

Construction Noise and Vibration Monthly Report – September 2022

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 September 2022.

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 gantry crane foundation works, track works, foundation works, ground preparation works, concrete pours, material deliveries, site widening works, tunnel boring machine works, construction of base slab, installation of shutters, scaffolding works, preparation works for tunnelling plant, launch ramp construction, conveyor fitting out works boundaries set up and bolt hole works were underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Willesden EuroTerminal worksite (ref. WET), where deliveries and removal of waste, conveyor works, waterproofing works, construction of crane, installation of permanent site power, manhole monitoring reinstallation, installation of fire hydrants and power cabling, installation of dust suppression system, relocation of the pedestrian bridge gate and cabling works were underway.
- Noise monitoring was undertaken in the vicinity of the Victoria Road Crossover Box worksite (worksite ref. VRCB), where:
 - construction of diaphragm wall, installation of formwork, dig-out works, reinforcement concrete works, tunnel set up works, excavation works, concrete pours, breakout of haul road and fabrication of steel cages were underway.
 - At Victoria Road Ancillary Shaft, secondary concrete lining works, installation of steel-reinforcement and waterproofing layer, lifting works, removal of shutters and platforms, shaft cover survey and testing of hoses.
- Noise monitoring was undertaken in the vicinity of the Flat Iron compound (worksite ref. FIC), where excavation works, concrete pours, plinth steel fixing works, installation of steel work and shutters were underway.
- Noise and vibration monitoring were undertaken in proximity of the Old Oak Common depot worksite (ref. OOC), where material movement, fixing of reinforced bars, form works, shuttering works, site entrance works, diaphragm wall works, construction of capping beams, excavation works, drainage installations, utility installation, removal of waste material and road sweeping works.
- Noise monitoring was undertaken in proximity of the Mandeville Road Ventilation Shaft worksite (ref.: MRVS), where grouting and drainage works were underway.

- Noise and vibration monitoring were undertaken in proximity of the Green Park Way Ventilation Shaft worksite (ref. GPWVS), where road sweeping, vegetation clearance, installation of key clamp, cabling works, shuttering works, concrete pours, installation of workshop, shaft works, installation of canopy and polythene, platform removal, installation of crane alarms and light, compressor commissioning, plant and equipment maintenance works were underway.
- Noise monitoring was undertaken in proximity of the Westgate Ventilation Shaft (ref. WVS), where excavation works, sprayed concrete lining works, installation of shutters and reinforcement bars, installation of tunnel edge protection, milling of joints, installation of tunnel drainage box, extension of ventilation and services, installation of lighting, plant and equipment maintenance, jacking and packing works were underway.

Further works, where monitoring was not undertaken, were also underway at:

- Atlas Road Sub-Station where power utility works were underway; and
- Wormwood Scrubs where manhole construction, pipe jacking and tunnelling works were underway.

The HS2 threshold levels for significant noise impacts, which are defined in Information Paper E23 (<https://www.gov.uk/government/publications/hs2-information-papers-environment>), was not exceeded during the reporting period.

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

Two (2) complaints were received during the monitoring period. A description of complaints, the results of investigation and any actions taken are detailed in Table 7 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 30th September 2022.

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 5 in Appendix A), where work activities included:
 - Gantry crane foundation works, including track works, drilling, concrete pours, shuttering and bolting works.
 - Tunnel boring machine works, including roof cladding, foundation and ground preparation, wall panels installation and concrete pours.
 - Construction of base slab.
 - Installation of shutters.
 - Scaffolding works.
 - Preparation works for tunnelling plant, including slab construction and water treatment plant.

- Construction works of launch ramp, including shutter fixing, concrete pours, sealing rings and removal works.
- Conveyor fitting out works, including fabrication of segment storage area, walkways repairs and paint removal for grinding and welding.
- Bolt hole works.
- Site widening works.
- Willesden EuroTerminal worksite, ref. WET (see plan 5 in Appendix A), where work activities included:
 - Waste deliveries, including loading of soil into railway trucks for removal from site.
 - Conveyor construction works, including maintenance works.
 - Waterproofing works, including installation of key clamp.
 - Construction of gantry crane bases, including trackwork drilling.
 - Manhole monitoring reinstallation.
 - Installation of permanent site power.
 - Installation of fire hydrants and power cabling.
 - Installation of dust suspension system.
 - Relocation of the pedestrian bridge gate.
 - Cabling works.
- Victoria Road Crossover Box worksite, ref. VRCB (see plan 6 in Appendix A), where work activities included:
 - Construction of diaphragm wall, including bentonite works, repair works, installation of cages and concrete works.
 - Installation of formwork, including removal of cross-walls and excavation works.
 - Dig-out works, including installation of steel and shutters, striking of formwork, steel fixing, lifting works, panel remedial works, hydro-demolition works, breakout of cross walls, reinforcement concrete works and backfilling works.
 - Tunnel set up works, including installation of reinforcements, setup of batching plant, roof scaffolding, installation of base plates, installation of batching plant silo augers and ladders.
 - Excavation works, including breakout of haul road.

- Fabrication of steel cages.
- Concrete pours.
- Victoria Road Ancillary Shaft works comprising secondary concrete lining works, installation of steel-reinforcement and waterproofing layer, lifting works, removal of shutters and platforms, shaft cover survey and testing of hoses.
- Flat Iron compound, worksite ref. FIC (see plan 6 in Appendix A), where work activities included:
 - Excavation works.
 - Concrete pours.
 - Plinth steel fixing works.
 - Installation of the steelwork and shutter work.
- Old Oak Common depot worksite, located in the London Borough of Hammersmith and Fulham (LBHF), ref. OOC (see plan 7 in Appendix A), where work activities included:
 - Material movement.
 - Fixing of reinforced bars, shuttering and form works.
 - Site entrance works, including kerb and installation.
 - Diaphragm wall works, including diaphragm wall breakdown.
 - Construction of capping beams.
 - Excavation works.
 - Drainage installation.
 - Utility installation.
 - Road sweeping works.
 - Removal of waste material.
- Mandeville Road Ventilation Shaft worksite, reference MRVS (see plan 1 in Appendix A), where work activities included:
 - Grouting works, including drilling and casting works.
 - Drainage works.

- Green Park Way Ventilation Shaft worksite, reference GPWVS (see plan 2 in Appendix A), where work activities included:
 - Road sweeping.
 - Vegetation clearance.
 - Installation of key clamp.
 - Cabling works.
 - Shuttering works.
 - Concrete pours.
 - Installation of workshop.
 - Shaft works, including excavation works, installation of rings and rings grouting.
 - Installation of canopy and polythene.
 - Platform removal.
 - Installation of crane alarms and lights.
 - Installation of pipework and air lines.
 - Compressor commissioning.
 - Plant and equipment maintenance works.
- Westgate Ventilation Shaft worksite, reference WVS (see plan 3 in Appendix A), where work activities included:
 - Excavation works.
 - Sprayed concrete lining works.
 - Installation of shuttering and reinforcement bars.
 - Installation of tunnel edge protection.
 - Milling of joints.
 - Installation of tunnel drainage box.
 - Extension of the ventilation and services.
 - Installation of lighting.
 - Plant and equipment maintenance.
 - Jacking and packing works.

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

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- Atlas Road Sub-Station where power utility works were underway; and
- Wormwood Scrubs where manhole construction, pipe jacking and tunnelling works 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 (20) noise and eight (8) vibration monitoring installations were active in September in the LBE area. Table 2 summarises the position of noise and vibration monitoring installations within the LBE area in September 2022.

1.2.2 A noise monitor (ref.: OOC-N03) was installed at Old Oak Common worksite (worksite ref.: OOC) on Thursday 8th September 2022.

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
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

Worksite Reference	Measurement Reference	Address
	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
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
	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	62.8 (64.6)	63.6 (65.4)	62.3 (63.6)	61.1 (70.2)	58.1 (62.8)	61.3 (62.6)	61.2 (62.0)	62.1 (63.4)	61.8 (63.8)	57.1 (61.5)	60.8 (65.4)	57.5 (62.7)
	N033	Outside The Collective, Atlas Road/Victoria Road	Free-field	65.5 (68.3)	66.9 (73.2)	63.1 (65.9)	62.3 (65.5)	60.0 (69.8)	63.8 (66.0)	70.7 (77.3)	63.0 (66.0)	62.7 (67.4)	57.5 (64.7)	61.6 (66.5)	58.5 (65.1)
	N060	Atlas Road next to Bashey Road	Free-field	54.6 (61.2)	63.5 (70.9)	52.2 (64.0)	55.6 (68.6)	55.5 (67.0)	57.9 (62.0)	59.2 (63.8)	51.3 (55.2)	50.7 (56.4)	48.0 (53.8)	51.9 (64.2)	53.2 (62.9)
WET	N034	Stephenson Street (north)	Free-field	53.0 (56.8)	56.0 (59.5)	54.3 (58.4)	53.5 (58.7)	48.3 (56.0)	52.0 (53.6)	53.8 (58.6)	51.7 (55.6)	51.8 (55.4)	46.6 (52.9)	51.4 (60.9)	46.7 (54.8)
	N035	Stephenson Street (south)	Free-field	53.7 (56.9)	56.6 (59.0)	51.0 (55.8)	51.3 (55.1)	48.7 (59.9)	51.6 (53.9)	56.3 (62.0)	49.2 (49.6)	50.5 (57.0)	46.6 (52.8)	48.6 (56.9)	47.5 (53.5)
	N041	Junction of Stephenson Street/Goodhall Street	Free-field	53.7 (57.2)	57.4 (60.4)	55.0 (59.3)	54.0 (58.2)	49.2 (55.6)	53.4 (56.8)	56.5 (58.9)	54.3 (58.2)	53.0 (55.9)	48.5 (53.8)	52.1 (59.7)	47.9 (53.4)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
VRCB	N031	School Road, outside Acton Business Centre	Free-field	63.4 (65.0)	66.1 (70.1)	63.4 (68.3)	60.7 (67.0)	57.5 (67.1)	60.5 (63.4)	67.5 (70.3)	66.2 (71.2)	63.6 (75.3)	56.0 (60.2)	60.2 (63.1)	56.5 (61.2)
	N050	Acton Square, outside North Acton Station	Free-field	63.6 (66.8)	64.8 (66.1)	62.6 (64.4)	61.6 (66.0)	58.5 (65.9)	63.1 (67.3)	64.3 (65.2)	63.0 (64.8)	61.8 (65.5)	58.7 (69.4)	61.2 (67.4)	58.3 (67.1)
FIC	N029	Braitrim House, Victoria Road	Free-field	54.9 (68.3)	61.5 (65.3)	52.5 (67.6)	53.2 (61.4)	55.7 (69.2)	56.1 (58.5)	58.6 (63.2)	55.7 (66.0)	52.6 (63.9)	44.8 (50.0)	50.0 (65.9)	51.0 (63.4)
	N042	Bodens car park	Free-field	59.6 (65.9)	62.4 (66.2)	56.2 (60.4)	53.7 (57.3)	52.1 (58.3)	56.0 (56.8)	62.8 (67.0)	62.7 (67.8)	56.0 (64.5)	51.0 (54.5)	53.2 (58.0)	50.7 (54.8)
	N049	Flat Iron compound	Free-field	54.6 (59.3)	65.9 (77.1)	55.4 (63.2)	55.7 (65.7)	57.6 (66.9)	57.3 (60.0)	60.7 (64.8)	56.9 (64.9)	54.6 (62.6)	48.0 (60.3)	51.8 (68.8)	53.6 (58.3)
OOC	OOC-N01	Old Oak Common Lane	Free-field	65.4 (67.2)	67.5 (69.7)	65.7 (68.5)	64.2 (67.2)	60.4 (66.3)	63.0 (63.8)	65.0 (65.6)	65.6 (66.5)	65.3 (69.7)	60.7 (65.9)	63.6 (65.9)	59.8 (63.9)
	OOC-N02	Old Oak Common Lane, Hilltop Works	Free-field	65.9 (67.2)	69.9 (71.7)	66.4 (68.5)	64.1 (66.6)	60.5 (67.5)	63.6 (64.4)	65.1 (65.6)	65.8 (66.7)	65.9 (70.9)	60.7 (65.3)	63.7 (66.7)	60.1 (63.8)
	OOC-N03	Old Oak Lane Halt, Wells House Road	Free-field	52.7 (55.1)	56.5 (62.4)	54.2 (57.7)	53.6 (58.3)	50.1 (56.0)	53.2 (53.8)	53.1 (54.4)	51.6 (53.2)	52.5 (54.6)	48.6 (52.8)	52.4 (56.6)	50.9 (54.7)
MRVS	N040	Badminton Close	Free-field	53.1 (58.5)	53.9 (56.1)	52.5 (55.2)	53.1 (57.9)	50.1 (60.1)	55.4 (58.4)	53.2 (54.1)	53.3 (53.7)	52.5 (54.0)	49.4 (55.7)	52.1 (54.8)	49.8 (55.0)

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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
	N058	Mandeville Road	Free-field	54.9 (58.4)	66.5 (72.4)	60.8 (74.1)	54.9 (58.2)	50.4 (57.1)	54.4 (55.2)	64.8 (68.8)	61.0 (65.6)	55.1 (66.4)	48.8 (54.8)	54.1 (58.3)	50.3 (56.2)
	N063	Mandeville Road	Free-field	57.9 (63.0)	68.2 (71.1)	57.1 (60.9)	57.5 (60.6)	54.0 (59.2)	57.0 (58.0)	69.1 (72.2)	67.0 (72.2)	57.8 (69.8)	53.3 (57.7)	56.6 (58.9)	54.0 (58.9)
GPWVS	N059	Green Park Way Ventilation Shaft	Free-field	58.0 (69.0)	60.6 (63.6)	53.1 (58.7)	53.9 (60.9)	51.7 (59.0)	55.2 (56.4)	55.8 (62.4)	51.5 (52.2)	50.7 (53.1)	46.8 (51.5)	51.0 (53.7)	48.3 (55.2)
	N064	Green Park Way Ventilation Shaft	Façade	53.5 (57.4)	56.7 (61.8)	53.3 (56.2)	52.7 (57.1)	49.5 (55.7)	52.4 (53.2)	52.6 (54.7)	51.4 (51.6)	52.1 (55.8)	47.3 (51.6)	52.1 (54.5)	48.7 (55.0)
WVS	N062	Westgate Ventilation Shaft	Free-field	64.8 (71.6)	66.7 (70.0)	63.7 (67.9)	63.5 (70.6)	61.4 (69.5)	59.1 (62.8)	63.0 (66.7)	55.8 (56.6)	55.5 (58.1)	53.8 (61.1)	56.6 (63.5)	54.6 (61.0)

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	2.91 (Y-axis)
	V057	37, Stephenson Street	1.79 (X-axis)
OOC	OOC-V02	Kildun Court, Old Oak Common Lane	2.13 (Y-axis)
	OOC-V03	Wells House Road Alleyway	1.71 (Y-axis)
GPWVS	V053	Green Park Way, Greenford	1.34 (Z-axis)
	V054	Green Park Way Ventilation Shaft	0.59 (Y-axis)
MRVS	V055	Mandeville Road	1.09 (Z-axis)
	V056	Mandeville Road	2.68 (Z-axis)

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

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

2.2 Exceedances of the SOAEL

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

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

2.2.3 Where reported construction noise levels exceed the SOAEL, 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
MRVS	N040	Badminton Close	All days	All periods	No exceedance

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

2.2.1 No exceedances of the SOAEL were recorded due to HS2 construction works during September 2022.

2.3 Exceedances of Trigger Level

2.3.1 Table 6 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 6: 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
-	-	-	-	-	-

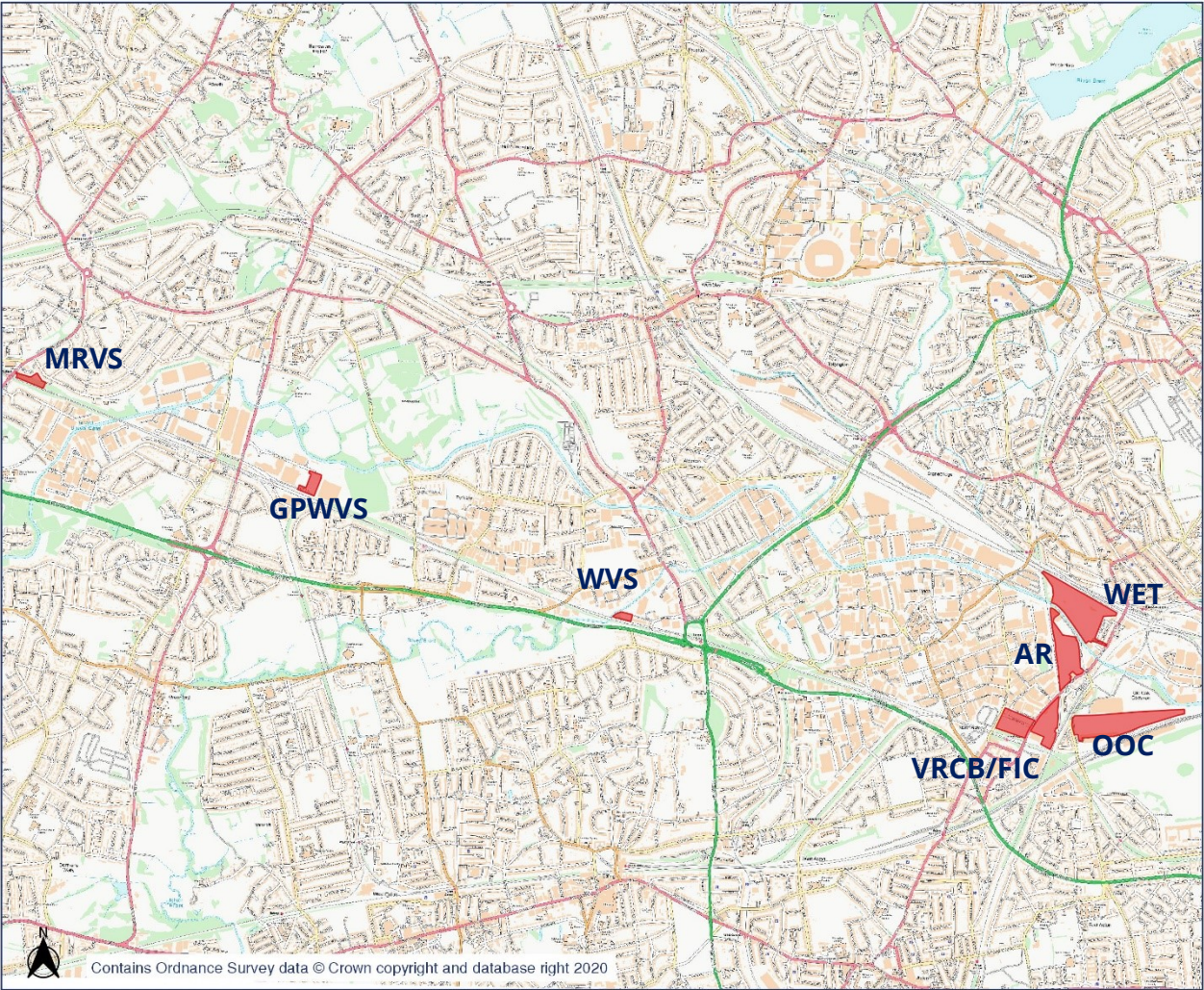
2.4 Complaints

2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

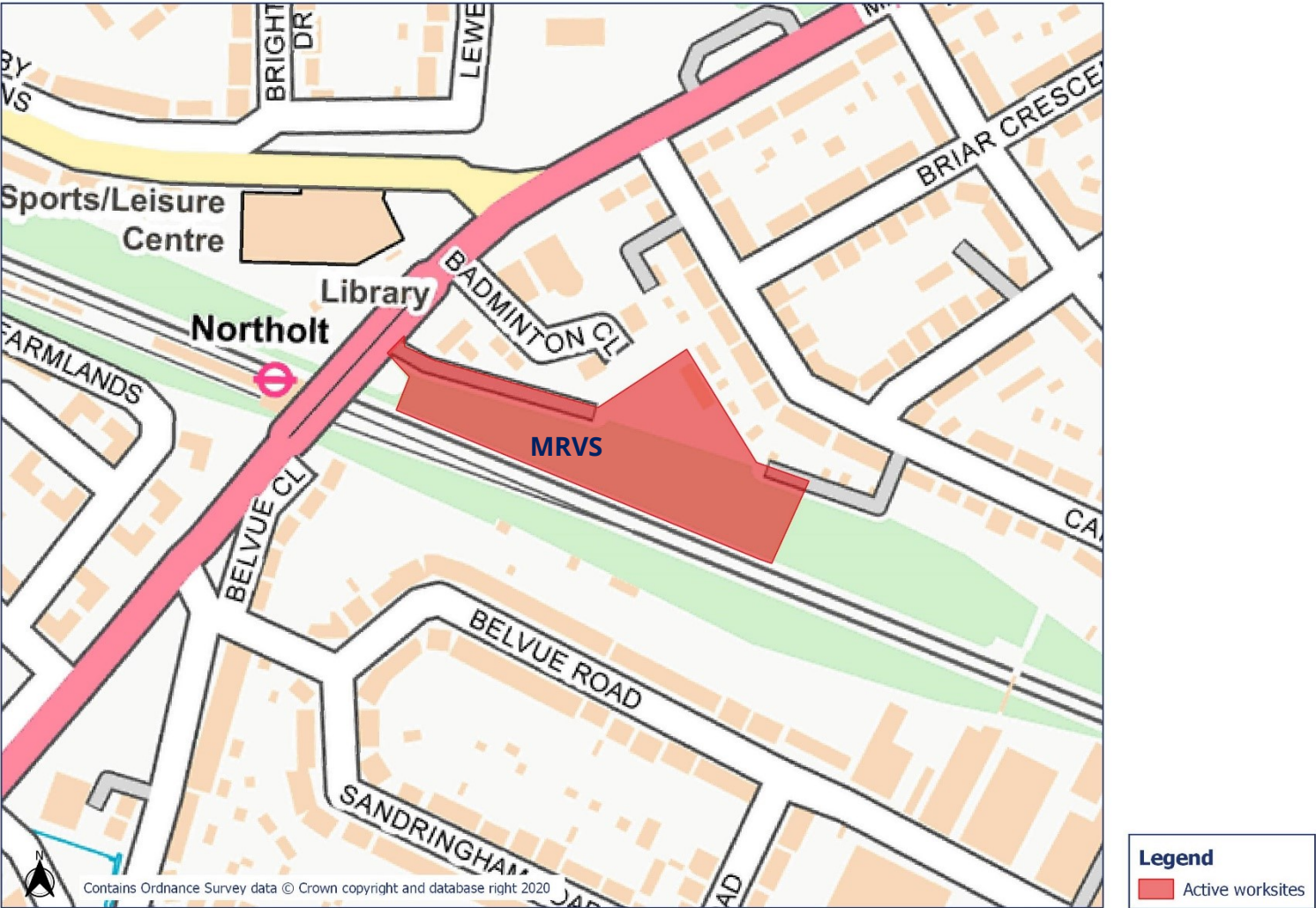
Table 7: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-22-43969-C	OOC	Complaint regarding ongoing noise from site in the mornings and evenings, particularly between 3am and 4am.	The investigation showed that the noise level may have been due to tunnelling works.	The complainant was contacted and informed about the results of investigation.
S2-22-43979-C	OOC	Complaint due to noise in the early mornings.	The noise is mainly from shouting and car horns entering site.	Site team was re-briefed. Apologies were given to resident regarding the disturbance early that morning and was also reassured that the issue is dealt with.

