. Ambient noise profiles were typical of an urban area.

The daily noise descriptor graphs obtained as part of this assessment (included in the Appendices) show that the current ambient noise environment, as measured at each monitoring location, generally fluctuated in accordance with diurnal patterns.

Noise levels for the areas surrounding the monitoring locations were found to be primarily influenced by urban and industrial noise sources consistent with the setting of the area.

Background noise levels measured through the use of the environmental noise loggers are influenced by all local sources of noise. The results are to be viewed in conjunction with the attended noise levels presented in Section 0 of this report.

Observations during the attended noise monitoring programme indicated short term peaks (warning alarms and impact events) either at Port Botany or surrounding industrial premises were generally audible at the nearest residential receivers to the site. Residential activity, off-site industrial noise, localised road works and traffic flow noise (both distant and local) were primary influences of the measured ambient noise levels.



6.1 Unattended Noise Monitoring Results

Unattended noise monitoring was carried out at six noise monitoring locations (Locations 1 to 6) during the daytime, evening and night-time periods. The results of the unattended monitoring are discussed below.

6.1.1 Location 1: 34 Chelmsford Avenue, Botany

Table 6-1 presents the unattended noise monitoring results at Chelmsford Avenue, Botany.

Table 6-1 Unattended monitoring results (Location 1: 34 Chelmsford Avenue)

Date	Day (7.00 am–6.00 pm)			Evening (6.00 pm–10.00 pm)			Night (10.00 pm–7.00 am)		
	<i>L_{Aeq}</i>	<i>L_{A1}</i>	<i>L_{A90}</i>	<i>L_{Aeq}</i>	<i>L_{A1}</i>	<i>L_{A90}</i>	<i>L_{Aeq}</i>	<i>L_{A1}</i>	<i>L_{A90}</i>
30/4/18	60.4	61.3	42.7	53.8	57.5	42.9	52.6	50.4	40.3
1/5/18	57.6	61	40.4	52.5	56.1	44.1	50.7	50.4	38.9
2/5/18	56.4	60.9	41.5	53.6	57.8	44.8	51.0	50.3	39.2
3/5/18	58.7	60.6	42.2	54.8	59.2	45.1	52.5	51	40.2
4/5/18	56.6	60.3	45.5	54.7	59.8	44.5	50.7	50.2	34.1
5/5/18	56.0	59.7	38.9	49.9	53.6	43.2	49.8	49.1	37.3
6/5/18	53.5	58.3	41.0	50.9	53.9	43.1	54.5	49.2	37.9
7/5/18	55.7	60.7	43.7	53.0	57.1	43.2	52.9	51.7	40.6
8/5/18	55.4	60	41.5	52.7	56.9	45.6	52.6	53	43.8
9/5/18	55.9	60.4	41.8	53.3	57.8	45.0	52.1	51.4	40.8
10/5/18	57.0	60.8	42.7	53.6	57.2	45.9	50.5	51	37.3
11/5/18	55.1	58.5	47.0	56.1	61.5	46.0	53.0	53.5	37.7
12/5/18	55.4	58.6	47.0	52.6	55	45.1	50.8	52.5	38.9
13/5/18	60.4	62.7	51.9	57.5	62	50.4	56.6	58.3	45.1
Median	56.3	60.1	42	53.4	57.2	44.8	52	51.1	38.9

Notes: Values expressed as dB(A)

Values in italics removed from Median calculation due to inclement weather

dB(A) = decibels, A-weighted, values rounded to nearest 1 dB(A)

L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level

L_{A1} = A-weighted sound pressure level exceeded for 1% of the time

L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background)

Data measured during inclement weather has been removed from the median values shown.

Median *L_{Aeq}* unattended noise measurements exceed the EPL day, evening and night-time *L_{Aeq}* noise limits for Chelmsford Avenue. The daily average daytime, evening and night-time *L_{Aeq}* noise levels also exceed the EPL noise limits.



The median night-time L_{A1} noise level of 51 dB(A) complies with the night-time L_{A1} noise limit of 53 dB(A) for Chelmsford Avenue. The daily average night-time L_{A1} noise levels complies with the EPL noise limit on all of the monitoring days except 11 May and 13 May 2018.

It should be noted that operational noise from Patrick PBT was not audible during daytime, evening and night-time operator attended noise monitoring. Hence, the exceedances of the EPL from the unattended monitoring are unlikely to be due to Patrick PBT operations. Based on this observation, operational noise from Patrick PBT facility is considered to comply with the EPL noise limits at the residences on Chelmsford Avenue.

6.1.2 Location 2: 26 Dent Street, Botany

Table 6-2 presents the unattended noise monitoring results at Dent Street, Botany.

