

Orora Pty Ltd

B9 Paper Mill – EPL Compliance November 2019 Quarterly noise monitoring report



27 November 2019

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Glossary

Acoustic and vibration related terms:

- **Acoustic Spectrum:** A representation of a sound sample (usually short term) of the amount of energy or sound level per frequency.
- **Ambient Noise:** Ambient noise encompasses all sound present in a given environment, being usually a composite of sounds from many sources near and far.
- **dB(A):** A unit of sound measurement which has frequency characteristics weighted so that it approximates the response of the human ear to sound waves
- **Heavy Vehicle:** A truck, transport or other vehicle with a gross vehicle weight above a specified level (for example: over 8 tonnes)
- **L_{A90}:** Is the noise level that is exceeded 90 per cent of the measurement time. This parameter is commonly referred to as the background noise level
- **L_{Aeq}:** Noise level that represents the energy average noise from the source during a specified time period, and is the equivalent continuous sound pressure level for a given period
- **L_{Aeq(15hr)}:** The Leq noise level for the period from 7 am to 10 pm.
- **L_{Aeq(9hr)}:** The Leq noise level for the period from 10 pm to 7 am.
- **NCA:** Noise Catchment Area. Grouping dwellings or receivers together in terms of similar noise environment.
- **Noise barrier:** Generally a wall or an earth mound that obstructs or restricts the passage of sounds waves from a noise source
- **Noise Logger:** A data logging (data and audio in some cases) which records noise. Usually used for unattended noise monitoring of background or ambient noise.
- **NML:** Noise Management Level as detailed in the NSW Interim Construction Noise Guideline. The NML is the noise goal for construction activities.
- **Octave Bands:** Sounds that contain energy over a wide range of frequencies are divided into sections called bands. A common standard division is in 10 octave bands identified by their center frequencies 31.5, 63, 250, 500, 1000, 2000, and 4000 Hz
- **RBL:** Rating Background Level is the overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used for determining the appropriate construction noise criteria.
- **RNP:** Road Noise Policy (OEH, 2011)
- **Sound Level Meter:** An instrument consisting of a microphone, amplifier and data analysis package for quantifying and measuring noise.
- **Sound Power Level (L_w):** Sound power level or acoustic power level is a logarithmic measure of the sound power in comparison to a specified reference level.
- **Sound Pressure Level (SPL or L_p):** The level of noise, usually expressed in dB(A), as measured by a standard sound level meter.

1. Introduction

1.1 Background

ORORA Packaging operates the B9 Paper Mill at its Botany site in Sydney, NSW. The Paper Mill is subject to operational noise conditions set out in the Ministers Conditions of Approval (MCoA) (including subsequent modifications) and the Environment Protection Licence (EPL) No. 1594.

As part of the EPL, there is a requirement to undertake quarterly monitoring at receivers surrounding the site to show compliance with set noise limits. This report covers the November 2019 – January 2020 quarter. At the time of monitoring, the B9 paper machine was operating at typical production capacity.

Land adjacent to the south east of the Orora site known as the ‘hanger block’ is currently being developed for industrial and commercial units. Earthworks for this development are complete and construction of the buildings is underway.

1.2 Objective

This report addresses operational licence conditions relating to measurements of the quarterly monitoring of the noise environment around the Orora site, i.e. Condition M6.1 and M6.2 of EPL 1594. These require:

- M6.1 The licensee must undertake noise monitoring at least once every three months to check compliance with the noise limits specified in Condition L4.1.
- M6.2 All monitoring required by this licence must be undertaken in accordance with Australian Standard 2659.1 – 1998: Guide to the use of sound measuring equipment – Portable sound level meters, or any revisions of that standard which may be made by Australian Standards Authority, and the compliance monitoring guidance provided in the NSW Industrial Noise Policy.

1.3 Operational noise limits

Operational noise limits for the new Orora Paper Mill are detailed in condition L4.1 of EPL 1594 and Condition 10 of the MCoA. These have been replicated in **Table 1**.

Table 1 Operational noise limits

ID	Location	Day	Evening	Night	Night
		$L_{Aeq,15min}$, dB(A)	$L_{Aeq,15min}$, dB(A)	$L_{Aeq,15min}$, dB(A)	L_{Amax} , dB(A)
R1	Corner of McCauley Street and Australia Avenue	46	45	43	55
R2	Australia Avenue	45	45	43	55
R3	Murrabin Avenue	46	45	43	55
R4	Partanna Avenue	42	41	41	55
R5	Corner of Partanna Avenue and Moorina Avenue	42	42	39	55
R6	Moorina Avenue	43	43	39	55

Regular quarterly monitoring surveys have demonstrated that direct measurement of Orora’s contribution to the noise environment is not possible because their noise emissions are generally lower than the ambient measured L_{Aeq} noise levels, which masks the actual noise from the Orora site.

Ambient noise levels measured at the receiver locations using the L_{Aeq} noise parameter are therefore not a true representation of noise from the Orora site. The influence from Orora on the local noise environment may be

better described using the L_{A90} statistical parameter. This additional parameter has been presented in the results summary to be considered in conjunction with the L_{Aeq} noise level when assessing compliance of the Orora site.

During the night time periods fewer extraneous noise influences are present providing lower overall noise levels in the area. Under these conditions constant noise sources such as Orora operations are more likely to be apparent in the background noise levels noting that the emission levels from the site remain relatively constant throughout the day, evening, and night time.

Maximum noise levels from the site are also captured under the EPL requiring a cap on noise emissions of L_{Amax} 55 dB(A) at all locations during the night time period. An L_{Amax} parameter for the monitoring period simply records the loudest noise level measured during the night time assessment period and does not distinguish the source of noise.

Maximum noise events are not generally observed from the Orora site unless equipment has broken down or maintenance activities are underway and neither of these scenarios reflect normal operation of the plant.

Maximum noise levels recorded during these surveys are, therefore, more representative of the broader noise environment which makes the distinction between external sources and Orora's emissions difficult. Furthermore, maximum noise levels measured during the monitoring surveys often, if not always, exceed the maximum noise limit from the site hindering the identification of Orora's contribution.

The addition of the L_{A1} noise level statistic is proposed in conjunction with the L_{Amax} parameter to compliment and provide a better characterisation of environmental noise influences.

An L_{A1} noise level above the night time criteria would not necessarily indicate an exceedance of the Orora noise goals however, long term measurements of this parameter may be useful in identifying changes to the local noise profile which can then be compared to any changes in functional operation within the Orora site.

2. Existing environment

The site is located at the boundary of an industrial area bounded by residential properties located to the north and east of the site, as illustrated in Figure 2-1. The local noise environment beyond the Orora boundary varies throughout the day depending on the contribution of sources including trucks on Botany Road, aircraft, port noise, local business activities on McCauley Road, and local traffic movements.

Noise emissions from the Orora B9 paper Mill do not vary significantly as the operation of the plant has been demonstrated to be consistent and reliable.

The source of maximum noise level events in the area are typically from the local road network and aircraft fly-overs. The nature of the processes within the Orora site means that there are typically no maximum noise level events associated with production activities. The exception to this may occur when equipment is not functioning properly during a breakdown or during maintenance activities, both of which are not common scenarios.

The influence of weather conditions on noise levels are apparent as seasonal variations which are forming data trends in the long-term monitoring for the local area.

2.1 Monitoring limitations

Total measured noise levels at monitoring locations are only partly due to Orora site operations. The local noise environment has been a feature of the area for many years. Direct monitoring of Orora noise emissions over this time has demonstrated that specific contribution from Orora cannot be provided with any certainty due to the contribution of other audible noise sources adjacent to the site.

2.2 Receiver locations

The EPL specifies six locations for quarterly monitoring. These are illustrated in Figure 2-1 and described further in Table 2.

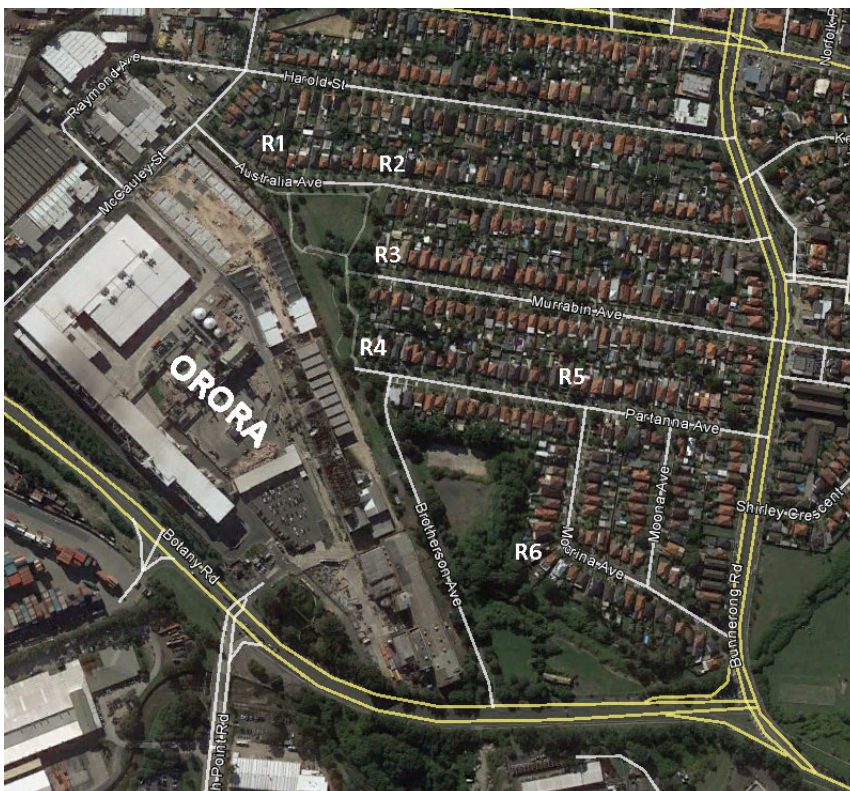


Figure 2-1 Site location and compliance monitoring locations (Source: Google Maps 2016)

Table 2 Description of monitoring locations

Monitoring location	Description
R1	This location has a large degree of acoustic shielding from local noise sources due to the development of a warehousing facility on the corner of McCauly Avenue and Australia Avenue. The noise environment at this location is heavily influenced by traffic on McCauley Street, Perry Street and Beauchamp Road. Local industrial noise from Raymond Avenue is also audible during the day and night time.
R2	This receiver is located opposite the bottom apex of the Purcell Park on Australia Avenue. At this location the residents have a clear line of sight to the paper mill. Noise walls have less effectiveness for the residences due to the large separation distances. Noise from port activities also has less shielding from the Orora site. Background noise levels are heavily dominated by road traffic noise from all sources.
R3	This receiver is located adjacent to Purcell Park on Murrabin Avenue. At this location the residents have a partial line of sight to the paper mill although they are located closer to the boundary noise wall than receivers at R2. Noise from port activities are partially shielded by the Orora site. Background noise levels are heavily dominated by road traffic, aircraft and industrial noise from all surrounding sources.
R4	The receivers at Partanna Avenue are physically closest to the Orora site but have the benefit of significant shielding of operational activities from the B7 paper machine building and the No. 7 reel store. Road traffic noise contributes to background noise for this receiver. Some construction work was in progress at the property during the monitoring period and therefore no measurements were taken for the November period.
R5	Furthest location from the Orora site, a higher degree of influence from Botany Road, Bunnerong Road and the port. Noise from the Orora site is generally inaudible at this location although significant noise from the Orora site has been observed here during adverse meteorological conditions.
R6	In this location receivers are well shielded from operational noise from the Orora site due to the presence of the redundant No. 7 and No. 8 paper machine buildings. Noise levels at this location are heavily influenced by local bird colonies, port noise, traffic on Botany road and traffic on Bunnerong Road. Construction of industrial units on the adjacent vacant land (Hanger block) is well underway at the time of writing this report.

3. Operational noise monitoring

3.1 Method

Operational noise monitoring for the November survey period was completed between 6 and 12 November 2019, using automatic noise loggers deployed at five representative locations.

Monitoring was performed using Acoustic Research Laboratories brand Ngara Type 1 noise loggers and SVAN 958 SLMs, set to A-weighting, fast-response, and recording noise levels continuously over consecutive 24-hour periods at each location. This survey period coincided with typical continuous operations of B9 paper mill.

Weather conditions during the survey period were obtained from the Automatic Weather Station (AWS) maintained by the Bureau of Meteorology at Sydney Airport. Weather conditions for the monitoring period have been plotted showing daily trends in wind direction and speed which are presented in Figure 3-1.

