

## **Construction Noise and Vibration Monthly Report – May 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 May 2023.

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken in proximity of the Mandeville Road Ventilation Shaft worksite (ref.: MRVS), where installation of dewatering wells, excavation, installation of pre-cast concrete lining rings, drainage, sprayed concrete lining and cabling works were underway.
- Noise and vibration monitoring were undertaken in proximity of the Green Park Way Ventilation Shaft worksite (ref.: GPWVS), where general site operations, road sweeping, vegetation clearance, walkway adjustment, removal of concrete slabs, pipe bridge and legs, shaft construction including excavation and water-proofing, maintenance of plant and equipment were underway.
- Noise monitoring was undertaken in proximity of the Westgate Ventilation Shaft (ref.: WVS), where shaft and adit construction including water-proofing, steel fixing, shuttering, concreting, construction of cast-in-situ secondary lining, plant and equipment maintenance were underway.
- Noise monitoring was undertaken in the vicinity of the Atlas Road worksite (ref.: AR) where tunnelling, back grouting, material delivery, installation of site lighting, cabling works and electrical testing, electrical workshop construction, fencing and barrier installation, site maintenance and repairs, dewatering pump relocation, staircase installation, concrete construction, ventilation installation, excavation and extension of conveyor belt system was underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Willesden EuroTerminal worksite (ref.: WET), where refurbishment works, installation of lighting and cabling, maintenance, Welcome Centre installation and train loading works were underway.
- Noise monitoring was undertaken in the vicinity of the Victoria Road Crossover Box worksite (worksite ref.: VRCB), where excavation, diaphragm wall including hydro-demolition, steel fixing, shuttering, duct works, concrete breaking out and wire sawing, installation of tower crane, staircase, scaffolding, fencing and barriers, construction of base slab, installation of offices and welfare cabin modules and assembly of tunnel boring machines were underway. At the Victoria Road Ancillary Shaft tunnel construction works were underway.
- Noise monitoring was undertaken in the vicinity of the Flat Iron compound (worksite ref.: FIC), where assembly of tunnel boring machines were underway.

- Noise and vibration monitoring were undertaken in proximity of the Old Oak Common depot worksite (ref.: OOC), where concrete works, drainage and kerb installation, diaphragm wall breakdown, steel fixing, excavation, reinforced concrete works, backfill, concrete cutting, black jacking, formwork construction, plank installation, road sweeping, piling platform works, demobilisation, bridge removal, pile mat construction and piling were underway.
- Noise and vibration monitoring were undertaken in proximity of the Scheme 6 worksite (ref.: S6), where signalling and telecommunications works, civil works, overhead line equipment works, electrification and plant works were underway.

1.1.1 Further works, where monitoring did not take place, were undertaken at Atlas Road Sub-Station where excavation, ducting and de-vegetation 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 exceeded twenty-two (22) times during the reporting period.

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

Eight (8) 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 1<sup>st</sup> to 31<sup>st</sup> May 2023.

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

- Mandeville Road Ventilation Shaft worksite, reference MRVS (see plan 1 in Appendix A), where work activities included:
  - Installation of dewatering wells.
  - Excavation.
  - Installation of pre-cast concrete lining rings.
  - Drainage.
  - Sprayed concrete lining.
  - Cabling.
- Green Park Way Ventilation Shaft worksite, reference GPWVS (see plan 2 in Appendix A), where work activities included:
  - General site operations, including site maintenance, road sweeping, vegetation management, adjustment of walkways and fencing.

- Concrete slab removal.
- Removal of pipe-bridge and legs
- Installation of grouting wells.
- Vegetation clearance.
- Shaft construction, including sprayed concrete lining and excavation.
- Plant and equipment maintenance.
- Westgate Ventilation Shaft worksite, reference WVS (see plan 3 in Appendix A), where work activities included:
  - Shaft and Adit construction, including water-proofing.
  - Steel fixing and shuttering.
  - Concreting.
  - Construction of cast-in-situ secondary lining.
  - Plant and equipment maintenance.
- Atlas Road worksite, ref. AR (see plan 4 in Appendix A), where work activities included:
  - Tunnelling.
  - Back grouting.
  - Material delivery.
  - Installation of site lighting.
  - Cabling and electrical testing.
  - Electrical workshop construction.
  - Installation of staircase, fencing, barriers and ventilation.
  - Repairs and site maintenance.
  - Dewatering pump relocation.
  - Concrete construction works.
  - Extension of conveyer belt system.
- Willesden EuroTerminal worksite, ref. WET (see plan 4 in Appendix A), where work activities included:
  - Refurbishment works.

- Installation of lighting and cabling.
- Maintenance.
- Cabling works, including installation of lighting.
- Welcome centre installation.
- 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.
  - Site maintenance.
  - Diaphragm wall works, including repairing and hydro-demolition works, steel fixing, shuttering, duck works, breaking out works, wire sawing, and construction of coring holes.
  - Installation of tower crane, staircase, scaffolding, fencing and barriers.
  - Assembly of tunnel boring machines.
  - Construction of base slab.
  - Excavation.
  - Installation of offices and welfare cabin modules.
  - Victoria Road Ancillary Shaft where tunnel construction works were underway.
- Flat Iron compound, worksite ref. FIC (see plan 4 in Appendix A), where assembly of tunnel boring machine was underway.
- 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:
  - Concrete works, including concrete pours, black jacking, concrete cutting and reinforced concrete works.
  - Drainage and kerb installation.
  - Diaphragm wall breakdown.
  - Steel fixing.
  - Excavation.
  - Backfilling.

- Formwork construction.
- Plank installation.
- Road sweeping.
- Piling platform works.
- Demobilisation.
- Bridge removal.
- Pile mat construction.
- Piling.
- 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:
  - Signalling and Telecommunication works.
  - Civil works.
  - Overhead line equipment works.
  - Electrification and plant works.

1.1.4 Further works, where monitoring did not take place, were undertaken at Atlas Road Sub-Station where excavation, ducting, and de-vegetation 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-two (22) noise and eight (8) vibration monitoring installations were active in May in the LBE area. Table 2 summarises the position of noise and vibration monitoring installations within the LBE area in May 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
MRVS	N040	Badminton Close
	N058	Mandeville Road
	N063	Mandeville Road
	BLV-N001	45 Belvue 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
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	Old Oak Common Lane, Hilltop Works
	OOC-V03	Old Oak Common Lane, Hilltop Works
S6	WT-N01	Old Oak Common Lane & Wells house Rd

## 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
MRVS	N040	Badminton Close	Free-field	51.6 (53.9)	54.3 (60.4)	52.7 (55.4)	52.4 (54.5)	49.8 (55.9)	51.5 (52.2)	52.4 (52.5)	51.6 (52.6)	52.7 (59.4)	49.4 (53.2)	52.3 (55.6)	50.2 (54.0)
	N058	Mandeville Road	Free-field	59.4 (64.1)	63.1 (66.1)	60.7 (68.8)	60.6 (73.9)	58.5 (72.0)	56.5 (58.5)	62.4 (65.1)	62.4 (63.3)	60.1 (64.3)	56.2 (61.7)	59.6 (65.4)	60.3 (66.6)
	N063	Mandeville Road	Free-field	60.1 (67.9)	66.5 (71.3)	59.2 (65.1)	56.8 (58.9)	54.6 (59.6)	57.4 (60.6)	67.2 (74.0)	60.8 (69.6)	57.0 (64.3)	53.6 (58.3)	56.4 (60.2)	54.3 (58.9)
	BLV-N001	45 Belvue Road	Free-field	57.9 (62.5)	59.4 (61.9)	57.3 (59.7)	57.0 (60.5)	54.8 (59.8)	57.0 (58.1)	58.4 (59.1)	59.1 (60.7)	57.6 (61.1)	52.7 (56.0)	57.7 (66.8)	54.4 (57.9)
GPWVS	N059	Green Park Way Ventilation Shaf	Free-field	57.5 (63.9)	60.5 (67.1)	53.9 (61.7)	56.2 (65.4)	54.6 (66.4)	55.4 (62.5)	55.0 (58.3)	54.4 (58.7)	53.7 (62.6)	49.3 (58.7)	51.9 (62.4)	50.1 (53.6)
	N064	Green Park Way Ventilation Shaft	Façade	54.4 (60.1)	57.6 (73.2)	54.4 (58.5)	53.8 (60.1)	51.2 (57.8)	52.7 (54.1)	52.1 (54.3)	51.7 (52.3)	52.8 (56.0)	48.8 (53.5)	52.1 (54.8)	49.6 (53.8)
WVS	N062	Westgate Ventilation Shaft	Free-field	60.6 (69.3)	61.9 (68.0)	57.7 (63.0)	57.7 (61.8)	56.6 (66.2)	63.8 (66.9)	65.9 (67.1)	62.5 (67.7)	58.7 (66.4)	53.7 (59.5)	60.8 (75.4)	54.2 (59.4)
AR	N032	Shaftesbury Gardens	Free-field	63.7 (65.5)	64.4 (67.4)	63.6 (65.2)	62.2 (65.3)	59.8 (65.7)	61.8 (63.3)	62.3 (62.8)	63.5 (64.1)	62.8 (64.3)	58.5 (62.1)	61.6 (66.0)	58.3 (62.4)



Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )					Saturday Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )					Sunday / Public Holiday Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
	N033	Outside The Collective, Atlas Road/Victoria Road	Free-field	66.6 (68.3)	66.9 (69.1)	65.0 (68.5)	64.4 (74.2)	62.4 (82.5)	63.2 (64.6)	63.4 (64.5)	64.3 (65.8)	64.2 (68.4)	61.4 (71.2)	63.6 (68.2)	61.3 (72.5)
	N060	Atlas Road next to Bashey Road	Free-field	59.1 (69.0)	66.3 (70.7)	58.3 (67.5)	62.5 (72.9)	61.0 (73.1)	61.5 (64.6)	62.8 (68.9)	61.5 (66.9)	59.6 (67.9)	49.6 (57.5)	51.1 (63.8)	53.6 (62.2)
WET	N034	Stephenson Street (north)	Free-field	54.7 (62.9)	56.8 (60.1)	57.0 (63.4)	55.9 (63.1)	51.9 (59.6)	51.7 (54.5)	54.0 (55.1)	53.8 (55.6)	54.0 (59.8)	46.2 (53.0)	52.4 (58.2)	48.2 (55.8)
	N035	Stephenson Street (south)	Free-field	54.5 (61.9)	58.0 (63.9)	54.2 (58.7)	52.5 (56.8)	49.8 (60.5)	52.6 (57.6)	60.5 (67.9)	53.5 (54.3)	51.7 (56.6)	46.4 (52.8)	51.3 (59.4)	47.6 (54.2)
	N041	Junction of Stephenson Street/Goodhall Street	Free-field	55.6 (63.5)	56.5 (58.5)	56.7 (69.4)	55.8 (65.6)	51.6 (57.6)	52.1 (52.6)	56.6 (64.3)	58.7 (63.9)	56.1 (68.0)	49.3 (55.0)	54.1 (59.2)	49.8 (55.5)
VRCB	N031	School Road, outside Acton Business Centre	Free-field	61.9 (65.1)	63.9 (67.6)	62.1 (68.4)	59.7 (64.1)	56.3 (61.7)	60.7 (64.3)	62.9 (64.9)	62.0 (63.9)	59.6 (62.9)	53.6 (58.1)	58.3 (71.0)	55.5 (60.5)
	N050	Acton Square, outside North Acton Station	Free-field	63.8 (67.2)	65.2 (67.3)	62.9 (65.7)	62.6 (68.0)	59.4 (67.3)	63.6 (68.4)	64.4 (67.2)	66.7 (71.3)	63.4 (71.7)	58.1 (61.9)	61.9 (68.0)	59.5 (66.5)
FIC	N029	Braitrim House, Victoria Road	Free-field	59.8 (72.0)	62.6 (65.8)	56.6 (62.6)	59.7 (68.5)	59.9 (71.0)	61.5 (63.2)	64.1 (72.7)	60.0 (61.3)	54.9 (64.0)	47.9 (54.4)	50.0 (62.5)	49.9 (57.7)
	N042	Bodens car park	Free-field	63.4 (67.2)	65.1 (69.4)	59.0 (61.8)	57.8 (64.3)	56.1 (59.8)	60.7 (61.8)	63.9 (64.8)	62.7 (68.6)	57.8 (64.2)	54.3 (58.6)	55.8 (59.2)	54.5 (60.3)

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Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
	N049	Flat Iron compound	Free-field	60.1 (66.4)	74.5 (77.9)	59.8 (66.0)	64.1 (71.1)	61.9 (69.6)	61.3 (61.9)	66.9 (67.9)	61.7 (67.7)	57.4 (67.0)	48.2 (54.8)	51.2 (66.2)	55.0 (64.4)
OOC	OOC-N01	Old Oak Common Lane	Free-field	65.5 (68.3)	68.4 (72.0)	66.4 (68.3)	65.2 (73.1)	60.8 (66.3)	62.6 (63.8)	65.9 (67.6)	62.5 (67.6)	63.2 (68.9)	59.9 (70.3)	62.1 (72.2)	59.5 (65.5)
	OOC-N02	Old Oak Common Lane, Hilltop Works	Free-field	66.9 (68.8)	69.9 (71.8)	67.6 (72.6)	65.8 (73.2)	61.6 (71.3)	63.4 (64.6)	65.6 (66.7)	65.0 (66.5)	65.0 (67.5)	60.7 (70.0)	63.8 (71.8)	59.3 (64.6)
	OOC-N03	Old Oak Lane Halt, Wells House Road	Free-field	64.6 (68.0)	67.0 (71.2)	65.6 (68.5)	64.8 (72.2)	60.9 (70.3)	67.3 (67.8)	70.2 (70.8)	68.0 (70.2)	68.8 (73.1)	60.4 (66.3)	68.2 (72.3)	60.7 (65.9)
S6	WT-N01	Old Oak Lane Halt, Wells House Road	Free-field	54.7 (58.5)	60.9 (63.7)	58.1 (63.2)	56.6 (61.5)	53.2 (59.9)	52.4 (52.8)	57.6 (61.3)	57.5 (60.7)	56.3 (61.2)	51.8 (59.9)	55.0 (58.1)	52.5 (59.1)

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
GPWVS	V053	Green Park Way, Greenford	1.86 (Y-axis)
	V054	Green Park Way Ventilation Shaft	1.69 (Z-axis)
MRVS	V055	Mandeville Road	1.14 (Y-axis)
	V056	Mandeville Road	2.29 (Y-axis)
WET	V052	63, Stephenson Street	2.96 (Y-axis)
	V057	37, Stephenson Street	2.13 (Z-axis)
OOC	OOC-V02	Kildun Court, Old Oak Common Lane	1.66 (X-axis)
	OOC-V03	Wells House Road Alleyway	2.62 (X-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
MRVS	N040	Badminton Close	All days	All periods	No exceedance
	N058	Mandeville Road	Weekday Nights	1900-2200 2200-0700	2 23
	N063	Mandeville Road	Saturday	0800-13:00	1
	BLV-N001	45 Belvue Road	Sunday Nights	0700-2200 2200-0700	2 6
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*
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*

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
	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
S6	WT-N01	Old Oak Lane Halt, Wells House Road	Nights	2200-0700	26

\* 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
MRVS	N058	Mandeville Road	10
	N063	Mandeville Road	1
	BLV-N001	45 Belvue Road	3
S6	WT-N01	Old Oak Lane Halt, Wells House Road	8

2.2.6 Twenty-two (22) 24-hour periods that experienced an exceedance of the SOAEL were recorded due to HS2 construction works during May 2023. Exceedances occurred at noise monitor N058 during nights and weekdays, noise monitor BLV-N001 during nights and Sundays, monitor N063 during Saturdays and 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.

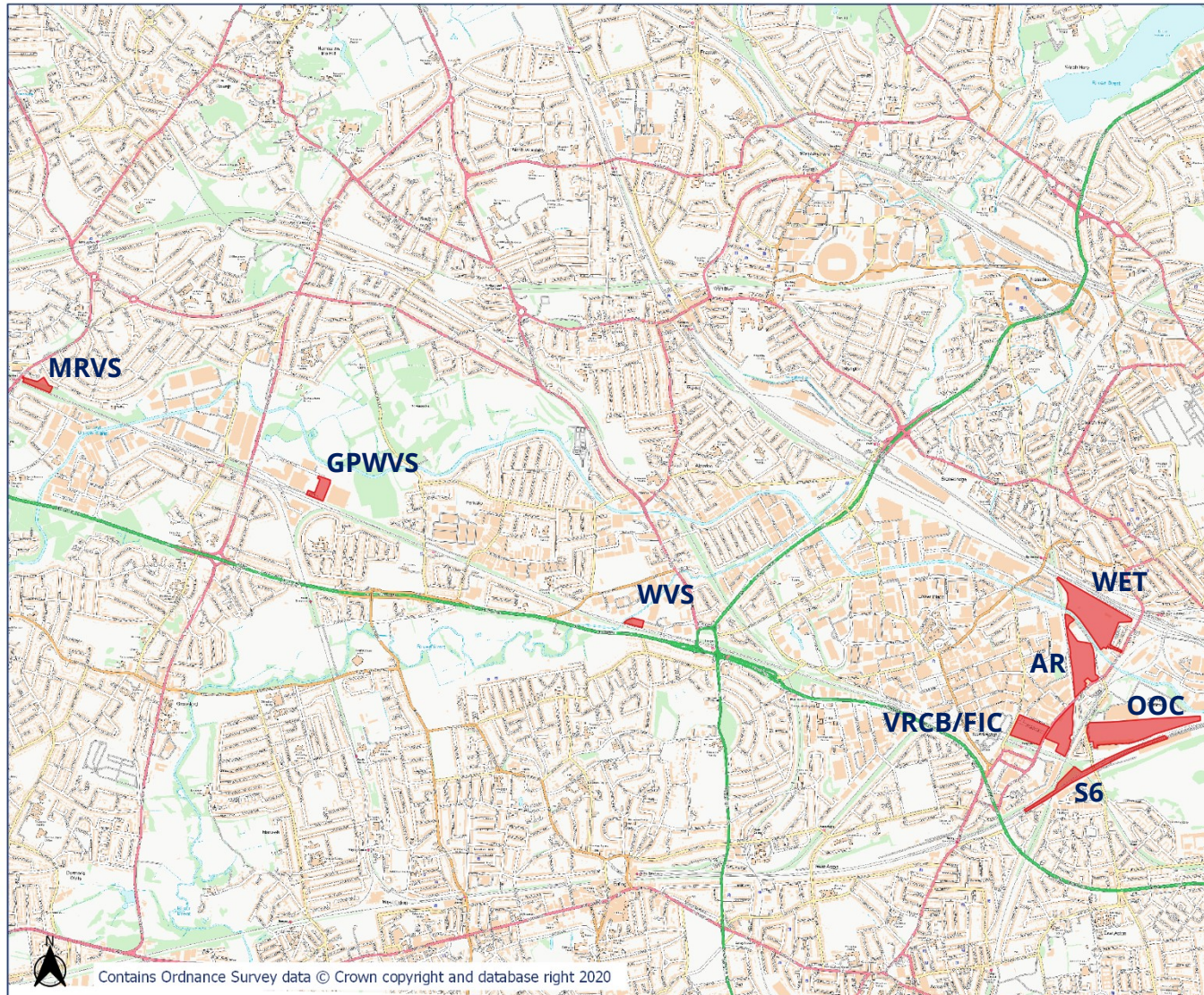
Table 8: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-23-93965-E-C	WET	Complaint due to noise and vibration from site.	Noise monitoring was reviewed and noise levels from construction works were within limits and all activities are undertaken in compliance with best practical means.	A response was provided to the resident explaining that activity is within limits and are required to continue until completion, however best practice methods for reducing noise output will continue.
HS2-23-44611-C HS2-23-44643-C	VRCB	Complaint regarding ongoing noise disturbance from site.	Noise monitoring was reviewed and noise levels from construction works were within limits and all activities are undertaken in compliance with best practical means.	A response was provided to the complainant detailing the results of the investigation.
HS2-23-44658-C	WET	Complaint due to noise disturbance from worksite.	Disturbance is predicted to be due to wagons movement. Noise levels were within permitted limits.	A response was provided to the complainant detailing the results of the investigation

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-23-44673-C	VRCB	Complaint about high pitched whining noise during night-time.	Noise monitoring was reviewed and noise levels from construction works were within limits and all activities are undertaken in compliance with best practical means.	A response was provided to the complainant detailing the results of the investigation.
HS2-23-95047-E-C	WET	Complaint regarding noise from site sounding like concrete dropped on metal and loud machinery.	Disturbance caused by road sweeping machine. Use of the road sweeper is only allowed outside of core hours for emergency cleaning to restore safe road conditions.	Review of road sweeper use was undertaken to ensure use as per consented hours. A response was provided to the complainant.
HS2-23-95263-E-C	OOB	Complaint about noise disturbance on early mornings.	The noise was associated with mobilisation works during shoulder hours, in advance of 8am. Noise levels during the period of work in question were within limits and all activities were undertaken in compliance with best practical means.	A response was provided to the complainant detailing the results of the investigation.
HS2-23-95280-E-C	AR	Complaint regarding beeping noise from site.	The noise was unlikely to be associated with equipment from the site as no HS2 works were ongoing at the time of complaint.	A response was provided to the complainant detailing the results of the investigation.

