Cambois Connection – Onshore Scheme

Environmental Statement Volume 3

Technical Appendix 13.1: Baseline Noise Assessment

sse Renewables

Cambois Connection Onshore Scheme

Technical Appendix 13.1: Baseline Noise Assessment

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Basis of Report

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1.0 Introduction

SLR has been appointed by SSE Renewables Developments Ltd to provide a Noise and Vibration impact assessment for the proposed Cambois Connection for the Berwick Bank Offshore Wind Farm. This Appendix provides the details of the environmental sound surveys undertaken to characterise the baseline sound environment at the development site, before presenting the baseline values established.

The existing baseline sound environment has been determined by a number of attended and unattended baseline sound surveys, the proposed locations of which were presented Northumberland County Council (NCC)in the scoping report, along with the proposed assessment methodologies.

1.1 Proposed Development and the Site

Berwick Bank Wind Farm Limited (BBWFL) is a wholly owned subsidiary of SSE Renewables (SSER) (hereafter referred to as 'the Applicant'). The Applicant is proposing the development of Offshore Export Cables, Onshore Export Cables, an Onshore Converter Station and associated grid connection at Blyth in Northumberland, known as 'the 'Project'). The onshore components of the Project, landward of Mean Low Water Springs (MLWS) comprise the Onshore Scheme, which is the subject of this Environmental Statement (ES).

The purpose of this infrastructure is to facilitate the export of green energy from the generation assets associated with the Berwick Bank Wind Farm (BBWF), located in the outer Firth of Forth. A separate application for developing a grid connection to Branxton, East Lothian, has been included as part of the Applicant's application for consent for BBWF, currently being determined separately[1]. The Project will enable the BBWF to reach full generating capacity by the early 2030's.

The Project comprises two distinct proposals, or 'Schemes', which will require three separate consents. For the Onshore Scheme (all activities and infrastructure landward of MLWS) consent will be sought via a planning application to NCC as the local planning authority (LPA) under Section 57 of the Town and Country Planning Act 1990.

The offshore components of the Project seaward of Mean High Water Springs (MHWS) ('the Marine Scheme') are located within both Scottish and English waters. In Scotland, the Marine Scheme is entirely within offshore waters (i.e., between the 12 nautical miles (nm) limit and the Scottish Exclusive Economic Zone). In England, the Marine Scheme is within offshore waters and inshore waters.

A preliminary site survey boundary (the Site) has been established which would allow for survey and design evolution of the ongoing scheme.

The Site comprises land east of the A189, East Sleekburn, Northumberland. The Site boundary totals approximately 700 hectares (ha) of land which is under varying land use including the former Blyth Power Stations, industrial plots, marine and rail networks, residential development and farmland.

Site boundaries include the North Sea to the East, the River Blyth Estuary to the south, the A189 to the west and Cambois village to the north.

[1] BBWF is subject to a separate consenting process. An application for consent under Section 36 of the Electricity Act 1989 (as amended) was submitted to MS-LOT and accepted in December 2022. The Branxton onshore infrastructure is subject to a separate planning application submitted to East Lothian Council and accepted in March 2023.

2.0 Relevant Standards and Guidance

A summary of the guidance and standards relevant for the characterise the baseline sound environment and associated assessments at the development site are provided below.

2.1 British Standard 7445-1:2003

The aim of British Standard 7445-1:2003 *Description and measurement of environmental noise – Part 1: Guide to quantities and procedures* (BS 7445-1) is to provide authorities with material for the description of noise in community environments. Based on the principles described in this British Standard, acceptable limits of noise can be specified and compliance with these limits can be controlled.

This British Standard does not specify limits for environmental noise but gives guidance on;

- the type of instrumentation which should be used to determine environmental sound levels;
- sound measurement positions both internal and external;
- the meteorological conditions which will affect the measurement of sound levels;
- the procedures necessary for determining acoustic metrics such as equivalent continuous sound pressure levels ($L_{Aeq,T}$) and percentile levels ($L_{AN,T}$) ; and
- the information which should be recorded during the sound surveys for reference purposes.

2.2 British Standard 5228-1:2009+A1:2014

The impact of construction noise from sources, arising from the Project, upon residential receptors will be determined with reference to British Standard 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise* (BS 5228-1).

BS 5228-1 sets out a methodology for predicting noise levels arising from a wide variety of construction and related activities and contains tables of sound power levels generated by a wide variety of mobile and fixed plant equipment.

BS 5228-1 gives several examples of acceptable noise limits for construction or demolition noise. For this assessment, as baseline sound data is available, it is proposed that the ABC method will be used to determine the threshold value at the receptor locations.

Under the ABC method, a threshold value noise level is determined by establishing the existing ambient sound level at each location. This measured ambient sound level is then rounded to the nearest whole 5 dB(A), and the threshold noise value for each receptor is then established from Table E.1 of BS 5228-1. This threshold value is the $L_{Aeq,T}$ noise level that should not be exceeded at the receptor location by operations at the site.

If the threshold value is exceeded, then the effect of construction noise upon nearby receptors may be significant. BS 5228-1 states that the significance of the effect will depend upon *"other project-specific factors, such as the number of receptors affected and the duration and character of the impact."* Professional judgement will be used to determine whether an effect is considered to be significant, and commentary explaining the reasons for this judgement will be provided. In accordance with this method, the threshold noise levels for a potentially significant effect are as detailed in Table A.

Table A: Construction Noise Residential Receptors – Example Threshold Values

Assessment Category and Threshold Value Period	Threshold Value in Decibels (dB)		
	Category A[A)]	Category B[B)]	Category C[C)]
Night-time (23:00-07:00)	45	50	55
Evenings and weekends [D)]	55	60	65
Daytime (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75

[A)] Category A: threshold values to use when ambient sound levels (when rounded to the nearest 5dB) are less than these values.

[B)] Category B: threshold values to use when the ambient sound levels (when rounded to the nearest 5dB) are the same as category A values.

[C)] Category C: threshold values to use when the ambient sound levels (when rounded to the nearest 5dB) are higher than category A values.

[D)] 19:00-23:00 weekdays, 13:00-23:00 Saturdays and 07:00-23:00 Sundays.

2.3 British Standard 4142:2014+A1:2019

The impact of operational noise from the proposed converter station on residential receptors will be determined with reference to British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142).

BS 4142 provides guidance on assessing the potential adverse impact of sound, of an industrial and/or commercial nature, at nearby residential receptor locations within the context of the existing sound environment.

BS 4142 gives definitions for several terms relating to sound level parameters:

- Ambient sound: “totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far”.
- Specific sound: sound level produced by the sound source being assessed at the assessment location.
- Residual sound level: “ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound”.

Where the specific sound contains tonality, impulsivity and/or other sound characteristics, corrections should be applied depending on the perceptibility. For tonality, a correction of up to 6 dB should be added; for impulsivity, a correction of up to 9 dB should be added, and if the sound contains identifiable operational and non-operational periods that are readily distinguishable against the existing sound environment (i.e., intermittency), a correction of 3 dB should be applied.

In addition, if the sound contains specific sound features which are neither tonal, impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a further correction of 3 dB should be added.

The assessment of impacts contained in BS 4142 is undertaken by comparing the rating level, i.e., the specific sound level of the source plus any character corrections, to the measured background sound at a location representative of the assessment location. Consideration is then given to the context of the existing sound environment at the sensitive receptor location to assess the potential impact.

Once an initial estimate of the impact is determined, by subtracting the measured background sound level from the rating level, BS 4142 states that the following should be considered:

- Typically, the greater the difference, the greater the magnitude of the impact;
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. It is an indication that the specific sound source has a low impact when the rating level does not exceed the background sound level, depending on the context.

BS 4142 outlines guidance for the consideration of the context of the potential impact, including consideration of the existing residual and background sound levels, location and/or absolute sound levels.

3.0 Local Planning Authority Consultation

3.1 Northumberland County Council

The sound monitoring locations and methodology were proposed within the Scoping Report submitted to Northumberland County Council (ref. 22/04118/SCOPE).

Both within the Scoping Opinion provided by the Local Planning Authority and the response to the Scoping Report, no survey locations or methodologies were requested in addition to those detailed below.

4.0 Baseline Sound Survey

The existing baseline sound environment has been determined by a number of attended and unattended baseline sound surveys. For the purposes of the ES chapter, the study area for the baseline sound environment has been divided in to two separate sections: Landfall and Converter Station. The measurement locations within the Converter Station section will also be considered as part of the cable route construction noise assessments, as appropriate.

4.1 Survey Locations

4.1.1 Landfall Locations

The final location of the landfall is still to be determined but will be located within the wider landfall corridor. Baseline sound levels have been monitored at two locations, described in Table B below, identified on Figure 4-1 (a reproduction of Figure 13.2 (Volume 4)), with photographs of the installations in Appendix B. The locations were selected based on a combination of their proximity to the proposed landfall corridor, equipment security, and access being granted.

Figure 4-1: Baseline Sound Survey Measurement Locations

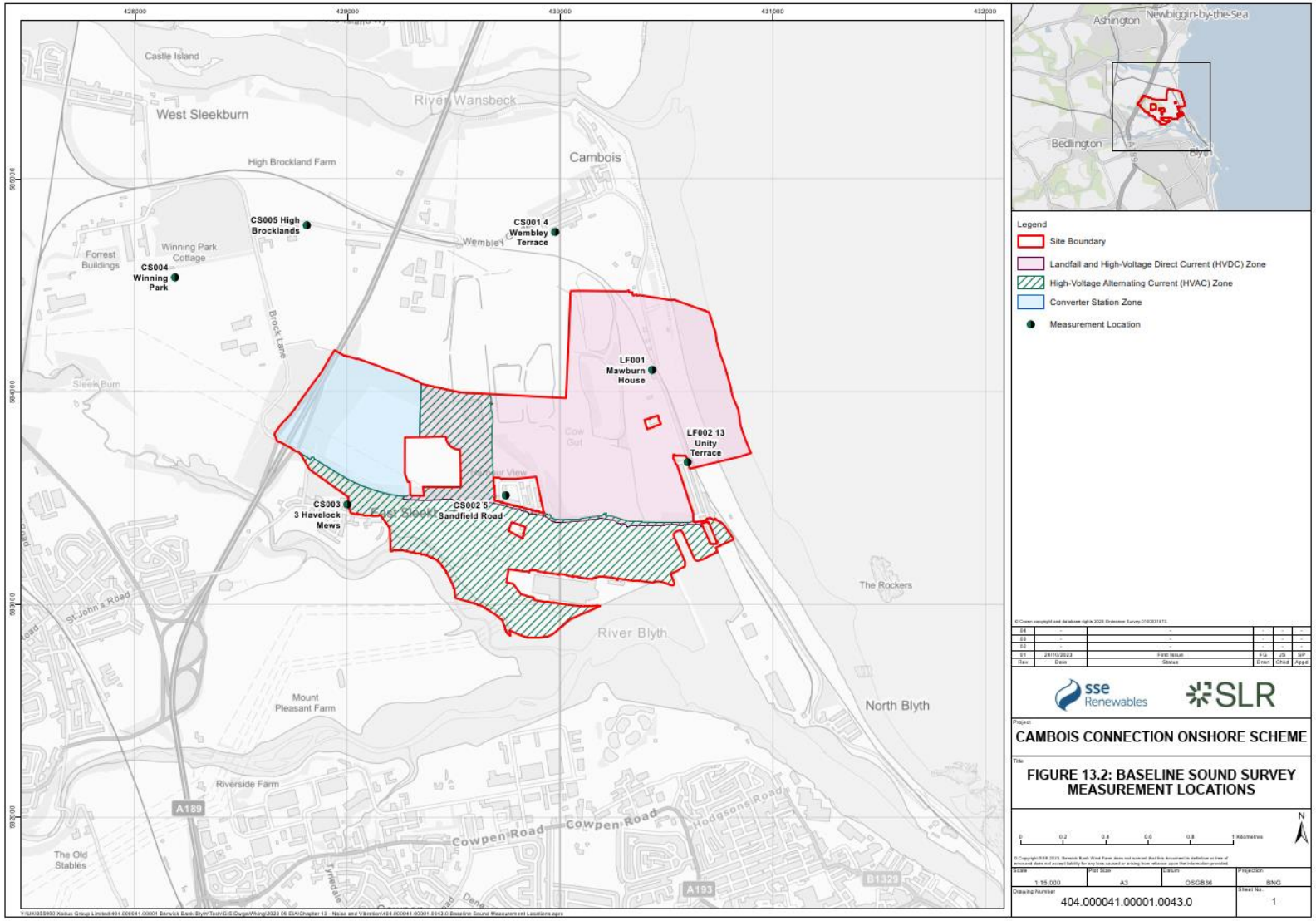


Table B: Baseline Sound Monitoring Locations - Landfall

Location ID	Description	OS Grid Ref	
LF001	Located in a lay-by to the north of Mawburn house. Representative of residential properties to the north of Landfall Area.	430433	584104
LF002	Located in the front garden of No. 13 Unity Terrace. Representative of residential properties to the south of Landfall Area.	430600	583670

4.1.2 Converter Station Locations

Baseline sound levels have been monitored at five locations around the converter station area, described in Table C below and identified on Figure 4-1, with photographs of the installations in Appendix B. The locations were selected based on a combination of their proximity to the proposed converter station location, equipment security, and access being granted.

