

Balliemeanoch Pumped Storage Hydro

Environmental Impact Assessment
Report

Volume 5: Appendices
Appendix 15.2: Measurement Surveys

ILI (Borders PSH) Ltd

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Quality information

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Revision History

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1. Measurement Survey Details

1.1 Instrumentation

The following table identifies the instrumentation used to conduct the measurements.

Table 1 Sound measurement equipment details

Measurement Location	Equipment Type	Model Number	Serial Number
All locations	Calibrator	Brüel & Kjær 4231	3005464
L1, S1	Sound level meter	Rion NL-52	00386764
L2, S2	Sound level meter	Rion NL-52	00386762
L3, S3	Sound level meter	Rion NL-52	00386763
L4, S4	Sound level meter	Rion NL-52	00386766

All the above equipment has in-date factory calibration certificates available on request. The sound level meters (SLMs) were field calibrated before conducting measurements and calibration was checked at the end of the measurements, where the maximum deviation in the calibrated signals was 0.3 dB. All SLMs have been calibrated at a UKAS accredited laboratory within the previous two years.

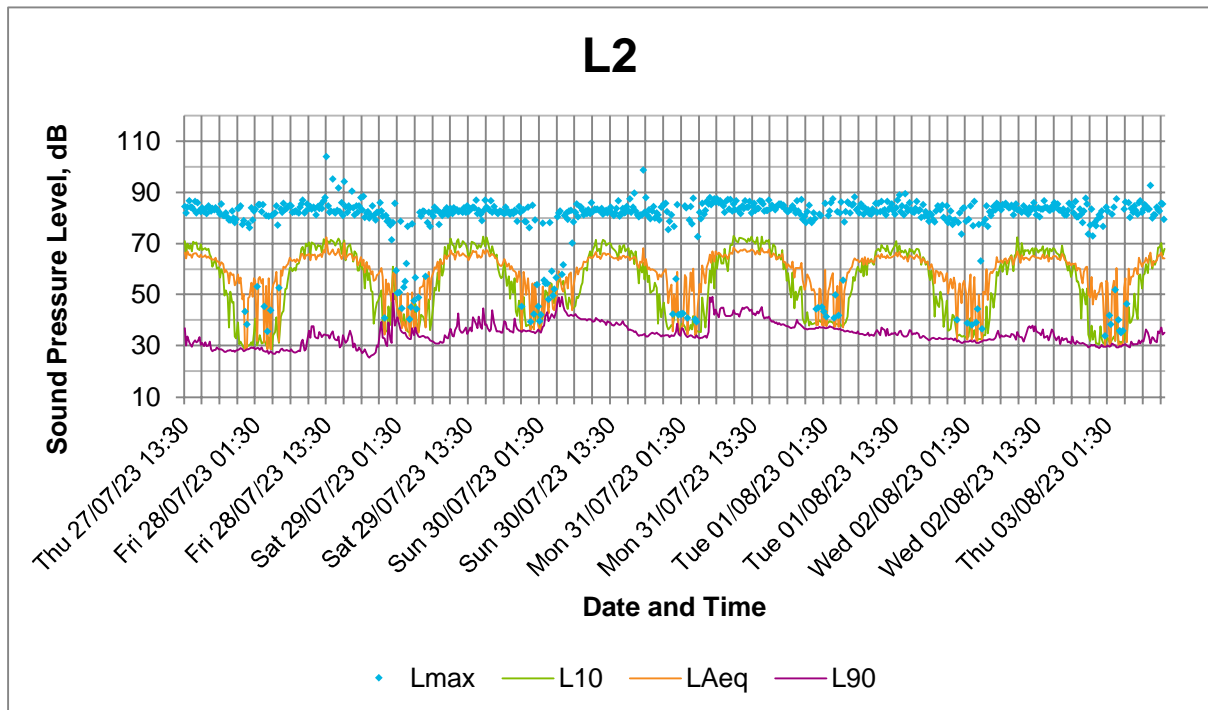
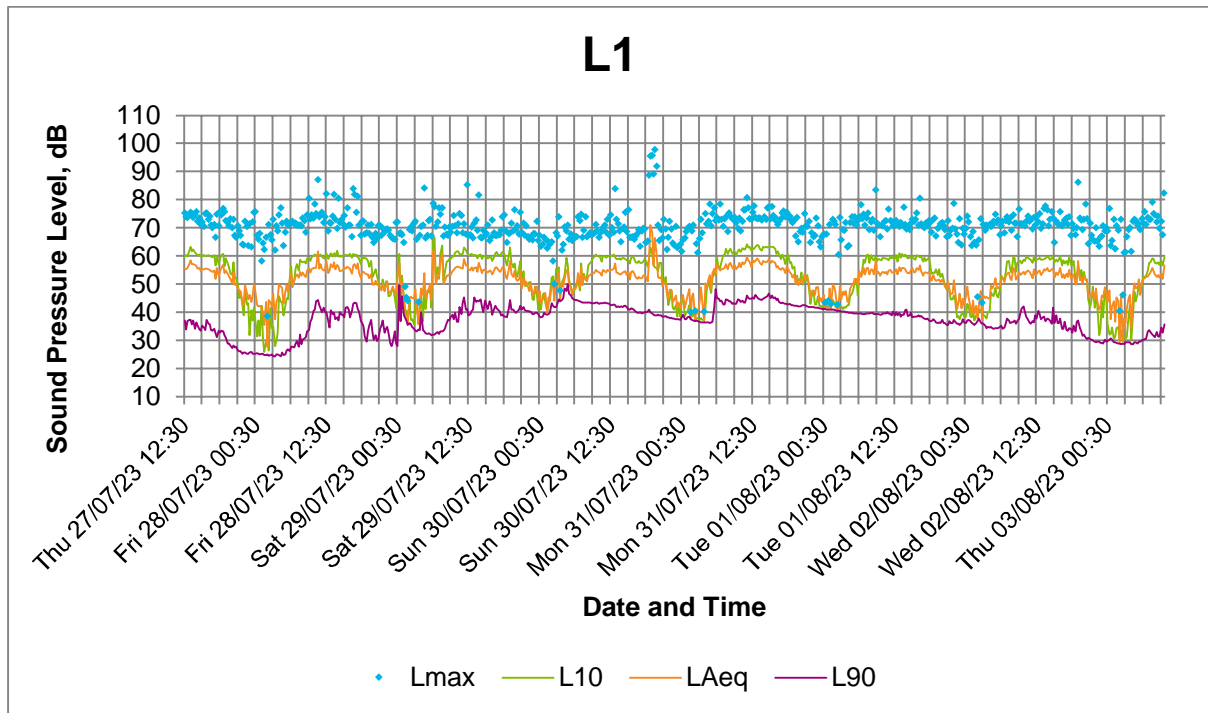
All monitoring locations were 1.2 to 1.5 m above ground level and free-field i.e. at least 3.5 m away from any reflecting surface except the ground. The exception to this is at S4 where due to sufficient and safe access, the sound level meter was positioned next to a low level wall approximately 0.5m high, 2m from the roadside and 2m from an earth embankment, the sound level meter was 1.5m above ground level.

