

Construction Noise and Vibration Monthly Report – June 2023

London Borough of Camden

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Non-Technical Summary

This Noise and Vibration Monitoring Report fulfils HS2 Limited's commitment detailed in the Environmental Minimum Requirements (EMRs), Annex 1, Code of Construction Practice, to present the results of noise and vibration monitoring carried out within the London Borough of Camden during the month of June 2023.

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken in the vicinity of The Adelaide Road Ventilation Shaft (ref.: ARVS) where platform construction, pile trimming, bulk excavation and drainage works, access ramp installation, chute installation, piling platform construction, anchor works, mains power connection, installation of high voltage substation base slab and cabin, low voltage substation works, mains water connection commissioning, monitoring prism installation and unexploded ordnance surveys were underway.
- Noise monitoring was undertaken in the vicinity of the Vehicle Holding Area worksite (ref.: VHA), where deliveries, site maintenance, surveys and relocation of storage cabin and skips were underway.
- Noise monitoring was undertaken in the vicinity of the Mornington Street Bridge worksite (ref.: MSB), where no works were undertaken.
- Noise monitoring was undertaken in the vicinity of the Park Village East worksite (ref.: PVE), where deliveries, site maintenance, surveys, haul road and drainage maintenance, piling, hoarding works, steel fixing and formwork installation, concrete pouring, wall works, installation of weephole and hangar bars were underway.
- Noise monitoring was undertaken in the vicinity of Euston Scissor Box worksite (ref.: ESB) where deliveries, site maintenance, surveys, haul road and drainage maintenance, installation and extraction of piles, hoarding works, installation of reinforced cages and concrete pouring were underway.
- Noise monitoring was undertaken in the vicinity of Euston Throat Retained Cut worksite (ref.: ETRC) where deliveries, site maintenance, surveys, haul road and drainage maintenance, utility diversions, piling, concrete breaking and excavations were underway.
- Noise monitoring was undertaken in the vicinity of Granby Terrace Bridge worksite (ref.: GTB) where deliveries, site maintenance, surveys, haul road and drainage maintenance, steel fixing, earthworks, concrete pouring, bridge deck works and utility works were underway.

- Noise and vibration monitoring were undertaken in the vicinity of the Hampstead Road Bridge worksite (ref.: HRB) where deliveries, site maintenance, surveys, haul road and drainage maintenance, utility diversions piling and hoarding works 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 pouring, piling and brick sampling 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:
 - Deliveries and waste removal (worksite E).
 - Surveys, steelwork strengthening, cable management system installation and parcel deck steel removal (worksite H and G).
 - No HS2 works were undertaken at worksites B, C, D and F.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital - North worksite (ref.: NTH-N) where no works were undertaken.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital - Euston North worksite (ref.: NTH-EN) where concrete blockwork installation, laying of aggregates, drainage installation and duct installation were underway.
- Noise monitoring was undertaken in the vicinity of Maria Fidelis worksite (ref.: MF) where ceiling and wall reinstatement, mechanical, electrical and plumbing installation, concrete screed installation, rooftop plant equipment installation, parapets and pediments installation, cladding installation, landscaping, brick wall construction and substation fit-out works were underway.
- Noise monitoring was undertaken in the vicinity of the Euston Towers Demolition worksite (ref.: ETD), where no works were undertaken.
- Noise monitoring was undertaken in the vicinity of the Traction Substation worksite (ref.: TSS) where concrete pouring, stair installation, substructure fitout, and mechanical, electrical and plumbing installation were underway.
- Noise monitoring was undertaken in the vicinity of the Interim Taxi Rank worksite (ref.: ITR), where roof works, road signal works, roadworks, resin installation and water mains works were underway.

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

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

- Coburg Street where kerb reinstatement, backfilling and concrete slab works were underway.
- Doric Way where duct excavation and installation 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 fifteen (15) times during the reporting period.

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

Four (4) complaints were received during the monitoring period. A description of complaints, the results of investigations and any actions taken are detailed in Table 8 of this report.

Abbreviations and Descriptions

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

Table 1: Table of Abbreviations

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

1 Introduction

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

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

Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the London Borough of Camden (LBC) for the period 1st to 30th June 2023.

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

- The Adelaide Road ventilation shaft ref.: ARVS, (see plan 2 in Appendix A), where work activities included:
 - Platform construction (including concrete pouring and construction of piling platform).
 - Pile trimming.
 - Bulk excavation and drainage works.
 - Access ramp installation.
 - Chute installation.
 - Piling platform construction.
 - Anchor works (including installation of steel whaling beams and stressing of installed anchors).
 - Main power connection.
 - Installation of high voltage substation base slab and cabin (including fit-out of substation).

- Low voltage substation works.
- Mains water connection commissioning.
- Monitoring prism installation.
- Unexploded ordnance surveys.
- Vehicle Holding Area worksite ref.: VHA (see plan 1 in Appendix A), where work activities included:
 - Deliveries.
 - Site maintenance.
 - Surveys.
 - Haul road and drainage maintenance.
- Mornington Street Bridge worksite ref.: MSB (see plan 2 in Appendix A), where no works were undertaken.
- Park Village East worksite ref.: PVE (see plan 2 in Appendix A), where work activities included:
 - Deliveries.
 - Site maintenance.
 - Surveys.
 - Haul road and drainage maintenance.
 - Hoarding works.
 - Steel fixing and formwork installation.
 - Concrete pouring.
 - Wall works (coring and grouting).
 - Installation of weephole and hangar bars.
- Euston Scissor Box worksite ref.: ESB (see plan 2 in Appendix A), where work activities included:
 - Deliveries.
 - Site maintenance.
 - Surveys.
 - Haul road and drainage maintenance.
 - Installation and extraction of sheet piles.
 - Hoarding works.
 - Installation of reinforced cages.
 - Concrete pouring.

- Euston Throat Retained Cut worksite ref.: ETRC (see plan 2 in Appendix A), where work activities included:
 - Deliveries.
 - Site maintenance.
 - Surveys.
 - Haul road and drainage maintenance.
 - Utility works.
 - Rotary bored piling (including demobilisation of piling plant).
 - Concrete breaking.
 - Excavations.
- Granby Terrace Bridge worksite ref.: GTB (see plan 2 in Appendix A), where work activities included:
 - Deliveries.
 - Site maintenance.
 - Surveys.
 - Haul road and drainage maintenance.
 - Steel fixing.
 - Earthworks.
 - Concrete pouring.
 - Bridge deck works.
 - Utility works.
- Hampstead Road Bridge worksite ref.: HRB (see plan 3 in Appendix A), where work activities included:
 - Deliveries.
 - Site maintenance.
 - Surveys.
 - Haul road and drainage maintenance.
 - Utility diversions.
 - Rotary bored piling (including demobilisation of piling plant).
 - Hoarding works.
- Euston Cavern worksite ref.: ECAV (see plan 3 in Appendix A), where work activities included:
 - Deliveries.

- Site maintenance.
- Surveys.
- Haul road and drainage maintenance.
- Piling.
- Brick sampling.
- On-Network worksites ref.: B, C, D, E, F, G and H (see plan 3 in Appendix A), where work activities included:
 - Deliveries and waste removal (worksite E).
 - Surveys, steelwork strengthening, cable management system installation and parcel deck steel removal (worksite H and G).
 - No HS2 works were undertaken at worksites B, C, D and F.
- Former National Temperance Hospital - North worksite ref.: NTH-N (see plan 4 in Appendix A), where no works were undertaken.
- Former National Temperance Hospital - Euston North worksite ref.: NTH-EN (see plan 4 in Appendix A), where no works were undertaken activities included:
 - Concrete blockwork installation.
 - Laying of aggregates.
 - Drainage installation.
 - Duct installation.
- Maria Fidelis worksite ref.: MF (see plan 4 in Appendix A), where work activities included:
 - Ceiling and wall reinstatement.
 - Mechanical, electrical and plumbing installation.
 - Concrete screed installation.
 - Rooftop plant equipment installation.
 - Parapets and pediments installation.
 - Cladding installation.
 - Landscaping.
 - Brick wall construction.
 - Substation fit-out works.
- Euston Towers Demolition worksite ref.: ETD (see plan 4 in Appendix A), where no works were undertaken.

- Traction Substation worksite ref.: TSS (see plan 4 in Appendix A), where work activities included:
 - Concrete pouring.
 - Stair installation.
 - Substructure fitout (including blockwork, screeding and downpipe installation).
 - Mechanical, electrical and plumbing installation (including brackets and ductwork installation).
- Interim Taxi Rank worksite ref.: ITR (see plan 4 in Appendix A), where work activities included:
 - Roof works.
 - Road signal works (including cable pulling).
 - Roadworks (including surfacing and road markings).
 - Resin installation.
 - Water mains works (including testing and chlorination).

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

- Various locations where utility diversion works were undertaken.
- Gloucester Avenue where water utility works were underway.
- Coburg Street where kerb reinstatement, backfilling and concrete slab works were underway.
- Doric Way where duct excavation and installation 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 June in the LBC area. Table 2 summarises the position of noise and vibration monitoring installations within the LBC area in June 2023.

- 1.2.2 At monitoring location ref.: N051 within Adelaide Road ventilation shaft worksite, ref.: ARVS, noise levels were measured for only one day (Monday 12th) in June 2023 due to the loss of lighting column's power.
- 1.2.3 Maps showing the position of noise and vibration monitoring installations are presented in Appendix B.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
ARVS	N051	Outside 70 Adelaide Road
	N052	Adelaide Road-Beaumont Walk
	V059	Outside 68 Adelaide Road
	ARBW-V1	Adelaide Road-Beaumont Walk
B	JC	Juniper Crescent
MSB & ECAV, PVE, C	N024	Lamppost outside Park Village Studios, Park Village East
	N047	Lamppost #3 on corner of Park Village East and Mornington Street Bridge
	PVS-N001	Park Village Studios
	PVS-V1	Park Village Studios
	N022	Lamppost #34 on Mornington Terrace, between Mornington Street Bridge and Edinboro Castle pub
	N046	Lamppost on Mornington Terrace, between Mornington Street Bridge and Delancey Street, near Edinboro Castle pub
ESB & GTB, PVE, E	N001	Park Village East Lamppost #1 Outside Cubitt Court
	N002	Park Village East Lamppost #2 Outside Richmond House
ESB & GTB, PVE, D	N003	Park Village East Lamppost #15 Outside Silsoe House
	SH-V1	Basement of Silsoe House
	N004	Mornington Terrace Lamppost #7 Junction of Mornington Terrace, Mornington Place & Clarkson Row
ESB & GTB, PVE, E	N005	Euston Approaches – Xavier House site office external staircase
	CR	Lamppost #2 on Clarkson Row
ETRC & HRB, F	N023	Lamppost #21 on Hampstead Road - opposite Xavier House site office
ETRC & HRB	N020	Lamppost on corner of Mackworth Street and Harrington Street
	N021	Lamppost on Stanhope Street, west of Stephenson House site office
	N044	Euston Approaches site hoarding – between Stephenson House site office and Langdale, Regent's Park Estate
	N045	Euston Approaches site hoarding – east of Coniston, Regent's Park Estate
	V039	Euston Approaches site – east of Coniston, Regent's Park Estate

Worksite Reference	Measurement Reference	Address
	V043	Euston Approaches site – east facing façade of Cartmel House
HRB & ETRC, NTH-N	N019	Euston Approaches site hoarding – north facing façade of Cartmel House
	N026a	Euston Approaches site hoarding – east facing façade of Cartmel House
G, H	HH	Euston Station Parcel Deck, Barnby Street
G	BS	Roof of Stockbeck House, Barnby Street
ETD, TSS	N006	Royal College of General Practitioners roof level
TSS	N008	Stephenson's Way lamppost (external to RCGP)
	N010	Wesley Hotel
	N011	Euston Street, lamppost #4 (external to 82 Euston Street)
	V002	Royal College of General Practitioners basement boiler room by Stephenson Way
	V037	Magic Circle, basement
	V038	Wesley Hotel, basement lightwell, Euston Street
ETD, ITR	N007	Royal College of General Practitioners, Melton Street
	V003	Royal College of General Practitioners basement vaults under Melton St
VHA	N025	Lamppost #3 on Prince Albert Road opposite the Vehicle Holding Area (VHA) site
NTH-EN, TSS	N012	Drummond Street, lamppost #14 (opposite to 92-94 Drummond Street)
NTH-EN, MF	N014	Starcross Street lamppost (external to Exmouth Arms)
	N016	Margaret Centre roof
	V021	42-44 Cobourg Street
NTH-EN	N017	Hampstead Road, lamppost #48
ETRC & HRB, NTH-N	N018	Outside replacement housing, Hampstead Road

2 Summary of Results

2.1 Summary of Measured Noise and Vibration Levels

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

Table 3: Summary of Measured dB L_{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	64.6 (64.6)	69.0 (69.0)	64.9 (64.9)	64.8 (66.1)	62.7 (62.7)	- -	- -	- -	- -	- -	- -	- -
	N052	Adelaide Road-Beaumont Walk	Free-field	65.9 (71.4)	67.0 (68.8)	66.7 (71.8)	66.1 (75.8)	63.5 (73.7)	63.8 (65.1)	65.4 (65.9)	67.4 (72.6)	66.0 (69.1)	64.3 (71.0)	65.6 (73.6)	63.6 (67.3)
B	JC	Juniper Crescent	Free-field	56.9 (59.2)	58.1 (61.4)	56.9 (58.8)	58.2 (60.2)	54.7 (61.1)	54.7 (56.4)	55.6 (56.7)	51.8 (55.4)	53.3 (57.3)	49.5 (55.1)	55.2 (58.7)	54.5 (60.7)
MSB & ECAV, PVE, C	N024	Lamppost outside Park Village Studios, Park Village East	Free-field	58.4 (71.3)	62.1 (78.1)	60.0 (66.7)	58.3 (66.3)	54.0 (61.7)	55.8 (60.3)	56.3 (57.4)	59.7 (65.6)	57.2 (60.9)	53.8 (58.3)	58.4 (72.5)	53.0 (56.4)
	N047	Lamppost #3 on corner of Park Village East and Mornington Street Bridge	Free-field	56.7 (59.0)	61.9 (66.1)	58.1 (71.1)	57.9 (71.8)	52.4 (63.1)	53.3 (54.1)	55.5 (57.0)	59.0 (67.2)	56.2 (58.6)	51.2 (55.0)	57.0 (68.6)	51.7 (56.8)
	PVS-N001	Park Village Studios	Façade	61.8 (63.0)	66.1 (74.4)	62.0 (63.6)	62.1 (64.7)	57.0 (68.2)	59.0 (60.9)	59.0 (61.2)	57.0 (60.2)	58.4 (61.0)	53.2 (66.3)	59.0 (62.8)	55.9 (61.9)
	N022	Lamppost #34 on Mornington Terrace	Free-field	57.8 (60.7)	60.3 (62.3)	57.2 (59.0)	57.2 (64.3)	52.2 (63.5)	54.0 (56.5)	55.6 (57.4)	54.4 (58.2)	55.3 (60.1)	49.4 (54.5)	55.5 (60.6)	52.1 (57.7)

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	Lamppost on Mornington Terrace, between Mornington Street Bridge and Delancey Street	Free-field	62.2 (63.3)	63.4 (66.0)	62.1 (69.3)	61.9 (65.0)	57.1 (65.8)	59.2 (61.0)	60.2 (61.8)	61.1 (68.2)	60.4 (65.3)	55.3 (64.1)	60.0 (62.8)	56.9 (62.0)
ESB & GTB, PVE, E	N001	Park Village East Lamppost #1	Free-field	55.3 (56.9)	65.2 (74.0)	57.5 (69.5)	56.7 (60.4)	51.1 (64.2)	52.1 (54.0)	54.1 (54.9)	58.6 (66.4)	55.4 (61.7)	51.7 (61.5)	55.9 (65.7)	50.0 (54.3)
	N002	Park Village East Lamppost #2	Free-field	56.4 (58.6)	60.8 (63.9)	57.8 (58.9)	57.3 (62.5)	52.4 (57.8)	54.4 (55.6)	56.4 (58.0)	58.3 (64.1)	56.0 (58.1)	52.1 (58.7)	55.9 (64.5)	51.5 (56.0)
ESB & GTB, PVE, D	N003	Park Village East Lamppost #15 Outside Silsoe House	Façade	56.0 (58.9)	61.4 (68.1)	57.8 (62.9)	57.4 (68.9)	52.2 (60.4)	52.5 (53.7)	54.9 (55.7)	58.3 (63.5)	56.2 (59.8)	51.9 (56.9)	55.8 (62.0)	51.6 (55.5)
	N004	Mornington Terrace Lamppost #7	Free-field	62.6 (64.3)	65.4 (67.7)	62.6 (63.8)	63.3 (69.7)	59.2 (69.3)	62.1 (62.7)	64.2 (68.8)	59.8 (65.1)	63.7 (70.7)	57.6 (70.5)	64.8 (71.1)	59.8 (69.5)
ESB & GTB, PVE, E	N005	Euston Approaches – Xavier House site office external staircase	Free-field	63.3 (67.2)	66.6 (72.7)	63.5 (66.0)	63.7 (68.2)	59.5 (64.9)	61.7 (63.8)	60.6 (62.0)	61.4 (64.3)	60.3 (63.0)	59.1 (67.0)	60.9 (64.9)	58.4 (64.9)
	CR	Lamppost #2 on Clarkson	Free-field	66.5 (70.7)	69.0 (71.0)	67.7 (71.7)	67.6 (71.1)	61.4 (69.4)	64.7 (69.7)	63.9 (67.1)	62.7 (67.3)	62.6 (70.2)	56.9 (64.7)	65.2 (70.3)	61.3 (70.6)

OFFICIAL

Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Saturday Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Sunday / Public Holiday Average L _{Aeq,T} (Highest Day L _{Aeq,T})	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
ETRC & HRB, F	N023	Lamppost #21 on Hampstead Road	Free-field	67.1 (69.7)	67.4 (68.7)	66.3 (68.3)	66.8 (72.5)	64.8 (69.5)	65.3 (66.8)	65.9 (67.4)	65.8 (66.5)	66.5 (68.8)	66.1 (73.2)	65.5 (73.4)	64.1 (69.3)
ETRC & HRB	N020	Lamppost on corner of Mackworth Street and Harrington Street	Free-field	52.9 (55.4)	59.1 (61.9)	52.2 (57.0)	52.0 (56.0)	49.7 (58.2)	50.3 (52.3)	51.5 (53.0)	52.9 (54.8)	52.5 (59.6)	50.5 (55.2)	51.5 (58.7)	49.3 (53.0)
	N021	Lamppost on Stanhope Street, west of Stephenson House site office	Free-field	53.5 (59.1)	65.6 (75.7)	56.1 (64.8)	55.0 (59.9)	49.0 (61.3)	48.7 (49.8)	51.4 (52.5)	56.4 (66.4)	55.0 (60.0)	49.6 (54.7)	54.6 (63.1)	48.0 (53.5)
	N044	Regents Park Estate west, near Langdale	Free-field	56.2 (58.1)	63.0 (68.3)	53.3 (56.9)	53.6 (57.7)	49.9 (57.5)	51.2 (53.0)	51.7 (53.1)	53.3 (53.6)	52.3 (56.3)	51.5 (58.5)	51.4 (59.7)	48.9 (52.8)
	N045	Euston Approaches site hoarding – east of Coniston, Regent's Park Estate	Free-field	58.1 (60.8)	68.6 (77.6)	57.4 (65.8)	57.5 (64.0)	54.6 (61.1)	55.0 (57.3)	55.5 (58.3)	59.1 (65.4)	59.3 (67.8)	55.7 (65.8)	55.3 (60.6)	53.6 (59.0)
ETRC & HRB, NTH-N	N019	Euston Approaches site hoarding – north facing façade of Cartmel House	Façade	57.3 (61.2)	66.5 (70.0)	55.1 (59.4)	56.5 (60.5)	53.8 (61.0)	55.2 (56.6)	54.2 (55.2)	55.4 (56.6)	55.5 (58.7)	56.7 (72.0)	54.1 (59.9)	52.5 (55.4)
	N026a	Euston Approaches site hoarding – east facing façade of Cartmel House	Façade	59.9 (68.2)	68.3 (78.7)	58.8 (60.5)	60.0 (64.4)	57.5 (63.0)	58.2 (59.4)	58.3 (59.5)	59.9 (60.8)	59.8 (67.0)	60.6 (75.4)	57.5 (60.8)	56.6 (61.7)

OFFICIAL

Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Saturday Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Sunday / Public Holiday Average L _{Aeq,T} (Highest Day L _{Aeq,T})	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
G, H	HH	Euston Station Parcel Deck, Barnby Street	Free-field	62.6 (68.3)	62.6 (64.1)	61.8 (66.3)	61.3 (67.0)	58.0 (67.0)	58.4 (60.0)	60.1 (61.1)	60.8 (63.1)	61.7 (65.6)	59.2 (65.9)	60.7 (67.8)	57.8 (66.3)
G	BS	Roof of Stockbeck House, Barnby Street	Free-field	61.2 (63.7)	61.4 (63.3)	60.5 (63.9)	61.6 (66.0)	57.7 (67.9)	59.7 (61.8)	59.6 (62.3)	59.0 (61.0)	59.1 (62.1)	55.6 (63.5)	60.2 (63.8)	56.8 (61.3)
ETD, TSS	N006	Royal College of General Practitioners roof level	Free-field	52.3 (53.3)	65.5 (68.2)	60.4 (68.3)	52.4 (54.4)	51.0 (60.9)	50.7 (51.3)	62.8 (65.7)	53.3 (54.7)	53.5 (57.0)	50.0 (52.6)	53.6 (57.2)	50.0 (51.7)
TSS	N008	Stephenson's Way lamppost (external to RCGP)	Façade	65.2 (70.4)	69.7 (76.2)	59.9 (67.5)	56.5 (62.9)	56.4 (68.3)	56.9 (63.4)	66.2 (69.2)	56.0 (58.7)	56.6 (68.1)	53.2 (54.5)	56.0 (64.3)	55.4 (66.9)
	N010	Wesley Hotel	Façade	66.4 (66.9)	71.4 (74.9)	68.8 (75.0)	66.6 (71.6)	59.2 (67.3)	66.4 (66.6)	70.9 (71.5)	66.2 (66.5)	66.0 (66.5)	56.4 (66.3)	63.8 (66.4)	57.8 (66.3)
	N011	Outside 82 Euston Street	Free-field	56.9 (63.1)	60.2 (62.6)	57.6 (63.9)	55.5 (68.6)	52.2 (64.0)	50.4 (51.8)	58.1 (58.9)	54.0 (55.8)	55.4 (60.0)	49.4 (55.2)	55.8 (68.5)	53.5 (68.8)
ETD, ITR	N007	Royal College of General Practitioners, Melton Street	Free-field	64.2 (78.0)	64.7 (66.1)	63.5 (65.9)	63.0 (66.0)	61.8 (69.1)	62.3 (63.5)	62.4 (64.5)	63.1 (65.6)	62.6 (64.3)	61.3 (63.6)	61.9 (65.2)	61.1 (64.4)
VHA	N025	Lamppost #3 on Prince Albert Road	Free-field	66.7 (68.1)	66.8 (67.9)	66.4 (72.6)	65.4 (73.8)	62.8 (68.1)	62.9 (63.2)	64.5 (66.0)	65.1 (67.1)	66.5 (74.1)	63.3 (67.0)	64.7 (70.2)	62.4 (65.8)

OFFICIAL

Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Saturday Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Sunday / Public Holiday Average L _{Aeq,T} (Highest Day L _{Aeq,T})	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
NTH-EN, TSS	N012	Opposite 92-94 Drummond Street	Free-field	52.5 (55.0)	58.0 (60.8)	56.4 (63.3)	56.2 (65.2)	51.6 (61.4)	49.3 (50.0)	55.5 (56.2)	55.6 (56.4)	56.2 (61.0)	50.1 (57.7)	55.8 (65.1)	51.5 (57.8)
NTH-EN, MF	N014	Starcross Street lamppost (external to Exmouth Arms)	Free-field	51.6 (55.8)	60.1 (64.2)	60.1 (71.4)	59.1 (71.5)	51.8 (63.3)	48.7 (50.6)	53.5 (56.0)	54.9 (60.8)	54.2 (59.2)	50.7 (60.5)	53.1 (61.9)	48.9 (57.1)
	N016	Margaret Centre roof	Free-field	53.3 (55.1)	61.1 (65.0)	52.9 (54.7)	53.6 (60.2)	51.6 (58.8)	52.0 (54.4)	55.9 (61.9)	57.2 (62.9)	54.5 (63.7)	52.8 (65.6)	51.8 (55.5)	50.7 (56.3)
NTH-EN	N017	Hampstead Road, lamppost #48	Free-field	68.3 (71.9)	69.4 (71.3)	67.8 (71.7)	68.7 (76.6)	66.6 (75.3)	67.2 (69.4)	67.6 (70.6)	70.0 (72.6)	67.7 (72.2)	67.7 (74.1)	66.5 (70.8)	66.4 (75.0)
ETRC & HRB, NTH-N	N018	Outside replacement housing, Hampstead Road	Free-field	67.4 (73.5)	68.5 (70.8)	67.9 (71.2)	69.5 (78.6)	66.6 (72.8)	67.6 (68.1)	69.5 (70.2)	71.6 (77.6)	69.5 (73.9)	65.7 (69.6)	69.5 (74.6)	66.5 (73.1)

*Noise levels measured throughout Monday 12th June 2023 only due to the loss of lighting column's power.

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

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

Worksite Reference	Measurement Reference	Monitor Address	Highest PPV measured in any axis, mm/s
ARVS	V059	Outside 68 Adelaide Road	2.61 (Z-axis)
	ARBW-V1	Adelaide Road – Beaumont Walk	2.99 (Y-axis)
MSB & ECAV, PVE, C	PVS-V1	Park Village Studios	2.94 (Y-axis)
ESB & GTB, PVE, D	SH-V1	Basement of Silsoe House	1.03 (Z-axis)
ETRC & HRB	V039	Euston Approaches site – east of Coniston, Regent’s Park Estate	6.66* (Y-axis)
	V043	Euston Approaches site – east facing façade of Cartmel House	7.04* (Z-axis)
ETD, ITR	V003	RCGP basement vaults, 305 Euston Road	0.48 (Z-axis)
TSS	V002	RCGP basement boiler room, 305 Euston Road	0.63 (Z-axis)
	V037	Magic Circle, basement	0.33 (Y-axis)
	V038	Wesley Hotel, basement lightwell, Euston Street	1.08 (Z-axis)
NTH-EN, MF	V021	42-44 Cobourg Street (floor)	2.48 (Y-axis)

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

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

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

2.2 Exceedances of the SOAEL

- 2.2.1 The significant observed adverse effect level (SOAEL) is defined in the 'Planning Practice Guidance – Noise' as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."
- 2.2.2 HS2 Phase One Information Paper E23: Control of Construction Noise and Vibration sets out the SOAELs for construction noise.
- 2.2.3 Where reported construction noise levels exceed the SOAEL at nearby receptors, relevant periods will be identified. Summary statistics to evaluate ongoing qualification for noise insulation and temporary rehousing are also presented where relevant.
- 2.2.4 Table 5 presents a summary of recorded exceedances of the SOAEL at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 5: Summary of Exceedances of SOAEL

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
ARVS	N051	Outside 70 Adelaide Road	All days	All periods	No exceedance
	N052	Adelaide Road, Beaumont Walk	All days	All periods	No exceedance
B	JC	Juniper Crescent	All days	All periods	No exceedance
MSB & ECAV, PVE, C	N024	Lamppost outside Park Village Studios, Park Village East	Weekday	07:00-08:00	1
			Weekday	08:00-18:00	1
	N047	Lamppost #3 on corner of Park Village East and Mornington Street Bridge	All days	All periods	No exceedance
	PVS-N001	Park Village Studios	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
	N022	Lamppost #34 on Mornington Terrace	All days	All periods	No exceedance
	N046	Lamppost on Mornington Terrace, between Mornington Street Bridge and Delancey Street	All days	All periods	No exceedance*
ESB & GTB, PVE, E	N001	Park Village East Lamppost #1	Night	22:00-07:00	3
	N002	Park Village East Lamppost #2	All days	All periods	No exceedance
ESB & GTB, PVE, D	N003	Park Village East Lamppost #15 Outside Silsoe House	All days	All periods	No exceedance
	N004	Mornington Terrace Lamppost #7	All days	All periods	No exceedance
ESB & GTB, E, PVE	N005	Euston Approaches - Xavier House site office external staircase	Night	22:00-07:00	2
	CR	Lamppost #2 on Clarkson Row	All days	All periods	No exceedance
ETRC & GTB, F	N023	Lamppost #21 on Hampstead Road	All days	All periods	No exceedance*
ETRC & HRB	N020	Lamppost on corner of Mackworth Street and Harrington Street	Night	22:00-07:00	2
	N021	Stanhope Street, lamppost #2	Weekday	08:00-18:00	3
	N044	Regents Park Estate west, near Langdale	All days	All periods	No exceedance*

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
	N045	Euston Approaches site hoarding – east of Coniston, Regent's Park Estate	Weekday Night	08:00-18:00 22:00-07:00	2* 3*
HRB & ETRC, NTH-N	N019	Euston Approaches site hoarding – north facing façade of Cartmel House	All days	All periods	No exceedance
	N026a	Euston Approaches site hoarding – east facing façade of Cartmel House	Weekday Night	08:00-18:00 22:00-07:00	1 1
G, H	HH	Euston Station Parcel Deck, Barnby Street	All days	All periods	No exceedance
G	BS	Roof of Stockbeck House, Barnby Street	All days	All periods	No exceedance
ETD, TSS	N006	RCGP Roof level	All days	All periods	Not applicable**
TSS	N008	Stephenson's Way lamppost (external to RCGP)	All days	All periods	Not applicable**
	N010	Wesley Hotel	All days	All periods	Not applicable**
	N011	Outside 82 Euston Street	All days	All periods	No exceedance
ETD, ITR	N007	RCGP, Melton Street	All days	All periods	No exceedance
VHA	N025	Lamppost #3 on Prince Albert Road	All days	All periods	No exceedance*
NTH-EN, TSS	N012	Opposite 92-94 Drummond Street	All days	All periods	No exceedance
NTH-EN, MF	N014	Starcross Street lamppost (external to Exmouth Arms)	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
	N016	Margarete Centre roof	All days	All periods	No exceedance
NTH-EN	N017	Hampstead Road, lamppost #48	Night	22:00-07:00	1
ETRC & HRB, NTH-N	N018	Outside replacement housing, Hampstead Road	All days	All periods	No exceedance

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

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

2.2.5 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	Lamppost outside Park Village Studios, Park Village East	1
ESB & GTB, PVE, E	N001	Park Village East Lamppost #1	1
ESB & GTB, E, PVE	N005	Euston Approaches – Xavier House site office external staircase	1
ETRC & HRB	N020	Lamppost on corner of Mackworth Street and Harrington Street	2
	N021	Stanhope Street, lamppost #2	3
	N045	Euston Approaches site hoarding – east of Coniston, Regent's Park Estate	4
HRB & ETRC, NTH-N	N026a	Euston Approaches site hoarding – east facing façade of Cartmel House	2
NTH-EN	N017	Hampstead Road, lamppost #48	1

2.2.6 Fifteen (15) SOAEL exceedances were recorded due to HS2 construction works during June 2023. Exceedances occurred during weekday daytime periods and night periods.

2.3 Exceedances of Trigger Level

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

Table 7: Summary of Exceedances of Trigger Levels

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

2.4 Complaints

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

Table 8: Summary of Complaints

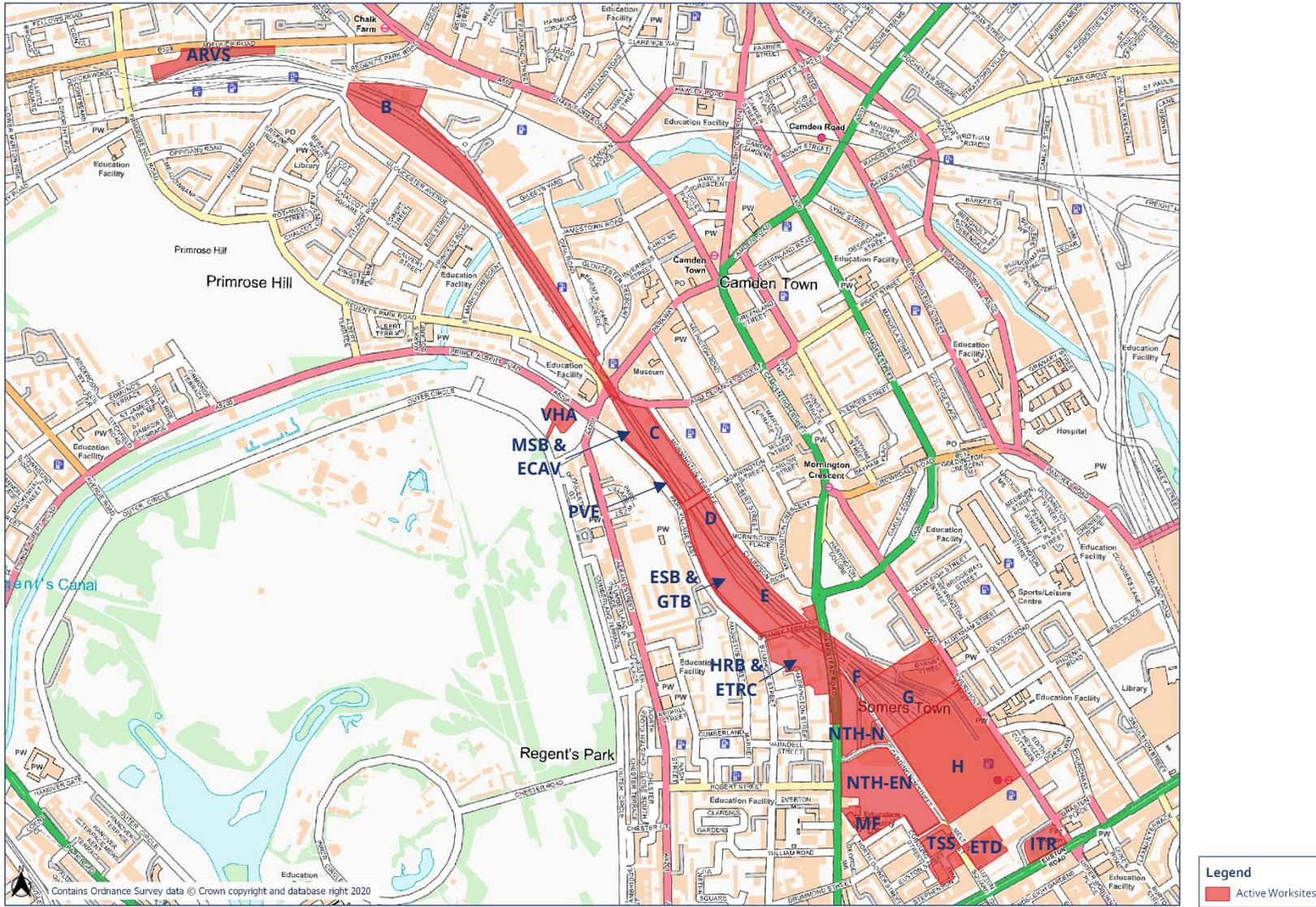
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-23-96290-E-C HS2-23-96291-E-C	ETRC & GTB, F	Complaint due to noise during the night-time.	Monitoring data demonstrates compliance with Section 61 requirements and best practicable means to minimise noise were employed.	The stakeholder was informed that the works were due to be completed by 03:00. Information was provided to the stakeholder confirming the results of the investigation.
HS2-23-96239-E-C	ESB & GTB, PVE, D	Complaint due to a siren sounding during the night-time.	A site mobile supervisor investigated immediately and no sirens were noted emanating from the worksite.	Information was provided to the stakeholder confirming the results of the investigation.

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-23-96664-E-C	ETRC & GTB, F	Complaint due to noise from a water bowser and street cleaner during the night-time.	Monitoring data demonstrates compliance with Section 61 requirements and best practicable means to minimise noise were employed.	Information was provided to the stakeholder confirming the results of the investigation.

Appendix A Site Locations

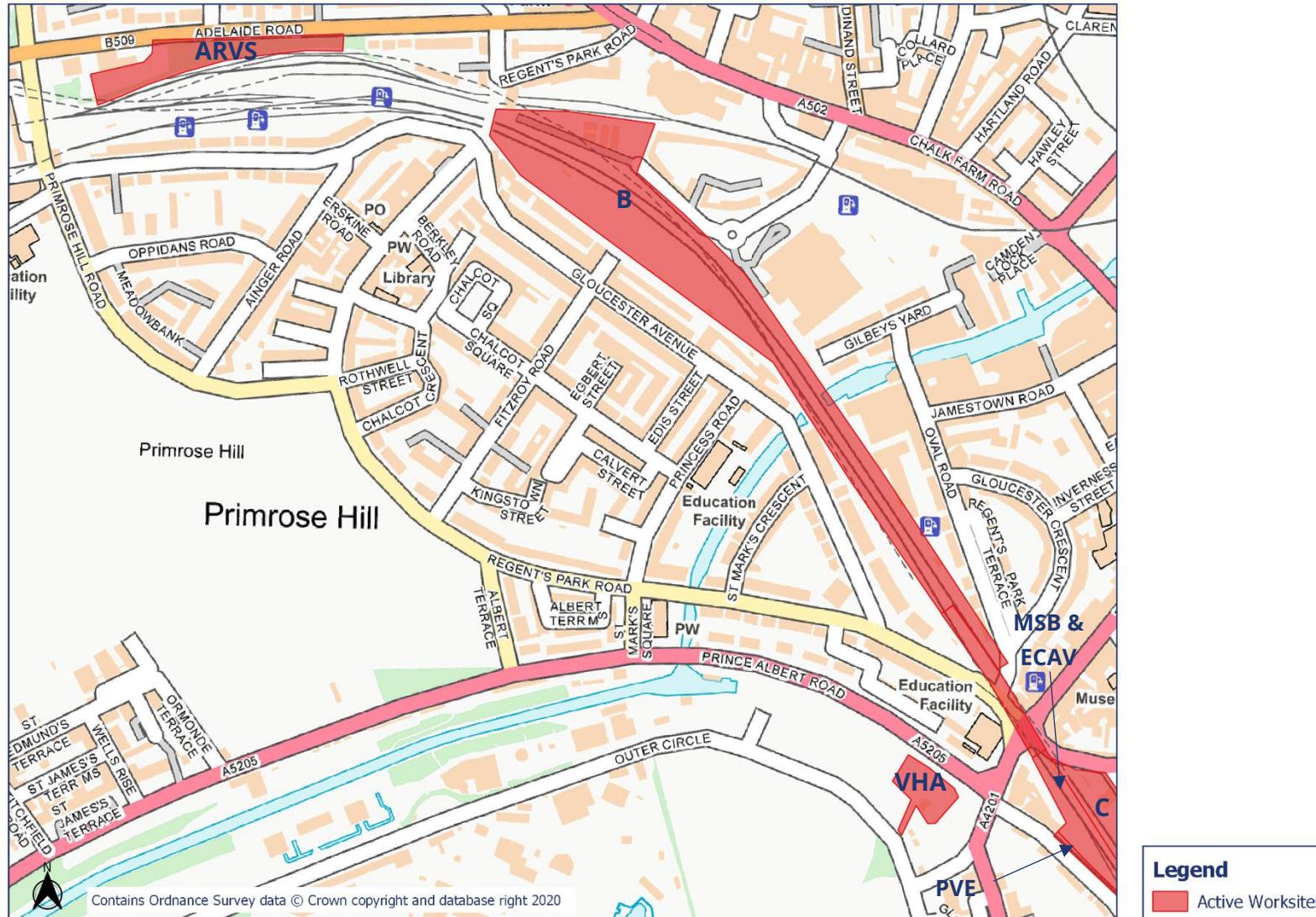
HS2

Worksite Identification Plan - Overview



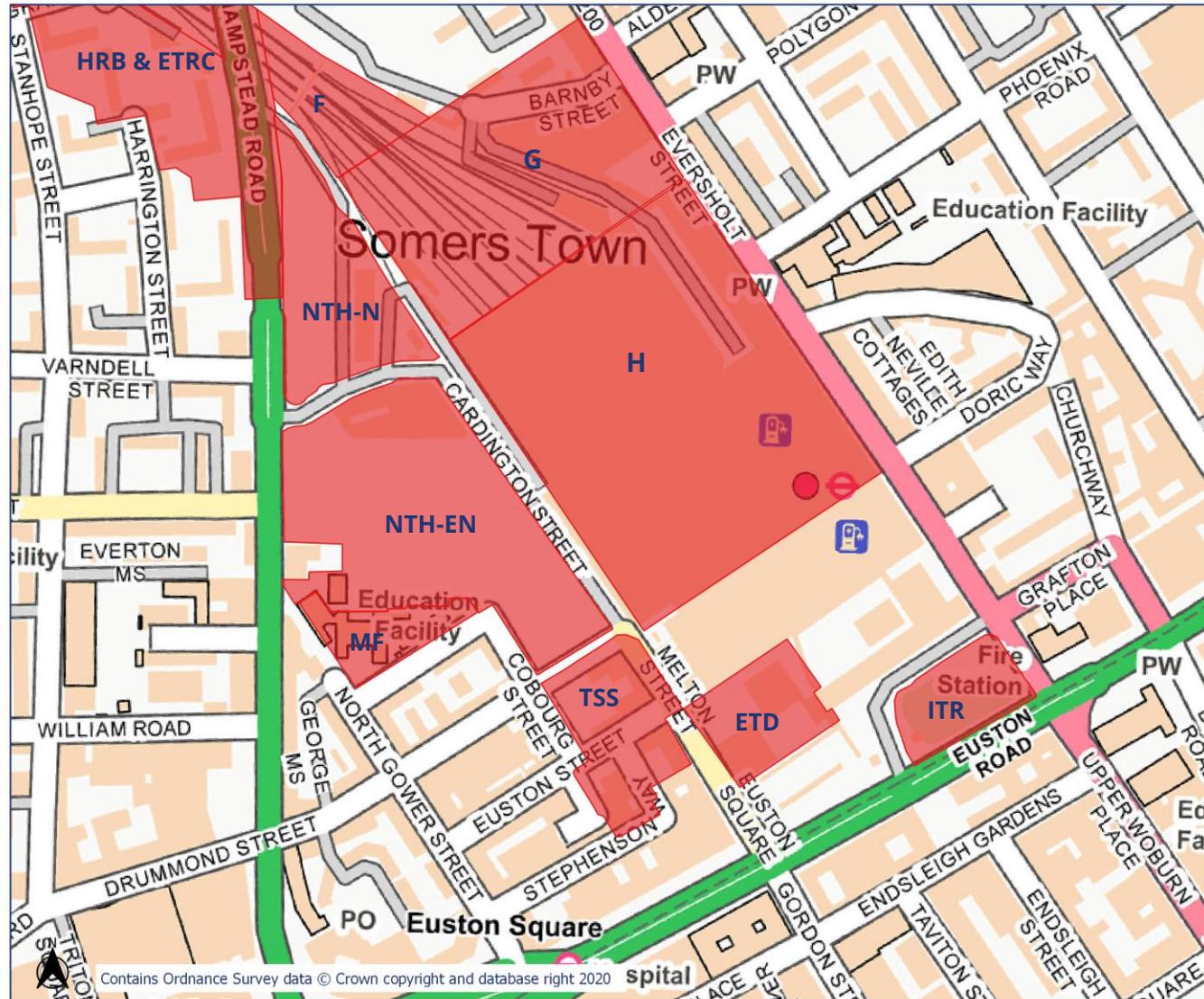
HS2

Worksite Identification Plan - 1



HS2

Worksite Identification Plan - 3

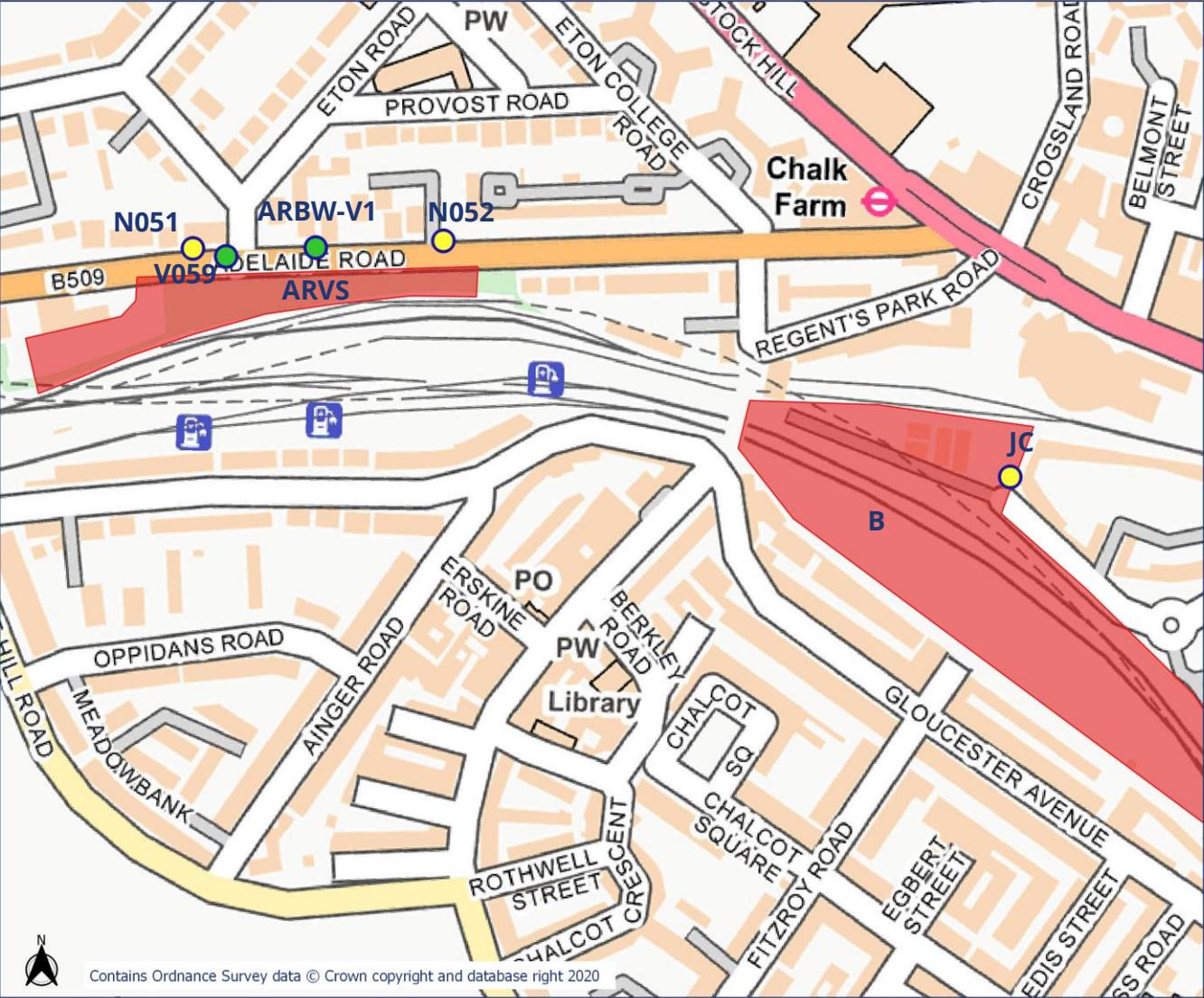


Legend

- Active Worksites

Appendix B Monitoring Locations

HS2 Noise and Vibration Monitoring Plan - 1

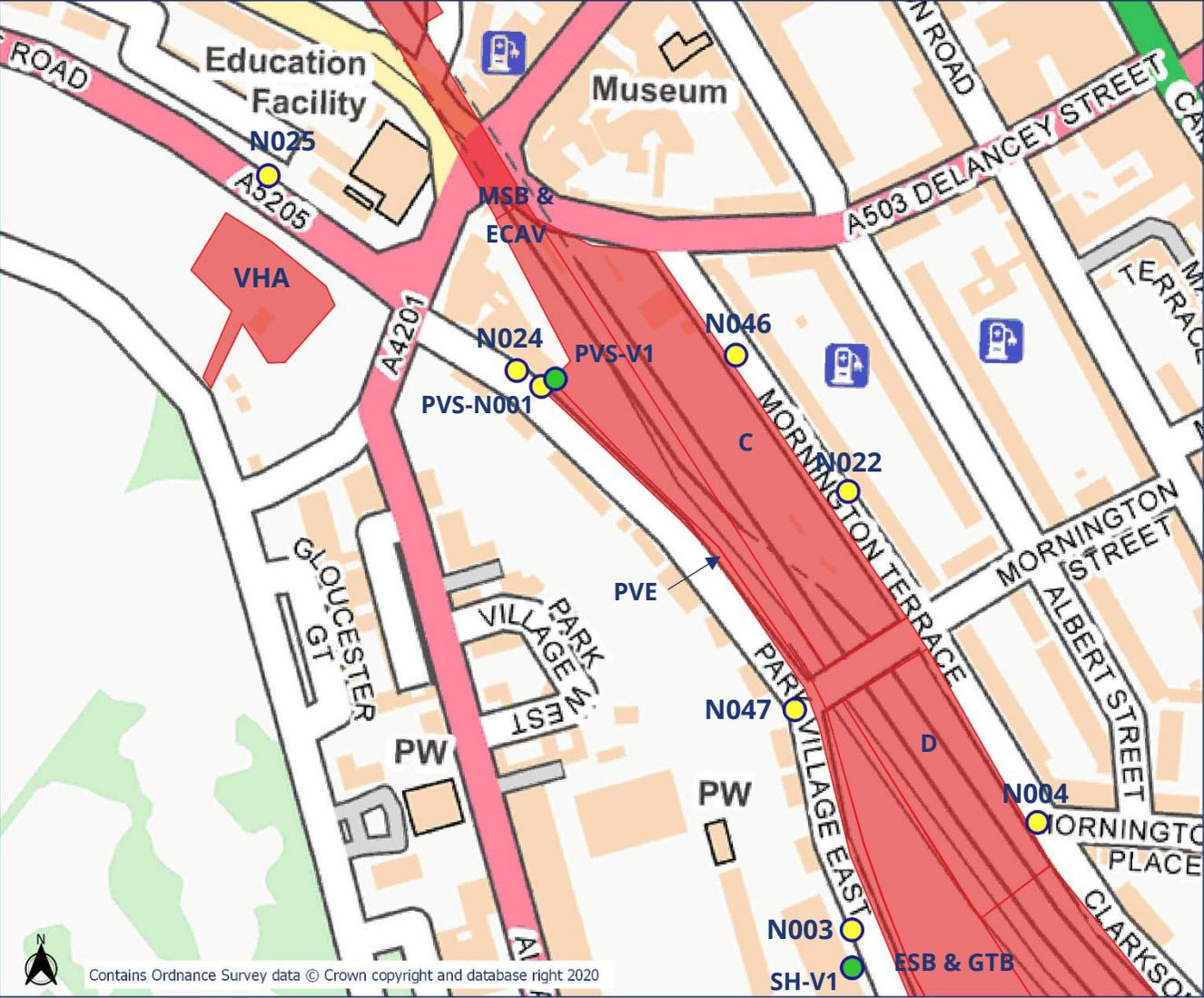


Legend

- Noise Monitor
- Vibration Monitor
- Active Worksites

HS2

Noise and Vibration Monitoring Plan - 2

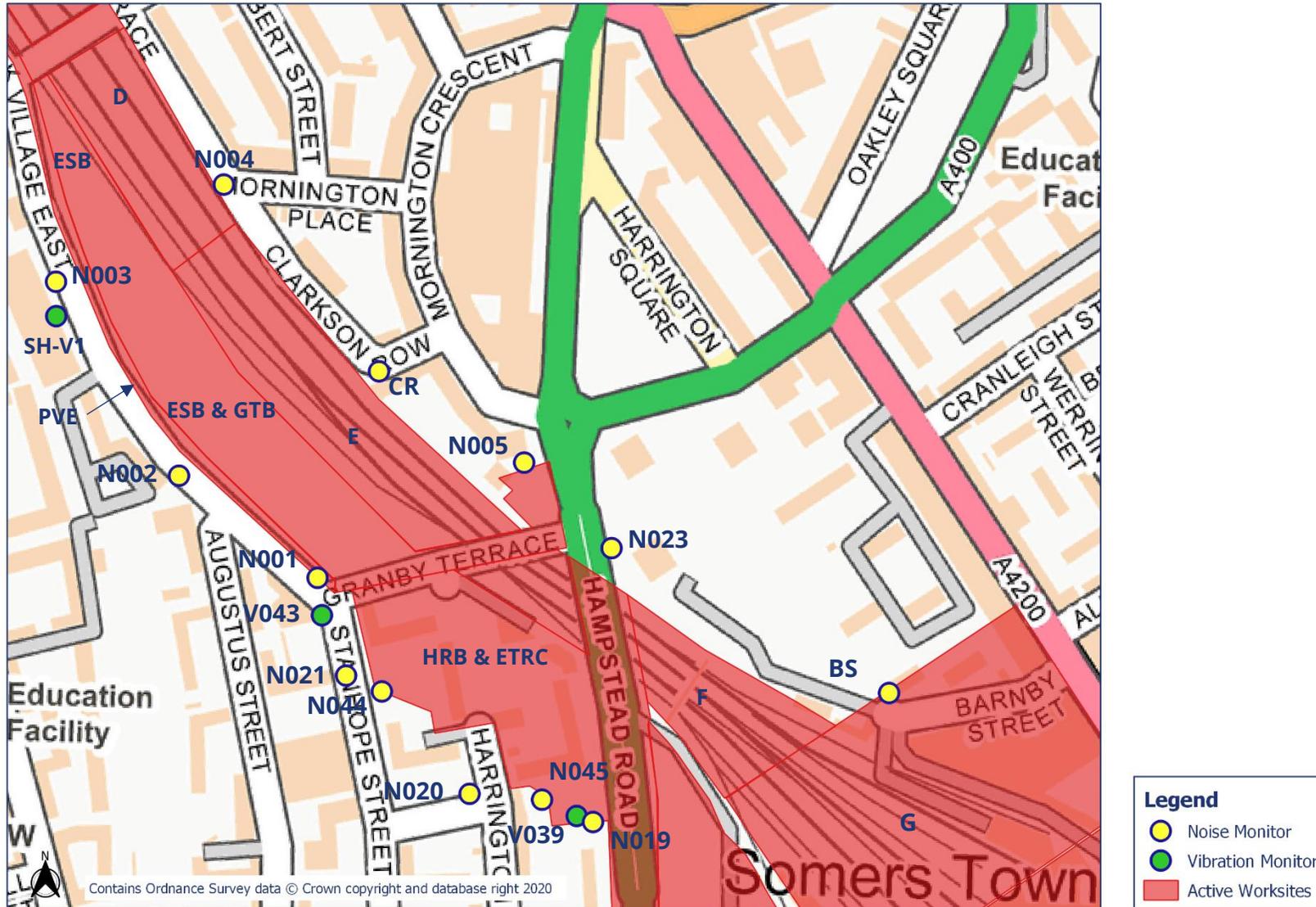


Legend

- Noise Monitor
- Vibration Monitor
- Active Worksites

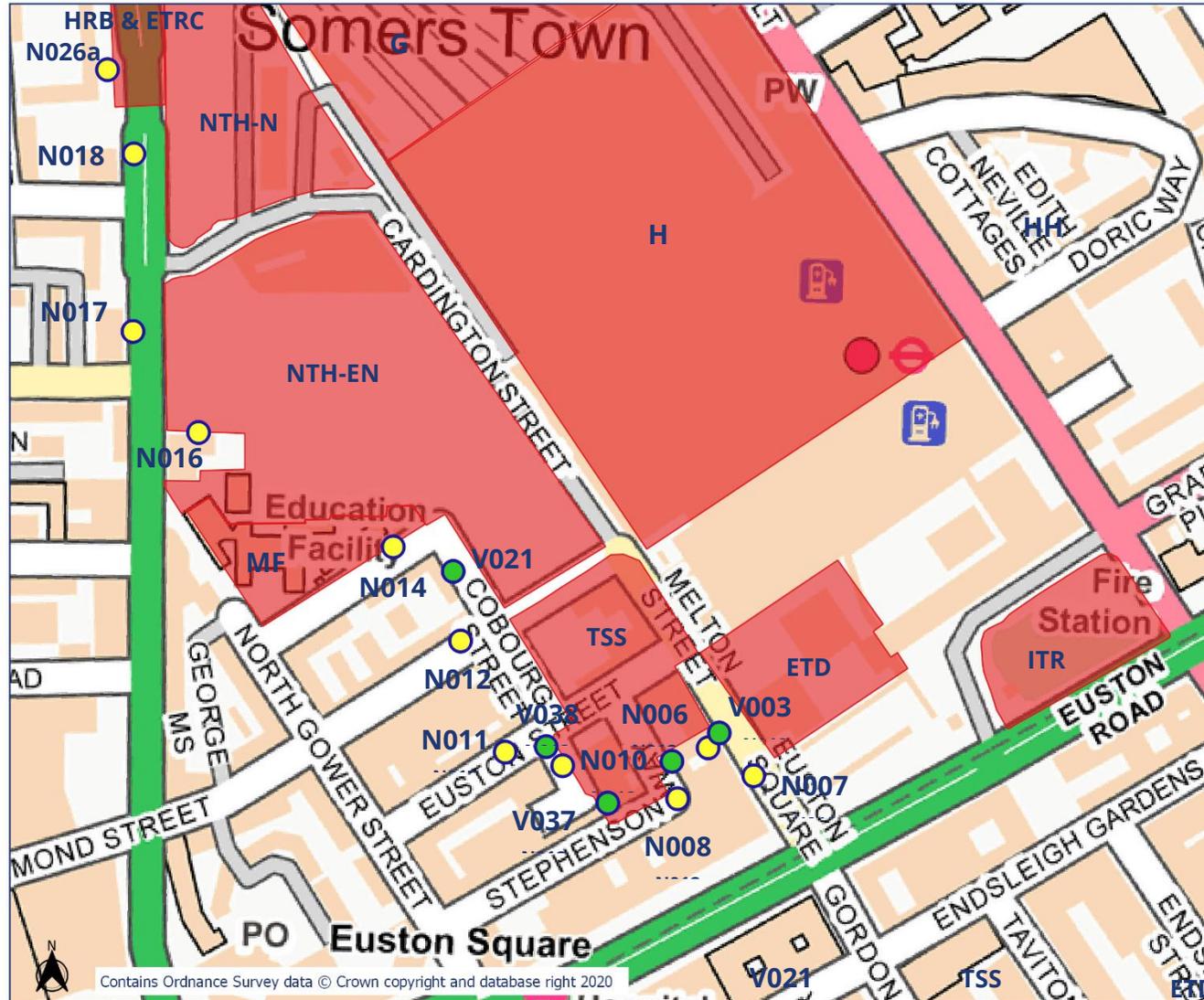
HS2

Noise and Vibration Monitoring Plan - 3



HS2

Noise and Vibration Monitoring Plan - 4



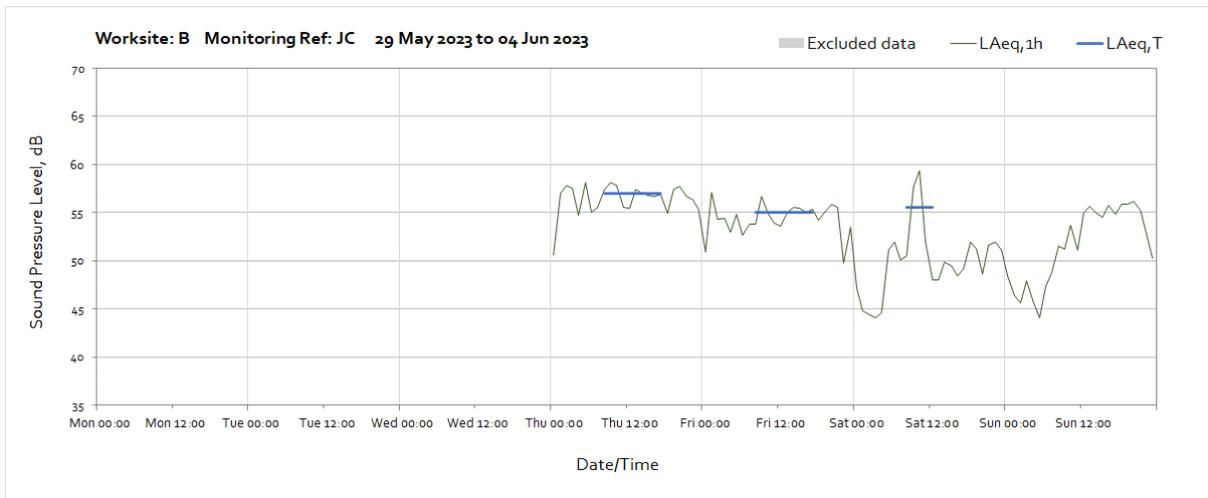
Contains Ordnance Survey data © Crown copyright and database right 2020

