

## **Great North Road Solar and Biodiversity Park**

Environmental Statement

Volume 4 – Technical Appendices

Technical Appendix A12.1 – Baseline Noise Survey

Document Reference – EN010162/APP/A12.1

Revision 1

June 2025

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009. APFP Regulation 5(2)(a)

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### **A12.1.1 INTRODUCTION**

- 1 To establish the existing background sound environment in the locality of the Development, background noise monitoring was undertaken between Monday 15<sup>th</sup> April and Tuesday 23<sup>rd</sup> April 2024.

### **A12.1.2 NOISE MONITORING METHODOLOGY**

- 2 The baseline noise monitoring was undertaken in accordance with the following guidance:
  - BS 7445-1:2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures; and
  - BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.
- 3 Monitoring was undertaken using Class 1 sound level meters calibrated to traceable standards. Each sound level meter was housed in an all-weather case with long life batteries, suitable for unattended monitoring. Microphones were placed at a height of 1.4 m above ground level, within suitable proprietary windshields.
- 4 Meters were field calibrated at the start and end of each survey; no significant calibration drift was found.
- 5 Indices measured included LA90,15mins (i.e. the background sound level).
- 6 Monitoring was undertaken continuously for approximately 48 hours at each monitoring location, and was timed to avoid school and bank holidays.
- 7 A weather station was installed to record wind speed and rainfall throughout the survey period. Any periods which coincided with rainfall or high winds (defined in BS 4142 as wind speeds over 5 m/s) have been omitted from further analysis, in order to ensure a conservative approach.
- 8 The survey details were agreed with the Environmental Health Officer (EHO) prior to being undertaken.

### **A12.1.3 MONITORING LOCATIONS**

- 9 Many of the Noise Sensitive Receptors (NSRs) are in close proximity to each other and therefore subject to similar levels of background noise. Where this is the case, monitoring was undertaken in a location representative of several NSRs in a given area.
- 10 In order to determine the representative background sound levels at the Assessment Locations, noise monitoring was undertaken at a total of 35 locations. These monitoring locations provided representative background levels for the 61 Assessed NSRs.
- 11 Since the PIER stage, a large area of Solar PV has been removed around Cromwell, North Muskham, Bathley, South Muskham, Little Carlton and Kelham, reducing the number of Assessment Locations required. For consistency with the PEIR assessment, Assessment Locations remain labelled between H1 and H89, however it should be noted however that H22 and H24 – H50 (i.e. Assessment Locations previously around the removed areas) have been removed from the assessment due to the increased

separation distance between operational plant and receptors. While some Assessment Receptors assessed at PEIR now fall slightly outside the 500 m study area (i.e. H3, H51, H57 and H65) these locations have been retained as a conservative measure. With regards to H54, background noise levels have been sourced from monitoring undertaken as part of the Staythorpe BESS application<sup>1</sup>.

- 12 The background noise monitoring locations and assessed NSRs were agreed with the EHO during consultation. Monitoring locations and assessment locations are presented in ES Figure 12.1 Noise Sensitive Receptors and Monitoring Locations [EN010162/APP/6.3.12.1].
- 13 Table A12.1.1 below presents the grid reference for each monitoring location, as well as the assessment locations for which the background levels are representative.

**Table A12.1.1: Assessment Locations and Representative Monitoring Locations**

Monitoring Location	Easting	Northing	Representative Assessment Locations
ML1	475742	368148	H1, H3, H8
ML2	475426	366411	H2, H4, H5, H6, H7, H9
ML3	477728	365745	H10
ML4	474140	365171	H11, H14
ML5	476392	365191	H12, H13
ML6	478817	364261	H15, H16, H17
ML7	477206	363927	H18, H19, H20, H23
ML8	478612	363119	H21
ML9	478708	361780	No longer required
ML10	479334	361595	No longer required
ML11	478655	360379	No longer required
ML12	479192	359612	No longer required
ML13	478691	359758	No longer required
ML14	477952	358991	No longer required
ML15	478698	358267	No longer required
ML16	478069	357544	No longer required
ML17	477292	356854	No longer required
ML18	476005	356736	H51, H57
ML19	477371	355968	H52, H53, H65
ML20	475081	355647	H55, H56

<sup>1</sup> As presented in Noise Assessment Addendum, Staythorpe BESS, June 2023, Metrica Environmental Consulting Ltd

Monitoring Location	Easting	Northing	Representative Assessment Locations
ML21	474322	356548	H58
ML22	475199	357526	H59, H60
ML23	473391	357822	H61, H62, H63
ML24	473944	358605	H64
ML25	472615	359982	H66, H67
ML26	470615	360075	H68, H69
ML27	470805	360955	H70, H71, H72
ML28	468740	362219	H73, H74
ML29	467702	362202	H75, H76
ML30	472924	361484	H77, H78
ML31	473771	361795	H79
ML32	471663	362010	H80, H81
ML33	472341	363144	H82, H83, H84
ML34	473430	362978	H85, H86
ML35	472587	363867	H87, H88, H89

- 14 Survey record sheets are provided in TA A12.3 and present the following details for each monitoring location:
- Grid reference;
  - Description of the acoustic environment;
  - Equipment used (including serial number of both sound level meter and calibrator);
  - Weather conditions during site visits;
  - Monitoring start and end time; and
  - Photographs of the equipment in situ.

#### A12.1.4 WEATHER DATA AND OTHER EXCLUSIONS

- 15 A weather station measuring wind speed and rainfall was installed at the following locations (all in 2024):
- ML4 between 15<sup>th</sup> and 17<sup>th</sup> April;
  - ML17 between 17<sup>th</sup> and 19<sup>th</sup> April; and
  - ML32 between 19<sup>th</sup> and 22<sup>nd</sup> April.
- 16 An additional rain gauge was installed at the following locations:
- ML13 between 15<sup>th</sup> and 17<sup>th</sup> April;
  - ML26 between 17<sup>th</sup> and 19<sup>th</sup> April; and
  - ML3 between 19<sup>th</sup> and 22<sup>nd</sup> April.
- 17 In addition to the on-site weather station and rain gauge, data from two local Met Office weather stations have been obtained to supplement the weather

data measured on site, ensuring a robust dataset. The following local weather stations have been utilised;

- North Scarle<sup>2</sup> located approx. 6 km to northeast of the Order Limits; and
  - Southwell LKR<sup>3</sup> located approx. 3 km southwest of the Order Limits;
- 18 Data from the nearest Met Office weather station was utilised for each monitoring location, meaning that ML1 – ML13 utilised the North Scarle data, while ML 14 – 35 utilised the Southwell LKR data. At each location, the on-site weather station data, on-site rain gauge data and nearest Met Office weather data was combined into a single dataset. The highest measured wind speed was used for data analysis as a worst-case assumption.
- 19 The combined weather dataset was correlated with the measured noise levels. All periods where wind speeds were above 5 m/s have been omitted from further analysis. Periods of rainfall were investigated, and where it was found that noise levels were impacted, these periods were omitted from further analysis.
- 20 During data analysis it was found that wind speeds towards the start of the survey (i.e. 15<sup>th</sup> April) were in excess of 5 m/s for the majority of the time. As a worst case, all data measured from the start of the measurement on the 15<sup>th</sup> April to 1200 on the 16<sup>th</sup> April was therefore omitted from further analysis.
- 21 In addition to weather exclusions, other periods of atypically elevated noise levels have been omitted from the data analysis, based on professional judgement, where considered necessary.

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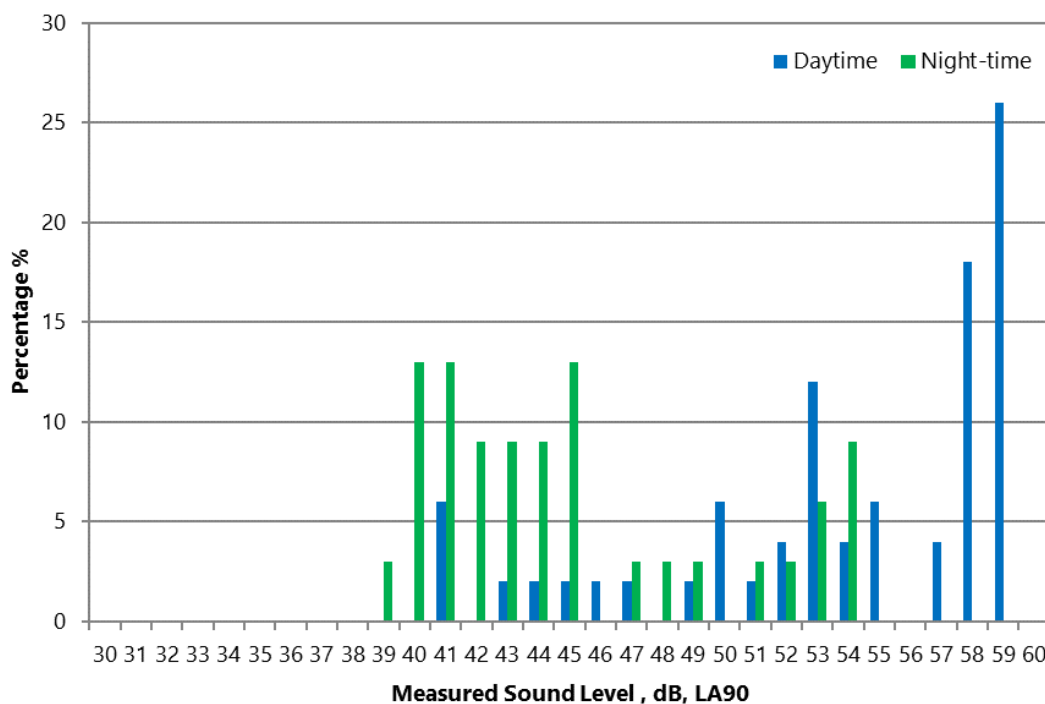
<sup>2</sup> <https://www.metoffice.gov.uk/observations/details/2024052351xjixea9ce69kyhygyuiqrnsy>

<sup>3</sup> <https://www.metoffice.gov.uk/observations/details/20240523hnhpfkaa9ce69kyhygyuizhzdr>

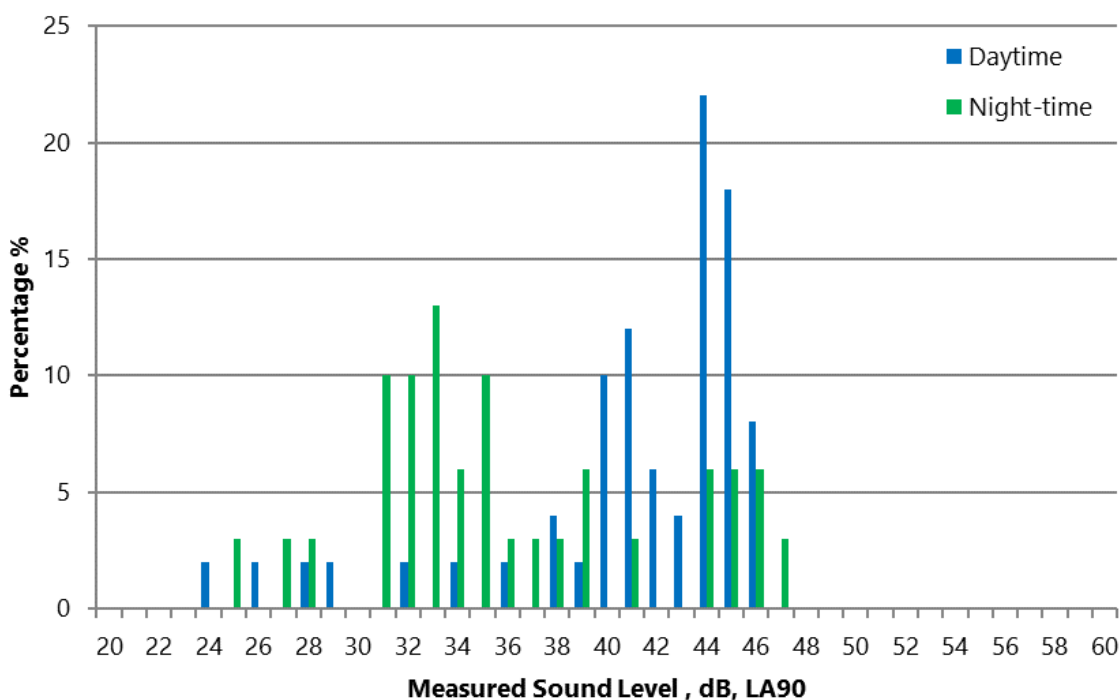
## A12.1.5 SURVEY RESULTS

- 22 Charts 1 – 35 below present histograms showing the range of noise levels measured at each location during both daytime and night-time periods.