Table C: Baseline Sound Monitoring Locations – Converter Station

Location ID	Description	OS Grid Ref	
CS001	Located in the rear garden of No. 4 Wembley Terrace. Representative of residential properties to the north of site boundary.	429977	584753
CS002	Within the garden of No. 7 Sandfield Road. Representative of residential properties to the east of the proposed Converter Station location.	429744	583514
CS003	Located in the rear garden of No. 3 Havelock Mews. Representative of residential properties to the south of the proposed Converter Station location.	428999	583471
CS004	In the garden of Winning Park Cottage. Representative of properties to the north-west of the proposed Converter Station location.	428188	584539
CS005	Located in a field to the east of High Brocklands. Representative of residential properties to the north-west of the site boundary.	428808	584784

4.2 Survey Equipment and Measurement Protocol

Sound pressure level measurements were carried out in accordance with BS 7445-1 and BS 4142 using the following equipment listed in Table D, conforming to Class 1 acoustic accuracy (as defined in IEC 61672-1:2013) for sound level meters and matched calibrators.

Table D: Sound Monitoring Equipment

Location ID	Description	Serial No.
LF001	Cirrus CR:171B Sound Level Meter	G301839
	Cirrus CR:515 Acoustic Calibrator	93674
LF002	Rion NL-52 Sound Level Meter	00710361
	Rion NC-74 Acoustic Calibrator	34713324
CS001	Cirrus CR:171B Sound Level Meter	G300561
	Cirrus CR:515 Acoustic Calibrator	87922

Location ID	Description	Serial No.
CS002	Rion NL-52 Sound Level Meter	00331823
	Rion NC-74 Acoustic Calibrator	34336013
CS003	Cirrus CR:171B Sound Level Meter	G0302667
	Cirrus CR:515 Acoustic Calibrator	94806
CS004	Rion NL-52 Sound Level Meter	00710359
	Rion NC-74 Acoustic Calibrator	34336013
CS005	Cirrus CR:171B Sound Level Meter	G301839
	Cirrus CR:515 Acoustic Calibrator	93674

The sound level meters were calibrated before the measurements using the handheld acoustic calibrator and the calibration was checked upon completion of the survey. No significant drift was observed with calibration offsets of ≤ 0.2 dB, within the maximum 0.5 dB drift considered suitable within BS 4142. The calibration chain is traceable via the United Kingdom Accreditation Service (UKAS) to National Standards held at the National Physical Laboratory, no greater than one year for sound calibrators and two years for sound level meters.

The calibration certificates for all the sound monitoring equipment utilised are shown in Appendix C.

At all monitoring locations, with the exception of LF002, the microphone was placed 1.5 m above the ground in conditions compliant with BS 4142, i.e., at least 3.5 m from the nearest vertical, reflecting surface with the following sound level indices being recorded. At LF002, due to the limited space in the accessible area where the equipment could be secured, measurements were undertaken at 1 m from the façade of 13 Unity Terrace. As noted in Table M, the dominant sources of environmental sound in this location included the sea and passing traffic, sound sources perpendicular to the façade of the property and therefore a -3 dB correction has been applied to the measured sound levels in accordance with the relevant guidance. This was considered the best method for reducing uncertainty, as BS 4142 advocates measurements at either at least 3.5 m from a façade or at approximately 1 m from a façade.

The following sound level indices were recorded at 15-minute intervals:

- $L_{Aeq,T}$ – The A-weighted equivalent continuous sound level over the measurement period; and
- $L_{A90,T}$ – The A-weighted sound level exceeded for 90% of the measurement period.

The measurement durations and protocols at the measurement locations were as follows:

- At LF001, the prevailing sound levels were measured in two 1-hour fully attended periods: 14:40-15:40 on 22 May 2023 and 09:30-10:30 on 23 May 2023, with sound levels being logged every minute.
- At LF002, CS002, and CS003 the prevailing sound levels were measured continuously between 16 May 2023 and 23 May 2023, with sound levels being logged every 15-minutes.
- At CS001 and CS004, the prevailing sound levels were measured continuously between 15 May 2023 and 22 May 2023, with sound levels being logged every 15-minutes.
- At CS005, the prevailing sound levels were measured continuously between 15 May 2023 and 19 May 2023, with sound levels being logged every 15-minutes.

4.3 Weather Conditions

The prevailing weather conditions were recorded using a Larson Davis weather station and a summary of the results are shown in Table E and in Appendix A: Sound Survey Results; the table also indicates which weather conditions were considered suitable – this is based on the guidance that environmental sound measurements should not be undertaken if wind speeds are above 5.0 m/s or during periods of prolonged precipitation.

The weather station was installed at a height of 1.5 m at Location CS003 as shown on Figure 4-1.

Table E: Summary of Weather Conditions

Date	Period	Average Temperature, °C	Average Wind Speed, m/s	Predominant Wind Direction	Precipitation, mm	Weather Conditions Suitable
15/05/2023	Daytime	13.8	0.0	-	0.0	Yes
	Evening	9.2	0.0	-	0.0	Yes
	Night-time	6.3	0.1	SE	0.0	Yes
16/05/2023	Daytime	14.8	0.6	SE	0.0	Yes
	Evening	9.8	0.0	-	0.0	Yes
	Night-time	8.5	0.0	-	0.0	Yes
17/05/2023	Daytime	13.7	0.0	-	0.0	Yes
	Evening	12.6	0.1	SW	0.0	Yes
	Night-time	10.7	0.0	-	0.0	Yes
18/05/2023	Daytime	15.8	0.1	SW	0.0	Yes
	Evening	14.2	0.3	SW	0.0	Yes
	Night-time	11.5	0.1	SW	0.0	Yes
19/05/2023	Daytime	15.4	0.0	-	0.0	Yes
	Evening	10.2	0.0	-	0.0	Yes
	Night-time	6.7	0.0	-	0.0	Yes
20/05/2023	Daytime	14.9	0.2	WSW	0.0	Yes
	Evening	11.8	0.1	WSW	0.0	Yes
	Night-time	9.6	0.0	-	0.0	Yes
21/05/2023	Daytime	17.1	0.0	-	0.0	Yes
	Evening	10.9	0.0	-	0.0	Yes
	Night-time	6.8	0.0	-	0.0	Yes
22/05/2023	Daytime	14.2	0.1	SE	0.0	Yes
	Evening	10.4	0.0	-	0.0	Yes
	Night-time	8.7	0.0	-	0.0	Yes
23/05/2023	Daytime	13.2	0.0	-	0.0	Yes

Table E provides a summary of the measured prevailing weather conditions; however, the results have also undergone a more detailed analysis where each 15-minute monitoring period was considered, based on this analysis the weather conditions through the whole duration of the survey were suitable for undertaking environmental sound measurements.

4.4 Measurement Results

4.4.1 Summaries of Results

Summaries of the survey results are included in Table F to Table L and time series plots are shown in Appendix A: Sound Survey Results.

It should be noted that the survey results have been divided into daytime (07:00 to 19:00), evening (19:00 to 23:00) and night-time (23:00 to 07:00) periods and daytime (07:00 to 23:00) and night-time (23:00 to 07:00) periods to be consistent with BS 5228-1 (construction noise) and BS 4142 (operational noise) respectively. The median background sound level ($L_{A90,T}$) is shown as a point of comparison between the measurement periods.

Table F: Summary of Baseline Survey Results – Location LF001

Date	Period	$L_{Aeq,T}$	Median $L_{A90,T}$
22/05/2023	14:40-15:40	51	47
23/05/2023	09:30-10:30	48	37

Table G: Summary of Baseline Survey Results – Location LF002

Date	Period	BS 5228		BS 4142	
		$L_{Aeq,T}$	Median $L_{A90,T}$	$L_{Aeq,T}$	Median $L_{A90,T}$
16/05/2023	Daytime	52	41	48	32
	Evening	48	32		
	Night-time	44	28	44	28
17/05/2023	Daytime	54	42	53	40
	Evening	49	34		
	Night-time	47	34	47	34
18/05/2023	Daytime	52	41	51	40
	Evening	47	31		
	Night-time	45	31	45	31
19/05/2023	Daytime	52	35	51	35
	Evening	49	35		
	Night-time	46	36	46	36
20/05/2023	Daytime	54	39	54	39
	Evening	54	39		
	Night-time	46	36	46	36
21/05/2023	Daytime	50	38	50	38
	Evening	49	42		
	Night-time	49	46	49	46
22/05/2023	Daytime	51	45	51	44
	Evening	49	44		
	Night-time	46	38	46	38
23/05/2023	Daytime	52	37	52	37

Table H: Summary of Baseline Survey Results – Location CS001

Date	Period	BS 5228		BS 4142	
		$L_{Aeq,T}$	Median $L_{A90,T}$	$L_{Aeq,T}$	Median $L_{A90,T}$
15/05/2023	Daytime	51	38	49	38
	Evening	43	39		
	Night-time	54	38	54	38
16/05/2023	Daytime	52	44	51	44
	Evening	45	38		
	Night-time	49	37	49	37
17/05/2023	Daytime	51	42	53	42
	Evening	57	42		
	Night-time	49	38	49	38
18/05/2023	Daytime	48	41	52	41
	Evening	56	42		
	Night-time	50	38	50	38
19/05/2023	Daytime	52	38	51	38
	Evening	43	39		
	Night-time	50	40	50	40
20/05/2023	Daytime	52	41	52	41
	Evening	54	41		
	Night-time	49	39	49	39
21/05/2023	Daytime	55	40	54	39
	Evening	50	39		
	Night-time	56	43	56	43
22/05/2023	Daytime	53	41	53	41

Table I: Summary of Baseline Survey Results – Location CS002

Date	Period	BS 5228		BS 4142	
		$L_{Aeq,T}$	Median $L_{A90,T}$	$L_{Aeq,T}$	Median $L_{A90,T}$
16/05/2023	Daytime	48	40	47	40
	Evening	46	35		
	Night-time	42	30	42	30
17/05/2023	Daytime	51	43	50	41
	Evening	45	36		
	Night-time	44	31	44	31
18/05/2023	Daytime	50	40	50	39
	Evening	51	35		
	Night-time	45	32	45	32
19/05/2023	Daytime	48	40	48	38
	Evening	45	36		
	Night-time	45	39	45	39
20/05/2023	Daytime	60	40	59	40
	Evening	47	38		
	Night-time	44	34	44	34
21/05/2023	Daytime	50	38	49	37
	Evening	45	36		
	Night-time	48	42	48	42
22/05/2023	Daytime	54	41	53	40
	Evening	44	37		
	Night-time	49	41	49	41
23/05/2023	Daytime	50	39	50	39

Table J: Summary of Baseline Survey Results – Location CS003

Date	Period	BS 5228		BS 4142	
		$L_{Aeq,T}$	Median $L_{A90,T}$	$L_{Aeq,T}$	Median $L_{A90,T}$
16/05/2023	Daytime	50	46	49	45
	Evening	45	38		
	Night-time	46	33	46	33
17/05/2023	Daytime	51	42	50	41
	Evening	47	40		
	Night-time	46	32	46	32
18/05/2023	Daytime	49	40	48	40
	Evening	44	40		
	Night-time	47	31	47	31
19/05/2023	Daytime	50	43	50	41
	Evening	48	38		
	Night-time	49	38	49	38
20/05/2023	Daytime	51	41	50	41
	Evening	47	39		
	Night-time	48	36	48	36
21/05/2023	Daytime	50	39	50	39
	Evening	49	39		
	Night-time	48	39	48	39
22/05/2023	Daytime	51	46	52	45
	Evening	54	41		
	Night-time	47	39	47	39
23/05/2023	Daytime	51	41	51	41