Table 6-2 Unattended monitoring results (Location 2: 26 Dent Street)

Date	Day (7.00 am–6.00 pm)			Evening (6.00 pm–10.00 pm)			Night (10.00 pm–7.00 am)		
	L_{Aeq}	L_{A1}	L_{A90}	L_{Aeq}	L_{A1}	L_{A90}	L_{Aeq}	L_{A1}	L_{A90}
30/4/18	53.2	59.3	43.5	50.1	58.4	43.3	52.1	53.6	44.0
1/5/18	52.4	59.7	42.3	49.6	57.1	44.4	51.1	54.6	41.8
2/5/18	51.3	59.8	41.6	50.0	58	44.9	51.8	55	43.2
3/5/18	53.2	61.8	43.2	50.8	59	46.0	49.9	52.2	43.2
4/5/18	62.5	64.6	48.6	55.0	61.4	47.1	50.0	54.3	38.3
5/5/18	52.7	60.8	40.0	48.4	52.8	42.9	49.8	52.5	41.4
6/5/18	51.9	59.6	41.4	49.1	58.7	43.3	52.1	53.7	42.3
7/5/18	54.2	62.1	44.8	49.8	57.8	44.0	53.4	56.3	44.7
8/5/18	53.9	60.3	42.1	50.1	56	45.9	50.8	54.8	43.5
9/5/18	51.2	59.2	41.2	50.8	58.2	44.7	52.5	56.8	44.5
10/5/18	55.2	61.9	43.4	55.5	62.5	49.7	51.4	58	42.6
11/5/18	55.4	62.2	49.5	56.3	64	48.9	55.3	56.7	41.8
12/5/18	55.9	62.1	49.3	53.5	59.7	46.9	50.5	59.1	41.4
13/5/18	58.2	64.7	50.3	56.9	64.5	49.1	53.9	59.1	44.7
Median	55.6	61	42.8	52.3	58.7	44.9	51.9	55.2	42.6

Notes: Values expressed as dB(A)

Values in italics removed from Median calculation due to inclement weather

dB(A) = decibels, A-weighted, values rounded to nearest 1 dB(A)

L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level

L_{A1} = A-weighted sound pressure level exceeded for 1% of the time

L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background)

Data measured during inclement weather has been removed from the median values shown.



Median L_{Aeq} unattended noise measurements exceed the EPL day, evening and night-time L_{Aeq} noise limits for Dent Street. The daily average daytime, evening and night-time L_{Aeq} noise levels also exceed the EPL noise limits.

The median night-time L_{A1} noise level of 55 dB(A) complies with the night-time L_{A1} noise limit of 55 dB(A) for Dent Street. The daily average night-time L_{A1} noise levels complies with the EPL noise limit on all of the monitoring days except 7 May and 9 May to 13 May 2018.

It should be noted that operational noise from Patrick PBT was not audible during daytime, evening and night-time operator attended noise monitoring. Hence, the exceedances of the EPL from the unattended monitoring are unlikely to be due to Patrick PBT operations. Based on this observation, operational noise from Patrick PBT facility is considered to comply with the EPL noise limits at the residences on Dent Street.

6.1.3 Location 3: 1424 Botany Road, Botany

Table 6-3 presents the unattended noise monitoring results at Botany Road, Botany.

Table 6-3 Unattended monitoring results (Location 3: 1424 Botany Road)

Date	Day (7.00 am–6.00 pm)			Evening (6.00 pm–10.00 pm)			Night (10.00 pm–7.00 am)		
	L_{Aeq}	L_{A1}	L_{A90}	L_{Aeq}	L_{A1}	L_{A90}	L_{Aeq}	L_{A1}	L_{A90}
30/4/18	54.5	59.8	44.4	53.3	56.4	47.2	57.0	58.6	48.9
1/5/18	55.3	57.6	46.2	50.7	54.4	45.7	54.5	56.1	45.0
2/5/18	53.8	57.5	45.7	52.8	58	47.0	55.6	57.2	46.1
3/5/18	55.4	59.1	51.0	53.1	56	47.8	53.5	55.1	45.9
4/5/18	58.3	62	42.5	57.5	61	50.0	53.6	53.7	41.5
5/5/18	53.7	56	43.6	51.7	53.3	43.4	53.3	56	43.6
6/5/18	52.3	55.7	46.9	48.0	50.6	43.8	55.8	57.9	45.9
7/5/18	54.8	58.2	45.3	51.2	54.9	46.1	56.7	56.3	48.5
8/5/18	55.1	57.9	45.3	51.9	55.2	47.1	55.0	56.9	47.0
9/5/18	54.0	57.1	47.2	53.4	56.6	47.1	55.9	57.2	48.0
10/5/18	57.2	60.2	52.5	57.8	61.4	51.5	54.3	57.4	46.1
11/5/18	57.7	60.9	51.6	58.4	63.3	50.8	55.1	56.3	42.9
12/5/18	58.0	61.2	54.3	55.1	58.7	49.3	53.8	59.1	43.0
13/5/18	60.4	63.5	44.4	61.9	65.8	53.3	57.9	59.1	47.9
Median	55.9	58.7	46	54.1	56.9	47.1	55.1	56.8	45.9

Notes: Values expressed as dB(A)

Values in italics removed from Median calculation due to inclement weather

dB(A) = decibels, A-weighted, values rounded to nearest 1 dB(A)

L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level

L_{A1} = A-weighted sound pressure level exceeded for 1% of the time



L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background)

Data measured during inclement weather has been removed from the median values shown.

Median L_{Aeq} unattended noise measurements exceed the EPL day, evening and night-time L_{Aeq} noise limits for Botany Road. The daily average daytime, evening and night-time L_{Aeq} noise levels also exceed the EPL noise limits.