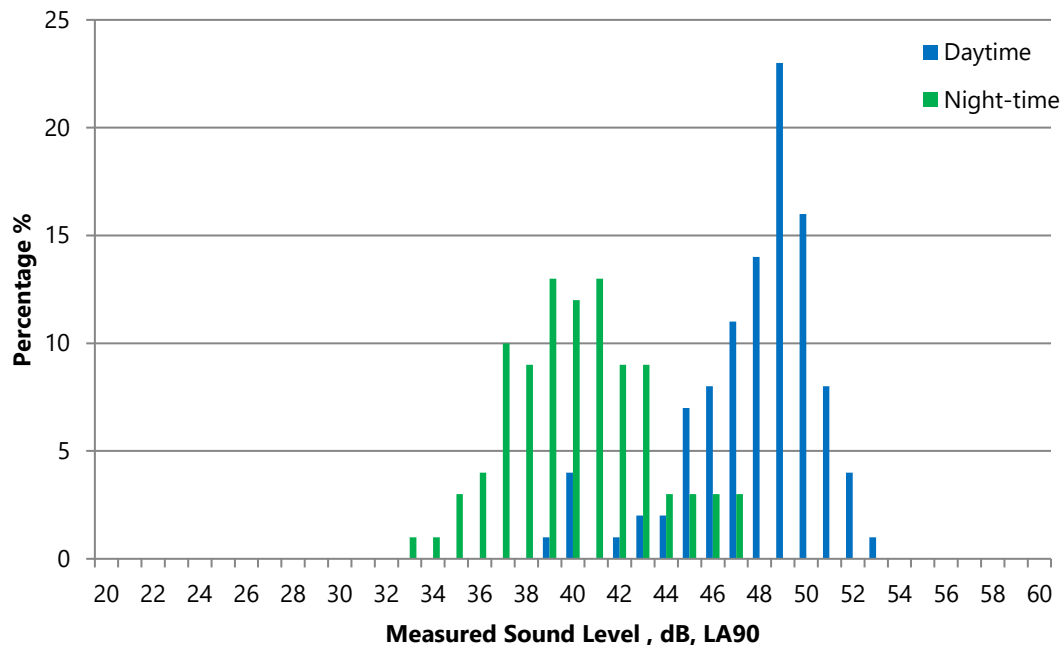
**Chart 1: Background Noise Levels – ML1**



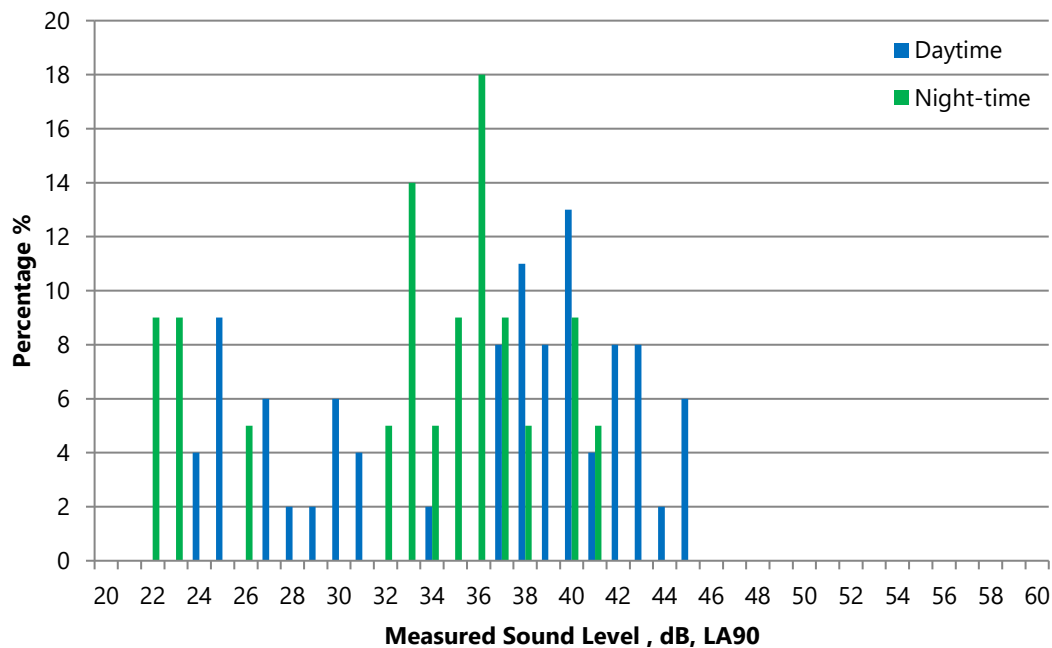
**Chart 2: Background Noise Levels – ML2**



**Chart 3: Background Noise Levels – ML3**

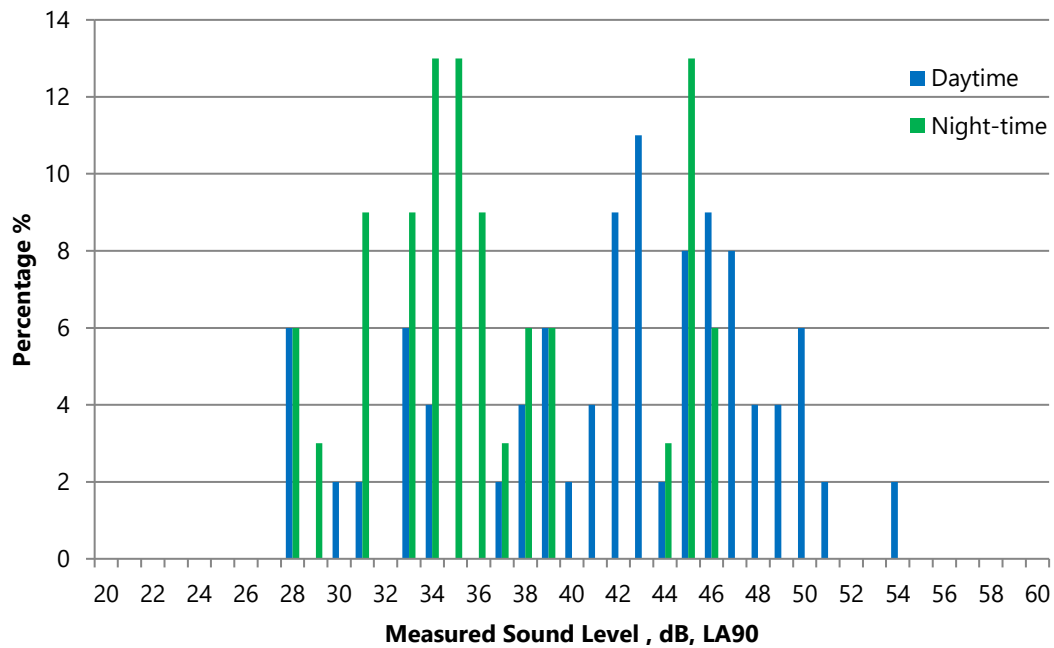


**Chart 4: Background Noise Levels – ML4**

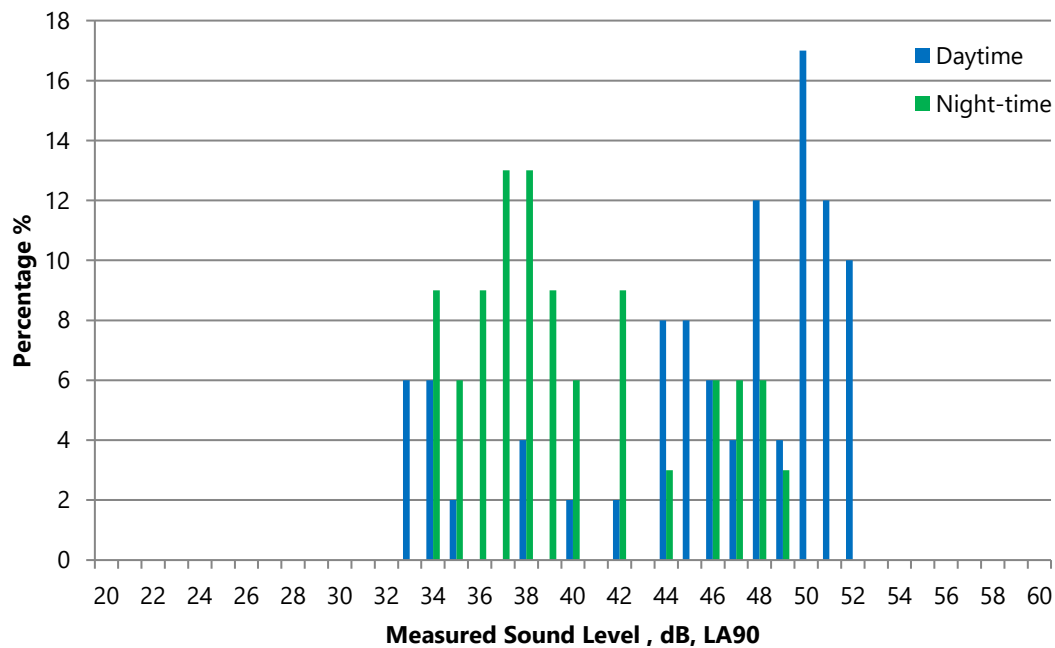




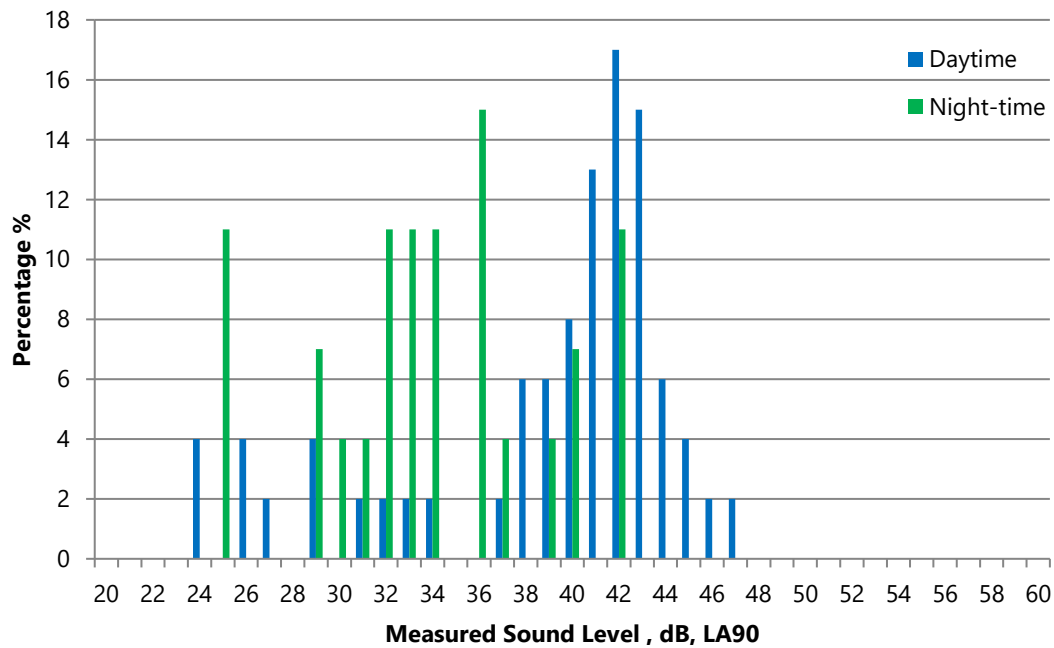
**Chart 5: Background Noise Levels – ML5**



