



REPORT 160095R1

Revision 0

Patrick Port Botany Terminal
Biannual Environmental
Noise Compliance Monitoring
November 2020

PREPARED FOR:

Patrick Stevedores Operations Pty Ltd,
Port Botany Terminal
PO Box 197, Botany NSW 1455

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Patrick Port Botany Terminal Biannual Environmental Noise Compliance Monitoring November 2020

PREPARED BY:

Rodney Stevens Acoustics Pty Ltd
Telephone: 61 2 9943 5057 Facsimile 61 2 9475 1019
Email: info@rodneystevensacoustics.com.au
Web: www.rodneystevensacoustics.com.au

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EXECUTIVE SUMMARY

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

This report presents the findings of the environmental noise compliance monitoring, carried out every 6-months, for the Patrick PBT operations between the dates of 2 November to 30 November 2020. The monitoring periods were between 2 November to 16 November 2020 for five of the six sites and 16 November to 30 November 2020 for the remaining site.

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, 1 September 2020.

Existing noise levels at the nearest receptors are considered high. Noise generated by surrounding industrial premises, container storage facilities, 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.

Due to the recent and ongoing Covid-19 pandemic, State and Federal Government have imposed restrictions on recommended activity to be carried out by residential and commercial operators. It is duly noted that during the latter period of 2020 some of the imposed restrictions have eased.

Analysis of the potential change in monitored noise levels show that there has been a small reduction in noise levels at some of the sites during some of the measurement periods. The cause of these changes is most likely due to reduced residential and commercial activity due to Covid-19 restrictions.

It was observed that operational noise was not audible at the Chelmsford Avenue and Dent Street monitoring locations, and was just audible at the Botany Road, Australia Avenue, Jennings Street and 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 Health, Safety & Environment 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 PBT site's current Environment Protection Licence (EPL) No.6962 (dated 1 September 2020), Clauses L3 and E1 at specified locations.

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

Noise monitoring for this assessment was undertaken between 2 November to 16 November 2020 for five of the six sites and 16 November to 30 November 2020 for the remaining site. Additional noise monitoring was undertaken at one of the sites due to technical issues with the measurement equipment forcing additional noise monitoring for one location. The PBT 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 LA1(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 point 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

The Patrick PBT is located at Penrhyn Road (Inter-modal Access Road), Banksmeadow, NSW 2019 (inside the Port Botany precinct). 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. In August 2019, as part of the rail line extension project, construction activities begun at the eastern most end of the terminal's rail siding. During 2020 construction has continued, along with three automated rail mounted gantry cranes currently undergoing installation and commissioning.
- *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 fifty AutoStrads are available for use throughout the automated at any given time.
- *Quay (ship-to-shore) crane activities.* Vessels are currently serviced at the site by seven operational 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 (Hutchison Ports container terminal, also known as Sydney International Container Terminal), Caltex Oil Terminal and DP World Australia (DP World container terminal). A number of additional industrial sites are located in the vicinity of the site, including the Opal, 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 Ports, DP World container terminal, Qube Logistics 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 Ports container terminal, DP World container terminal and various nearby transport and logistic, and haulage and container handling facilities e.g. Sydney Haulage.

