

Orora Pty Ltd

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



5 April 2019

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Table of Contents

1.	Introduction	4
1.1	Background	4
1.2	Objective	4
1.3	Operational noise limits	4
2.	Existing environment	5
2.1	Monitoring limitations	5
2.2	Receiver locations	5
3.	Operational noise monitoring	7
3.1	Method.....	7
3.2	Monitoring results.....	8
3.3	Comparison with previous monitoring surveys	9
4.	Summary	14

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 February 2019 – April 2019 quarter. At the time of preparing this report, the B9 paper machine is currently operating at typical production capacity and underwent a maintenance shutdown between February 18 and February 21.

Recent modifications to the site layout include the demolition of the B7 reel store on the eastern boundary and a 12 metre high container noise barrier on the boundary at this location.

1.2 Objective

This report addresses operational licence conditions relating to measurements of the quarterly monitoring of the noise environment around the Orora site, ie 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

2. Existing environment

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 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.

The prevailing meteorological conditions include strong drainage flows for wind direction and temperature inversions during the winter months influencing the propagation of noise. Weather conditions are also apparent as seasonal variations which are increasingly apparent in the long-term monitoring data 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.

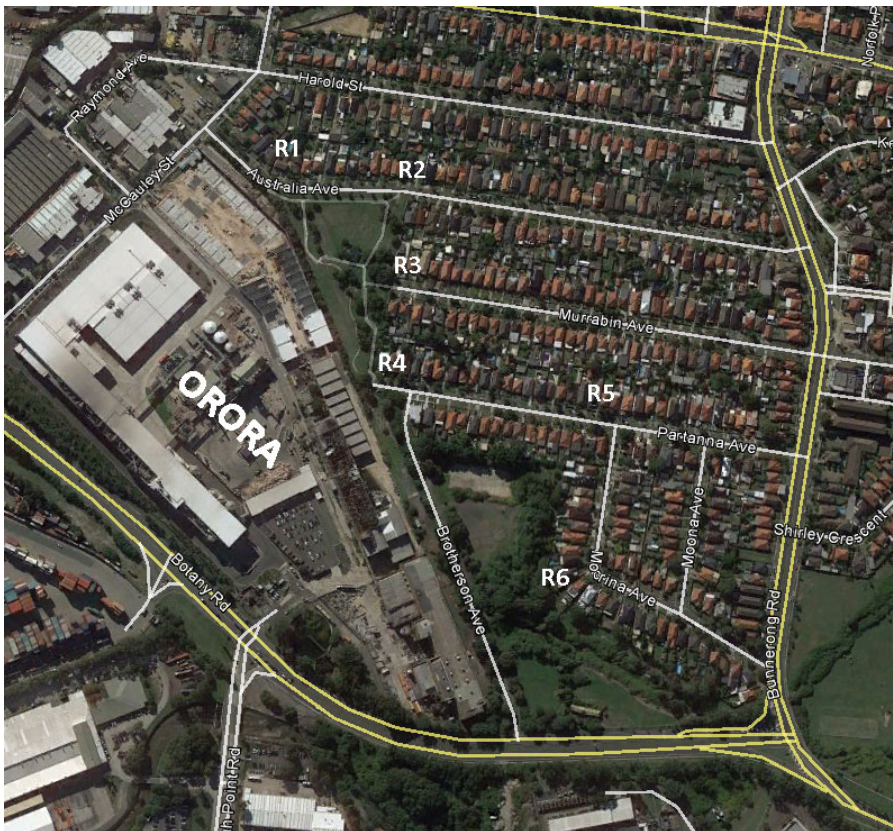


Figure 2-1 Site location and compliance monitoring locations (Source: Google Maps 2016)

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.

3. Operational noise monitoring

3.1 Method

Operational noise monitoring for the February survey period was completed between 15 February and 22 February 2019, using automatic noise loggers deployed at six representative locations.

Monitoring was performed using Acoustic Research Laboratories brand Ngara Type 1 noise loggers, 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.

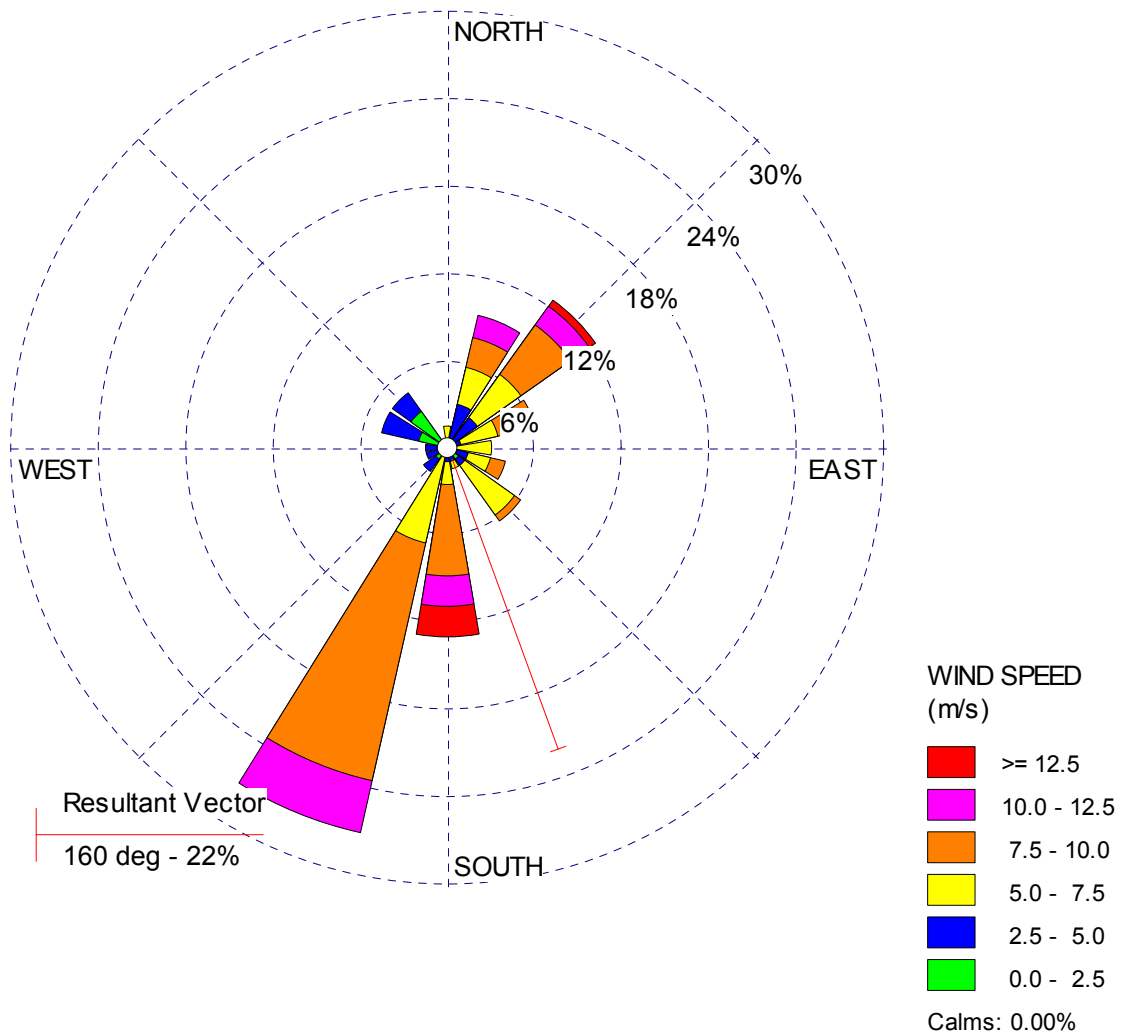


Figure 3-1 Wind speed and direction during monitoring period (15 February – 22 February 2019, source BoM 2019)

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 to the north-north-west, in a direction away from residences. During the monitoring period winds from the south-south-west dominated for nearly 30% of the time. Winds from this direction are expected to enhance noise levels from the Orora site as well as Botany Road and Port Botany Terminal during these times.

Approximately 73% of the total measurements observed were greater than 5 m/s over the monitoring period. The high wind speeds and resultant direction will have the tendency to increase overall noise levels at receiver locations in this direction.

3.2 Monitoring results

During the February 2019 quarterly noise survey, the paper mill was in shutdown mode between 18 February from about 2 pm to 21 February until 11 am. Monitoring periods outside of these times represented normal operations and full production. The measured L_{Aeq} noise levels taken across several days are affected by a multitude of noise sources such as road traffic, loud short-term noise such as birds, aircraft, and local heavy vehicle movements.

The plant and equipment with the Orora site operates under controlled conditions for the day and night time periods. The steady operational characteristics of the plant and equipment means that the B9 Paper Mill has little influence on fluctuations in the local noise environment which occur over a 24 hour period. Regular quarterly monitoring surveys have demonstrated that direct measurement of Orora's contribution to the noise environment is generally lower than the ambient measured L_{Aeq} noise levels, which 'mask' the actual noise emissions from the Orora site.

Ambient noise levels measured using the L_{Aeq} noise parameter are not a true reflection of noise from the Orora site that 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.

The results of monitoring survey for February 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.

The most recent results at monitoring location 6 included the influence of noise from nearby construction activities on some days however, these influences did not extend to the night time periods, which were used for the analysis of impacts.

The night time periods were assessed to provide information of the Orora B9 Paper Mill noise contributions using the median L_{A90} noise levels as a benchmark. The results of the analysis indicate that background noise levels during operations were lower at the majority of receiver locations when compared to the periods of inactivity of the shut-down (see Table 4 and Figures 3-4 and 3-5).

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.

Table 4 compares the noise measurements for the dates when the B9 Paper Mill was operational versus when it was shut down for maintenance, during the night time period. In Table 4 the differences in median values were calculated with a negative result indicating that a quieter environment was measured when the mill was operational. These results are not conclusive but serve to highlight the variability in the noise environment and minimal impact the B9 operations have on the local noise environment.

3.3 Comparison with previous monitoring surveys

An indicator of the contribution of Orora operational noise to existing noise levels may be made using background noise levels measured during both shutdown and operational conditions. During the night time-period, 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 measured during this time noting that the emission levels from the site remain relatively constant throughout the day, evening, and night time.

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	
Day 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
Friday 15 February 2019	29.3	70.0	37.8	53.2	39.2	53.6	38.6	51.3	26.4	75.3	26.8	67.6
Saturday 16 February 2019	39.0	50.9	38.4	55.3	40.7	48.3	40.1	51.8	39.3	53.9	39.0	50.5
Sunday 17 February 2019	38.4	51.1	38.6	52.8	42.1	51.9	39.2	50.1	39.4	54.1	40.2	53.7
Monday 18 February 2019	40.9	52.4	38.8	50.2	42.0	53.8	40.1	51.0	40.4	55.8	42.5	55.1
Tuesday 19 February 2019*	44.1	55.4	42.6	54.6	45.4	55.5	42.3	55.0	42.2	53.2	46.3	58.9
Wednesday 20 February 2019*	48.6	55.7	50.2	54.8	49.8	54.7	48.6	54.8	44.8	51.9	47.9	65.1
Thursday 21 February 2019	48.2	54.2			49.7	53.4	48.5	55.0	44.8	51.1	47.7	65.0
Friday 22 February 2019					50.8	55.9	50.8	56.8	47.2	55.1	49.8	62.9
Median	40.9	54.2	38.7	53.9	43.7	53.7	41.2	53.3	41.3	54.0	44.4	60.9

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
Friday 15 February 2019	39.8	52.1	37.2	49.6	38.7	46.9	39.9	53.8	37.8	51.0	39.0	53.1
Saturday 16 February 2019	41.7	49.8	38.8	46.9	41.1	47.2	40.4	50.6	40.4	51.0	42.0	52.8
Sunday 17 February 2019	41.9	50.8	40.6	55.8	43.4	52.1	42.2	50.4	43.1	52.5	45.3	55.2
Monday 18 February 2019*	44.9	52.4	43.5	51.5	46.8	56.6	47.1	54.4	47.0	55.9	48.5	58.7
Tuesday 19 February 2019*	48.2	55.2	49.5	54.3	49.6	53.7	49.7	53.6	46.3	52.0	48.2	53.3
Wednesday 20 February 2019*	41.8	52.3			40.5	48.7	44.0	54.7	39.8	62.7	43.3	57.9
Thursday 21 February 2019	46.1	53.5			48.7	52.5	47.1	53.7	43.6	61.1	46.2	56.4
Friday 22 February 2019					46.8	52.8	46.8	52.8			44.8	51.7
Median	41.9	52.3	40.6	51.5	45.1	52.3	45.4	53.6	43.1	52.5	45.0	54.3

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
Friday 15 February 2019	37.5	45.2	37.2	45.5	39.1	44.3	41.5	54.7	36.4	44.8	33.8	42.2
Saturday 16 February 2019	38.5	48.2	38.6	46.5	40.3	45.0	39.3	53.1	37.2	44.9	35.4	42.6
Sunday 17 February 2019	37.0	49.2	35.3	44.0	39.2	44.3	37.0	52.1	36.3	43.7	36.2	43.8
Monday 18 February 2019*	37.5	47.4	36.4	46.0	36.6	46.1	39.7	55.6	34.8	45.9	34.3	45.8
Tuesday 19 February 2019*	45.9	52.0	48.1	52.0	48.1	52.0	46.4	50.6	43.5	51.1	45.0	52.6
Wednesday 20 February 2019*	39.4	47.4			38.6	46.3	39.0	45.5	34.2	44.8	38.2	45.8
Thursday 21 February 2019					41.6	49.1	39.7	48.4	35.4	46.5	38.4	48.5
Friday 22 February 2019					45.0	49.4	45.0	49.4			42.4	48.1
Median	38.0	47.8	37.2	46.0	39.8	46.2	39.7	51.3	36.3	44.9	37.2	45.8

*Orora not operating

Table 4 Comparison of operating v shut median noise levels

Night 10:00:00 PM to 7:00:00 AM	Median Noise Environment - Noise Monitoring Location											
	R1		R2		R3		R4		R5		R6	
	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
Median during shut	39.4	47.4	42.25	49	38.6	46.3	39.7	50.6	34.8	45.9	38.2	45.8
Median when operating	37.5	48.2	37.2	45.5	39.2	44.3	39.3	53.1	36.4	44.8	35.4	42.6
Difference (Operating V shut)*	-1.9	0.8	-5.1	-3.5	0.6	-2.0	-0.4	2.5	1.6	-1.1	-2.8	-3.2

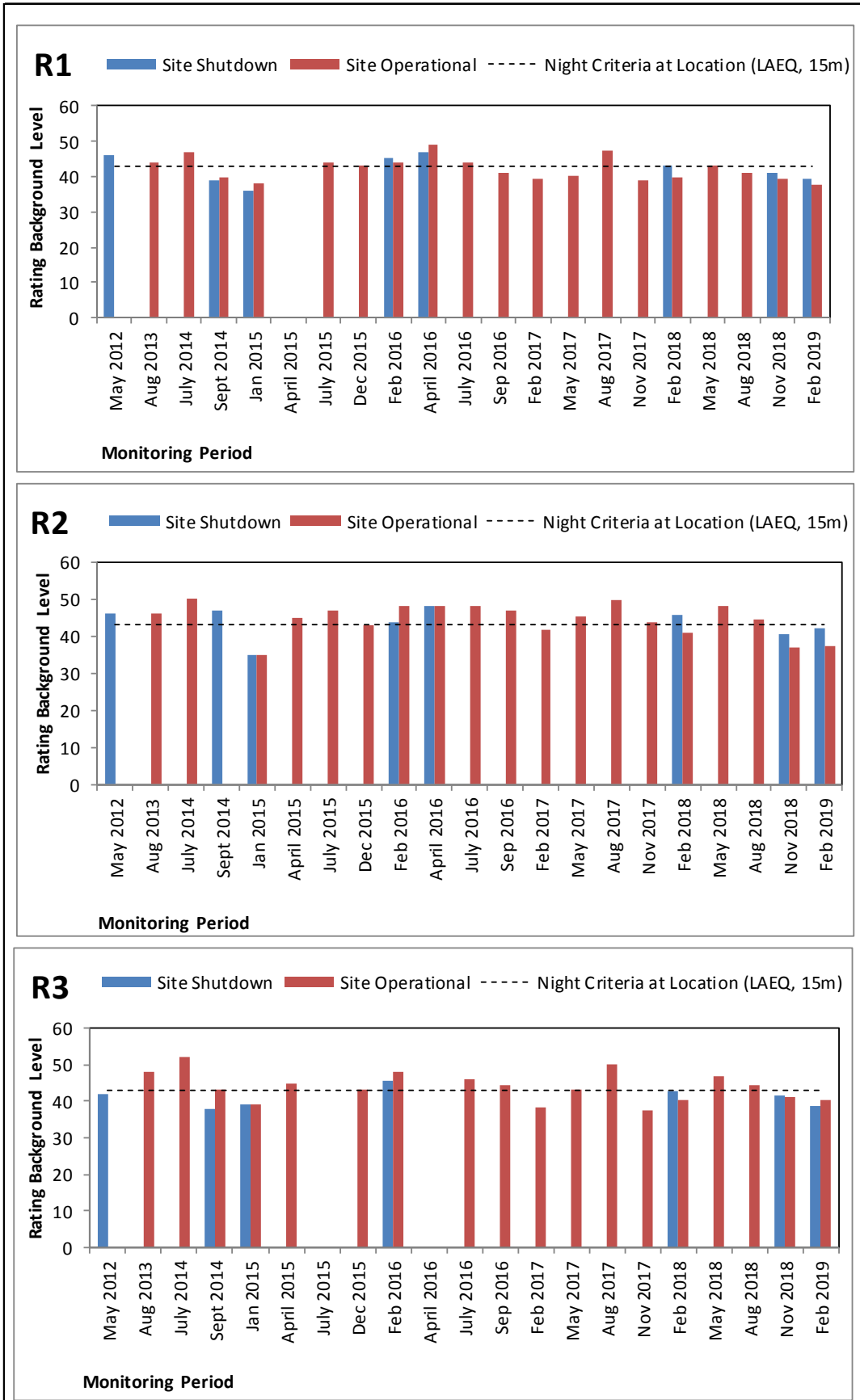


Figure 3-2: Comparison of background noise levels at R1 – R3

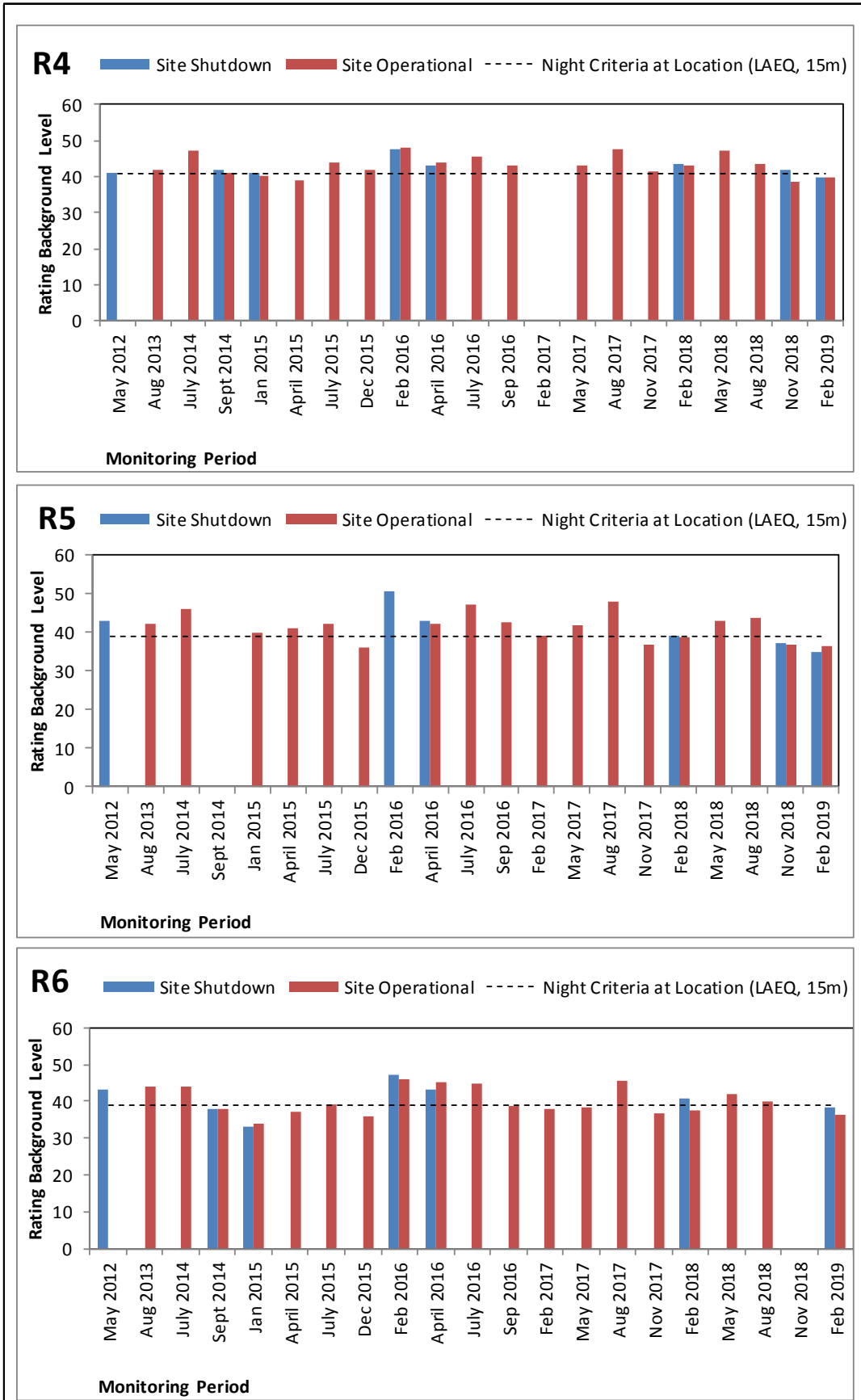


Figure 3-3: Comparison of background noise levels at R4 – R6

4. Summary

The recent noise survey undertaken in February 2019 indicates that the L_{Aeq} measured noise levels in the vicinity of the B9 Paper Mill will exceed the EPL criteria for day, evening, and night time whether the paper mill is operational or shut down.

