

## **Construction Noise and Vibration Monthly Report – August 2023**

**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 August 2023.

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 platform construction, concrete pouring, barrier installation, deliveries, piling and scaffolding works were underway.
- Noise monitoring was undertaken in the vicinity of the Vehicle Holding Area worksite (ref.: VHA), where deliveries, site maintenance, surveys and relocation of storage cabin and skips were underway.
- Noise monitoring was undertaken in the vicinity of the Mornington Street Bridge worksite (ref.: MSB), where no works were undertaken.
- Noise monitoring was undertaken in the vicinity of the Park Village East worksite (ref.: PVE), where deliveries, site maintenance, surveys, haul road and drainage maintenance, steel fixing and formwork installation, concrete pouring, wall works, installation of weephole and hangar bars, CCTV sewer surveys, concrete pumping and concrete pouring were underway.
- Noise monitoring was undertaken in the vicinity of Euston Scissor Box worksite (ref.: ESB) where deliveries, site maintenance, surveys, haul road and drainage maintenance, installation and extraction of piles, capping beam installation, scaffold installation, building of reinforcement cages, crane demobilisation and concrete pouring were underway.
- Noise monitoring was undertaken in the vicinity of Euston Throat Retained Cut worksite (ref.: ETRC) where deliveries, site maintenance, surveys, haul road and drainage maintenance, utility diversions, surveys, piling platform removal and piling were underway.
- Noise monitoring was undertaken in the vicinity of Granby Terrace Bridge worksite (ref.: GTB) where deliveries, site maintenance, surveys, haul road and drainage maintenance, piling, bridge deck works, utility works and internal refurbishment of site office were underway.

- Noise and vibration monitoring were undertaken in the vicinity of the Hampstead Road Bridge worksite (ref.: HRB) where deliveries, site maintenance, surveys, haul road and drainage maintenance, utility diversions and piling platform construction were underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Euston Cavern worksite (ref.: ECAV) where deliveries, site maintenance, surveys, haul road and drainage maintenance and piling were underway.
- Noise monitoring was undertaken in the vicinity of On-Network worksites (ref.: B, C, D, E, F, G and H), where work activities included:
  - Fencing installation (worksite C).
  - Deliveries, waste removal, surveys, digging of trial puts and foundation excavations (worksite E).
  - Surveys, mechanical, electrical and plumbing works, strengthening works, roof works and installation of edge protection (worksite H and G).
  - No HS2 works were undertaken at worksites B, D and F.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital - North worksite (ref.: NTH-N) where no works were undertaken.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital - Euston North worksite (ref.: NTH-EN) where no works were undertaken.
- Noise monitoring was undertaken in the vicinity of Maria Fidelis worksite (ref.: MF) where dry lining, mechanical, electrical and plumbing installation and internal fitout works were underway.
- Noise monitoring was undertaken in the vicinity of the Euston Towers Demolition worksite (ref.: ETD), where no works were undertaken.
- Noise monitoring was undertaken in the vicinity of the Traction Substation worksite (ref.: TSS) where concrete wall bracket installation, installation of communications and lighting trunking, pipe installation, meter room and containment installation, ductwork installation, cable management system installation, internal concrete blockwork installation, wall and door installation, concrete screen installation, lifting beam and lifting scheme installation and demolition were underway.
- Noise monitoring was undertaken in the vicinity of the Interim Taxi Rank worksite (ref.: ITR), where soffit installation, snagging works, CCTV and wayfinding signage fixing and commissioning, signal installation and bus stop, kerb and pavement improvement works were underway.

Further works, where monitoring did not take place, were also undertaken at:

- Various locations where water utility works were underway.
- Gloucester Avenue where water utility 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 three (3) times during the reporting period.

Trigger levels as defined in section 61 consents were not exceeded during the reporting period.

One (1) complaint was received during the monitoring period.

# 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> August 2023.

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:
  - Platform construction.
  - Concrete pouring.
  - Barrier installation.
  - Deliveries.
  - Rotary bored piling.
  - Scaffolding modification works.
- Vehicle Holding Area worksite ref.: VHA (see plan 1 in Appendix A), where work activities included:
  - Deliveries.
  - Site maintenance.

- Surveys.
  - Haul road and drainage maintenance.
- Mornington Street Bridge worksite ref.: MSB (see plan 2 in Appendix A), where no works were undertaken.
- Park Village East worksite ref.: PVE (see plan 2 in Appendix A), where work activities included:
  - Deliveries.
  - Site maintenance.
  - Surveys.
  - Haul road and drainage maintenance.
  - Steel fixing and formwork installation.
  - Concrete pouring.
  - Wall works (coring and grouting).
  - Installation of weephole and hangar bars.
  - CCTV sewer survey and sewer lining works.
- Euston Scissor Box worksite ref.: ESB (see plan 2 in Appendix A), where work activities included:
  - Deliveries.
  - Site maintenance.
  - Surveys.
  - Haul road and drainage maintenance.
  - Installation and extraction of sheet piles.
  - Capping beam installation (including hydroscabbling).
  - Scaffold installation.
  - Building of reinforcement cages for concrete pours.
  - Tower crane demobilisation.
  - Concrete pumping.
  - Concrete pouring.
- Euston Throat Retained Cut worksite ref.: ETRC (see plan 2 in Appendix A), where work activities included:
  - Deliveries.
  - Site maintenance.
  - Surveys.



- Haul road and drainage maintenance.
- Utility works.
- Unexploded ordnance surveys.
- Piling platform removal (including concrete breaking and excavations).
- Sheet piling.
- Granby Terrace Bridge worksite ref.: GTB (see plan 2 in Appendix A), where work activities included:
  - Deliveries.
  - Site maintenance.
  - Surveys.
  - Haul road and drainage maintenance.
  - Sheet piling (including pre-augering).
  - Bridge deck works (including waterproofing).
  - Utility works.
  - Internal refurbishment of site office.
- Hampstead Road Bridge worksite ref.: HRB (see plan 3 in Appendix A), where work activities included:
  - Deliveries.
  - Site maintenance.
  - Surveys.
  - Haul road and drainage maintenance.
  - Utility diversions.
  - Piling platform construction.
- Euston Cavern worksite ref.: ECAV (see plan 3 in Appendix A), where work activities included:
  - Deliveries.
  - Site maintenance.
  - Surveys.
  - Haul road and drainage maintenance.
  - Piling.
- On-Network worksites ref.: B, C, D, E, F, G and H (see plan 3 in Appendix A), where work activities included:
  - Fencing installation (worksite C).

- Deliveries, waste removal, surveys, digging of trial puts and foundation excavations (worksite E).
- Surveys, mechanical, electrical and plumbing works, strengthening works, roof works and installation of edge protection (worksite H and G).
- No HS2 works were undertaken at worksites B, D and F.
- Former National Temperance Hospital - North worksite ref.: NTH-N (see plan 4 in Appendix A), where no works were undertaken.
- Former National Temperance Hospital - Euston North worksite ref.: NTH-EN (see plan 4 in Appendix A), where no works were undertaken activities included:
- Maria Fidelis worksite ref.: MF (see plan 4 in Appendix A), where work activities included:
  - Mechanical, electrical and plumbing installation.
  - Internal fitout works (including installation of doors, dry-lining, ceiling grids, cladding, flooring and rooftop plan supports).
- Euston Towers Demolition worksite ref.: ETD (see plan 4 in Appendix A), where no works were undertaken.
- Traction Substation worksite ref.: TSS (see plan 4 in Appendix A), where work activities included:
  - Wall bracket installation.
  - Installation of communications and lighting trunking.
  - Pipe installation.
  - Meter room and containment installation (including transfer of controls).
  - Ductwork installation.
  - Cable management system installation.
  - Internal concrete blockwork installation.
  - Wall and door installation.
  - Concrete screed installation.
  - Lifting beam and lifting scheme installation.
  - Demolition.
- Interim Taxi Rank worksite ref.: ITR (see plan 4 in Appendix A), where work activities included:
  - Soffit installation.
  - Snagging works.
  - CCTV and wayfinding signage fixing and commissioning.

- Signal installation.
- Bus stop, kerb and pavement improvement works.

1.1.3 Further works, where monitoring did not take place, were also undertaken at:

- Various locations where water utility works were underway.
- Gloucester Avenue where water utility works were underway.

1.1.4 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-four (34) noise and twelve (12) vibration monitoring installations were active across eighteen worksites in August in the LBC area. Table 2 summarises the position of noise and vibration monitoring installations within the LBC area in August 2023.

1.2.2 An additional vibration monitor, ref.: PVE-V1, was installed at 30 Park Village East, worksite ref.: MSB & ECAV, PVE, C and became active at the start of August.

1.2.3 Noise monitor ref.: N051 did not measure any data throughout the month due to loss of power to the lighting column which supplies power to the monitoring station.

1.2.4 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
	N051a	Outside 70 Adelaide Road
	N052	Adelaide Road-Beaumont Walk
	V059	Outside 68 Adelaide Road
	ARBW-V1	Adelaide Road-Beaumont Walk
B	JC	Juniper Crescent
	N024	Lamppost outside Park Village Studios, Park Village East

Worksite Reference	Measurement Reference	Address
MSB & ECAV, PVE, C	N047	Lamppost #3 on corner of Park Village East and Mornington Street Bridge
	PVE-V1	30 Park Village East
	PVS-N001	Park Village Studios
	PVS-V1	Park Village Studios
	N022	Lamppost #34 on Mornington Terrace, between Mornington Street Bridge and Edinboro Castle pub
	N046	Lamppost on Mornington Terrace, between Mornington Street Bridge and Delancey Street, near Edinboro Castle pub
ESB & GTB, PVE, E	N001	Park Village East Lamppost #1 Outside Cubitt Court
	N002	Park Village East Lamppost #2 Outside Richmond House
ESB & GTB, PVE, D	N003	Park Village East Lamppost #15 Outside Silsoe House
	SH-V1	Basement of Silsoe House
	N004	Mornington Terrace Lamppost #7 Junction of Mornington Terrace, Mornington Place & Clarkson Row
ESB & GTB, PVE, E	N005	Euston Approaches – Xavier House site office external staircase
	CR	Lamppost #2 on Clarkson Row
ETRC & HRB, F	N023	Lamppost #21 on Hampstead Road - opposite Xavier House site office
ETRC & HRB	N020	Lamppost on corner of Mackworth Street and Harrington Street
	N021	Lamppost on Stanhope Street, west of Stephenson House site office
	N044	Euston Approaches site hoarding – between Stephenson House site office and Langdale, Regent's Park Estate
	N045	Euston Approaches site hoarding – east of Coniston, Regent's Park Estate
	V039	Euston Approaches site – east of Coniston, Regent's Park Estate
	V043	Euston Approaches site – east facing façade of Cartmel House
HRB & ETRC, NTH-N	N019	Euston Approaches site hoarding – north facing façade of Cartmel House
	N026a	Euston Approaches site hoarding – east facing façade of Cartmel House
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	N008	Stephenson's Way lamppost (external to RCGP)
	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

Worksite Reference	Measurement Reference	Address
	V038	Wesley Hotel, basement lightwell, Euston Street
ETD, ITR	N007	Royal College of General Practitioners, Melton Street
	V003	Royal College of General Practitioners basement vaults under Melton St
VHA	N025	Lamppost #3 on Prince Albert Road opposite the Vehicle Holding Area (VHA) site
NTH-EN, TSS	N012	Drummond Street, lamppost #14 (opposite to 92-94 Drummond Street)
NTH-EN, MF	N014	Starcross Street lamppost (external to Exmouth Arms)
	N016	Margaret Centre roof
	V021	42-44 Cobourg Street
NTH-EN	N017	Hampstead Road, lamppost #48
ETRC & HRB, 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	N051a	Outside 70 Adelaide Road	Free-field	65.3 (67.7)	71.3 (74.8)	65.2 (68.9)	64.7 (67.8)	62.7 (69.9)	64.0 (66.5)	68.0 (73.7)	64.9 (67.3)	65.3 (68.0)	64.0 (69.6)	64.2 (69.1)	62.6 (66.9)
	N052	Adelaide Road-Beaumont Walk	Free-field	66.1 (69.2)	67.0 (69.6)	66.2 (68.3)	65.8 (69.9)	64.1 (71.5)	63.9 (64.2)	66.2 (69.2)	66.4 (69.4)	65.9 (68.9)	64.4 (69.0)	65.5 (72.4)	64.3 (70.9)
B	JC	Juniper Crescent	Free-field	56.8 (58.6)	57.8 (59.2)	57.4 (59.1)	57.9 (59.6)	53.8 (60.7)	55.0 (56.3)	56.4 (57.6)	55.9 (57.6)	55.2 (58.6)	50.2 (56.7)	55.0 (57.9)	53.7 (58.7)
MSB & ECAV, PVE, C	N024	Lamppost outside Park Village Studios, Park Village East	Free-field	58.0 (60.1)	59.6 (66.1)	60.0 (69.2)	58.3 (76.2)	55.0 (73.4)	55.6 (56.2)	56.0 (58.3)	56.9 (57.4)	58.2 (63.6)	54.1 (59.7)	56.0 (61.7)	53.1 (58.0)
	N047	Lamppost #3 on corner of Park Village East and Mornington Street Bridge	Free-field	56.8 (58.7)	58.7 (65.4)	58.1 (62.8)	56.7 (64.3)	51.9 (63.0)	53.9 (54.8)	55.6 (58.9)	57.1 (59.2)	56.8 (61.7)	51.1 (57.8)	54.7 (58.7)	50.9 (54.4)
	PVS-N001	Park Village Studios	Façade	61.3 (63.2)	64.1 (69.2)	62.1 (63.4)	61.4 (64.8)	55.8 (65.4)	59.0 (60.2)	59.3 (60.6)	59.4 (60.9)	59.1 (61.4)	49.9 (56.3)	58.4 (61.8)	55.4 (63.5)
	N022	Lamppost #34 on Mornington Terrace	Free-field	57.5 (59.0)	58.8 (60.1)	57.7 (60.8)	57.1 (61.1)	52.3 (65.9)	57.6 (61.5)	56.6 (57.9)	56.8 (57.4)	56.7 (59.9)	51.3 (64.4)	56.5 (67.0)	51.9 (57.8)

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
	N046	Lamppost on Mornington Terrace, between Mornington Street Bridge and Delancey Street	Free-field	61.7 (62.8)	62.4 (63.8)	61.8 (63.6)	61.3 (63.2)	56.9 (66.9)	59.9 (61.1)	60.8 (61.4)	60.5 (61.0)	61.4 (66.6)	53.4 (59.5)	60.4 (66.2)	57.0 (62.1)
ESB & GTB, PVE, E	N001	Park Village East Lamppost #1	Free-field	53.9 (65.1)	66.7 (74.8)	54.6 (58.9)	54.5 (62.2)	49.3 (60.3)	50.9 (51.4)	52.9 (55.5)	54.3 (59.1)	54.3 (60.7)	47.3 (53.1)	53.3 (62.6)	48.6 (53.7)
	N002	Park Village East Lamppost #2	Free-field	55.6 (57.7)	59.1 (65.1)	57.9 (63.3)	56.5 (61.4)	52.0 (61.5)	53.0 (53.8)	55.6 (58.3)	57.0 (59.5)	56.7 (59.4)	51.0 (55.7)	55.0 (61.3)	50.6 (54.8)
ESB & GTB, PVE, D	N003	Park Village East Lamppost #15 Outside Silsoe House	Façade	55.3 (57.2)	58.4 (61.2)	58.3 (64.3)	56.1 (60.1)	52.0 (67.8)	52.7 (53.2)	55.6 (59.2)	56.9 (58.6)	56.5 (60.5)	53.7 (69.6)	54.6 (60.2)	51.0 (55.7)
	N004	Mornington Terrace Lamppost #7	Free-field	61.8 (63.7)	64.3 (66.1)	63.0 (65.2)	62.4 (67.6)	59.0 (68.1)	59.7 (61.1)	62.4 (64.9)	61.5 (61.8)	64.2 (71.9)	54.3 (68.7)	65.8 (73.5)	62.5 (70.2)
ESB & GTB, PVE, E	N005	Euston Approaches – Xavier House site office external staircase	Free-field	62.3 (65.3)	64.7 (66.2)	63.8 (66.3)	62.9 (66.5)	58.6 (64.5)	60.1 (61.3)	64.2 (69.1)	61.5 (62.4)	61.7 (64.9)	57.3 (61.4)	61.6 (65.9)	58.3 (63.3)
	CR	Lamppost #2 on Clarkson	Free-field	64.5 (69.7)	69.2 (74.1)	68.4 (71.8)	66.7 (71.1)	59.0 (66.2)	64.0 (66.1)	65.2 (68.6)	65.0 (67.5)	64.7 (70.0)	53.2 (62.7)	65.6 (72.1)	59.0 (63.8)

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
ETRC & HRB, F	N023	Lamppost #21 on Hampstead Road	Free-field	67.3 (69.7)	68.0 (71.2)	66.3 (71.7)	65.7 (69.6)	64.4 (71.9)	64.8 (66.4)	66.6 (71.0)	65.5 (66.8)	66.6 (70.2)	64.7 (67.6)	65.9 (72.6)	64.4 (68.7)
ETRC & HRB	N020	Lamppost on corner of Mackworth Street and Harrington Street	Free-field	54.1 (57.3)	56.5 (58.9)	52.7 (54.2)	52.7 (55.1)	51.1 (58.3)	50.6 (50.6)	52.3 (52.3)	53.7 (53.7)	51.7 (52.4)	49.7 (51.5)	52.1 (53.8)	50.0 (51.4)
	N021	Lamppost on Stanhope Street, west of Stephenson House site office	Free-field	53.8 (65.9)	58.3 (61.5)	53.4 (58.5)	52.1 (58.1)	47.4 (57.6)	48.2 (50.3)	53.1 (55.6)	53.9 (55.3)	55.1 (60.2)	47.3 (52.9)	52.0 (60.3)	47.0 (54.2)
	N044	Regents Park Estate west, near Langdale	Free-field	54.7 (58.8)	60.1 (64.6)	52.6 (59.0)	52.1 (57.7)	48.7 (58.9)	49.9 (50.0)	51.4 (53.0)	50.8 (51.1)	52.0 (55.6)	47.1 (50.3)	50.2 (54.9)	47.7 (51.4)
	N045	Euston Approaches site hoarding – east of Coniston, Regent's Park Estate	Free-field	56.1 (58.4)	66.2 (73.5)	55.2 (63.8)	55.4 (60.5)	54.3 (67.5)	54.9 (55.6)	55.5 (55.9)	55.3 (56.7)	56.5 (66.3)	54.4 (56.0)	55.1 (57.2)	54.5 (56.1)
ETRC & HRB, NTH-N	N019	Euston Approaches site hoarding – north facing façade of Cartmel House	Façade	55.0 (59.1)	67.8 (74.3)	54.2 (62.4)	54.5 (60.9)	52.5 (64.5)	52.5 (53.0)	55.8 (58.8)	55.8 (62.2)	57.3 (72.0)	52.1 (56.4)	53.5 (58.8)	51.6 (54.4)
	N026a	Euston Approaches site hoarding – east facing façade of Cartmel House	Façade	59.2 (62.9)	68.9 (77.7)	59.0 (71.0)	59.3 (70.1)	57.2 (63.2)	57.1 (57.4)	58.7 (62.8)	57.8 (59.8)	61.3 (76.0)	57.3 (60.2)	58.3 (63.2)	56.8 (60.2)

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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
G, H	HH	Euston Station Parcel Deck, Barnby Street	Free-field	63.2 (68.6)	62.6 (64.3)	61.2 (63.4)	62.0 (69.9)	58.2 (66.9)	60.0 (61.2)	62.6 (65.4)	61.4 (64.6)	61.9 (66.8)	58.5 (64.7)	60.6 (66.7)	58.3 (64.7)
G	BS	Roof of Stockbeck House, Barnby Street	Free-field	60.8 (62.0)	61.4 (64.1)	61.3 (68.2)	60.9 (63.4)	56.9 (63.0)	60.7 (61.8)	60.2 (60.7)	59.1 (60.2)	59.4 (63.4)	54.1 (59.6)	60.1 (62.5)	56.6 (60.6)
ETD, TSS	N006	Royal College of General Practitioners roof level	Free-field	54.9 (61.5)	63.0 (71.4)	53.1 (57.6)	52.1 (56.5)	50.1 (57.9)	50.8 (52.1)	54.7 (63.1)	51.8 (52.3)	52.4 (55.1)	49.5 (51.1)	52.0 (54.0)	49.8 (51.8)
TSS	N008	Stephenson's Way lamppost (external to RCGP)	Façade	62.5 (69.1)	65.8 (82.5)	55.8 (67.7)	56.4 (65.2)	55.4 (68.3)	54.6 (55.1)	60.1 (69.5)	54.9 (55.5)	55.1 (56.1)	53.9 (54.8)	55.3 (62.6)	54.6 (58.8)
	N010	Wesley Hotel	Façade	66.6 (69.0)	68.5 (70.6)	65.9 (67.1)	65.4 (66.6)	57.9 (69.7)	61.7 (66.2)	64.3 (66.9)	65.9 (66.4)	65.7 (66.3)	56.7 (65.5)	63.1 (66.3)	57.8 (66.3)
	N011	Outside 82 Euston Street	Free-field	55.9 (63.5)	58.8 (68.8)	53.6 (62.6)	52.9 (60.1)	51.3 (63.7)	50.4 (52.1)	53.6 (55.6)	51.8 (52.8)	53.1 (57.6)	48.2 (51.7)	51.7 (58.1)	49.2 (57.5)
ETD, ITR	N007	Royal College of General Practitioners, Melton Street	Free-field	63.3 (65.9)	64.6 (66.9)	63.2 (64.7)	63.3 (66.8)	61.4 (65.1)	62.3 (63.6)	62.6 (64.1)	62.5 (64.1)	63.7 (68.8)	60.7 (64.1)	62.7 (69.5)	61.1 (64.4)

OFFICIAL

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
VHA	N025	Lamppost #3 on Prince Albert Road	Free-field	66.4 (69.3)	66.2 (68.9)	65.7 (72.2)	65.3 (69.8)	63.0 (70.9)	63.3 (63.7)	65.1 (67.2)	65.4 (66.3)	66.1 (72.7)	63.5 (69.5)	65.8 (73.2)	63.2 (68.8)
NTH-EN, TSS	N012	Opposite 92-94 Drummond Street	Free-field	53.1 (57.0)	58.9 (68.2)	55.8 (58.9)	56.2 (64.0)	52.5 (66.5)	50.8 (51.4)	56.9 (60.1)	54.4 (55.5)	56.3 (62.1)	51.0 (57.8)	54.5 (60.5)	52.8 (62.5)
NTH-EN, MF	N014	Starcross Street lamppost (external to Exmouth Arms)	Free-field	51.9 (59.0)	59.7 (68.4)	57.4 (66.7)	55.6 (67.2)	48.8 (62.0)	49.5 (51.2)	52.4 (55.2)	50.5 (51.3)	52.6 (57.4)	46.4 (52.3)	52.4 (61.5)	47.1 (50.4)
	N016	Margaret Centre roof	Free-field	53.1 (56.1)	56.7 (60.5)	52.5 (58.9)	52.9 (57.7)	50.7 (57.4)	51.1 (51.6)	53.7 (55.3)	53.3 (55.6)	54.4 (64.3)	50.8 (53.9)	52.6 (60.3)	50.3 (53.5)
NTH-EN	N017	Hampstead Road, lamppost #48	Free-field	68.2 (72.1)	69.0 (76.9)	67.4 (72.5)	67.8 (73.4)	66.5 (74.7)	65.8 (66.4)	67.6 (72.0)	67.1 (68.6)	68.1 (71.1)	66.8 (71.8)	67.1 (72.8)	66.2 (70.8)
ETRC & HRB, NTH-N	N018	Outside replacement housing, Hampstead Road	Free-field	67.8 (72.6)	68.7 (70.8)	68.1 (75.5)	68.6 (85.3)	66.3 (73.5)	65.9 (67.8)	67.3 (70.7)	67.9 (68.9)	68.5 (73.1)	66.6 (70.0)	67.5 (73.3)	65.7 (69.7)

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	2.82 (Z-axis)
	ARBW-V1	Adelaide Road – Beaumont Walk	2.92 (Y-axis)
MSB & ECAV, PVE, C	PVS-V1	Park Village Studios	1.01 (Y-axis)
	PVE-V1	30 Park Village East	1.61 (Y-axis)
ESB & GTB, PVE, D	SH-V1	Basement of Silsoe House	1.16 (Z-axis)
ETRC & HRB	V039	Euston Approaches site – east of Coniston, Regent’s Park Estate	5.79 (Y-axis)
	V043	Euston Approaches site – east facing façade of Cartmel House	5.97 (X-axis)
ETD, ITR	V003	RCGP basement vaults, 305 Euston Road	0.40 (Z-axis)
TSS	V002	RCGP basement boiler room, 305 Euston Road	2.24 (Z-axis)
	V037	Magic Circle, basement	1.86 (Z-axis)
	V038	Wesley Hotel, basement lightwell, Euston Street	0.61 (Z-axis)
NTH-EN, MF	V021	42-44 Cobourg Street (floor)	1.04 (Y-axis)

\* High levels of vibration caused by works close to the monitor. Lower vibration levels anticipated at nearest receptor.

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	All days	All periods	No exceedance
B	JC	Juniper Crescent	All days	All periods	No exceedance
MSB & ECAV, PVE, C	N024	Lamppost outside Park Village Studios, Park Village East	All days	All periods	No exceedance
	N047	Lamppost #3 on corner of Park Village East and Mornington Street Bridge	All days	All periods	No exceedance
	PVS-N001	Park Village Studios	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
	N022	Lamppost #34 on Mornington Terrace	All days	All periods	No exceedance
	N046	Lamppost on Mornington Terrace, between Mornington Street Bridge and Delancey Street	All days	All periods	No exceedance*
ESB & GTB, PVE, E	N001	Park Village East Lamppost #1	All days	All periods	No exceedance
	N002	Park Village East Lamppost #2	All days	All periods	No exceedance
ESB & GTB, PVE, D	N003	Park Village East Lamppost #15 Outside Silsoe House	All days	All periods	No exceedance
	N004	Mornington Terrace Lamppost #7	All days	All periods	No exceedance
ESB & GTB, E, PVE	N005	Euston Approaches - Xavier House site office external staircase	All days	All periods	No exceedance
	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*
ETRC & HRB	N020	Lamppost on corner of Mackworth Street and Harrington Street	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*

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
	N045	Euston Approaches site hoarding – east of Coniston, Regent's Park Estate	All days	All periods	No exceedance
HRB & ETRC, NTH-N	N019	Euston Approaches site hoarding – north facing façade of Cartmel House	All days	All periods	No exceedance
	N026a	Euston Approaches site hoarding – east facing façade of Cartmel House	Weekday Saturday	08:00 – 18:00 14:00 – 22:00	2 1
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	Stephenson's Way lamppost (external to RCGP)	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, ITR	N007	RCGP, Melton Street	All days	All periods	No exceedance
VHA	N025	Lamppost #3 on Prince Albert Road	All days	All periods	No exceedance*
NTH-EN, TSS	N012	Opposite 92-94 Drummond Street	All days	All periods	No exceedance
NTH-EN, MF	N014	Starcross Street lamppost (external to Exmouth Arms)	All days	All periods	No exceedance

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

\* A distance correction has been applied when calculating exceedances of the SOAEL.

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

2.2.5 Exceedances of the SOAEL were recorded at one noise monitor. The SOAEL exceedances were recorded during weekday daytime and Saturday evening periods.

2.2.6 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 & ETRC, NTH-N	N026a	Euston Approaches site hoarding – east facing façade of Cartmel House	3

2.2.7 Three (3) 24-hour periods that experienced an exceedance of the SOAEL were recorded due to HS2 construction works during August 2023. The exceedances occurred at N026a during weekday daytime and Saturday evening working hours



## 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.

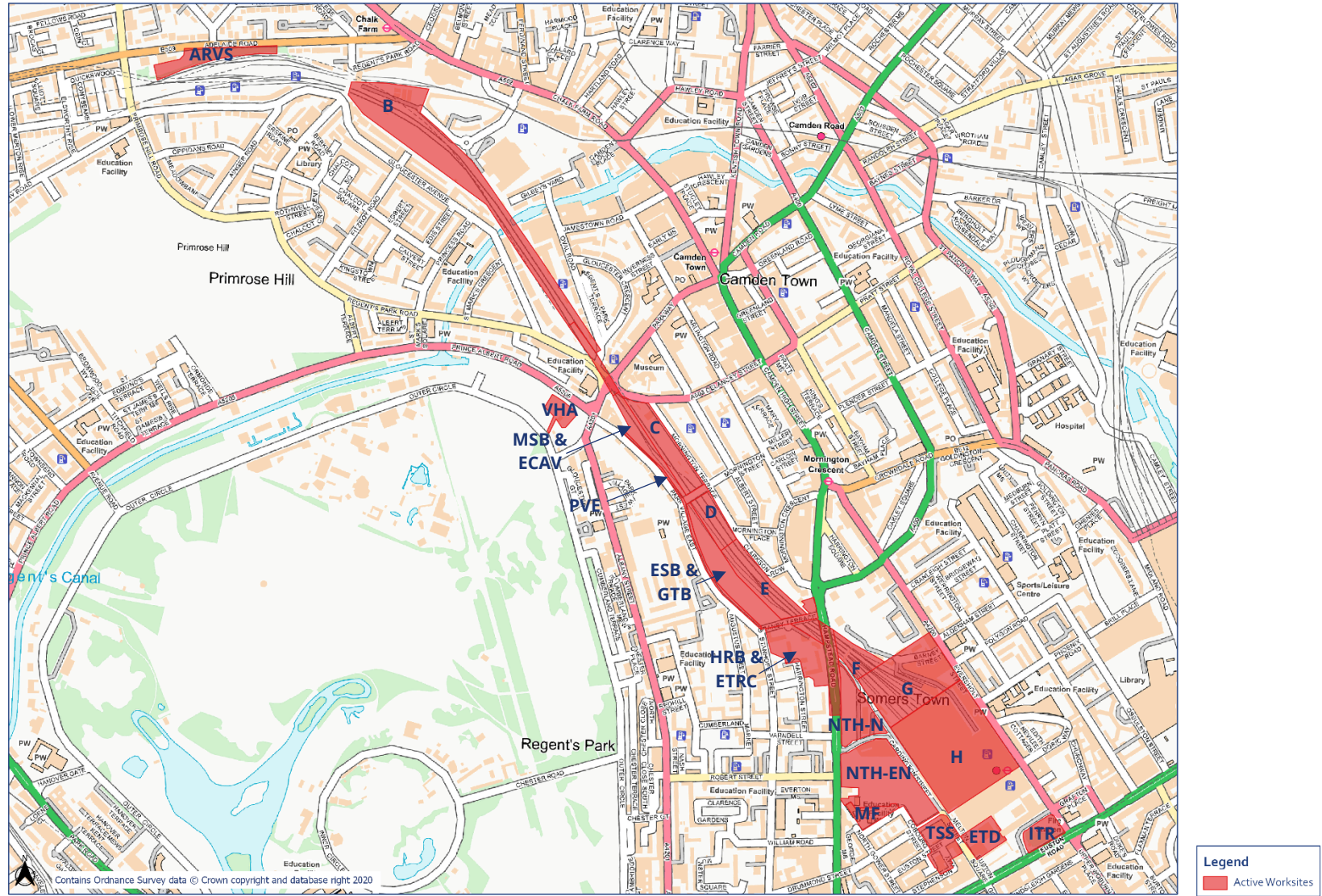
Table 8: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-23-99485-E-C	N/A	Complaint due to alarm sounding during the night-time.	The alarm was not associated with HS2 construction.	Information was provided to the stakeholder.

# Appendix A Site Locations

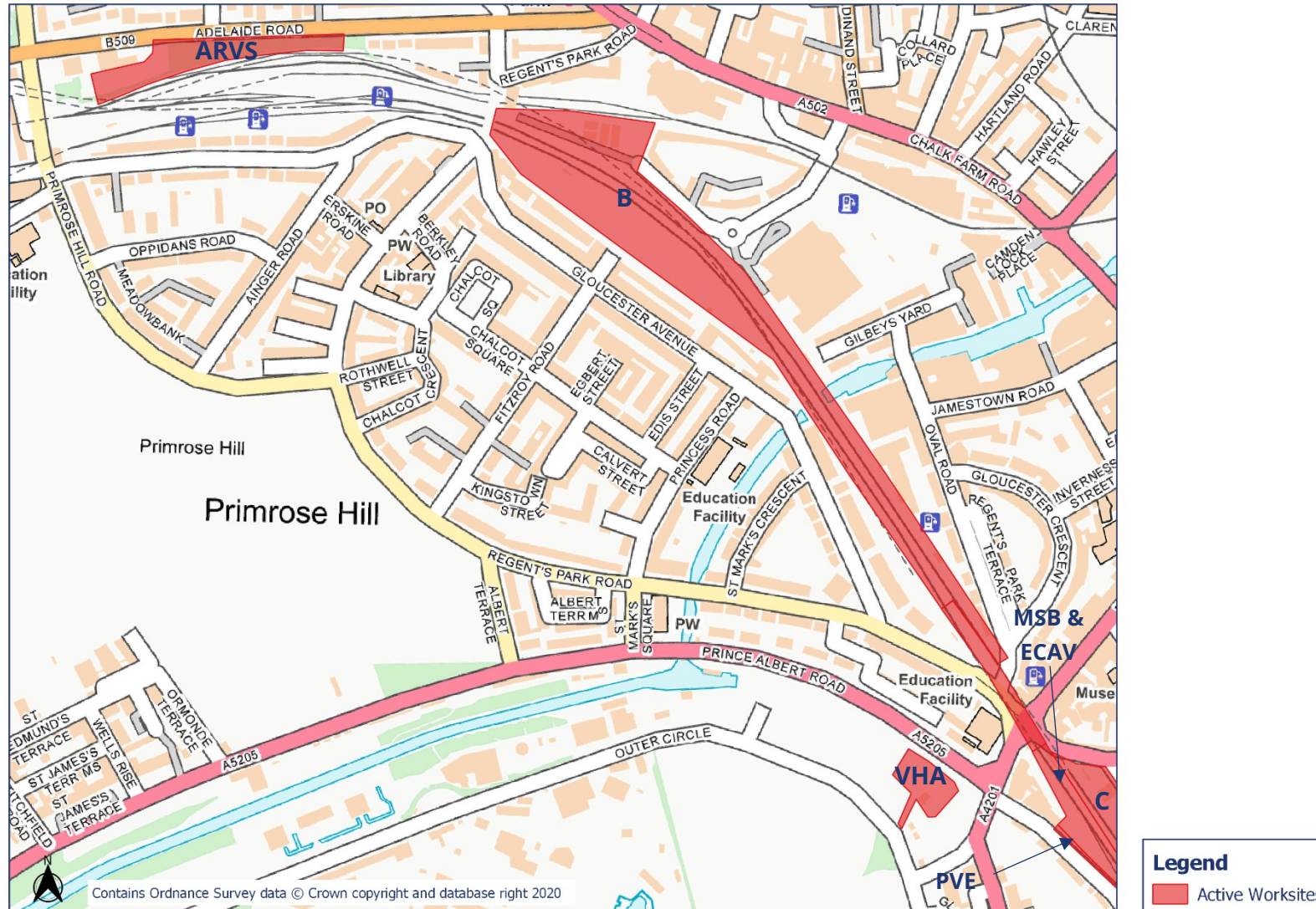
# HS2

## Worksite Identification Plan - Overview



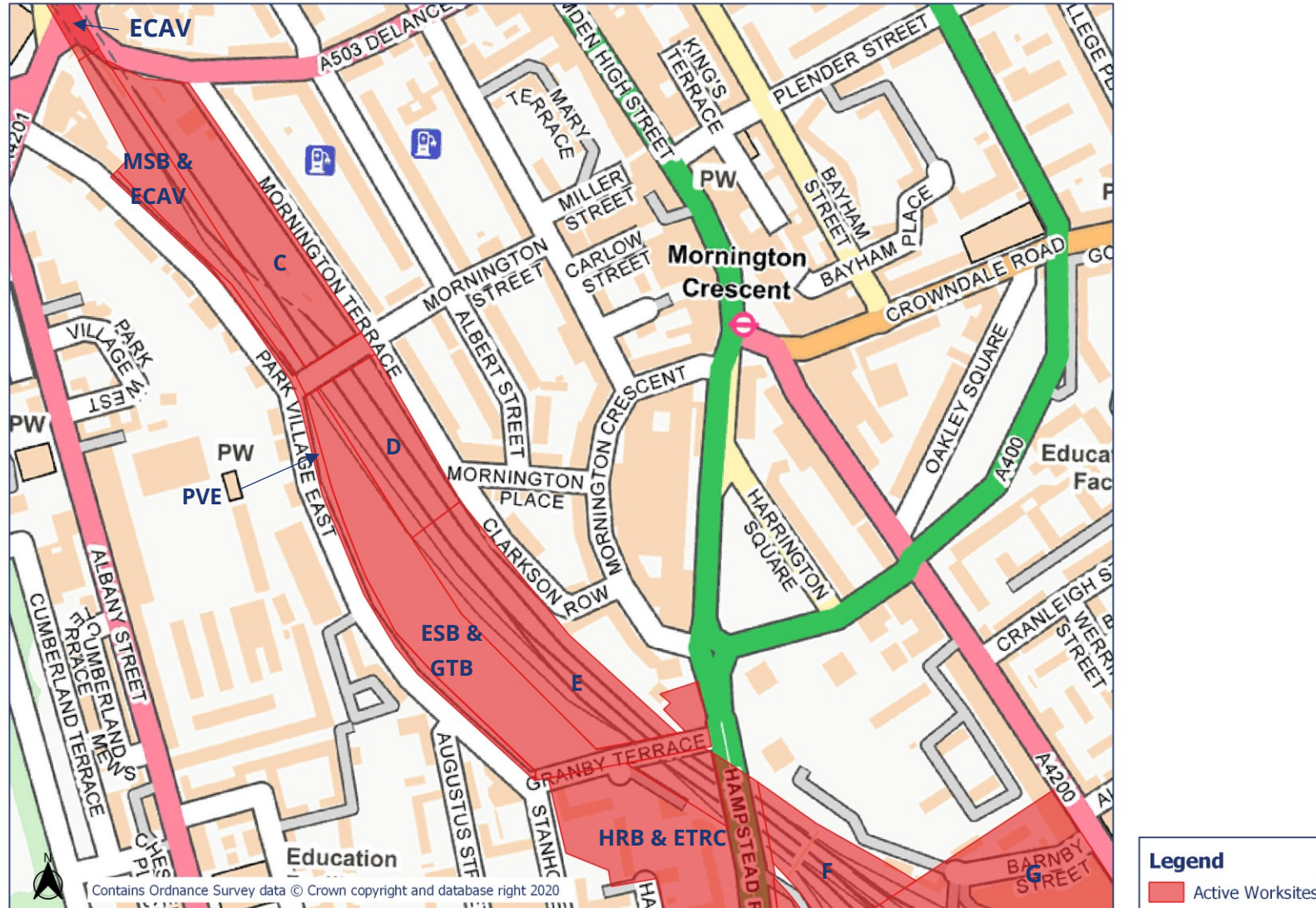
# HS2

## Worksite Identification Plan - 1



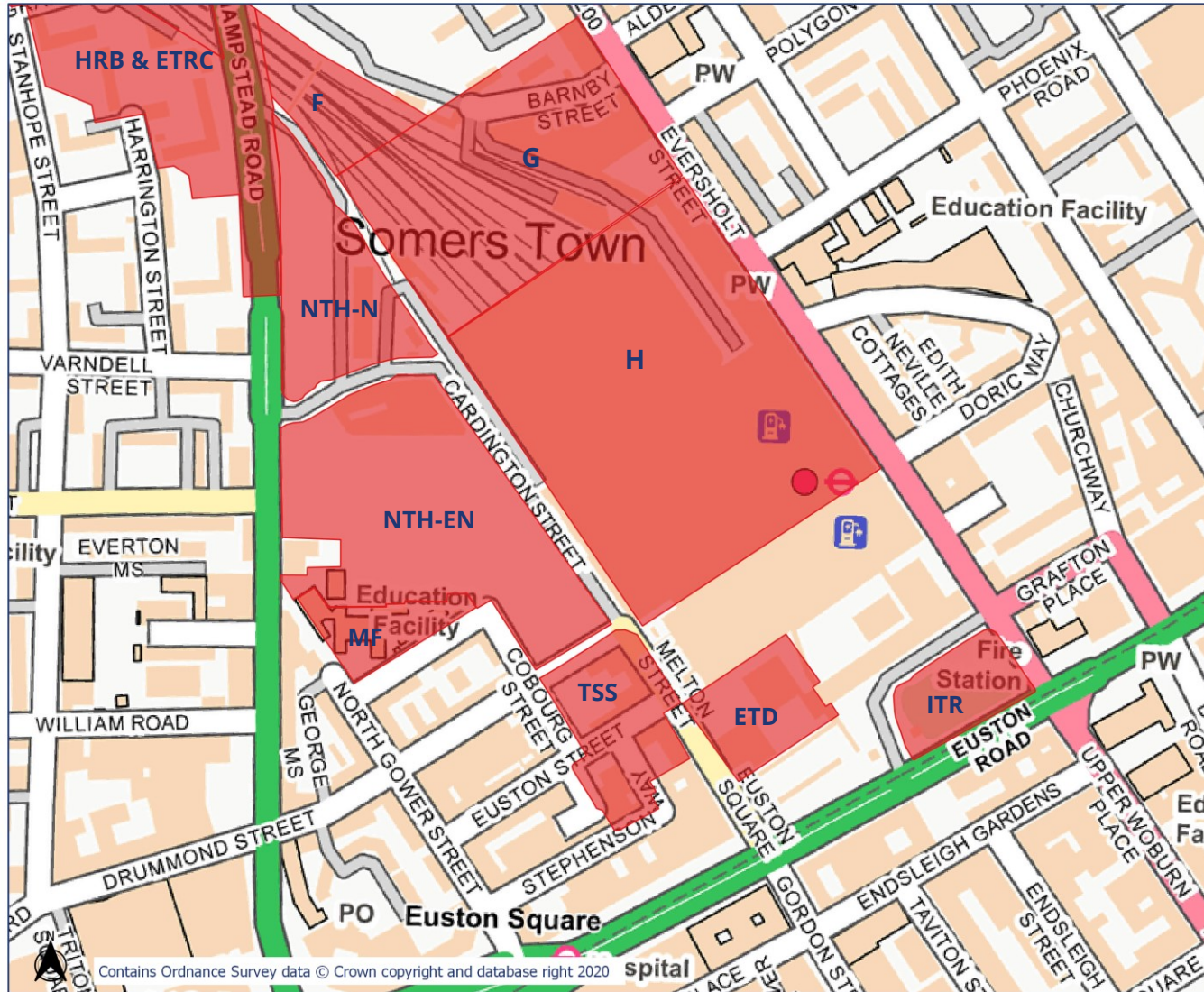
# HS2

## Worksite Identification Plan - 2



# HS2

## Worksite Identification Plan - 3

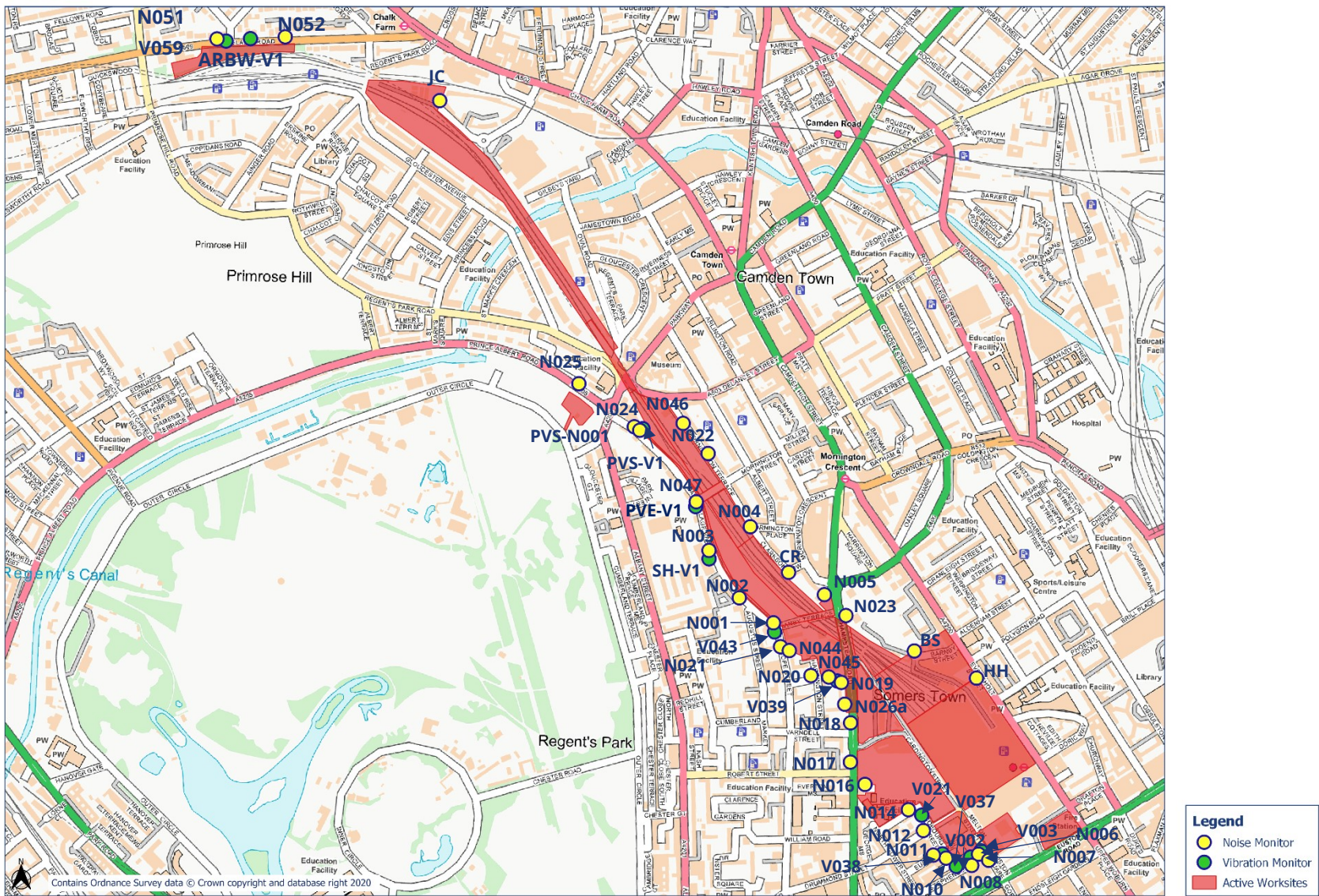


**Legend**

- Active Worksites

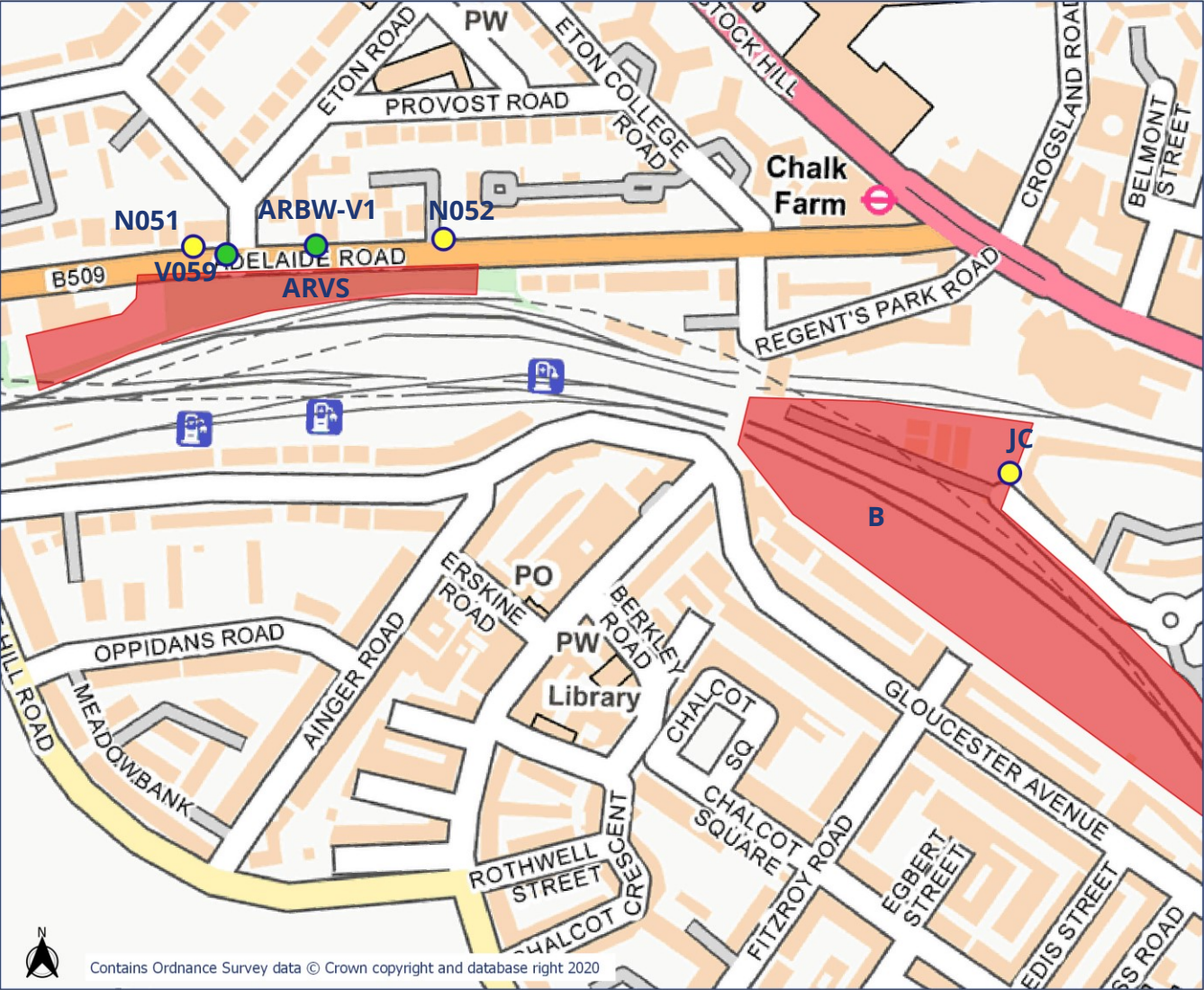
# Appendix B Monitoring Locations

## Noise and Vibration Monitoring Plan - Overview





# HS2 Noise and Vibration Monitoring Plan - 1



**Legend**

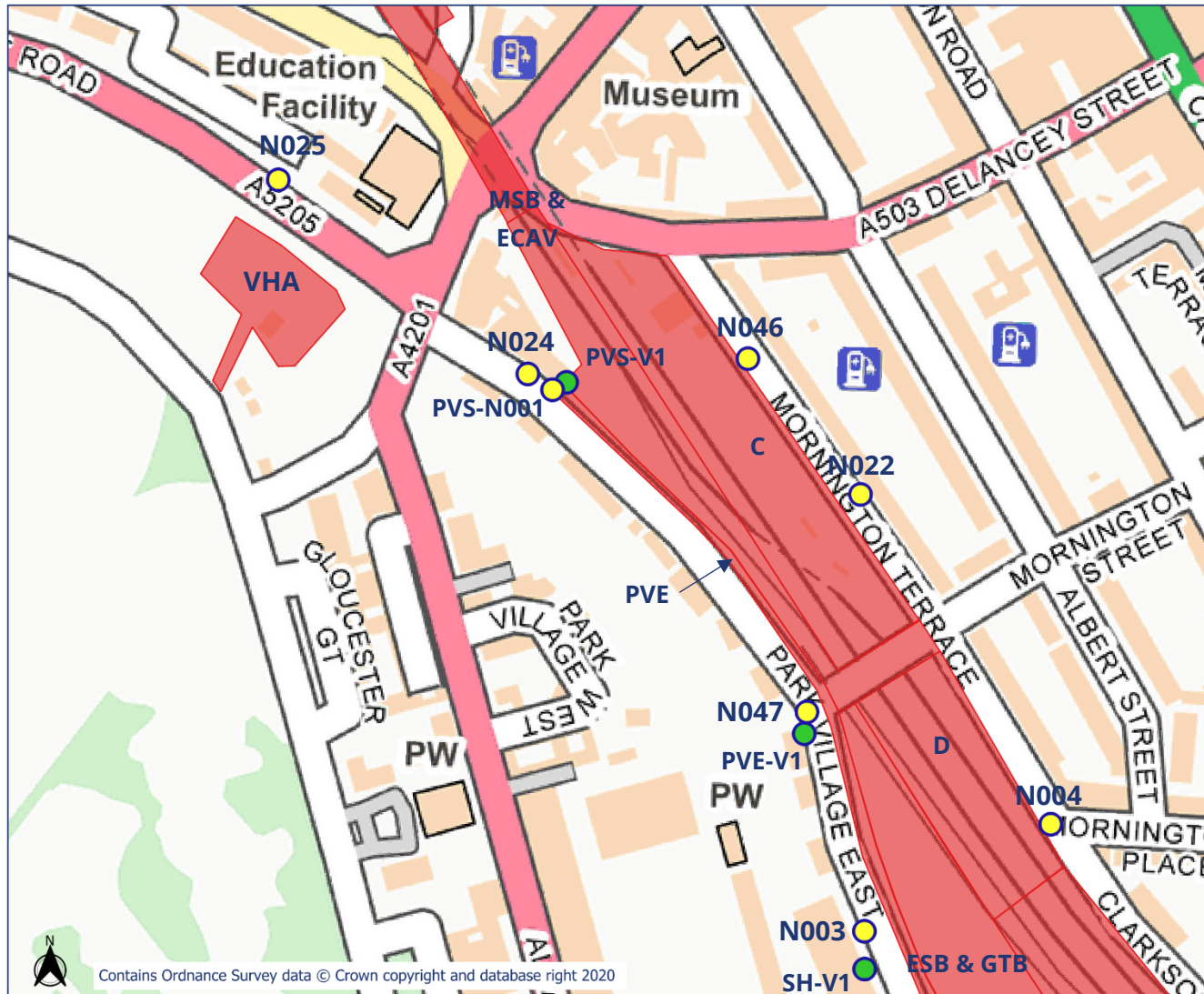
- Noise Monitor
- Vibration Monitor
- Active Worksites



