

Construction Noise and Vibration Monthly Report – January 2023

London Borough of Ealing

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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 Ealing (LBE) (including one monitoring location on the boundary with the London Borough of Hammersmith and Fulham) during the month of January 2023.

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken in the vicinity of the Atlas Road worksite (ref. AR) where excavation works, concrete works, installation of culvert drain and hyperbaric slab, installation of cooling water tank, installation of bolts, cabling works, installation of gantry crane, tunnel boring machine operations, installation of steel framework, placement of fill material, installation of ducts and conveyor works were underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Willesden EuroTerminal worksite (ref. WET), where installation of gantry crane, installation and relocation of barriers, trial holes digging and removal of materials from site were underway.
- Noise monitoring was undertaken in the vicinity of the Victoria Road Crossover Box worksite (worksite ref. VRCB), where excavation works, diaphragm wall works, including concrete works, capping beam works, backfilling works, concrete breaking out, wire sawing, installation of staircase were underway. At the Victoria Road Ancillary Shaft tunnelling works were underway.
- Noise monitoring was undertaken in the vicinity of the Flat Iron compound (worksite ref. FIC), where concrete base slab works, conveyor installation, cabling works, installation of fencing and turnstiles, installation of drainage pipes and reducers, lifting works, excavation works, concrete pours and installation of pumps were underway.
- Noise and vibration monitoring were undertaken in proximity of the Old Oak Common depot worksite (ref. OOC), where ground reduction works, waste removal, diaphragm wall breakdown, excavation works, steel fixing, manhole construction, road sweeping, shuttering works and pile breaking were underway.
- Noise and vibration monitoring were undertaken in proximity of the Scheme 6 worksite (ref. S6), where civil works, signalling works, survey works and overhead line equipment works were underway.
- Noise monitoring was undertaken in proximity of the Mandeville Road Ventilation Shaft worksite (ref.: MRVS), where general site management, heavy vehicles movement, removal of waste, installation and commissioning of dewatering wells and utility diversions were underway.
- Noise and vibration monitoring were undertaken in proximity of the Green Park Way Ventilation Shaft worksite (ref. GPWVS), where general site operations, sprayed

concrete lining works, main shaft works, excavation works, concrete breaking out, installation of pre-cast concrete lining rings, shaft sinking works, maintenance of plant and equipment were underway.

- Noise monitoring was undertaken in proximity of the Westgate Ventilation Shaft (ref. WVS), where construction of cross passage collars, installation of decking, installation of gates, relocation of services, installation of beams and handrails, installation of concrete retaining wall, construction of shaft base slab, excavation works, sprayed concrete lining works, plant and equipment maintenance were underway.

Further works, where monitoring did not take place, were undertaken at Atlas Road Sub-Station where power utility works, concrete breaking, trial holes and boreholes digging were underway.

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

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

Four (4) complaints were received during the monitoring period. A description of complaints, the results of investigation 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.

1.1.2 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 Ealing (LBE) (including one monitoring location on the boundary with the London Borough of Hammersmith and Fulham) during the month for the period 1st to 31st January 2023.

1.1.3 Active construction sites in the local authority area, where noise and vibration monitoring were conducted during this period, include:

- Atlas Road worksite, ref. AR (see plan 4 in Appendix A), where work activities included:
 - Excavation works.
 - Concrete works.
 - Installation of culvert drain and hyperbaric slab.
 - Installation of cooling water tank for tunnel boring machine.
 - Installation of bolts.
 - Cabling works.
 - Installation of gantry crane, including commissioning works.
 - Tunnel boring machine operations, including launch ramp works, installation of guidance system and welding bracket plates, welding, assembly and lifting works.

- Installation of steel framework.
- Placement of fill material.
- Installation of ducts.
- Conveyor works, including construction and concrete base works.
- Willesden EuroTerminal worksite, ref. WET (see plan 4 in Appendix A), where work activities included:
 - Installation of gantry crane.
 - Installation and relocation of barrier.
 - Trial holes digging.
 - Removal of materials, including loading of spoil into railway trucks.
- Victoria Road Crossover Box worksite, ref. VRCB (see plan 4 in Appendix A), where work activities included:
 - Excavation works.
 - Diaphragm wall works, including trimming, repairing and demolition works, backfilling, wire sewing, removal of blocks and coring holes.
 - Capping beam works, including steel fixing, shuttering and concreting works.
 - Plant and equipment maintenance.
 - Victoria Road Ancillary Shaft tunnelling works were underway, including concrete works.
- Flat Iron compound, worksite ref. FIC (see plan 4 in Appendix A), where work activities included:
 - Concrete base slab works.
 - Conveyor installation.
 - Cabling works.
 - Installation of fencing and turnstiles.
 - Installation of drainage pipes and reducers.
 - Lifting works.
 - Excavation works.
 - Concrete pours.
 - Installation of pumps.

- Old Oak Common depot worksite, located in the London Borough of Hammersmith and Fulham (LBHF), ref. OOC (see plan 4 in Appendix A), where work activities included:
 - Ground reduction works.
 - Waste removal.
 - Diaphragm wall breakdown.
 - Excavation works.
 - Manhole construction.
 - Road sweeping.
 - Concrete works, including steel fixing, shuttering and blinding works.
 - Pile breaking.
- Scheme 6 worksite, which is partly located in the London Borough of Hammersmith and Fulham (LBHF), ref. S6 (see plan 4 in Appendix A), where work activities included:
 - Civil works.
 - Signalling works.
 - Survey works.
 - Overhead line equipment works.
- Mandeville Road Ventilation Shaft worksite, reference MRVS (see plan 1 in Appendix A), where work activities included:
 - General site management, including adjustment of hoarding line and dewatering operations.
 - Heavy vehicles movement.
 - Removal of waste.
 - Installation and commissioning of dewatering wells.
 - Utility diversions.
- Green Park Way Ventilation Shaft worksite, reference GPWVS (see plan 2 in Appendix A), where work activities included:
 - General site operations, including housekeeping works, road sweeping, gardening, adjustment of walkways, fencing works.
 - Sprayed concrete lining works, including fabrication of trial panel.

- Main shaft works, including concrete pours and collar works.
- Excavation works.
- Concrete breaking out.
- Installation of pre-cast concrete lining rings.
- Shaft sinking works.
- Plant and equipment maintenance.
- Westgate Ventilation Shaft worksite, reference WVS (see plan 3 in Appendix A), where work activities included:
 - Construction of cross passage collars, including steel fixing and shuttering works.
 - Installation of the decking, including lifting works.
 - Installation of gates.
 - Relocation of services.
 - Installation of beams and handrails.
 - Installation of concrete retaining wall.
 - Construction of base shaft slab, including steel fixing and shuttering works.
 - Excavation works.
 - Sprayed concrete lining works.
 - Plant and equipment maintenance.

1.1.4 Further works, where monitoring did not take place, were undertaken at Atlas Road Sub-Station where power utility works, concrete breaking, trial holes and boreholes digging were underway.

1.1.5 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 Twenty-one (21) noise and eight (8) vibration monitoring installations were active in January in the LBE area. Table 2 summarises the position of noise and vibration monitoring installations within the LBE area in January 2023.

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

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
AR	N032	Shaftesbury Gardens
	N033	Outside The Collective, Atlas Road / Victoria Road
	N060	Atlas Road next to Bashey Road
WET	N034	Stephenson Street (north)
	N035	Stephenson Street (south)
	N041	Junction of Stephenson Street / Goodhall Street
	V057	37, Stephenson Street
	V052	63, Stephenson Street
VRCB	N031	School Road, outside Acton Business Centre
	N050	Acton Square, outside North Acton Station
FIC	N029	Braitrim House, Victoria Road
	N042	Boden House Car Park
	N049	Flat Iron compound railway fence, Victoria Rd North Acton
OOC	OOC-N01	Old Oak Common Lane
	OOC-N02	Old Oak Common Lane, Hilltop Works
	OOC-N03	Old Oak Lane Halt, Wells House Road
	OOC-V02	Kildun Court, Old Oak Common Lane
	OOC-V03	Wells House Road Alleyway
S6	WT-N01	Old Oak Lane Halt, Wells House Road
MRVS	N040	Badminton Close
	N058	Mandeville Road
	N063	Mandeville Road
	V055	Mandeville Road
	V056	Mandeville Road
GPWVS	N059	Green Park Way Ventilation Shaft
	N064	Green Park Way Ventilation Shaft

Worksite Reference	Measurement Reference	Address
	V053	Green Park Way, Greenford
	V054	Green Park Way Ventilation Shaft
WVS	N062	Westgate Ventilation Shaft

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 LAeq Data over the Monitoring Period

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday Average LAeq,T (highest day LAeq,T)					Saturday Average LAeq,T (highest day LAeq,T)					Sunday / Public Holiday Average LAeq,T (highest day LAeq,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
AR	N032	Shaftesbury Gardens	Free-field	65.0 (66.7)	65.6 (67.6)	63.6 (66.5)	62.2 (66.1)	59.9 (65.8)	63.4 (64.4)	64.0 (65.2)	63.3 (63.7)	63.4 (67.5)	59.2 (63.8)	61.7 (65.2)	59.6 (63.4)
	N033	Outside The Collective, Atlas Road/Victoria Road	Free-field	66.6 (68.9)	68.2 (70.6)	65.5 (71.3)	64.2 (71.6)	61.6 (71.3)	63.7 (65.0)	66.7 (70.2)	63.9 (64.4)	64.6 (69.1)	60.3 (64.9)	62.8 (65.2)	61.0 (65.8)
	N060	Atlas Road next to Bashey Road	Free-field	54.4 (61.2)	65.4 (72.1)	56.6 (69.3)	56.3 (71.6)	54.5 (69.1)	53.6 (55.5)	60.8 (61.8)	56.7 (57.6)	54.8 (59.5)	51.0 (59.5)	53.3 (57.8)	54.4 (69.3)
WET	N034	Stephenson Street (north)	Free-field	54.9 (58.5)	59.6 (63.4)	56.4 (64.7)	56.4 (66.6)	53.3 (62.9)	53.4 (55.7)	57.1 (58.9)	54.4 (54.8)	53.3 (56.4)	48.0 (54.5)	52.8 (60.0)	49.8 (56.8)
	N035	Stephenson Street (south)	Free-field	55.3 (57.6)	58.0 (61.2)	53.9 (59.7)	53.9 (66.6)	51.0 (62.9)	52.8 (54.0)	56.9 (58.9)	54.3 (54.6)	55.2 (71.4)	47.6 (50.5)	51.4 (58.2)	48.9 (52.3)
	N041	Junction of Stephenson Street/Goodhall Street	Free-field	54.8 (57.3)	59.8 (65.2)	55.7 (61.9)	55.1 (60.1)	52.5 (59.5)	53.1 (53.6)	57.6 (60.8)	56.5 (60.3)	54.3 (58.1)	50.3 (56.6)	53.1 (59.3)	50.5 (57.3)

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
				VRCB	N031	School Road, outside Acton Business Centre	Free-field	63.7 (66.1)	67.1 (70.3)	65.8 (70.0)	62.3 (73.0)	59.7 (64.2)	60.7 (60.8)	66.6 (69.2)	67.5 (69.1)
	N050	Acton Square, outside North Acton Station	Free-field	64.2 (67.6)	65.3 (66.6)	64.2 (71.0)	63.3 (72.5)	59.6 (65.7)	64.0 (65.2)	65.5 (69.6)	63.1 (63.9)	64.5 (73.0)	61.3 (77.0)	62.1 (66.6)	59.2 (63.4)
FIC	N029	Braitrim House, Victoria Road	Free-field	58.4 (67.6)	62.1 (69.9)	57.6 (70.6)	54.8 (63.2)	54.4 (71.2)	55.6 (57.0)	56.8 (58.6)	55.5 (58.3)	51.1 (55.0)	47.2 (52.7)	49.5 (54.5)	55.6 (67.2)
	N042	Bodens car park	Free-field	61.2 (65.7)	63.5 (65.7)	59.0 (64.2)	55.9 (59.8)	54.7 (59.3)	58.6 (60.0)	62.0 (65.6)	62.4 (64.2)	59.4 (70.6)	53.1 (55.7)	54.9 (58.0)	53.9 (58.2)
	N049	Flat Iron compound	Free-field	56.9 (71.6)	75.5 (80.6)	57.7 (62.3)	55.3 (62.4)	56.5 (71.4)	54.9 (56.4)	58.3 (61.2)	58.2 (61.2)	53.2 (61.0)	51.2 (67.8)	51.8 (58.8)	55.8 (67.9)
OOO	OOO-N01	Old Oak Common Lane	Free-field	66.6 (68.4)	69.3 (71.7)	66.6 (68.8)	65.2 (70.4)	61.5 (70.0)	63.6 (64.3)	67.0 (67.7)	66.3 (66.7)	66.3 (70.5)	61.1 (64.4)	64.3 (67.2)	61.0 (64.6)
	OOO-N02	Old Oak Common Lane, Hilltop Works	Free-field	67.1 (68.9)	71.1 (74.0)	67.4 (69.8)	65.2 (68.6)	62.3 (72.3)	64.9 (66.1)	68.6 (72.4)	72.2 (82.1)	70.3 (85.1)	62.2 (68.2)	64.8 (69.3)	61.6 (65.4)
	OOO-N03	Old Oak Lane Halt, Wells House Road	Free-field	55.2 (58.6)	59.2 (61.2)	55.5 (60.6)	54.7 (60.2)	52.2 (58.3)	55.5 (58.7)	56.0 (58.3)	54.6 (56.1)	54.9 (58.4)	53.0 (66.6)	55.3 (58.1)	51.9 (55.7)
S6	WT-N01	Old Oak Lane Halt, Wells House Road	Free-field	56.6 (60.0)	62.2 (63.8)	59.4 (62.2)	58.3 (63.0)	55.3 (60.9)	56.3 (59.8)	59.0 (60.9)	58.1 (59.4)	58.3 (60.9)	56.2 (68.0)	58.1 (60.9)	55.5 (60.0)

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Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
MRVS	N040	Badminton Close	Free-field	55.4 (58.0)	56.6 (59.0)	55.2 (58.4)	55.7 (59.2)	53.5 (59.2)	55.0 (58.8)	56.2 (58.6)	54.4 (57.1)	55.0 (57.7)	53.4 (57.6)	55.7 (62.1)	53.2 (61.5)
	N058	Mandeville Road	Free-field	57.7 (63.8)	66.6 (71.4)	56.0 (61.0)	56.1 (61.4)	53.5 (64.9)	55.4 (58.9)	64.5 (68.1)	61.4 (67.0)	56.5 (62.6)	54.6 (60.8)	56.9 (63.0)	51.6 (56.4)
	N063	Mandeville Road	Free-field	60.2 (62.1)	69.0 (72.4)	58.3 (60.5)	59.1 (61.0)	56.6 (62.4)	58.6 (60.1)	71.2 (73.9)	64.3 (69.5)	59.9 (69.2)	56.6 (59.9)	63.2 (75.2)	56.8 (69.4)
GPWVS	N059	Green Park Way Ventilation Shaft	Free-field	58.8 (62.8)	62.6 (69.9)	57.3 (63.1)	59.0 (65.8)	57.5 (68.9)	55.8 (57.0)	56.7 (58.7)	57.0 (59.6)	55.2 (59.0)	53.7 (56.8)	57.0 (69.5)	53.7 (57.8)
	N064	Green Park Way Ventilation Shaft	Façade	55.7 (60.1)	59.2 (62.2)	59.0 (69.6)	57.1 (62.3)	54.6 (63.0)	54.1 (56.6)	56.9 (58.5)	56.7 (60.0)	56.8 (65.8)	53.9 (59.7)	57.0 (69.6)	53.5 (59.4)
WVS	N062	Westgate Ventilation Shaft	Free-field	63.1 (69.9)	65.1 (71.0)	60.2 (71.5)	61.9 (70.6)	60.4 (73.1)	59.4 (63.3)	64.2 (72.9)	61.5 (70.2)	59.2 (62.8)	58.0 (62.0)	61.3 (69.0)	56.9 (61.3)

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
WET	V052	63, Stephenson Street	2.90 (Y-axis)
	V057	37, Stephenson Street	1.15 (Z-axis)
OOC	OOC-V02	Kildun Court, Old Oak Common Lane	1.73 (Z-axis)
	OOC-V03	Wells House Road Alleyway	0.68 (Y-axis)
GPWVS	V053	Green Park Way, Greenford	2.96 (Z-axis)
	V054	Green Park Way Ventilation Shaft	1.22 (Z-axis)
MRVS	V055	Mandeville Road	1.60 (Y-axis)
	V056	Mandeville Road	1.88 (Y-axis)

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

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

2.2 Exceedances of the SOAEL

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

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

2.2.3 Where reported construction noise levels exceed the SOAEL, 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
AR	N032	Shaftesbury Gardens	All days	All periods	No exceedance
	N033	Outside The Collective, Atlas Road / Victoria Road	All days	All periods	No exceedance
	N060	Atlas Road next to Bashey Road	All days	All periods	No exceedance
WET	N034	Stephenson Street (north)	All days	All periods	No exceedance
	N035	Stephenson Street (south)	All days	All periods	No exceedance
	N041	Junction of Stephenson Street / Goodhall Street	All days	All periods	No exceedance
VRCB	N031	School Road, outside Acton Business Centre	All days	All periods	Not applicable*
	N050	Acton Square, outside North Acton Station	All days	All periods	No exceedance
FIC	N029	Braitrim House, Victoria Road	All days	All periods	No exceedance
	N042	Bodens Car Park	All days	All periods	No exceedance
	N049	Flat Iron compound	All days	All periods	No exceedance
OOC	OOC-N01	Old Oak Common Lane	All days	All periods	No exceedance
	OOC-N02	Old Oak Common Lane, Hilltop Works	All days	All periods	No exceedance
	OOC-N03	Old Oak Lane Halt, Wells House Road	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
S6	WT-N01	Old Oak Lane Halt, Wells House Road	Nights	2200-0700	13
MRVS	N040	Badminton Close	All days	All periods	No exceedance
	N058	Mandeville Road	All days	All periods	No exceedance
	N063	Mandeville Road	All days	All periods	No exceedance
GPWVS	N059	Green Park Way Ventilation Shaft	All days	All periods	Not applicable*
	N064	Green Park Way Ventilation Shaft	All days	All periods	Not applicable*
WVS	N062	Westgate Ventilation Shaft	All days	All periods	Not applicable*

* 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
S6	WT-N01	Old Oak Lane Halt, Wells House Road	4

2.2.6 Four (4) 24-hour periods that experienced an exceedance of the SOAEL were recorded due to HS2 construction works during January 2023. Exceedances occurred at noise monitor WT-N01 during night-time periods.

2.3 Exceedances of Trigger Level

2.3.1 Table 7 provides a summary of exceedances of the Section 61 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
-	-	-	-	-	-

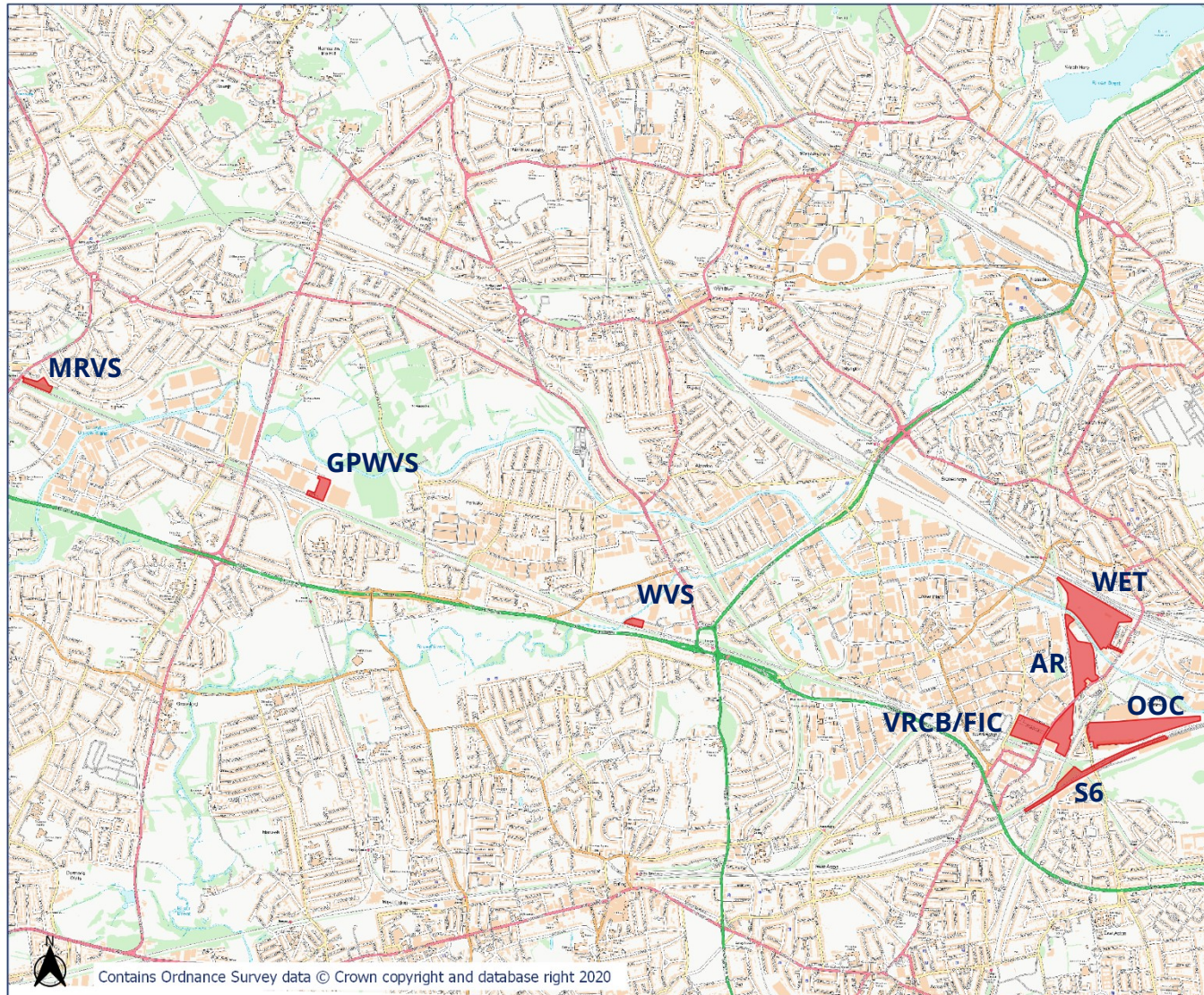
2.4 Complaints

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.

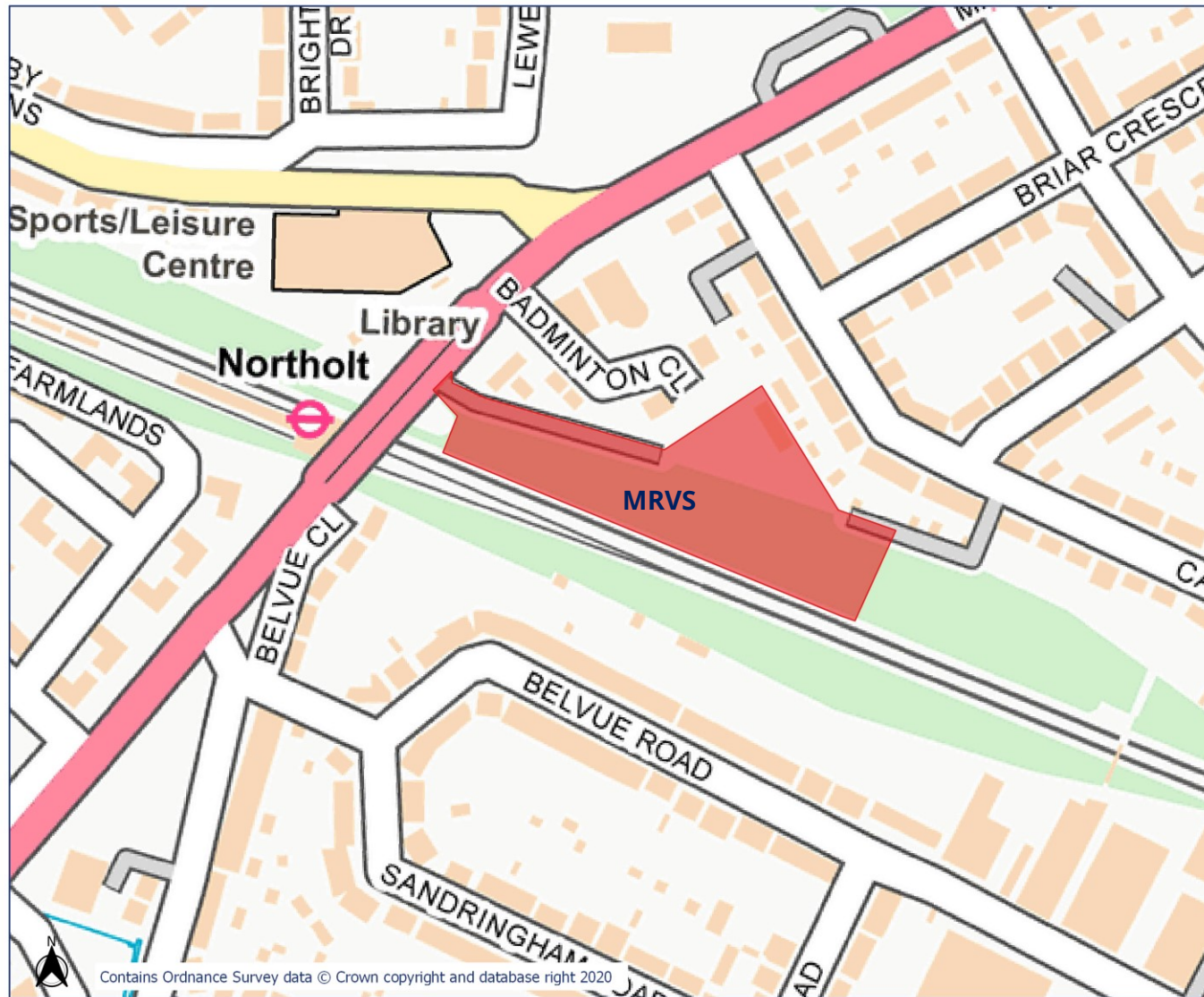
Table 8: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-23-44263-C	MRVS	Complaint due to high vibration levels felt inside the house, thought to be caused by drilling.	Investigation found that no works were ongoing at the time of complaint. Delivery trucks were moving in and out of site, but no noisy works undertaken.	Results of investigations were passed to the stakeholder.
HS2-23-44282-C HS2-23-44284-C HS2-23-89126-E-C	WET	Complaint regarding noise from waste removal.	A set of wagons has been identified as causing the issue. The noise source was identified to be caused by metal and mechanical components scratching.	The contractor continues to look at ways to mitigate noise but will not be able to eradicate it. New wagons have been ordered, but they are unlikely to be in situ until summer. The Maintenance Team is ensuring rail greaser is operating correctly and have inspected the wagons to see if it is possible to improve noise levels. Additional hoarding are also being erected which should assist with the noise.

