

Construction Noise and Vibration Monthly Report – December 2022

London Borough of Camden

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Non-Technical Summary

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

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken in the vicinity of The Adelaide Road Ventilation Shaft (ref.: ARVS) where bulk excavations, installation of anchors, concreting works, installation of drainage and ducts, manhole construction, ramp and pedestrian walkway construction and high voltage cable diversion were underway.
- Noise monitoring was undertaken in the vicinity of the Vehicle Holding Area worksite (ref.: VHA), where compound operation and tank installation were underway.
- Noise monitoring was undertaken in the vicinity of the Mornington Street Bridge worksite (ref.: MSB), where deliveries, site maintenance, surveys, haul road and drainage maintenance, access installation and track works were underway.
- 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, wall mitigation works and sewer lining 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, piling, earthworks, concrete works, wall works, pile testing and site drainage works were underway.
- Noise monitoring was undertaken in the vicinity of Euston Throat Retained Cut and Granby Terrace Bridge worksite (ref.: ETRC & GTB) where deliveries, site maintenance, surveys, haul road and drainage maintenance, piling, tank installation, relocation of electrical stores, site welfare maintenance, utility diversions, wall works and concrete pouring 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, pile mat and guide wall installation 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, concrete works, utility diversions, digging of trial holes and tunnelling works 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:
 - Digging of trial holes and core holes, ground investigation works and lighting column relocation (worksite E).
 - High level surveys, demolition and strengthening works, scaffolding works, services works and lift shaft works (worksite H).
 - No HS2 works were undertaken at worksites B, C, D, F and G.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital - North worksite (ref.: NTH-N) where piling was underway.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital - Euston North worksite (ref.: NTH-EN) where piling, concrete breaking, services installation, compound setup and footpath reinstatement were underway.
- Noise monitoring was undertaken in the vicinity of Maria Fidelis worksite (ref.: MF) where site temporary power establishment, removal of boards and services, foundation works, drainage and services installation, weatherboard installation, roofing works, soffit installation and compound setup were underway.
- Noise monitoring was undertaken in the vicinity of the Euston Towers Demolition worksite (ref.: ETD), where ramp relocation, scaffolding works, emergency lighting relocation and digging of trial holes were underway.
- Noise monitoring was undertaken in the vicinity of the Traction Substation worksite (ref.: TSS) where excavations, concrete works, installation of services and footpath reinstatement were underway.
- Noise monitoring was undertaken in the vicinity of the Interim Taxi Rank worksite (ref.: ITR), where excavations, reinstatement of tarmac, sign painting, trial hole investigations, retaining wall works, tree root protection installation, asbestos removal and relocation of power generators were underway.

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

- Various locations where surveys and noise insulation works were underway.
- Vardnell Street, Stanhope Street and Harrington Square where utility diversions 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 thirteen (13) times during the reporting period.

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

One (1) complaint was received during the monitoring period. A description of complaints, the results of investigations and any actions taken are detailed in Table 8 of this report.

Abbreviations and Descriptions

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

Table 1: Table of Abbreviations

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

1 Introduction

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

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

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

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

- The Adelaide Road ventilation shaft ref.: ARVS, (see plan 2 in Appendix A), where work activities included:
 - Bulk excavations.
 - Installation of anchors.
 - Concreting works (including working platform and concrete slab construction).
 - Installation of drainage and ducts.
 - Manhole construction.
 - Ramp and pedestrian walkway construction.
 - High voltage cable diversion.
- Vehicle Holding Area worksite ref.: VHA (see plan 1 in Appendix A), where work activities included:
 - General compound operation.

- Deliveries.
- Tank installation.
- Mornington Street Bridge worksite ref.: MSB (see plan 2 in Appendix A), where work activities included:
 - Deliveries.
 - Site maintenance.
 - Surveys.
 - Haul road and drainage maintenance.
 - Access installation.
 - Track works (including installation of monitoring equipment).
- 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.
 - Wall mitigation works.
 - Sewer lining.
- 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.
 - Rotary bored piling.
 - Sheet piling.
 - Earthworks.
 - Reinforced concrete works including concrete surface treatment (hydroscabbling).
 - Wall works.
 - Concrete pouring.
 - Pile testing.
 - Site drainage works.

- Euston Throat Retained Cut and Granby Terrace Bridge worksite ref.: ETRC & GTB (see plan 2 in Appendix A), where work activities included:
 - Deliveries.
 - Site maintenance.
 - Surveys.
 - Haul road and drainage maintenance.
 - Rotary bored piling.
 - Tank installation.
 - Relocation of electrical stores.
 - Site welfare maintenance.
 - Utility diversions.
 - Wall works.
 - Concrete pouring.
- 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.
 - Pile mat and guide wall installation.
- Euston Cavern worksite ref.: ECAV (see plan 3 in Appendix A), where work activities included:
 - Deliveries.
 - Site maintenance.
 - Surveys.
 - Haul road and drainage maintenance.
 - Reinforced concrete works including concrete surface treatment (hydroscabbling)
 - Tunnel works.
 - Utility diversions.
 - Digging of trial holes.
- On-Network worksites ref.: B, C, D, E, F, G and H (see plan 3 in Appendix A), where work activities included:

- Digging of trial holes and core holes, ground investigation works and lighting column relocation (worksite E).
- High level surveys, demolition and strengthening works, scaffolding works, services works and lift shaft works (worksite H).
- No HS2 works were undertaken at worksites B, C, D, F and G.
- Former National Temperance Hospital - North worksite ref.: NTH-N (see plan 4 in Appendix A), where work activities included:
 - Piling.
- Former National Temperance Hospital - Euston North worksite ref.: NTH-EN (see plan 4 in Appendix A), where work activities included:
 - Piling (including pile mat installation).
 - Concrete breaking.
 - Services installation.
 - Compound setup.
 - Footpath reinstatement.
- Mary Fidelis worksite ref.: MF (see plan 4 in Appendix A), where work activities included:
 - Site temporary power establishment.
 - Removal of boards and services.
 - Foundation, drainage and services installation.
 - Weatherboard installation.
 - Roofing works.
 - Soffit installation.
 - Compound setup.
- Euston Towers Demolition worksite ref.: ETD (see plan 4 in Appendix A), where work activities included:
 - Ramp relocation.
 - Scaffolding works.
 - Emergency lighting relocation.
 - Digging of trial holes.
- Traction Substation worksite ref.: TSS (see plan 4 in Appendix A), where work activities included:
 - Excavations.

- Concrete works (including installation of reinforced concrete structures, concrete finishing and concrete pouring).
- Installation of services.
- Footpath reinstatement.
- Interim Taxi Rank worksite ref.: ITR (see plan 4 in Appendix A), where work activities included:
 - Excavations.
 - Reinstatement of tarmac.
 - Sign painting.
 - Trial hole investigations (including excavations, surveys and backfill).
 - Retaining wall works.
 - Tree root protection installation.
 - Asbestos removal.
 - Relocation of power generators.

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

- Various locations where surveys and noise insulation works were undertaken.
- Varndell Street, Stanhope Street and Harrington square where utility diversions 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 eleven (11) vibration monitoring installations were active across eighteen worksites in December in the LBC area. Table 2 summarises the position of noise and vibration monitoring installations within the LBC area in December 2022.

1.2.2 Maps showing the position of noise and vibration monitoring installations are presented in Appendix B.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
ARVS	N051	Outside 70 Adelaide Road
	N052	Adelaide Road-Beaumont Walk
	V059	Outside 68 Adelaide Road
	ARBW-V1	Adelaide Road-Beaumont Walk
B	JC	Juniper Crescent
MSB & ECAV, PVE, C	N024	External to Park Village Studios, Park Village East
	N047	Park Village East/Mornington Street bridge, lamppost #13
	PVS-N001	Park Village Studios
	PVS-V1	Park Village Studios
	N022	External to 34 Mornington Terrace
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18
ESB & GTB, PVE, E	N001	Park Village East, lamppost #1 (external to Cubitt Court, 100 Park Village East)
	N002	Park Village East, lamppost #2 (external to Richmond Court)
ESB & GTB, PVE, D	N003	Park Village East, lamppost #9 (external to Silsoe House)
	SH-V1	Silsoe House
	N004	Mornington Terrace, lamppost #7 (junction of Mornington Terrace, Mornington Place and Clarkson Row)
ESB & GTB, PVE, E	N005	Xavier House Fire Escape
	CR	Lamppost #2 on Clarkson Row
ETRC & HRB, F	N023	Lamppost #21 on Hampstead Road
ETRC & HRB	N020	Mackworth Street, lamppost #1
	N021	Stanhope Street, lamppost #2
	N044	Regents Park Estate west, near Langdale
	N045	Regents Park Estate south, external to Coniston
	V039	Coniston, Regents Park Estate
	V043	Cubitt Court, Park Village East
HRB & ETRC, NTH-N	N019	Outside Cartmel, Hampstead Road
	N026a	Euston Site, Cartmel
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)

Worksite Reference	Measurement Reference	Address
	N010	Wesley Hotel
	N011	Euston Street, lamppost #4 (external to 82 Euston Street)
	V002	Royal College of General Practitioners basement boiler room by Stephenson Way
	V037	Magic Circle, basement
	V038	Wesley Hotel, basement lightwell, Euston Street
ETD, ITR	N007	Royal College of General Practitioners, Melton Street
	V003	Royal College of General Practitioners basement vaults under Melton St
VHA	N025	External to 3 Prince Albert Road
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_{Aeq} Data over the Monitoring Period

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
ARVS	N051	Outside 70 Adelaide Road	Free-field	66.4 (71.7)	70.0 (73.9)	66.4 (69.2)	67.0 (79.0)	64.5 (76.0)	65.3 (69.8)	67.6 (68.8)	68.6 (74.8)	68.5 (74.9)	65.4 (70.3)	65.4 (73.5)	64.0 (72.9)
	N052	Adelaide Road-Beaumont Walk	Free-field	66.5 (71.3)	68.7 (70.2)	67.5 (69.8)	67.7 (75.3)	65.2 (76.2)	64.6 (65.2)	67.3 (68.5)	69.6 (75.8)	68.6 (74.5)	65.6 (69.2)	66.1 (72.5)	65.3 (72.2)
B	JC	Juniper Crescent	Free-field	55.0 (59.2)	56.4 (60.0)	55.4 (59.1)	55.6 (60.6)	53.6 (60.7)	57.6 (60.6)	57.3 (58.9)	56.0 (57.8)	55.0 (59.5)	53.2 (59.4)	53.2 (57.9)	50.5 (55.9)
MSB & ECAV, PVE, C	N024	External to Park Village Studios, Park Village East	Free-field	58.2 (62.3)	61.0 (65.7)	61.2 (65.6)	60.0 (73.1)	55.7 (66.4)	55.1 (56.4)	58.3 (60.2)	58.9 (60.4)	60.0 (71.4)	56.4 (64.3)	57.2 (60.8)	53.5 (60.0)
	N047	Park Village East/Mornington Street bridge, lamppost #13	Free-field	56.3 (60.7)	61.0 (67.5)	59.8 (63.8)	58.1 (65.3)	53.3 (60.4)	54.4 (56.6)	58.3 (59.2)	59.2 (62.2)	59.7 (71.1)	54.5 (59.0)	57.1 (62.1)	51.4 (57.0)
	PVS-N001	Park Village Studios	Façade	58.4 (62.3)	65.2 (71.5)	59.4 (63.2)	59.4 (66.2)	55.0 (62.8)	58.2 (60.5)	63.9 (66.2)	61.1 (65.4)	59.3 (63.1)	55.4 (62.6)	58.7 (62.5)	56.8 (64.0)
	N022	External to 34 Mornington Terrace	Free-field	56.1 (60.5)	59.0 (62.2)	57.8 (60.9)	56.6 (60.1)	52.5 (61.0)	56.6 (61.0)	58.3 (59.1)	57.4 (58.8)	56.5 (60.1)	53.0 (60.9)	54.6 (61.1)	52.1 (58.4)

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
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18	Free-field	59.5 (62.2)	61.9 (65.9)	60.2 (62.1)	59.5 (62.9)	55.7 (60.6)	59.0 (60.6)	61.5 (62.7)	60.5 (62.0)	59.2 (61.6)	55.6 (61.7)	57.3 (60.9)	54.2 (59.8)
ESB & GTB, PVE, E	N001	External to Cubitt Court, 100 Park Village East	Free-field	55.9 (59.3)	63.0 (68.4)	59.7 (65.1)	57.8 (66.5)	53.1 (62.6)	54.4 (57.5)	60.1 (63.7)	57.6 (59.0)	57.9 (59.5)	54.5 (60.4)	56.1 (59.0)	51.2 (55.5)
	N002	Richmond Court, Park Village East	Free-field	55.8 (58.4)	61.3 (64.6)	60.1 (63.5)	58.1 (65.2)	53.3 (60.0)	53.9 (56.8)	59.7 (62.5)	58.4 (59.7)	59.3 (68.0)	55.3 (63.4)	56.5 (59.6)	50.8 (56.8)
ESB & GTB, PVE, D	N003	Silsoe House, Park Village East	Façade	56.0 (60.1)	60.4 (64.6)	60.5 (63.7)	58.8 (66.6)	53.9 (60.5)	54.2 (56.8)	58.7 (60.0)	59.1 (60.2)	60.0 (68.8)	55.3 (59.3)	57.1 (60.1)	51.7 (57.5)
	N004	Mornington Terrace, lamppost #7	Free-field	61.1 (67.1)	64.6 (69.1)	62.1 (68.9)	60.8 (68.4)	56.3 (68.0)	60.4 (62.3)	63.4 (64.4)	60.8 (62.8)	59.7 (65.6)	54.9 (64.1)	57.1 (62.6)	52.9 (60.1)
ESB & GTB, PVE, E	N005	5A Granby Terrace	Free-field	60.9 (62.9)	67.4 (68.9)	62.8 (69.3)	61.1 (63.8)	58.9 (68.6)	60.0 (62.1)	66.2 (66.6)	60.9 (61.9)	61.3 (63.3)	58.6 (61.5)	60.0 (62.5)	57.2 (62.2)
	CR	Lamppost #2 on Clarkson	Free-field	60.2 (65.0)	65.7 (70.7)	62.5 (69.2)	60.5 (68.1)	55.7 (70.0)	61.9 (68.0)	65.4 (67.7)	63.4 (67.5)	61.3 (68.9)	53.6 (60.5)	58.3 (64.1)	53.3 (61.5)
ETRC & HRB, F	N023	Lamppost #21 on Hampstead Road	Free-field	67.8 (71.4)	68.5 (70.9)	67.9 (73.0)	67.3 (72.6)	65.8 (70.7)	65.4 (66.7)	67.8 (69.2)	68.3 (69.7)	68.0 (71.4)	65.8 (68.9)	66.5 (70.4)	65.0 (69.3)

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Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Saturday Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Sunday / Public Holiday Average L _{Aeq,T} (Highest Day L _{Aeq,T})	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
ETRC & HRB	N020	Mackworth Street, lamppost #1	Free-field	53.3 (55.5)	58.9 (63.2)	54.1 (60.4)	51.9 (56.6)	50.7 (59.0)	51.6 (53.8)	57.8 (62.2)	52.6 (55.5)	53.2 (57.0)	52.4 (60.2)	51.1 (56.7)	48.9 (53.7)
	N021	Stanhope Street, lamppost #2	Free-field	56.4 (61.4)	60.5 (64.2)	59.0 (61.2)	57.4 (65.9)	52.9 (62.2)	53.7 (55.9)	58.9 (60.0)	58.1 (60.1)	58.1 (60.9)	55.0 (64.4)	56.2 (59.5)	52.1 (58.5)
	N044	Regents Park Estate west, near Langdale	Free-field	53.7 (57.6)	54.9 (56.2)	53.4 (55.5)	53.0 (54.9)	50.1 (54.1)	52.0 (53.5)	53.1 (54.6)	53.0 (55.9)	53.4 (56.0)	52.0 (56.9)	51.0 (53.0)	51.6 (56.9)
	N045	Regents Park Estate south, external to Coniston	Free-field	54.4 (59.3)	63.7 (71.1)	54.2 (61.7)	53.5 (57.5)	51.4 (58.5)	53.2 (54.4)	62.2 (70.5)	55.2 (60.8)	54.5 (62.6)	53.0 (59.8)	53.4 (56.9)	50.5 (55.9)
ETRC & HRB, NTH-N	N019	Outside Cartmel, Hampstead Road	Free-field	53.1 (55.5)	61.0 (67.0)	53.2 (58.1)	52.5 (57.1)	51.0 (57.5)	51.7 (53.1)	59.3 (66.4)	53.6 (56.8)	53.8 (63.9)	52.8 (60.9)	52.7 (56.1)	49.9 (53.8)
	N026a	Euston Site, Cartmel	Free-field	66.6 (69.1)	70.0 (72.5)	68.3 (74.7)	66.9 (74.4)	65.5 (72.9)	64.8 (66.2)	68.0 (70.9)	67.3 (70.2)	69.3 (77.8)	65.6 (70.8)	66.3 (74.9)	65.0 (70.0)
G, H	HH	Euston Station Parcel Deck, Barnby Street	Free-field	63.5 (68.4)	63.4 (65.8)	64.0 (69.0)	62.5 (68.5)	60.0 (70.0)	60.4 (65.4)	60.6 (61.6)	63.2 (65.4)	62.9 (67.0)	59.7 (67.5)	62.1 (68.0)	58.1 (63.0)

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
G	BS	Roof of Stockbeck House, Barnby Street	Free-field	57.5 (62.0)	60.7 (62.9)	58.2 (61.1)	57.9 (61.4)	55.0 (62.0)	57.4 (59.5)	60.0 (61.7)	59.1 (61.0)	57.8 (61.6)	54.6 (60.4)	56.5 (59.5)	54.4 (58.9)
ETD, TSS	N006	Royal College of General Practitioners roof level	Free-field	52.7 (53.6)	59.5 (66.4)	53.0 (56.7)	52.6 (58.8)	50.9 (56.8)	52.4 (53.6)	55.6 (62.2)	54.8 (64.5)	51.7 (54.3)	51.5 (61.1)	51.7 (58.5)	51.3 (59.5)
TSS	N008	Stephenson's Way lamppost (external to RCGP)	Façade	61.2 (64.8)	64.0 (69.1)	57.9 (62.7)	57.4 (66.7)	57.4 (65.8)	58.1 (59.9)	60.6 (67.6)	57.6 (60.7)	57.0 (63.2)	56.2 (59.4)	56.4 (59.0)	56.7 (60.6)
	N010	Wesley Hotel	Façade	65.1 (66.2)	67.6 (71.8)	64.3 (67.9)	62.8 (67.5)	57.1 (65.6)	64.4 (65.5)	64.6 (66.0)	61.0 (65.3)	59.6 (65.4)	58.3 (65.5)	62.9 (65.9)	56.9 (65.2)
	N011	Outside 82 Euston Street	Free-field	54.9 (60.1)	59.0 (61.9)	54.6 (56.4)	54.1 (62.1)	53.0 (67.4)	52.3 (55.7)	54.1 (56.4)	55.2 (56.8)	54.5 (63.1)	52.1 (59.5)	55.2 (65.8)	52.3 (59.3)
ETD, ITR	N007	Royal College of General Practitioners, Melton Street	Free-field	63.4 (66.7)	66.7 (71.3)	64.1 (67.5)	63.5 (67.0)	62.9 (68.3)	62.6 (63.5)	63.4 (64.8)	64.3 (65.9)	63.7 (65.6)	62.7 (65.4)	63.3 (67.1)	62.8 (69.2)
VHA	N025	External to 3 Prince Albert Road	Free-field	66.8 (71.0)	67.5 (69.6)	67.1 (70.5)	66.1 (69.7)	64.9 (69.9)	64.7 (65.6)	66.6 (67.7)	66.7 (69.8)	66.9 (72.2)	65.3 (69.6)	66.2 (73.6)	65.7 (70.3)
NTH-EN, TSS	N012	Opposite 92-94 Drummond Street	Free-field	56.0 (66.3)	60.1 (66.9)	56.8 (58.5)	56.5 (59.3)	53.3 (58.9)	52.8 (55.7)	55.5 (56.8)	56.8 (58.7)	58.1 (73.6)	53.3 (61.9)	55.3 (58.9)	53.5 (58.6)

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Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Saturday Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Sunday / Public Holiday Average L _{Aeq,T} (Highest Day L _{Aeq,T})	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
NTH-EN, MF	N014	Starcross Street lamppost (external to Exmouth Arms)	Free-field	54.2 (61.7)	61.8 (69.1)	54.5 (62.1)	53.7 (64.8)	48.7 (58.8)	49.2 (50.2)	55.5 (72.8)	56.5 (76.6)	52.6 (72.3)	49.8 (59.8)	50.3 (53.0)	47.4 (54.6)
	N016	Margaret Centre roof	Free-field	52.8 (55.5)	58.3 (62.4)	53.0 (57.1)	52.9 (58.9)	51.3 (58.3)	52.0 (54.0)	54.2 (56.1)	54.5 (56.9)	53.9 (59.0)	52.5 (61.9)	52.2 (56.7)	50.5 (56.0)
NTH-EN	N017	Hampstead Road, lamppost #48	Free-field	68.3 (73.7)	71.0 (73.0)	69.9 (77.2)	69.7 (80.3)	68.2 (75.5)	66.1 (67.4)	67.8 (69.5)	67.8 (69.3)	70.2 (76.9)	68.1 (72.4)	68.2 (76.8)	68.1 (74.4)
ETRC & HRB, NTH-N	N018	Outside replacement housing, Hampstead Road	Free-field	68.1 (73.4)	71.0 (74.0)	69.4 (74.7)	68.8 (77.6)	67.5 (74.5)	65.4 (66.1)	67.5 (69.2)	67.5 (68.7)	69.5 (75.4)	67.5 (73.3)	67.2 (75.1)	67.0 (71.4)

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

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

Worksite Reference	Measurement Reference	Monitor Address	Highest PPV measured in any axis, mm/s
ARVS	V059	Outside 68 Adelaide Road	4.27 (Z-axis)
	ARBW-V1	Adelaide Road – Beaumont Walk	4.28 (Y-axis)
MSB & ECAV, PVE, C	PVS-V1	Park Village Studios	4.06 (Y-axis)
ESB & GTB, PVE, D	SH-V1	Silsoe House	2.64 (X-axis)
ETRC & HRB	V039	Coniston, Regents Park Estate	4.30 (Y-axis)
	V043	Cubitt Court, Park Village East	4.25 (Y-axis)
ETD, ITR	V003	RCGP basement vaults, 305 Euston Road	0.57 (Z-axis)
TSS	V002	RCGP basement boiler room, 305 Euston Road	0.59 (Z-axis)
	V037	Magic Circle, basement	0.99 (X-axis)
	V038	Wesley Hotel, basement lightwell, Euston Street	1.05 (Z-axis)
NTH-EN, MF	V021	42-44 Cobourg Street (floor)	1.24 (Z-axis)

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

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

2.2 Exceedances of the SOAEL

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

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

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

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

Table 5: Summary of Exceedances of SOAEL

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
ARVS	N051	Outside 70 Adelaide Road	All days	All periods	No exceedance
	N052	Adelaide Road, Beaumont Walk	All days	All periods	No exceedance
B	JC	Juniper Crescent	All days	All periods	No exceedance
MSB & ECAV, PVE, C	N024	External to Park Village Studios, Park Village East	Weekday	18:00-19:00	1
			Night	22:00-07:00	2
	N047	Park Village East/Mornington Street bridge, lamppost #13	Saturday	14:00-22:00	1
	PVS-N001	Park Village Studios	Night	22:00-07:00	12
	N022	External to 34 Mornington Terrace	Night	22:00-07:00	3
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18	Night	22:00-07:00	7
ESB & GTB, PVE, E	N001	External to Cubitt Court, 100 Park Village East	All days	All periods	No exceedance
	N002	Richmond Court, Park Village East	All days	All periods	No exceedance
ESB & GTB, PVE, D	N003	Silsoe House, Park Village East	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
	N004	Mornington Terrace, lamppost #7	All days	All periods	No exceedance
ESB & GTB, E, PVE	N005	5A Granby Terrace	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	Mackworth Street, lamppost #1	All days	All periods	No exceedance
	N021	Stanhope Street, lamppost #2	All days	All periods	No exceedance
	N044	Regents Park Estate west, near Langdale	All days	All periods	No exceedance
	N045	Regents Park Estate south, external to Coniston	Night	22:00-07:00	6
HRB & ETRC, NTH-N	N019	Outside Cartmel, Hampstead Road	All days	All periods	No exceedance
	N026a	Euston Site, Cartmel	All days	All periods	No exceedance
G, H	HH	Euston Station Parcel Deck, Barnby Street	All days	All periods	No exceedance
G	BS	Roof of Stockbeck House, Barnby Street	All days	All periods	No exceedance
ETD, TSS	N006	RCGP Roof level	All days	All periods	Not applicable*
TSS	N008	Stephenson's Way lamppost (external to RCGP)	All days	All periods	Not applicable*
	N010	Wesley Hotel	All days	All periods	Not applicable*

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
	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	External to 3 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
	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

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

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

Table 6: Summary of Total Exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
MSB & ECAV, PVE, C	N024	External to Park Village Studios, Park Village East	2
	N047	Park Village East/Mornington Street bridge, lamppost #13	1
	PVS-N001	Park Village Studios	3
	N022	External to 34 Mornington Terrace	2
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18	3
ETRC & HRB	N045	Regents Park Estate south, external to Coniston	2

2.2.6 Thirteen (13) SOAEL exceedances were recorded due to HS2 construction works during December 2022. Two (2) exceedances occurred at monitoring location N024, one (1) at N047, three (3) at PVS-N001, two (2) at N022, three (3) at N046 and two (2) at N045. SOAEL exceedances at N024 occurred during weekday shoulder hours and extended working hours, exceedances at N047 occurred during a Saturday and exceedances at PVS-N001, N022, N046 and N045 occurred during the night-time.

2.3 Exceedances of Trigger Level

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

Table 7: Summary of Exceedances of Trigger Levels

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

2.4 Complaints

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

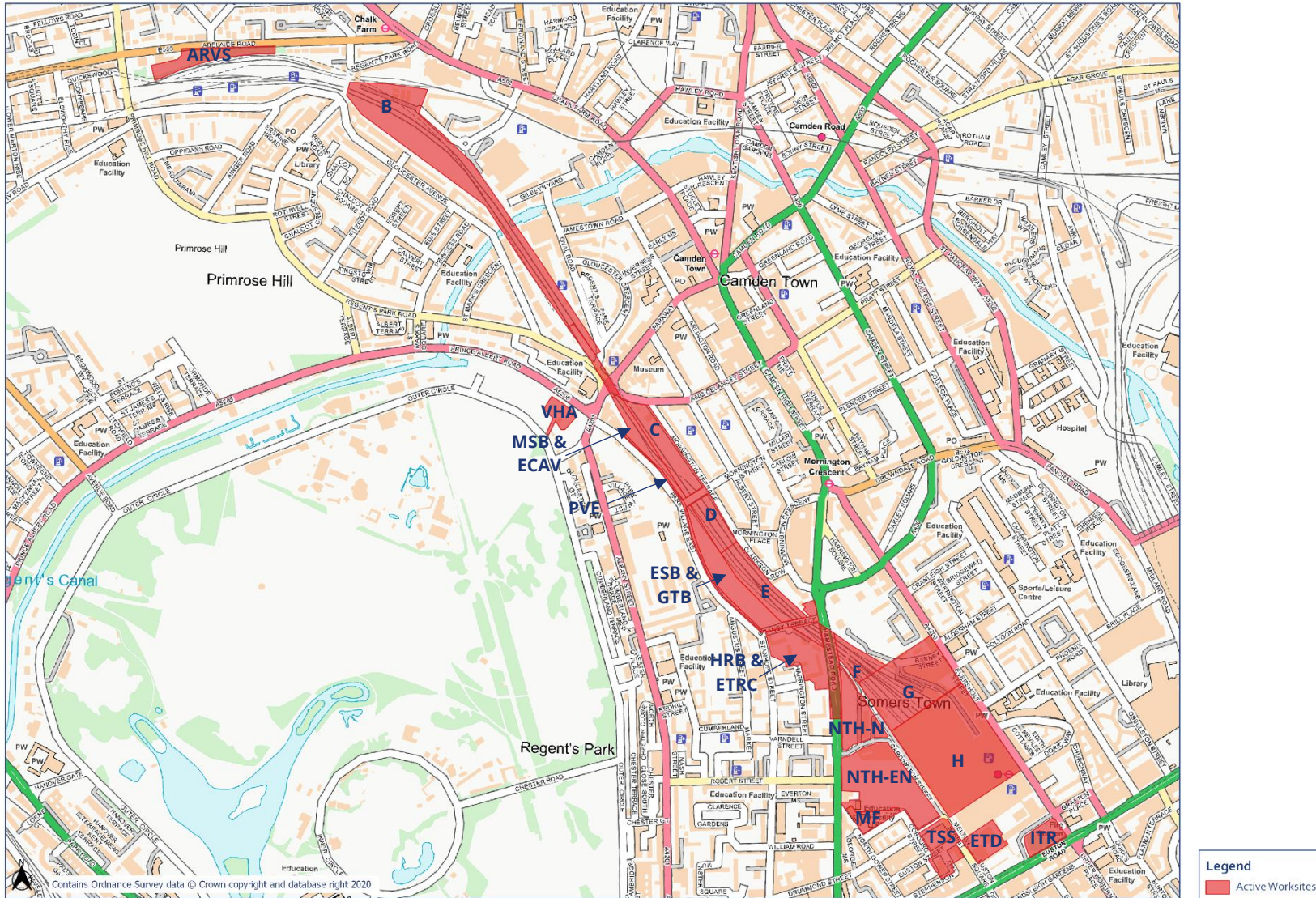
Table 8: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-22-87299-E-C	ARVS	Complaint due to noise from machinery within close proximity to the stakeholder's property.	Monitoring data at the time of the complaint showed compliance with Section 61 requirements and best practicable means to reduce noise were used.	Information was provided to the stakeholder confirming the results of the investigation.

Appendix A Site Locations

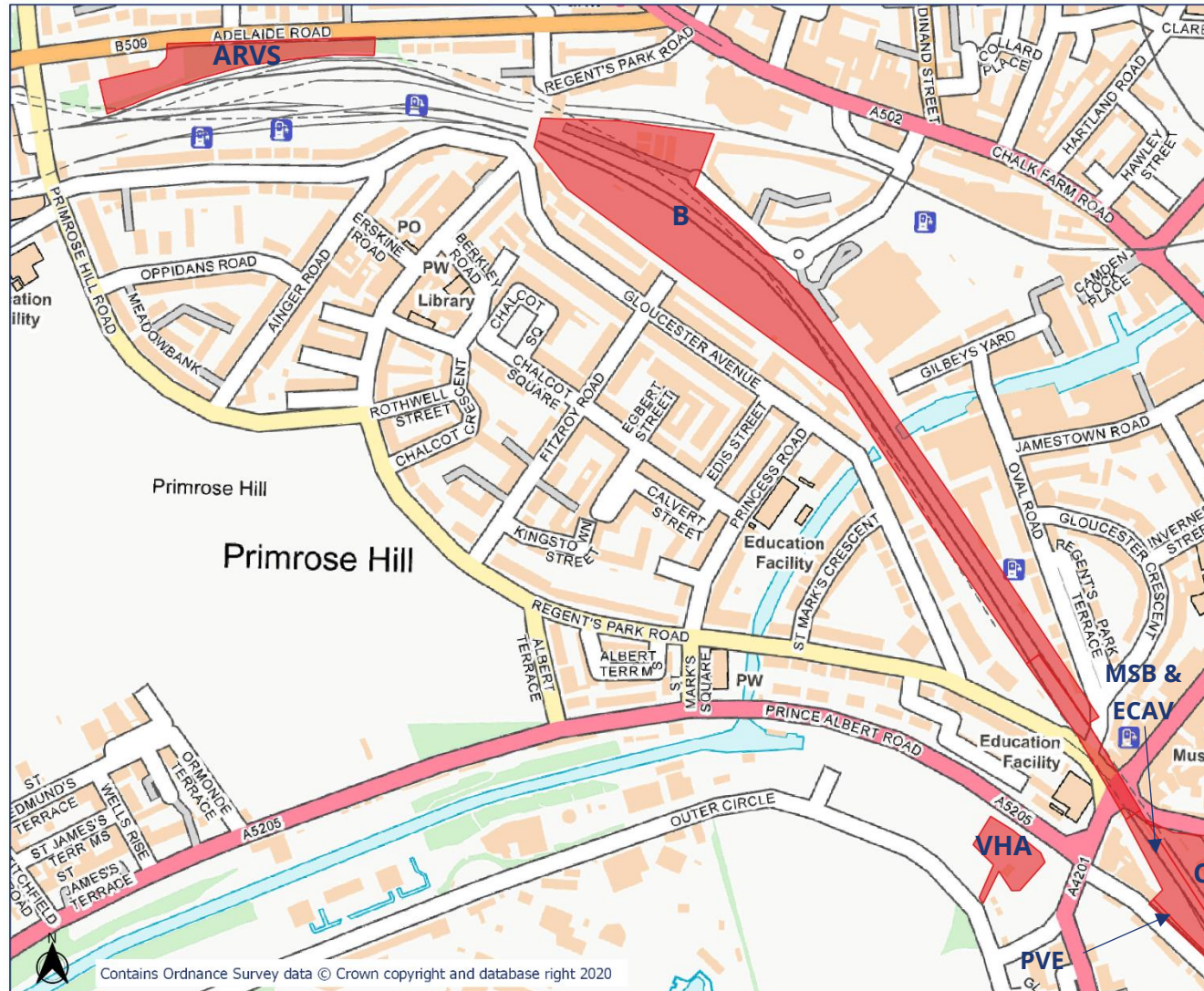
HS2

Worksite Identification Plan - Overview



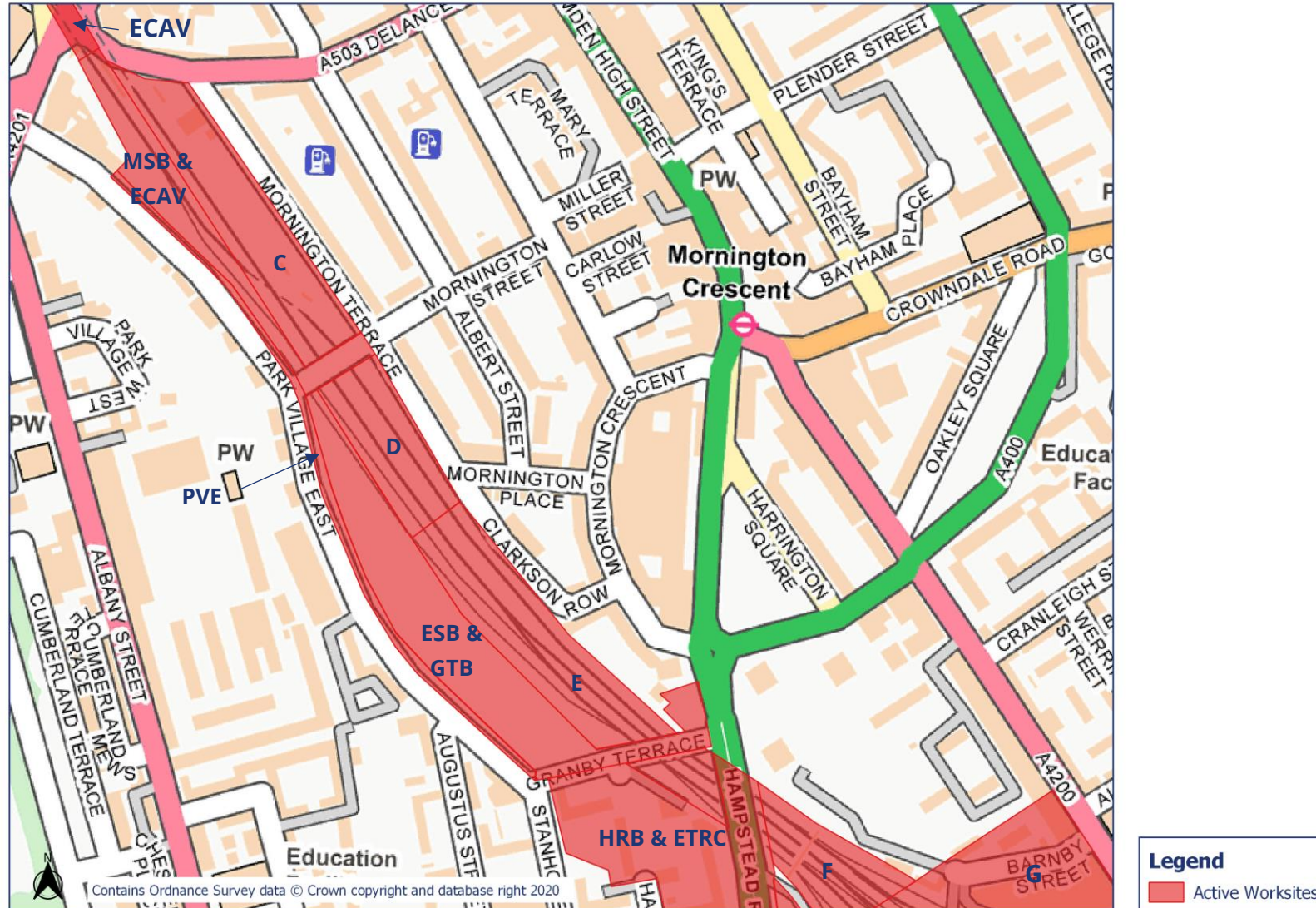
HS2

Worksite Identification Plan - 1



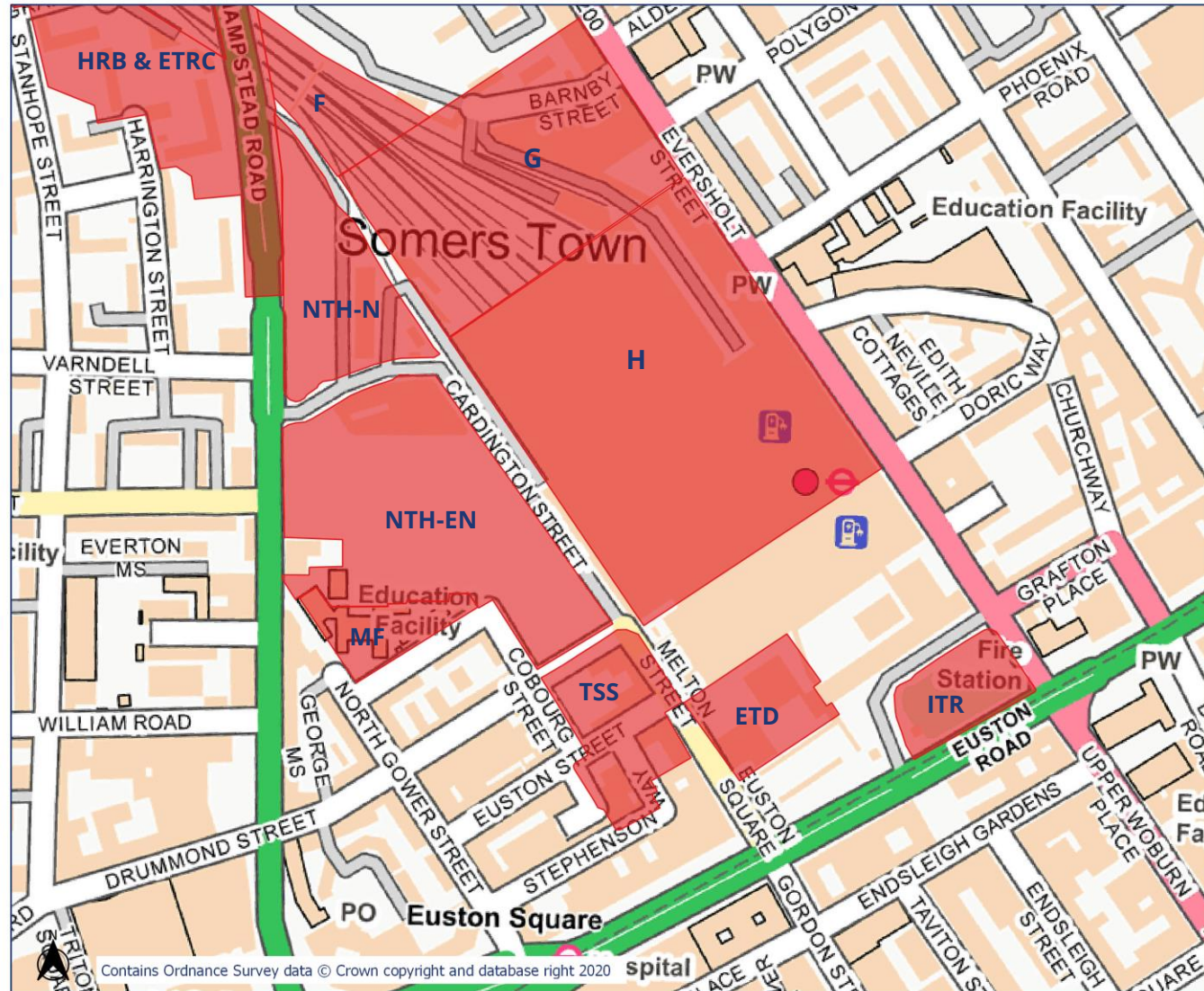
HS2

Worksite Identification Plan - 2



HS2

Worksite Identification Plan - 3



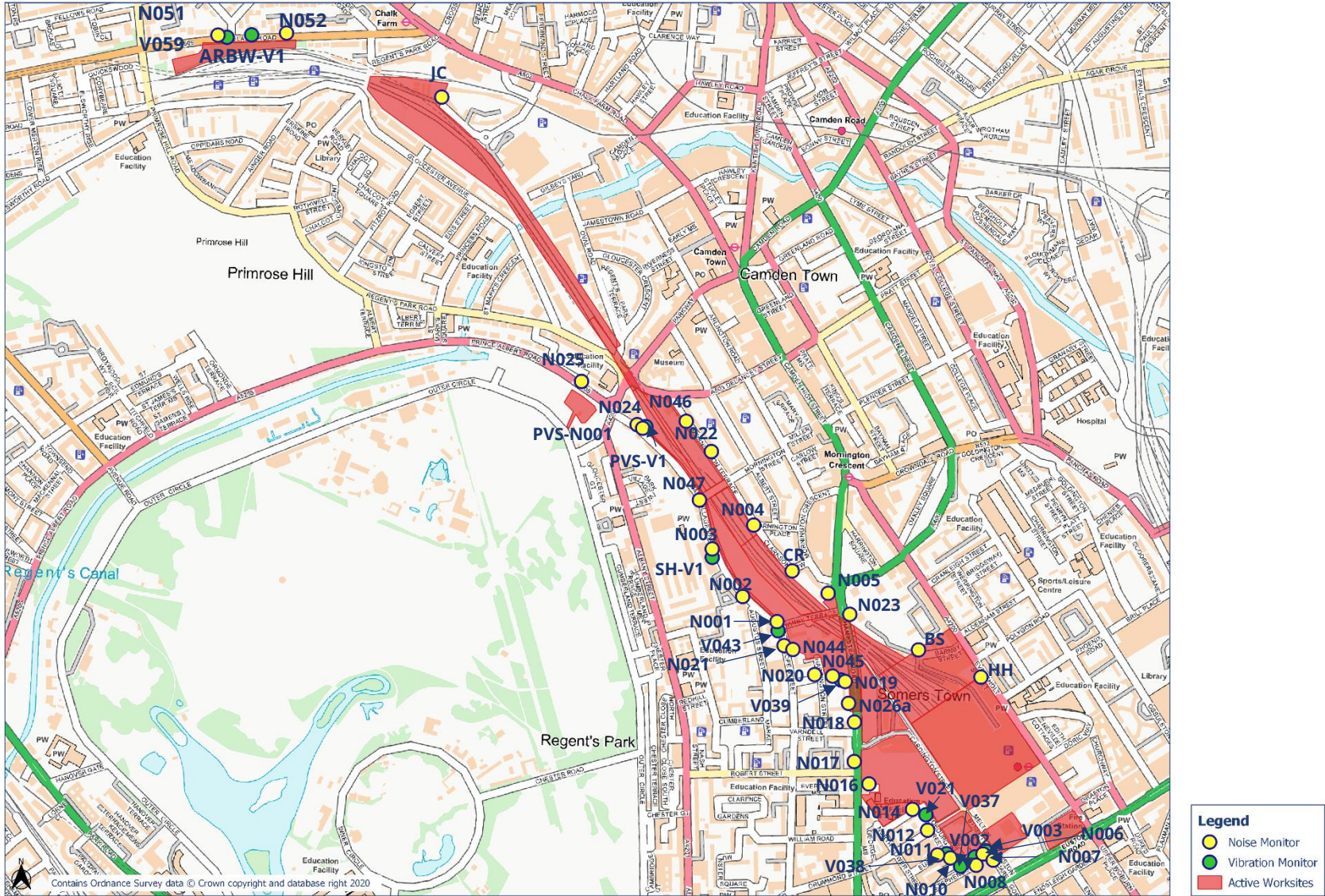
Legend

- Active Worksites

Appendix B Monitoring Locations

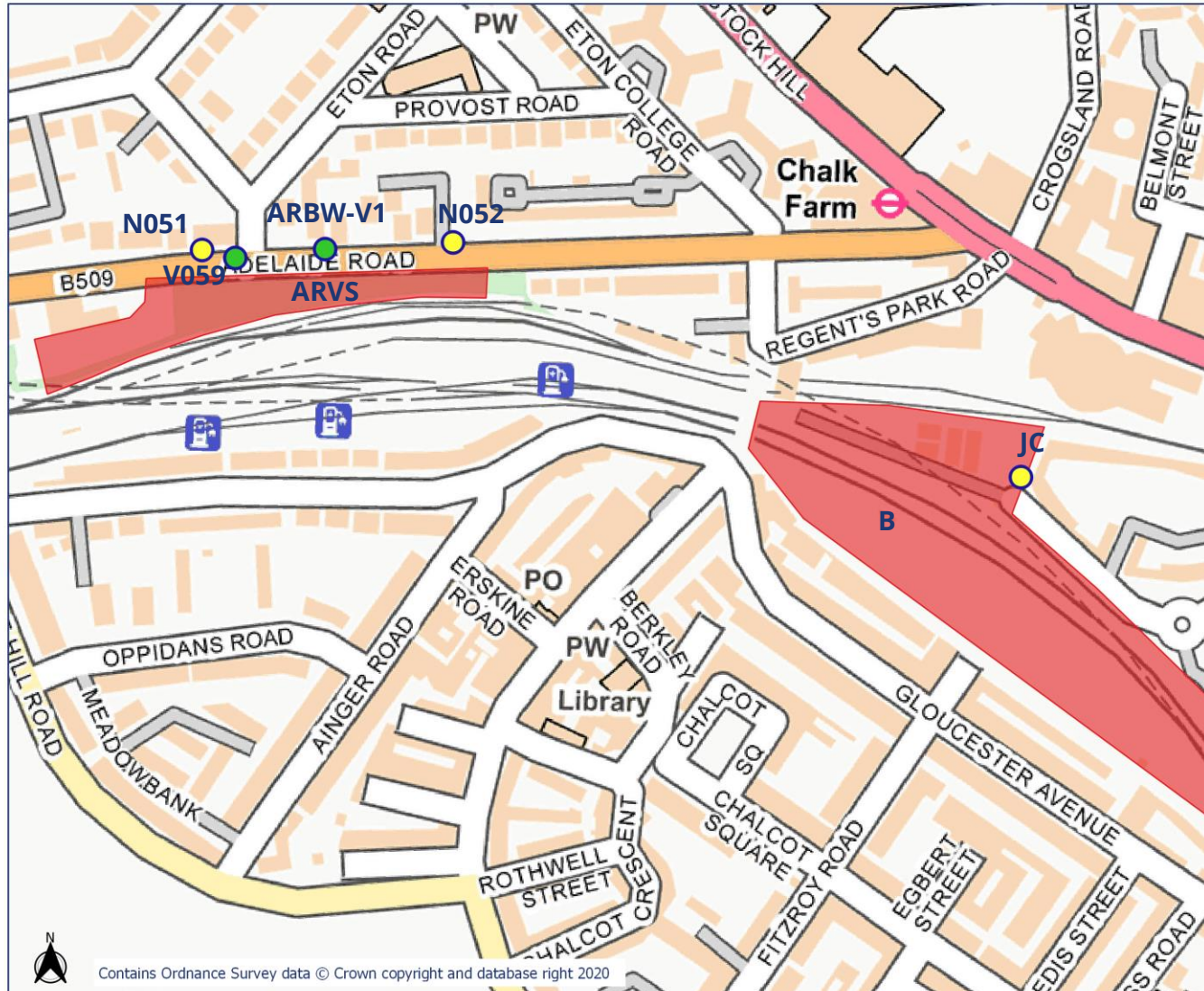
HS2

Noise and Vibration Monitoring Plan - Overview



HS2

Noise and Vibration Monitoring Plan - 1

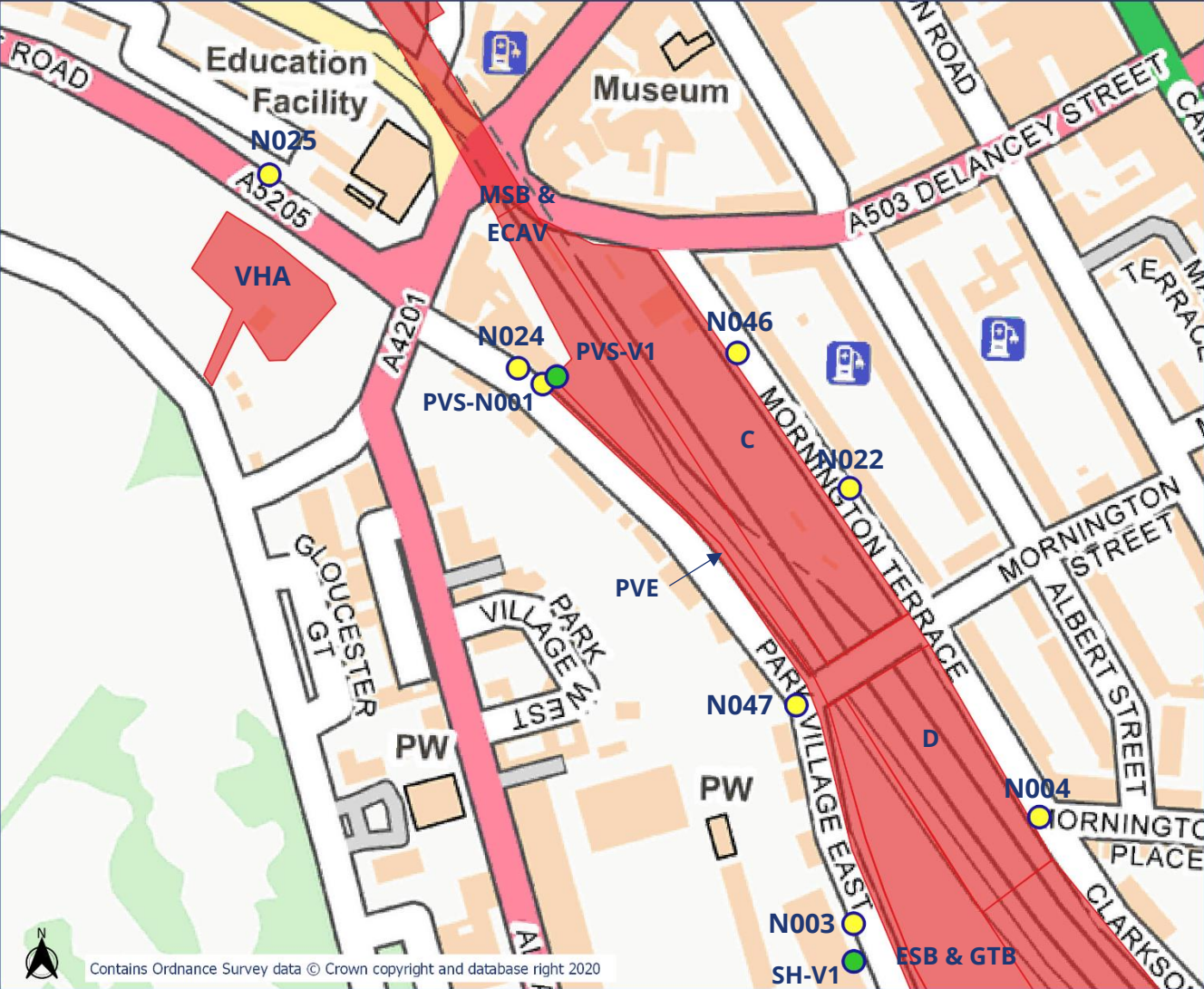


Legend

- Noise Monitor
- Vibration Monitor
- Active Worksites

HS2

Noise and Vibration Monitoring Plan - 2

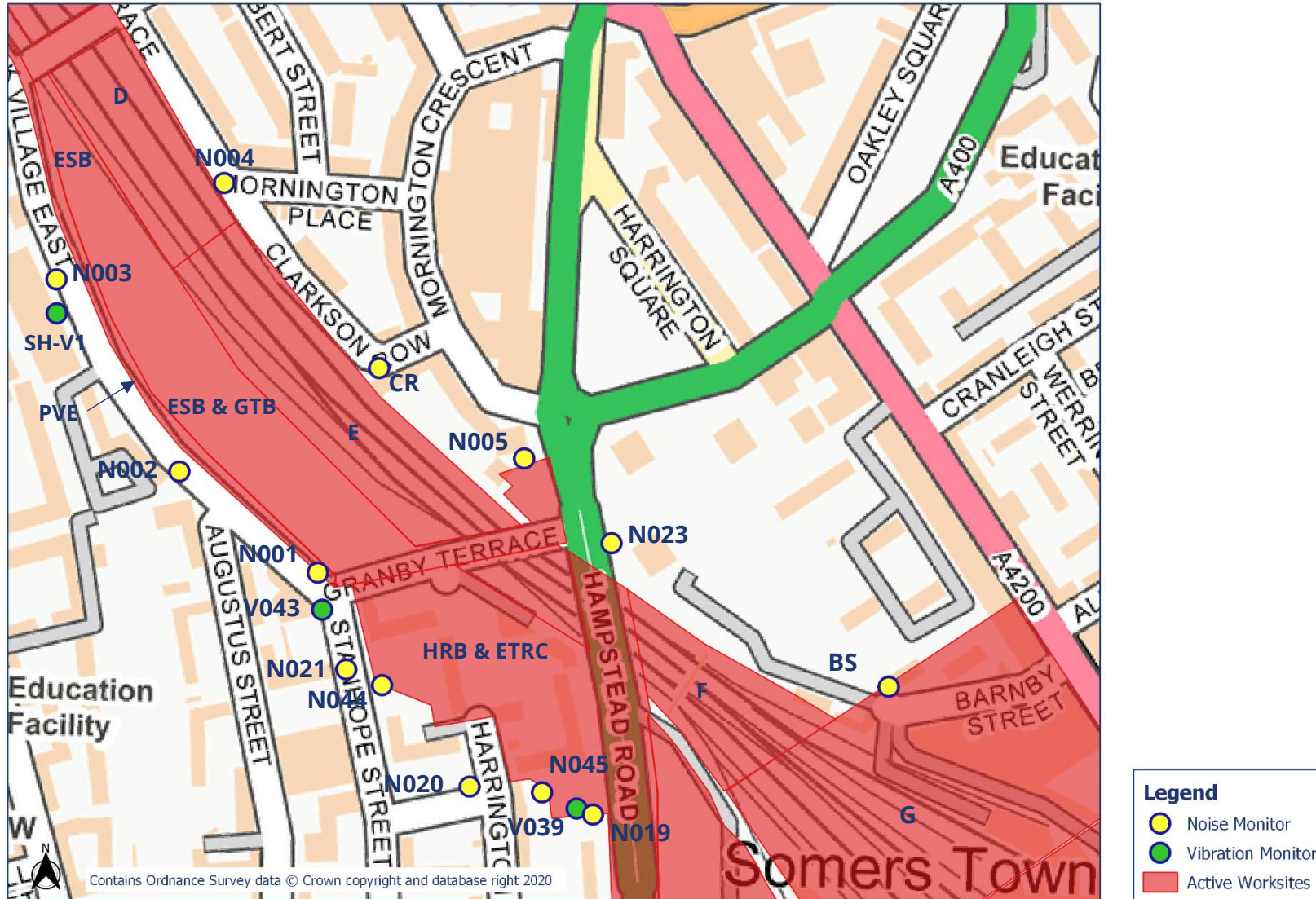


Legend

- Noise Monitor
- Vibration Monitor
- Active Worksites

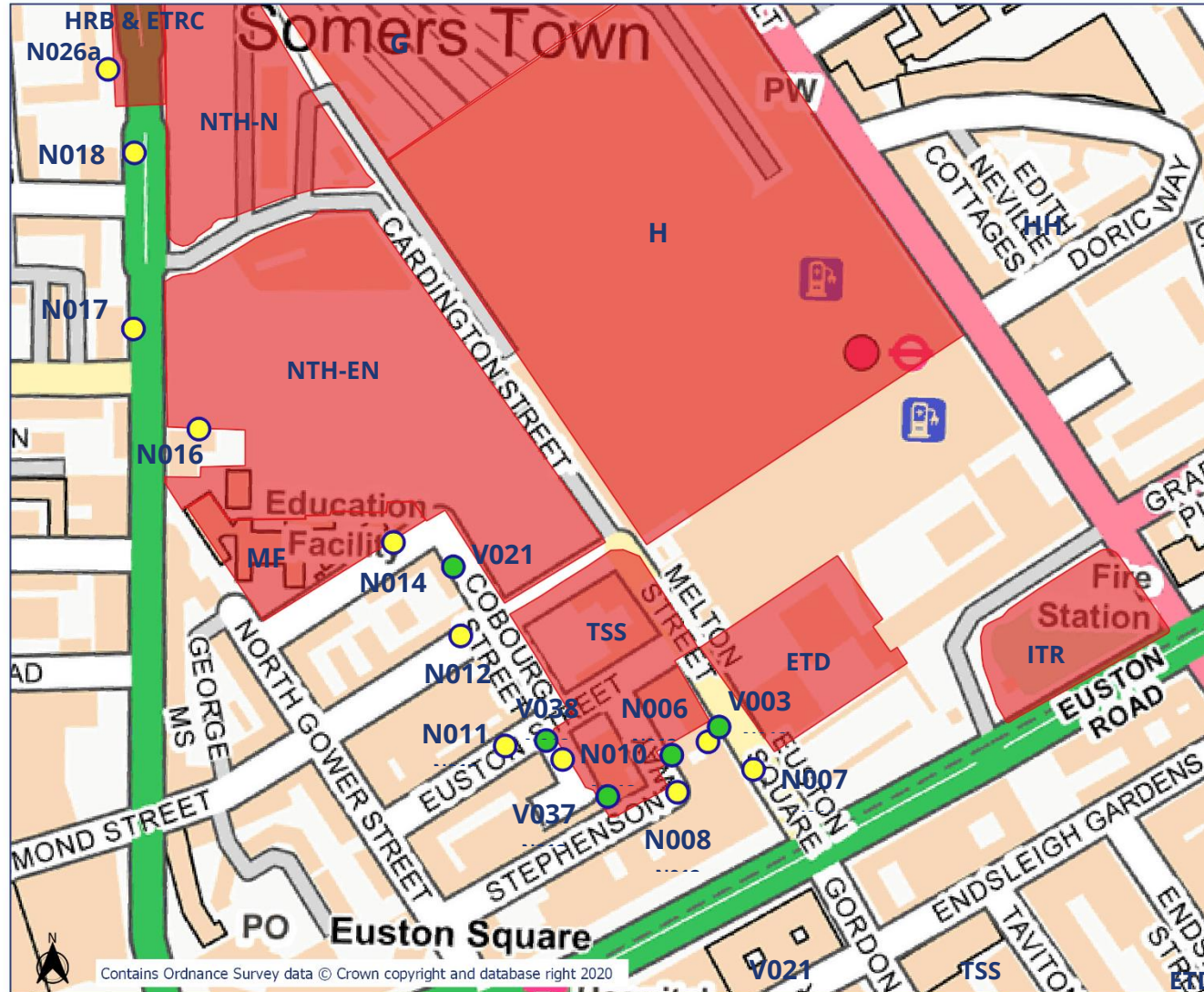
HS2

Noise and Vibration Monitoring Plan - 3



HS2

Noise and Vibration Monitoring Plan - 4



Legend

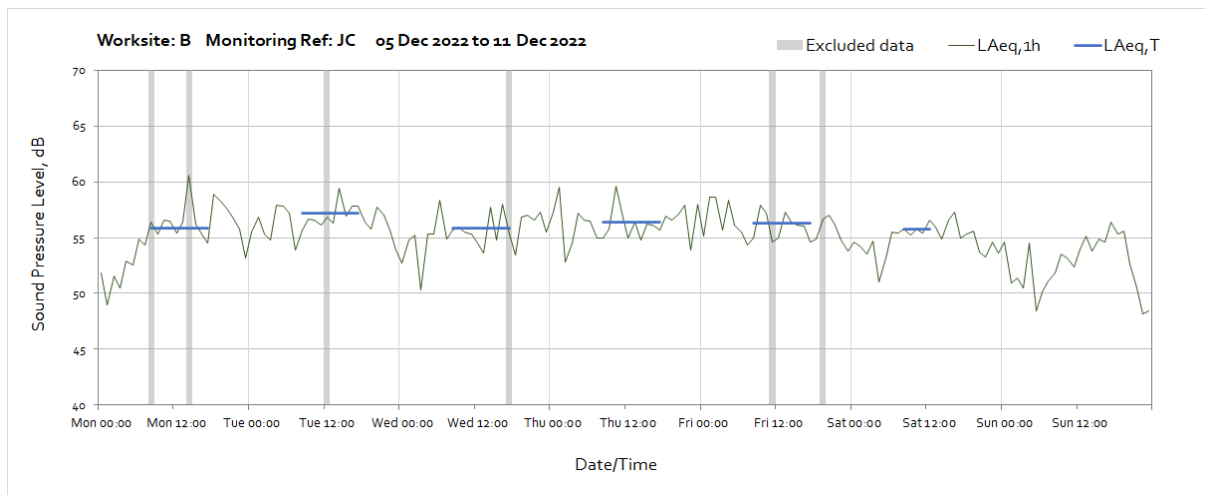
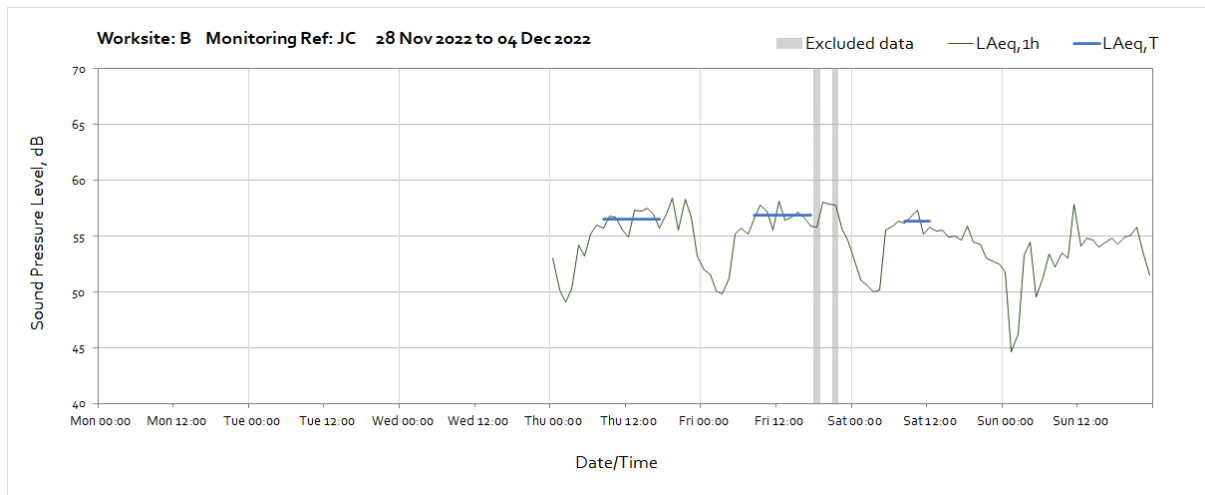
- Noise Monitor
- Vibration Monitor
- Active Worksites