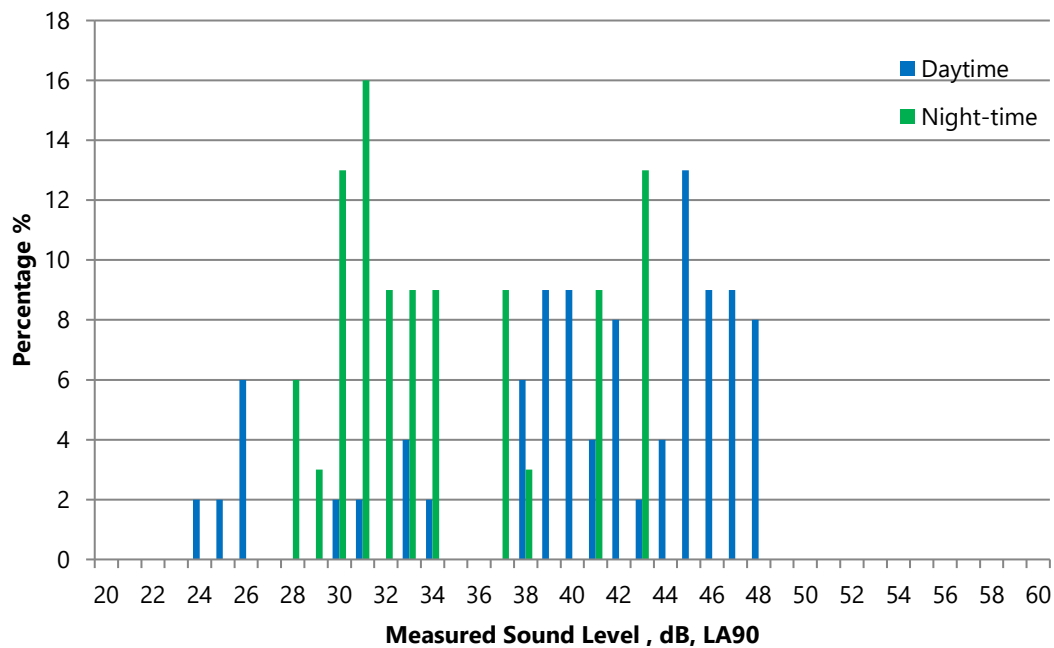
**Chart 6: Background Noise Levels – ML6**



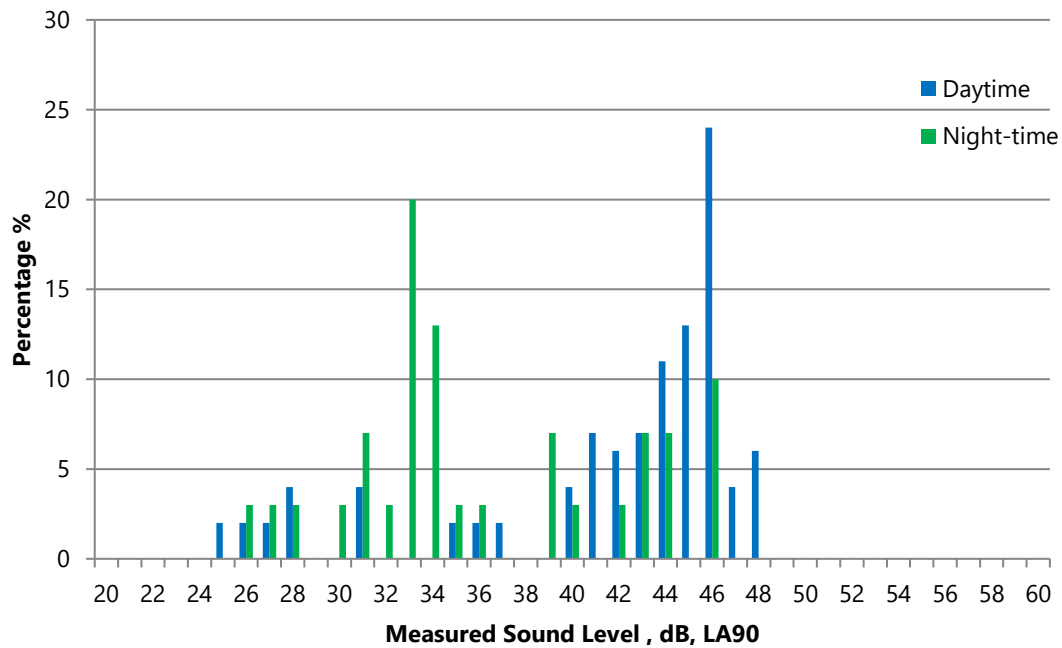
**Chart 7: Background Noise Levels – ML7**



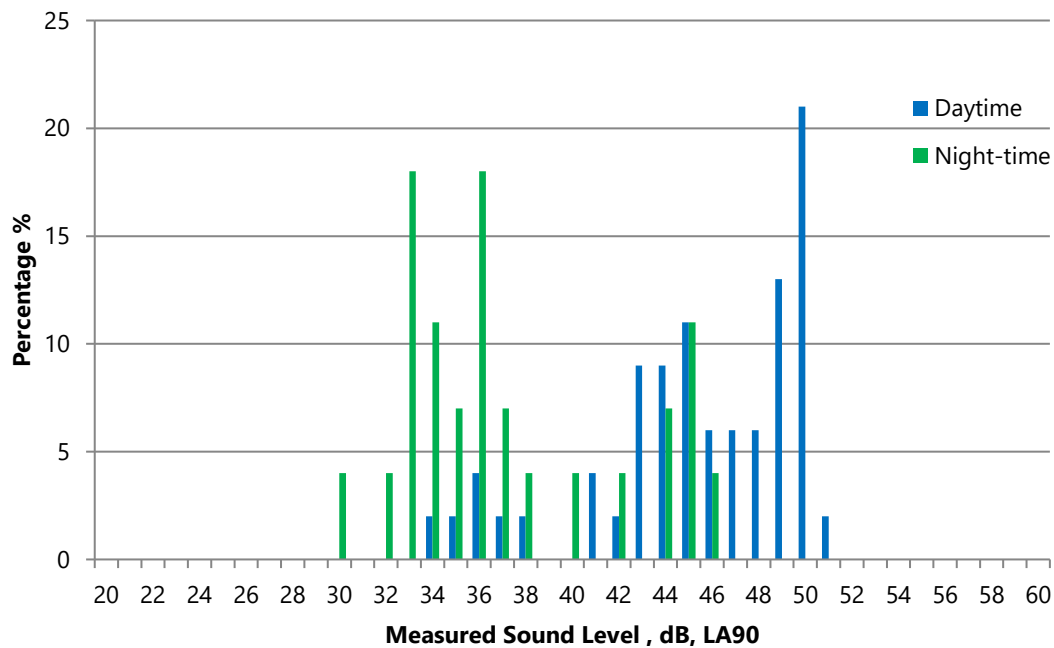
**Chart 8: Background Noise Levels – ML8**



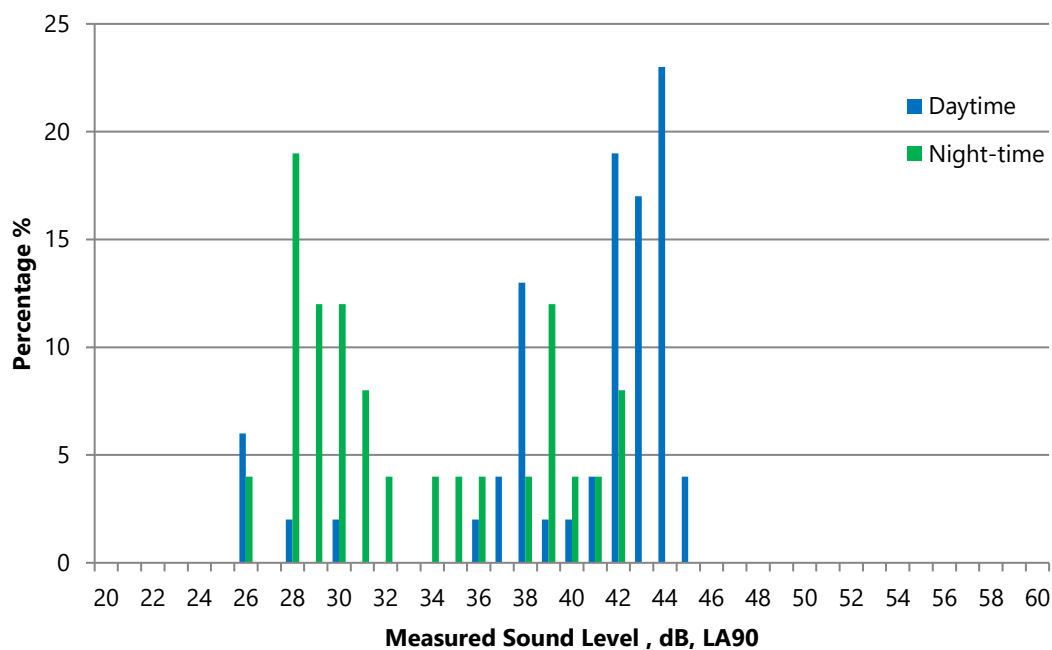
**Chart 9: Background Noise Levels – ML9**



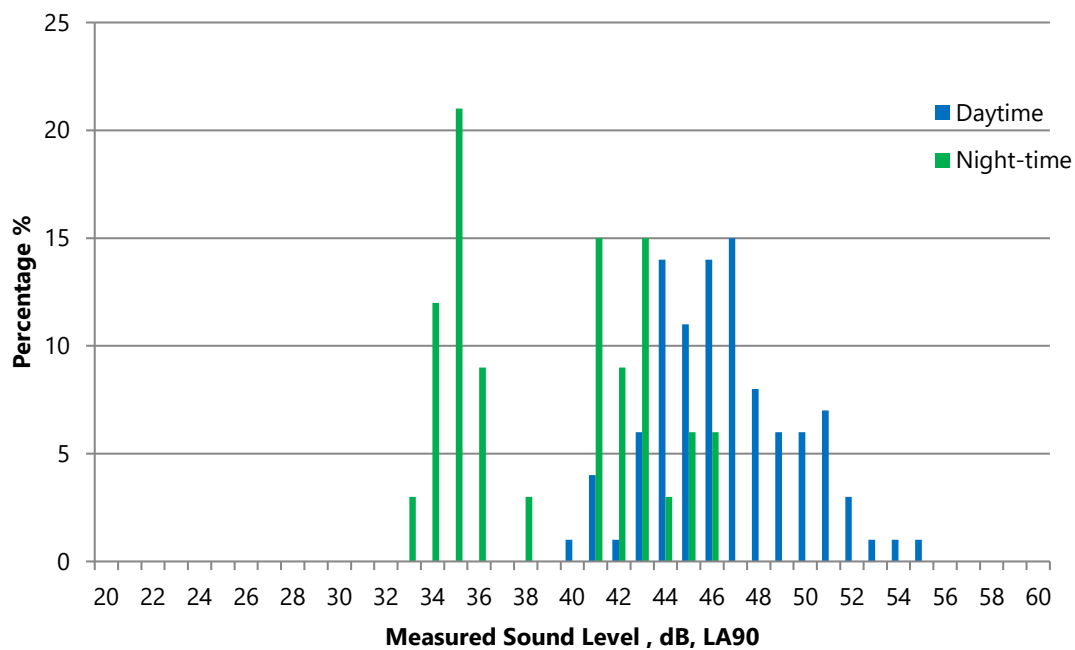
**Chart 10: Background Noise Levels – ML10**



