

## **Construction Noise and Vibration Monthly Report – March 2022**

**London Borough of Camden**

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# Non-Technical Summary

This Noise and Vibration Monitoring Report fulfils HS2 Limited's commitment detailed in the Environmental Minimum Requirements (EMRs), Annex 1, Code of Construction Practice, to present the results of noise and vibration monitoring carried out within the London Borough of Camden during the month of March 2022.

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken in the vicinity of The Adelaide Road Ventilation Shaft (ref.: ARVS) where piling, installation of new site cabins, installation of cable / utility runs and site monitoring were underway.
- Noise monitoring was undertaken in the vicinity of the Vehicle Holding Area worksite (ref.: VHA), where compound operations were underway.
- Noise monitoring was undertaken in the vicinity of Euston Throat Retained Cut and Granby Terrace Bridge worksite (ref.: ETRC & GTB) where slab construction, removal and installation of supporting structures, concrete treatment works, pile mat preparation, haul road modification and piling were underway.
- Noise monitoring was undertaken in the vicinity of Euston Scissor Cut worksite (ref.: ESC) where crane installation, digging of trial holes, piling and retaining wall works were underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Hampstead Road Bridge worksite (ref.: HRB) where surveys and drainage works were underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Euston Cavern worksite (ref.: ECAV) where piling preparation and ground stabilisation works, concrete pouring, roadworks and retaining wall works were underway.
- Noise monitoring was undertaken in the vicinity of On-Network worksites (ref.: B, C, D, E, F, G and H), where:
  - surveys and cable management system installation works (worksite H) were underway.
  - no HS2 works were undertaken at worksites B, C, D, E, F and G.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital - North worksite (ref.: NTH-N) where compressed aggregate bed, removal of waste, demolition, removal of pile structures were underway.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital - Euston North worksite (ref.: NTH-EN) where manhole and pipework construction and setup of ground investigation compound were underway.

- Noise monitoring was undertaken in the vicinity of the Euston Towers Demolition worksite (ref.: ETD), where installation of support structures, demolition, pile extraction, cutting and removal of reinforcement bars, concrete cutting and staircase works were underway.
- Noise monitoring was undertaken in the vicinity of the Traction Substation worksite (ref.: TSS) where supportive structure works, excavation works, tunnel waterproofing and concrete pouring were underway.
- Noise monitoring was undertaken in the vicinity of the Interim Taxi Rank worksite (ref.: ITR), where installation of utility works, earthworks and manhole works were underway.

The HS2 threshold levels for significant noise impacts, which are defined in Information Paper E23 (<https://www.gov.uk/government/publications/hs2-information-papers-environment>) were exceeded four (4) times during the reporting period.

There were no exceedances of trigger levels as defined in section 61 consents during the reporting period.

Three (3) complaints were received during the monitoring period. A description of complaints, the results of investigations and any actions taken are detailed in Table 8 of this report.



# Abbreviations and Descriptions

The abbreviations, descriptions and project terminology used within this report can be found in Table 1.

Table 1: Table of Abbreviations

Acronym/Term	Definition
$L_{Aeq,T}$	See equivalent continuous sound pressure level
Ambient sound	A description of the all-encompassing sound at a given location and time which will include sound from many sources near and far. Ambient sound can be quantified in terms of the equivalent continuous sound pressure level, $L_{pAeq,T}$
Decibel(s), or dB	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140dB.
Decibel(s) A-weighted, or dB(A)	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.
Equivalent continuous sound pressure level, or $L_{Aeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Exclusion of data	Measurement of noise levels can be affected by weather conditions such as prolonged periods of rain, winds speeds higher than 5m/s and snow/ice ground cover. Noise levels measured during these periods are considered not representative of normal noise conditions at the site and, for the purposes of this report, are excluded from the assessment of exceedances and calculation of typical noise levels and are also greyed out in charts. Identifiable incongruous noise and vibration events not attributable to HS2 construction noise are also excluded.
Façade	A facade noise level is the noise level 1m in front of a large reflecting surface. The effect of reflection, is to produce a slightly higher (typically +3 dB) sound level than it would be if the reflecting surface was not there.
Free-field	A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
Peak particle velocity, or PPV	Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position. The PPV is a simple indicator of perceptibility and risk of damage to structures due to vibration. It is usually measured in mm/s.
SOAEL	Significant Observed Adverse Effect Level - the level above which significant adverse effects on health and quality of life occur.
Sound pressure level	The parameter by which sound levels are measured in air. It is measured in decibels. The threshold of hearing has been set at 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB at a distance of 1 metre and a change of 3dB in a time varying sound signal is commonly regarded as being just detectable. A change of 10dB is subjectively twice, or half, as loud.
Vibration dose value, or VDV	An index used to evaluate human exposure to vibration in buildings. While the PPV provides information regarding the magnitude of single vibration events, the VDV provides a measure of the total vibration experienced over a specified period of time (typically 16h daytime and 8h night-time). It takes into account the magnitude, the number and the duration of vibration events and can be used to quantify exposure to continuous, impulsive, occasional and intermittent vibration. The vibration dose value is measured in $m/s^{1.75}$ .

# 1 Introduction

1.1.1 HS2 is required to undertake noise (and vibration) monitoring as necessary to comply with the requirements of the High Speed Rail (London-West Midlands) Environmental Minimum Requirements, including specifically Annex 1: Code of Construction Practice, in addition to any monitoring requirements arising from conditions imposed through consents under Section 61 of the Control of Pollution Act, 1974 or through Undertakings & Assurances given to third parties. Such monitoring may be undertaken for the following purposes:

- monitoring the impact of construction works;
- to investigate complaints, incidents and exceedance of trigger levels; or
- monitoring the effectiveness of noise and vibration control measures.

Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the London Borough of Camden (LBC) for the period 1<sup>st</sup> to 31<sup>st</sup> March 2022.

1.1.2 Active construction sites in the local authority area where monitoring was undertaken during this period include:

- The Adelaide Road ventilation shaft ref.: ARVS, (see plan 2 in Appendix A), where work activities included:
  - piling;
  - installation of new site cabins
  - installation of troughs; and
  - site monitoring.
- Vehicle Holding Area worksite ref.: VHA (see plan 1 in Appendix A), where work activities included:
  - general compound operation (vehicle movements).
- Euston Throat Retained Cut and Granby Terrace Bridge worksite ref.: ETRC & GTB (see plan 2 in Appendix A), where work activities included:
  - concrete slab construction;
  - concrete treatment works (hydroscabbling);

- pile mat preparation;
- haul road modifications;
- piling; and
- capping beam construction.
- Euston Scissor Cut worksite ref.: ESC (see plan 2 in Appendix A), where work activities included:
  - installation of tower crane;
  - digging of trial holes;
  - continuous and in-abeyance piling;
  - sheet pile extraction; and
  - retaining wall works.
- Hampstead Road Bridge worksite ref.: HRB (see plan 3 in Appendix A), where work activities included:
  - surveys; and
  - drainage works.
- Euston Cavern worksite ref.: ECAV (see plan 3 in Appendix A), where work activities included:
  - pile mat preparation;
  - concrete pouring;
  - roadworks; and
  - retaining wall works.
- On-Network worksites ref.: B, C, D, E, F, G and H (see plan 3 in Appendix A), where work activities included:
  - surveys and cable management system works (worksite H).
  - no HS2 works were undertaken at worksites B, C, D, E, F and G.
- Former National Temperance Hospital - North worksite ref.: NTH-N (see plan 3 in Appendix A), where work activities included:
  - installation of basement piling mat;
  - removal of stockpile;
  - foundations demolition;
  - removal of pile caps; and
  - removal of waste.

- Former National Temperance Hospital - Euston North worksite ref.: NTH-EN (see plan 3 in Appendix A), where work activities included:
  - construction of manholes;
  - construction of pipework; and
  - setup of ground investigation compound.
- Euston Towers Demolition worksite ref.: ETD (see plan 3 in Appendix A), where work activities included:
  - installation of props;
  - demolition;
  - sheet pile extraction;
  - cutting and removal of reinforced bars;
  - concrete cutting; and
  - staircase works.
- Traction Substation worksite ref.: TSS (see plan 3 in Appendix A), where work activities included:
  - pile support (capping beam) works;
  - installation of props;
  - excavations;
  - tunnel waterproofing; and
  - concrete pouring of tunnel linings.
- Interim Taxi Rank worksite ref.: ITR (see plan 3 in Appendix A), where work activities included:
  - installation of pipework;
  - earthworks (backfilling); and
  - manhole works.

1.1.3 The applicable standards, guidance, and monitoring methodology are outlined in the construction noise and vibration monitoring methodology report which can be found at the following location <https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2>. Noise and vibration monitoring reports for previous months can also be found at this location.

## 1.2 Measurement Locations

- 1.2.1 Thirty-two (32) noise and eleven (11) vibration monitoring installations were active across eighteen worksites in March in the LBC area. Table 2 summarises the position of noise and vibration monitoring installations within the LBC area in March 2022.
- 1.2.2 Noise monitor ref. CR was removed from site on Monday 28<sup>th</sup> March as enabling works on site have been completed. It is proposed that this monitor will be re-installed in advance of the main works.
- 1.2.3 Maps showing the position of noise and vibration monitoring installations are presented in Appendix B.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
ARVS	N051	Outside 70 Adelaide Road
	N052	Adelaide Road-Beaumont Walk
	V059	Outside 68 Adelaide Road
	ARBW-V1	Adelaide Road-Beaumont Walk
B	JC	Juniper Crescent
ESC	N024	External to Park Village Studios, Park Village East
	N047	Park Village East/Mornington Street bridge, lamppost #13
	PVS-V1	Park Village Studios
ESC, C	N022	External to 34 Mornington Terrace
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18
ETRC & GTB	N001	Park Village East, lamppost #1 (external to Cubitt Court, 100 Park Village East)
	N002	Park Village East, lamppost #2 (external to Richmond Court)
	N003	Park Village East, lamppost #9 (external to Silsoe House)
	SH-V1	Silsoe House
ETRC & GTB, D	N004	Mornington Terrace, lamppost #7 (junction of Mornington Terrace, Mornington Place and Clarkson Row)
ETRC & GTB, E	N005	5A Granby Terrace
E	CR	Lamppost #2 on Clarkson Row
ETRC & GTB, F	N023	Lamppost #21 on Hampstead Road
HRB	N019	Outside Cartmel, Hampstead Road
	N020	Mackworth Street, lamppost #1

Worksite Reference	Measurement Reference	Address
	N021	Stanhope Street, lamppost #2
	N044	Regents Park Estate west, near Langdale
	N045	Regents Park Estate south, external to Coniston
	V039	Coniston, Regents Park Estate
	V043	Cubitt Court, Park Village East
G, H	HH	Euston Station Parcel Deck, Barnby Street
G	BS	Roof of Stockbeck House, Barnby Street
ETD, TSS	N006	Royal College of General Practitioners roof level
TSS	N010	Wesley Hotel
	N011	Euston Street, lamppost #4 (external to 82 Euston Street)
	V002	Royal College of General Practitioners basement boiler room by Stephenson Way
	V037	Magic Circle, basement
	V038	Wesley Hotel, basement lightwell, Euston Street
ETD	N007	Royal College of General Practitioners, Melton Street
	V003	Royal College of General Practitioners basement vaults under Melton St
VHA	N025	External to 3 Prince Albert Road
	N026	Thames Water Compound
NTH-EN, TSS	N012	Drummond Street, lamppost #14 (opposite to 92-94 Drummond Street)
NTH-EN	N014	Starcross Street lamppost (external to Exmouth Arms)
	N016	Margaret Centre roof
	N017	Hampstead Road, lamppost #48
	V021	42-44 Cobourg Street
NTH-EN, NTH-N	N018	Outside replacement housing, Hampstead Road

## 2 Summary of Results

### 2.1 Summary of Measured Noise and Vibration Levels

2.1.1 Table 3 presents a summary of the measured noise levels at each monitoring location over the reporting period. The  $L_{Aeq,T}$  is presented for each of the relevant time periods averaged over the calendar month, along with the highest single period  $L_{Aeq,T}$  that was found to occur within the month.

Table 3: Summary of Measured dB L<sub>Aeq</sub> Data over the Monitoring Period

Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday Average L <sub>Aeq,T</sub> (Highest Day L <sub>Aeq,T</sub> )					Saturday Average L <sub>Aeq,T</sub> (Highest Day L <sub>Aeq,T</sub> )					Sunday / Public Holiday Average L <sub>Aeq,T</sub> (Highest Day L <sub>Aeq,T</sub> )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
ARVS	N051	Outside 70 Adelaide Road	Free-field	67.6 (70.5)	70.1 (72.3)	67.3 (76.7)	67.7 (78.2)	64.3 (73.5)	65.0 (65.7)	67.0 (68.0)	67.8 (71.9)	67.2 (73.2)	65.4 (76.5)	67.8 (72.3)	63.7 (70.1)
	N052	Adelaide Road-Beaumont Walk	Free-field	67.4 (71.4)	69.0 (71.5)	66.3 (70.8)	66.8 (75.3)	63.5 (69.2)	65.2 (65.6)	66.9 (67.9)	67.2 (69.2)	66.8 (71.6)	65.7 (75.6)	66.5 (71.6)	63.9 (70.5)
B	JC	Juniper Crescent	Free-field	58.0 (63.6)	58.0 (59.6)	57.7 (58.8)	59.0 (61.2)	56.1 (61.2)	59.0 (63.7)	57.6 (59.8)	57.0 (58.8)	56.7 (59.2)	52.7 (56.8)	55.5 (57.8)	54.5 (57.7)
ESC	N024	External to Park Village Studios, Park Village East	Free-field	58.2 (60.8)	61.9 (82.7)	58.7 (61.7)	57.6 (64.0)	53.9 (61.2)	56.0 (58.8)	58.3 (59.6)	58.5 (61.0)	58.2 (61.9)	54.1 (60.9)	58.3 (69.2)	53.6 (59.9)
	N047	Park Village East/Mornington Street bridge, lamppost #13	Free-field	59.1 (65.1)	62.8 (77.9)	60.1 (65.6)	58.2 (61.0)	53.6 (59.4)	56.4 (57.9)	59.5 (60.6)	59.5 (60.8)	59.8 (63.8)	55.2 (61.8)	58.7 (69.1)	53.4 (60.6)
ESC, C	N022	External to 34 Mornington Terrace	Free-field	58.9 (61.6)	62.8 (77.5)	58.7 (59.8)	58.2 (60.4)	53.7 (58.9)	58.4 (58.8)	59.6 (60.8)	58.9 (60.2)	58.0 (59.5)	52.5 (59.6)	56.7 (60.5)	52.9 (58.2)
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18	Free-field	62.0 (63.3)	64.2 (73.3)	61.6 (67.0)	61.1 (66.4)	57.1 (65.3)	61.7 (62.5)	63.1 (63.9)	62.0 (64.0)	61.2 (63.0)	55.4 (60.4)	59.7 (62.3)	56.3 (61.6)



Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday Average L <sub>Aeq,T</sub> (Highest Day L <sub>Aeq,T</sub> )					Saturday Average L <sub>Aeq,T</sub> (Highest Day L <sub>Aeq,T</sub> )					Sunday / Public Holiday Average L <sub>Aeq,T</sub> (Highest Day L <sub>Aeq,T</sub> )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
ETRC & GTB	N001	External to Cubitt Court, 100 Park Village East	Free-field	58.9 (62.0)	64.3 (66.6)	60.6 (62.8)	59.0 (65.1)	53.4 (59.5)	56.7 (58.6)	62.0 (66.0)	60.6 (62.9)	60.8 (64.3)	54.8 (59.3)	58.9 (64.8)	52.8 (58.1)
	N002	Richmond Court, Park Village East	Free-field	60.3 (63.1)	62.9 (66.9)	61.7 (65.1)	60.0 (66.5)	54.6 (60.5)	57.6 (58.1)	61.1 (62.6)	61.7 (63.8)	62.0 (70.5)	56.1 (60.9)	60.0 (62.5)	54.2 (60.1)
	N003	Silsoe House, Park Village East	Façade	59.7 (64.4)	63.2 (67.7)	61.1 (63.7)	59.1 (62.1)	54.0 (59.6)	56.0 (56.7)	59.7 (60.1)	60.4 (62.0)	60.9 (67.4)	56.9 (70.0)	58.7 (62.7)	53.8 (60.6)
ETRC & GTB, D	N004	Mornington Terrace, lamppost #7	Free-field	63.8 (64.9)	66.2 (68.1)	64.0 (65.6)	63.2 (65.2)	58.8 (66.5)	62.9 (64.0)	64.7 (66.2)	63.1 (63.9)	63.3 (67.3)	57.1 (64.2)	62.0 (68.5)	58.4 (64.7)
ETRC & GTB, E	N005	5A Granby Terrace	Free-field	64.9 (66.7)	68.0 (69.9)	65.5 (67.5)	64.9 (67.7)	61.7 (66.8)	63.8 (64.2)	67.0 (69.9)	66.3 (68.0)	65.2 (67.8)	61.7 (65.6)	63.5 (69.4)	61.8 (68.1)
E	CR	Lamppost #2 on Clarkson Row	Free-field	64.9 (67.5)	69.8 (72.7)	69.4 (72.3)	69.0 (73.4)	60.8 (72.4)	63.4 (64.3)	69.3 (70.9)	67.1 (70.7)	67.9 (72.5)	56.6 (62.7)	67.7 (73.3)	61.6 (68.2)
ETRC & GTB, F	N023	Lamppost #21 on Hampstead Road	Free-field	67.6 (69.6)	69.0 (70.8)	66.9 (69.5)	66.8 (71.8)	65.0 (69.9)	65.4 (66.6)	67.6 (69.3)	66.4 (67.9)	66.9 (71.1)	65.7 (70.3)	66.3 (72.0)	64.2 (67.7)
HRB	N019	Outside Cartmel, Hampstead Road	Free-field	55.9 (60.5)	70.4 (76.6)	57.4 (68.8)	55.9 (69.7)	53.1 (60.7)	54.8 (55.7)	64.2 (67.7)	58.6 (61.3)	57.2 (61.2)	54.5 (59.2)	55.4 (66.4)	51.2 (56.2)

Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday Average L <sub>Aeq,T</sub> (Highest Day L <sub>Aeq,T</sub> )					Saturday Average L <sub>Aeq,T</sub> (Highest Day L <sub>Aeq,T</sub> )					Sunday / Public Holiday Average L <sub>Aeq,T</sub> (Highest Day L <sub>Aeq,T</sub> )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
HRB	N020	Mackworth Street, lamppost #1	Free-field	53.1 (57.0)	61.2 (63.4)	53.6 (58.1)	51.7 (59.8)	48.6 (56.0)	51.0 (51.9)	59.4 (64.6)	55.4 (58.9)	52.3 (55.2)	48.9 (53.4)	52.4 (59.8)	47.7 (52.9)
	N021	Stanhope Street, lamppost #2	Free-field	57.9 (61.9)	61.9 (67.1)	59.6 (63.5)	57.3 (62.0)	52.2 (57.4)	54.0 (55.2)	58.9 (61.4)	60.2 (61.8)	60.1 (68.4)	53.5 (56.9)	59.0 (75.3)	51.7 (58.7)
	N044	Regents Park Estate west, near Langdale	Free-field	59.9 (65.0)	65.6 (71.8)	58.6 (65.0)	57.4 (66.0)	56.8 (64.7)	56.7 (59.9)	68.2 (73.4)	68.5 (74.0)	64.3 (74.7)	54.5 (60.3)	61.4 (77.8)	57.5 (61.2)
	N045	Regents Park Estate south, external to Coniston	Free-field	58.8 (60.2)	71.7 (74.8)	58.9 (63.1)	57.9 (63.9)	56.5 (59.5)	58.2 (60.6)	66.3 (72.8)	62.7 (65.7)	58.0 (63.4)	55.2 (59.6)	58.1 (62.8)	56.7 (59.2)
G, H	HH	Euston Station Parcel Deck, Barnby Street	Free-field	62.3 (70.7)	64.3 (69.8)	62.3 (71.2)	62.8 (69.3)	58.3 (66.0)	59.8 (61.5)	62.4 (64.0)	61.7 (64.0)	63.0 (71.5)	60.2 (66.9)	61.1 (65.8)	57.5 (64.9)
G	BS	Roof of Stockbeck House, Barnby Street	Free-field	60.3 (62.3)	62.7 (65.0)	61.3 (62.4)	60.6 (63.2)	56.5 (63.8)	59.4 (60.2)	61.4 (63.0)	60.1 (61.1)	60.0 (61.9)	55.4 (60.0)	59.2 (62.2)	56.0 (63.1)
ETD, TSS	N006	Royal College of General Practitioners roof level	Free-field	57.2 (62.5)	65.7 (68.6)	55.9 (63.3)	55.1 (59.1)	54.9 (60.1)	52.8 (54.3)	61.4 (62.2)	52.8 (56.0)	52.4 (55.1)	51.1 (55.0)	51.6 (54.8)	50.9 (53.9)
TSS	N010	Wesley Hotel	Façade	69.8 (70.2)	71.2 (72.1)	69.6 (70.2)	68.4 (70.5)	60.7 (70.2)	69.8 (70.0)	70.5 (71.2)	69.6 (69.7)	69.2 (70.2)	58.2 (67.6)	66.5 (70.0)	60.8 (70.1)

OFFICIAL

Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday Average L <sub>Aeq,T</sub> (Highest Day L <sub>Aeq,T</sub> )					Saturday Average L <sub>Aeq,T</sub> (Highest Day L <sub>Aeq,T</sub> )					Sunday / Public Holiday Average L <sub>Aeq,T</sub> (Highest Day L <sub>Aeq,T</sub> )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
	N011	Outside 82 Euston Street	Free-field	55.2 (66.3)	60.1 (62.7)	55.1 (57.6)	54.9 (60.9)	53.3 (69.7)	52.5 (55.9)	57.3 (58.2)	56.5 (58.7)	59.1 (78.1)	50.7 (55.0)	55.2 (65.5)	51.3 (58.4)
ETD	N007	Royal College of General Practitioners, Melton Street	Free-field	64.8 (71.4)	67.7 (71.9)	64.4 (68.4)	63.7 (67.1)	62.4 (66.8)	63.4 (64.8)	64.6 (65.4)	64.0 (65.2)	64.3 (66.3)	62.9 (66.1)	63.3 (66.3)	61.9 (66.0)
VHA	N025	External to 3 Prince Albert Road	Free-field	67.8 (70.5)	67.8 (70.4)	66.7 (70.4)	65.5 (69.3)	64.3 (69.4)	65.3 (66.3)	66.7 (67.1)	65.7 (66.6)	66.9 (70.8)	65.2 (67.1)	66.1 (70.2)	64.0 (70.1)
	N026	Vehicle Holding Area	Free-field	58.8 (61.4)	61.2 (69.7)	56.3 (59.1)	55.2 (59.0)	53.0 (57.5)	56.7 (60.0)	55.9 (56.5)	55.5 (56.3)	56.4 (60.7)	53.5 (55.8)	55.2 (58.8)	52.4 (56.3)
NTH-EN, TSS	N012	Opposite 92-94 Drummond Street	Free-field	54.3 (61.5)	58.8 (63.5)	57.0 (59.4)	56.4 (60.5)	52.7 (67.1)	52.1 (52.5)	56.6 (58.2)	56.4 (57.4)	56.2 (59.3)	51.9 (56.3)	55.5 (59.1)	52.0 (56.4)
NTH-EN	N014	Starcross Street lamppost (external to Exmouth Arms)	Free-field	53.9 (64.6)	58.3 (61.3)	58.4 (66.4)	57.5 (67.2)	52.4 (62.3)	51.8 (52.8)	55.0 (56.7)	55.1 (58.0)	55.7 (60.3)	51.2 (55.9)	55.2 (67.1)	51.0 (56.5)
	N016	Margaret Centre roof	Free-field	55.2 (64.4)	59.1 (62.8)	53.4 (56.6)	52.7 (57.7)	51.1 (58.2)	52.7 (54.8)	57.5 (65.4)	54.6 (58.1)	53.4 (56.3)	51.8 (56.0)	52.7 (57.4)	50.1 (55.9)
NTH-EN	N017	Hampstead Road, lamppost #48	Free-field	68.8 (70.9)	69.9 (71.2)	68.0 (71.3)	68.4 (72.4)	66.3 (70.9)	66.0 (67.6)	67.1 (67.8)	67.5 (68.5)	67.7 (72.7)	67.9 (75.3)	67.1 (71.3)	65.0 (68.9)

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Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$ )					Saturday Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$ )					Sunday / Public Holiday Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$ )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
NTH-EN, NTH-N	N018	Outside replacement housing, Hampstead Road	Free-field	69.3 (70.9)	70.9 (72.3)	69.0 (74.0)	68.6 (72.9)	66.7 (73.2)	66.3 (69.0)	68.1 (69.0)	68.2 (68.9)	68.2 (74.8)	68.6 (76.6)	67.9 (73.0)	65.7 (72.8)

2.1.2 Table 4 presents a summary of the measured vibration levels at each monitoring location over the reporting period. The highest PPV measured during the monitoring along any axis is presented in the table.

Table 4: Summary of Measured PPV Data over the Monitoring Period

Worksite Reference	Measurement Reference	Monitor Address	Highest PPV measured in any axis, mm/s
ARVS	V059	Outside 68 Adelaide Road	4.27 (Z-axis)
	ARBW-V1	Adelaide Road – Beaumont Walk	3.01 (Y-axis)
HRB	V039	Coniston, Regents Park Estate	2.00 (Z-axis)
	V043	Cubitt Court, Park Village East	2.24 (X-axis)
ETD, TSS	V003	RCGP basement vaults, 305 Euston Road	0.83 (Y-axis)
TSS	V002	RCGP basement boiler room, 305 Euston Road	1.74 (Z-axis)
	V037	Magic Circle, basement	1.73 (Z-axis)
	V038	Wesley Hotel, basement lightwell, Euston Street	1.06 (Z-axis)
NTH-EN	V021	42-44 Cobourg Street (floor)	0.56 (X-axis)
ESC	PVS-V1	Park Village Studios	0.50 (Y-axis)
ETRC & GTB	SH-V1	Silsoe House	0.49 (Z-axis)

2.1.3 Appendix C presents graphs of the noise and vibration monitoring data over the month for each of the measurement locations. Noise data presented consists of the hourly  $L_{Aeq}$  values and, where relevant, the  $L_{Aeq,T}$  values (where the time period T has been taken to be the averaging period as specified in Table 1 of HS2 Information Paper E23). Vibration data presented consist of hourly PPV values. The full data set for the monitoring equipment can be found at the following location:

<https://data.gov.uk/dataset/24542ae7-dd44-444f-b259-871c4cc43b5e/environmental-monitoring-data>.

## 2.2 Exceedances of the SOAEL

2.2.1 The significant observed adverse effect level (SOAEL) is defined in the ‘Planning Practice Guidance – Noise’ as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

2.2.2 HS2 Phase One Information Paper E23: Control of Construction Noise and Vibration sets out the SOAELs for construction noise.

2.2.3 Where reported construction noise levels exceed the SOAEL at nearby receptors, relevant periods will be identified. Summary statistics to evaluate ongoing qualification for noise insulation and temporary rehousing are also presented where relevant.

2.2.4 Table 5 presents a summary of recorded exceedances of the SOAEL at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 5: Summary of Exceedances of SOAEL

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
ARVS	N051	Outside 70 Adelaide Road	All days	All periods	No exceedance
	N052	Adelaide Road, Beaumont Walk	Weekday	All periods	No exceedance
B	JC	Juniper Crescent	All days	All periods	No exceedance
ESC	N024	External to Park Village Studios, Park Village East	Weekday	08:00 – 18:00	1
	N047	Park Village East/Mornington Street bridge, lamppost #13	All days	All periods	No exceedance
ESC, C	N022	External to 34 Mornington Terrace	All days	All periods	No exceedance
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18	All days	All periods	No exceedance
ETRC & GTB	N001	External to Cubitt Court, 100 Park Village East	All days	All periods	No exceedance
	N002	Richmond Court, Park Village East	All days	All periods	No exceedance
	N003	Silsoe House, Park Village East	All days	All periods	No exceedance
ETRC & GTB, D	N004	Mornington Terrace, lamppost #7	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
ETRC & GTB, E	N005	5A Granby Terrace	All days	All periods	No exceedance
E	CR	Lamppost #2 on Clarkson Row	All days	All periods	No exceedance
ETRC & GTB, F	N023	Lamppost #21 on Hampstead Road	All days	All periods	No exceedance
HRB	N019	Outside Cartmel, Hampstead Road	Weekday	08:00 – 18:00	3
	N020	Mackworth Street, lamppost #1	All days	All periods	No exceedance
	N021	Stanhope Street, lamppost #2	All days	All periods	No exceedance
	N044	Regents Park Estate west, near Langdale	All days	All periods	No exceedance
	N045	Regents Park Estate south, external to Coniston	All days	All periods	No exceedance
G, H	HH	Euston Station Parcel Deck, Barnby Street	All days	All periods	No exceedance
G	BS	Roof of Stockbeck House, Barnby Street	All days	All periods	No exceedance
ETD, TSS	N006	RCGP Roof level	All days	All periods	Not applicable*
TSS	N008	RCGP Stephenson Way	All days	All periods	Not applicable*
	N010	Wesley Hotel	All days	All periods	Not applicable*
	N011	Outside 82 Euston Street	All days	All periods	No exceedance
ETD	N007	RCGP, Melton Street	All days	All periods	No exceedance
VHA	N025	External to 3 Prince Albert Road	All days	All periods	No exceedance
	N026	Thames Water Compound	All days	All periods	No exceedance
NTH-EN	N012	Opposite 92-94 Drummond Street	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
	N014	Starcross Street lamppost (external to Exmouth Arms)	All days	All periods	No exceedance
NTH-EN	N016	Margarete Centre roof	All days	All periods	No exceedance
	N017	Hampstead Road, lamppost #48	All days	All periods	No exceedance
NTH-N	N018	Outside replacement housing, Hampstead Road	All days	All periods	No exceedance

\* The defined SOAEL criteria are not applicable to non-residential properties.

2.2.5 For the purpose of assessing eligibility for noise insulation or temporary rehousing, multiple exceedances of the SOAEL in a 24-hour period would be counted as a single exceedance during that day. Over the reporting period, the overall number of SOAEL exceedances at each measurement location is shown in Table 6 and may be lower than the total sum of individual exceedances reported in Table 5 for each location.

Table 6: Summary of Total Exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
HRB	N019	Outside Cartmel, Hampstead Road	3
ESC	N024	External to Park Village Studios, Park Village East	1

2.2.6 Four (4) exceedances of the SOAEL were measured during March 2022. Three (3) occurred at monitoring location N019 during weekday periods and one (1) occurred at monitoring location N045 during a weekday period.



## 2.3 Exceedances of Trigger Level

2.3.1 Table 7 provides a summary of exceedances of the S61 trigger noise levels determined to be due to HS2 related construction noise measured during the reporting period, along with the findings of any investigation.

Table 7: Summary of Exceedances of Trigger Levels

Complaint Reference Number (if applicable)	Worksite Reference	Date and Time Period	Identified Source	Results of Investigation (including noise monitoring results)	Actions Taken
-	-	-	-	-	-

## 2.4 Complaints

2.4.1 Table 8 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 8: Summary of Complaints

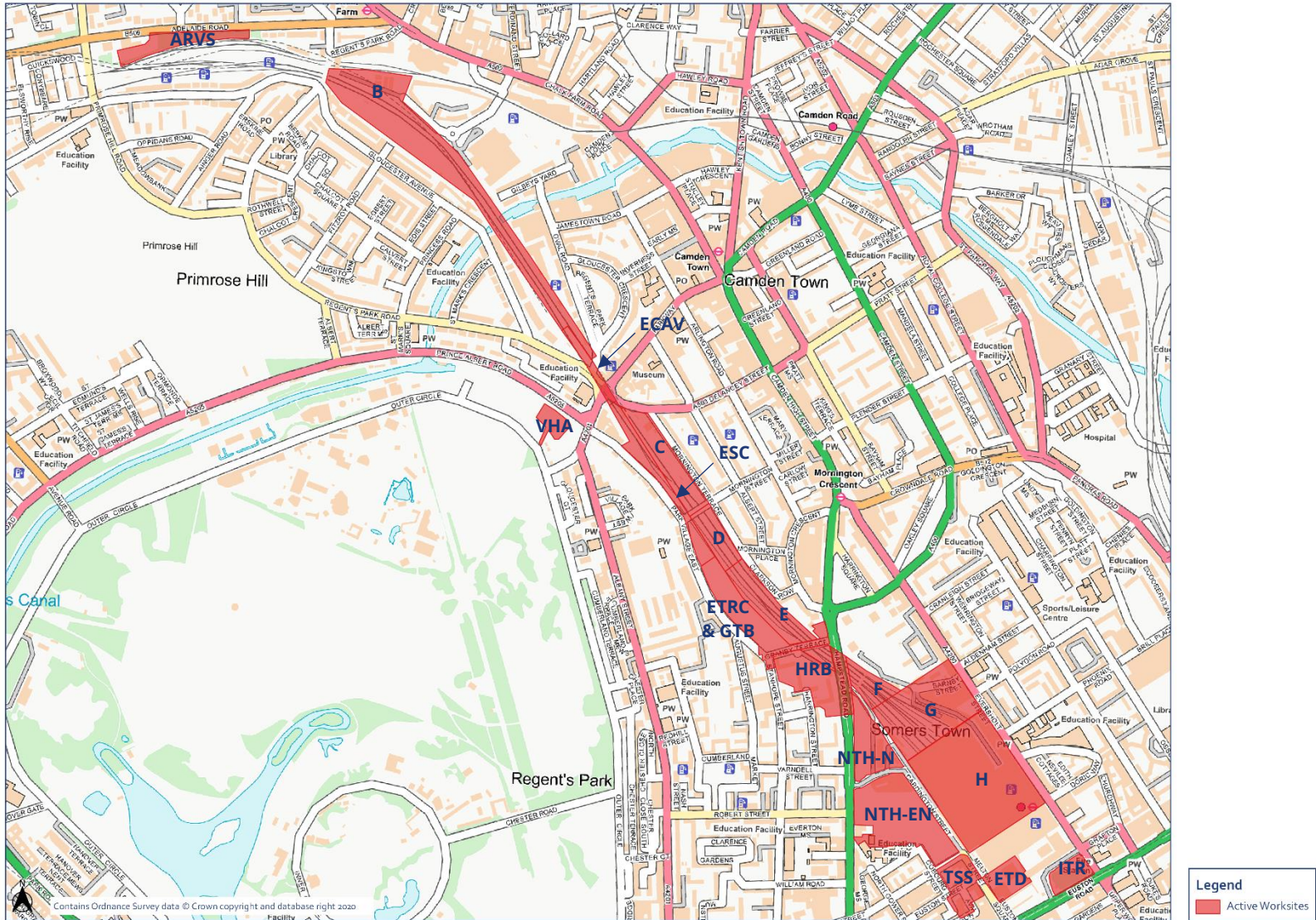
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-22-43454-C	ETRC	Complaint from a stakeholder regarding out of hours works.	Complaint relates to a large concrete pour that started early in the morning and had to be completed the same day to ensure structural integrity of the pile once hardened. Large concrete pours are allowed for in the current Section 61 agreement (with a maximum of three per week). Works were completed by 22:00 and best practicable means were used throughout. Monitoring data demonstrates compliance with Section 61 limits.	Information was provided to the resident confirming the results of the investigation.

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-22-43467-C	ETRC	Complaint from a stakeholder regarding construction vibration and potential for building damage.	Complaint relates to unexpected works near to the stakeholders address that were necessary to break out an old sewer pipe before removal. Works generated high noise and vibration for a few hours in the morning. Monitoring data demonstrates compliance with Section 61 limits.	After the complaint the work methodology was reviewed and site staff briefed to minimise any further disruption. Following this noise and vibration levels were significantly reduced, however due to the proximity of the working area to the receptor some disturbance will have been unavoidable.
HS2-22-43484-C	ETRC	Complaint from a stakeholder regarding construction vibration.	Works were ongoing to install the pile mat near to the stakeholder's property which required compaction of aggregate. An exclusion zone of 15m from receptors was in place for using vibro-rolling setting. Monitoring data were reviewed and were well below levels normally considered associated to cosmetic building damage, however they will have been perceptible for a few hours on the day of the complaint. Methodology and best practicable means were as per Section 61, however due to the nature of this activity and the proximity to the receptor perceptible levels of vibration are at times inevitable despite best efforts to reduce disturbance to residents.	After the complaint the work methodology was reviewed and site staff briefed to minimise any further disruption. Following this noise and vibration levels were significantly reduced, however due to the proximity of the working area to the receptor some disturbance will have been unavoidable.

# Appendix A Site Locations

# HS2

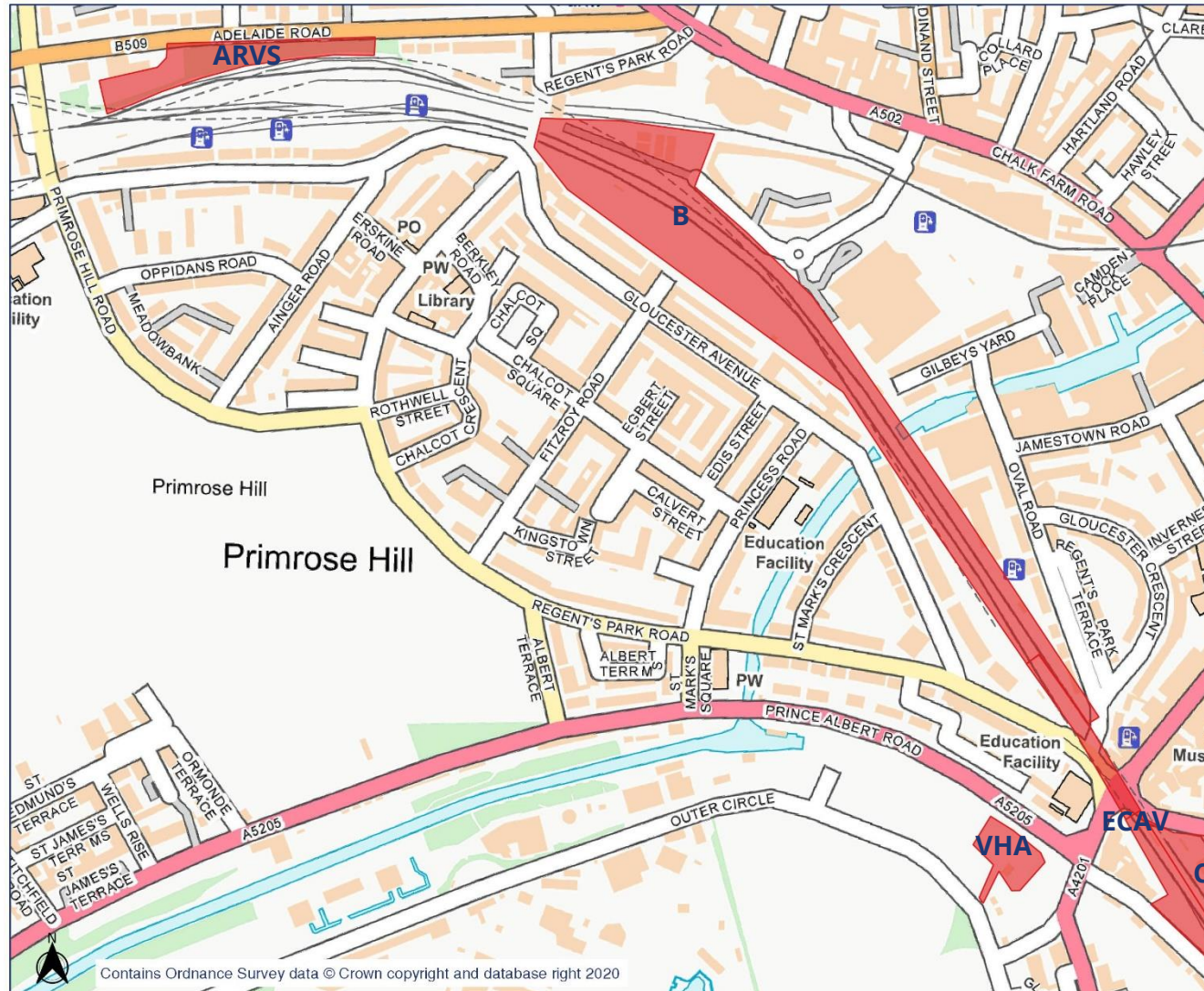
## Worksite identification plan - Overview





# HS2

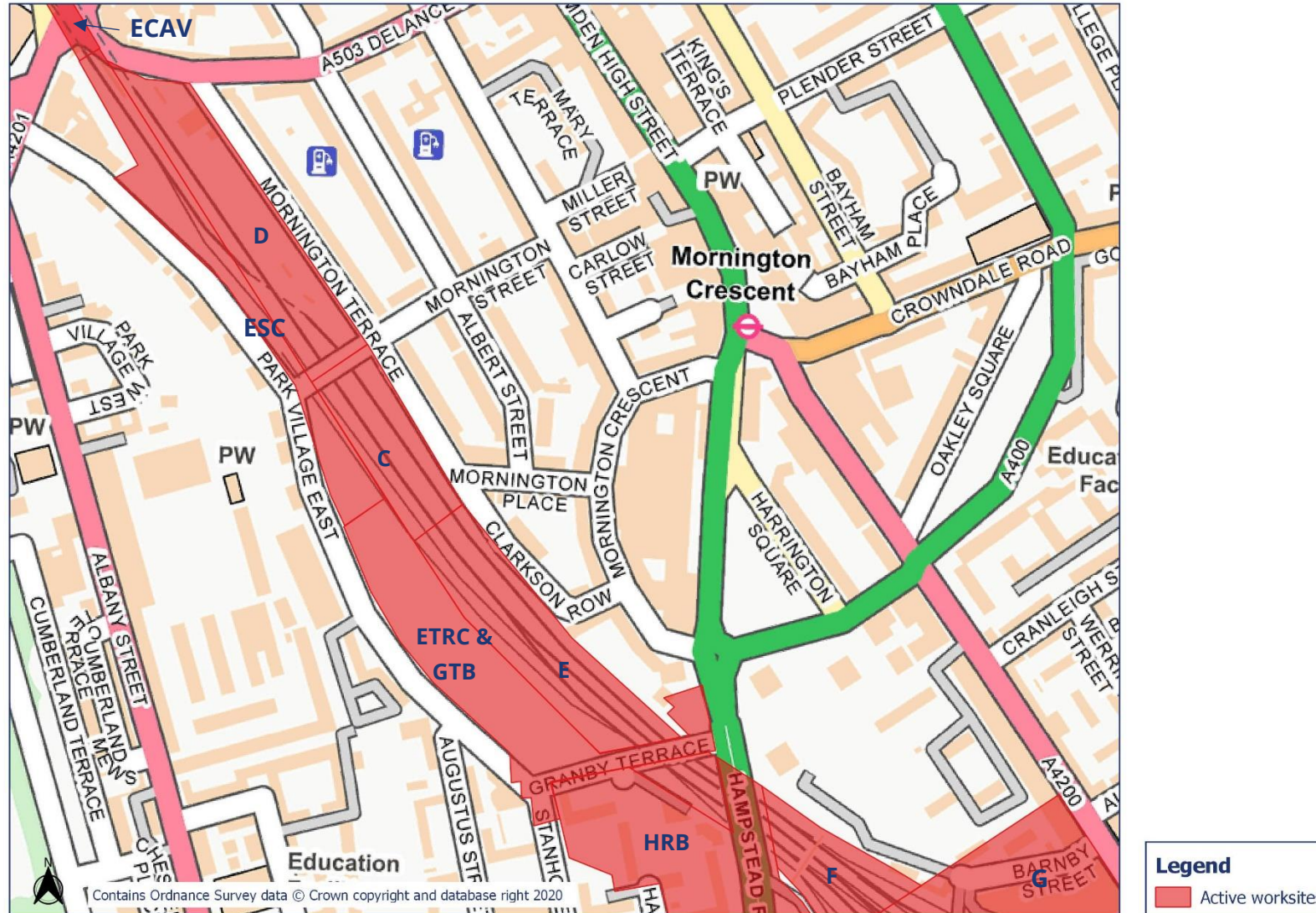
## Worksite identification plan - 1





# HS2

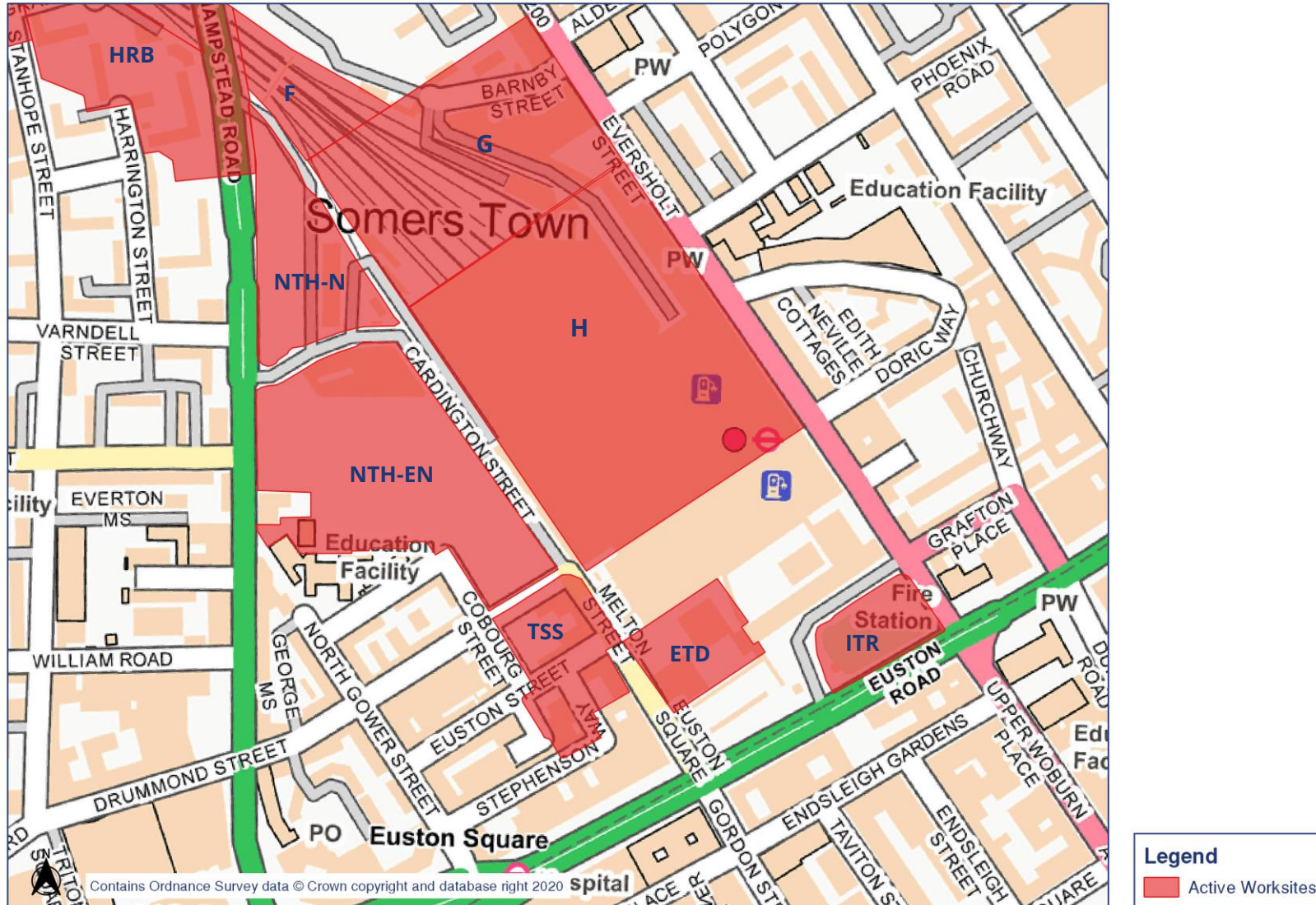
## Worksite identification plan - 2





# HS2

## Worksite identification plan - 3

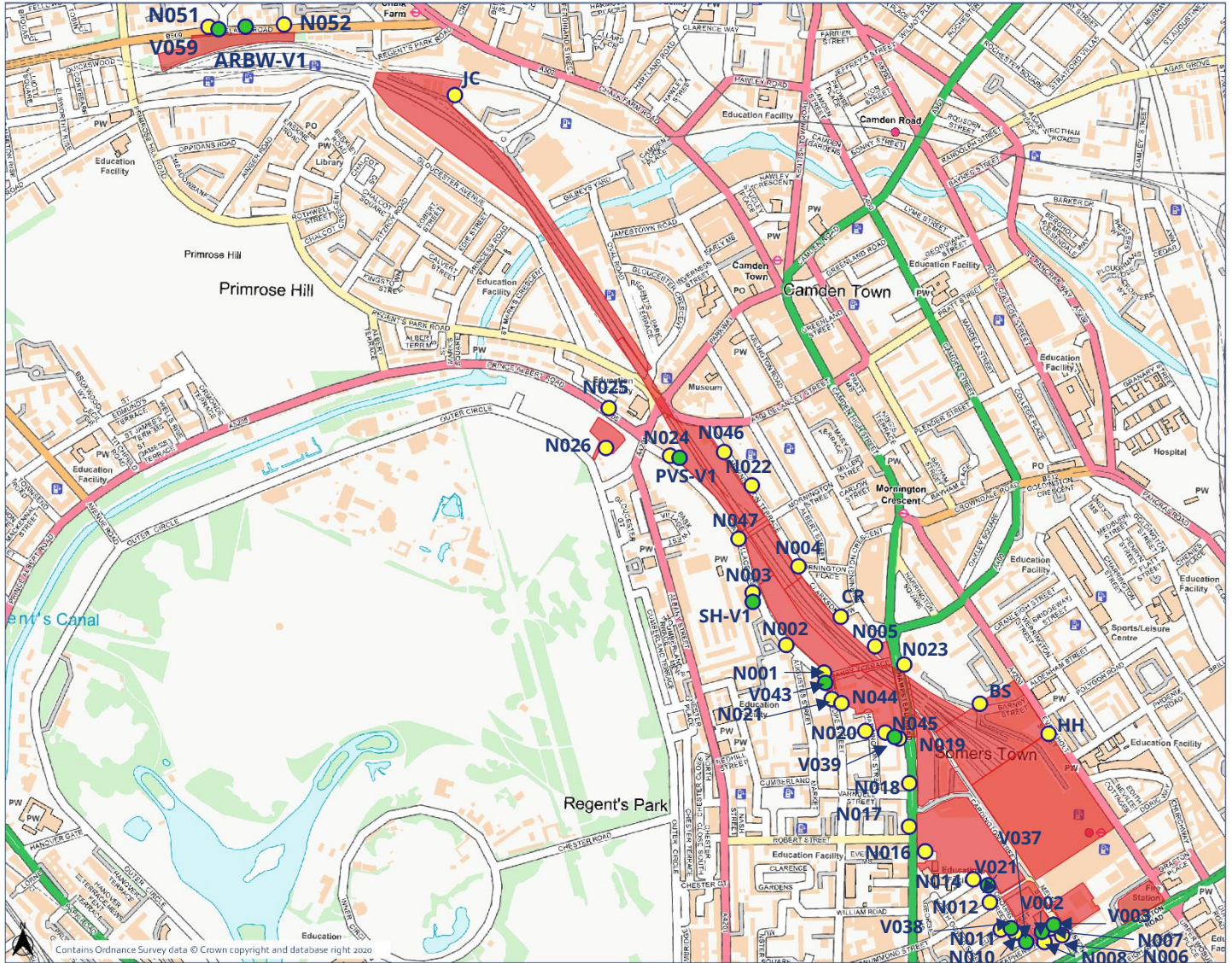


# Appendix B Monitoring Locations



# HS2

## Noise and vibration monitoring plan - Overview



**Legend**

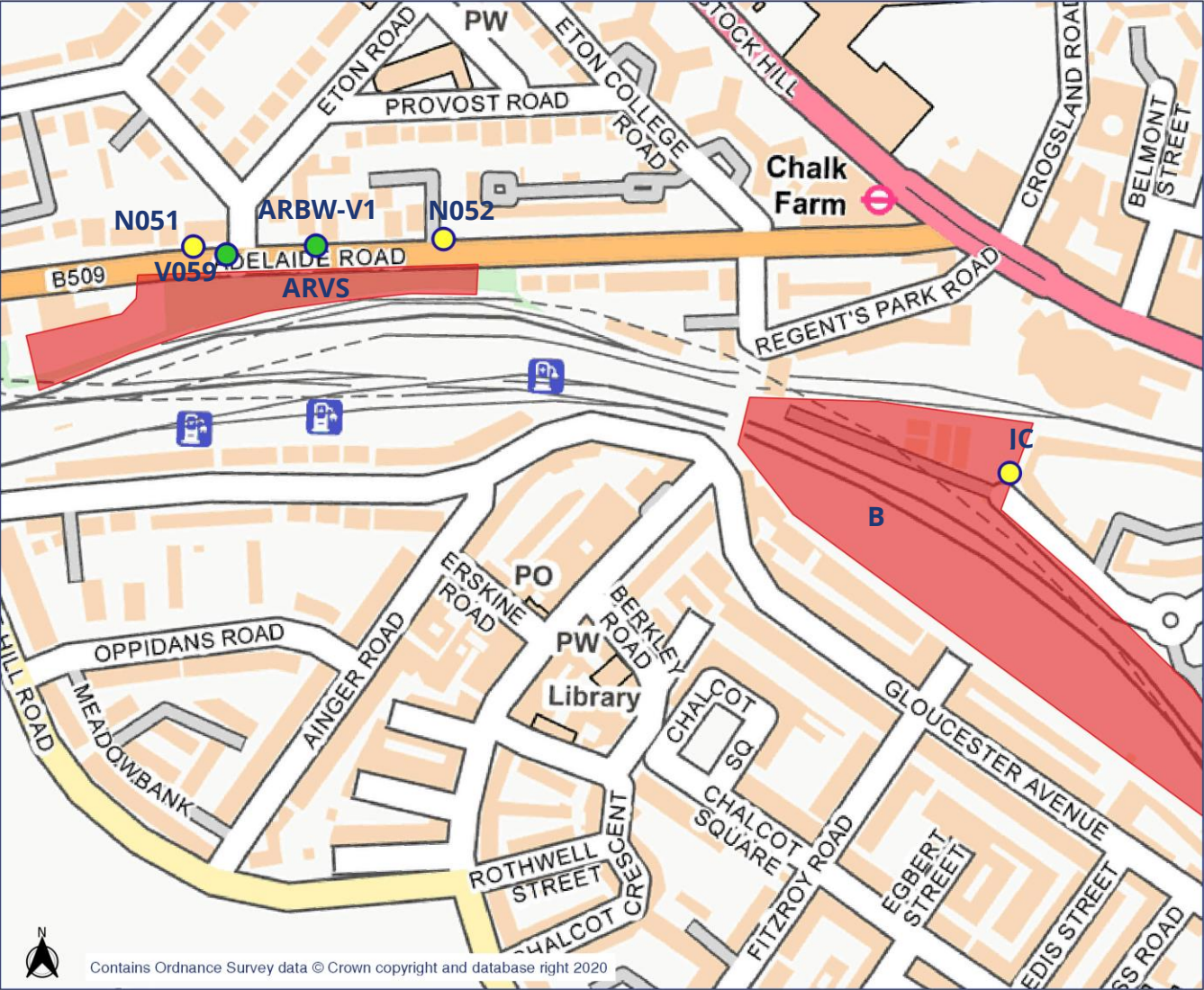
- Noise Monitor
- Vibration Monitor
- Active Worksites