The daily average night-time L_{A1} noise levels achieves the EPL noise limit on most of the monitoring days except on 2 May and 5 May to 13 May 2018.

It should be noted that operational noise from Patrick PBT was not audible during daytime, evening and night-time operator attended noise monitoring. Hence, the exceedances of the EPL from the unattended monitoring are unlikely to be due to Patrick PBT operations. Based on this observation, operational noise from Patrick PBT facility is considered to comply with the EPL noise limits at the residences on Botany Road.

6.1.4 Location 4: 80 Australia Avenue, Matraville

Table 6-4 presents the unattended noise monitoring results at Australia Avenue, Matraville.

Table 6-4 Unattended monitoring results (Location 4: 80 Australia Avenue)

Date	Day (7.00 am–6.00 pm)			Evening (6.00 pm–10.00 pm)			Night (10.00 pm–7.00 am)		
	L_{Aeq}	L_{A1}	L_{A90}	L_{Aeq}	L_{A1}	L_{A90}	L_{Aeq}	L_{A1}	L_{A90}
30/4/18	53.9	63	44.4	53.1	59.4	47.4	52.2	55.9	47.3
1/5/18	51.5	60.8	40.8	46.9	55.9	40.9	49.9	54.7	45.1
2/5/18	49.9	59.9	41.2	48.4	57.7	41.5	51.1	54.9	44.6
3/5/18	53.1	62.3	41.7	49.0	59.7	41.7	46.5	50.3	39.9
4/5/18	56.5	63.3	45.7	54.6	60.2	50.6	52.0	56.3	47.7
5/5/18	53.1	61.6	40.4	50.2	57.9	42.0	52.1	56.6	48.1
6/5/18	49.7	60	41.4	46.3	54.9	39.5	51.2	53.8	44.8
7/5/18	51.4	61.2	41.5	46.7	56.8	40.8	52.0	55.3	46.6
8/5/18	51.9	61.4	41.3	47.7	56.8	42.2	52.4	56.5	47.6
9/5/18	54.1	61.6	40.4	48.4	57.7	41.2	51.4	55.9	47.2
10/5/18	53.5	61.5	41.7	54.4	61.7	49.1	51.7	58.1	46.5
11/5/18	55.1	62.5	48.7	53.2	60.9	47.2	54.7	61.9	46.2
12/5/18	56.2	62.3	51.8	55.0	60.3	52.4	57.2	63.2	51.5
13/5/18	59.7	66.1	54.2	61.6	68.6	55.0	58.5	63.2	55.0
Median	53.5	61.6	41.4	51.5	58.5	42	52.5	56.4	46.6

Notes: Values expressed as dB(A)

Values in italics removed from Median calculation due to inclement weather

dB(A) = decibels, A-weighted, values rounded to nearest 1 dB(A)

L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level



L_{A1} = A-weighted sound pressure level exceeded for 1% of the time

L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background)

Data measured during inclement weather has been removed from the median values shown.

Median L_{Aeq} unattended noise measurements exceed the EPL day, evening and night-time L_{Aeq} noise limits for Australia Avenue. The daily average daytime, evening and night-time L_{Aeq} noise levels also exceed the EPL noise limits.

The daily average night-time L_{A1} noise levels complies with the EPL noise limit on all of the monitoring days except 30 April, 4 May to 5 May and 8 May to 13 May 2018.

It should be noted that operational noise from Patrick PBT was not audible during daytime, evening and night-time operator attended noise monitoring. Hence, the exceedances of the EPL from the unattended monitoring are unlikely to be due to Patrick PBT operations. Based on this observation, operational noise from Patrick PBT facility is considered to comply with the EPL noise limits at the residences on Australia Avenue.

6.1.5 Location 5: 44 Jennings Street, Matraville

Table 6-5 presents the unattended noise monitoring results at Jennings Street, Matraville.

Table 6-5 Unattended monitoring results (Location 5: 44 Jennings Street)

Date	Day (7.00 am–6.00 pm)			Evening (6.00 pm–10.00 pm)			Night (10.00 pm–7.00 am)		
	L _{Aeq}	L _{A1}	L _{A90}	L _{Aeq}	L _{A1}	L _{A90}	L _{Aeq}	L _{A1}	L _{A90}
30/4/18	55.4	62.5	39.8	52.1	58.2	40.5	50.9	49.4	41.9
1/5/18	56.6	62.8	37.3	57.2	57.7	40.4	50.3	47.2	38.3
2/5/18	56.8	62.7	38.4	52.3	47.7	39.7	50.3	54.9	39.0
3/5/18	55.9	61.6	39.8	53.7	60	41.8	49.2	47.8	36.1
4/5/18	56.5	62	43.0	53.8	58.2	40.9	48.0	47.7	38.5
5/5/18	55.2	61.7	37.6	52.0	55.8	38.5	47.5	47.8	40.6
6/5/18	53.3	59.8	37.4	52.1	57.1	38.0	52.5	48.1	38.1
7/5/18	56.7	63	39.9	53.1	59	39.7	52.0	48.4	38.9
8/5/18	56.2	62.2	38.3	54.4	59.5	39.5	50.6	48.7	39.1
9/5/18	57.1	62.8	37.3	53.8	59.9	40.7	50.7	53.8	40.7
10/5/18	56.0	62.4	39.6	53.5	59.7	44.6	51.5	59.8	40.3
11/5/18	57.4	67.5	44.9	54.6	65.7	43.7	50.9	59.2	40.9
12/5/18	56.2	66.9	43.6	53.0	65.5	43.4	50.3	59.3	40.3
13/5/18	56.8	67.4	46.1	56.4	67.1	46.1	52.0	59.2	42.4
Median	56.3	62.9	39	53.8	58.7	40.5	50.6	51.7	39.1