Appendix A Site Locations

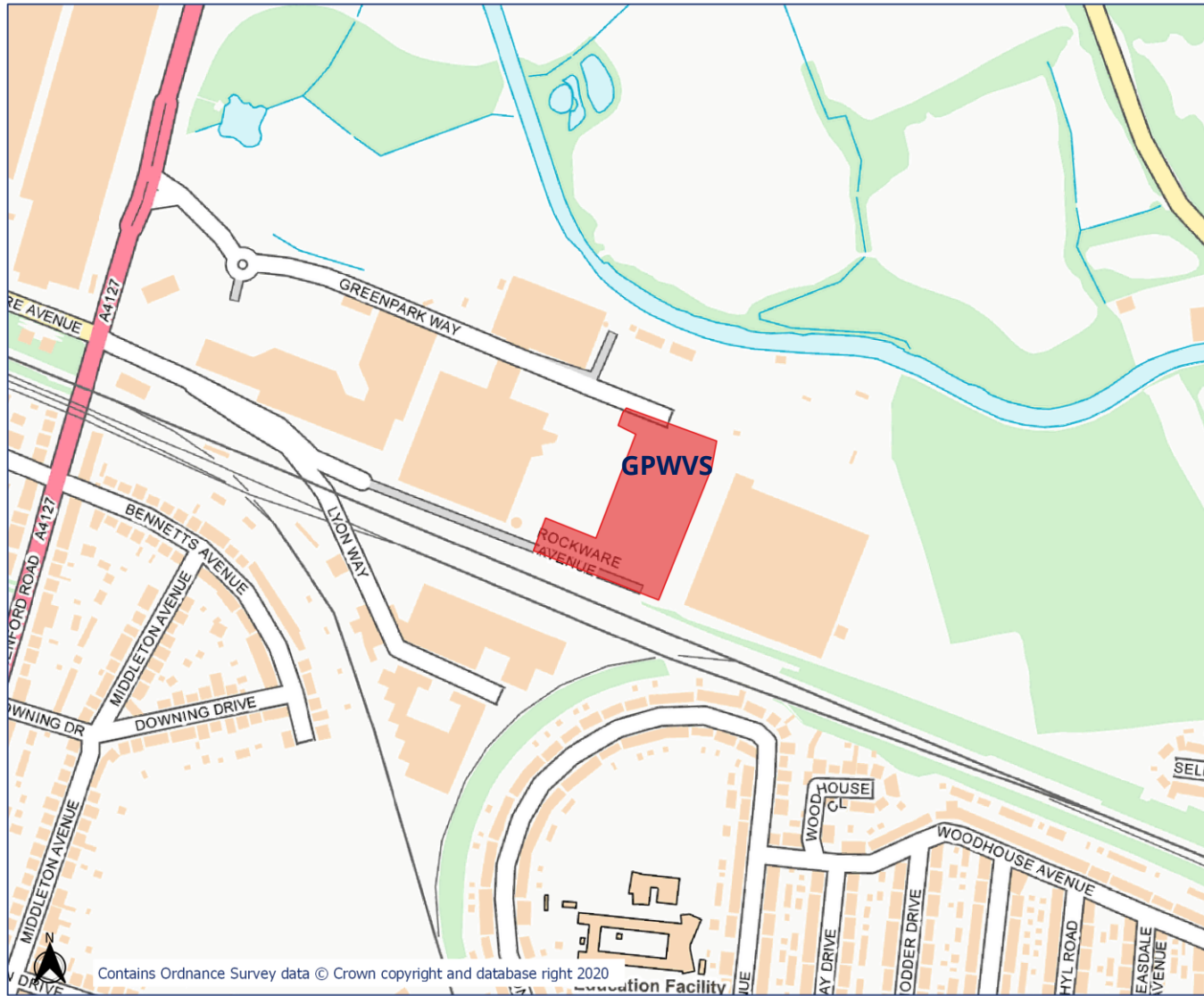


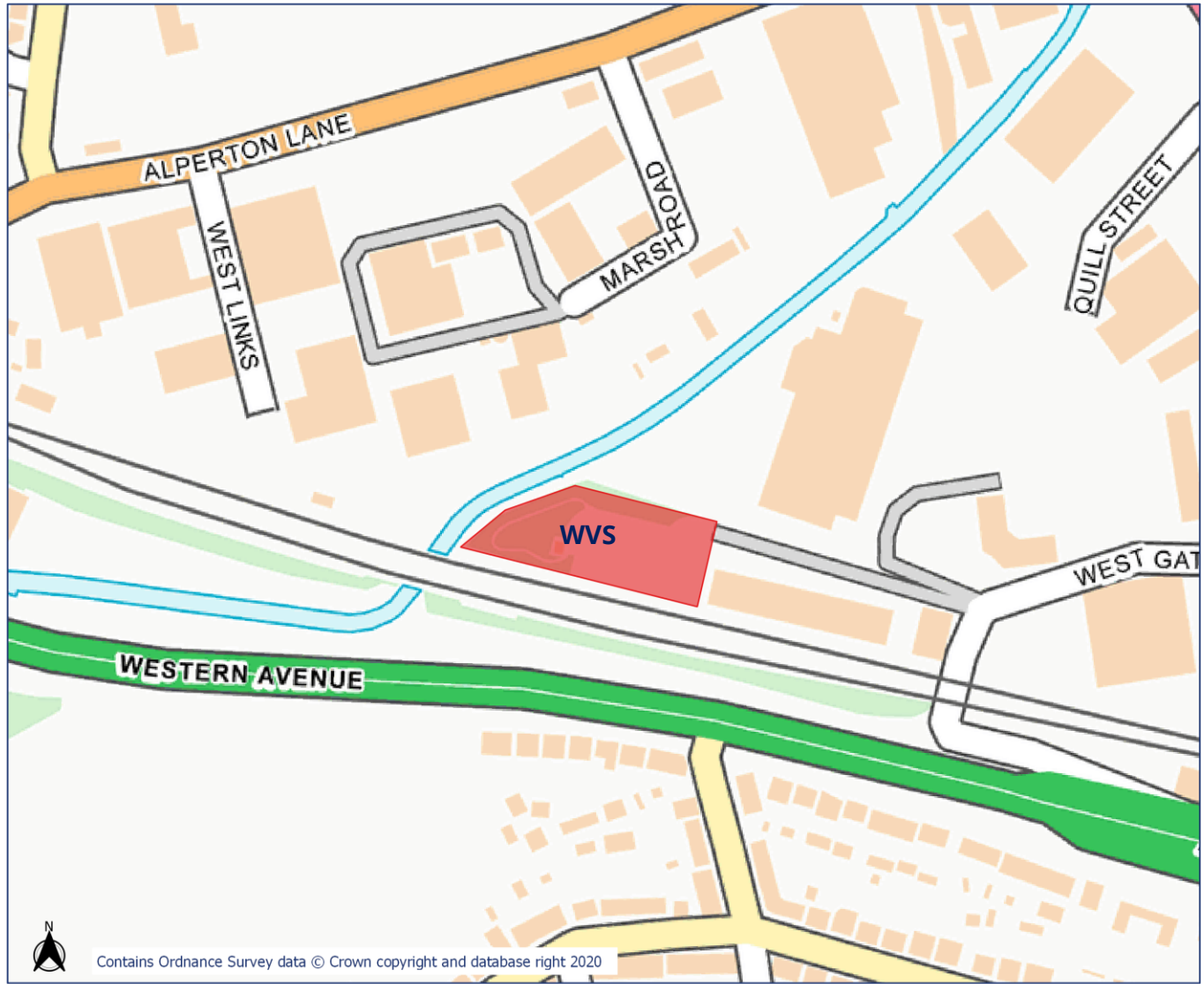
Legend
Active Worksites

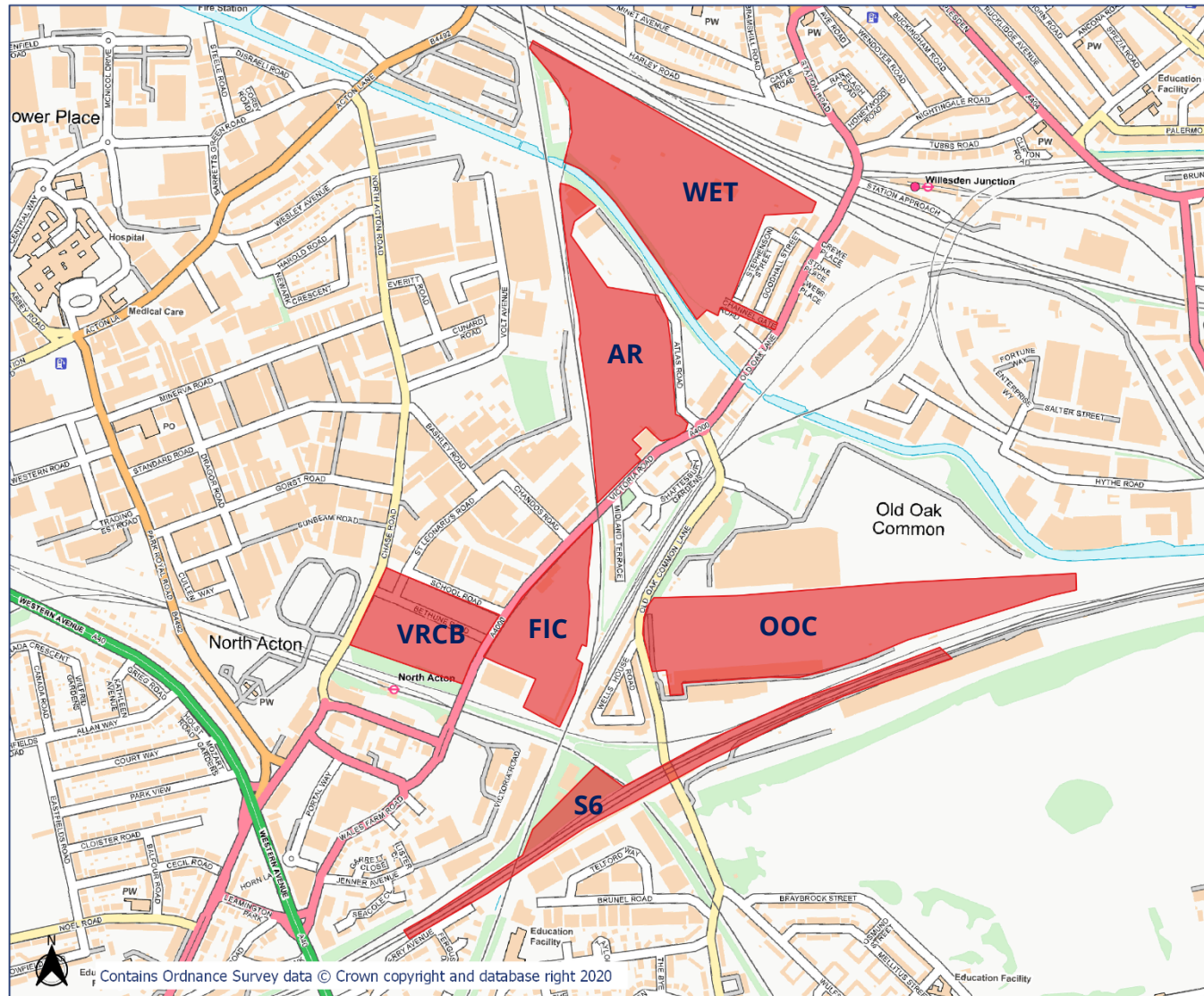


Legend

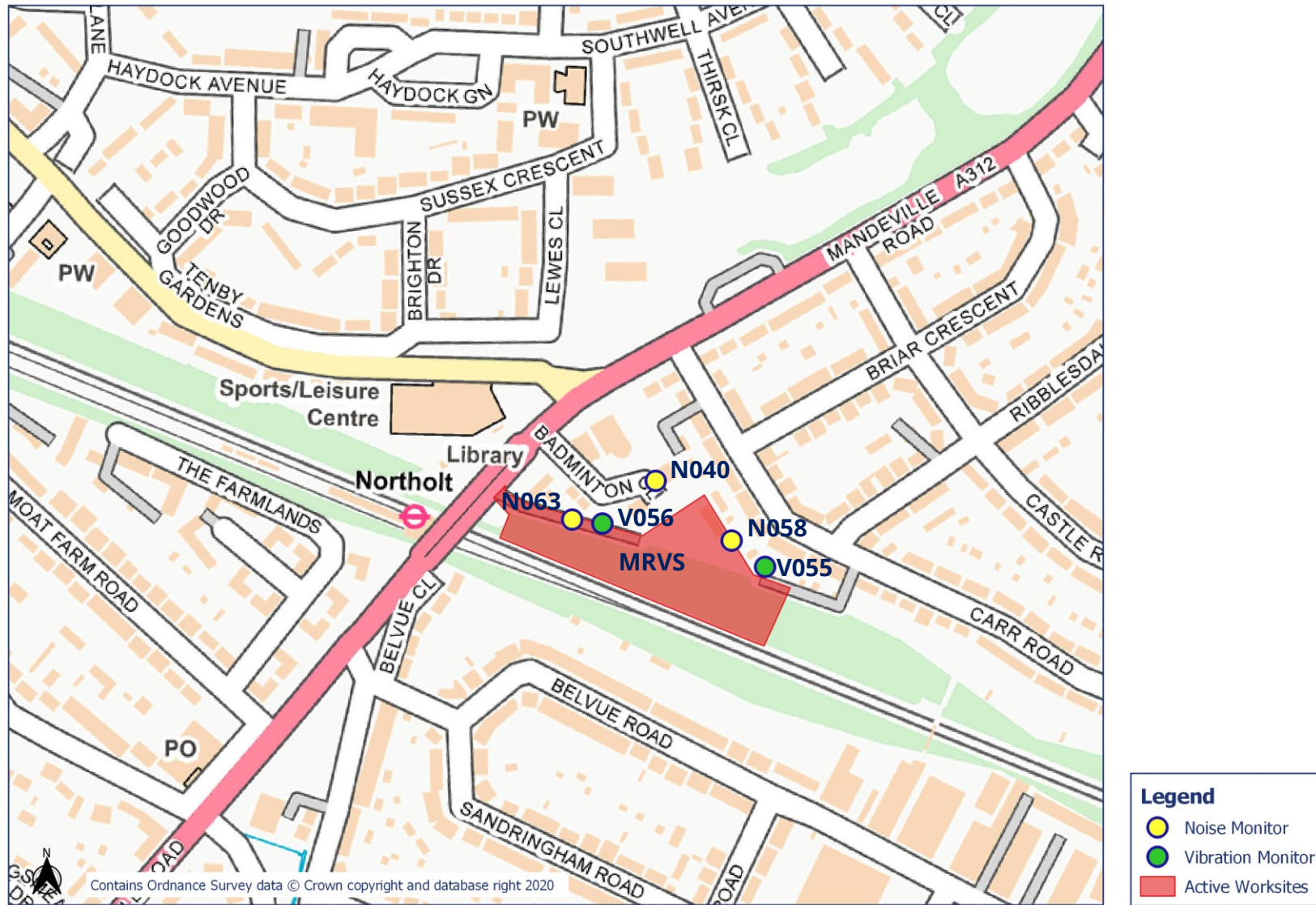
- Active Worksites

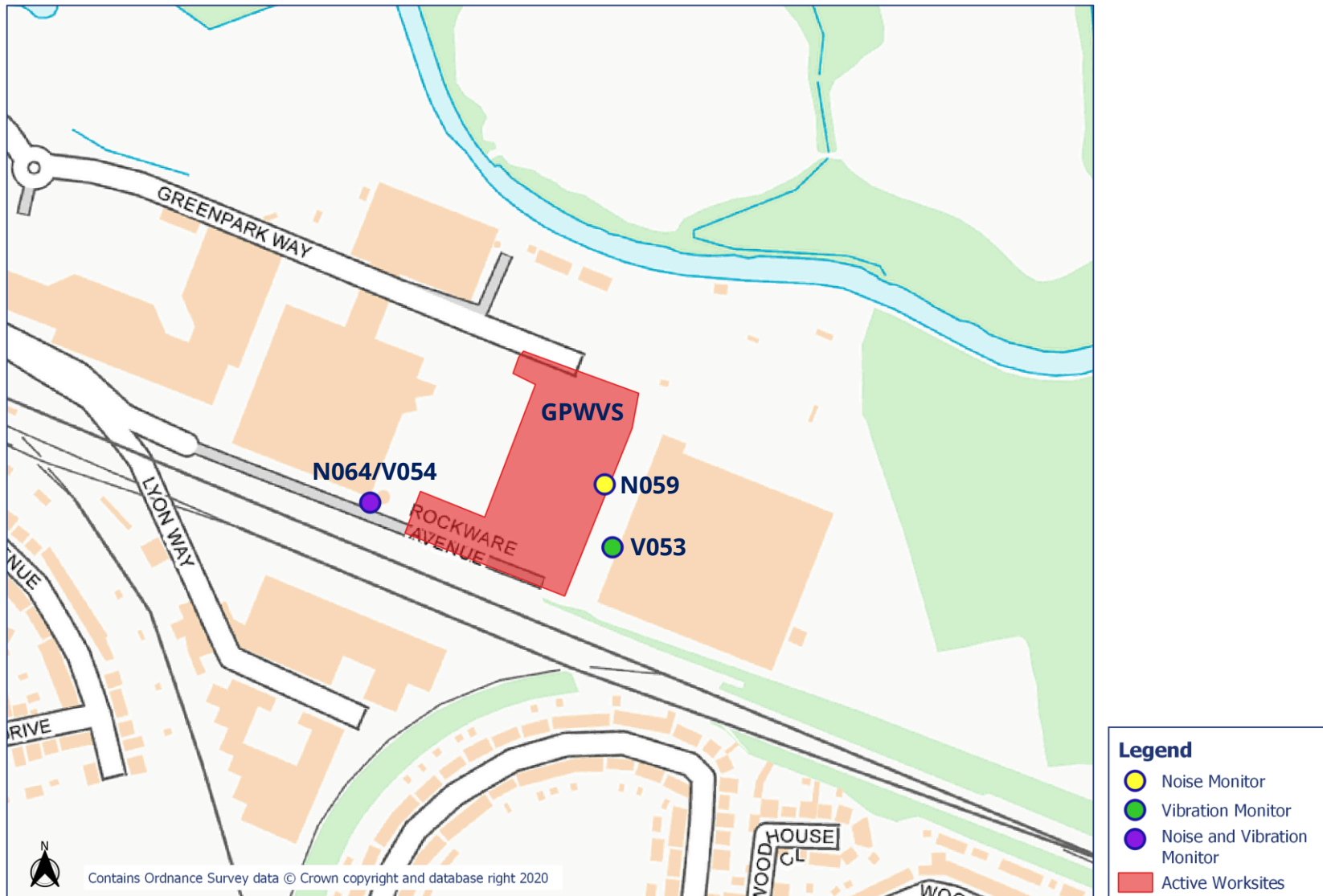


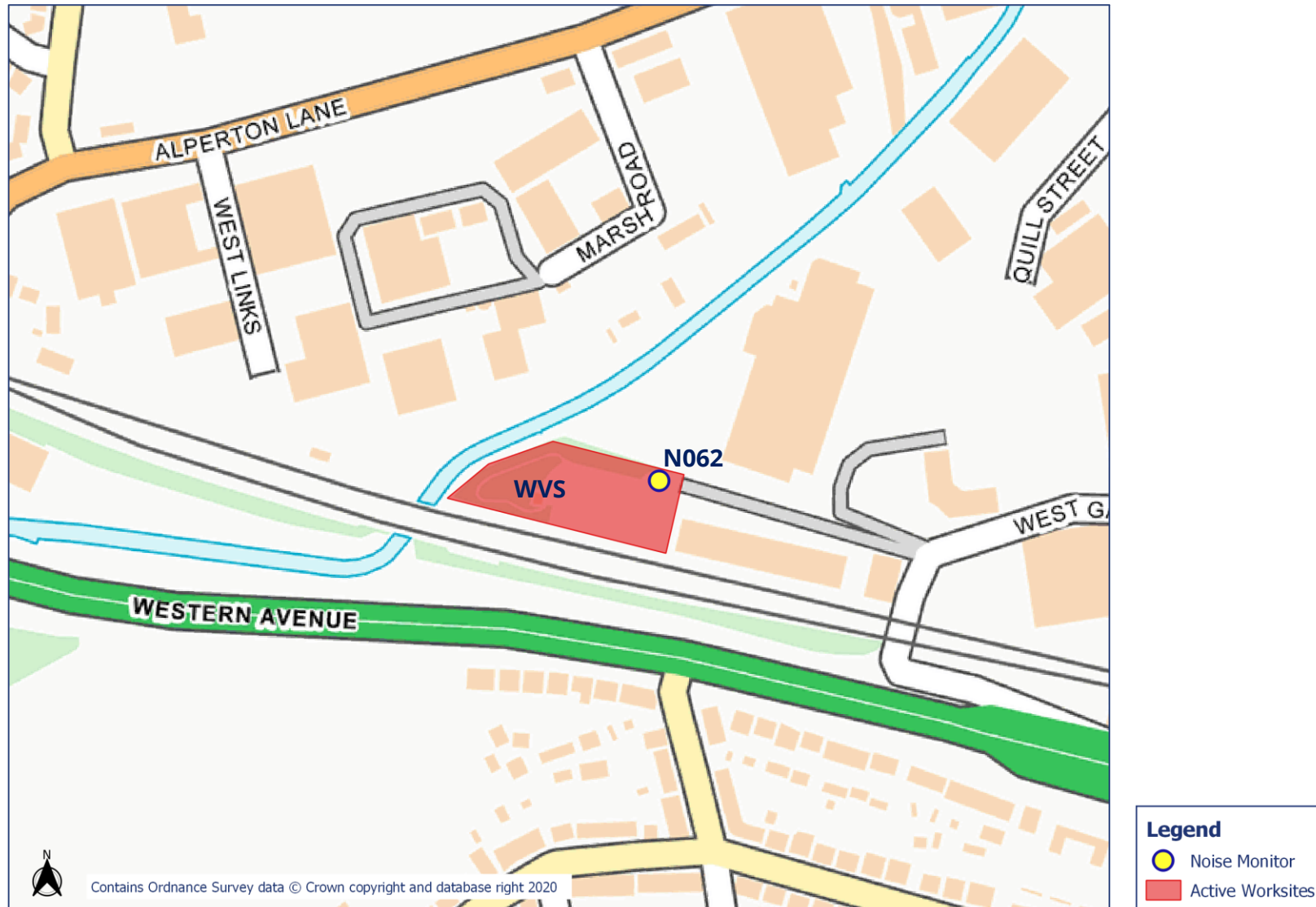


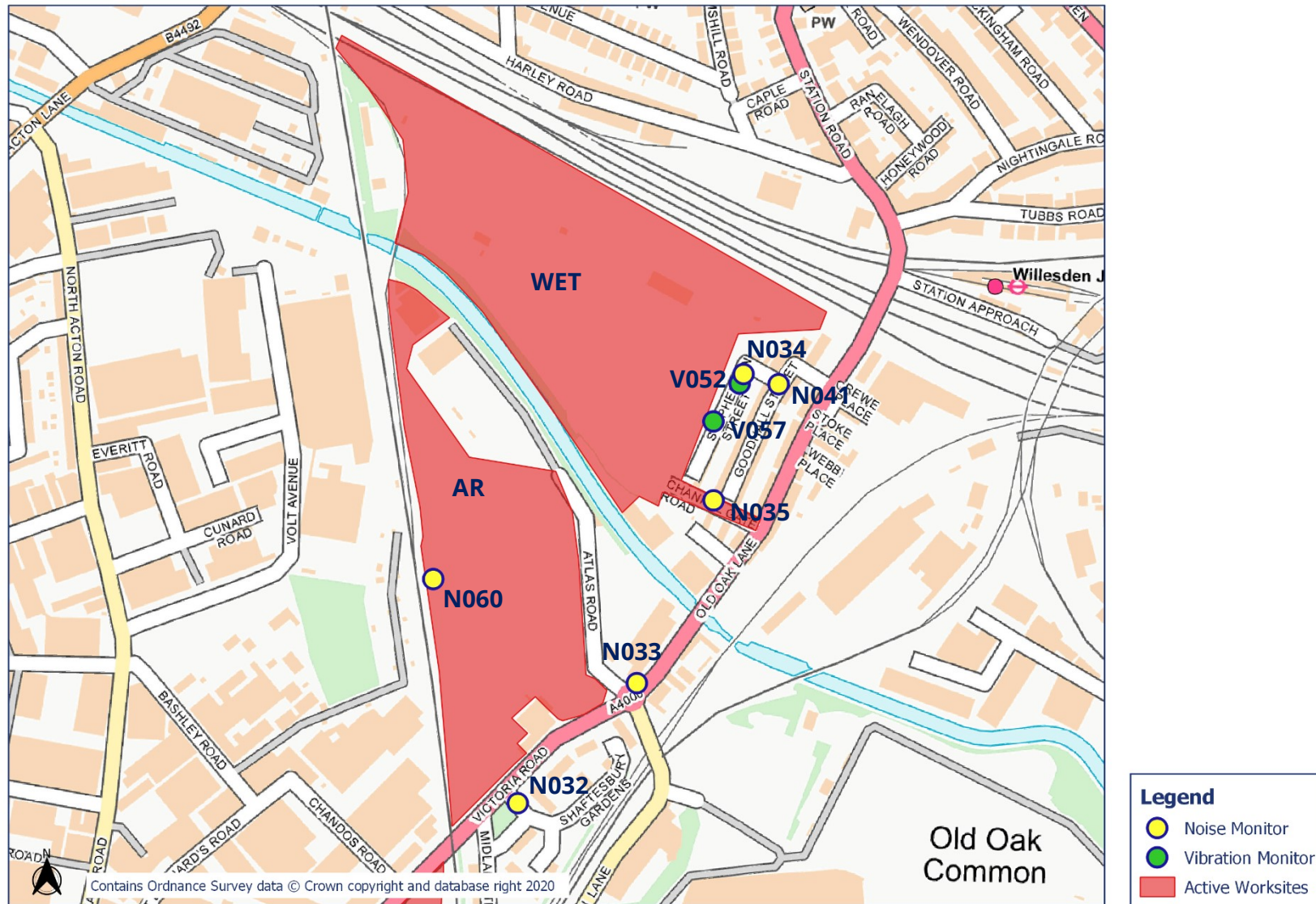


Appendix B Monitoring Locations









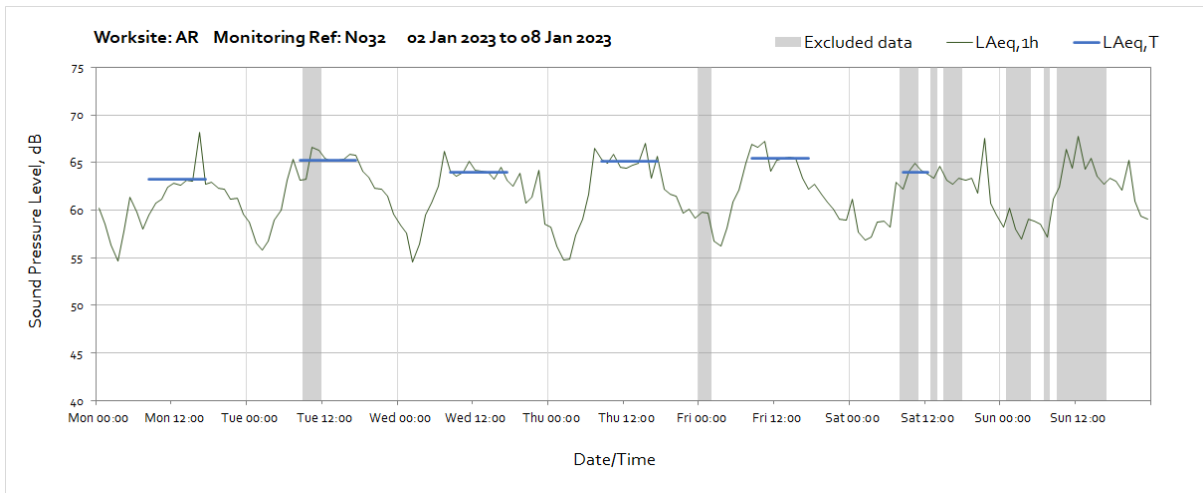
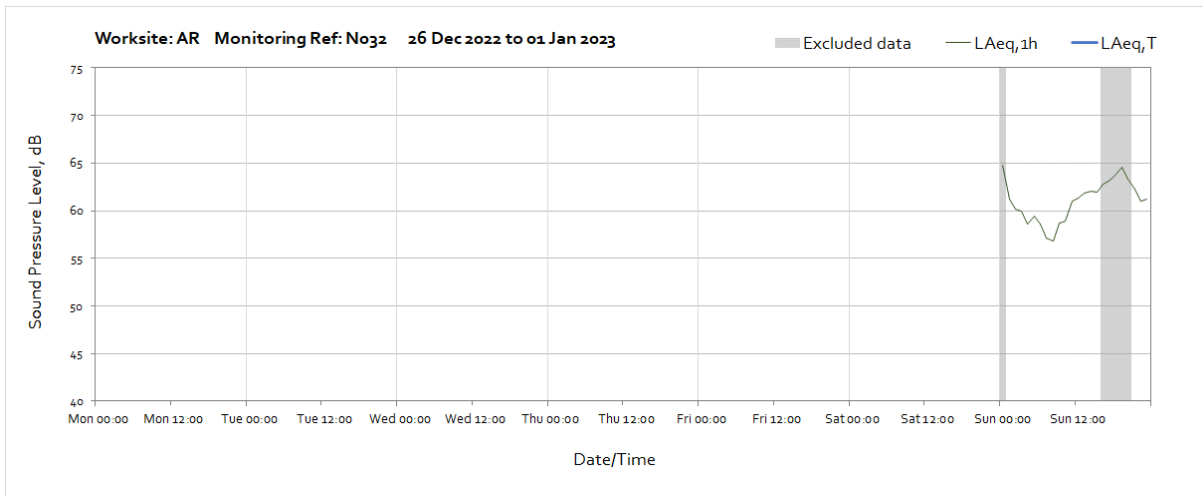


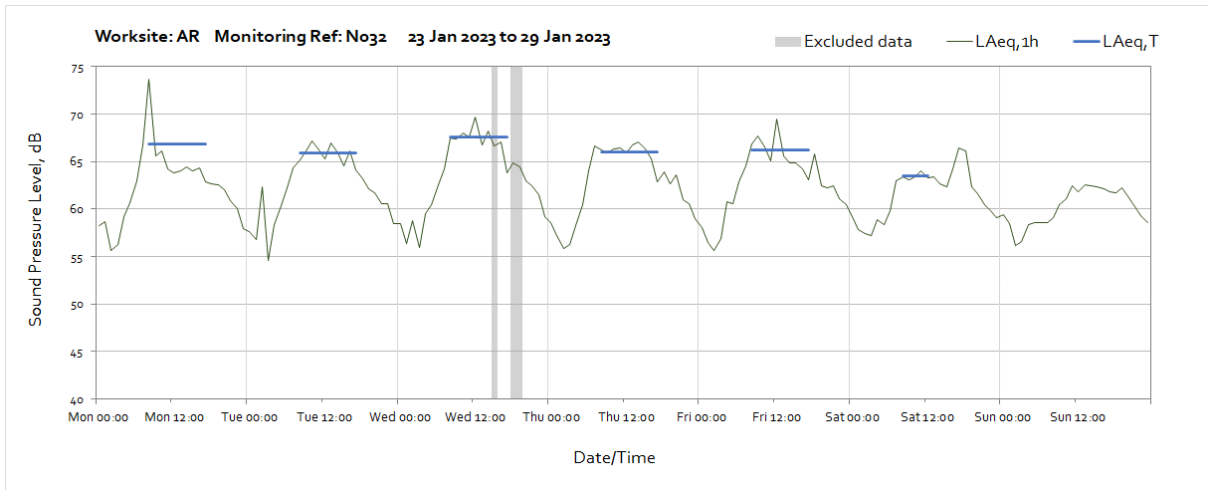
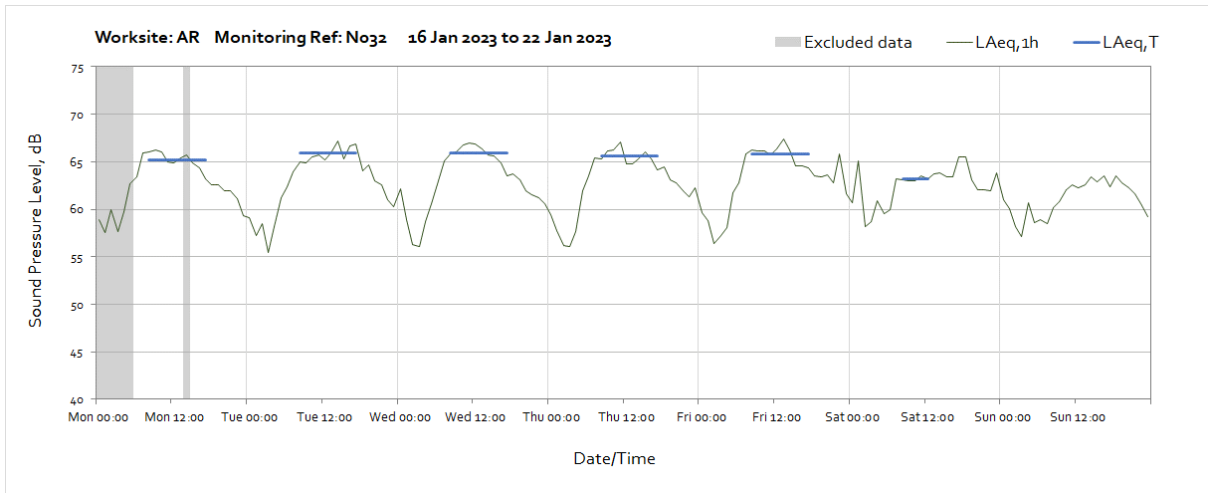
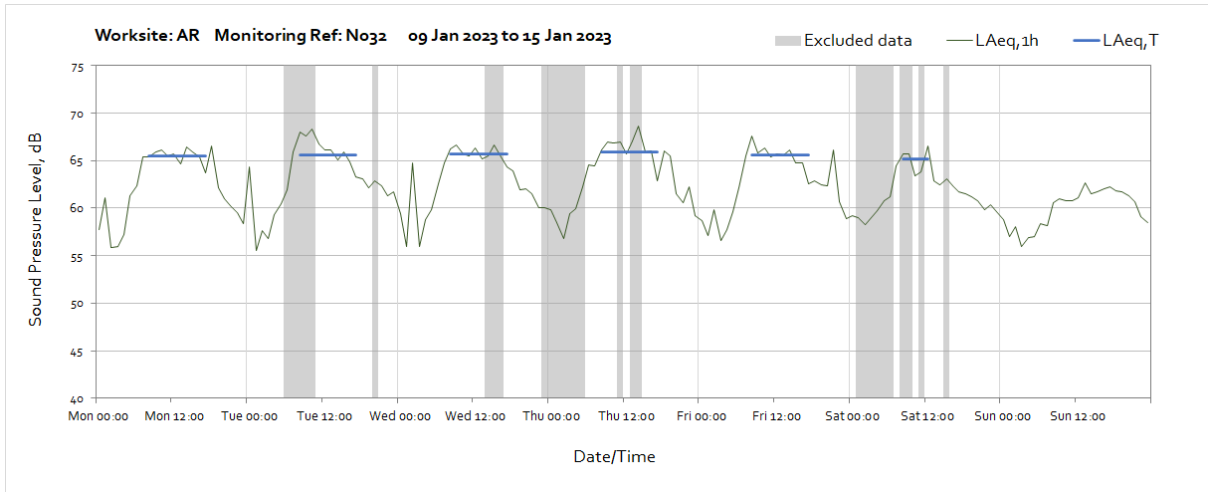
Appendix C Data

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.

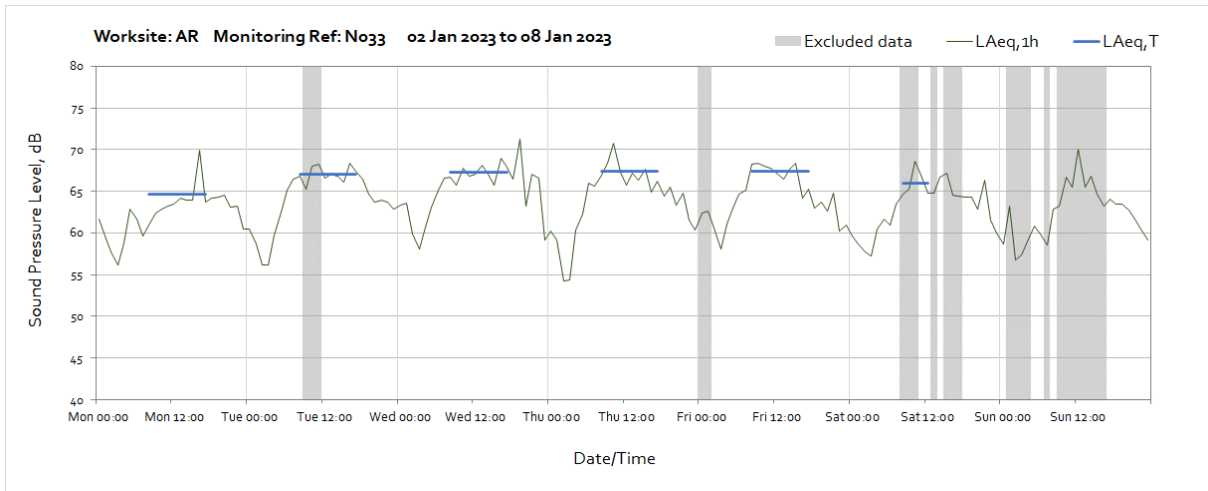
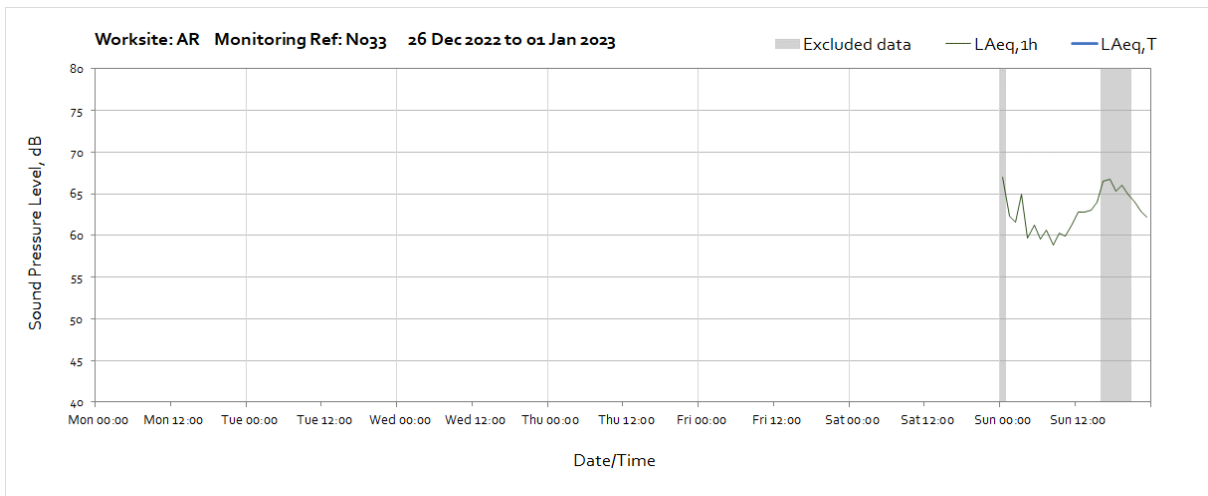
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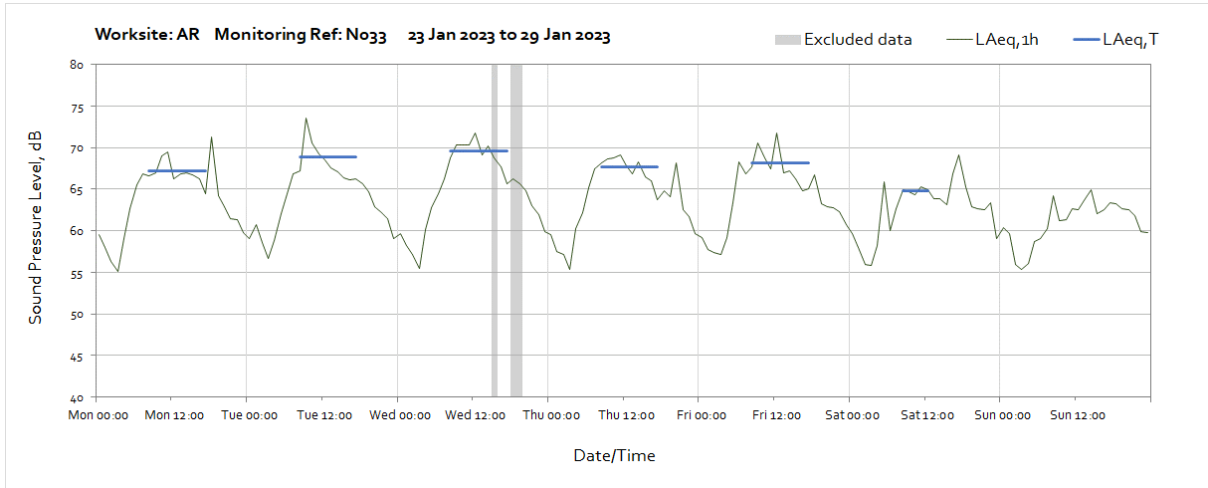
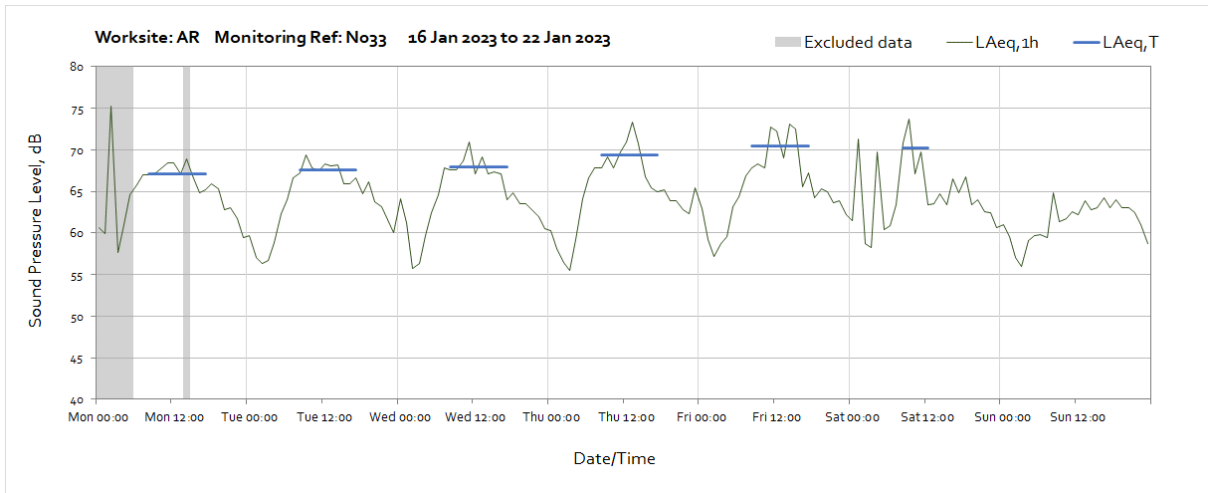
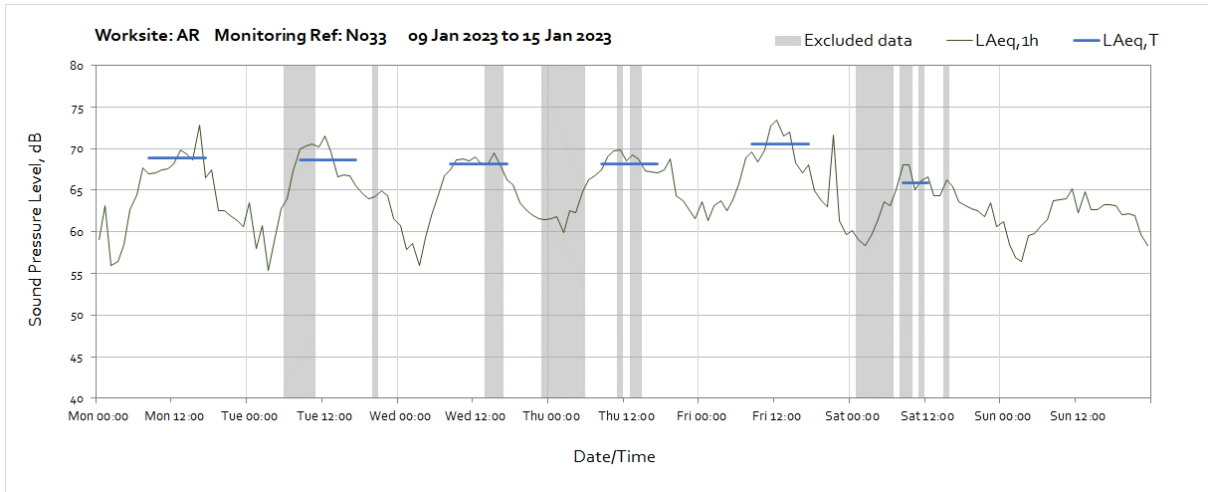


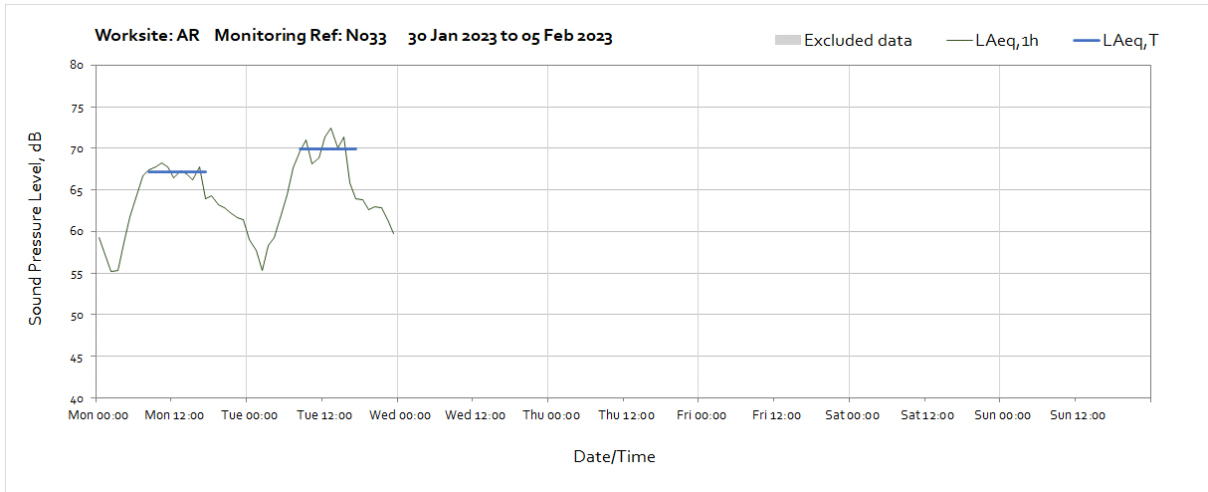




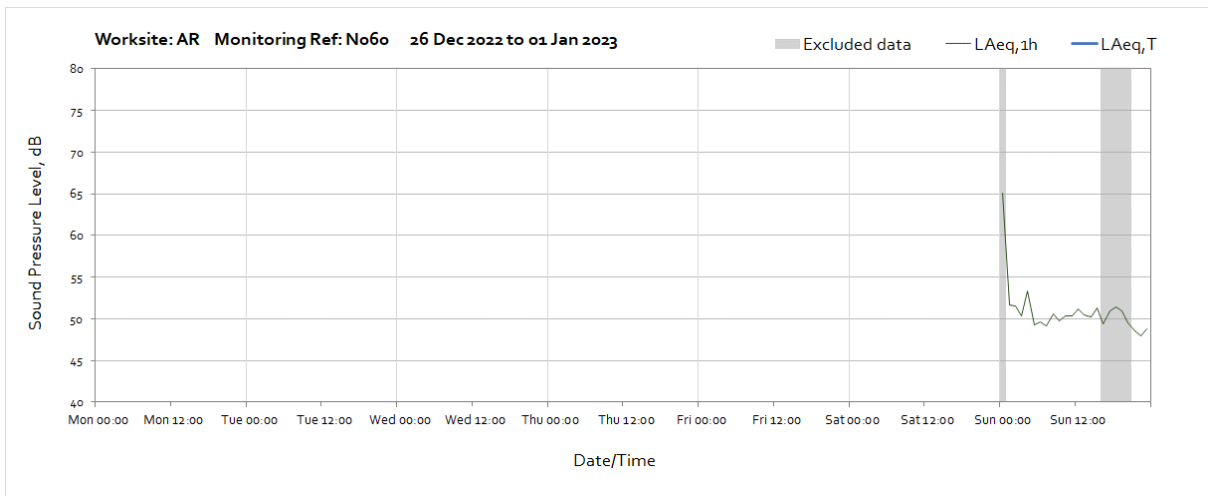
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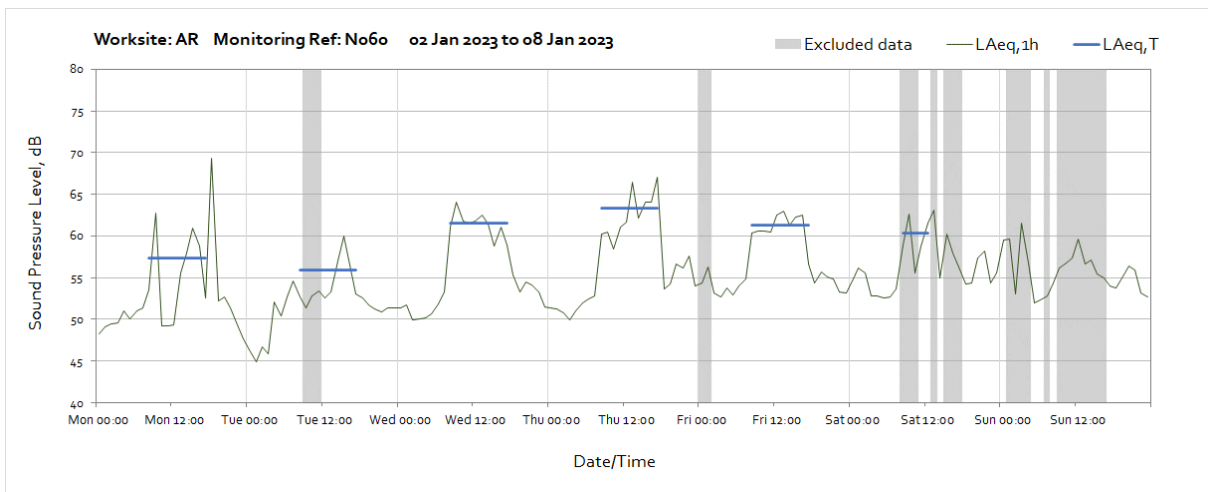


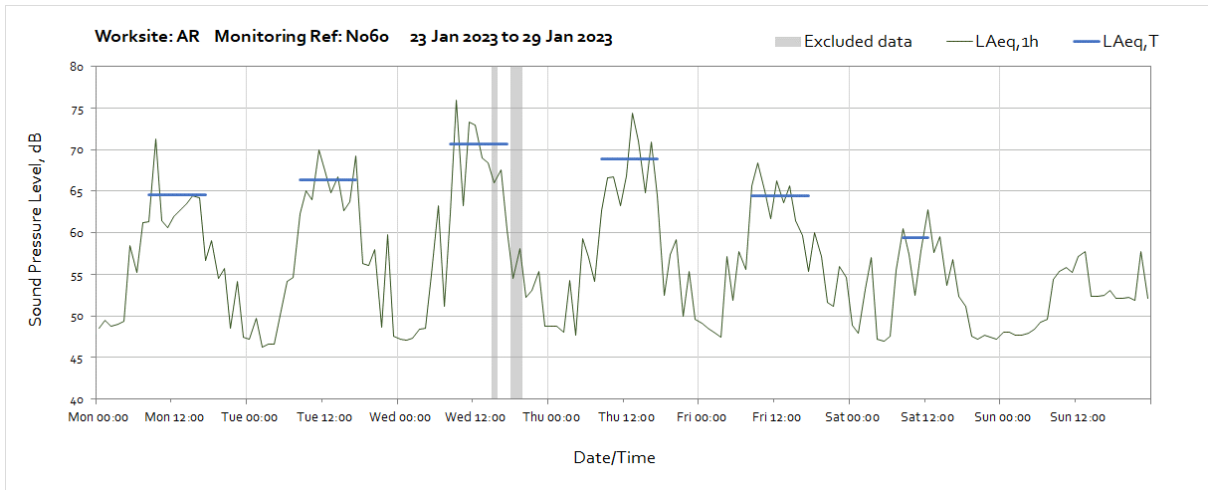
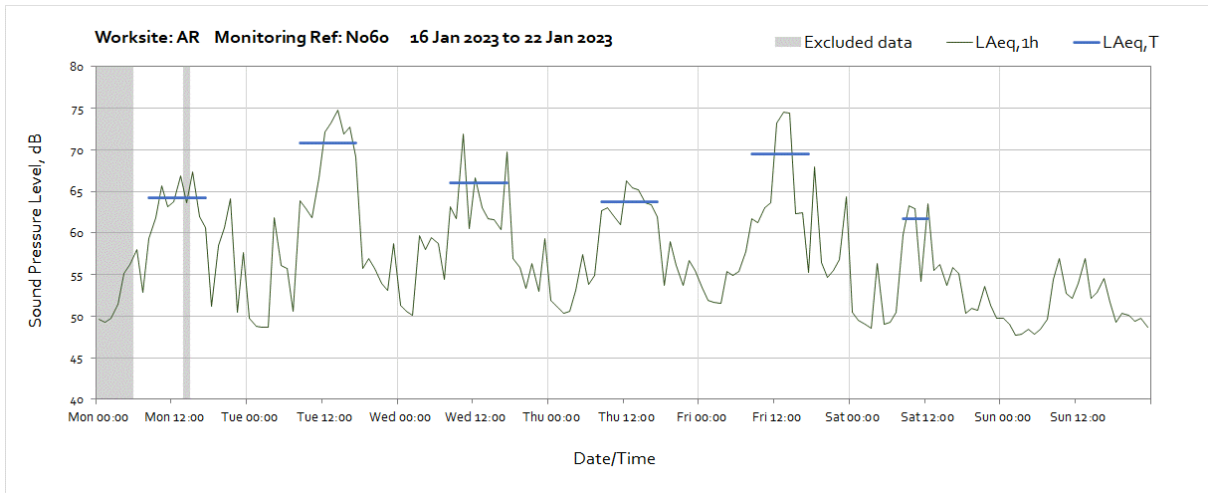
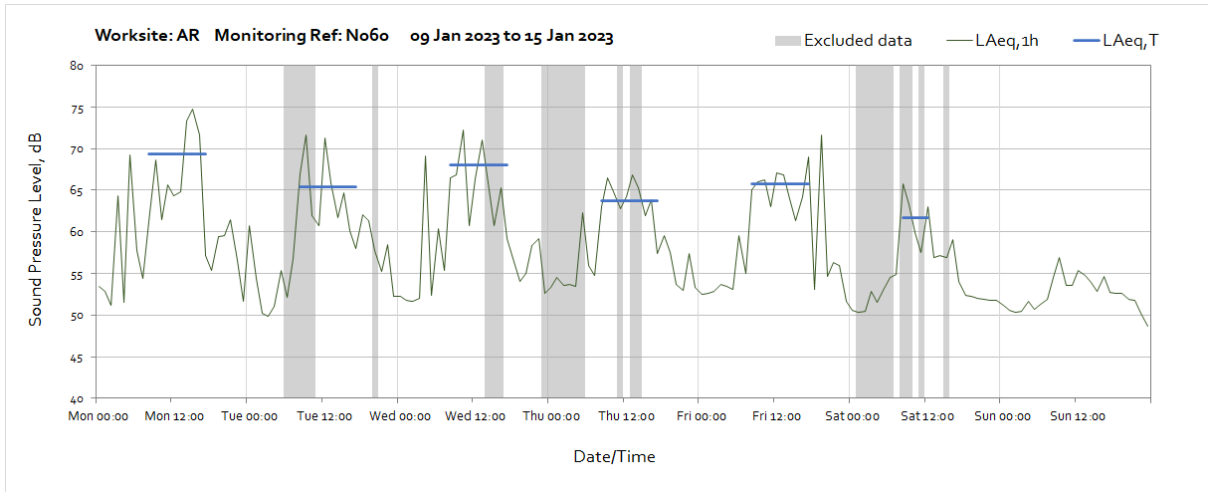


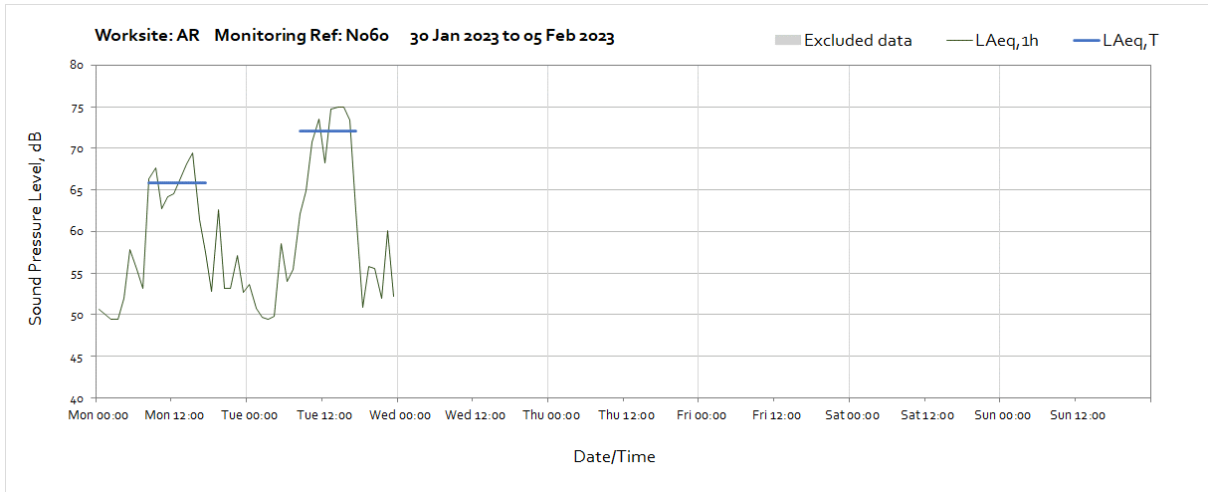
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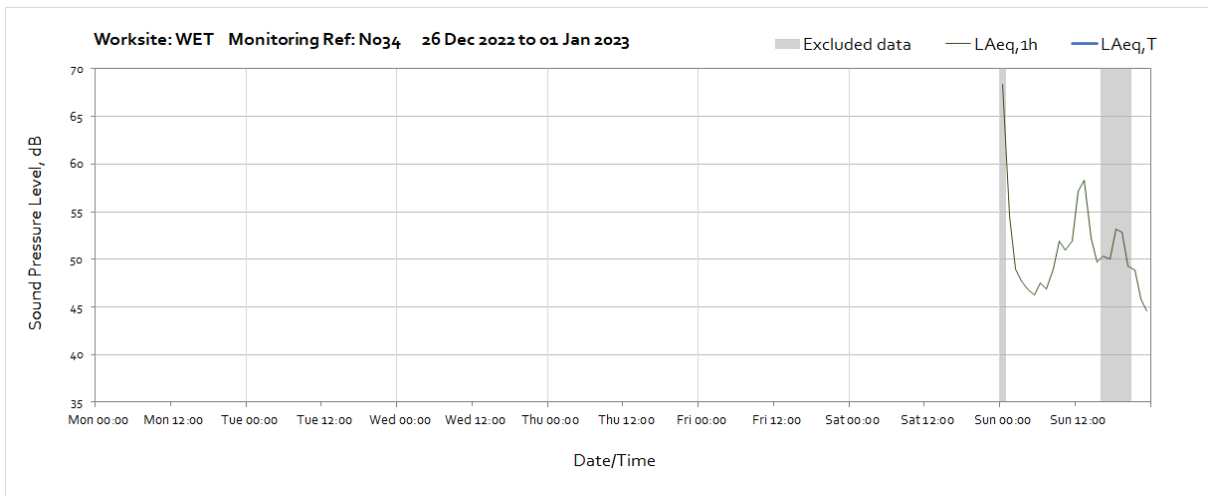
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



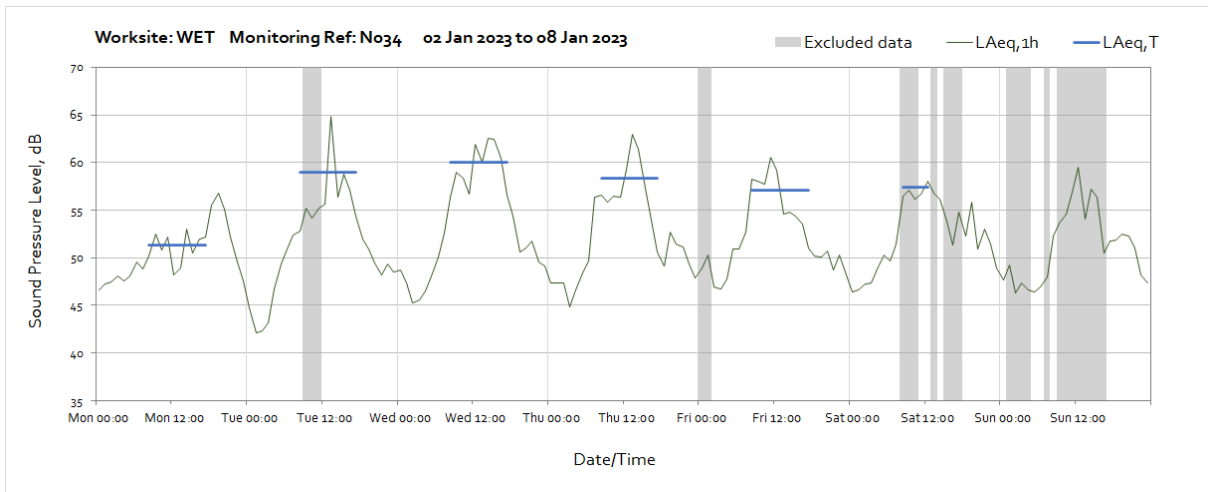


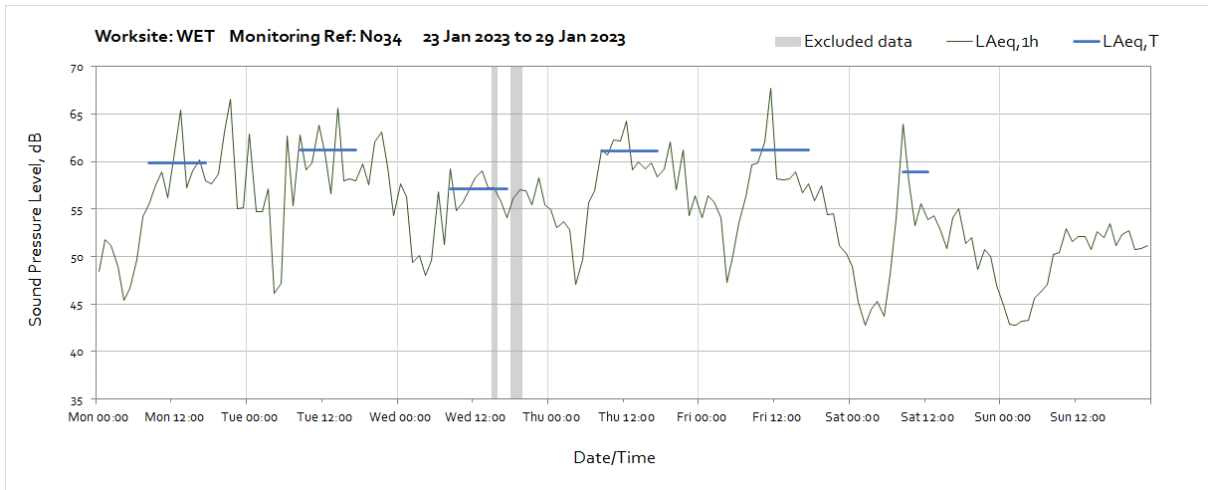
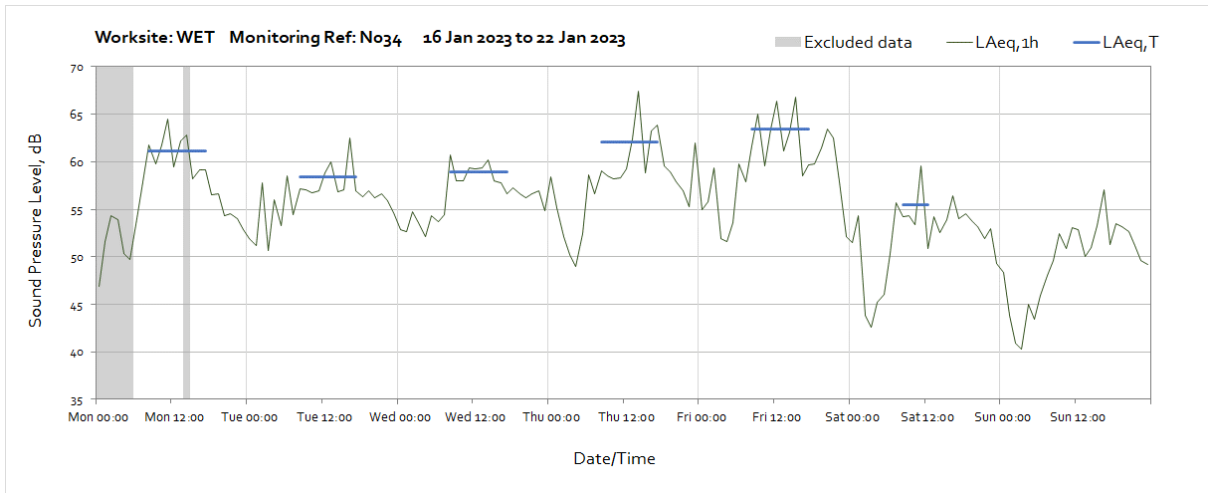
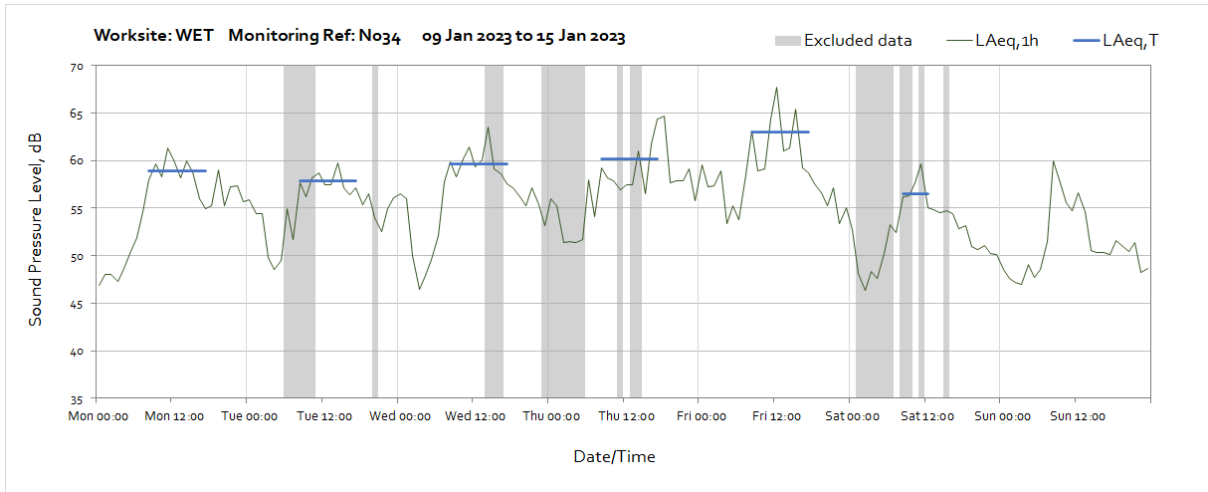