Contains Ordnance Survey data © Crown copyright and database right 2020



# HS2

## Noise and vibration monitoring plan - 1



**Legend**

- Noise Monitor
- Vibration Monitor
- Active Worksites

# HS2

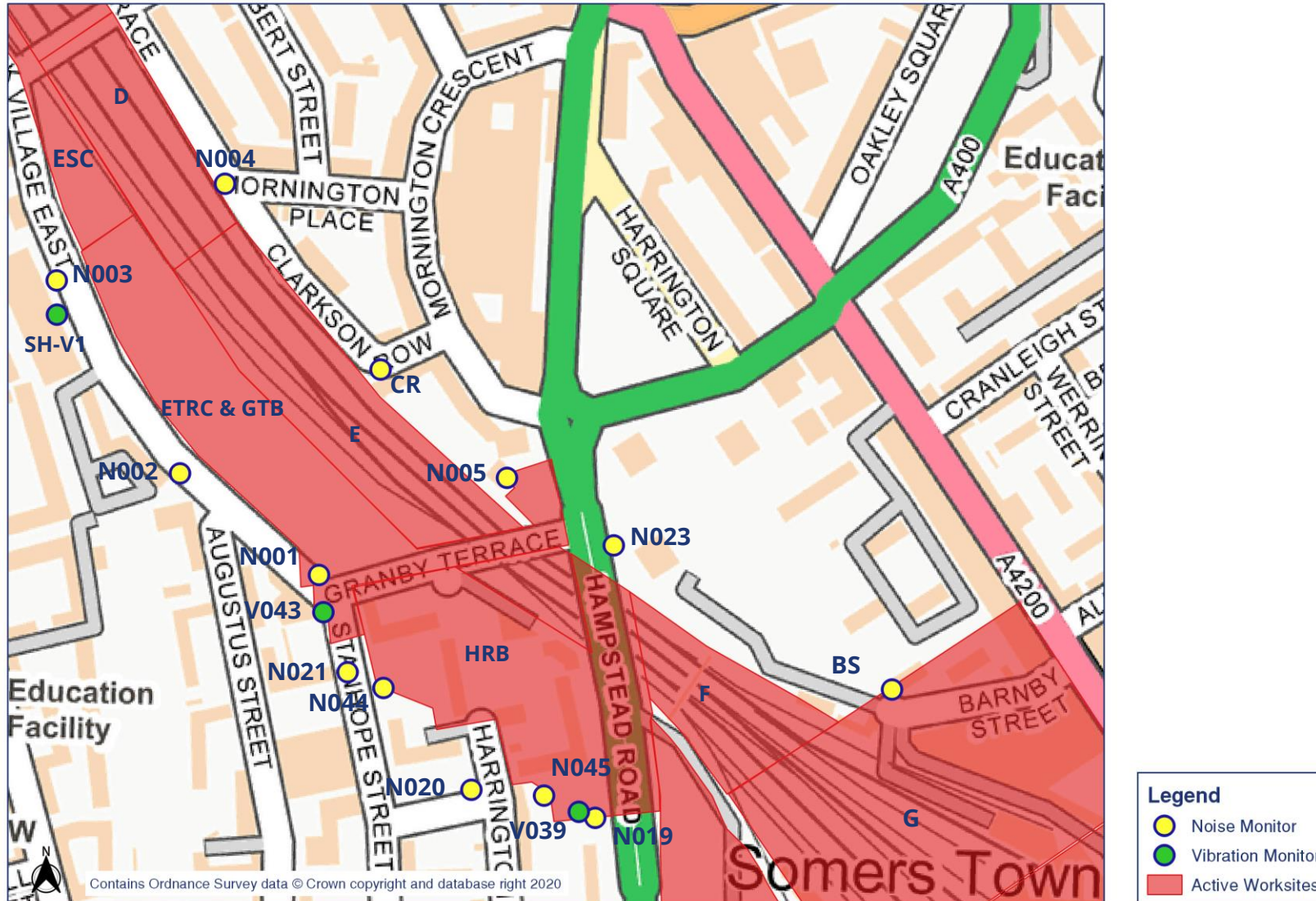
## Noise and vibration monitoring plan - 2





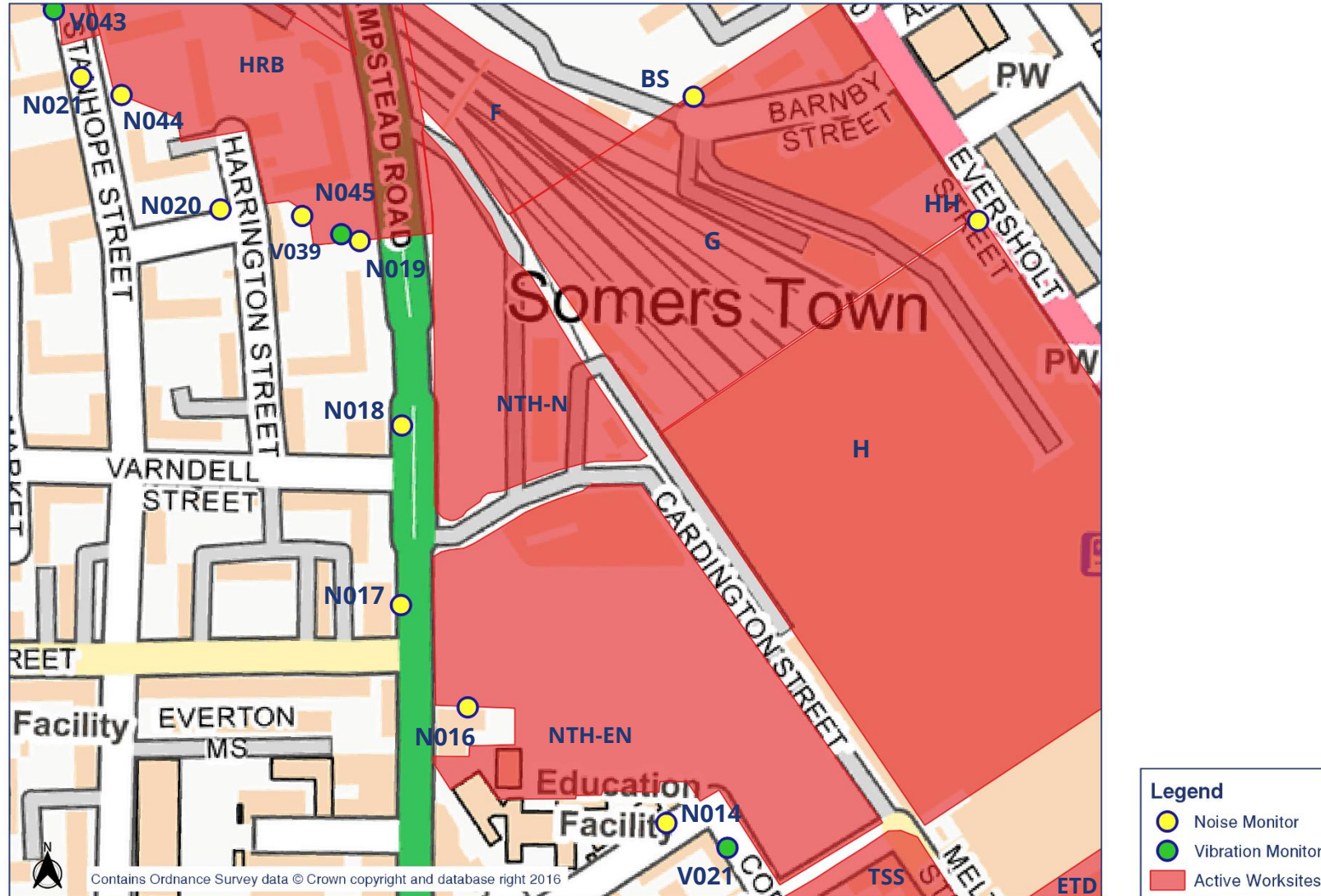
# HS2

## Noise and vibration monitoring plan - 3



# HS2

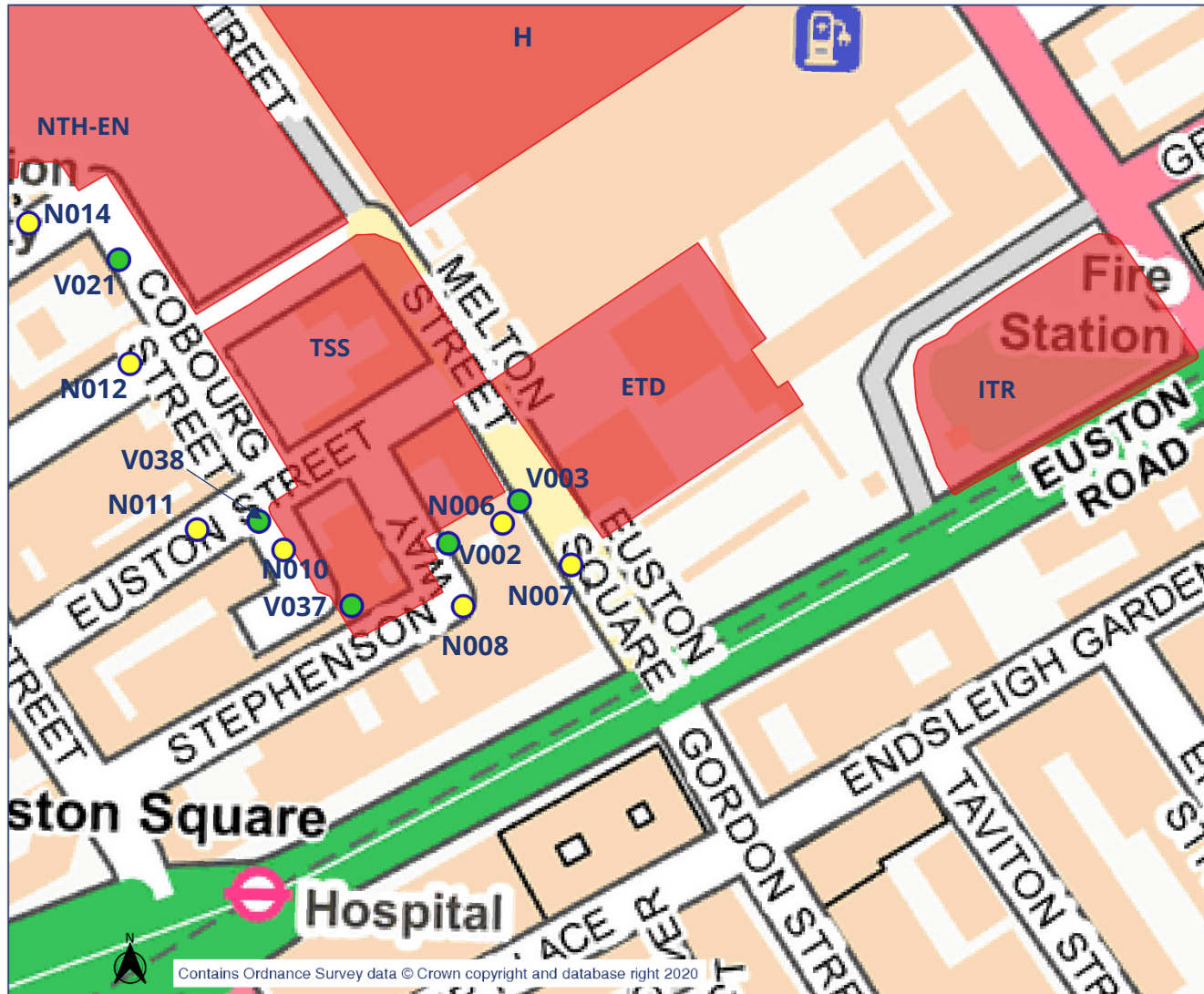
## Noise monitoring plan - 4





# HS2

## Noise and vibration monitoring plan - 5



**Legend**

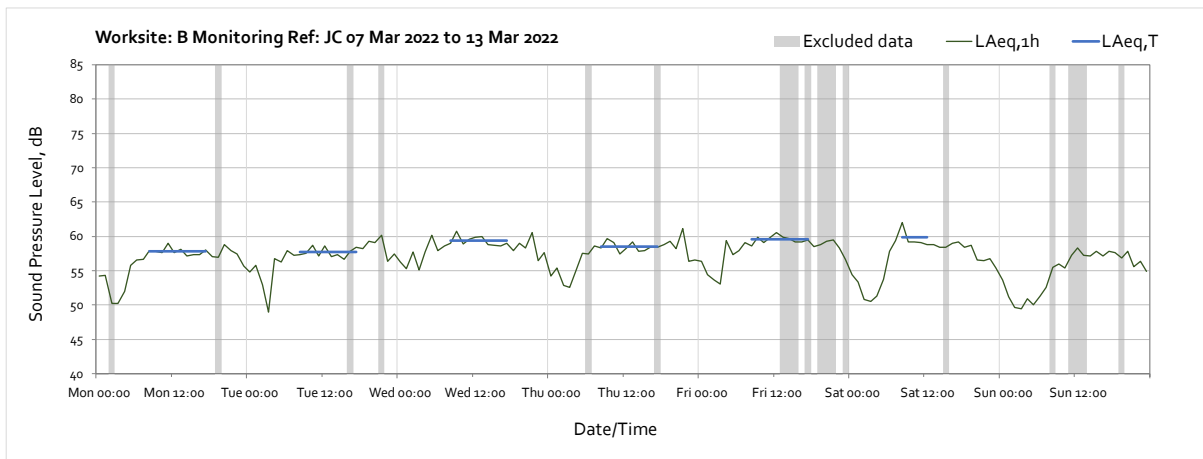
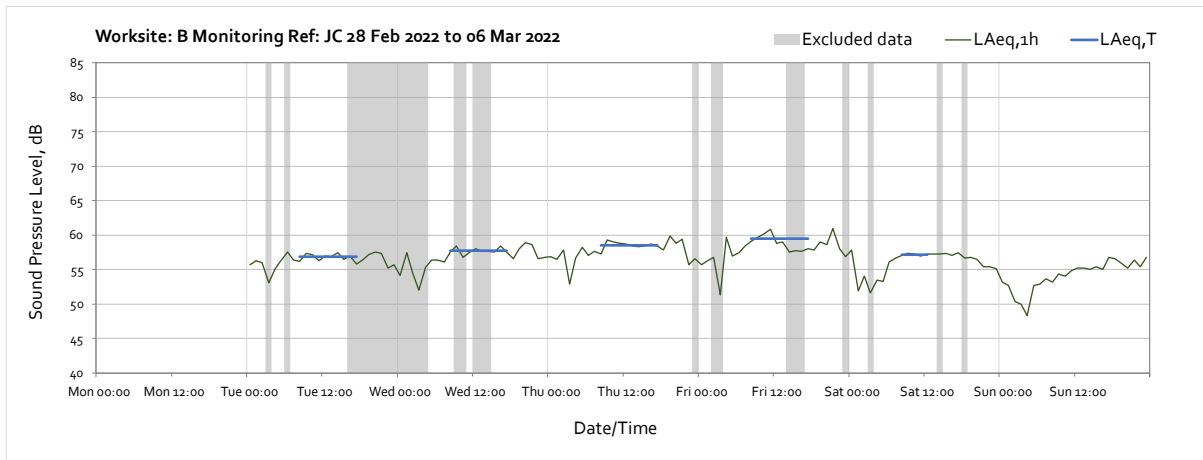
- Noise Monitor
- Vibration Monitor
- Active Worksites

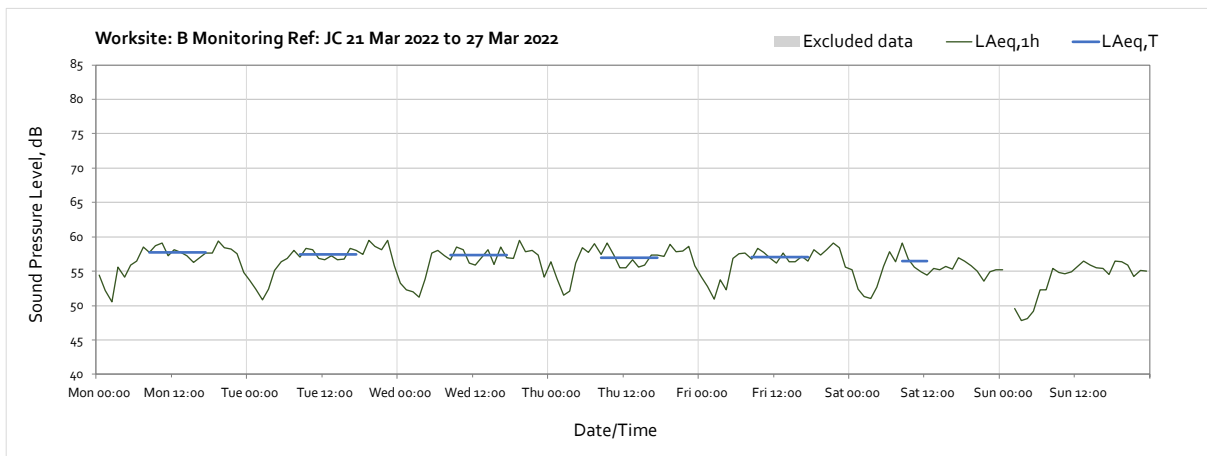
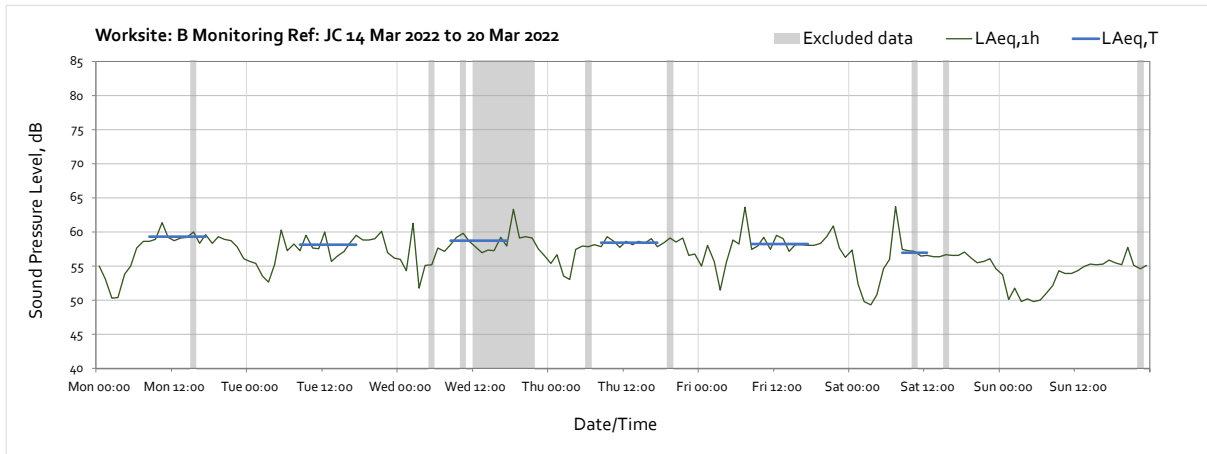
# Appendix C Data

The following graphs show the hourly measured ambient noise level  $L_{Aeq,1h}$  and, where relevant, the averaged noise level  $L_{Aeq,T}$  values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have been excluded from the calculation of the  $L_{Aeq,T}$  values in Table 3 of the main report.

## Noise

### Worksite: B – Monitoring Ref: JC



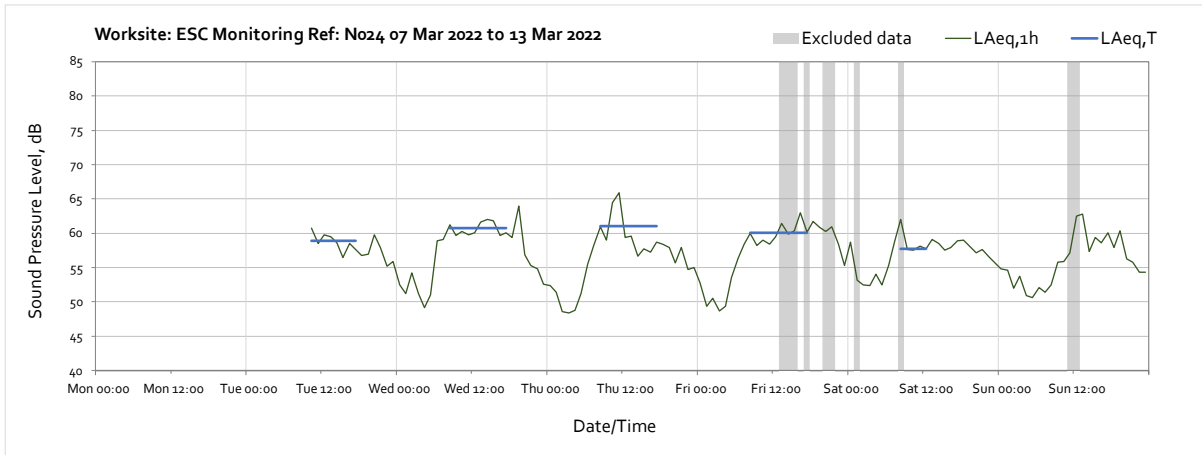


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

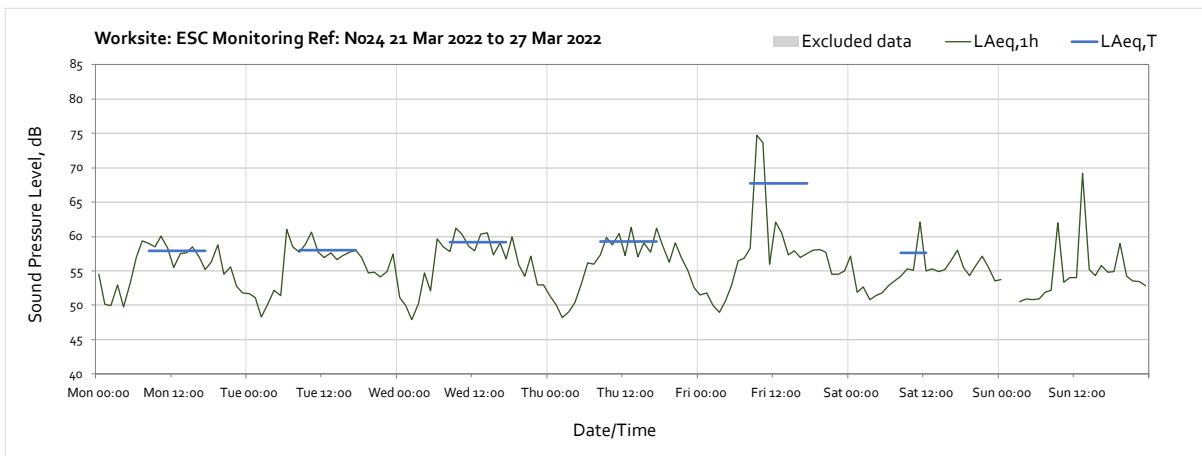
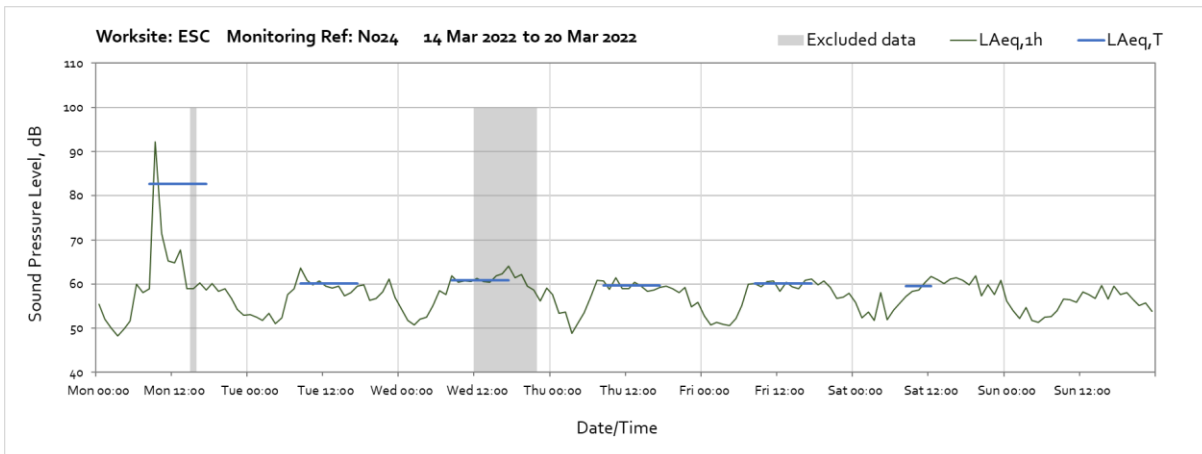




## Worksite: ESC – Monitoring Ref: N024

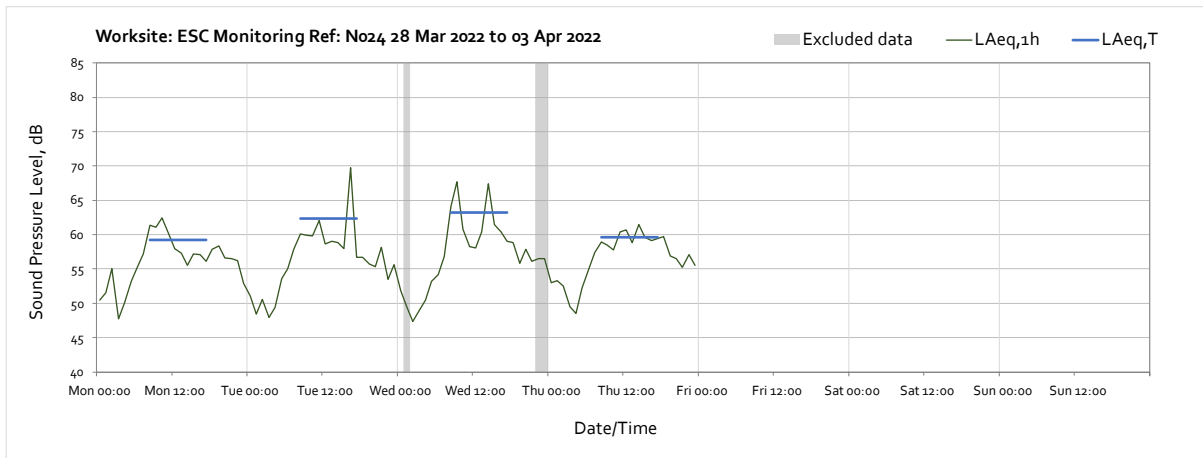


Note: Missing data from the start of the month until 09:00 on Tuesday 8<sup>th</sup> March was due to a fault with the monitoring station.

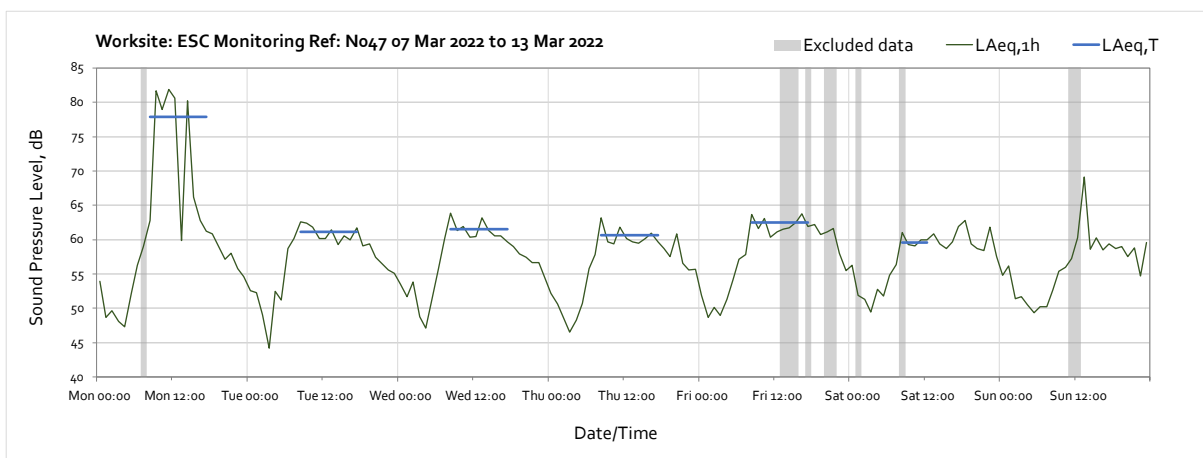
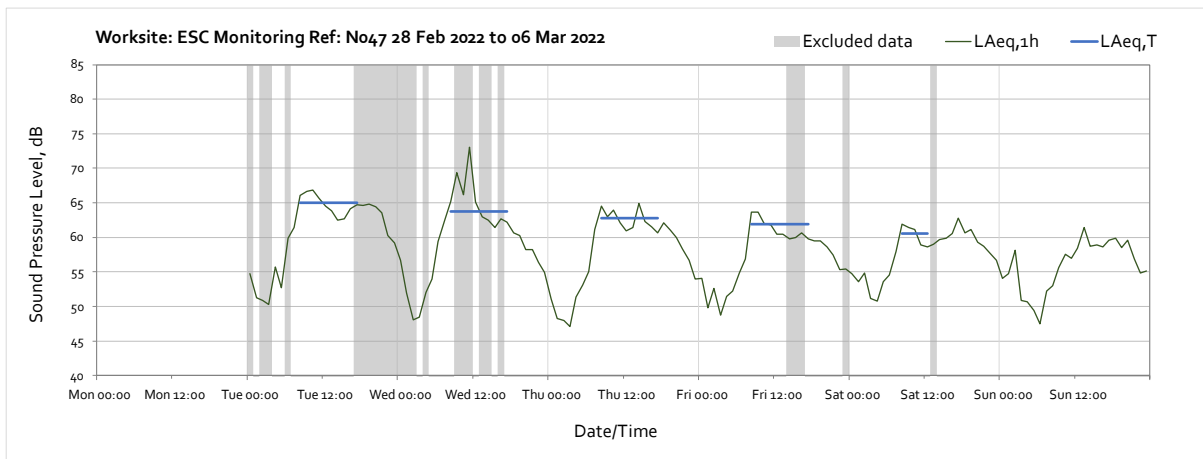


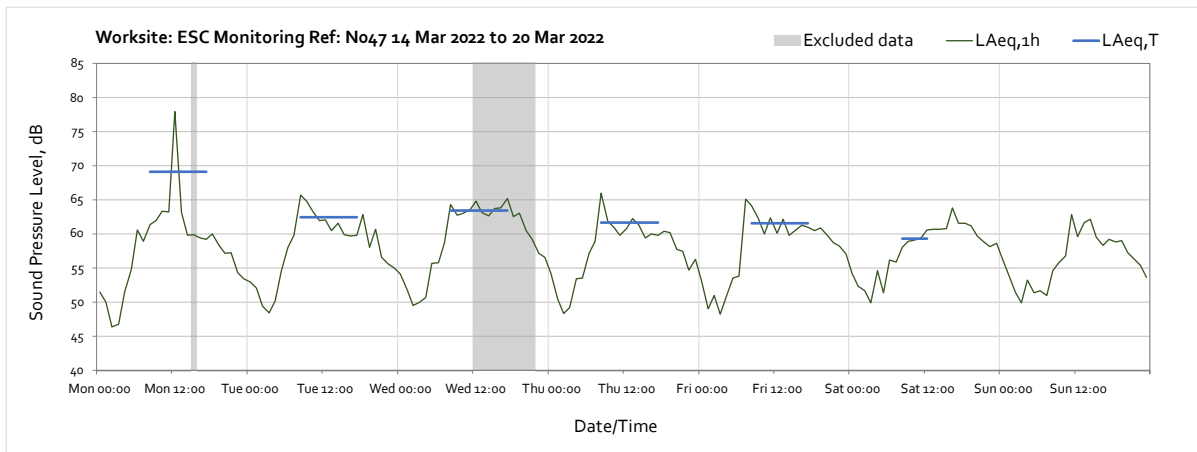
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Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



### Worksite: ESC - Monitoring Ref: N047

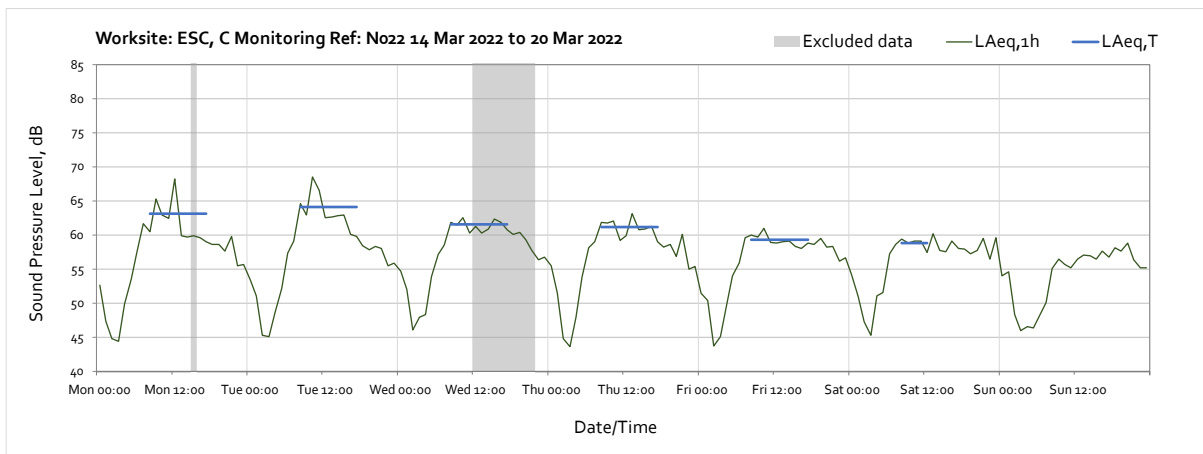
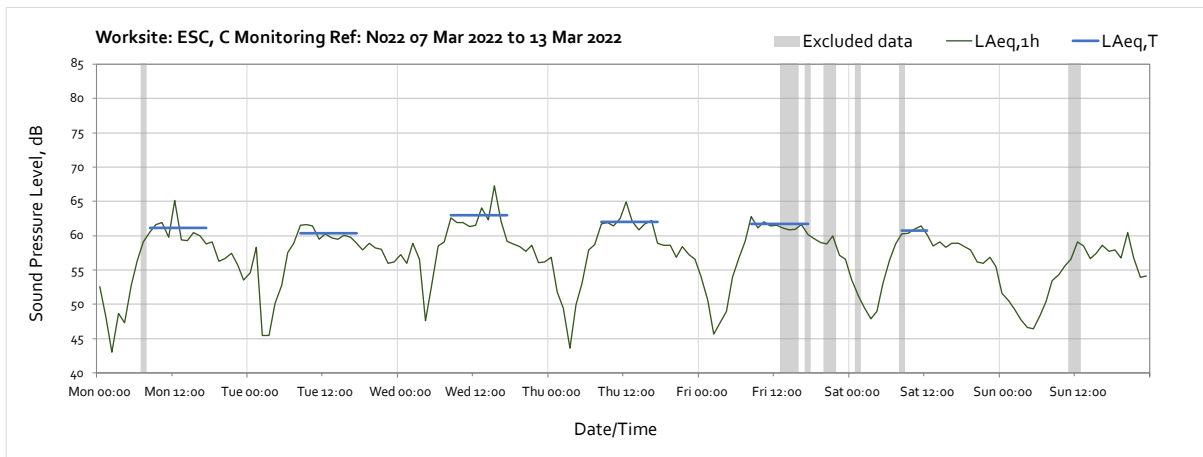
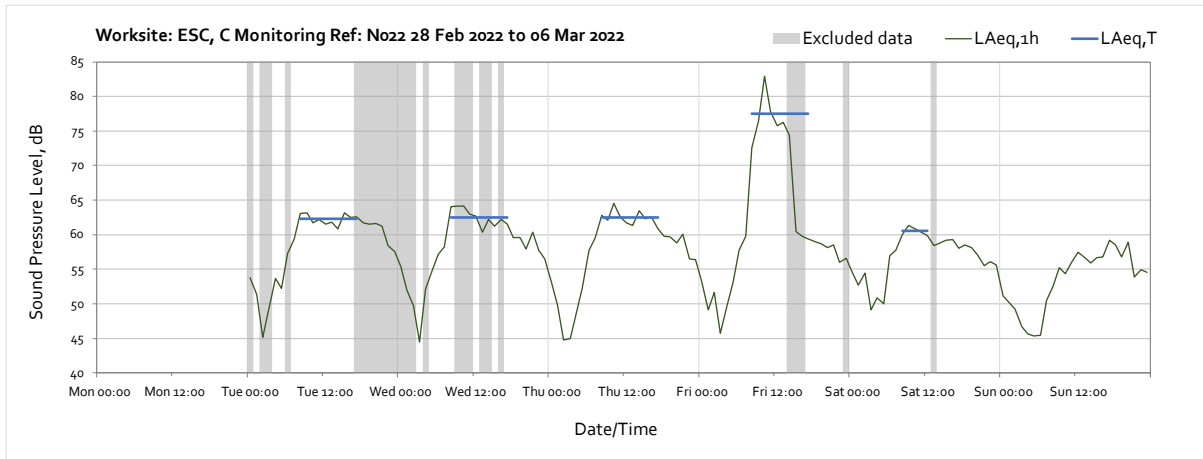


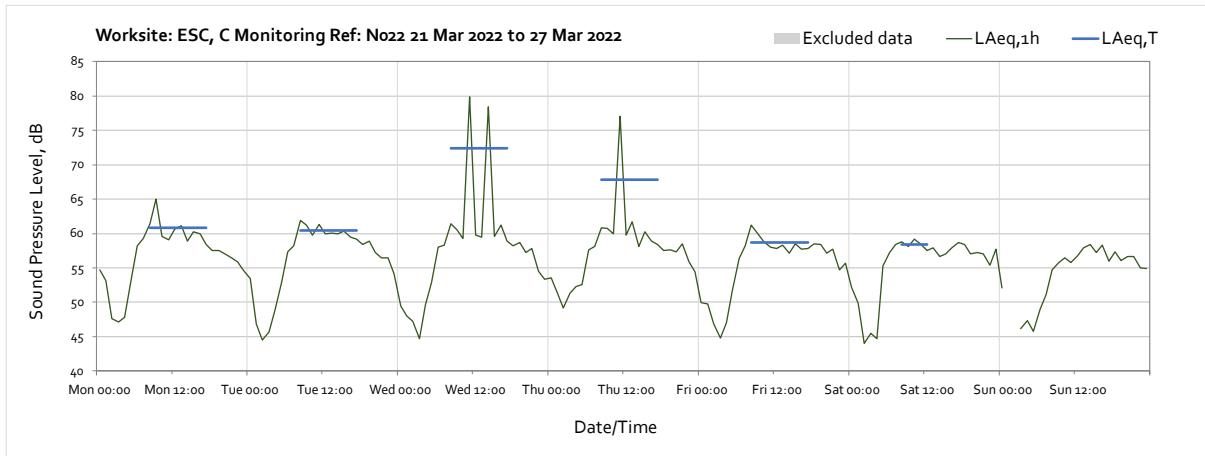


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



## Worksite: ESC, C – Monitoring Ref: N022

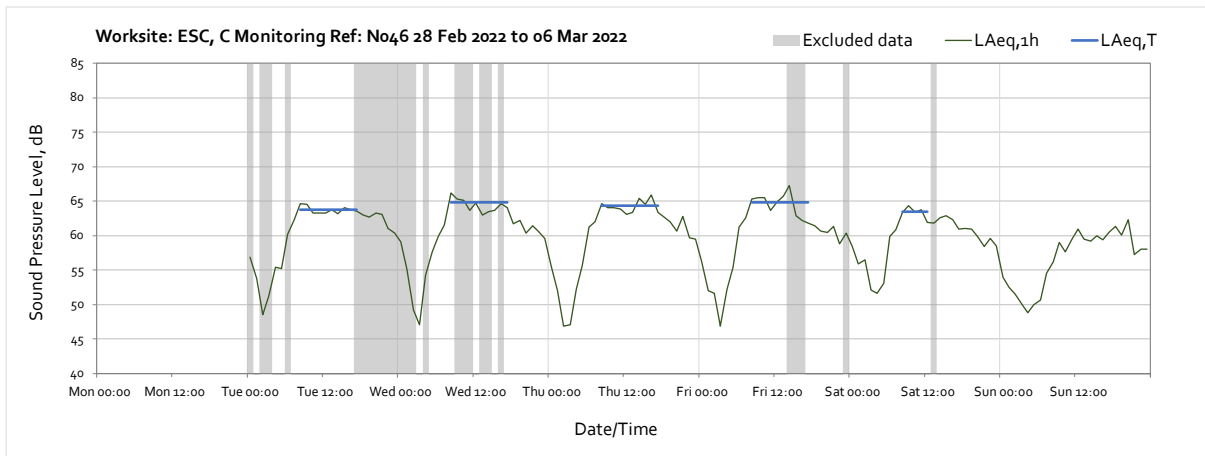


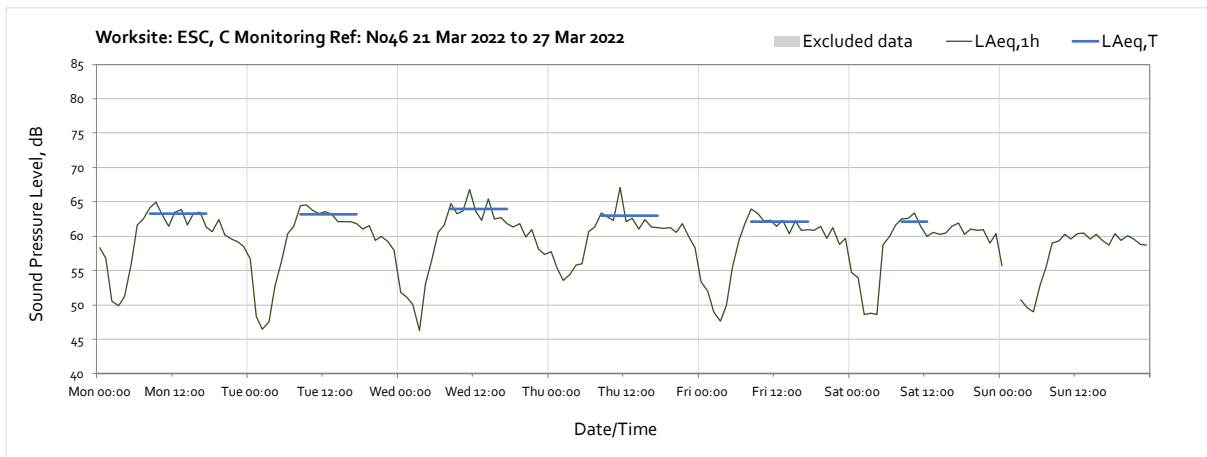
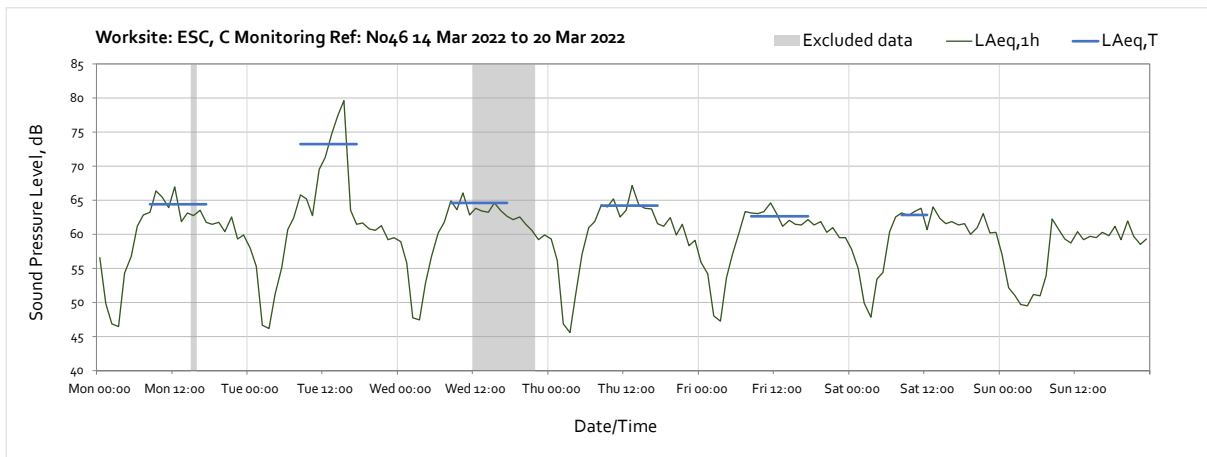
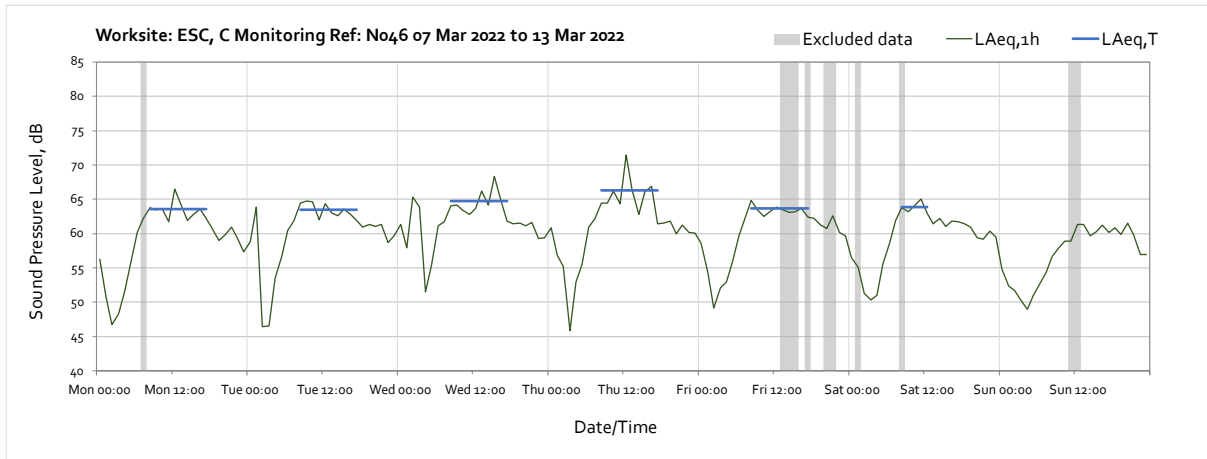


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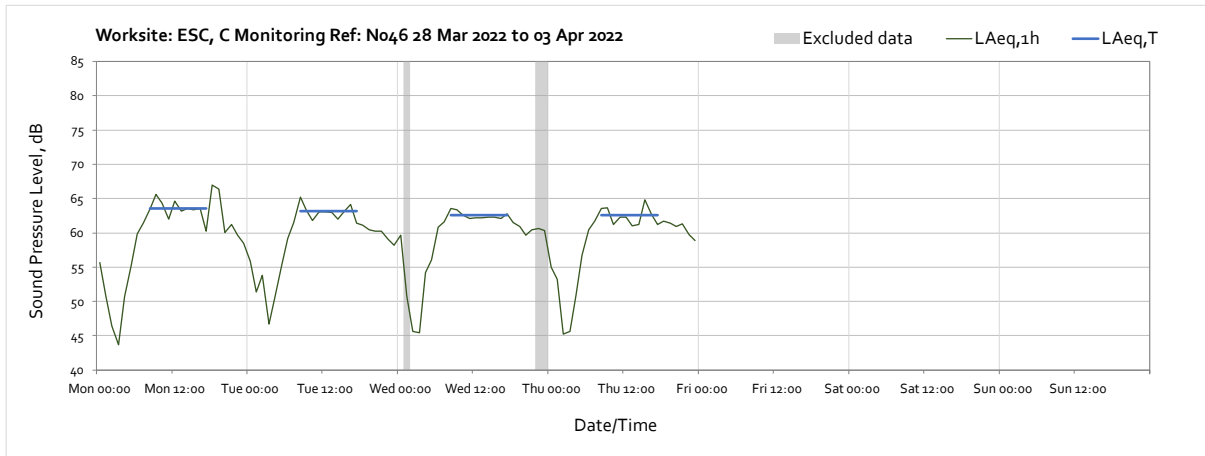
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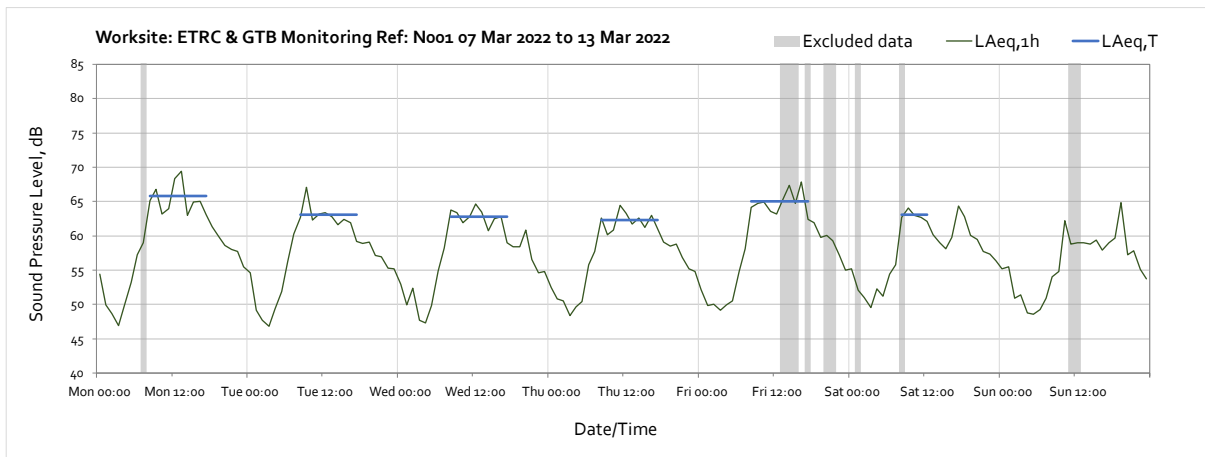
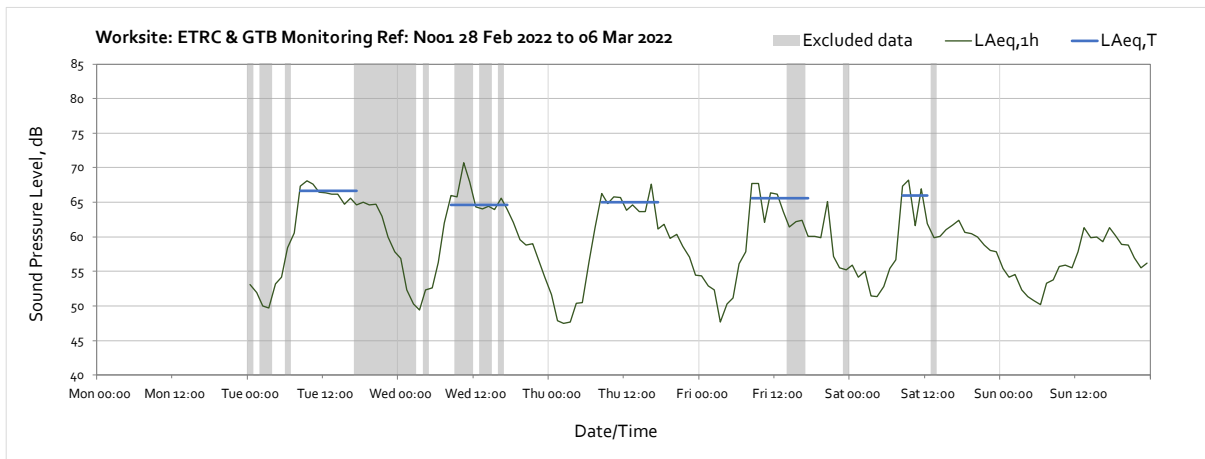