Notes: Values expressed as dB(A)

Values in italics removed from Median calculation due to inclement weather

dB(A) = decibels, A-weighted, values rounded to nearest 1 dB(A)



L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level
 L_{A1} = A-weighted sound pressure level exceeded for 1% of the time
 L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background)

Data measured during inclement weather has been removed from the median values shown.

Median L_{Aeq} unattended noise measurements exceed the EPL day, evening and night-time L_{Aeq} noise limits for Jennings Street. The daily average daytime, evening and night-time L_{Aeq} noise levels also exceed the EPL noise limits.

The median night-time L_{A1} noise level of 52 dB(A) complies with the night-time L_{A1} noise limit of 55 dB(A) for Jennings Street. The daily average night-time L_{A1} noise levels complies with the EPL noise limit on all of the monitoring days except 10 May to 13 May 2018.

It should be noted that operational noise from Patrick PBT was not audible during daytime, evening and night-time operator attended noise monitoring. Hence, the exceedances of the EPL from the unattended monitoring are unlikely to be due to Patrick PBT operations. Based on this observation, operational noise from Patrick PBT facility is considered to comply with the EPL noise limits at the residences on Jennings Street.

6.1.6 Location 6: Military Road, Matraville

Table 6-6 presents the unattended noise monitoring results at Military Road, Matraville.

Table 6-6 Unattended monitoring results (Location 6: Military Road)

Date	Day (7.00 am–6.00 pm)			Evening (6.00 pm–10.00 pm)			Night (10.00 pm–7.00 am)		
	L _{Aeq}	L _{A1}	L _{A90}	L _{Aeq}	L _{A1}	L _{A90}	L _{Aeq}	L _{A1}	L _{A90}
30/4/18	51.4	65.2	41.1	54.0	63	41.9	53.1	59.6	46.9
1/5/18	54.1	63.4	40.7	54.4	63.1	44.7	52.0	59.6	44.8
2/5/18	57.1	64.1	43.9	54.7	61.7	52.5	54.3	61.3	46.3
3/5/18	55.3	64.3	45.0	55.1	63.8	45.3	54.3	60.6	45.9
4/5/18	56.0	64.2	48.0	53.5	61.9	46.2	50.8	57.1	43.2
5/5/18	52.7	63.2	38.5	49.1	59.9	39.7	50.8	57.2	44.1
6/5/18	53.1	63.6	40.6	50.4	60.8	44.5	53.2	58.8	45.1
7/5/18	60.5	64.5	45.3	49.7	59.9	43.7	52.9	58.4	45.3
8/5/18	54.4	63.8	41.0	54.8	61.9	44.5	52.3	59.7	45.7
9/5/18	53.5	63.1	42.0	50.3	61	43.5	52.3	59.2	46.2
10/5/18	54.2	63	44.5	56.3	63.6	48.8	51.9	57.8	45.0
11/5/18	54.7	62.8	49.0	53.1	60.9	47.4	52.1	83.5	45.7
12/5/18	66.9	74.2	46.8	71.0	80.8	47.8	72.4	81.7	47.1
13/5/18	80.6	83.1	51.4	85.1	96.1	56.4	73.8	81.4	49.3
Median	55.8	63.8	42.9	53.6	61.8	44.5	52.7	59	45.3

Notes: Values expressed as dB(A)



Values in italics removed from Median calculation due to inclement weather

dB(A) = decibels, A-weighted, values rounded to nearest 1 dB(A)

L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level

L_{A1} = A-weighted sound pressure level exceeded for 1% of the time

L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background)

Data measured during inclement weather has been removed from the median values shown.

Median L_{Aeq} unattended noise measurements exceed the EPL day, evening and night-time L_{Aeq} noise limits for Military Road. The daily average daytime, evening and night-time L_{Aeq} noise levels also exceed the EPL noise limits.

The unattended noise logger located on Military Road was most affected by bad weather towards to end of the monitoring period. High wind and rain on the last few days have artificially raised the background noise level in the area. This data has been presented in Table 6-6 on the previous page, the data has not been used to determine median values for the measurement period.

It should be noted that operational noise was observed during the operator attended noise monitoring was not audible during daytime periods, and just audible during evening and night-time periods during low ambient levels of between 50 dB(A) to 60 dB(A) and the source could not be determined. It was also observed that operational noise from adjoining industrial premises was present and noise associated with activity at the crematorium during the daytime and evening which might have masked any operational noise from Patrick PBT. Hence, the exceedances of the EPL from the unattended monitoring are unlikely to be due to Patrick PBT operations. Based on this observation, operational noise from Patrick PBT facility is considered to comply with the EPL noise limits at the residences on Military Road.