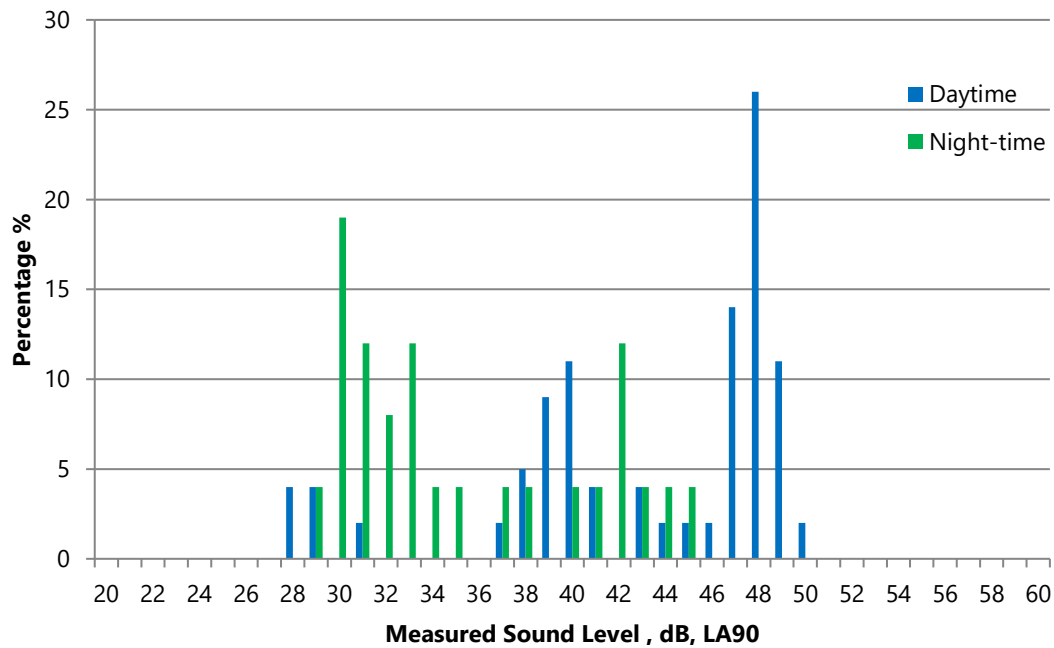
**Chart 11: Background Noise Levels – ML11**



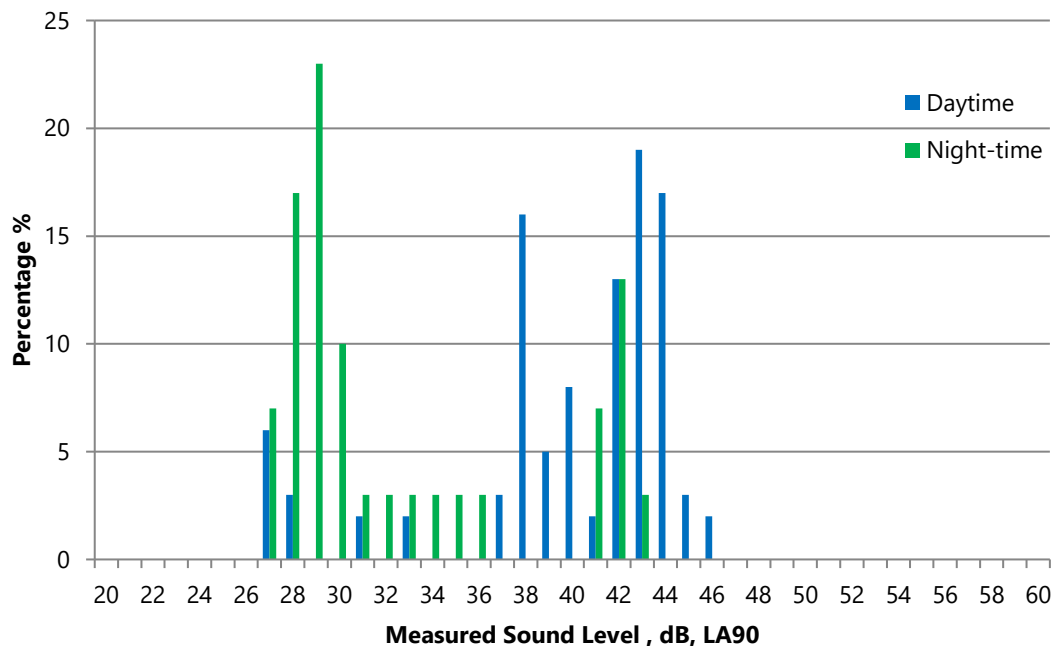
**Chart 12: Background Noise Levels – ML12**



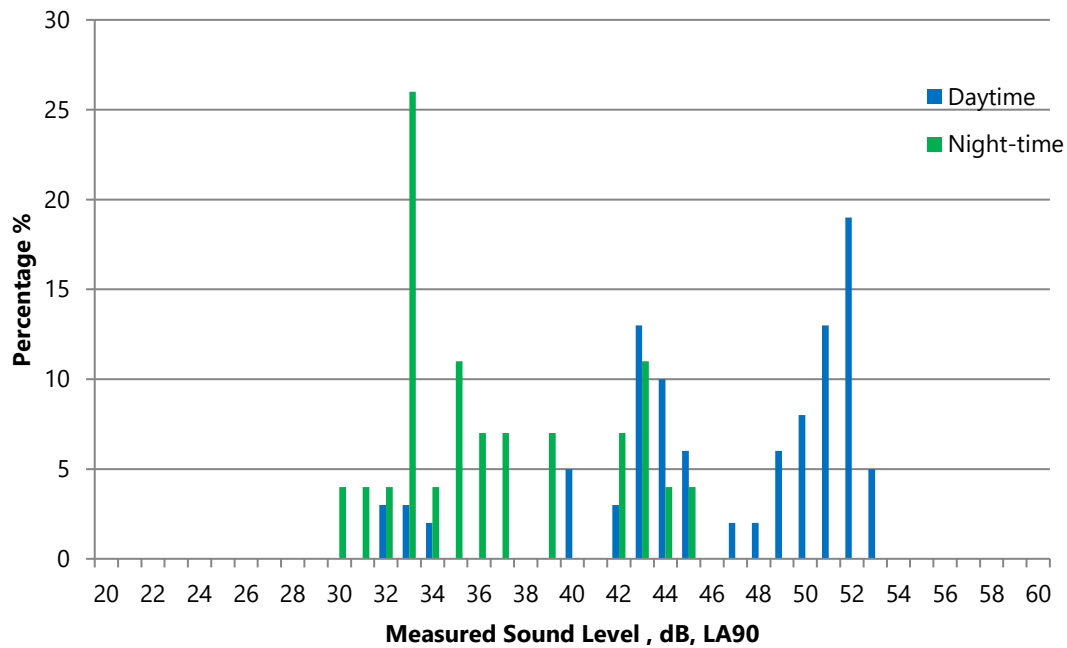
**Chart 13: Background Noise Levels – ML13**



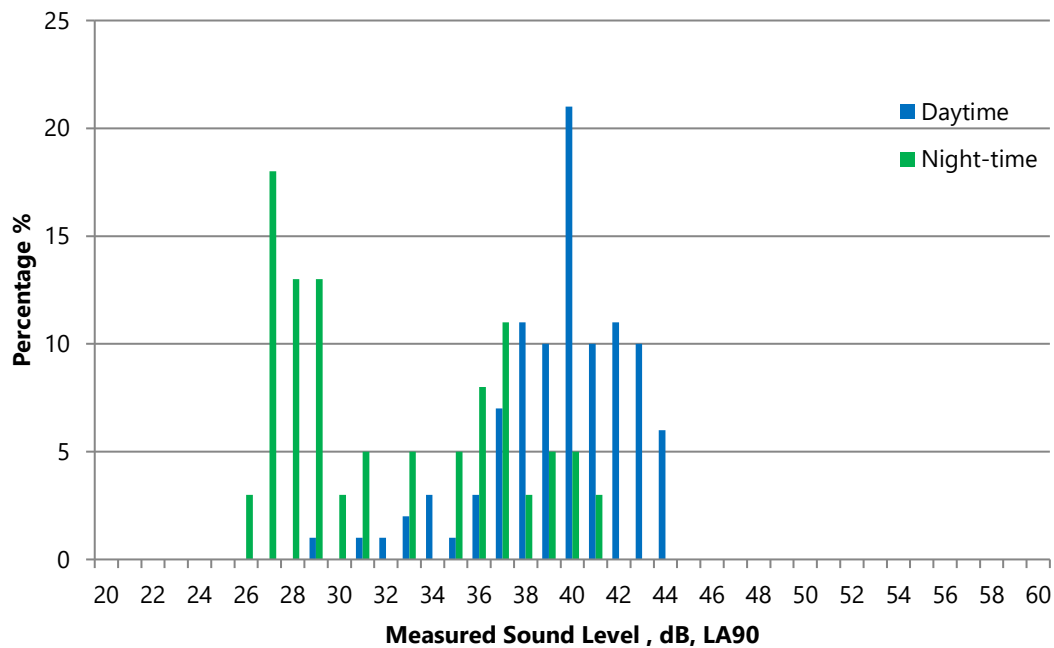
**Chart 14: Background Noise Levels – ML14**



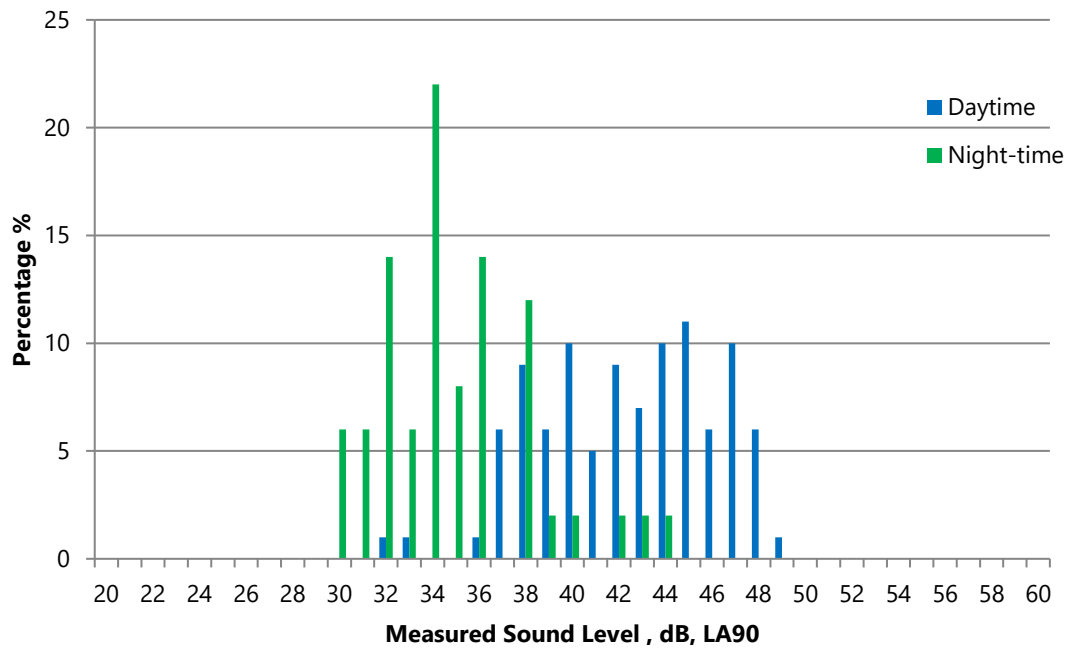
**Chart 15: Background Noise Levels – ML15**



