

Orora Pty Ltd

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



5 June 2019

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Author Scott Hughes

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Hutchison Weller Pty Ltd
ABN 34 603 174 518
102/1-3 Gurrigal Street
Mosman NSW 2008

www.hutchisonweller.com

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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 May 2019 – July 2019 quarter. At the time of preparing this report, the B9 paper machine is currently operating at typical production capacity.

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.

An indicator of the contribution of Orora operational noise to existing noise levels may be made using rating background noise levels measured during the night time periods. At that time, 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 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 to 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.

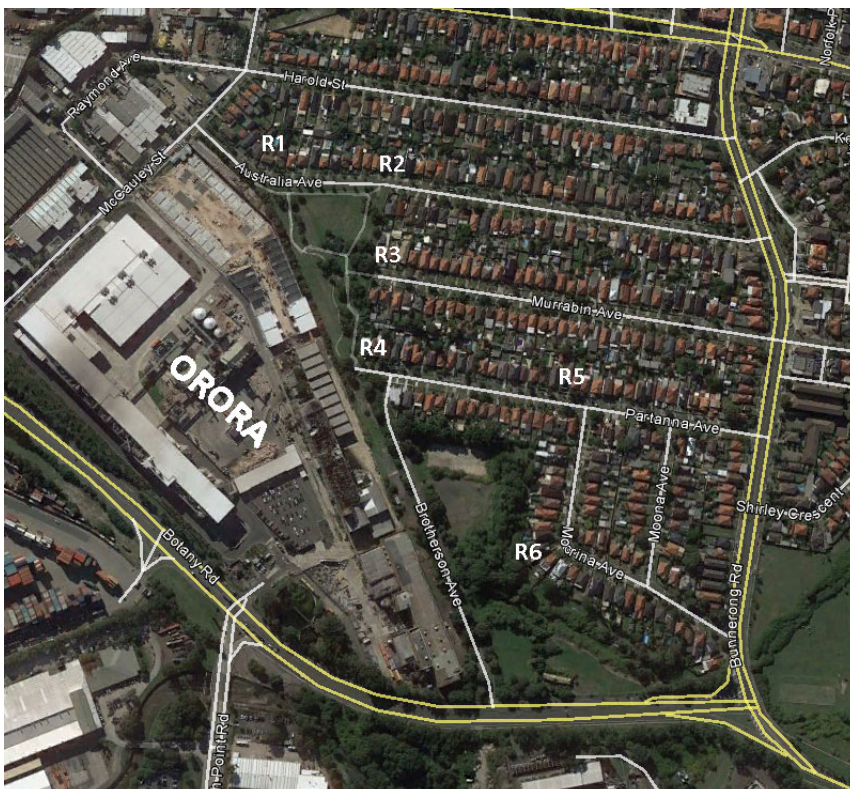


Figure 2-1 Site location and compliance monitoring locations (Source: Google Maps 2016)

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 recent development of a warehousing facility on the corner of McCauley 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. Some construction work was in progress at the property during the monitoring period.
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	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.
R4	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. Some construction activity was noted at the adjacent property during the monitoring period.
R5	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.
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. Work on the adjacent vacant land has been underway at this location for about 9-10 months at the time of writing this report.

3. Operational noise monitoring

3.1 Method

Operational noise monitoring for the May survey period was completed between 15 May and 21 May 2019, using automatic noise loggers deployed at six 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.

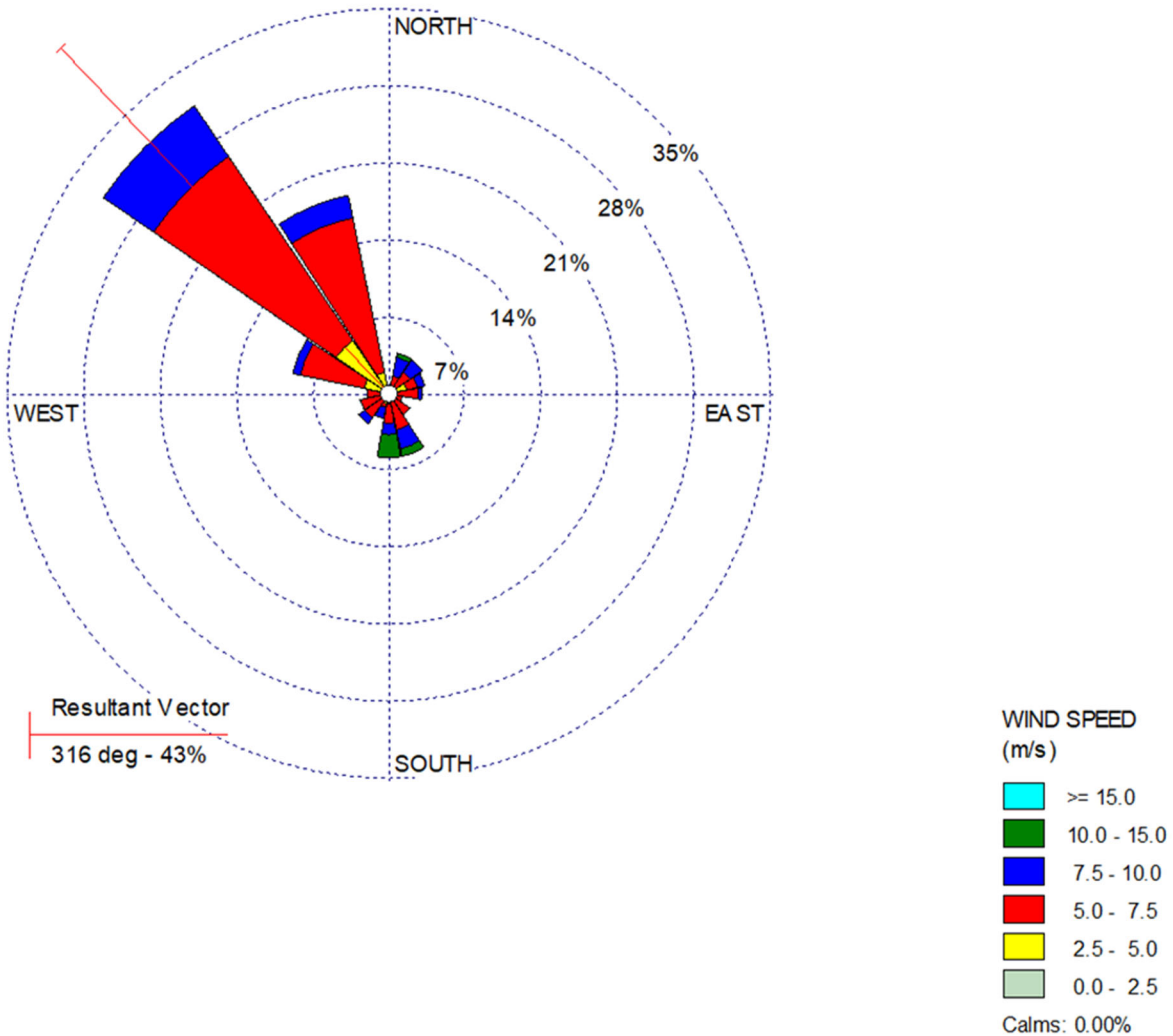


Figure 3-1 Wind speed and direction during monitoring period (15 May – 21 May 2019, source BoM 2019)

The plotted data indicates that the wind speeds during the monitoring were typically higher than 5 m/s with the overall resultant wind vector for the monitoring period concentrated from 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.

During the monitoring period winds from the north-westerly direction dominated for over 50% of the time. Winds from this direction are expected to minimise noise levels originating from the Orora site while enhancing noise from road networks to the north and west of the site.

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

3.2 Monitoring results

During the May 2019 quarterly noise survey, the paper mill was operating under normal conditions and no breakdowns or noisy events were reported.

The measured L_{Amax} , L_{A1} , L_{Aeq} , and L_{A90} 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.

The most recent results at monitoring location 6 included the ongoing influence of construction activities on the adjacent vacant block currently under development. The influence of construction noise did not occur during night time periods, which have been used for the analysis of long term noise impacts.

At Location 2 a logger failure meant that only several hours of monitoring during the first day were captured.

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

The night time periods were also assessed to provide information of the Orora B9 Paper Mill noise contributions using the median L_{A90} noise levels as a benchmark. Rating background noise levels at night were typically higher than the day and evening periods at the majority of receiver locations. This is expected to be due to the presence of temperature inversions during the night time periods and is consistent with patterns recorded during similar times in previous surveys.

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 May 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 will be graphed to demonstrate data trends for each of the monitoring locations.

3.3 Comparison with previous monitoring surveys

The data in Figure 3-2 and Figure 3-3 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 3-2 and Figure 3-3 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)	Leq - over period	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period
Wednesday 15 May2019	39.9	51.4	39	48	40.2	50.8	43.4	54.4	38.0	74.1	42.5	50.1
Thursday 16 May2019	39.5	51.2	-	-	41.4	53.4	42.1	52.1	40.8	53.1	41.1	50.5
Friday 17 May2019	38.6	50.6	-	-	40.9	61.2	41.3	53.6	39.7	52.9	40.6	52.6
Saturday 18 May2019	39.7	48.8	-	-	43.4	50.6	42.0	52.9	39.2	50.5	40.4	48.6
Sunday 19 May2019	37.5	48.1	-	-	39.7	49.1	-	-	37.8	48.9	38.0	47.7
Monday 20 May2019	38.1	49.4	-	-	-	-	--		41.0	55.9	40.4	48.8
Median	39.0	50.0	39	48	40.9	50.8	42.1	53.2	39.5	53.0	40.5	49.5
Evening: 6:00:00 PM to 10:00:00 PM												
Date	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period
Wednesday 15 May2019	42.5	48.5	-	-	43.3	47.7	42.1	46.6	41.8	54.4	41.4	48.3
Thursday 16 May2019	41.3	48.5	-	-	40.5	47.2	41.0	46.7	40.4	58.9	40.7	47.0
Friday 17 May2019	42.0	48.6	-	-	44.0	48.4	41.2	45.6	44.0	50.0	41.8	47.6
Saturday 18 May2019	39.6	47.0	-	-	42.8	46.3	-	-	38.1	46.7	37.1	44.8
Sunday 19 May2019	38.2	47.4	-	-	38.8	46.2	-	-	38.7	48.1	36.6	45.2
Monday 20 May2019	42.4	47.8	-	-	-	-	-	-	45.4	50.5	41.6	46.1
Median	41.6	48.1			42.8	47.2	41.2	46.6	41.1	50.3	41.0	46.6

ORORA – B9 COMPLIANCE NOISE MONITORING

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)	Leq - over period	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period	L90 (10th Percentile)	Leq - over period
Wednesday 15 May2019	42.1	46.1	-	-	47.7	50.4	43.7	47.2	45.1	49.3	40.0	44.7
Thursday 16 May2019	41.3	47.6	-	-	47.1	50.3	43.4	47.2	45.4	50.2	39.1	45.6
Friday 17 May2019	39.6	45.5	-	-	45.4	49.4	41.9	45.9	43.4	48.0	37.4	44.7
Saturday 18 May2019	37.0	43.8	-	-	42.9	47.4	-	-	40.0	44.8	33.6	41.1
Sunday 19 May2019	40.2	45.6	-	-	45.8	48.6	-	-	44.5	49.0	39.0	45.0
Monday 20 May2019	-	-	-	-	-	-	-	-	45.6	50.2	-	-
Median	40.2	45.6	-	-	45.8	49.4	43.4	47.2	44.8	49.1	39.0	44.7

Table 4 Summary of maximum noise levels

Time and date	Maximum Noise Environment - Noise Monitoring Location											
	R1		R2		R3		R4		R5		R6	
Date	L _{Amax}	L _{A1}	L _{Amax}	L _{A1}	L _{Amax}	L _{A1}	L _{Amax}	L _{A1}	L _{Amax}	L _{A1}	L _{Amax}	L _{A1}
Wednesday 15 May	75.5	62.3	-	-	75.2	62.1	72.8	60.6	74.7	63.3	74.0	57.7
Thursday 16 May	80.3	71.6	-	-	72.7	65.7	72.5	63.4	84.7	65.5	72.3	65.2
Friday 17 May	80.6	62.5	-	-	74.1	63.0	71.5	59.0	75.5	62.6	73.3	63.0
Saturday 18 May	70.2	63.1	-	-	81.6	63.0	-	-	71.2	59.2	73.5	57.2
Sunday 19 May	74.3	63.2	-	-	66.7	61.8	-	-	69.9	62.0	71.2	62.3
Monday 20 May			-	-	0.0	0.0	-	-	69.6	60.2	-	-
Median	75.5	63.1	-	-	74.1	63.0	72.5	60.6	70.3	63.1	73.3	62.3