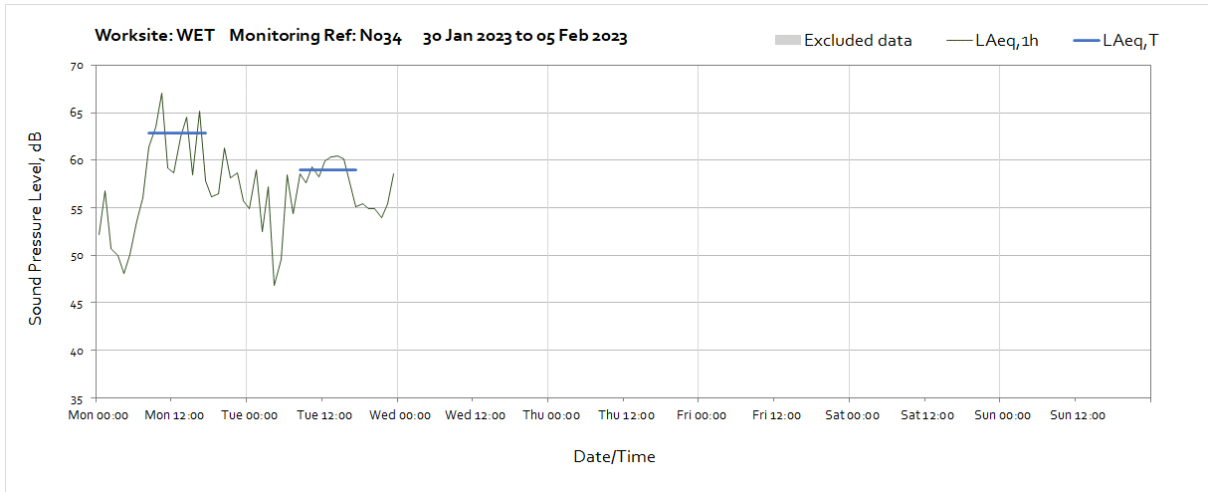
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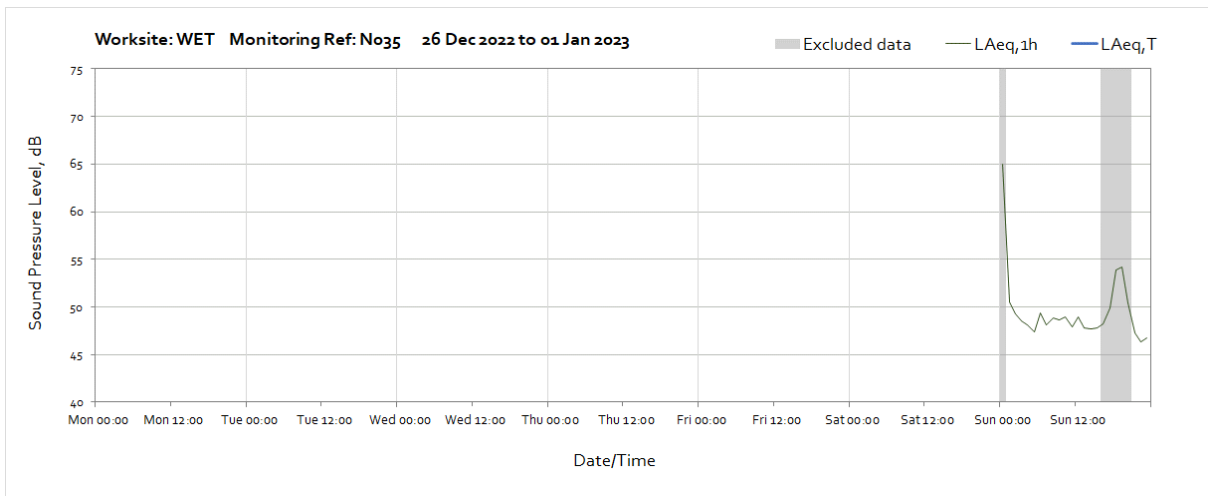
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



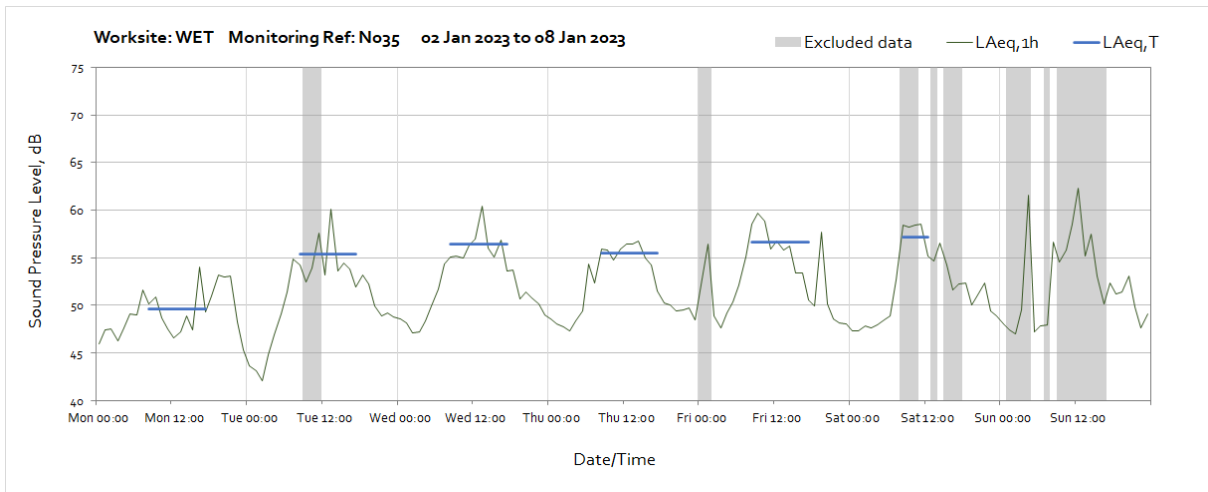


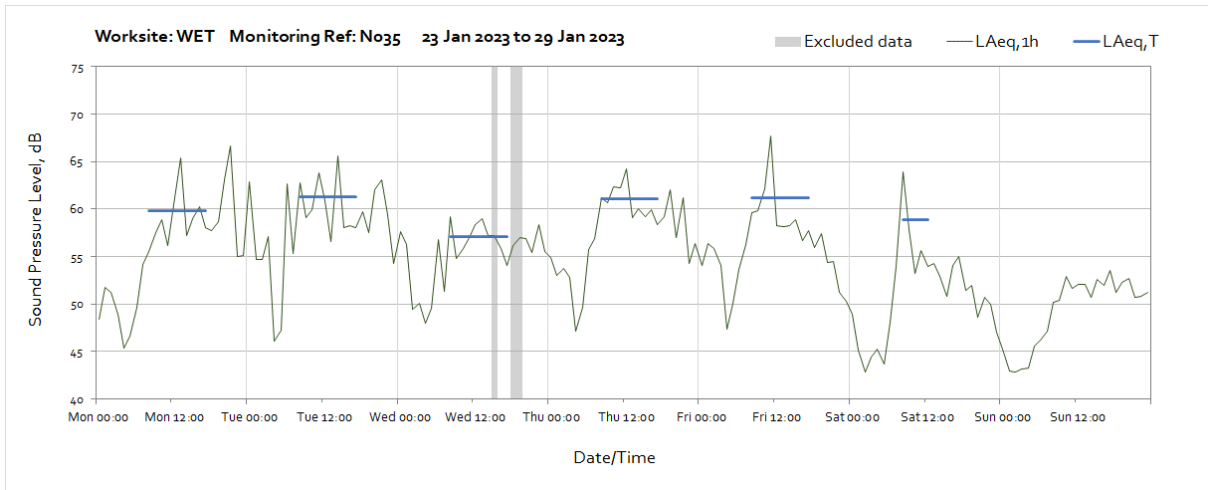
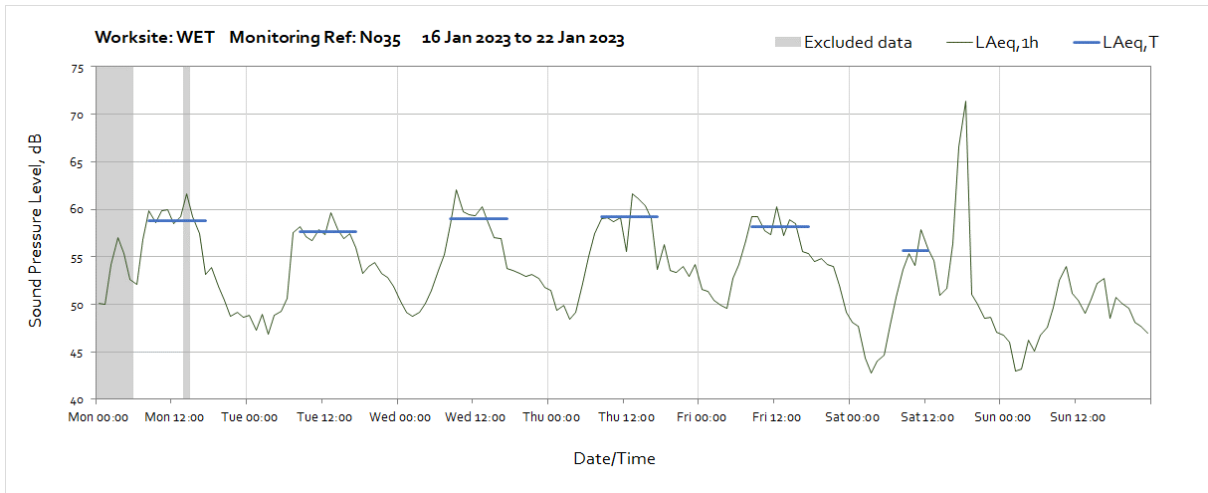
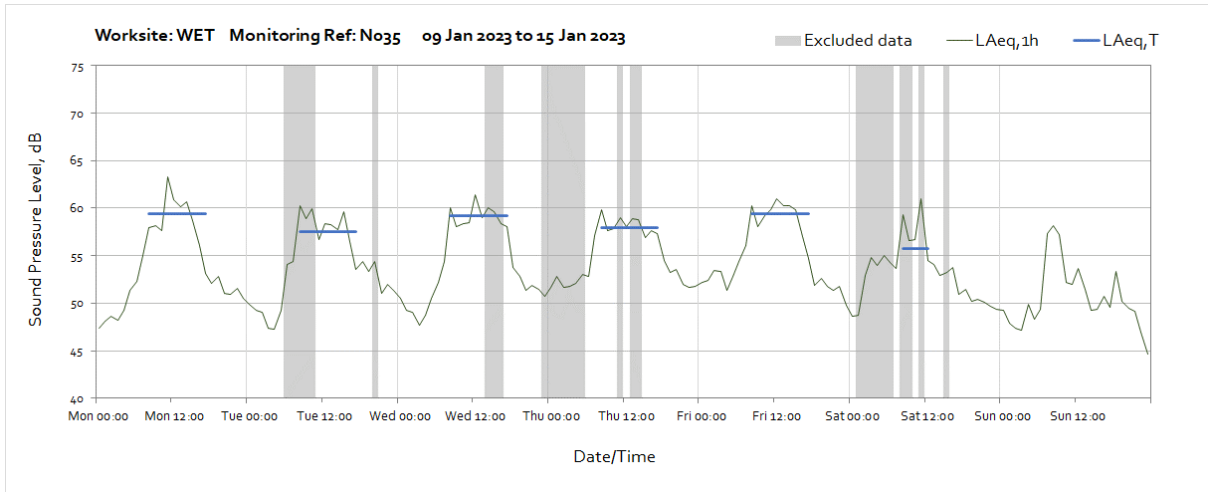


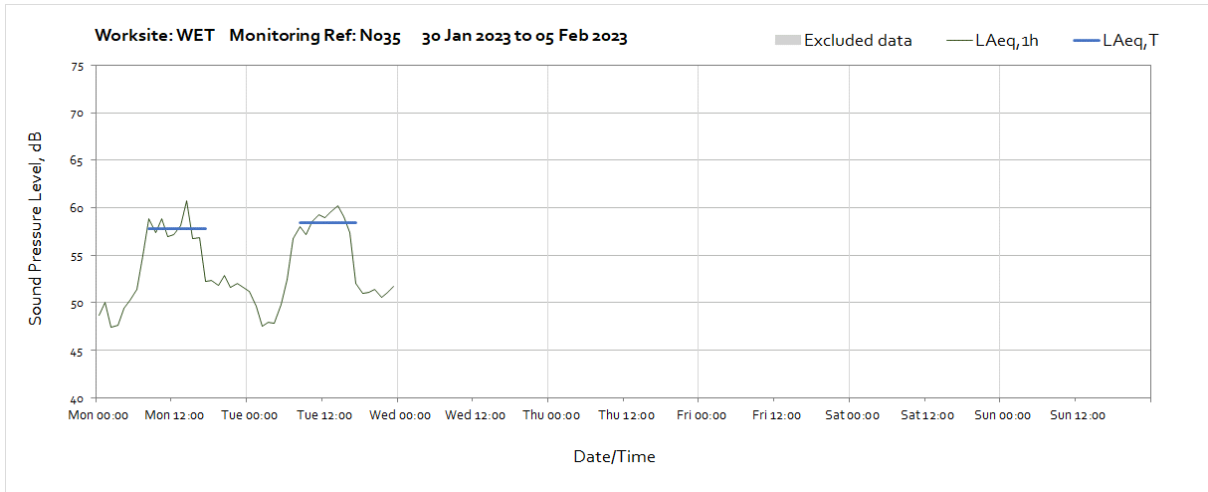
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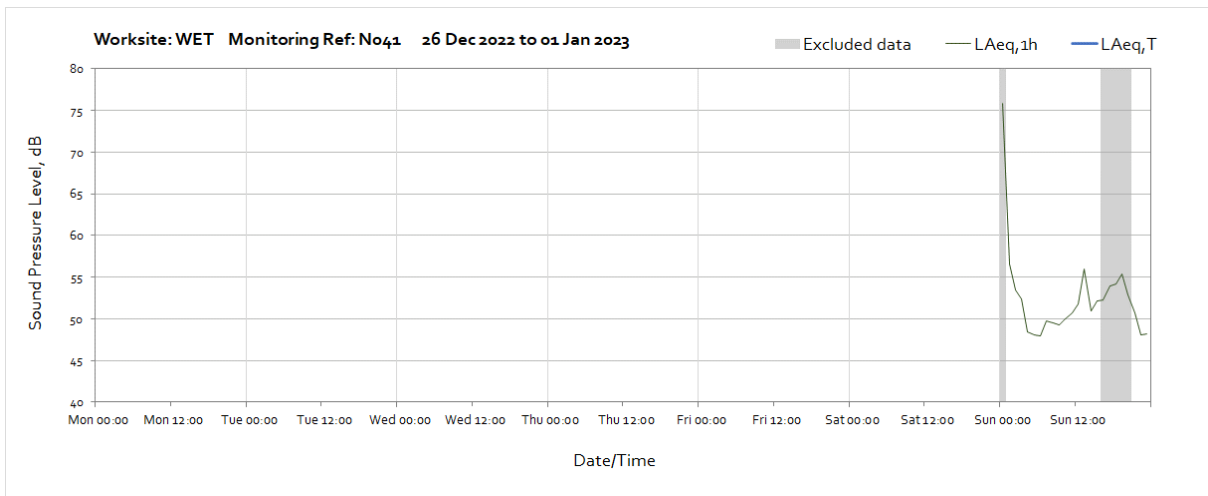
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



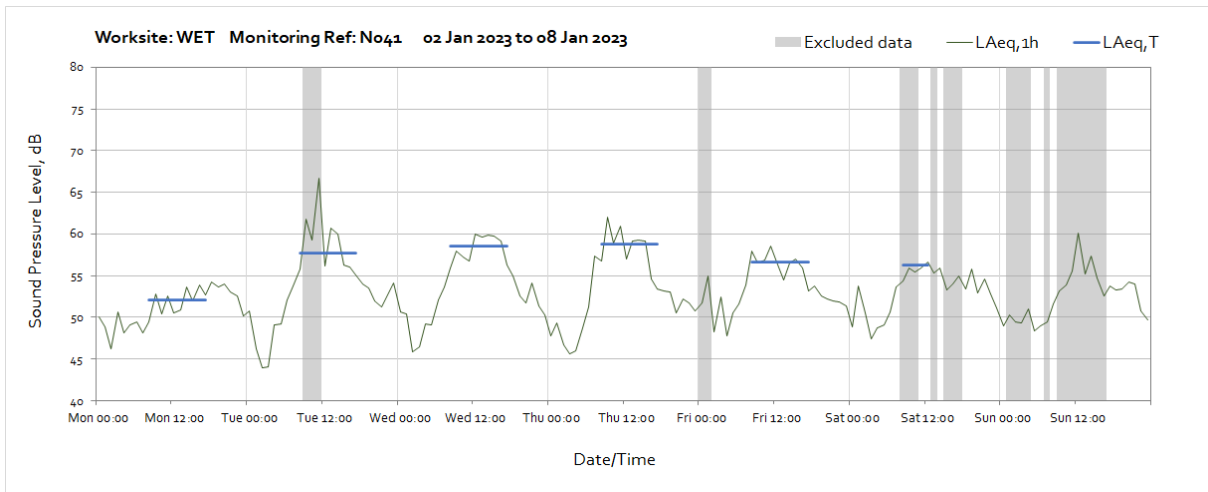


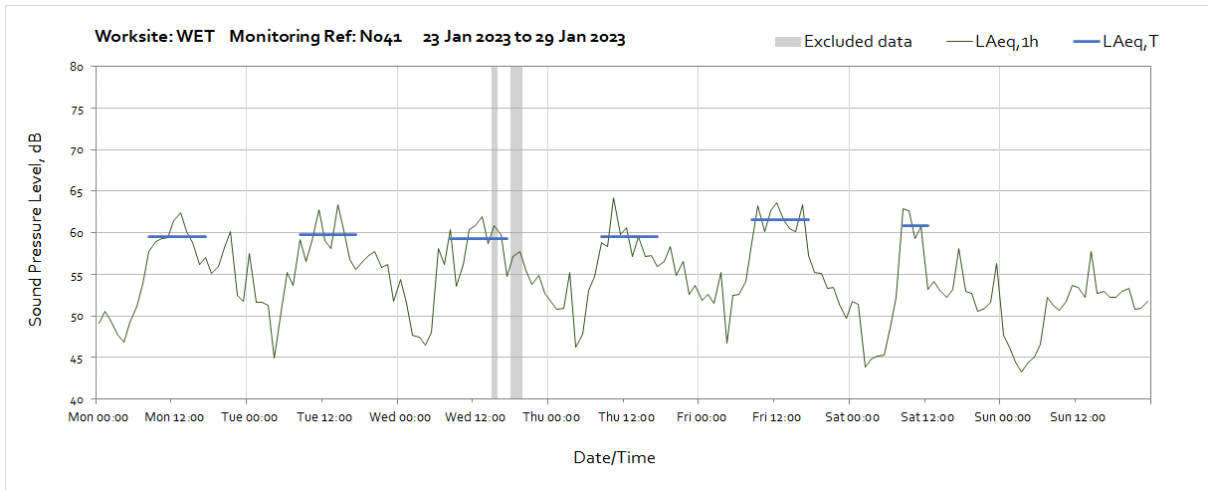
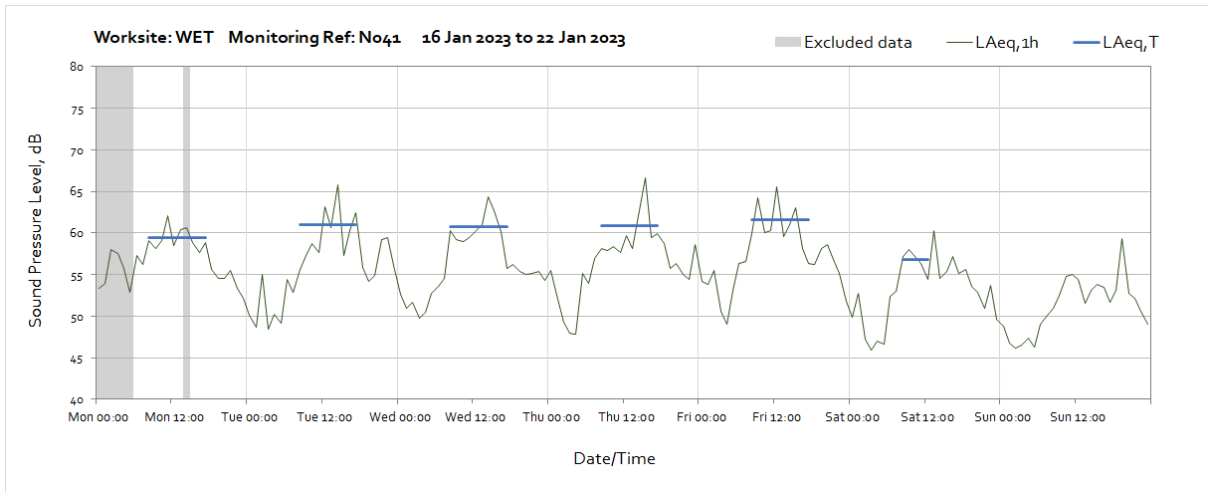
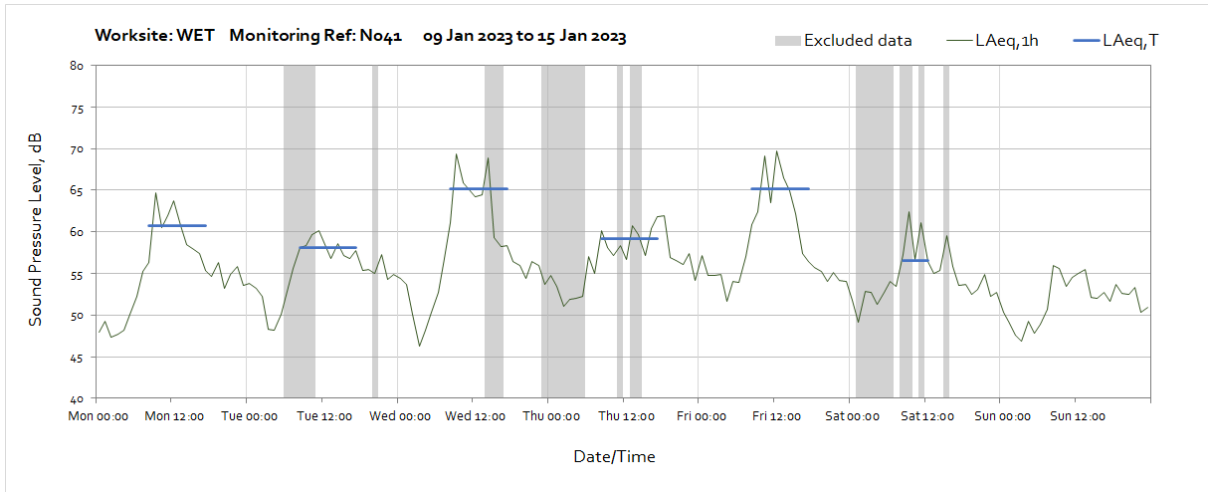


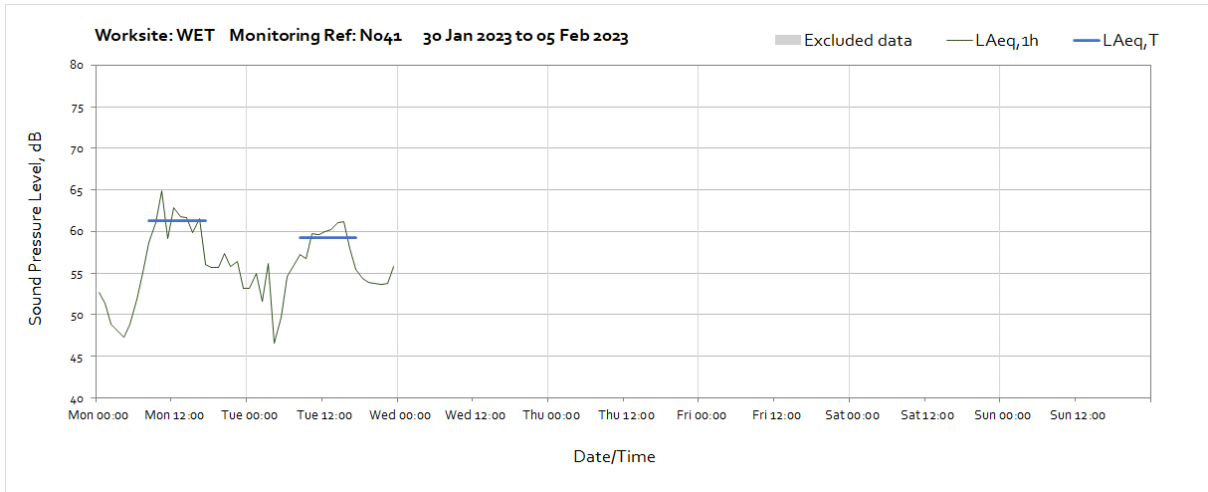
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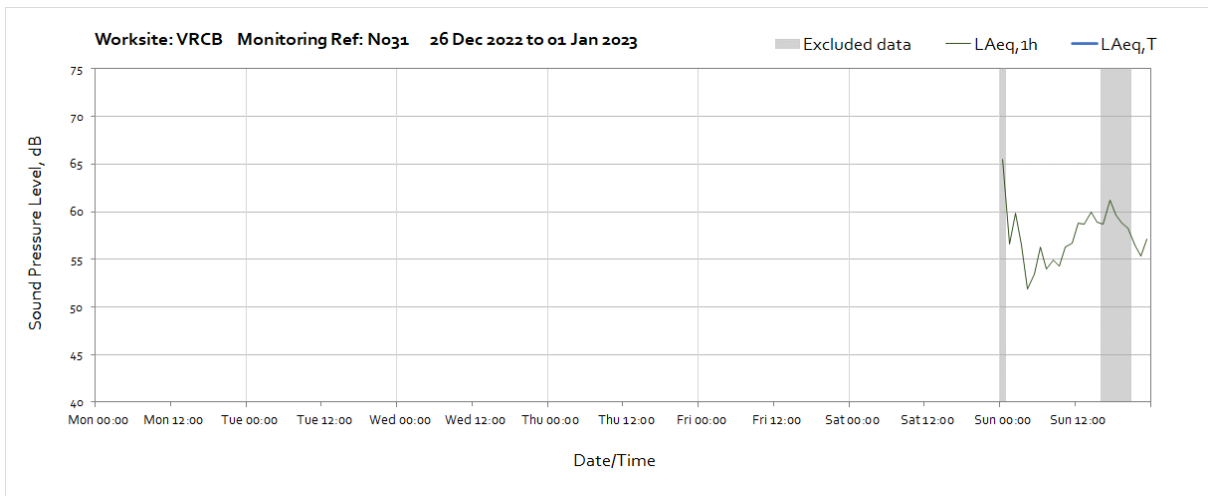
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



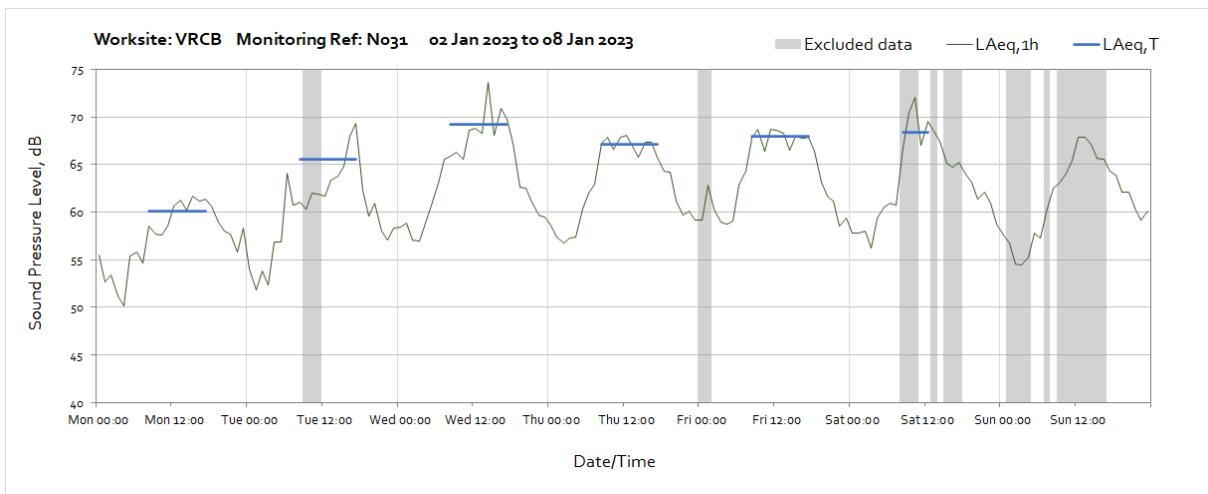


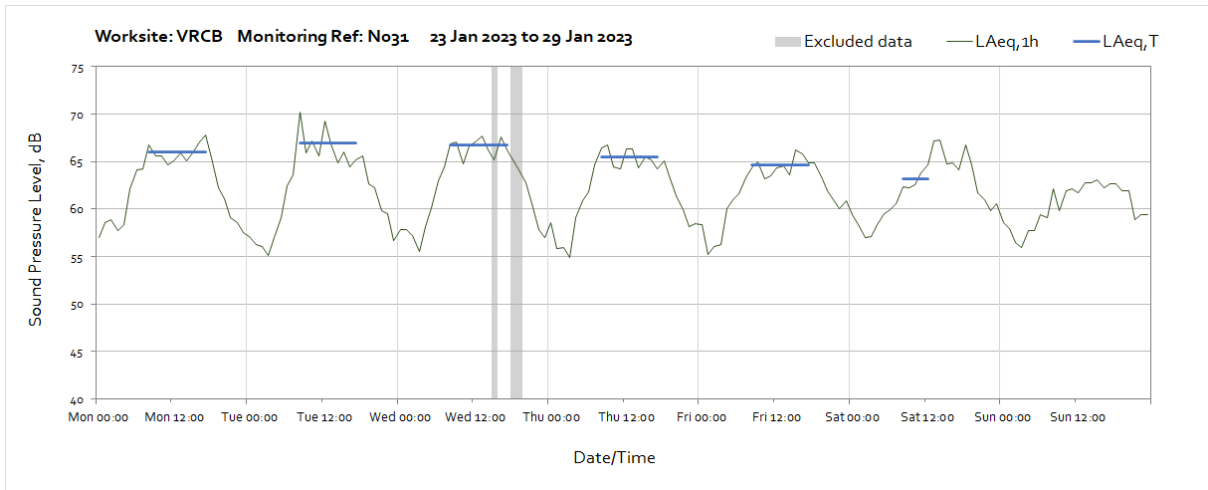
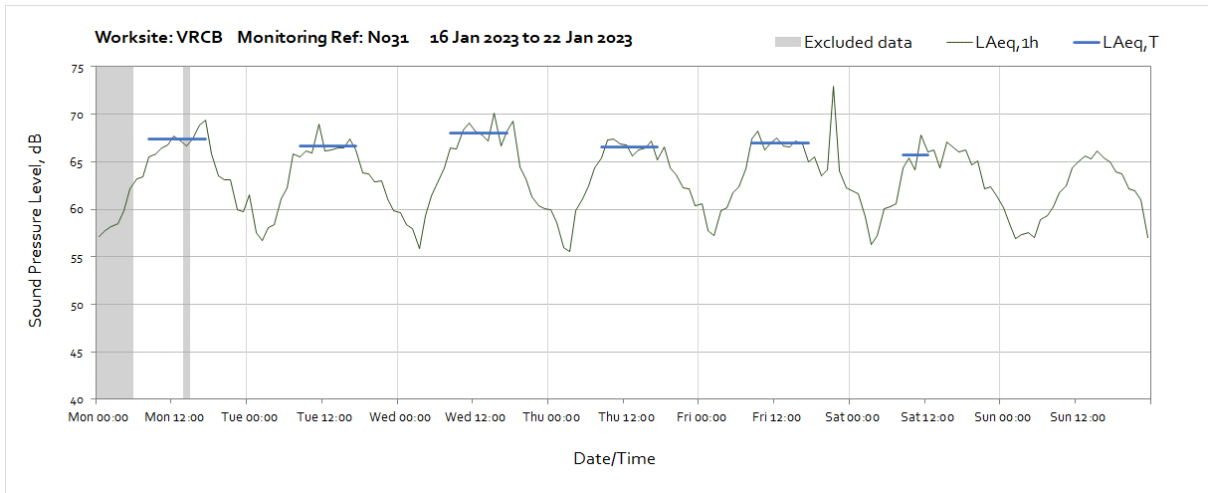
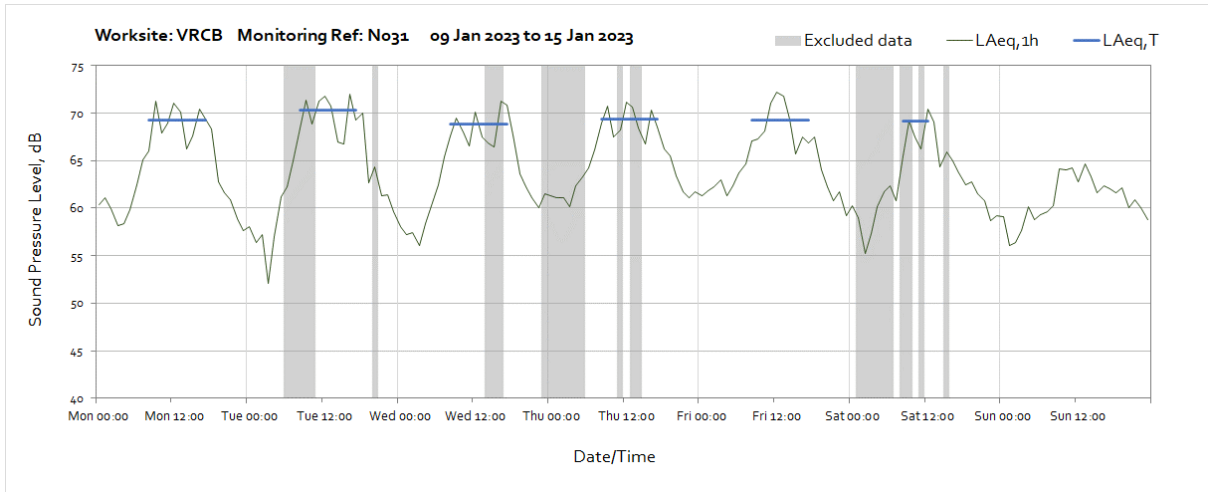


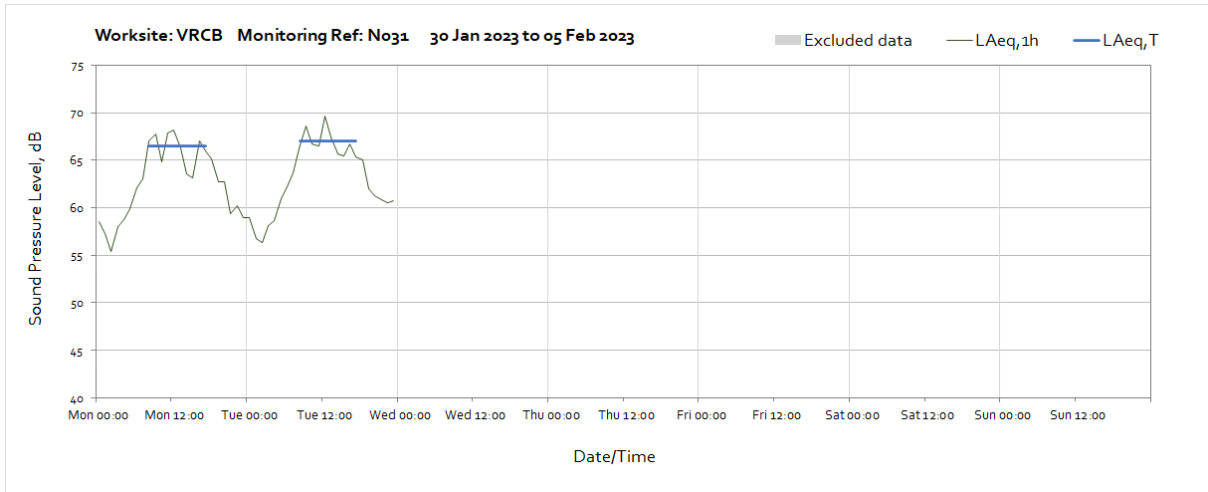
Worksite: Victoria Road Crossover Box (VRCB) – Monitoring Ref: N031



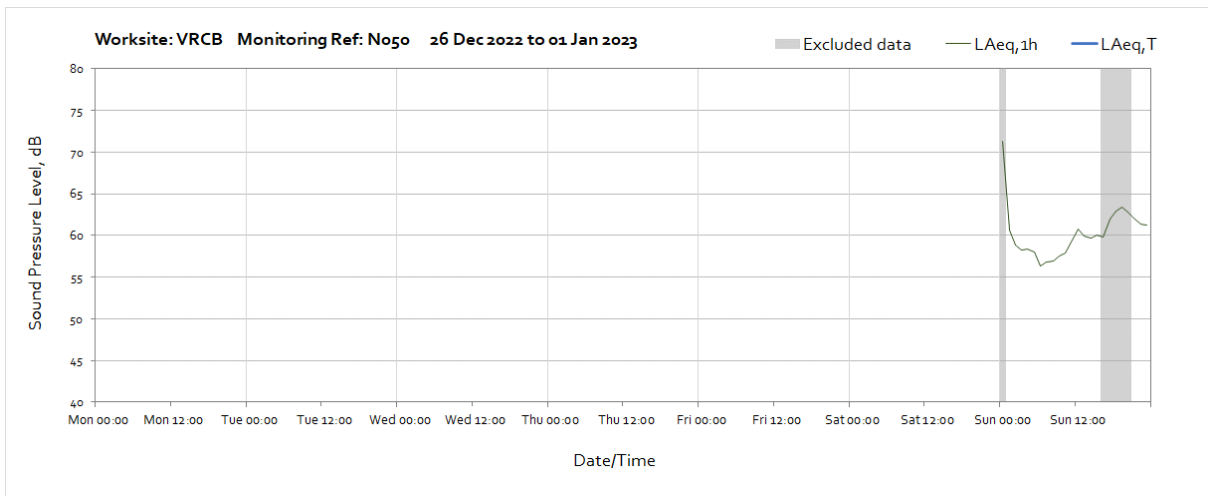
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



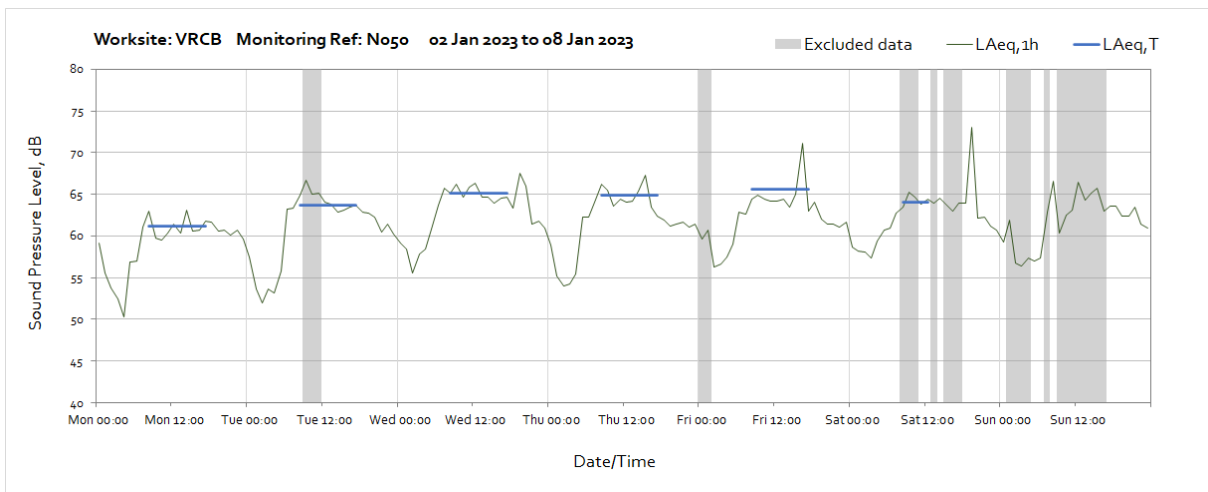


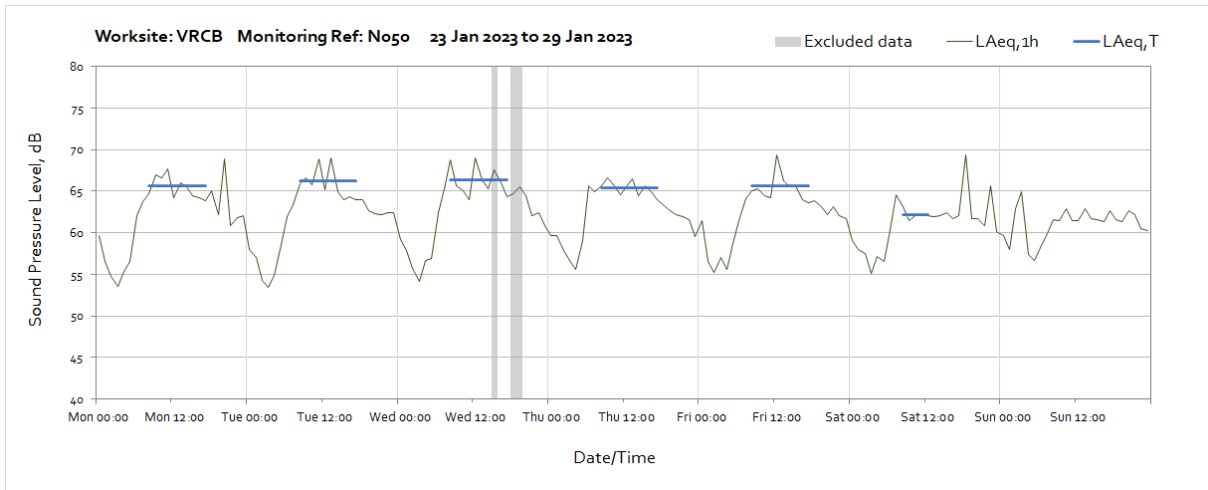
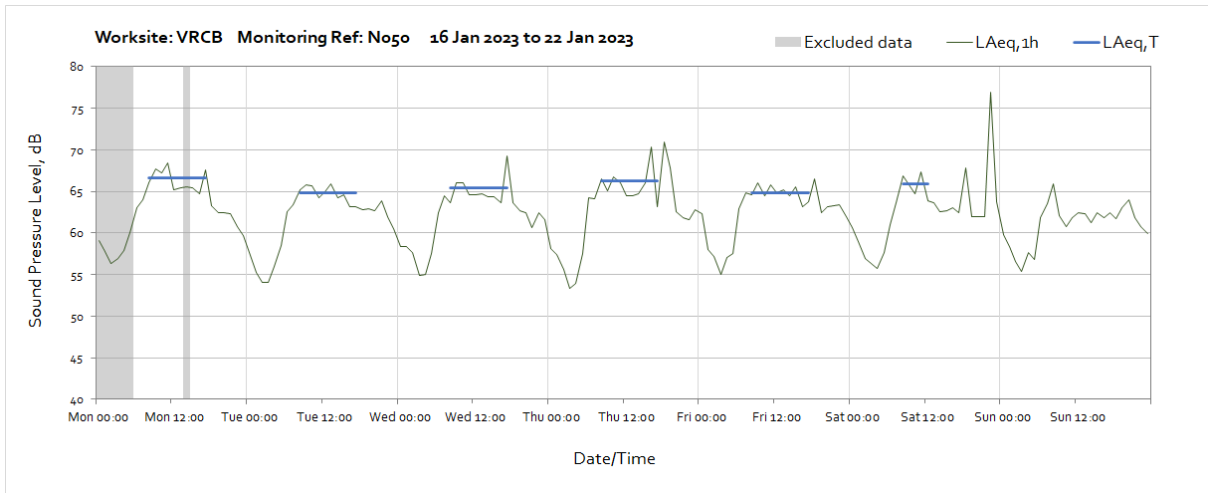
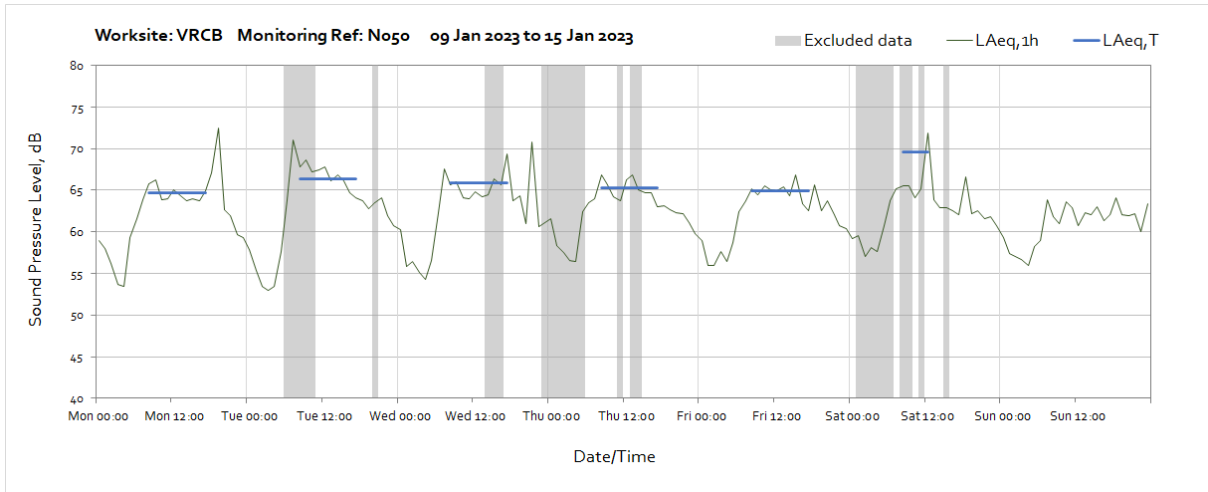


