

Gould Street PRS, Manchester

Noise Survey Report

National Grid

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Prepared on behalf of WYG Environment Planning Transport Limited.

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1.0 Introduction

This report presents the findings of a noise survey undertaken to present the noise emissions around the boundary of an existing Pressure Reduction System (PRS) at Gould Street, Manchester.

Noise measurements have been undertaken following the methodology set out in BS 7445:2003 '*Description and Measurement of Environmental Noise*'.

A list of acoustic terminology and abbreviations used in this report is provided in Appendix A, Time History Plots for corresponding MT monitoring locations are presented in Appendix B and Report Conditions are presented in Appendix C.

2.0 Noise Survey

2.1 Methodology

Noise measurements were taken in accordance with BS 7445:2003 '*Description and Measurement of Environmental Noise*'. Equipment used during the survey included:

Nor 140	Environmental Noise Analyser	s/n	1402987
Nor 1251	Sound Calibrator	s/n	25010
Rion NL-52	Environmental Noise Analyser	s/n	01276552
Rion NL-52	Environmental Noise Analyser	s/n	01176464
Rion NC-75	Sound Calibrator	s/n	35270131

The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice and no drift was observed. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates for which are available on request.

A noise monitoring survey was undertaken over two consecutive daytime periods between 15:00hrs and 19:00hrs on Wednesday 4th March 2020 and Thursday 5th March 2020.

Each day, the noise survey consisted of an attended noise survey at five attended locations where measurements were undertaken around the compound boundary over a period of around 4 hours to coincide with periods when demand on the PRS would be at its peak. In addition, simultaneous monitoring was undertaken at three medium-term (MT) locations around the compound boundary for an hour at each location.

Noise monitoring locations are presented in Figure 2.1 and summarised in Table 2.1 overleaf.