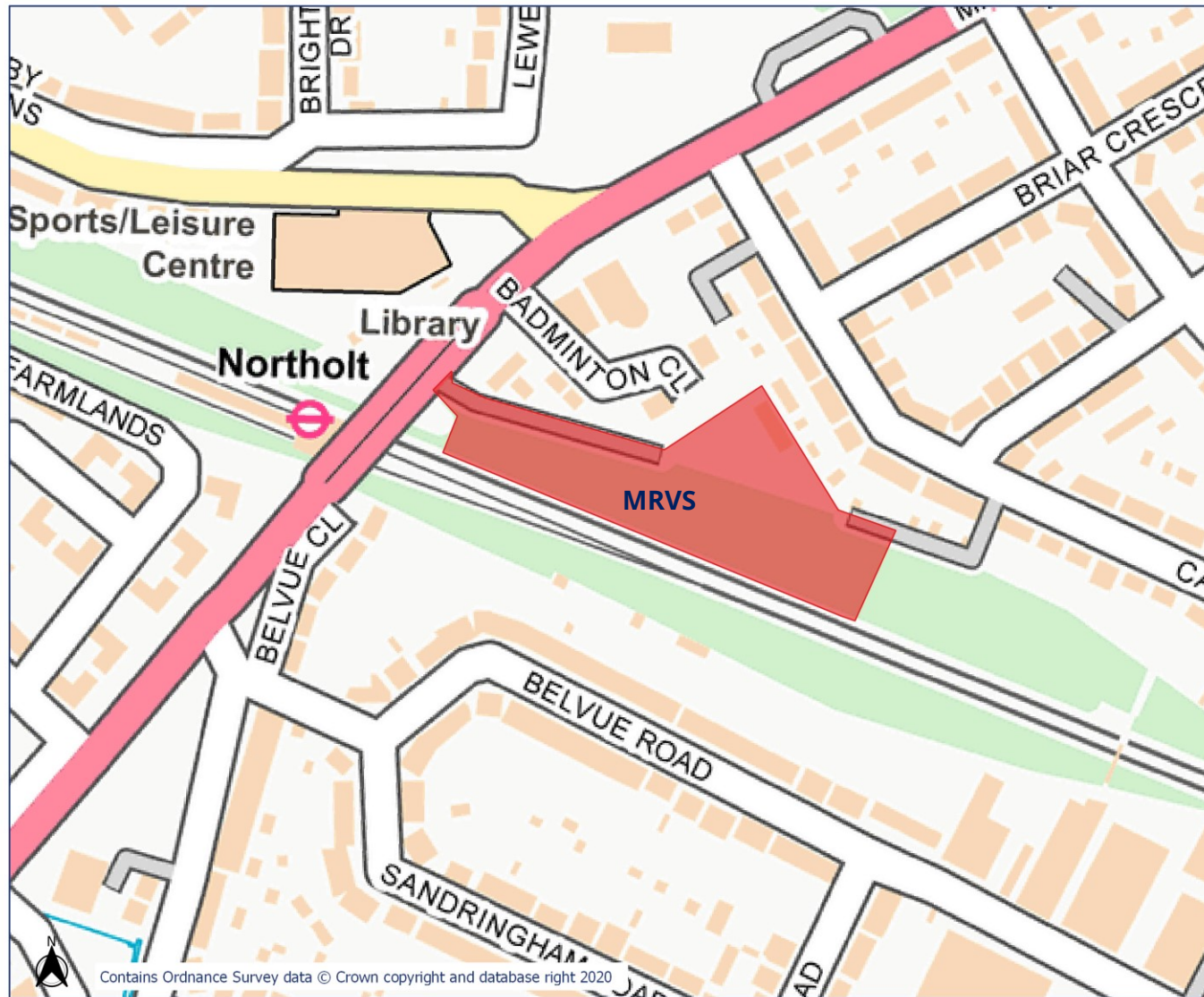
# Appendix A Site Locations

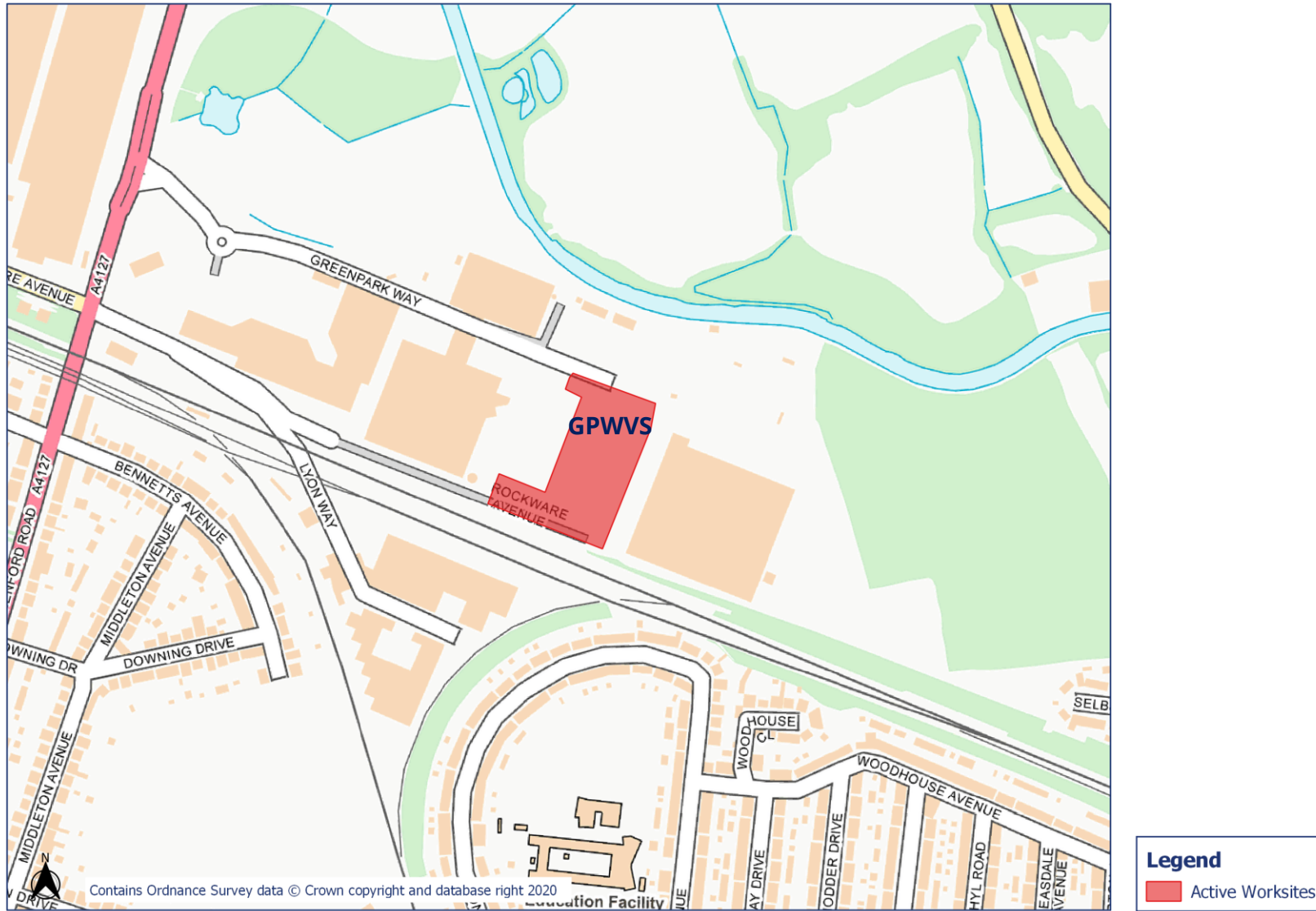


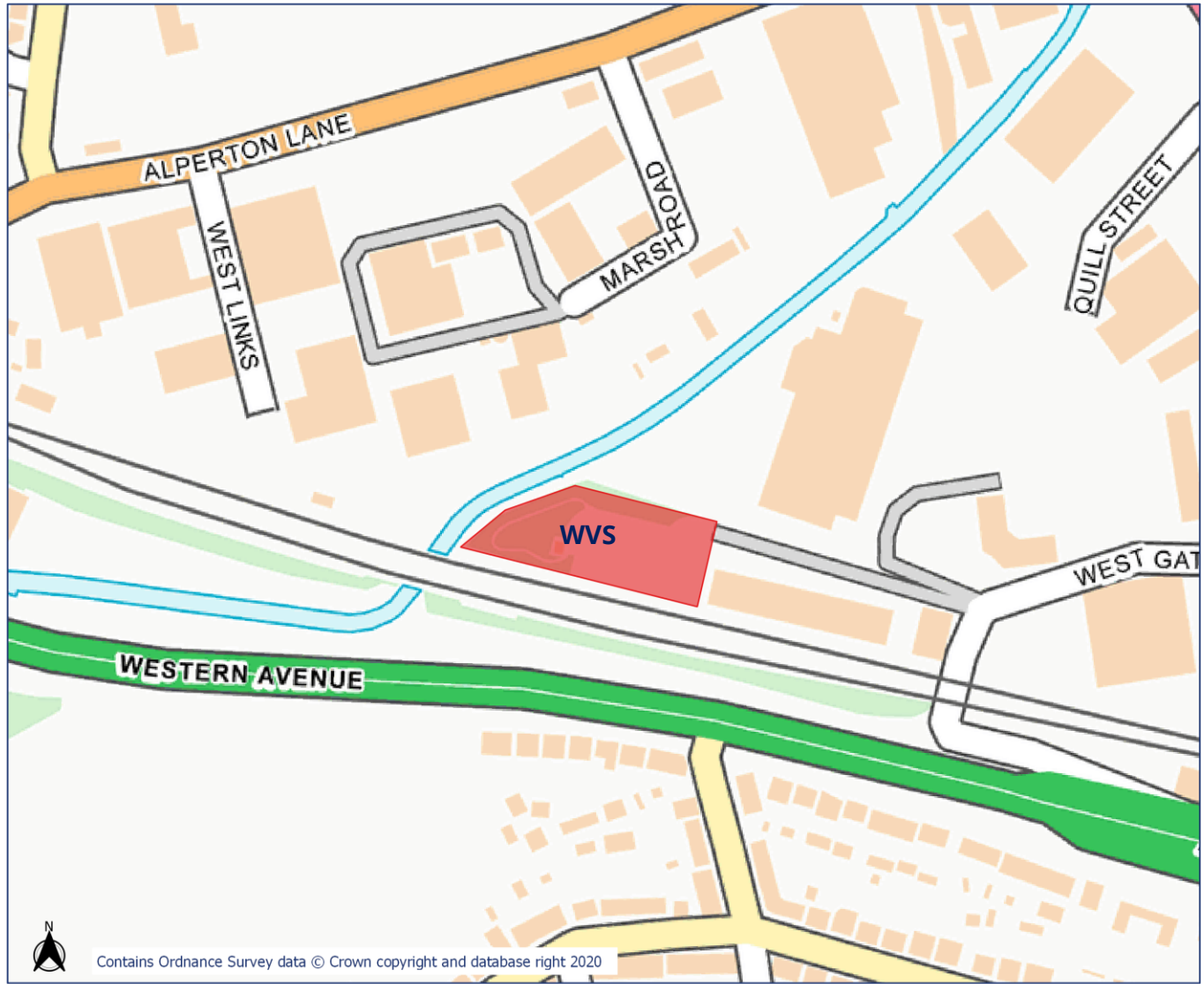


**Legend**  
Active Worksites

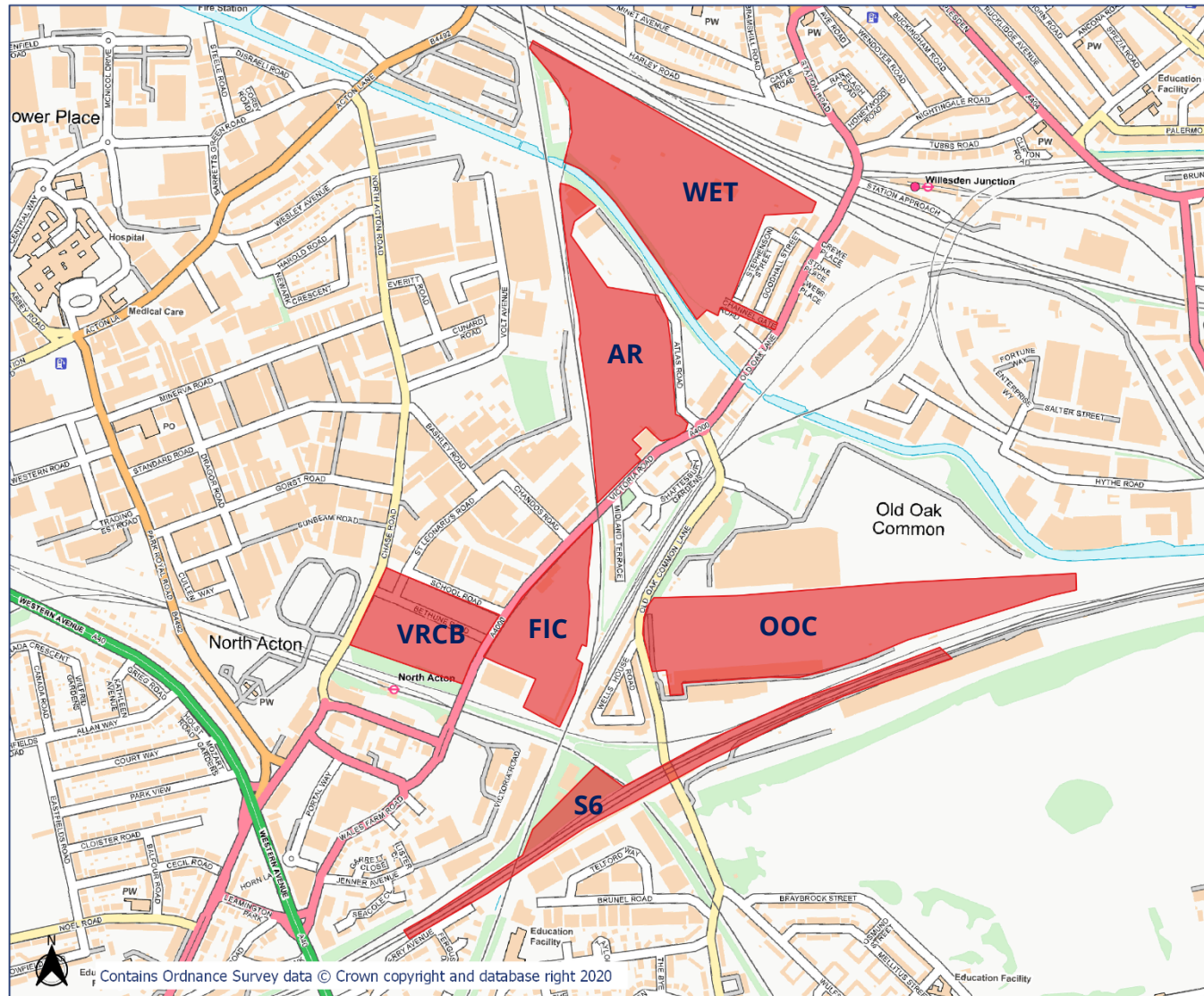




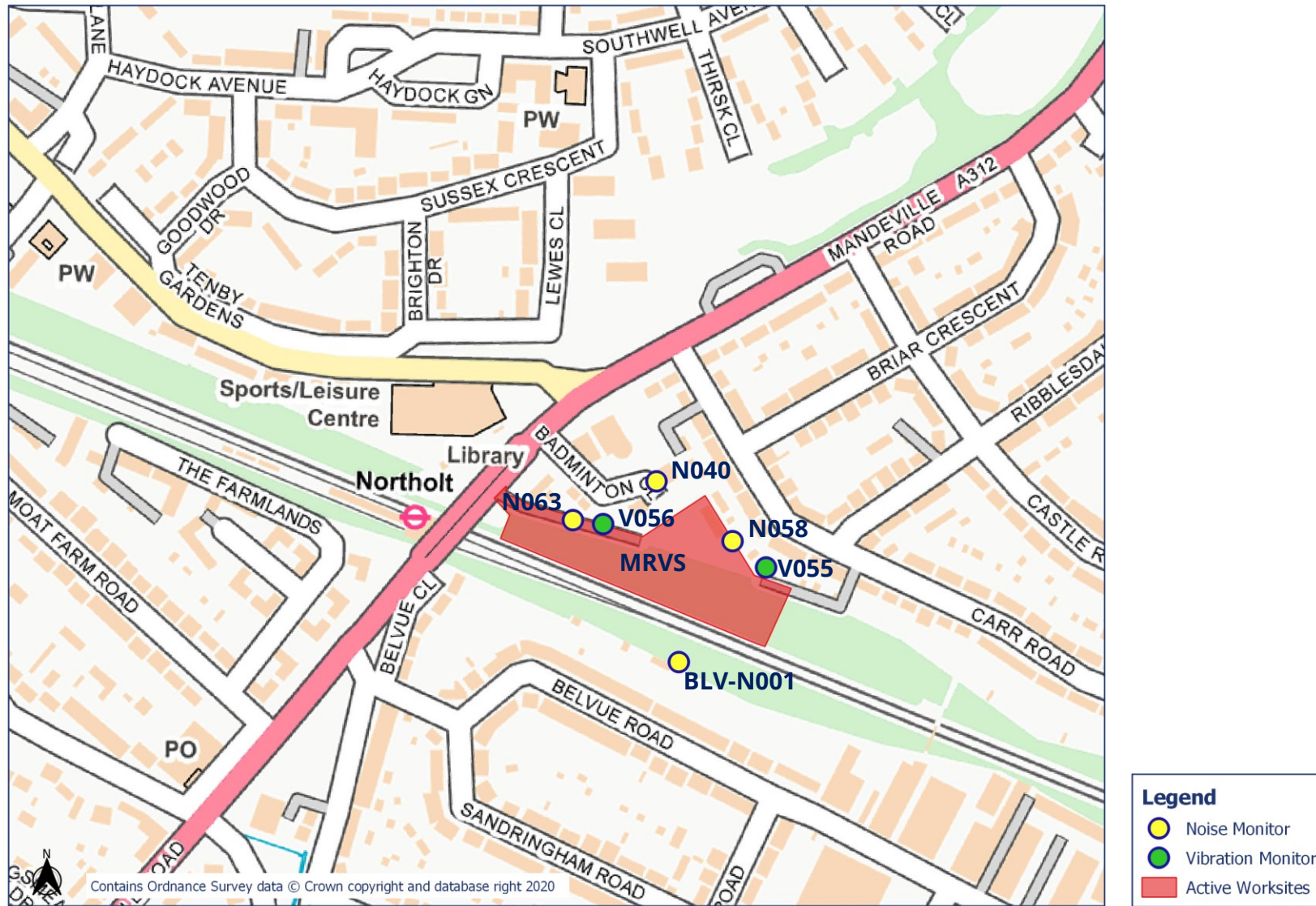




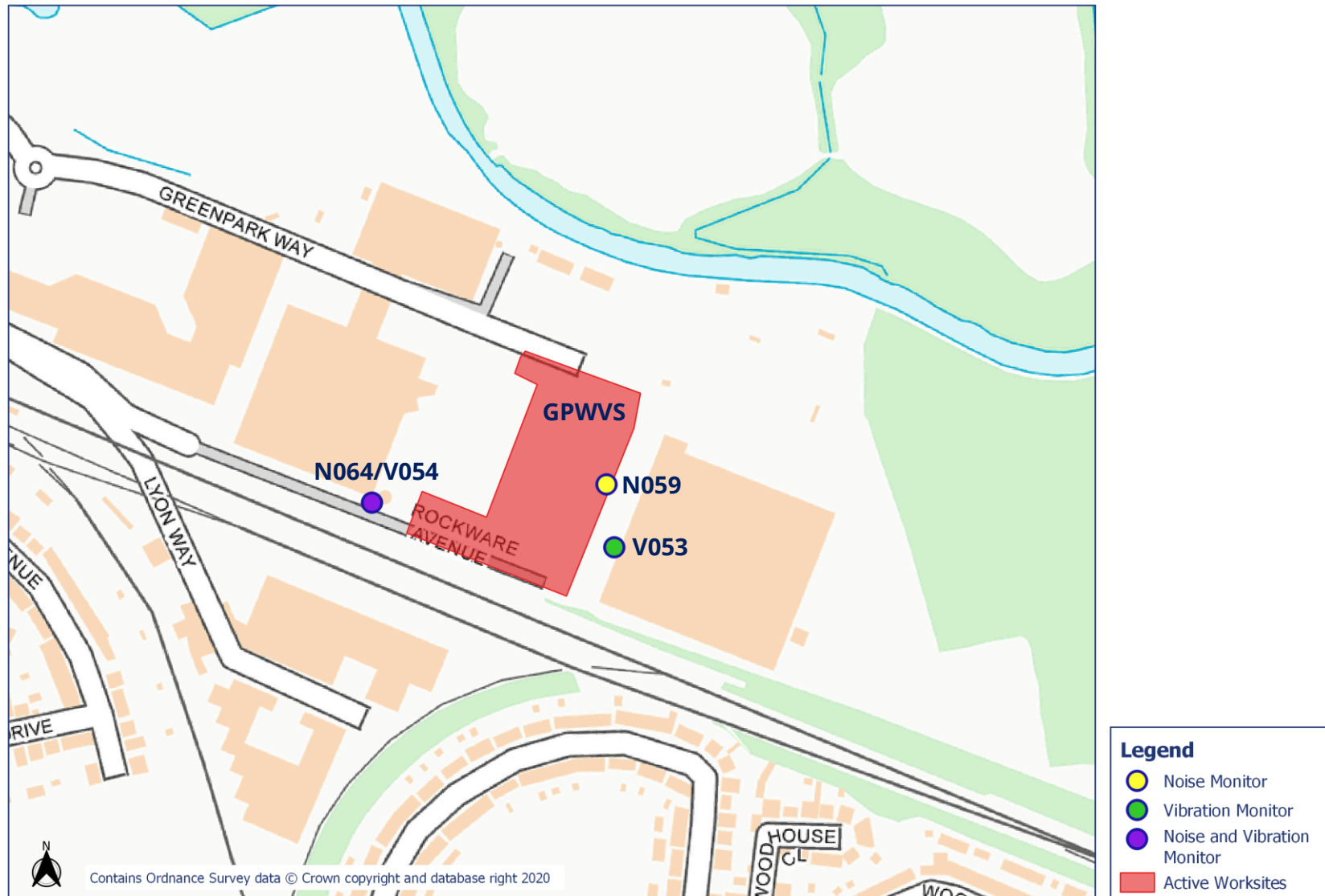