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# HS2

## Noise and Vibration Monitoring Plan - 2

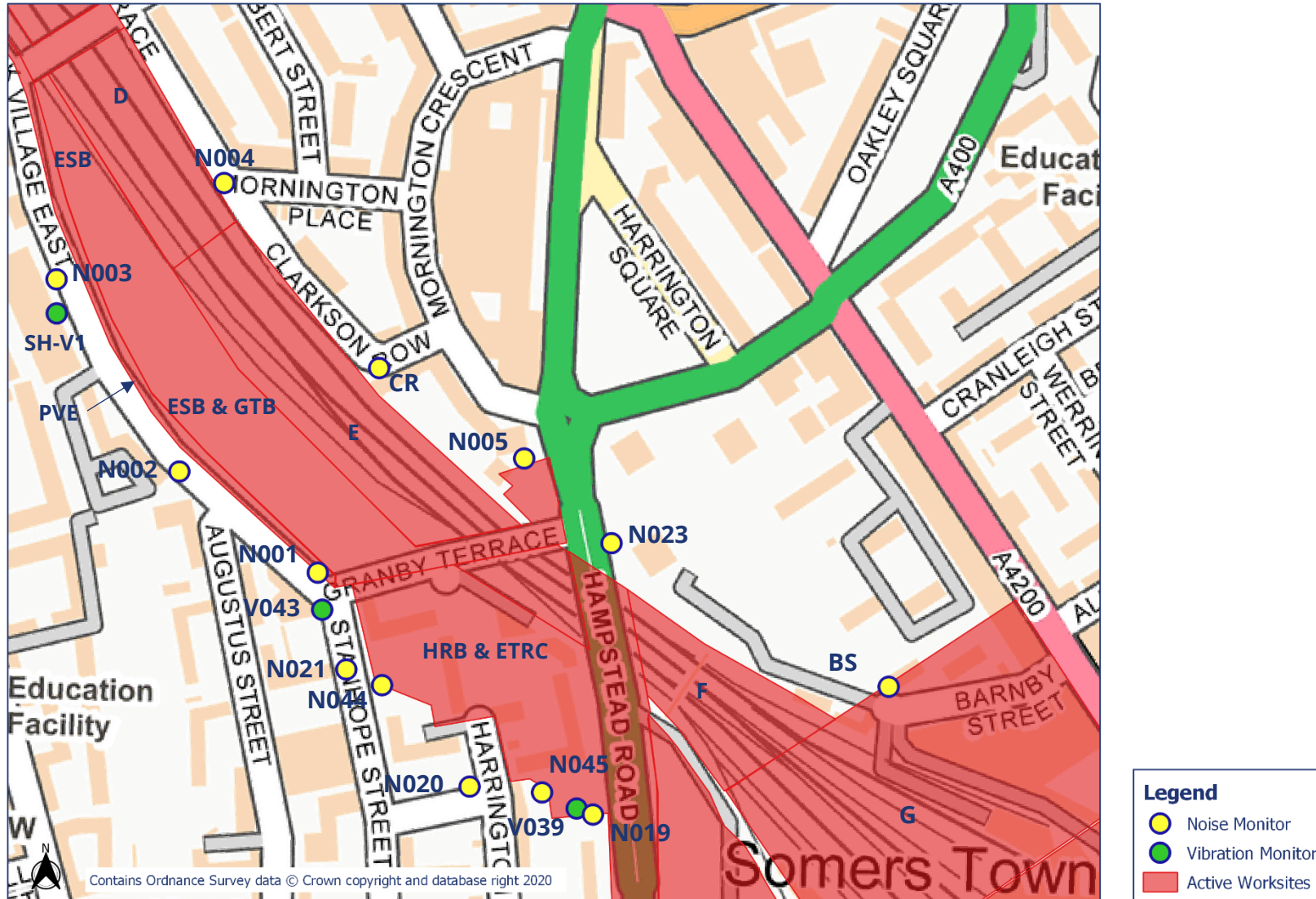


**Legend**

- Noise Monitor
- Vibration Monitor
- Active Worksites

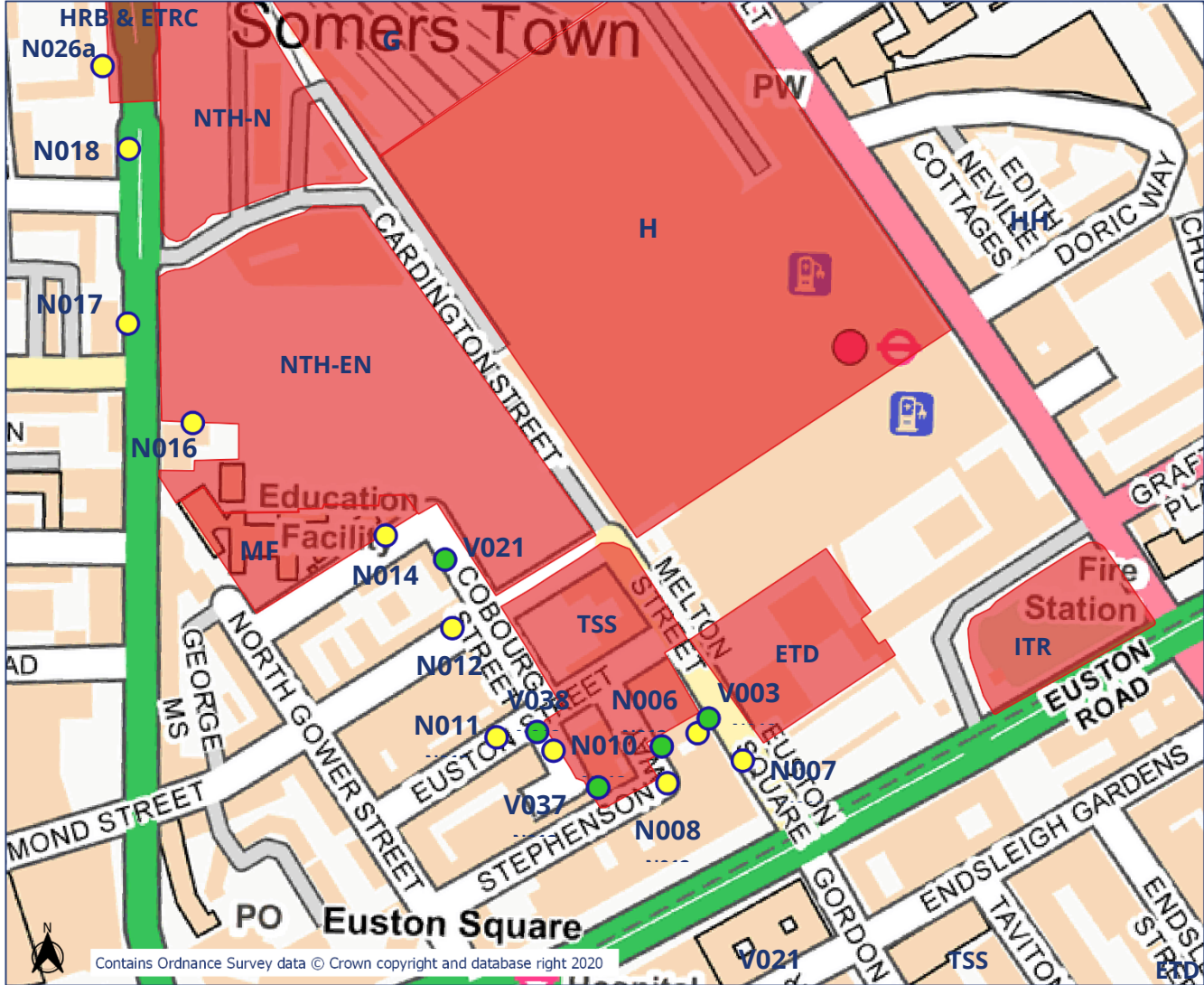
# HS2

## Noise and Vibration Monitoring Plan - 3



# HS2

## Noise and Vibration Monitoring Plan - 4



**Legend**

- Noise Monitor
- Vibration Monitor
- Active Worksites

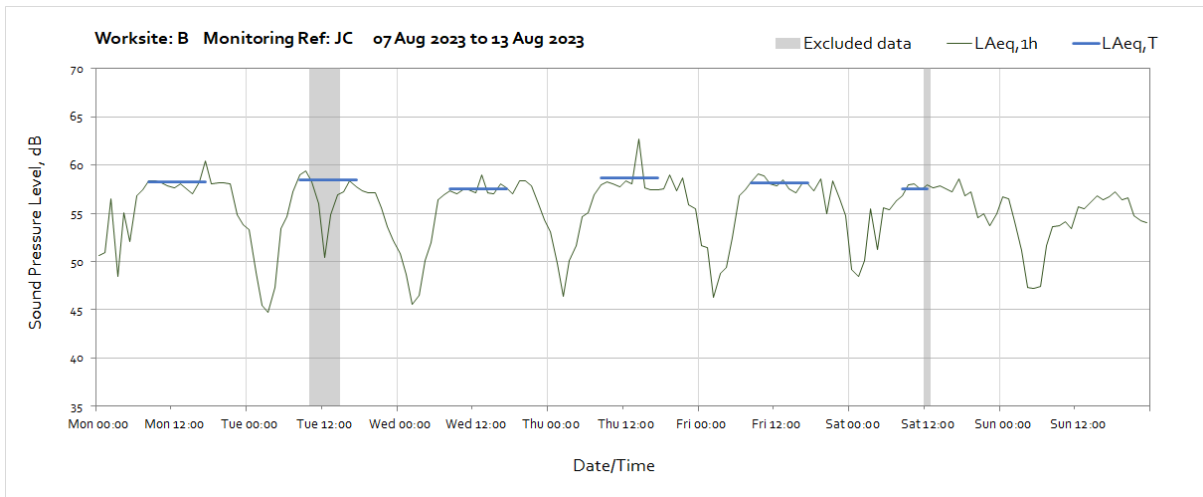
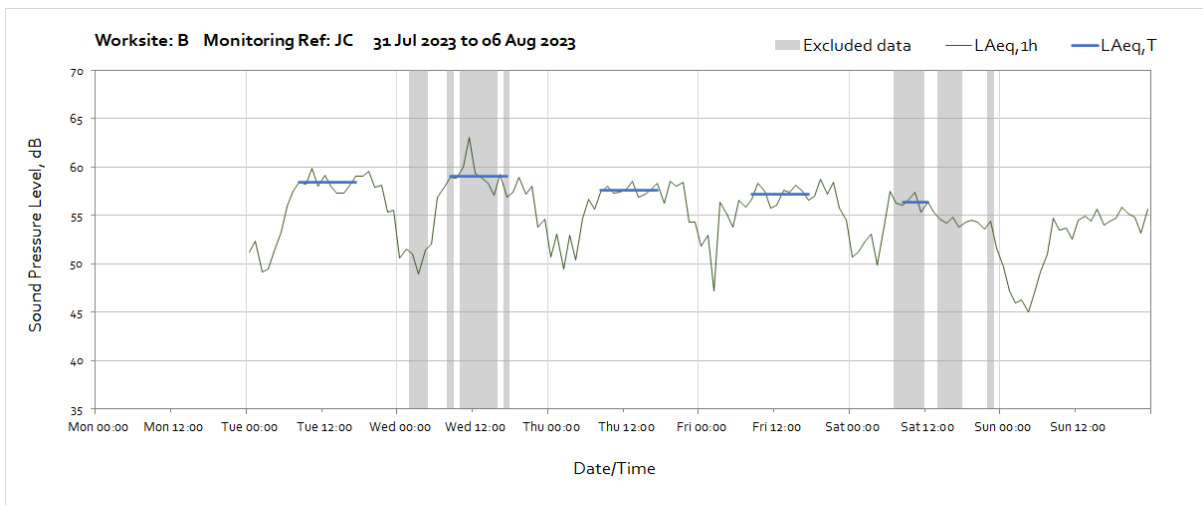
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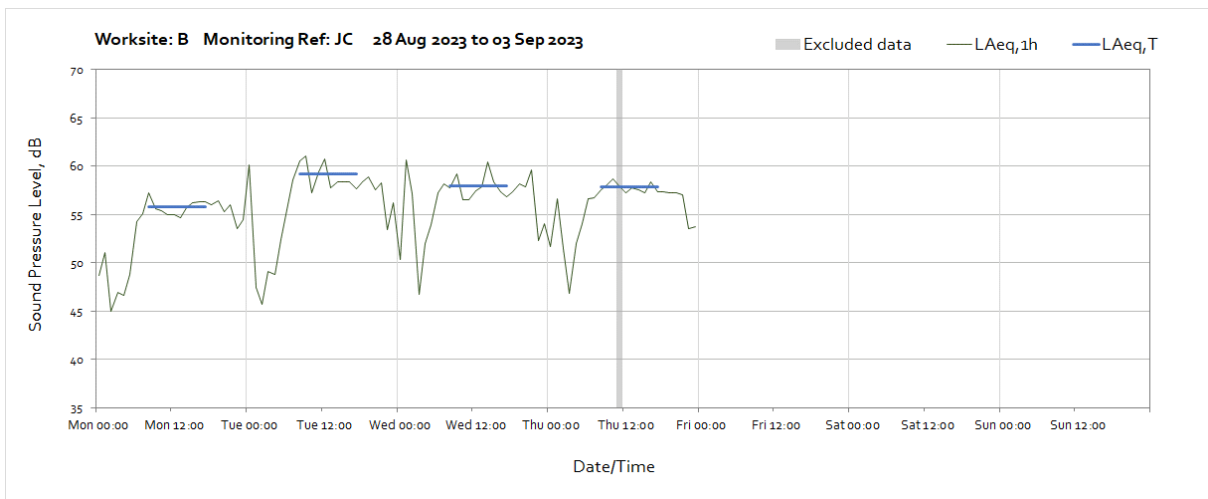
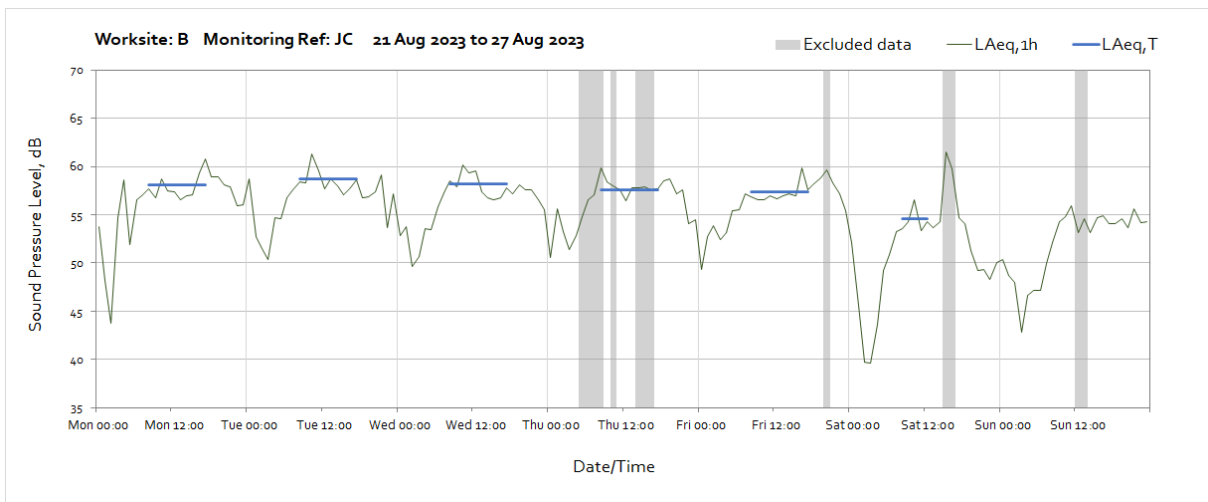
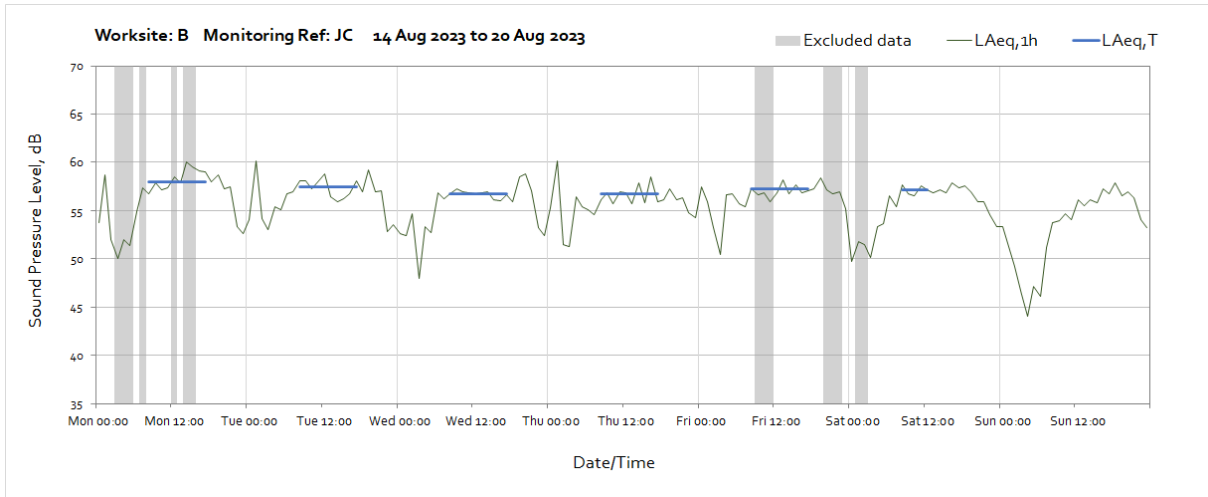
# Appendix C Data

## Noise

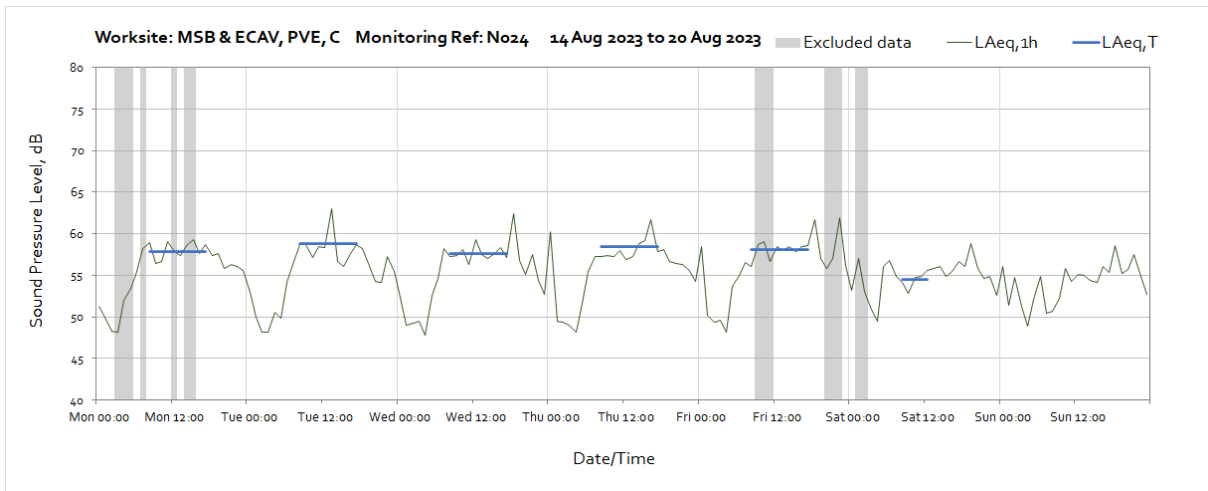
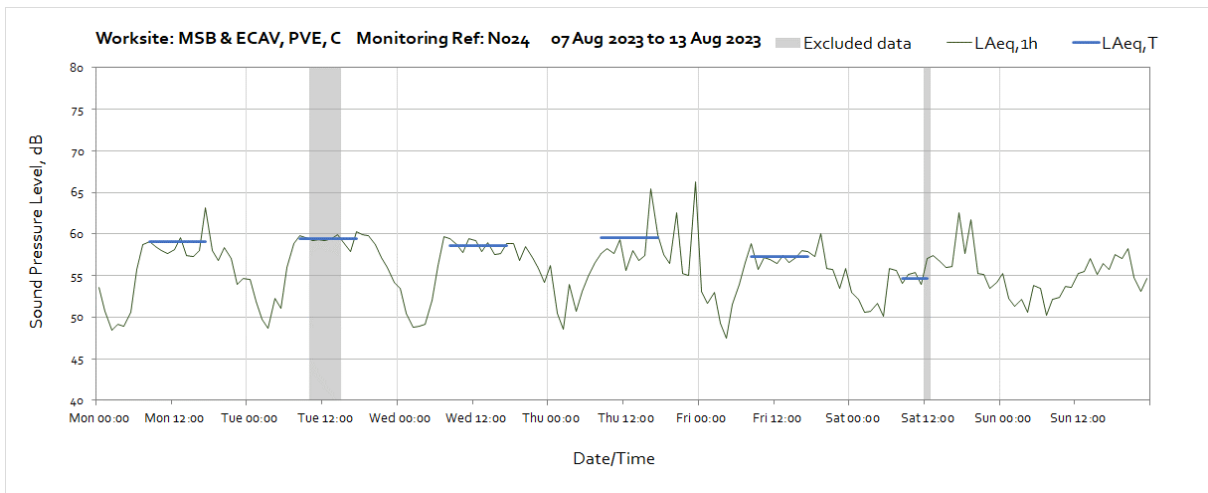
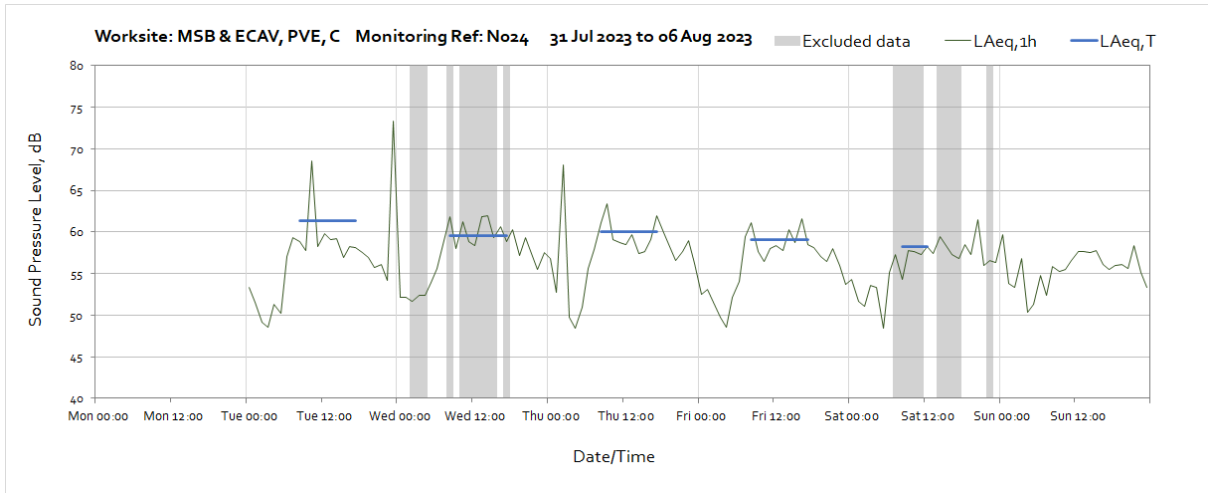
The following graphs show the hourly measured ambient noise level  $L_{Aeq,1h}$  and, where relevant, the averaged noise level  $L_{Aeq,T}$  values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods where noise levels are adversely affected by weather or only measured for part of the period, which are not representative of HS2 construction works, have been greyed out and excluded from the calculation of the  $L_{Aeq,T}$  values in in Table 3 of the main report.

### Worksite: B - Monitoring Ref: JC

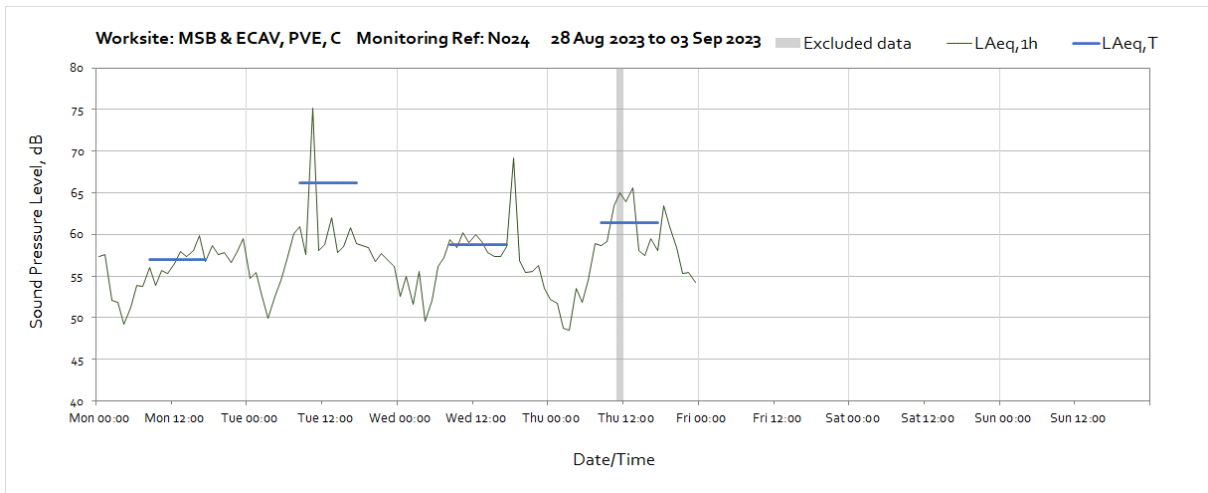
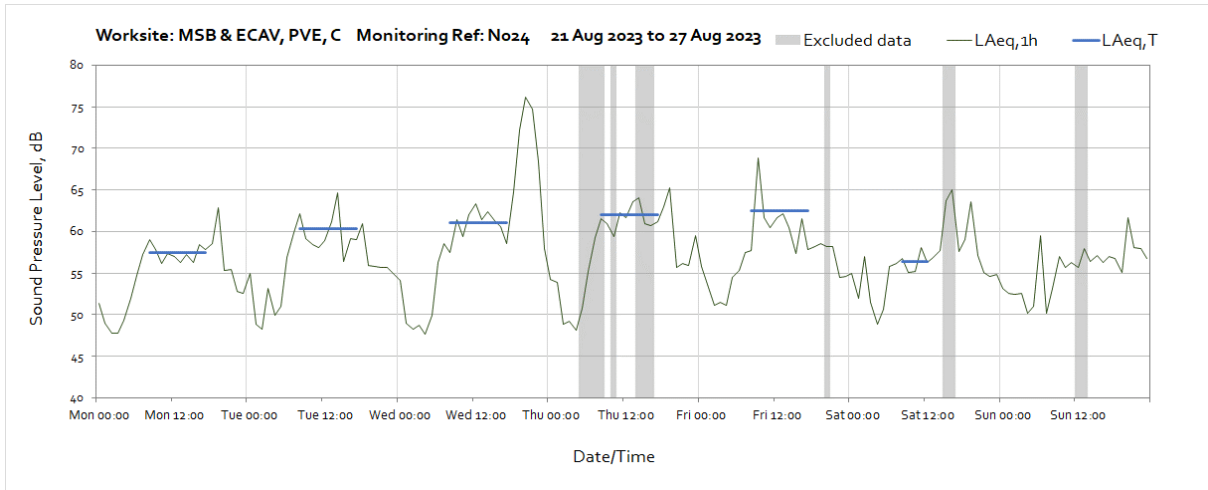




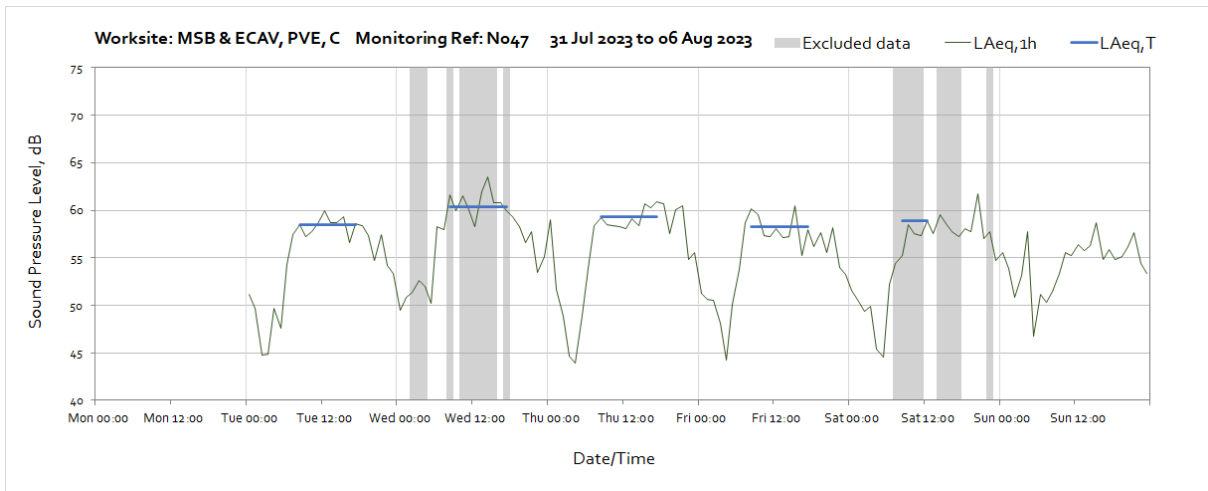
**Worksite: MSB & ECAV, PVE, C - Monitoring Ref: N024**



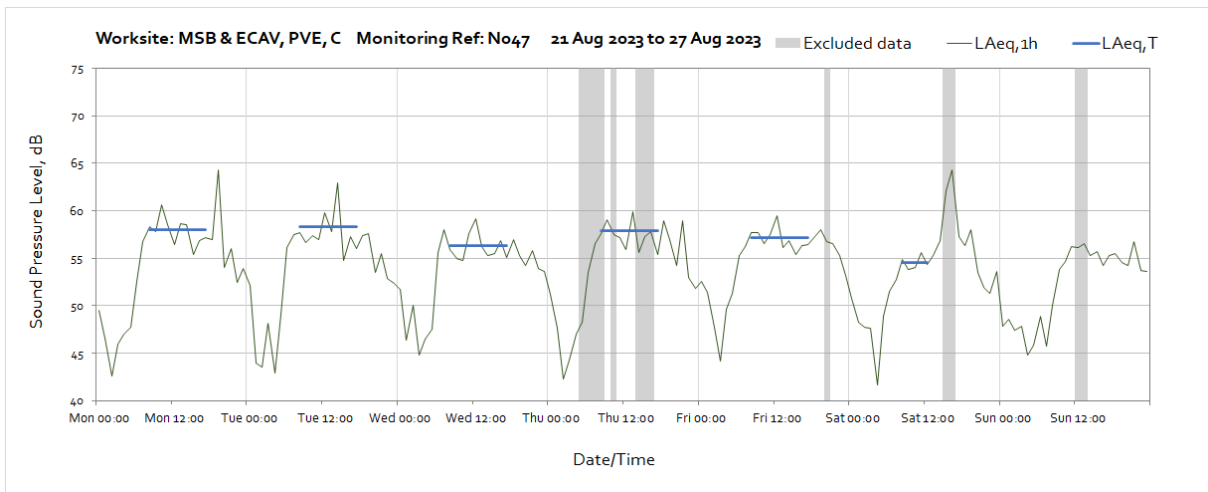
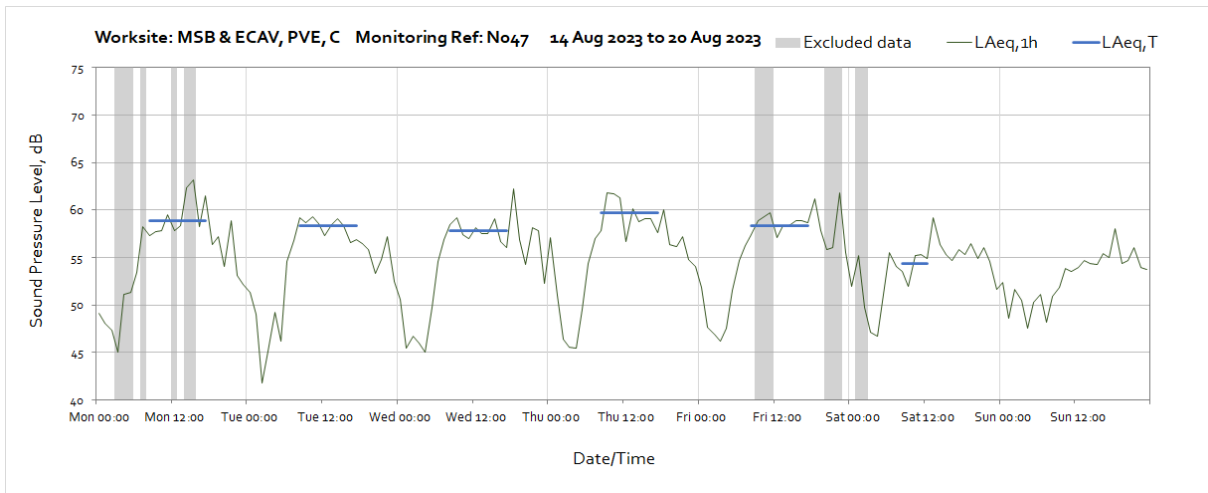
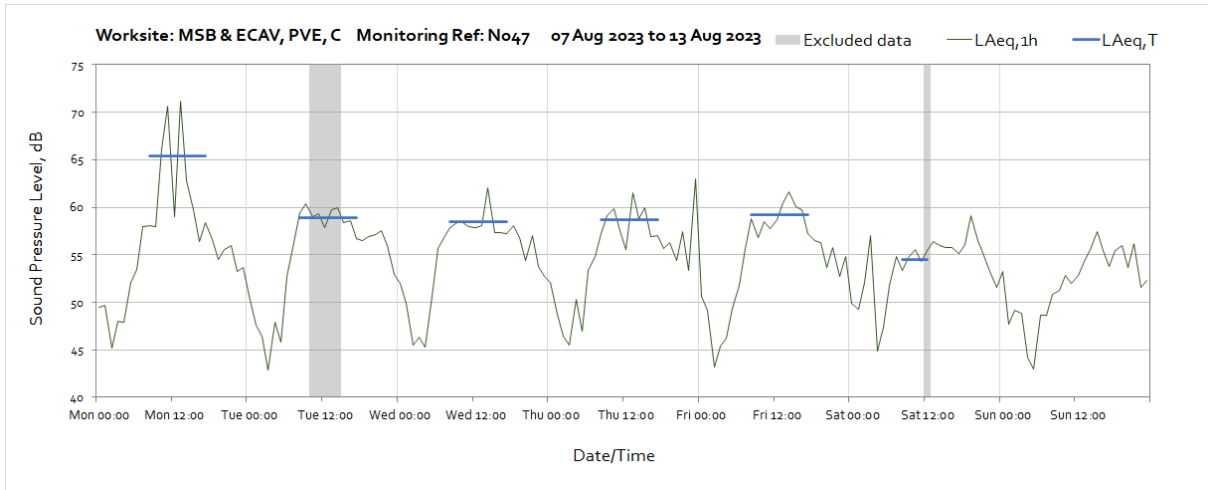
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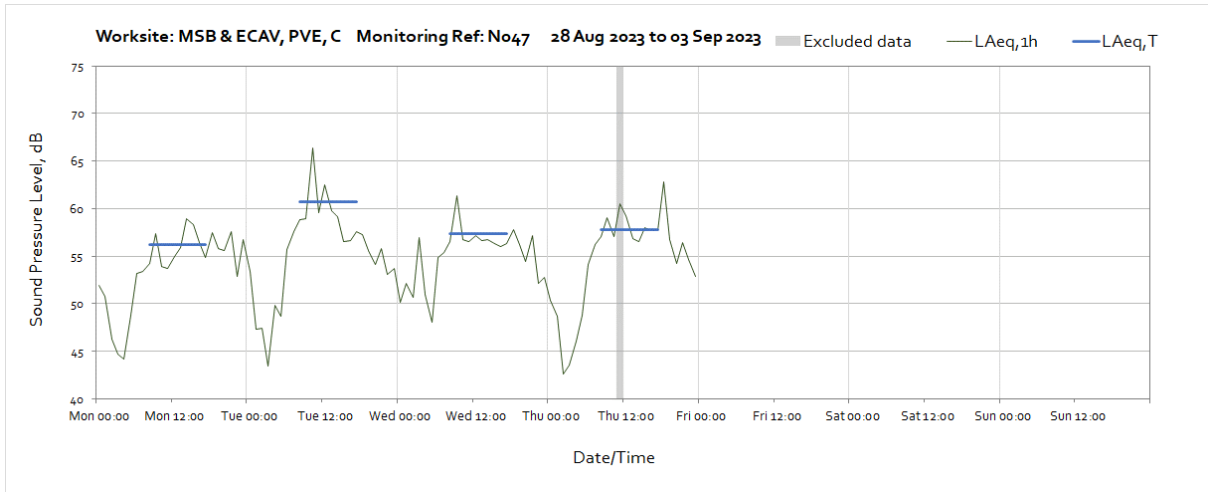


**Worksite: MSB & ECAV, PVE, C – Monitoring Ref: N047**

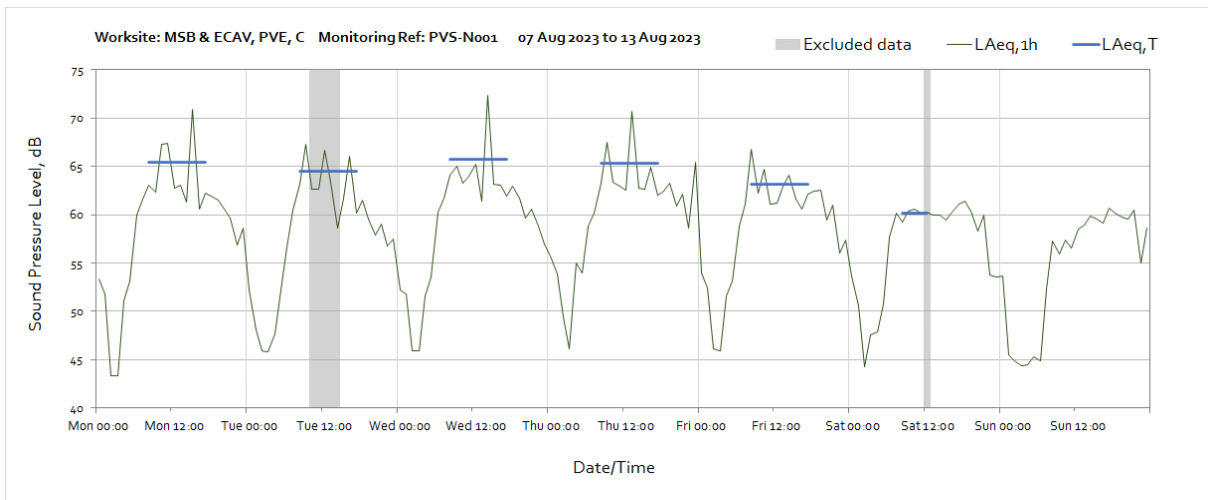
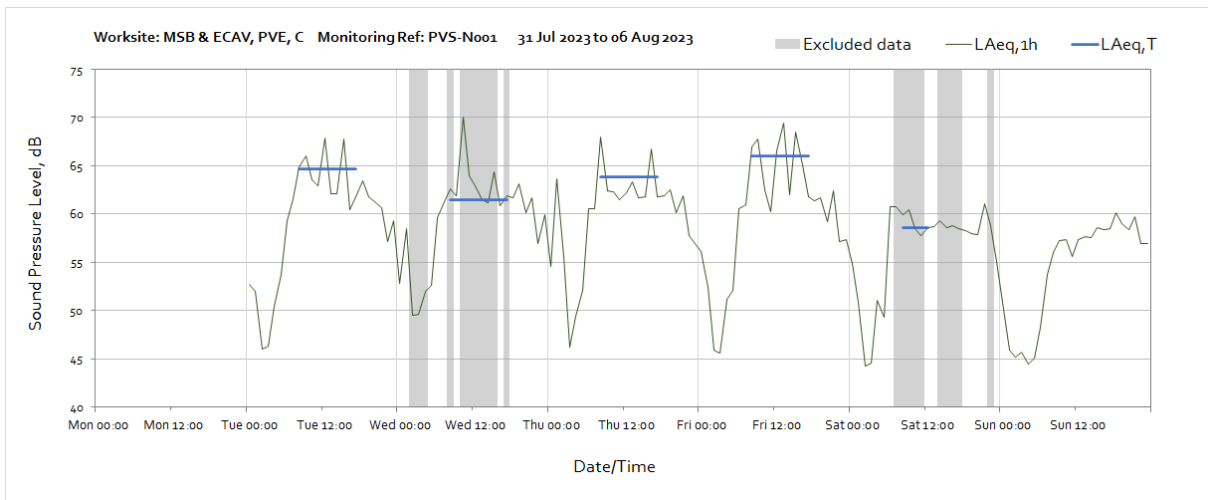


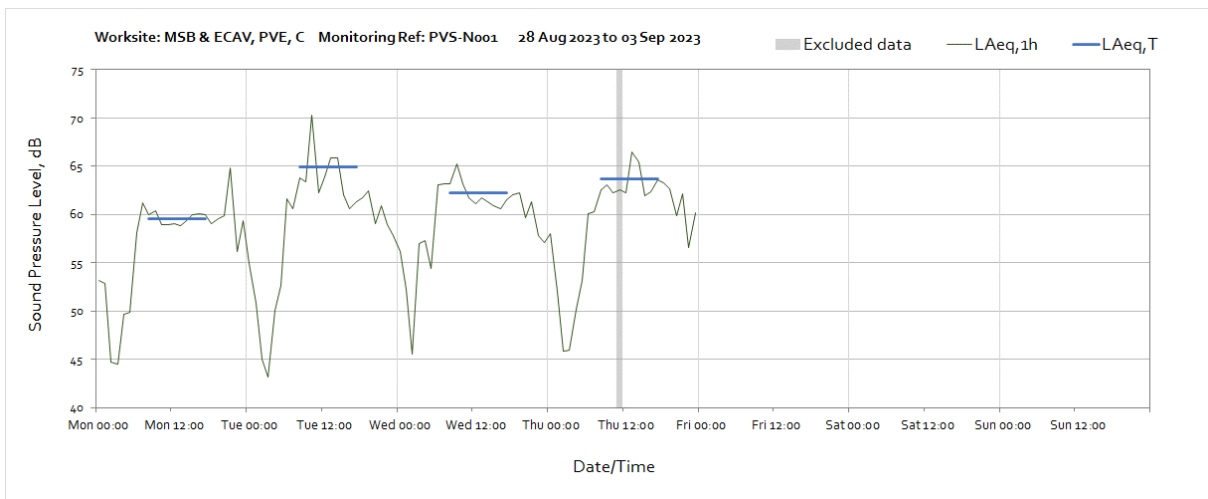
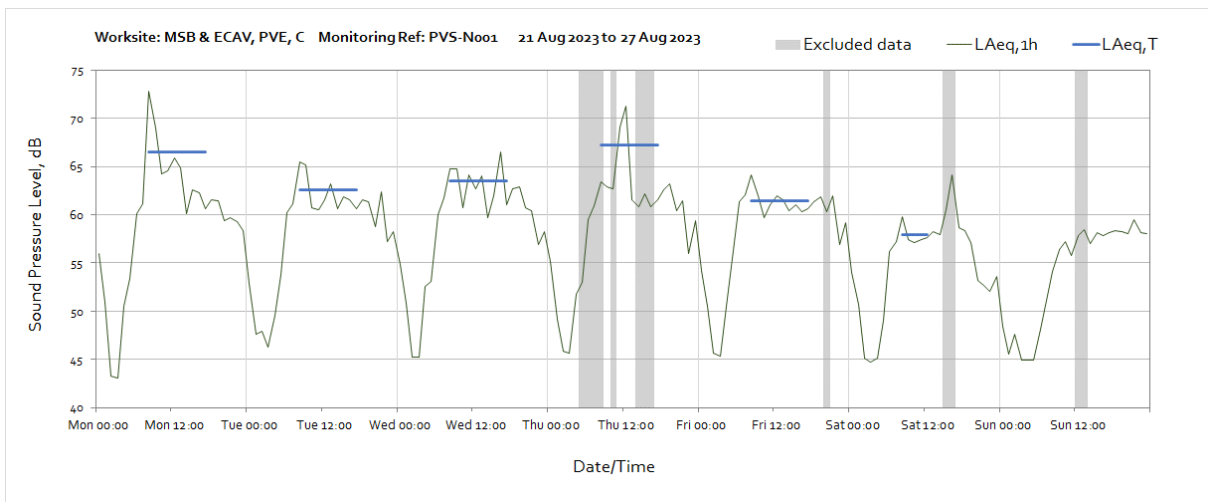
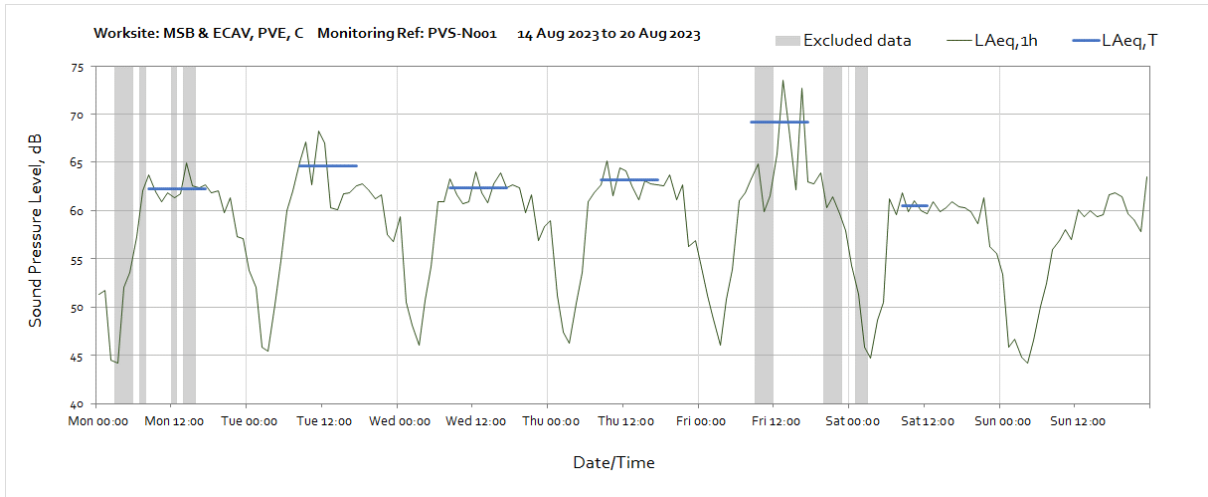




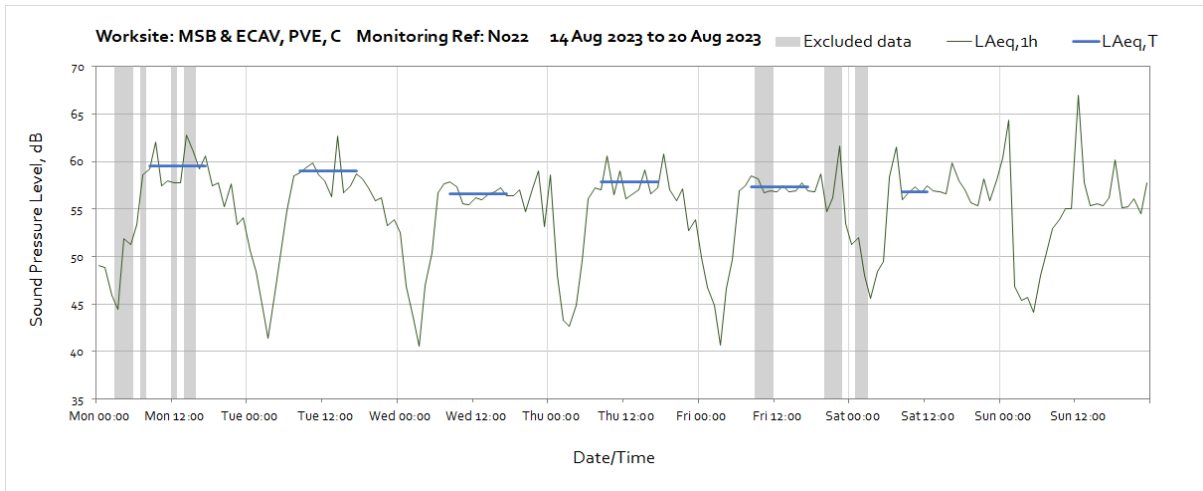
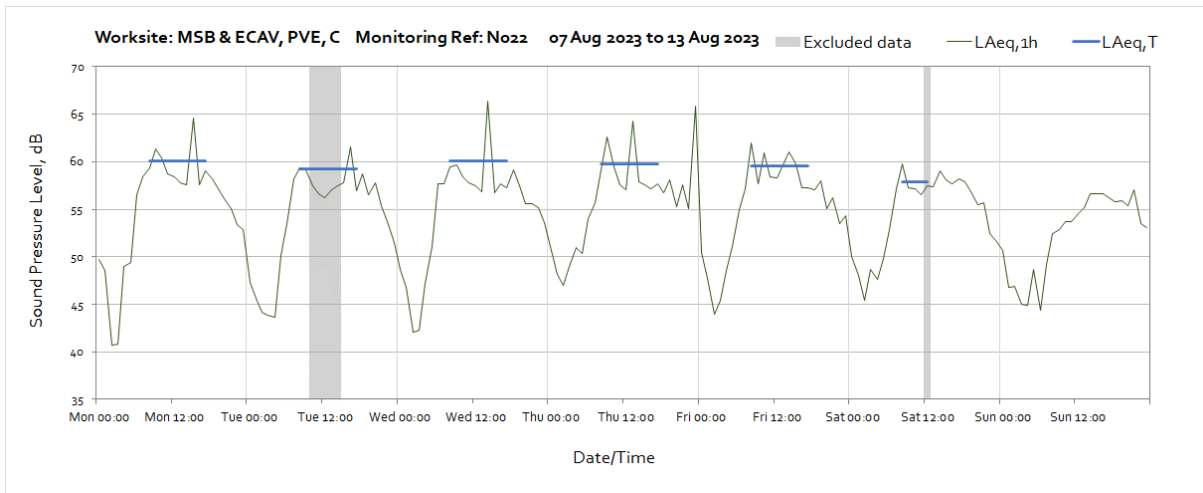
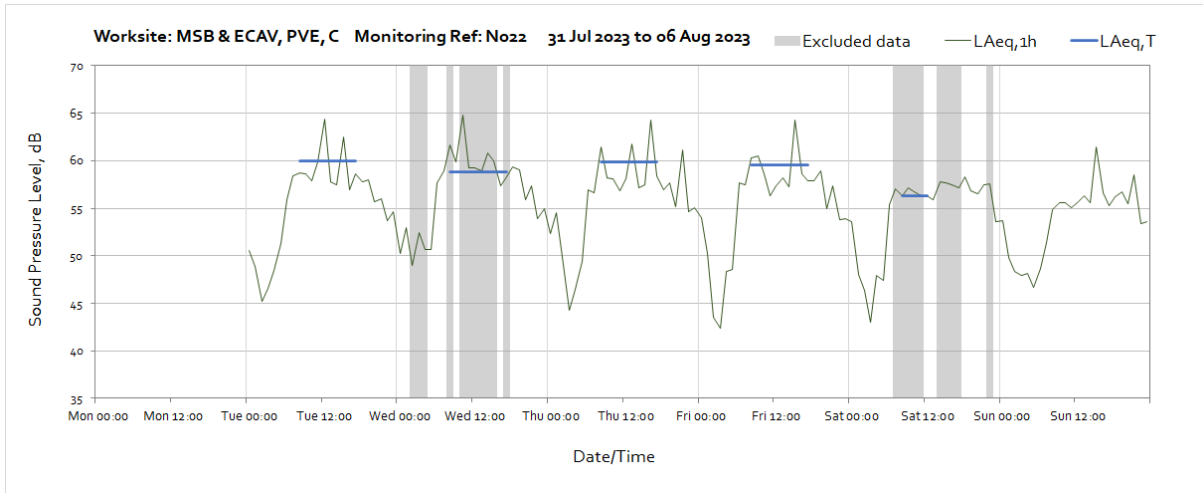


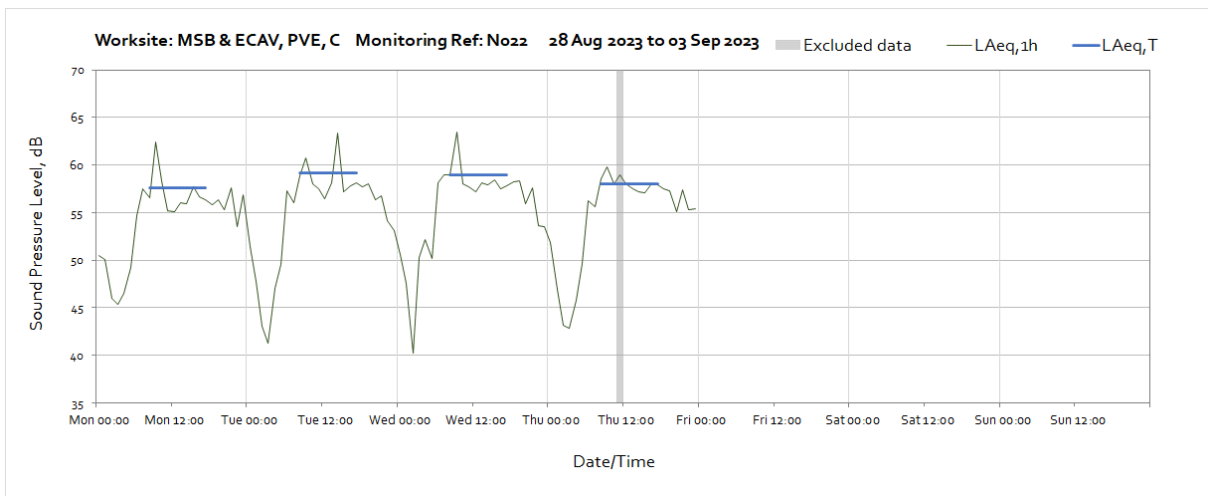
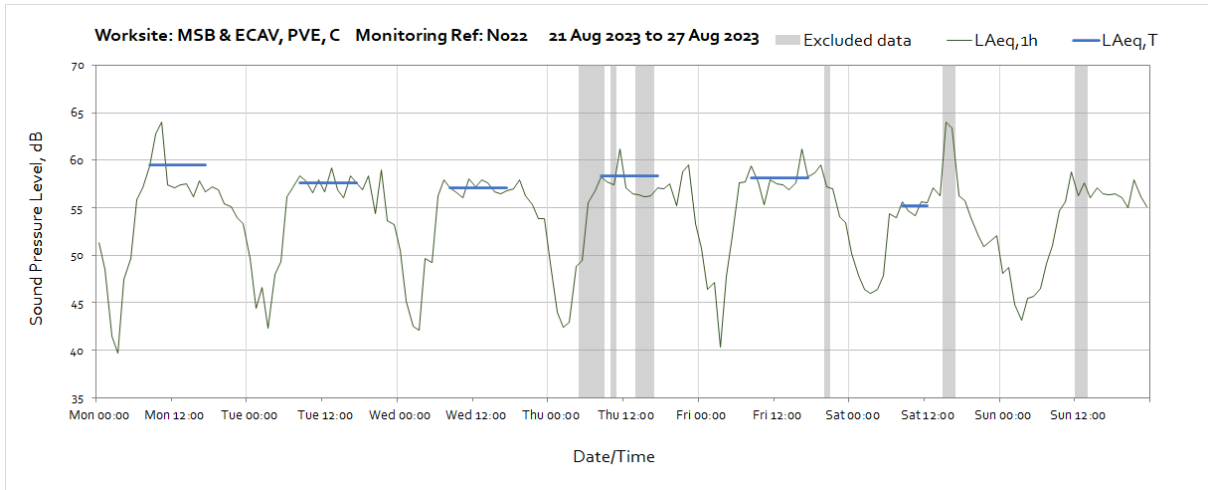
**Worksite: MSB & ECAV, PVE, C – Monitoring Ref: PVS-N001**



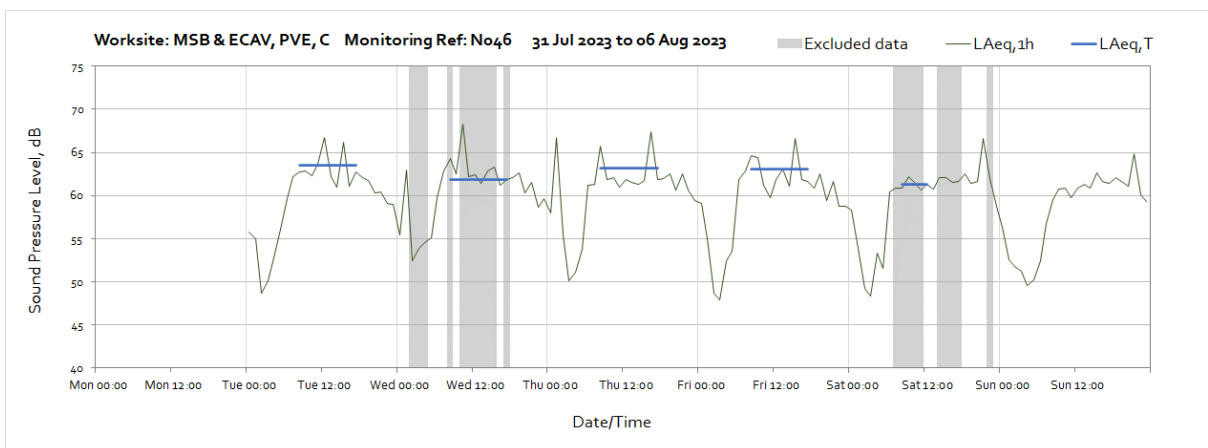


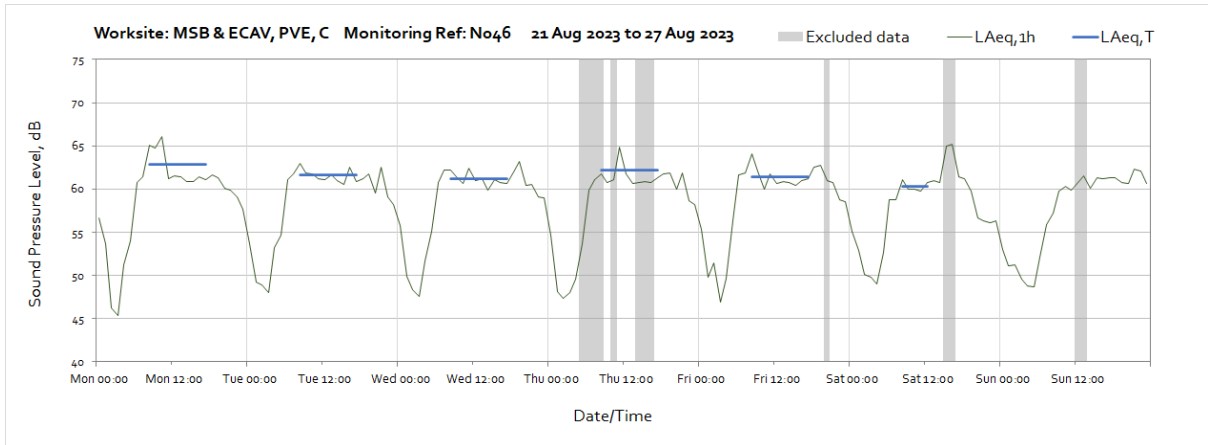
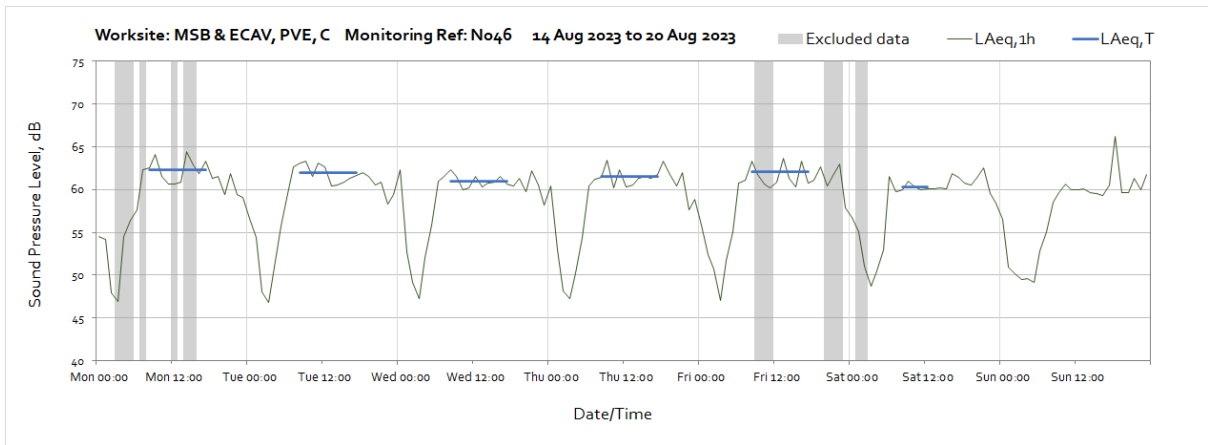
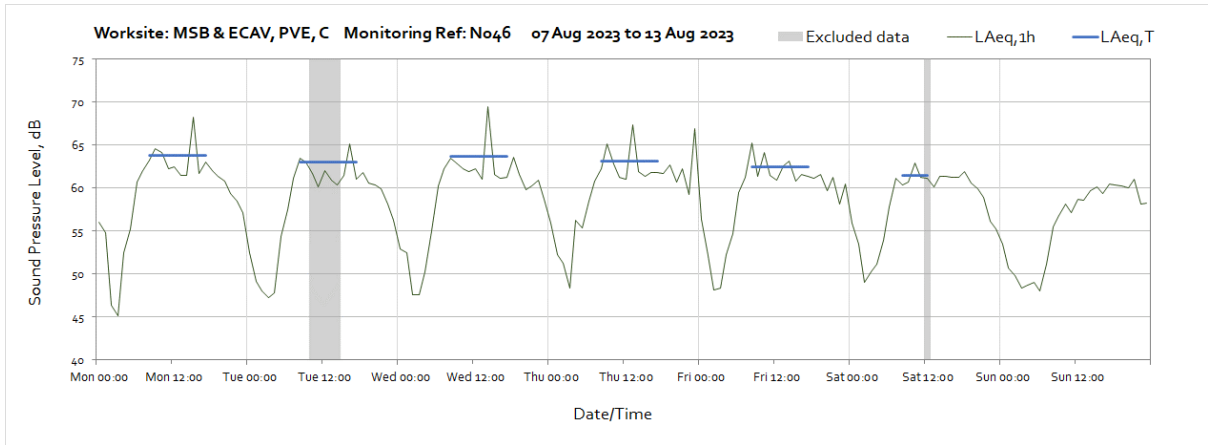
## Worksite: MSB & ECAV, PVE, C - Monitoring Ref: N022

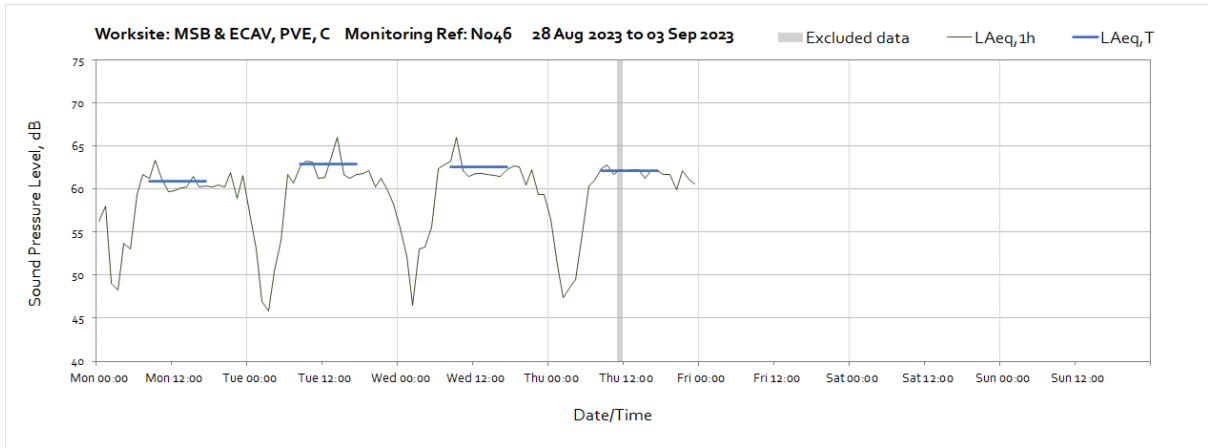




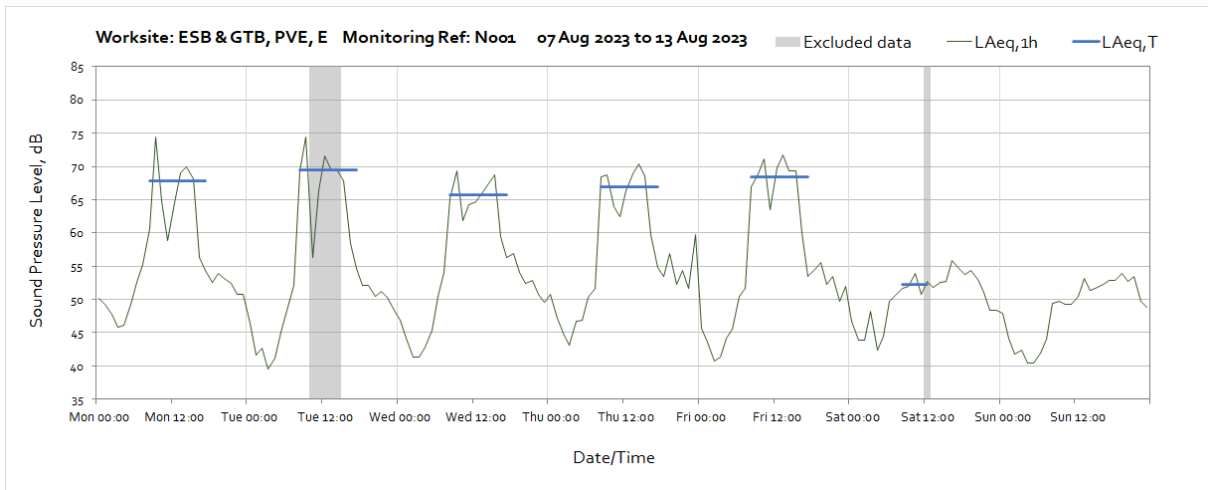
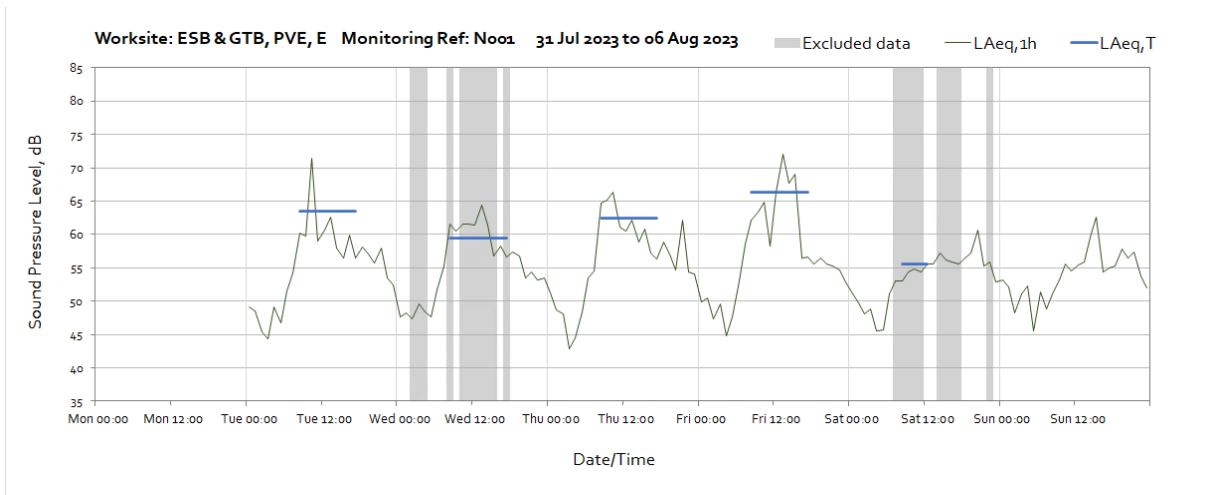
**Worksite: MSB & ECAV, PVE, C – Monitoring Ref: N046**

