

Noise and Vibration Survey

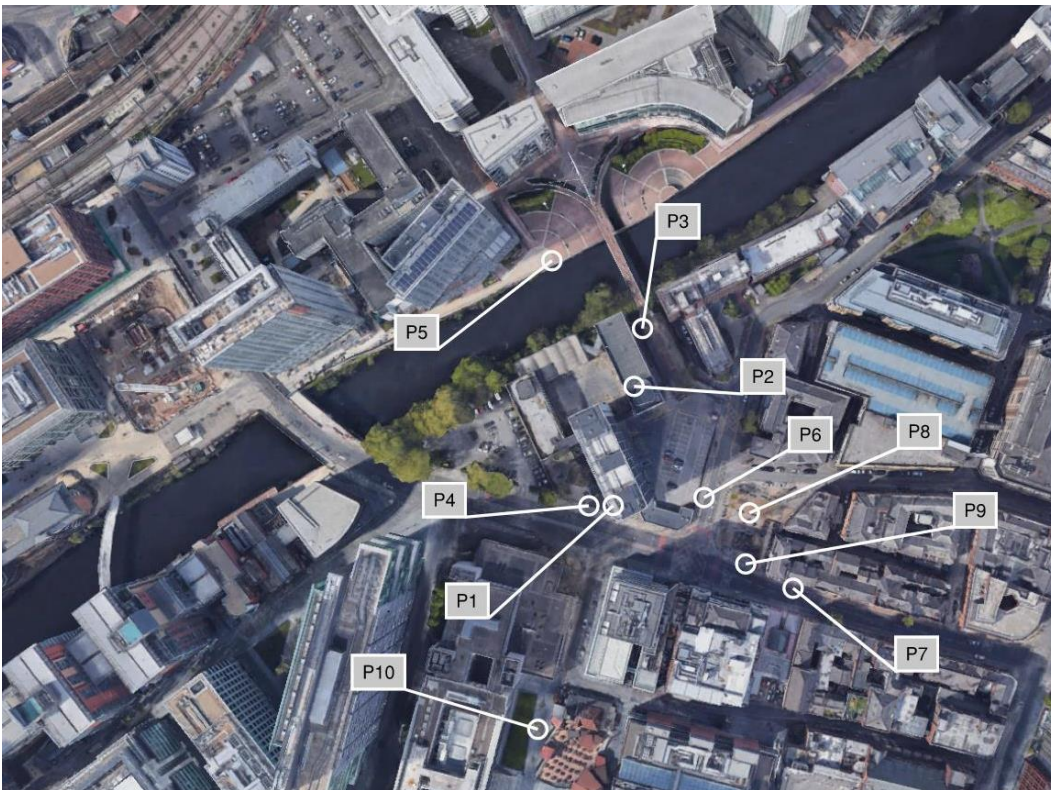
1. Introduction

This document provides the supporting information for the noise and vibration measurements undertaken on and around the Site of the Proposed Scheme.

2. Measurement locations

Noise measurements on Site were acquired by use of automatic unattended logging sound level meters and hand-held sound level meters during attended measurements. Ten measurement positions were used as shown in Figure 1.

Figure 1: Plan showing noise measurement positions



The unattended measurement positions P1 and P2 were selected to be secure locations for leaving the equipment for the duration of the survey period.

The daytime (07:00 to 23:00 hours) attended measurement positions P3 to P6 inclusive were selected to widen the measurement area and to permit observation of differences by comparison to the unattended positions P1 and P2.

The night (23:00 to 07:00 hours) attended measurements positions P7 to P10 inclusive were selected to quantify the influence of late night amplified music and entertainment noise.

All noise measurements were taken at a height of approximately 1.2 metres (m) above local ground level under 'free-field' conditions, except positions P1 and P2 which were 1.2m above the roof deck height and position P7 which was a 'façade' measurement. The acoustic measurement parameters obtained were $L_{Aeq,T}$ dB (ambient noise), $L_{Amax,T}$ dB (maximum event) and $L_{A90,T}$ dB (background).

Table 1 provides a summary description of the measurement periods at each position.

Table 1: Noise measurement positions

Position Reference	Approximate Measurement Height m	Measurement Conditions	Start Date and Time	End Date and Time
P1	65.2	Unattended 'Free-field'	10:45 hours Wednesday 2 nd March 2022	11:45 hours Wednesday 9 th March 2022
P2	23.2	Unattended 'Free-field'	10:15 hours Wednesday 2 nd March 2022	11:45 hours Wednesday 9 th March 2022
P3	1.2	Attended 'Free-field'	10:37 hours to 11:17 hours on Wednesday 2 nd March 2022*	09:31 hours to 09:46 hours on Wednesday 9 th March 2022*
P4	1.2	Attended 'Free-field'	11:19 hours to 11:49 hours on Wednesday 2 nd March 2022*	10:33 hours to 10:48 hours on Wednesday 9 th March 2022*
P5	1.2	Attended 'Free-field'	09:48 hours Wednesday 9 th March 2022	10:19 hours Wednesday 9 th March 2022
P6	1.2	Attended 'Free-field'	10:50 hours Wednesday 9 th March 2022	11:30 hours Wednesday 9 th March 2022
P7	1.2	Attended 'Façade'	23:06 hours Friday 26 th August 2022	23:14 hours Friday 26 th August 2022
P8	1.2	Attended 'Free-field'	23:08 hours Friday 26 th August 2022	23:09 hours Friday 26 th August 2022
P9	1.2	Attended 'Free-field'	23:09 hours Friday 26 th August 2022	23:11 hours Friday 26 th August 2022
P10	1.2	Attended 'Free-field'	23:16 hours Friday 26 th August 2022	23:20 hours Friday 26 th August 2022
Note * indicates a start time and end time on the same day, for measurements undertaken on two separate visits.				

Record images of noise measurement positions P1 to P6 used are provided in Figure 2 below.

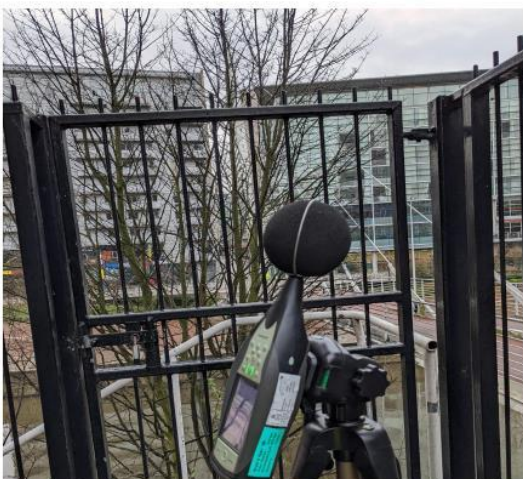
Figure 2: Photos of measurement positions



P1 Unattended Measurement Location



P2 Unattended Measurement Location



P3 Attended Measurement Location



P4 Attended Measurement Location



P5 Attended Measurement Location



P6 Attended Measurement Location

3. Measurement equipment

Three sets of sound measurement equipment were used on Site for which the details are provided below.

Measurement position P1:

- Rion - Sound Level Meter: NL-52 SN: 01143558
- Rion - Pre-amplifier: NH-25 SN: 43575
- Rion - Microphone: UC-59 SN: 07367
- External calibration date 10/01/2022
- External calibration certificate reference UCRT22/1036

Measurement position P2:

- Rion - Sound Level Meter: NL-52 SN: 00510142
- Rion - Pre-amplifier: NH-25 SN: 31928
- Rion - Microphone: UC-59 SN: 02847
- External calibration date 15/02/2022
- External calibration certificate reference UCRT22/1234

Measurement positions P3 to P6 P10:

- Brüel and Kjær - Sound Level Meter: 2250 SN: 3003815
- Brüel and Kjær - Pre-amplifier: ZC-0032 SN: 19781
- Brüel and Kjær - Microphone: 4189 SN: 2887159
- External calibration date 16/11/2021
- External calibration certificate reference UCRT21/2413

Local calibration was undertaken before and after each set of measurements. No significant drift in calibration level was observed. The hand-held calibrator details are as below.