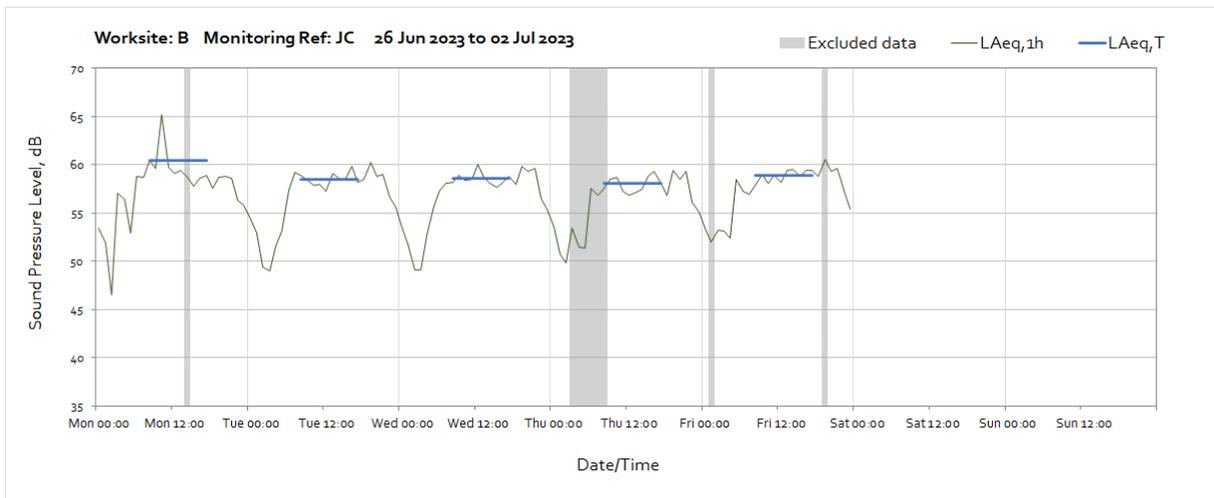
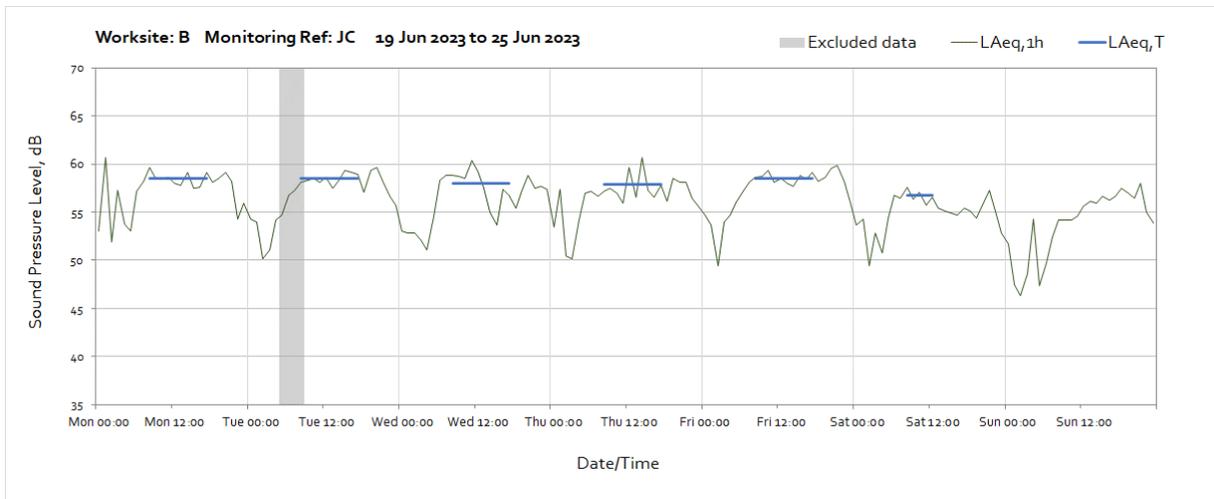
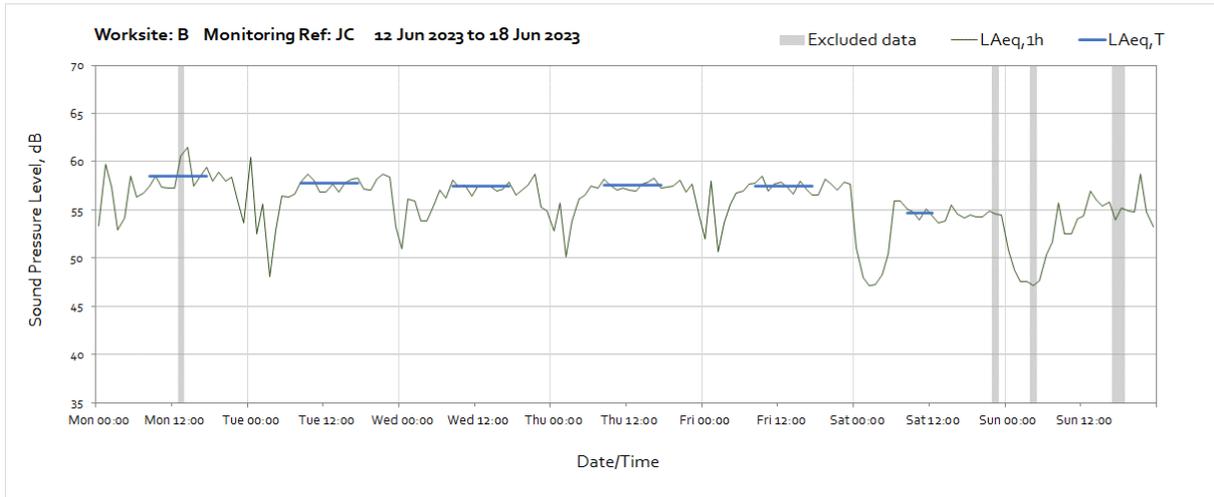
Appendix C Data

Noise

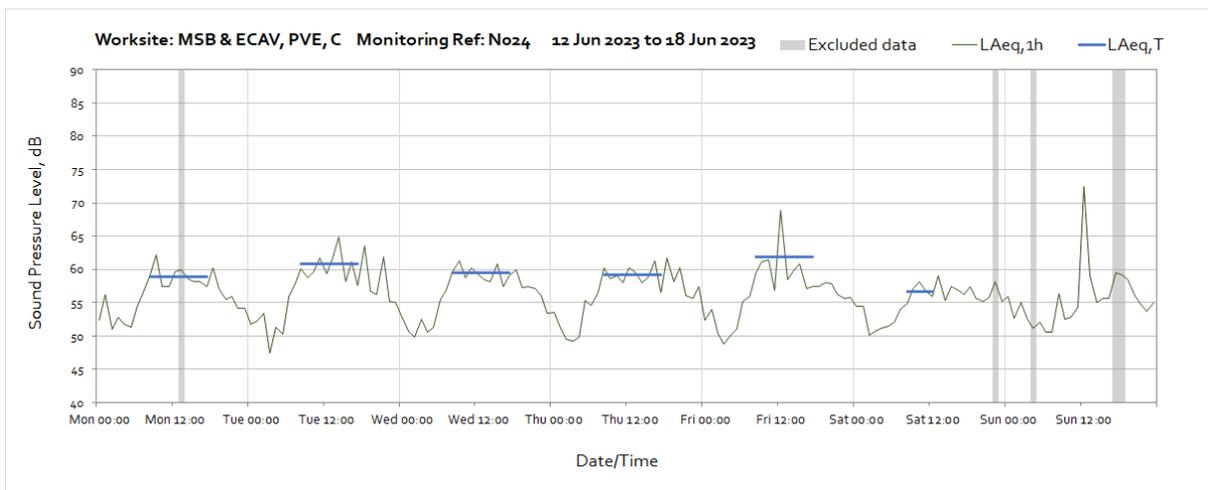
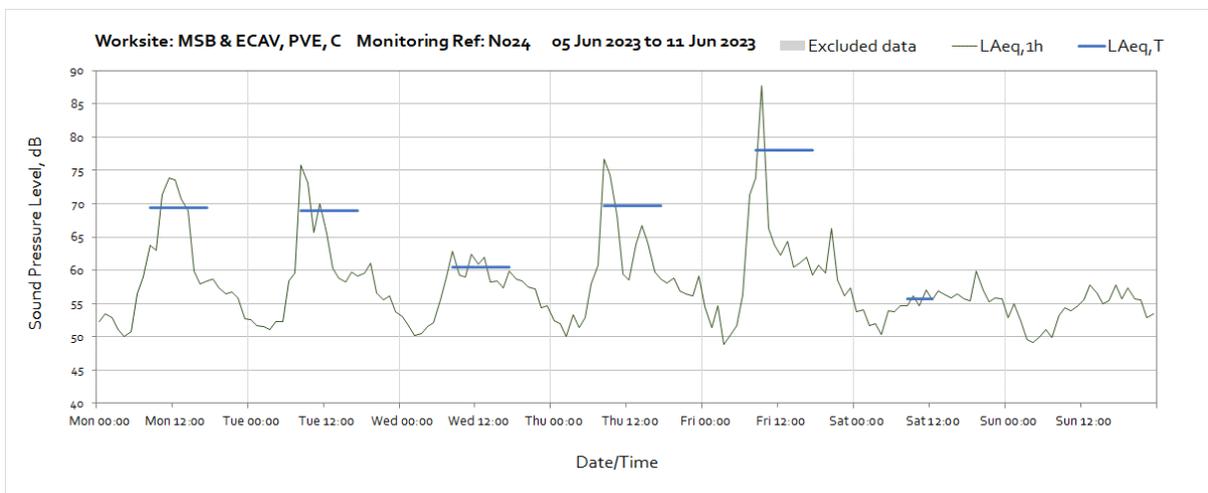
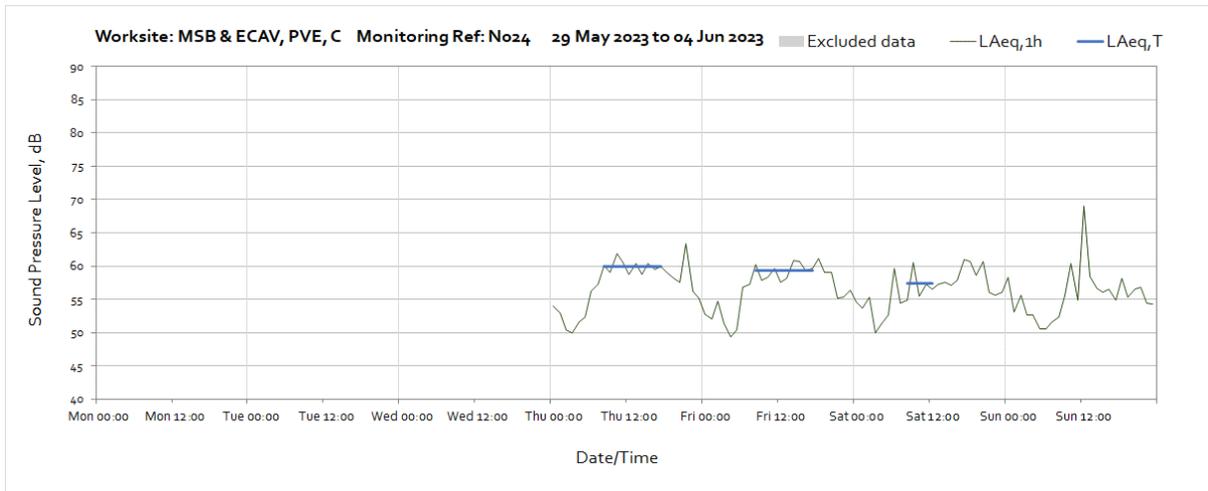
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

Worksite: B – Monitoring Ref: JC

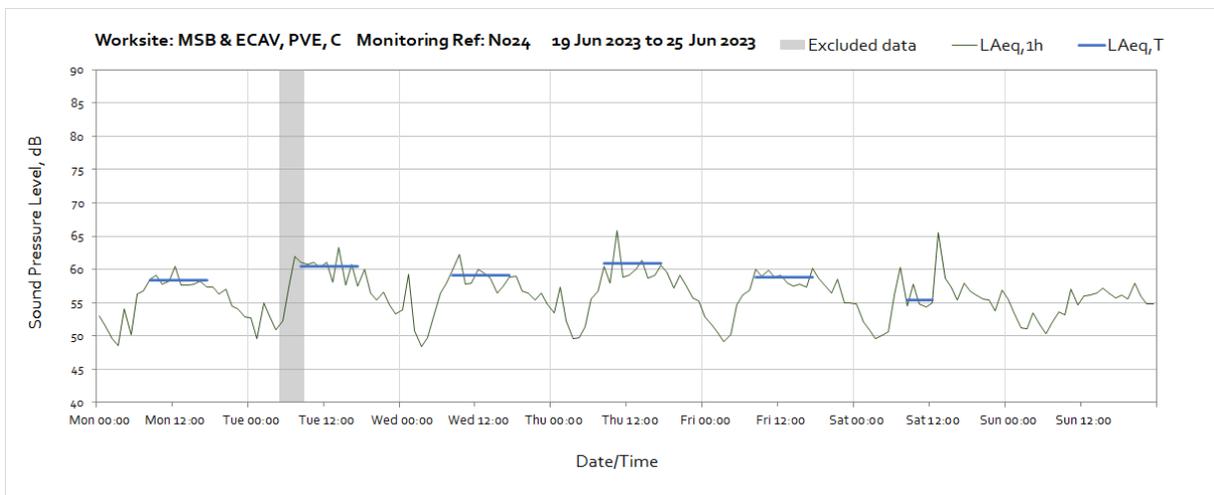
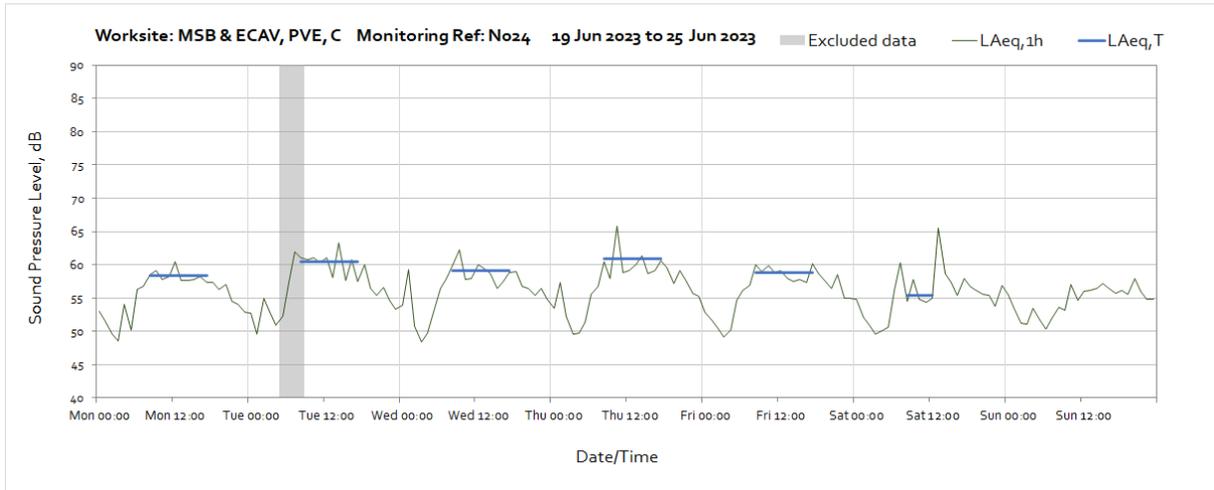




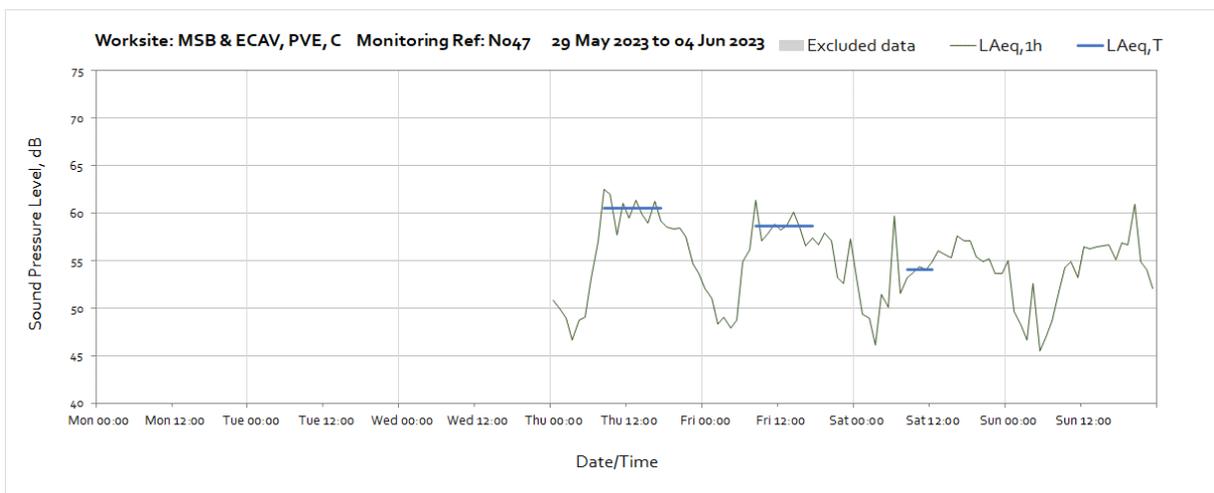
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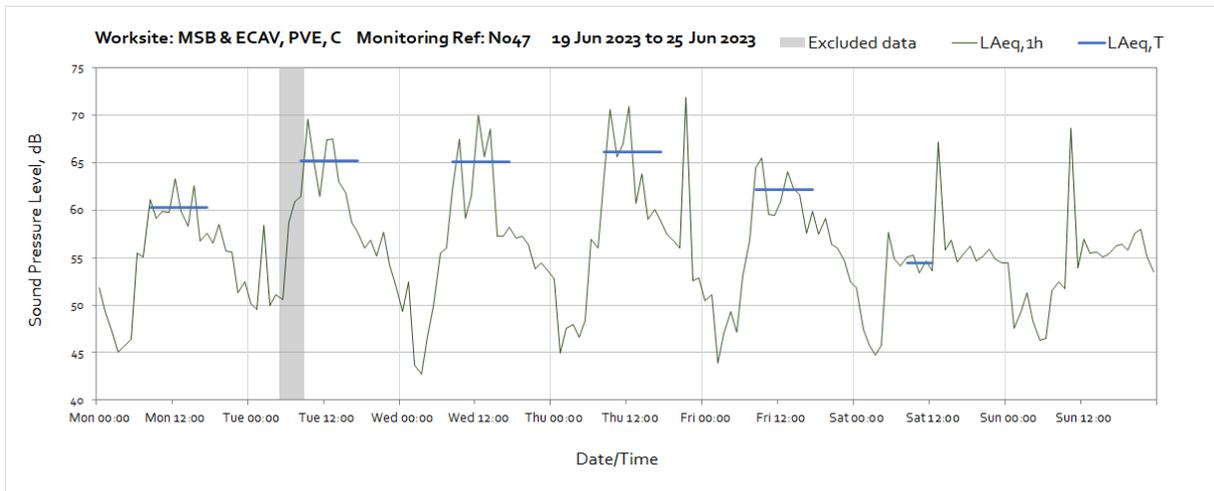
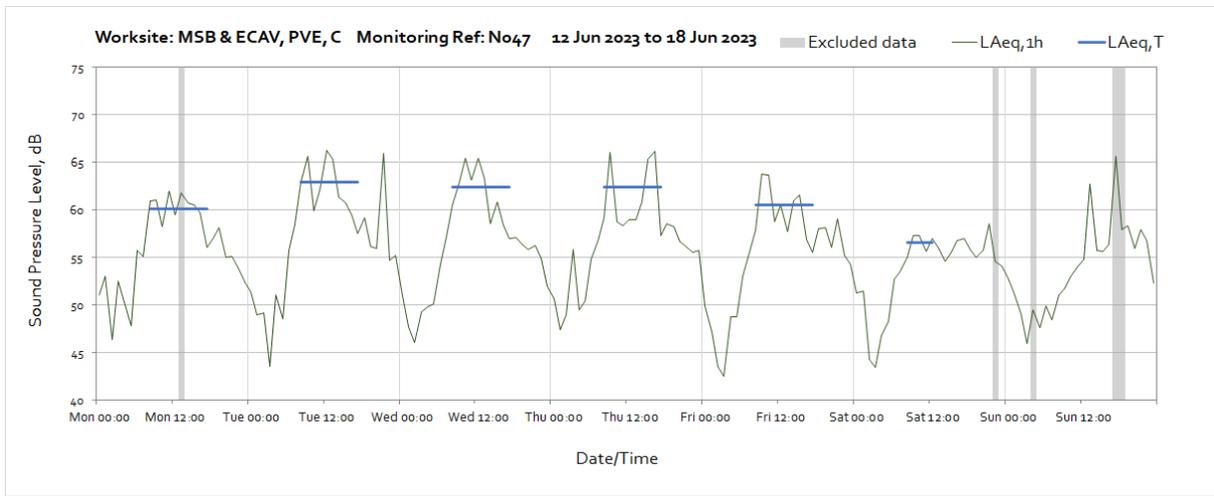
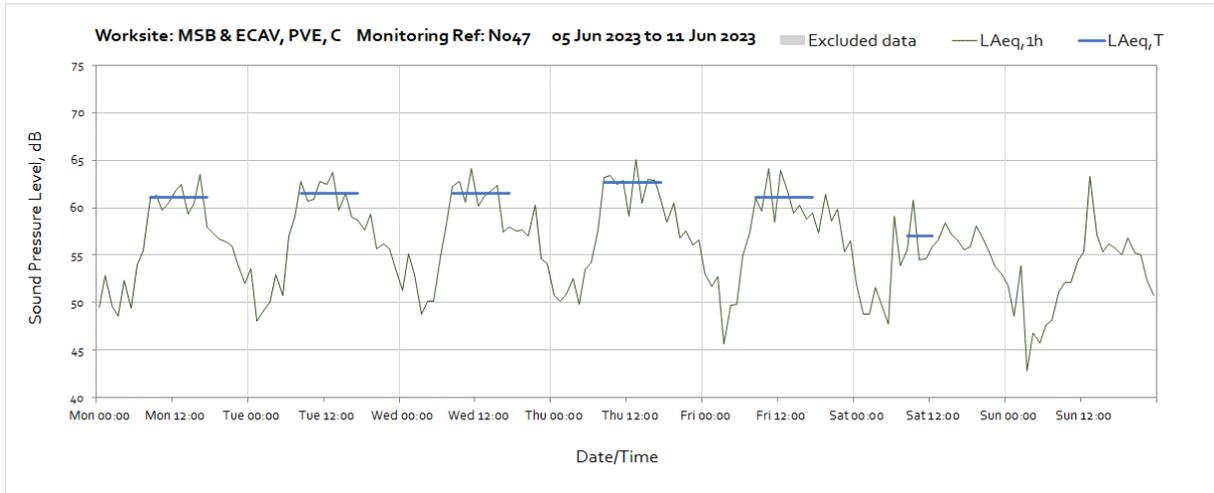


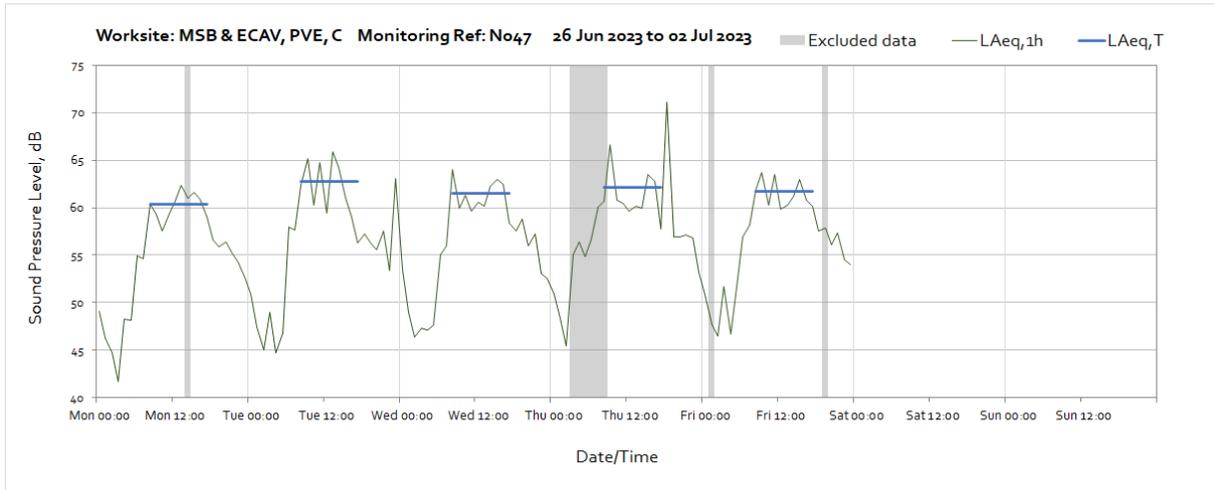
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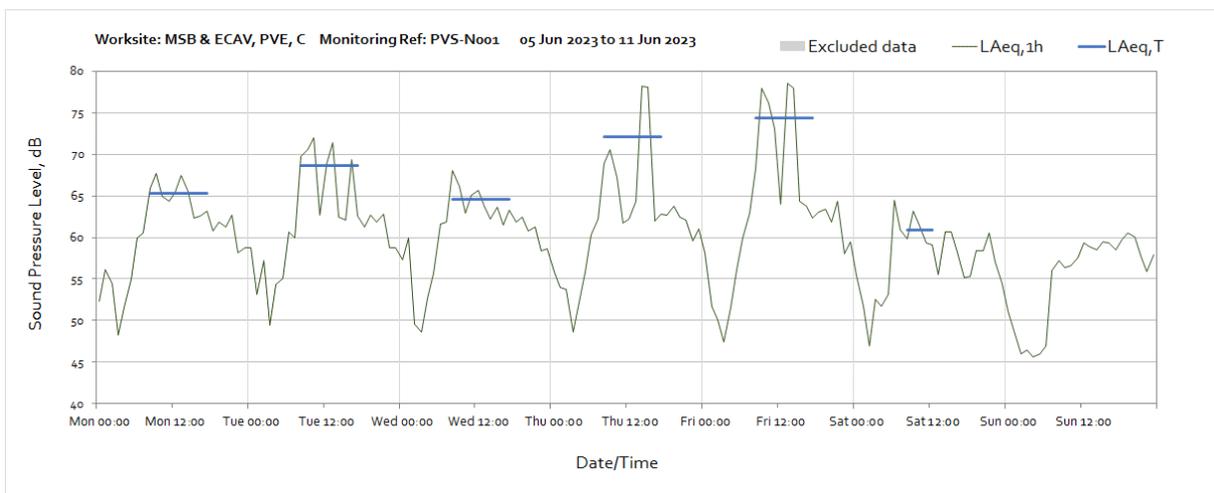
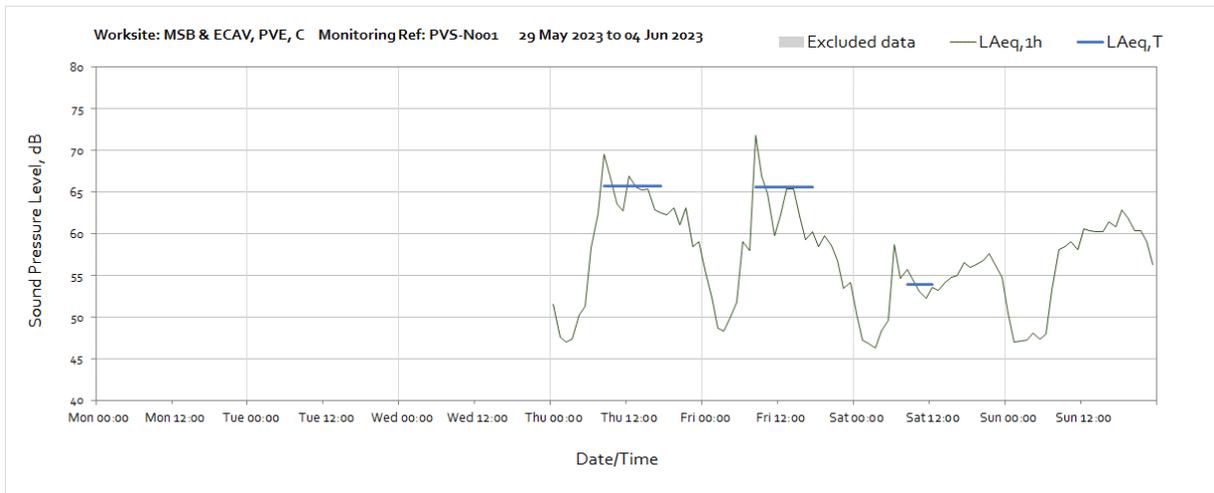
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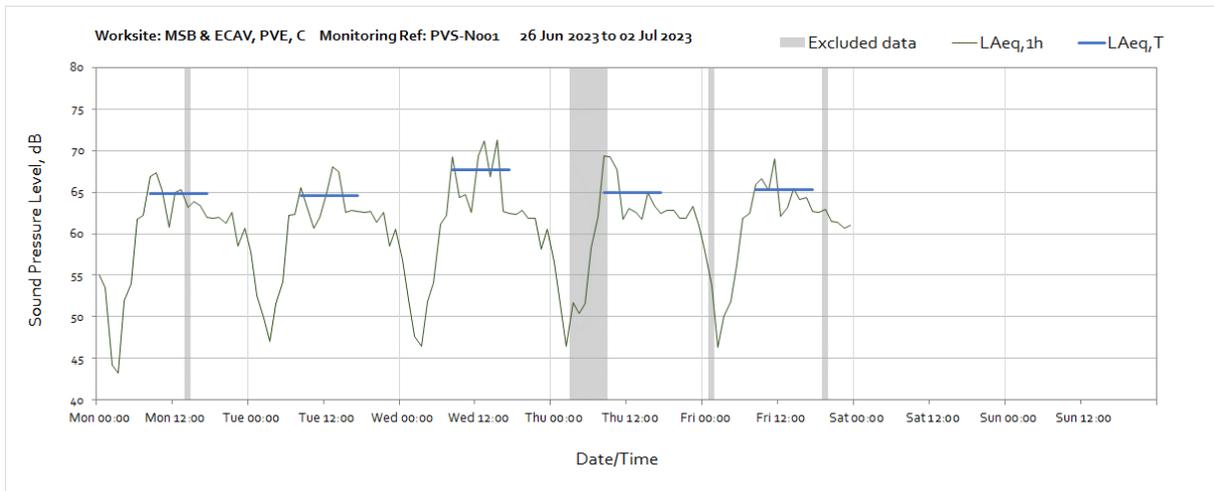
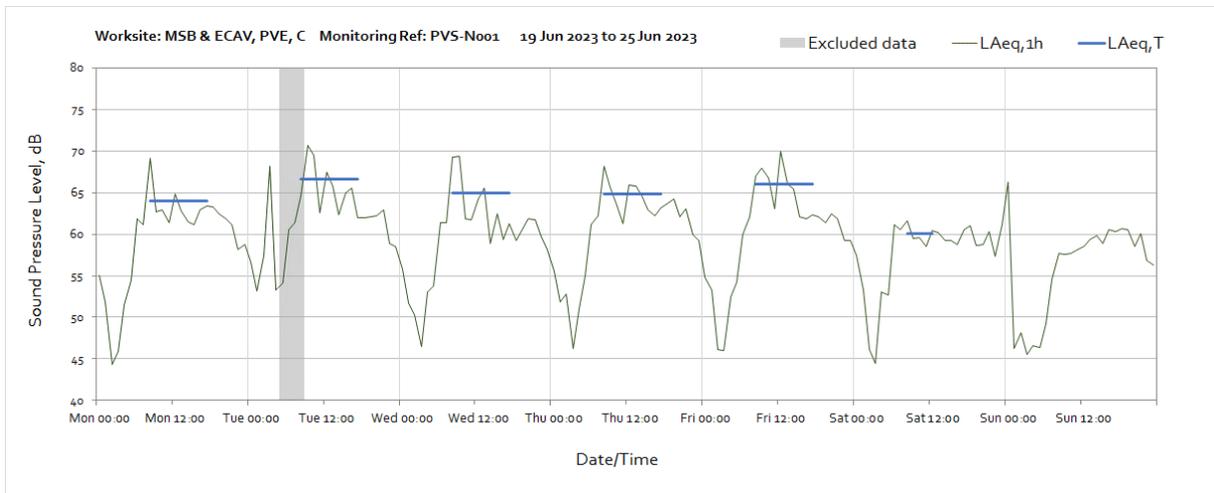
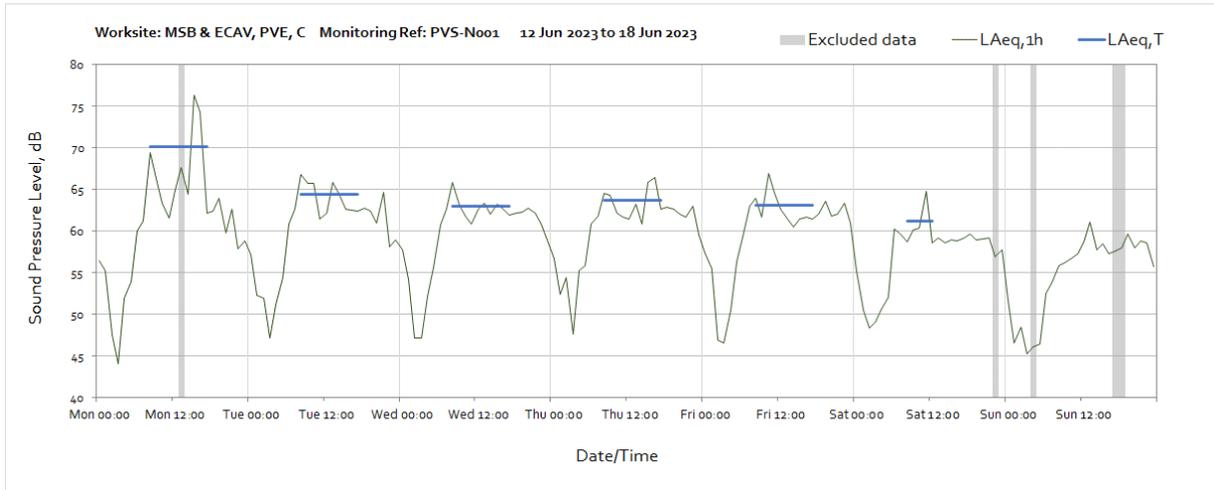




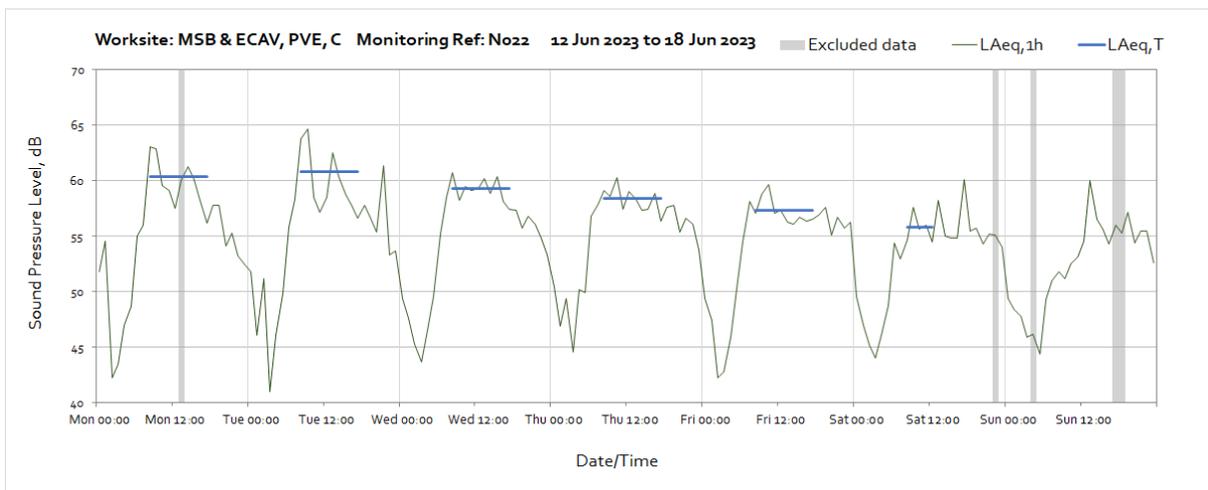
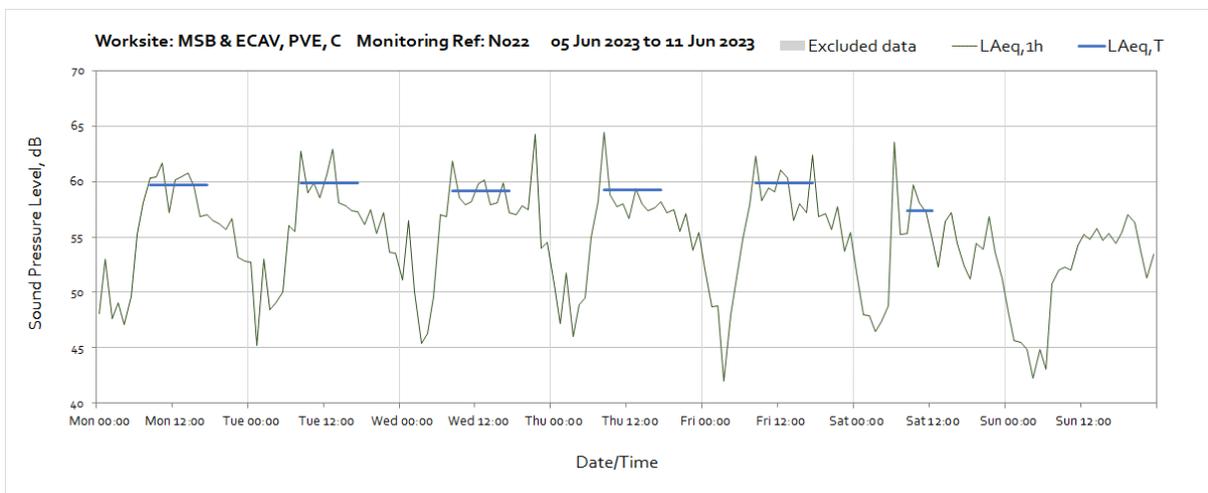
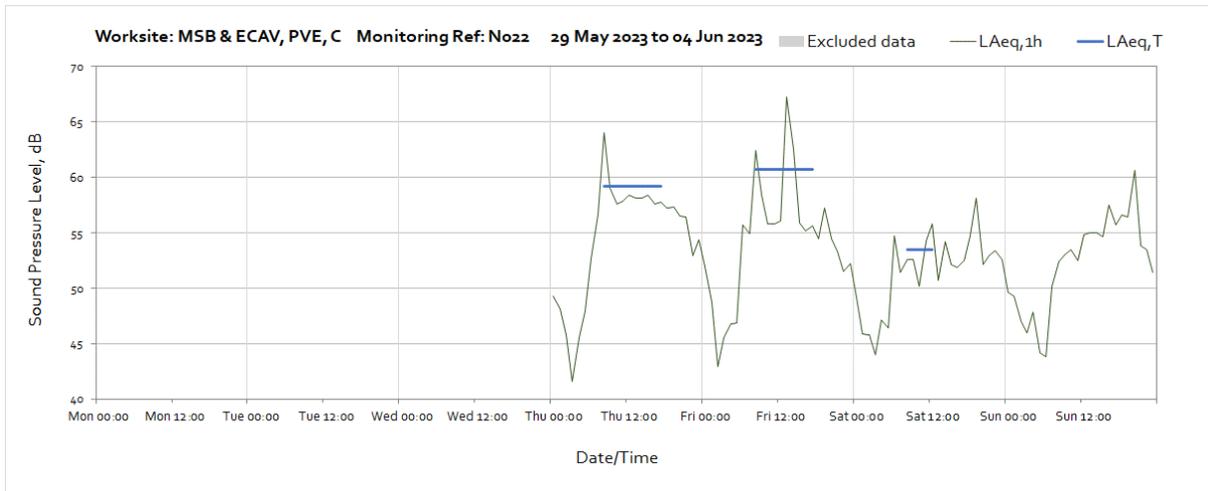


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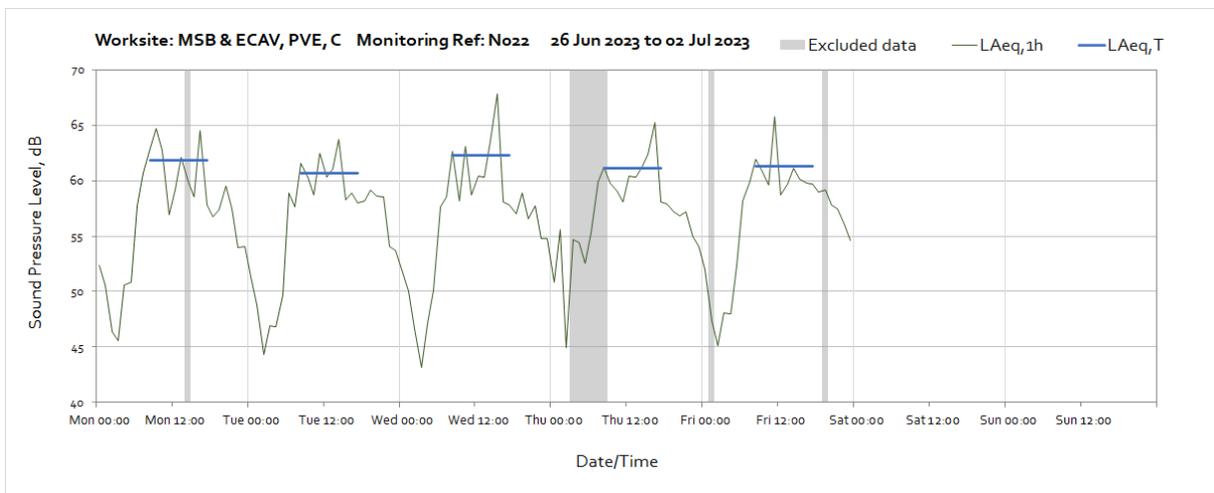
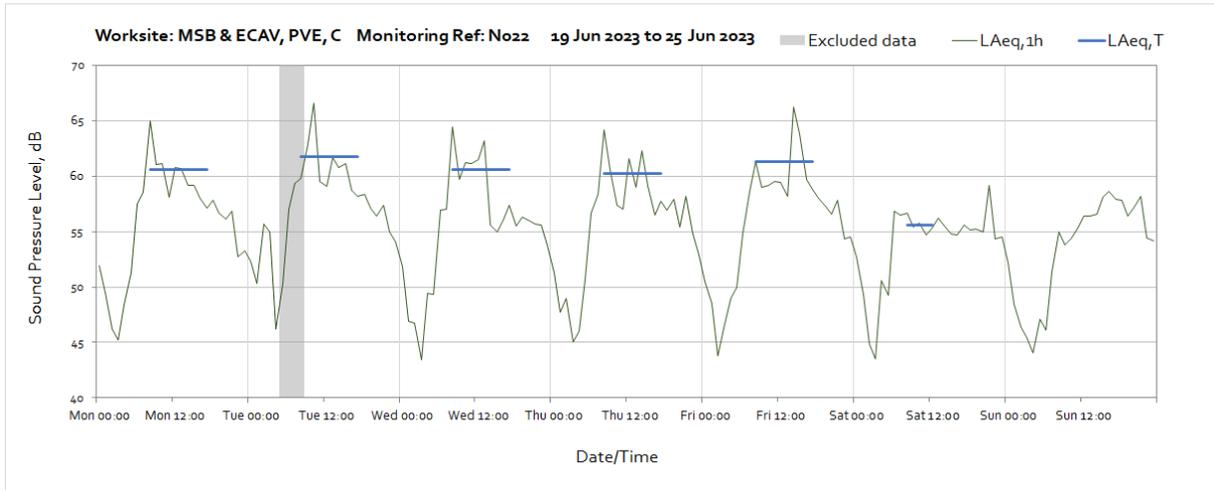




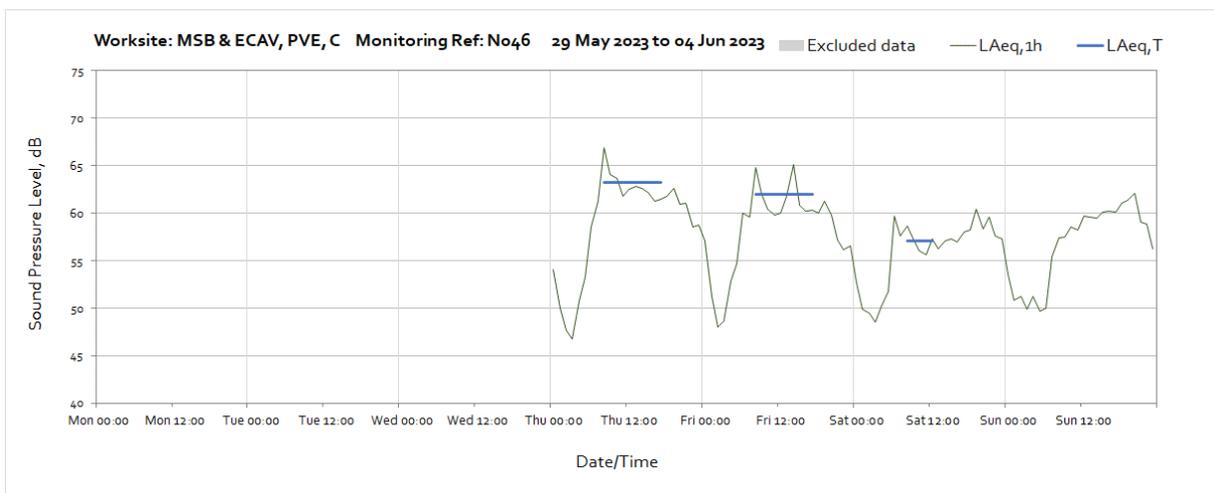
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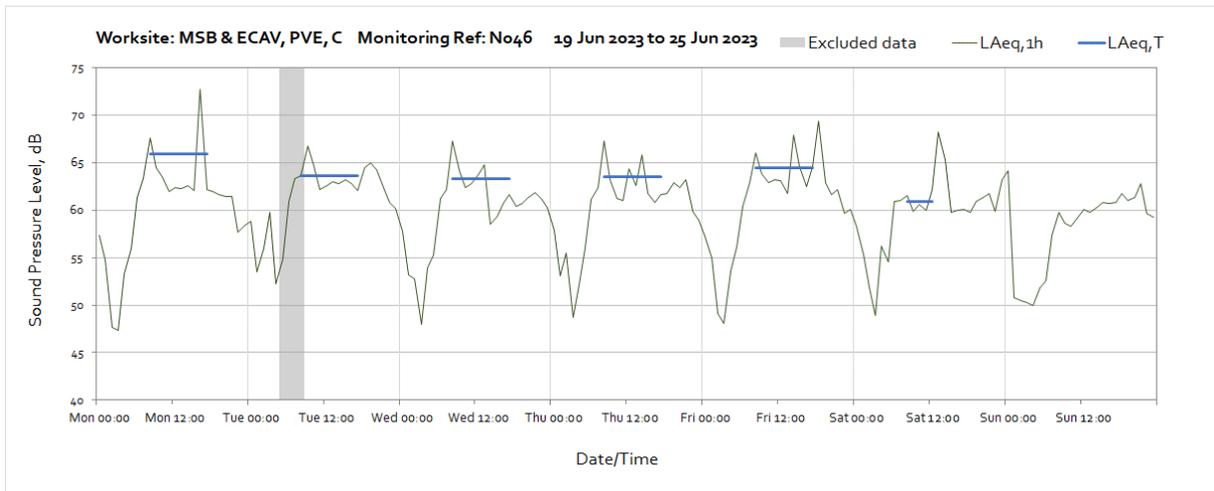
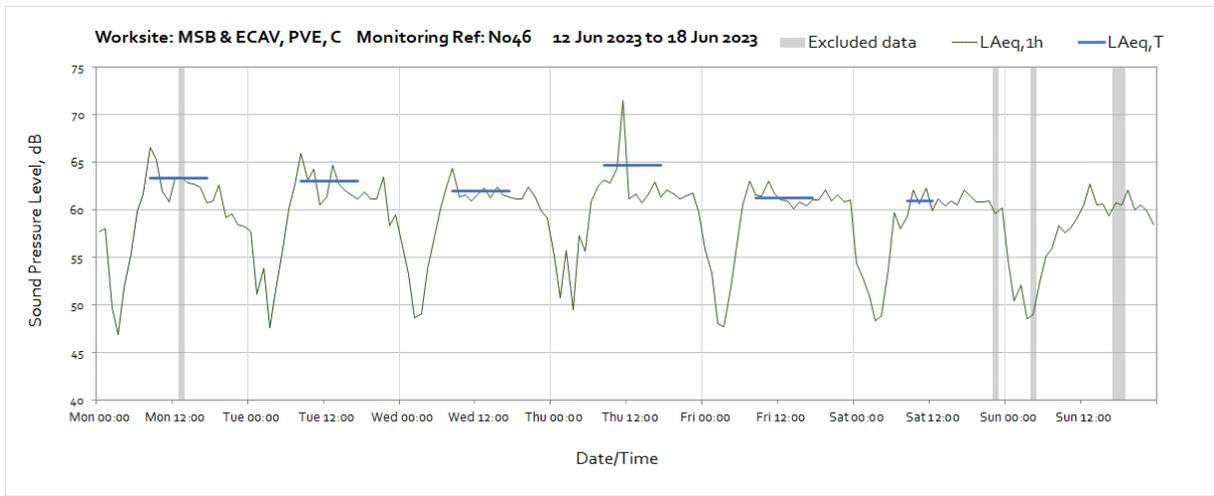
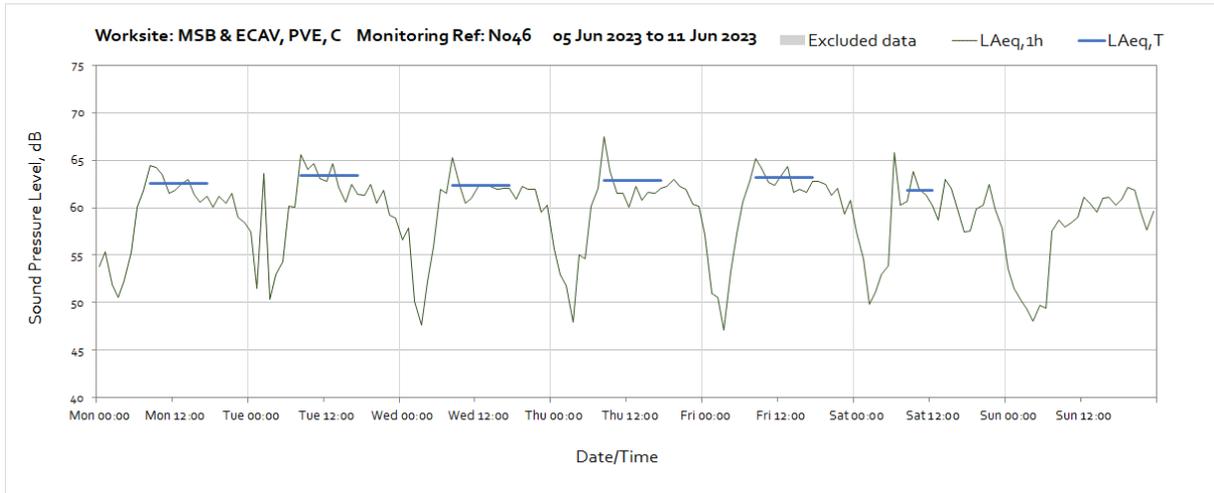