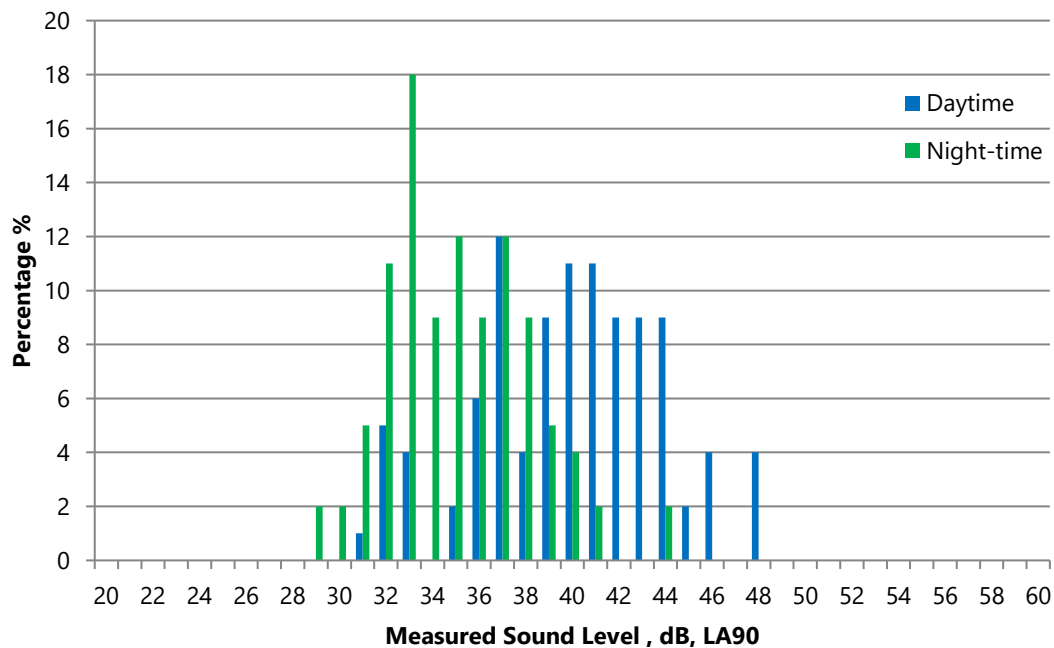
**Chart 16: Background Noise Levels – ML16**



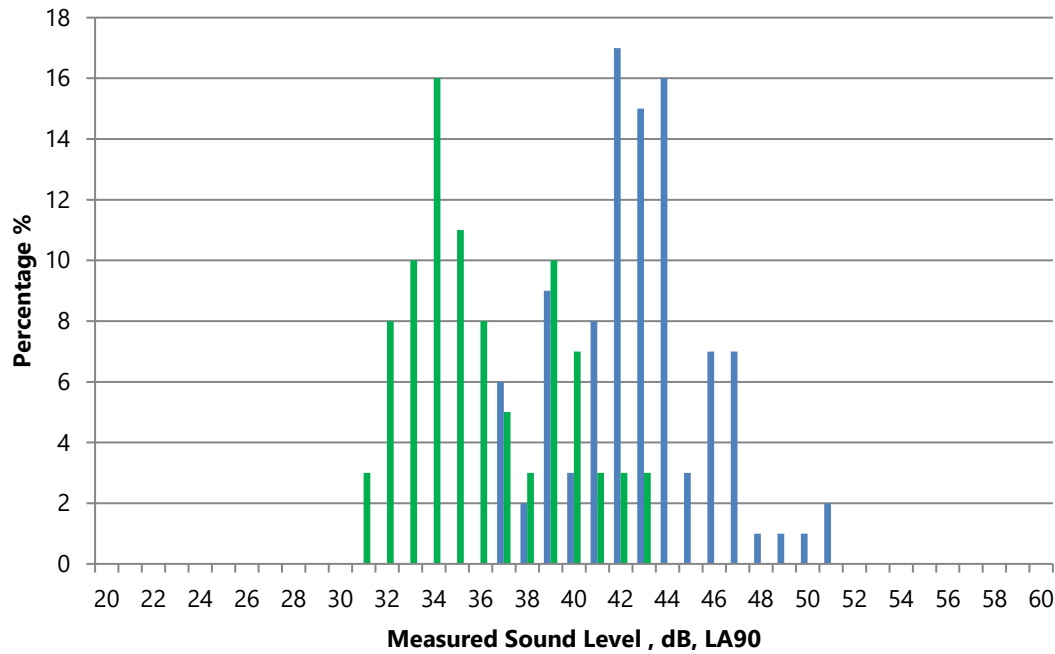
**Chart 17: Background Noise Levels – ML17**



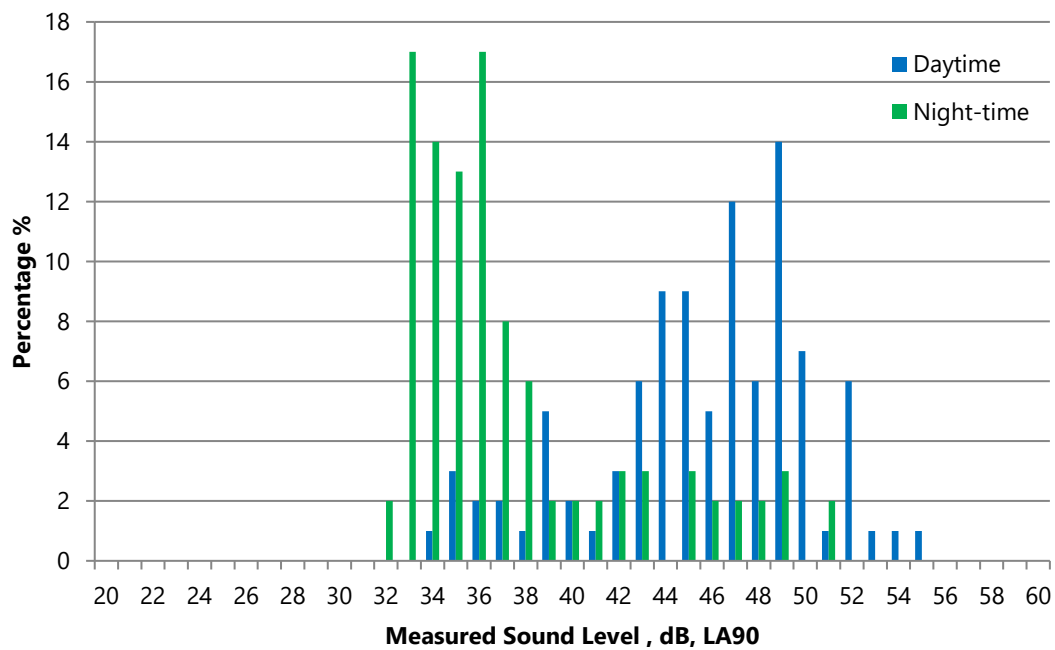
**Chart 18: Background Noise Levels – ML18**