Table K: Summary of Baseline Survey Results – Location CS004

Date	Period	BS 5228		BS 4142	
		$L_{Aeq,T}$	Median L_{A90}	$L_{Aeq,T}$	Median L_{A90}
16/05/2023	Daytime	53	43	51	35
	Evening	50	40		
	Night-time	52	32	47	31
17/05/2023	Daytime	59	45	56	43
	Evening	53	40		
	Night-time	54	33	50	37
18/05/2023	Daytime	53	42	54	43
	Evening	51	39		
	Night-time	56	31	48	34
19/05/2023	Daytime	54	42	54	38
	Evening	51	41		
	Night-time	55	38	49	39
20/05/2023	Daytime	53	46	57	42
	Evening	49	44		
	Night-time	50	37	49	39
21/05/2023	Daytime	51	41	53	41
	Evening	50	38		
	Night-time	49	36	52	49
22/05/2023	Daytime	52	42	54	47

Table L: Summary of Baseline Survey Results – Location CS005

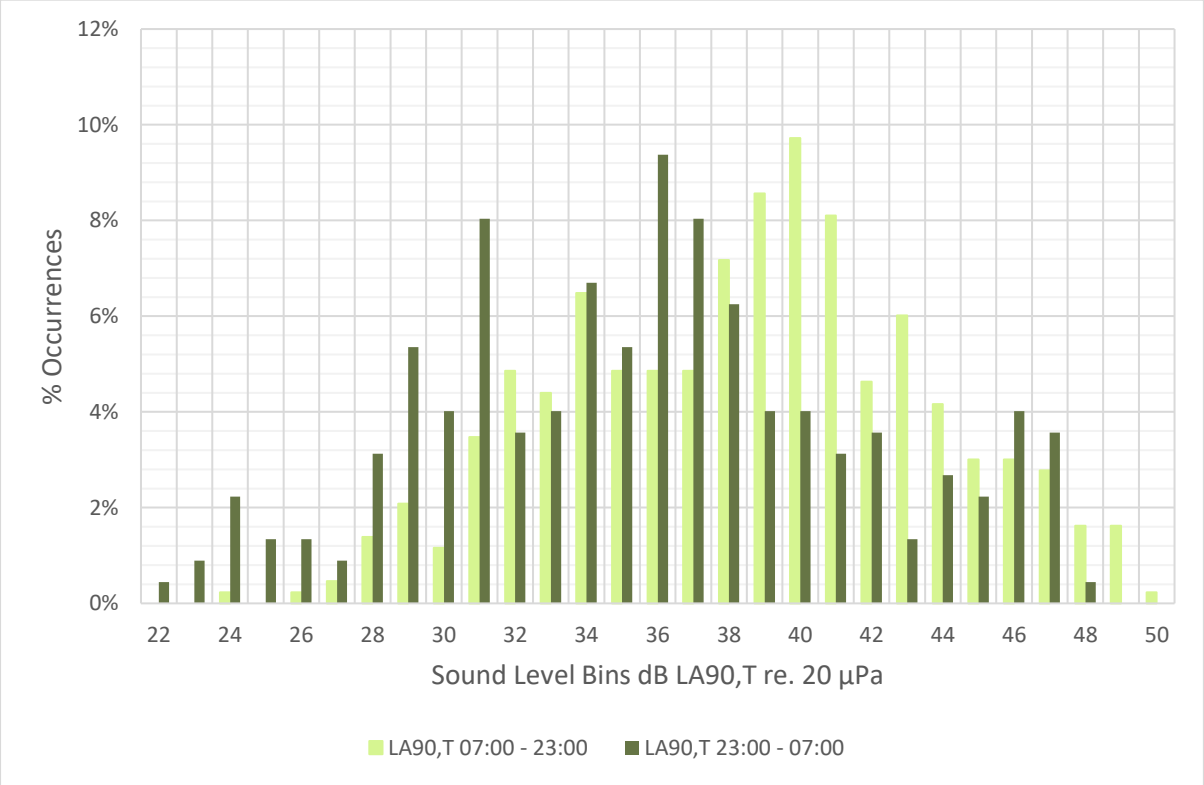
Date	Period	BS 5228		BS 4142	
		$L_{Aeq,T}$	Median L_{A90}	$L_{Aeq,T}$	Median L_{A90}
15/05/2023	Daytime	65	53	62	47
	Evening	59	46		
	Night-time	59	35	59	35
16/05/2023	Daytime	65	45	64	46
	Evening	60	47		
	Night-time	59	35	59	35
17/05/2023	Daytime	65	53	64	50
	Evening	61	45		
	Night-time	58	34	58	34
18/05/2023	Daytime	64	48	64	47
	Evening	59	44		
	Night-time	58	34	58	34
19/05/2023	Daytime	65	51	64	50
	Evening	62	49		
	Night-time	58	40	58	40

4.4.2 Histograms of Day / Night Background Sound Levels

Histograms of the daytime (07:00 to 23:00) and night-time (23:00 to 07:00) background sound levels from all long-term locations are shown in Figure 4-2 to Figure 4-7 below.

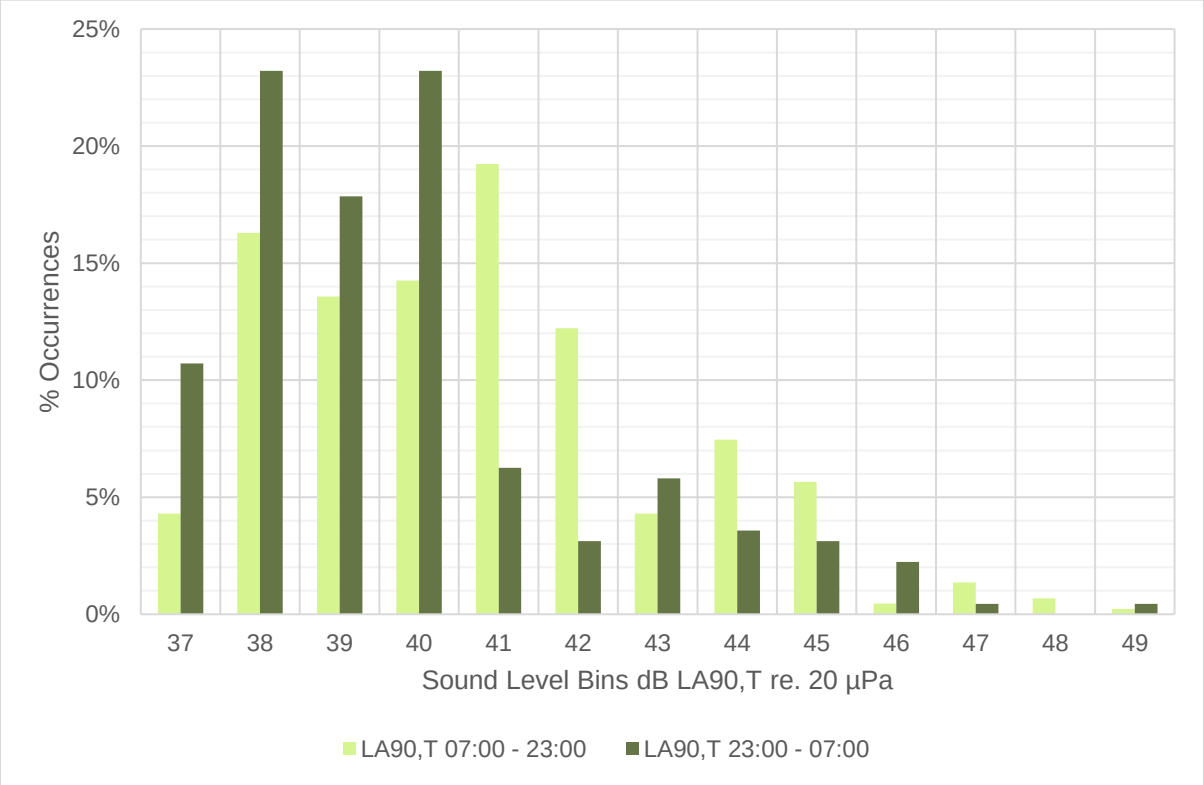
The histograms will be utilised to determine the representative background sound levels at the receptor locations for use in the operational BS 4142 assessment. As BS 4142 notes, *"A representative background sound level should account for the range of background sound levels and should not automatically be assumed to be either the minimum or the modal value"*. It is considered that a representative background sound level will fall between the 25th and 50th centiles and not be significantly less common than a neighbouring value. However, it is considered that a conservative (lower) representative background sound level within this range should be chosen so that, should periods where the background sound level is typically lower than the levels measured occur, the chosen representative background sound level can still be representative of those.

Figure 4-2: Histogram of Background Sound Levels, LF002



In Figure 4-2, the 25th centile values for daytime and night-time periods fall in the 34 and 31 dB $L_{A90,15min}$ bins respectively. These both fall within the predominant distribution of the background sound levels within their time periods and are not significantly less common than their neighbouring values, and so are considered suitable for the representative background sound level at this location.

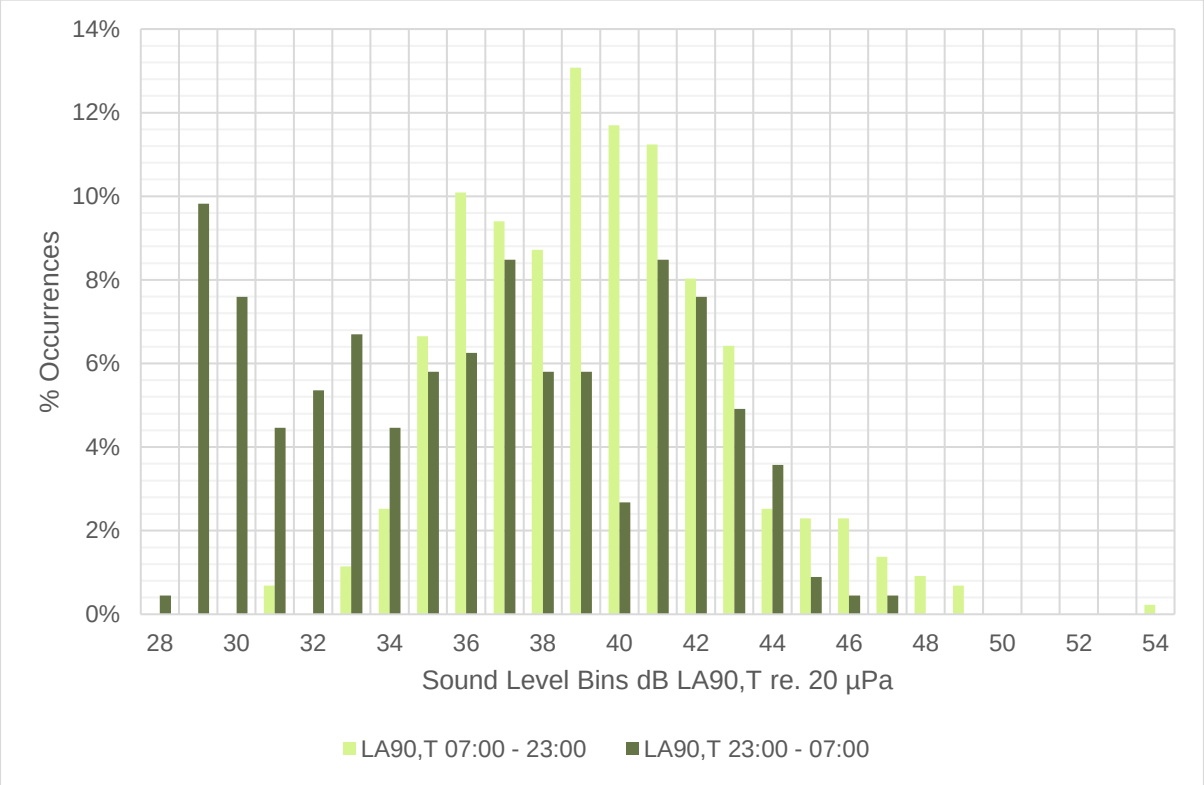
Figure 4-3: Histogram of Background Sound Levels, CS001



In Figure 4-3, the 25th centile values for daytime and night-time periods fall in the 39 and 38 dB $L_{A90,15min}$ bins respectively. These both fall within the predominant distribution of the background sound levels within their time periods and are not significantly less common than their neighbouring values, and so are considered suitable for the representative background sound level at this location.