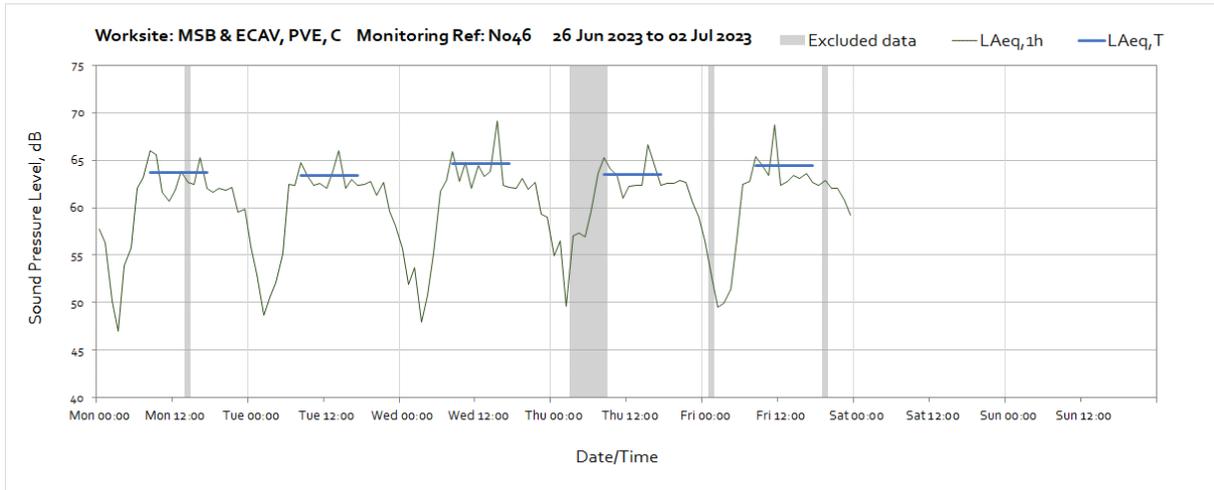
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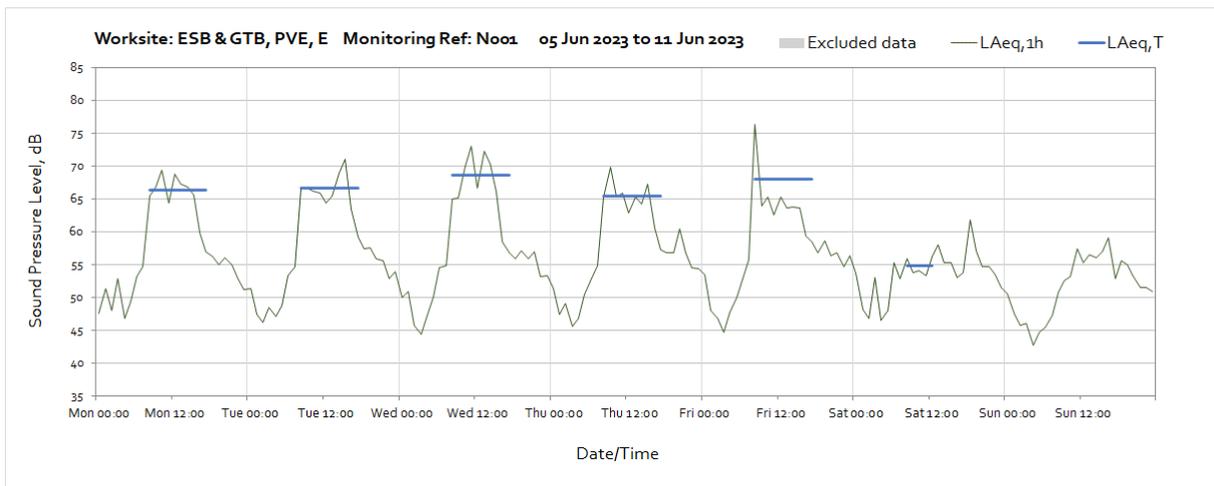
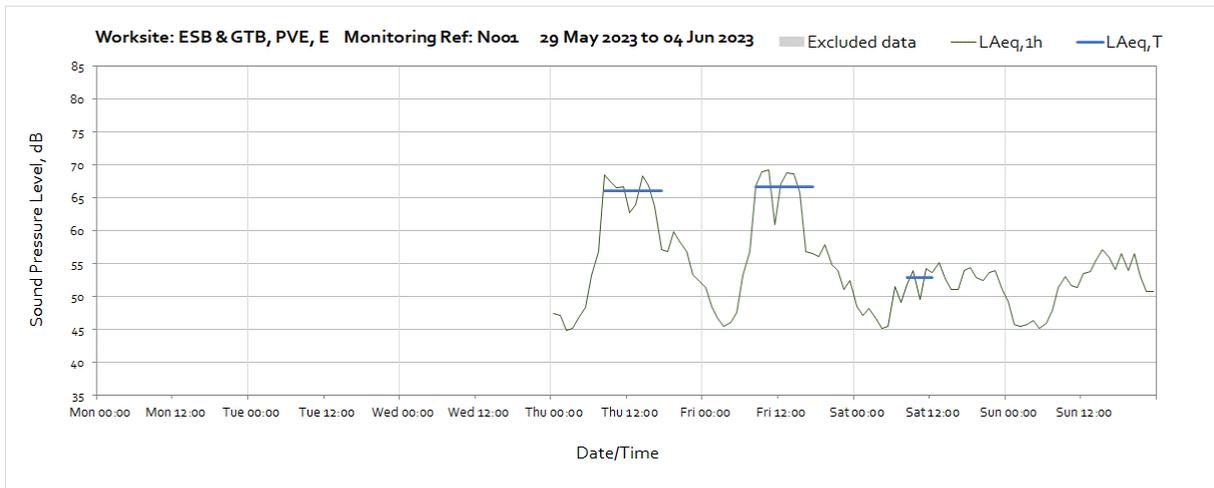
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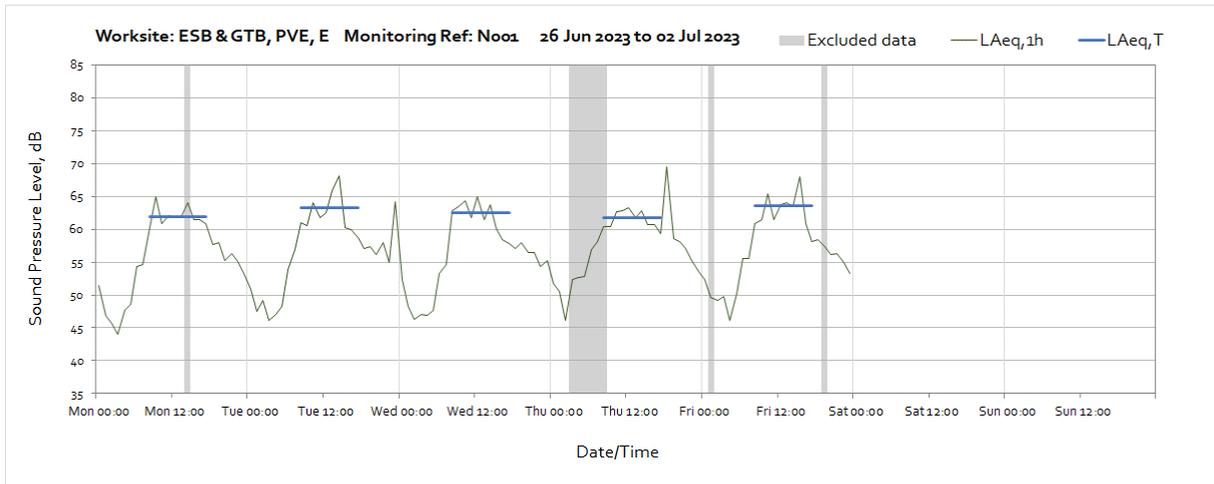
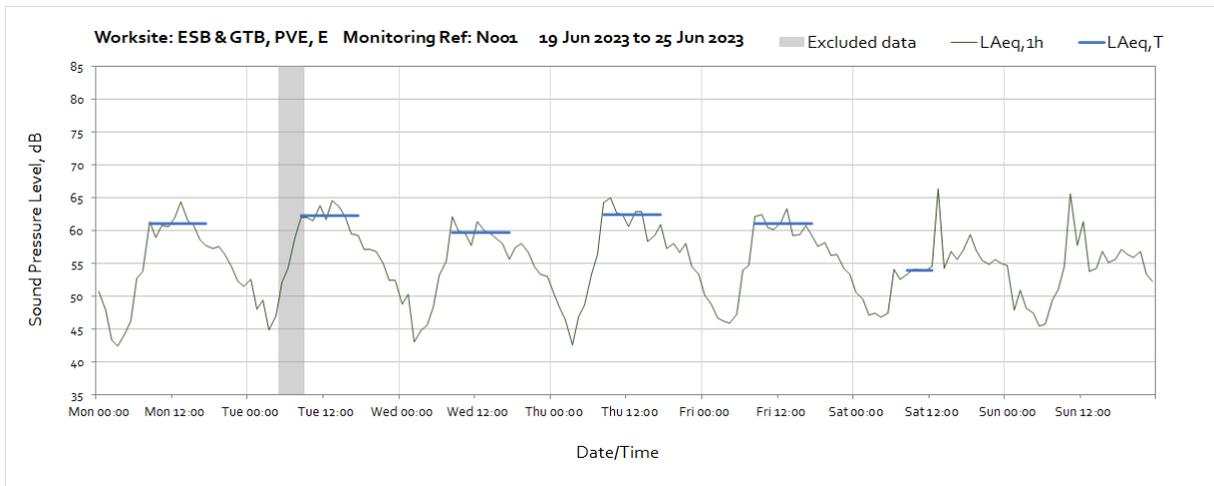
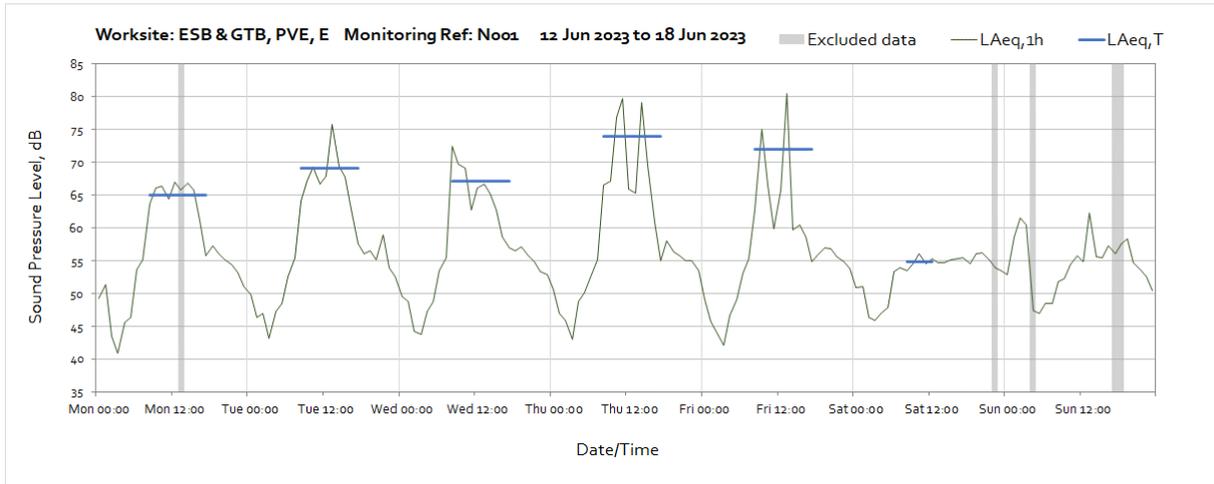




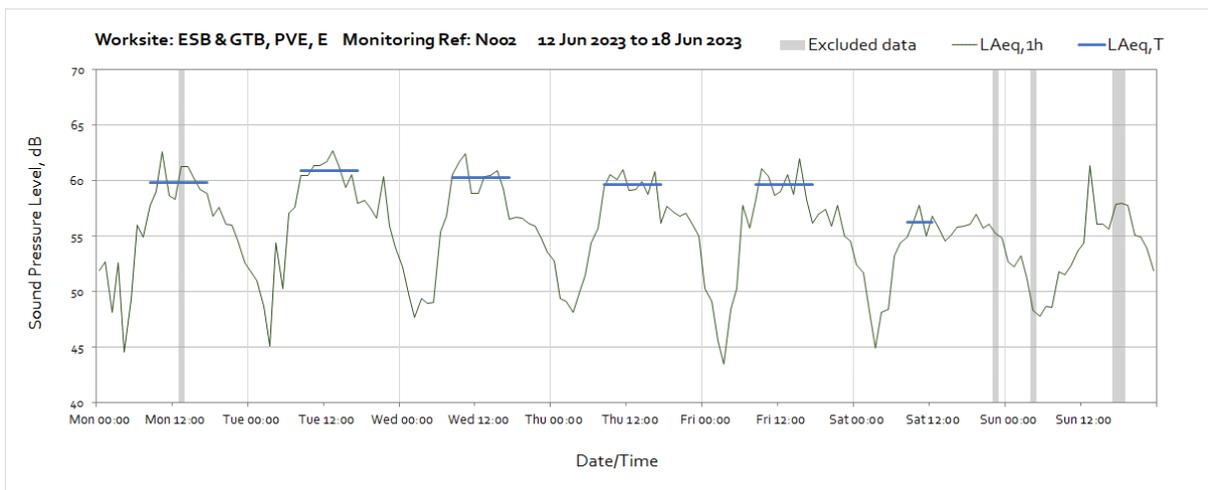
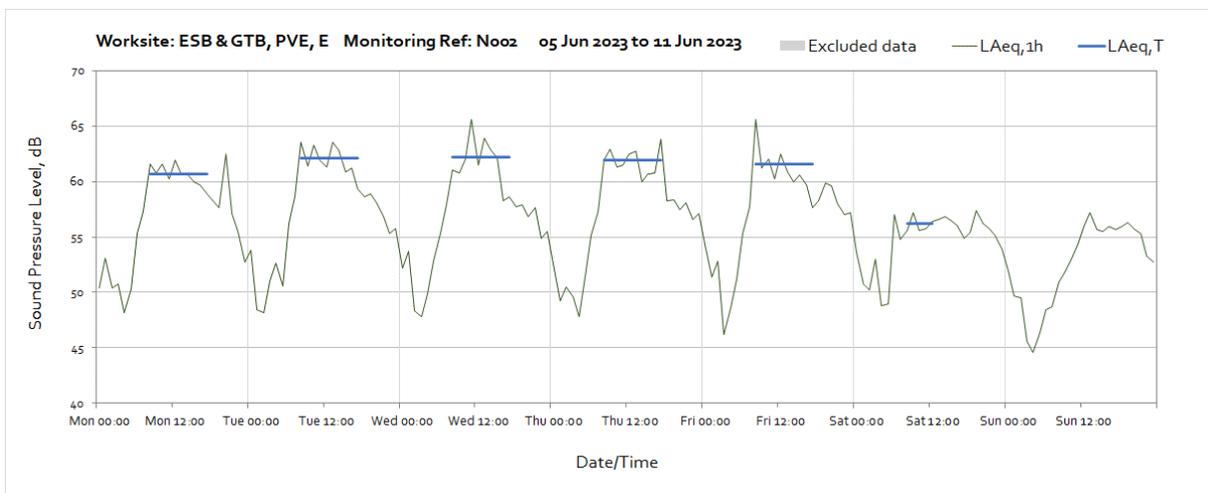
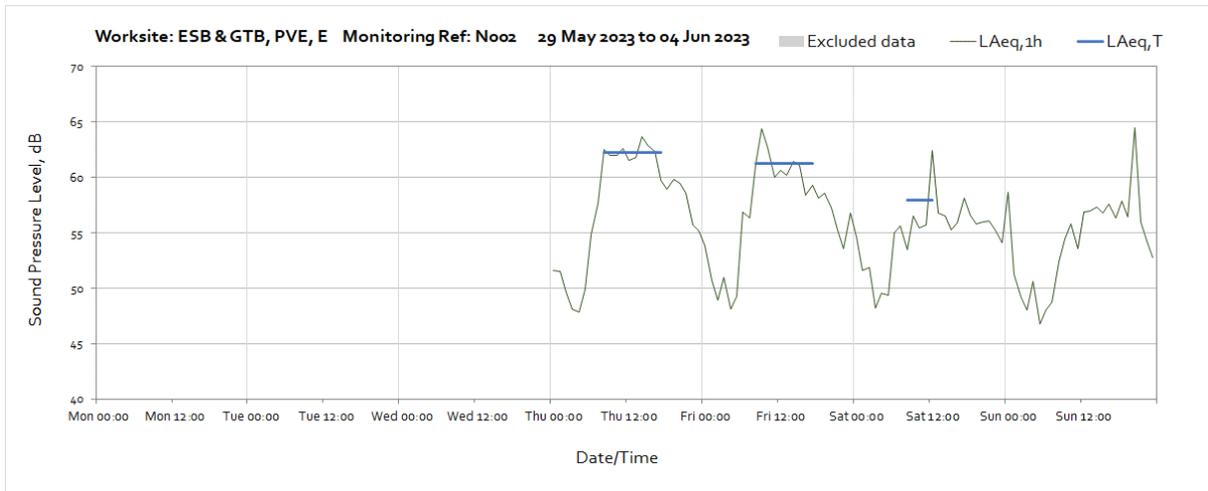


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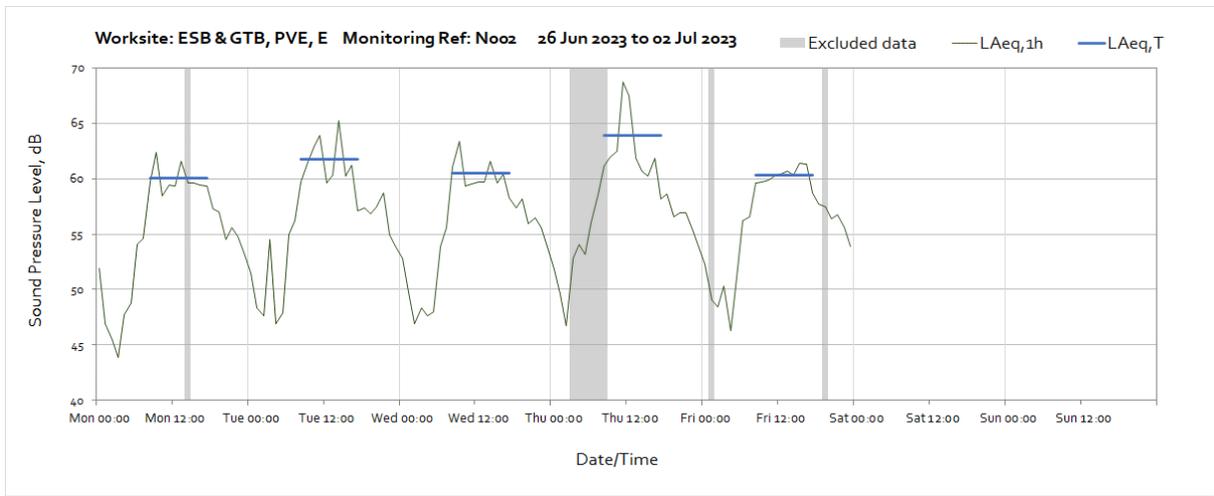
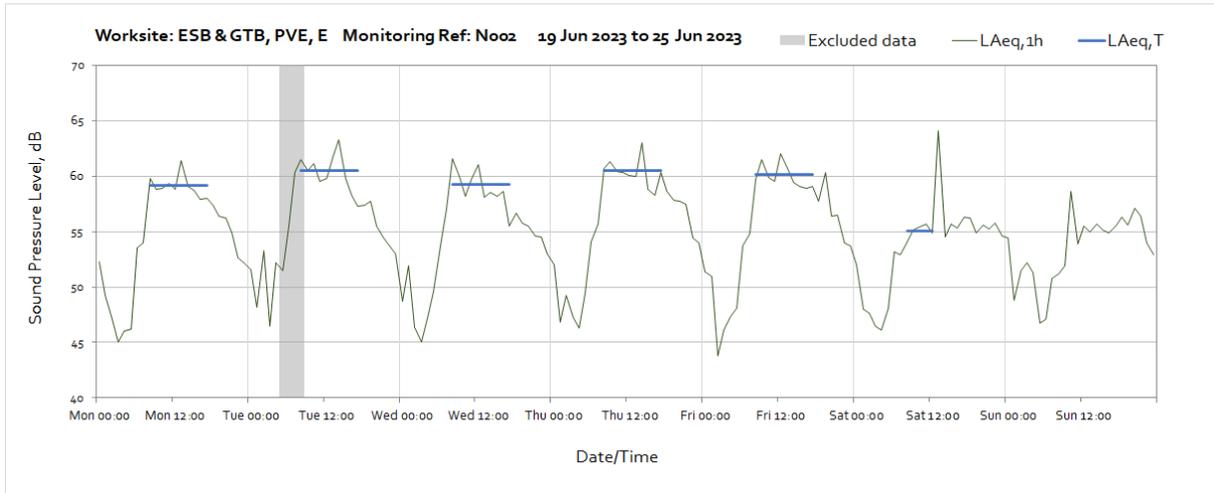




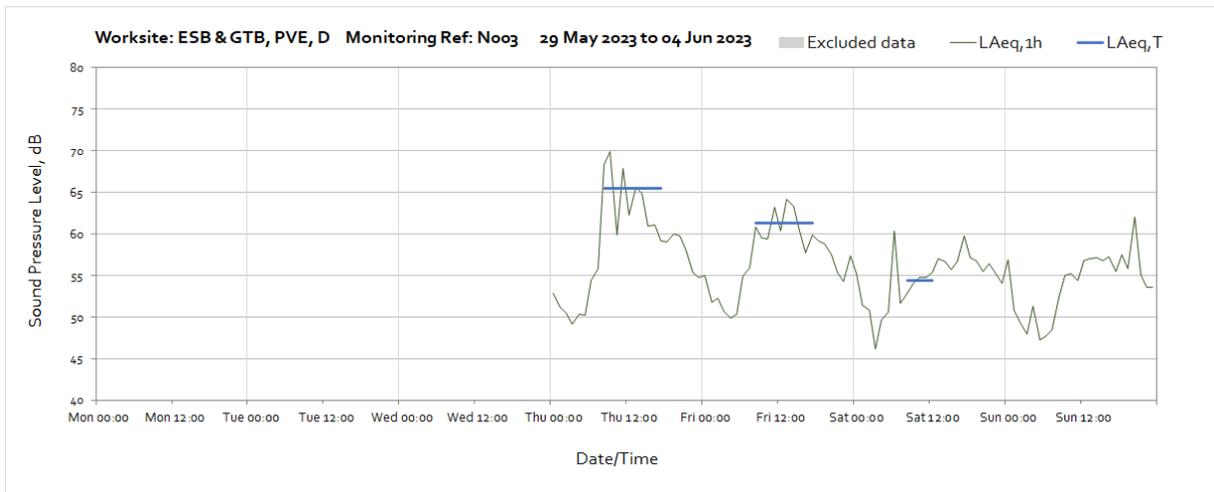
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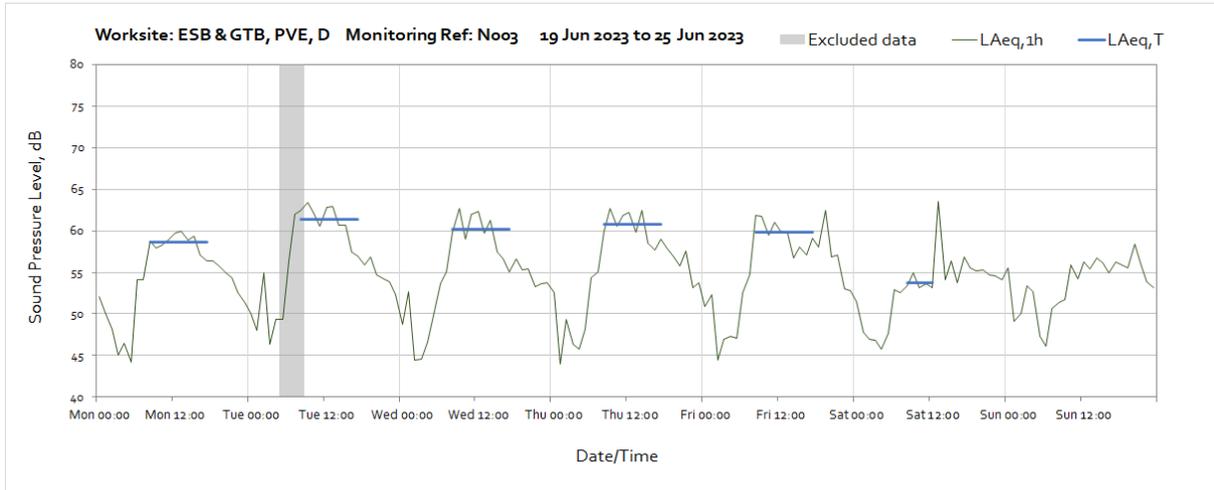
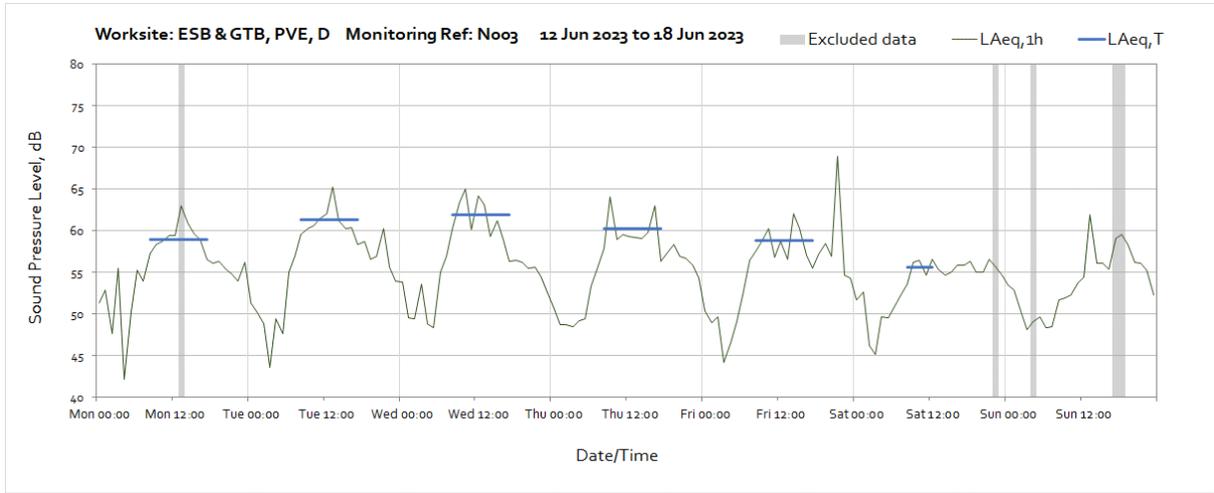
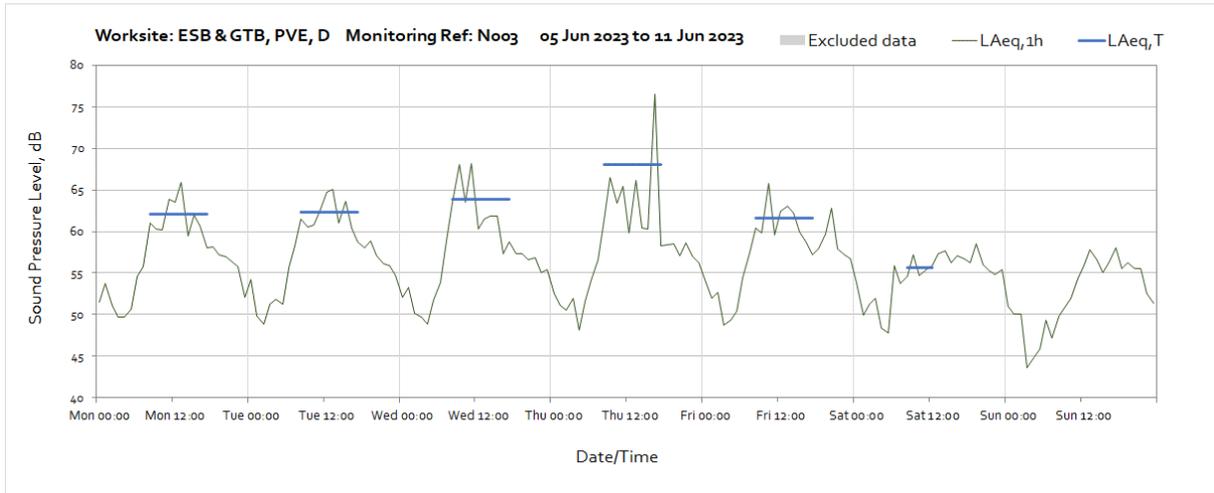


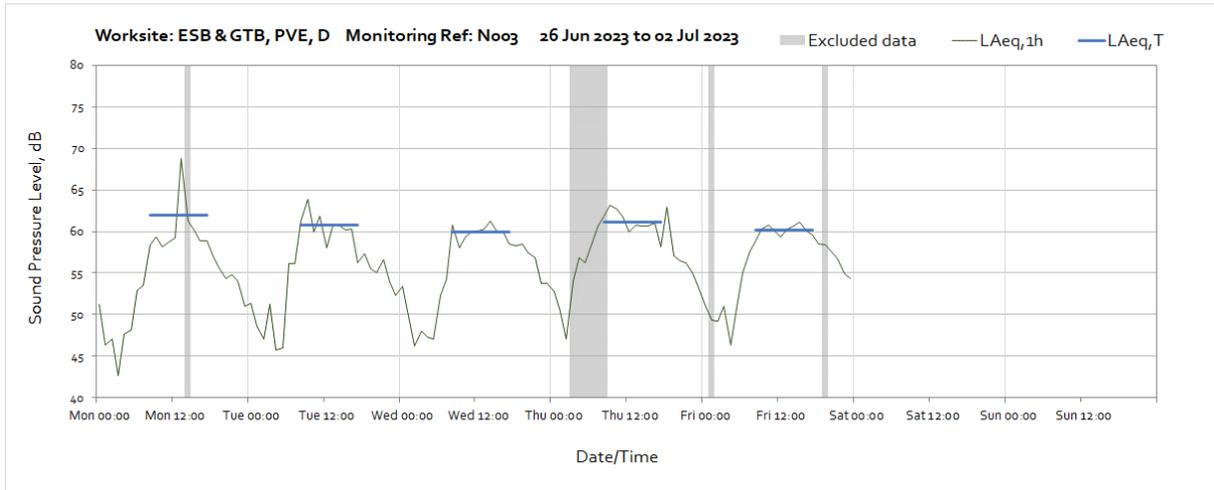
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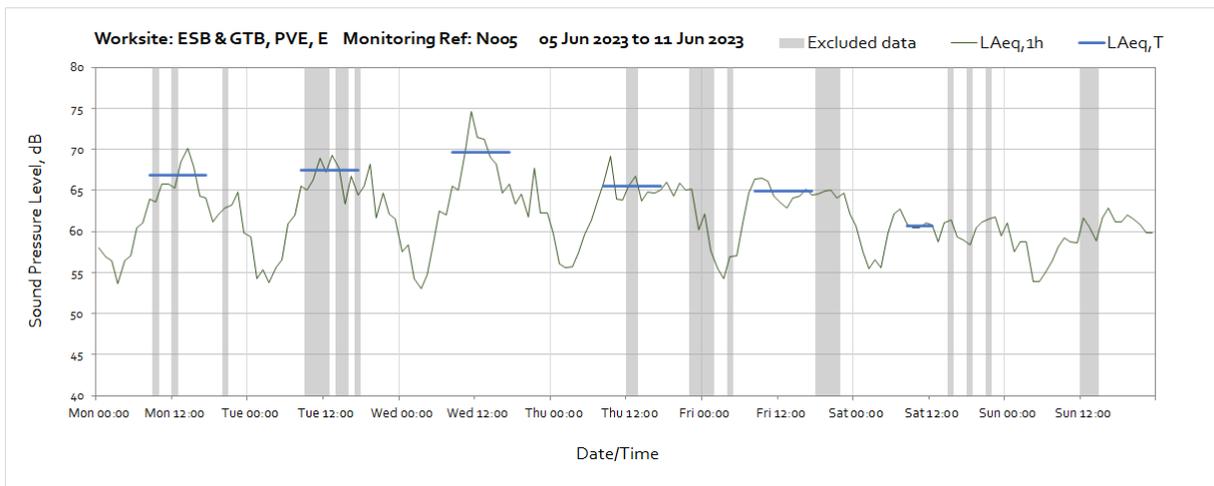
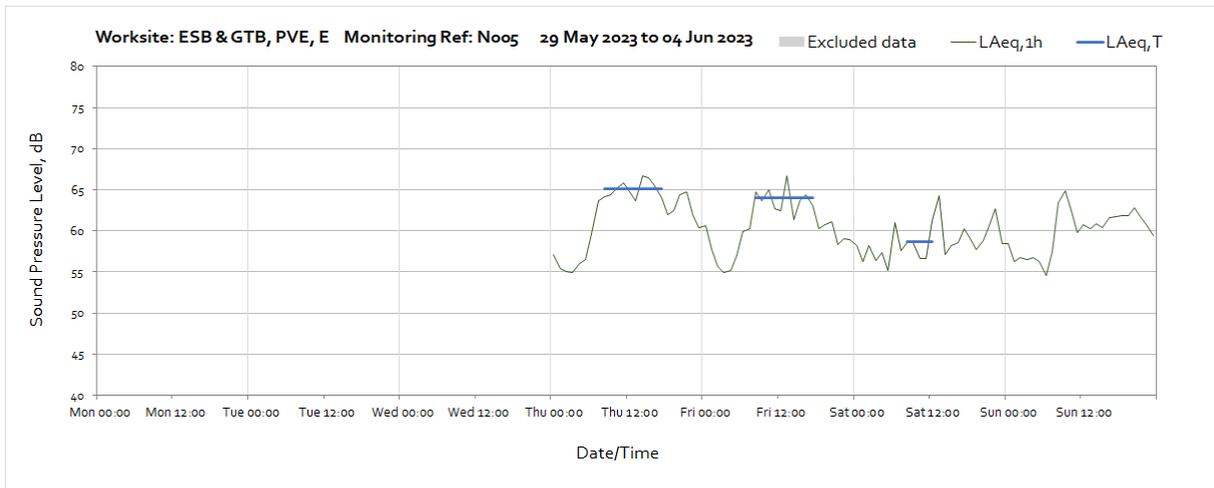
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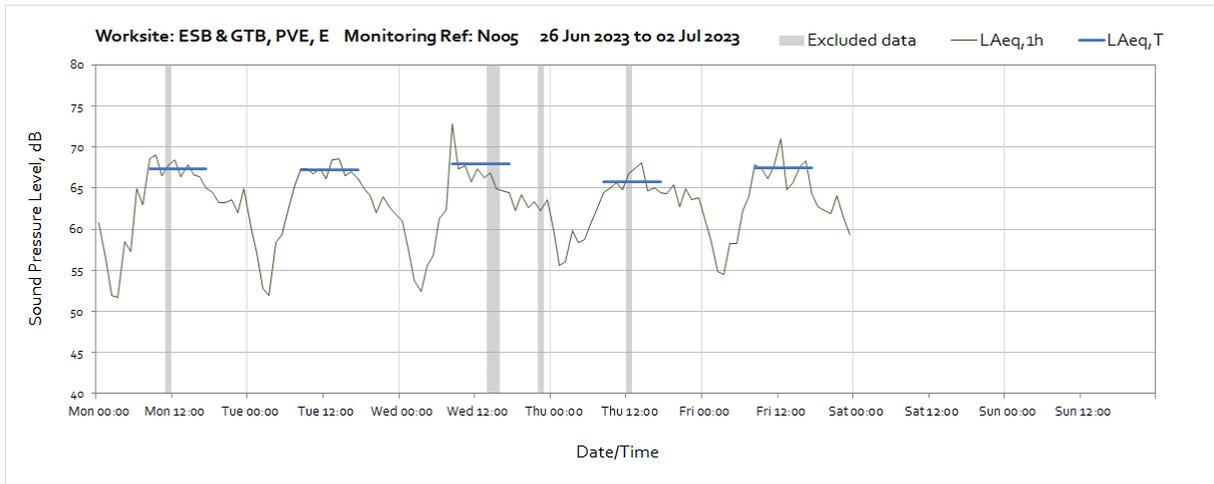
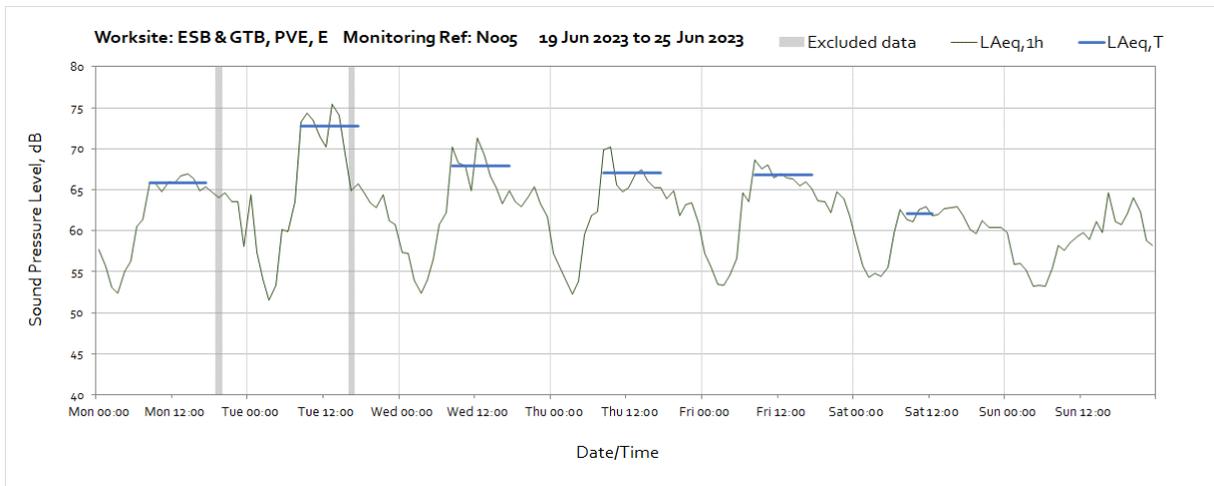
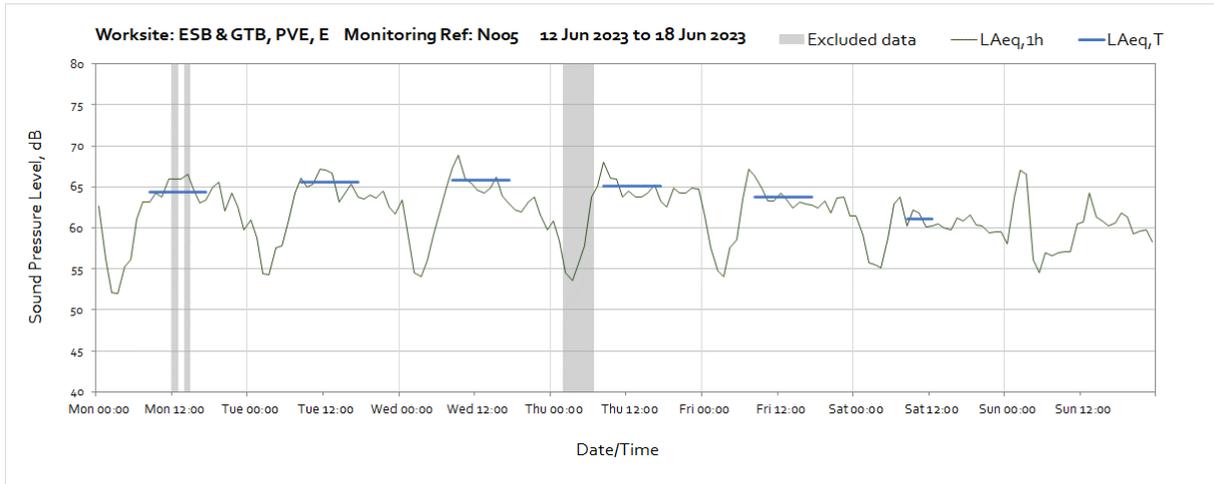




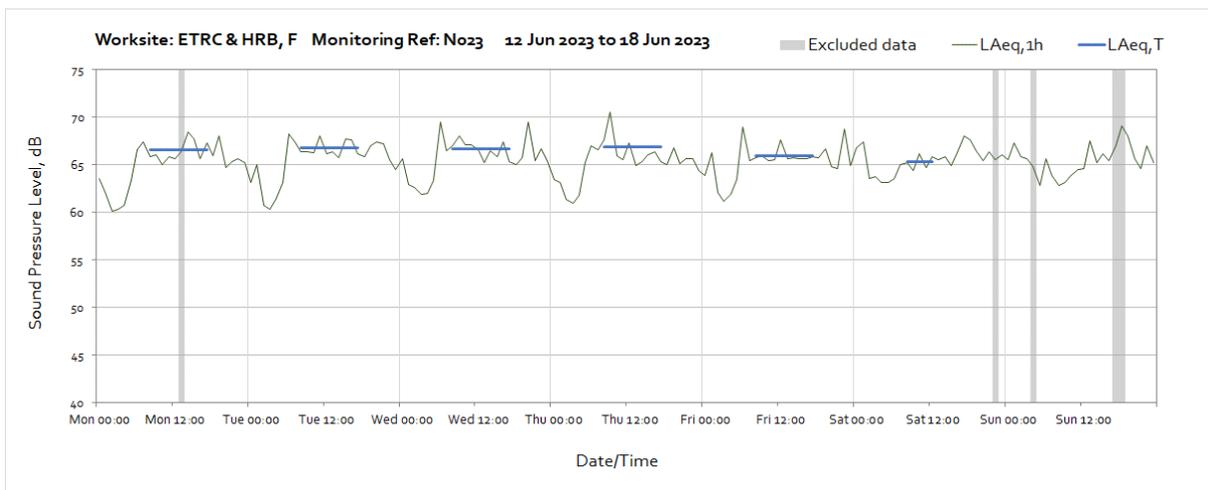
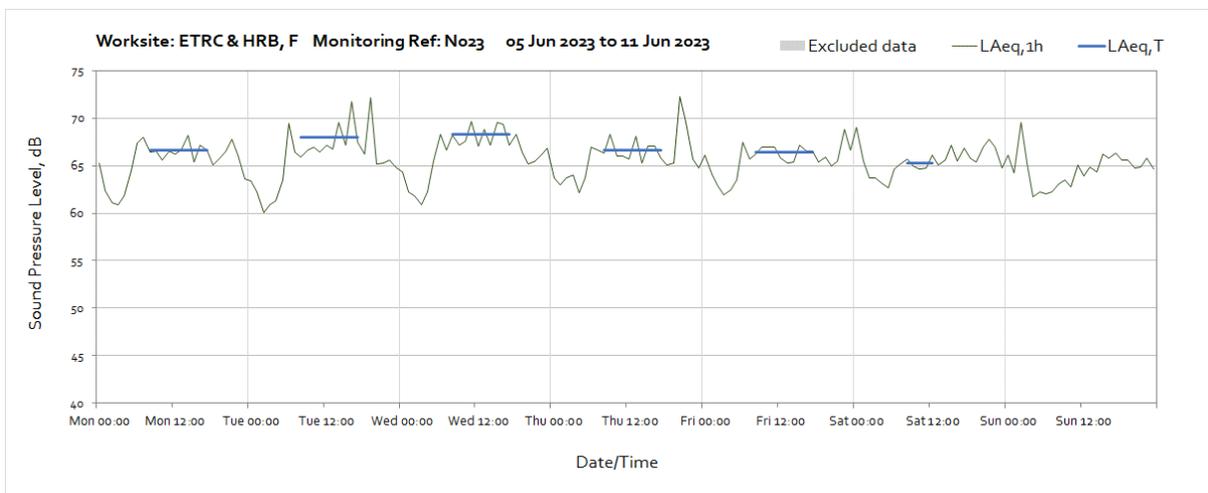
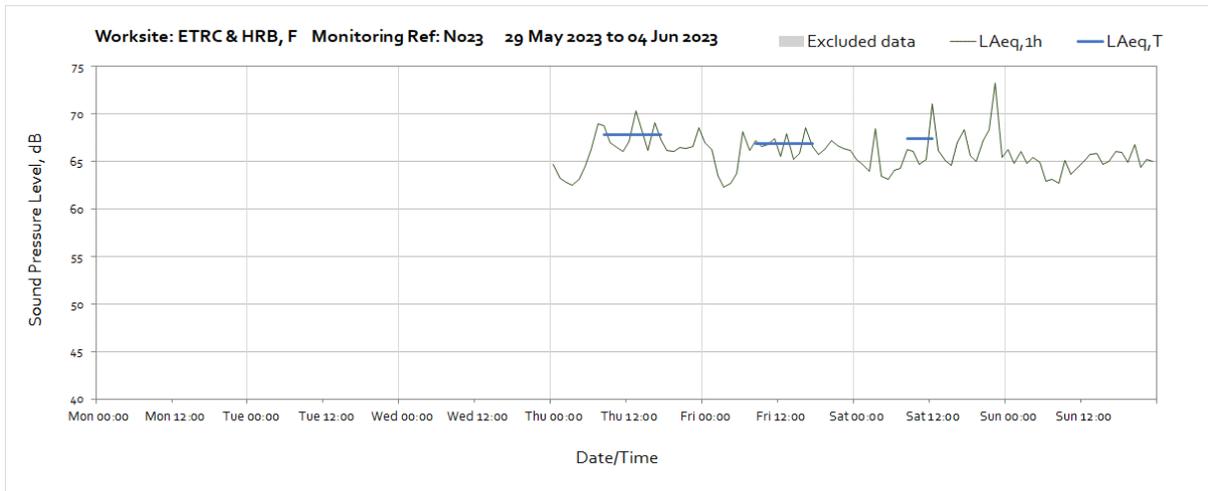


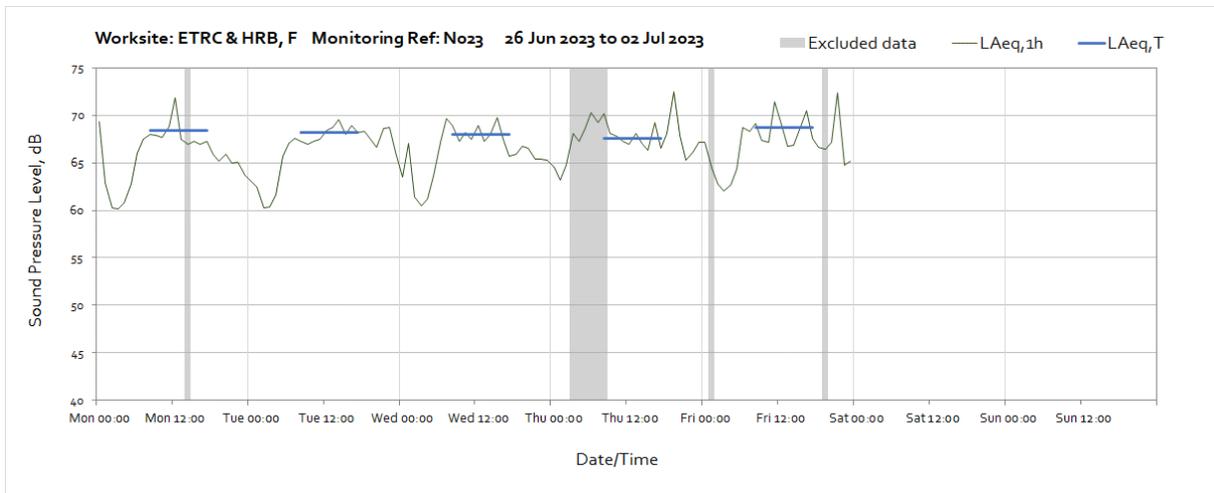
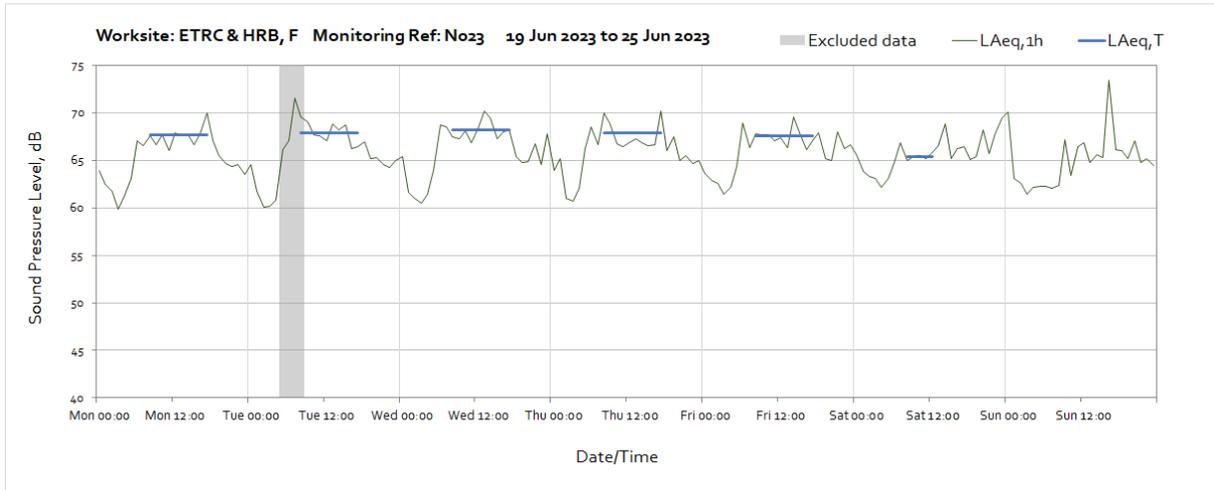
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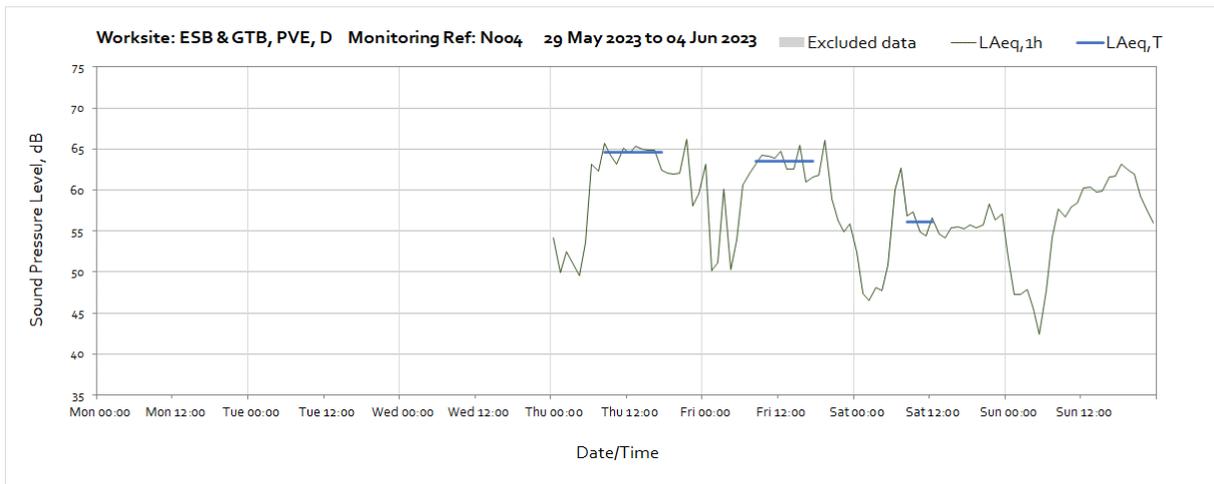


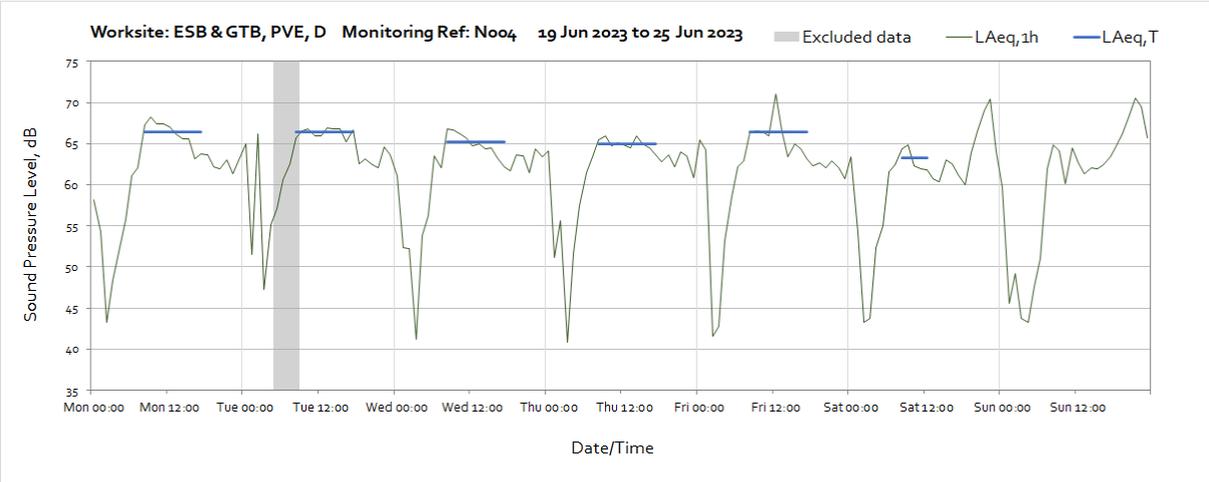
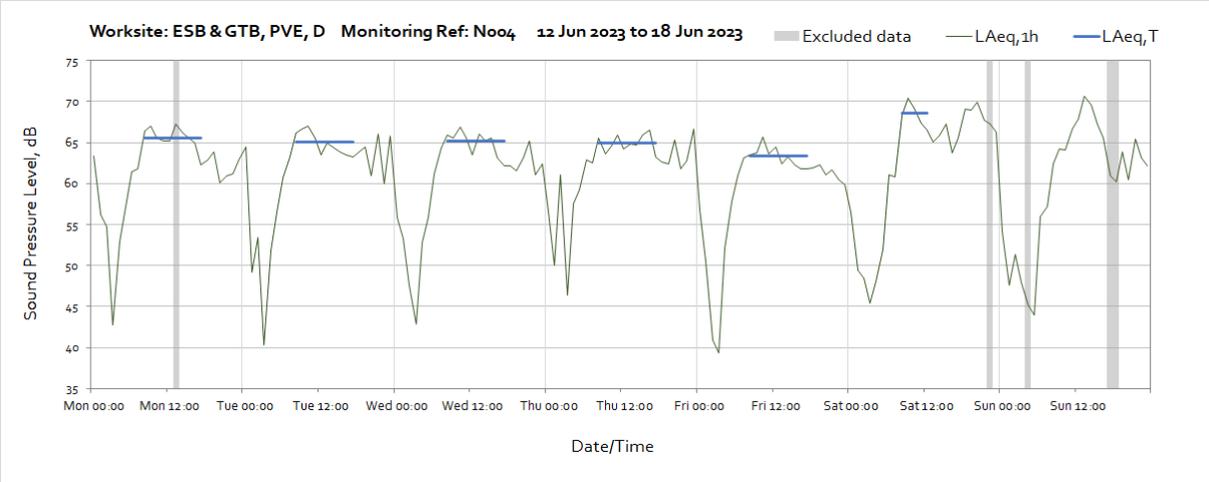
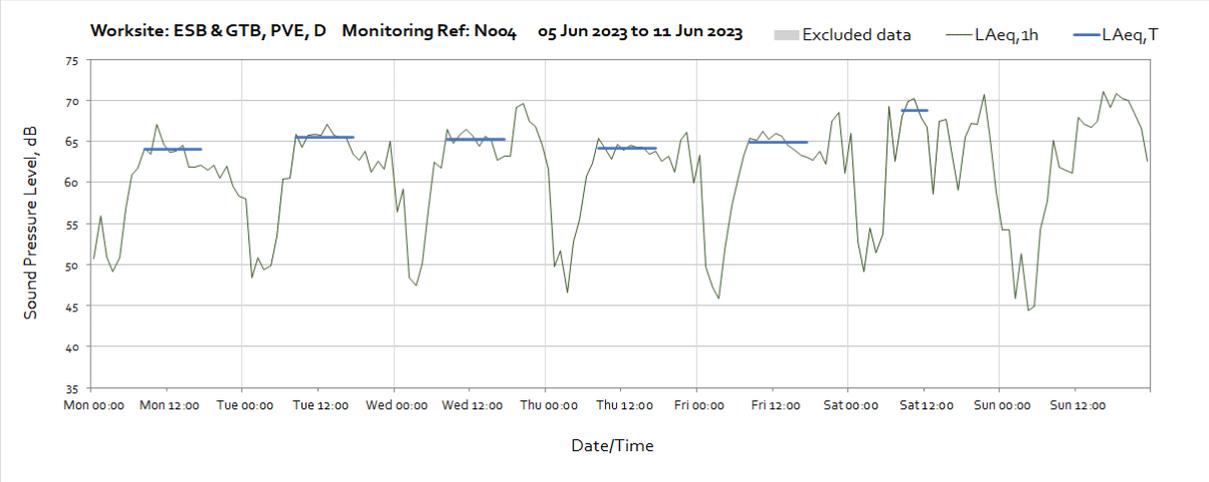
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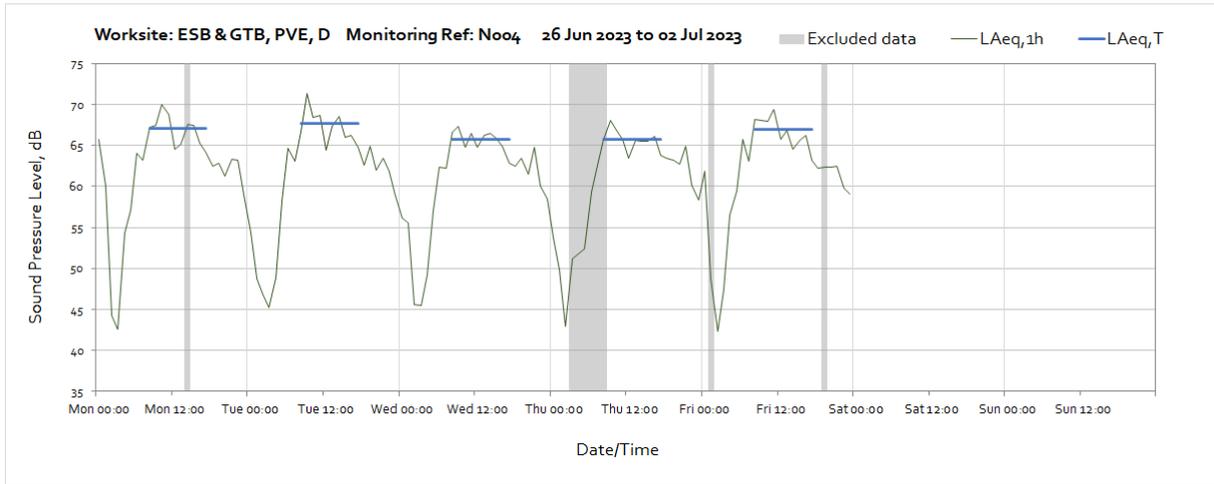