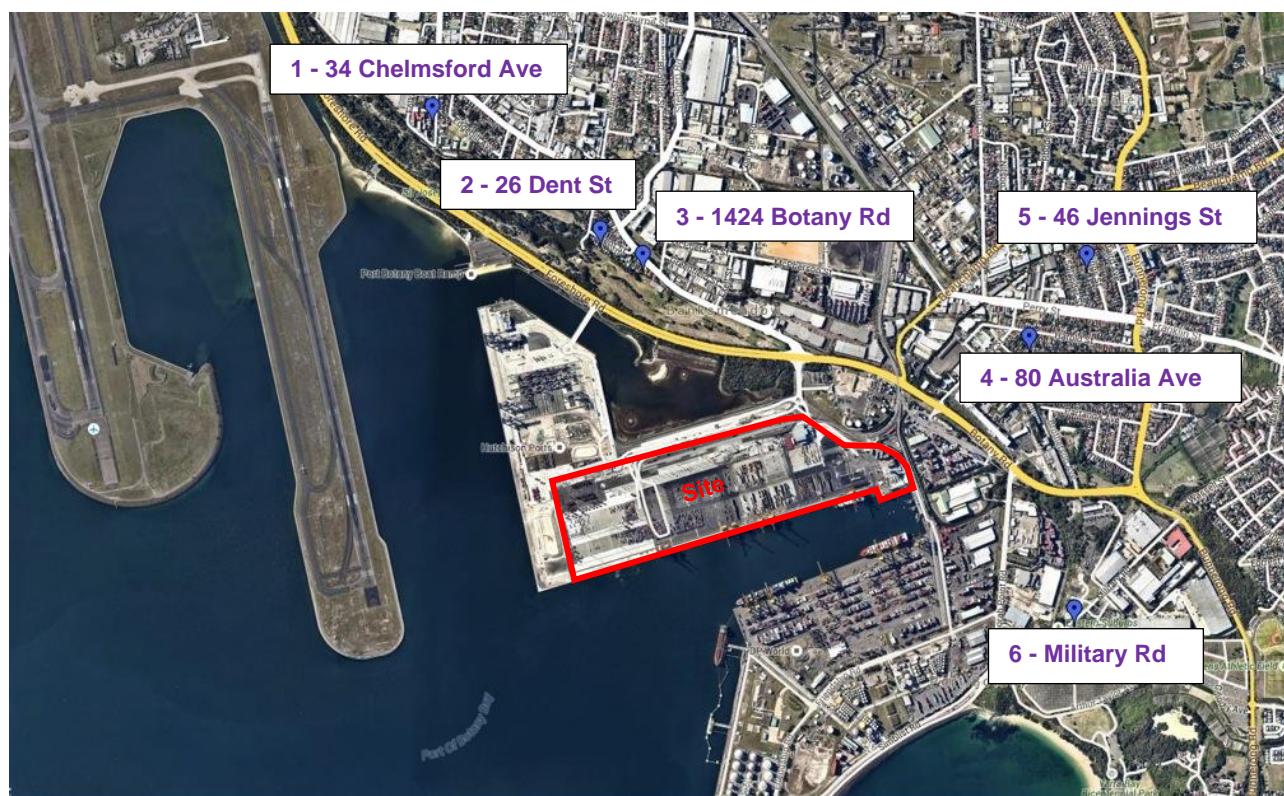
4.2.2 Residential, Recreation and Open Space Uses

Residential land uses are located to the east, north-east and north-west of the 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 numbers 21039 and 34075) and a Bruel and Kjaer 2250 Type 1 Precision Sound Level Meter (serial number 3011625) (operator attended noise monitoring), Acoustic Research Laboratories' statistical Environmental Noise Loggers, Type RION NL- 42 (serial numbers 810779, 572559, 184112, 546395 and 546393) 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 Ports container terminal and aircraft noise from Sydney Airport 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 Ports 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 Ports 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: 46 Jennings Street, Matraville

Noise logging was conducted in the front yard of 46 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 2 November to 16 November 2020 for five of the six sites and 16 November to 30 November 2020 for the remaining site, at Locations 1 to 6 as indicated in Figure 4-1.

Attended noise monitoring at all of the locations was undertaken during the daytime period on Wednesday 11 and Tuesday 24 November, evening period on Wednesday 11 and Thursday 19 November and night-time period on Sunday 15, Monday 16 November and Thursday 26th November 2020.

Local meteorological conditions were satisfactory during the attended monitoring program.

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 sporadically 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 and container storage facilities were frequently audible during the monitoring. Ambient noise profiles were typical of an urban area.

Due to the recent and ongoing Covid-19 pandemic, State and Federal Government have imposed restrictions on recommended activity to be carried out by residential and commercial operators. Easing off of these restrictions have been carried out over the latter months of 2020. Analysis of any potential impact of the reduction in activity has been included in this report.

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 6.2 of this report.