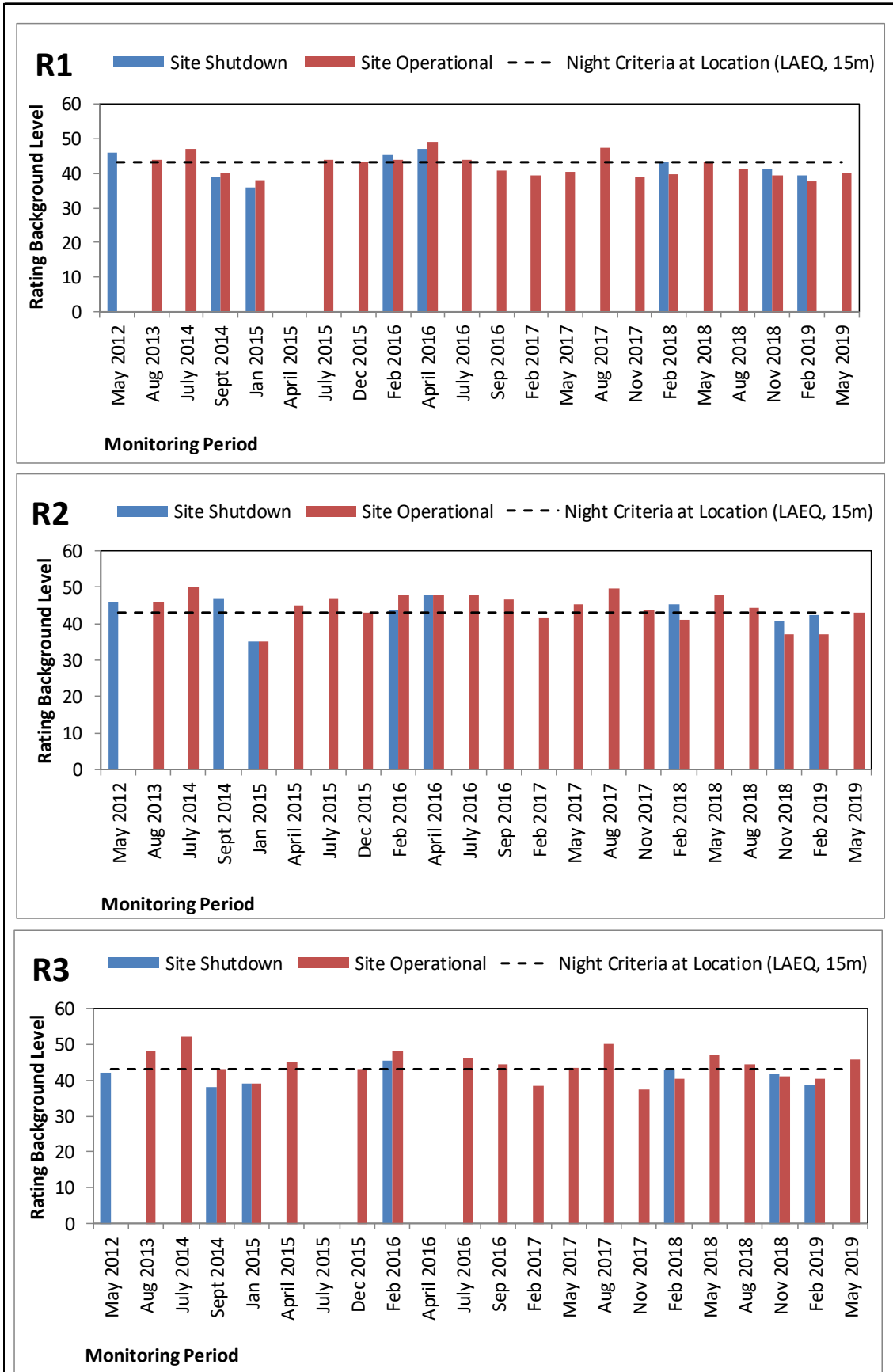


Figure 3-2: Comparison of background noise levels at R1 – R3

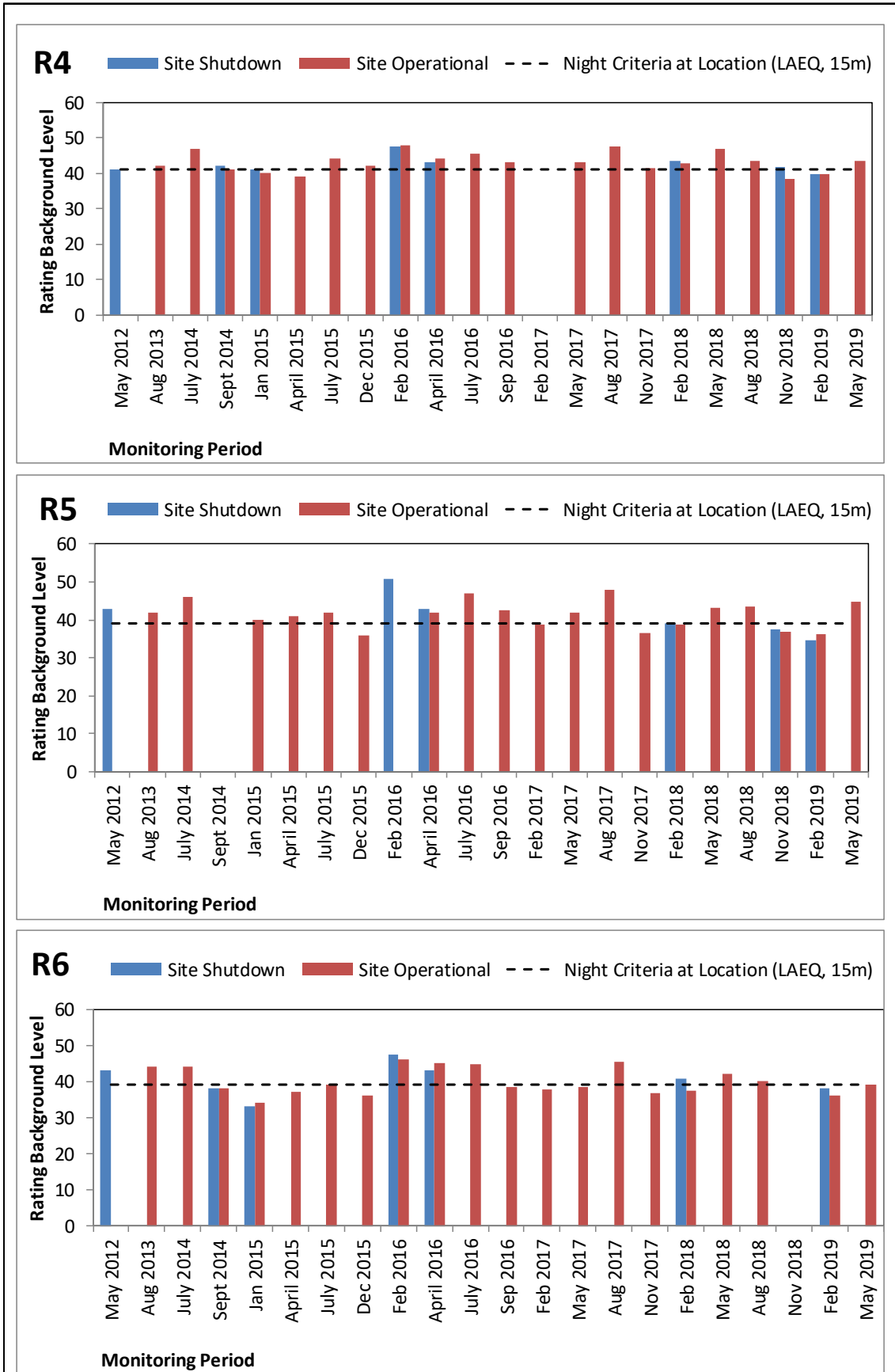


Figure 3-3: Comparison of background noise levels at R4 – R6

4. Summary

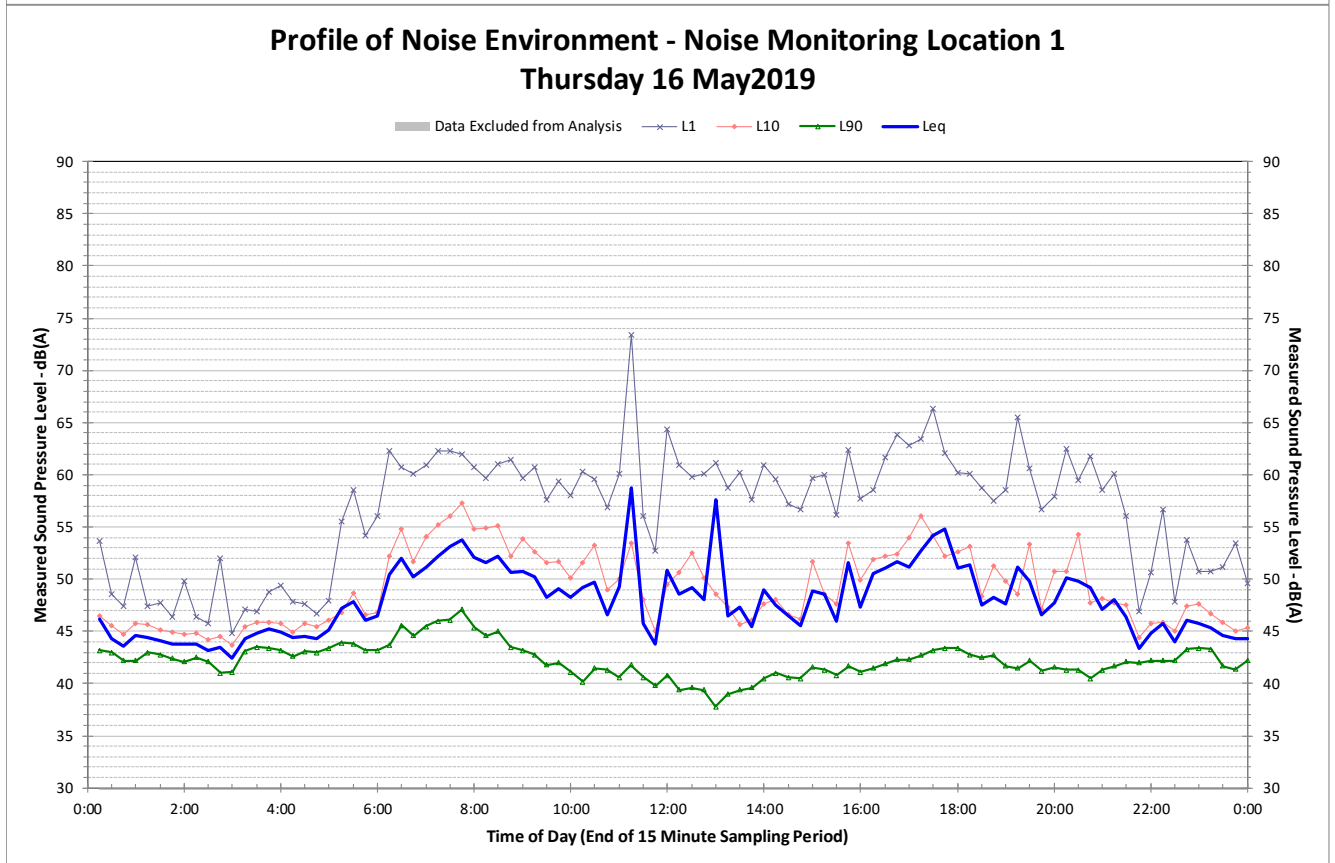
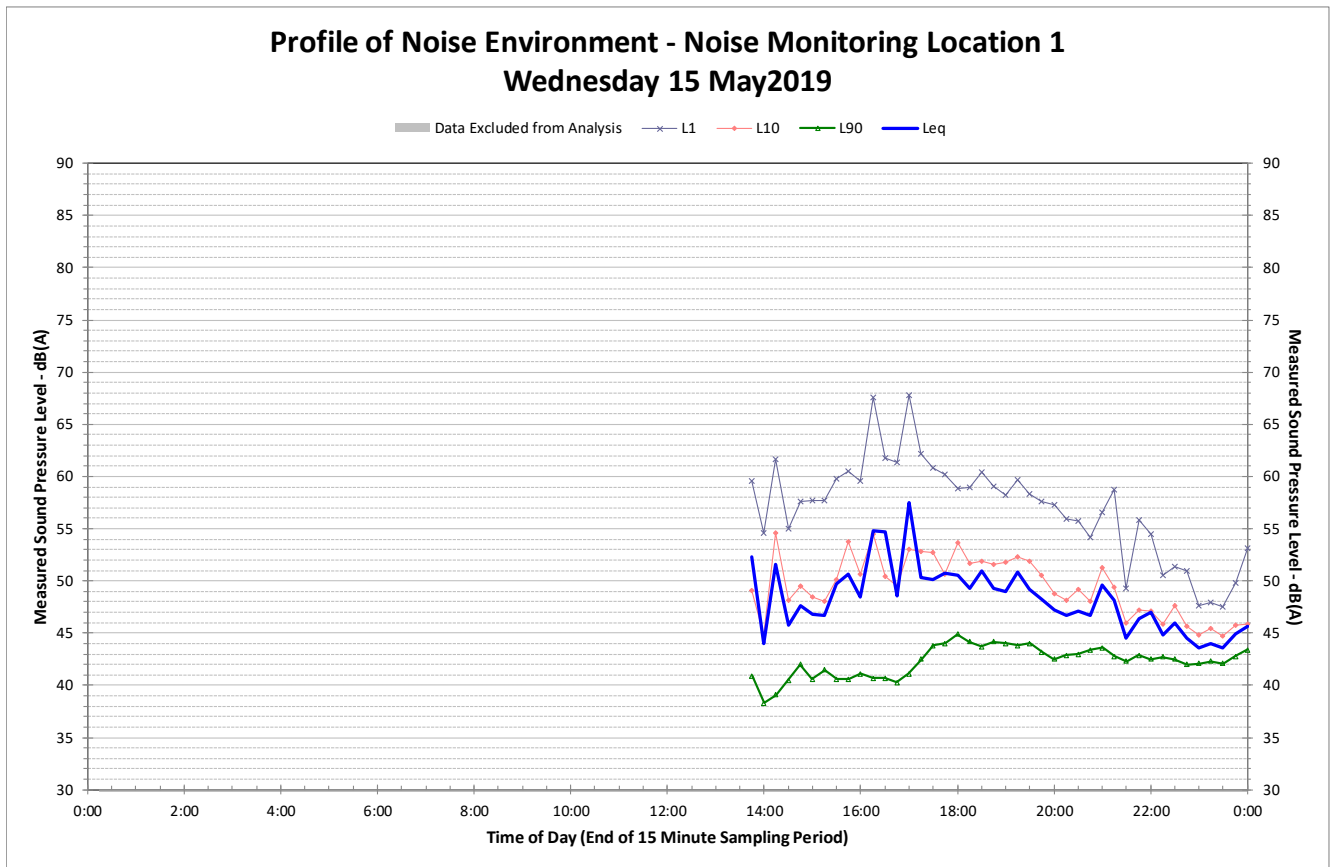
The recent noise survey undertaken in May 2019 indicates that the L_{Aeq} measured noise levels in the vicinity of the B9 Paper Mill exceeded the EPL criteria for day, evening, and night time. The maximum recorded noise level exceeded the EPL criteria of 55 dB(A) for this assessment parameter.