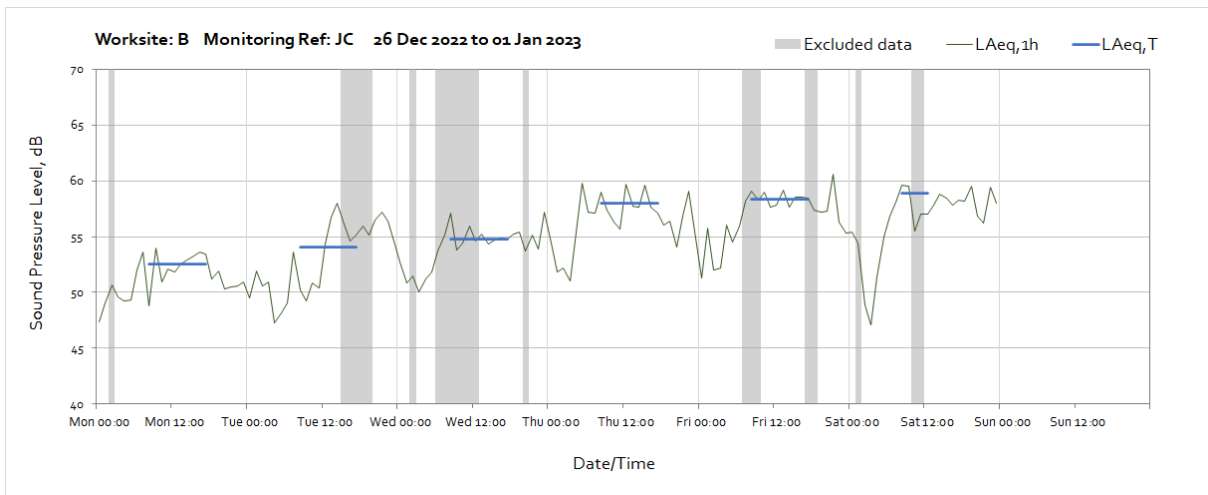
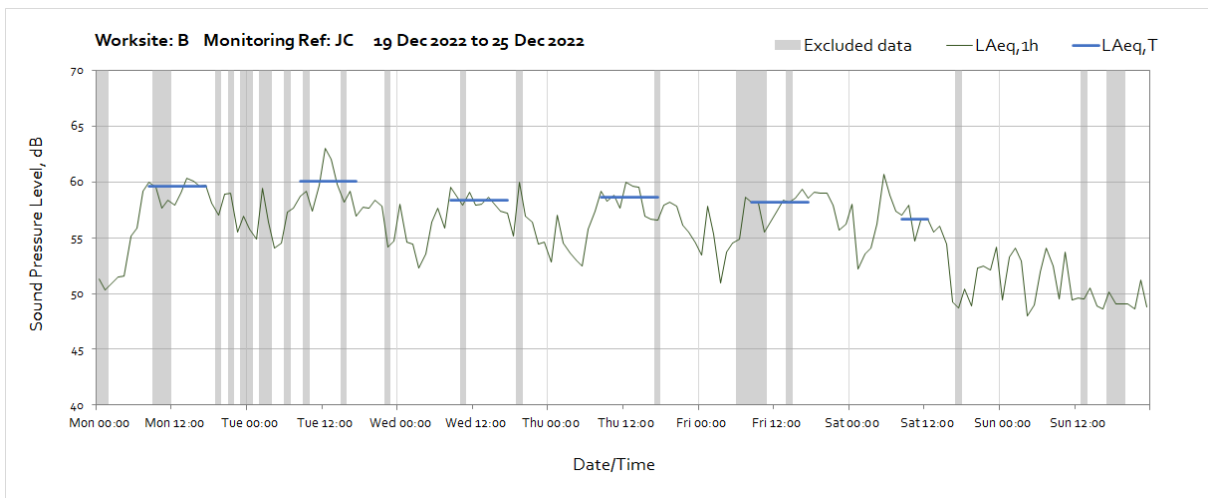
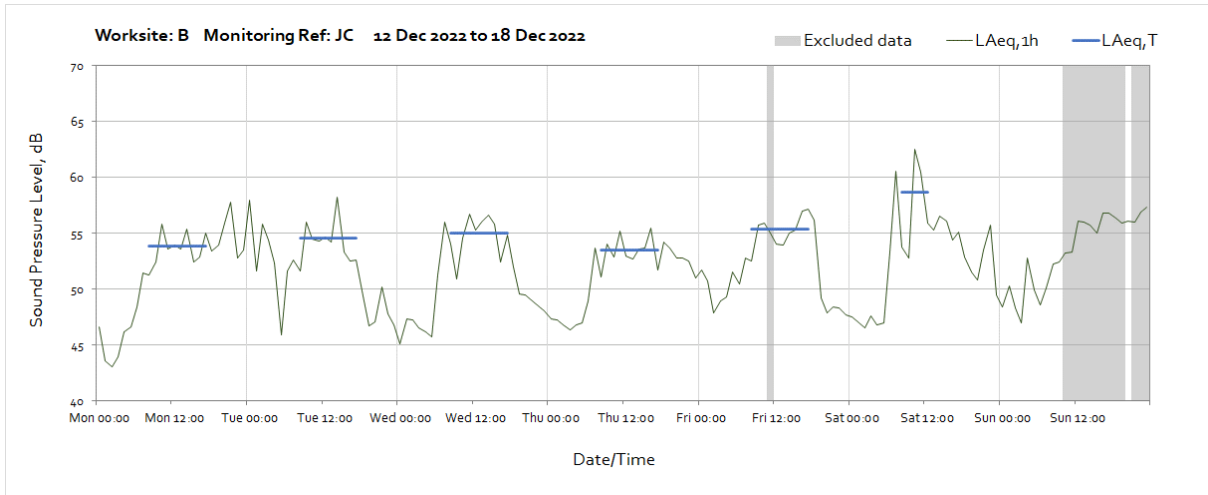
Appendix C Data

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

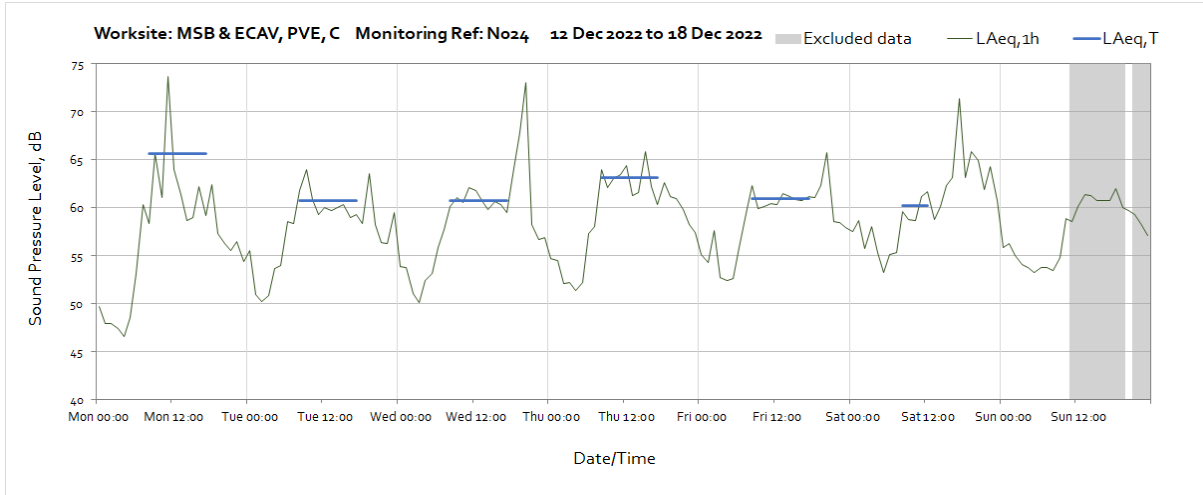
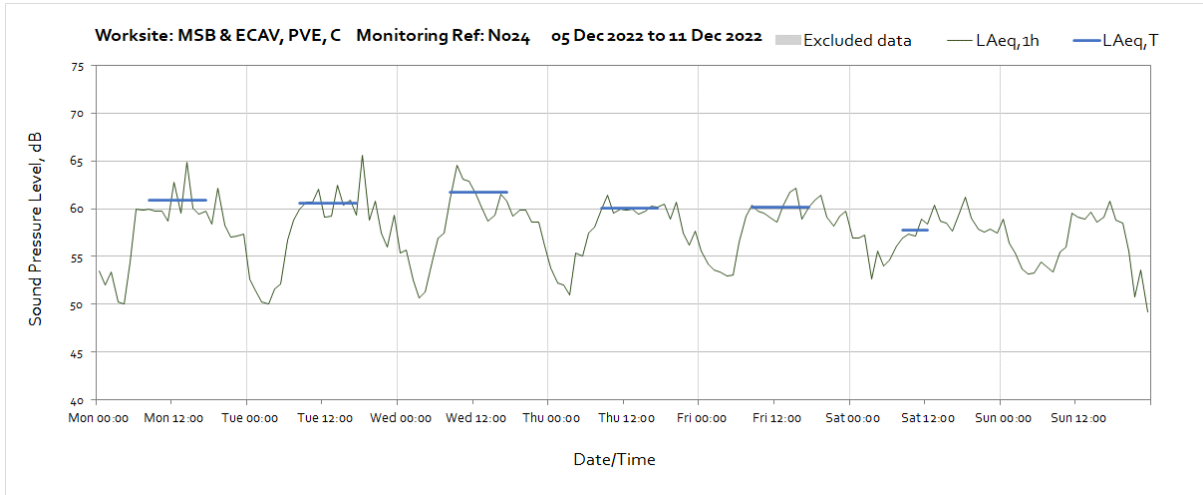
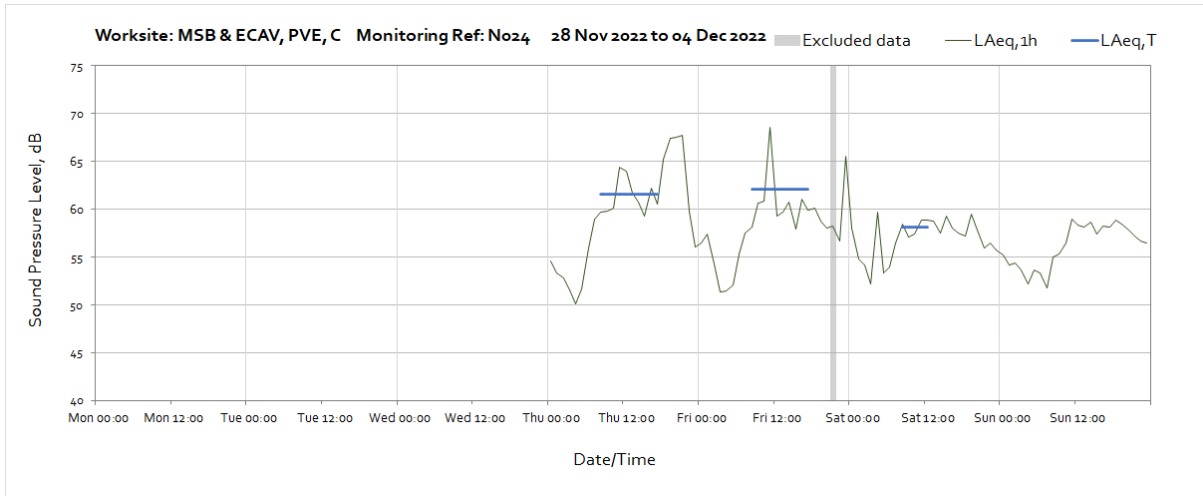
Noise

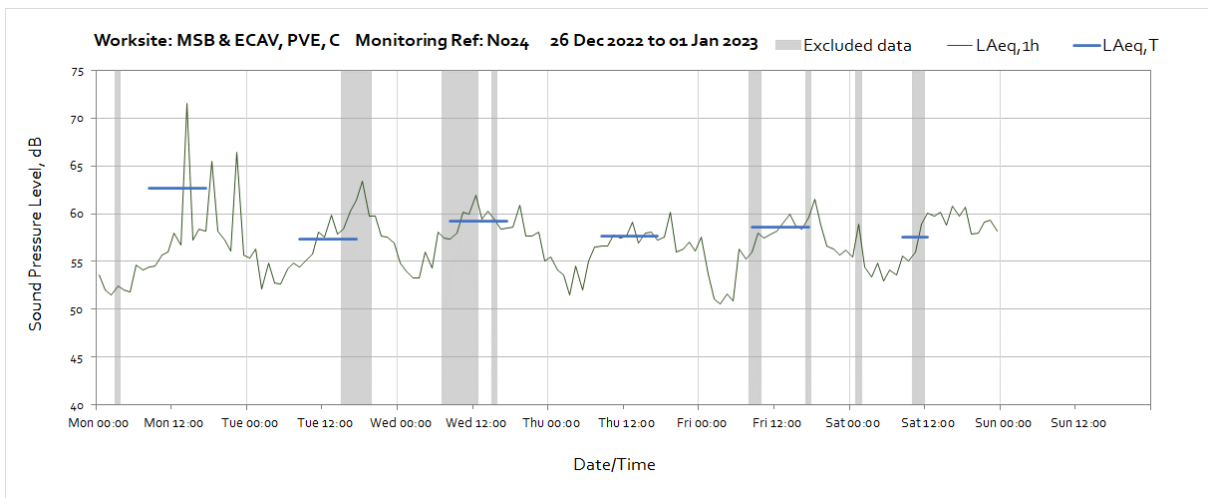
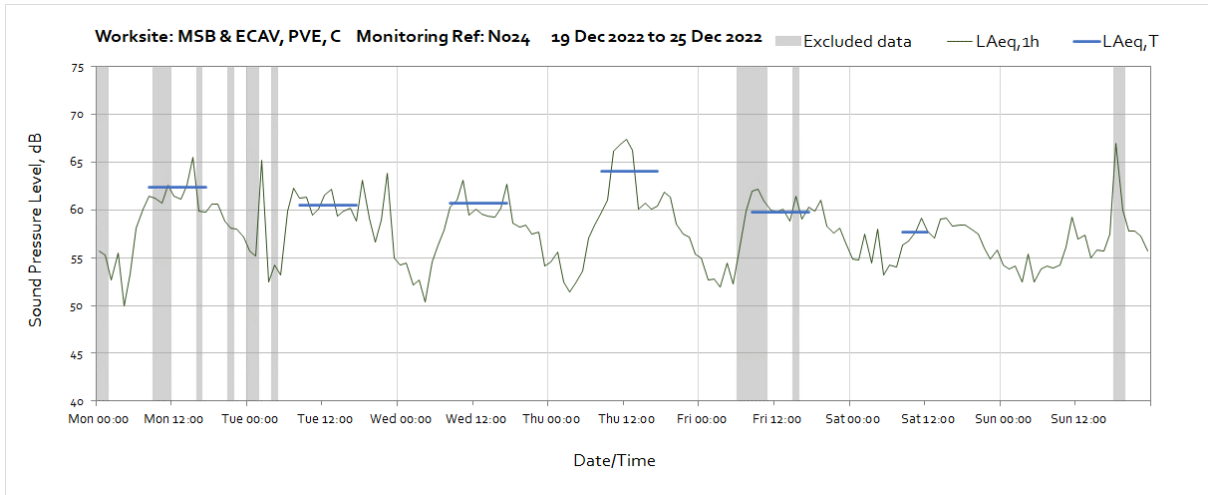
Worksite: B – Monitoring Ref: JC



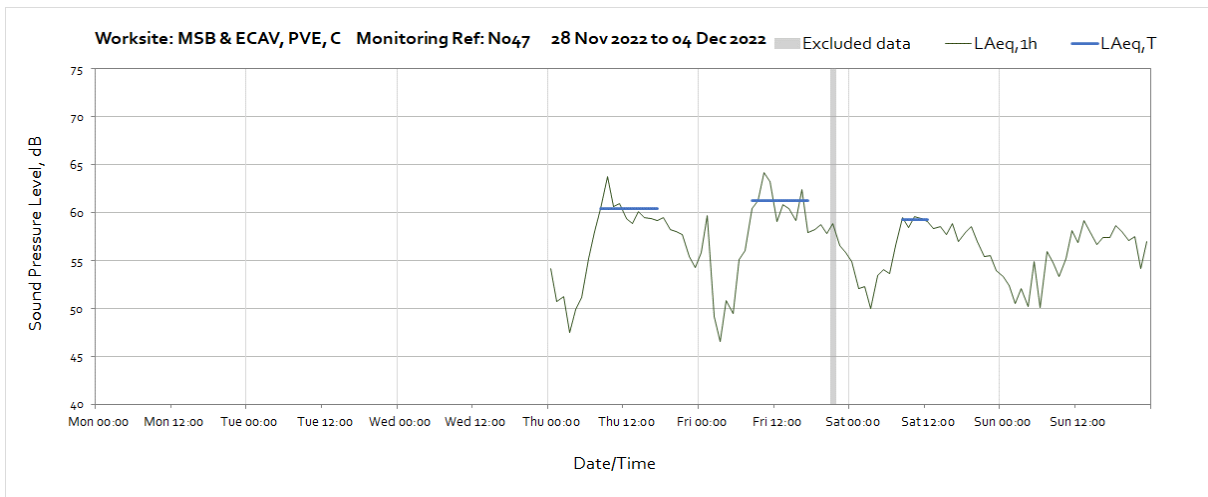


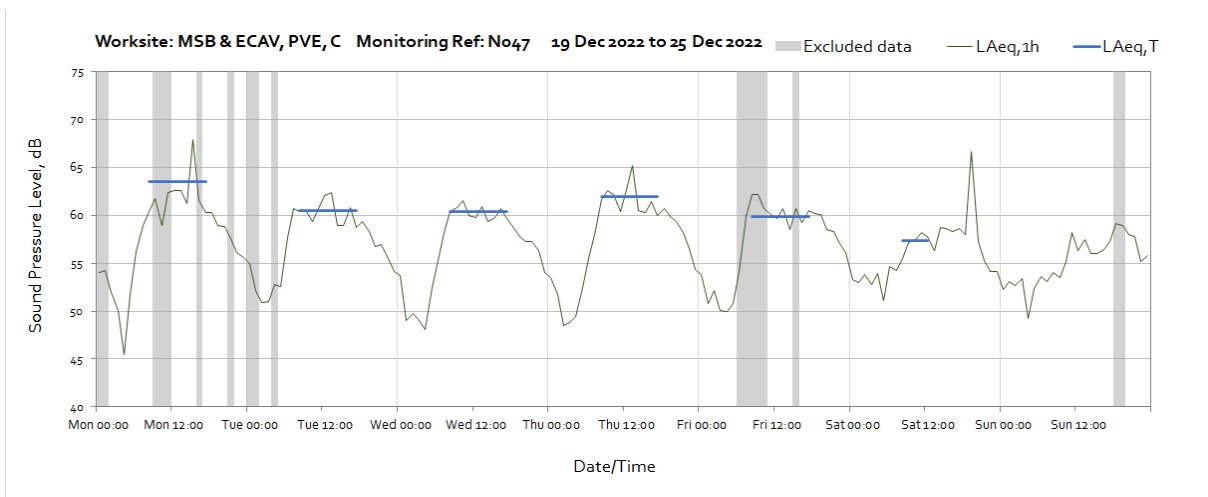
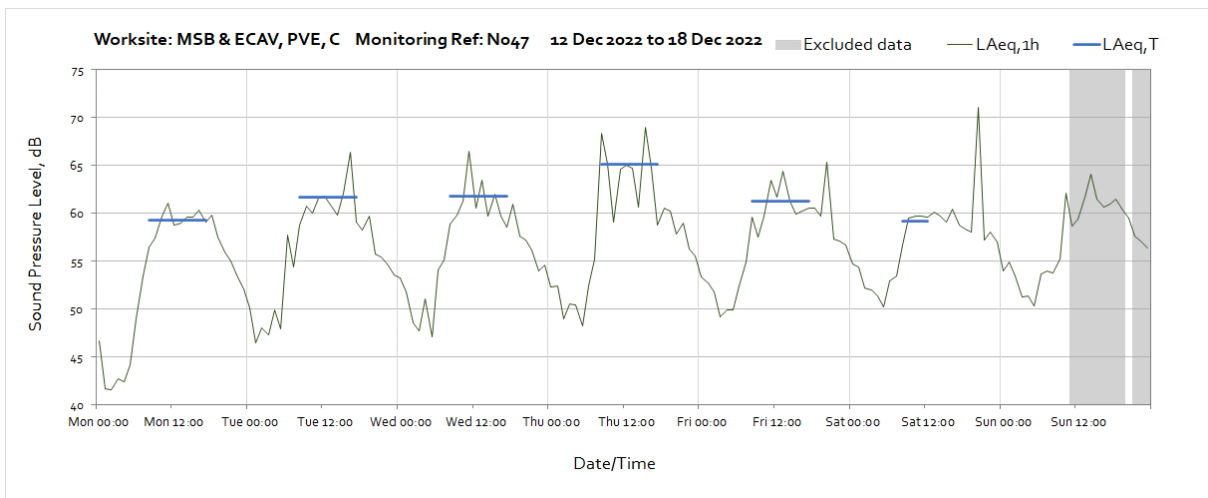
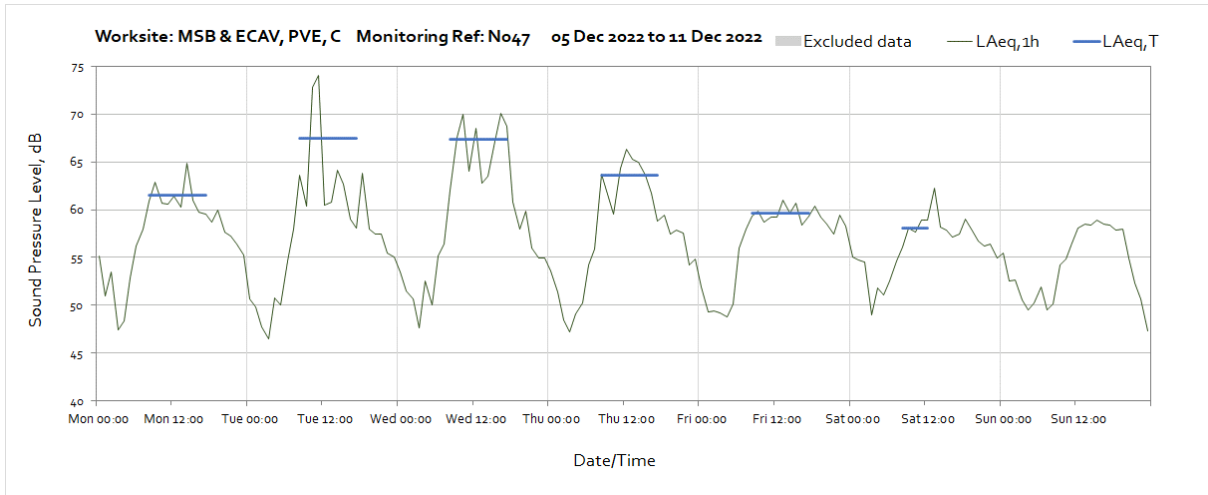
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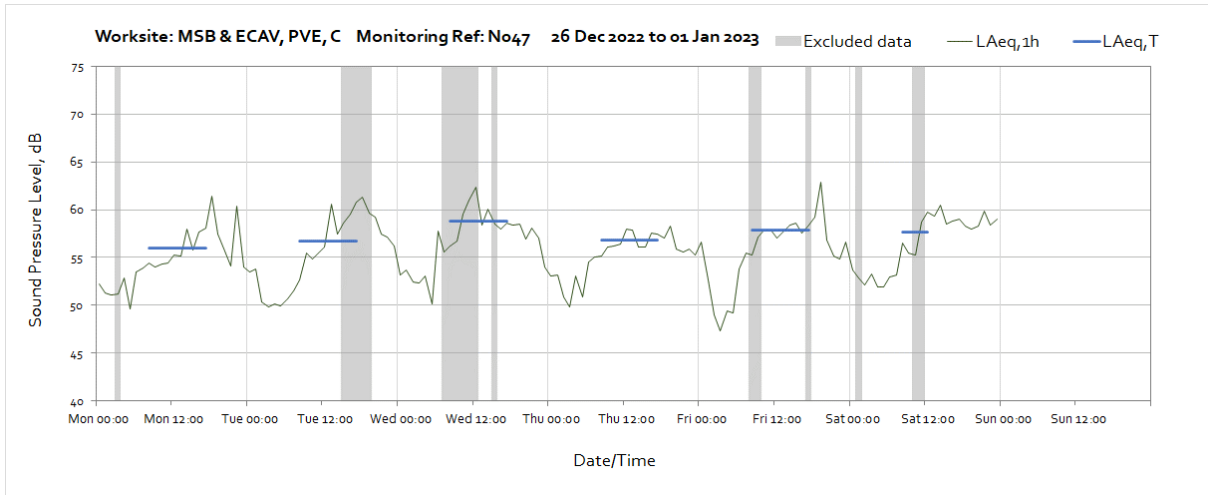




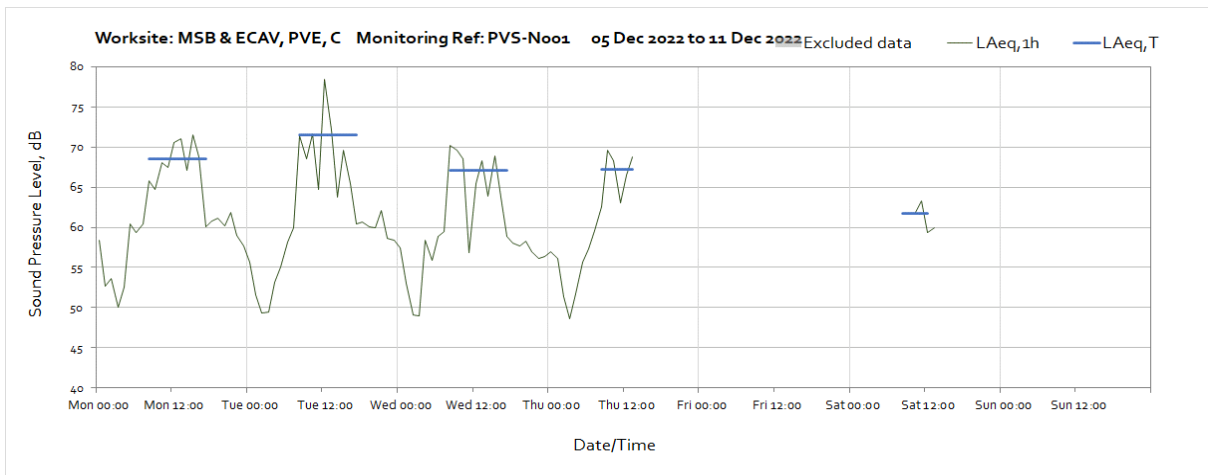
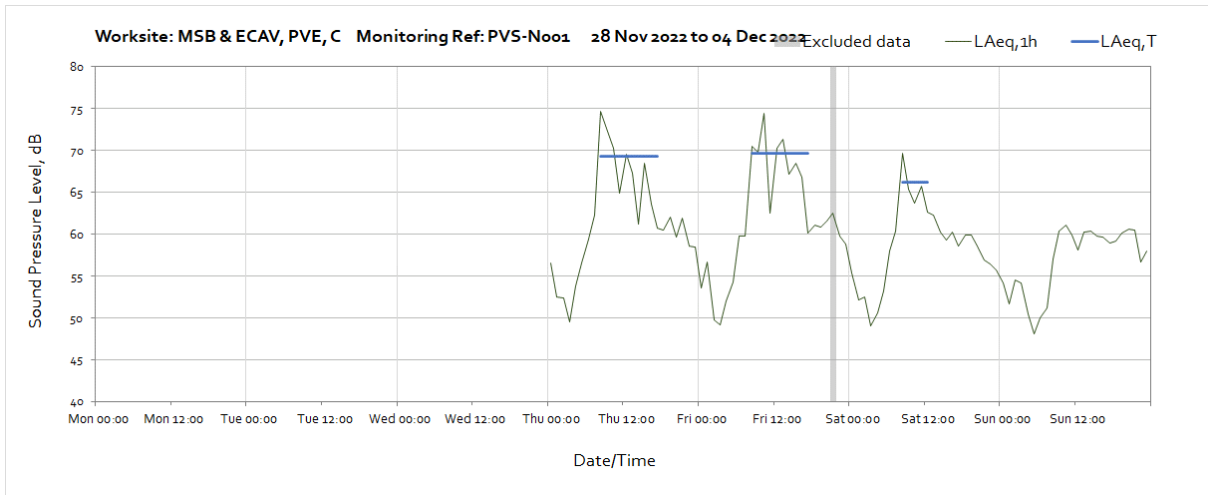
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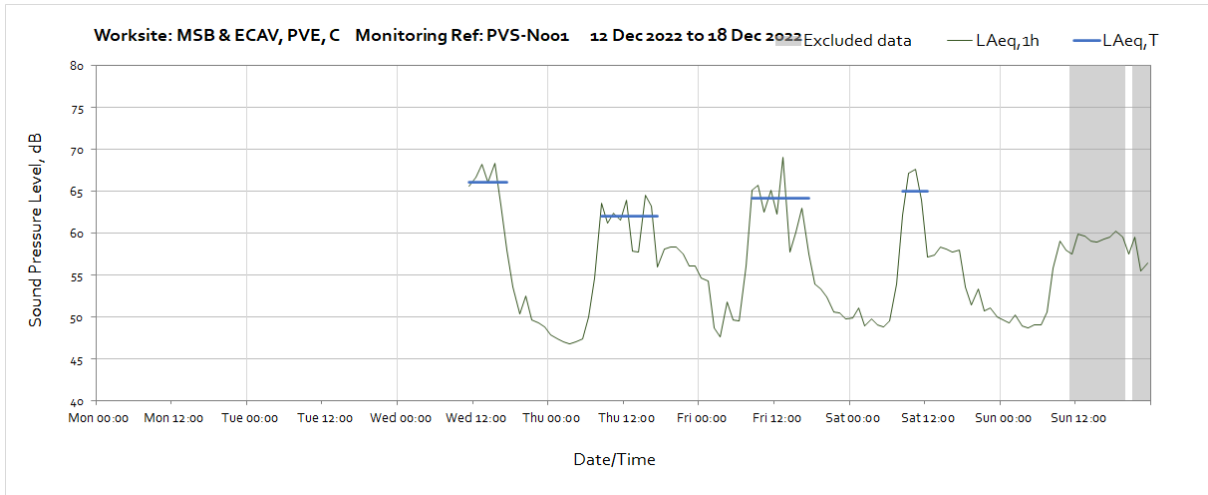


Worksite: MSB & ECAV, PVE, C – Monitoring Ref: PVS-N001

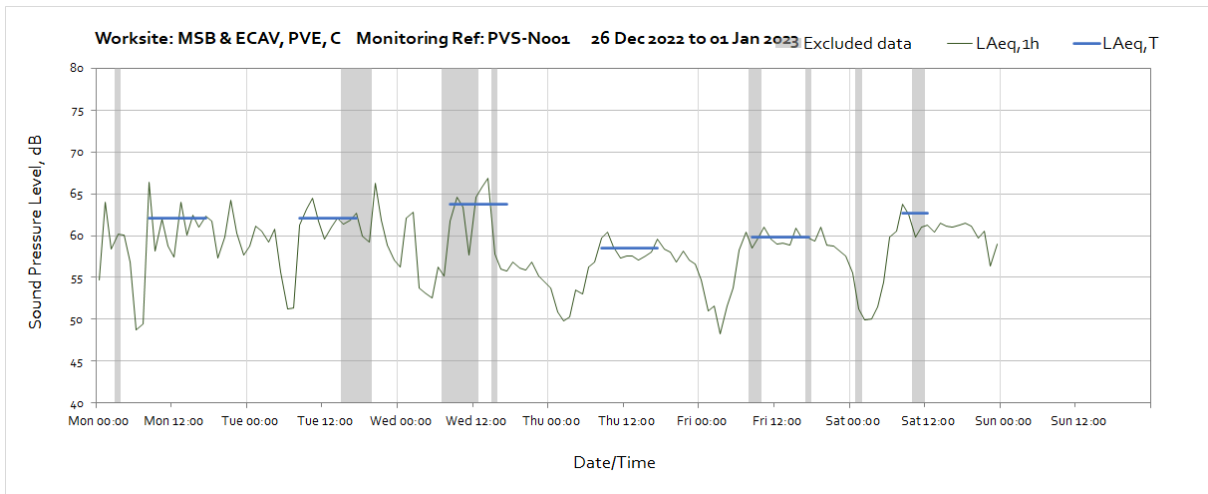
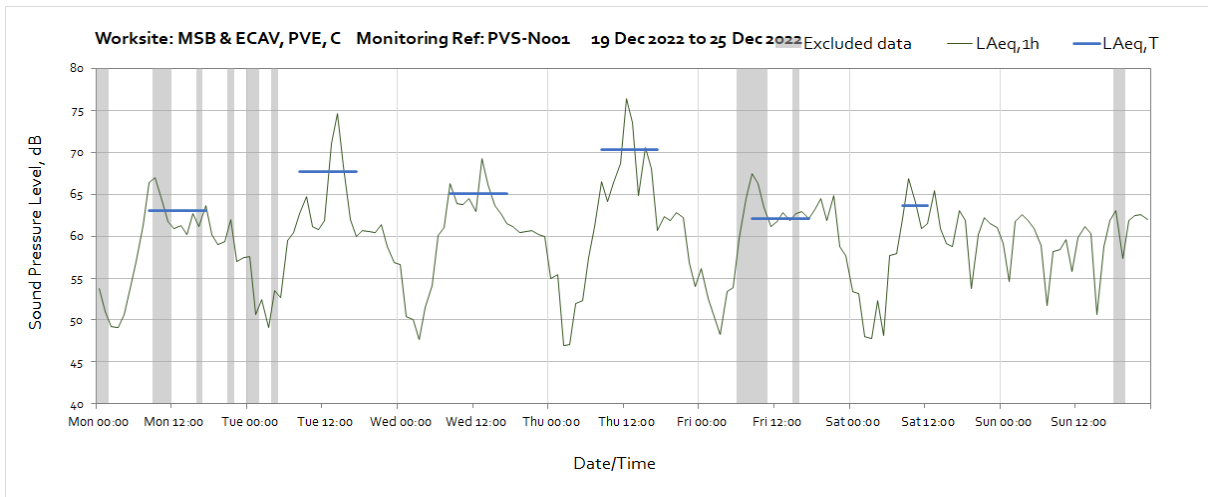


Note: Missing data from 14:00 on Thursday 8th December until 10:00 on Saturday 10th December and from 14:00 on Saturday 10th December until 11:00 on Wednesday 14th December was due to loss of power to the monitoring station.

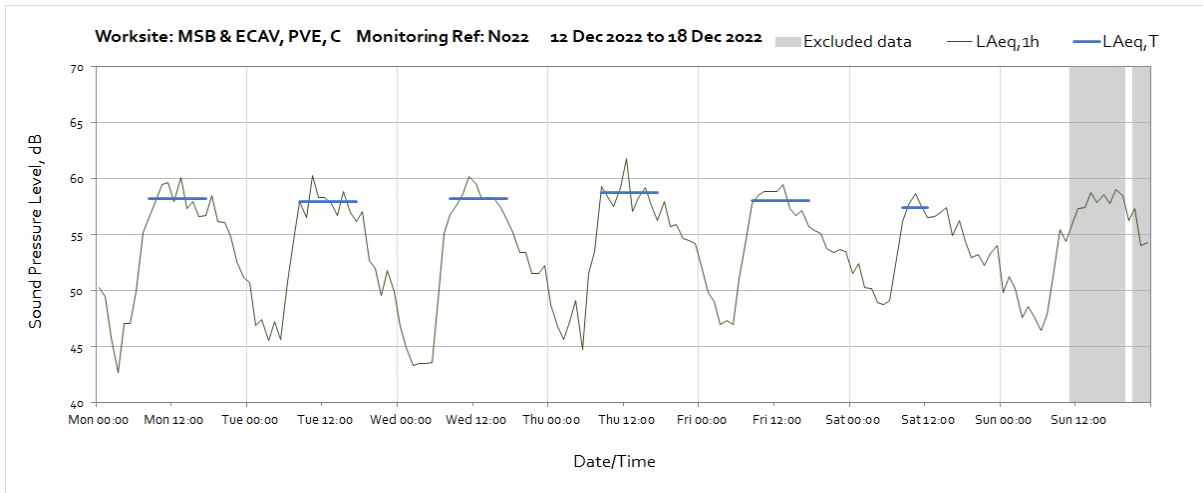
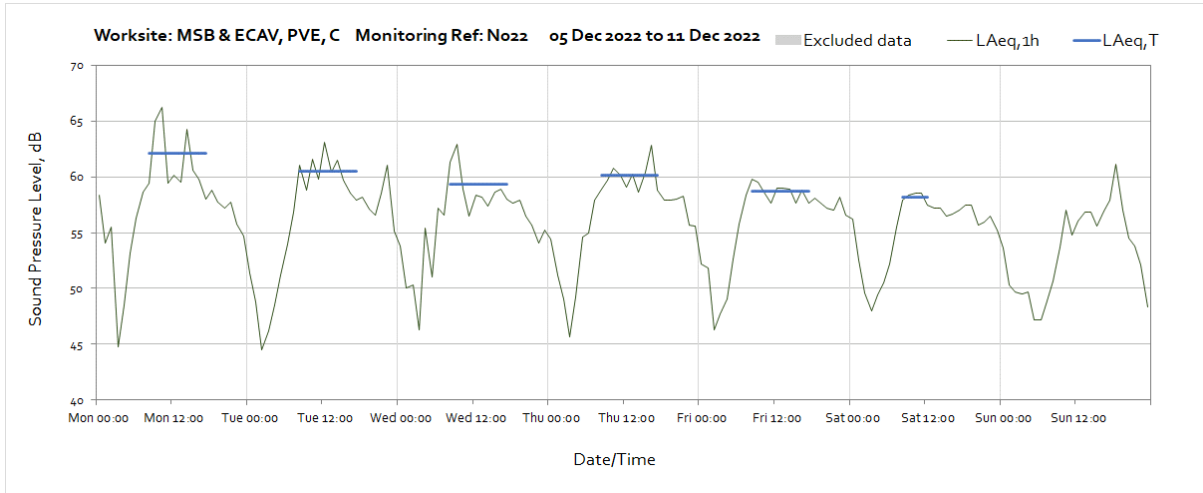
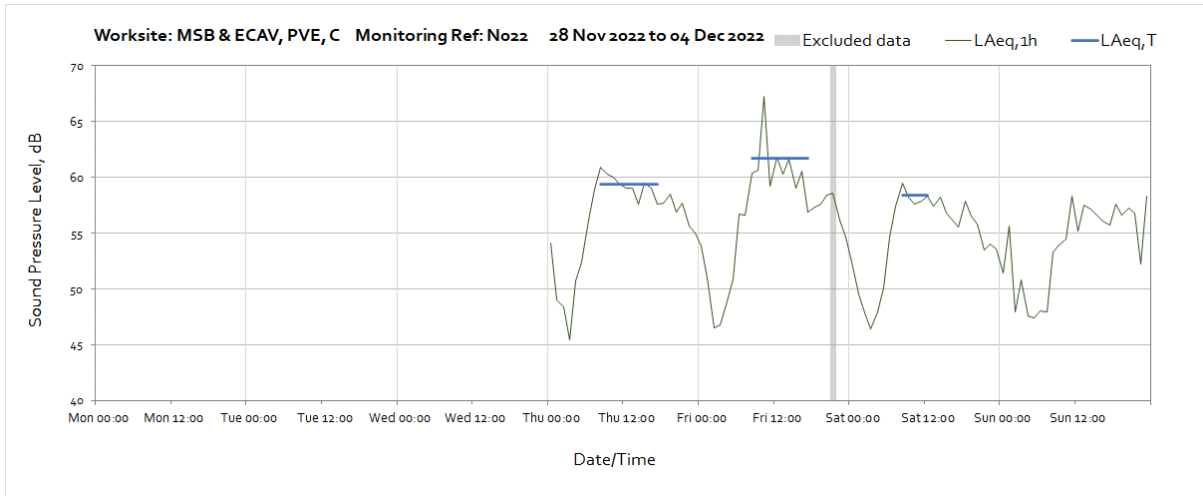
OFFICIAL



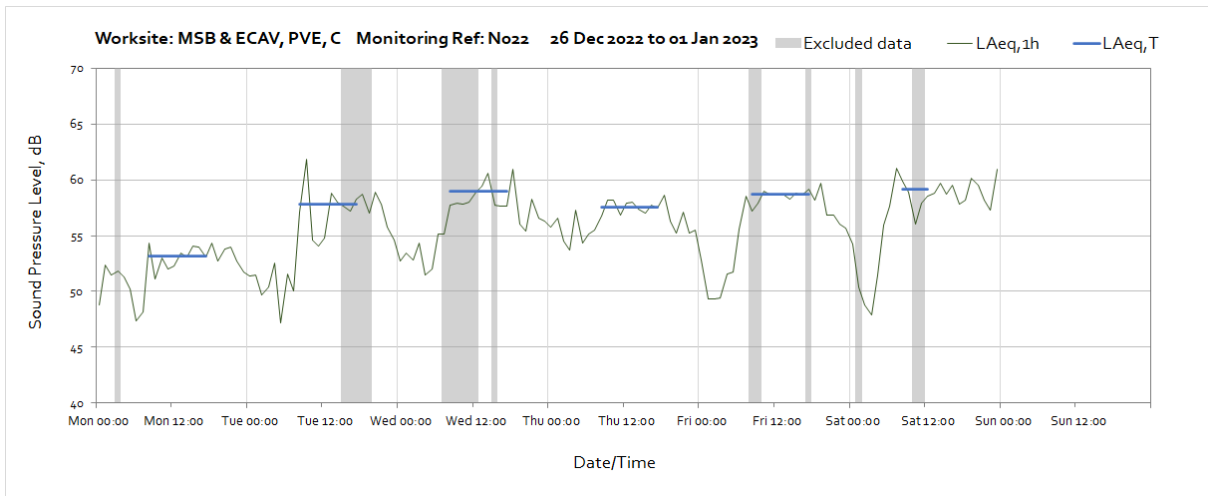
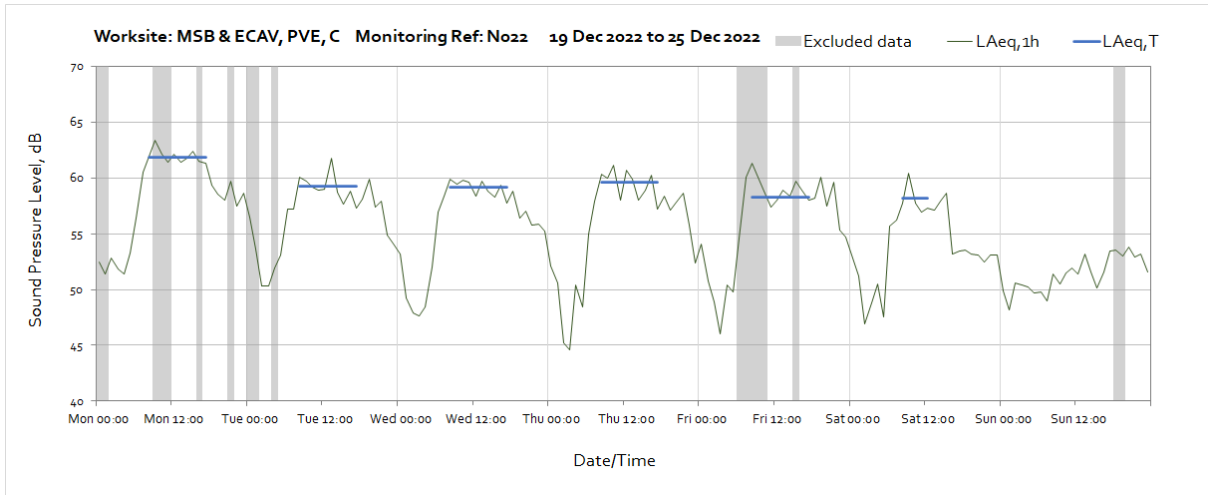
Note: Missing data from 14:00 on Saturday 10th December until 11:00 on Wednesday 14th December was due to loss of power to the monitoring station.



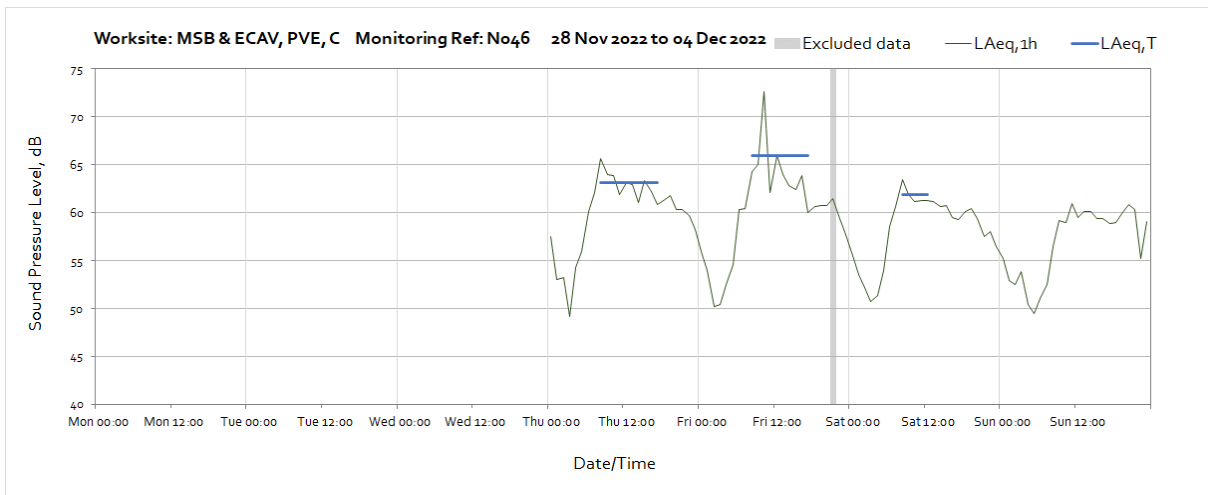
Worksite: MSB & ECAV, PVE, C - Monitoring Ref: N022

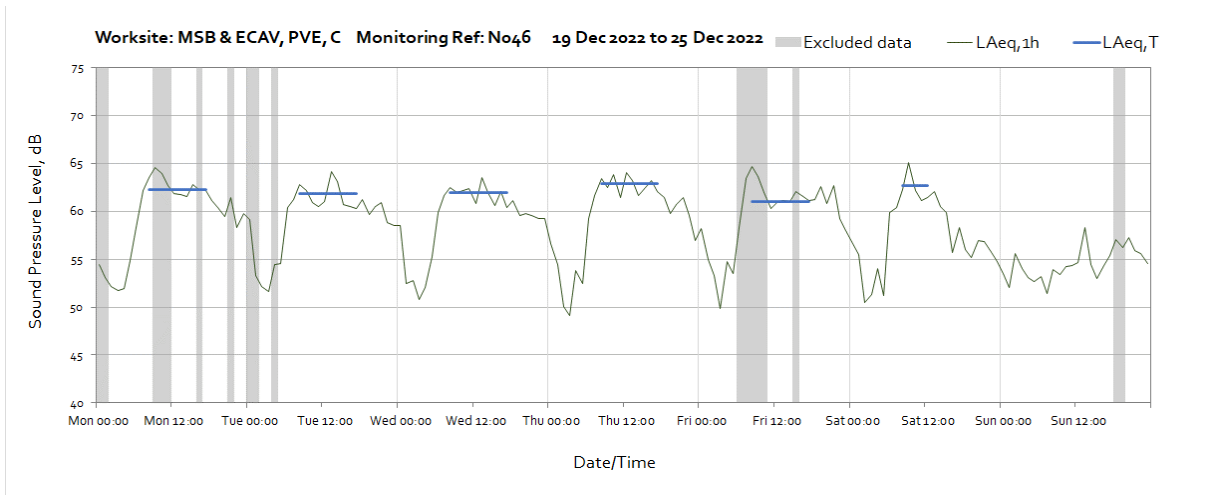
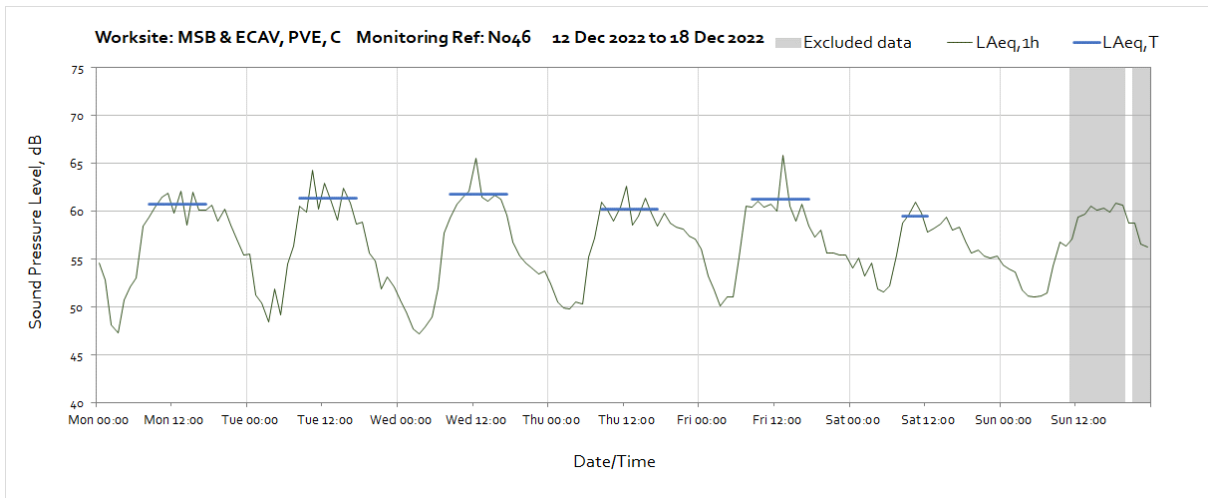
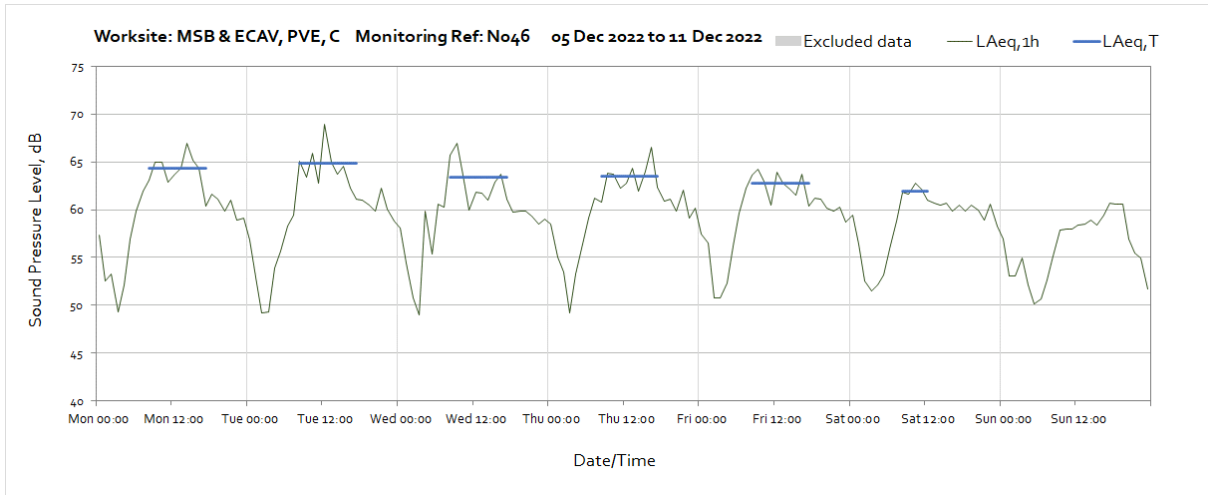


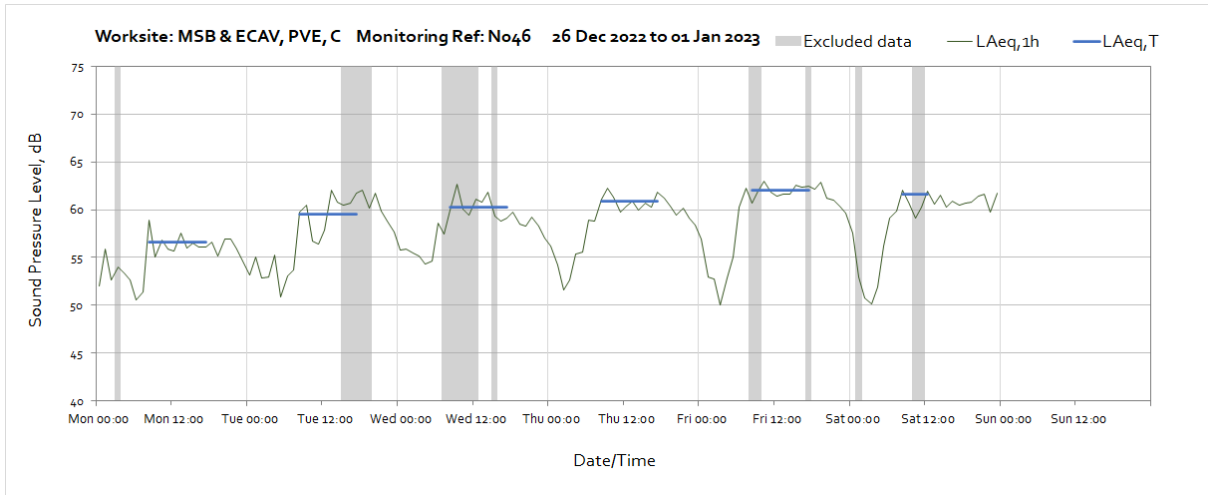
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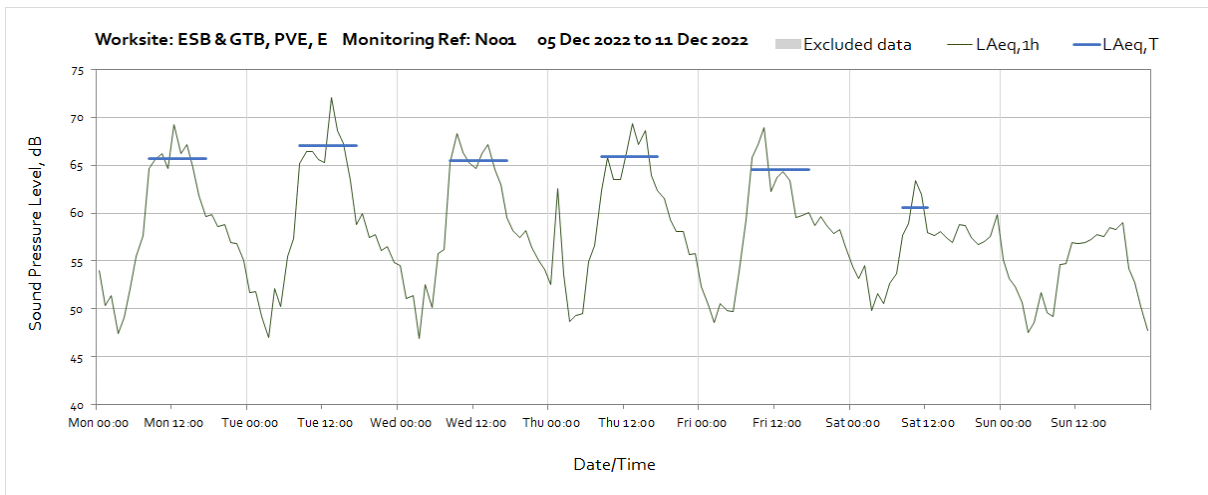
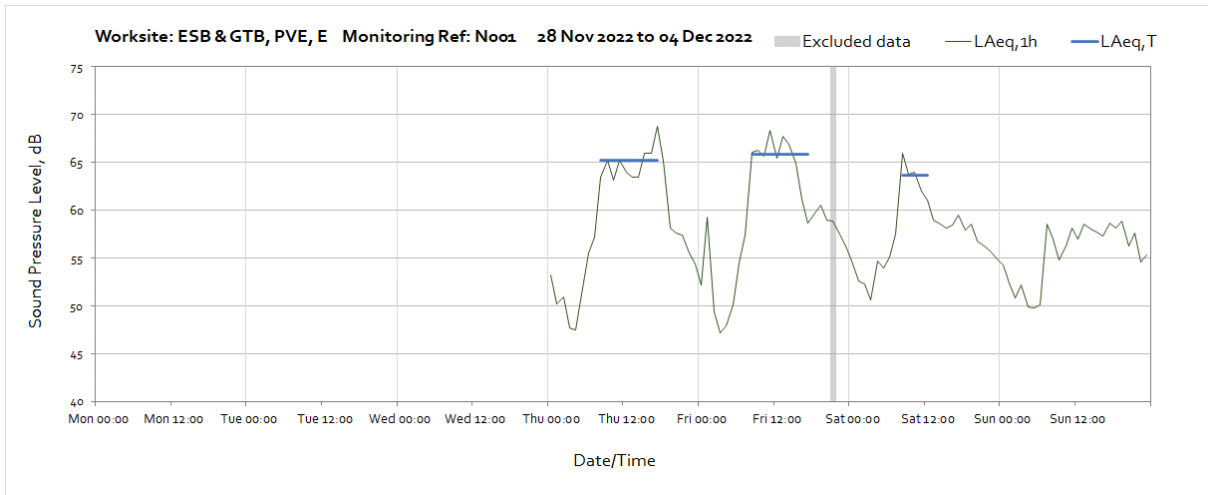
Worksite: MSB & ECAV, PVE, C – Monitoring Ref: N046