**Chart 19: Background Noise Levels – ML19**

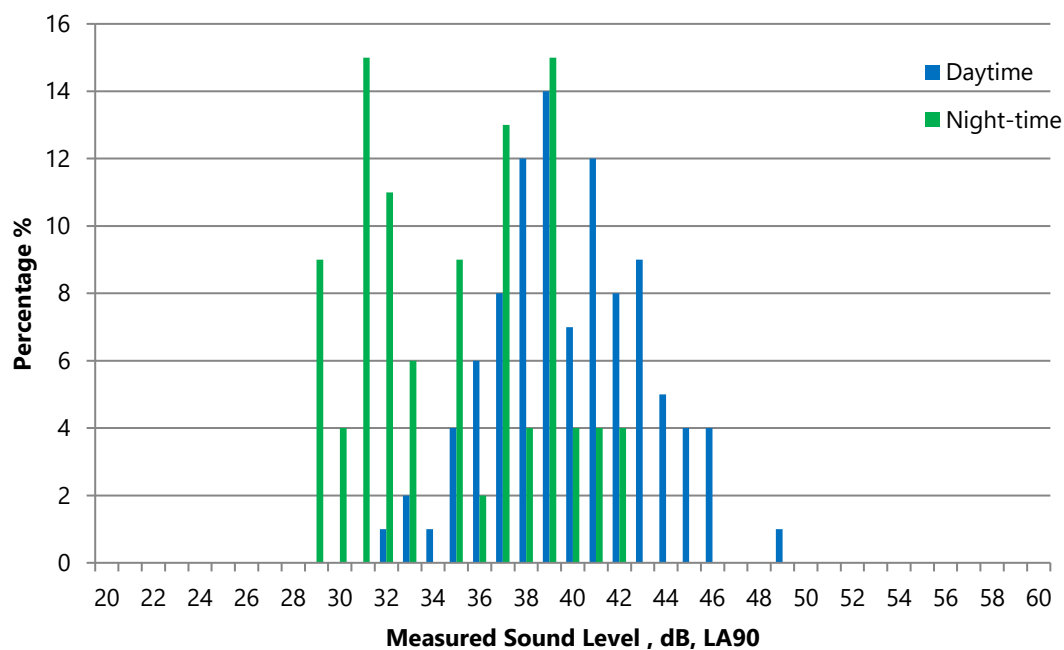


**Chart 20: Background Noise Levels – ML20**

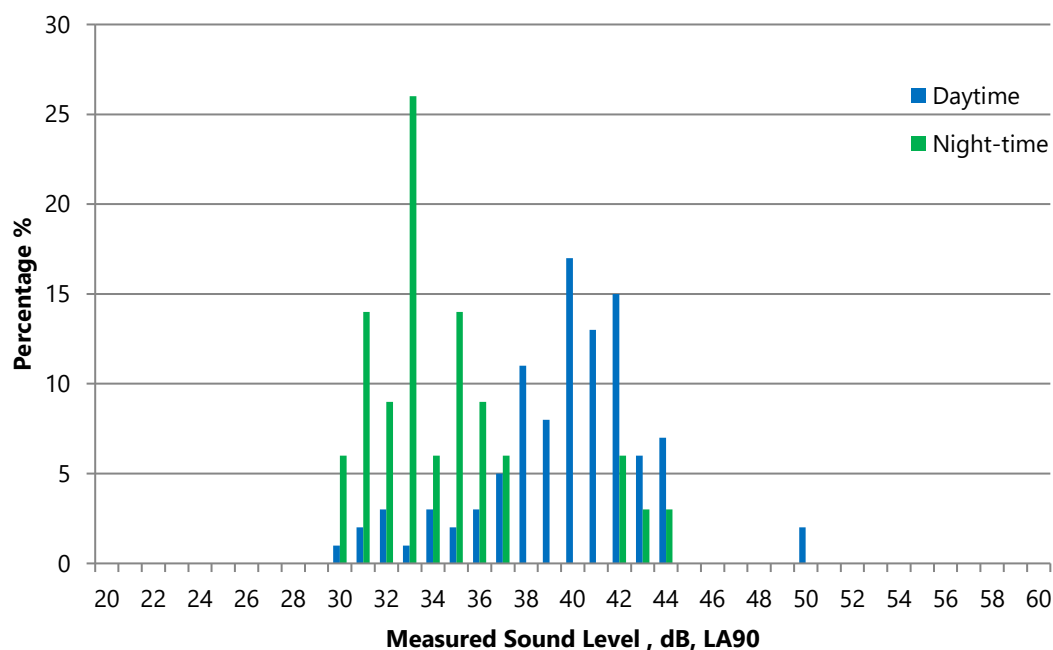




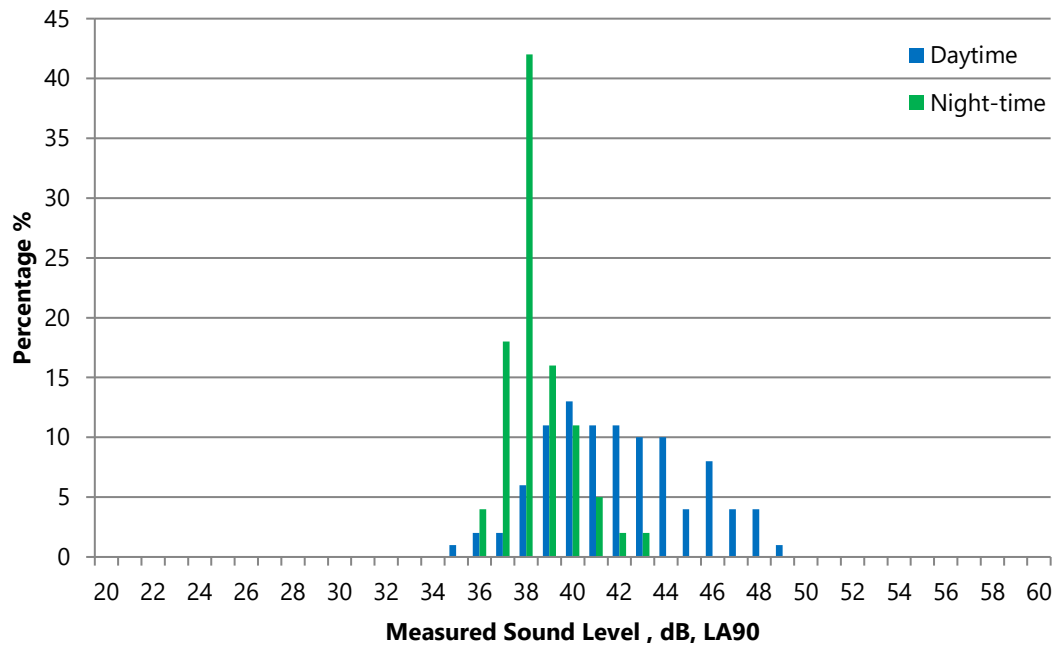
**Chart 21: Background Noise Levels – ML21**



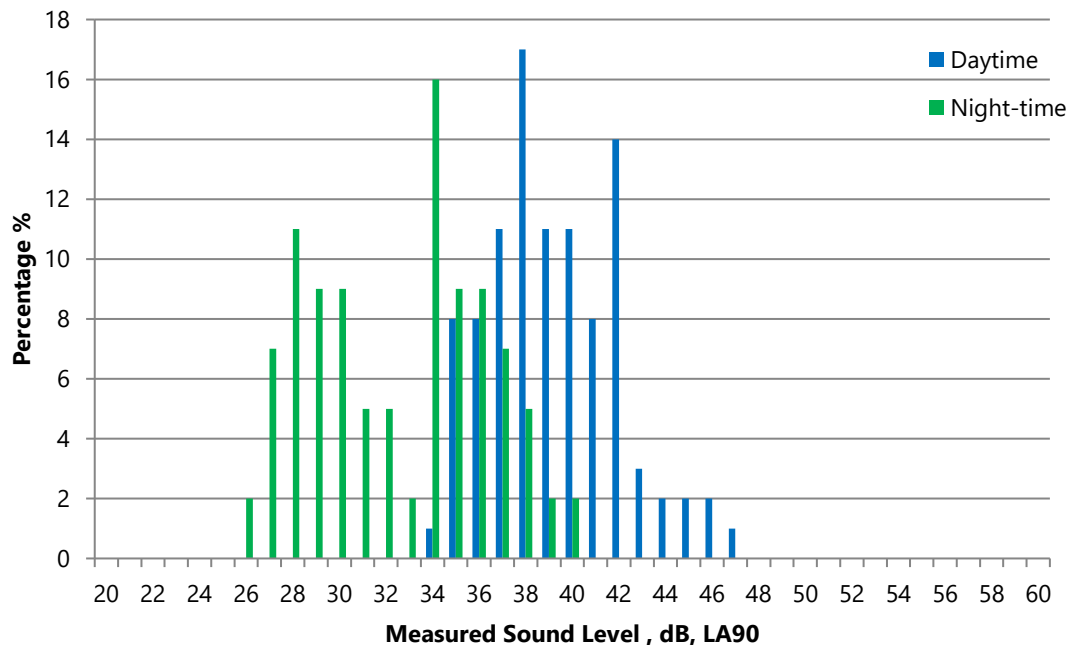
**Chart 22: Background Noise Levels – ML22**



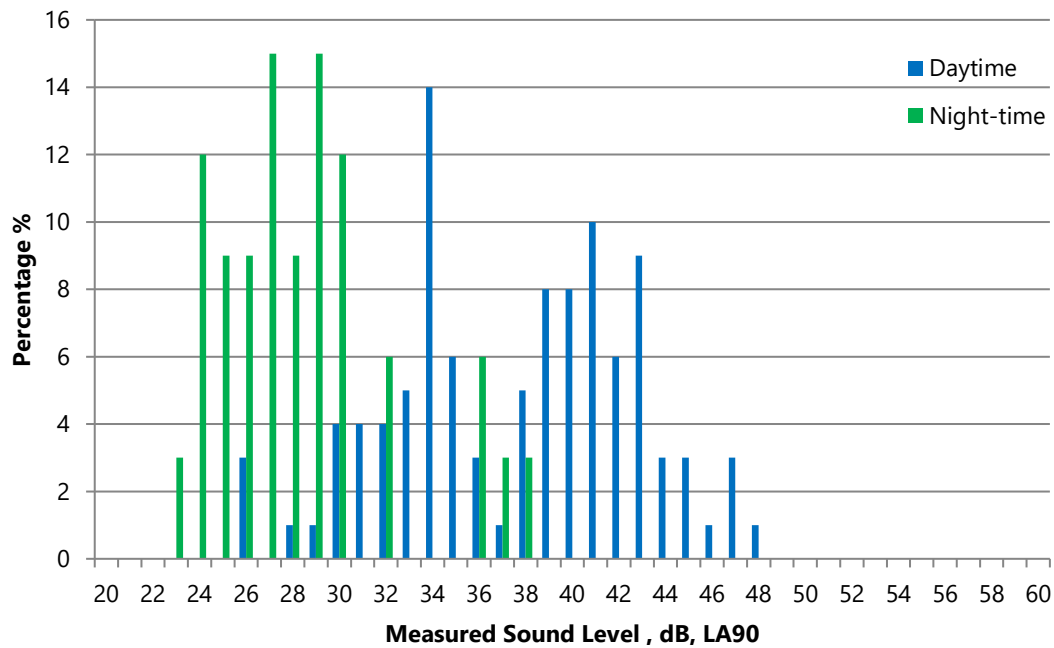
**Chart 23: Background Noise Levels – ML23**



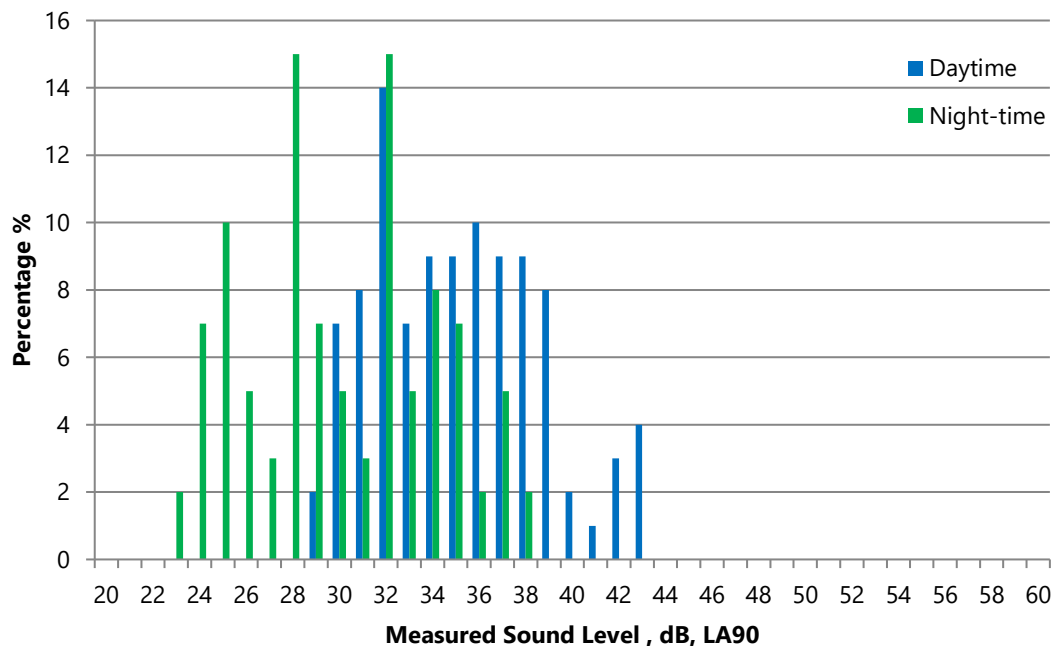
**Chart 24: Background Noise Levels – ML24**



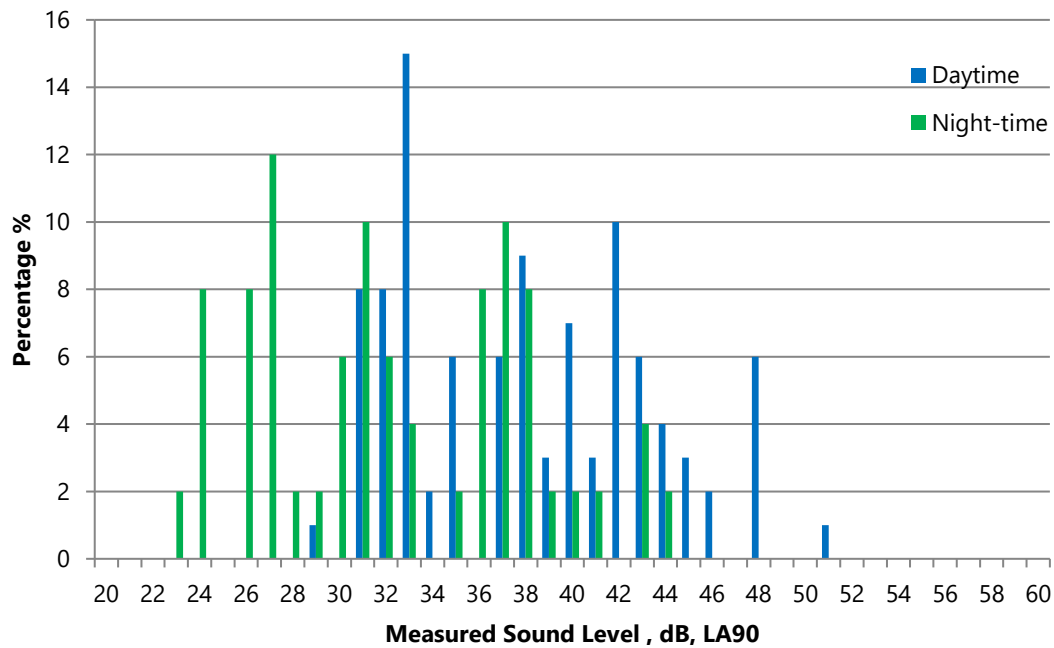
**Chart 25: Background Noise Levels – ML25**