Observations during the attended noise monitoring program 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 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>
2/11/20	56.8	66.4	50.3	53.9	63.5	46.0	49.6	55.7	37.5
3/11/20	58.6	67	43.3	50.4	60.5	42.2	48.7	55.2	38.5
4/11/20	60.8	66.7	42.4	52.5	61.3	43.4	55.2	59	42.0
5/11/20	60.1	67.4	53.9	57.3	64.5	50.2	56.5	62	48.2
6/11/20	<i>58.4</i>	<i>66.7</i>	<i>49.0</i>	<i>53.6</i>	<i>64.5</i>	<i>44.4</i>	<i>47.7</i>	<i>54.8</i>	<i>36.9</i>
7/11/20	56.6	66.1	41.9	54.2	63.5	47.0	49.8	57.2	41.6
8/11/20	54.5	64.6	45.0	52.0	61.7	42.6	49.5	53.6	37.3
9/11/20	53.3	65.1	40.3	50.2	60.7	42.1	49.3	53.7	36.7
10/11/20	53.6	65.1	41.0	49.7	60.8	41.9	49.0	54.4	38.7
11/11/20	55.5	66	43.6	53.2	63.3	46.5	48.8	53.7	40.9
12/11/20	54.1	65.4	42.9	53.2	62.6	45.0	49.9	57.3	39.3
13/11/20	53.8	65.1	40.4	51.3	61.9	41.1	47.4	53.6	38.4
14/11/20	55.5	65.2	41.6	52.8	63.2	41.3	45.7	53.9	36.3
15/11/20	52.9	64.3	39.3	52.5	62.9	44.2	50.5	53.2	40.1
Median	56.8	65.8	42.4	53.1	62.5	43.8	50.9	55.5	38.6

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 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 56 dB(A) exceeds the night-time L_{A1} noise limit of 53 dB(A) for Chelmsford Avenue on all days except 15 November 2020.

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}
2/11/20	50.2	55.2	47.4	49.0	54	44.9	47.3	52.2	42.4
3/11/20	48.4	54	43.4	50.7	53.1	41.9	47.7	51.8	41.3
4/11/20	48.8	55.7	42.9	53.2	56.7	43.8	52.7	56.2	42.4
5/11/20	57.9	61.8	52.6	57.3	61.2	50.2	54.7	60.1	47.8
6/11/20	53.6	57.6	47.0	47.4	52.5	43.1	45.7	50.2	40.0
7/11/20	52.6	58.6	43.8	52.2	59.7	46.4	46.9	51.6	40.9
8/11/20	47.8	54.2	42.9	48.0	52.5	41.2	46.1	49.9	40.4
9/11/20	47.2	54.4	41.2	46.5	50.6	41.8	47.9	51.7	38.4
10/11/20	58.2	58	41.9	46.7	52	42.0	47.4	50.9	40.1
11/11/20	65.8	66.2	45.9	52.1	59	46.4	46.0	50.8	41.5
12/11/20	57.5	63.3	44.7	51.8	58.1	46.6	49.3	55.1	41.7
13/11/20	56.5	62.1	44.4	46.2	52	41.0	47.0	52.1	42.6
14/11/20	49.1	56.3	42.3	48.9	57.9	40.6	44.7	50.6	36.6
15/11/20	49.0	54.6	39.6	48.5	54.7	43.7	47.2	50.3	39.6
Median	57.2	58	43.4	51.2	55.3	43.4	48.9	52.4	41.1

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 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 52 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 complied with the EPL noise limit on all of the monitoring days except for 4 and 5 November 2020.

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}
2/11/20	54	59.4	50.4	52.0	57.1	47.5	50.8	56	45.9
3/11/20	51.6	57.9	45.6	48.4	54.9	43.6	51.3	55.7	44.0
4/11/20	51.9	58.3	45.7	50.3	56	45.3	57.4	60.2	45.2
5/11/20	61.9	66.5	56.6	57.6	61.7	53.1	58.2	63.1	50.9
6/11/20	57.2	61.4	49.6	50.3	55.6	46.2	50.1	55.5	44.0
7/11/20	55.3	60.5	47.2	53.1	59.2	47.9	49.5	55	42.3
8/11/20	51.6	58	45.2	47.4	54.8	42.2	48.9	52.6	40.8
9/11/20	50.9	57.6	45.1	48.7	55.3	41.7	51.6	55.7	40.9
10/11/20	64.9	59.9	46.1	51.6	54.6	43.1	51.7	55.3	42.2
11/11/20	50.8	57	46.0	51.3	57	47.8	48.0	52.7	41.9
12/11/20	51.6	58.2	46.0	51.6	55.8	47.7	50.1	55.9	43.8
13/11/20	53.7	58.6	46.1	48.7	53.9	43.9	50.2	55.8	44.9
14/11/20	49.4	55.4	43.5	46.2	53.3	40.8	46.7	51.8	39.8
15/11/20	48.5	56.1	42.9	49.2	55.3	44.8	48.2	52.6	40.1
Median	57.1	58.9	46	51.5	56	45.1	52.3	55.6	43.1

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 Botany Road. 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 56 dB(A) exceeds the night-time L_{A1} noise limit of 55 dB(A) for Botany Road. The daily average night-time L_{A1} noise levels achieved the EPL noise limit on 7, 8, 10, 11, 14 and 15 November 2020.