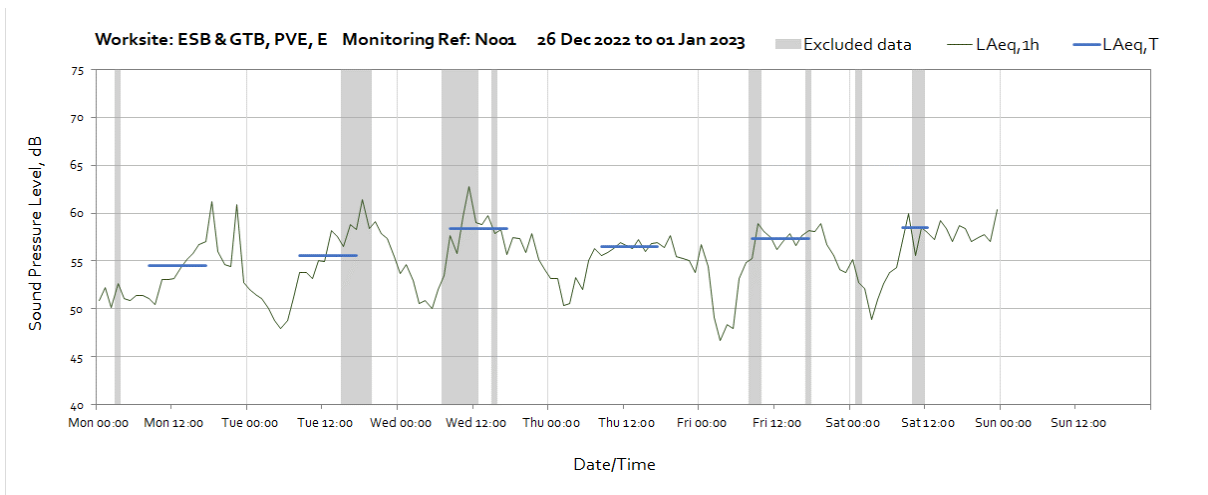
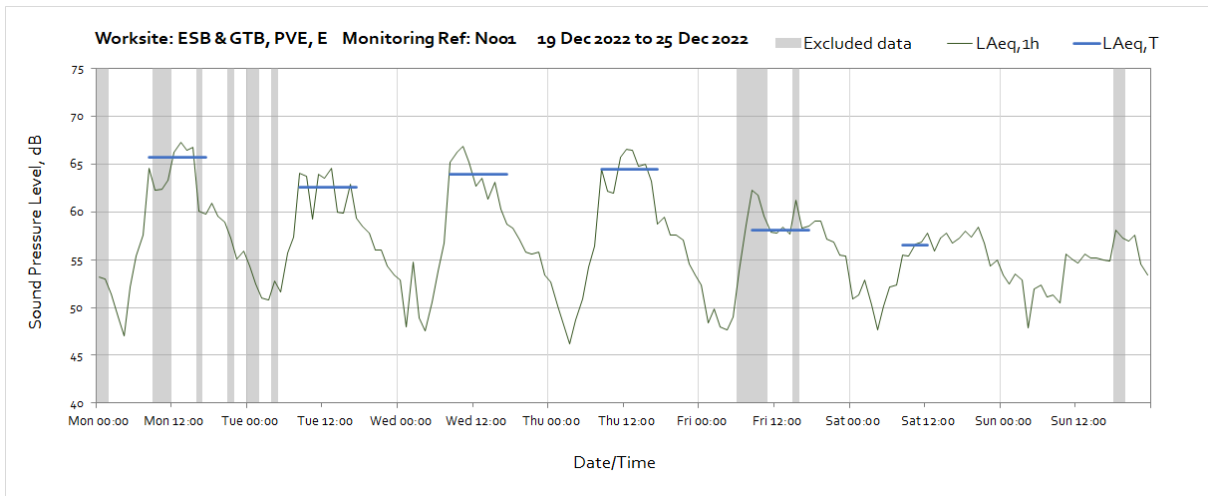
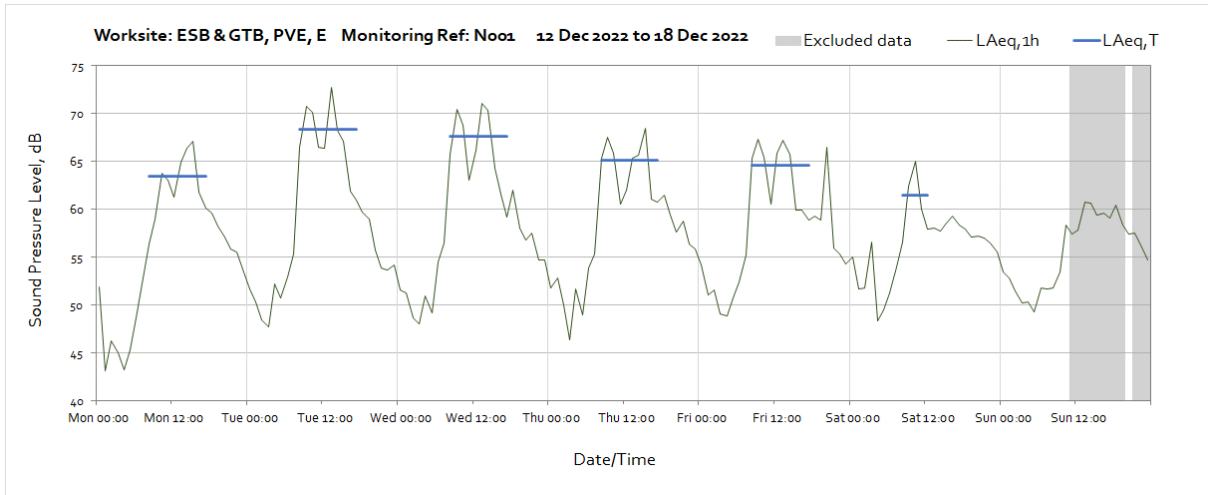




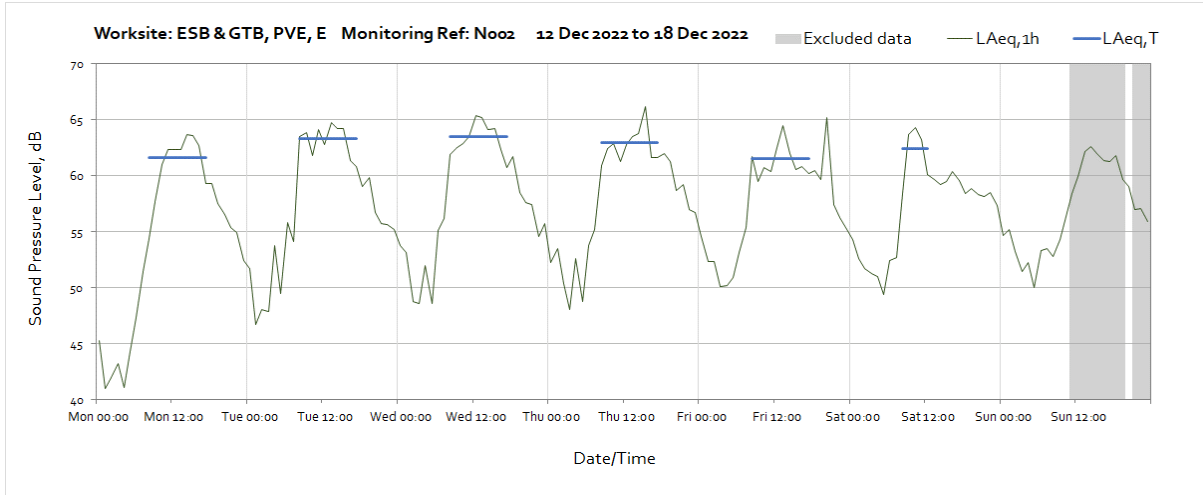
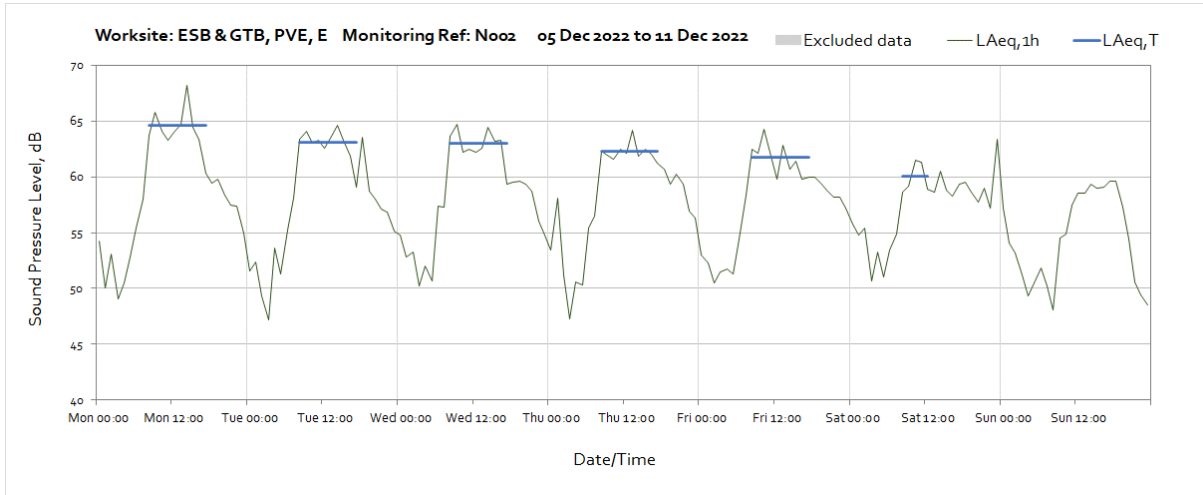
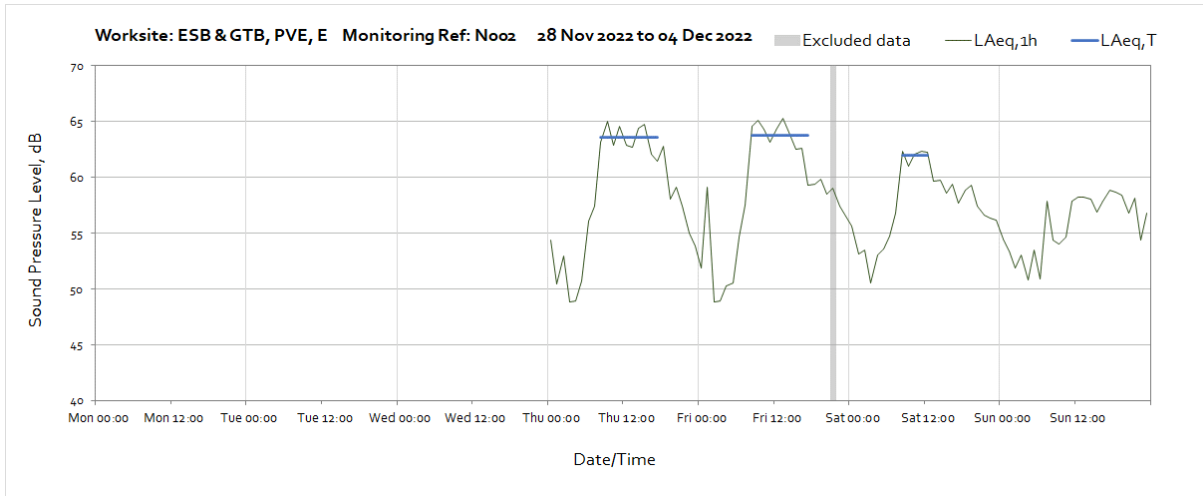


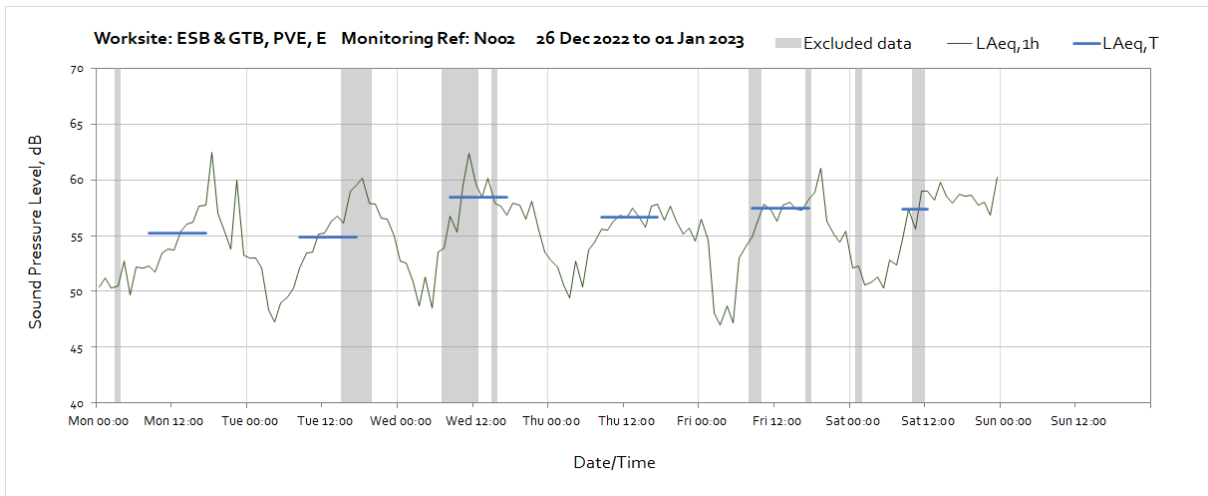
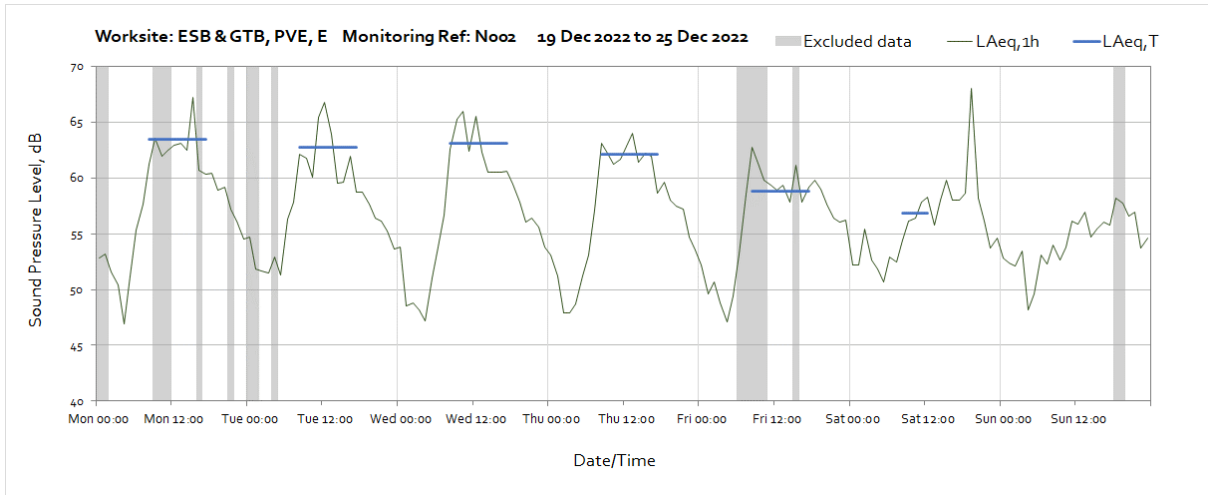
Worksite: ESB & GTB, PVE, E – Monitoring Ref: N001



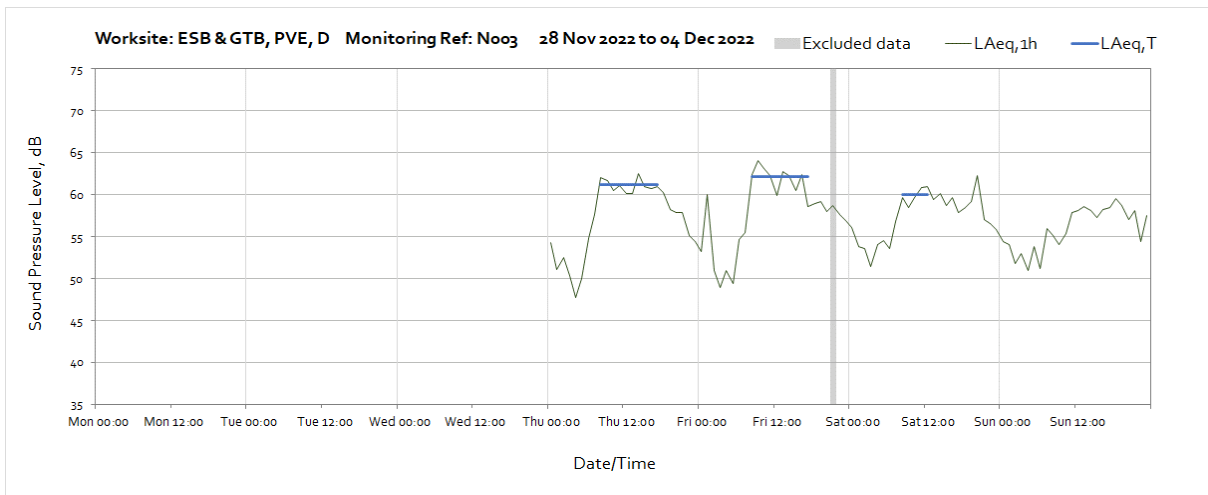


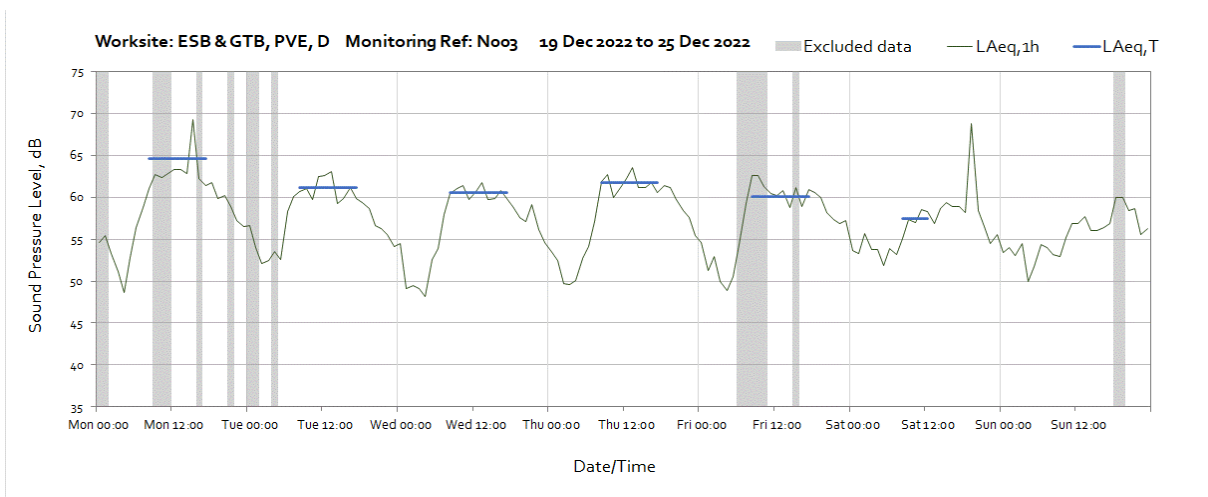
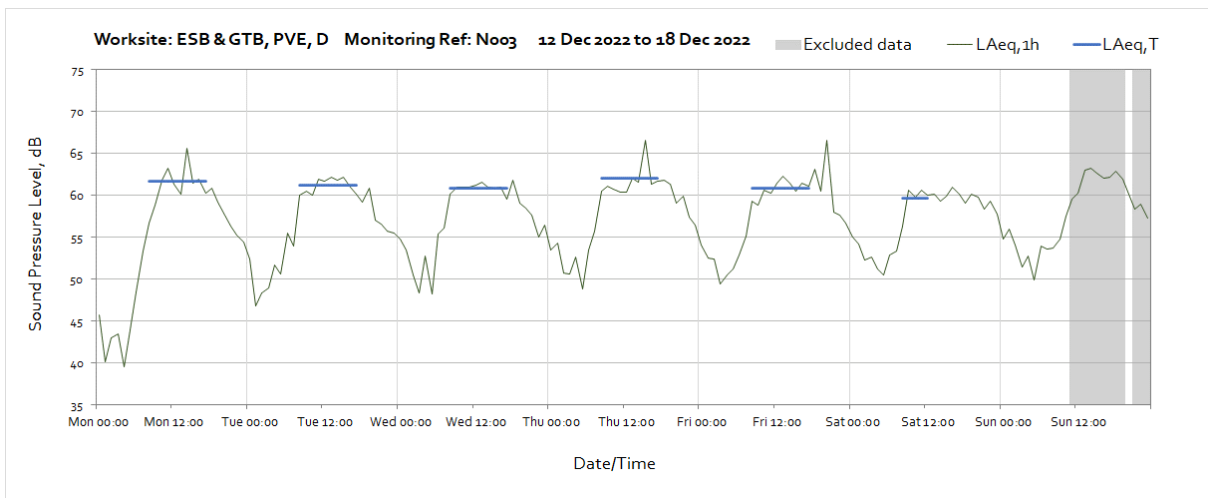
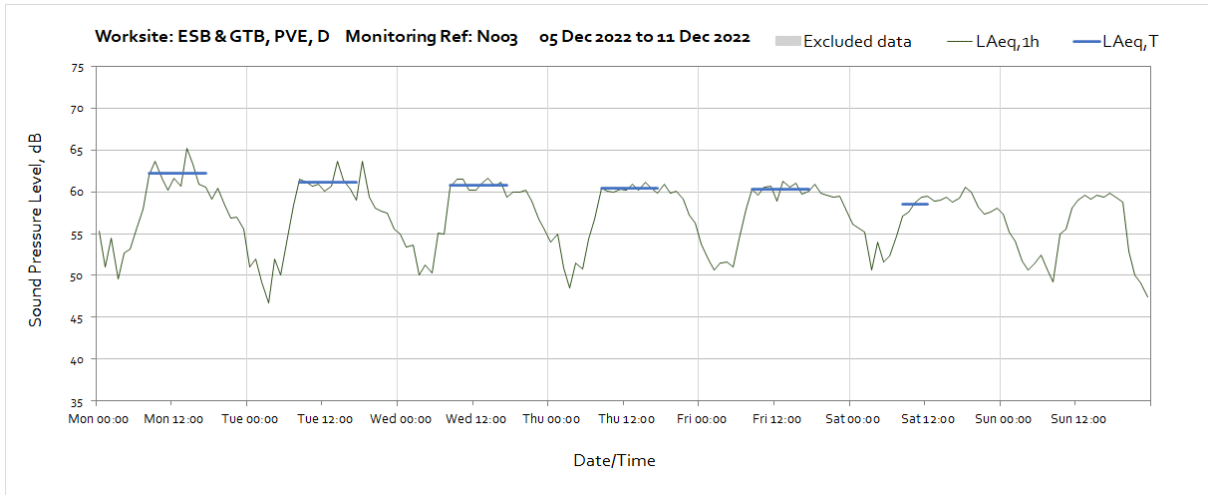
Worksite: ESB & GTB, PVE, E – Monitoring Ref: N002

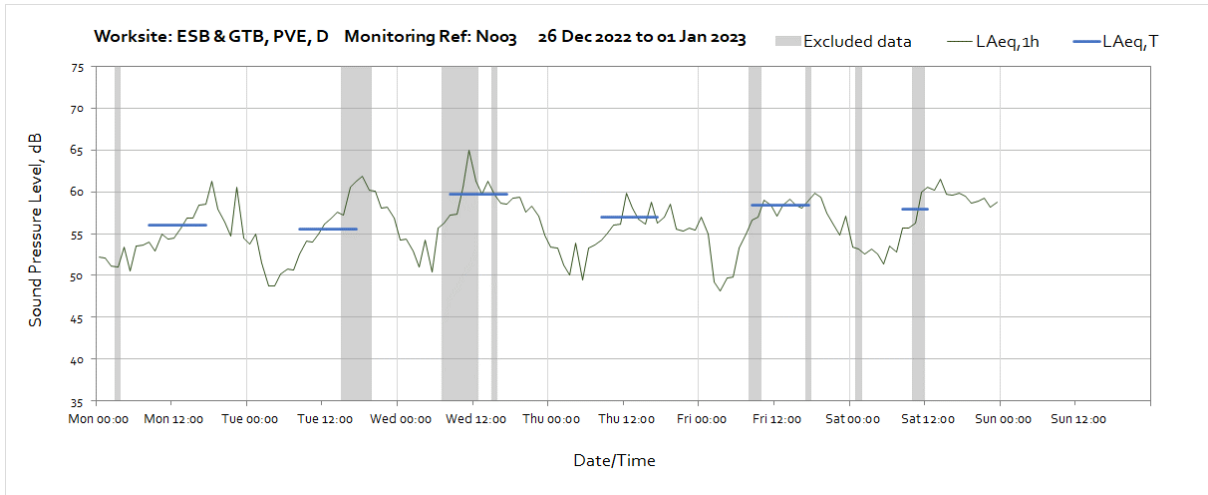




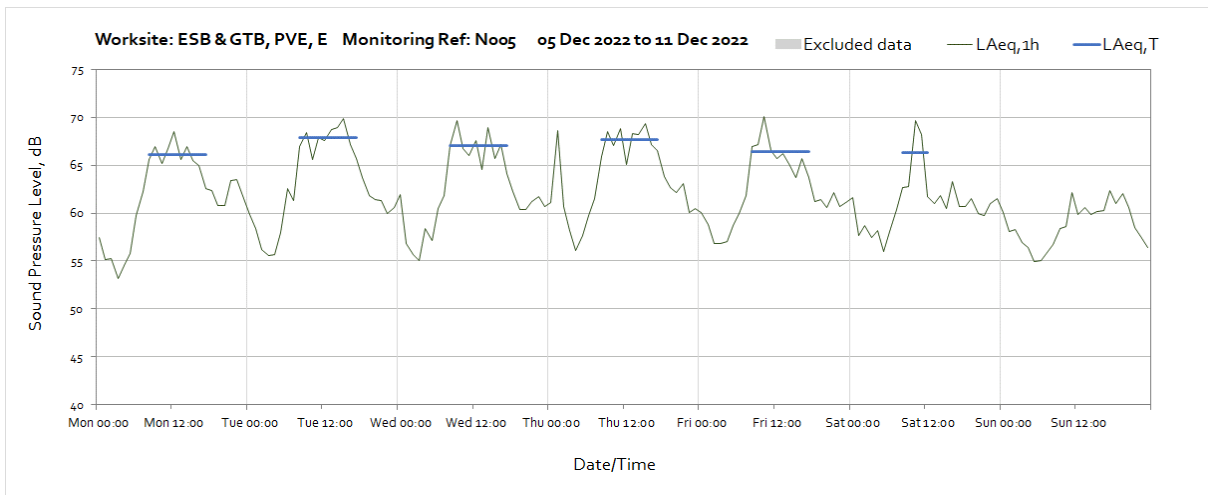
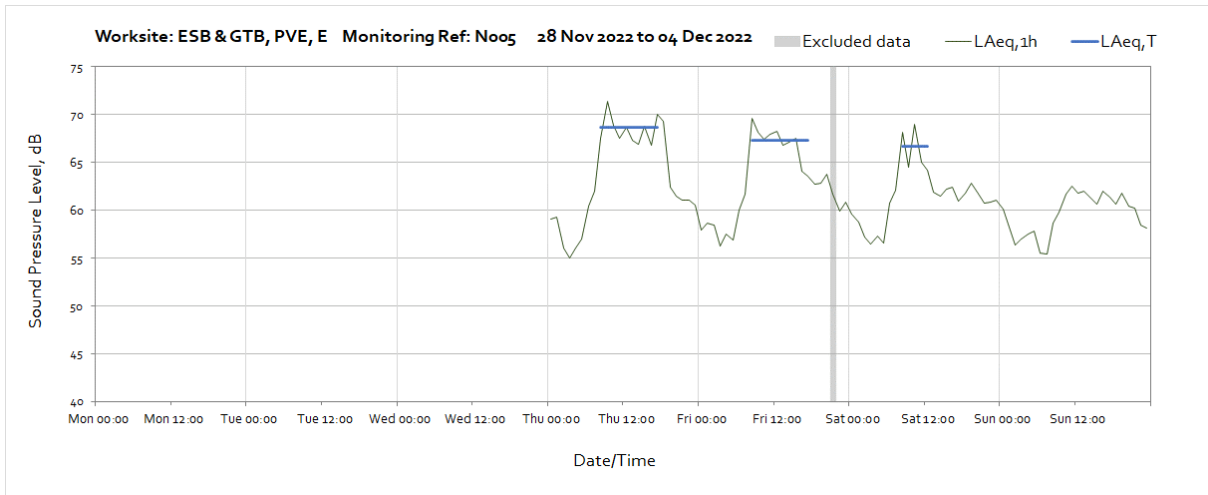
Worksite: ESB & GTB, PVE, D – Monitoring Ref: N003

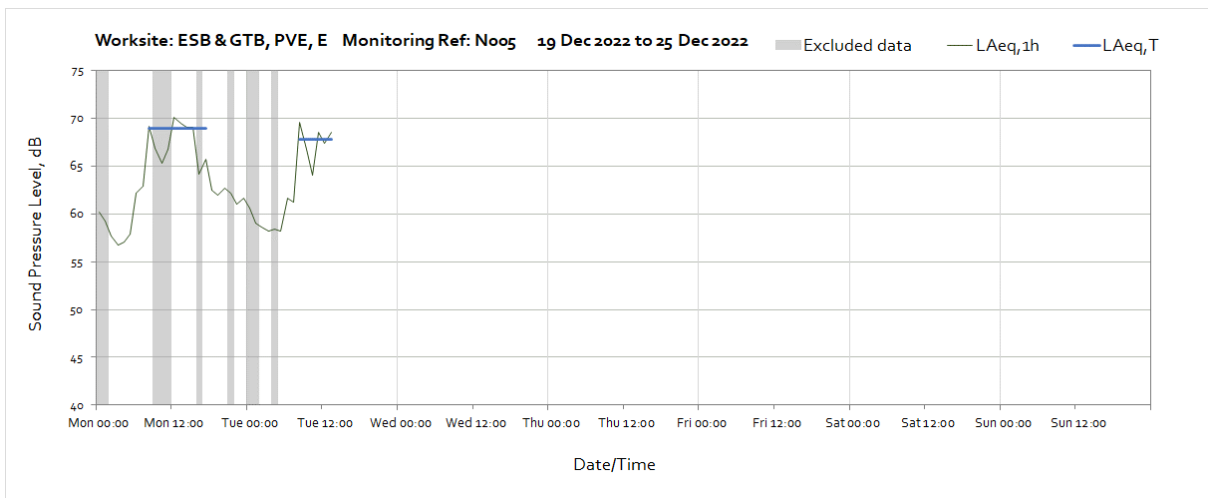
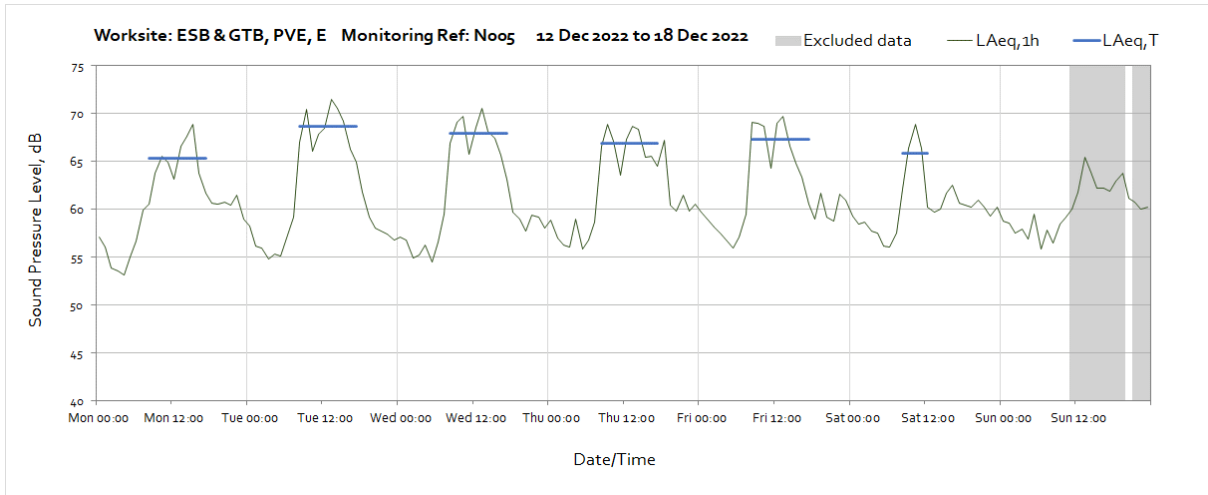






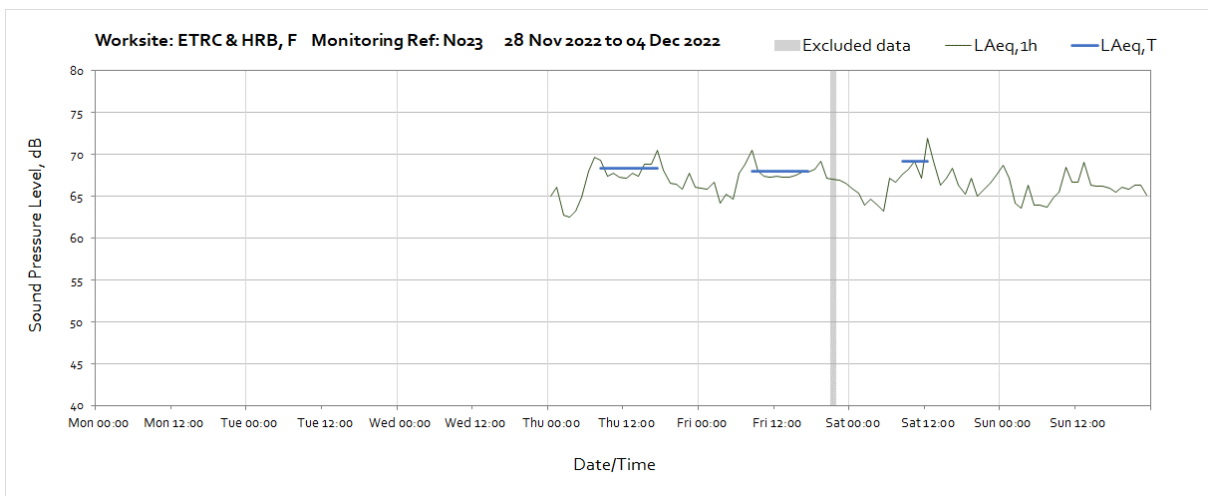
Worksite: ESB & GTB, PVE, E – Monitoring Ref: N005



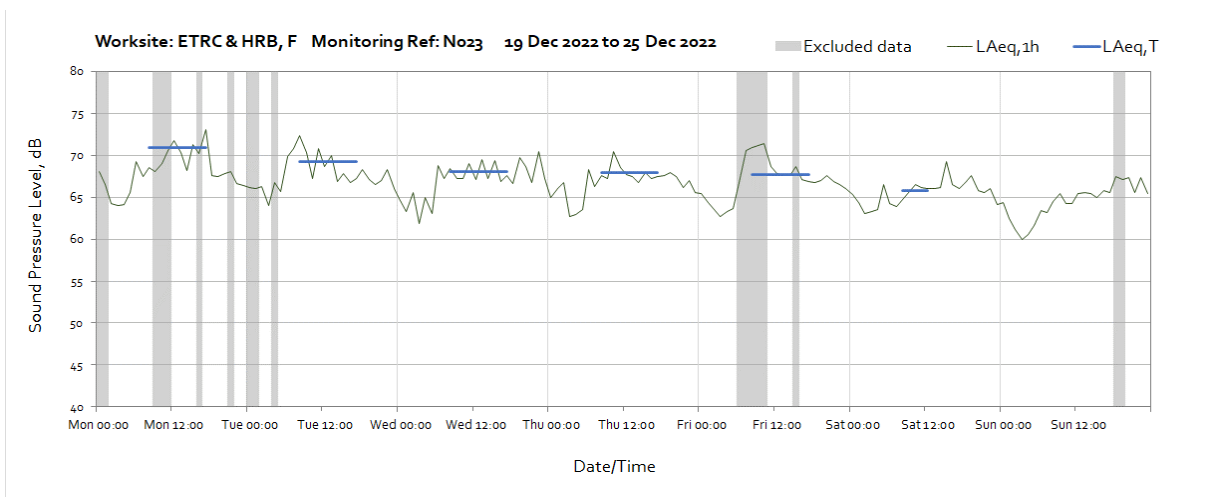
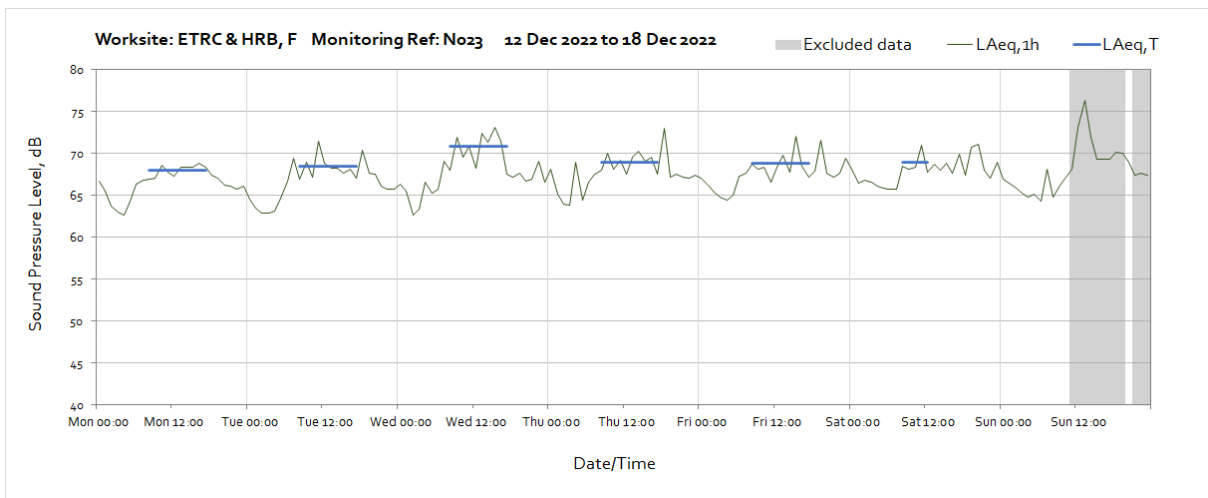
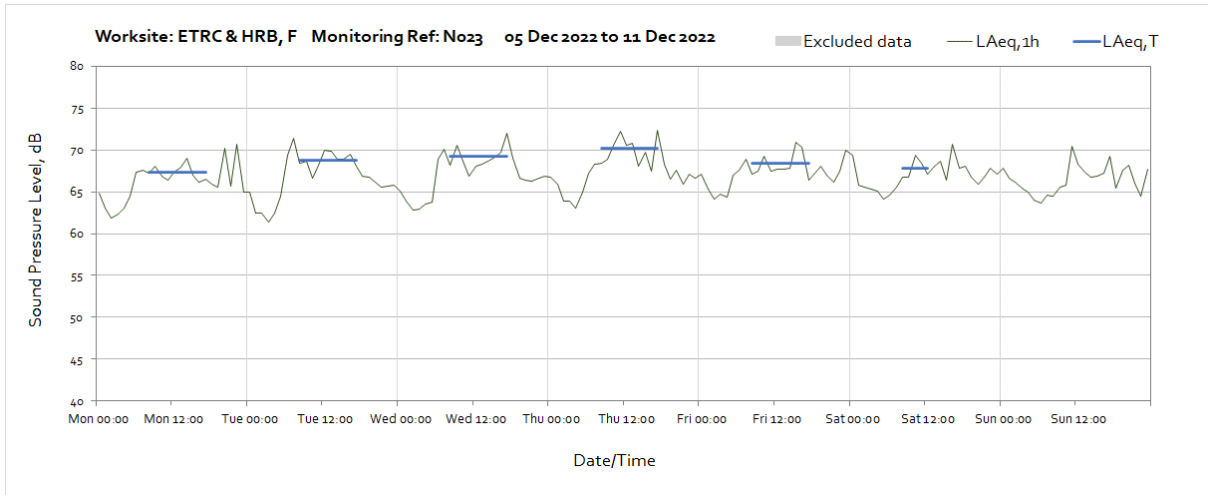


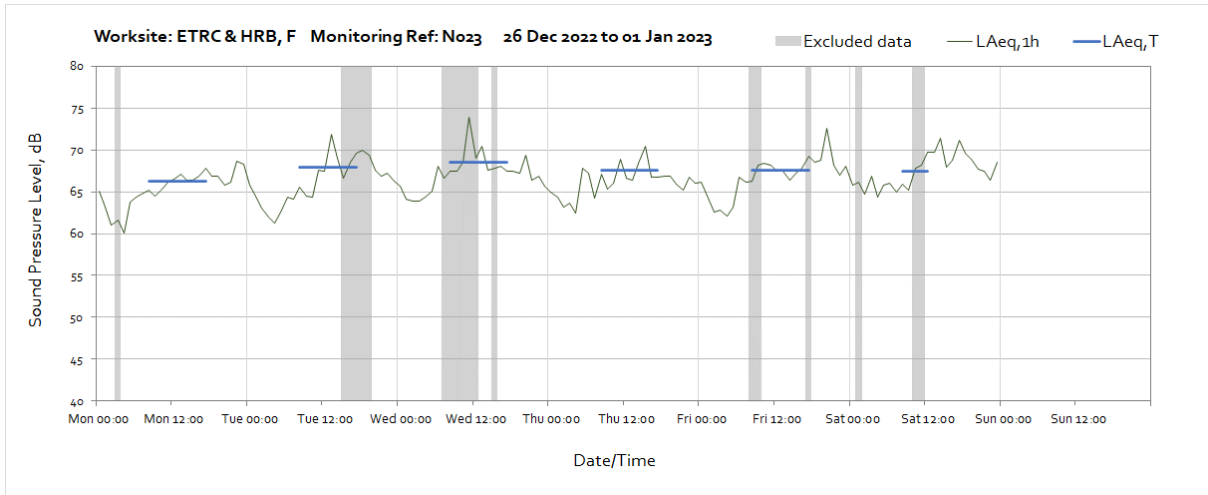
Note: Missing data from 14:00 on Tuesday 20th December until the end of the month was due to an equipment malfunction. The monitor could not be safely accessed until Wednesday 11th January 2023. The equipment malfunction and issues with access have since been resolved.

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

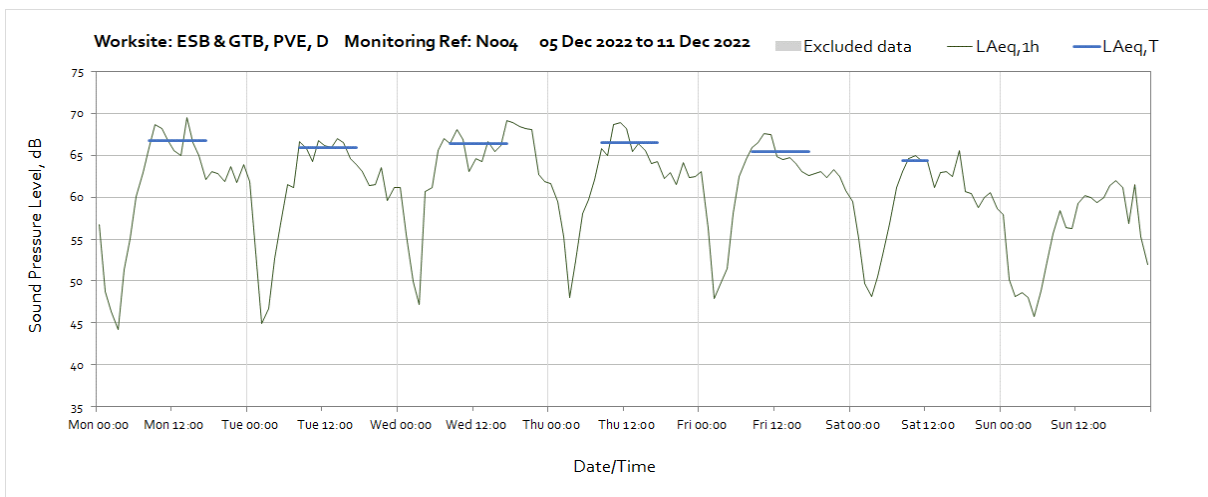
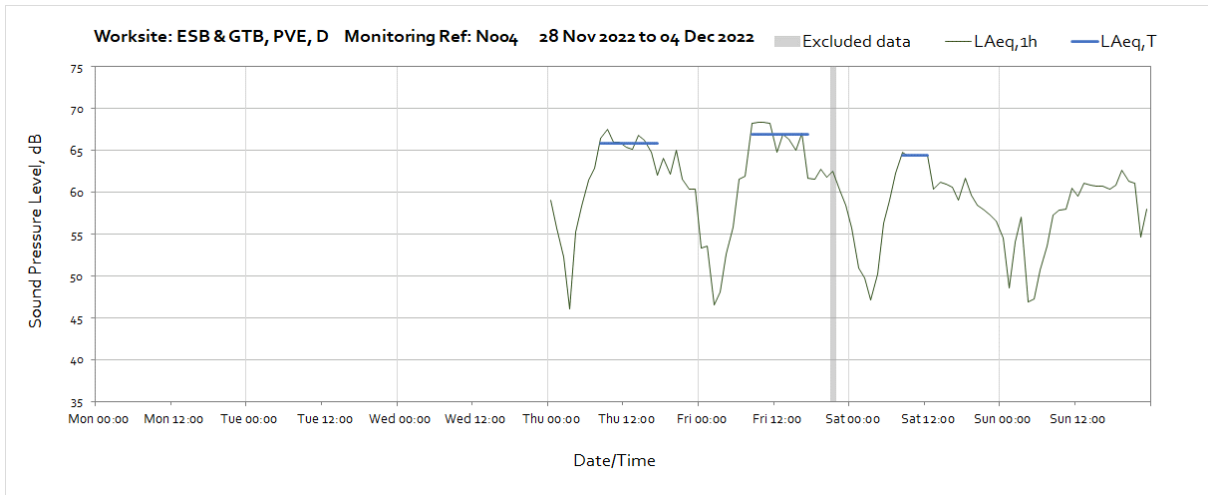


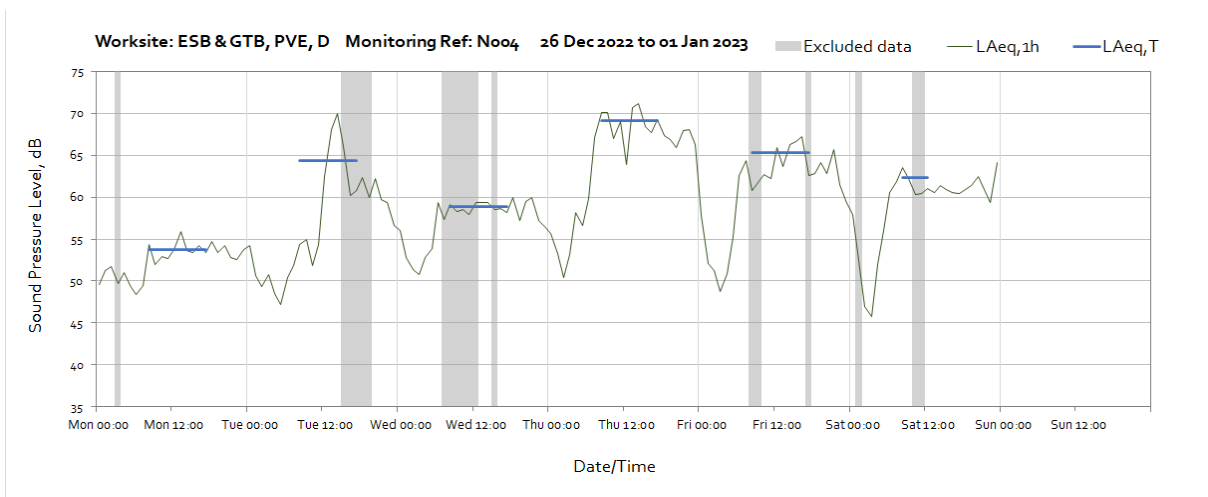
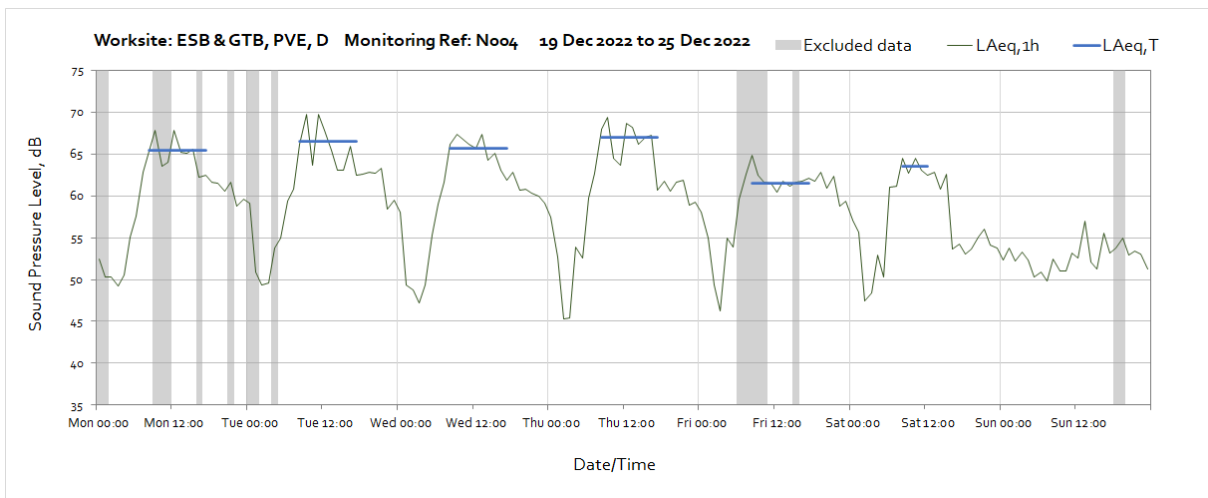
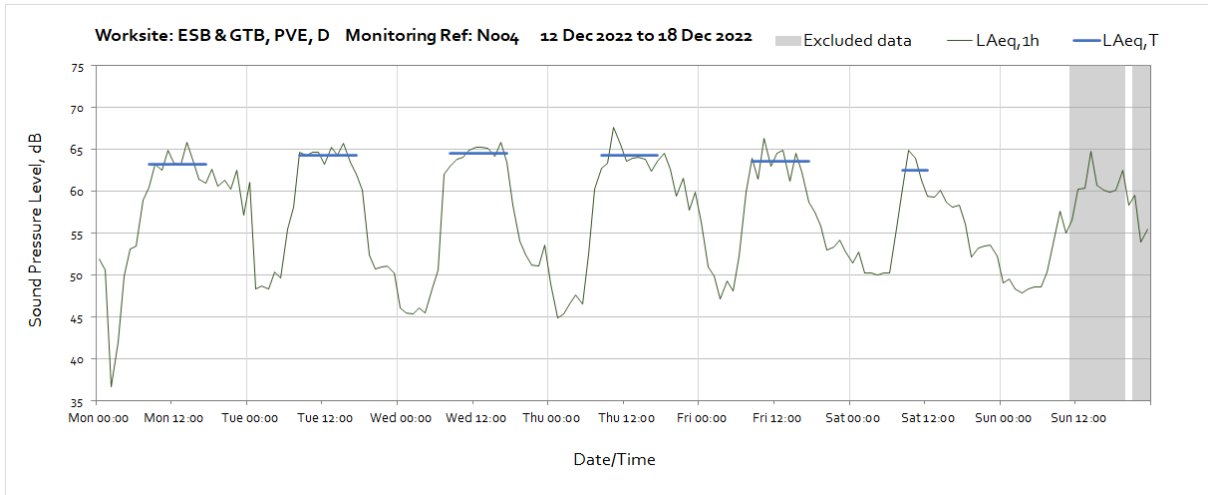
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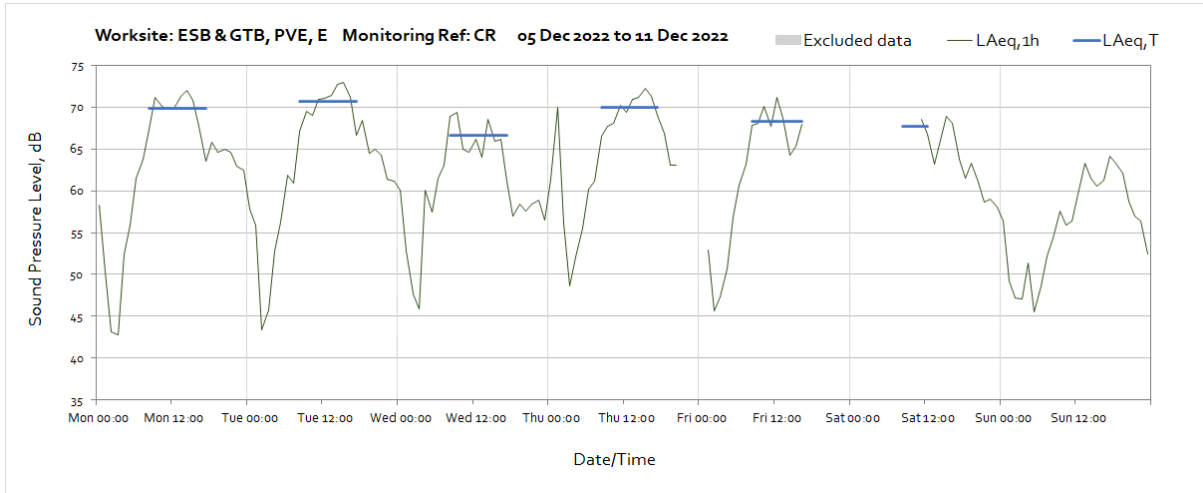
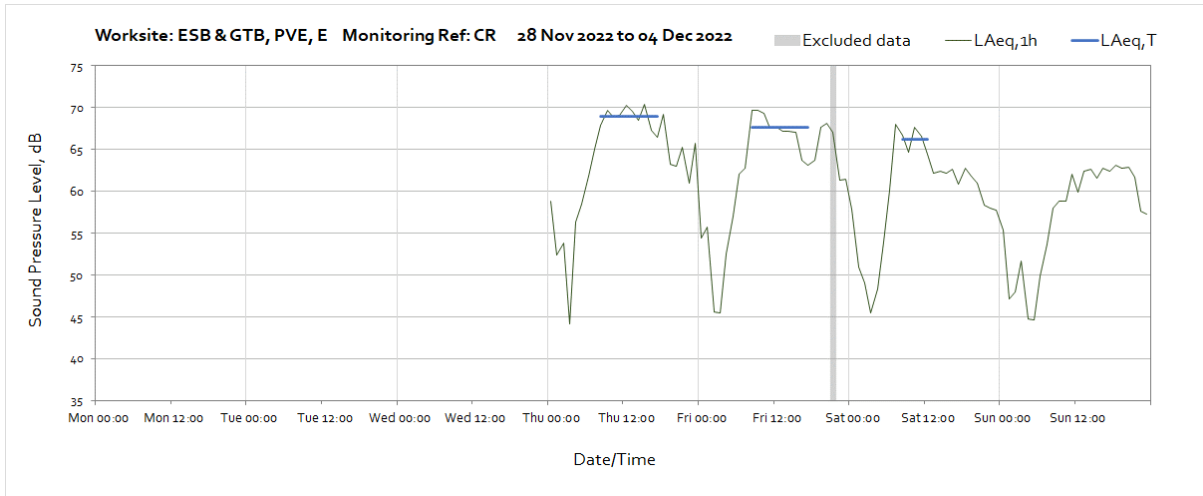


Worksite: ESB & GTB, PVE, D – Monitoring Ref: N004

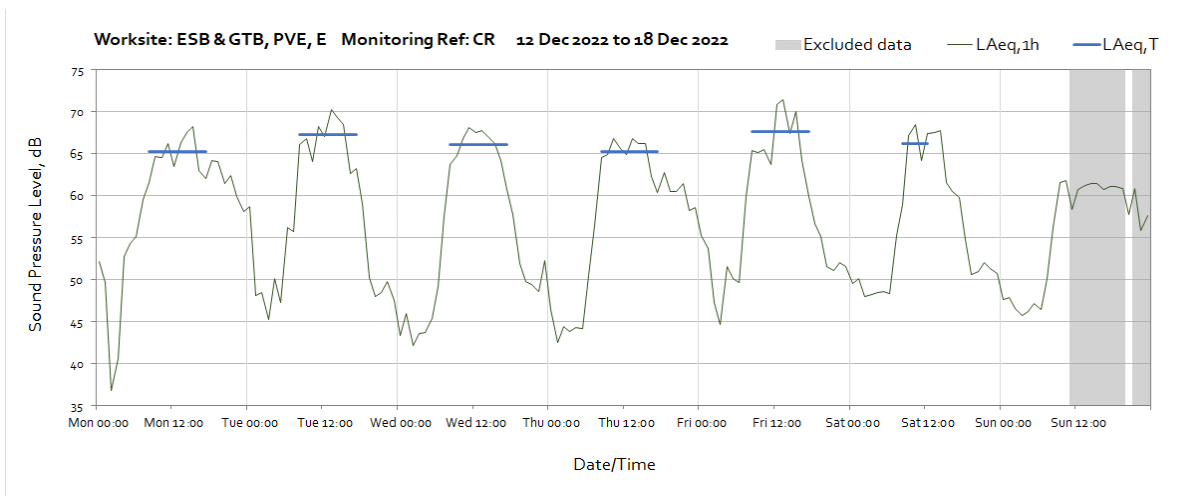


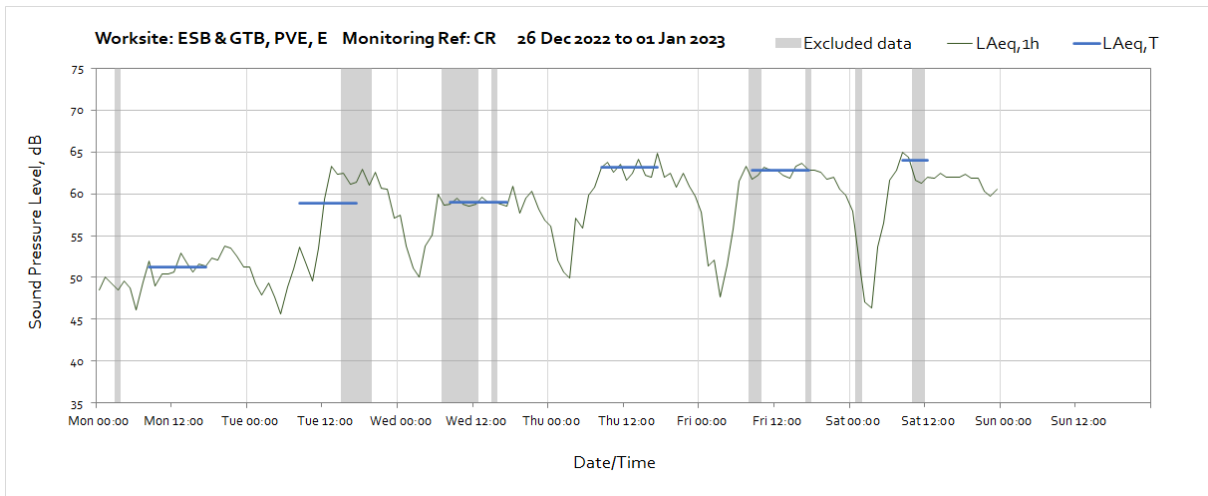
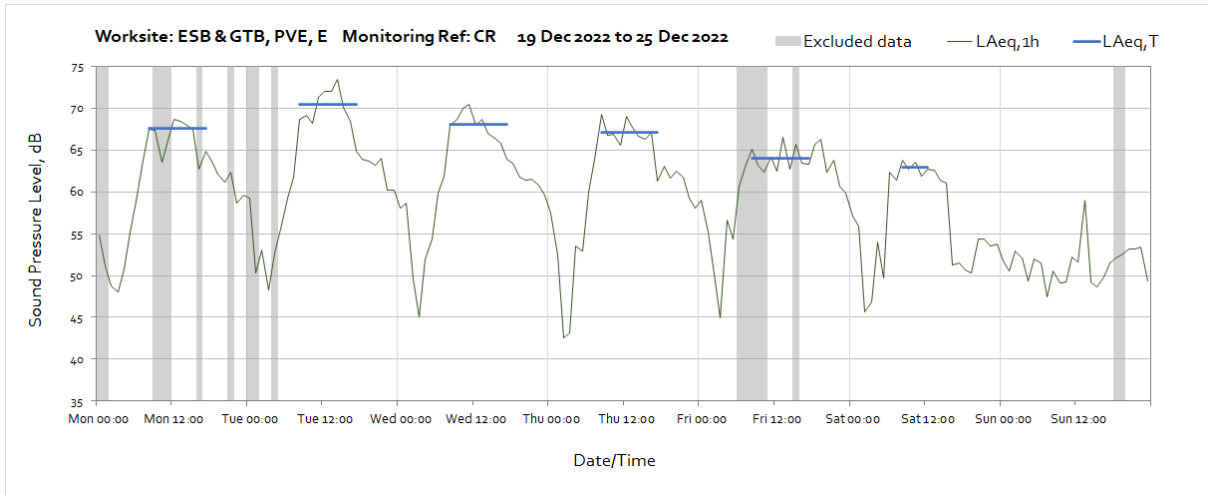