6.2 Attended Noise Monitoring Results

Attended noise monitoring was carried out at the six sensitive receiver noise monitoring locations during the daytime, evening and night-time periods. The results of the attended monitoring are presented in Table 6-7 to Table 6-12.

The results of the attended monitoring are discussed below.

6.2.1 Location 1: 34 Chelmsford Avenue, Botany

The results of the attended background noise monitoring undertaken at 34 Chelmsford Avenue are presented in Table 6-7 below.



Table 6-7 Attended monitoring results (Location 1: 34 Chelmsford Avenue)

Period	Date of measurement	Time	Measured Noise Level			Comments
			L _{A90}	L _{Aeq}	L _{A1}	
Day	14/5/2018	15:12-15:27	54	59	68	Road traffic 56-68 dB(A) Aircraft 60-67 dB(A) S.S. 47-54 dB(A)
Evening	3/5/2018	20:14-20:29	45	55	65	Road traffic 55-72 dB(A) Aircraft 55-60 dB(A) Local fauna 45 dB(A) S.S. 43-45 dB(A)
Night	10/5/2018	22:50-23:05	43	51	61	Road traffic 45-61 dB(A) S.S. 39-43 dB(A)

Notes: Values expressed as dB(A) and rounded to nearest 1 dB(A)
 L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background)
 L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level
 L_{A1} = A-weighted sound pressure level exceeded for 1% of the time
 dB(A) = decibels, A-weighted
 All values from comments are approximate readings
 SS (steady state) noise level is the operator observed baseline noise level where sources influencing the statistical results are determined.

From the attended measurements presented in Table 6-7 above, the operational noise from Patrick PBT was not audible during day, evening and night-time periods. Based on this observation, the operational noise from Patrick PBT is considered to comply with the EPL day, evening and night noise limits at this monitoring location.

Road traffic noise on Chelmsford Avenue and Foreshore Road were the dominant noise sources during the attended measurements and influenced the L_{Aeq} and L_{A1} descriptors. Noise generated by aircraft pass-by and industrial source activity was also audible during the measurements.

6.2.2 Location 2: 26 Dent Street, Botany

The results of the attended background noise monitoring undertaken at 26 Dent Street are presented in Table 6-8 below.

Table 6-8 Attended monitoring results (Location 2: 26 Dent Street)

Period	Date of measurement	Time	Measured Noise Level			Comments
			L _{A90}	L _{Aeq}	L _{A1}	
Day	14/5/2018	14:48-15:03	54	58	65	Road traffic 58-65 dB(A) Aircraft 52-55 dB(A) S.S. 46-54 dB(A)
Evening	3/5/2018	20:37-20:52	45	48	57	Road traffic 45-57 dB(A) Aircraft 50-57 dB(A) Industrial noise 43-46 dB(A) S.S. 44-46 dB(A)
Night	10/5/2018	23:12-23:27	44	49	57	Road traffic 45-57 dB(A) Aircraft 56-60 dB(A) S.S. 40-44 dB(A)

Notes: Values expressed as dB(A) and rounded to nearest 1 dB(A)
 L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background)
 L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level
 L_{A1} = A-weighted sound pressure level exceeded for 1% of the time
 dB(A) = decibels, A-weighted
 All values from comments are approximate readings
 SS (steady state) noise level is the operator observed baseline noise level where sources influencing the statistical results are determined.



From the attended measurements presented in Table 6-8 above, the operational noise was not audible during day, evening and night time periods. Based on this observation, the operational noise from Patrick PBT is considered to comply with the EPL day, evening and night noise limits at this monitoring location.

Road traffic noise from Dent Street and Foreshore Road was the dominant noise source during the attended measurements and influenced the L_{Aeq} and L_{Amax} descriptors. Noise generated by aircraft pass-by and industrial source activity was also audible during the measurements.

6.2.3 Location 3: 1424 Botany Road, Botany

The results of the attended background noise monitoring undertaken at 1424 Botany Road are presented in Table 6-9 below.

Table 6-9 Attended monitoring results (Location 3: 1424 Botany Road)

Period	Date of measurement	Time	Measured Noise Level			Comments
			L_{A90}	L_{Aeq}	L_{A1}	
Day	14/5/2018	14:23-14:38	58	63	68	Road traffic 60-68 dB(A) Aircraft 60-68 dB(A) S.S. 50-58 dB(A)
Evening	3/5/2018	20:57-21:12	50	53	62	Road traffic 50-60 dB(A) Aircraft 55-62 dB(A) S.S. 47-50 dB(A)
Night	10/5/2018	23:37-23:52	52	56	60	Road traffic 50-60 dB(A) Road works 55-60 dB(A) (short term noise) S.S. 47-52 dB(A)

Notes: Values expressed as dB(A) and rounded to nearest 1 dB(A)
 L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background)
 L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level
 L_{A1} = A-weighted sound pressure level exceeded for 1% of the time
 dB(A) = decibels, A-weighted
 All values from comments are approximate readings
 SS (steady state) noise level is the operator observed baseline noise level where sources influencing the statistical results are determined.