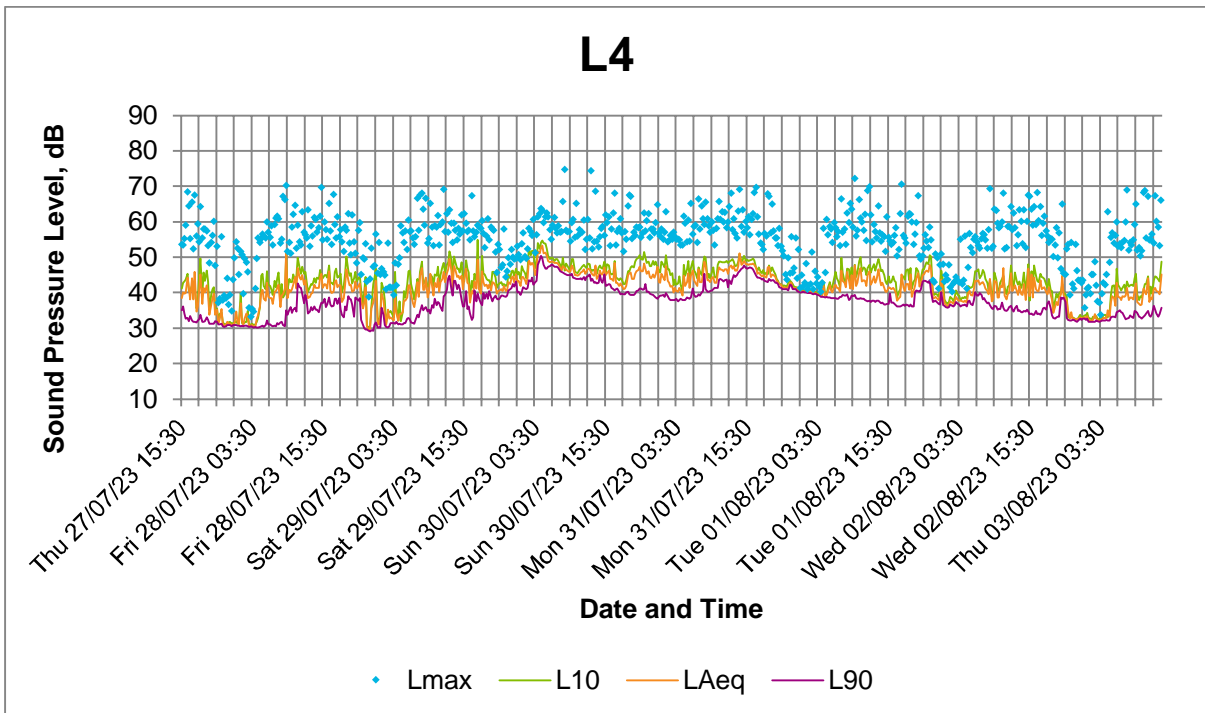
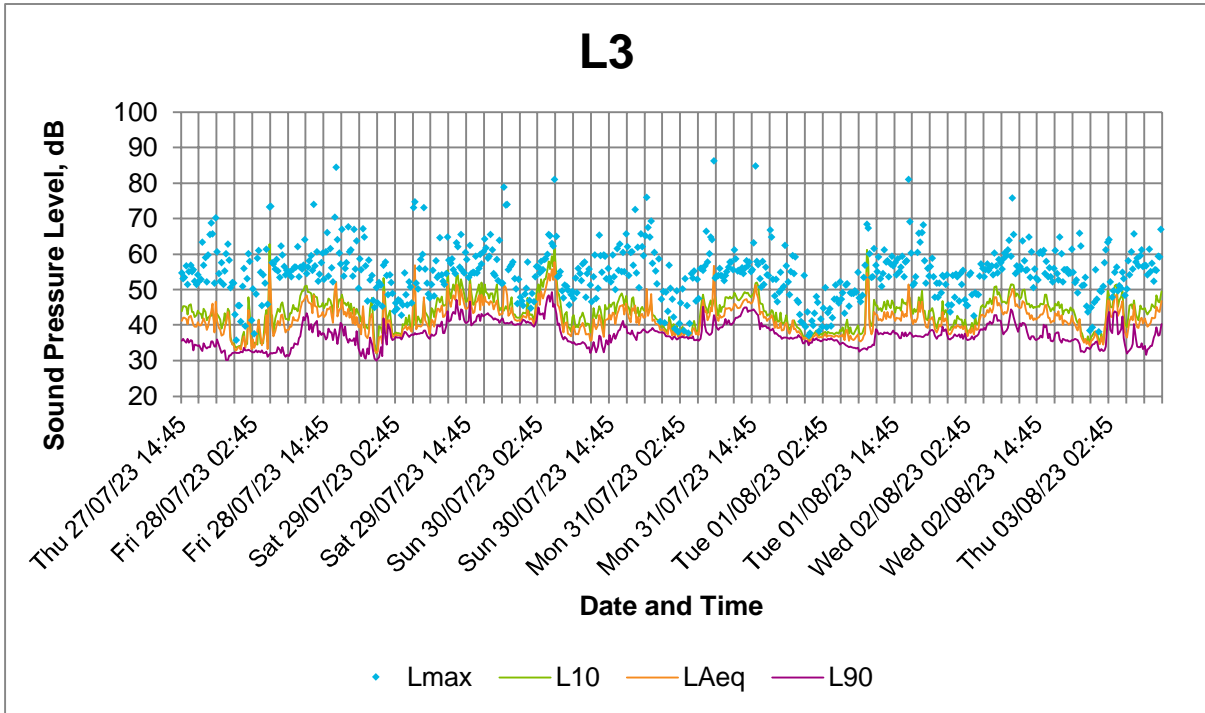
The sound level meters were programmed to log L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} values, third-octave band spectral levels and audio recordings over the 15-minute measurement period. Sound pressure levels were also logged every second. Due to an equipment error at S4, sound levels were measured for 5 minutes every 15 minutes. However, the operator was present throughout the period and the sound levels over these 5 minutes is considered to be representative of each 15-minute period. S4 had a shorter recording period due to the continuous background noise of a nearby watercourse, approximately 30m away. Therefore night-time sound levels are considered to be similar to that measured in the daytime in this area.