Worksite: ESB & GTB, PVE, E – Monitoring Ref: CR

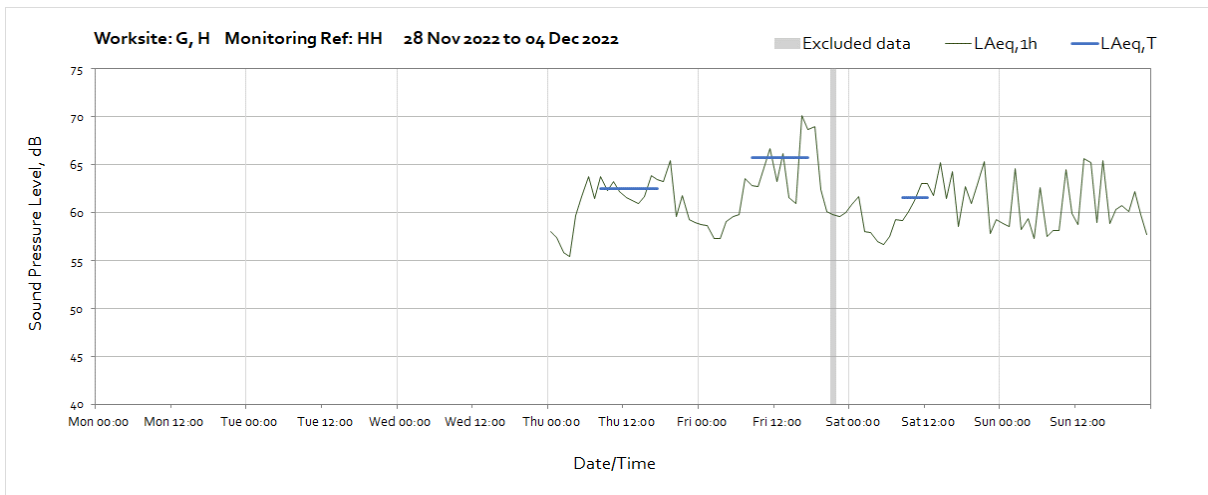


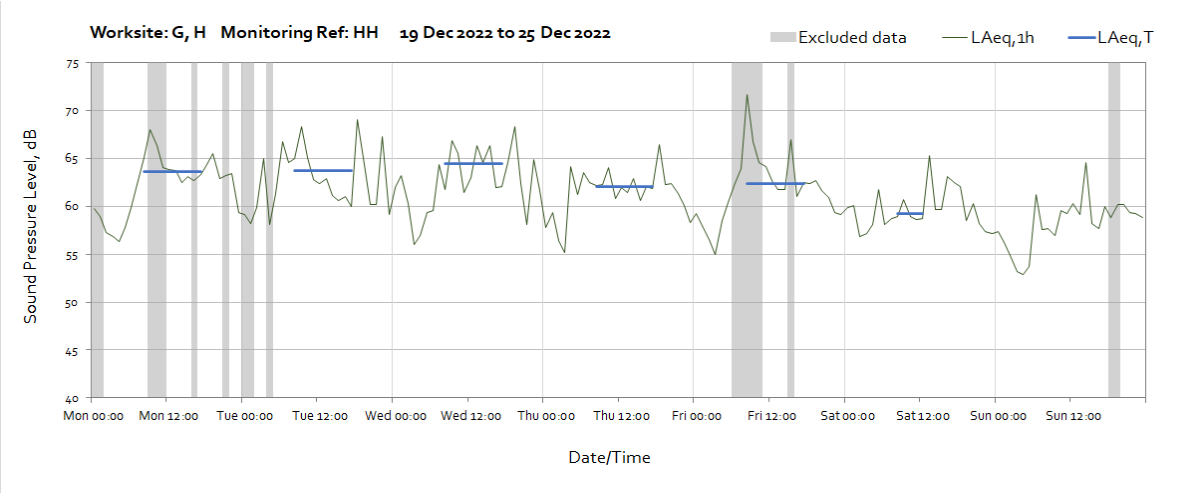
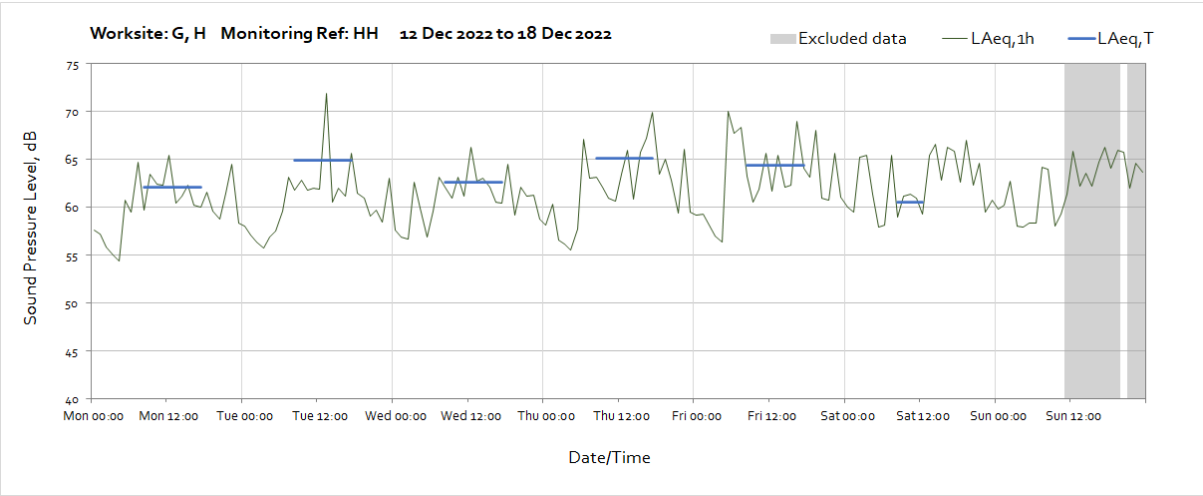
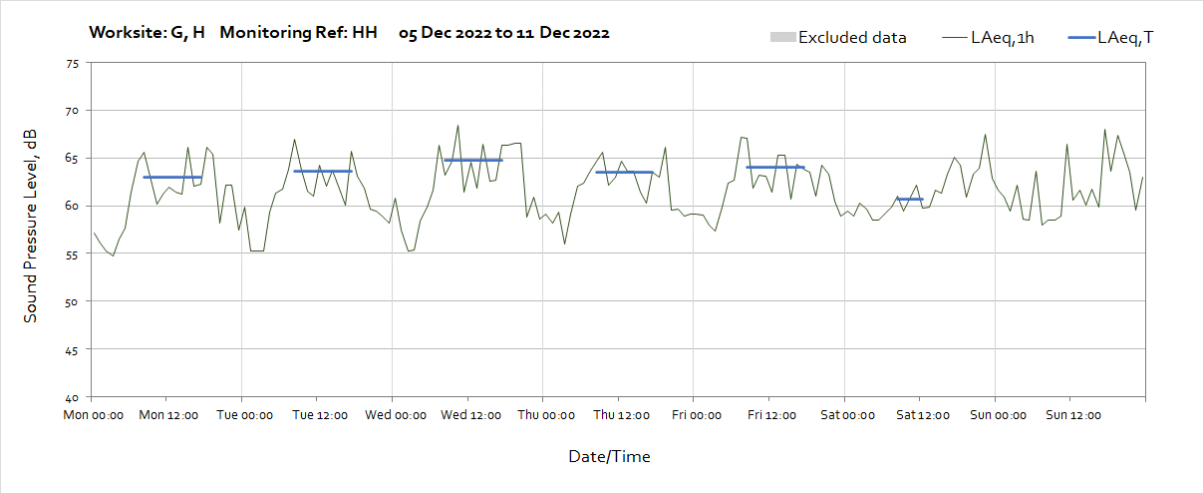
Note: Missing data from 21:00 on Thursday 8th January until 01:00 on Friday 9th January and from 17:00 on Friday 9th January until 11:00 on Saturday 10th January was due to loss of power to the monitoring station.

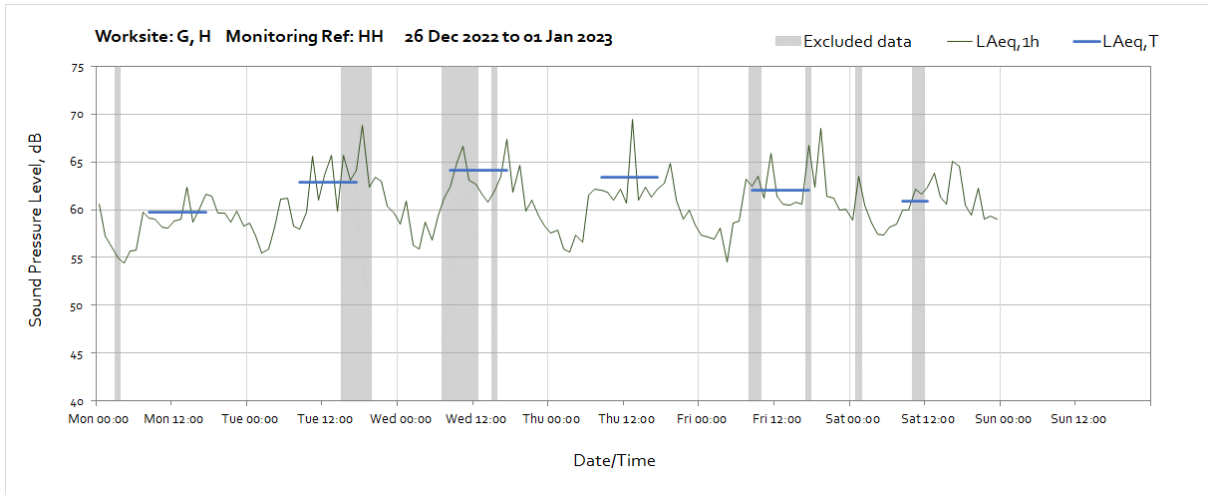




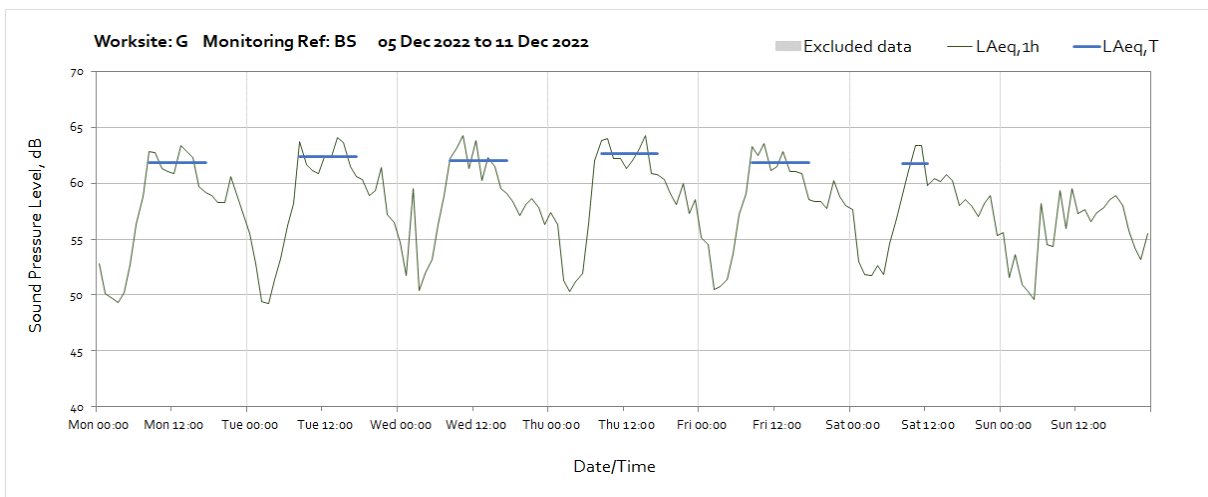
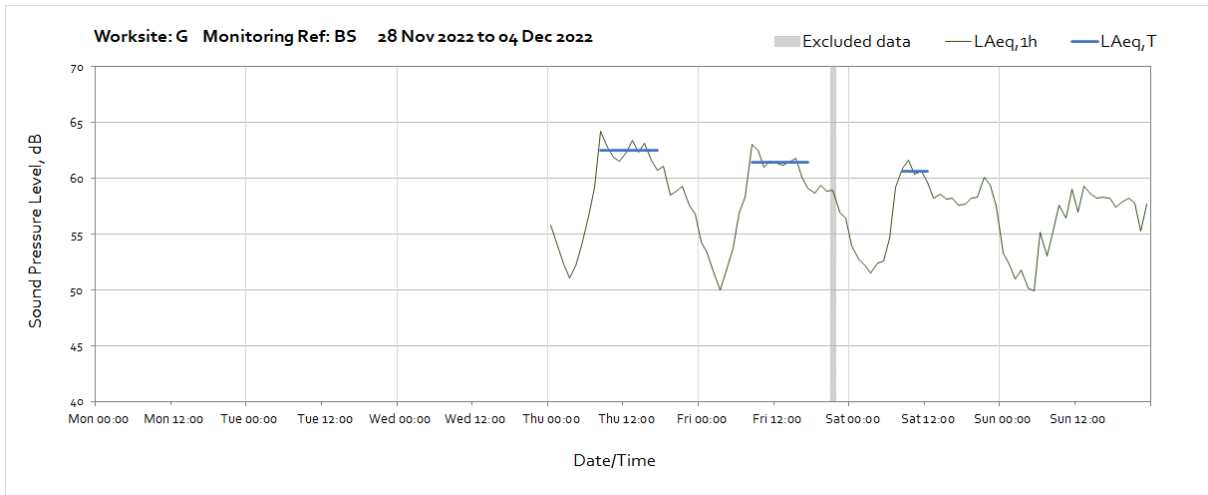
Worksite: G, H – Monitoring Ref: HH

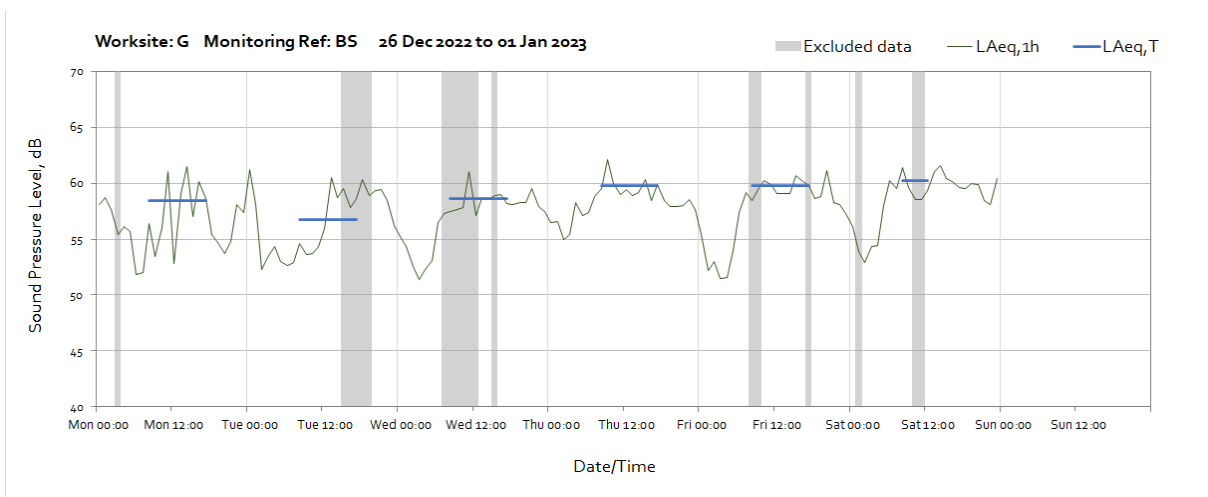
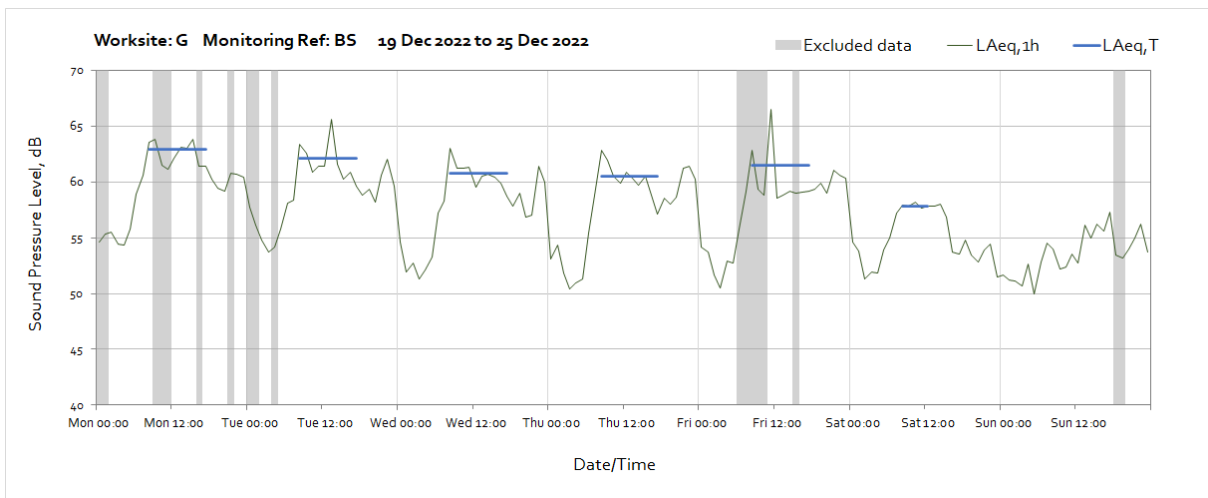
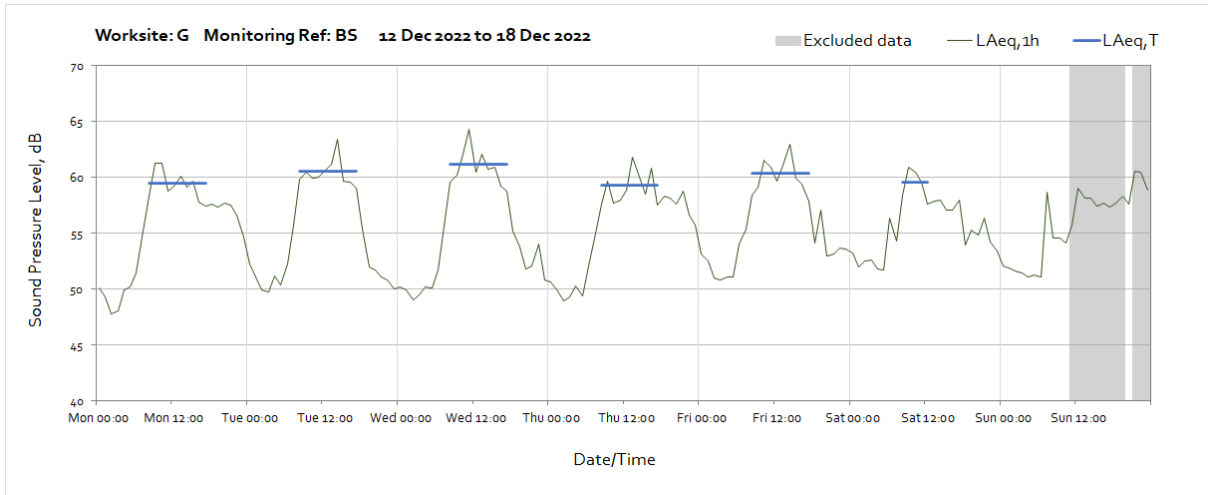




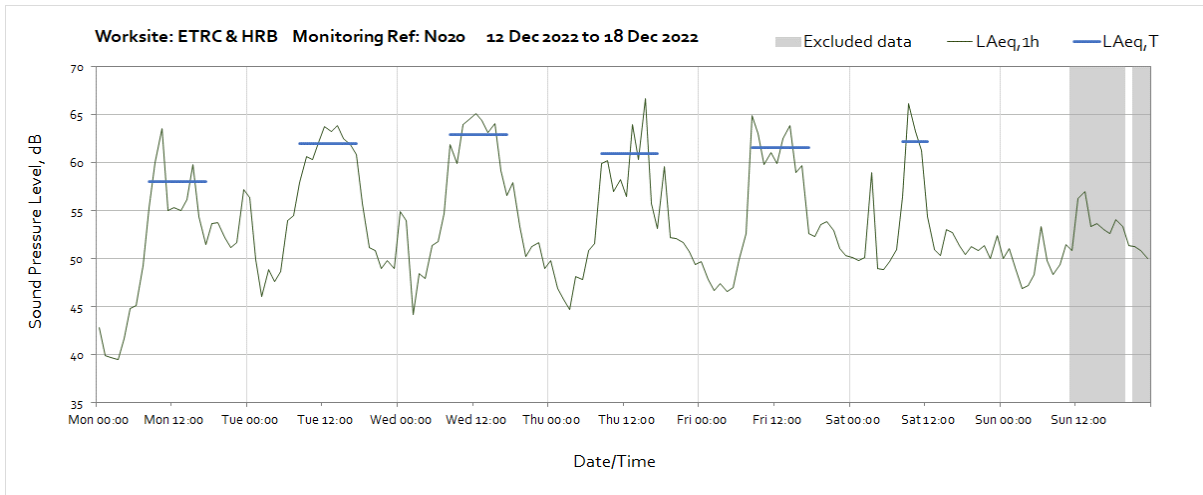
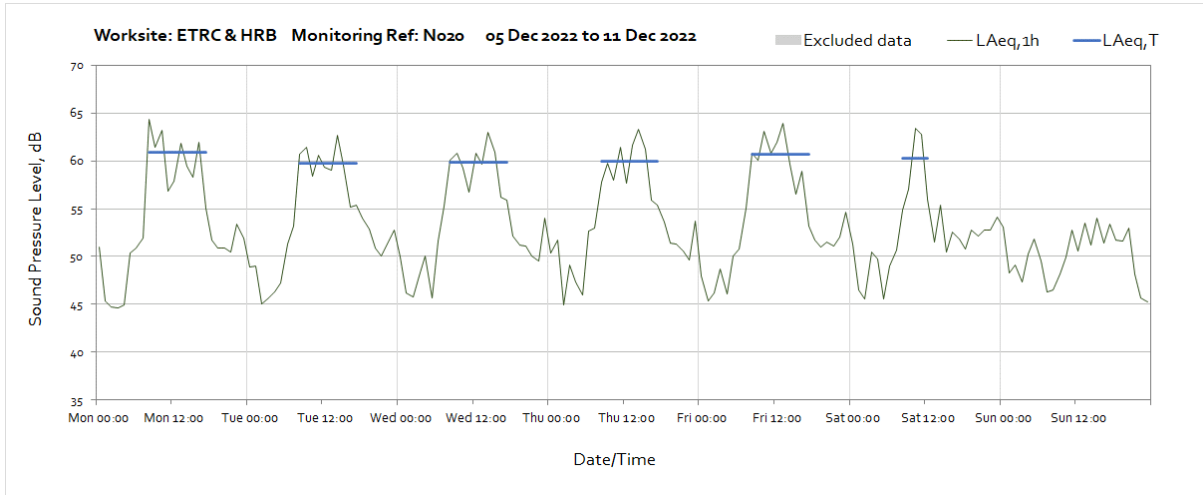
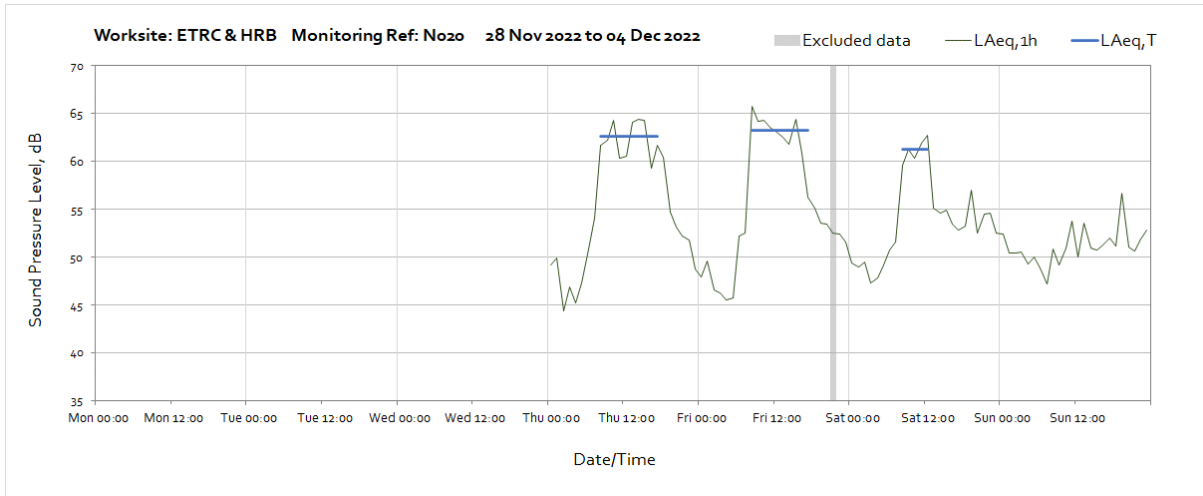


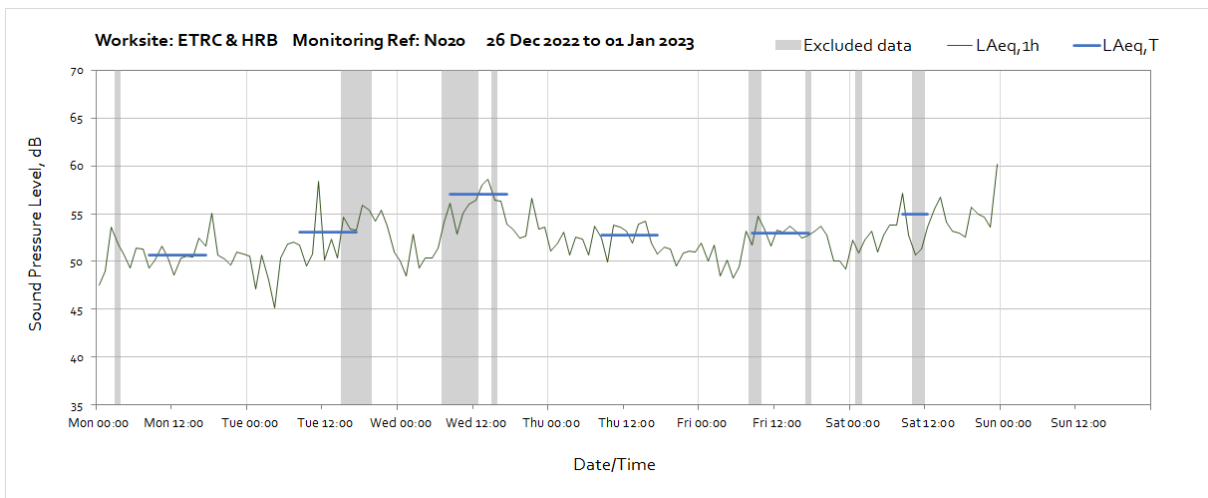
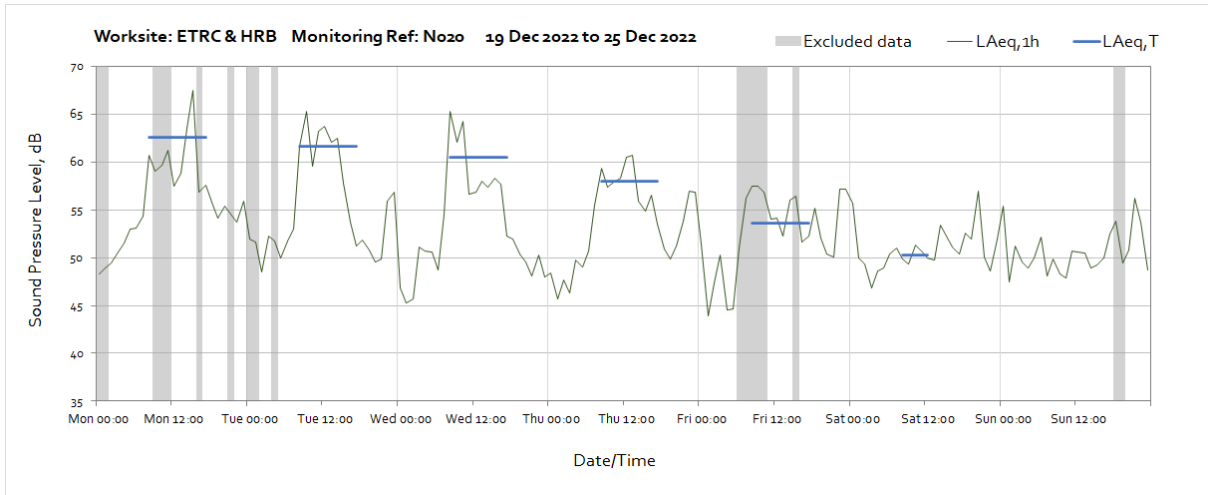
Worksite: G - Monitoring Ref: BS





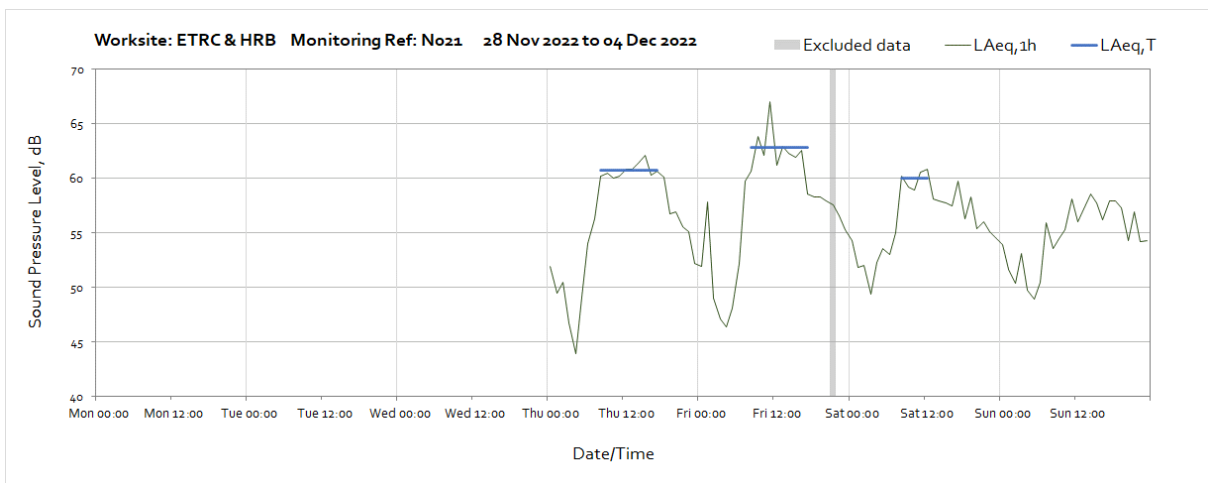
Worksite: ETRC & HRB – Monitoring Ref: N020

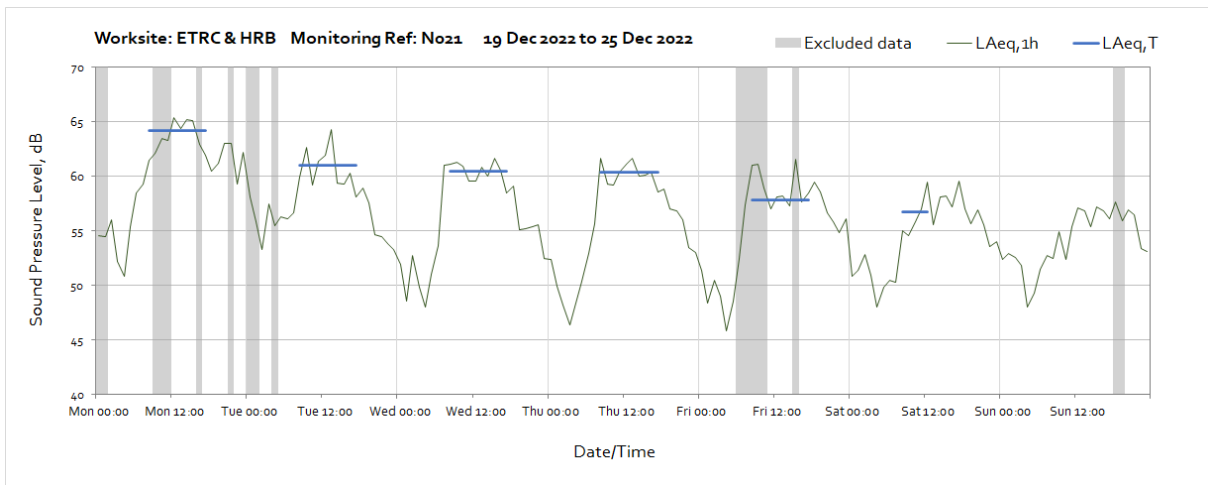
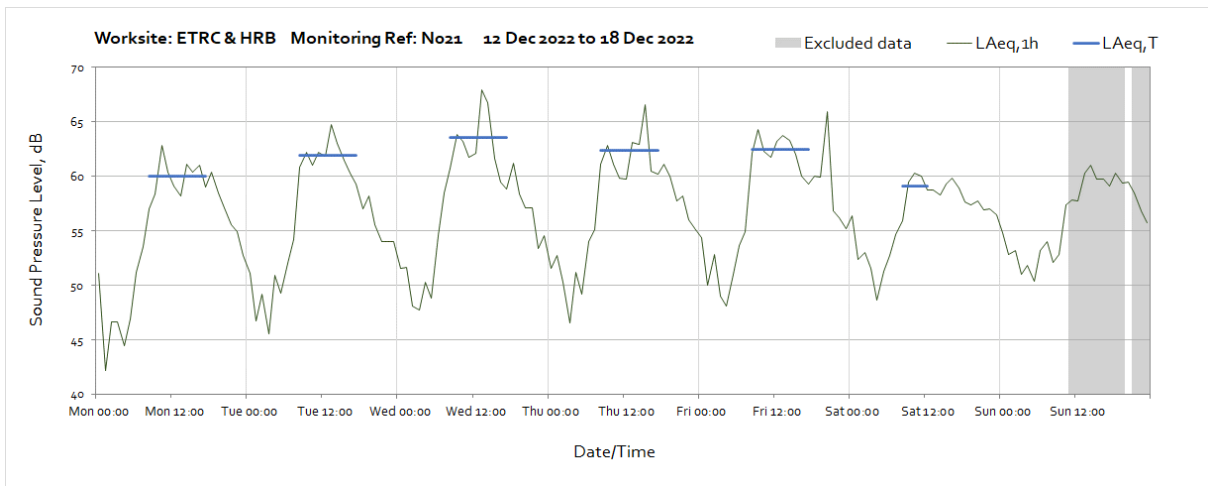
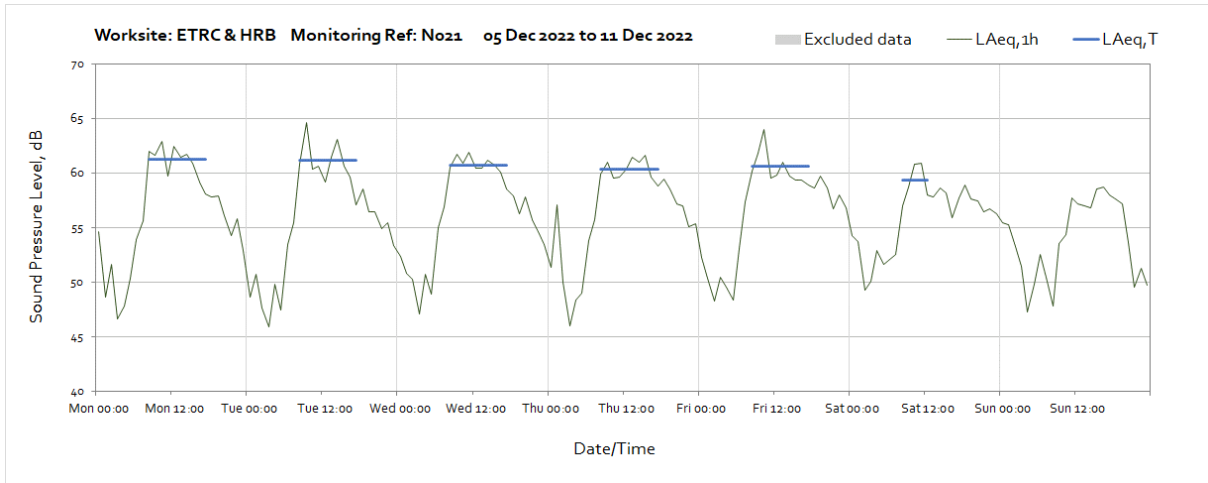


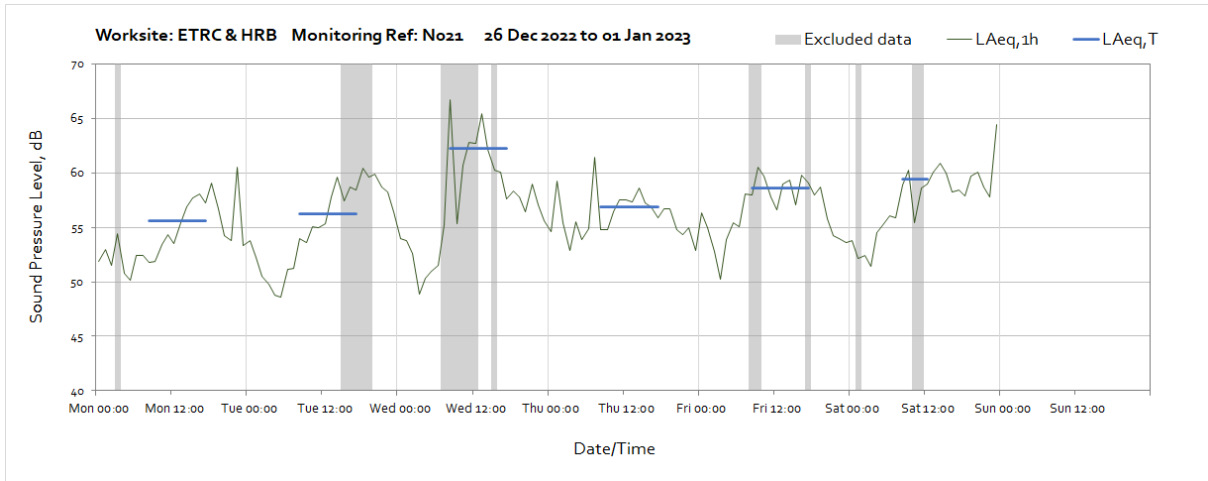


Note: Increase in noise levels at 23:00 on Saturday 31st December was due to new year celebrations.

Worksite: ETRC & HRB - Monitoring Ref: N021

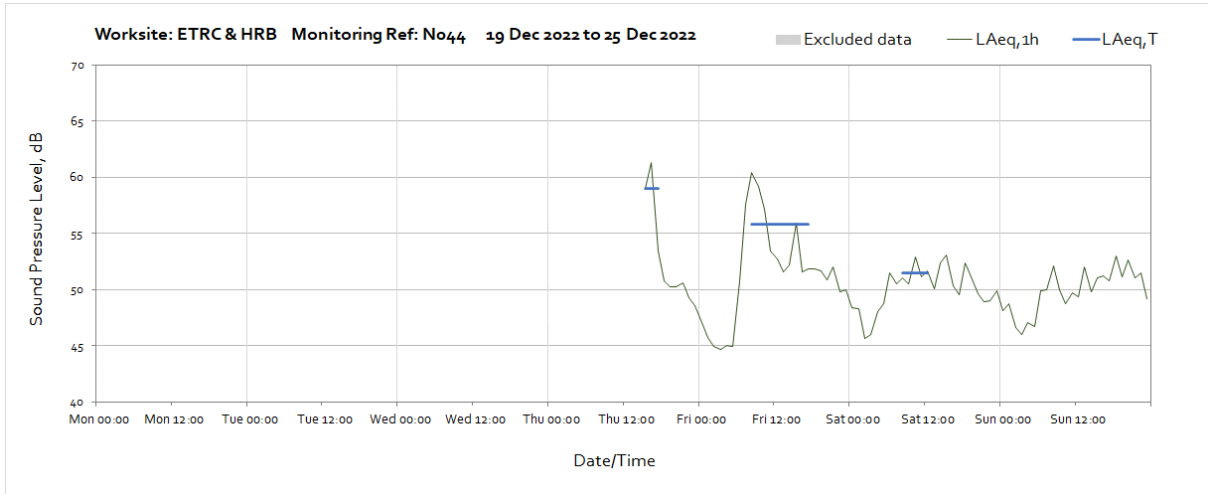






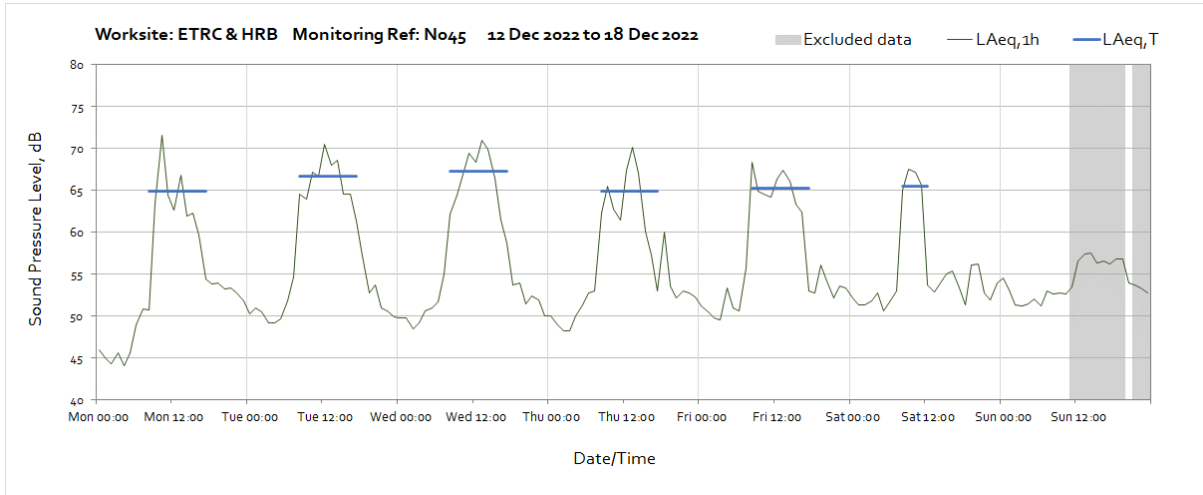
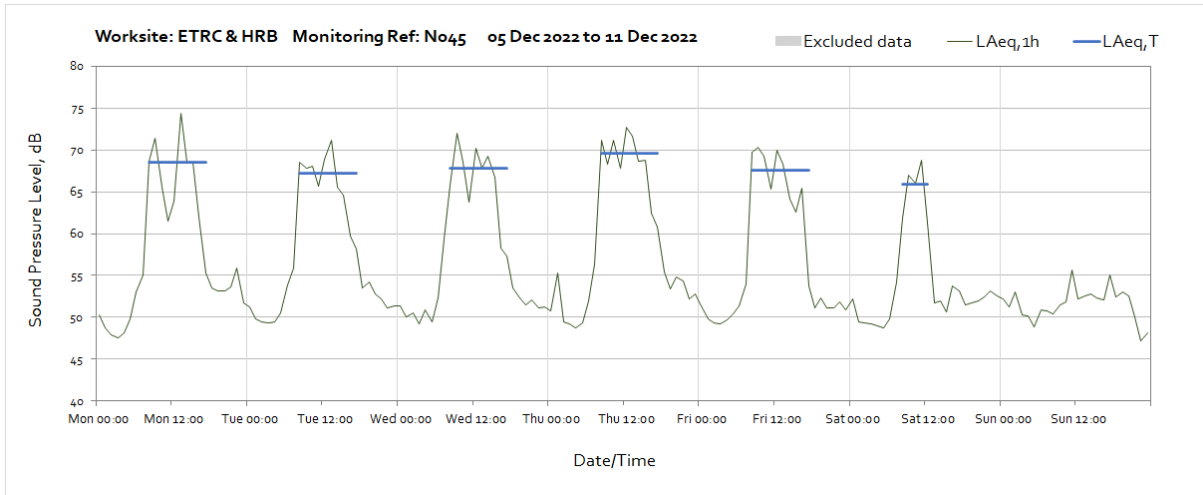
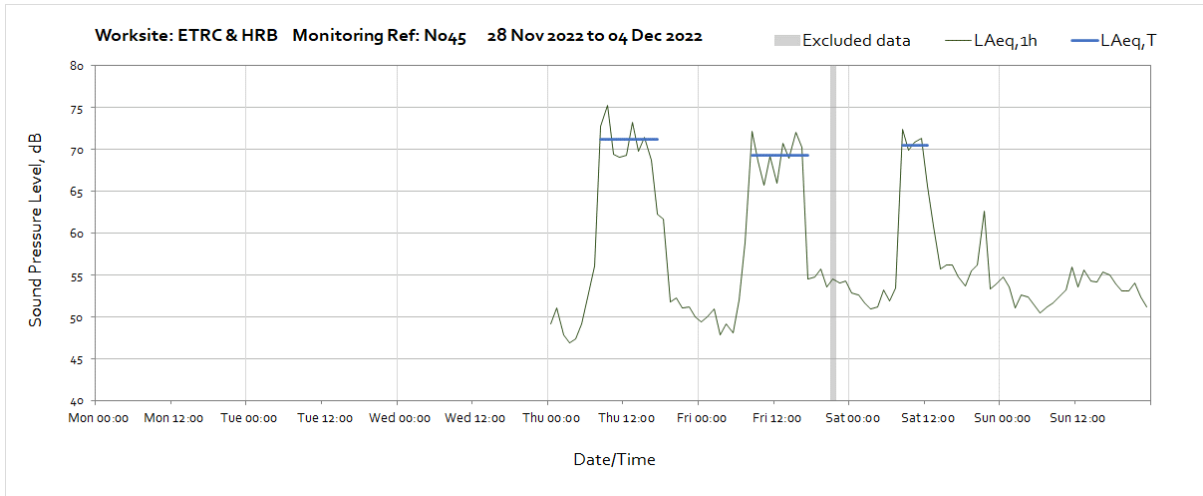
Note: Increase in noise levels at 23:00 on Saturday 31st December was due to new year celebrations.

Worksite: ETRC & HRB – Monitoring Ref: N044

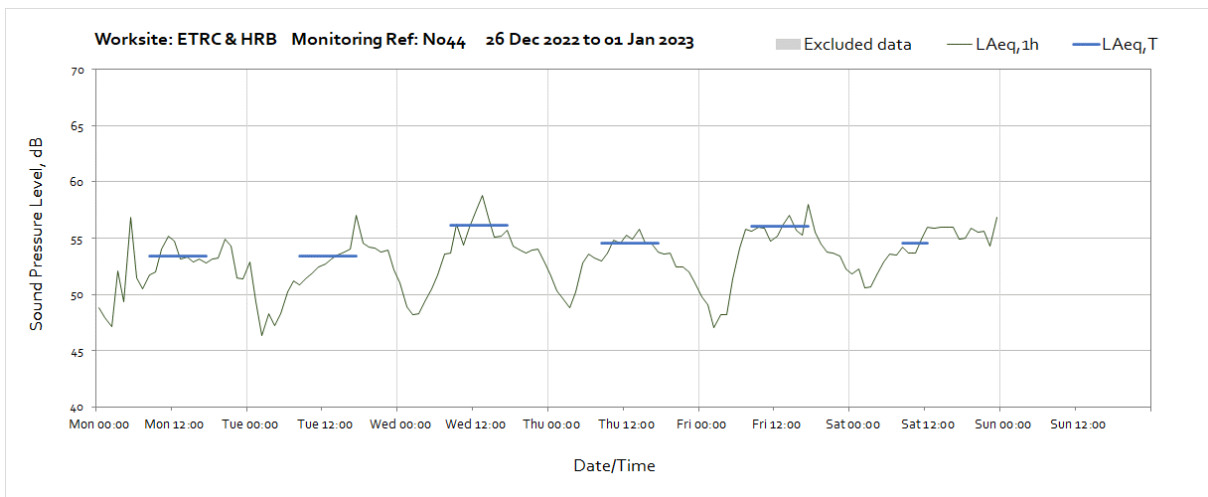
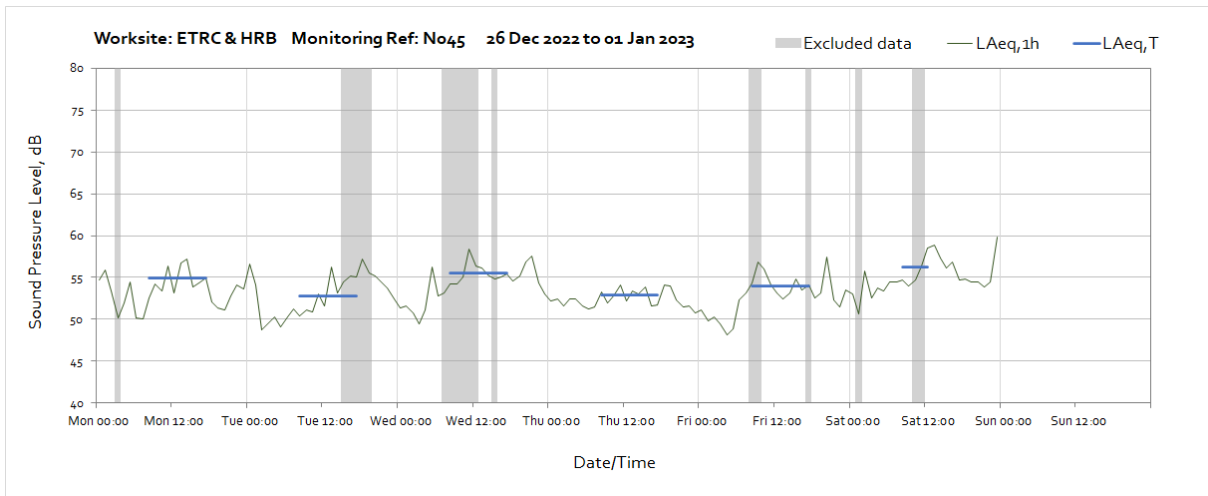
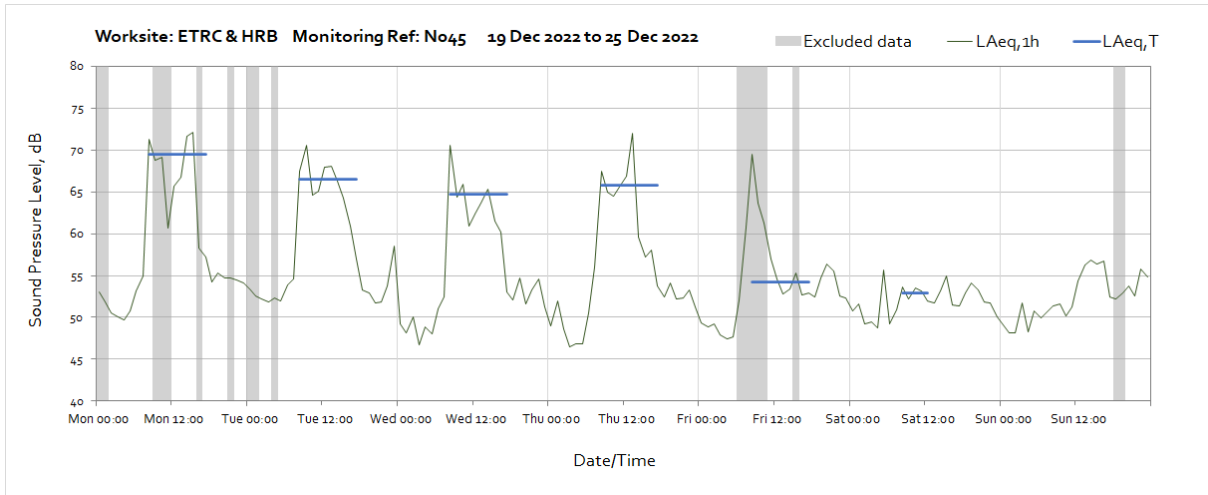


Note: Missing data from the start of the month until 15:00 on Thursday 22nd December was due to a SIM card error within the monitoring station. The SIM card was replaced with view of minimising further loss of data.