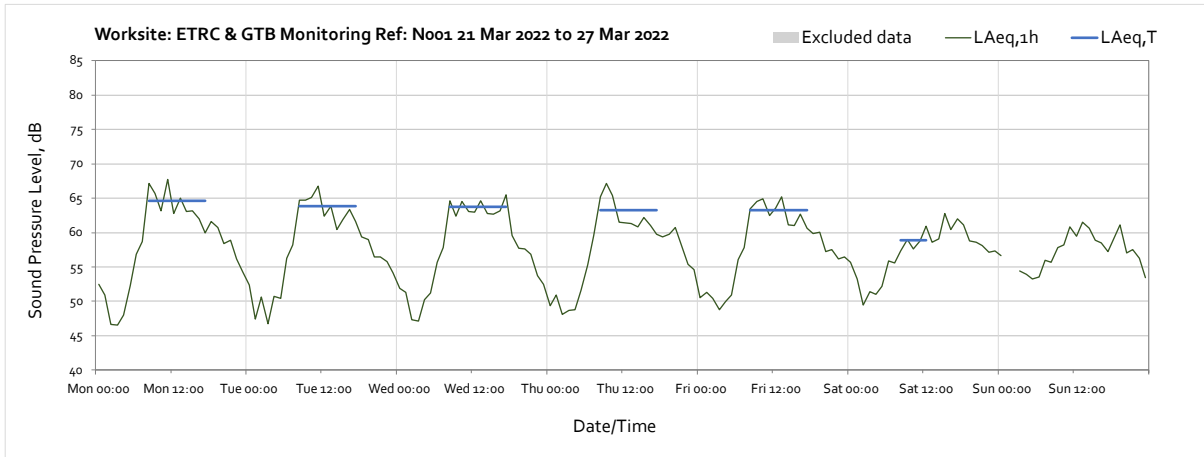
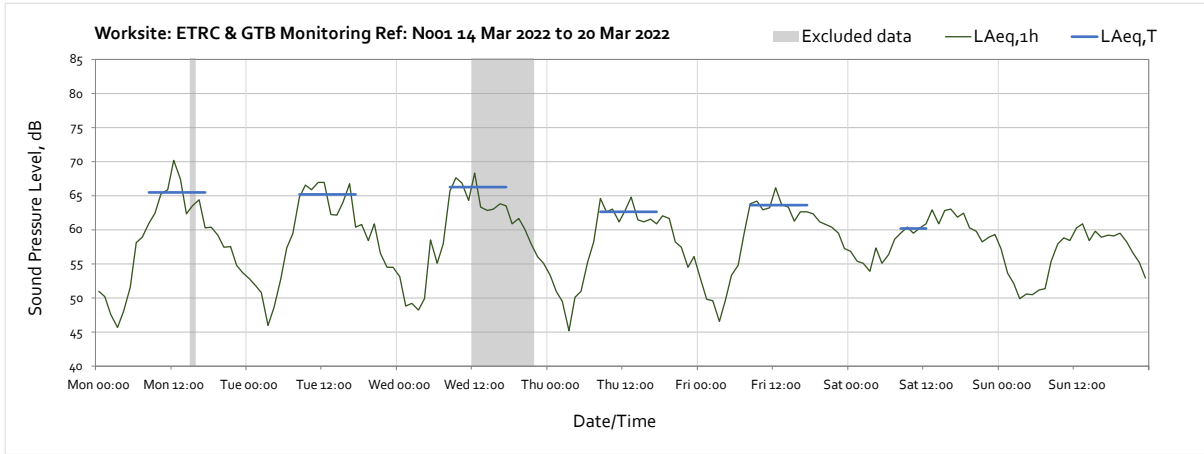
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



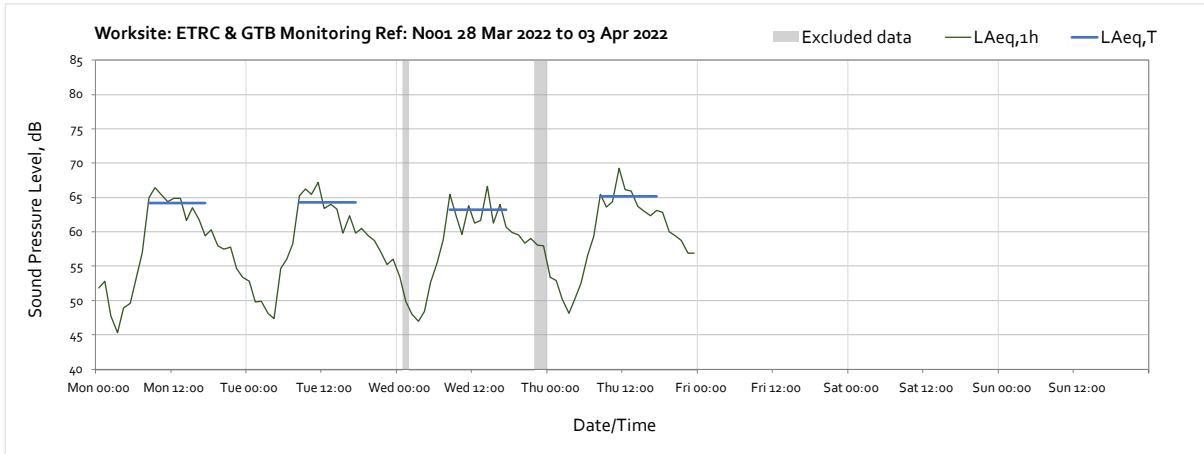


**Worksite: ETRC & GTB - Monitoring Ref: N001**

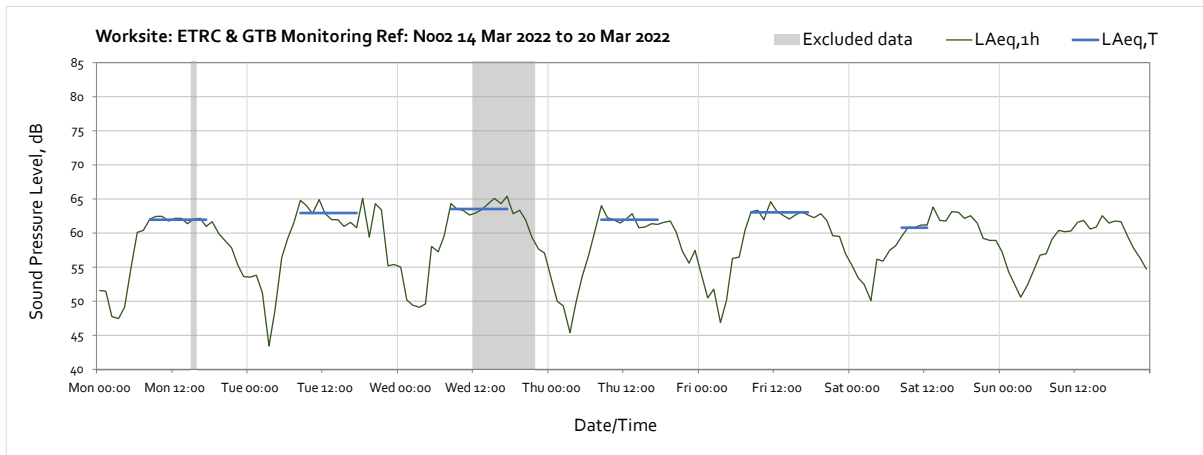
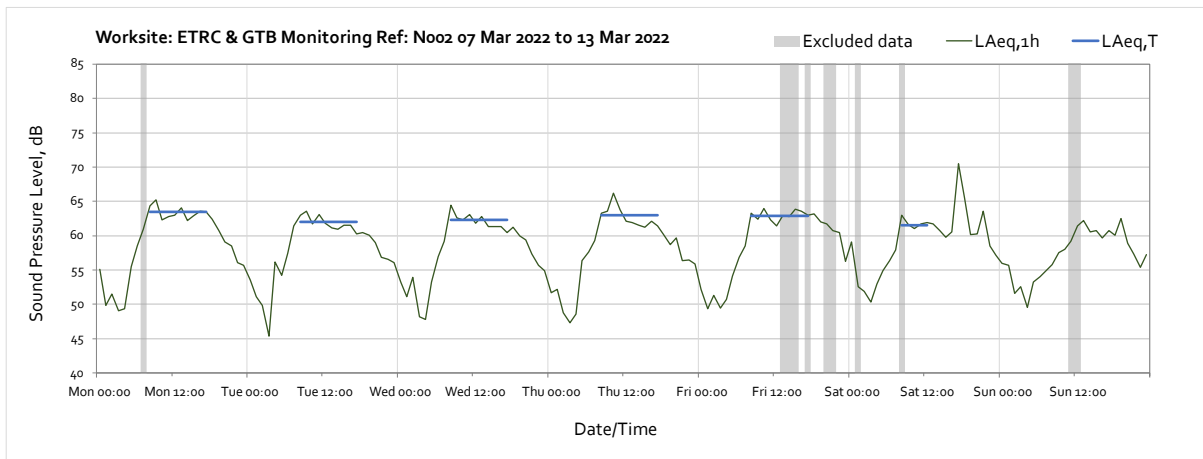
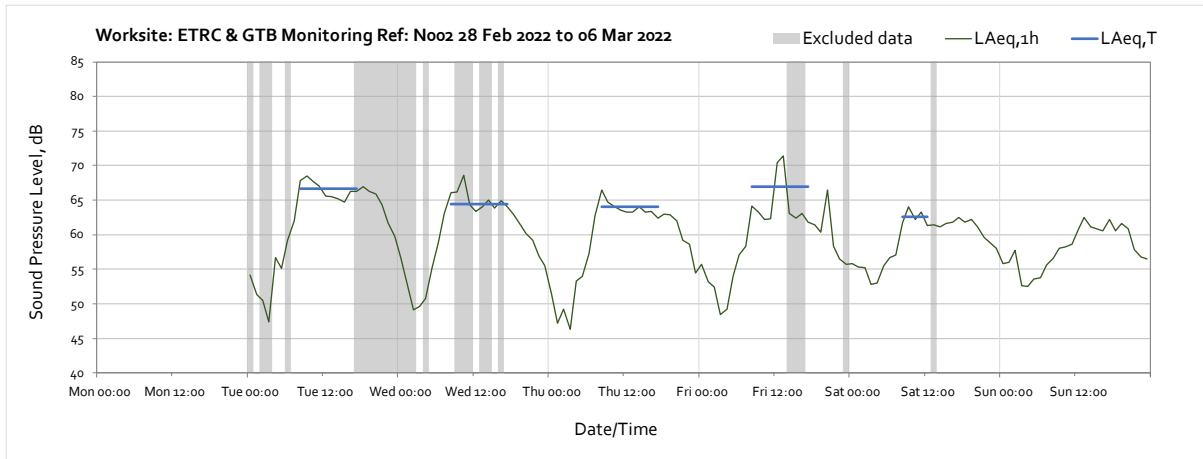


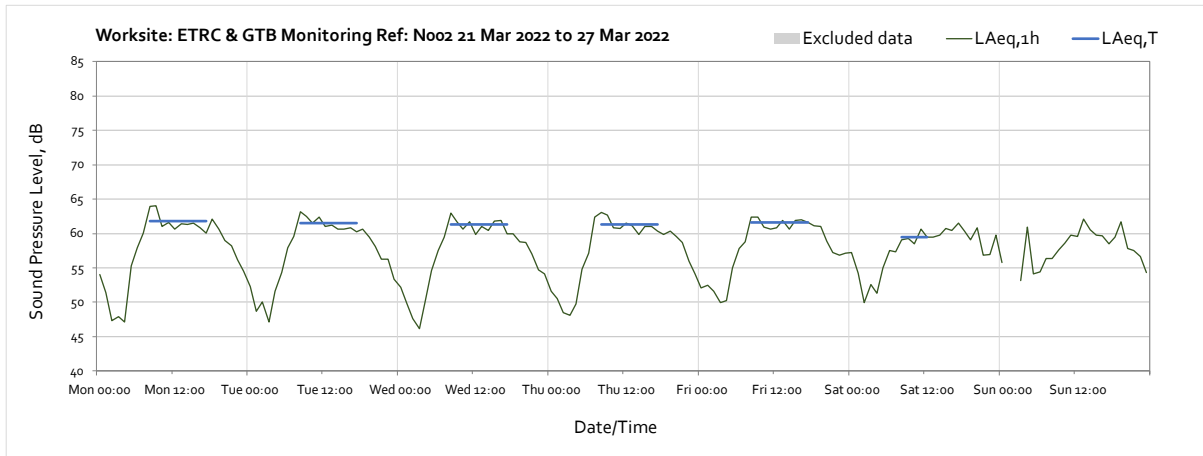


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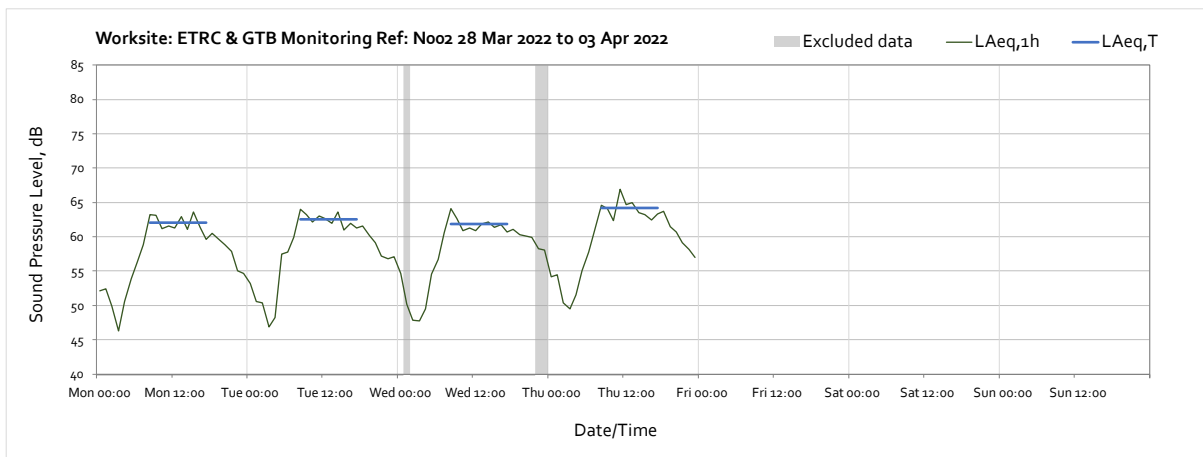


## Worksite: ETRC & GTB - Monitoring Ref: N002

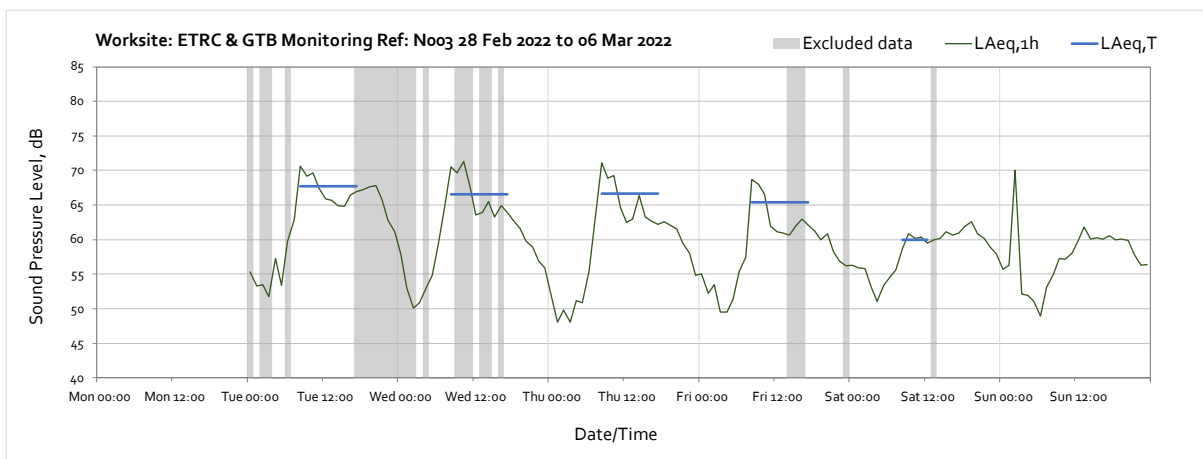


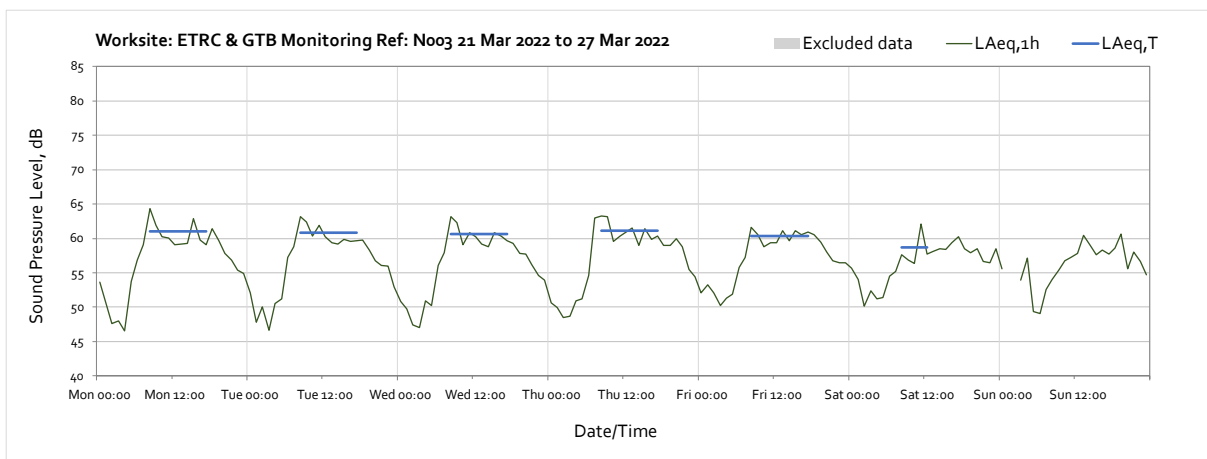
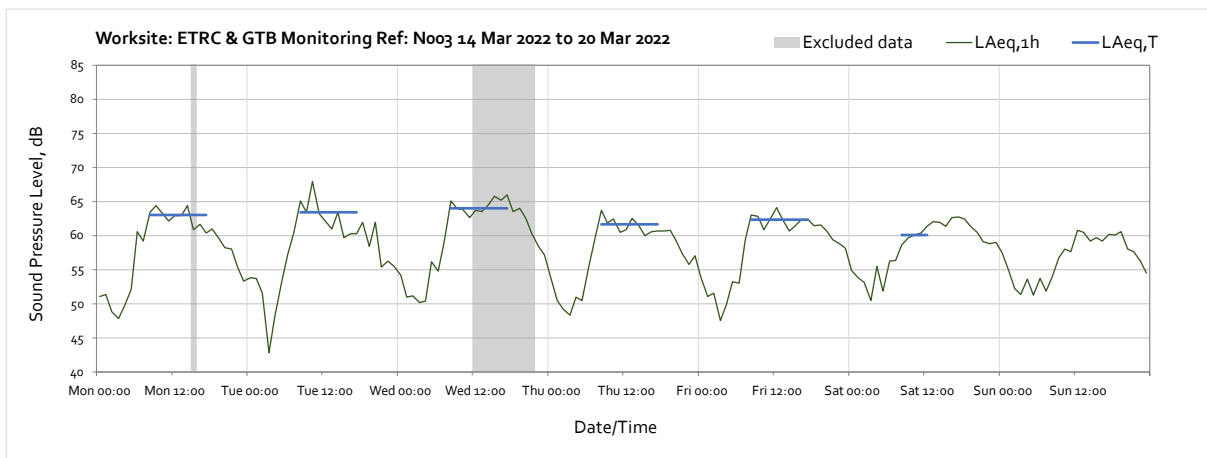
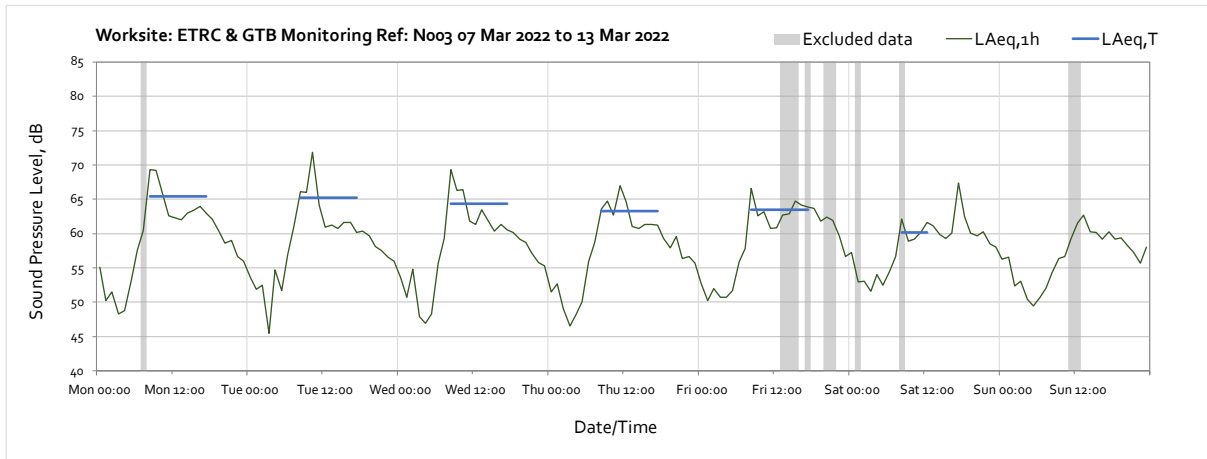


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

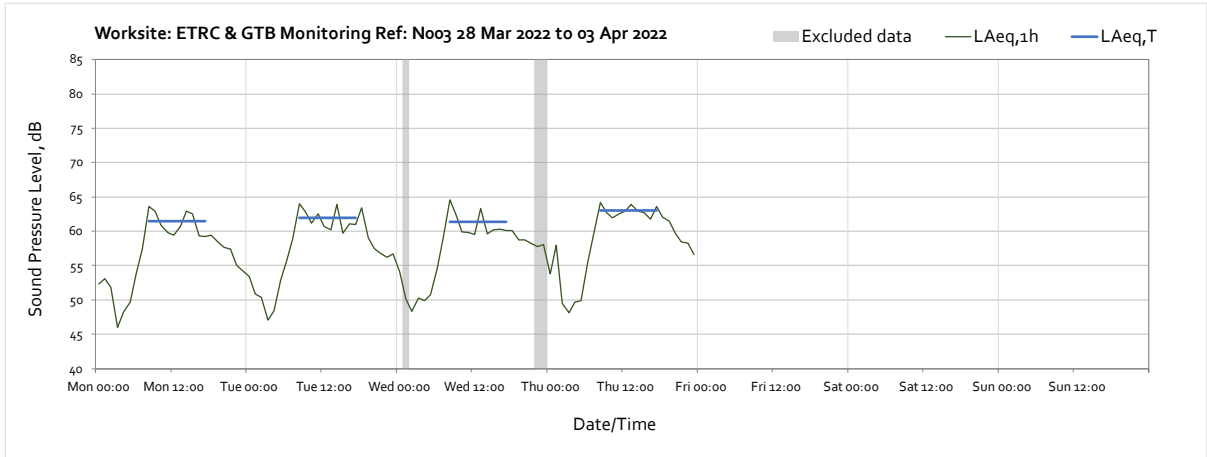


### Worksite: ETRC & GTB - Monitoring Ref: N003

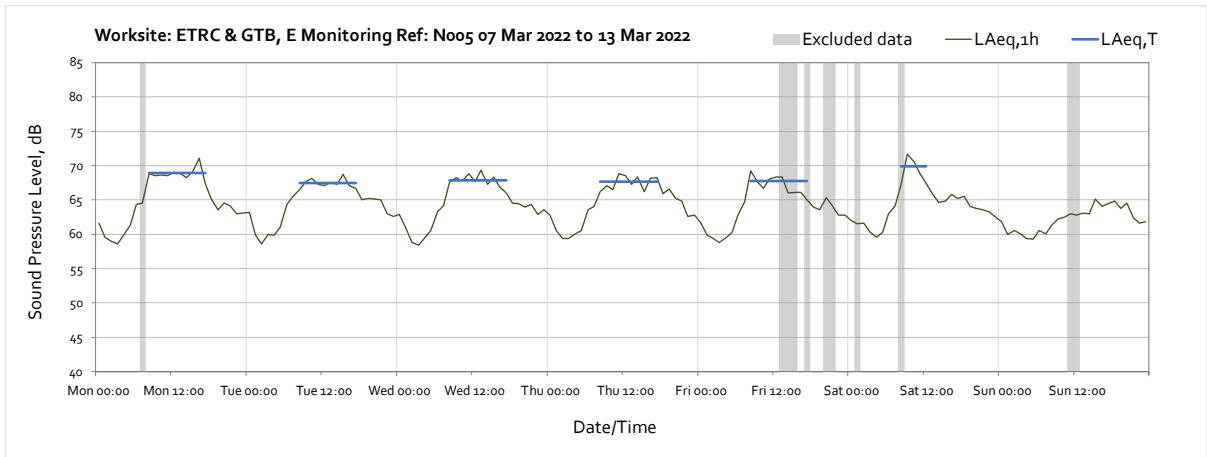
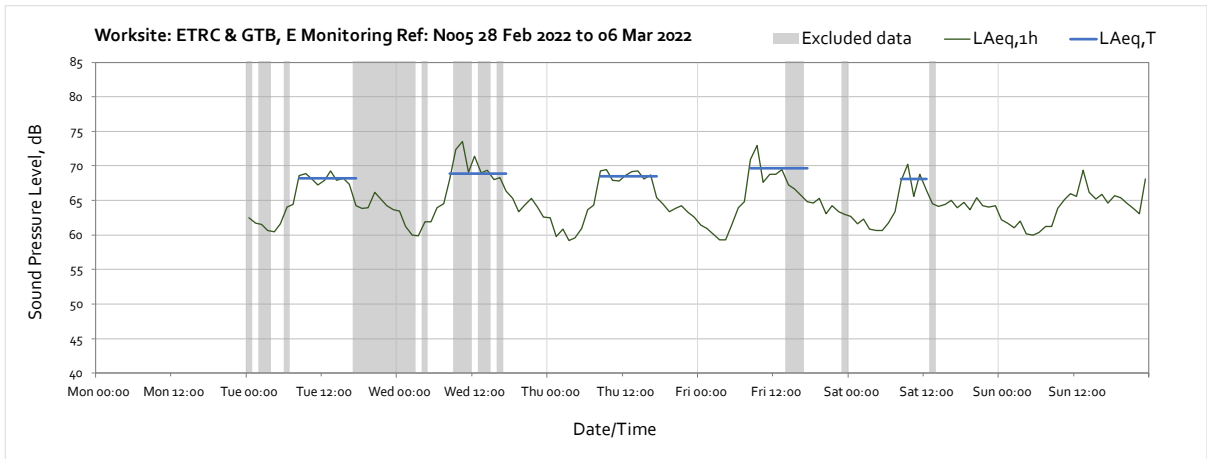




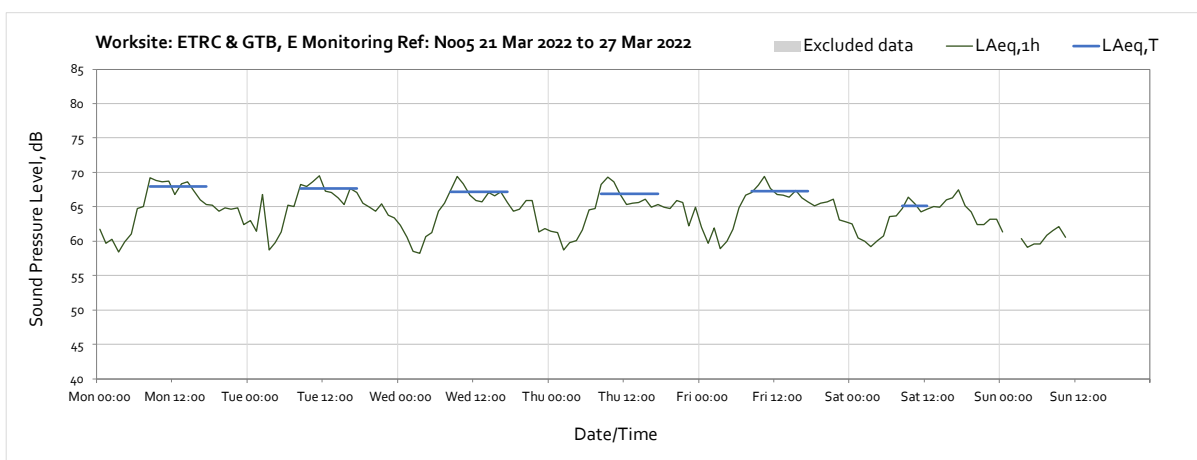
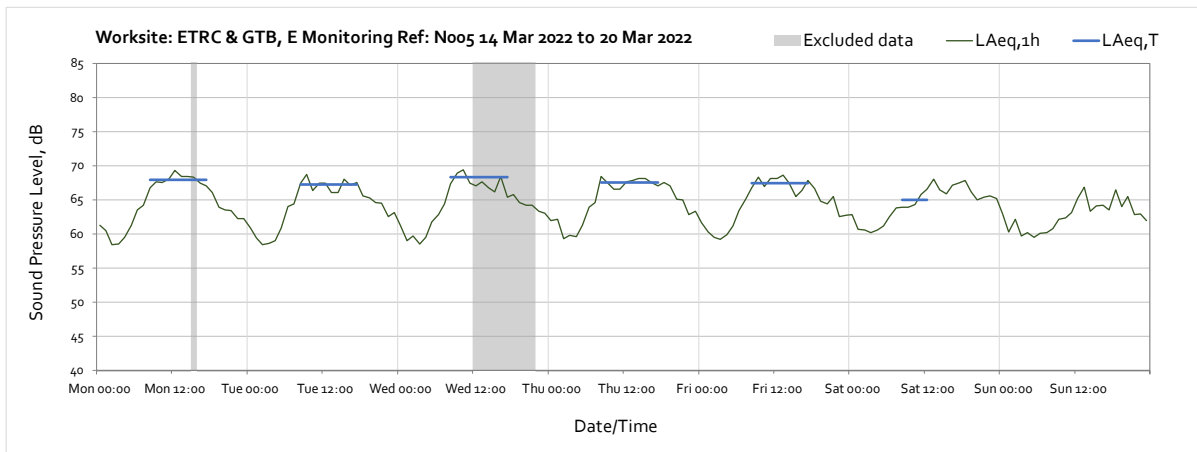
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



**Worksite: ETRC & GTB, E - Monitoring Ref: N005**

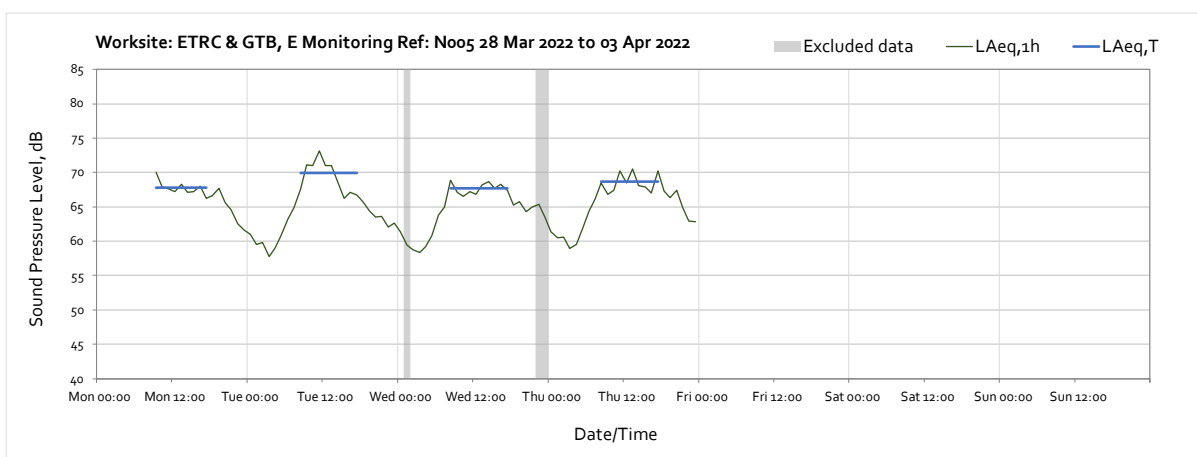






Note: Missing data at 01:00 on Sunday 27th March 2022 was due to the clocks going forward at the start of British Summer Time.

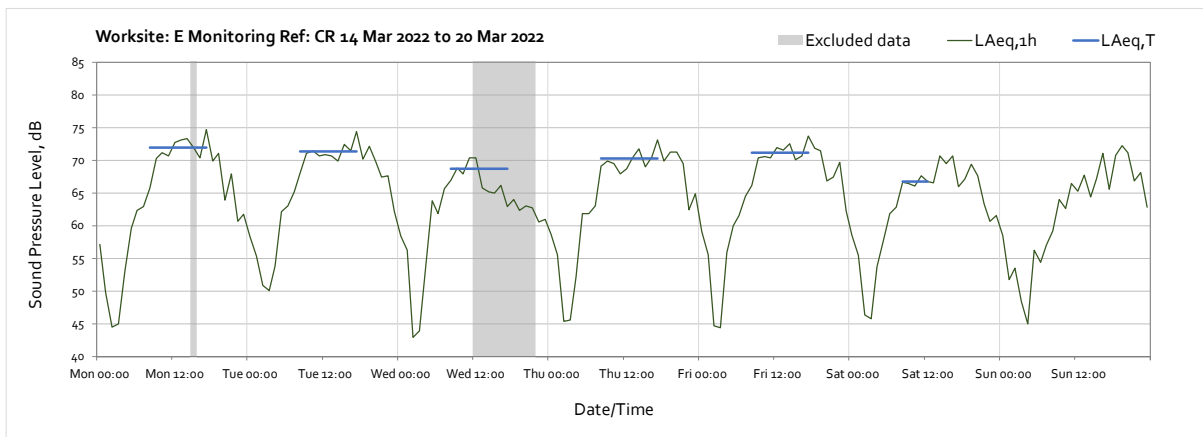
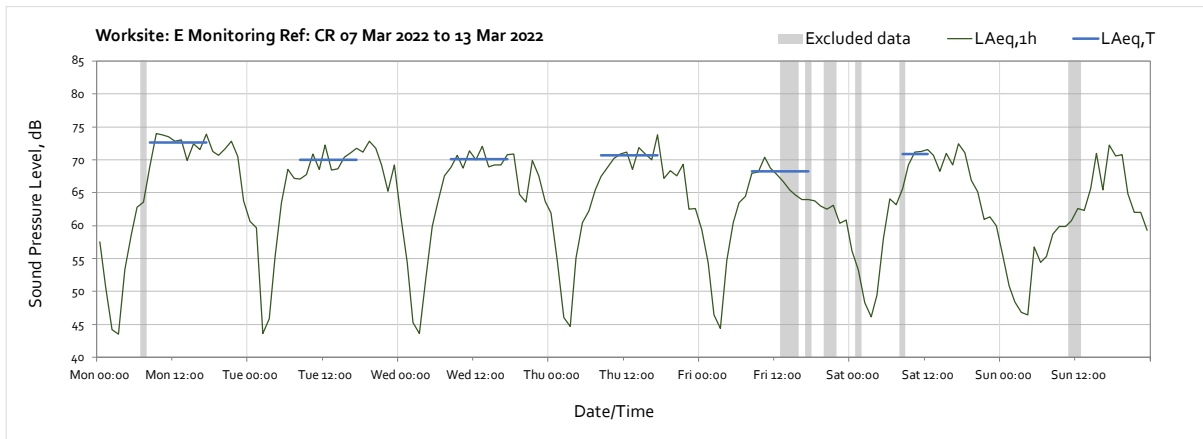
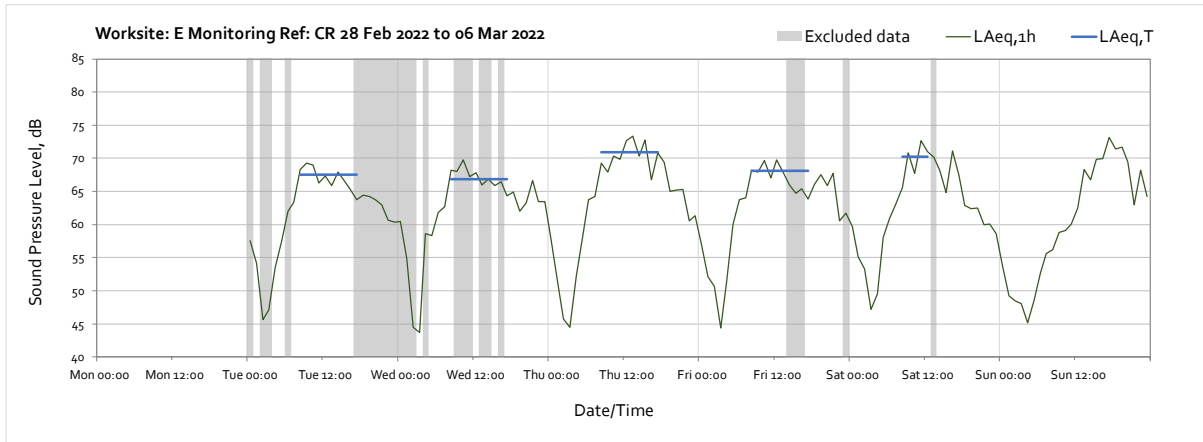
Note: Missing data at 11:00 on Sunday 27th March 2022 was due to a continuous loss of power.

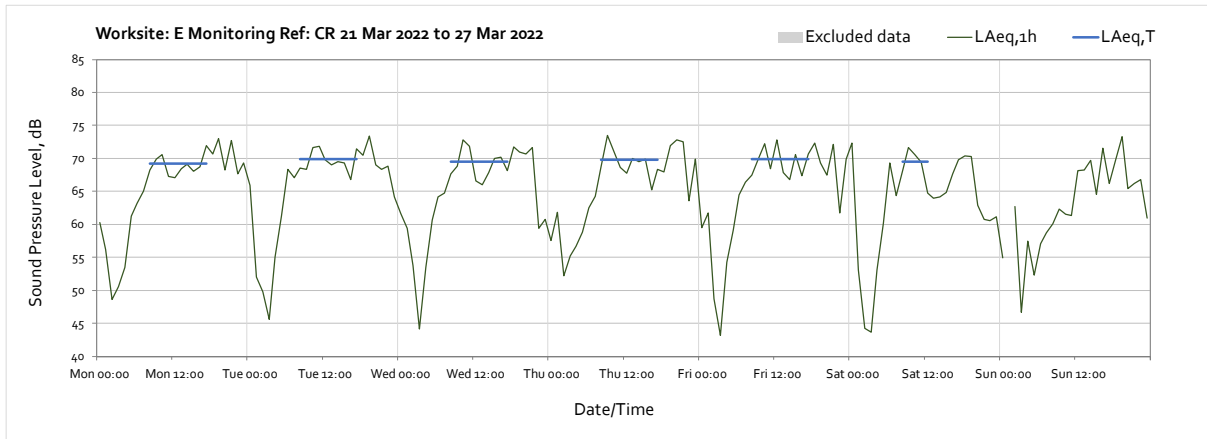


Note: Missing data at 11:00 on Sunday 27th March 2022 to 09:00 on Monday -28<sup>th</sup> March 2022 was due to a continuous loss of power.

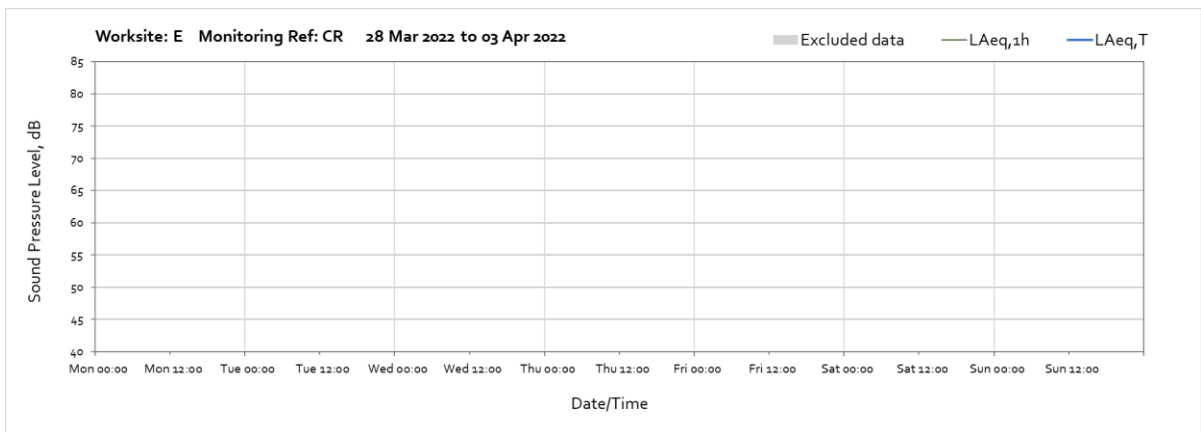
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## Worksite: E – Monitoring Ref: CR



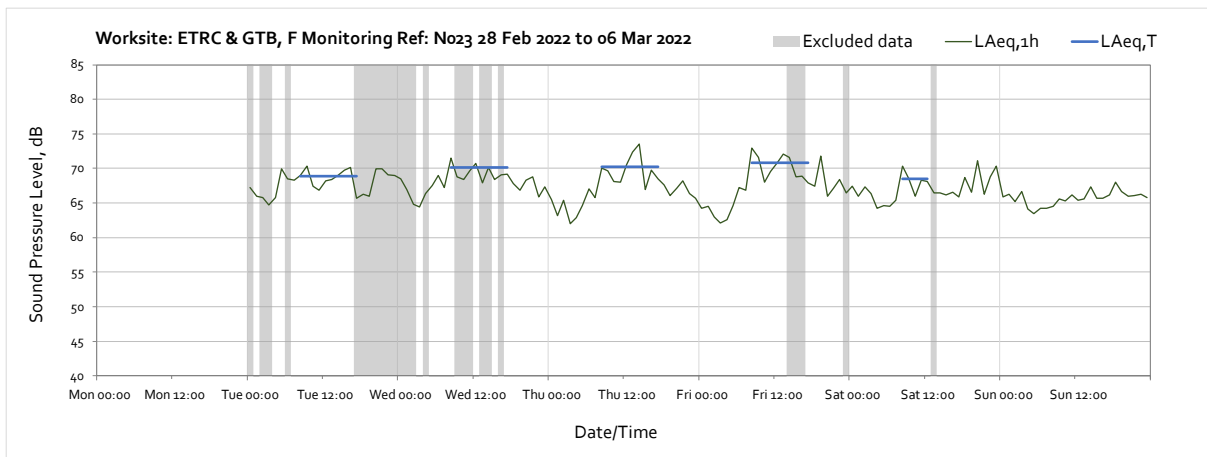


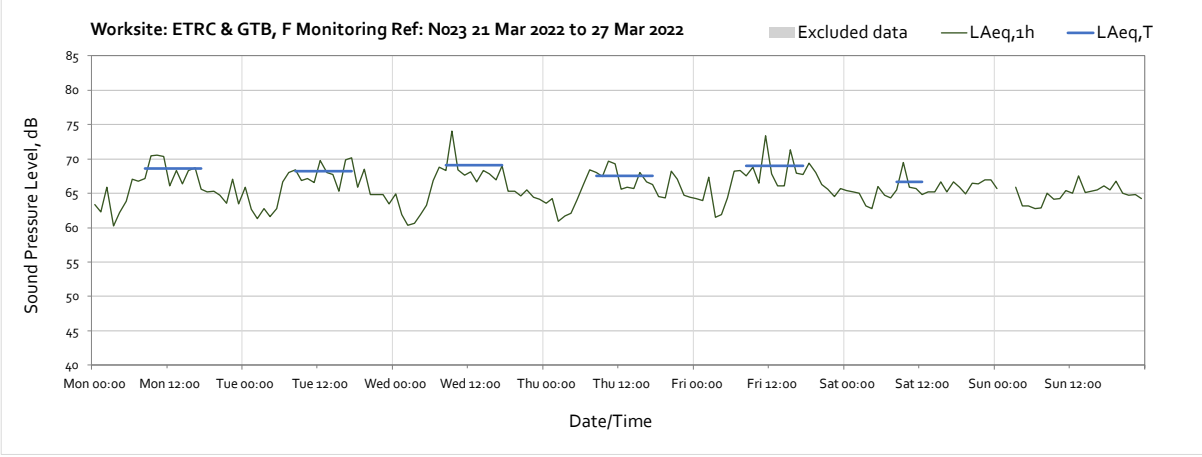
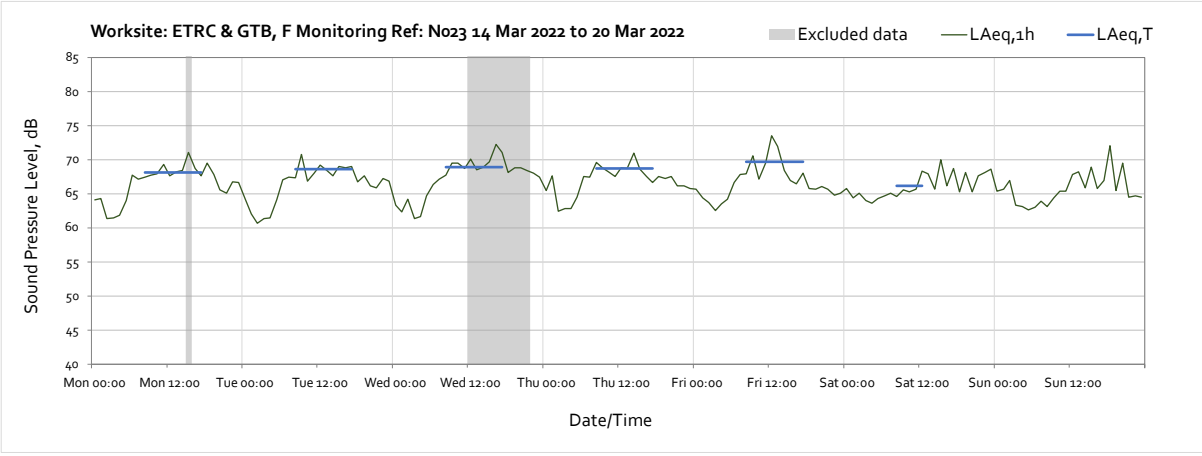
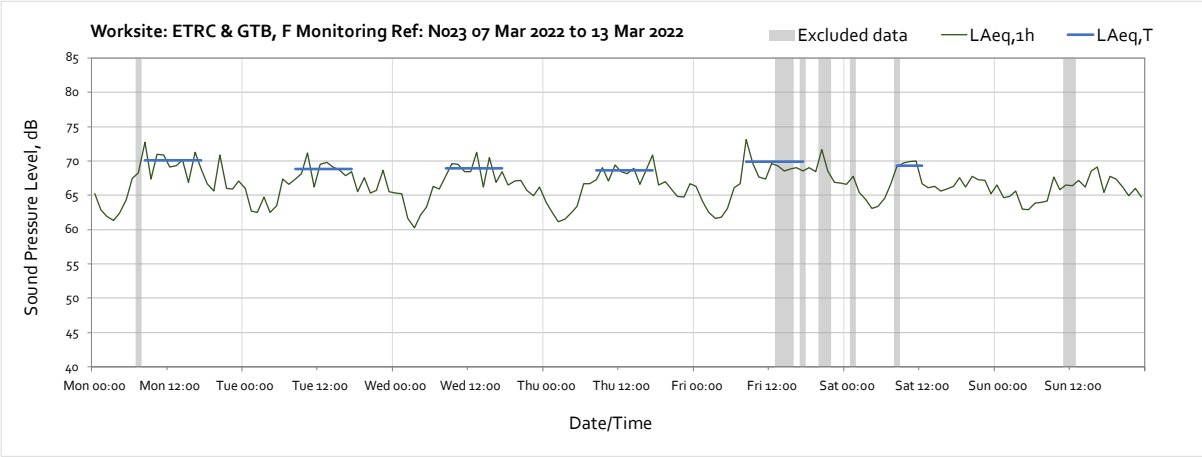
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



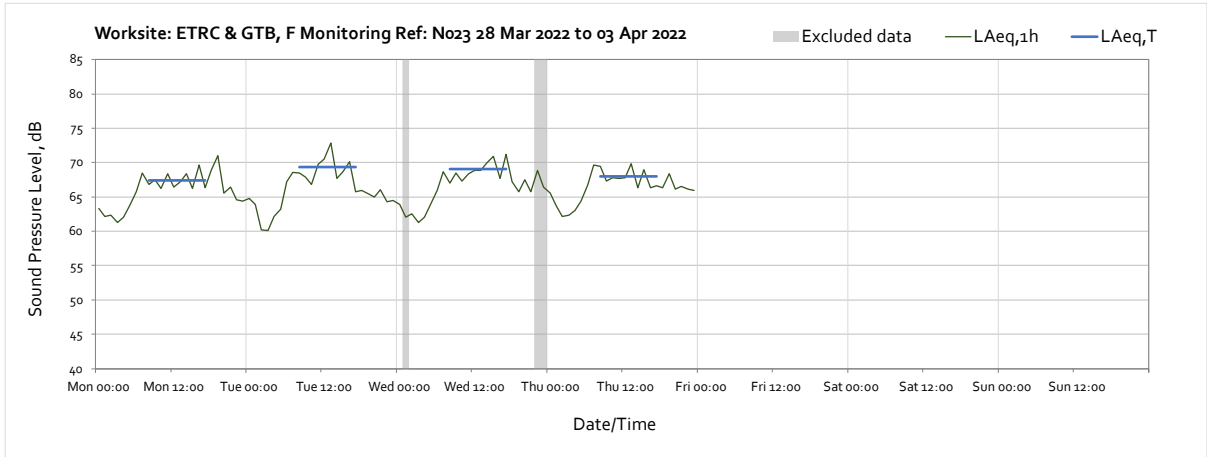
Note: Missing data at 00:00 on Monday 28<sup>th</sup> March 2022 was due to the monitor being removed from site.