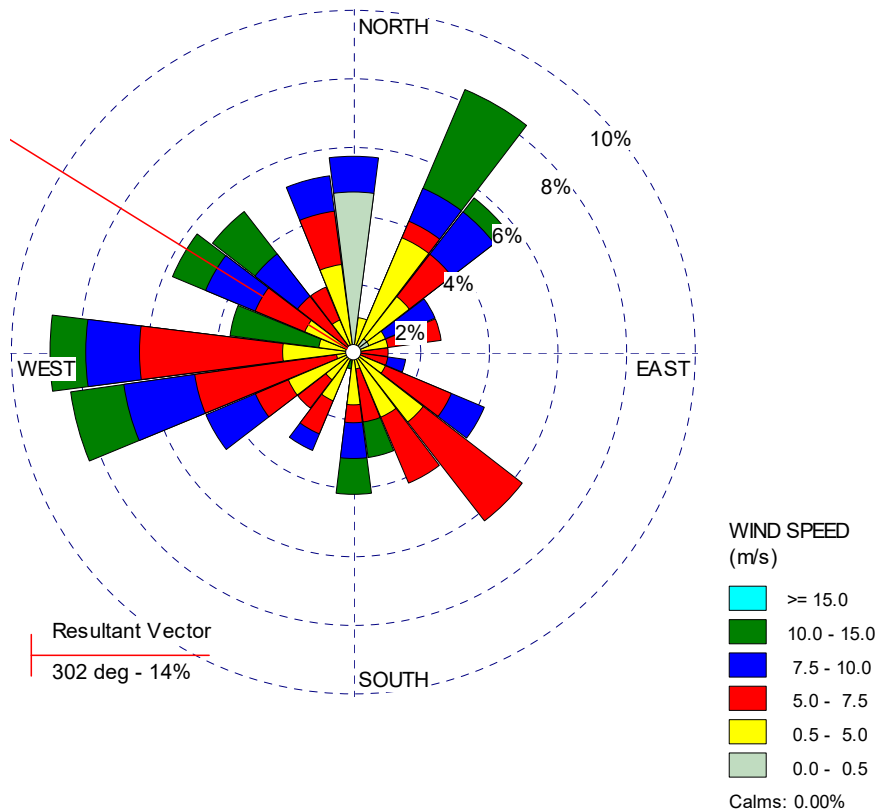


Figure 3-1 Wind speed and direction during monitoring period (6 November – 13 November 2019, source BoM 2019)

The plotted data from the wind rose indicates that for about 65% of the time the wind speeds during the monitoring were typically higher than 5 m/s (see Figure 3-2) with the overall resultant wind vector for the monitoring period concentrated in the north west. Winds from this direction would tend to minimise the influence of the Orora operations on residences to the north and east of the site.

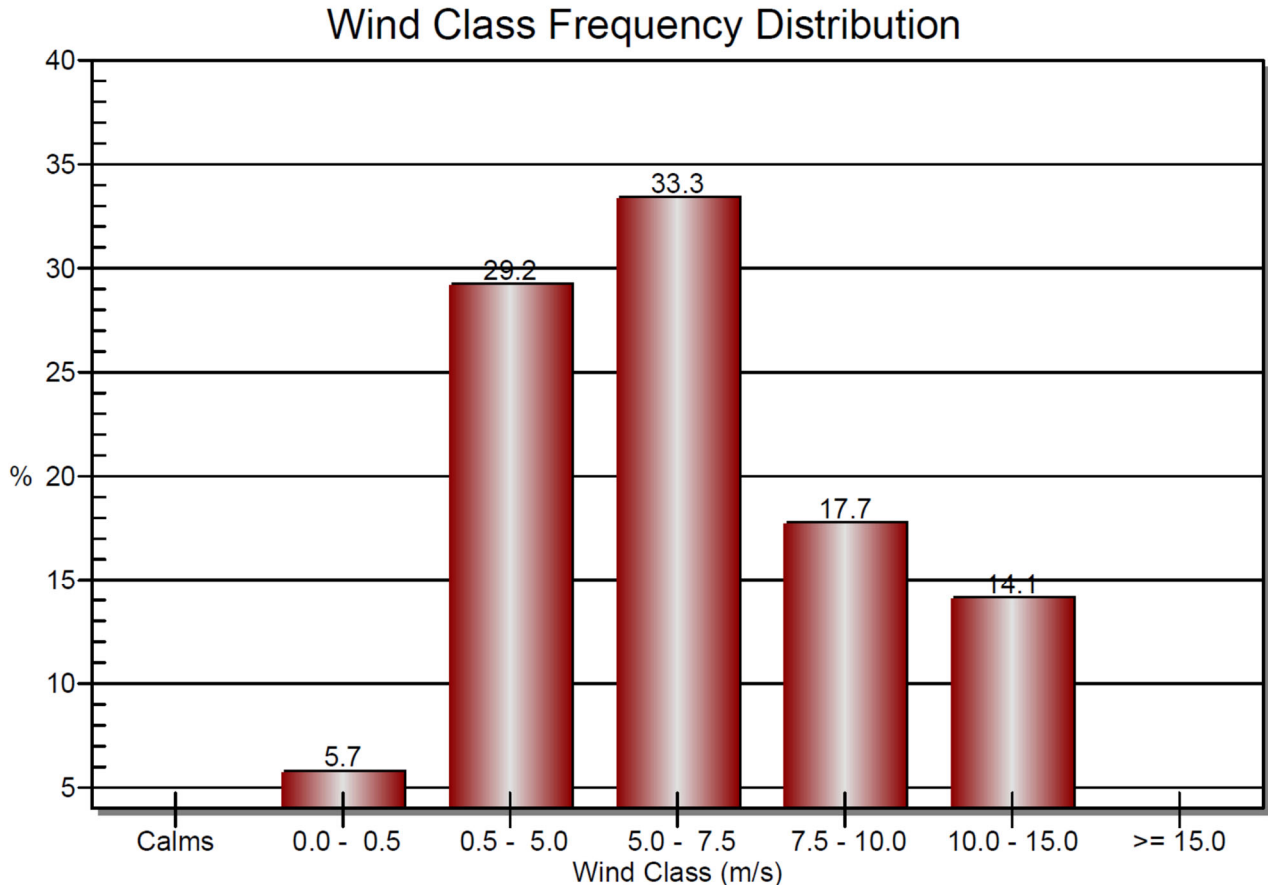


Figure 3-2 Wind speed frequency distribution

Winds from the north east (about 14% of the time) will tend minimise noise levels originating from the Orora site at the closest receiver locations. Conversely wind from the west (about 18% of the time) will enhance noise from the Orora site as well as Botany Road and Beauchamp Road at receiver locations east of the site.

Wind speeds greater than 5 m/s over the monitoring period tend will to increase overall measured noise levels at all receiver locations.

3.2 Monitoring results

During the November 2019 quarterly noise survey, the paper mill was operating under normal conditions and no breakdowns or noisy events are noted during this period.

The measured L_{Amax} , $LA1$, $LAeq$, and $LA90$ noise levels taken across several days are affected by all noise sources in the local area such as road traffic, loud short-term noise (birds), aircraft, and local industry and heavy vehicle movements.

At monitoring location 6, the logger failed after only one day however, sufficient 15 minute periods were recorded to allow the assessment for day, evening, and night time noise levels to be recorded for this period.

At Location 4 renovations to the property precluded the installation of a logger for the November quarter.

The results of the analysis indicate that the L_{Aeq} noise levels exceed the EPL noise goals for each assessment period at all of the survey locations.

When compared to other seasonal results for similar times during the year, the measured L_{A90} noise levels from the November monitoring data are higher than measured noise levels from previous surveys at corresponding times of the year.

The higher wind speeds and westerly source of the prevailing weather may have contributed to the generally higher levels during this monitoring survey.

Night time periods were assessed to provide additional information of the Orora B9 Paper Mill noise contributions using the median L_{A90} noise levels as a benchmark as rating background noise levels provide a good proxy for L_{Aeq} levels from steady state noise emitters.

The most recent round of compliance measurements has been added to the historical data collected during compliance monitoring, providing about six years of seasonal data. This data includes measurements of the noise environment both with the Orora site both operational and shut down for maintenance over this period.

The results of monitoring survey for November 2019 have been graphed and are shown in Appendix A. The parameters of L_{Aeq} and L_{A90} presented in Table 3 are used to provide information for comparison against the project criteria and the background noise environment.

A separate table of L_{Amax} and L_{A1} noise levels has been generated for the recent monitoring survey and in future once sufficient data is acquired, will be graphed to demonstrate data trends for each of the monitoring locations.

3.3 Comparison with previous monitoring surveys

The data in Figure 3-3 and Figure 3-4 provides a chronological progression of the measured noise levels during shutdown and normal operations summarised for monitoring from 2012 to present.

Historical background noise levels from Figure 3-3 and Figure 3-4 are not directly related to the L_{Aeq} criteria from the EPL; however, they provide an indication of the increase in background environmental noise levels corresponding to the regular noise surveys undertaken for the Orora site.

Table 3 Summary of noise monitoring

Time and date	Profile of Noise Environment - Noise Monitoring Location											
	R1		R2		R3		R4		R5		R6	
Daytime: 7:00:00 AM to 6:00:00 PM Date	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq
Wednesday 6 November 2019	45.5	64.3	41.6	66.6	44.5	68.1	-	-	41.6	68.1	42	51
Thursday 7 November 2019	46.6	52.4	41.7	51.6	43.3	52.5	-	-	42.5	52.2	-	-
Friday 8 November 2019	48.6	53.5	47.3	55.3	47.5	55.0	-	-	47.0	57.3	-	-
Saturday 9 November 2019	45.9	50.3	39.2	52.7	40.6	51.6	-	-	39.0	49.4	-	-
Sunday 10 November 2019	44.3	50.4	40.7	53.8	42.5	50.4	-	-	40.0	50.2	-	-
Monday 11 November 2019	46.6	52.5	40.5	51.9	42.8	53.0	-	-	42.1	53.7	-	-
Tuesday 12 November 2019	-	-	44.2	53.1	45.7	52.3	-	-	44.5	56.1	-	-
Median	46	53	42	53	43	52	-	-	42	52	42	51
Evening: 6:00:00 PM to 10:00:00 PM Date	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq
Wednesday 6 November 2019	46.4	51.6	43.0	54.2	45.4	51.9	-	-	46.1	52.4	46	49
Thursday 7 November 2019	45.0	49.8	41.5	50.6	42.4	49.7	-	-	41.7	50.9	-	-
Friday 8 November 2019	51.1	53.0	50.8	54.6	49.3	53.9	-	-	47.6	55.5	-	-
Saturday 9 November 2019	39.4	47.0	38.0	48.3	38.4	46.3	-	-	35.8	47.8	-	-
Sunday 10 November 2019	43.8	49.9	41.9	50.7	41.0	47.3	-	-	35.1	46.4	-	-
Monday 11 November 2019	46.8	51.9	42.5	50.2	45.7	54.9	-	-	45.3	55.0	-	-
Tuesday 12 November 2019	-	-	50.2	54.2	49.3	54.9	-	-	46.9	54.7	-	-
Median	46	51	42	51	44	51	-	-	44	52	46	49

Time and date	Profile of Noise Environment - Noise Monitoring Location											
	R1		R2		R3		R4		R5		R6	
Night 10:00:00 PM to 7:00:00 AM Date	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq	L90 (10th Percentile)	LAeq
Wednesday 6 November 2019	46.7	51.7	40.8	49.9	42.9	50.0	-	-	42.8	49.3	45	49
Thursday 7 November 2019	52.3	49.5	40.7	50.2	41.3	48.8	-	-	40.7	48.5	-	-
Friday 8 November 2019	46.3	48.0	47.3	51.4	44.7	50.2	-	-	40.4	48.3	-	-
Saturday 9 November 2019	42.2	45.2	46.5	49.8	44.5	47.0	-	-	42.3	47.0	-	-
Sunday 10 November 2019	45.6	48.8	41.0	47.2	40.4	44.9	-	-	33.4	45.3	-	-
Monday 11 November 2019	-	-	39.5	49.5	41.9	48.1	-	-	40.9	48.2	-	-
Tuesday 12 November 2019	-	-	46.9	51.9	44.5	50.6	-	-	40.0	48.9	-	-
Median	46	49	42	50	43	49	-	-	41	48	45	49

Table 4 Summary of night time maximum noise levels

Time and date	Maximum Noise Environment - Noise Monitoring Location											
	R1		R2		R3		R4		R5		R6	
Date	LAmx	LA1	LAmx	LA1	LAmx	LA1	LAmx	LA1	LAmx	LA1	LAmx	LA1
Wednesday 6 November 2019	80.8	75.7	77.7	68.7	80.3	72.5	-	-	74	62.3	63	56
Thursday 7 November 2019	75.7	62.3	75.1	65.5	77.1	62.6	-	-	73.8	61.1	-	-
Friday 8 November 2019	79.6	60.3	75.1	66	81.7	70.9	-	-	80	60.2	-	-
Saturday 9 November 2019	76	62.7	76.2	66.2	68.8	62.2	-	-	82	59.3	-	-
Sunday 10 November 2019	78.8	64	77.7	69.6	77.8	59.5	-	-	74.2	66.1	-	-
Monday 11 November 2019	-	-	76.2	65.5	75.6	62.5	-	-	71.8	63	-	-
Tuesday 12 November 2019	-	-	83.7	64	82	65	-	-	70.6	62.9	-	-
Median	79	63	77	66	77	63	-	-	74	62	63	56