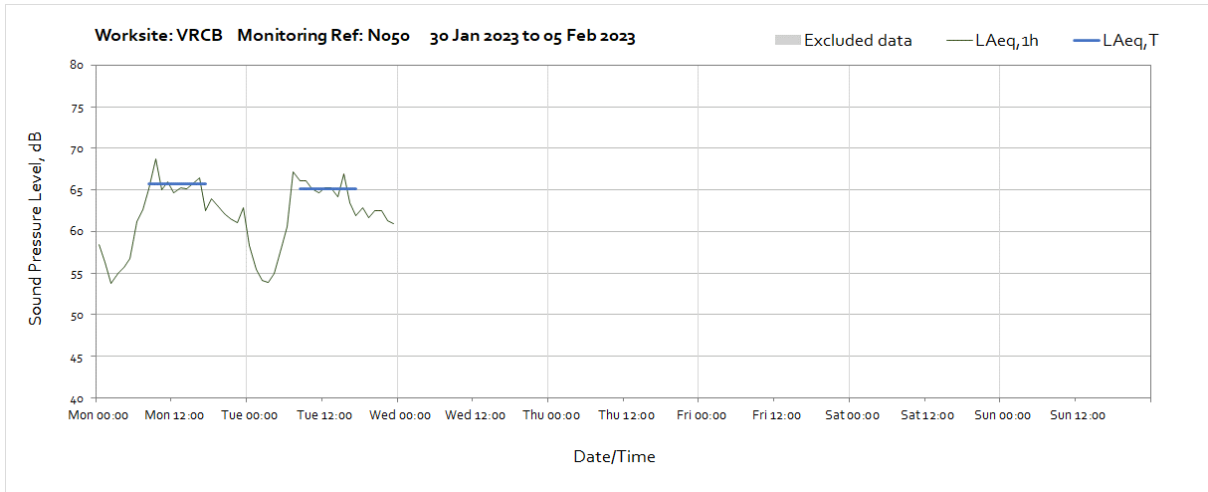
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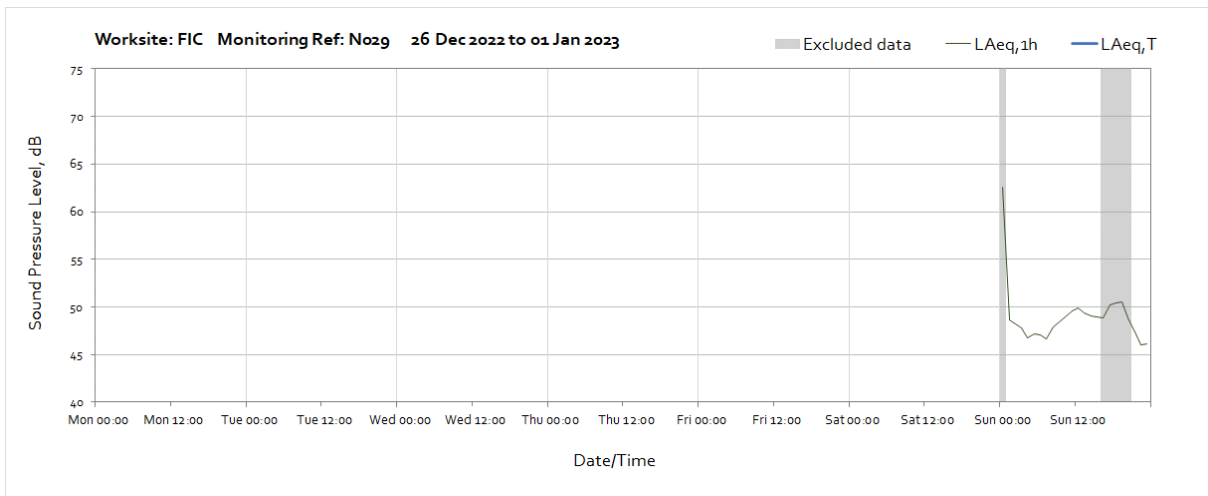
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



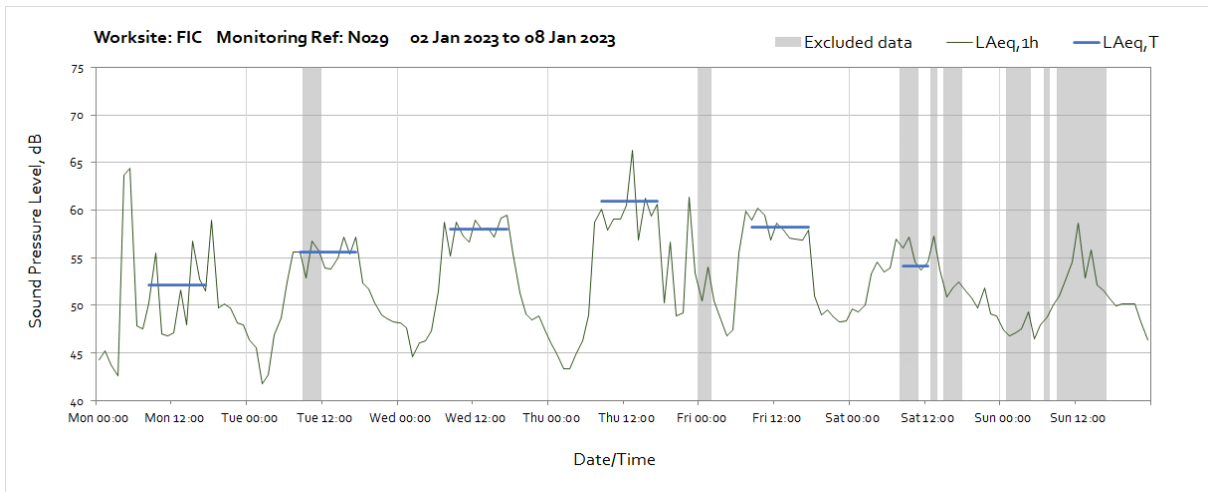


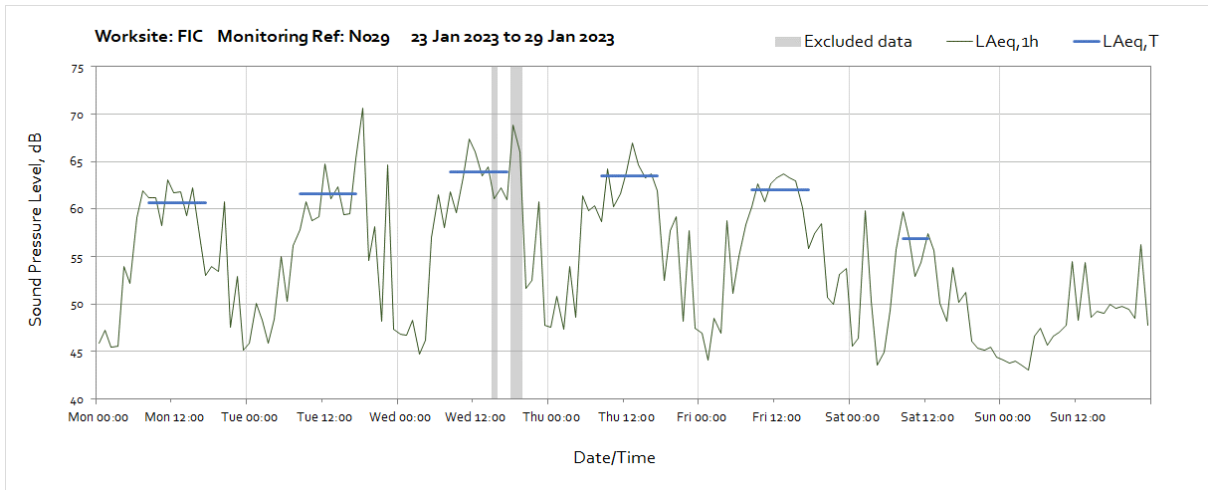
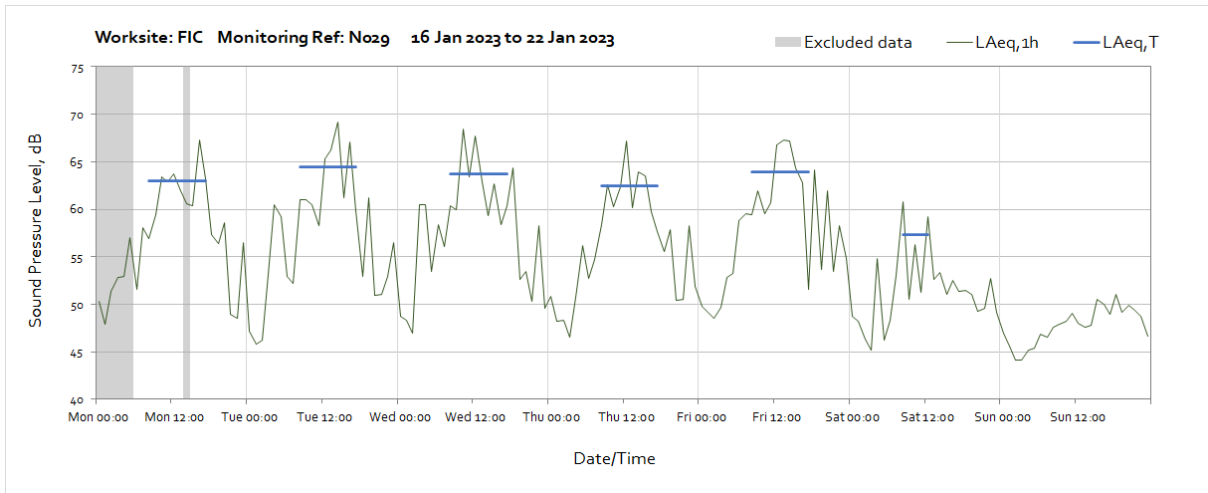
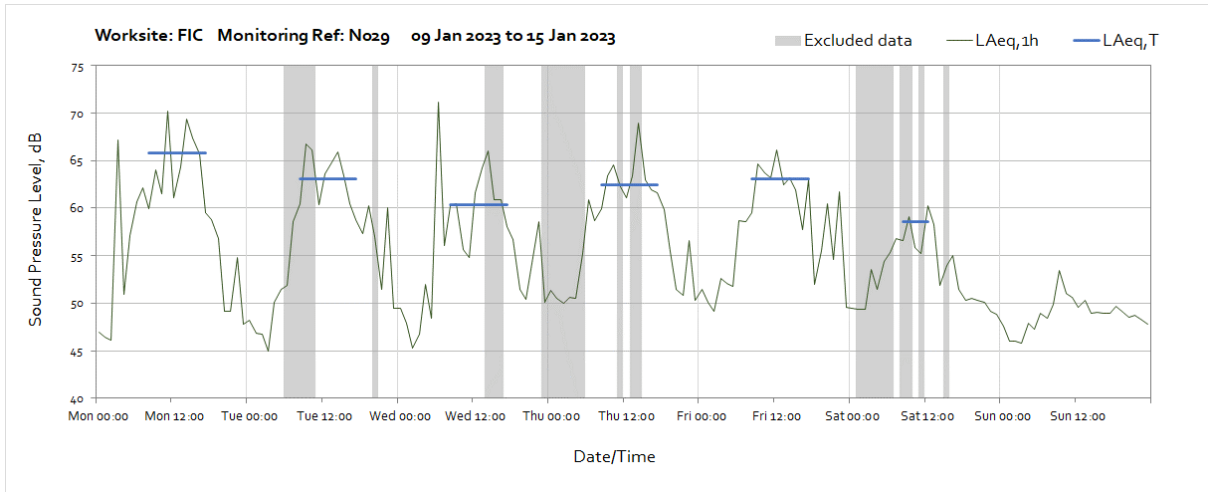


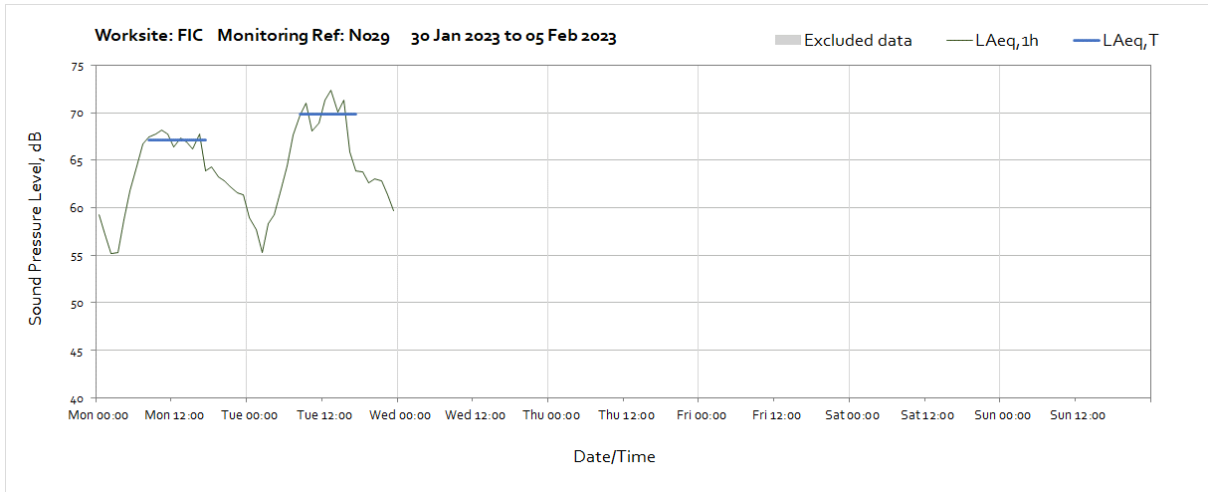
Worksite: Flat Iron Compound (FIC) – Monitoring Ref: N029



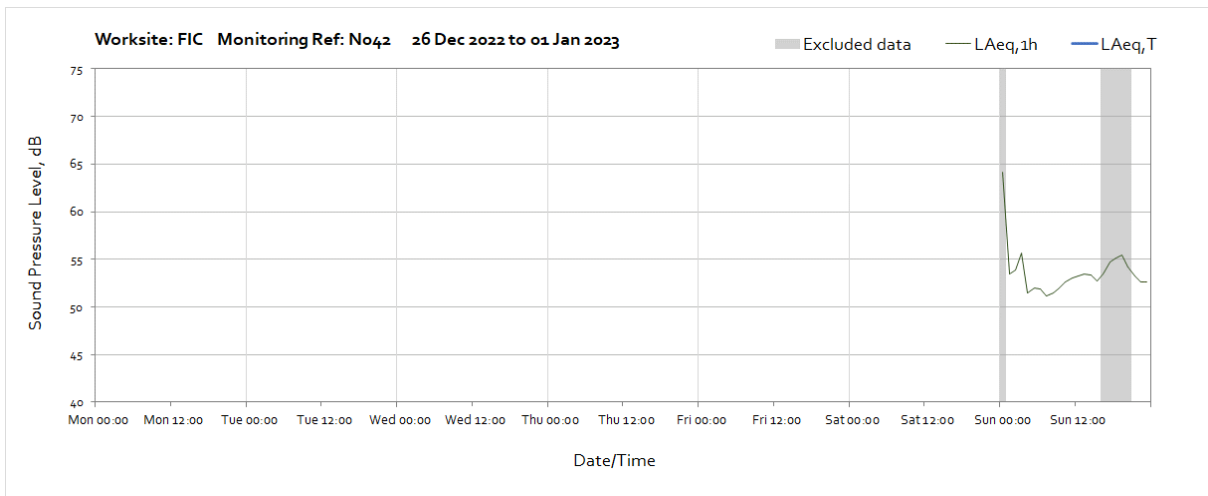
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



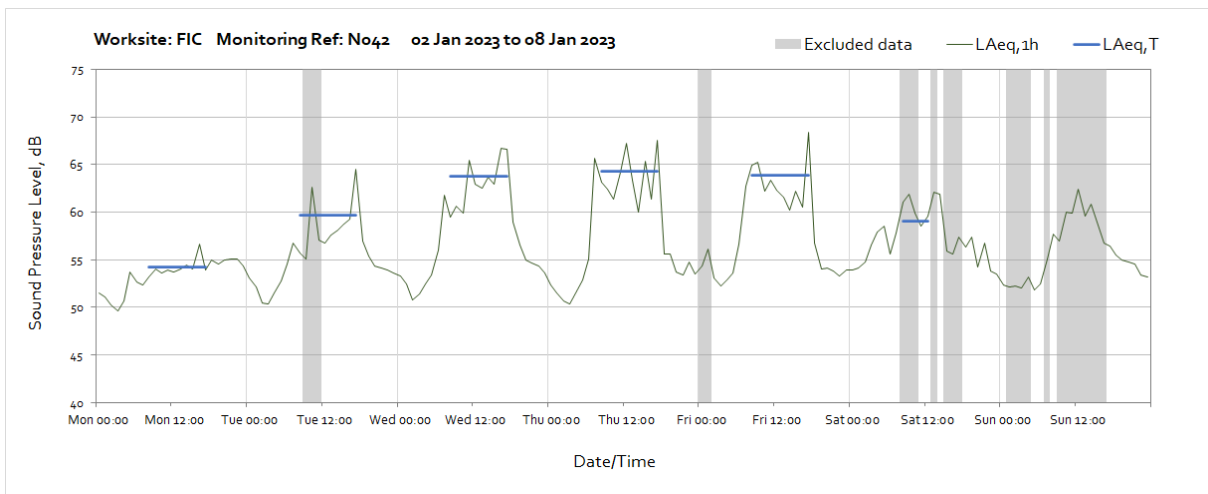


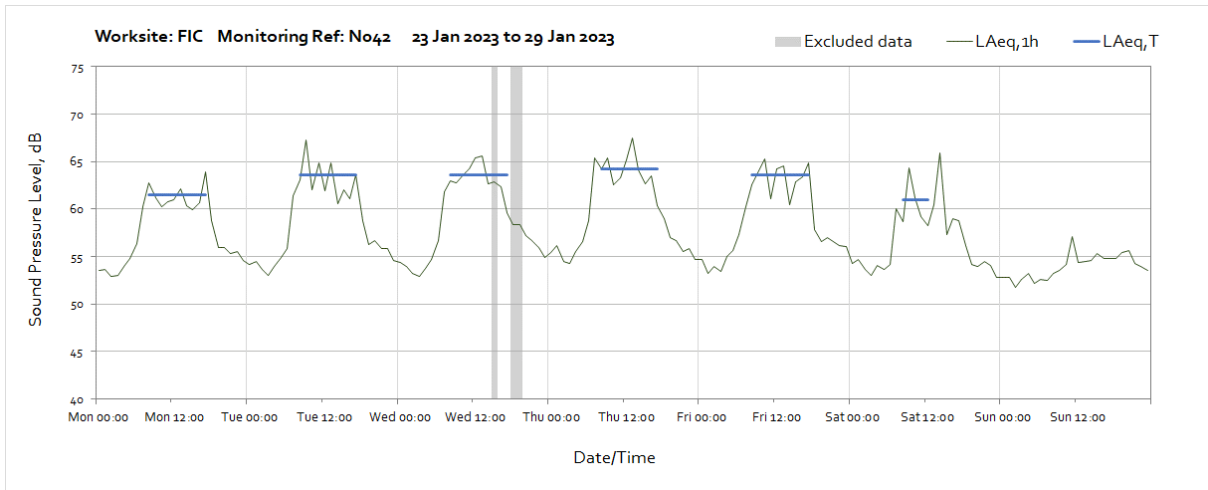
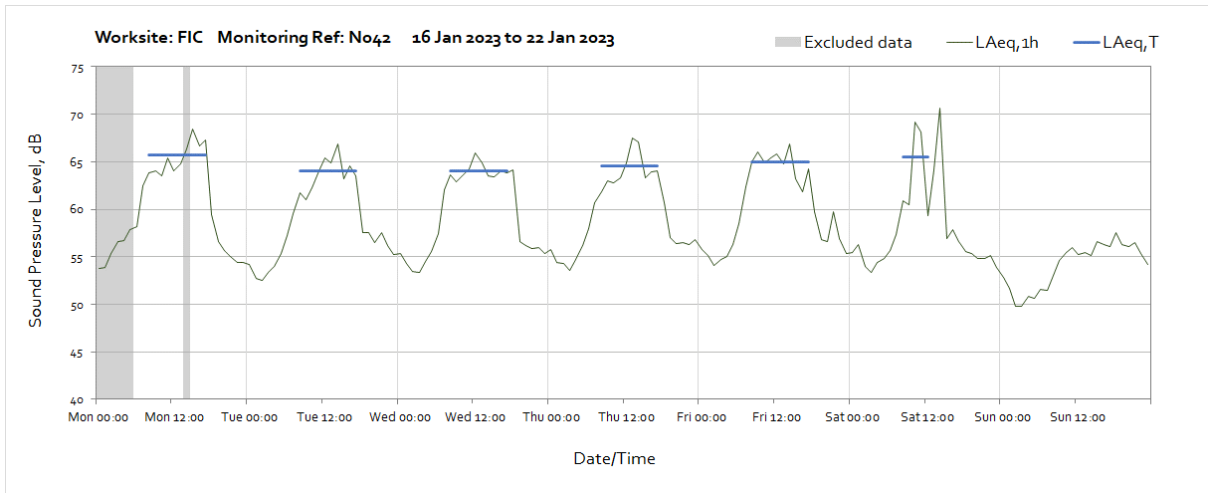
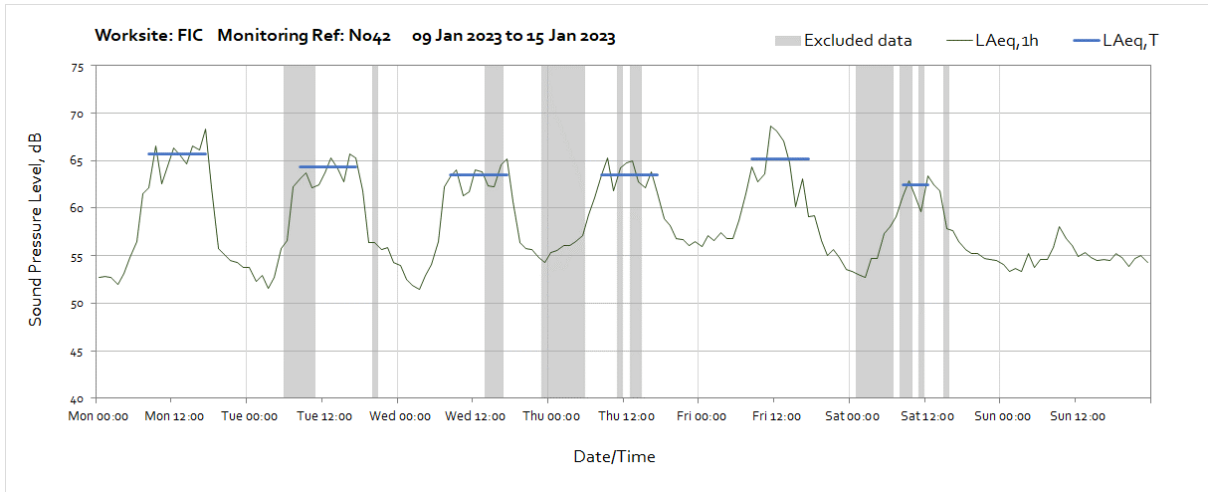


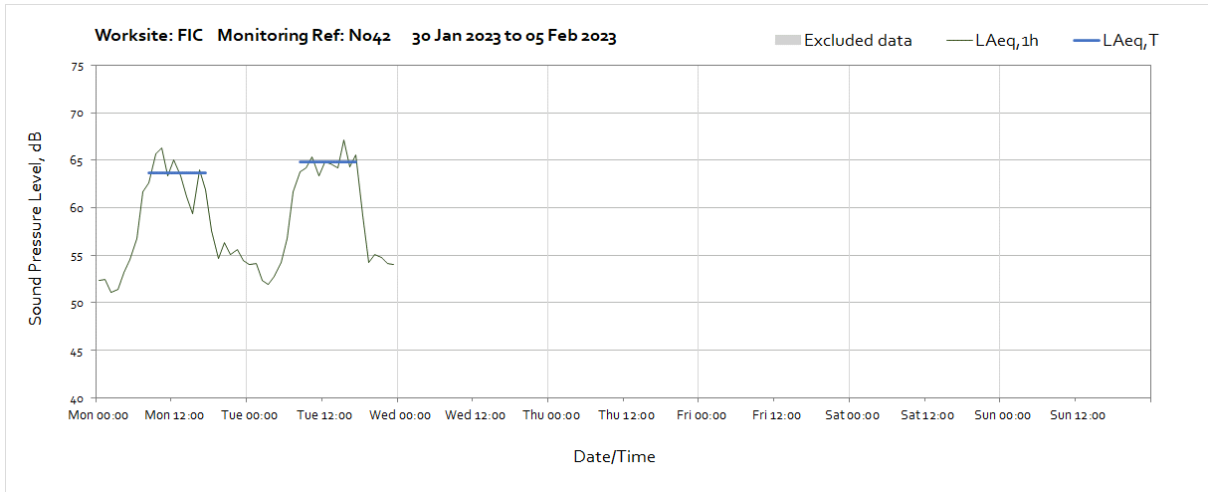
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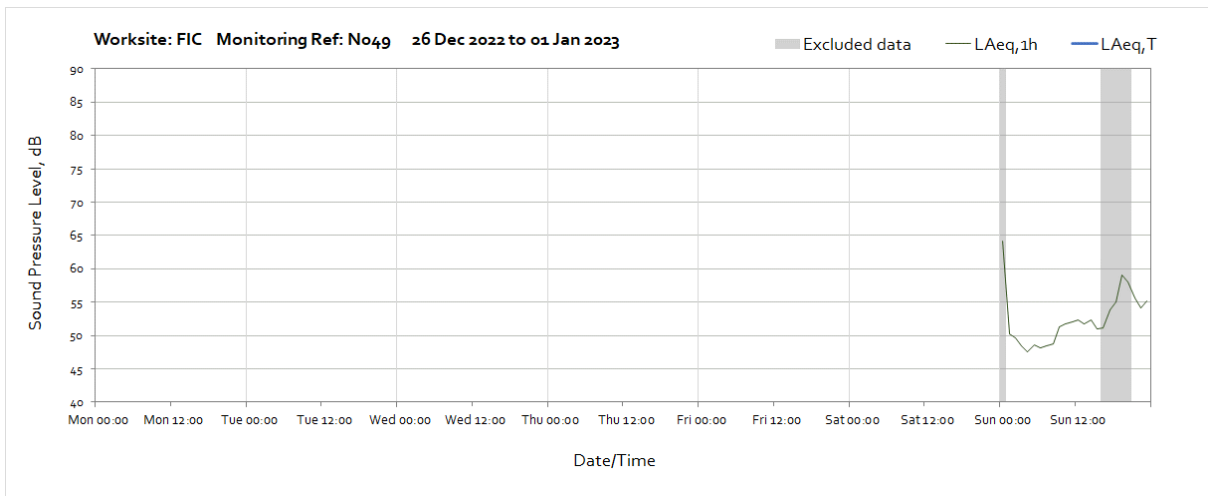
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



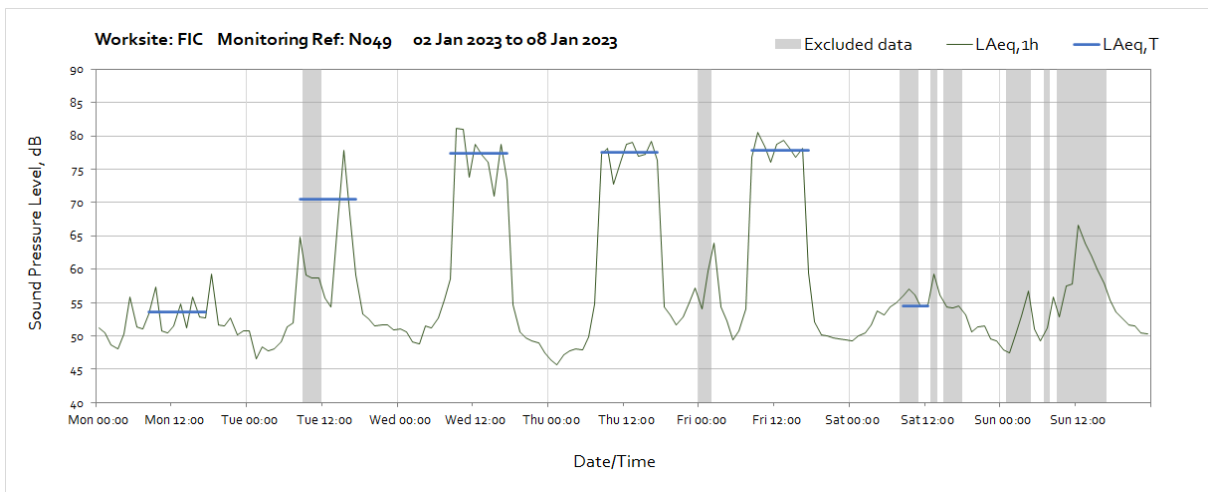


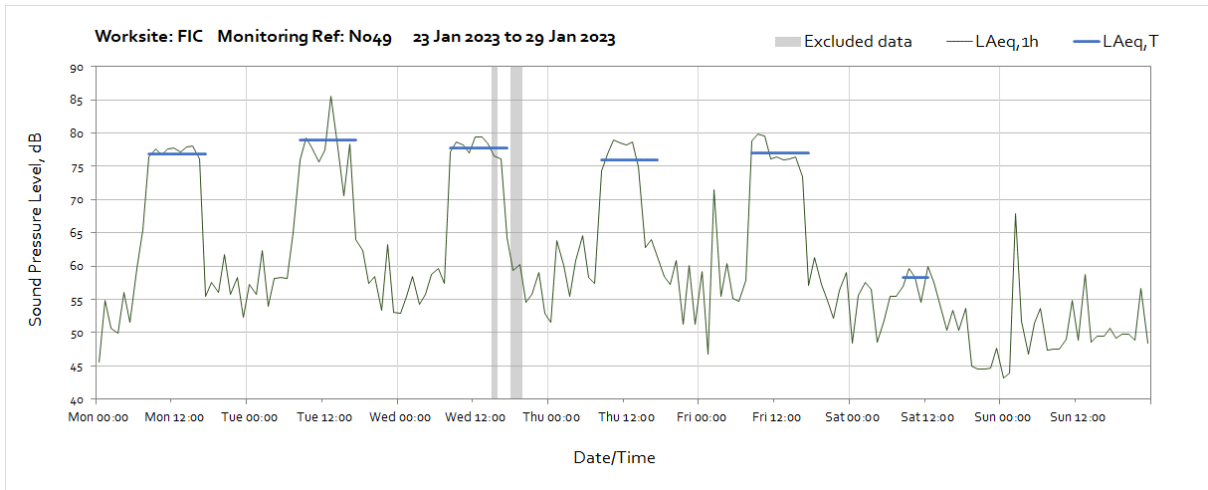
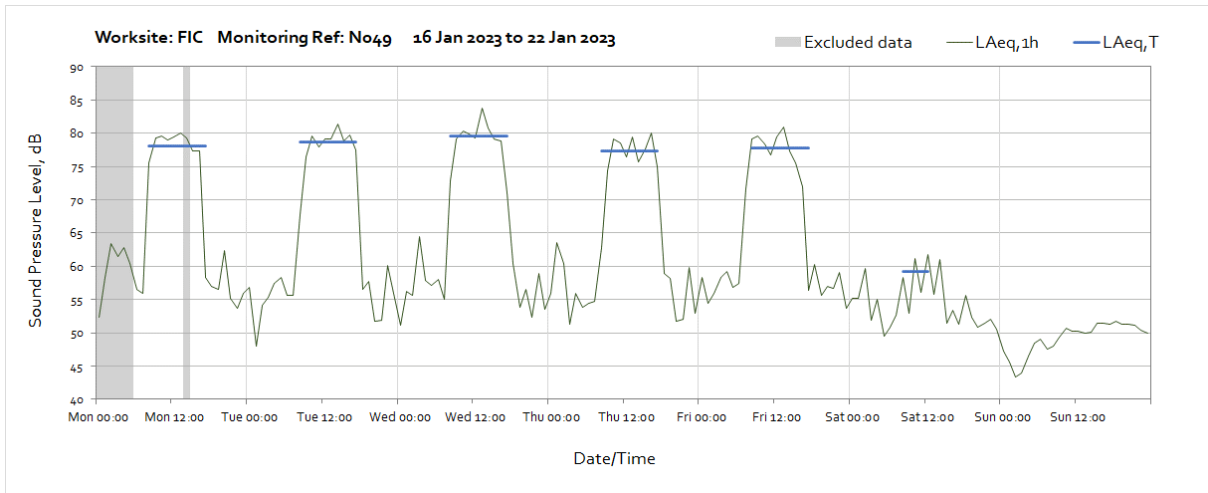
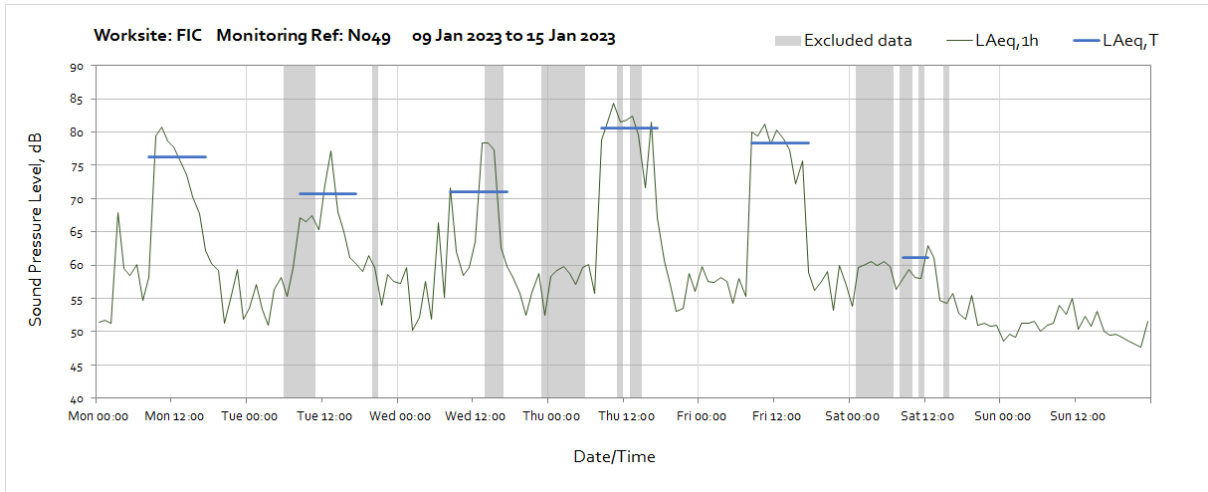


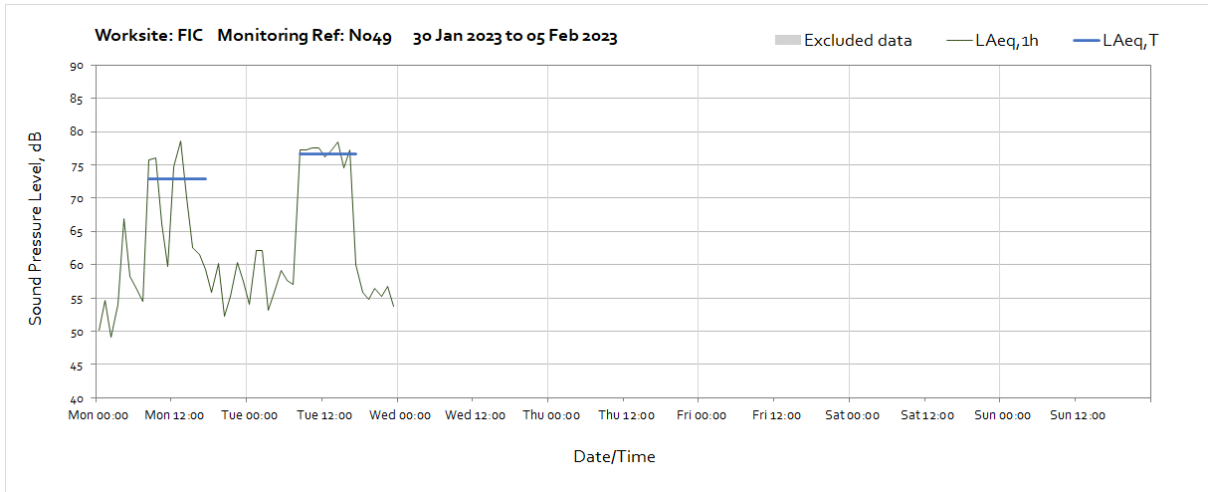
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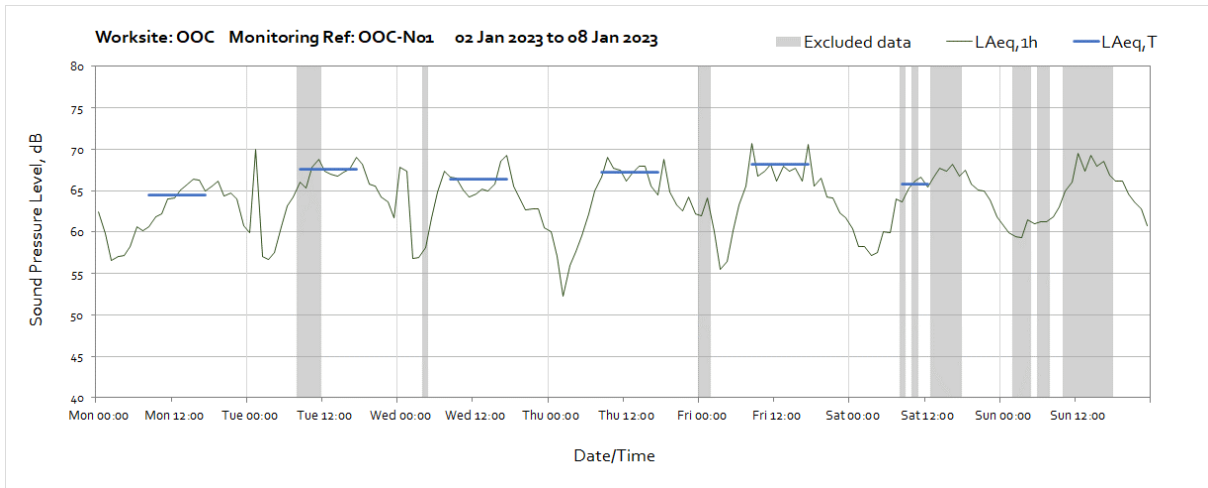
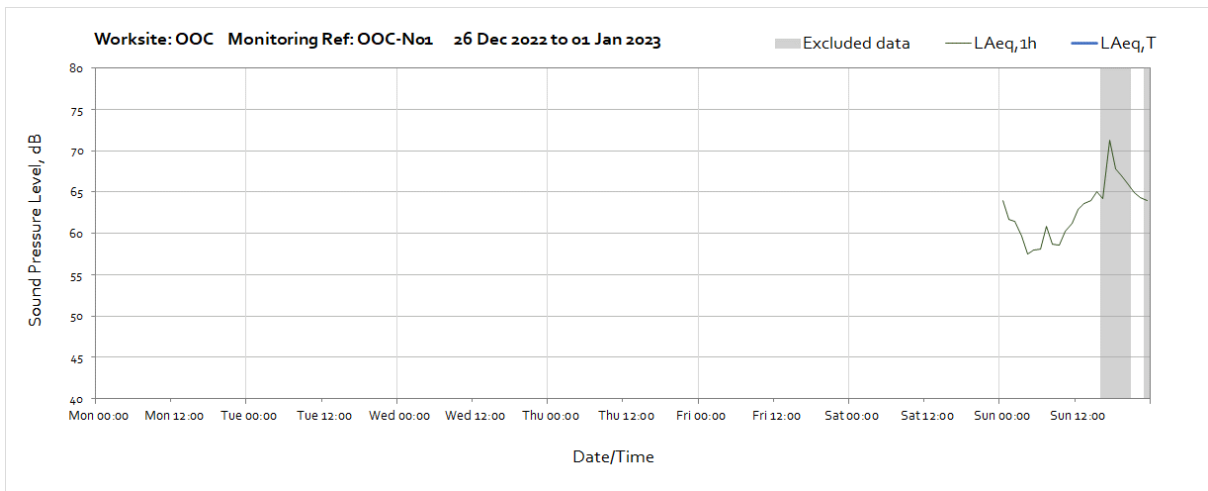
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.

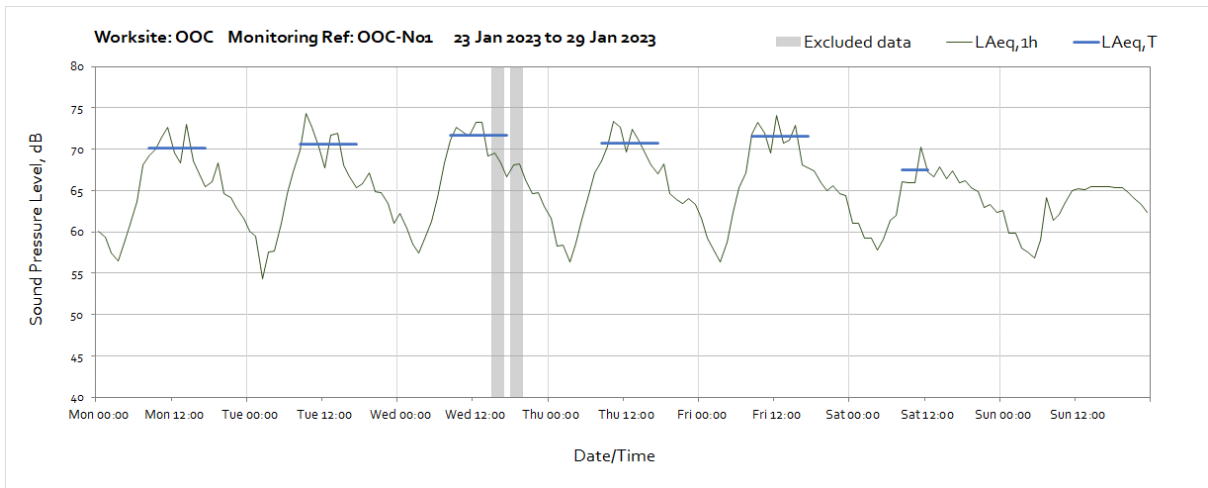
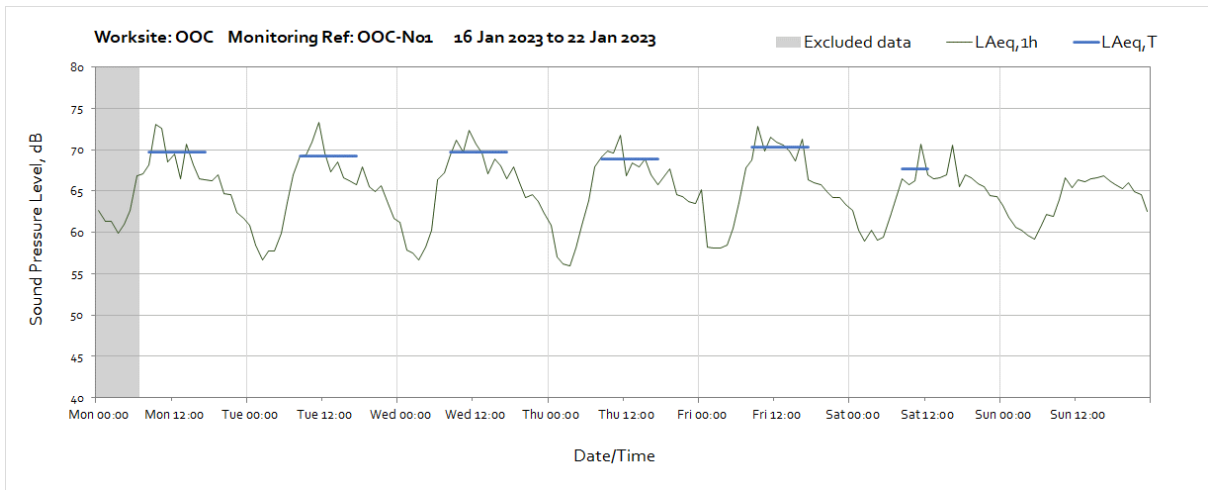
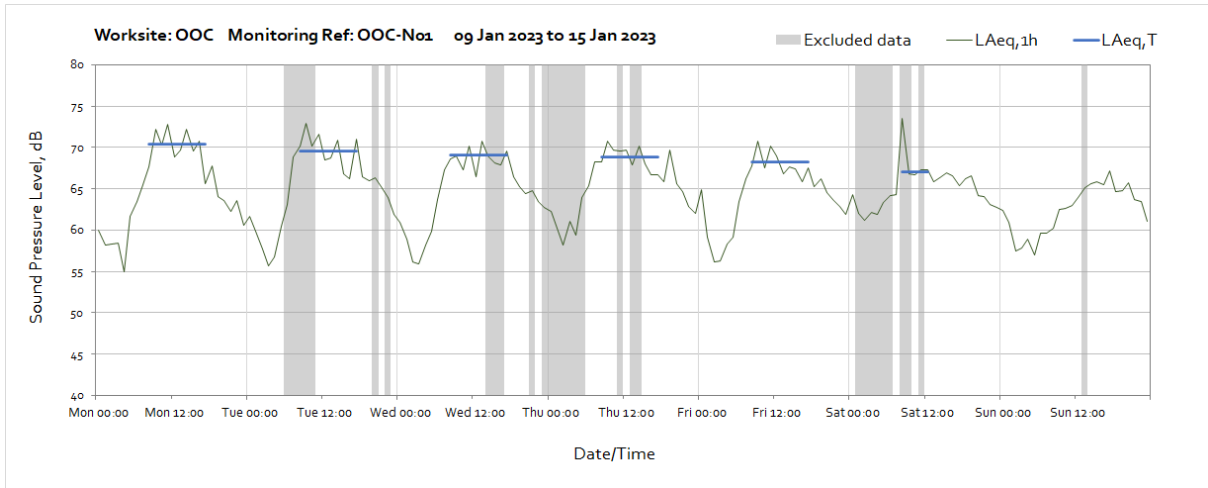