### Worksite: ETRC & GTB, F – Monitoring Ref: N023

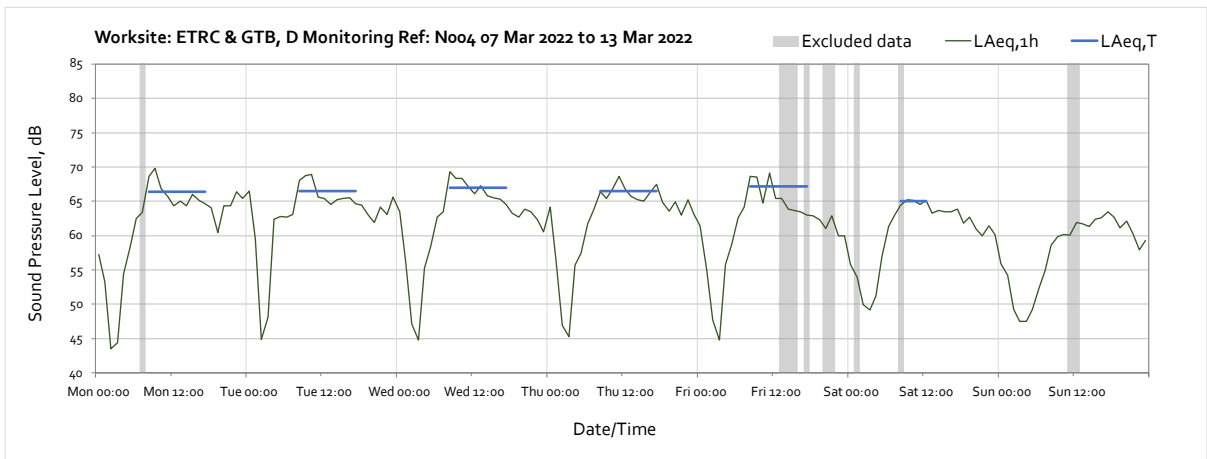
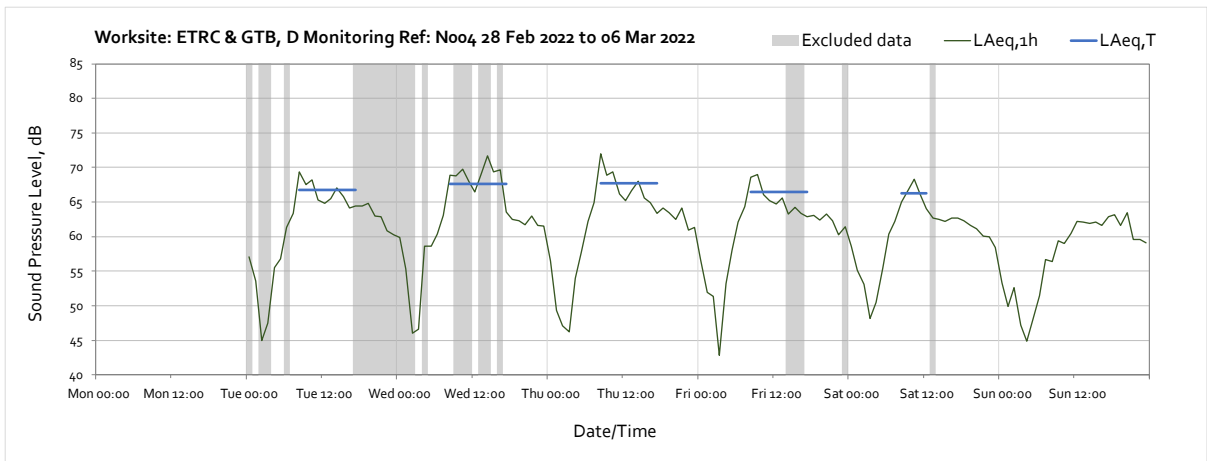


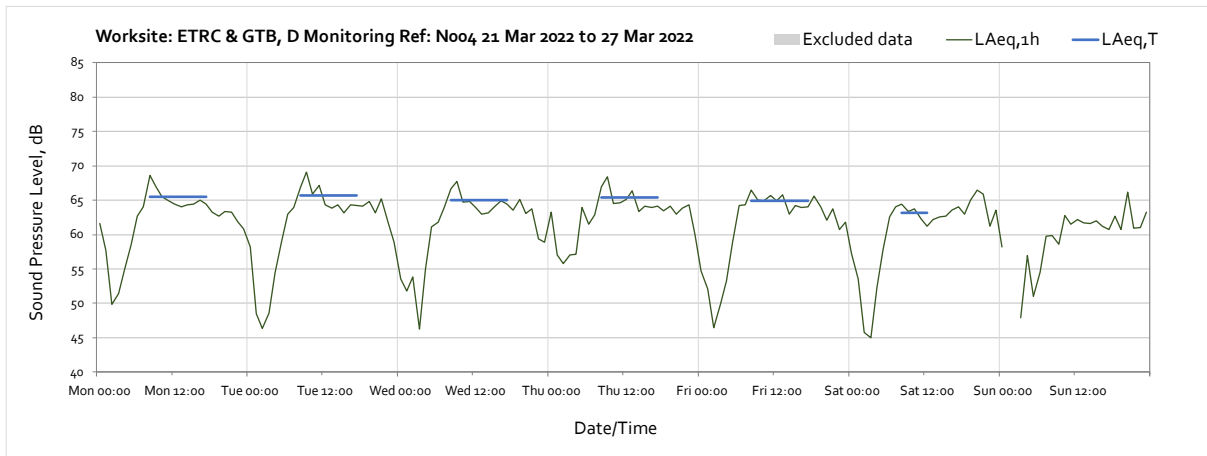
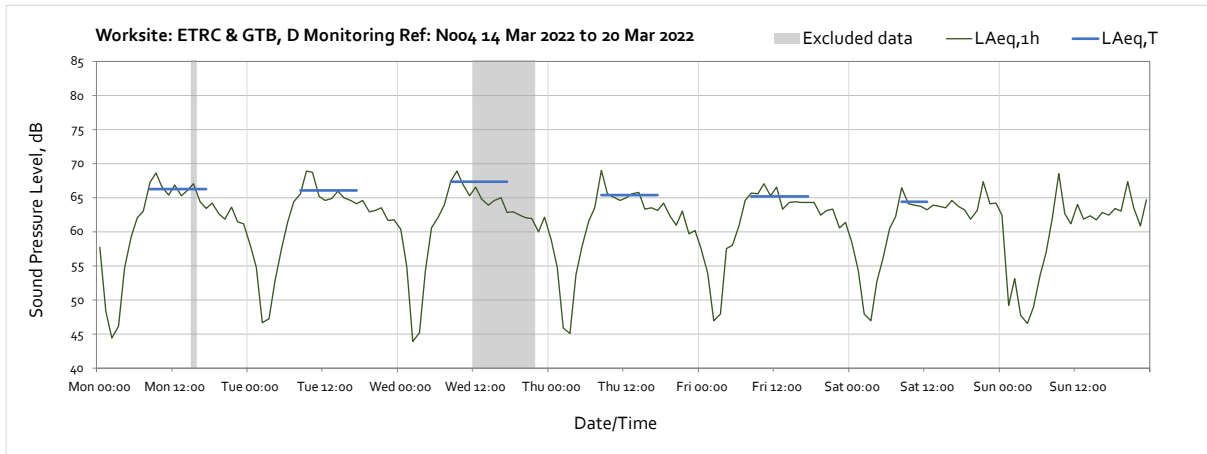


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

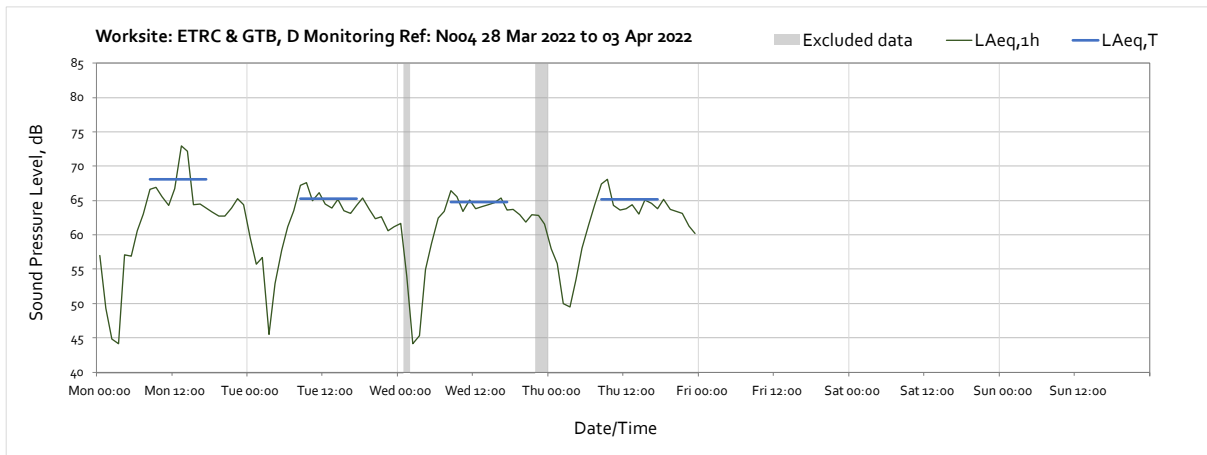


**Worksite: ETRC & GTB, D – Monitoring Ref: N004**



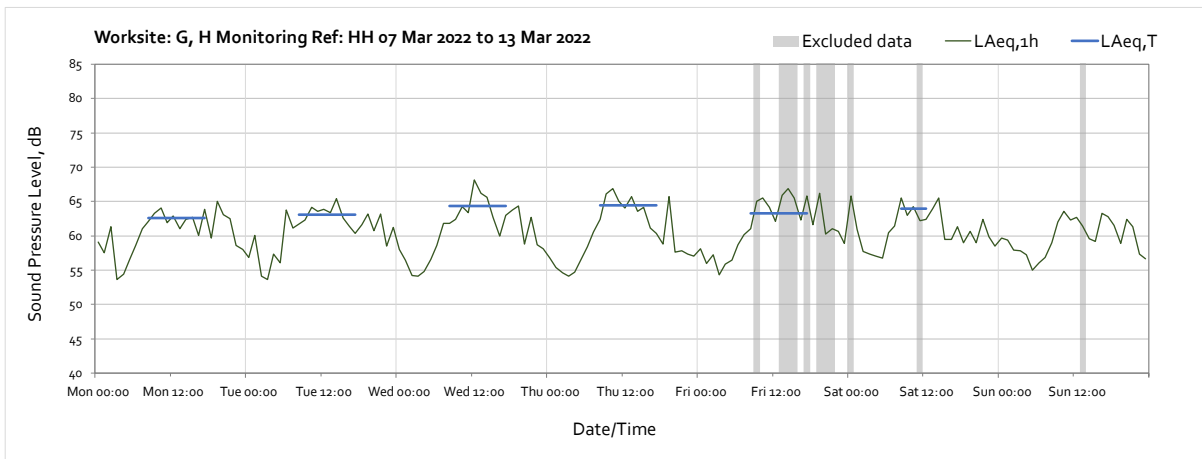
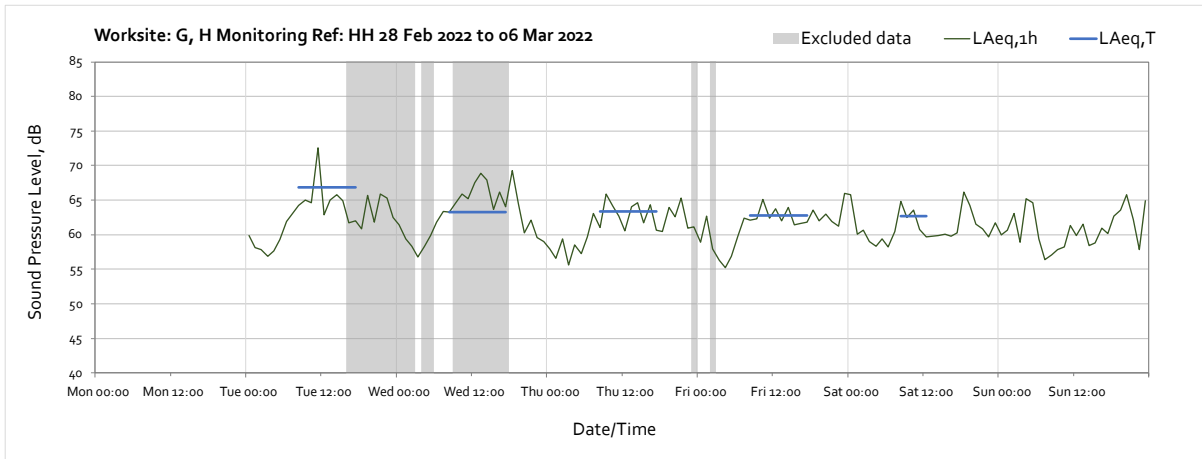


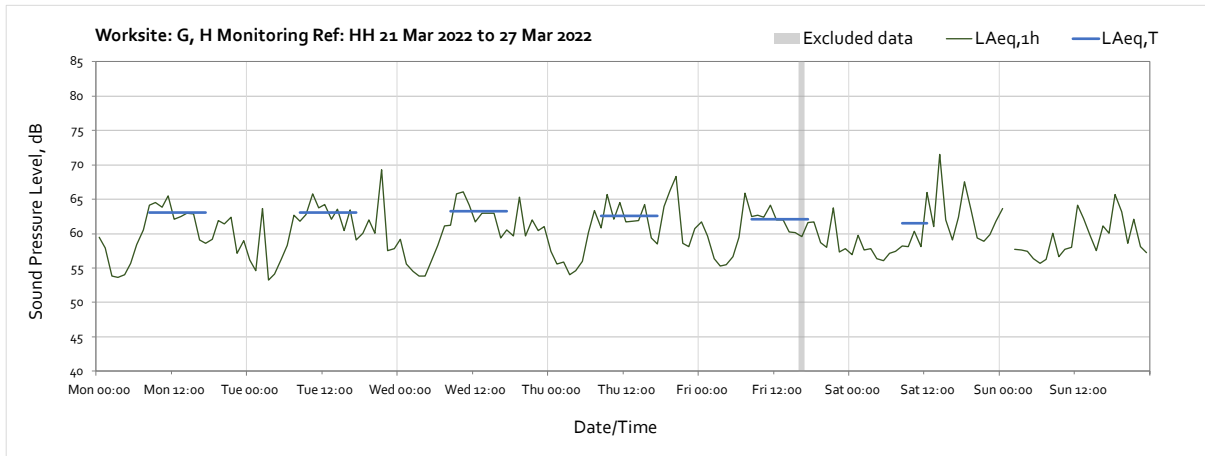
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



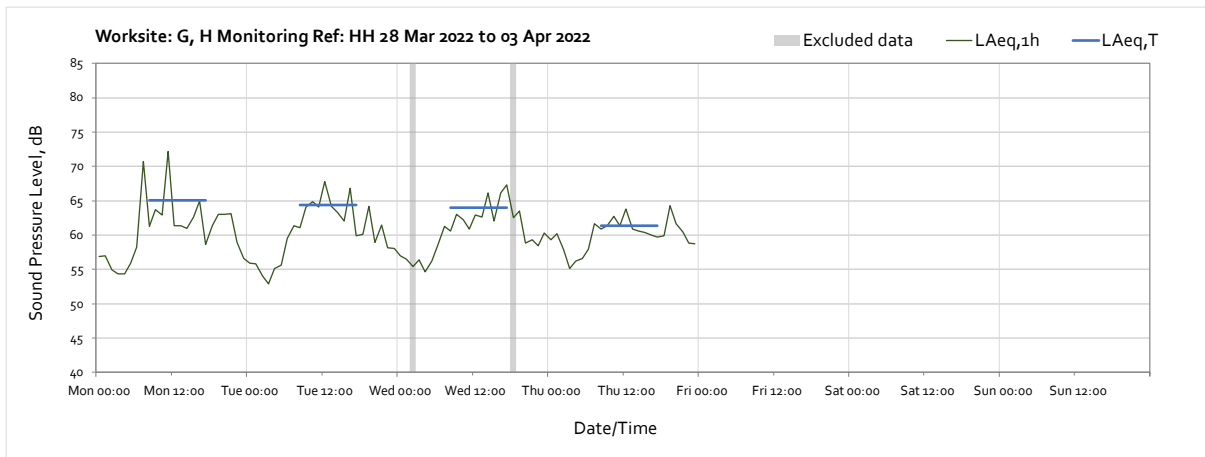


## Worksite: G, H – Monitoring Ref: HH

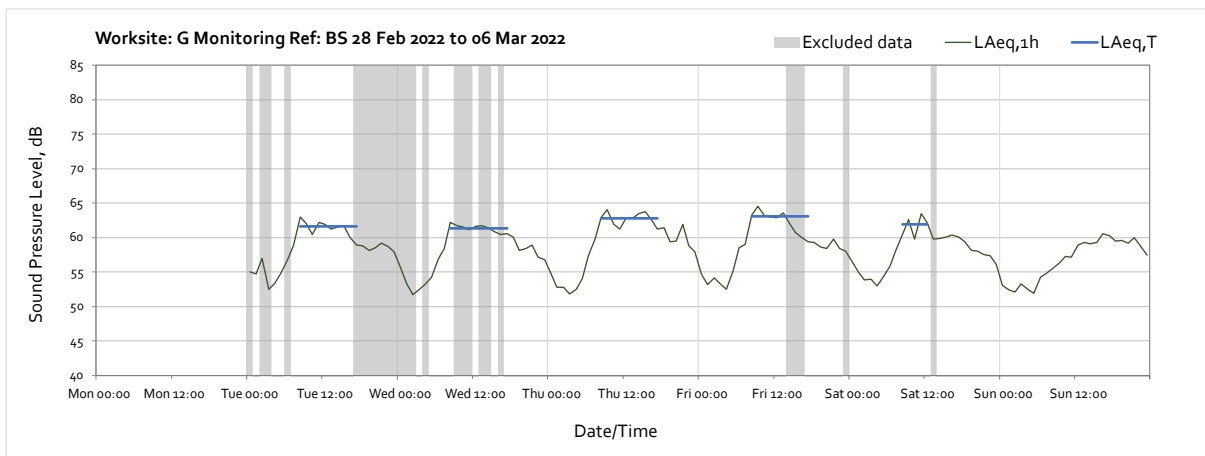


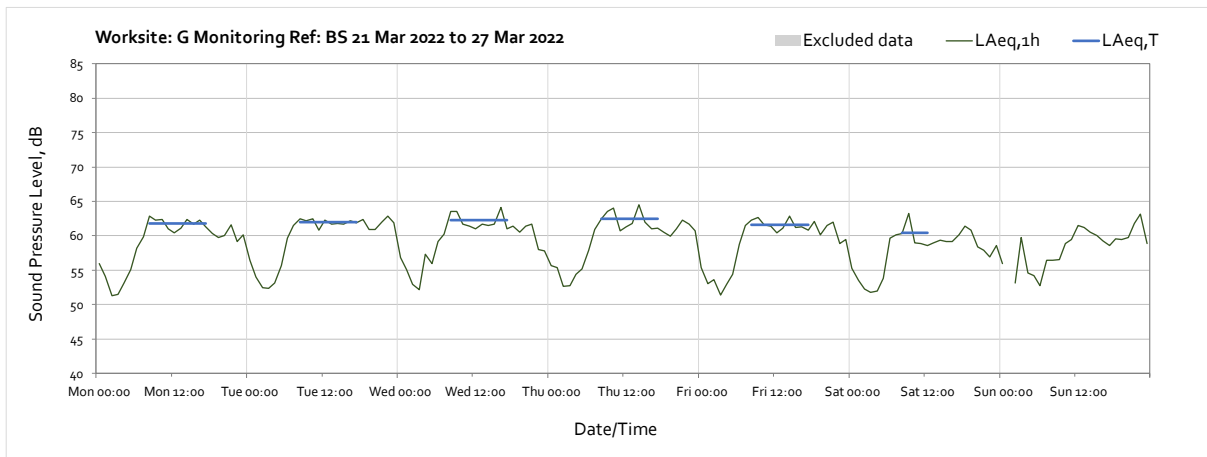
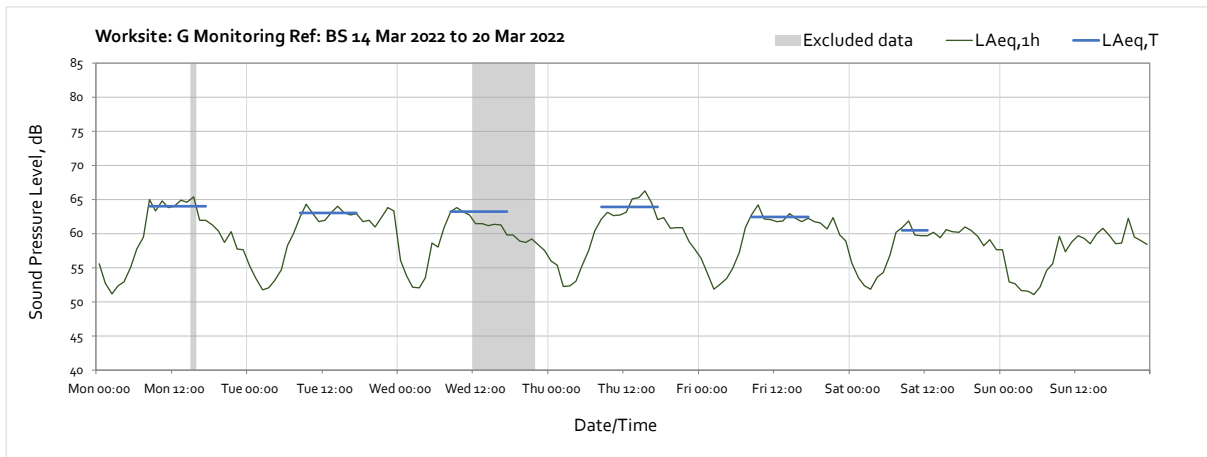
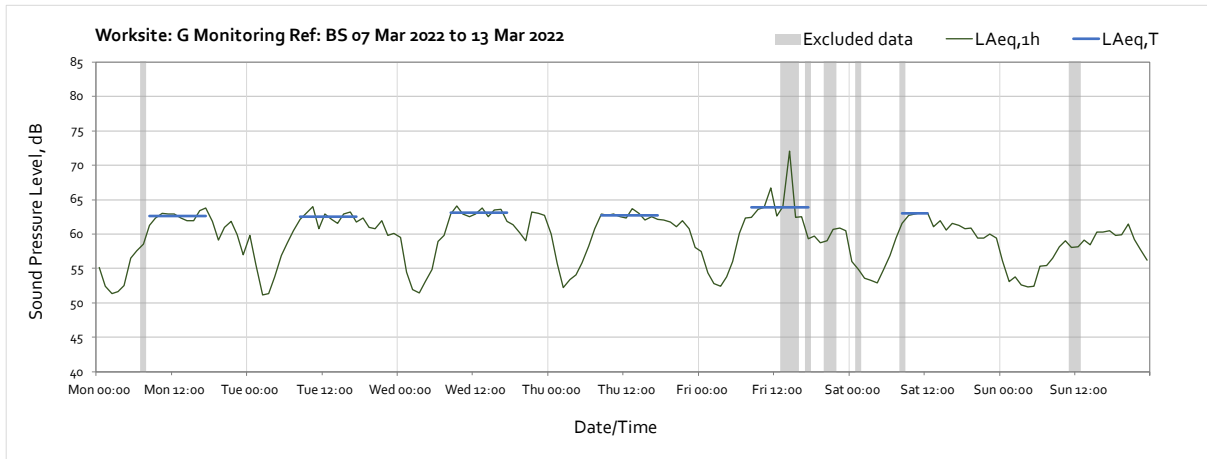


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



### Worksite: G - Monitoring Ref: BS

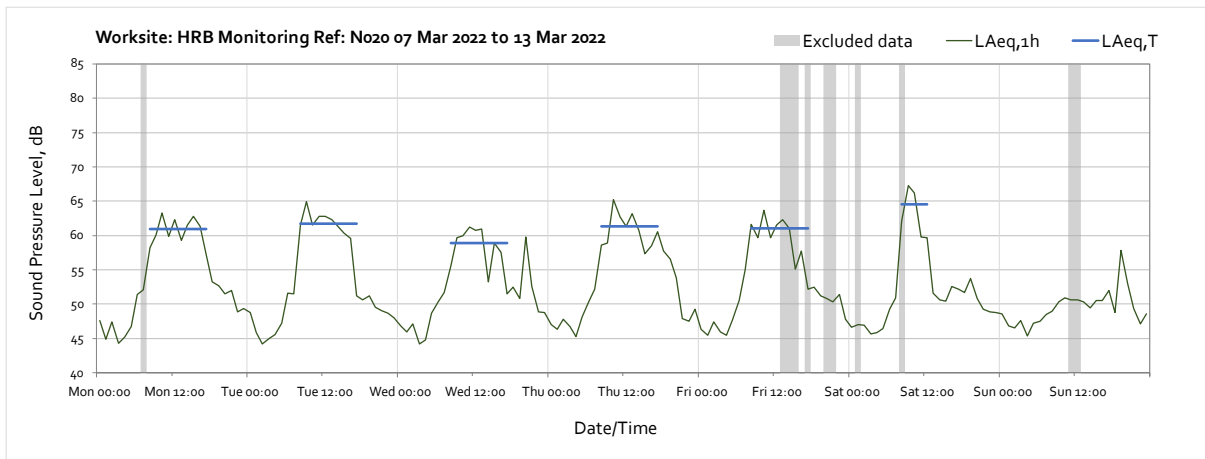
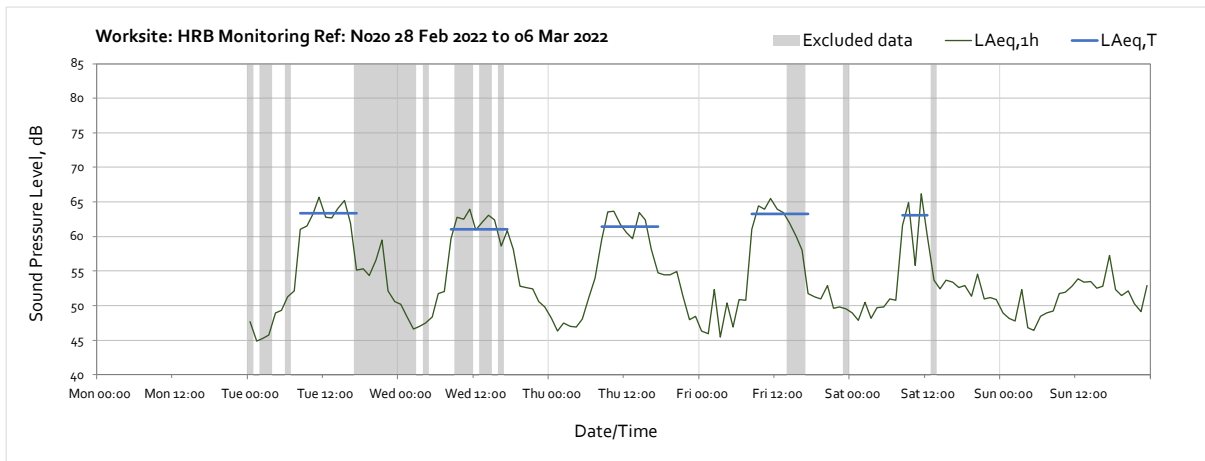


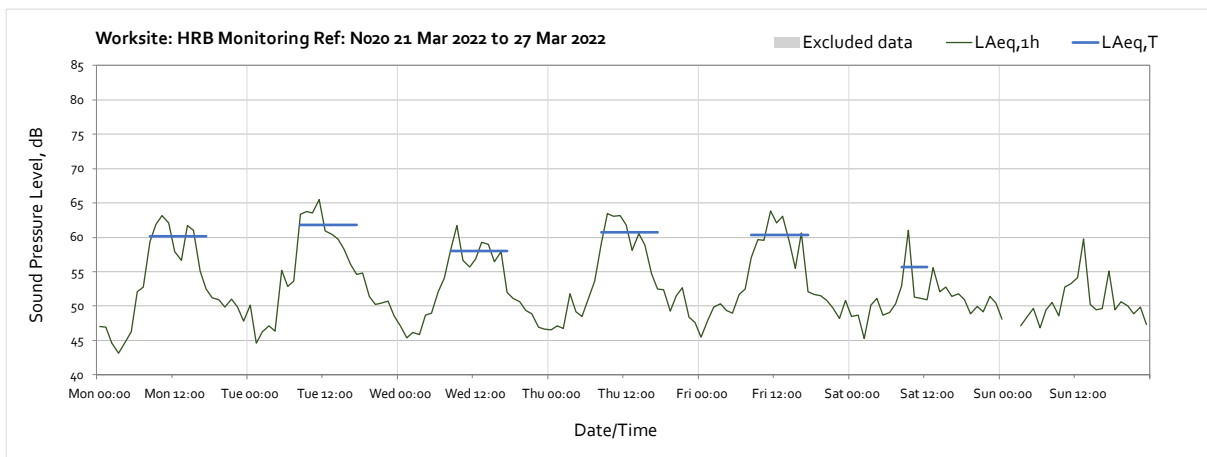
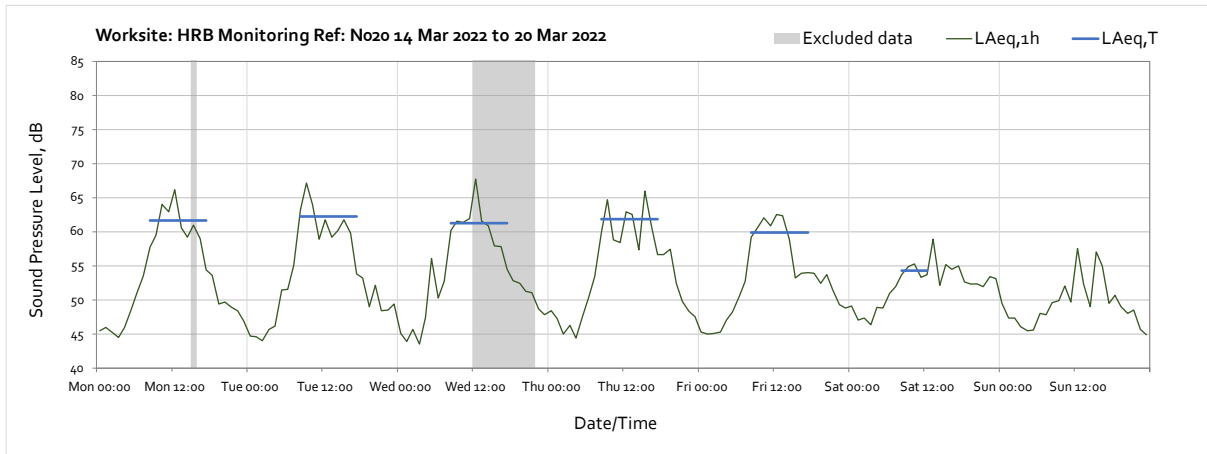


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

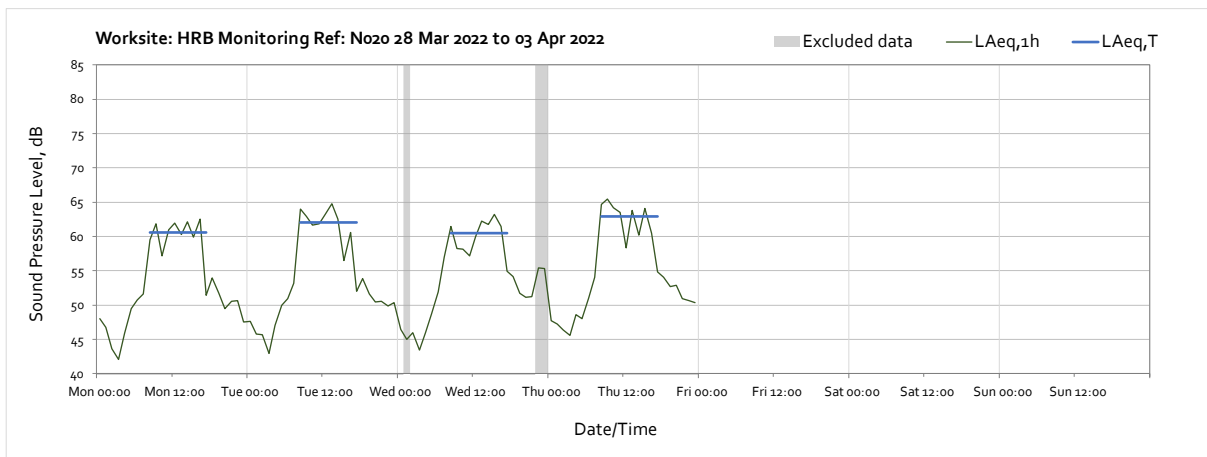


**Worksite: HRB – Monitoring Ref: N020**

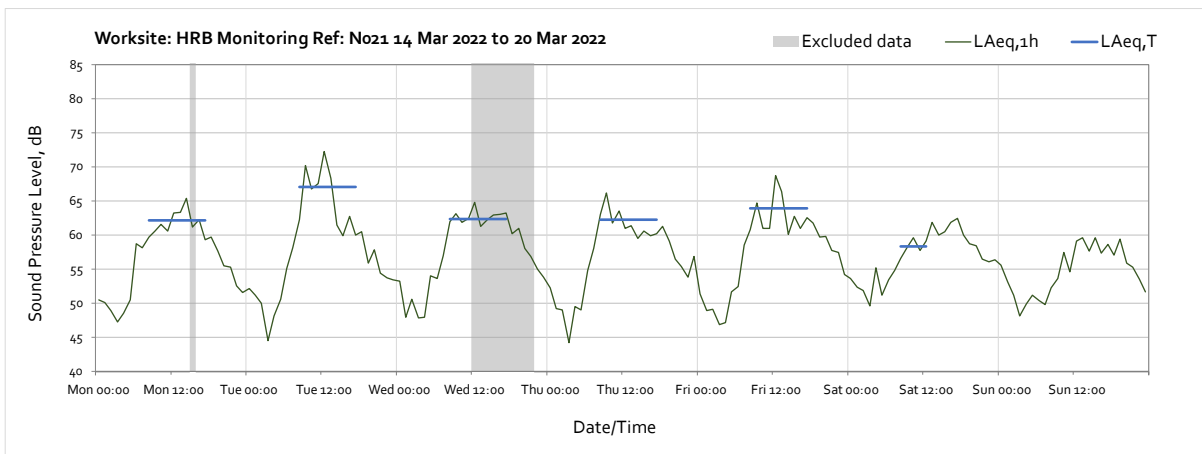
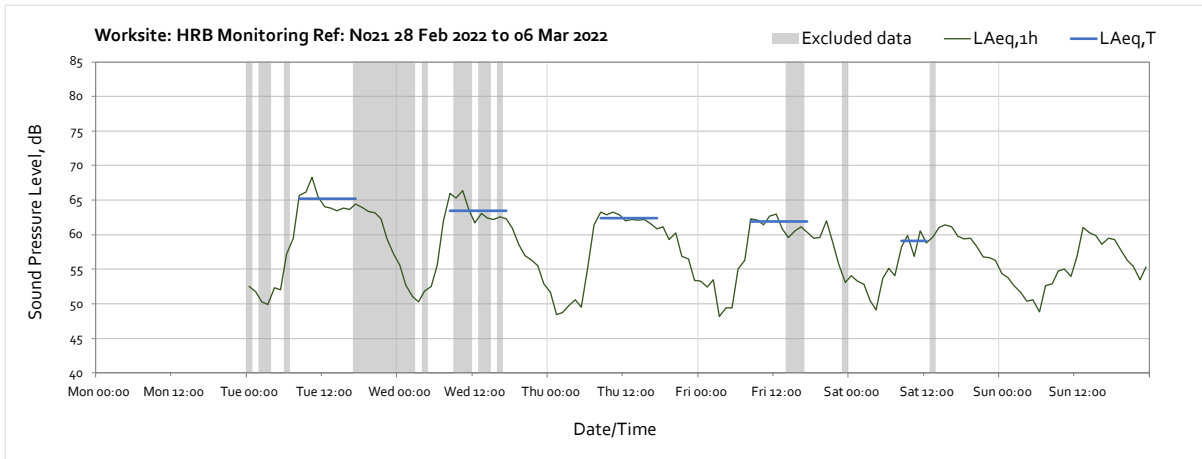




Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

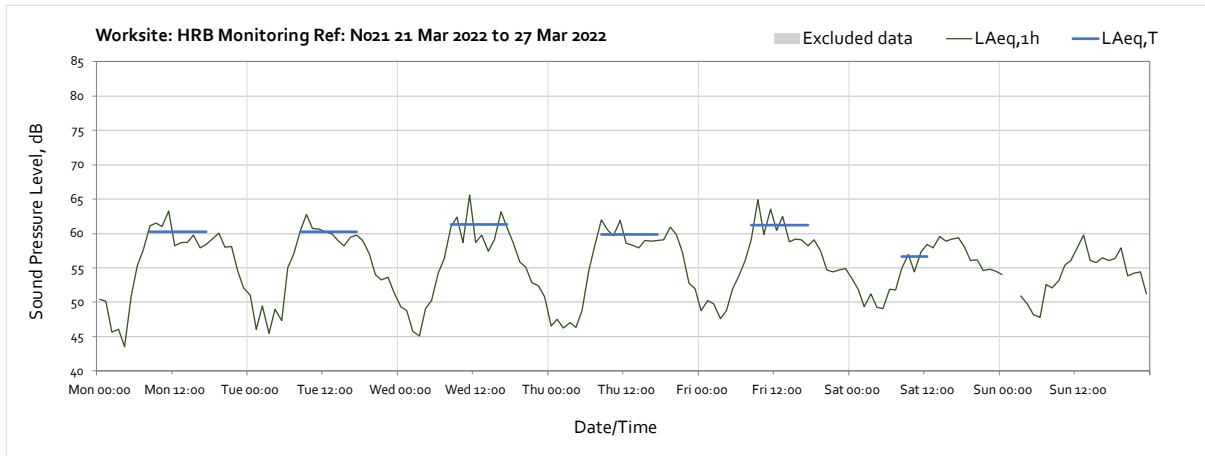


## Worksite: HRB – Monitoring Ref: N021



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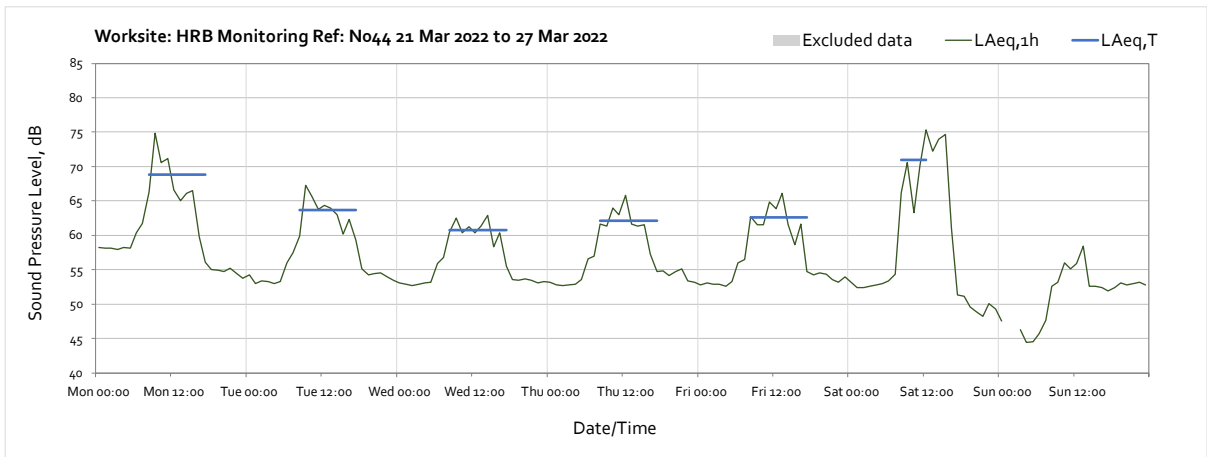
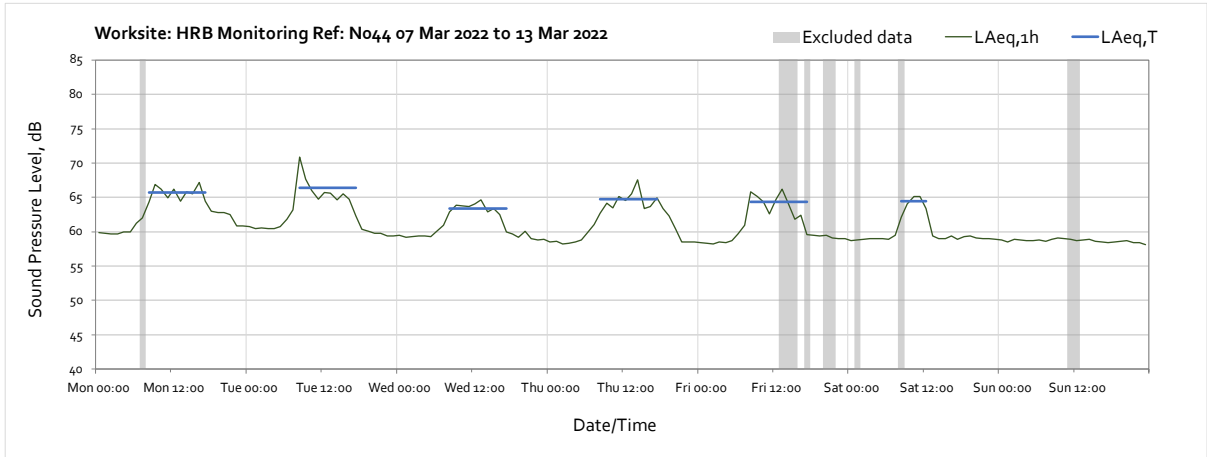


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



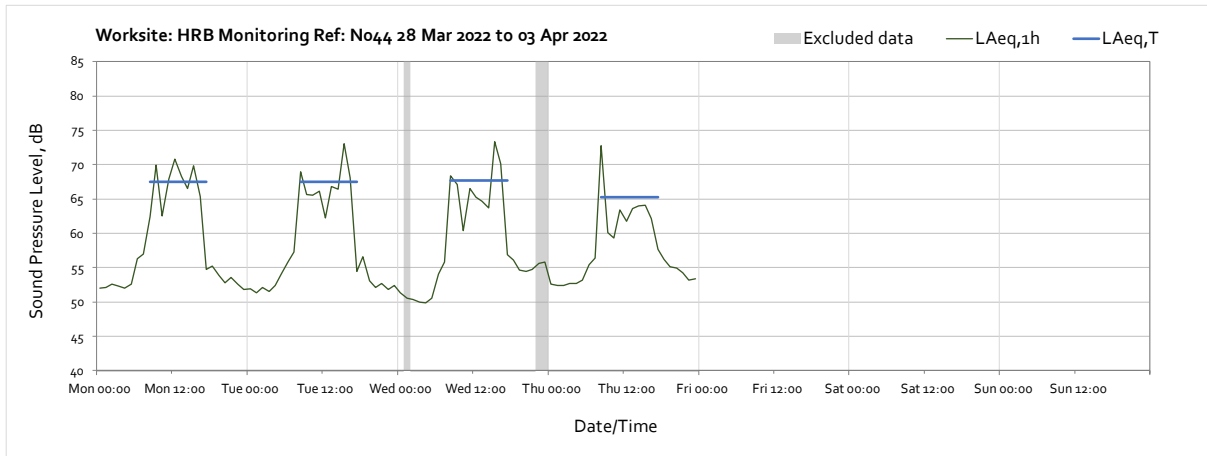
**Worksite: HRB - Monitoring Ref: N044**



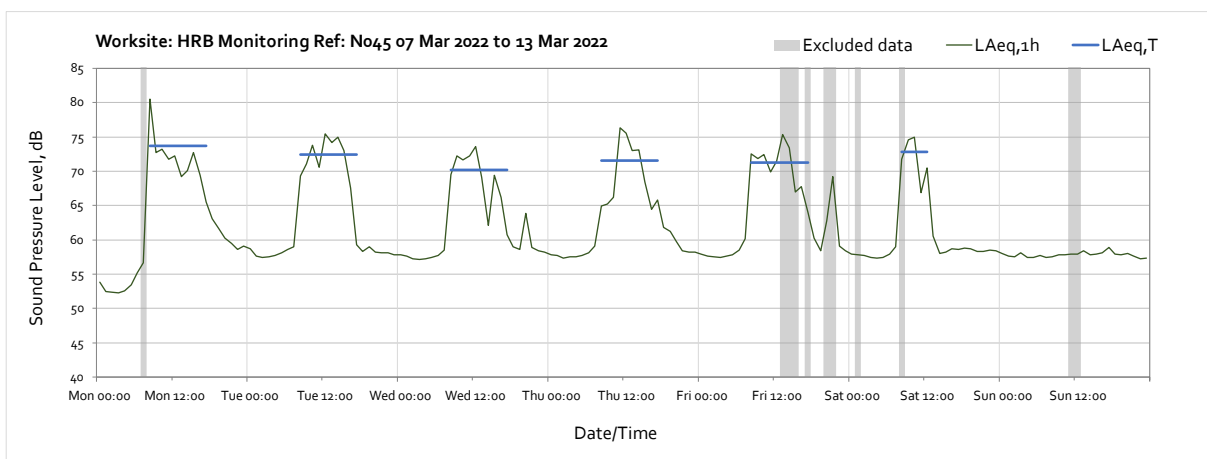
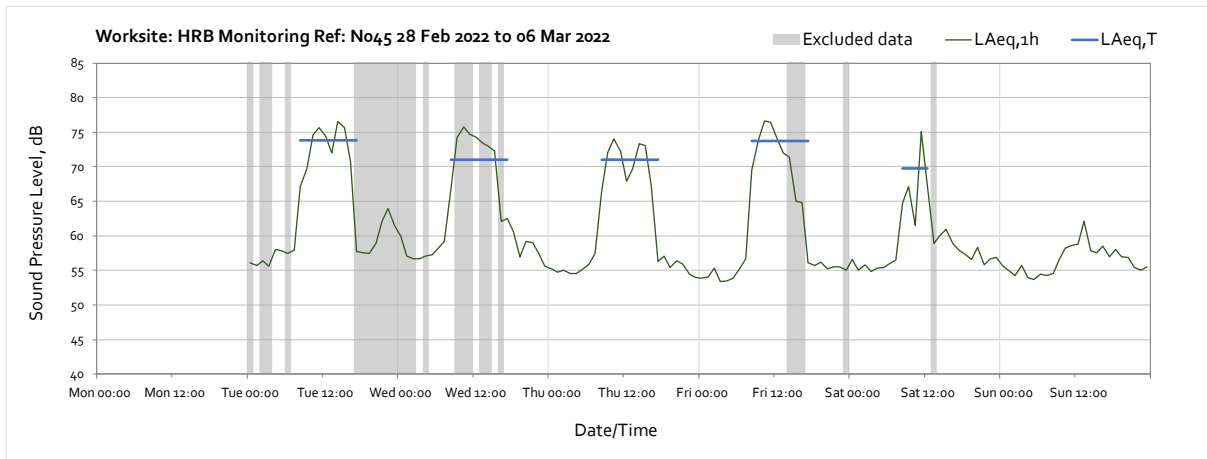


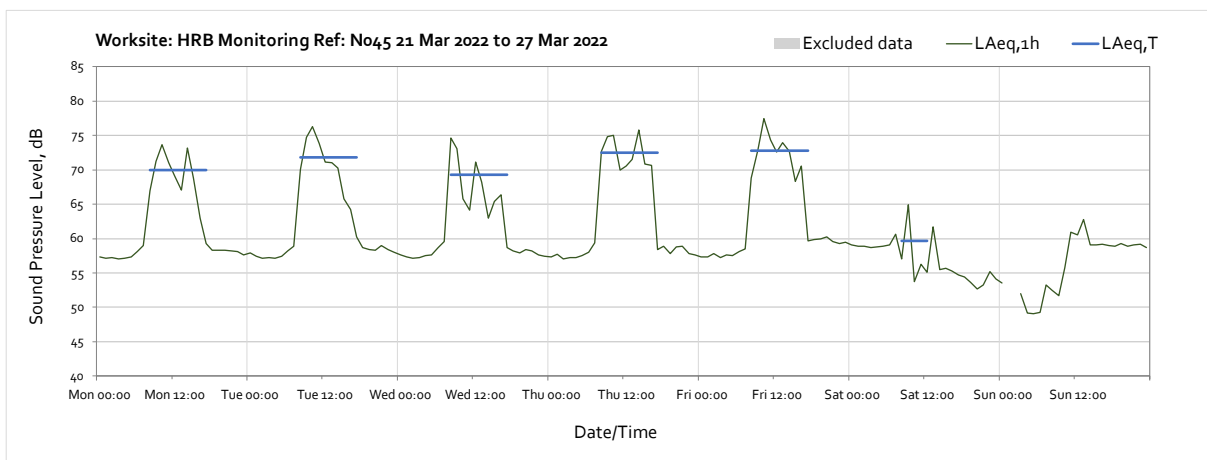
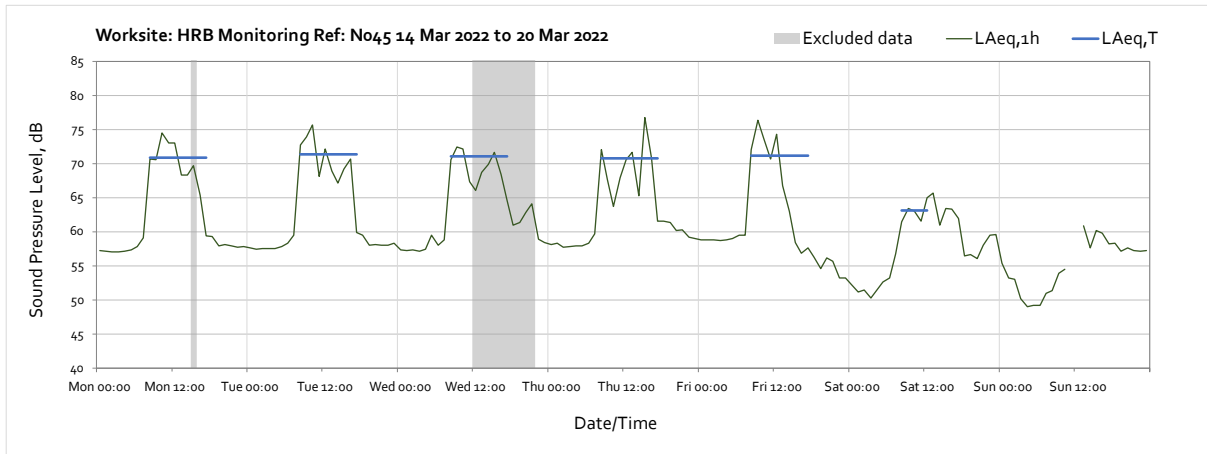
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

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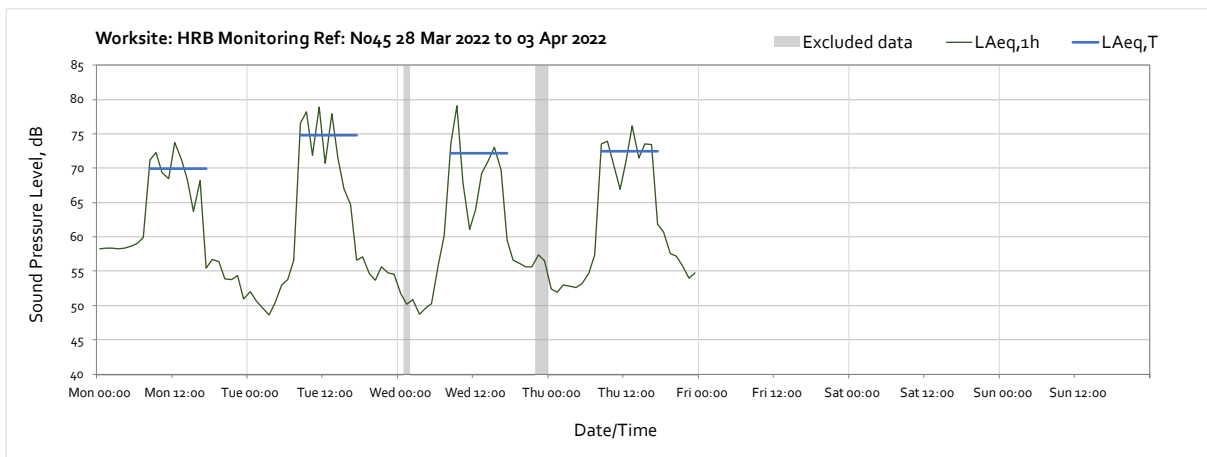