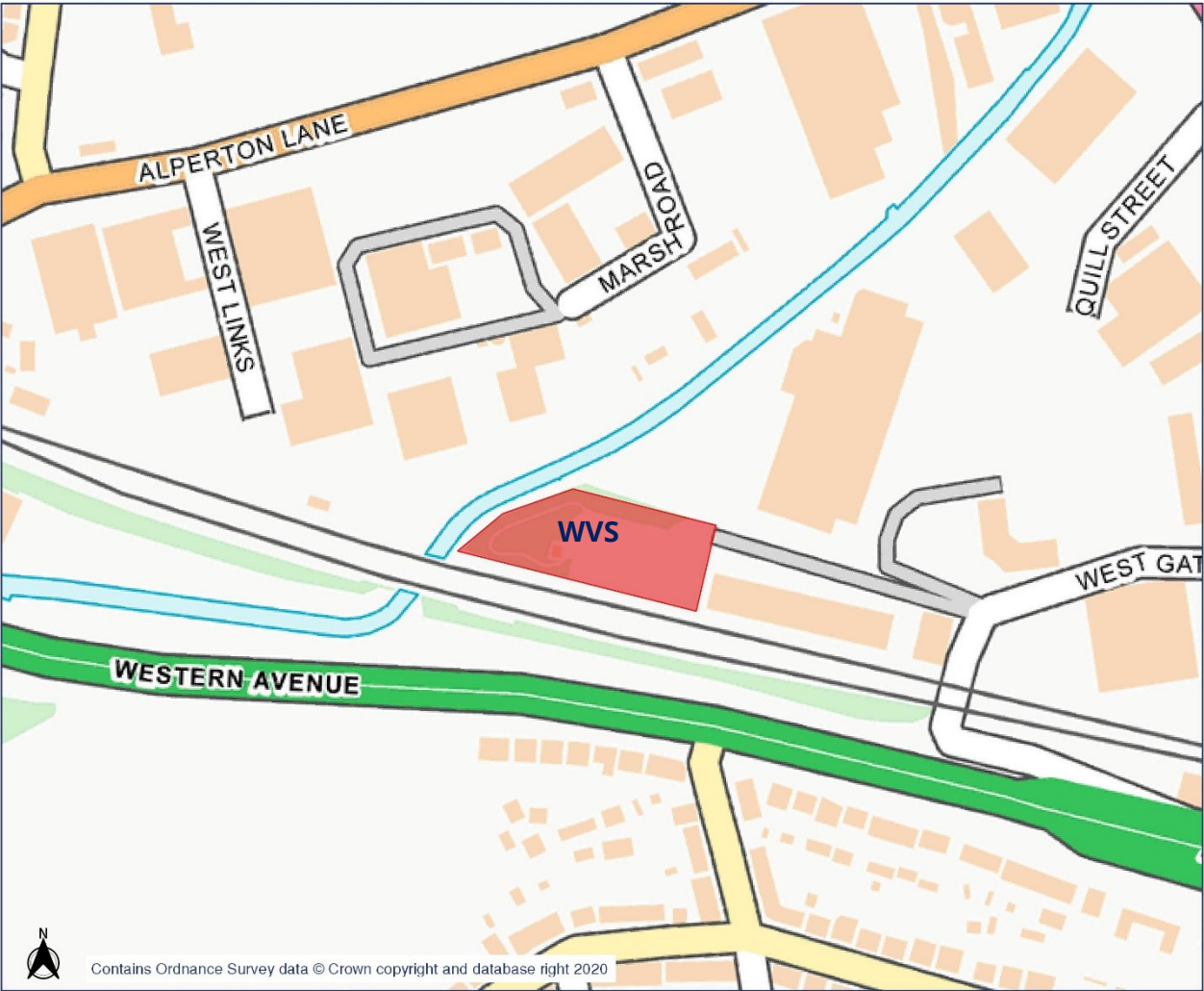
Appendix A Site Locations

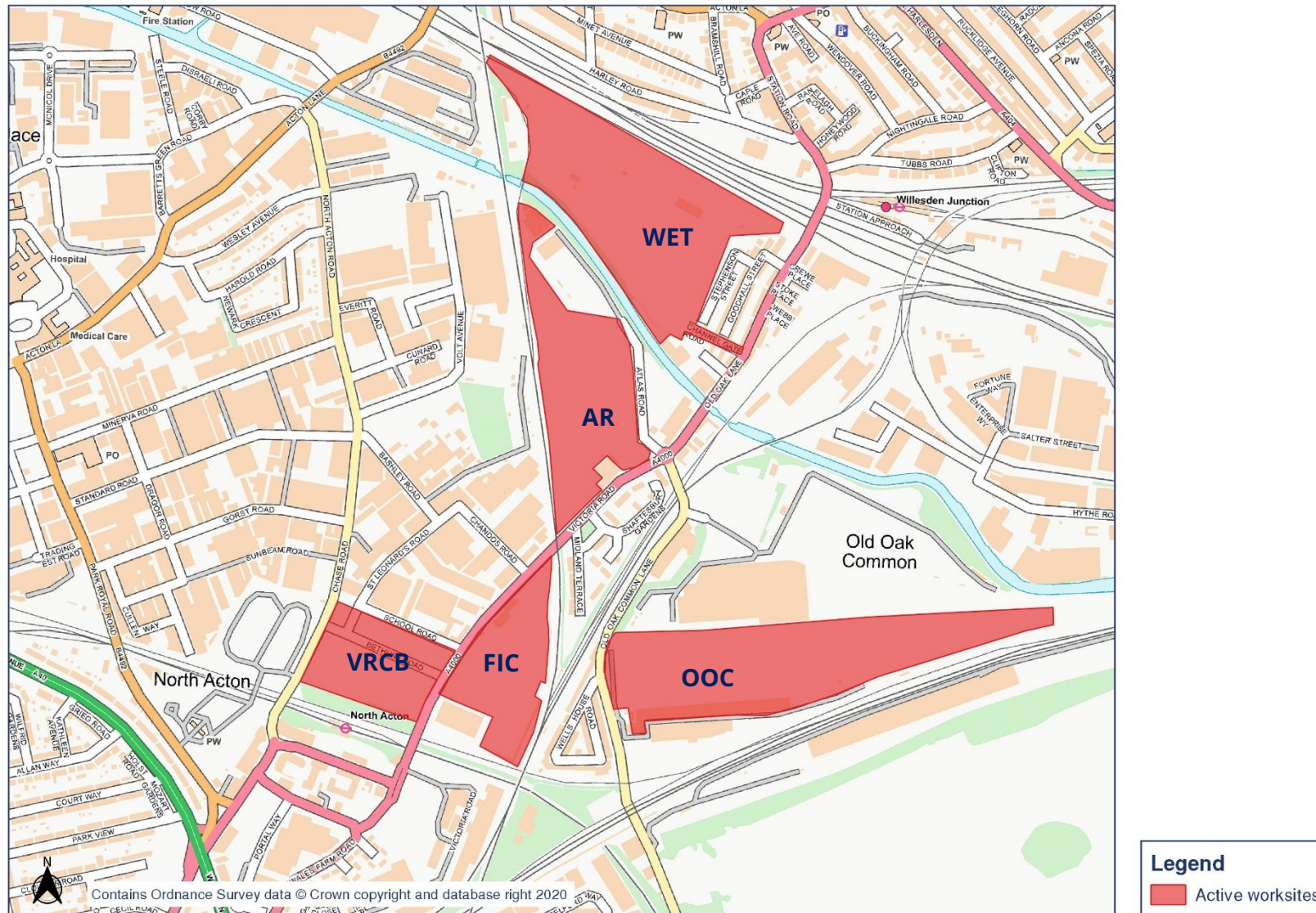


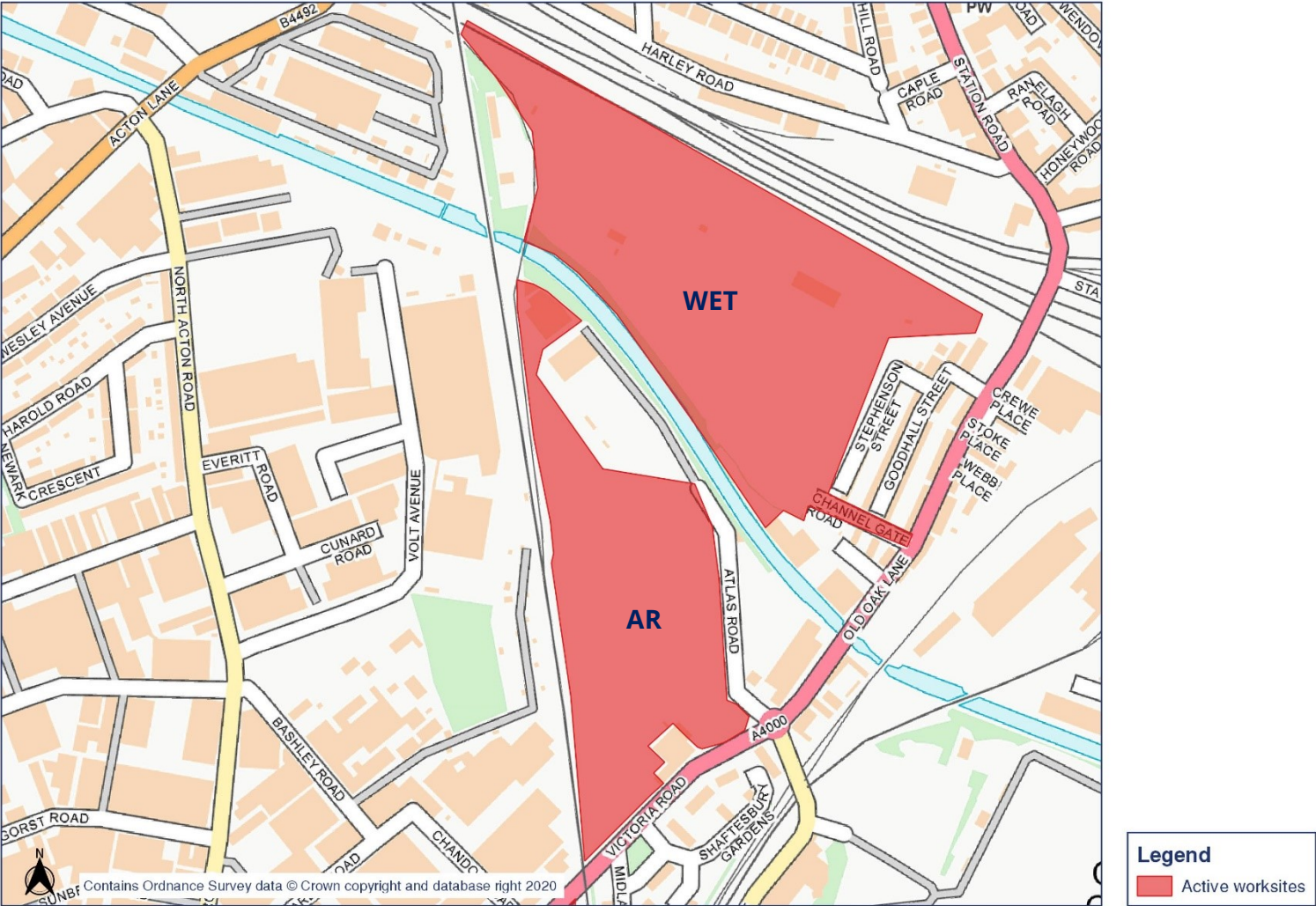
Legend
Active worksites

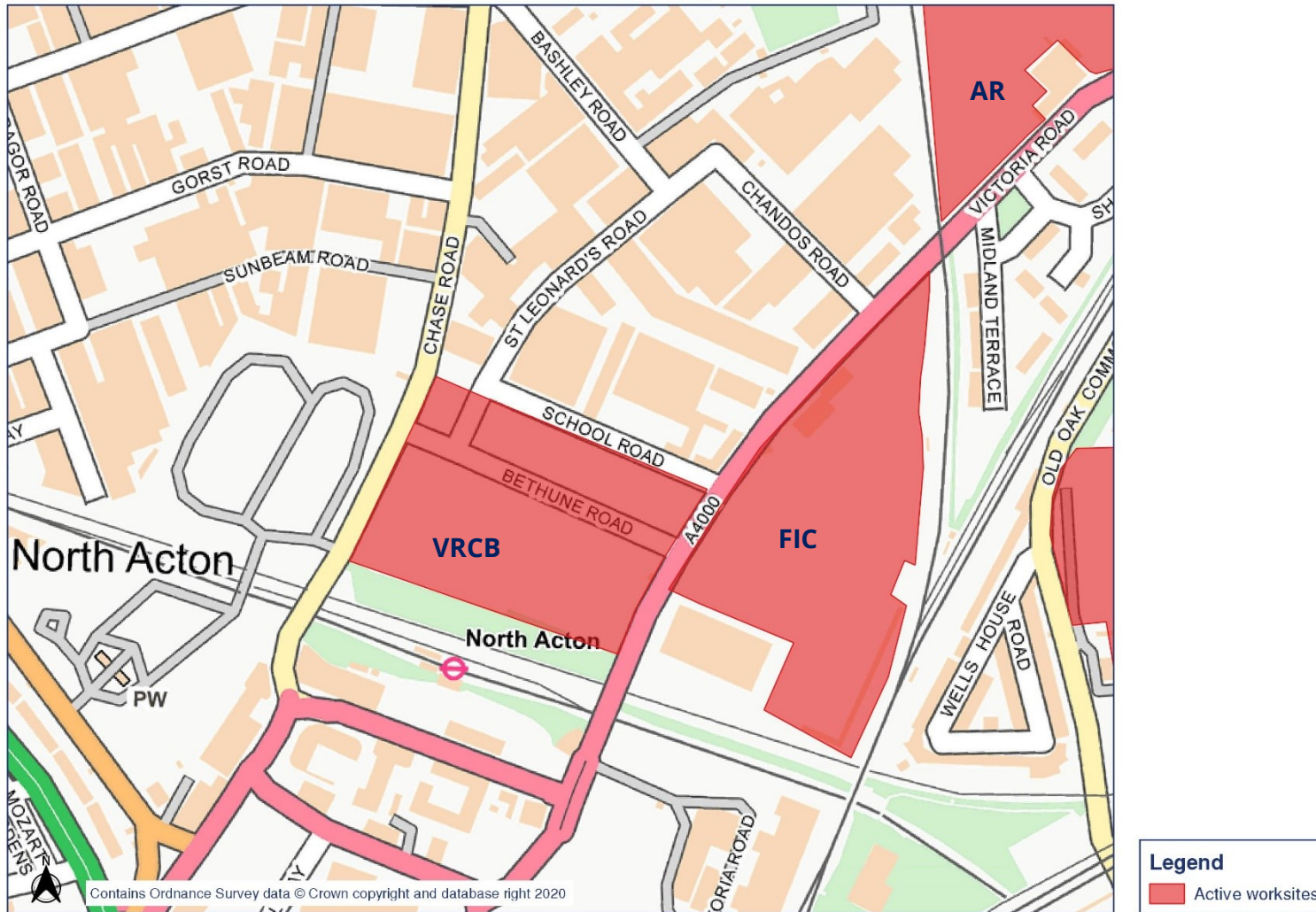






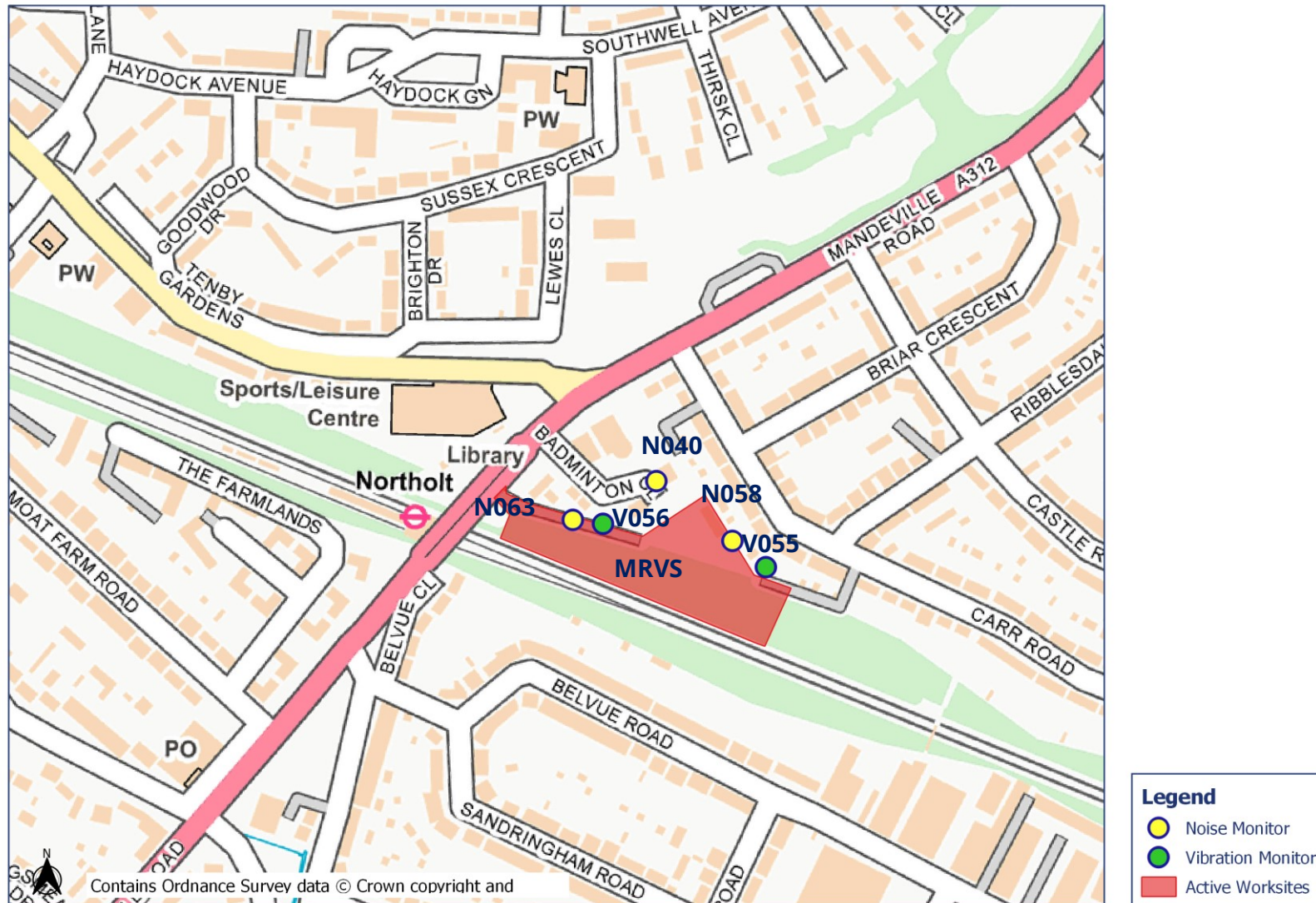


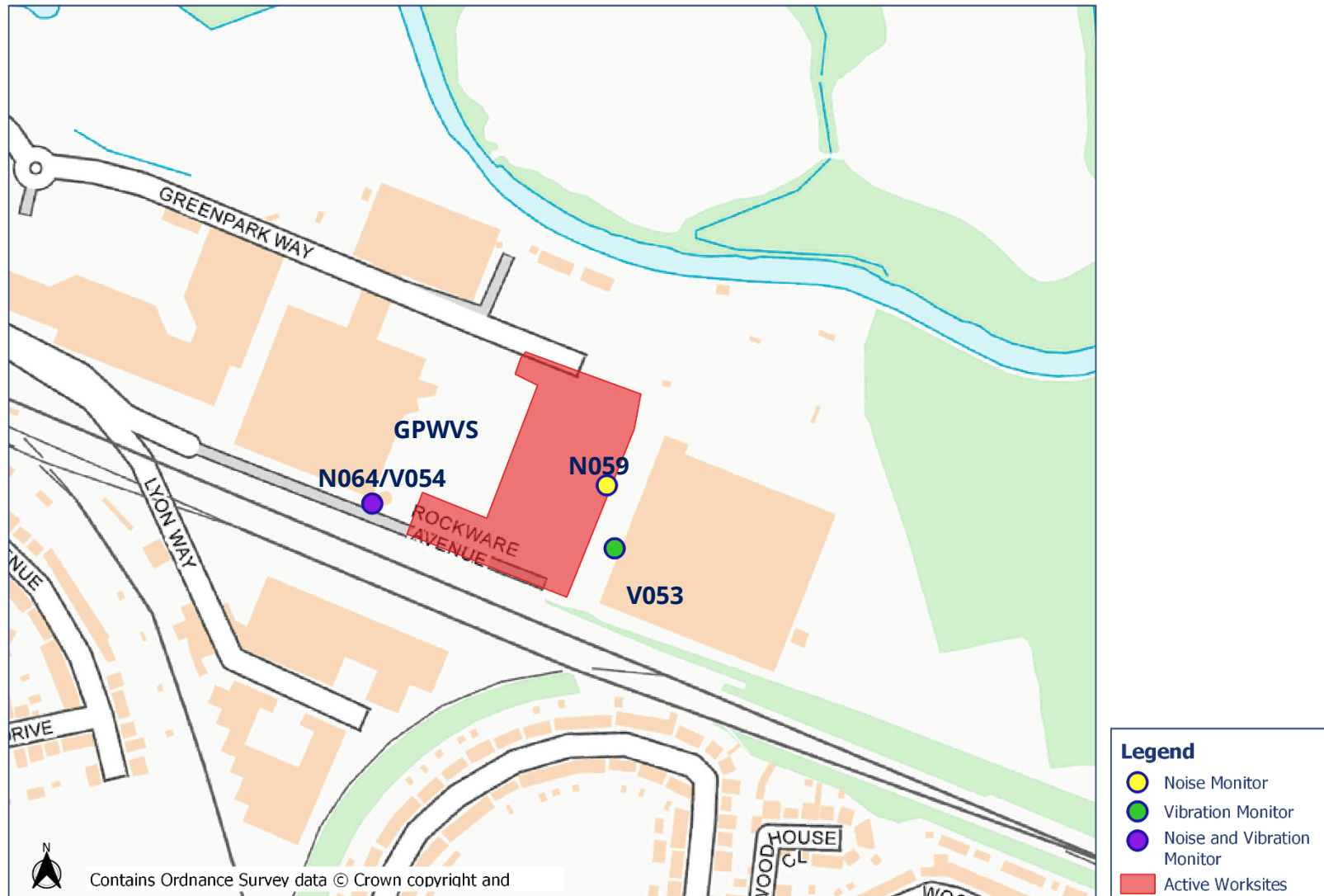


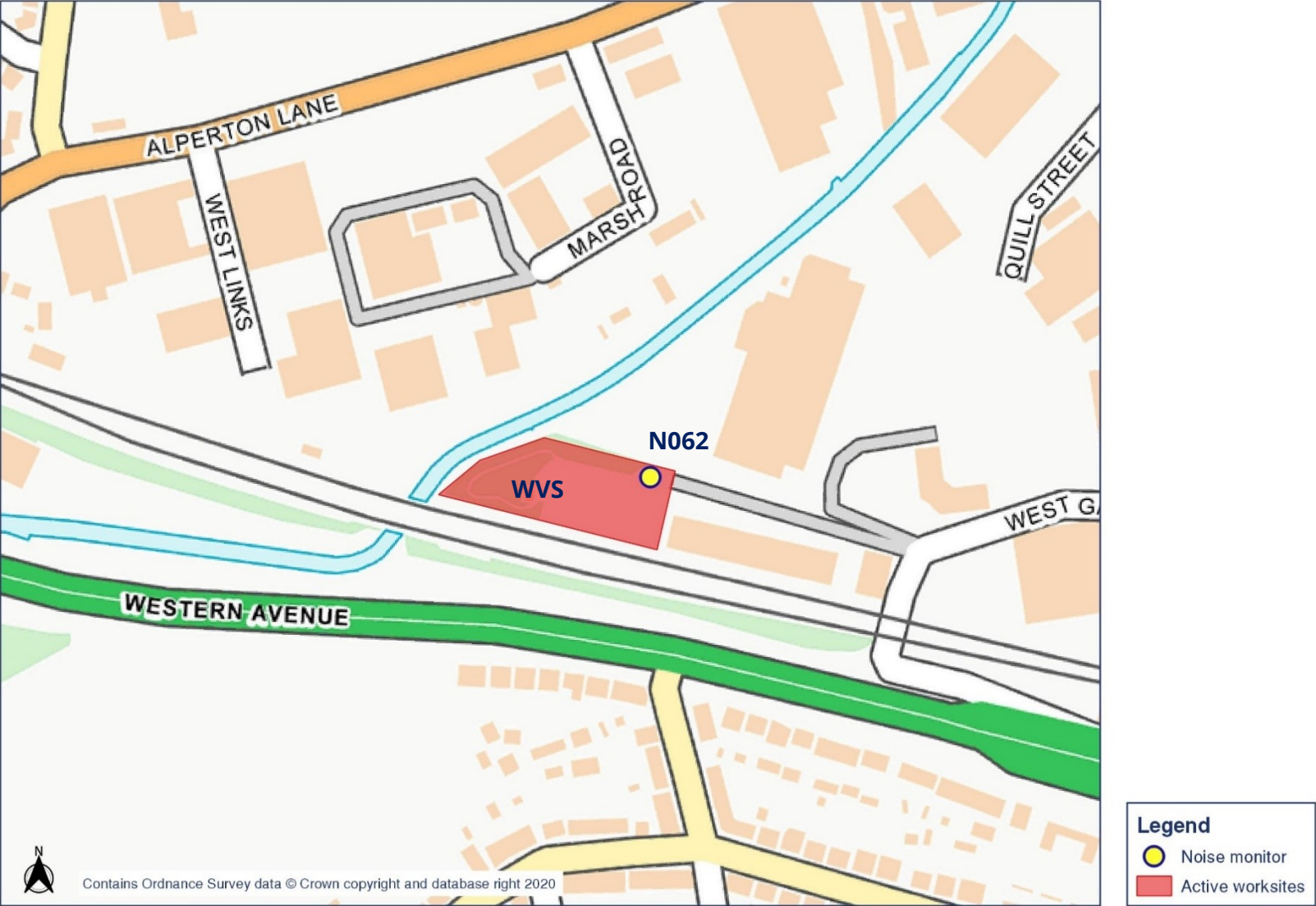


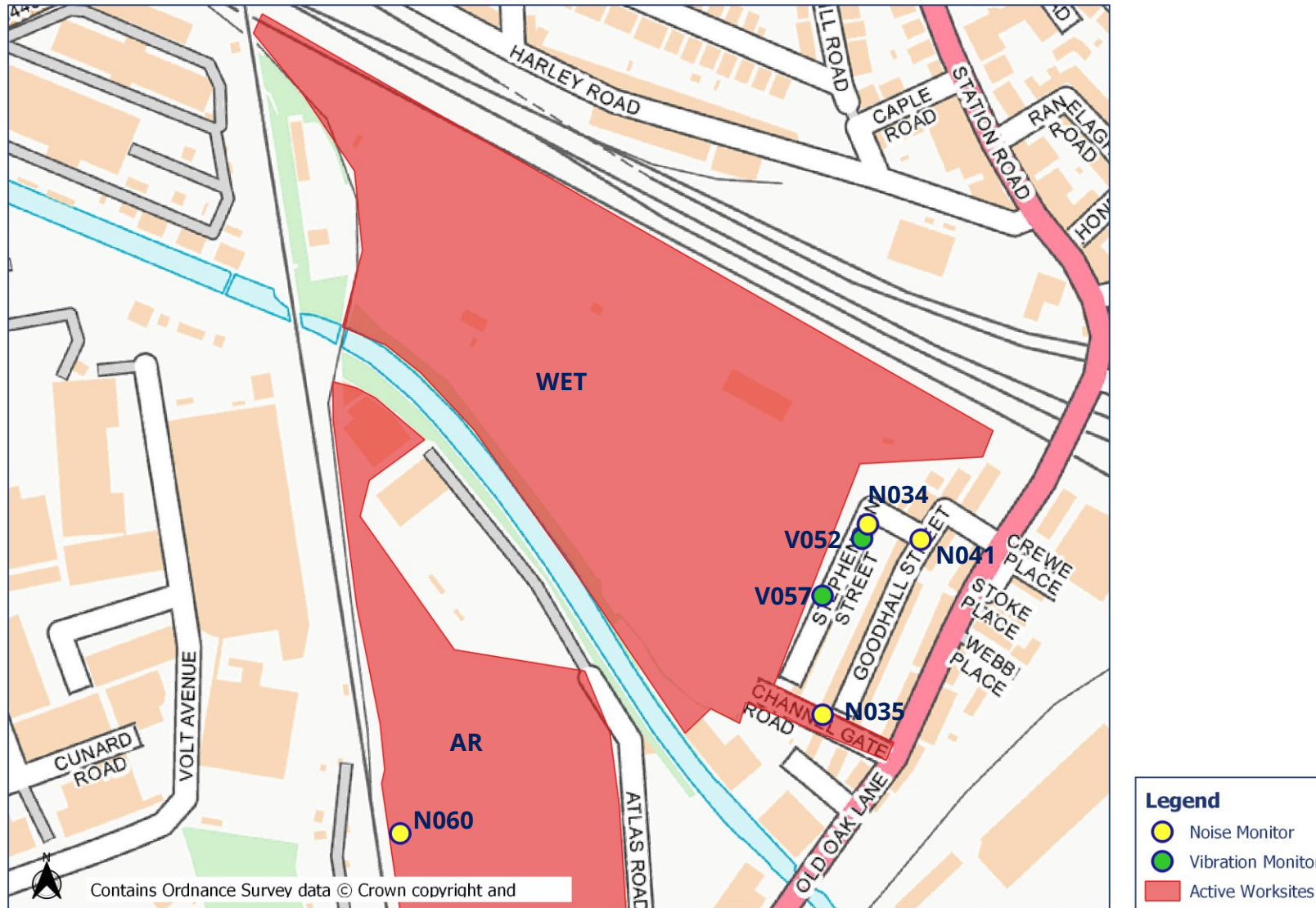


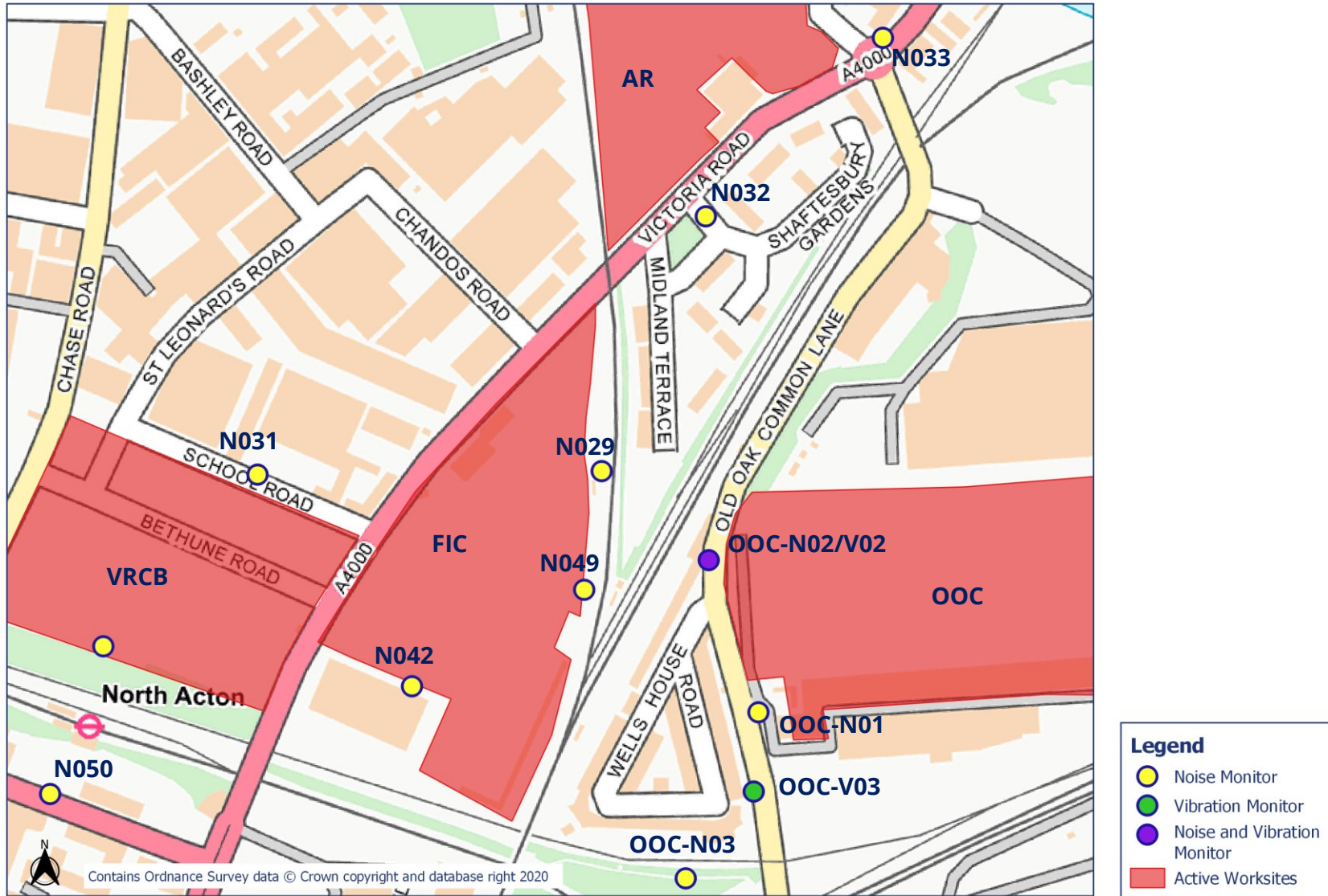
Appendix B Monitoring Locations









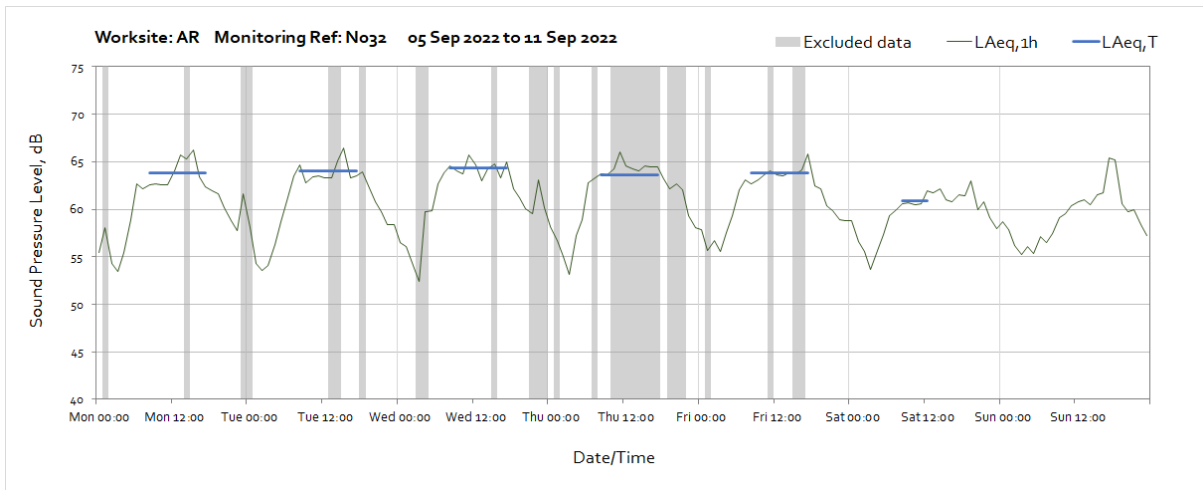
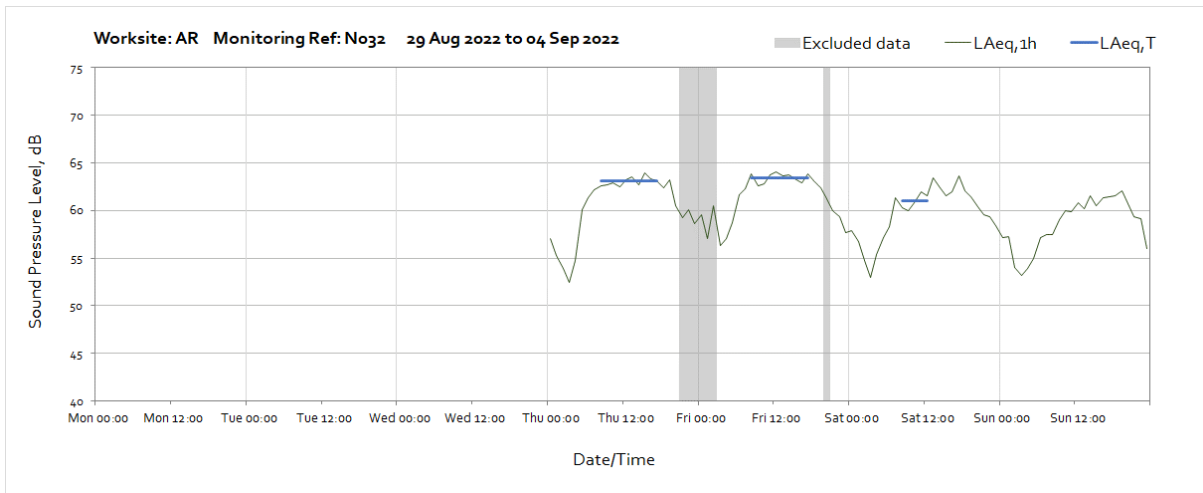


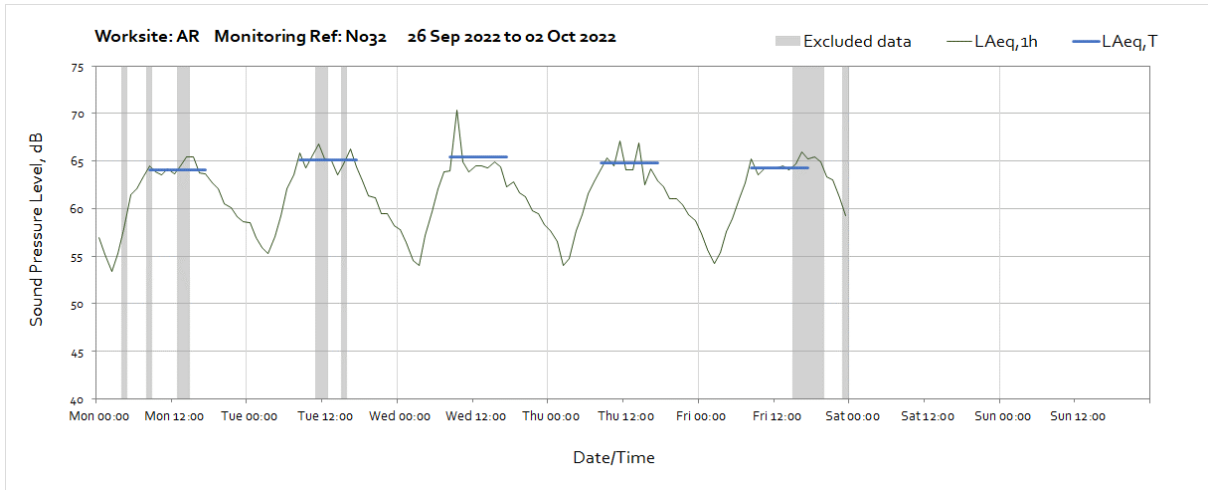
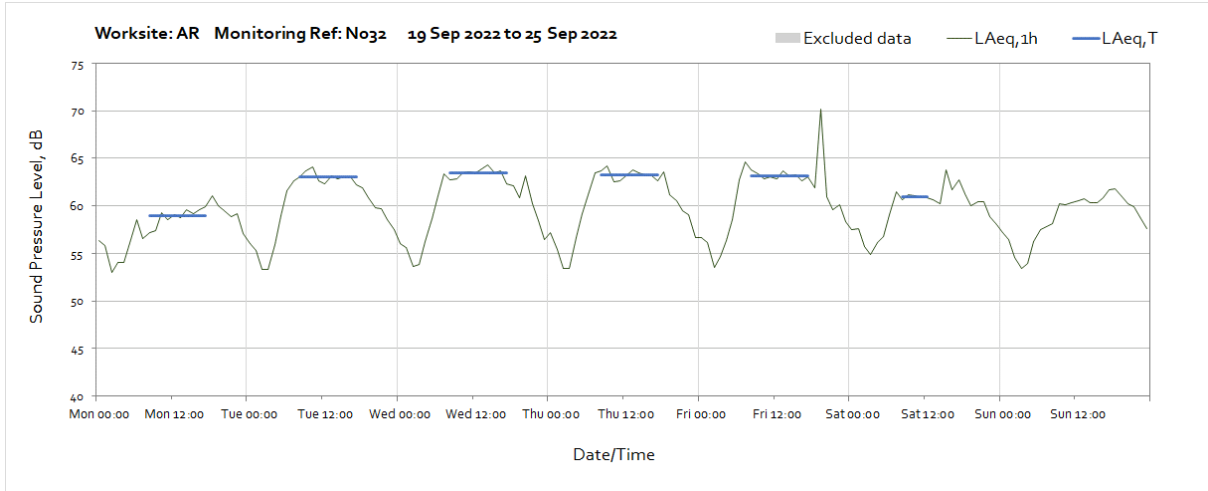
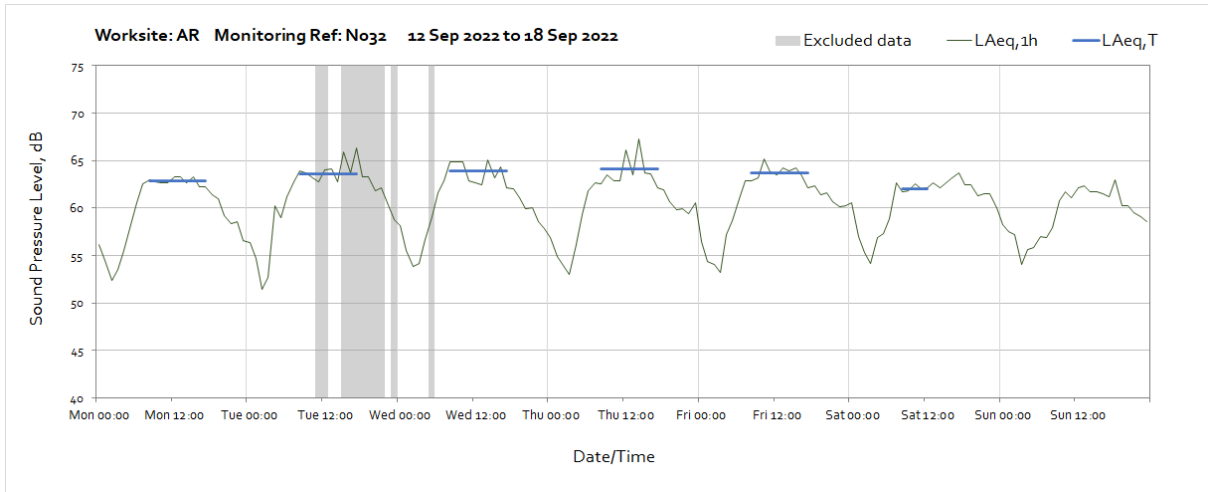
Appendix C Data

Noise

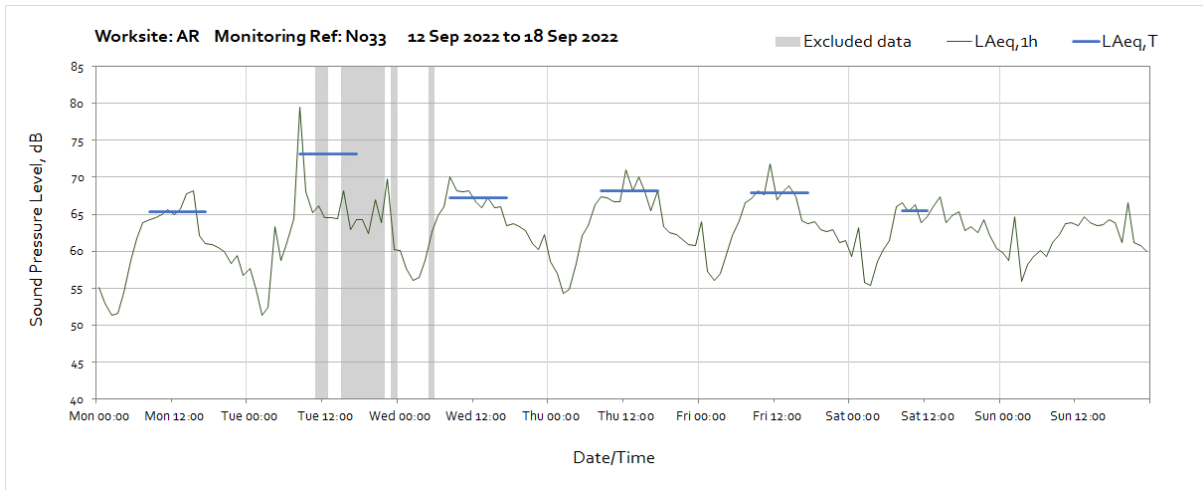
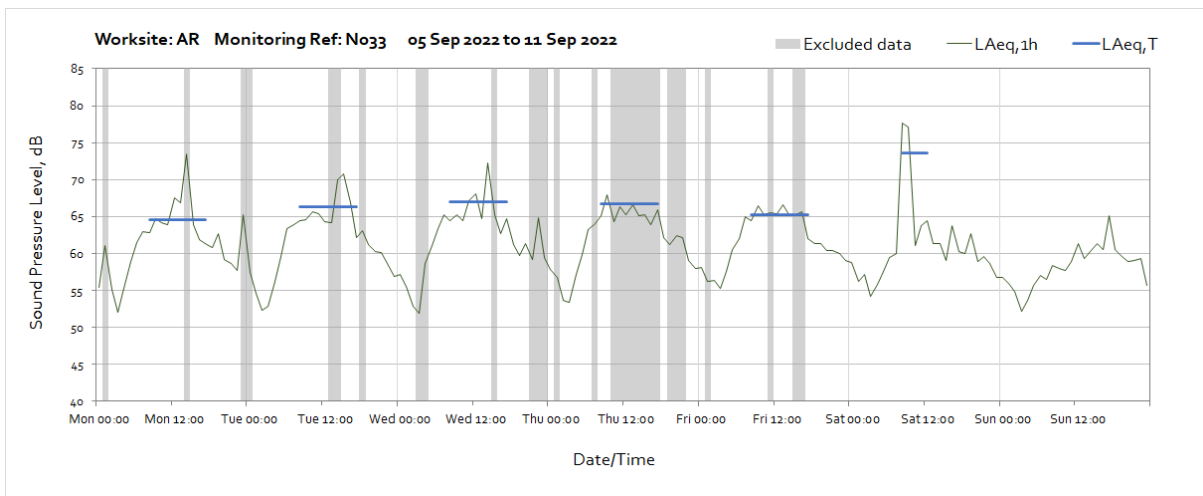
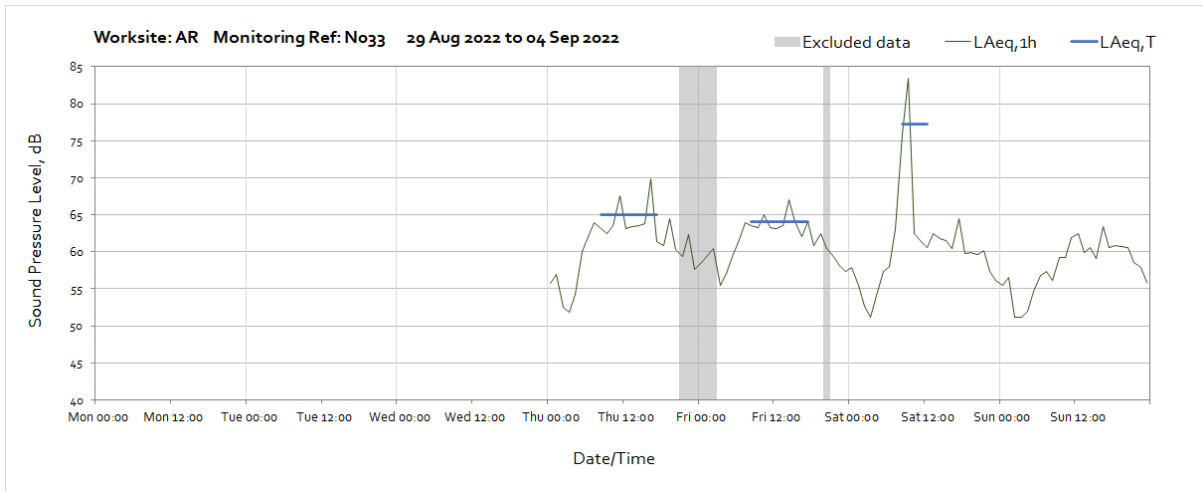
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

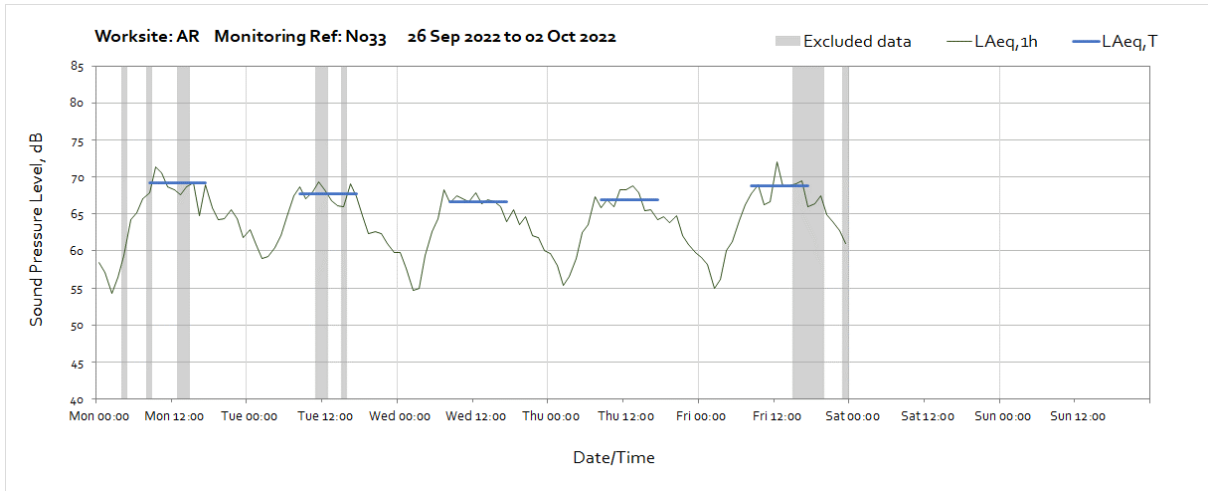
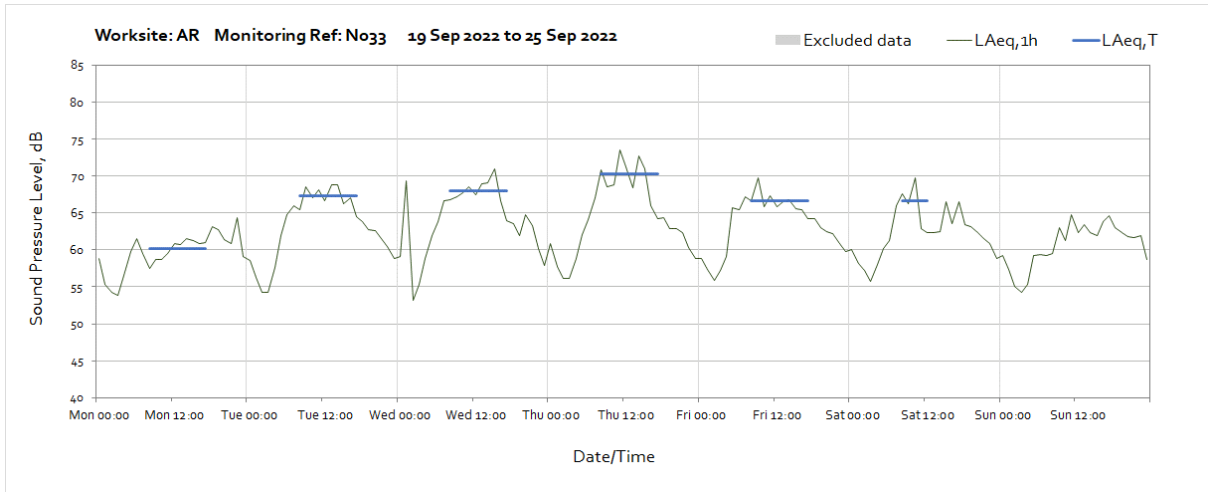
Worksite: Atlas Road worksite (AR) – Monitoring Ref: N032