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

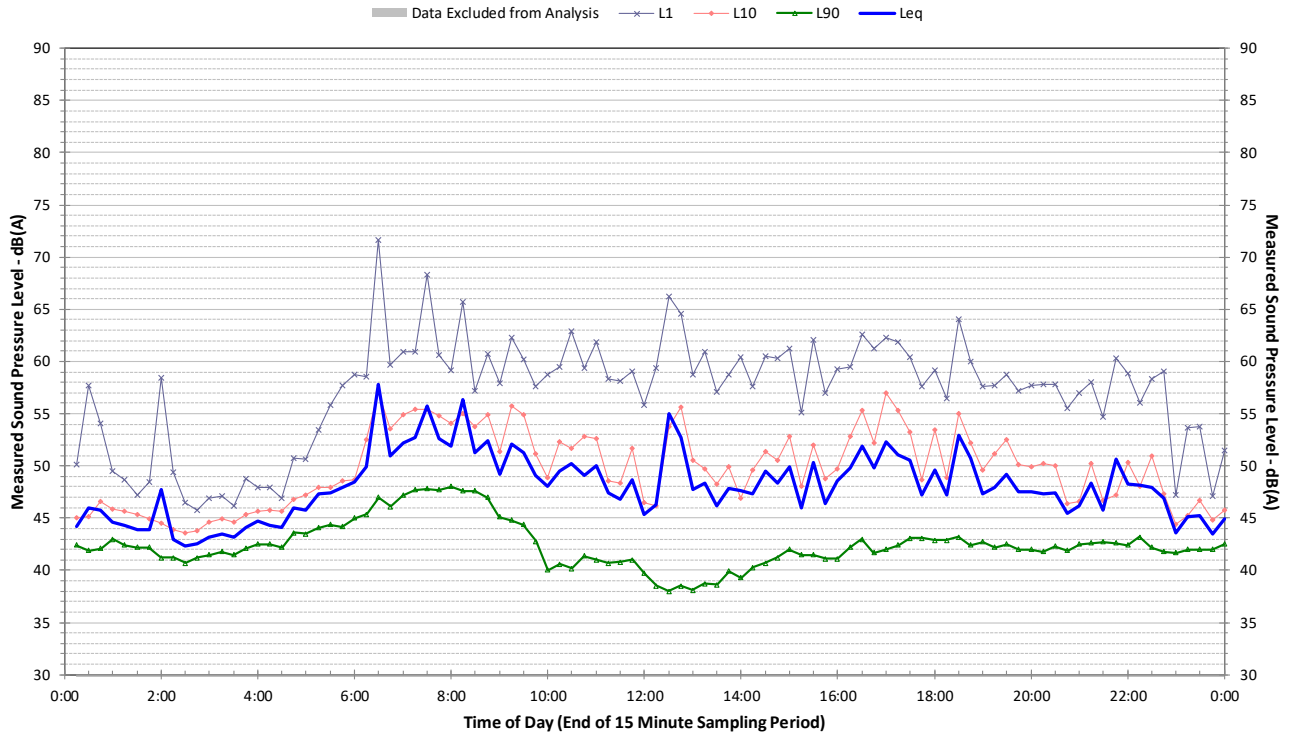
From the May 2019 quarterly monitoring the following conclusions may be drawn:

- The most recent noise monitoring results indicate that the measured L_{Aeq} noise levels are higher than the L_{Aeq} criteria but are within the range 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.
- Maximum recorded noise levels are not related to the normal operation of the Orora site.
- Winds from the north west were observed for more than 50% of the time. Wind from this direction tend to minimise noise influences from the Orora site at residential locations to the north and east. These same weather patterns may enhance road traffic noise from local road networks to the west at some receiver locations.
- The presence of temperature inversions in this area during the monitoring period may have generated higher night time background noise levels when compared to day and evening noise level measurements.
- Recent changes to the site including the completion of the demolition of the B7 reel store building and the implementation of a container noise barrier on the boundary adjacent to the reel store location. These changes have not noticeably affected the measured noise levels in the vicinity of the Orora site when compared on an historical basis.

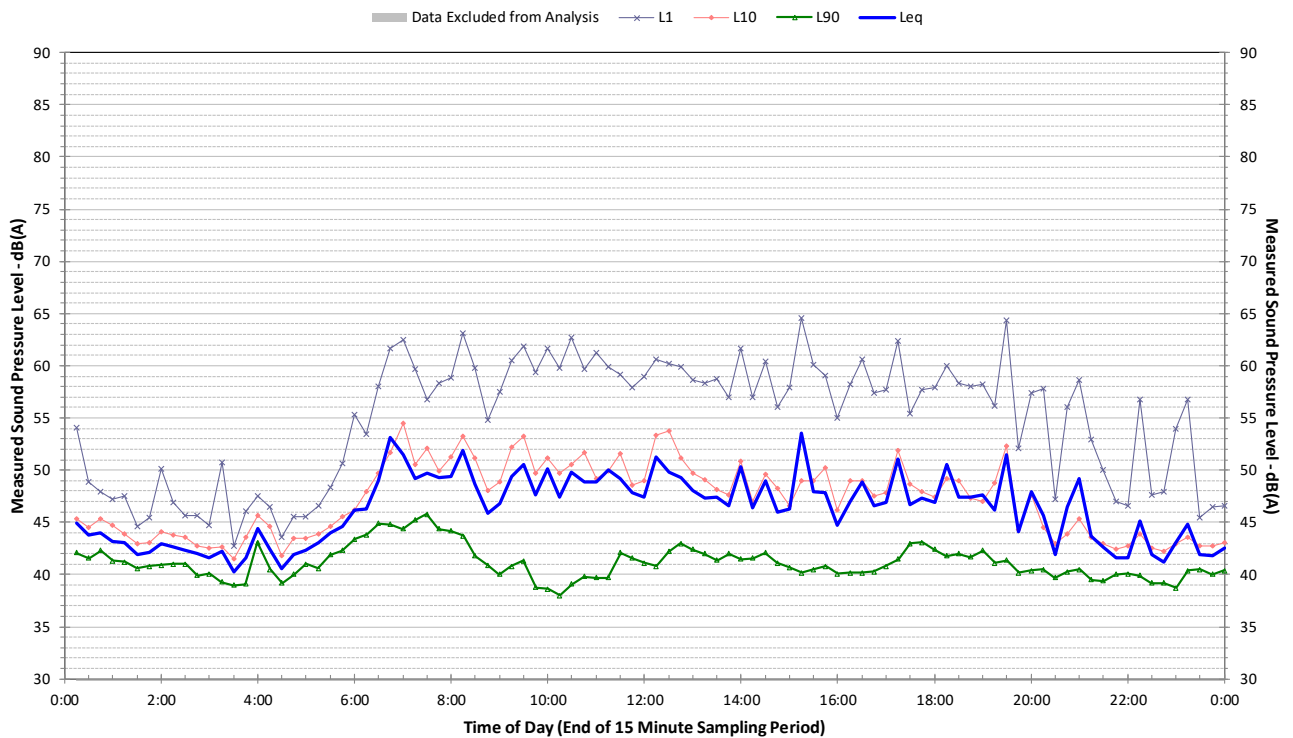
Appendix A. Noise logger graphs



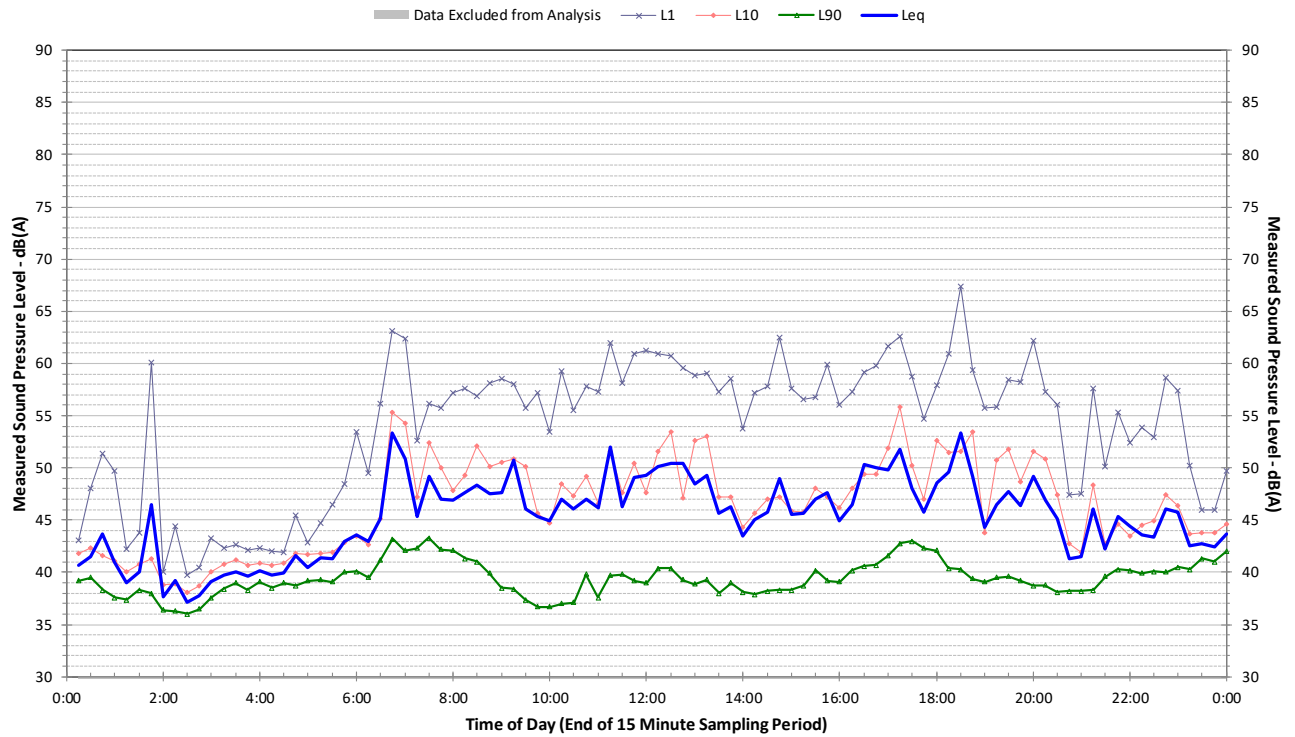
**Profile of Noise Environment - Noise Monitoring Location 1
Friday 17 May 2019**



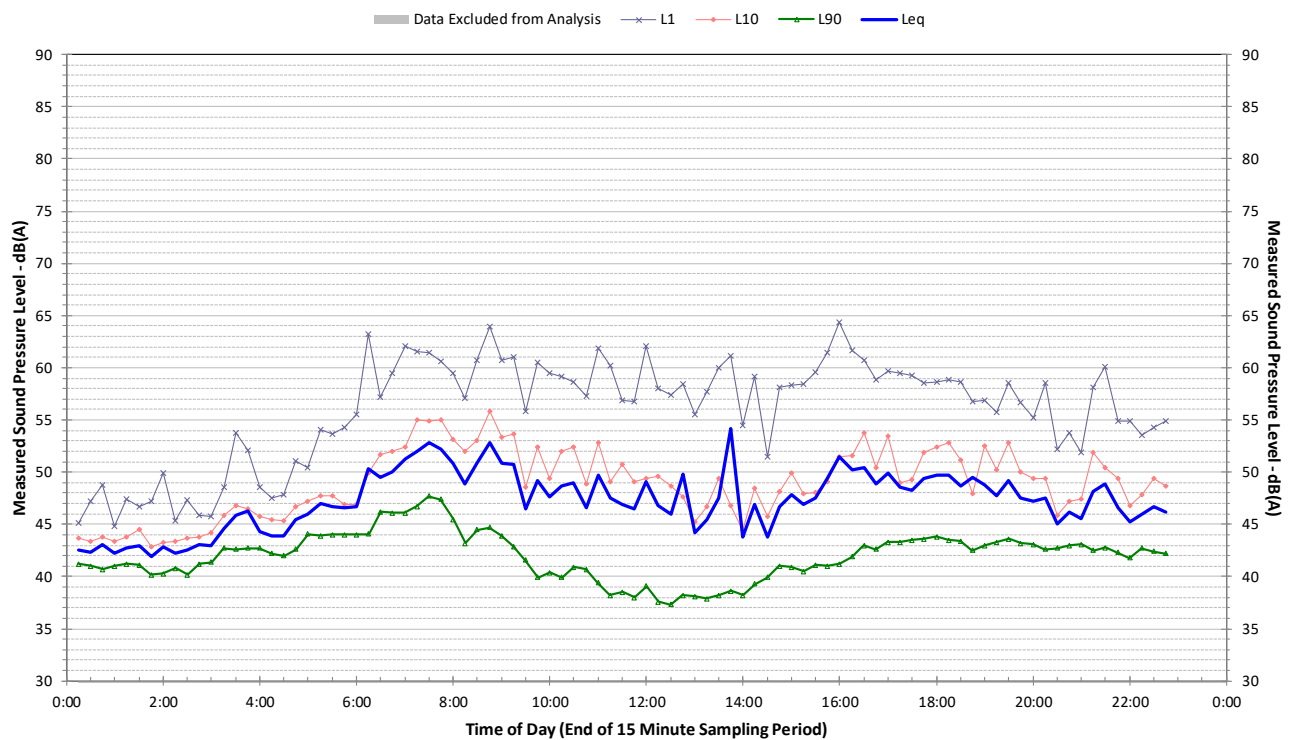
**Profile of Noise Environment - Noise Monitoring Location 1
Saturday 18 May 2019**



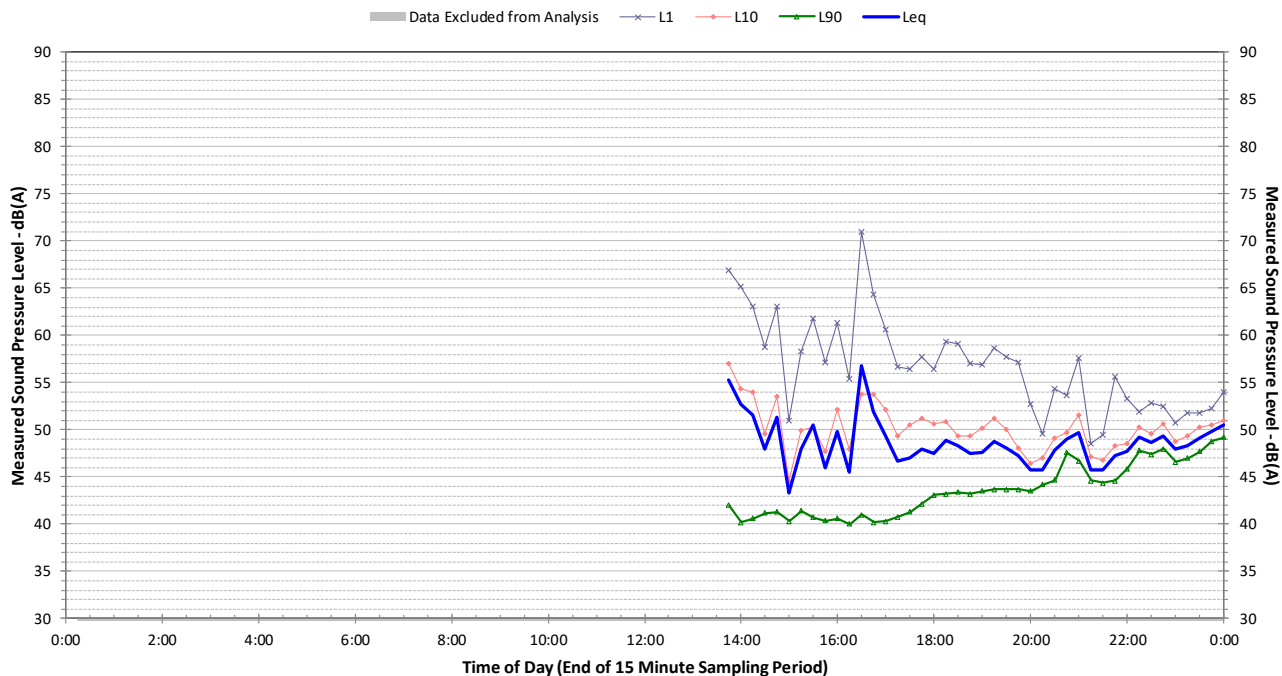
**Profile of Noise Environment - Noise Monitoring Location 1
Sunday 19 May 2019**