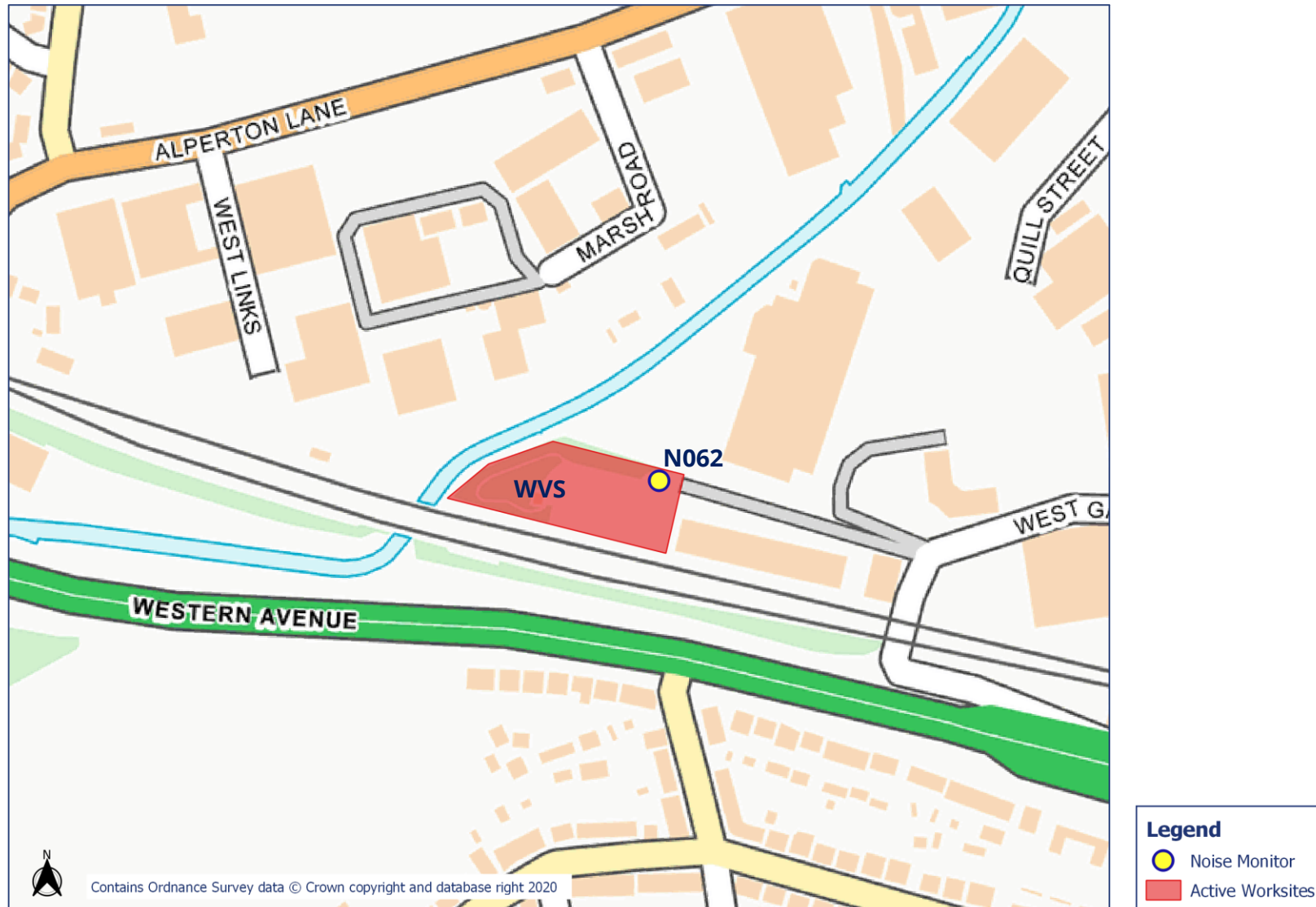
# Appendix B Monitoring Locations

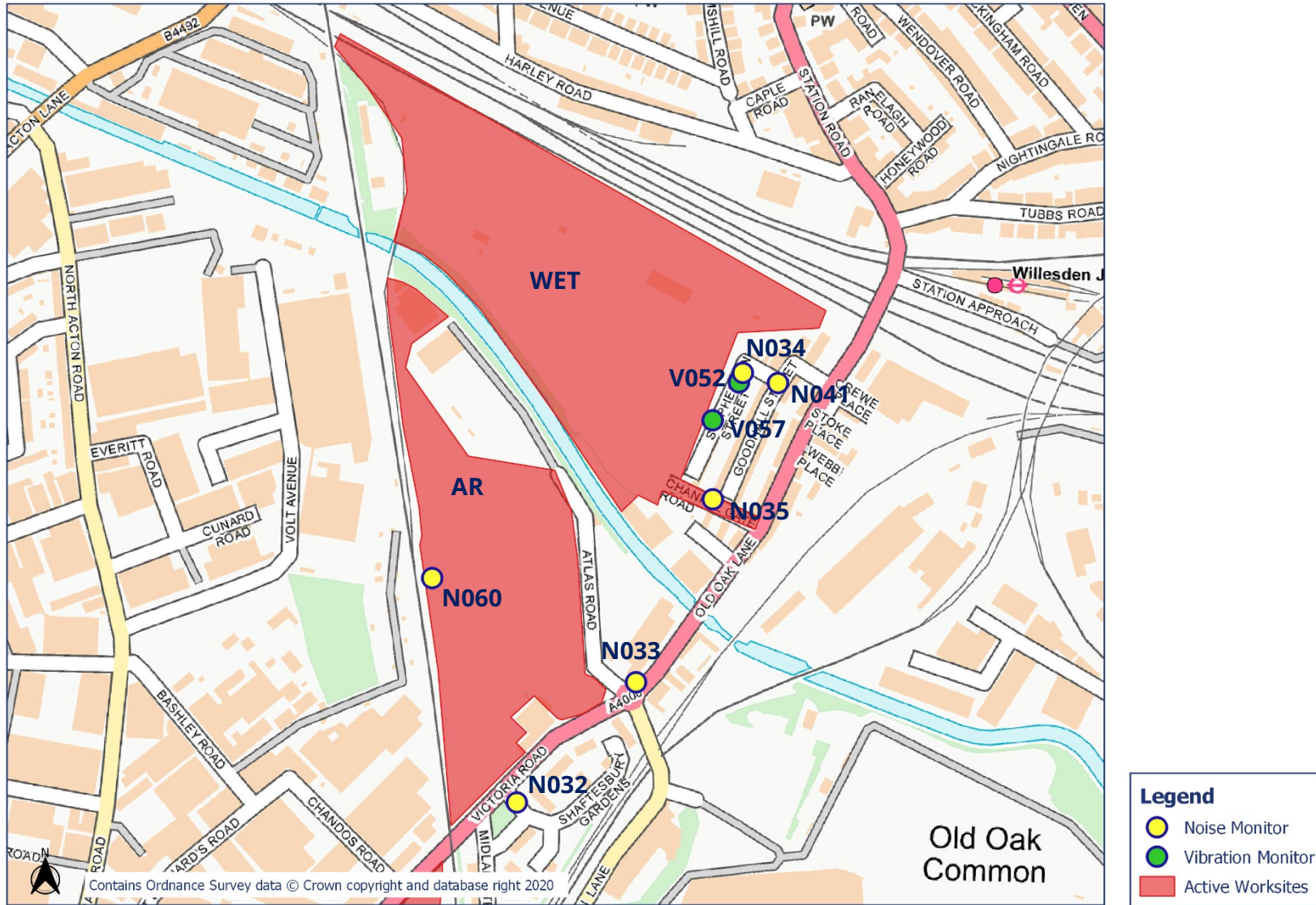














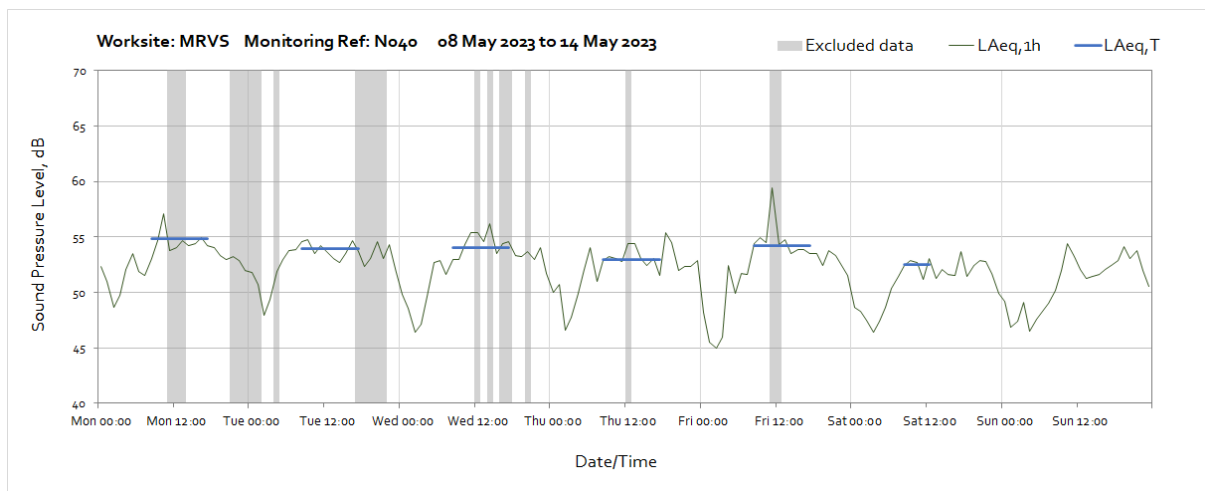
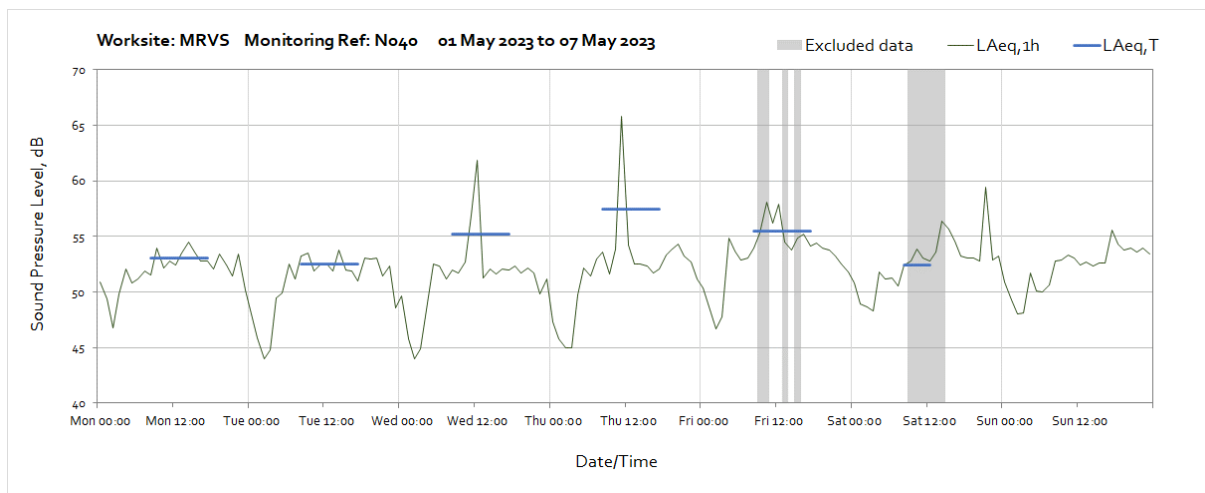


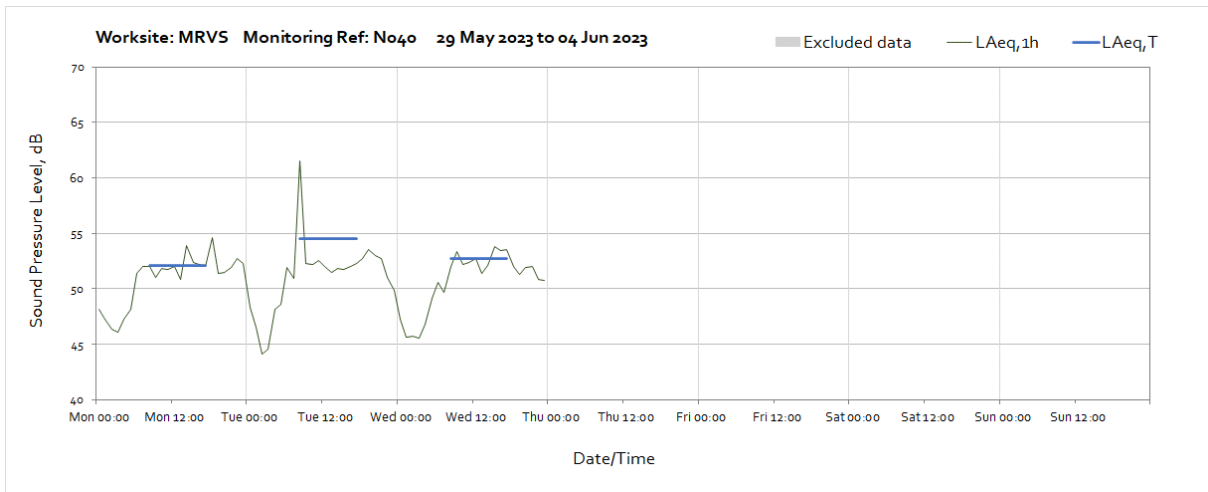
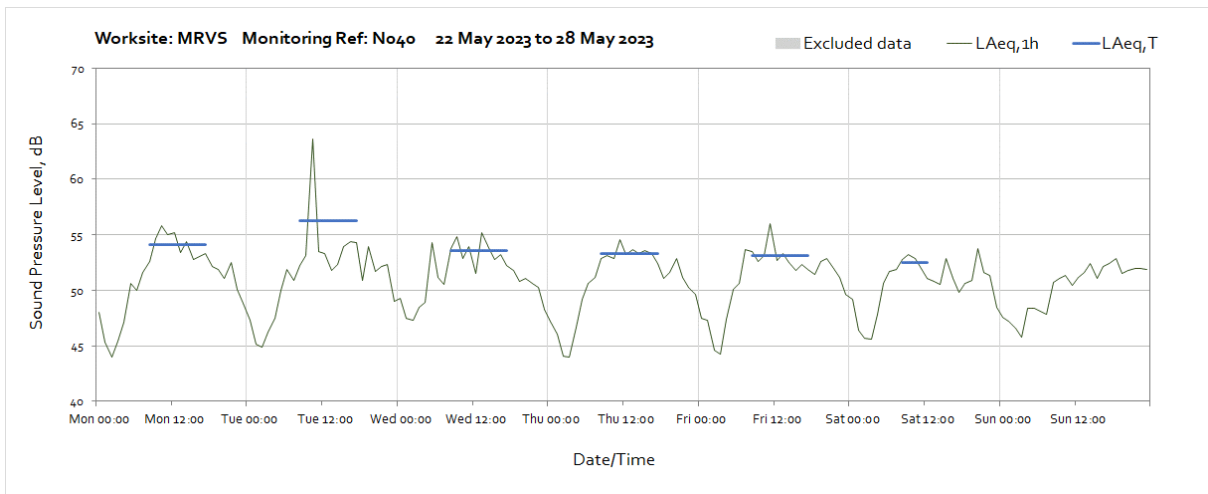
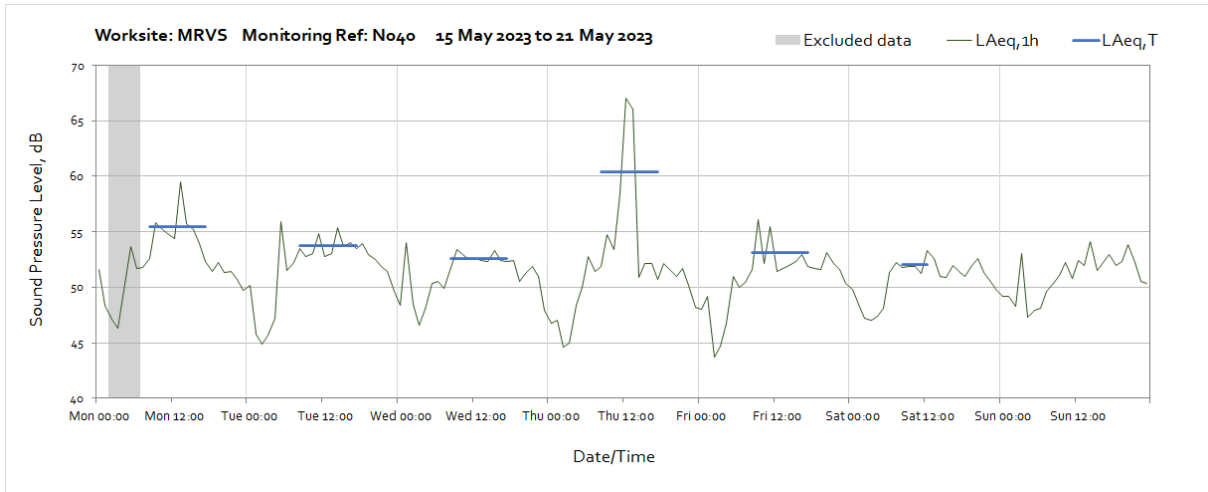
# Appendix C Data