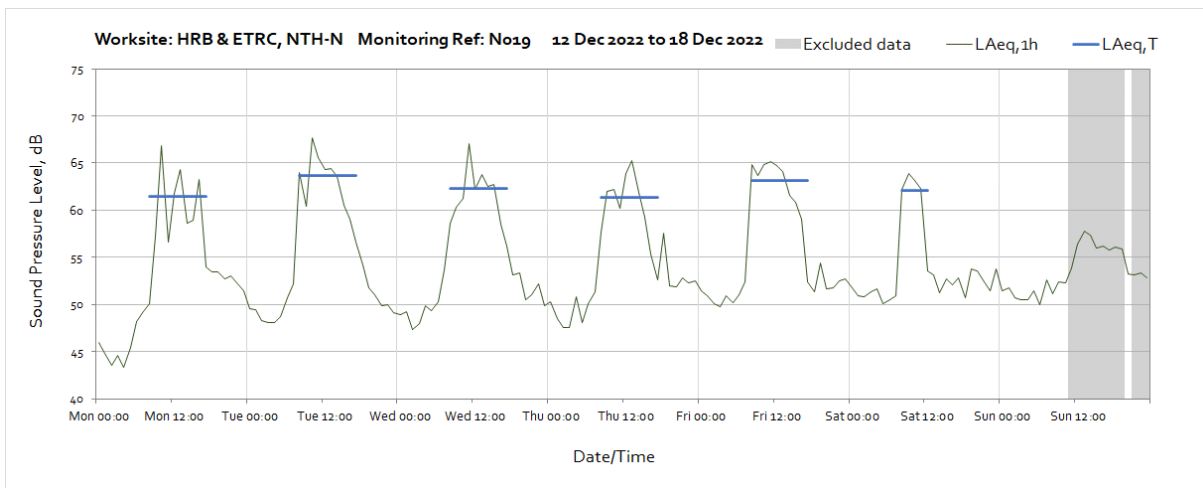
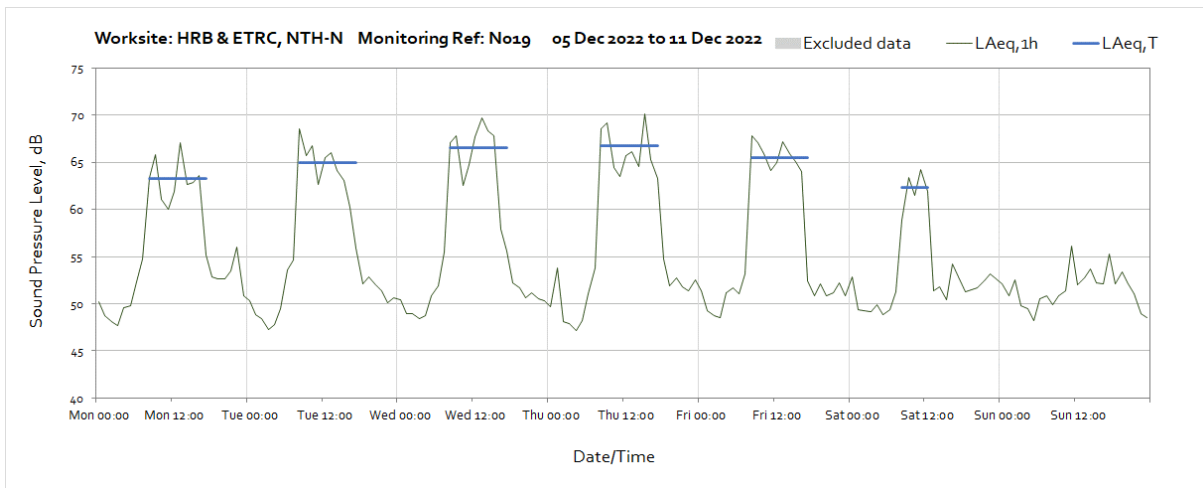
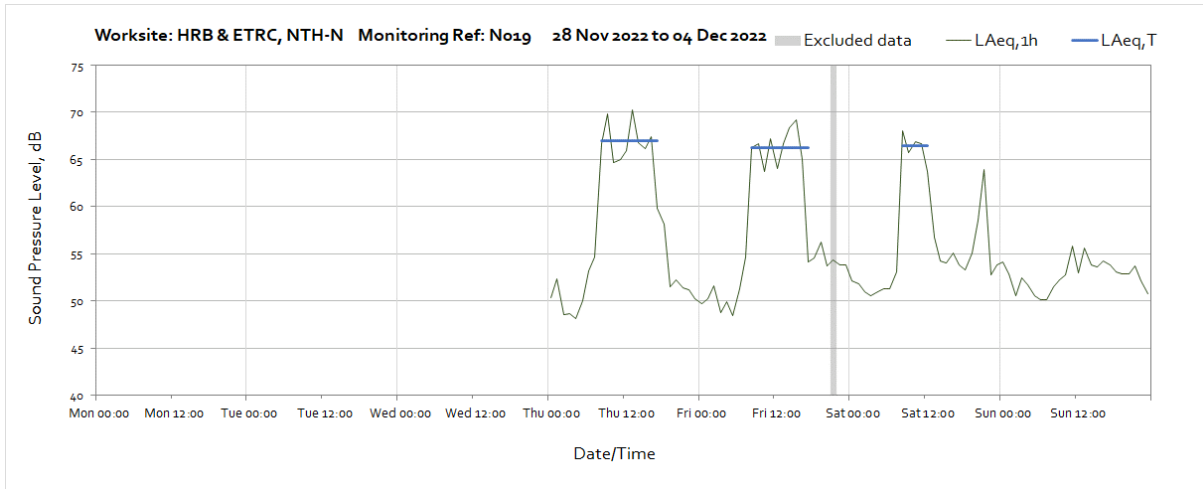
Worksite: HRB – Monitoring Ref: N045



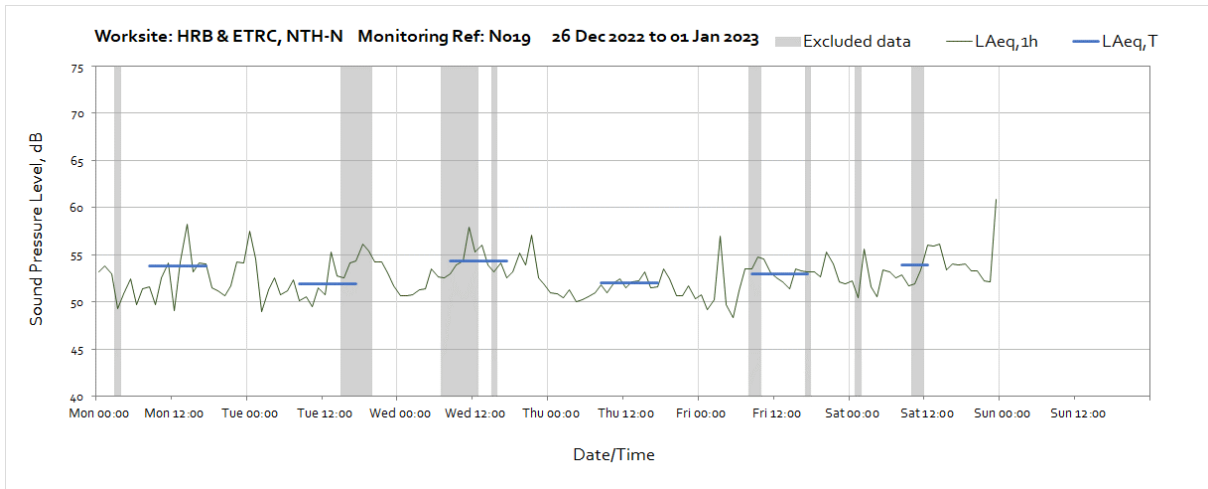
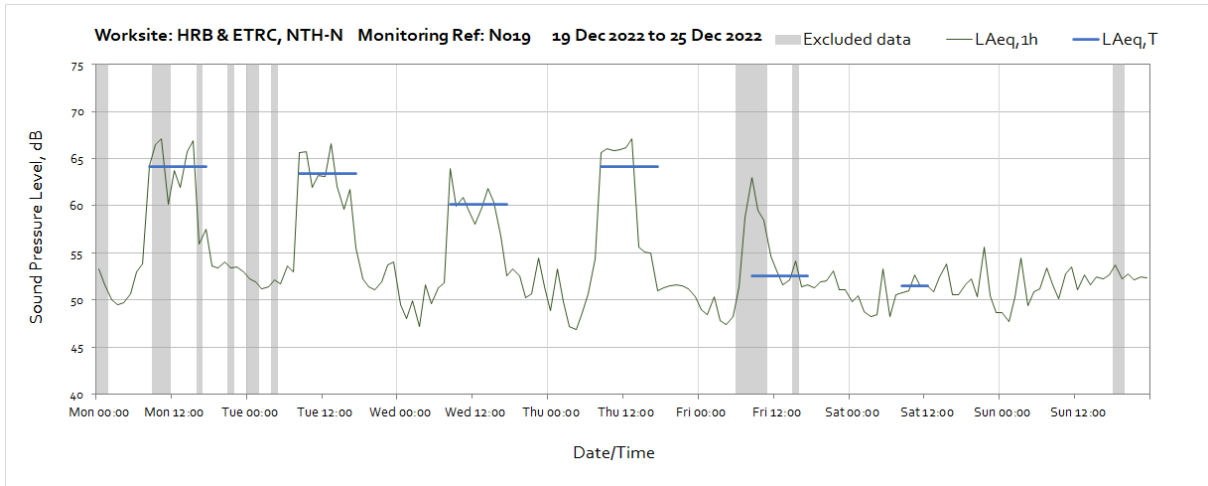
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Worksite: HRB & ETRC, NTH-N – Monitoring Ref: N019

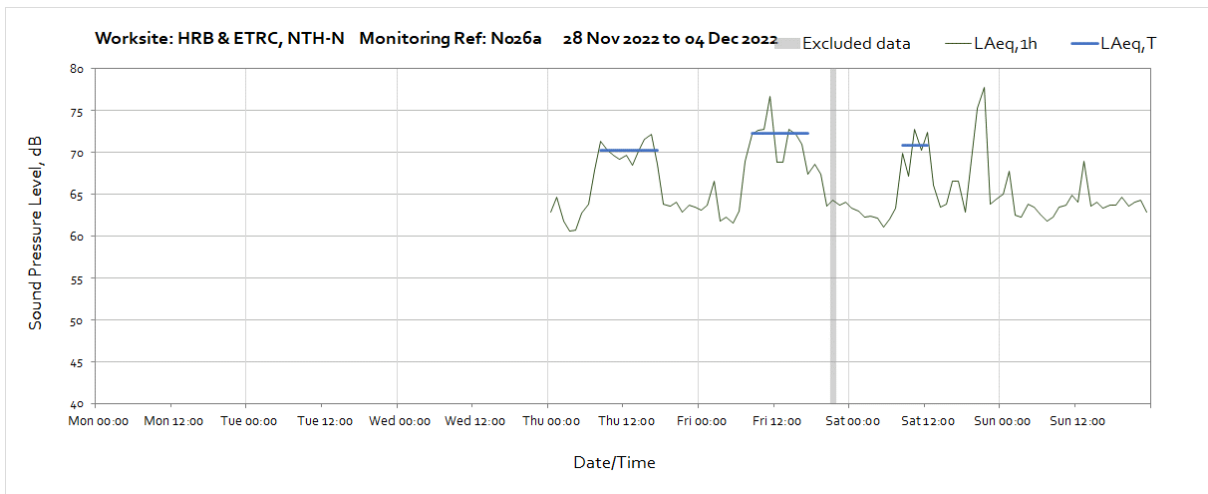


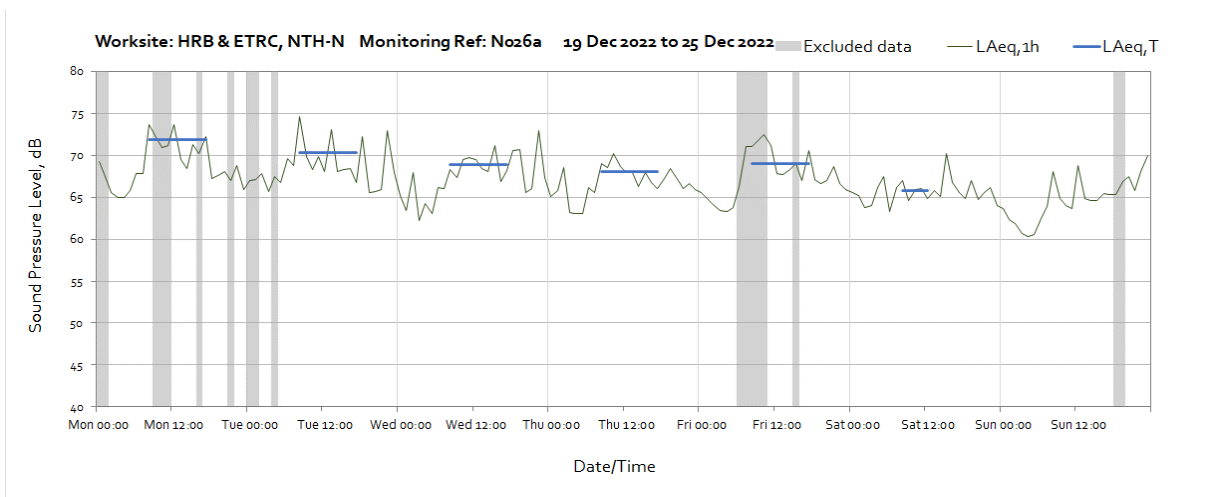
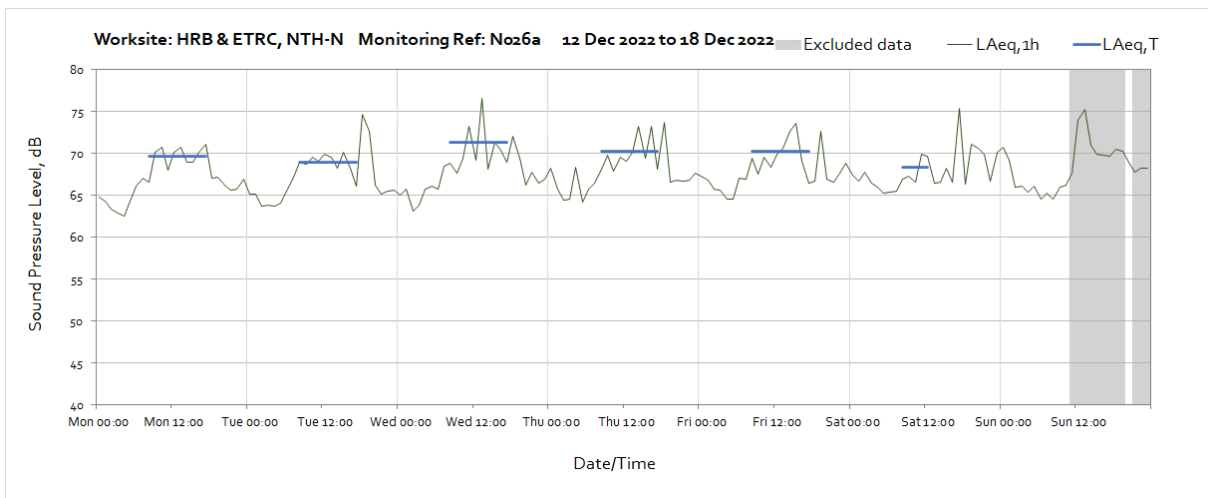
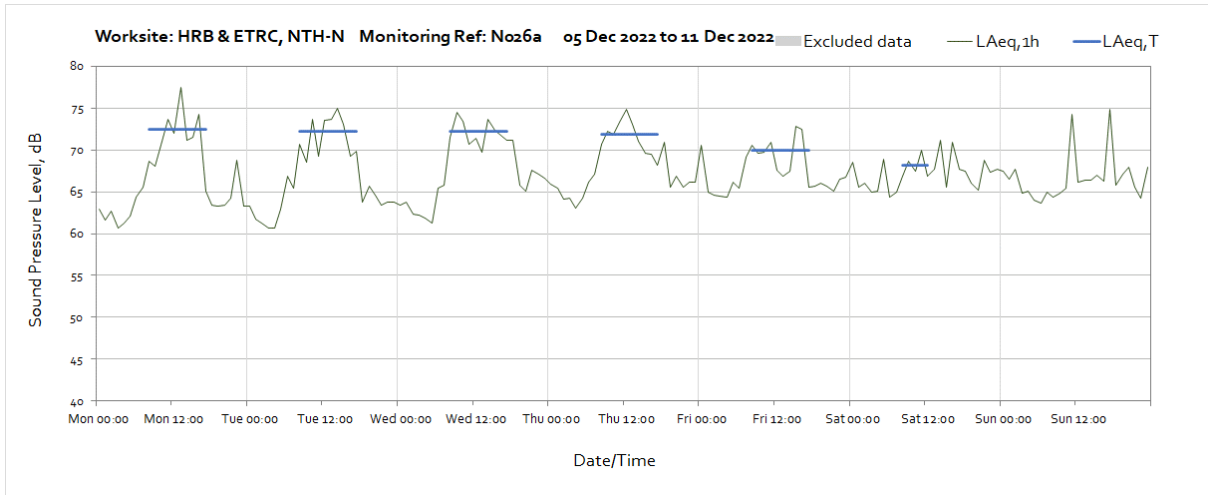
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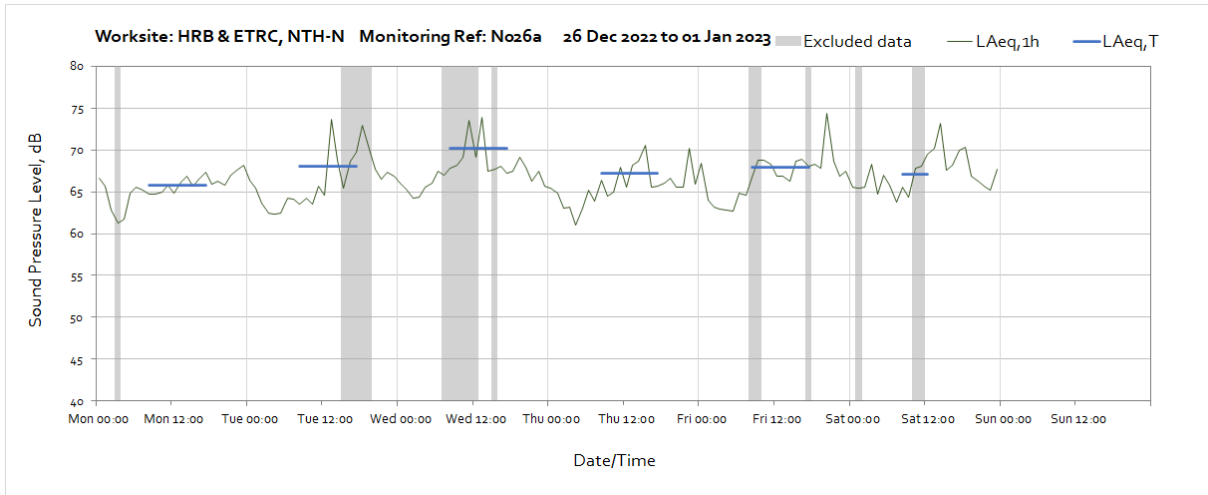


Note: Increase in noise levels at 23:00 on Saturday 31st December was due to new year celebrations.

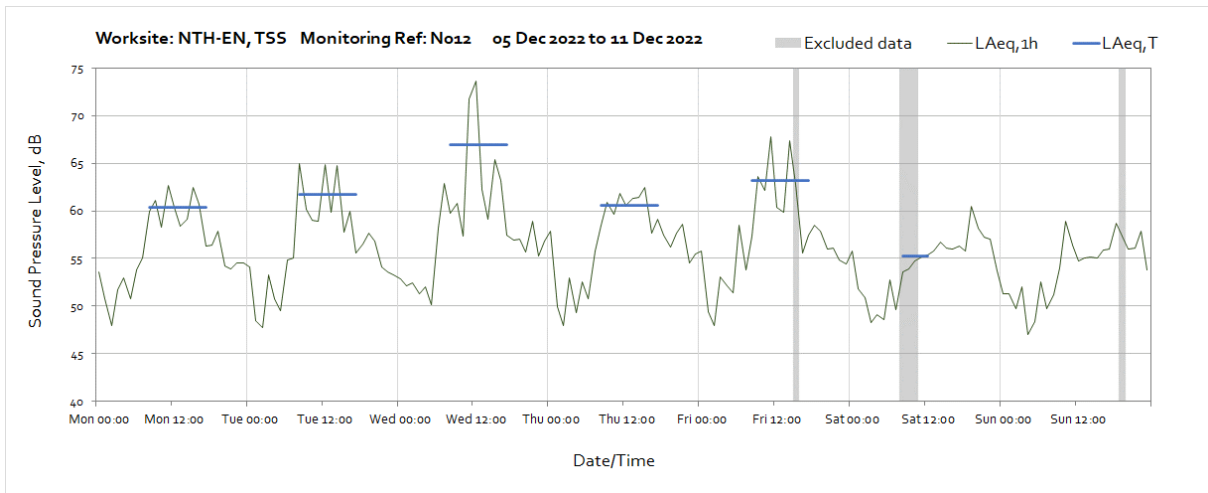
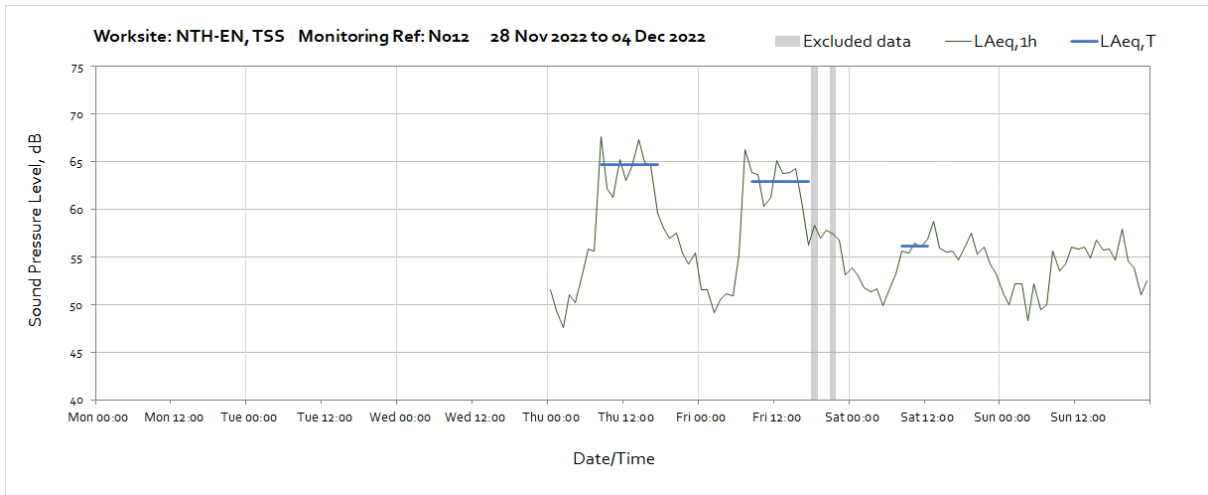
Worksite: HRB & ETRC, NTH-N – Monitoring Ref: N026a

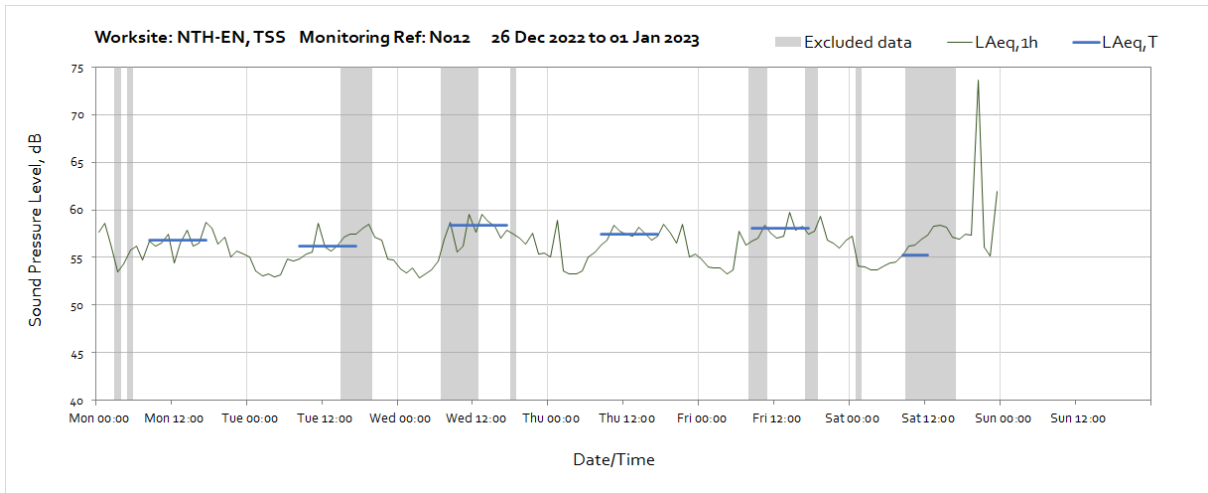
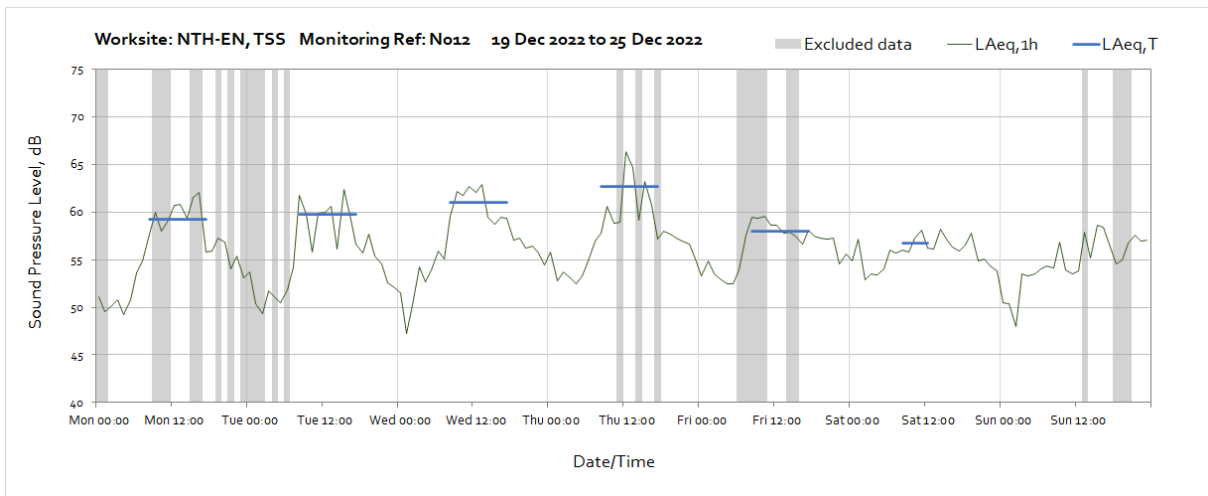
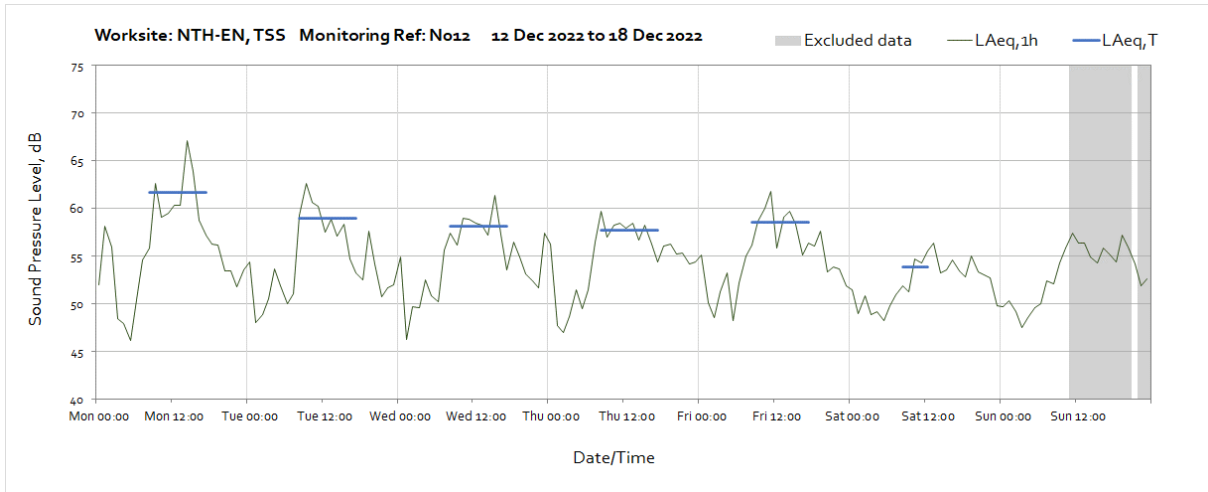




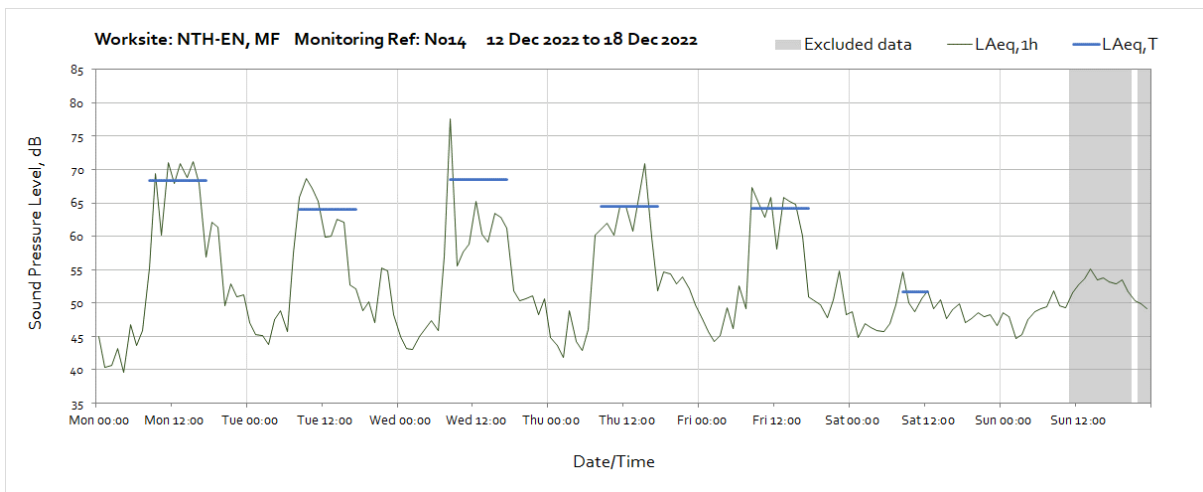
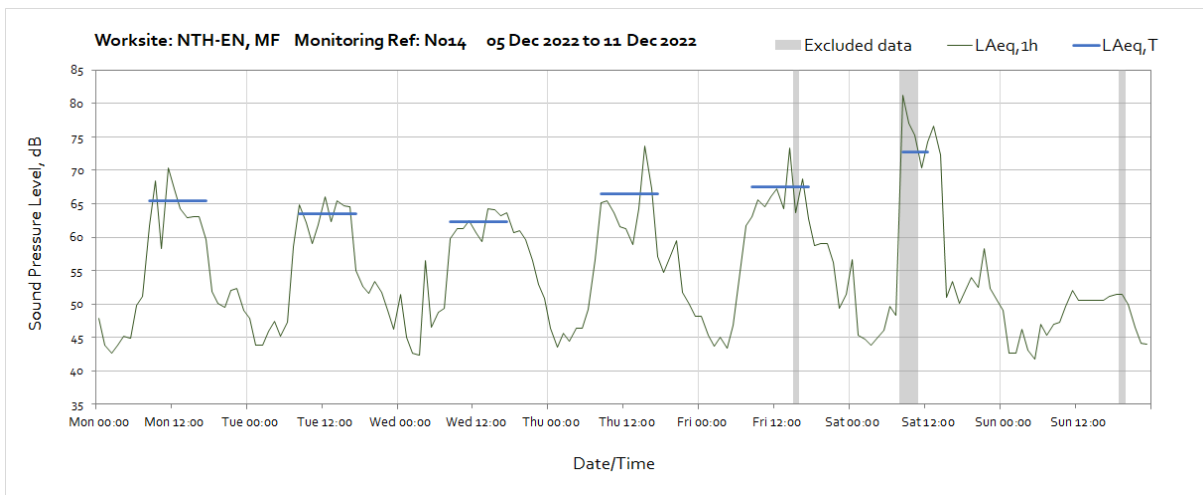
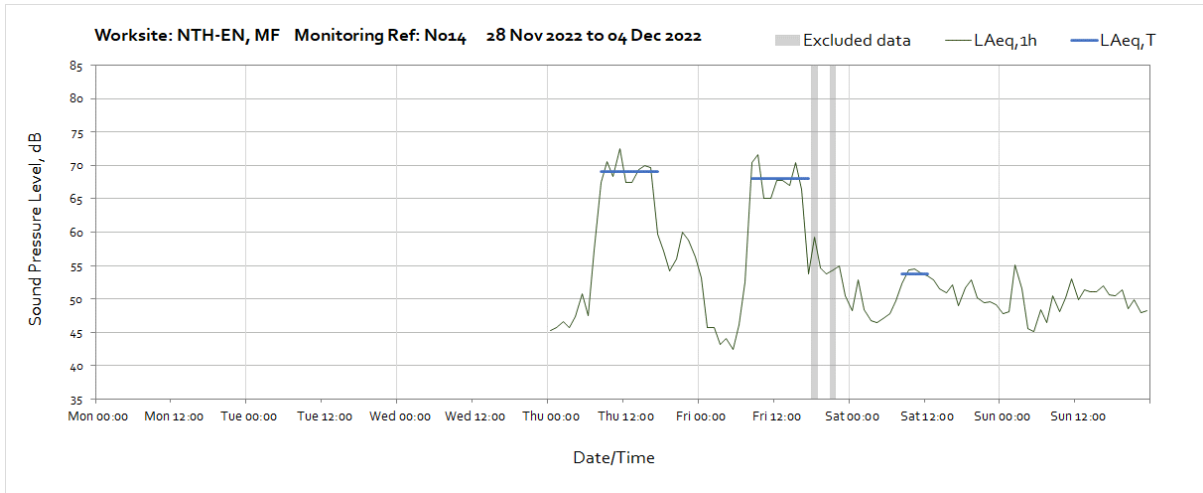


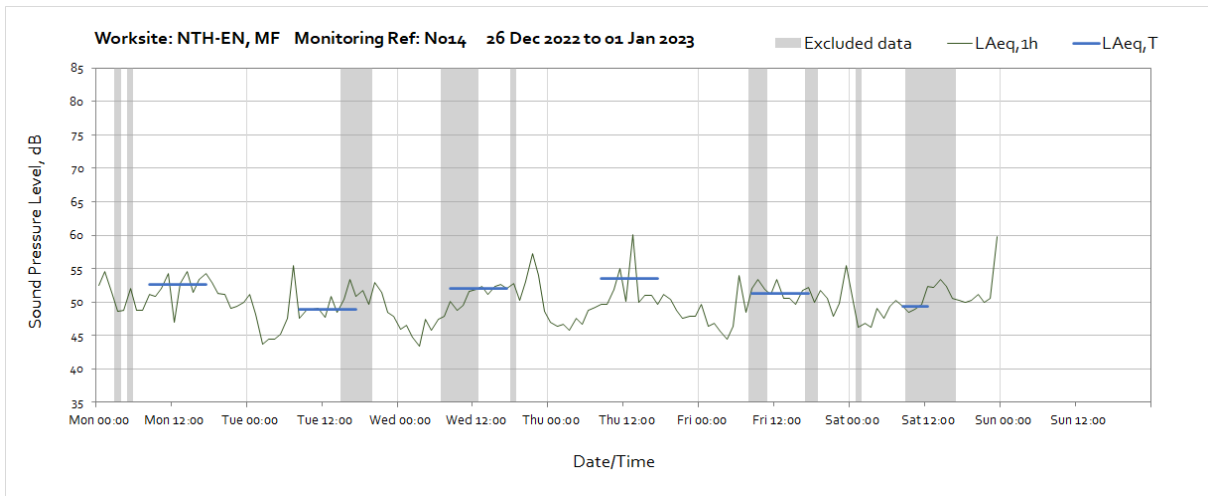
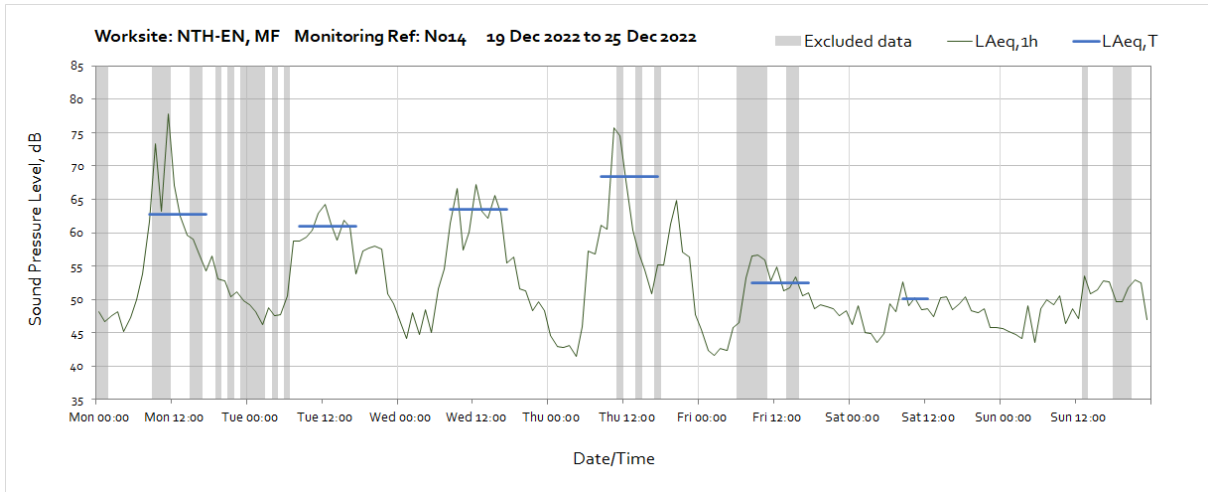
Worksite: NTH-EN, TSS - Monitoring Ref: N012





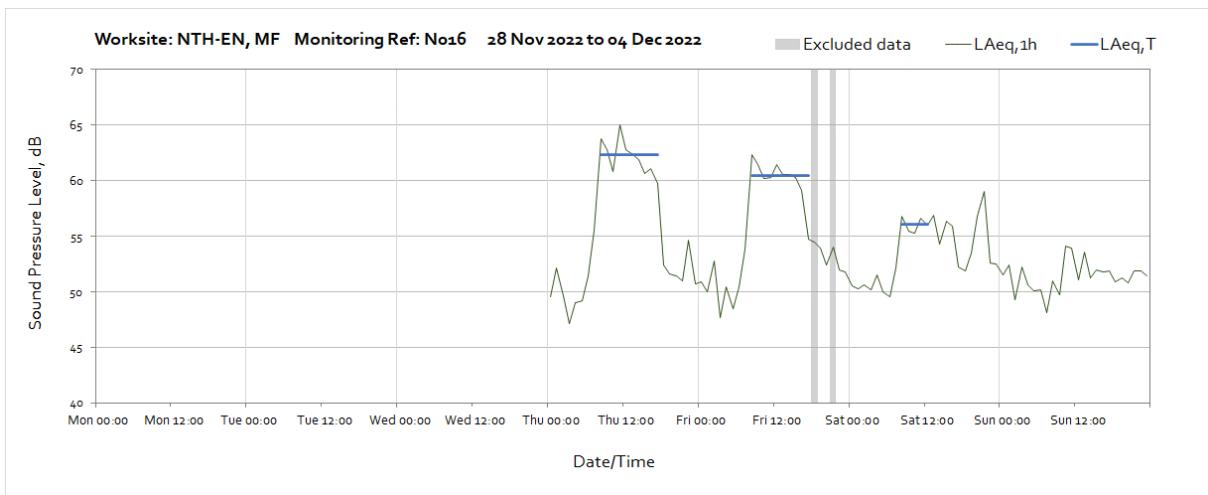
Worksite: NTH-EN, MF - Monitoring Ref: N014

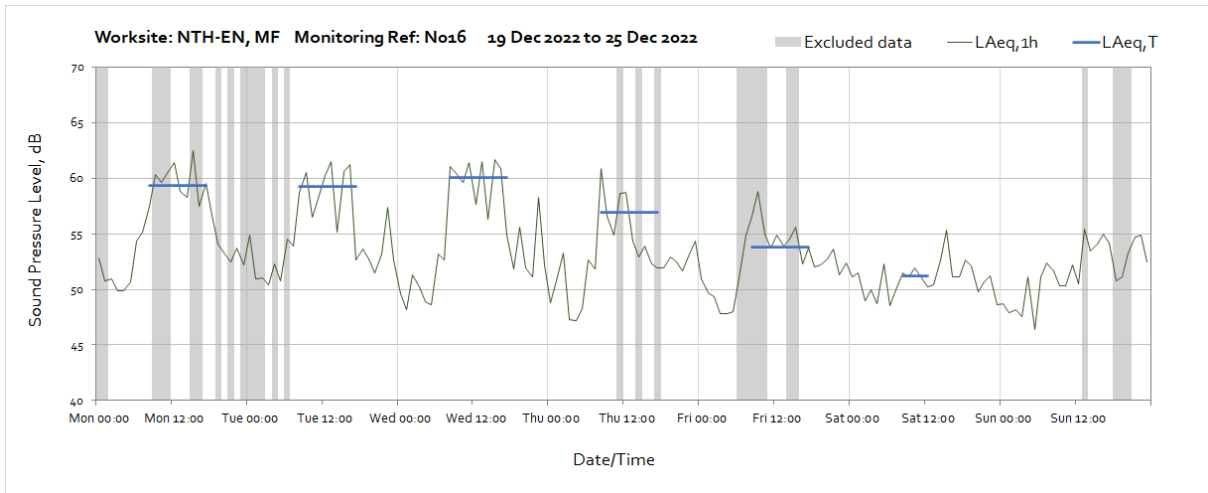
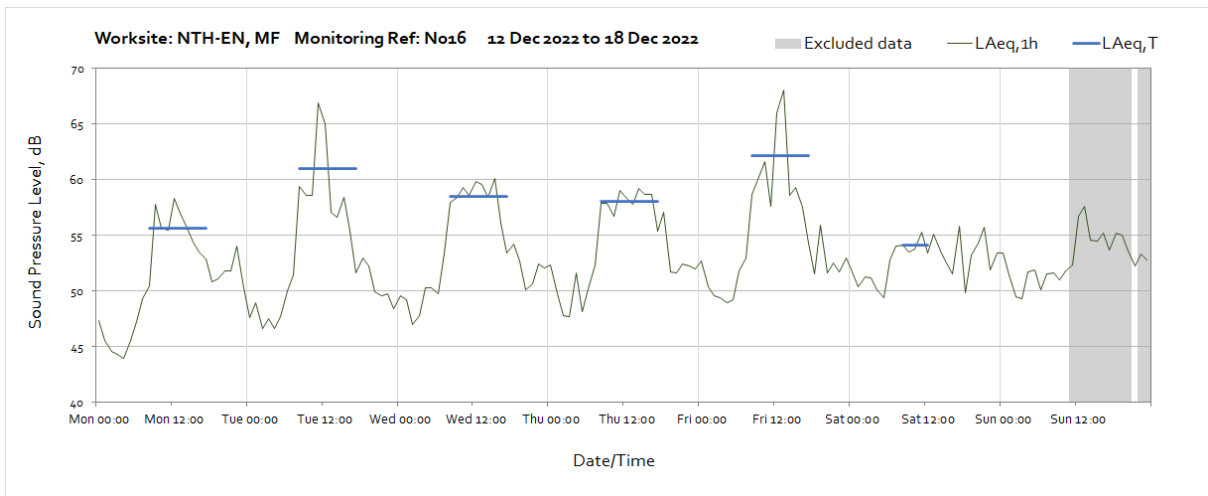
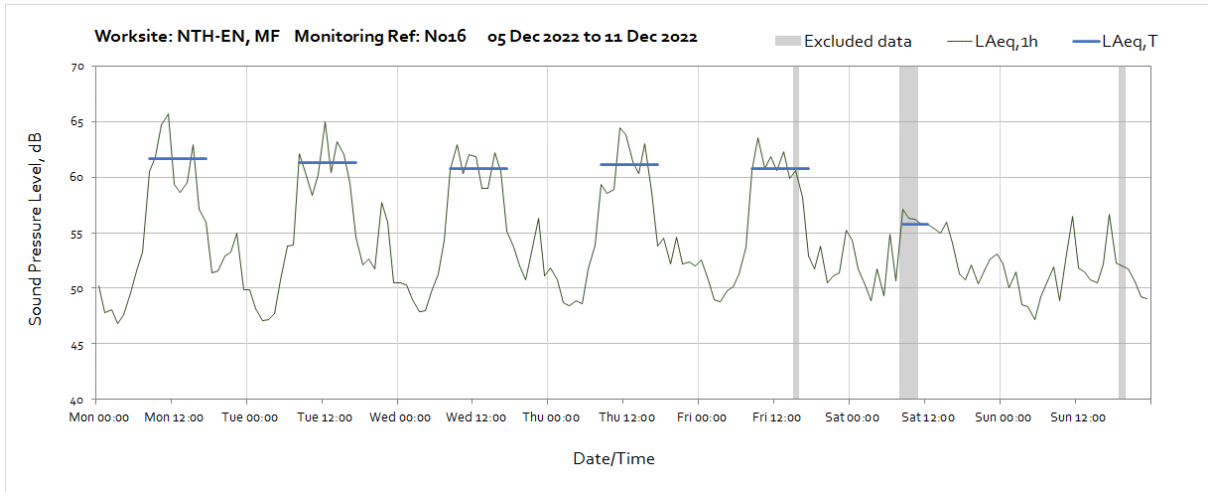


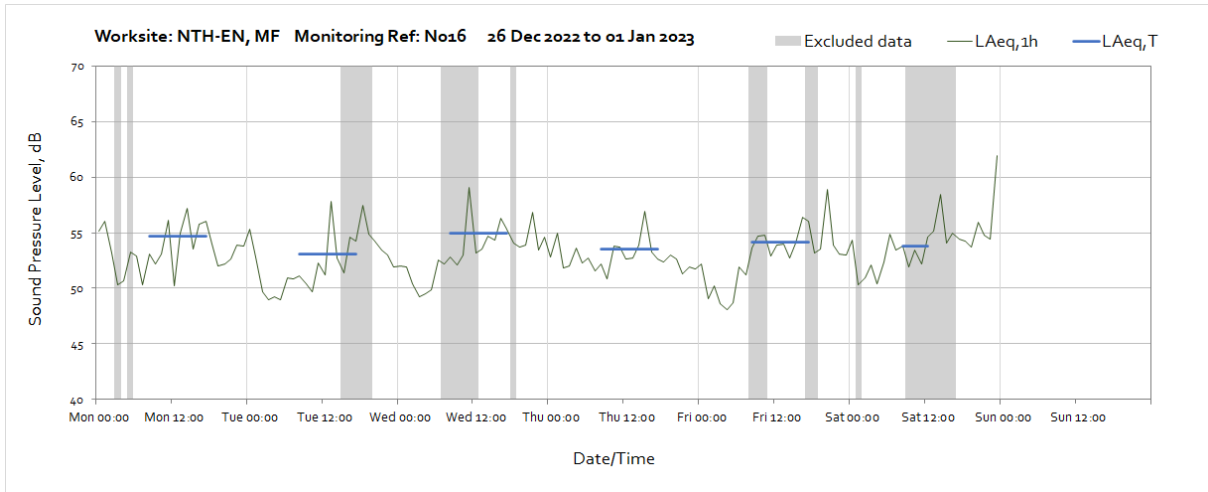


Note: Increase in noise levels at 23:00 on Saturday 31st December 3 was due to new year celebrations.

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

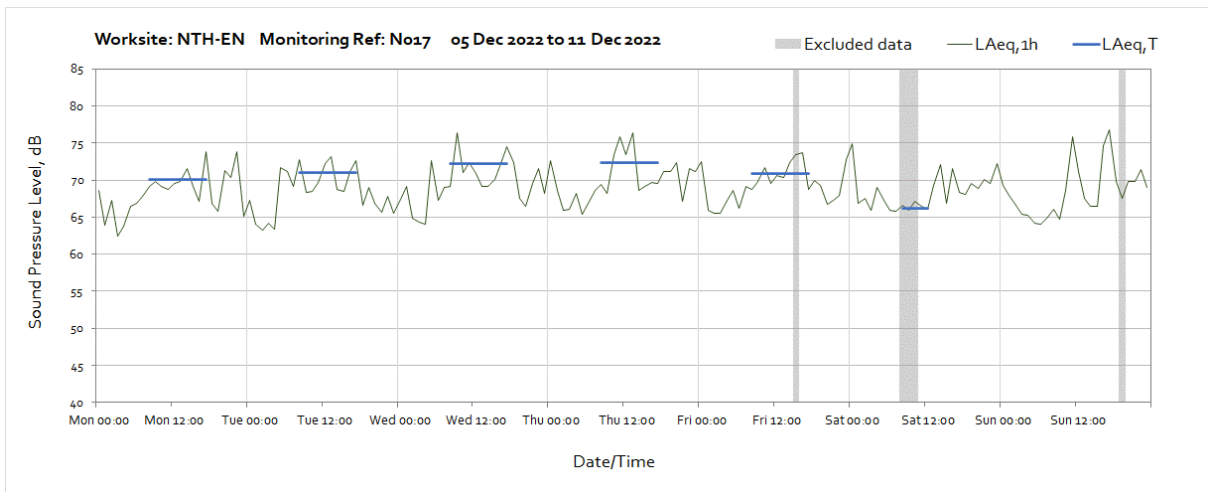
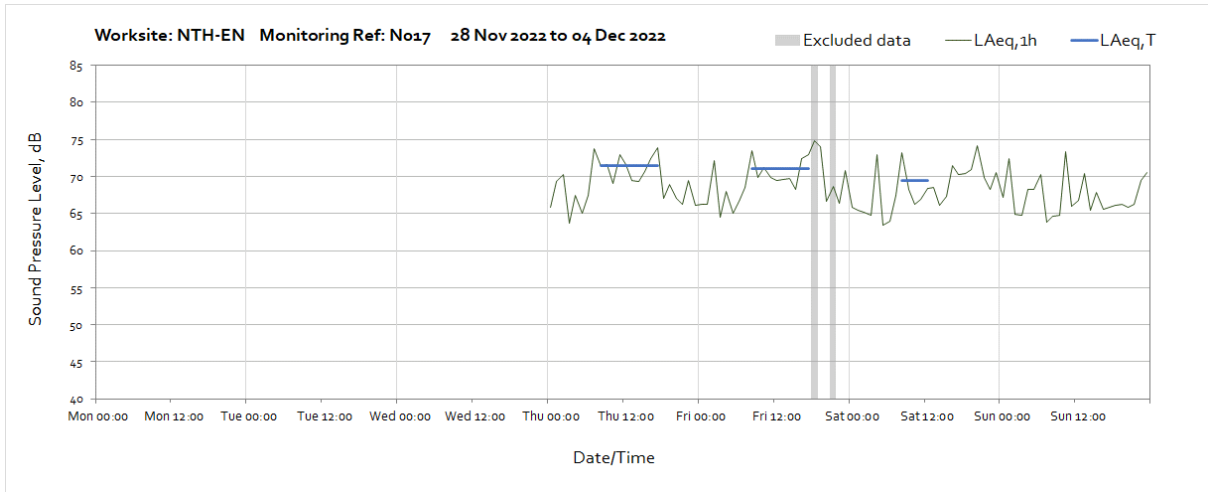


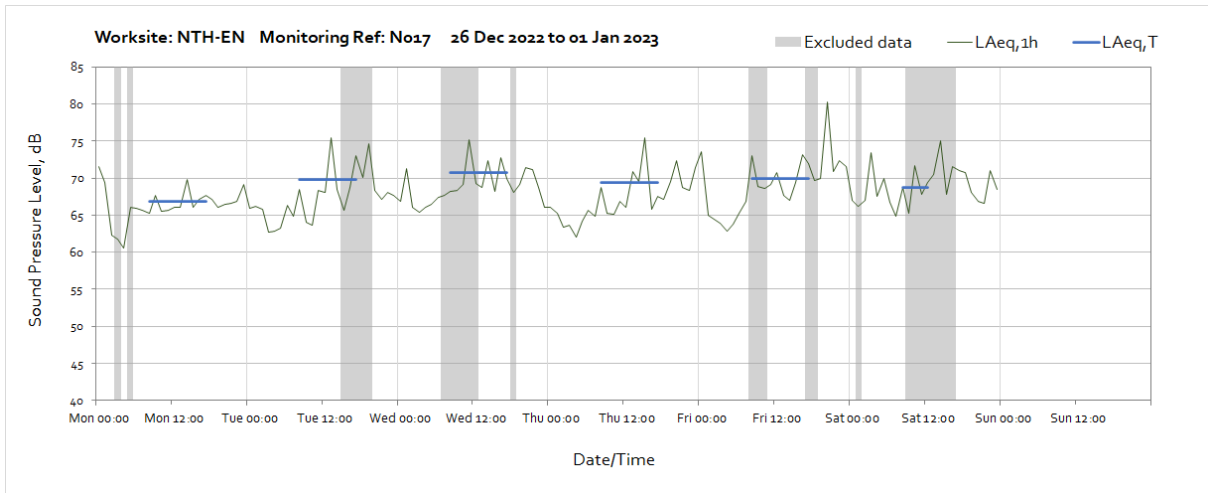
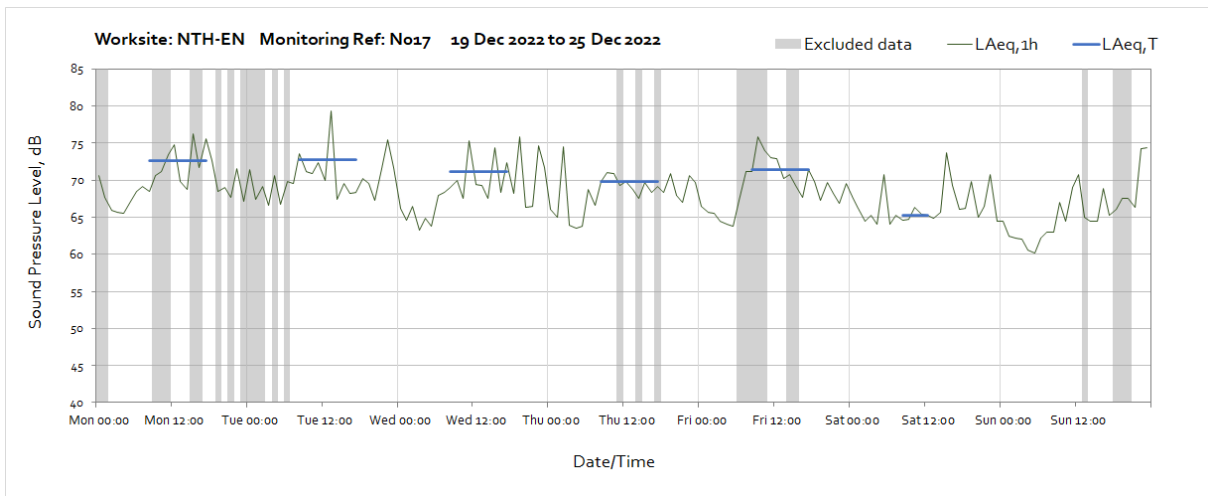
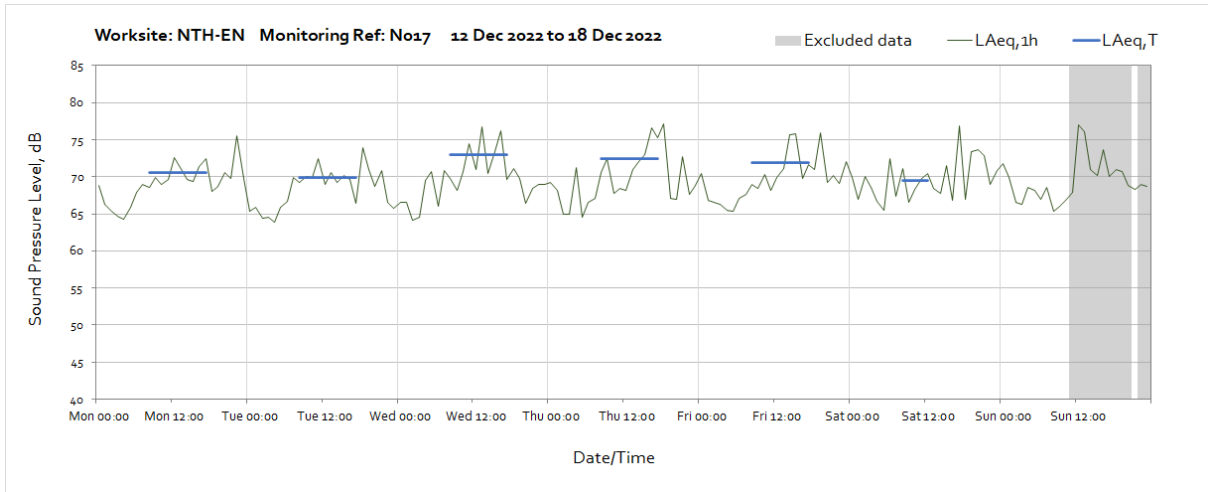




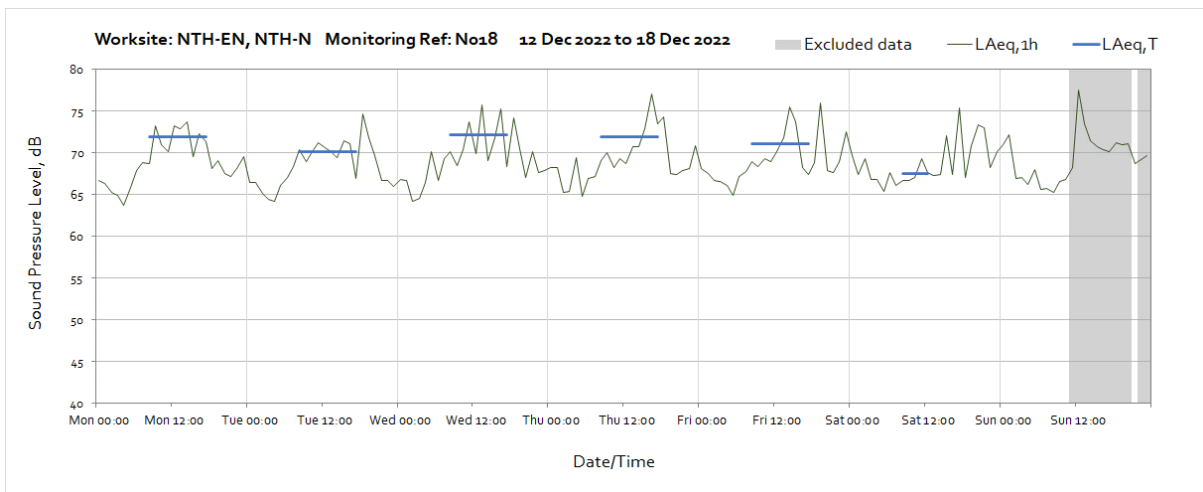
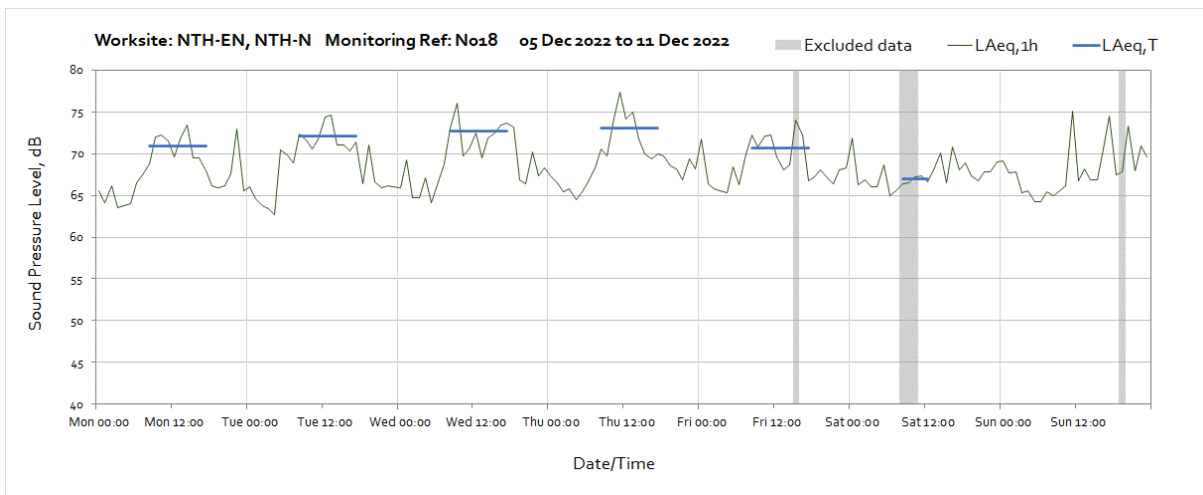
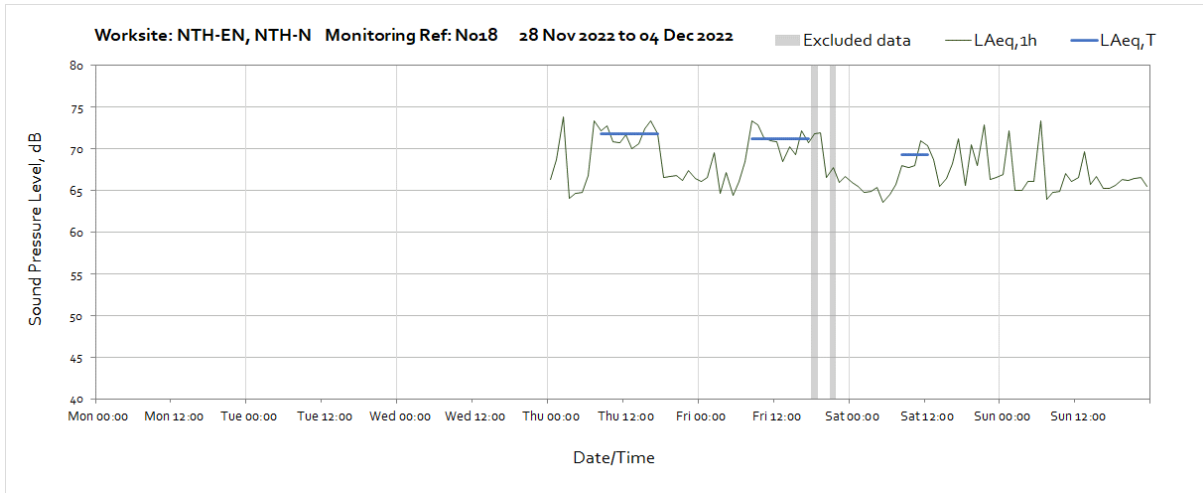
Note: Increase in noise levels at 23:00 on Saturday 31st December was due to new year celebrations.