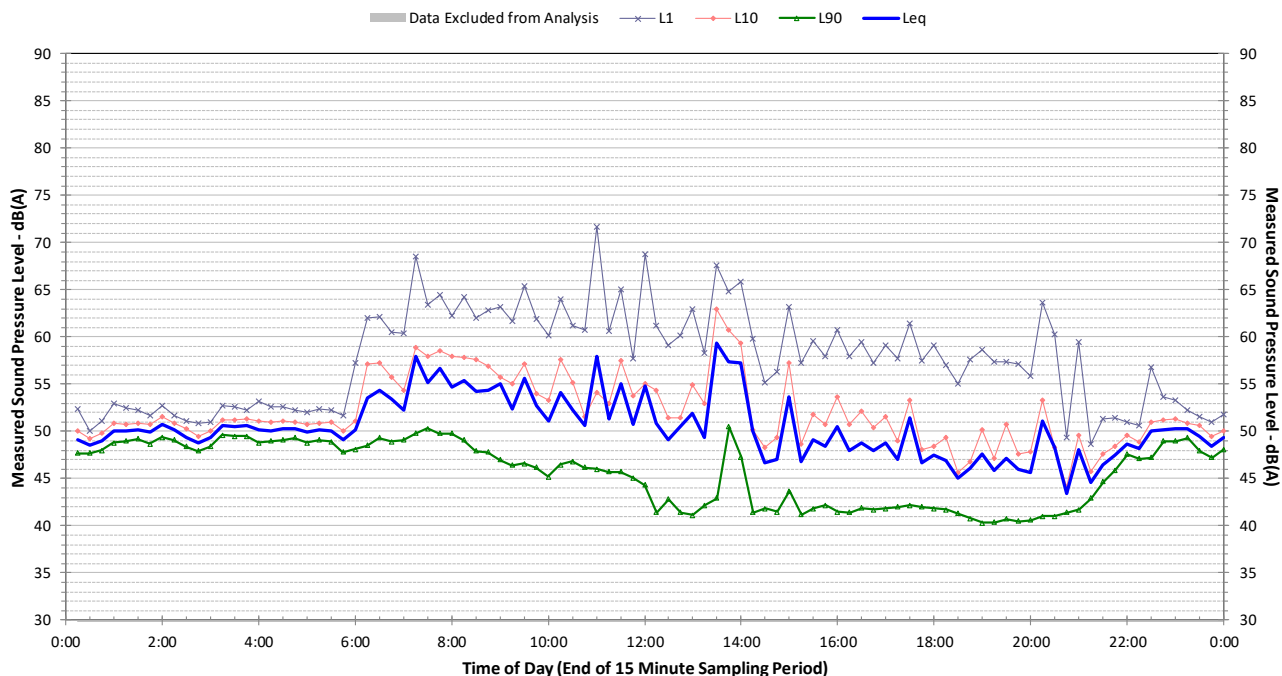
**Profile of Noise Environment - Noise Monitoring Location 1
Monday 20 May 2019**



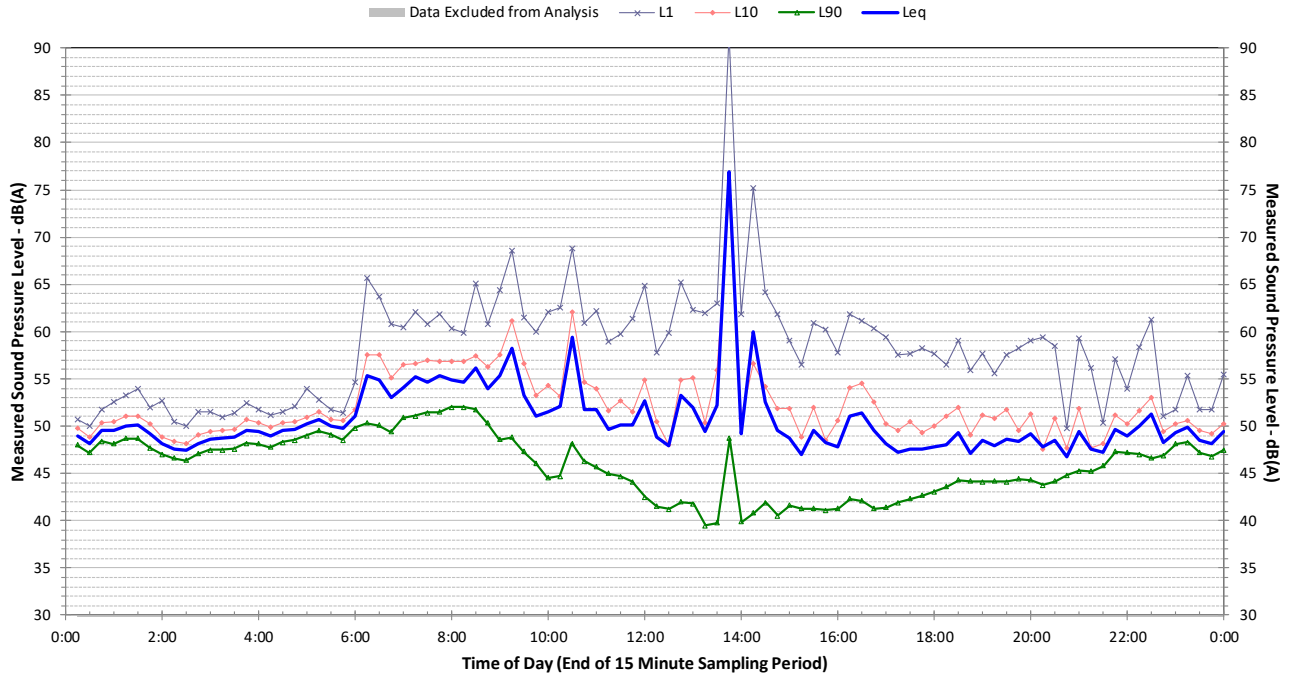
Profile of Noise Environment - Noise Monitoring Location 3 Wednesday 15 May 2019



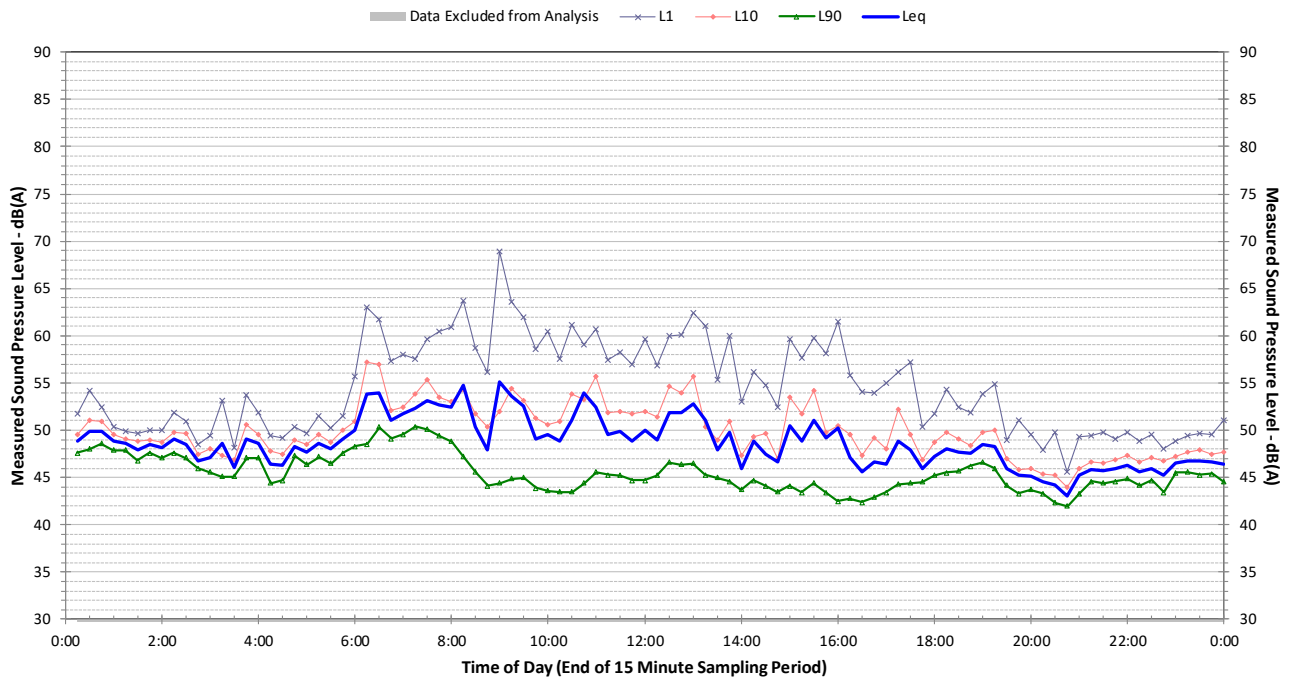
Profile of Noise Environment - Noise Monitoring Location 3 Thursday 16 May 2019



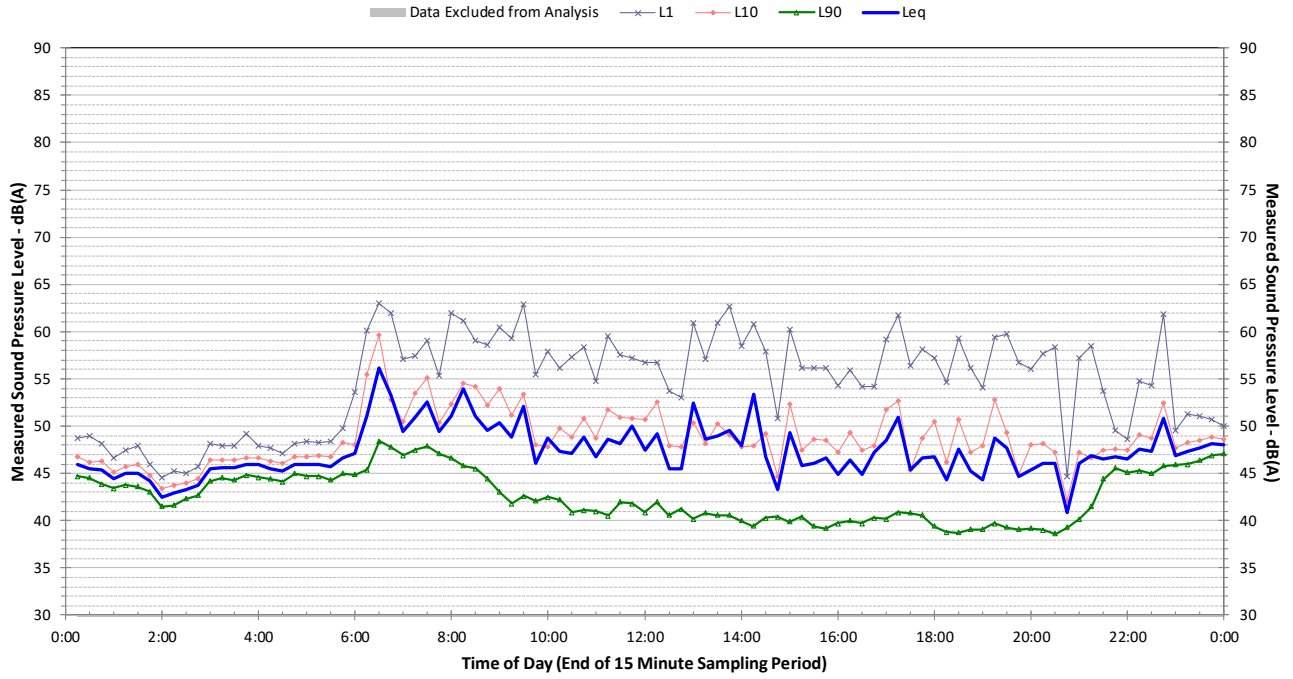
Profile of Noise Environment - Noise Monitoring Location 3 Friday 17 May 2019



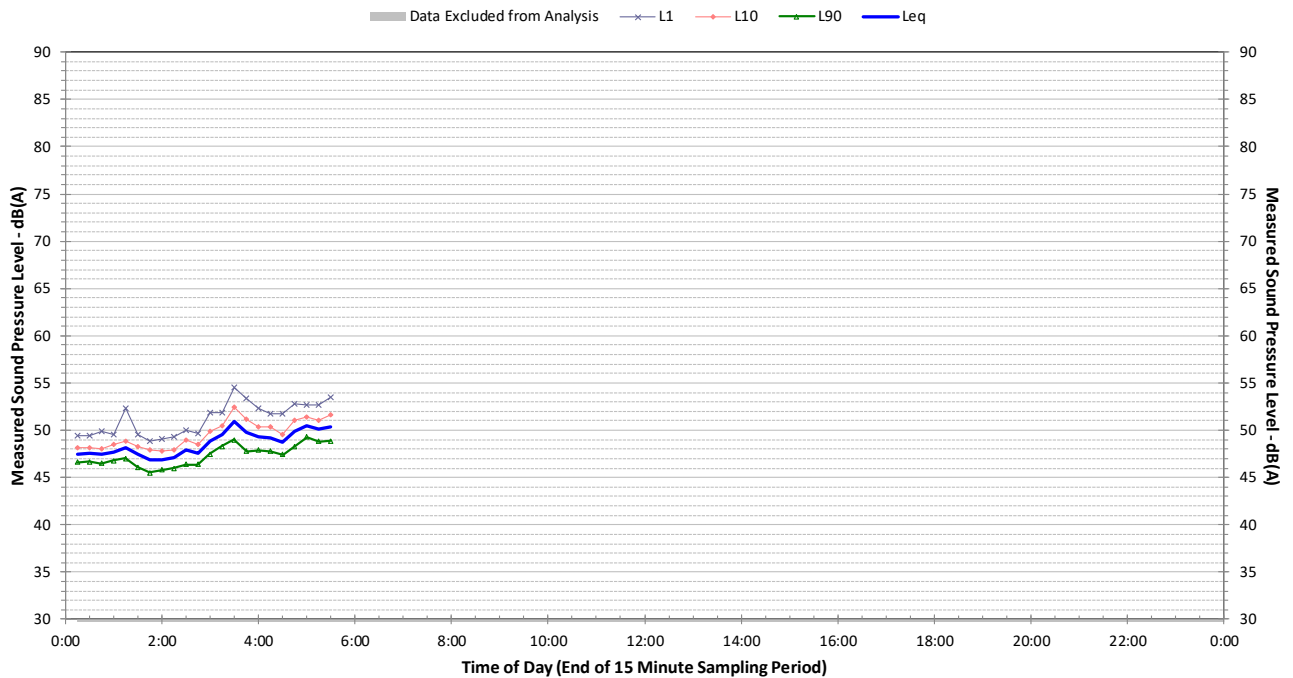
Profile of Noise Environment - Noise Monitoring Location 3 Saturday 18 May 2019