**Worksite: HRB – Monitoring Ref: N045**

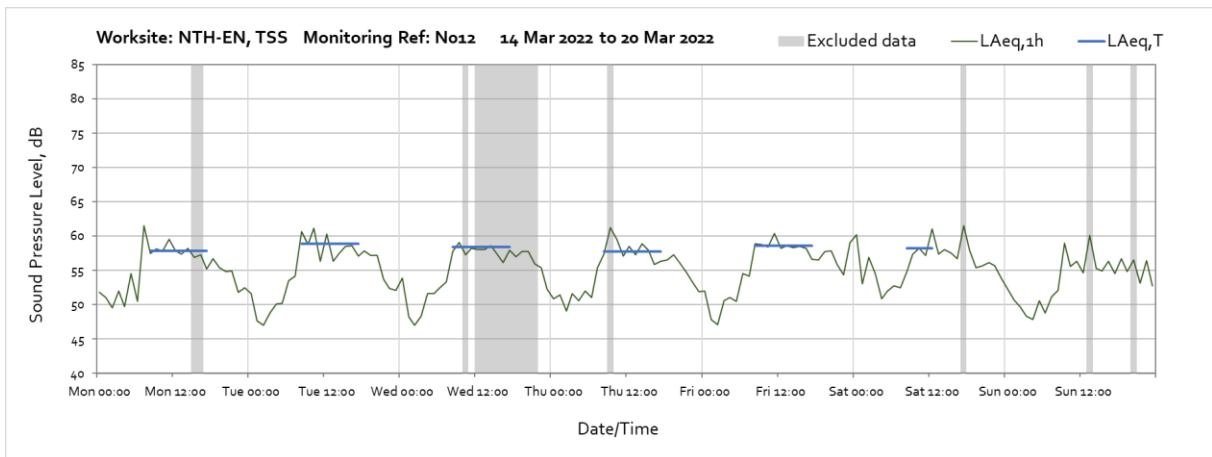
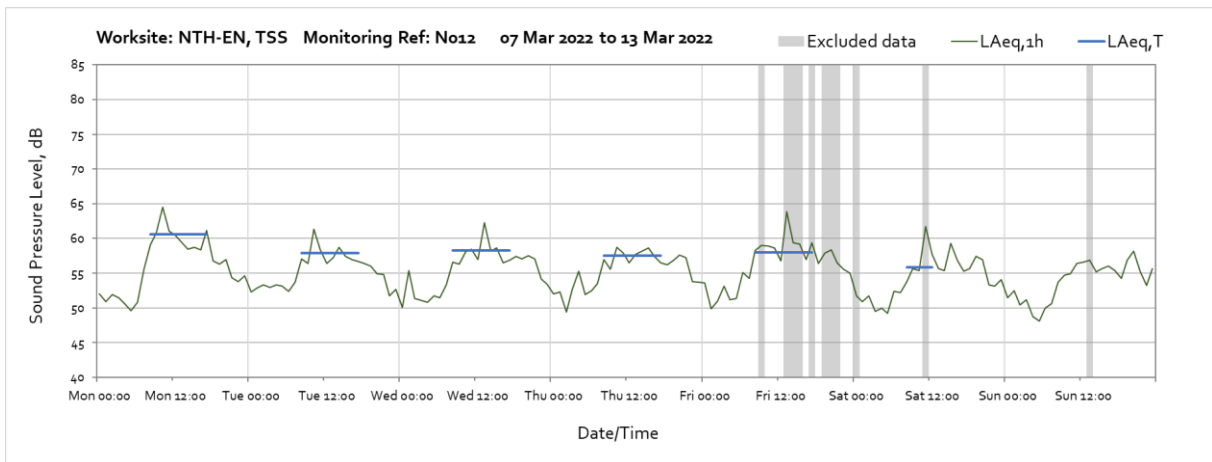
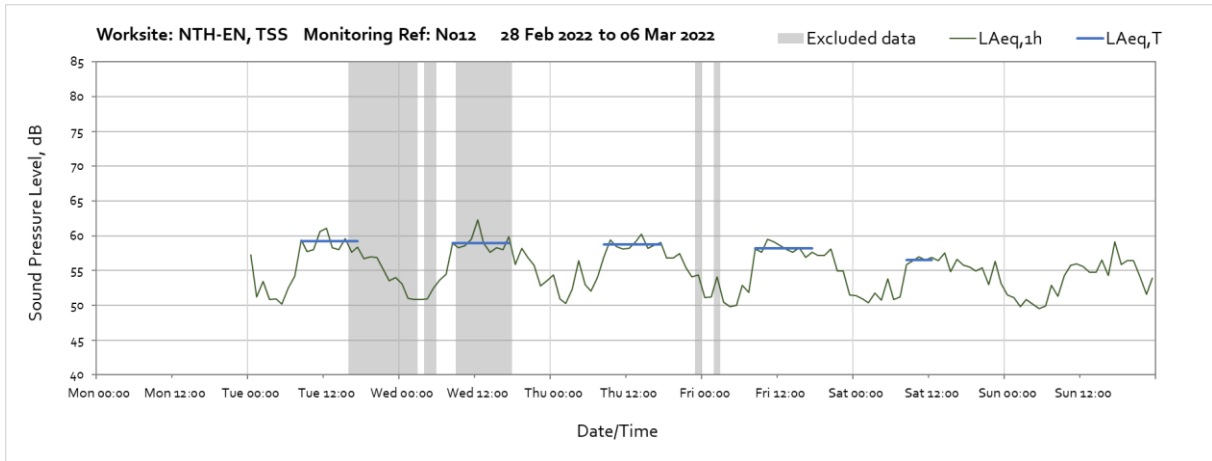




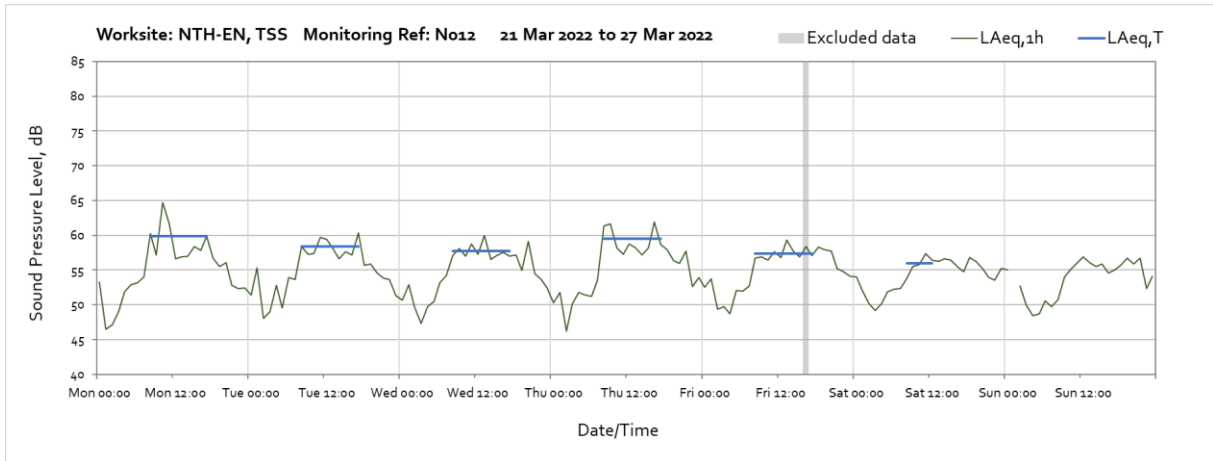
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



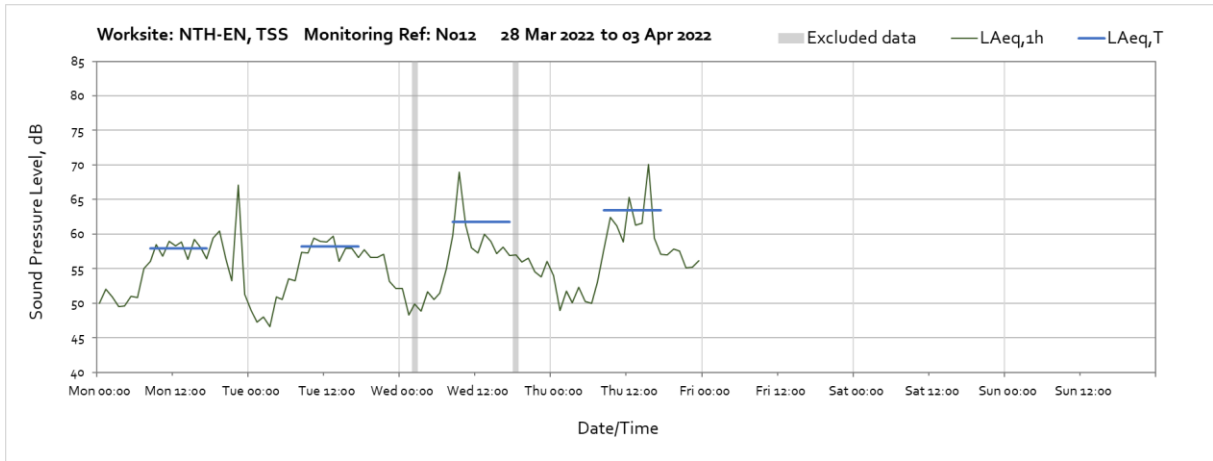
## Worksite: NTH-EN, TSS – Monitoring Ref: N012



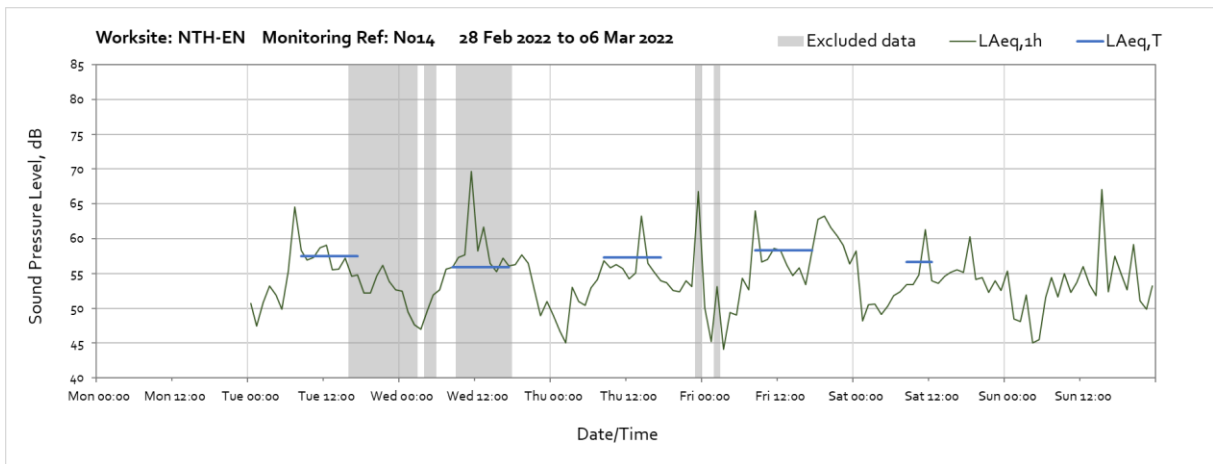
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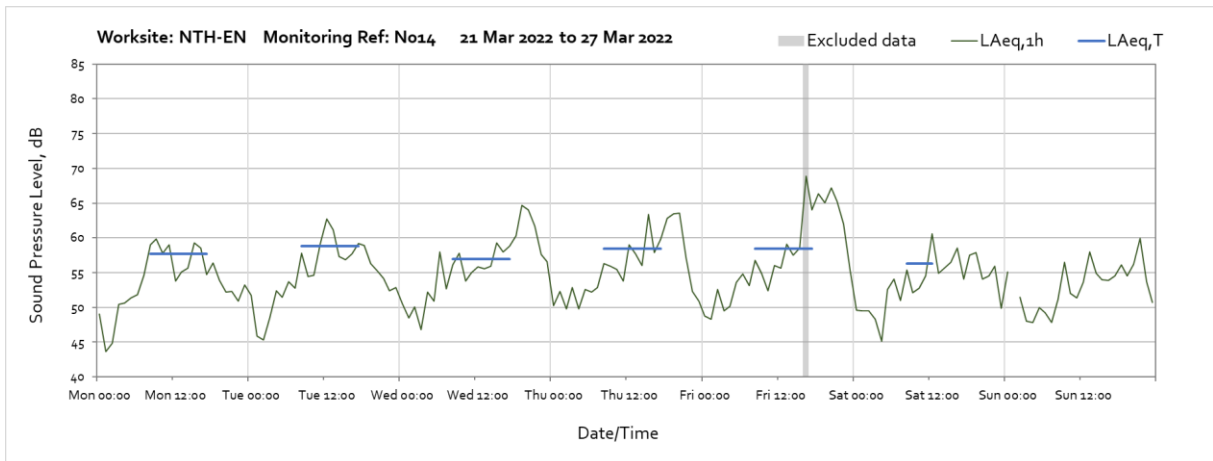
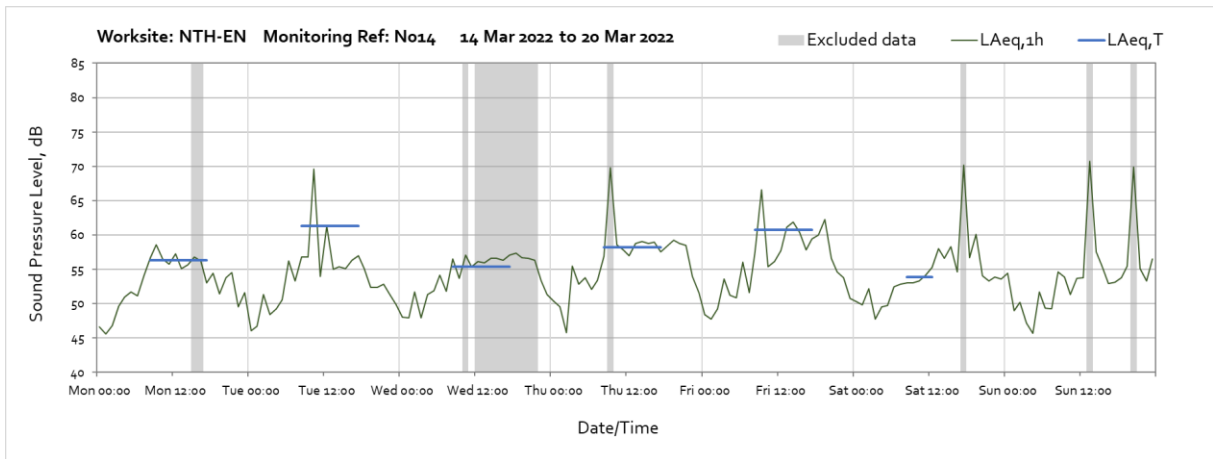
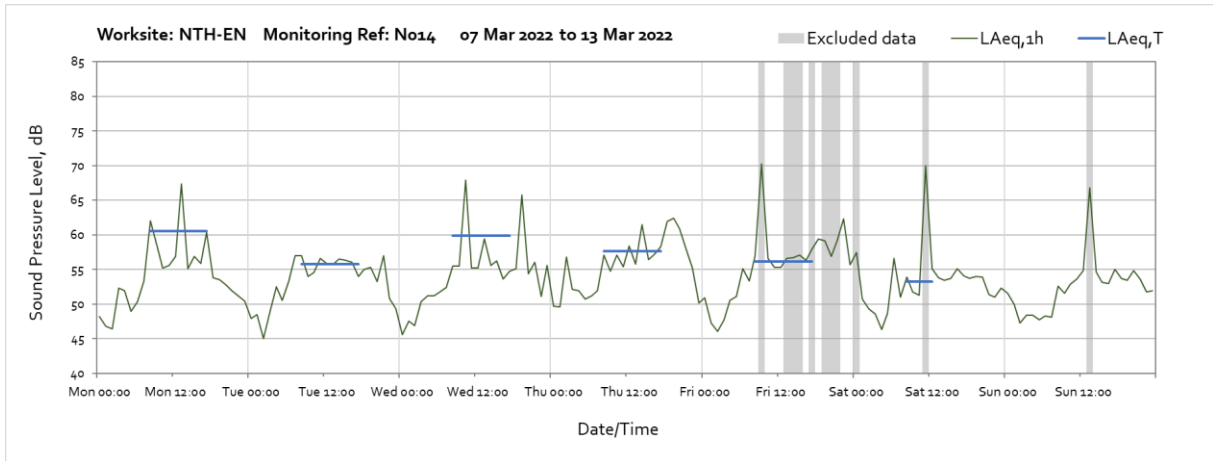
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



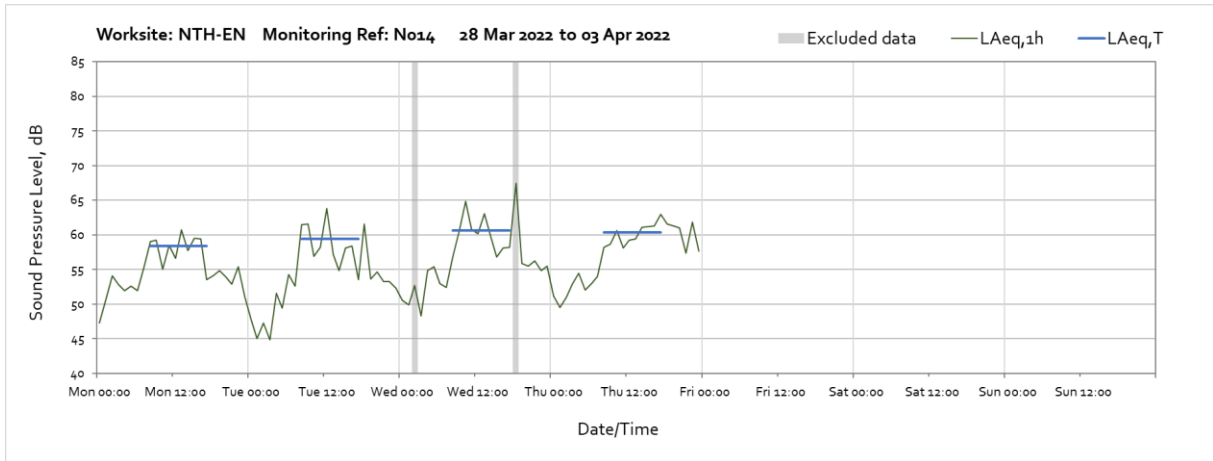
**Worksite: NTH-EN - Monitoring Ref: N014**



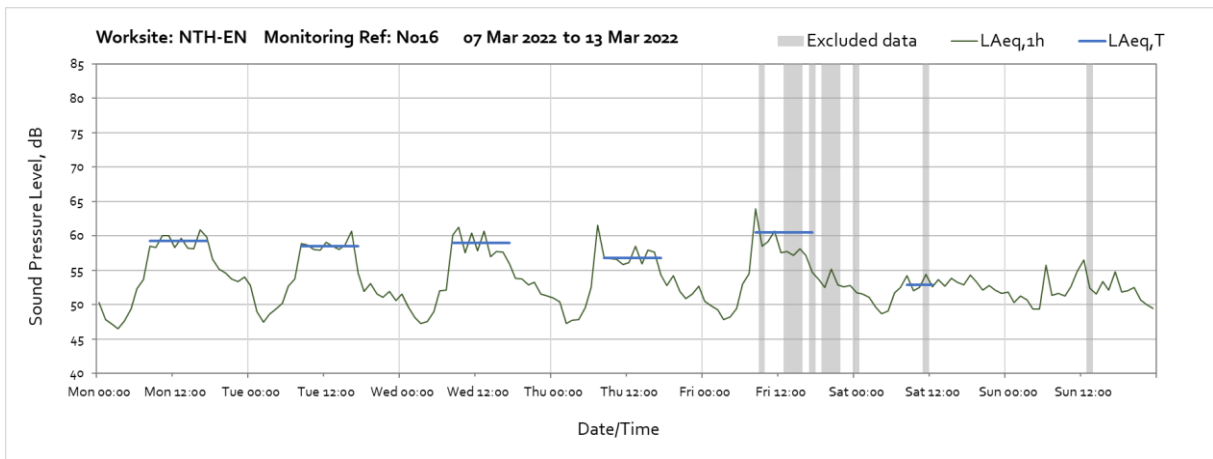
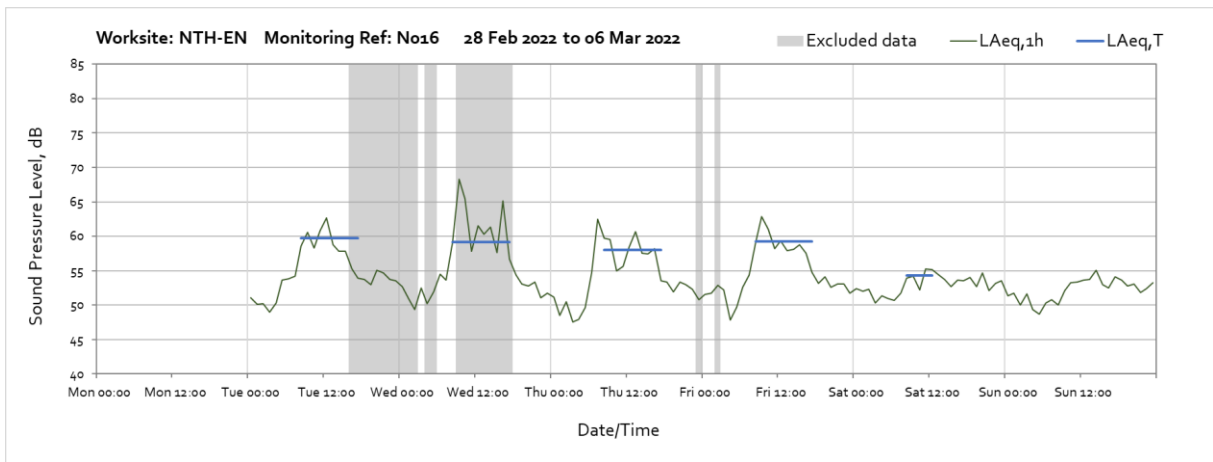


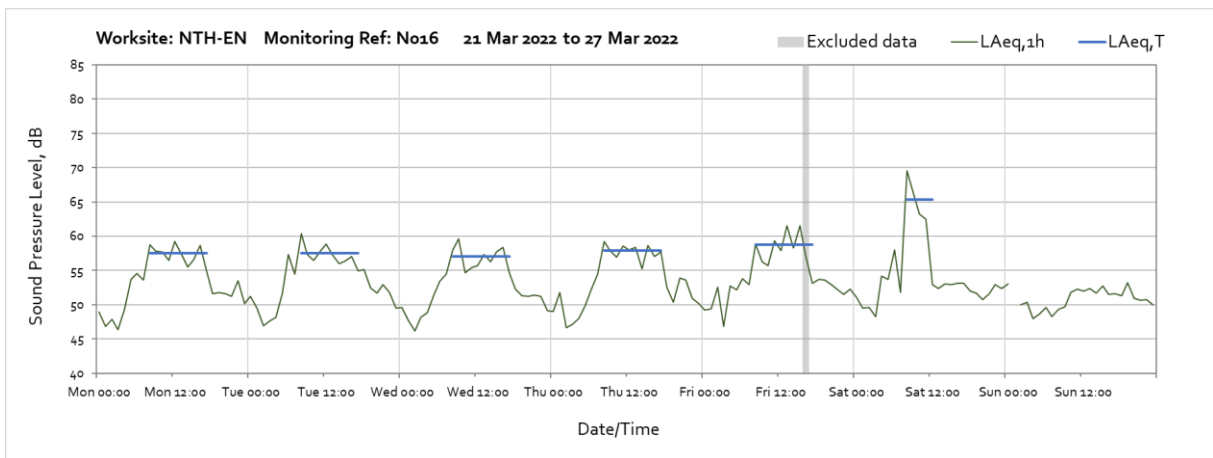
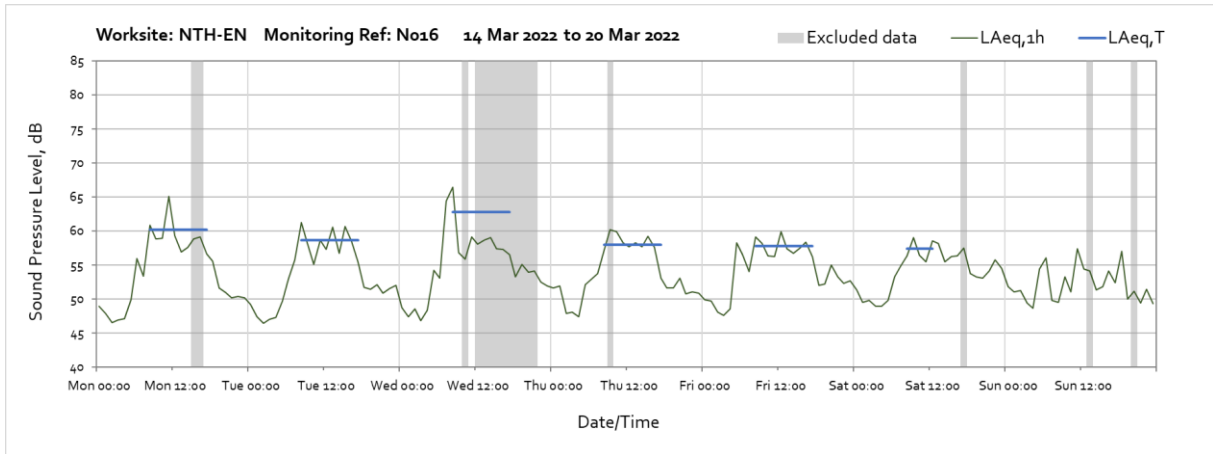


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

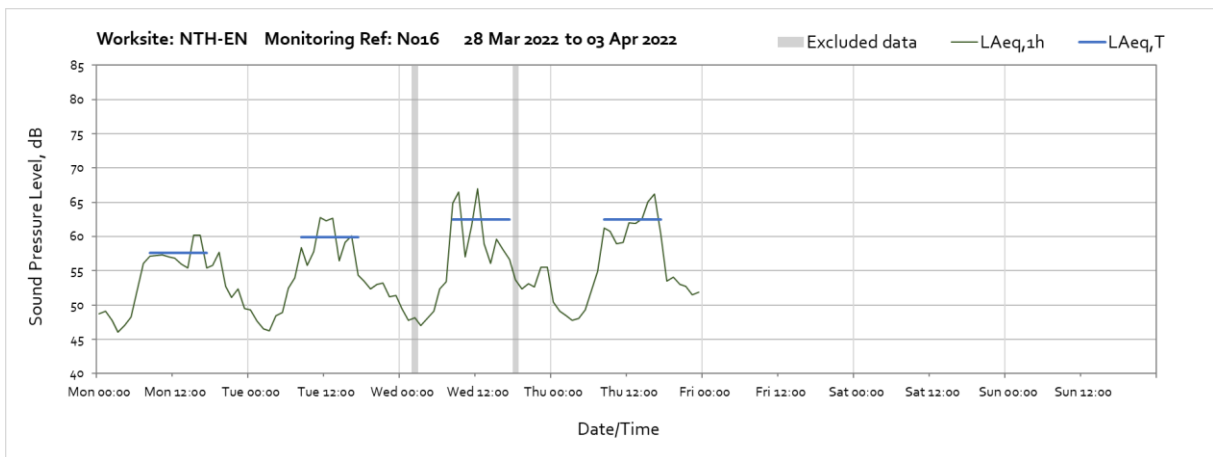


**Worksite: NTH-EN - Monitoring Ref: N016**

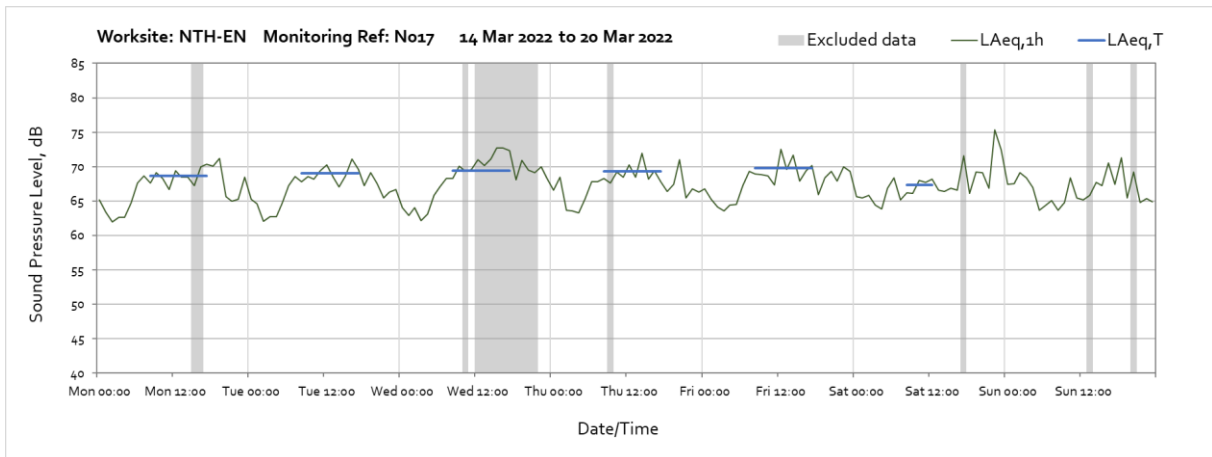
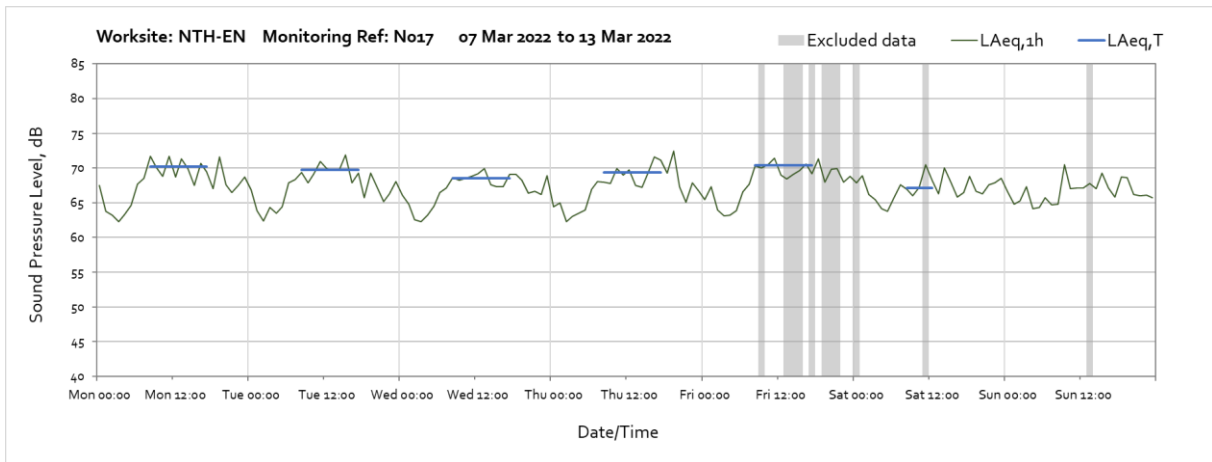
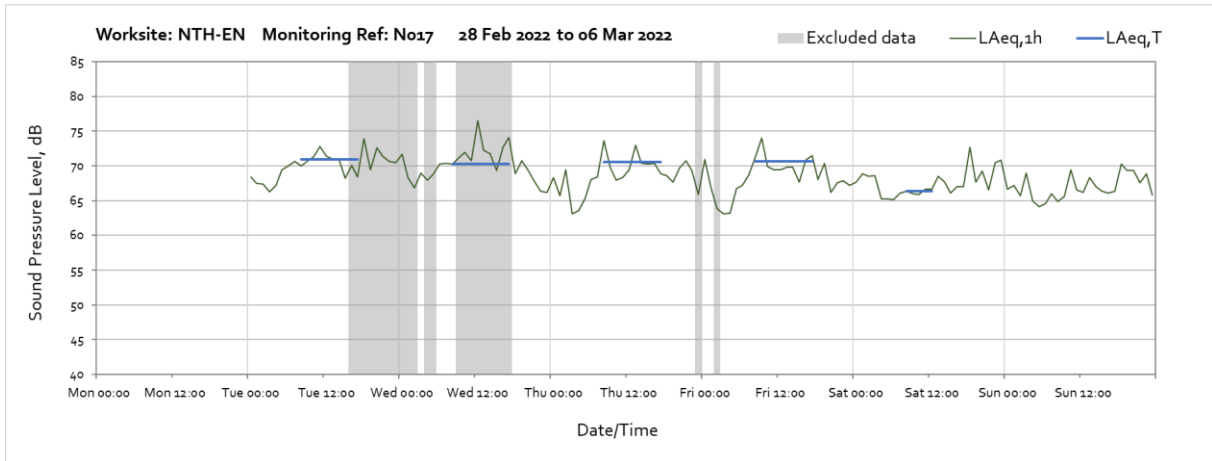




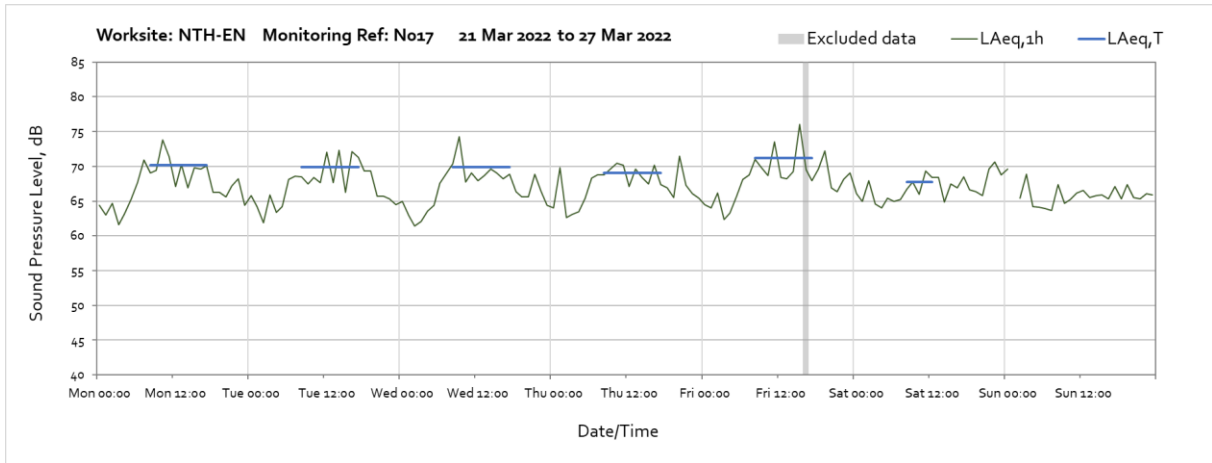
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



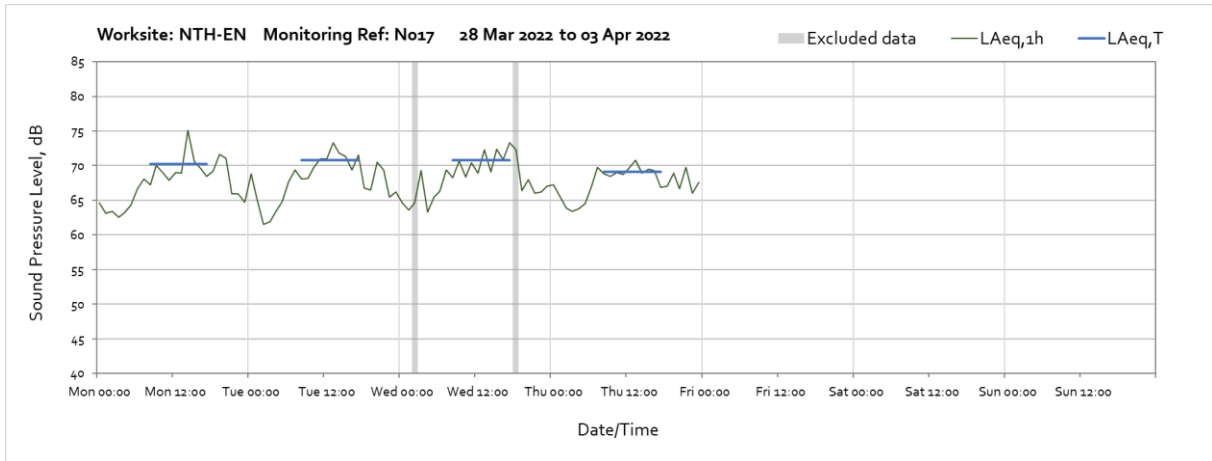
## Worksite: NTH-EN - Monitoring Ref: N017



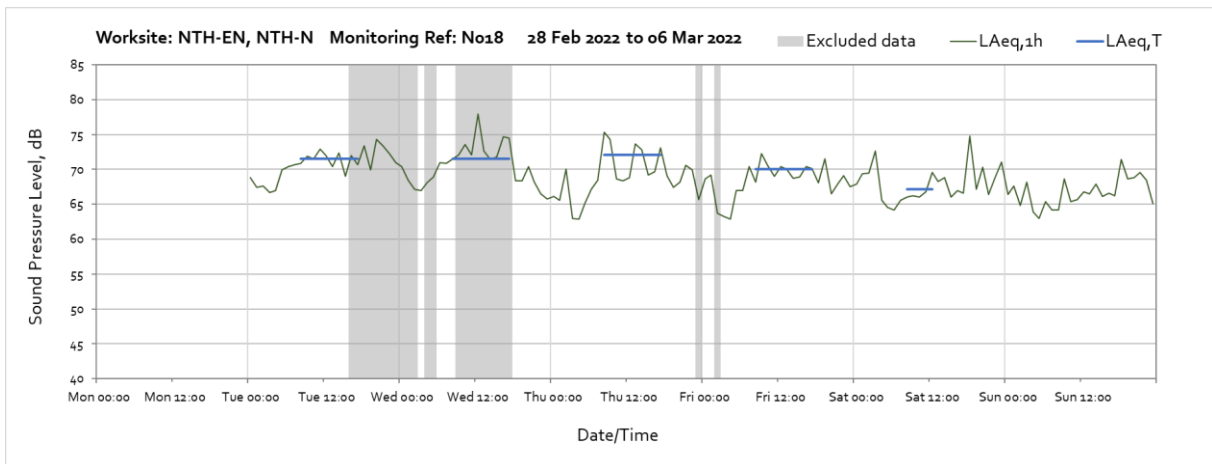
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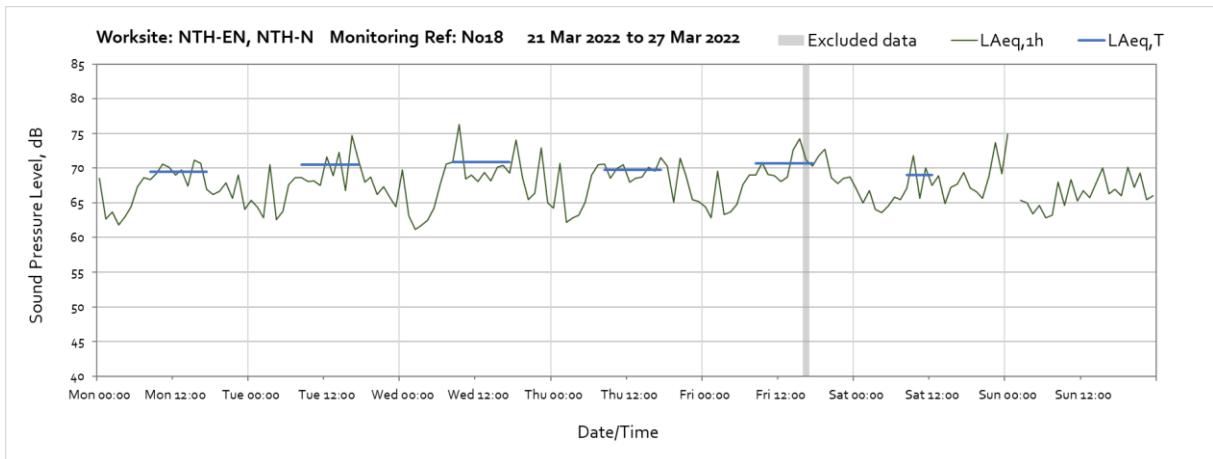
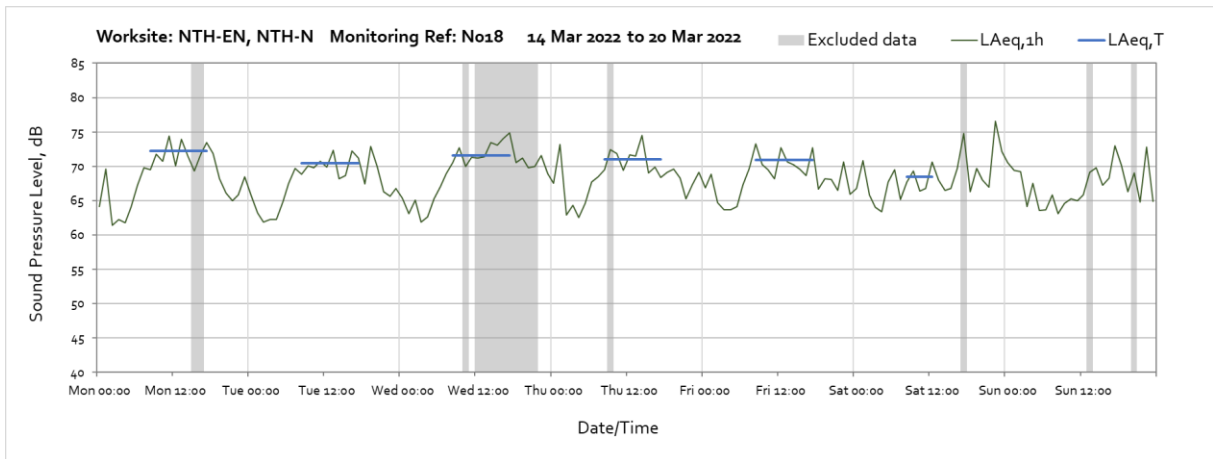
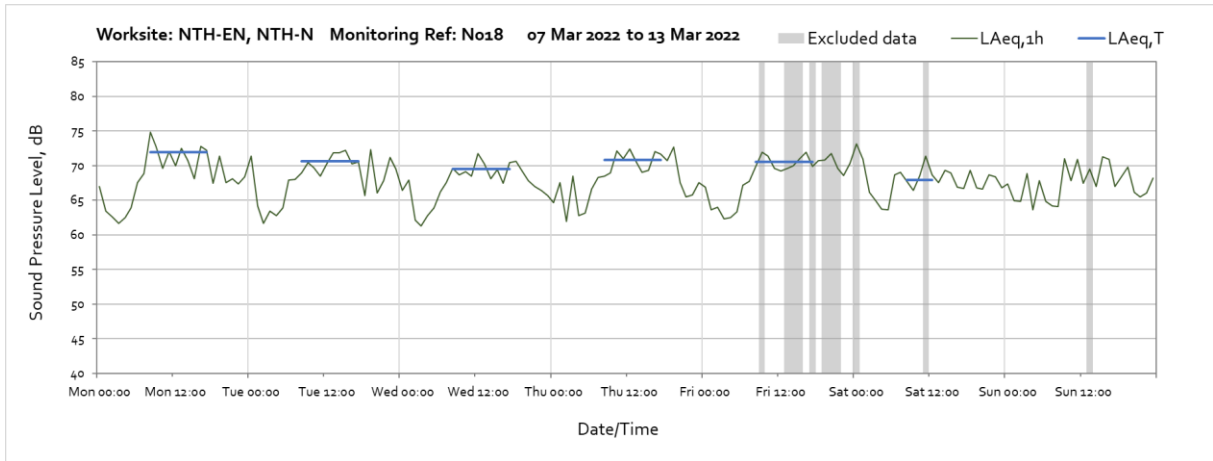


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

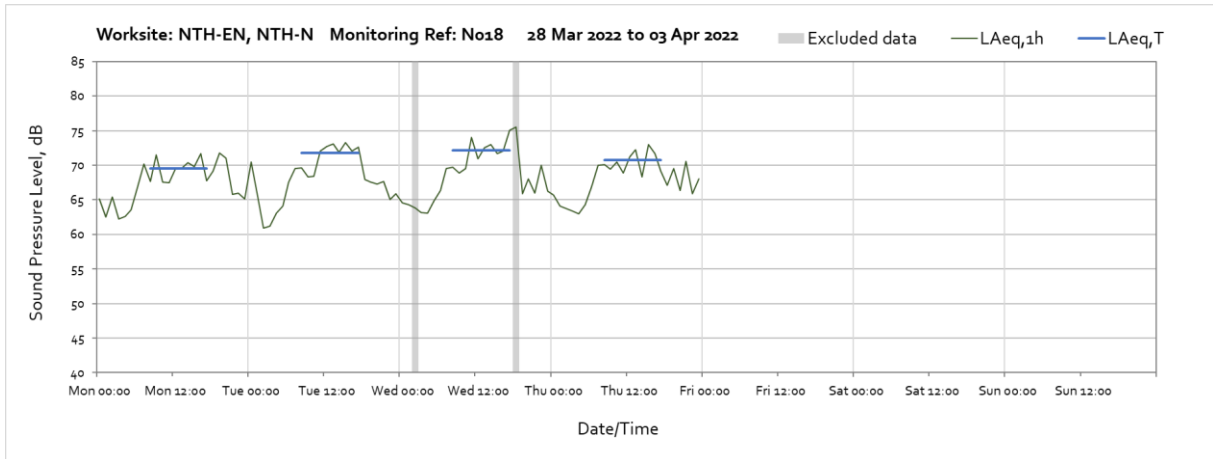


### Worksite: NTH-EN, NTH-N - Monitoring Ref: N018

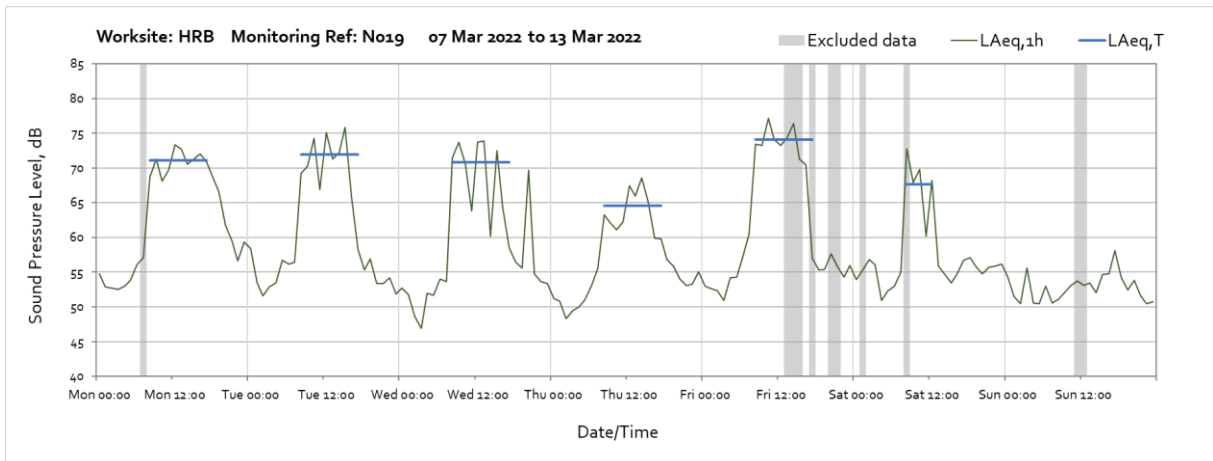
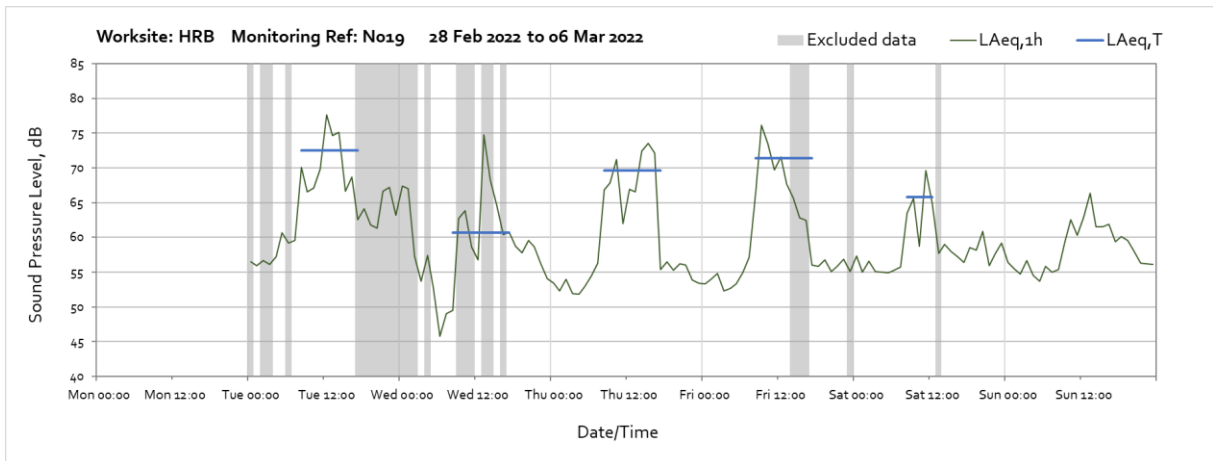




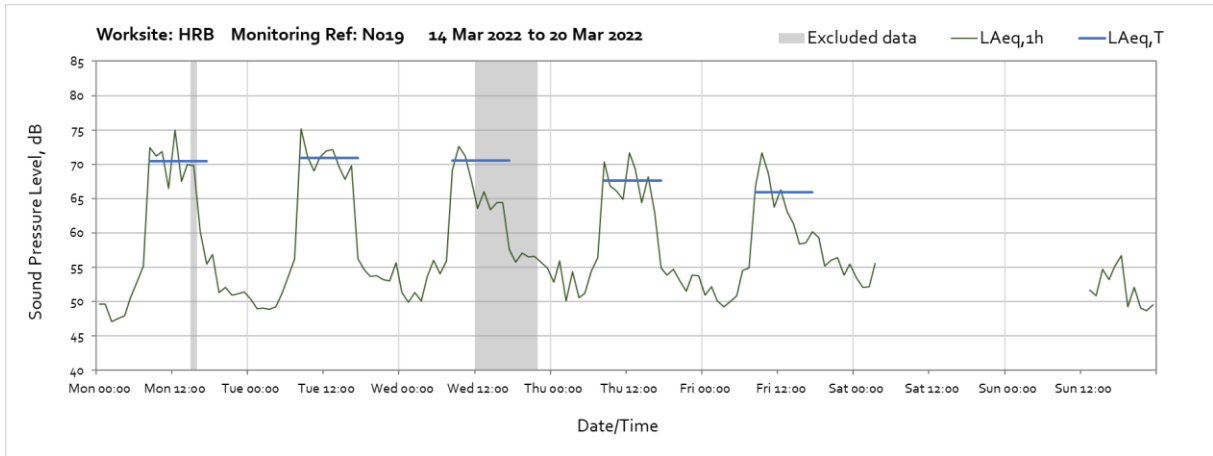
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



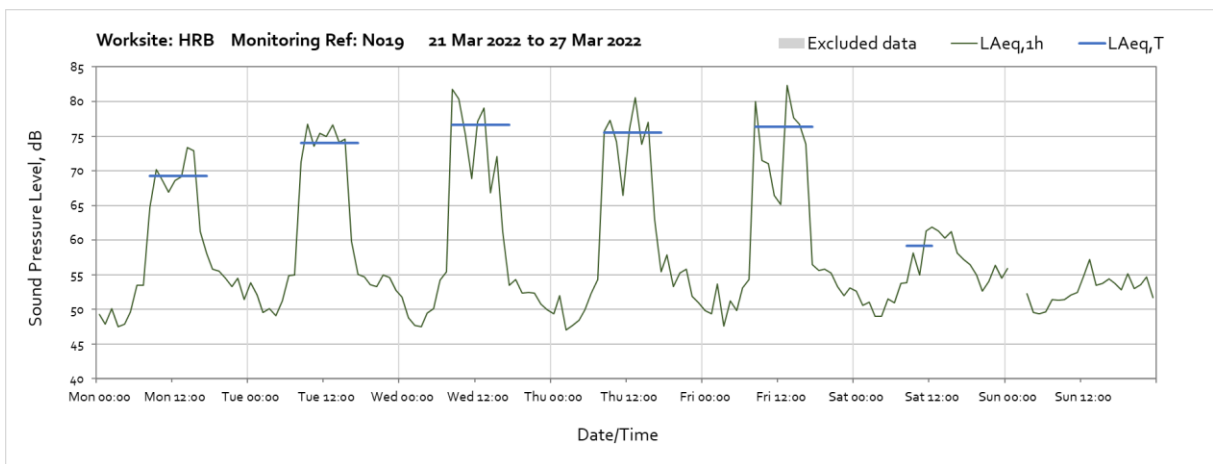
**Worksite: NTH-EN - Monitoring Ref: N019**



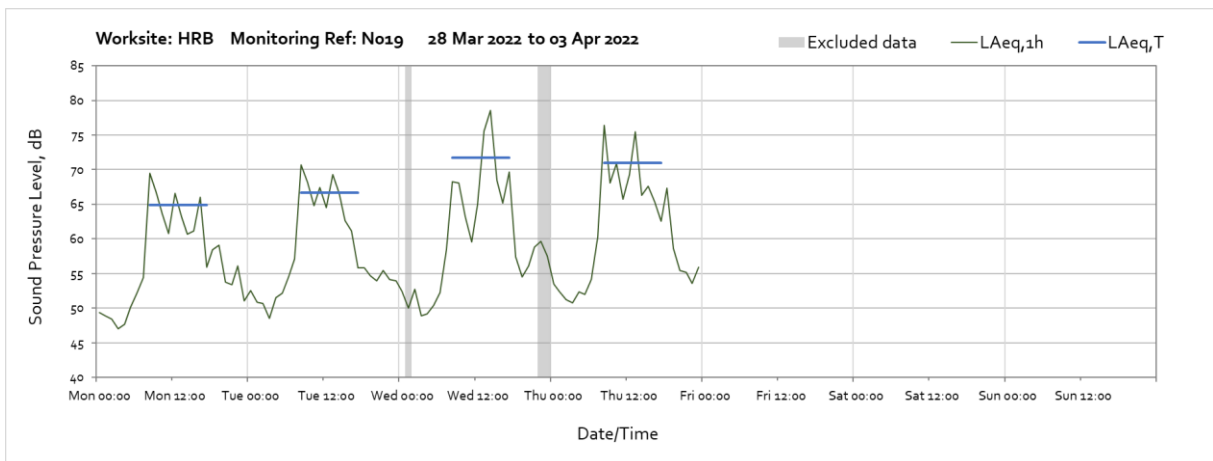




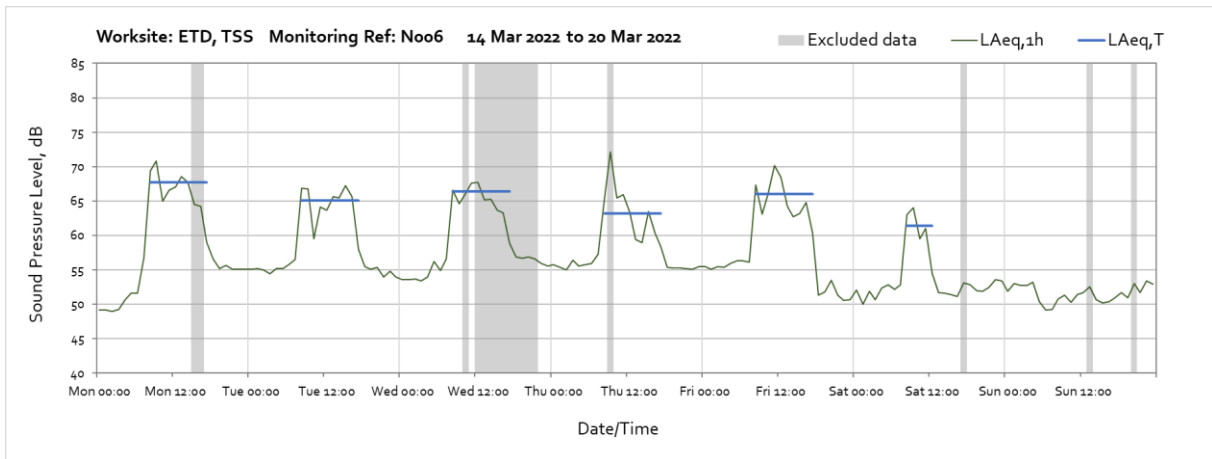
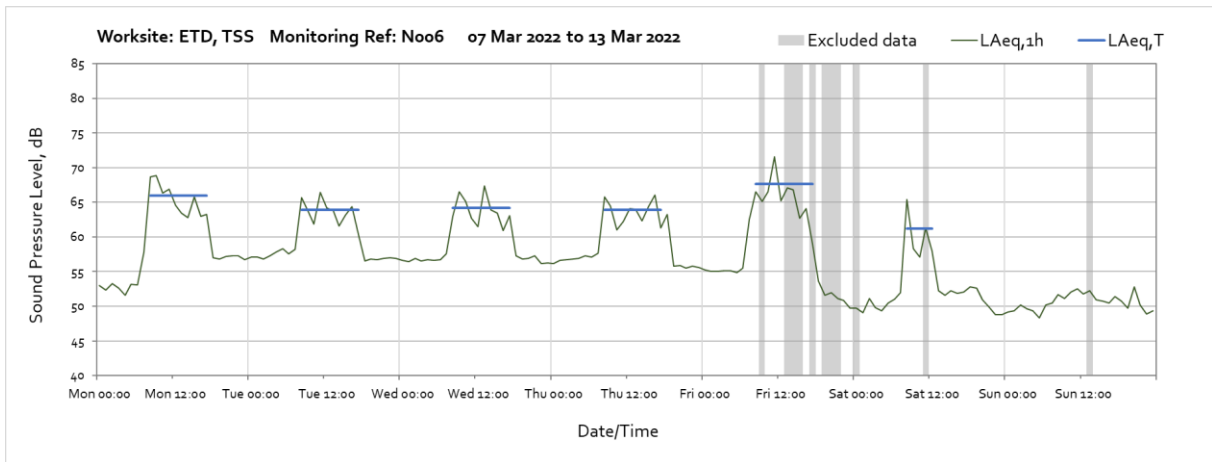
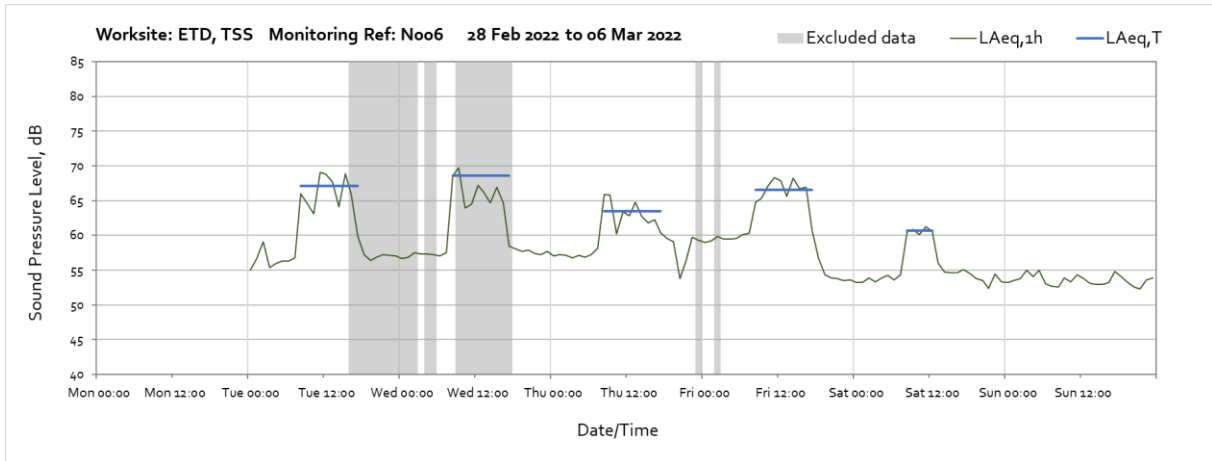
Note: Missing data at 04:00 on Saturday 19th March 2022 was due to a continuous loss of power.