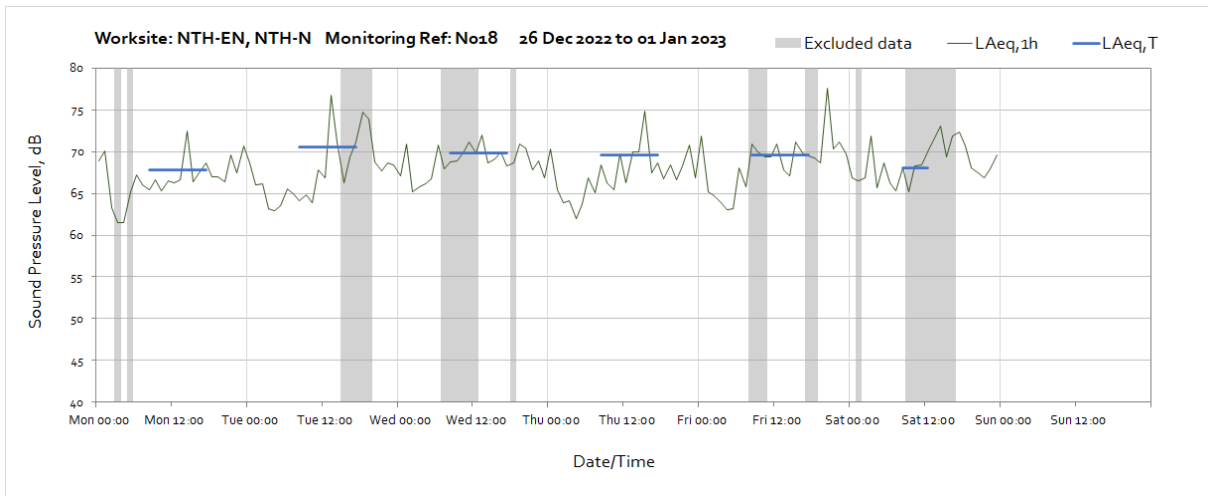
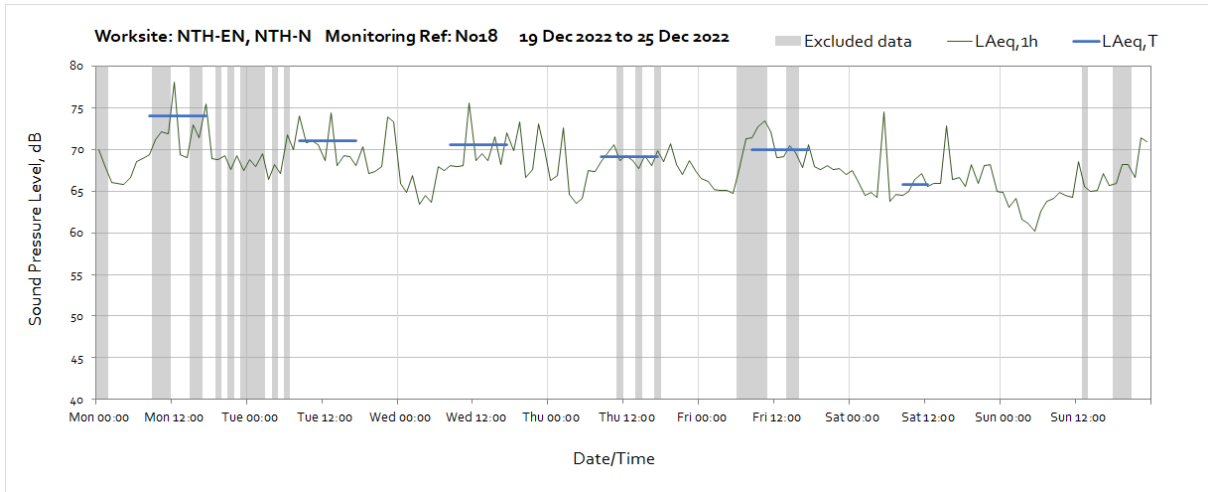
Worksite: NTH-EN - Monitoring Ref: N017



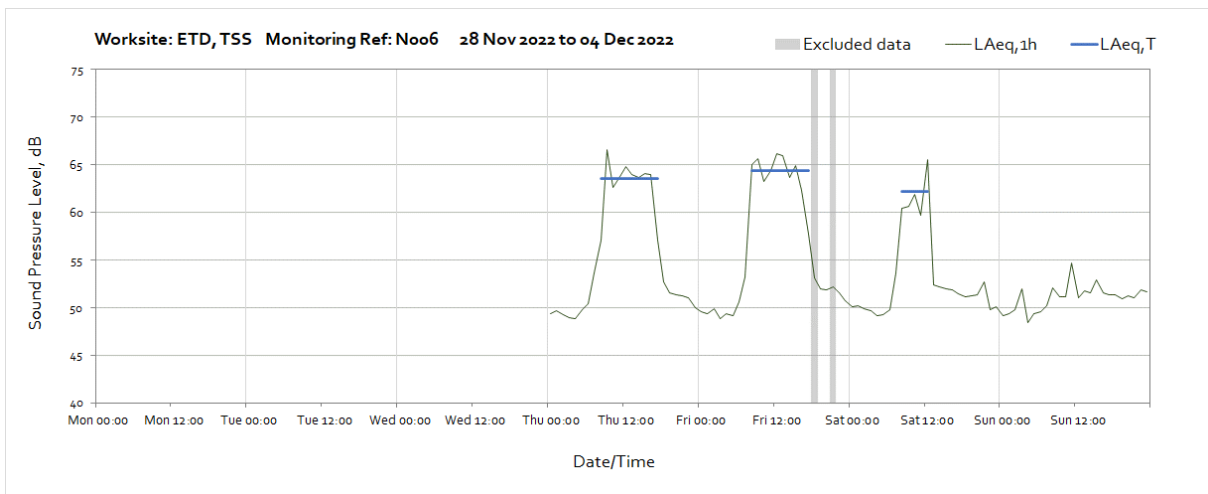


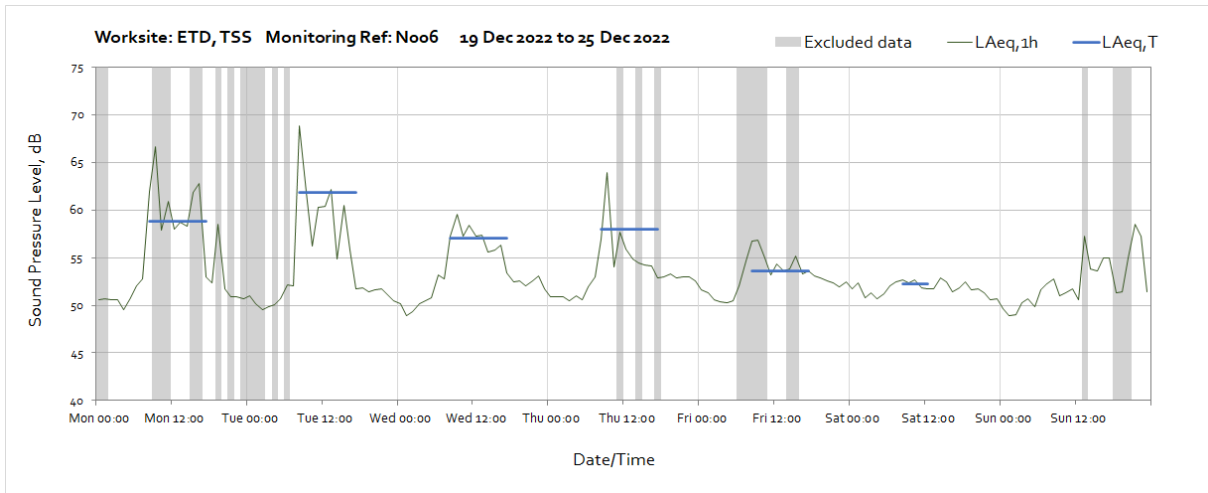
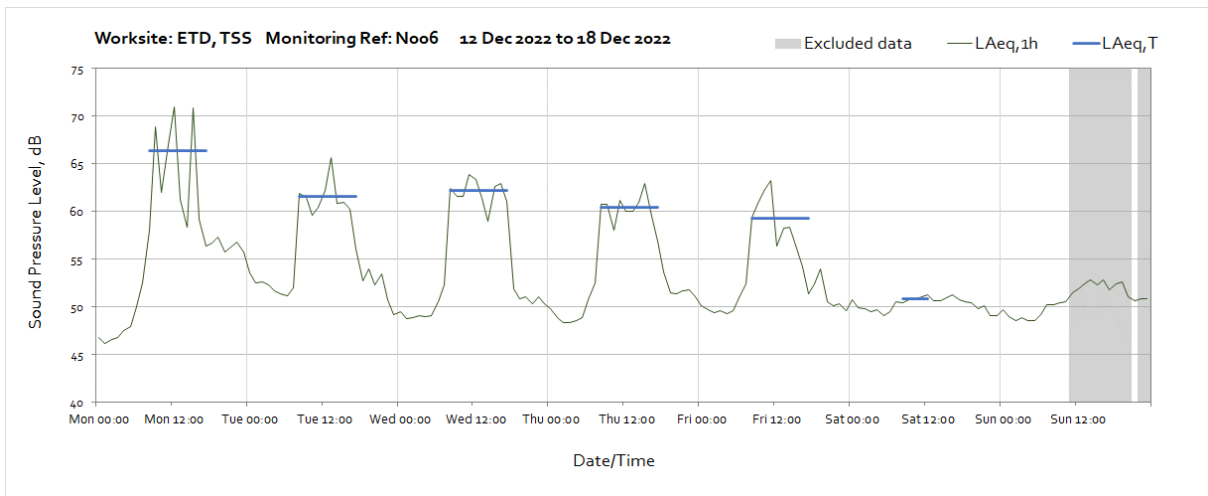
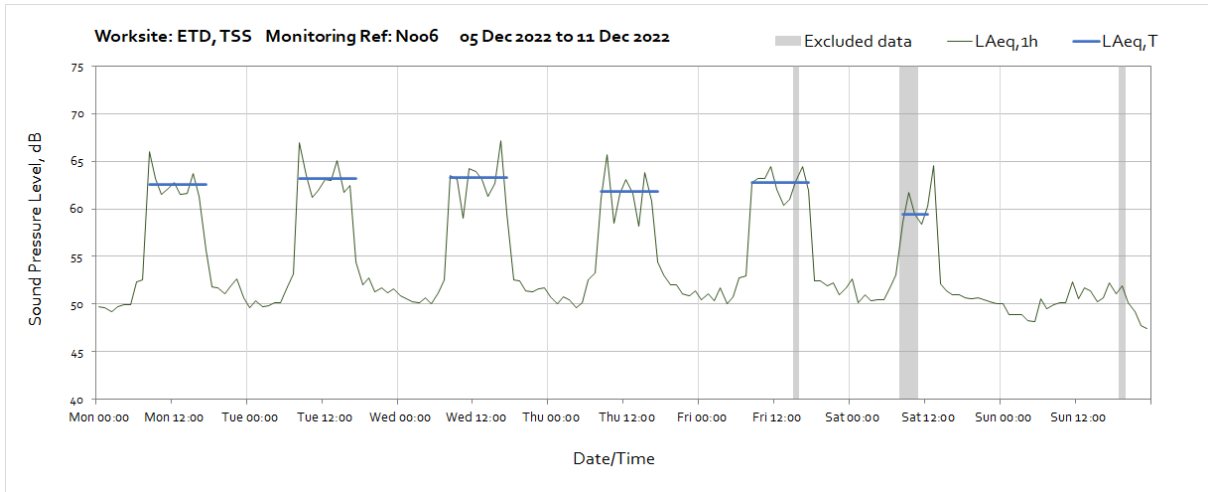
Worksite: NTH-EN, NTH-N – Monitoring Ref: N018

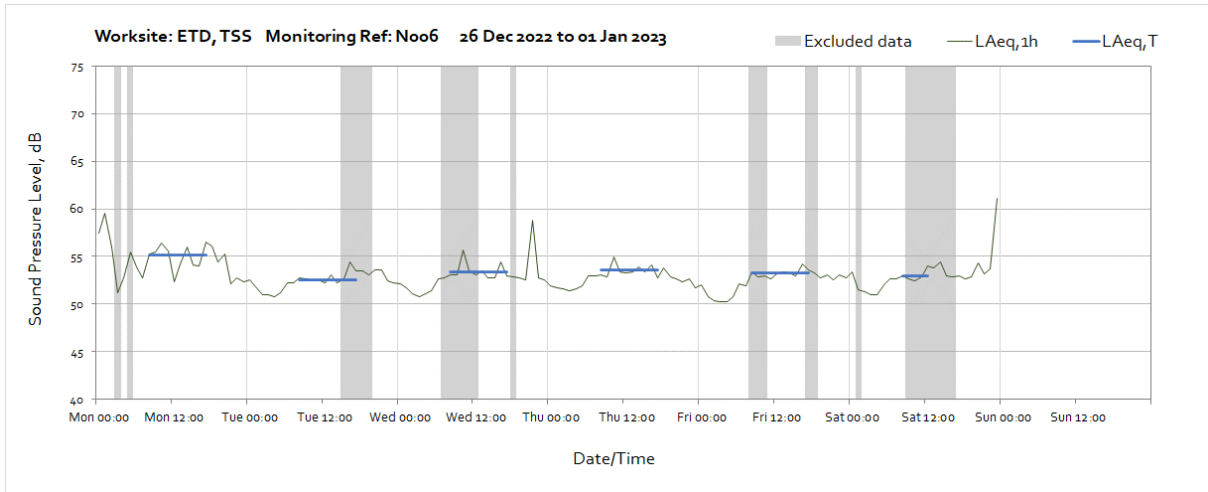




Worksite: ETD, TSS – Monitoring Ref: N006

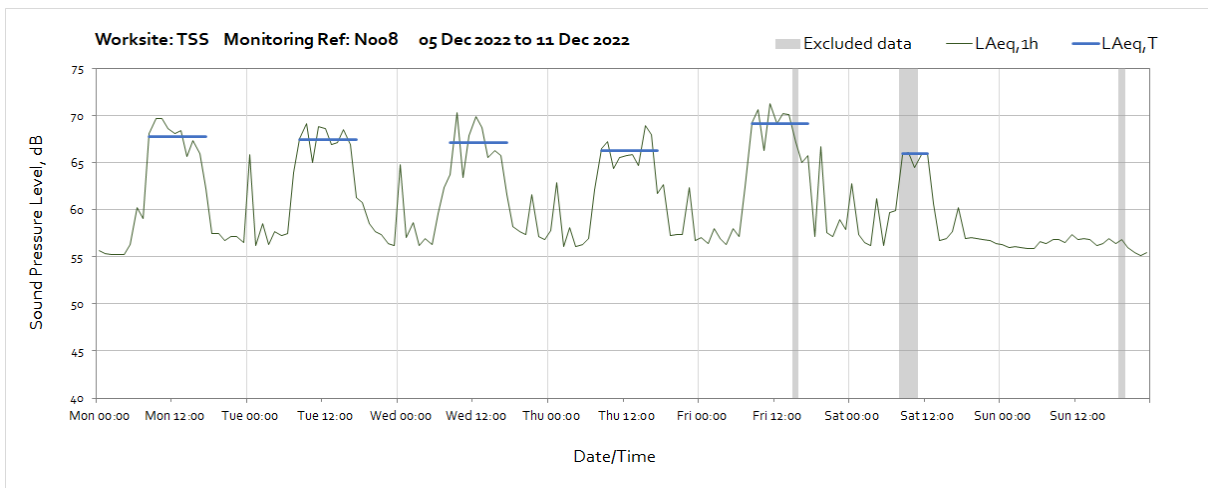
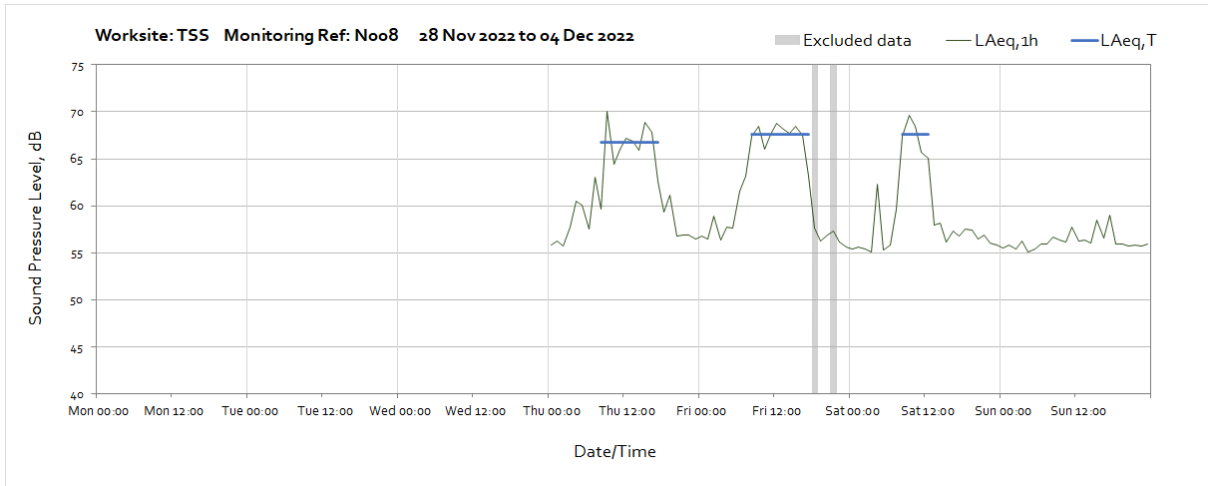


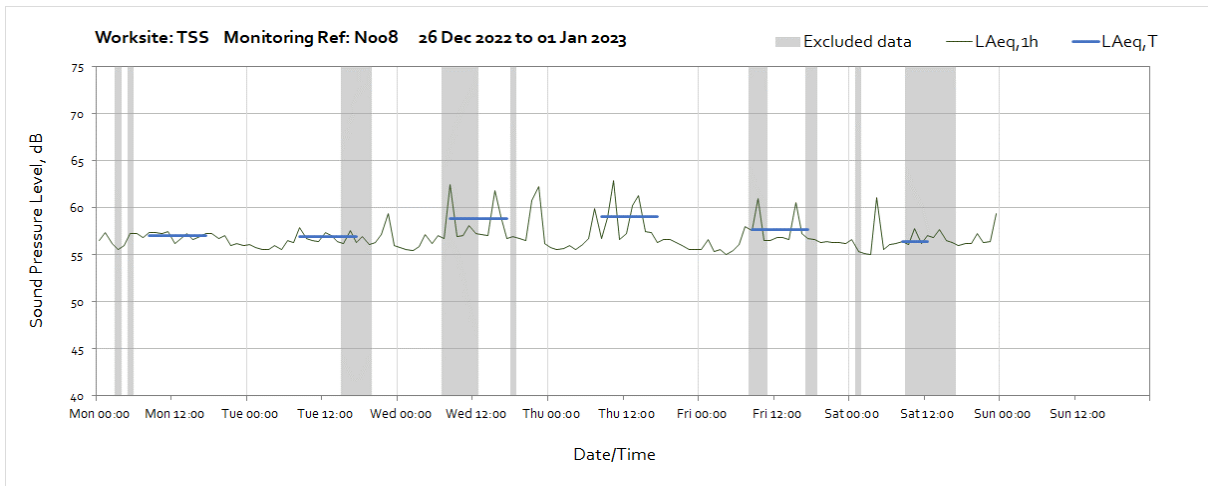
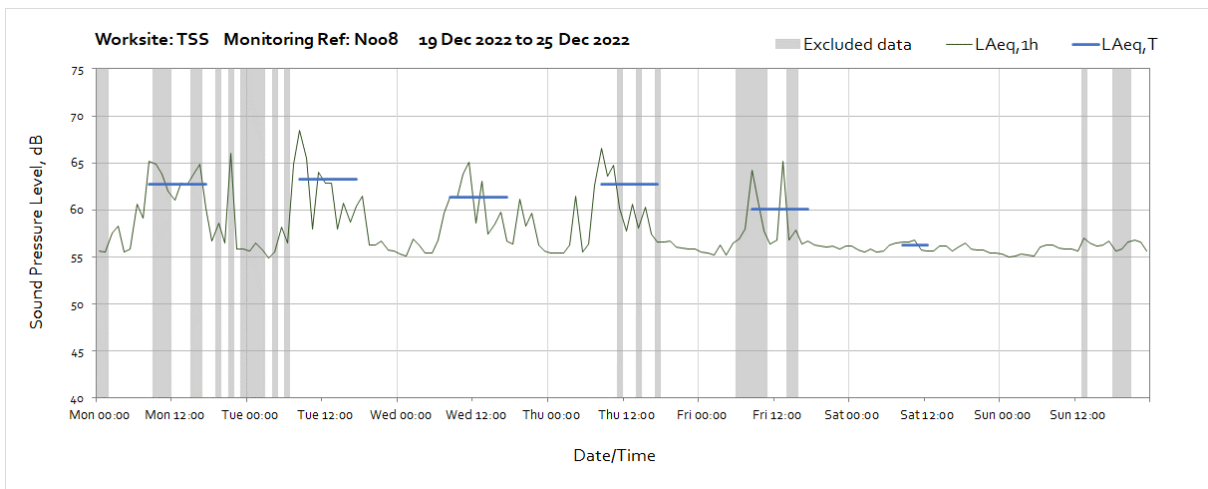
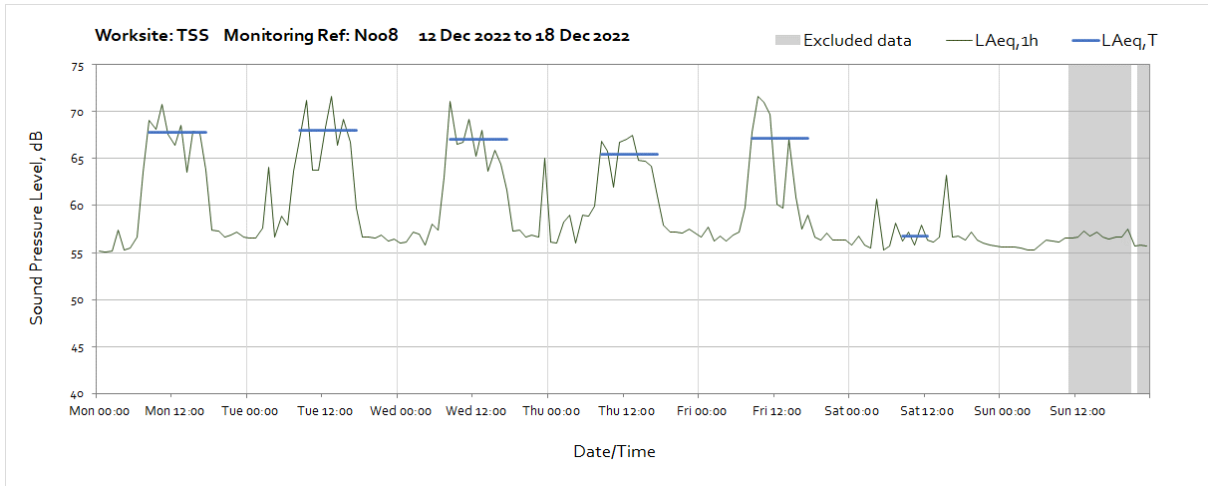




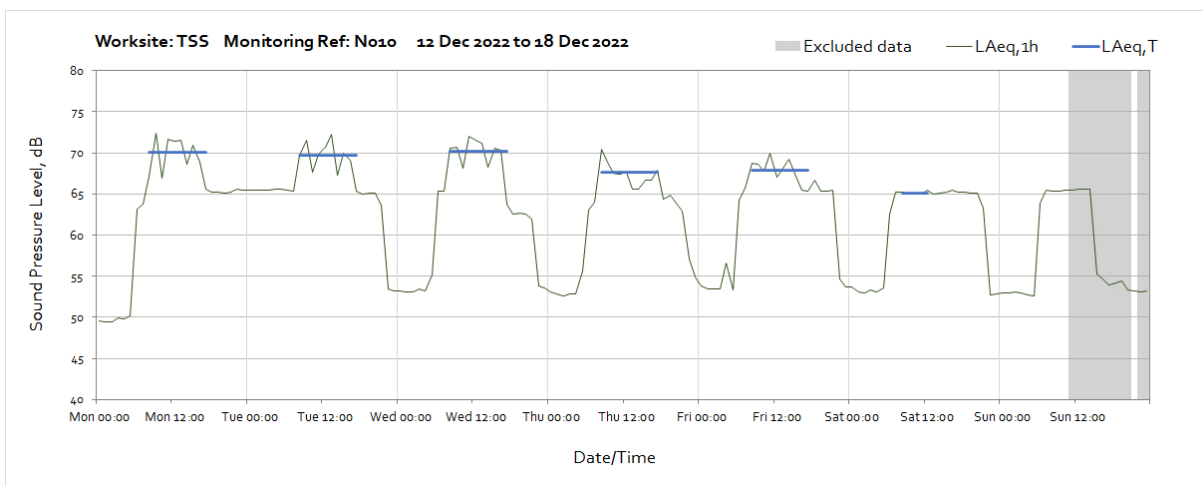
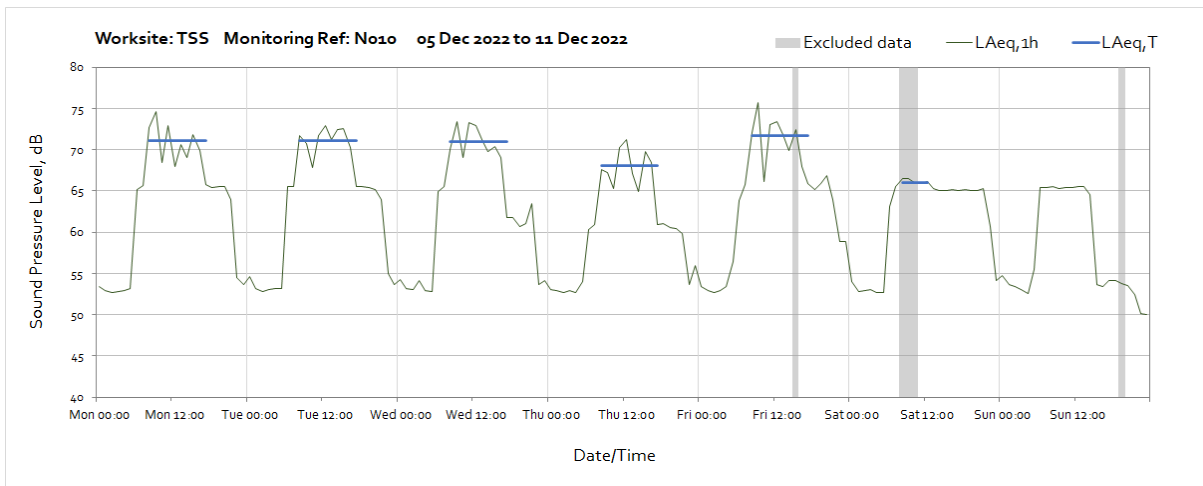
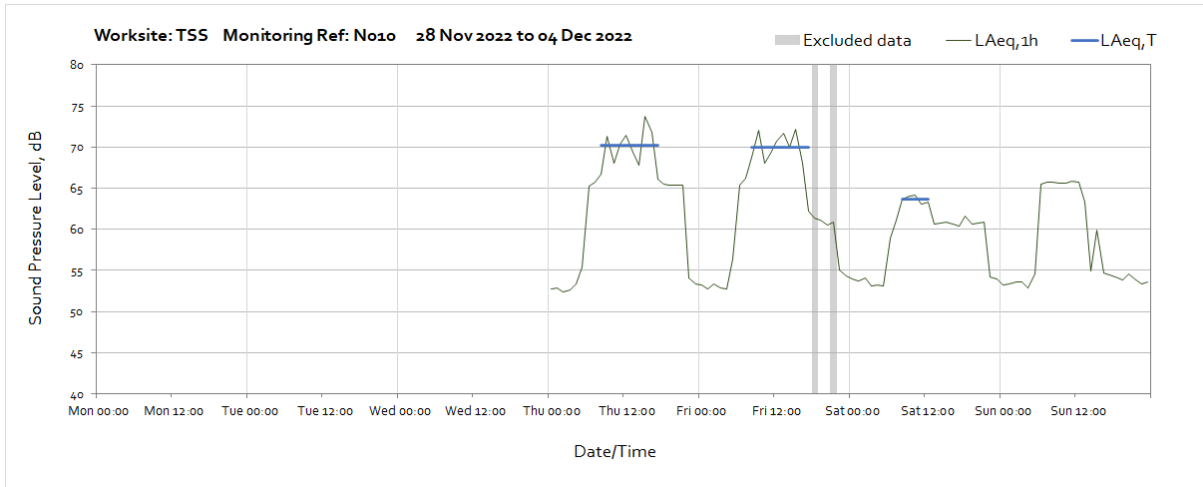
Note: Increase in noise levels at 23:00 on Saturday 31st December was due to new year celebrations.

Worksite: TSS – Monitoring Ref: N008

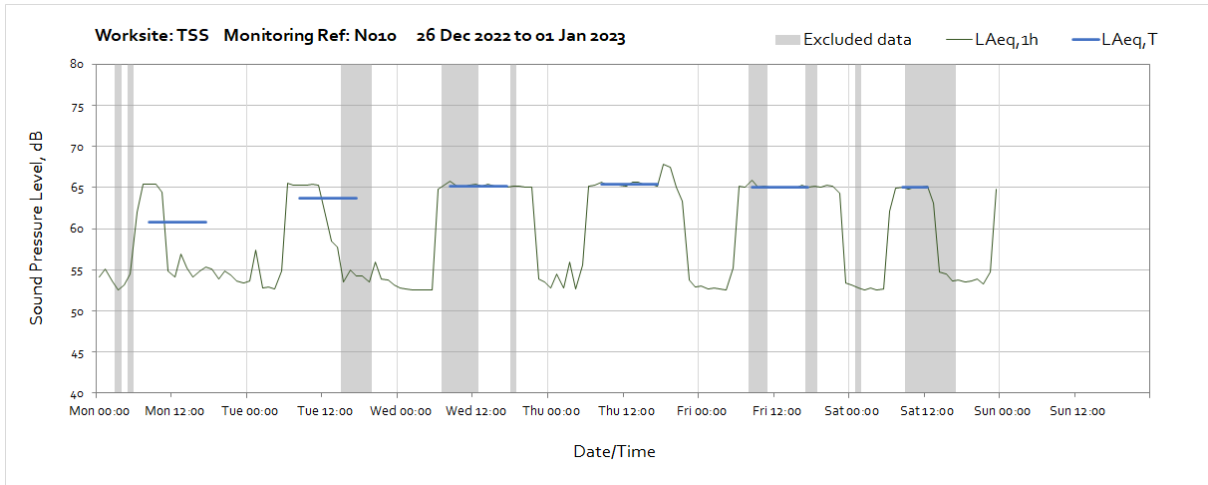
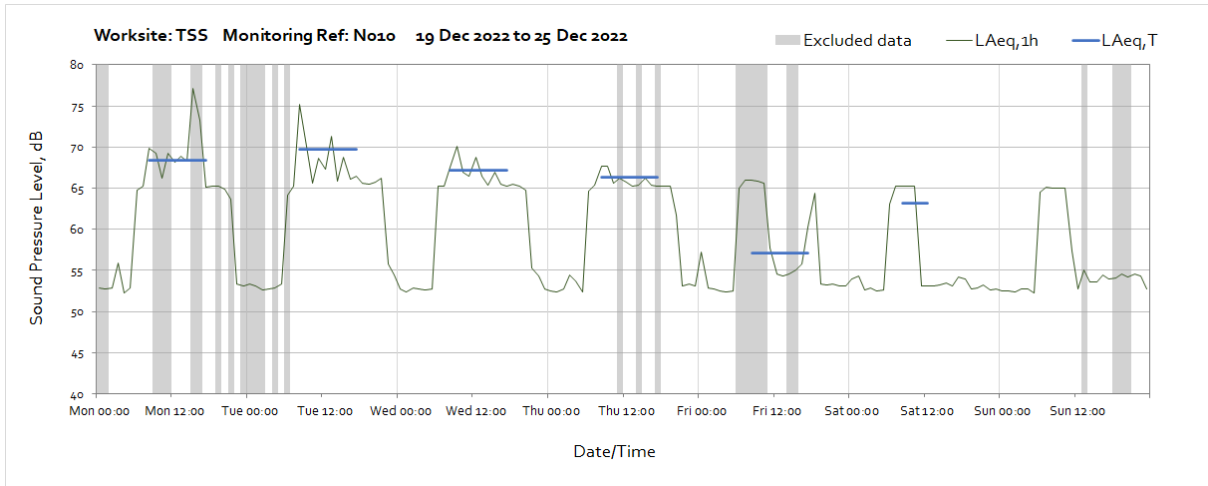




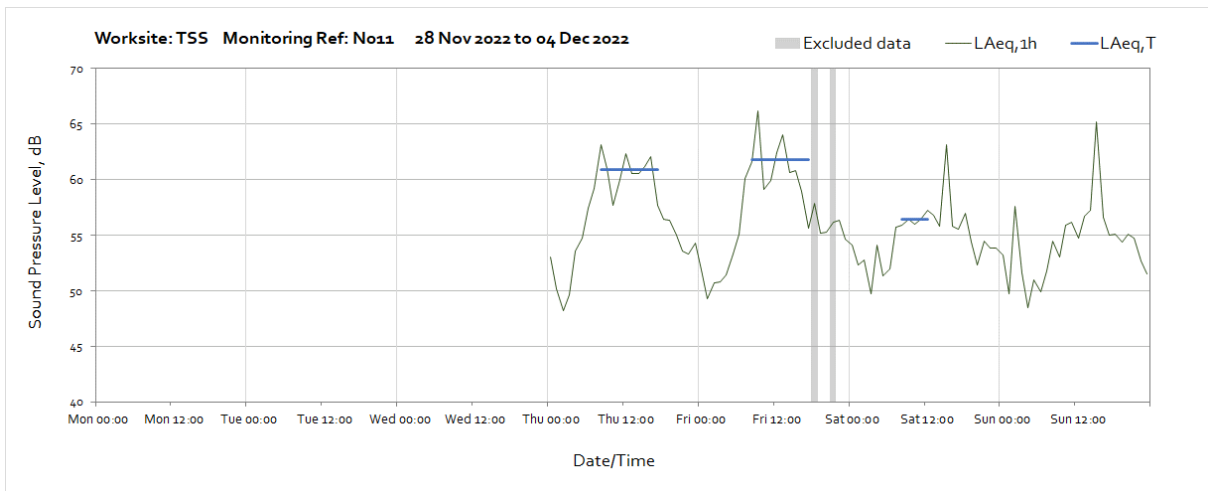
Worksite: TSS – Monitoring Ref: N010

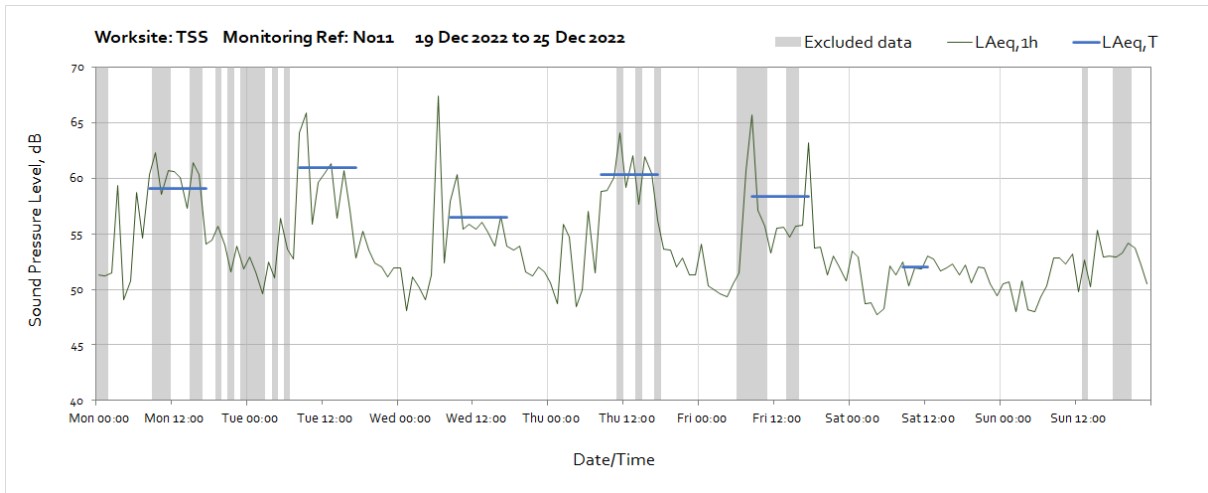
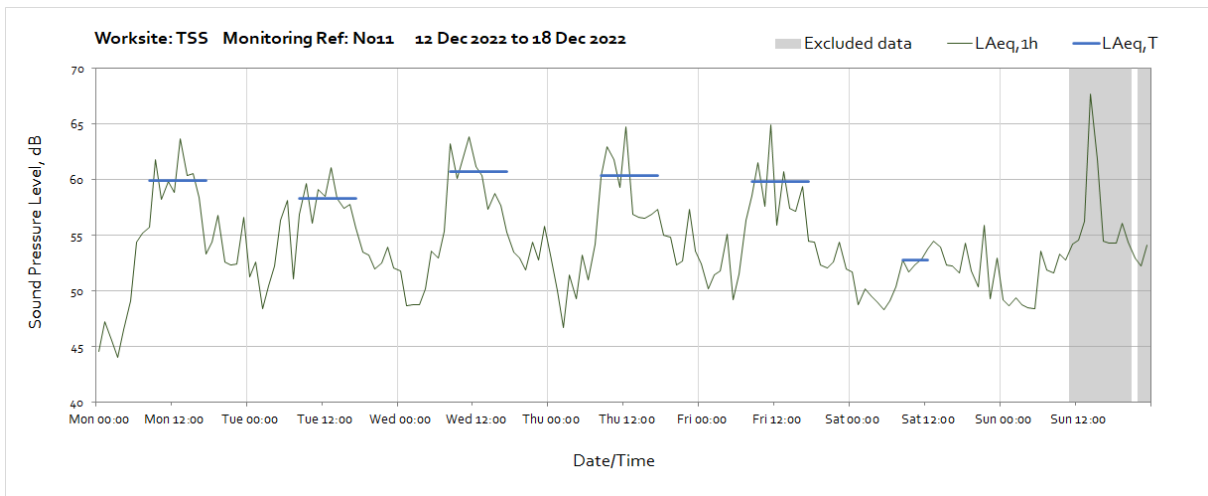
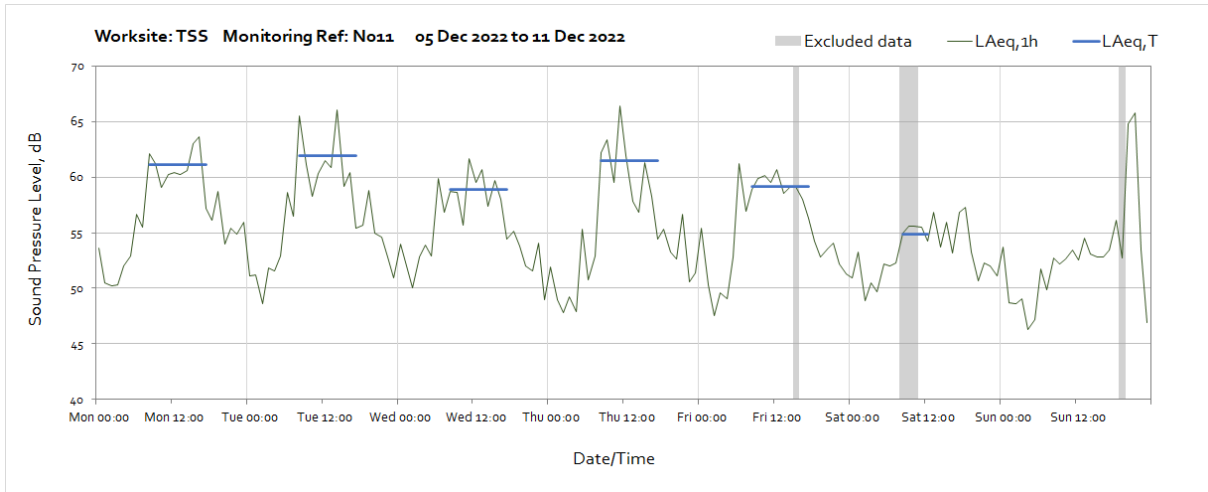


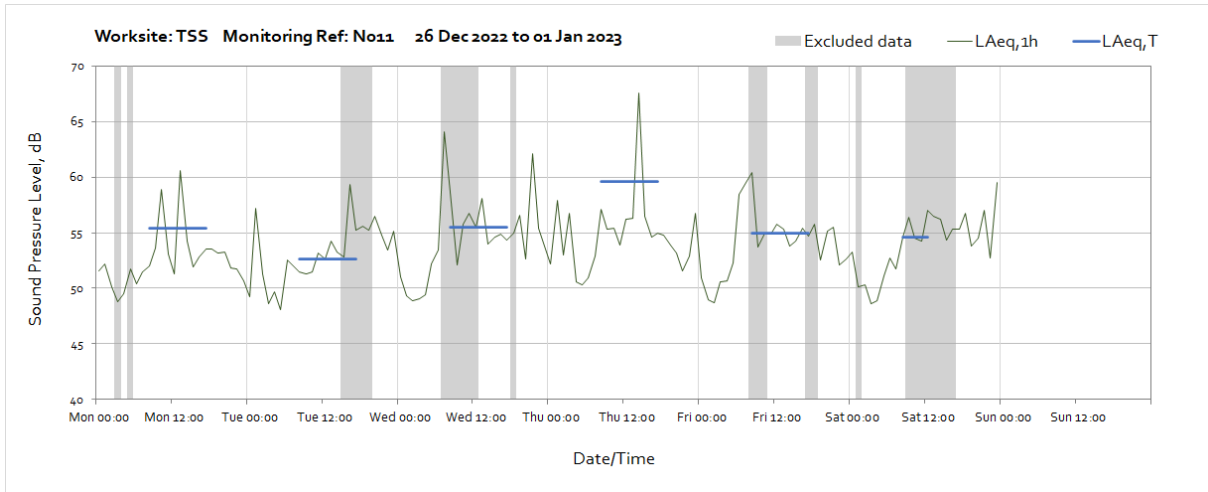
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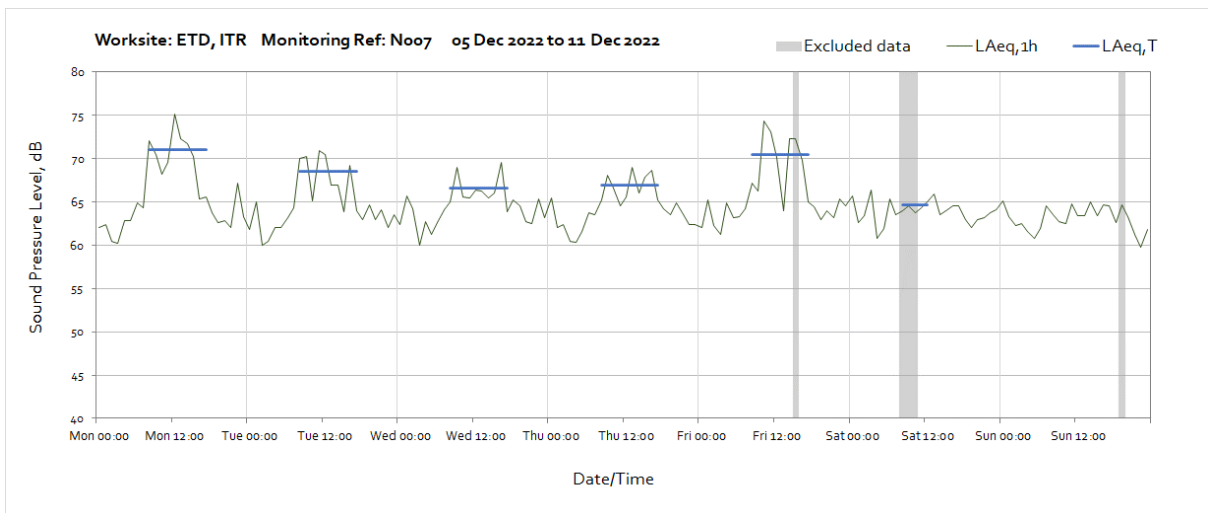
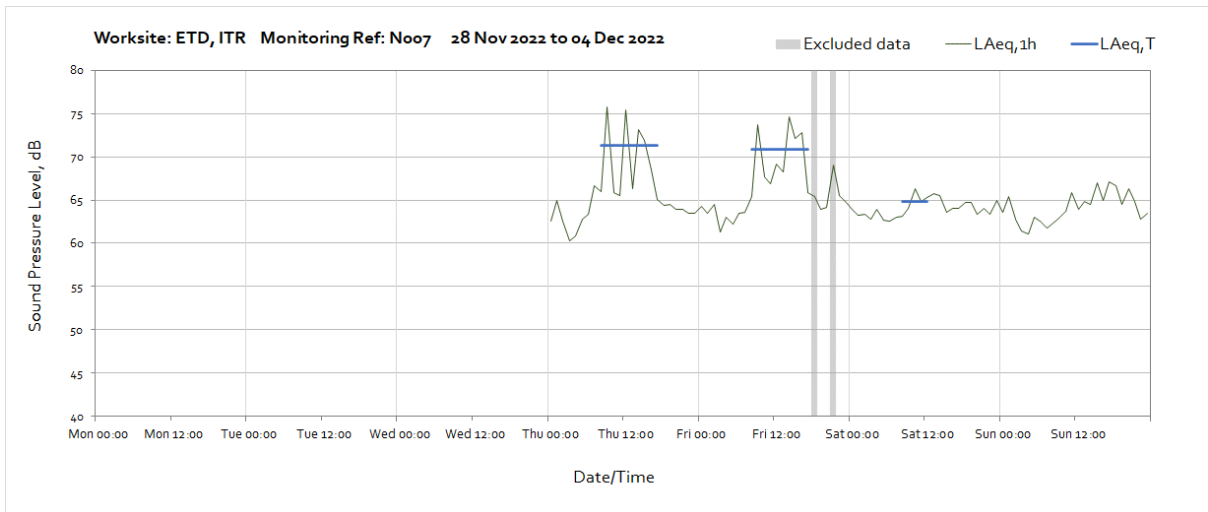
Worksite: TSS - Monitoring Ref: N011

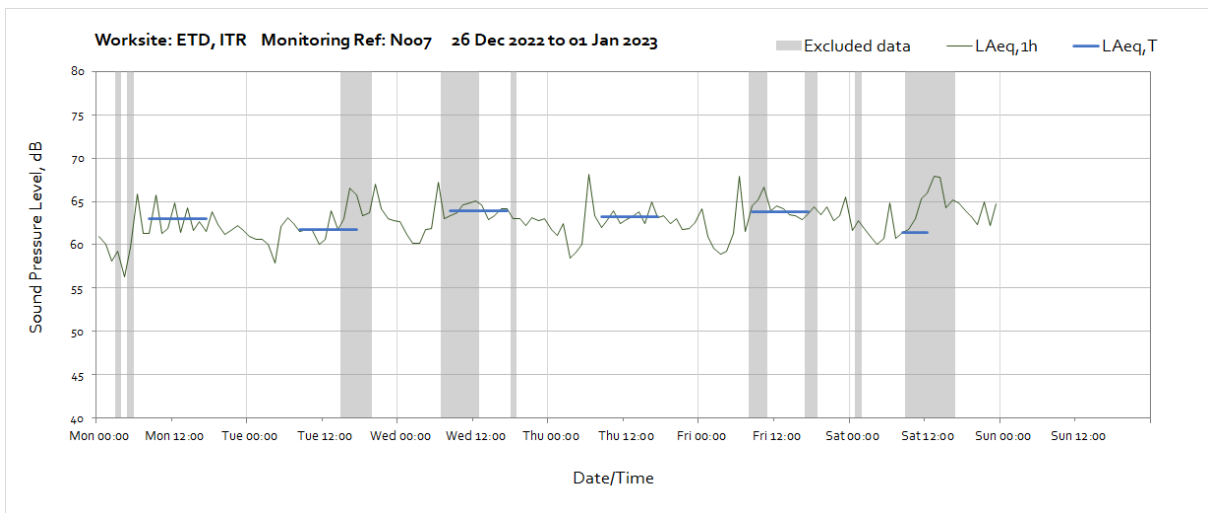
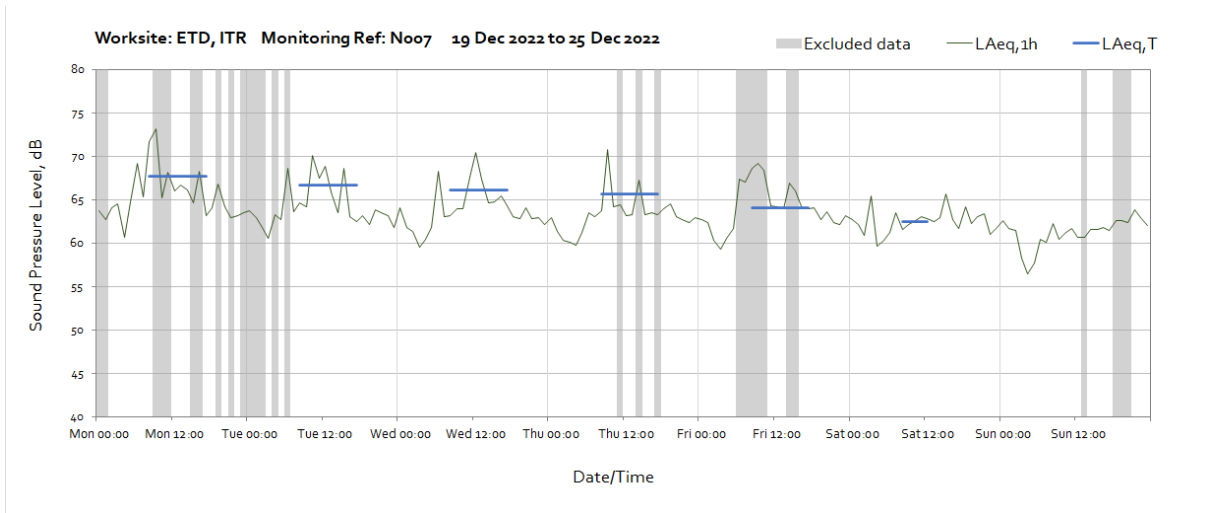
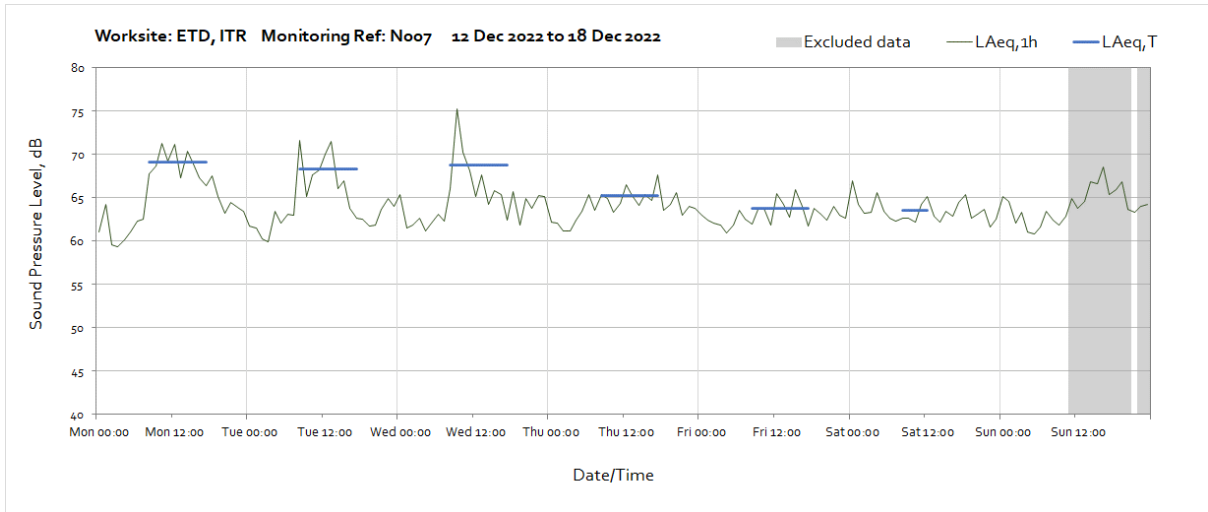




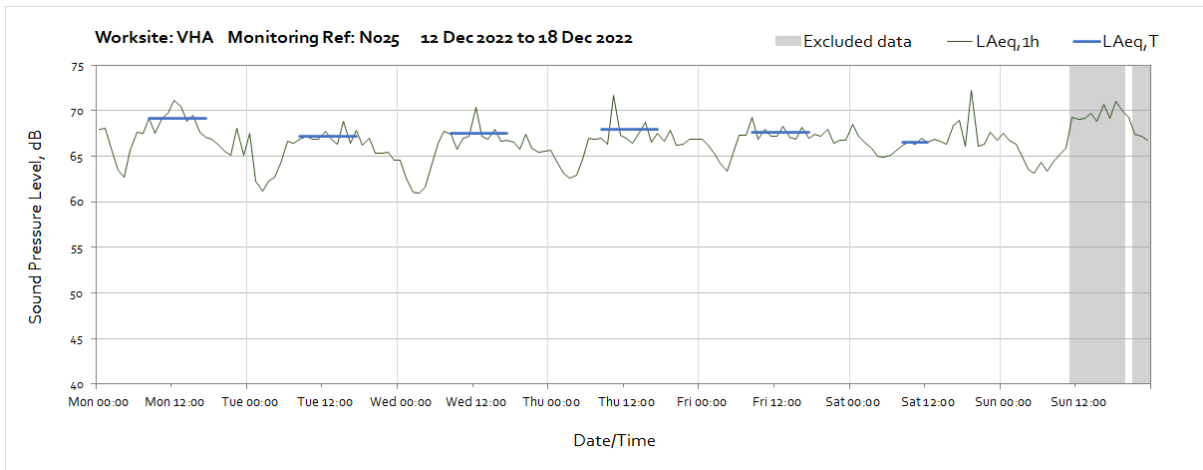
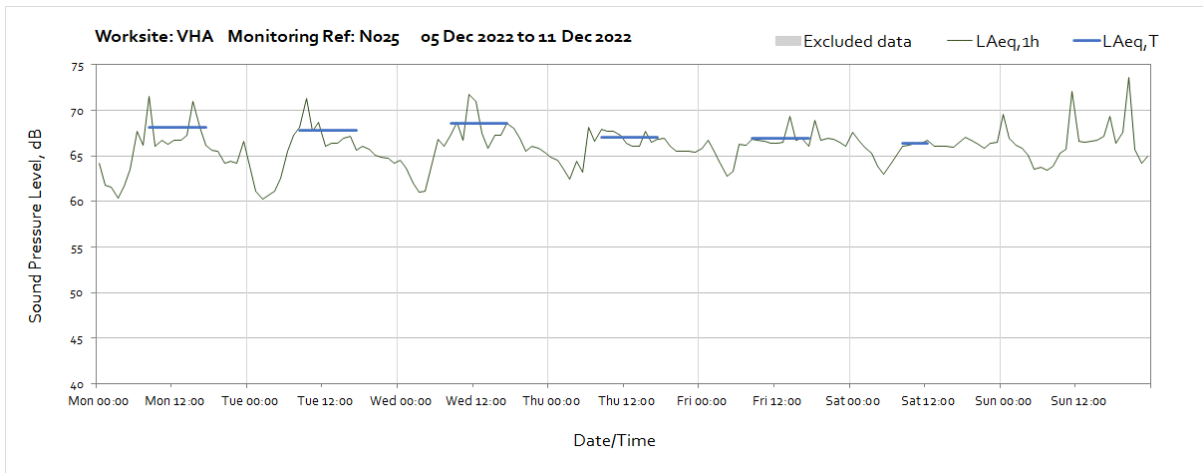
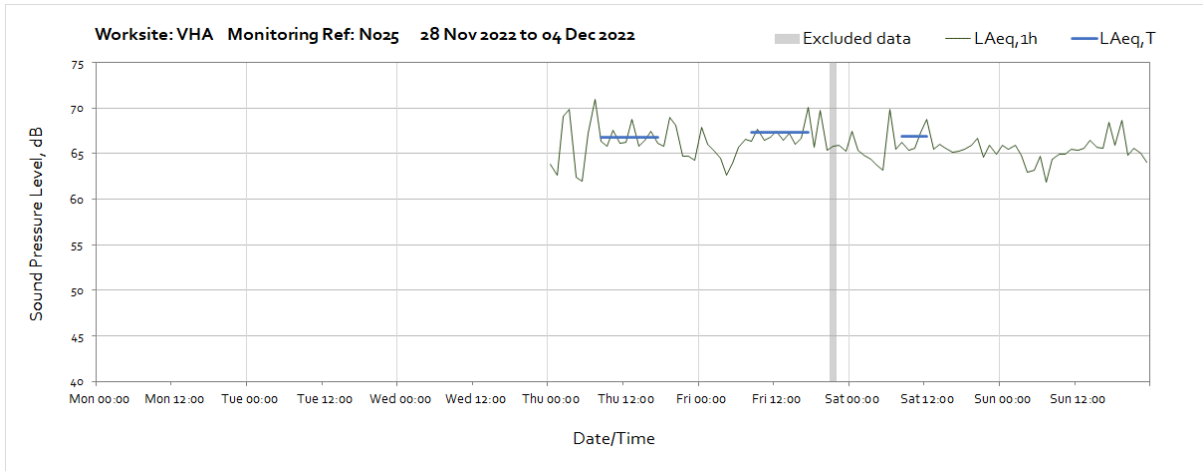


Worksite: ETD, ITR – Monitoring Ref: N007

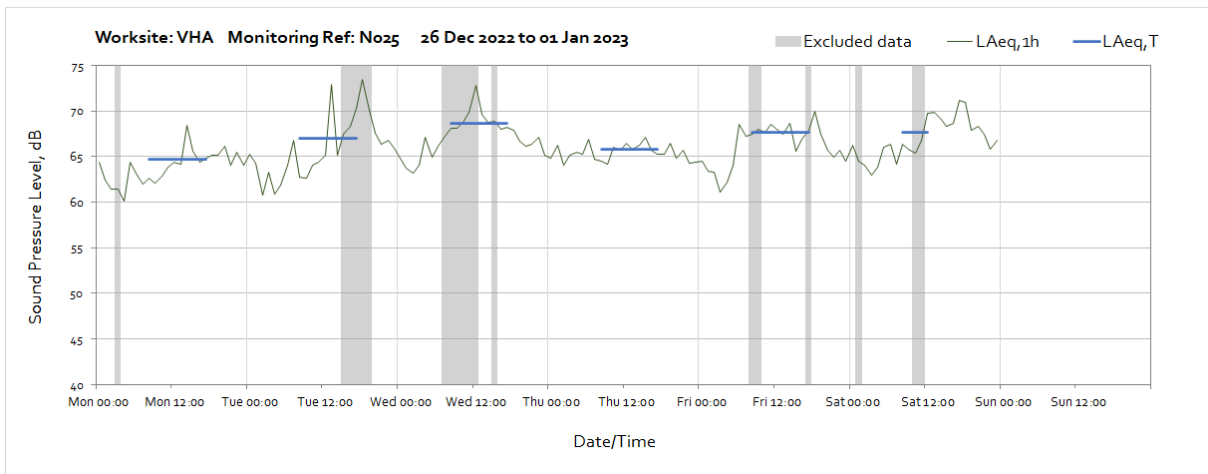
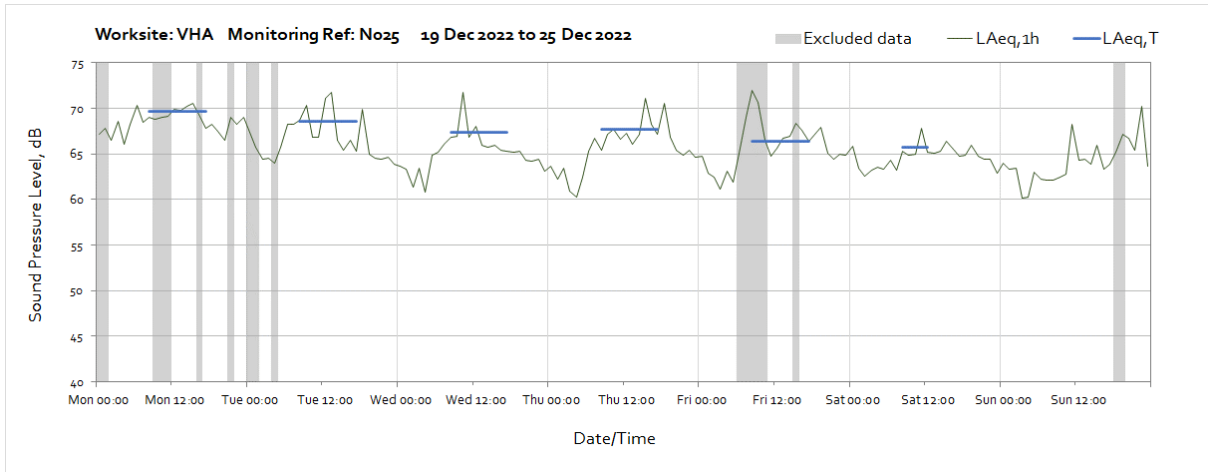




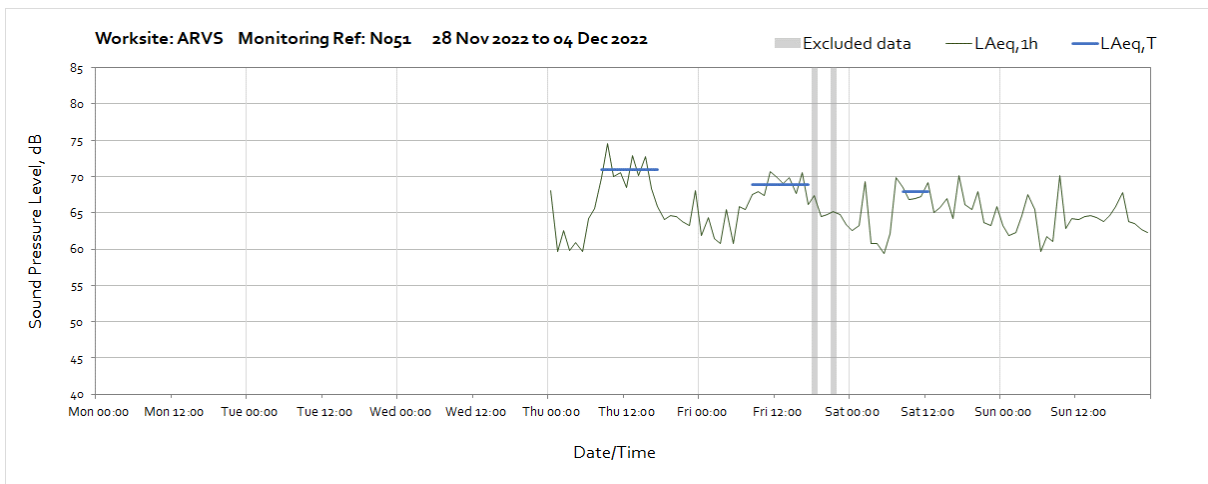
Vehicle Holding Area (VHA) – Monitoring Ref: N025