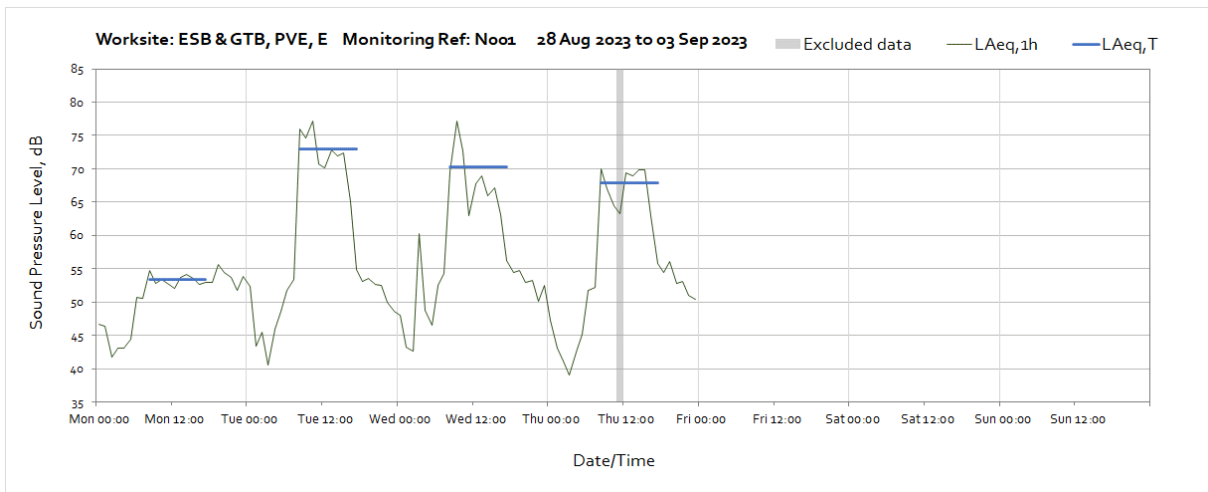
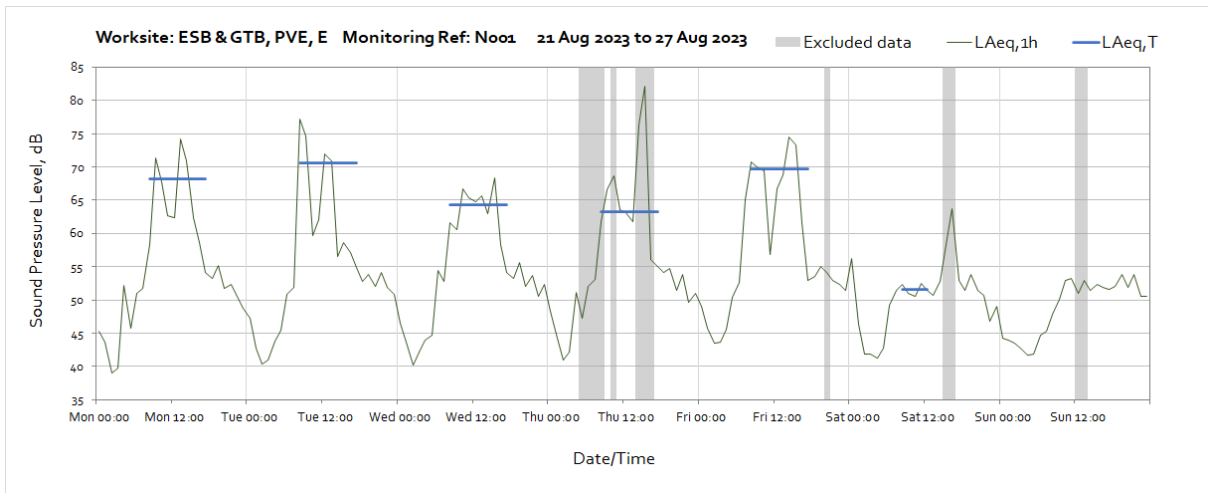
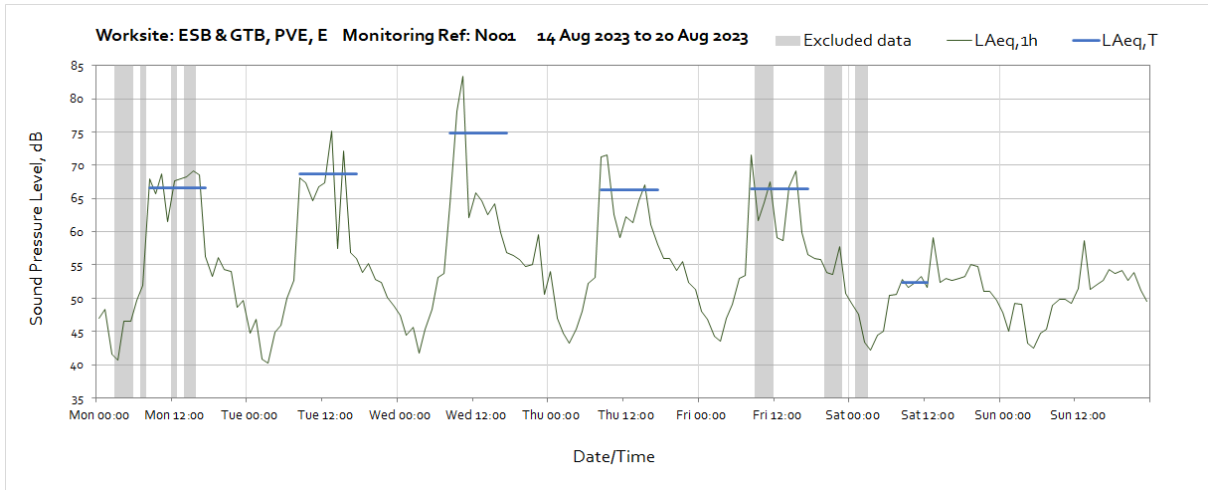






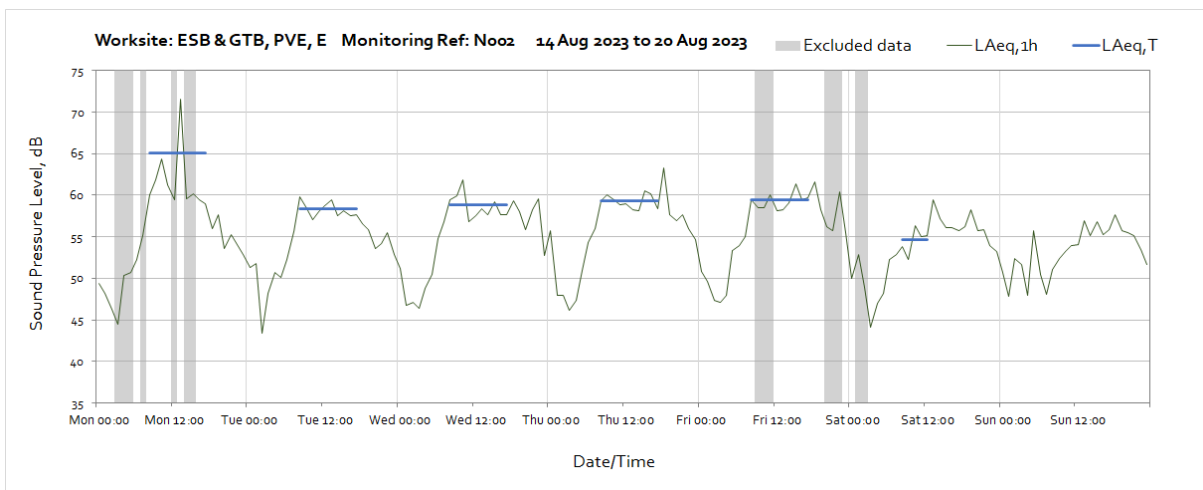
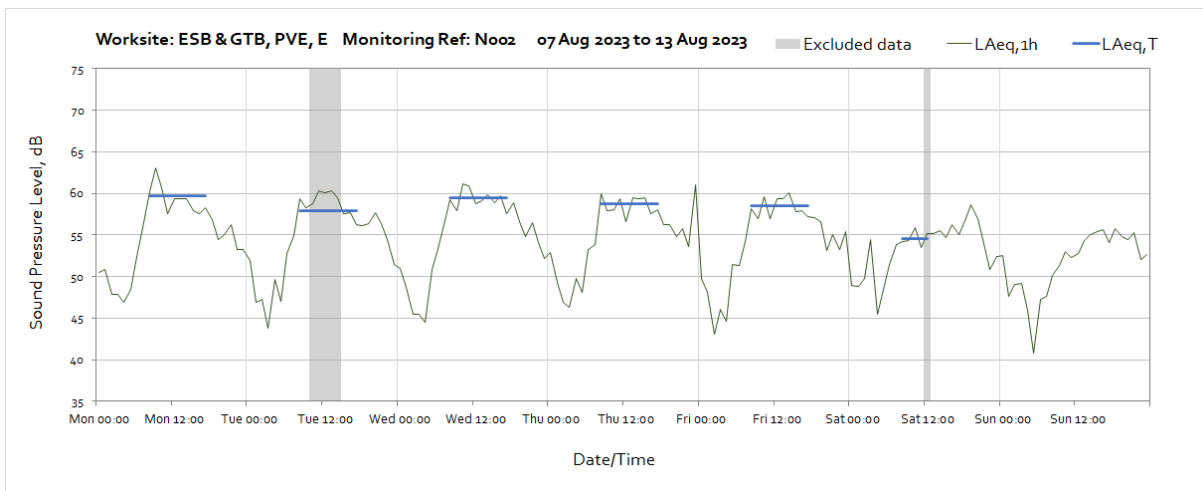
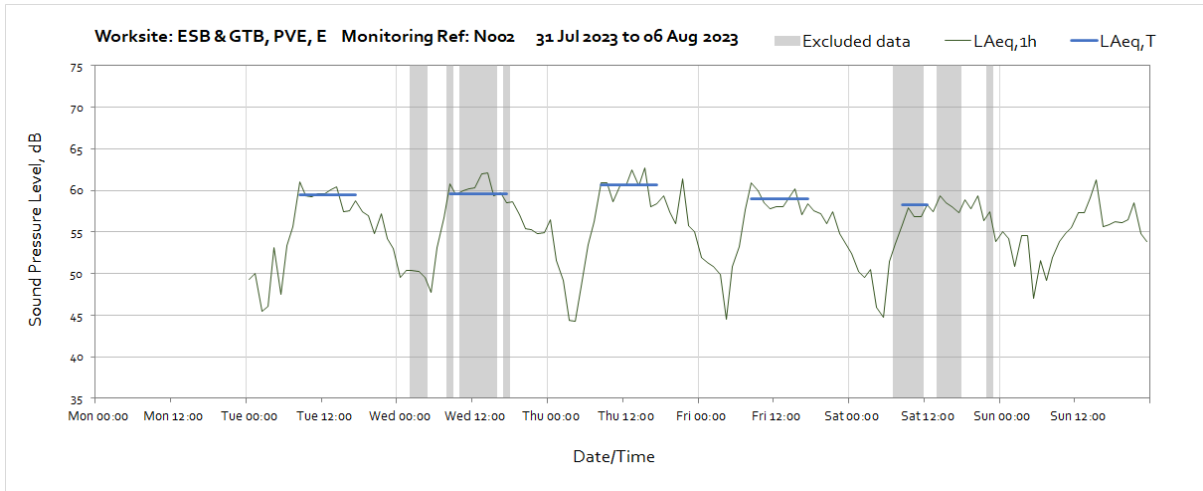
**Worksite: ESB & GTB, PVE, E - Monitoring Ref: N001**

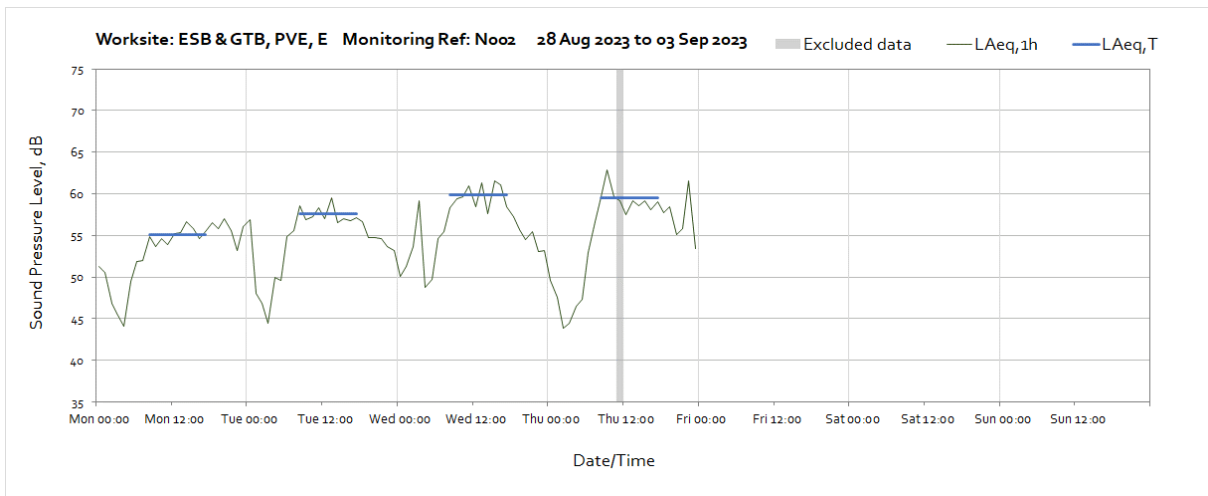
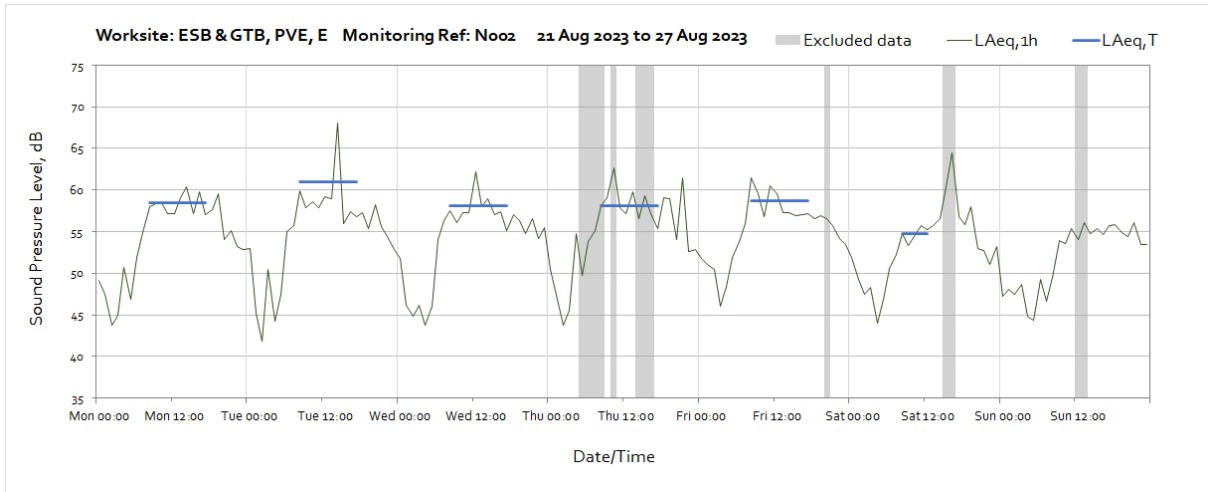




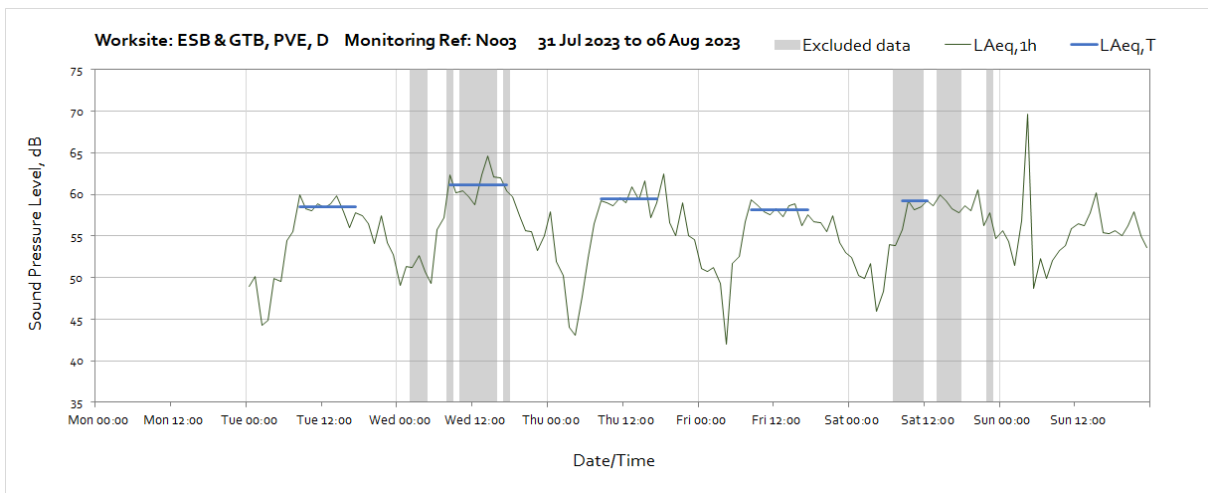


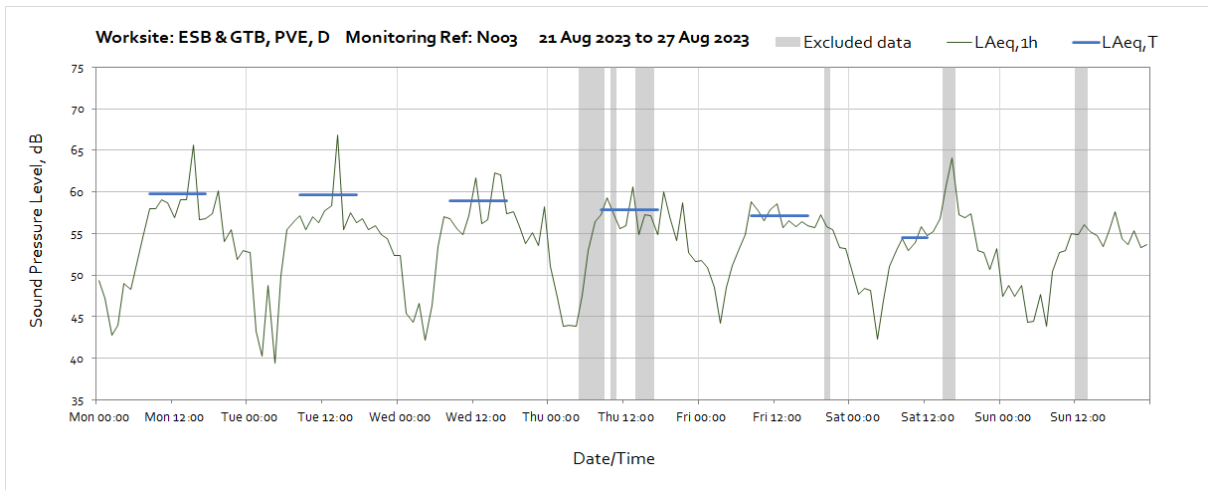
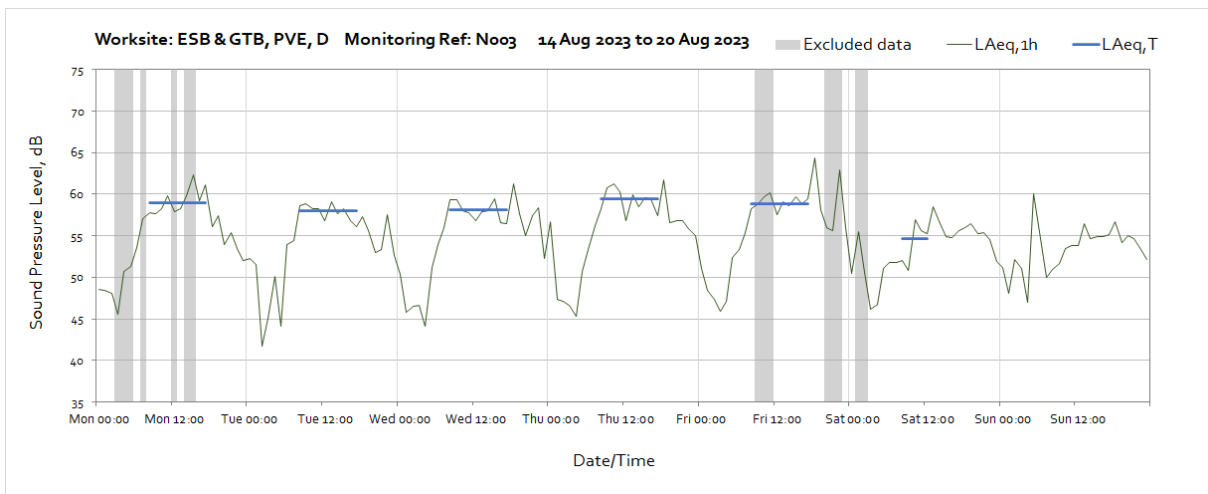
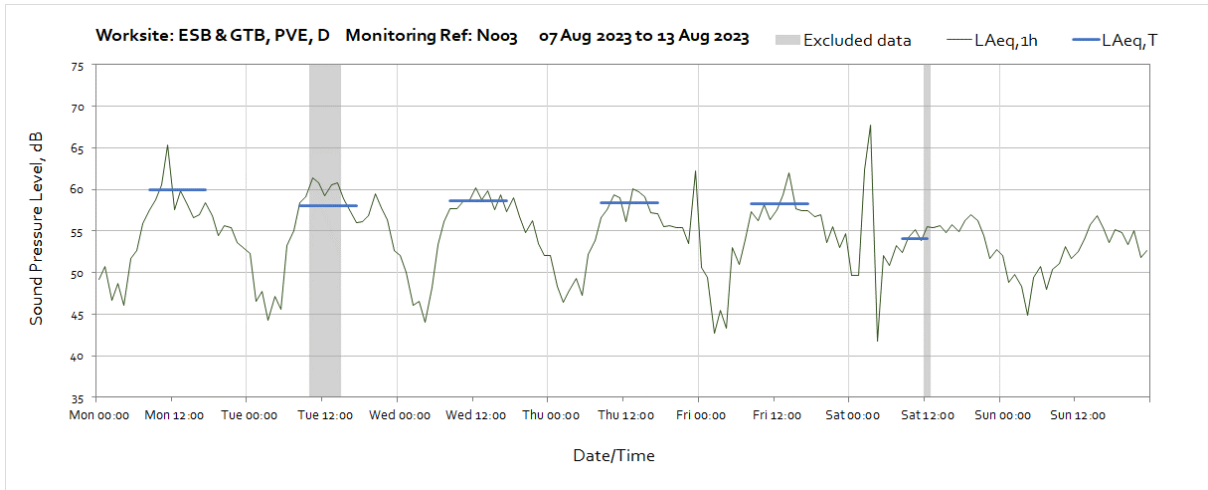
## Worksite: ESB & GTB, PVE, E – Monitoring Ref: N002

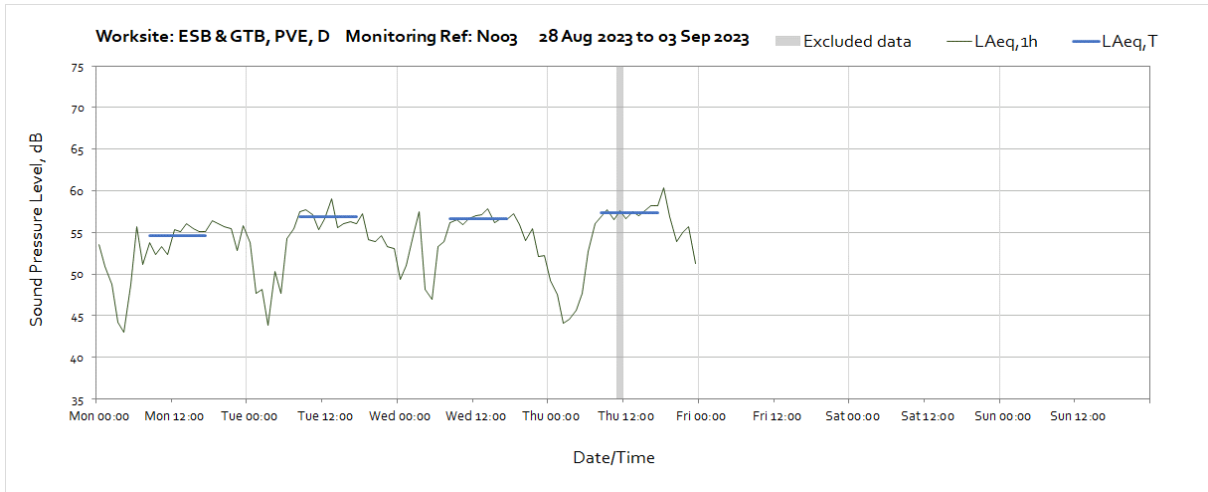




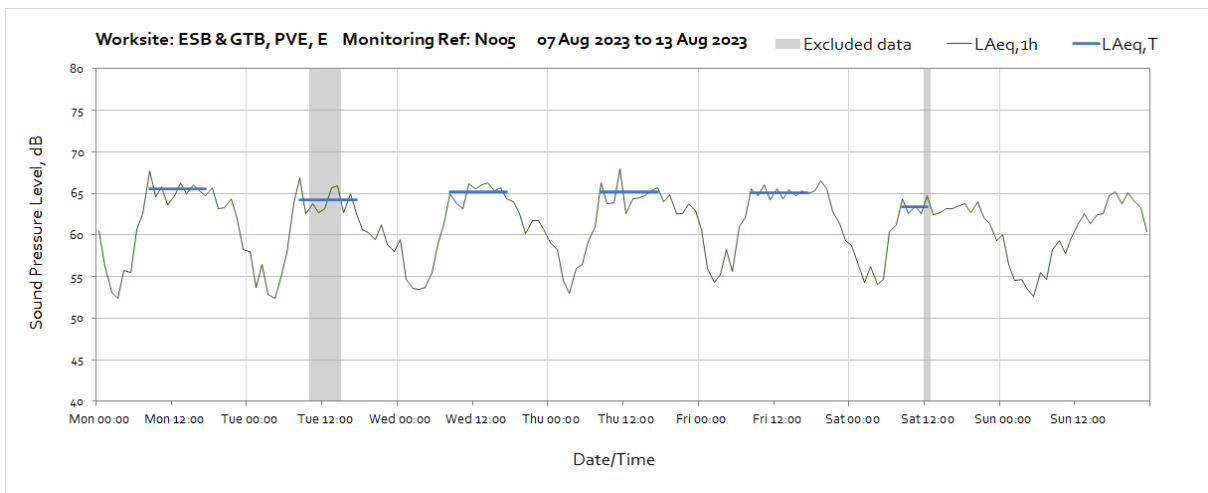
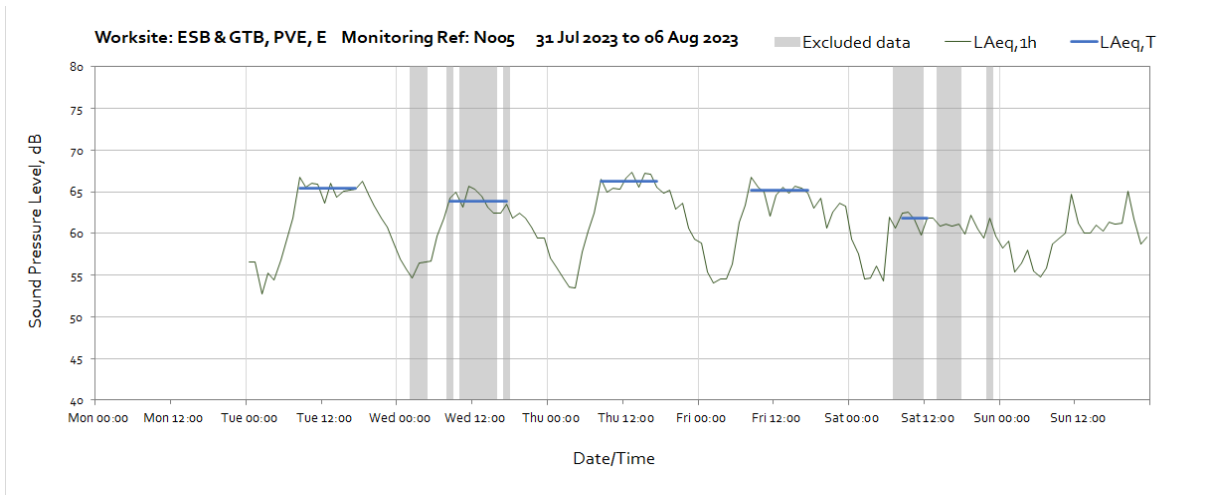
**Worksite: ESB & GTB, PVE, D - Monitoring Ref: N003**

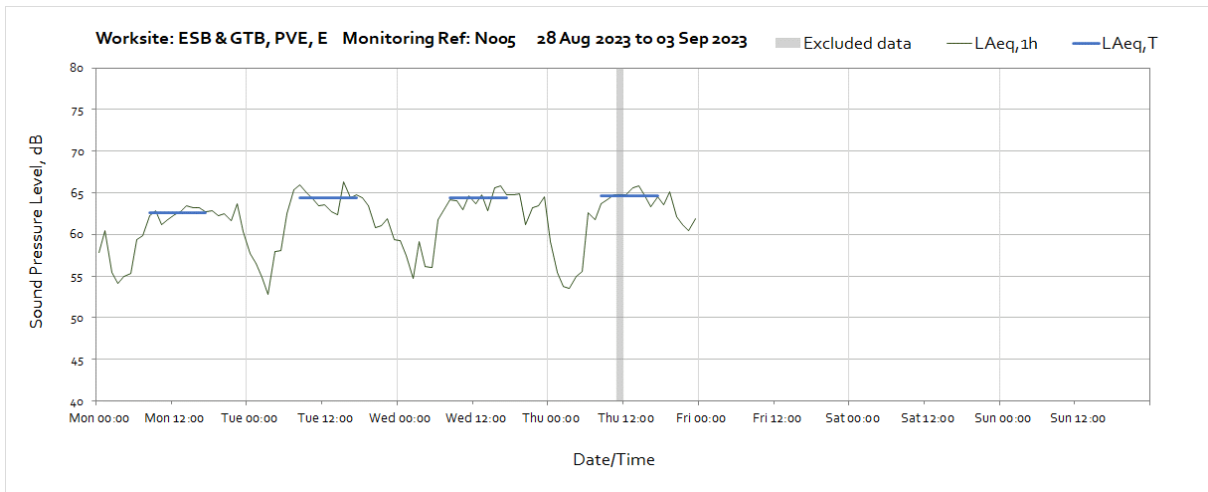
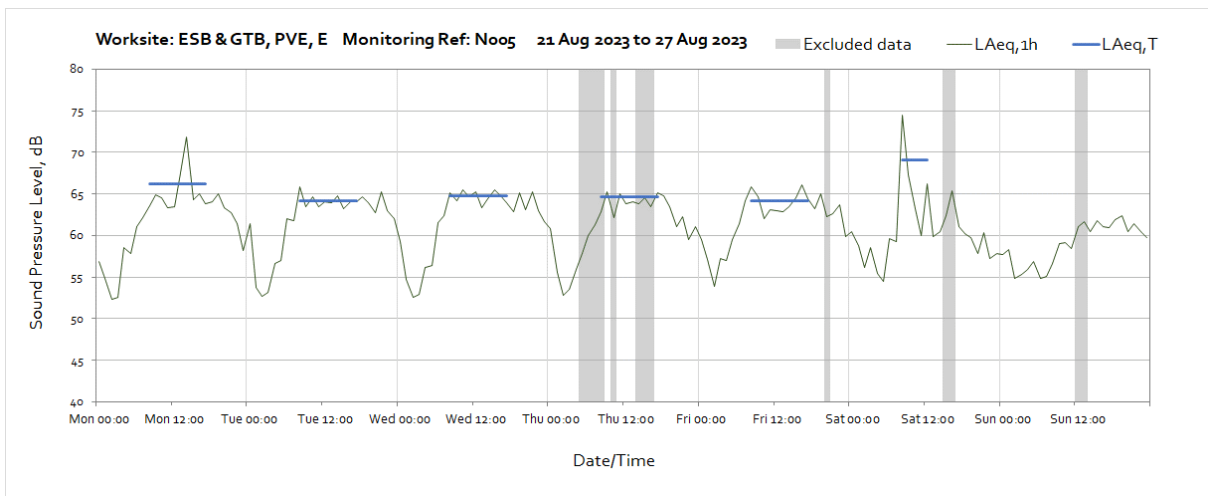
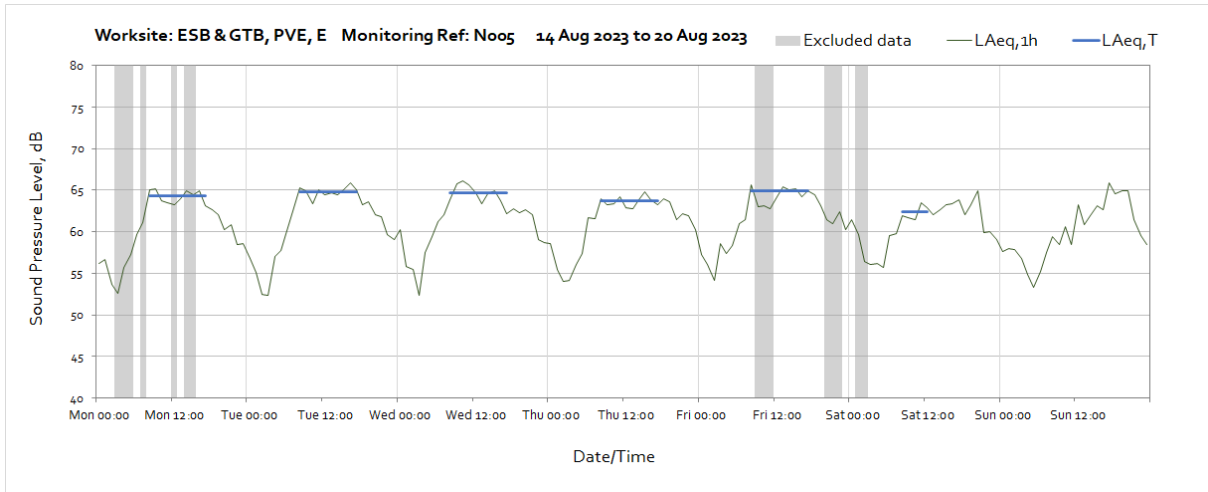




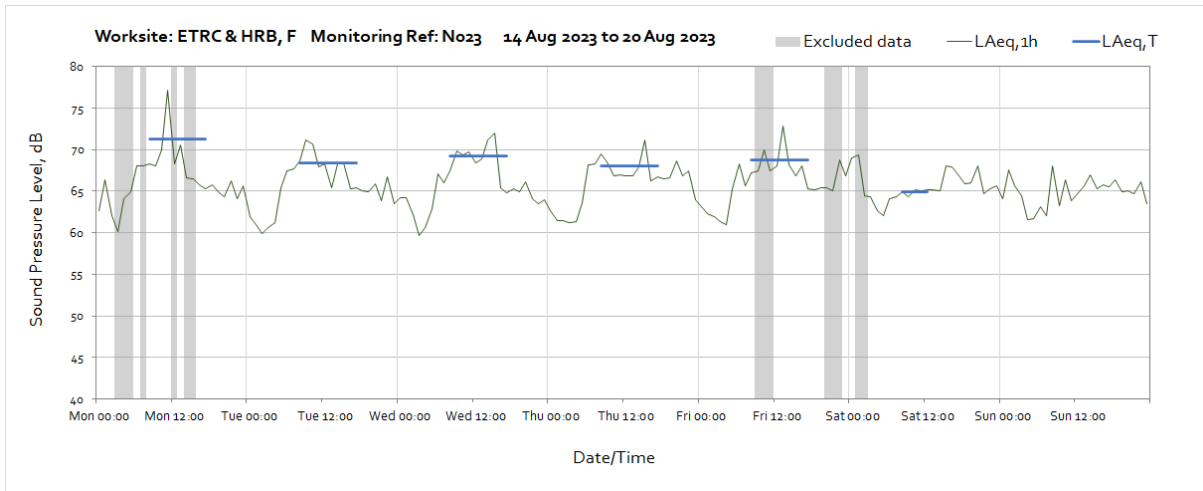
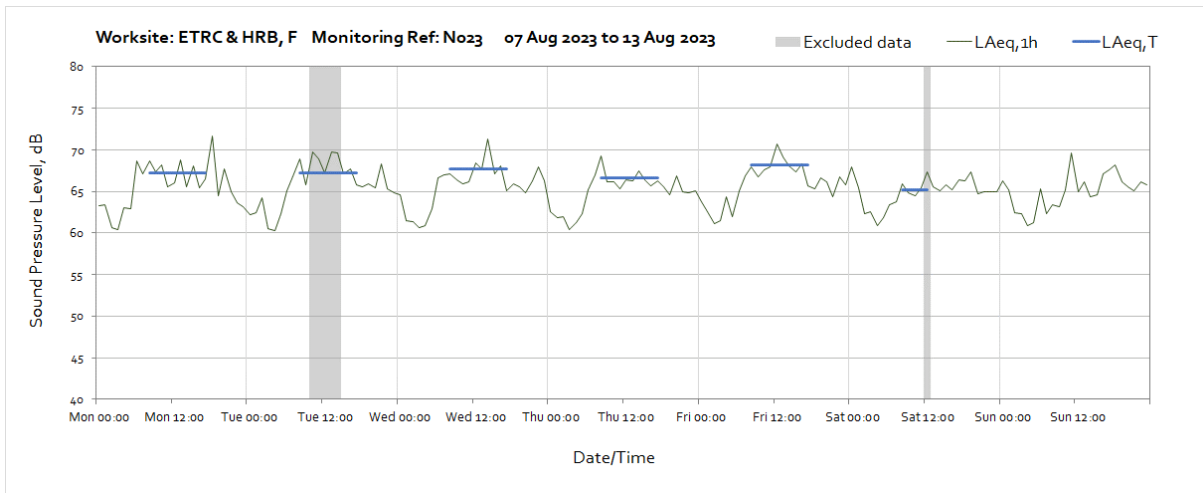
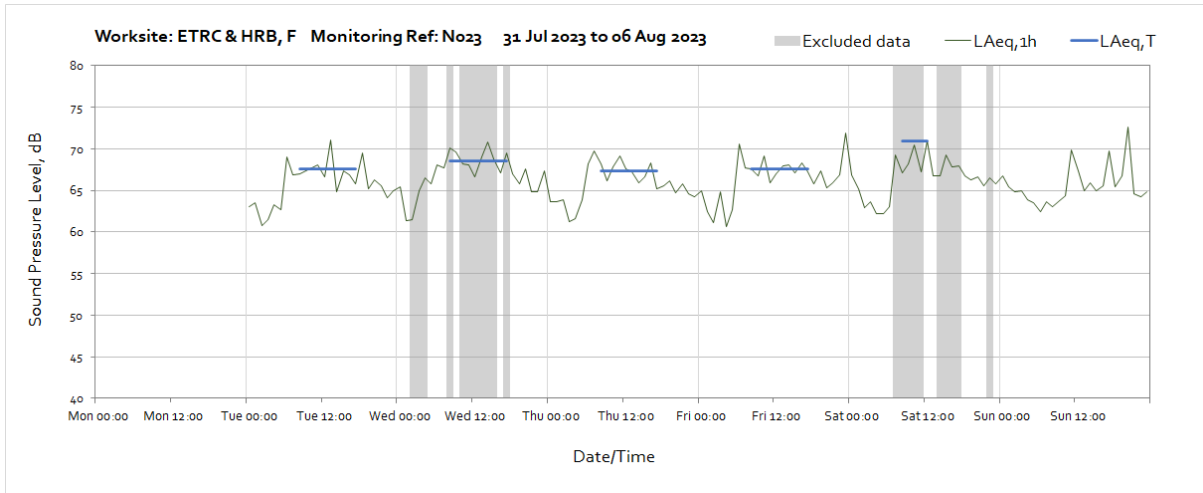


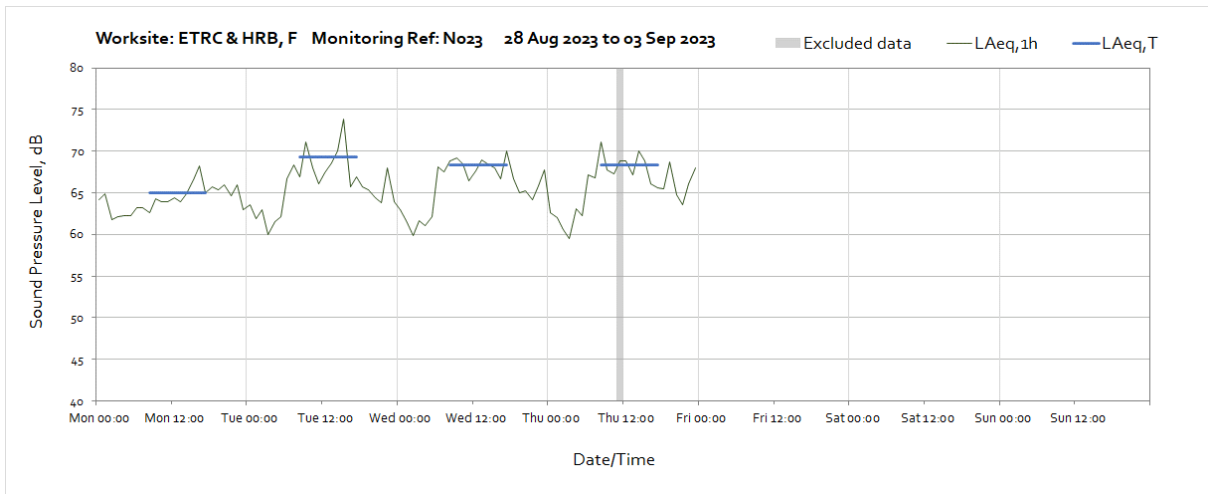
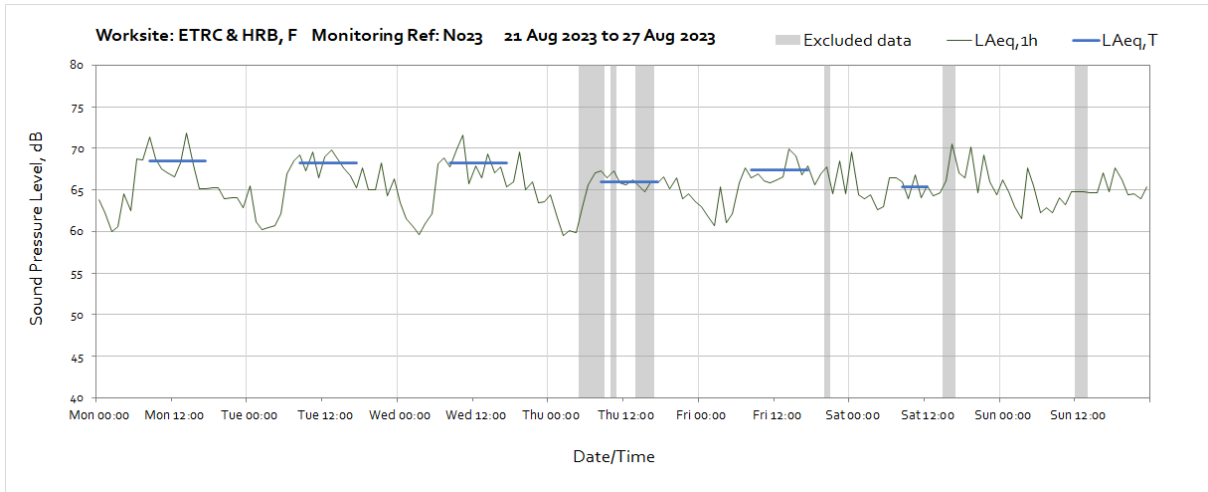
**Worksite: ESB & GTB, PVE, E – Monitoring Ref: N005**



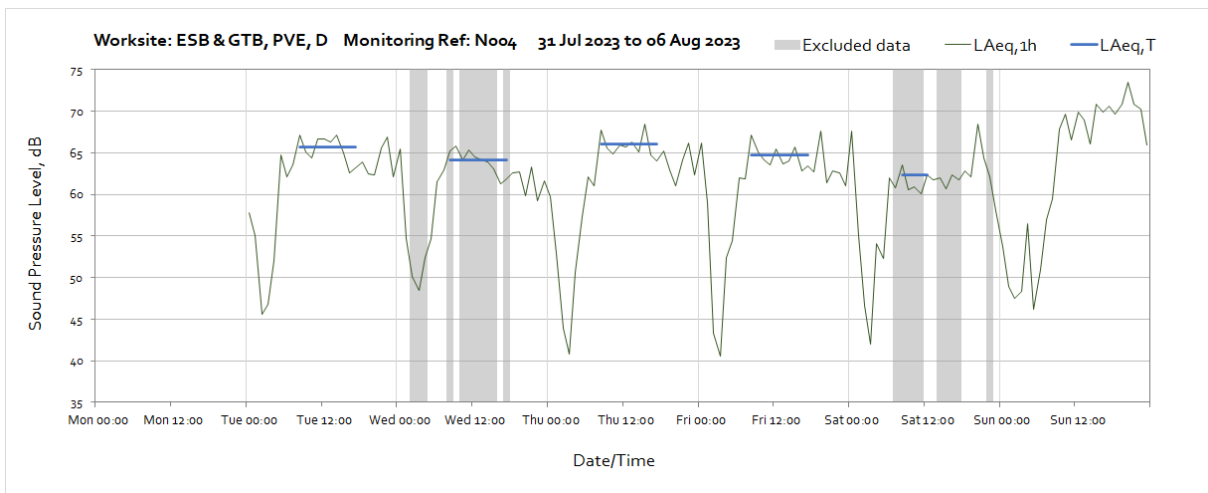


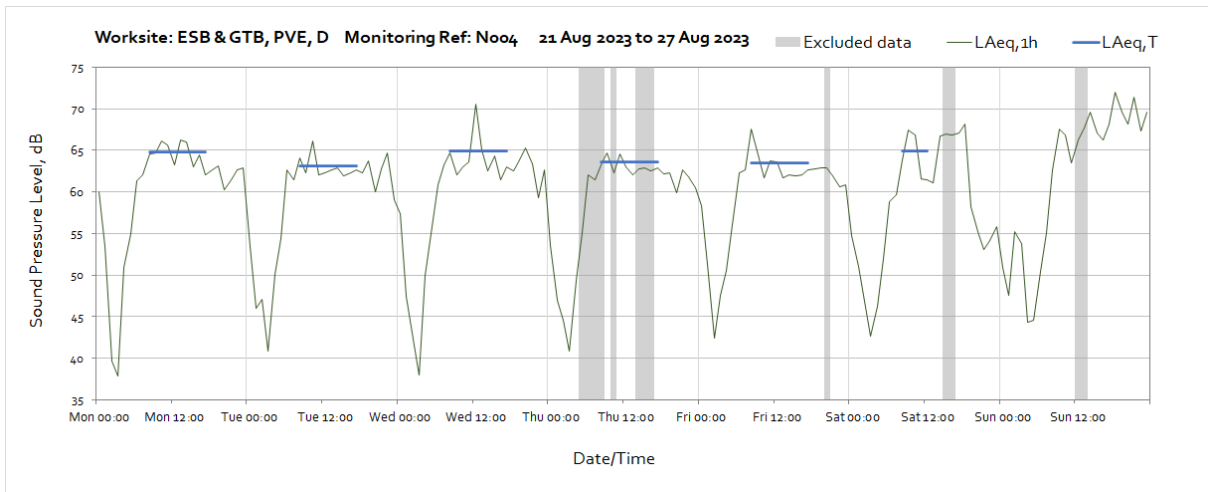
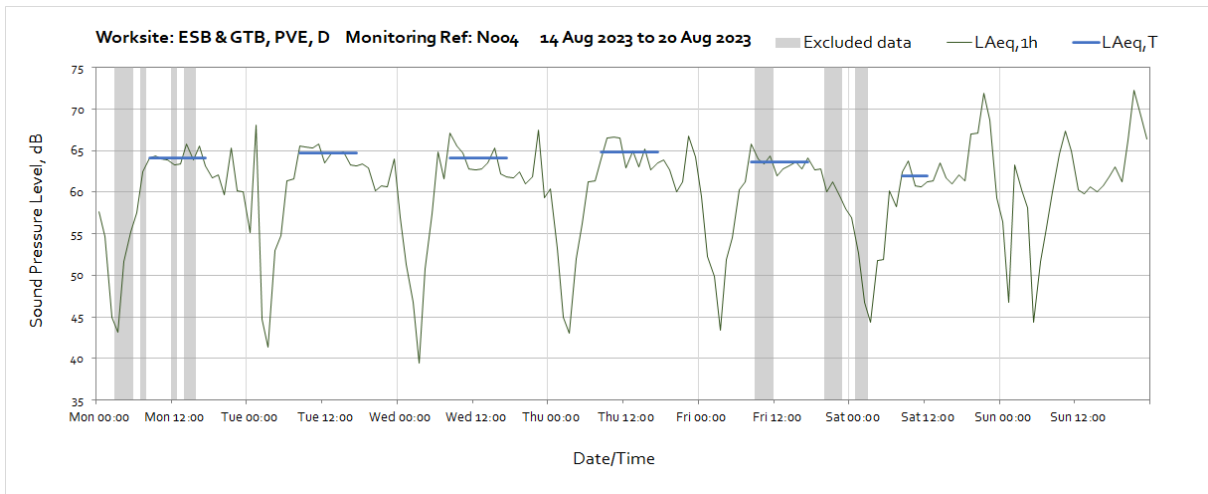
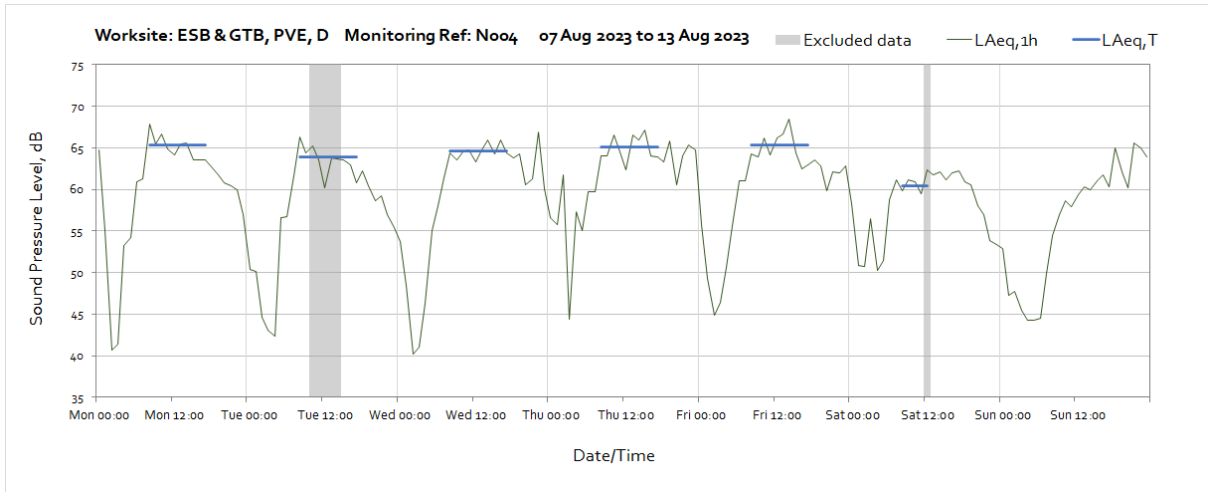
## Worksite: ETRC & HRB, F - Monitoring Ref: N023



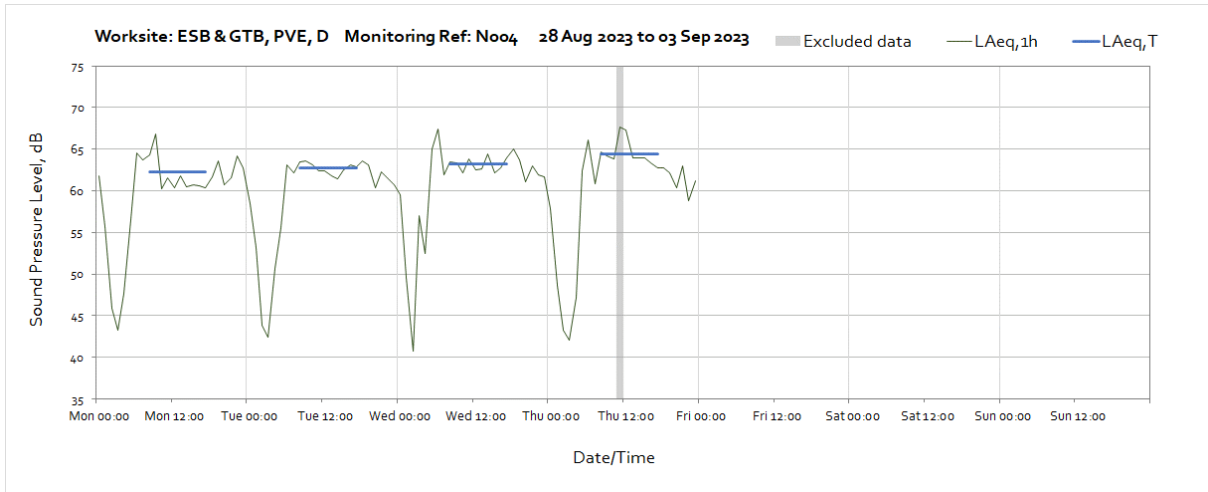


**Worksite: ESB & GTB, PVE, D – Monitoring Ref: N004**

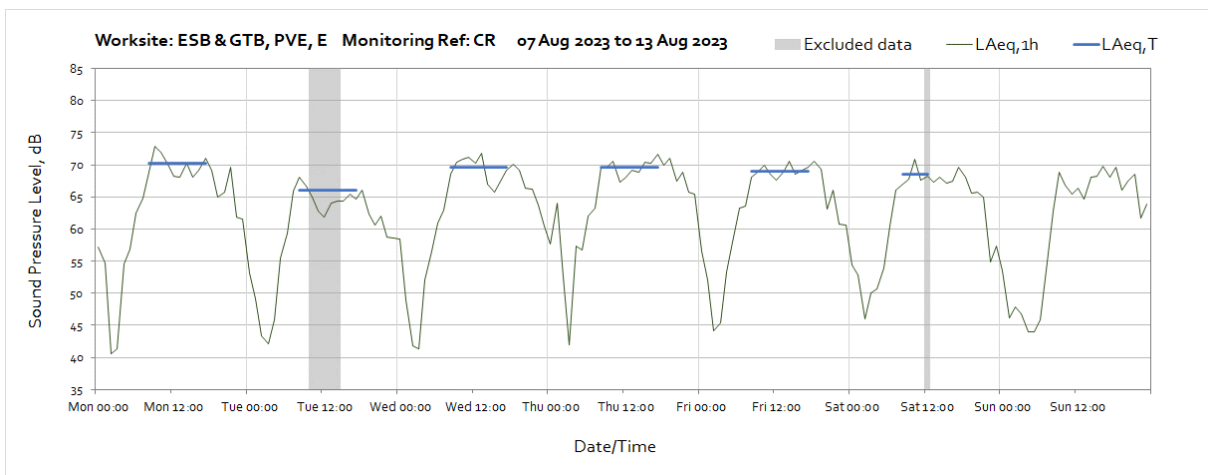
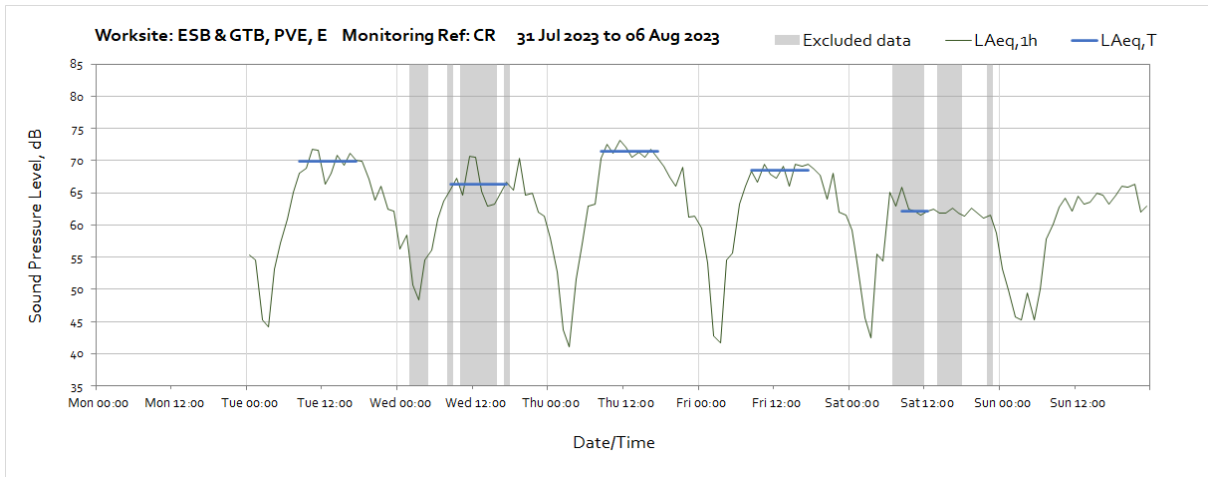


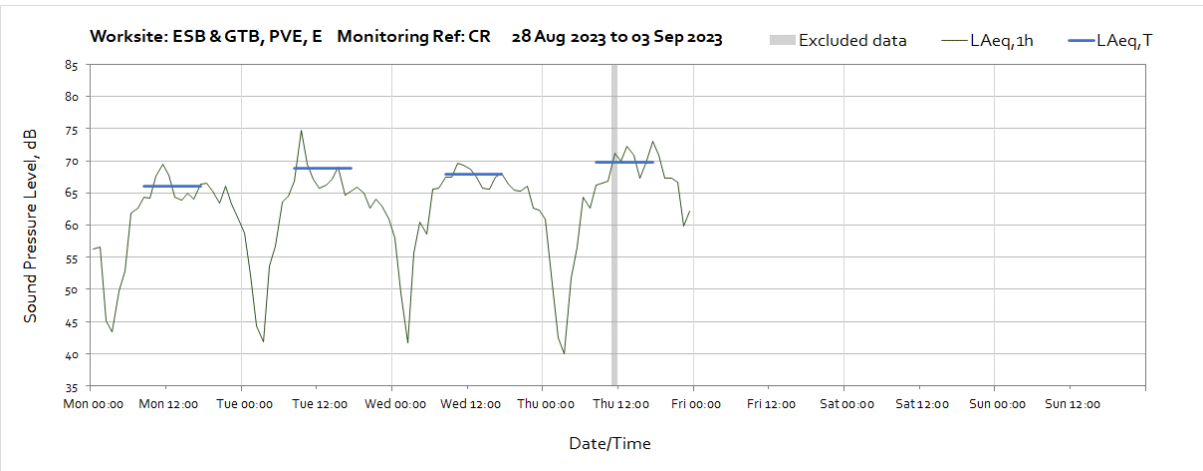
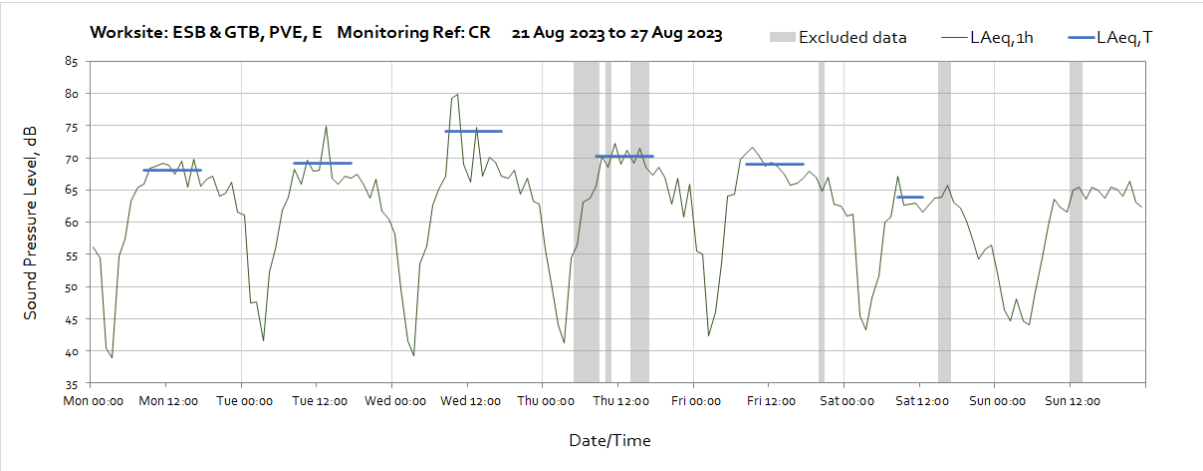
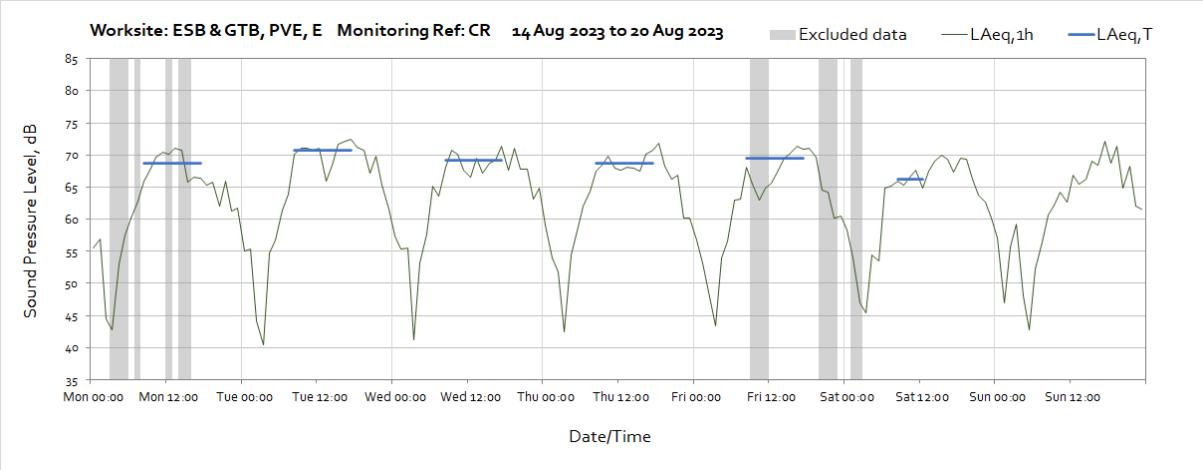