Measurement positions P1 and P2:

- Rion - Calibrator: NC-74 SN: 34536109

Measurement position P3 to P6 P10:

- Brüel & Kjær - Calibrator: 4231 SN: 2545611
- External calibration date 11/08/2022
- External calibration certificate reference UCRT22/1995

4. Weather conditions

Table 2 provides the basic weather conditions encountered during the survey period. The historic recorded data has been taken from observations made at Manchester Airport weather station.

Table 2: Weather conditions

Date	Wind Direction	Mean Wind Speed m/s	Mean Daytime Temperature Degrees Celsius	Precipitation mm
Wednesday 2nd March 2022	East	3.0	6.8	0
Thursday 3rd March 2022	North	1.0	7.1	0
Friday 4th March 2022	Northwest	4.5	5.9	0
Saturday 5th March 2022	North	5.4	5.0	0
Sunday 6th March 2022	North	3.6	4.5	0
Monday 7th March 2022	East	2.7	3.6	0
Tuesday 8th March 2022	East turning South	3.6	6.4	0

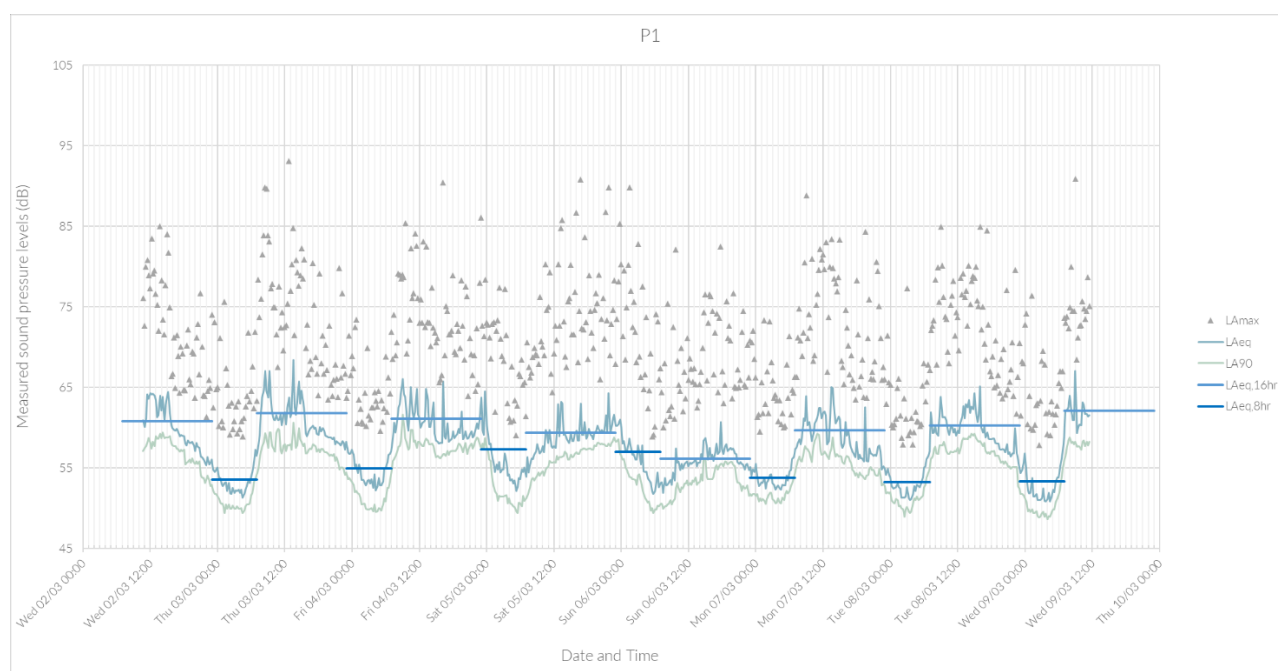
Date	Wind Direction	Mean Wind Speed m/s	Mean Daytime Temperature Degrees Celsius	Precipitation mm
Wednesday 9th March 2022	South	4.0	9.5	0
Friday 26 th August 2022	North east	6.4	16.3	0

5. Summary of measured noise levels

5.1 Position P1

Figure 3 provides a noise level time history at position P1 for three measured parameters, the ambient noise $L_{Aeq,15 \text{ min}}$ dB, the maximum noise events $L_{AFmax,15 \text{ min}}$ dB and the $L_{A90,15 \text{ min}}$ dB used to describe the underlying background noise.

Figure 3: Noise level time history at position P1



The ambient noise levels have been logarithmically averaged to determine hourly values $L_{Aeq,1 \text{ hr}}$ dB. These are presented in Table 3. In addition, the daytime (07:00 hours to 23:00 hours) $L_{Aeq,16 \text{ hr}}$ dB and night (23:00 hours to 07:00 hours) $L_{Aeq,8 \text{ hr}}$ dB are also provided (see Table 3 and Figure 3). For the overall measurement period, the highest complete daytime level was 62 dB $L_{Aeq,16 \text{ hr}}$ and at night 57 dB $L_{Aeq,8 \text{ hr}}$ (rounded to the nearest dB).

Table 3: Ambient noise levels at position P1

Start of Hourly Time Period	Wed. 02/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Thurs. 03/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Fri. 04/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Sat. 05/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Sun. 06/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Mon. 07/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Tues. 08/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Wed. 09/03/22 $L_{Aeq,1 \text{ hr}}$ dB
00:00	-	53.9	56.2	58.9	58.5	53.9	52.9	54.2
01:00	-	52.8	54.6	55.5	57.7	53.2	52.7	52.2

Start of Hourly Time Period	Wed. 02/03/22 LAeq,1 hr dB	Thurs. 03/03/22 LAeq,1 hr dB	Fri. 04/03/22 LAeq,1 hr dB	Sat. 05/03/22 LAeq,1 hr dB	Sun. 06/03/22 LAeq,1 hr dB	Mon. 07/03/22 LAeq,1 hr dB	Tues. 08/03/22 LAeq,1 hr dB	Wed. 09/03/22 LAeq,1 hr dB
02:00	-	52.3	53.2	55.0	56.3	53.8	51.3	51.2
03:00	-	52.1	53.2	55.5	57.1	52.7	51.6	51.4
04:00	-	51.8	53.3	53.6	54.3	52.6	52.4	51.3
05:00	-	52.9	53.5	53.0	52.7	53.3	53.1	52.9
06:00	-	55.5	56.0	54.5	53.2	55.5	55.7	55.7
07:00	-	59.3	59.1	55.1	53.0	57.9	59.8	61.6
08:00	-	65.2	62.8	56.5	53.1	59.9	60.2	62.2
09:00	-	64.6	64.1	57.3	54.9	61.5	62.1	63.0
10:00	60.9*	61.1	62.5	58.5	55.4	59.8	59.9	62.1
11:00	62.5	61.2	62.7	58.3	55.5	61.8	59.6	61.5*
12:00	64.2	62.3	60.7	60.0	55.5	61.1	60.3	-
13:00	62.7	64.6	62.7	61.5	55.7	63.1	62.4	-
14:00	62.5	63.6	61.3	58.6	56.8	61.2	62.6	-
15:00	62.9	62.6	58.2	58.8	57.6	58.9	62.4	-
16:00	59.8	59.6	61.7	60.3	56.4	59.4	61.9	-
17:00	59.1	59.8	59.0	59.5	58.4	56.9	58.8	-
18:00	58.3	59.7	59.1	59.2	57.4	56.9	58.5	-
19:00	58.1	59.1	60.1	59.4	57.3	58.7	57.6	-
20:00	57.6	58.7	58.9	59.6	56.7	56.7	57.3	-
21:00	56.1	58.1	59.1	61.7	55.5	56.8	56.7	-
22:00	55.7	57.9	60.2	60.5	55.1	56.4	57.7	-
23:00	55.0	57.2	62.4	60.5	54.6	54.5	55.0	-
LAeq,16 hr dB	60.8 [#]	61.7	61.1	59.3	56.1	59.7	60.3	62.1 [#]
LAeq,8 hr dB	53.5	54.9	57.2	57	53.8	53.2	53.3	-
Note * indicates an incomplete hour measurement								
Note [#] indicates a partial period result								