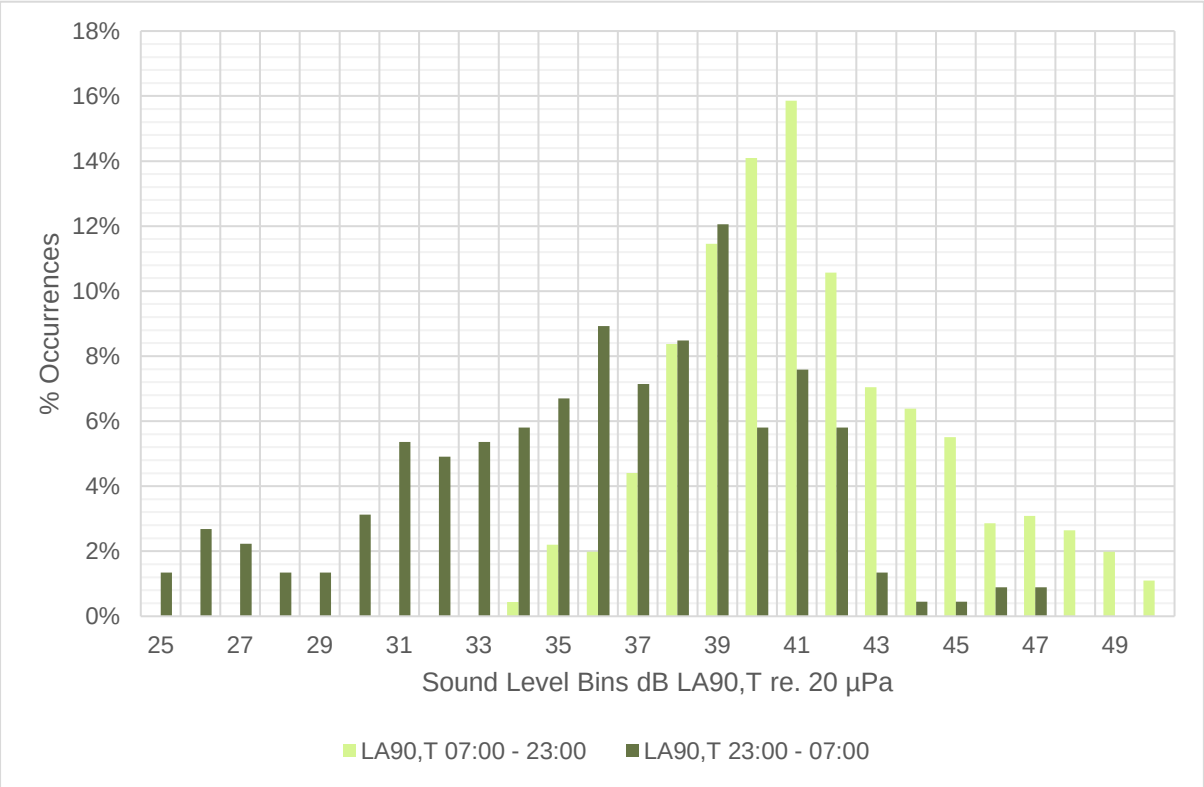
It is notable that the distribution of background sound levels is much smaller at this location than at others. This may be due to influence from the water feature that was audible on installation and decommission of the measurement equipment from the garden next door.

Figure 4-4: Histogram of Background Sound Levels, CS002



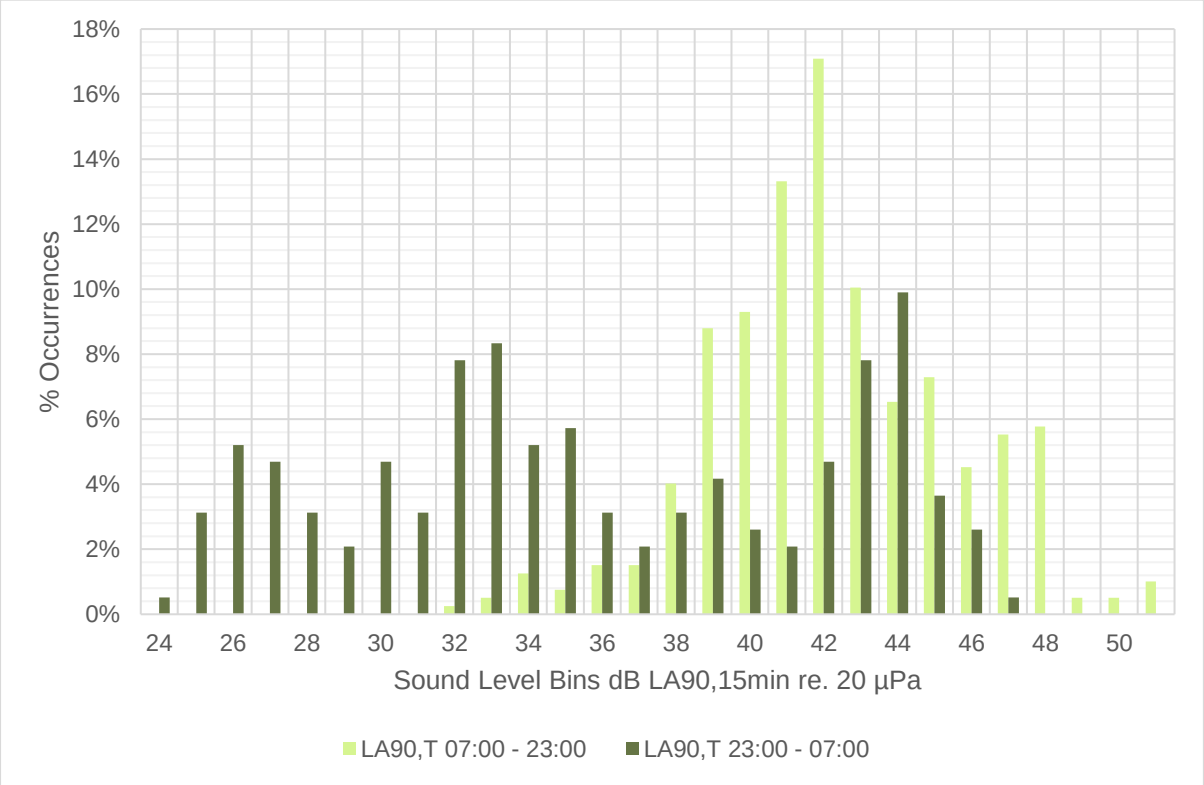
In Figure 4-3, the 25th centile values for daytime and night-time periods fall in the 37 and 32 dB $L_{A90,15min}$ bins respectively. These both fall within the predominant distribution of the background sound levels within their time periods and are not significantly less common than their neighbouring values, and so are considered suitable for the representative background sound level at this location.

Figure 4-5: Histogram of Background Sound Levels, CS003



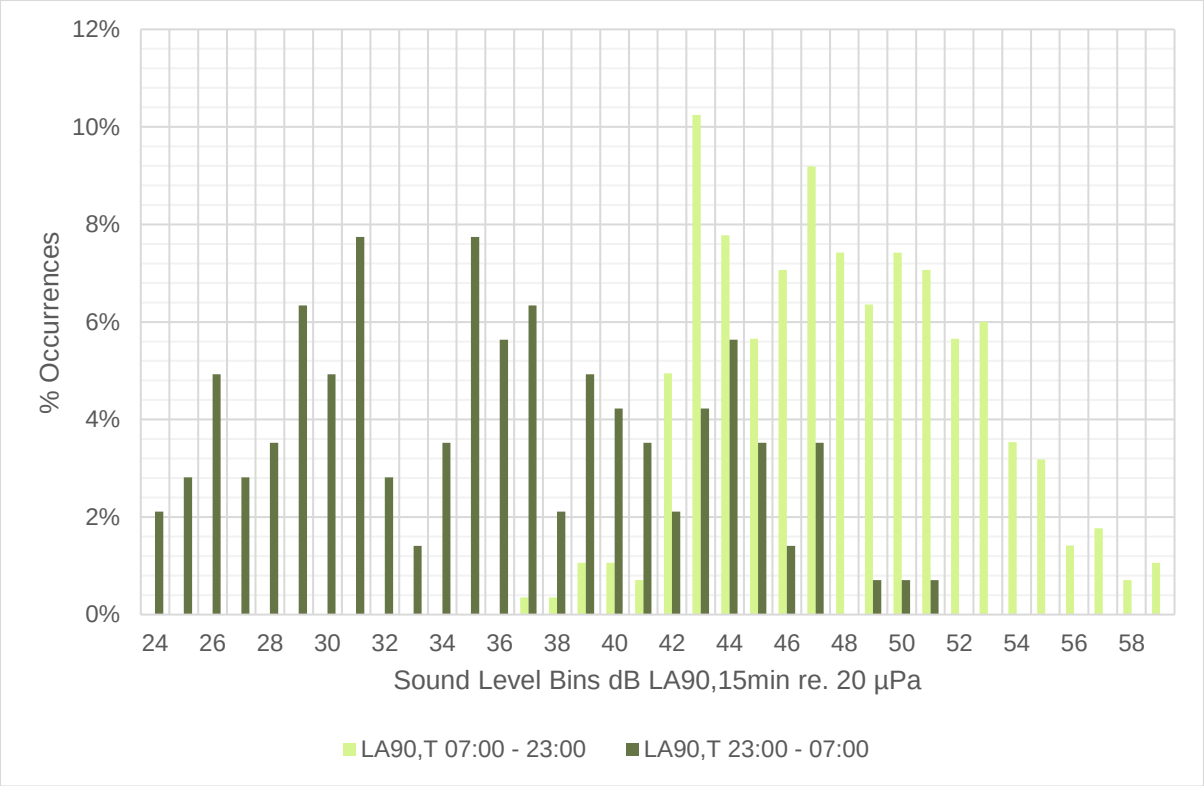
In Figure 4-5, the 25th centile values for daytime and night-time periods fall in the 39 and 33 dB $L_{A90,15min}$ bins respectively. These both fall within the predominant distribution of the background sound levels within their time periods and are not significantly less common than their neighbouring values, and so are considered suitable for the representative background sound level at this location.

Figure 4-6: Histogram of Background Sound Levels, CS004



In Figure 4-6, the 25th centile values for daytime and night-time periods fall in the 40 and 31 dB $L_{A90,15min}$ bins respectively. These both fall within the predominant distribution of the background sound levels within their time periods. While the 40 dB $L_{A90,15min}$ daytime value is less common than the 41 dB $L_{A90,15min}$ value, it is more common than the 39 dB $L_{A90,15min}$ value and is therefore considered suitable for the representative background sound level at this location during the daytime. However, the 31 dB $L_{A90,15min}$ night-time value is less common than it's neighbouring values, significantly so by the 32 dB $L_{A90,15min}$ value; therefore it is considered that 32 dB $L_{A90,15min}$ is more representative of the night-time background sound level.

Figure 4-7: Histogram of Background Sound Levels, CS005



In Figure 4-7, the 25th centile values for daytime and night-time periods fall in the 44 and 30 dB $L_{A90,15min}$ bins respectively. These both fall within the predominant distribution of the background sound levels within their time periods. While the 44 dB $L_{A90,15min}$ value is less common than the 43 dB $L_{A90,15min}$ value, selecting the lower value is considered to not be representative of enough of the data. The 44 dB $L_{A90,15min}$ value is more common than either the 45 or 46 dB $L_{A90,15min}$ value, and is therefore considered representative of the daytime background sound level. The 30 dB $L_{A90,15min}$ value is less common than both the 29 and 31 dB $L_{A90,15min}$ values, significantly so than the 31 dB $L_{A90,15min}$ value, which is therefore considered to be more representative of the night-time background sound level.

Acoustic Environment

The acoustic environment at the measurement locations was subjectively observed during equipment installation and collection and is shown in Table M.

Table M: Acoustic Environment

Location	Acoustic Environment
LF001	Waves swooshing, bird song and occasional passing traffic (approx. 15-20mph, 3-4 cars per minute) dominant sound sources. Area overall peaceful. High-altitude aircraft overhead and sound of sheet metal occasionally blowing in wind nearby.
LF002	Bird song dominant, waves audible but low. Occasional passing traffic (approx. 20 mph), high-altitude aircraft, and vegetation rustling in the wind. Neighbours talking, walking past and opening / closing doors.
CS001	Birdsong and vegetation rustling in the wind dominant. Small water feature in garden next door audible. Distant road traffic, occasional high-altitude aircraft.
CS002	Road traffic from the main road to south dominant (approx. 30-40 mph). Occasional banging from neighbouring garden and dog barking.
CS003	Bird song dominant, with construction noise and distant road traffic audible. Occasional high-altitude aircraft.
CS004	Bird song dominant, with noise from industrial estate (predominantly scrap yard) to north audible (banging, crashing, reversing alarms). Distant road traffic and wind through vegetation.
CS005	Road traffic dominant: non-steady local road traffic passing at approx. 40-50 mph and distant road traffic on A189. Bird song, occasional high-altitude aircraft, vegetation rustling in the wind, and nearby horses also audible.