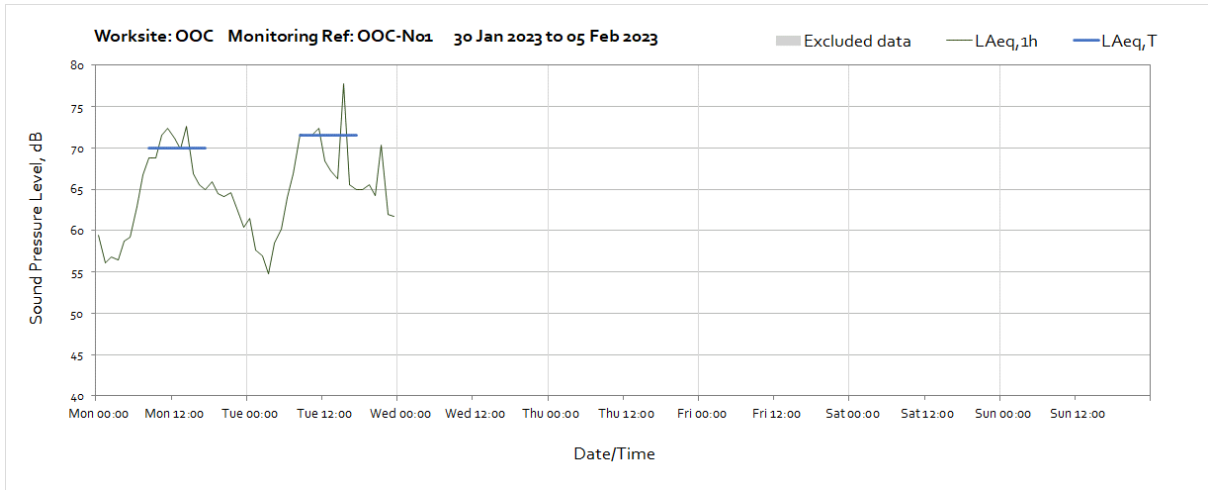




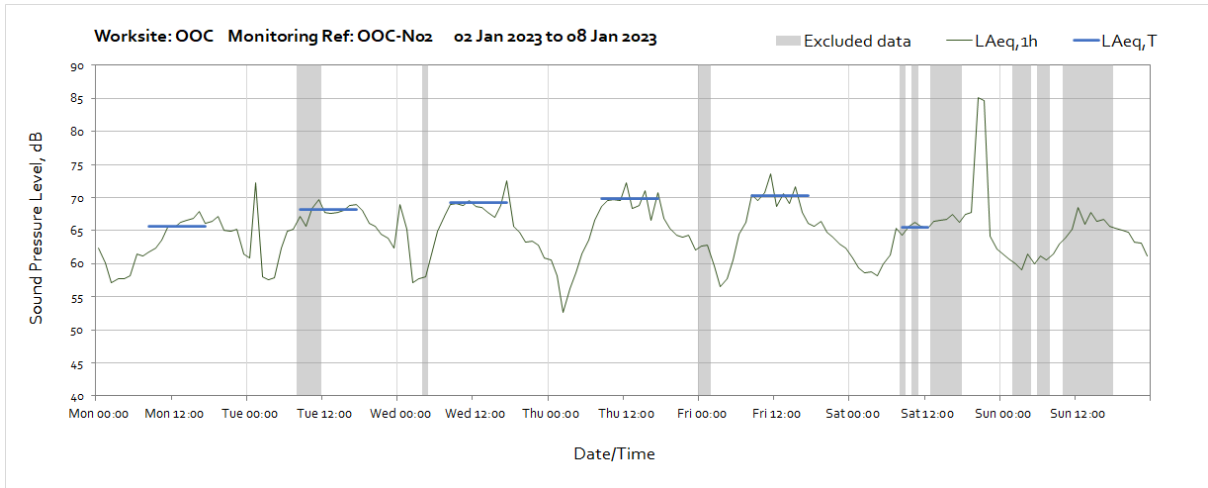
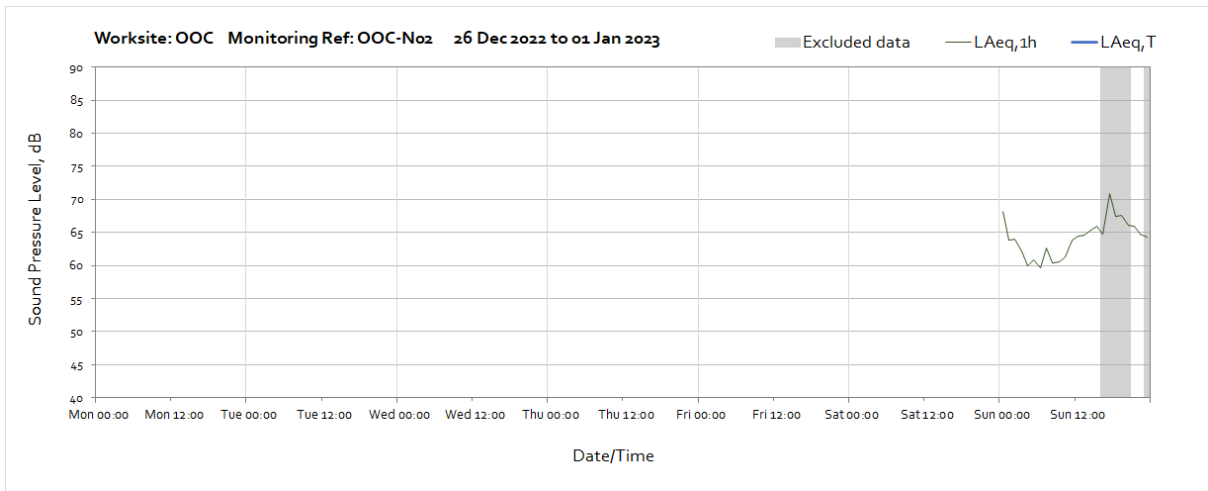
Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-N01

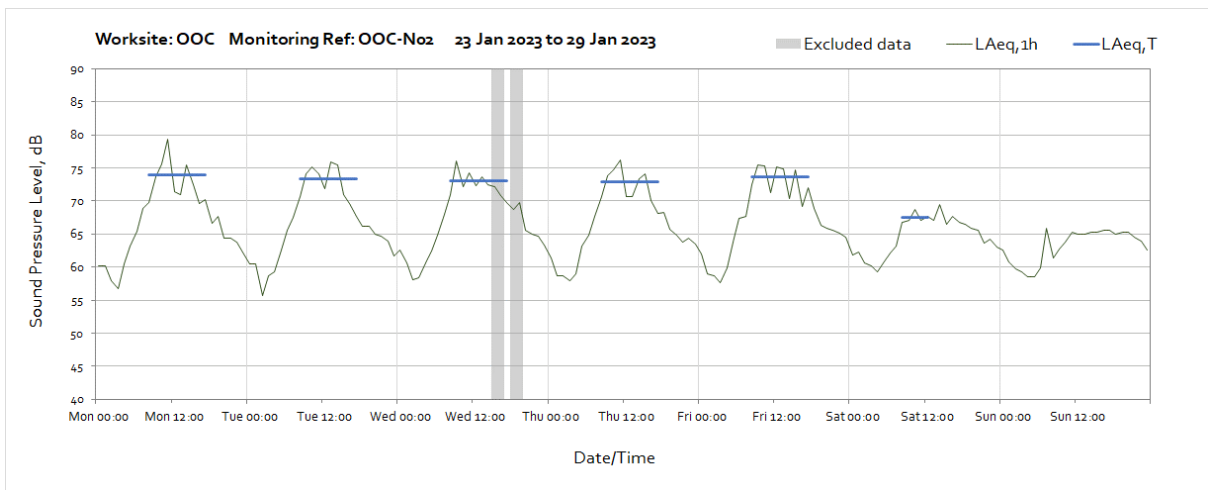
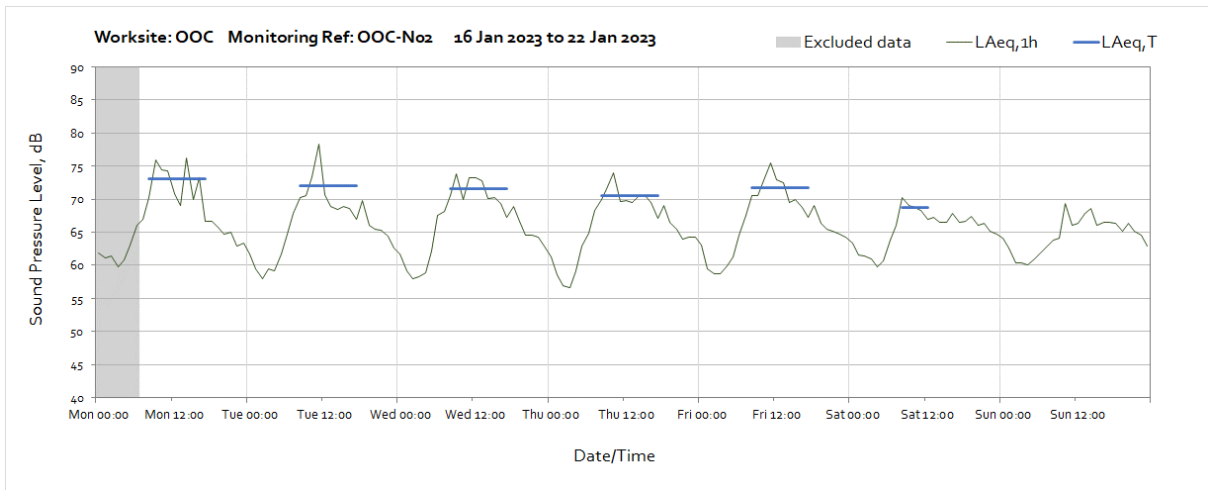
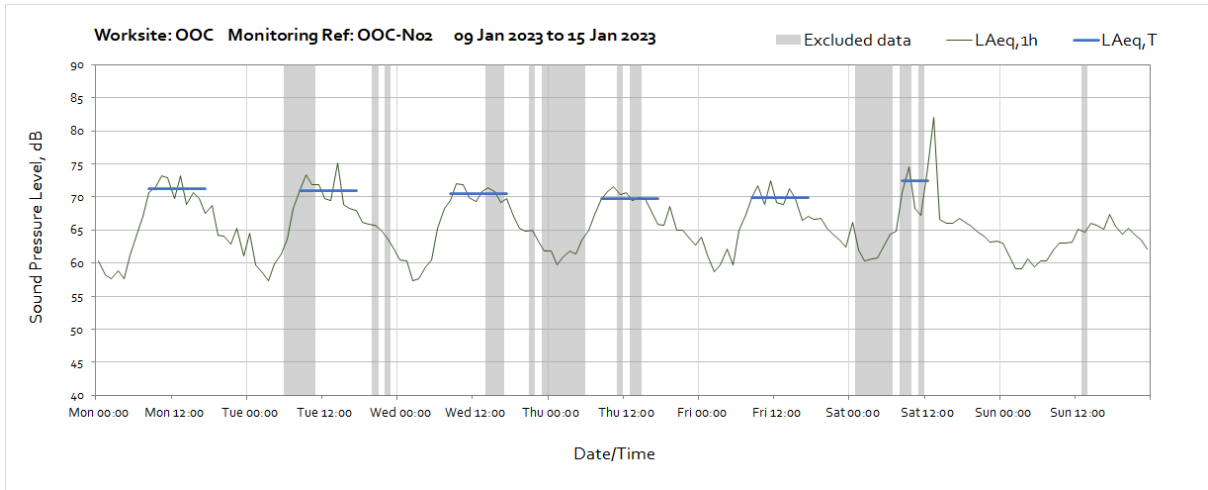


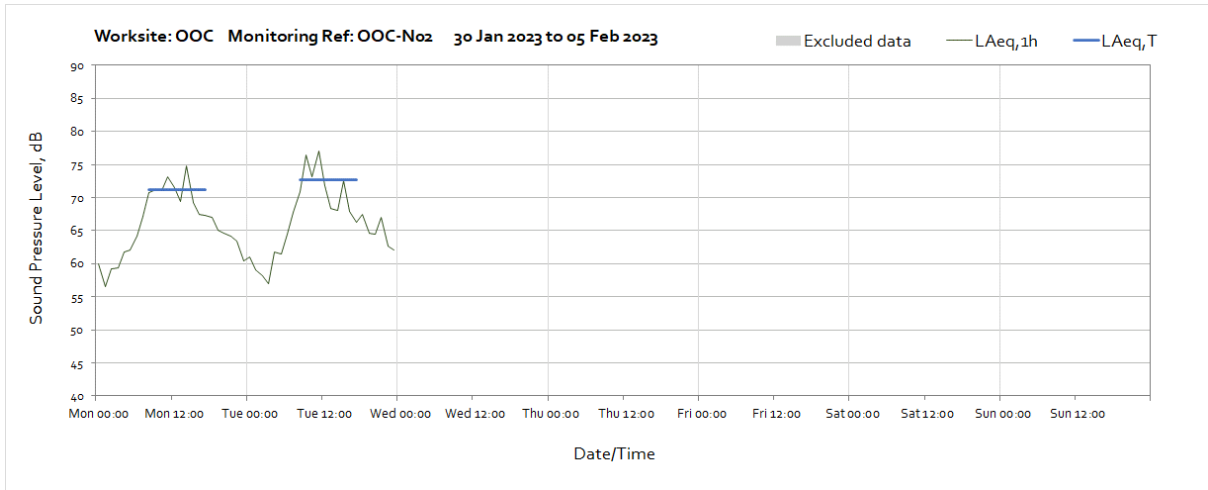




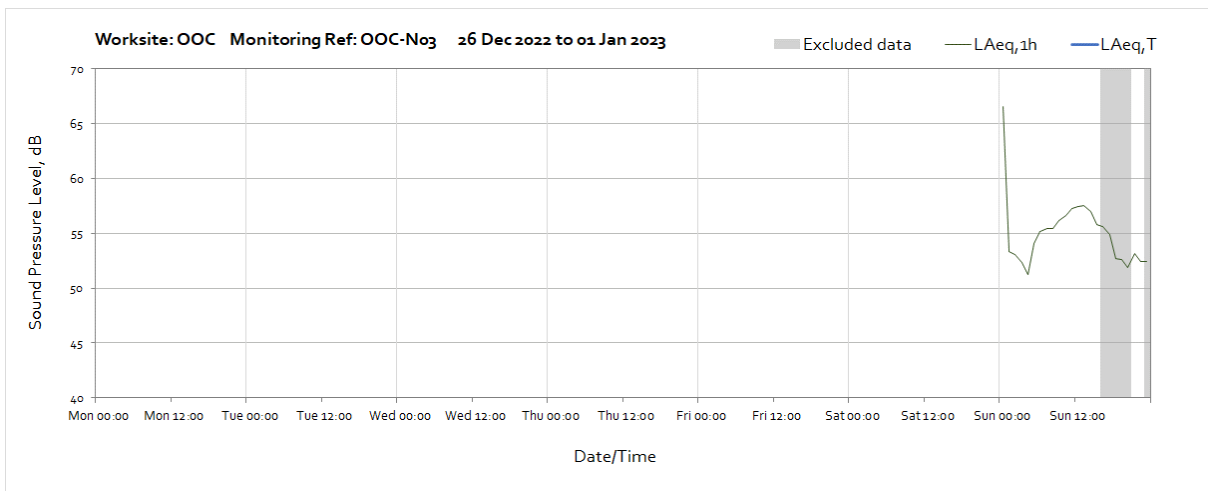
Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-N02



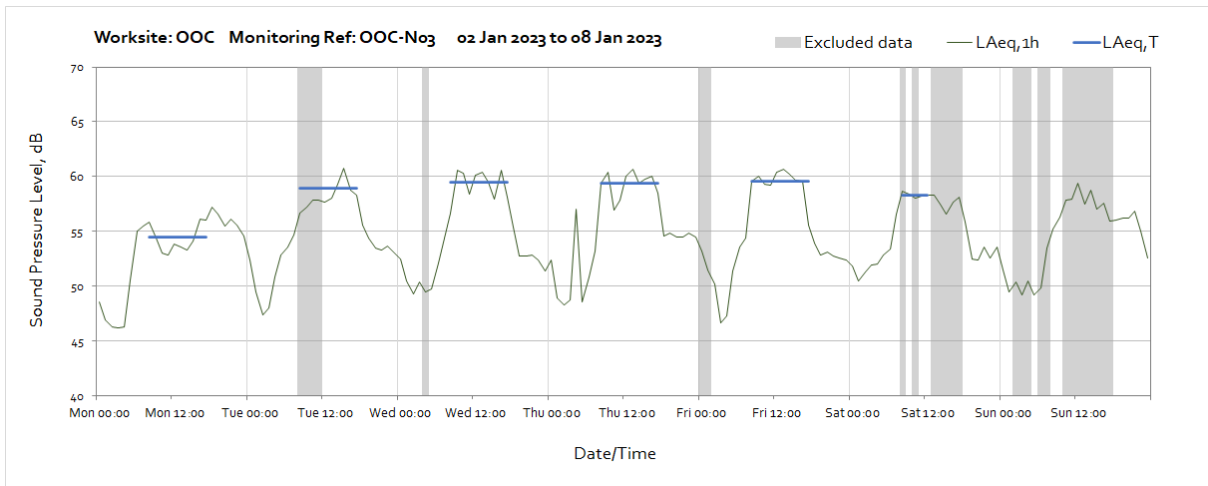


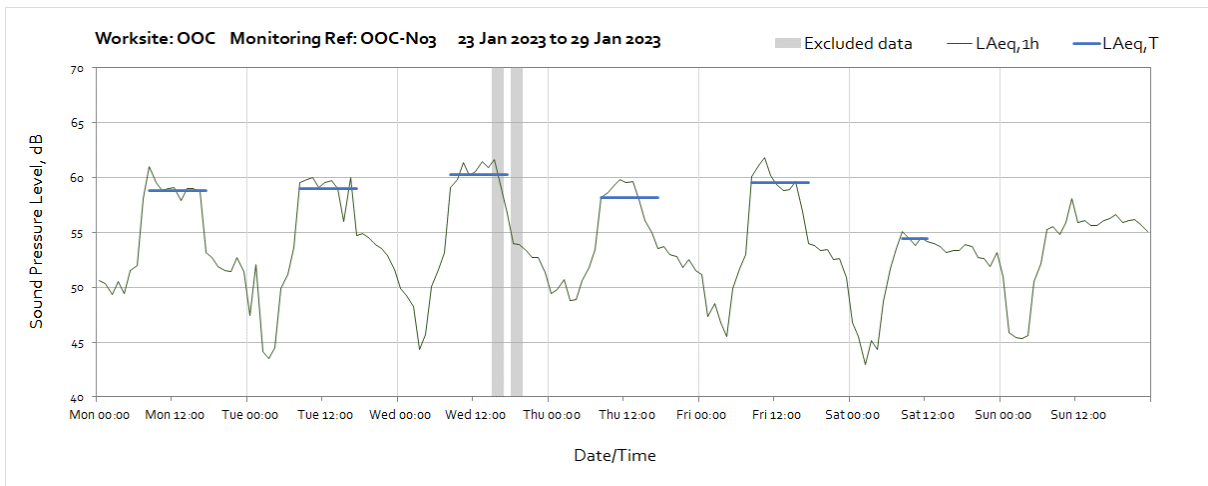
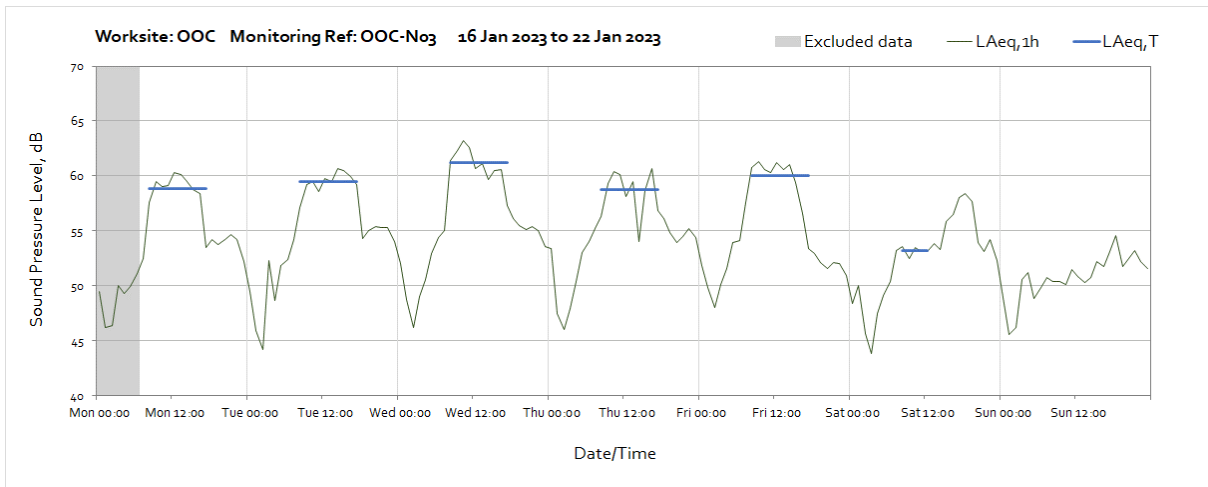
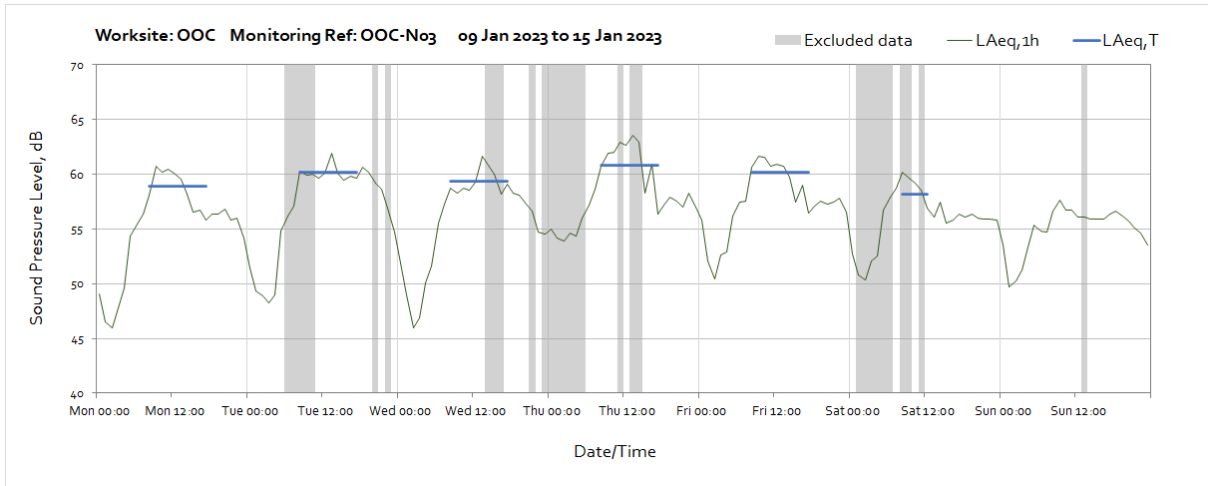


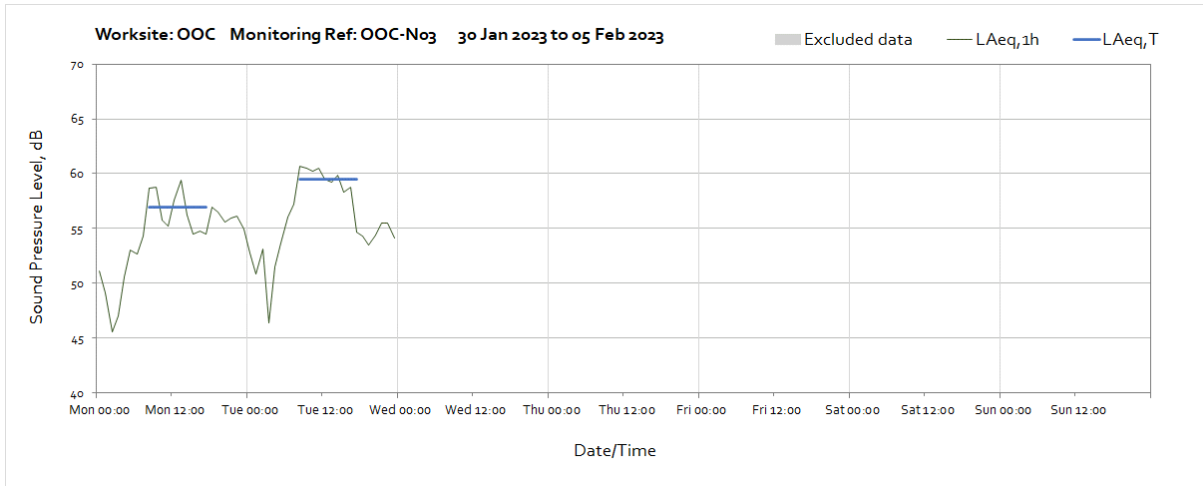
Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-N03



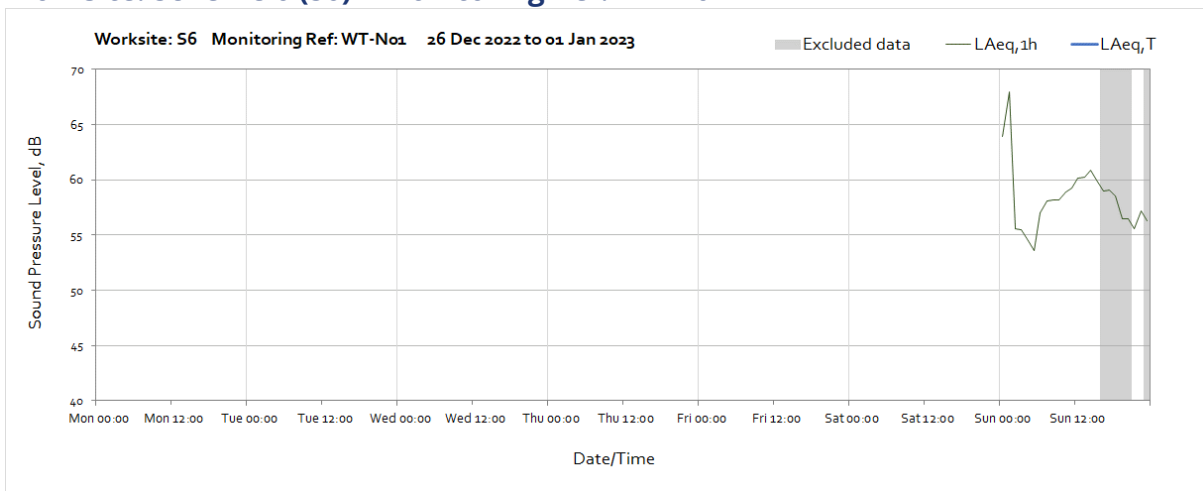
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



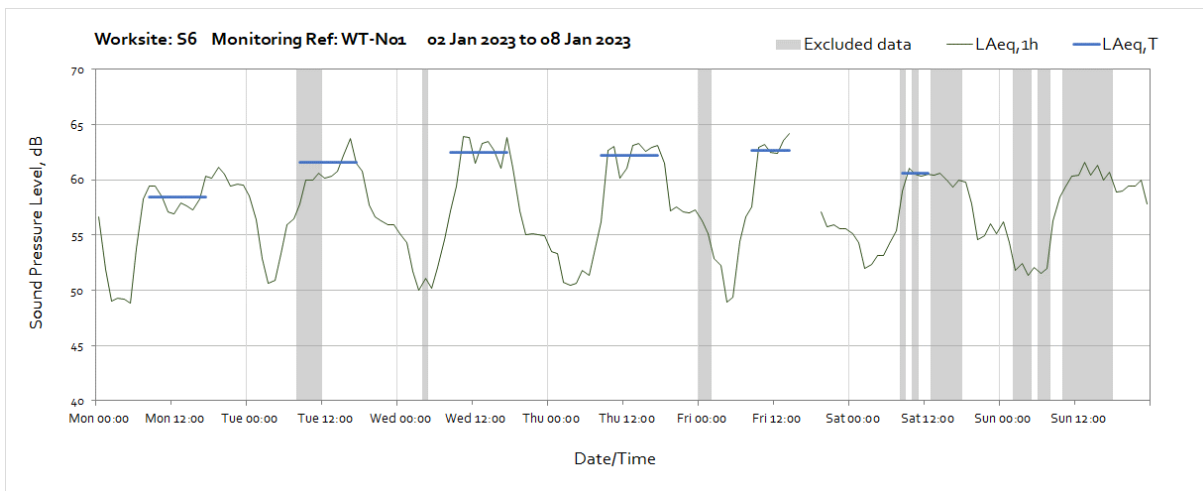




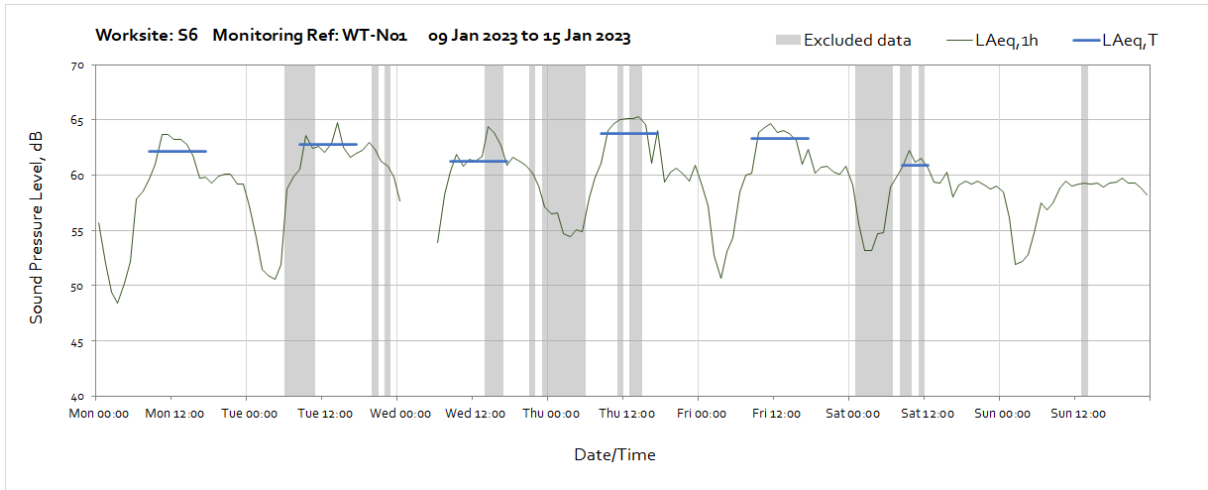
Worksite: Scheme 6 (S6) – Monitoring Ref: WT-N01



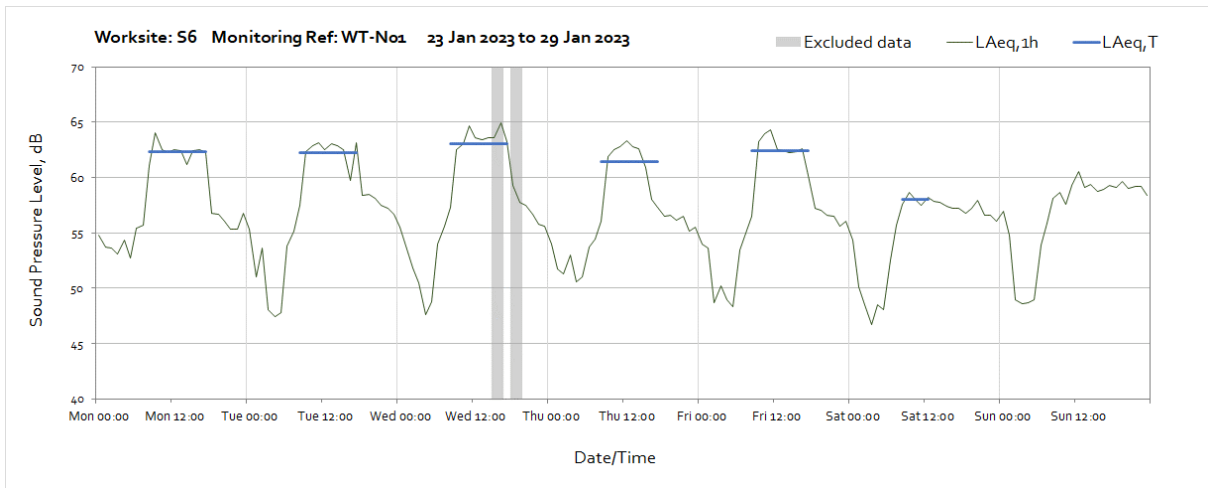
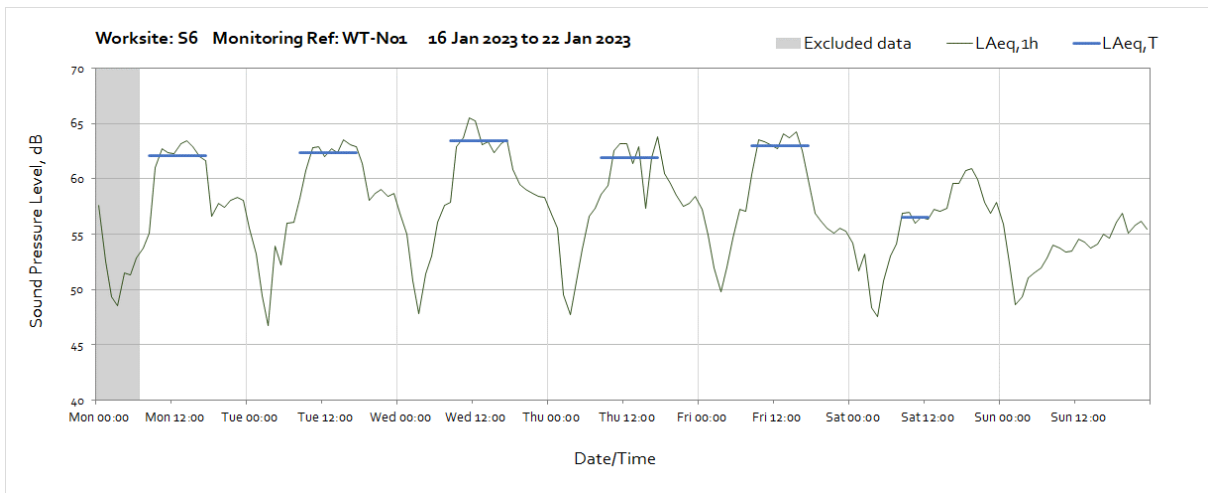
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.

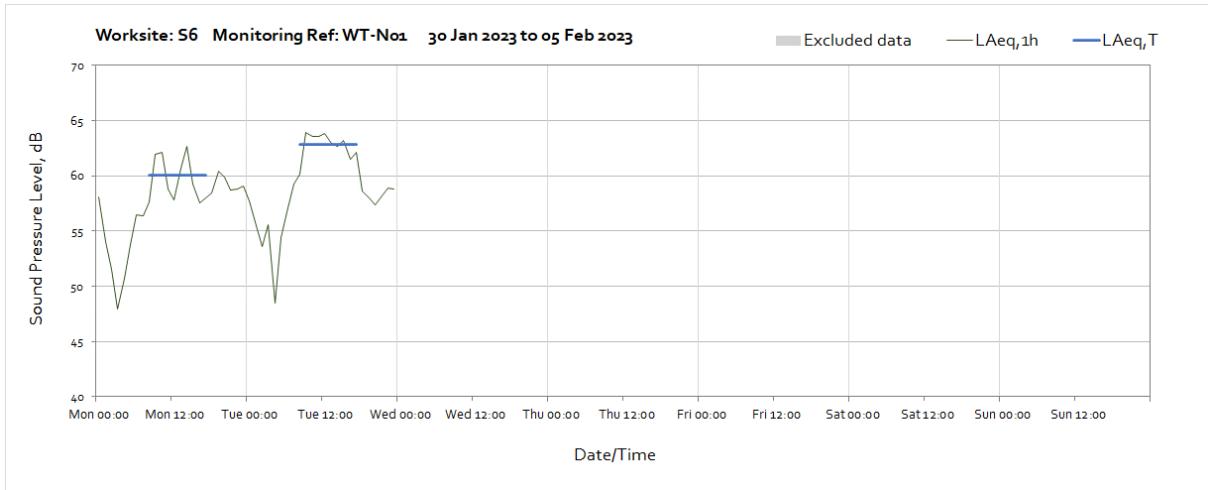


Note: Missing data between 15:00 and 18:00 on Friday 6th January were due to a software issue at the monitoring station.

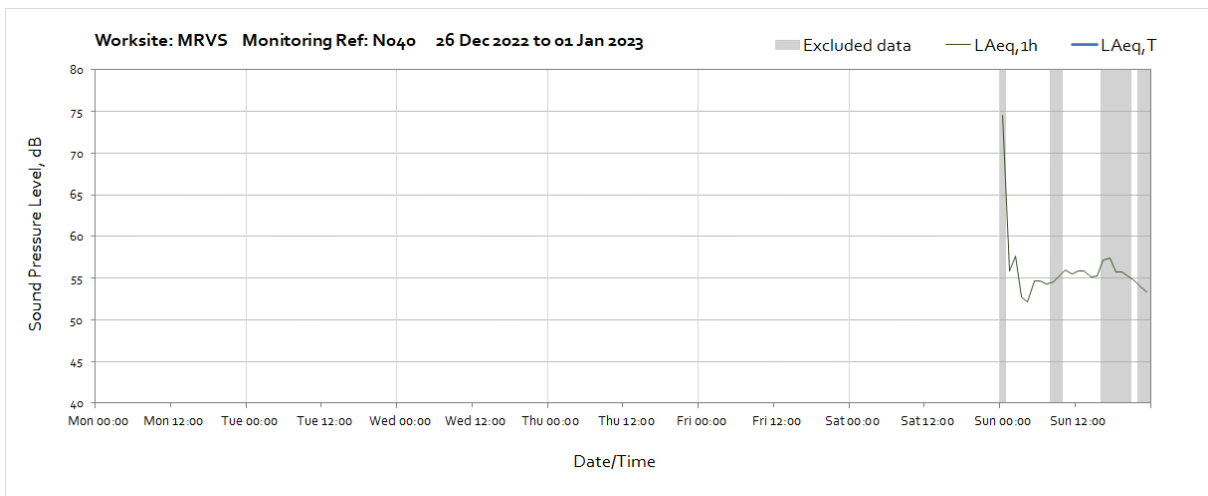


Note: Missing data between 01:00 and 05:00 on Wednesday 11th January were due to a software issue at the monitoring station.

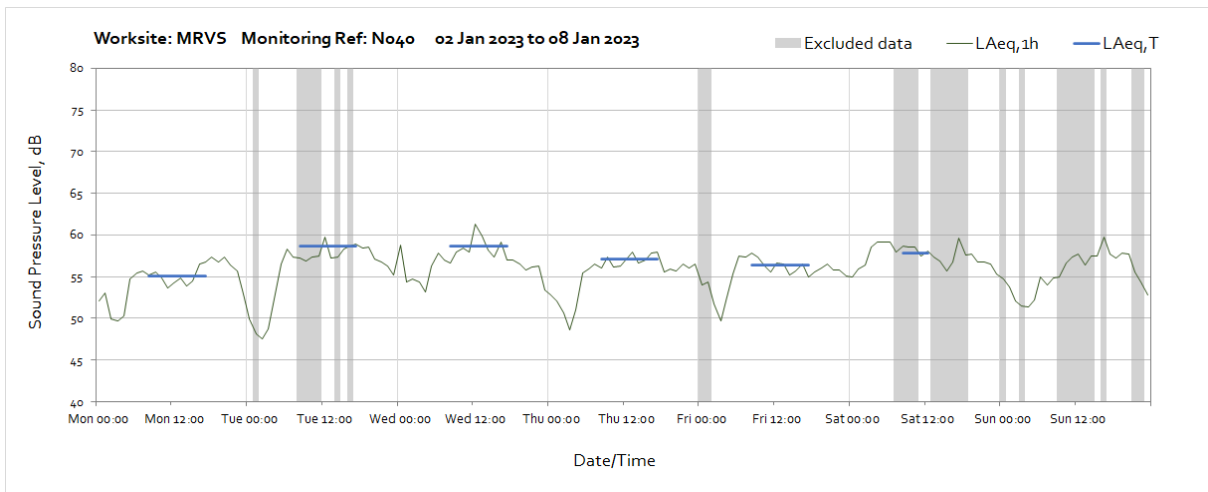


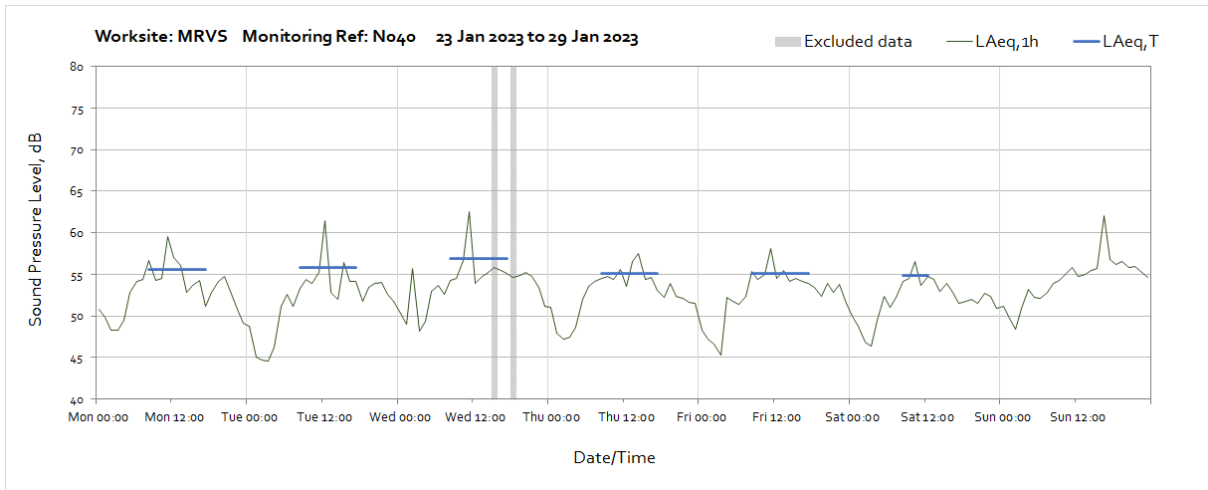
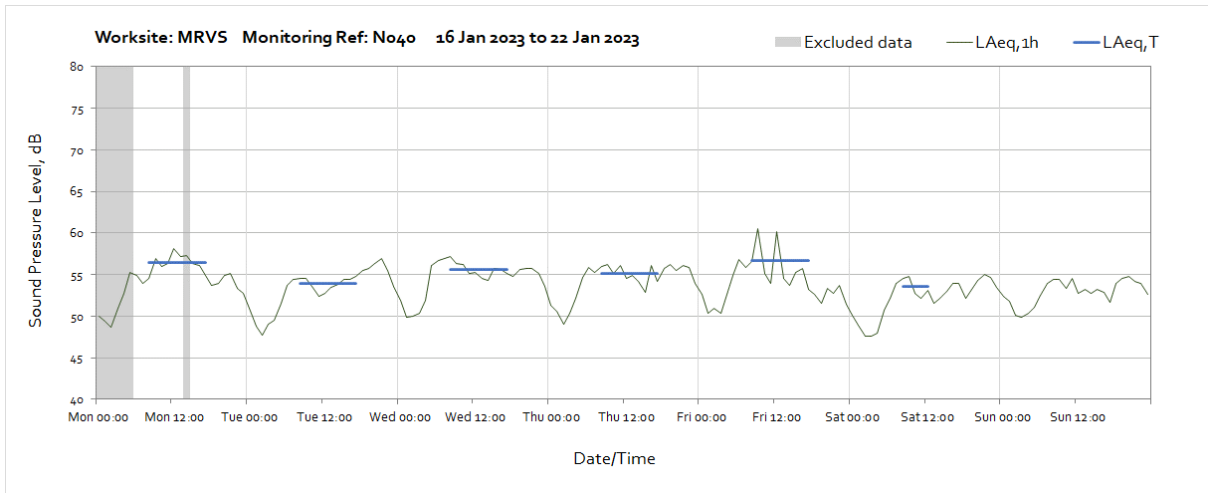
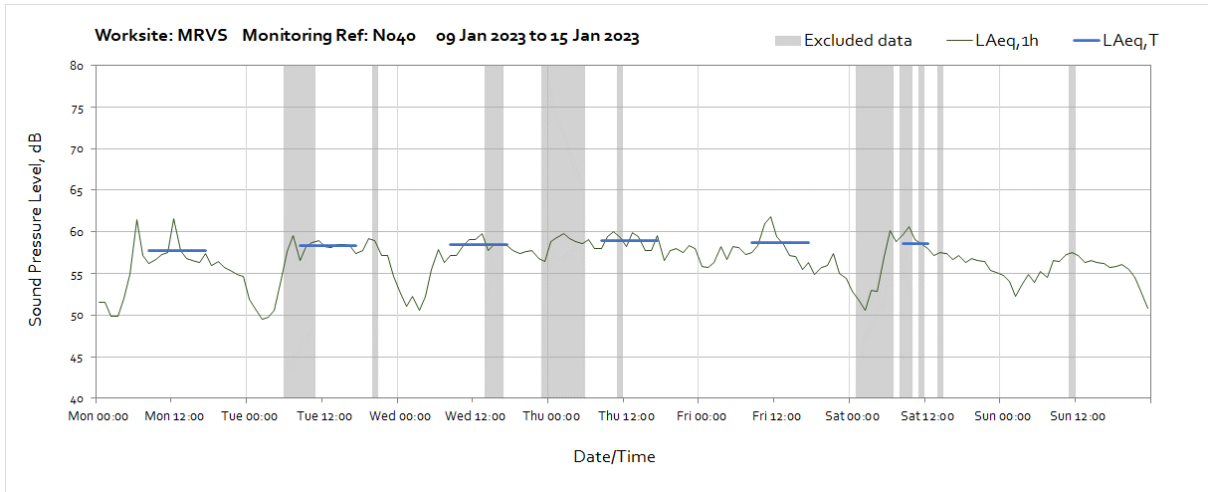


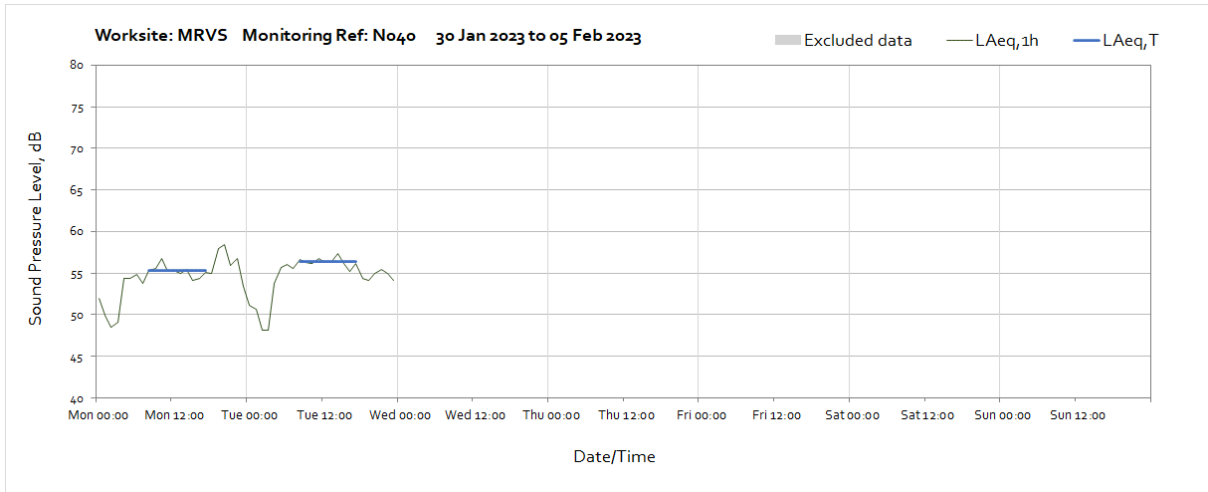
Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N040



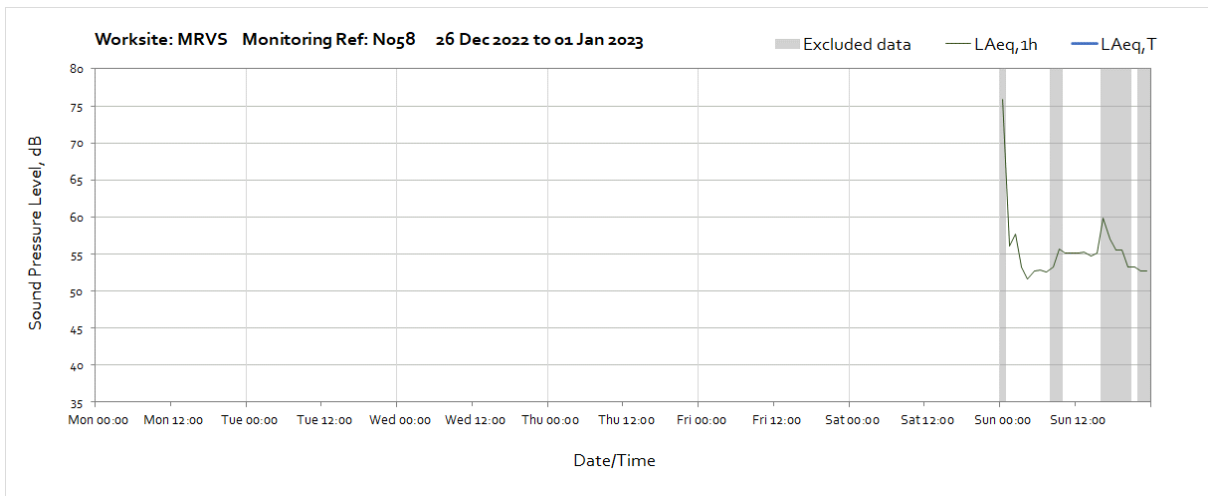
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