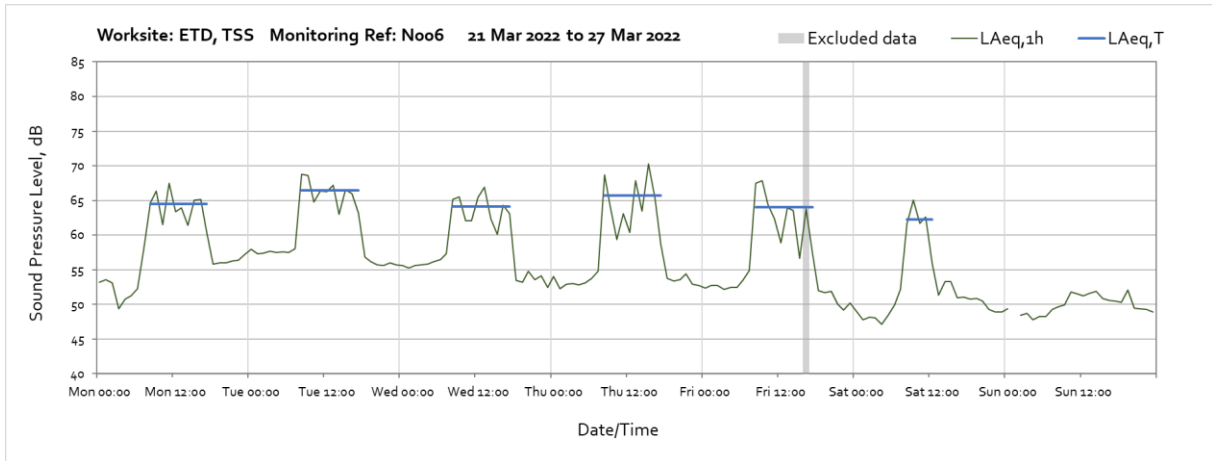


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

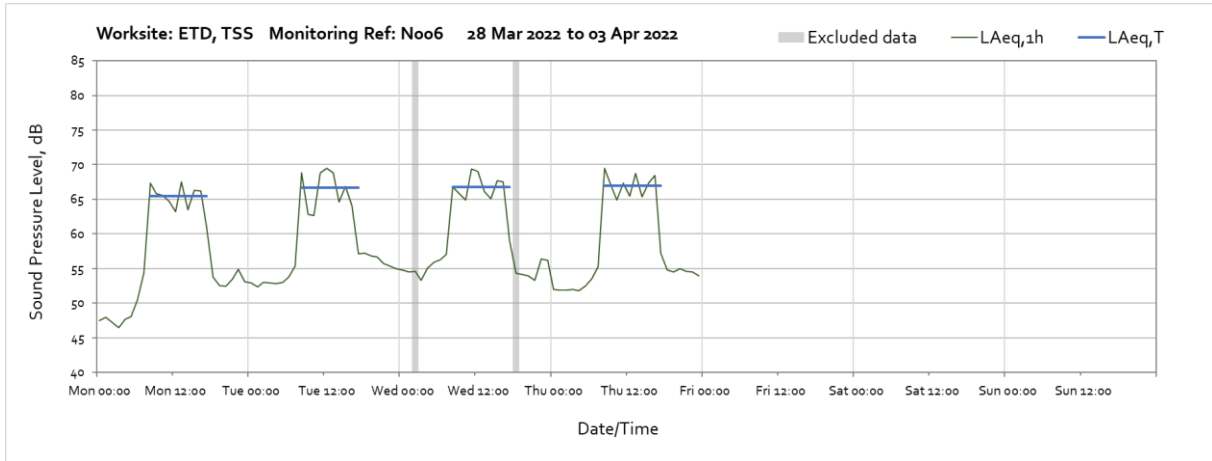


**Worksite: ETD, TSS - Monitoring Ref: N006**

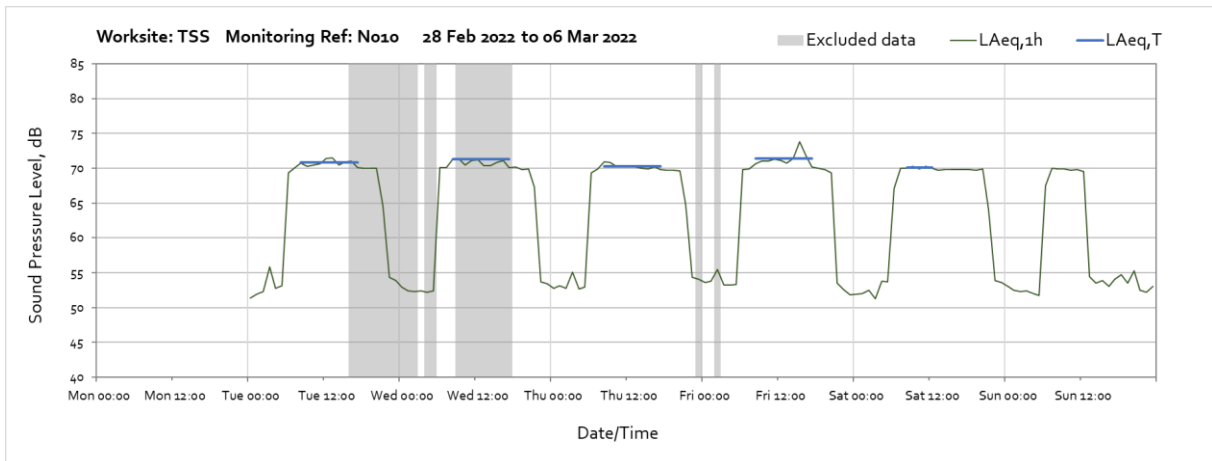


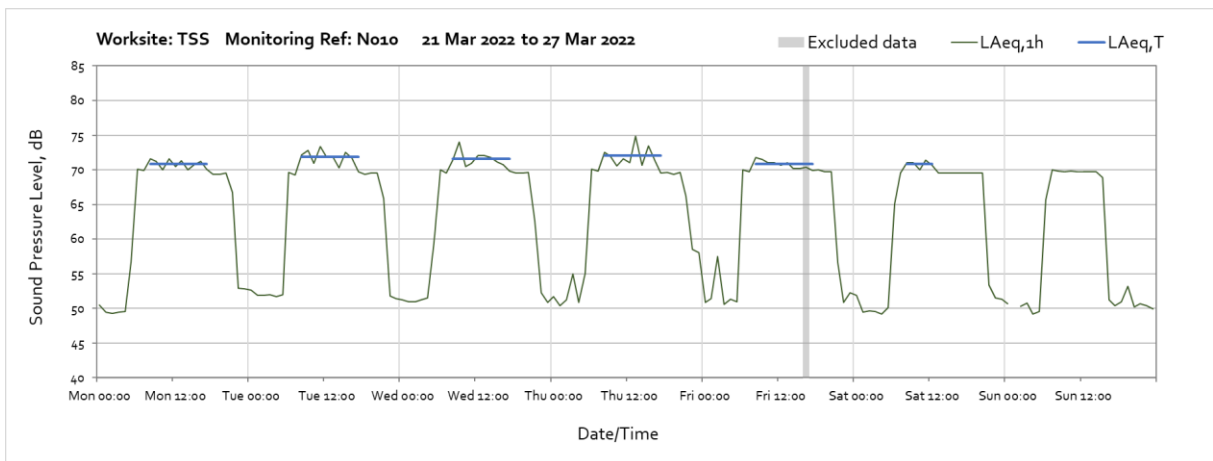
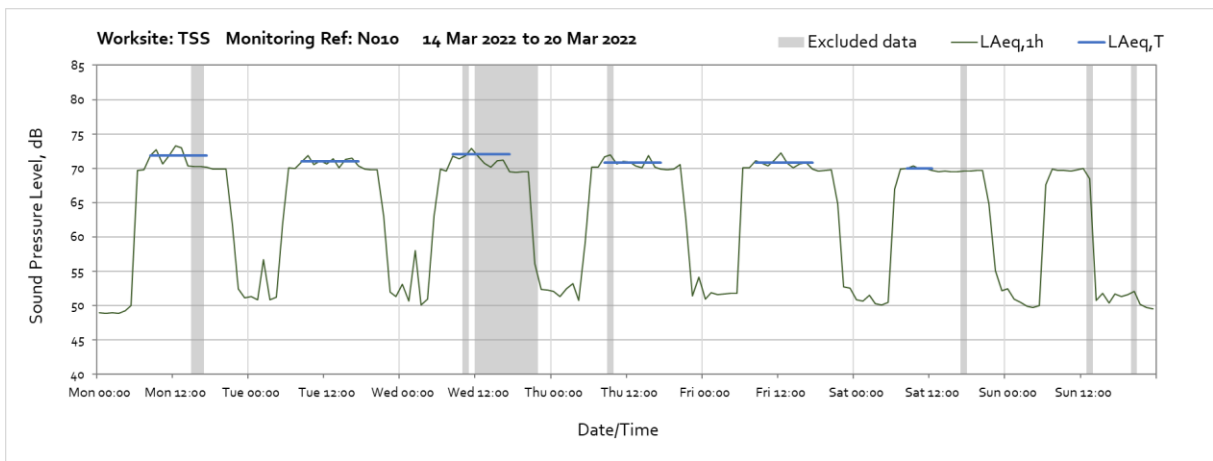
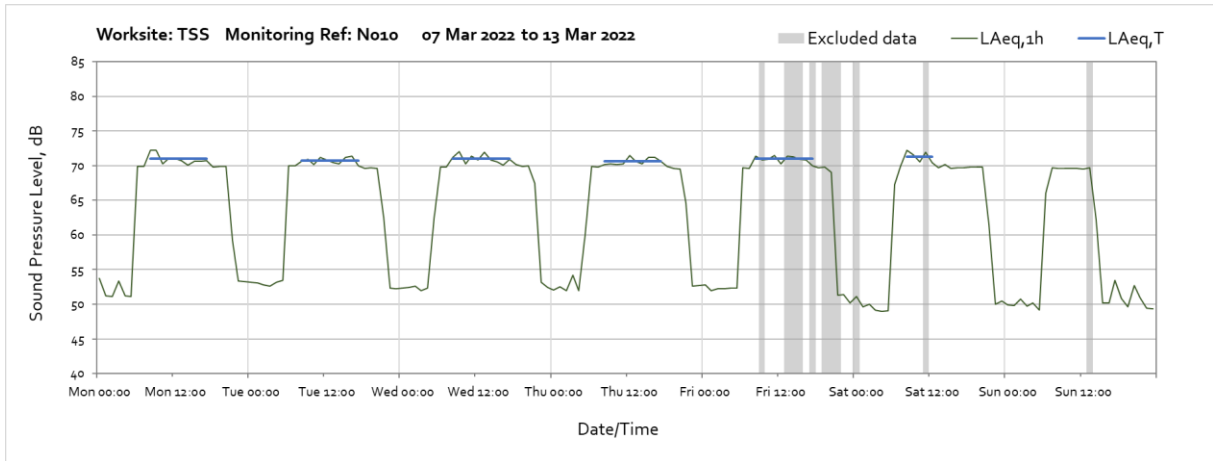


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

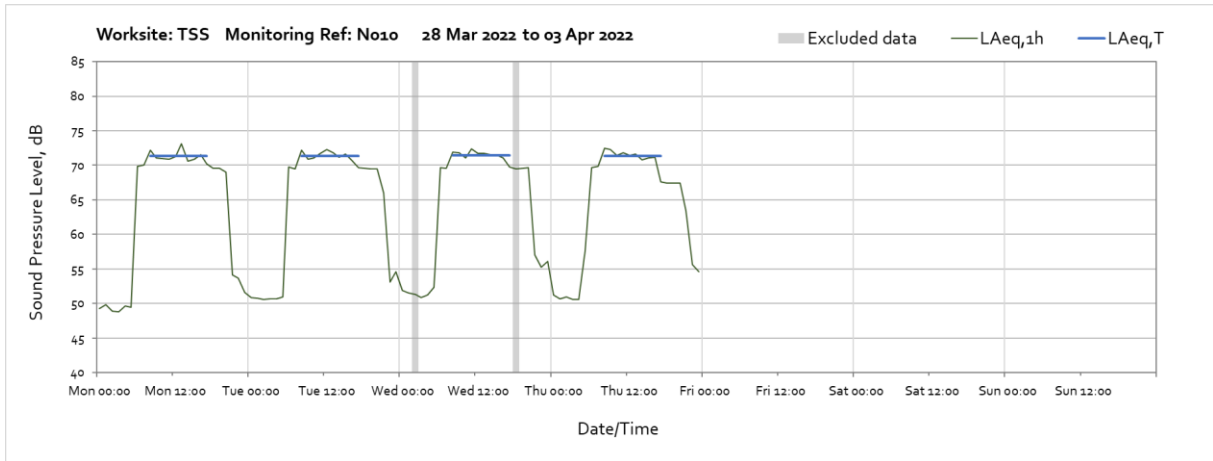


### Worksite: TSS - Monitoring Ref: N010

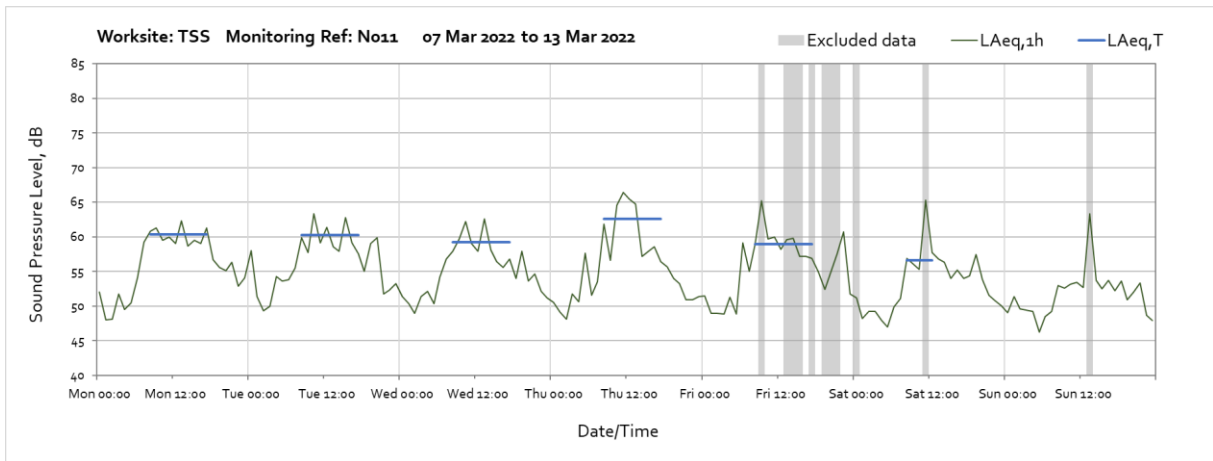
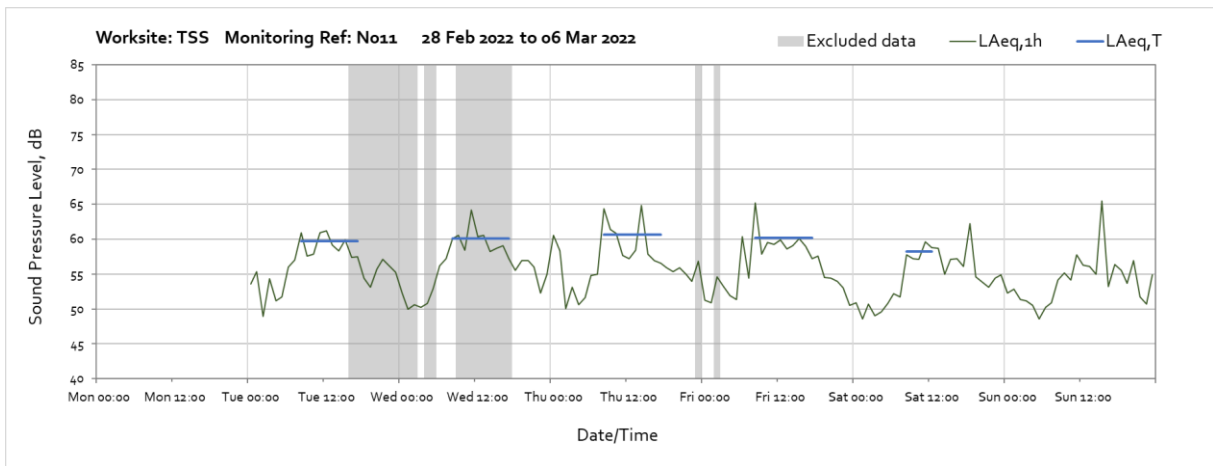


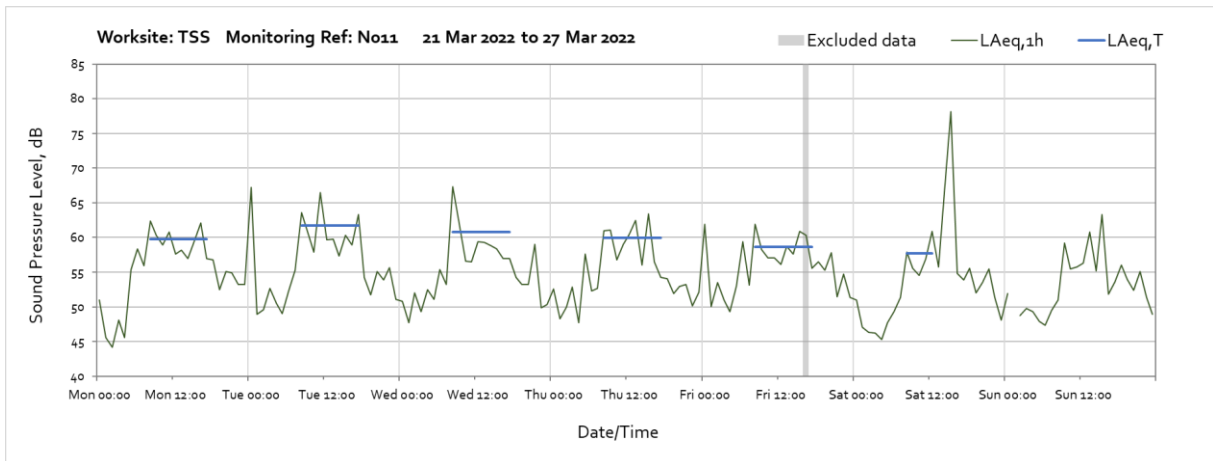
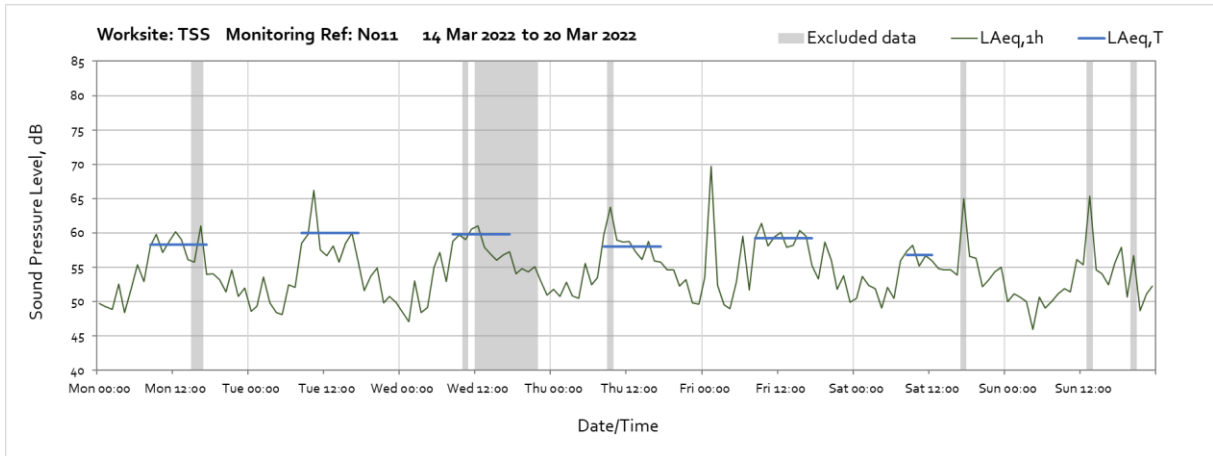


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

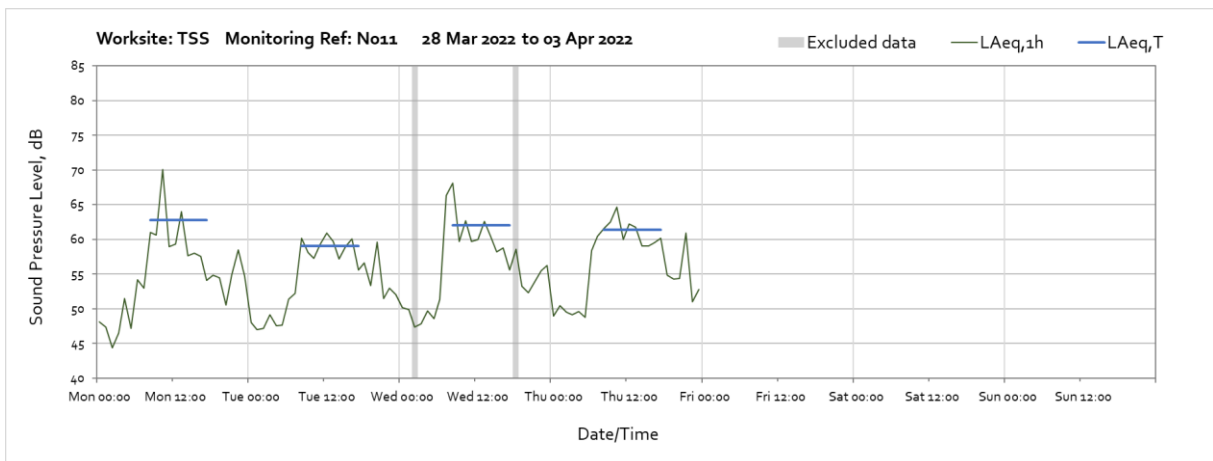


### Worksite: TSS - Monitoring Ref: N011

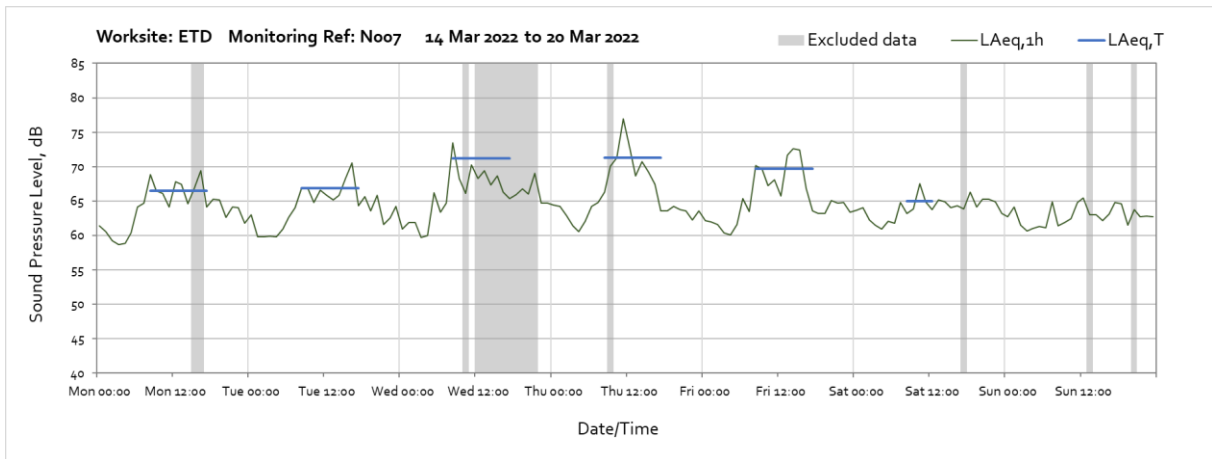
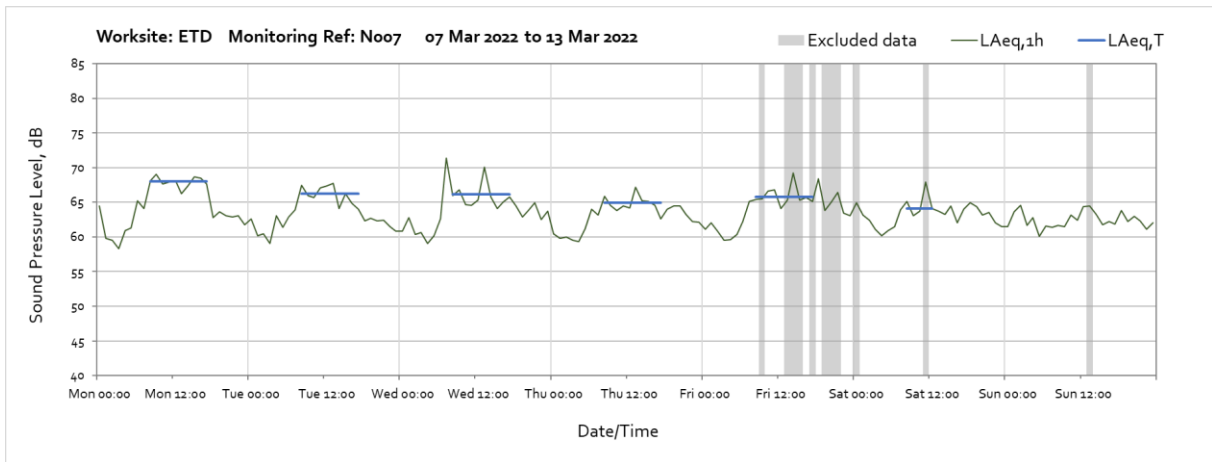
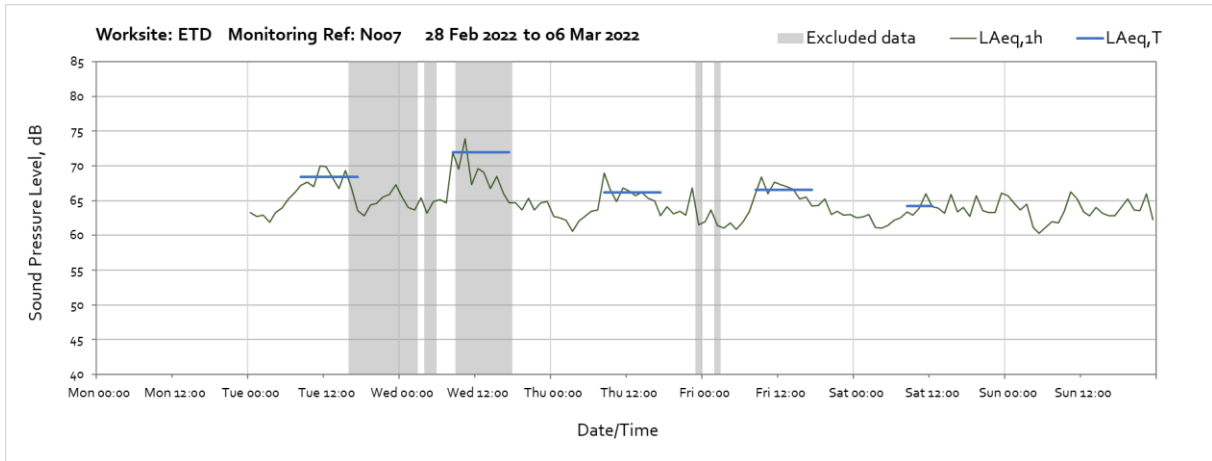




Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

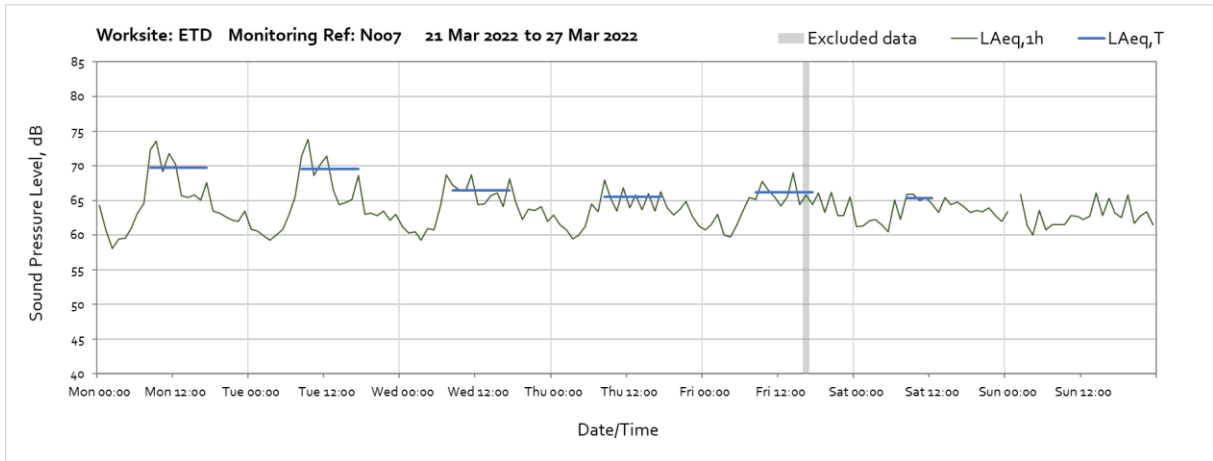


## Worksite: ETD - Monitoring Ref: N007

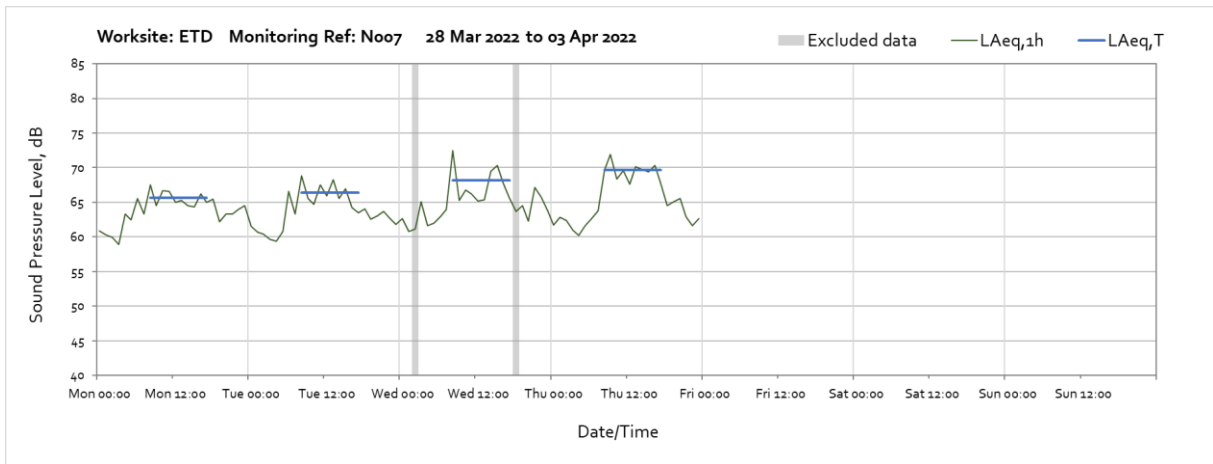


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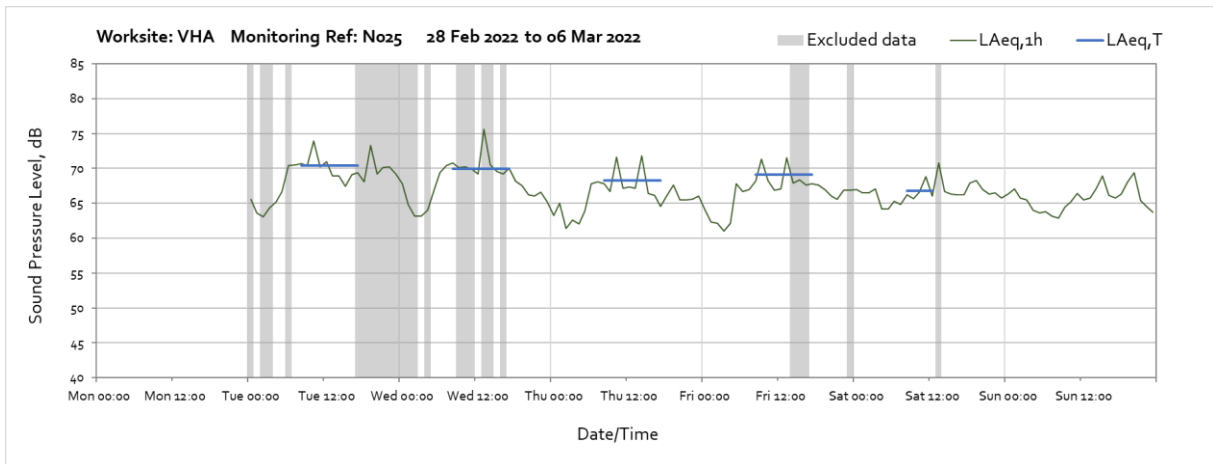


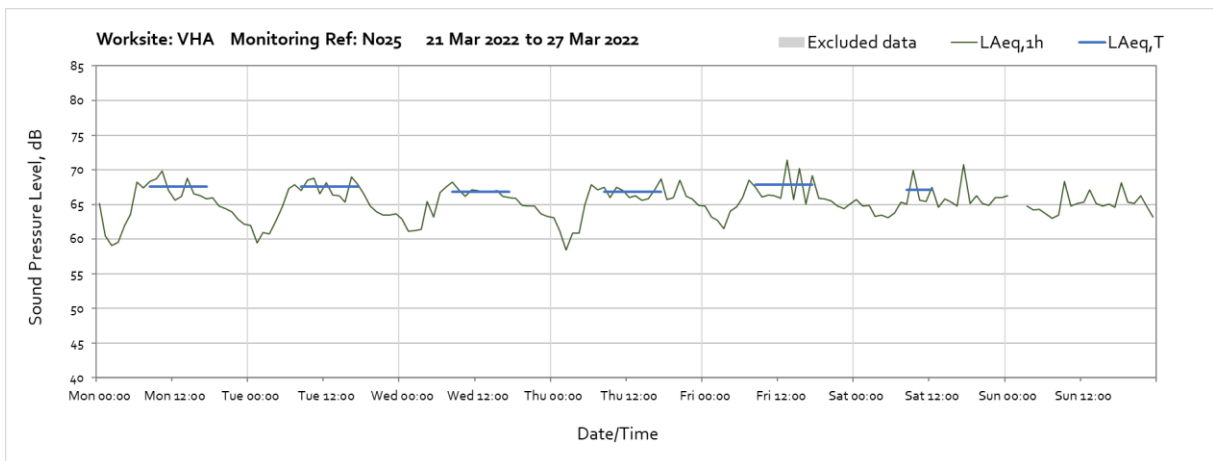
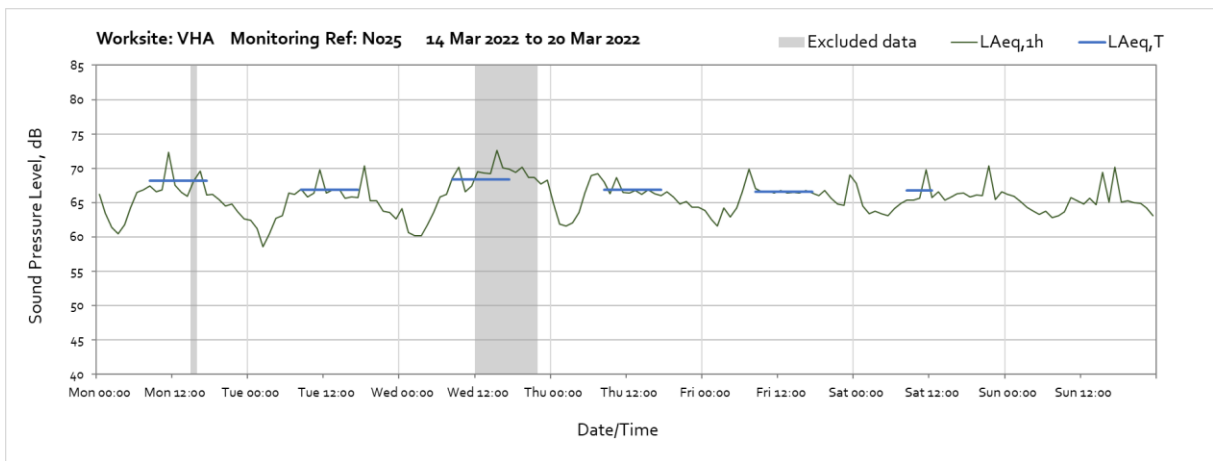
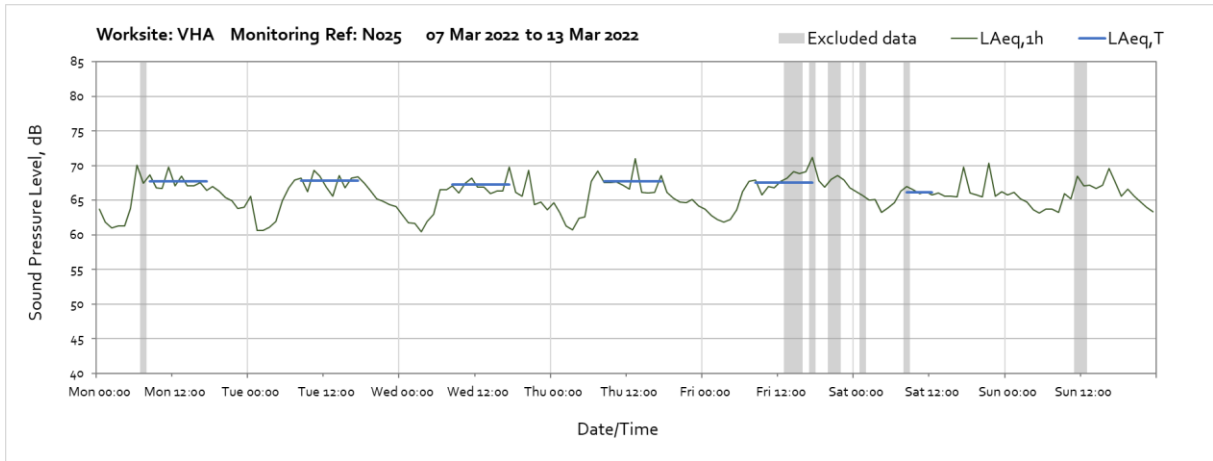


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



### Vehicle Holding Area (VHA) - Monitoring Ref: N025

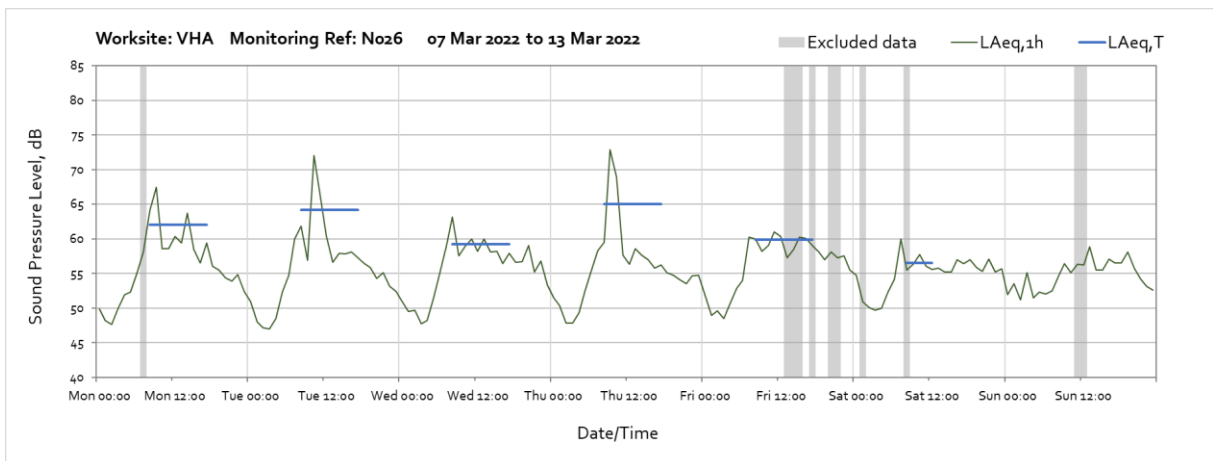
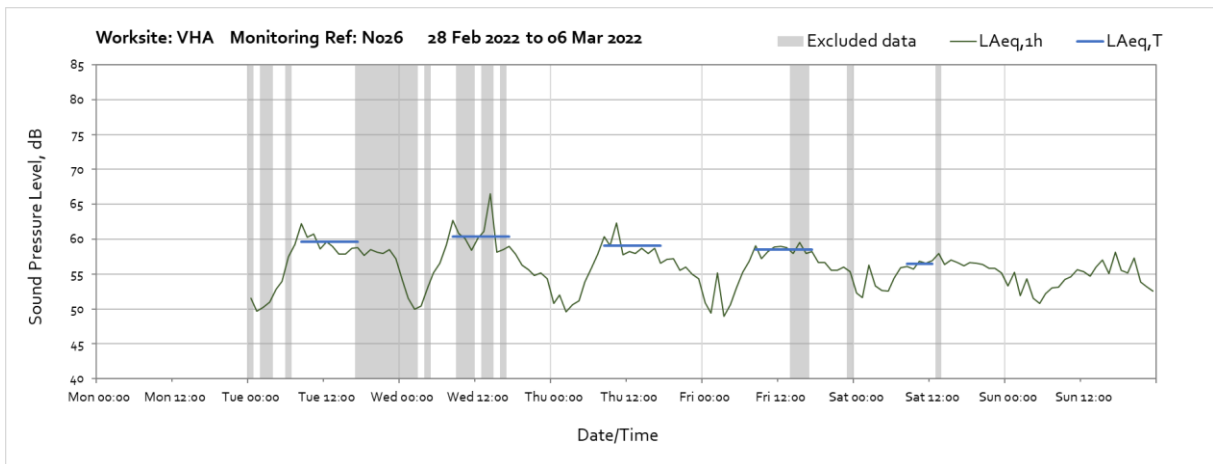


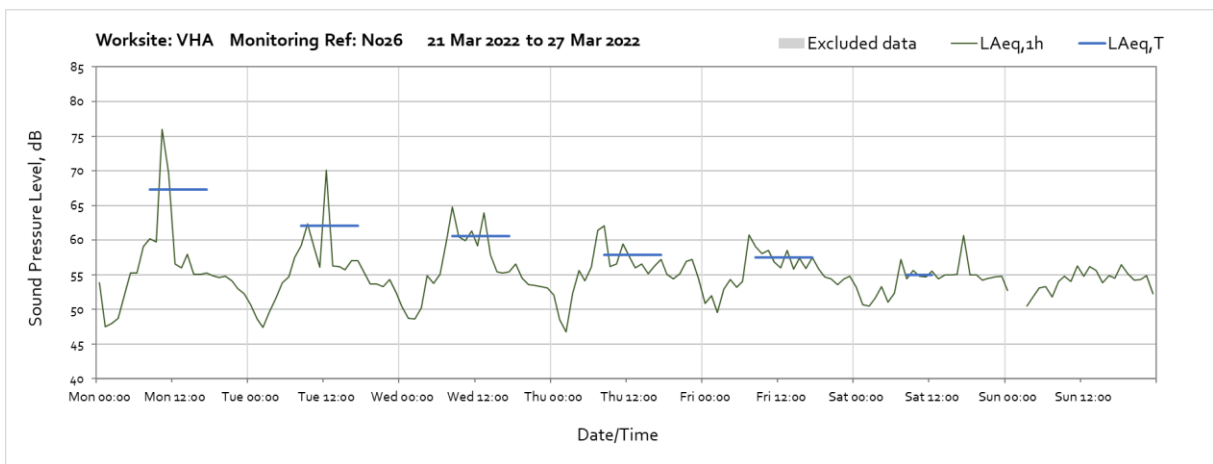
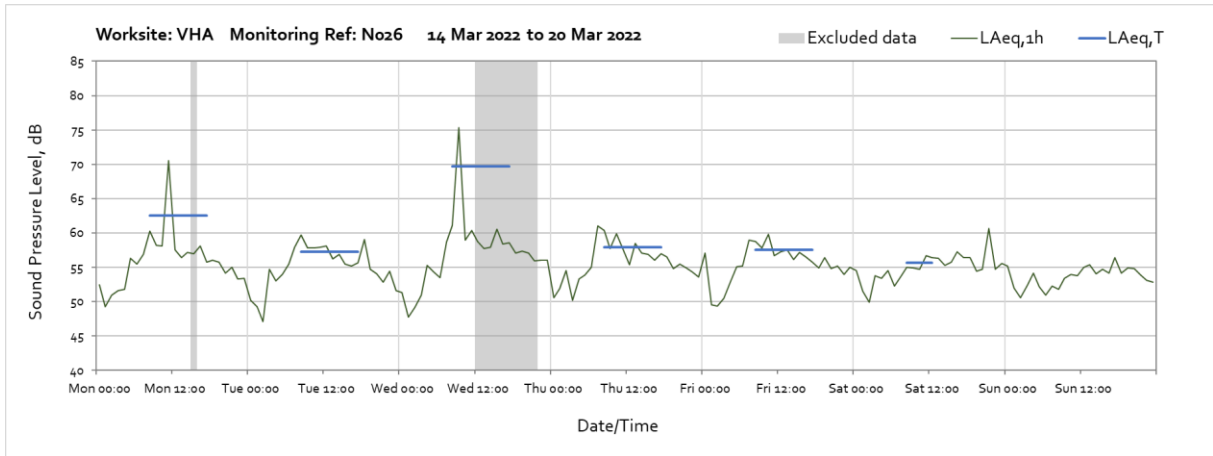