## Noise

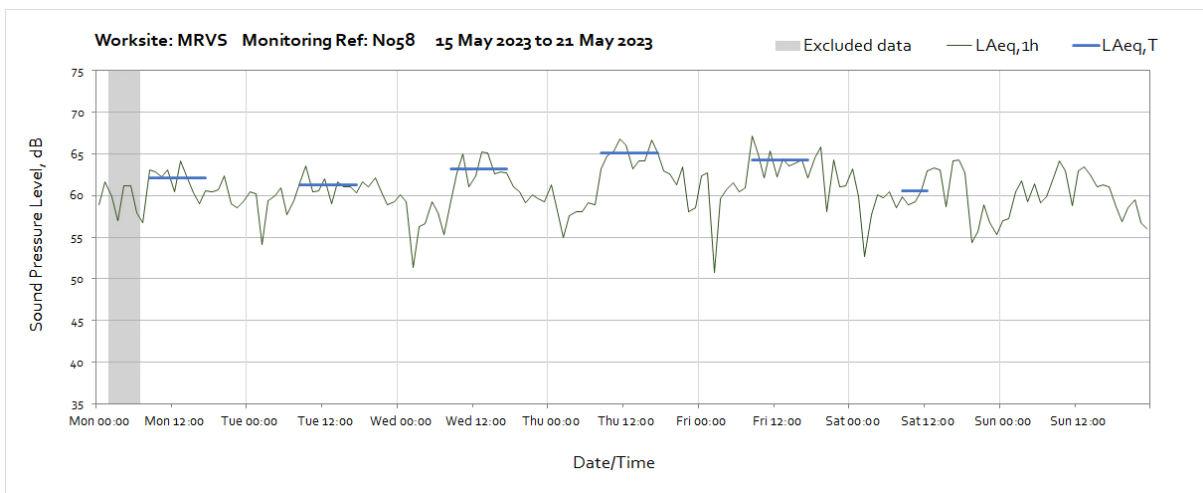
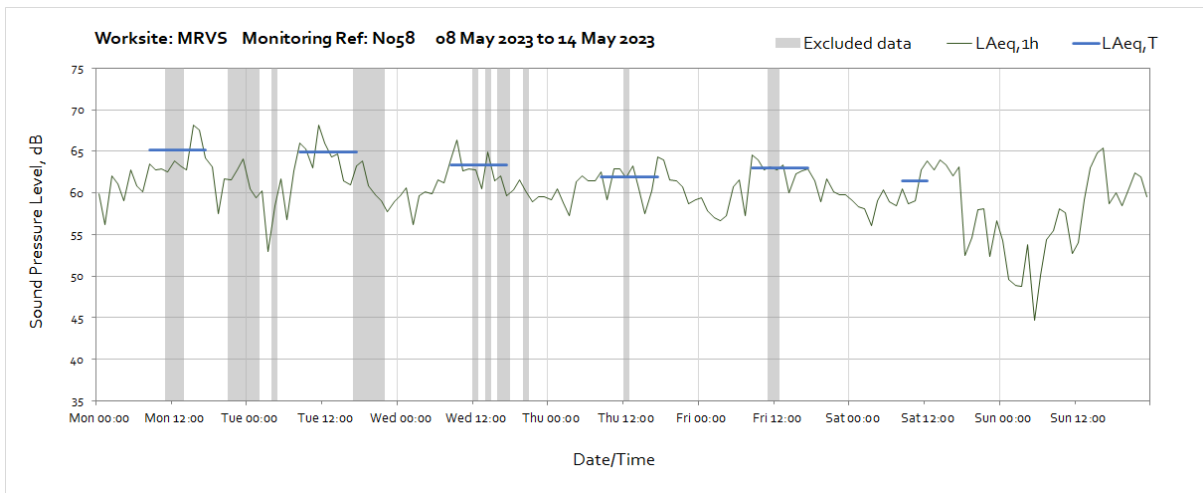
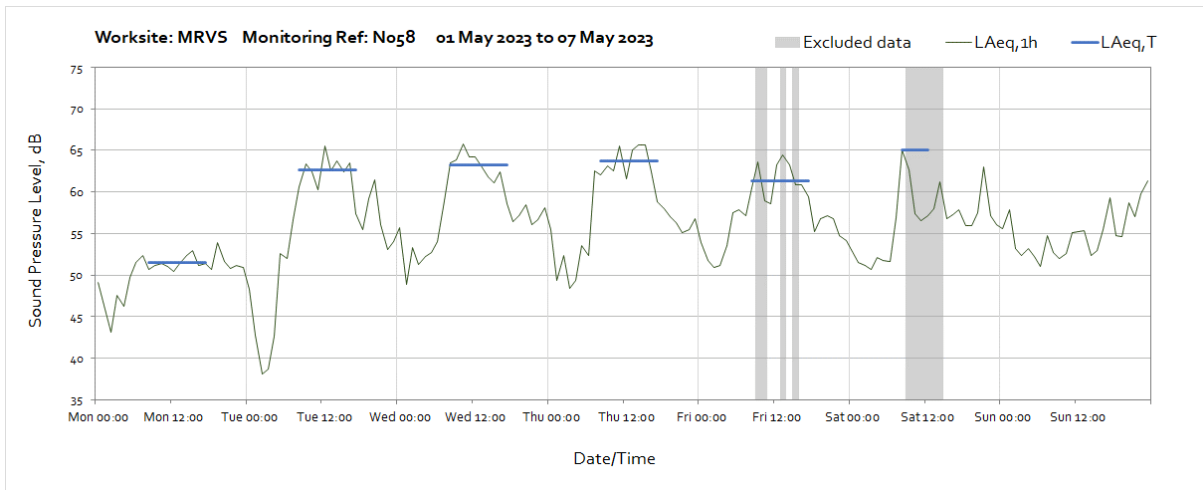
The following graphs show the hourly measured ambient noise level  $L_{Aeq,1h}$  and, where relevant, the averaged noise level  $L_{Aeq,T}$  values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and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

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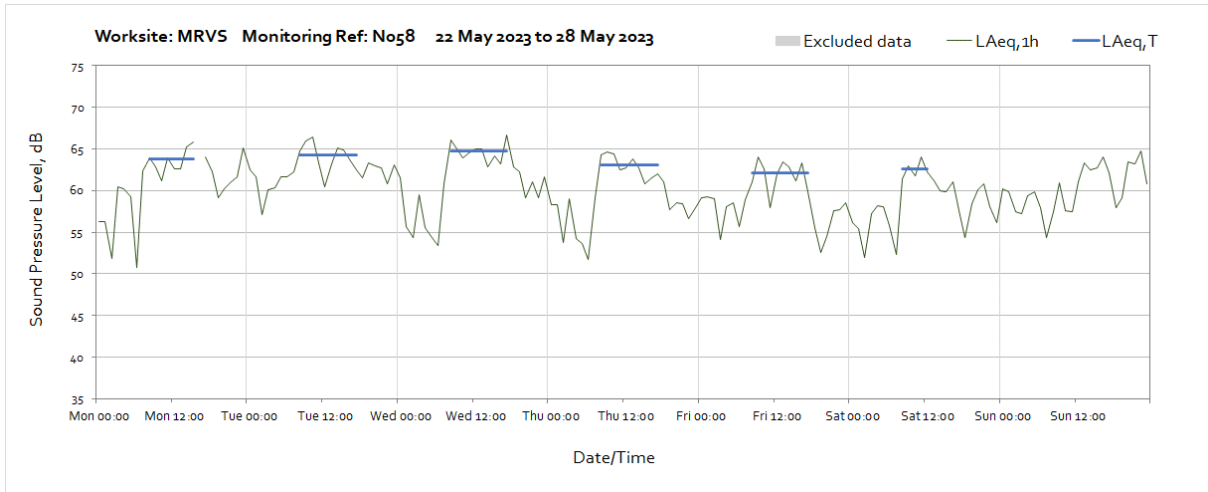




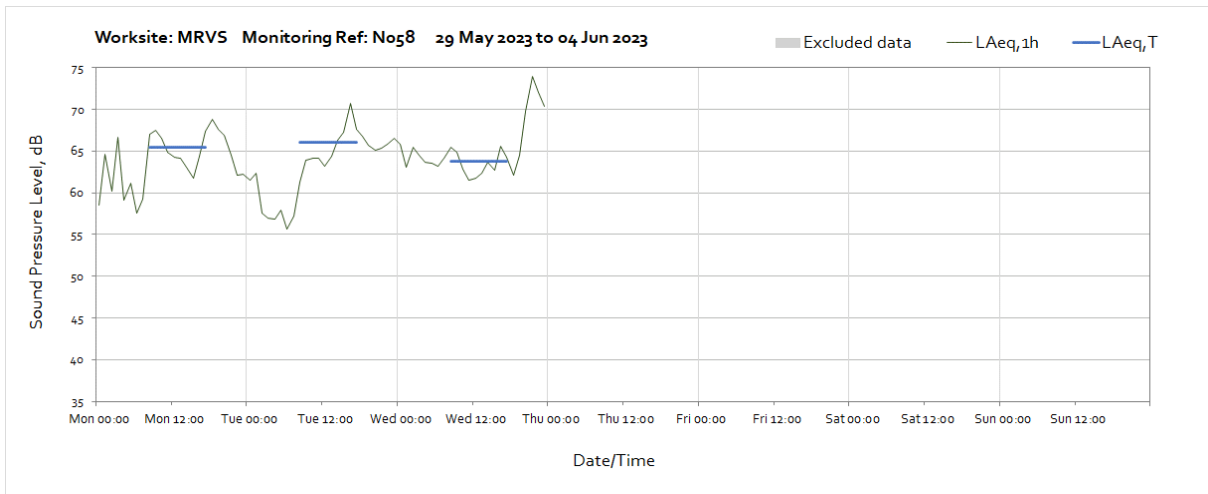
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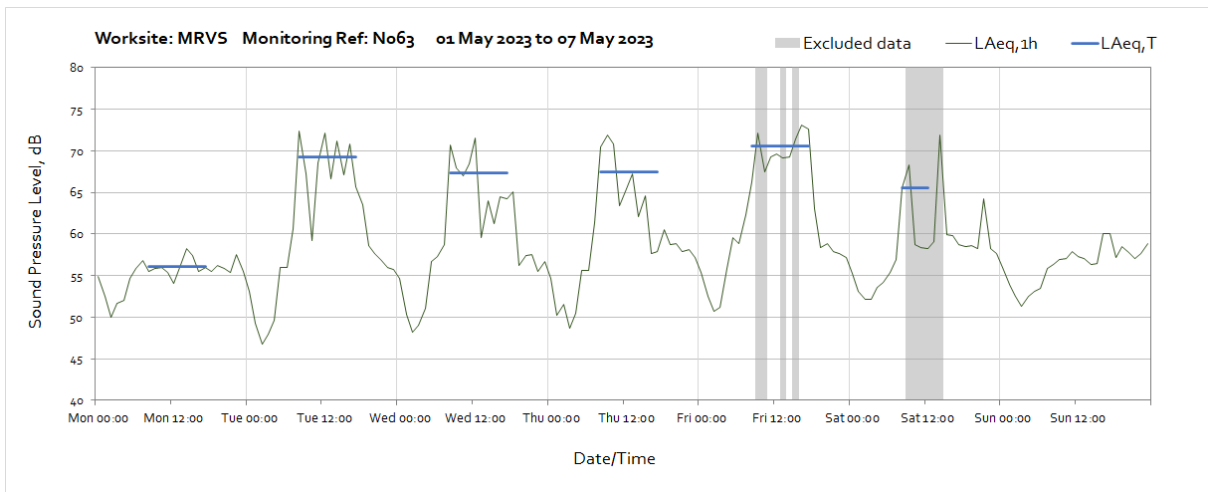
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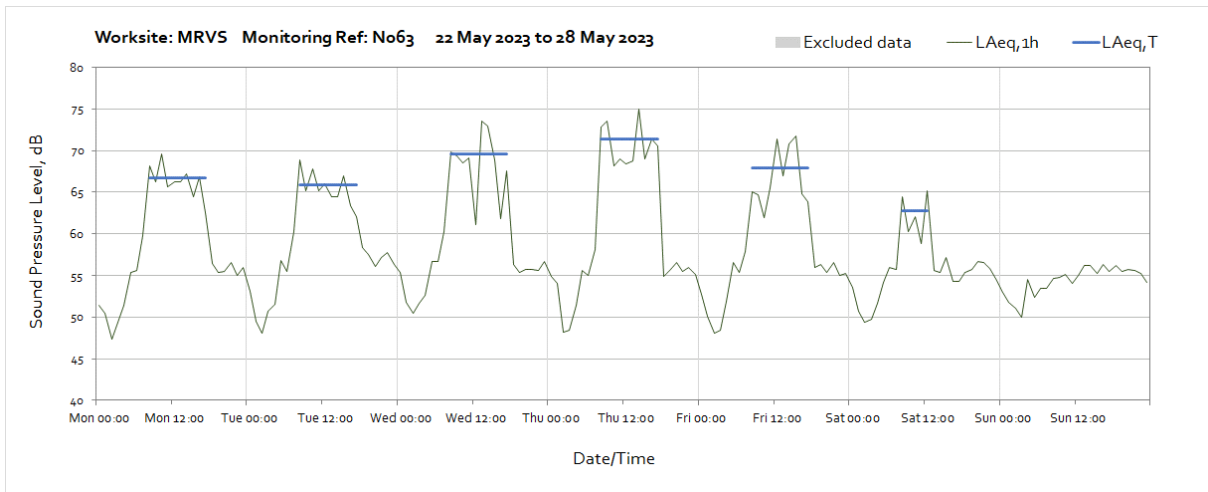
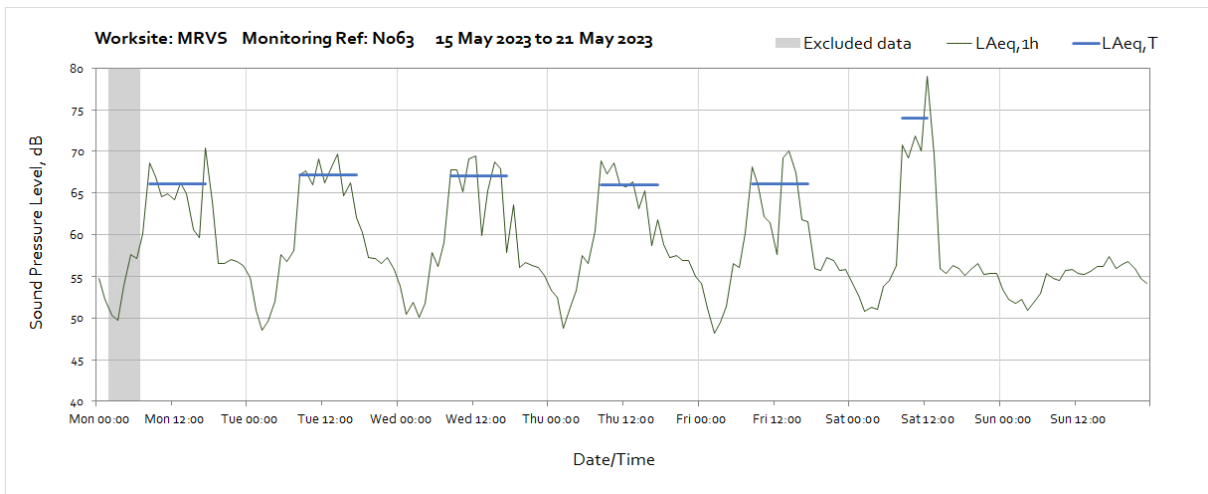
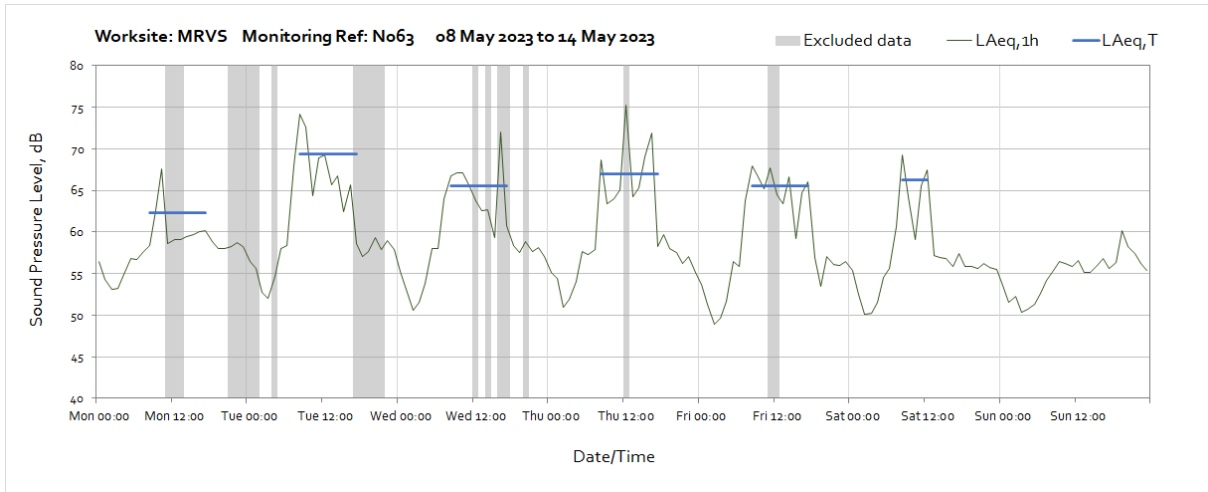


Note: Missing data at 16:00 on Monday 22<sup>nd</sup> May was due to a monitor fault.