It should be noted that operational noise was observed during the operator attended noise monitoring was not audible during daytime periods, and slightly audible during evening and night-time periods during low ambient levels of between 48 dB(A) to 54 dB(A) and the source could not be determined. 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}
2/11/20	55.5	64.3	50.8	52.0	58.6	48.0	50.3	55.4	46.0
3/11/20	52.6	61.6	40.6	48.6	57.9	38.8	47.3	53.5	39.3
4/11/20	51.4	60.9	43.6	48.2	57.2	42.0	55.3	58.1	43.9
5/11/20	59.9	65.6	55.9	59.5	64.6	54.8	57.1	62.3	54.0
6/11/20	58.5	64.8	46.8	50.0	57.1	45.6	51.2	55.3	48.3
7/11/20	55.9	63	48.5	53.5	58.9	48.9	50.3	54.8	46.5
8/11/20	51.5	60.2	42.9	47.8	57.4	39.7	48.1	50.6	38.8
9/11/20	53.3	62.4	41.0	45.3	54.7	38.2	49.3	52.8	38.2
10/11/20	52.6	61.8	42.8	47.3	56.5	39.3	47.6	51	40.0
11/11/20	54.1	63.6	42.8	48.0	57.1	42.9	47.0	50.8	38.2
12/11/20	54.5	62	43.5	48.8	57.8	42.2	49.5	54.4	40.2
13/11/20	55.7	63.7	42.4	46.1	55.5	39.5	50.6	54.8	44.0
14/11/20	51.2	60.8	41.7	49.7	59	39.1	46.7	52.5	41.1
15/11/20	51.3	60.2	39.7	46.7	56.2	41.5	46.2	50.8	40.6
Median	55	62.5	42.8	51.5	57.8	41.7	51.1	54.1	40.8

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 median night-time L_{A1} noise level of 54 dB(A) complies with the night-time L_{A1} noise limit of 55 dB(A) for Australia Avenue. The daily average night-time L_{A1} noise levels do not achieve the EPL noise limit on 4 to 5 November 2020.

It should be noted that operational noise was observed during the operator attended noise monitoring was not audible during daytime and evening periods, and slightly audible during night-time periods during low ambient levels of between 48 dB(A) to 54 dB(A) and the source could not be determined. 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: 46 Jennings Street, Matraville

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

Table 6-5 Unattended monitoring results (Location 5: 46 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}
2/11/20	55.6	66.5	66.6	52.5	64.8	39.8	50.0	56.3	38.9
3/11/20	56.2	66.6	39.6	52.4	64.9	36.8	48.9	55.2	35.0
4/11/20	56.6	66.8	41.6	52.8	64.2	40.1	55.2	59.3	40.0
5/11/20	61.6	71.6	47.9	56.1	67.9	45.6	55.7	65.7	46.2
6/11/20	58.5	68.5	43.6	54.7	64.7	39.9	48.1	56.6	38.9
7/11/20	59.9	70.1	40.8	57.0	68.1	41.2	48.9	59.1	35.9
8/11/20	55.3	65.5	40.7	52.0	62.7	35.6	50.6	54.6	30.9
9/11/20	54.7	66.1	37.1	51.8	64.8	35.6	50.3	55.3	31.7
10/11/20	55.0	65.8	39.6	52.7	64.4	38.8	49.3	55.4	34.4
11/11/20	55.8	66.5	39.9	56.2	67.2	43.8	50.8	60.4	35.8
12/11/20	55.8	66.4	41.4	55.6	66.6	42.4	50.8	58.7	38.6
13/11/20	56.0	66.7	38.9	52.6	64.2	37.5	48.5	55.9	37.7
14/11/20	54.2	65	38.9	52.4	64.6	36.6	47.2	57.4	34.5



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}
	15/11/20	52.3	64.1	36.6	53.1	64.6	42.5	48.9	55.5
Median	57	66.9	39.9	54.1	65.3	39.8	51	57.5	35.8

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 58 dB(A) exceeds with the night-time L_{A1} noise limit of 55 dB(A) for Jennings Street. The daily average night-time L_{A1} noise levels complied with the EPL noise limit on the following monitoring days 3, 8, 9 and 10 November 2020.