From the attended measurements presented in Table 6-9 above, the operational noise was not audible during day, evening and night time periods. Based on this observation, the operational noise from Patrick PBT is considered to comply with the EPL day, evening and night noise limits at this monitoring location.

Road traffic noise from Botany Road and Foreshore Road was the dominant noise source during the attended measurements and influenced the L_{Aeq} and L_{A1} descriptors. Noise generated by night time road works on Botany Road and occasional aircraft pass-by was also audible during daytime and evening measurement periods.



6.2.4 Location 4: 80 Australia Avenue, Matraville

The results of the attended background noise monitoring undertaken at 80 Australia Avenue are presented in Table 6-10 below.

Table 6-10 Attended monitoring results (Location 4: 80 Australia Avenue)

Period	Date of measurement	Time	Measured Noise Level			Comments
			L _{A90}	L _{Aeq}	L _{A1}	
Day	14/5/2018	13:33-13:48	54	57	64	Road traffic 55-64 dB(A) Industrial noise from adjoining Orora Recycling facility 50-55 dB(A) S.S. 50-54 dB(A)
Evening	3/5/2018	21:44-21:59	44	50	63	Road traffic 55-63 dB(A) Aircraft 58-65 dB(A) Industrial noise from adjoining Orora Recycling facility 40-45 dB(A) S.S. 40-44 dB(A)
Night	11/05/2018	00:23-00:38	44	47	52	Road traffic 45-52 dB(A) Local fauna 46-55 dB(A) Industrial noise from adjoining Orora Recycling facility 40-45 dB(A) S.S. 40-44 dB(A)

Notes: Values expressed as dB(A) and rounded to nearest 1 dB(A)
 L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background)
 L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level
 L_{A1} = A-weighted sound pressure level exceeded for 1% of the time
 dB(A) = decibels, A-weighted
 All values from comments are approximate readings
 SS (steady state) noise level is the operator observed baseline noise level where sources influencing the statistical results are determined.

From the attended measurements presented in Table 6-10 above, the operational noise was not audible during day, evening and night time periods. Based on this observation, the operational noise from Patrick PBT is considered to comply with the EPL day, evening and night noise limits at this monitoring location.

Nearby industrial noise (Orora Recycling) and road traffic on Australia Avenue and Botany Road were the primary influence during the day, evening and night-time periods at Australia Avenue. Noise generated by occasional aircraft pass-by and local fauna noise was also audible during the measurements.

6.2.5 Location 5: 44 Jennings Street, Matraville

The results of the attended background noise monitoring undertaken at Jennings Street are presented in Table 6-11 below. It should be noted that attended noise measurements were conducted outside of the residential premises, at the front boundary on Jennings Street.

Table 6-11 Attended monitoring results (Location 5: Jennings Street)

Period	Date of measurement	Time	Measured Noise Level			Comments
			L _{A90}	L _{Aeq}	L _{A1}	
Day	14/5/2018	13:08-13:23	47	58	71	Road traffic 55-71 dB(A) S.S. 43-47 dB(A)
Evening	3/5/2018	22:03-22:18	41	51	65	Road traffic 52-65 dB(A) S.S. 37-41 dB(A)
Night	11/5/2018	00:46-01:01	41	45	50	Road traffic 42-50 dB(A) S.S. 38-41 dB(A)

Notes: Values expressed as dB(A) and rounded to nearest 1 dB(A)
 L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background)



L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level
 L_{A1} = A-weighted sound pressure level exceeded for 1% of the time
 dB(A) = decibels, A-weighted
 All values from comments are approximate readings
 SS (steady state) noise level is the operator observed baseline noise level where sources influencing the statistical results are determined.

From the attended measurements presented in Table 6-11 above, the operational noise was not audible during day, evening and night time periods. Based on this observation, the operational noise from Patrick PBT is considered to comply with the EPL day, evening and night noise limits at this monitoring location.

Road traffic on Jennings Street and Perry Street were the primary influences during the day, evening and night-time measurements at Jennings Street.

6.2.6 Location 6: Military Road, Matraville

The results of the attended background noise monitoring undertaken at Military Road are presented in Table 6-12 below.

Table 6-12 Attended monitoring results (Location 6: Military Road)

Period	Date of measurement	Time	Measured Noise Level			Comments
			L_{A90}	L_{Aeq}	L_{A1}	
Day	14/5/2018	13:57-14:12	54	61	72	Road traffic 65-72 dB(A) S.S. 48-54 dB(A)
Evening	3/5/2018	21:20-21:35	50	62	73	Road traffic 60-73 dB(A) Operational noise such warning alarms and forklifts were just audible at ambient levels of 50-60 dB(A) S.S. 47-50 dB(A)
Night	11/5/2018	00:02-00:17	52	55	67	Road traffic 50-67 dB(A) Operational noise such warning alarms and forklifts were just audible at ambient levels of 50-58 dB(A) S.S. 48-52 dB(A)

Notes: Values expressed as dB(A) and rounded to nearest 1 dB(A)
 L_{A90} = A-weighted sound pressure level exceeded for 90% of the time (background)
 L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level
 L_{A1} = A-weighted sound pressure level exceeded for 1% of the time
 dB(A) = decibels, A-weighted
 All values from comments are approximate readings
 SS (steady state) noise level is the operator observed baseline noise level where sources influencing the statistical results are determined.