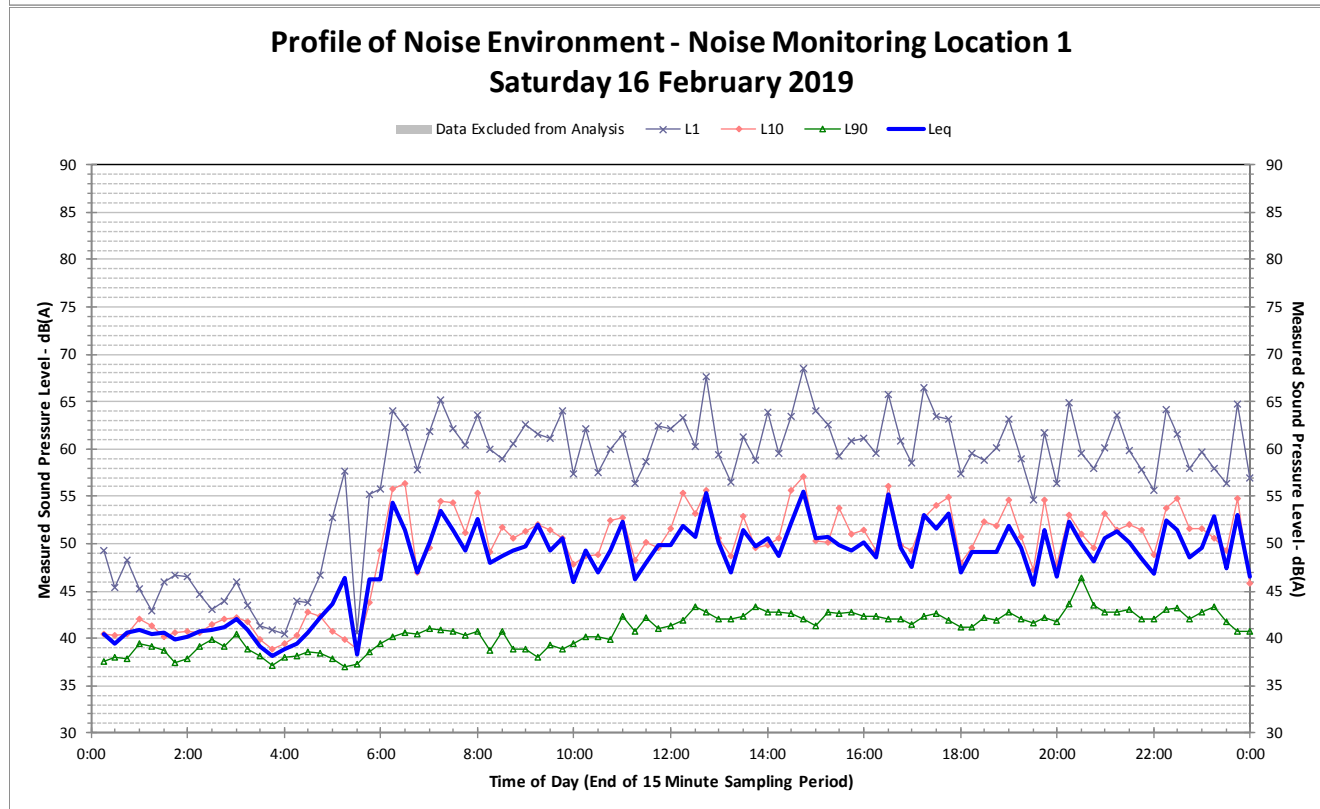
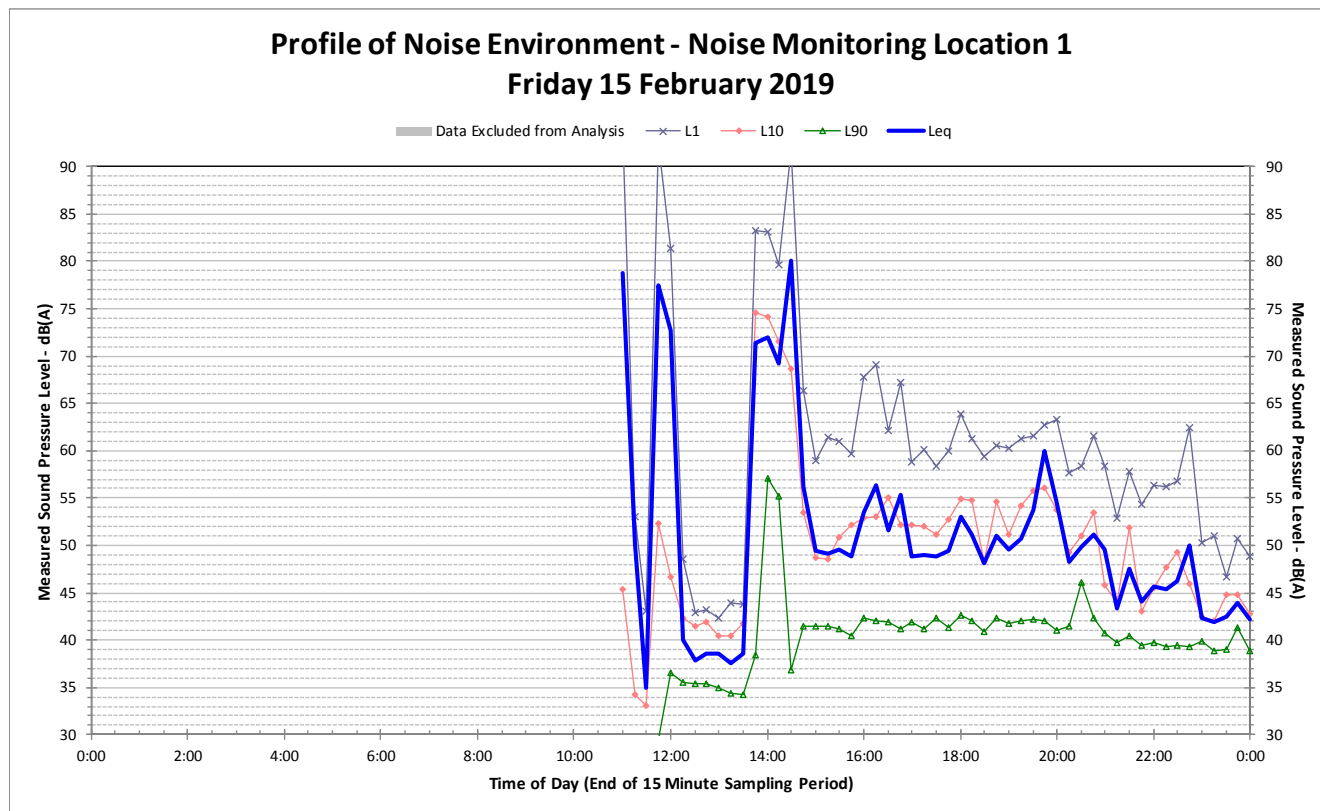
The median ambient noise environment (L_{A90}) was lower during some of the operational periods compared to the times when the plant was shut down. This highlights the variability of the local noise environment and provides additional evidence that operations of the Orora B9 site do not have a significant influence on the local ambient or background noise levels.

When compared to other seasonal results for similar times during the year, the measured L_{A90} noise levels from the latest monitoring data are (mostly) marginally lower than those of other surveys.

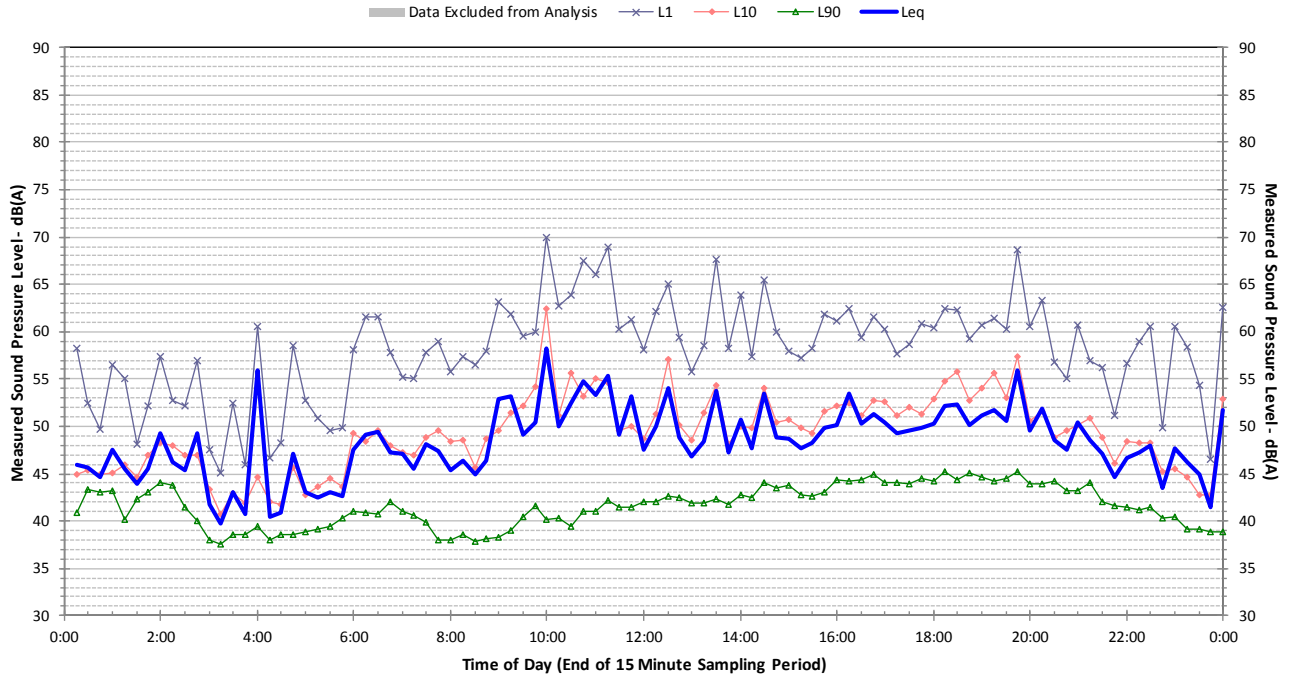
From the February 2019 quarterly monitoring the following conclusions may be drawn:

- 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.
- Winds from a south-westerly direction dominated, which tend to enhance noise from the Orora site as well as other sources such as Botany road, for receivers to the north-east of the site. These enhancing effects tend to increase measured noise levels at some receiver locations, although this does not appear to be reflected in the noise monitoring data.
- 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.
- 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.

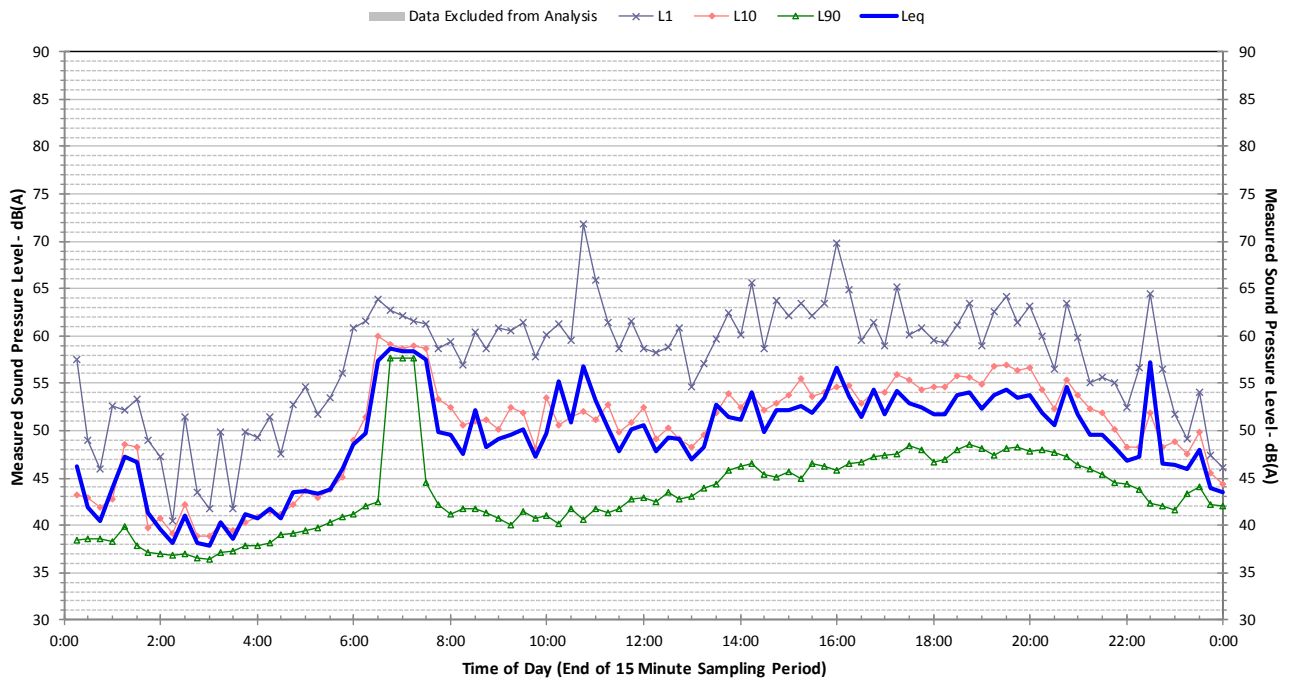
Appendix A. Noise logger graphs



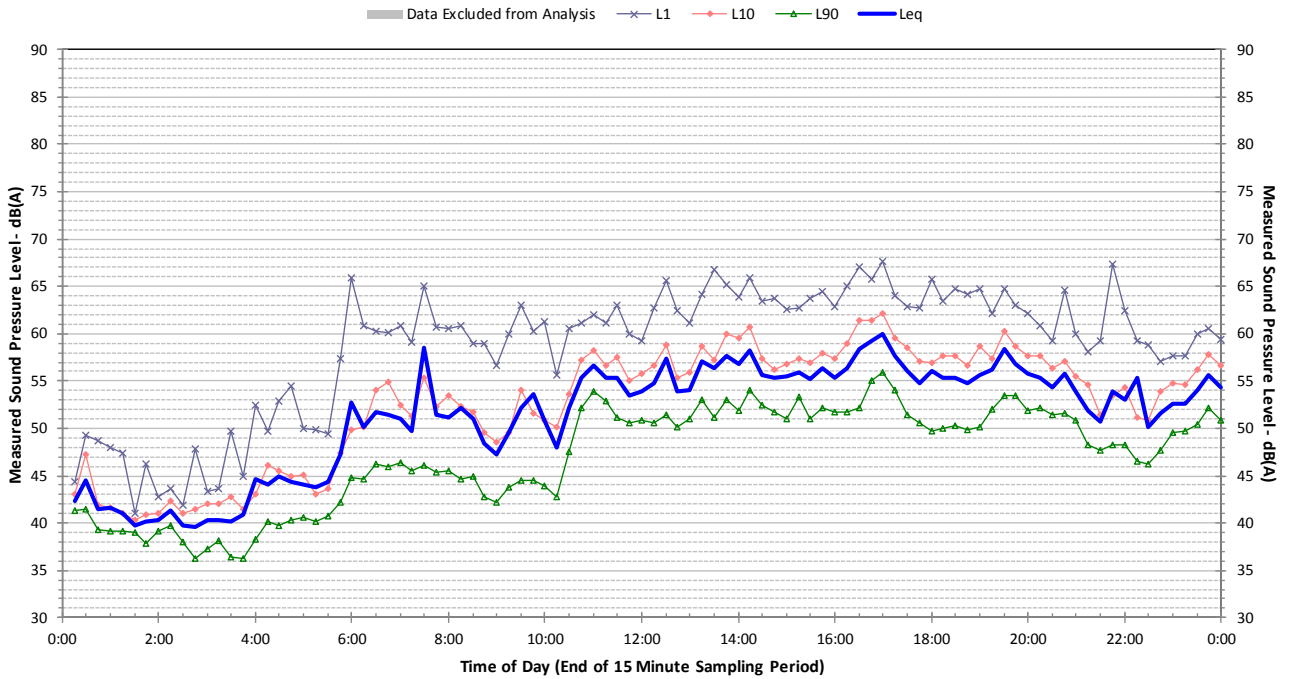
Profile of Noise Environment - Noise Monitoring Location 1 Sunday 17 February 2019