Figure 2.1 Noise Monitoring Location Plan

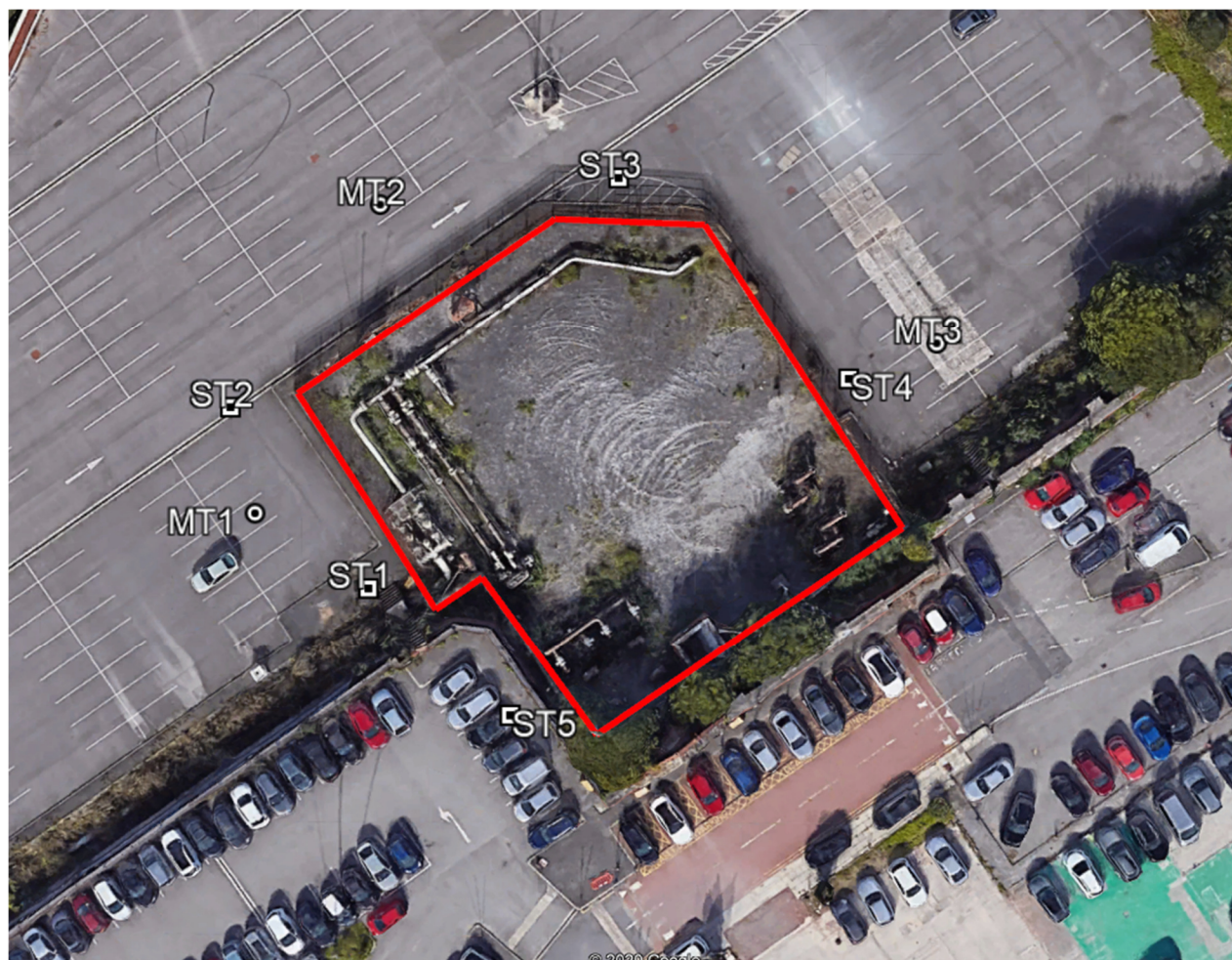


Table 2.1 Noise Monitoring Locations

Ref	Description
ST1	2.5m from west side of compound fence
ST2	3m from north-west corner of compound fence
ST3	2m from north-east corner of compound fence
ST4	2.4m from east side of compound fence
ST5	4m from south-west corner of compound fence
MT1	4.8m from west side of compound fence
MT2	8.5m from north side of compound fence
MT3	8m from east side of compound fence

2.2 Results

The dominant noise sources found in the area included noise emitted from the PRS unit and frequent intermittent rail noise from nearby railway line to the north of the site. The $L_{A90,T}$ metric is considered most

relevant to quantify noise levels from the PRS as this excludes most influence from extraneous noise sources such as noise from the nearby rail line usage.

Subjectively, noise levels from the PRS increased towards the end of the survey as evidenced in the short-term measurement data. This is also supported by measurements at location MT1, which is close to the main valves of the PRS. However, noise levels at MT2 and MT3, which are further away remained reasonably constant.

On-site observations concluded that noise emissions from the PRS presented no tonal characteristics. However, to ensure a robust assessment, further assessment to identify whether tonal characteristics are present was undertaken following the guidance within Annex C of BS 4142. Annex C details an objective method for assessing the audibility of tones in the one-third octave band centre frequencies based on $L_{Zeq,T}$ frequency data. The assessment concluded that no tonal characteristics were present in either the low (25Hz to 125Hz), mid (160Hz to 400Hz) or high (500Hz to 10 000Hz) frequencies.

In accordance with BS 7445, the meteorological conditions during the survey and a subjective description of noise climate during the surveys are presented in Table 2.2 below. No rain occurred immediately prior to or during the survey.

Time history plots for MT monitoring locations are presented in Appendix B.