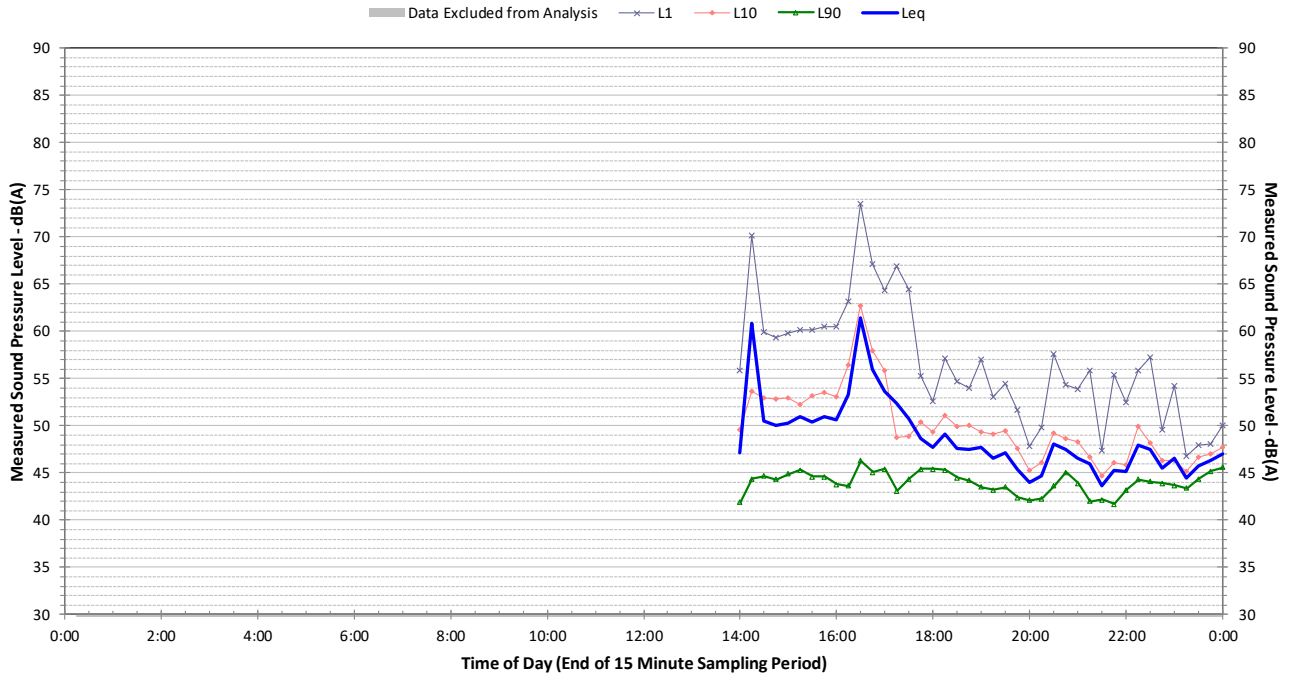
Profile of Noise Environment - Noise Monitoring Location 3 Sunday 19 May 2019



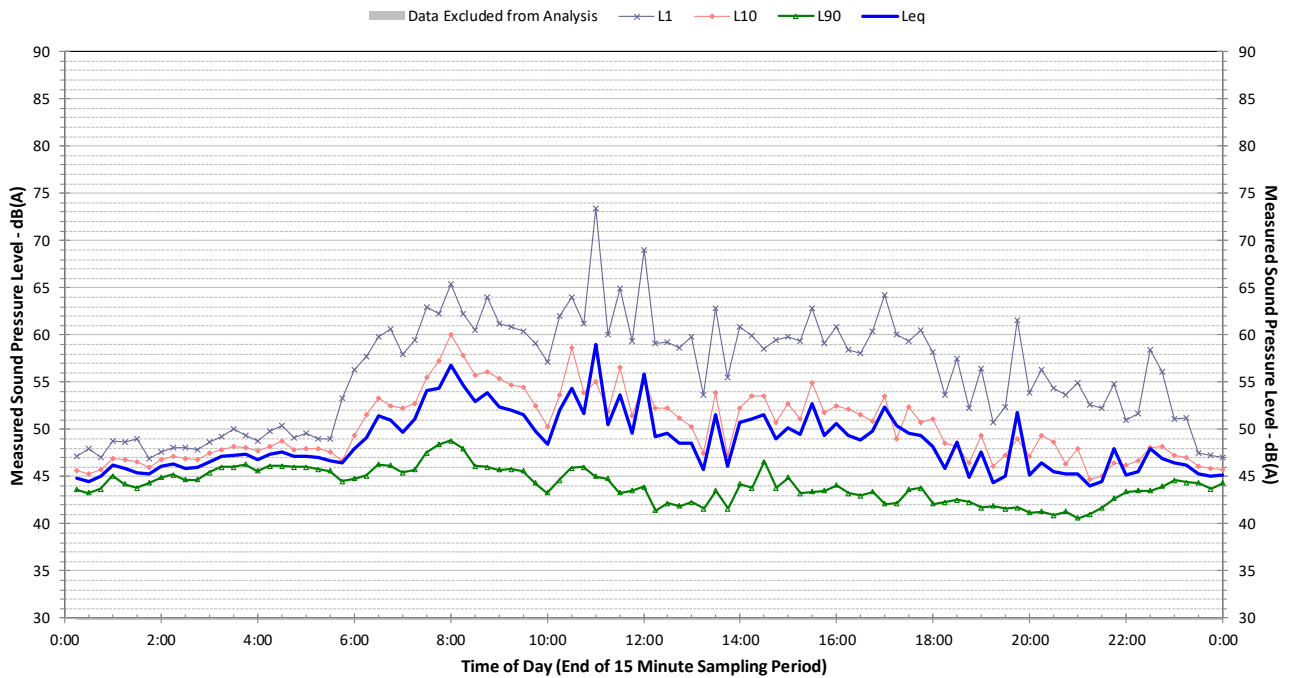
Profile of Noise Environment - Noise Monitoring Location 3 Monday 20 May 2019



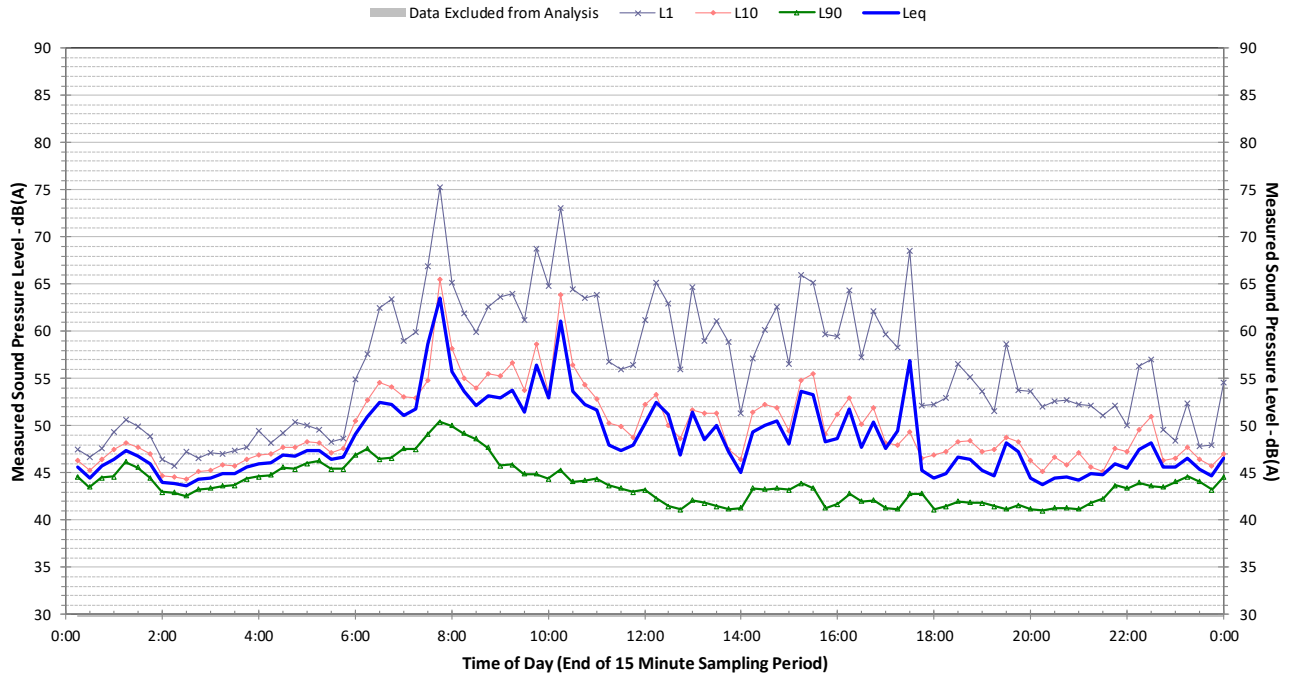
Profile of Noise Environment - Noise Monitoring Location 4 Wednesday 15 May 2019



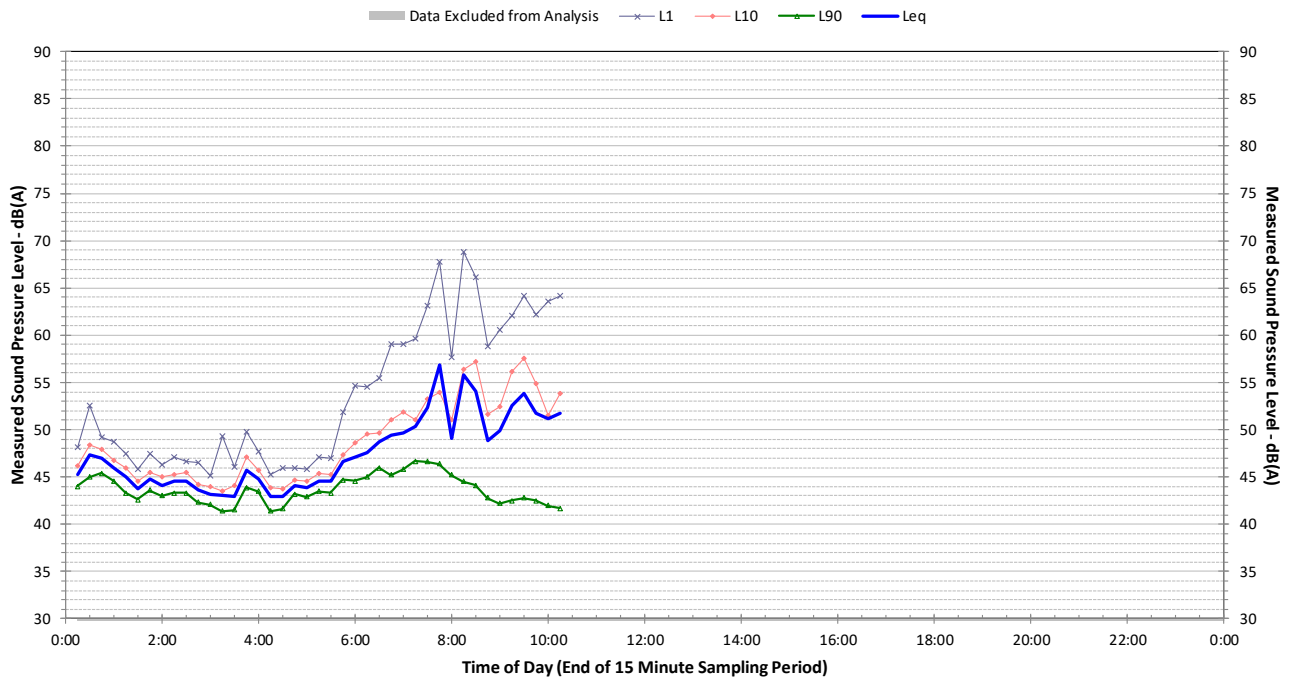
Profile of Noise Environment - Noise Monitoring Location 4 Thursday 16 May 2019