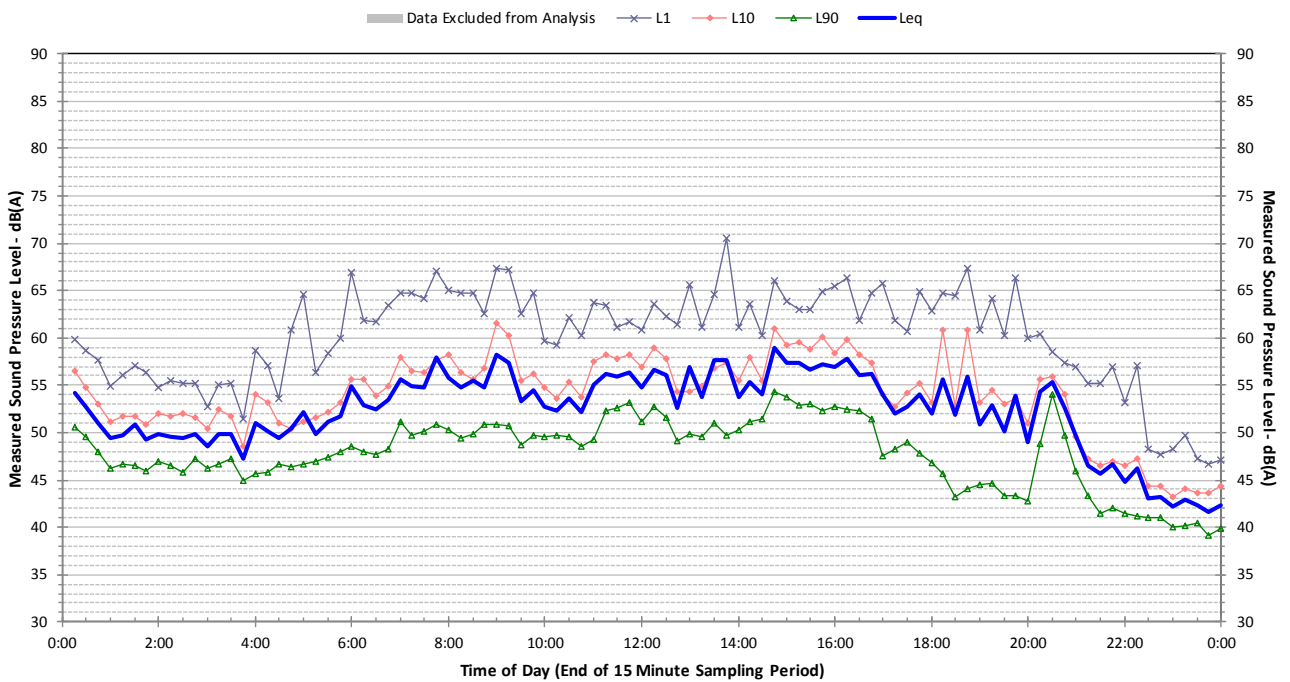
Profile of Noise Environment - Noise Monitoring Location 1 Monday 18 February 2019



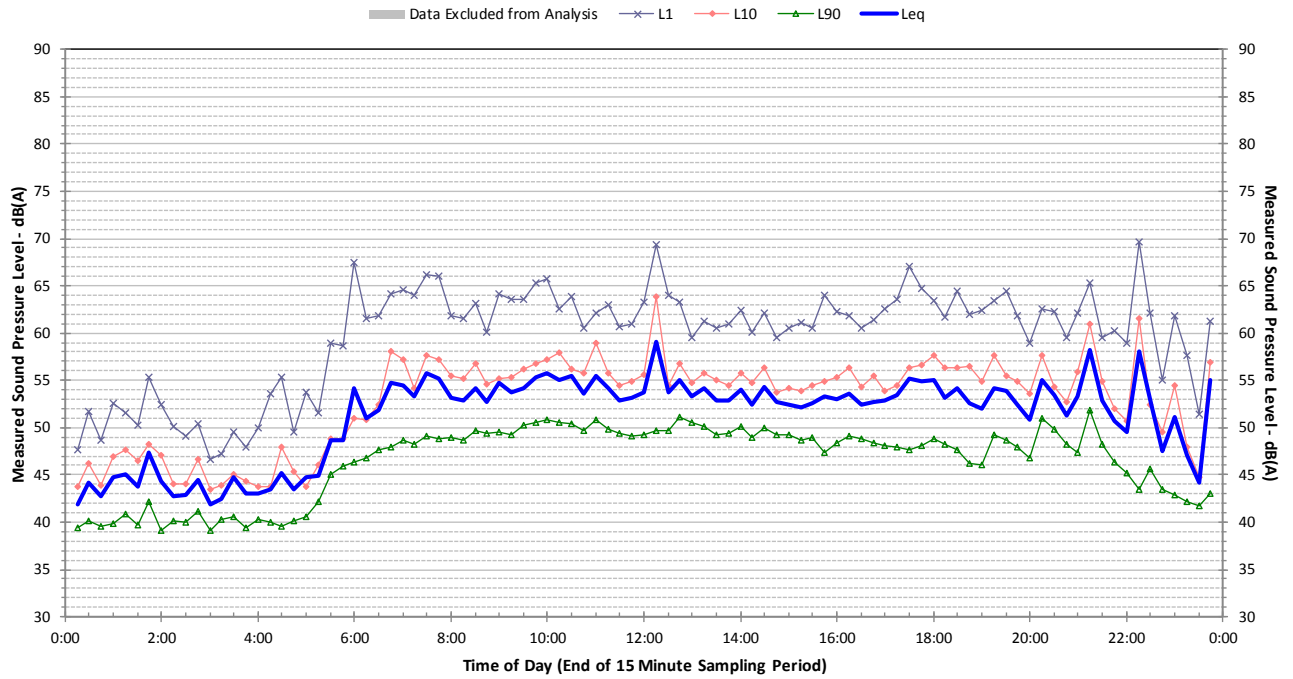
Profile of Noise Environment - Noise Monitoring Location 1 Tuesday 19 February 2019



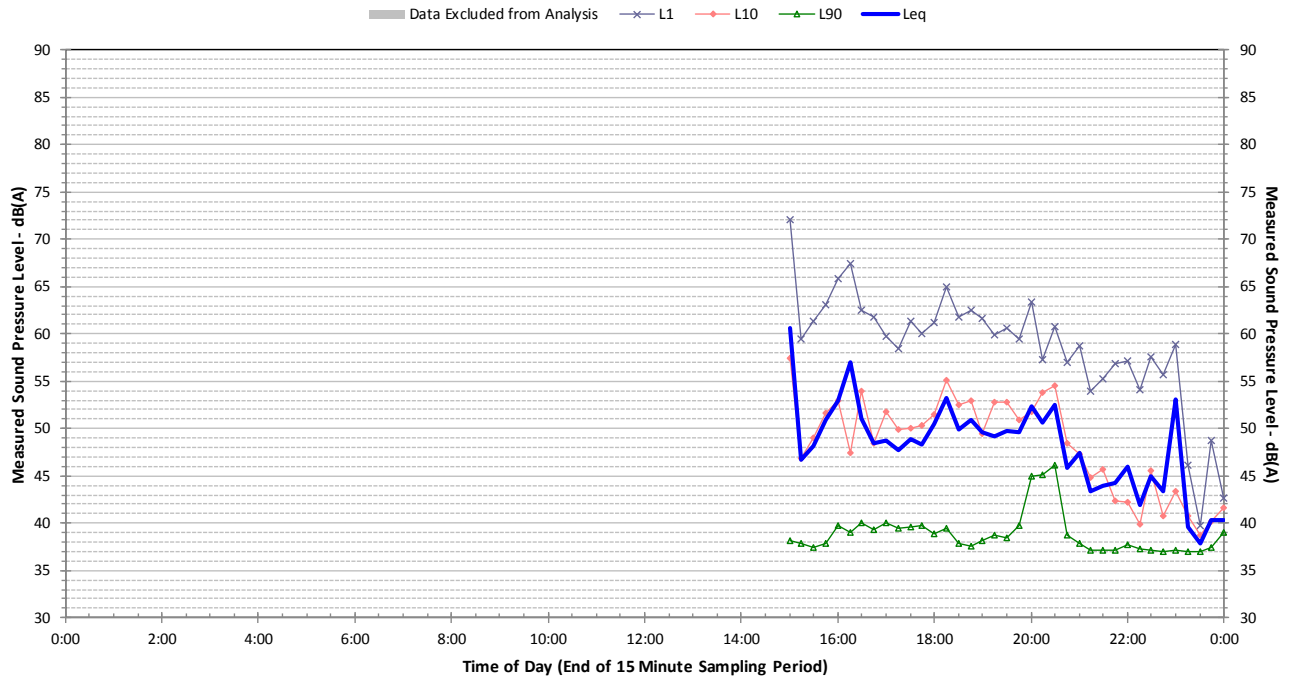
Profile of Noise Environment - Noise Monitoring Location 1 Wednesday 20 February 2019



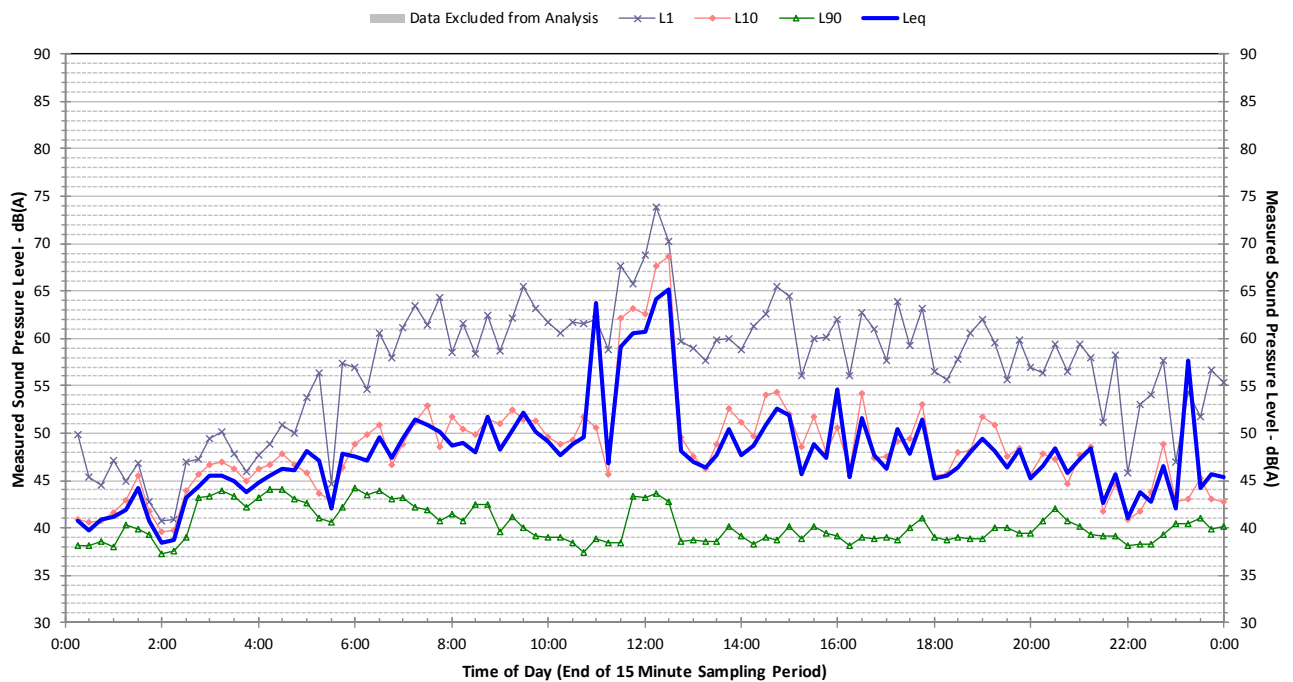
Profile of Noise Environment - Noise Monitoring Location 1 Thursday 21 February 2019



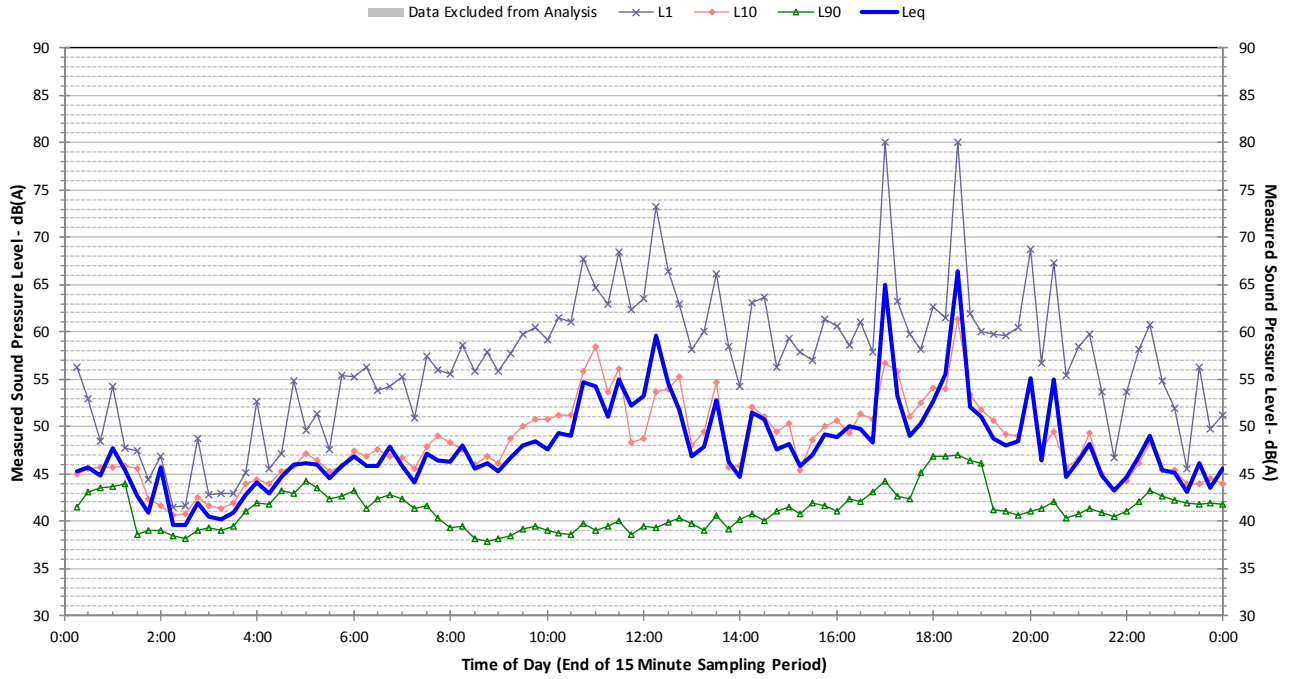
Profile of Noise Environment - Noise Monitoring Location 2 Friday 15 February 2019



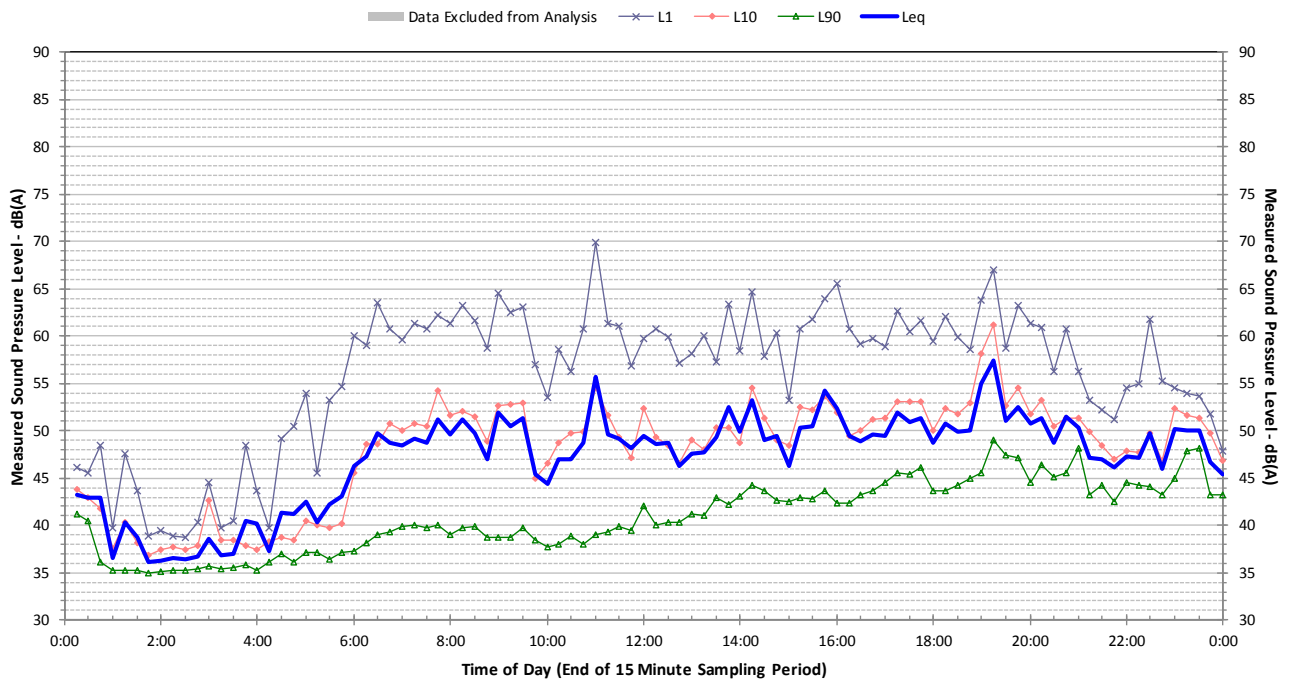
Profile of Noise Environment - Noise Monitoring Location 2 Saturday 16 February 2019



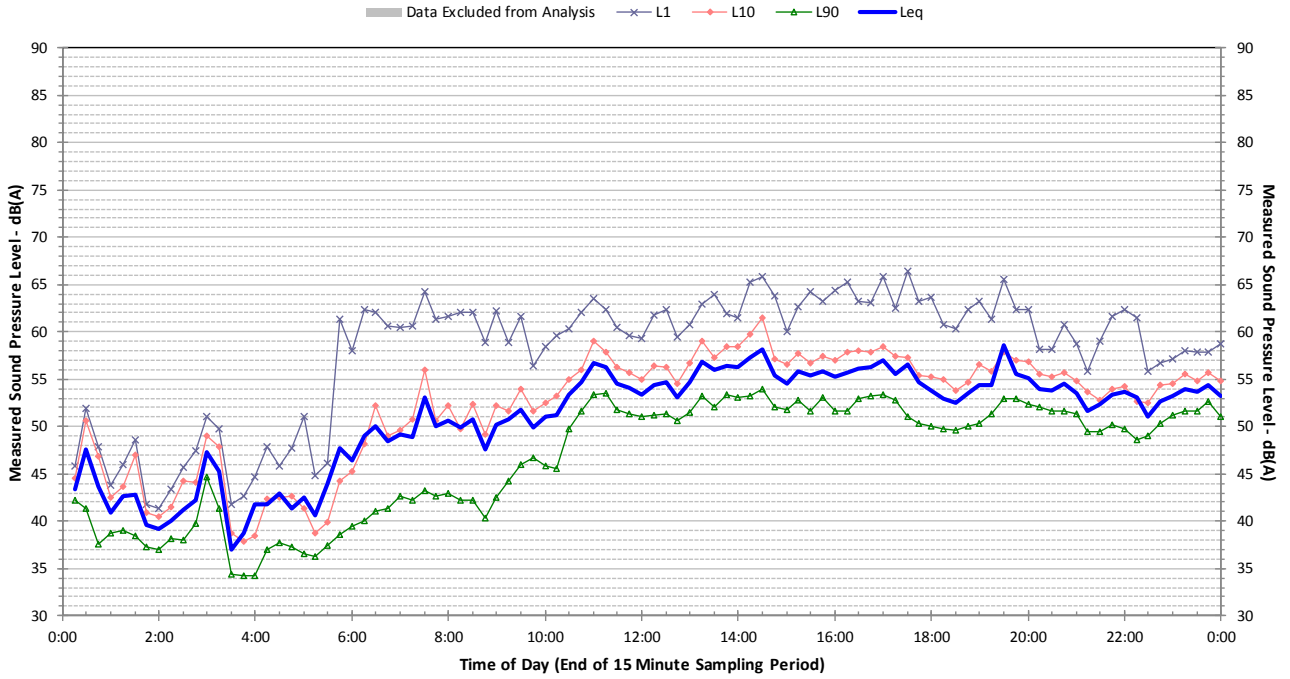
Profile of Noise Environment - Noise Monitoring Location 2 Sunday 17 February 2019