It should be noted that operational noise was observed during the operator attended noise monitoring was not audible during daytime and evening periods, and slightly audible during night-time periods during low ambient levels of between 42 dB(A) to 48 dB(A) and the source could not be determined. 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}
	16/11/20	52.2	61.6	46	52.2	62.8	42.7	53.9	63.6
17/11/20	53.3	63.3	40.6	50.8	62.3	38.8	51.0	61	34.6
18/11/20	53.5	63.2	43.4	53.3	64.1	45.2	50.9	60.9	39.7
19/11/20	54.0	63.2	43.0	53.5	63.8	45.8	51.3	60.5	41.7
20/11/20	63.1	64.5	45.2	61.6	68.6	45.1	54.3	62.9	43.5
21/11/20	50.1	60.7	37.0	52.5	62.7	38.0	48.2	56.6	35.5
22/11/20	51.0	61.4	39.3	53.3	63.2	42.9	53.0	60.4	45.2
23/11/20	54.2	63	46.3	52.7	62.7	43.4	52.5	61.9	42.8



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}
24/11/20	54.2	63.2	41.6	51.7	62.8	38.3	51.4	60.8	36.2
25/11/20	52.2	62.1	41.8	53.5	63.6	43.6	51.0	59.8	41.5
26/11/20	51.6	61.5	42.7	55.1	63.8	42.9	55.1	63.5	41.8
27/11/20	53.2	63.1	42.4	53.4	63.6	44.7	49.6	59.6	42.7
28/11/20	51.1	60.8	42.7	52.1	61.7	45.3	50.7	57.9	43.5
29/11/20	56.6	63.8	45.9	54.3	64.4	45.4	52.0	60	40.0
Median	55.5	62.5	42.7	54.7	63.5	43.5	52.1	60.6	41.6

Notes: Values expressed as dB(A)

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)

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 median night-time L_{A1} noise level of 61 dB(A) exceeds the night-time L_{A1} noise limit of 55 dB(A) for Military Road. The daily average night-time L_{A1} noise levels complied with the EPL noise limit on none of the monitoring days.

It should be noted that operational noise was observed during the operator attended noise monitoring was not audible during daytime periods, and slightly audible during evening and night-time periods during low ambient levels of between 51 dB(A) to 58 dB(A) and the source could not be determined. 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	11/11/2020	08:37-08:52	48	62	75	Distant road traffic 48-50 dB(A) Residential activity 52 dB(A) Garbage truck pass by 75 dB(A) Fauna 60 dB(A) Dog bark 61 dB(A) S.S. 48 dB(A)
Evening	11/11/2020	21:57-22:12	45	53	64	Distant road traffic 46-49 dB(A) Aircraft fly over 56 dB(A) Fauna 58 dB(A) Car pass by 52 dB(A) S.S. 45 dB(A)
Night	16/11/2020	00:04-00:19	39	47	57	Distant road traffic 39-42 dB(A) Fauna 54 dB(A) Residential activity 51 dB(A) Car pass by 52 dB(A) S.S. 39 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. Residential and community activity on Chelmsford Avenue was also audible.



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	11/11/2020	09:12-09:25	45	56	68	Distant road traffic 50-55 dB(A) Truck pass by 68 dB(A) Car pass by 61 dB(A) Construction activity 60 dB(A) Fauna 61 dB(A) S.S. 45 dB(A)
Evening	11/11/2020	21:37-21:52	47	50	55	Distant road traffic 47-50 dB(A) Distant industrial activity 52 dB(A) S.S. 47 dB(A)
Night	15/11/2020	23:44-23:59	39	41	46	Distant road traffic 39-41 dB(A) Distant industrial activity 44 dB(A) Fauna 44 dB(A) Dog bark 46 dB(A) S.S. 39 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 Botany Road and Foreshore Road was the dominant noise source during the attended measurements and influenced the L_{Aeq} and L_{Amax} descriptors. Noise generated by industrial activity on the opposite side of Botany Road 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	11/11/2020	09:49-10:04	50	54	64	Road traffic 52-57 dB(A) Fauna 60-63 dB(A) Truck pass by 58 dB(A) S.S. 50 dB(A)
Evening	11/11/2020	21:19-21:34	49	52	56	Road traffic 49-52 dB(A) Fauna 55 dB(A) Residential activity 50 dB(A)