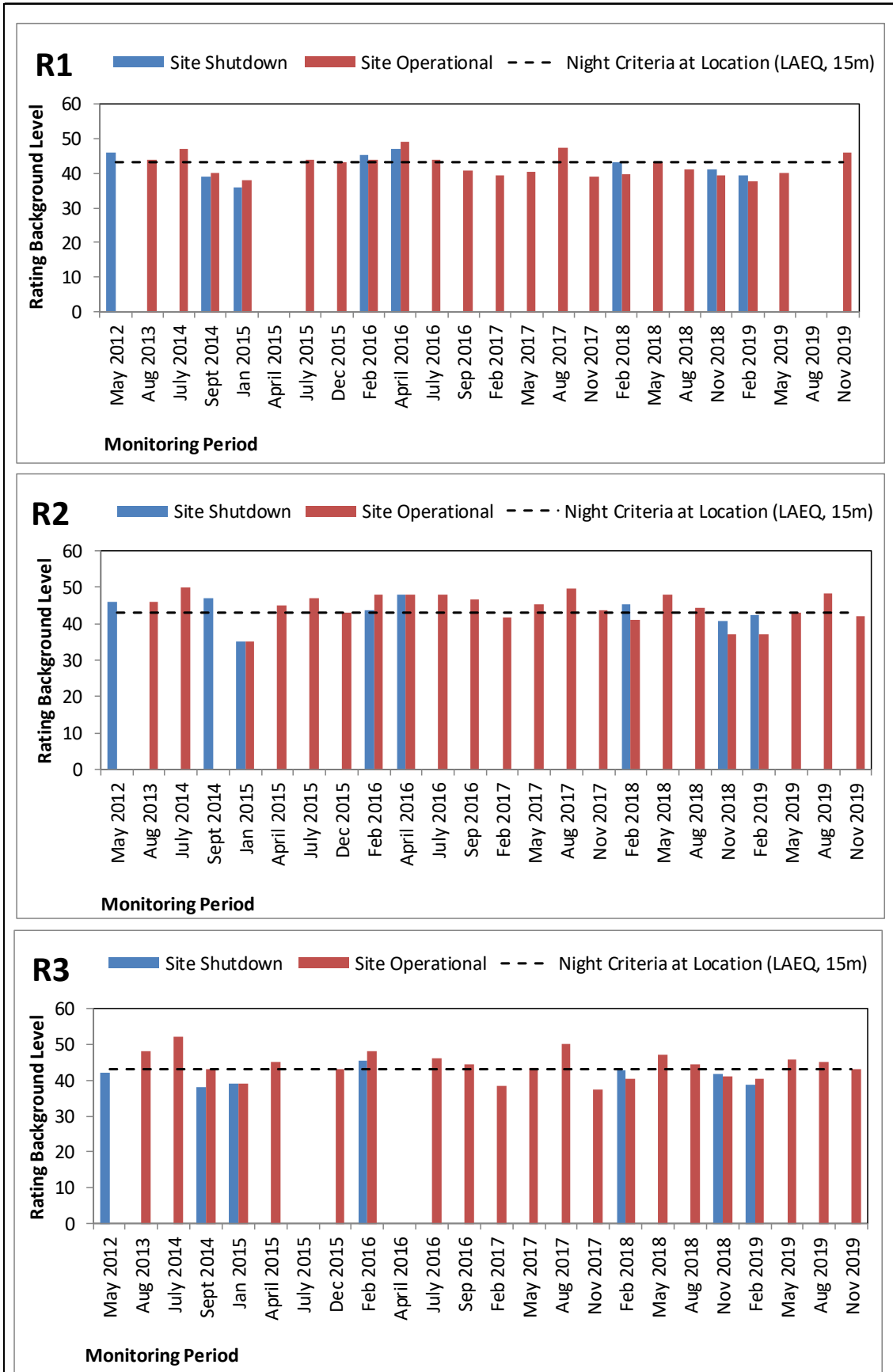


Figure 3-3: Comparison of background noise levels at R1 – R3

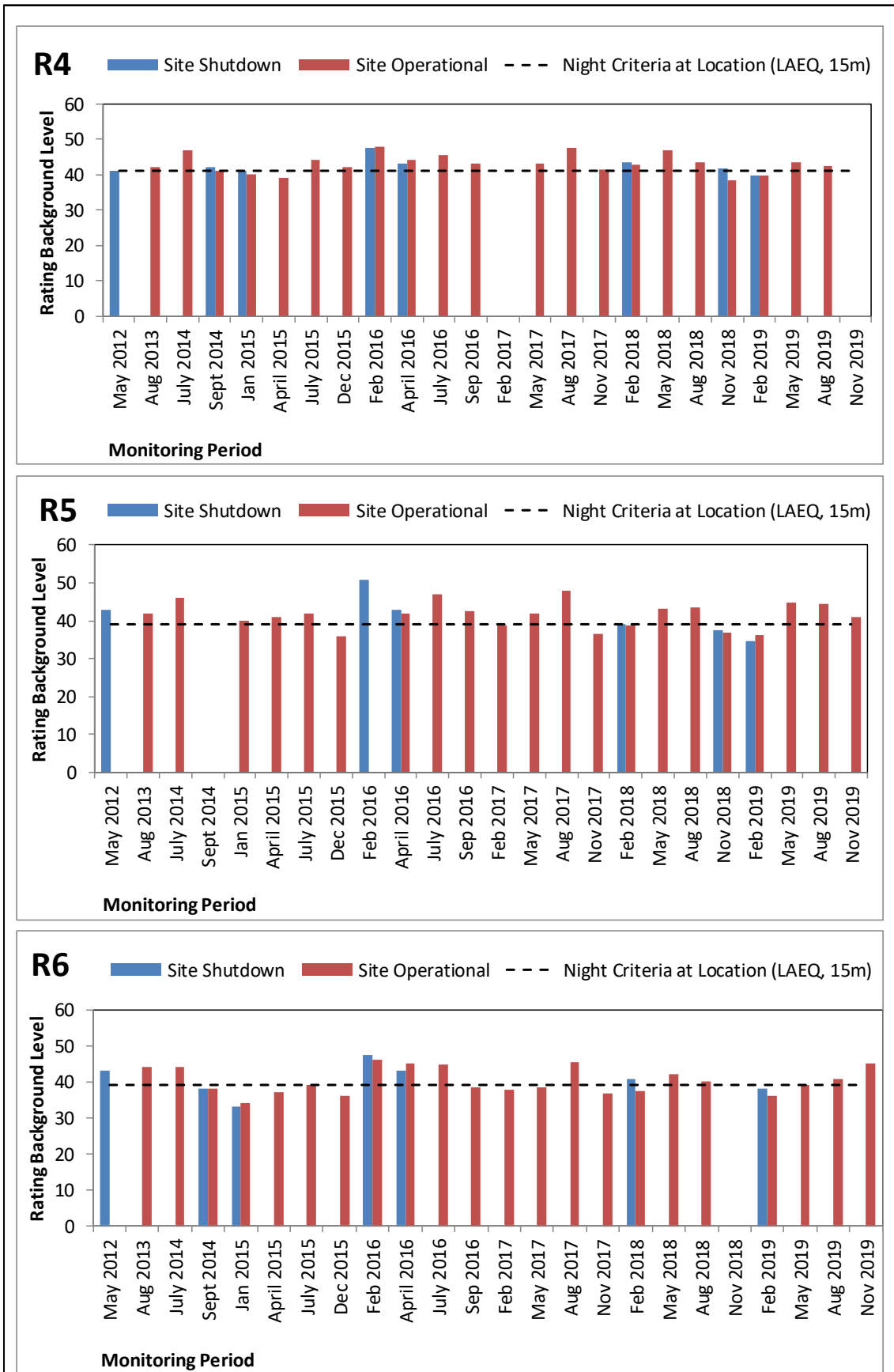


Figure 3-4: Comparison of background noise levels at R4 – R6

4. Summary

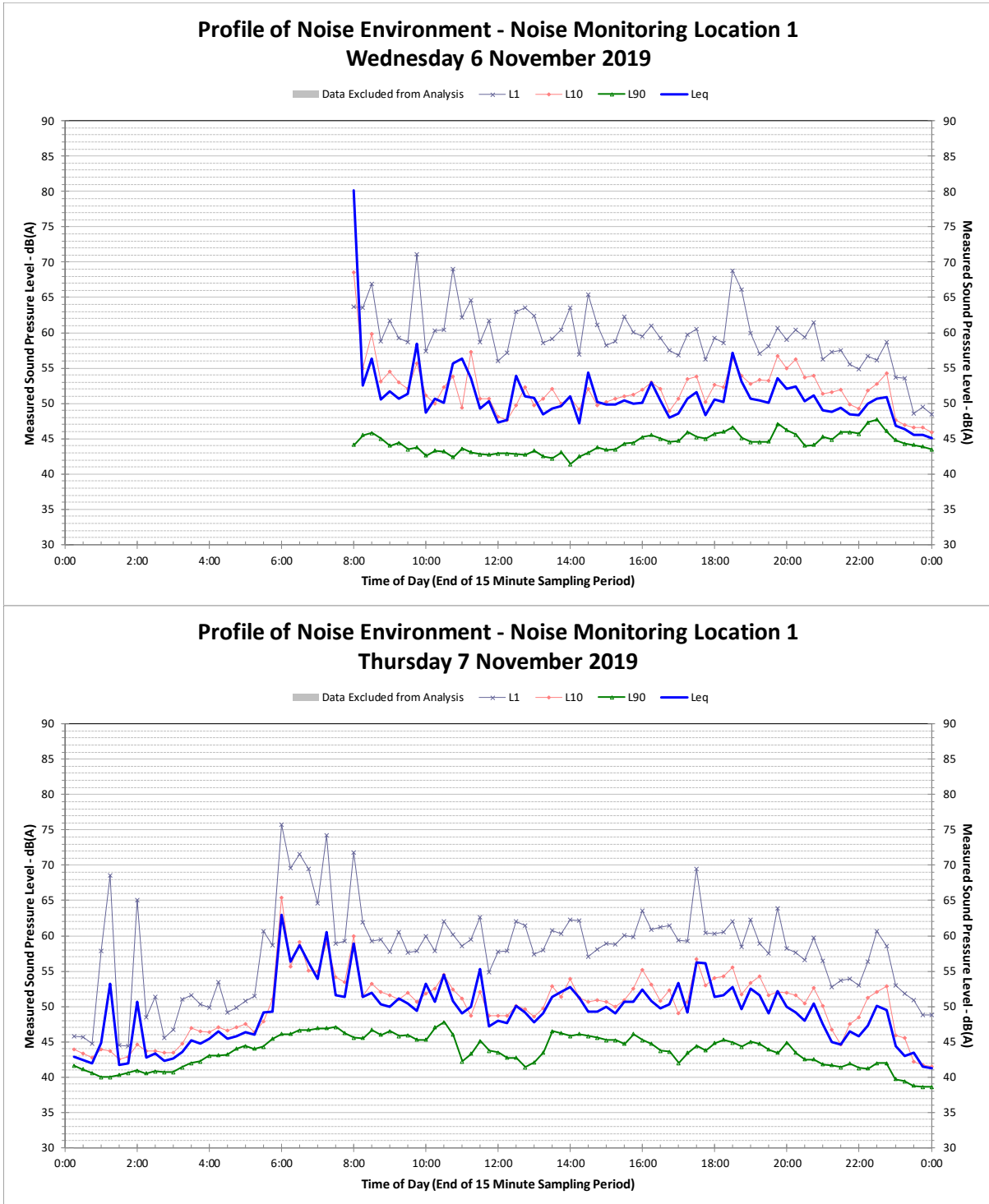
The recent noise survey undertaken in November 2019 indicates that the L_{Aeq} measured noise levels in the vicinity of the B9 Paper Mill exceeded the EPL criteria for day, evening, and night time. The maximum recorded noise level exceeded the EPL criteria of 55 dB(A) for this assessment parameter at all receiver locations.

When compared to other seasonal results for similar times during the year, the measured L_{A90} noise levels from the latest monitoring data are higher than measured noise levels from previous surveys at corresponding times of the year.

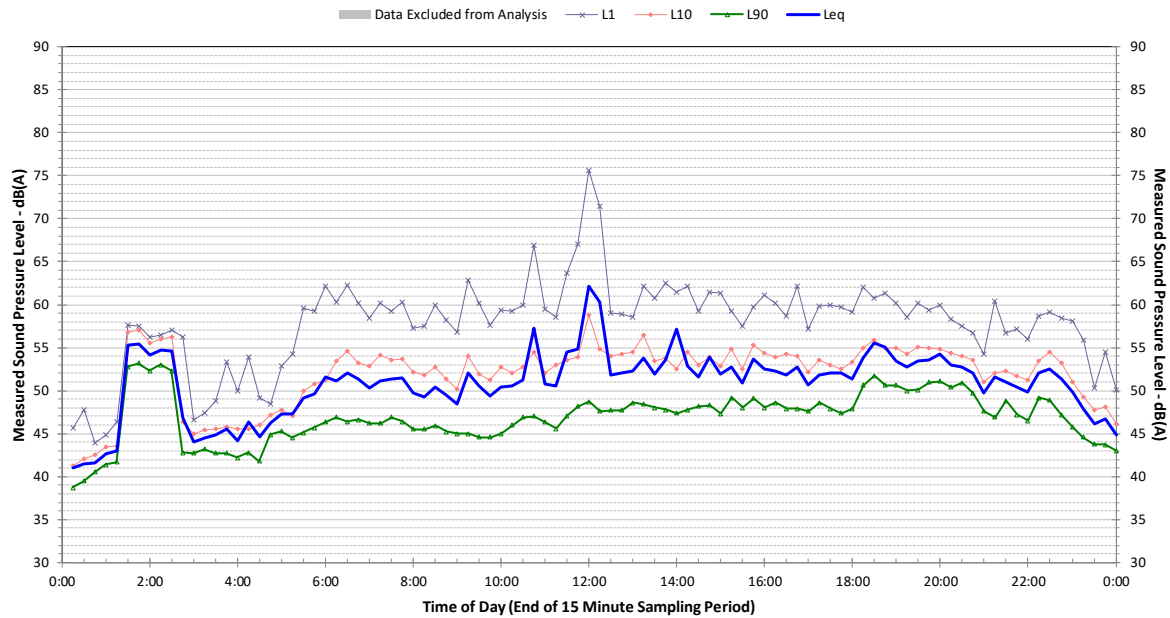
From the November 2019 quarterly monitoring the following conclusions may be drawn:

- The most recent noise monitoring results indicate that the measured L_{Aeq} noise levels are higher than the L_{Aeq} criteria and are typically higher than the long term series of data for corresponding seasonal measurement periods.
- The ambient noise environment in the local area is a product of the combined influence of all noise sources within the Port Botany area including the Orora site when operational.
- L_{Aeq} and maximum noise levels recorded during the survey period are generally unrelated to the normal operation of the Orora site.
- The resultant wind vector was from the north west with dominant wind from a westerly direction. These winds occur for about 18% of the time with other wind directions accounting for the balance of the observations.
- Wind speeds exceeding 5 ms^{-1} were recorded for about 65% of the time during the monitoring period. These weather patterns tend to enhance road traffic noise from local road networks to the west at some receiver locations.