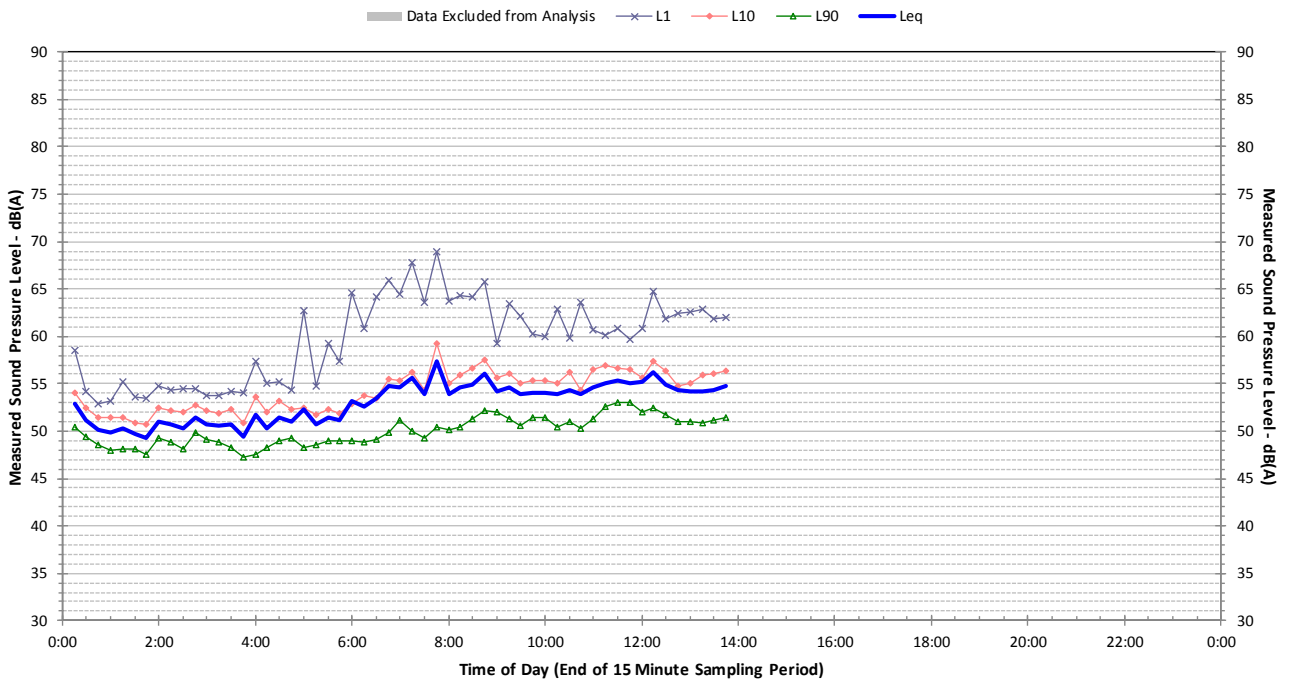
Profile of Noise Environment - Noise Monitoring Location 2 Monday 18 February 2019



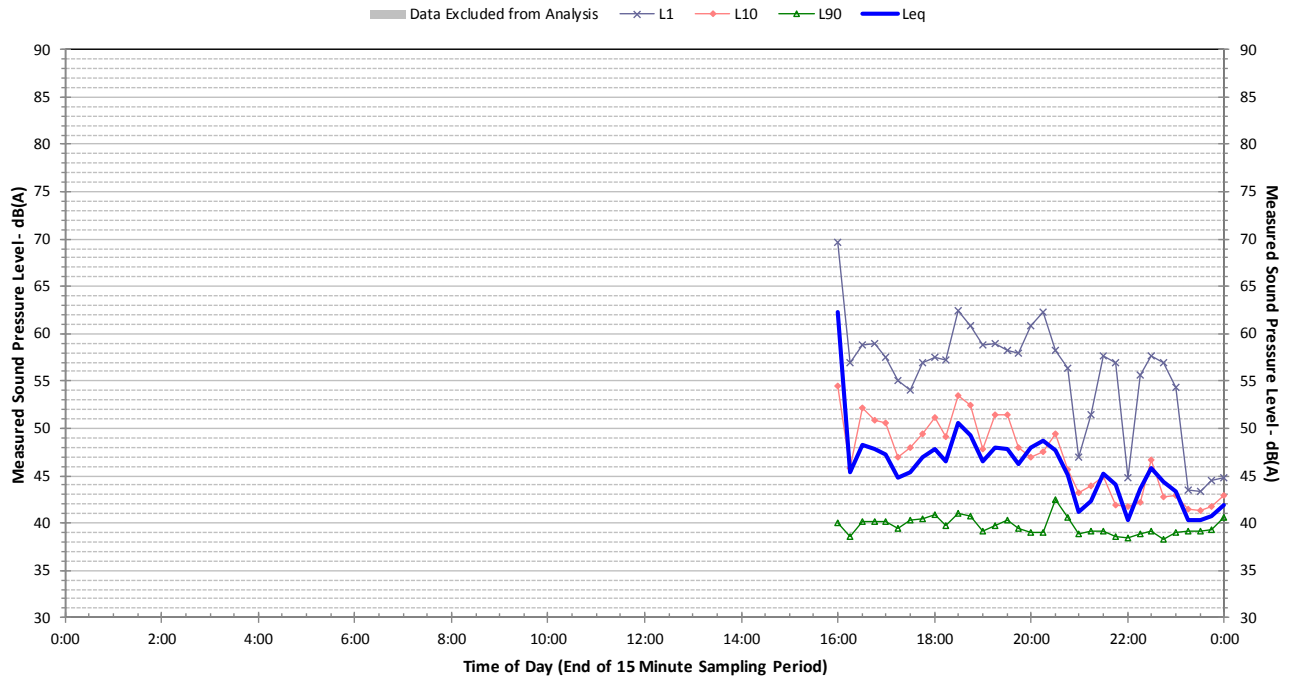
Profile of Noise Environment - Noise Monitoring Location 2 Tuesday 19 February 2019



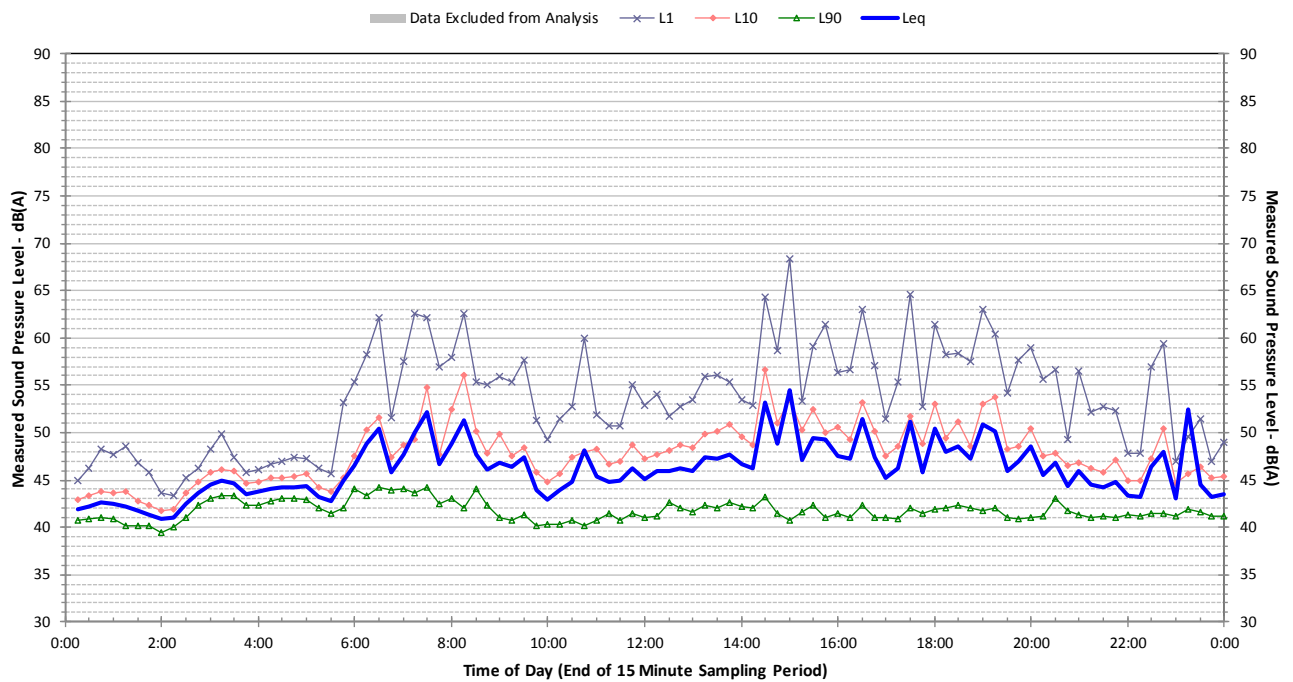
Profile of Noise Environment - Noise Monitoring Location 2 Wednesday 20 February 2019



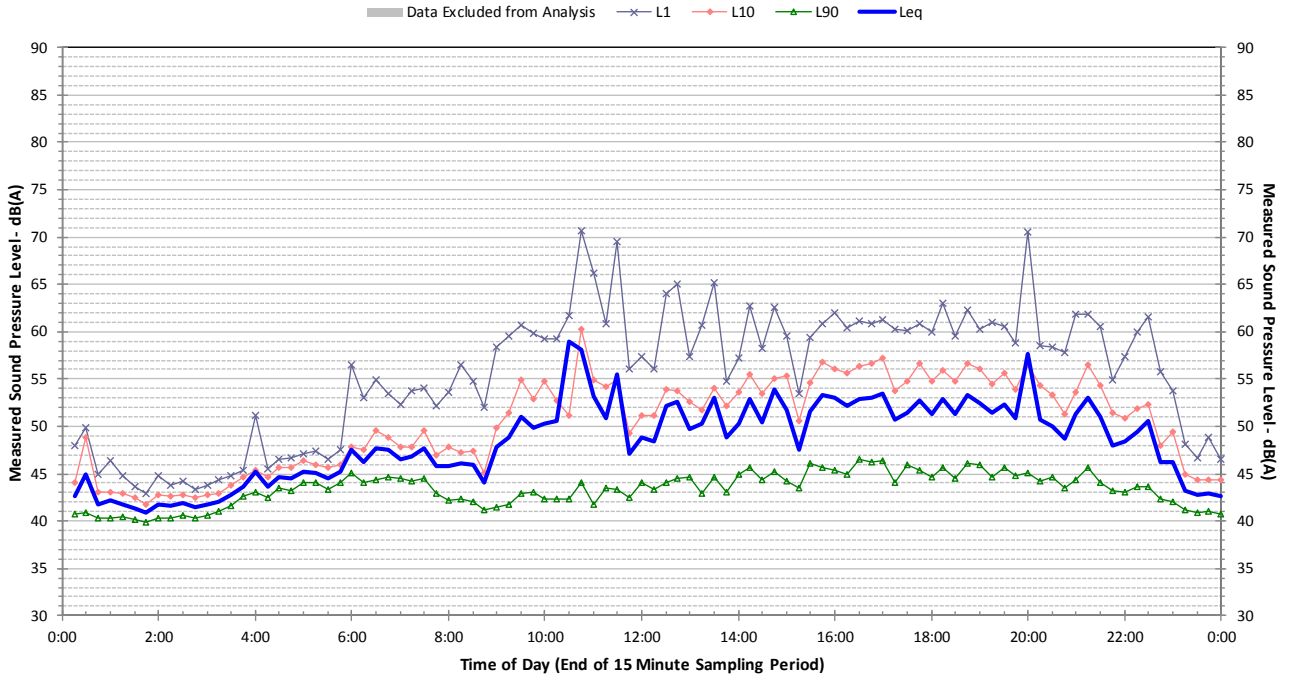
Profile of Noise Environment - Noise Monitoring Location 3 Friday 15 February 2019



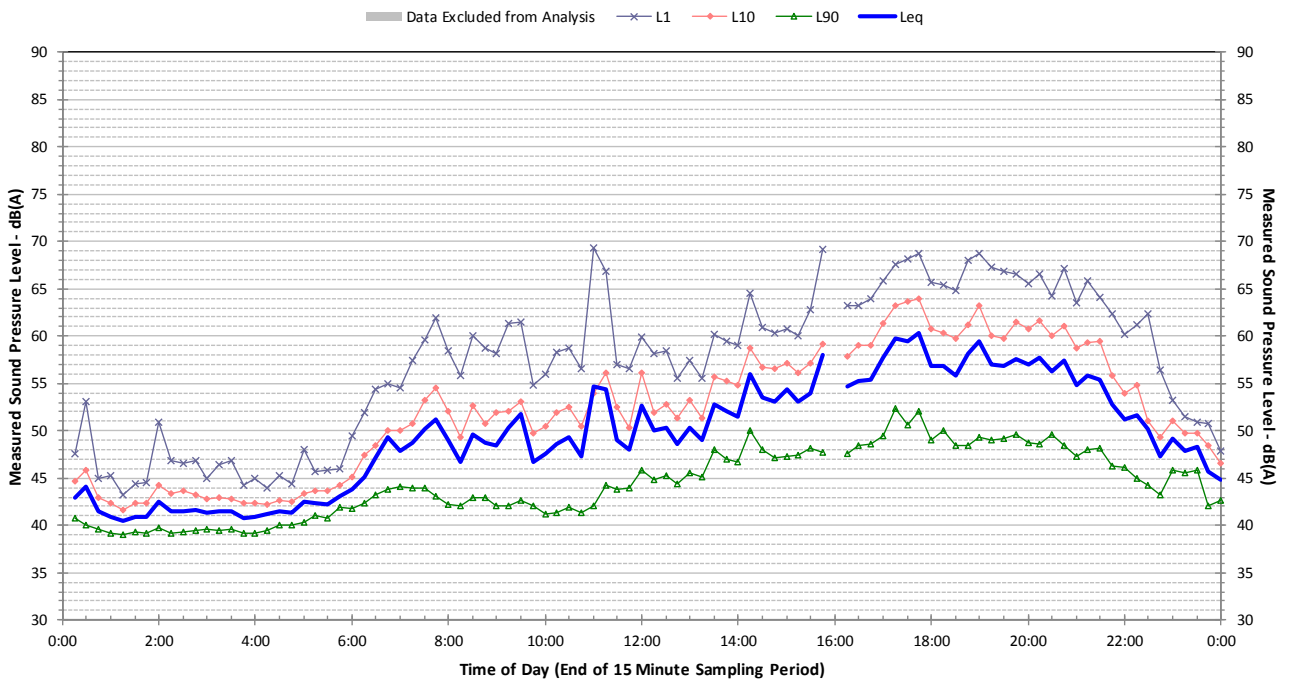
Profile of Noise Environment - Noise Monitoring Location 3 Saturday 16 February 2019



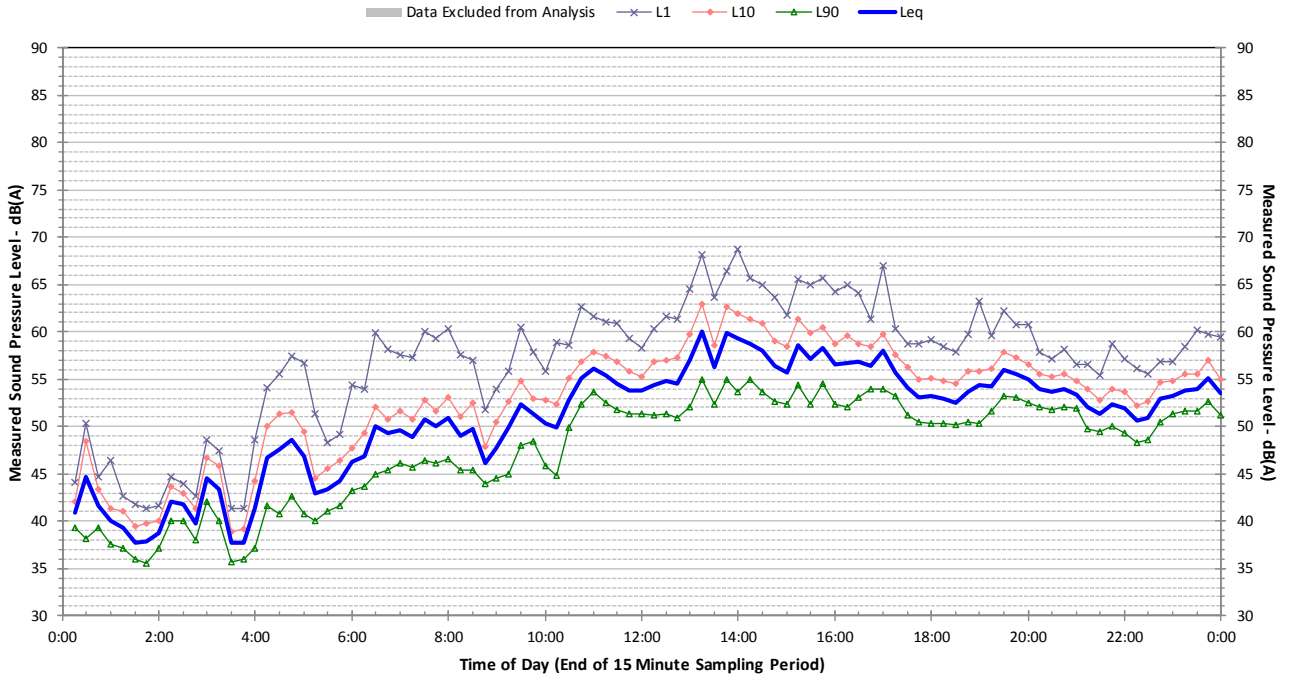
Profile of Noise Environment - Noise Monitoring Location 3 Sunday 17 February 2019