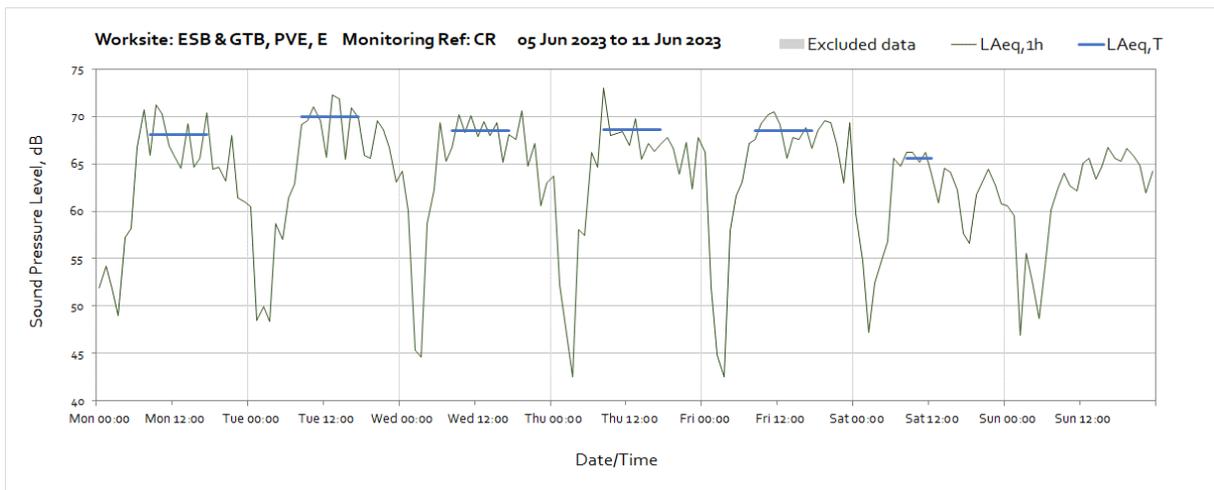
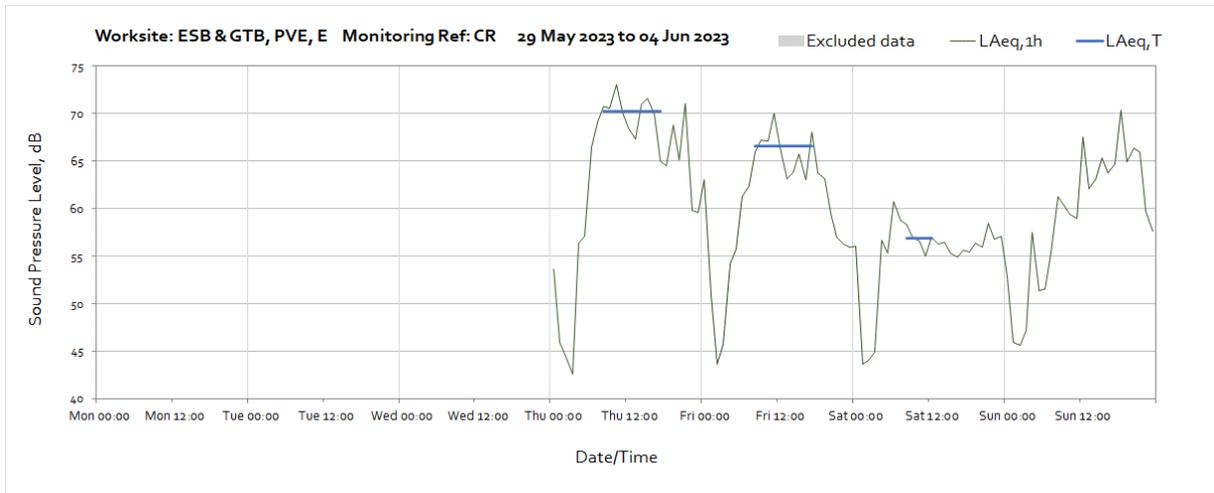
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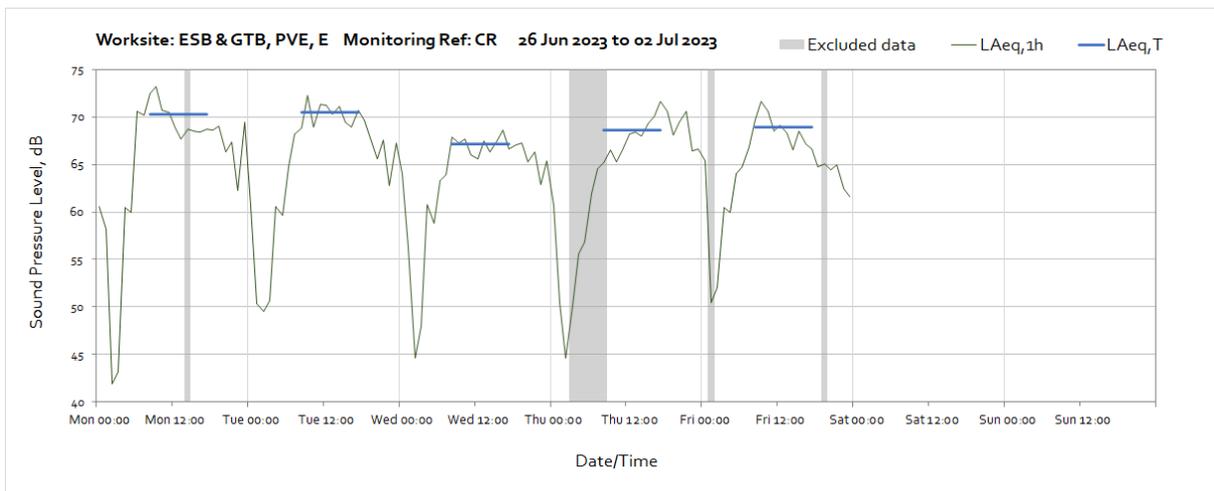
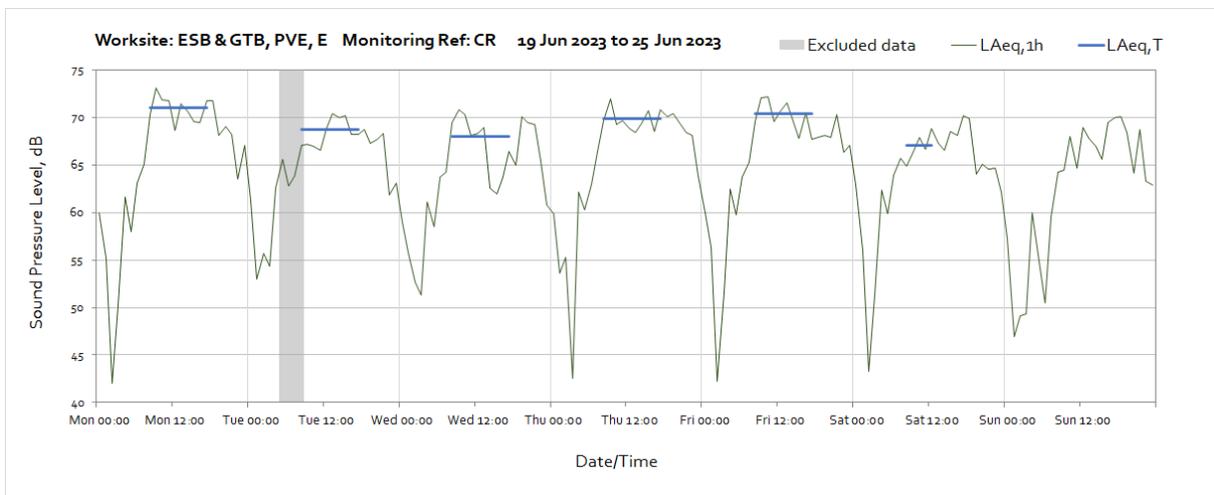
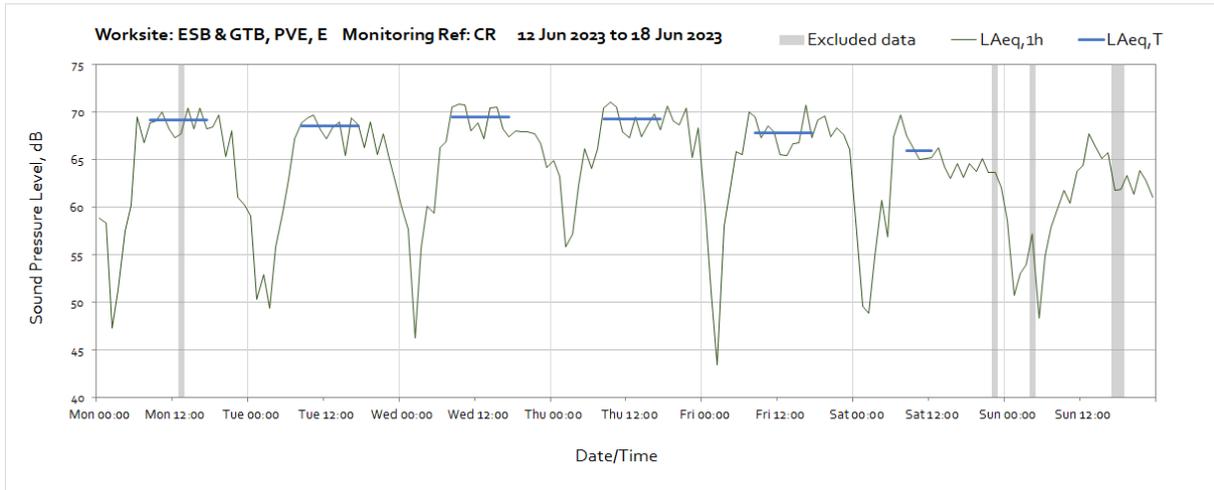




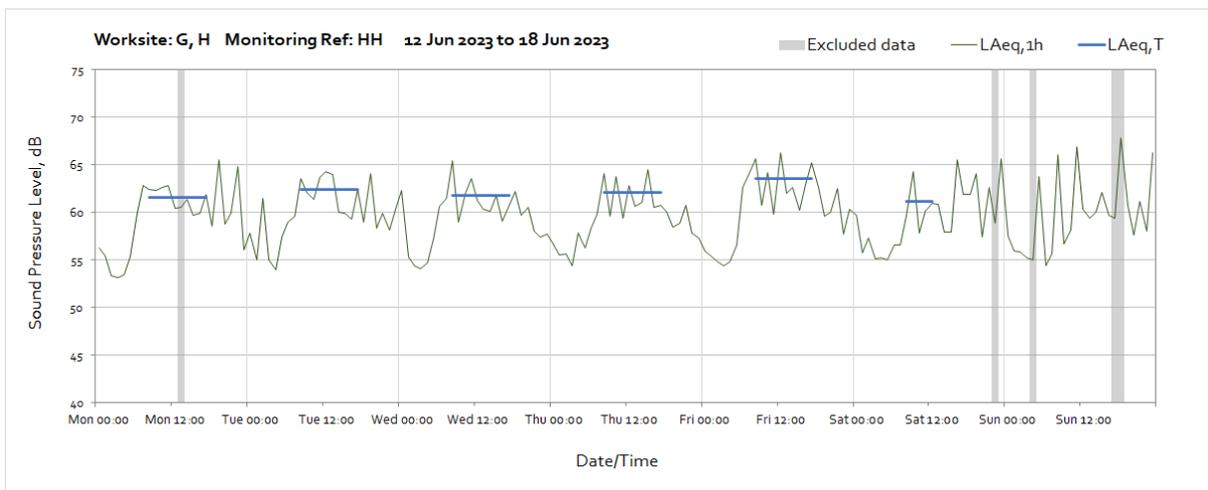
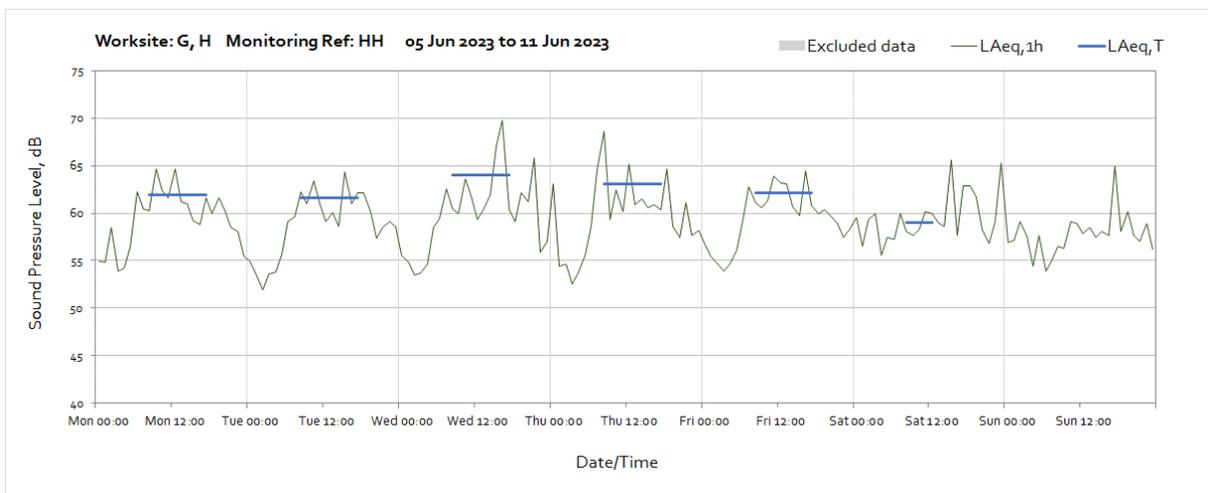
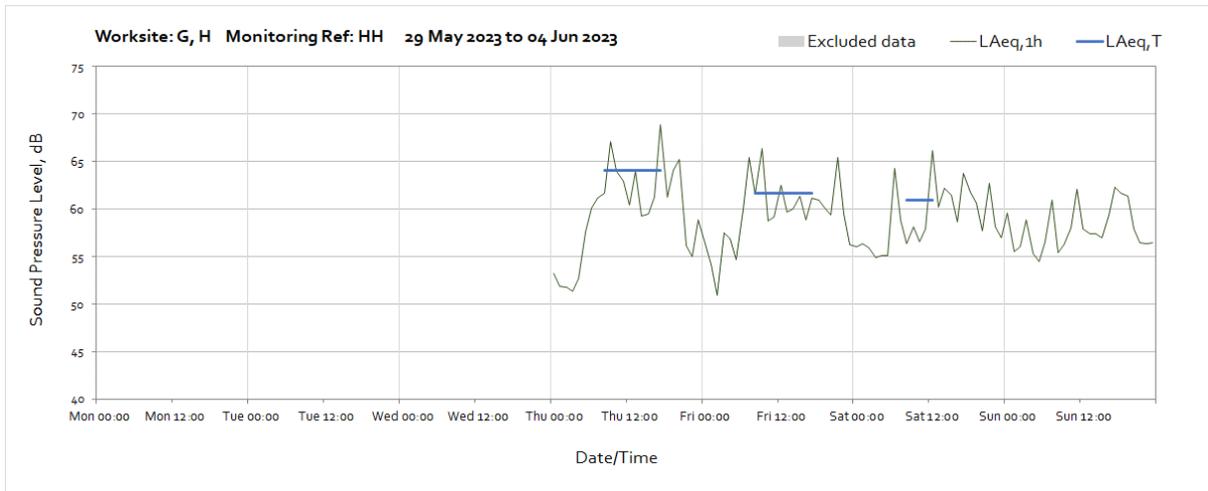


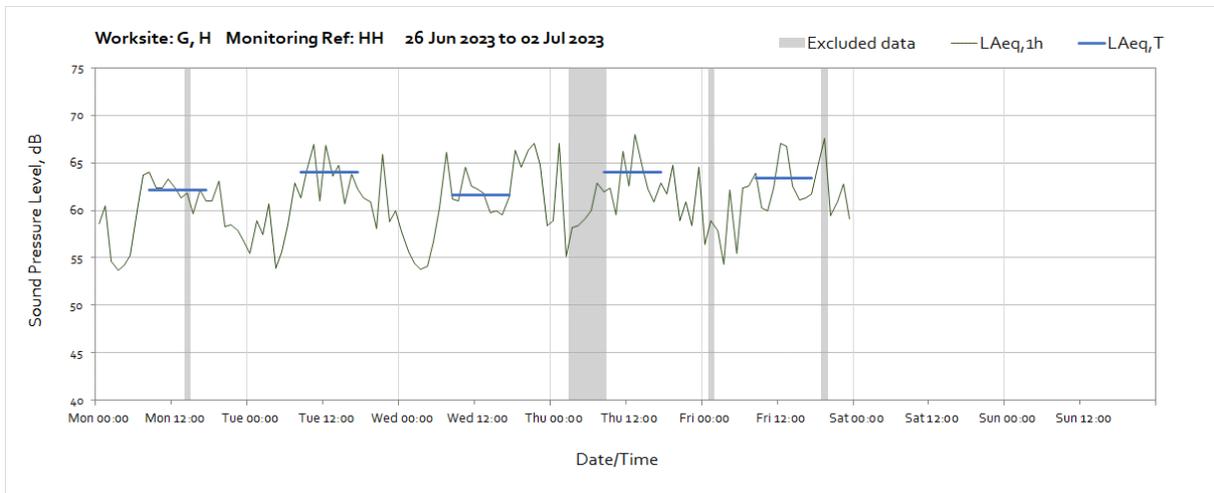
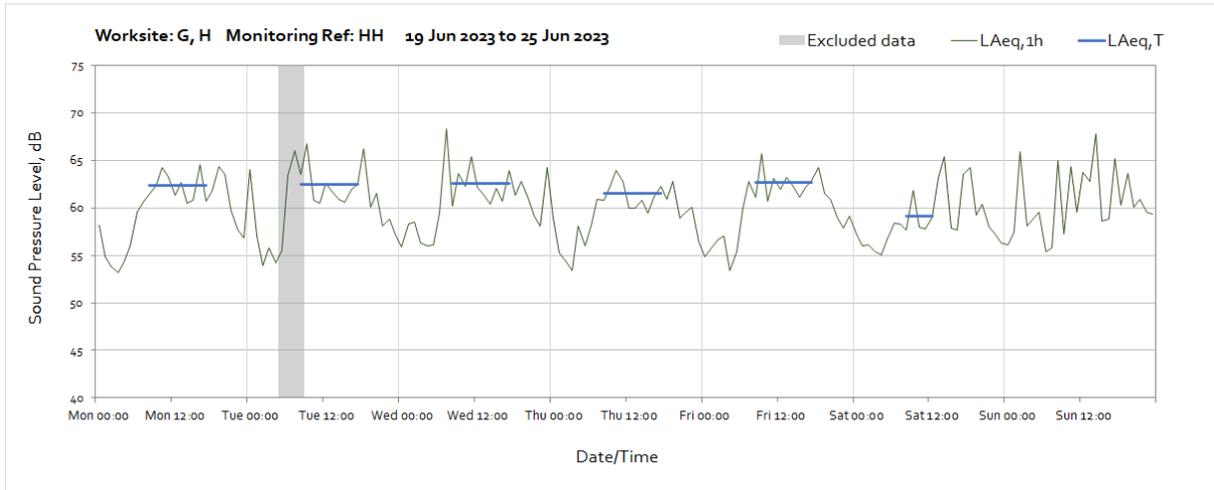
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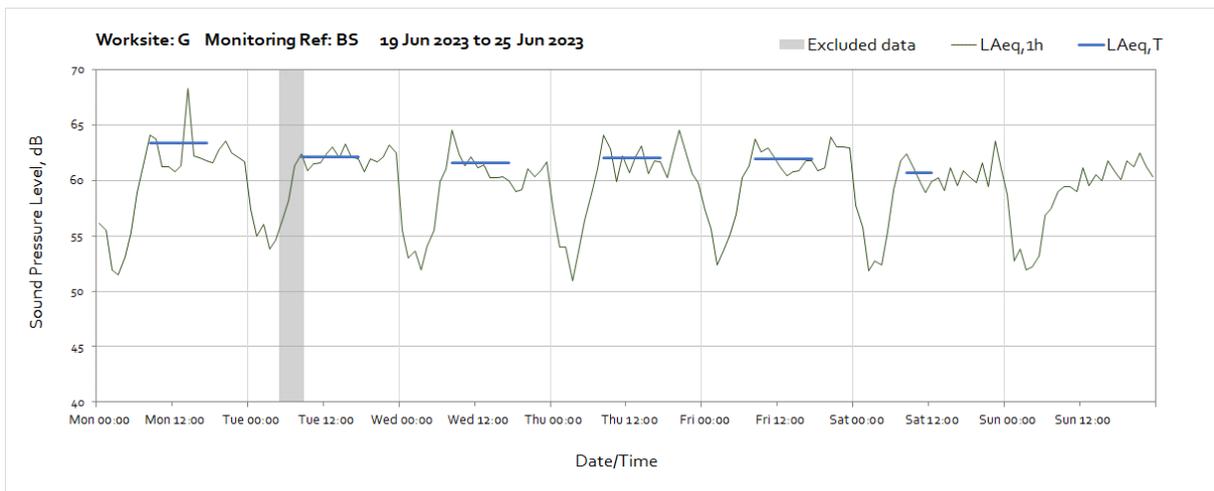
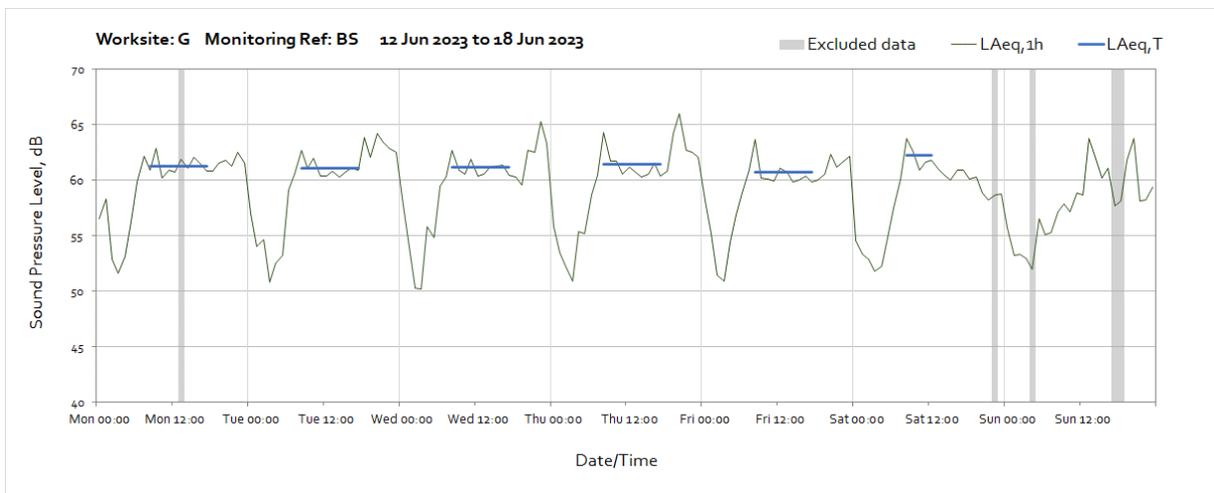
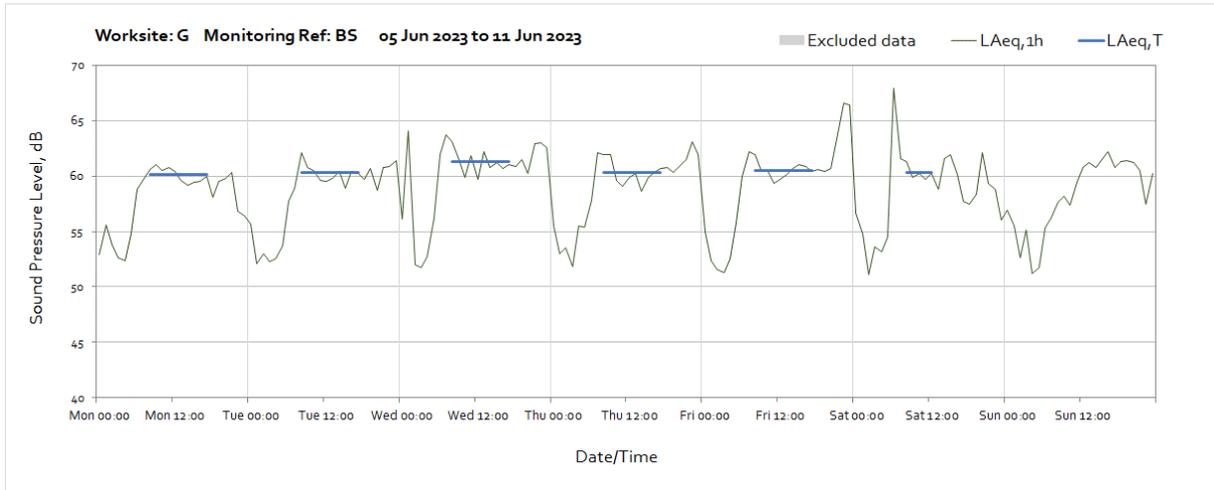
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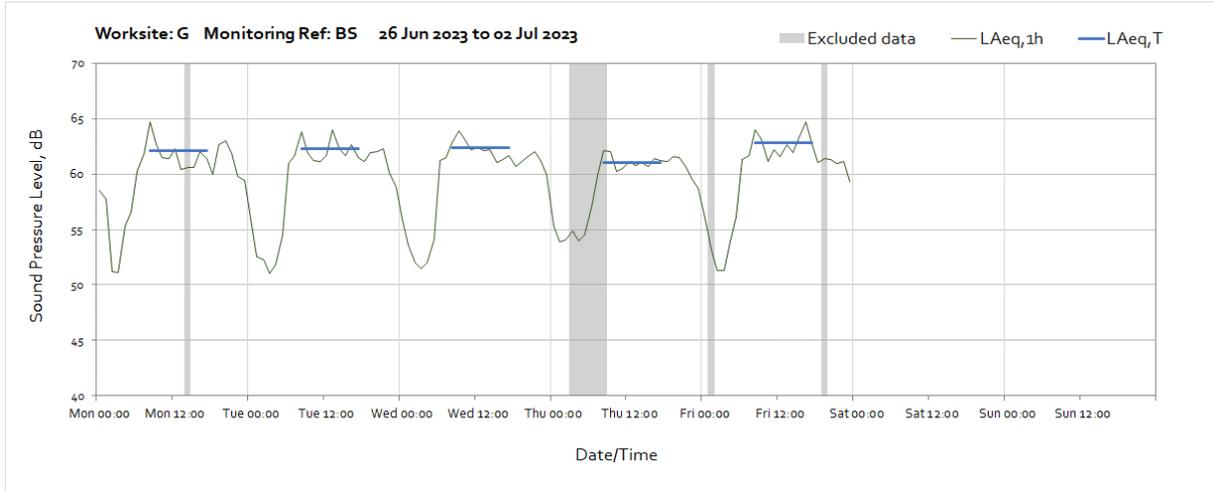




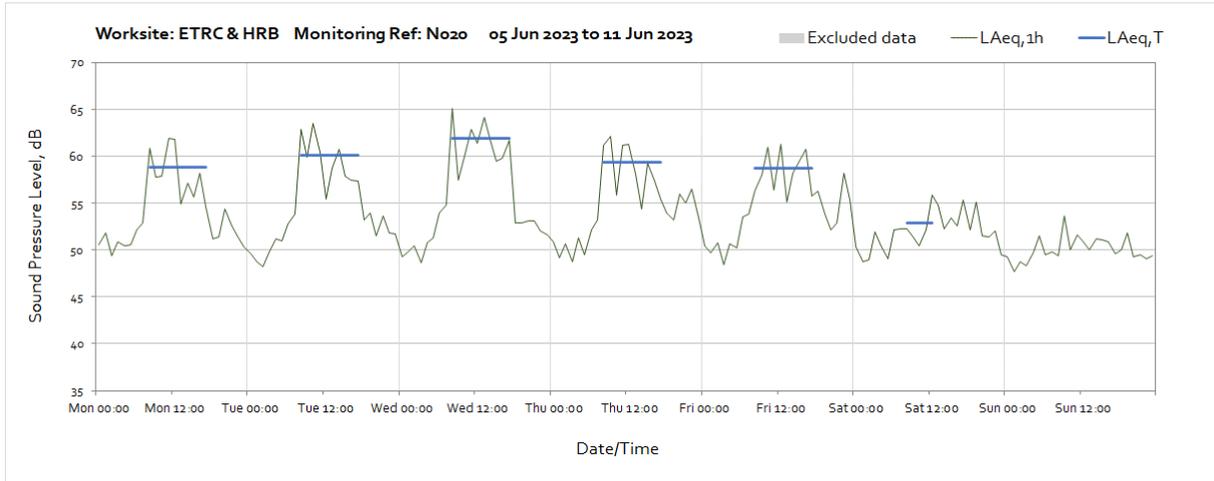
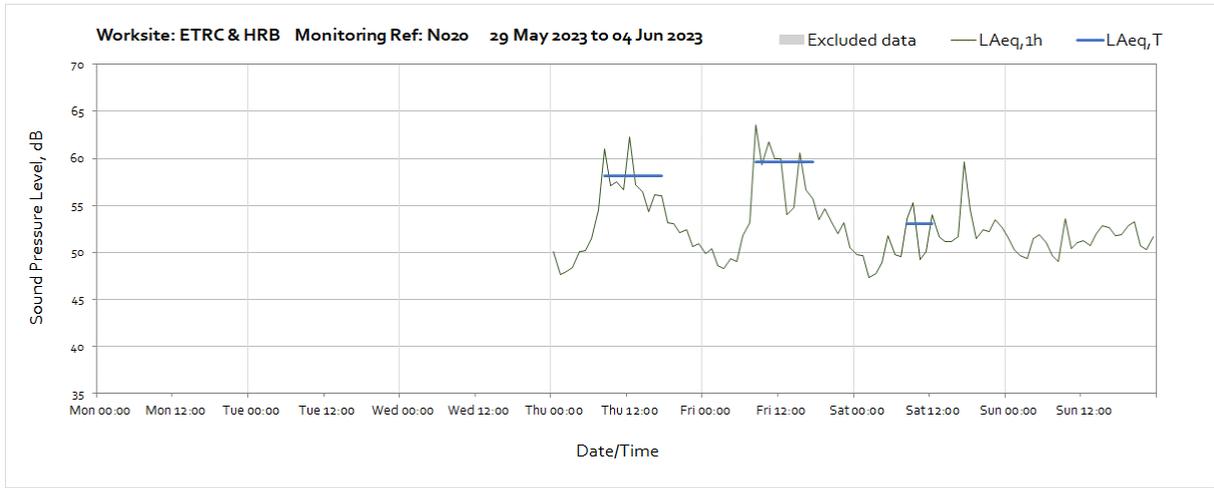
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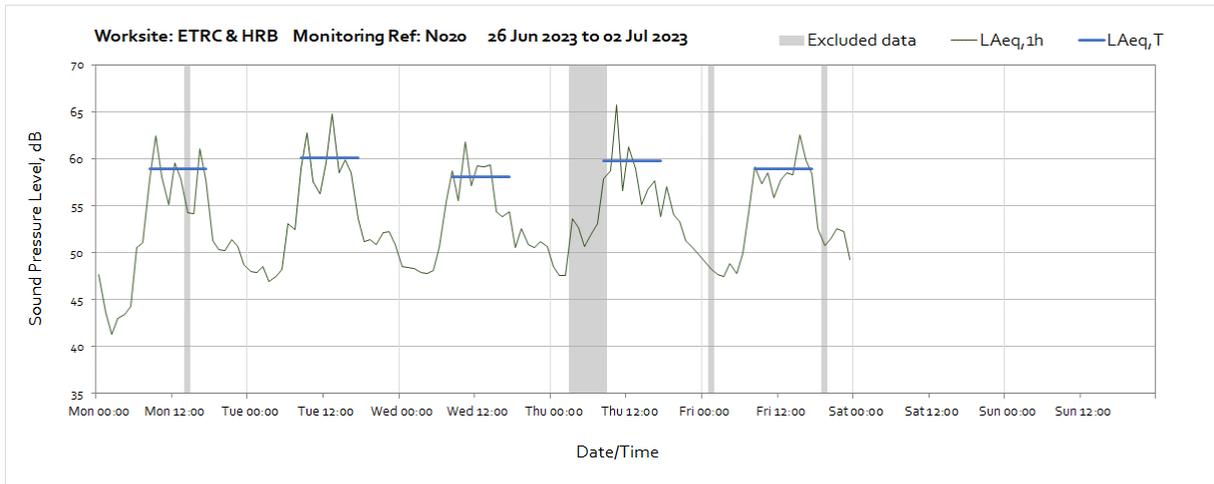
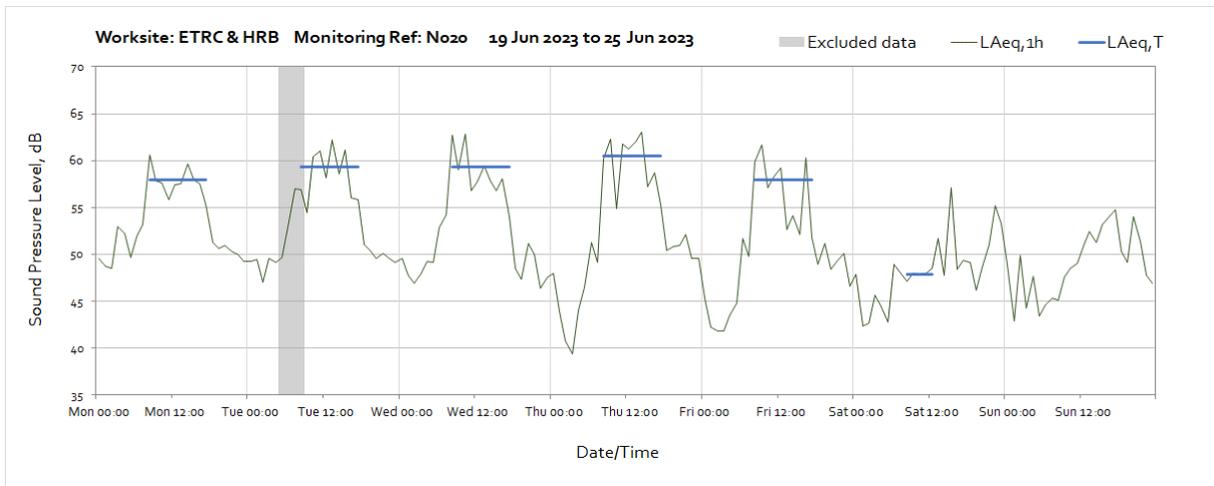
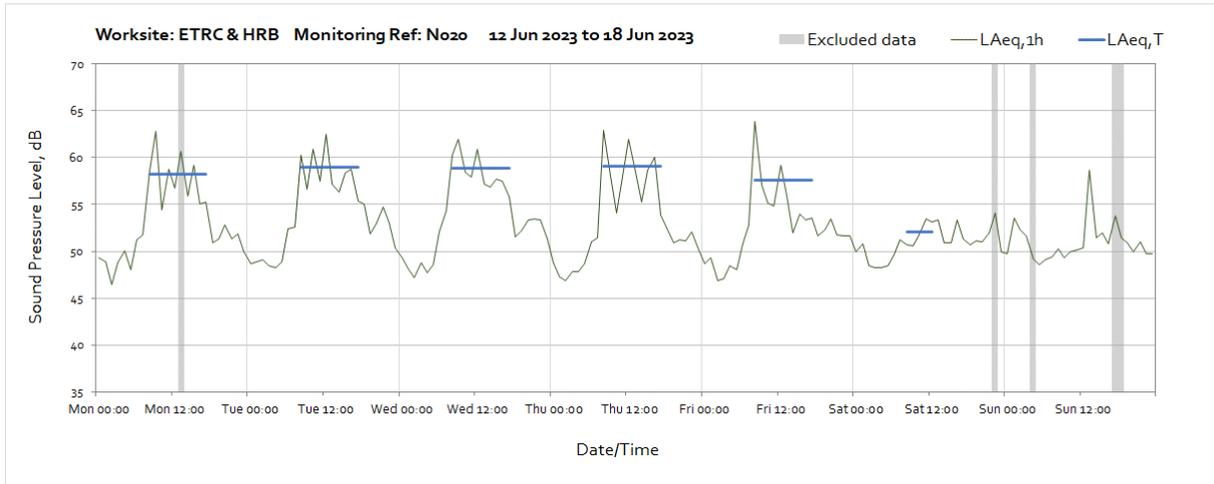




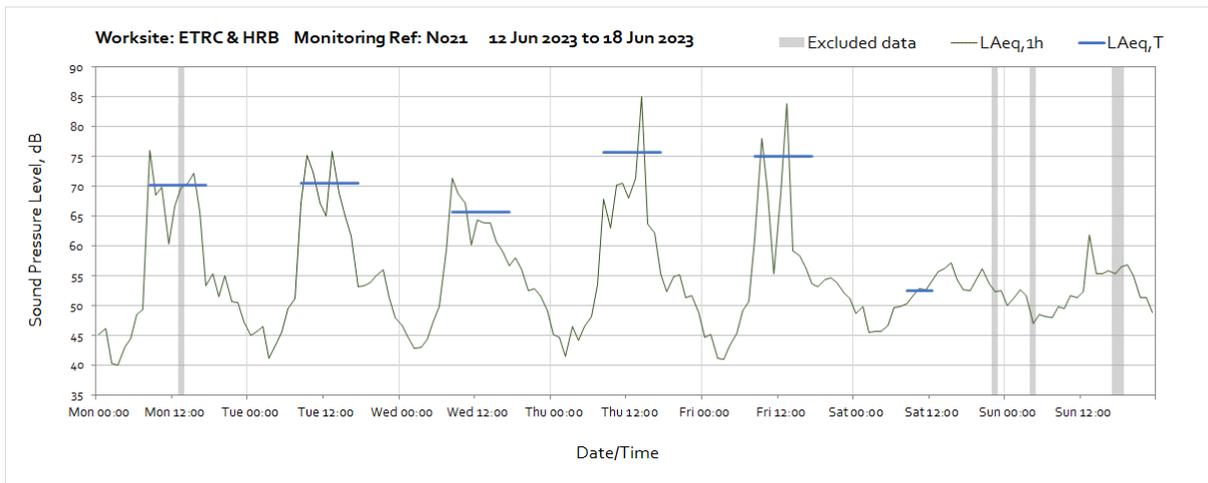
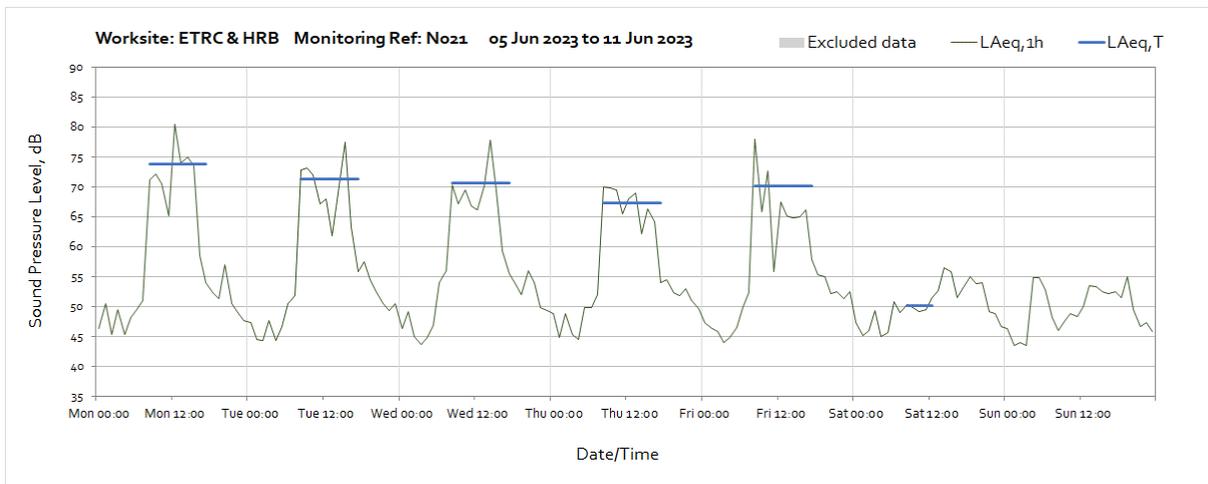
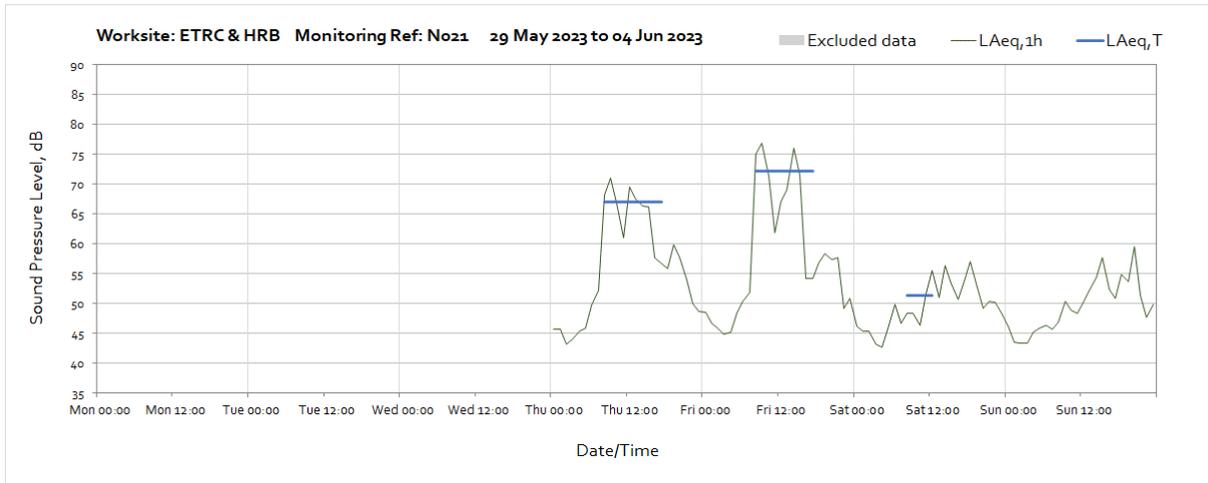


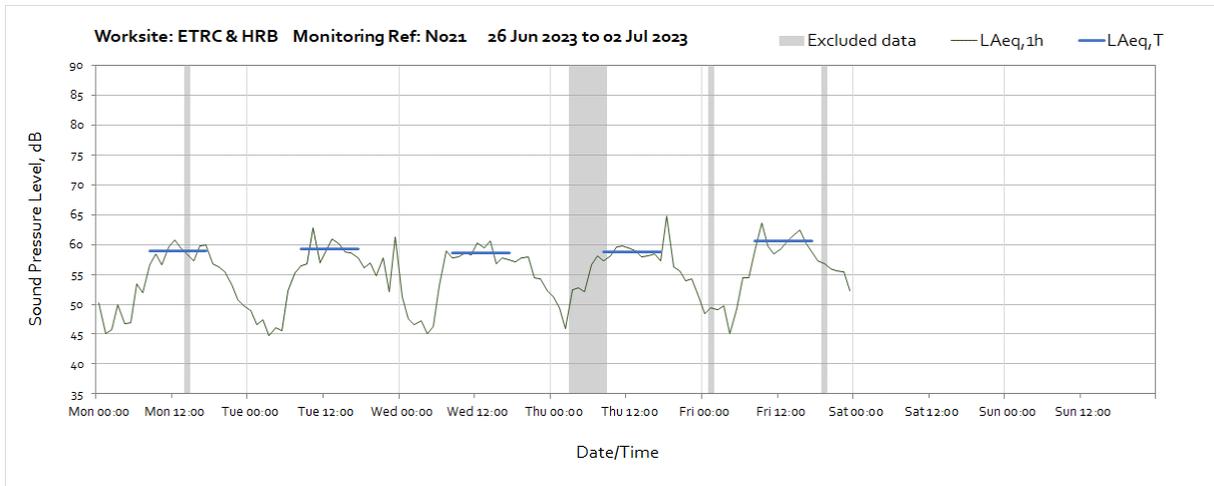
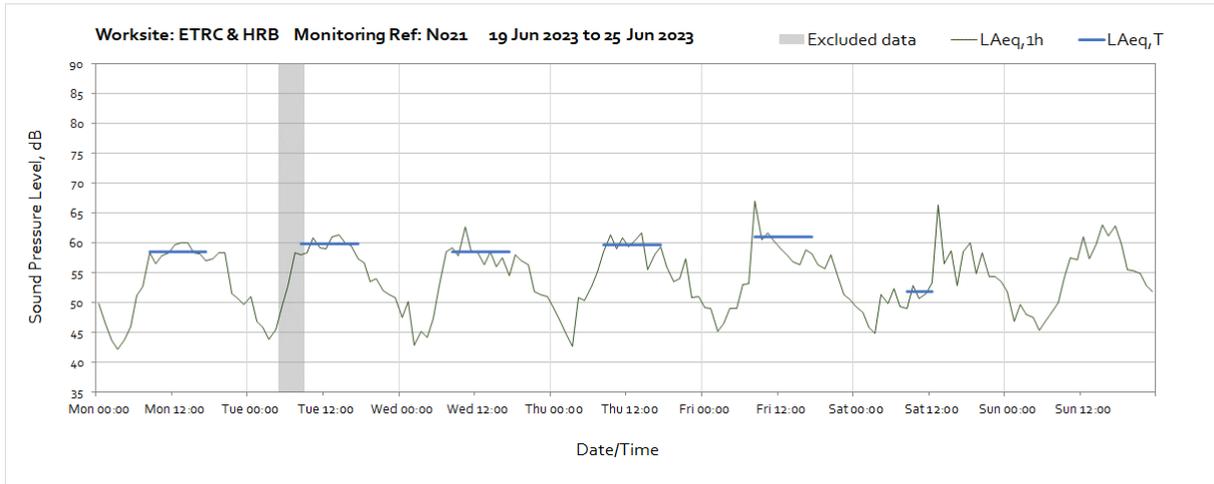
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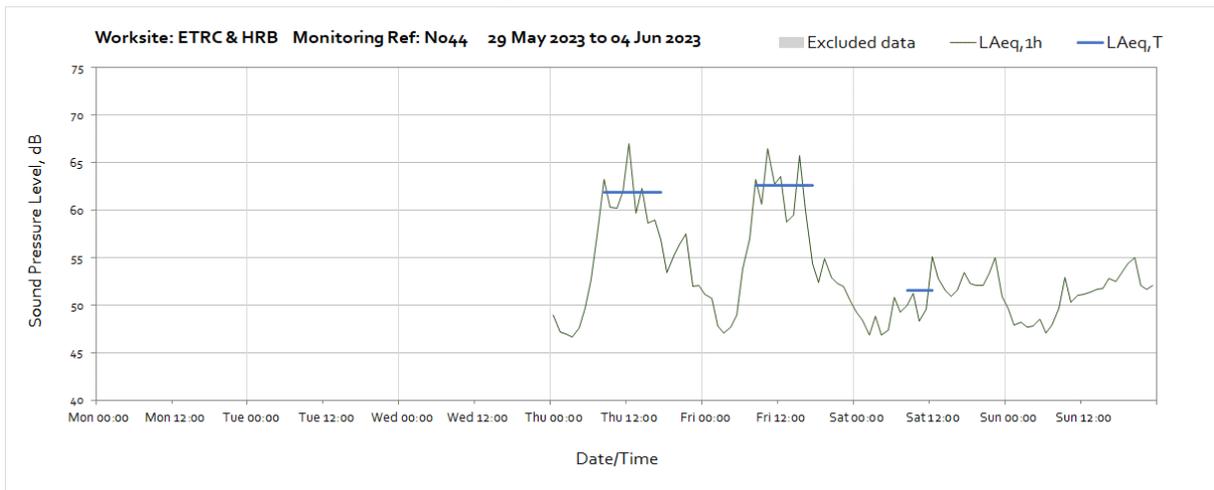


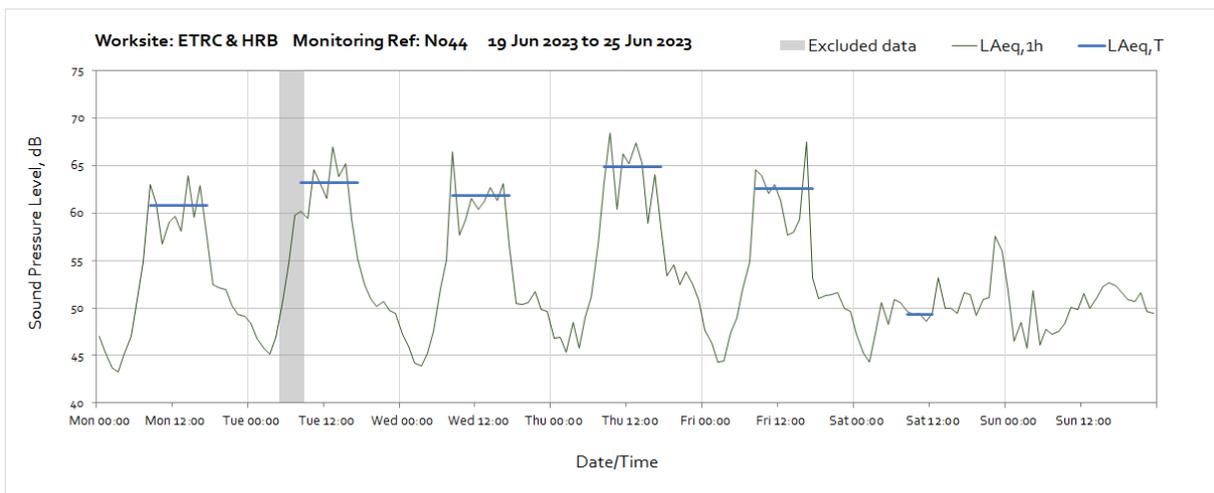
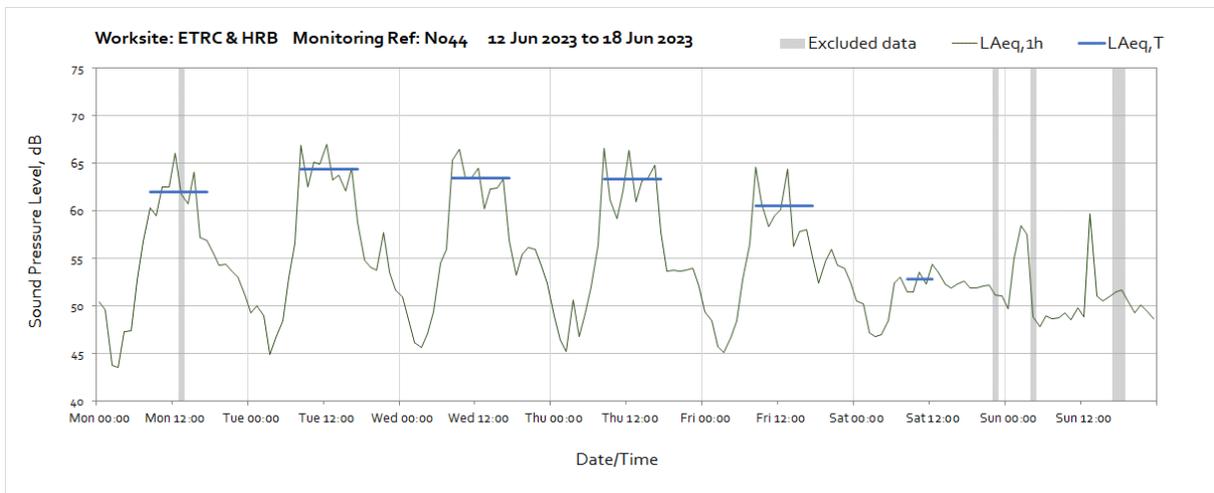
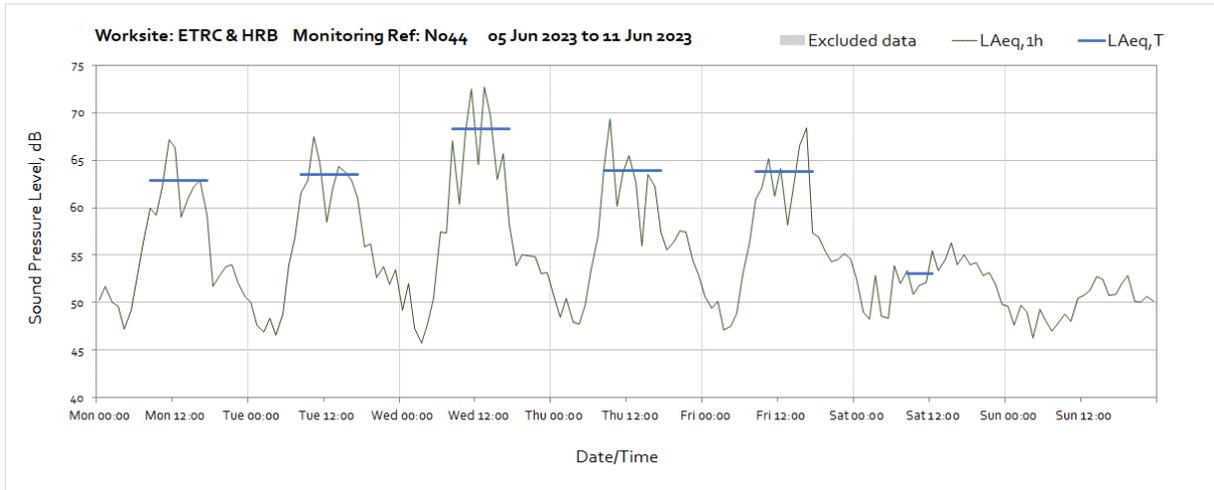
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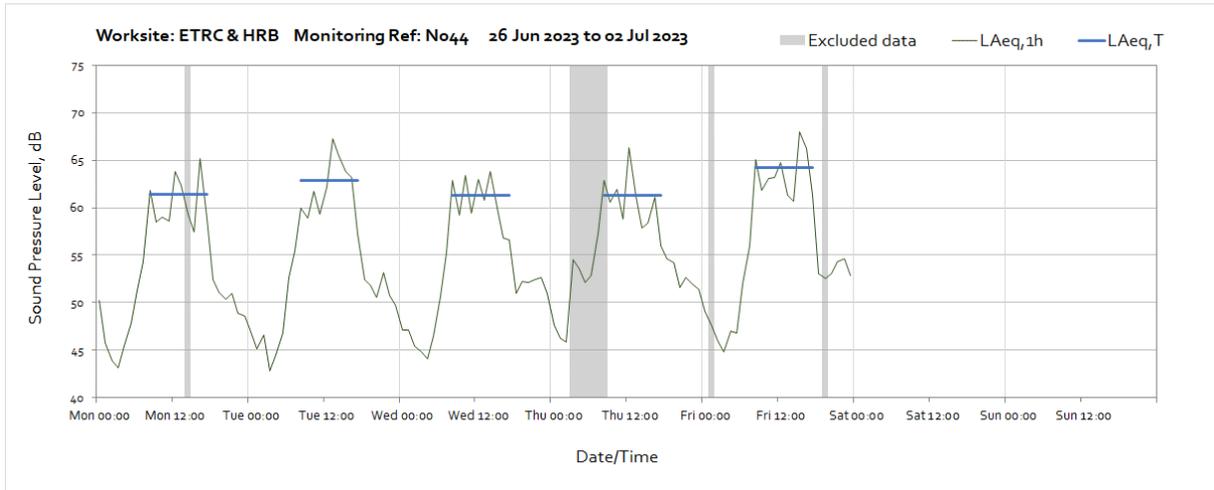