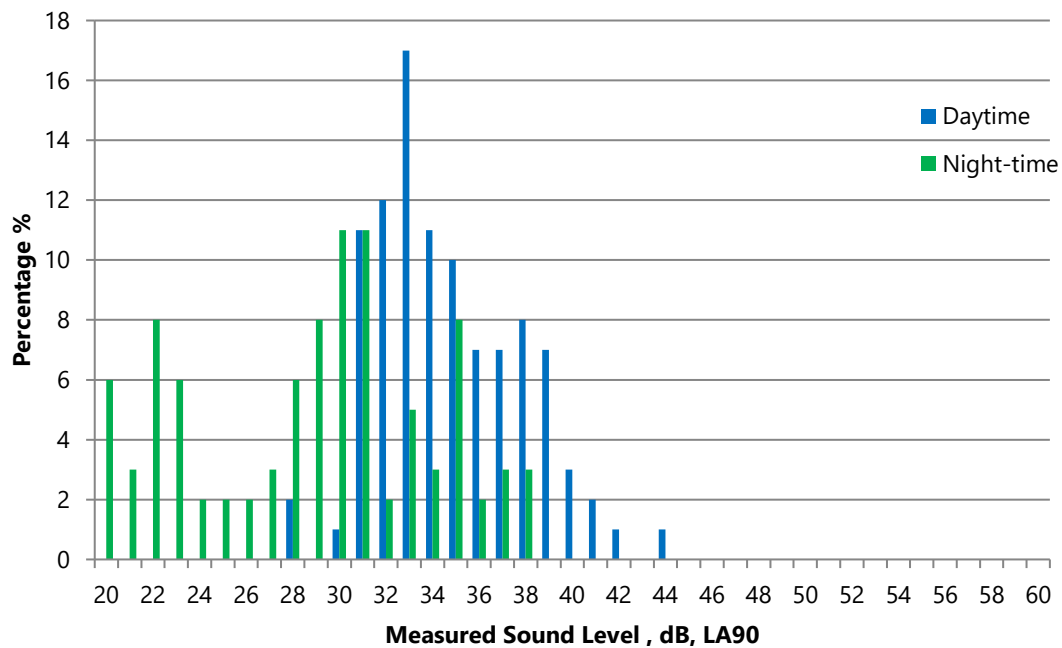
**Chart 26: Background Noise Levels – ML26**



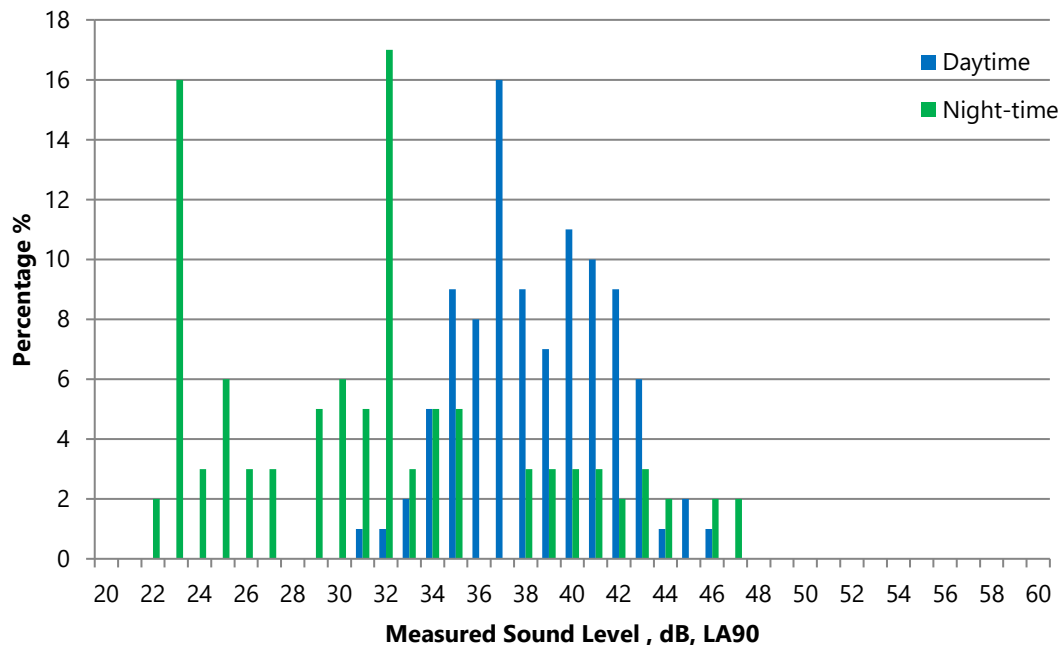
**Chart 27: Background Noise Levels – ML27**



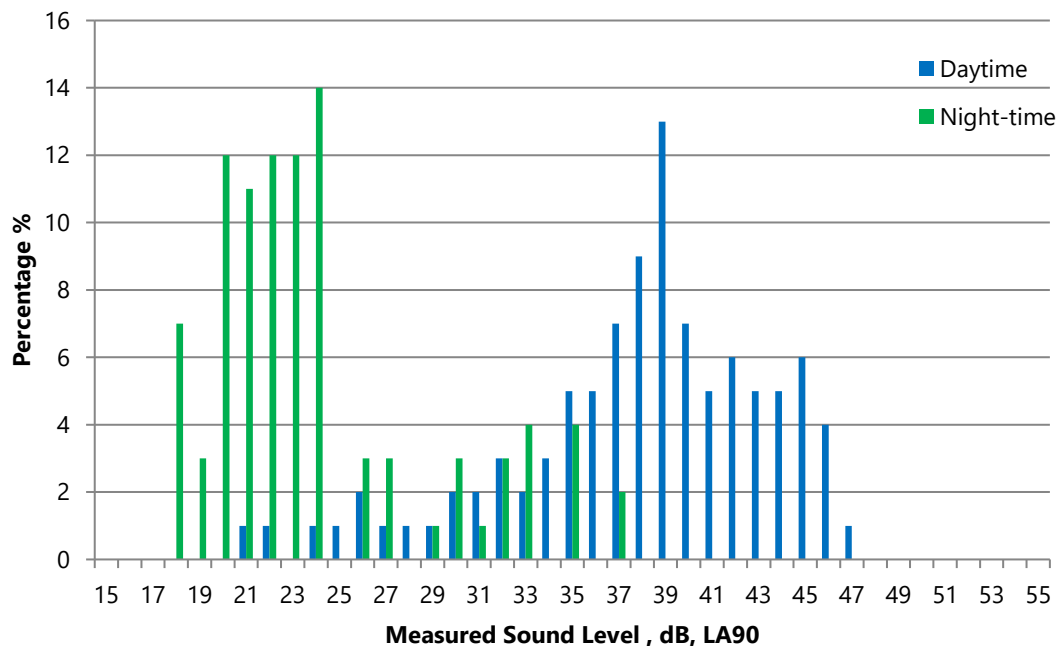
**Chart 28: Background Noise Levels – ML28**



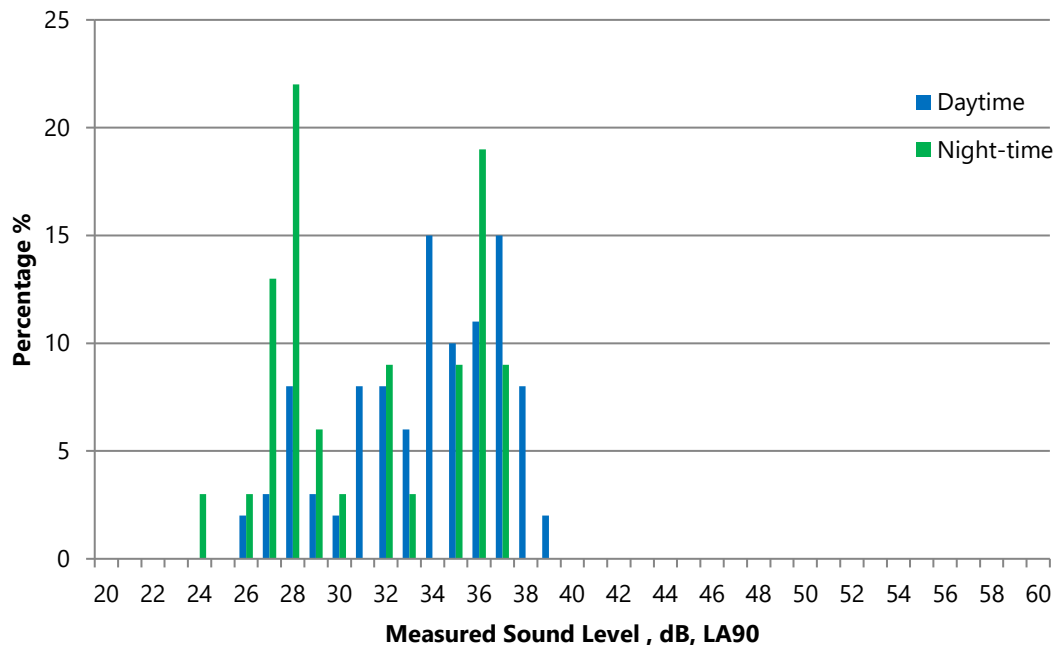
**Chart 29: Background Noise Levels – ML29**



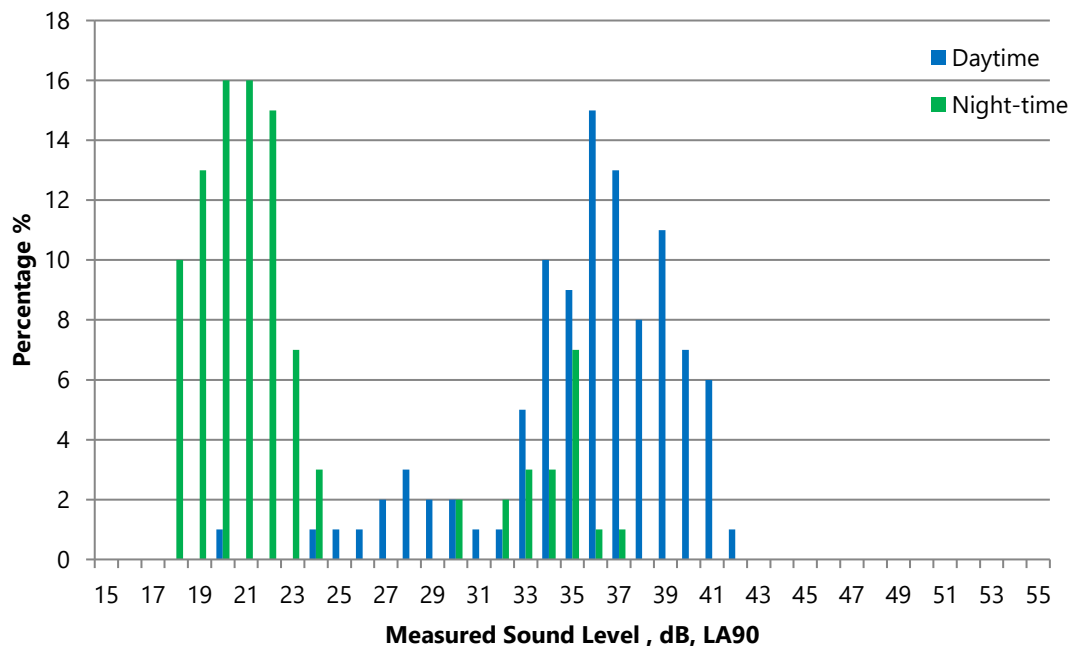
**Chart 30: Background Noise Levels – ML30**