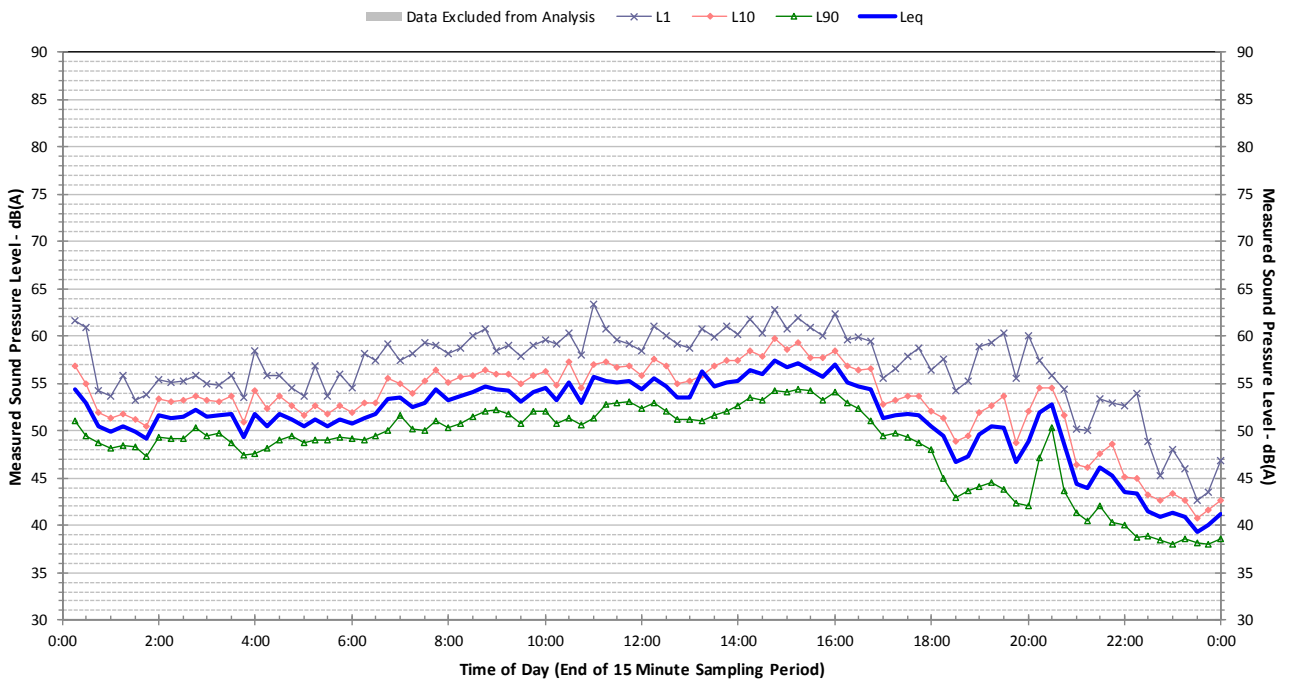
Profile of Noise Environment - Noise Monitoring Location 3 Monday 18 February 2019



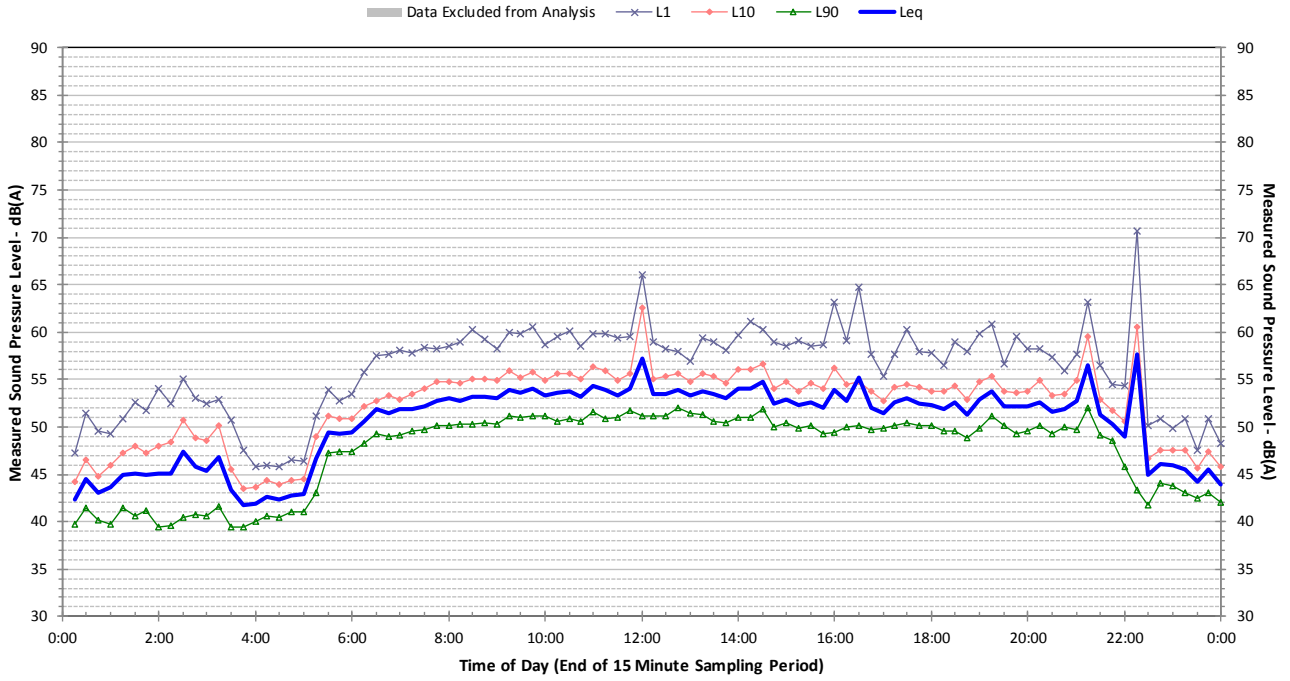
**Profile of Noise Environment - Noise Monitoring Location 3
Tuesday 19 February 2019**



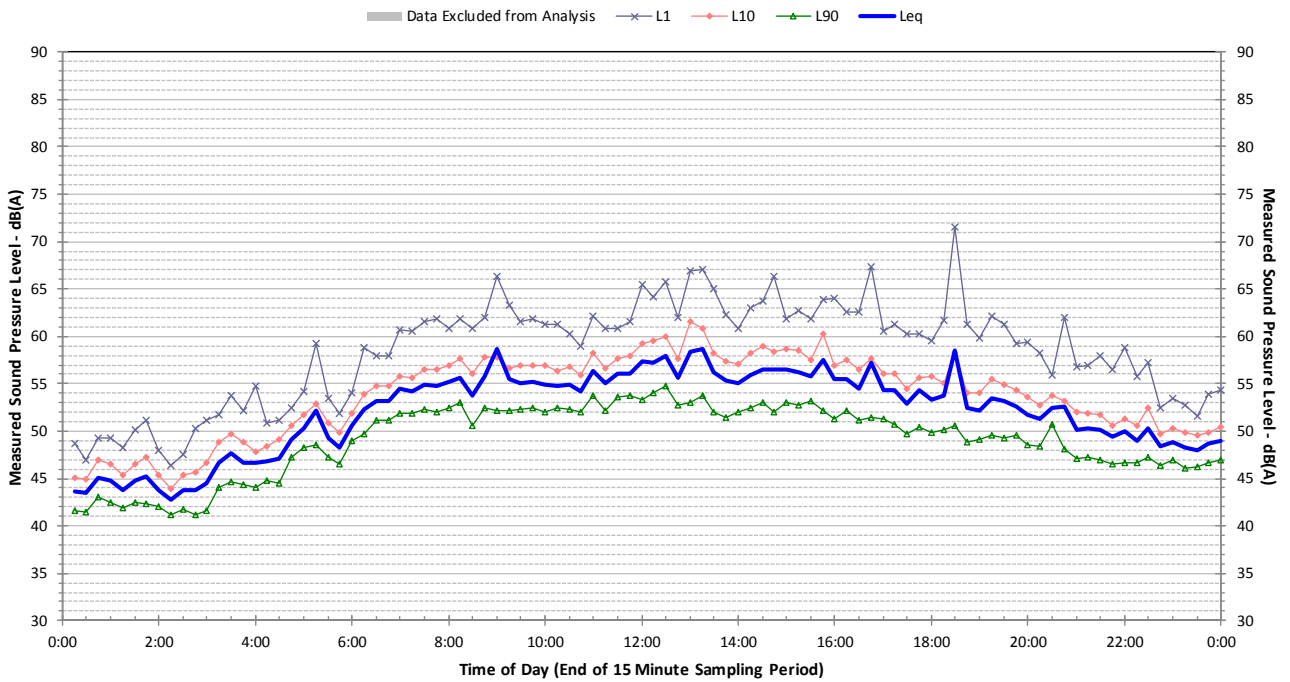
**Profile of Noise Environment - Noise Monitoring Location 3
Wednesday 20 February 2019**



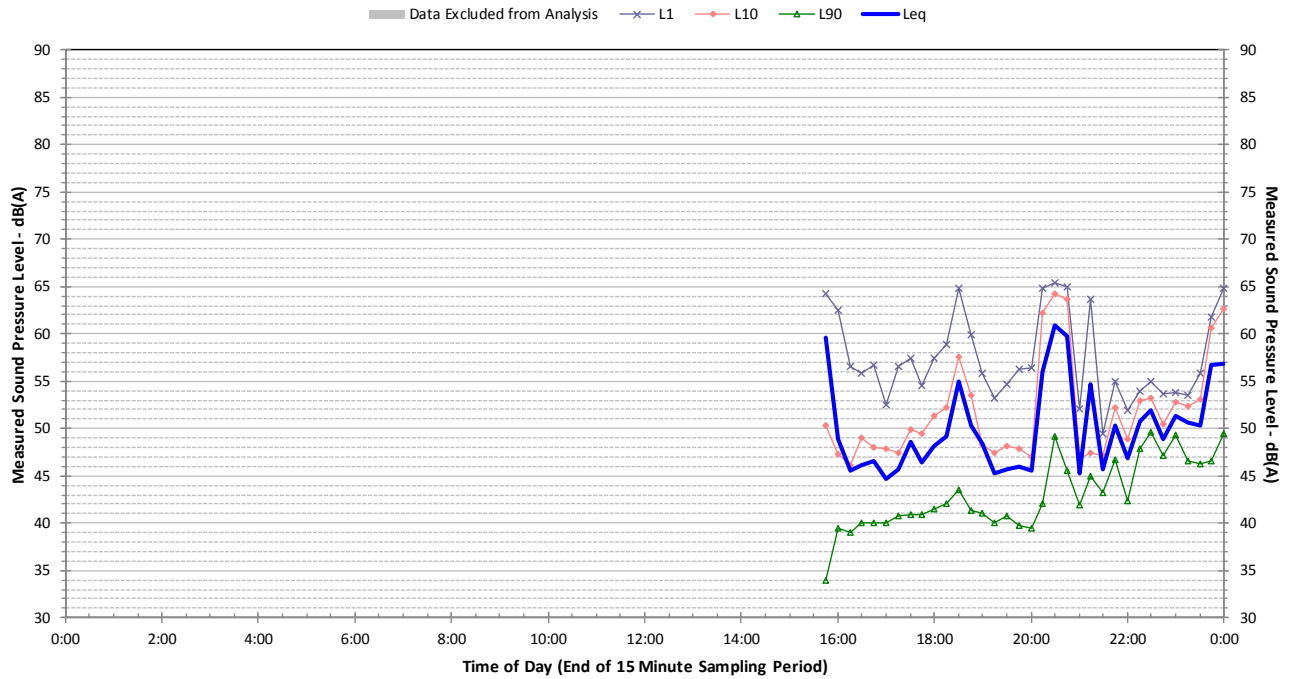
Profile of Noise Environment - Noise Monitoring Location 3 Thursday 21 February 2019



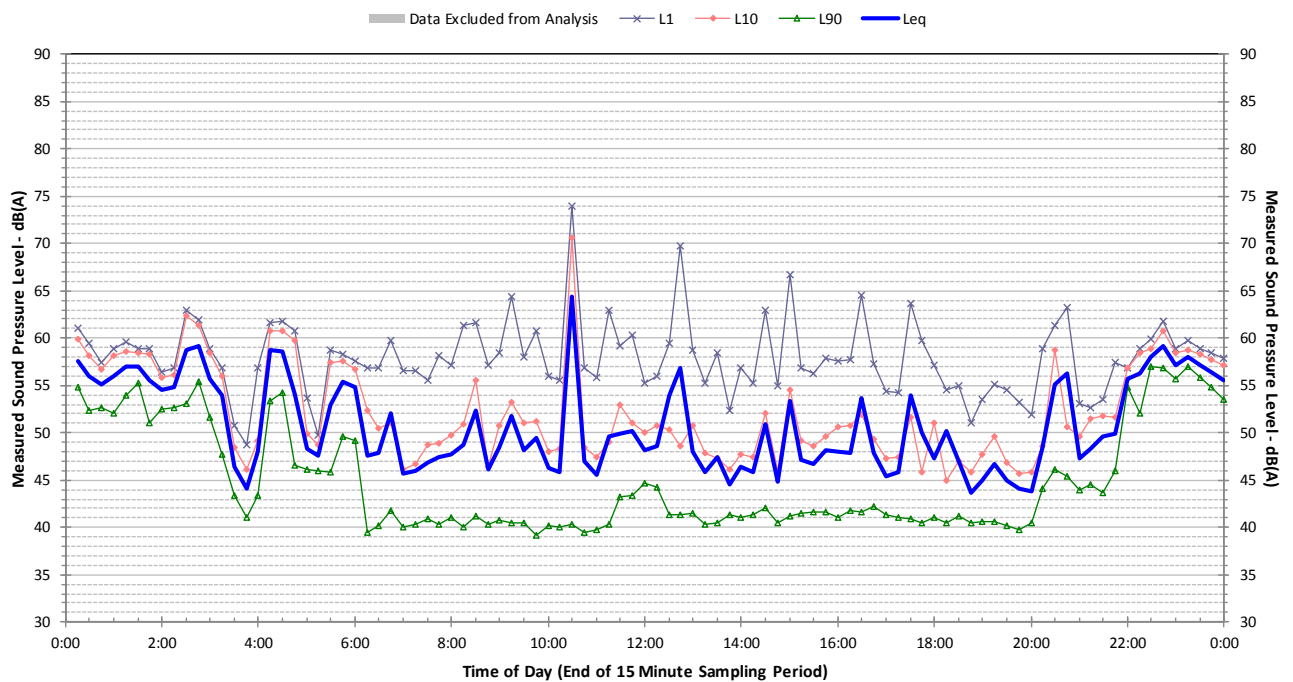
Profile of Noise Environment - Noise Monitoring Location 3 Friday 22 February 2019



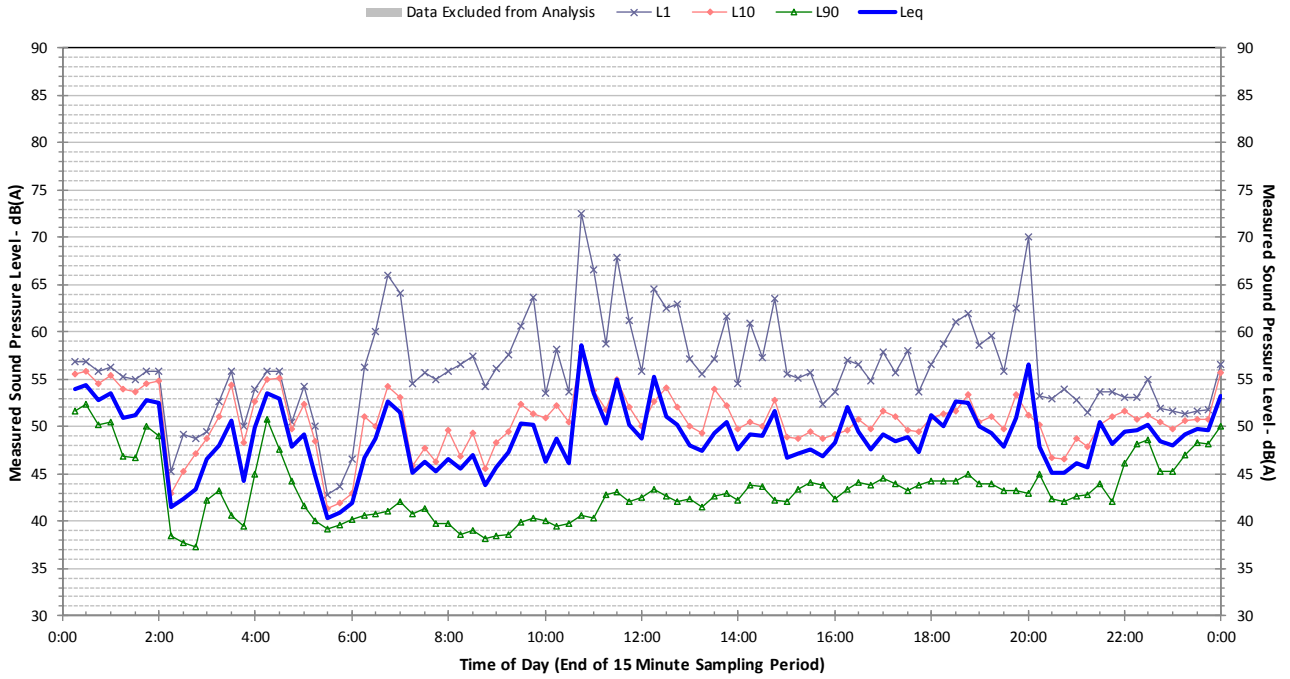
Profile of Noise Environment - Noise Monitoring Location 4 Friday 15 February 2019



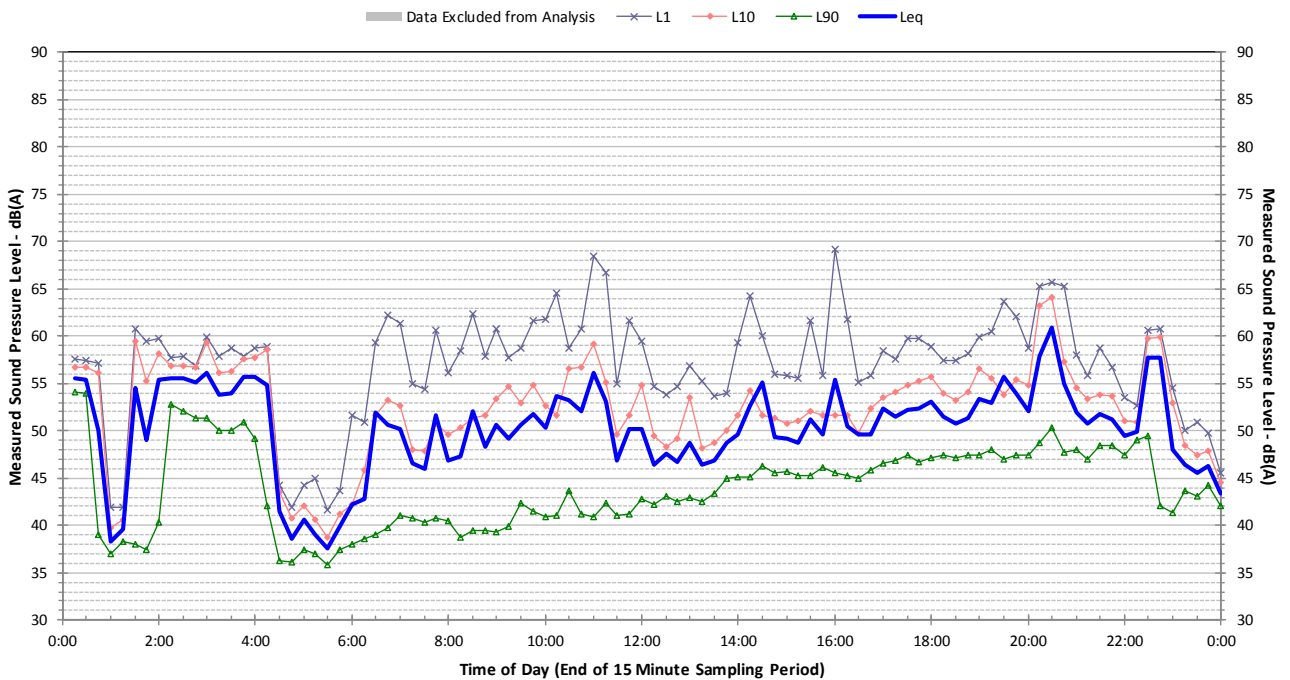
Profile of Noise Environment - Noise Monitoring Location 4 Saturday 16 February 2019