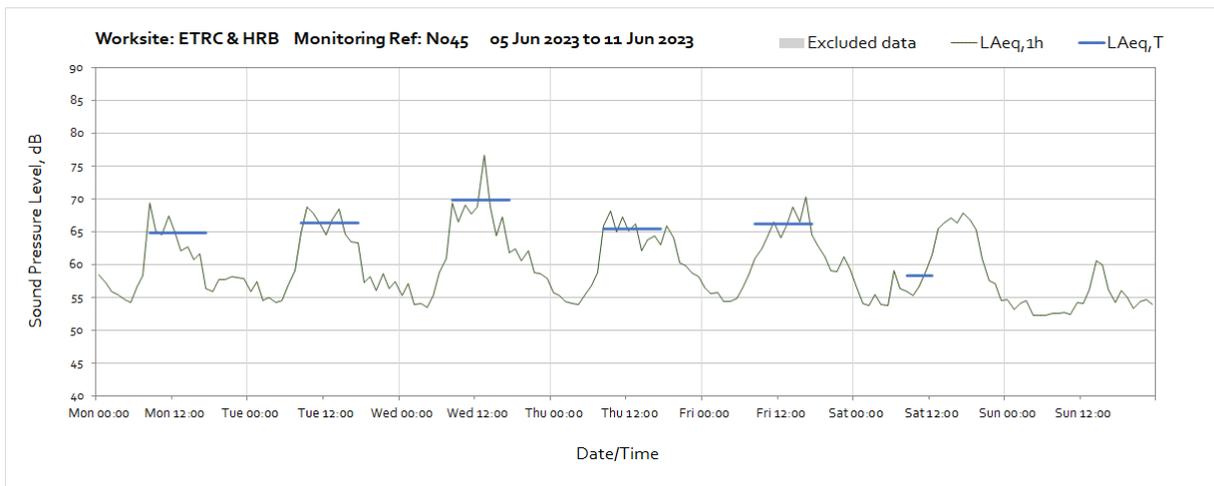
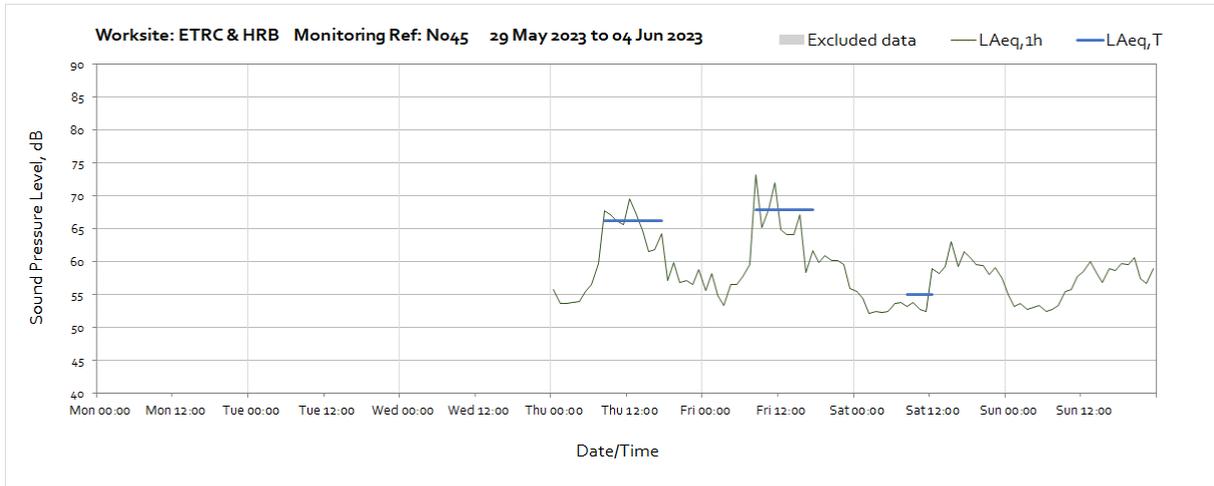
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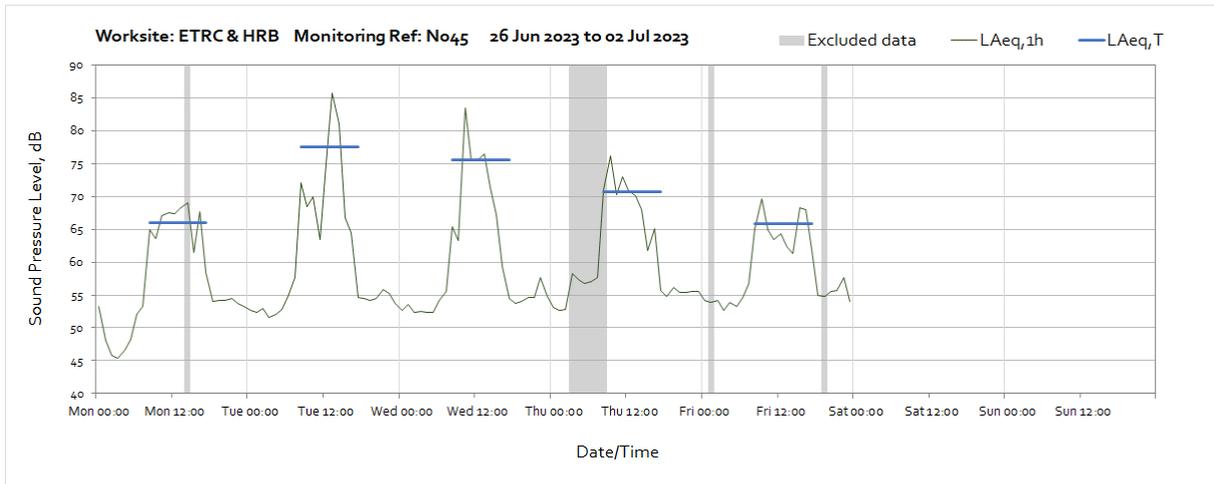
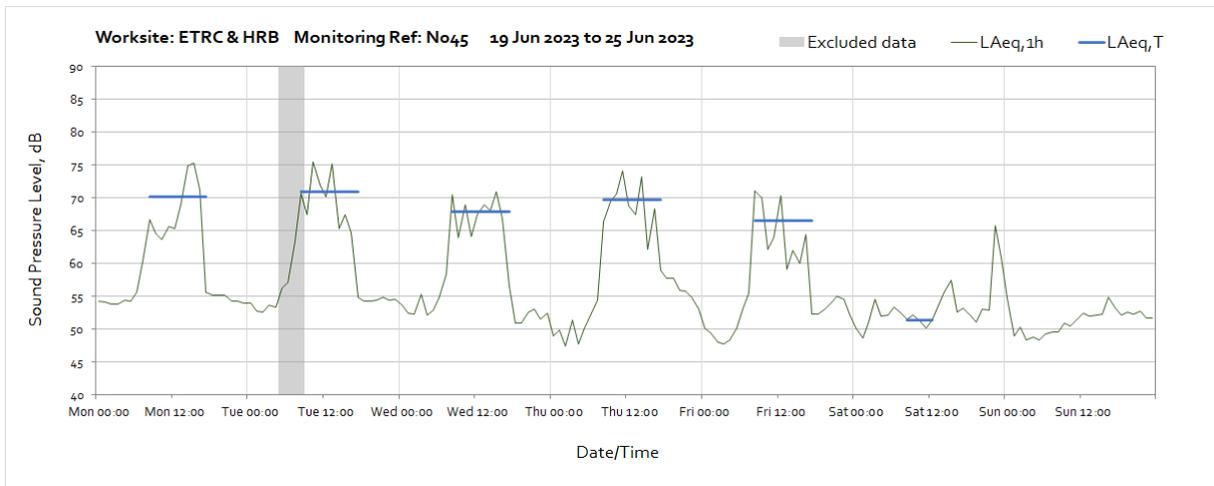
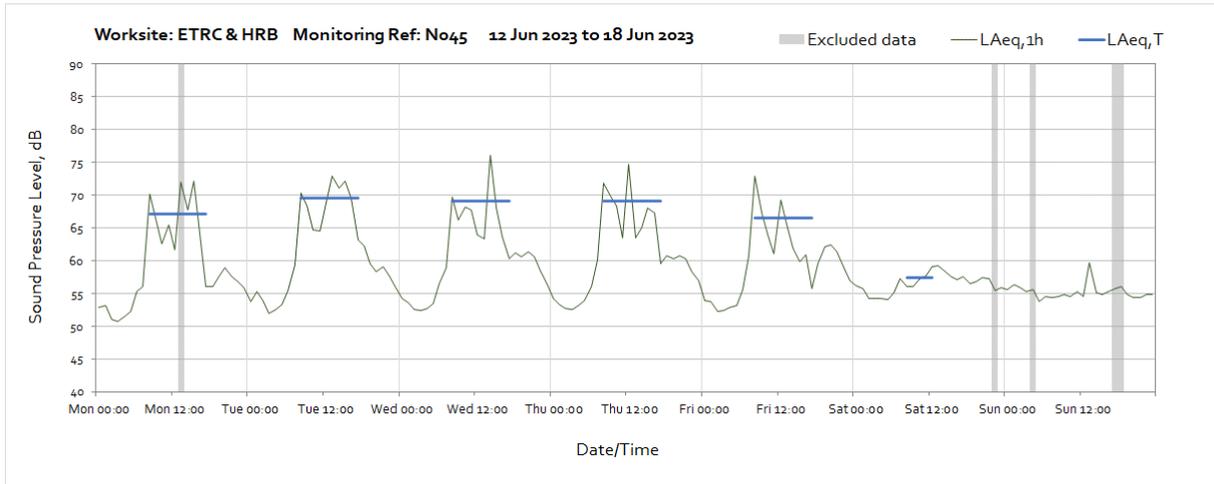




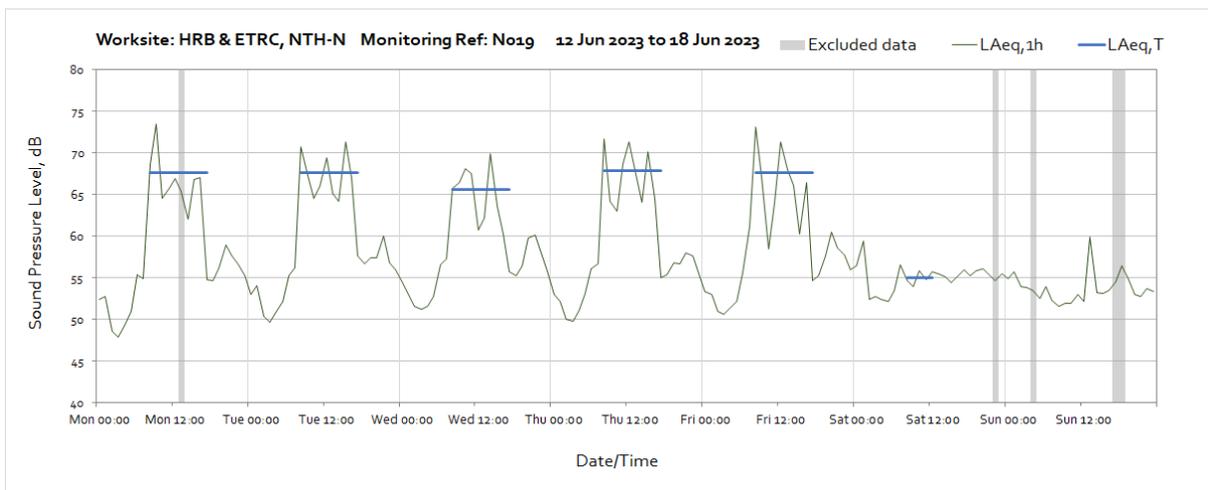
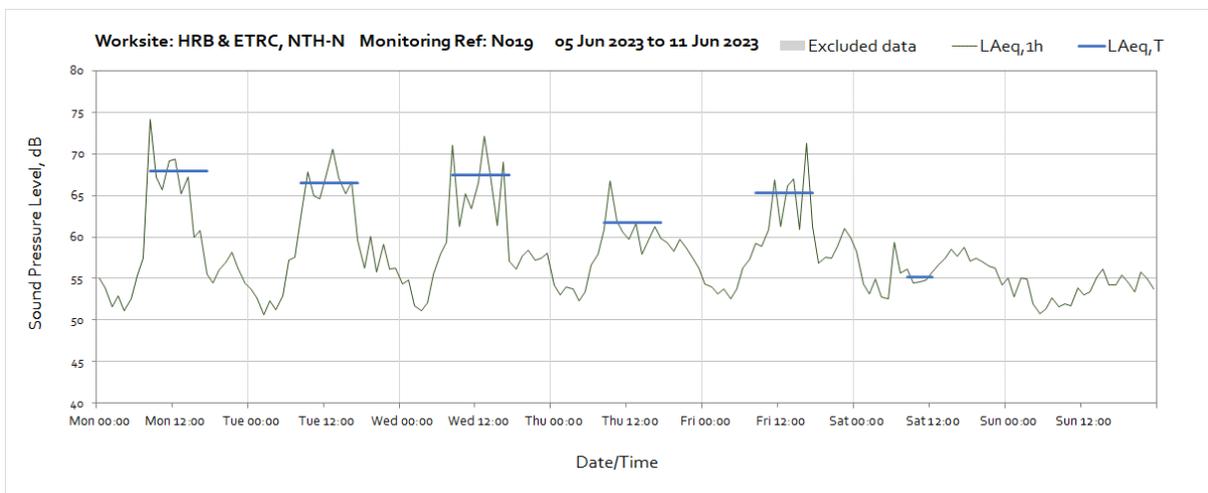
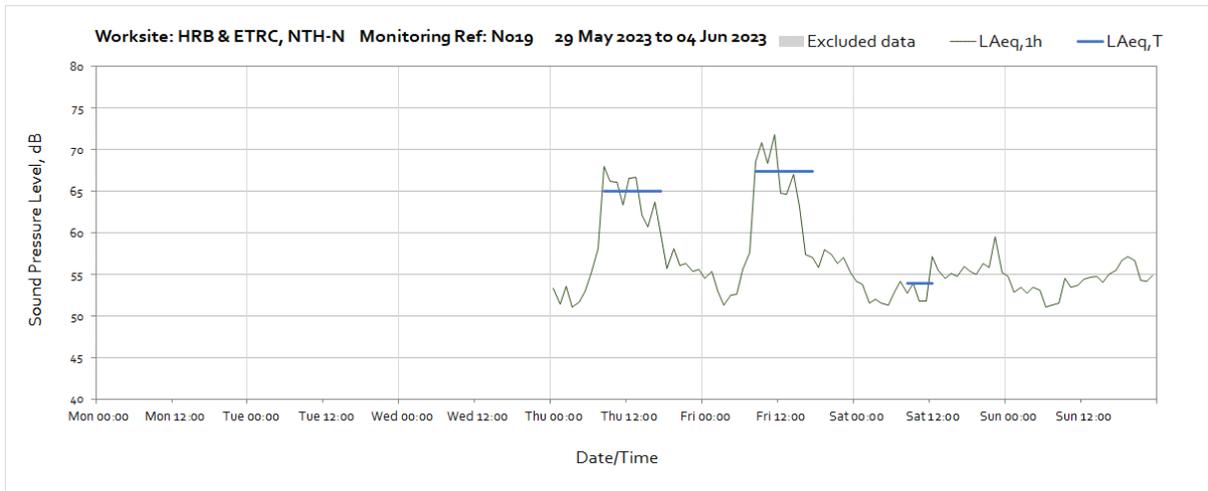


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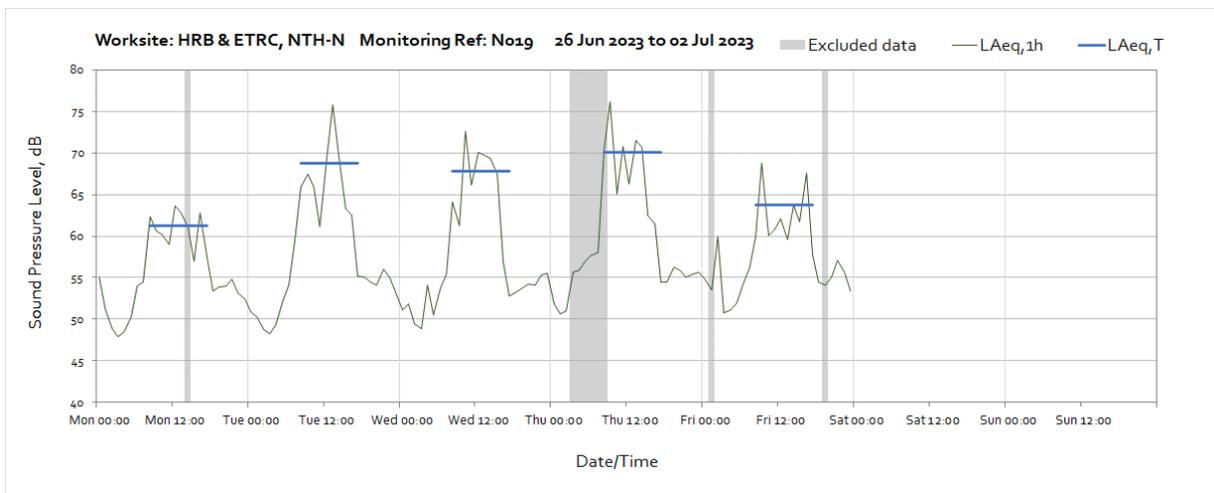
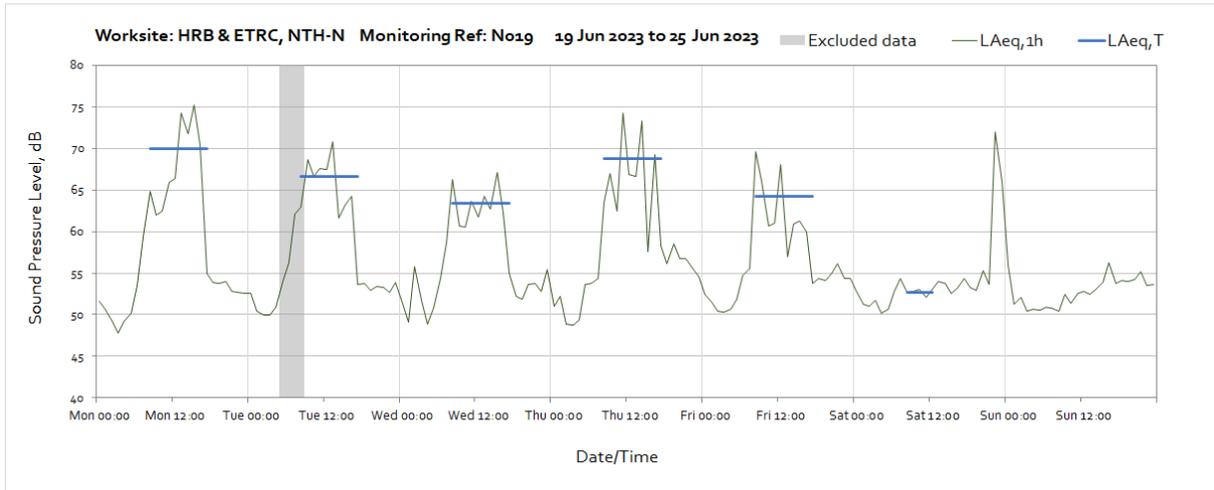




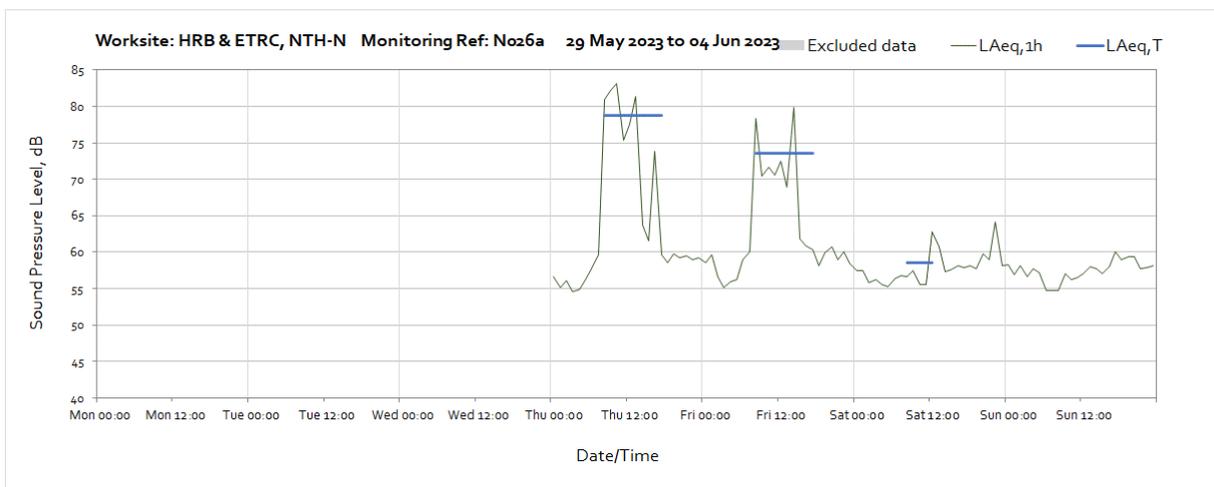
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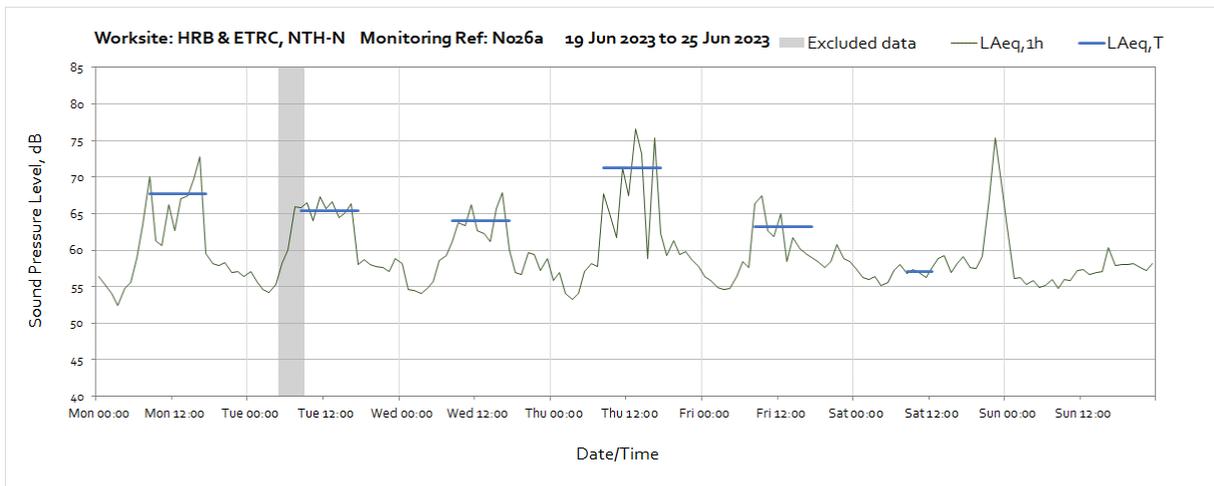
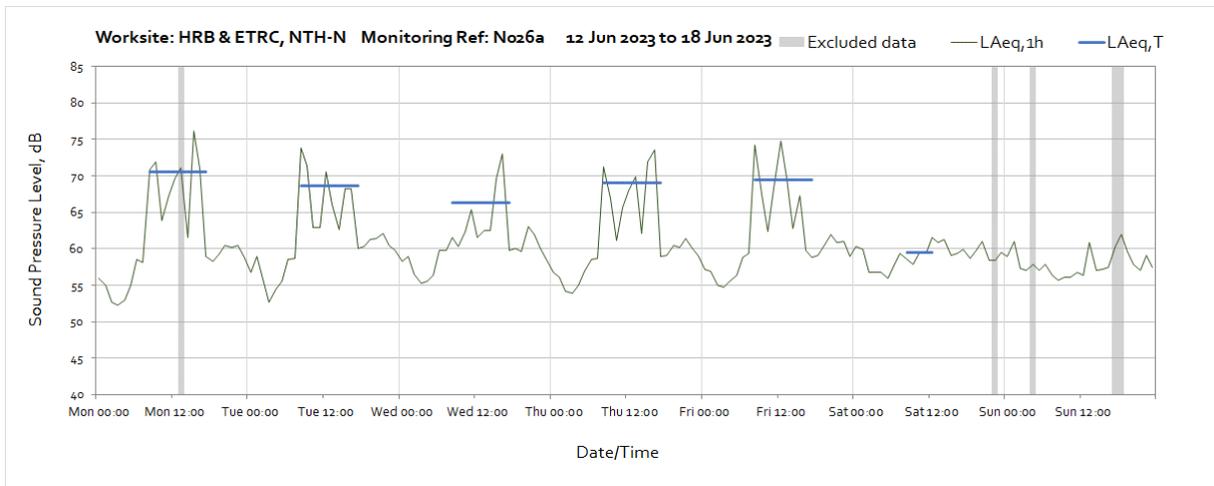
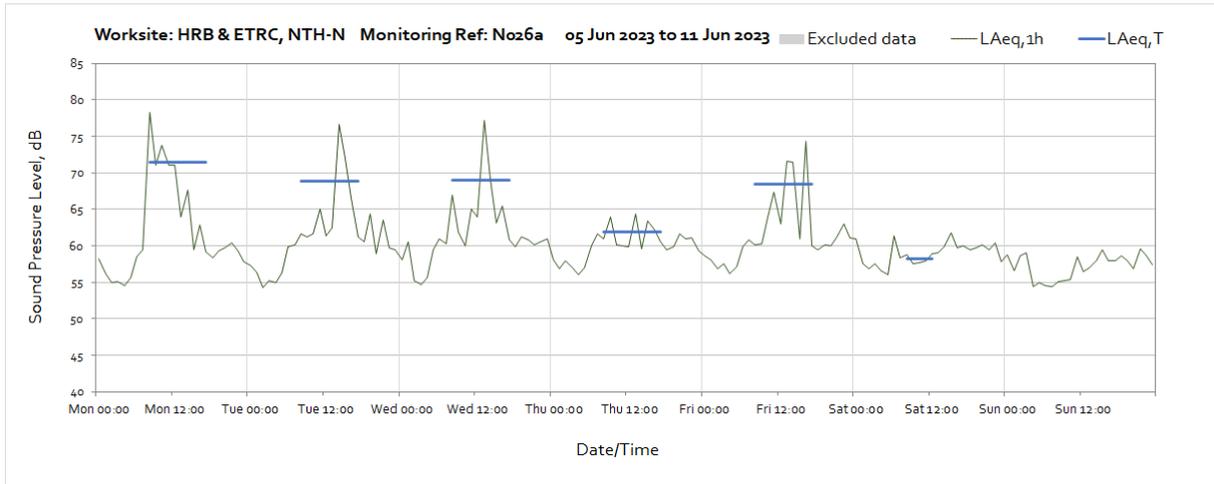


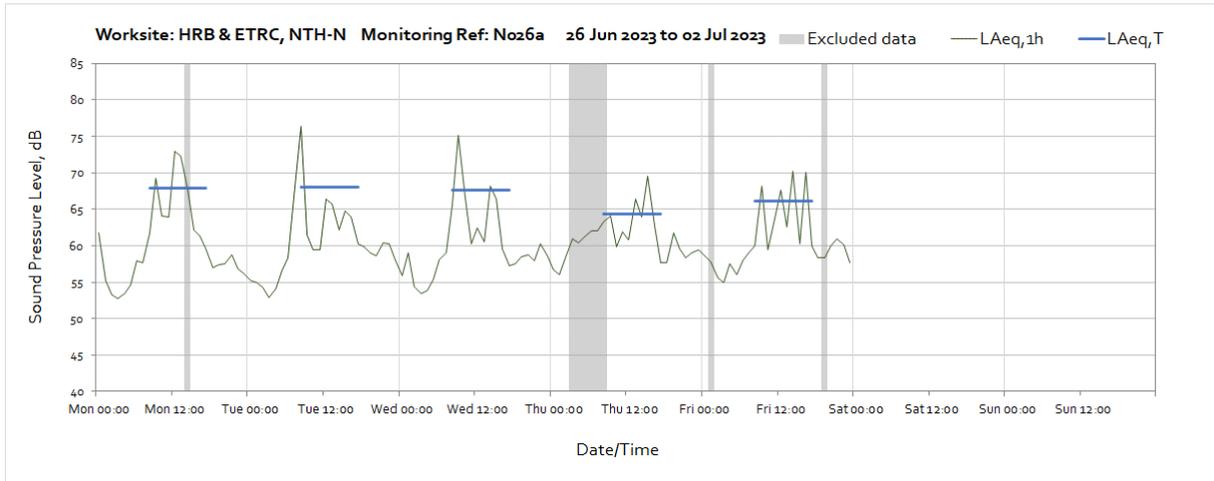
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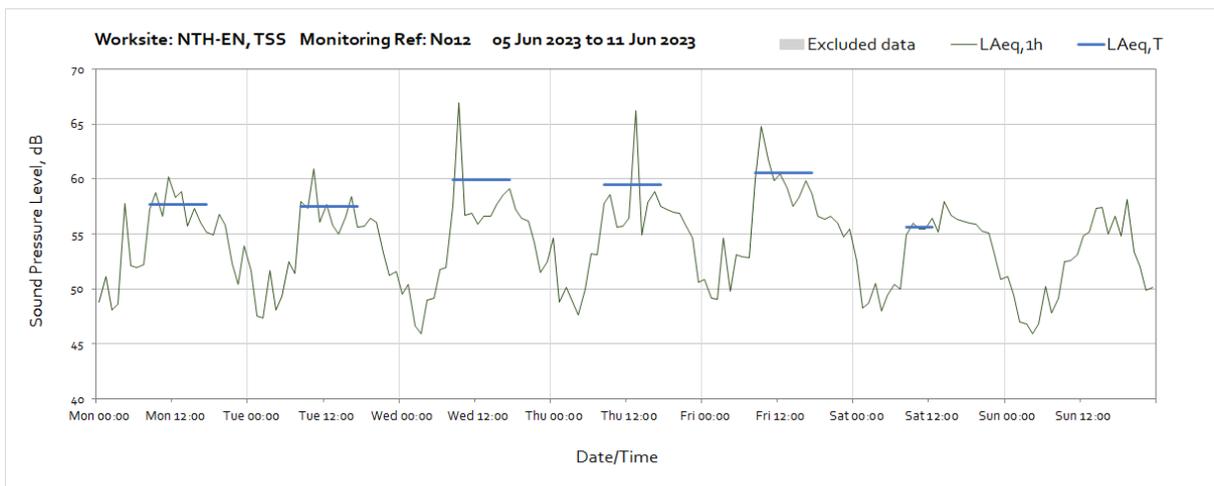
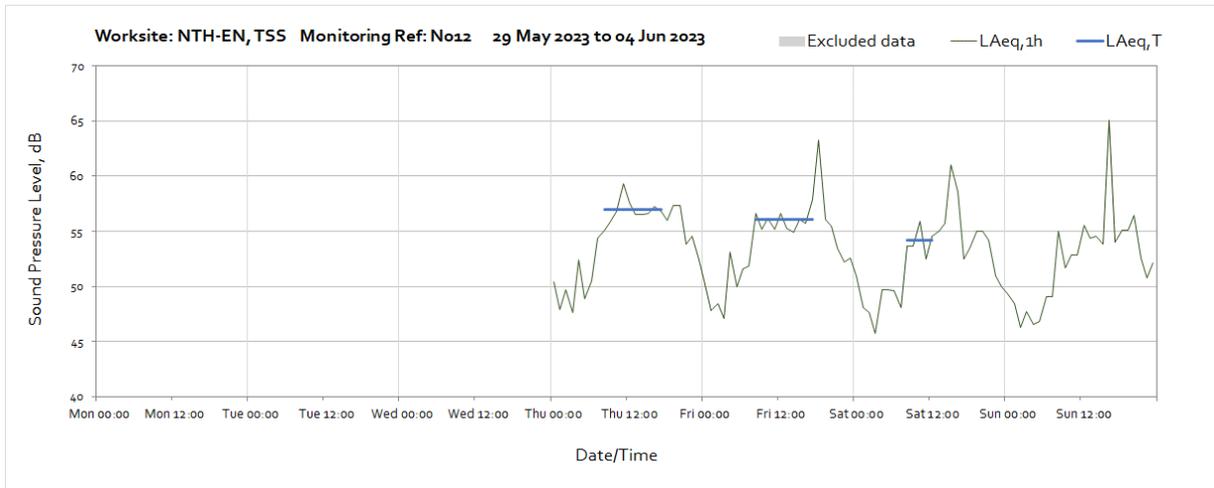
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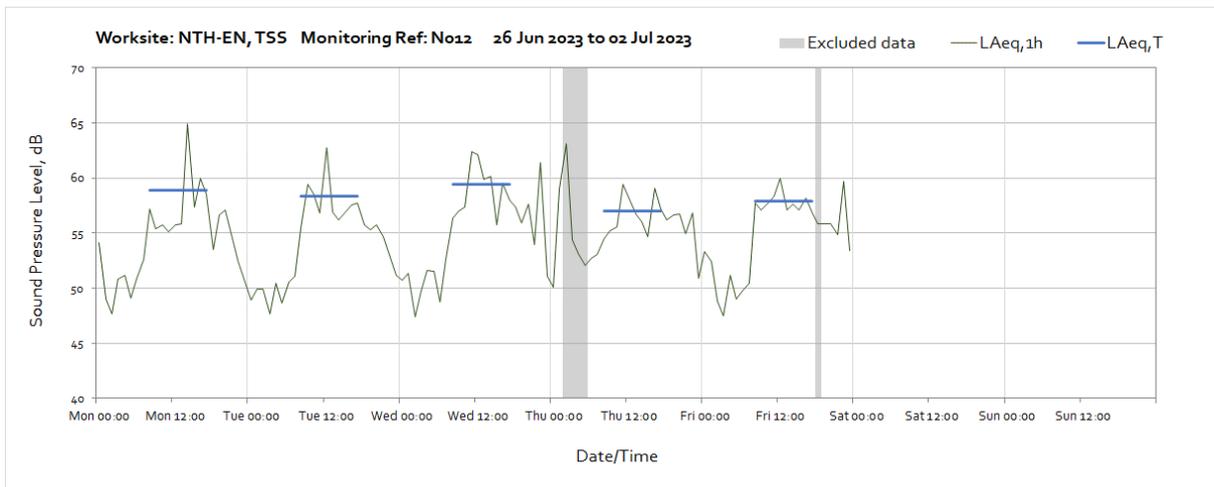
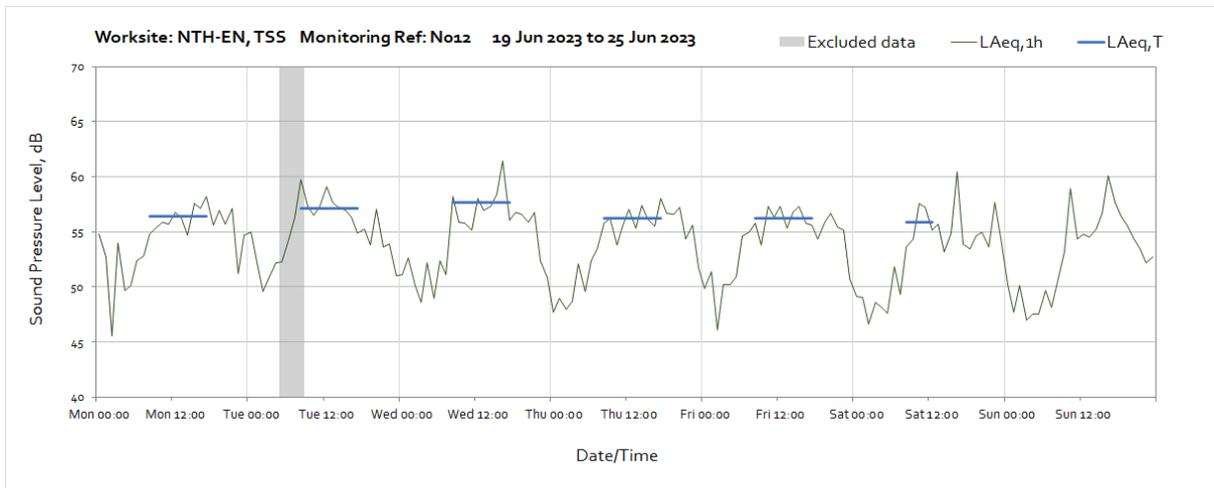
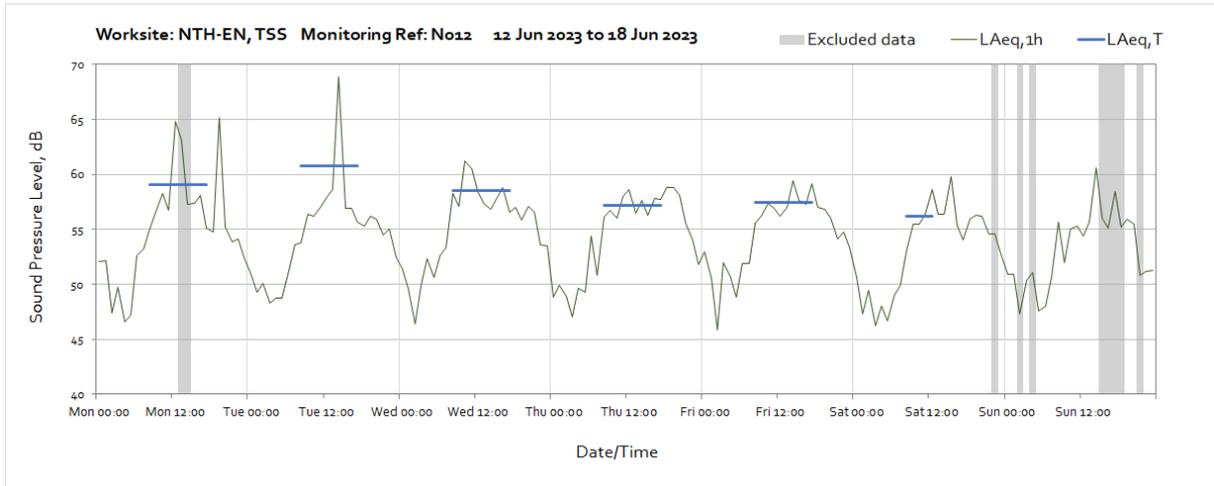




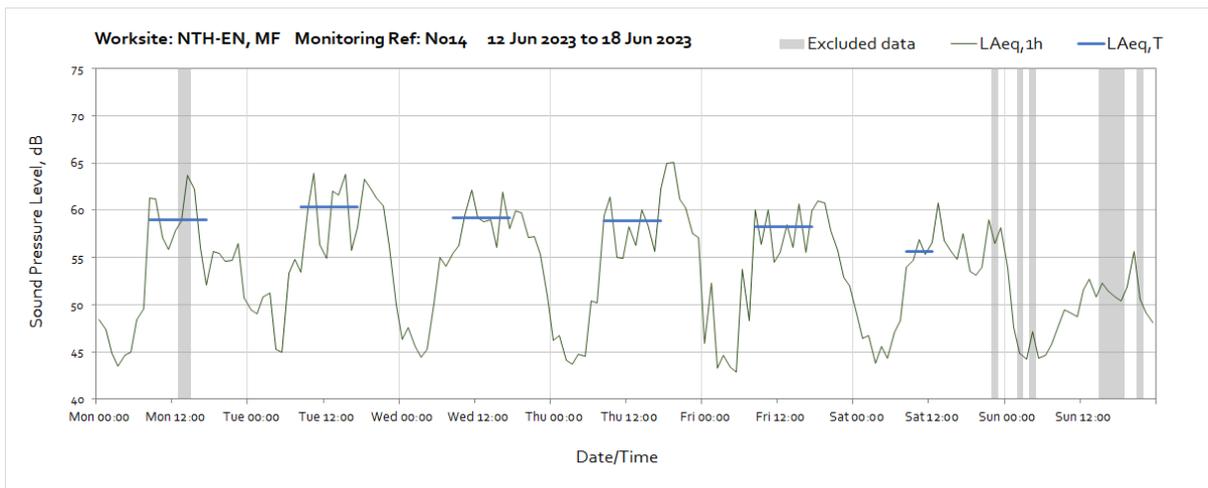
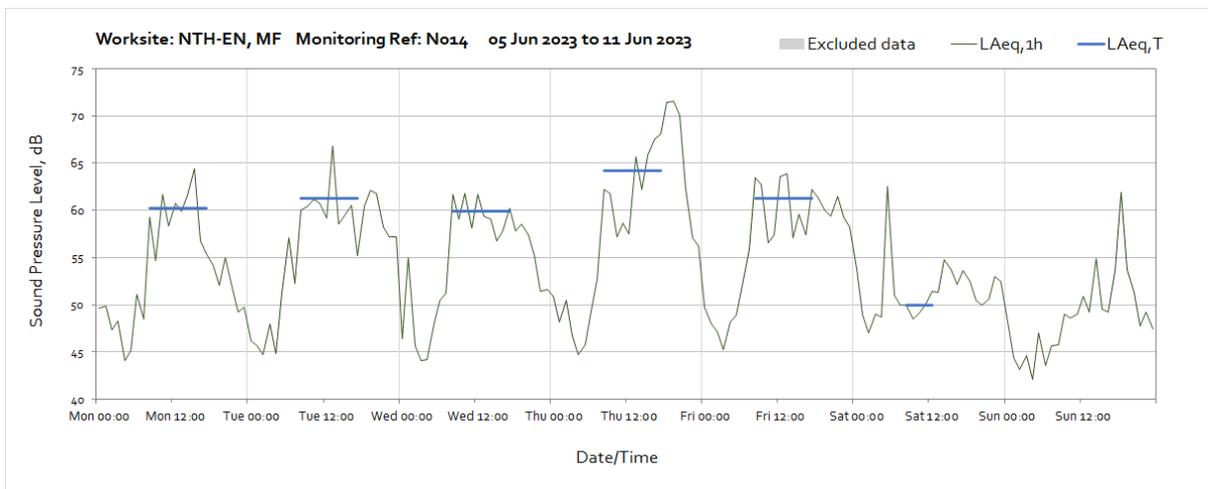
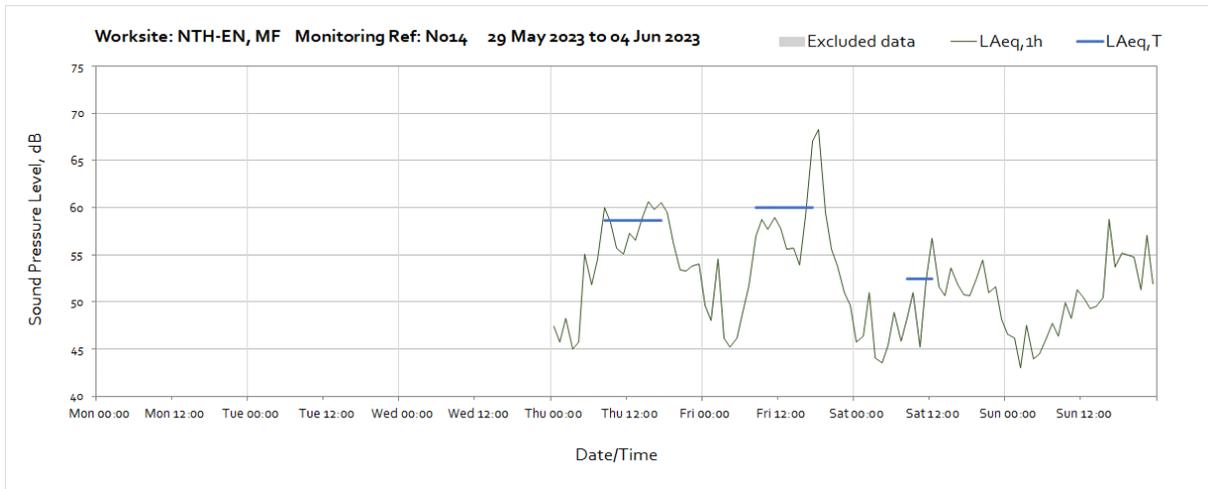


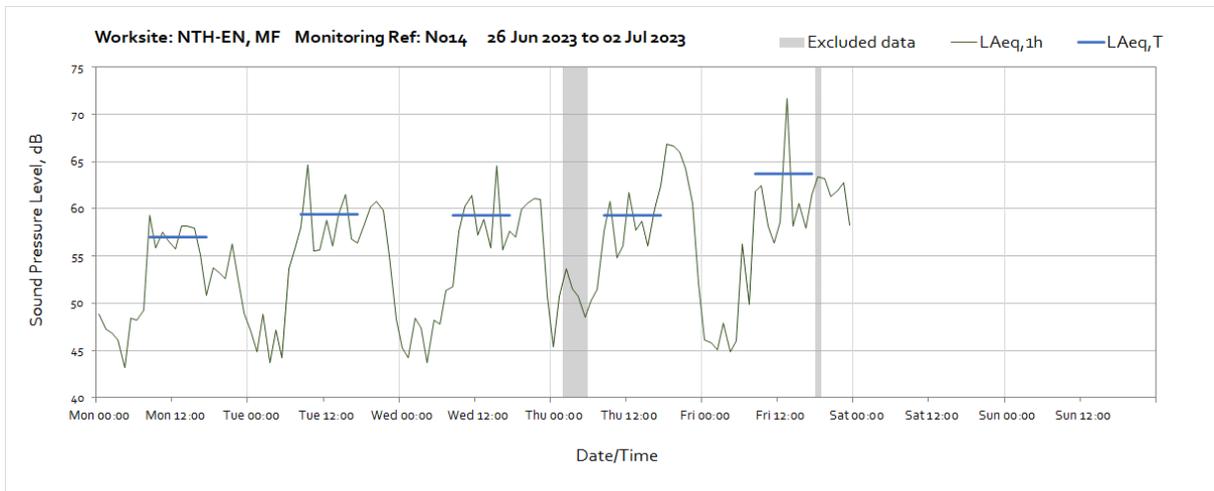
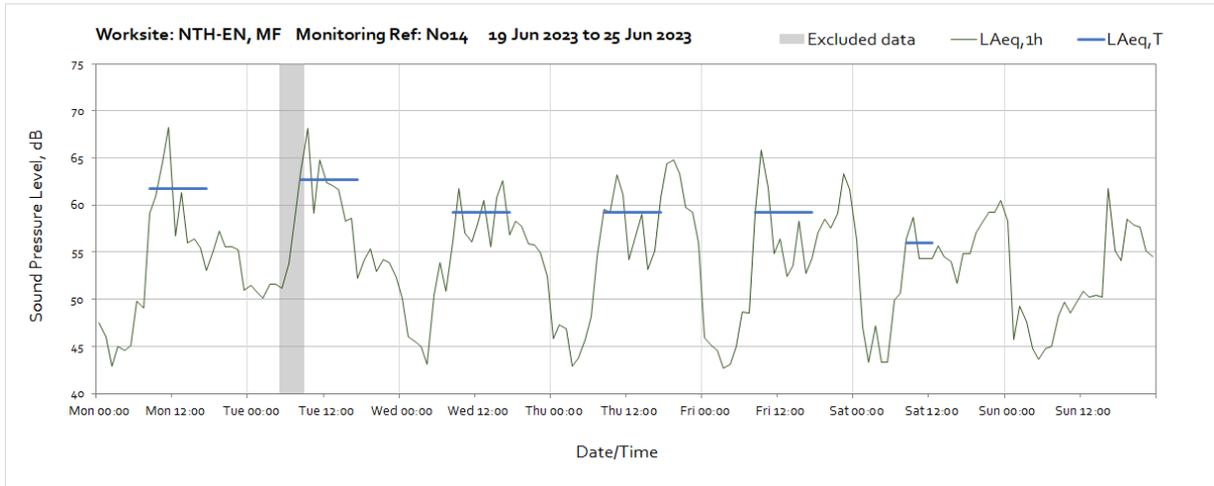
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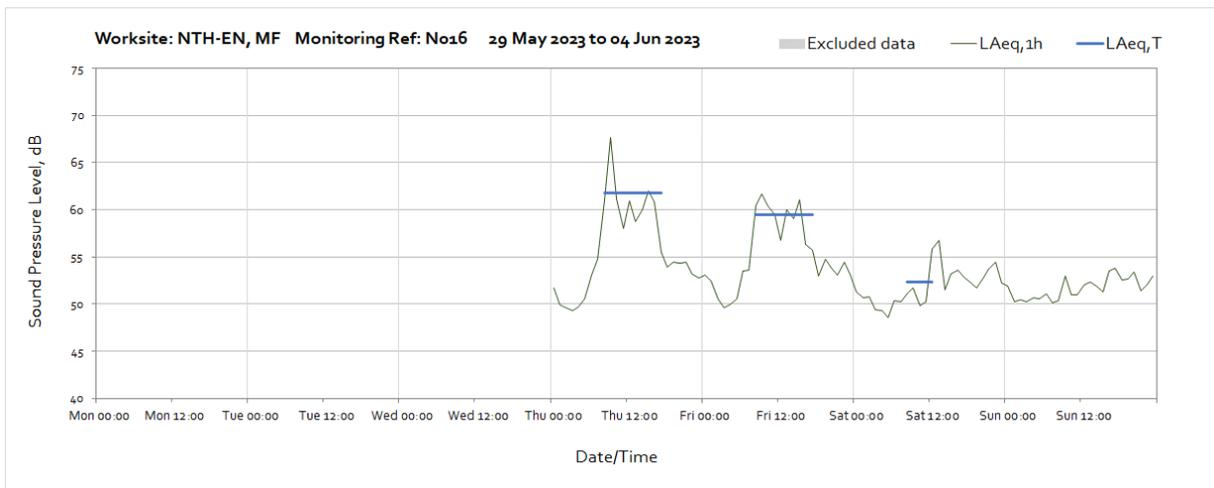


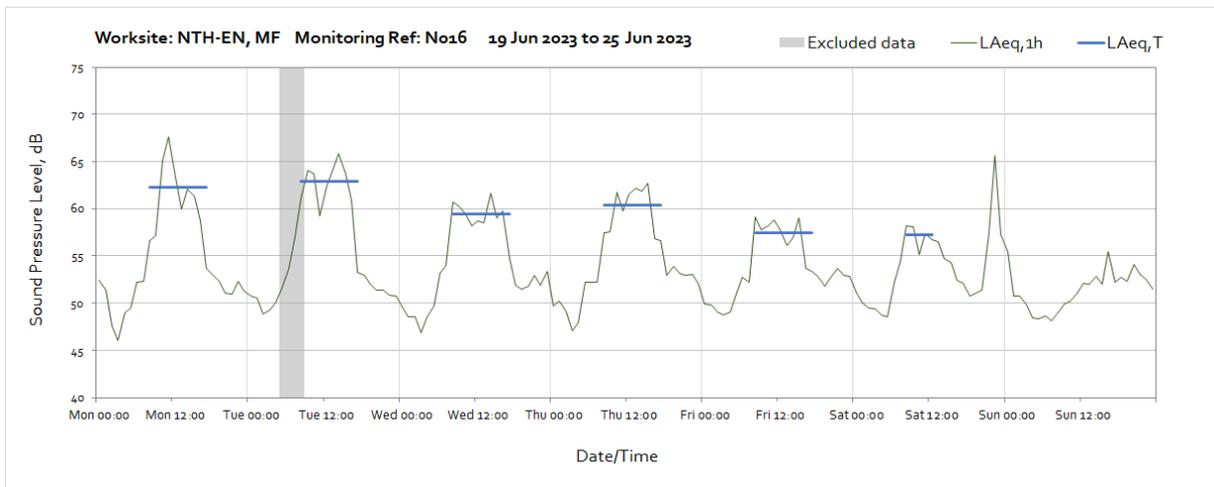
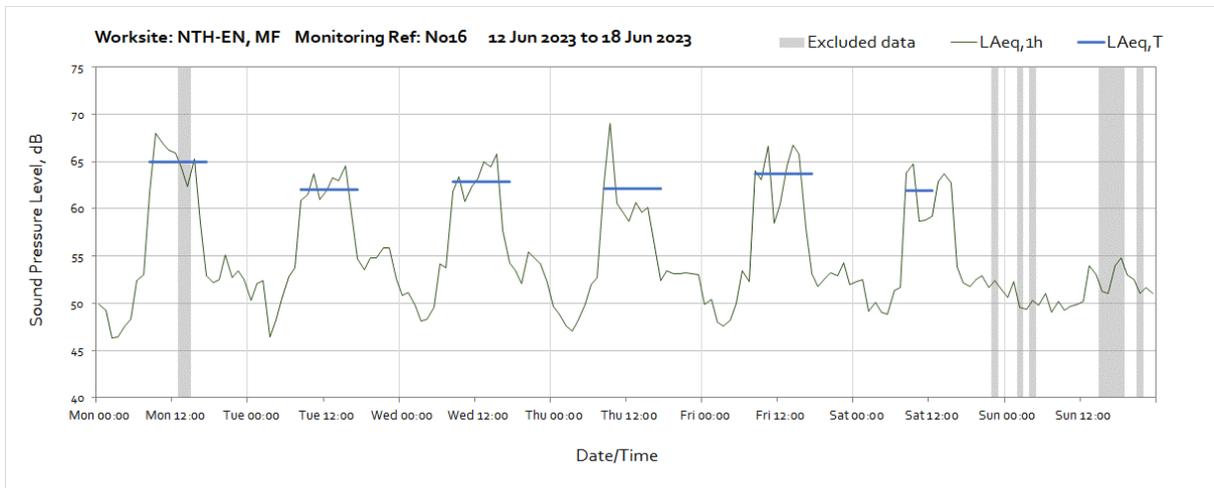
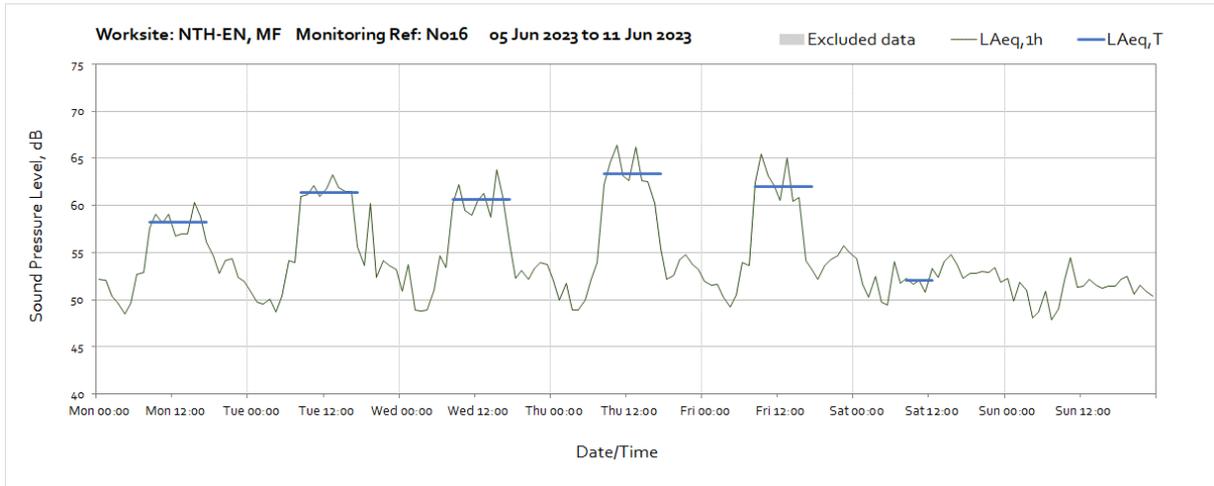
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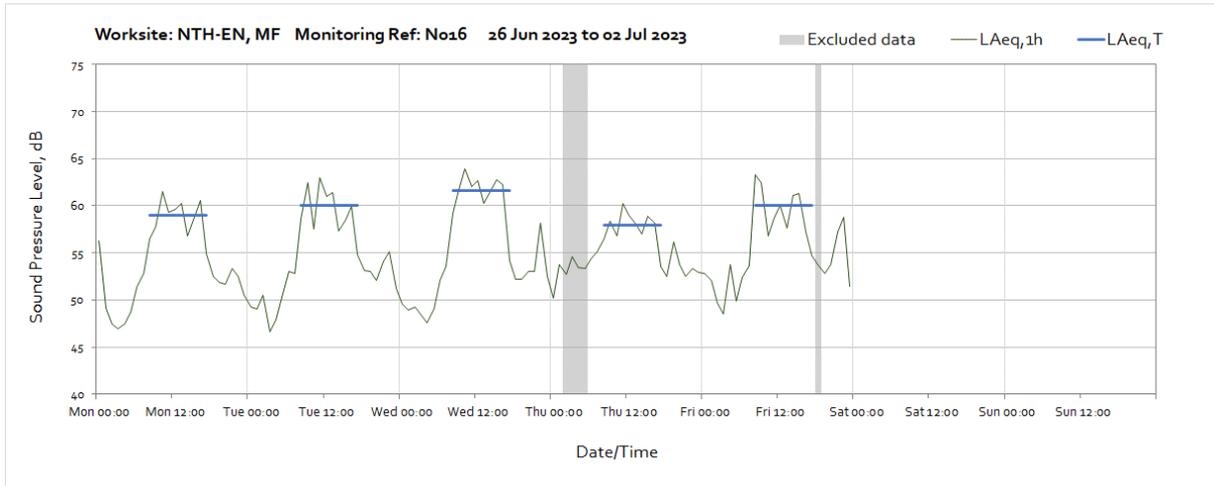