Figures 4 and 5 below provide histogram representations of the measured LA_{Fmax,15 min} dB maximum event noise levels for the daytime (07:00 to 23:00 hours) and night (23:00 to 07:00 hours) periods respectively. The 90th percentile levels from the overall measurement period were 80 dB LA_{Fmax,15 min} during the daytime and 73 dB LA_{Fmax,15 min} at night (rounded to the nearest dB).

Figure 4: Daytime maximum noise event levels at position P1

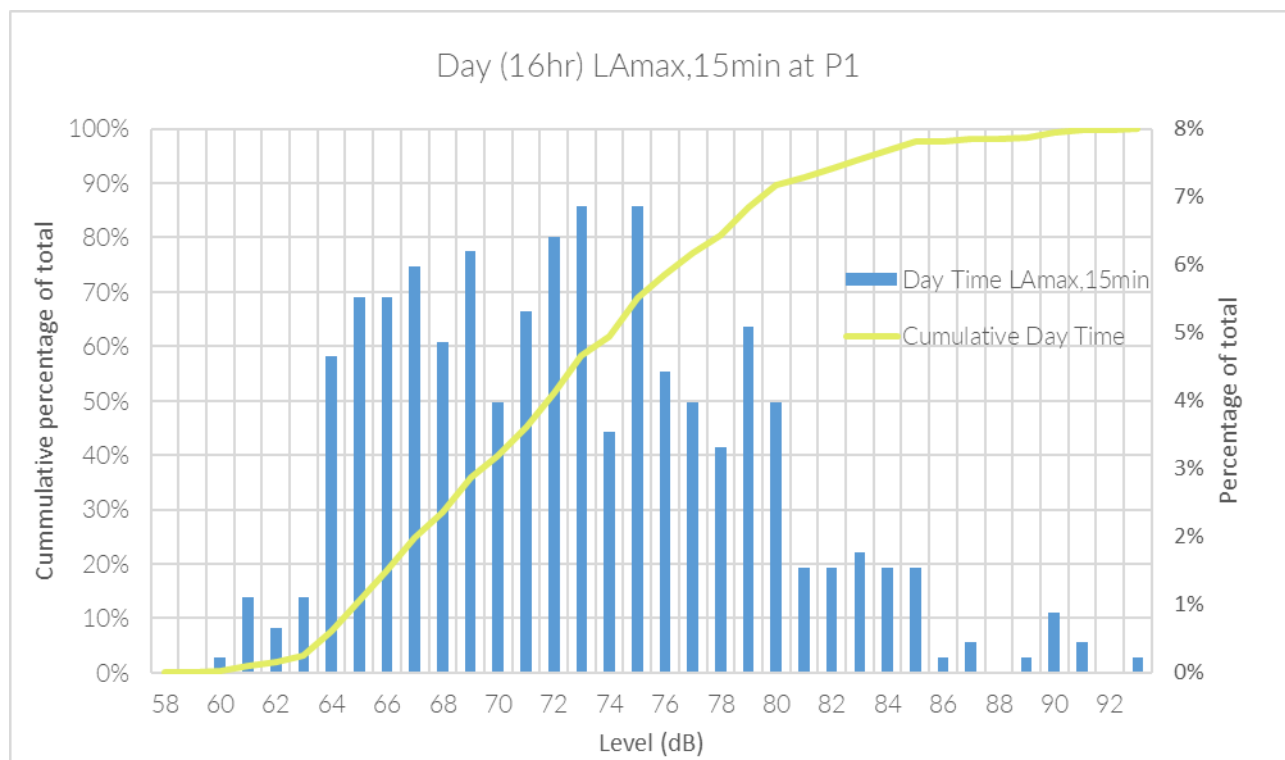
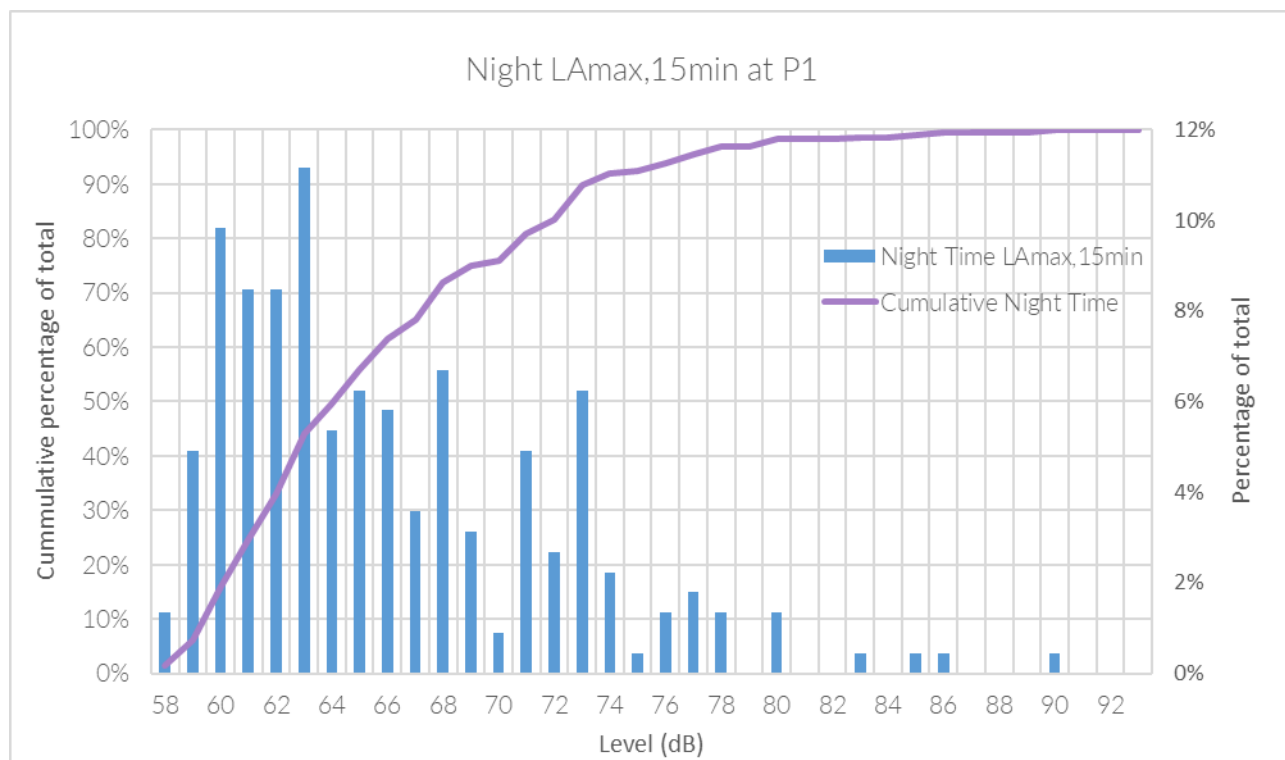


Figure 5: Night maximum noise event levels at position P1



Background noise measurements are presented following the statistical analysis approach of 'BS 4142 Methods for rating and assessing industrial and commercial sound:2014' (BS4142). The full measurement period has been

processed as daytime (07:00 to 23:00 hours) and night (23:00 to 07:00 hours) histograms shown in Figure 6 and Figure 7 respectively. The lowest consistent daytime level, approximately the 10th percentile value is 53 dB LA90,15 min and at night is 49 dB LA90,15 min.