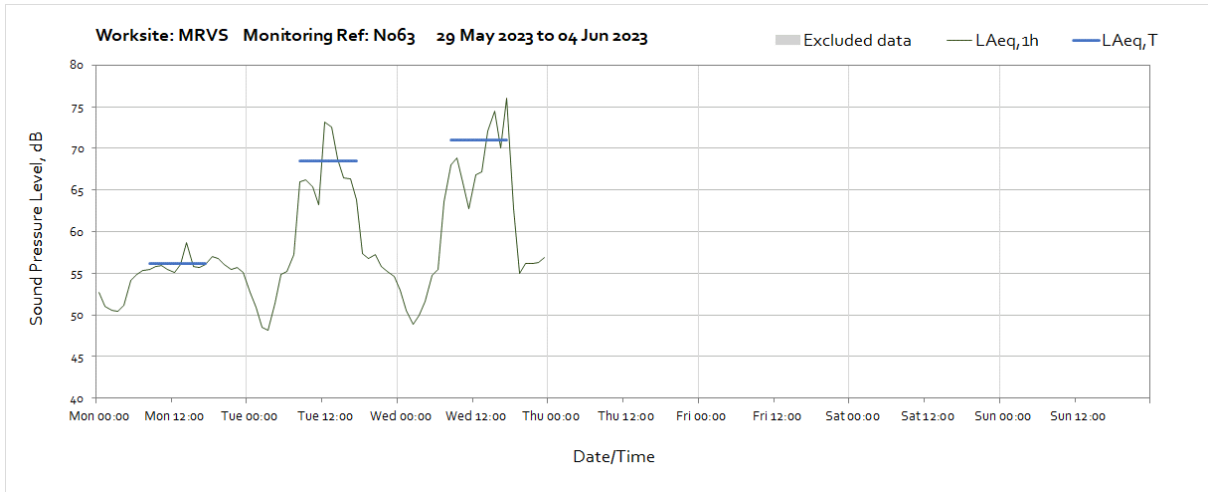


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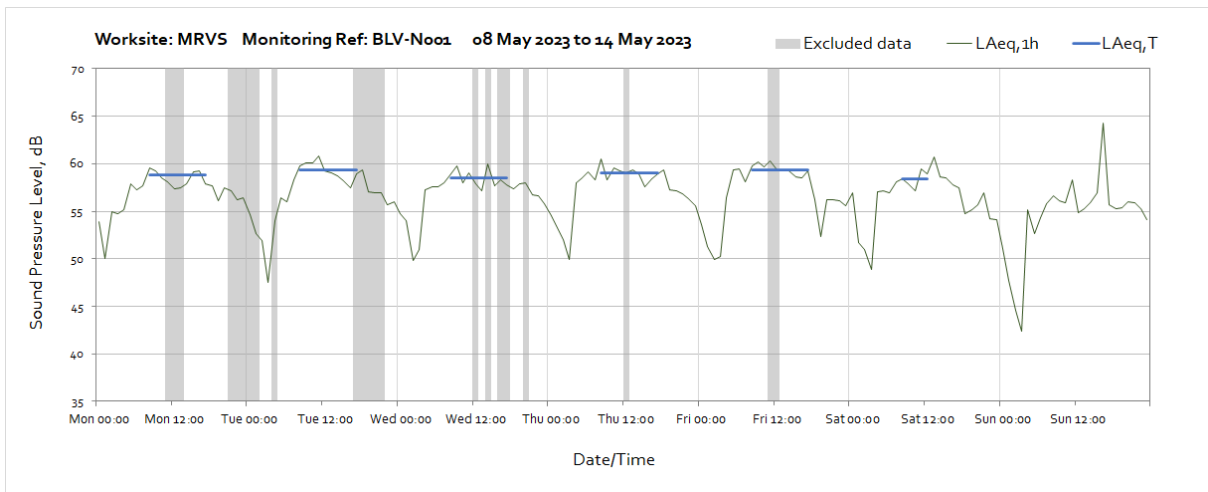
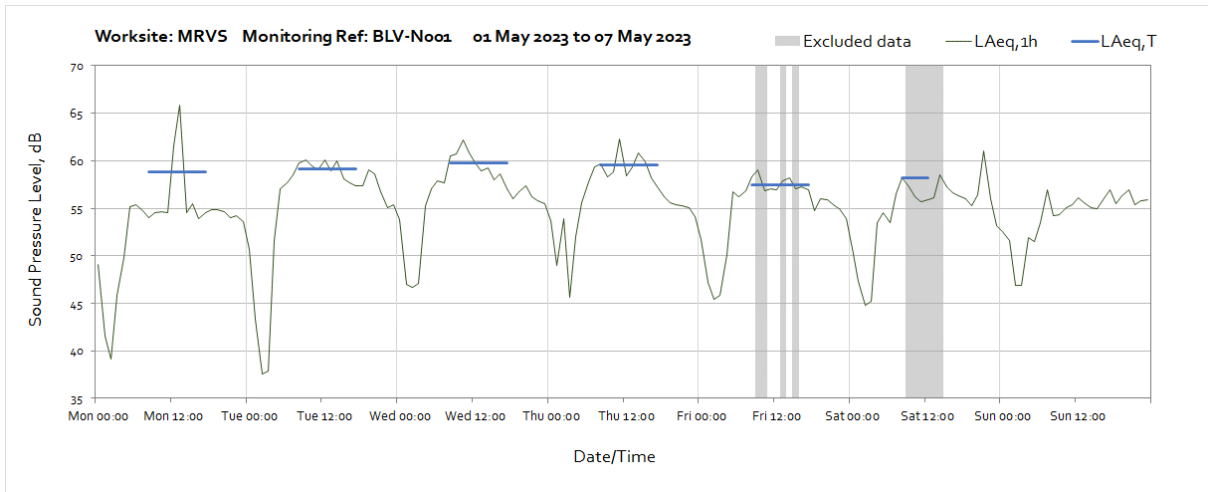


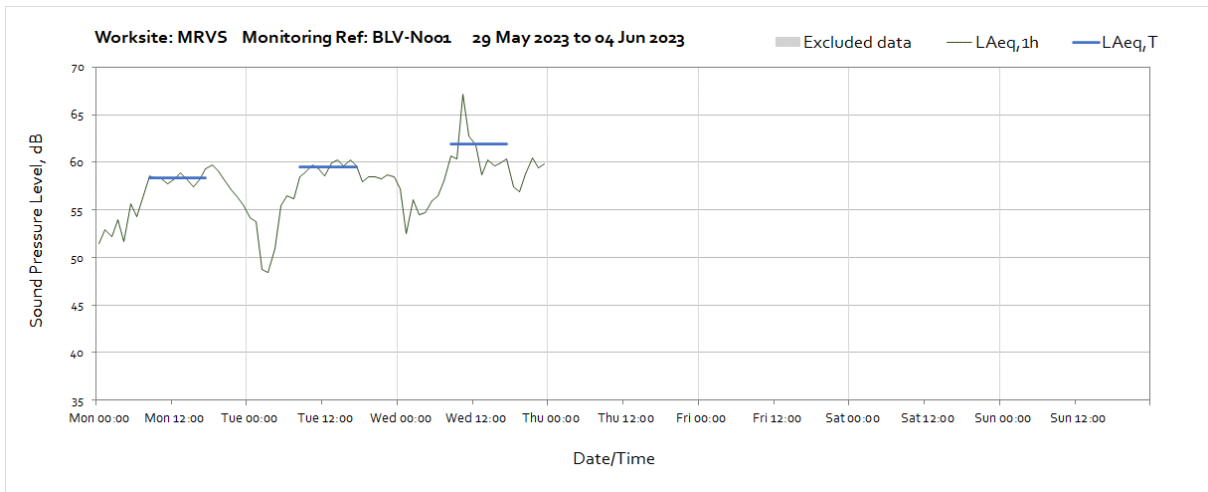
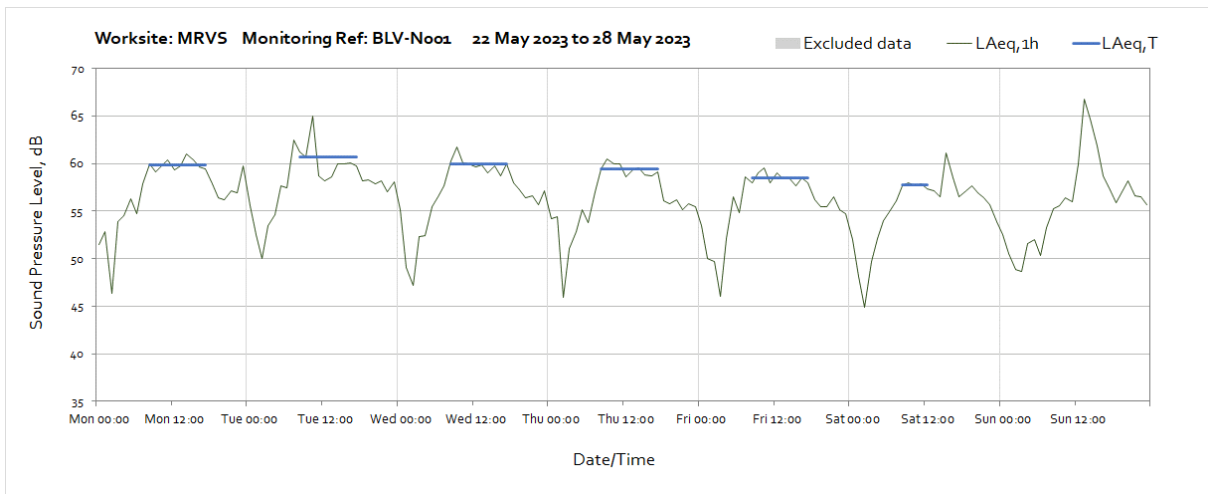
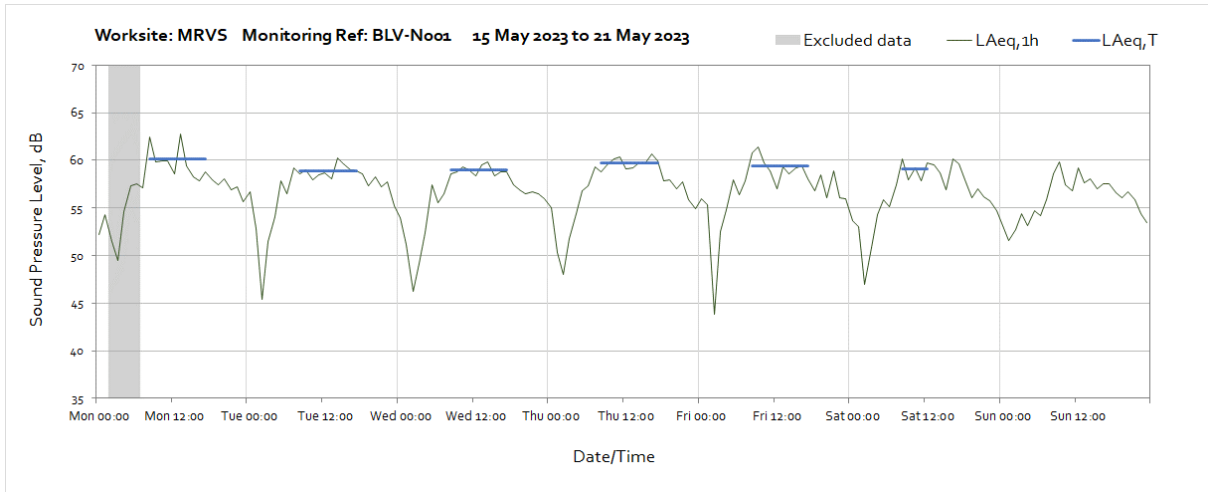




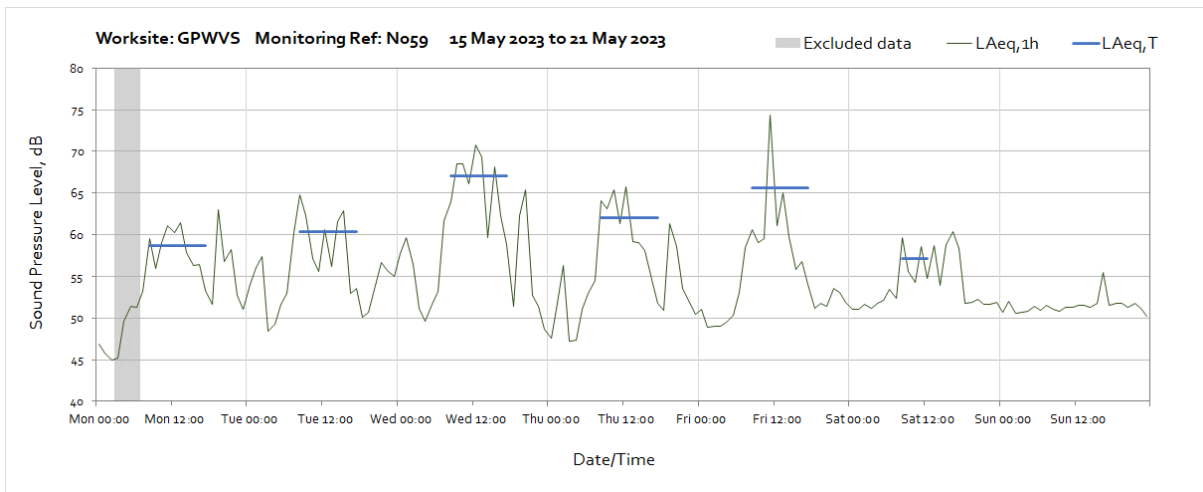
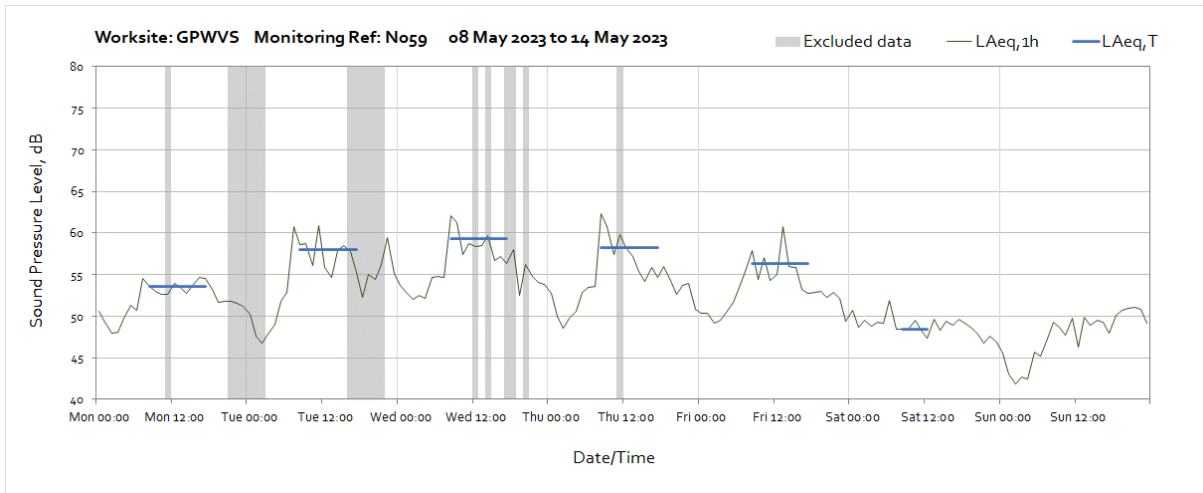
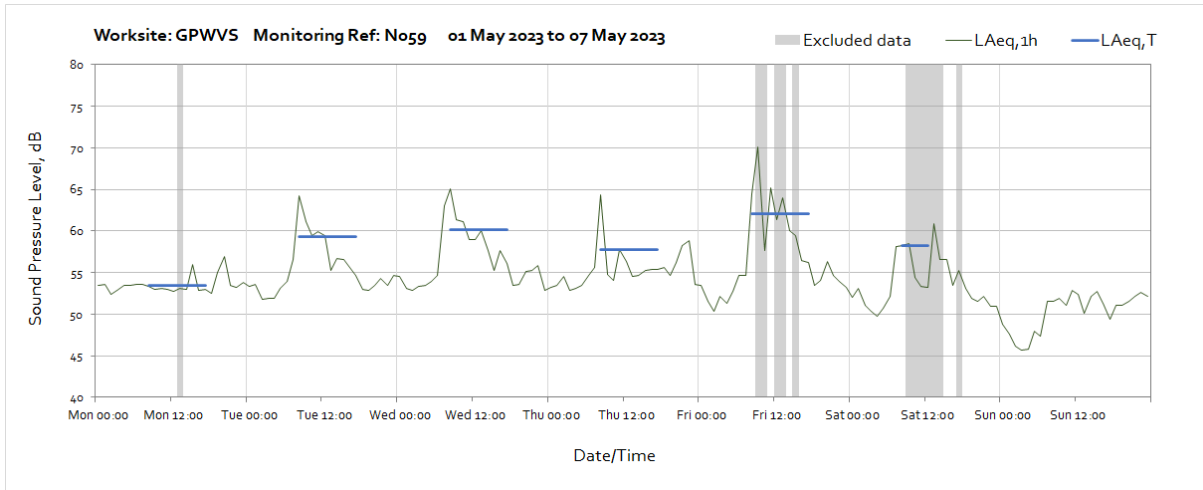


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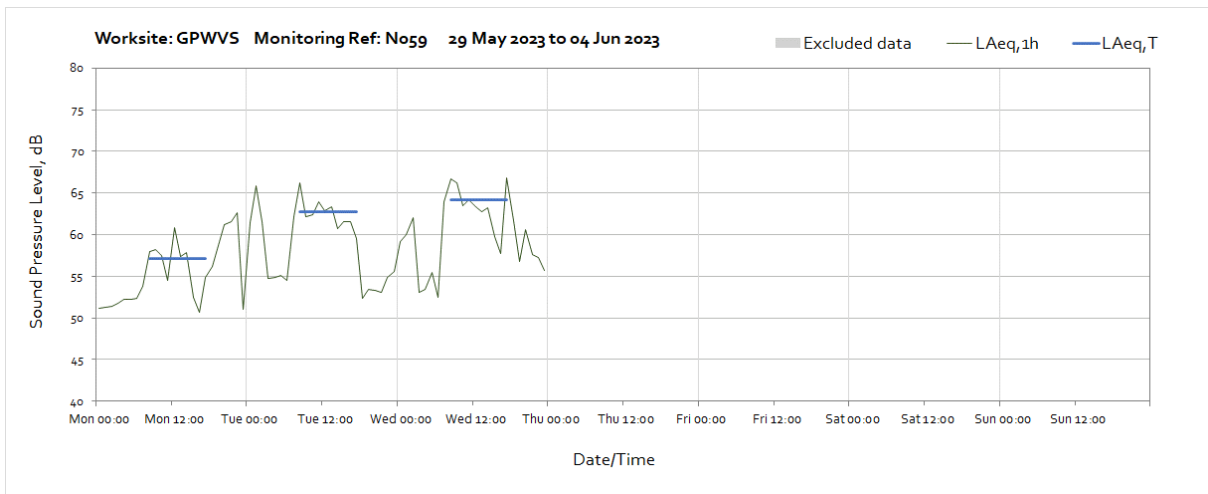
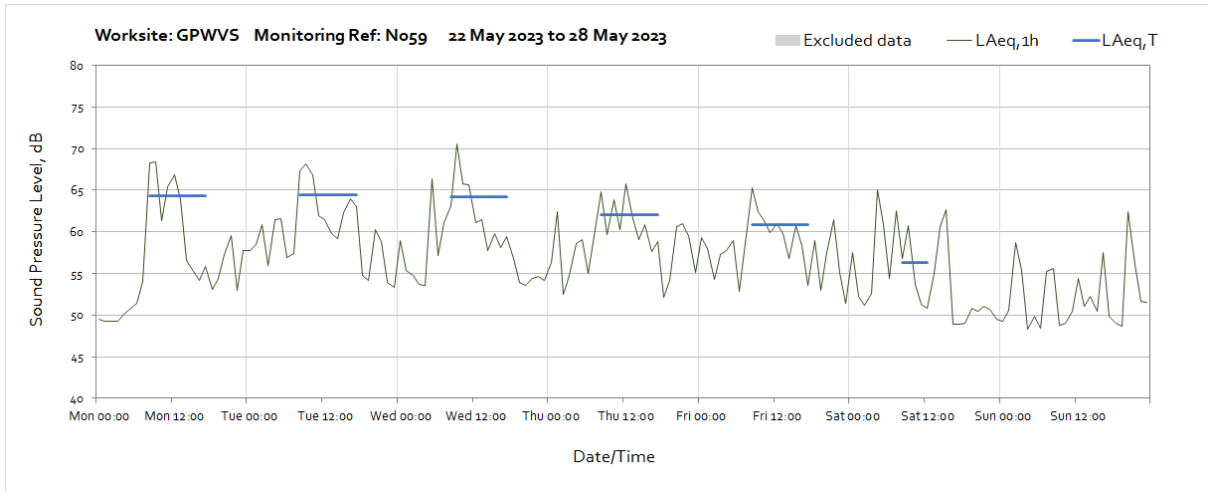