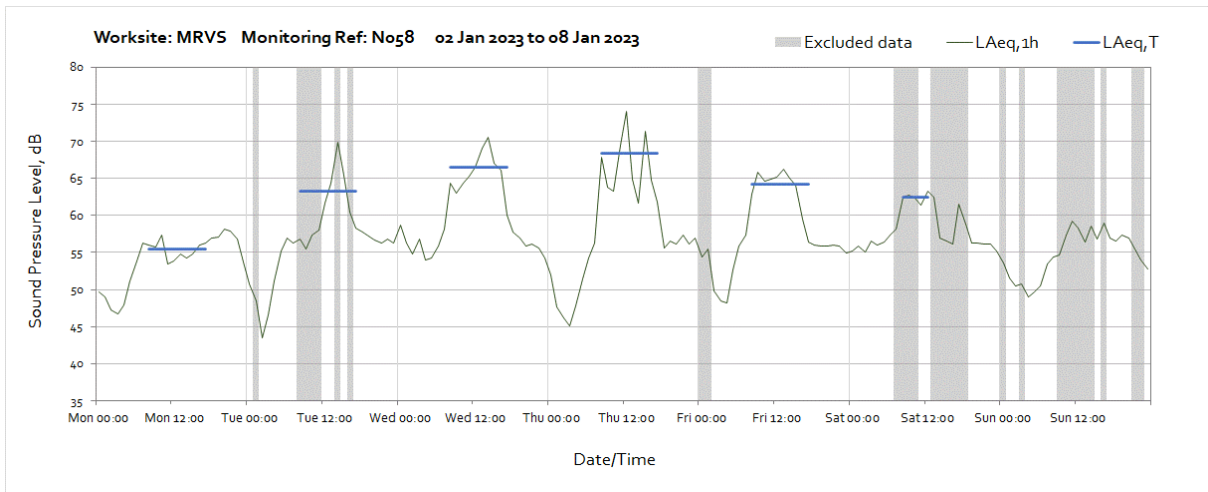


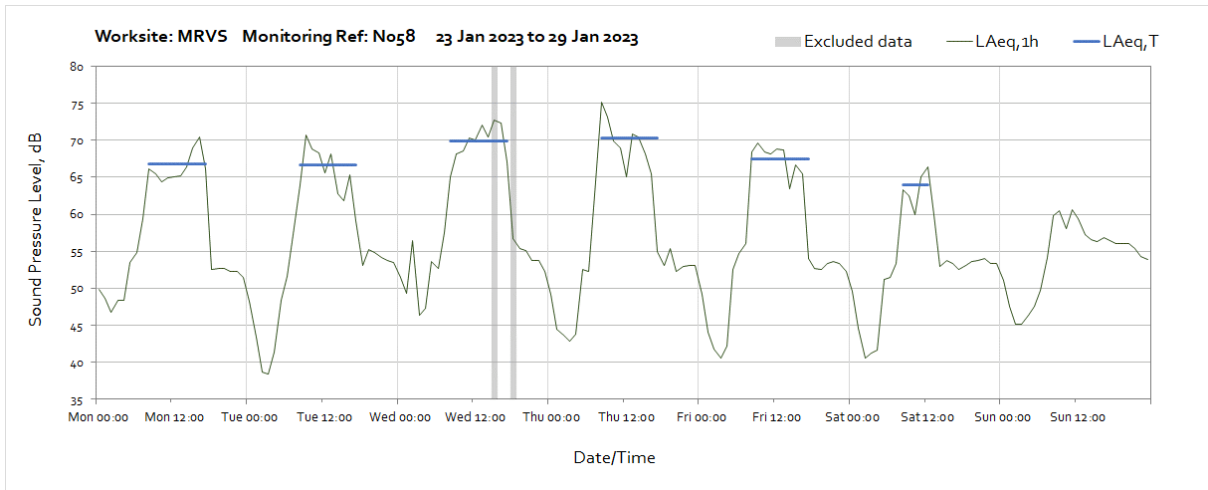
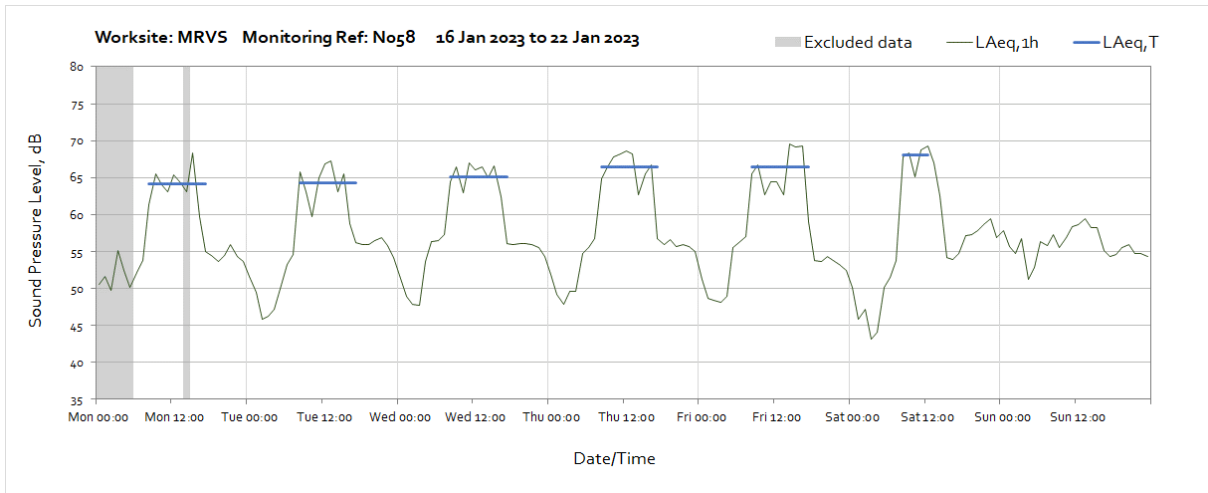
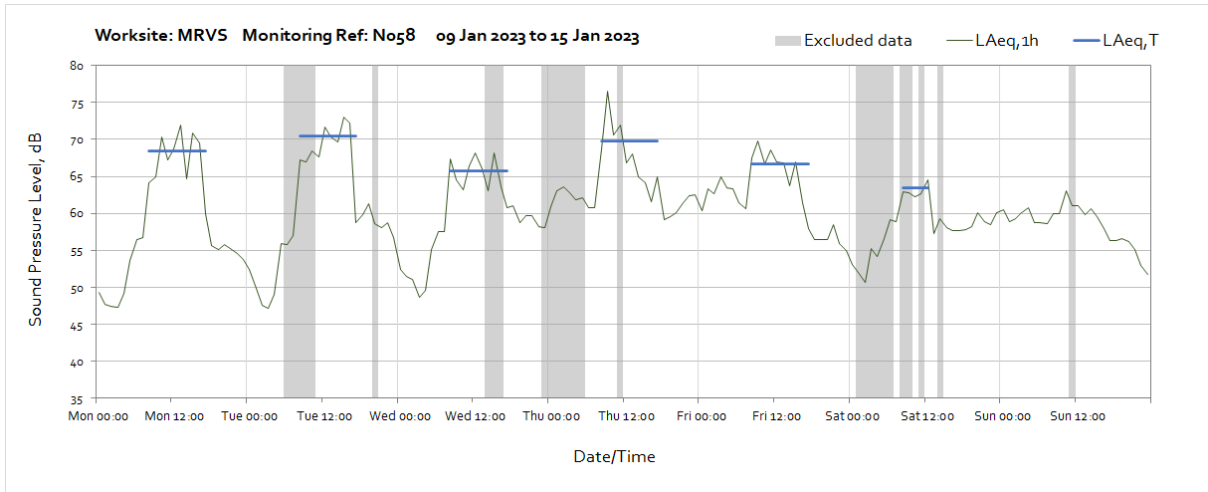


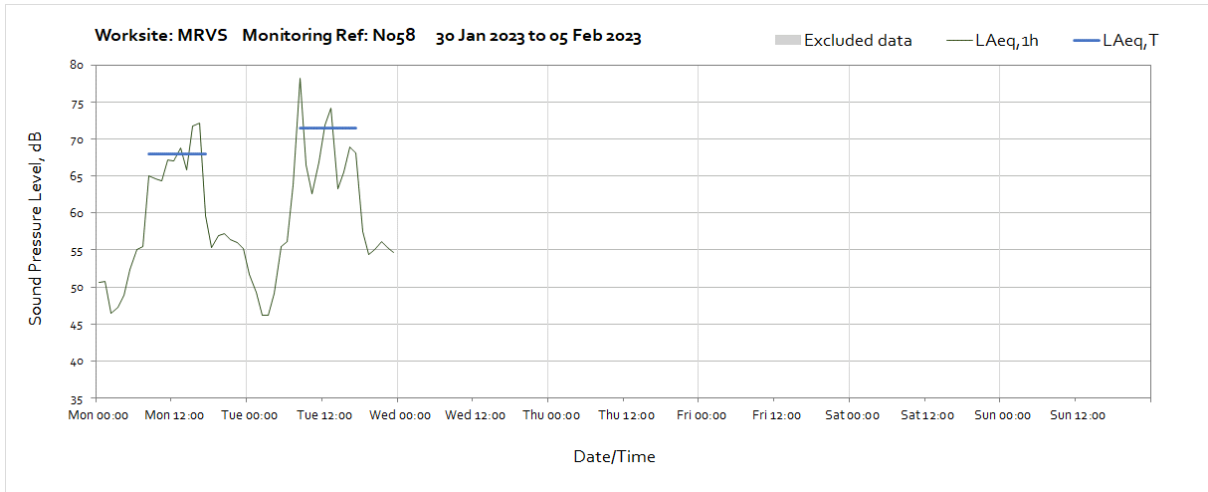
Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N058



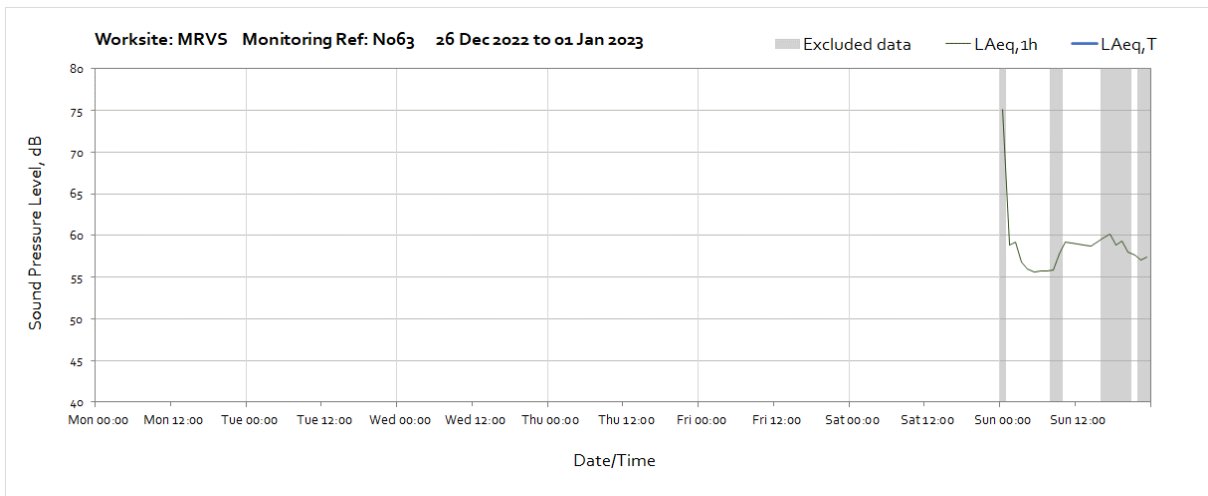
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



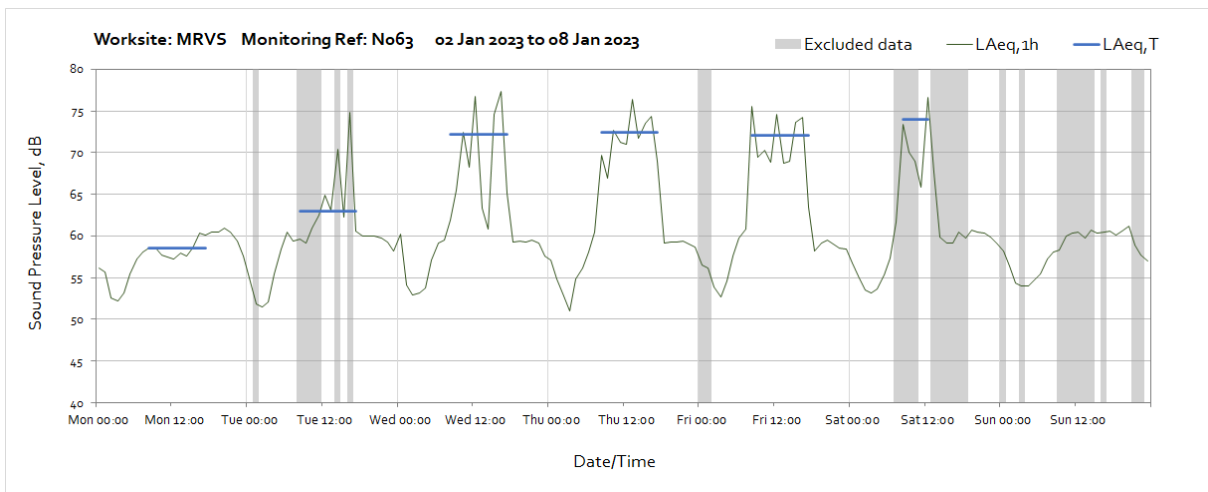


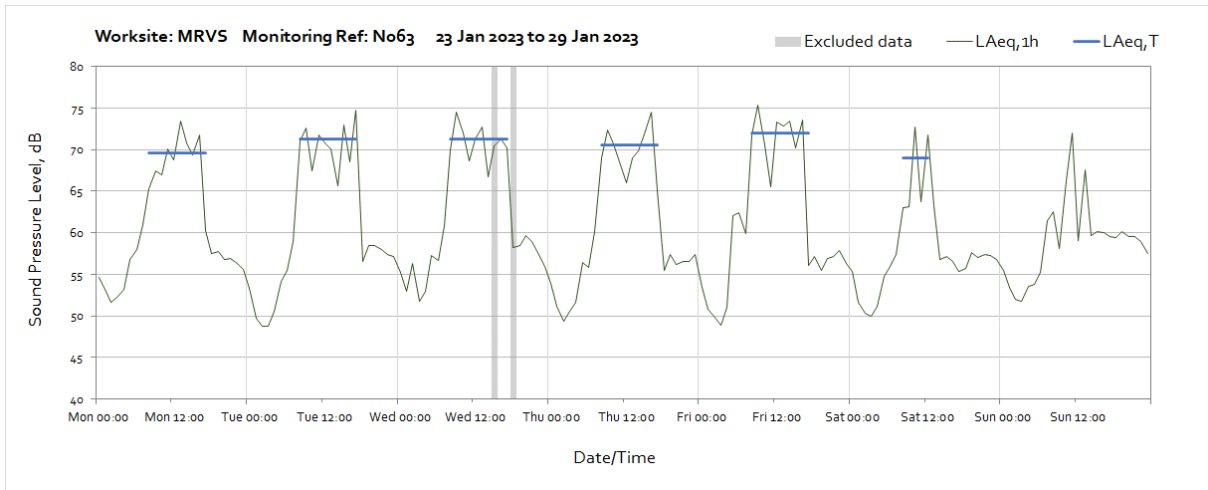
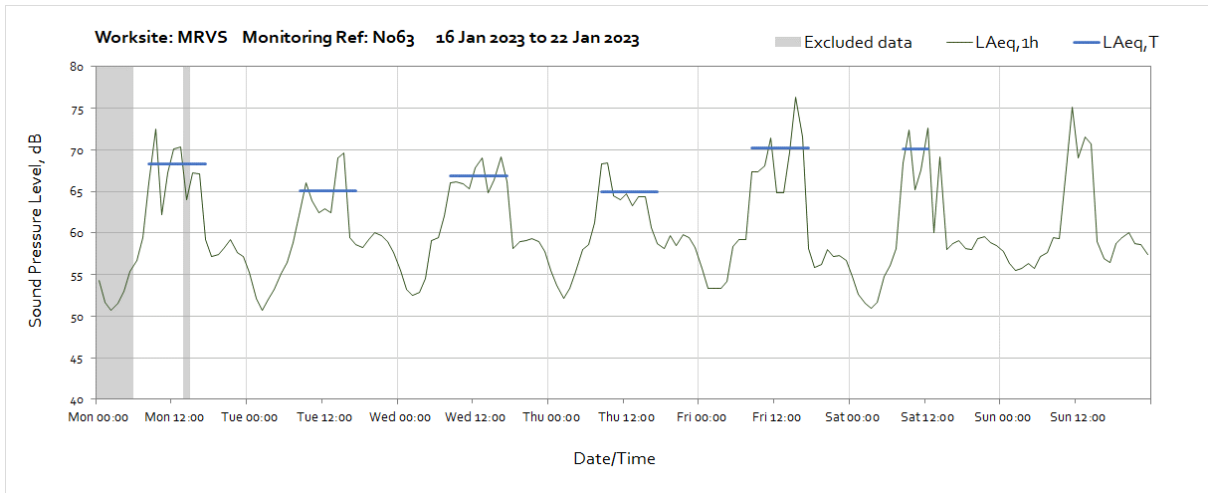
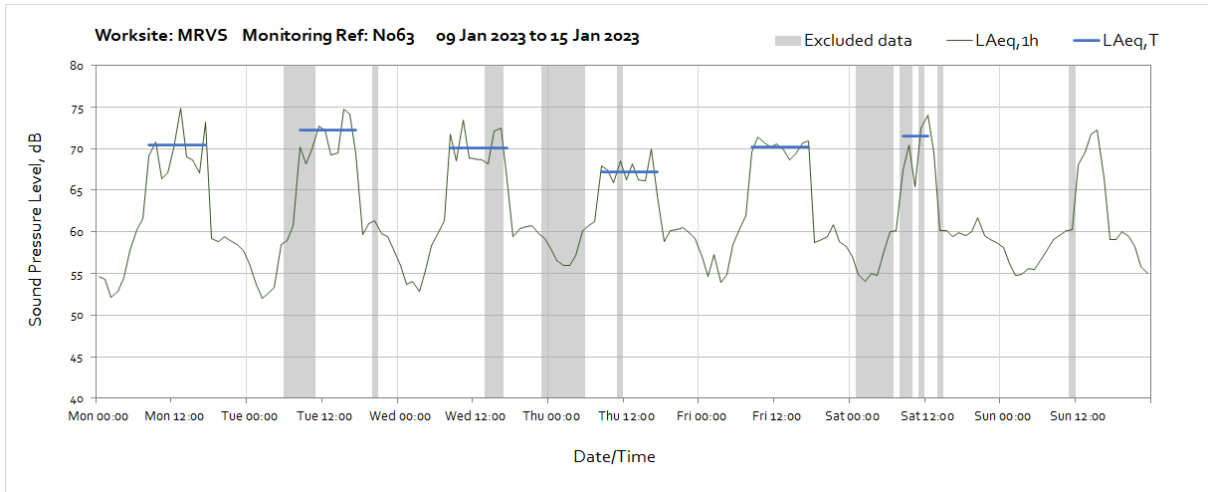


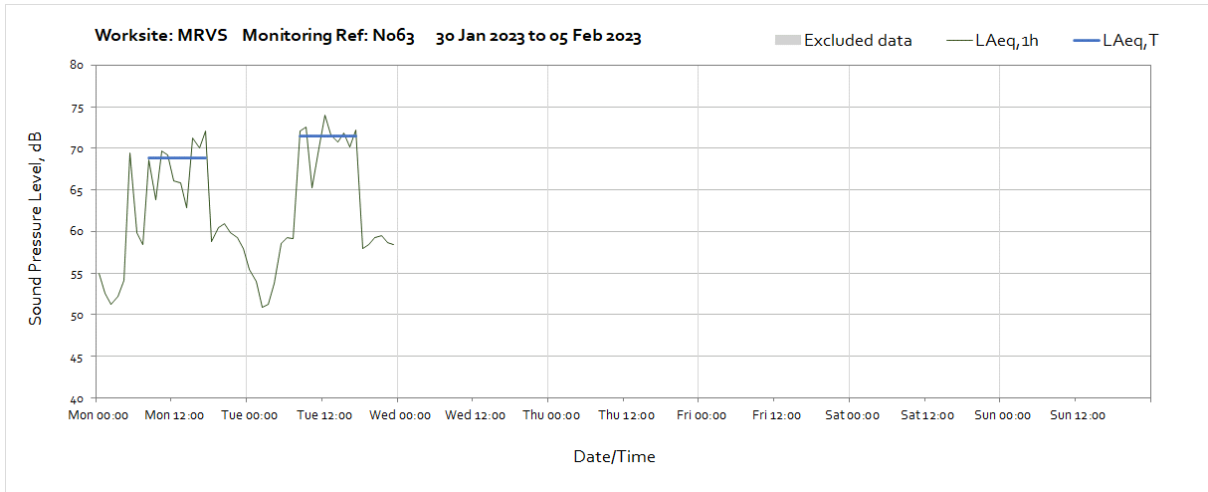
Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N063



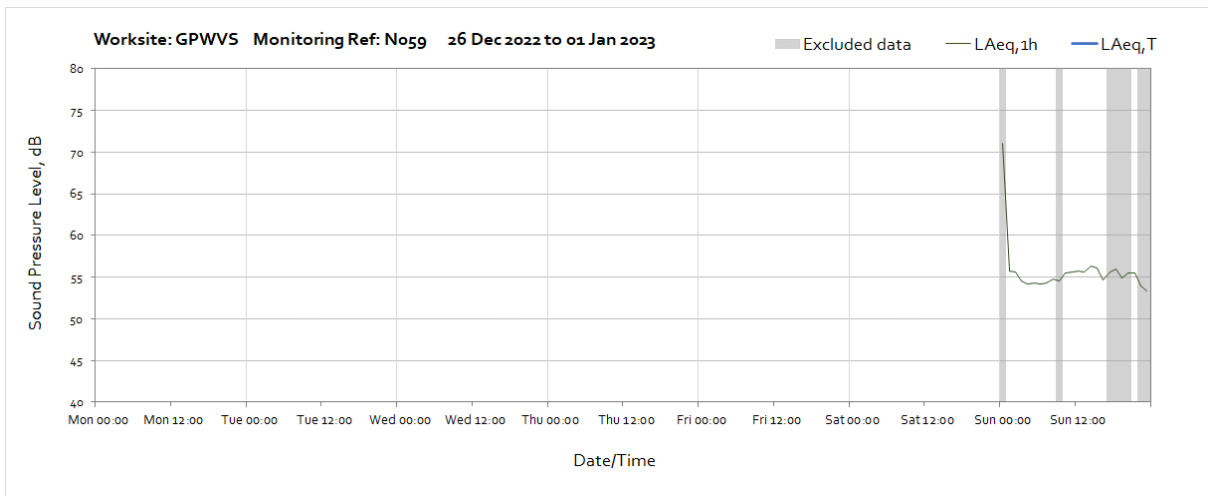
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



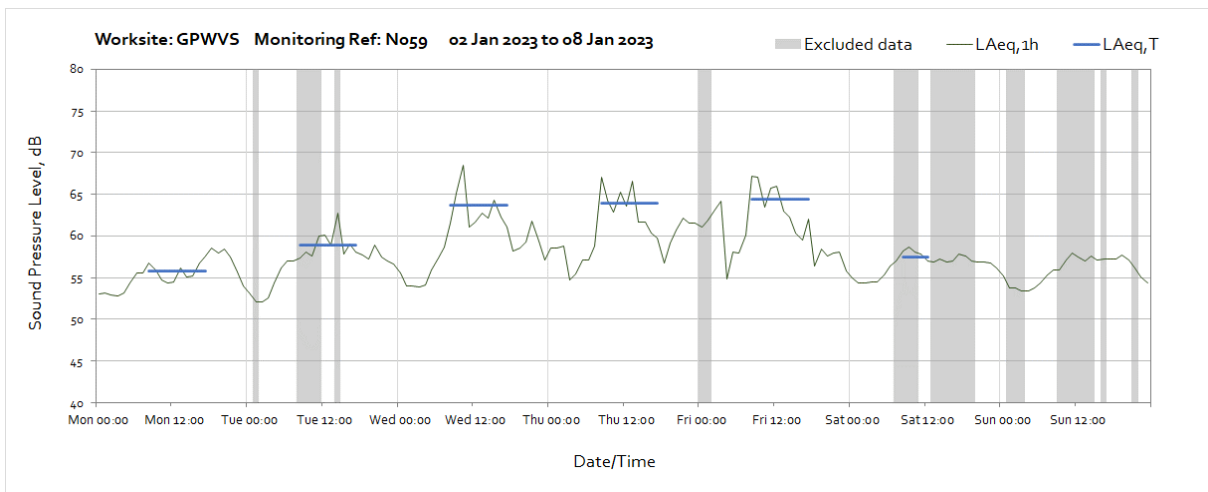


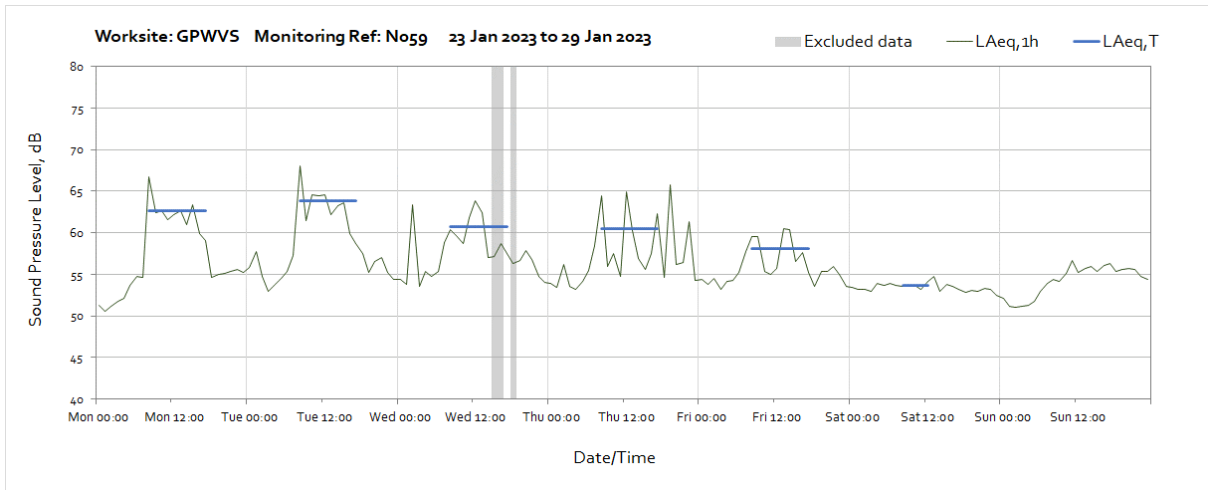
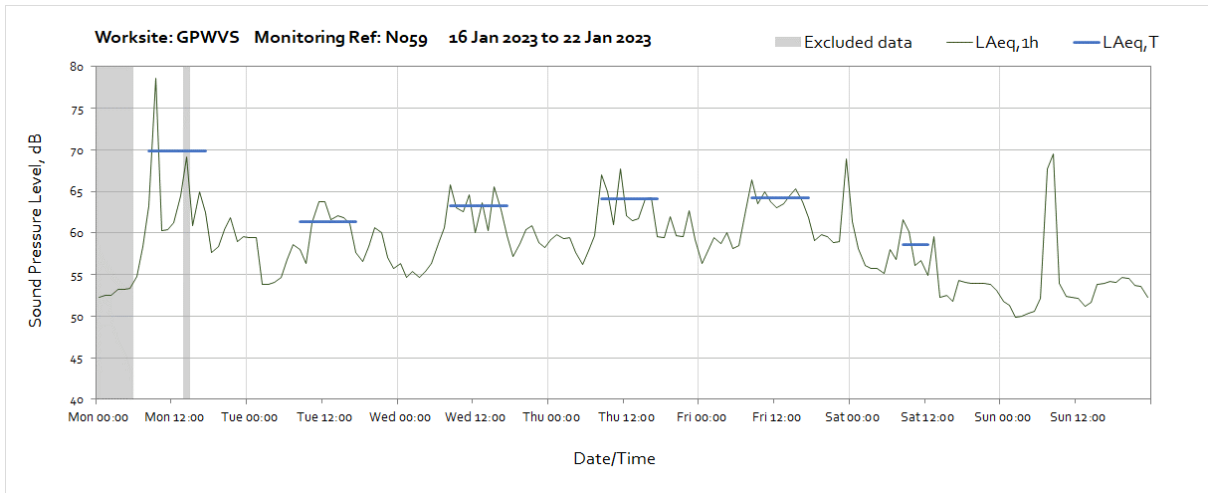
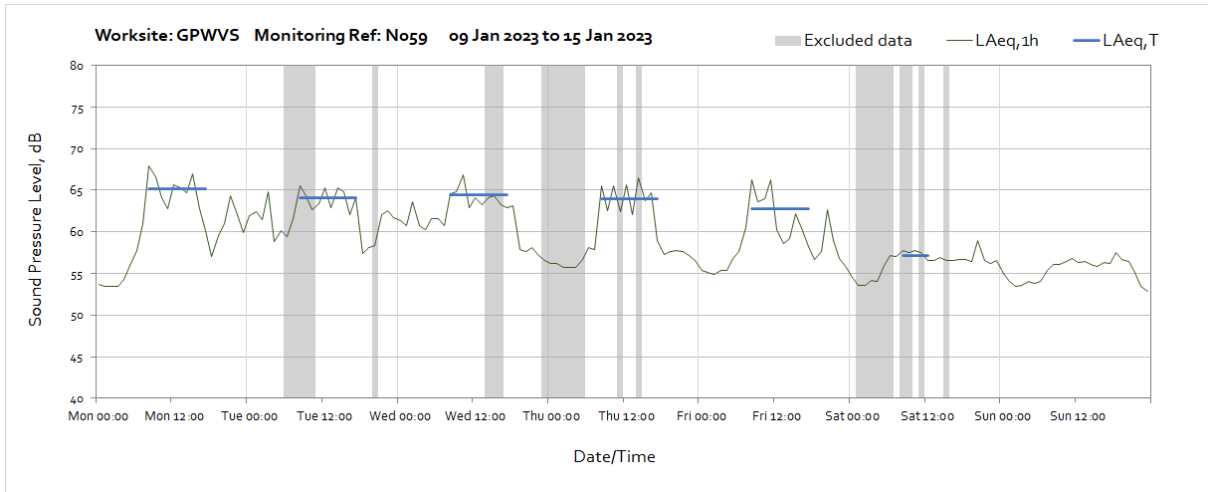


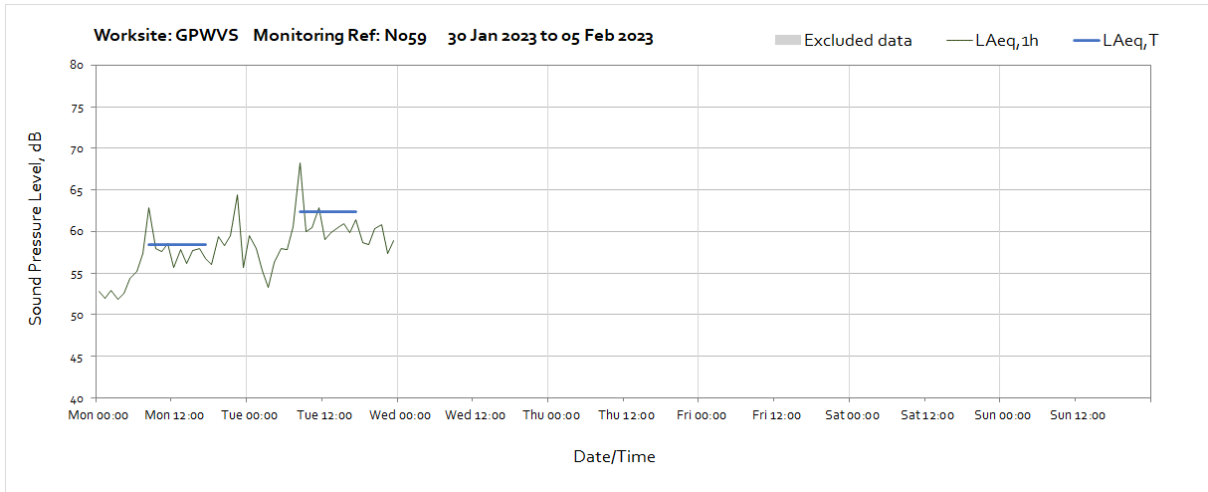
Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: N059



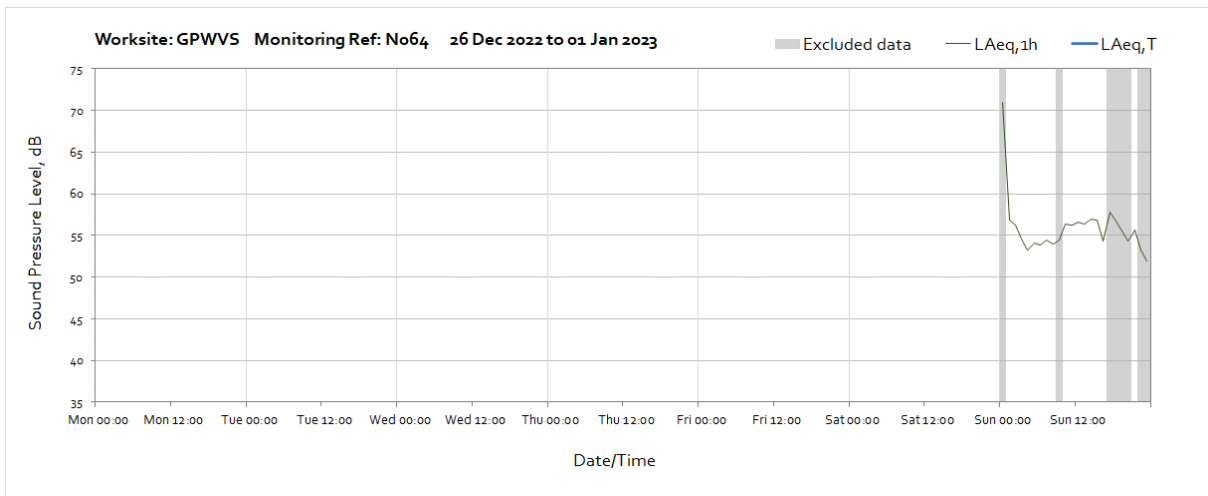
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



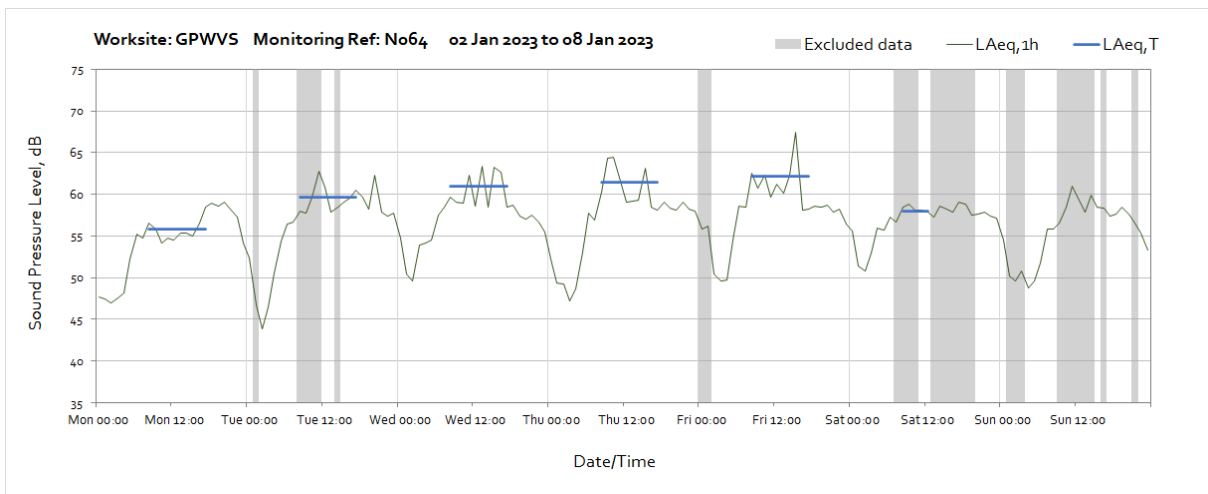


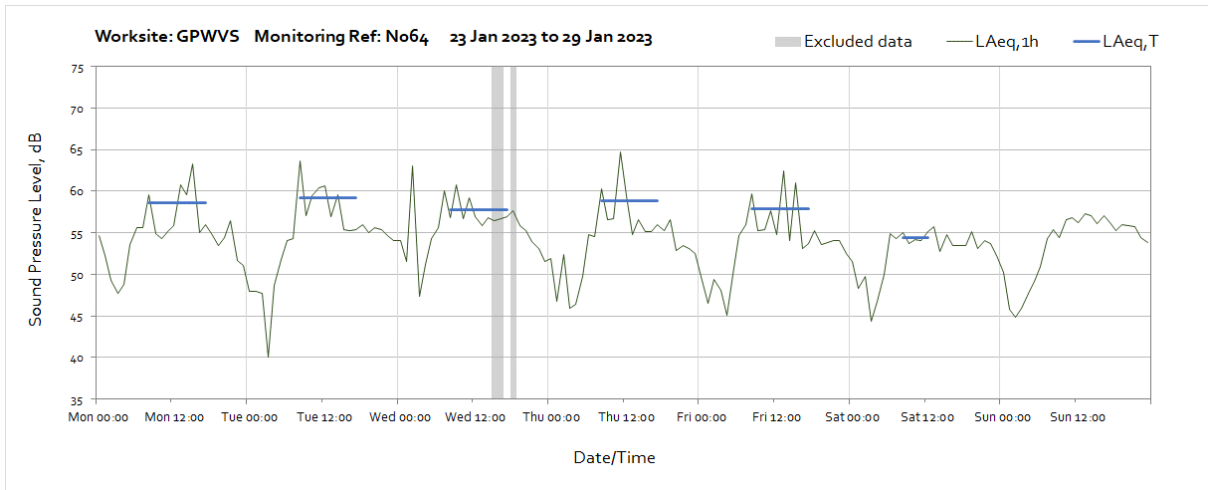
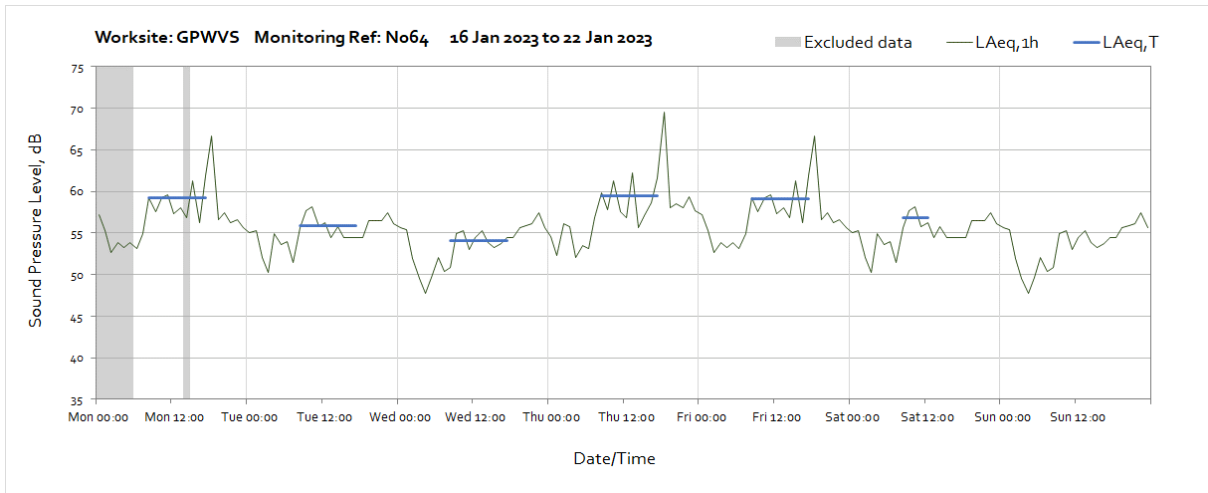
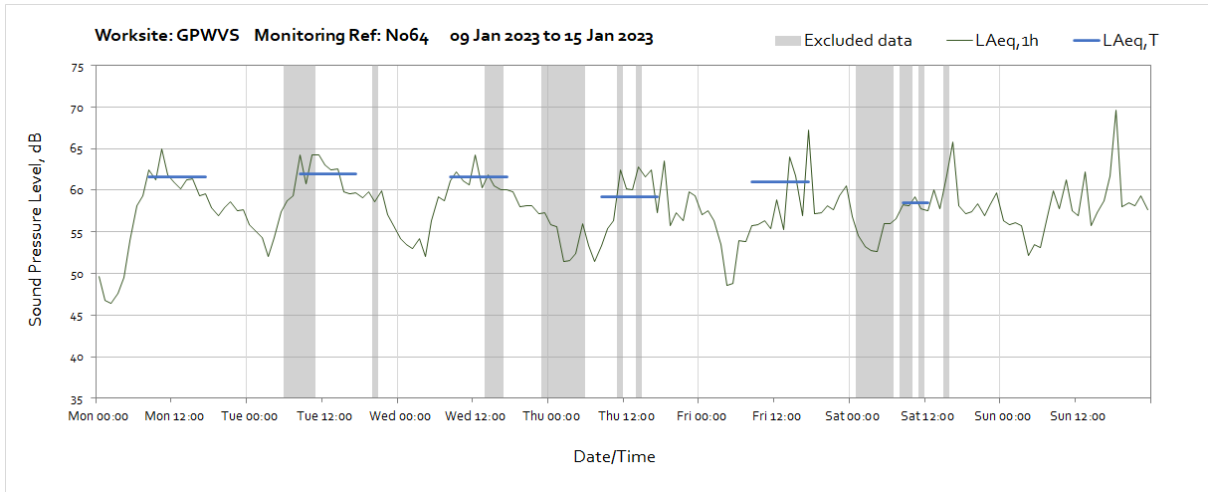


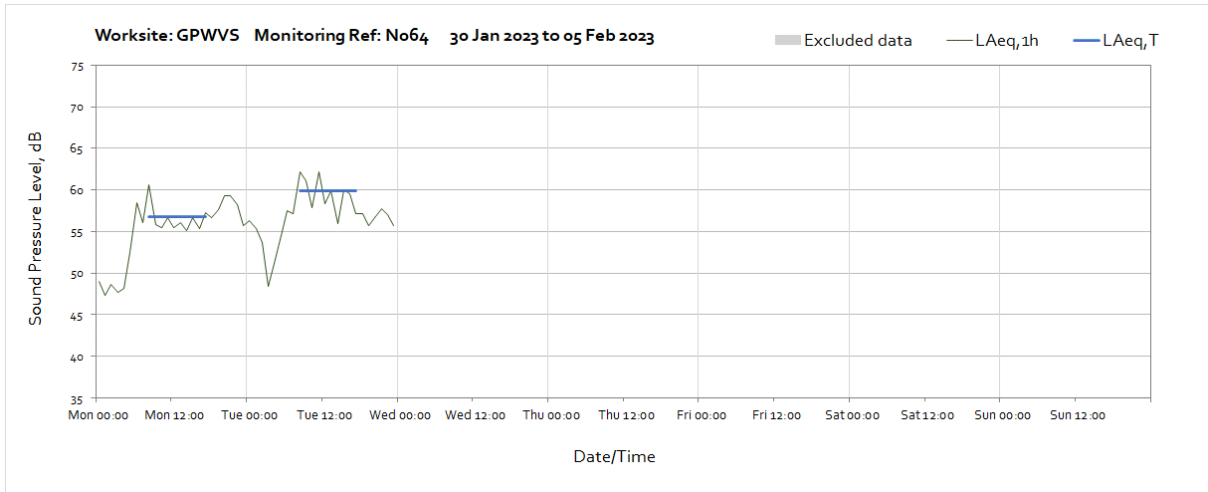
Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: N064



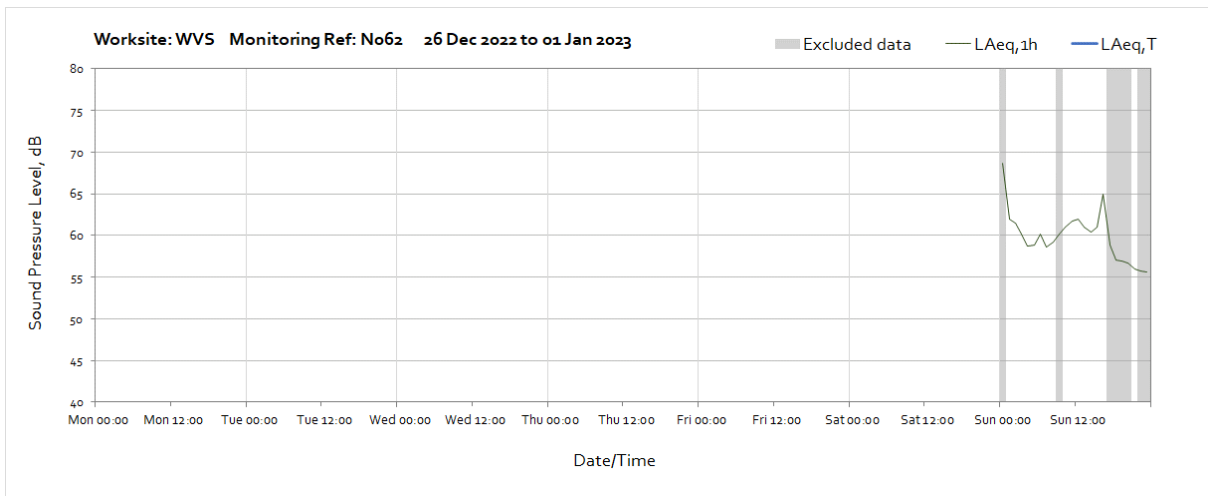
Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