Period	Date of measurement	Time	Measured Noise Level			Comments
			L _{A90}	L _{Aeq}	L _{A1}	
						Operational noise such warning alarms and forklifts were just audible at ambient levels of 50-54 dB(A) S.S. 49 dB(A)
Night	16/11/2020	23:26-23:41	44	48	54	Road traffic 44-48 dB(A) Fauna 52 dB(A) Operational noise such warning alarms and forklifts were just audible at ambient levels of 48-52 dB(A) S.S. 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 6-9 above, the operational noise was not audible during daytime periods. The operational noise was audible during evening and night time periods at ambient levels of between 48 dB(A) and 54 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 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.

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	11/11/2020	11:10-11:25	46	60	72	Distant road traffic 48-54 dB(A) Truck pass by 68 dB(A) Residential activity 66 dB(A) S.S. 46 dB(A)
Evening	11/11/2020	20:40-20:55	44	49	58	Distant road traffic 44-49 dB(A) Car pass by 58 dB(A) Fauna 51 dB(A) S.S. 44 dB(A)
Night	16/11/2020	23:04-23:19	48	51	55	Distant road traffic 48-51 dB(A) Car pass by 58 dB(A) Industrial noise from adjoining Orora Recycling facility 50-55 dB(A) Operational noise such warning alarms and forklifts and mechanical hum were just audible at ambient levels of 48-54 dB(A) S.S. 48 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 and evening time periods. The operational noise was audible during night time periods at ambient levels of between 48 dB(A) and 54 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.

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.

6.2.5 Location 5: 46 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	11/11/2020	11:39-11:54	44	58	70	Car pass by 69 dB(A) Motorcycle pass by 70 dB(A) Fauna 55 dB(A) Distant road traffic 44-50 dB(A) S.S. 44 dB(A)
Evening	11/11/2020	20:58-21:13	44	53	67	Road traffic 44-49 dB(A) Residential activity 60 dB(A) Car pass by 52 dB(A) S.S. 44 dB(A)
Night	15/11/2020	23:04-23:19	37	46	56	Road traffic 40-46 dB(A) Fauna 50 dB(A) Car pass by 47 dB(A) Residential activity 55 dB(A) Operational noise such warning alarms and forklifts and mechanical hum were just audible at ambient levels of 42-48 dB(A) S.S. 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 6-11 above, the operational noise was not audible during day and evening periods. The operational noise was audible during night time periods at ambient levels of between 42 dB(A) and 48 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 Jennings Street and surrounding streets and residential activity was the primary influence 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
			LA90	LAeq	LA1	
Day	24/11/2020	10:38-10:53	50	62	73	Road traffic 55-58 dB(A) Car pass by 65 dB(A) Truck pass by 72 dB(A) Fauna 54 dB(A) S.S. 50 dB(A)
Evening	19/11/2020	19:00-19:15	48	58	71	Truck pass by 71 dB(A) Car pass by 65 dB(A) Operational noise such warning alarms and forklifts were just audible at ambient levels of 53-58 dB(A) S.S. 48
Night	26/11/2020	23:05-23:20	51	60	73	Car pass by 73 dB(A) Truck idling 50 dB(A) Operational noise such warning alarms and forklifts and mechanical hum were just audible at ambient levels of 51-57 dB(A) S.S. 51 dB(A)

Notes: Values expressed as dB(A) and rounded to nearest 1 dB(A)
 LA90 = A-weighted sound pressure level exceeded for 90% of the time (background)
 LAeq = equivalent continuous (energy average) A-weighted sound pressure level
 LA1 = 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 evening and night time periods at ambient levels of between 51 dB(A) and 58 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 COVID-19 POTENTIAL IMPACT

Observations have been made of the unattended noise monitoring periods during and outside of Covid-19 restrictions. Comparisons were made between the November 2018, May 2019, November 2019 monitoring periods and the latest monitoring period shown in this report (November 2020), along with the previous measurement period during Covid-19 restrictions applying (May 2020). The purpose was to observe if there were any discernible differences in the noise levels between the periods and what (if any) impact the restrictions enacted by the State and Federal Governments due to Covid-19 have had an impact on acoustic environment at the monitoring locations.

Long term unattended noise monitoring is considered the best source of data to compare as it spans a 14 day period and presents the noise levels measured over the entire measurement period. This is considered a better representation than attended measurements which is short term measurements.