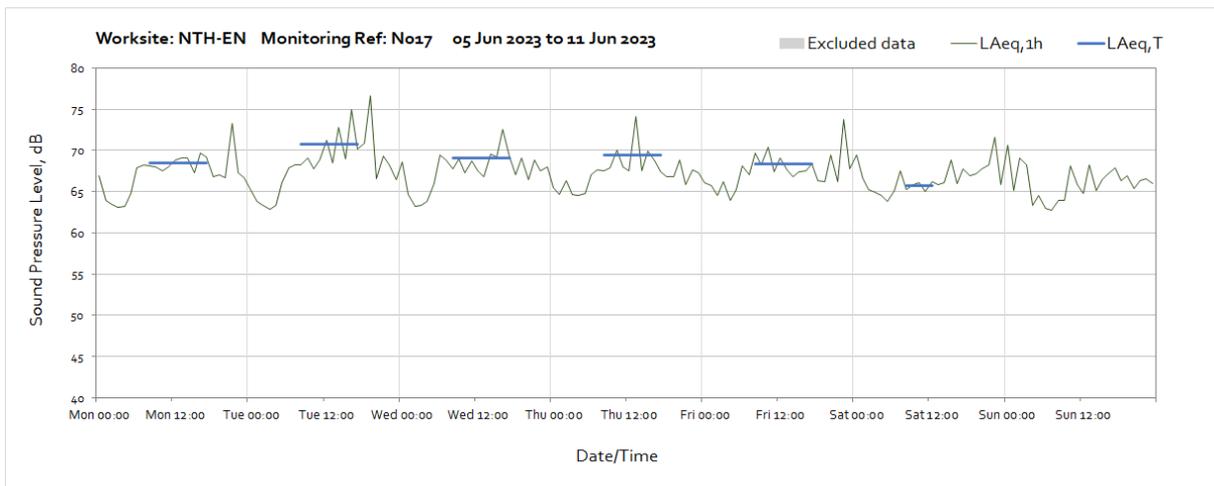
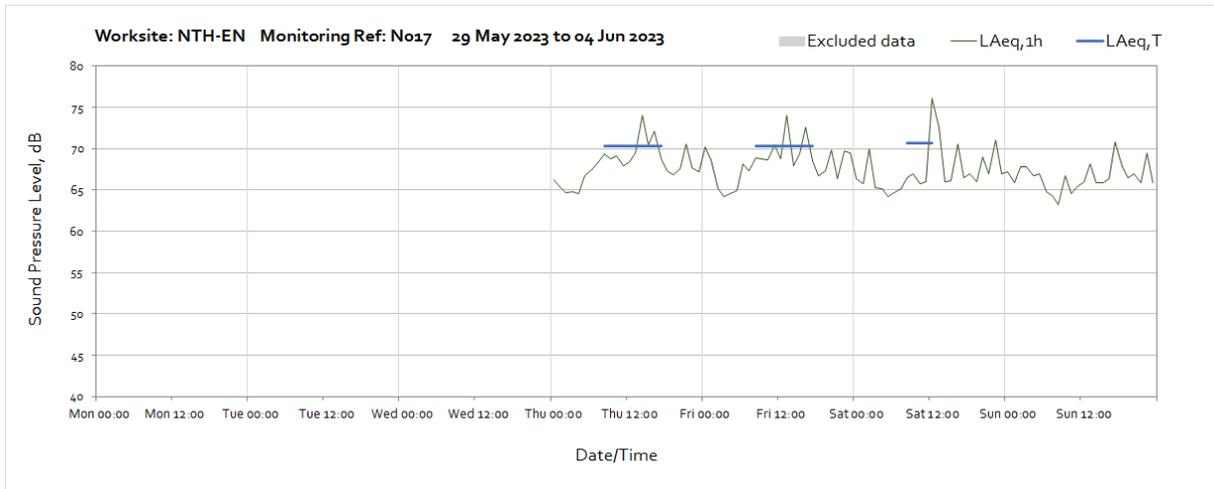
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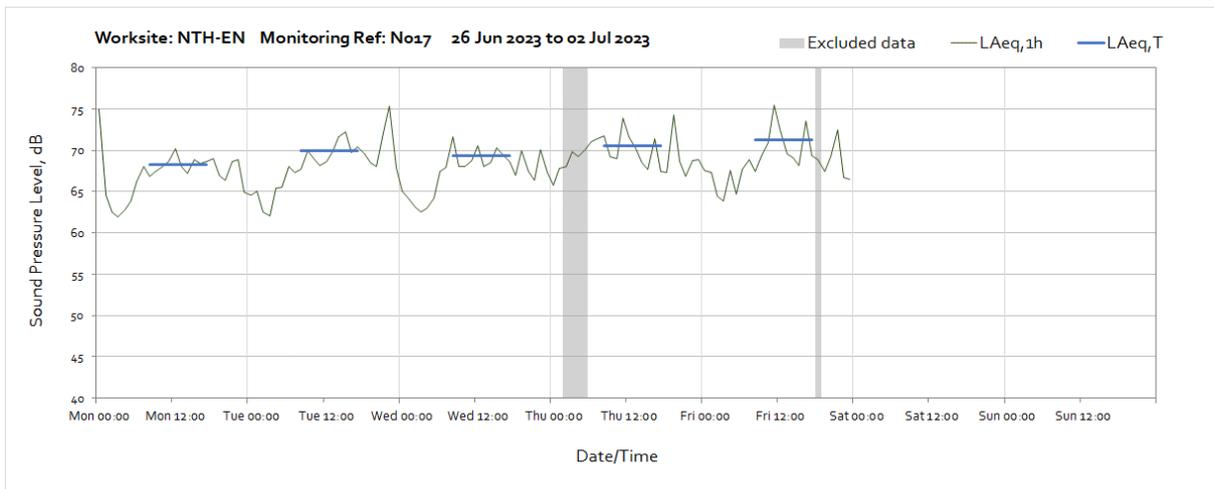
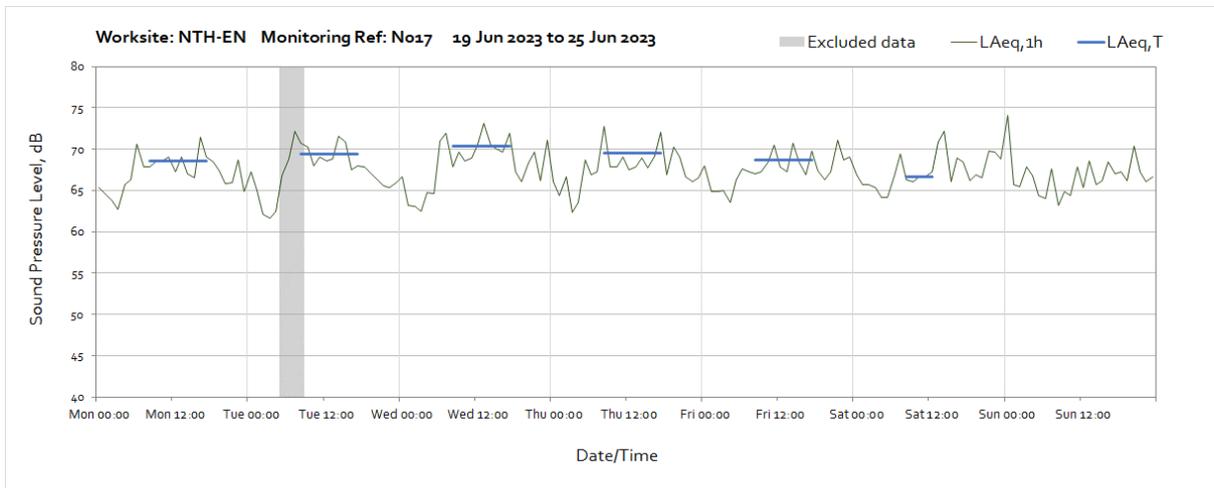
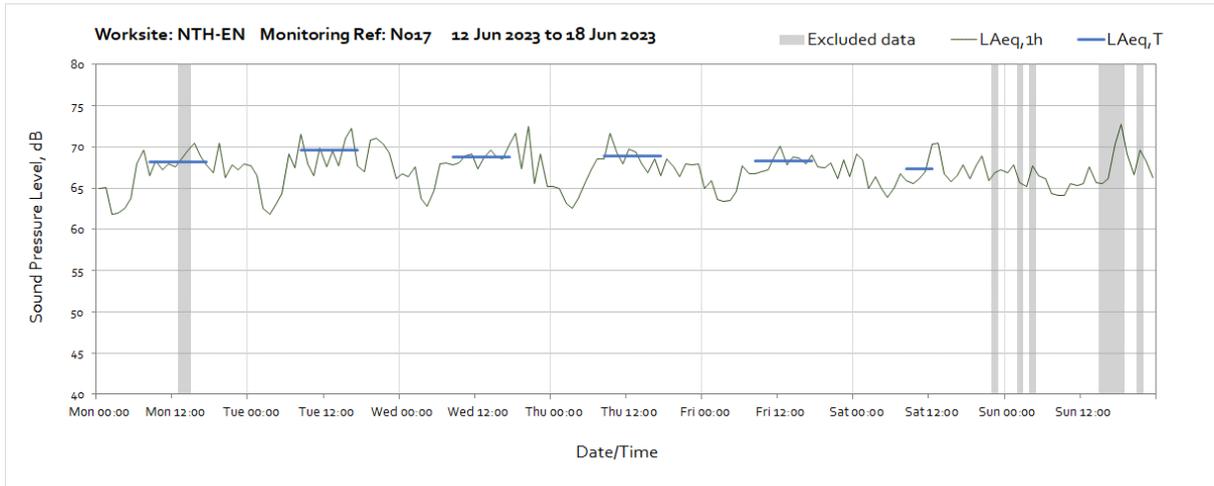




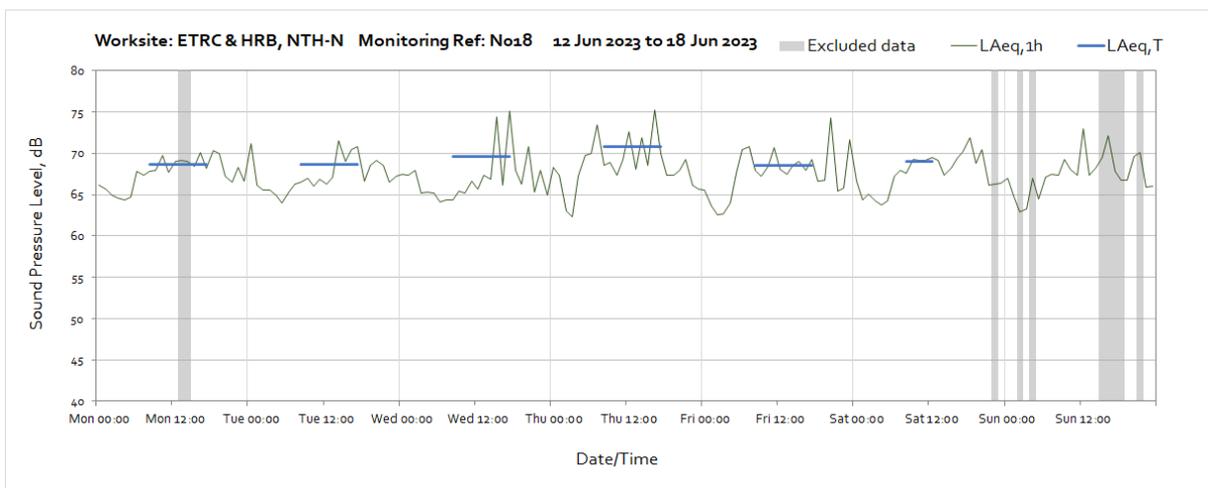
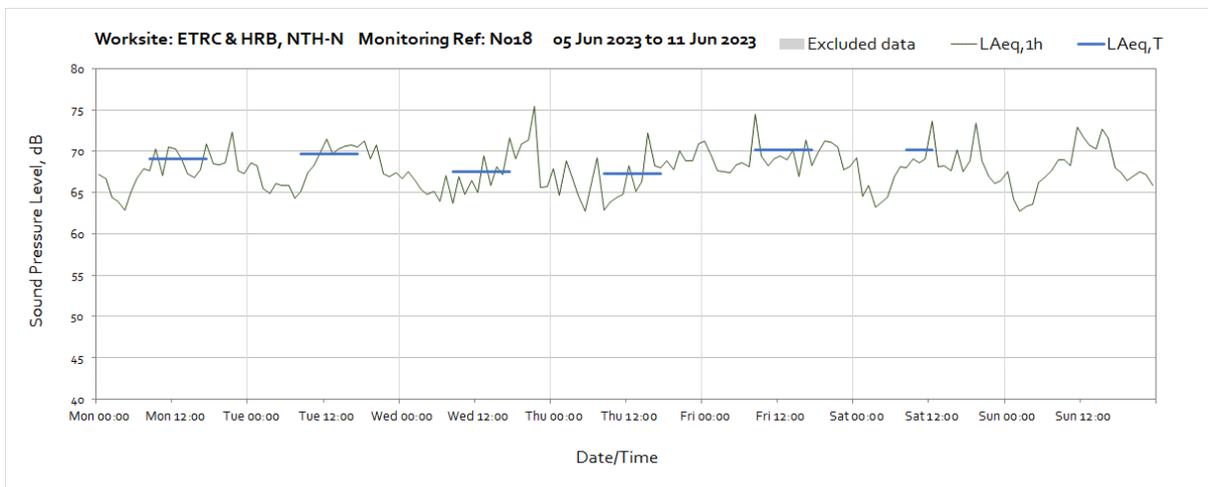
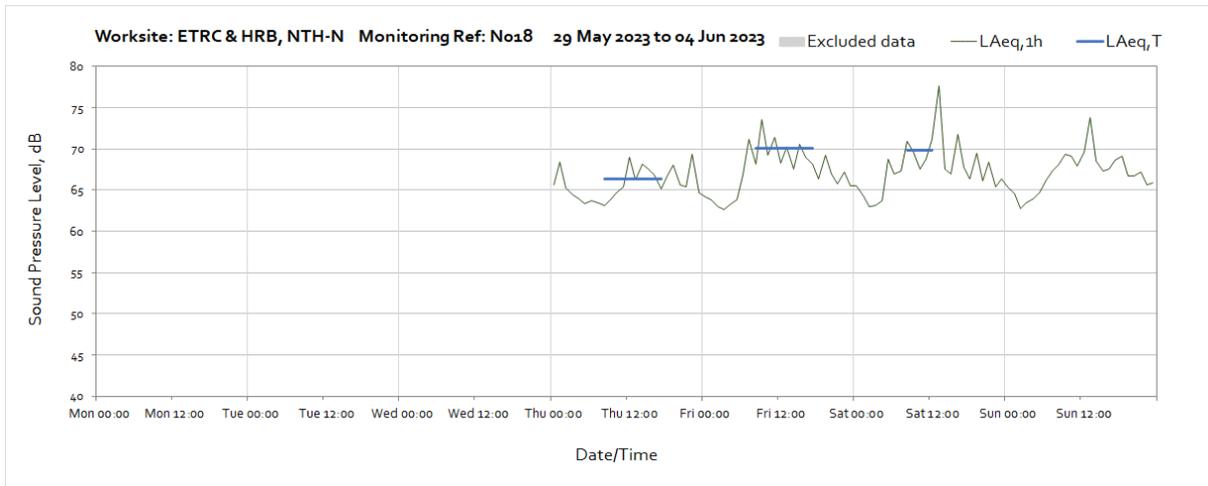


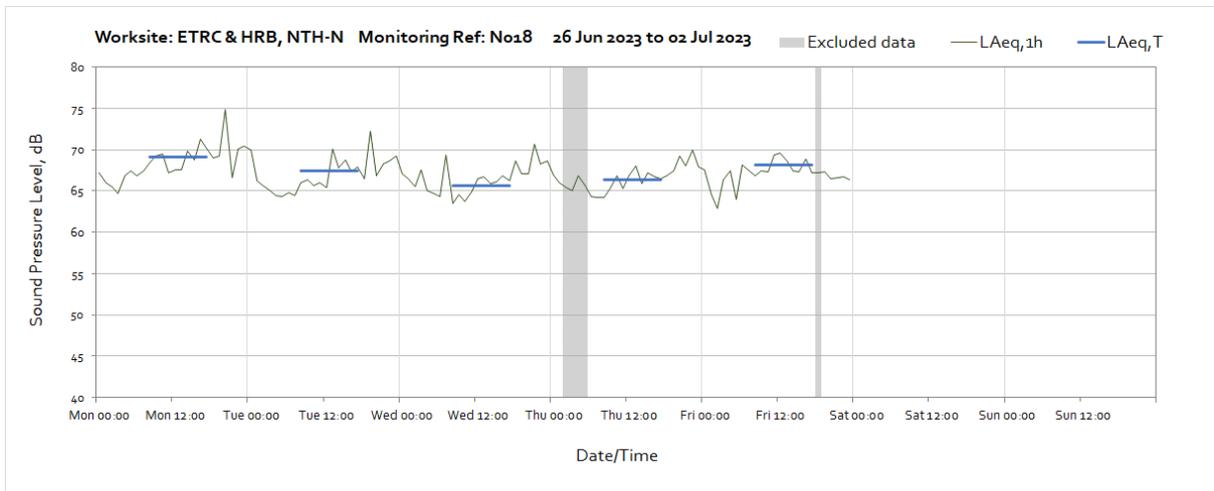
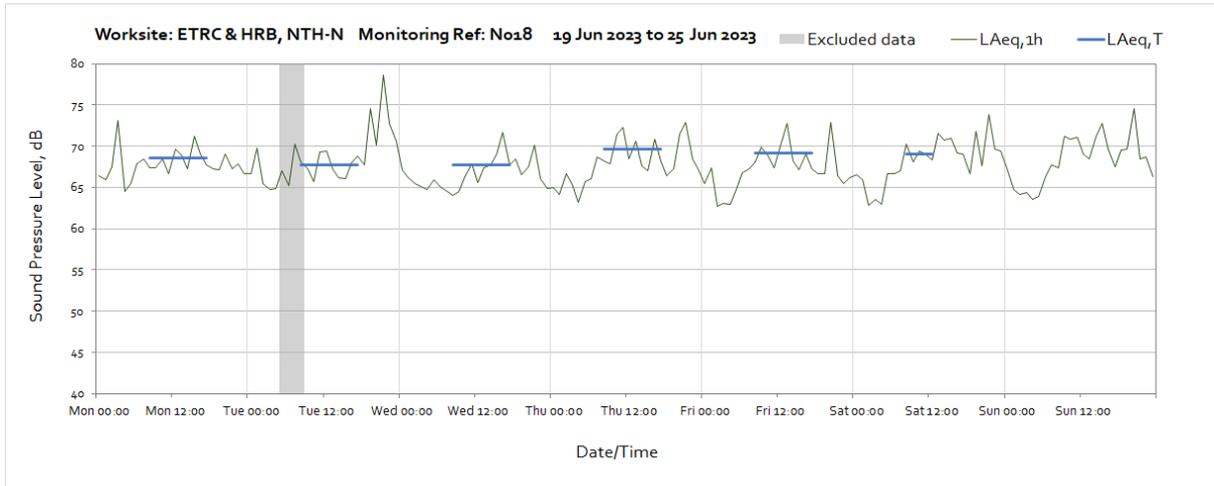
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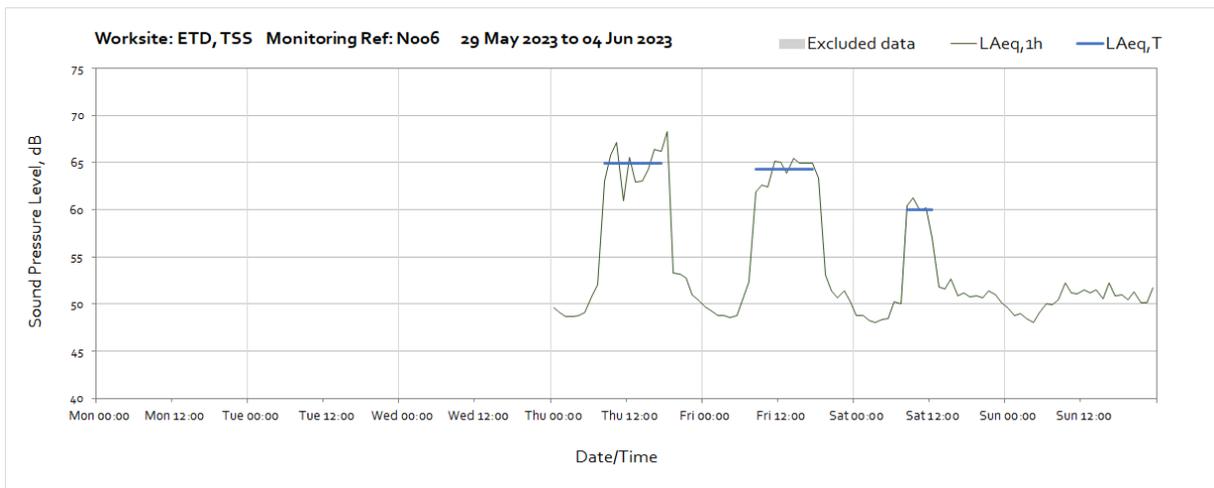


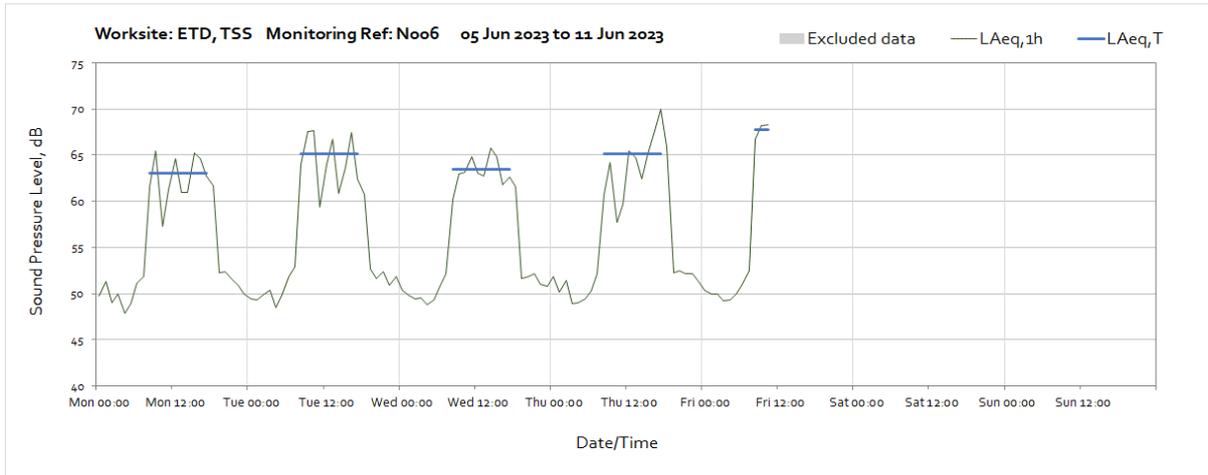
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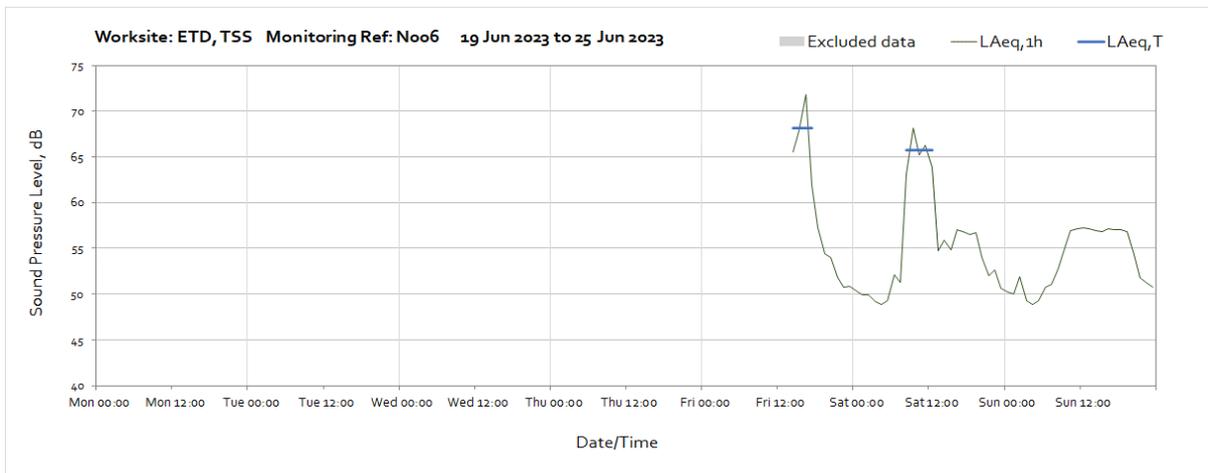


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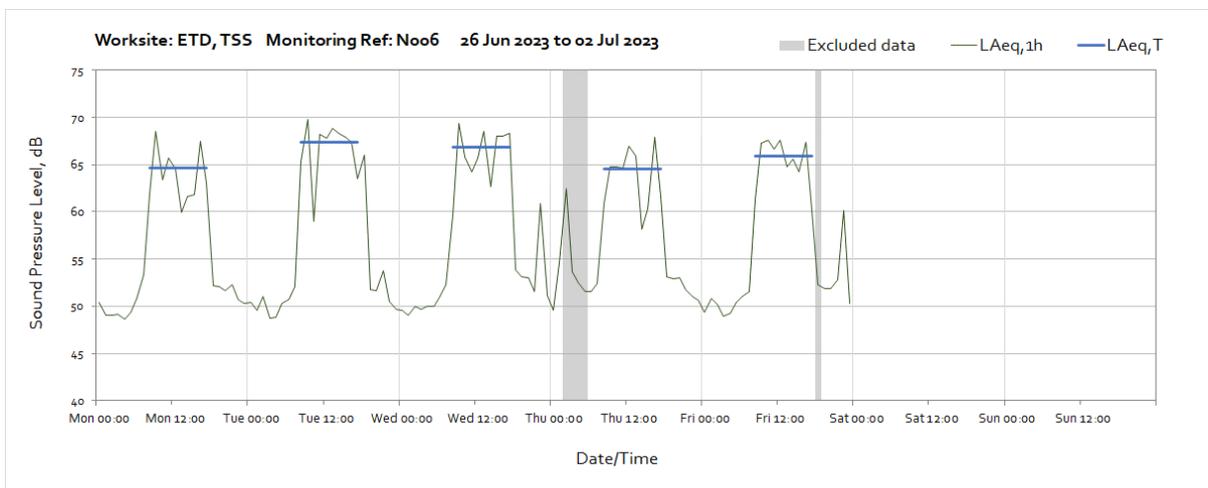




Note: Missing data from 11:00 on Friday 9th June until 14:00 on Friday 23rd June was due to loss of power to the monitoring station. Stakeholder liaison resulted in a delay in obtaining access to the monitor to correct the power issue.

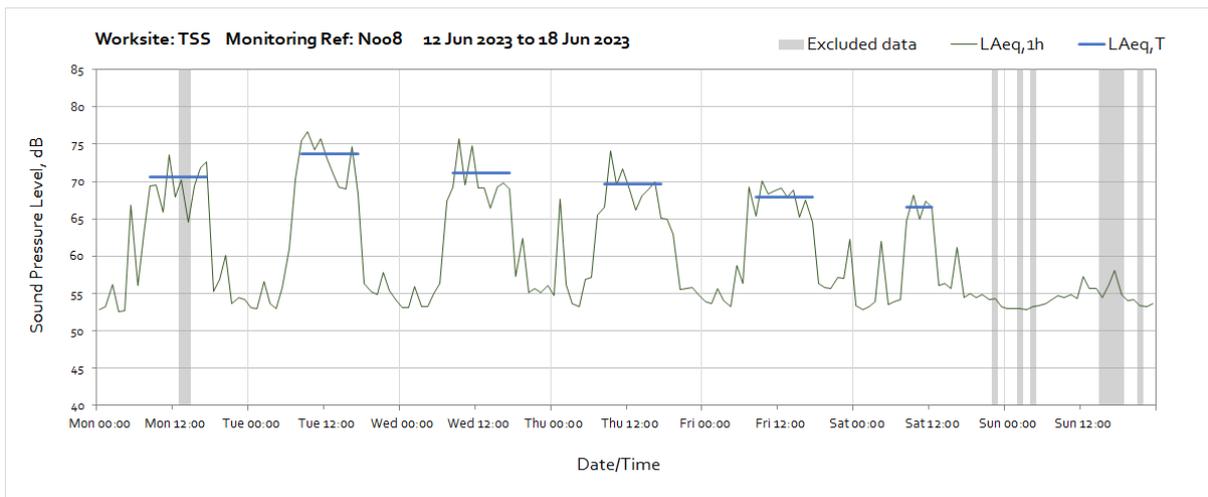
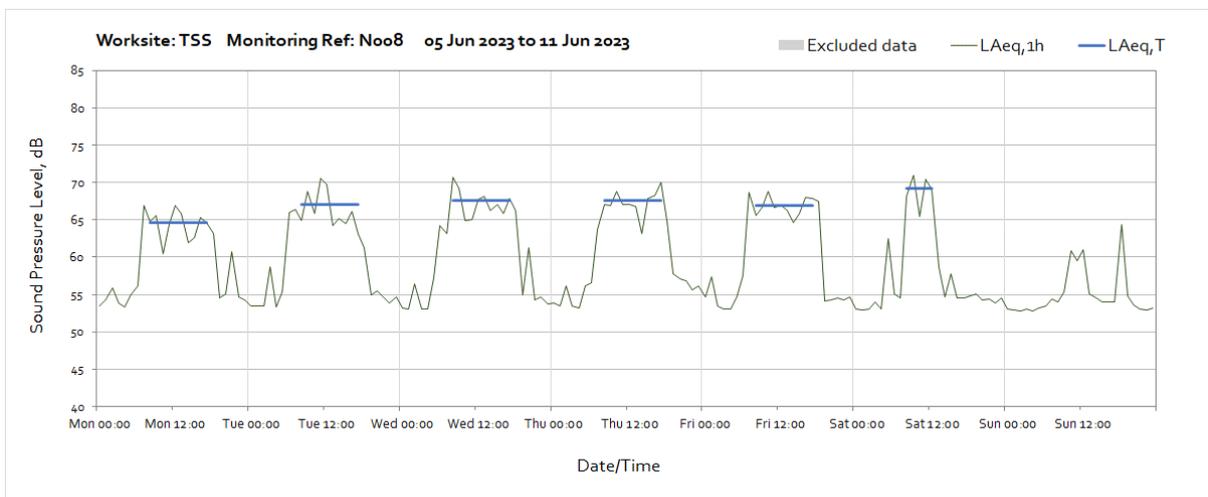
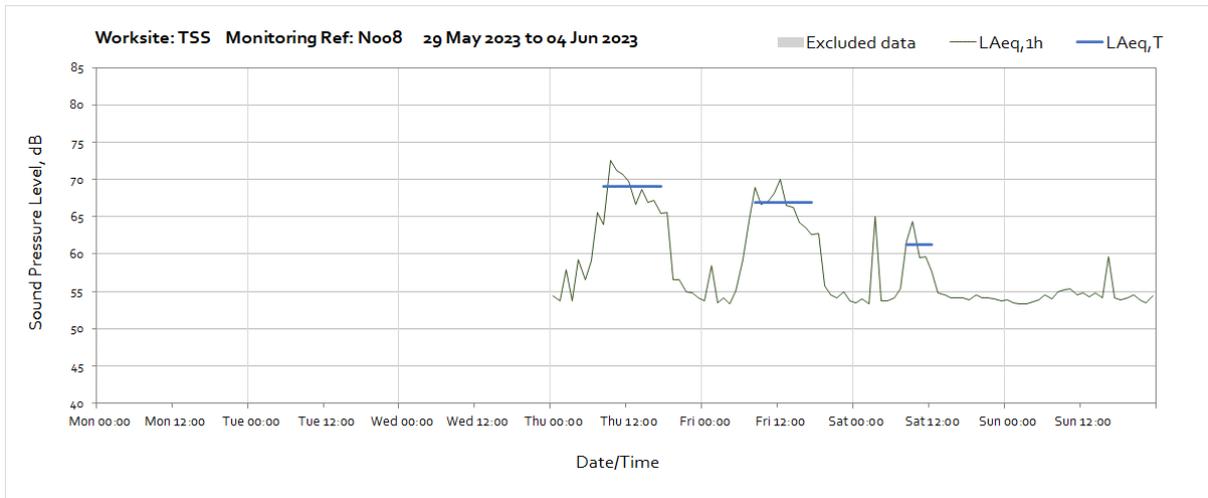


Note: Missing data from 11:00 on Friday 9th June until 14:00 on Friday 23rd June was due to loss of power to the monitoring station. Stakeholder liaison resulted in a delay in obtaining access to the monitor to correct the power issue.

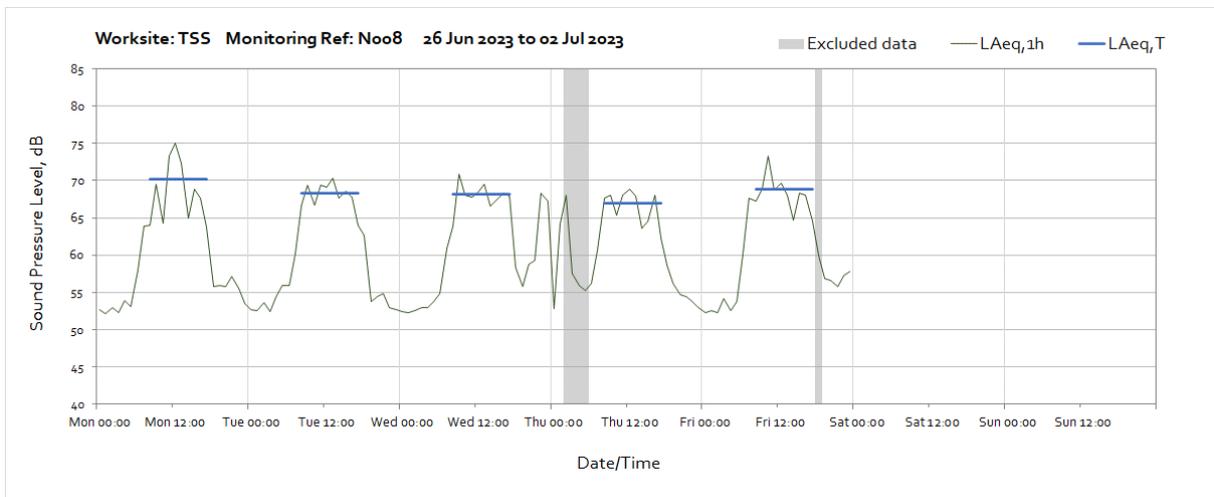
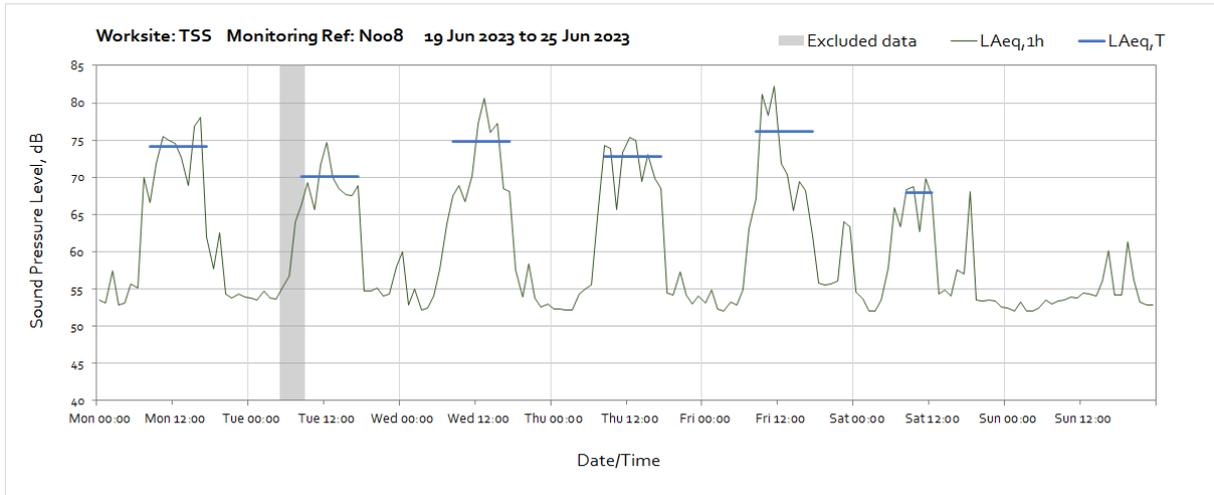


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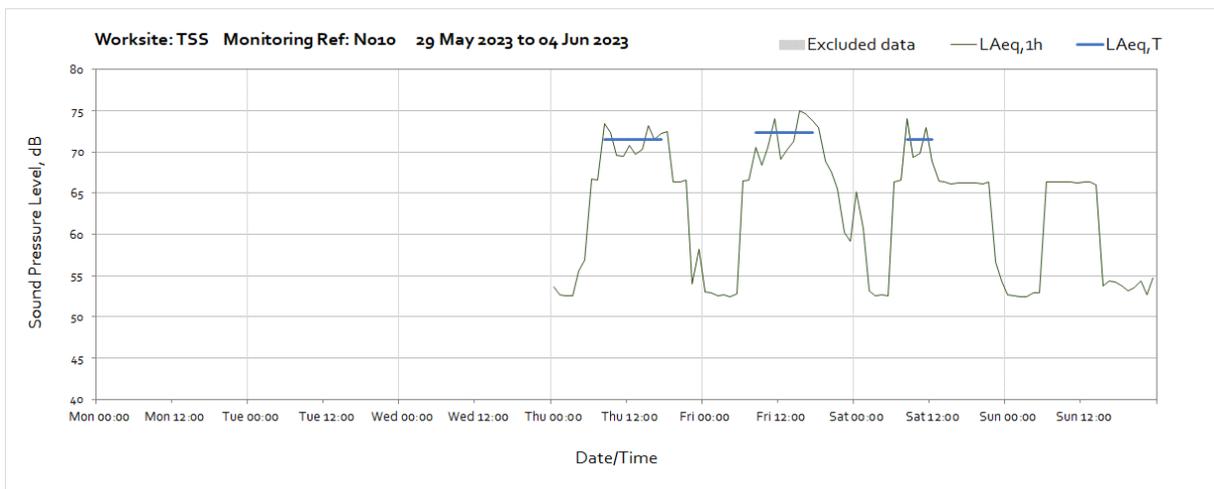
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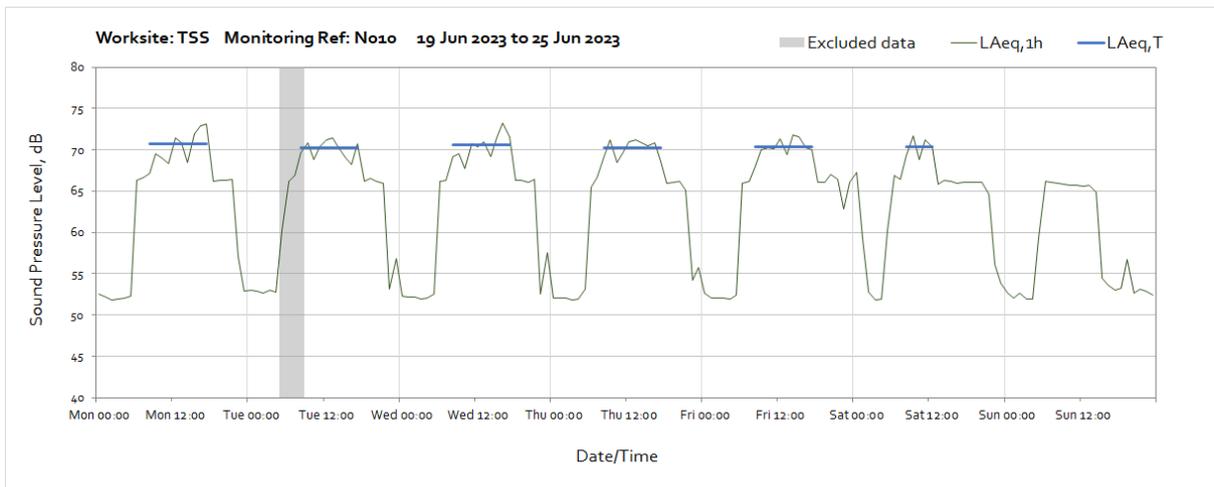
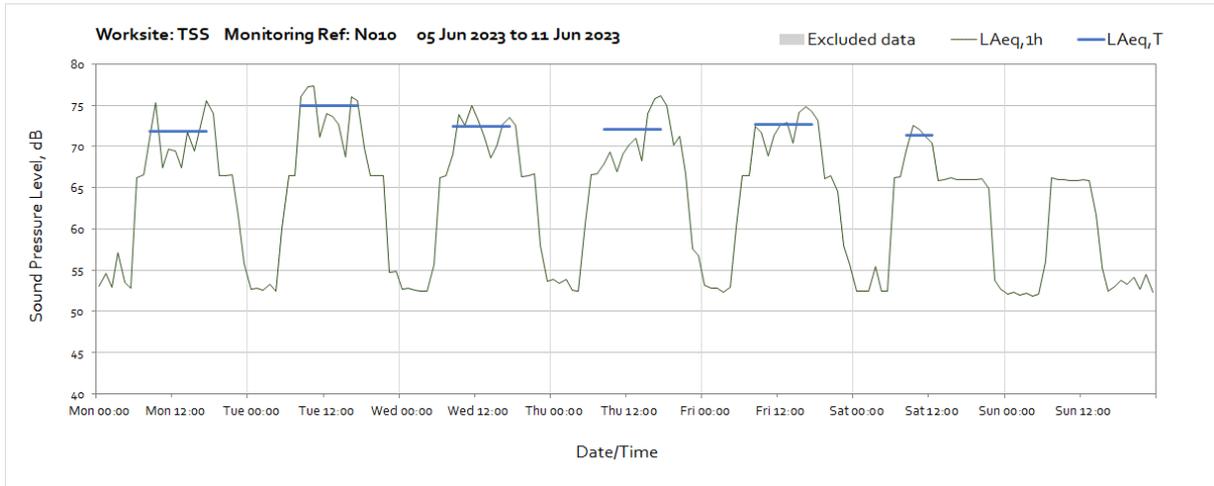


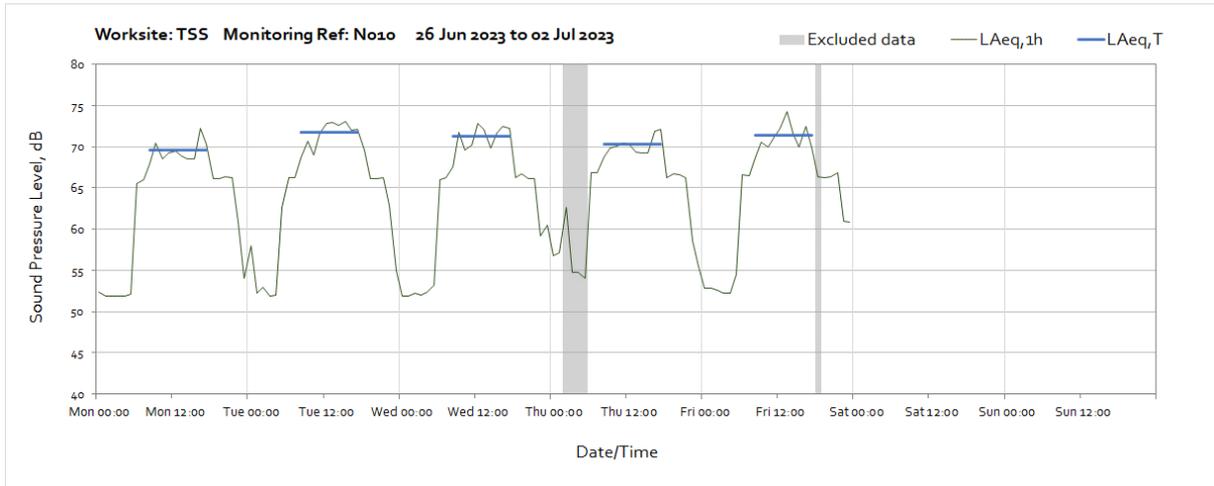
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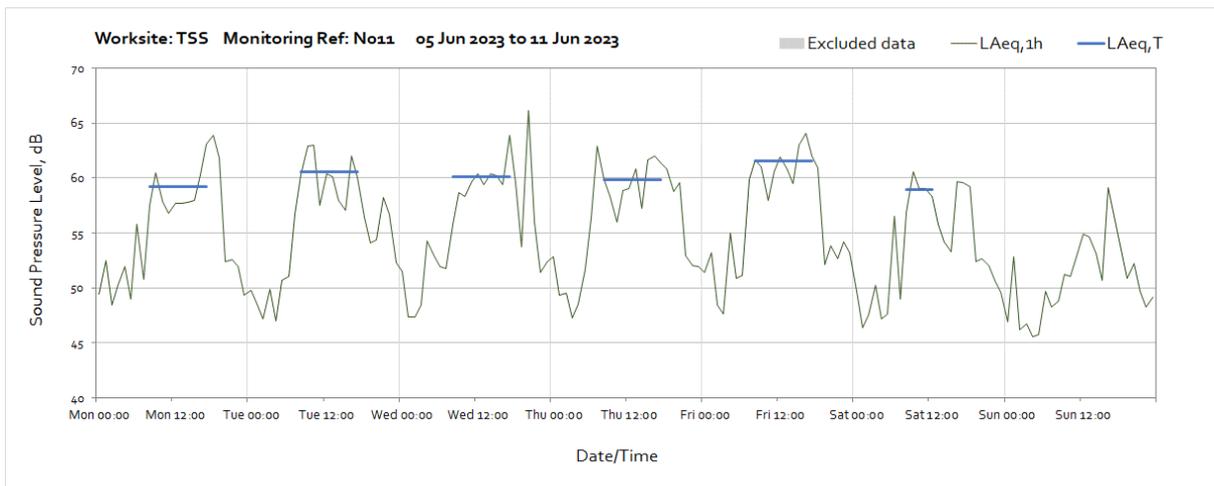
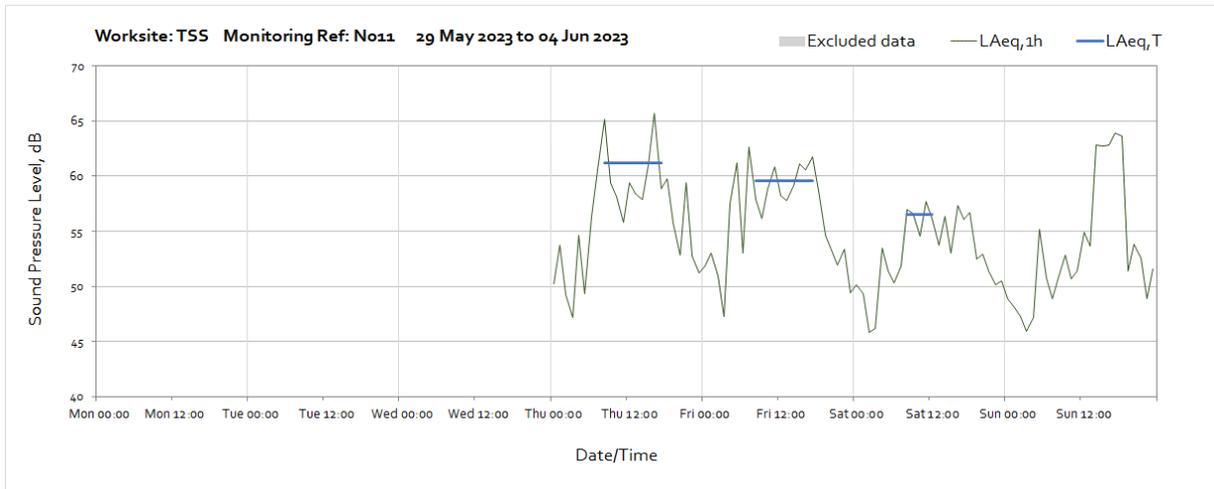
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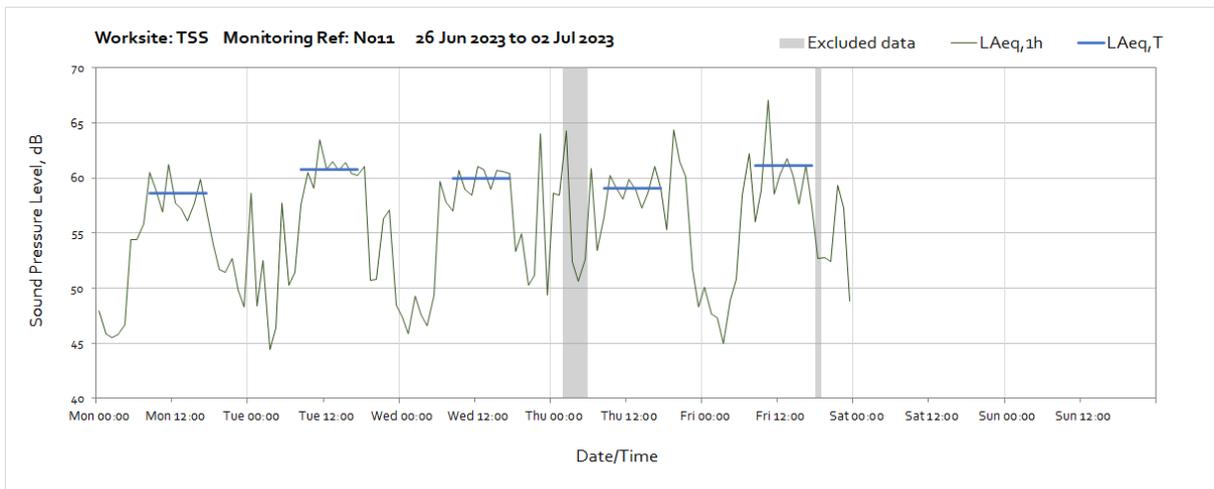
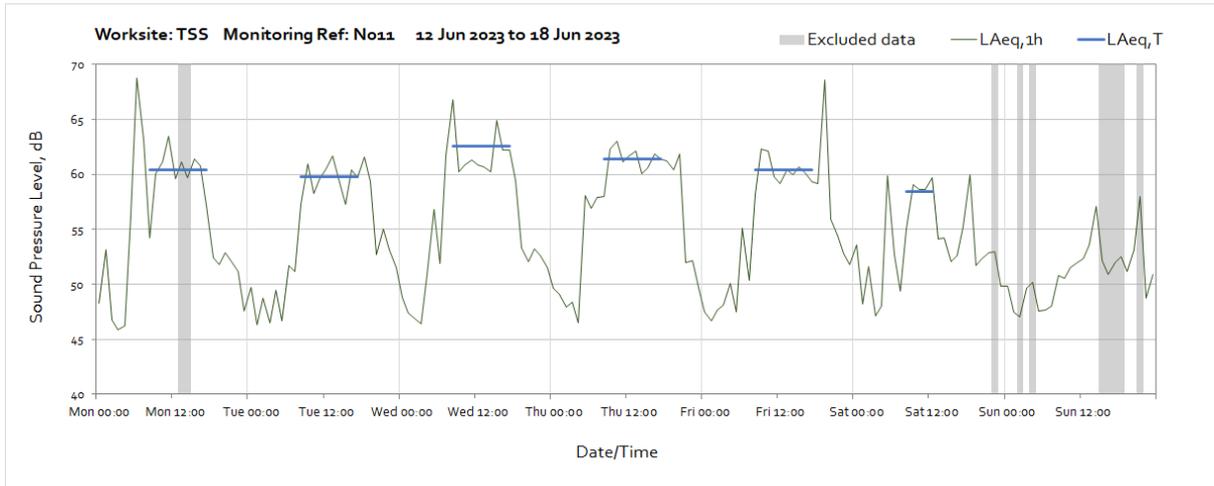




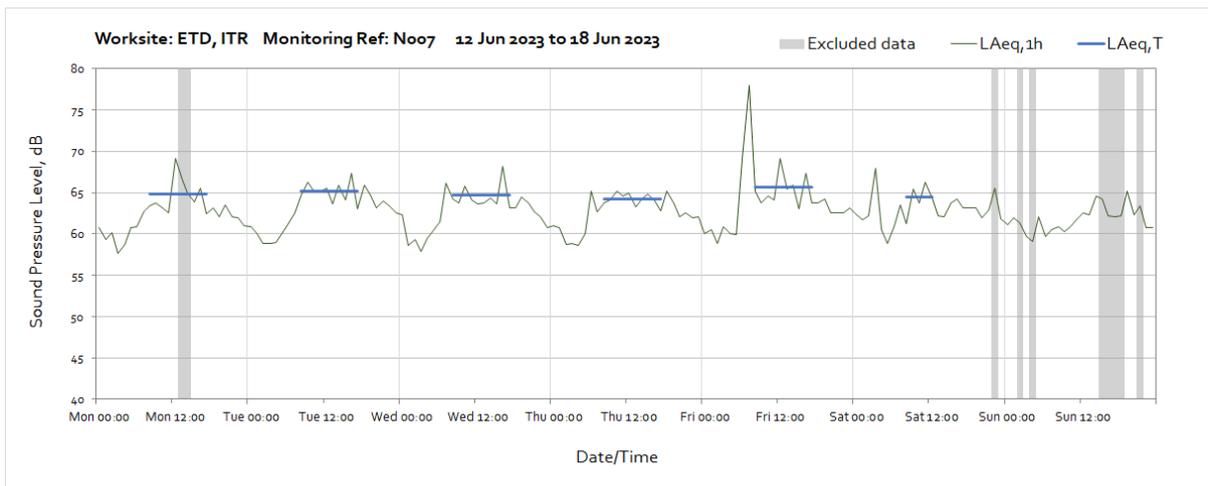
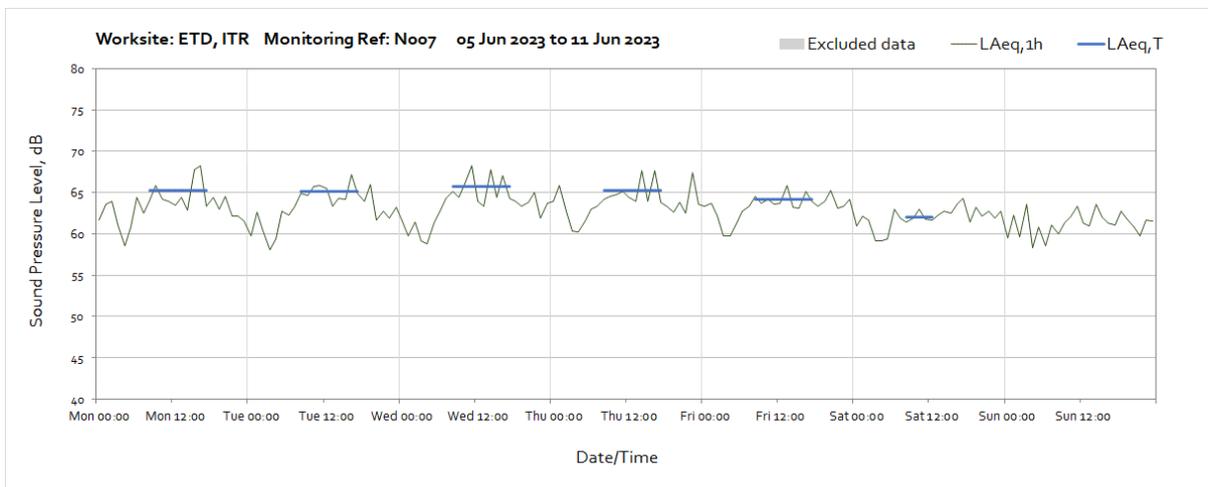
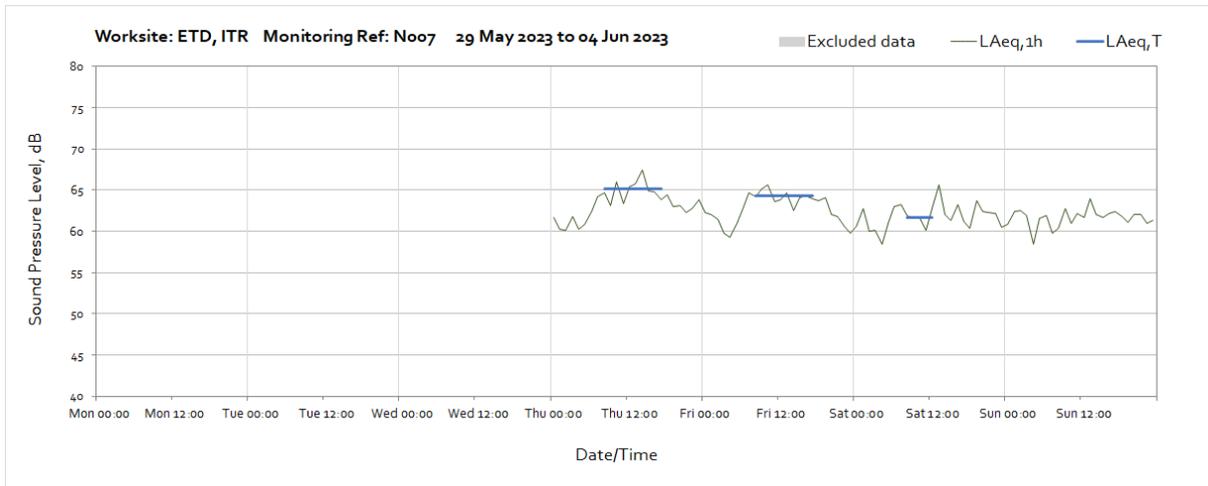


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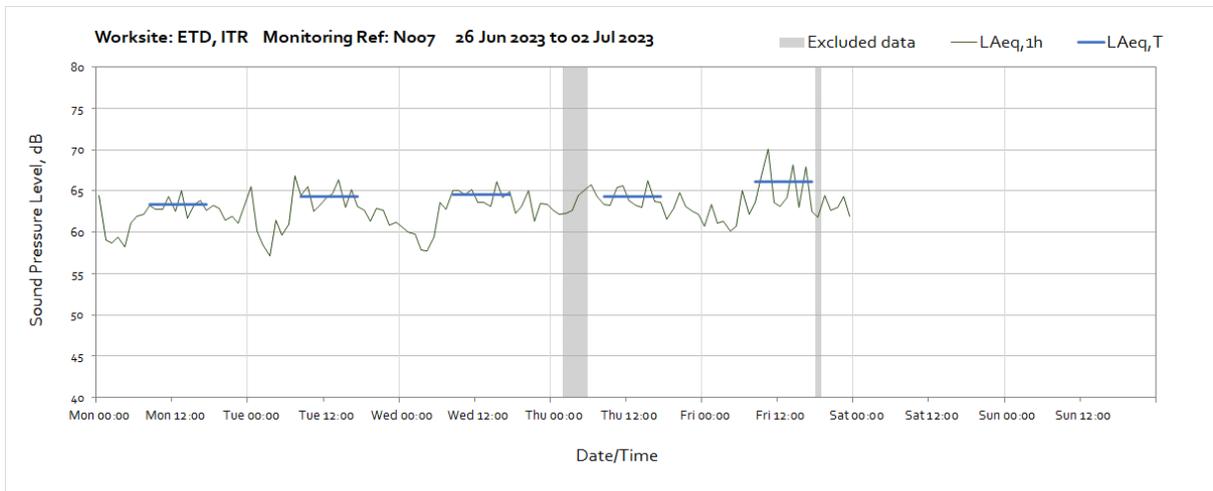
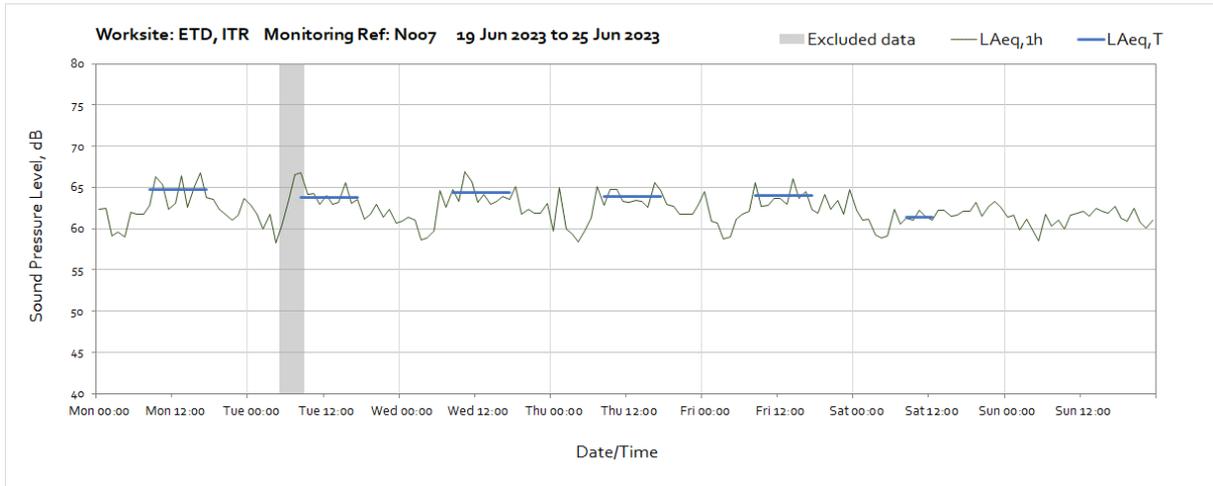