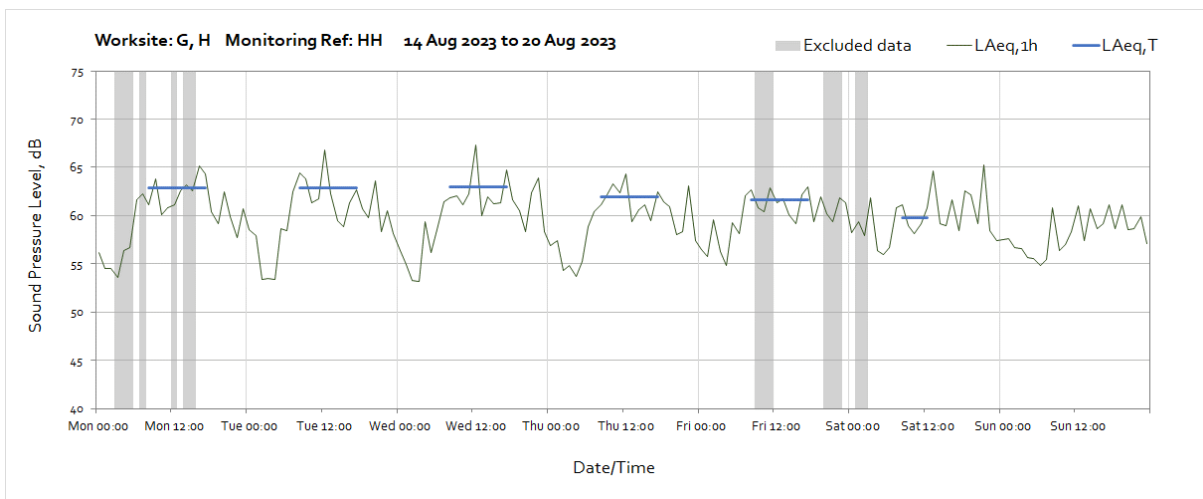
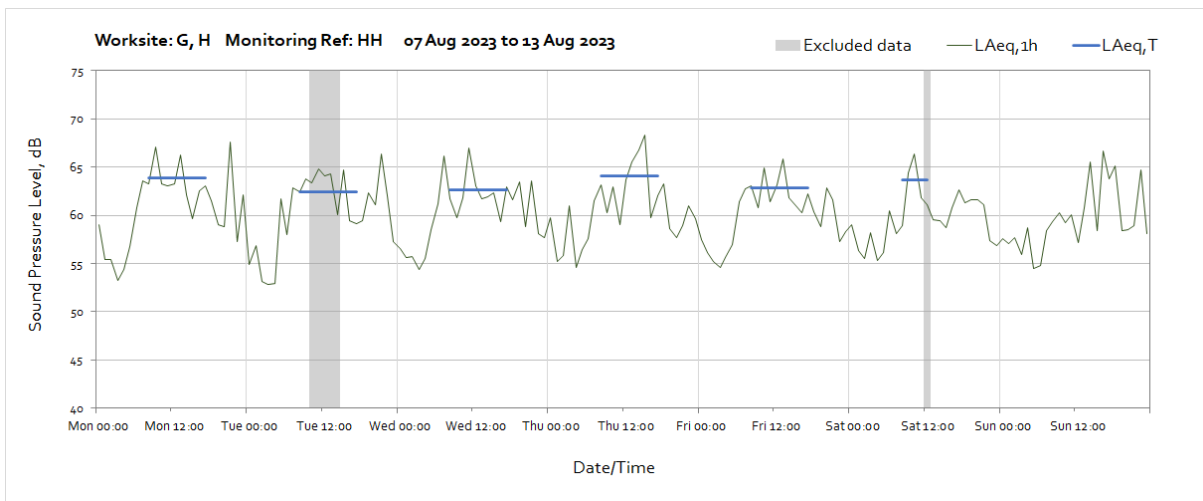
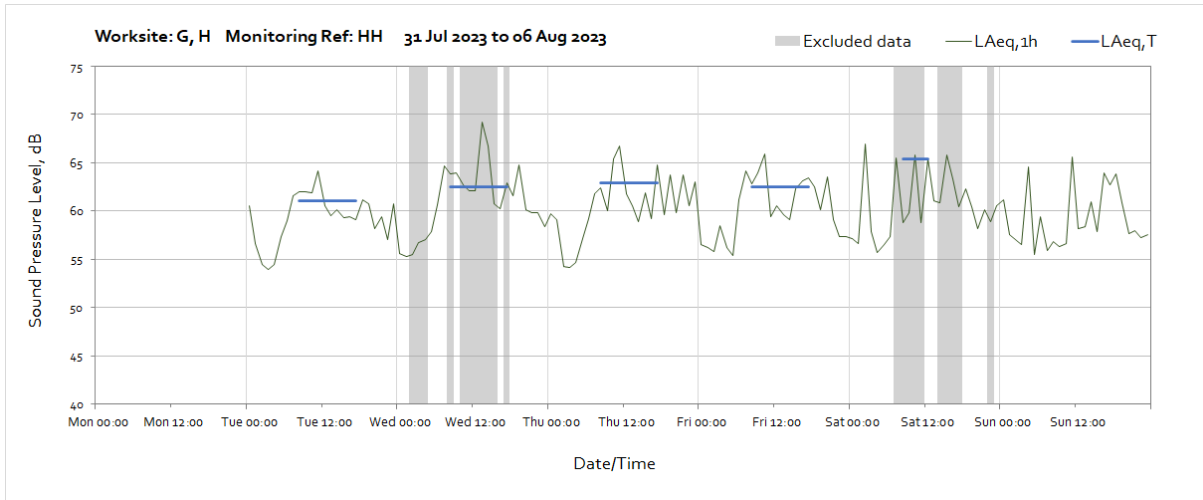


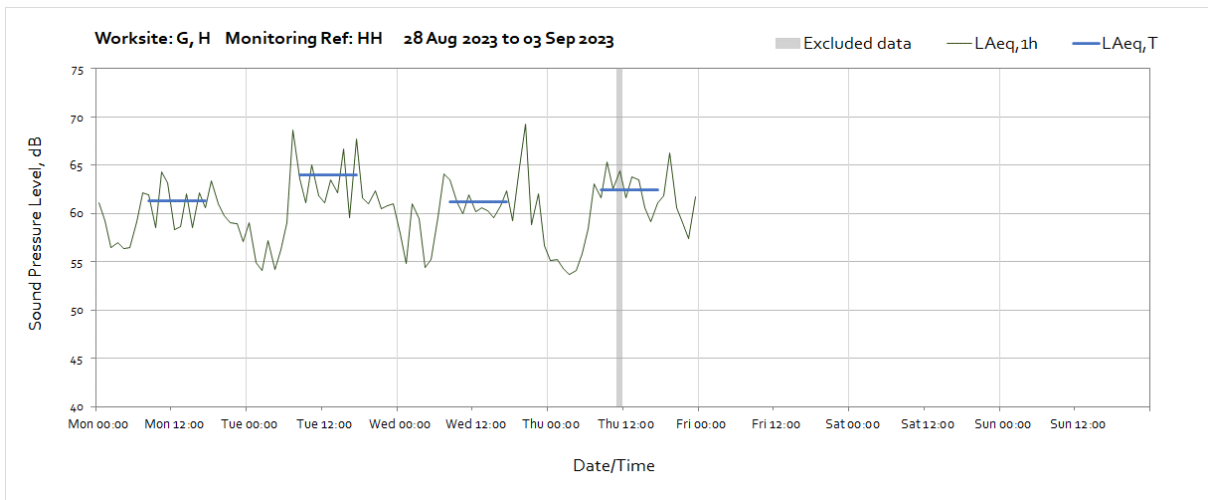
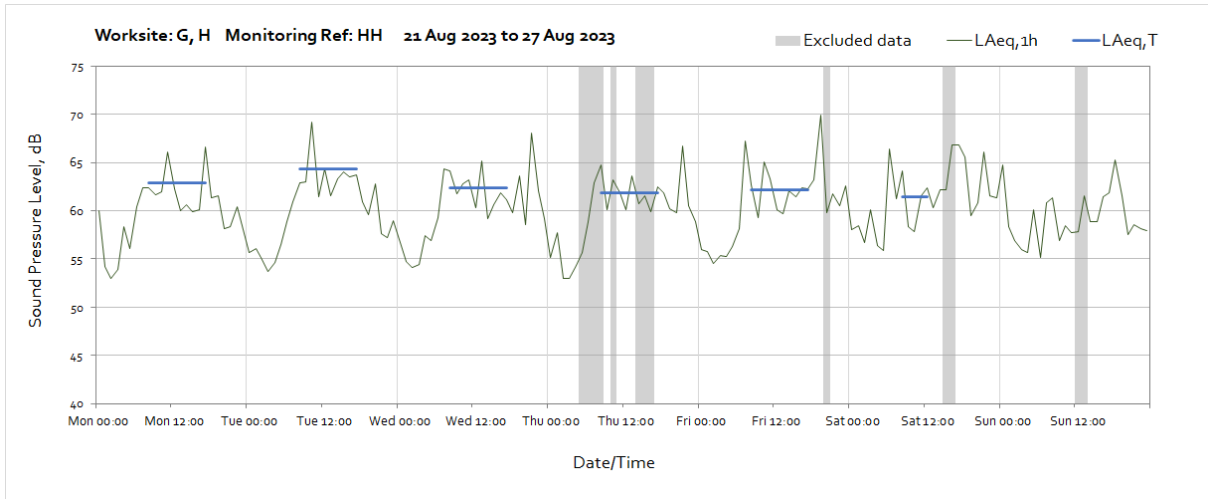
**Worksite: ESB & GTB, PVE, E – Monitoring Ref: CR**



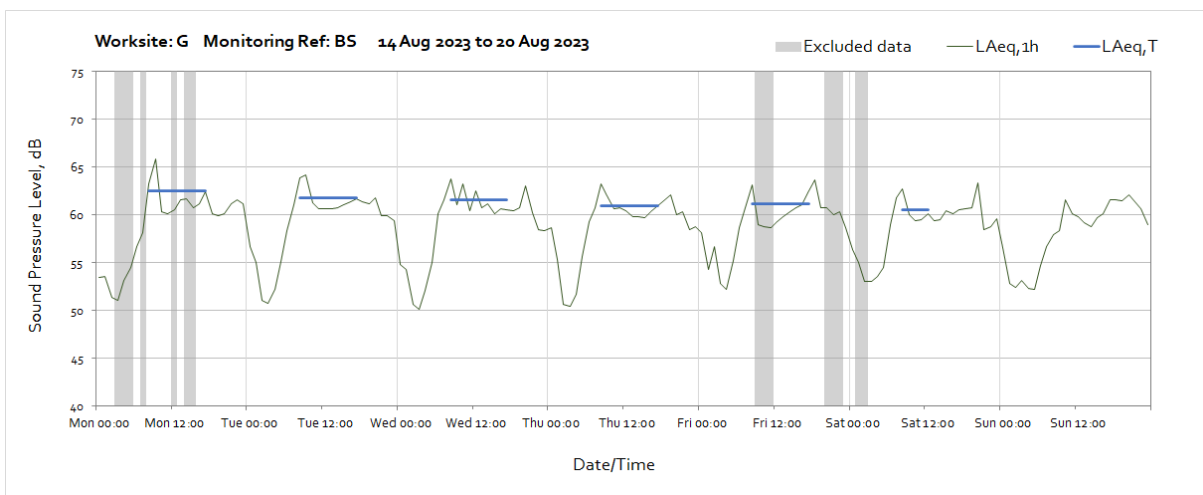
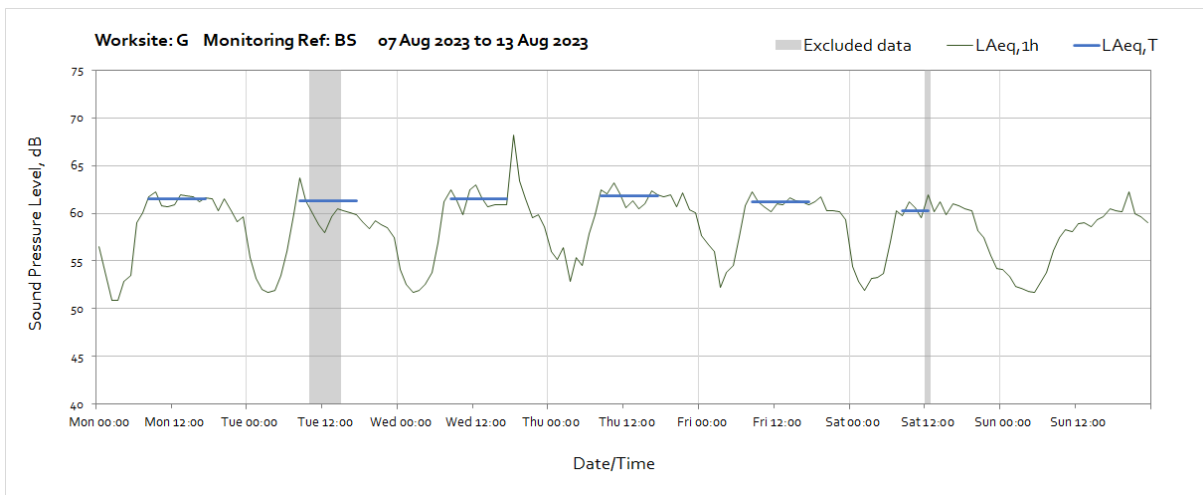
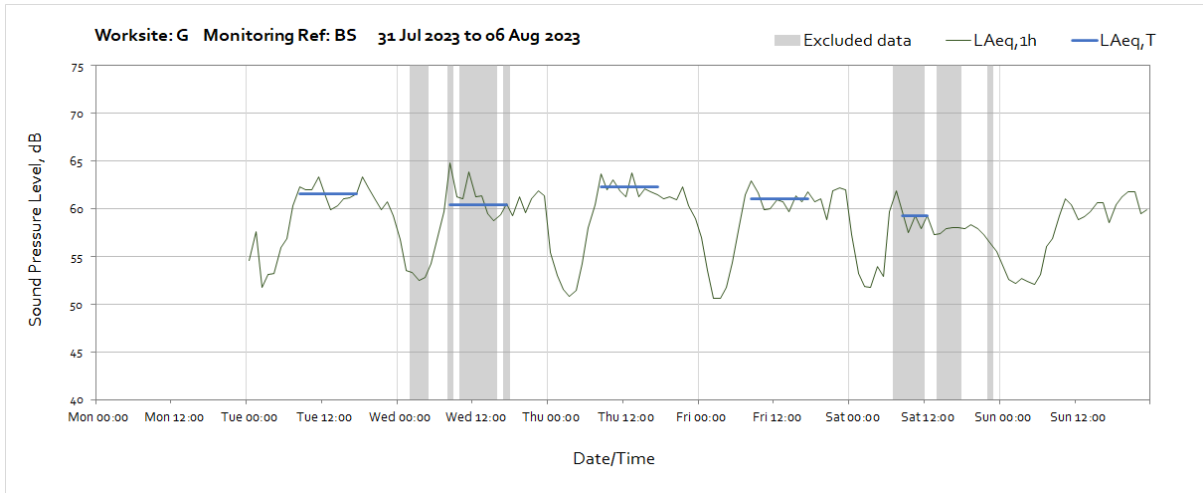


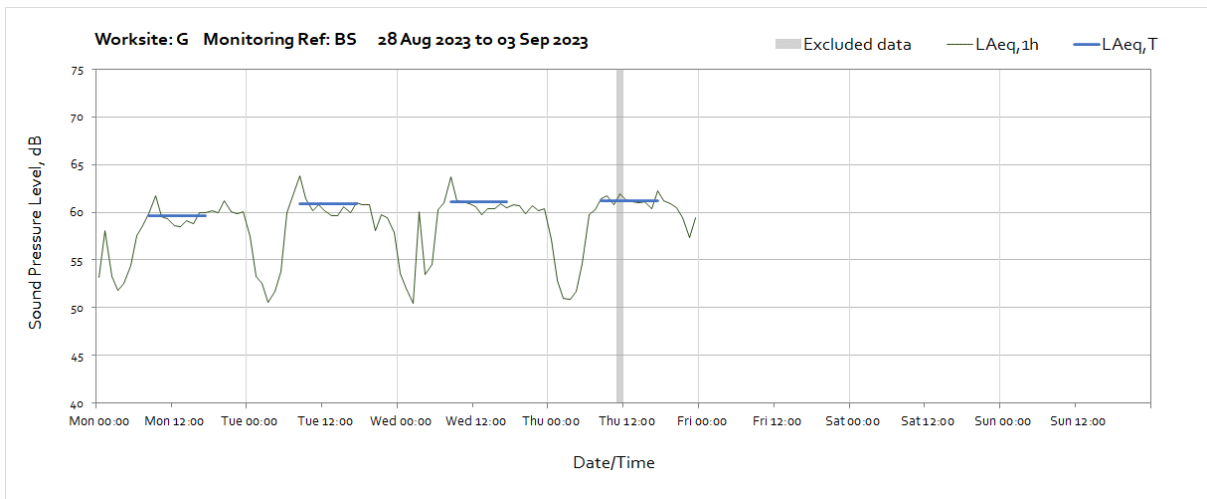
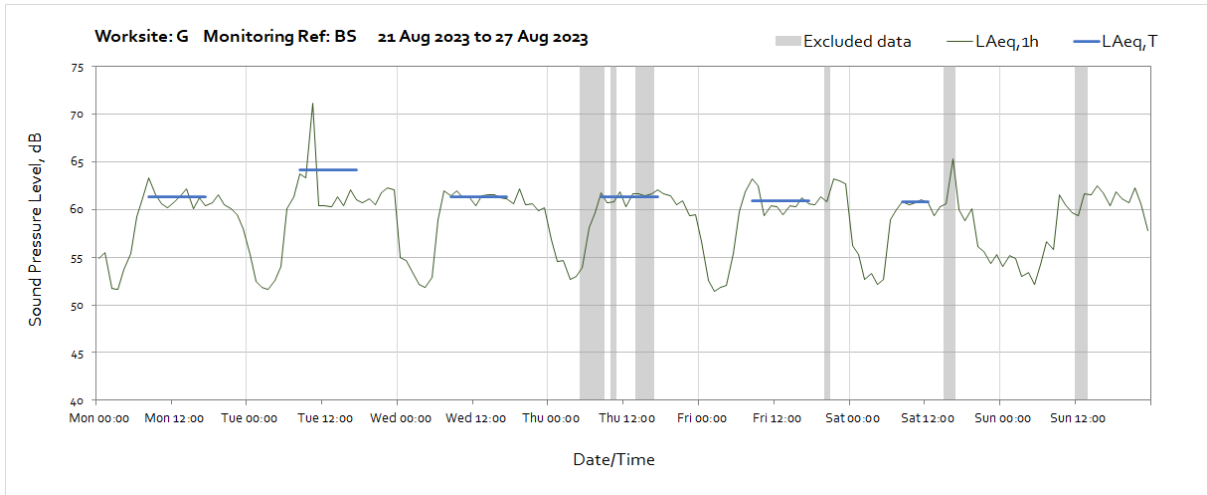
## Worksite: G, H – Monitoring Ref: HH



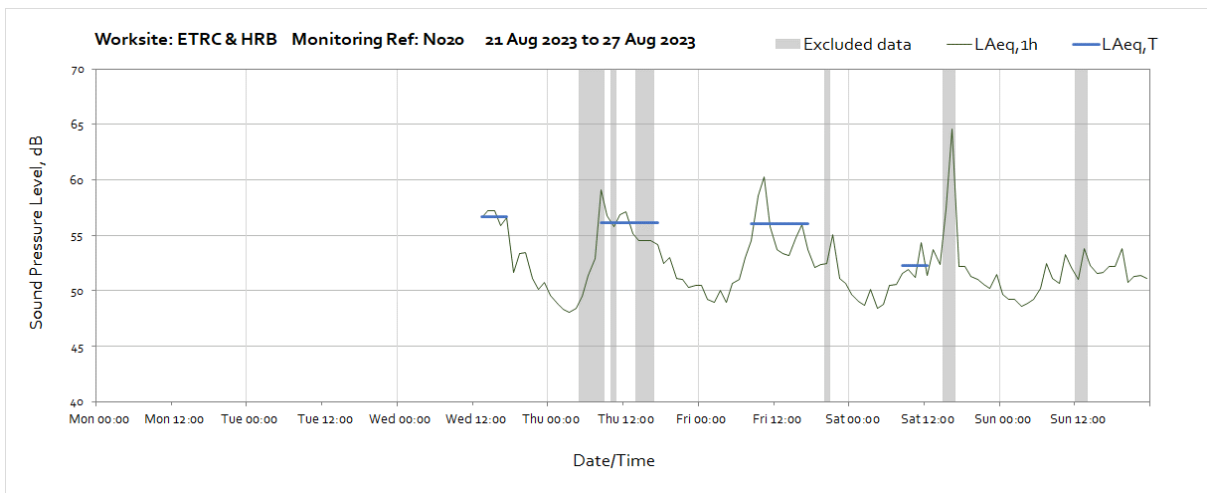


## Worksite: G – Monitoring Ref: BS



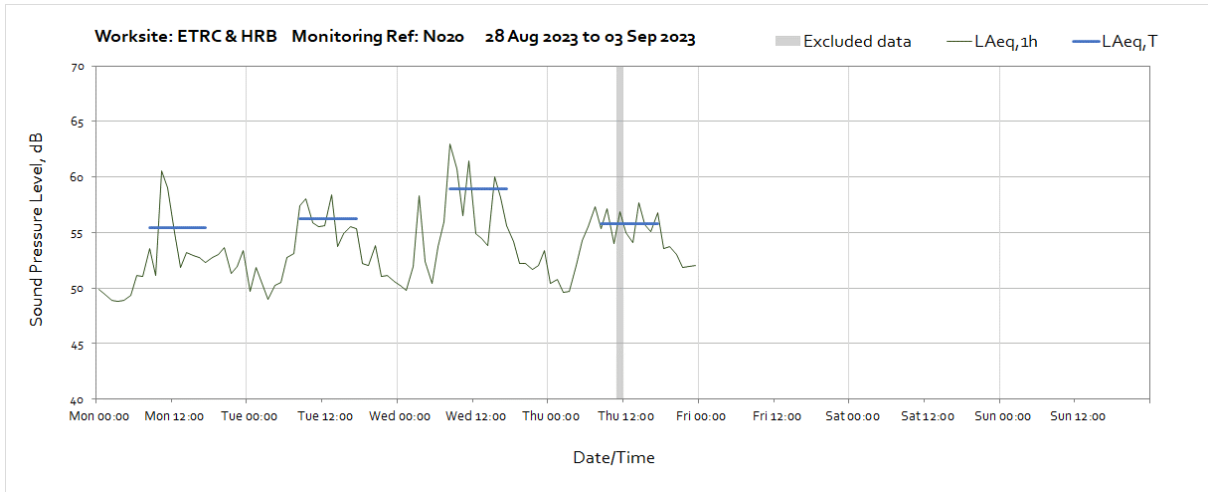


**Worksite: ETRC & HRB - Monitoring Ref: N020**

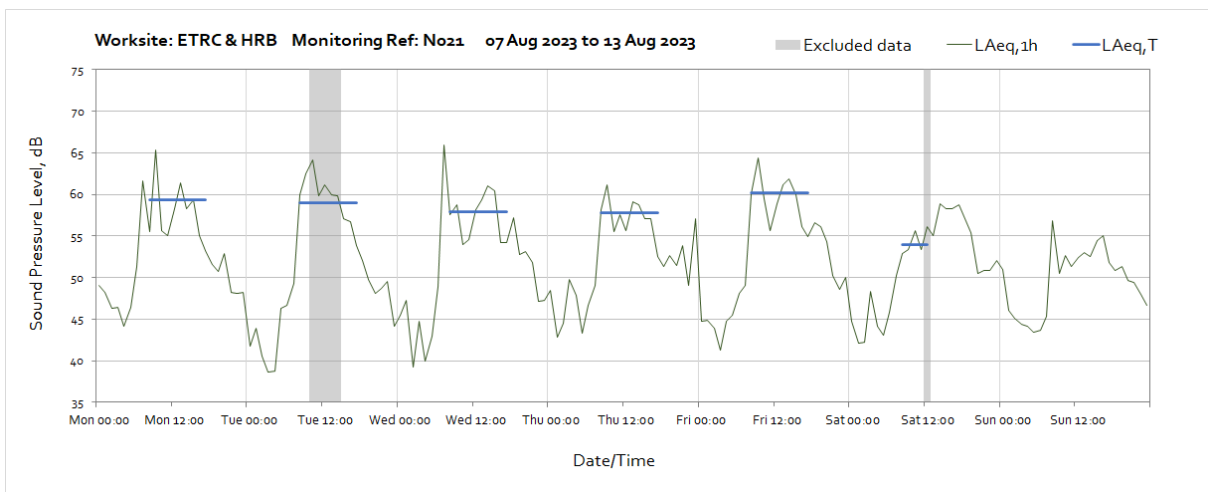
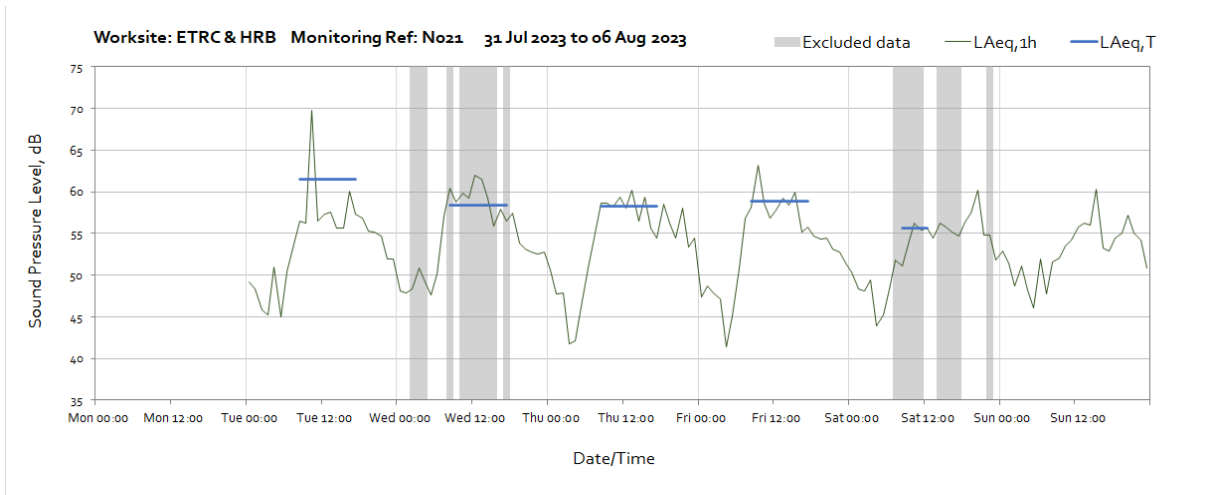


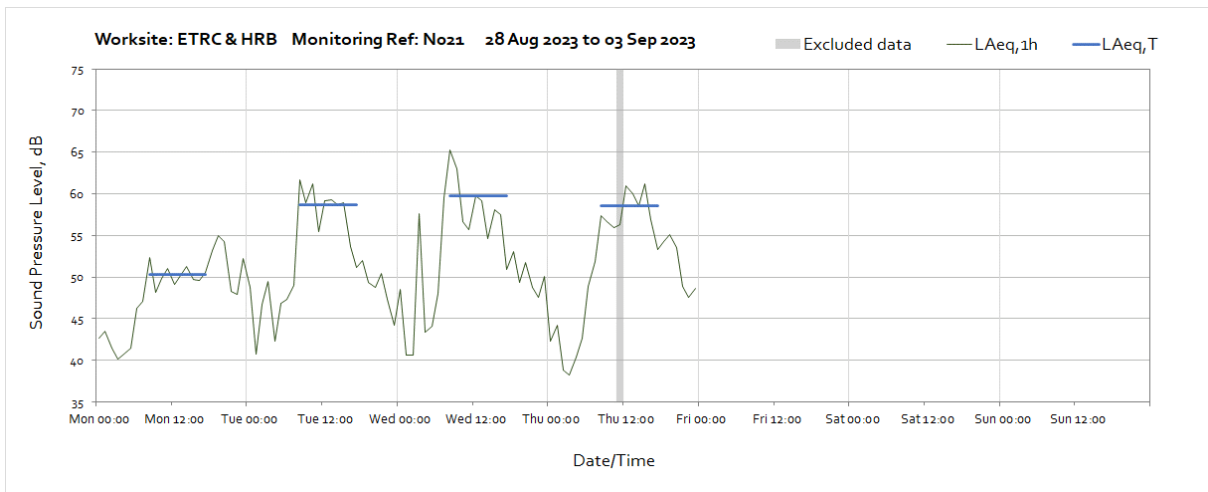
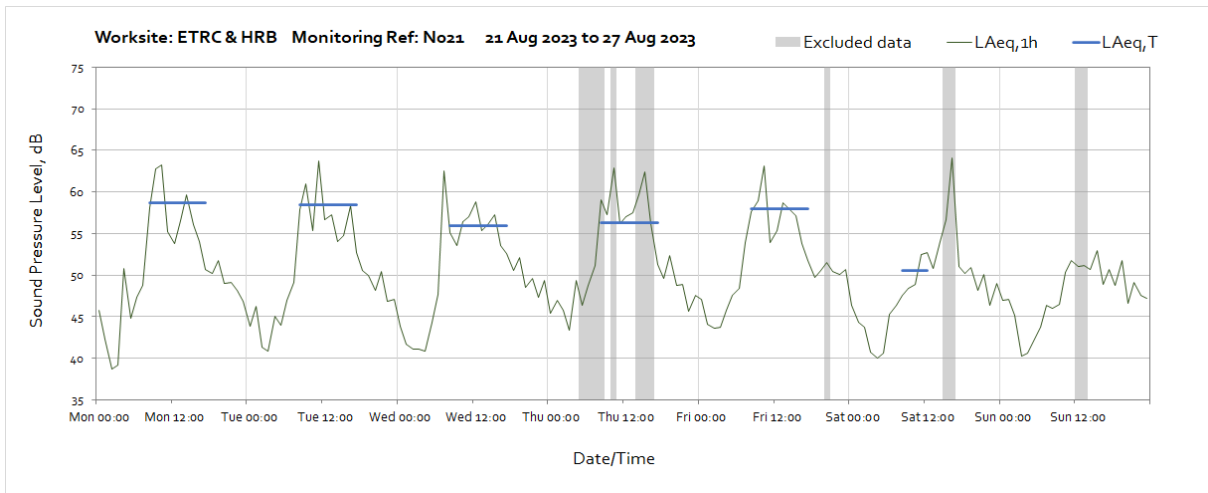
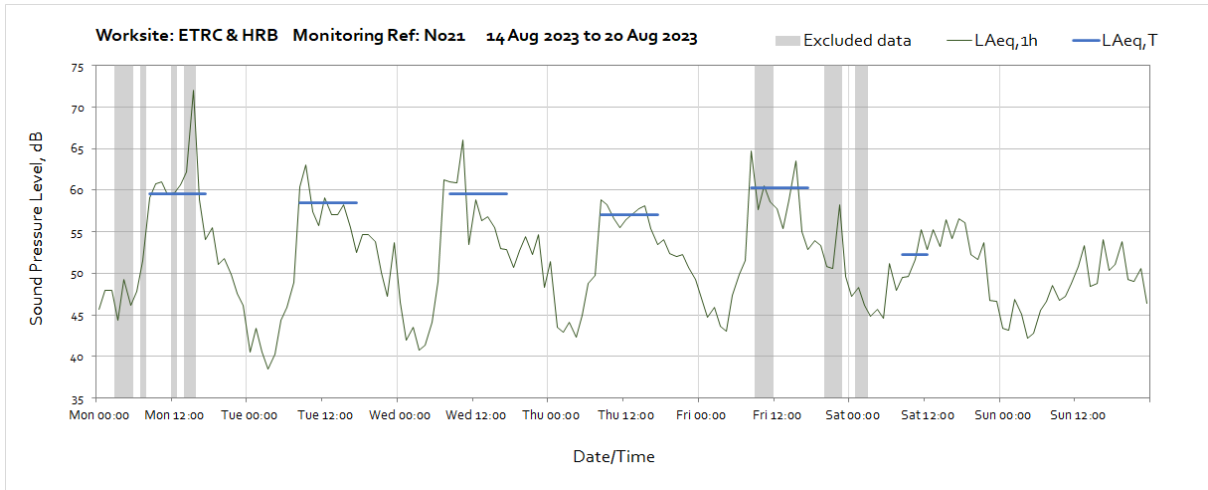
Note: Missing data from 00:00 on Tuesday 1<sup>st</sup> until 12:00 on Wednesday 23<sup>rd</sup> of August due to a fault with the monitoring station.

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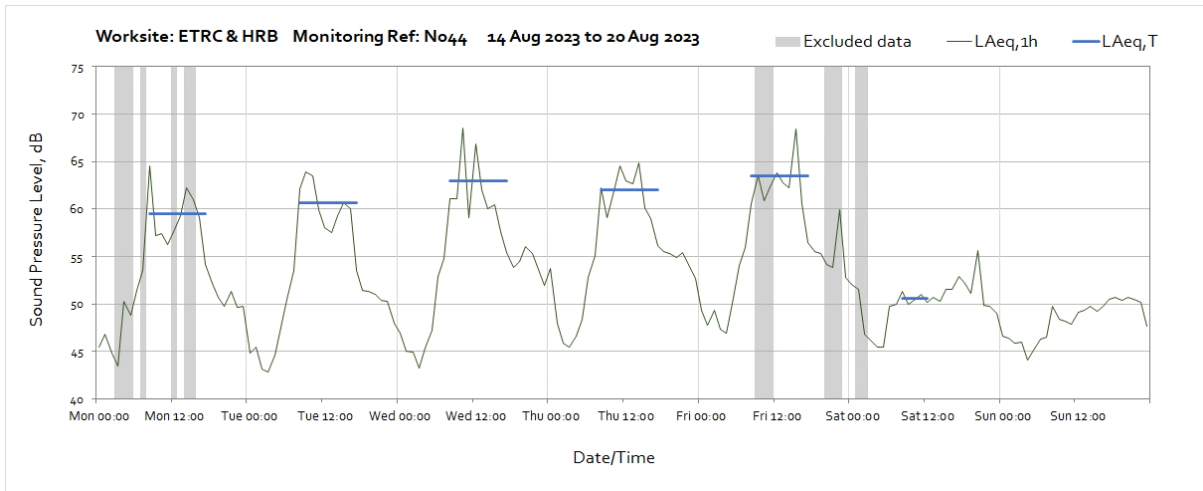
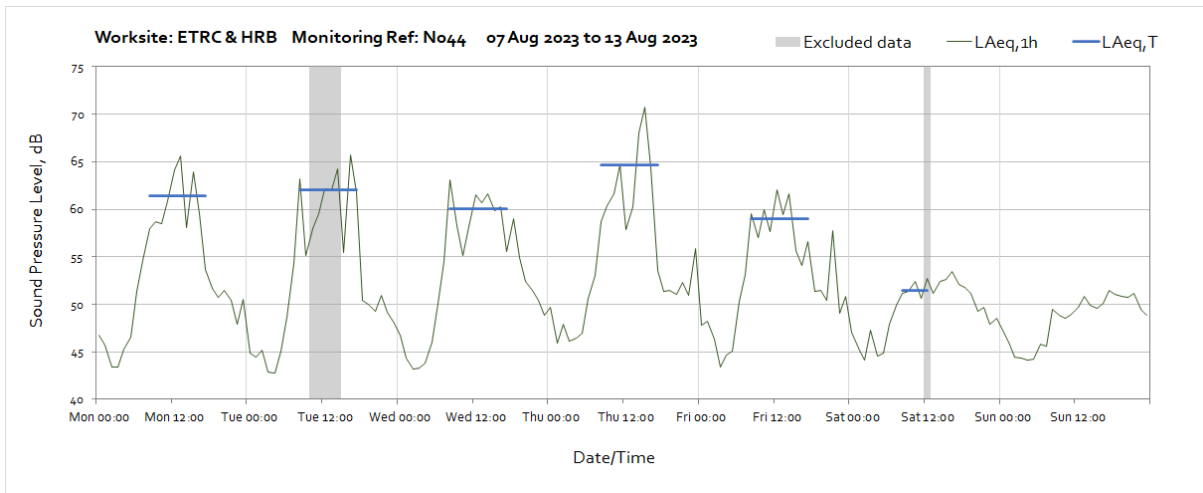
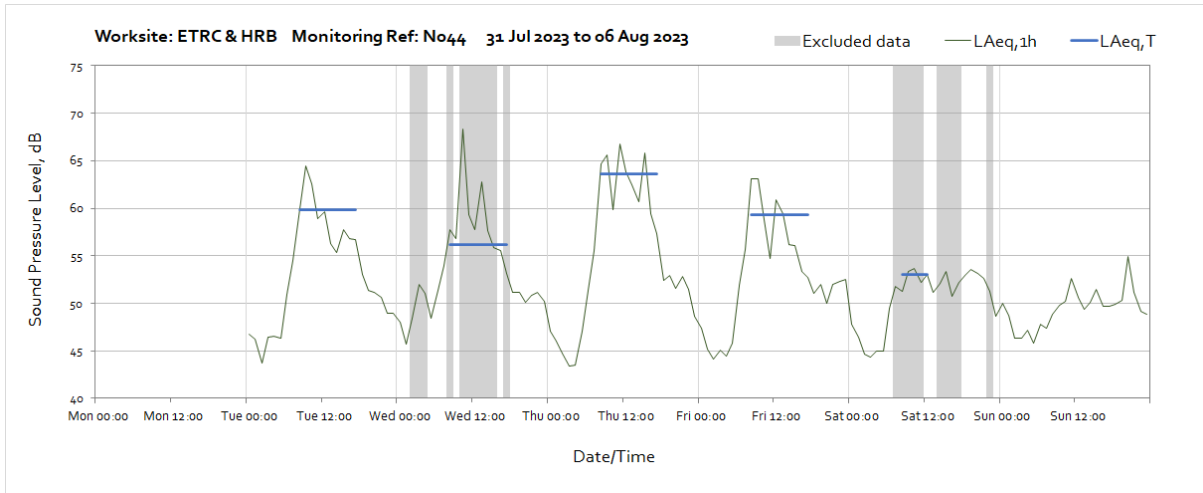
**Worksite: ETRC & HRB - Monitoring Ref: N021**

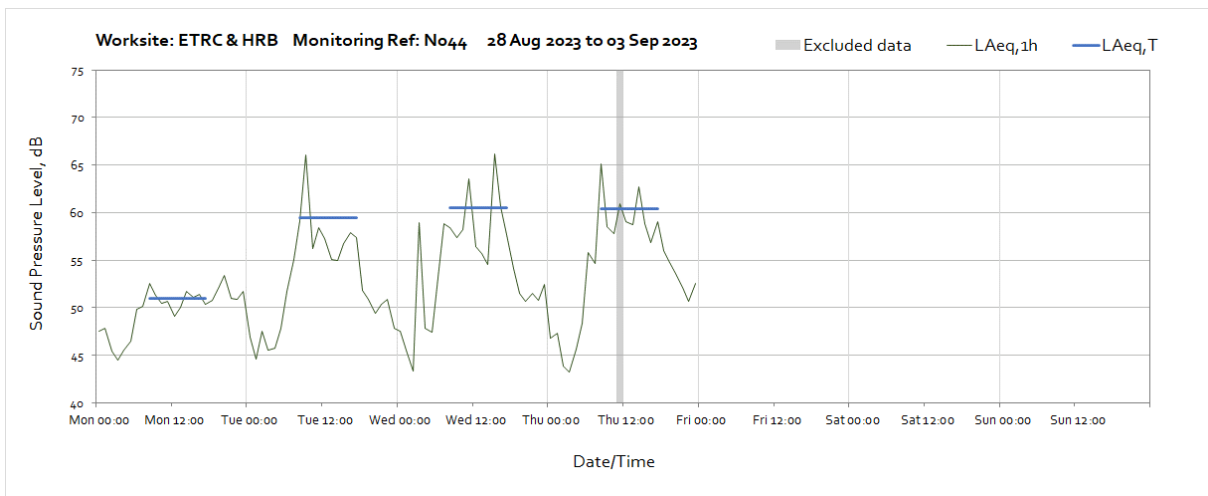
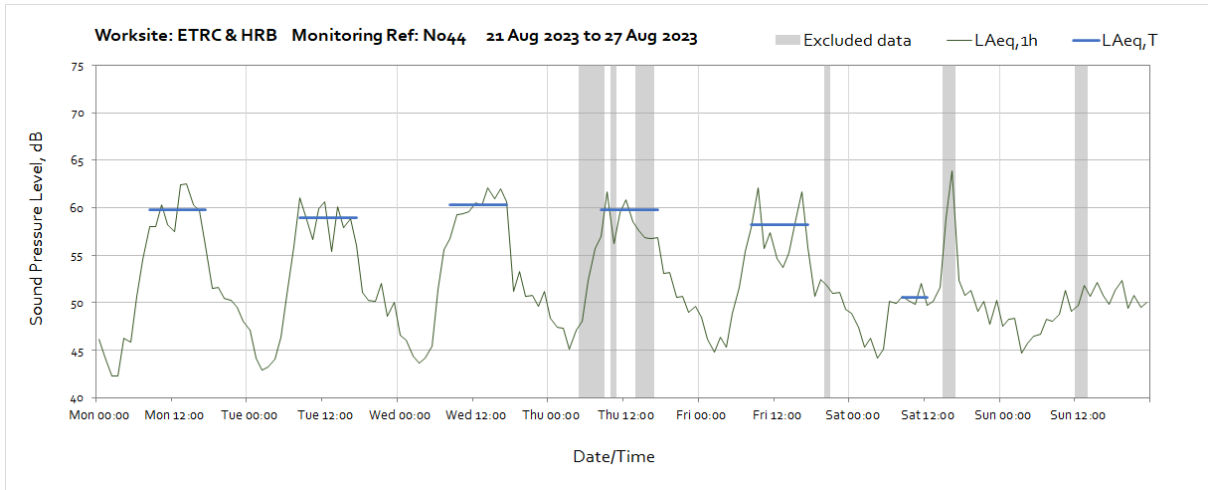




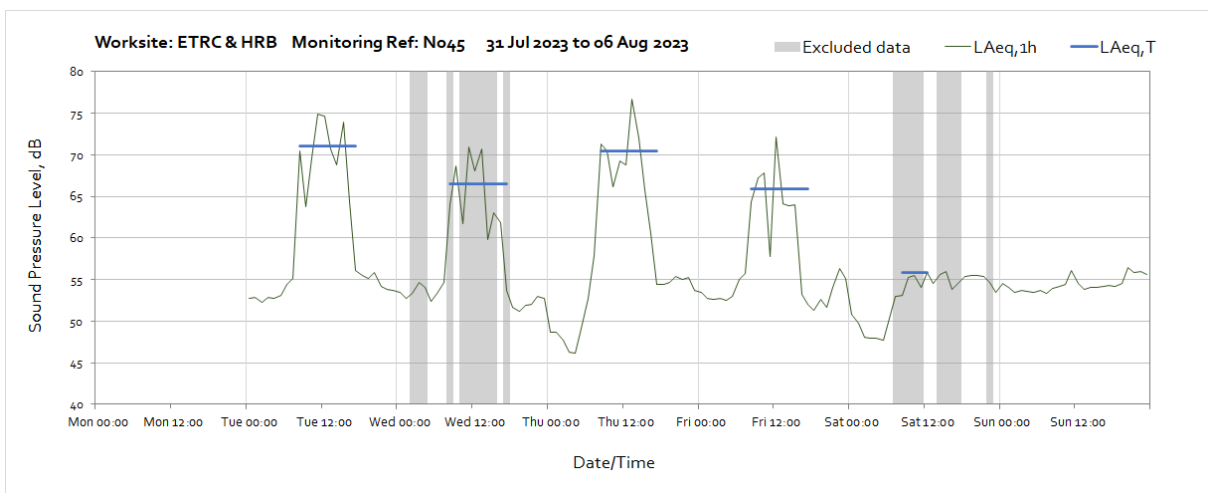


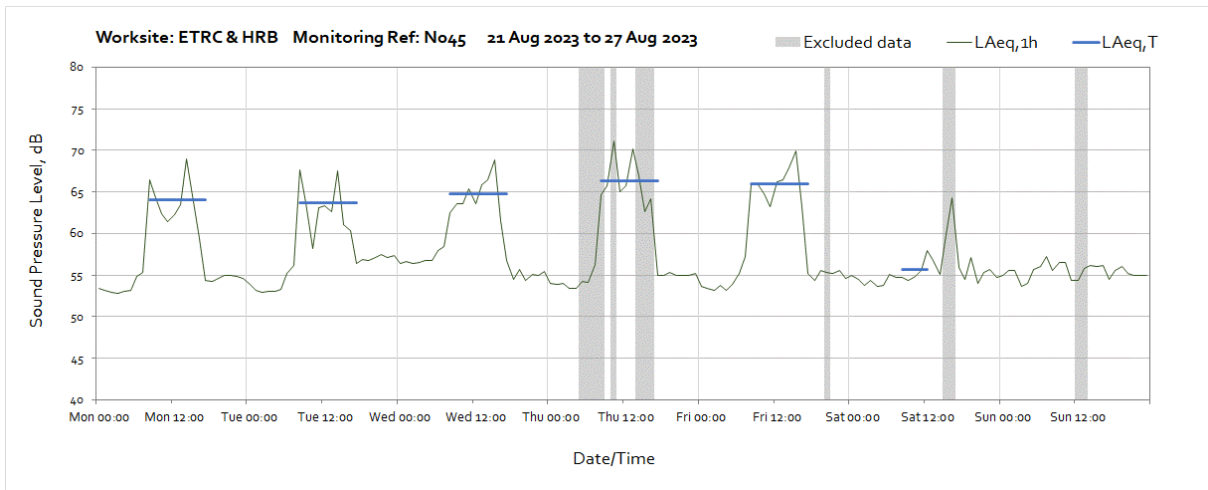
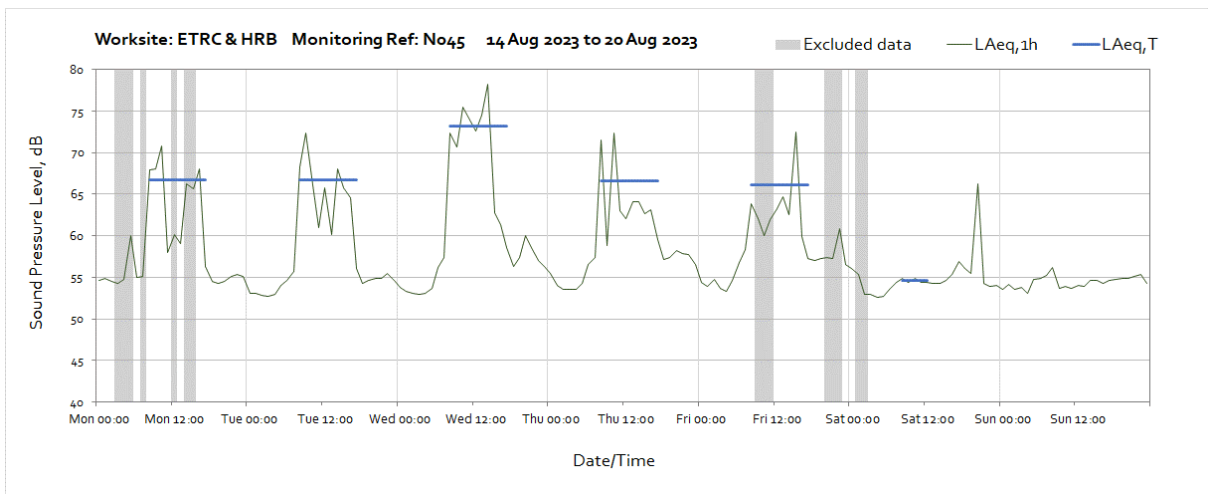
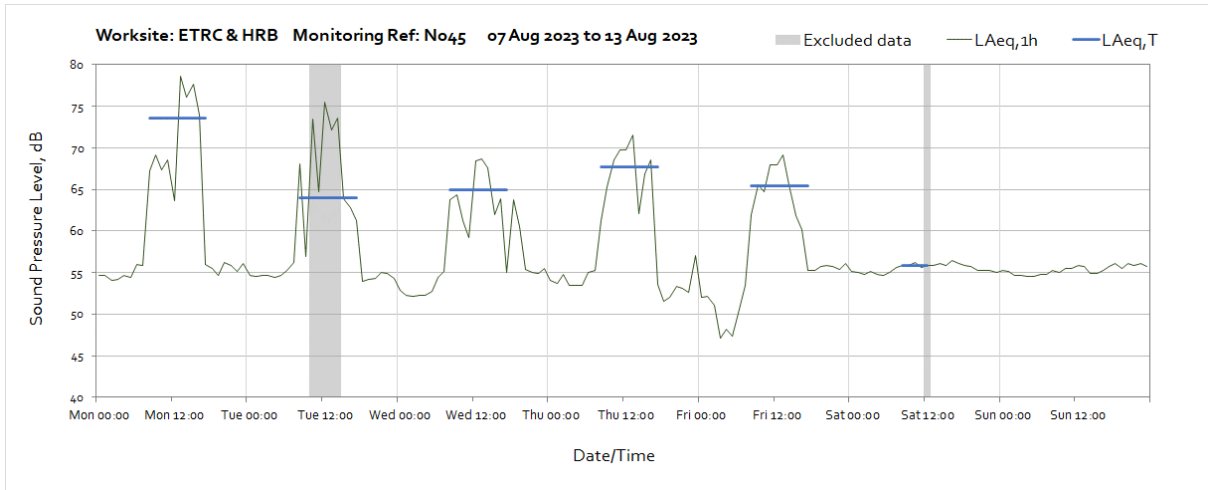
## Worksite: ETRC & HRB – Monitoring Ref: N044

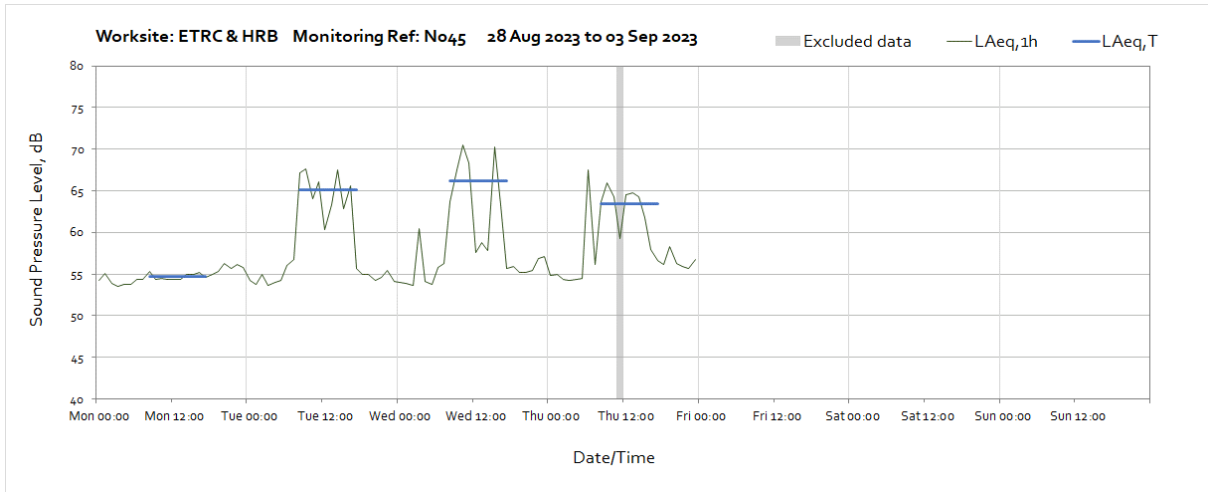




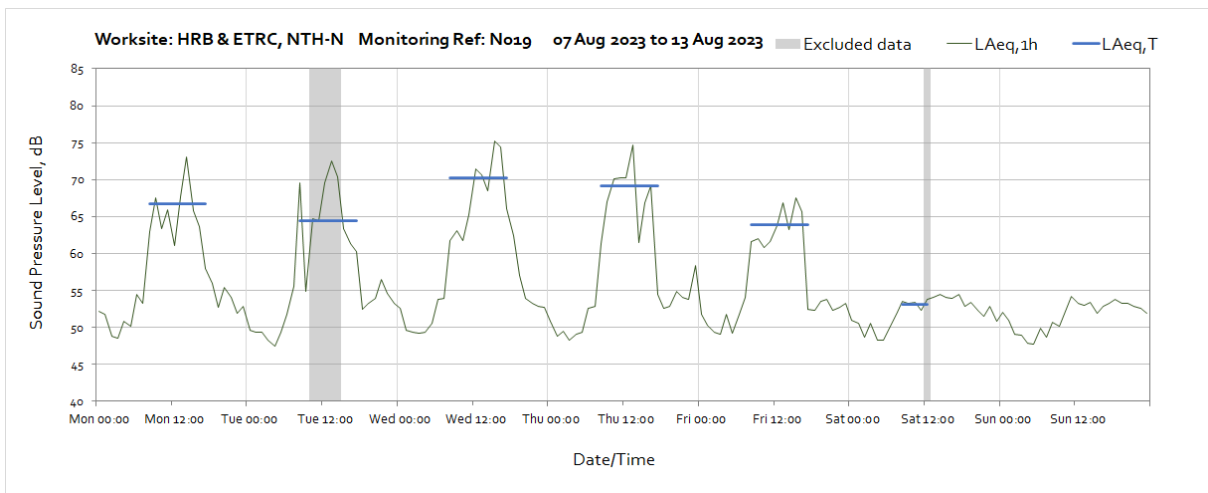
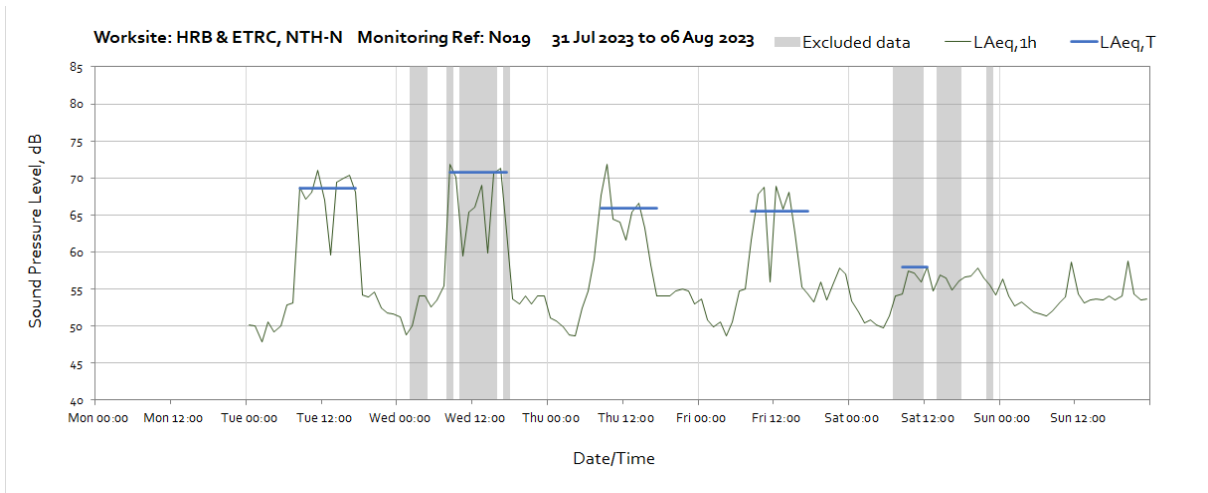
**Worksite: ETRC & HRB - Monitoring Ref: N045**

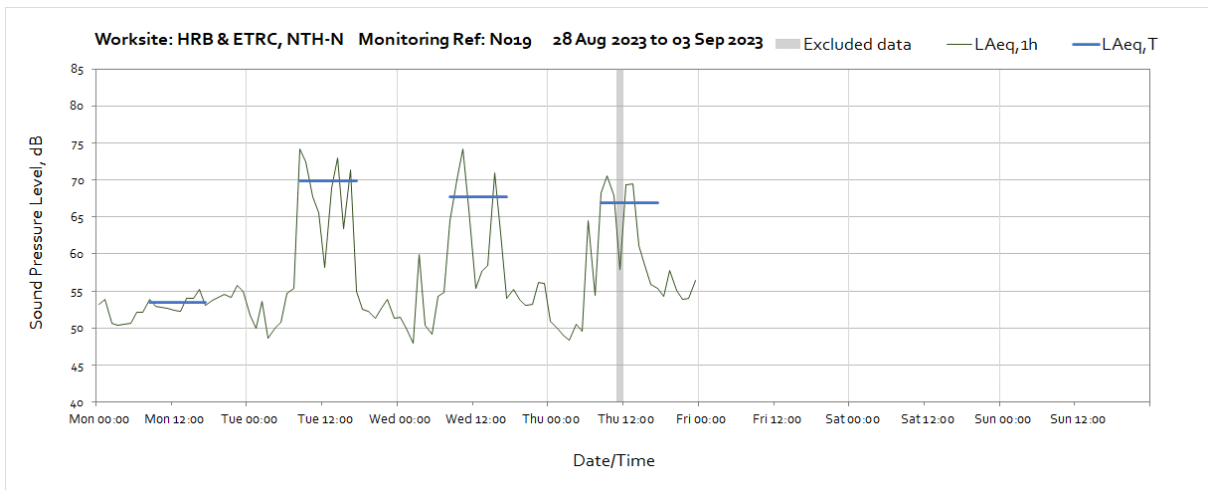
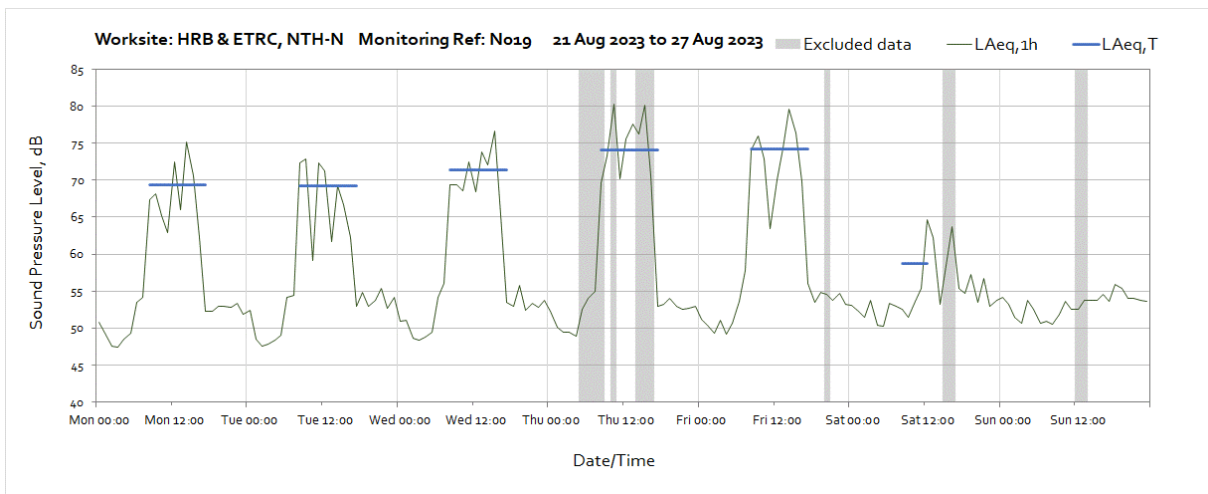
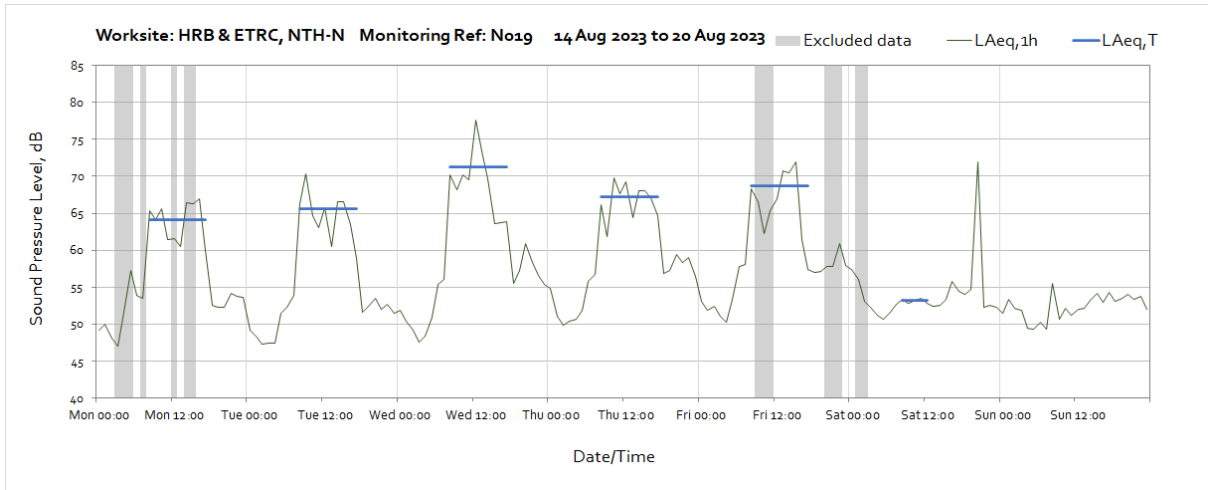