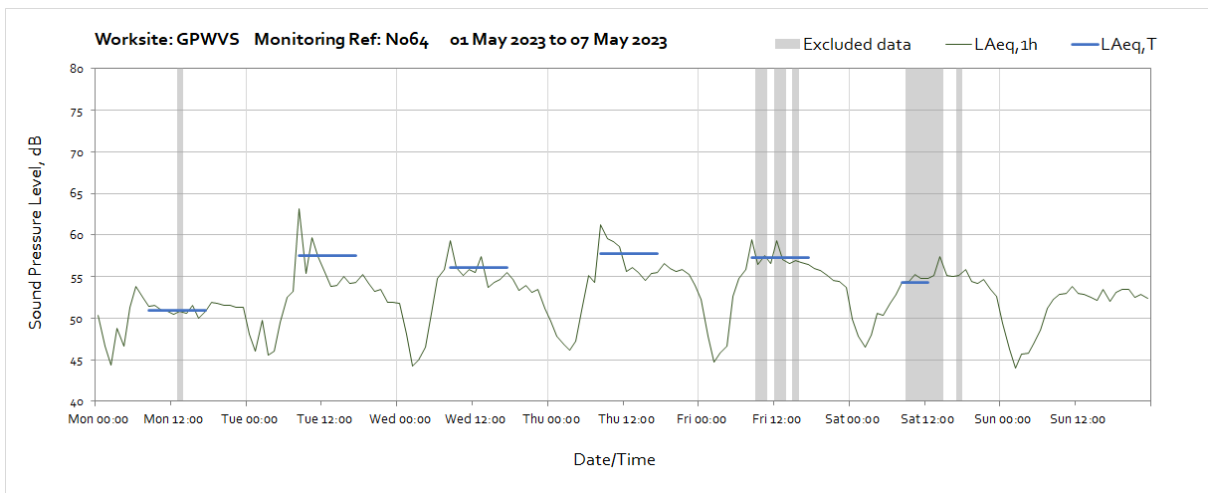
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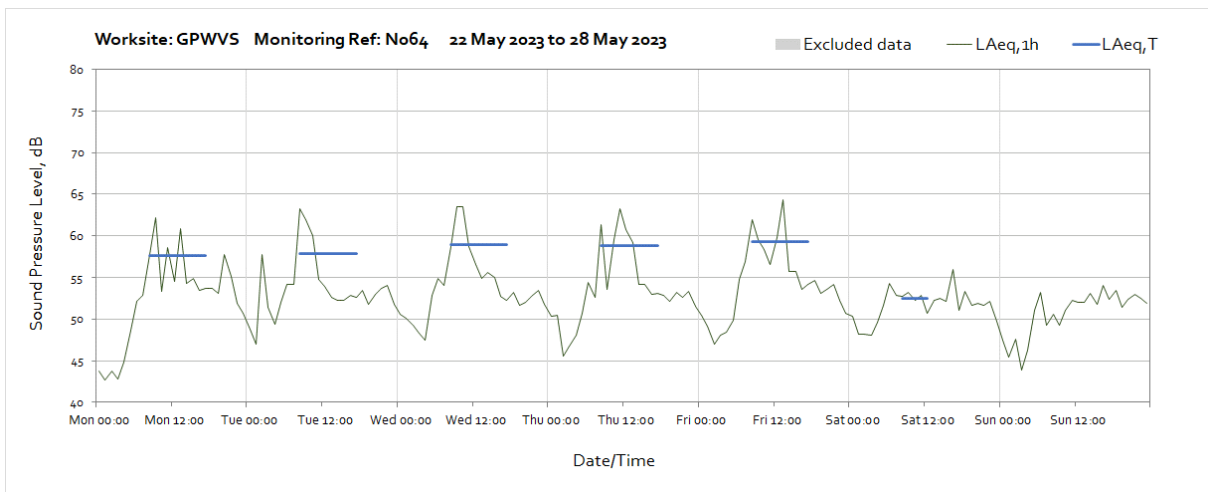
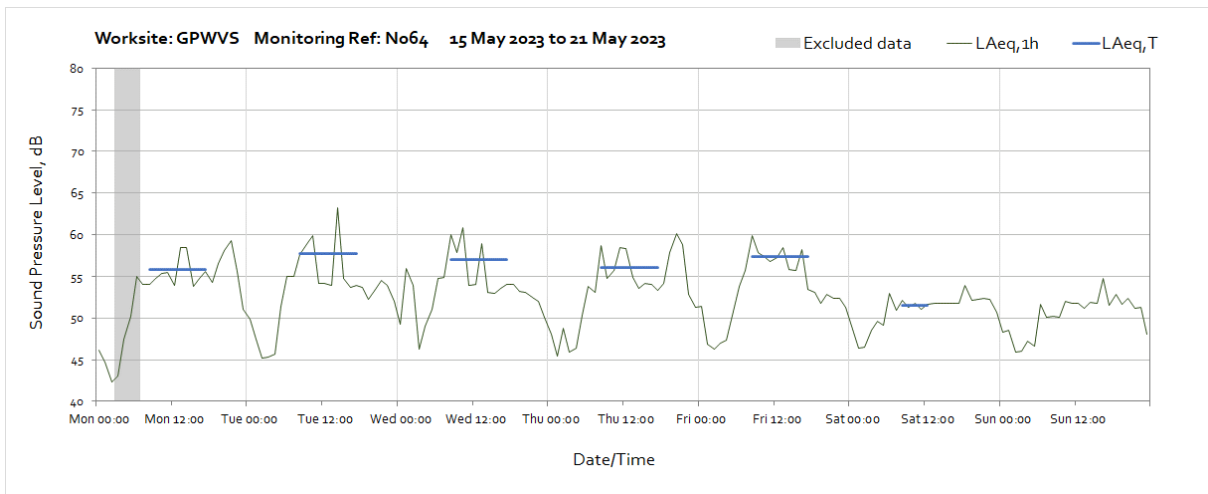
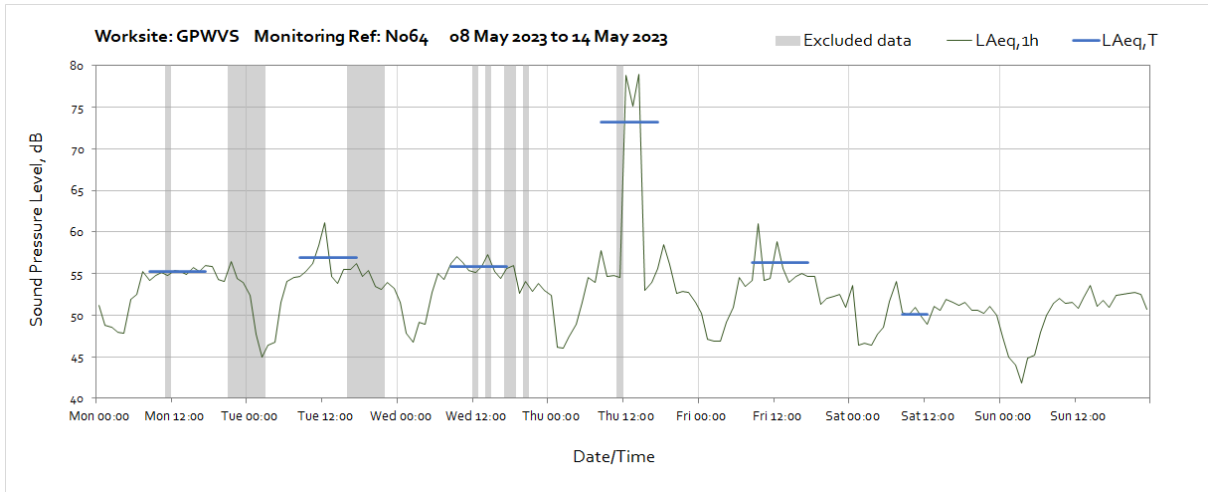


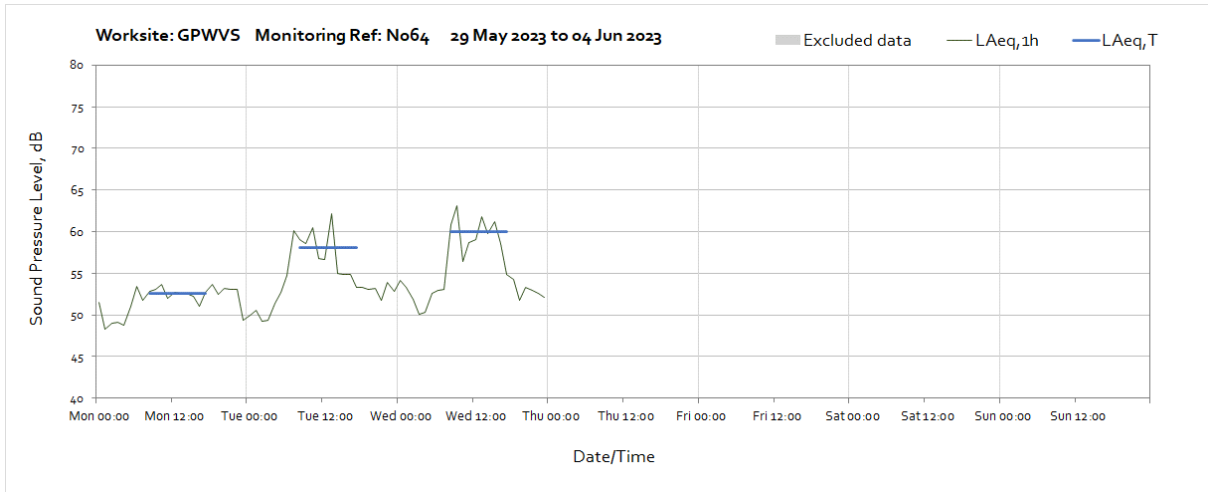
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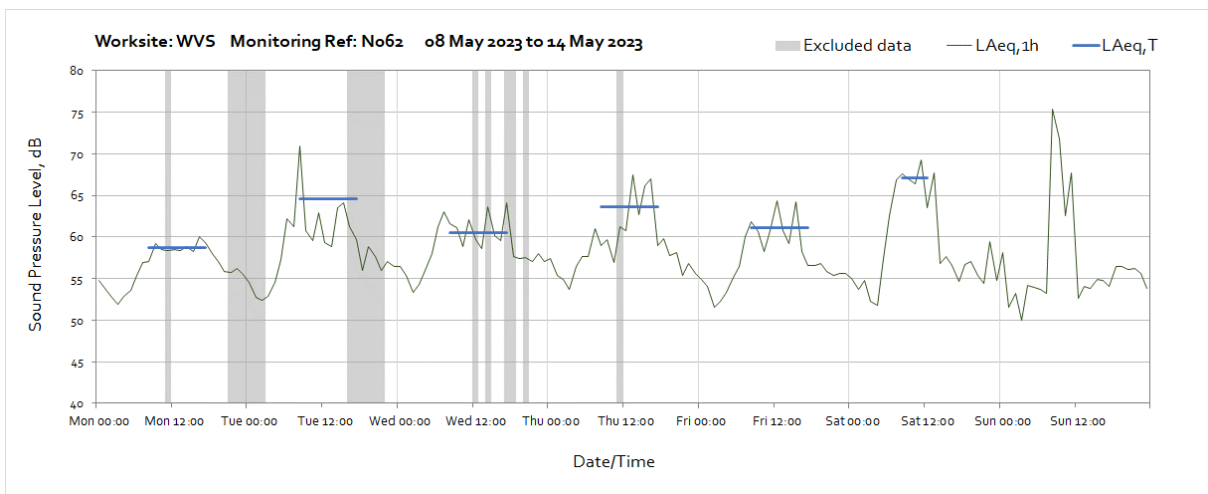
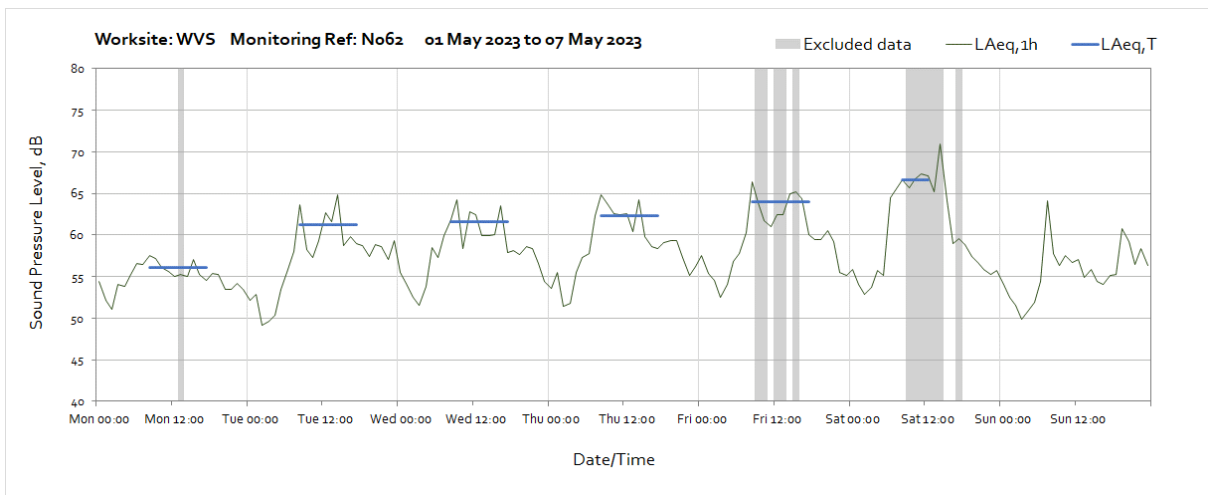
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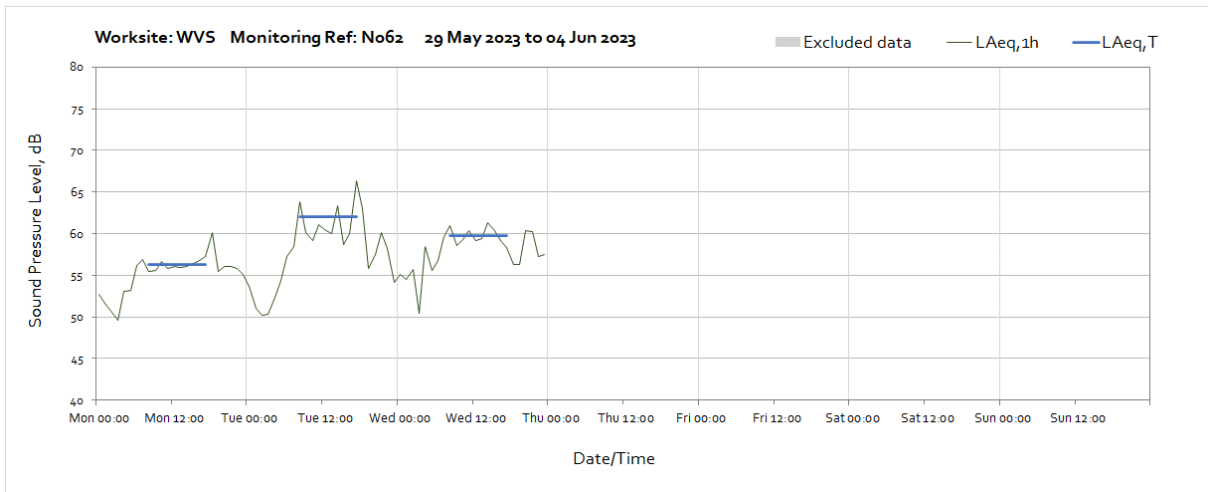
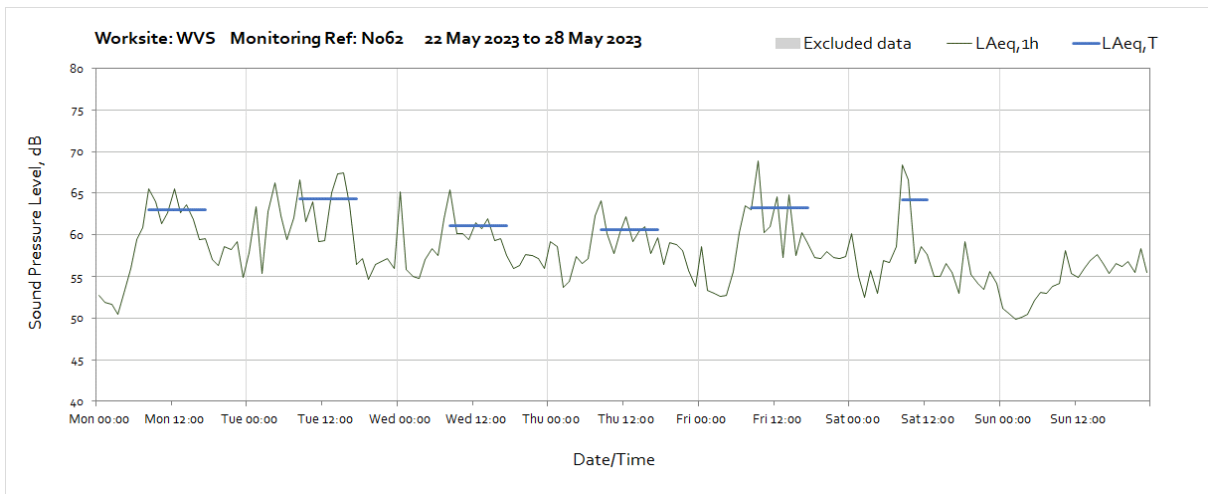
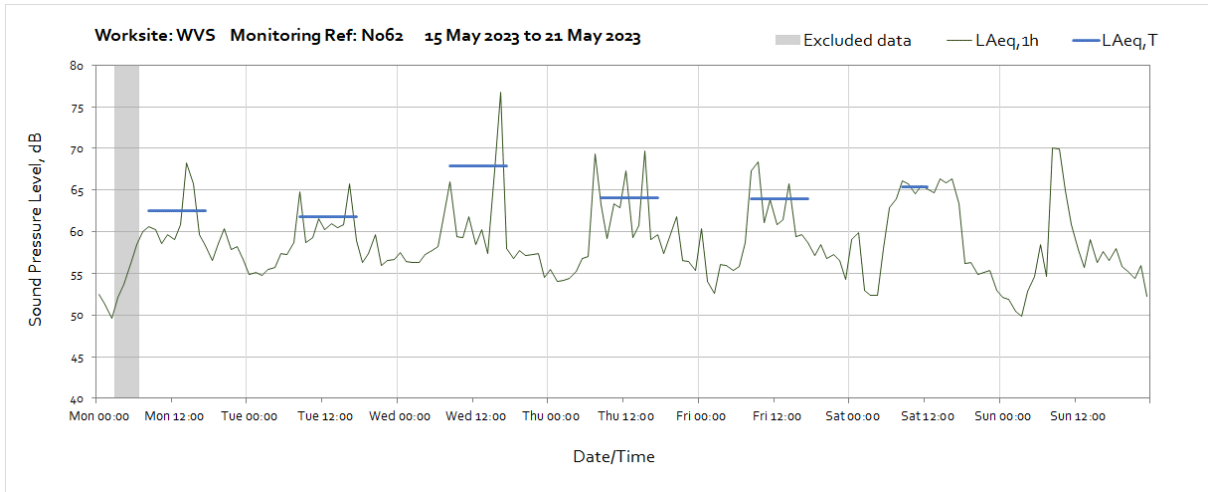