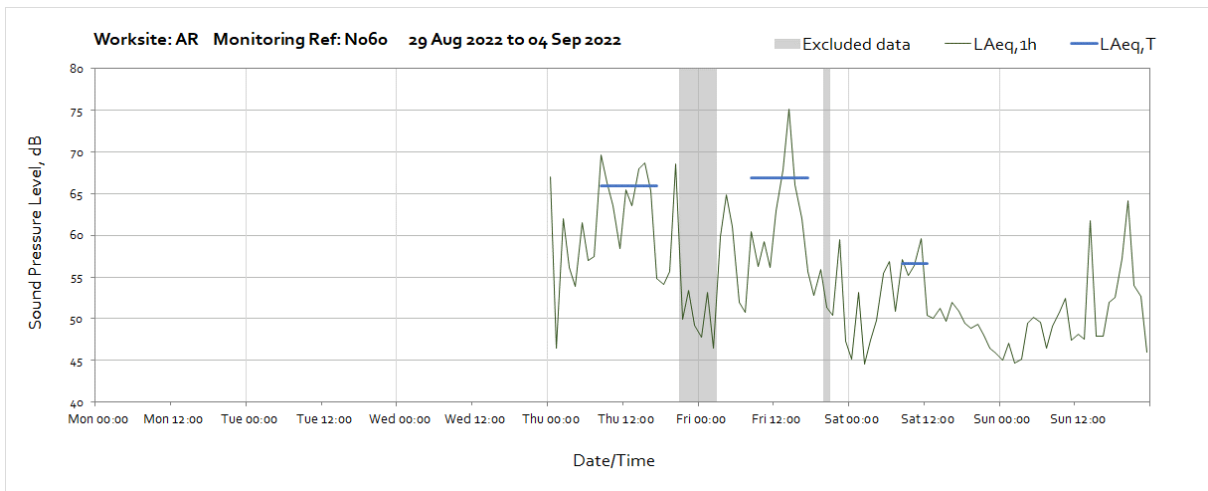


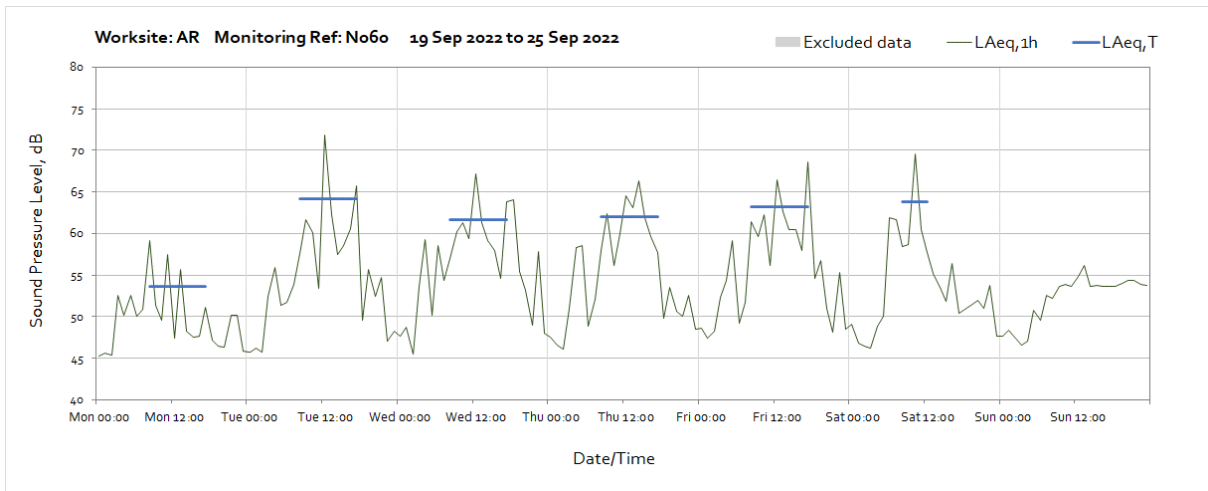
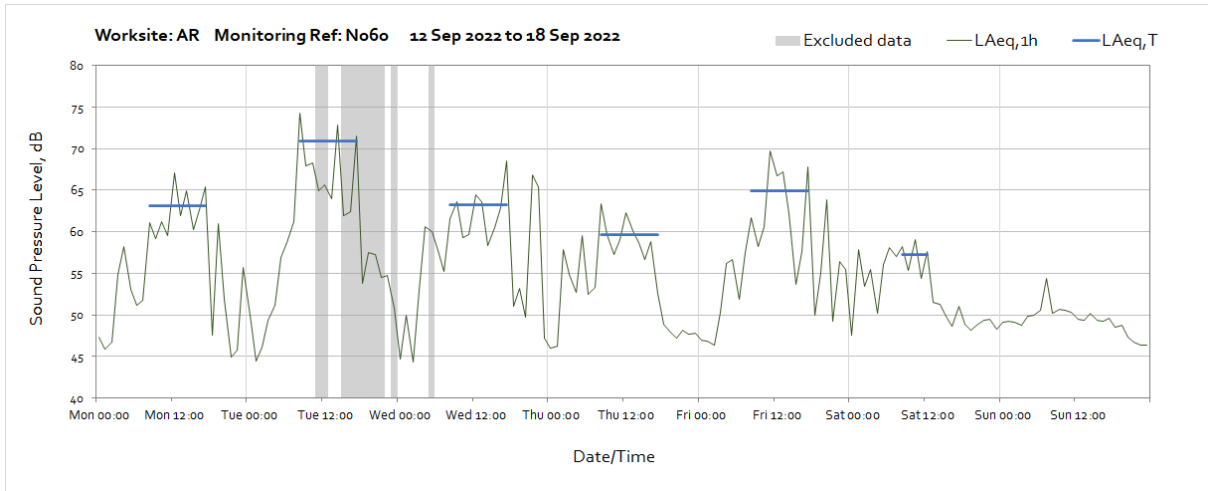
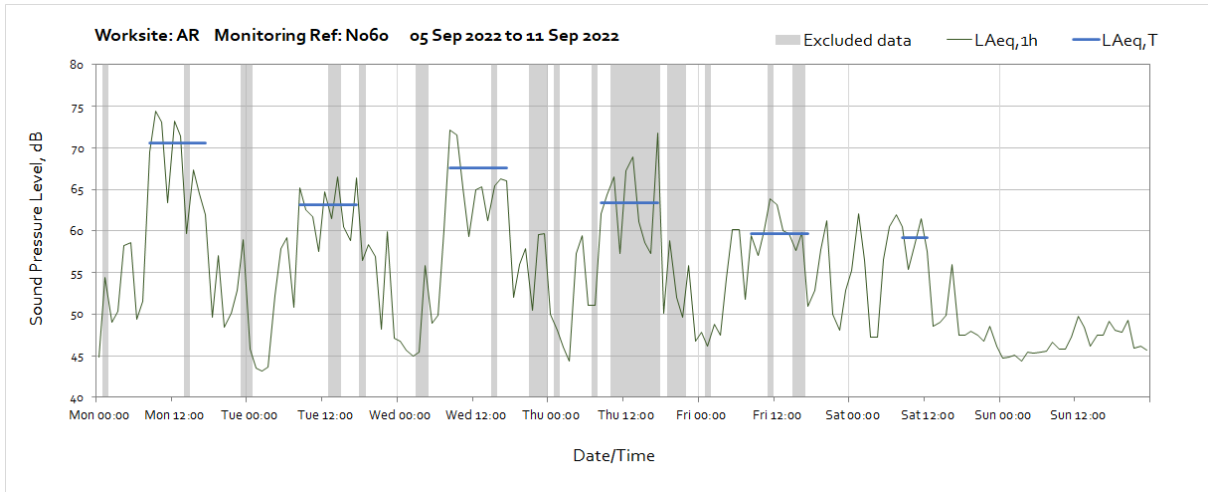
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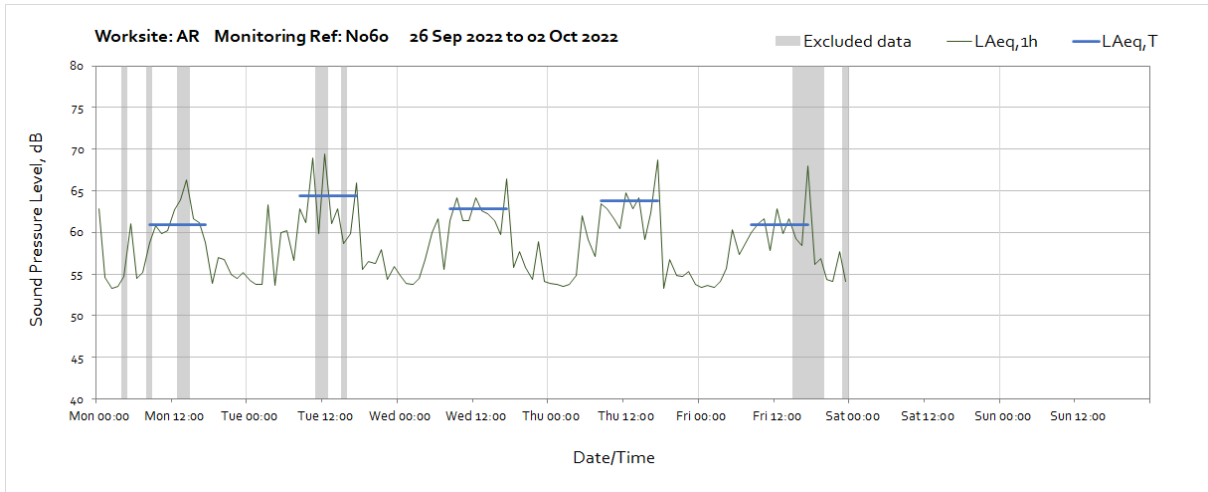




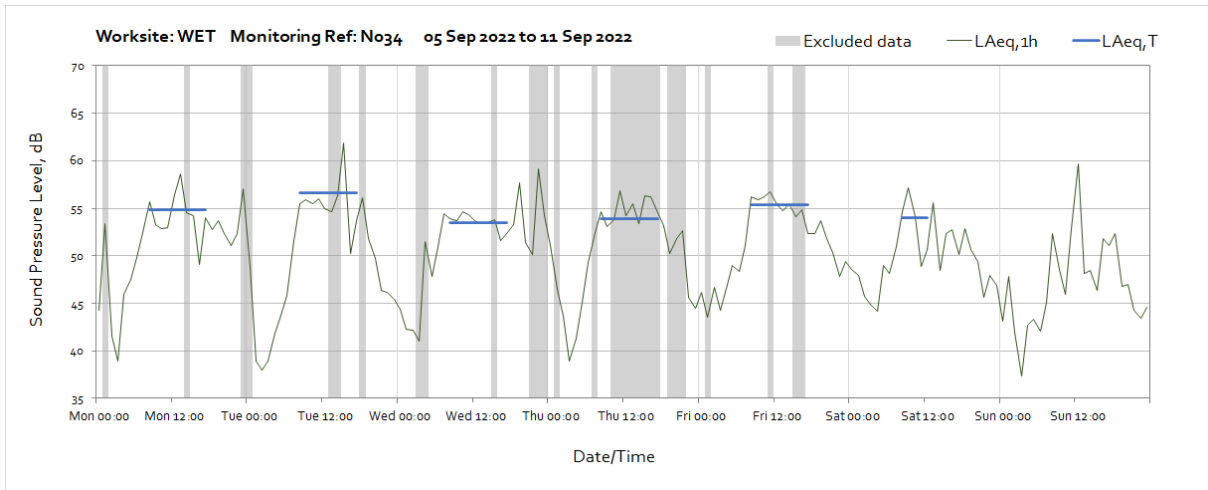
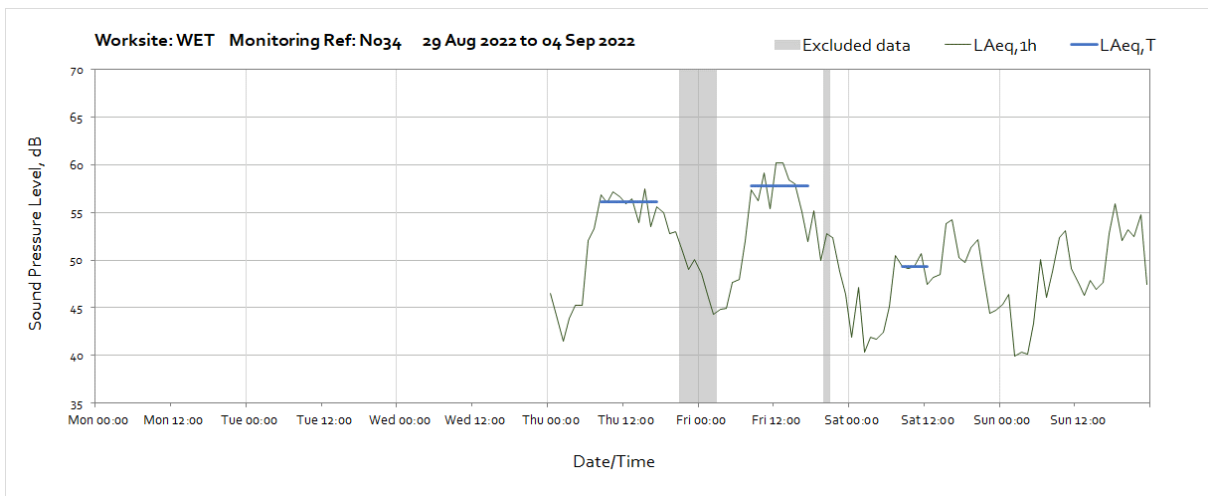
Worksite: Atlas Road worksite (AR) - Monitoring Ref: N060

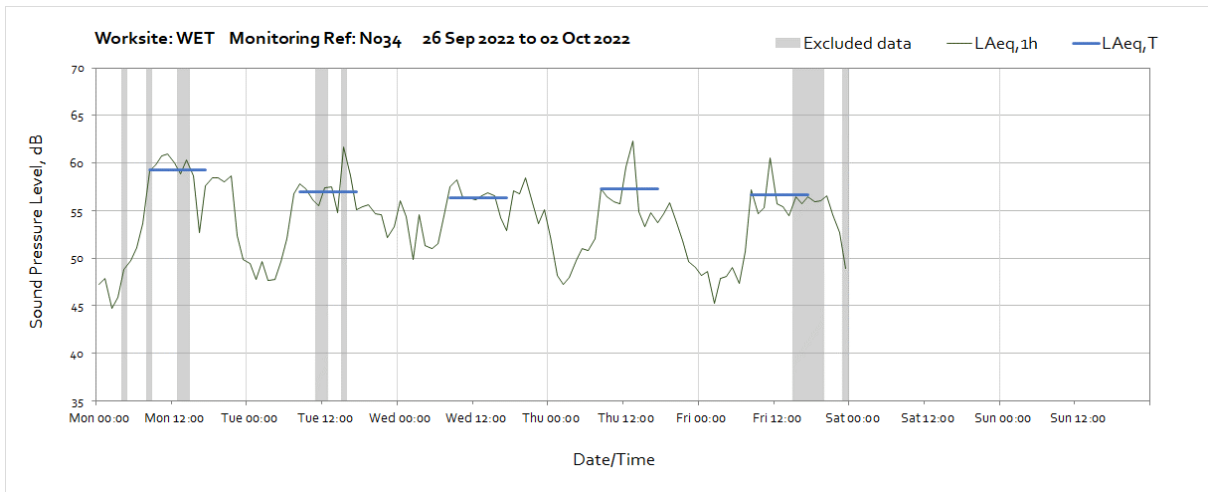
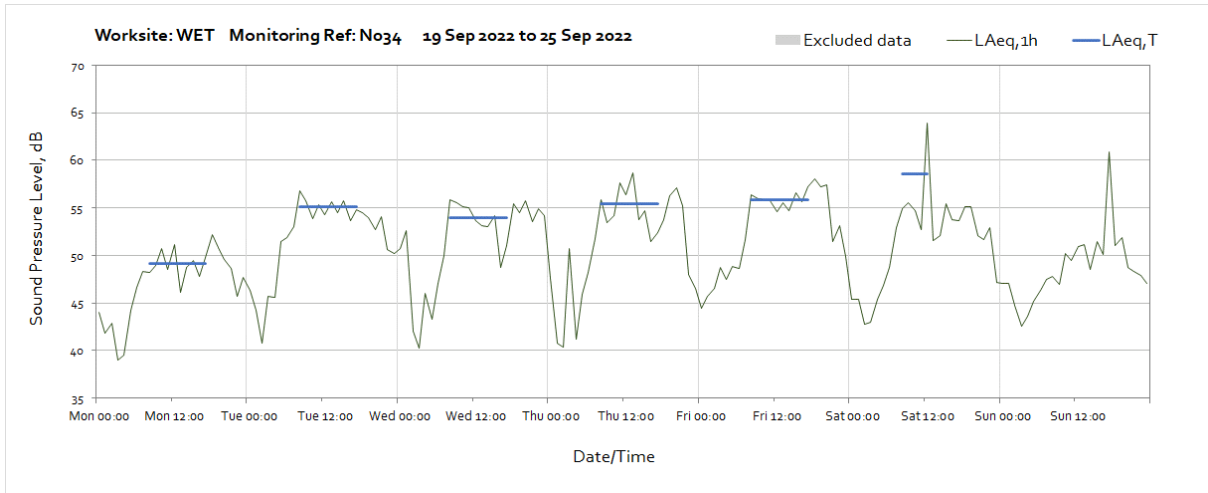
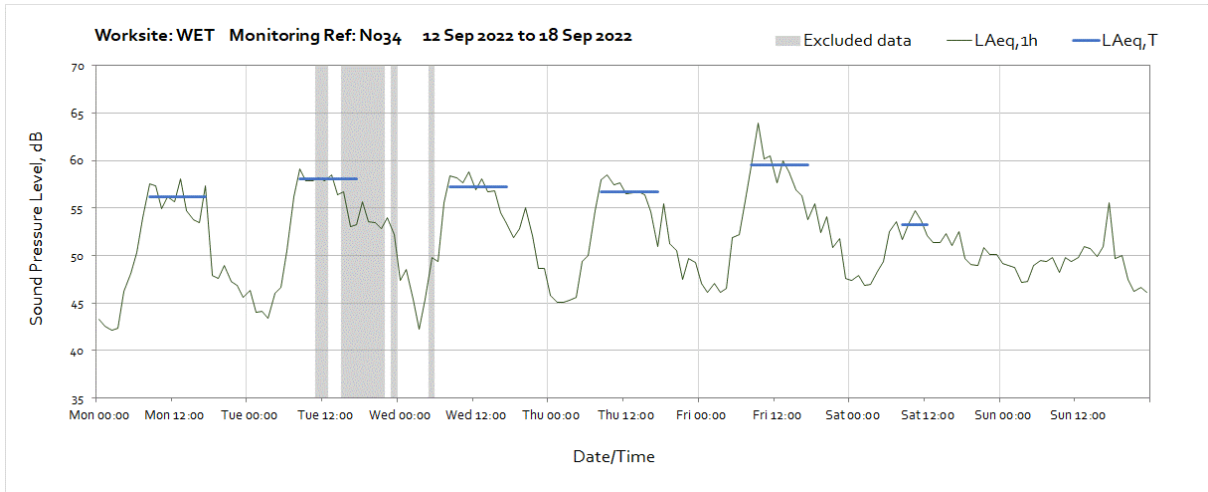




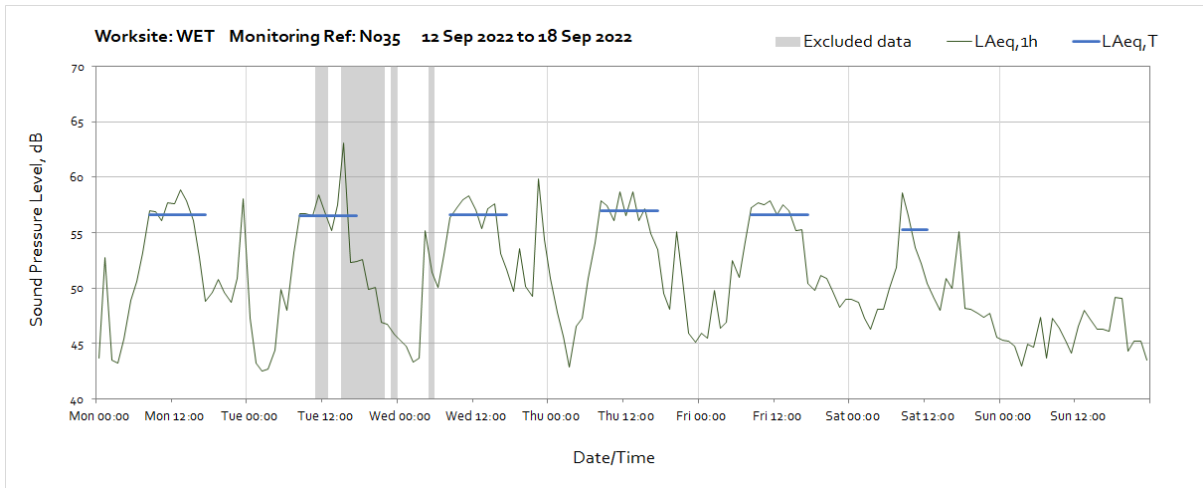
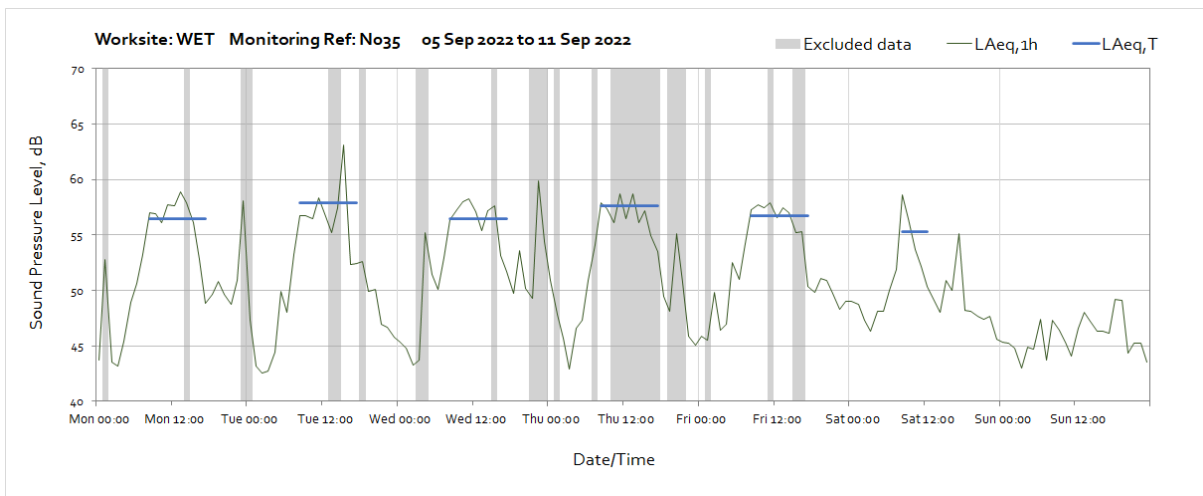
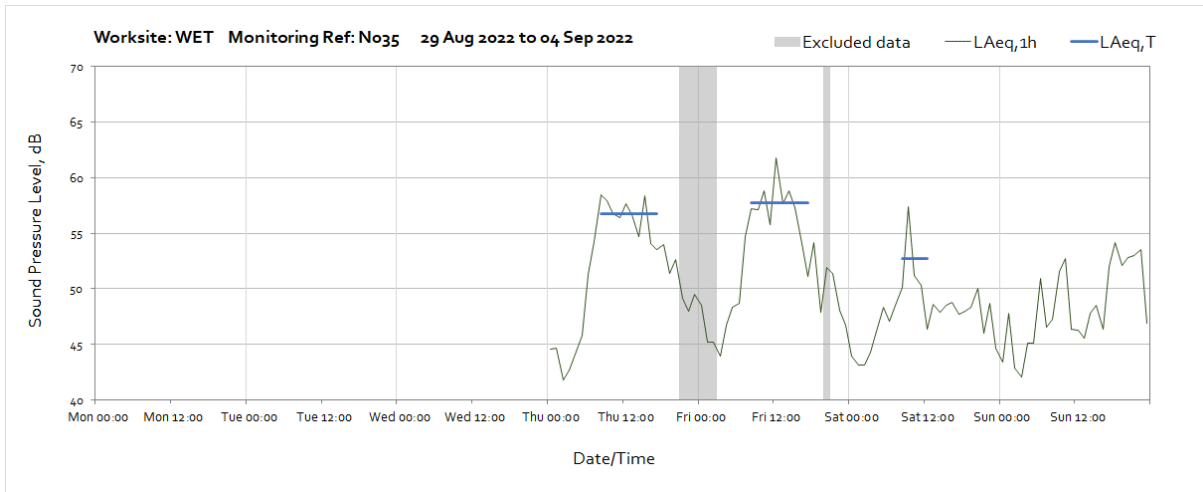


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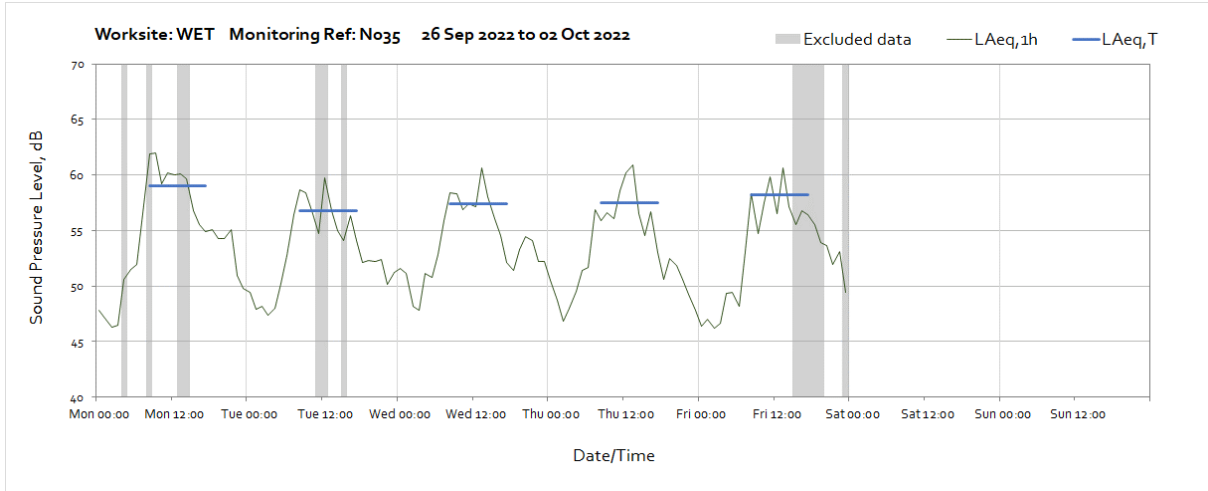
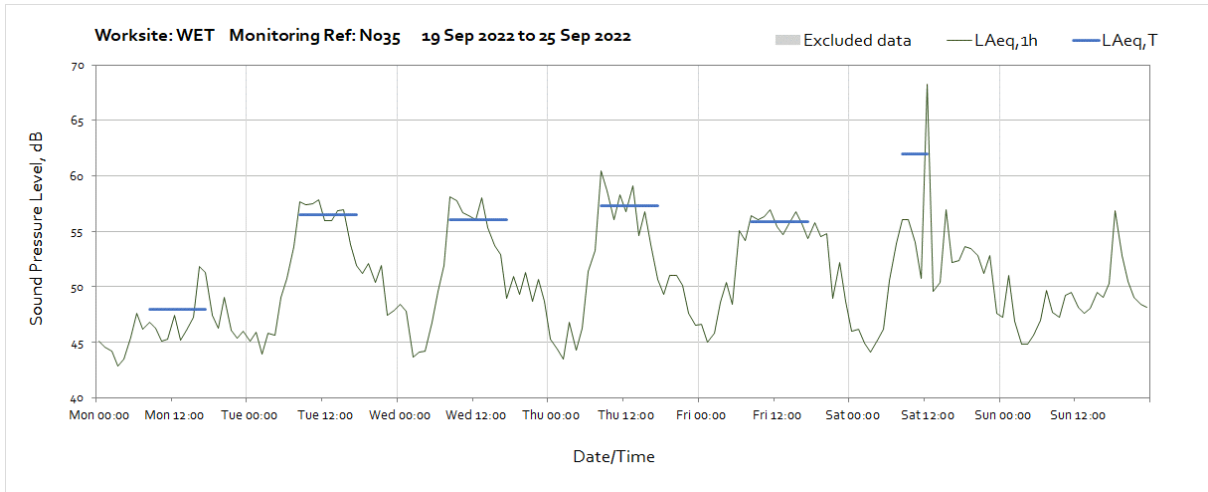




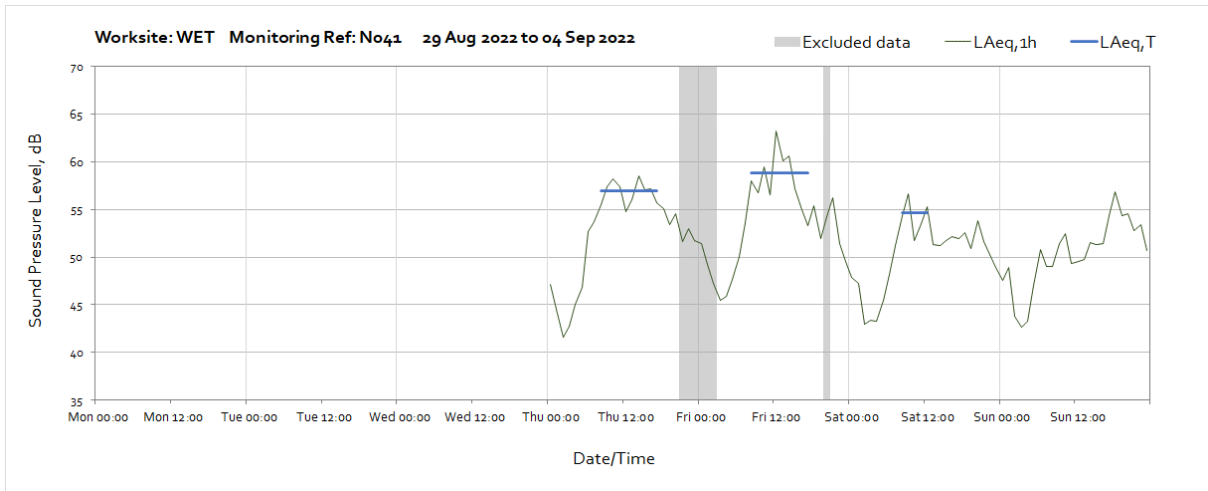
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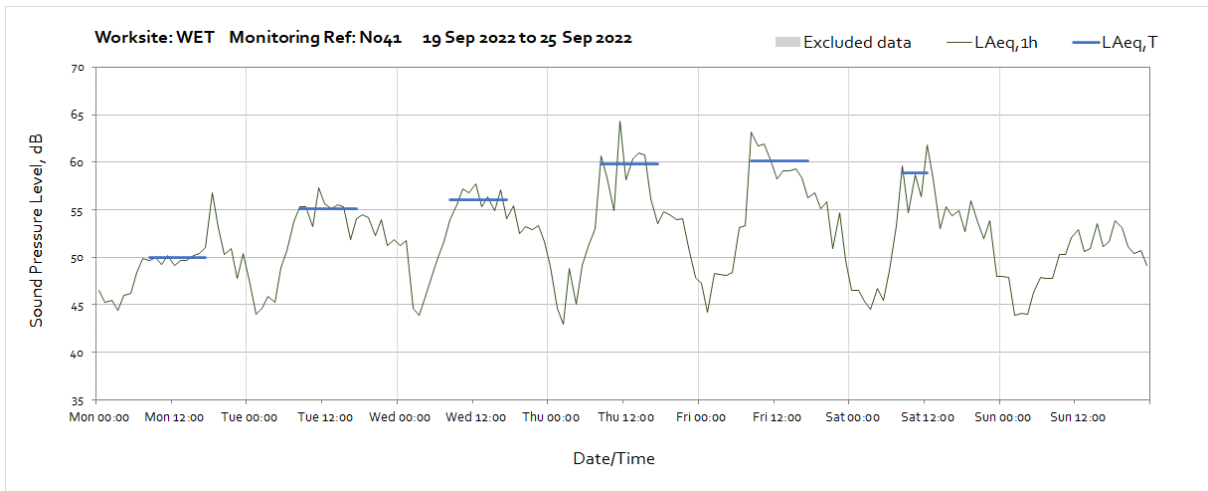
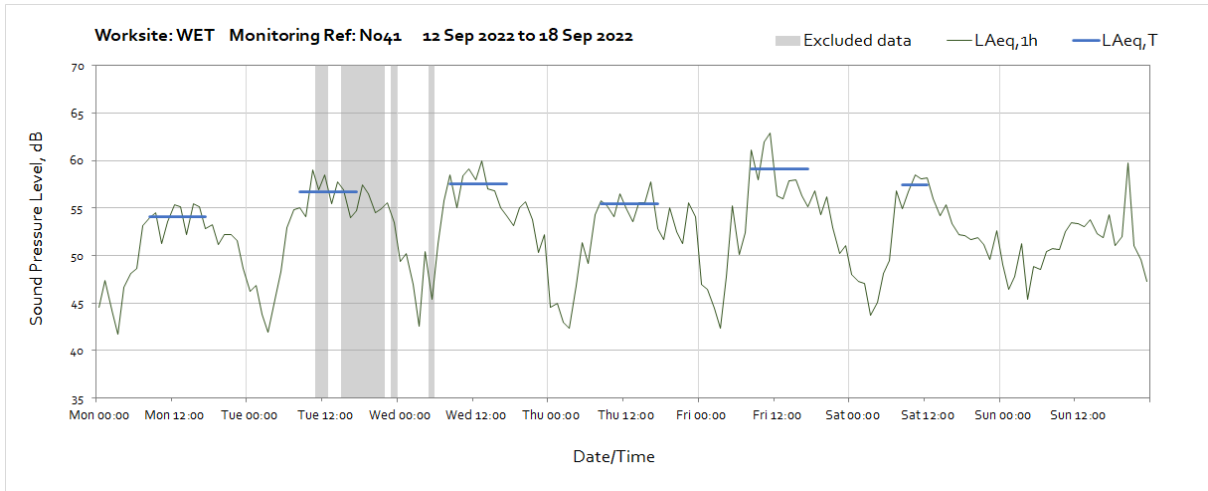
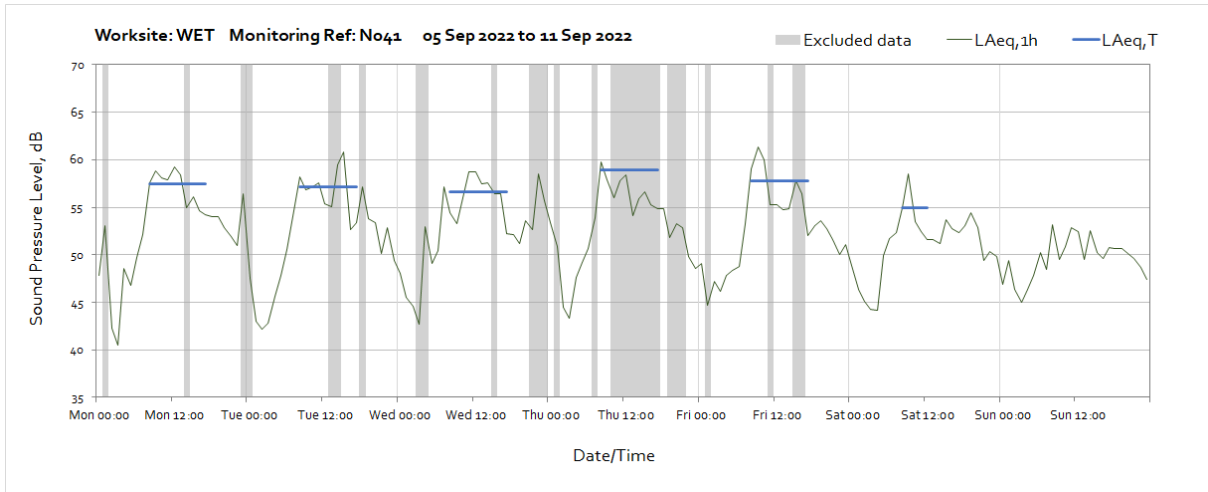