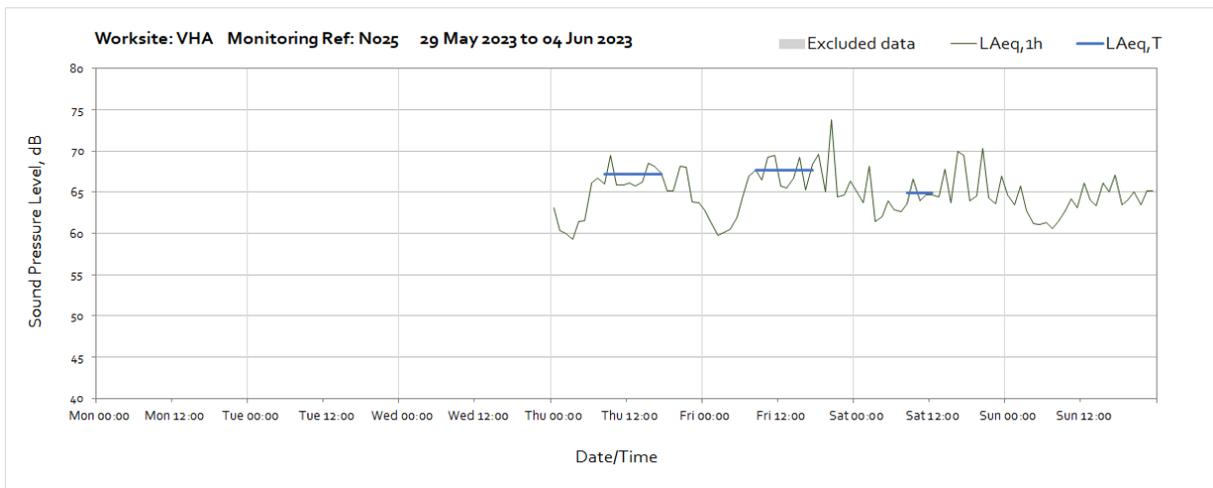
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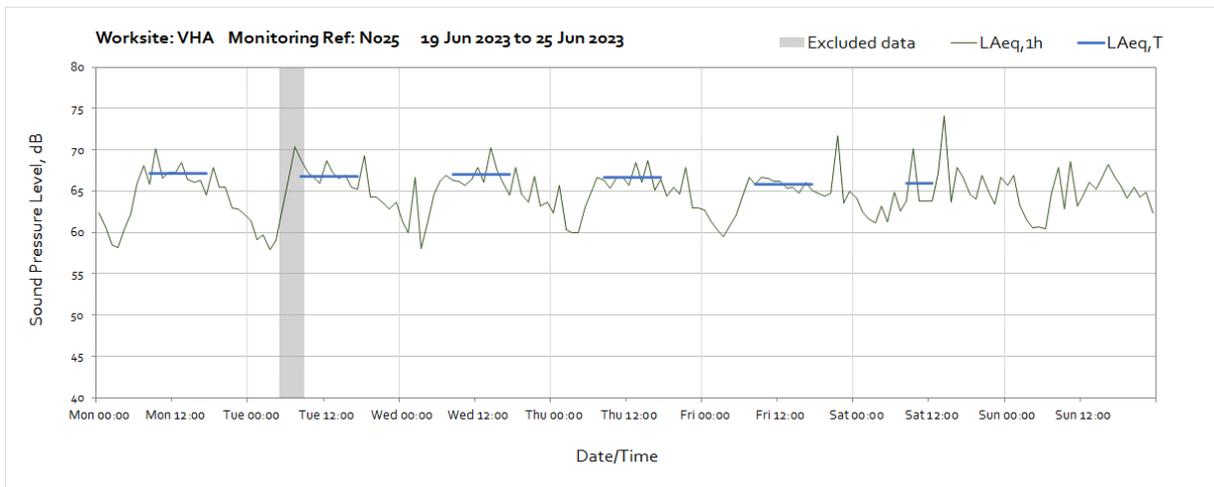
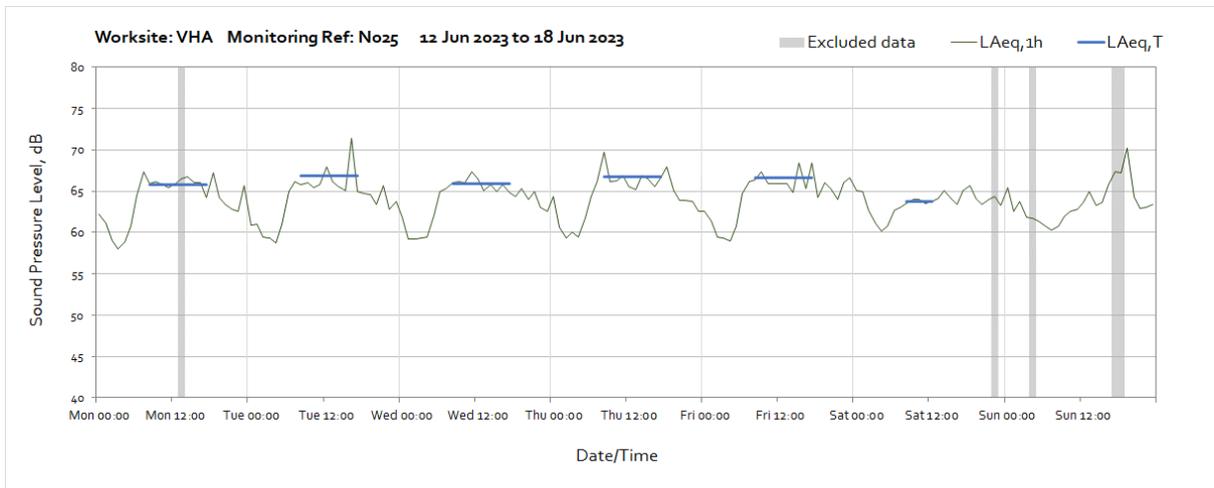
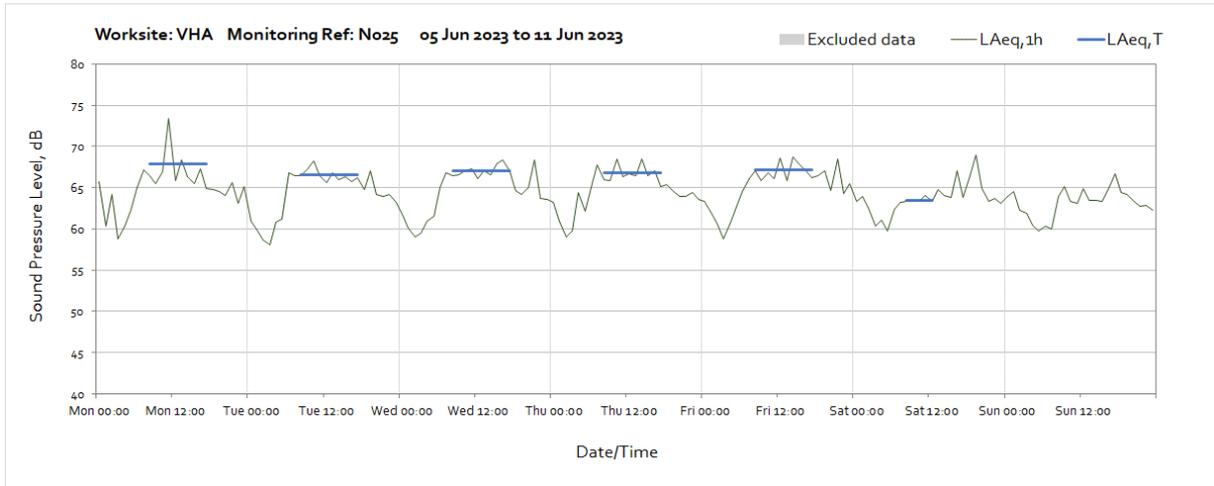


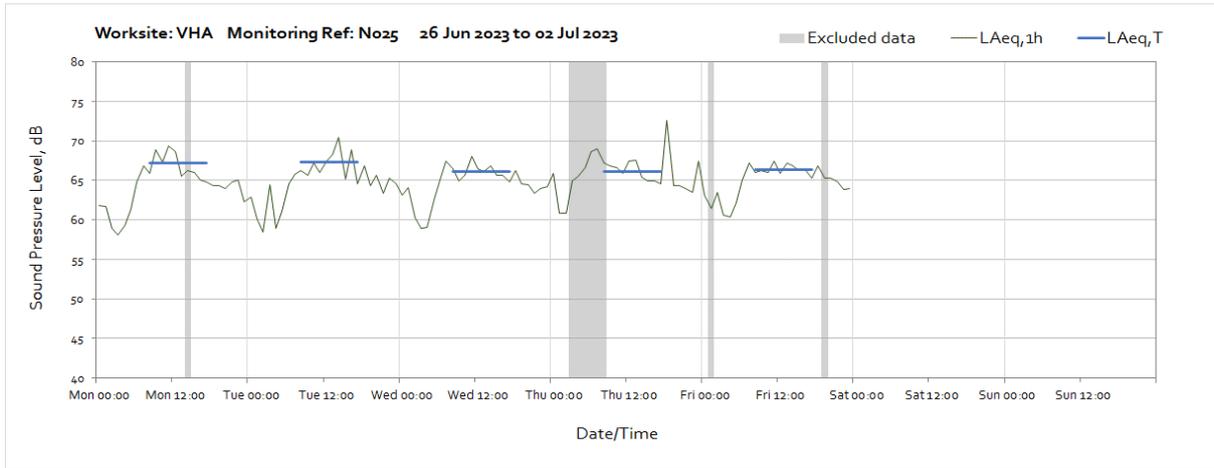
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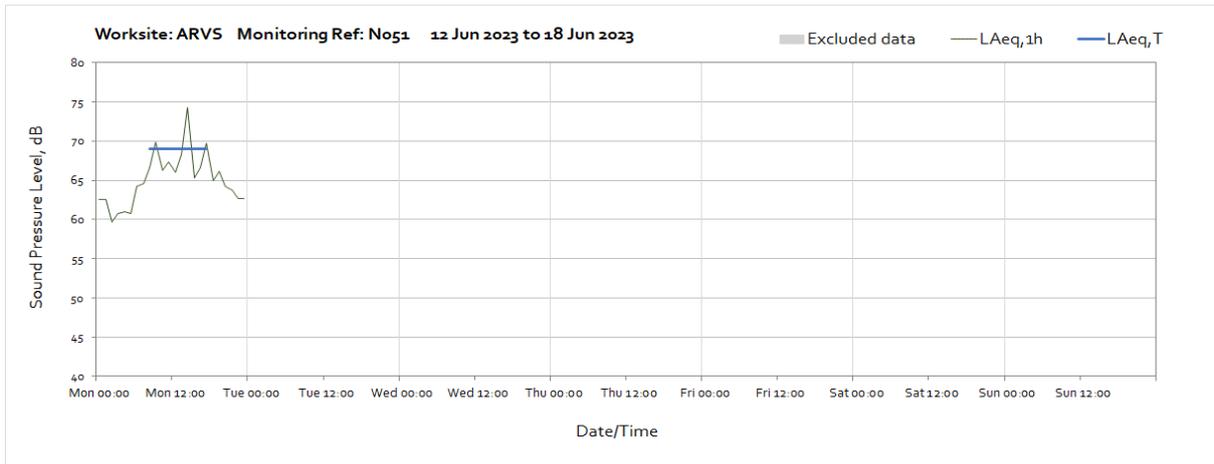
Vehicle Holding Area (VHA) – Monitoring Ref: N025





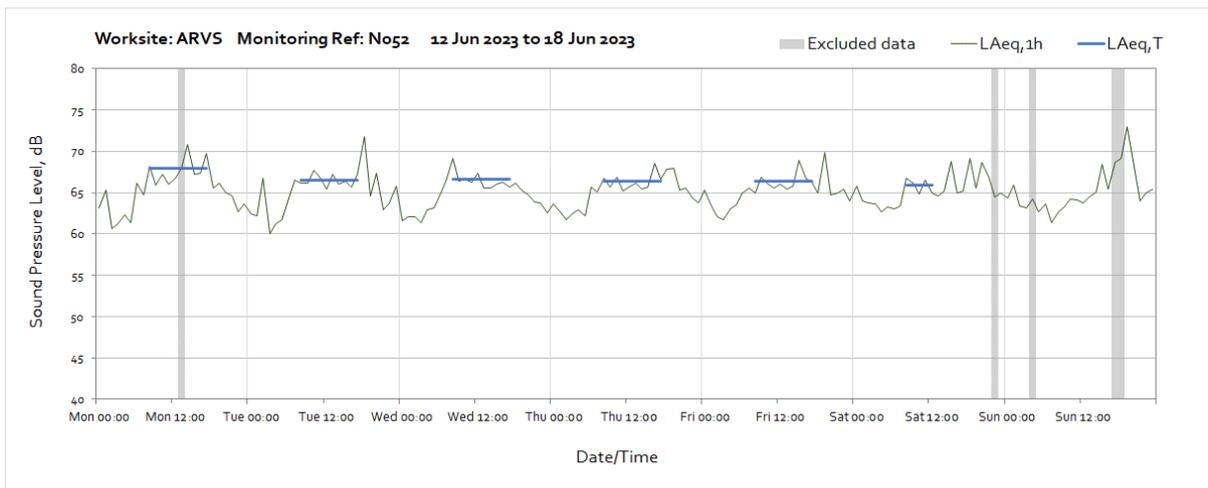
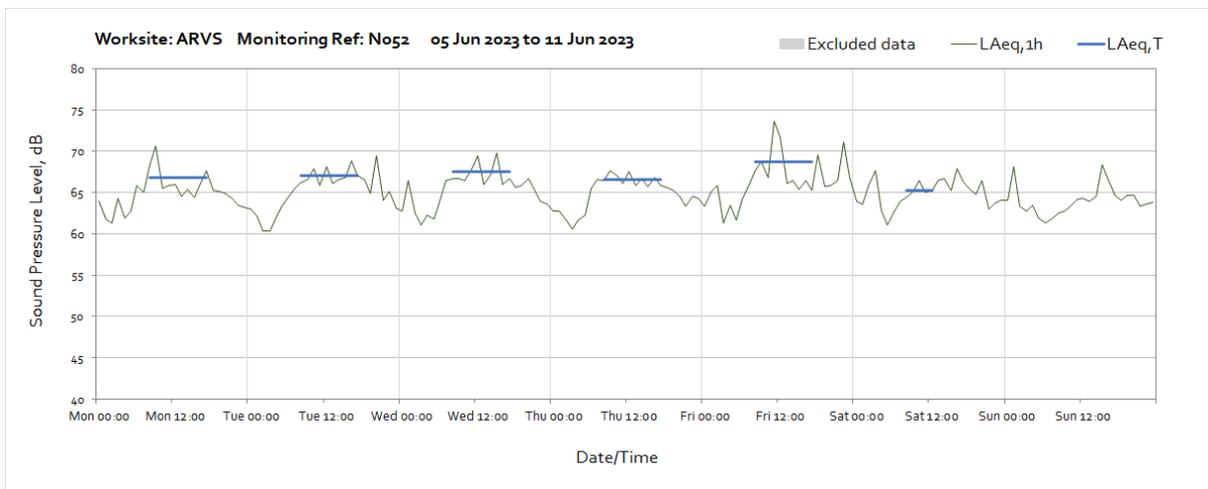
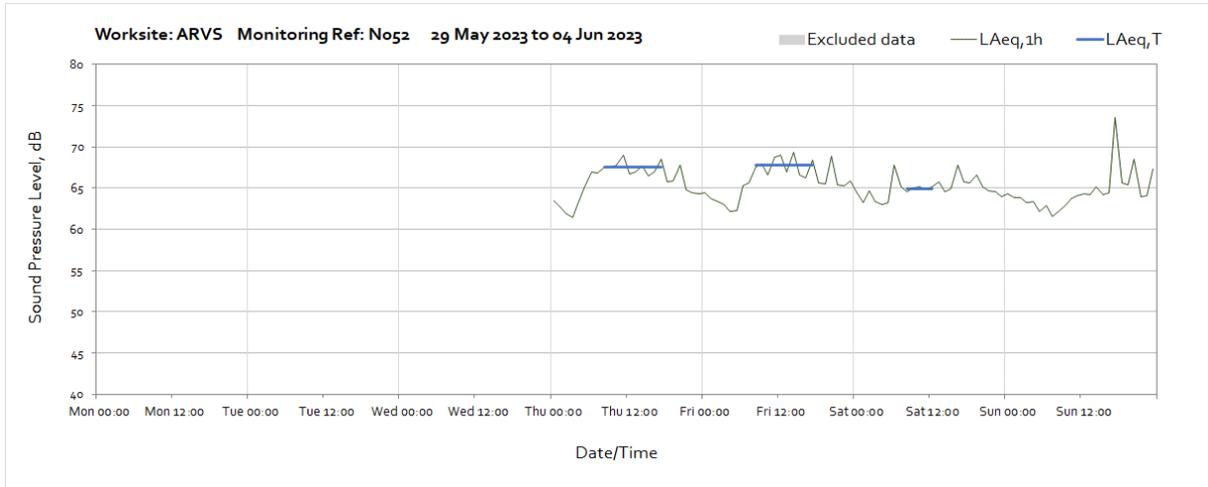


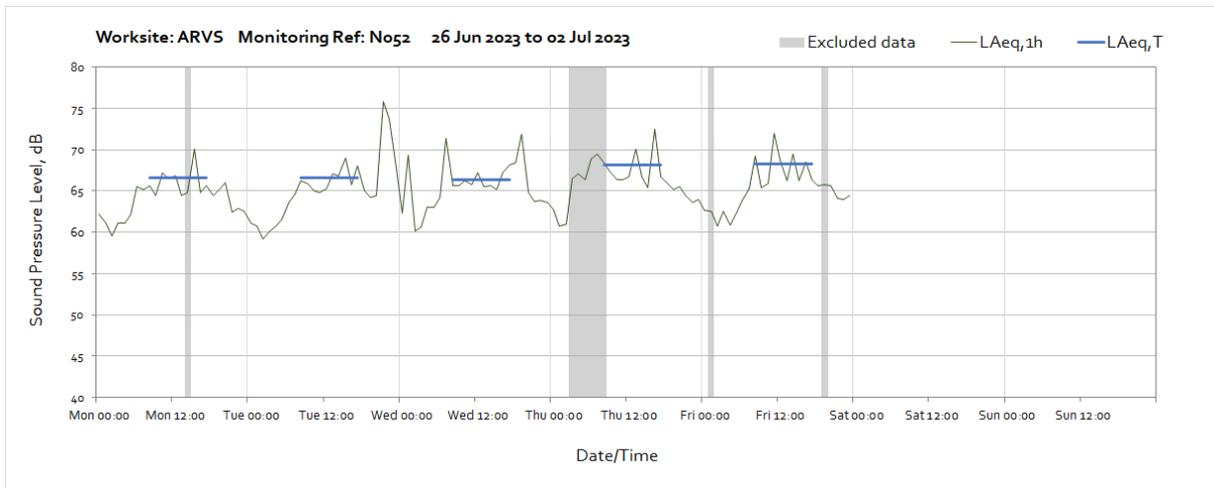
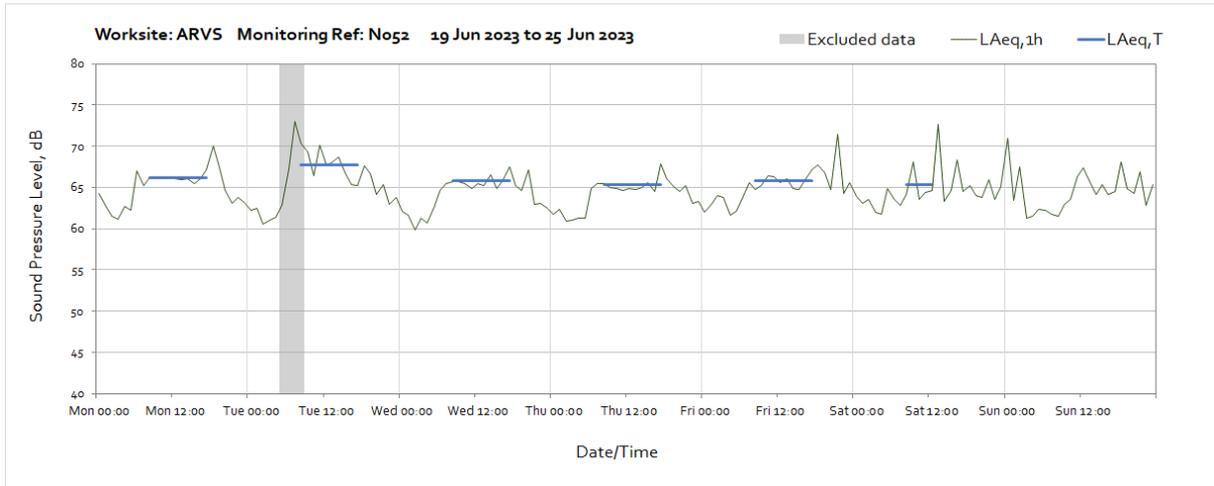
Adelaide Road Ventilation Shaft (ARVS) – Monitoring Ref: N051



Note: Missing data from the start of the month until 00:00 on Monday 12th June and from 00:00 on Tuesday 13th June and the end of the month was due to loss of power to the lighting column which powers the monitoring station.

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

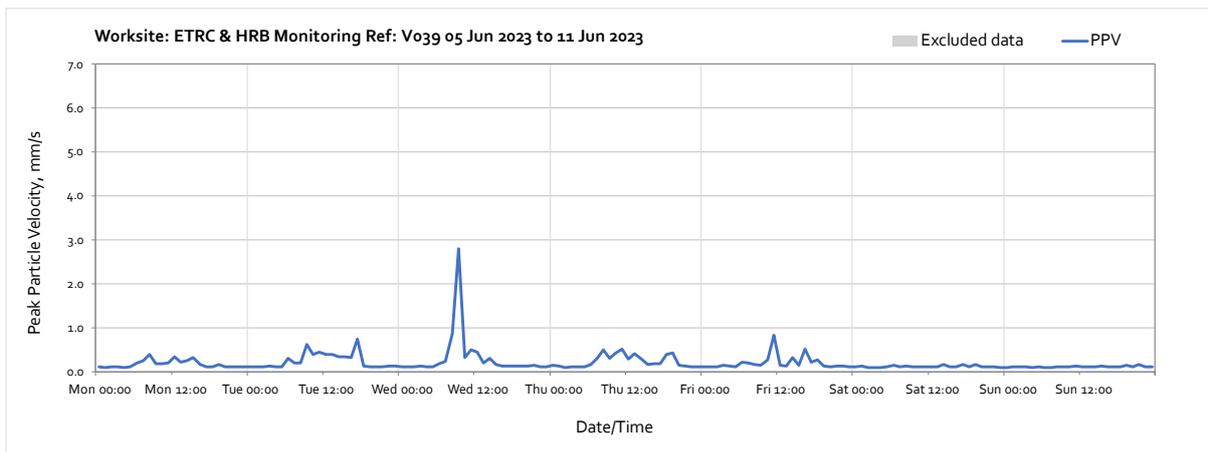
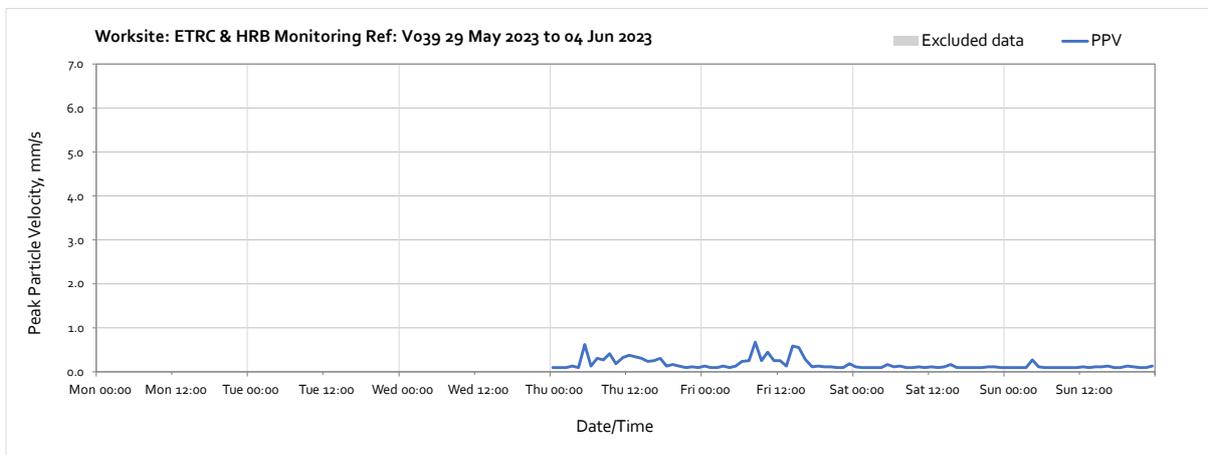


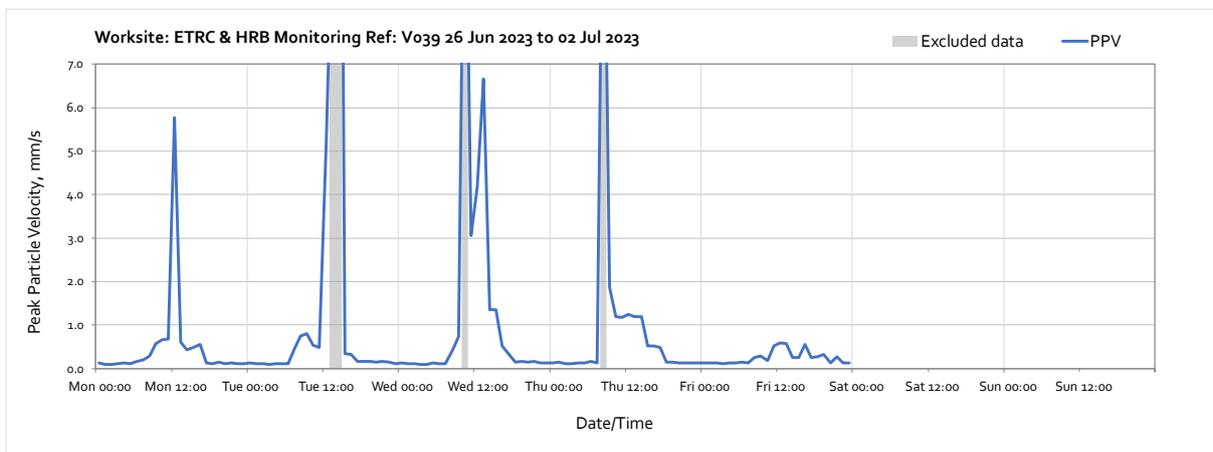
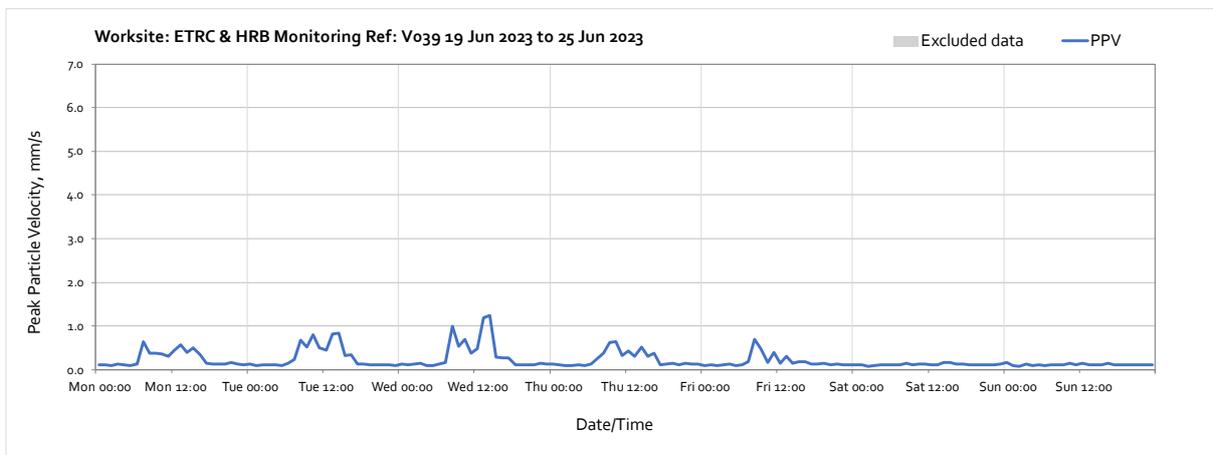
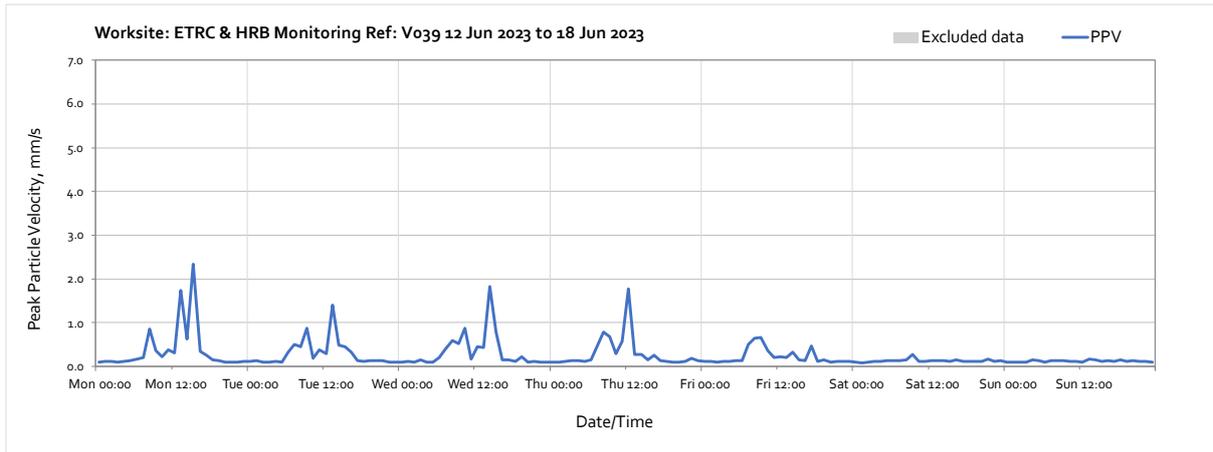


Vibration

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 1 hr 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.

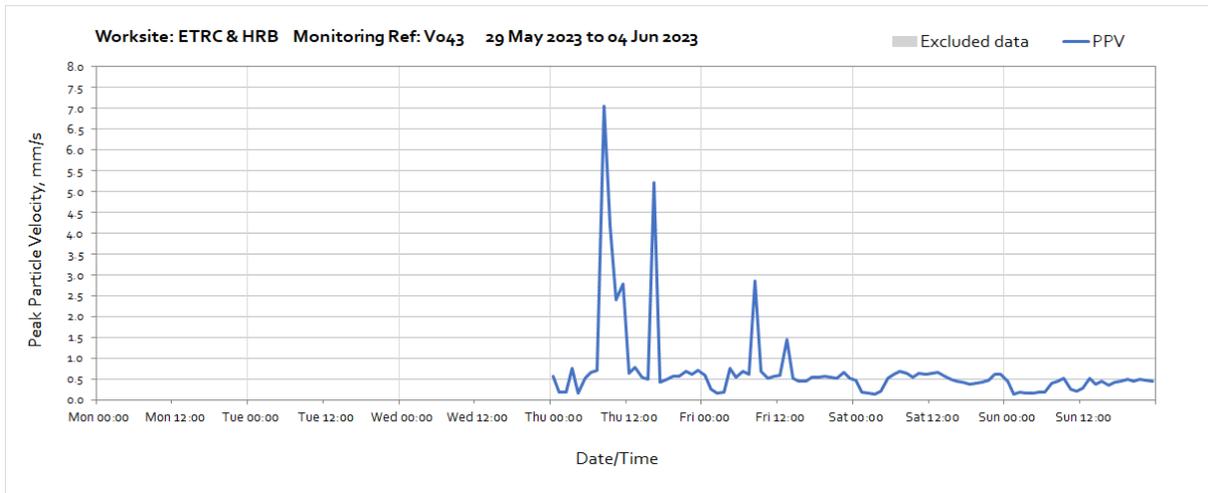
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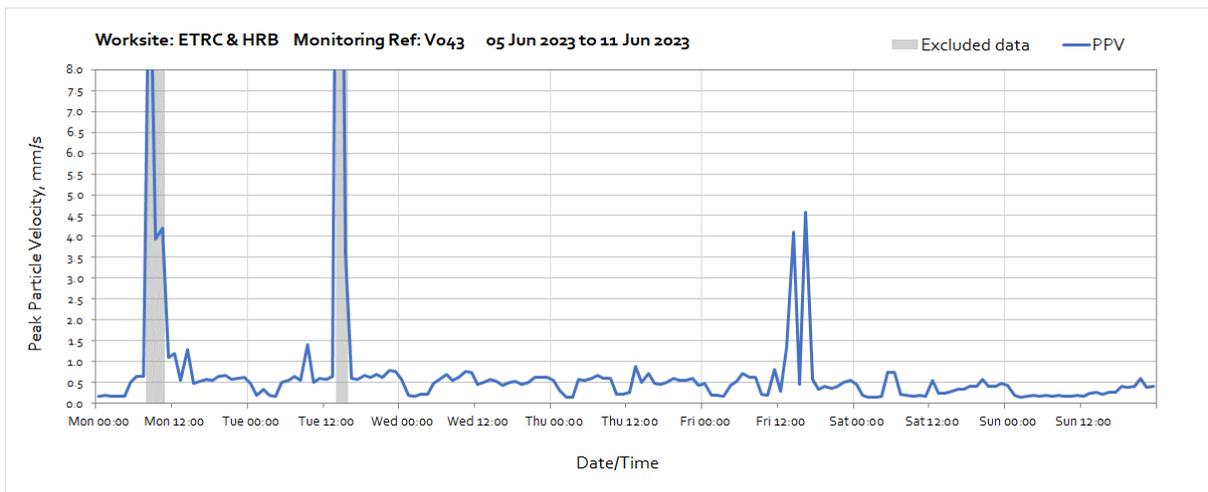


Note: High levels of vibration caused by works close to the monitor. Lower vibration levels anticipated at nearest receptor.

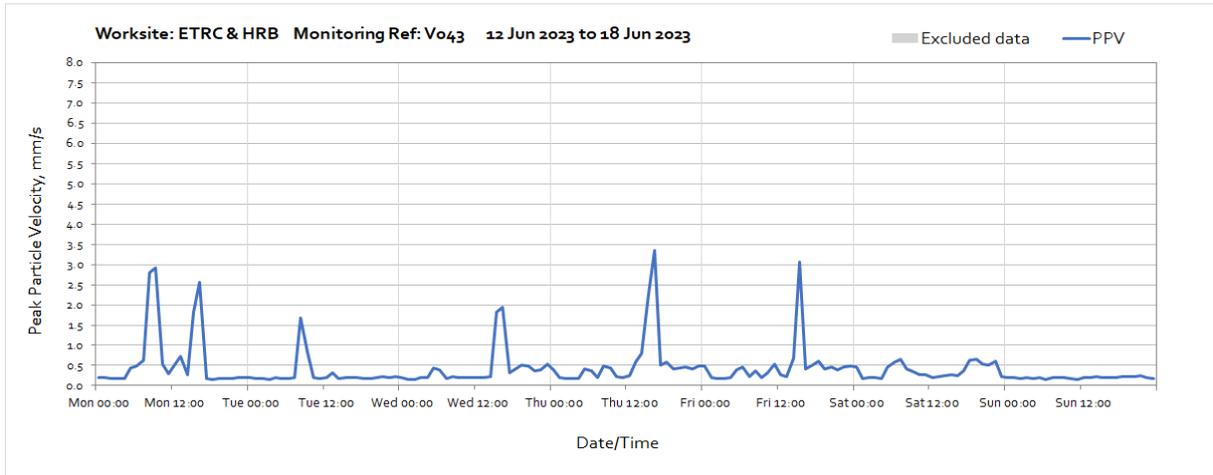
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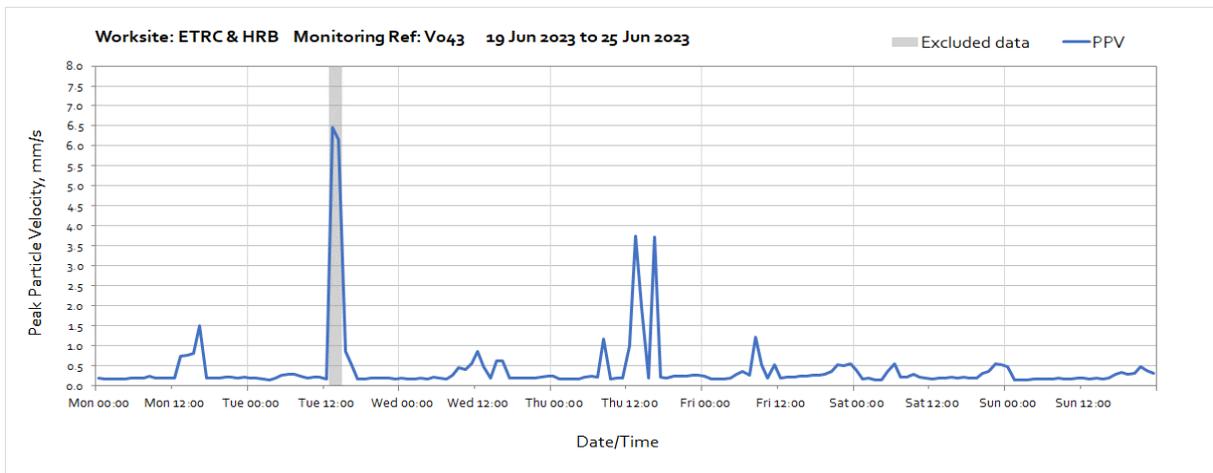
Note: High levels of vibration caused by works close to the monitor. Lower vibration levels anticipated at nearest receptor.



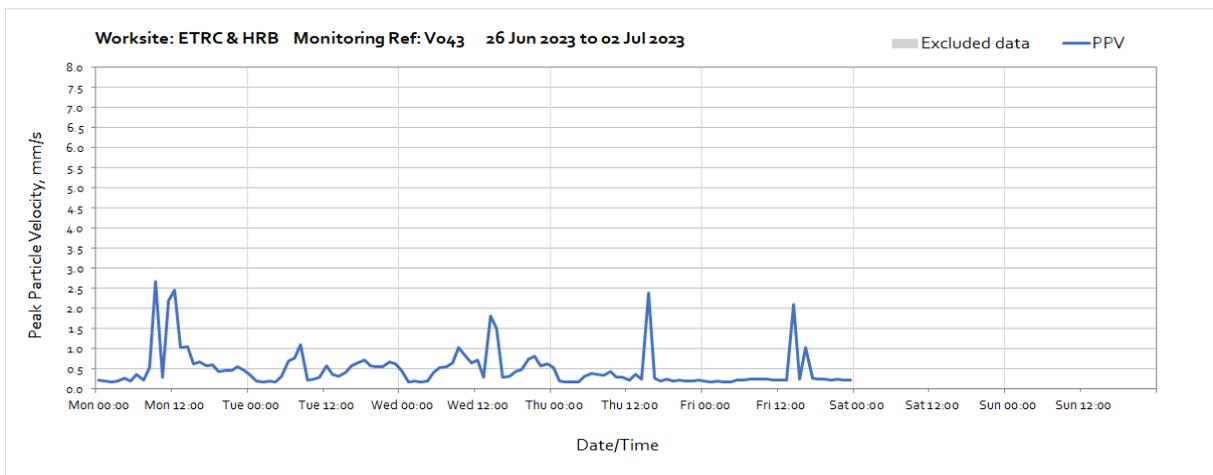
Note: High levels of vibration caused by works close to the monitor. Lower vibration levels anticipated at nearest receptor.



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



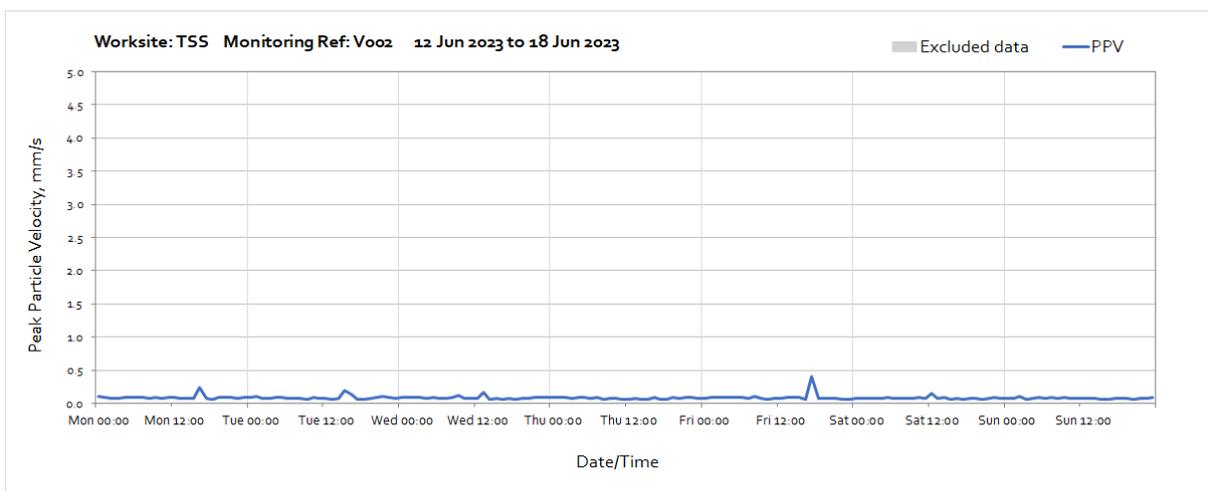
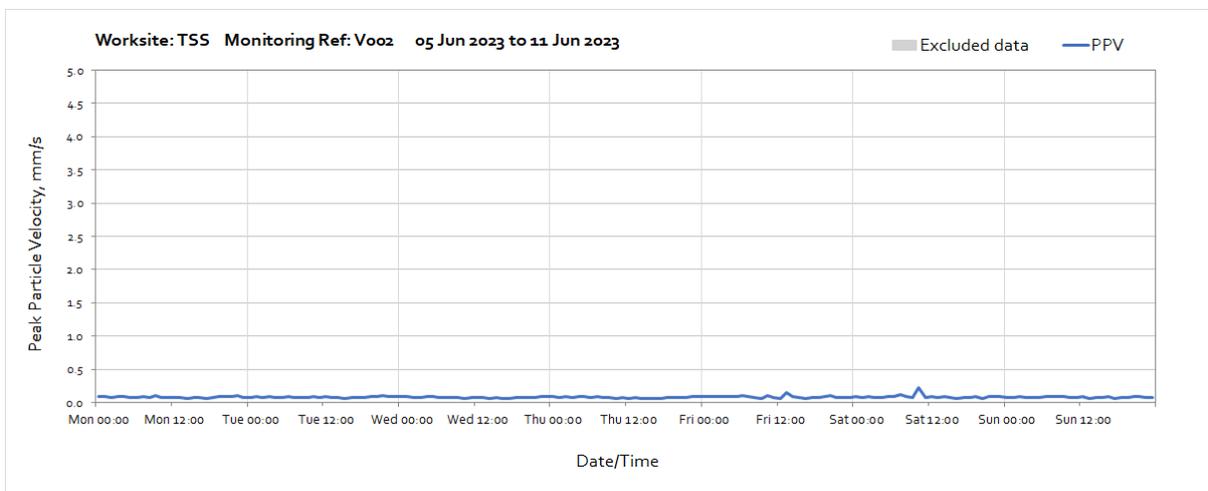
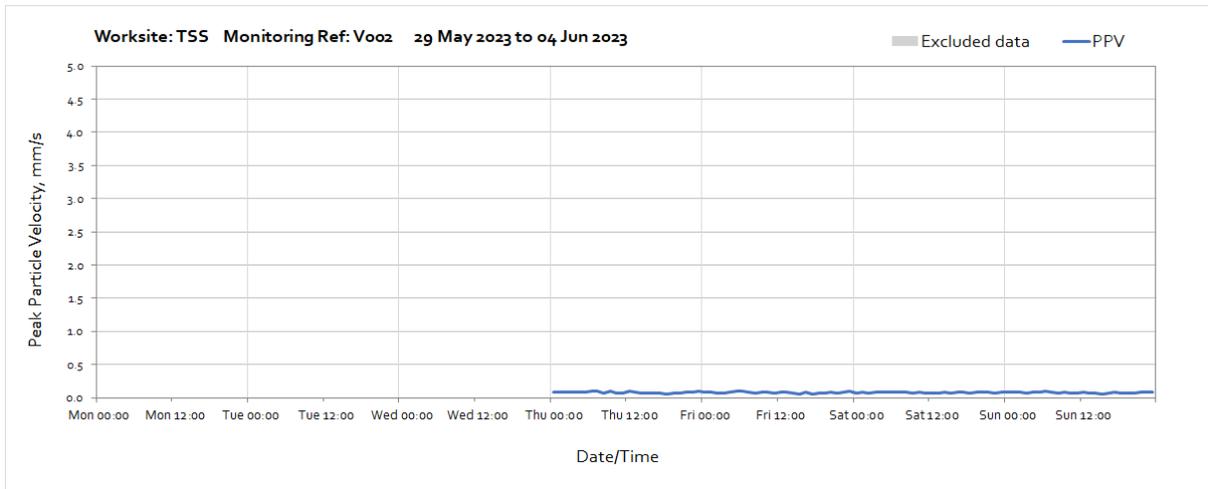
Note: High levels of vibration caused by works close to the monitor. Lower vibration levels anticipated at nearest receptor.



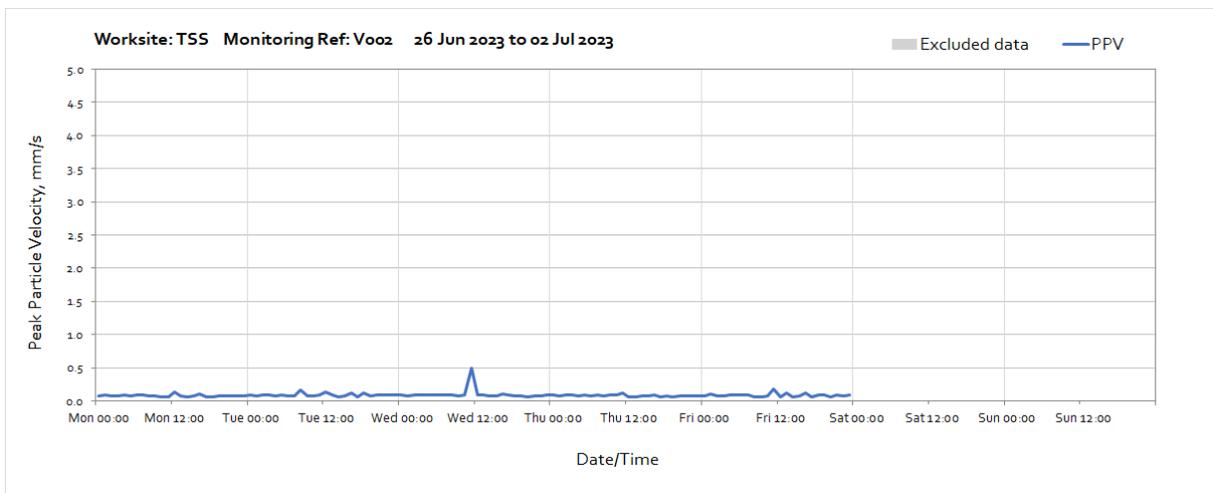
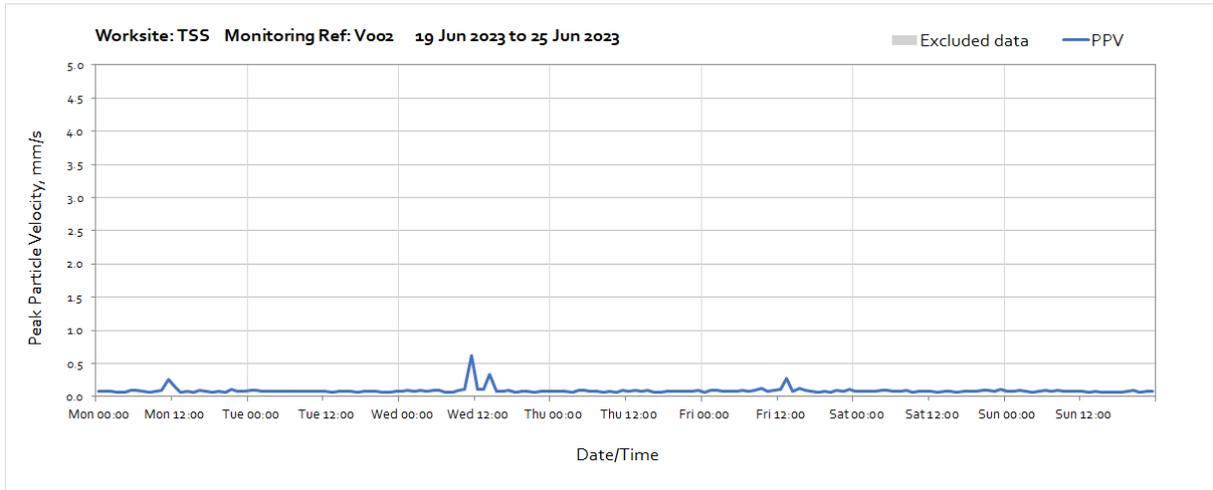
Note: High levels of vibration caused by works close to the monitor. Lower vibration levels anticipated at nearest receptor.

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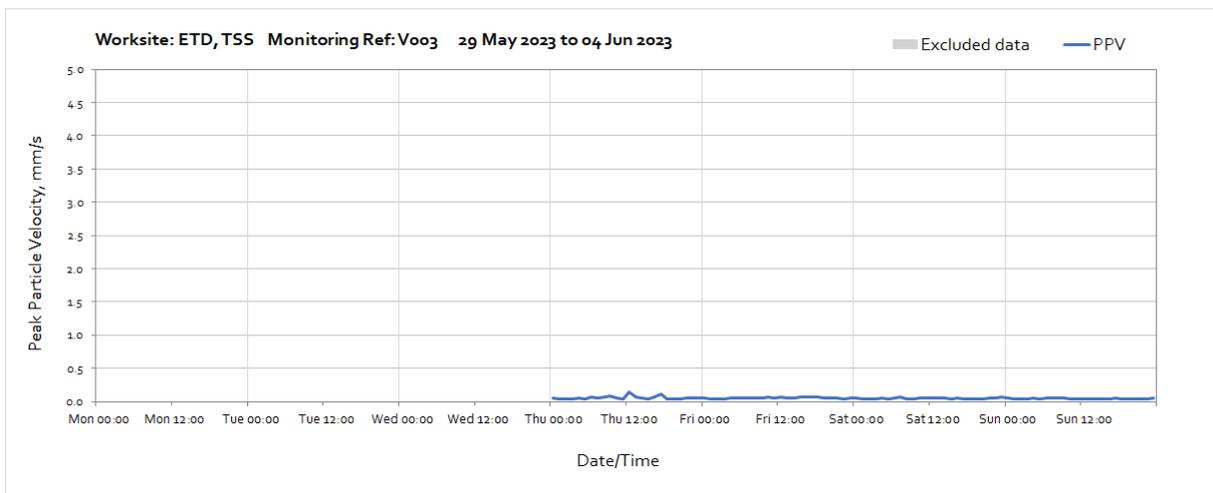
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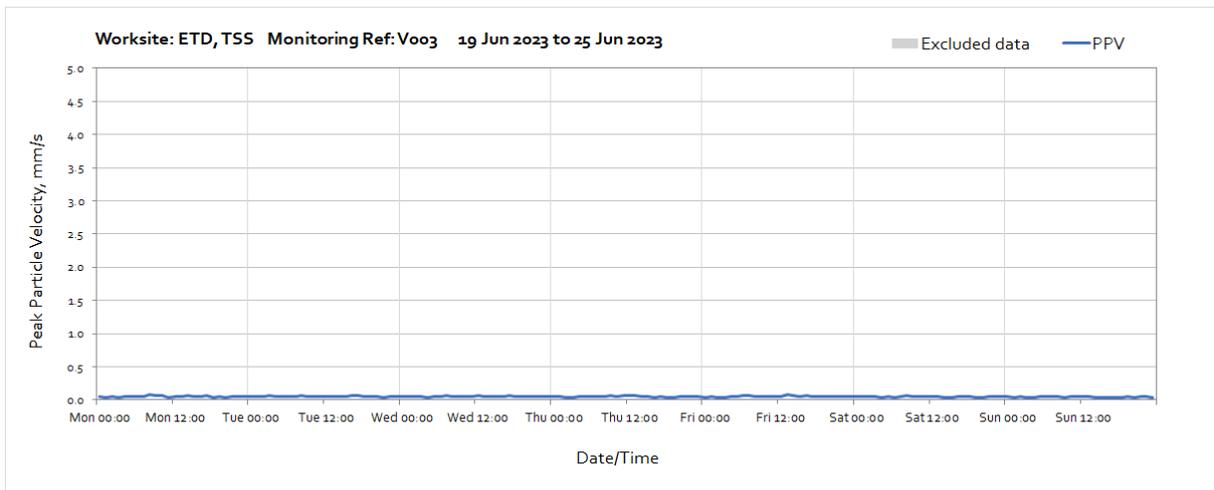
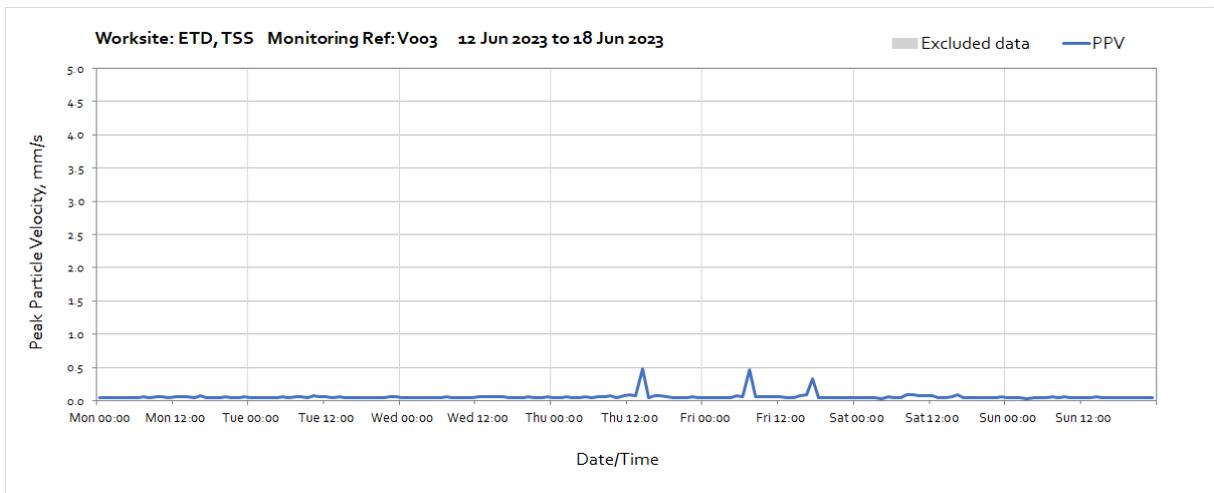
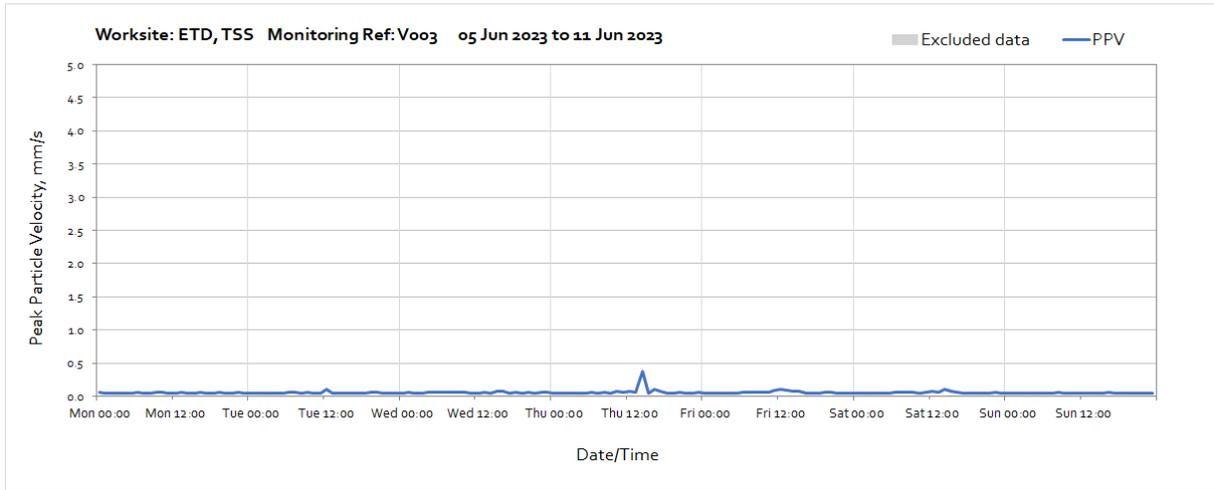