Figure 6: Daytime background noise levels at position P1

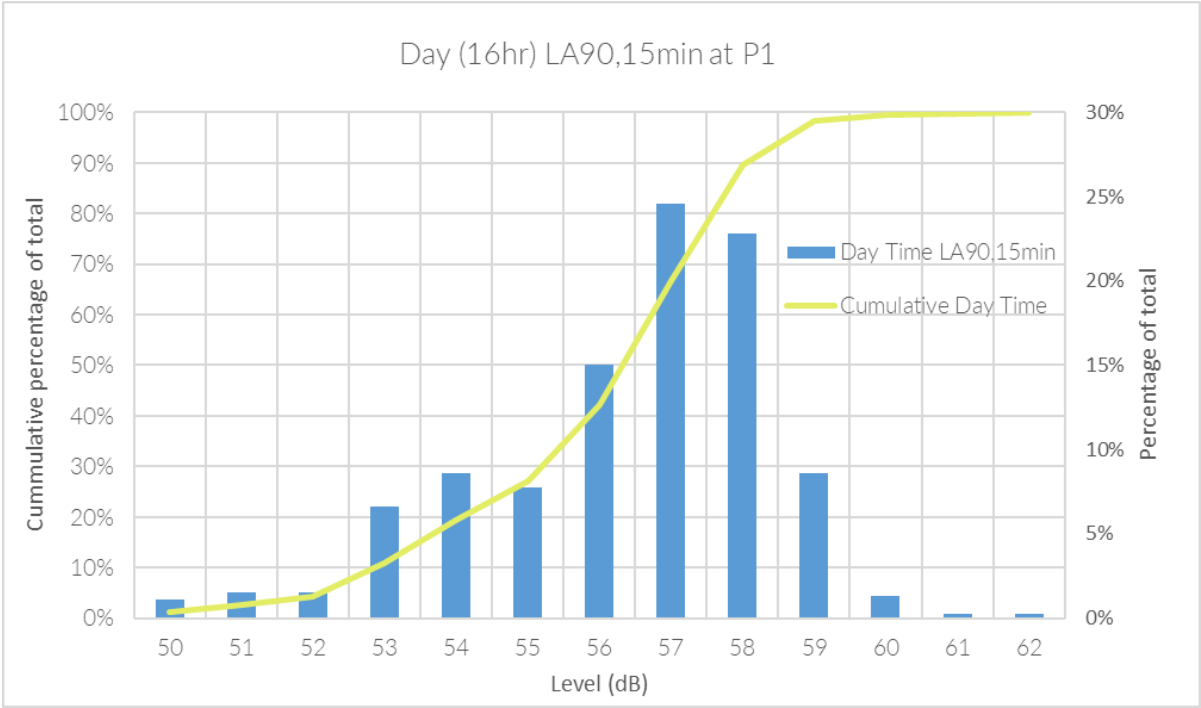
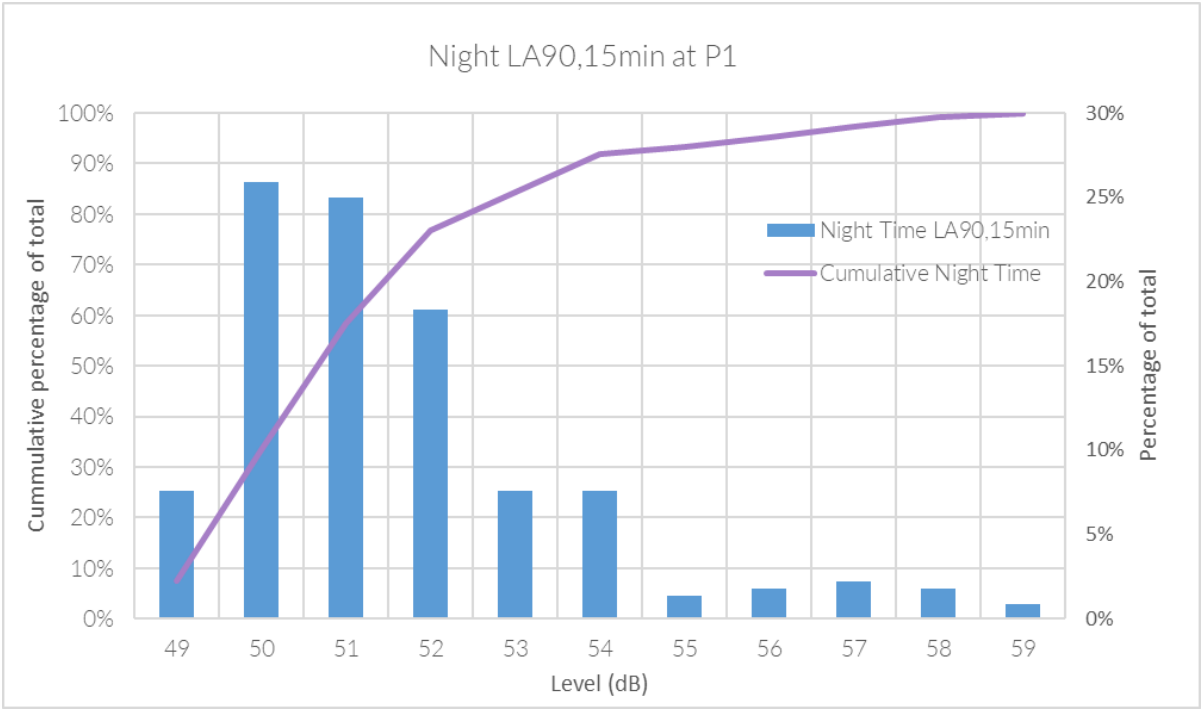