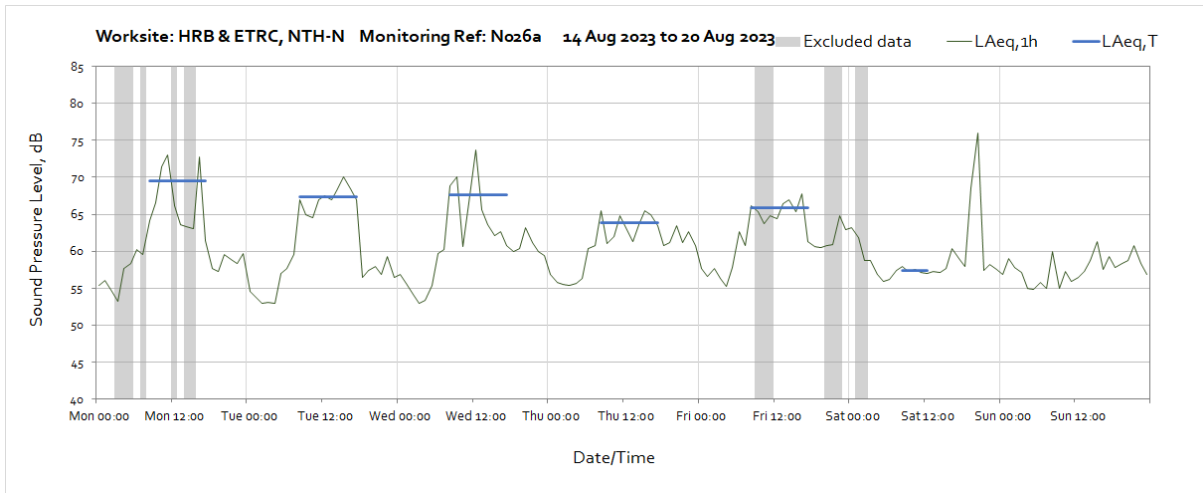
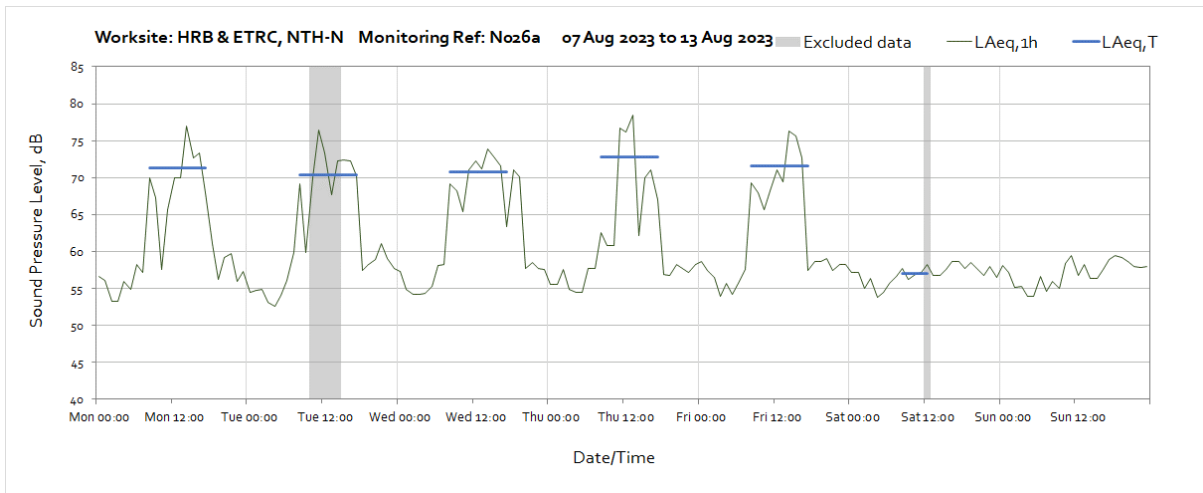
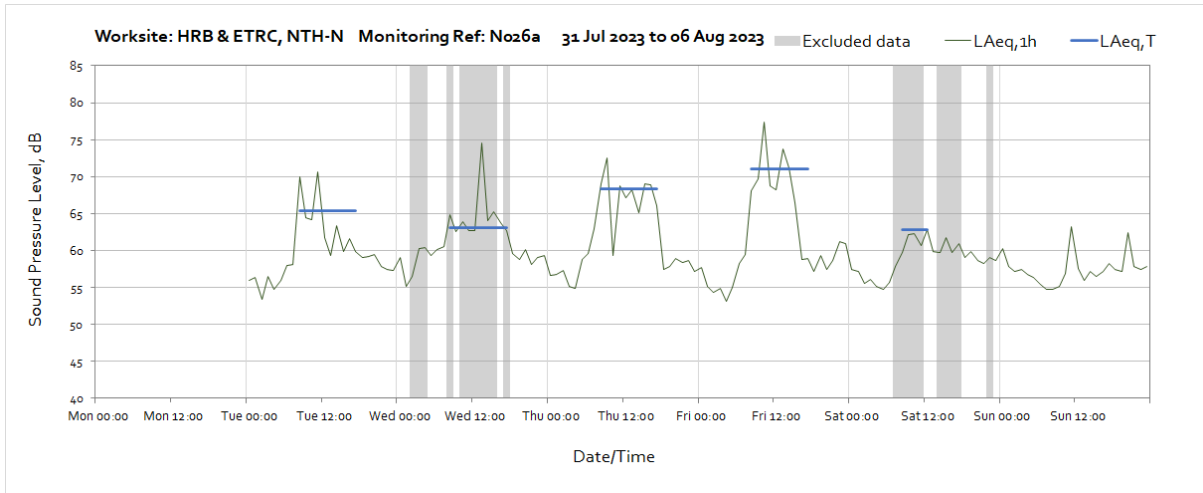


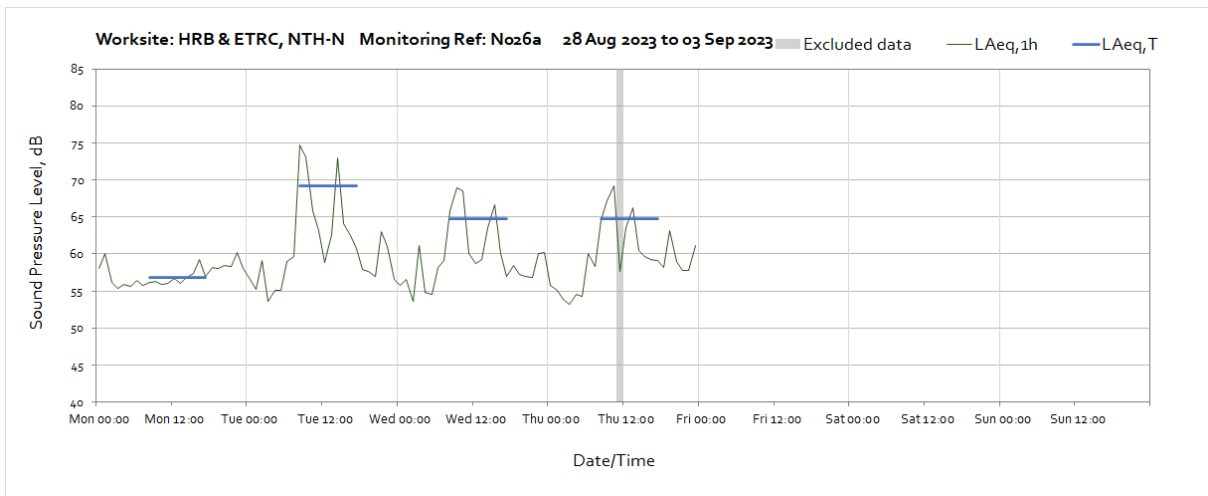
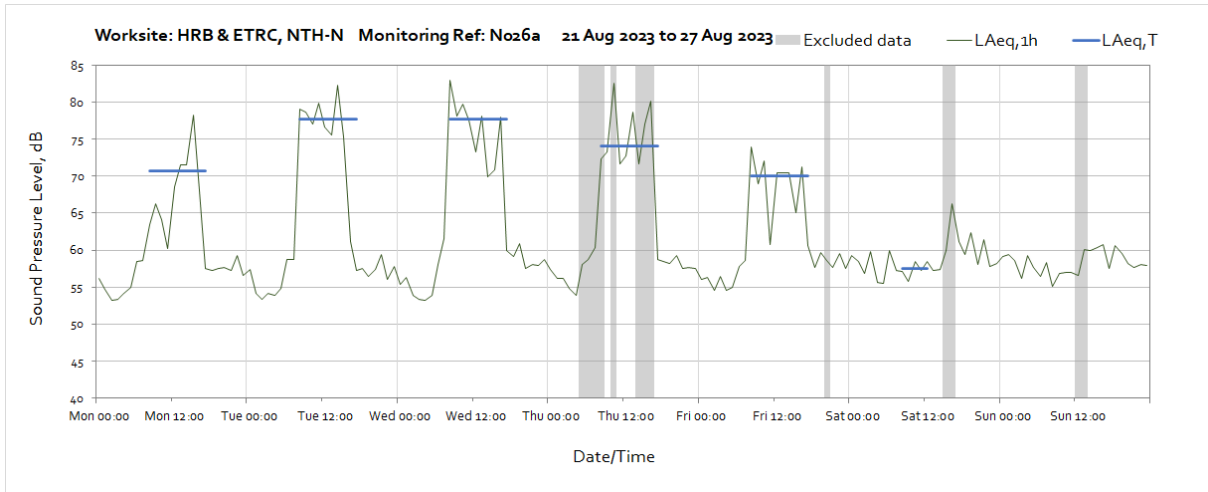
**Worksite: HRB & ETRC, NTH-N - Monitoring Ref: N019**



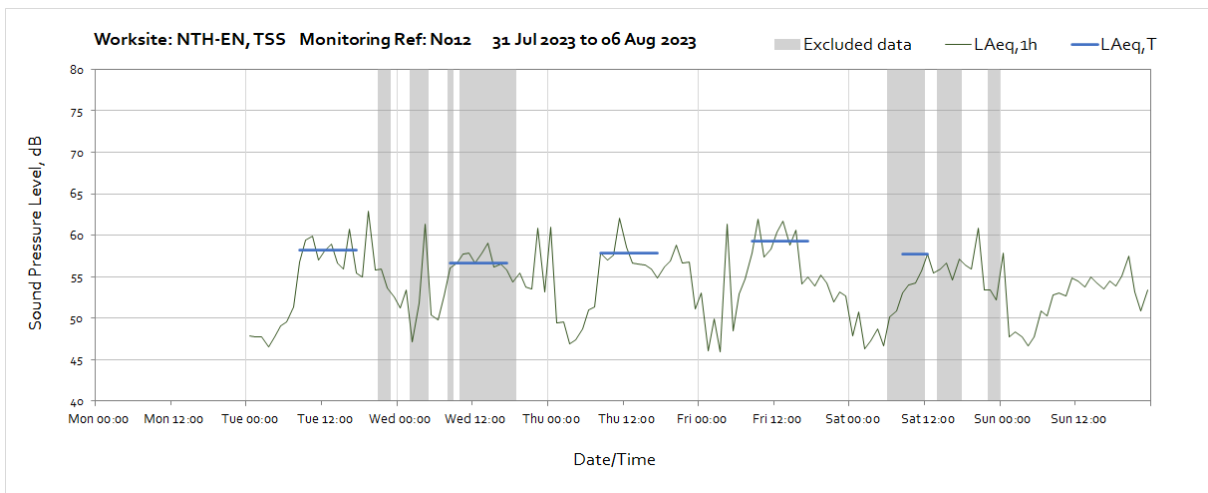


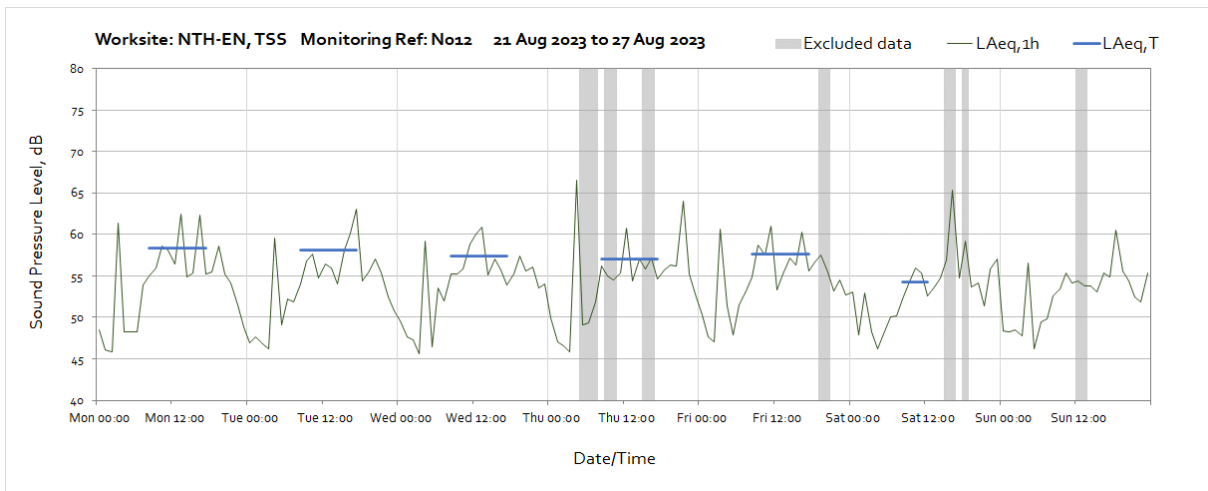
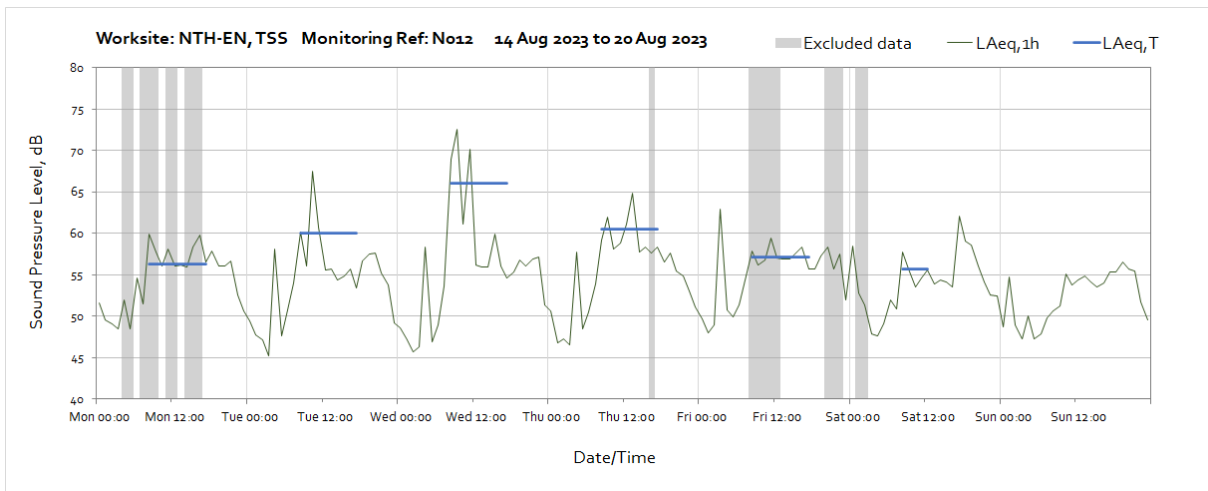
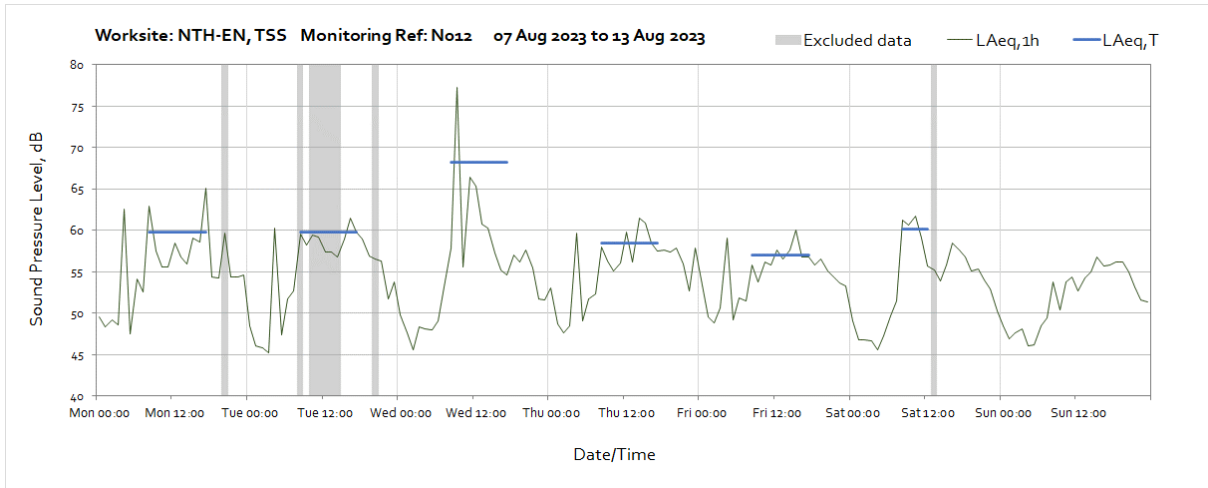
**Worksite: HRB & ETRC, NTH-N – Monitoring Ref: N026a**



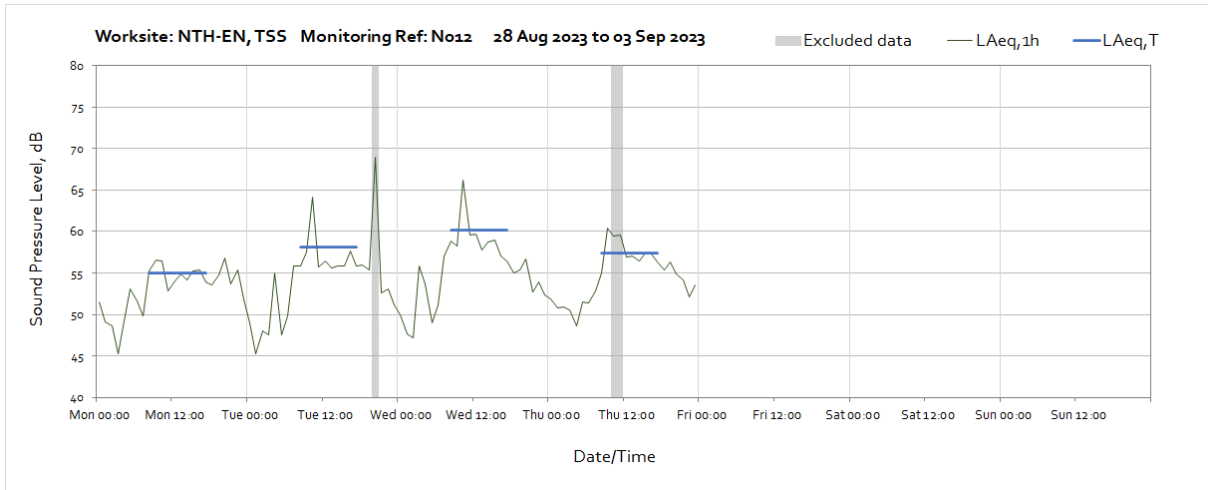


**Worksite: NTH-EN, TSS - Monitoring Ref: N012**

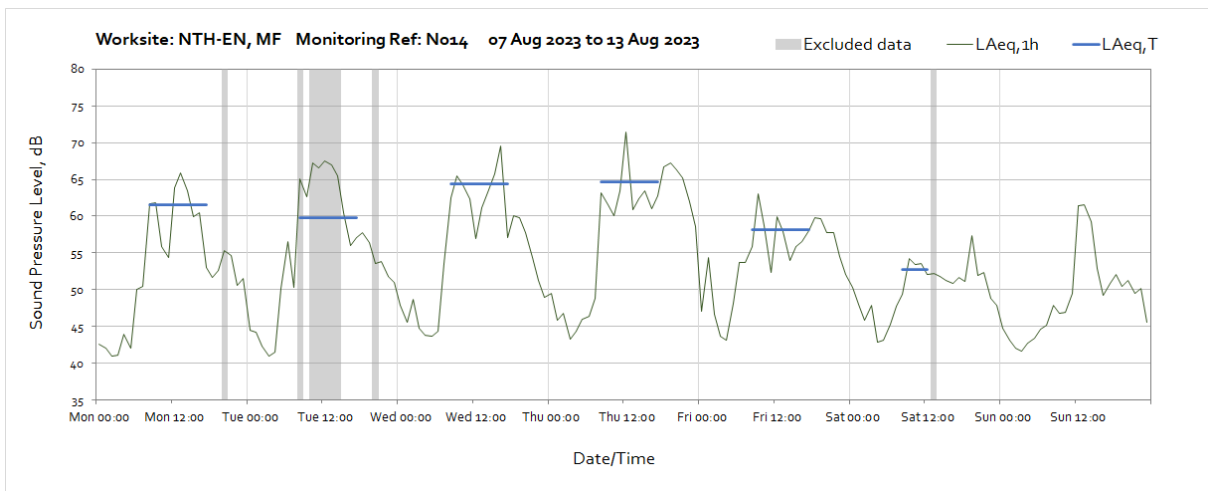
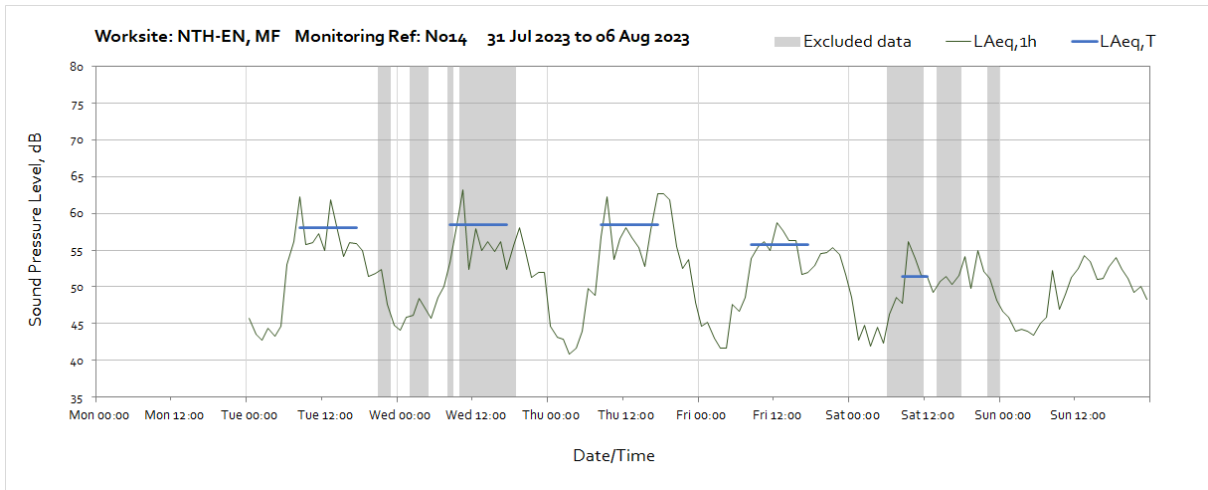


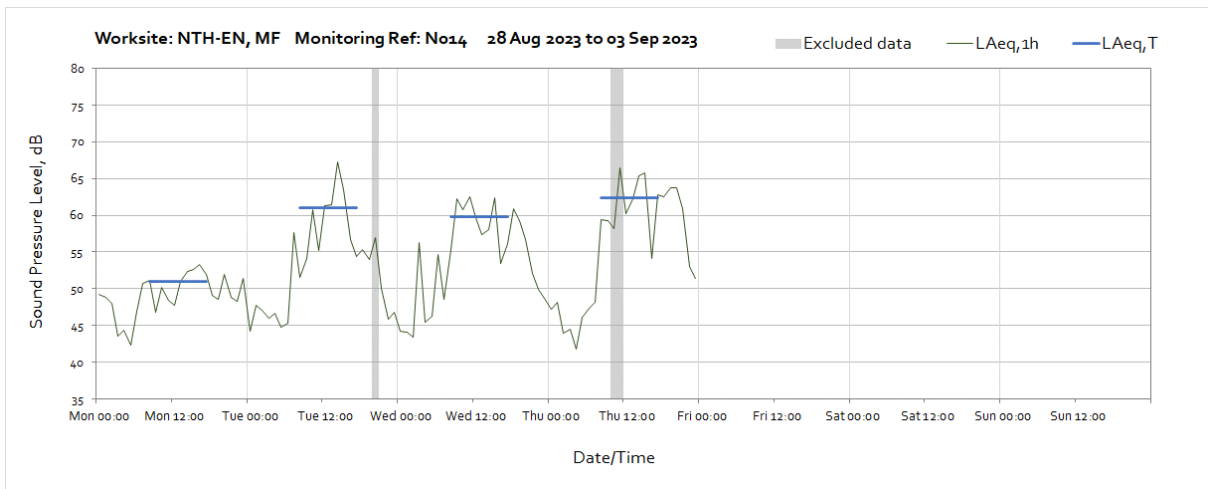
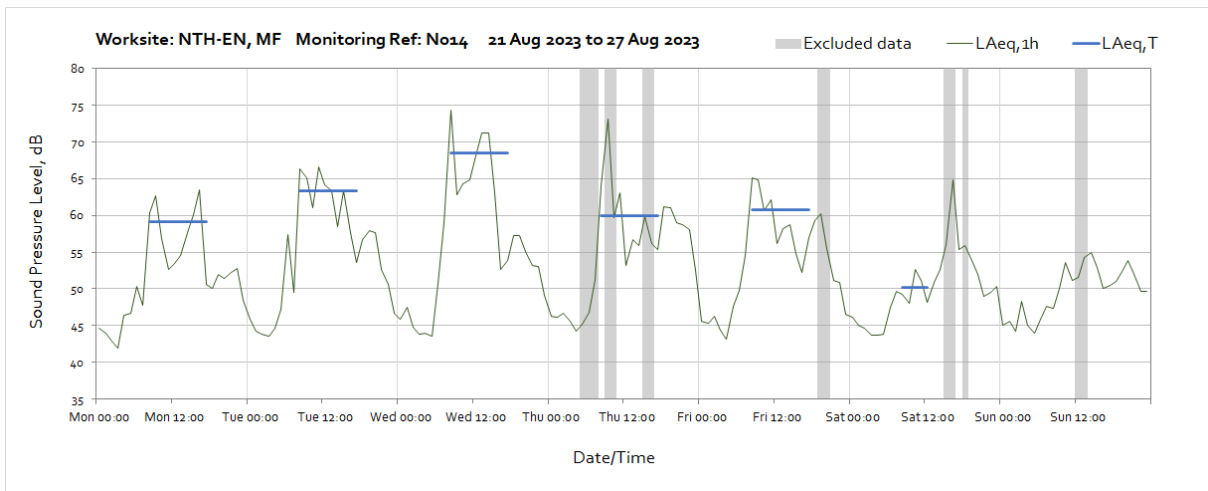
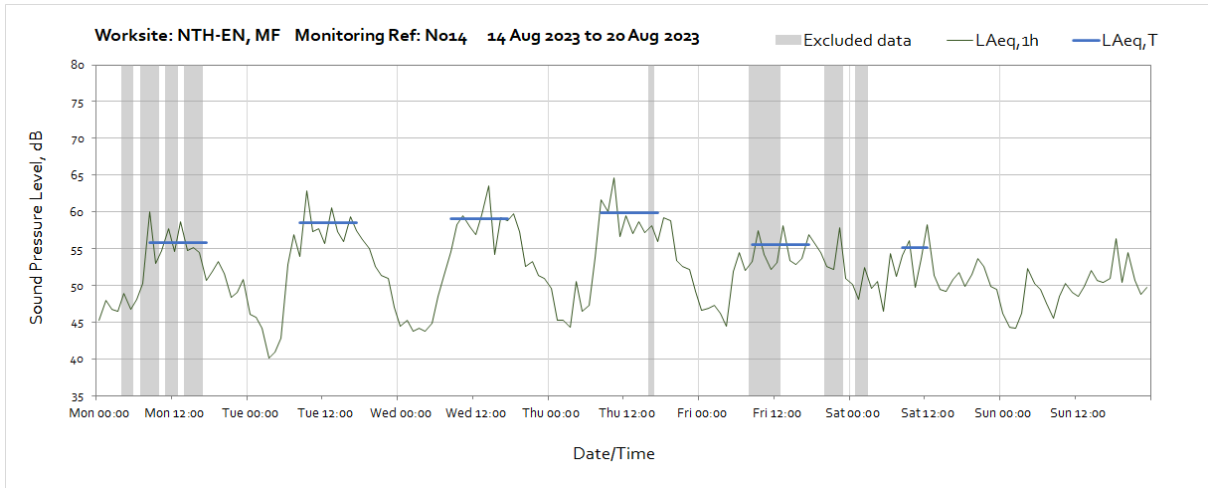




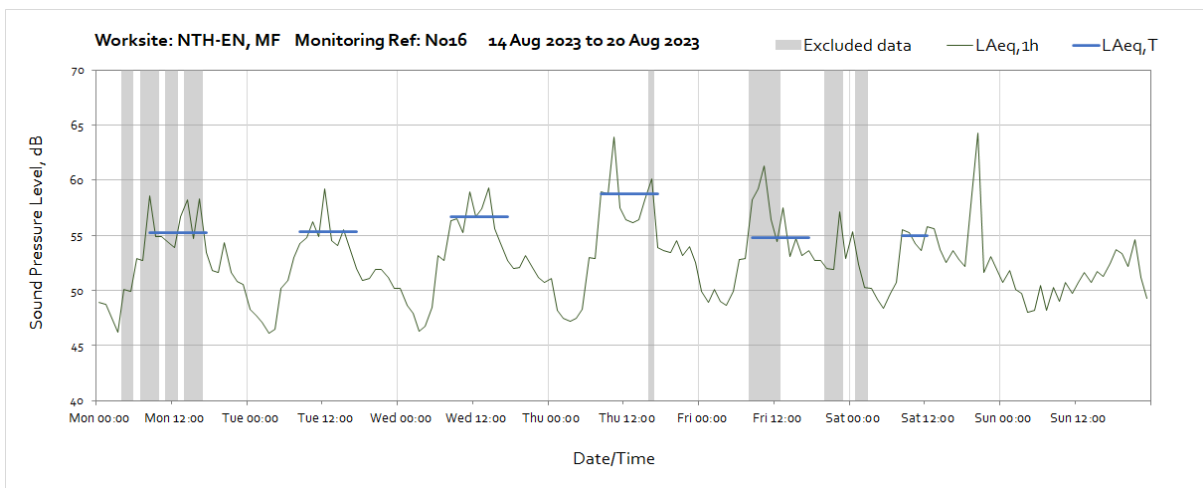
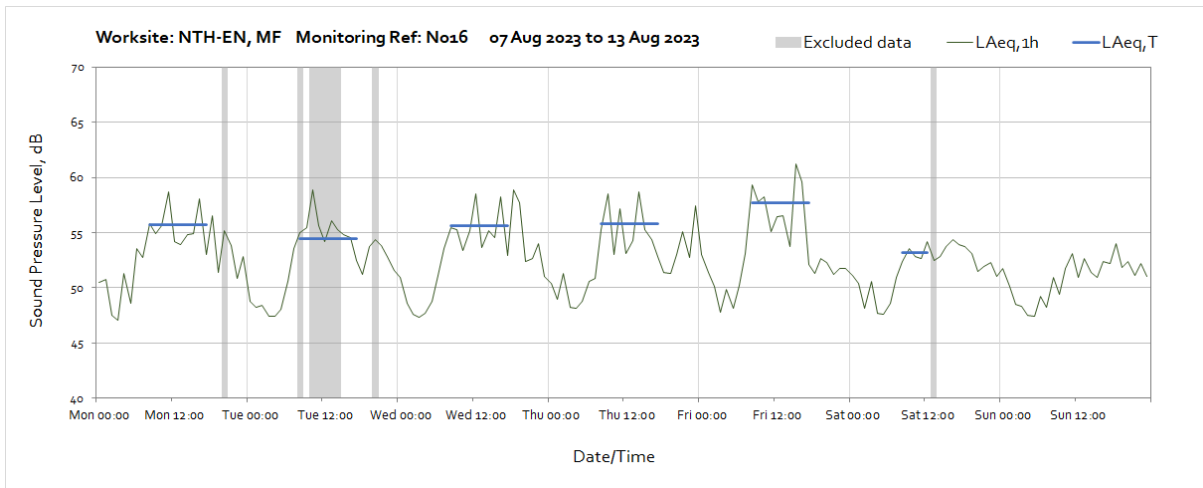
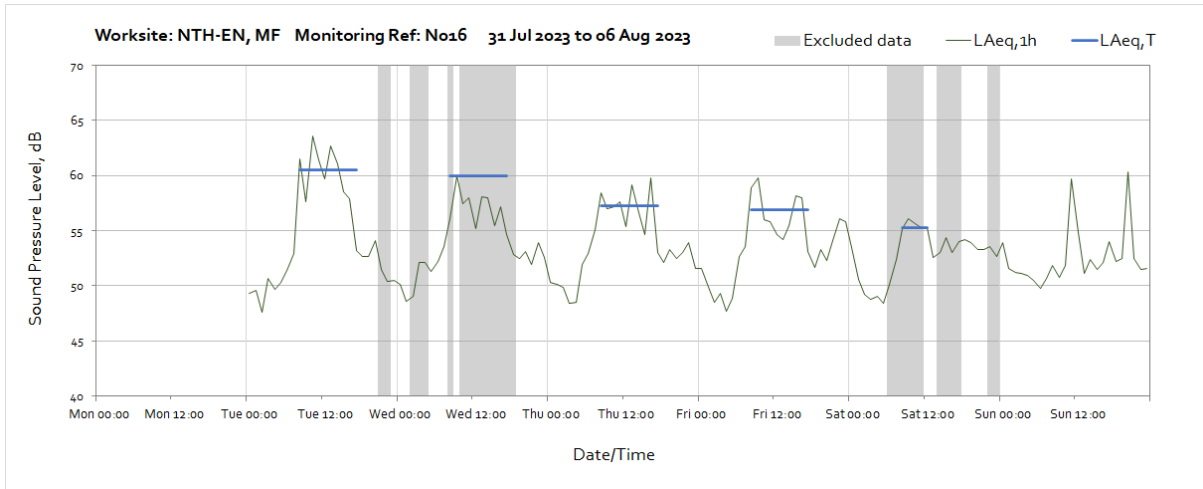


**Worksite: NTH-EN, MF – Monitoring Ref: N014**

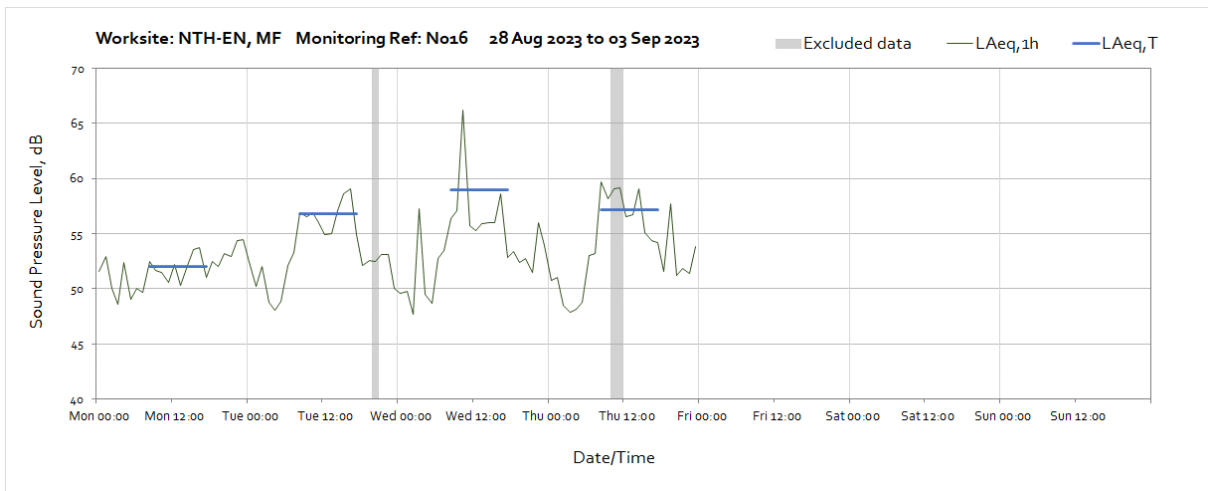
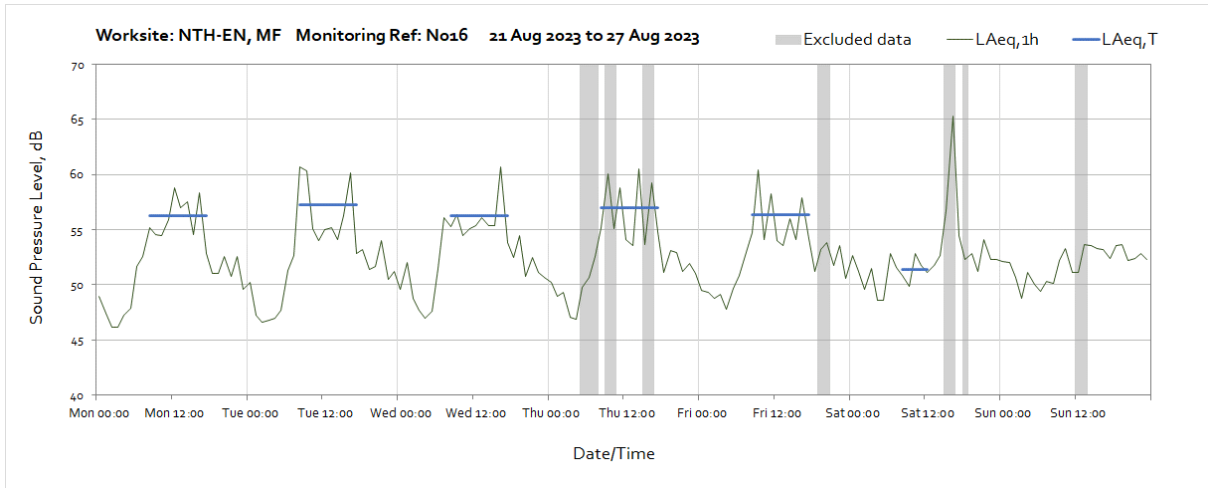




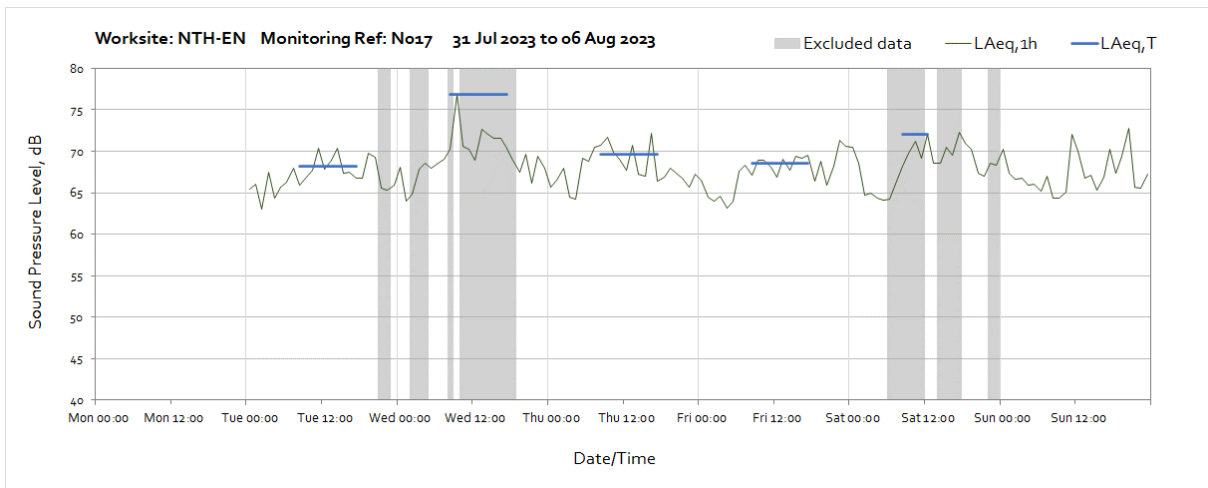
## Worksite: NTH-EN, MF - Monitoring Ref: N016

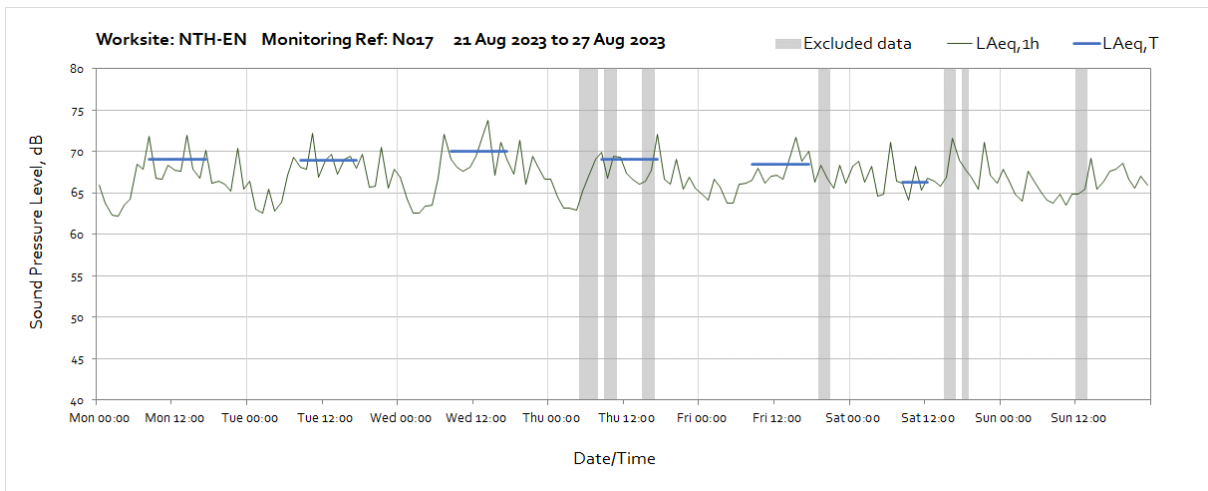
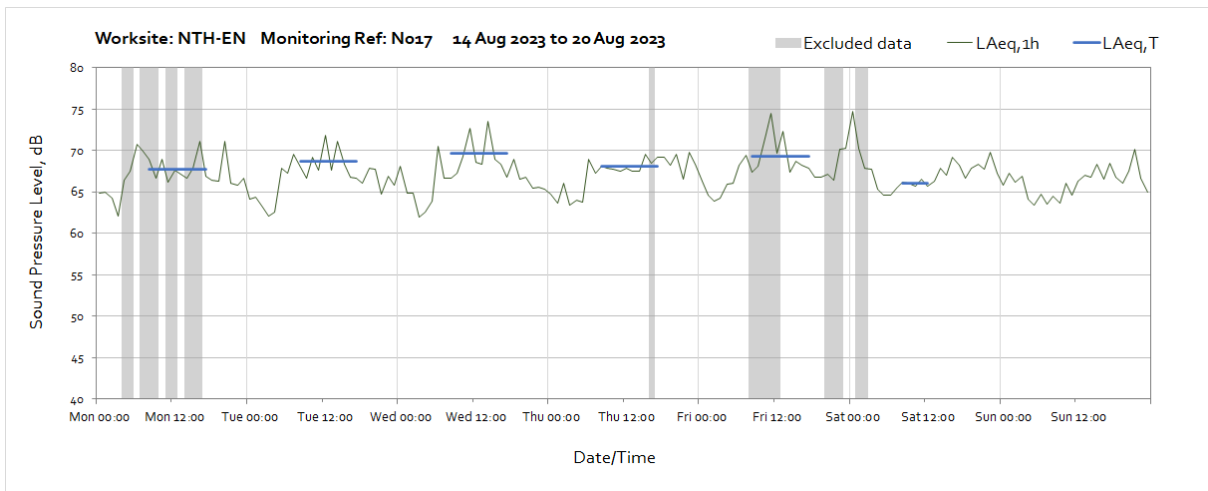
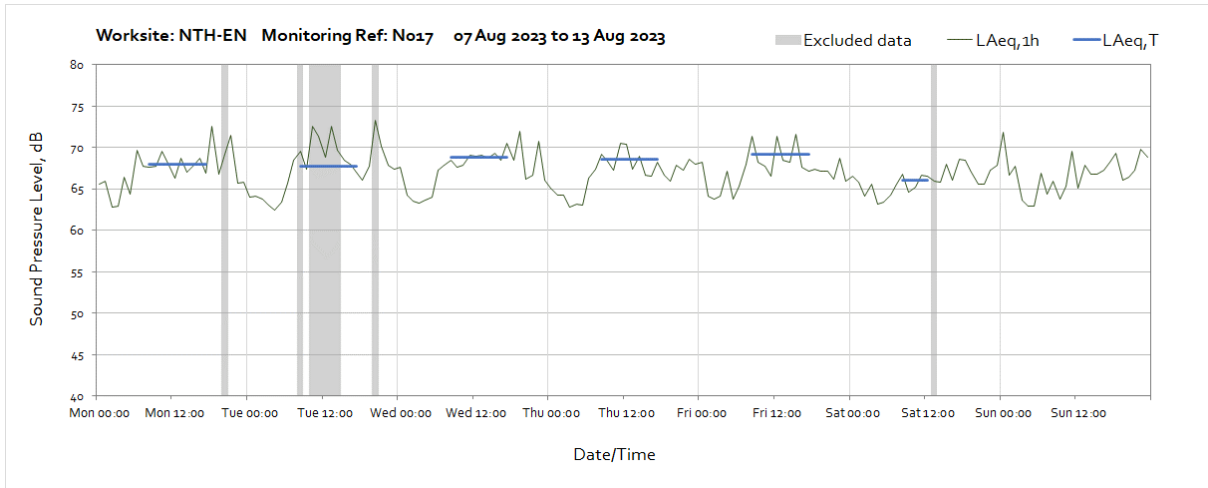


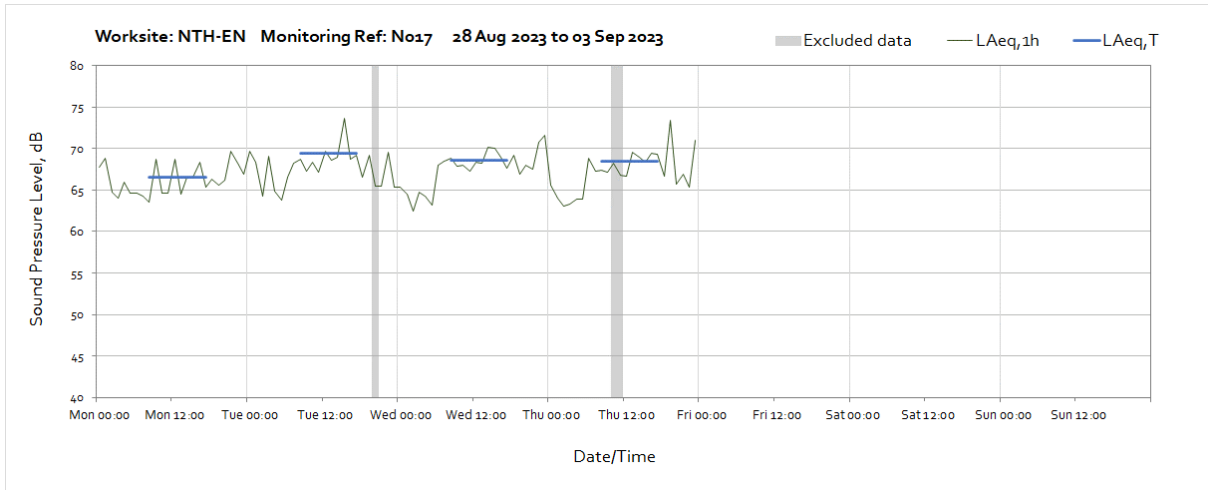
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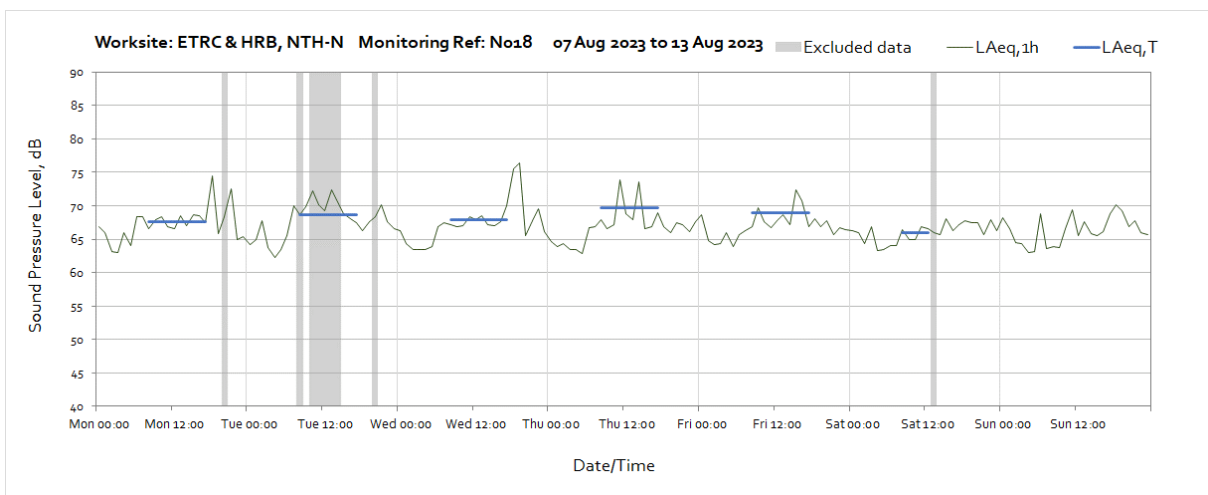
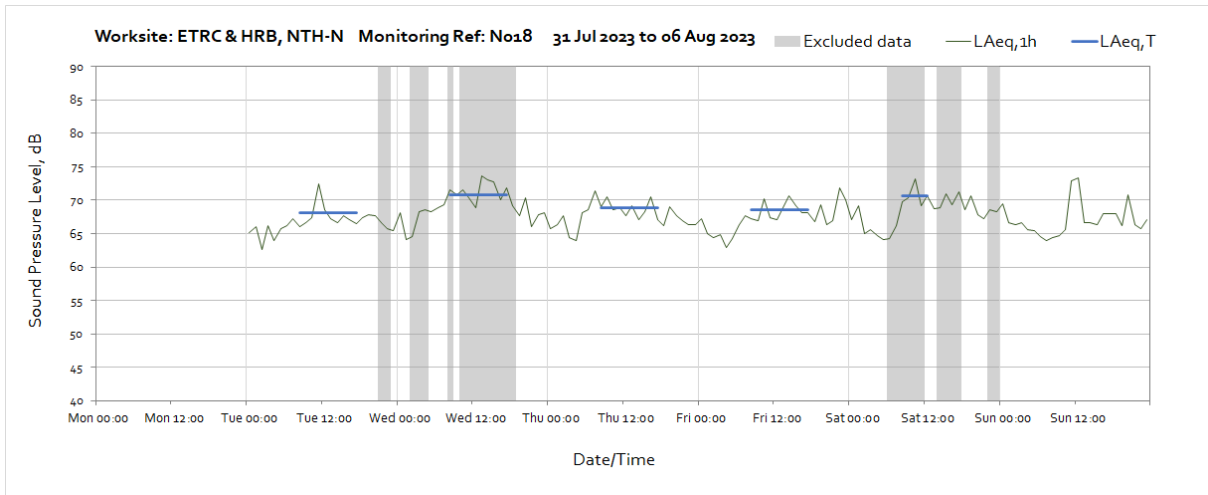
**Worksite: NTH-EN - Monitoring Ref: N017**

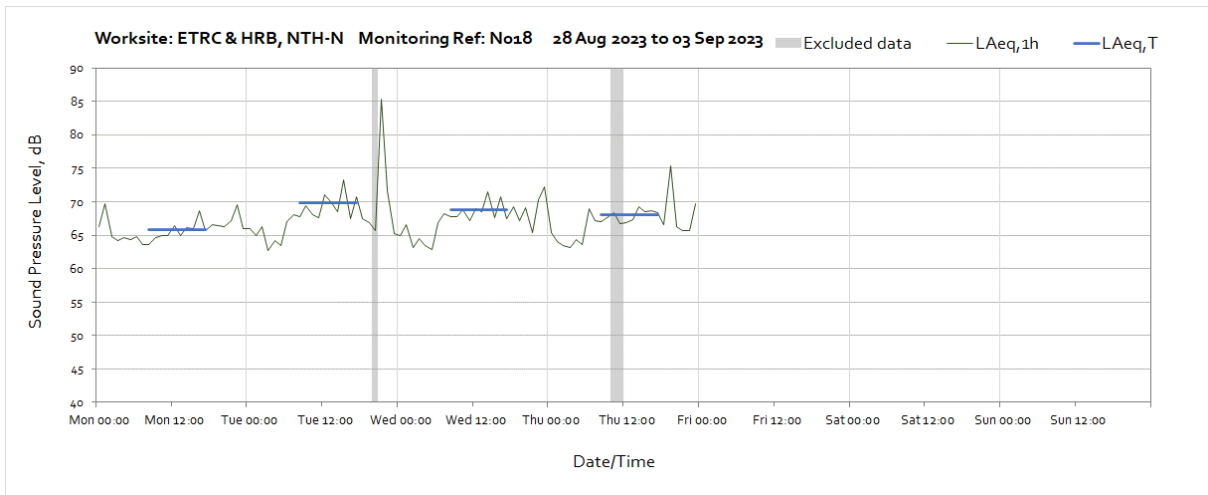
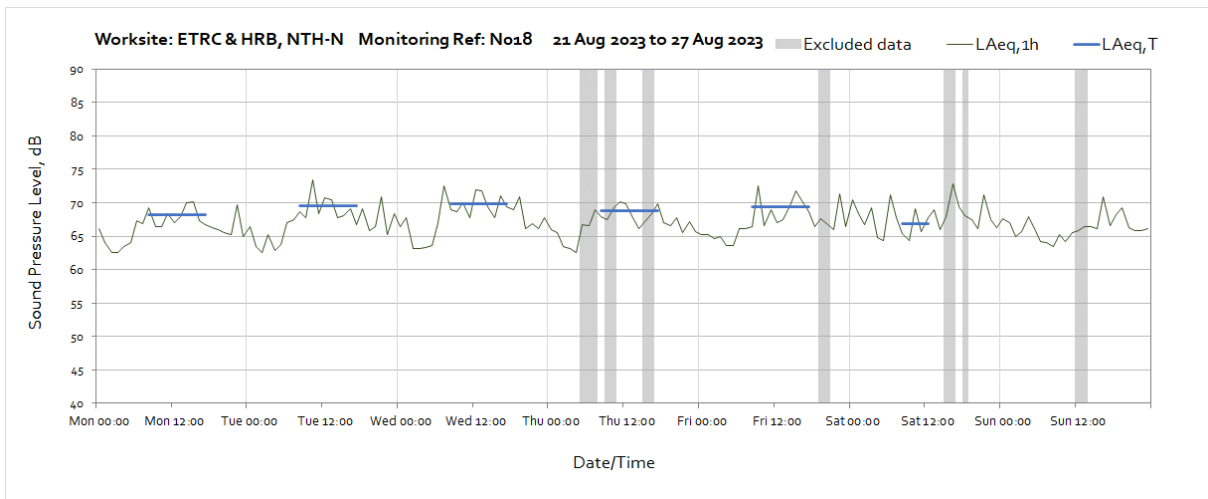
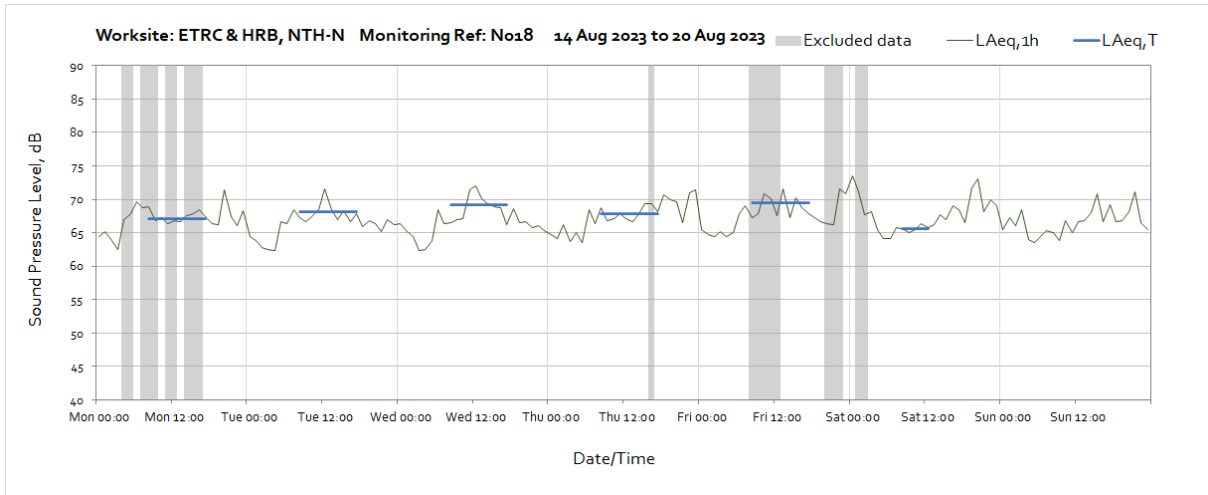




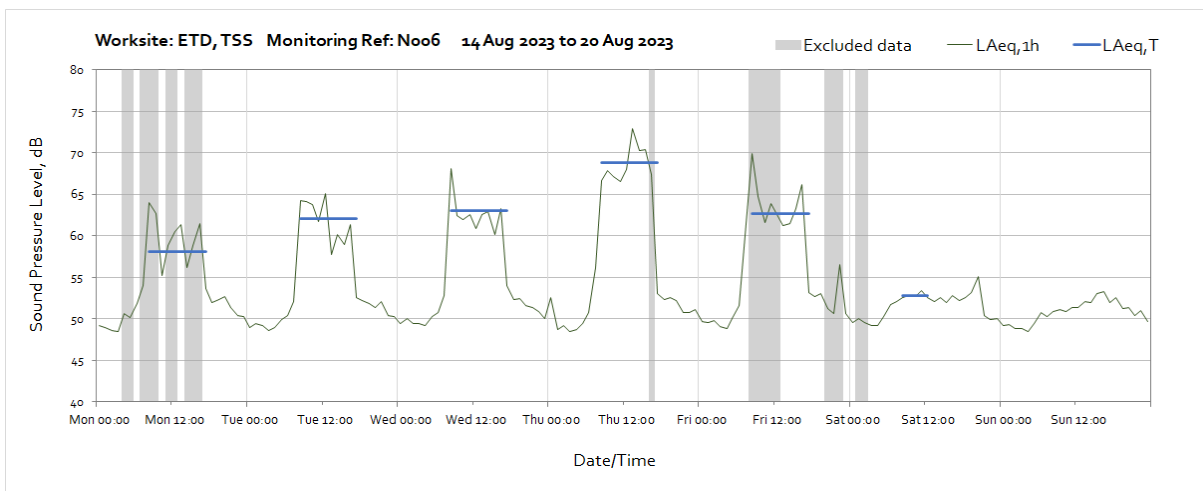
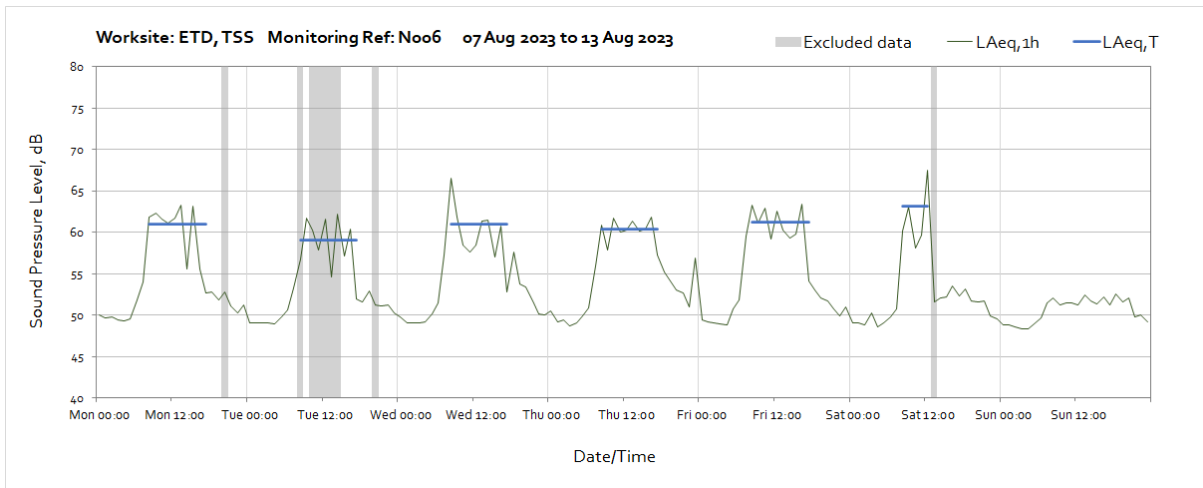
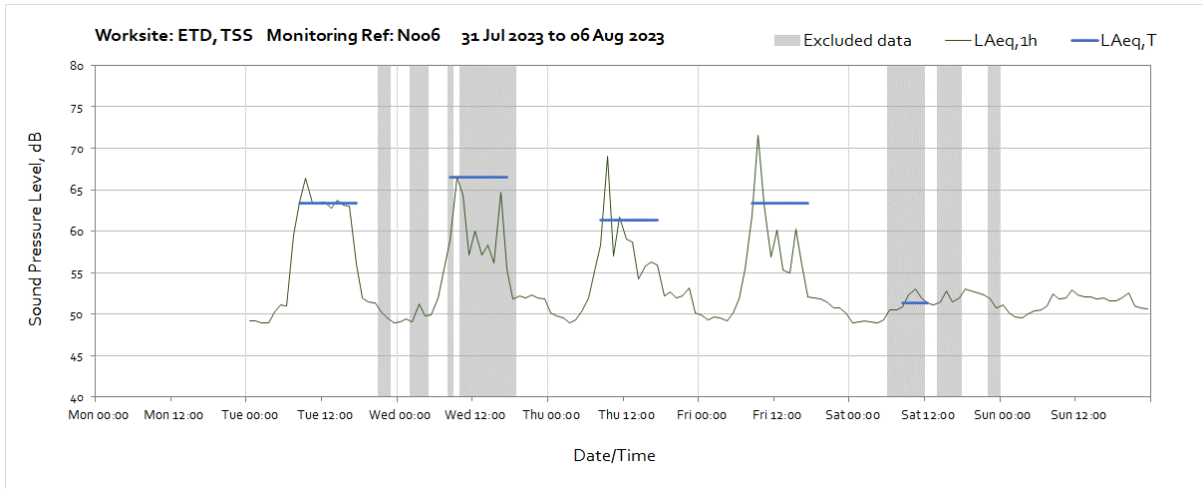