Table 2.2 Meteorological Conditions during the Survey

Date & Time	Temperature °C	Wind Speed (ms ⁻¹)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
04/03/2020 15:31	8	0 - 1	N/A	4	Noise from PRS
04/03/2020 18:56	7	0 - 1	N/A	8	Noise from PRS
05/03/2020 15:16	8	0 - 1	N/A	4	Noise from PRS
05/03/2020 18:43	8	0 - 1	N/A	4	Noise from PRS

The results of the statistical measurements and frequency measurements conducted during the survey are summarised in Table 2.3, Table 2.4, Table 2.5 and Table 2.6. All values are sound pressure levels in dB (re: 2×10^{-5} Pa). Ambient and background noise levels are usually described using the L_{Aeq} index (a form of energy average) and the L_{A90} index (i.e. the level exceeded for 90% of the measurement period) respectively. Frequency data is available on request.

Table 2.3 Results of Noise Monitoring Survey (Average Levels) – Day One, Short Term

Location	Monitoring Date and Times	$L_{Aeq,5mins}$ (dB)	L_{Amax} (dB)	L_{Amin} (dB)	$L_{A10,5mins}$ (dB)	$L_{A90,5mins}$ (dB)
ST1	04/03/2020 15:33	69.1	70.9	67.1	70.3	67.6

Location	Monitoring Date and Times	L _{Aeq,5mins} (dB)	L _{Amax} (dB)	L _{Amin} (dB)	L _{A10,5mins} (dB)	L _{A90,5mins} (dB)
	04/03/2020 16:57	75.7	78.7	72.0	77.5	73.4
	04/03/2020 17:43	75.1	78.0	72.2	76.6	73.0
ST2	04/03/2020 15:39	62.5	68.3	60.5	63.8	61.3
	04/03/2020 17:03	67.5	72.4	65.7	68.0	66.8
	04/03/2020 17:49	66.9	68.2	64.9	67.4	66.2
ST3	04/03/2020 15:33	58.2	66.6	55.2	58.2	57.0
	04/03/2020 16:57	63.6	66.8	61.2	63.8	64.0
	04/03/2020 17:43	63.7	67.5	61.0	63.9	63.0
ST4	04/03/2020 15:40	57.1	66.4	53.8	56.9	55.0
	04/03/2020 17:03	60.0	67.7	57.5	60.0	59.0
	04/03/2020 17:48	59.1	62.8	56.9	59.4	59.0
ST5	04/03/2020 18:56	58.9	64.4	56.6	60.1	57.6

All values are sound pressure levels in dB re: 2x 10⁻⁵ Pa

Table 2.4 Results of Noise Monitoring Survey (Average Levels) – Day One, Medium Term

Location	Monitoring Date and Times	L _{Aeq,T} (dB)	L _{Amax,T} (dB)	L _{Amin,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
MT1	04/03/2020 15:31	67.8	72.8	61.5	67.9	69.0
MT2	04/03/2020 16:35	62.4	70.9	59.9	63.3	62.0
MT3	04/03/2020 17:40	59.7	67.8	56.7	60.7	59.0

All values are sound pressure levels in dB re: 2x 10⁻⁵ Pa

Table 2.5 Results of Noise Monitoring Survey (Average Levels) – Day Two, Short Term

Location	Monitoring Date and Times	L _{Aeq,5mins} (dB)	L _{Amax} (dB)	L _{Amin} (dB)	L _{A10,5mins} (dB)	L _{A90,5mins} (dB)
ST1	05/03/2020 15:26	70.1	71.0	69.3	70.4	69.8
	05/03/2020 16:22	74.8	77.1	72.0	76.5	72.7
	05/03/2020 17:29	73.8	76.1	71.3	75.1	72.2
ST2	05/03/2020 15:33	63.5	73.8	60.7	64.5	61.3
	05/03/2020 16:29	67.0	68.8	65.0	67.8	65.9
	05/03/2020 17:35	67.2	72.5	65.7	67.7	66.5
ST3	05/03/2020 15:22	59.4	66.3	56.7	59.7	58.0
	05/03/2020 16:25	62.5	66.9	60.1	62.7	62.0
	05/03/2020 17:29	64.3	67.3	62.3	64.6	64.0
ST4	05/03/2020 15:36	61	71.7	54.3	59.7	57.0