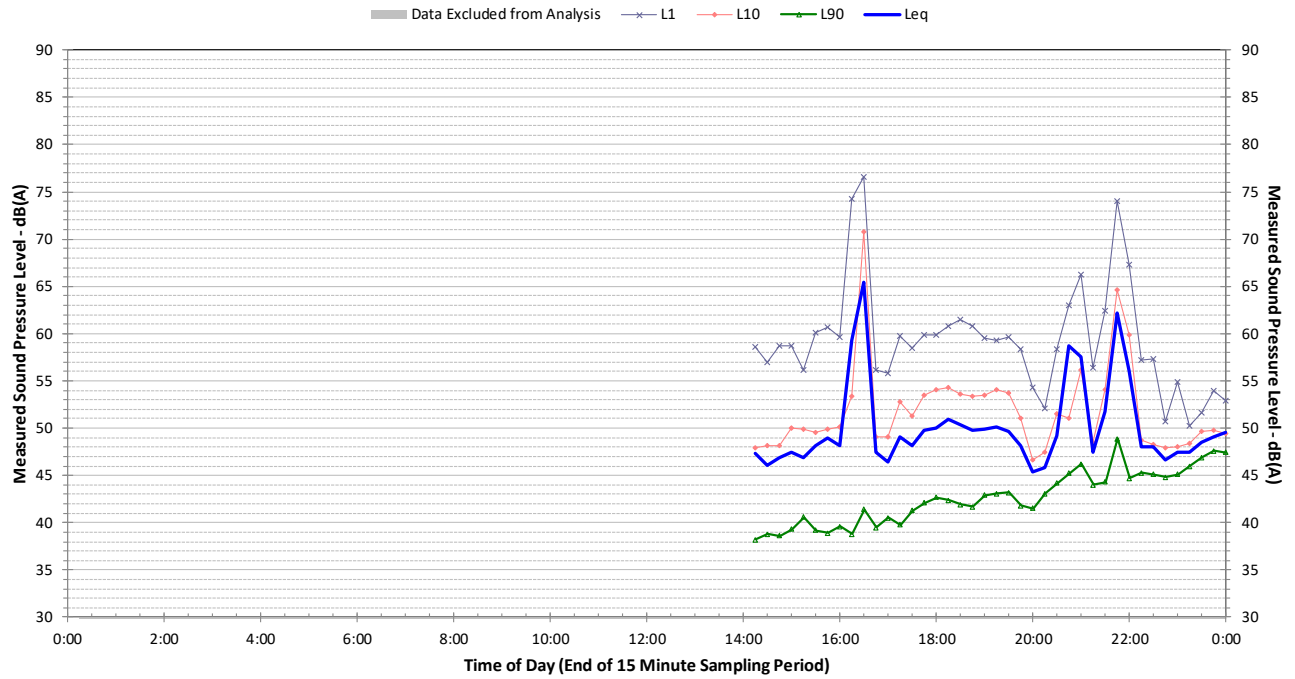
Profile of Noise Environment - Noise Monitoring Location 4 Friday 17 May 2019



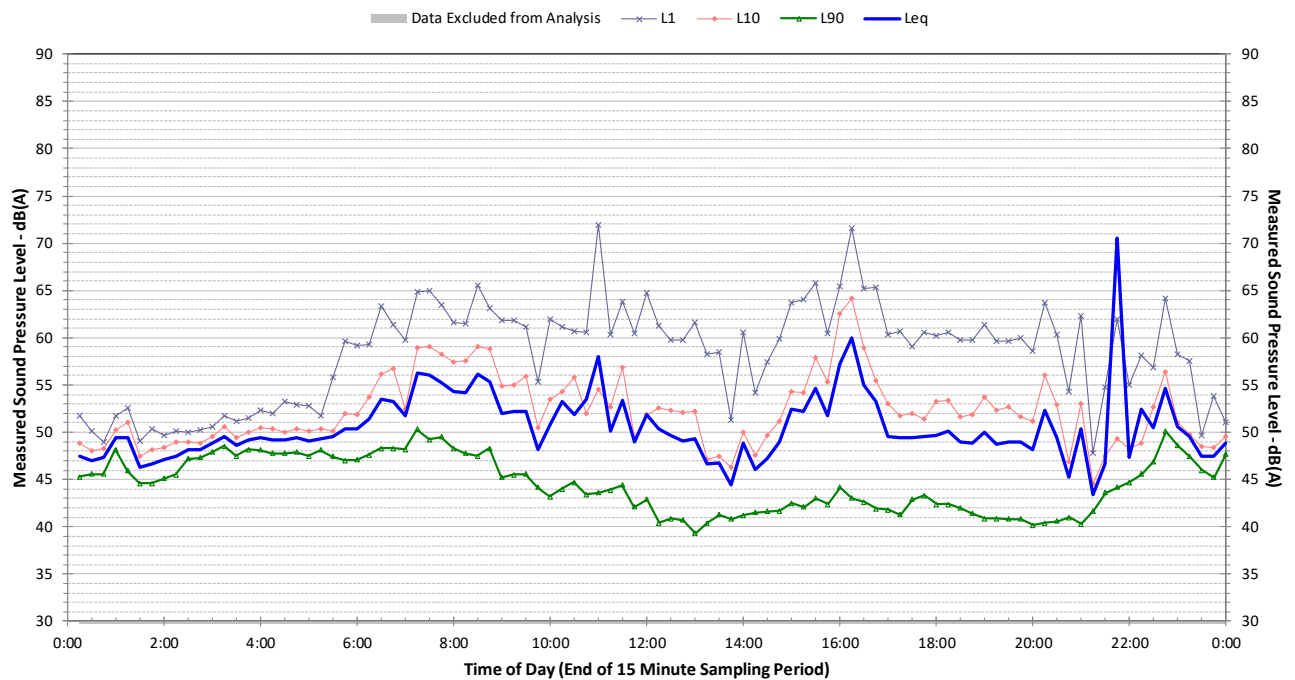
Profile of Noise Environment - Noise Monitoring Location 4 Saturday 18 May 2019



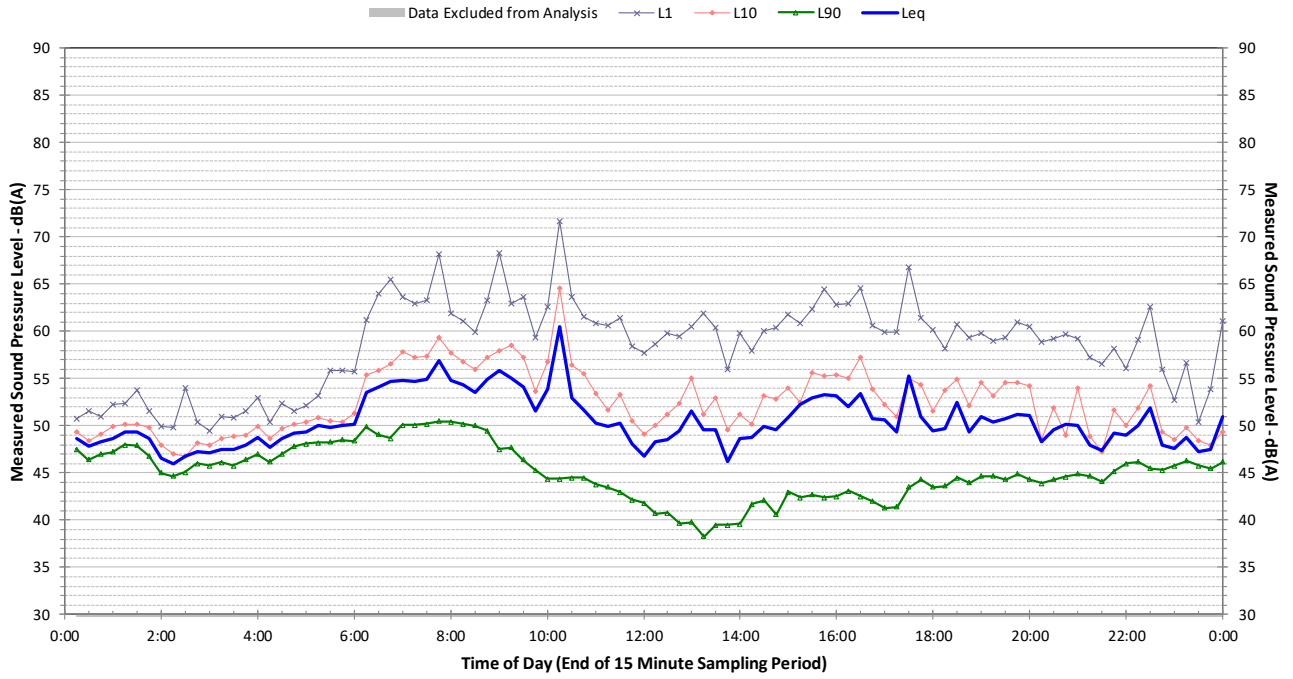
Profile of Noise Environment - Noise Monitoring Location 5 Wednesday 15 May 2019



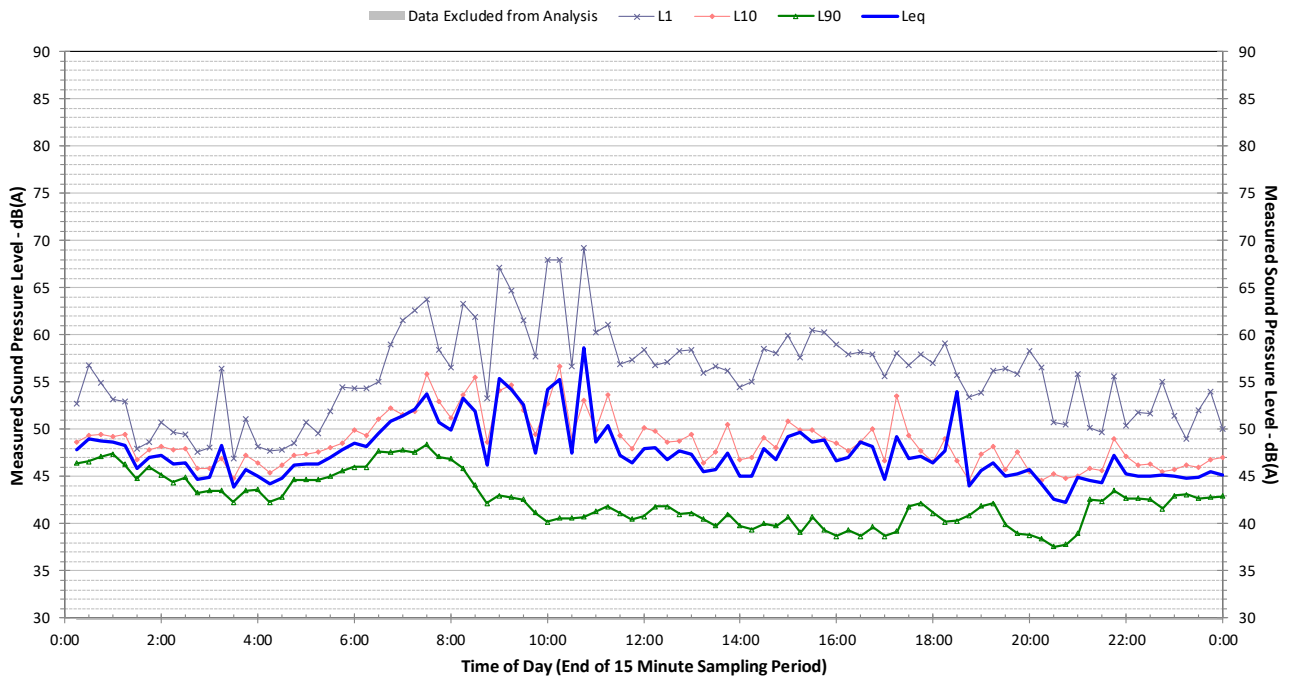
Profile of Noise Environment - Noise Monitoring Location 5 Thursday 16 May 2019



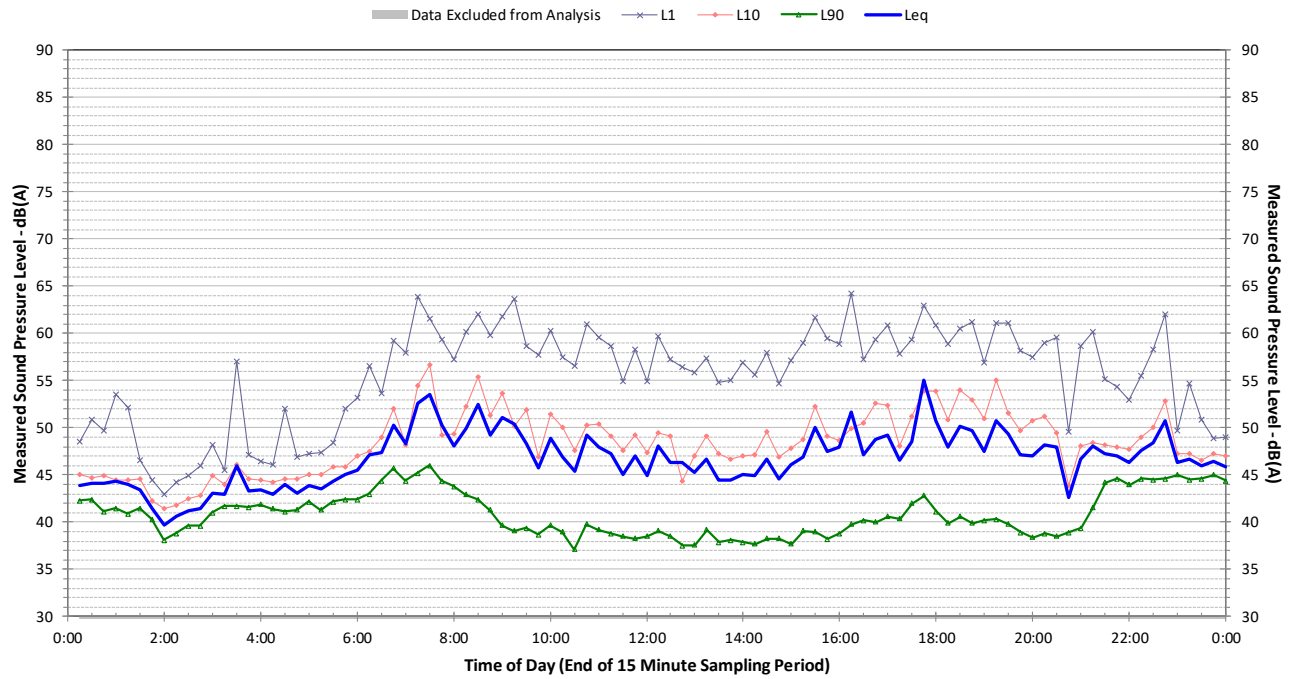
Profile of Noise Environment - Noise Monitoring Location 5 Friday 17 May 2019