5.0 Evaluation of the Baseline Sound Levels

5.1 BS 5228-1:2014 Construction Noise

The noise-sensitive receptors situated close to the construction areas would potentially be impacted by noise during construction operations, including trenchless drilling techniques. Therefore, it is necessary to evaluate the measured baseline levels in conjunction with the ABC Method contained in BS 5228-1 to calculate the construction noise threshold limits, which will be established within the Onshore Noise and Vibration chapter.

It is considered that all of the measurement locations, with the exception of CS005, were representative of the ambient sound environment at the receptor where construction or operational noise would be incident. However, at CS005, measurements were undertaken at approximately 8 m from the roadside (the dominant sound source), whereas construction and operational noise will be incident on the opposite façade of the property, some 32 m from the roadside. On this basis, an approximate 6 dB reduction in the sound level would be expected in the sound level at this receptor for the quadrupling of distance from a line source. This is reflected in the summary below.

The lowest measured average ambient level at each location during each time period is shown in Table N, the lowest value has been used to ensure a robust construction noise level limit will be chosen for that location.

Table N: Calculated construction noise threshold limits, dB

Location	Period	Lowest Measured Average Ambient Level $L_{Aeq,T}$
Noise sensitive receptors represented by LF001 & LF002	Daytime[1]	50
	Weekend / Evening[2]	47
	Night-time[3]	44
Noise sensitive receptors represented by CS001	Daytime	48
	Weekend / Evening	43
	Night-time	49
Noise sensitive receptors represented by CS002	Daytime	48
	Weekend / Evening	44
	Night-time	42
Noise sensitive receptors represented by CS003	Daytime	49
	Weekend / Evening	44
	Night-time	46
Noise sensitive receptors represented by CS004	Daytime	52
	Weekend / Evening	49
	Night-time	49
Noise sensitive receptors represented by CS005	Daytime	59
	Weekend / Evening	53
	Night-time	52

[1] 07:00-23:00 Monday-Friday and 07:00-13:00 Saturday

[2] 19:00-23:00 Monday-Friday, 13:00-23:00 Saturday, and 07:00-23:00 Sunday

[3] 23:00-07:00 Monday-Sunday

5.2 BS 4142:2014+A1:2019 Operational Noise

The representative daytime and night-time background sound levels (LA90,T) which will be utilised as the basis for the operational noise assessment of the converter station on the residential receptors are shown in Table O along with the lowest measured average residual sound level for day- and night-time periods. Representative background sound levels for the receptor locations have been selected from the histograms in Figure 4-2 to Figure 4-7.

Table O: Representative background sound levels, dB

Location	Period	Lowest Measured Average Residual Level $L_{Aeq,T}$	Representative Background Sound Level $L_{A90,T}$
Noise sensitive receptors represented by LF001 & LF002	Daytime[1]	48	34
	Night-time[2]	44	31
Noise sensitive receptors represented by CS001	Daytime	49	39
	Night-time	49	38
Noise sensitive receptors represented by CS002	Daytime	47	37
	Night-time	42	32
Noise sensitive receptors represented by CS003	Daytime	48	39
	Night-time	46	33
Noise sensitive receptors represented by CS004	Daytime	51	40
	Night-time	47	32
Noise sensitive receptors represented by CS005	Daytime	62	44
	Night-time	58	31