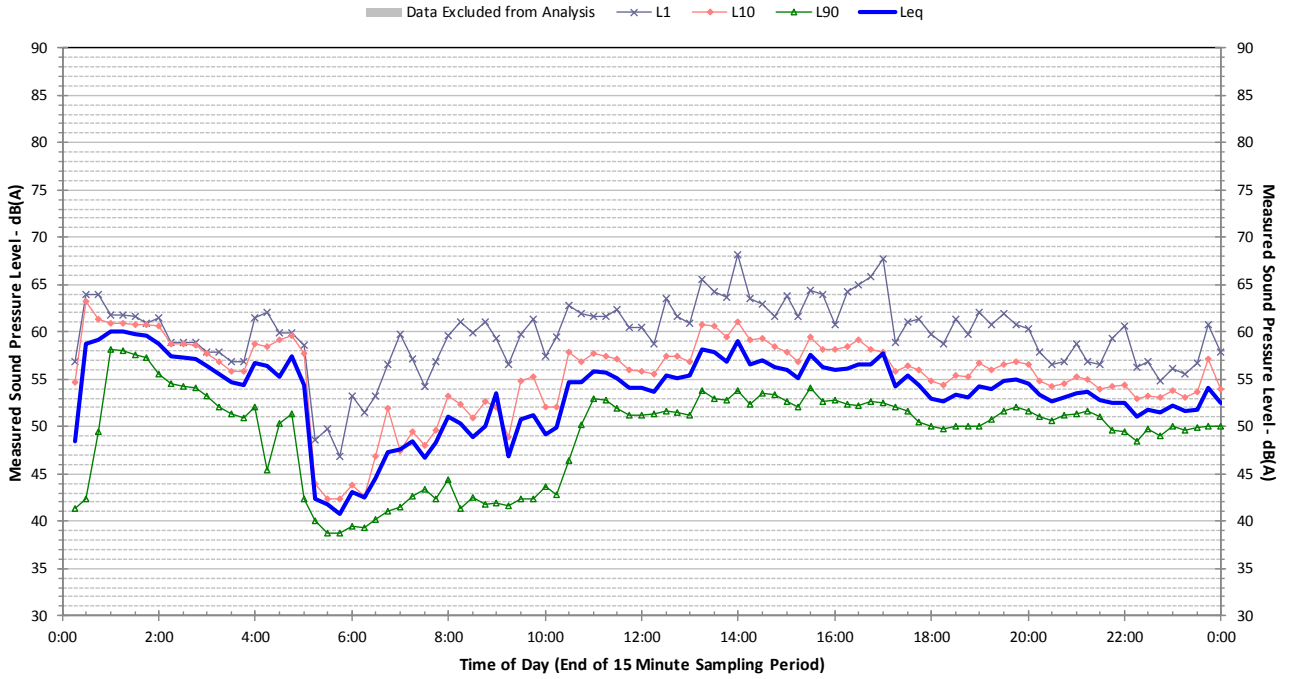
Profile of Noise Environment - Noise Monitoring Location 4 Sunday 17 February 2019



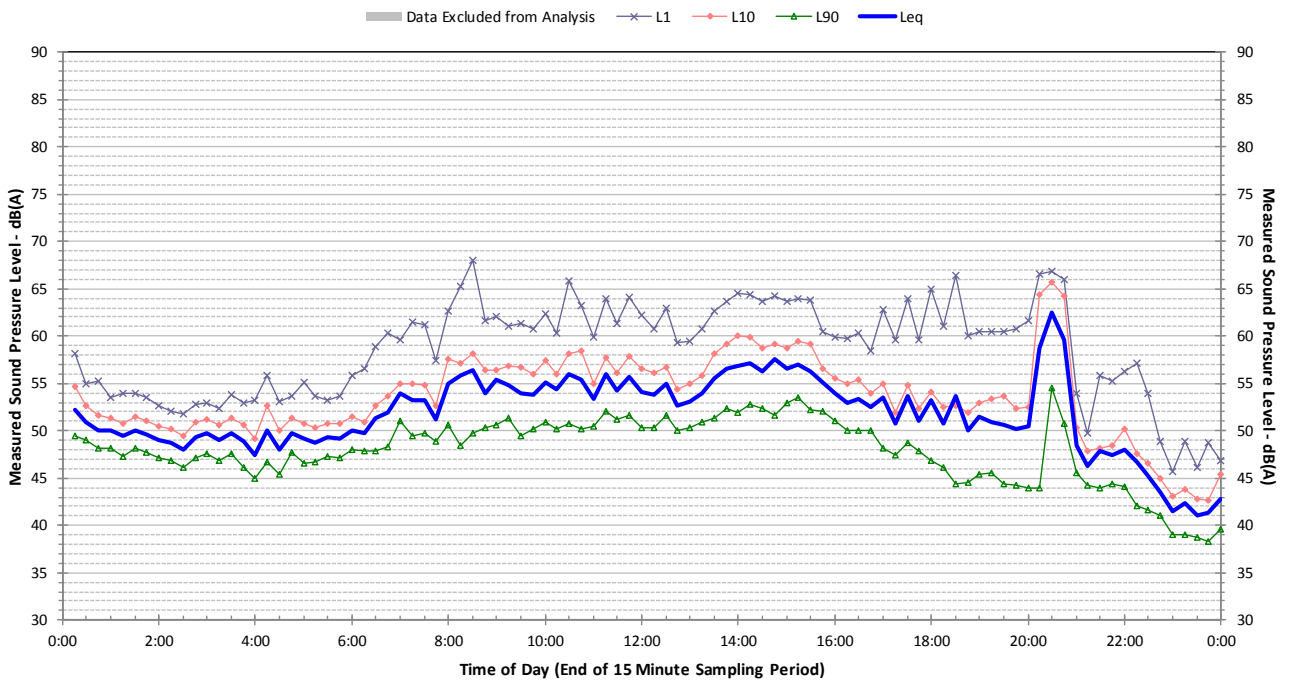
Profile of Noise Environment - Noise Monitoring Location 4 Monday 18 February 2019



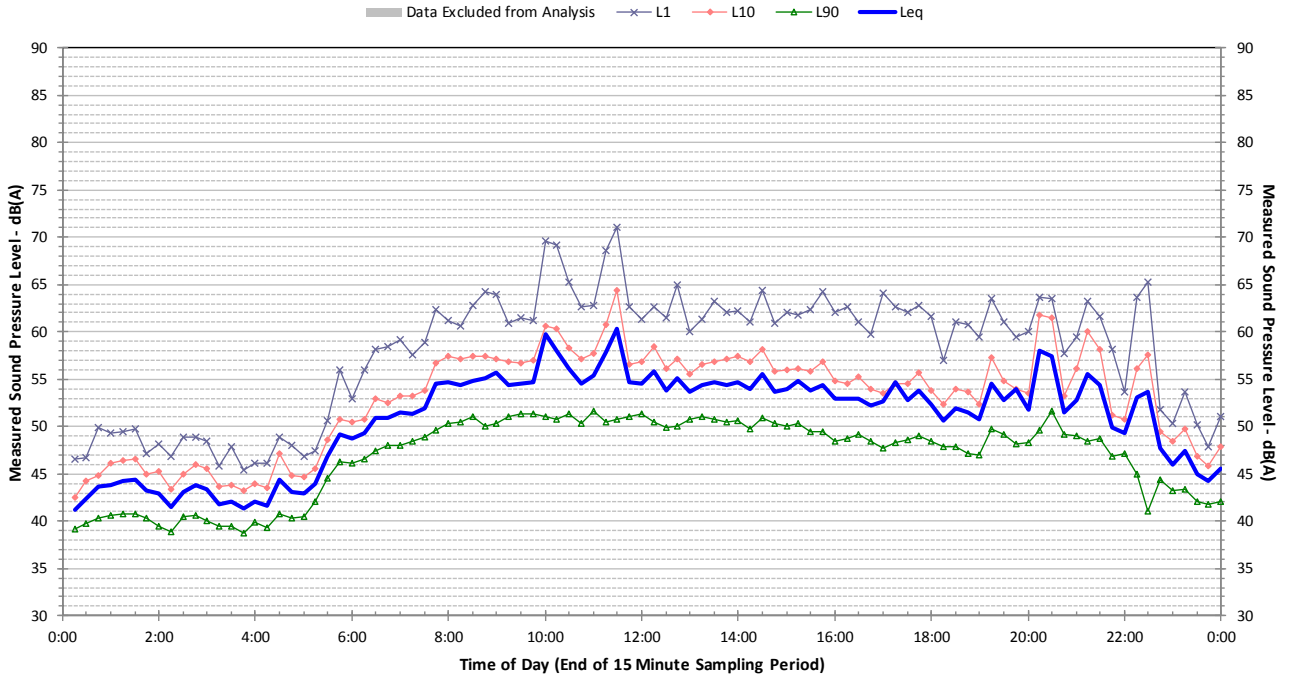
Profile of Noise Environment - Noise Monitoring Location 4 Tuesday 19 February 2019



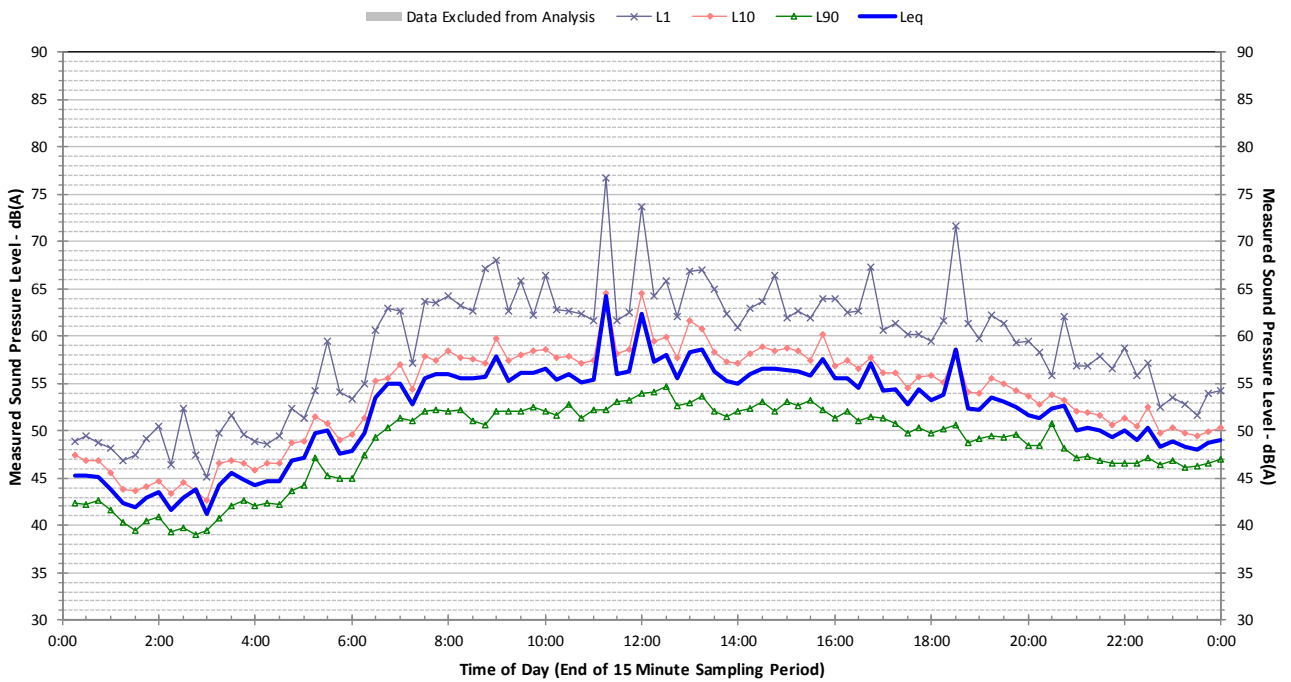
Profile of Noise Environment - Noise Monitoring Location 4 Wednesday 20 February 2019



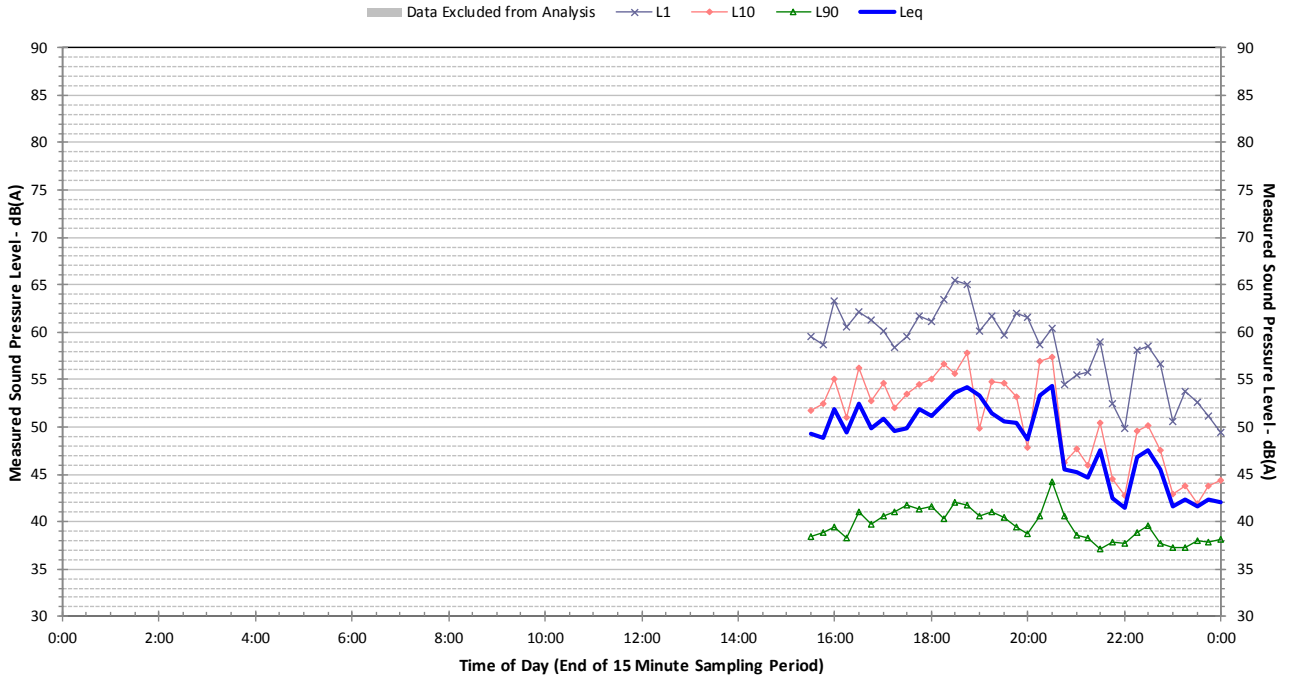
**Profile of Noise Environment - Noise Monitoring Location 4
Thursday 21 February 2019**



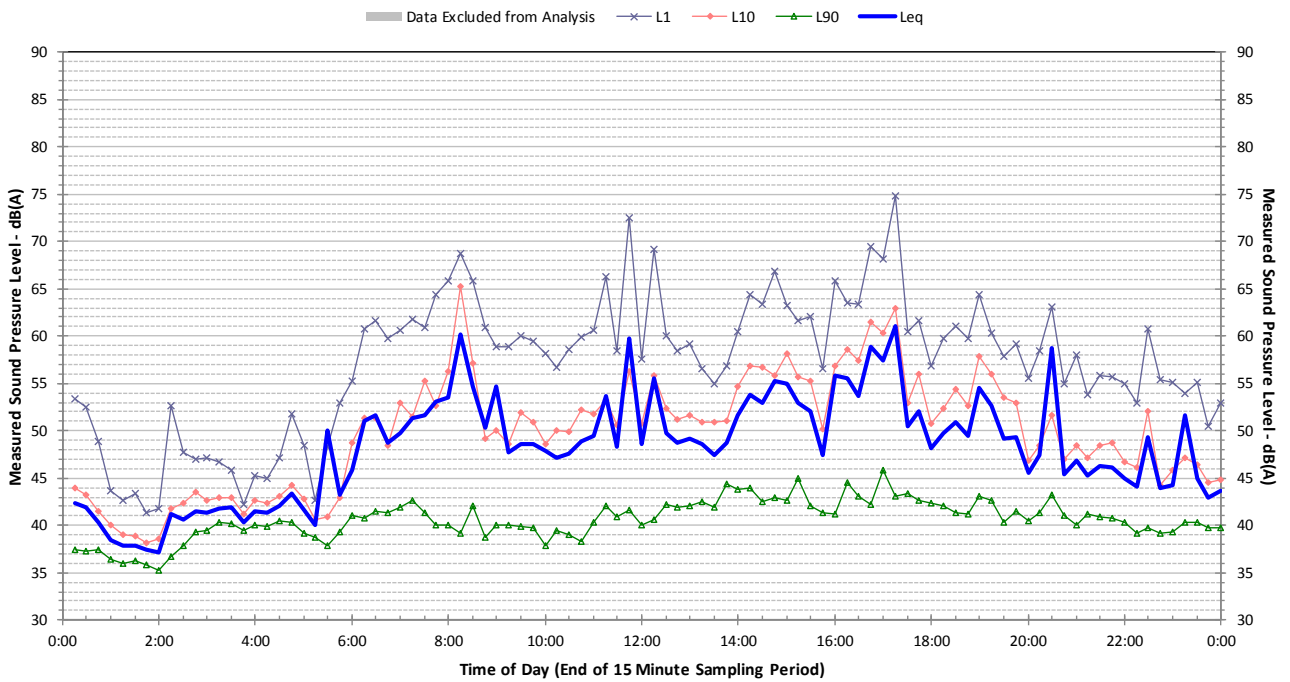
**Profile of Noise Environment - Noise Monitoring Location 4
Friday 22 February 2019**



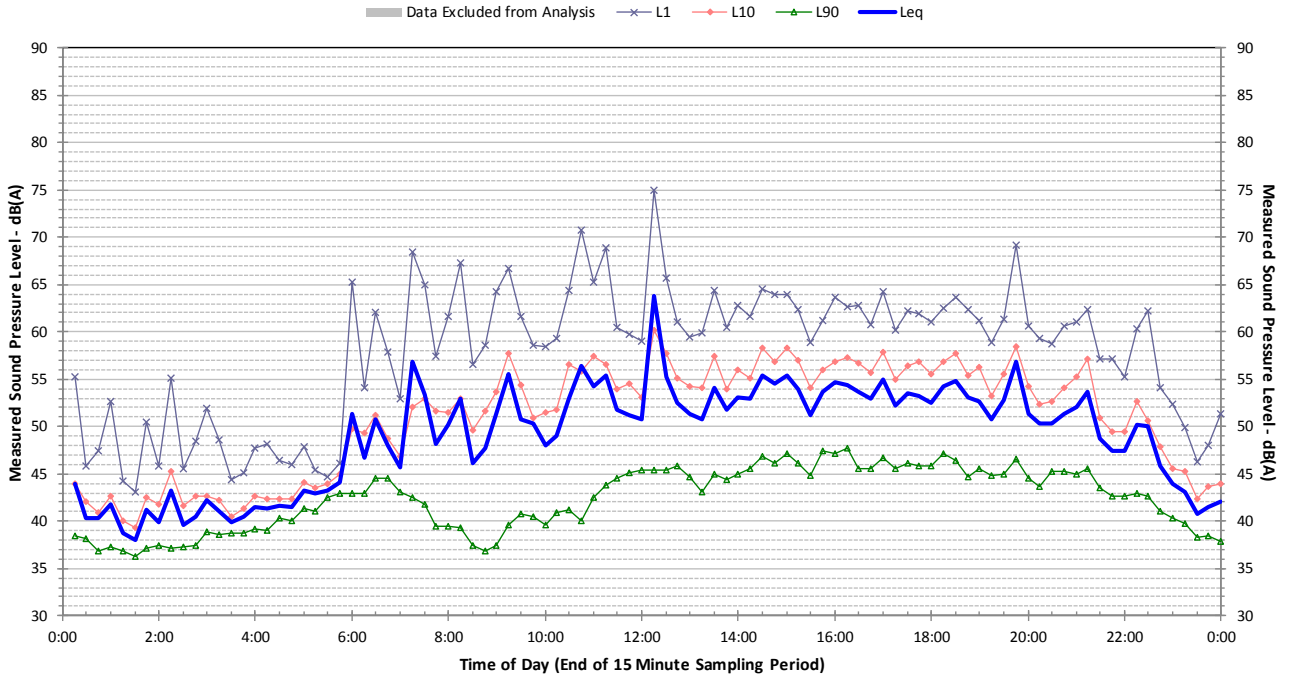
Profile of Noise Environment - Noise Monitoring Location 5 Friday 15 February 2019