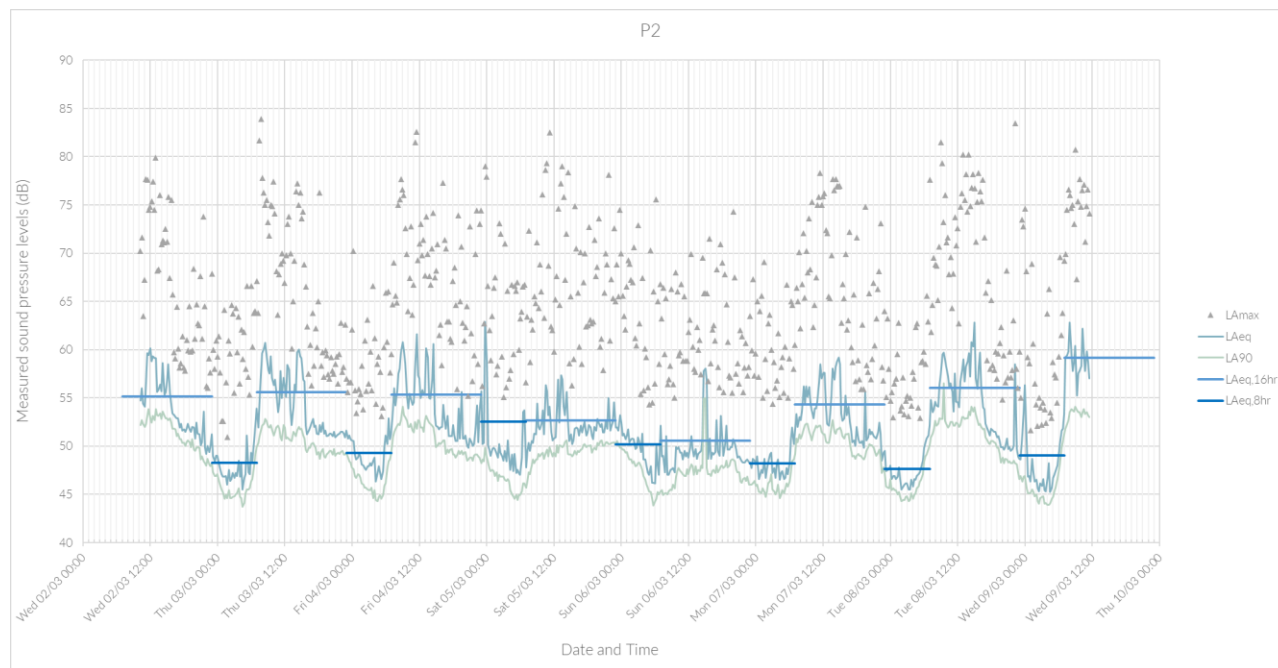
Figure 7: Night background noise levels at position P1



5.2 Position P2

Figure 6 provides a noise level time history at position P2 for three measured parameters, the ambient noise $L_{Aeq,15 \text{ min}}$ dB, the maximum noise events $L_{AFmax,15 \text{ min}}$ dB and the $L_{A90,15 \text{ min}}$ dB used to describe the underlying background noise.

Figure 8: Noise level time history at position P2



The ambient noise levels have been logarithmically averaged to determine hourly values $L_{Aeq,1 \text{ hr}}$ dB. These are presented in Table 4. In addition, the daytime (07:00 hours to 23:00 hours) $L_{Aeq,16 \text{ hr}}$ dB and night (23:00 hours to 07:00 hours) $L_{Aeq,8 \text{ hr}}$ dB are also provided (see Table 3 and Figure 3). For the overall measurement period, the highest complete daytime level was 56 dB $L_{Aeq,16 \text{ hr}}$ and at night 53 dB $L_{Aeq,8 \text{ hr}}$ (rounded to the nearest dB).

Table 5: Ambient noise levels at position P2

Start of Hourly Time Period	Wed. 02/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Thurs. 03/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Fri. 04/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Sat. 05/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Sun. 06/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Mon. 07/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Tues. 08/03/22 $L_{Aeq,1 \text{ hr}}$ dB	Wed. 09/03/22 $L_{Aeq,1 \text{ hr}}$ dB
00:00	-	48.0	49.8	54.1	51.4	47.8	47.1	52.0
01:00	-	46.6	48.8	49.6	51.0	47.6	47.0	47.2
02:00	-	47.0	47.8	49.3	50.3	48.6	45.9	45.9
03:00	-	47.4	48.2	49.3	50.6	47.5	45.9	45.8
04:00	-	46.9	47.7	48.3	48.1	47.5	46.5	46.6
05:00	-	48.5	48.0	47.9	46.9	47.1	47.7	47.3
06:00	-	50.4	51.4	51.7	48.0	50.4	50.5	50.8
07:00	-	55.0	54.1	49.4	49.7	52.6	53.7	58.6
08:00	-	60.0	58.0	50.9	48.5	54.4	54.9	60.1
09:00	-	58.0	59.0	52.7	48.3	55.5	59.0	58.1
10:00	55.1*	55.8	54.7	54.6	49.6	53.6	57.1	59.9
11:00	58.0	56.3	58.6	52.6	49.1	56.9	55.6	58.7*

Start of Hourly Time Period	Wed. 02/03/22 LAeq,1 hr dB	Thurs. 03/03/22 LAeq,1 hr dB	Fri. 04/03/22 LAeq,1 hr dB	Sat. 05/03/22 LAeq,1 hr dB	Sun. 06/03/22 LAeq,1 hr dB	Mon. 07/03/22 LAeq,1 hr dB	Tues. 08/03/22 LAeq,1 hr dB	Wed. 09/03/22 LAeq,1 hr dB
12:00	59.4	57.1	55.8	53.9	49.9	56.0	56.1	-
13:00	57.0	54.4	58.0	55.6	49.1	55.2	58.3	-
14:00	56.5	59.0	57.3	53.4	53.5	58.3	59.7	-
15:00	56.5	56.8	51.9	51.0	55.1	55.1	59.4	-
16:00	53.1	51.8	52.8	51.7	49.1	53.9	56.6	-
17:00	52.2	52.1	51.6	51.8	51.5	50.7	51.7	-
18:00	51.8	51.9	51.1	51.7	50.8	50.9	51.6	-
19:00	51.8	51.3	53.3	51.8	49.8	52.3	50.6	-
20:00	51.5	51.3	50.5	52.0	49.9	51.3	50.1	-
21:00	51.3	51.1	50.4	53.0	48.6	51.0	49.7	-
22:00	49.7	51.3	52.6	52.8	48.4	50.7	53.9	-
23:00	49.5	51.1	58.0	52.2	48.3	48.1	51.0	-
LAeq,16hr dB	55.1 [#]	55.6	55.4	52.7	50.5	54.3	56	59.1 [#]
LAeq,8hr dB	48.2	49.3	52.5	50.2	48.2	47.6	49	-
Note * indicates an incomplete hour measurement Note # indicates a partial period result								

Figures 9 and 10 below provide histogram representations of the measured $L_{AFmax,15\text{ min}}$ dB maximum event noise levels for the daytime (07:00 to 23:00 hours) and night (23:00 to 07:00 hours) periods respectively. The 90th percentile levels from the overall measurement period were 77 dB $L_{AFmax,15\text{ min}}$ during the daytime and 71 dB $L_{AFmax,15\text{ min}}$ at night (rounded to the nearest dB).