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

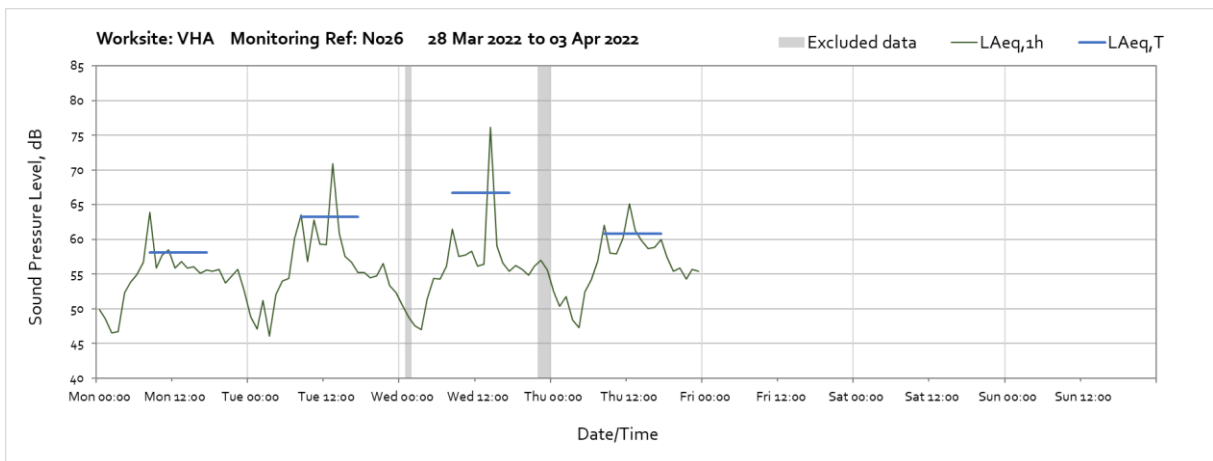


### Vehicle Holding Area (VHA) – Monitoring Ref: N026

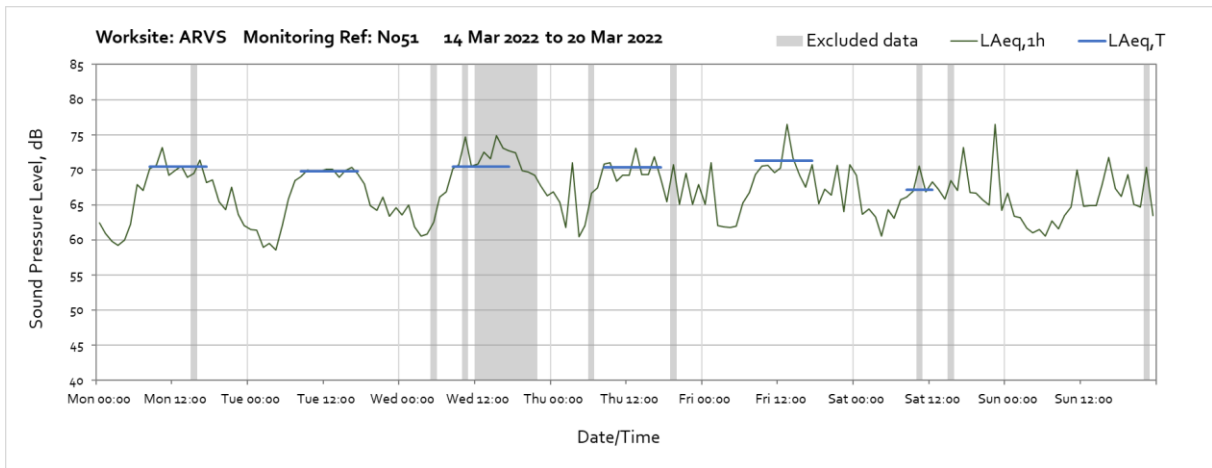
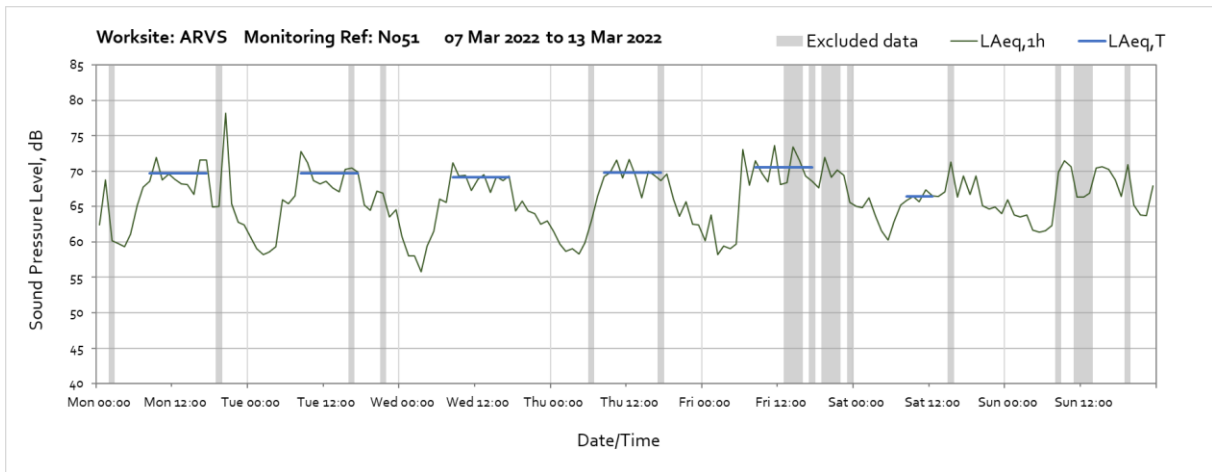
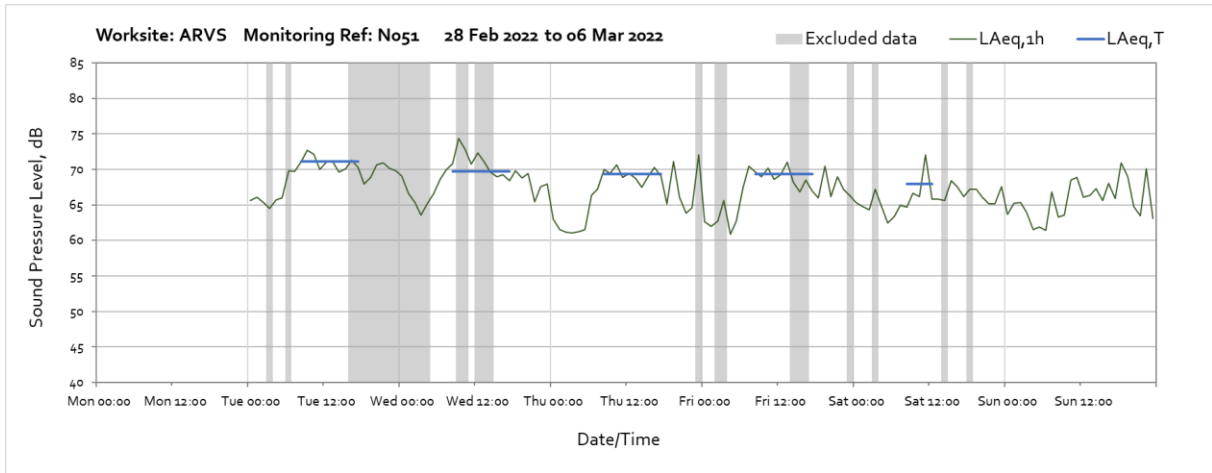


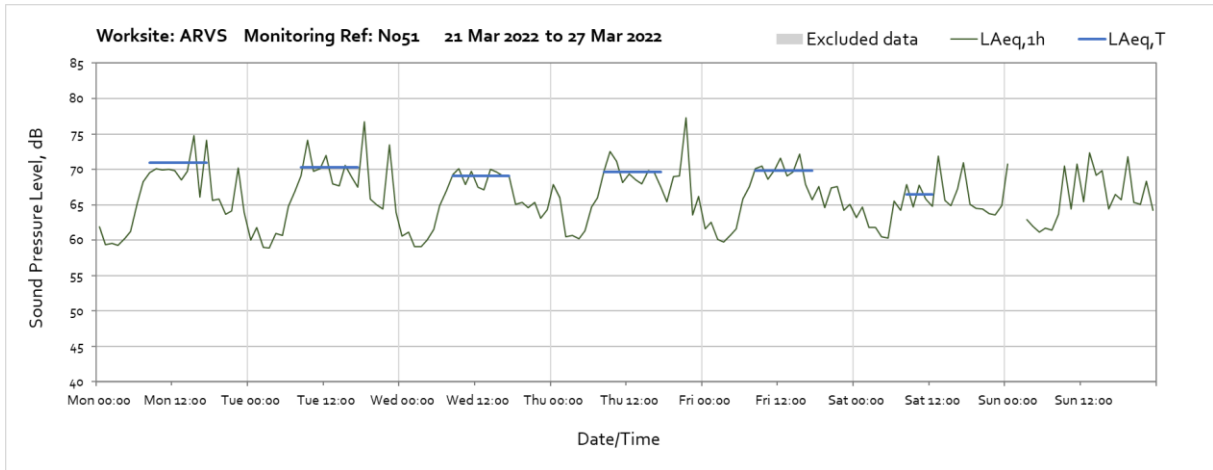


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

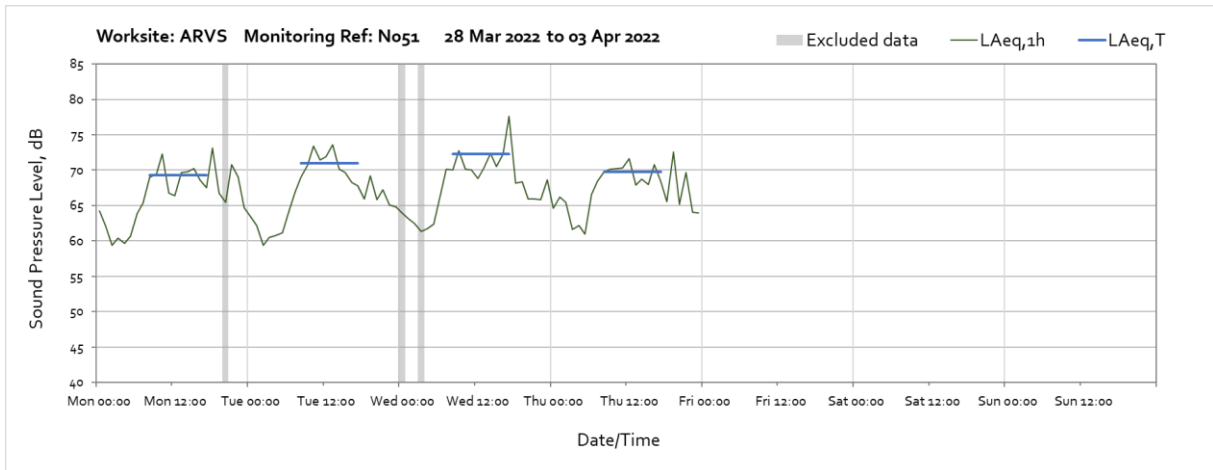


## Adelaide Road Ventilation Shaft (ARVS) – Monitoring Ref: N051

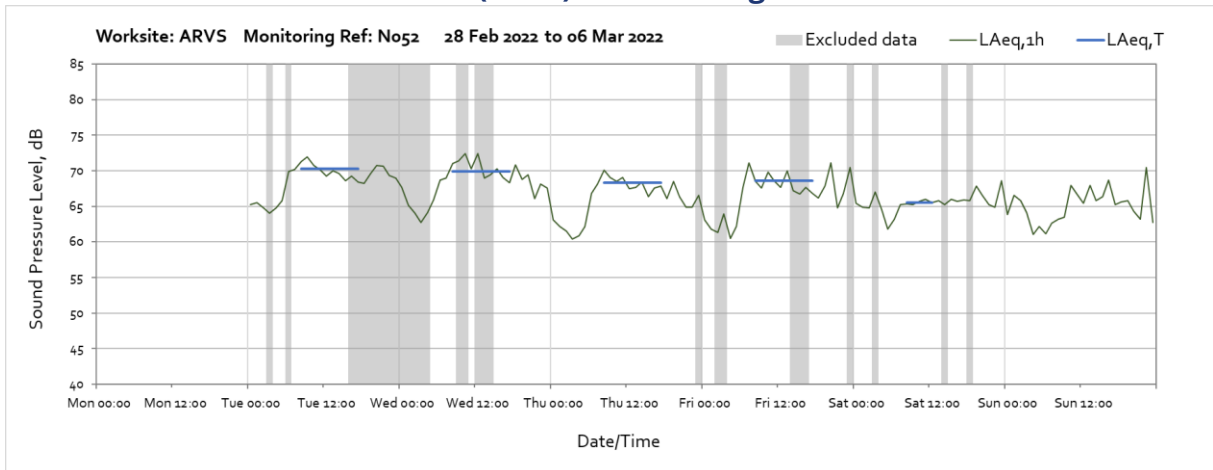


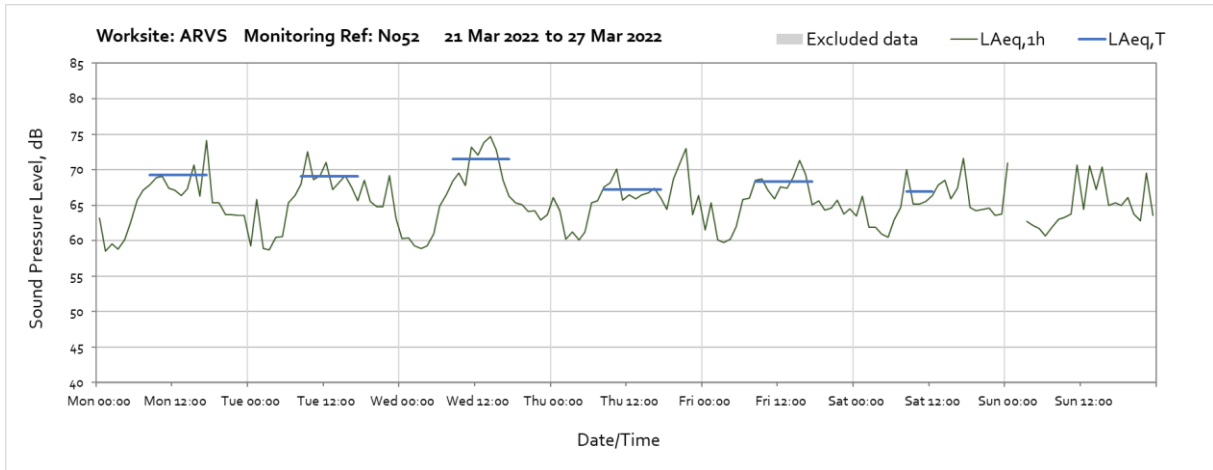
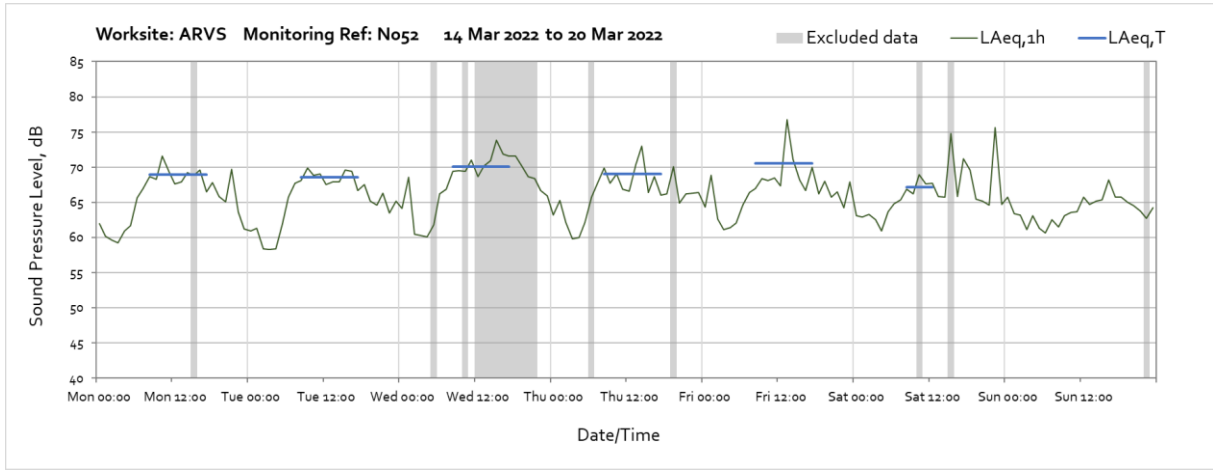
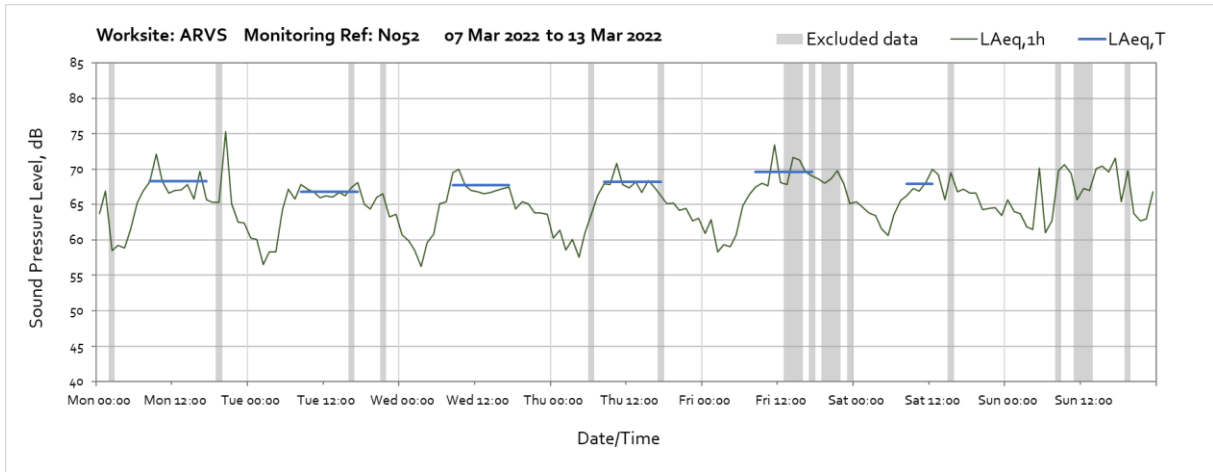


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



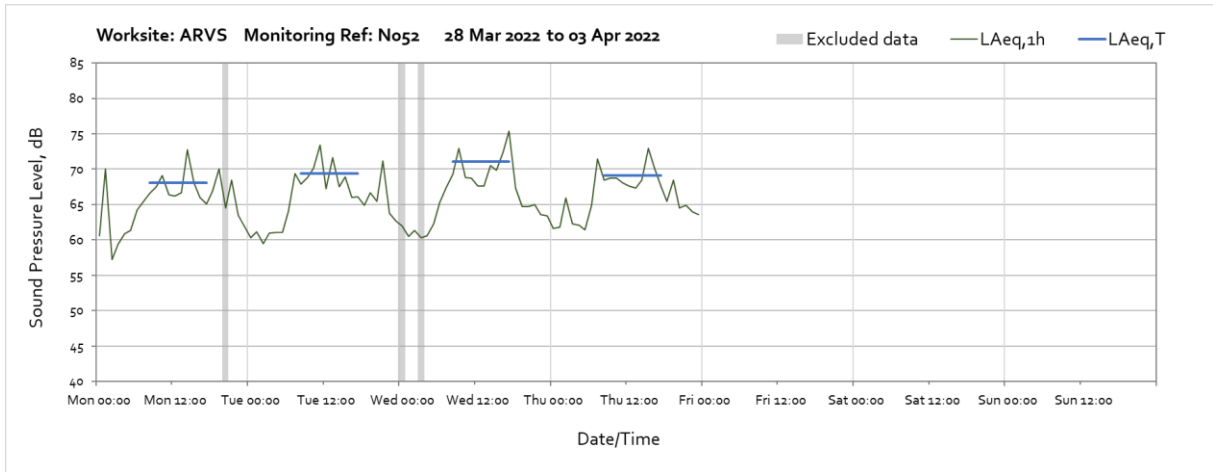
### Adelaide Road Ventilation Shaft (ARVS) – Monitoring Ref: N052





Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

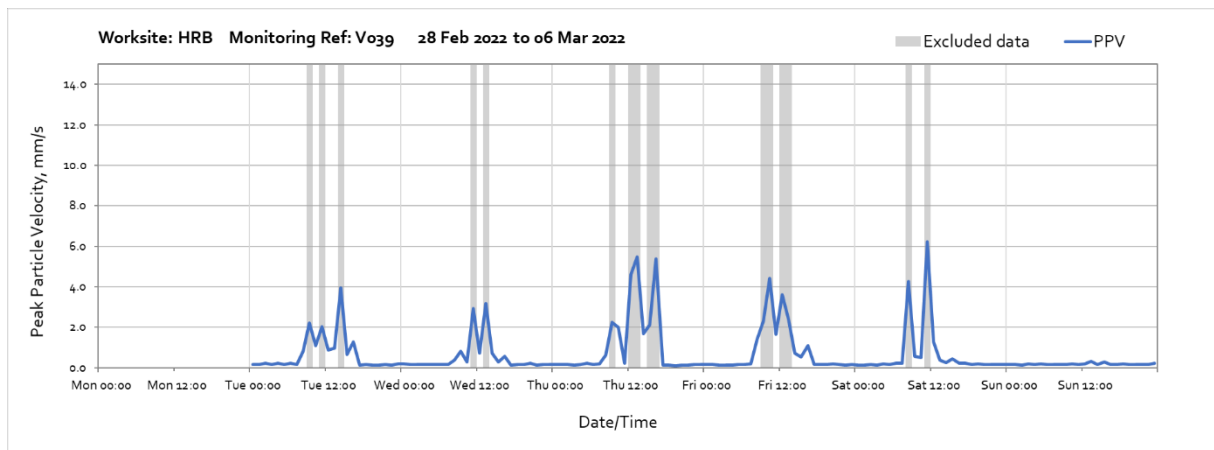




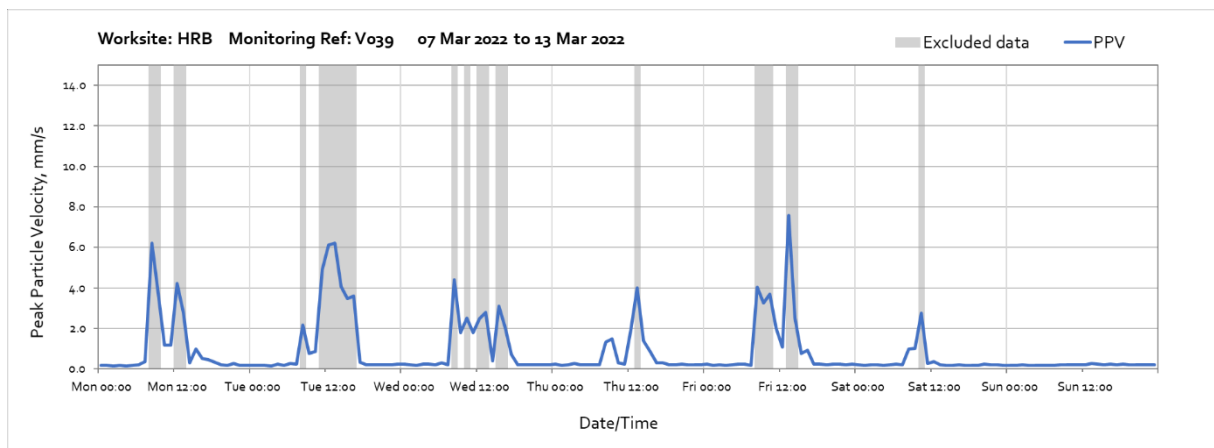
## Vibration

The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axes x, y and z. Where resultant PPV data is not available (monitors V039 and V043), the highest vibration component in either of the three axes is presented for each 1hr measurement period respectively. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative of HS2 construction works, these values have been greyed out in the following charts and have been excluded to calculate values in Table 4 of the main report.

### Worksite: HRB – Monitoring Ref: V039

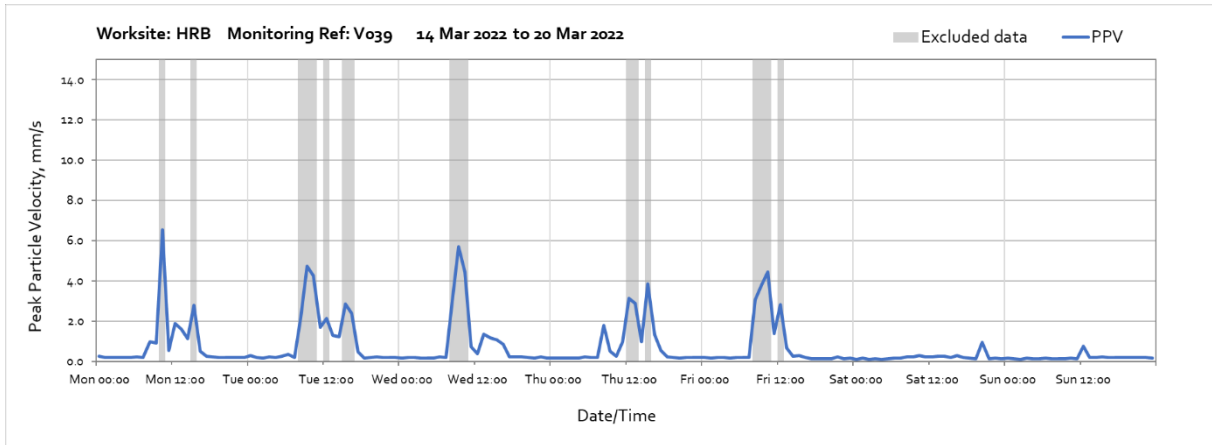


Note: High vibraton levels measured throughout the week were due to works next to the monitor and are not representative of HS2 vibration levels at the receptor.

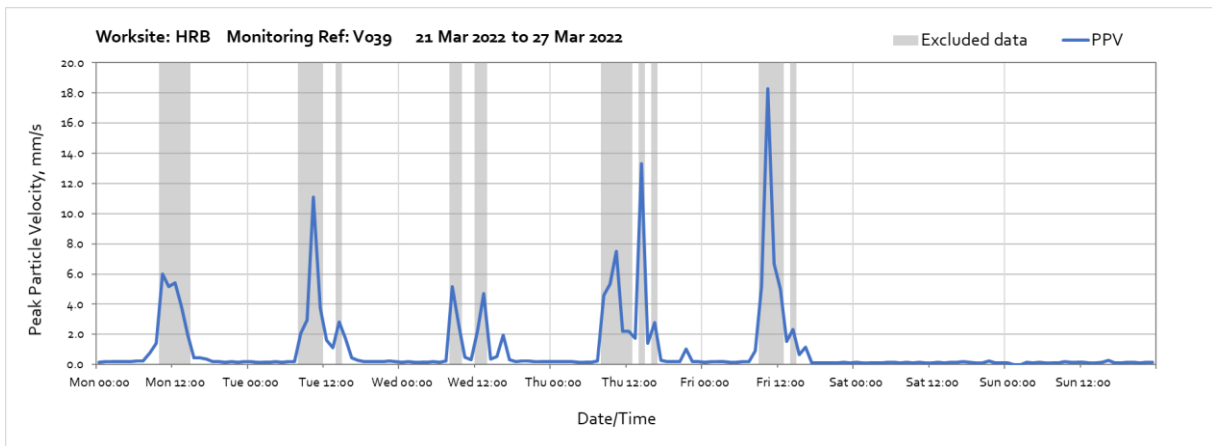


Note: High vibraton levels measured throughout the week were due to works next to the monitor and are not representative of HS2 vibration levels at the receptor.

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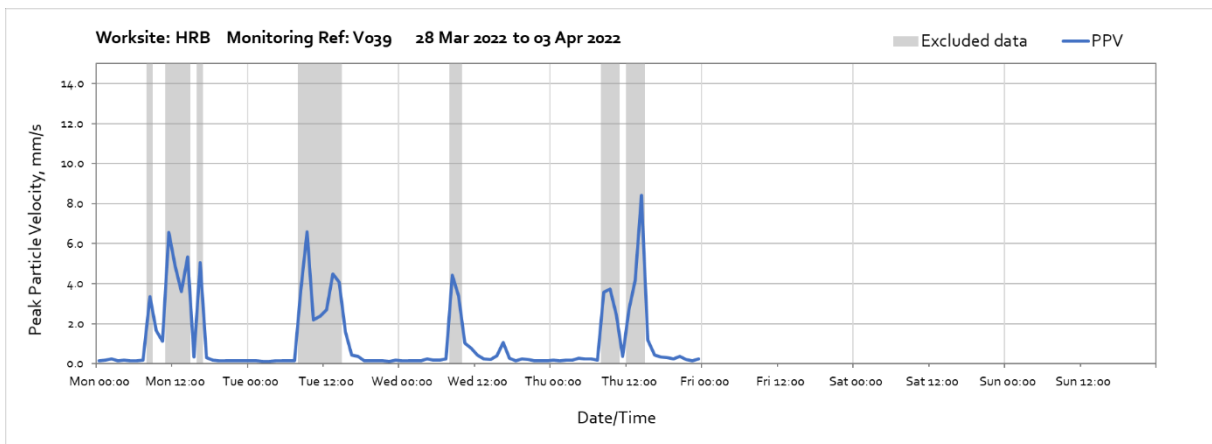


Note: High vibraton levels measured throughout the week were due to works next to the monitor and are not representative of HS2 vibration levels at the receptor.



Note: High vibraton levels measured throughout the week were due to works next to the monitor and are not representative of HS2 vibration levels at the receptor.

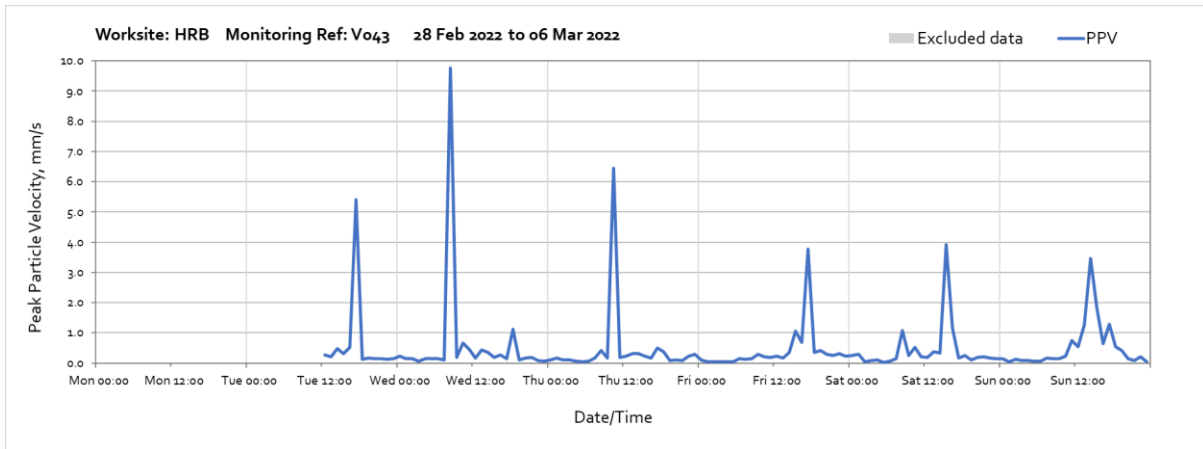
Note: Missing data at 01:00 on Sunday 27th March 2022 was due to the clocks going forward at the start of British Summer Time.



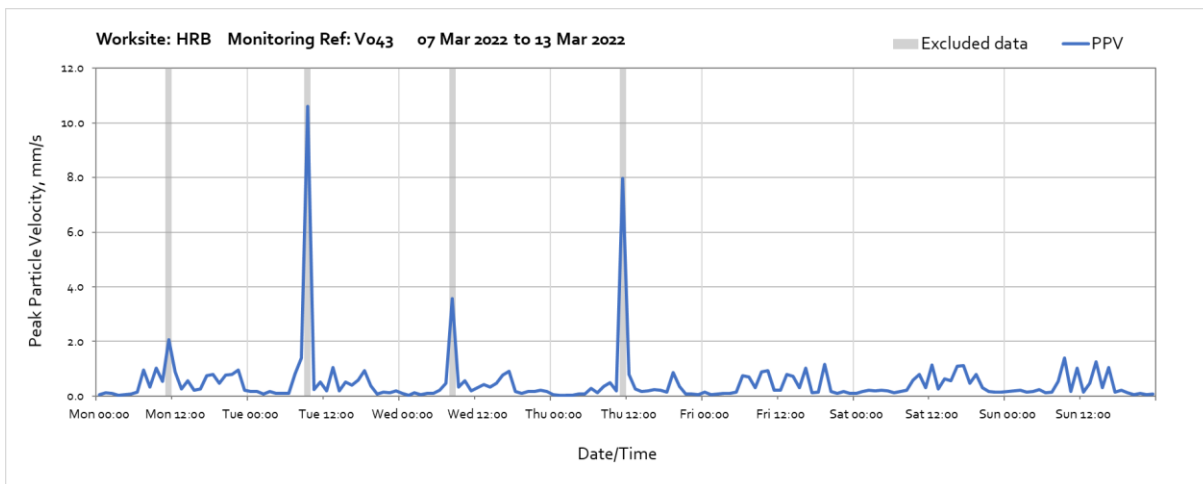
Note: High vibraton levels measured throughout the week were due to works next to the monitor and are not representative of HS2 vibration levels at the receptor.

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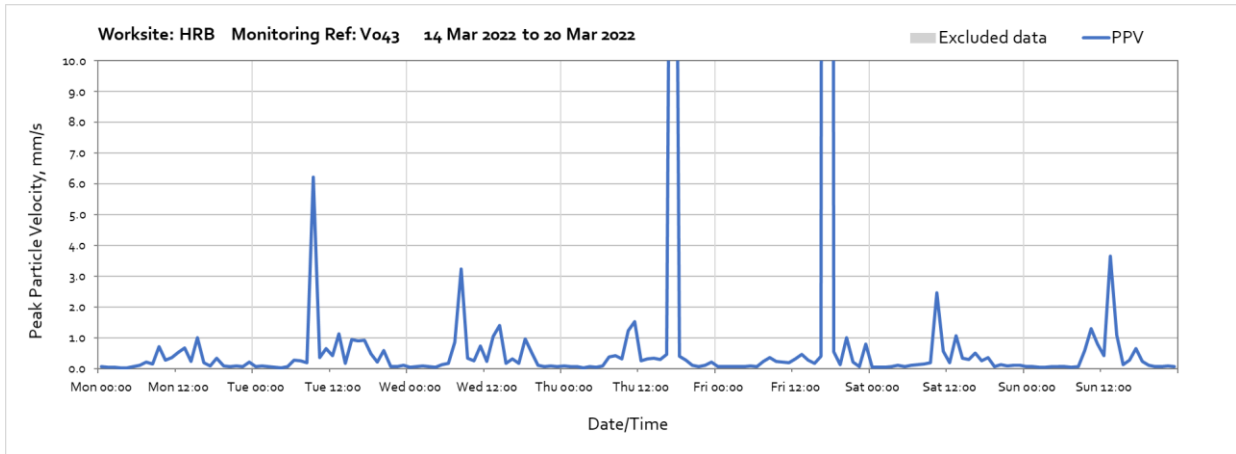
## Worksite: HRB – Monitoring Ref: V043



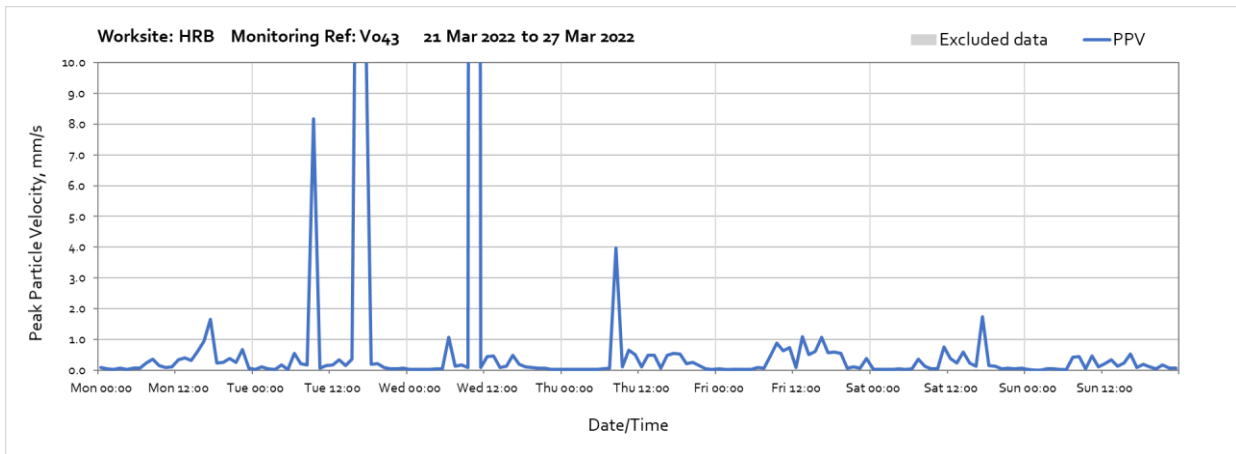
Note: Missing data from the start of the month until 11:00 on Tuesday 1<sup>st</sup> March was due to depletion of the monitoring station batteries. High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.



Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.

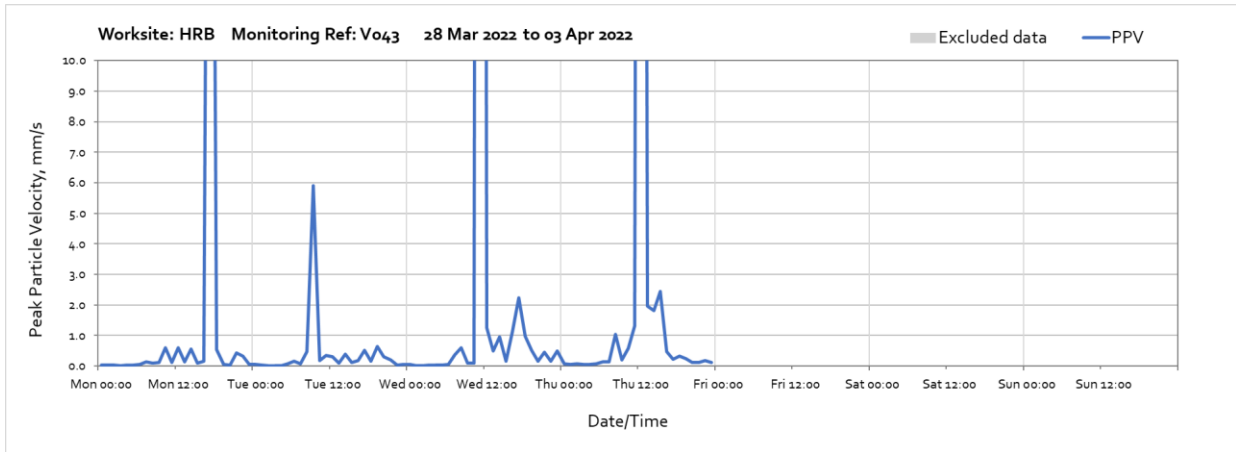


Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.



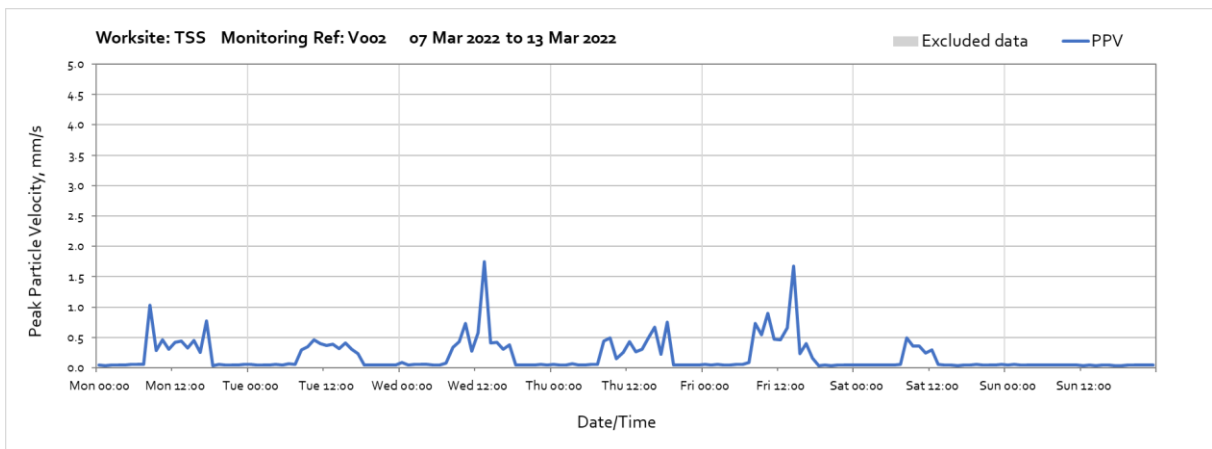
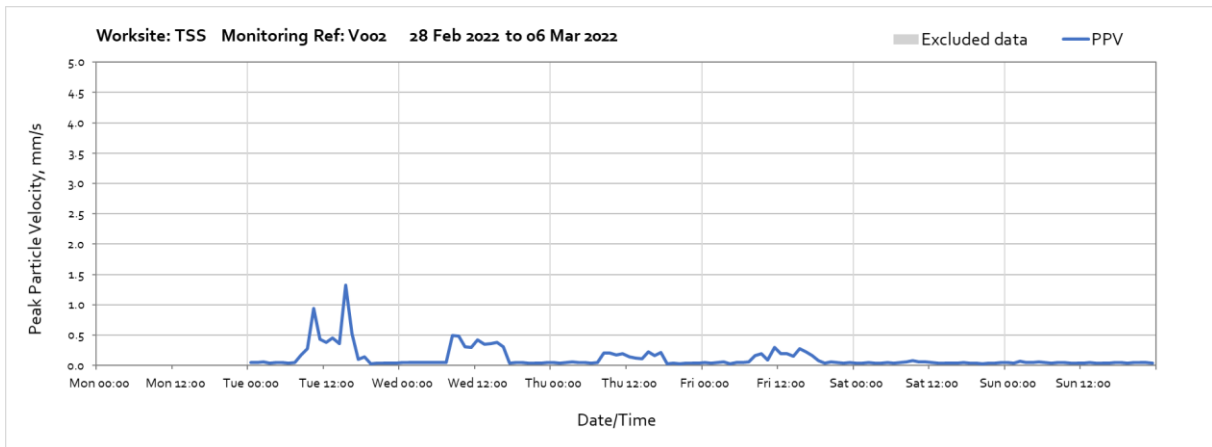
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

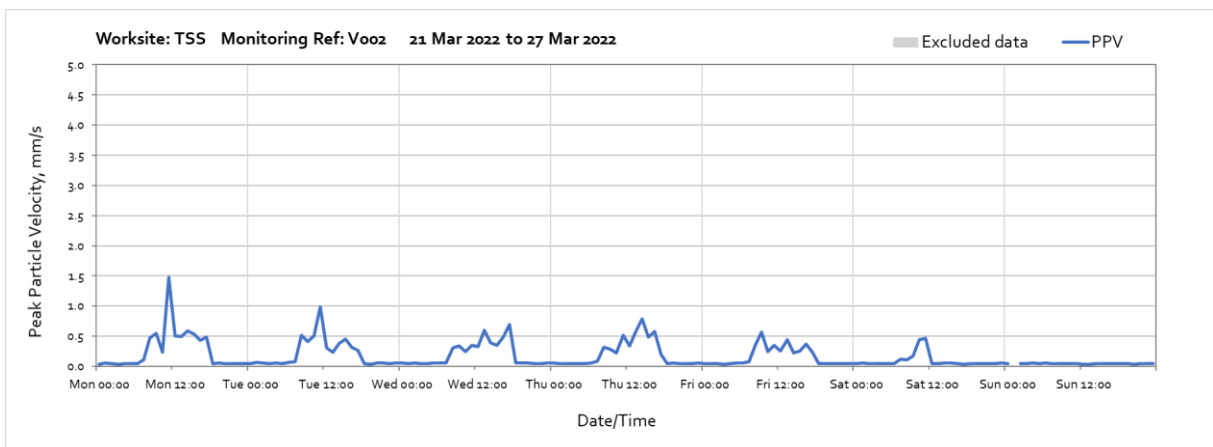
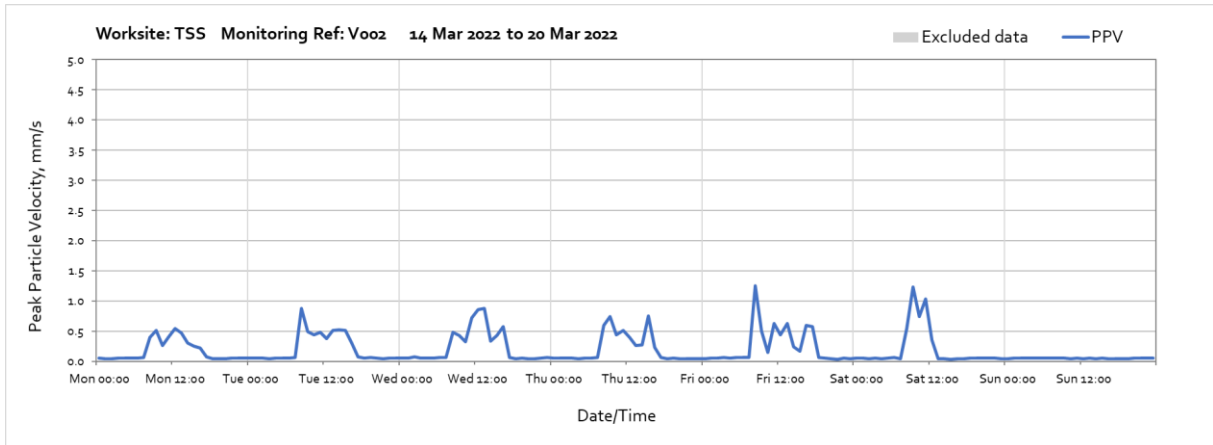
Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.



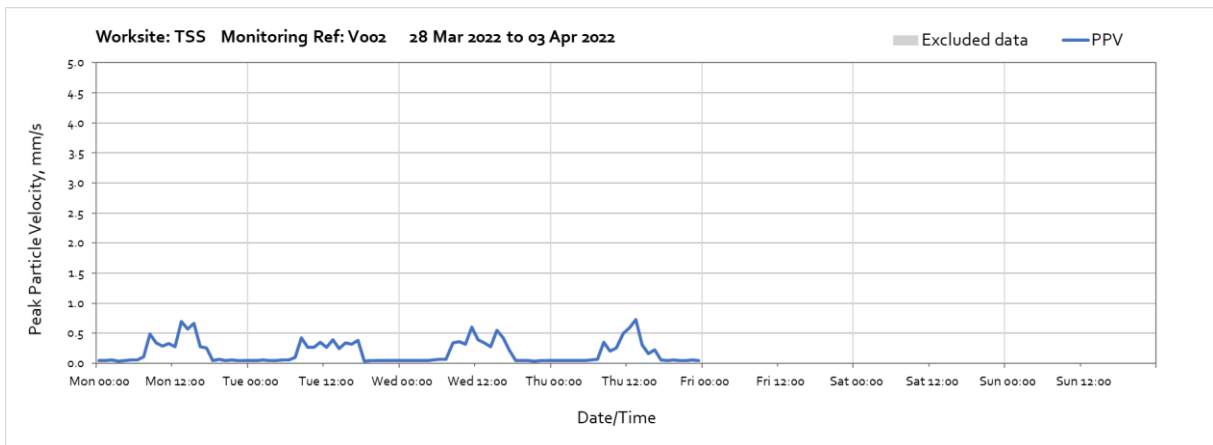
Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.

### Worksite: TSS – Monitoring Ref: V002

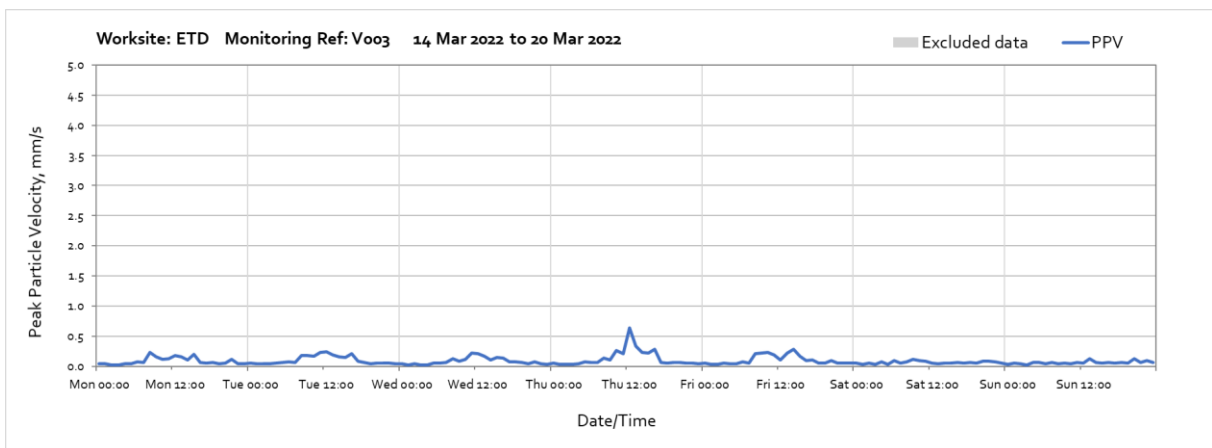
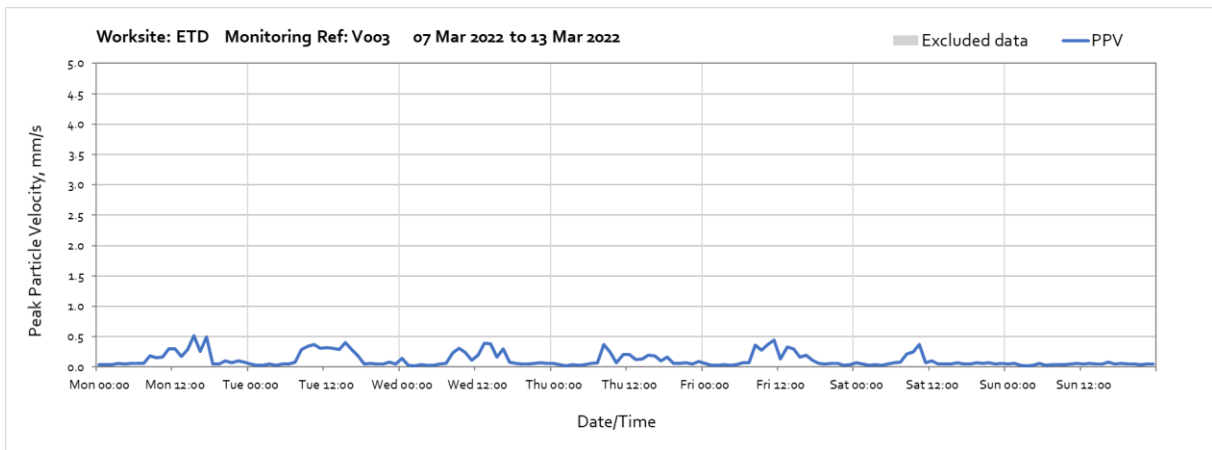
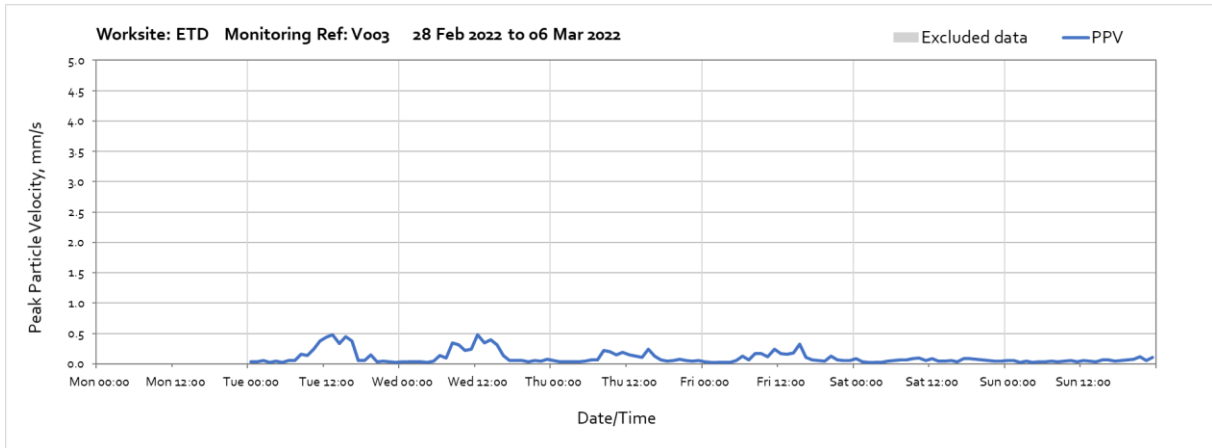




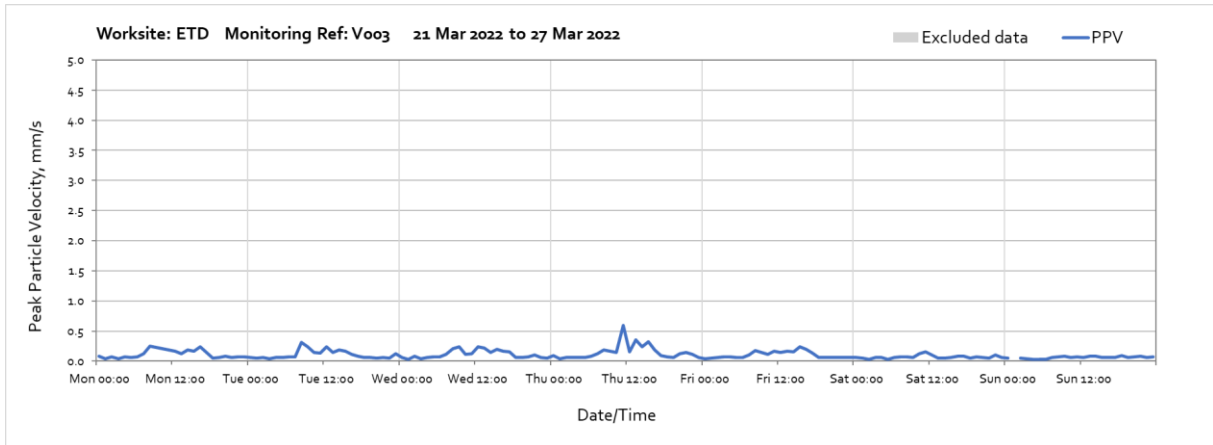
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



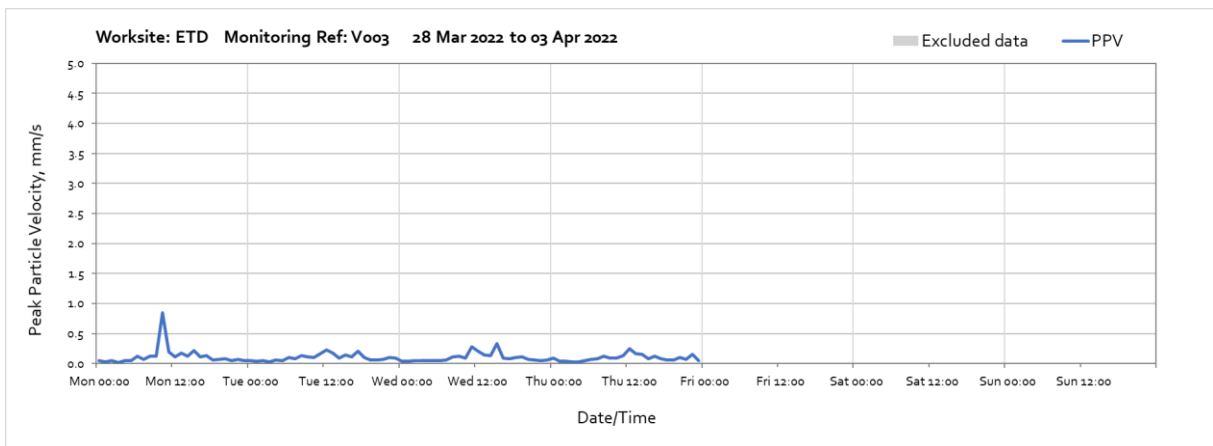
## Worksite: ETD, TSS - Monitoring Ref: V003