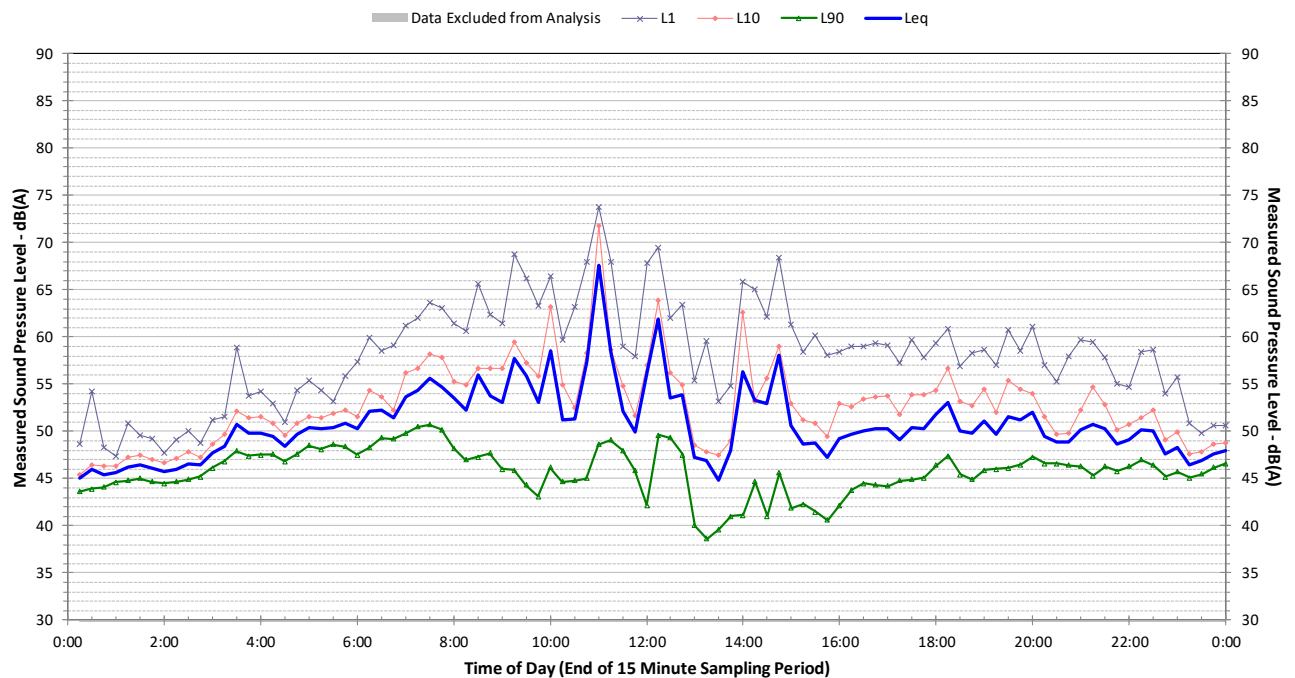
Profile of Noise Environment - Noise Monitoring Location 5 Saturday 18 May 2019



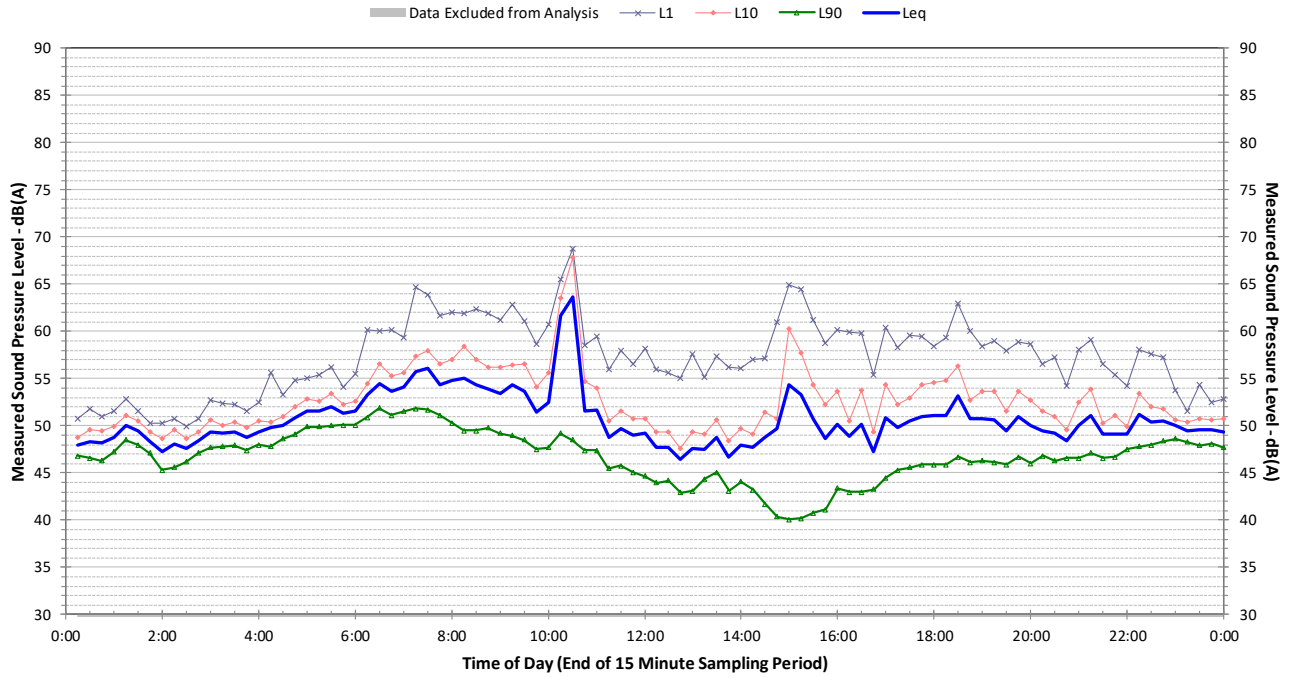
Profile of Noise Environment - Noise Monitoring Location 5 Sunday 19 May 2019



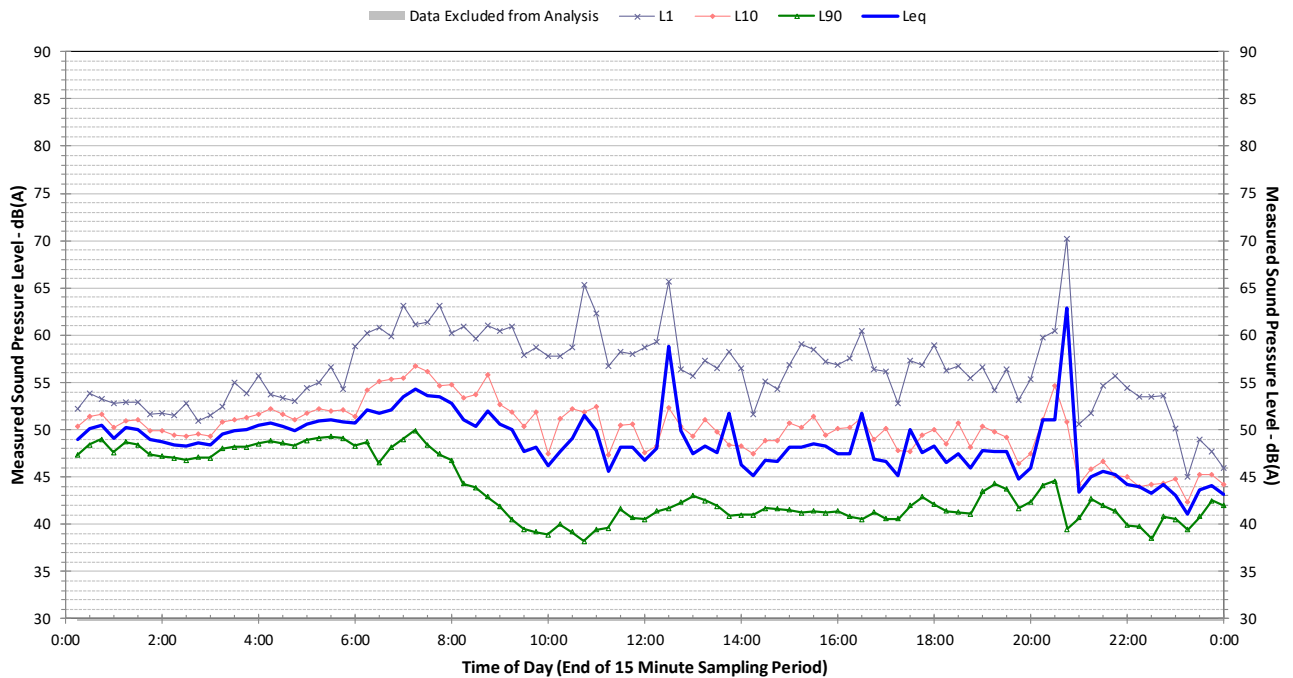
Profile of Noise Environment - Noise Monitoring Location 5 Monday 20 May 2019



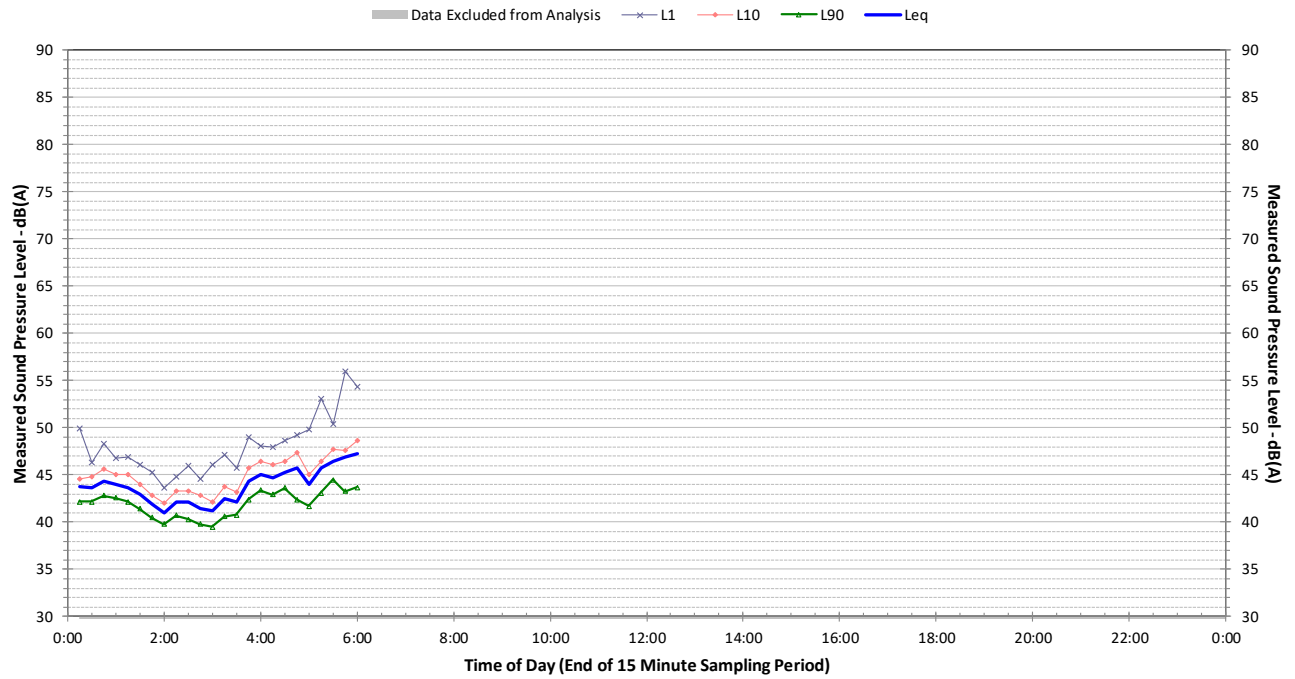
Profile of Noise Environment - Noise Monitoring Location 5 Tuesday 21 May 2019



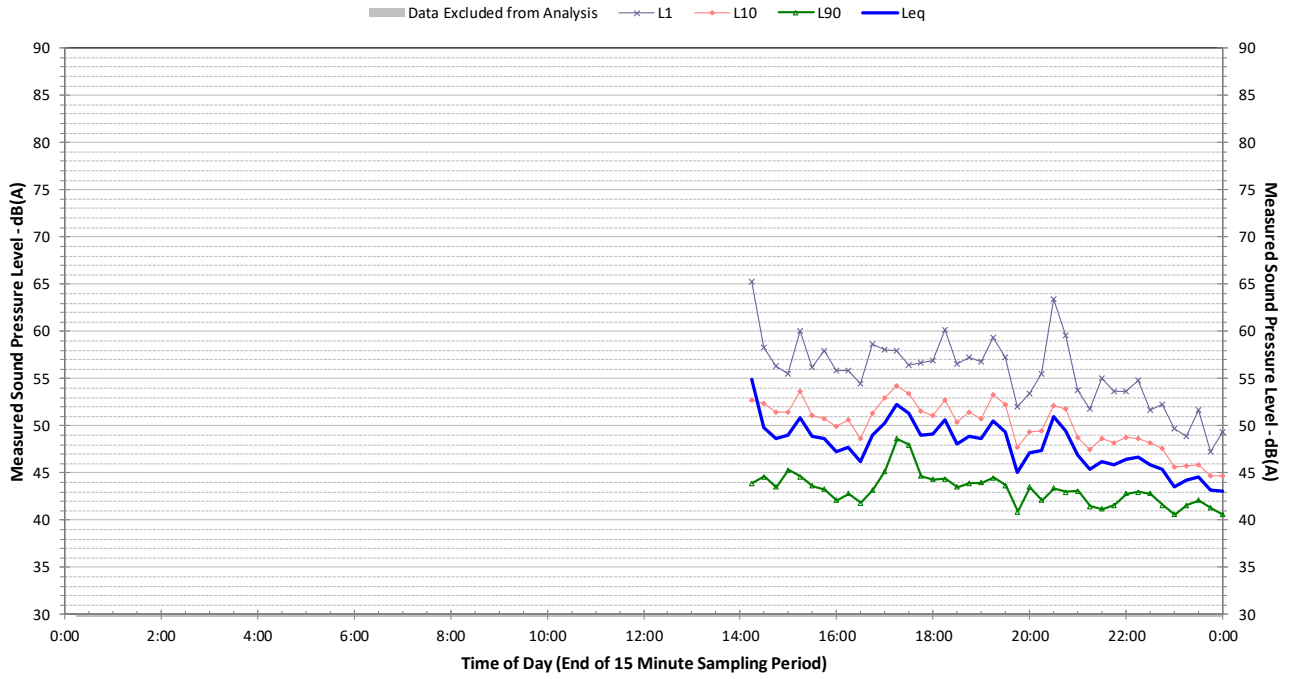
Profile of Noise Environment - Noise Monitoring Location 5 Wednesday 22 May 2019