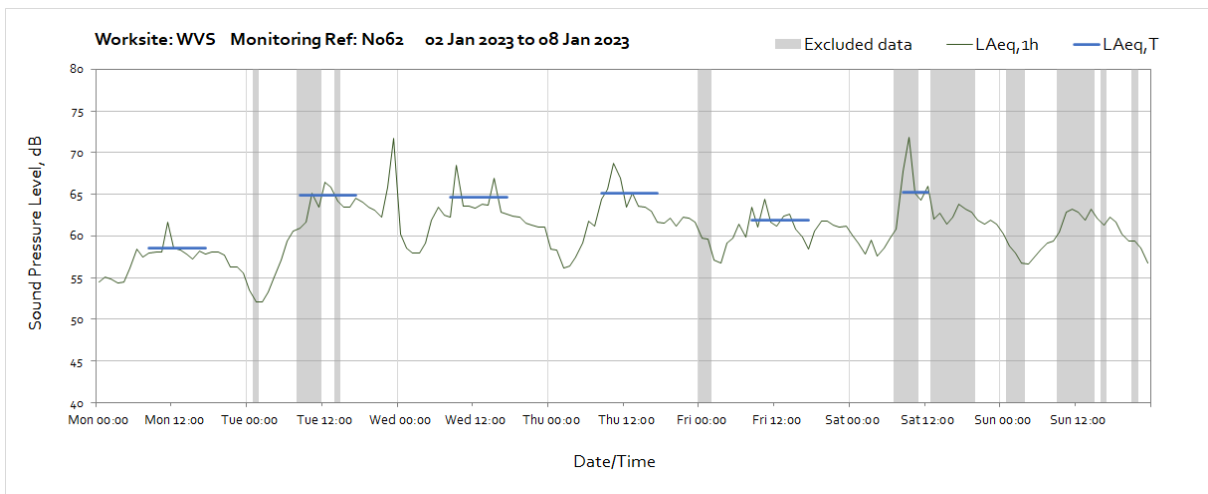


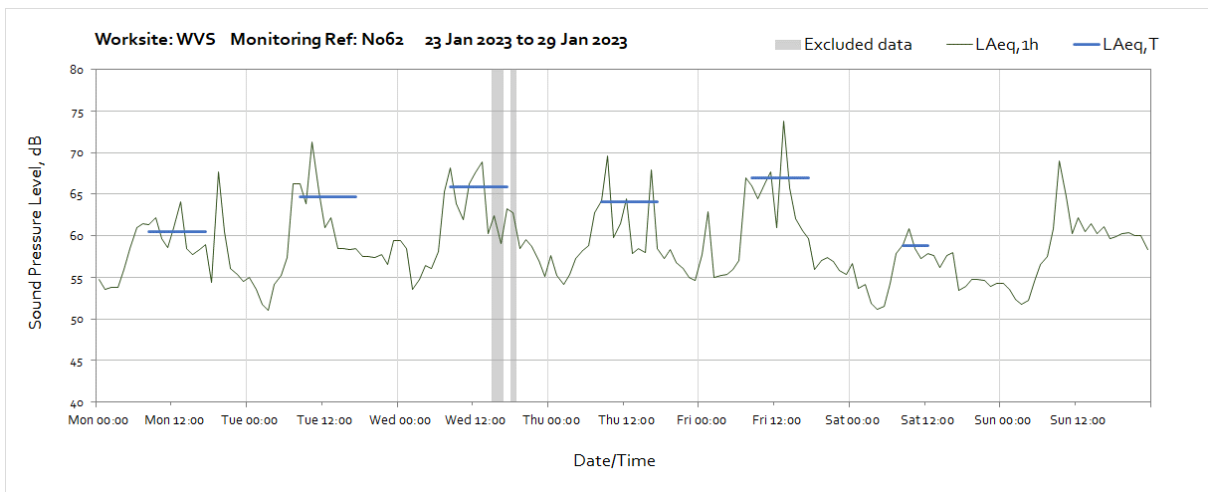
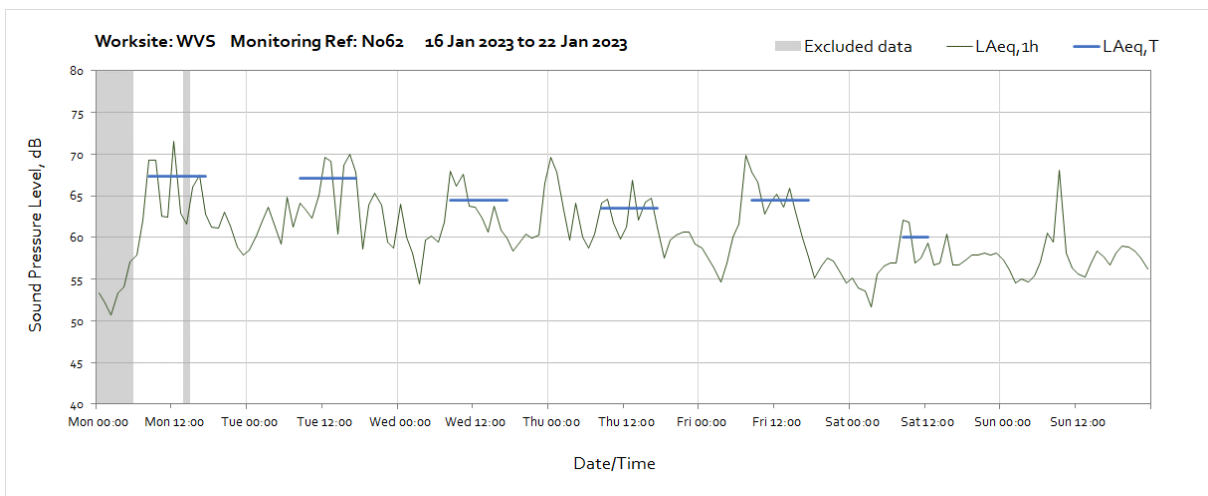
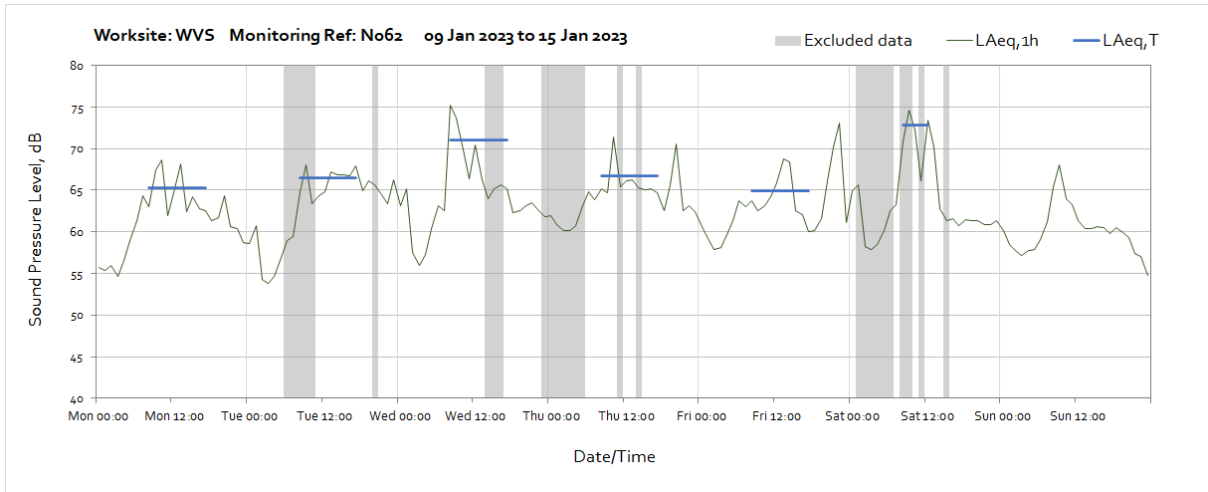


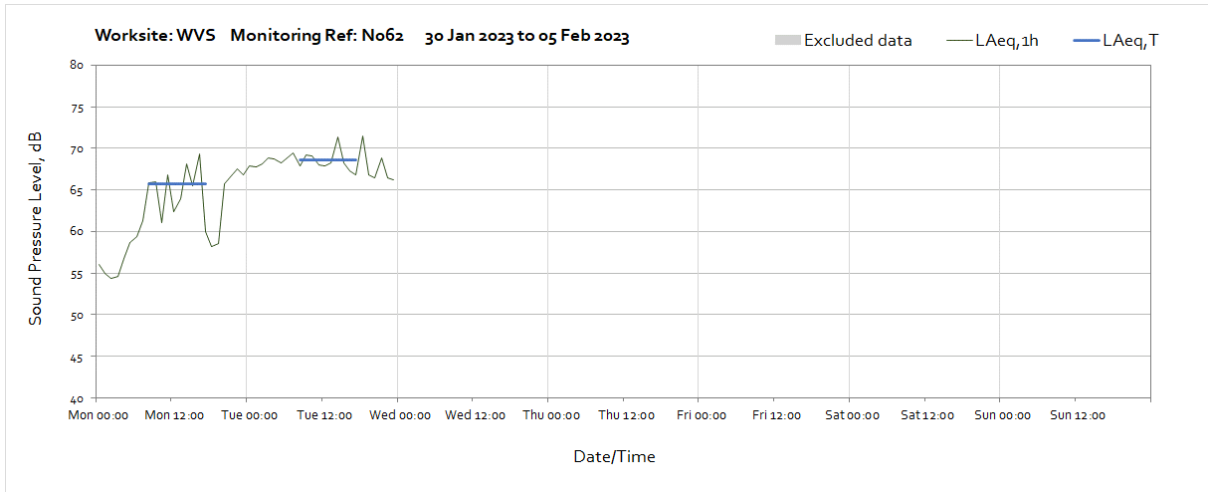
Worksite: Westgate Ventilation Shaft (WVS) – Monitoring Ref: N062



Note: High noise levels measured at 00:00 on Sunday 1st January were due to New Year Night celebration.



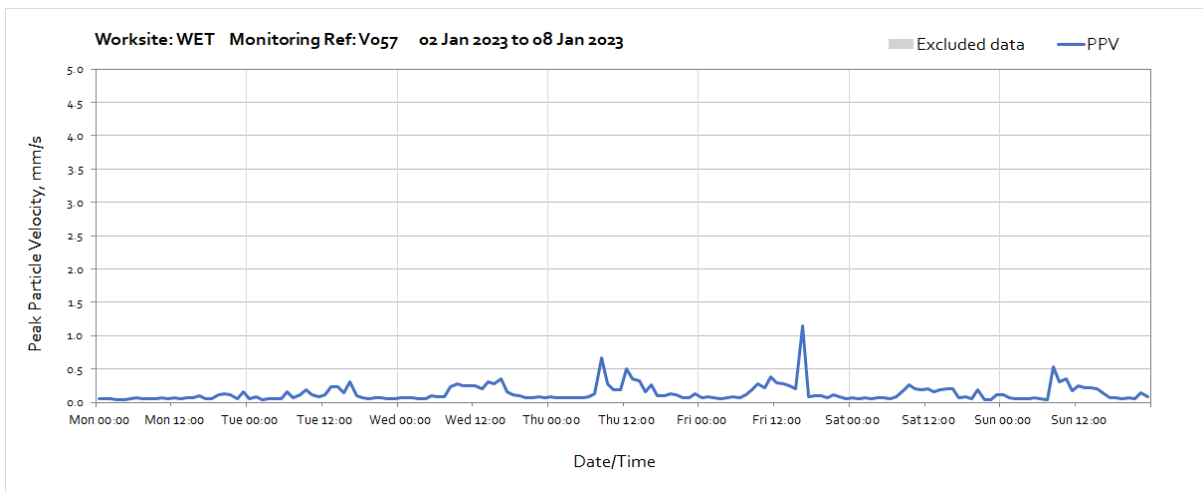
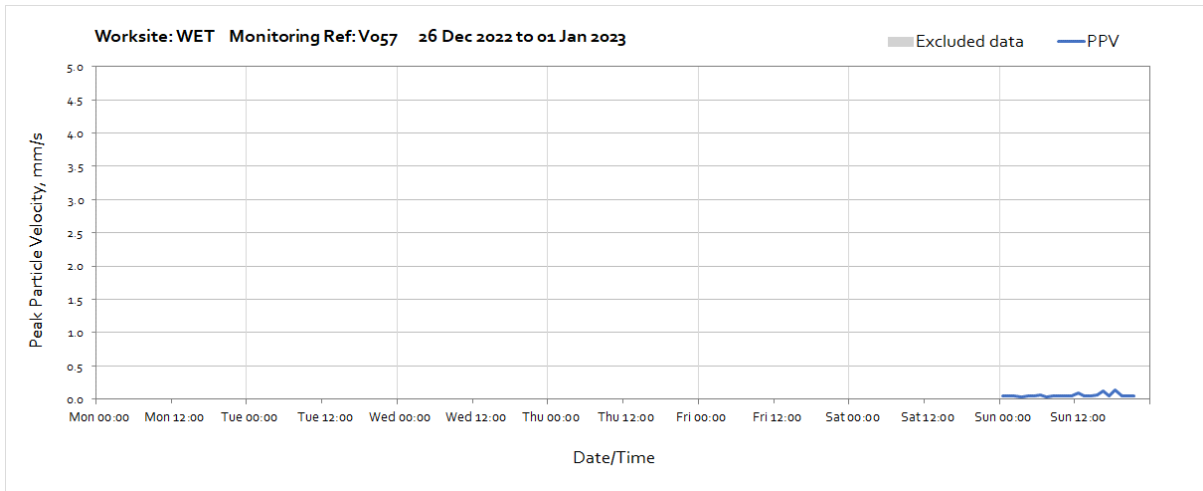


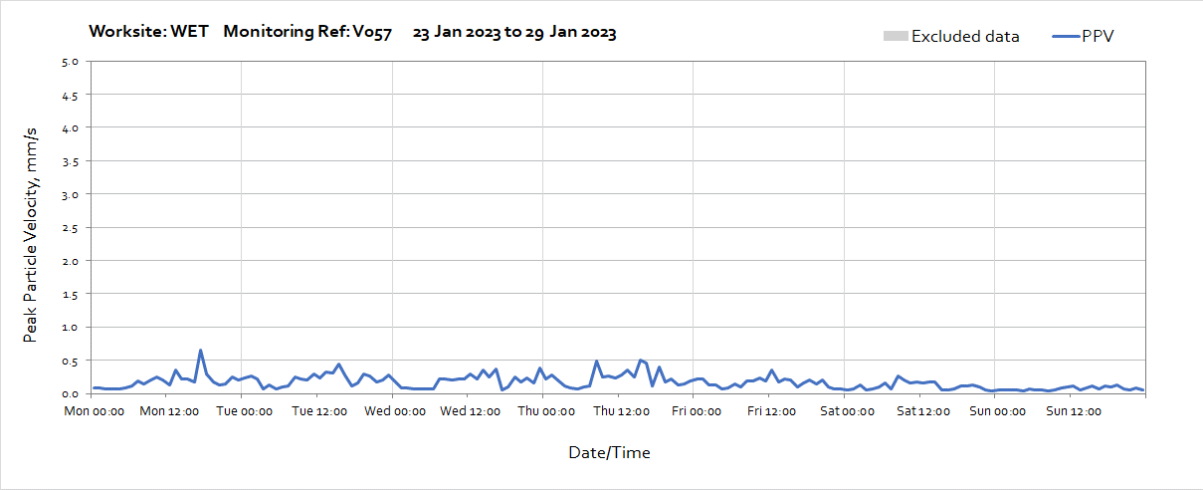
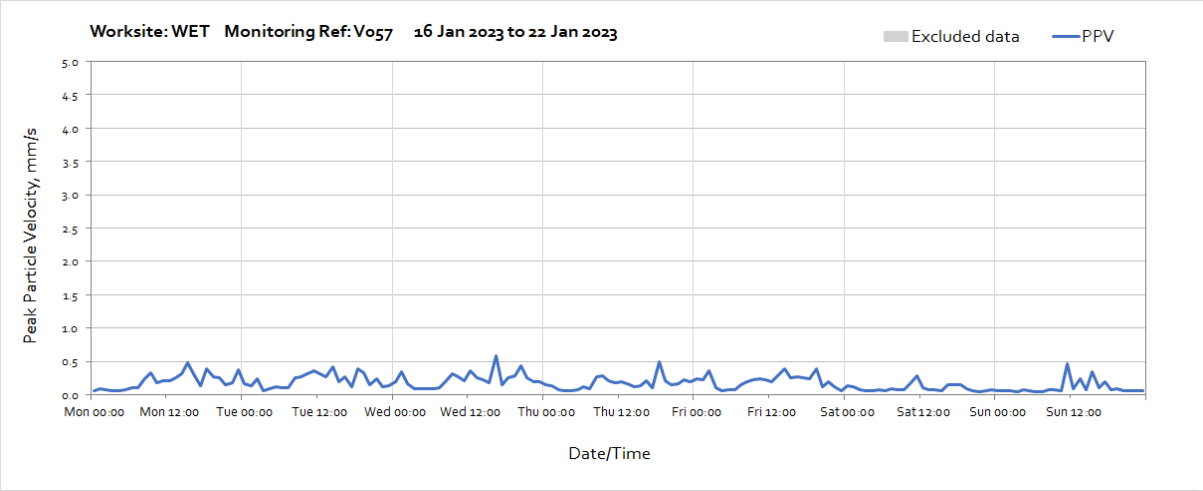
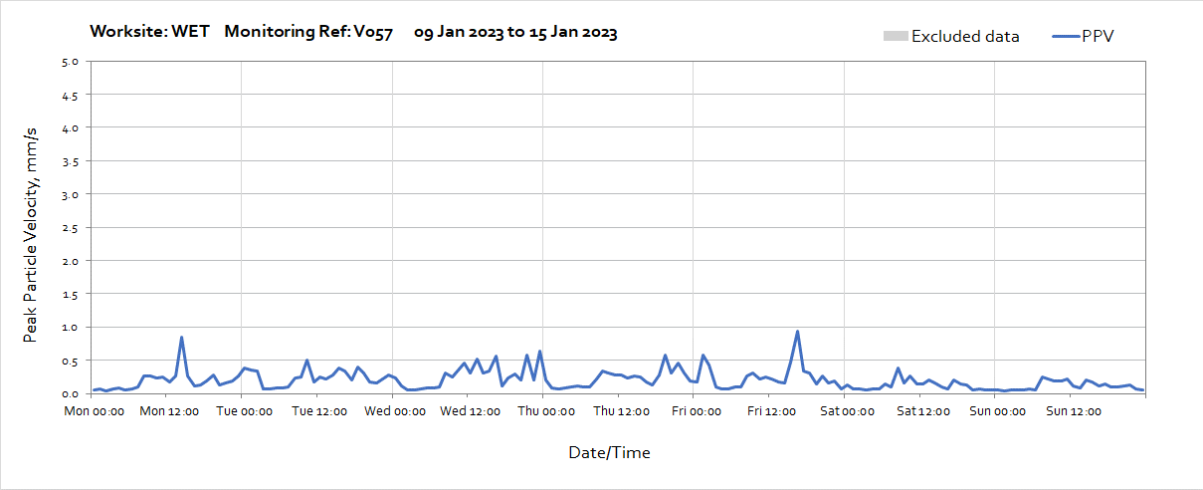


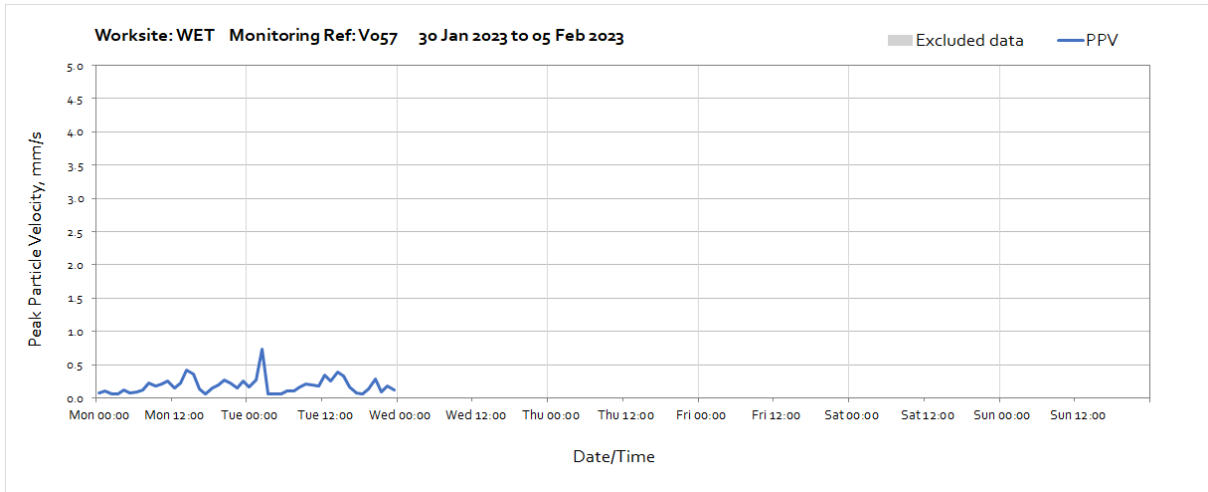
Vibration

The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative of HS2 construction works, these values have been greyed out in the following charts and have been excluded to calculate values in Table 4 of the main report.

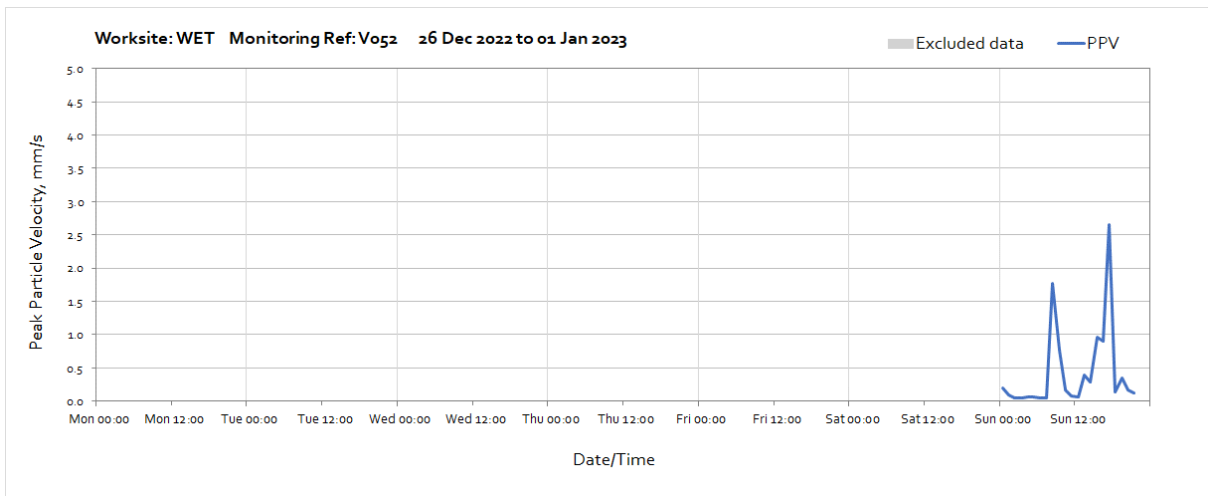
Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: V057



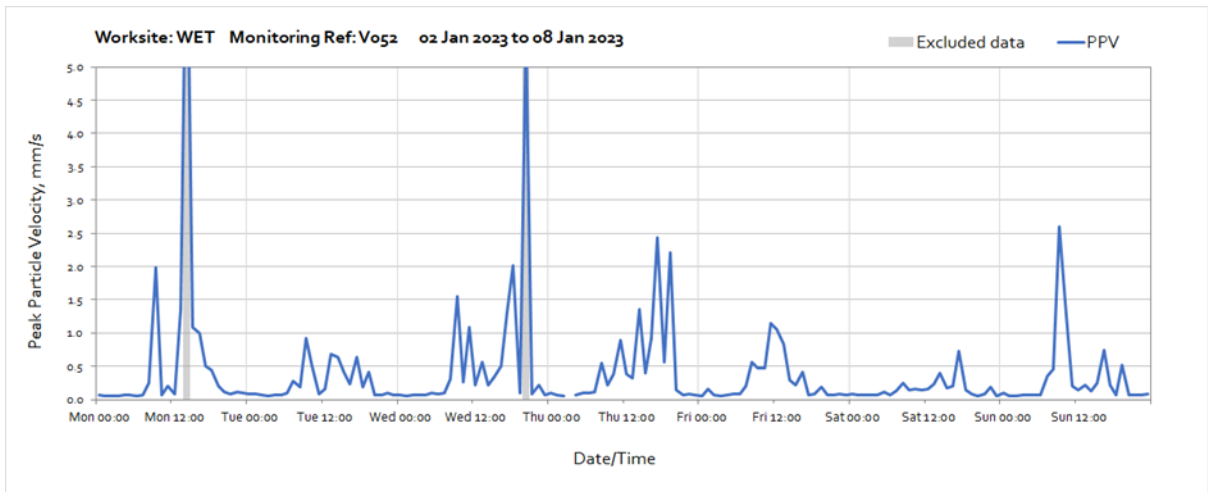




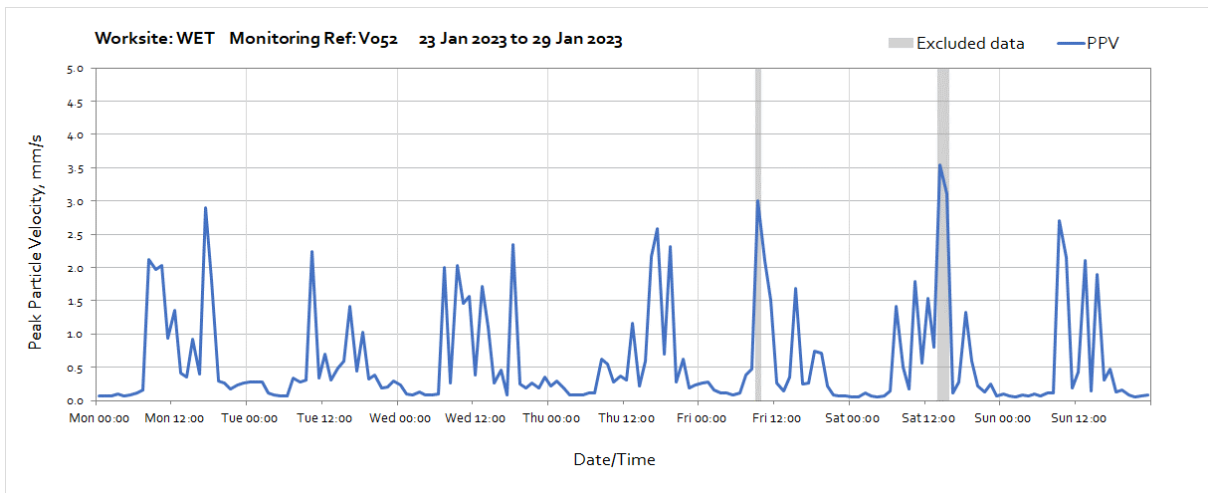
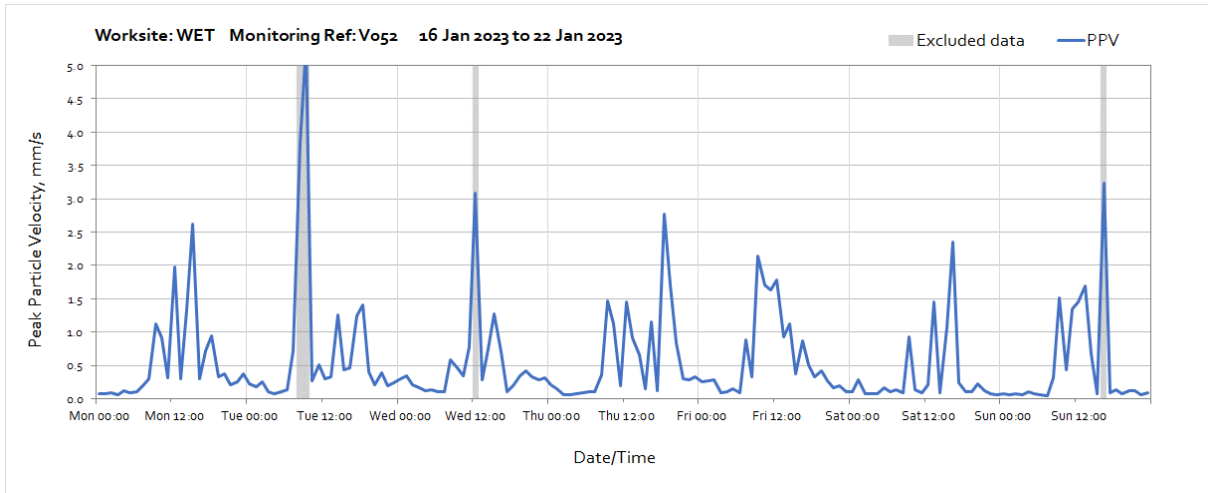
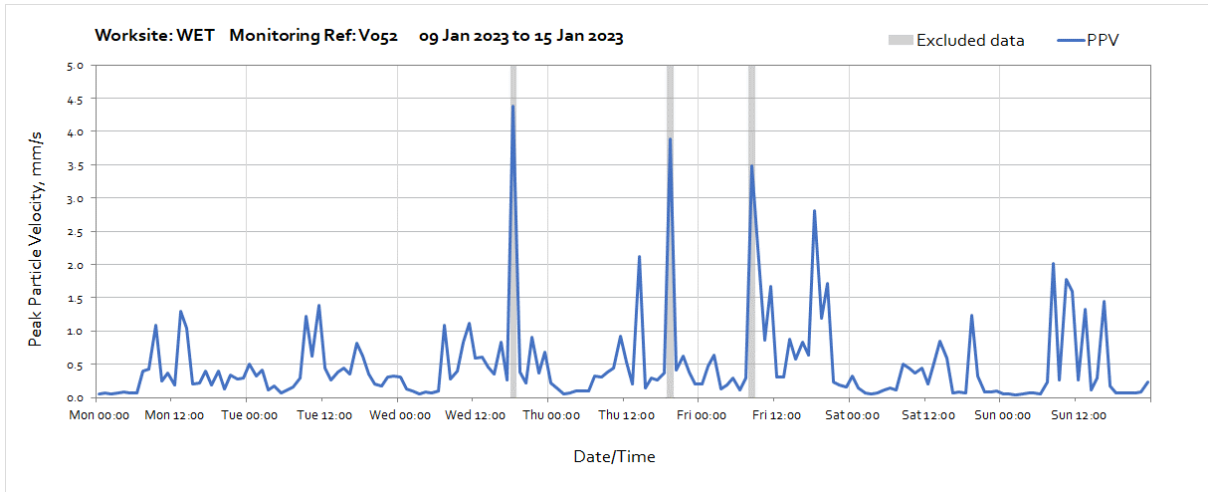
Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: V052

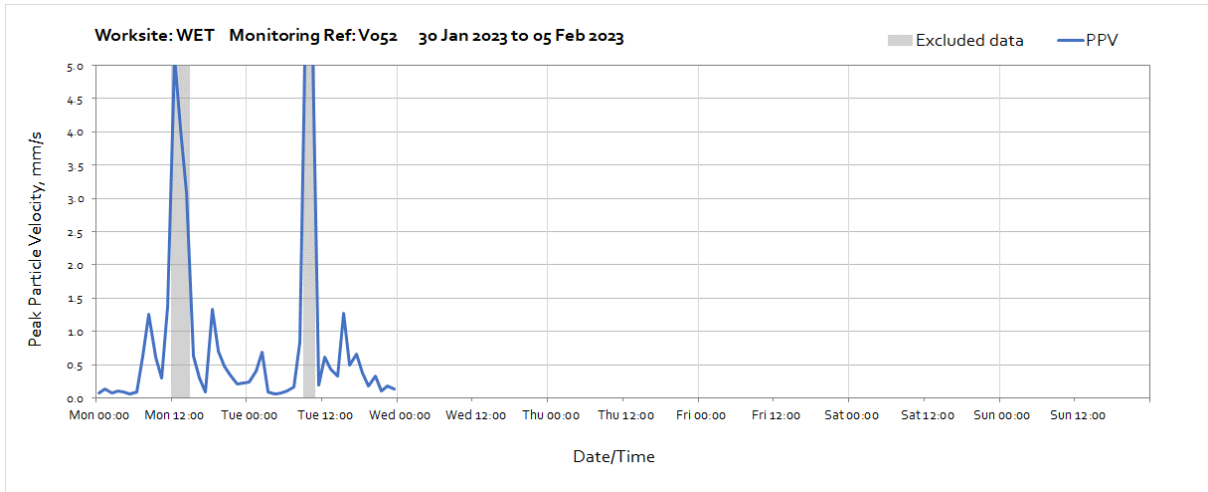


Note: Missing data at 22:00 on Sunday 1st January was due to software updates at the monitoring station.

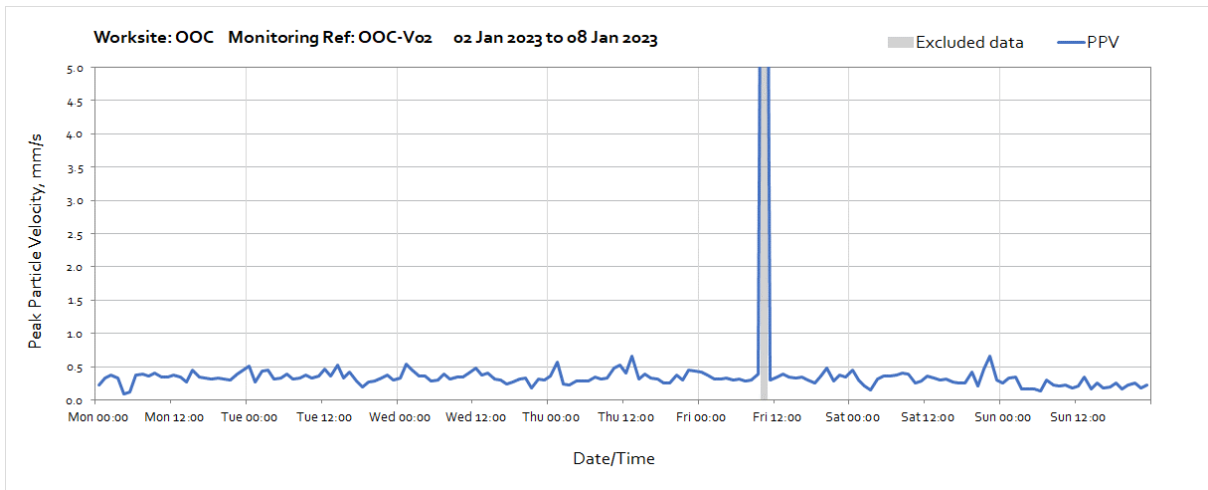
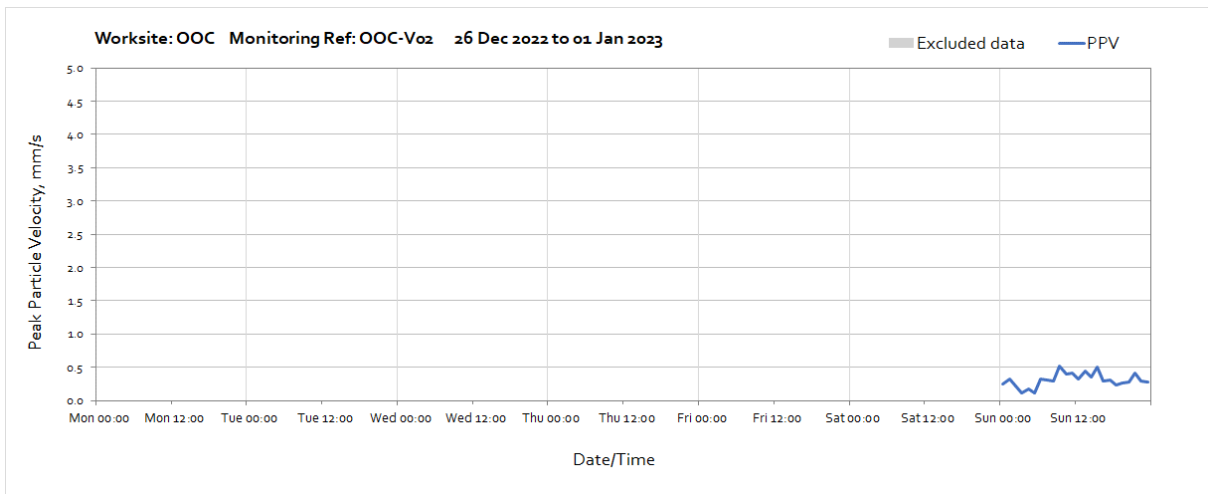


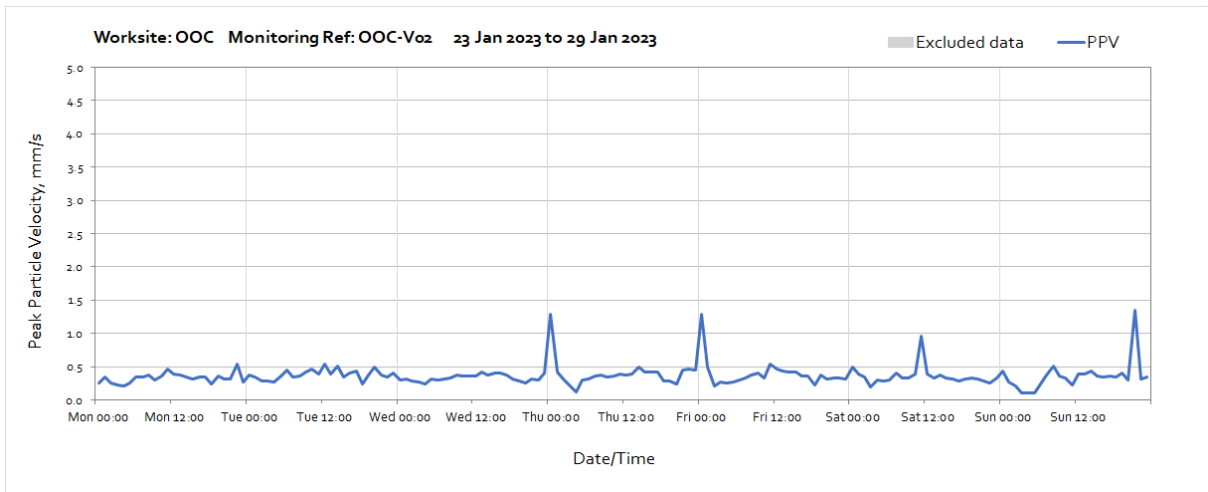
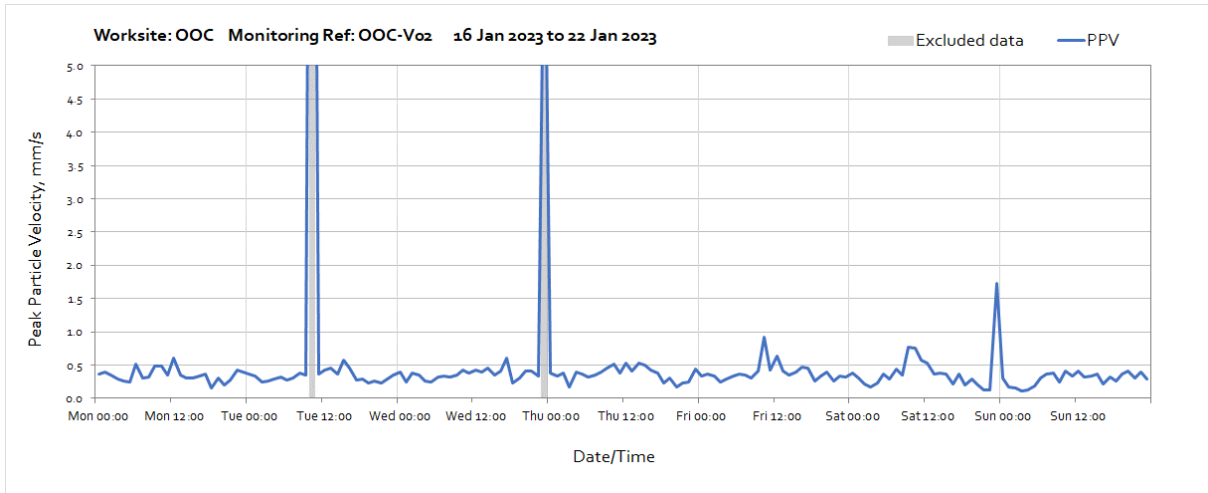
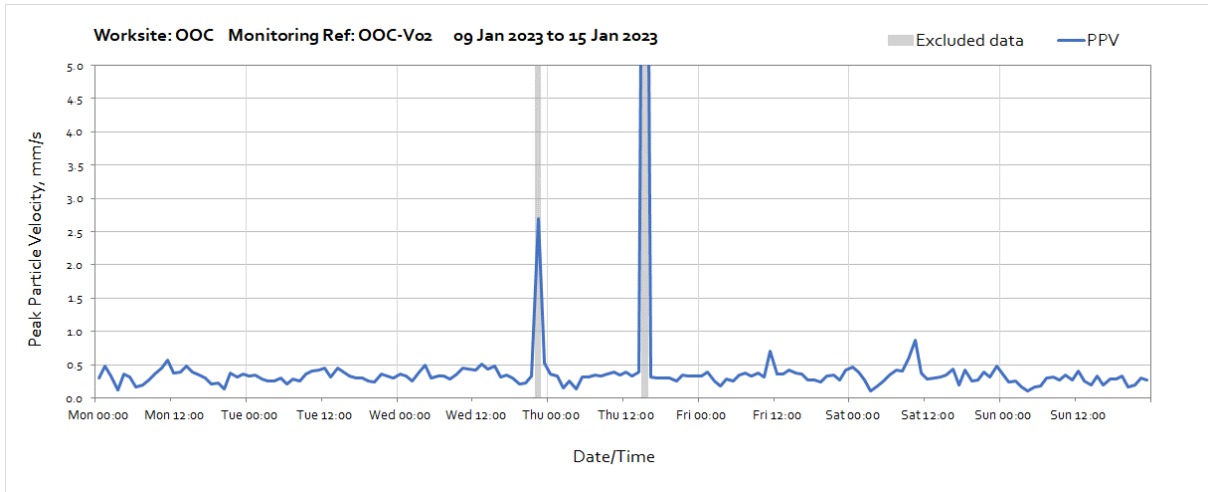
Note: Missing data at 03:00 on Thursday 5th January was due to software updates at the monitoring station.