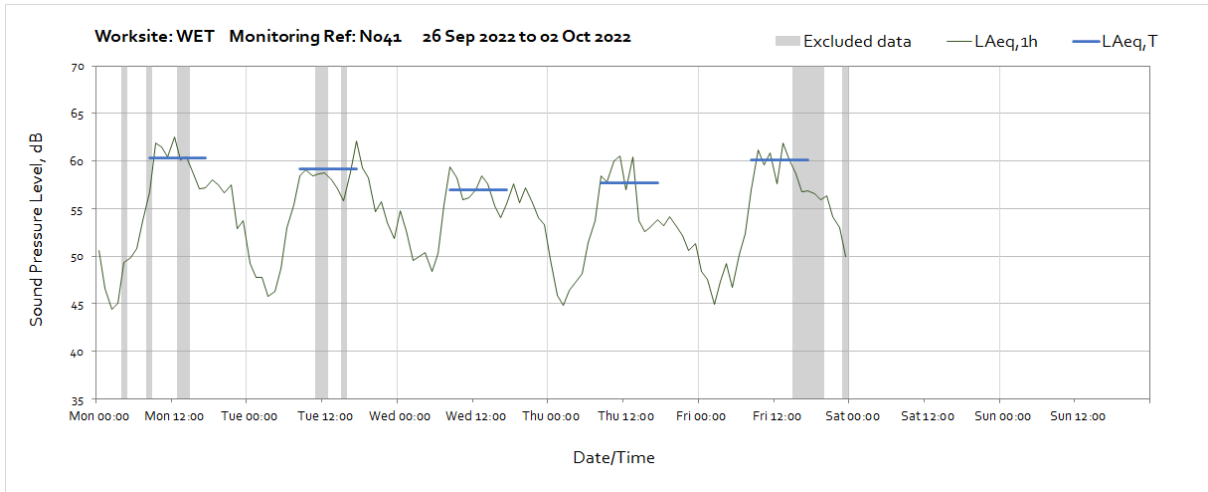
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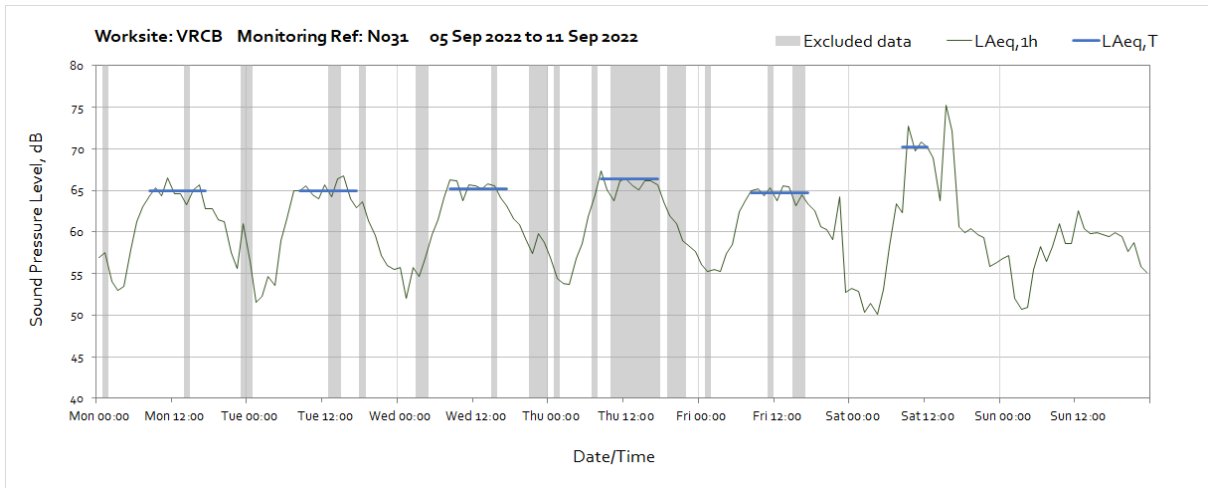
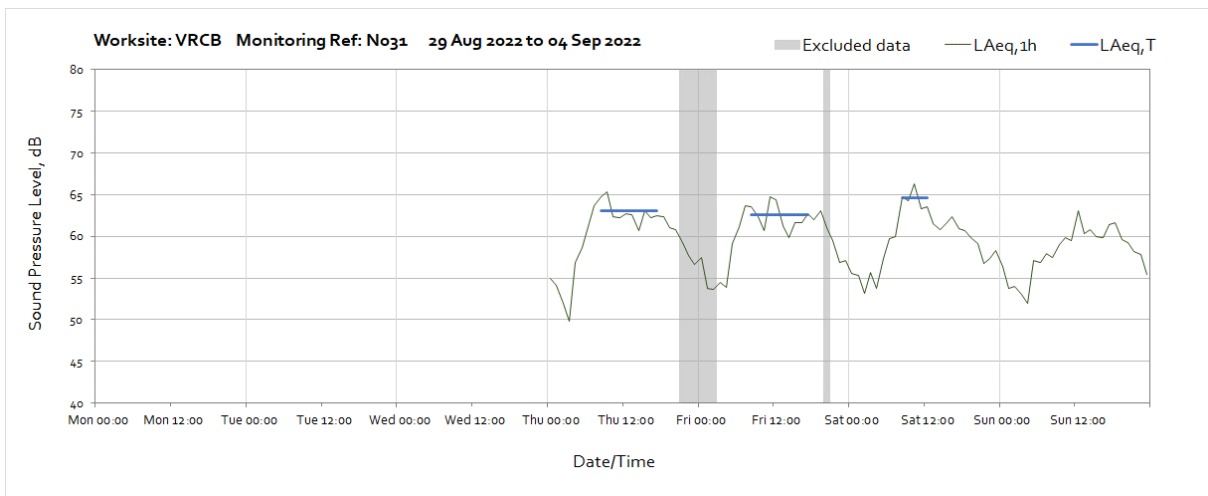
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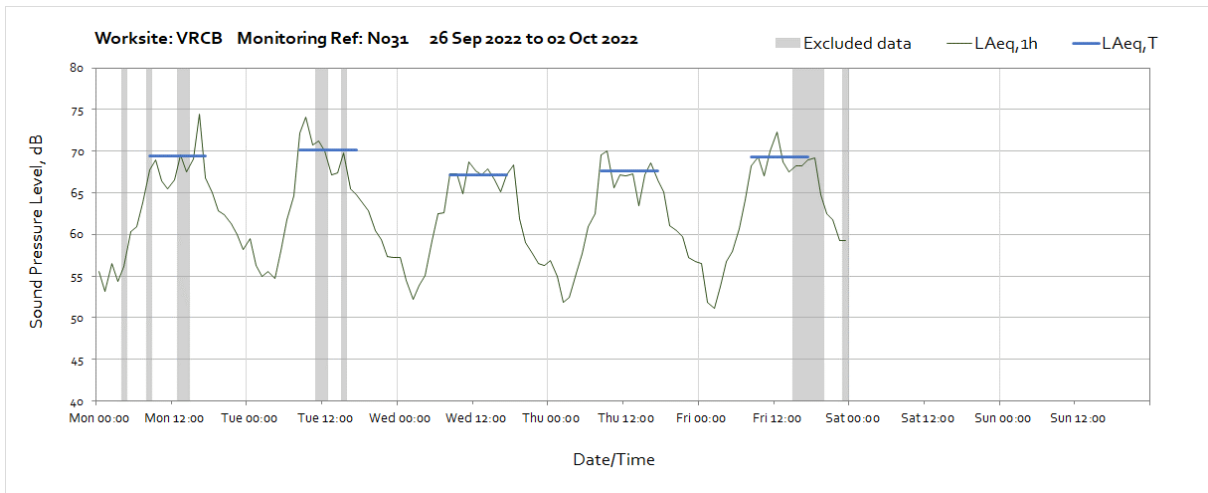
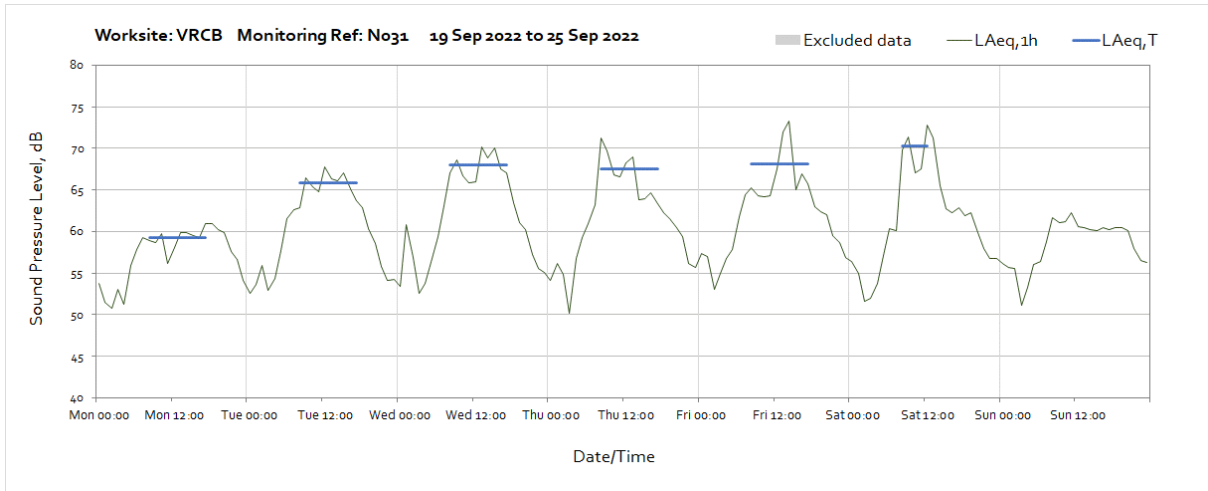
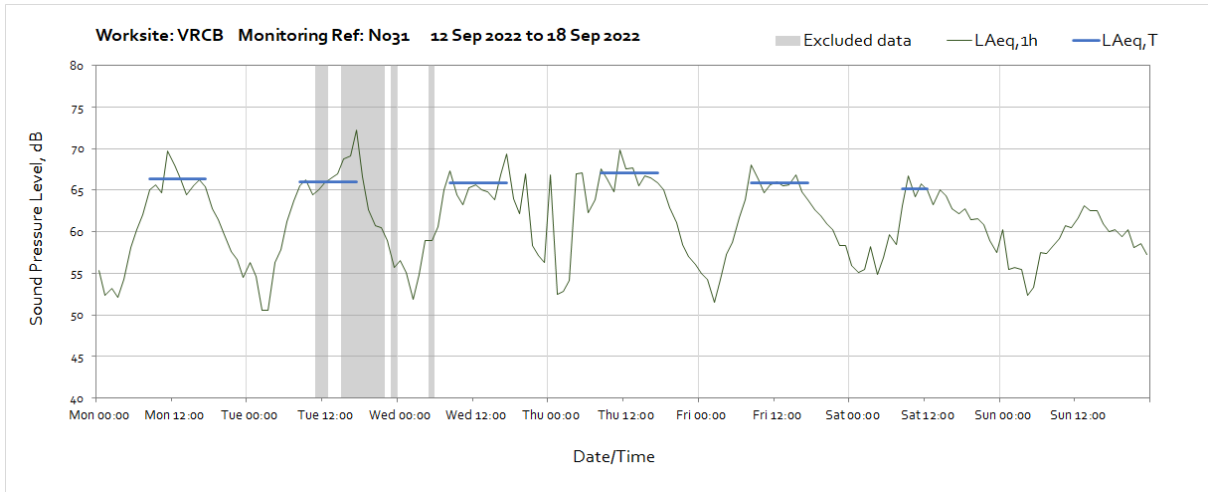




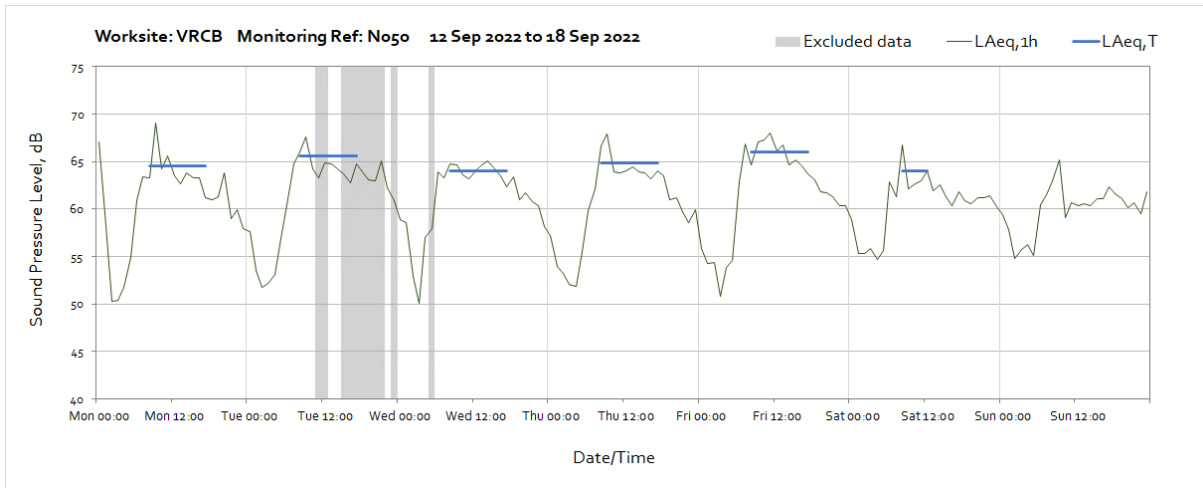
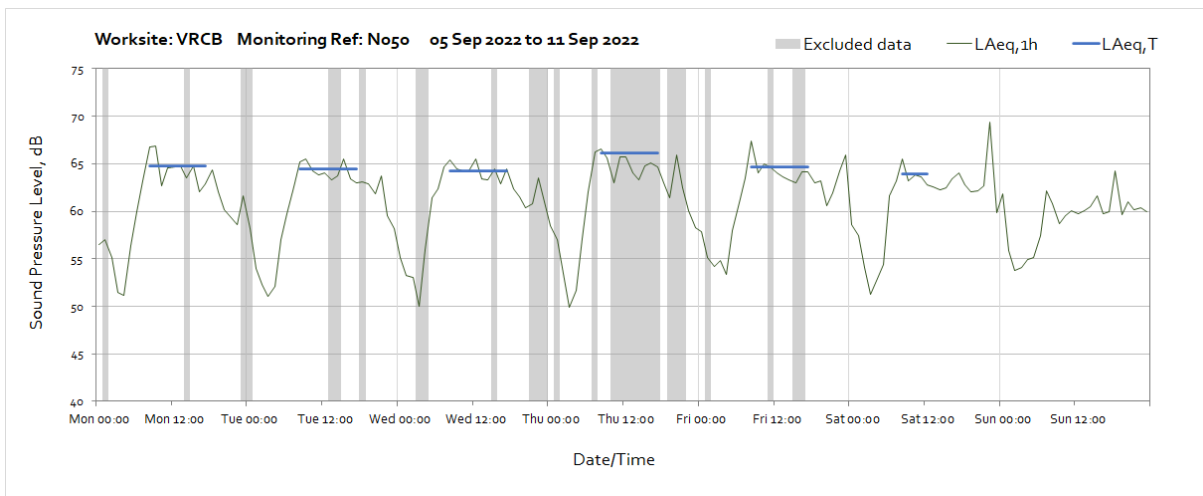
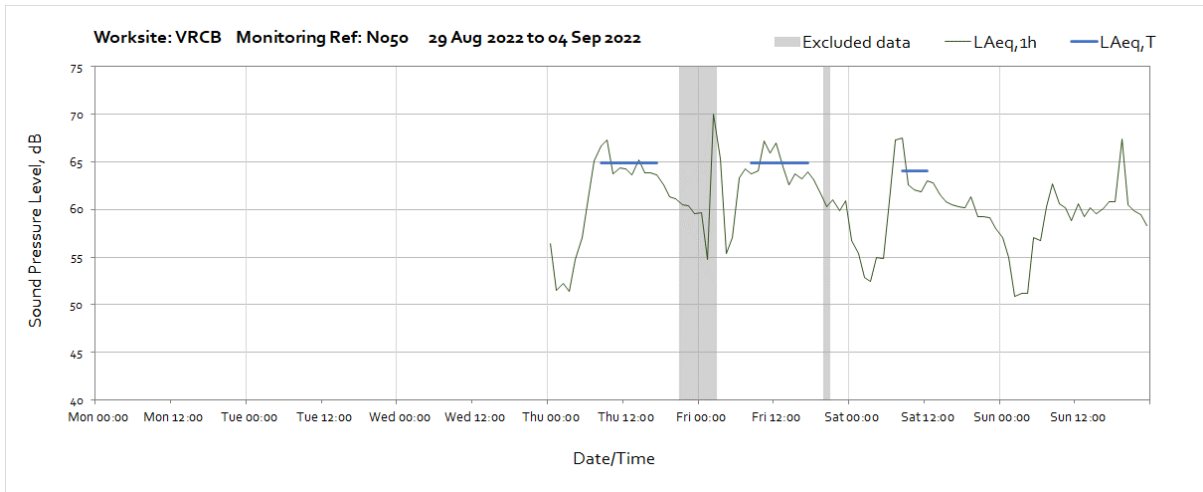


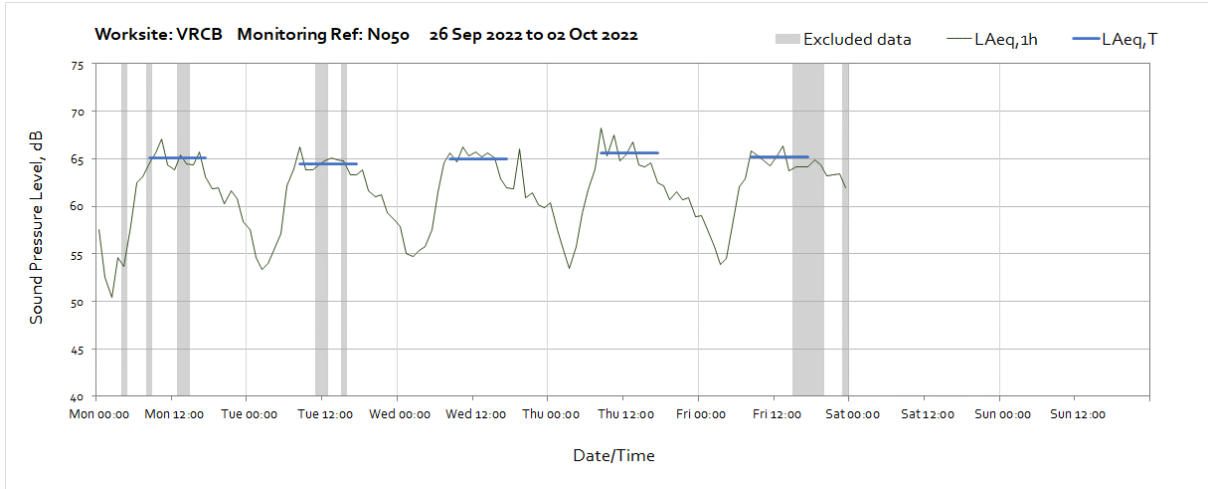
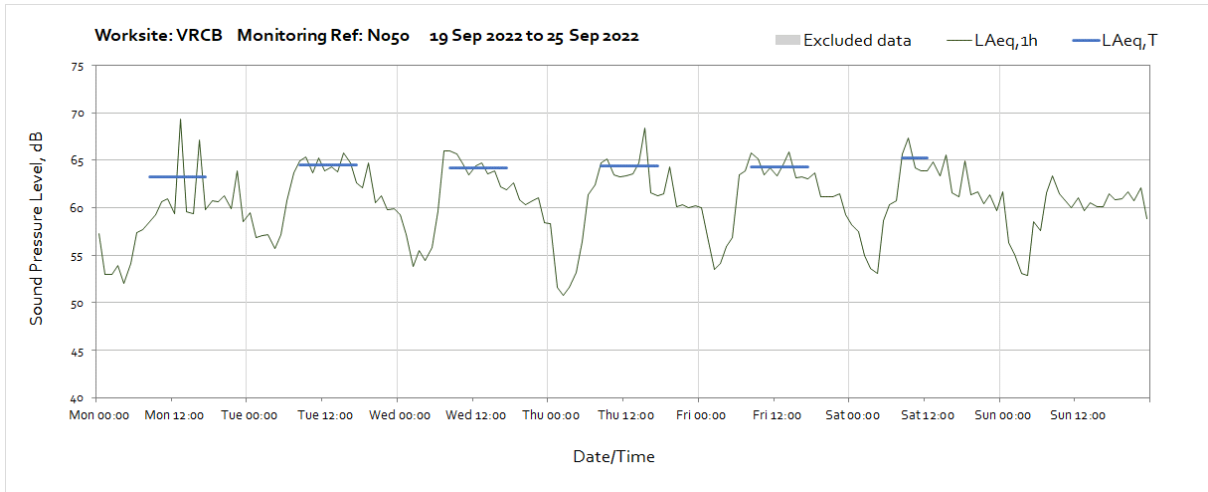
Worksite: Victoria Road Crossover Box (VRCB) – Monitoring Ref: N031



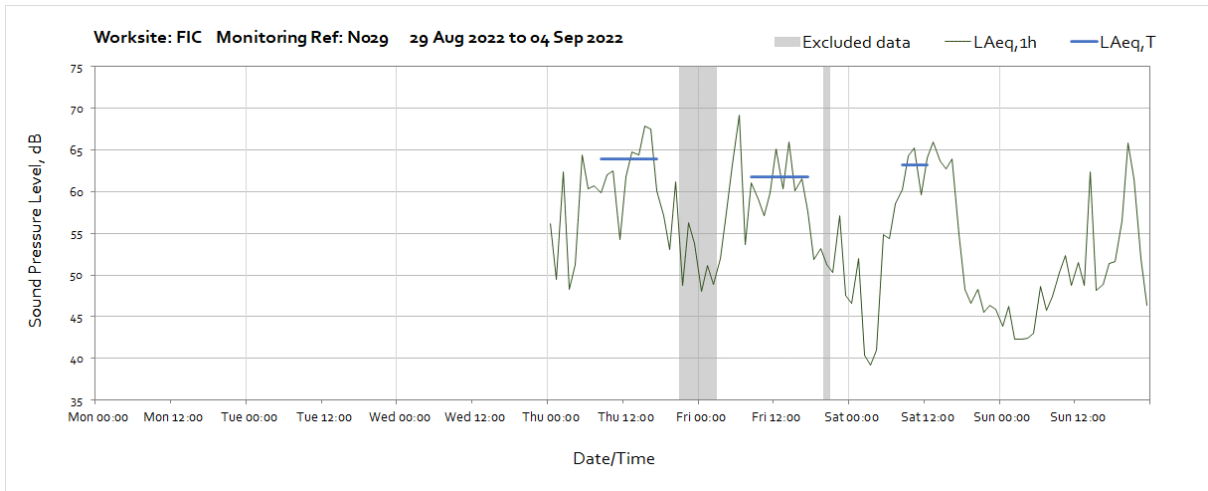


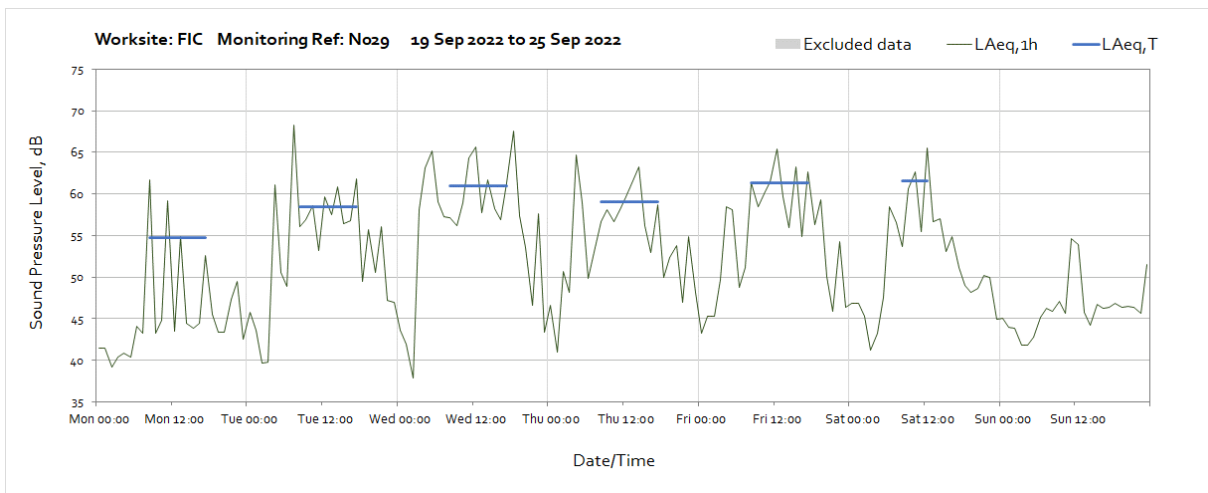
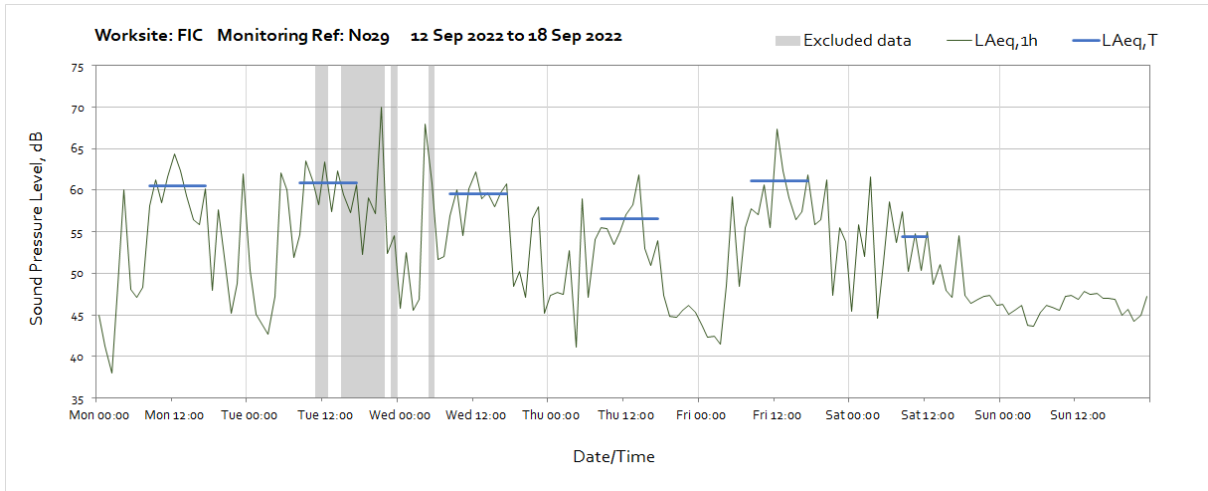
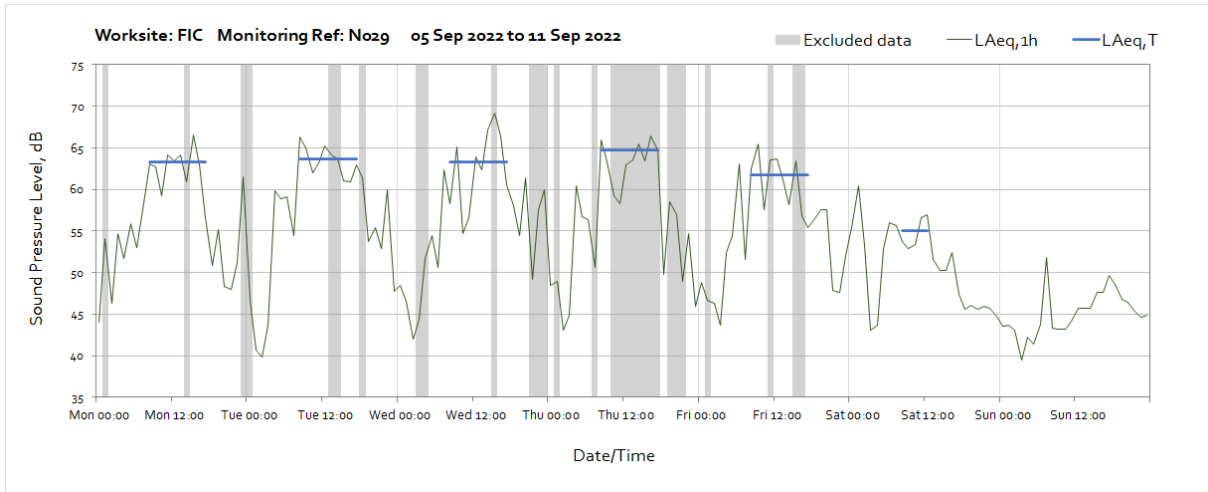
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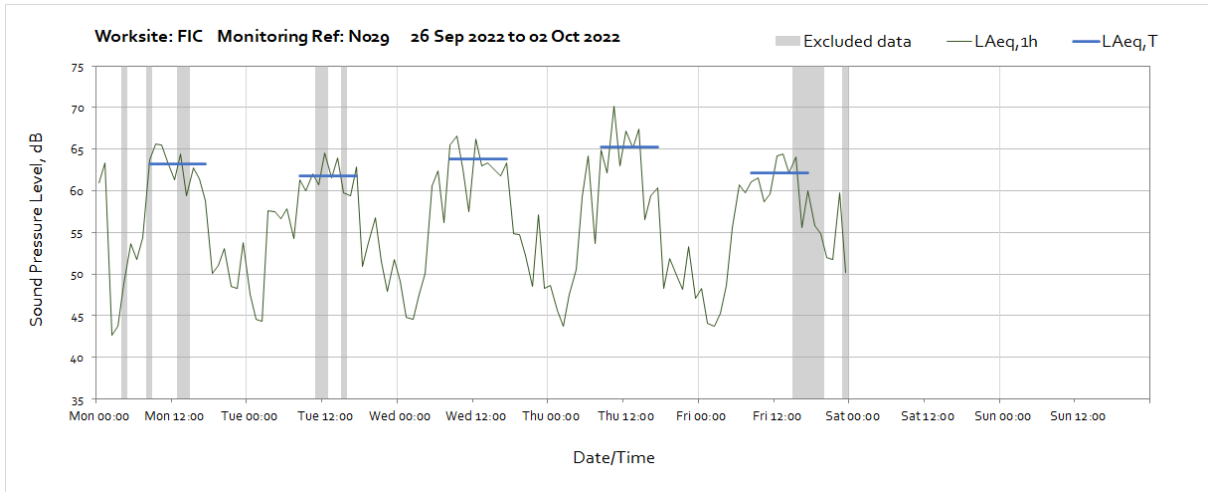




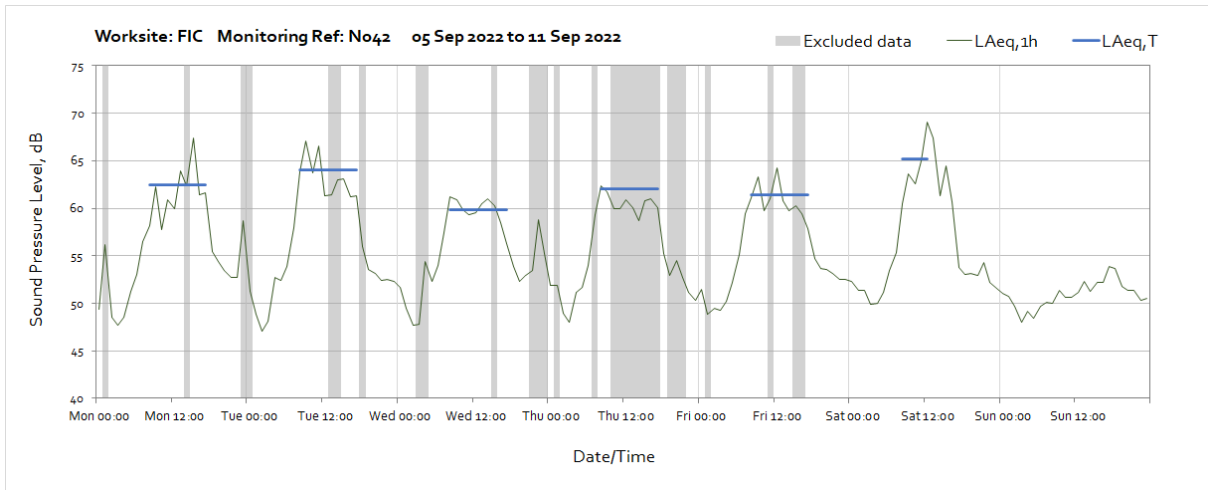
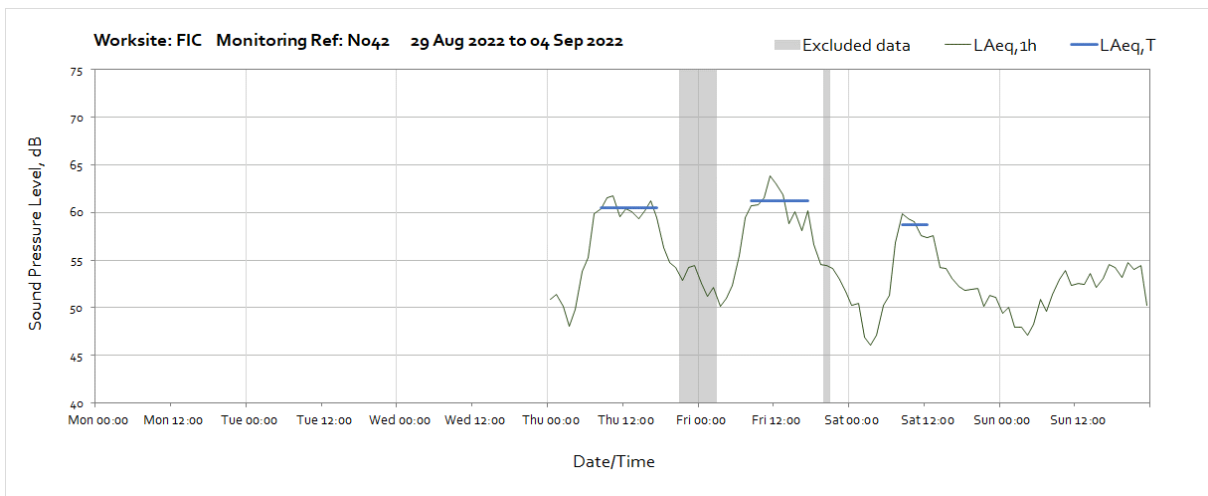
Worksite: Flat Iron Compound (FIC) – Monitoring Ref: N029

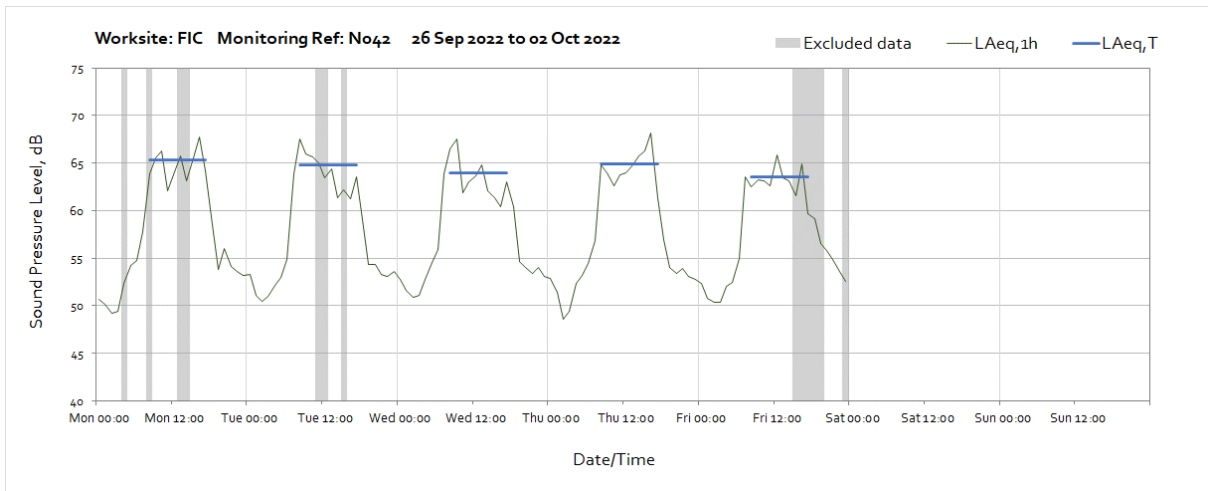
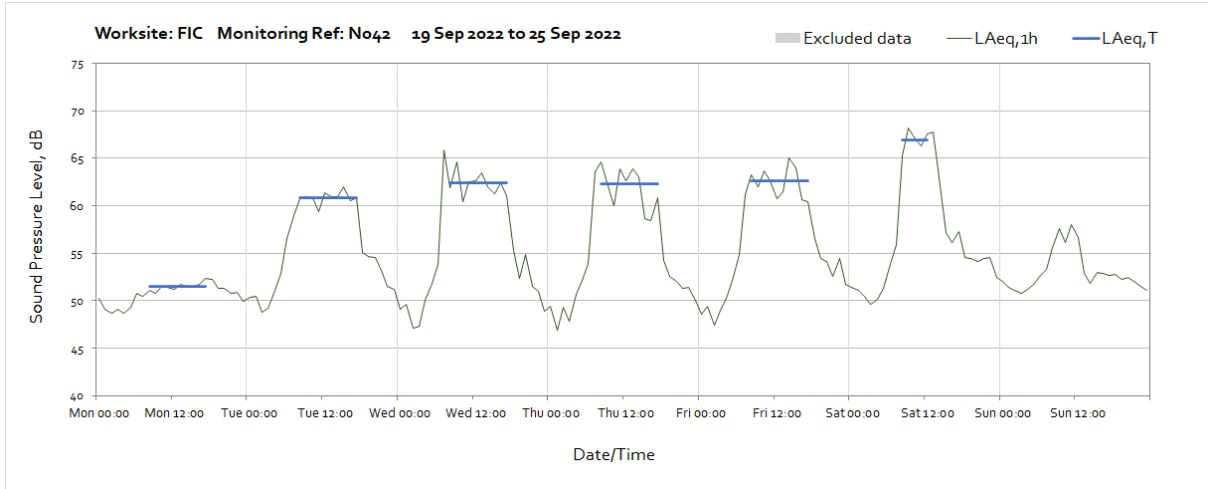
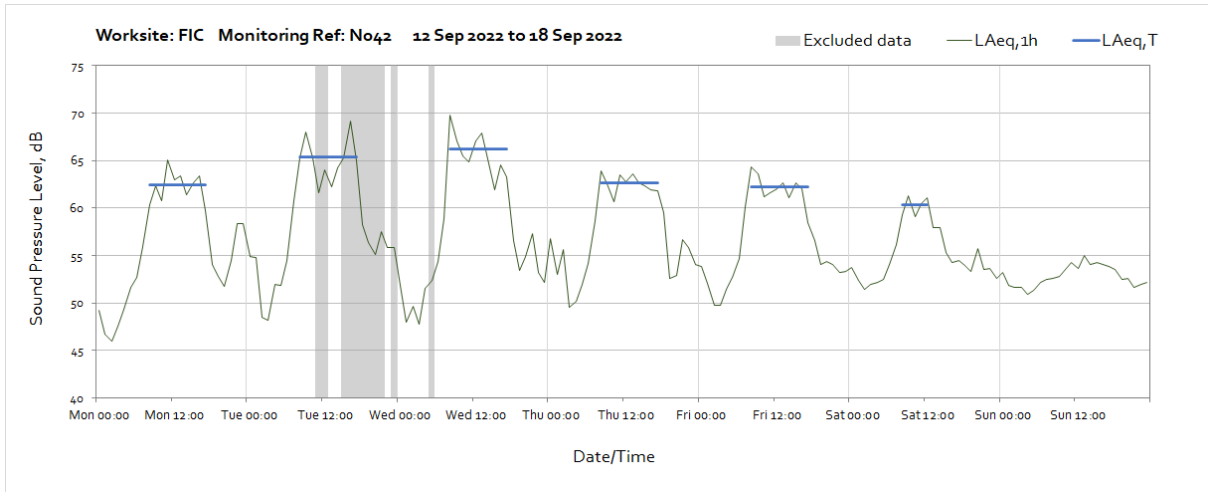