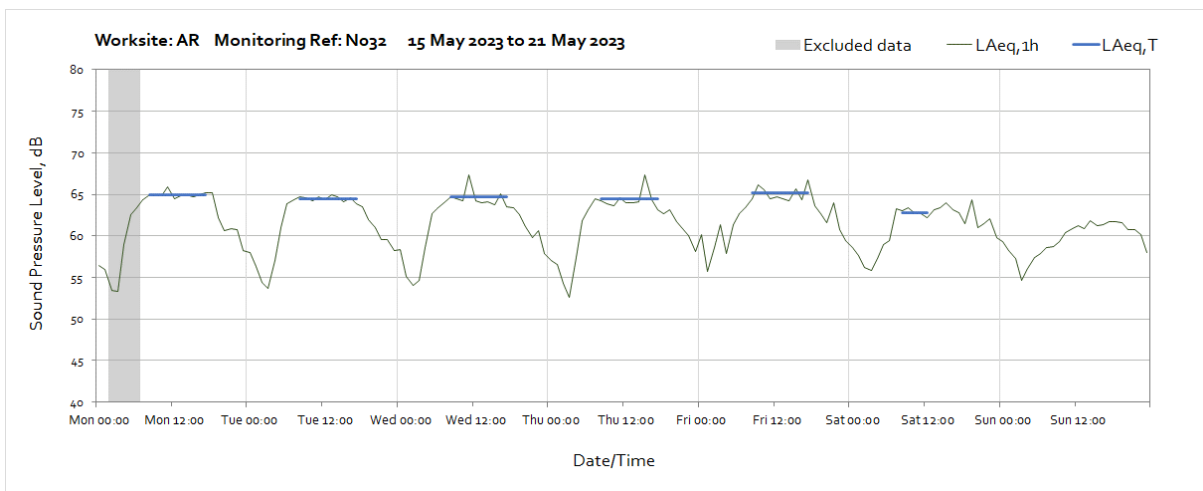
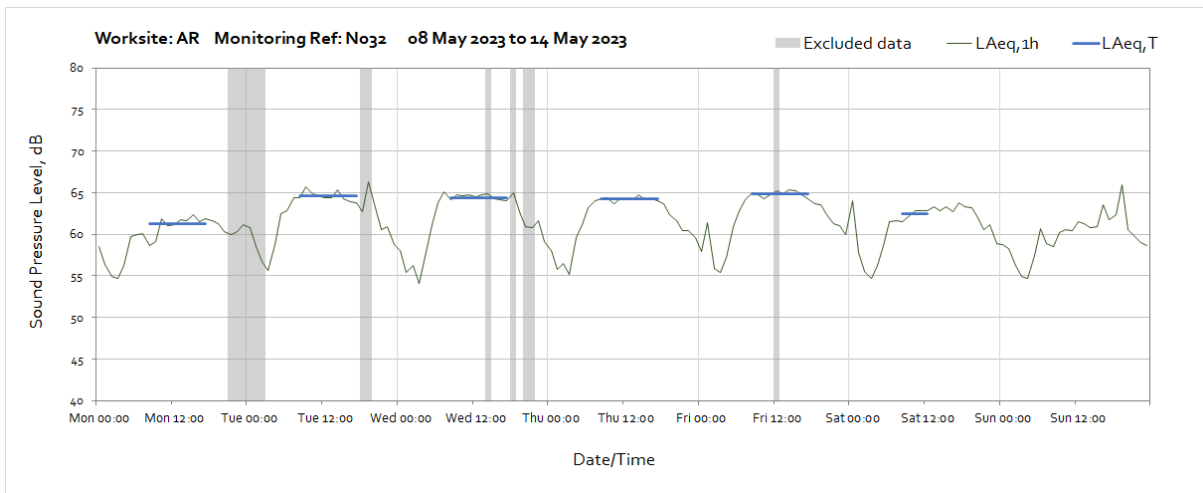
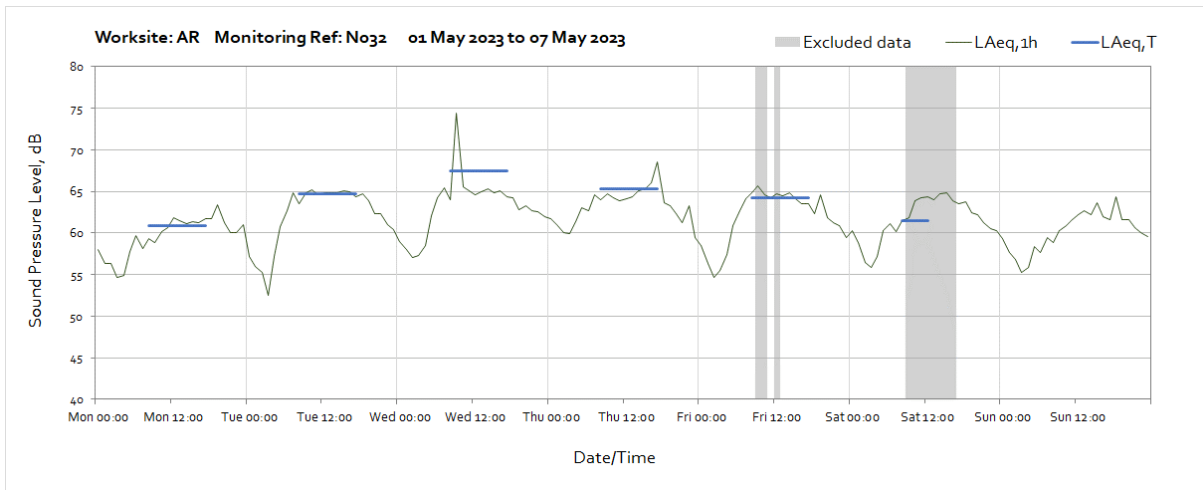
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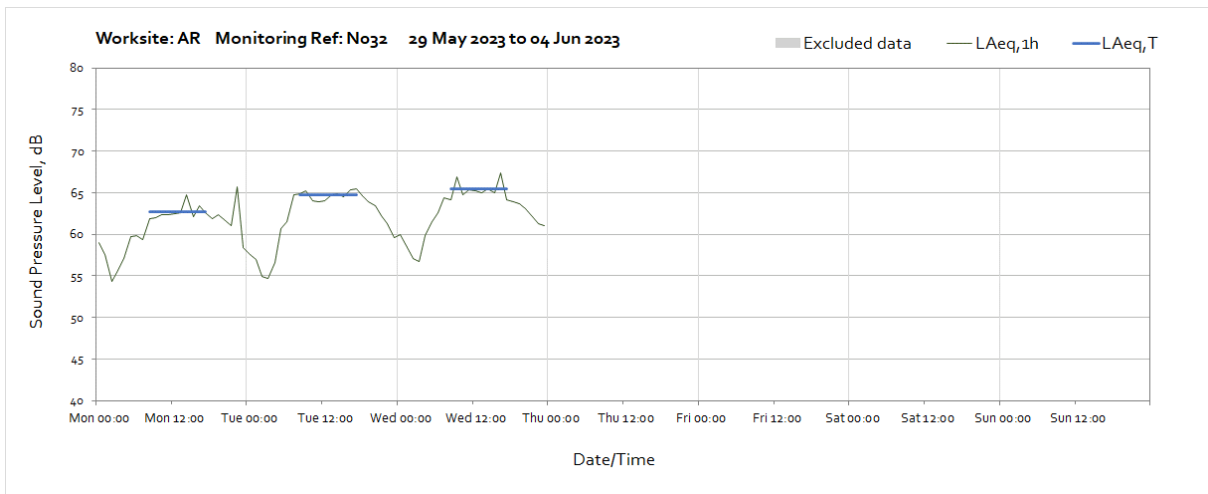
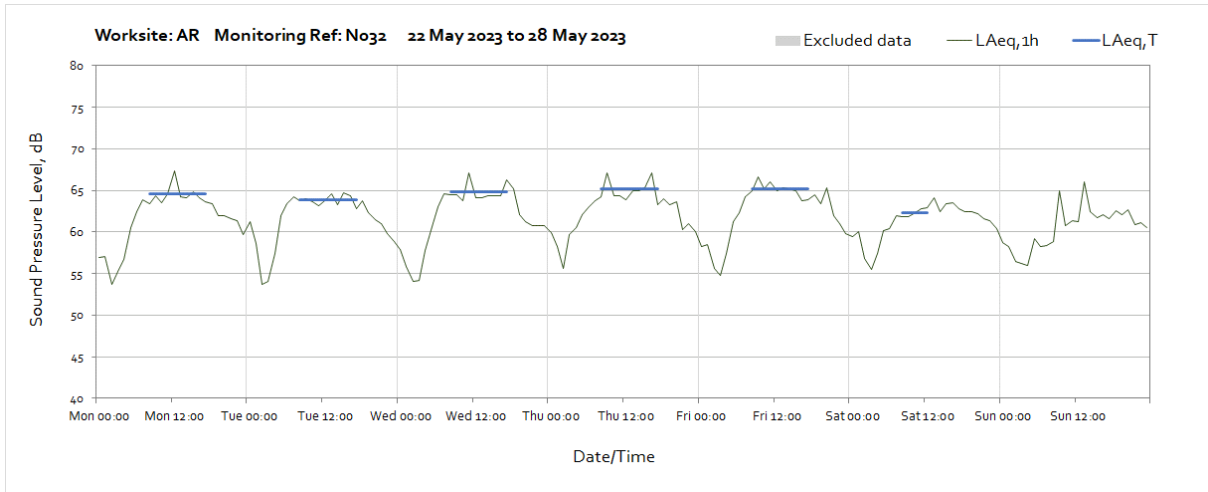




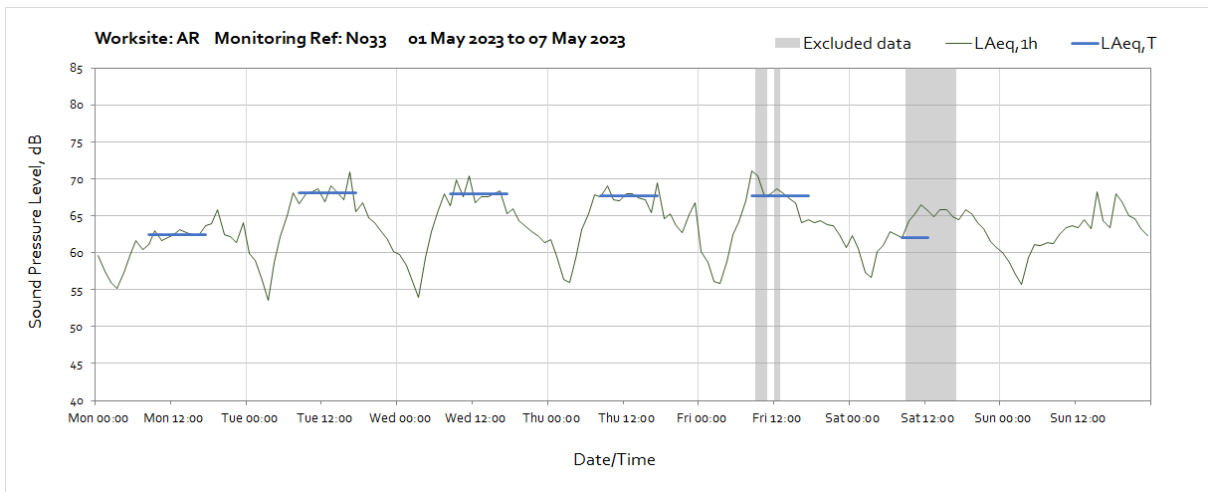


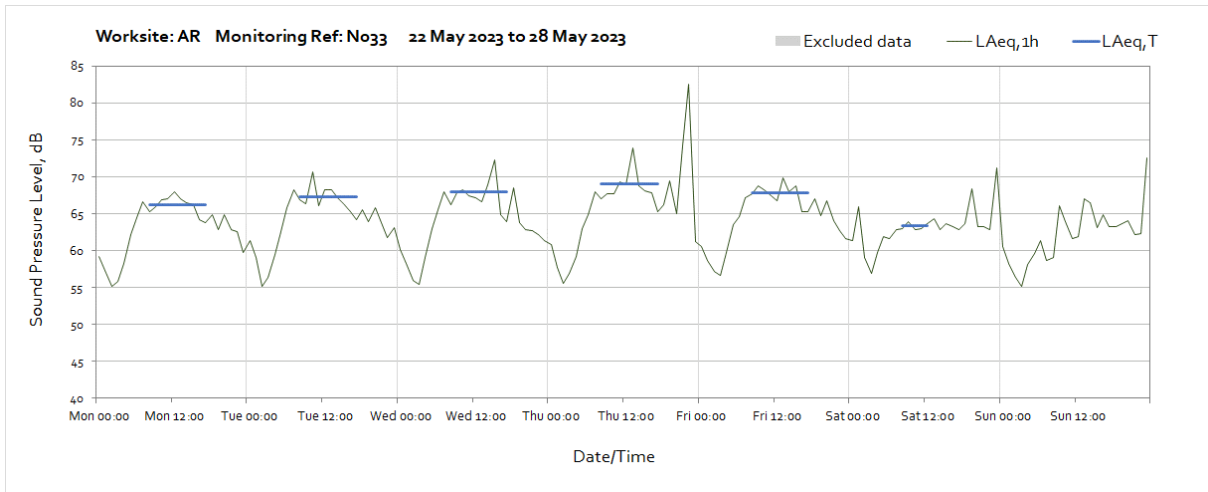
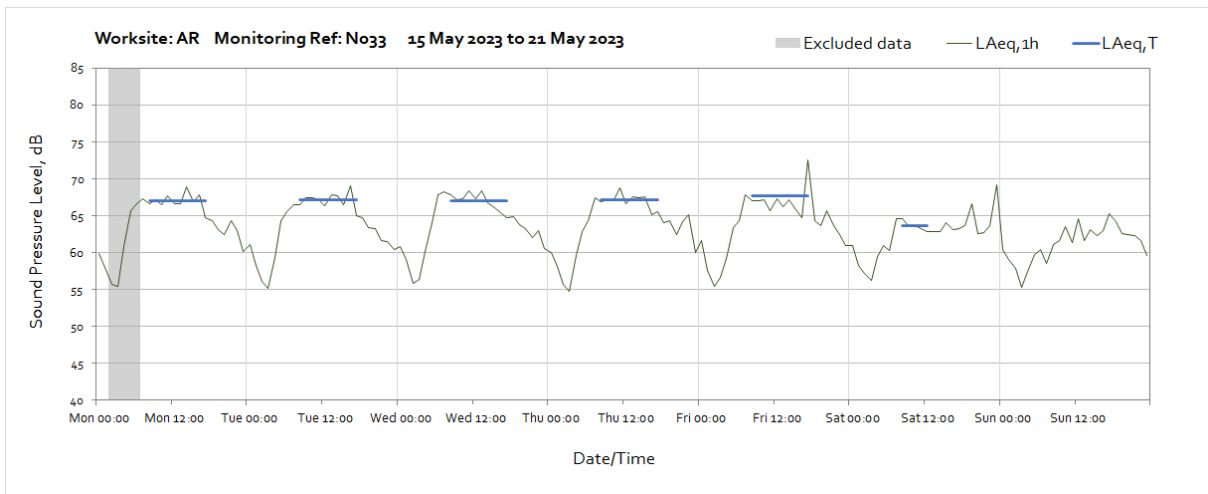
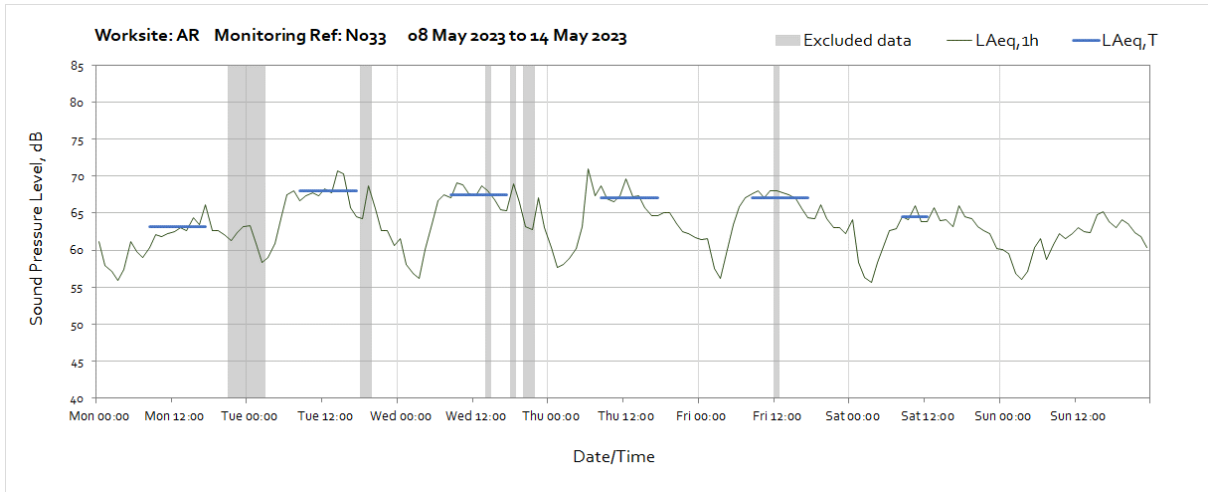
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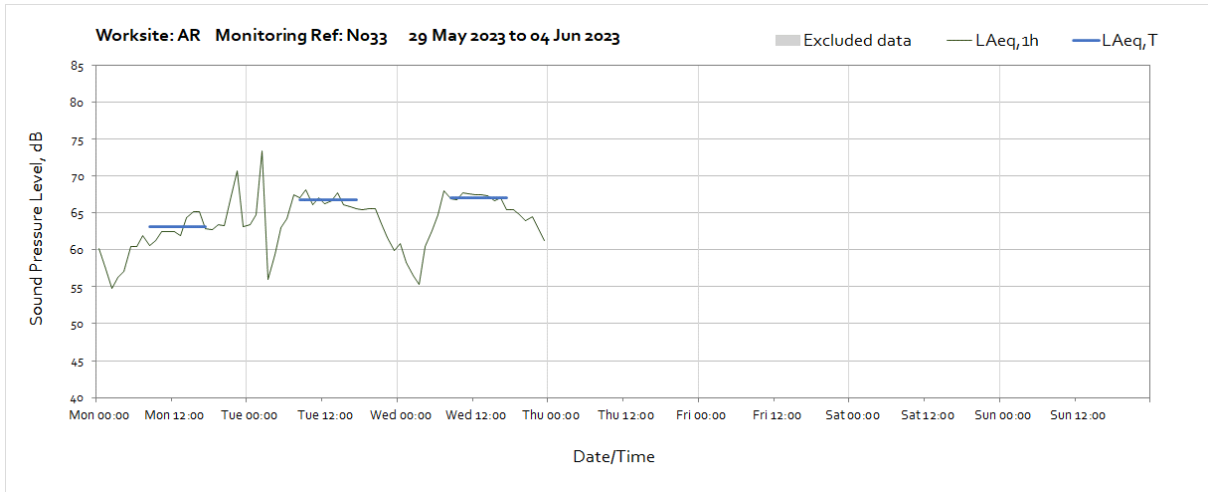