[1] 07:00-23:00 Monday-Sunday

[2] 23:00-07:00 Monday-Sunday

Appendix A Sound Survey Results

Figure A-1: Measured weather, Location CS003

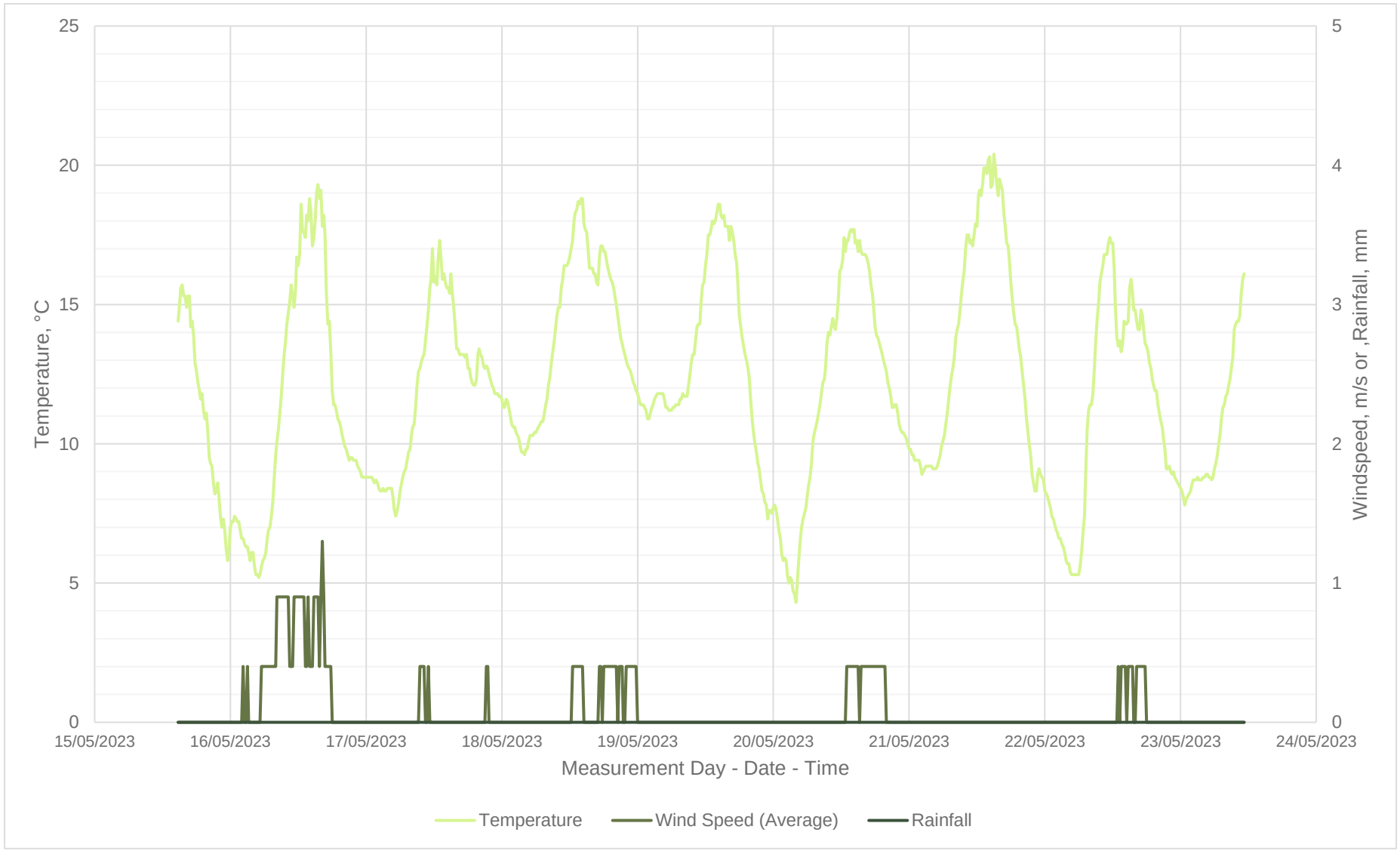


Figure A-2: Measured sound levels at Location LF001, 22nd May 2023

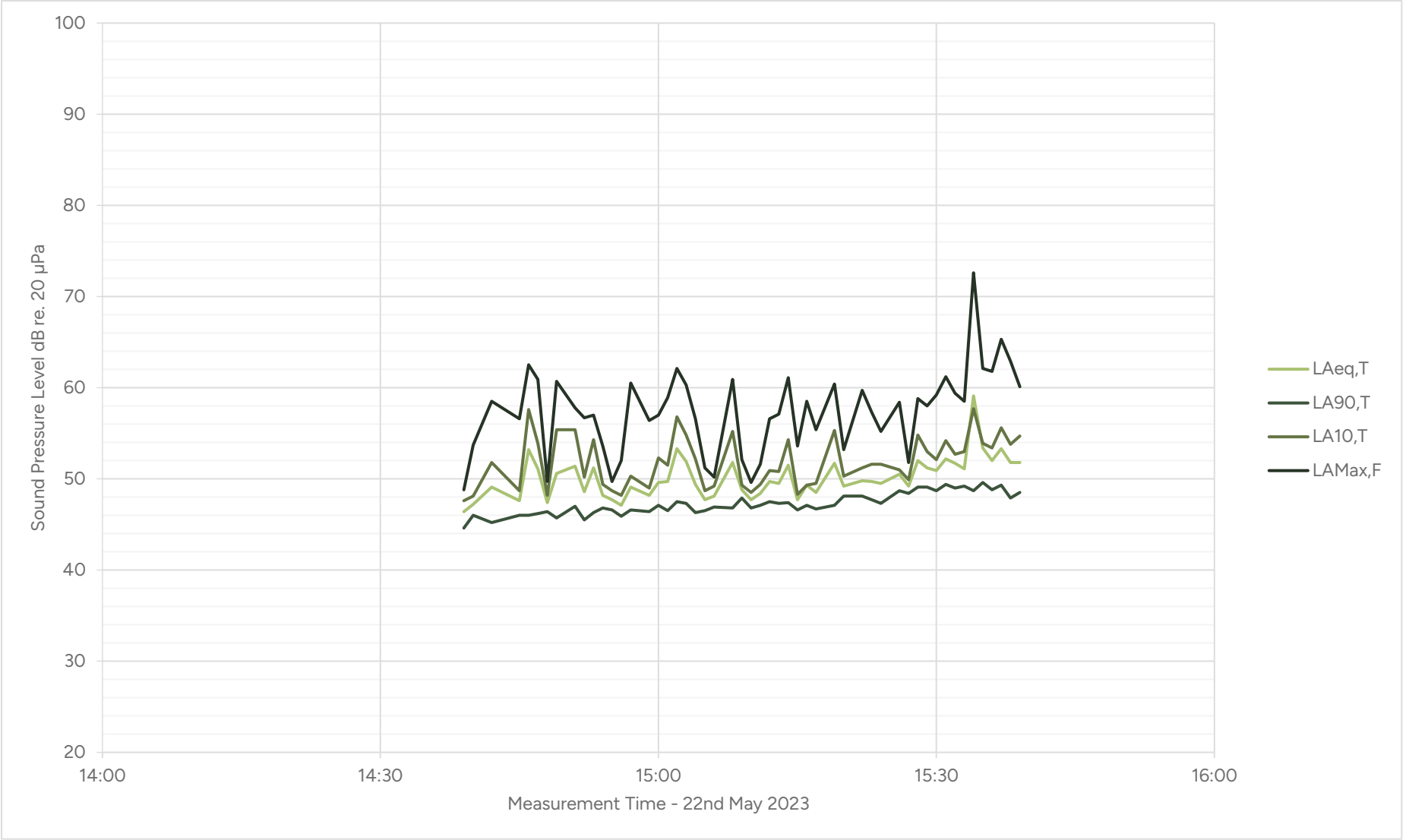


Figure A-3: Measured sound levels at Location LF001, 22nd May 2023

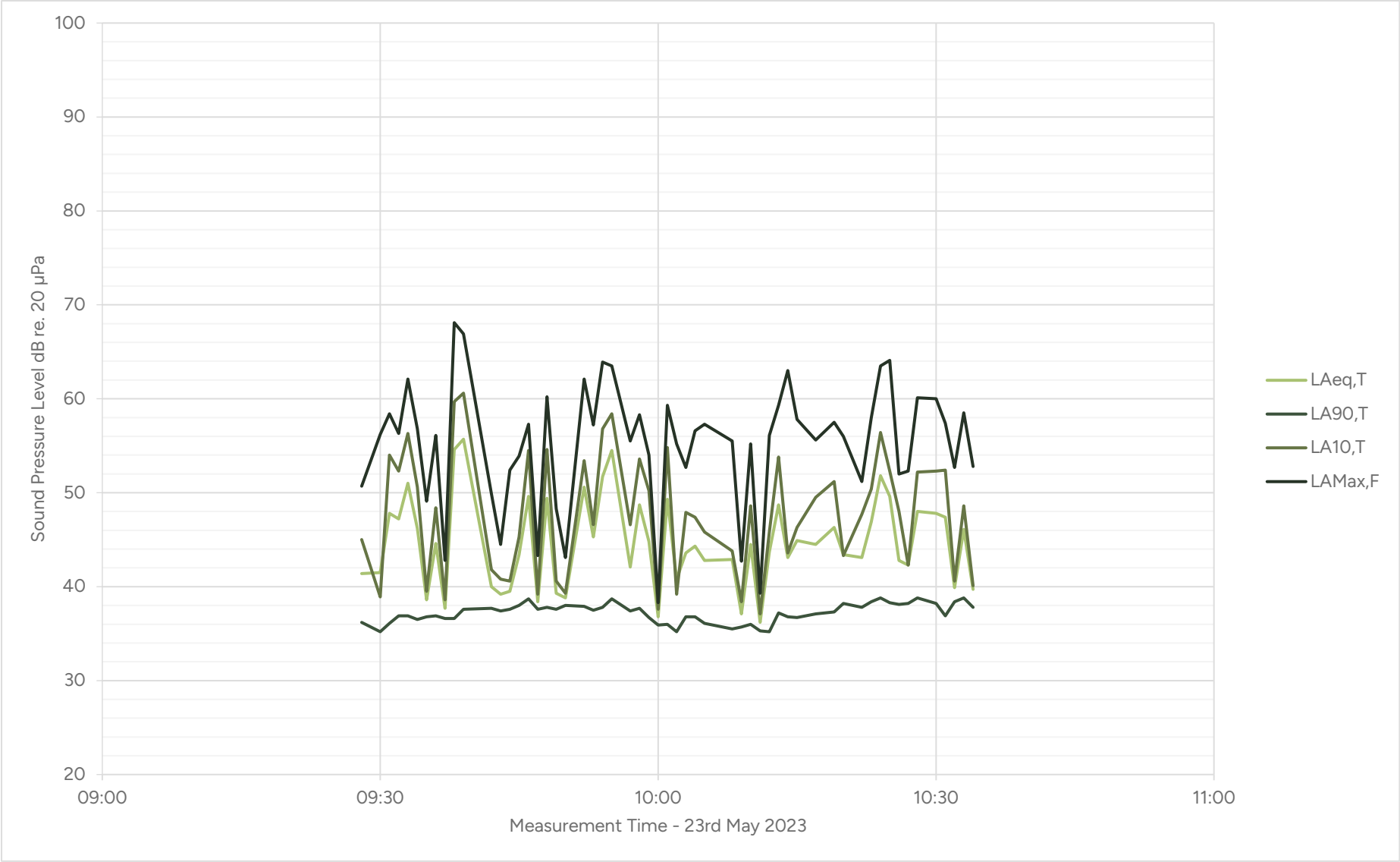


Figure A-4: Measured sound levels at Location LF002 (with façade correction)