From the attended measurements presented in Table 6-12 above, the operational noise was audible during night time periods at ambient levels of between 50 dB(A) and 60 dB(A) and the direct source could not be determined. Based on this observation, the operational noise from Patrick PBT is considered to comply with the EPL day, evening and night noise limits at this monitoring location.

Road traffic on Military Road and activity associated with the crematorium in the facility were the primary influences during the day, evening and night-time measurements at Military Road.



7 STATEMENT OF EXISTING INDUSTRIAL NOISE COMPLIANCE

In providing the statement of existing noise compliance status, the results of the noise monitoring have been reviewed. The steady state noise levels from Patrick PBT operations at locations that were just audible were estimated through observations during periods of minimal extraneous noise. Multiple noise sources were audible at all locations and could not be totally eliminated from the monitoring period, therefore estimates are likely to be overly conservative and overall compliance is generally based on the observed site influence, and measurement statistics.

7.1 Operations

It is understood that standard operations of Patrick PBT facility were generally present during the 2 weeks monitoring period.

7.2 Review of Measured Noise Levels

7.2.1 Daytime Period

Measured ambient noise levels from the unattended monitoring and attended measurements show exceedances of the EPL daytime L_{Aeq} limits at Chelmsford Avenue, Dent Street, Botany Road, Australia Avenue, Jennings Street and Military Road.

However, operational noise from Patrick PBT was not audible at all 6 monitoring locations during the daytime attended noise surveys. Based on this observation, operational noise impacts from Patrick PBT facility are considered to comply with the EPL daytime noise limits.

Dominant noise sources at all 6 monitoring locations were mainly road traffic noise from surrounding roads and local activity (residential, industrial, road works and construction).

7.2.2 Evening Period

Measured ambient noise levels from the unattended monitoring and attended measurements show exceedances of the EPL evening L_{Aeq} limits at Chelmsford Avenue, Dent Street, Botany Road, Australia Avenue, Jennings Street and Military Road.

Operational noise was just audible at the Military Road location at low ambient levels of between 50-60 dB(A), but the source could not be determined. The operation noise observed was over a very short duration (usually no more than 30 seconds). This observed noise level from the Military Road monitoring location complies with the 42 dB(A) $L_{Aeq(15min)}$, 40 dB(A) $L_{Aeq(9hour)}$ and 55 dB(A) L_{A1} night-time noise limits.

Dominant noise sources at all 6 monitoring locations were mainly road traffic noise from surrounding roads and local activity (residential, industrial and road works).

7.2.3 Night-time Period

Measured ambient noise levels from the unattended monitoring and attended measurements show exceedances of the EPL night-time L_{Aeq} limits at Chelmsford Avenue, Dent Street, Botany Road, Australia Avenue, Jennings Street and Military Road.

Operational noise was just audible at the Military Road location at low ambient levels of between 50-58 dB(A), but the source could not be determined. The operation noise observed was over a very short duration (usually no more than 30 seconds). This observed noise level from the Military Road monitoring location complies with the 42 dB(A) $L_{Aeq(15min)}$, 40 dB(A) $L_{Aeq(9hour)}$ and 55 dB(A) L_{A1} night-time noise limits.

Operational noise from Patrick PBT was not audible at the Chelmsford Avenue, Dent Street, Botany Road, Australia Avenue and Jennings Street monitoring locations during the attended noise surveys. Based on these observations, operational noise impacts from Patrick PBT facility are considered to comply with the EPL evening noise limits.

Dominant noise sources at all 6 monitoring locations were mainly road traffic noise from surrounding roads and local activity (residential, industrial and road works).



8 CONCLUSION

This report presents the findings of the May 2018 environmental noise compliance monitoring for the Patrick Stevedores' Port Botany Terminal (Patrick PBT) operations.

Attended and unattended noise monitoring was carried out to determine compliance with the established noise limits at the nearest affected receivers.

Existing noise levels at the nearest receptors are considered high. Noise generated by surrounding industrial premises, localised road works, road traffic, local fauna, residential activities and aircraft activities were the primary contributors to the L_{Aeq} and L_{A1} descriptors during the daytime, evening and night-time measurements.

It was observed that operational noise was not audible at the Chelmsford Avenue, Dent Street, Botany Road, Australia Avenue and Jennings Street monitoring locations, and was just audible at the Military Road monitoring location when ambient levels were low, but the direct source was indeterminable. Based on this observation, Patrick PBT operational noise is considered to comply with the EPL day, evening and night-time noise limits.

It is a finding of this compliance assessment that the current operation will comply with the established licence limits at all locations during the daytime, evening and night-time periods.

Assessment of the measured residential noise levels indicated no annoying characteristics (tonality) were present. No sleep disturbance issues were present.