Figure 9: Daytime maximum noise event levels at position P2

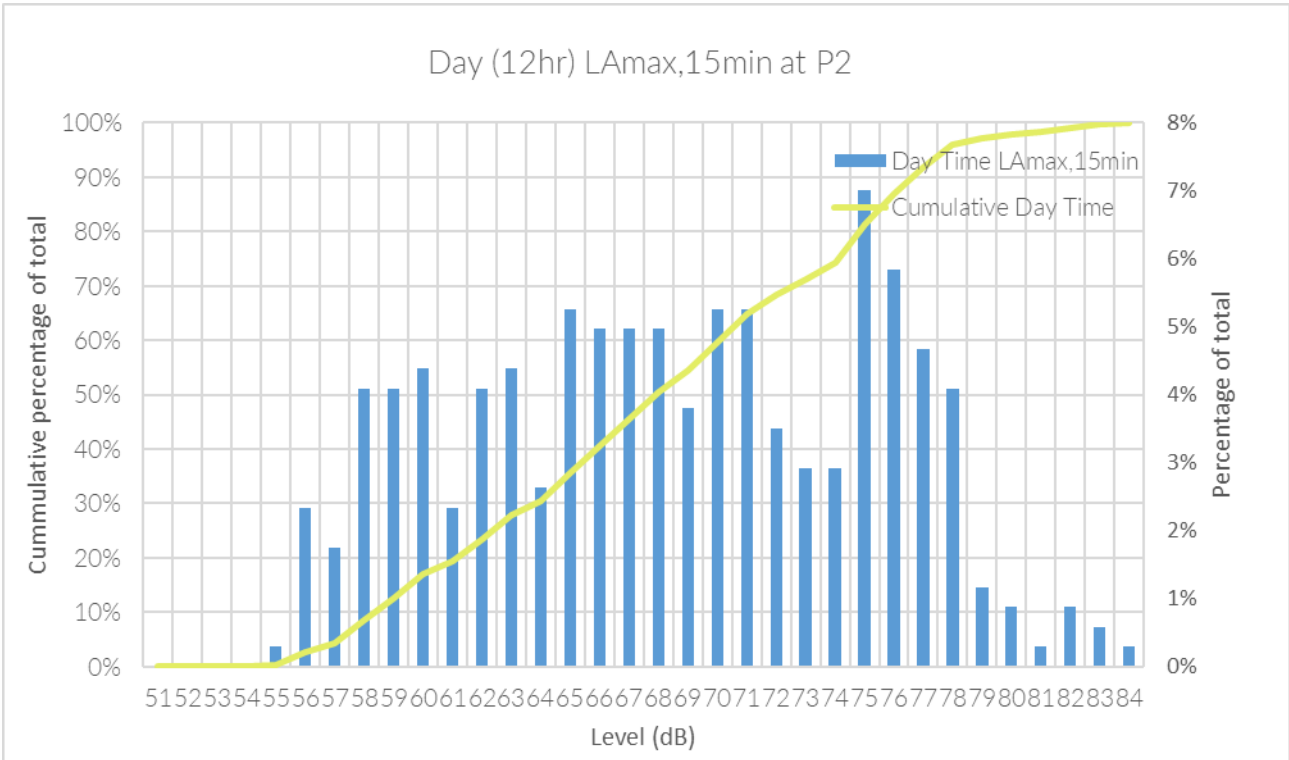
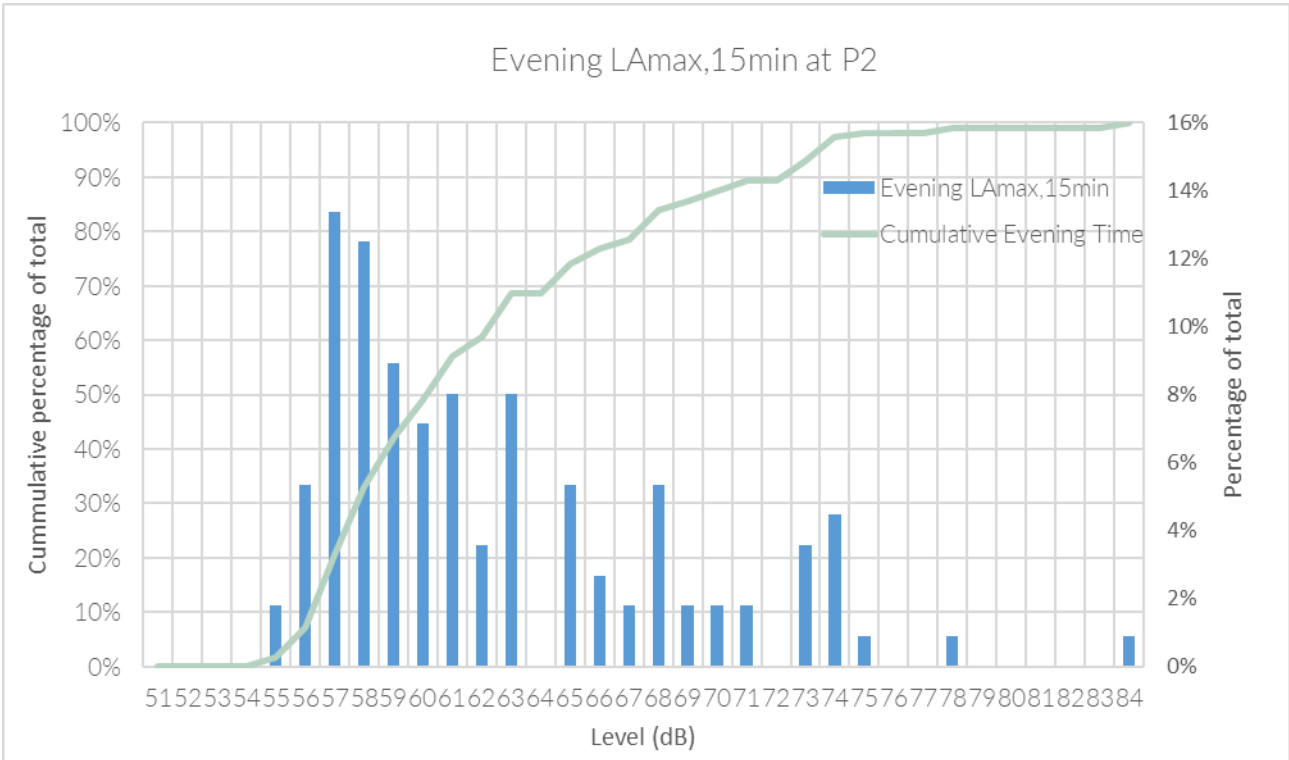


Figure 10: Night maximum noise event levels at position P2



Background noise measurements are presented following the statistical analysis approach of ‘BS 4142 Methods for rating and assessing industrial and commercial sound:2014’ (BS4142). The full measurement period has been processed as daytime (07:00 to 23:00 hours) and night (23:00 to 07:00 hours) histograms shown in Figure 11 and Figure 12 respectively. The lowest consistent daytime level, approximately the 10th percentile value is 47 dB LA90,15 min and at night is 44 dB LA90,15 min.