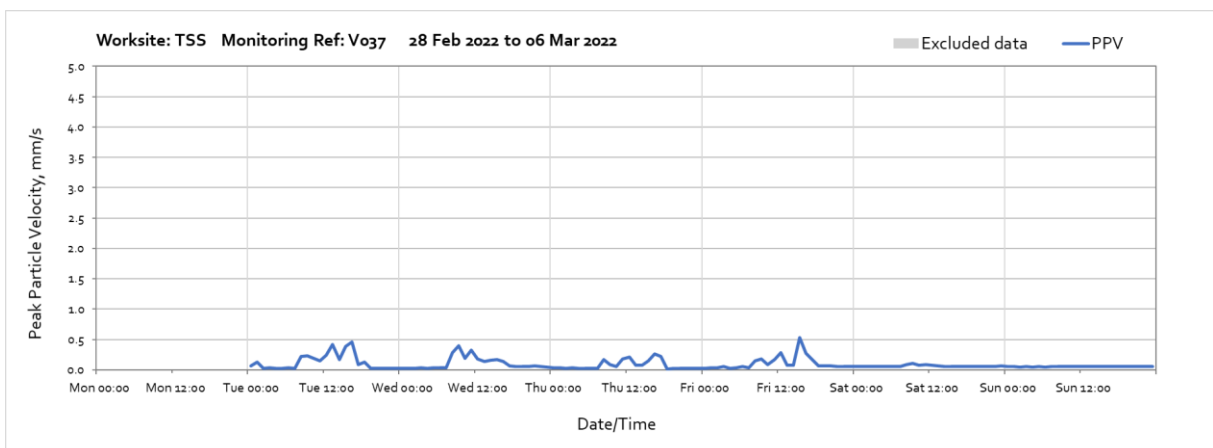


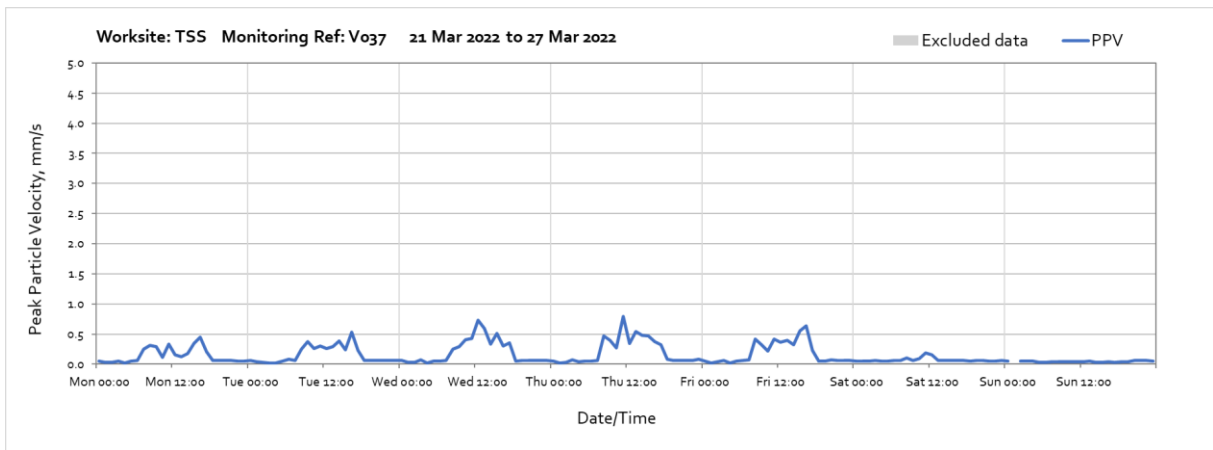
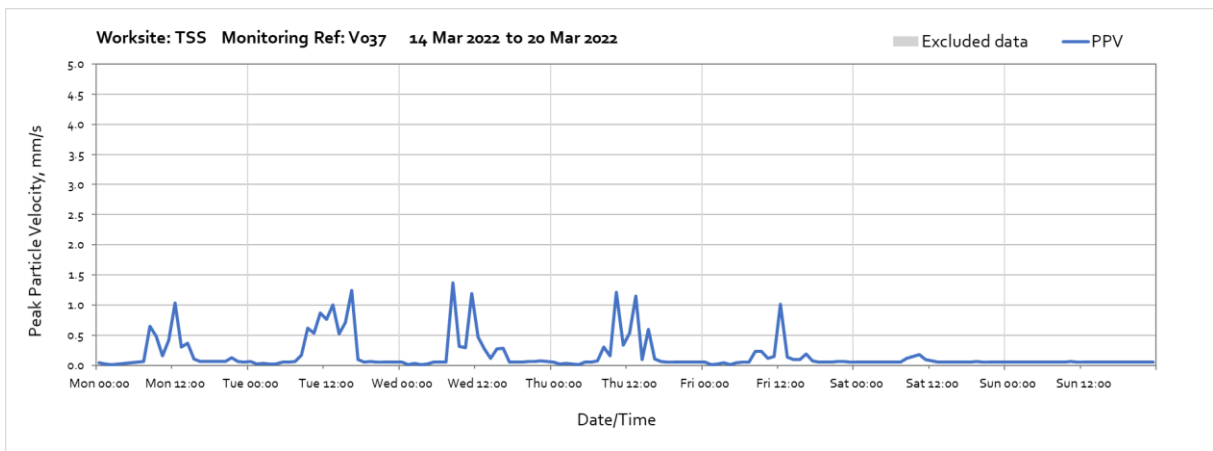
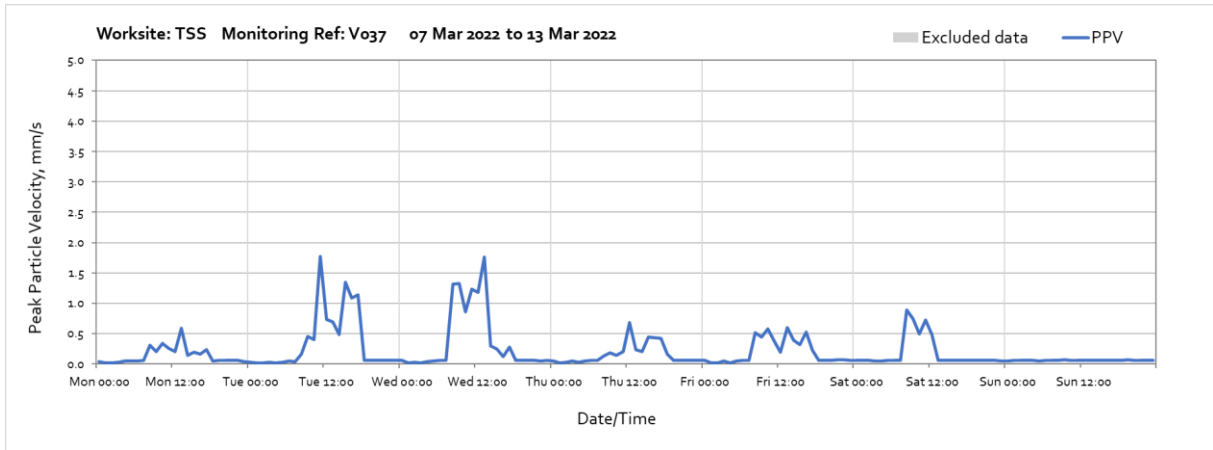


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

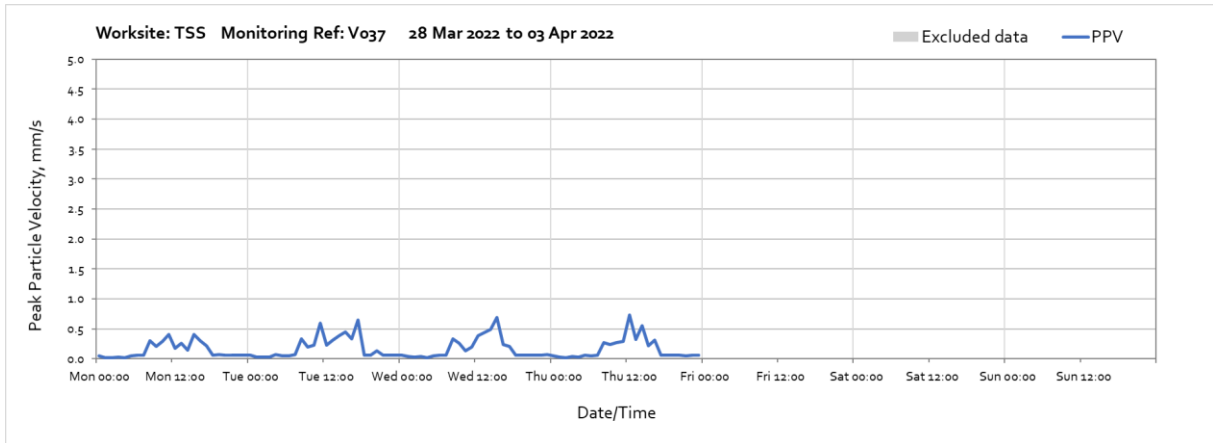


### Worksite: TSS - Monitoring Ref: V037

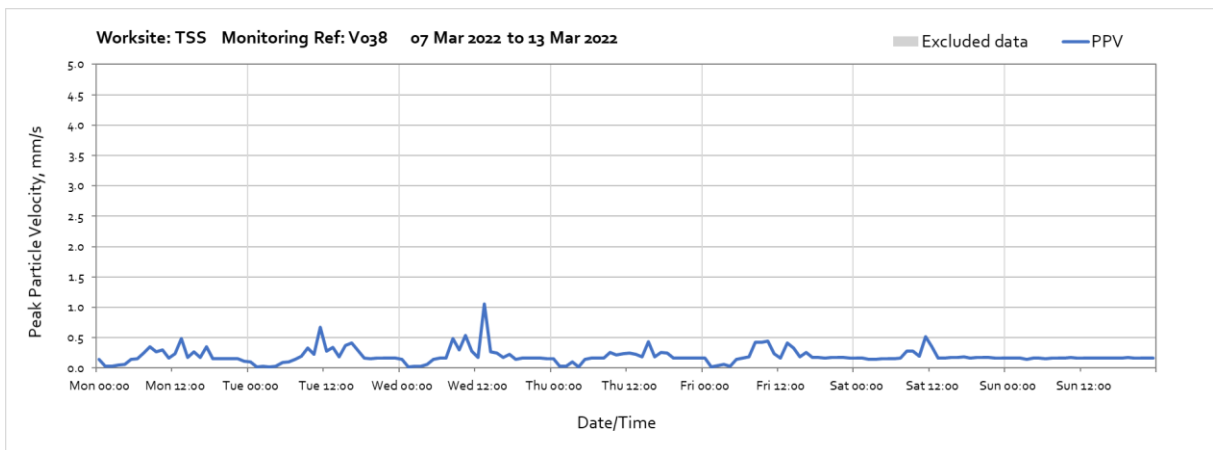
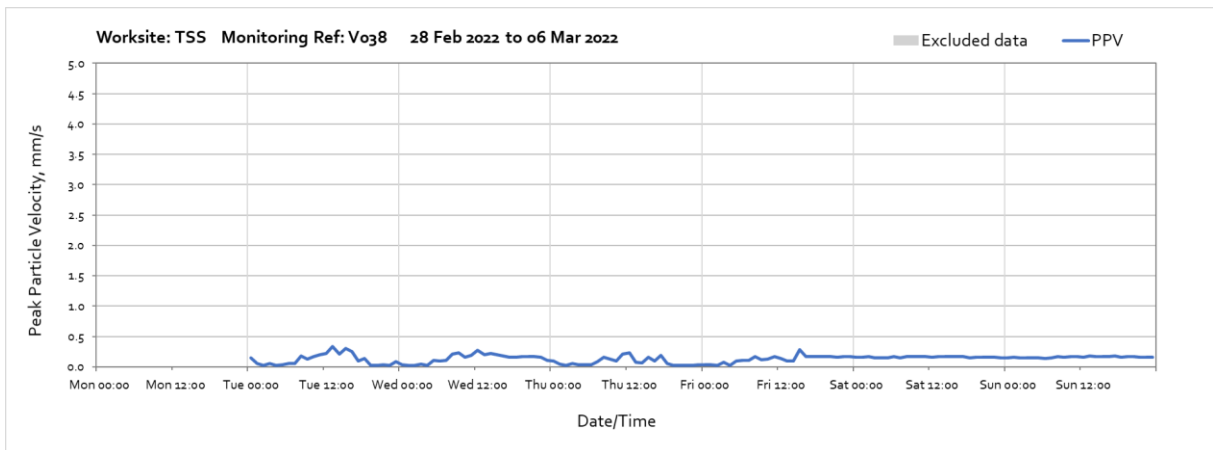


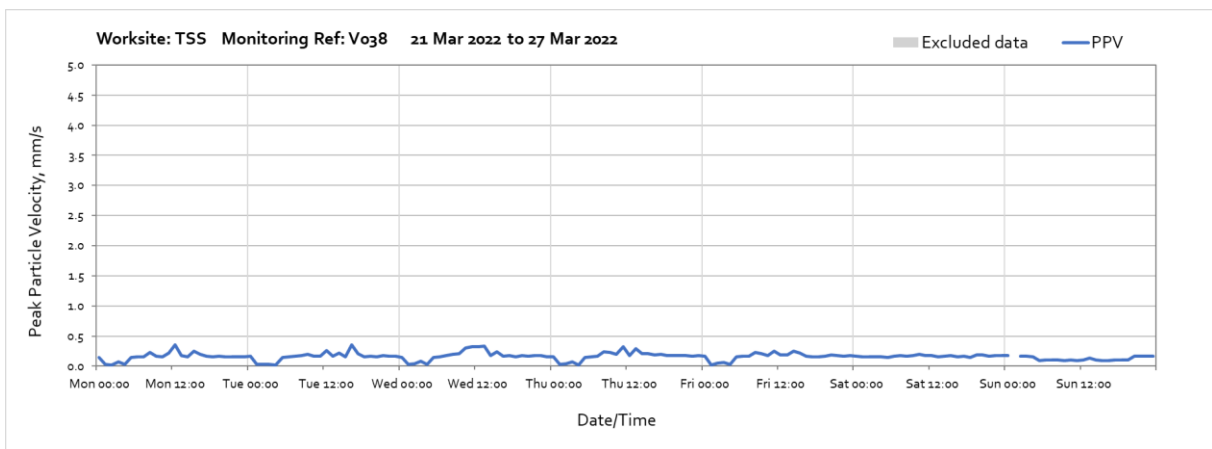
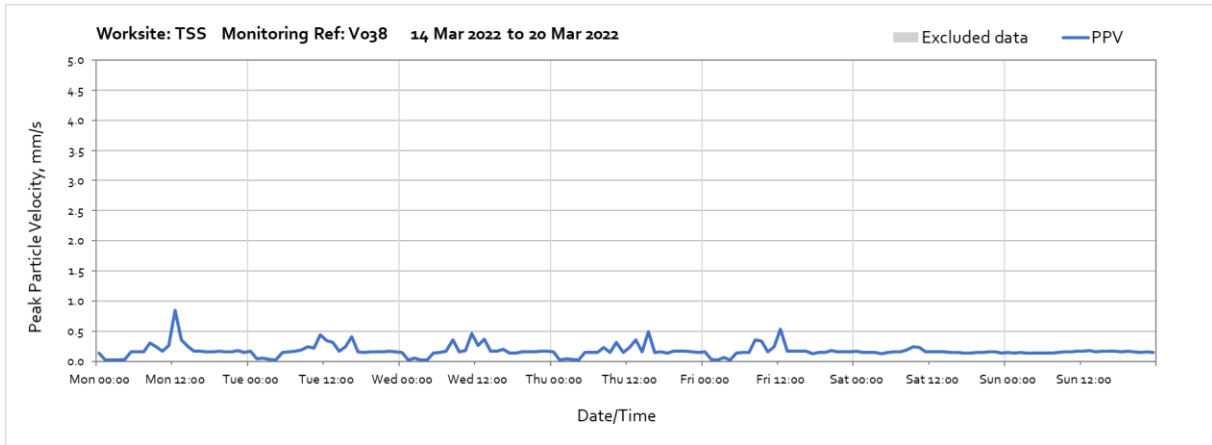


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

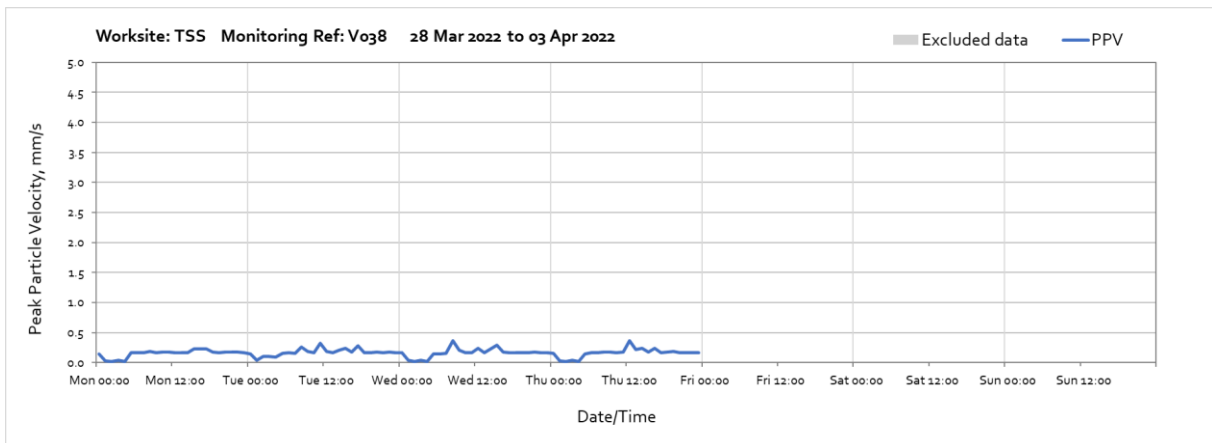


### Worksite: TSS – Monitoring Ref: V038

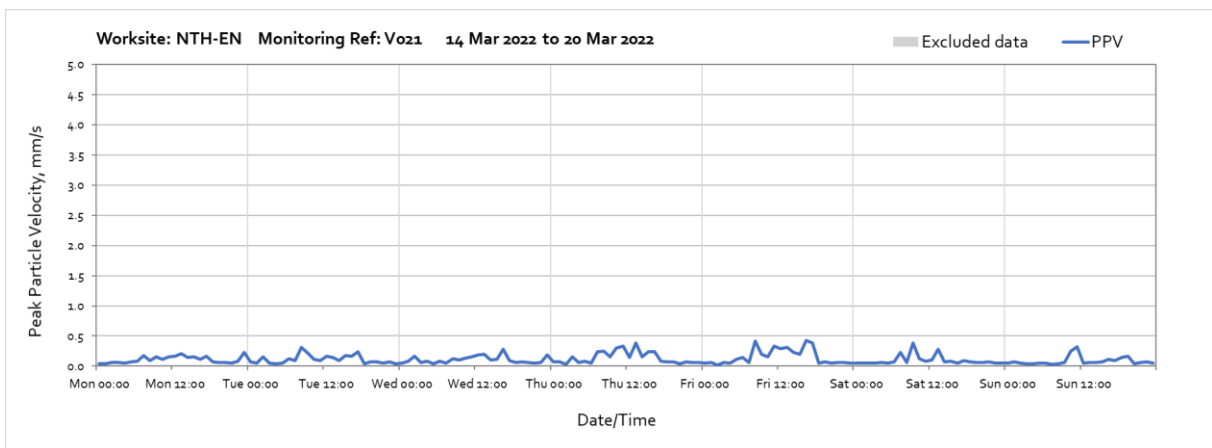
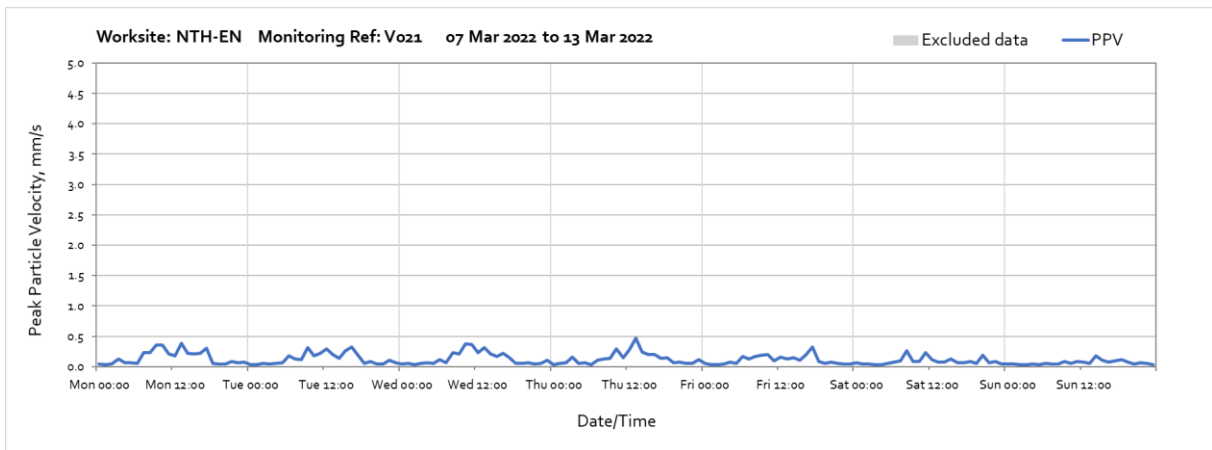
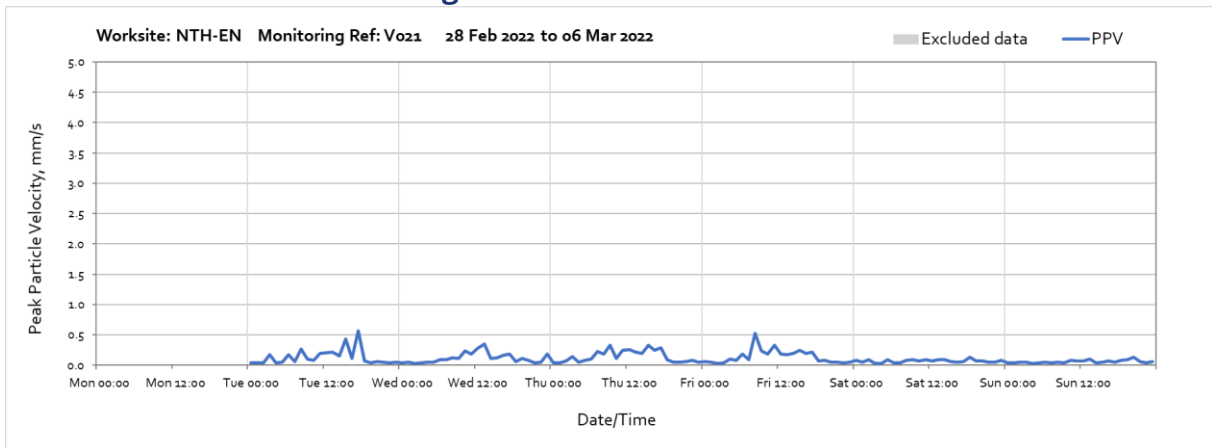




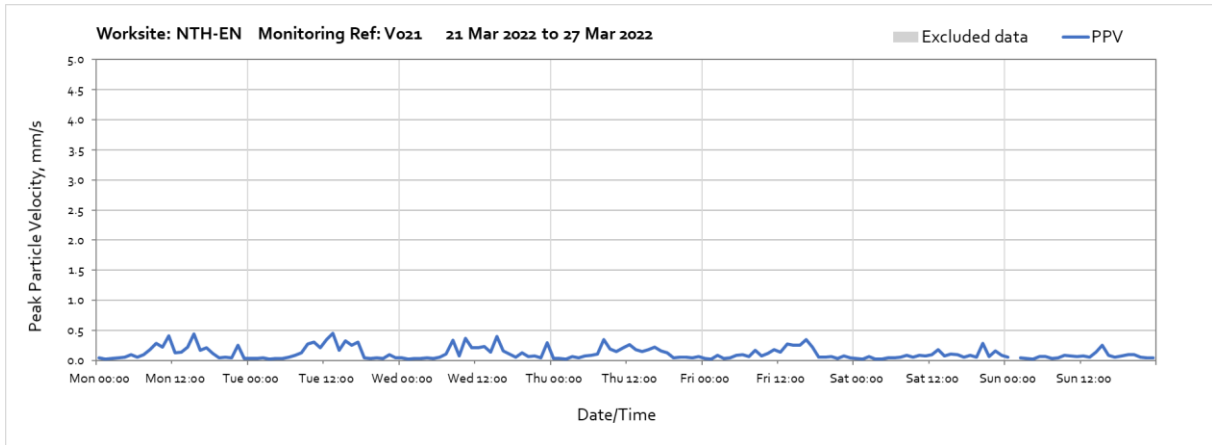
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



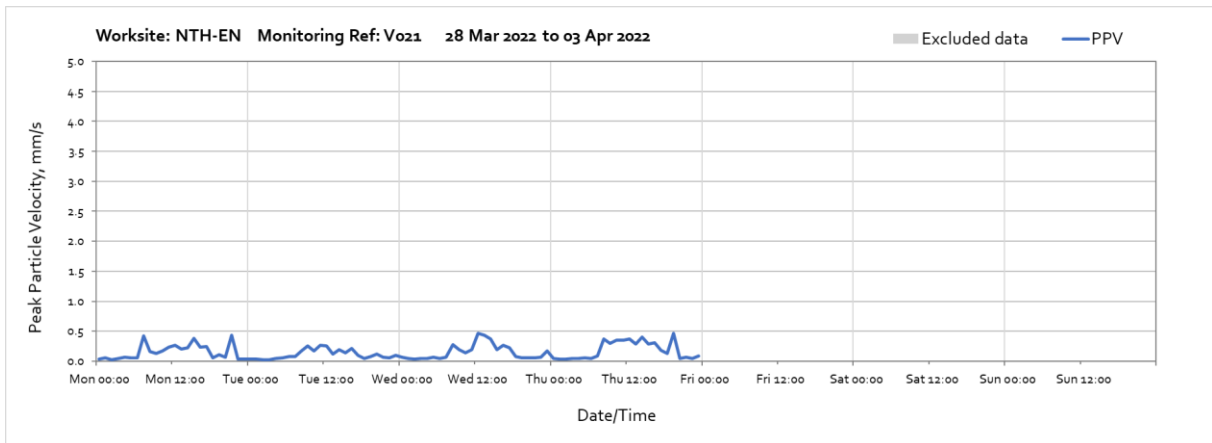
## Worksite: NTH-EN - Monitoring Ref: V021



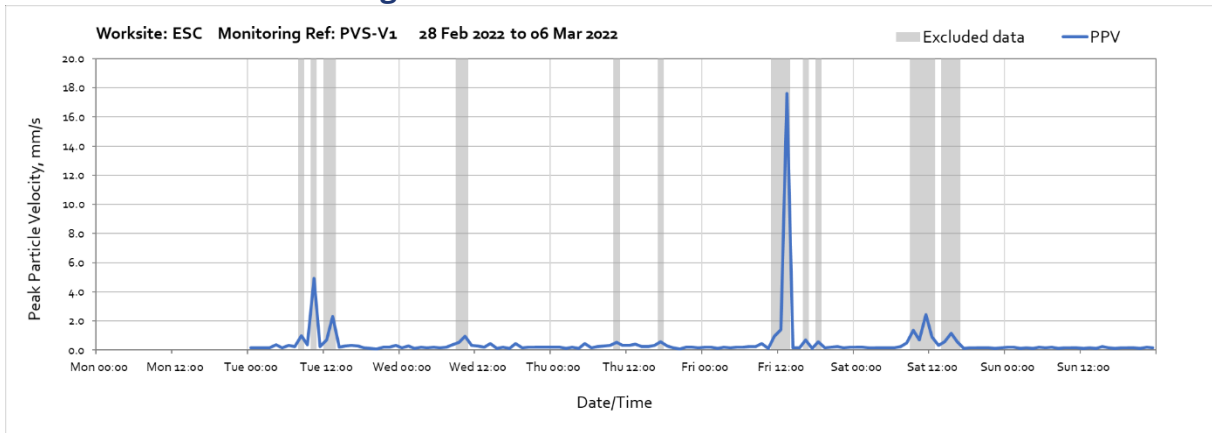
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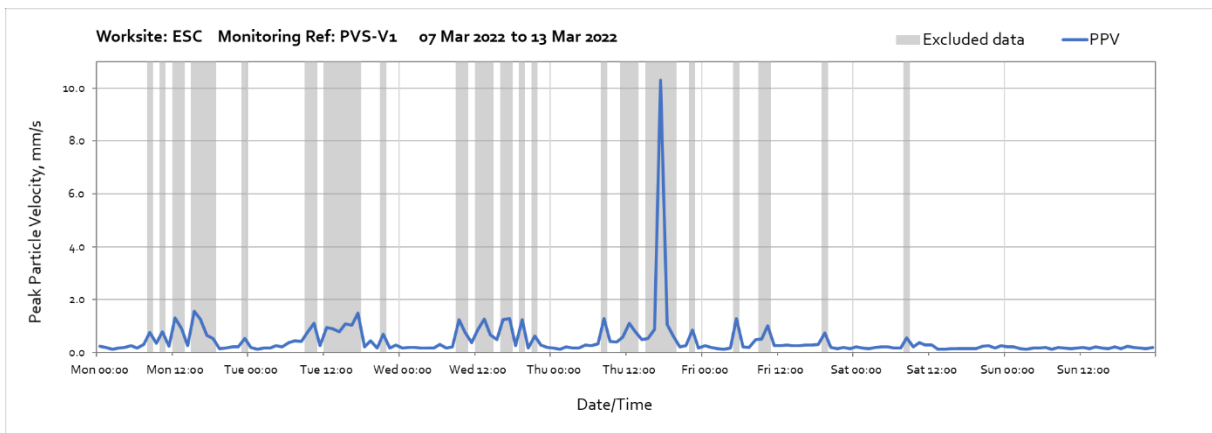
Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.



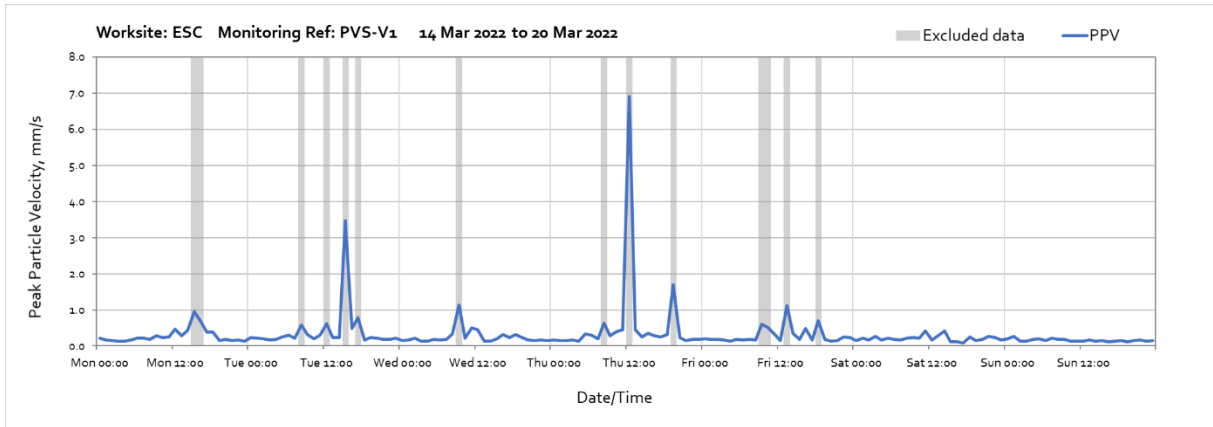
## Worksite: ESC – Monitoring Ref: PVS-V1



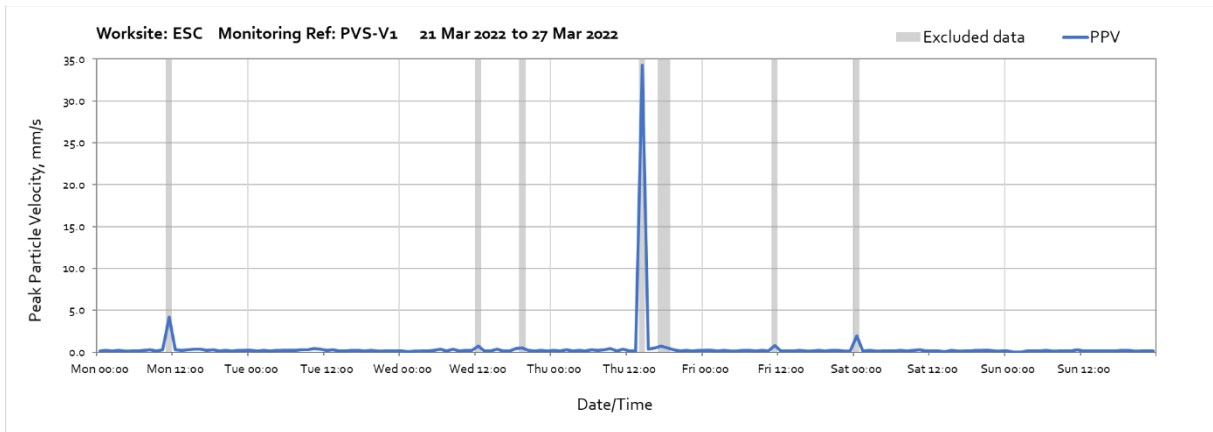
Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.



Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.



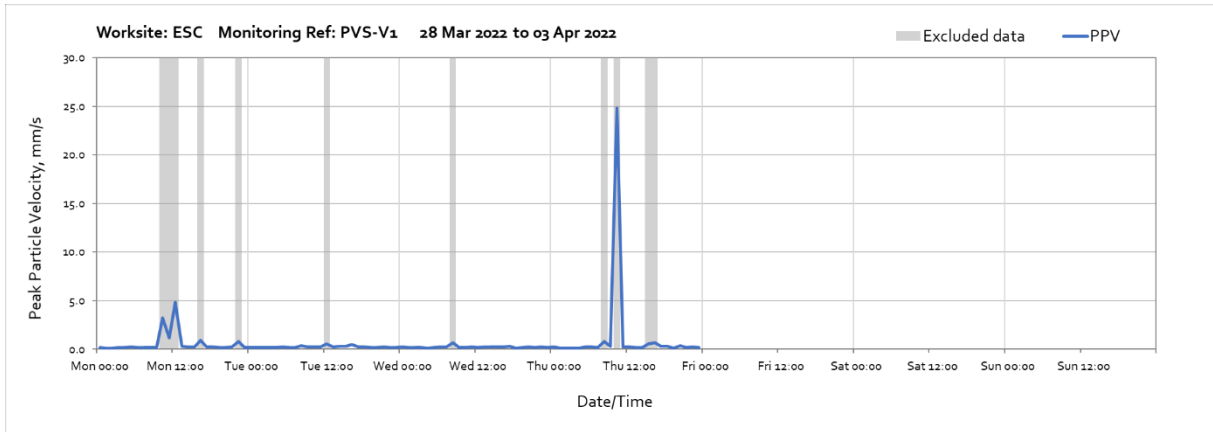
Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.



Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

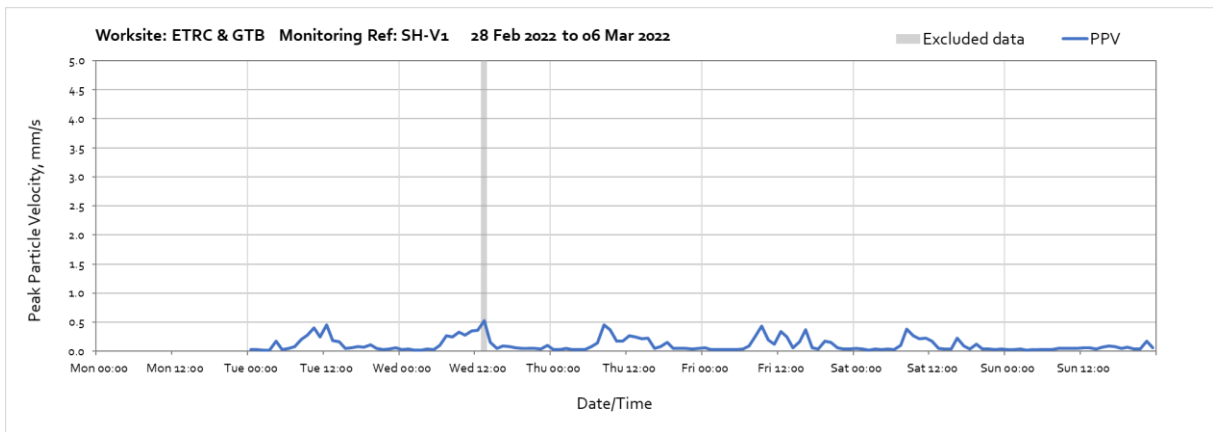
Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.



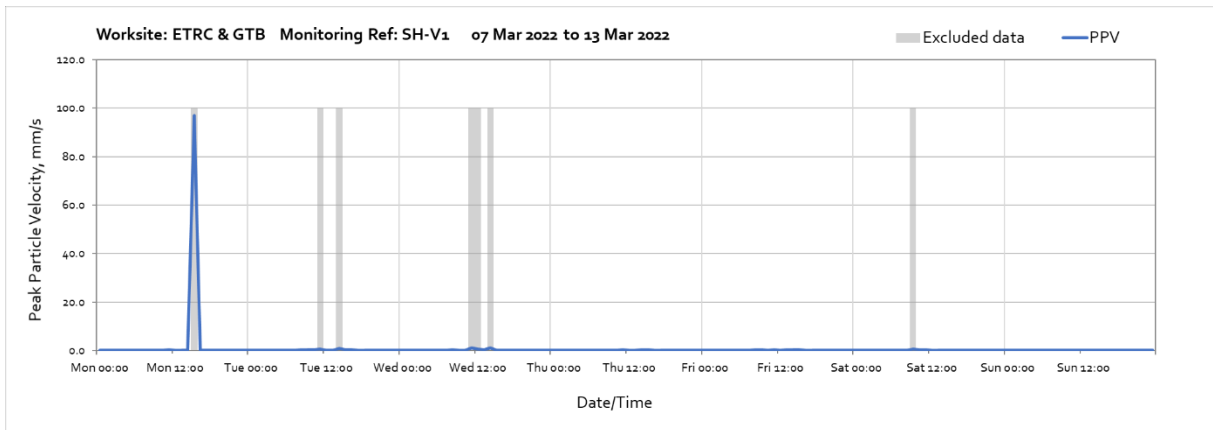


Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.

### Worksite: ETRC & GTB – Monitoring Ref: SH-V1

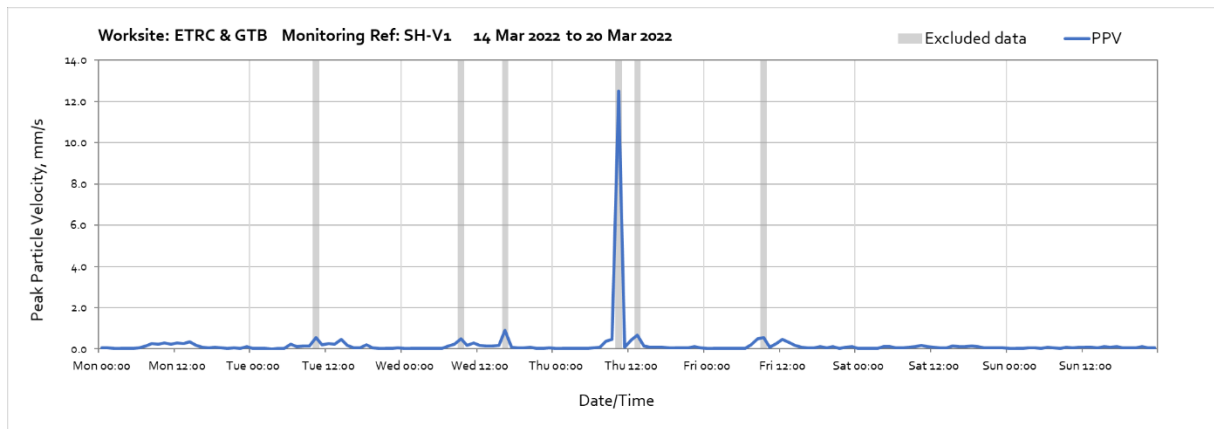


Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.

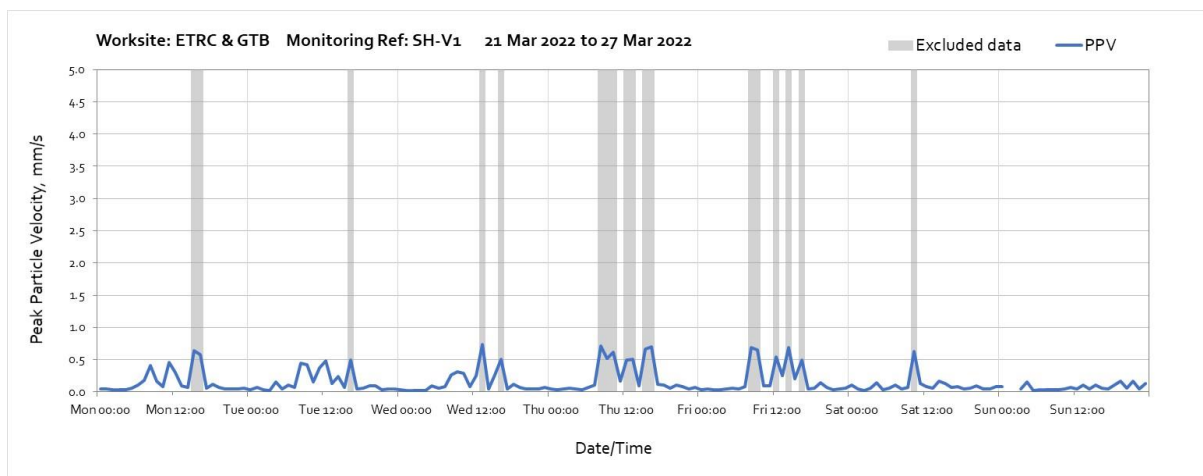


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Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.

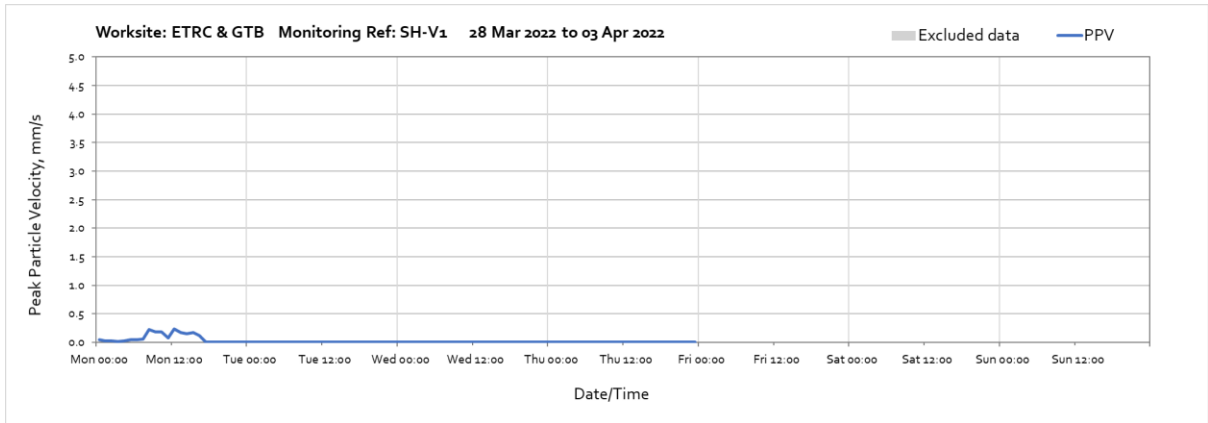


Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.

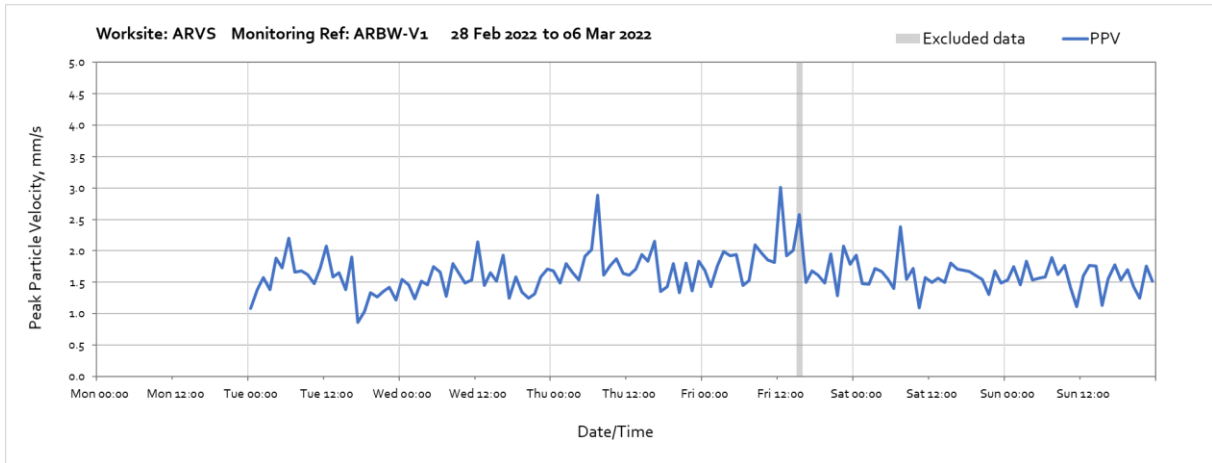


Note: Missing data at 01:00 on Sunday 27th March 2021 was due to the clocks going forward at the start of British Summer Time.

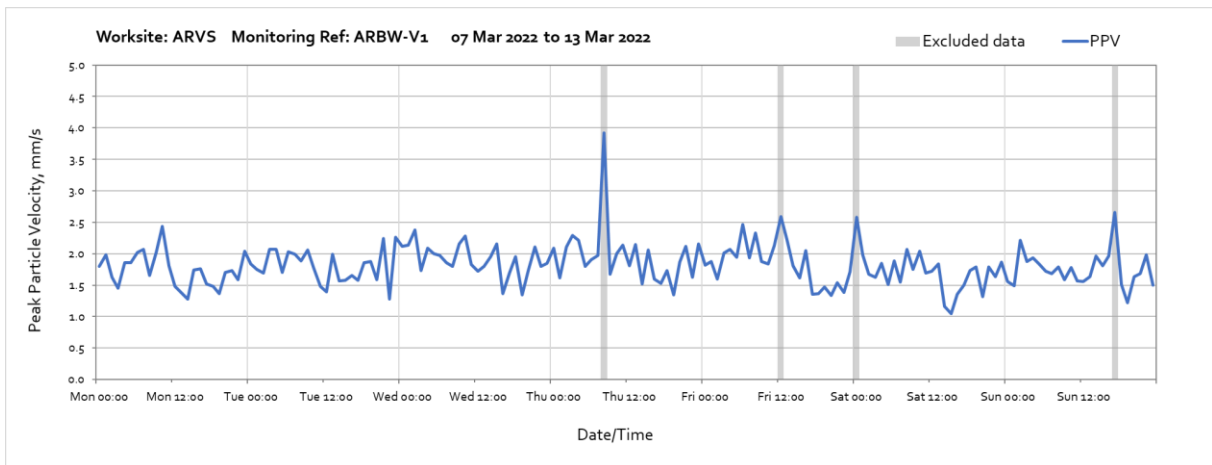
Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.



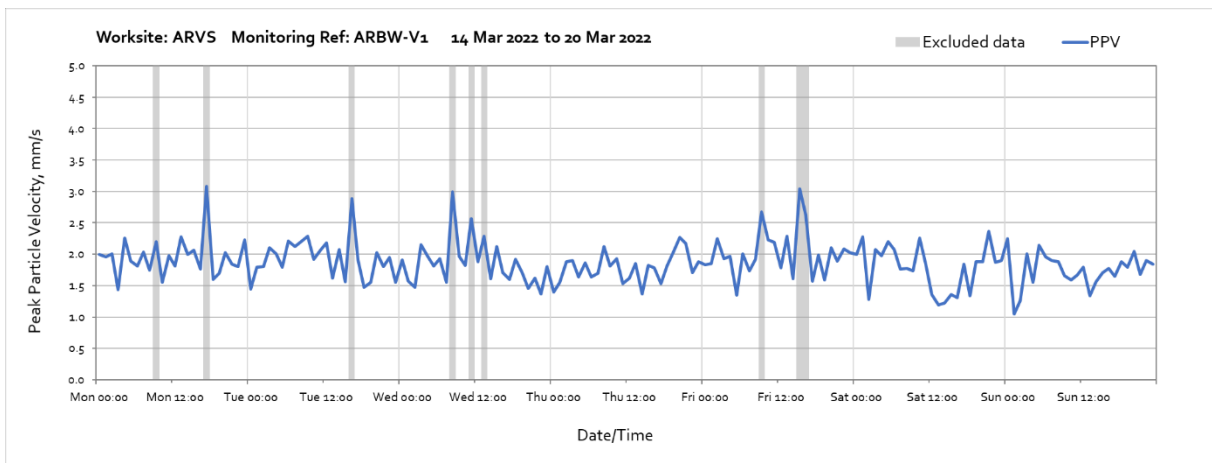
## Worksite: ARVS – Monitoring Ref: ABRW-V1



Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.

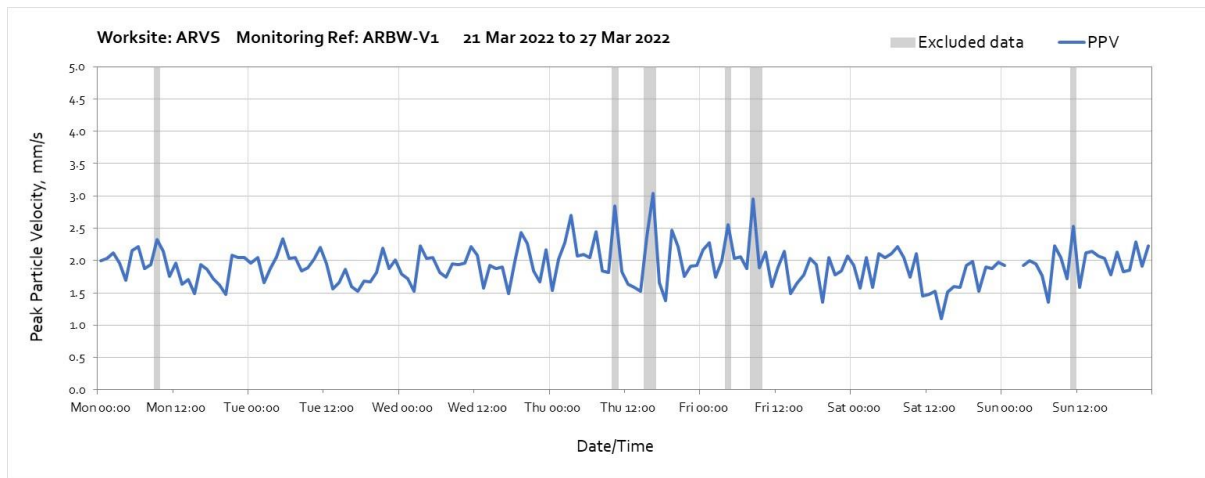


Note: High vibration levels measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 vibration levels at the receptor.



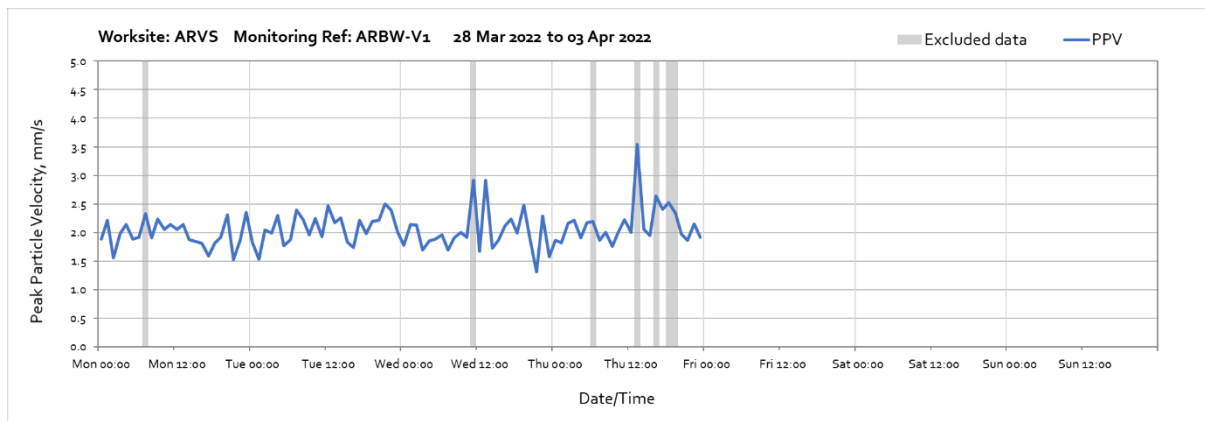
OFFICIAL

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