Approved:-

Rodney Stevens - MAAS



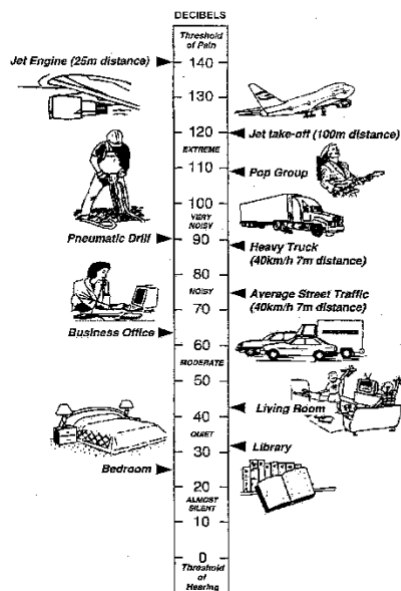
Appendix A – Acoustic Terminology

A-weighted sound pressure	The human ear is not equally sensitive to sound at different frequencies. People are more sensitive to sound in the range of 1 to 4 kHz (1000 – 4000 vibrations per second) and less sensitive to lower and higher frequency sound. During noise measurement an electronic ' <i>A-weighting</i> ' frequency filter is applied to the measured sound level <i>dB(A)</i> to account for these sensitivities. Other frequency weightings (B, C and D) are less commonly used. Sound measured without a filter is denoted as linear weighted dB(linear).
Ambient noise	The total noise in a given situation, inclusive of all noise source contributions in the near and far field.
Community annoyance	Includes noise annoyance due to: <ul style="list-style-type: none">▪ character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content)▪ character of the environment (e.g. very quiet suburban, suburban, urban, near industry)▪ miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations)▪ human activity being interrupted (e.g. sleep, communicating, reading, working, listening to radio/TV, recreation).
Compliance	The process of checking that source noise levels meet with the noise limits in a statutory context.
Cumulative noise level	The total level of noise from all sources.
Extraneous noise	Noise resulting from activities that are not typical to the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors: <ul style="list-style-type: none">▪ Noise mitigation benefits (amount of noise reduction provided, number of people protected).▪ Cost of mitigation (cost of mitigation versus benefit provided).▪ Community views (aesthetic impacts and community wishes).▪ Noise levels for affected land uses (existing and future levels, and changes in noise levels).
Impulsiveness	Impulsive noise is noise with a high peak of short duration or a sequence of these peaks. Impulsive noise is also considered annoying.
Low frequency	Noise containing major components in the low-frequency range (20 to 250 Hz) of the frequency spectrum.
Noise criteria	The general set of non-mandatory noise levels for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (e.g. noise levels for various land use).



Noise level (goal)	A noise level that should be adopted for planning purposes as the highest acceptable noise level for the specific area, land use and time of day.
Noise limits	Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.
Performance-based goals	Goals specified in terms of the outcomes/performance to be achieved, but not in terms of the means of achieving them.
Rating Background Level (RBL)	The rating background level is the overall single figure background level representing each day, evening and night time period. The rating background level is the 10 th percentile min L _{A90} noise level measured over all day, evening and night time monitoring periods.
Receptor	The noise-sensitive land use at which noise from a development can be heard.
Sleep disturbance	Awakenings and disturbance of sleep stages.
Sound and decibels (dB)	Sound (or noise) is caused by minute changes in atmospheric pressure that are detected by the human ear. The ratio between the quietest noise audible and that which should cause permanent hearing damage is a million times the change in sound pressure. To simplify this range the sound pressures are logarithmically converted to decibels from a reference level of 2 x 10 ⁻⁵ Pa.

The picture below indicates typical noise levels from common noise sources.



dB is the abbreviation for decibel – a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

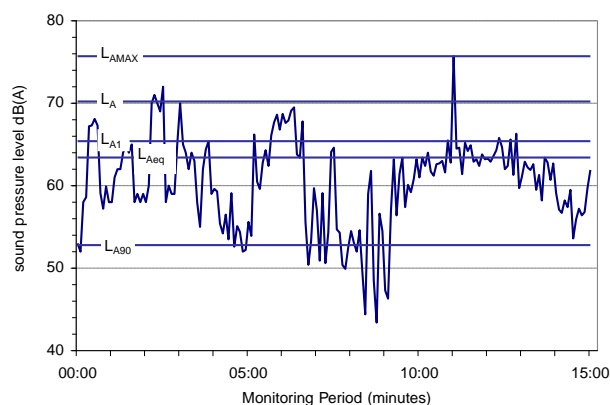
Sound Power Level (SWL)	The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in dB(A).
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Sound Pressure Level (SPL) The level of noise, usually expressed as SPL in $dB(A)$, as measured by a standard sound level meter with a pressure microphone. The sound pressure level in $dB(A)$ gives a close indication of the subjective loudness of the noise.

Statistical noise levels Noise levels varying over time (e.g. community noise, traffic noise, construction noise) are described in terms of the statistical exceedance level.

A hypothetical example of A weighted noise levels over a 15 minute measurement period is indicated in the following figure:



Key descriptor

- **L_Amax** Maximum recorded noise level.
- **L_A1** The noise level exceeded for 1% of the 15 minute interval.
- **L_A10** Noise level present for 10% of the 15 minute interval. Commonly referred to the average maximum noise level.
- **L_Aeq** Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.
- **L_A90** Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

Threshold The lowest sound pressure level that produces a detectable response (in an instrument/person).

Tonality Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dBA penalty is typically applied to noise sources with tonal characteristics.