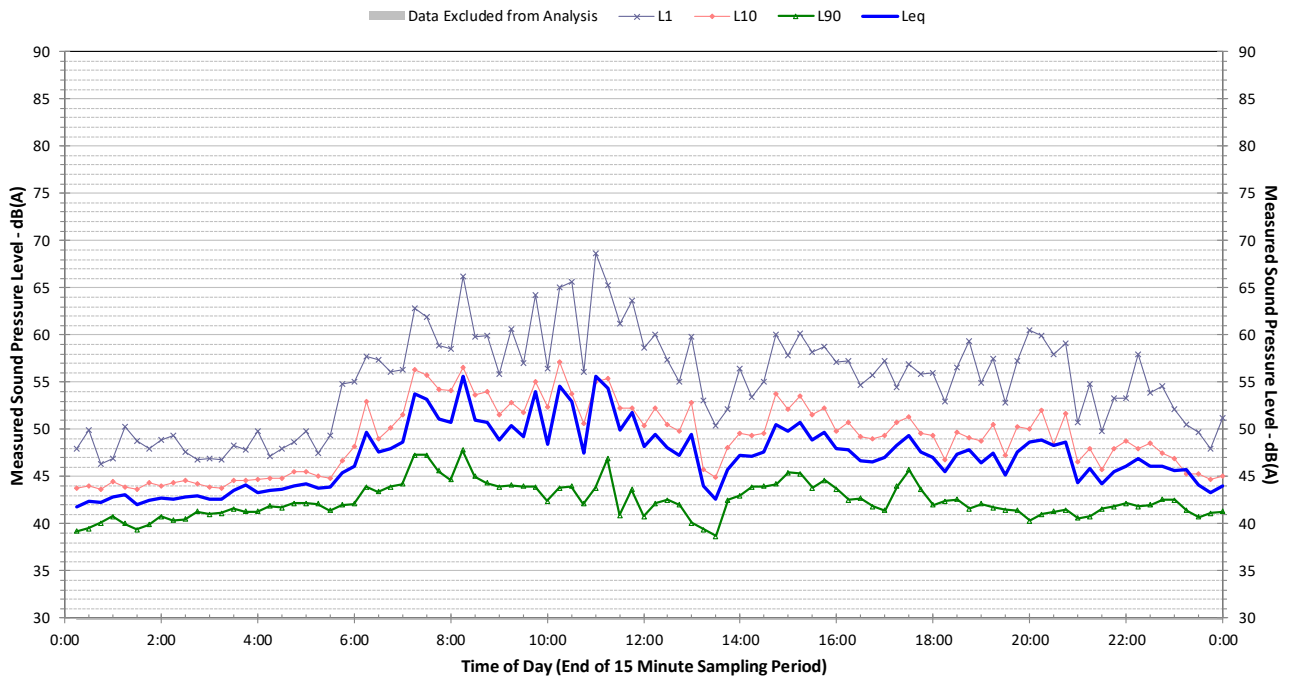
Profile of Noise Environment - Noise Monitoring Location 5 Thursday 23 May 2019



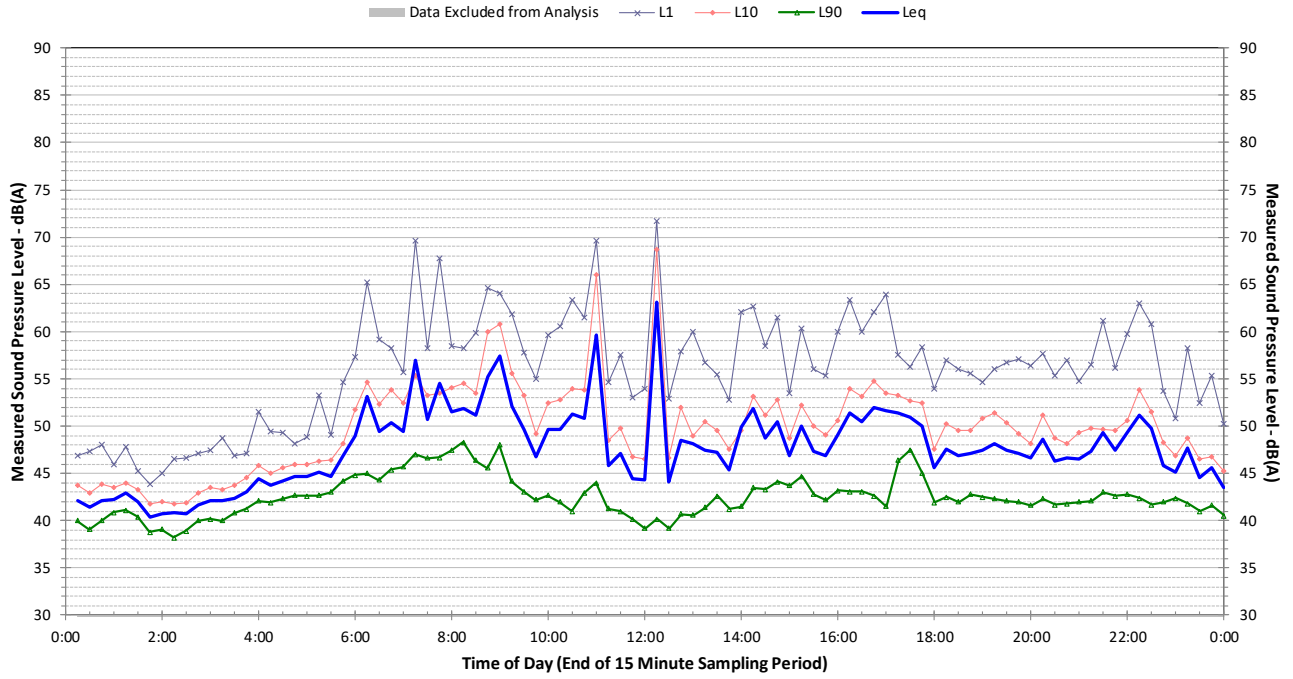
Profile of Noise Environment - Noise Monitoring Location 6 Wednesday 15 May 2019



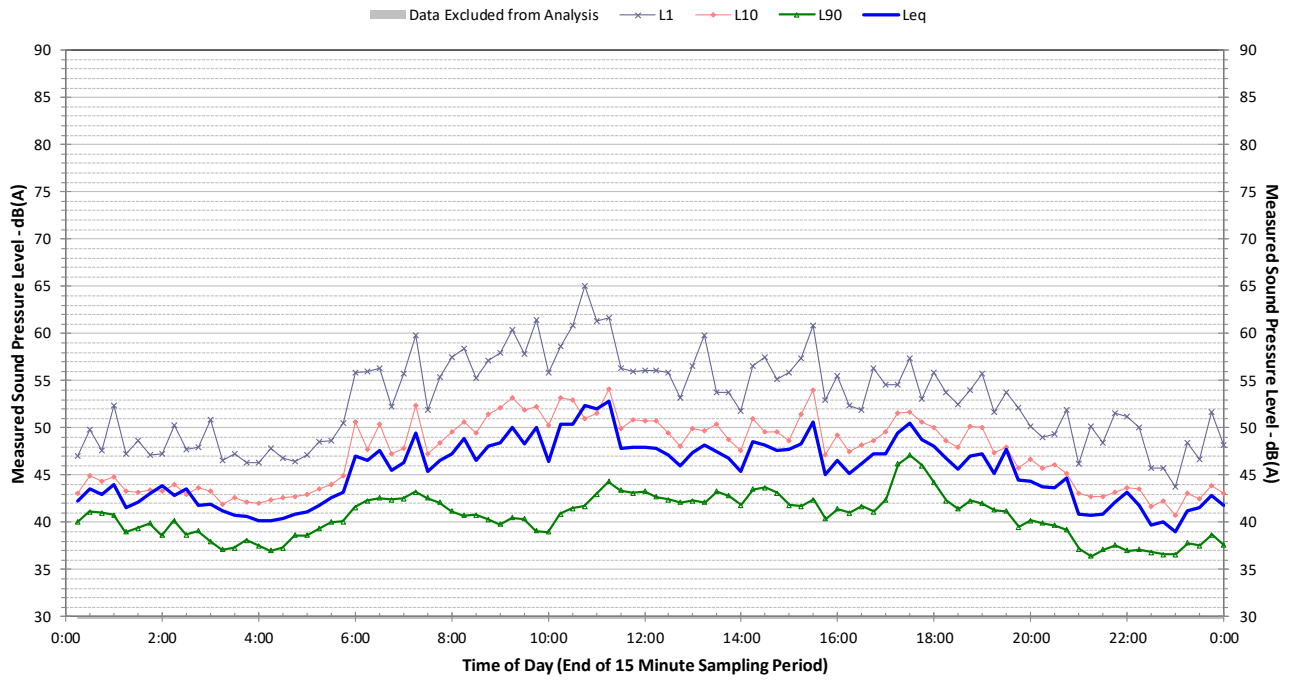
Profile of Noise Environment - Noise Monitoring Location 6 Thursday 16 May 2019



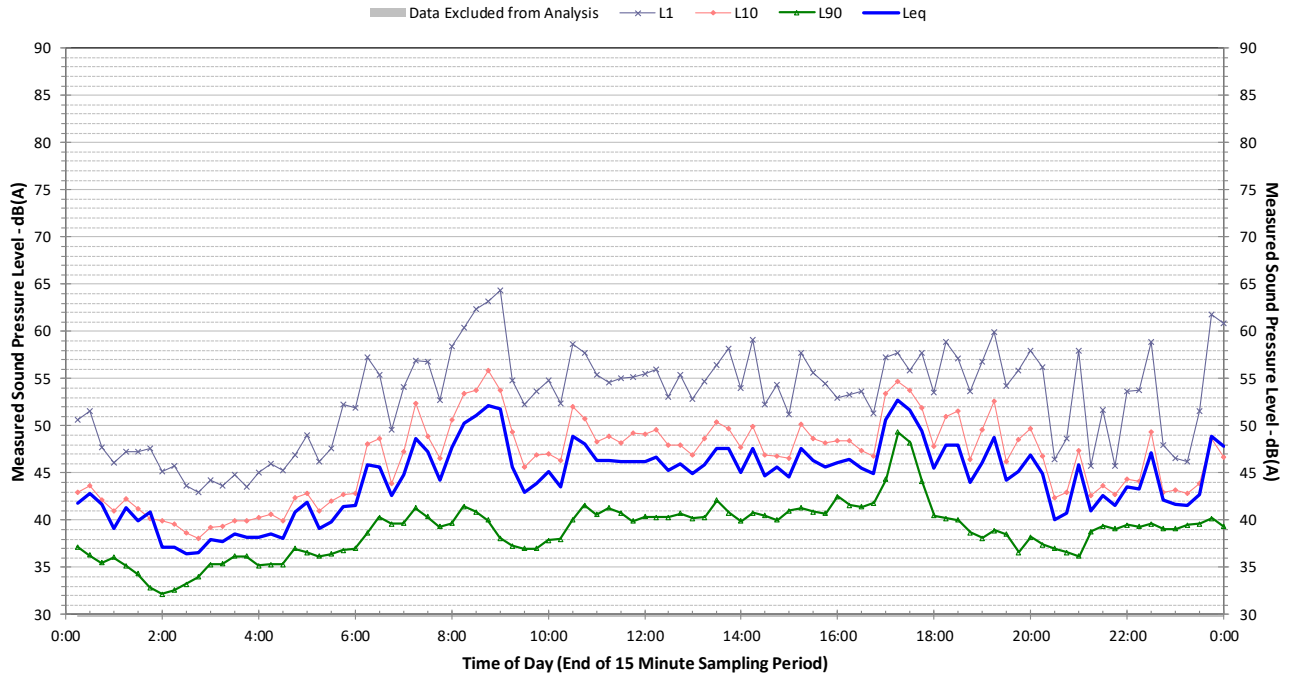
Profile of Noise Environment - Noise Monitoring Location 6 Friday 17 May 2019



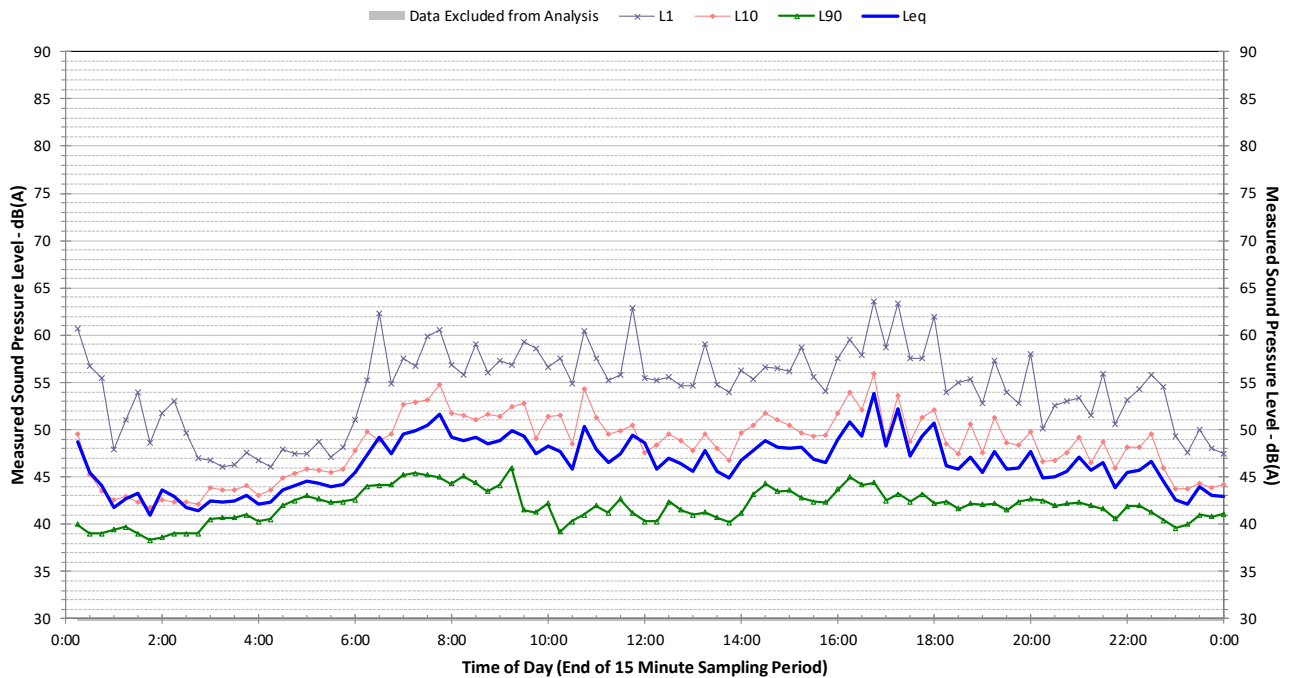
Profile of Noise Environment - Noise Monitoring Location 6 Saturday 18 May 2019



Profile of Noise Environment - Noise Monitoring Location 6 Sunday 19 May 2019



Profile of Noise Environment - Noise Monitoring Location 6 Monday 20 May 2019



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Hutchison Weller Pty Ltd
ABN 34 603 174 518
102, 1-3 Gurrigal Street, Mosman NSW 2088
www.hutchisonweller.com