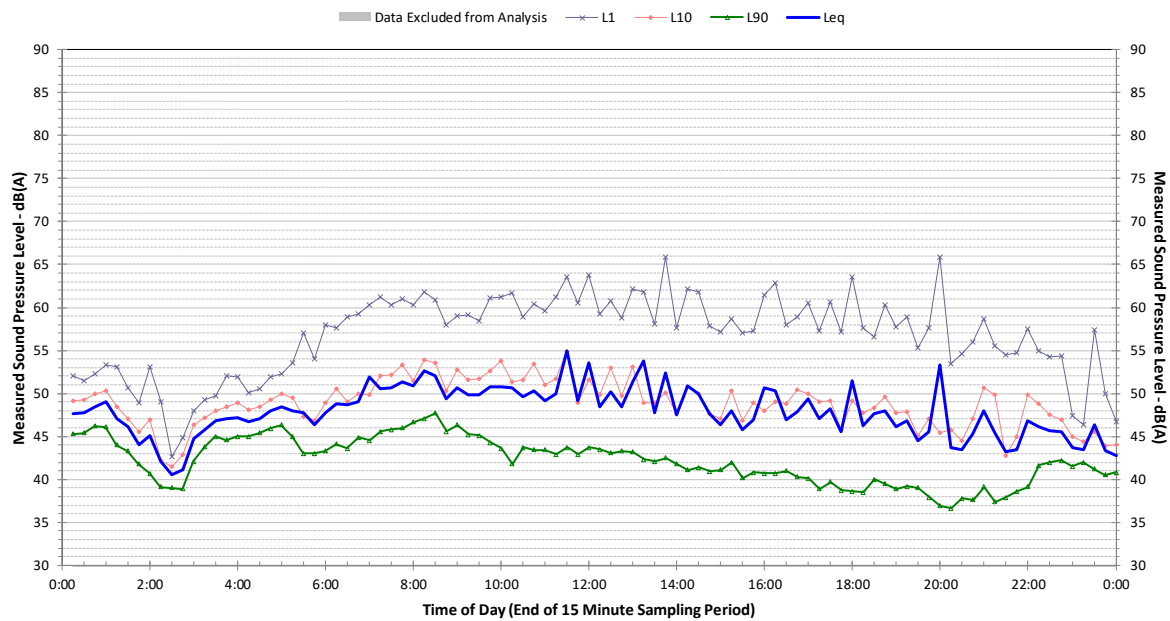
Appendix A. Noise logger graphs



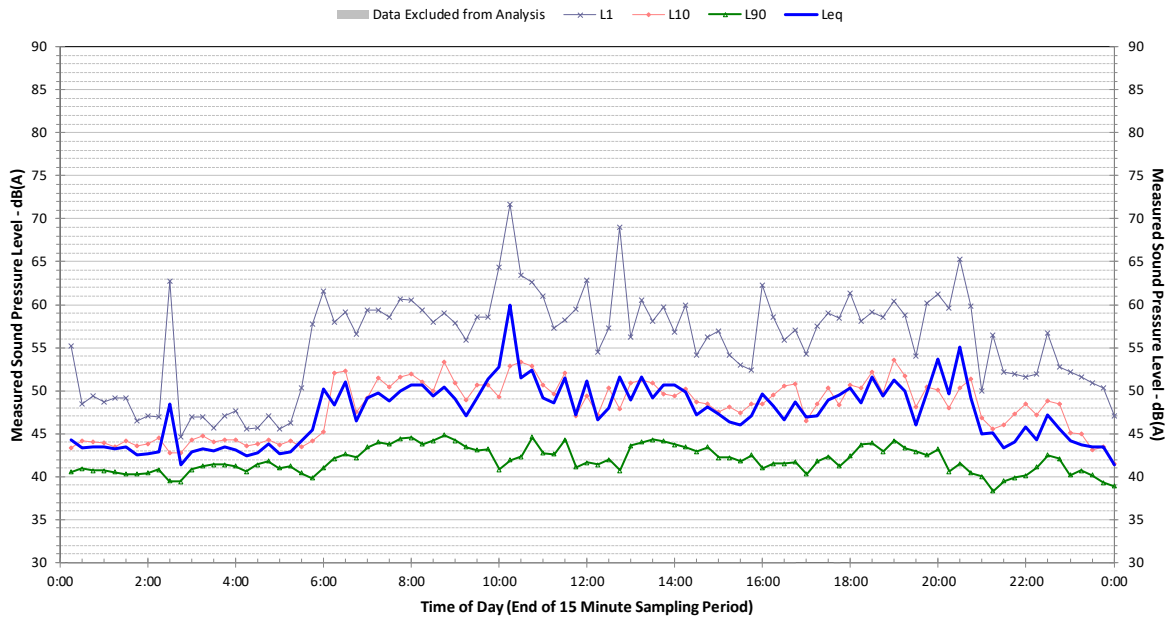
**Profile of Noise Environment - Noise Monitoring Location 1
Friday 8 November 2019**



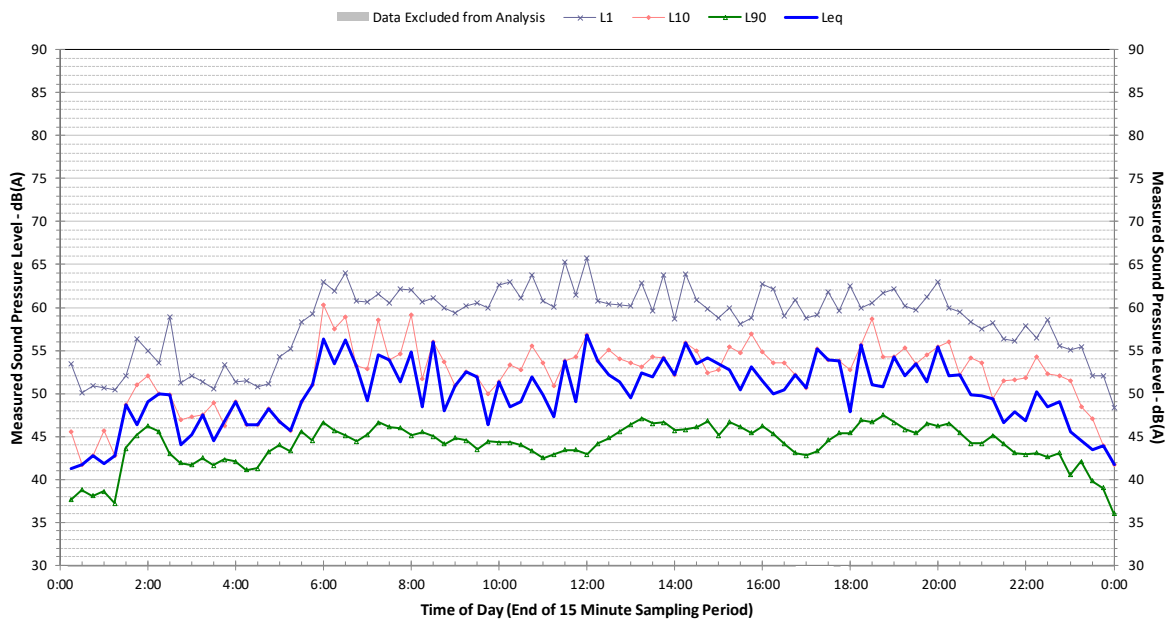
**Profile of Noise Environment - Noise Monitoring Location 1
Saturday 9 November 2019**



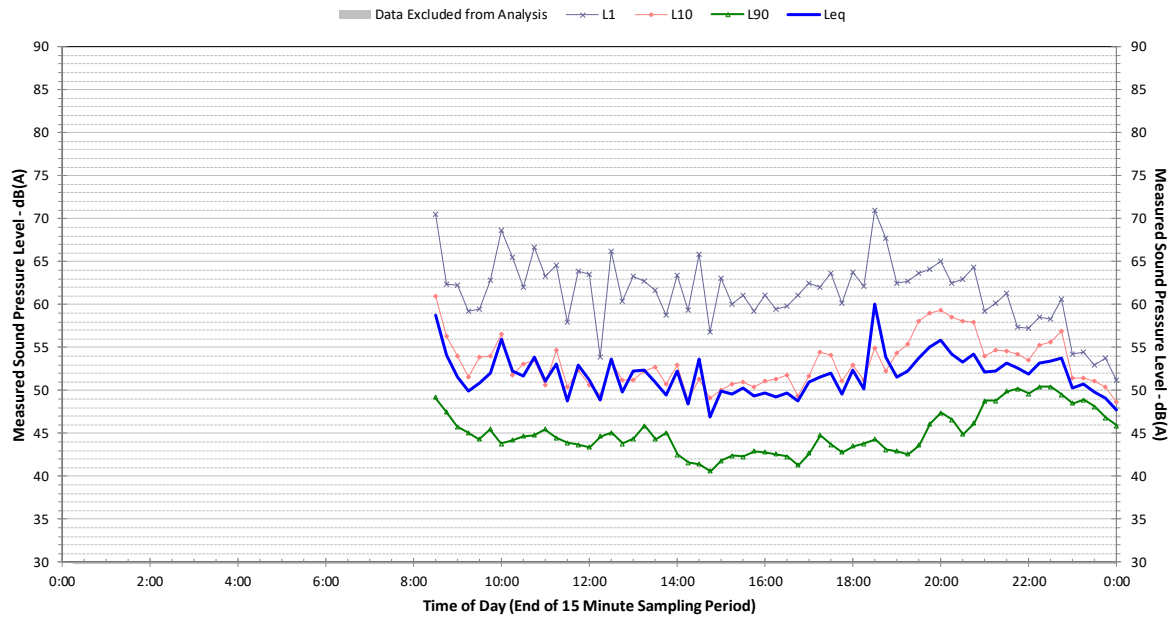
**Profile of Noise Environment - Noise Monitoring Location 1
Sunday 10 November 2019**



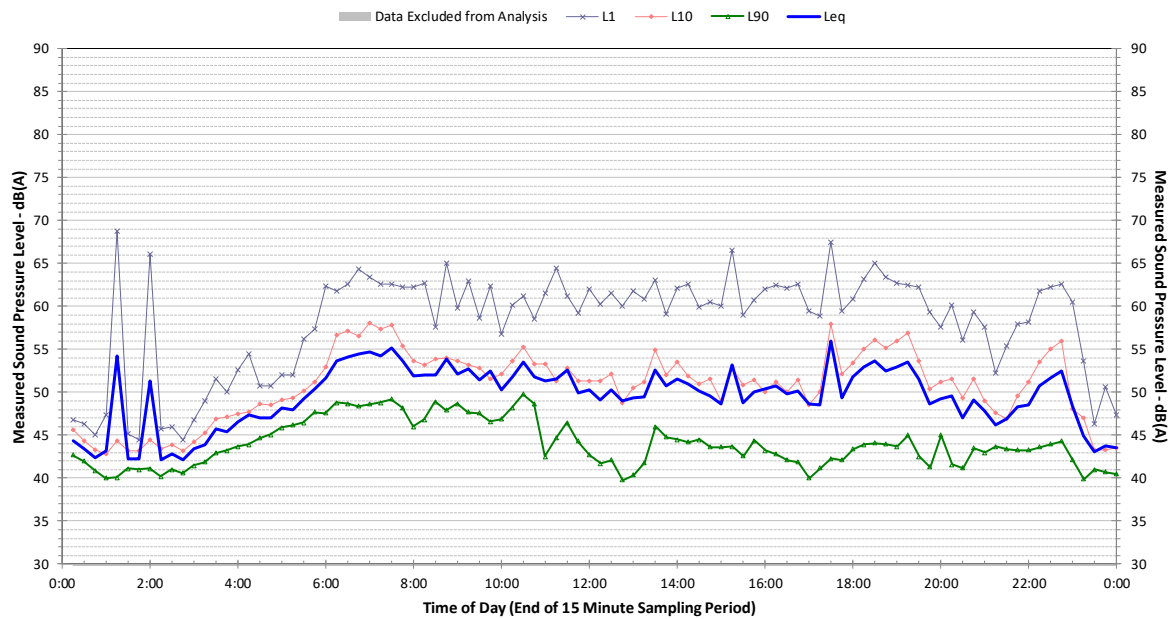
**Profile of Noise Environment - Noise Monitoring Location 1
Monday 11 November 2019**