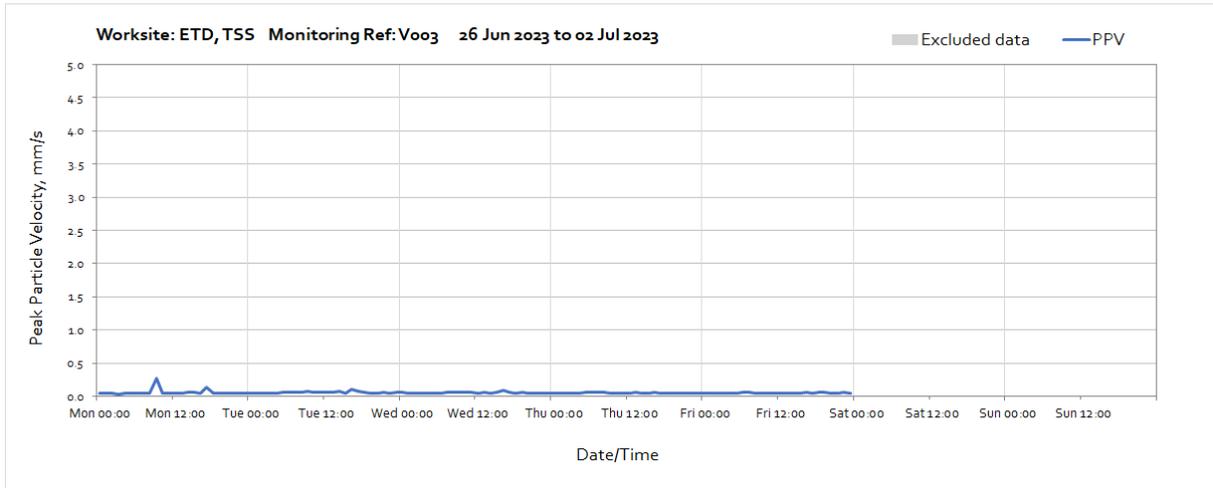
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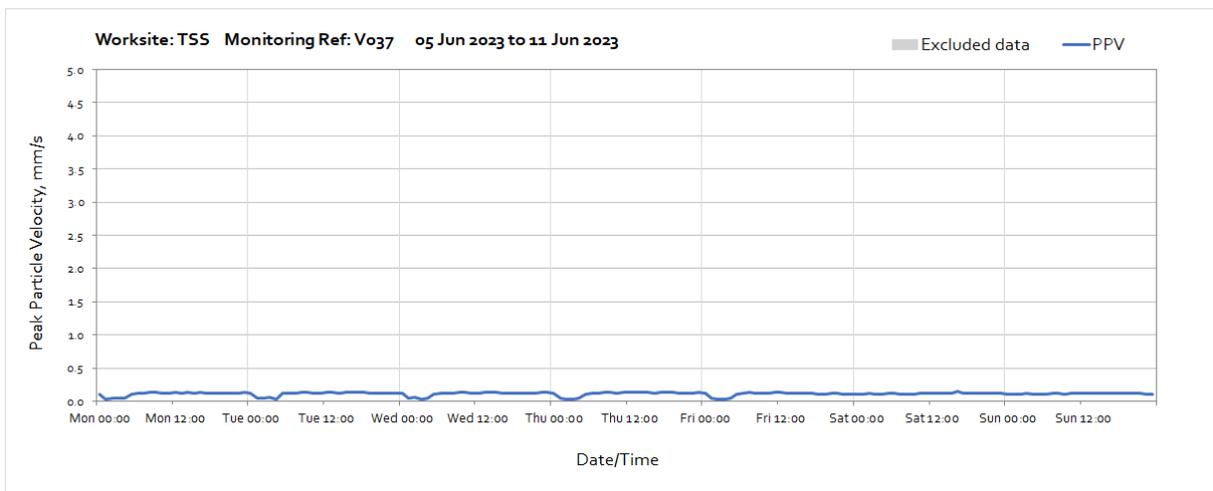
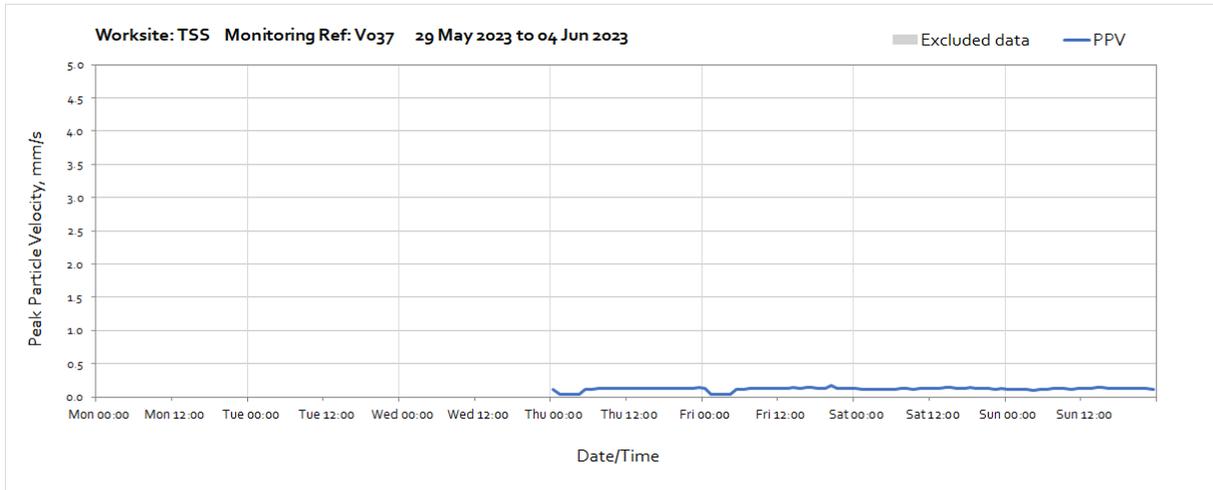
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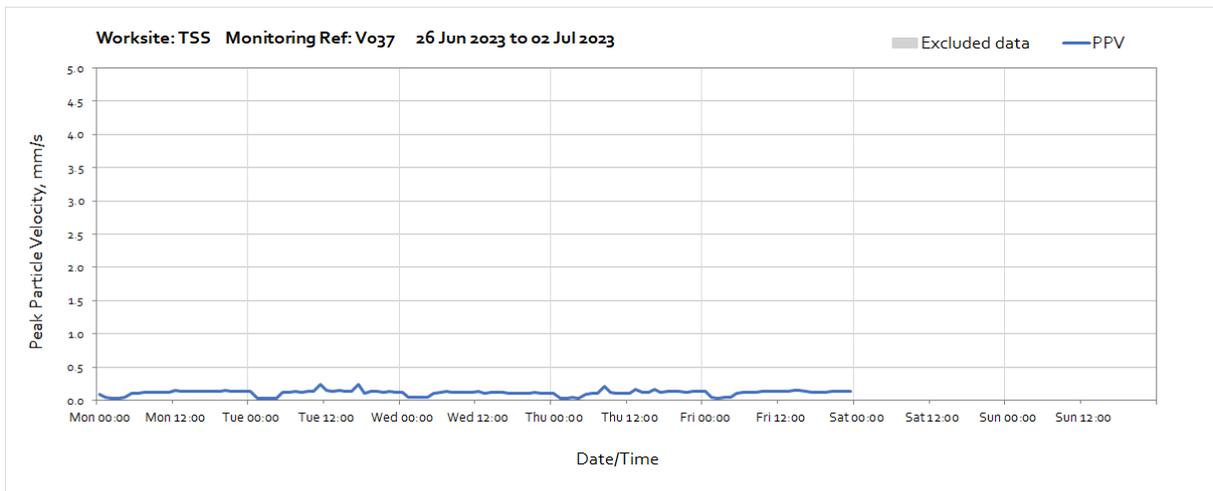
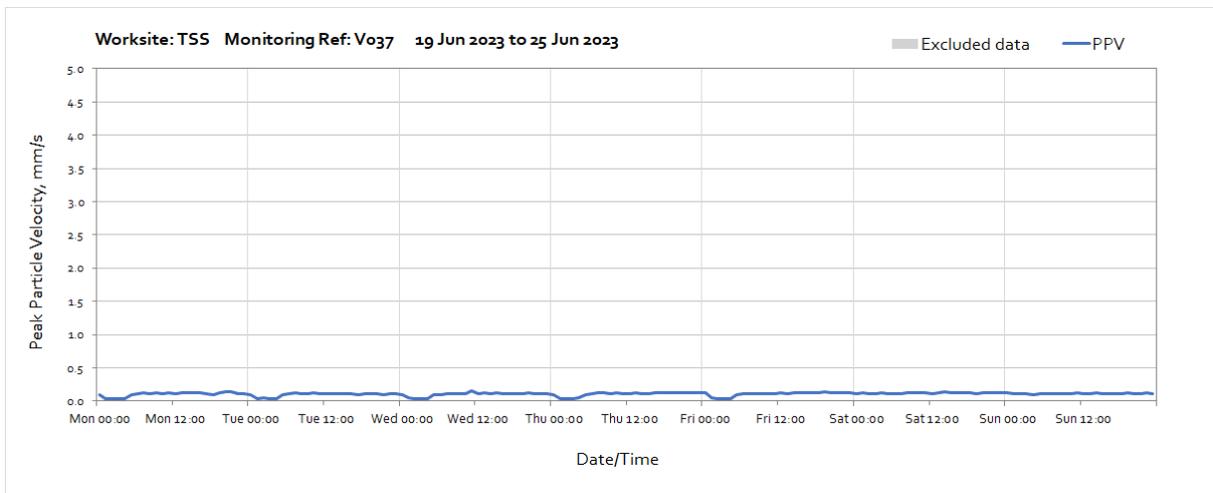
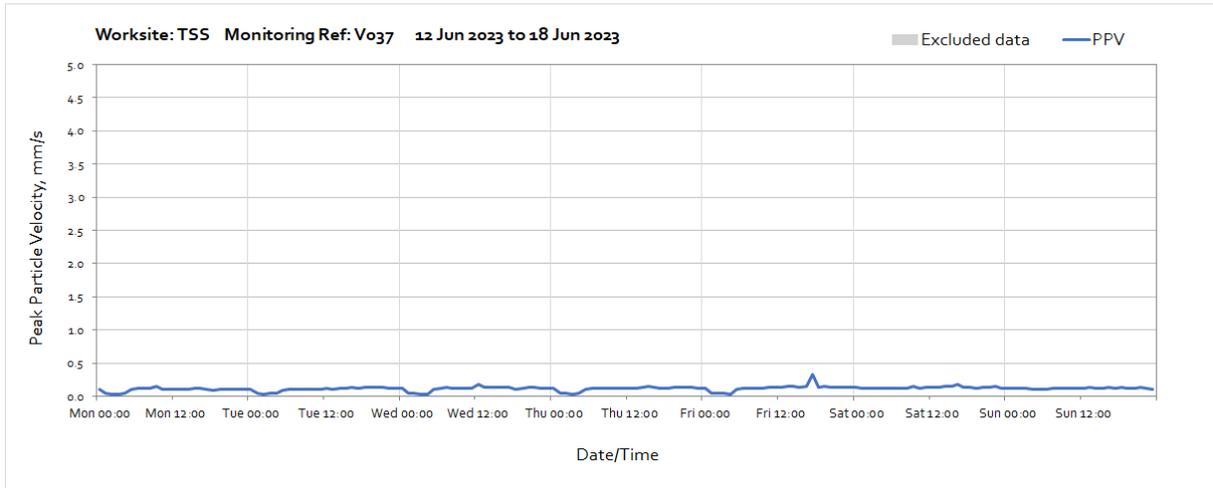




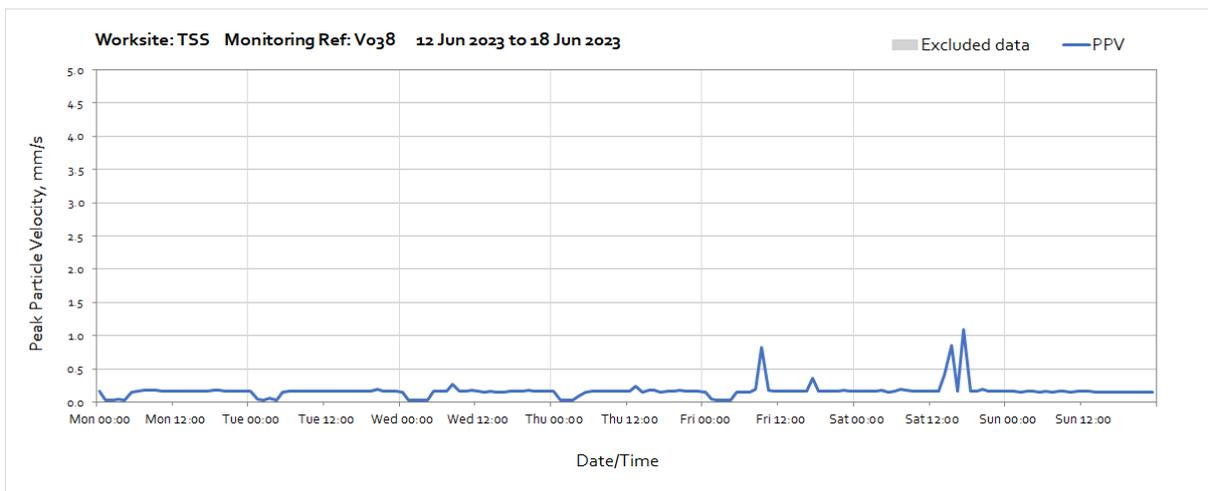
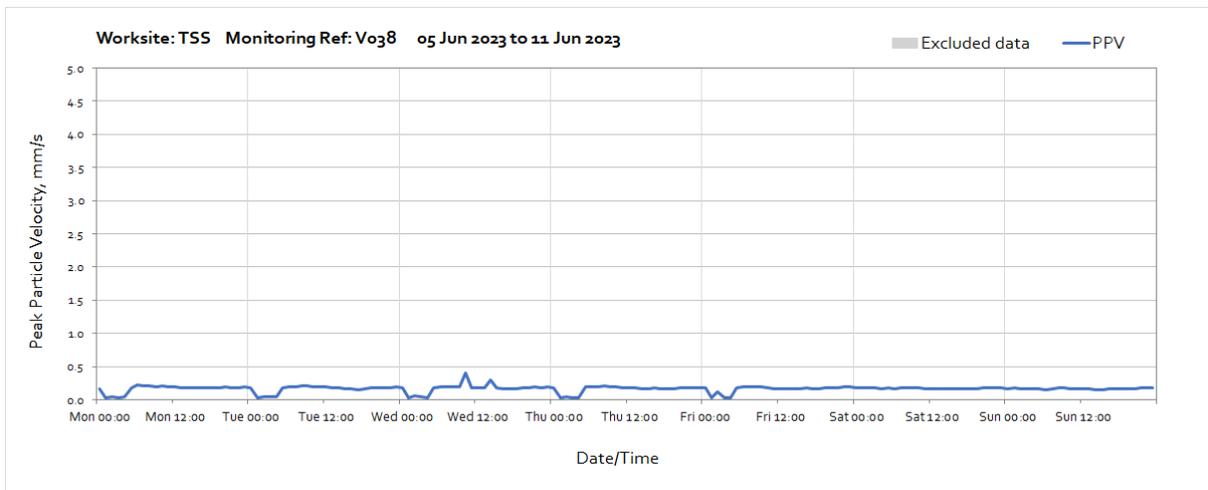
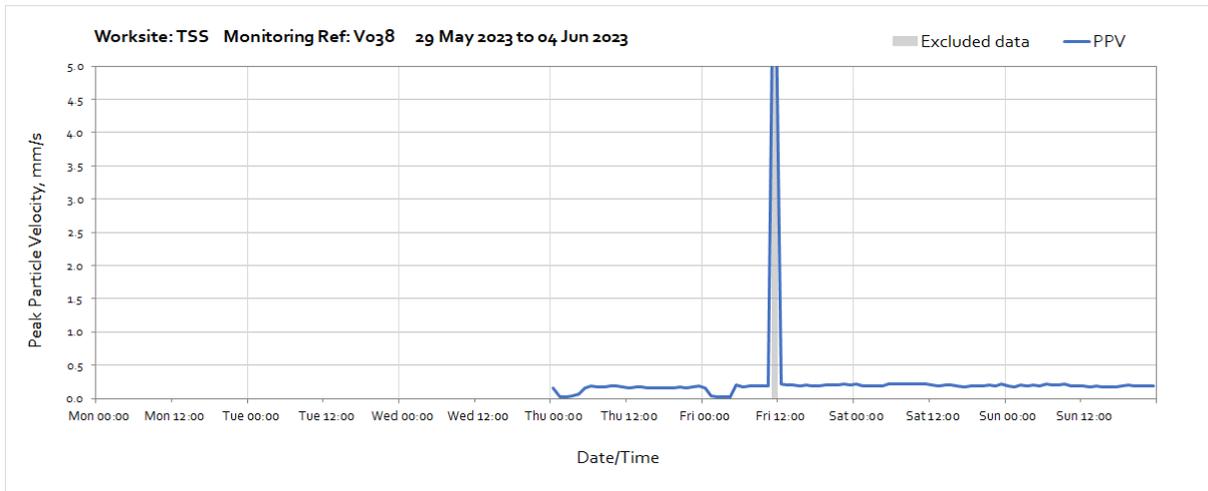


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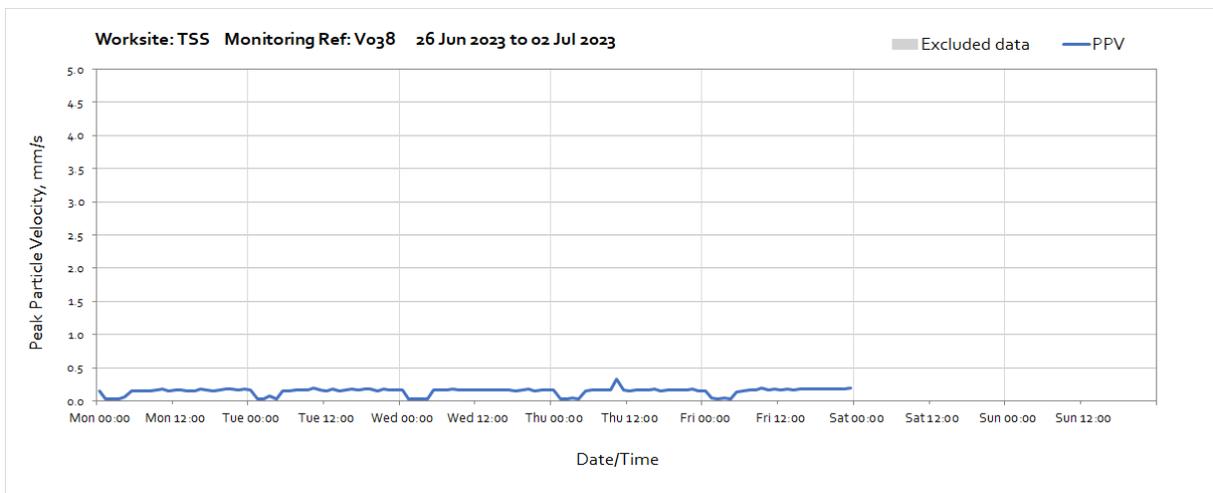
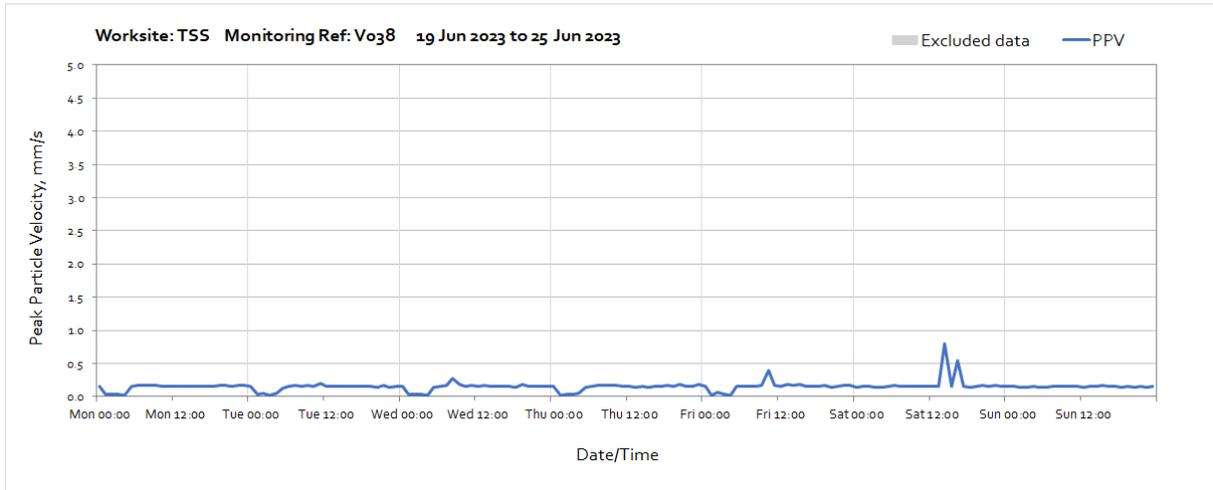




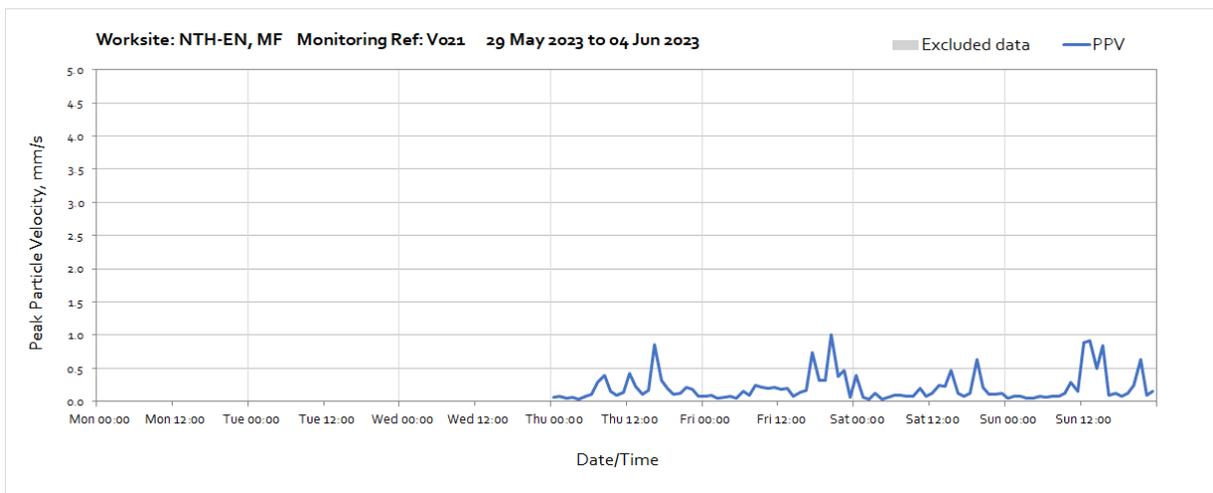
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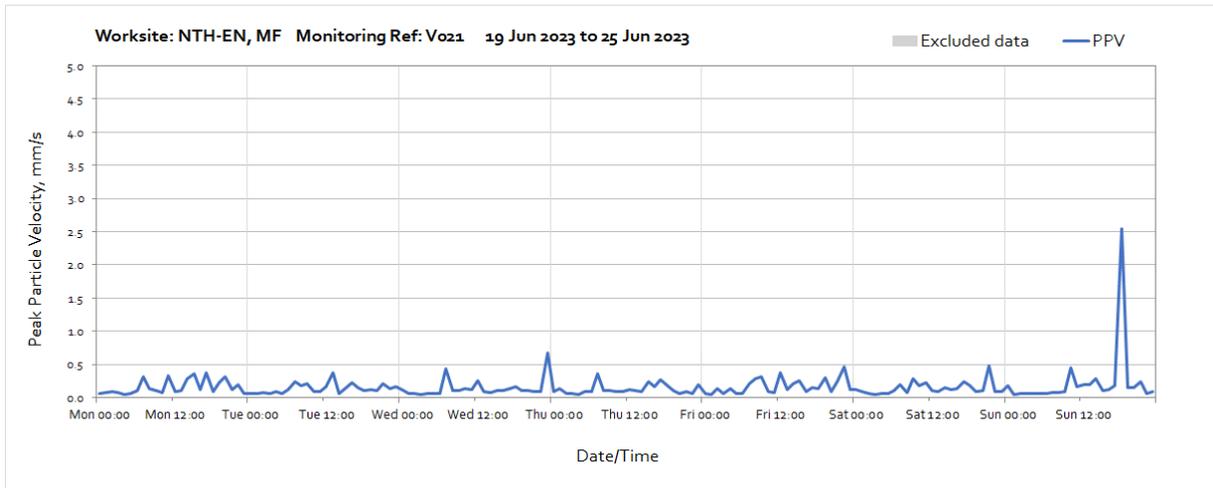
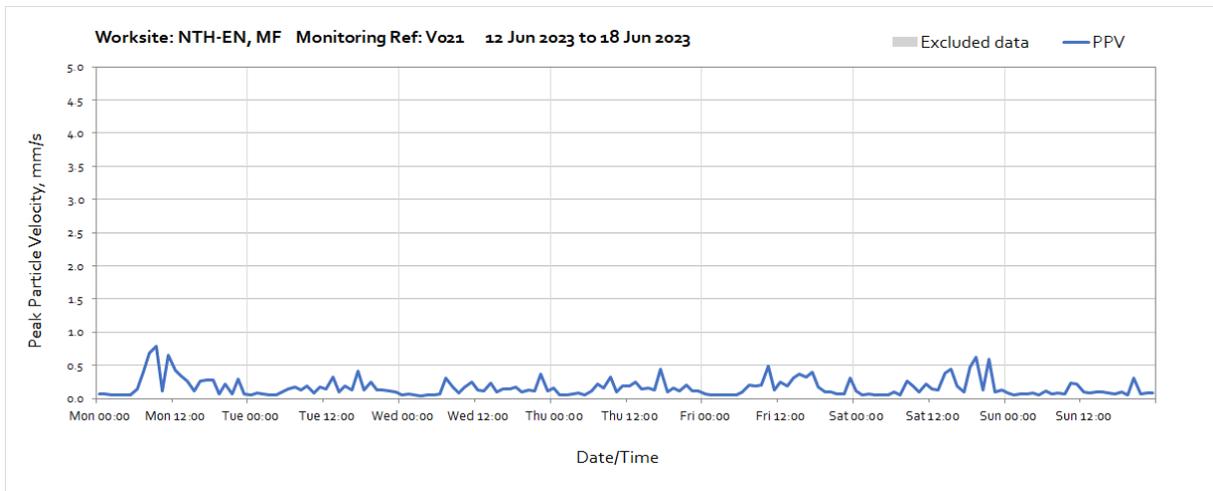
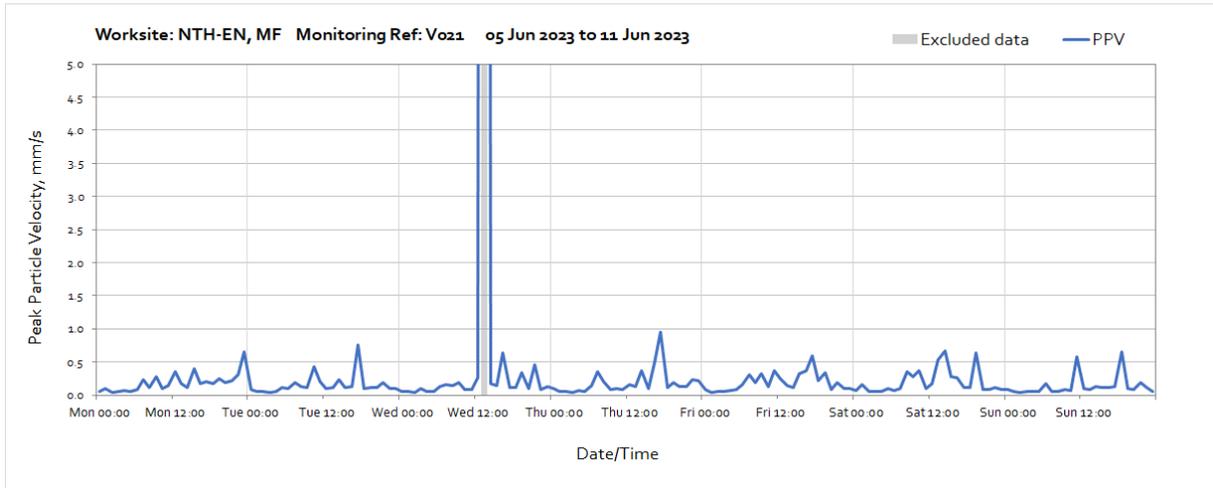


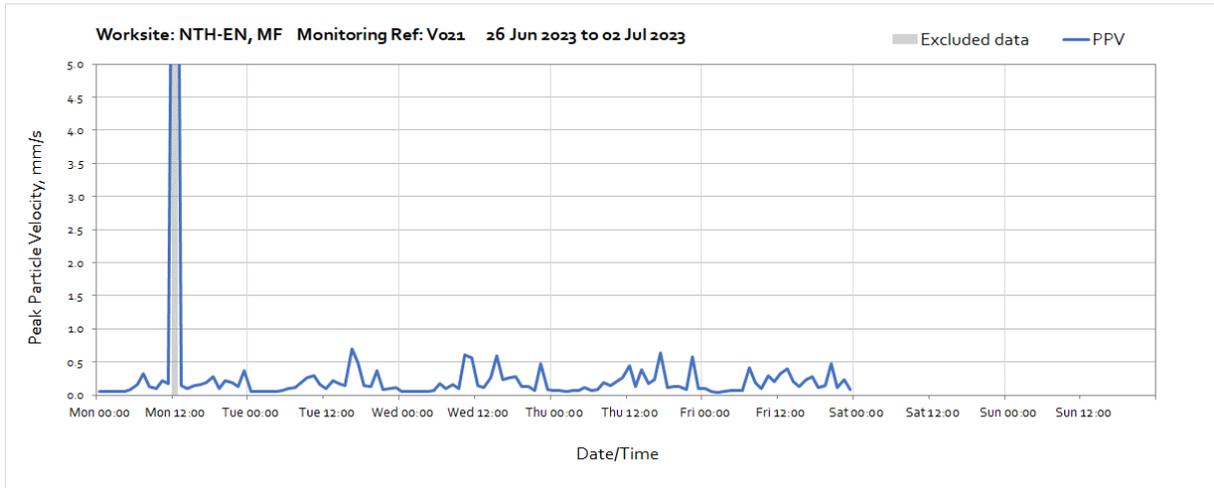
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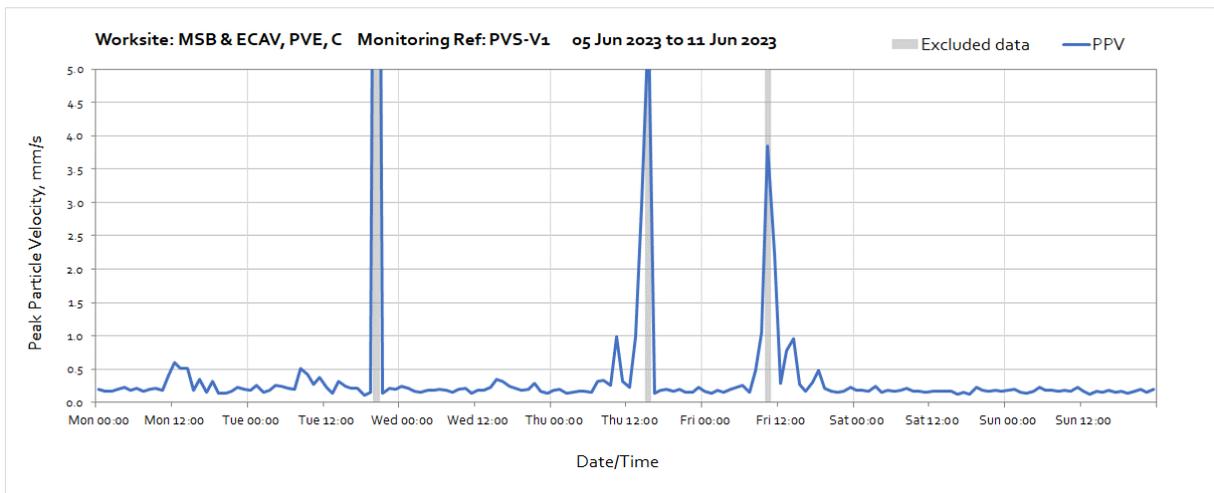
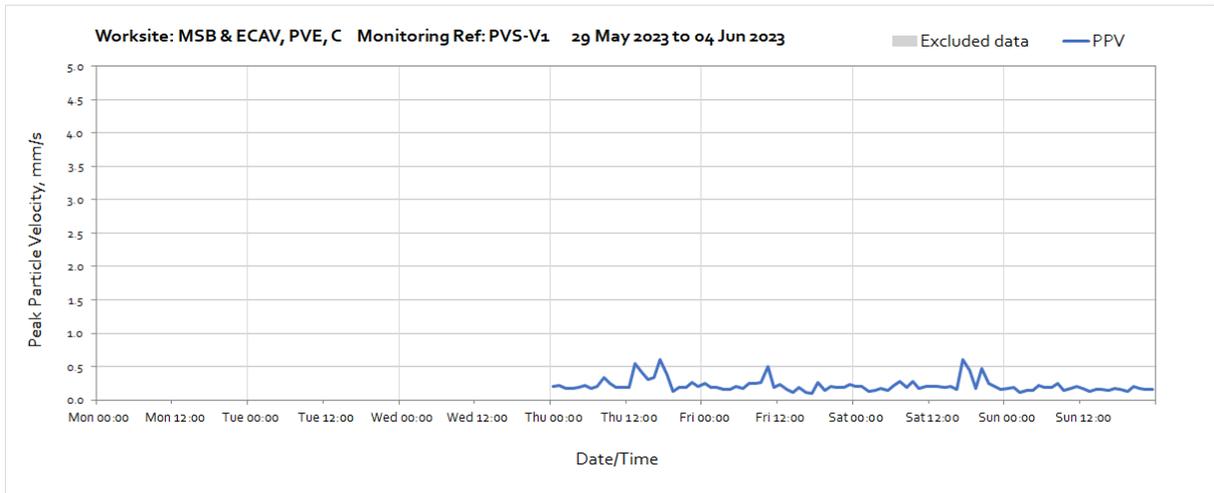
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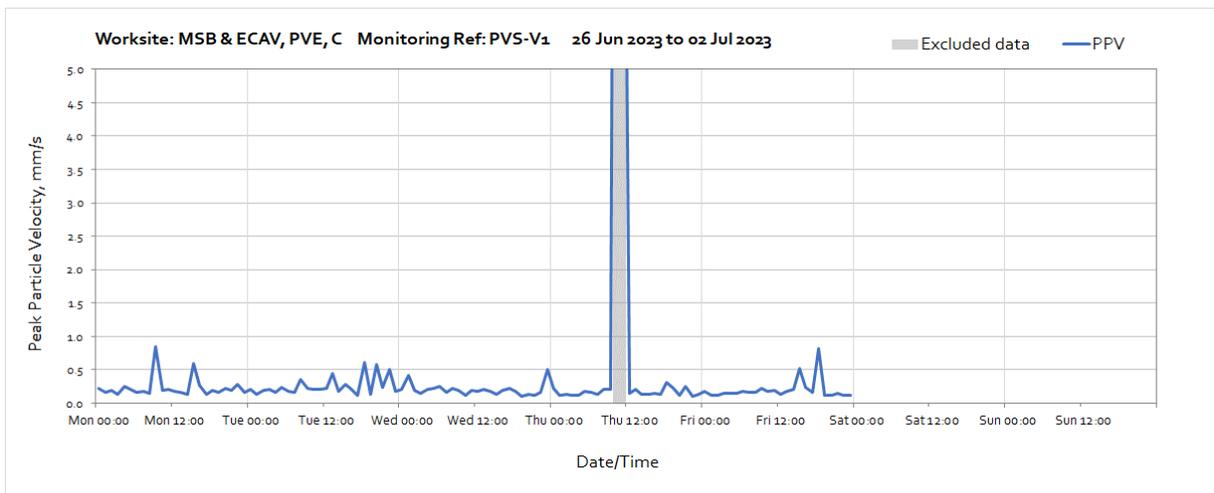
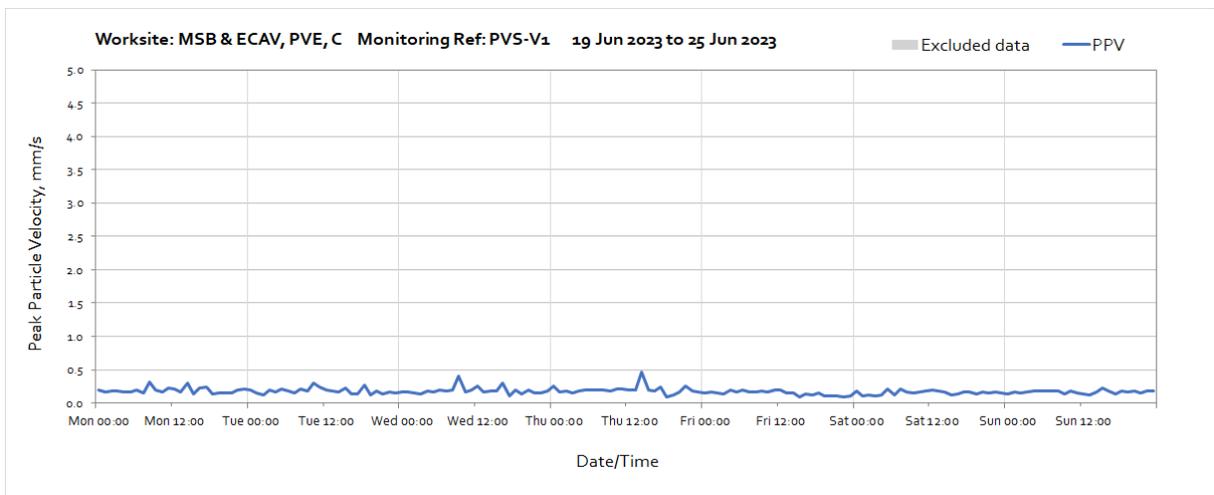
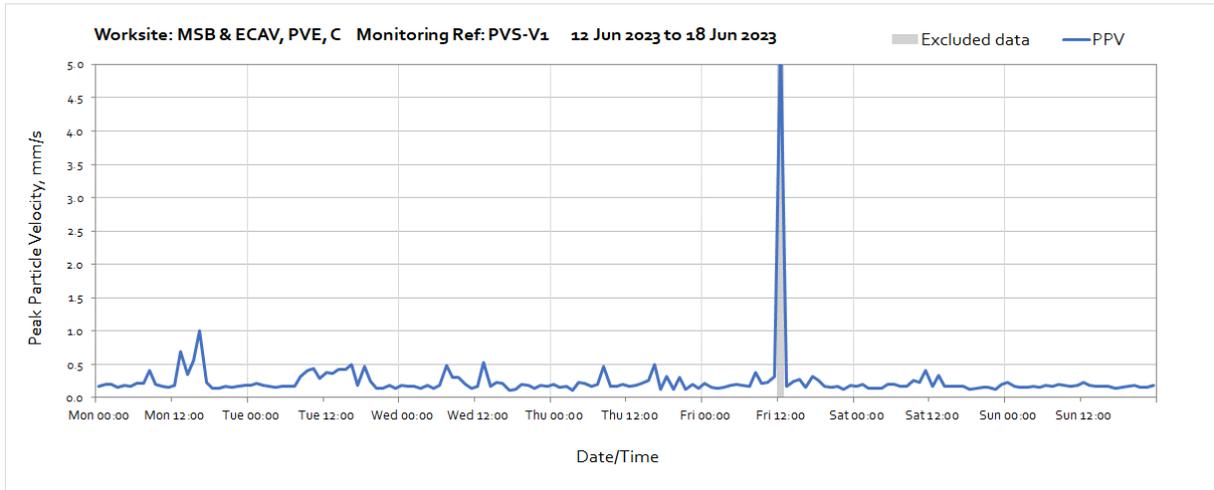




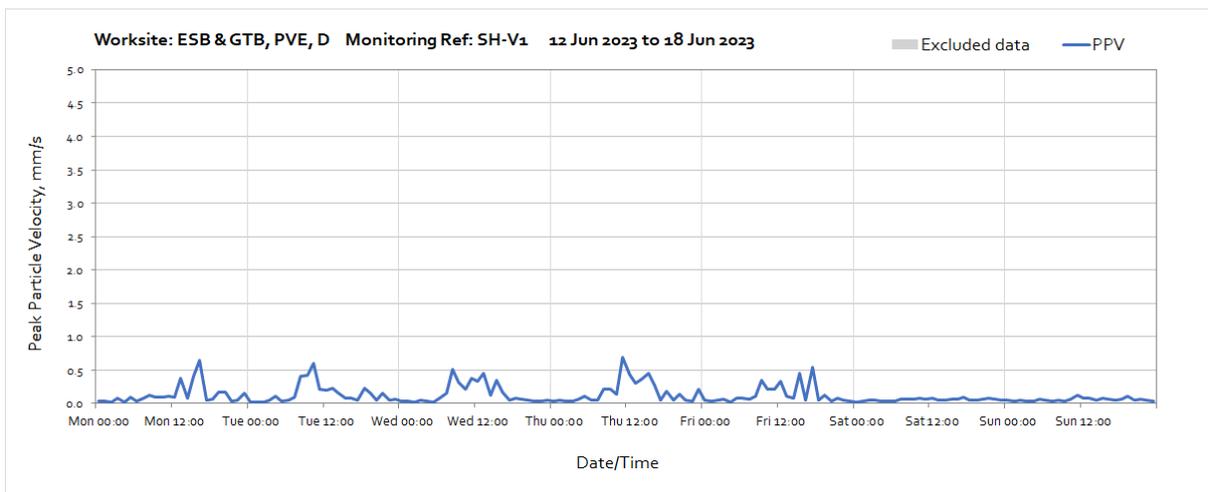
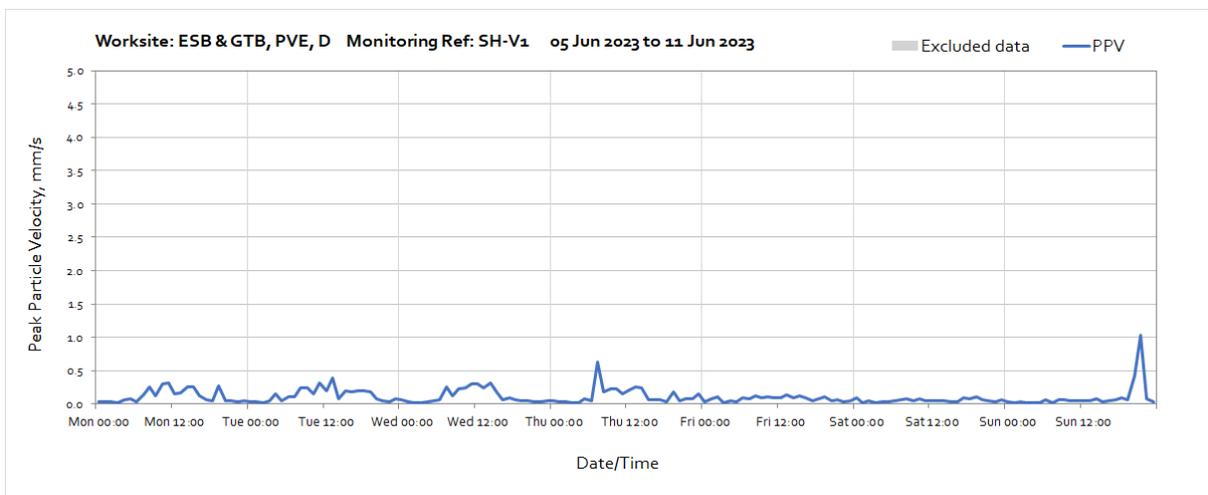
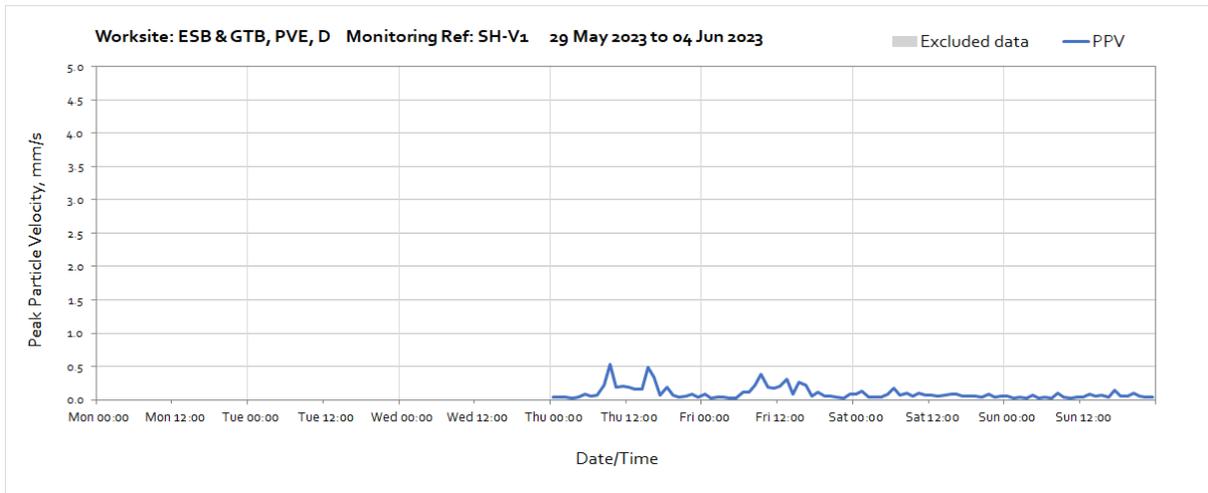


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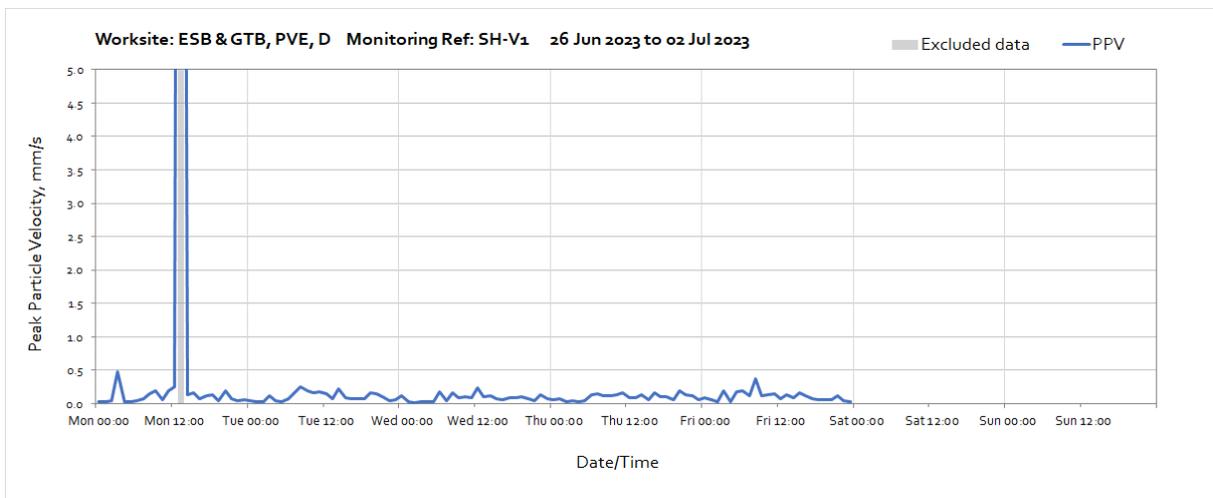
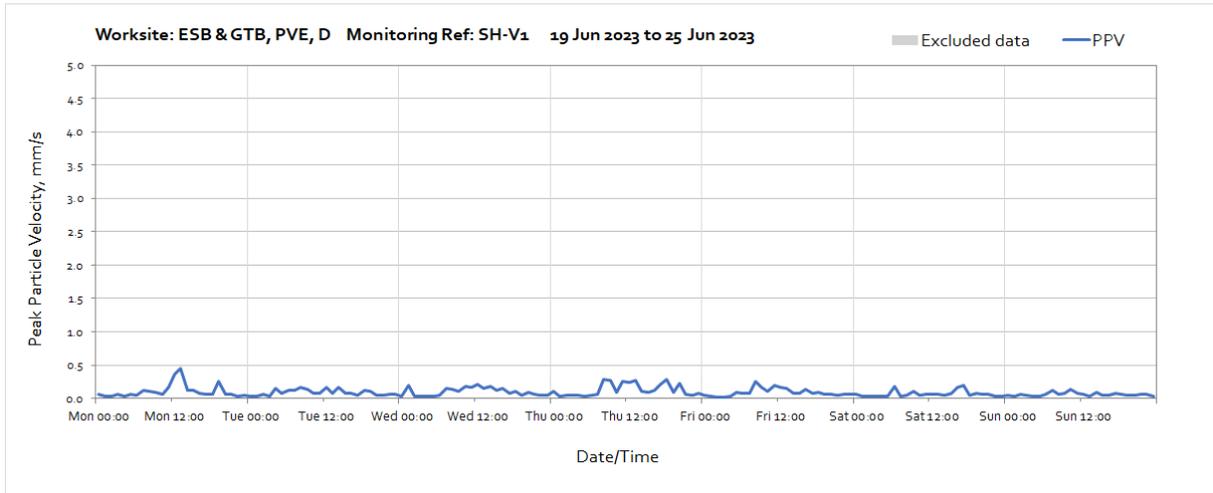




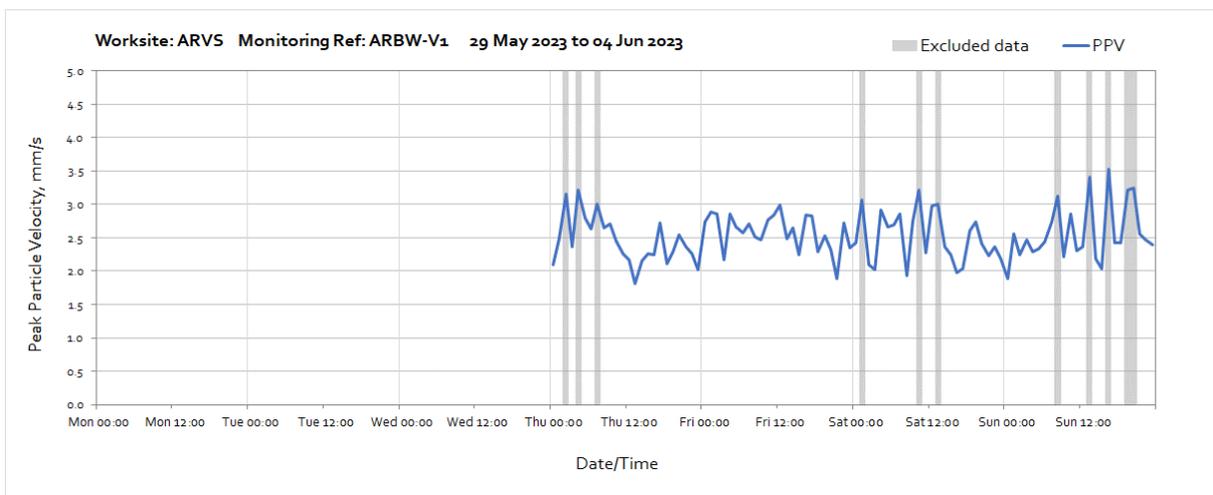
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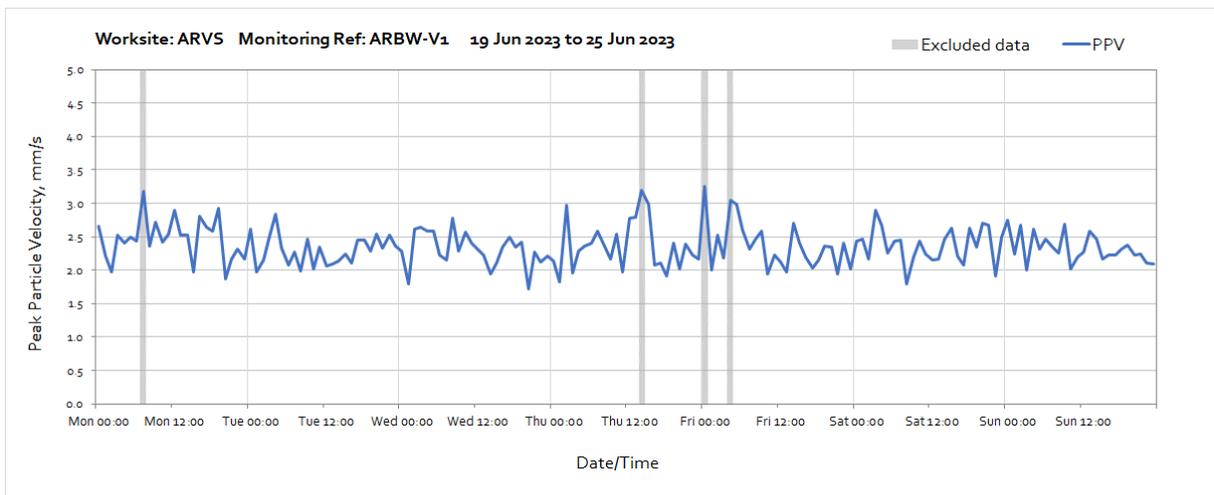
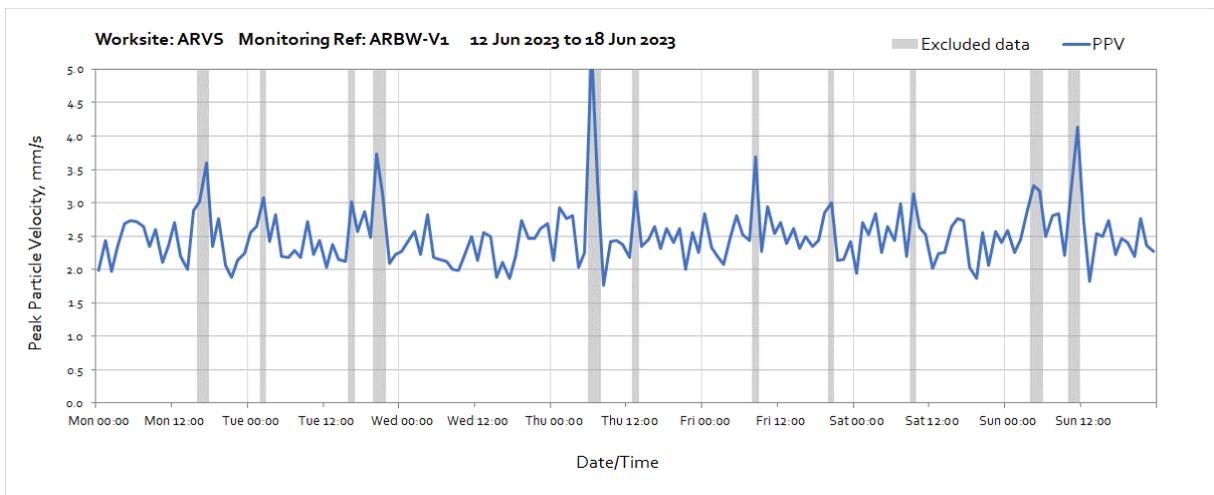
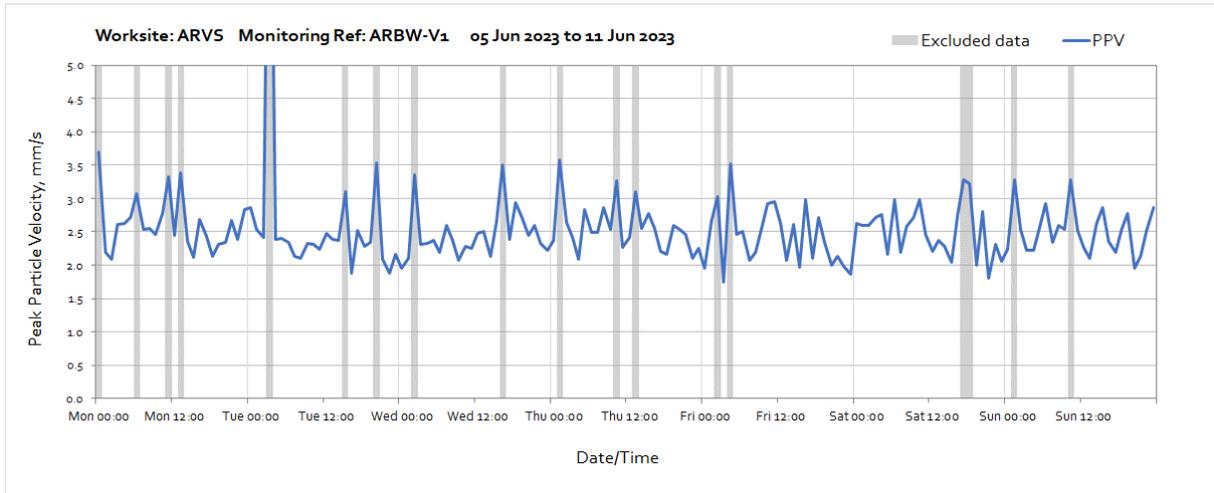


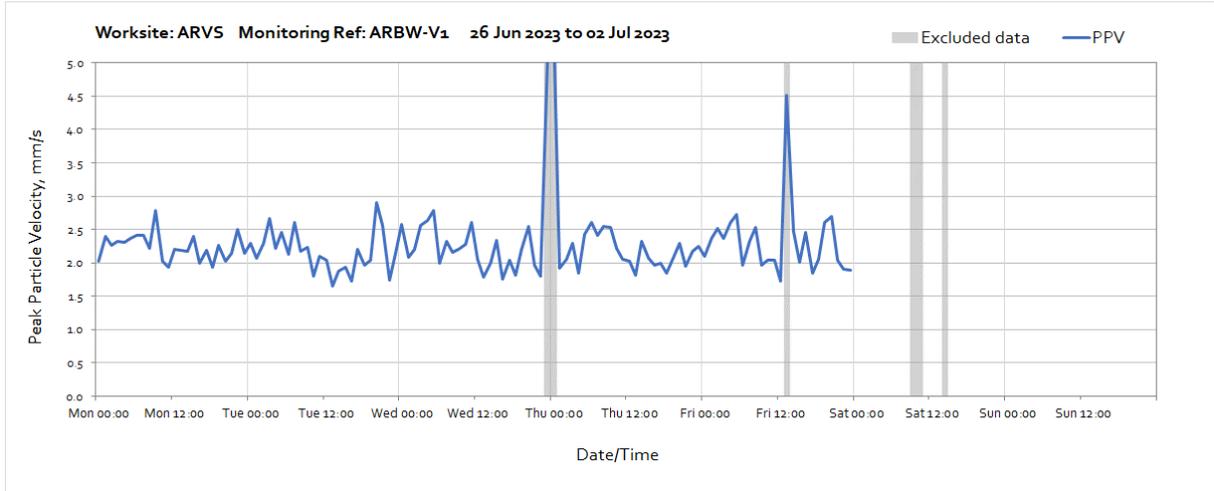
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Worksite: ARVS – Monitoring Ref: ABRW-V1







Worksite: ARVS – Monitoring Ref: V059