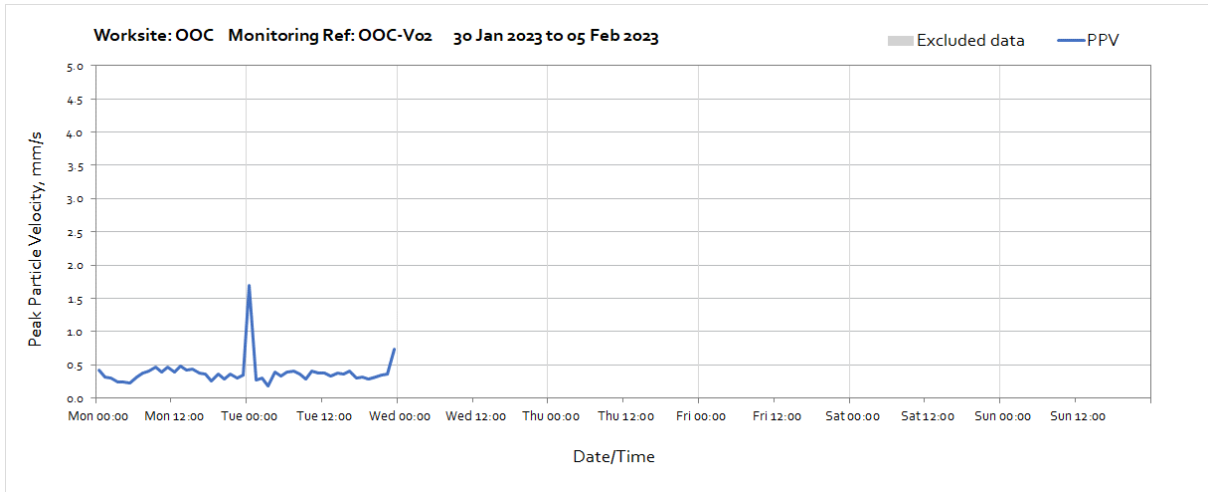




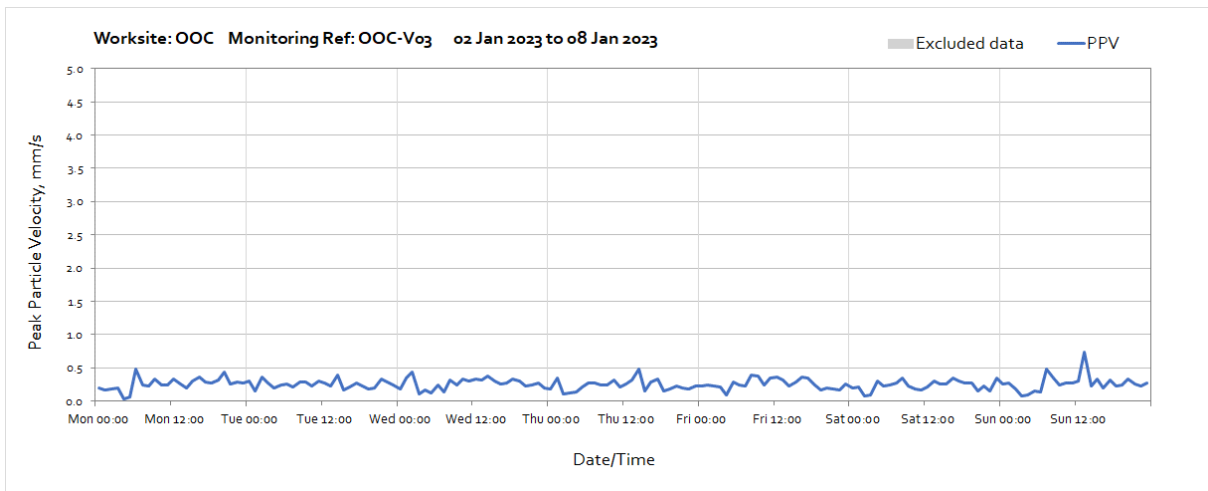
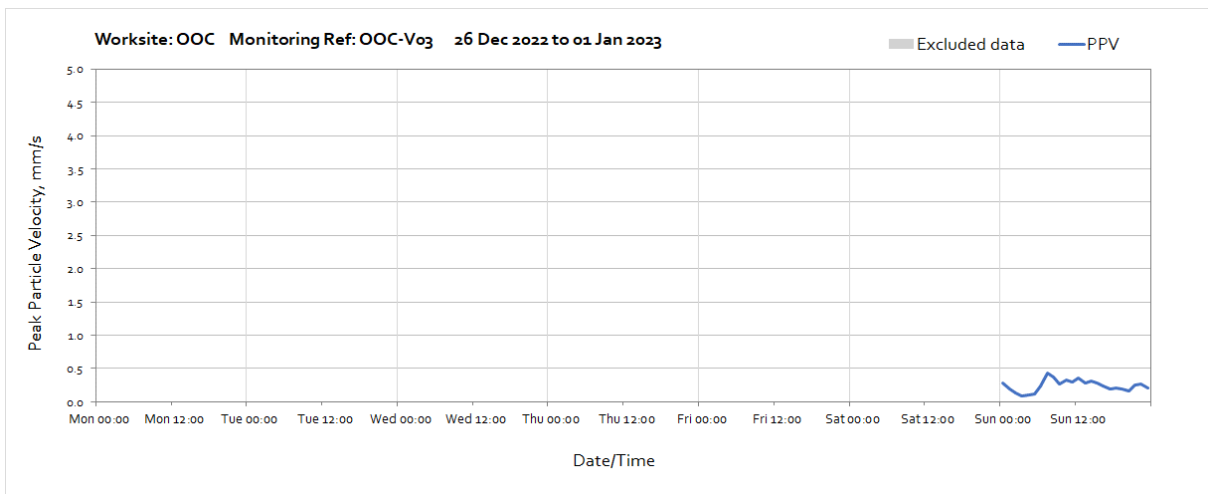
Worksite: Old Oak Common (OOC) - Monitoring Ref: OOC-V02

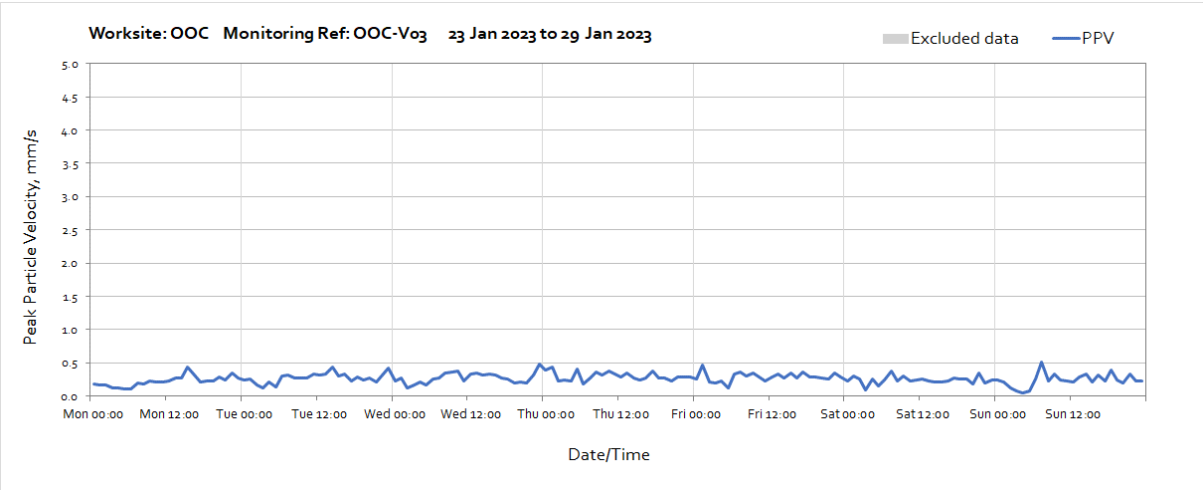
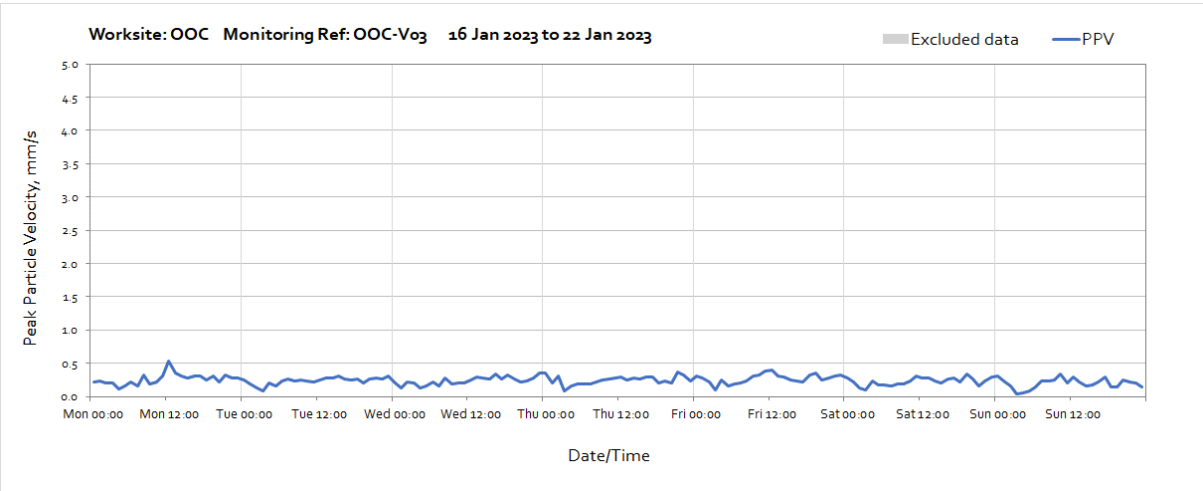
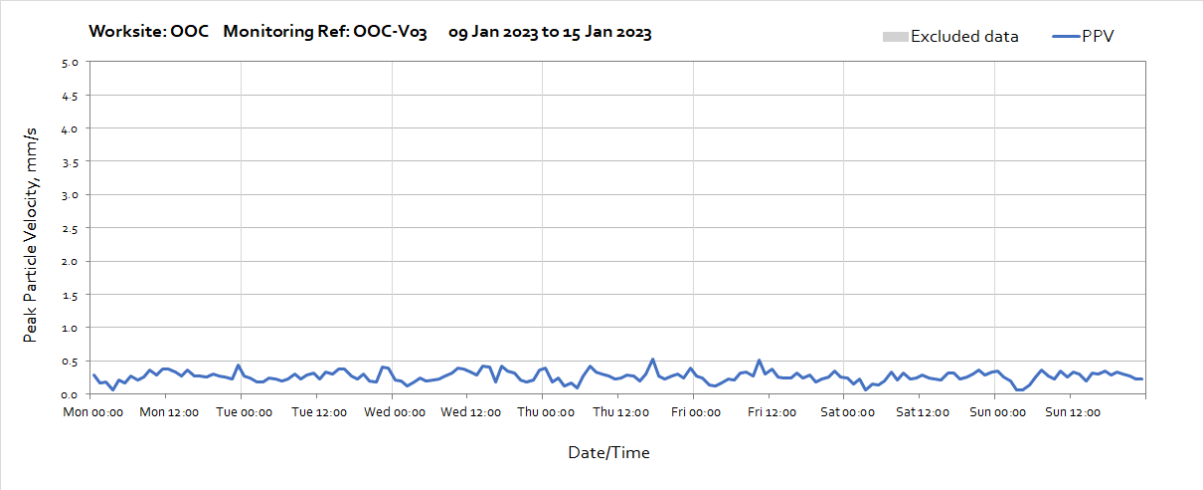


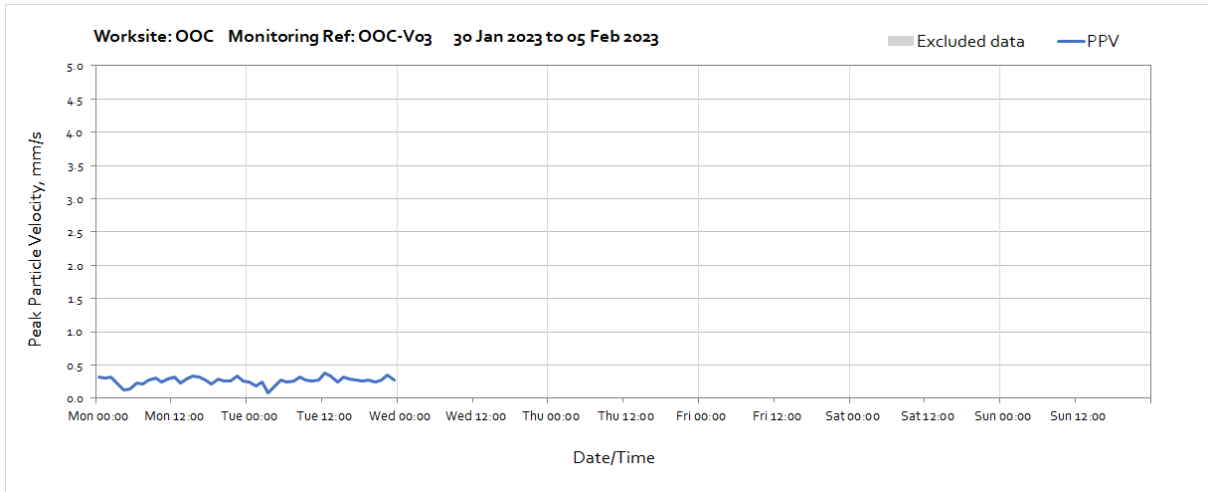




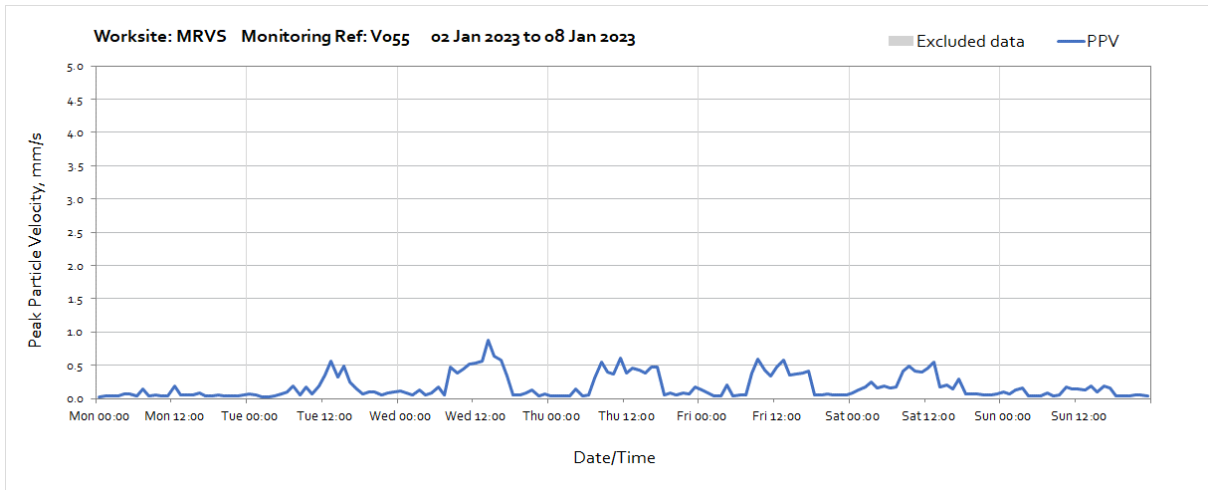
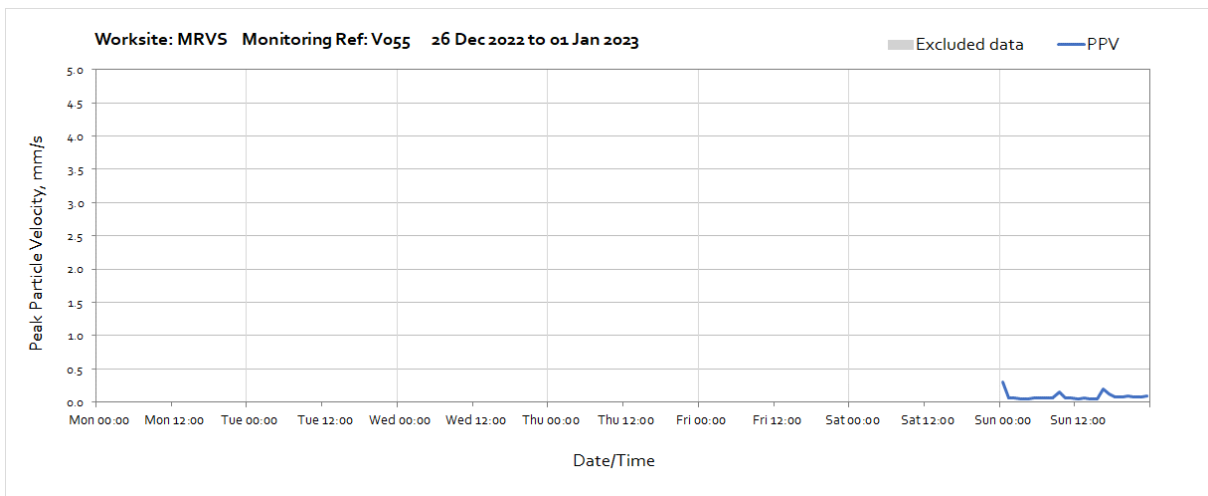
Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V03

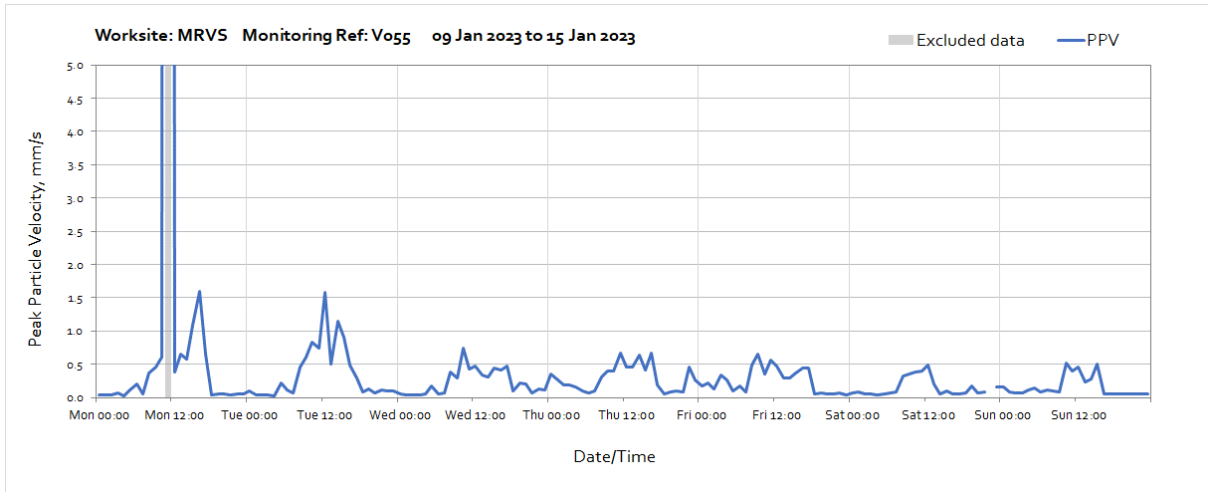




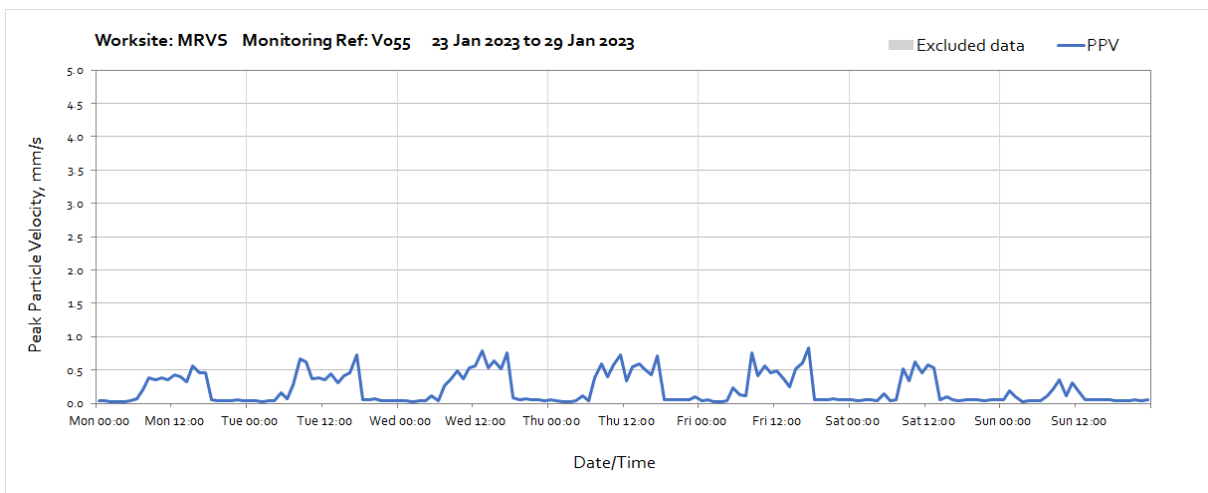
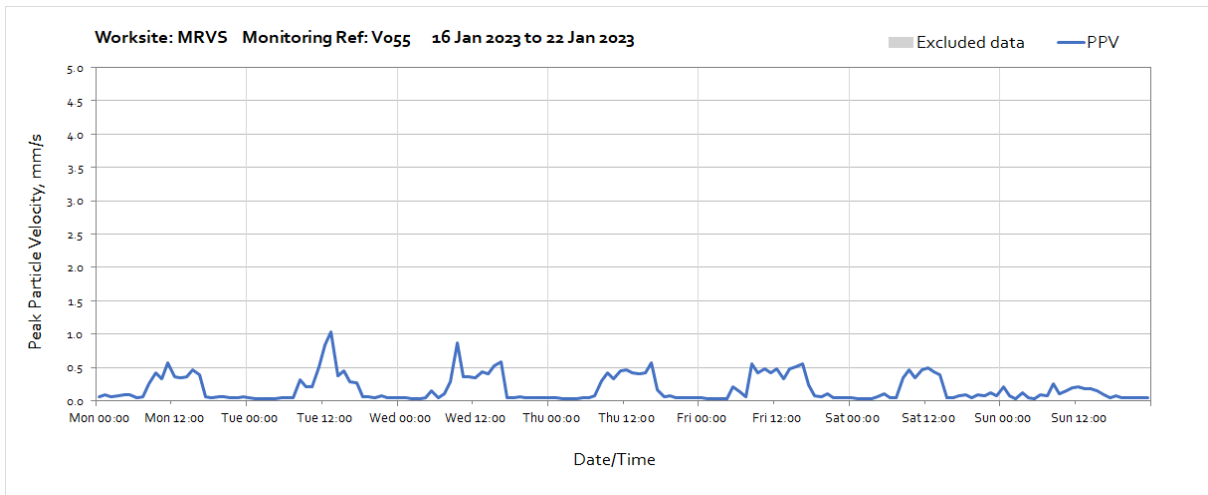


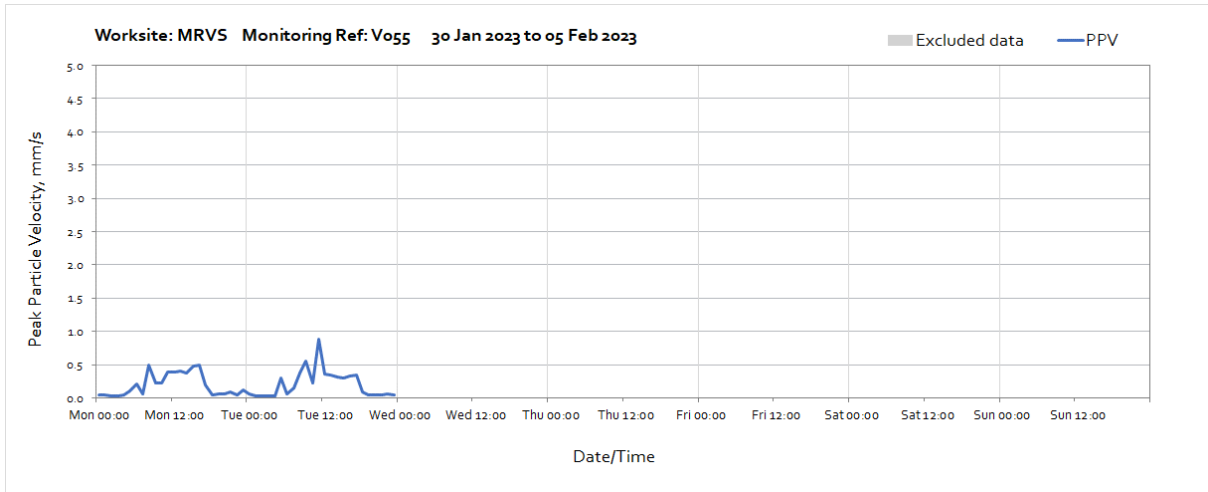
Worksite: Mandeville Road Vent Shaft (MRVS) – Monitoring Ref: V055



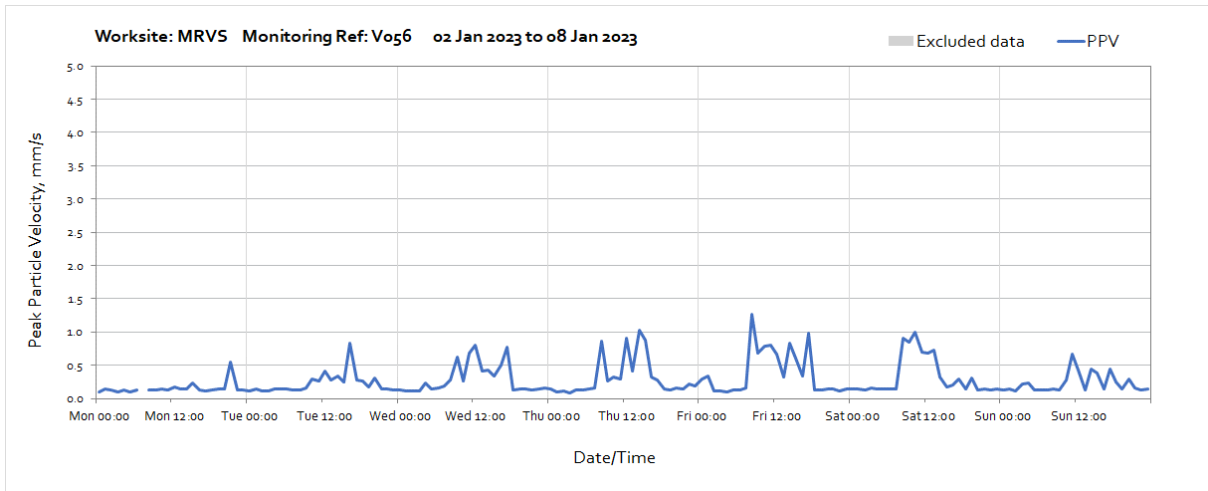
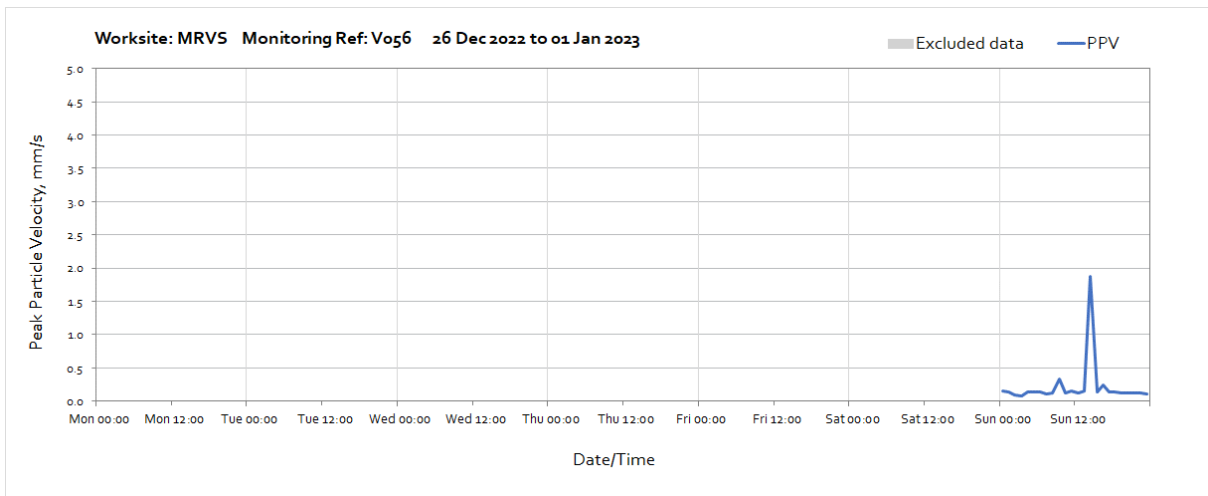


Note: Missing data at 22:00 on Saturday 14th January was due to software updates at the monitoring station.

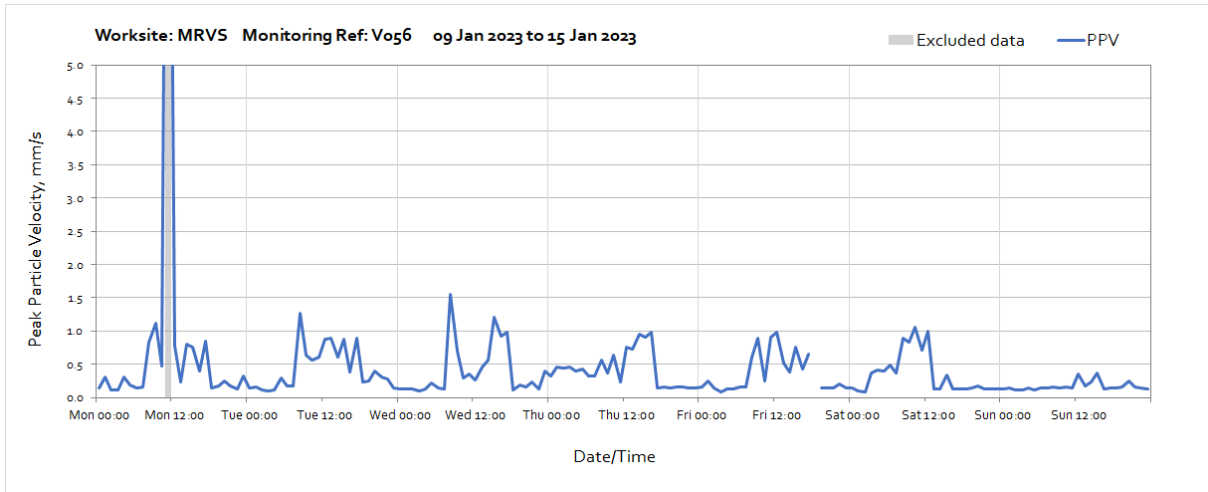




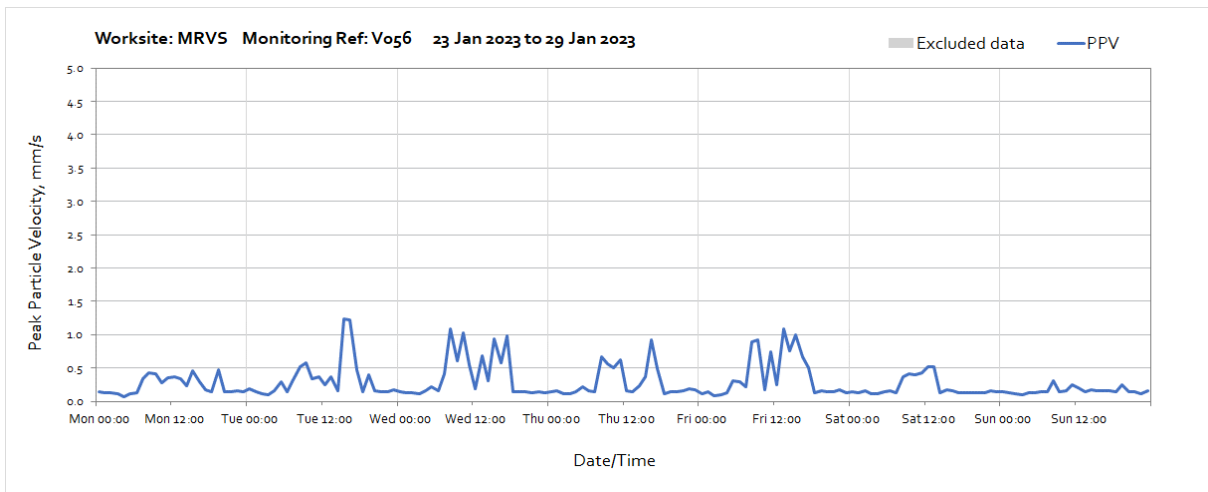
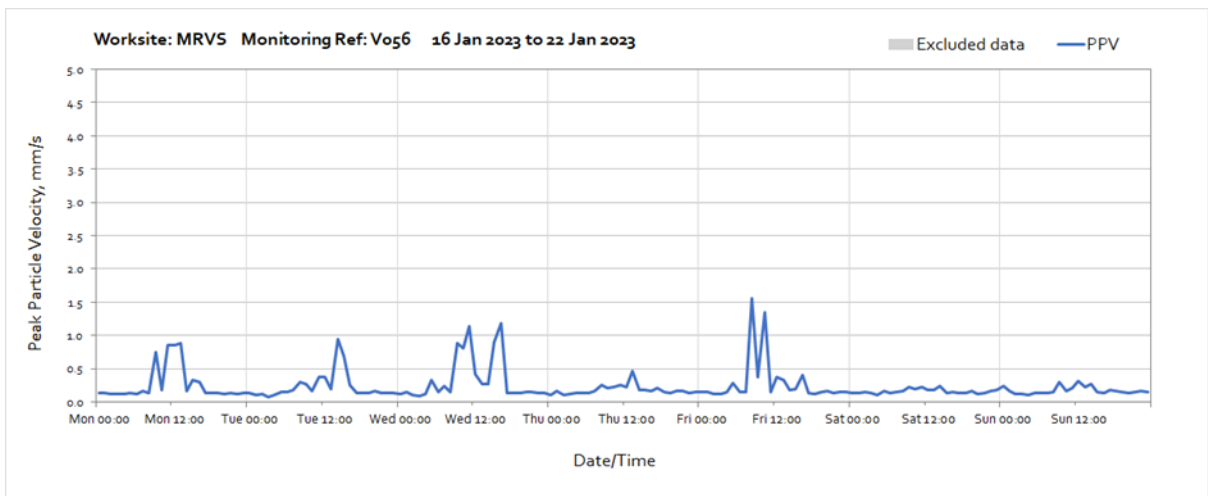
Worksite: Mandeville Road Vent Shaft (MRVS) – Monitoring Ref: V056

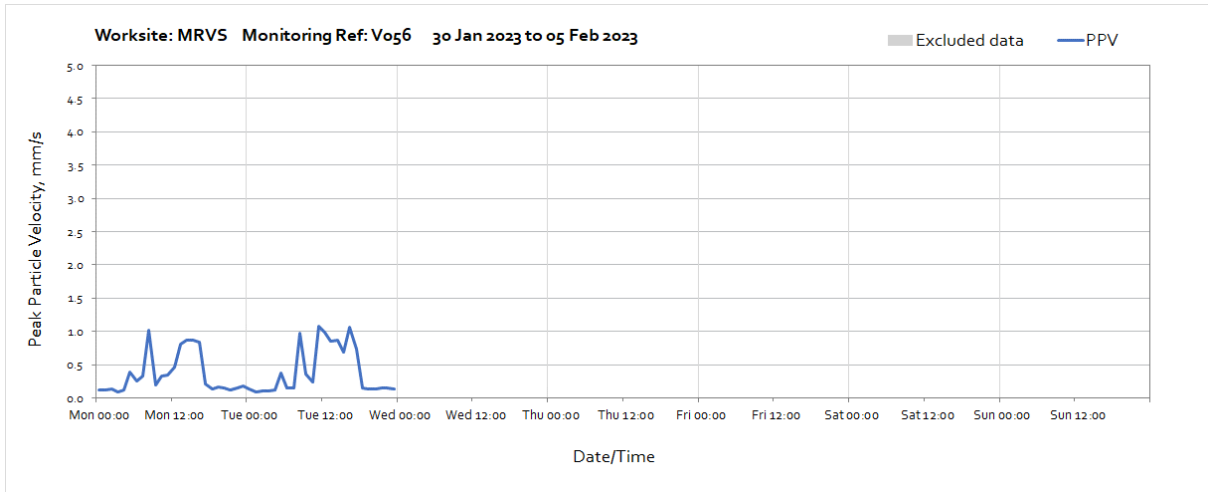


Note: Missing data at 07:00 on Monday 2nd January was due to software updates at the monitoring station.

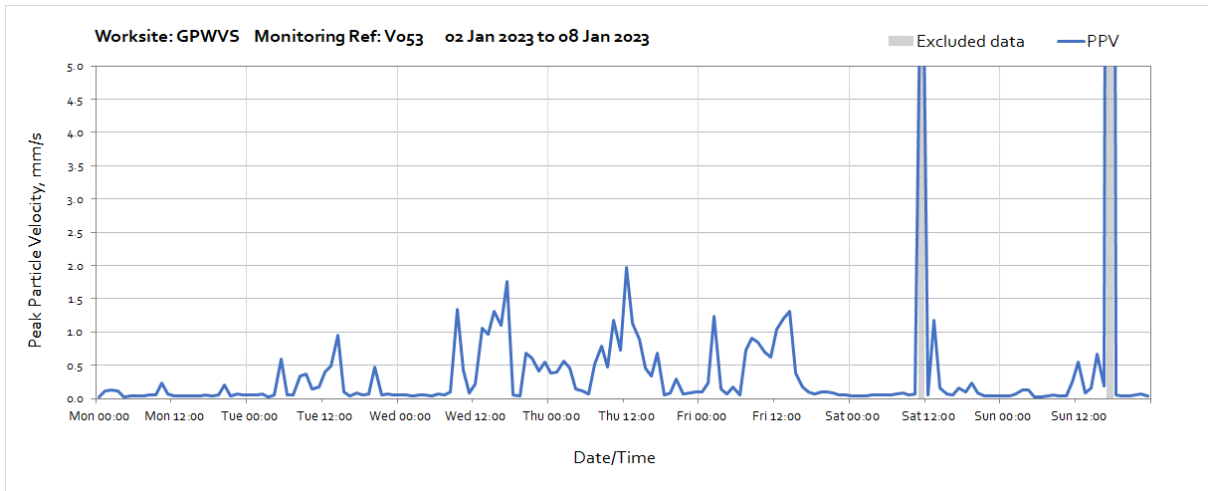
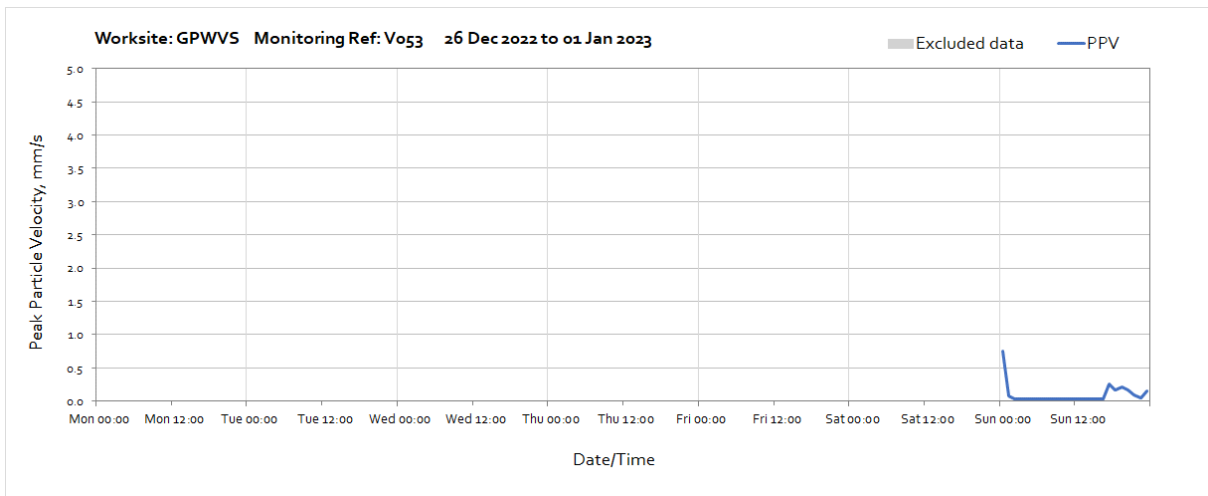


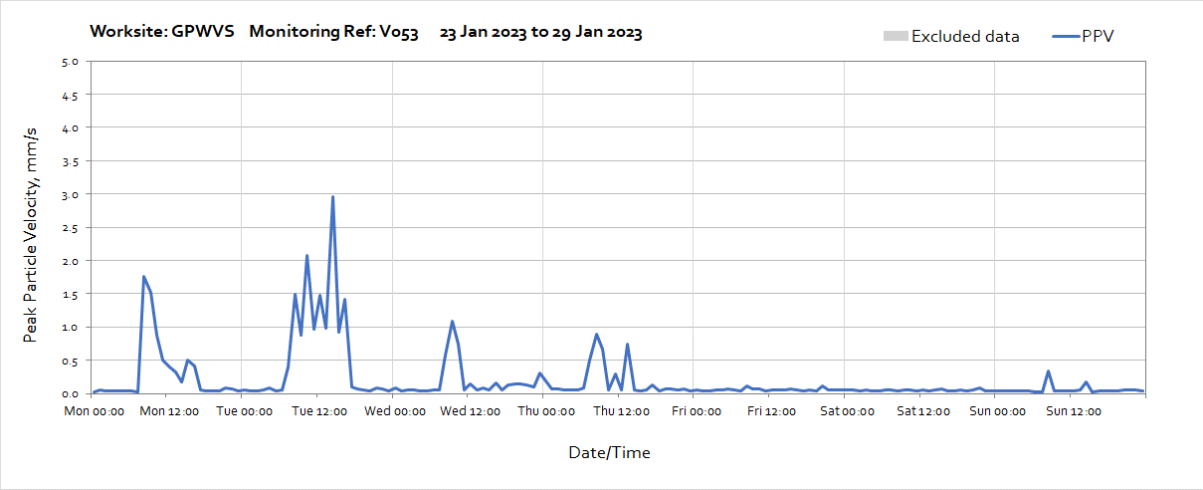
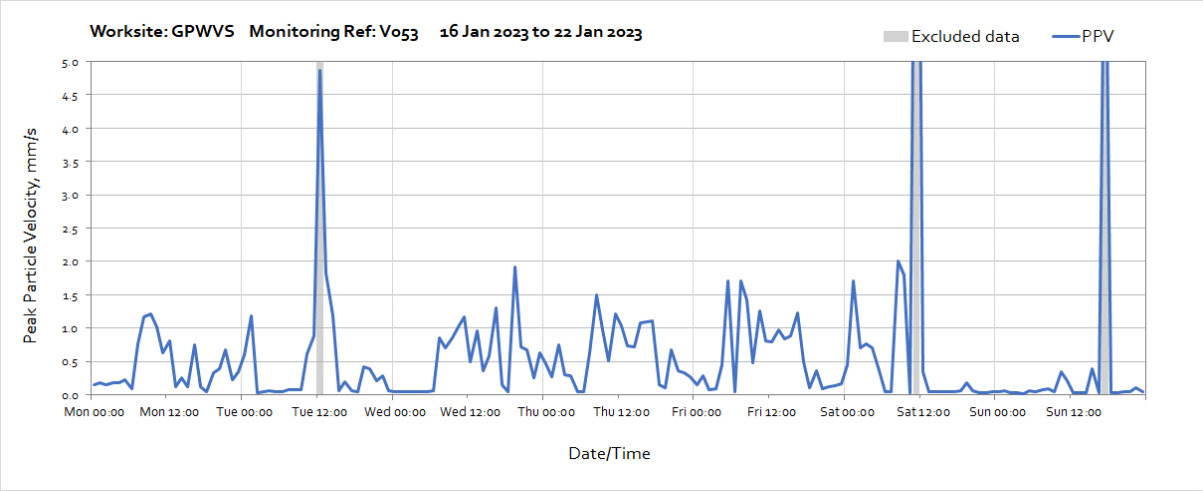
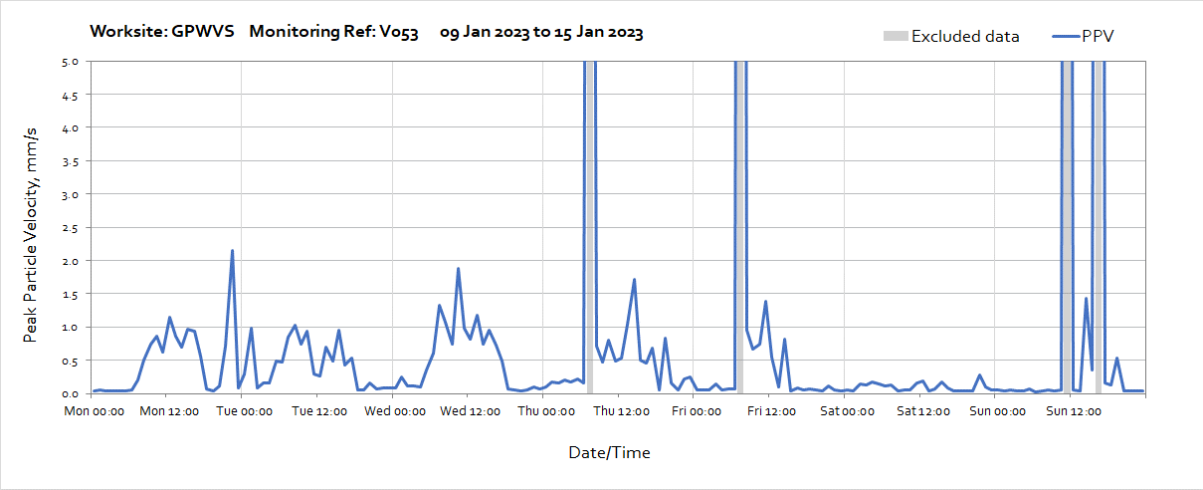
Note: Missing data at 18:00 on Friday 13th January was due to software updates at the monitoring station.

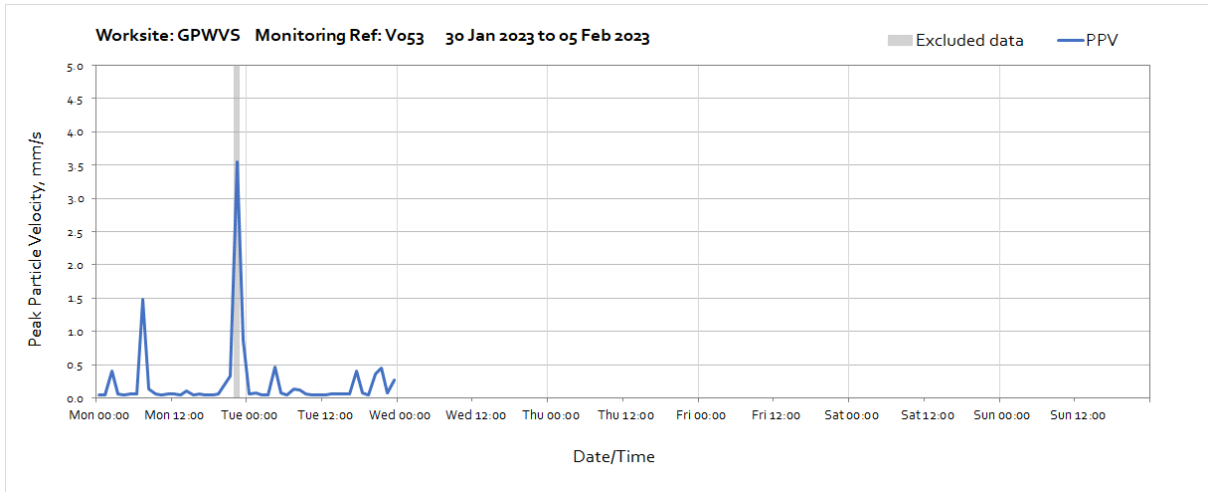




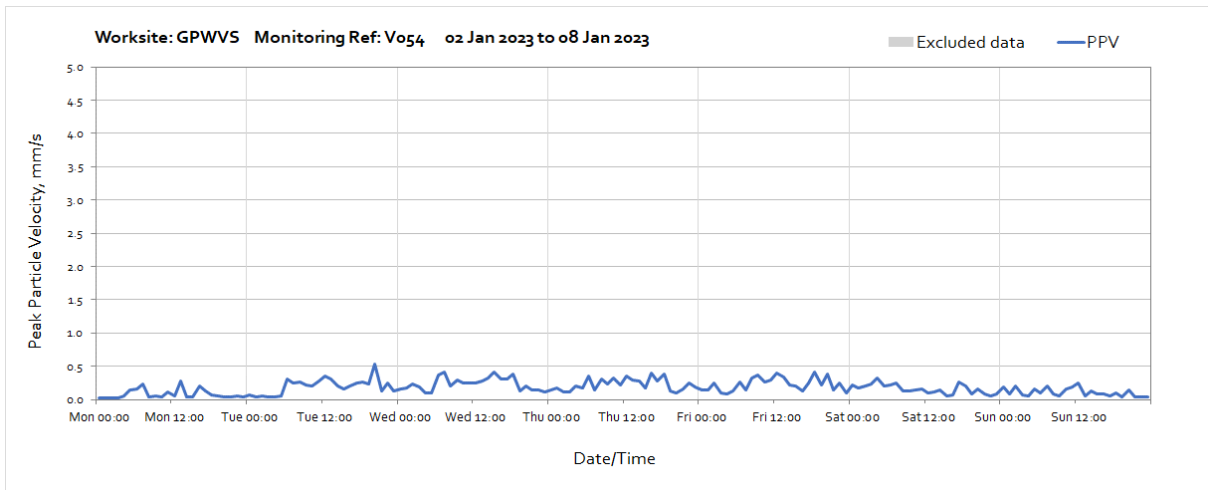
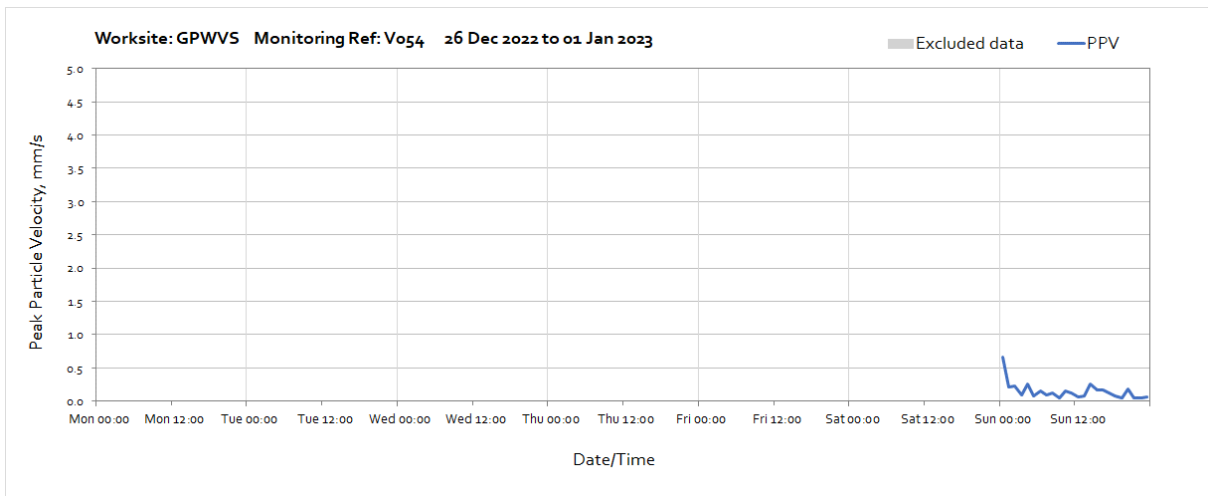
Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: V053

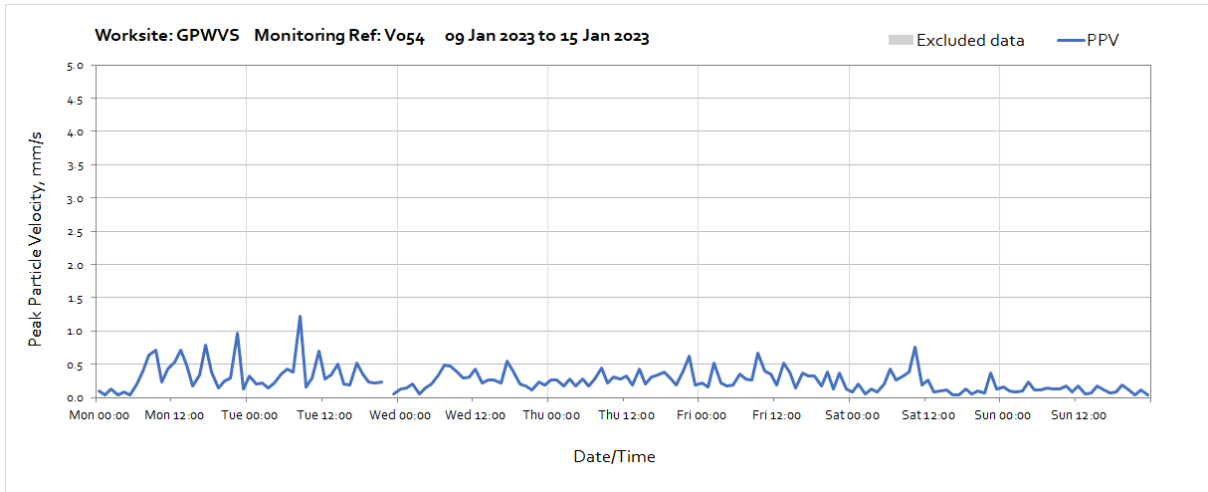






Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: V054





Note: Missing data at 21:00 on Tuesday 10th January was due to software updates at the monitoring station.