Chelmsford Avenue, Botany is considered to be a predominantly residential area with strong noise influence from nearby arterial roads and the Kingsford-Smith airport. Comparing the monitoring periods (with and without Covid-19 restrictions) shows that during the May 2020 measurement and during the evening period only that there was a reduction of 3-4 dB(A) in LAeq levels and a reduction of 2-3 dB(A) in LA90 in comparison with previous measurement periods. There was significant reduction of 5-6 dB(A) to the L1. There was no statistically significant change in the day or night time measurement periods. Comparing the November 2020 monitoring period with those periods not affected by Covid-19 restrictions and the previous monitoring period that was (May 2020) it is observed that the noise levels measured on site are almost the same as those measured pre Covid-19 restrictions. This indicates that activity in the area is “returning to normal” and some of the restrictions imposed have been removed or eased. It should be noted that activity from Port Botany operations were not audible during attended monitoring periods.

Dent Street, Botany is also considered to be a residential area. Dent Street is primarily servicing the residences on that street and is not often used by through traffic (who use Botany Road). Comparing the monitoring periods (with and without Covid-19 restrictions) there is a reduction (May 2020) to the LAeq levels of 3-4 dB(A) during the evening period and approximately 3 dB(A) during the night time period. There is a reduction in LA90 levels is not considered significant. The reduction in LA1 levels is greater, 4-6 dB(A), but again this accounts for only 1% of the noise environment. There was no statistically significant change during the daytime period. The changes in level with and without restrictions can also be explained due to a lack of residential activity during the May 2020 measurement period and potentially less aircraft activity in the vicinity. Levels measured during November 2020 show similar levels to those measured in May 2020, with a slight increase in the levels measured during the daytime. Overall this indicates that Dent Street may have slightly less activity than it did prior to Covid-19 restrictions. It should be noted that activity from Port Botany operations were not audible during attended monitoring periods.

Botany Road, Botany is an arterial road for the area and is characterised by heavy through traffic and a relatively large amount of heavy vehicles (predominantly trucks and busses). The area could be classified as a mixture of residential and commercial development. During the evening measurement periods (May 2020) there was a reduction in LAeq levels of approximately 3 dB(A) and no statistically significant change in LA90 and LA1 levels. During the night time monitoring there was a reduction in LAeq levels of approximately 3 dB(A) and an LA90 reduction of approximately 2-3 dB(A). Changes in LA1 levels were not statistically significant during any of the monitoring periods. Similar changes were observed during the November 2020 monitoring period. There was no statistically significant change during the day time measurement periods. Difference in evening and night time periods can potentially be explained by less residential and business (i.e. industrial) activity in the vicinity of the monitoring location. It should be noted that activity from Port Botany operations were audible during evening and night time attended monitoring periods, however this is consistent with previous measurement periods (pre Covid-19).

Australia Avenue, Matraville is a mixed residential and commercial area, Australia Avenue borders industrial premises on one side (for part of the Avenue) and residential on the other. There was no statistically significant change in noise levels during day, evening or night time measurement periods for the monitoring period. It should be noted that activity from Port Botany operations were audible during night time attended monitoring periods, however this is consistent with previous measurement periods (pre Covid-19).

Jennings Street, Matraville is considered to be a predominantly residential area. Jennings Street has a small amount of through traffic, but the majority of vehicle activity would be by residents in the vicinity. There was a reduction (May 2020) in LAeq levels during the day, evening and night time periods of 2-3 dB(A). There was no statistically significant change to LA90 or LA1 noise levels. The changes in level with and without restrictions can also be explained due to a lack of residential activity during the May 2020 measurement period and potentially less aircraft activity in the vicinity. Levels measured during the November 2020 period show noise levels returning slightly to pre-Covid noise levels, which shows that activity in the area could be somewhat returning to pre-Covid levels. It should be noted that activity from Port Botany operations were audible during night time attended monitoring periods, however this is consistent with previous measurement periods (pre Covid-19).

Military Road, Matraville is considered to be predominantly a commercial area with Eastern Suburbs Memorial Park also contributing to the noise environment. LAeq levels were reduced during the day time period only (May



2020). Evening and night time periods did not see a statistically significant change in any of the measurement parameters. The reduction in L_{Aeq} during the daytime is most likely due to reduced activity at Eastern Suburbs Memorial Park due to Covid-19 restrictions. Similar noise levels were observed during the November 2020 monitoring period. It should be noted that activity from Port Botany operations were audible during evening and night time attended monitoring periods, however this is consistent with previous measurement periods (pre Covid-19).