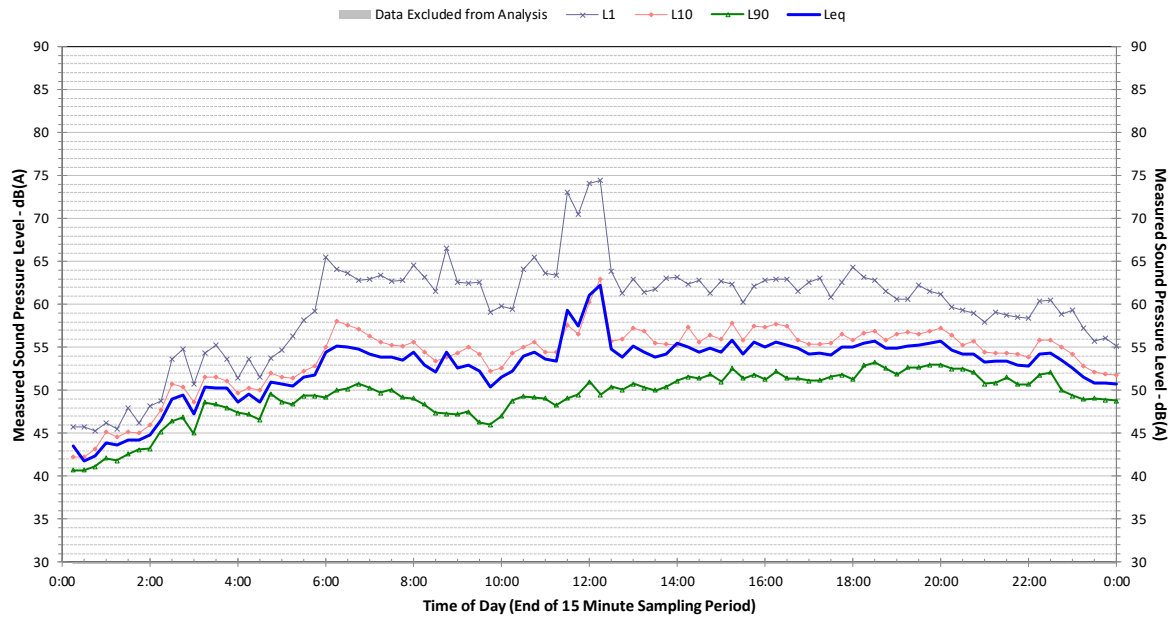
**Profile of Noise Environment - Noise Monitoring Location 2
Wednesday 6 November 2019**



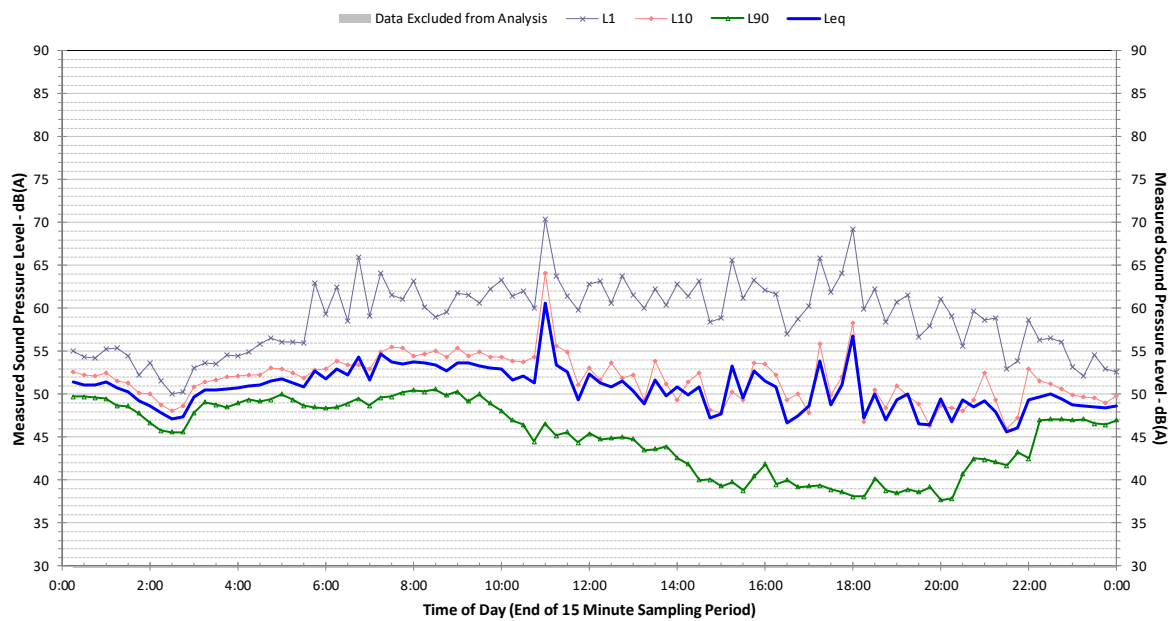
**Profile of Noise Environment - Noise Monitoring Location 2
Thursday 7 November 2019**



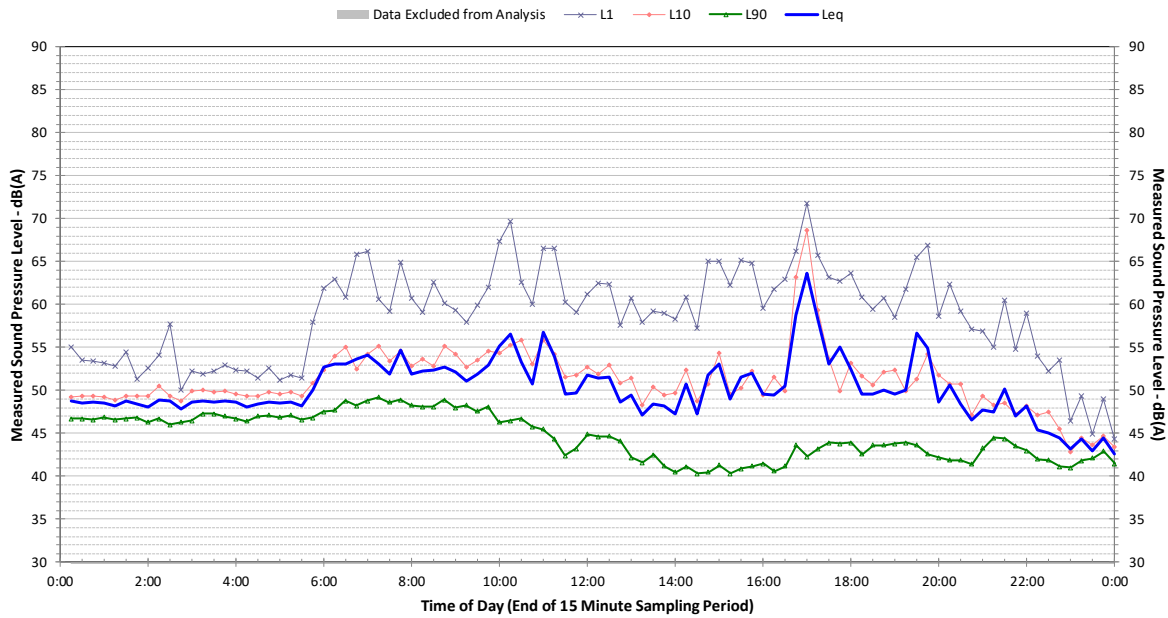
**Profile of Noise Environment - Noise Monitoring Location 2
Friday 8 November 2019**



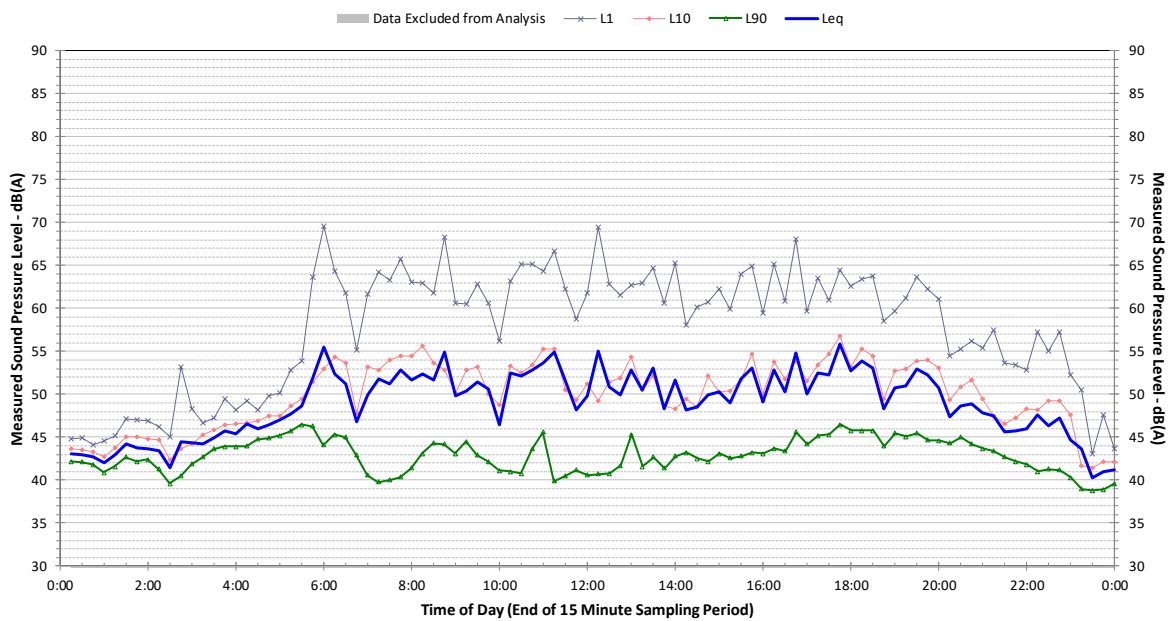
**Profile of Noise Environment - Noise Monitoring Location 2
Saturday 9 November 2019**



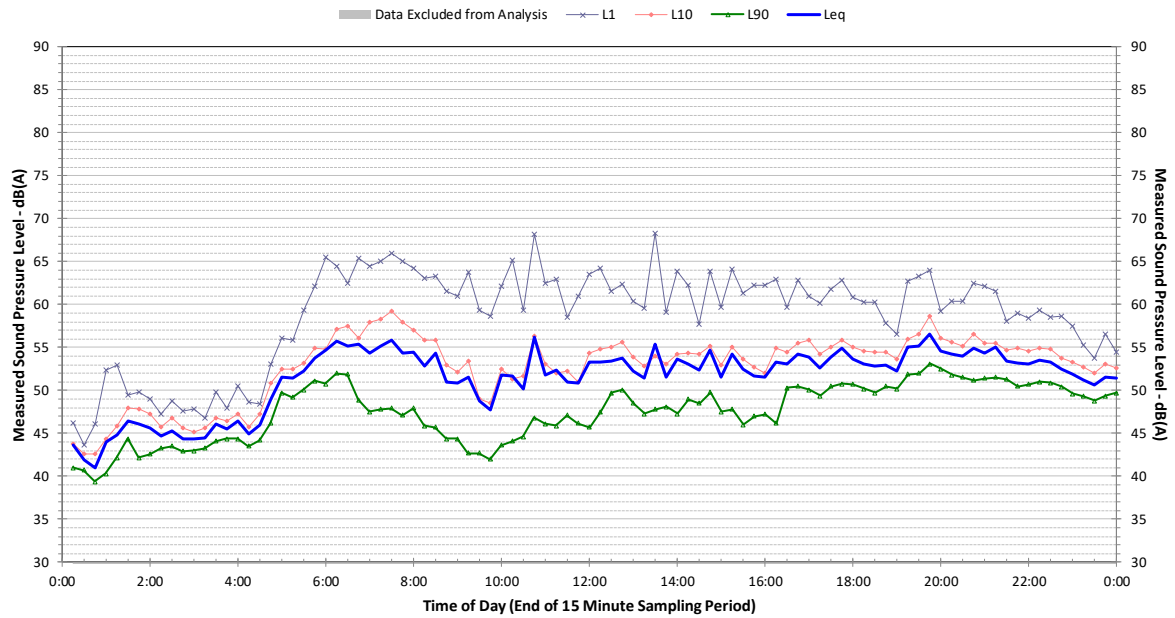
Profile of Noise Environment - Noise Monitoring Location 2 Sunday 10 November 2019



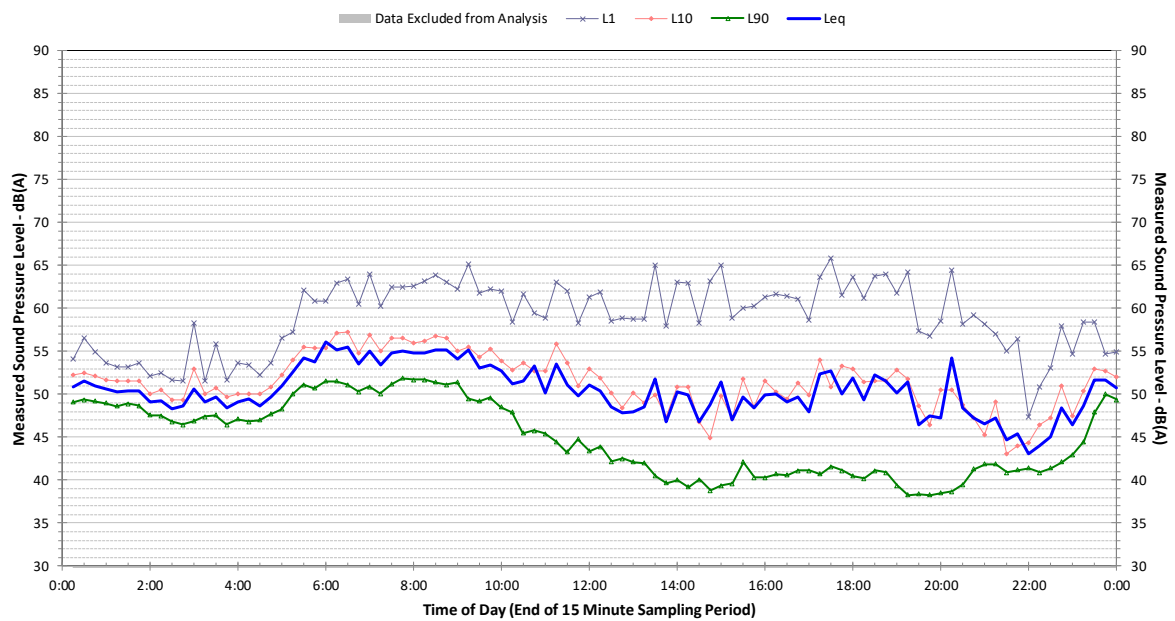
Profile of Noise Environment - Noise Monitoring Location 2 Monday 11 November 2019