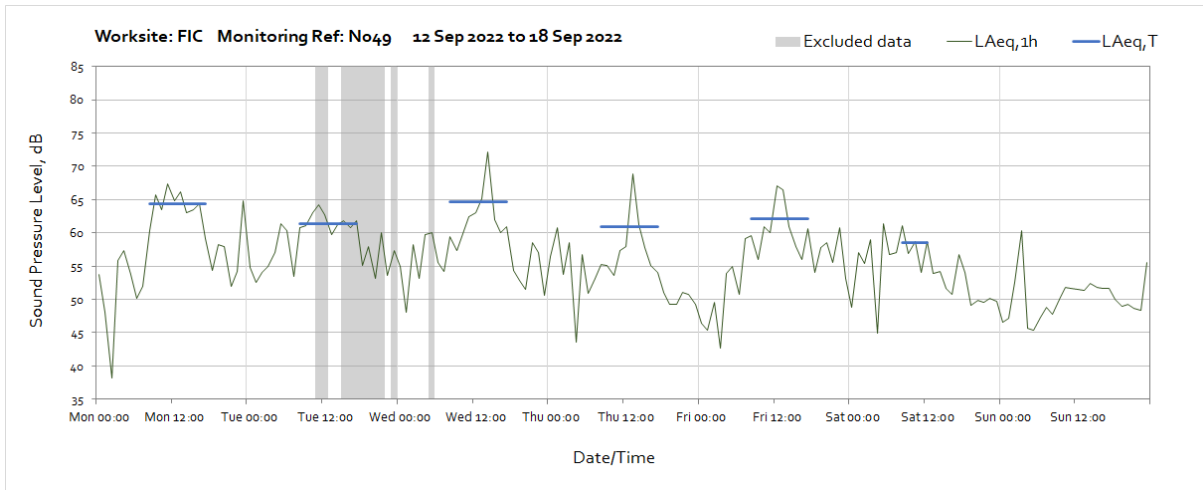
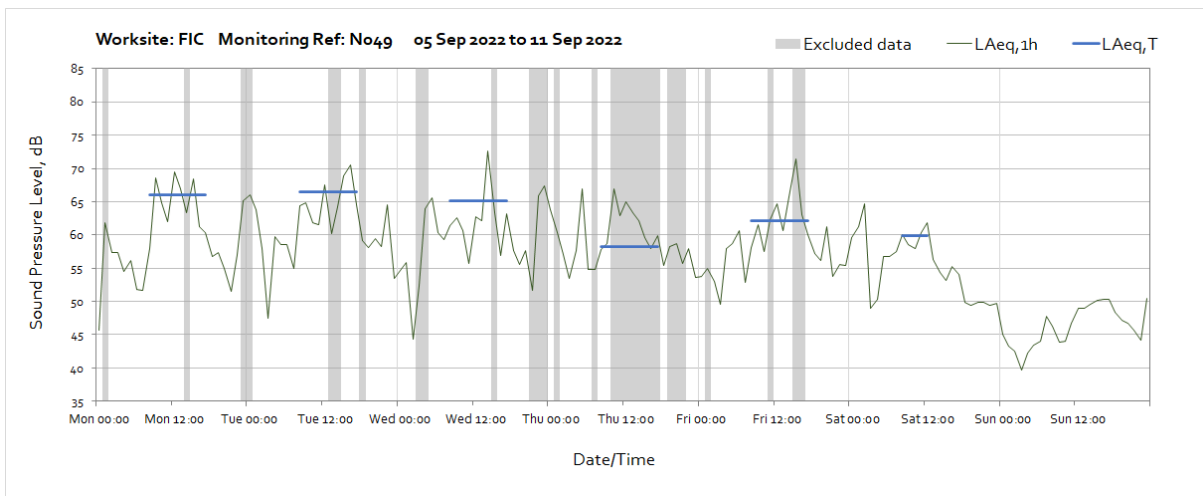
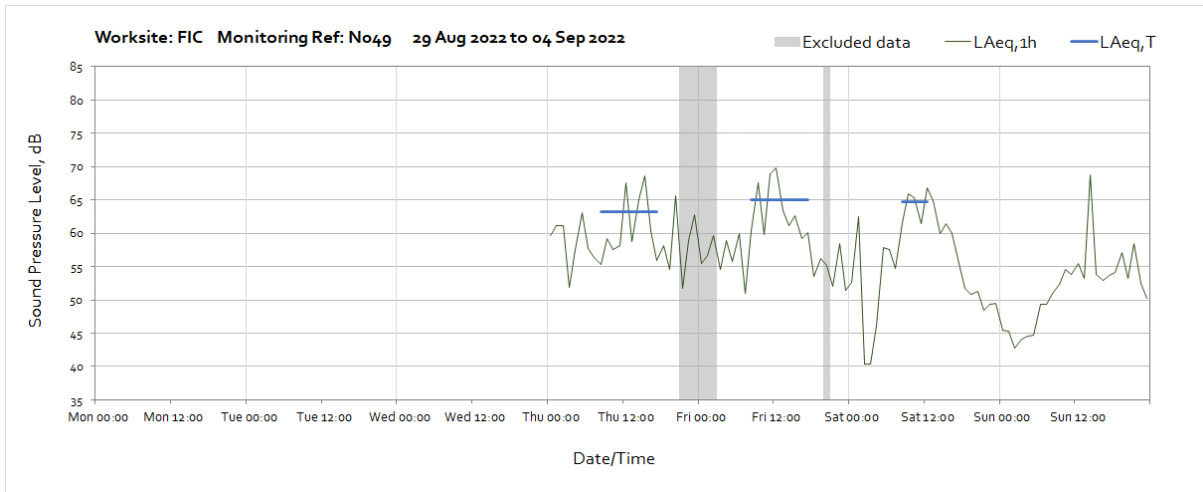


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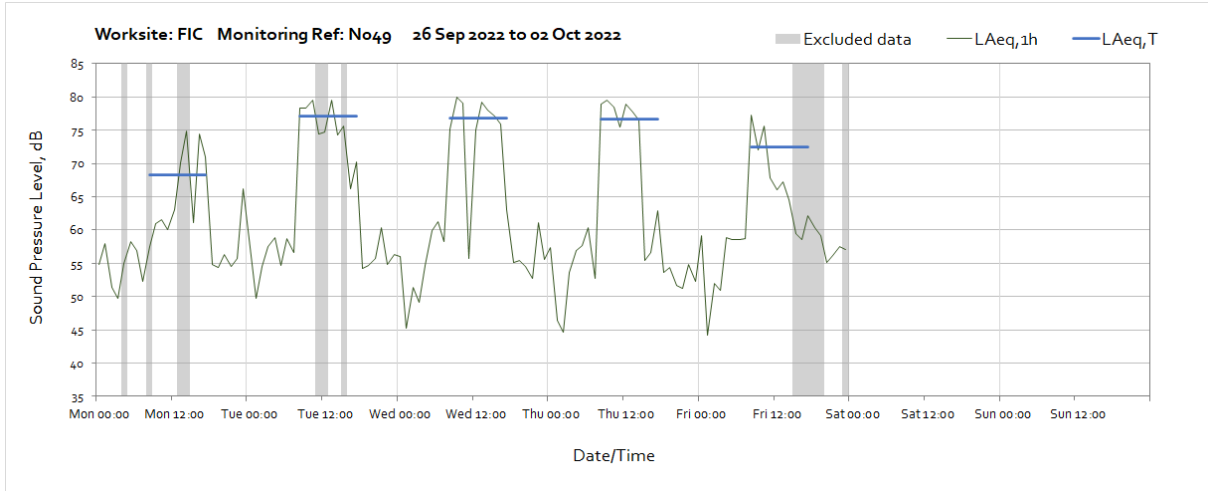
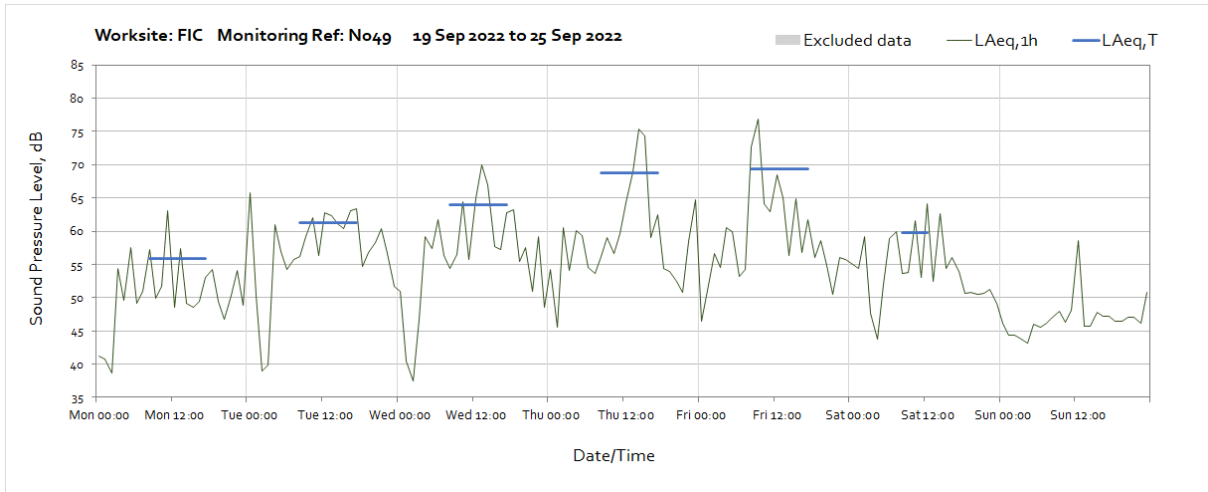




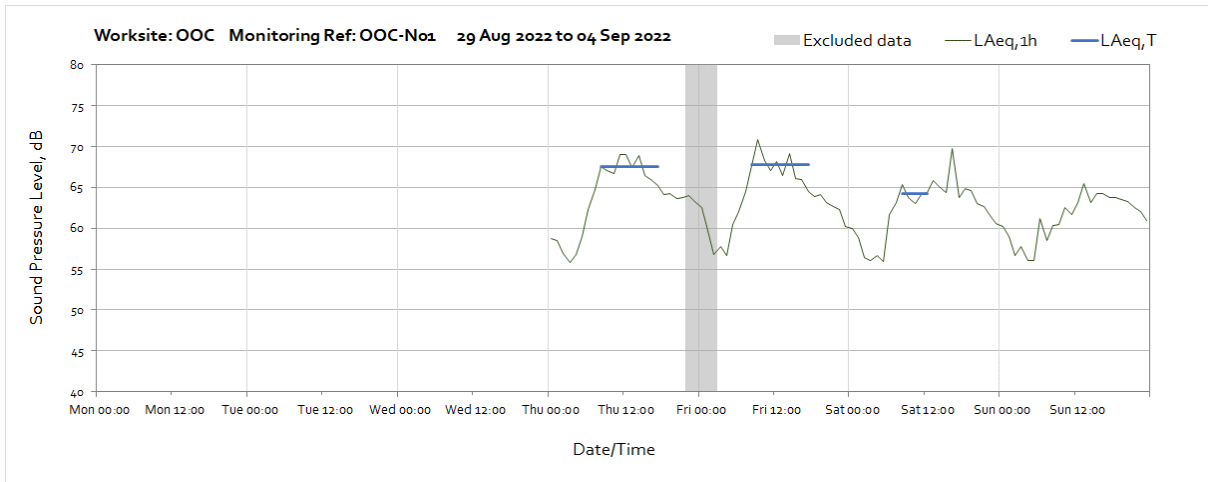
Worksite: Flat Iron Compound (FIC) – Monitoring Ref: N049

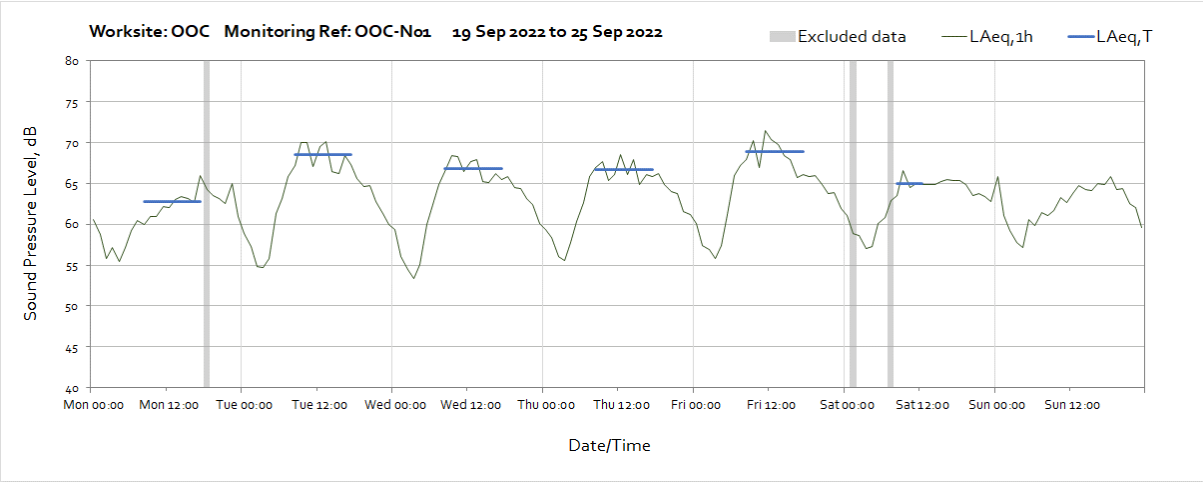
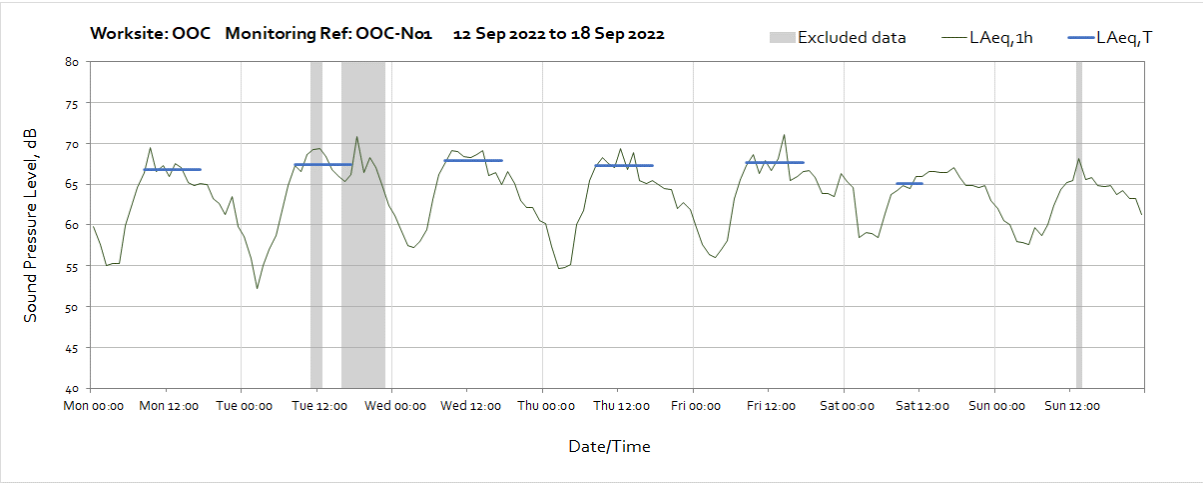
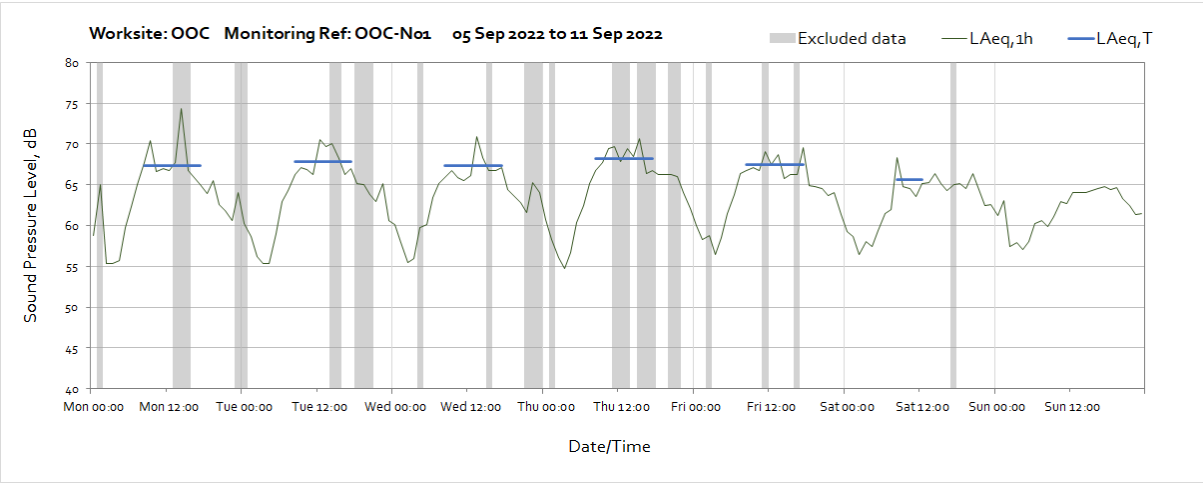


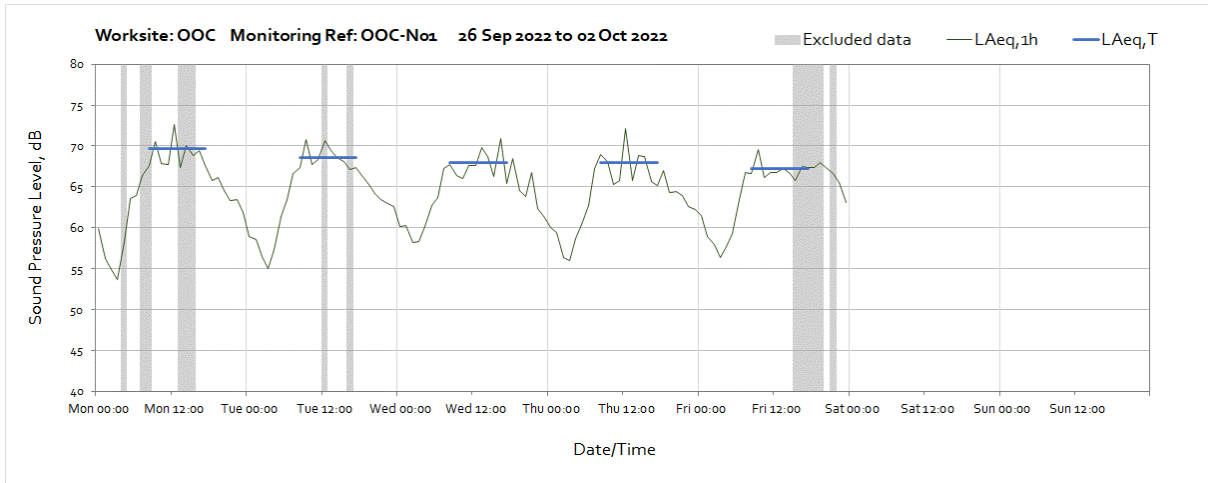
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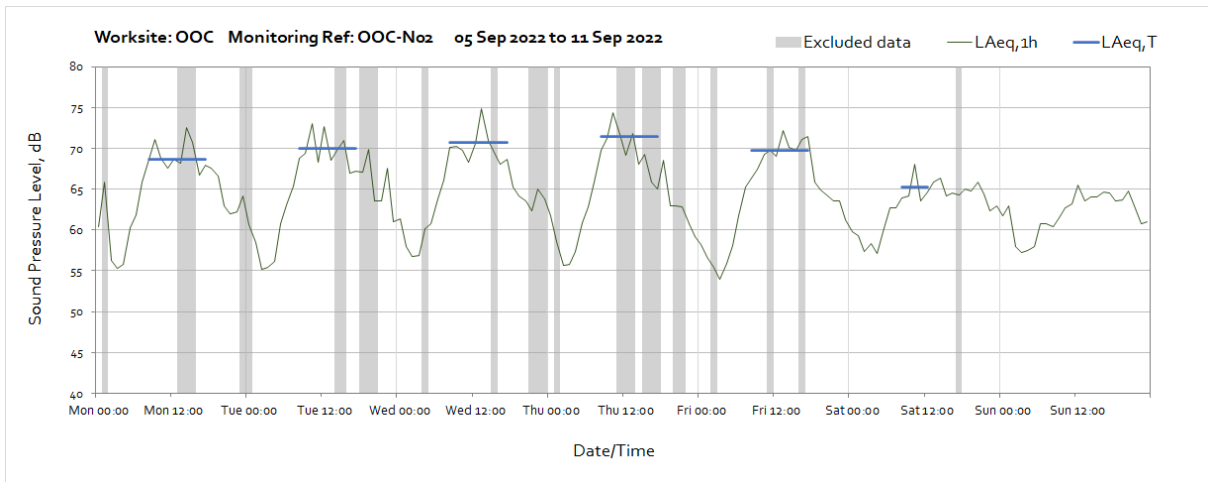
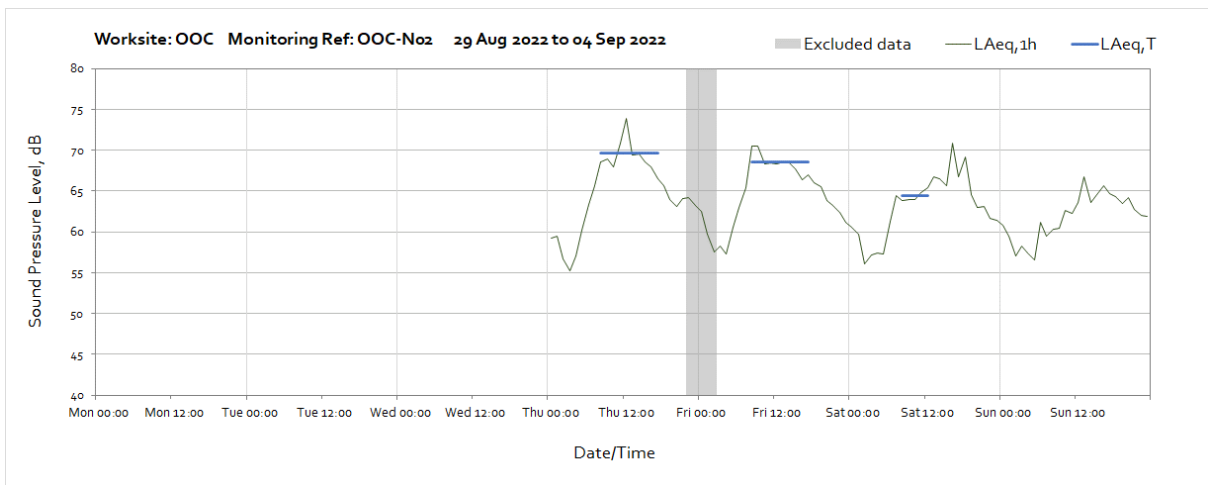
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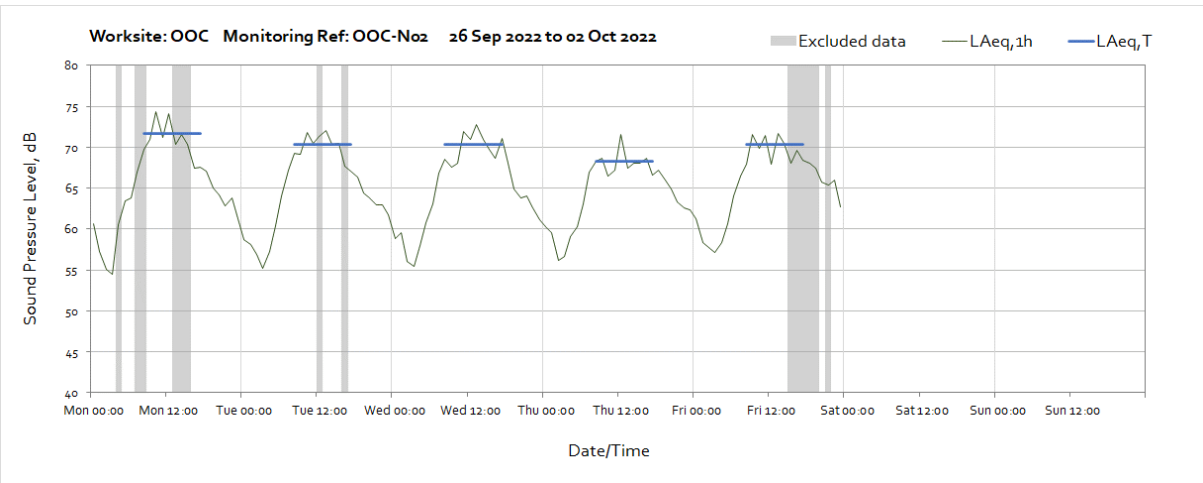
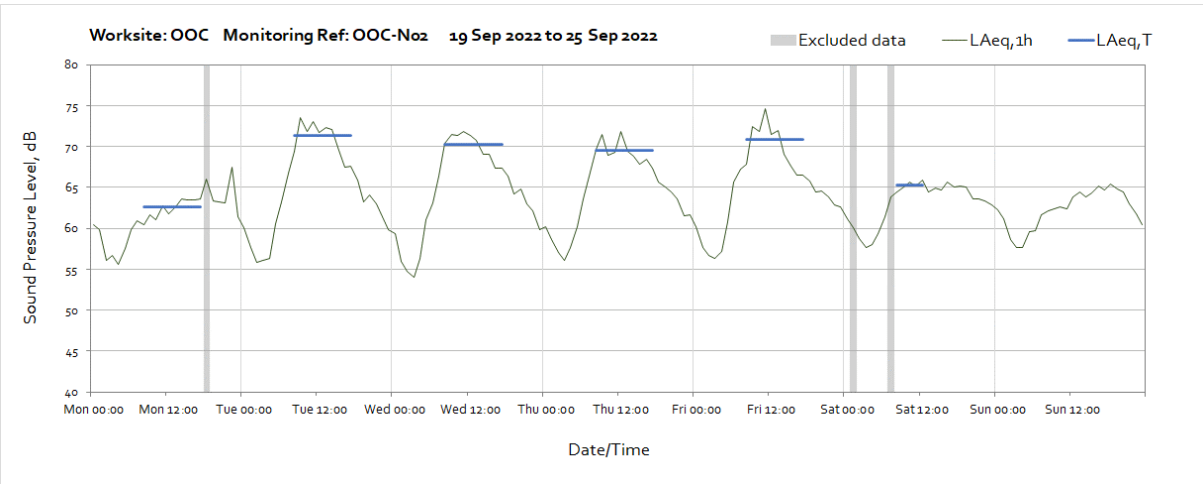
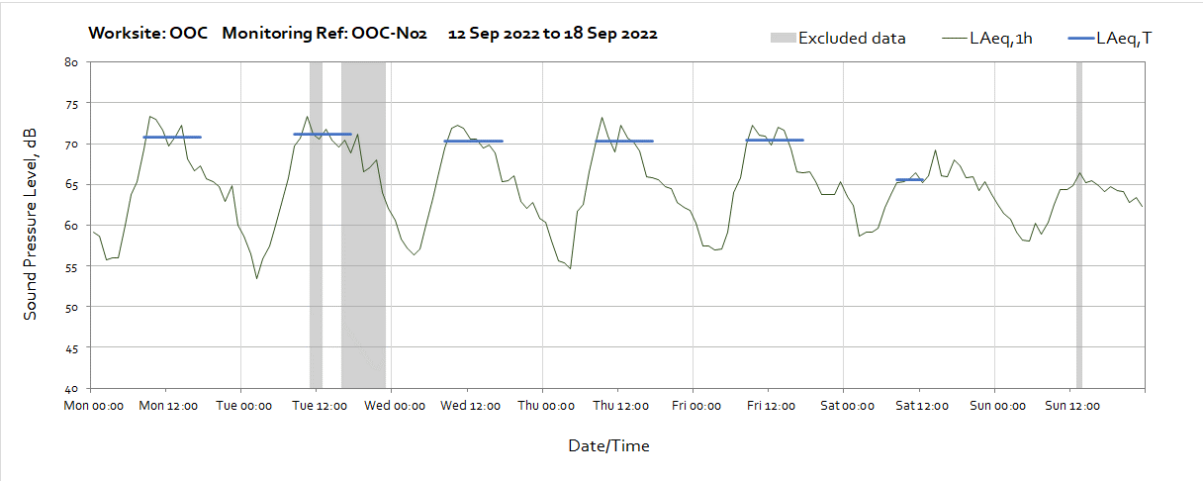




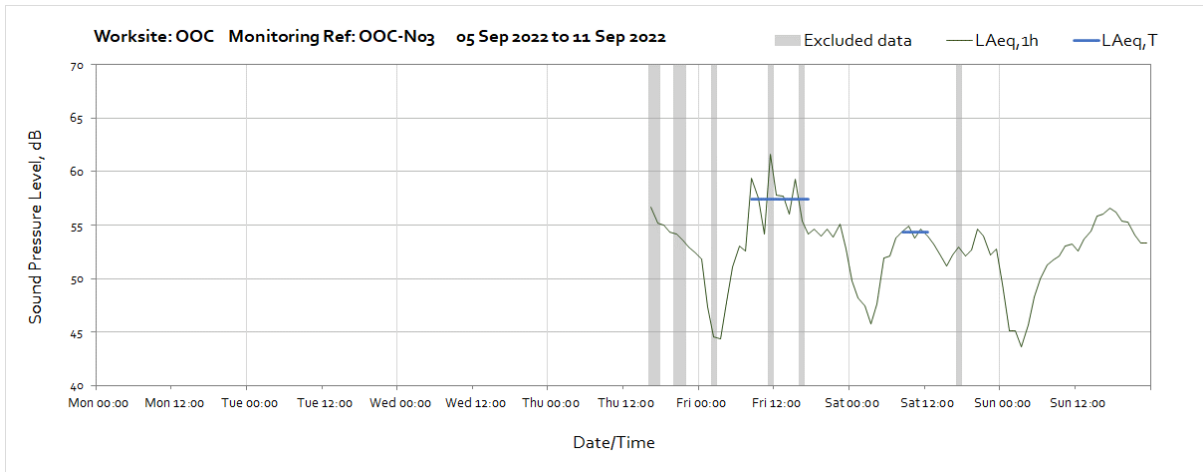


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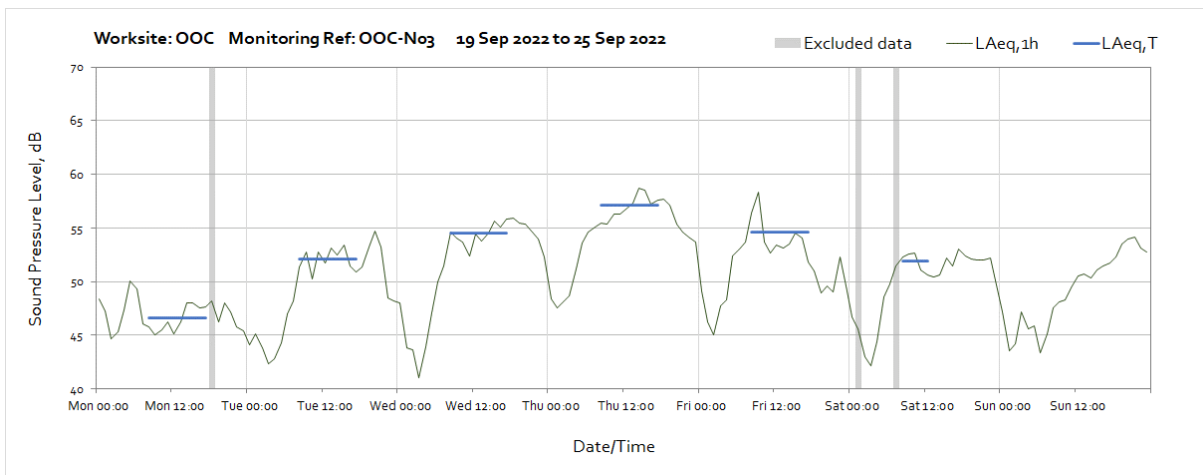
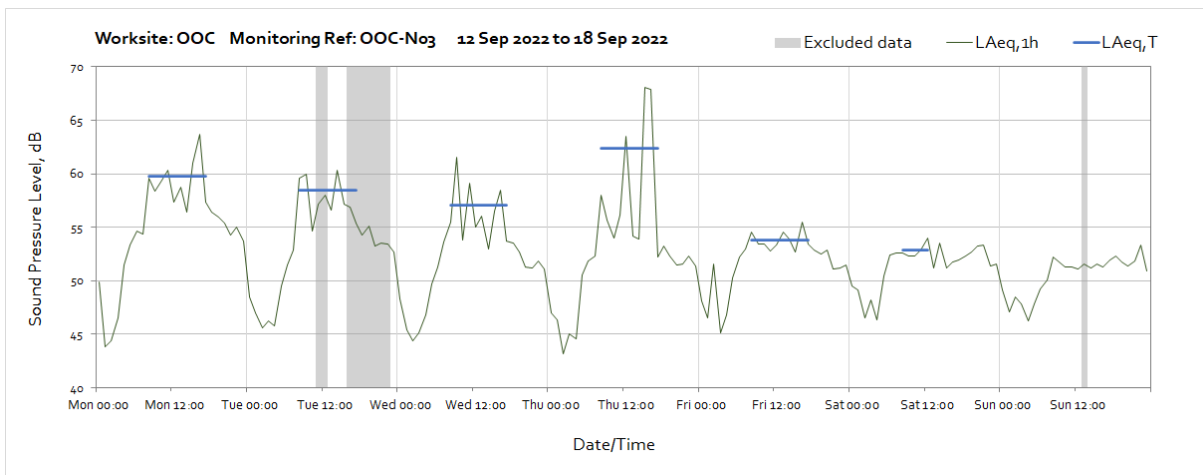


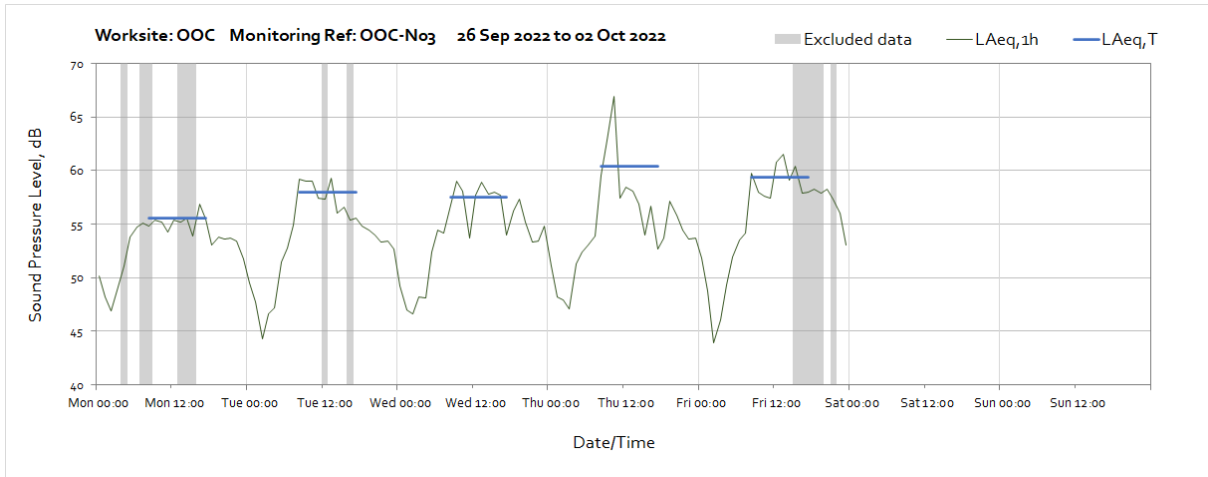


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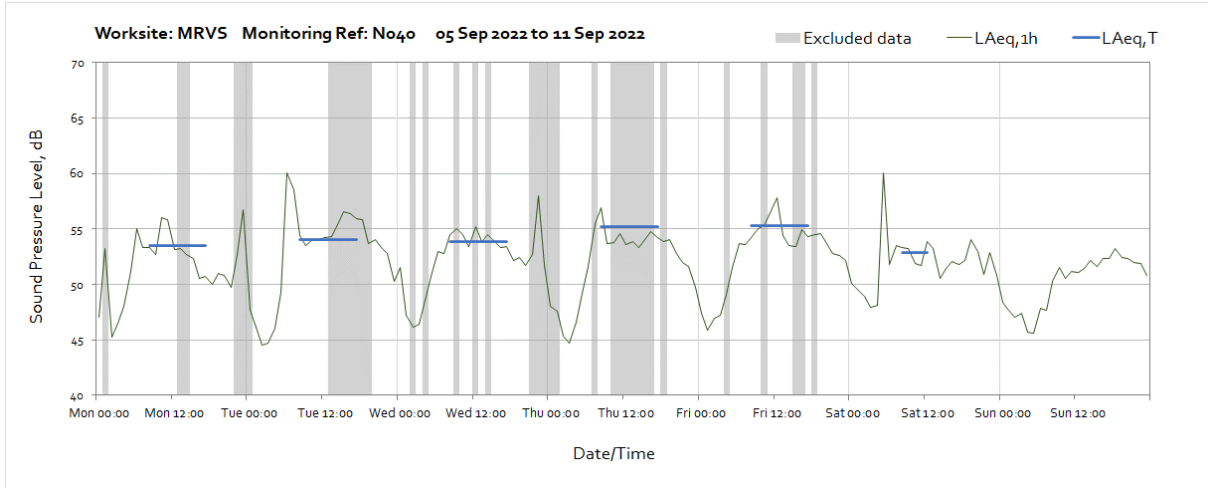
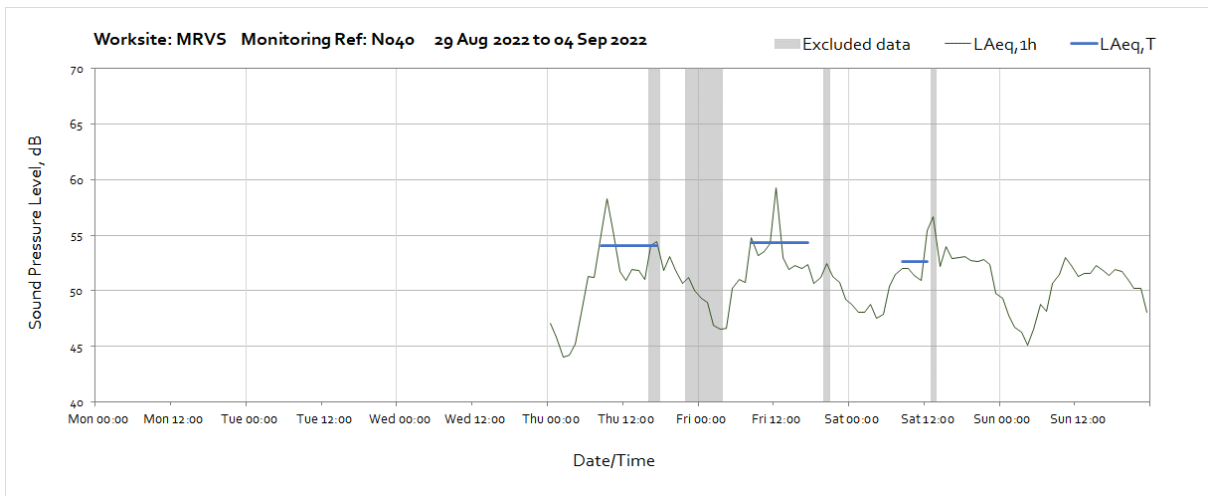


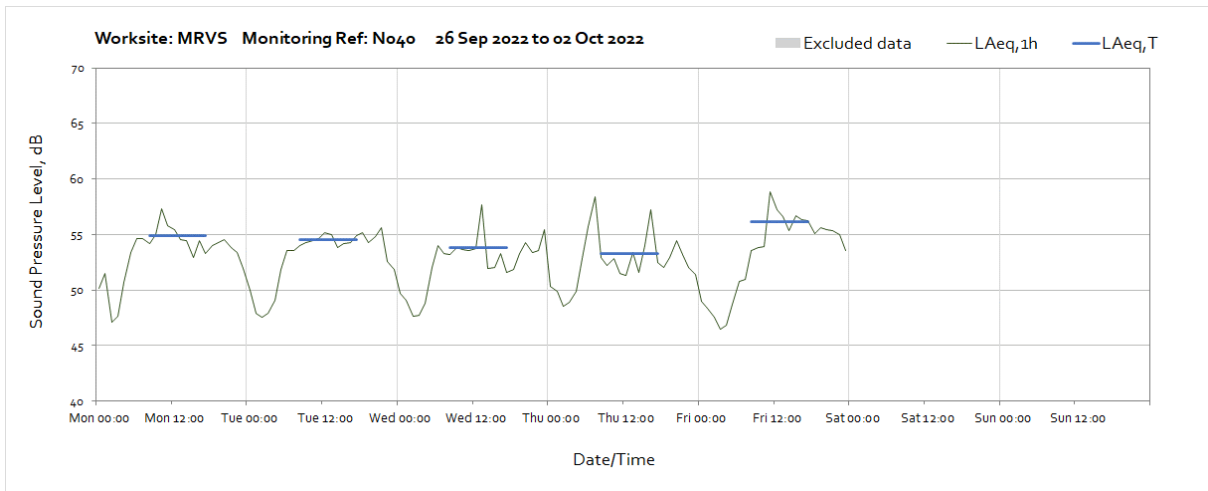
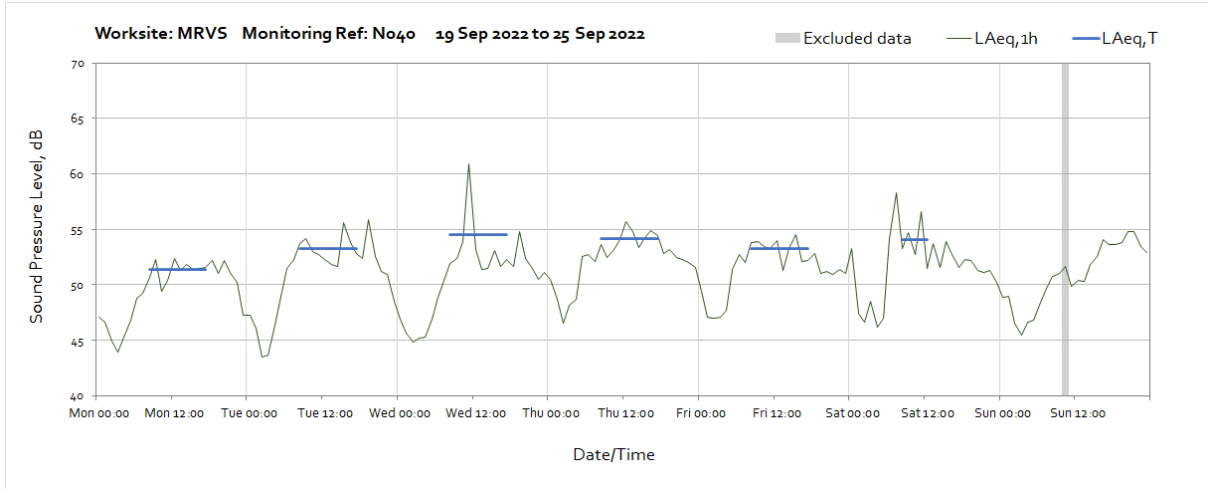
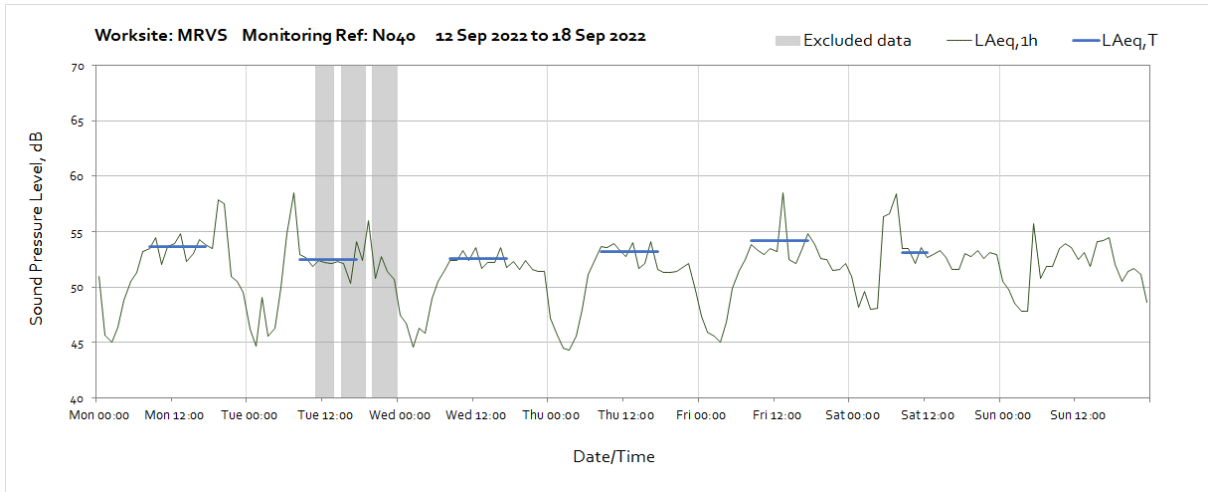
Note: The noise monitor was installed at 15:00 on Thursday 8th September 2022.