**Worksite: ETRC & HRB, NTH-N – Monitoring Ref: N018**

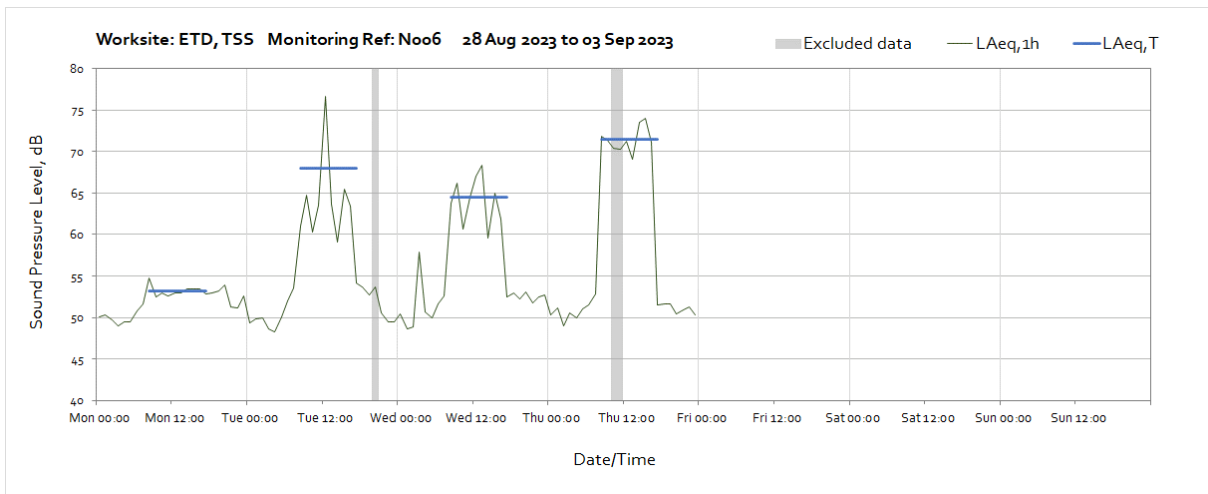
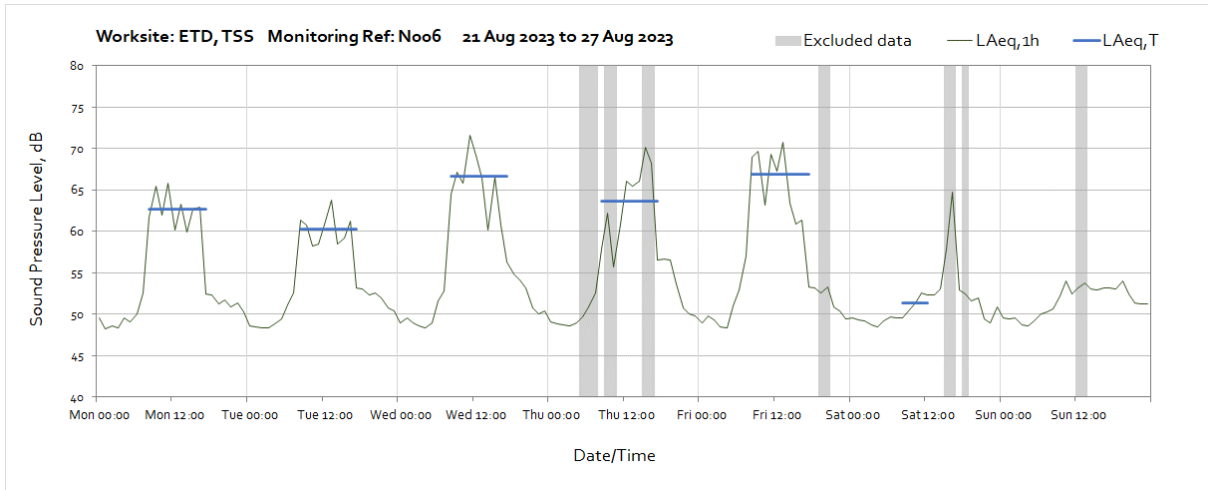




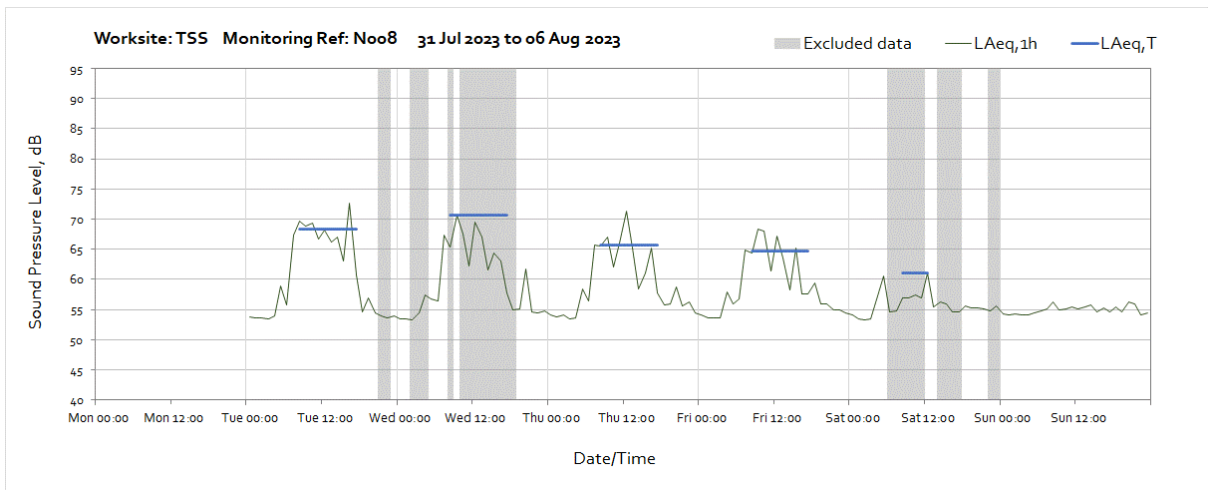
## Worksite: ETD, TSS - Monitoring Ref: N006

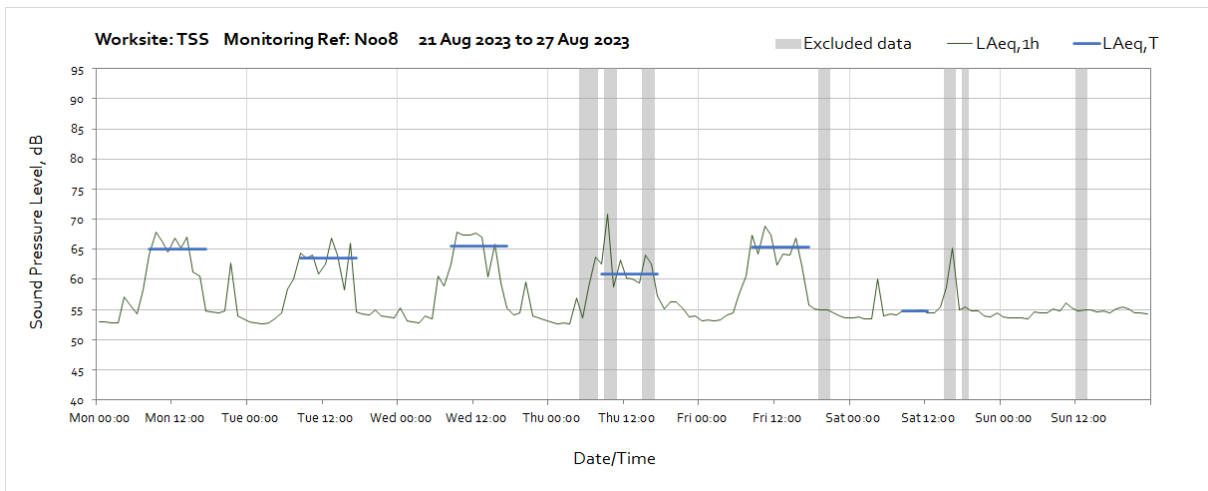
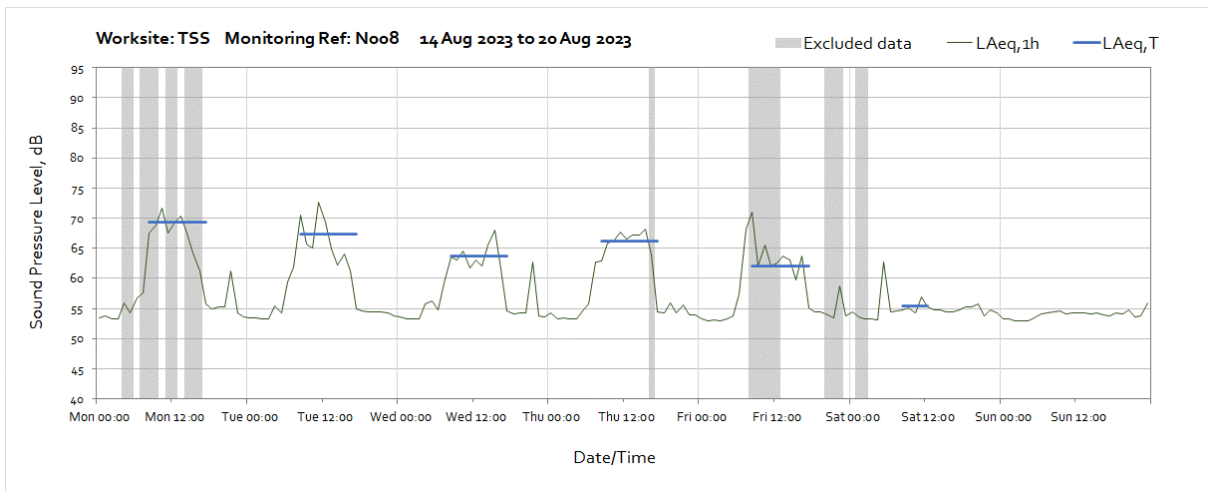
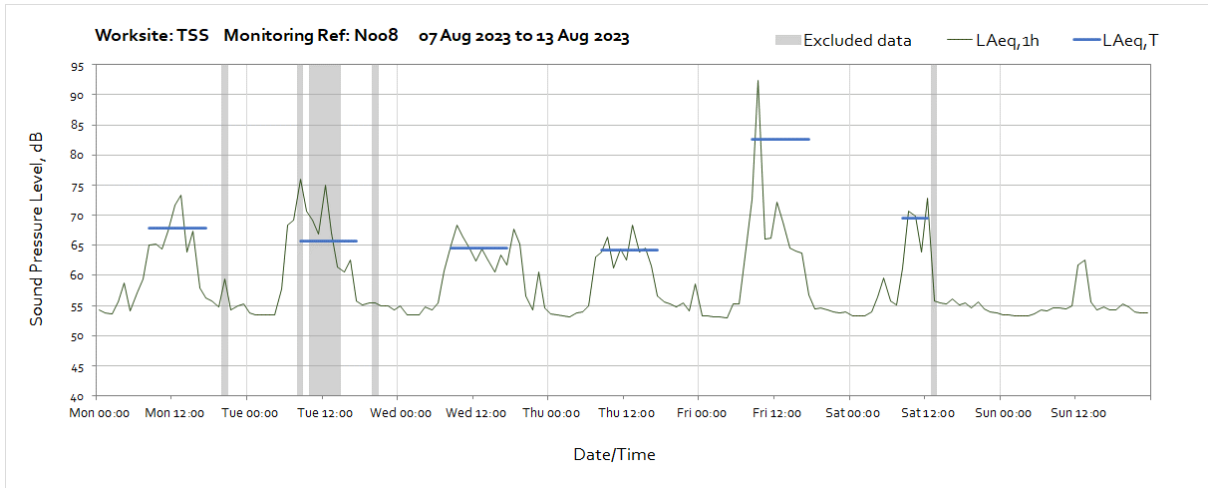


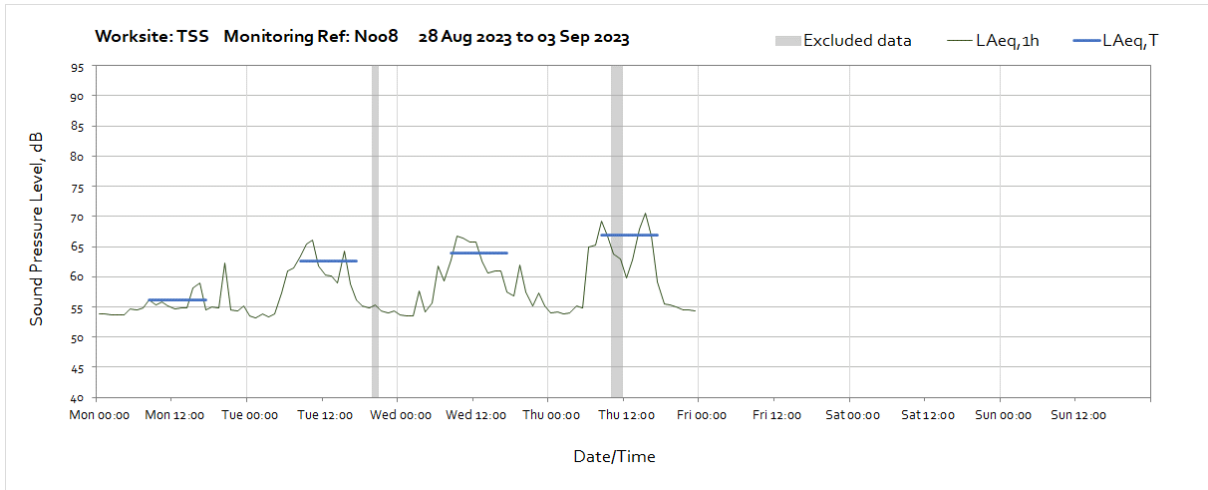




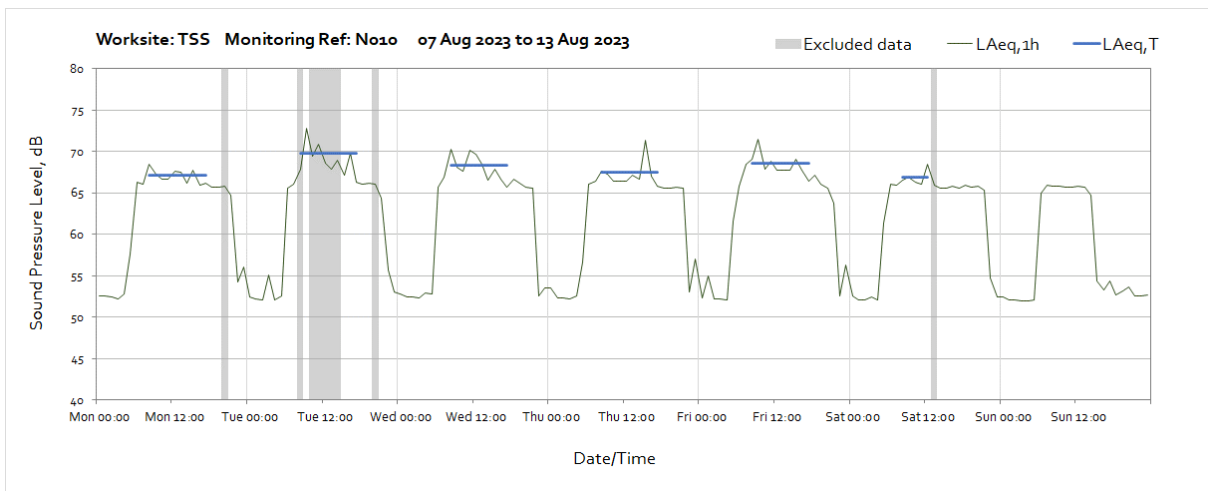
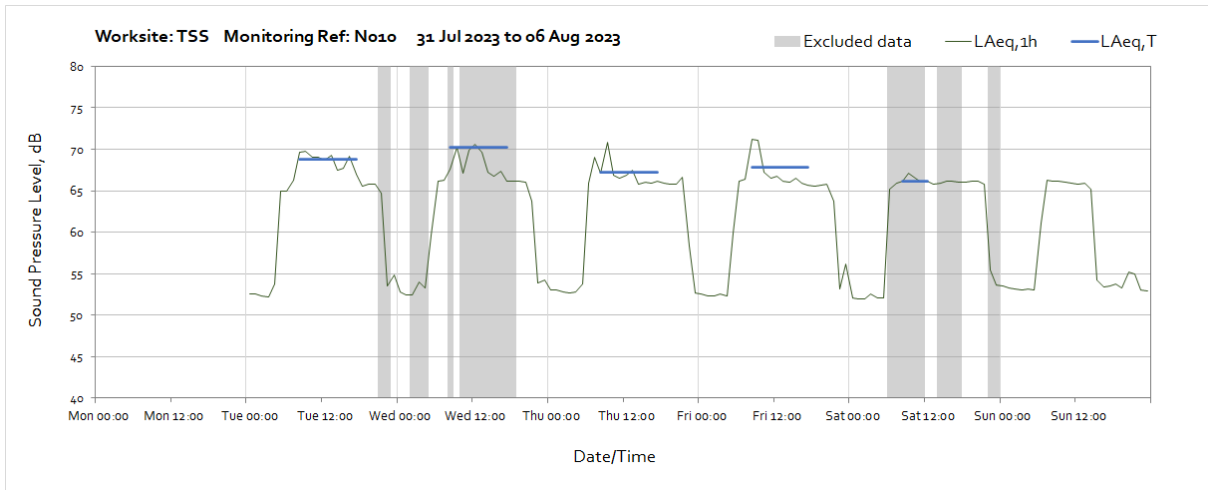
**Worksite: TSS - Monitoring Ref: N008**

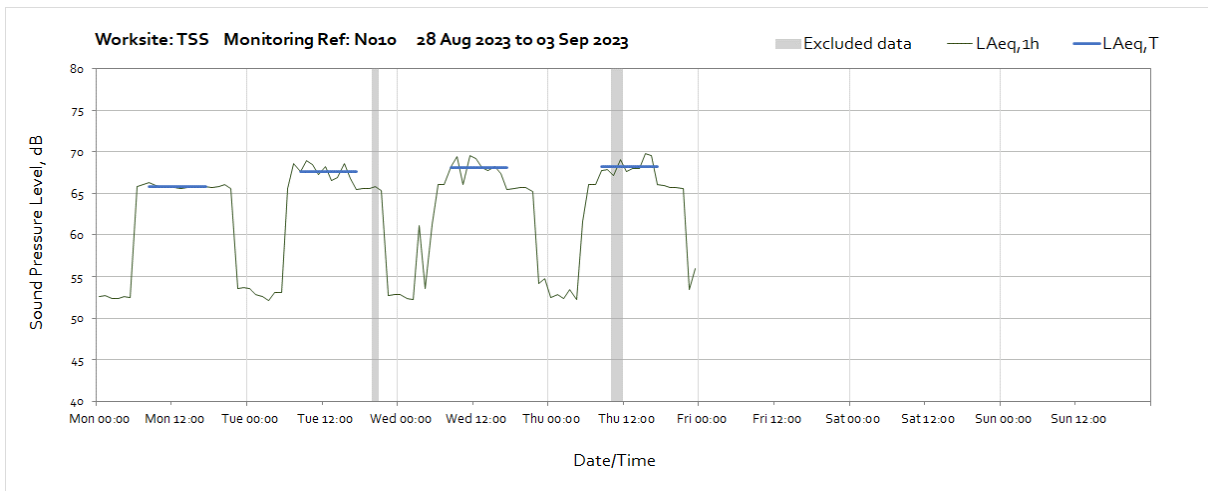
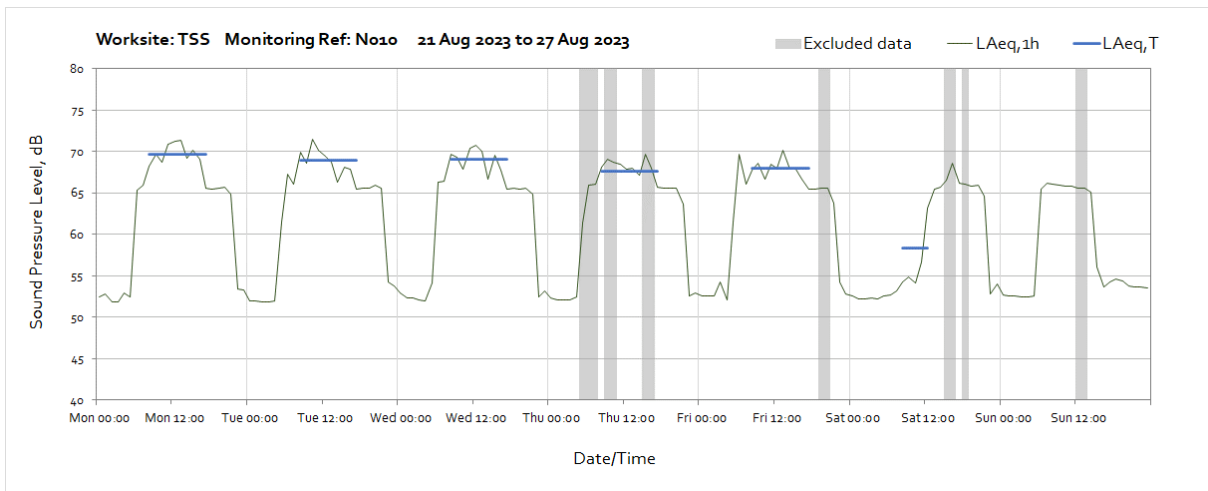
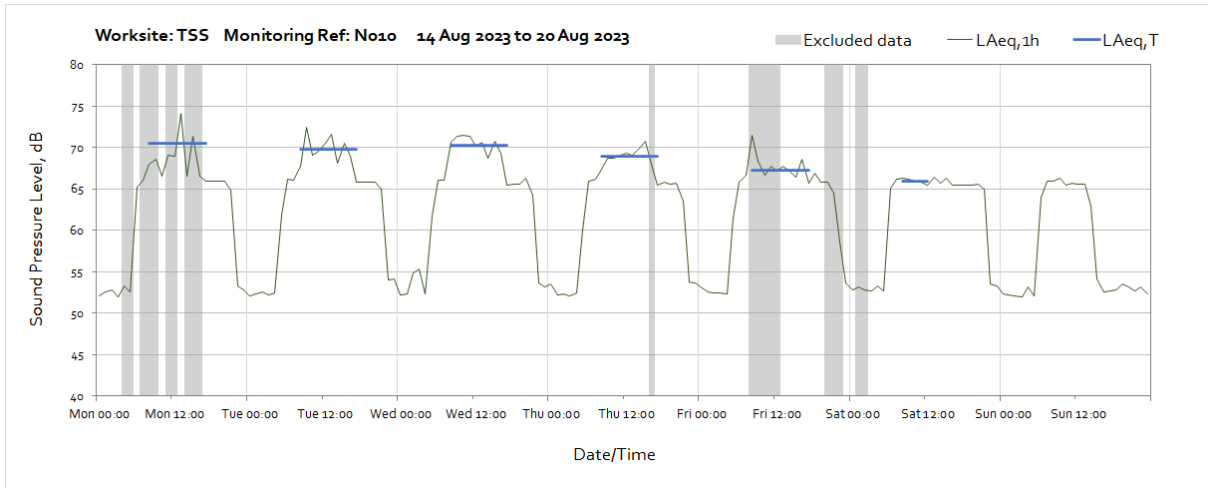




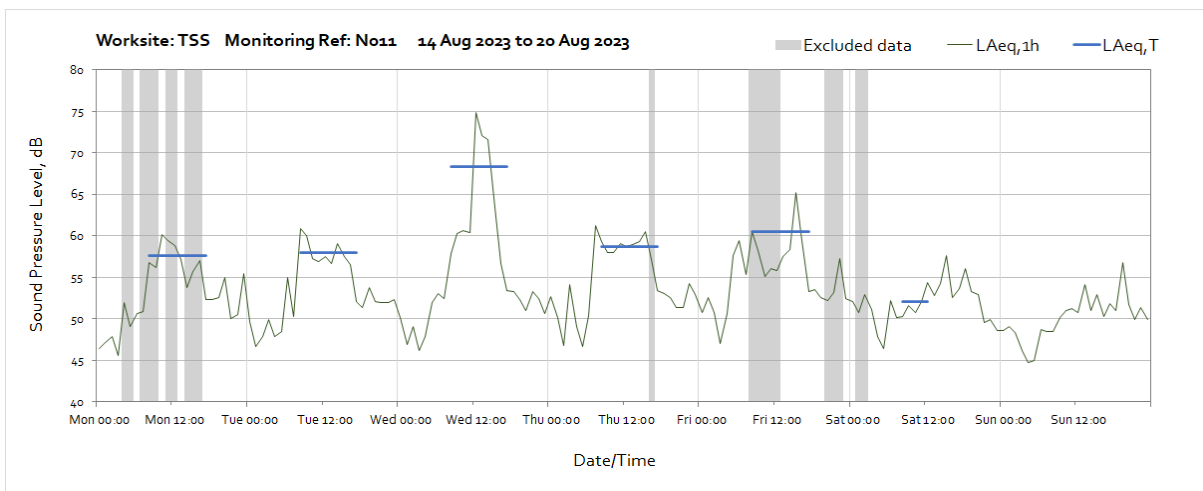
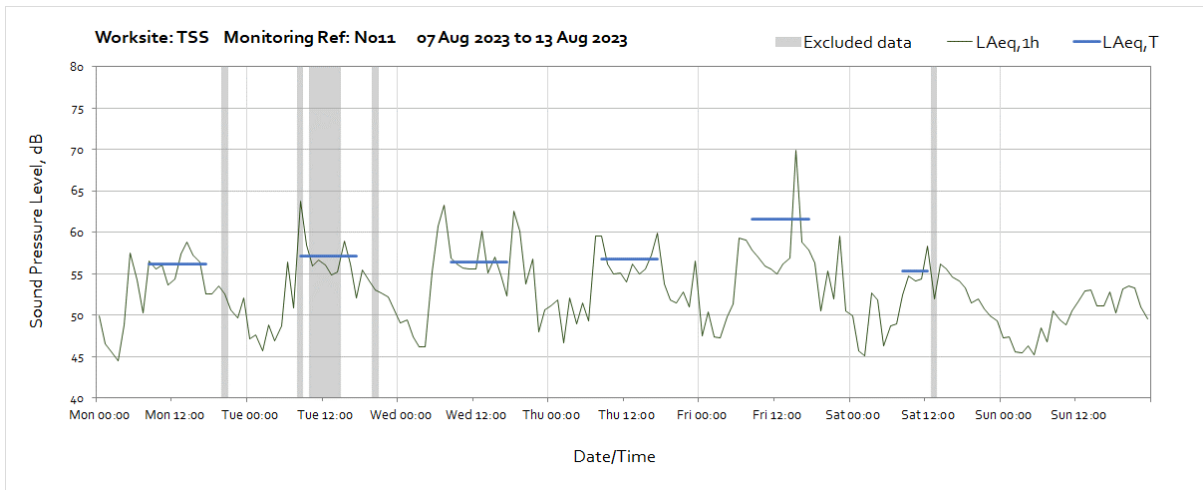
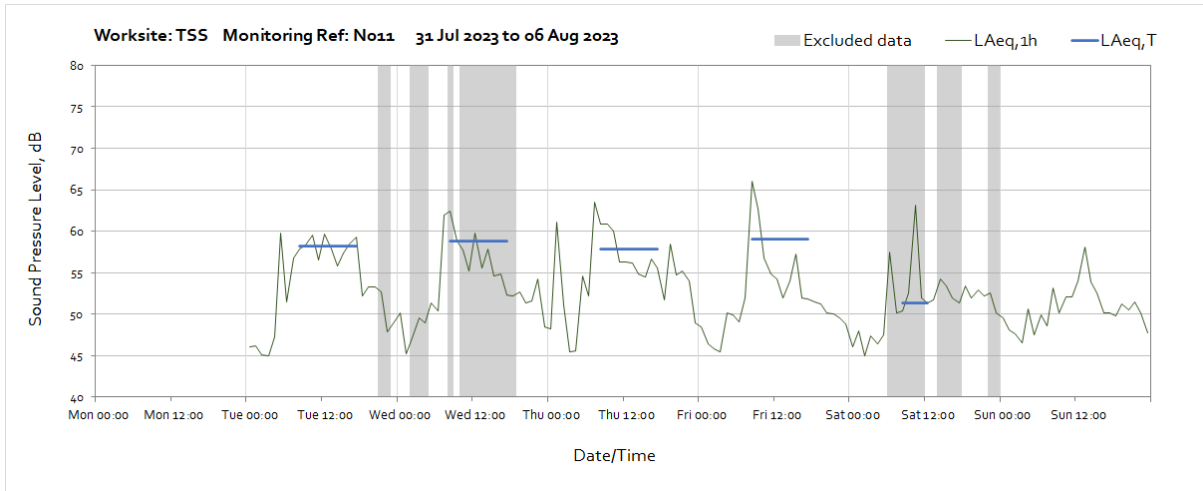


**Worksite: TSS - Monitoring Ref: N010**

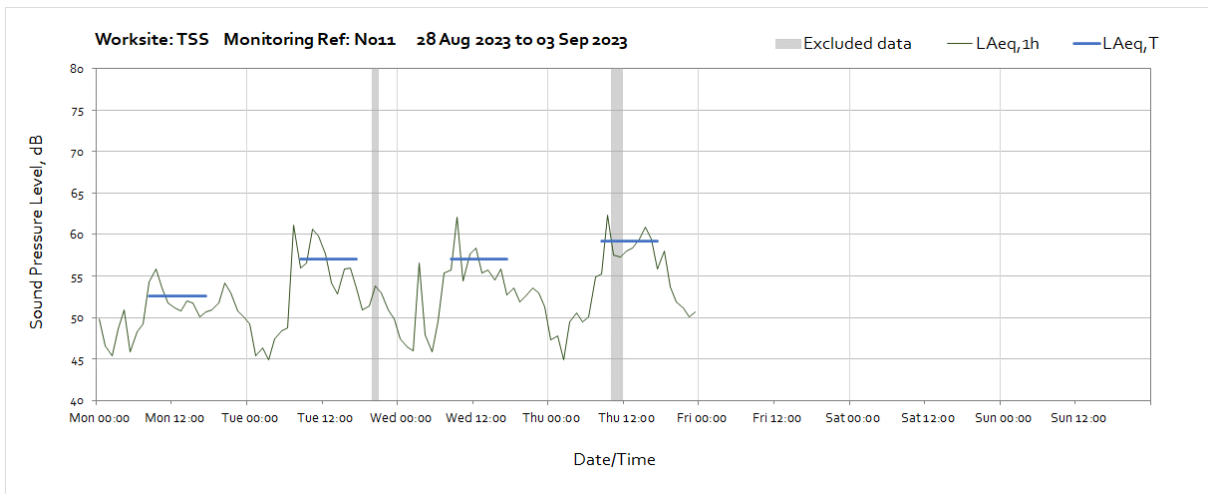
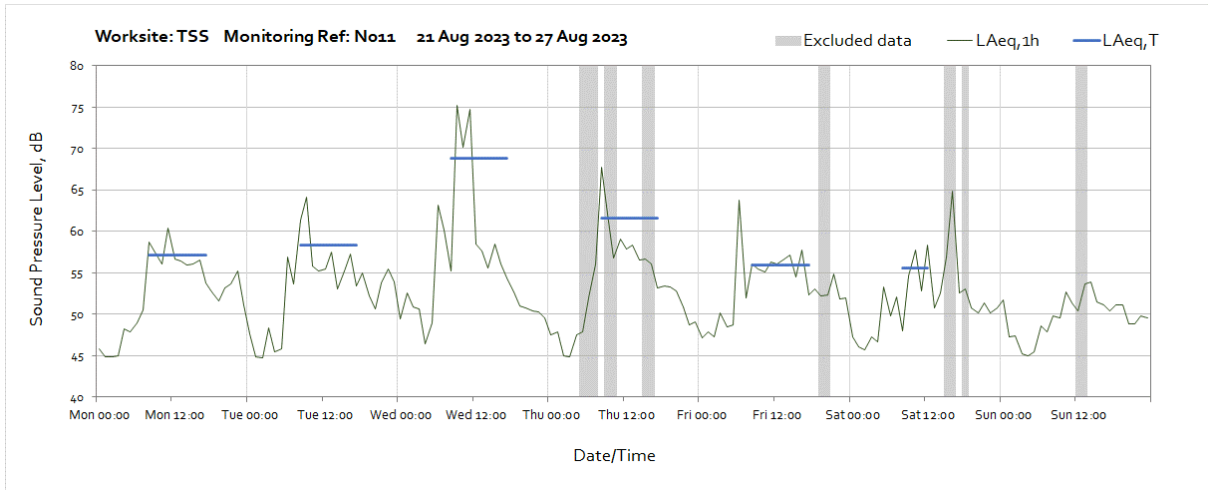




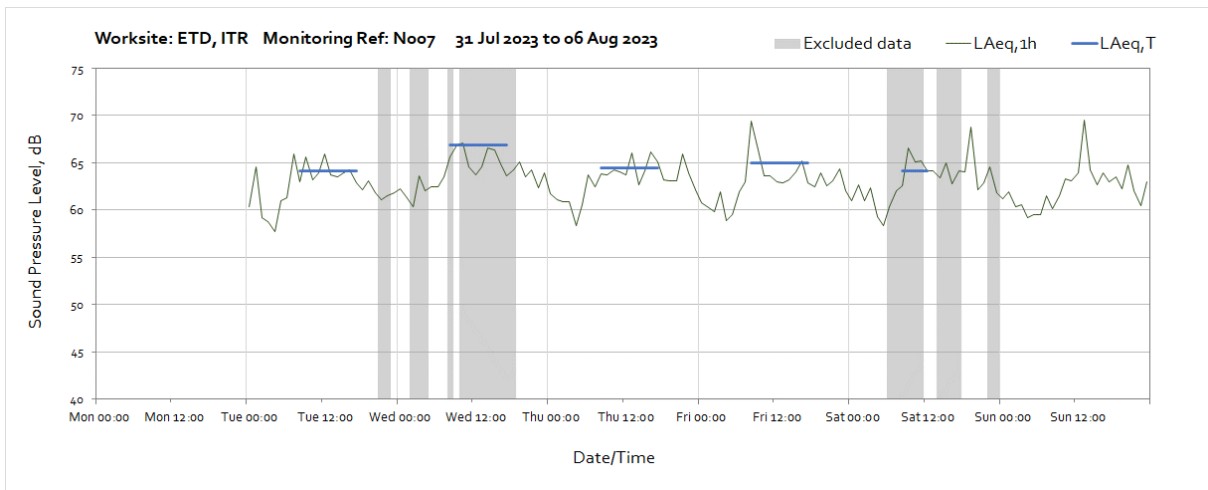
## Worksite: TSS – Monitoring Ref: N011

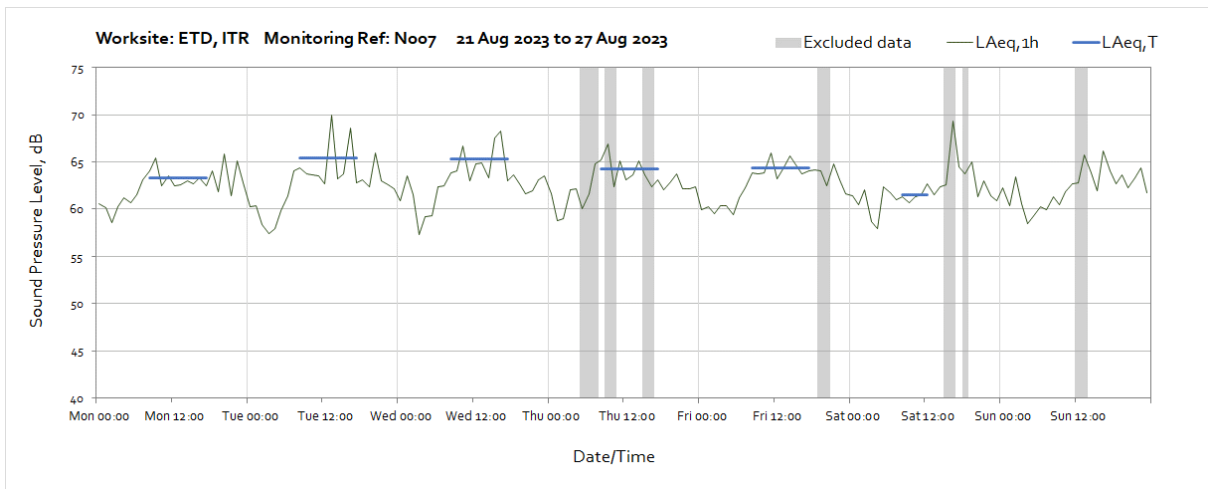
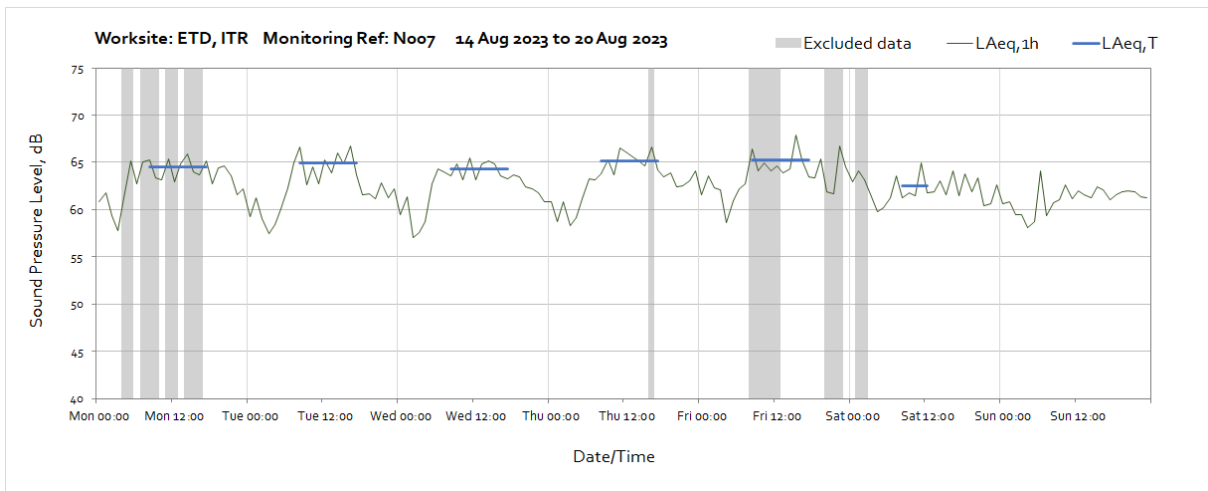
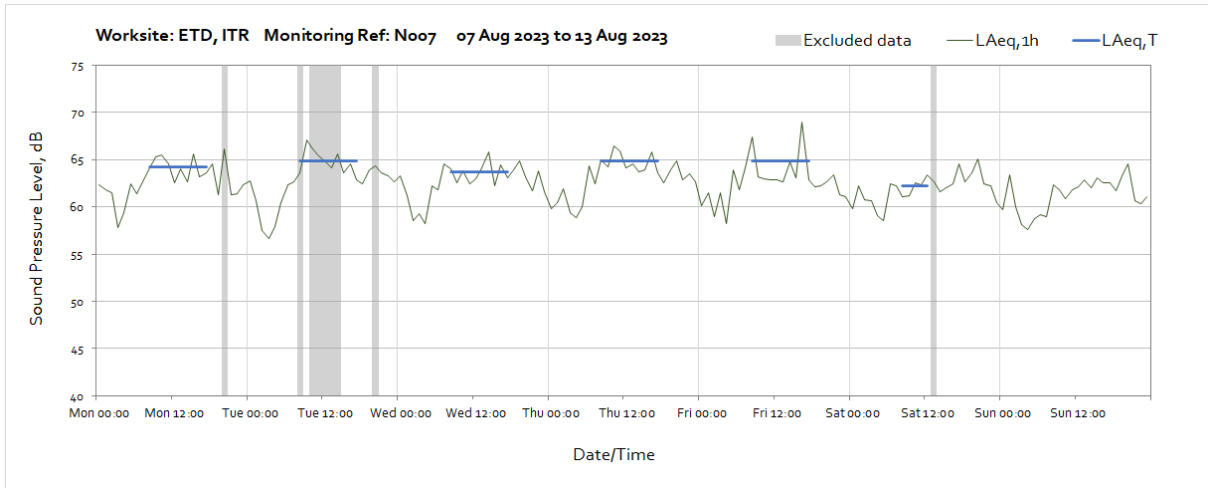


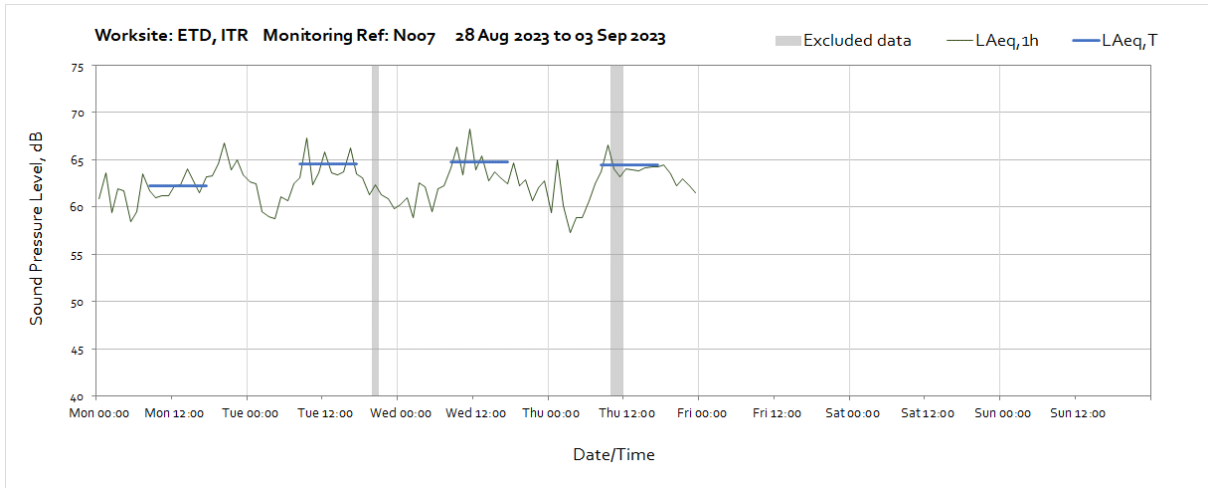
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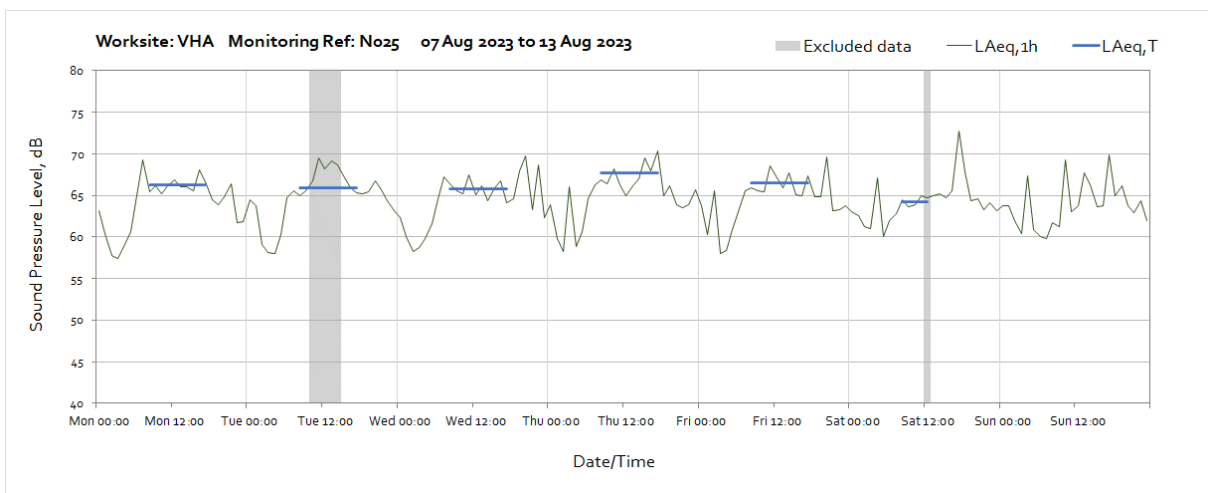
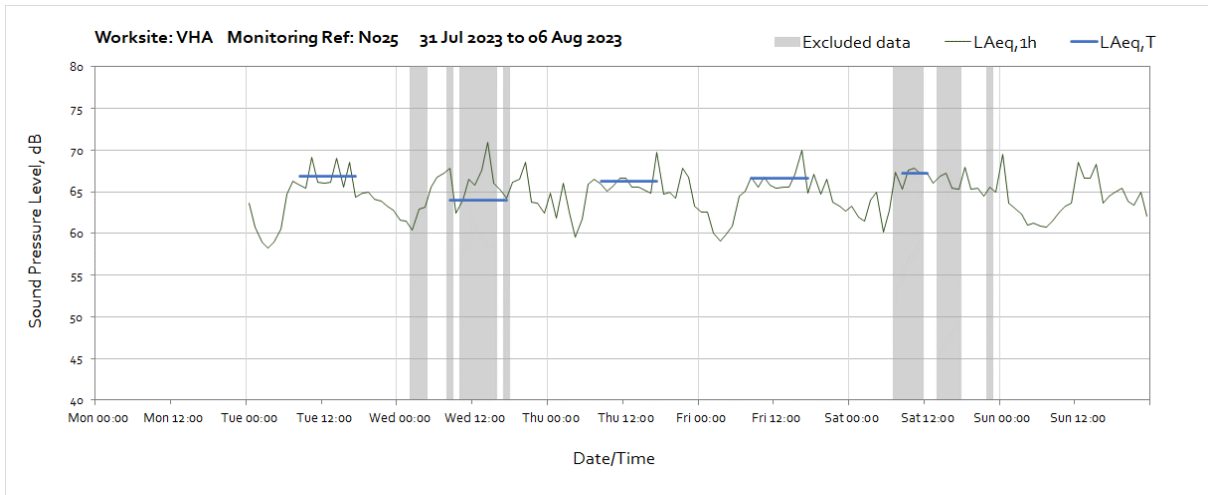
**Worksite: ETD, ITR – Monitoring Ref: N007**



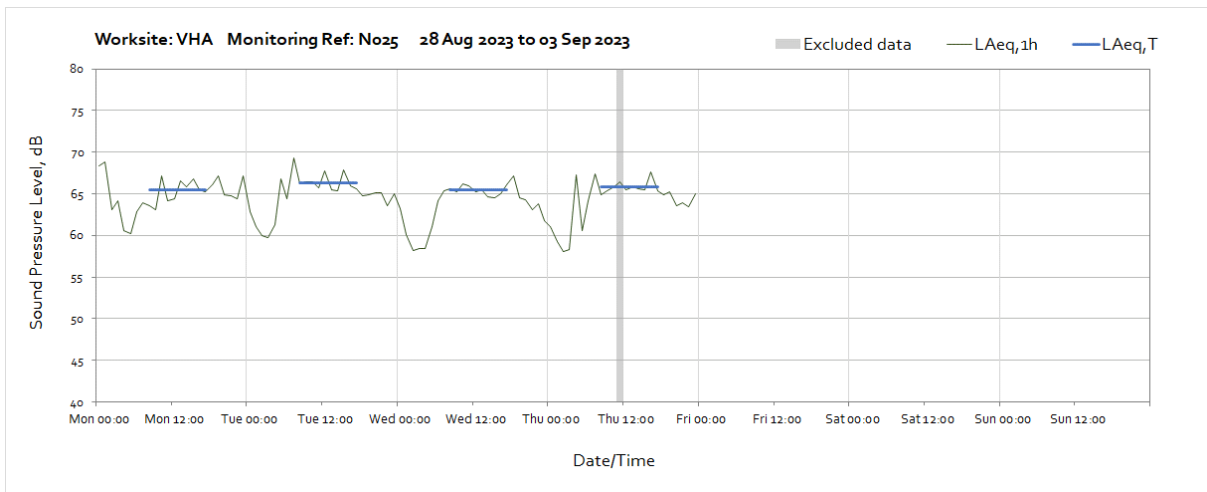
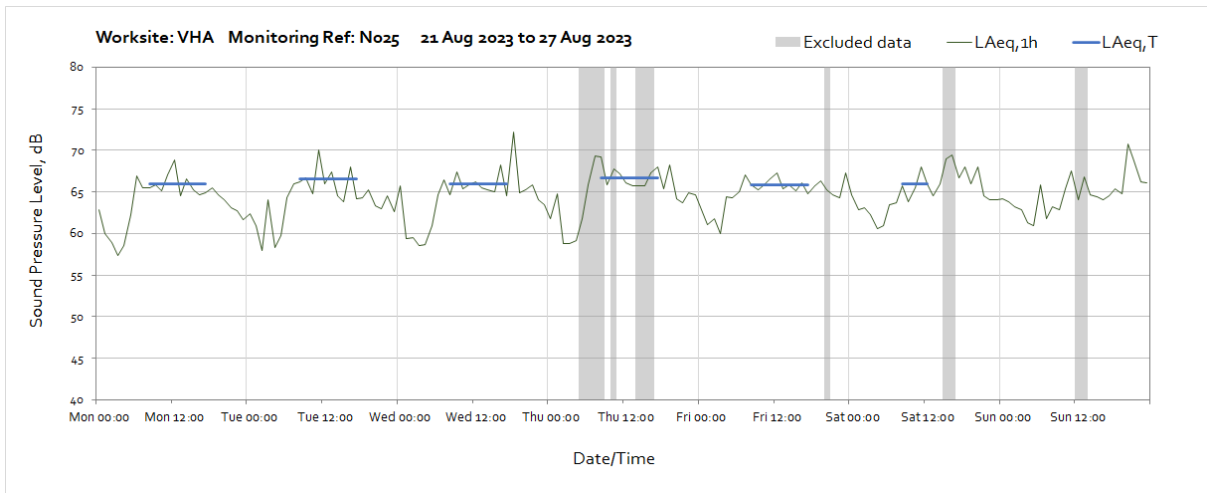
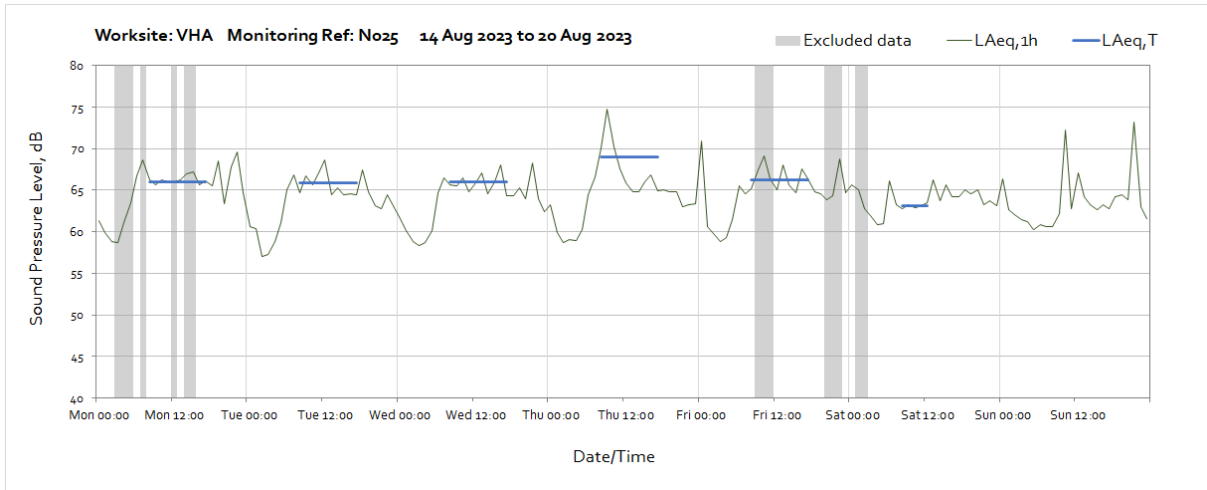




### Vehicle Holding Area (VHA) - Monitoring Ref: N025





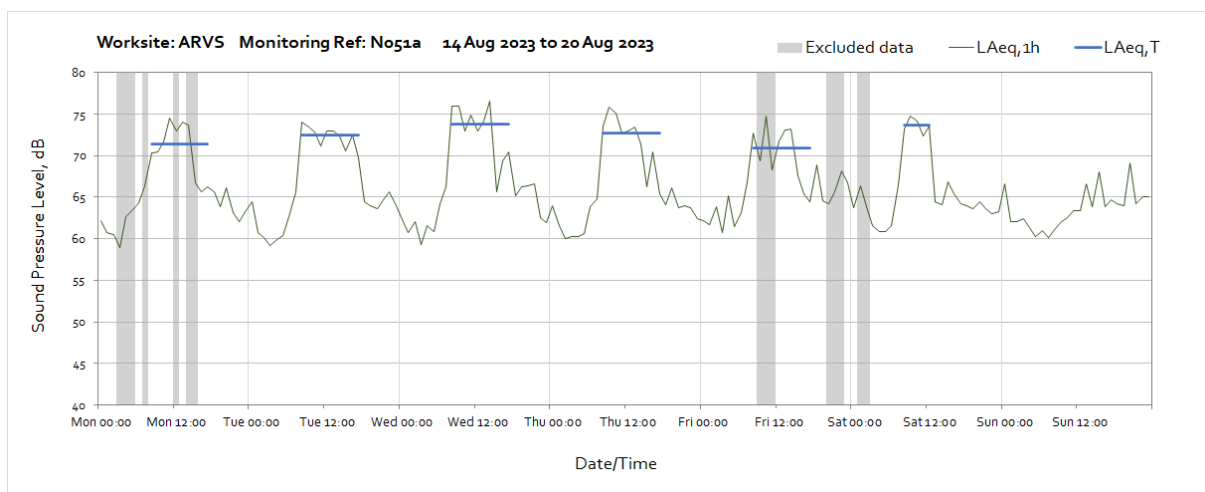
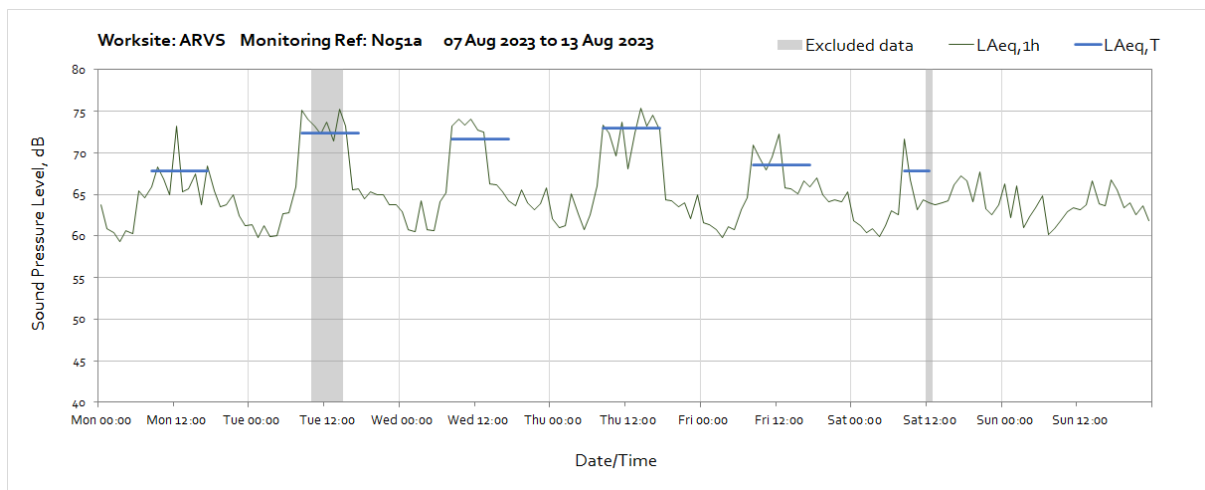
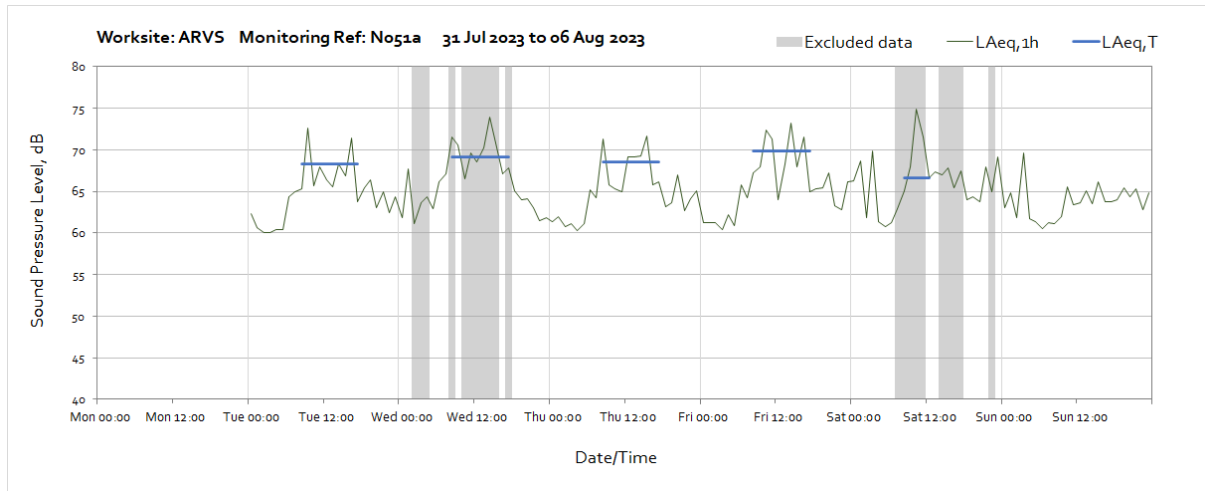