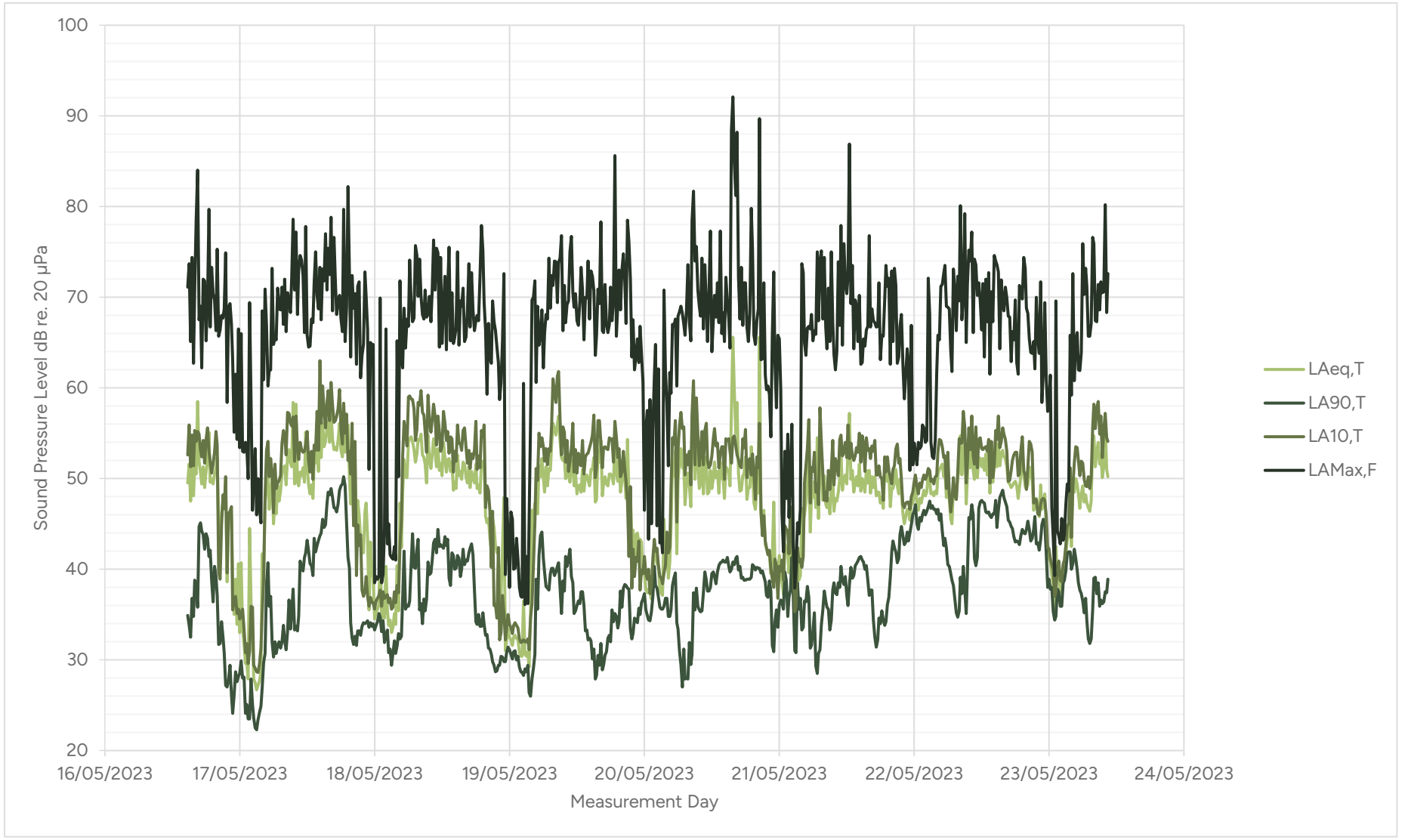


Figure A-5: Measured sound levels at Location CS001

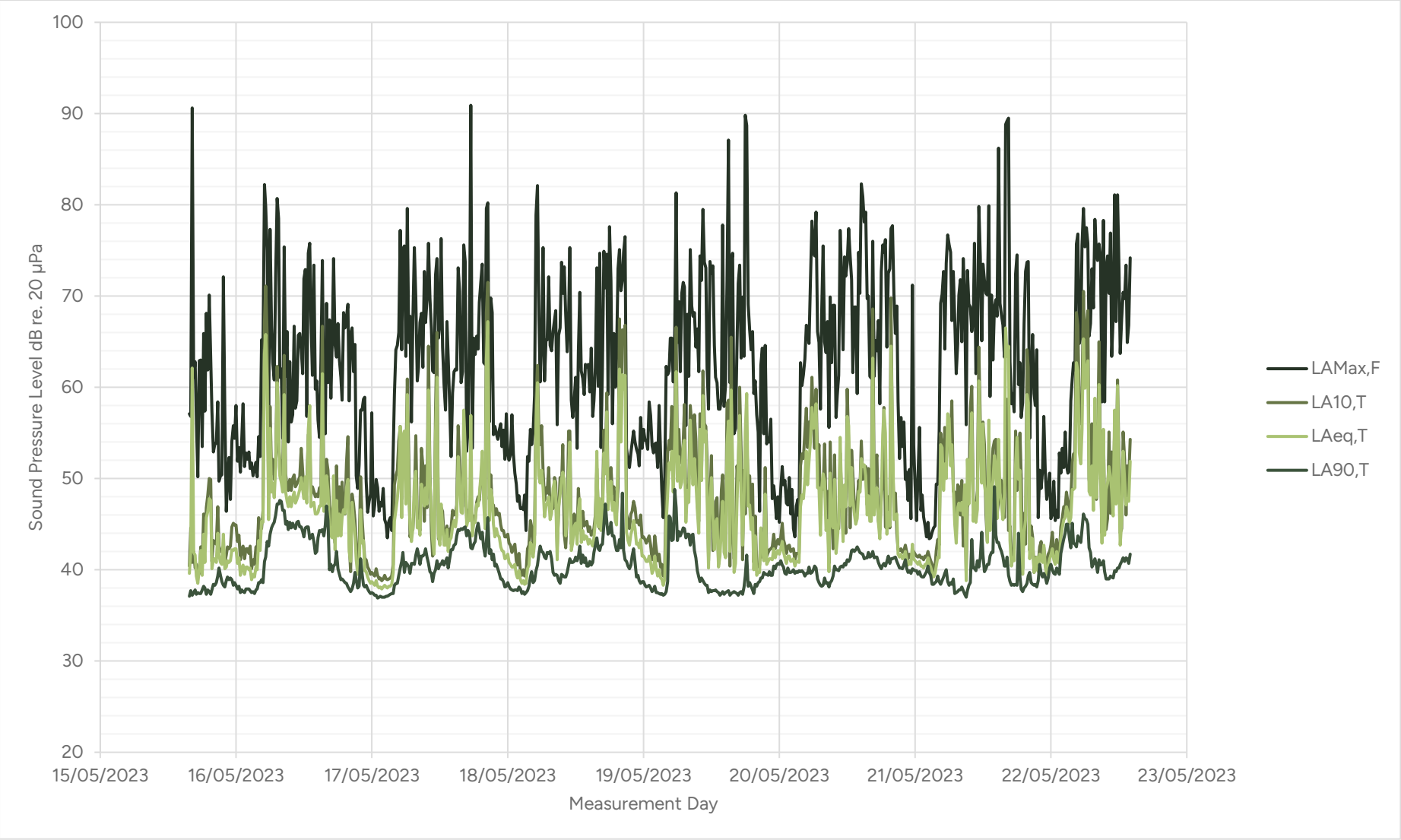


Figure A-6: Measured sound levels at Location CS002

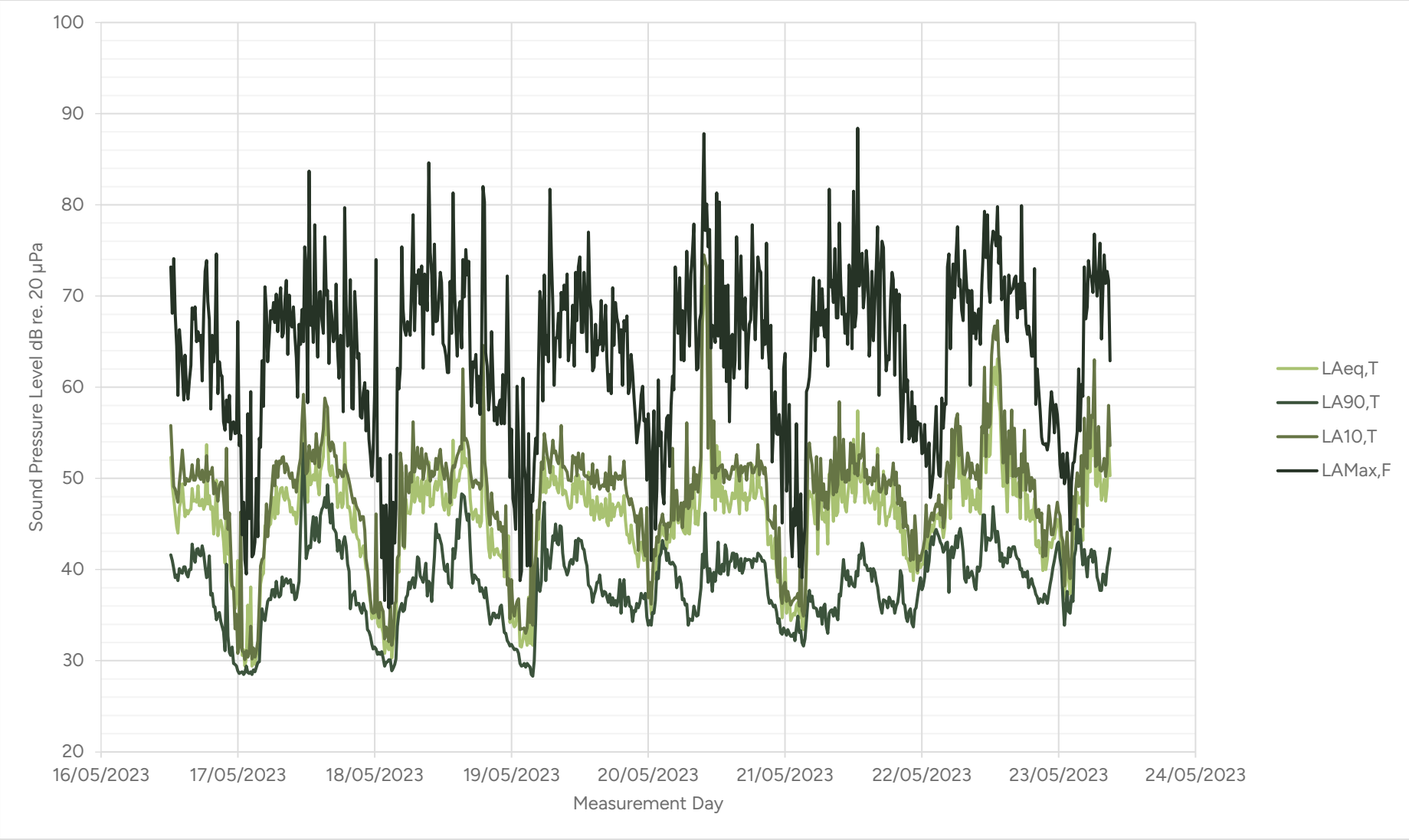


Figure A-7: Measured sound levels at Location CS003

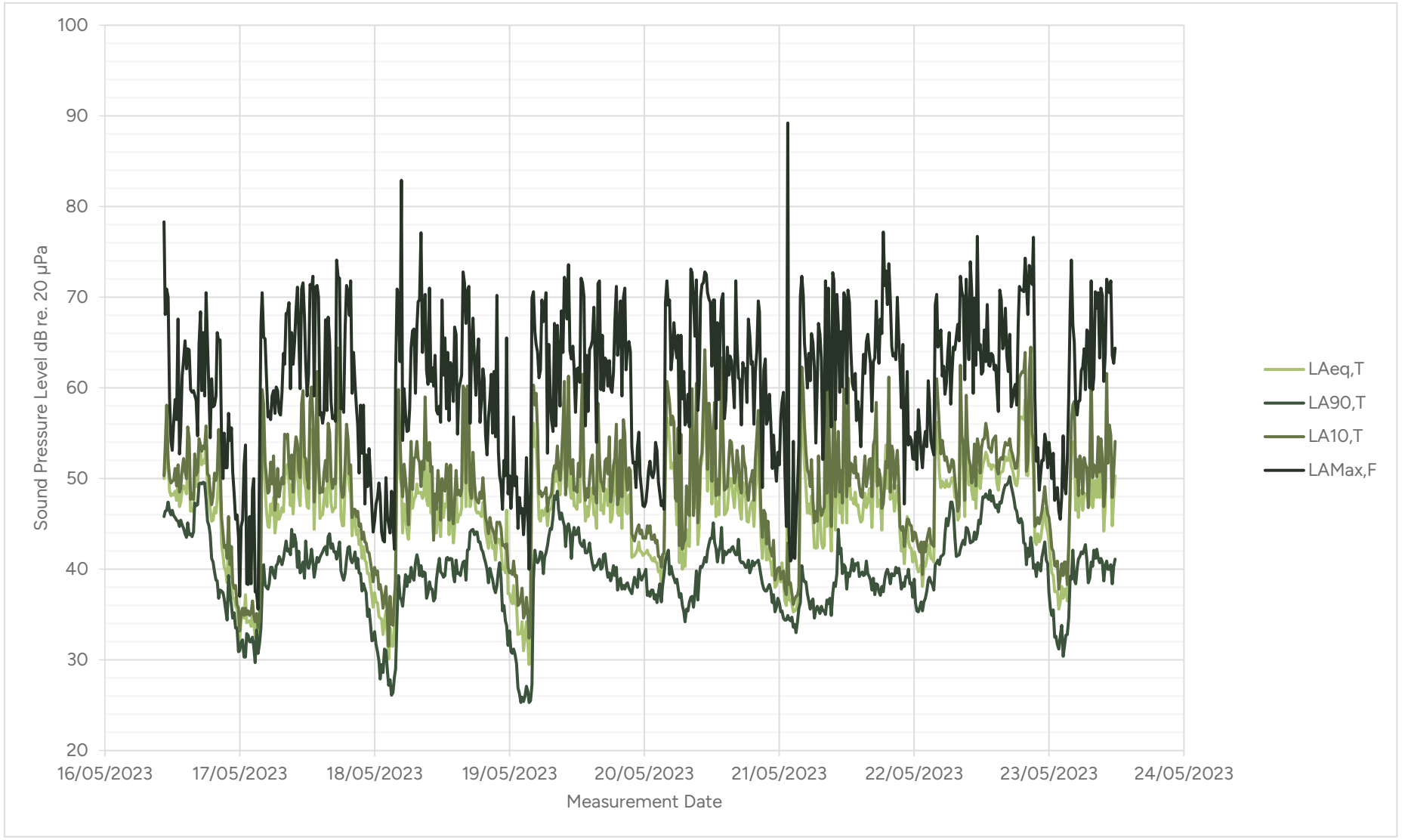


Figure A-8: Measured sound levels at Location CS004

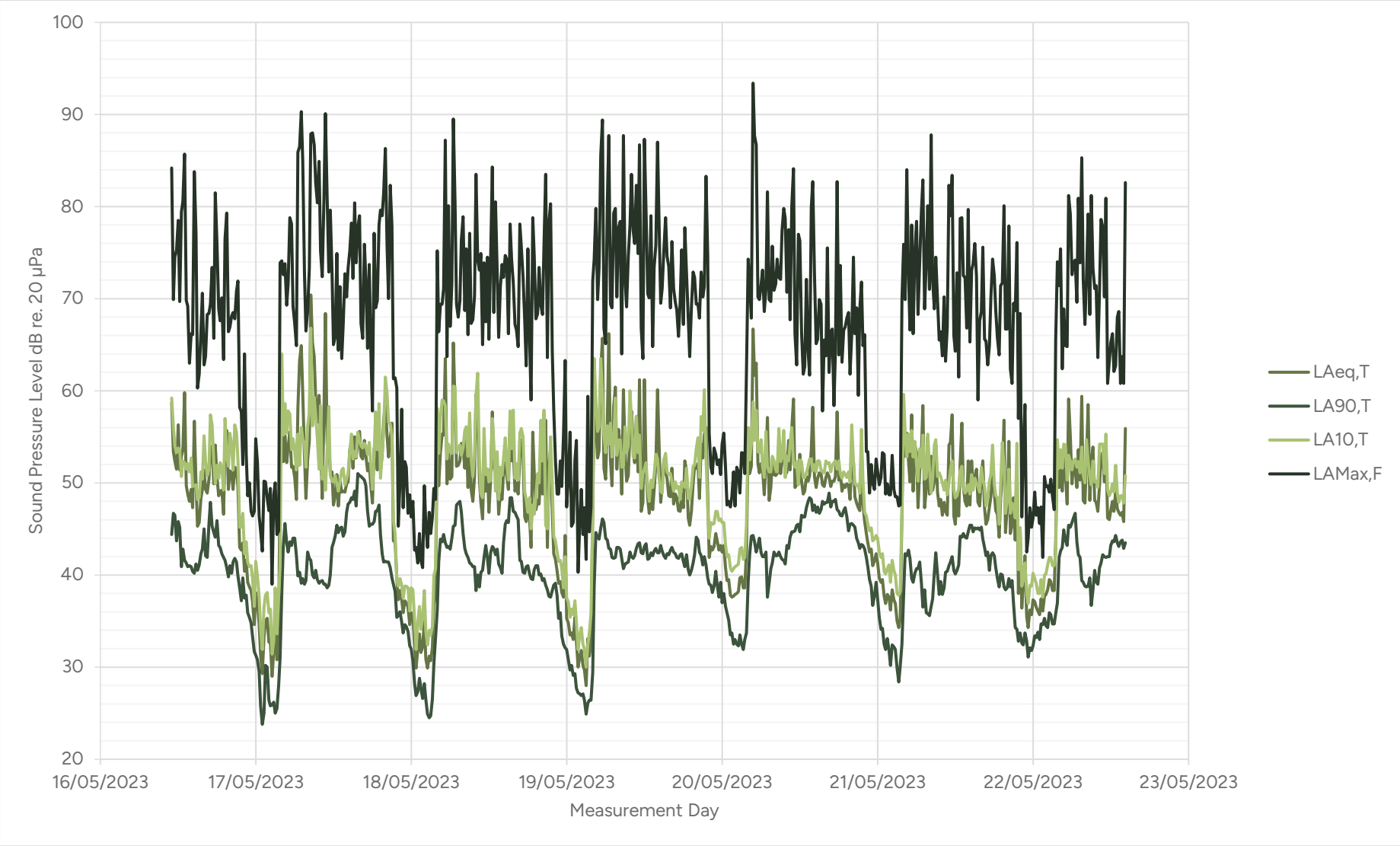
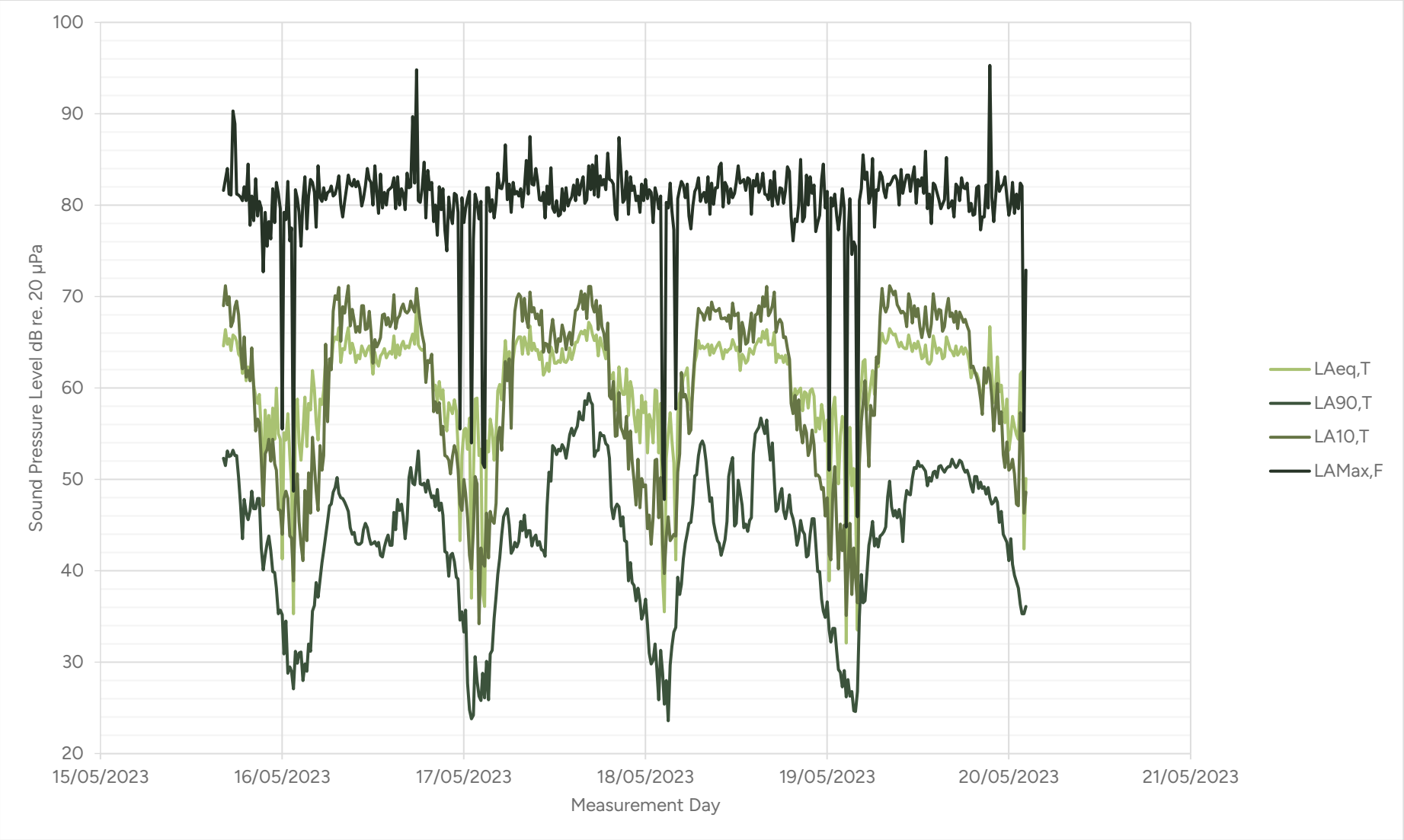


Figure A-9: Measured sound levels at Location CS005



Appendix B Sound Level Meter Installation Photographs

B.1 Measurement Location LF001

B.2 Measurement Location LF002

B.3 Measurement Location CS001

B.4 Measurement Location CS002

B.5 Measurement Location CS003

B.6 Measurement Location CS004

B.7 Measurement Location CS005

Appendix C Sound Level Meter Calibration Certificates

C.1 Sound Level Meter and Calibration Certificates

Presented below are the cover sheets for the calibration certificates for all the sound level meters and acoustic calibrators used throughout the project, all of which are traceable to national standards. Sound level meter calibration certificates are valid for 2 years. Acoustic calibrator certificates are valid for 1 year. Full certificates are available on request.