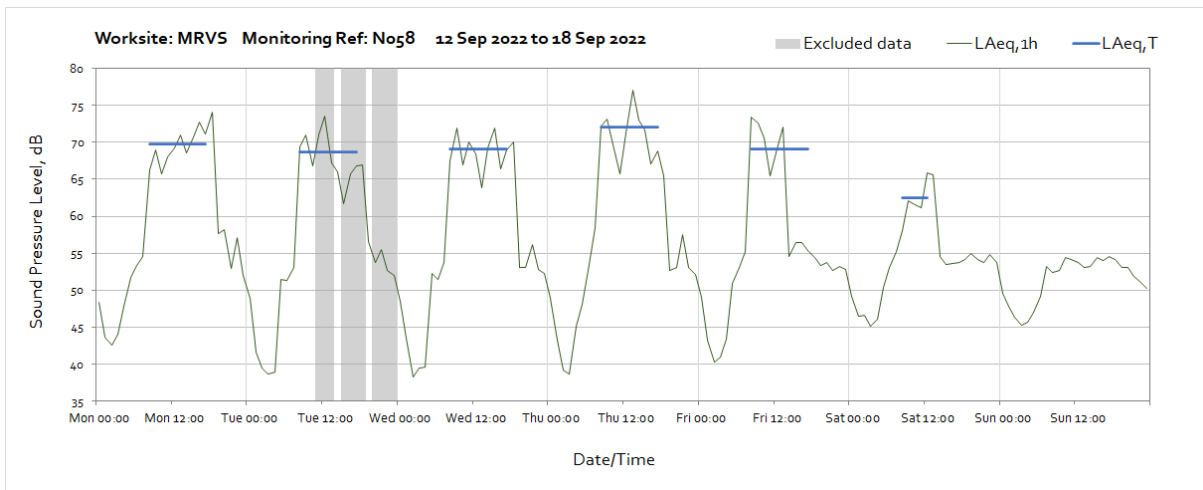
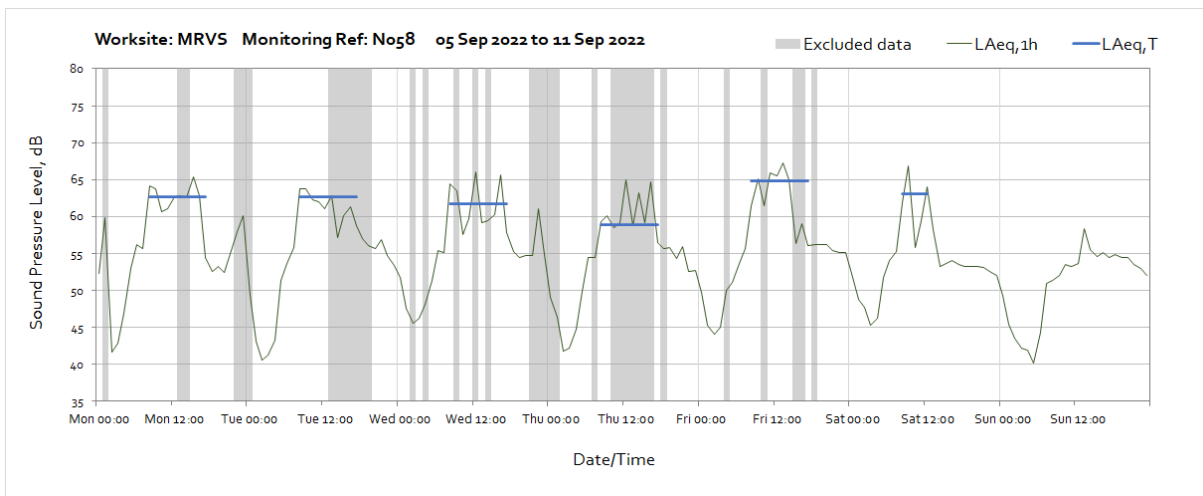
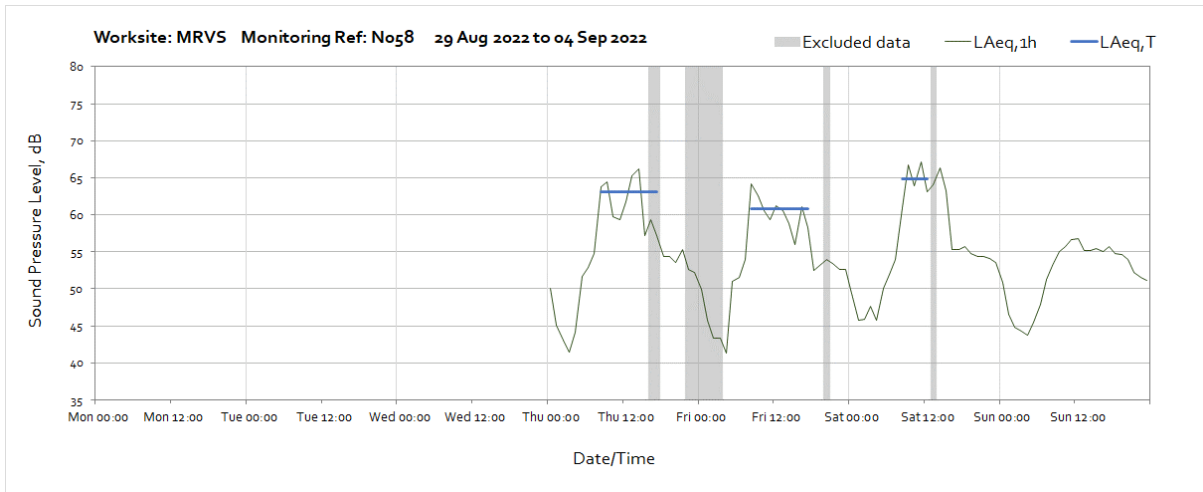


Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N040

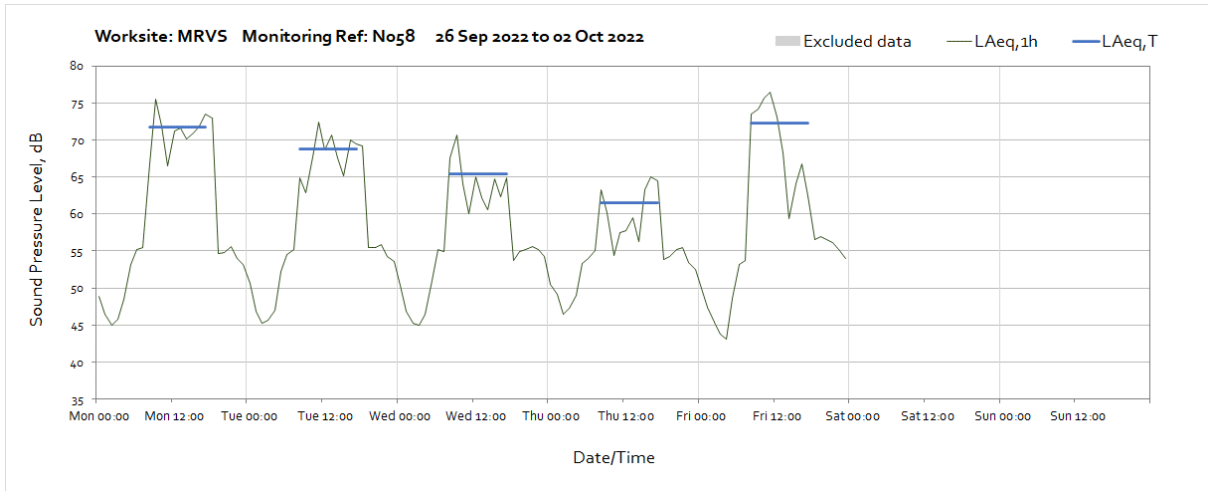
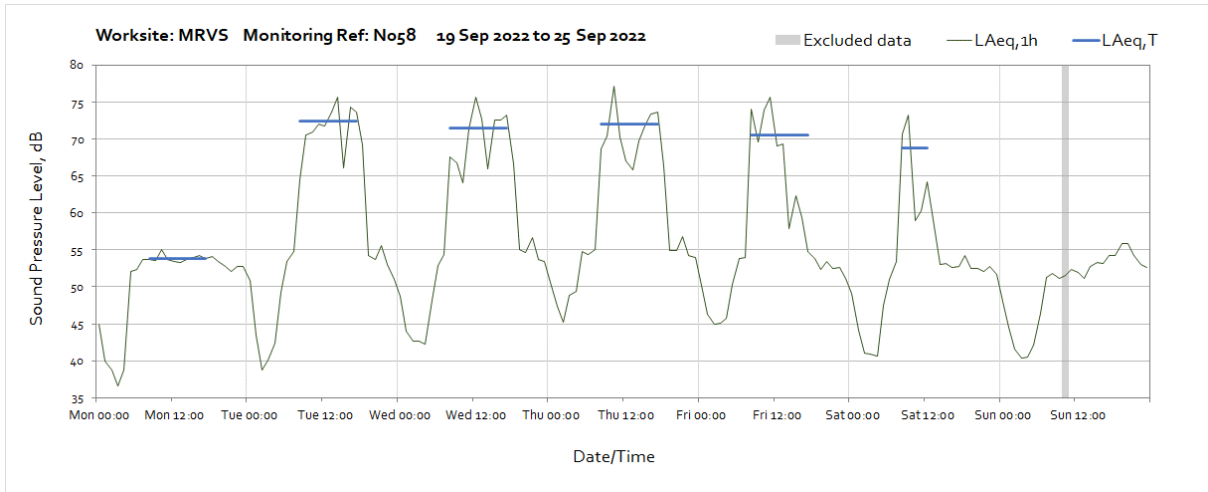




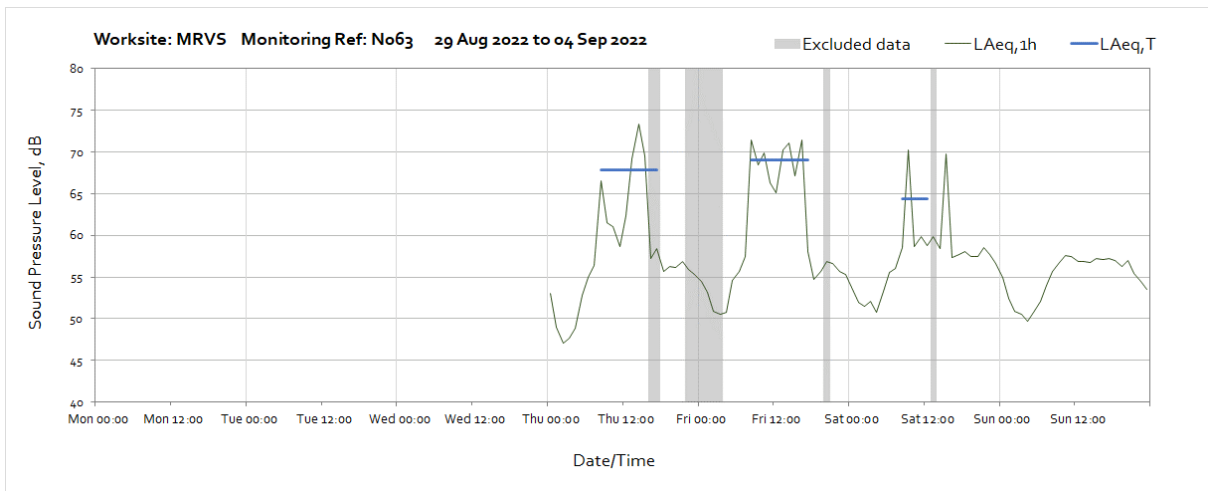
Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N058

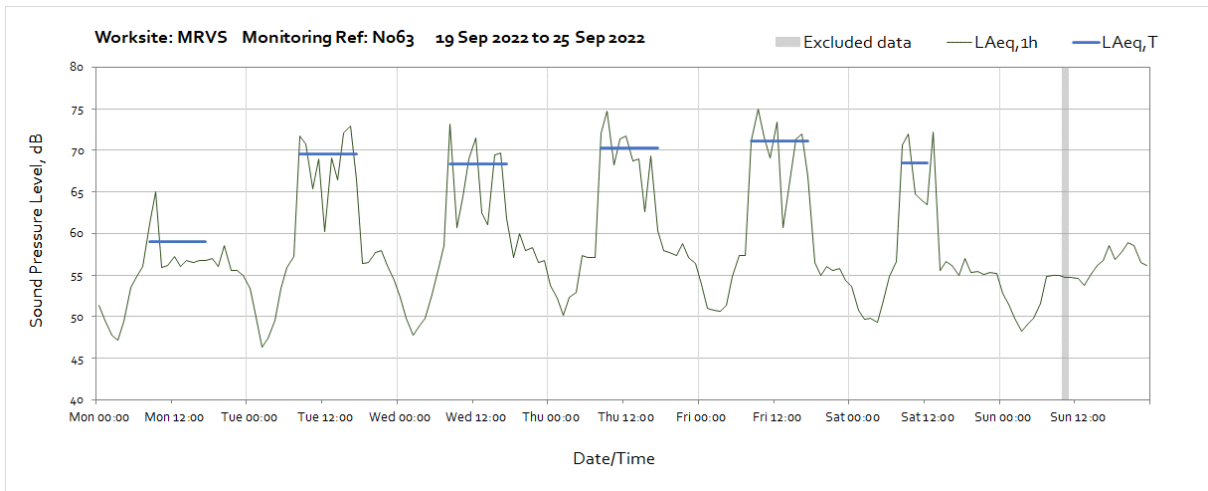
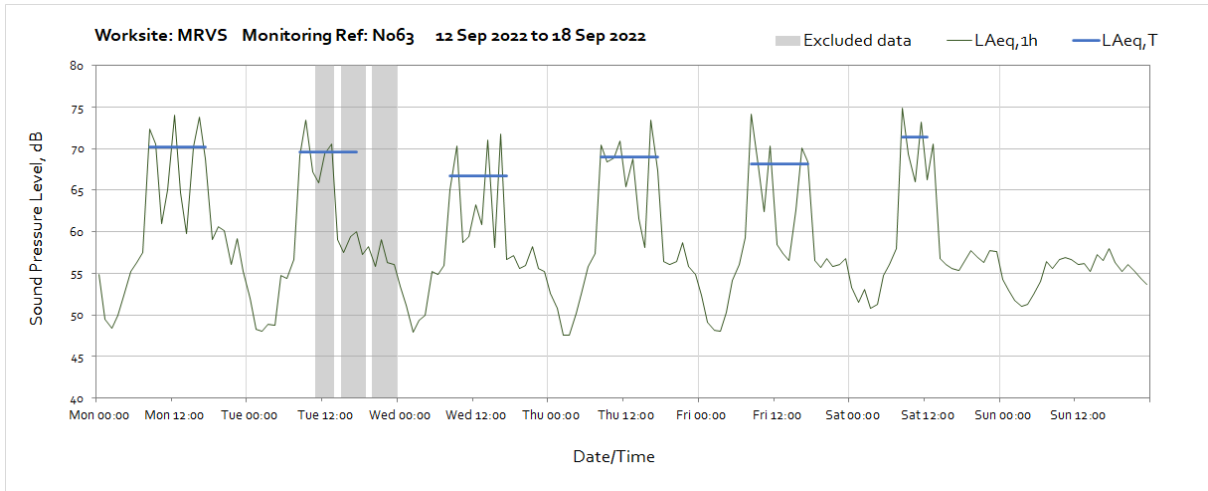
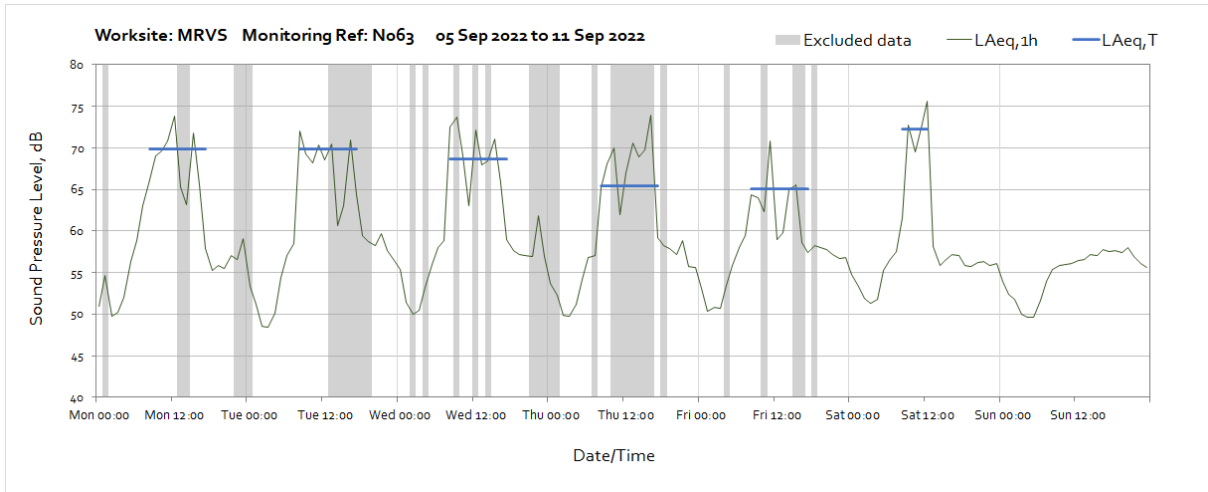


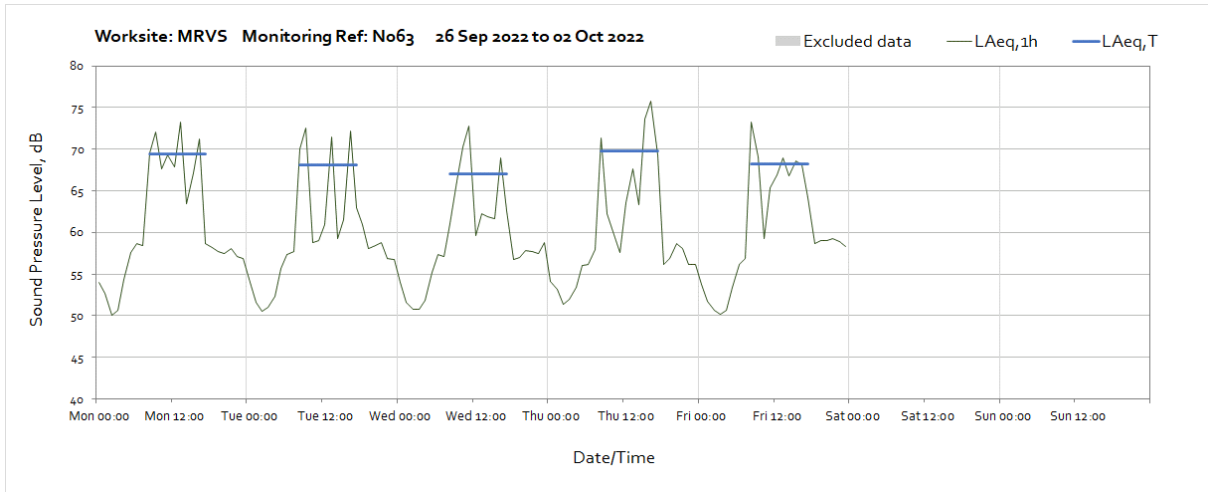
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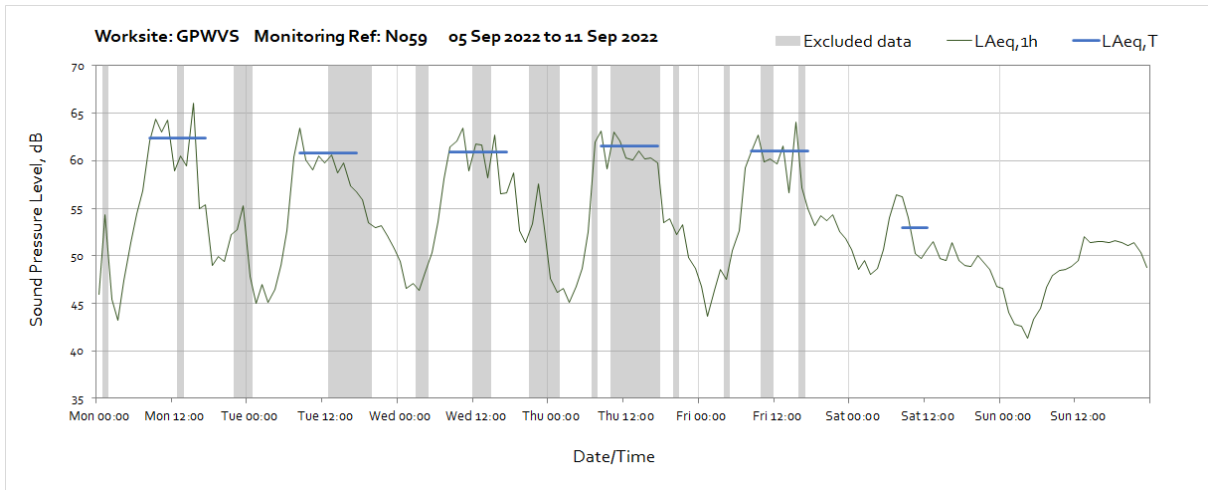
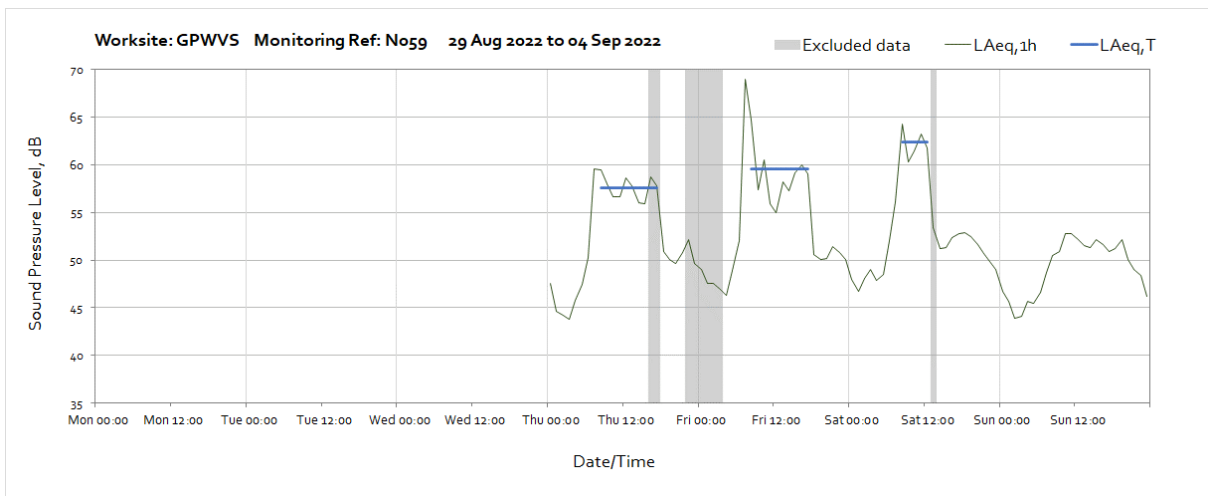
Worksite: Mandeville Road Ventilation Shaft (MRVS) - Monitoring Ref: N063

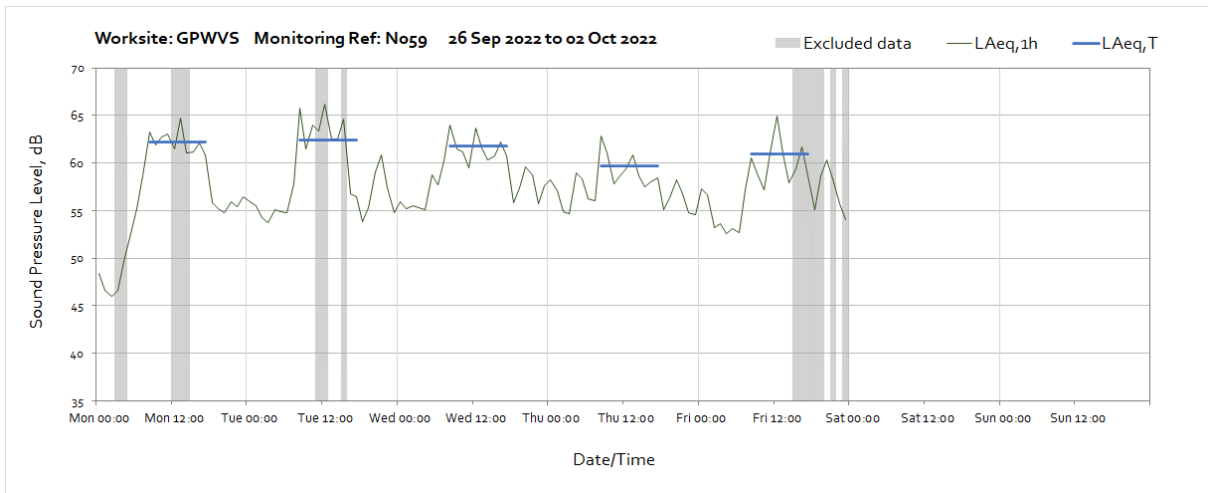
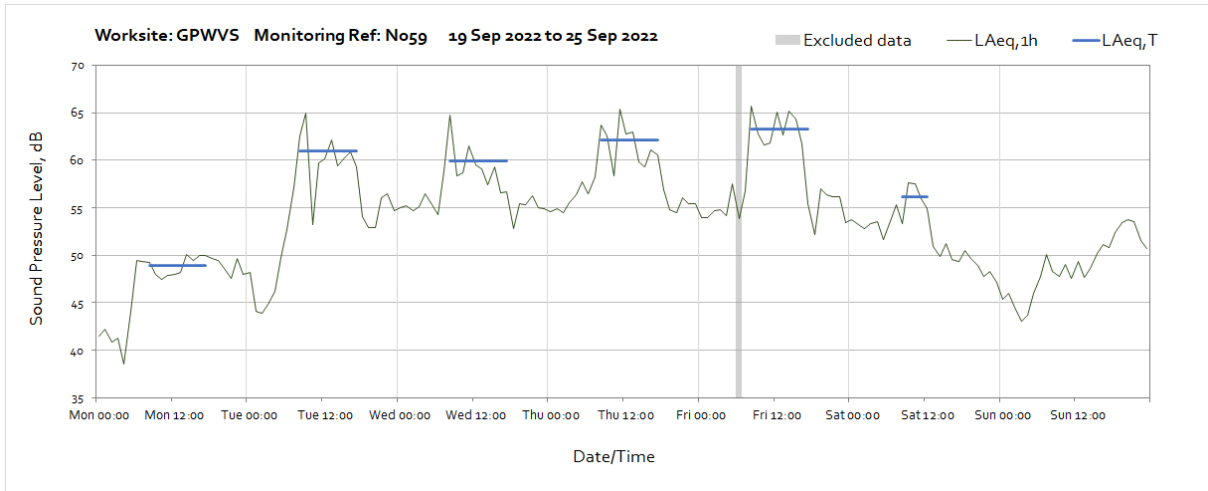
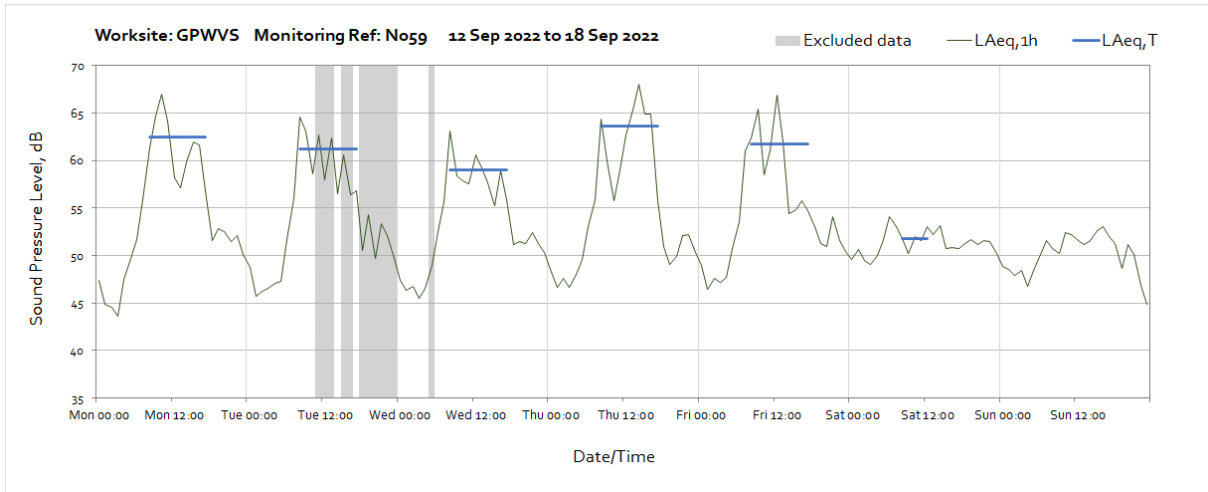




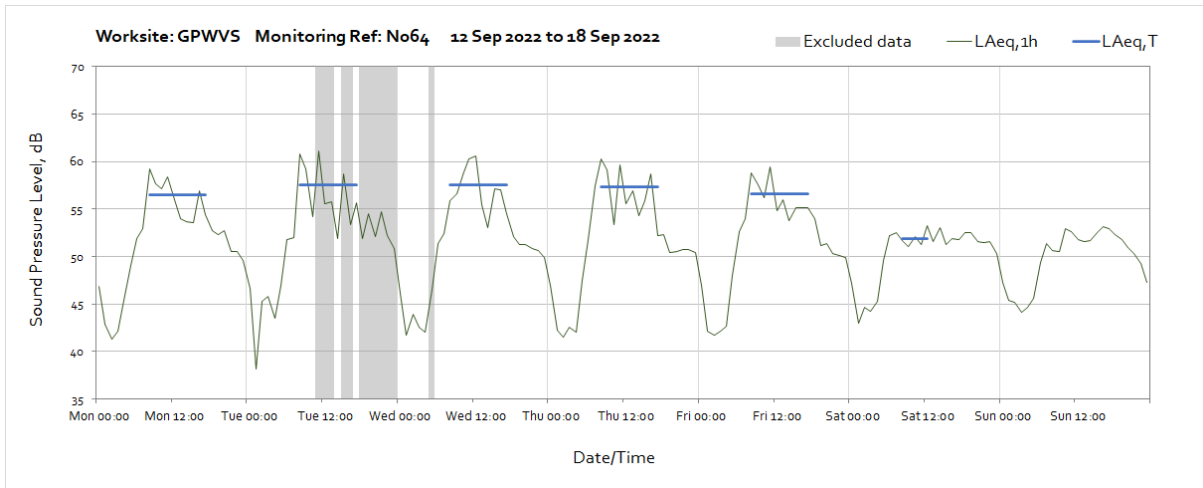
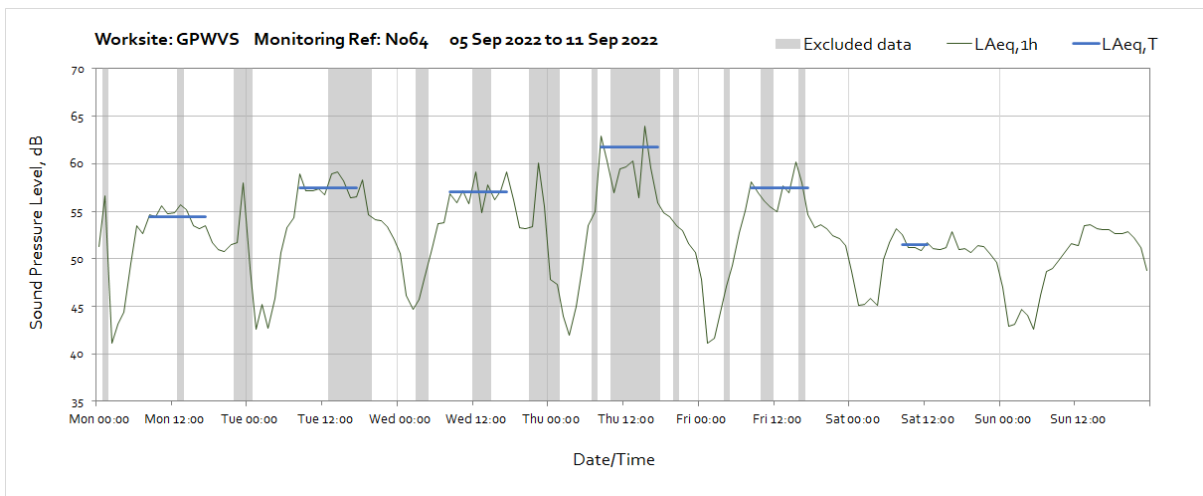
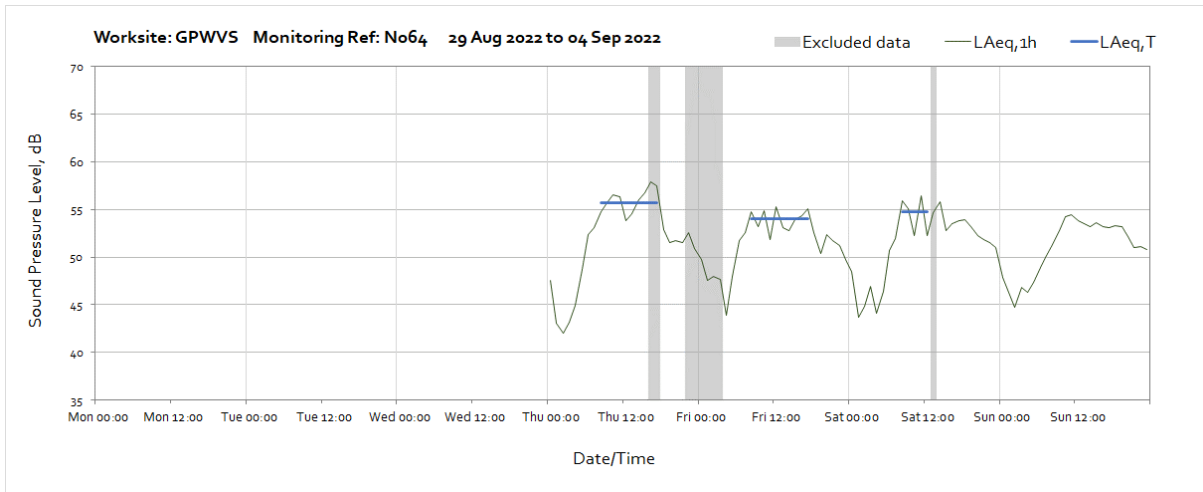


Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: N059

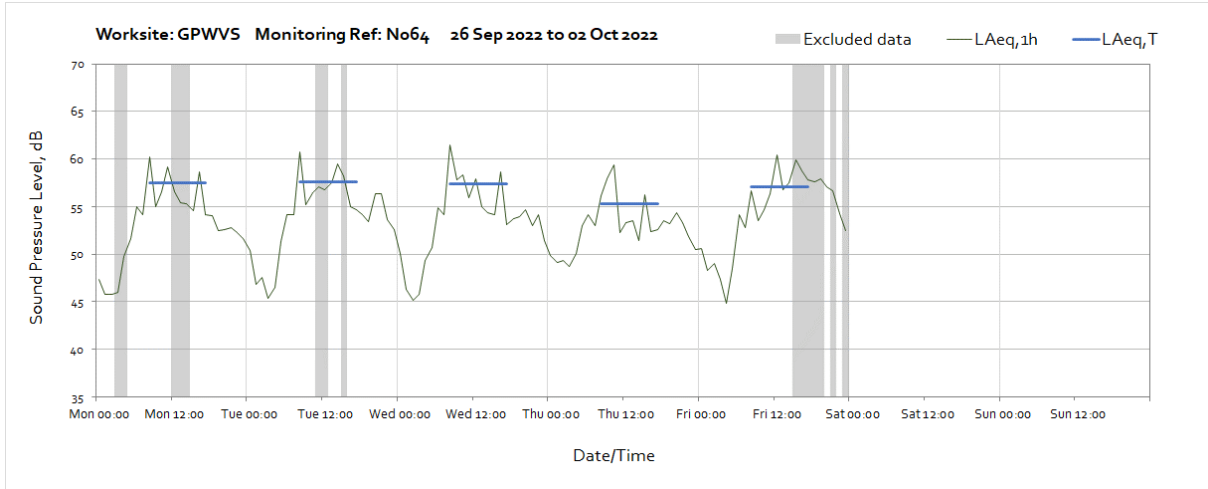
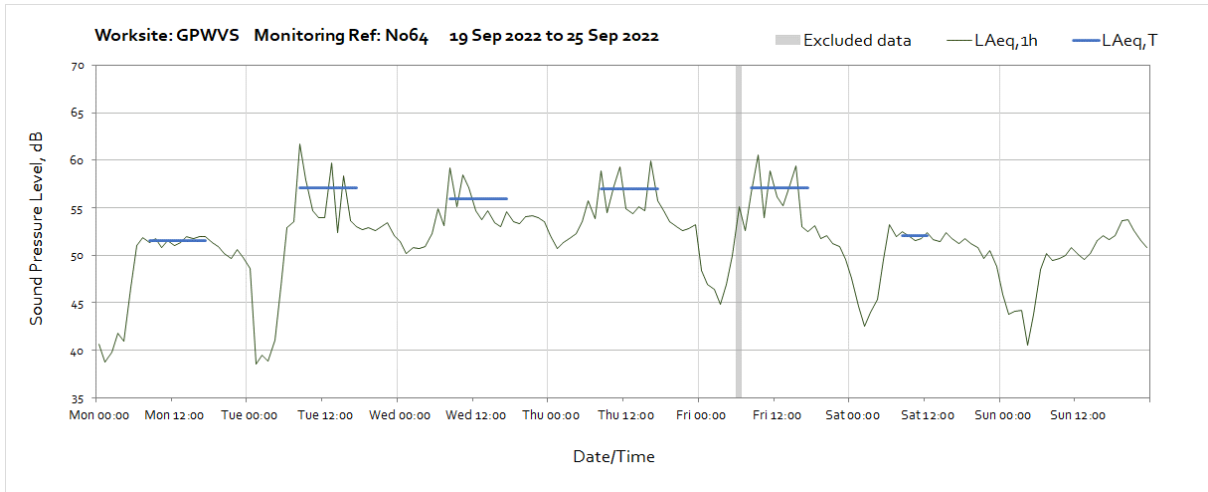




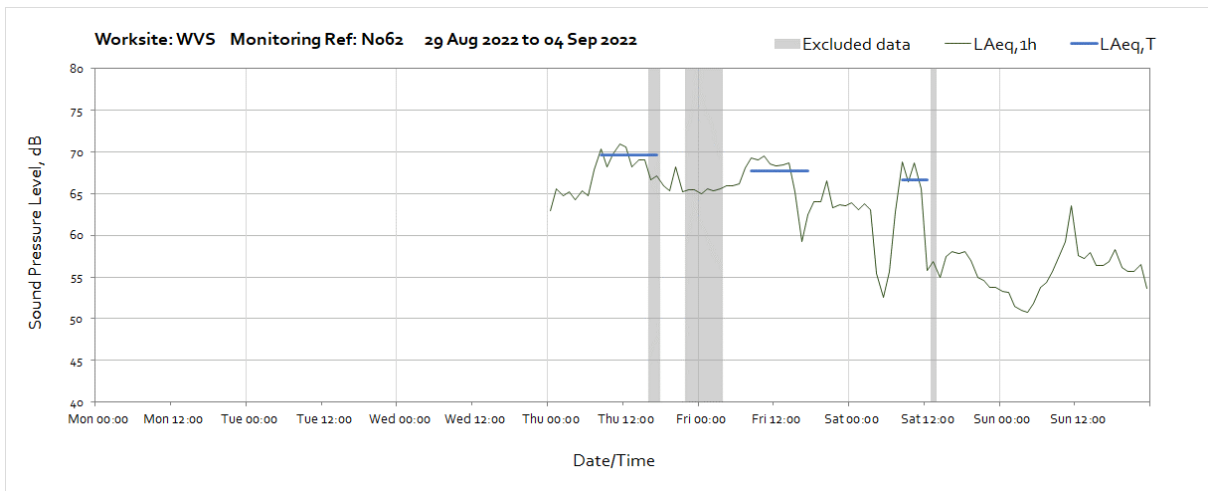
Worksite: Green Park Way Vent Shaft (GPWVS) - Monitoring Ref: N064

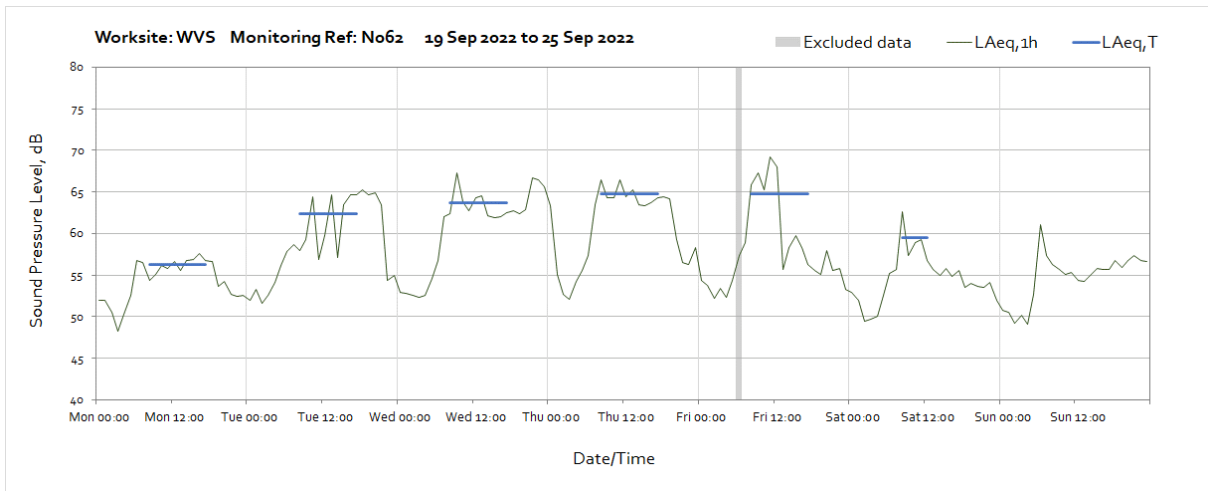
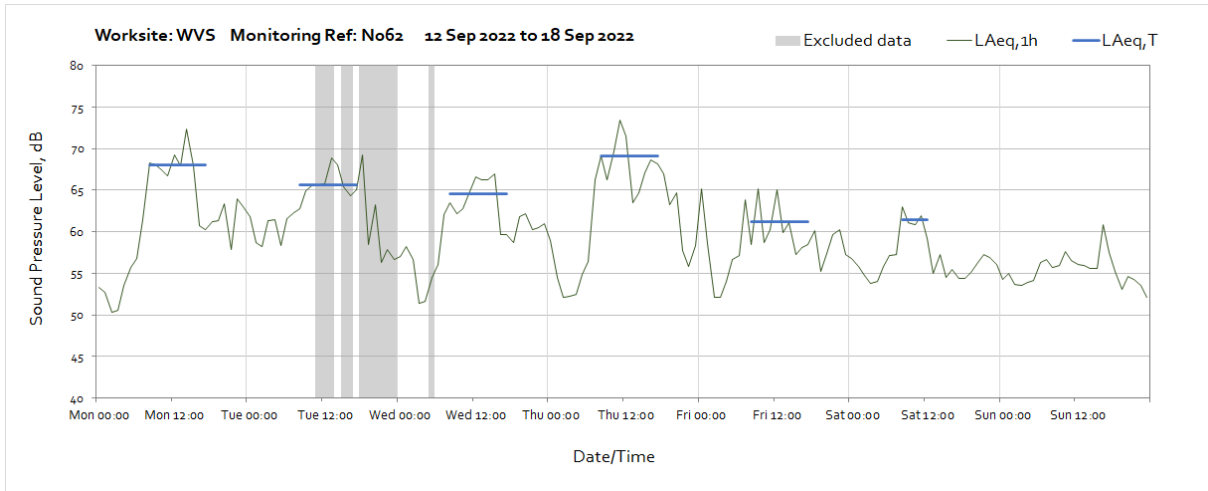
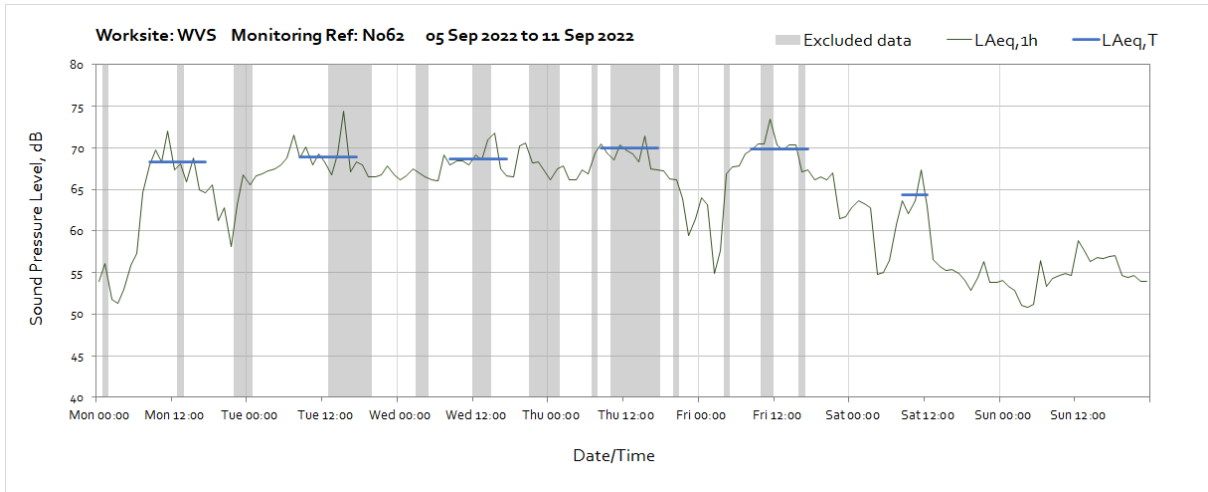


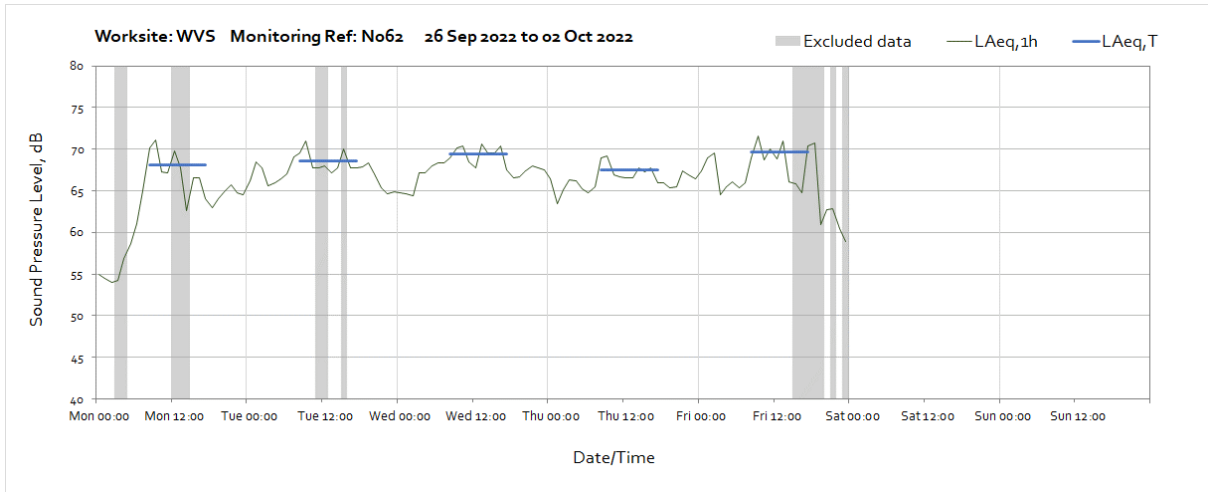
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Worksite: Westgate Ventilation Shaft (WVS) – Monitoring Ref: N062



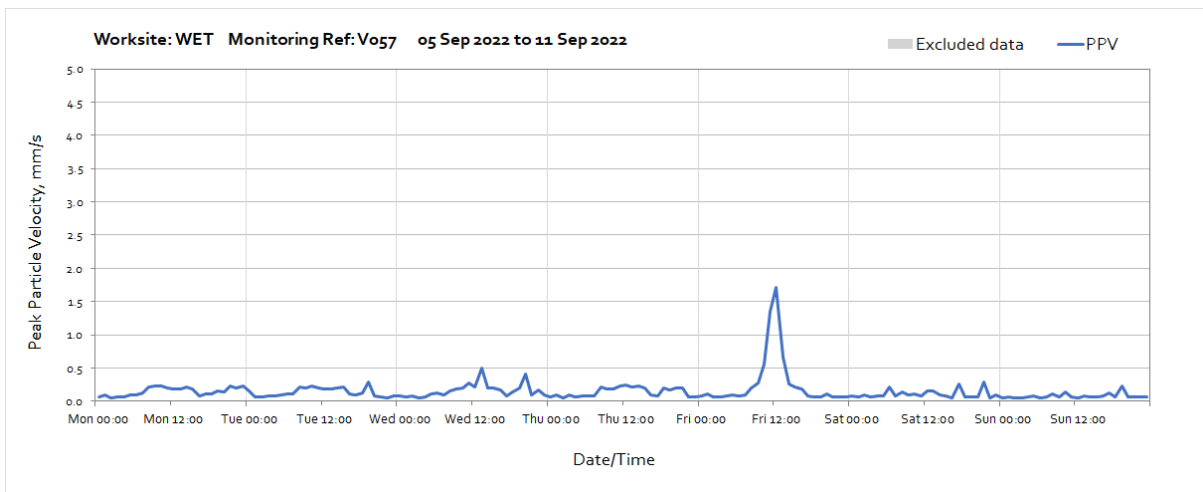
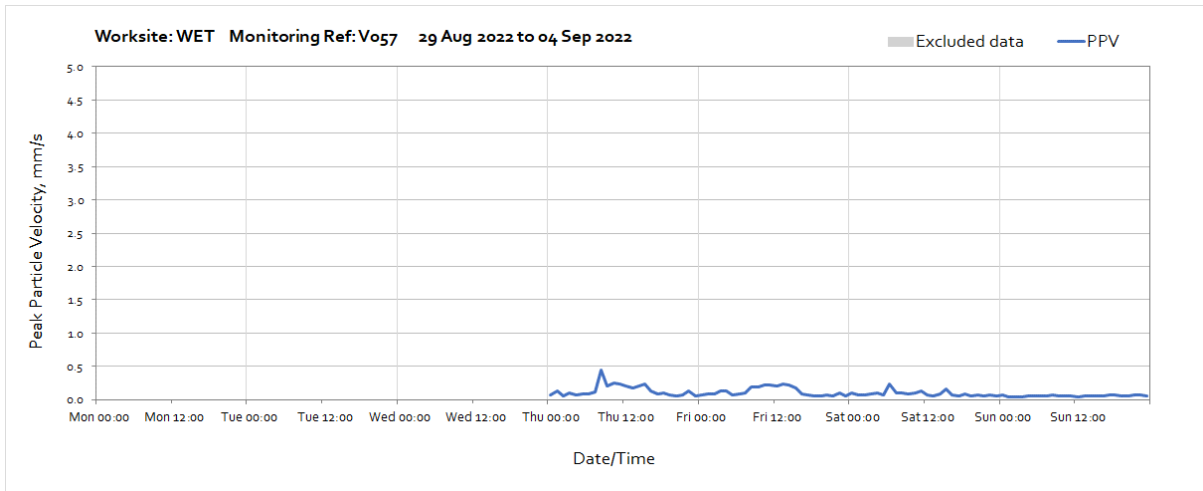


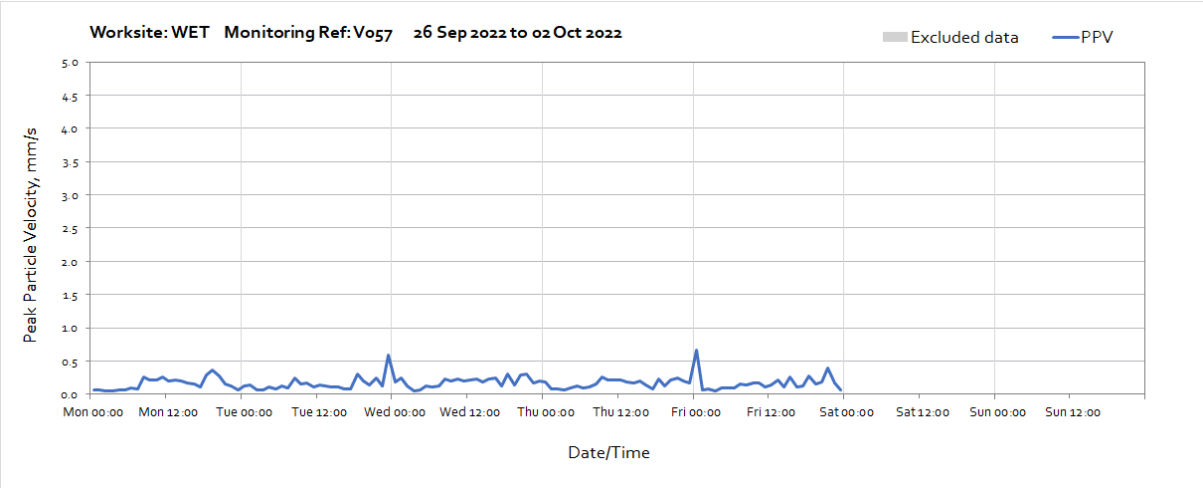
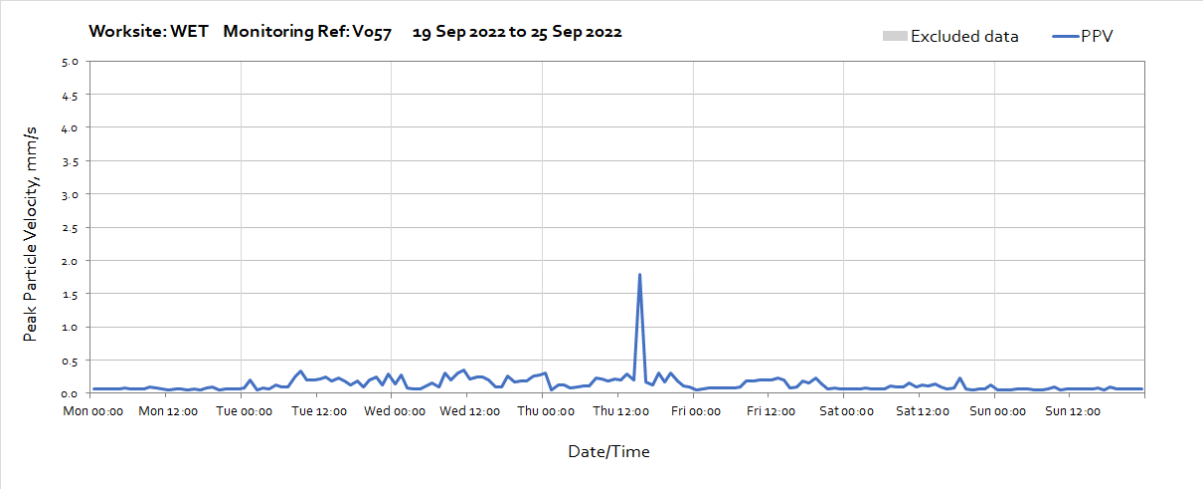
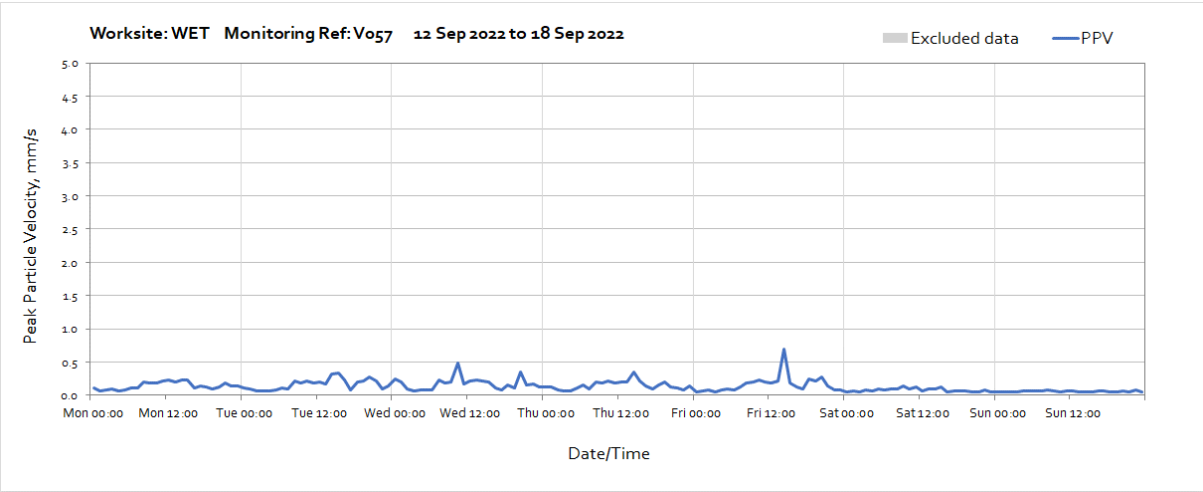


Vibration

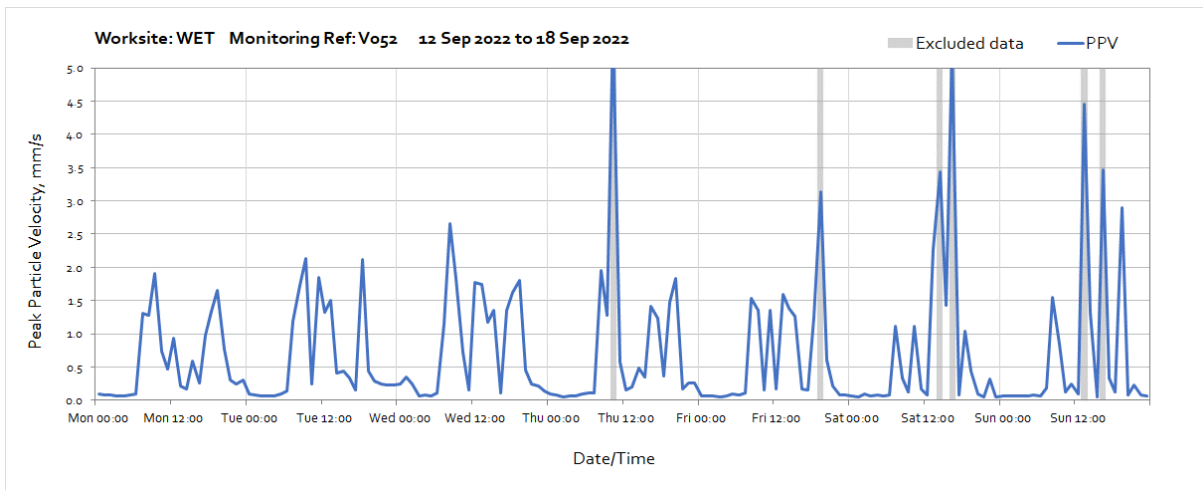
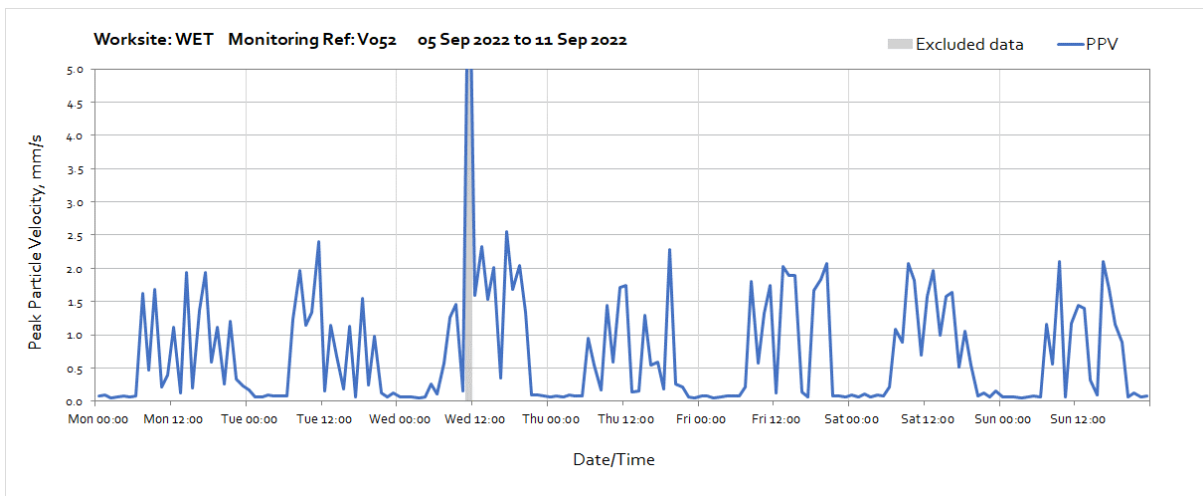
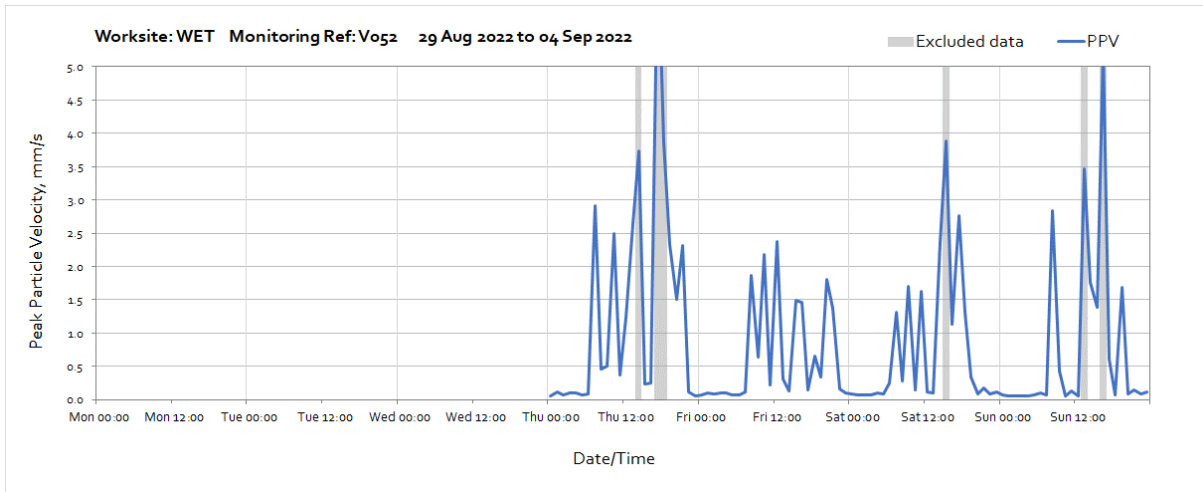
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative 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

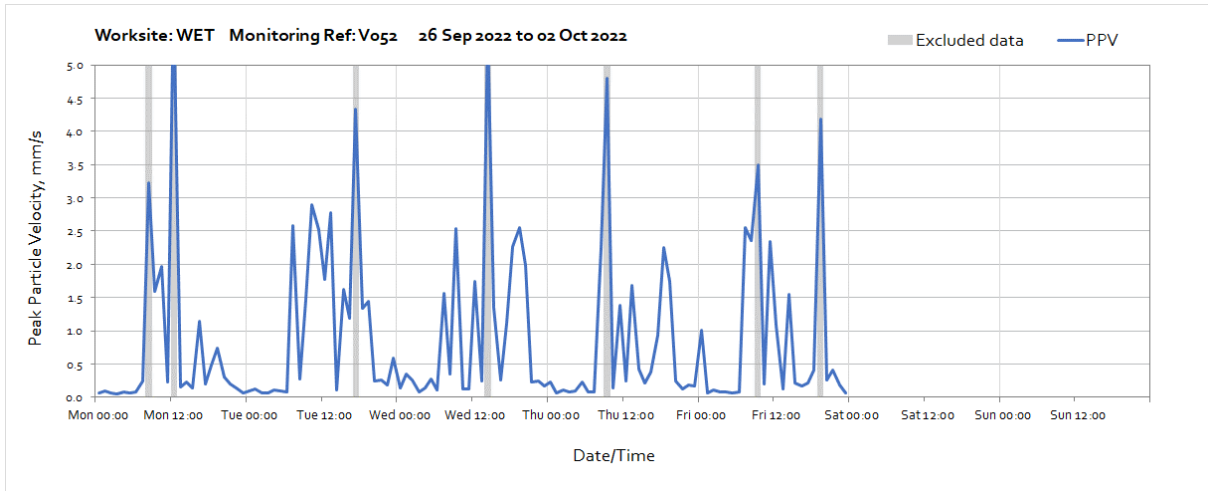
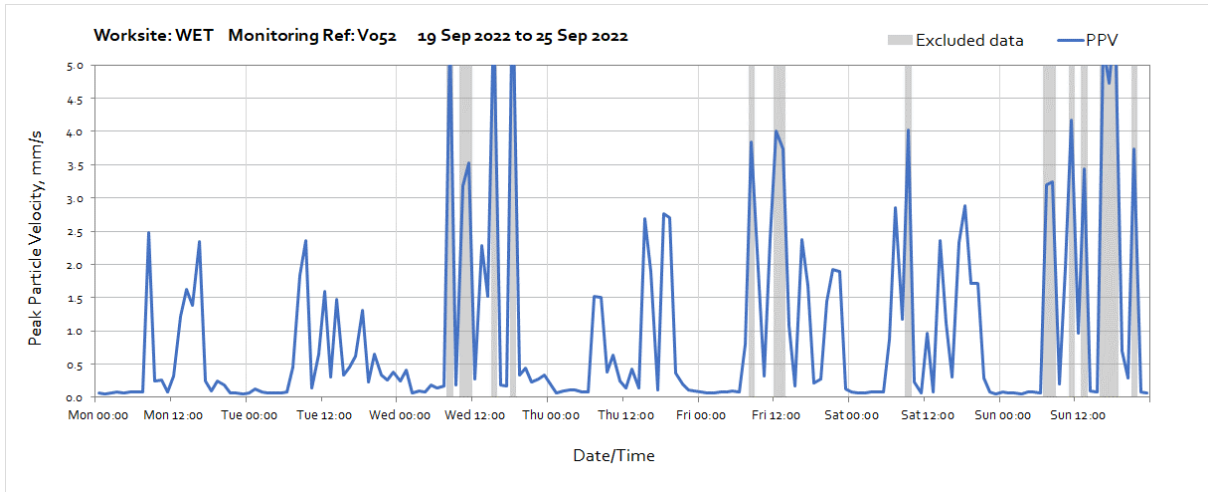




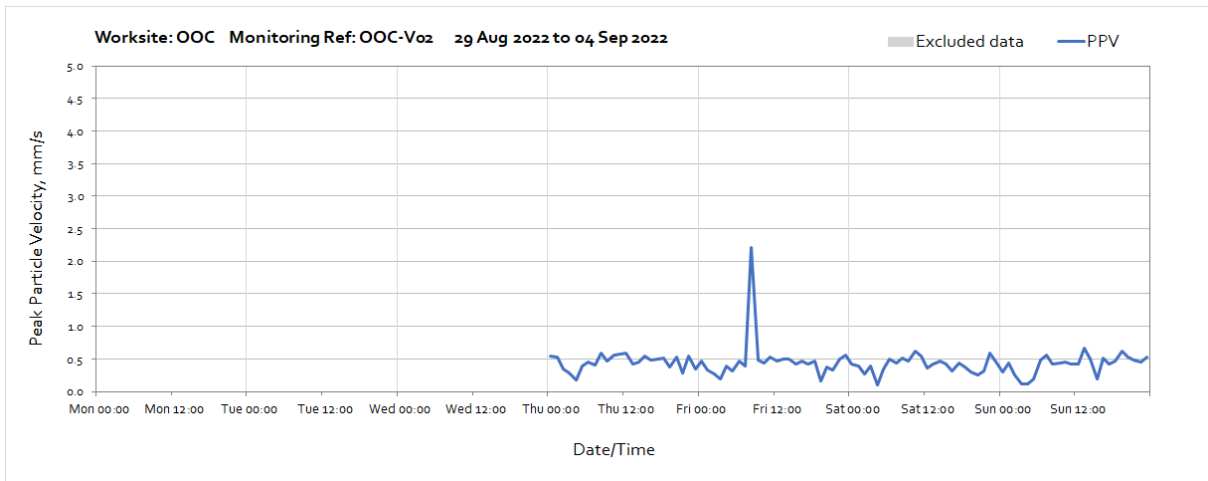
Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: V052

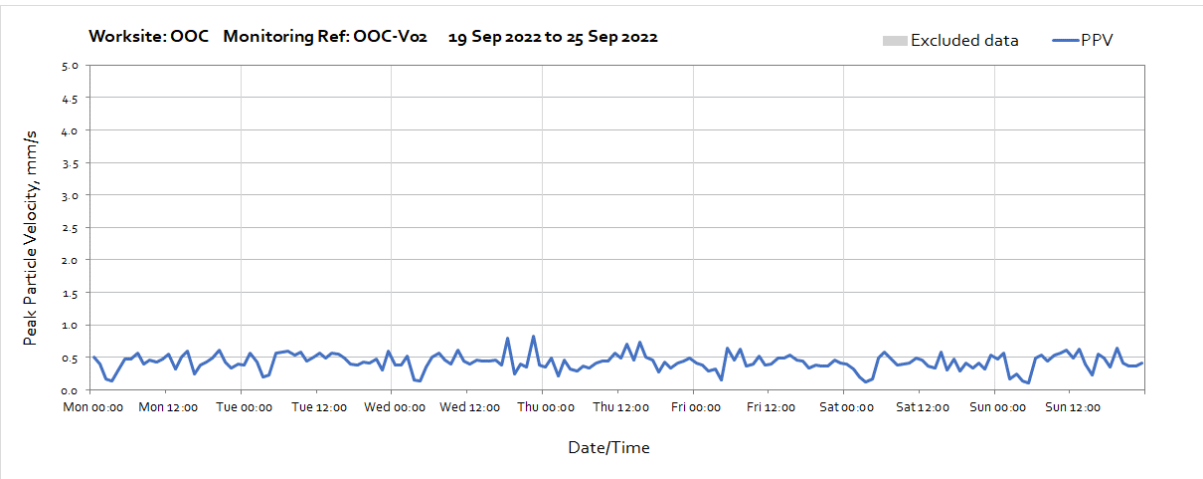
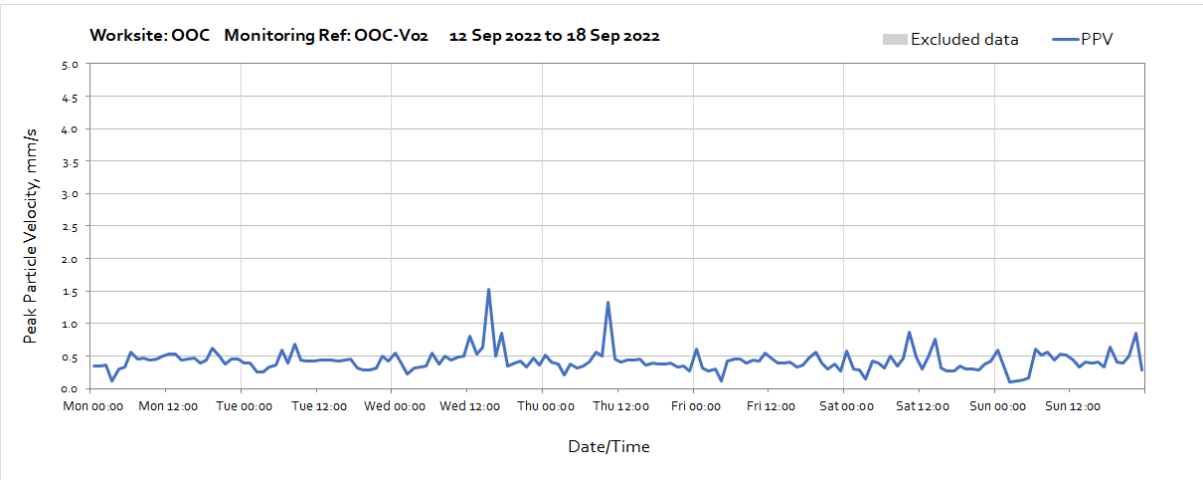
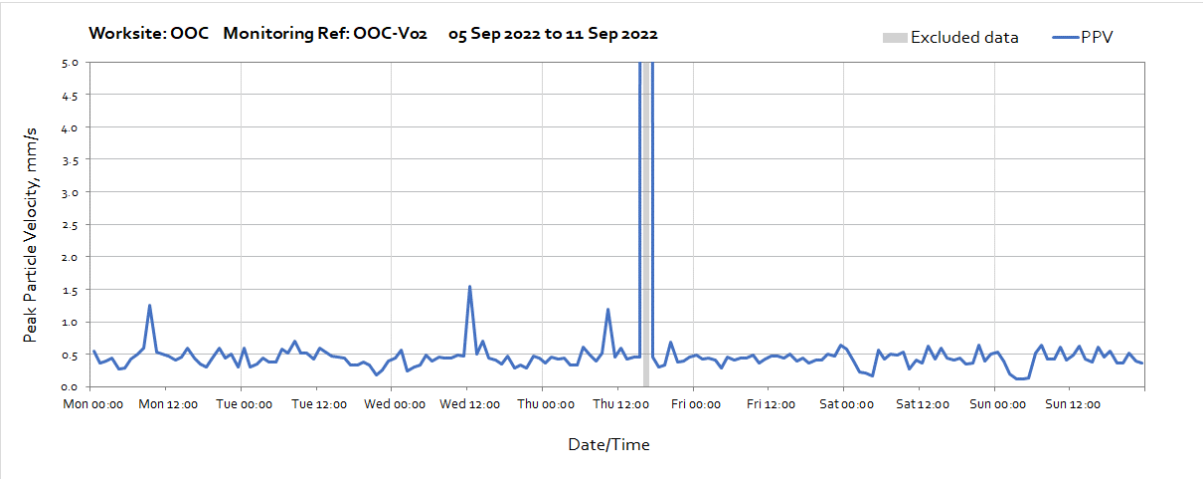