Location	Monitoring Date and Times	L _{Aeq,5mins} (dB)	L _{Amax} (dB)	L _{Amin} (dB)	L _{A10,5mins} (dB)	L _{A90,5mins} (dB)
	05/03/2020 16:31	63.1	73.6	58.9	63.1	62.0
	05/03/2020 17:36	60.9	71.8	57.9	60.6	59.0
ST5	05/03/2020 18:43	59.2	67.6	56.6	61.2	57.4

All values are sound pressure levels in dB re: 2×10^{-5} Pa

Table 2.6 Results of Noise Monitoring Survey (Average Levels) – Day Two, Medium Term

Location	Monitoring Date and Times	L _{Aeq,T} (dB)	L _{Amax,T} (dB)	L _{Amin,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
MT1	05/03/2020 15:16	66.3	72.6	62.9	66.9	64.0
MT2	05/03/2020 16:20	62.5	72.4	59.7	63.6	61.0
MT3	05/03/2020 17:28	59.4	72.4	56.4	60.6	58.0

All values are sound pressure levels in dB re: 2×10^{-5} Pa

3.0 Conclusion

A noise survey has been undertaken to establish noise levels around the boundary of the existing National Grid Pressure Reduction System (PRS) compound at Gould Street Manchester. The survey was undertaken to coincide with periods when the PRS was anticipated to operate at full capacity.

In summary, current operating noise levels around the boundary of the PRS are presented in the report and were measured to range from 55 – 73 dB $L_{A90,T}$.

It is understood that the PRS is to be relocated and housed within an acoustic enclosure. On this basis noise levels around the boundary of the new PRS will be lower than existing operating noise levels.

Appendices

Appendix A – Acoustic Terminology and Abbreviations

An explanation of the specific acoustic terminology referred to within this report is provided below.

dB Sound levels from any source can be measured in frequency bands in order to provide detailed information about the spectral content of the noise, i.e. whether it is high-pitched, low-pitched, or with no distinct tonal character. These measurements are usually undertaken in octave or third octave frequency bands. If these values are summed logarithmically, a single dB figure is obtained. This is usually not very helpful as it simply describes the total amount of acoustic energy measured and does not take any account of the ear's ability to hear certain frequencies more readily than others.

dBA Instead, the dBA figure is used, as this is found to relate better to the loudness of the sound heard. The dBA figure is obtained by subtracting an appropriate correction, which represents the variation in the ear's ability to hear different frequencies, from the individual octave or third octave band values, before summing them logarithmically. As a result the single dBA value provides a good representation of how loud a sound is.

L_{Aeq} Since almost all sounds vary or fluctuate with time it is helpful, instead of having an instantaneous value to describe the noise event, to have an average of the total acoustic energy experienced over its duration. The $L_{Aeq, 07:00 - 23:00}$ for example, describes the equivalent continuous noise level over the 12 hour period between 7 am and 11 pm. During this time period the L_{pA} at any particular time is likely to have been either greater or lower than the $L_{Aeq, 07:00 - 23:00}$.

L_{Amin} The L_{Amin} is the quietest instantaneous noise level. This is usually the quietest 125 milliseconds measured during any given period of time.

L_{Amax} The L_{Amax} is the loudest instantaneous noise level. This is usually the loudest 125 milliseconds measured during any given period of time.

L_n Another method of describing, with a single value, a noise level which varies over a given time period is, instead of considering the average amount of acoustic energy, to consider the length of time for which a particular noise level is exceeded. If a level of x dBA is exceeded for say. 6 minutes within one hour, then that level can be described as being exceeded for 10% of the total measurement period. This is denoted as the $L_{A10, 1 \text{ hr}} = x \text{ dB}$.