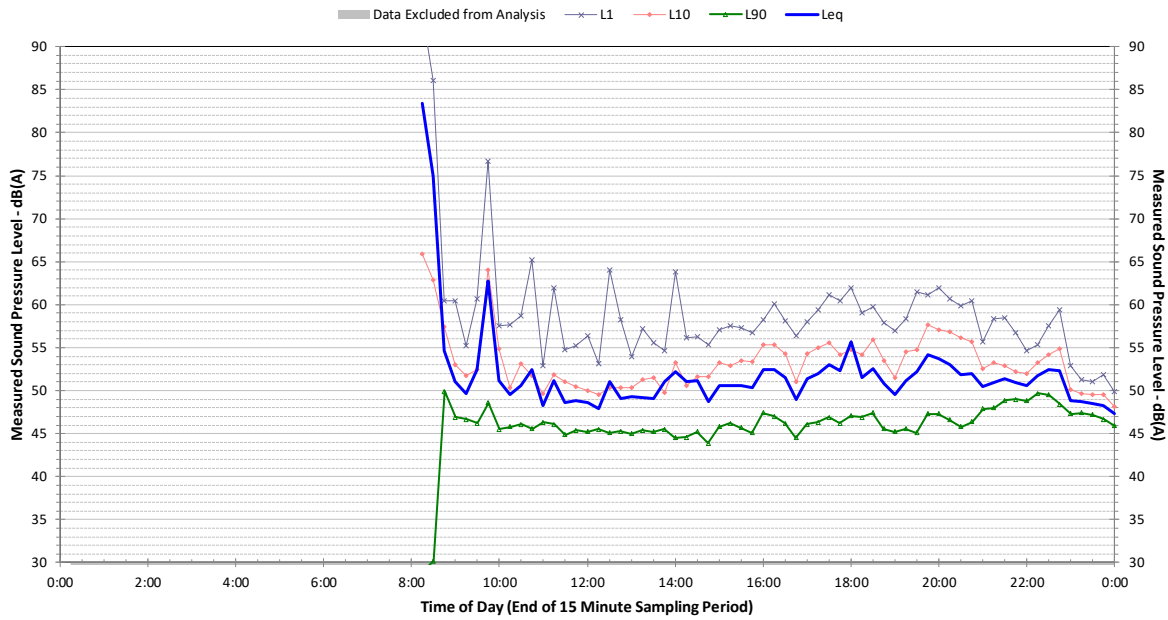
**Profile of Noise Environment - Noise Monitoring Location 2
Tuesday 12 November 2019**



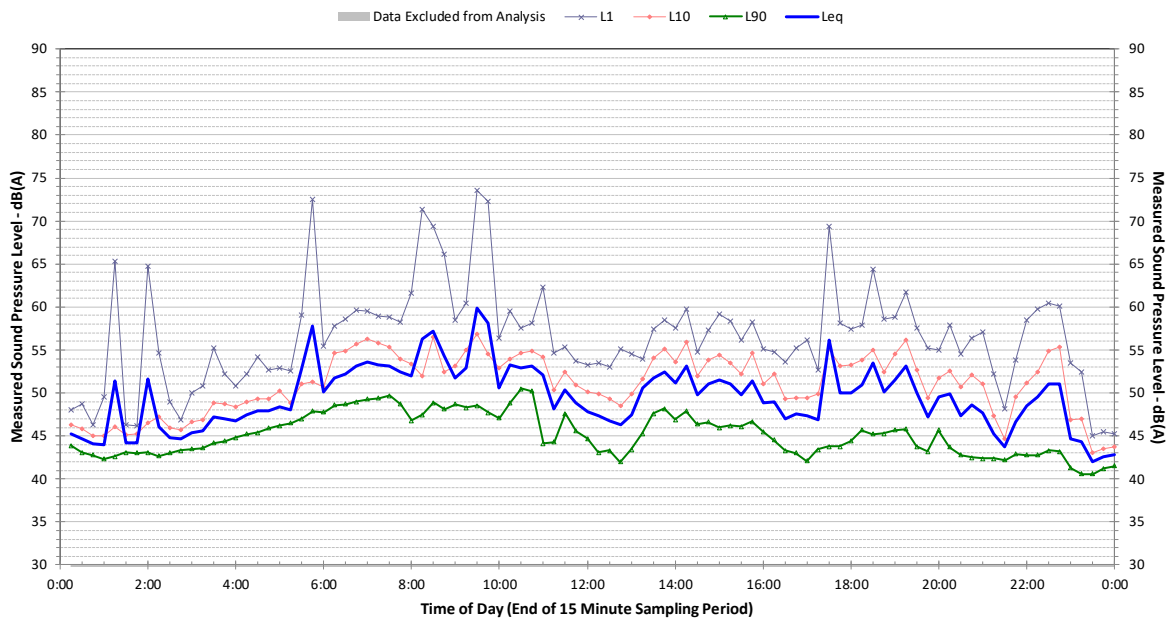
**Profile of Noise Environment - Noise Monitoring Location 2
Wednesday 13 November 2019**



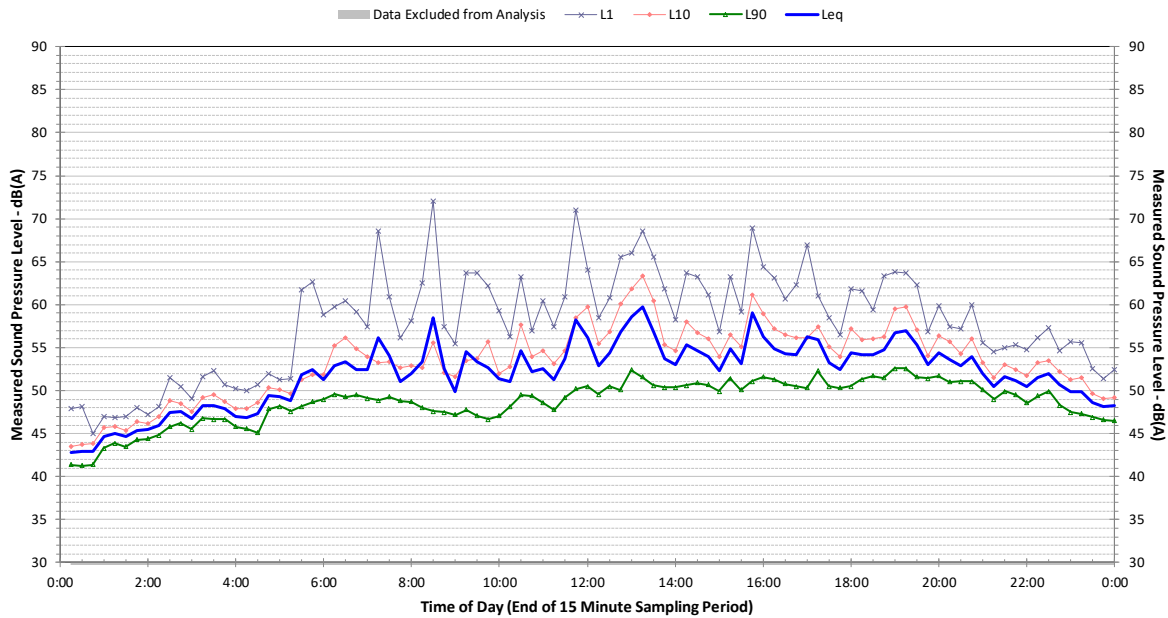
Profile of Noise Environment - Noise Monitoring Location 3 Wednesday 6 November 2019



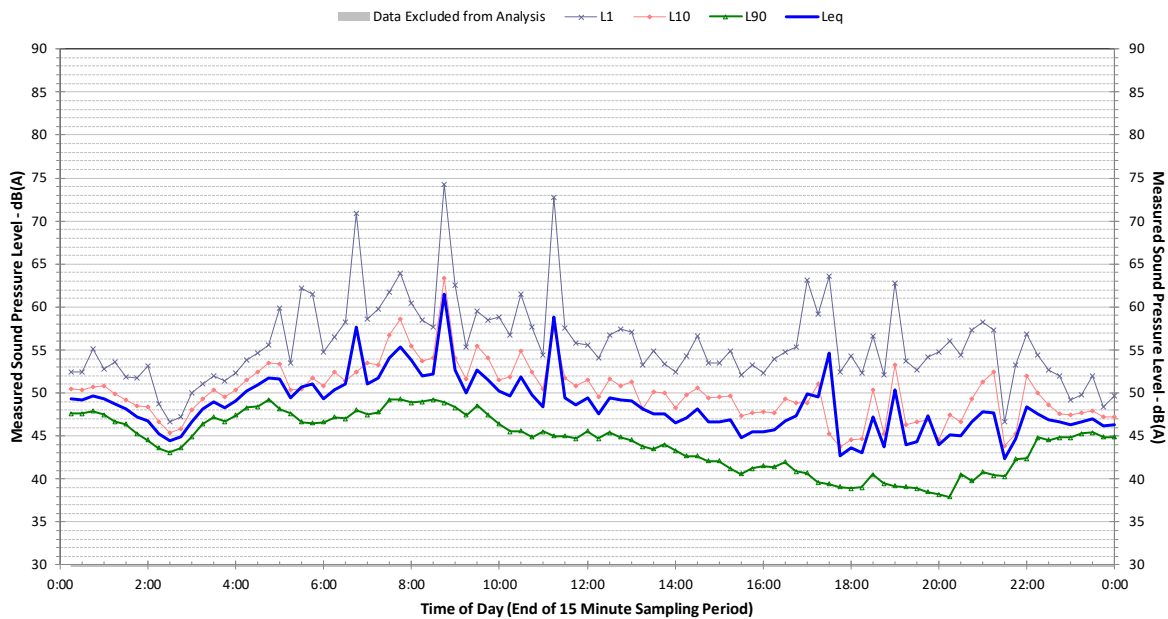
Profile of Noise Environment - Noise Monitoring Location 3 Thursday 7 November 2019



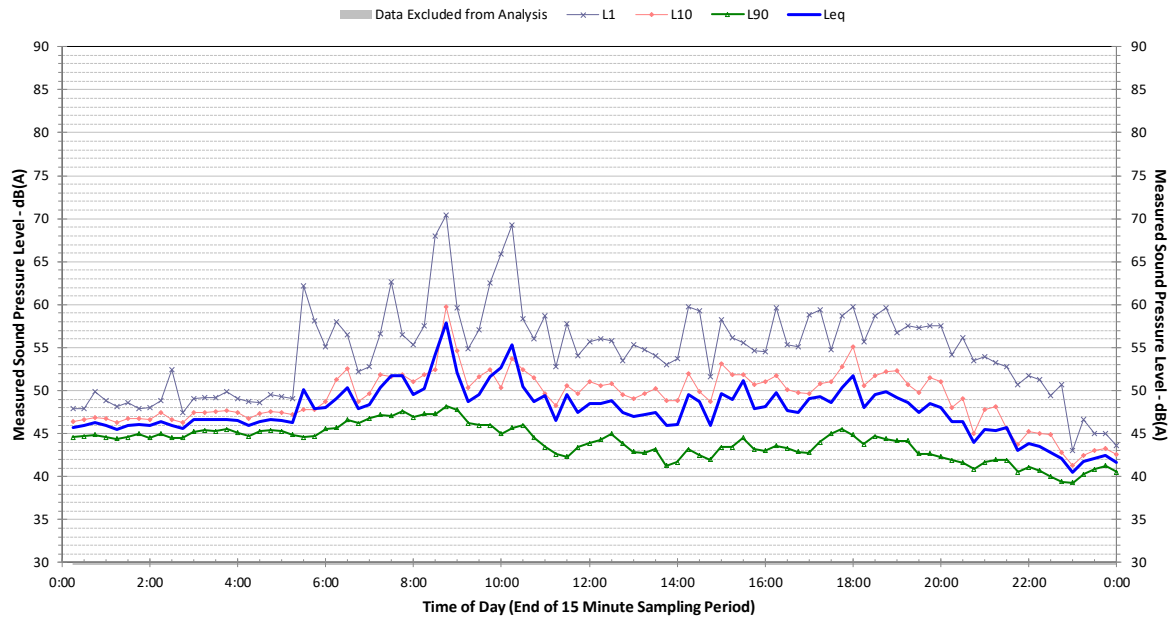
Profile of Noise Environment - Noise Monitoring Location 3 Friday 8 November 2019