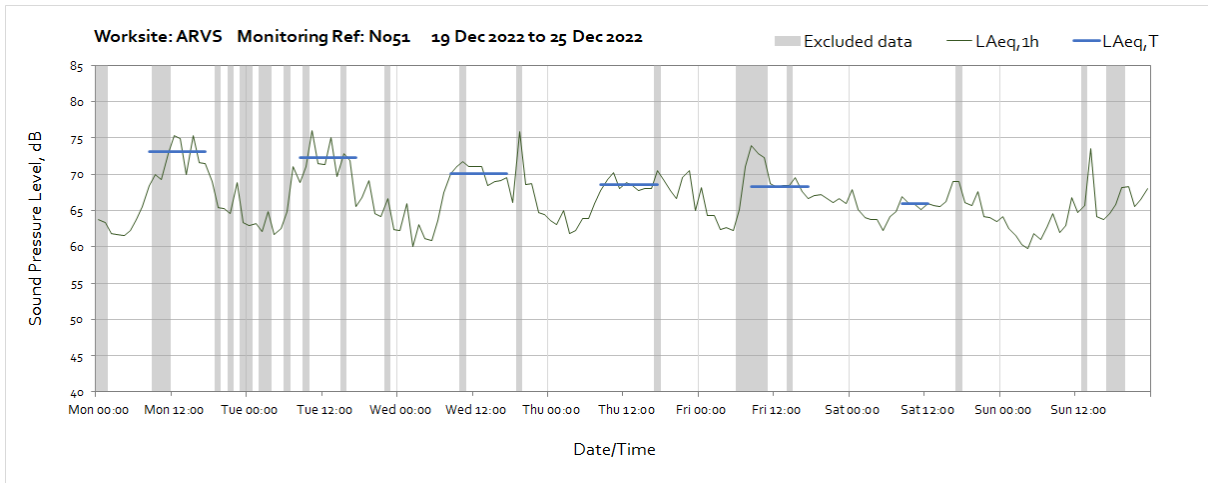
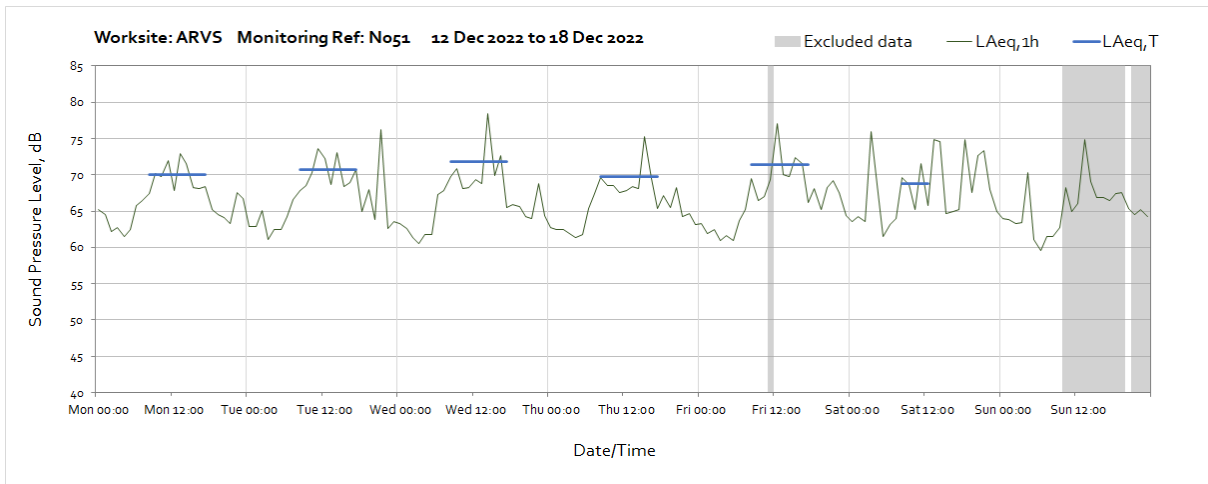
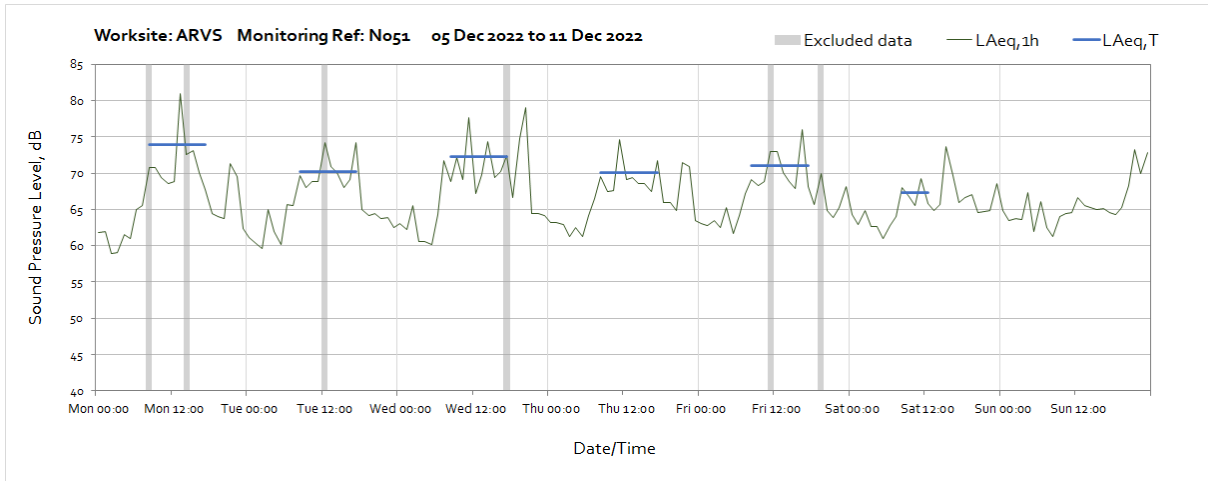


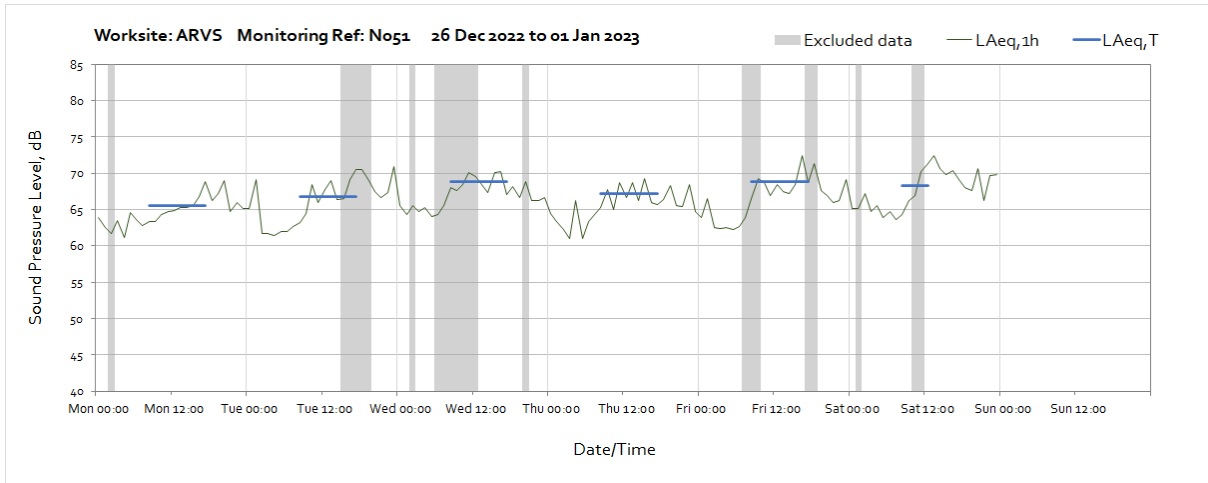
OFFICIAL



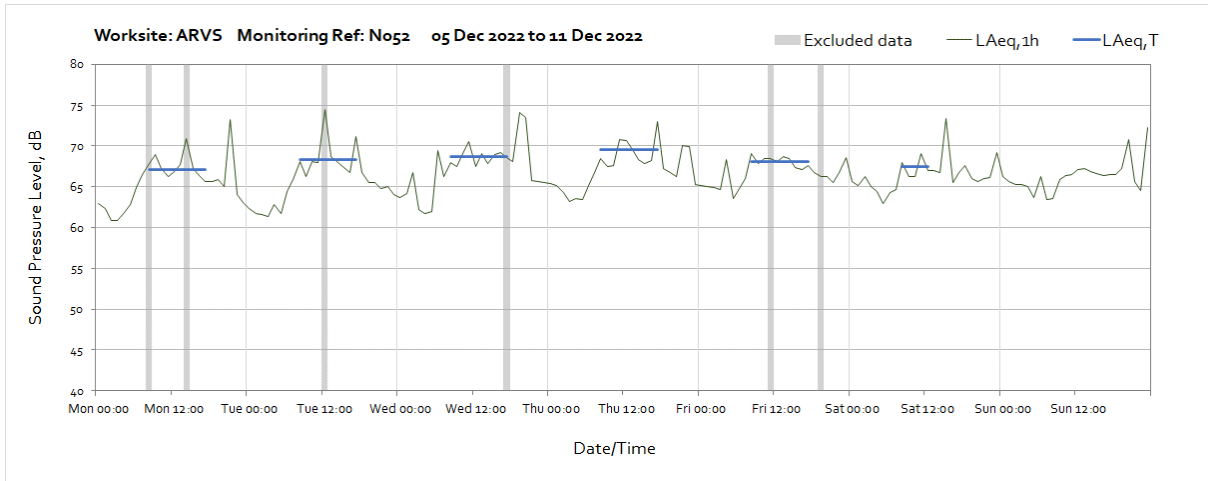
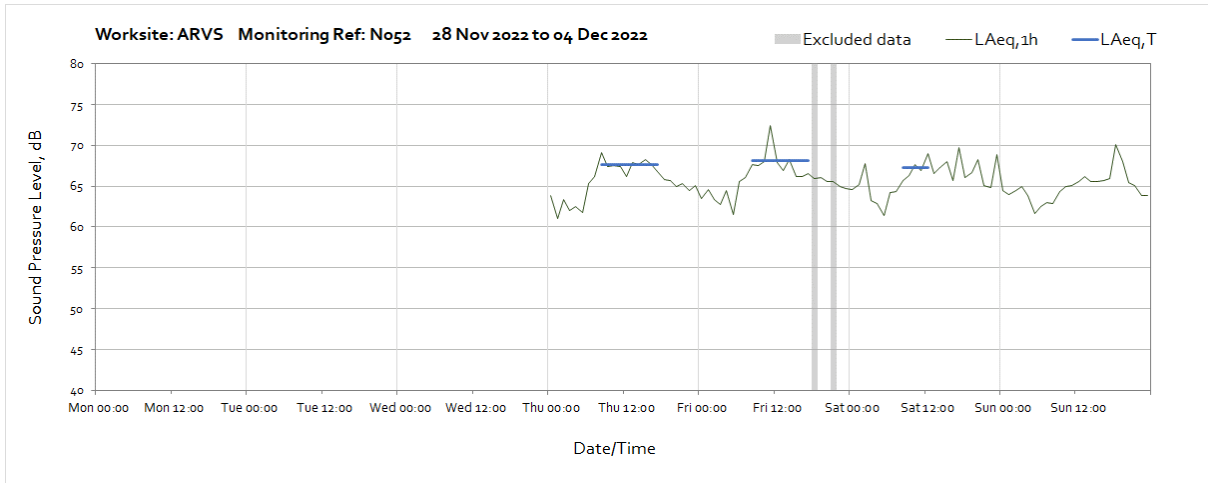
Adelaide Road Ventilation Shaft (ARVS) – Monitoring Ref: N051

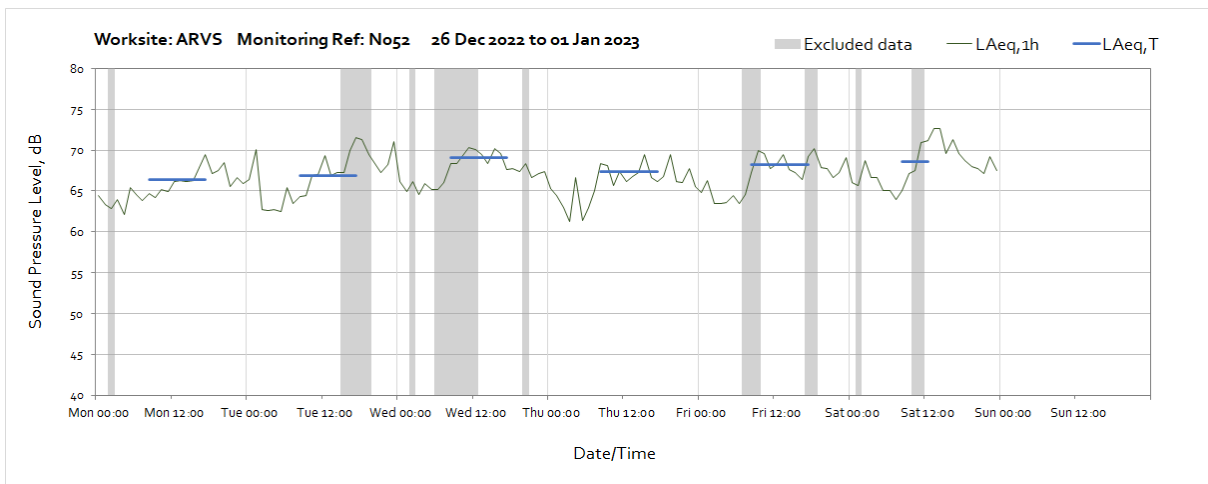
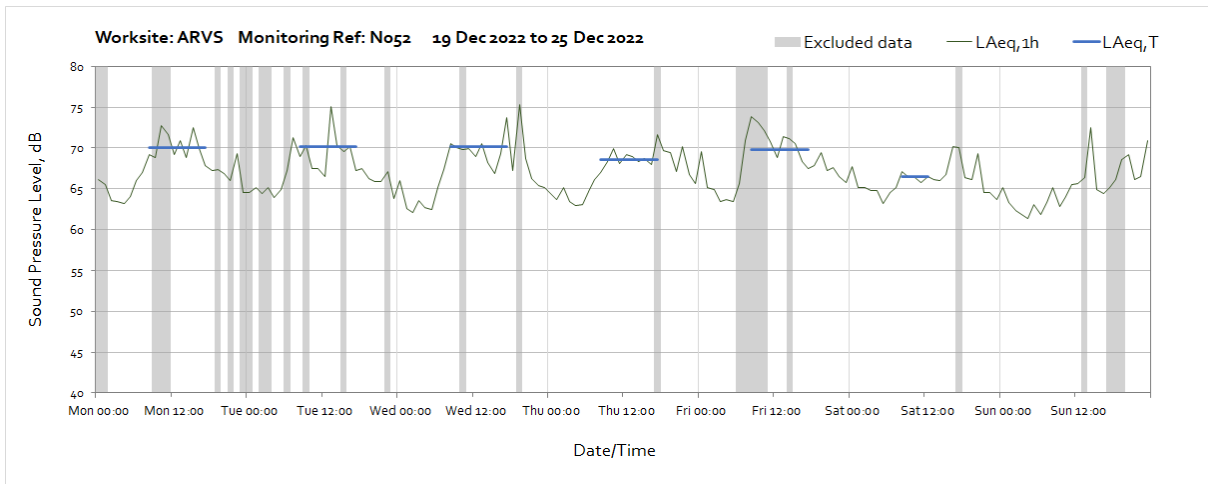
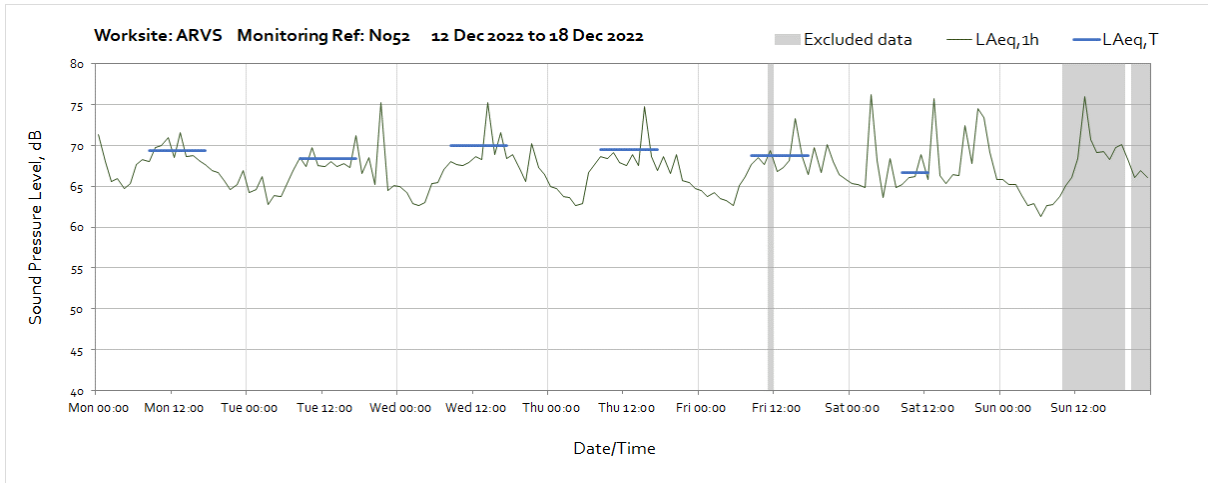






Adelaide Road Ventilation Shaft (ARVS) – Monitoring Ref: N052

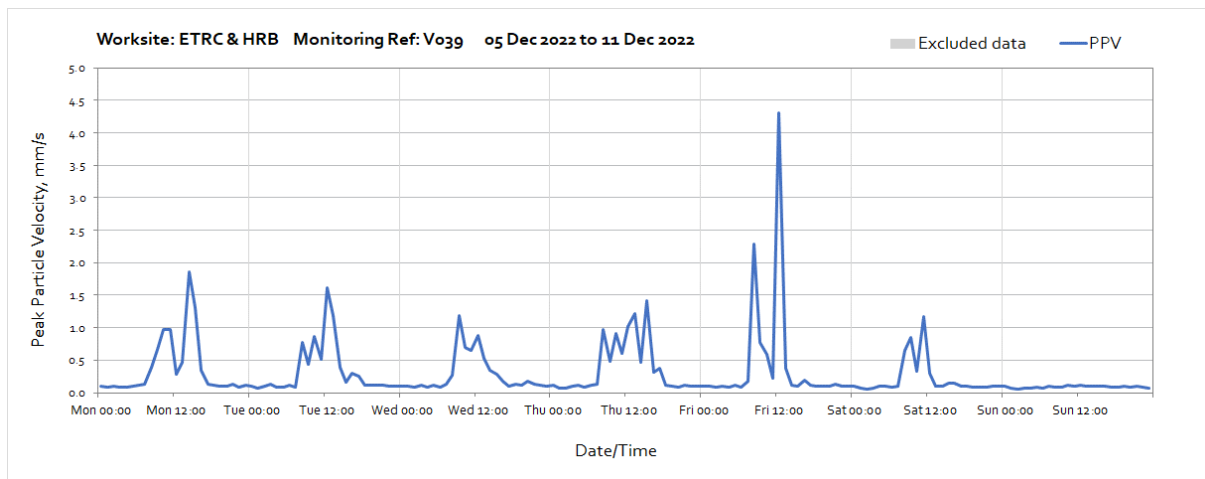
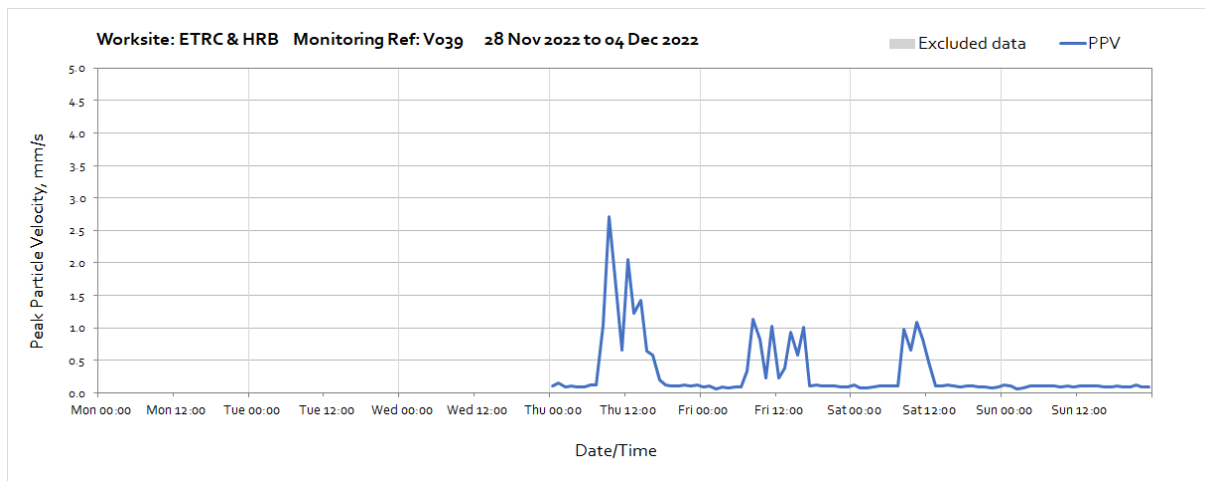


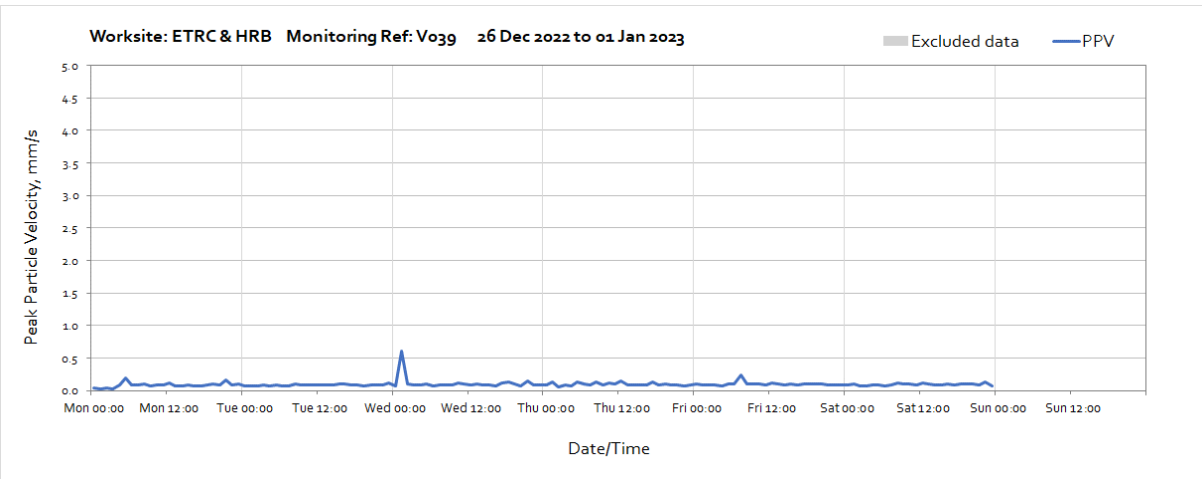
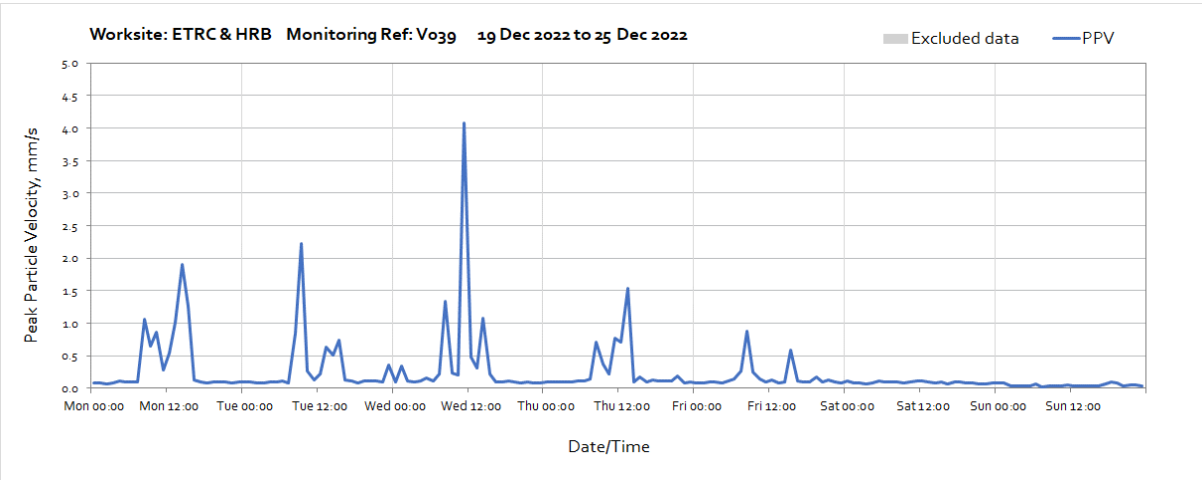
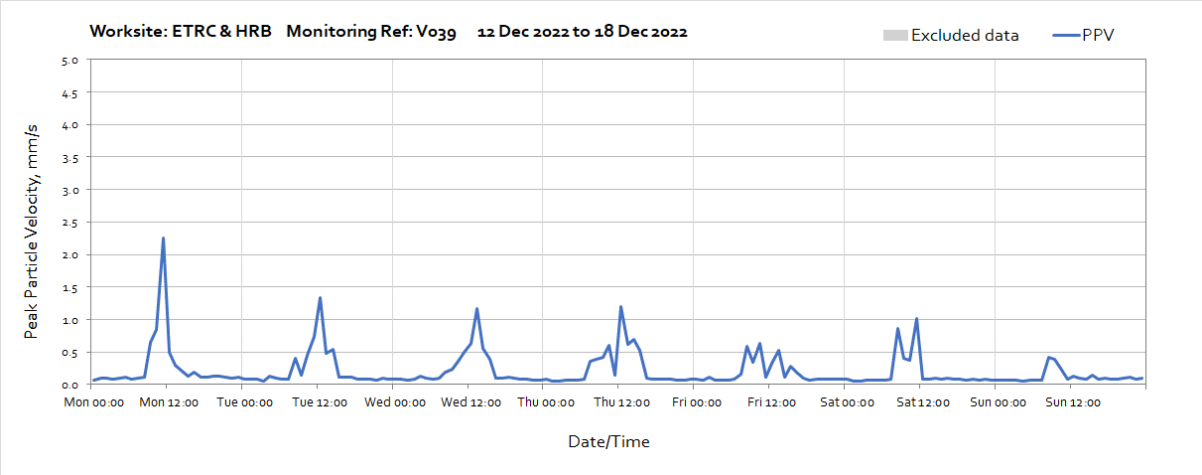


Vibration

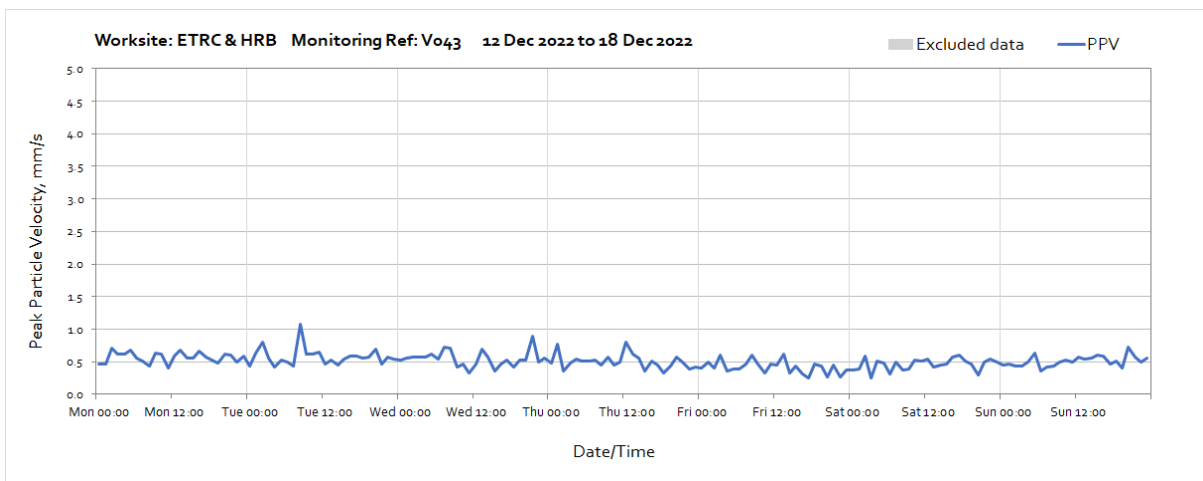
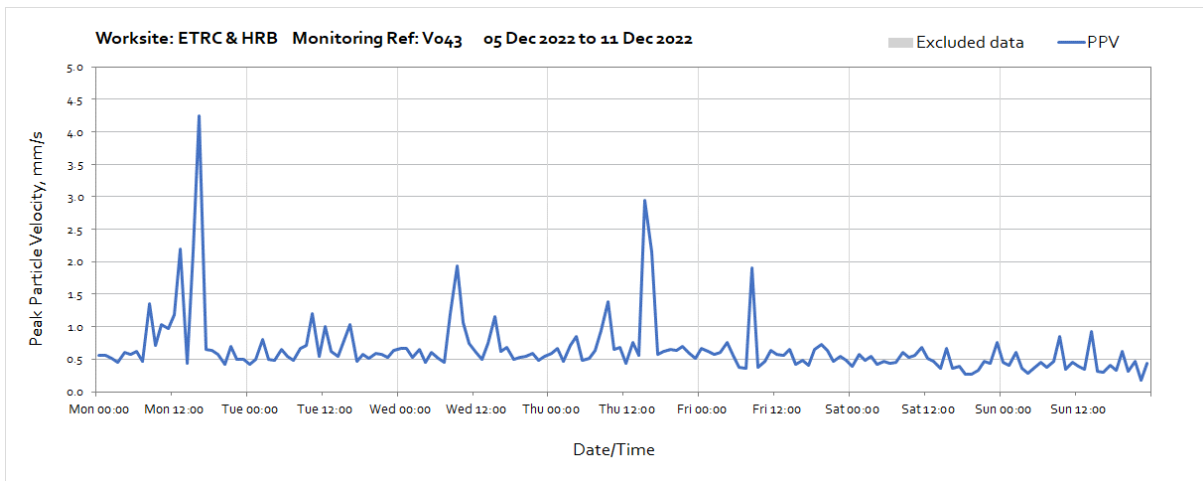
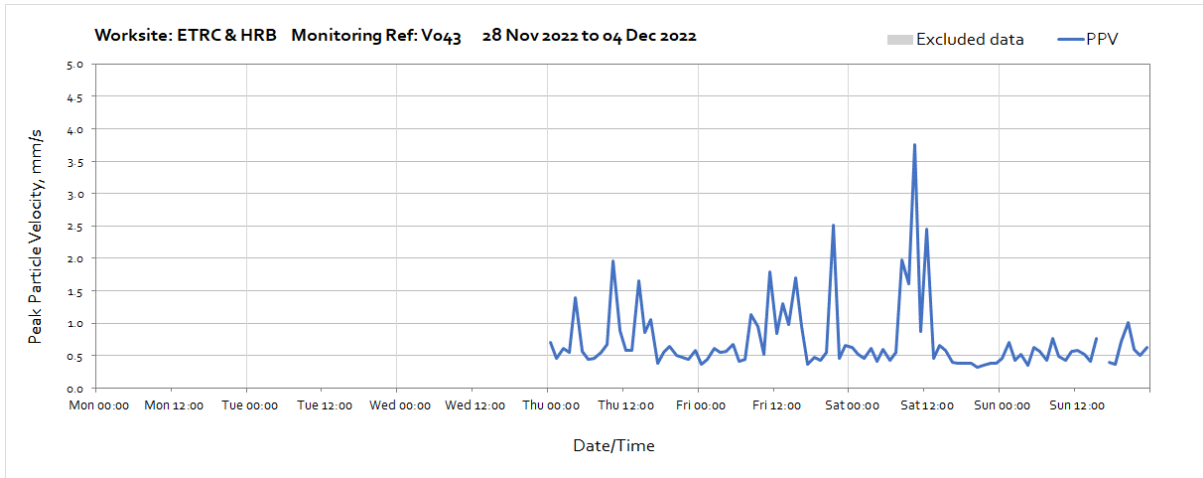
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axes x, y and z. Where resultant PPV data is not available (monitors V039 and V043), the highest vibration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

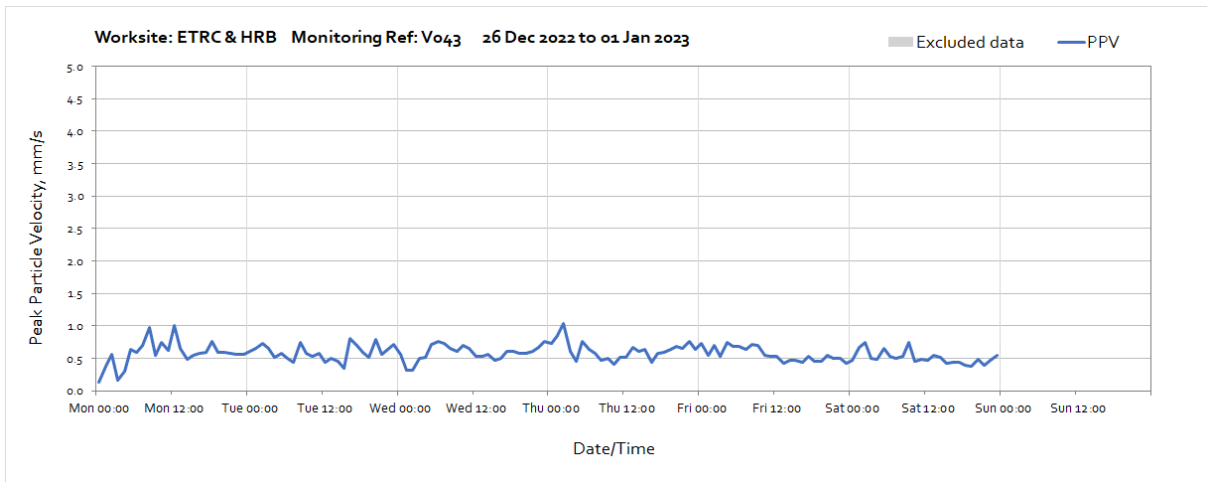
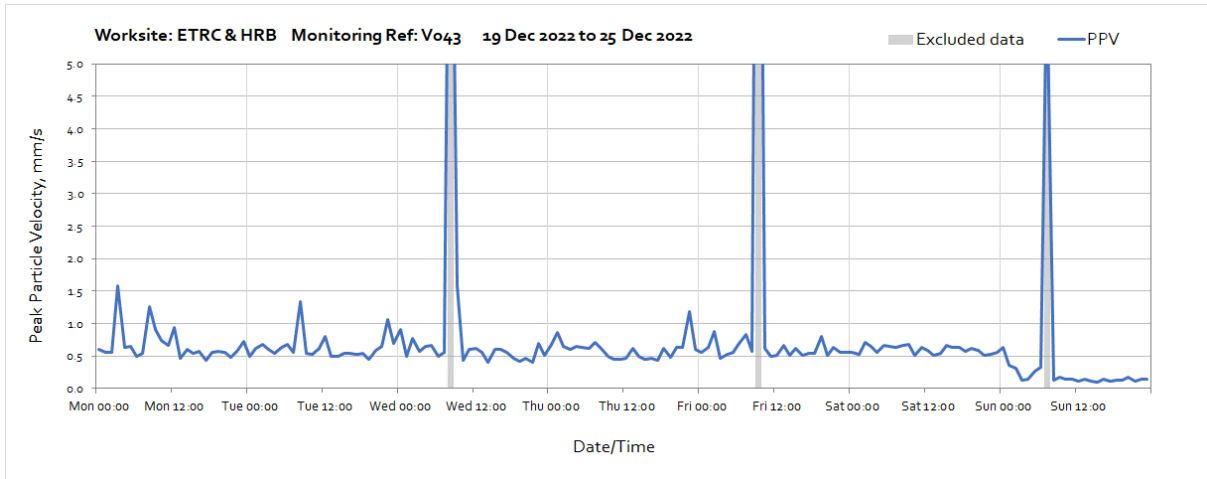
Worksite: ETRC & HRB – Monitoring Ref: V039



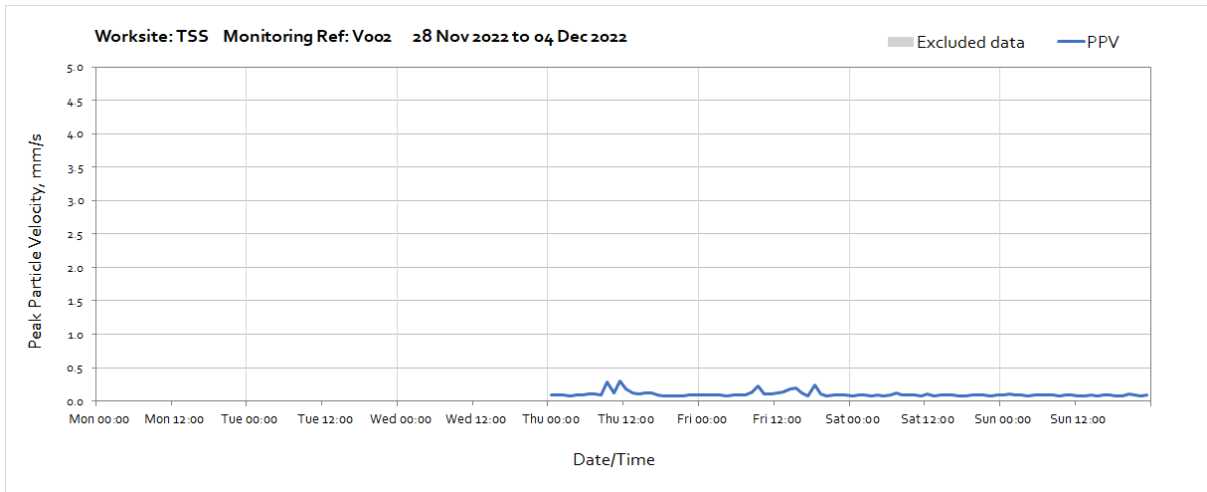


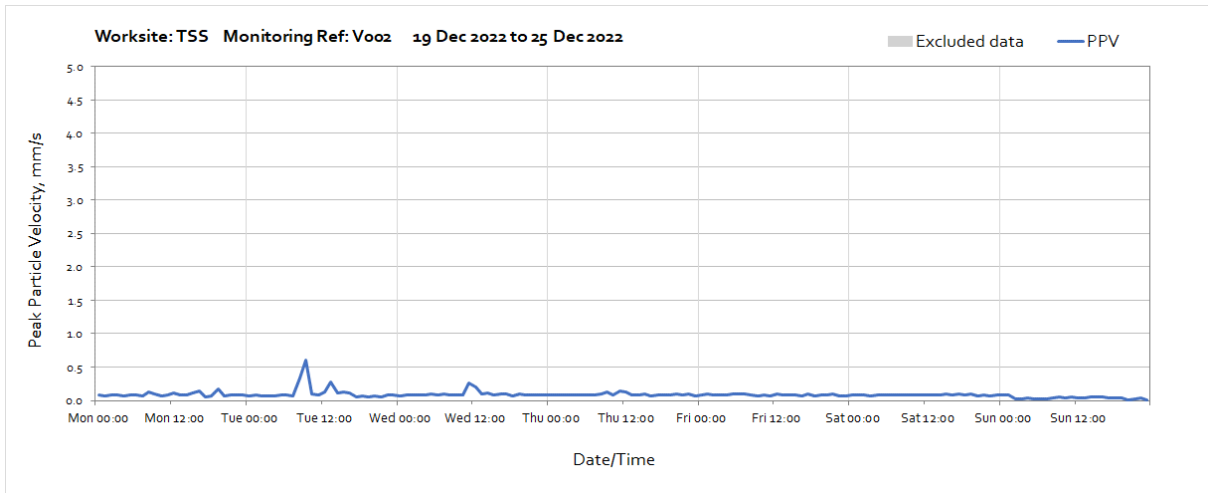
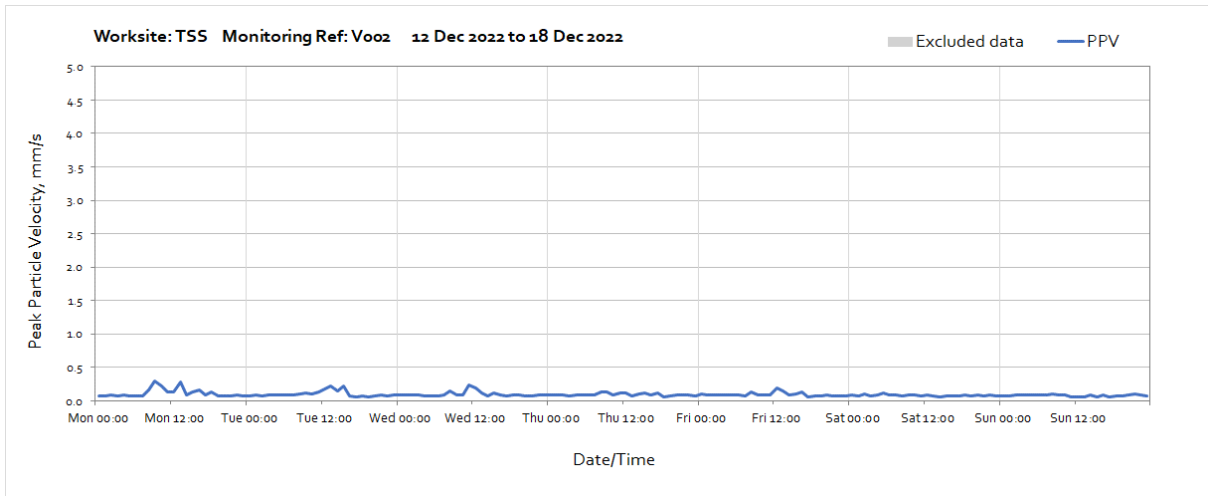
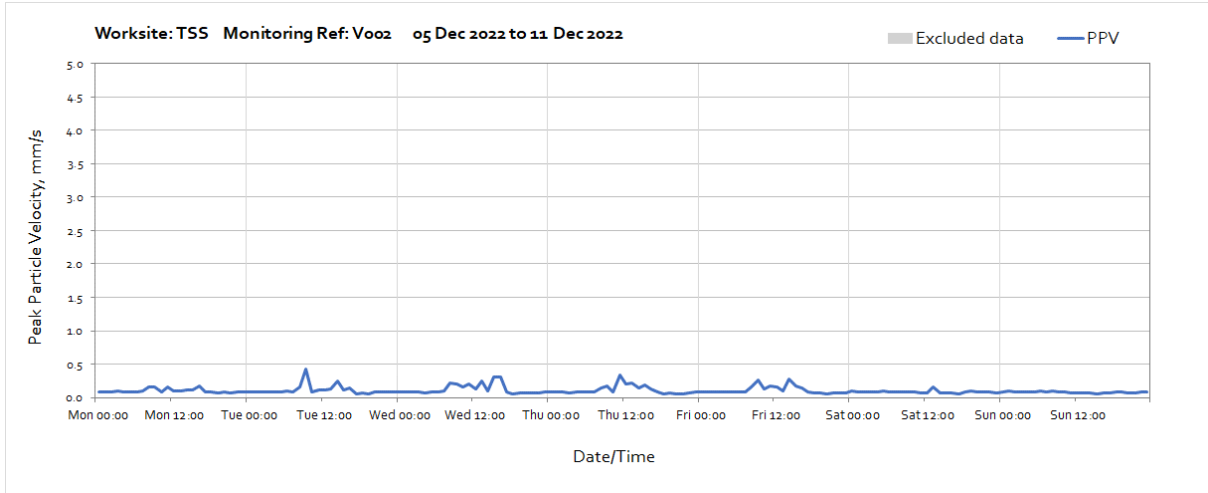
Worksite: ETRC & HRB – Monitoring Ref: V043

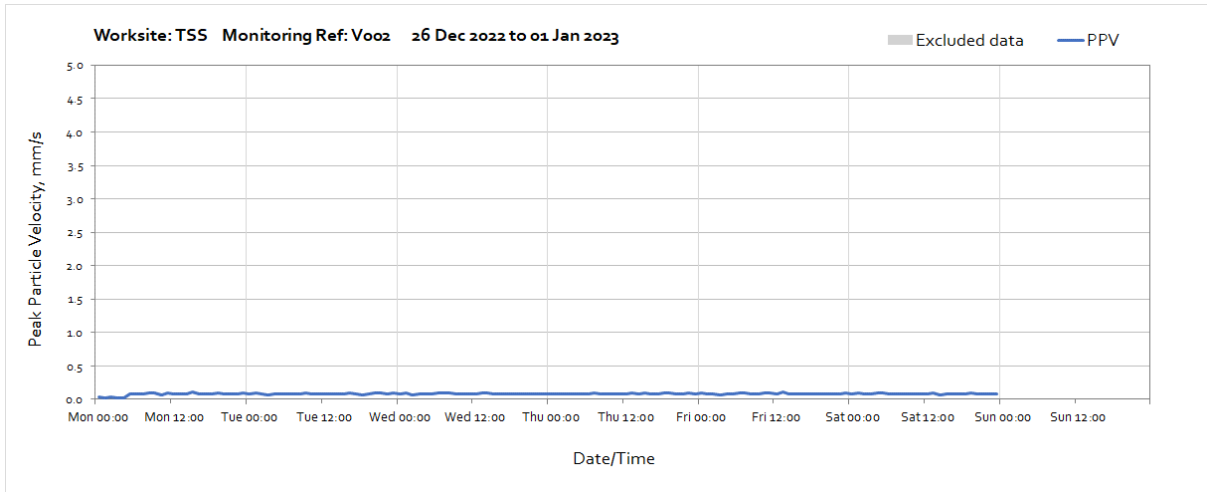




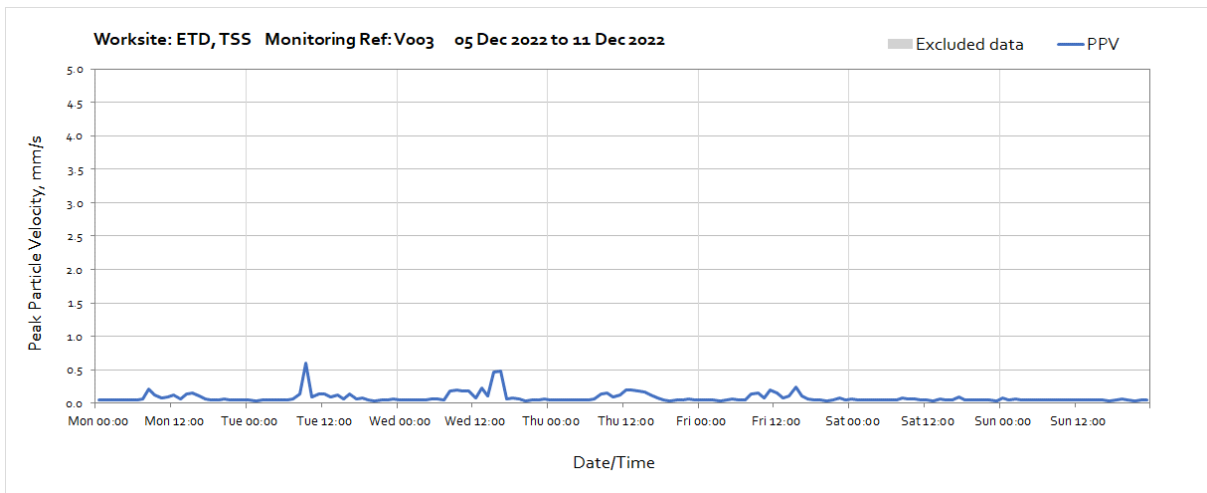
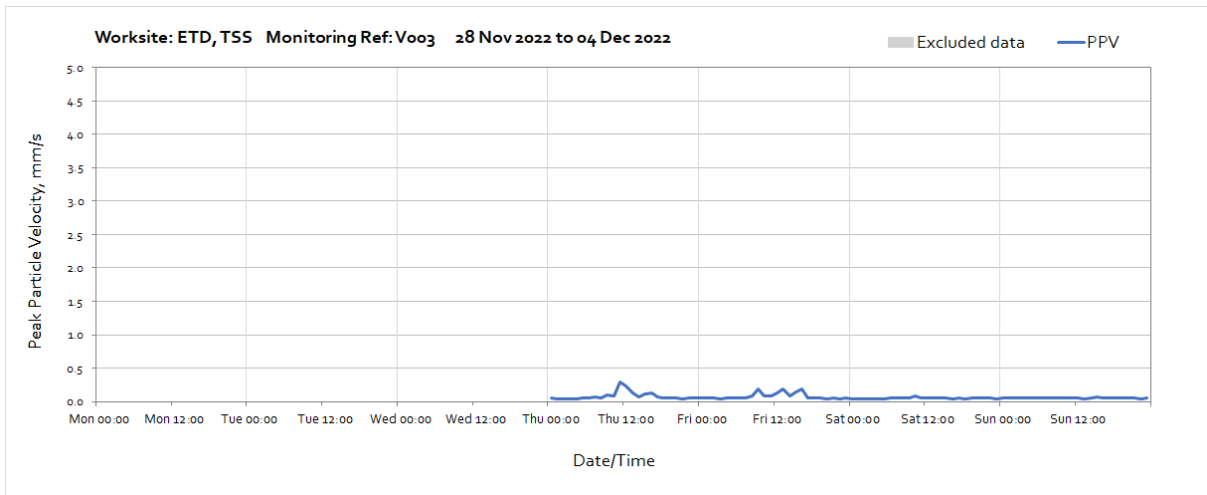
Worksite: TSS - Monitoring Ref: V002

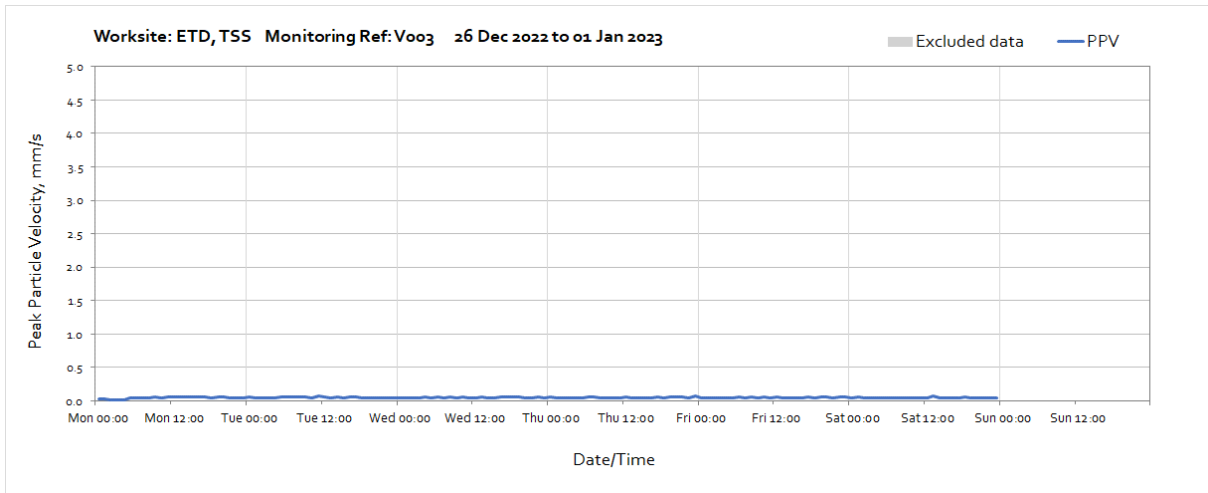
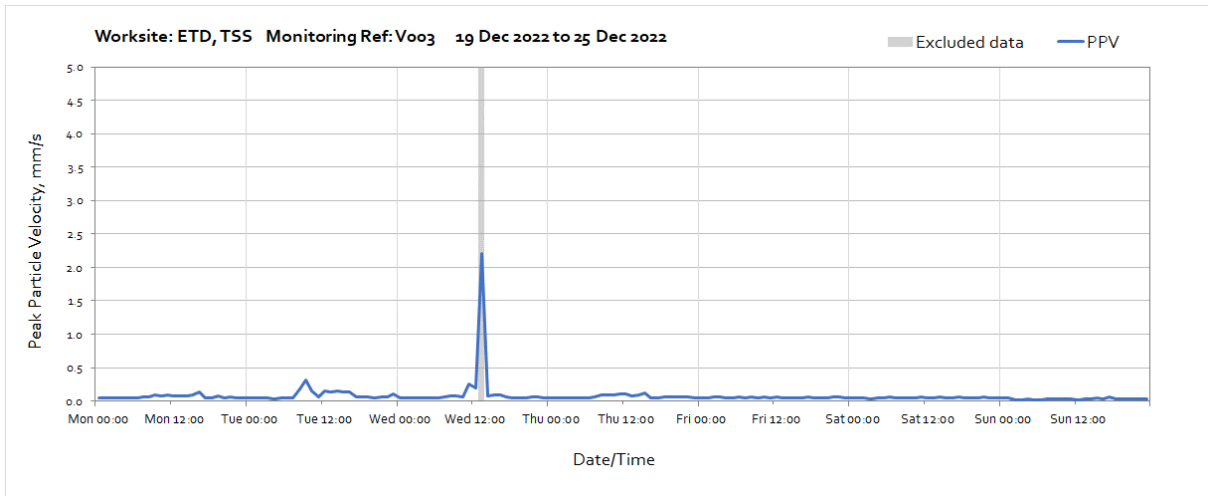
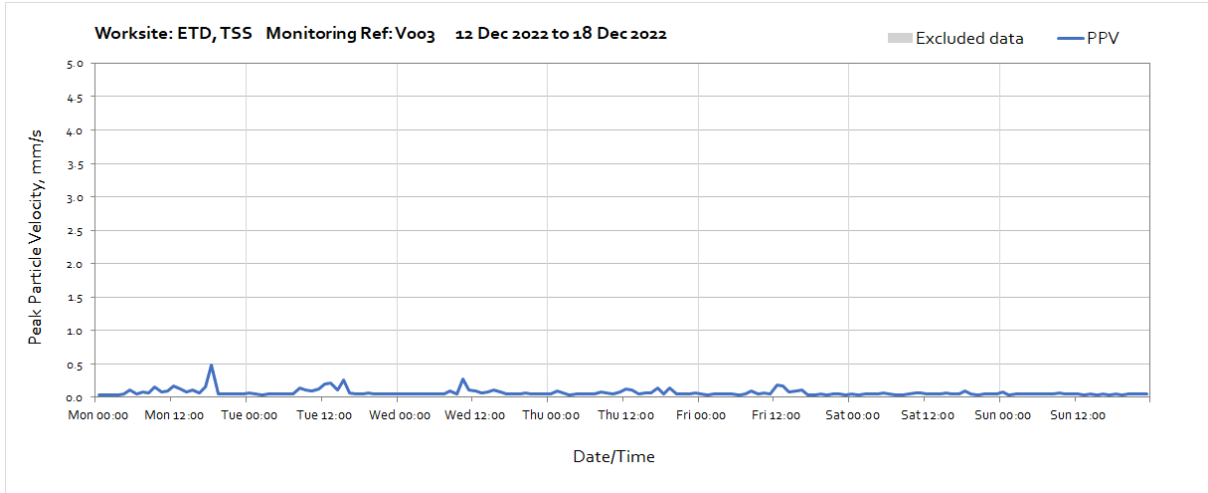




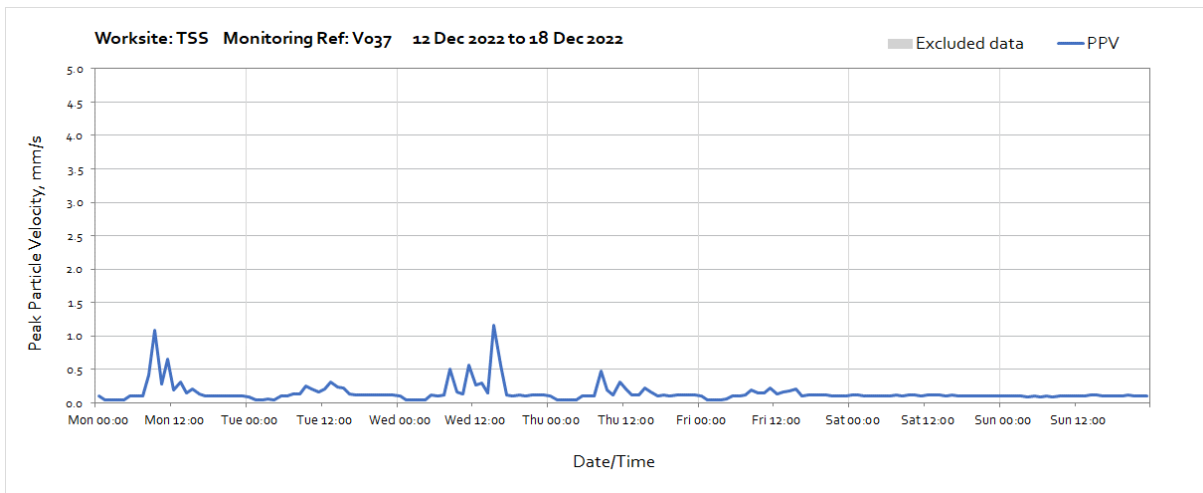
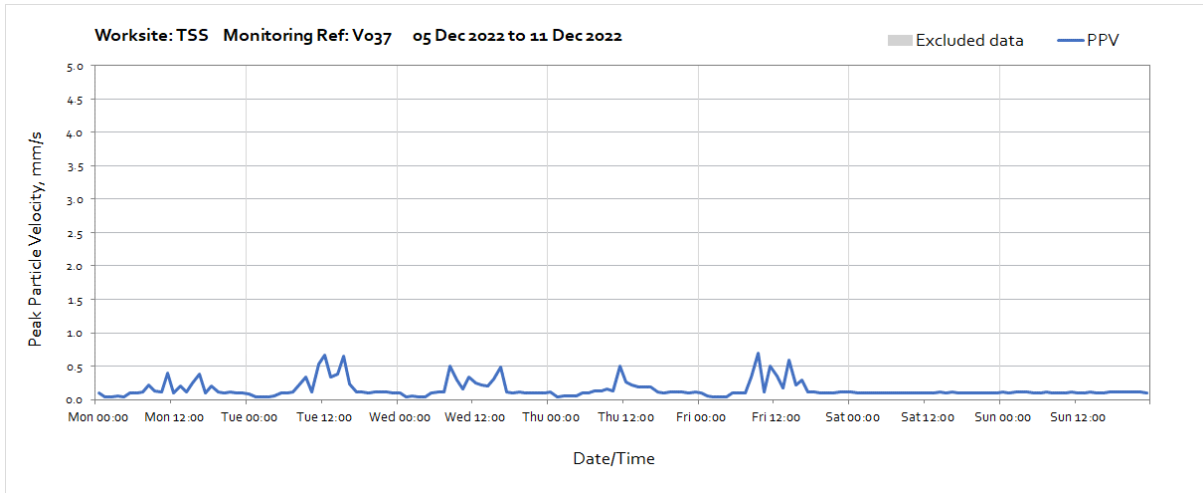
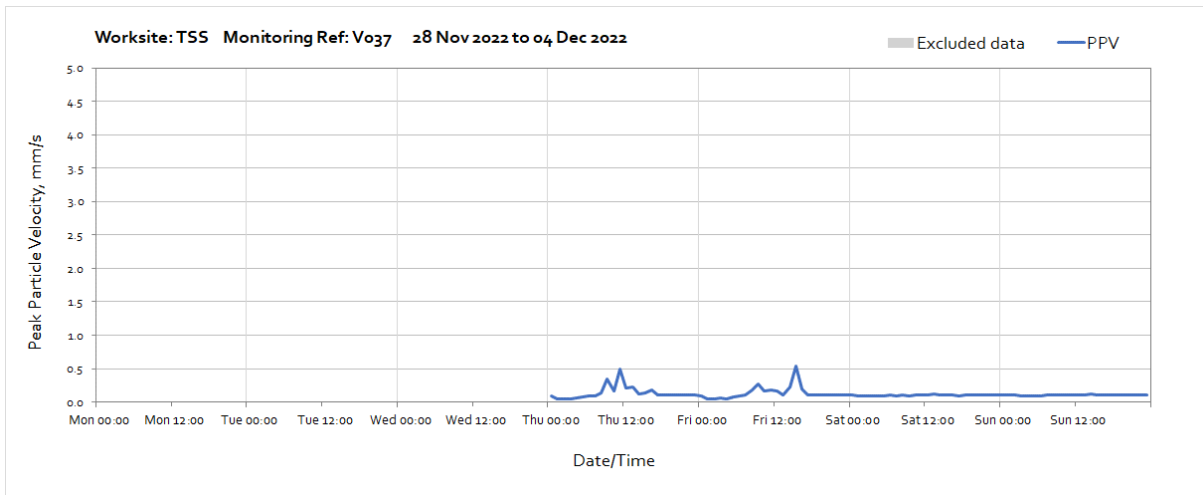