C.1.1 Rion NL-52 – 00710361

RW3

ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

ilac-MRA UKAS CALIBRATION 0653

Date of Issue: 05 October 2021

Certificate Number: UCRT21/2224

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

B. Giles

Customer: SLR Consulting Limited
2nd and 3rd Floors
15 Middle Pavement
Nottingham
NG1 7DX

Order No. 422-17278

Description: Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification:

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00710361
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	10903
Rion	Microphone	UC-59	19635
Rion	Calibrator	NC-75	34713324
	Calibrator adaptor type if applicable		NC-75-022

Performance Class: 1

Test Procedure: TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013: Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received: 05 October 2021 ANV Job No. UKAS21/10653

Date Calibrated: 05 October 2021

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	Initial Calibration		

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

C.1.2 Rion NL-52 – 00331823

CERTIFICATE OF CALIBRATION

Date of Issue: 23 September 2022

Certificate Number: TCRT22/1591

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

B. Bogdan

Customer	SLR Consulting Ltd 15 Middle Pavement Nottingham NG1 7DX

Order No.	000406-403			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	00331823
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	21774
	Rion	Microphone	UC-59	18250
	Rion	Calibrator	NC-74	34336013
		Calibrator adaptor type if applicable		NC-74-002
Performance Class	1			
Test Procedure	TP 2.SLM 61672-3 TPS-49			
	Procedures from IEC 61672-3:2006 were used to perform the periodic tests.			
Type Approved to IEC 61672-1:2002	YES	Approval Number	21.21 / 13.02	
	If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003			
Date Received	22 September 2022	ANV Job No.	TRAC22/09348	
Date Calibrated	23 September 2022			

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	04 February 2021	UCRT21/1177	0653

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

C.1.3 Rion NL-52 – 00710359

ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

ilac-MRA UKAS CALIBRATION 0653

Date of Issue: 05 October 2021

Certificate Number: UCRT21/2223

Page 1 of 2 Pages

Approved Signatory

B. Giles

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Customer: SLR Consulting Limited
2nd and 3rd Floors
15 Middle Pavement
Nottingham
NG1 7DX

Order No. 422-17278

Description: Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification:

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00710359
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	10901
Rion	Microphone	UC-59	19633
Rion	Calibrator	NC-75	34713324
	Calibrator adaptor type if applicable		NC-75-022

Performance Class: 1

Test Procedure: TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013: Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received: 05 October 2021 ANV Job No. UKAS21/10653

Date Calibrated: 05 October 2021

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	Initial Calibration		

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

C.1.4 Cirrus CR:171B - G300561

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **11/06/21** CERTIFICATE NUMBER **158222**

10148

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 15

Approved signatory
T.Goodrich
Electronically signed:

Sound level meter : IEC 61672-3:2013

Customer information

Name: SLR Consulting Ltd Address: 15 Middle Pavement
Nottingham
Postcode: NG1 7DX
Country: United Kingdom

Instrument information

Manufacturer:	Cirrus Research plc	Notes:
Model:	CR:171B	
Serial number:	G300561	
Class:	1	
Firmware version:	V5.6.3177	

Test summary

Date of receipt: 11/06/21 Date of calibration: 11/06/21

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013.

The sound level meter submitted for testing successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to determine that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Notes

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. UKAS is one of the signatories to the Multilateral Agreement of the European co-opeation for Accreditation (EA) for the mutual recognition of calibration certificates issued by accredited laboratories. The United Kingdom Accreditation Service (UKAS) is one of the signatories to the International Laboratory Accreditation Co-operation (ILAC) Arrangement for the mutual recognition of calibration certificates. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

C.1.5 Cirrus CR:171B - G0302667

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 30 June 2022 CERTIFICATE NUMBER 176576

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
R.Woodall
Electronically signed:

R Woodall

Sound Level Meter : IEC 61672-3:2013

Instrument information

Manufacturer:	Cirrus Research plc	Notes:
Model:	CR:171B	
Serial number:	G302667	
Class:	1	
Firmware version:	5.7.3228	

Test summary

Date of calibration: 30 June 2022

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
Periodic tests were performed in accordance with procedures from IEC 61672-3:2013.

The sound level meter submitted for testing successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to determine that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

C.1.6 Cirrus CR:171B - G0301839

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **18 November 2022** CERTIFICATE NUMBER **183449**

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Approved signatory
R.Thomas
Electronically signed:

Sound Level Meter : IEC 61672-3:2013

Instrument information

Manufacturer:	Cirrus Research plc	Notes:
Model:	CR:171B	
Serial number:	G301839	
Class:	1	
Firmware version:	5.8.3251	

Test summary

Date of calibration: 18 November 2022

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
Periodic tests were performed in accordance with procedures from IEC 61672-3:2013.

The sound level meter submitted for testing successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to determine that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

C.1.7 Rion NC-75 – 34713324

MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

Date of Issue: 15 February 2023

Certificate Number: TCRT23/1157

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer	SLR Consulting Ltd 15 Middle Pavement Nottingham NG1 7DX
Order No.	002567-403
Test Procedure	Procedure TP 14 Calibration of Sound Calibrators (60942:2017)
Description	Acoustic Calibrator

Identification	*Manufacturer*	*Instrument*	*Model*	*Serial No.*
	Rion	Calibrator	NC-75	34713324
Public evidence of Type Approval		Yes	Approved by PTB	

The calibrator has been tested as specified in Annex B of IEC 60942:2017. As public evidence was available, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2017, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2017.

ANV Job No.	TRAC23/02092	
Date Received	14 February 2023	
Date Calibrated	15 February 2023	
Previous Certificate	*Dated*	05 October 2021
	Certificate No.	UCRT21/2215
	Laboratory	0653

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

C.1.8 Rion NC-74 – 34336013

CERTIFICATE OF CALIBRATION

Date of Issue: 22 September 2022

Certificate Number: TCRT22/1589

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

B. Bogdan

Customer	SLR Consulting Ltd 15 Middle Pavement Nottingham NG1 7DX
Order No.	000406-403
Test Procedure	Procedure TP 1 Calibration of Sound Calibrators
Description	Acoustic Calibrator

Identification	*Manufacturer*	*Instrument*	*Model*	*Serial No.*
	Rion	Calibrator	NC-74	34336013

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No.	TRAC22/09348	
Date Received	22 September 2022	
Date Calibrated	22 September 2022	
Previous Certificate	*Dated*	08 September 2021
	Certificate No.	UCRT21/2083
	Laboratory	0653

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

C.1.9 Cirrus CR:515 – 87922

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **07 June 2022** CERTIFICATE NUMBER **175488**

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Approved signatory
R.Thomas
Electronically signed:

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Sound Calibrator : IEC 60942:2003

Instrument information

Manufacturer: Cirrus Research plc
Model: CR:515
Serial number: 87922
Class: 1

Notes:

Test summary

Date of calibration: 07 June 2022

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC60942_2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

The manufacturer's product information indicates that this model of sound calibrator has been formally pattern approved to IEC60942_2003 Annex A to Class 1. This has been confirmed by Laboratoire National d'Essais (LNE), PhysikalischTechnische Bundesanstalt (PTB) and APPLUS (APPLUS).

Notes:

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

C.1.10 Cirrus C5:515 – 93674

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **18 November 2022** CERTIFICATE NUMBER **183451**

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
R.Thomas
Electronically signed:

Sound Calibrator : IEC 60942:2003

Instrument information

Manufacturer: Cirrus Research plc

Model: CR:515

Serial number: 93674

Class: 1

Notes:

Test summary

Date of calibration: 18 November 2022

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC60942_2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

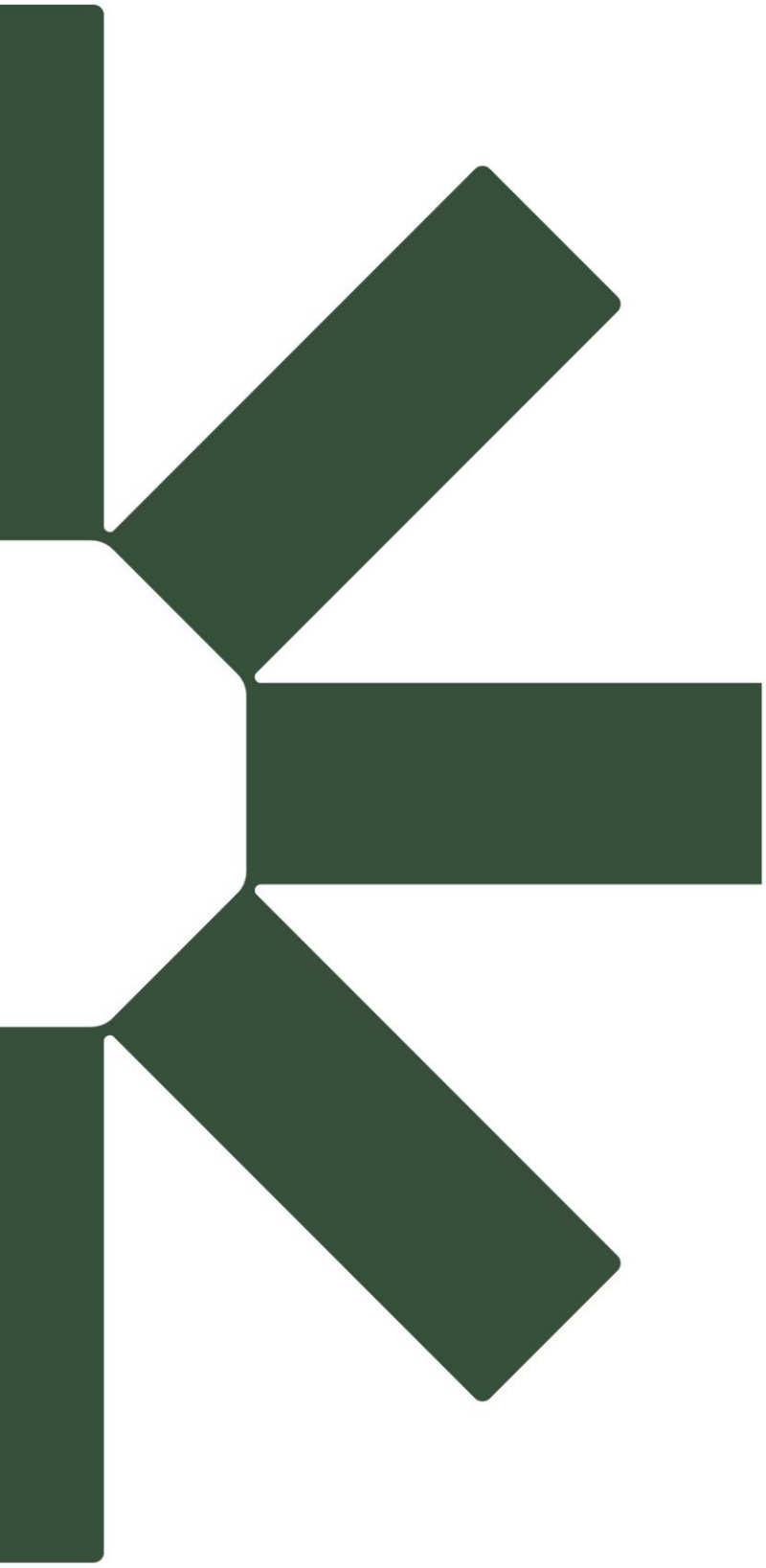
The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

As public evidence was available, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the Class 1 requirements of IEC 60942:2003.

The manufacturer's product information indicates that this model of sound calibrator has been formally pattern approved to IEC60942_2003 Annex A to Class 1. This has been confirmed by APPLUS, PhysikalischTechnische Bundesanstalt (PTB) and Laboratoire National d'Essais (LNE).

Notes:

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.



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