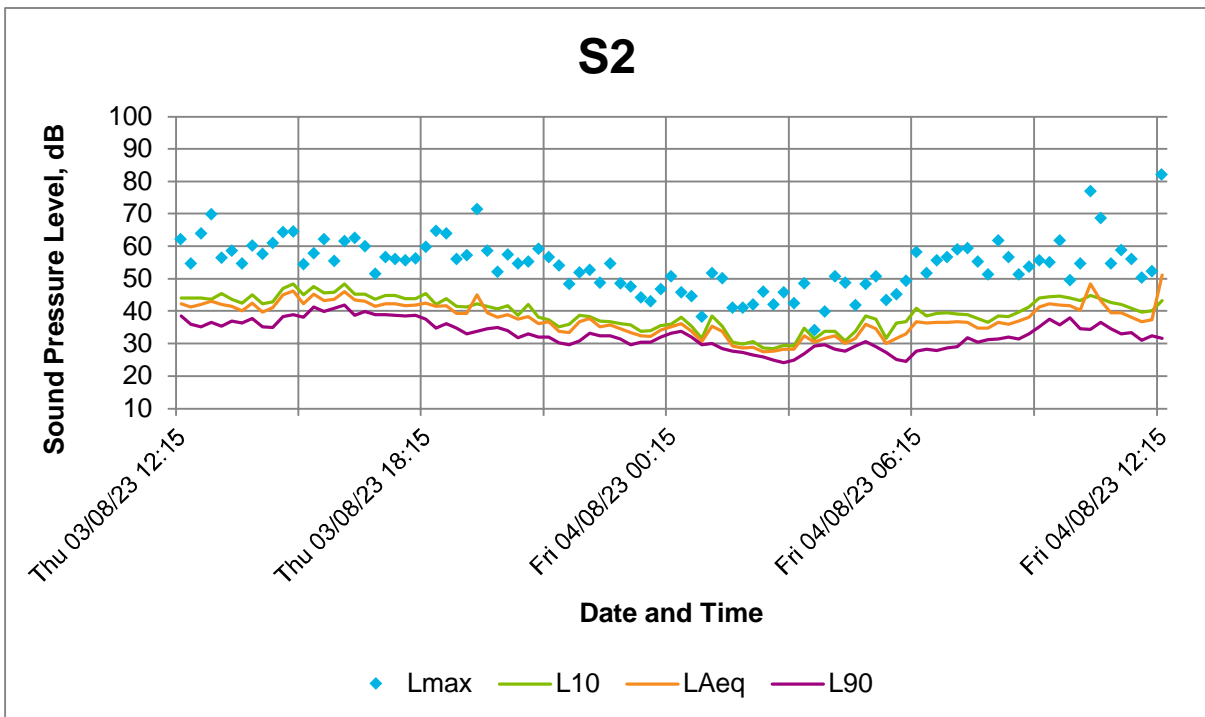
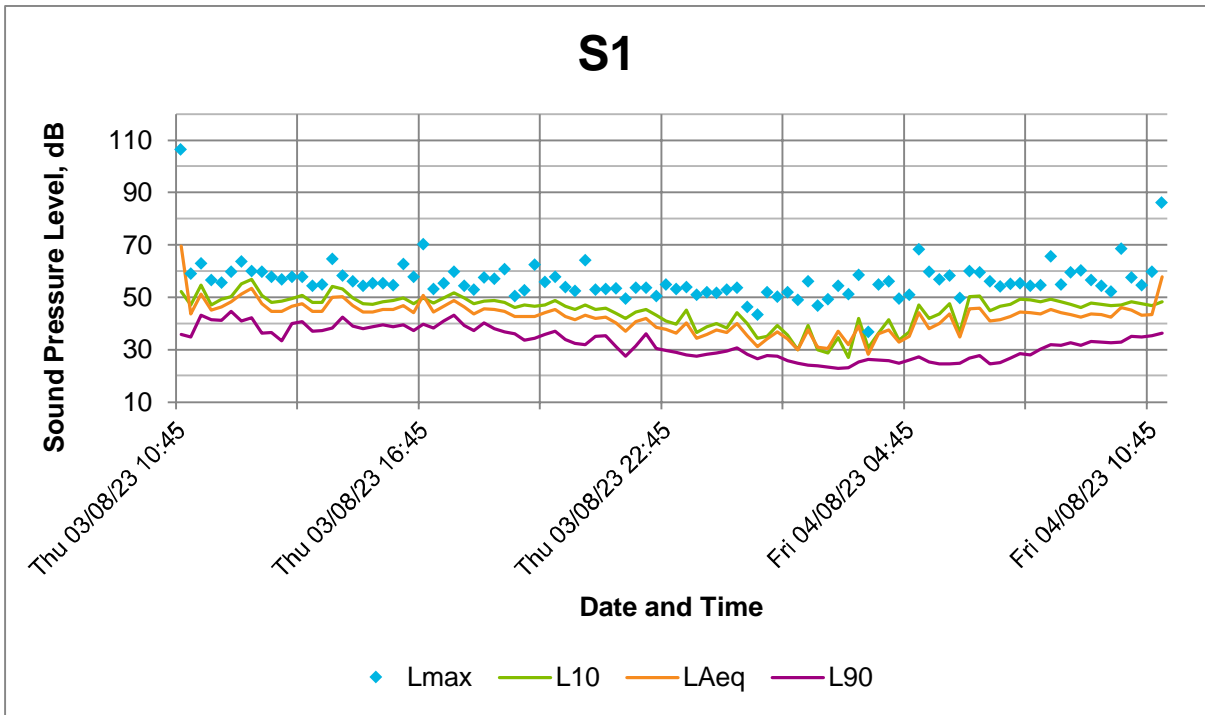
1.2 Weather Conditions