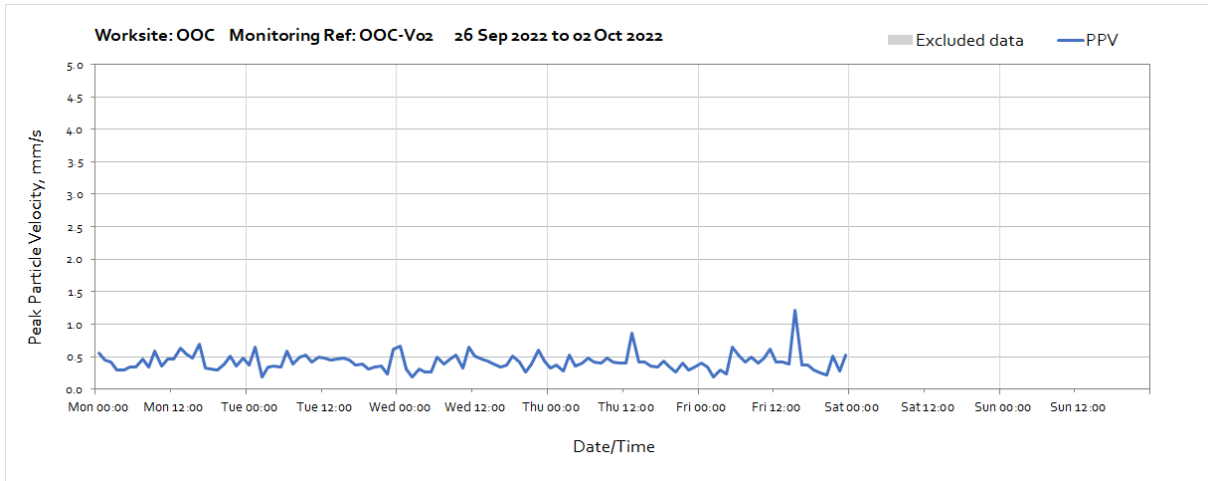
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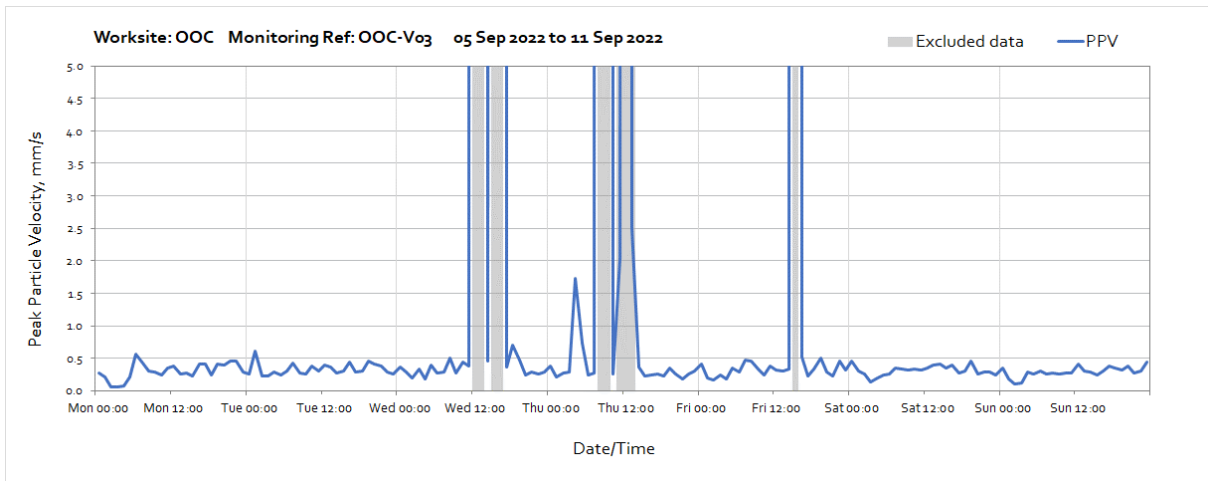
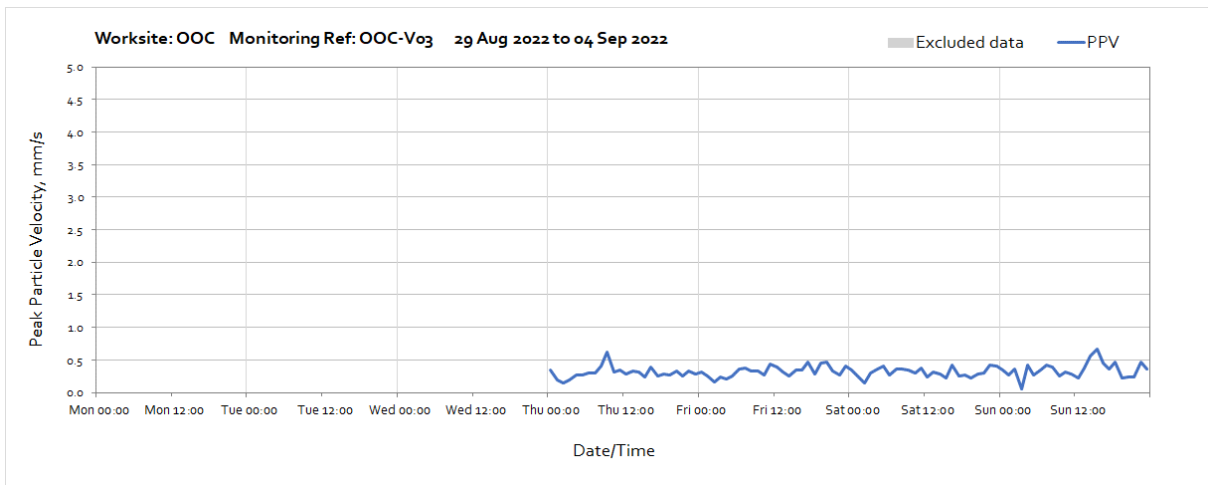
Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V02

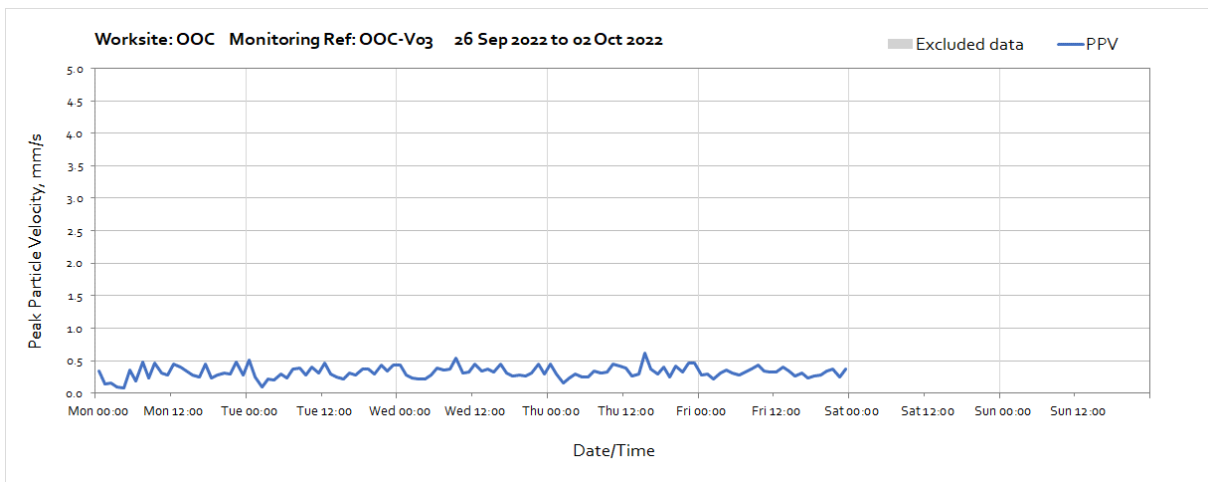
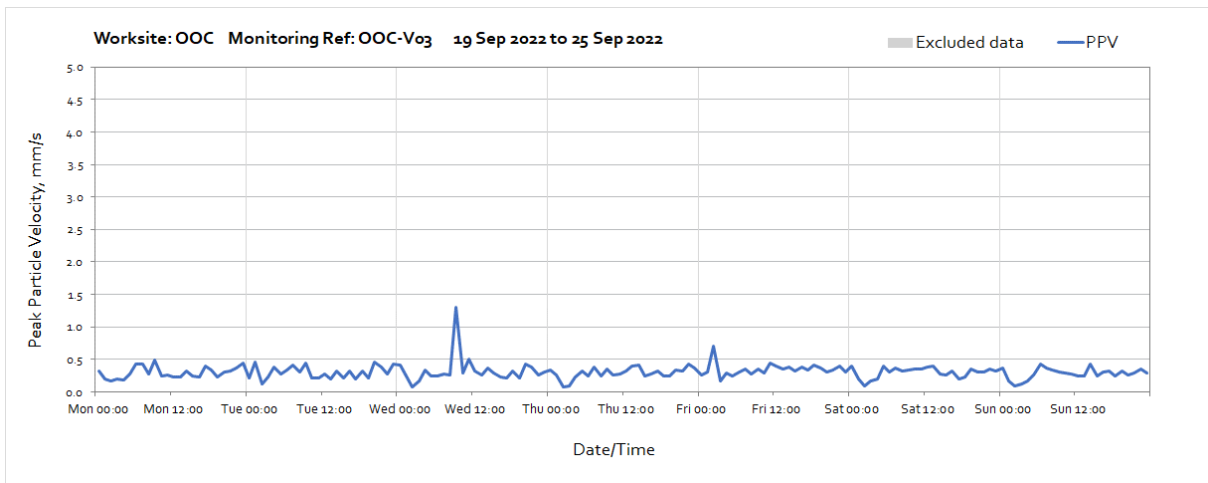
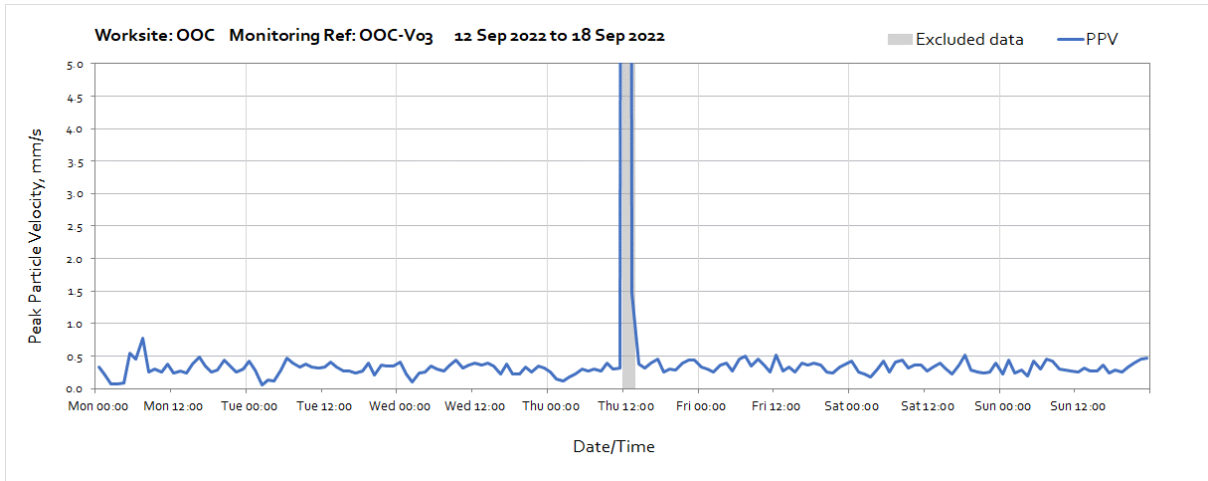




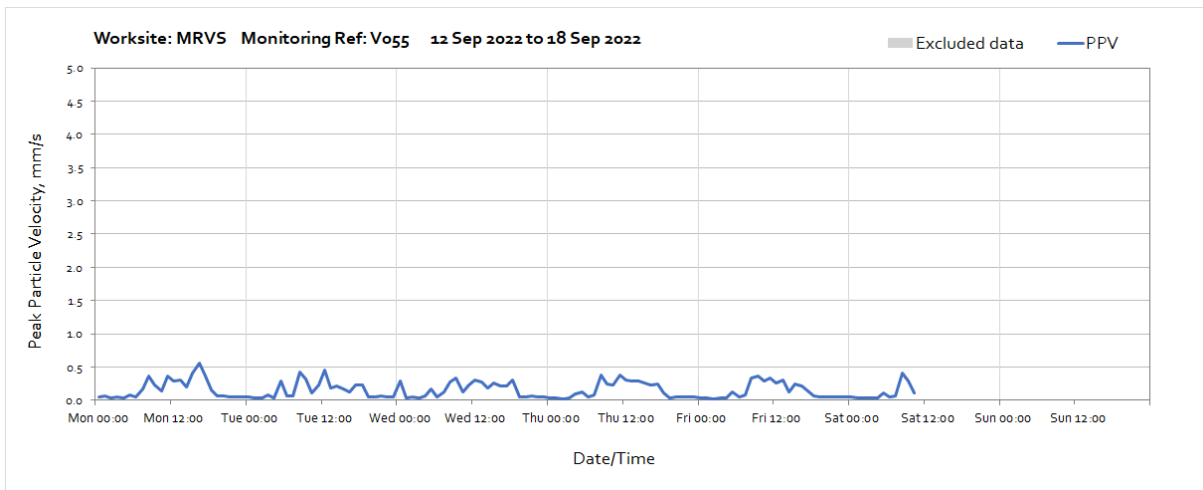
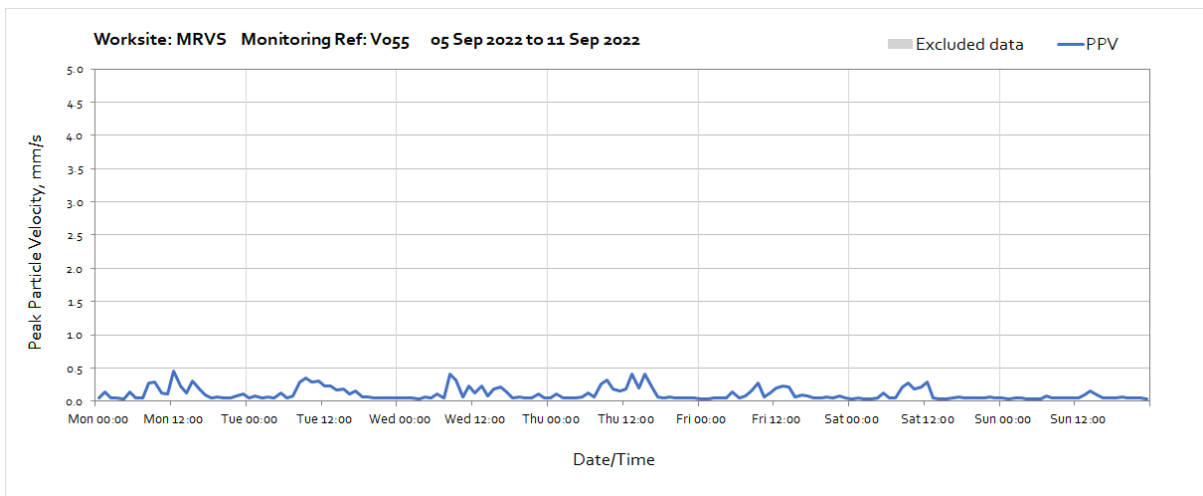
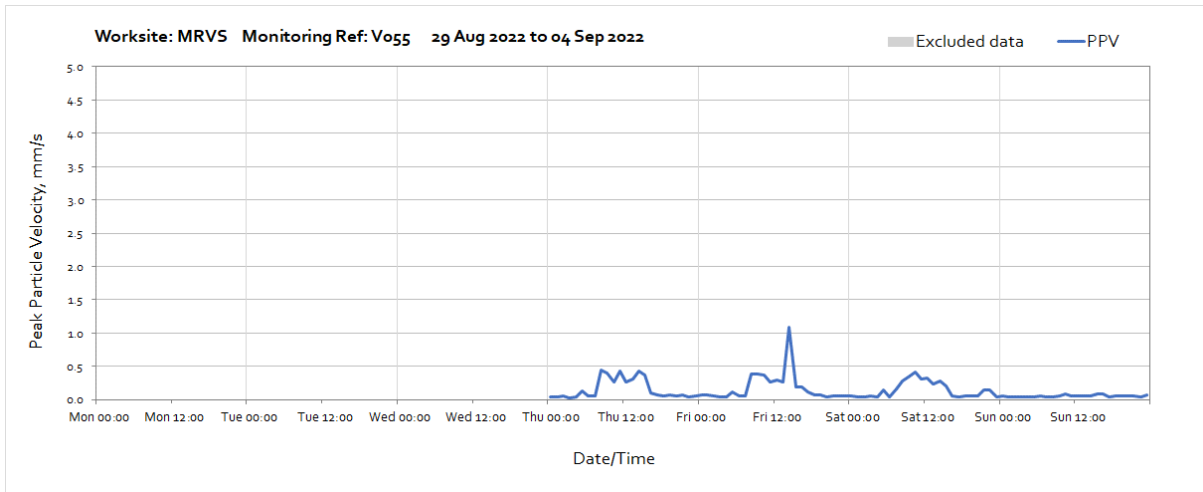


Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V03





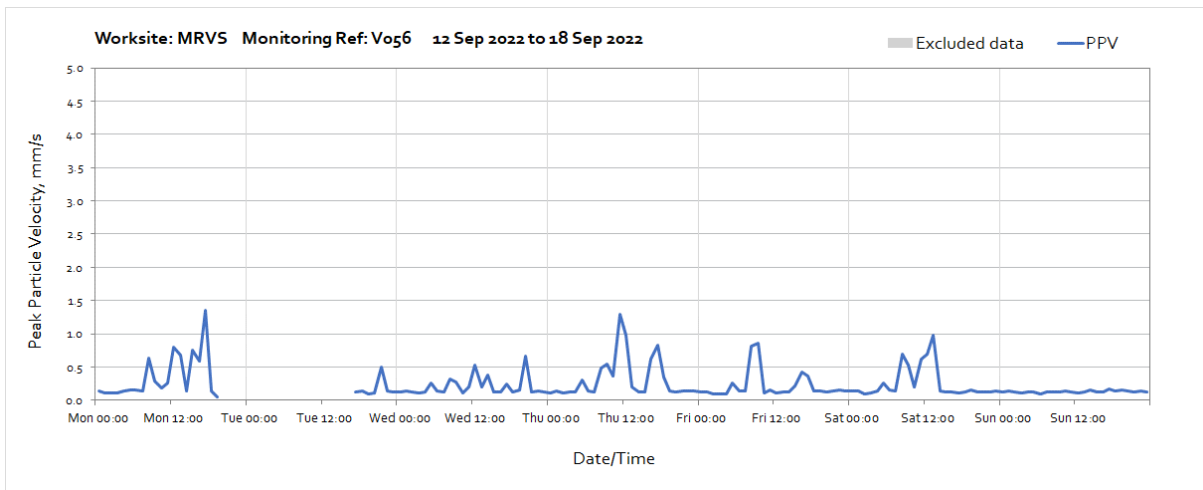
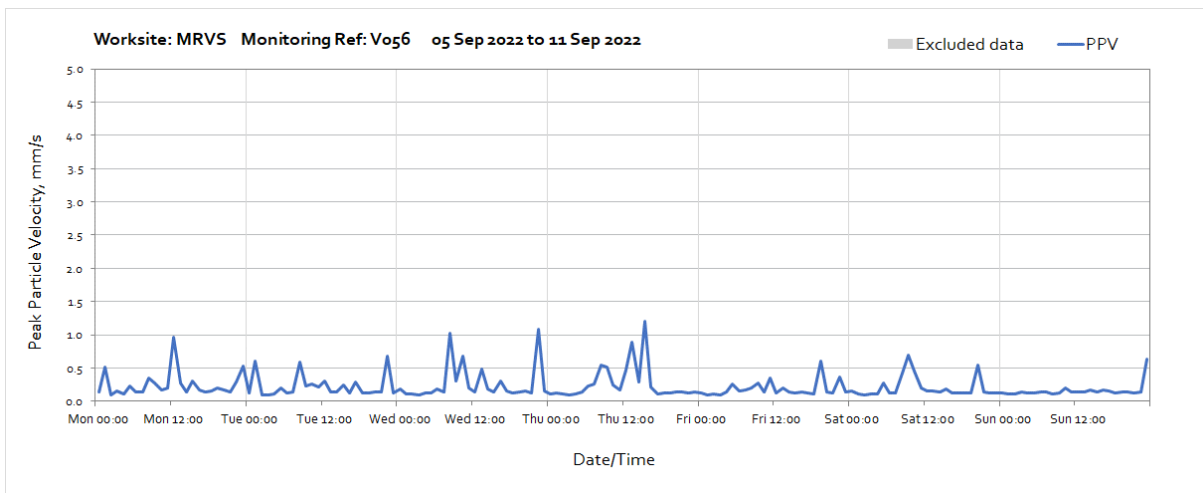
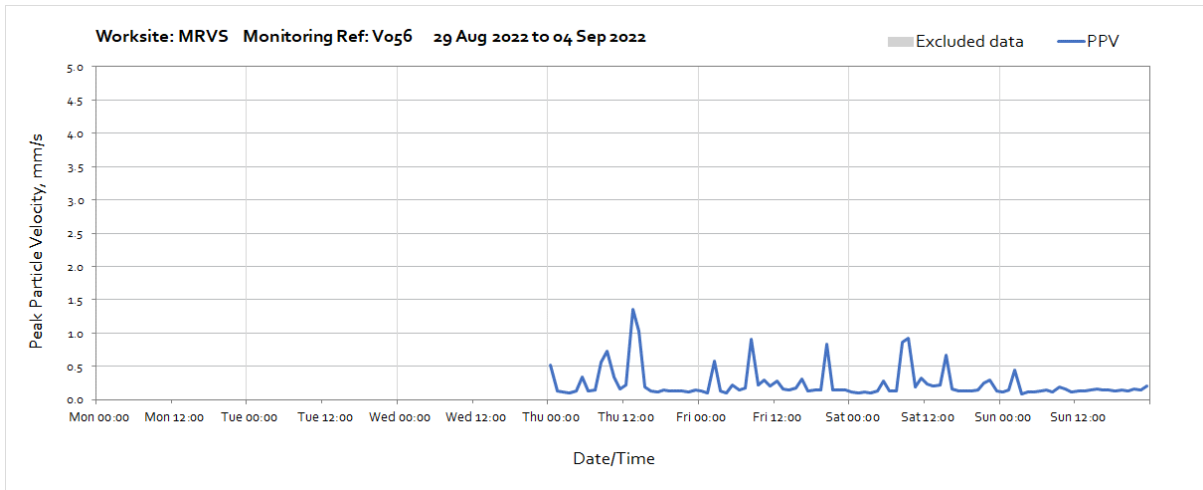
Worksite: Mandeville Road Vent Shaft (MRVS) – Monitoring Ref: V055



Note: Missing data from 11:00 on Saturday 17th September until the end of the month was due to loss of battery power at the monitoring station.

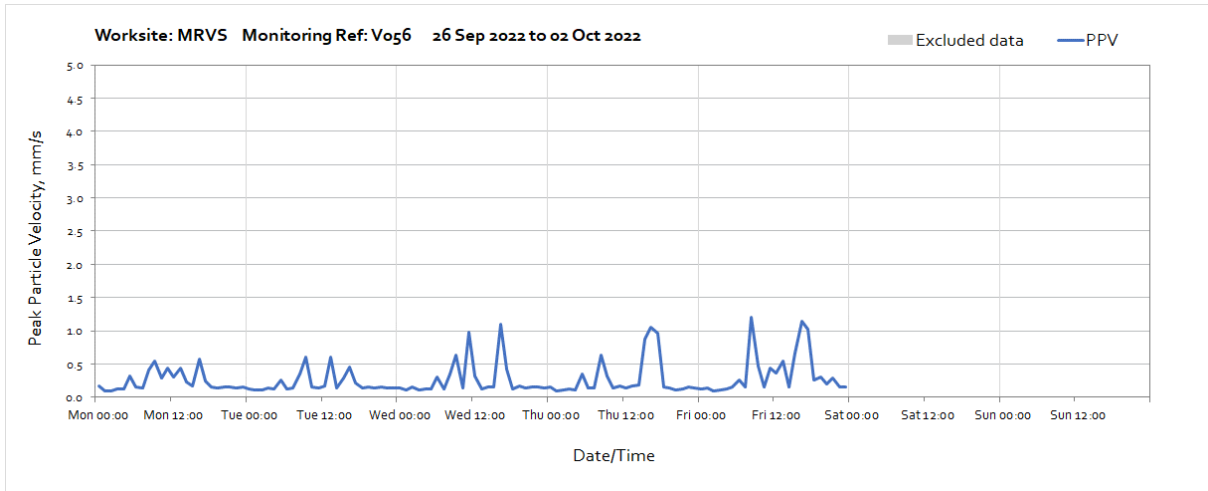
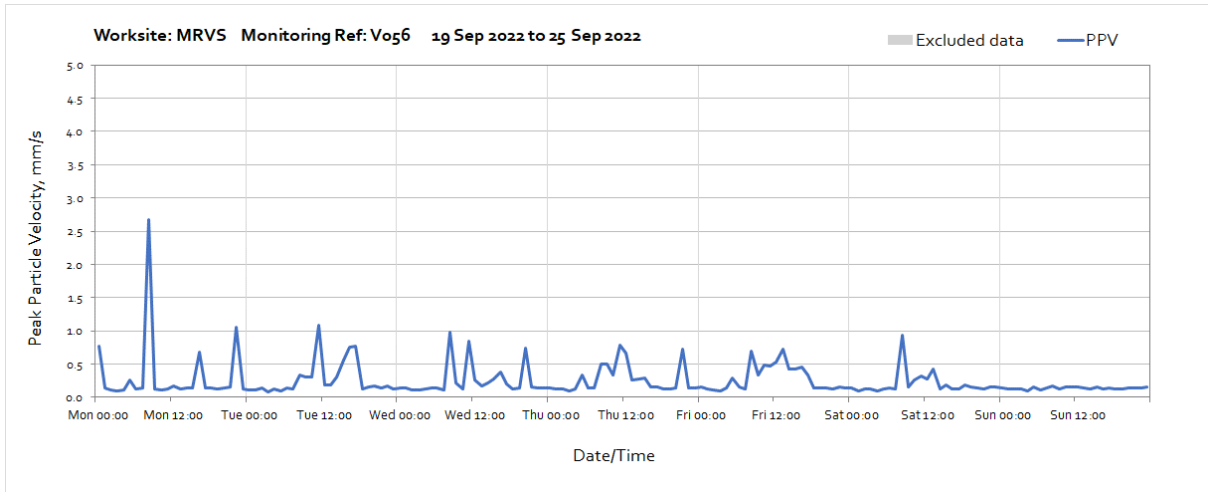
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Worksite: Mandeville Road Vent Shaft (MRVS) – Monitoring Ref: V056

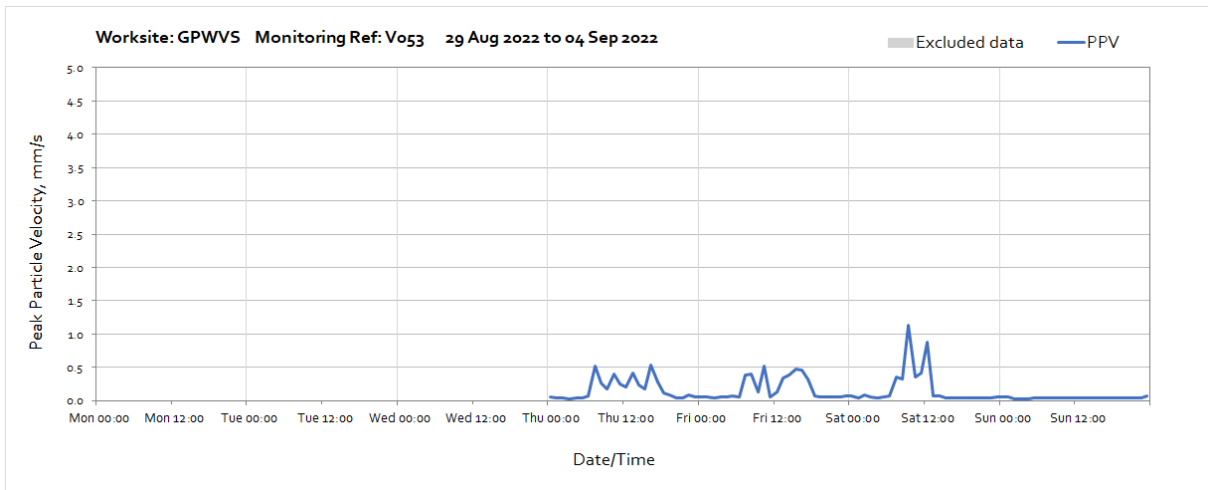


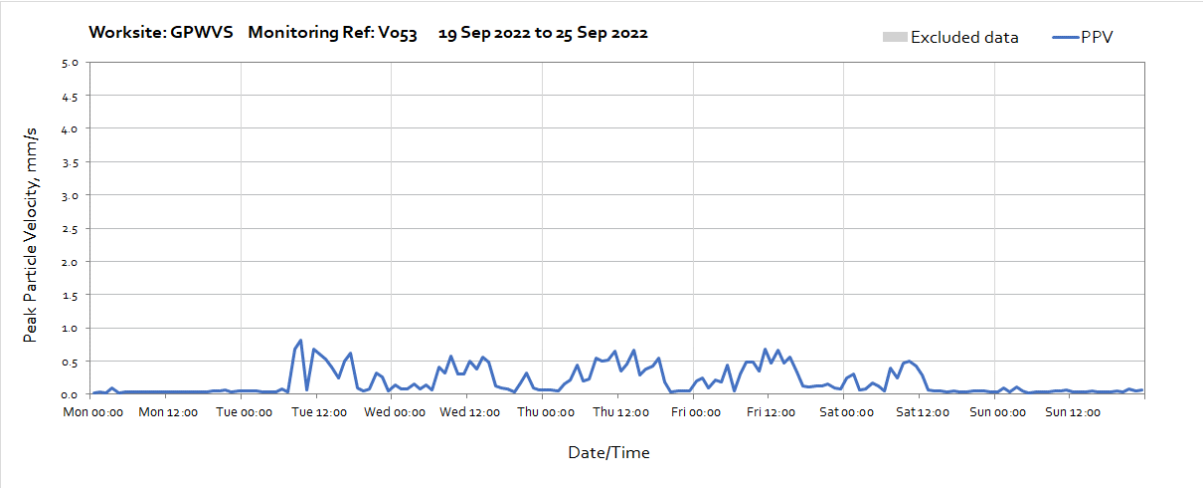
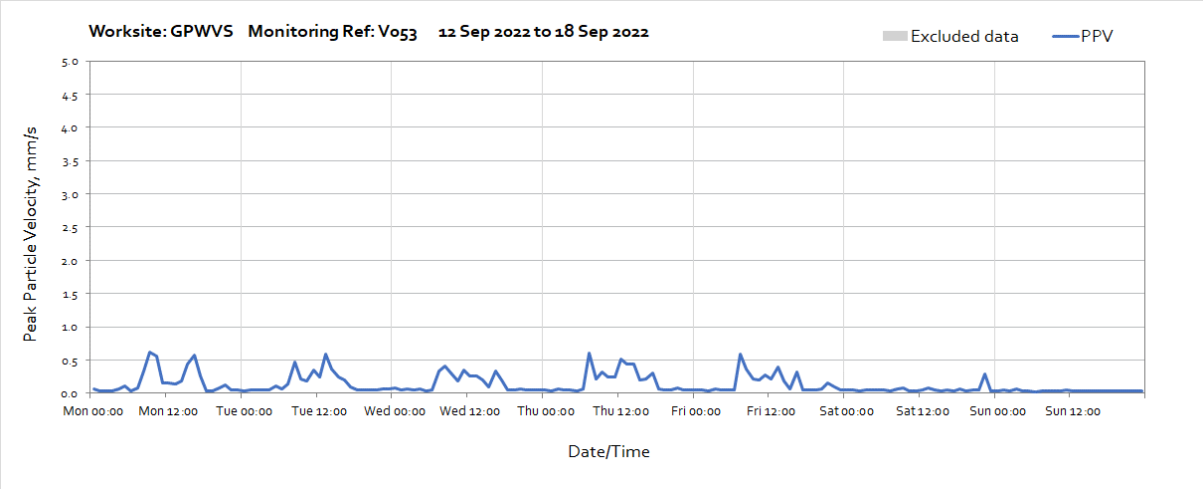
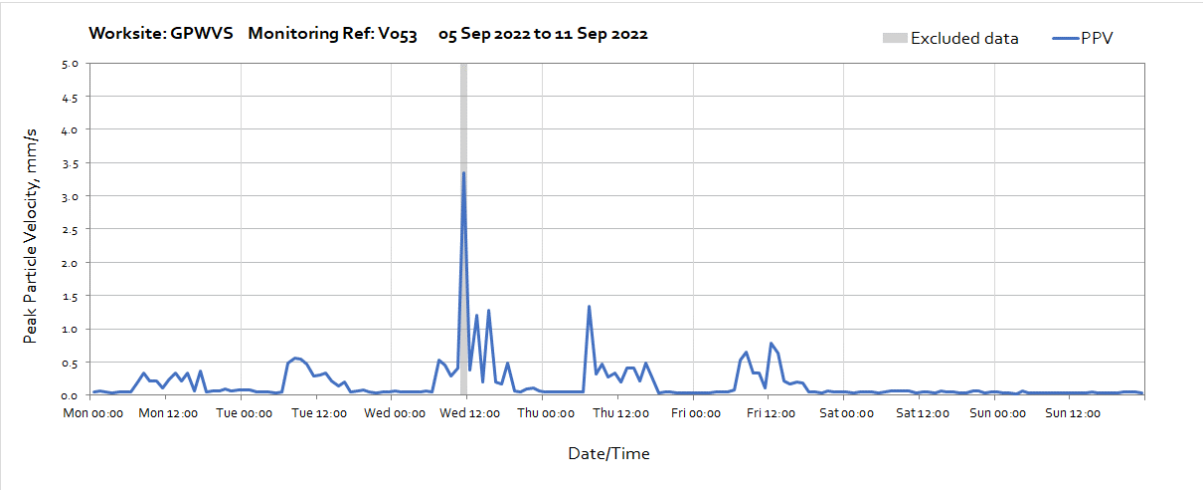
Note: Missing data between 22:00 on Monday 12th September and 16:00 on Tuesday 13th September was due to loss of power at the monitoring station.

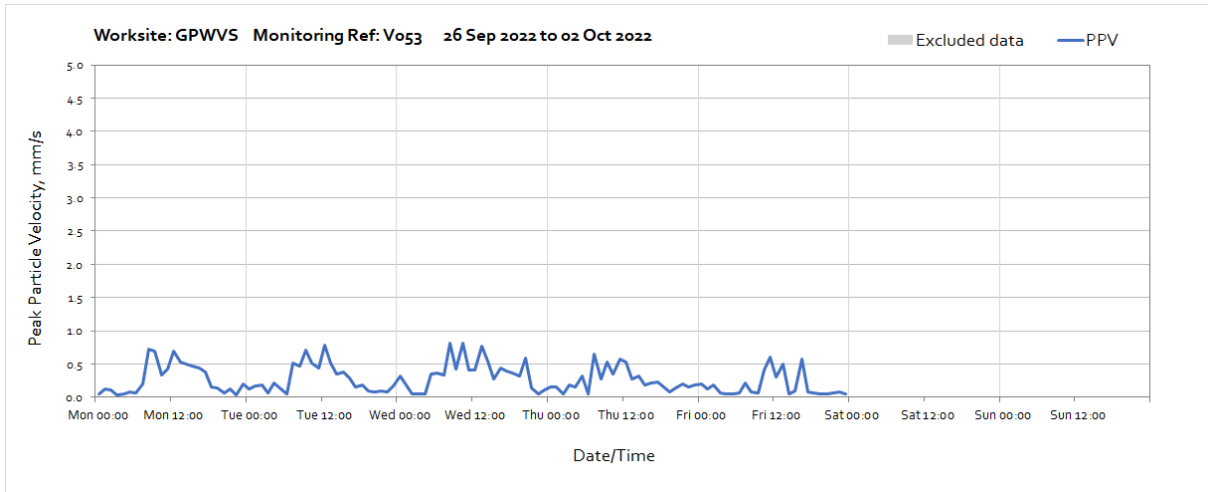
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Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: V053







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