The L_{A10} index is often used in the description of road traffic noise, whilst the L_{A90} , the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise. L_{A1} and L_{Amax} are common descriptors of construction noise.

R_w The *weighted sound reduction index* determined using the above *measurement* procedure, but weighted in accordance with the procedures set down in BS EN ISO 717-1. Partitioning and building board manufacturers commonly use this index to describe the inherent sound insulation performance of their products.

An explanation of abbreviations used within this report is provided below.

UKAS – United Kingdom Accreditation Service

WYGE – WYG Environment

Appendix B - MT Data (Time History Plots)

Figure B 1 Time History Plot, Location MT1 – Day One

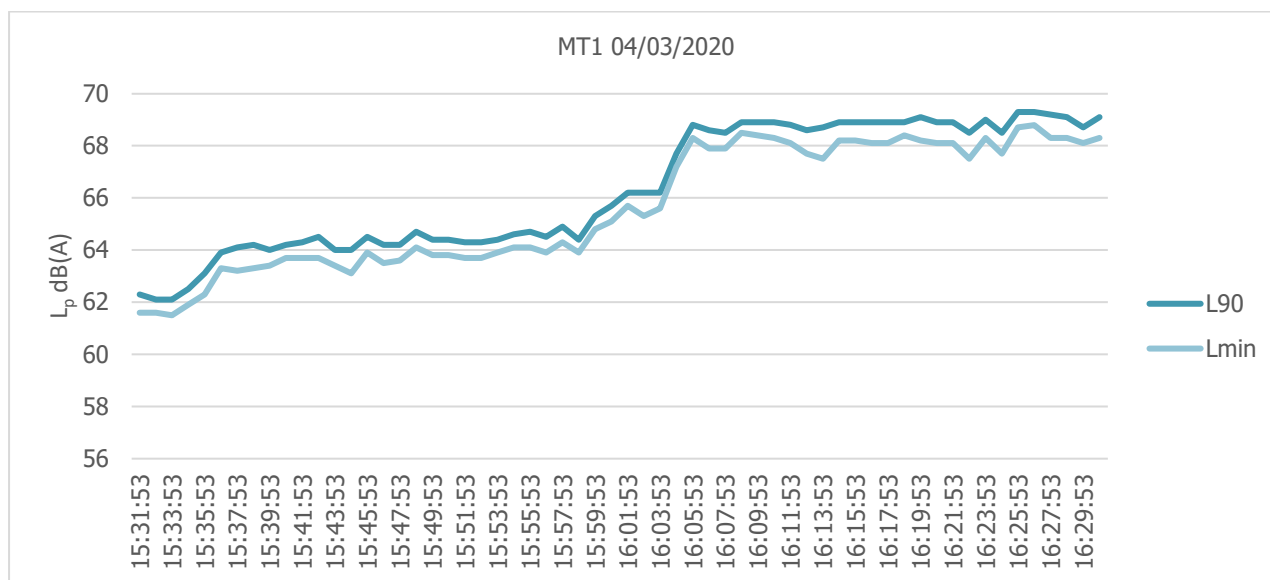


Figure B 2 Time History Plot, Location MT2 – Day One

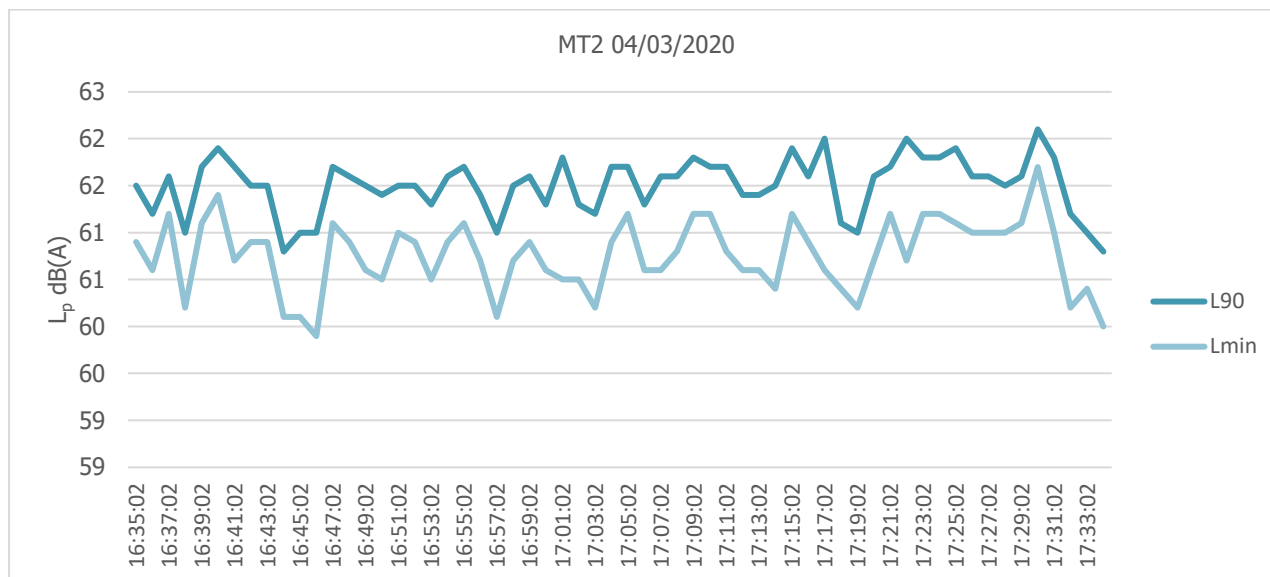


Figure B 3 Time History Plot, Location MT3 – Day One

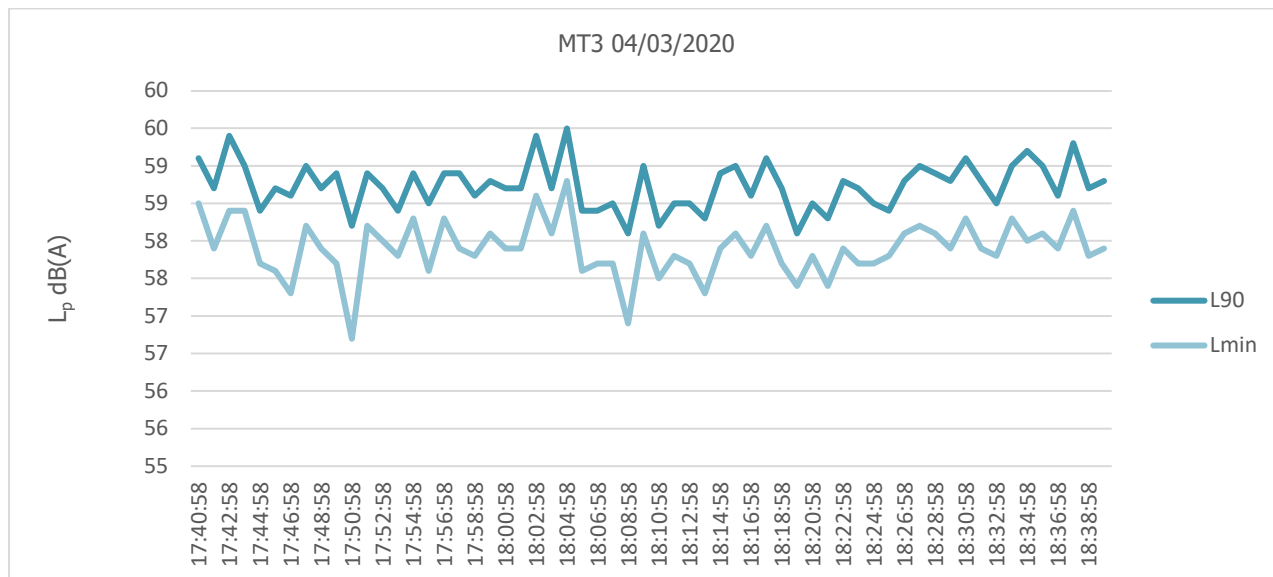