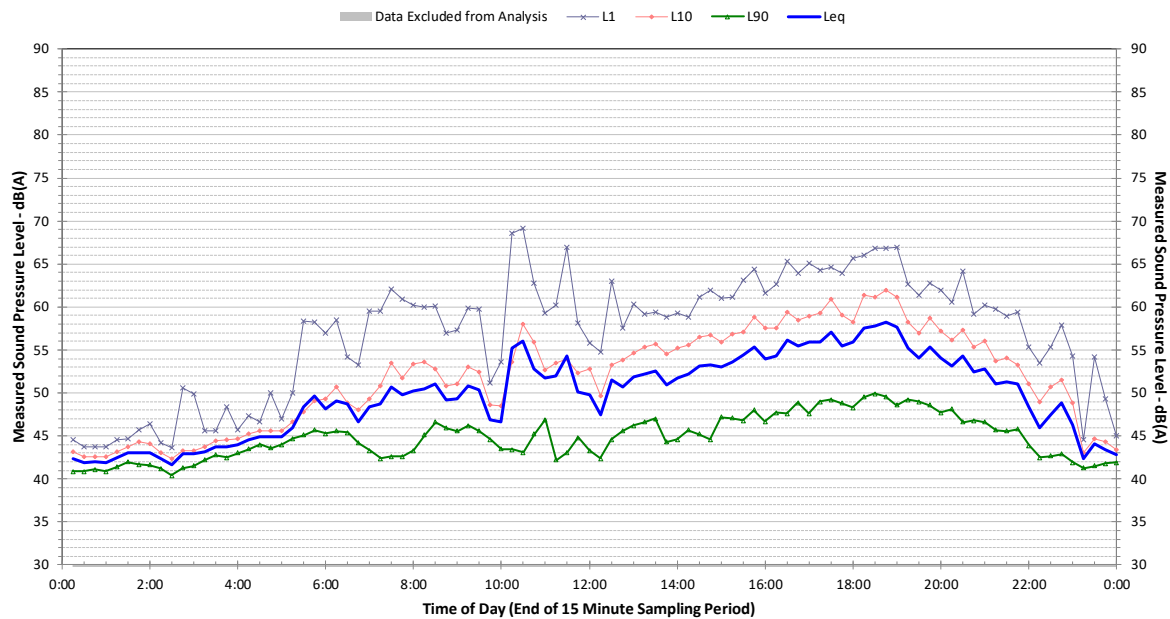
Profile of Noise Environment - Noise Monitoring Location 3 Saturday 9 November 2019



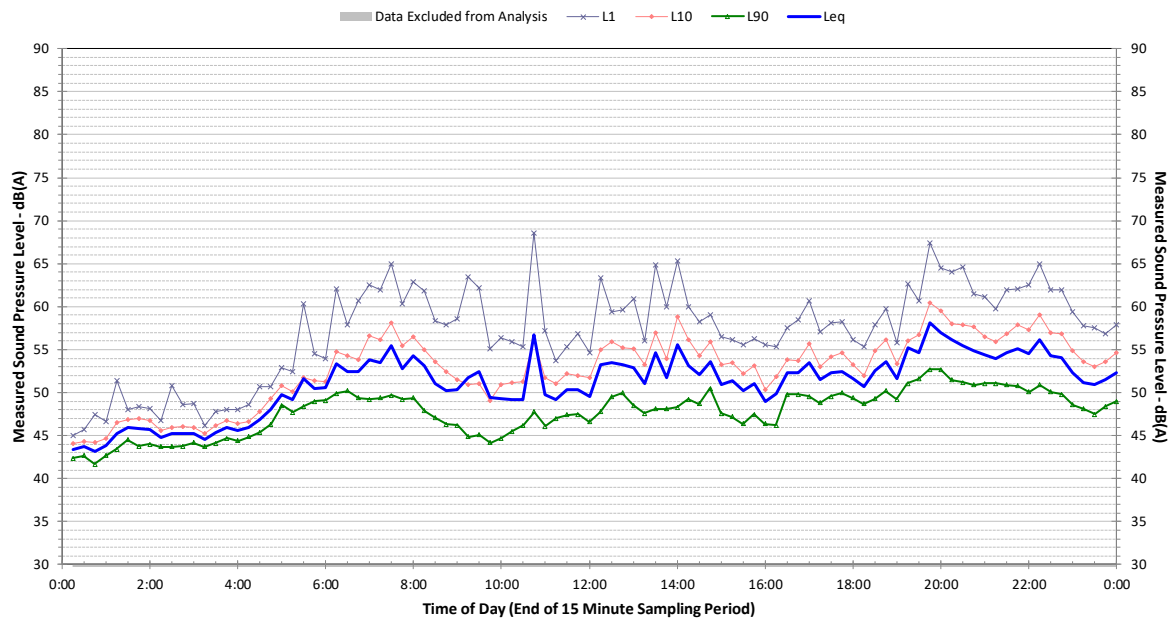
**Profile of Noise Environment - Noise Monitoring Location 3
Sunday 10 November 2019**



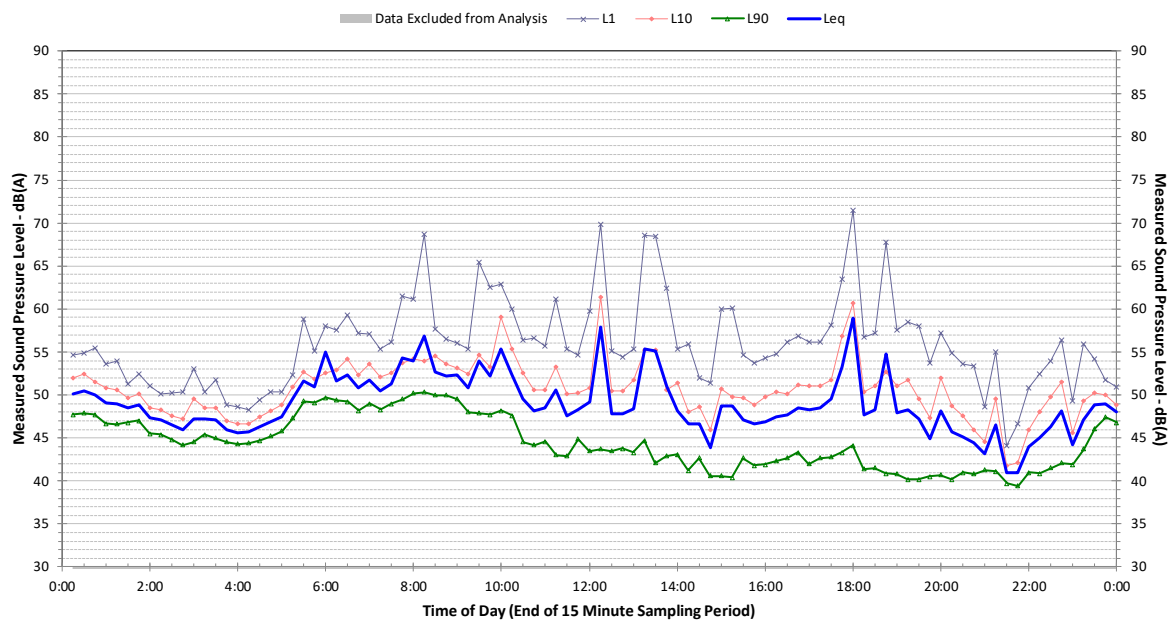
**Profile of Noise Environment - Noise Monitoring Location 3
Monday 11 November 2019**



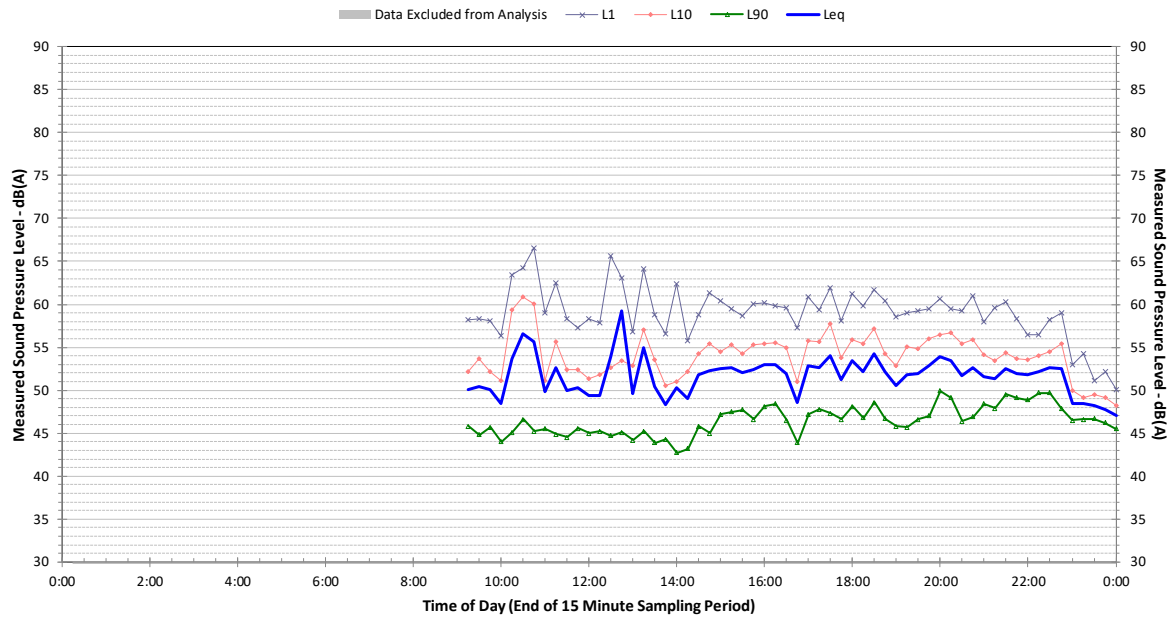
**Profile of Noise Environment - Noise Monitoring Location 3
Tuesday 12 November 2019**



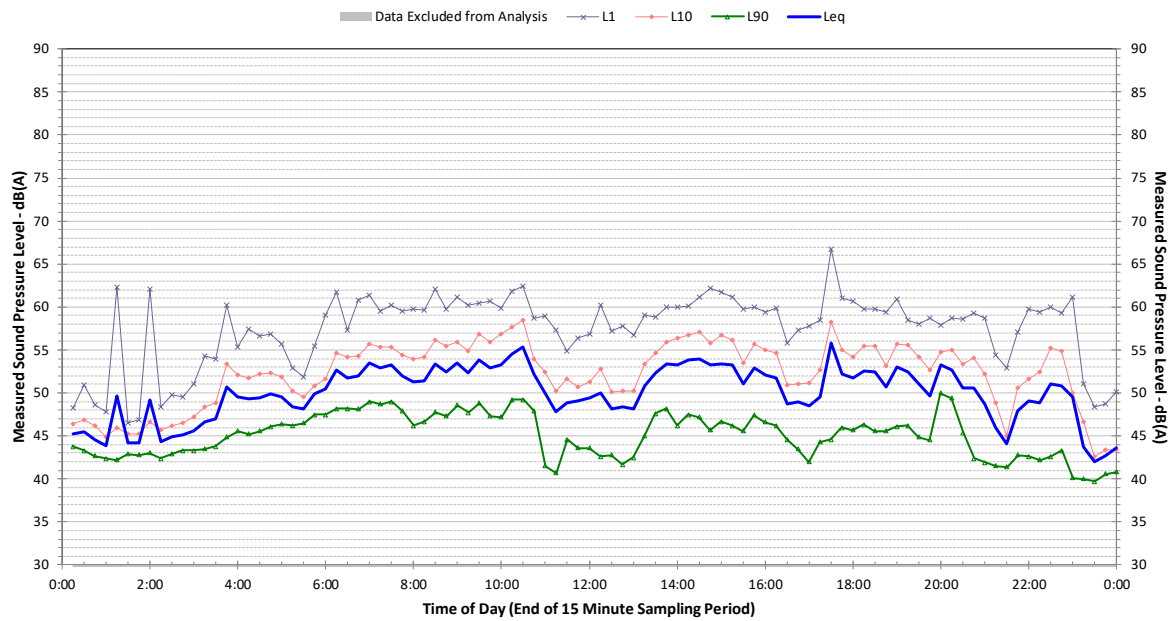
**Profile of Noise Environment - Noise Monitoring Location 3
Wednesday 13 November 2019**



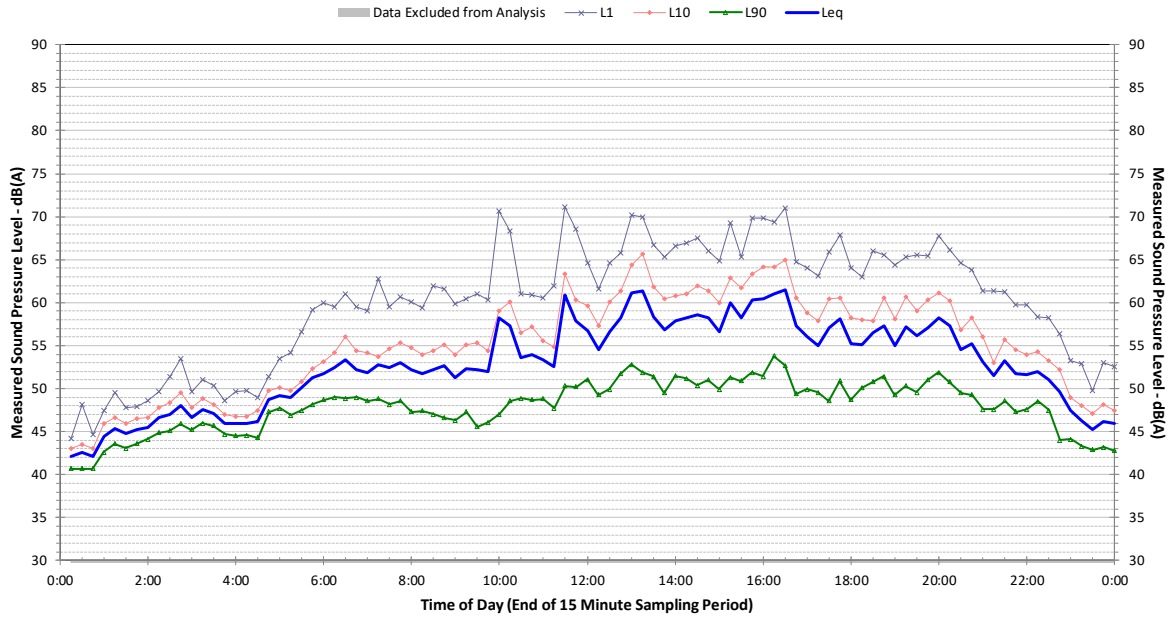
**Profile of Noise Environment - Noise Monitoring Location 5
Wednesday 6 November 2019**