Figure 11: Daytime background noise levels at position P2

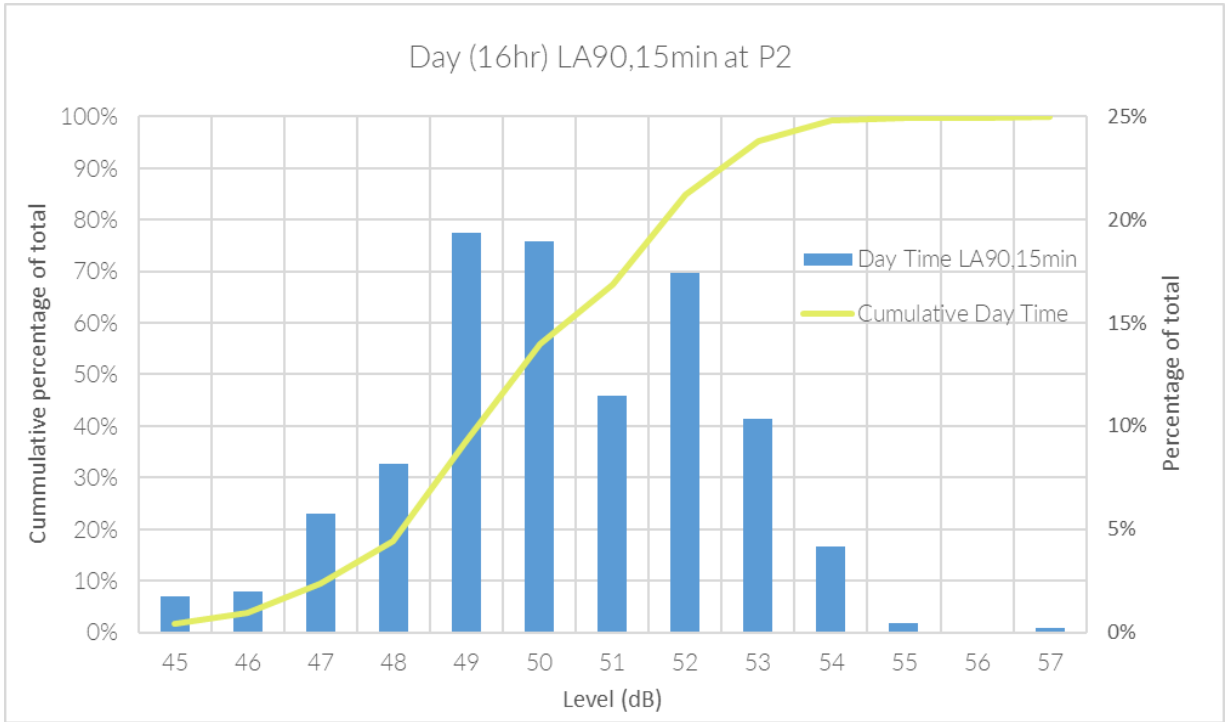
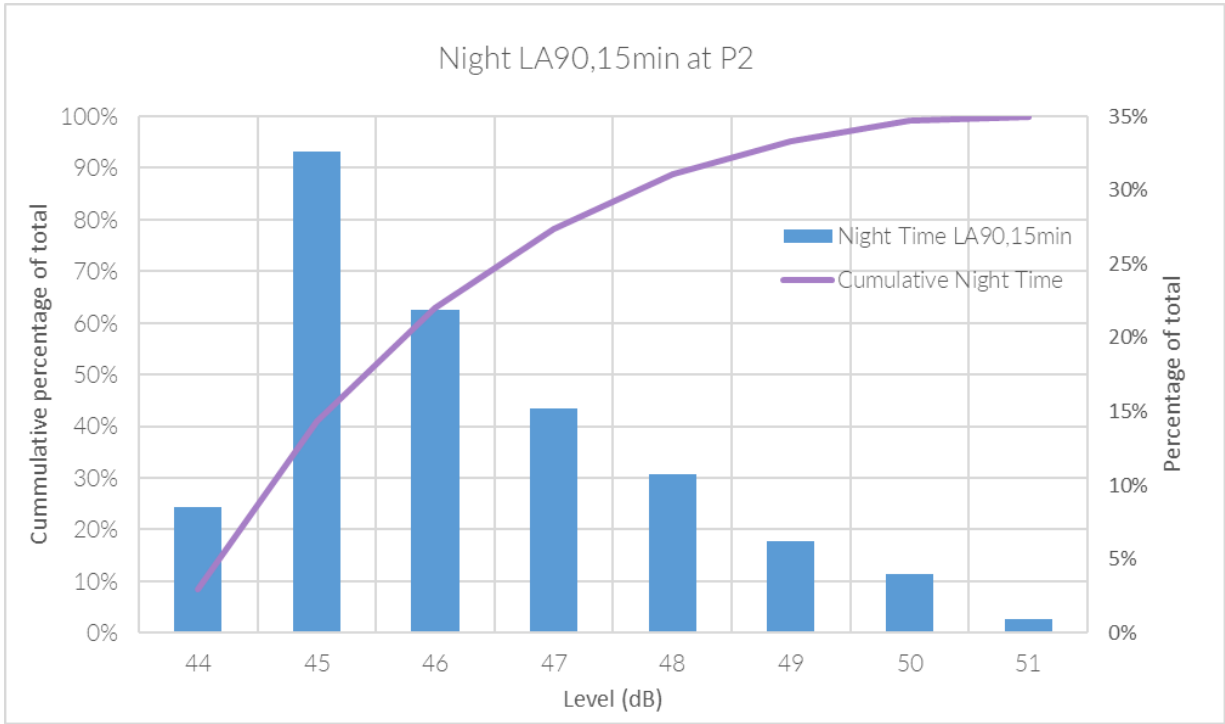


Figure 12: Night background noise levels at position P2



5.3 Position P3

Table 6 below provides the attended measured noise levels, the ambient noise $L_{Aeq,15 \text{ min}}$ dB, the maximum noise events $L_{AFmax,15 \text{ min}}$ dB and the $L_{A90,15 \text{ min}}$ dB used to describe the underlying background noise.

Table 6: Attended measured noise levels at position P3

Measurement Start Time and Date	Duration Minutes:Seconds	$L_{Aeq,15 \text{ min}}$ dB	$L_{AFmax,15 \text{ min}}$ dB	$L_{A90,15 \text{ min}}$ dB
10:37 on 02/03/22	07:56	56	71	54
10:46 on 02/03/22	15:00	58	73	53
11:02 on 02/03/22	15:00	56	67	52
09:31 on 09/03/22	15:00	55	72	52

5.4 Position P4

Table 7 below provides the attended measured noise levels, the ambient noise $L_{Aeq,15 \text{ min}}$ dB, the maximum noise events $L_{AFmax,15 \text{ min}}$ dB and the $L_{A90,15 \text{ min}}$ dB used to describe the underlying background noise.

Table 7: Attended measured noise levels at position P4

Measurement Start Time	Duration Minutes:Seconds	$L_{Aeq,15 \text{ min}}$ dB	$L_{AFmax,15 \text{ min}}$ dB	$L_{A90,15 \text{ min}}$ dB
11:19 on 02/03/22	15:00	68	79	59
11:34 on 02/03/22	15:00	68	79	61
10:33 on 09/03/22	15:00	65	78	58

5.5 Position P5

Table 8 below provides the attended measured noise levels, the ambient noise $L_{Aeq,15 \text{ min}}$ dB, the maximum noise events $L_{AFmax,15 \text{ min}}$ dB and the $L_{A90,15 \text{ min}}$ dB used to describe the underlying background noise.

Table 8: Attended measured noise levels at position P5

Measurement Start Time	Duration Minutes:Seconds	$L_{Aeq,15 \text{ min}}$ dB	$L_{AFmax,15 \text{ min}}$ dB	$L_{A90,15 \text{ min}}$ dB
09:48 on 09/03/22	15:00	56	72	51
10:04 on 09/03/22	15:00	55	64	51

5.6 Position P6

Table 9 below provides the attended measured noise levels, the ambient noise $L_{Aeq,15 \text{ min}}$ dB, the maximum noise events $L_{AFmax,15 \text{ min}}$ dB and the $L_{A90,15 \text{ min}}$ dB used to describe the underlying background noise.

Table 9: Attended measured noise levels at position P6

Measurement Start Time	Duration Minutes:Seconds	$L_{Aeq,15 \text{ min}}$ dB	$L_{AFmax,15 \text{ min}}$ dB	$L_{A90,15 \text{ min}}$ dB
10:50 on 09/03/22	15:00	64	80	55
11:06 on 09/03/22	09:28	64	91	56
11:15 on 09/03/22	15:00	63	78	54

5.7 Position P7

Table 10 below provides the attended measured short duration ambient entertainment noise levels. Position P7 was a façade measurement location and hence the noise levels of Table 10 below have been adjusted down by 3dB to convert to an equivalent free-field noise level. Position P7 was approximately 11m from the nearest boundary of the Carnival Street Food entertainment venue on Bridge Street. At the time of measurement there were many patrons occupying the outdoor seating and a DJ was playing a music set through an amplified music system.