Figure B 4 Time History Plot, Location MT1 – Day Two

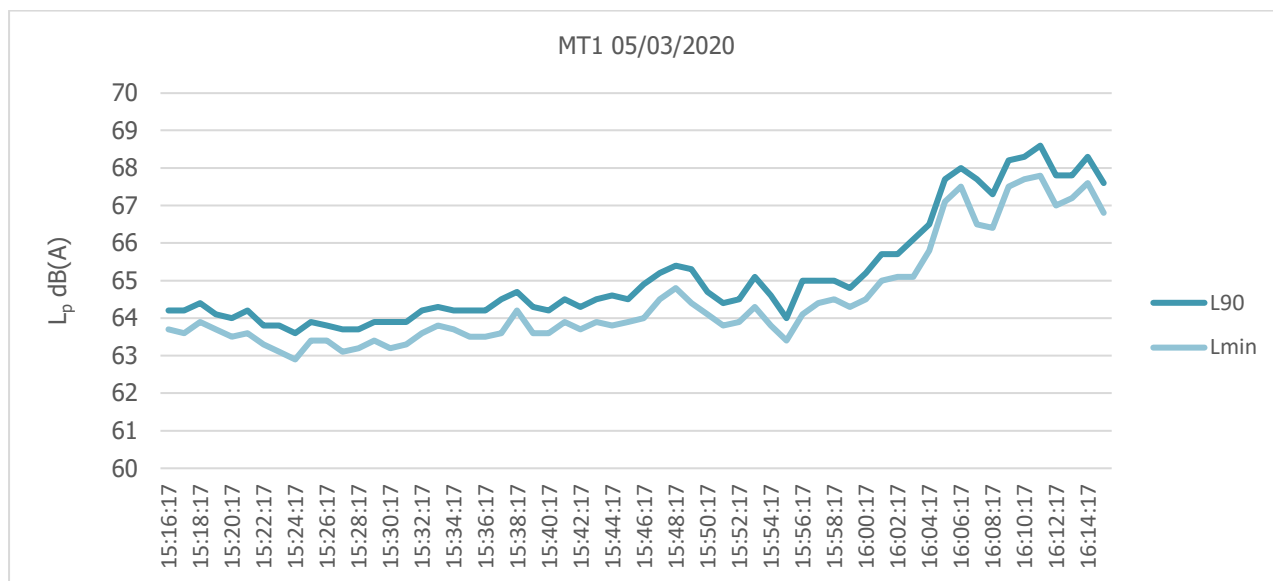


Figure B 5 Time History Plot, Location MT2 – Day Two

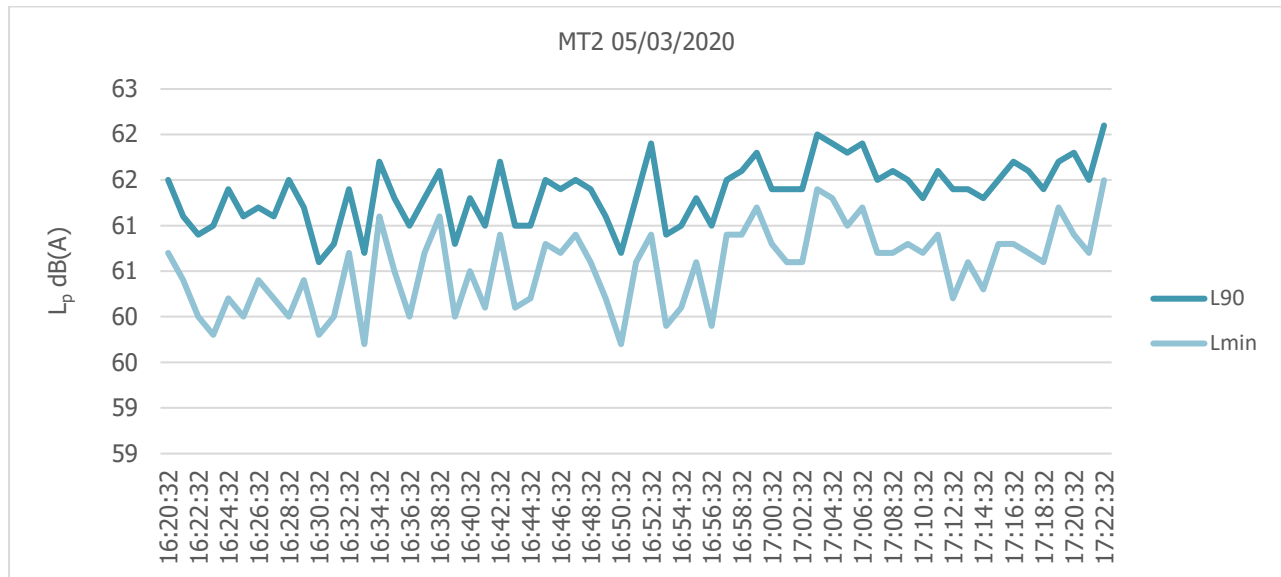
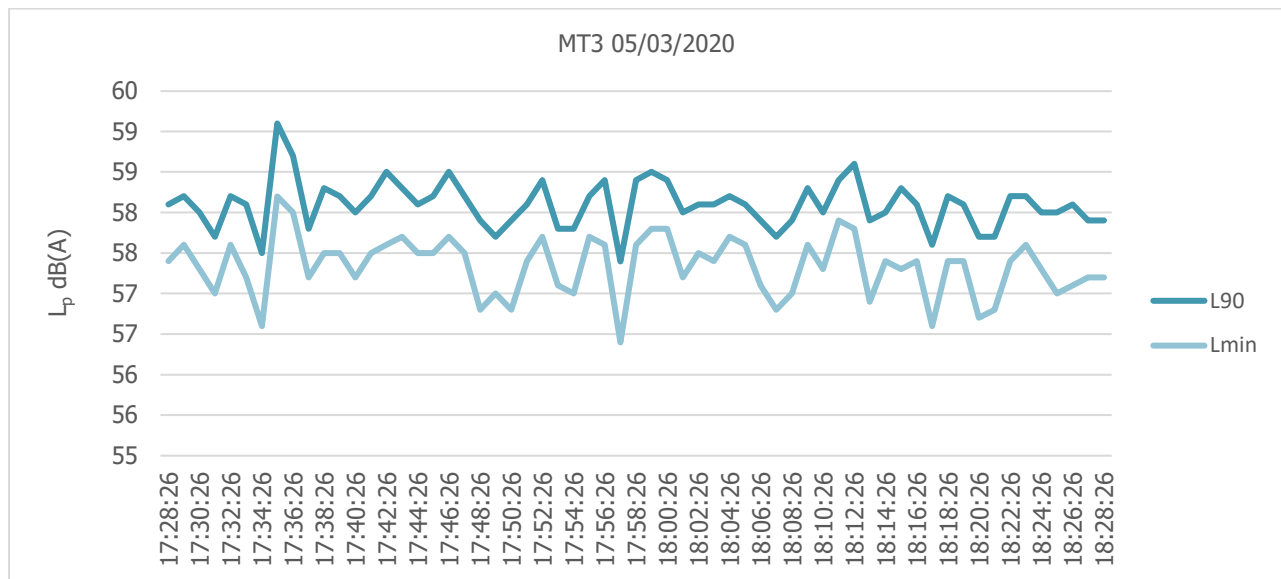


Figure B 6 Time History Plot, Location MT3 – Day Two



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