Worksite: ETD, TSS – Monitoring Ref: V003

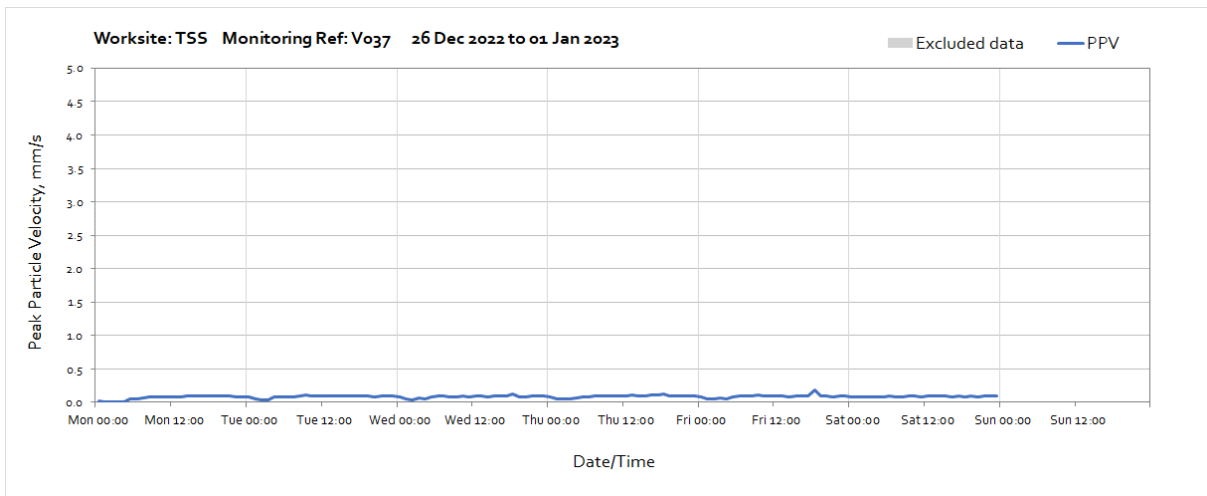
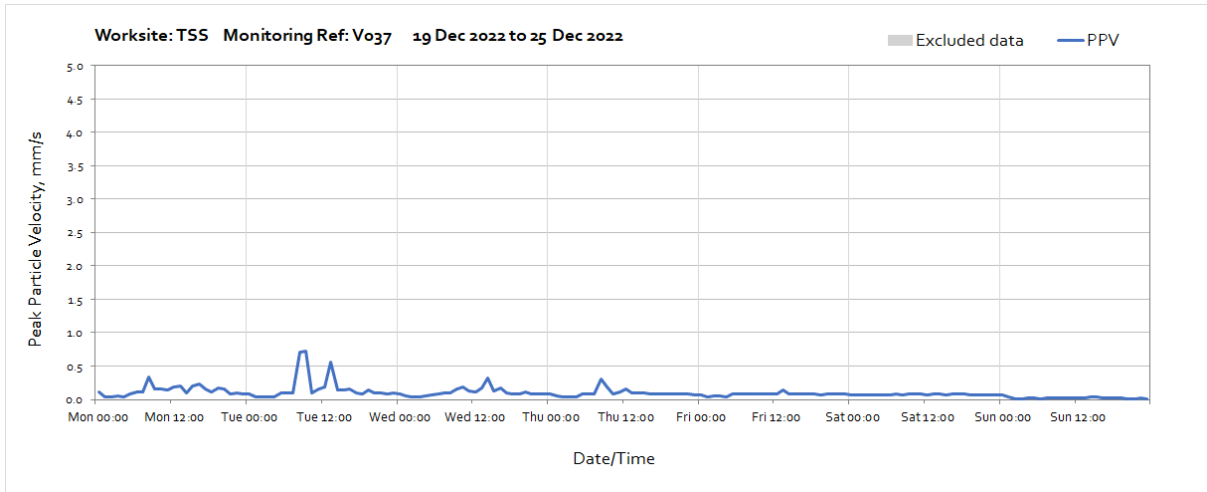




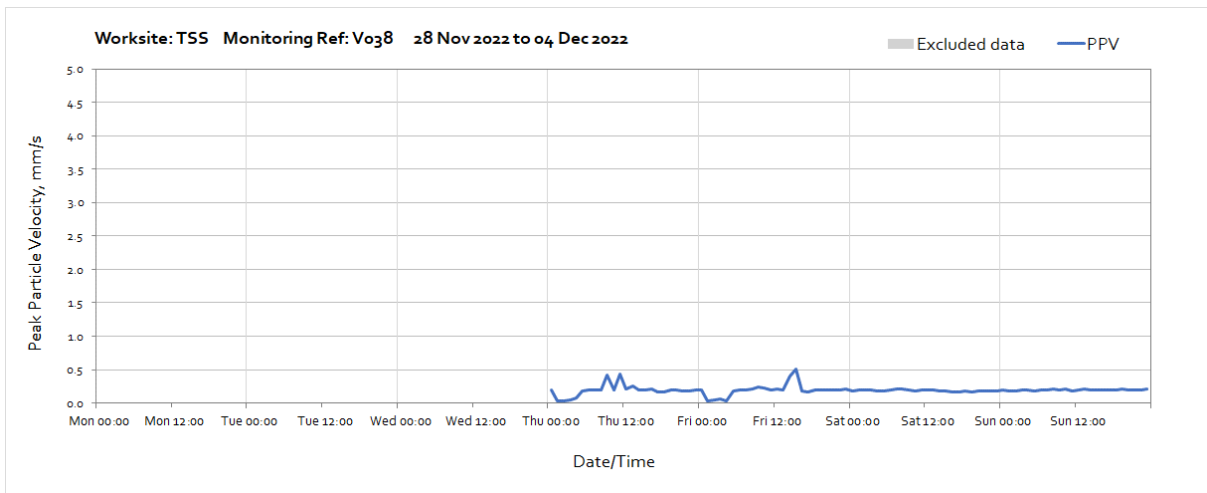
Worksite: TSS – Monitoring Ref: V037

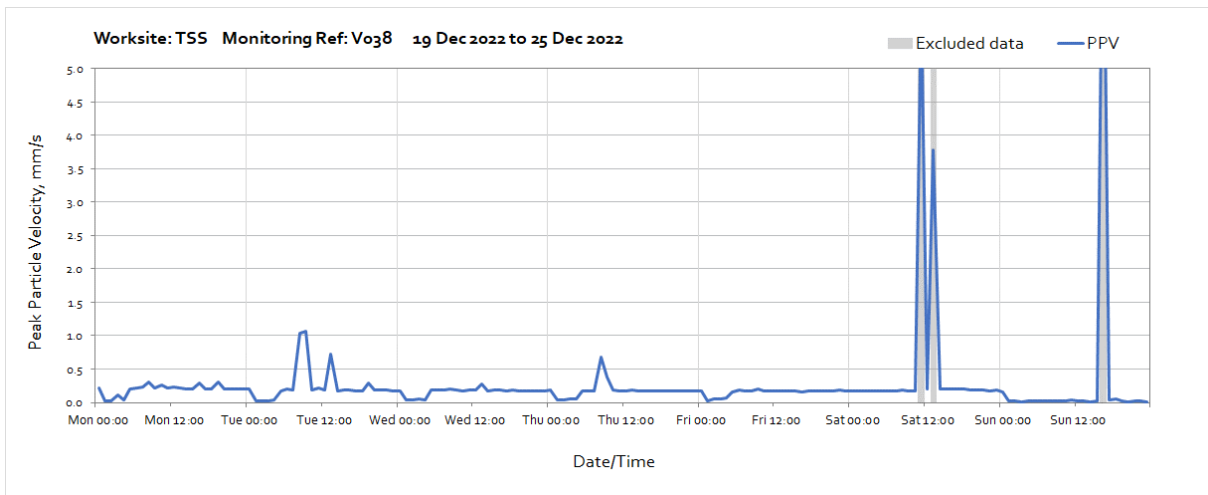
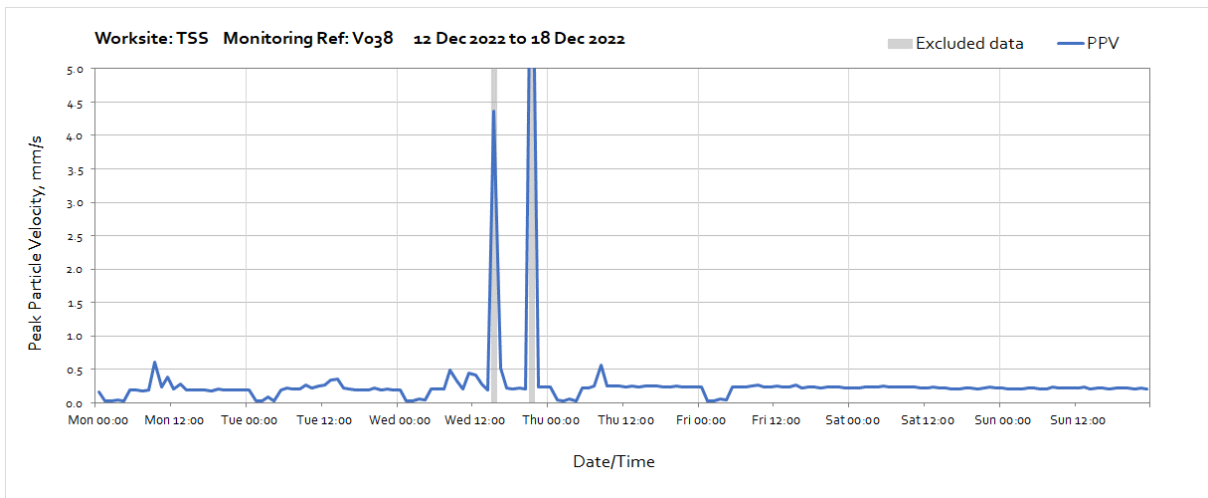
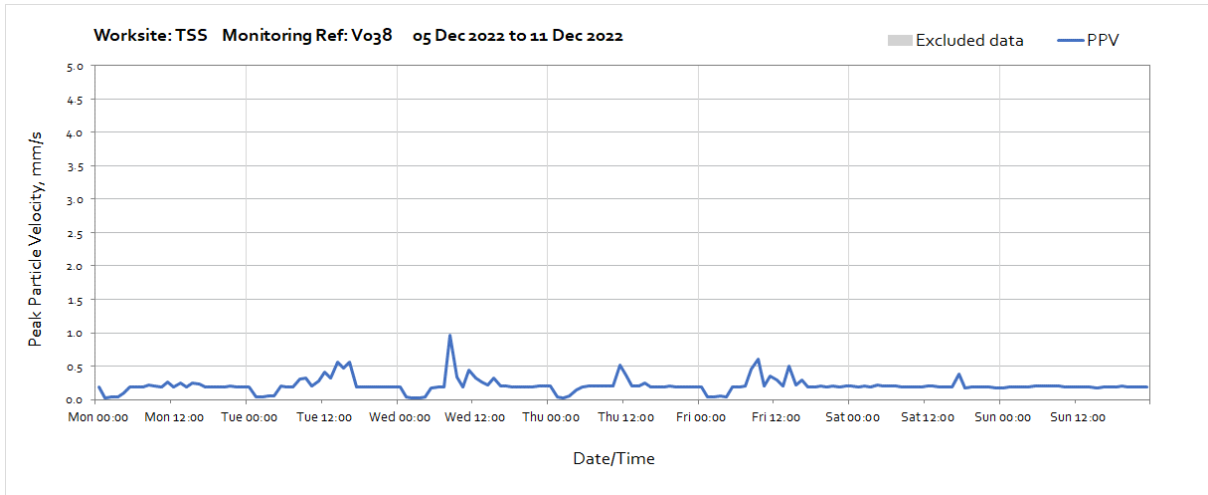


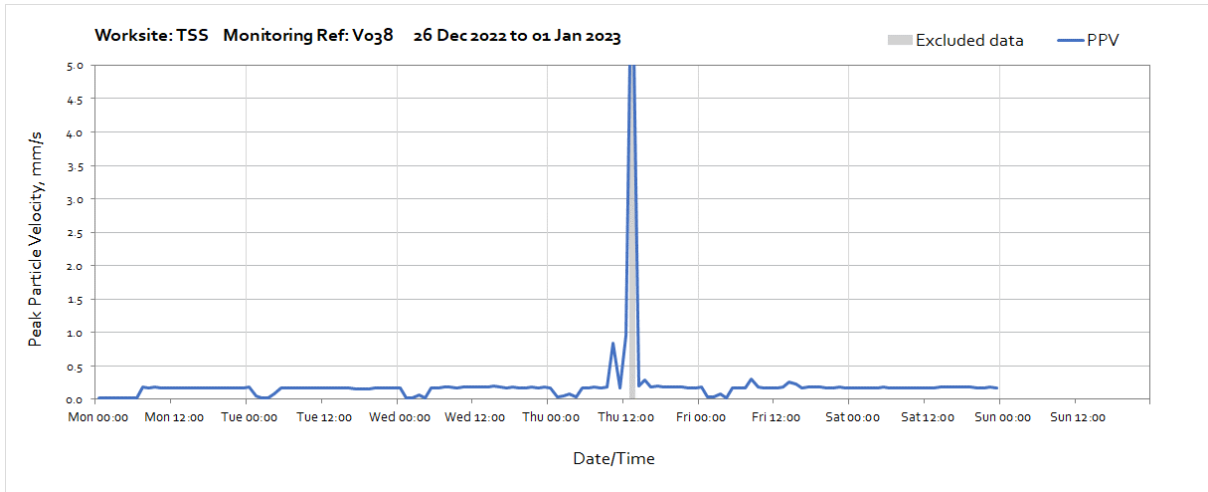
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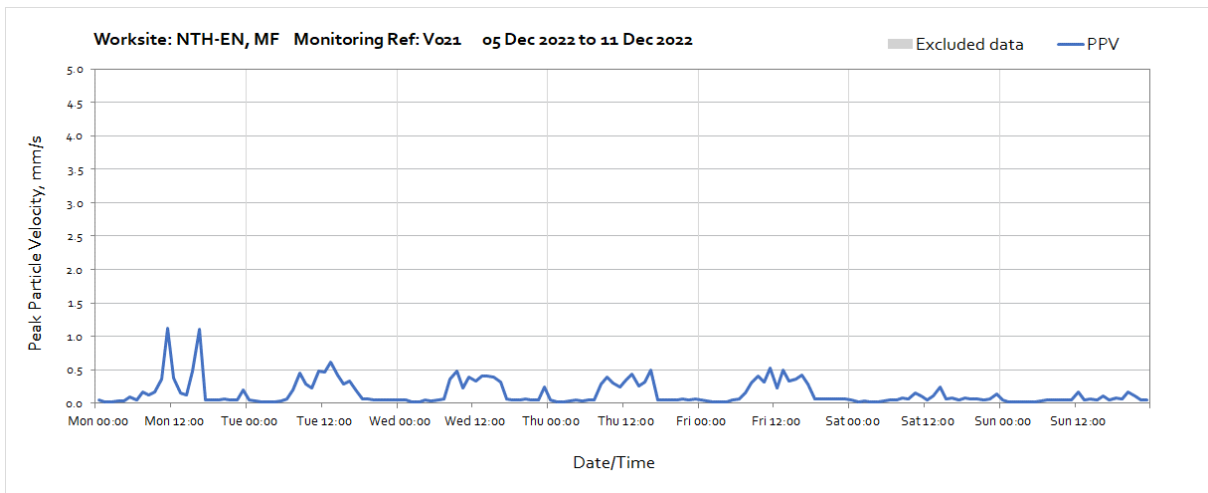
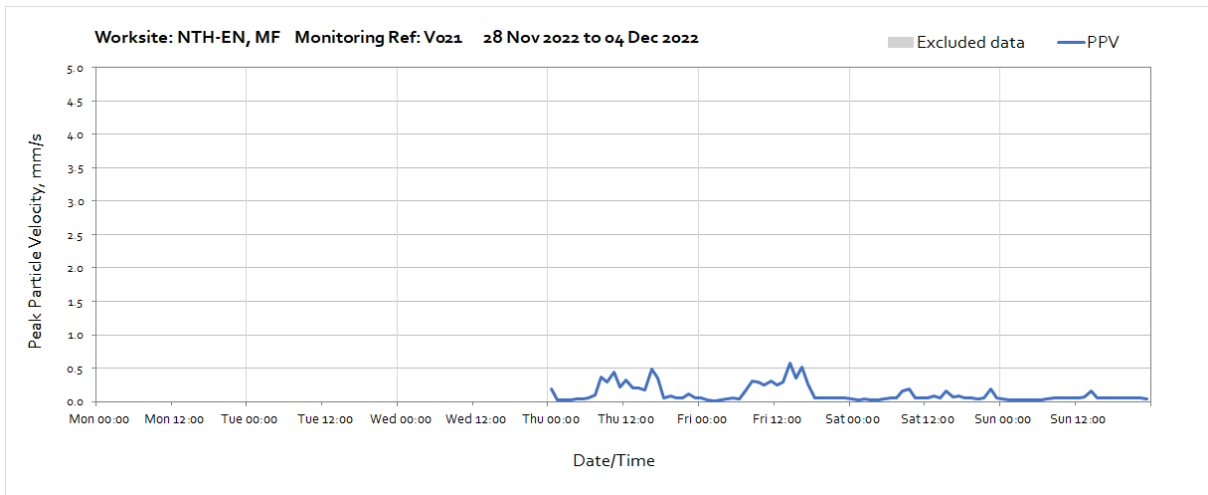
Worksite: TSS - Monitoring Ref: V038

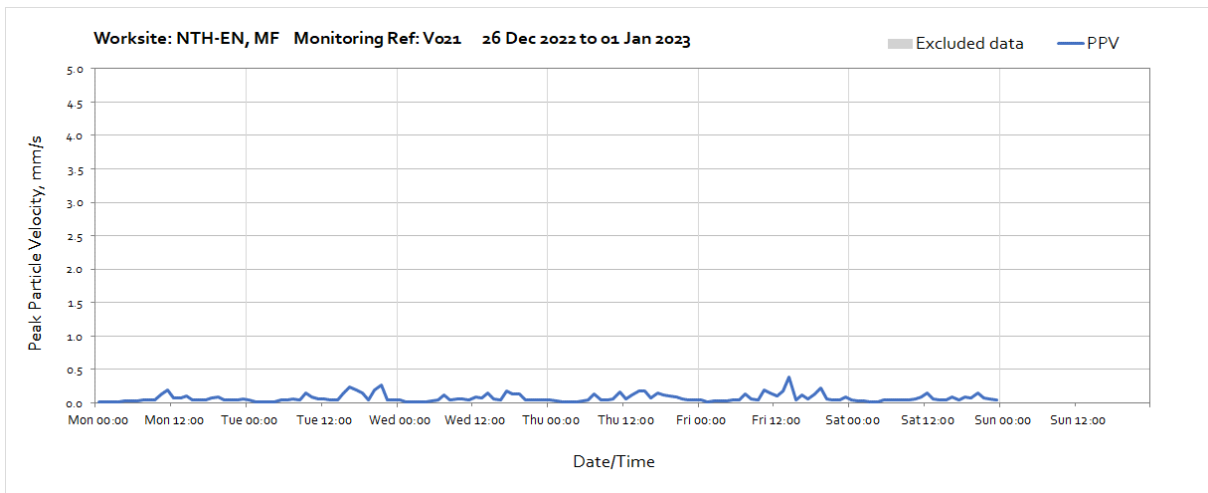
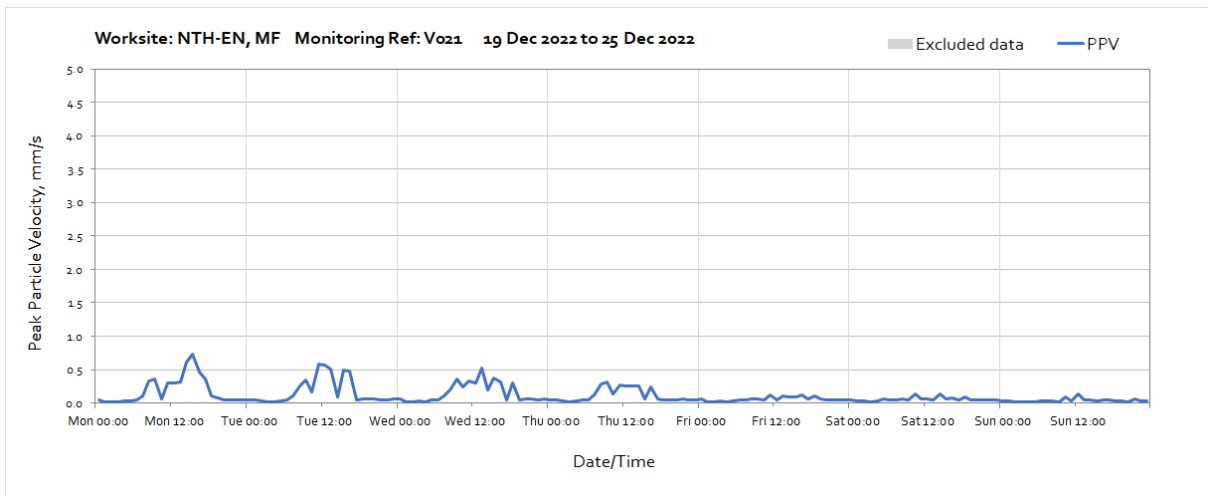
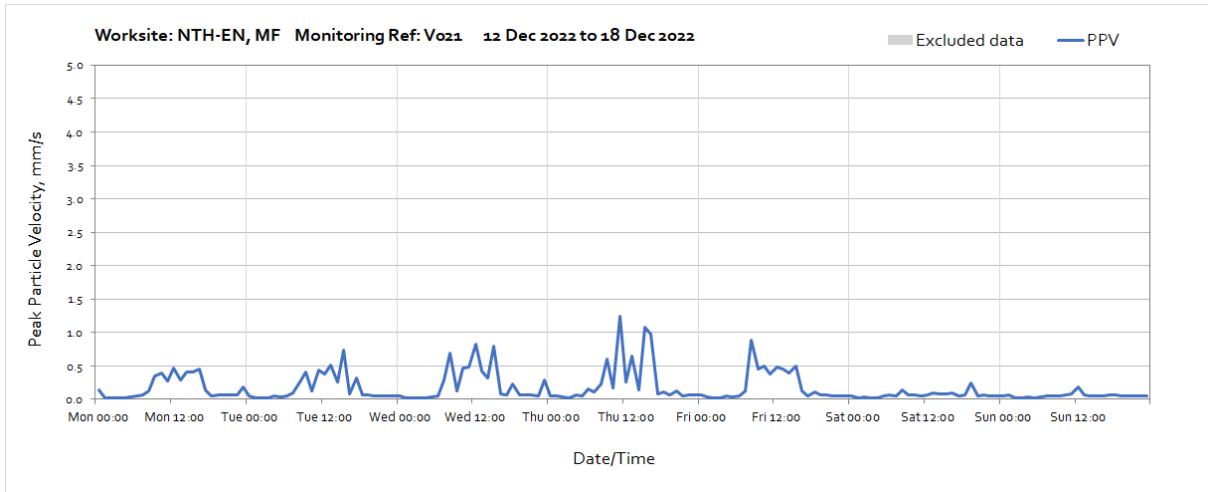




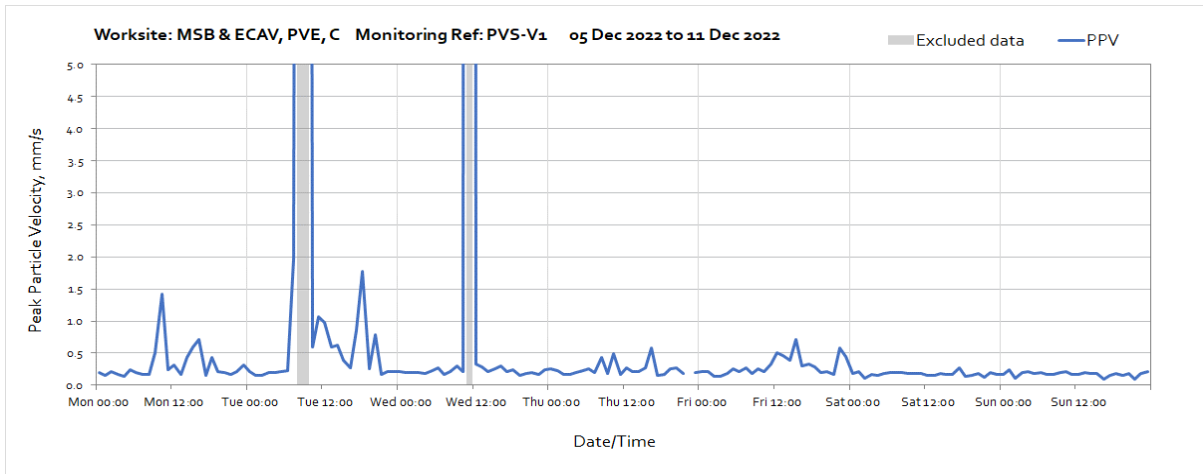
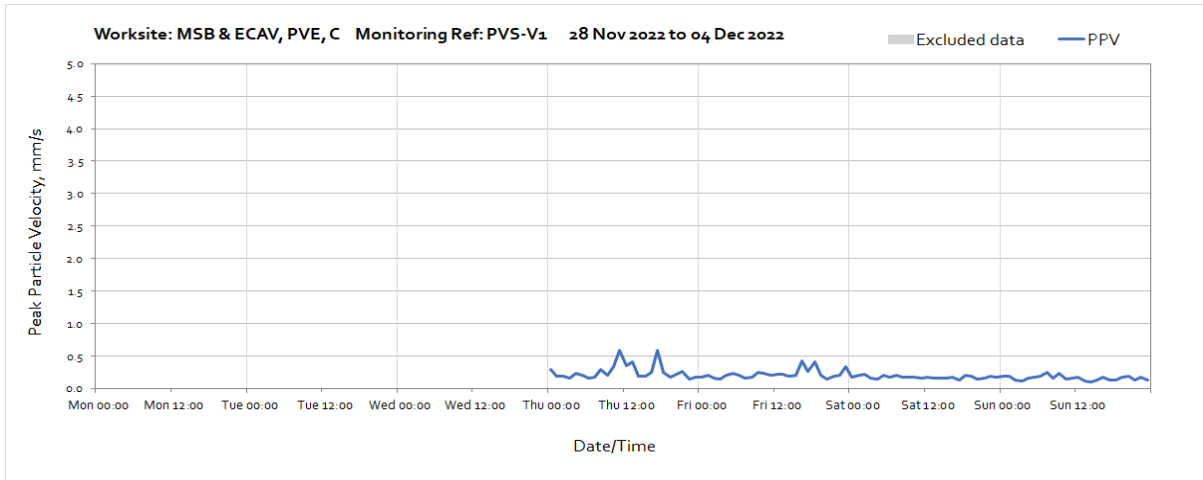


Worksite: NTH-EN, MF - Monitoring Ref: V021

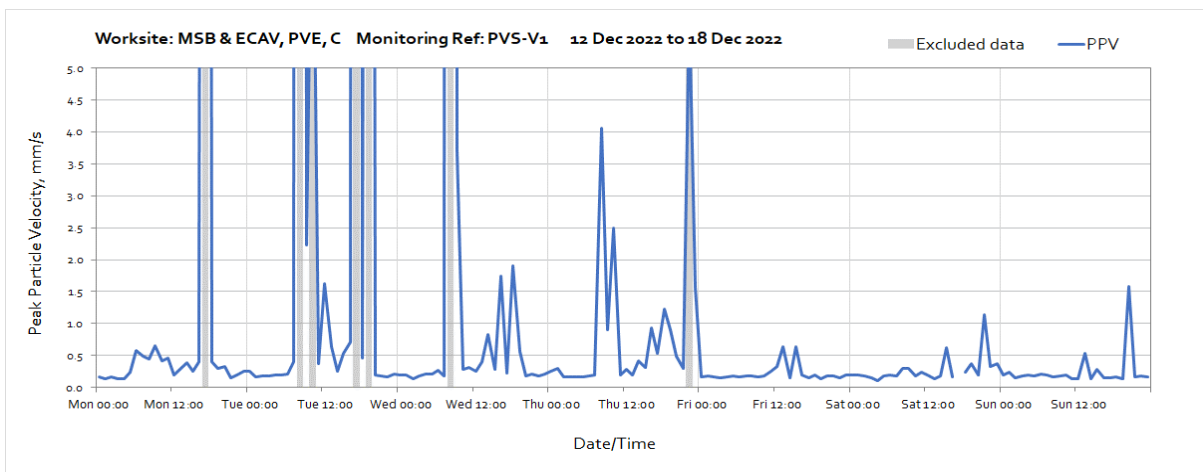




Worksite: MSB & ECAV, PVE, C - Monitoring Ref: PVS-V1

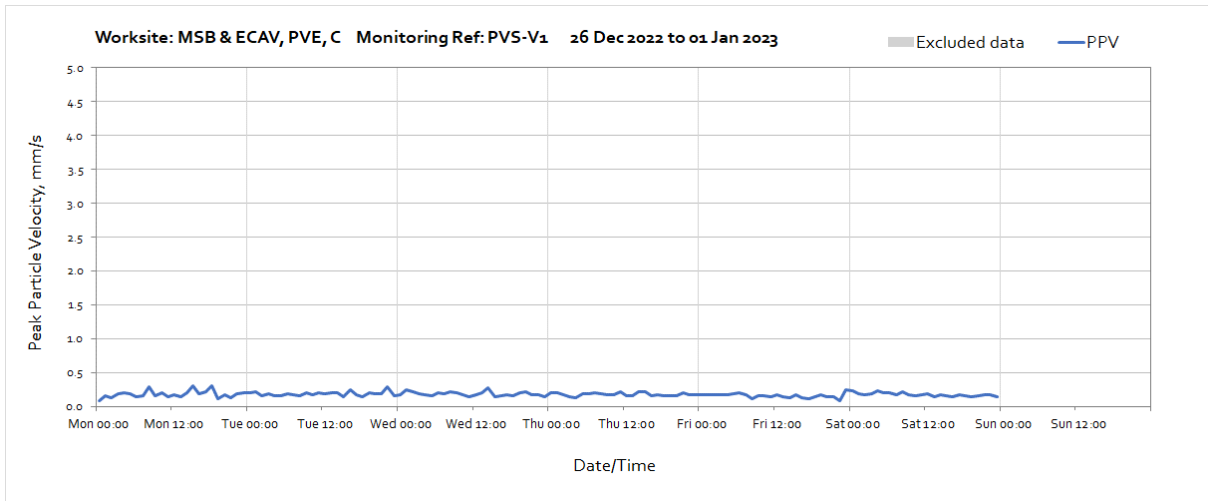
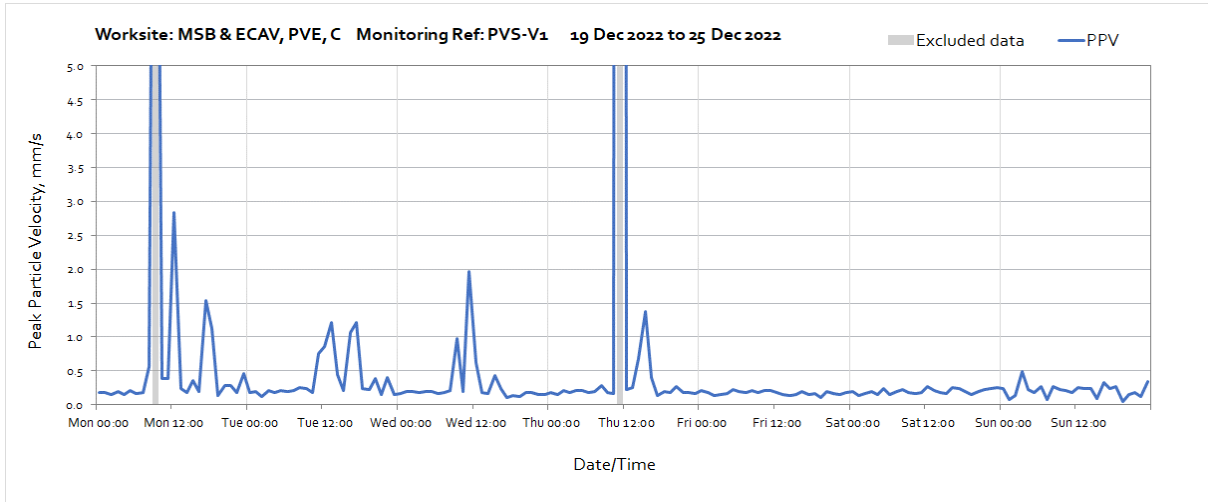


Note: Missing data from 22:00 until 23:00 on Thursday 8th December was due to an equipment error which is currently under investigation.

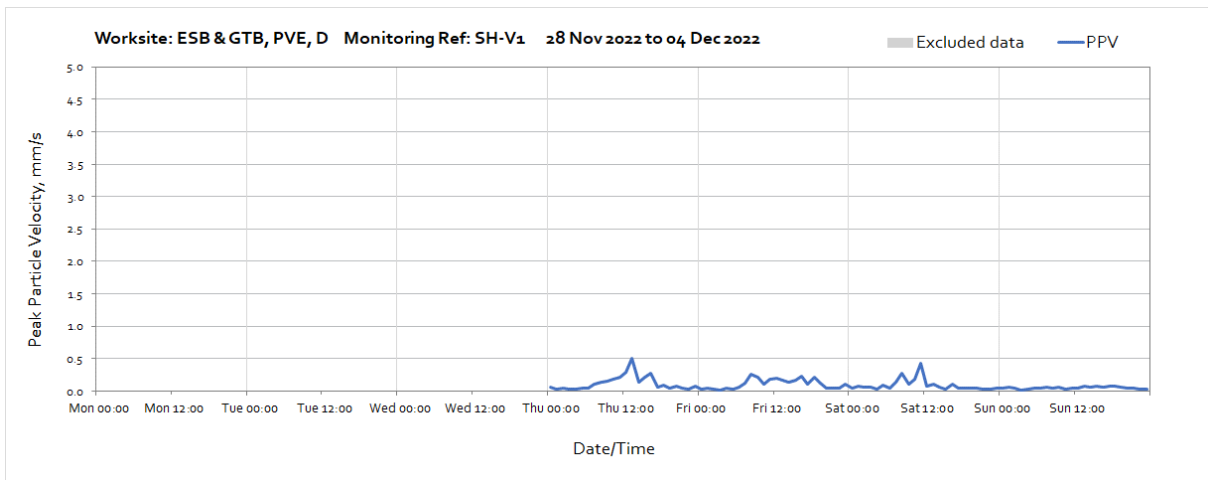


Note: Missing data from 17:00 until 18:00 on Saturday 17th December was due to an equipment error which is currently under investigation.

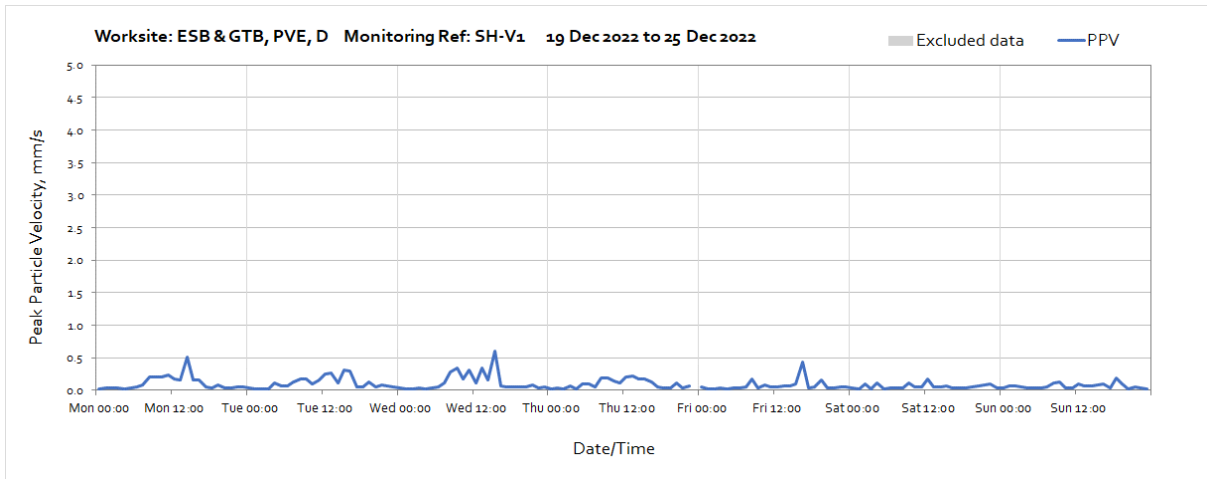
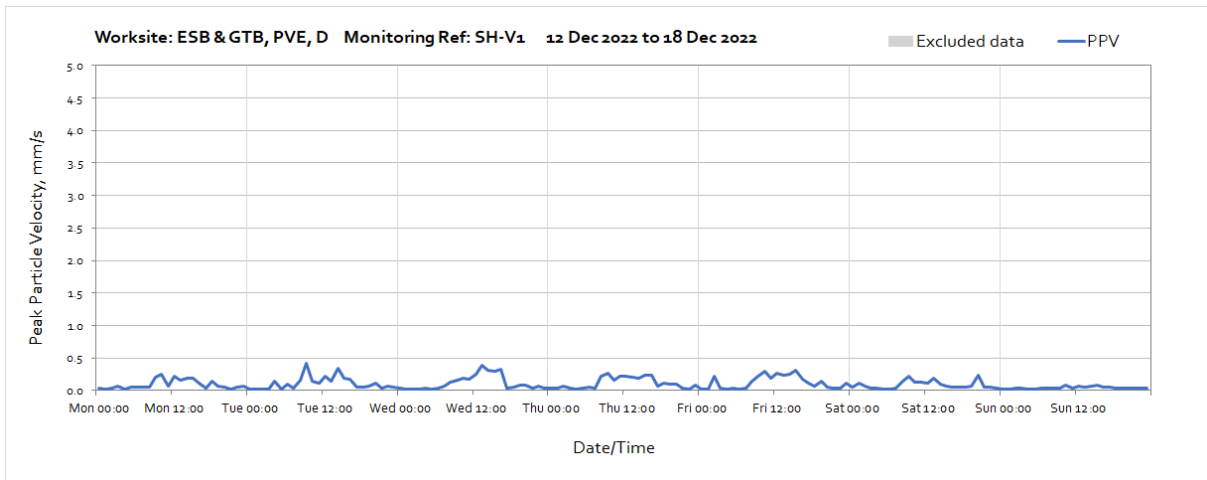
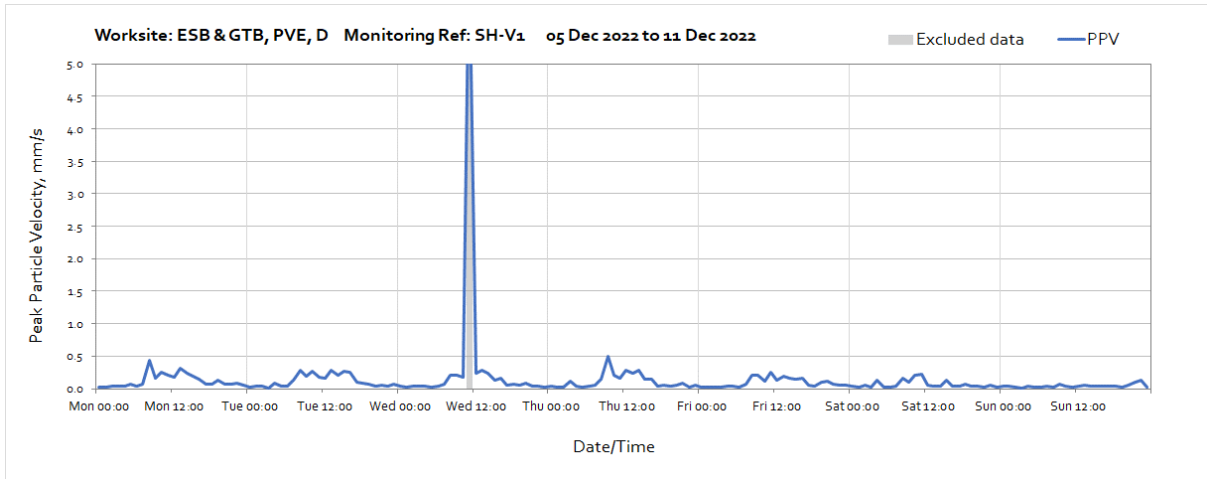
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Worksite: ESB & GTB, PVE, D - Monitoring Ref: SH-V1

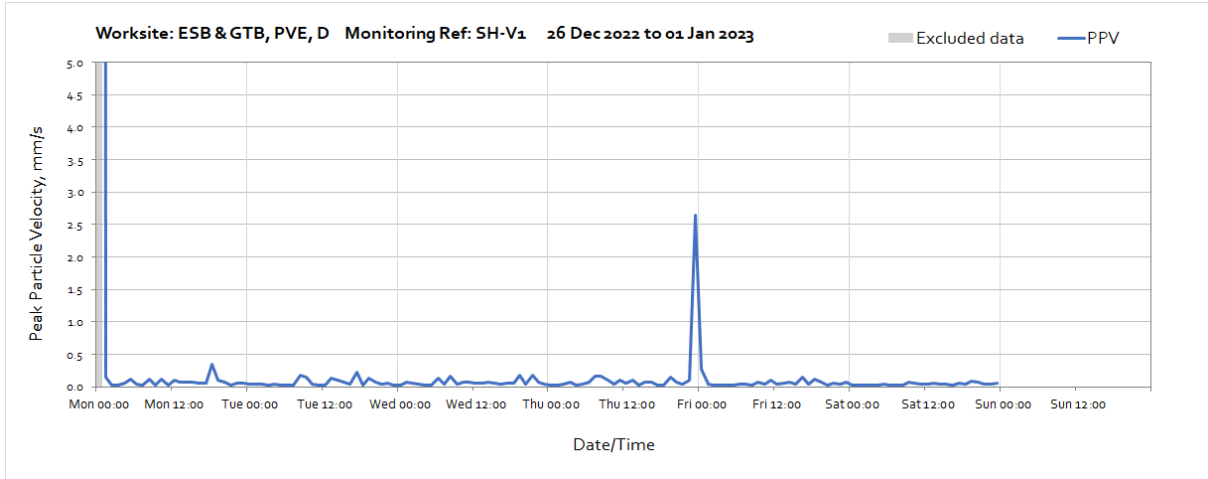


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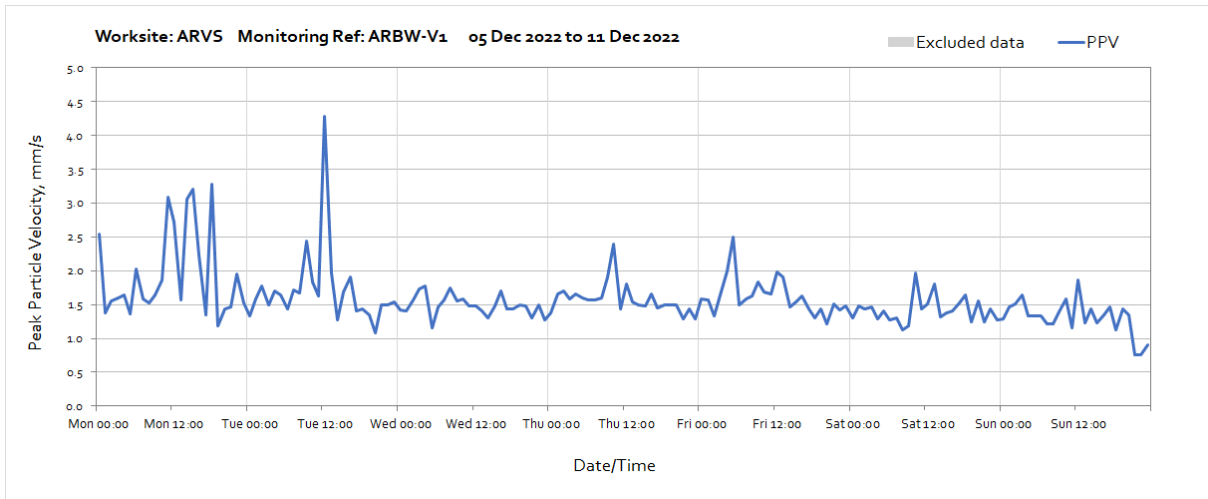
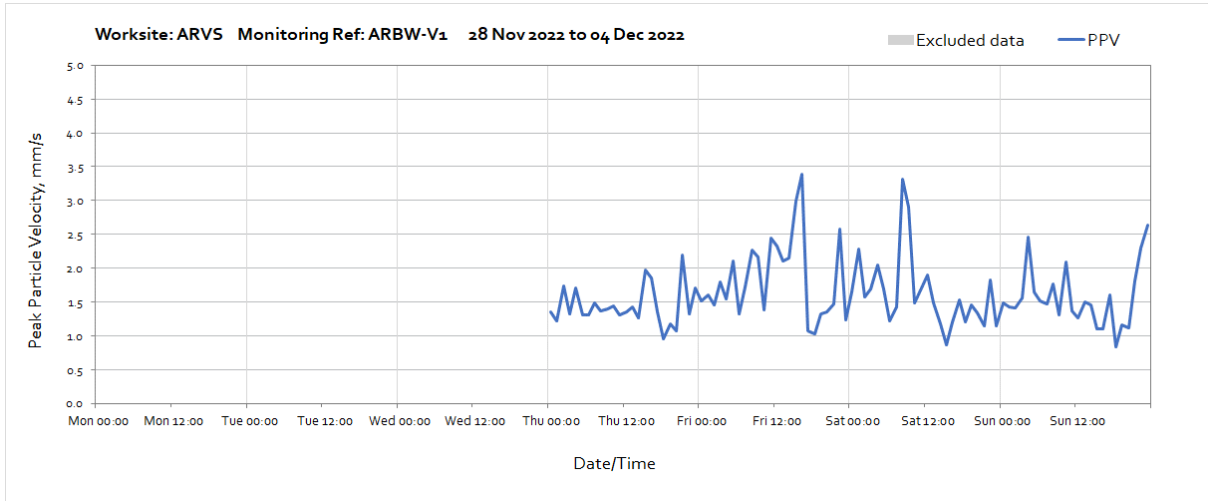


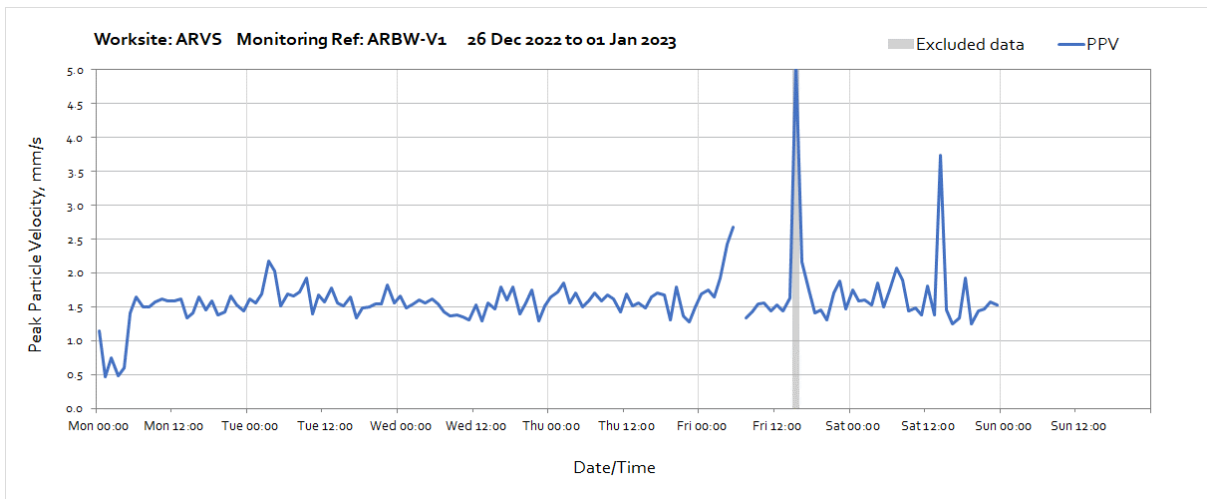
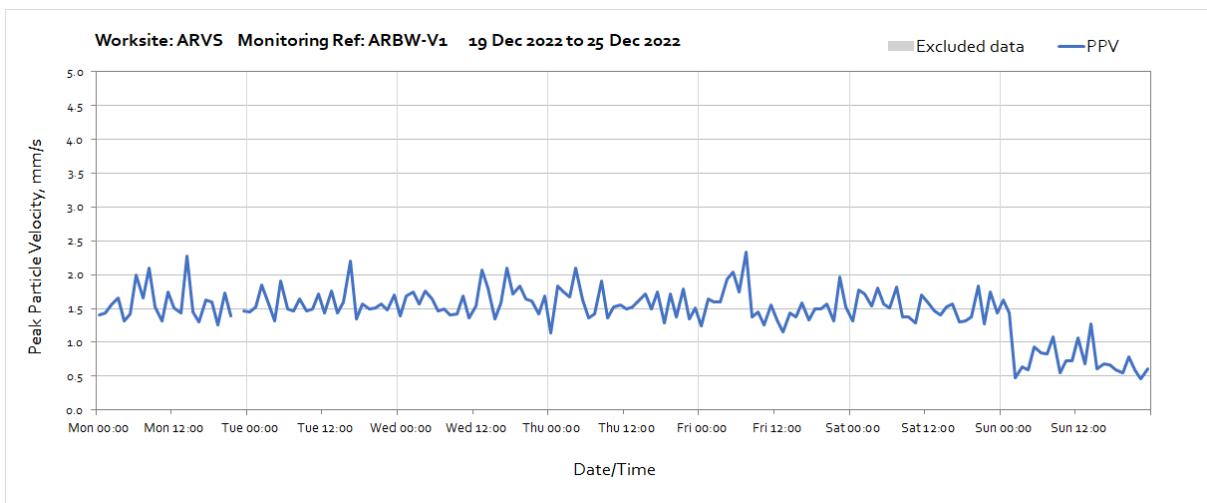
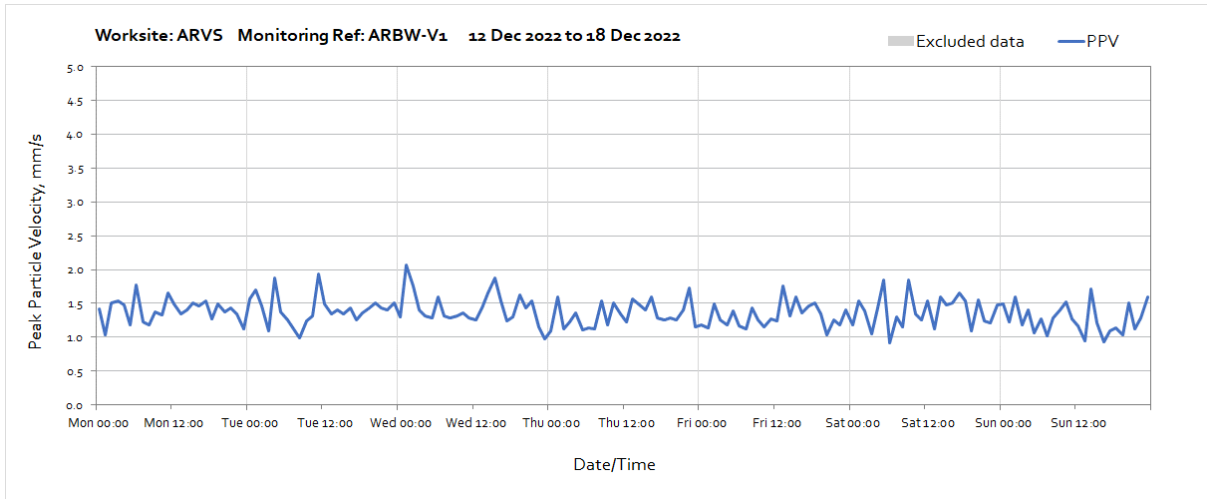
Note: Missing data from 23:00 on Thursday 22nd December until 00:00 on Friday 23rd December was due to an equipment error which is currently under investigation.

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Worksite: ARVS – Monitoring Ref: ABRW-V1

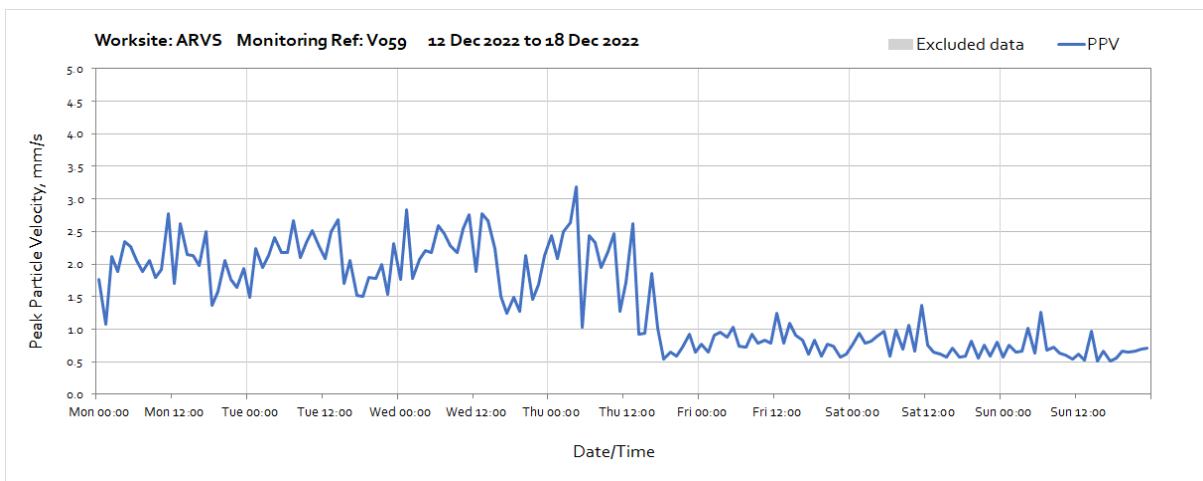
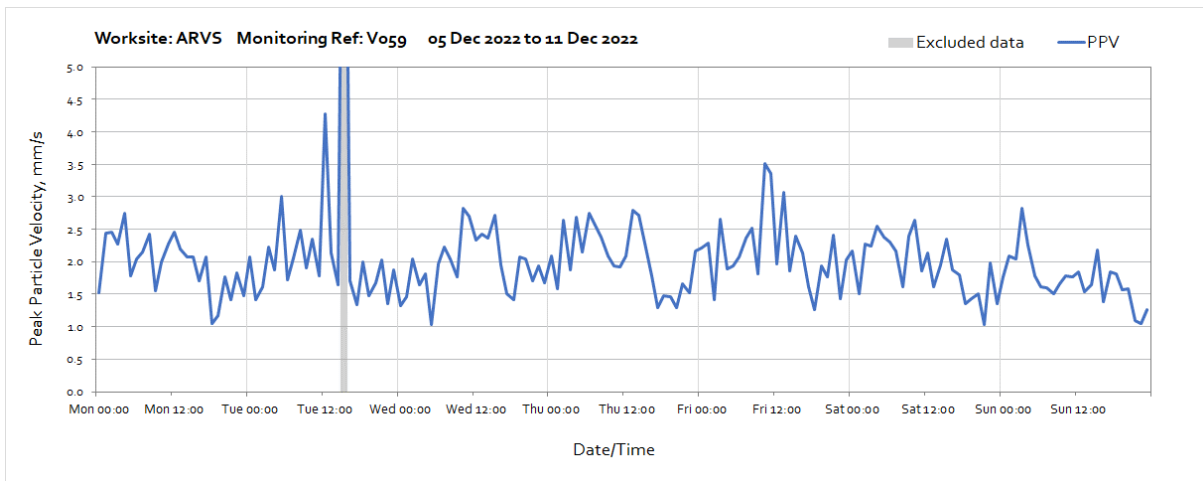
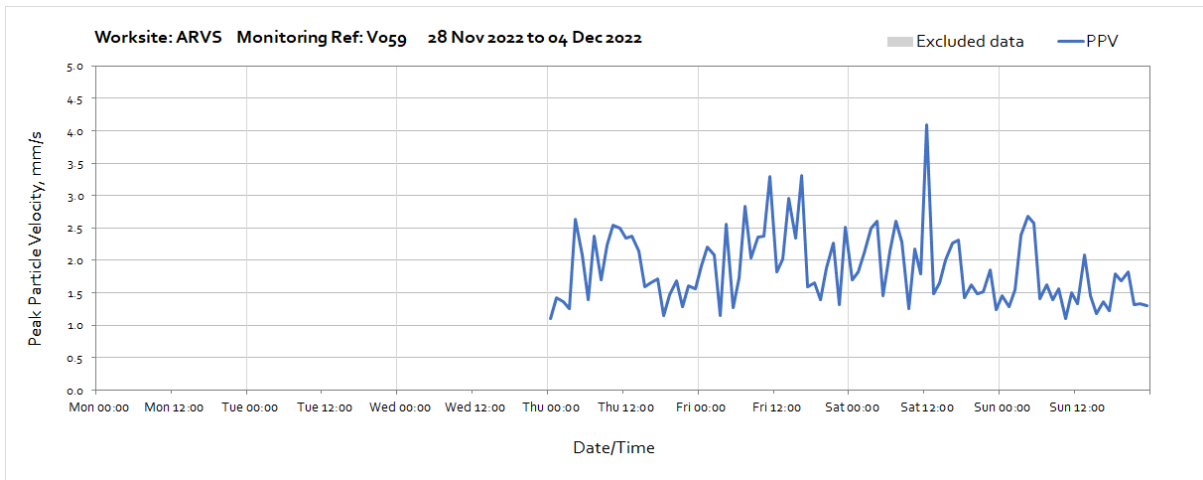




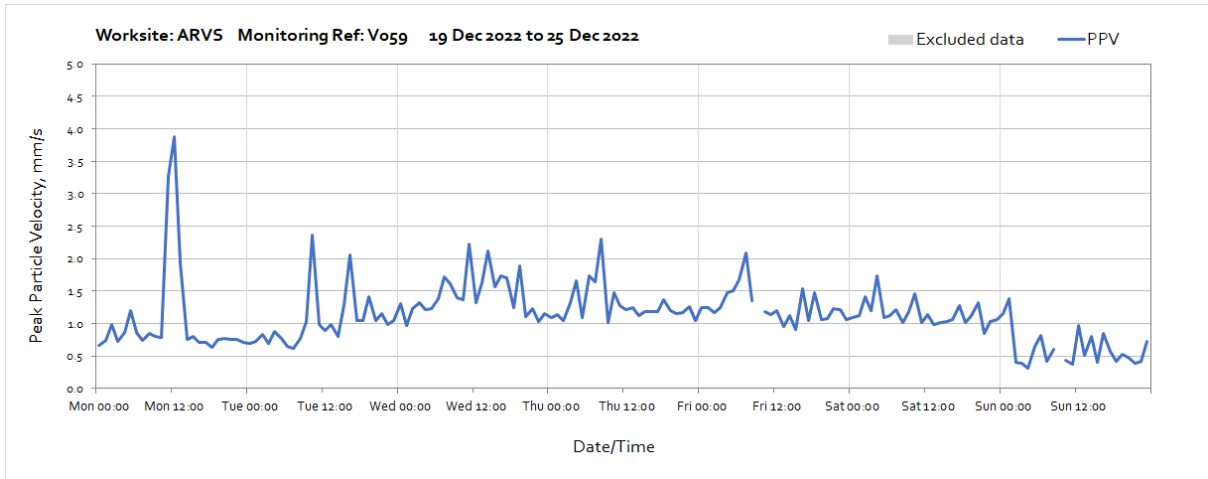
Note: Missing data from 22:00 until 23:00 on Monday 12th December was due to an equipment error which is currently under investigation.

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Worksite: ARVS – Monitoring Ref: V059



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Note: Missing data from 09:00 until 10:00 on Sunday 25th December was due to an equipment error which is currently under investigation.