Analysis of the potential change in monitored noise levels show that there has been a small reduction in noise levels at some of the sites during some of the measurement periods. The cause of these changes is most likely due to reduced residential and commercial activity due to Covid-19 restrictions.

8 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.

8.1 Operations

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

8.2 Review of Measured Noise Levels

8.2.1 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 and aircraft).

8.2.2 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 Botany Road and Military Road locations 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). Operational noise was observed at a level reaching 58 dB(A) however, the duration of this noise was of an impulsive nature and largely intermittent and the exact source could not be determined. This observed noise level from the monitoring locations complies with the relevant noise limits. It also complies with the Botany Road 47 dB(A) $L_{Aeq(15min)}$, 43 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, 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 aircraft).

8.2.3 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 Botany Road, Australia Avenue, Jennings Street and Military Road locations at low ambient levels of between 42-57 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). Operational noise was observed at a level reaching 57 dB(A) however, the duration of this noise was of an impulsive nature and largely intermittent and the exact source could not be determined. This observed noise level from the monitoring locations complies with their relevant noise limits.

Operational noise from Patrick PBT was not audible at the Chelmsford Avenue and Dent 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 night time noise limits.

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

9 CONCLUSION

This report presents the findings of the November 2020 environmental noise compliance monitoring for the Patrick Stevedores' Port Botany Terminal (Patrick PBT) operations.

Attended and unattended noise monitoring were 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, container storage facilities, 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.

Due to the recent and ongoing Covid-19 pandemic, State and Federal Government have imposed restrictions on recommended activity to be carried out by residential and commercial operators. It is duly noted that during the latter period of 2020 some of the imposed restrictions have eased.

Analysis of the potential change in monitored noise levels show that there has been a small reduction in noise levels at some of the sites during some of the measurement periods. The cause of these changes is most likely due to reduced residential and commercial activity due to Covid-19 restrictions. It should be noted that activity from Port Botany operations were not audible during attended monitoring periods at 2 of the 6 monitoring locations, which is consistent with previous monitoring periods pre 2020.

It was observed that operational noise was not audible at the Chelmsford Avenue and Dent Street monitoring locations, and was slightly audible at the Botany Road, Australia Avenue, Jennings Street and 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 O. Stevens.

Rodney Stevens - MAAS



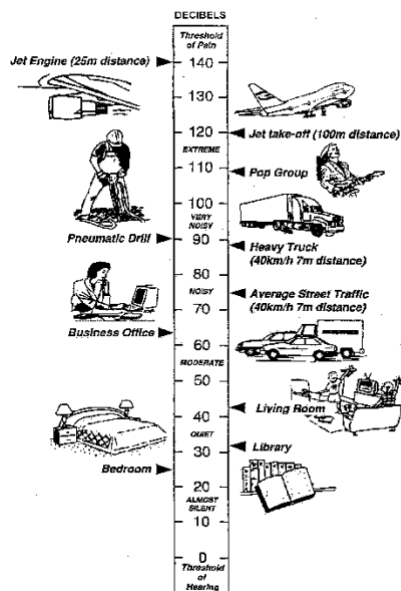
Appendix A – Acoustic Terminology

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 $dB(A)$ 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.

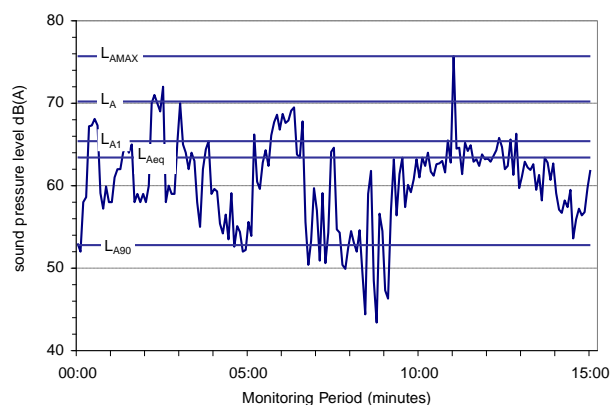
Sound Power Level (SWL)	The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in dB(A).
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Sound Pressure Level (SPL) The level of noise, usually expressed as SPL 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.