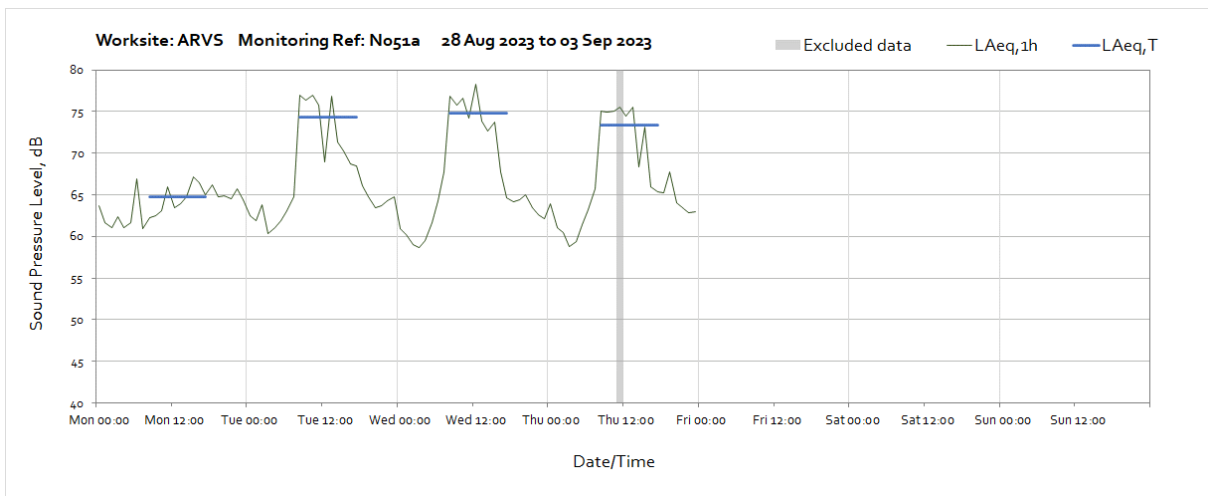
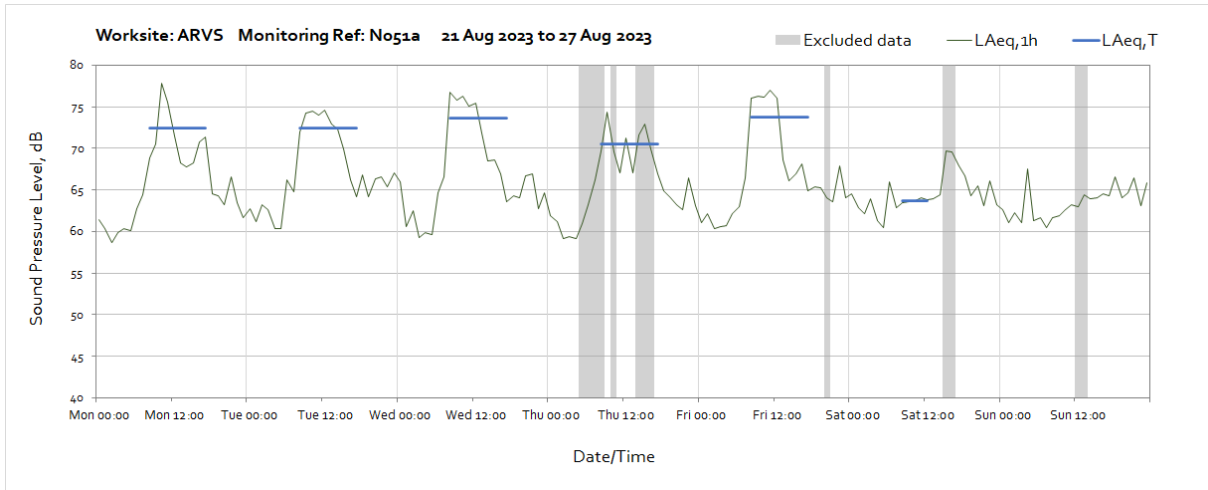
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## Adelaide Road Ventilation Shaft (ARVS) – Monitoring Ref: N051

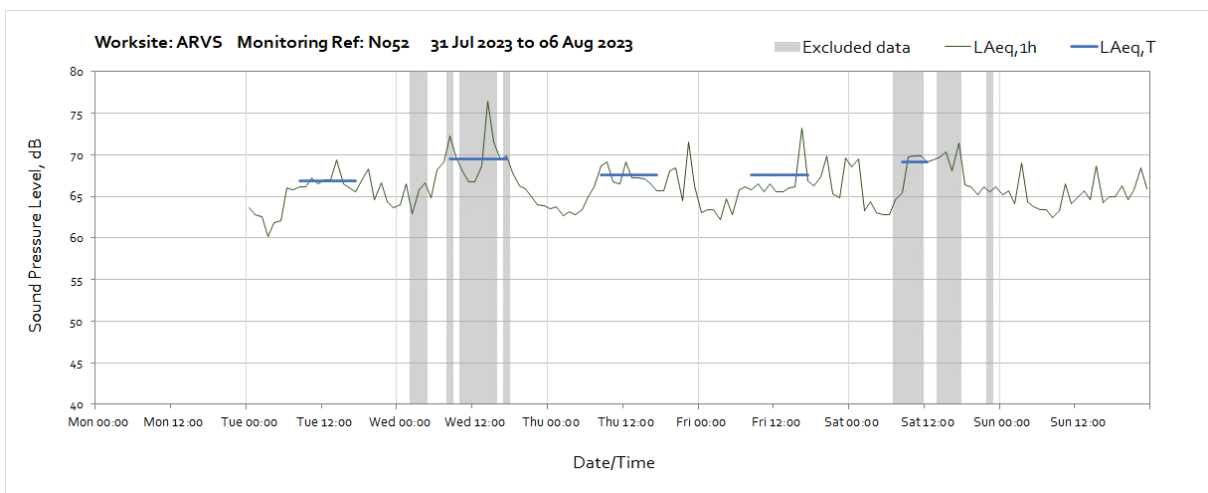
Note: No data measured throughout the month due to loss of power to the lighting column which supplies power to the monitoring station

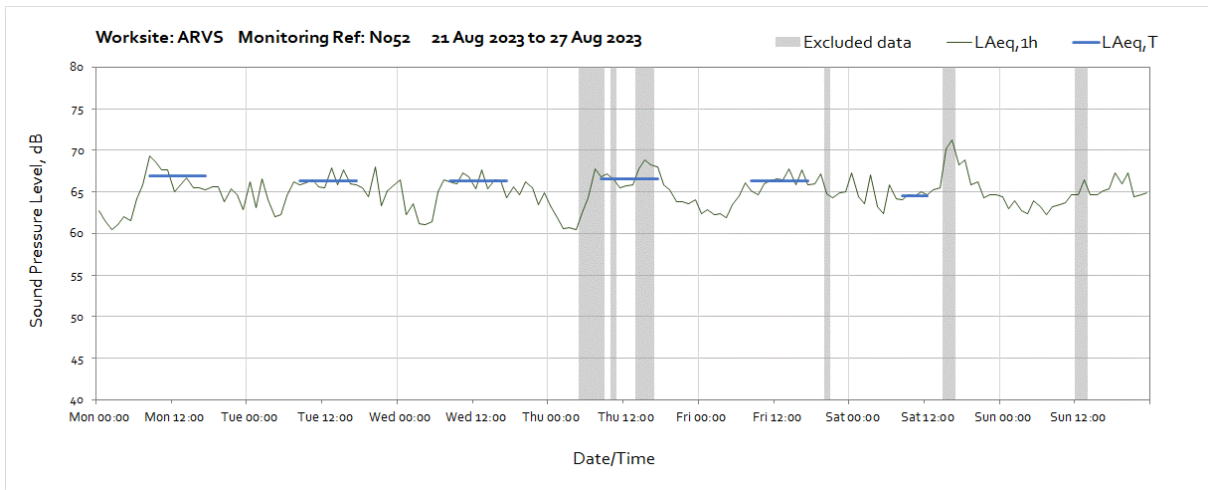
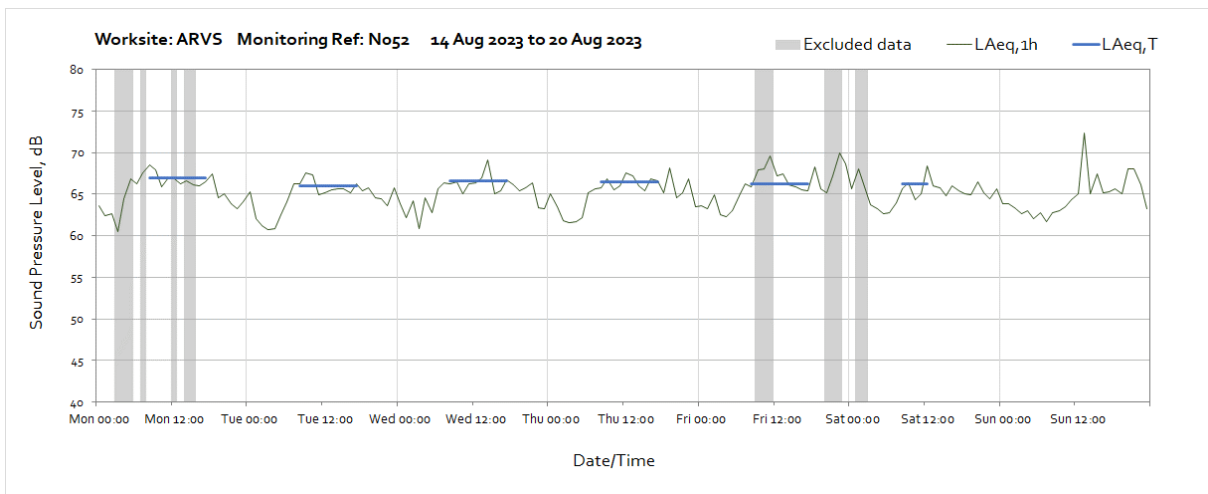
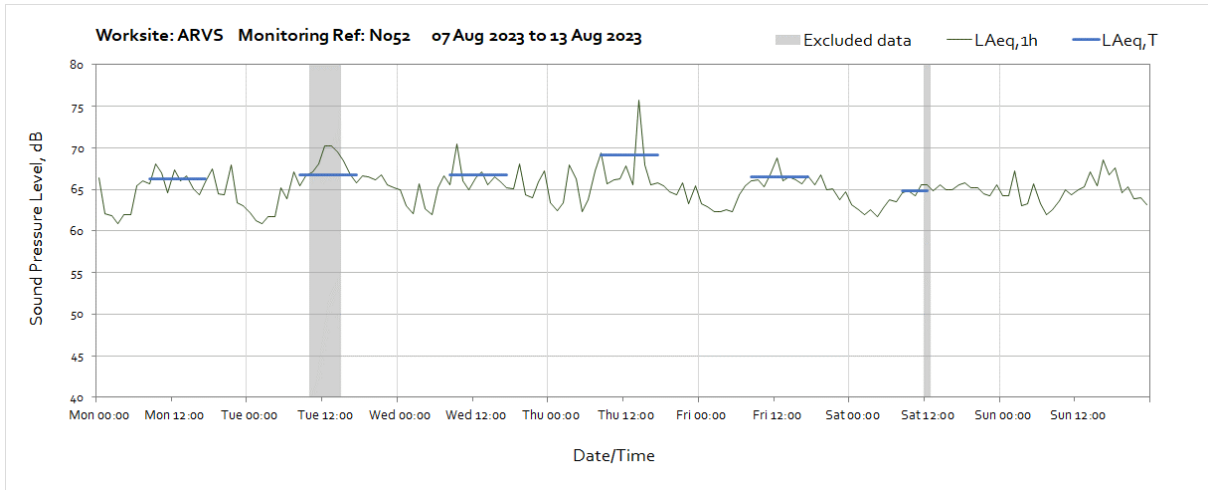
## Adelaide Road Ventilation Shaft (ARVS) – Monitoring Ref: N051a

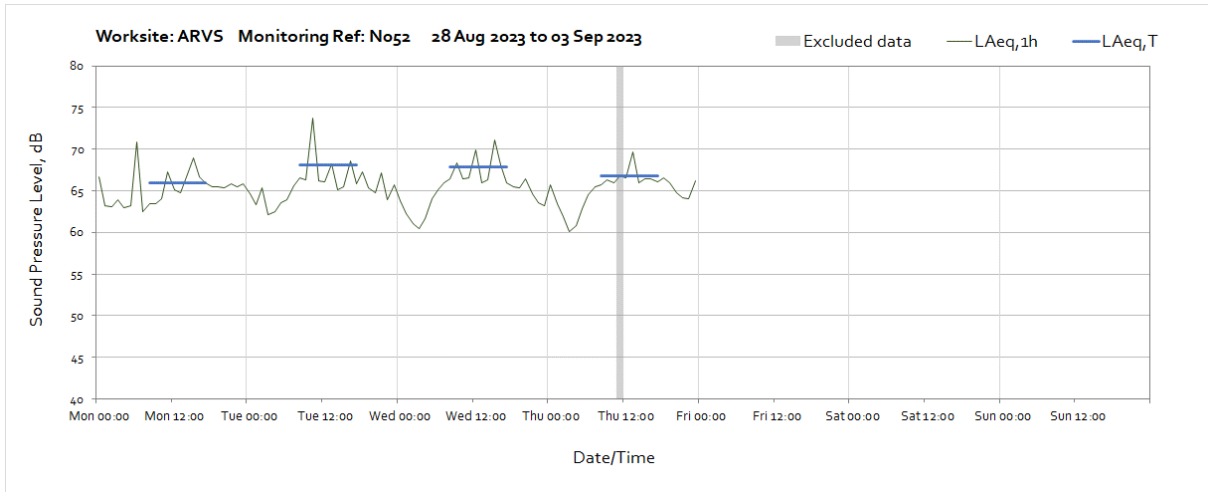




### Adelaide Road Ventilation Shaft (ARVS) - Monitoring Ref: N052



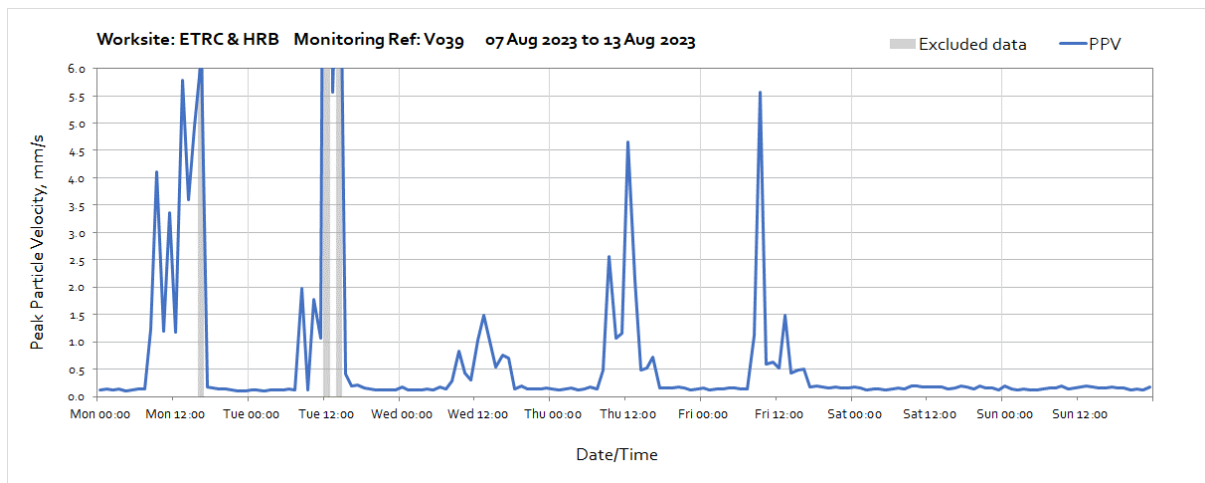
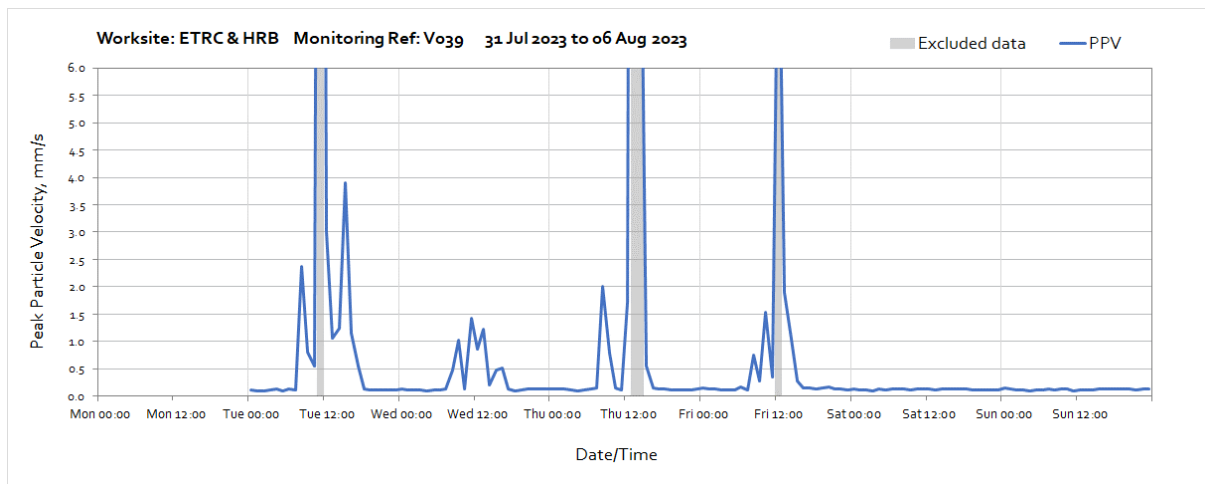


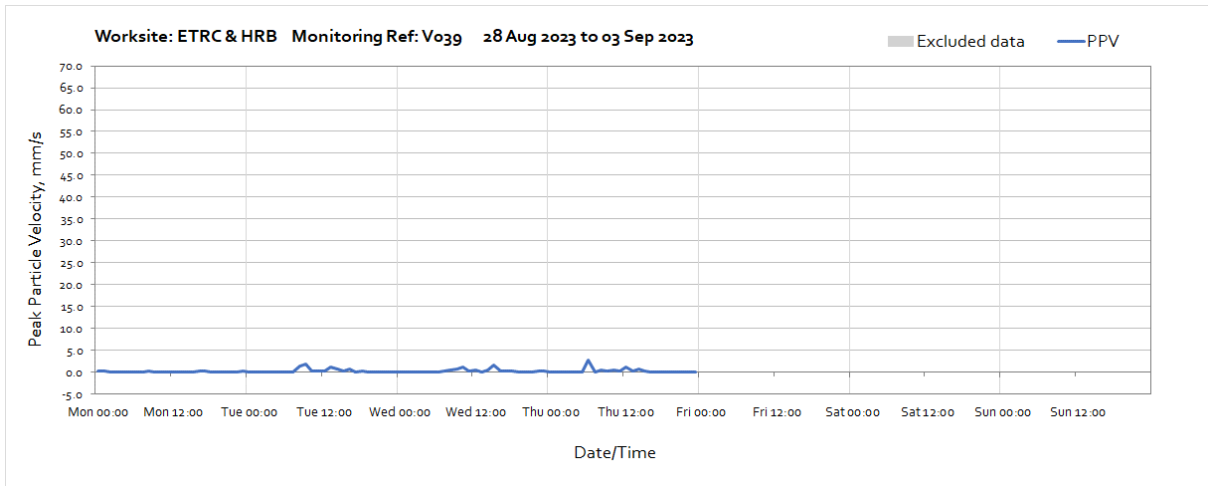
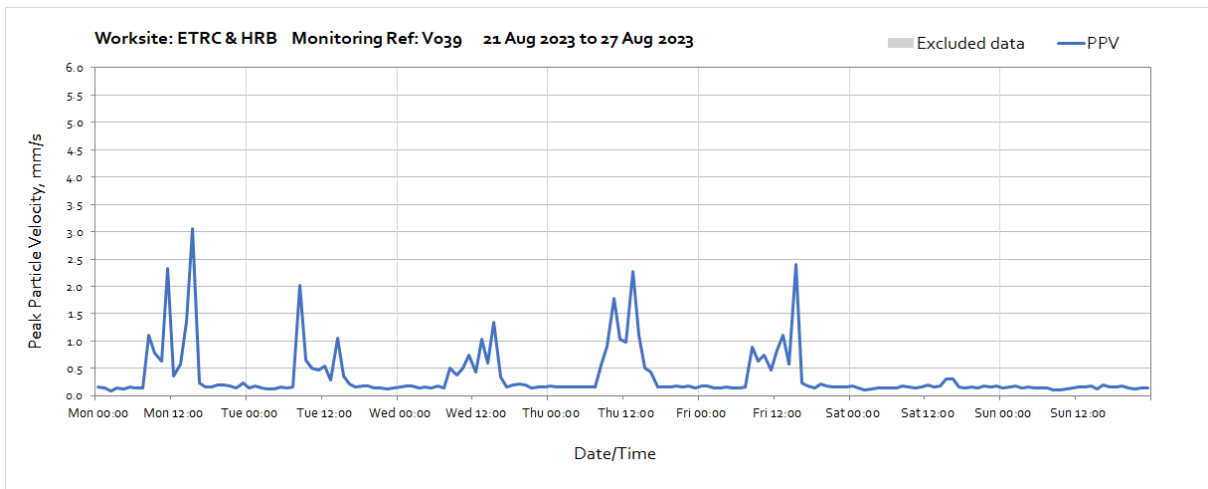
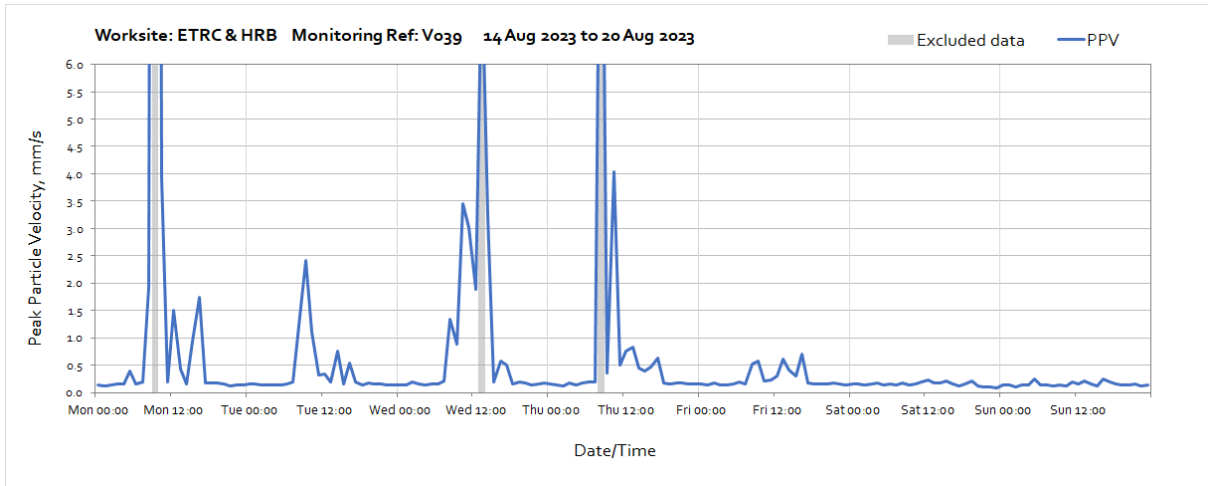


## Vibration

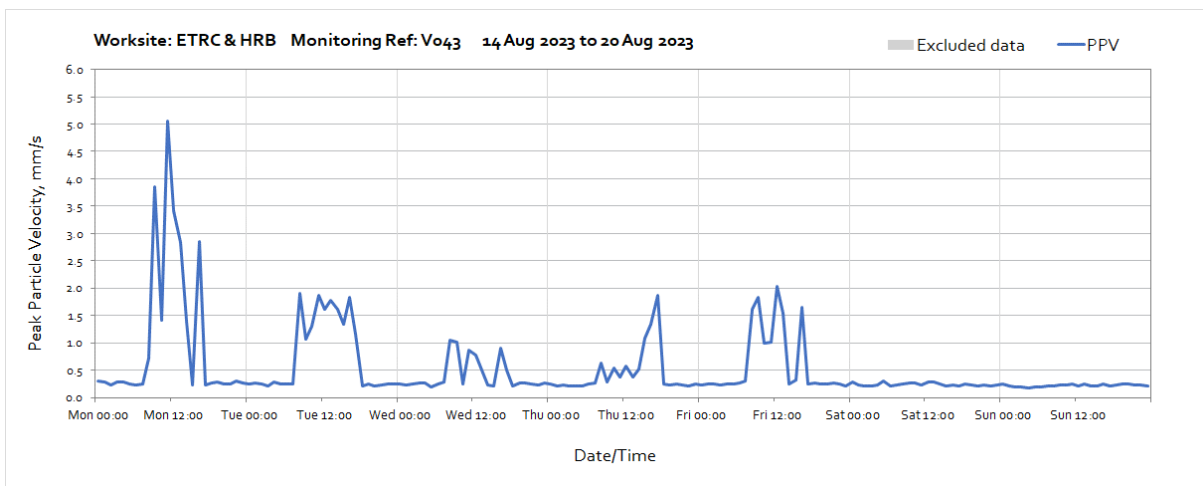
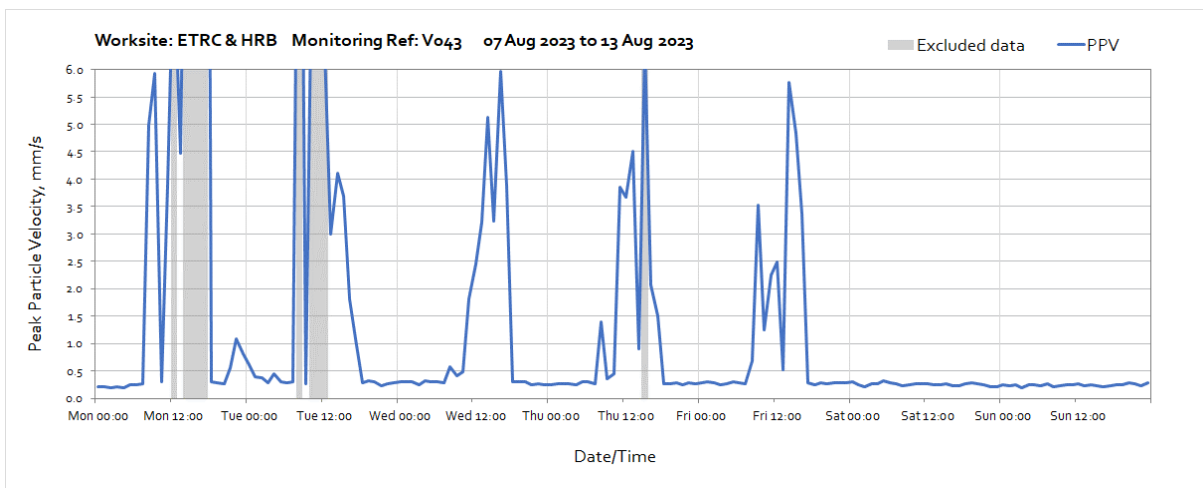
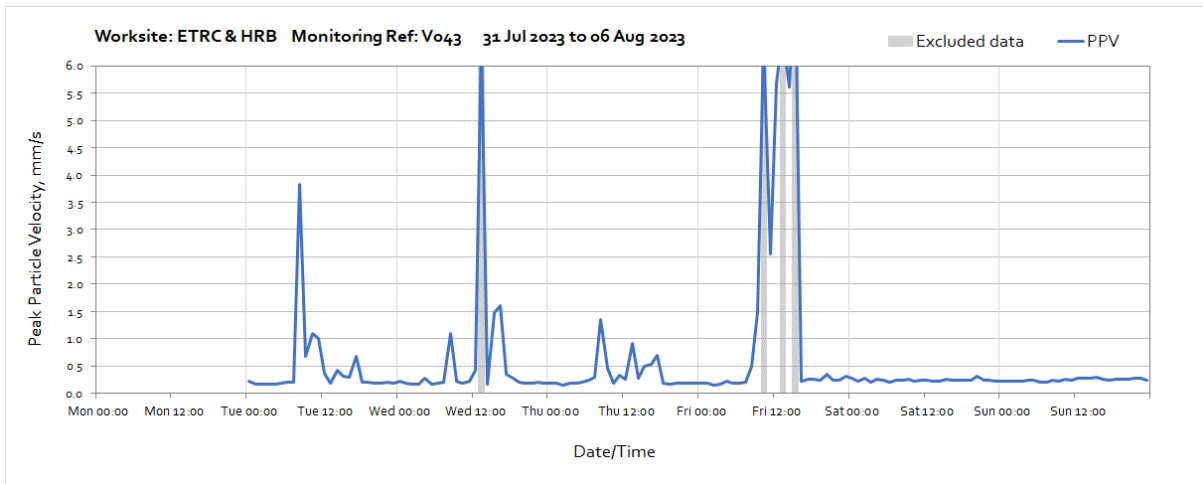
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axes x, y and z . Periods where PPV values have been affected by local interference with the vibration monitor or only measured for part of the period, which are not representative of HS2 construction works , have been greyed out and excluded when calculating values in Table 4 of the main report.

### Worksite: ETRC & HRB – Monitoring Ref: V039

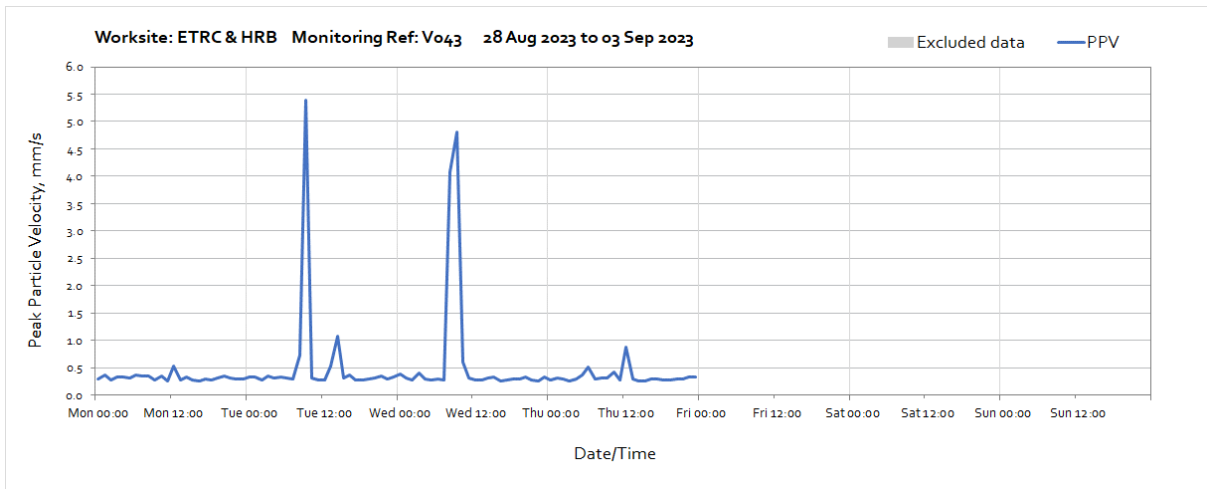
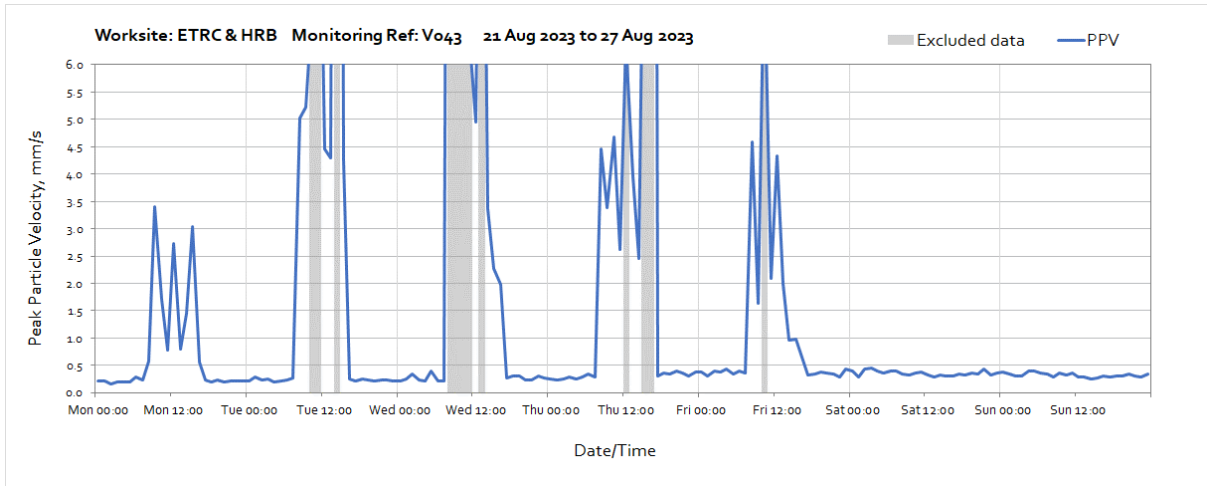




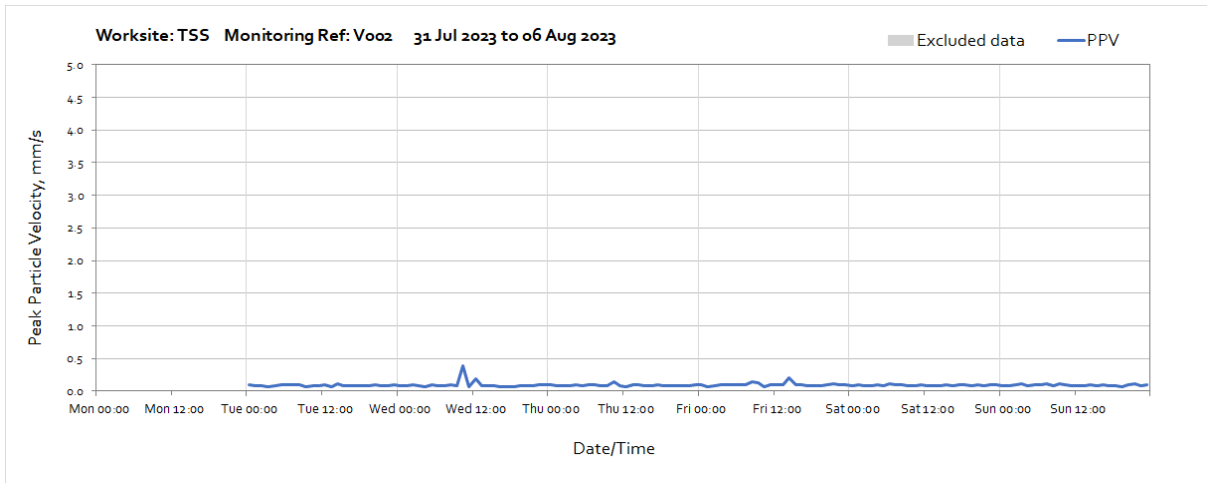
### Worksite: ETRC & HRB – Monitoring Ref: V043

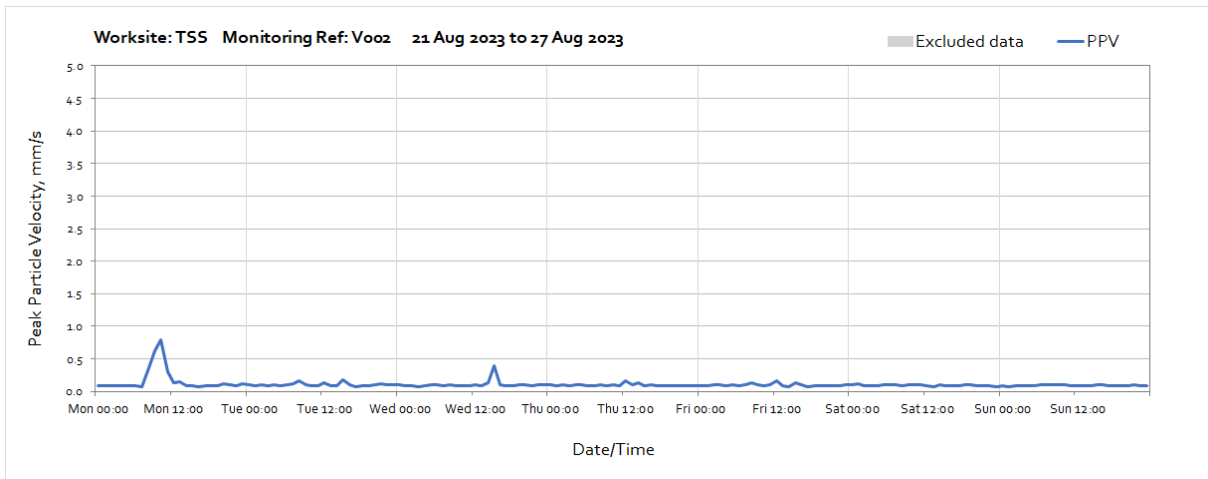
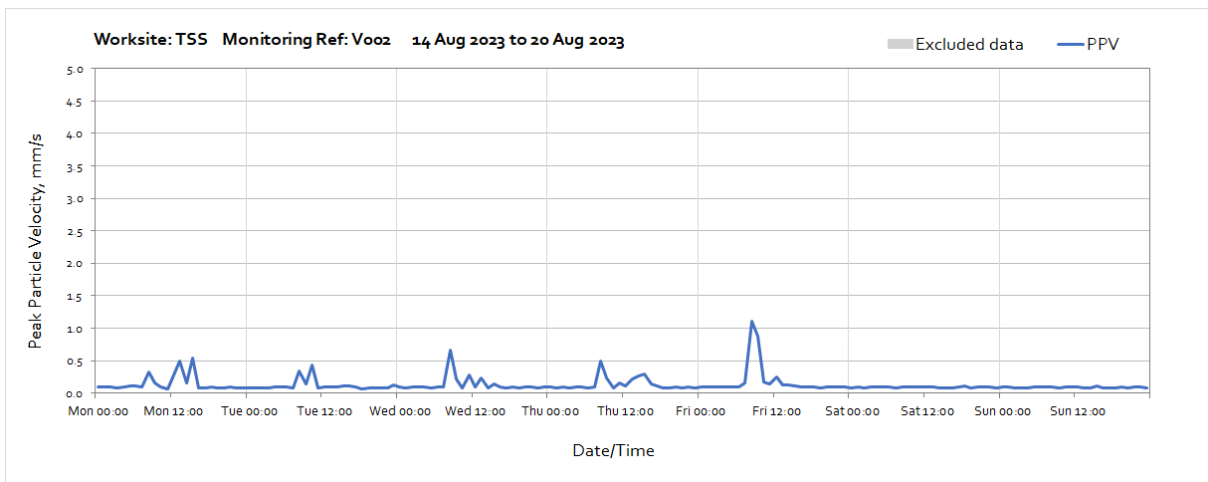
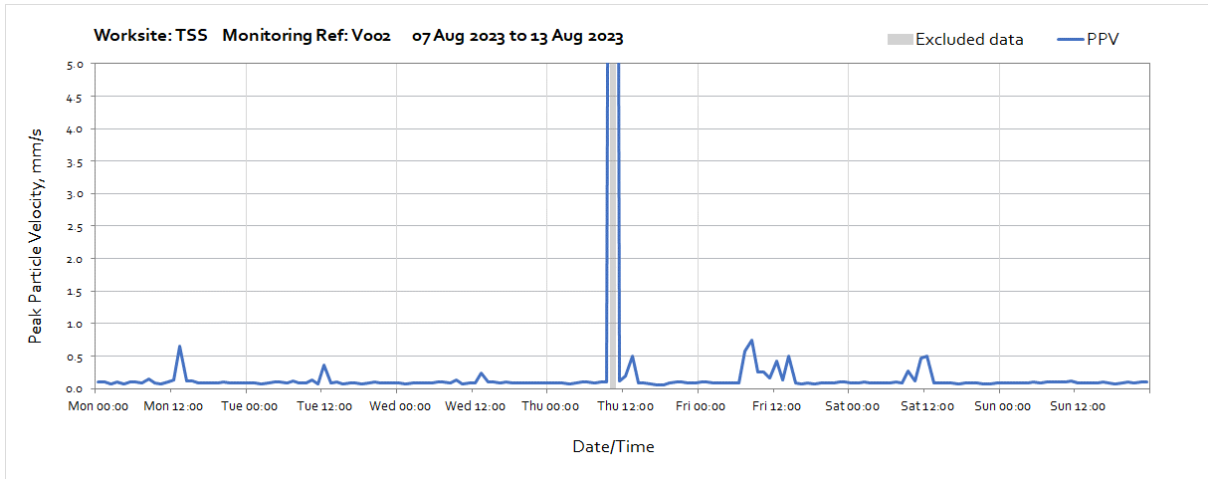


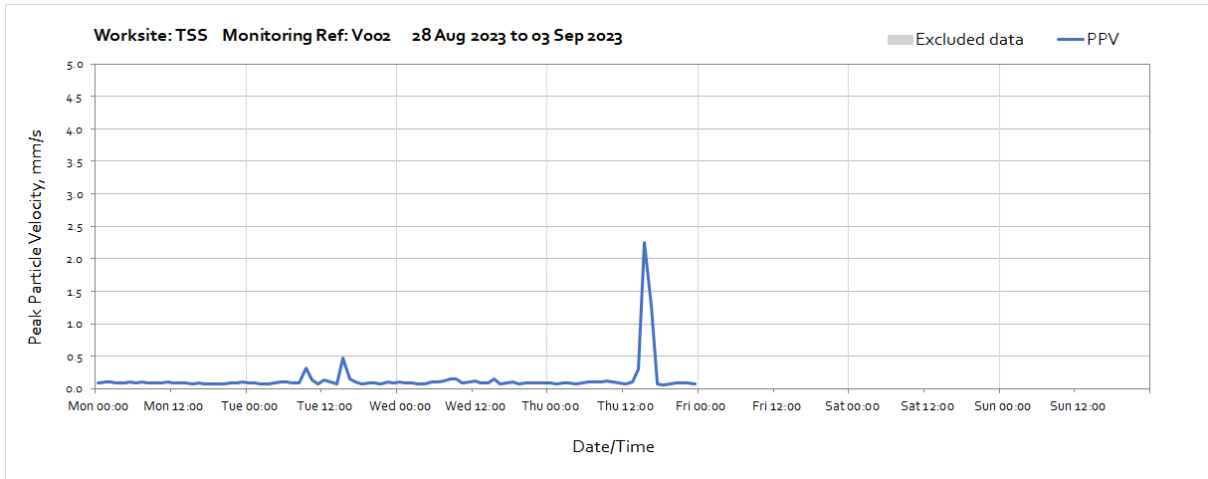




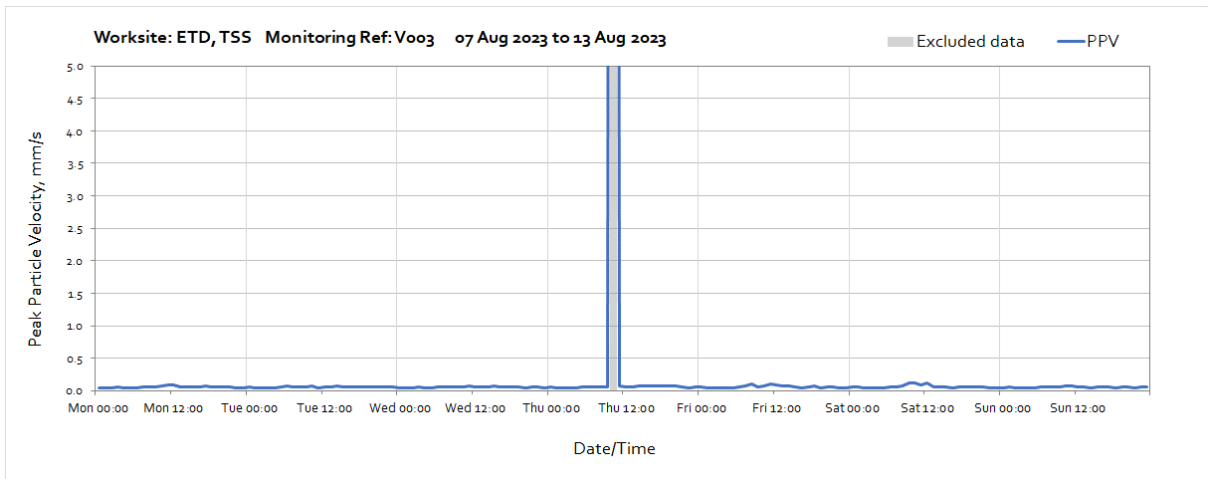
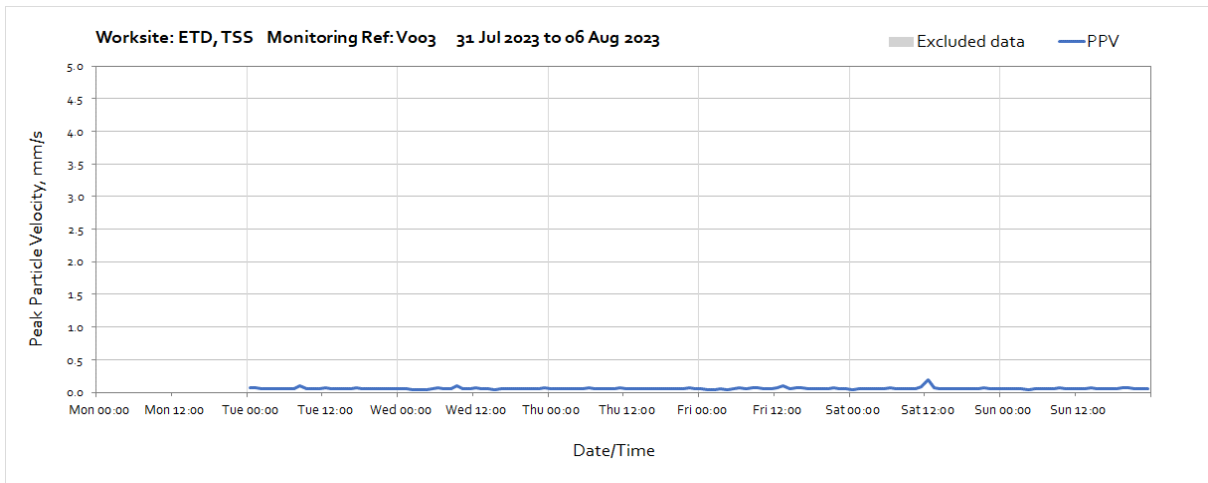
**Worksite: TSS - Monitoring Ref: V002**

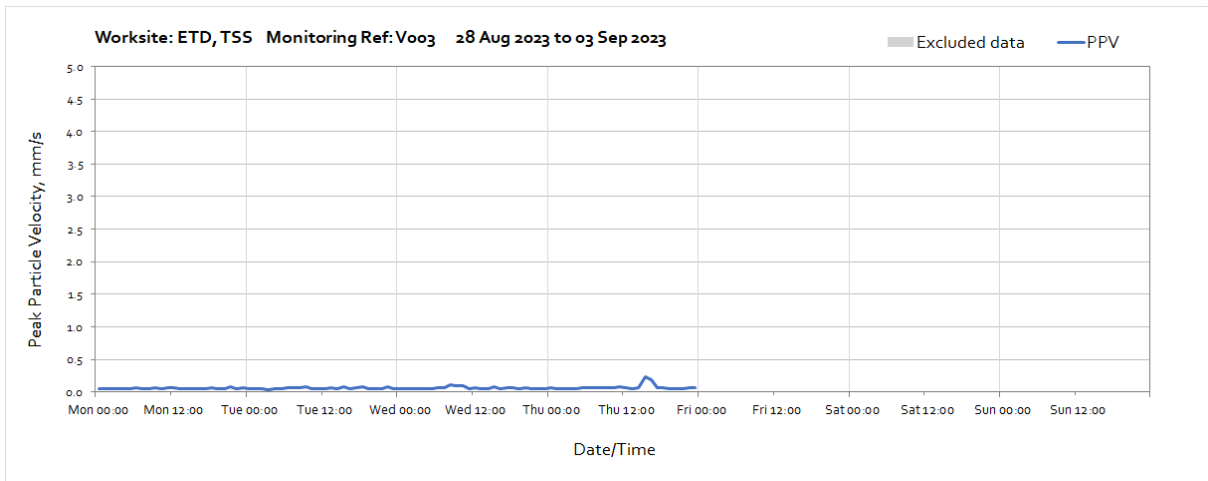
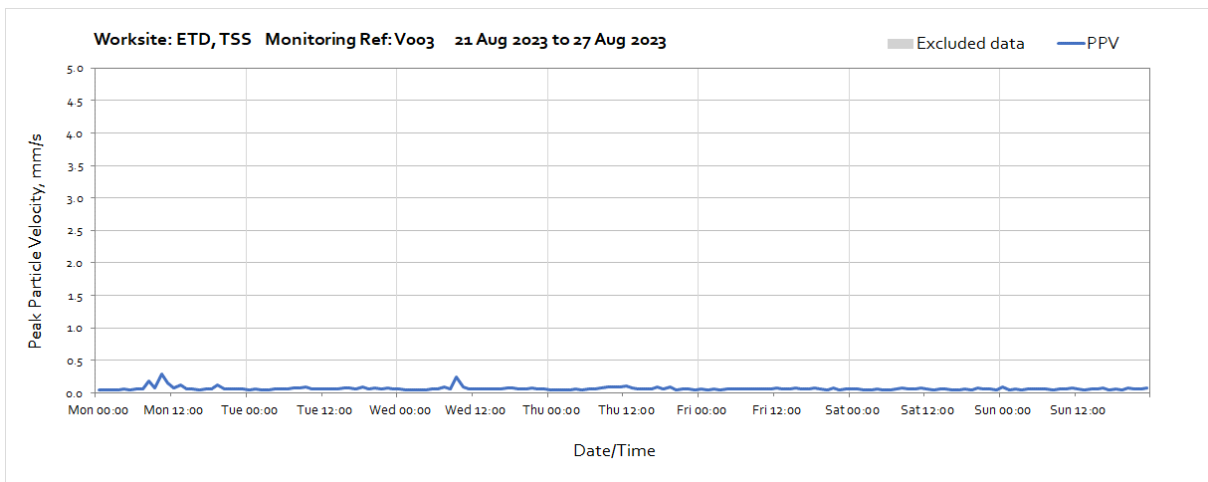
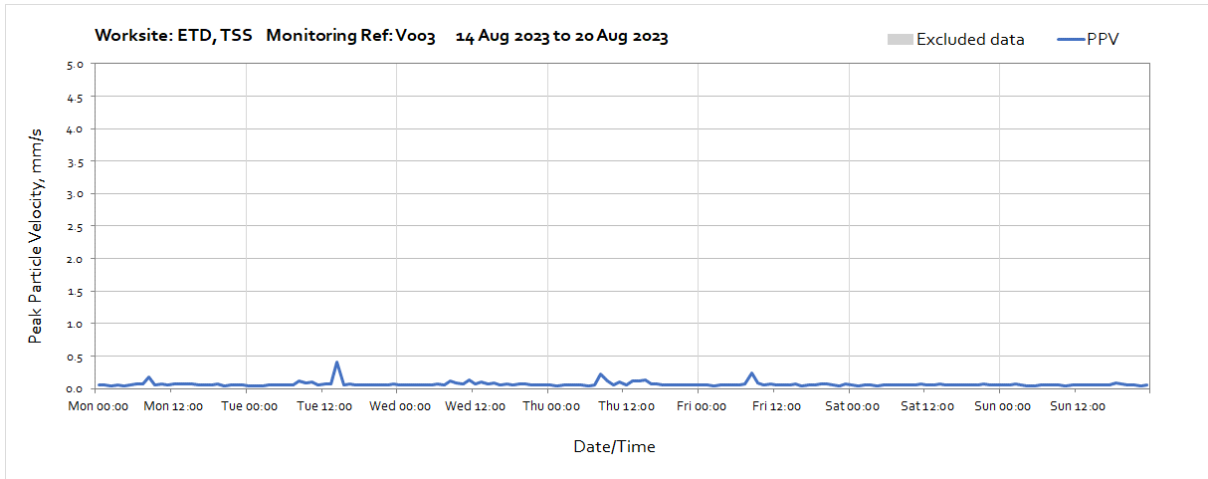




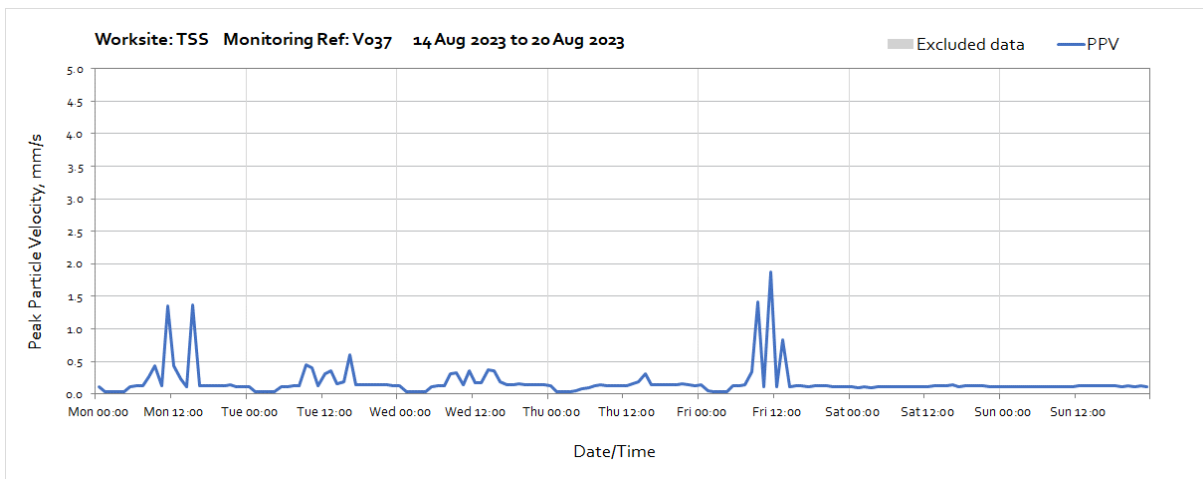
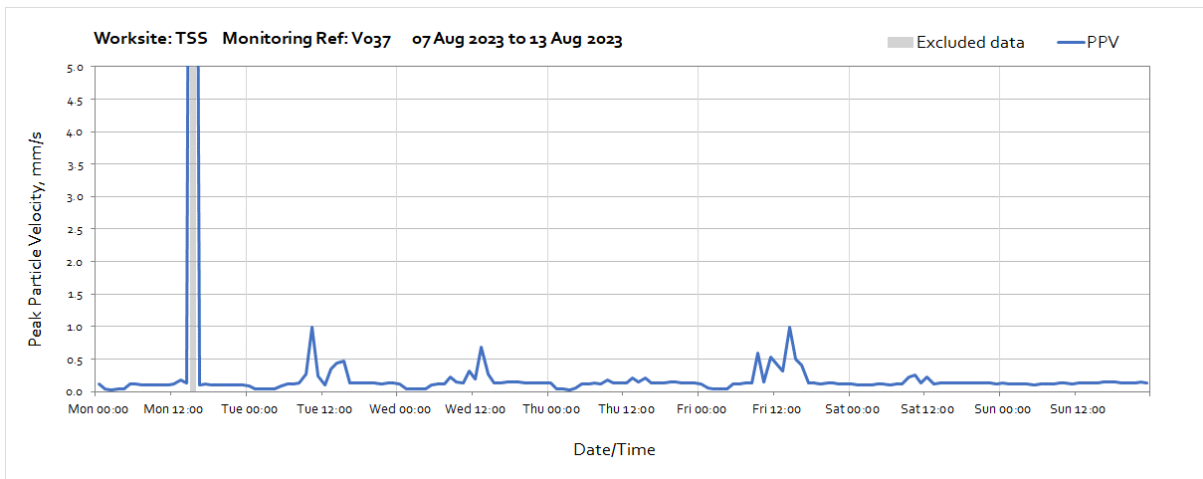
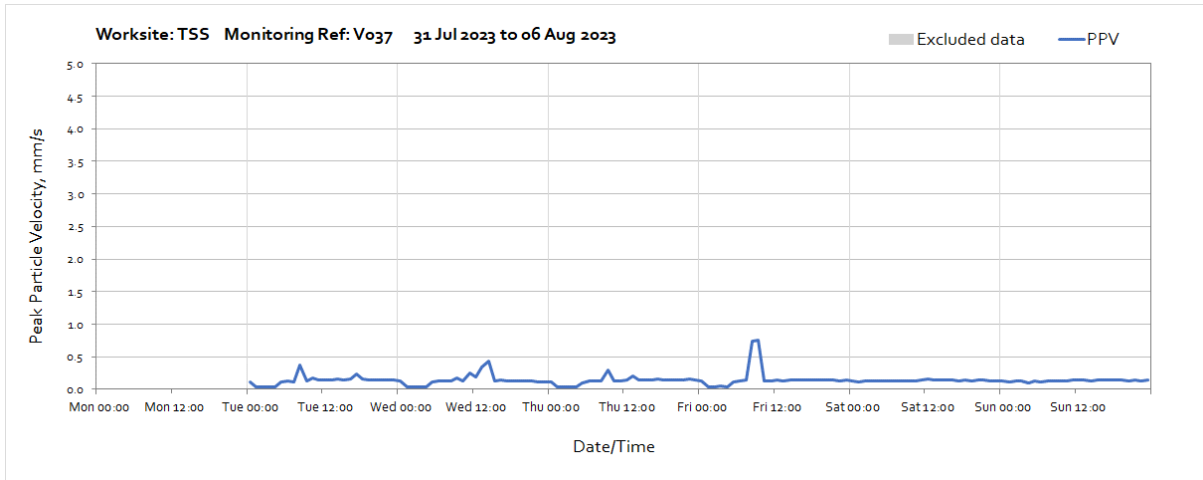


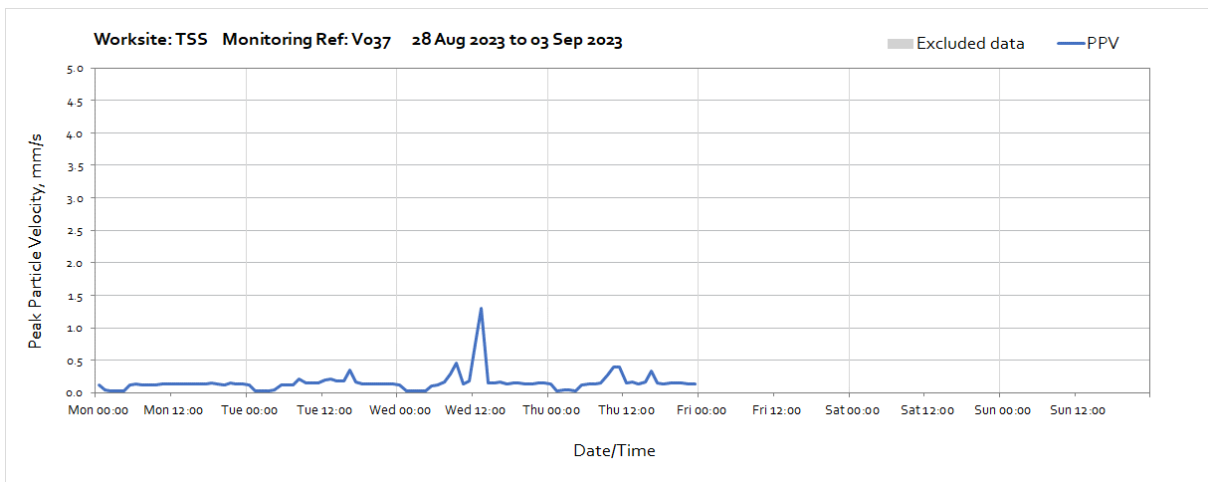
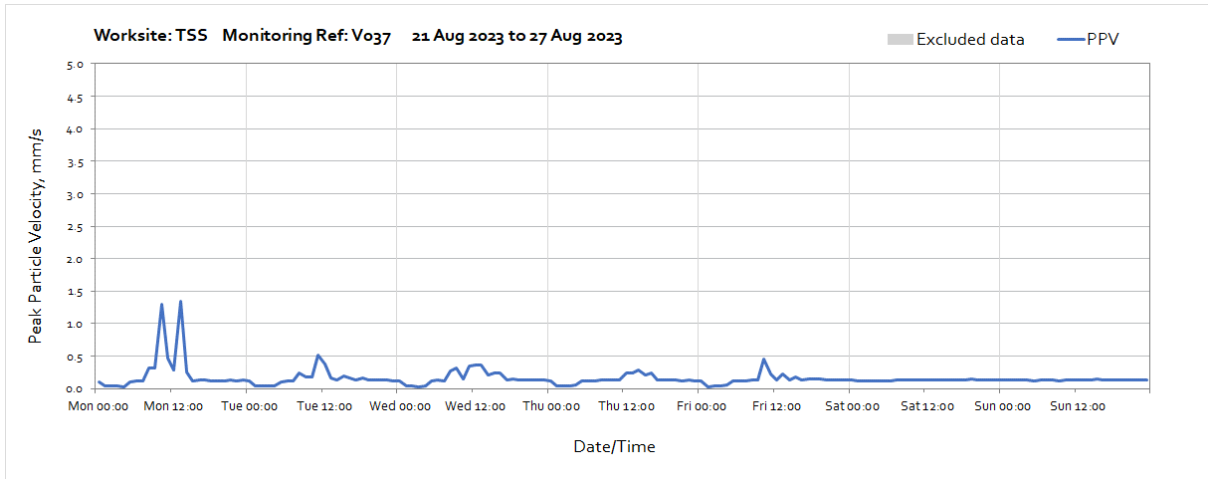
**Worksite: ETD, TSS – Monitoring Ref: V003**