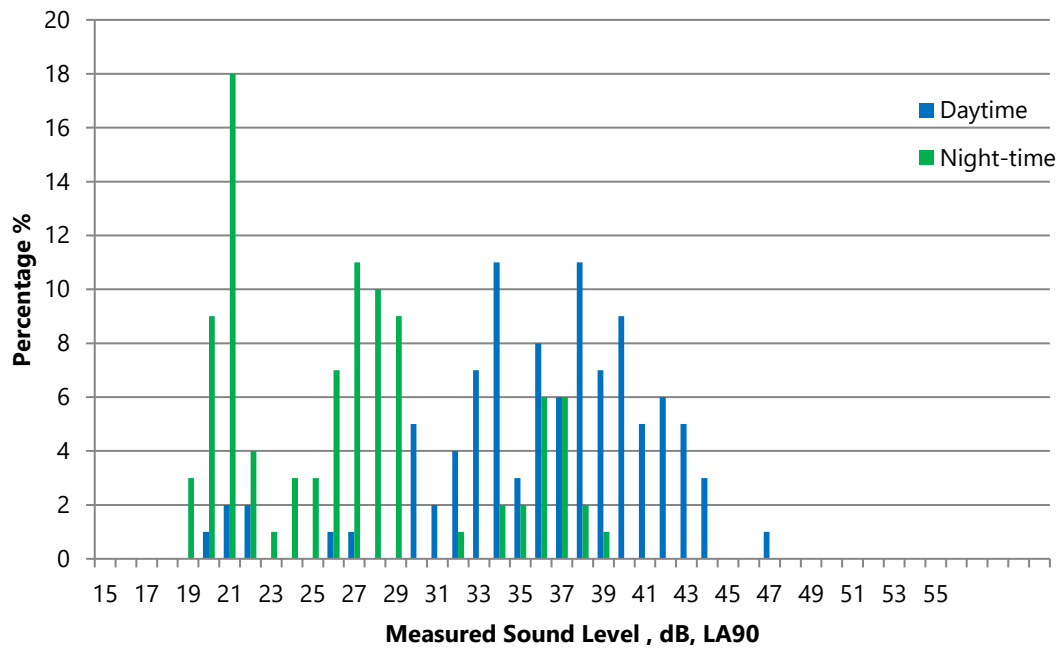
**Chart 31: Background Noise Levels – ML31**



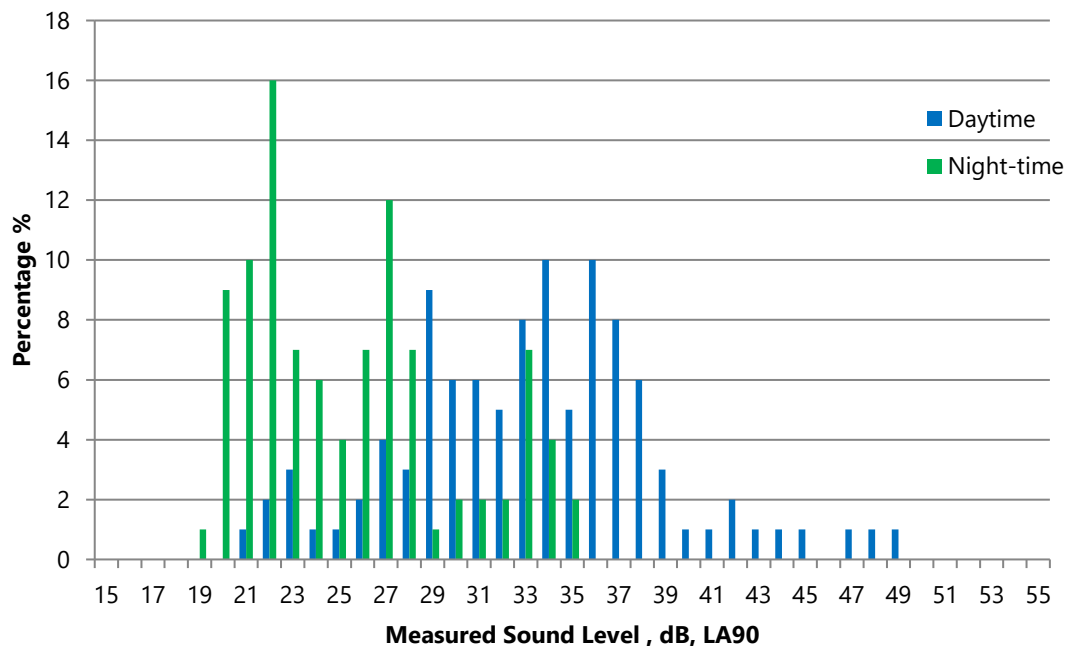
**Chart 32: Background Noise Levels – ML32**



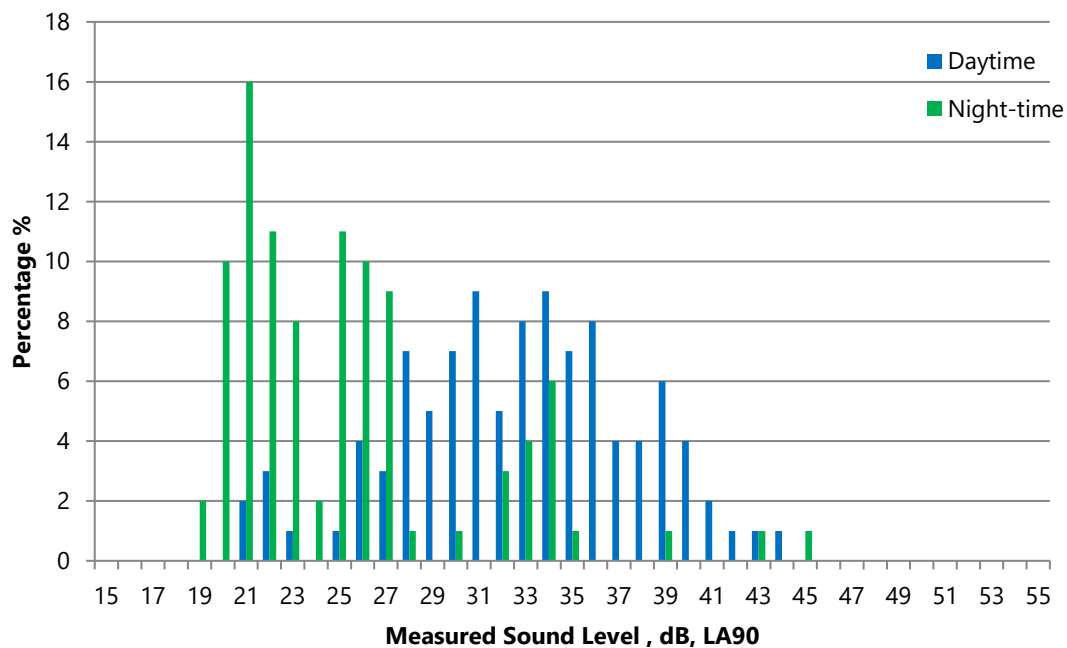
**Chart 33: Background Noise Levels – ML33**



**Chart 34: Background Noise Levels – ML34**



**Chart 35: Background Noise Levels – ML35**



- 23 When determining representative daytime and night-time levels for assessment purposes, BS 4142 advises against assuming that it can be determined using any single approach.
- 24 Table A12.1.2 below presents the mean, median and mode average recorded during daytime and night-time periods at each monitoring location. These levels were considered along with Charts 1 – 35 to determine the representative background level.

**Table A12.1.2: Representative Background Levels**

Monitoring Location	Period	Mode	Median	Mean	Representative
ML1	Daytime	59	55	54	54
	Night-time	40/41/45	44	45	40
ML2	Daytime	44	43	41	41
	Night-time	33	35	36	33
ML3	Daytime	49	49	48	48
	Night-time	39/41	40	40	39
ML4	Daytime	40	38	36	36
	Night-time	36	35	33	33
ML5	Daytime	43	43	42	42
	Night-time	34/35/45	35	37	34
ML6	Daytime	50	48	46	46
	Night-time	37/38	39	40	37



Monitoring Location	Period	Mode	Median	Mean	Representative
ML7	Daytime	42	41	39	39
	Night-time	36	34	34	34
ML8	Daytime	45	42	41	41
	Night-time	31	33	34	31
ML9	Daytime	46	44	42	42
	Night-time	33	34	36	33
ML10	Daytime	50	46	46	46
	Night-time	33/36	36	37	33
ML11	Daytime	44	42	40	40
	Night-time	28	31	33	28
ML12	Daytime	47	46	47	46
	Night-time	35	41	39	35
ML13	Daytime	48	47	43	43
	Night-time	30	33	35	30
ML14	Daytime	43	42	40	40
	Night-time	29	30	33	29
ML15	Daytime	52	49	47	47
	Night-time	33	35	37	33
ML16	Daytime	40	40	39	39
	Night-time	27	31	32	27
ML17	Daytime	45	43	42	42
	Night-time	34	34	35	34
ML18	Daytime	37	40	40	37
	Night-time	33	35	35	33
ML19	Daytime	42	43	43	42
	Night-time	34	35	33	33
ML20	Daytime	49	46	45	45
	Night-time	36	36	37	36
ML21	Daytime	39	40	40	39
	Night-time	31	35	35	31
ML22	Daytime	40	40	40	40
	Night-time	33	33	34	33
ML23	Daytime	40	42	42	40

Monitoring Location	Period	Mode	Median	Mean	Representative
	Night-time	38	38	38	33
ML24	Daytime	38	39	39	38
	Night-time	34	34	33	33
ML25	Daytime	34	39	38	34
	Night-time	27	28	28	27
ML26	Daytime	32	35	35	32
	Night-time	28	30	30	28
ML27	Daytime	33	38	38	33
	Night-time	27	32	32	27
ML28	Daytime	33	34	35	33
	Night-time	31	29	28	28
ML29	Daytime	37	38	39	37
	Night-time	32	32	31	31
ML30	Daytime	39	39	38	38
	Night-time	24	23	24	23
ML31	Daytime	37	34	34	34
	Night-time	28	31	31	28
ML32	Daytime	36	36	36	36
	Night-time	21	21	23	21
ML33	Daytime	38	37	36	36
	Night-time	21	27	27	21
ML34	Daytime	36	34	33	33
	Night-time	22	25	26	22
ML35	Daytime	34	33	33	33
	Night-time	21	25	25	21

25 Having reviewed the charts, a narrow spread of data at ML23 during night-time periods was found, indicating that an external source impacted the results at this location. As a conservative measure, the representative night-time noise level at ML23 has therefore been taken from the nearest adjacent measurement locations ML22 and ML24, where a level of 33 dB was considered representative

26 In all cases, the representative noise level is assumed to be the lowest of the mean, median or mode average.

- 27 As can be seen, noise levels toward the eastern side of the site (approx. ML1 – ML19) are typically higher than those to the west due to the proximity of the A1 dual carriageway road and East Coast Main Line railway.