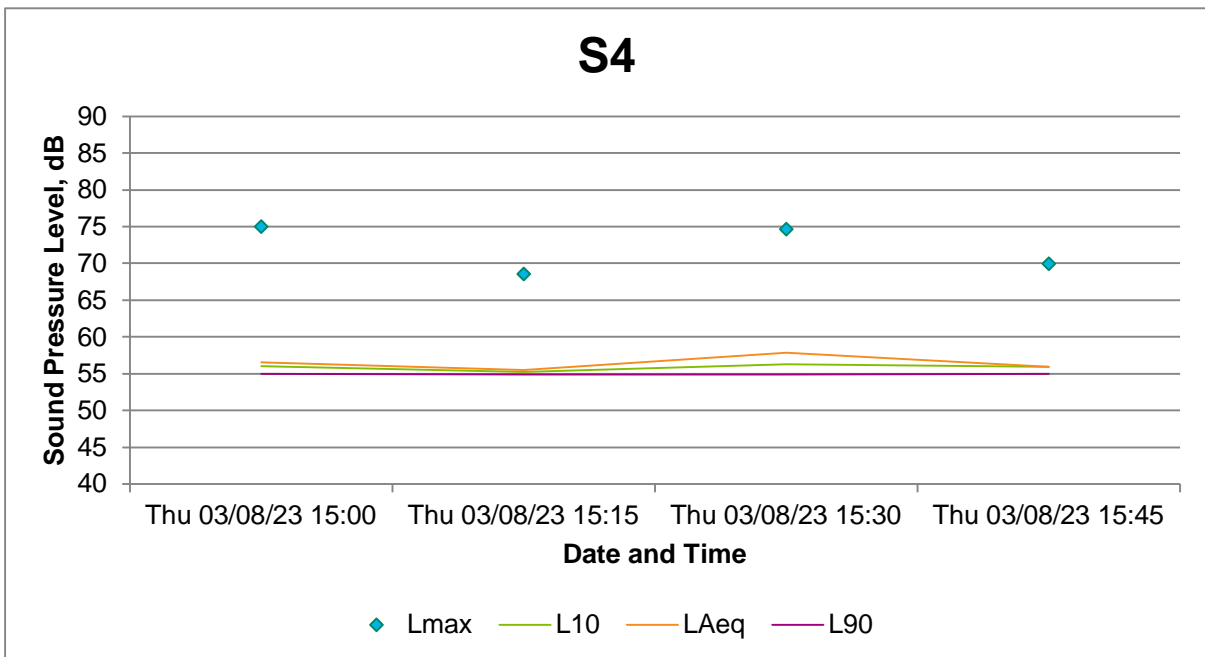
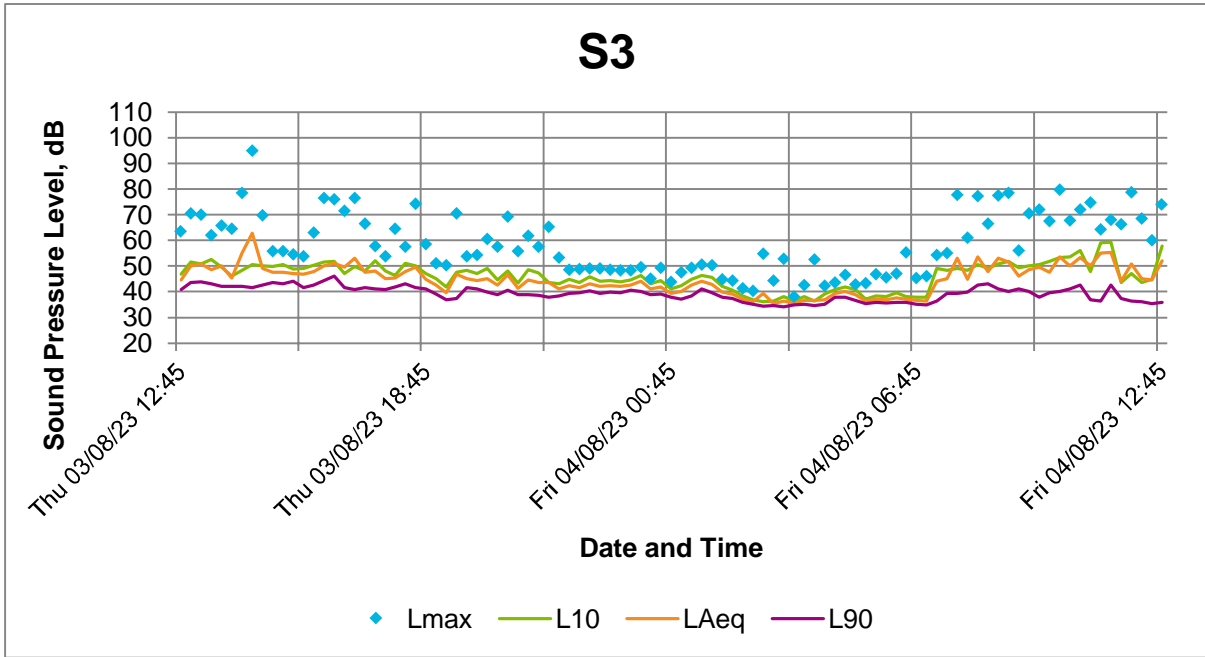
The meteorological conditions throughout the monitoring period were suitable for sound measurements: No recorded windspeeds exceeded 5 m/s and there was a relatively small number of 15 min periods that were excluded for precipitation.