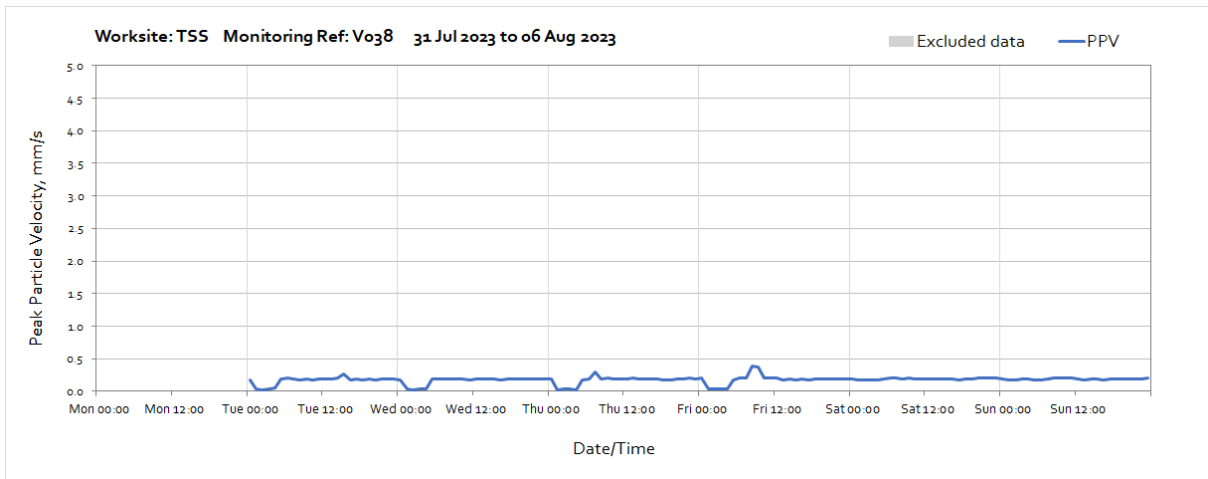


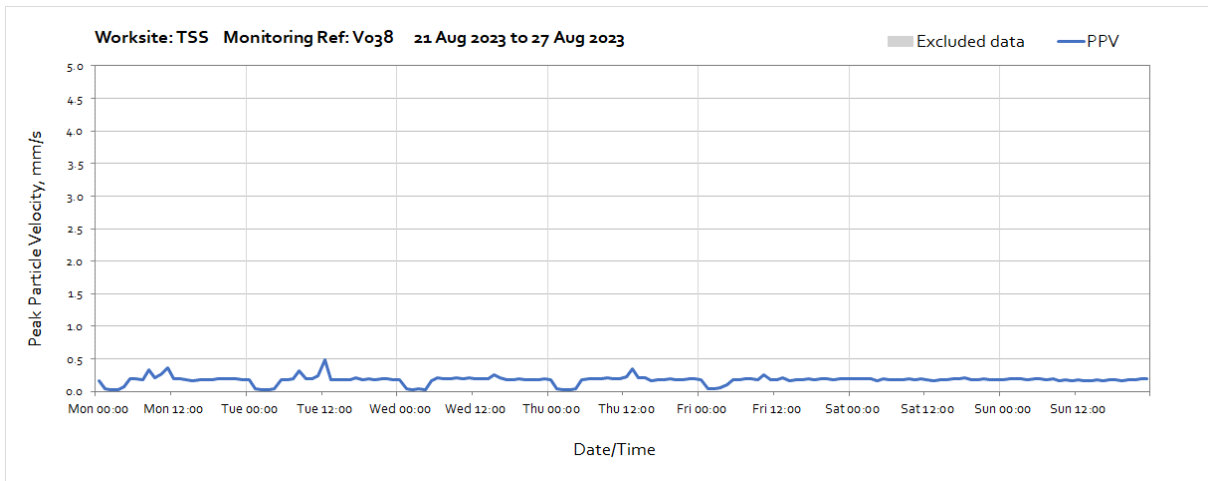
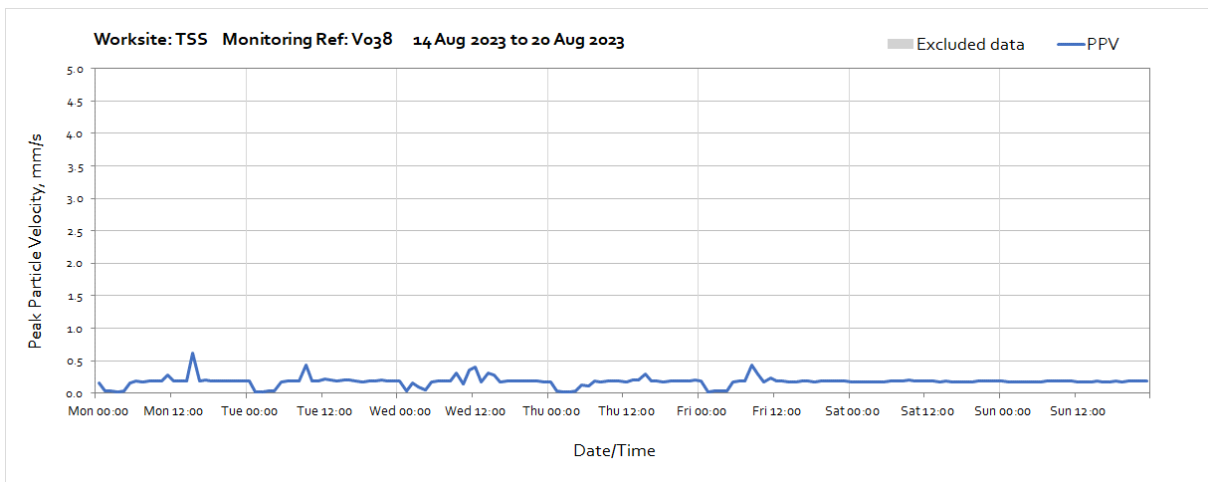
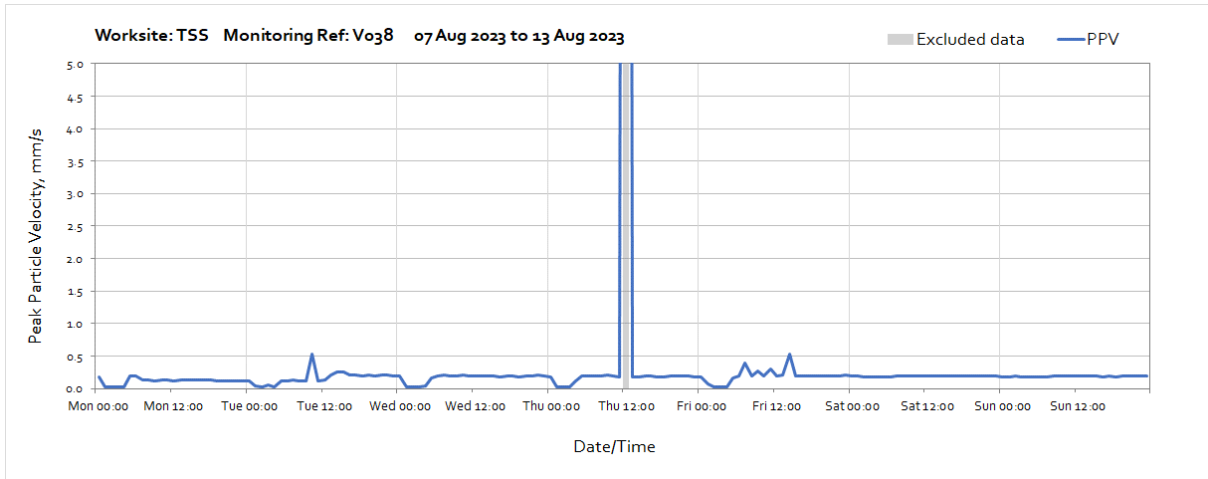
## Worksite: TSS – Monitoring Ref: V037

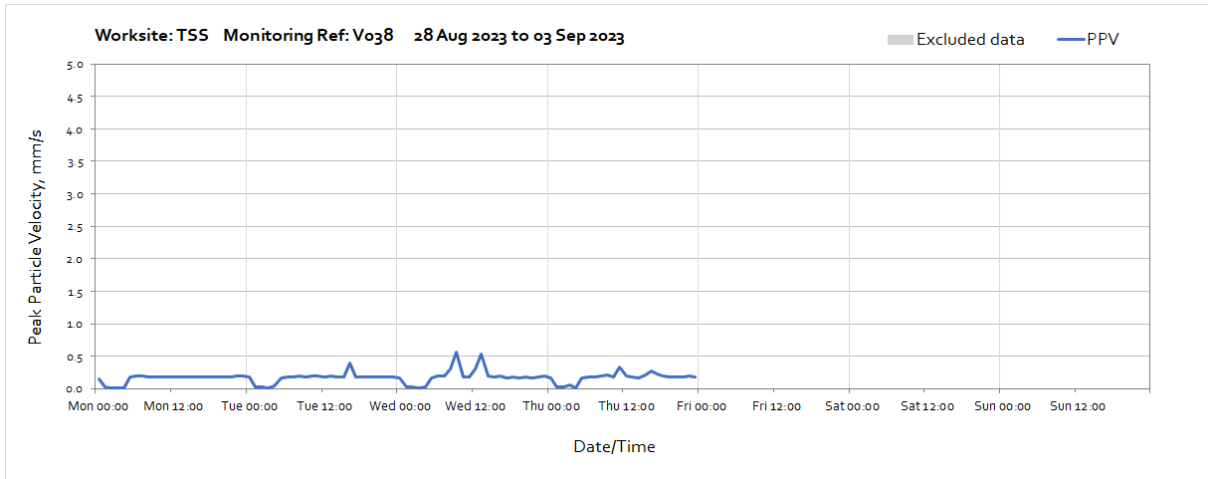




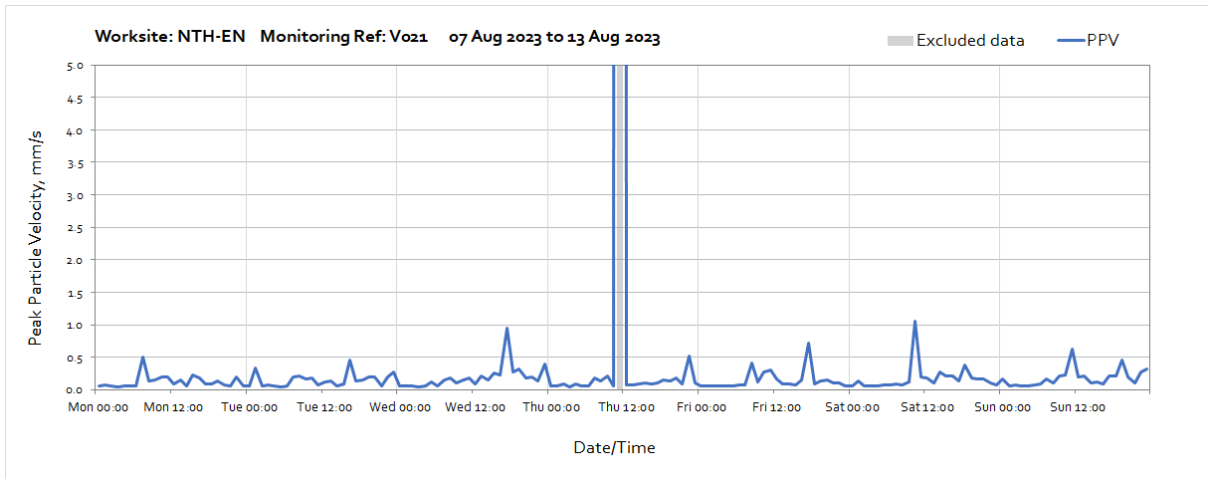
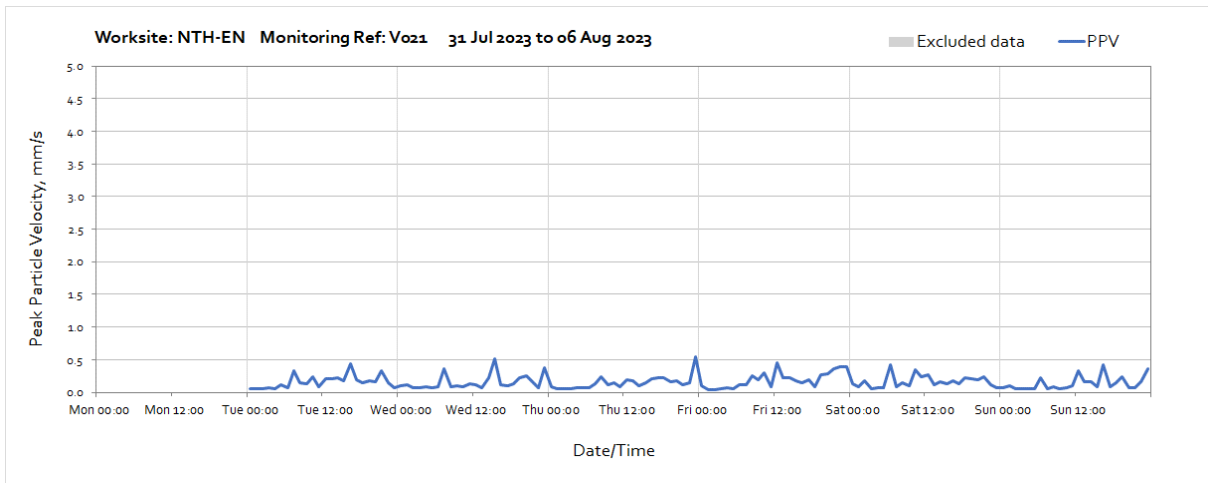
**Worksite: TSS - Monitoring Ref: V038**



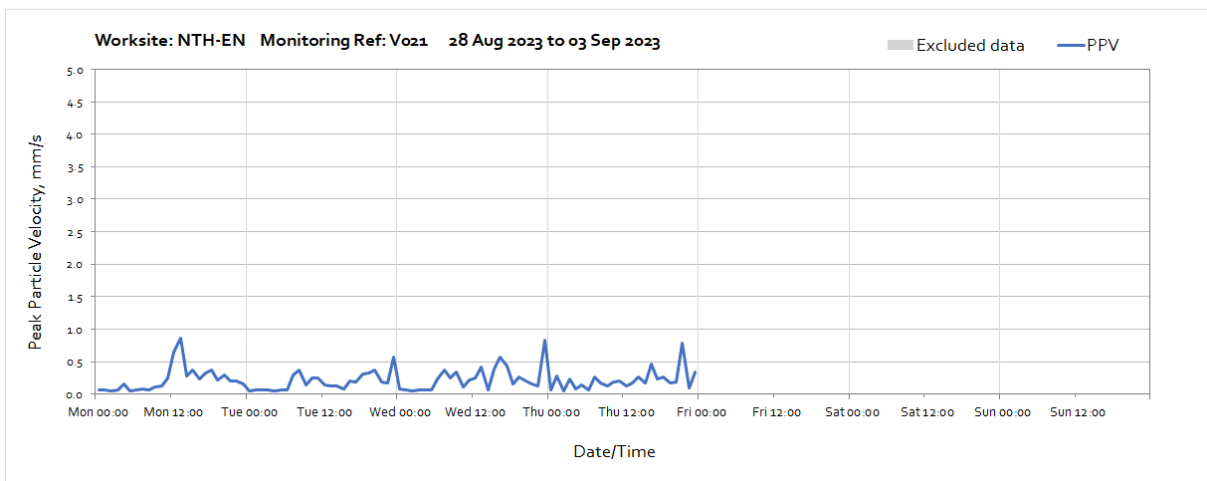
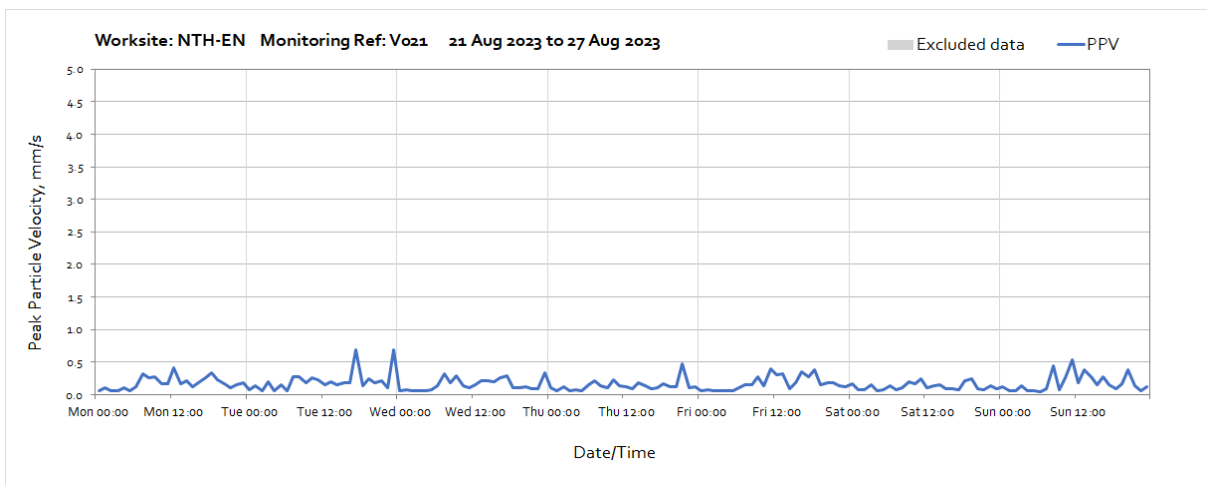
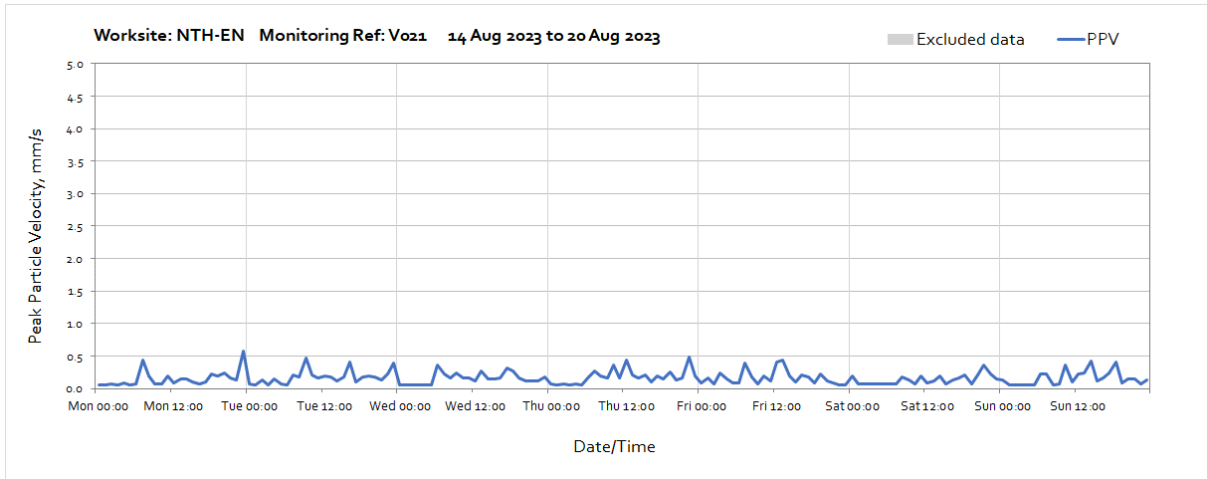




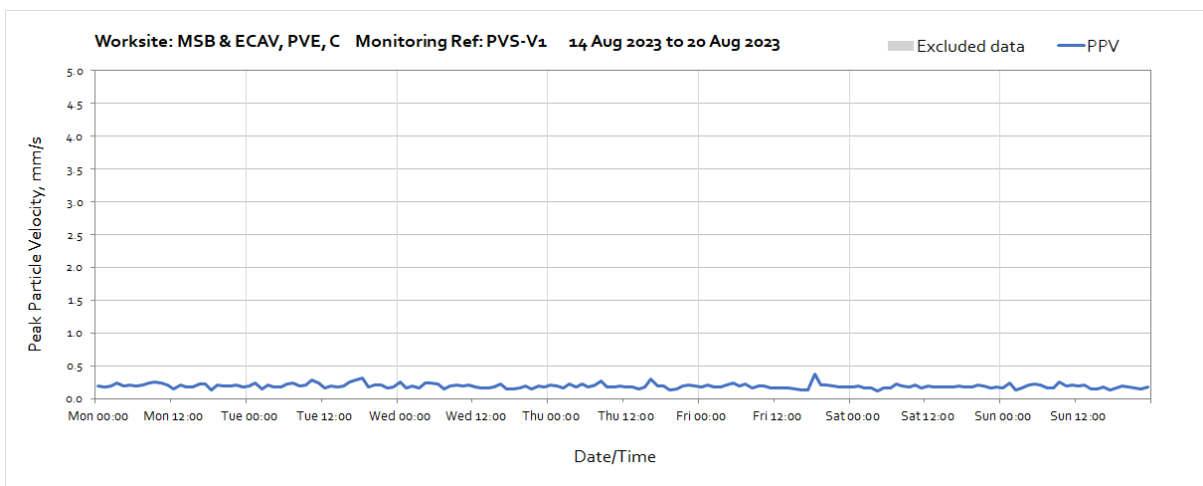
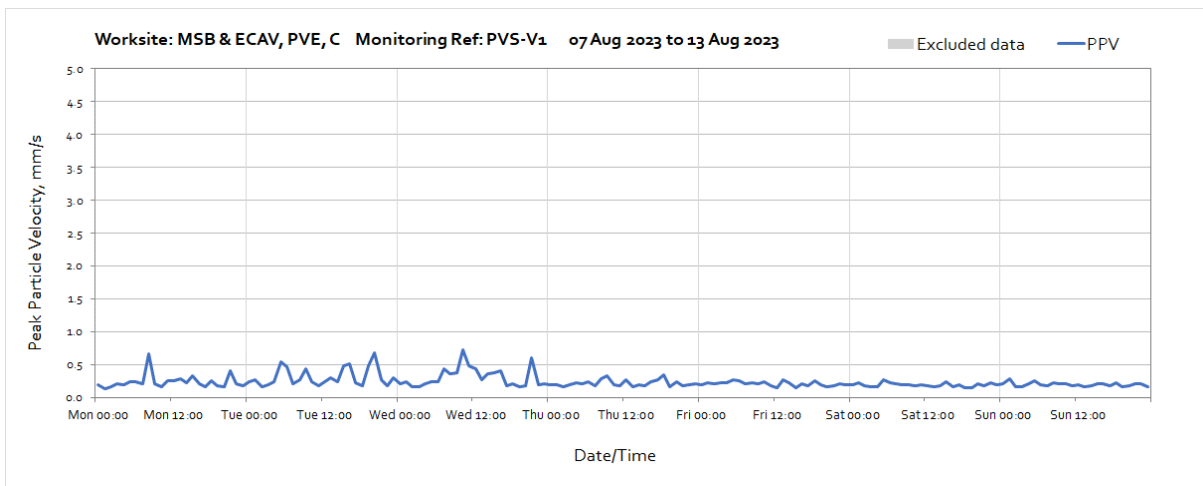
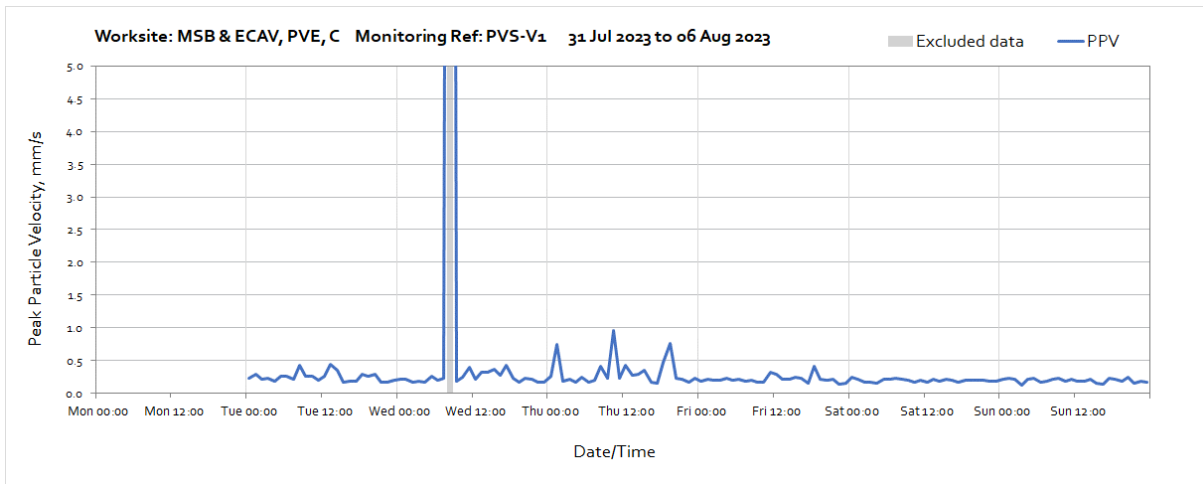
**Worksite: NTH-EN, MF - Monitoring Ref: V021**

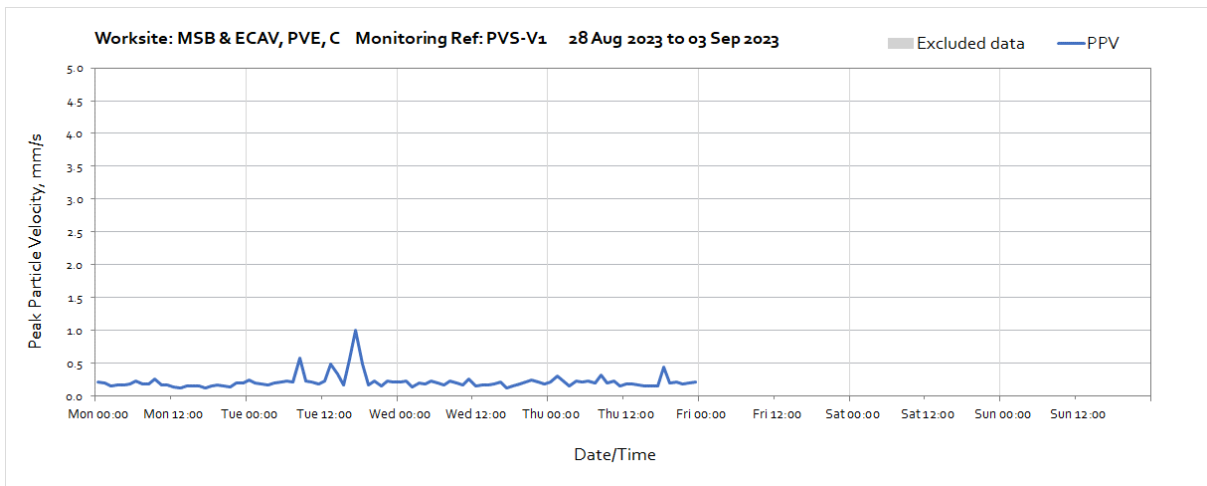
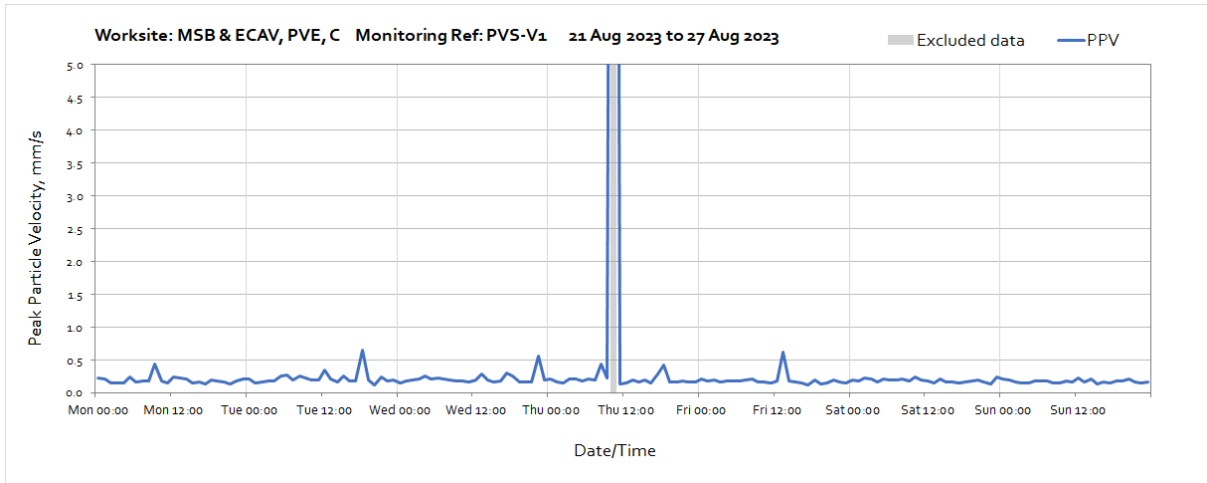




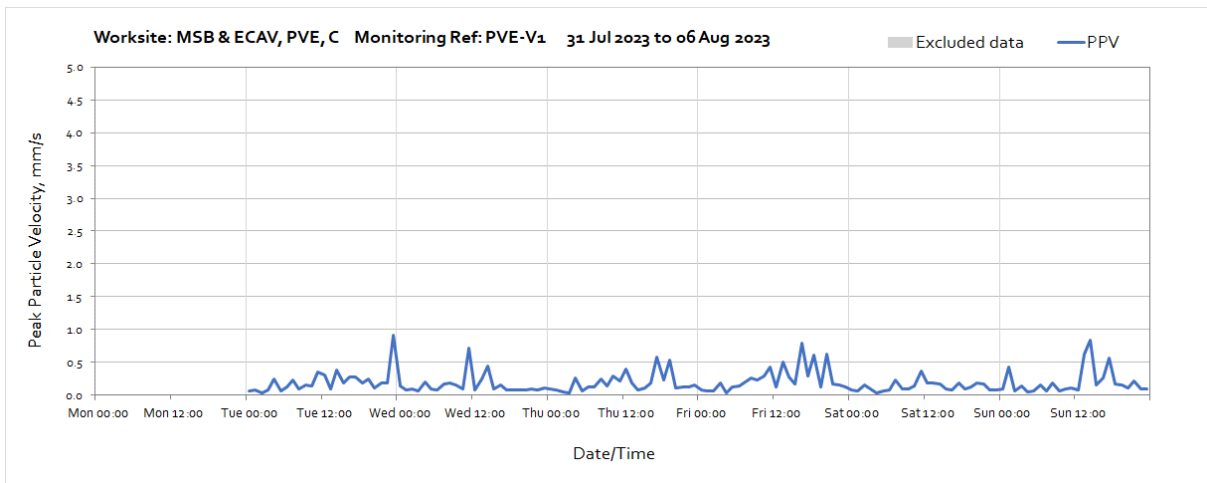


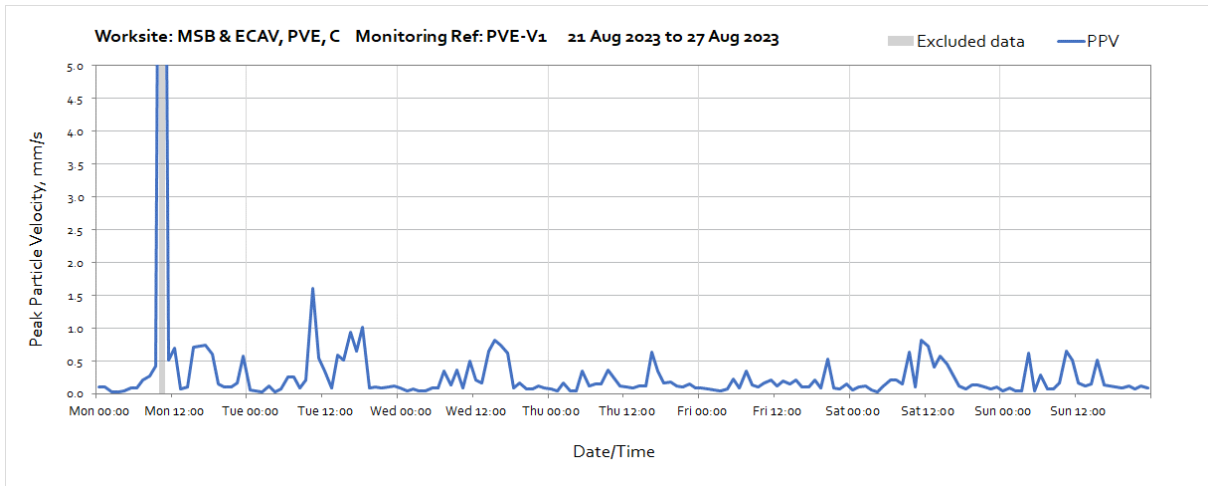
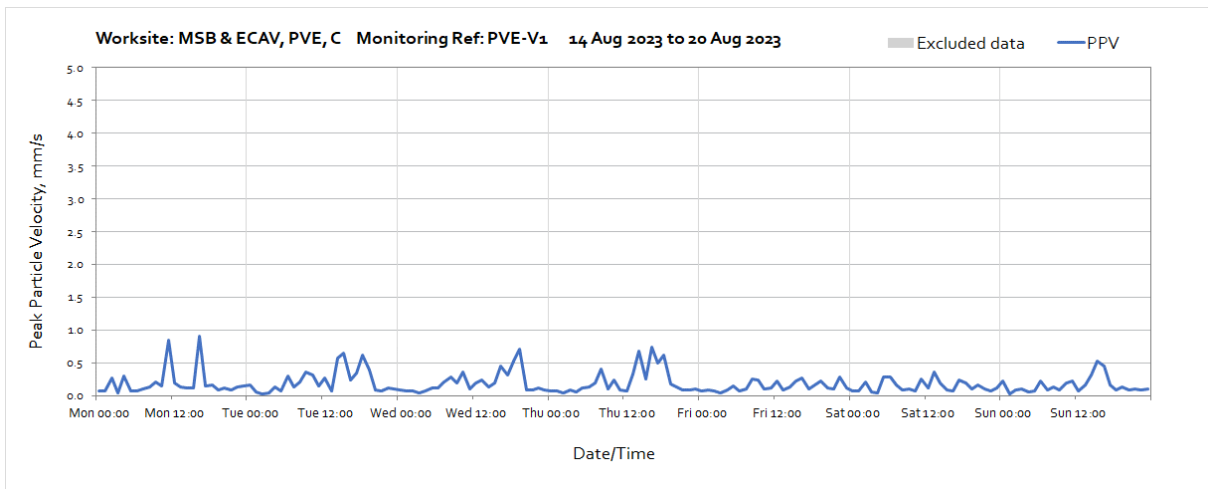
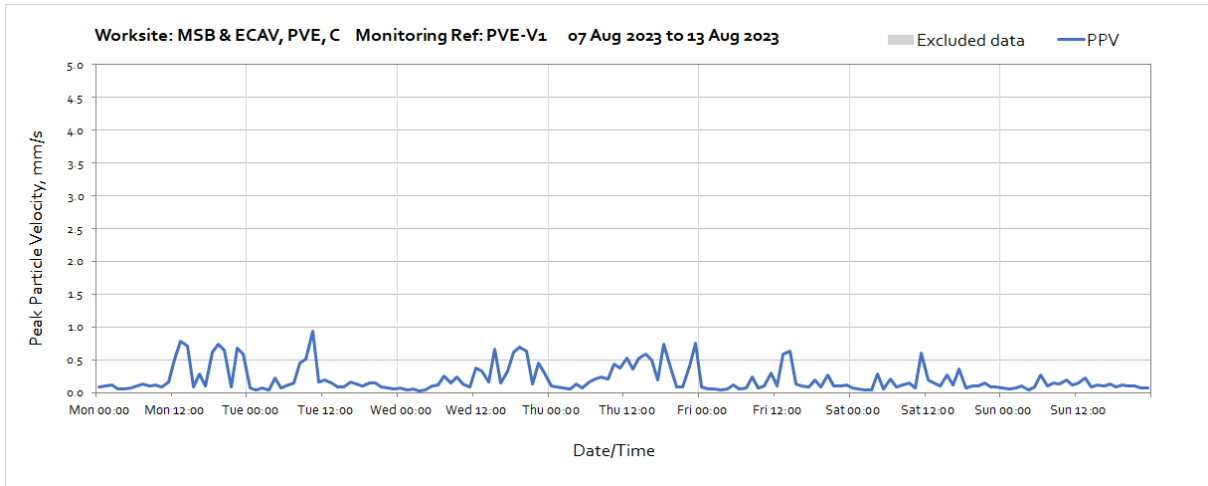
### Worksite: MSB & ECAV, PVE, C - Monitoring Ref: PVS-V1

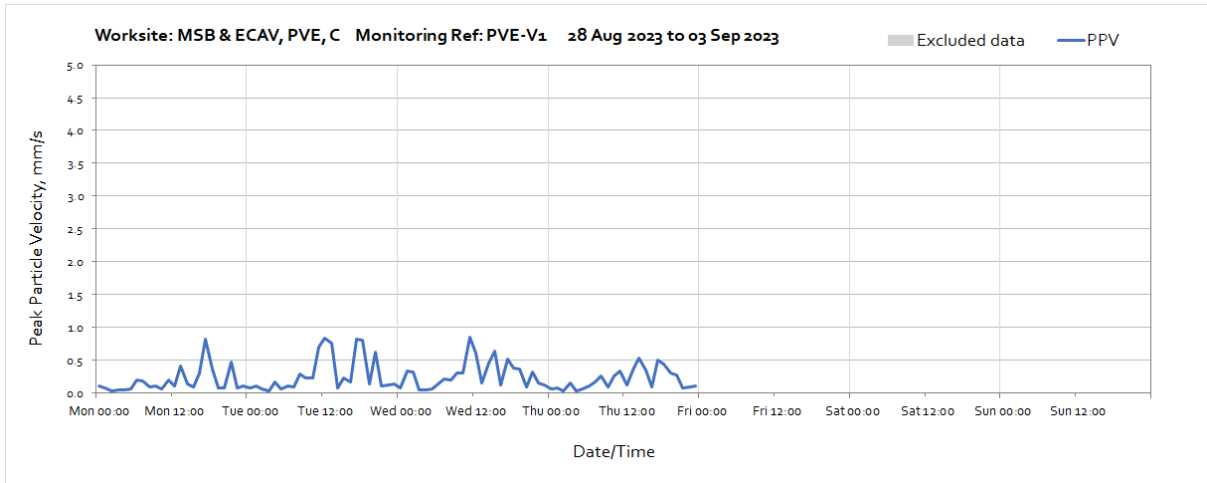




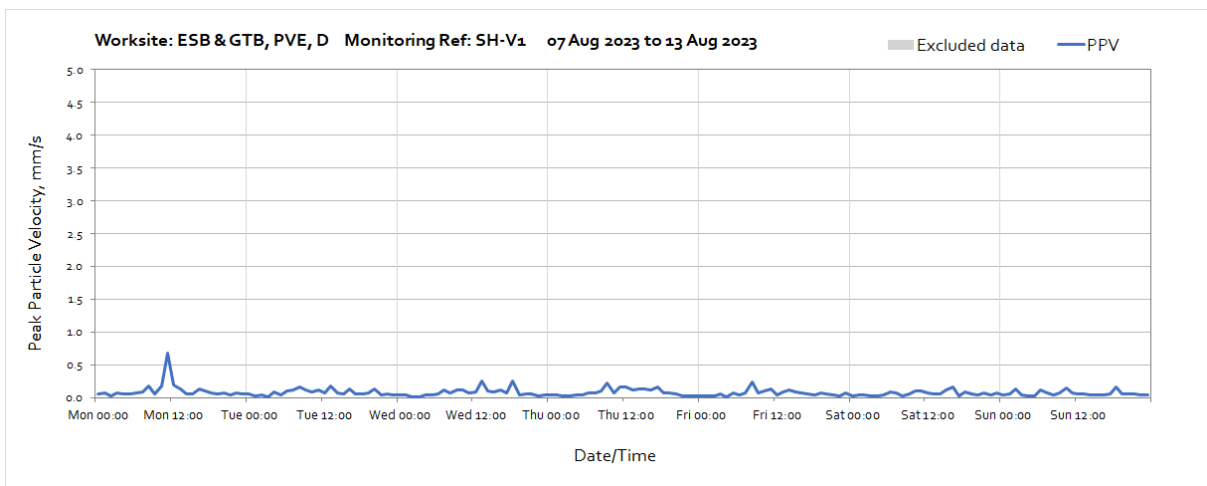
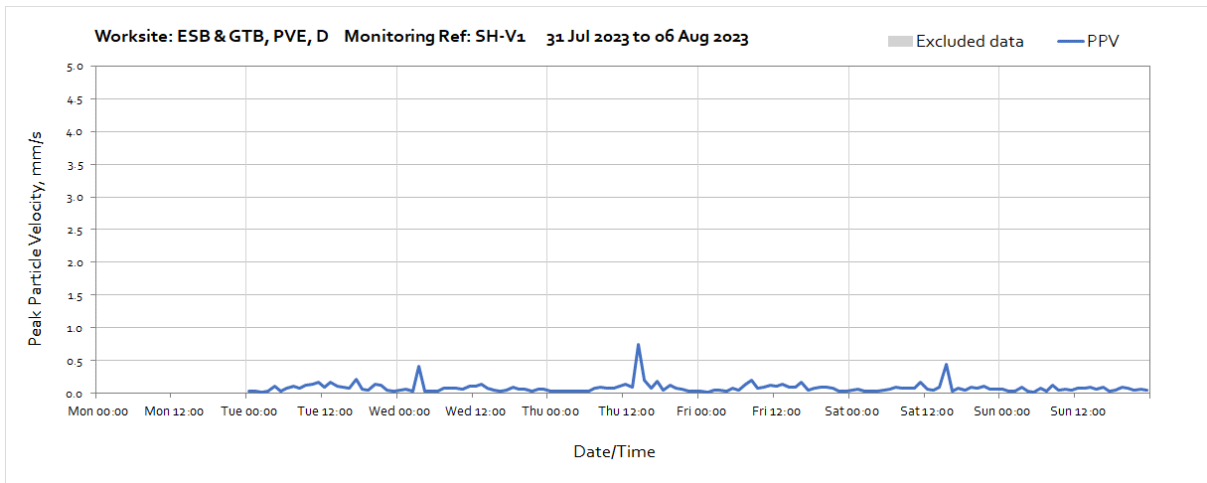
**Worksite: MSB & ECAV, PVE, C - Monitoring Ref: PVE-V1**

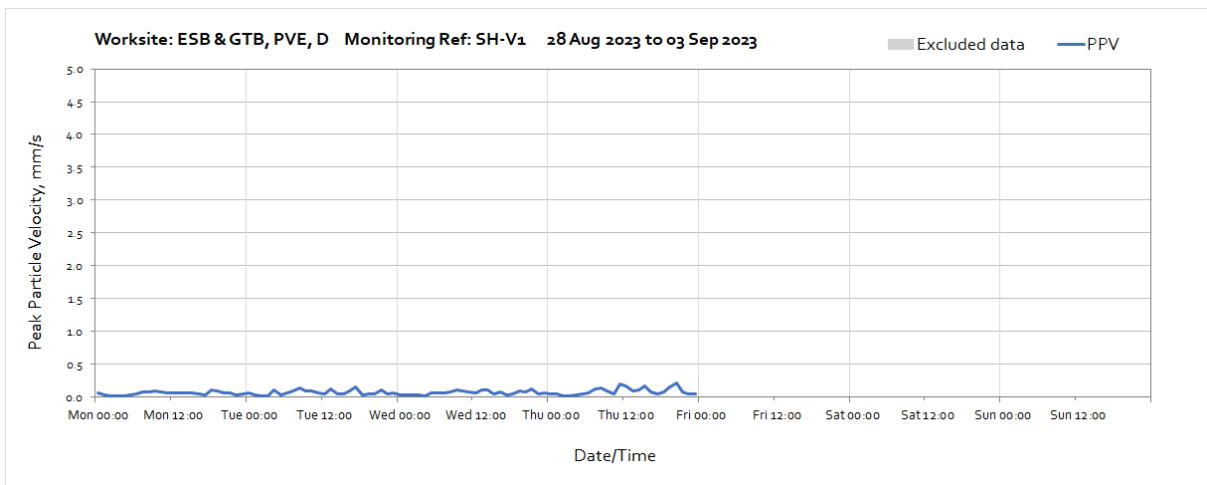
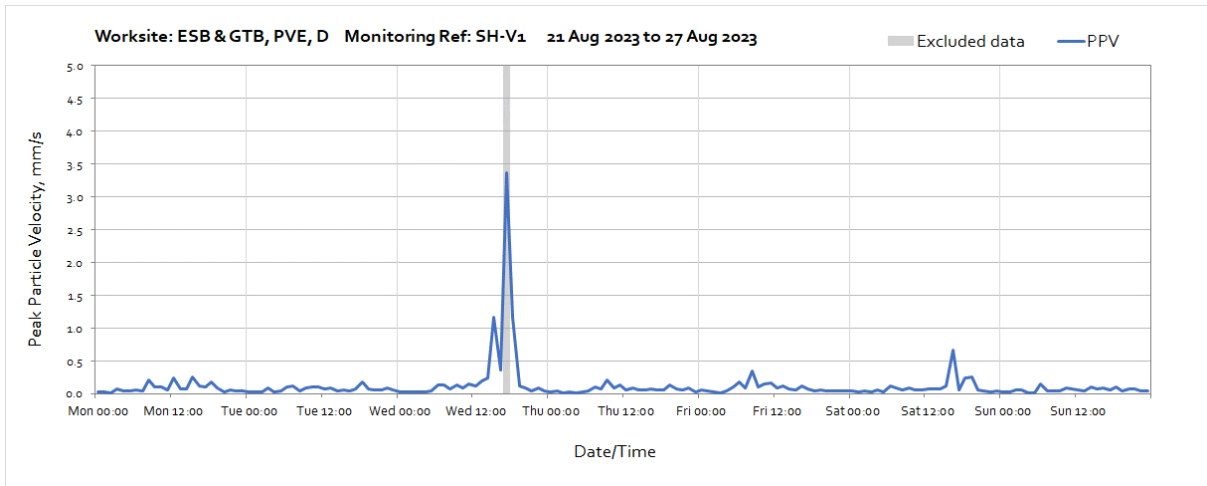
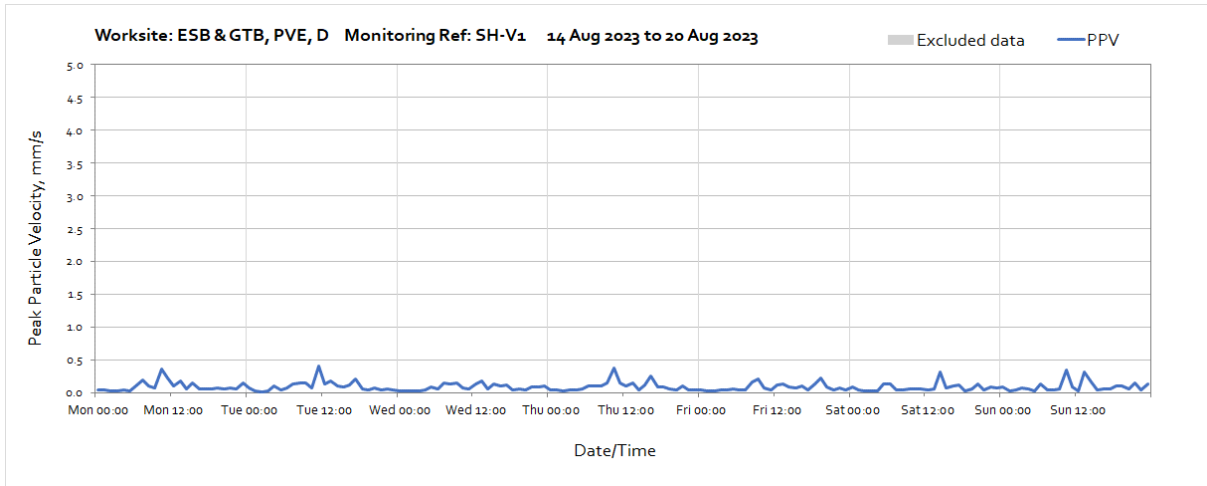




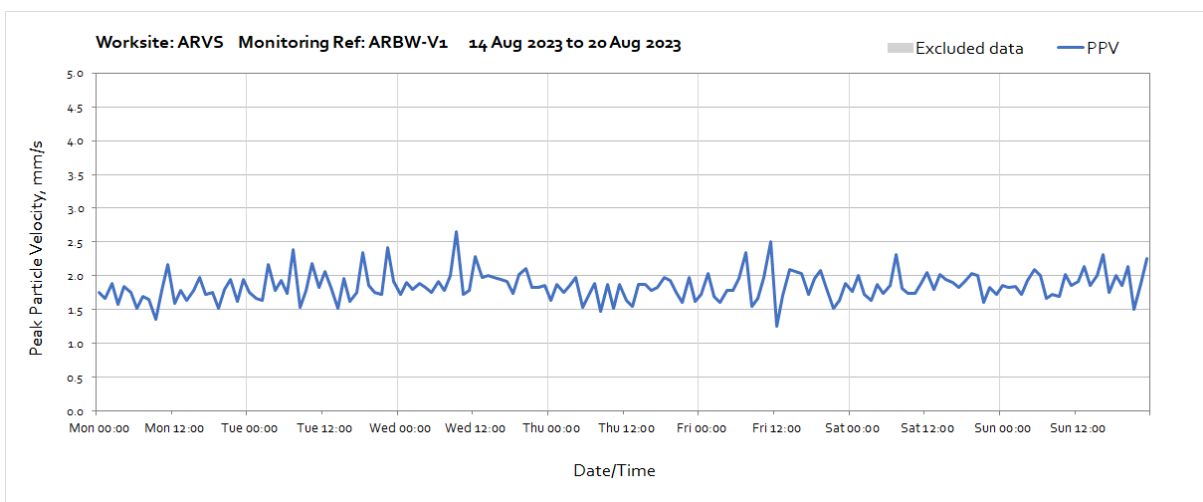
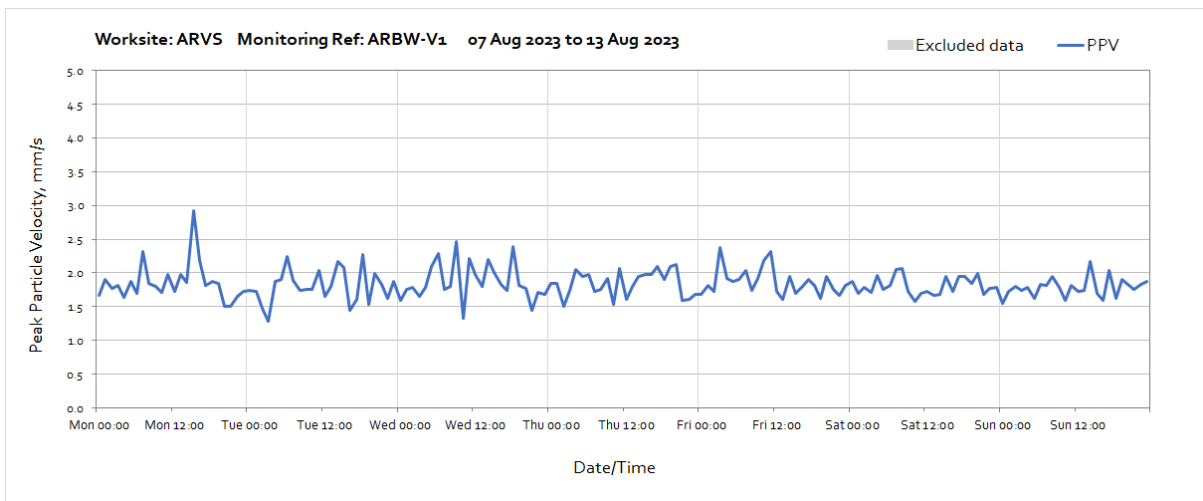
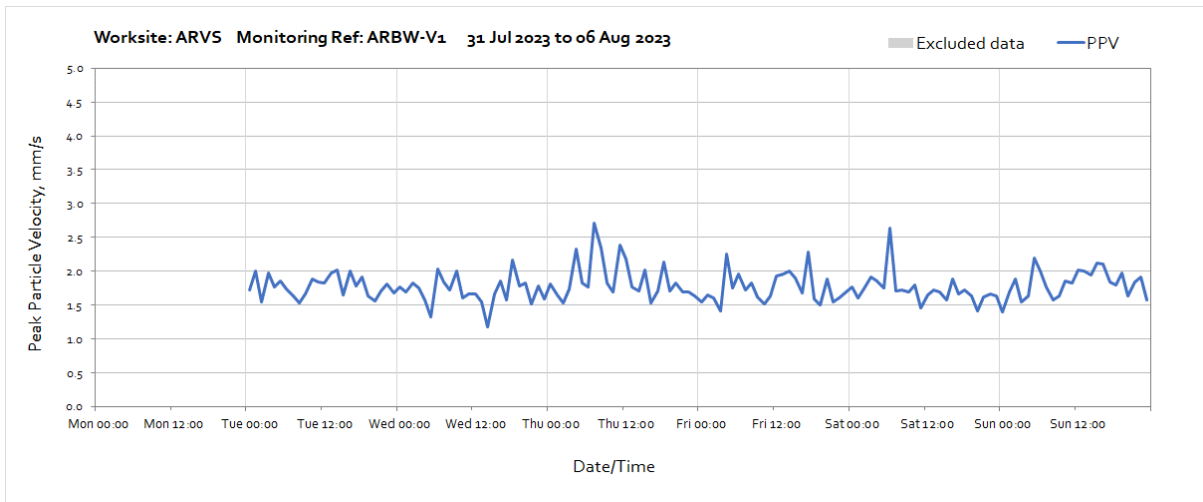


**Worksite: ESB & GTB, PVE, D – Monitoring Ref: SH-V1**

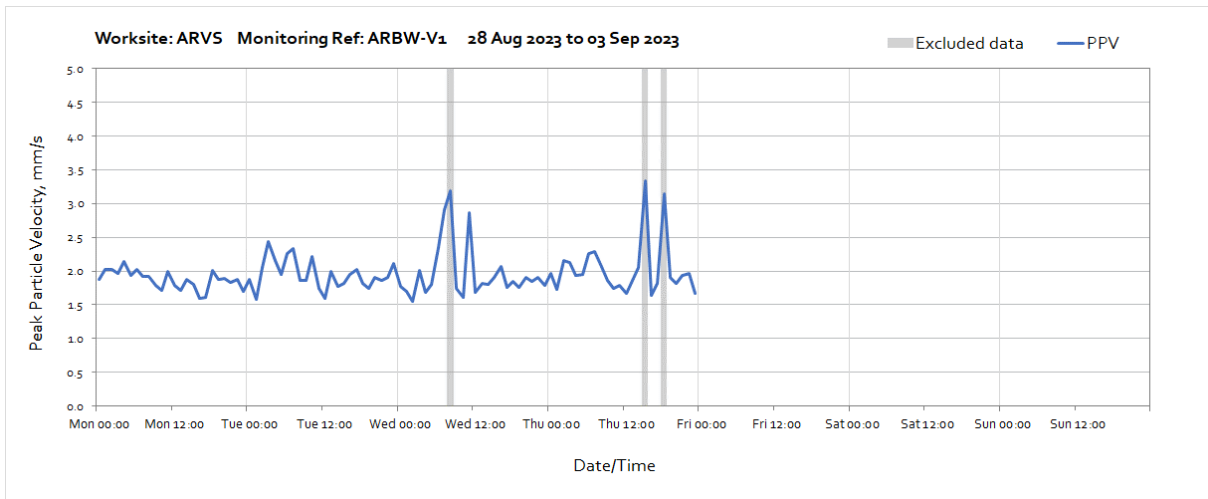
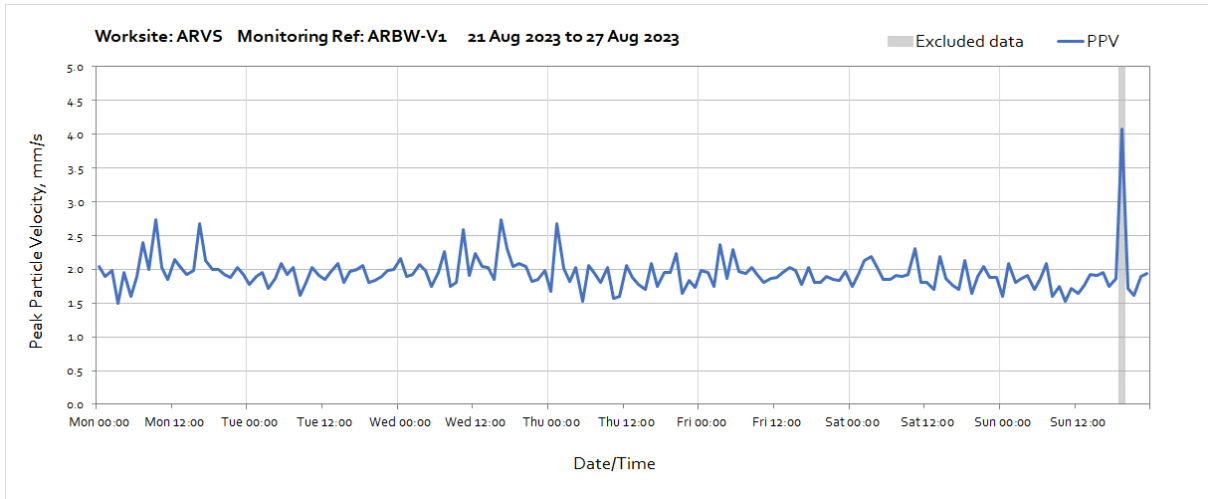




## Worksite: ARVS – Monitoring Ref: ABRW-V1

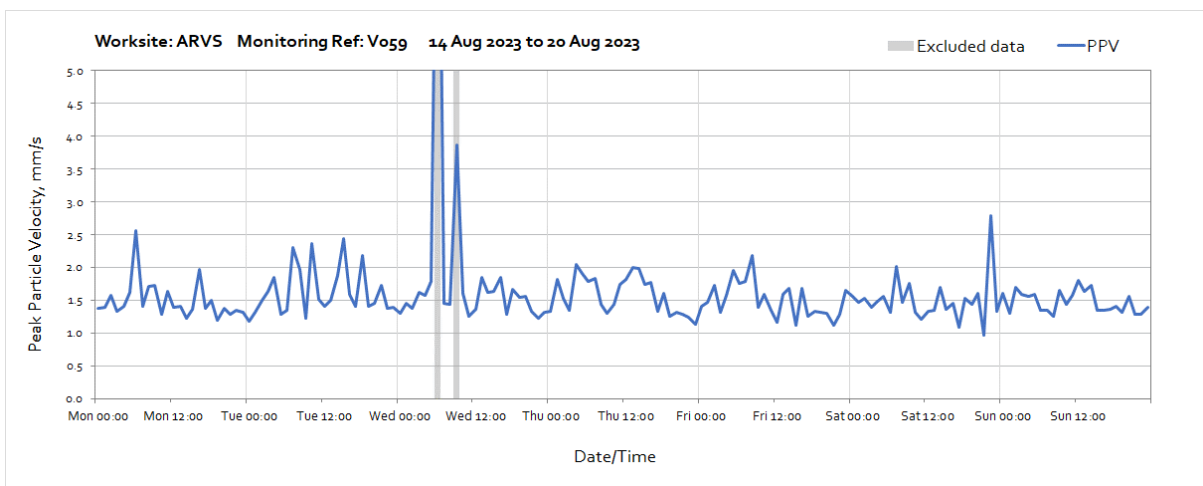
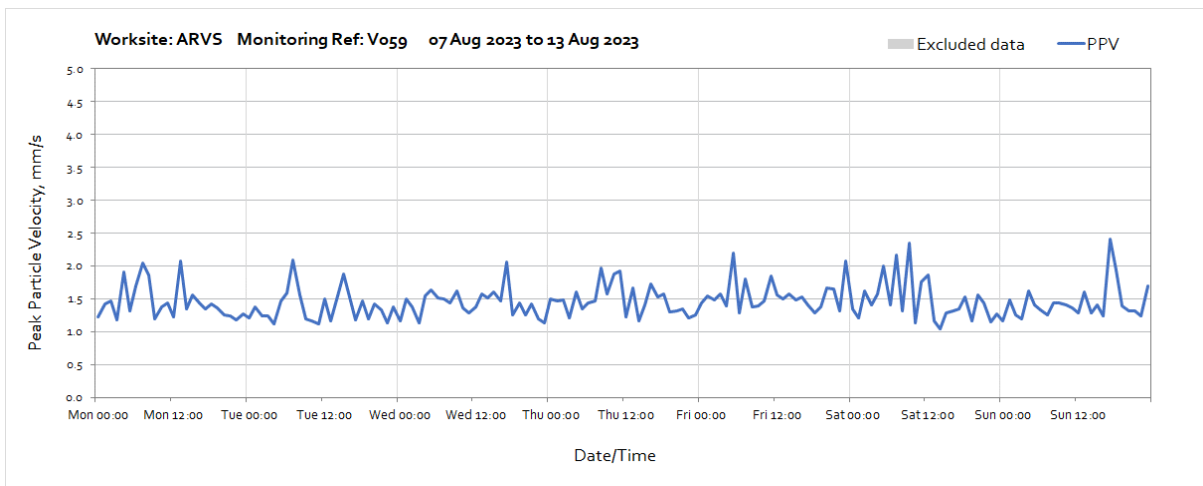
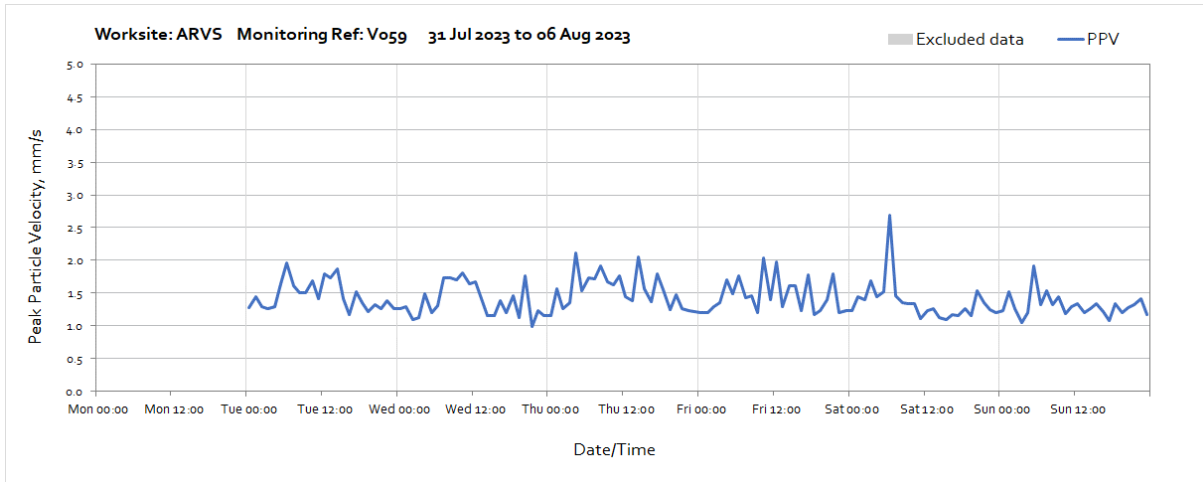


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## Worksite: ARVS – Monitoring Ref: V059



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