Table 10: Attended measured noise levels at position P7 (free-field)

Start Time	Duration s	L _{Aeq,T} dB	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
23:06:04	10	79	89	78	72	72	77	69	62
23:06:14	10	78	90	74	74	72	76	68	62
23:06:24	10	78	88	74	79	74	74	68	63
23:06:43	10	78	90	80	71	73	74	70	64
23:06:53	7	76	90	81	72	70	74	65	62
23:12:58	8	76	87	78	74	72	73	66	63
23:13:06	10	76	87	79	77	71	73	67	63
23:13:16	10	75	86	79	79	69	70	64	58
23:13:26	10	74	85	80	79	68	69	63	57
23:13:36	10	75	86	79	78	70	71	66	58
23:13:46	10	76	85	79	81	70	73	65	58
23:14:08	10	75	84	74	78	71	70	62	57
23:14:18	10	76	86	76	81	72	69	63	58
23:14:28	10	76	85	75	83	71	69	65	59
23:14:38	10	77	87	75	82	72	72	65	59
Maximum	-	79	90	81	83	74	77	70	64

5.8 Position P8

Table 11 below provides the attended measured short duration ambient entertainment noise levels. Position P8 was approximately 15m from the nearest boundary of Crazy Pedros / MOJO / Liars Club entertainment venues. Although music was audible from Crazy Pedros / MOJO / Liars Club, the more dominant sources of noise were road traffic on Bridge Street and spill-out from Carnival Street Food on Bridge Street.

Table 11: Attended measured noise levels at position P8

Start Time	Duration s	L _{Aeq,T} dB	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
23:08:05	10	68	75	71	67	63	64	60	53
23:08:15	10	69	74	70	67	65	64	61	56
23:08:46	10	73	72	69	73	70	69	65	59
Maximum	-	73	75	71	73	70	69	65	59

5.9 Position P9

Table 12 below provides the attended measured short duration ambient entertainment noise levels. Position P9 was approximately 8m from the nearest boundary of Crazy Pedros / MOJO / Liars Club entertainment venues, approximately 25m from Carnival Street Food and 15m from the entrance of Manchester Hall, which had a function. Although music was audible from Crazy Pedros / MOJO / Liars Club, the more dominant sources of noise were road traffic on Bridge Street and spill-out from Carnival Street Food adjacent to Manchester Hall on Bridge Street.

Table 12: Attended measured noise levels at position P9

Start Time	Duration s	L _{Aeq,T} dB	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
23:09:06	10	72	74	71	72	71	67	63	58
23:09:16	10	71	73	73	75	70	66	61	56
23:09:26	10	71	75	77	76	69	65	60	54
23:09:36	10	71	74	77	74	68	65	60	54
23:10:00	10	72	66	67	71	71	66	60	58
23:10:10	10	71	75	70	72	70	65	60	57
23:10:20	10	71	77	73	70	67	67	60	57
23:10:30	10	72	73	72	71	71	68	61	55
23:11:25	10	73	78	75	76	72	67	58	54
23:11:35	10	72	76	76	72	71	66	61	54
Maximum	-	73	78	77	76	72	68	63	58

5.10 Position P10

Table 13 below provides the attended measured short duration ambient entertainment noise levels. Position P10 was approximately 25m from the live band stage of The Oast House Bar and Restaurant. Music noise was clearly audible at the measurement position.

Table 13: Attended measured noise levels at position P10

Start Time	Duration s	L _{Aeq,T} dB	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
23:16:52	10	77	90	82	74	73	71	68	68
23:17:10	10	80	95	84	77	78	74	70	69
23:17:57	10	83	93	87	84	81	78	73	70
23:18:07	7	82	93	84	82	80	77	73	70
23:18:23	7	81	94	83	82	77	76	71	65
23:19:13	10	75	89	81	75	69	68	66	65
23:19:23	10	76	87	81	76	71	70	66	64
23:19:33	10	76	91	82	76	72	71	66	65
23:19:43	10	77	90	83	76	74	72	67	66
23:19:53	10	78	89	82	76	74	73	67	67
23:13:46	9	78	89	83	75	74	74	67	68

Start Time	Duration s	L _{Aeq,T} dB	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
23:14:08	10	80	96	88	81	73	73	68	69
Maximum	-	83	96	88	84	81	78	73	70

6. Estimated ground floor noise levels

The two unattended noise measurement positions P1 and P2 were elevated above ground floor level for equipment security purposes, to capture potential influences from neighbouring roof mounted building services plant and to indicate the change in noise level with height. The noise measurements of positions P3 and P5 have been used to adjust the position P2 measured noise levels to an estimated ground floor level set of data at positions P3 and P5 respectively. The same has been carried out for positions P4 and P6 adjusting position P1.

6.1 Position P3

Adjustments applied to the position P2 measured noise levels:

Daytime +3dB to L_{Aeq,16hr};

Night +3dB to L_{Aeq,8hr};

Night +0dB to L_{AFmax,15min} (measured at position P3);

Daytime +0dB to L_{A90,15min}; and

Night +0dB to L_{A90,15min}.

The adjusted position P2 noise levels providing an estimated representation for position P3 are provided in Table 14 below.

Table 14: Estimated position P3 noise levels

Daytime			Night			
Lowest Ambient L _{Aeq,16hr} dB	Highest Ambient L _{Aeq,16hr} dB	Background L _{A90,15min} dB	Lowest Ambient L _{Aeq,8hr} dB	Highest Ambient L _{Aeq,8hr} dB	Maximum Event L _{AFmax,15min} dB	Background L _{A90,15min} dB
54	59	47	51	56	73	44

6.2 Position P4

Daytime +5dB to L_{Aeq,16hr};

Night +5dB to L_{Aeq,8hr};

Night +0dB to L_{AFmax,15min} (measured at position P4);

Daytime +2dB to L_{A90,15min}; and

Night +2dB to L_{A90,15min}.

The adjusted position P1 noise levels providing an estimated representation for position P4 are provided in Table 15 below.

Table 15: Estimated position P3 noise levels

Daytime			Night			
Lowest Ambient L _{Aeq,16hr} dB	Highest Ambient L _{Aeq,16hr} dB	Background L _{A90,15min} dB	Lowest Ambient L _{Aeq,8hr} dB	Highest Ambient L _{Aeq,8hr} dB	Maximum Event L _{AFmax,15min} dB	Background L _{A90,15min} dB
61	67	55	58	63	79	51

6.3 Position P5

Daytime -2dB to L_{Aeq,16hr};

Night -2dB to L_{Aeq,8hr};

Night +0dB to L_{AFmax,15min} (measured at position P5);

Daytime -2dB to L_{A90,15min}; and

Night -2dB to L_{A90,15min}.

The adjusted position P2 noise levels providing an estimated representation for position P5 are provided in Table 16 below.

Table 16: Estimated position P3 noise levels

Daytime			Night			
Lowest Ambient L _{Aeq,16hr} dB	Highest Ambient L _{Aeq,16hr} dB	Background L _{A90,15min} dB	Lowest Ambient L _{Aeq,8hr} dB	Highest Ambient L _{Aeq,8hr} dB	Maximum Event L _{AFmax,15min} dB	Background L _{A90,15min} dB
49	54	45	46	51	72	42

6.4 Position P6

Daytime +2dB to L_{Aeq,16hr};

Night +2dB to L_{Aeq,8hr};

Night +7dB to L_{AFmax,15min} (and as measured at position P6);

Daytime -3dB to L_{A90,15min}; and

Night -3dB to L_{A90,15min}.

The adjusted position P1 noise levels providing an estimated representation for position P6 are provided in Table 17 below.

Table 17: Estimated position P3 noise levels

Daytime			Night			
Lowest Ambient L _{Aeq,16hr} dB	Highest Ambient L _{Aeq,16hr} dB	Background L _{A90,15min} dB	Lowest Ambient L _{Aeq,8hr} dB	Highest Ambient L _{Aeq,8hr} dB	Maximum Event L _{AFmax,15min} dB	Background L _{A90,15min} dB
58	64	50	55	59	80	46

7. Vibration measurements

No direct measurement of vibration was deemed necessary following subjective observations during the set up and dismantling of the noise measurement equipment. Subjectively, no perceivable ground vibration existed on Site leading to the measurement positions P1 to P6. In addition, observations did not indicate any significant areas of vibration concern.