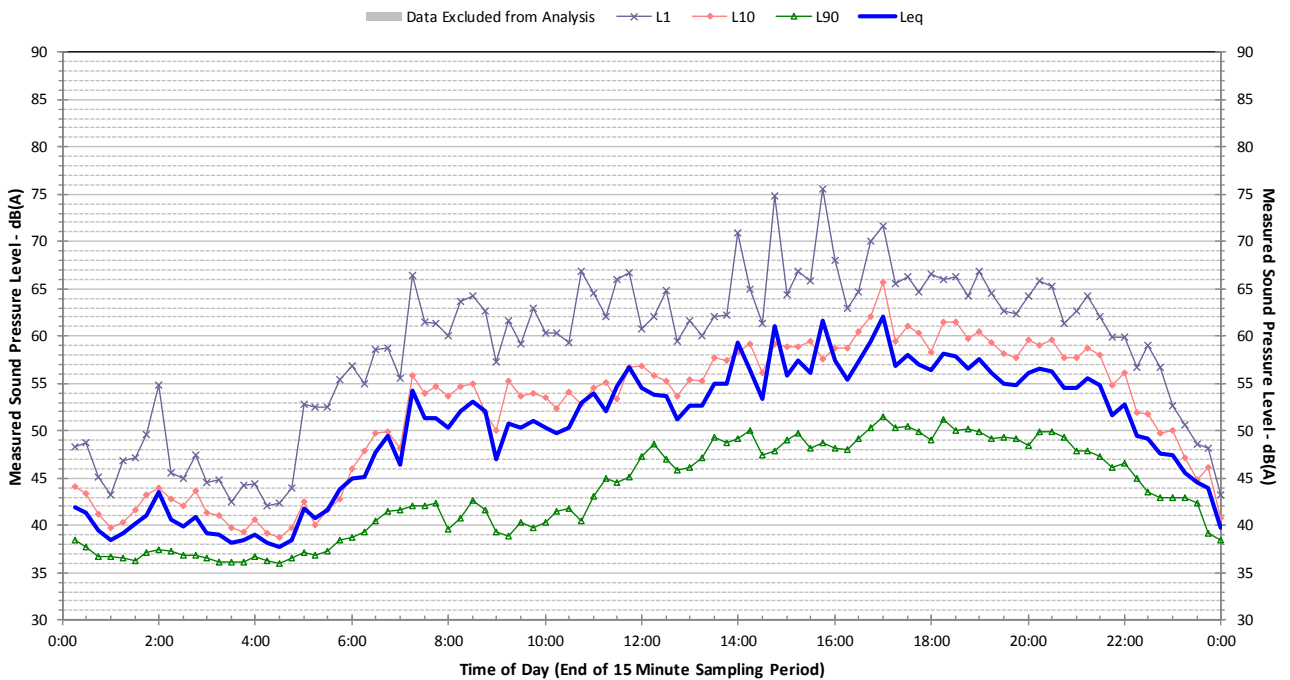
Profile of Noise Environment - Noise Monitoring Location 5 Saturday 16 February 2019



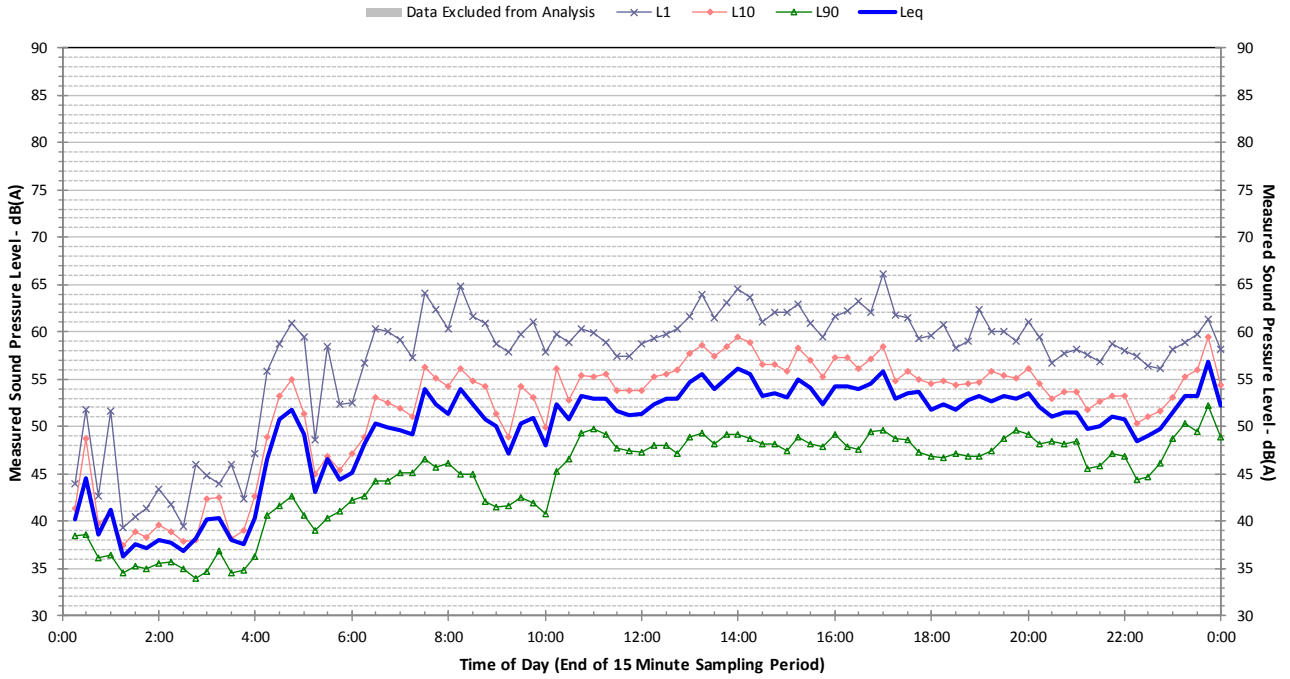
Profile of Noise Environment - Noise Monitoring Location 5 Sunday 17 February 2019



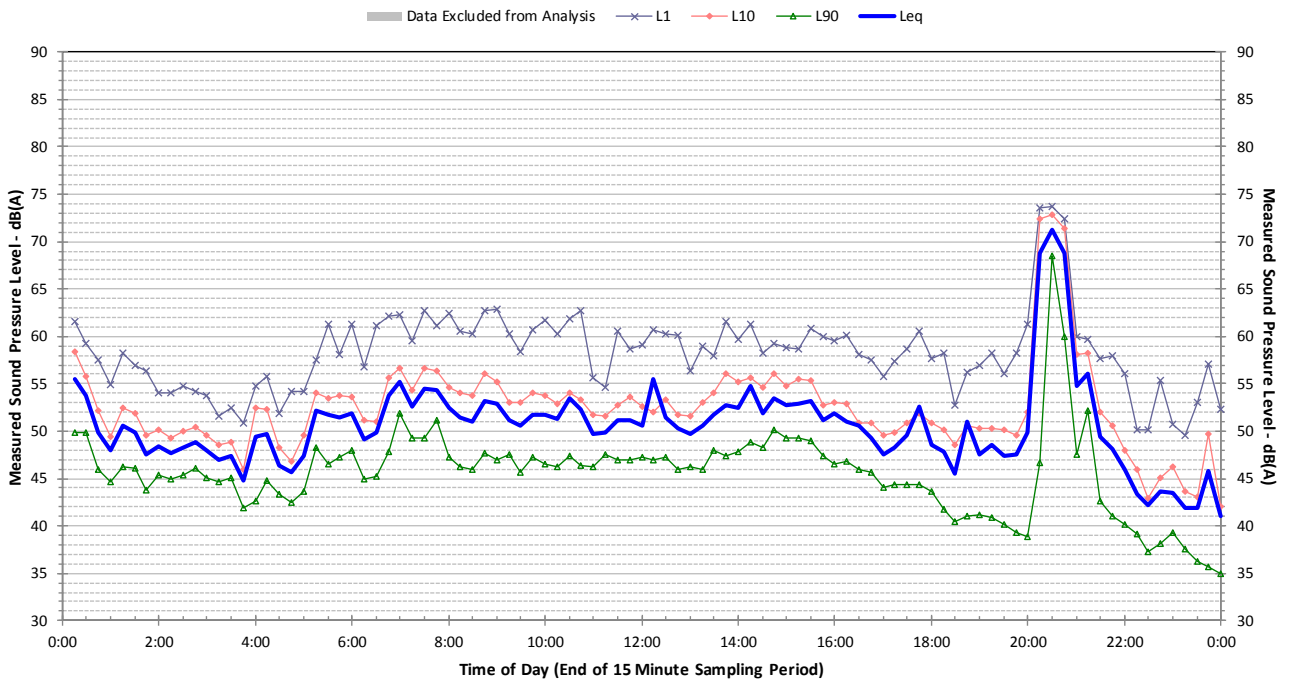
Profile of Noise Environment - Noise Monitoring Location 5 Monday 18 February 2019



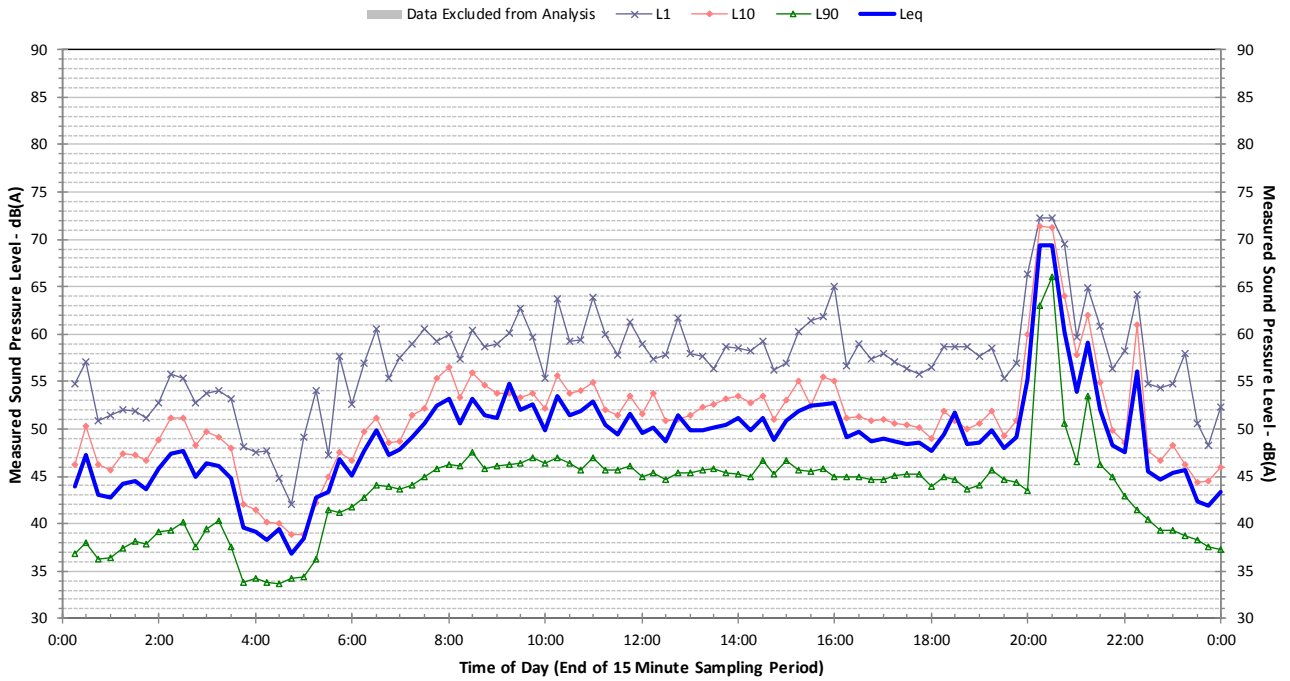
Profile of Noise Environment - Noise Monitoring Location 5 Tuesday 19 February 2019



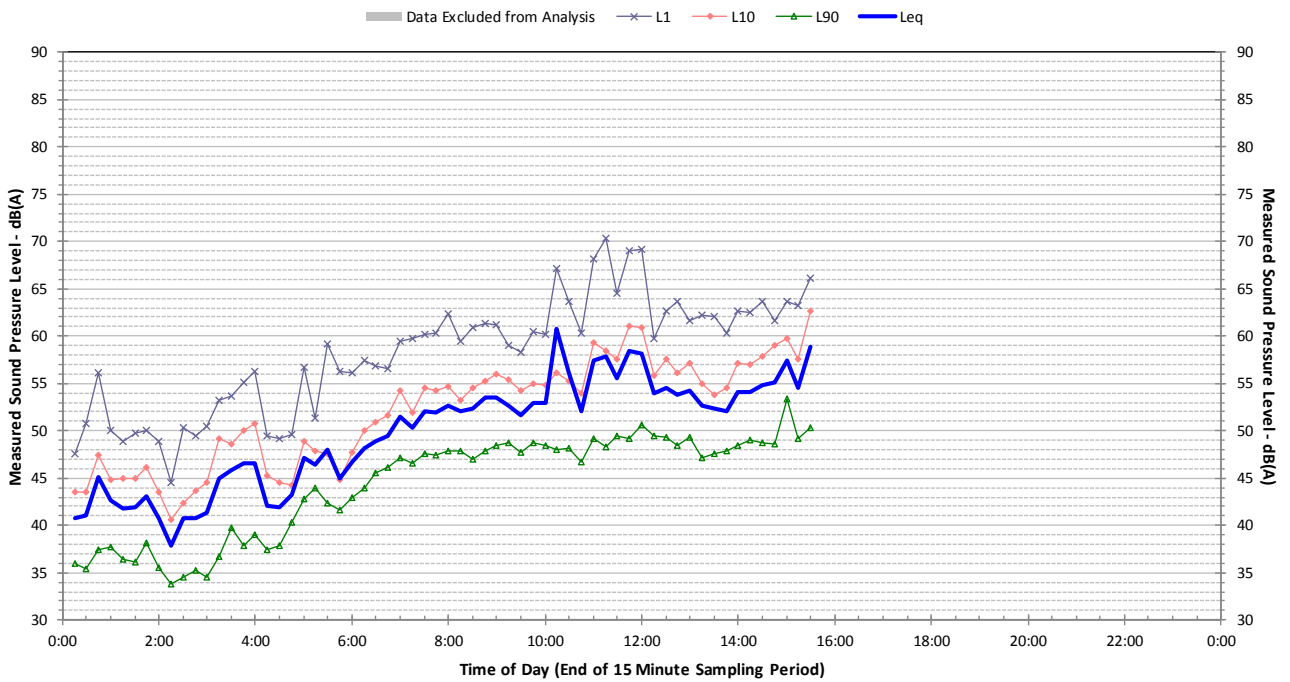
Profile of Noise Environment - Noise Monitoring Location 5 Wednesday 20 February 2019



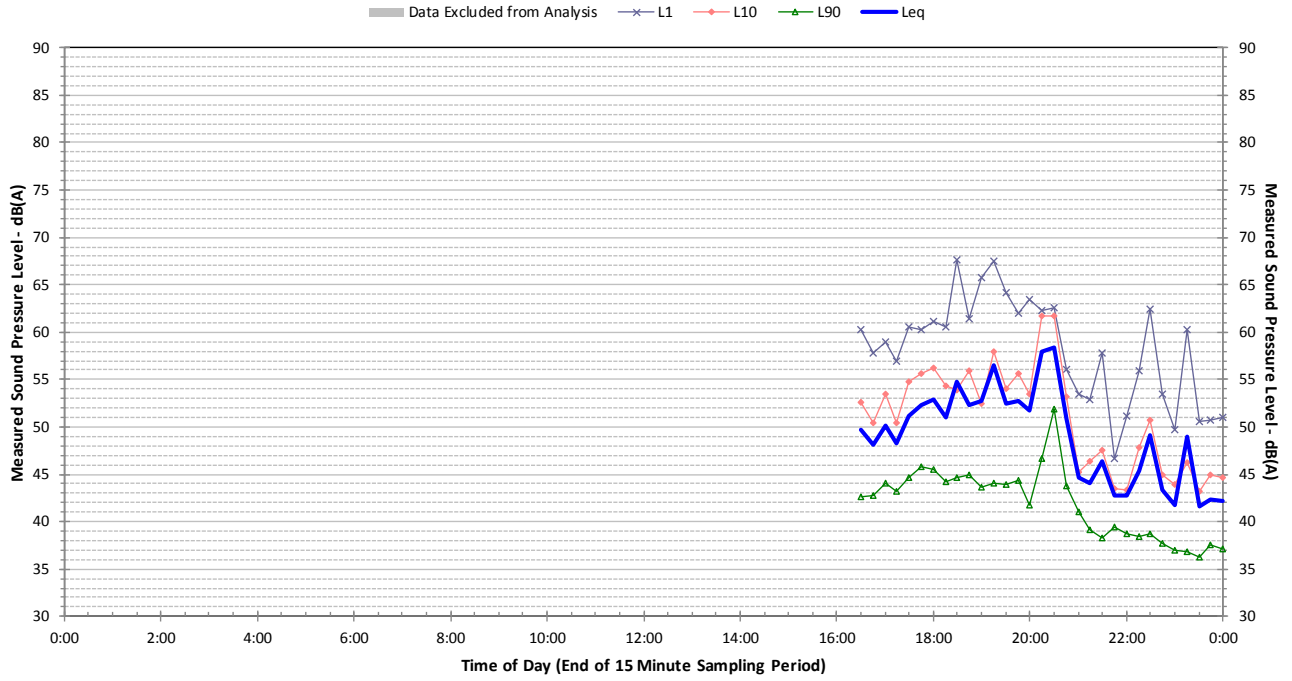
Profile of Noise Environment - Noise Monitoring Location 5 Thursday 21 February 2019