1.3 Baseline Survey – Time Histories









1.4 Baseline Survey – Levels by Day/Night Periods

The following is a summary of the logged levels grouped by day and night periods at each receptor. Note only day time levels were obtained at S4 on the basis that day and night periods are likely to very similar due to the remote nature of that location when vehicles on the B840 are not in the vicinity, as represented by the measured $L_{A90,T}$ values.

1.4.1 Short Term

S1 (11:00 - 03/08/2023 : 10:45 - 04/08/2023)

Period	Start	End	L_{Aeq}	L_{AFmax}	L_{A90} Mode	L_{A90} Mean
Day	07:00	19:00	54	107	37	36
Evening	19:00	23:00	42	64	36	33
Day-Evening	07:00	23:00	54	107	37	37
Night	23:00	07:00	39	69	25	26

S2 (12:15 – 03/08/2023 : 12:00 – 04/08/2023)

Period	Start	End	L_{Aeq}	L_{AFmax}	L_{A90} Mode	L_{A90} Mean
Day	07:00	19:00	42	71	35	35
Evening	19:00	23:00	39	71	33	36
Day-Evening	07:00	23:00	42	71	33	33
Night	23:00	07:00	33	58	28	29

S3 (12:45 – 03/08/2023 : 12:30 – 04/08/2023)

Period	Start	End	L_{Aeq}	L_{AFmax}	L_{A90} Mode	L_{A90} Mean
Day	07:00	19:00	50	95	41	40
Evening	19:00	23:00	44	71	39	39
Day-Evening	07:00	23:00	50	95	42	41
Night	23:00	07:00	40	56	35	37

S4 (15:00 - 03/08/2023 : 16:00 – 03/08/2023)

Period	Start	End	L_{Aeq}	L_{AFmax}	L_{A90}
Day	15:00	15:05	57	75	55
Day	15:15	15:20	56	69	55
Day	15:30	15:35	58	75	55
Day	15:45	15:50	56	70	55

Day periods include level logged between 07:00-23:00 only

Night periods include level logged between 23:00-07:00 only

Due to the remote nature of S4, day-time LA90,T measurements were considered representative of night-time levels.

1.4.2 Long Term

Averaged periods of monitoring locations presented in *Chapter 15 Noise and Vibration (Volume 2 Main Report)*

L1

Period	Date	Time	L _{Aeq}	L _{AFmax}	LA90	LA90
					Mode	Mean
Day	28/07/2023	07:00-19:00	56	87	40	38
Day	29/07/2023	07:00-19:00	55	85	39	40
Day	30/07/2023	07:00-19:00	54	84	43	42
Day	31/07/2023	07:00-19:00	57	81	45	44
Day	01/08/2023	07:00-19:00	55	83	39	39
Day	02/08/2023	07:00-19:00	54	78	36	37
Evening	27/07/2023	19:00-23:00	52	77	26	28
Evening	28/07/2023	19:00-23:00	51	71	33	33
Evening	29/07/2023	19:00-23:00	53	77	41	41
Evening	30/07/2023	19:00-23:00	62	98	39	39
Evening	31/07/2023	19:00-23:00	51	75	42	42
Evening	01/08/2023	19:00-23:00	51	75	42	42
Evening	02/08/2023	19:00-23:00	50	79	36	36
Day-Evening	28/07/2023	07:00-23:00	55	87	40	36
Day-Evening	29/07/2023	07:00-23:00	55	85	41	40
Day-Evening	30/07/2023	07:00-23:00	58	98	43	41
Day-Evening	31/07/2023	07:00-23:00	56	81	43	44
Day-Evening	01/08/2023	07:00-23:00	54	83	39	38
Day-Evening	02/08/2023	07:00-23:00	53	86	37	36
Night	27/07/2023	23:00-07:00	47	77	25	25
Night	28/07/2023	23:00-07:00	53	84	34	33
Night	29/07/2023	23:00-07:00	49	74	42	39
Night	30/07/2023	23:00-07:00	47	78	38	37
Night	31/07/2023	23:00-07:00	48	78	40	40
Night	01/08/2023	23:00-07:00	47	75	36	36
Night	02/08/2023	23:00-07:00	47	77	29	29

Day and Day-Evening periods excluded on the 27/07/2023 due to not extending full periods

L2

LA90	LA90
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Period	Date	Time	L _{Aeq}	L _{AFmax}	Mode	Mean
Day	28/07/2023	07:00-19:00	66	104	28	32
Day	29/07/2023	07:00-19:00	65	87	37	36
Day	30/07/2023	07:00-19:00	64	90	40	39
Day	31/07/2023	07:00-19:00	66	88	42	42
Day	01/08/2023	07:00-19:00	64	90	34	35
Day	02/08/2023	07:00-19:00	64	87	34	34
Evening	27/07/2023	19:00-23:00	60	86	28	28
Evening	28/07/2023	19:00-23:00	61	89	27	29
Evening	29/07/2023	19:00-23:00	60	85	36	37
Evening	30/07/2023	19:00-23:00	61	99	34	34
Evening	31/07/2023	19:00-23:00	60	87	37	38
Evening	01/08/2023	19:00-23:00	60	87	37	38
Evening	02/08/2023	19:00-23:00	59	85	33	33
Day-Evening	28/07/2023	07:00-23:00	65	104	34	31
Day-Evening	29/07/2023	07:00-23:00	64	87	36	36
Day-Evening	30/07/2023	07:00-23:00	63	99	40	38
Day-Evening	31/07/2023	07:00-23:00	65	88	42	41
Day-Evening	01/08/2023	07:00-23:00	64	90	34	34
Day-Evening	02/08/2023	07:00-23:00	64	88	34	33
Night	27/07/2023	23:00-07:00	55	86	29	28
Night	28/07/2023	23:00-07:00	53	86	33	34
Night	29/07/2023	23:00-07:00	53	85	36	40
Night	30/07/2023	23:00-07:00	55	88	34	34
Night	31/07/2023	23:00-07:00	56	89	37	36
Night	01/08/2023	23:00-07:00	56	87	32	32
Night	02/08/2023	23:00-07:00	56	88	30	30