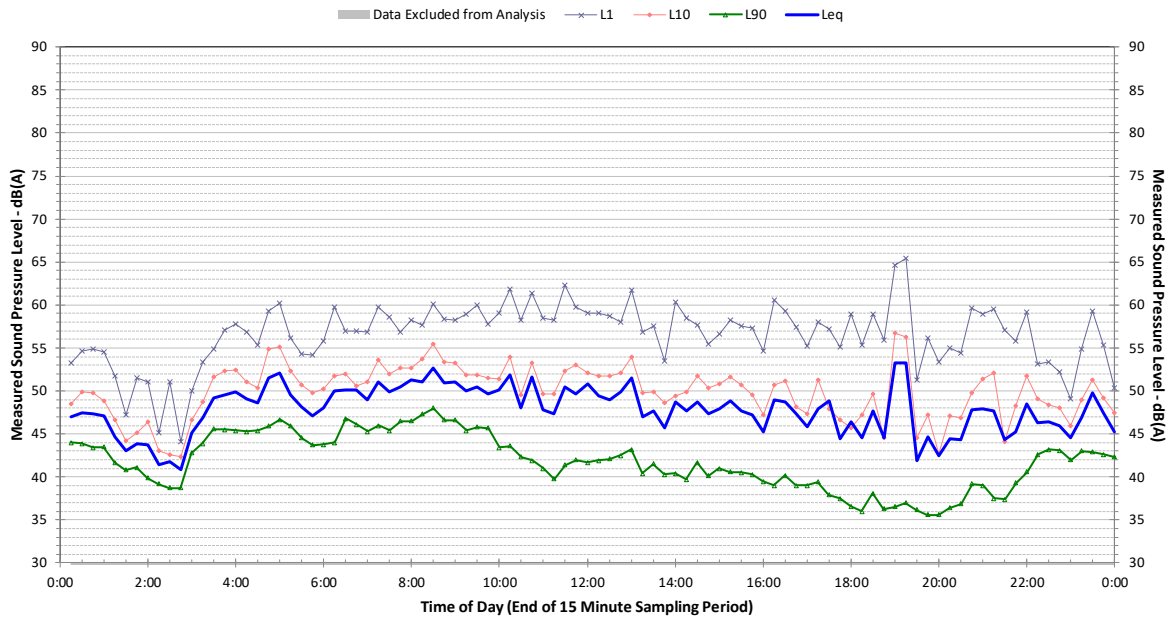
**Profile of Noise Environment - Noise Monitoring Location 5
Thursday 7 November 2019**



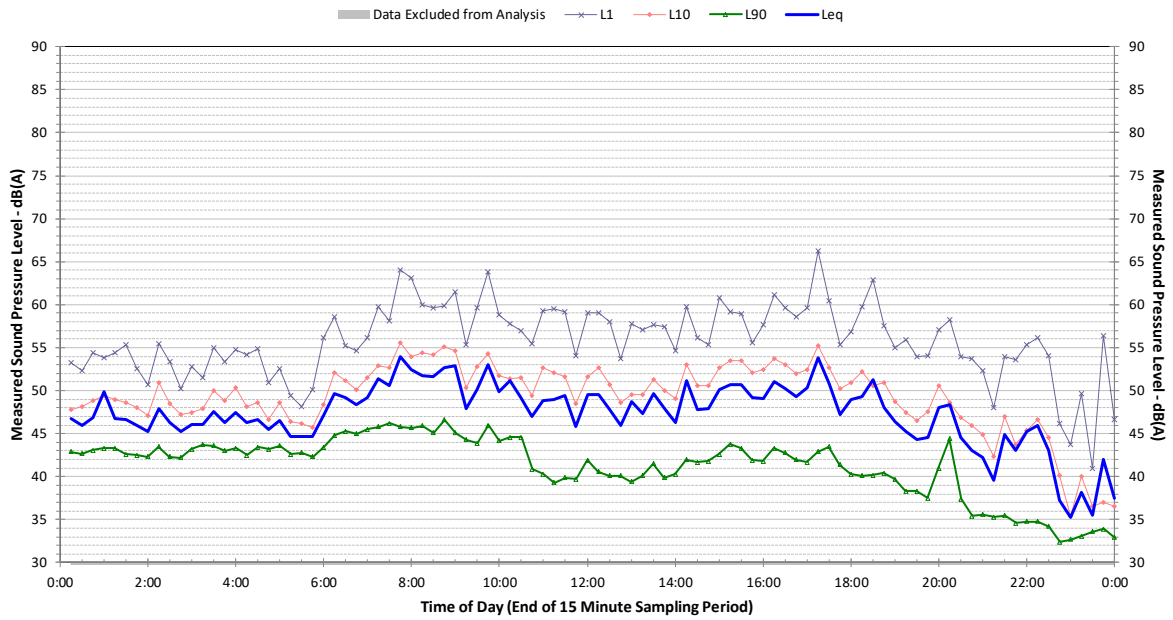
Profile of Noise Environment - Noise Monitoring Location 5 Friday 8 November 2019



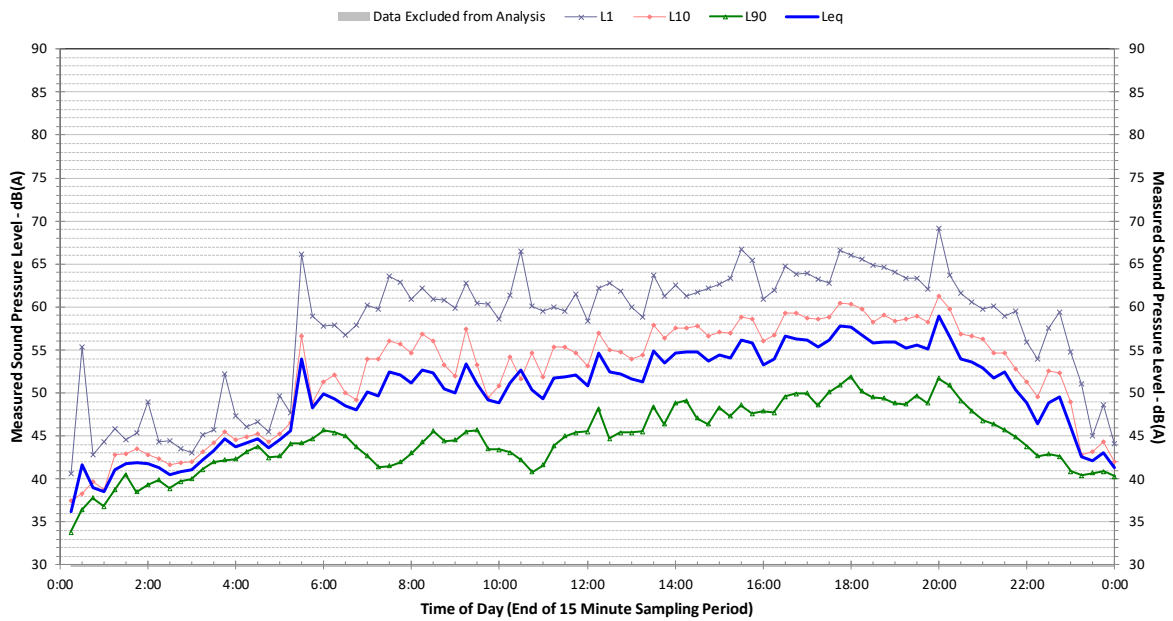
Profile of Noise Environment - Noise Monitoring Location 5 Saturday 9 November 2019



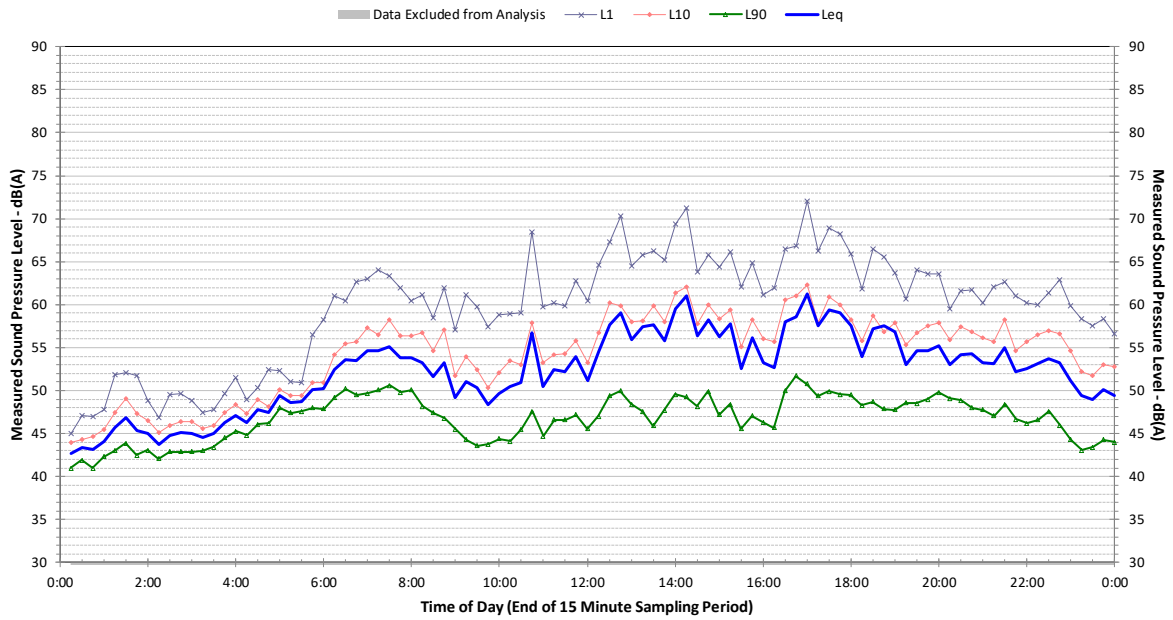
Profile of Noise Environment - Noise Monitoring Location 5 Sunday 10 November 2019



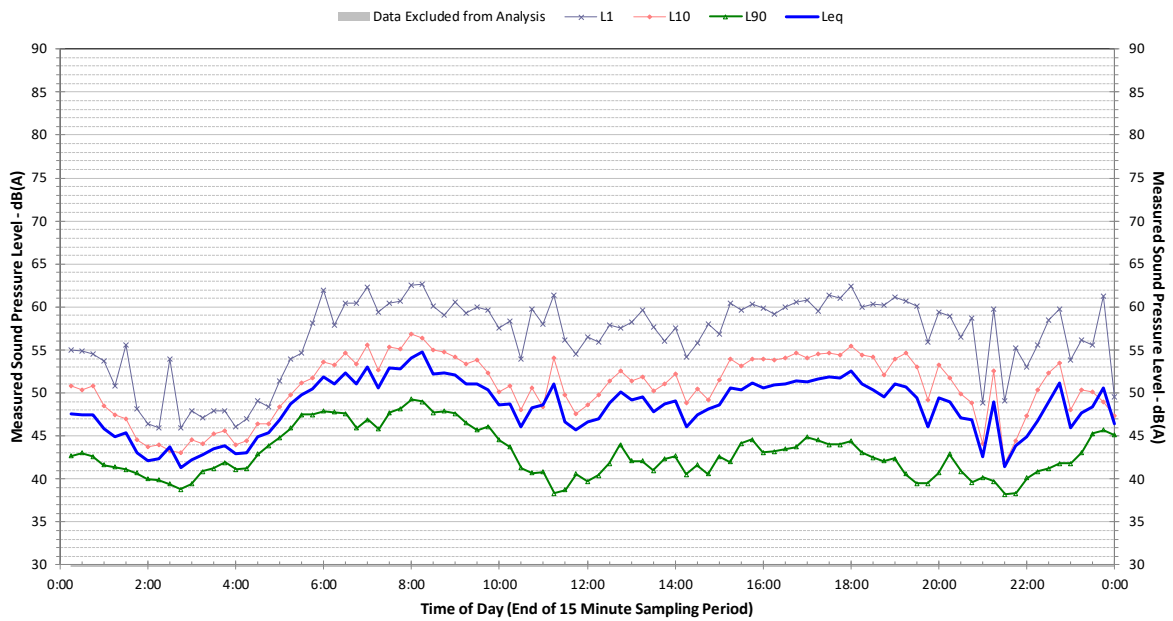
Profile of Noise Environment - Noise Monitoring Location 5 Monday 11 November 2019



Profile of Noise Environment - Noise Monitoring Location 5 Tuesday 12 November 2019



Profile of Noise Environment - Noise Monitoring Location 5 Wednesday 13 November 2019



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