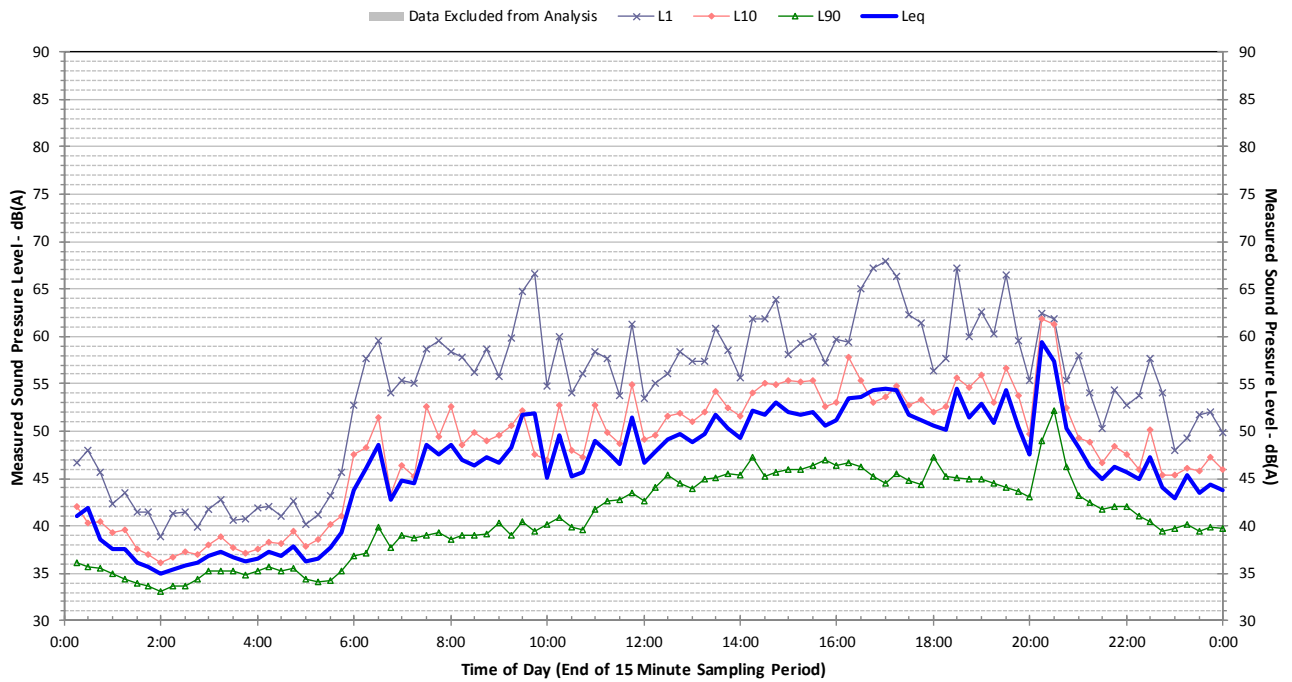
Profile of Noise Environment - Noise Monitoring Location 5 Friday 22 February 2019



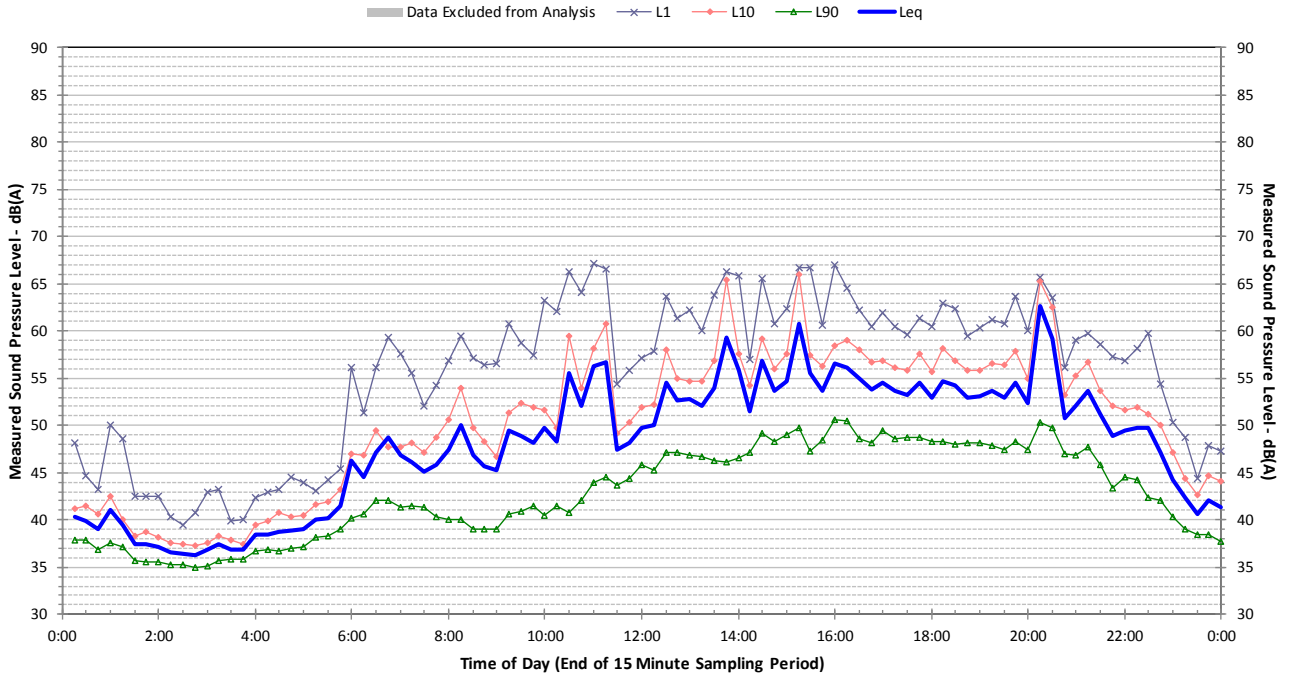
Profile of Noise Environment - Noise Monitoring Location 6 Friday 15 February 2019



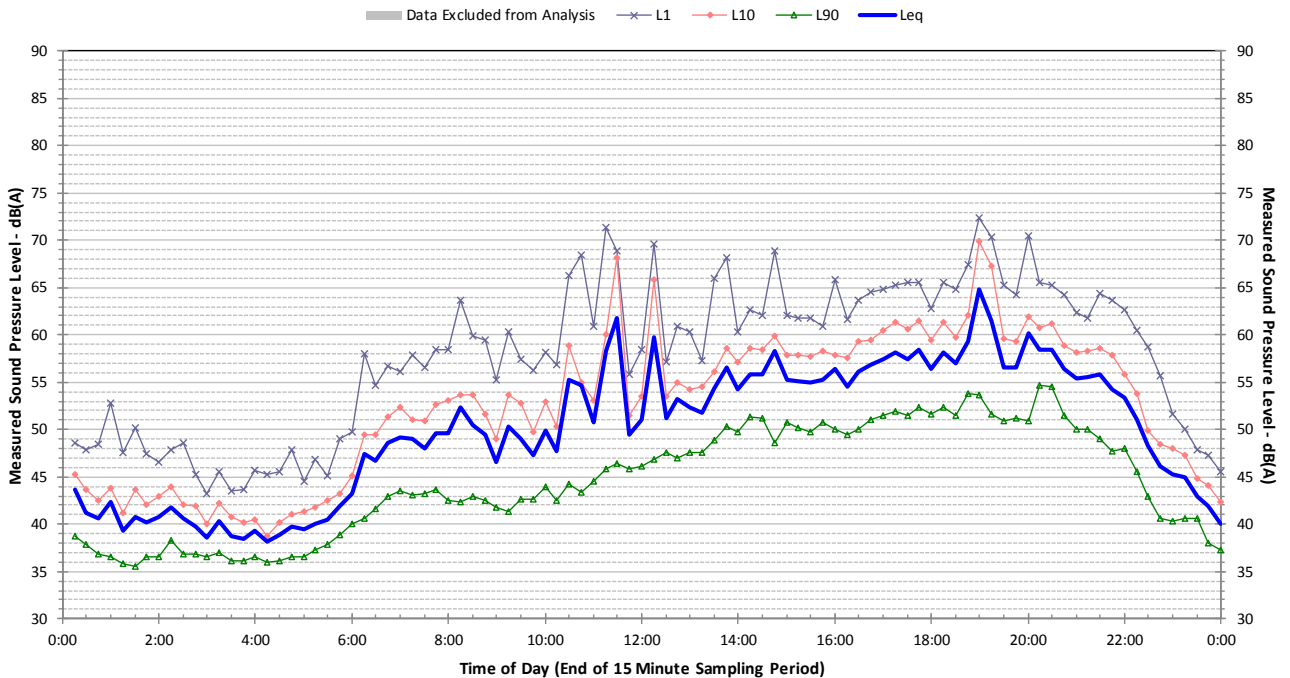
Profile of Noise Environment - Noise Monitoring Location 6 Saturday 16 February 2019



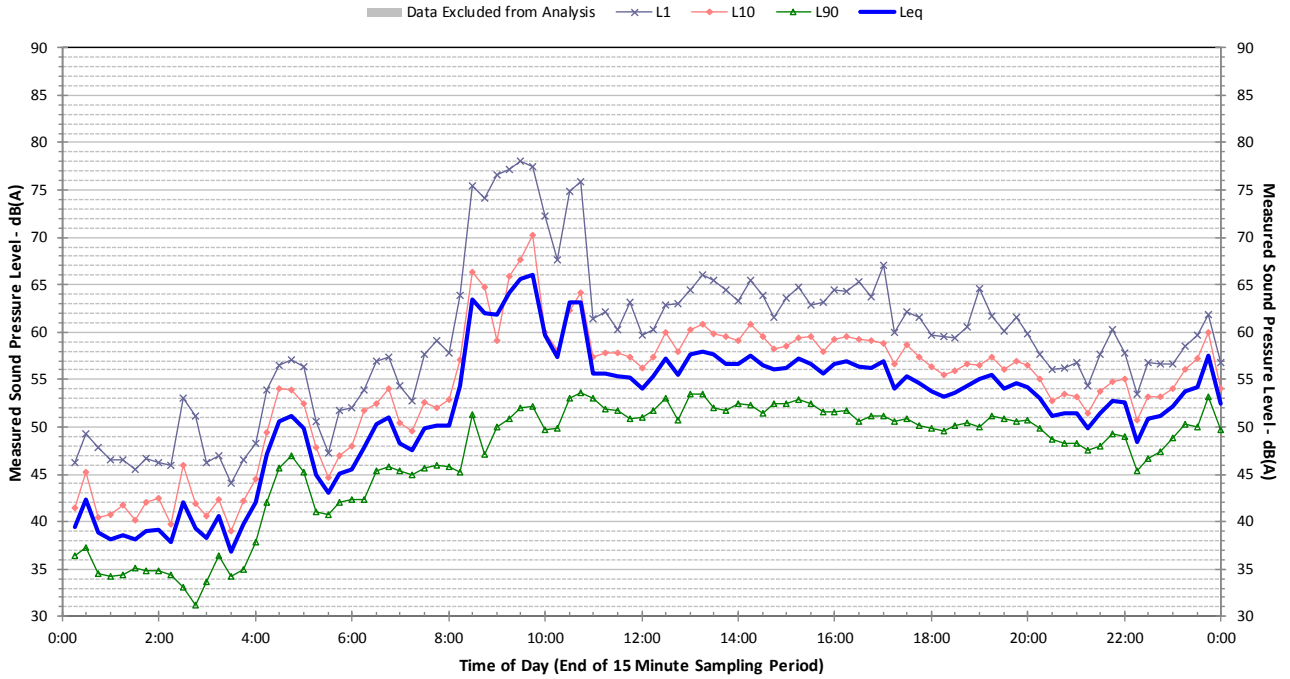
Profile of Noise Environment - Noise Monitoring Location 6 Sunday 17 February 2019



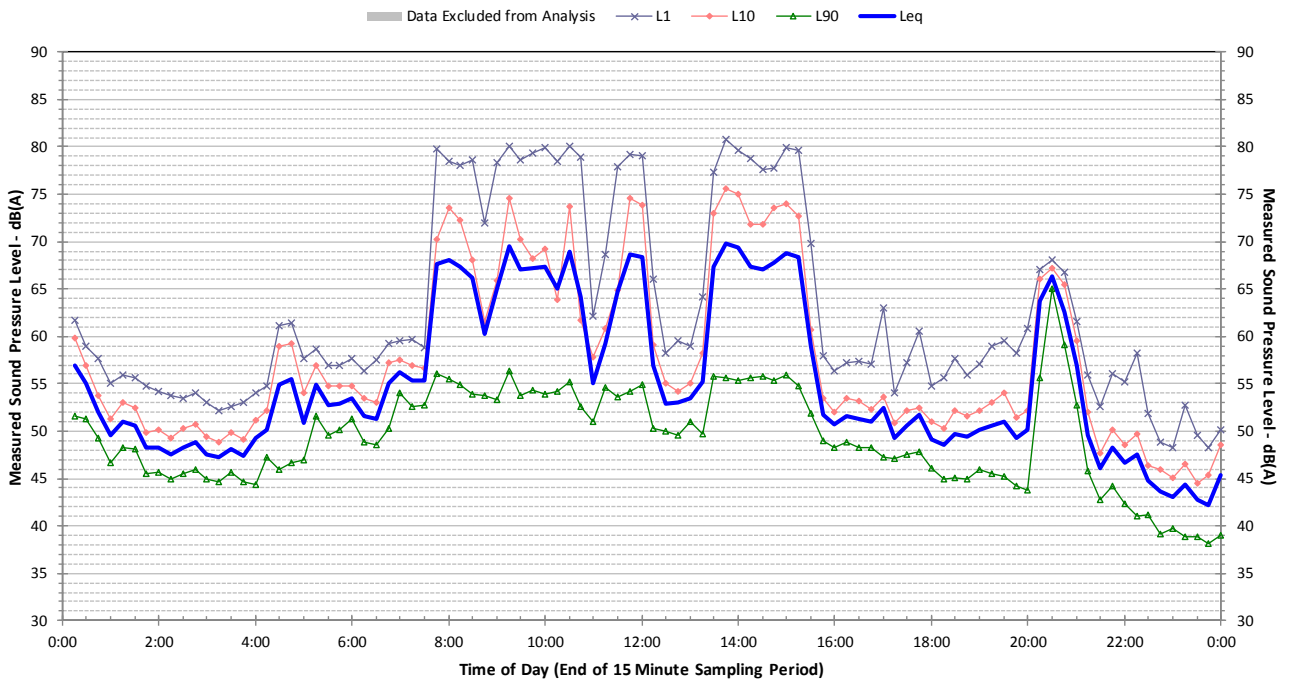
Profile of Noise Environment - Noise Monitoring Location 6 Monday 18 February 2019



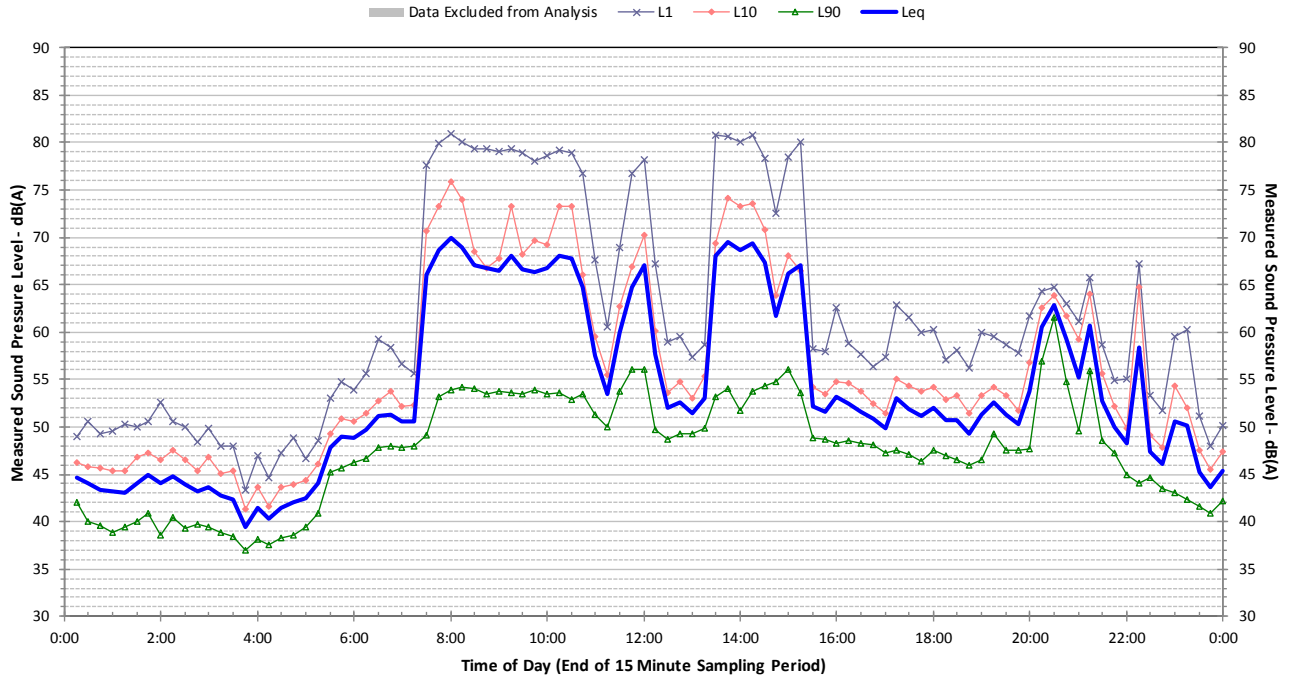
Profile of Noise Environment - Noise Monitoring Location 6 Tuesday 19 February 2019



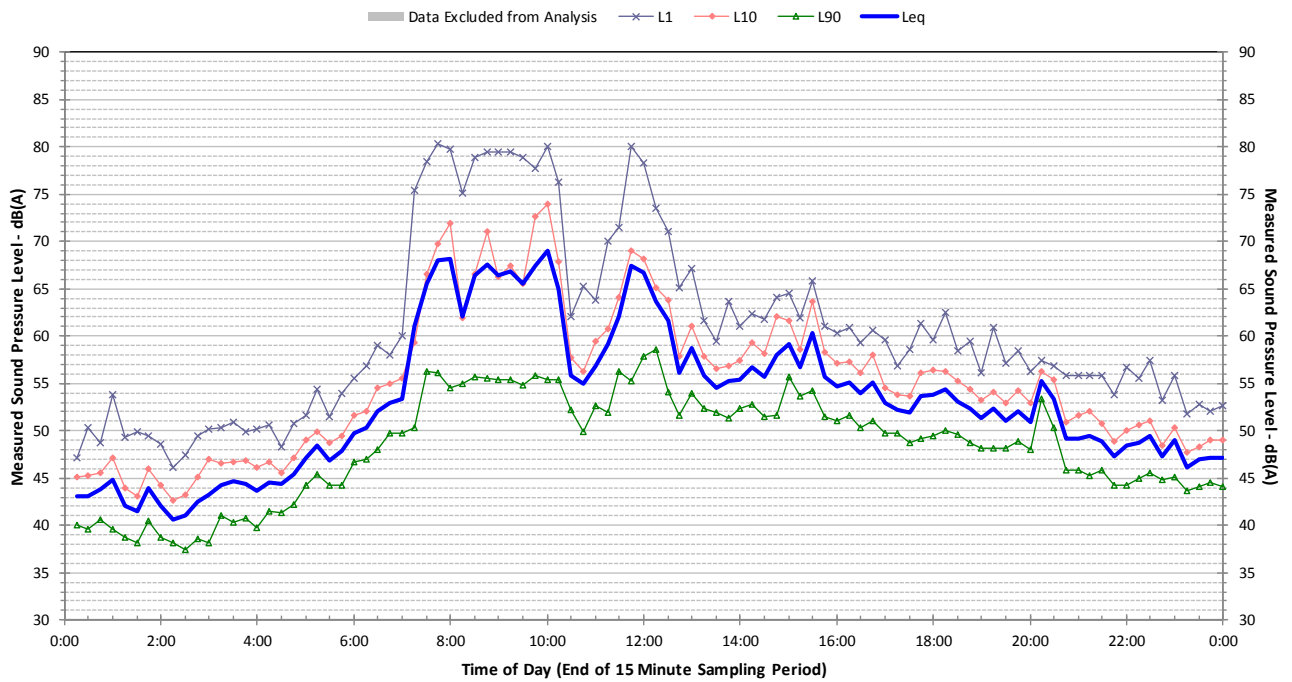
Profile of Noise Environment - Noise Monitoring Location 6 Wednesday 20 February 2019



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