L3

Period	Date	Time	L _{Aeq}	L _{AFmax}	Mode	Mean
Day	28/07/2023	07:00-19:00	45	85	38	37
Day	29/07/2023	07:00-19:00	46	73	41	41
Day	30/07/2023	07:00-19:00	42	66	35	36
Day	31/07/2023	07:00-19:00	45	85	39	41
Day	01/08/2023	07:00-19:00	44	81	38	36
Day	02/08/2023	07:00-19:00	45	76	36	39
Evening	27/07/2023	19:00-23:00	42	70	34	33

Evening	28/07/2023	19:00-23:00	42	67	36	34
Evening	29/07/2023	19:00-23:00	46	79	42	41
Evening	30/07/2023	19:00-23:00	44	76	38	38
Evening	31/07/2023	19:00-23:00	39	63	36	37
Evening	01/08/2023	19:00-23:00	39	63	36	37
Evening	02/08/2023	19:00-23:00	42	68	37	37
Day-Evening	28/07/2023	07:00-23:00	44	85	36	36
Day-Evening	29/07/2023	07:00-23:00	46	79	41	41
Day-Evening	30/07/2023	07:00-23:00	42	76	38	36
Day-Evening	31/07/2023	07:00-23:00	44	85	37	40
Day-Evening	01/08/2023	07:00-23:00	44	81	37	36
Day-Evening	02/08/2023	07:00-23:00	44	76	36	38
Night	27/07/2023	23:00-07:00	44	74	32	32
Night	28/07/2023	23:00-07:00	44	85	37	36
Night	29/07/2023	23:00-07:00	49	81	40	42
Night	30/07/2023	23:00-07:00	38	59	36	37
Night	31/07/2023	23:00-07:00	37	54	36	35
Night	01/08/2023	23:00-07:00	41	57	37	37
Night	02/08/2023	23:00-07:00	42	64	33	36

L4

Period	Date	Time	L _{Aeq}	L _{AFmax}	LA90 Mode	LA90 Mean
Day	28/07/2023	07:00-19:00	43	70	35	36
Day	29/07/2023	07:00-19:00	44	69	36	37
Day	30/07/2023	07:00-19:00	46	75	45	43
Day	31/07/2023	07:00-19:00	47	70	44	44
Day	01/08/2023	07:00-19:00	43	72	38	38
Day	02/08/2023	07:00-19:00	42	69	35	36
Evening	27/07/2023	19:00-23:00	38	60	31	32
Evening	28/07/2023	19:00-23:00	42	62	38	35
Evening	29/07/2023	19:00-23:00	41	61	39	39
Evening	30/07/2023	19:00-23:00	46	68	40	40
Evening	31/07/2023	19:00-23:00	44	68	41	42
Evening	01/08/2023	19:00-23:00	44	68	41	42
Evening	02/08/2023	19:00-23:00	45	67	43	40
Day-Evening	28/07/2023	07:00-23:00	43	70	35	36
Day-Evening	29/07/2023	07:00-23:00	43	69	39	38

Day-Evening	30/07/2023	07:00-23:00	46	75	40	43
Day-Evening	31/07/2023	07:00-23:00	46	70	44	43
Day-Evening	01/08/2023	07:00-23:00	44	72	37	38
Day-Evening	02/08/2023	07:00-23:00	41	69	35	35
Night	27/07/2023	23:00-07:00	36	60	31	31
Night	28/07/2023	23:00-07:00	37	60	31	31
Night	29/07/2023	23:00-07:00	48	64	41	44
Night	30/07/2023	23:00-07:00	44	65	38	39
Night	31/07/2023	23:00-07:00	41	61	40	40
Night	01/08/2023	23:00-07:00	39	57	36	37
Night	02/08/2023	23:00-07:00	35	63	32	33