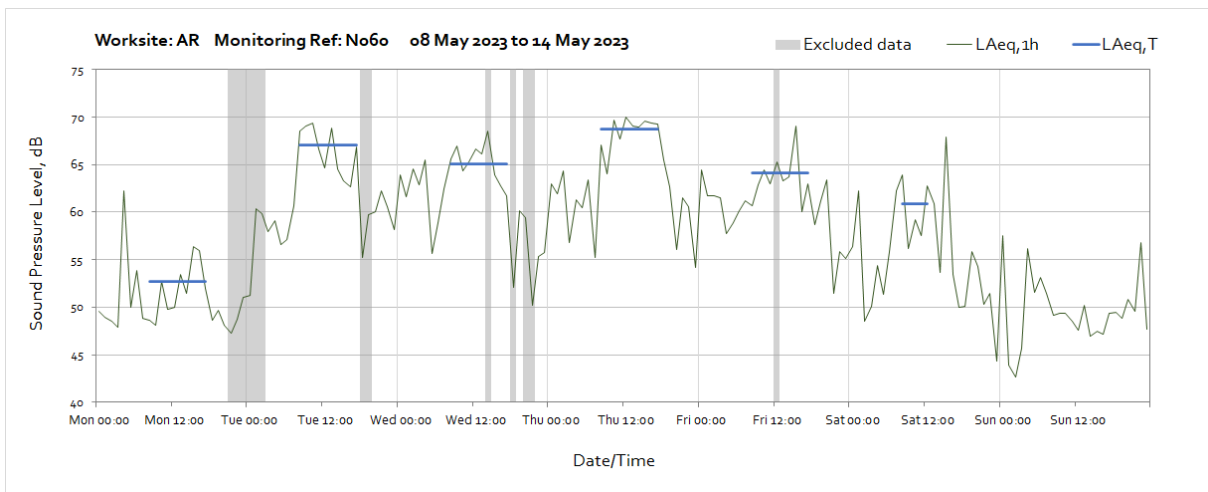
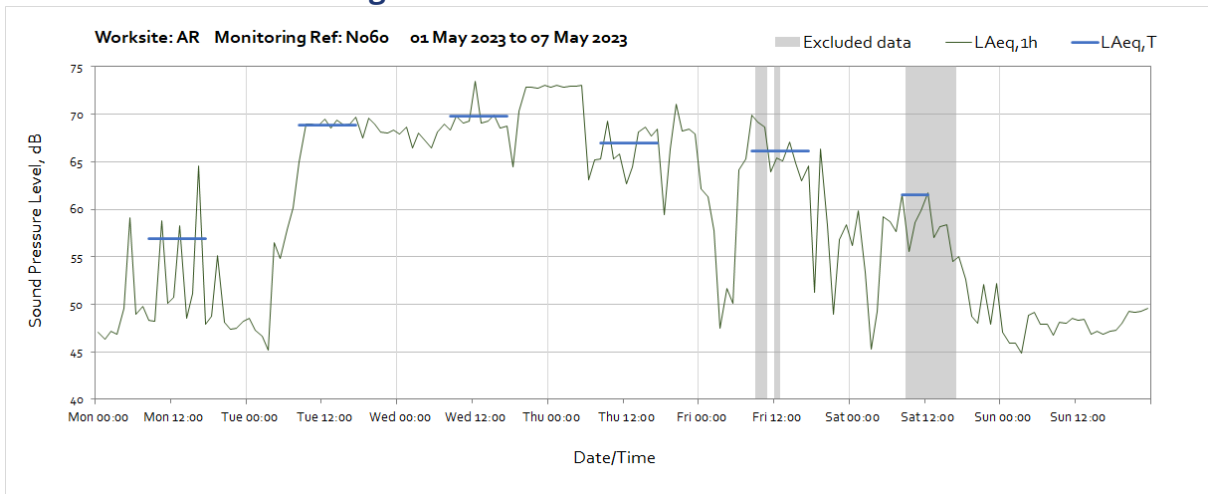
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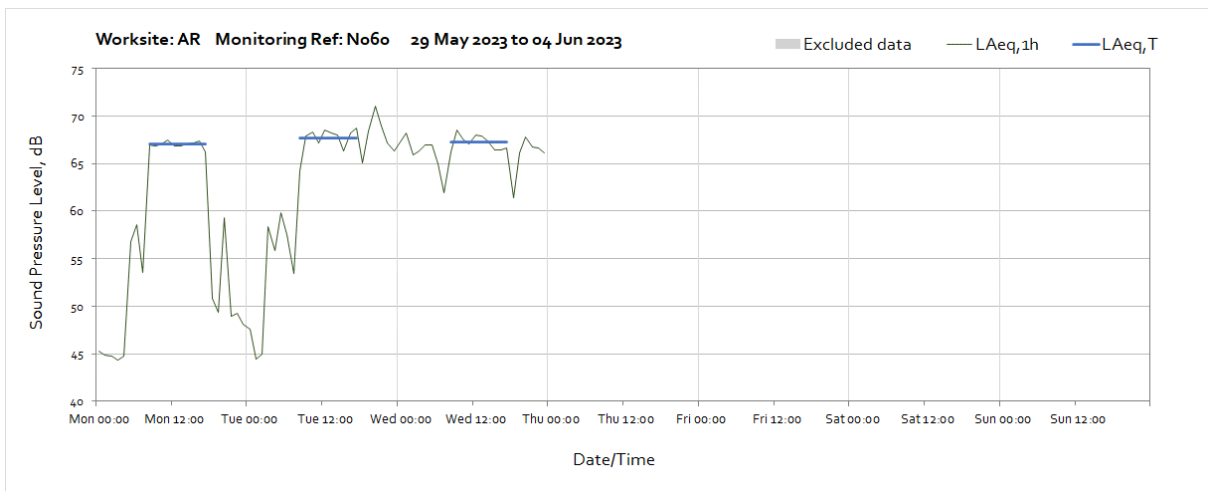
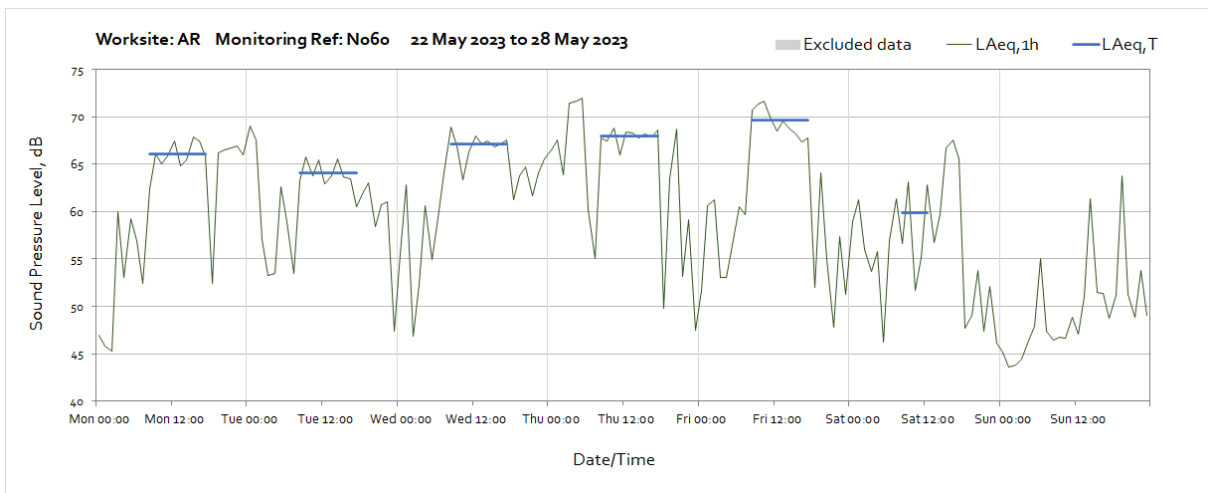
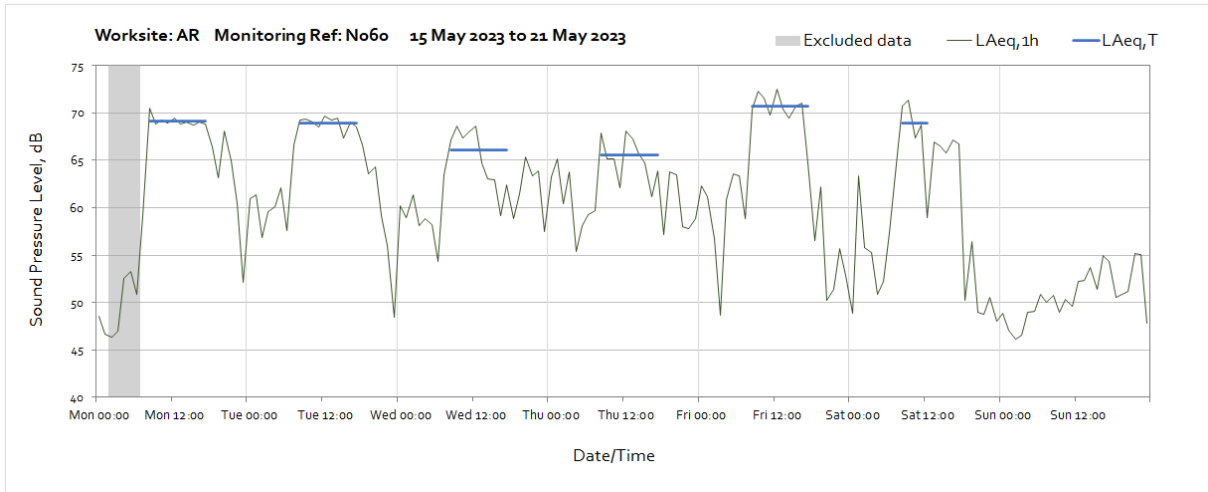






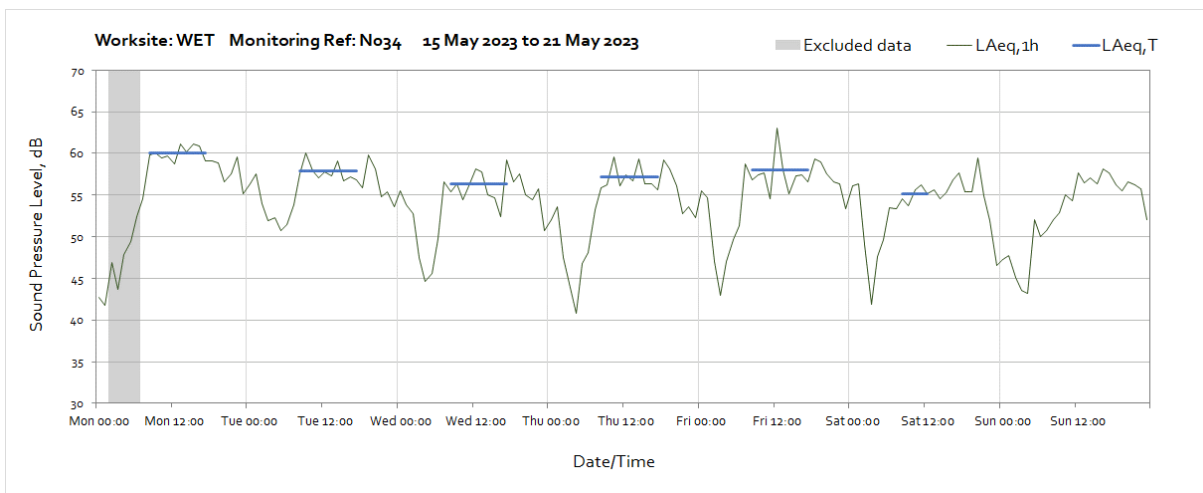
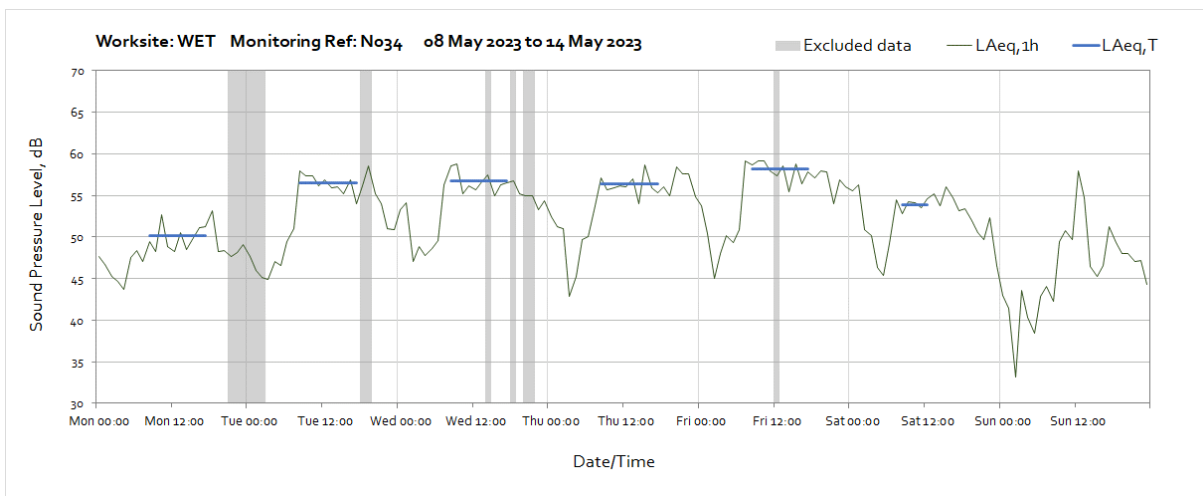
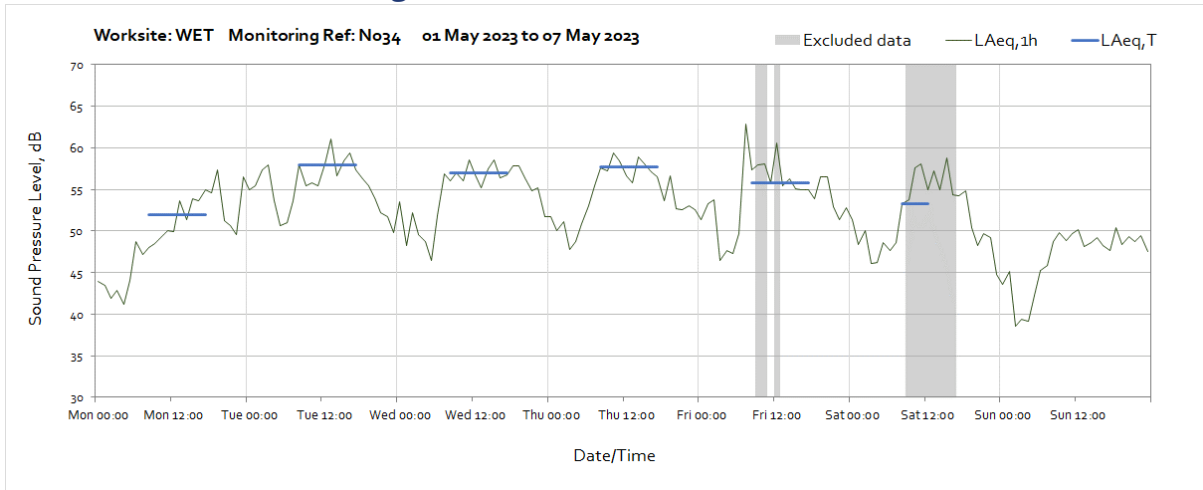
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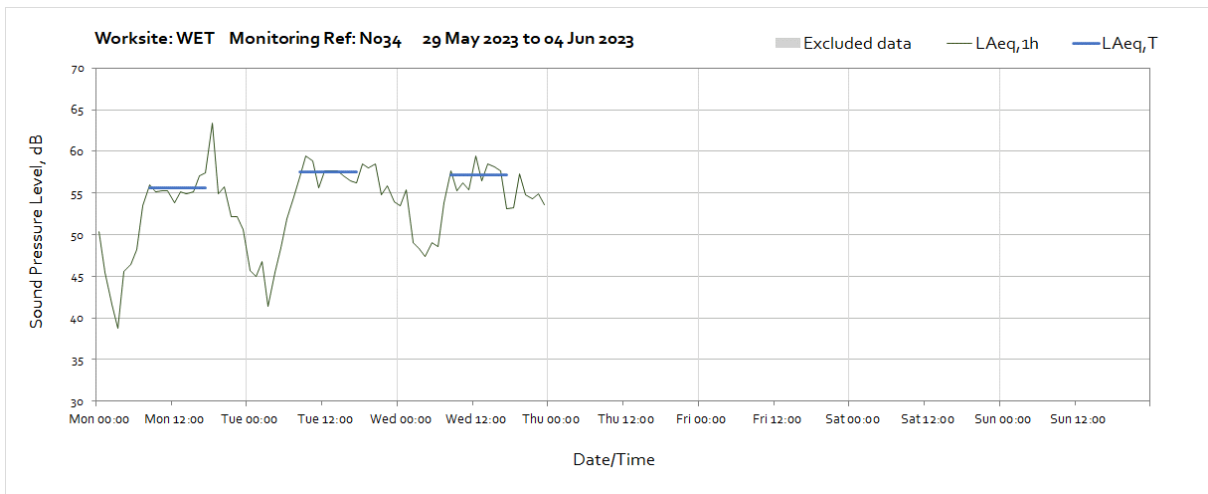
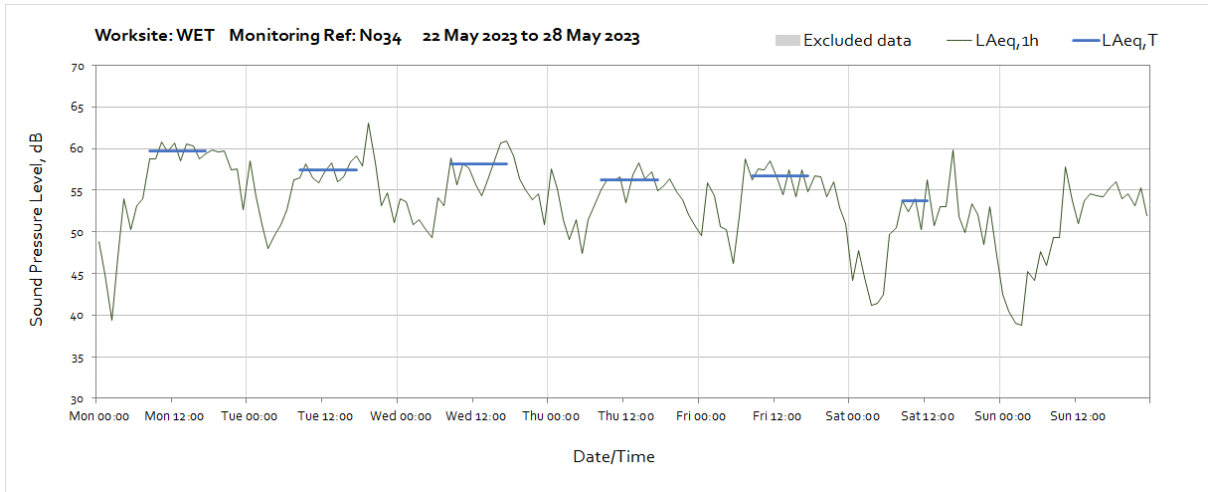




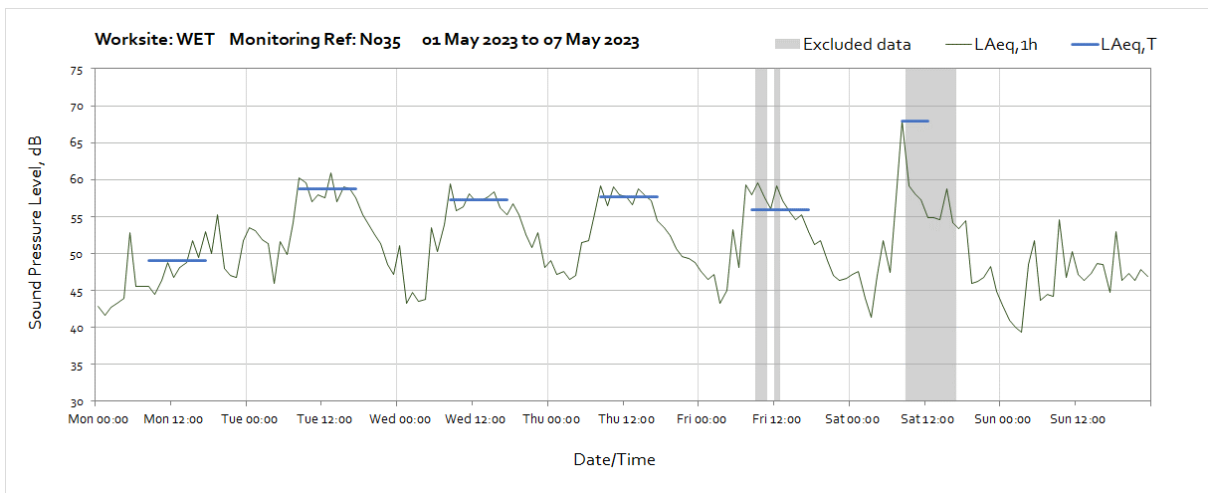
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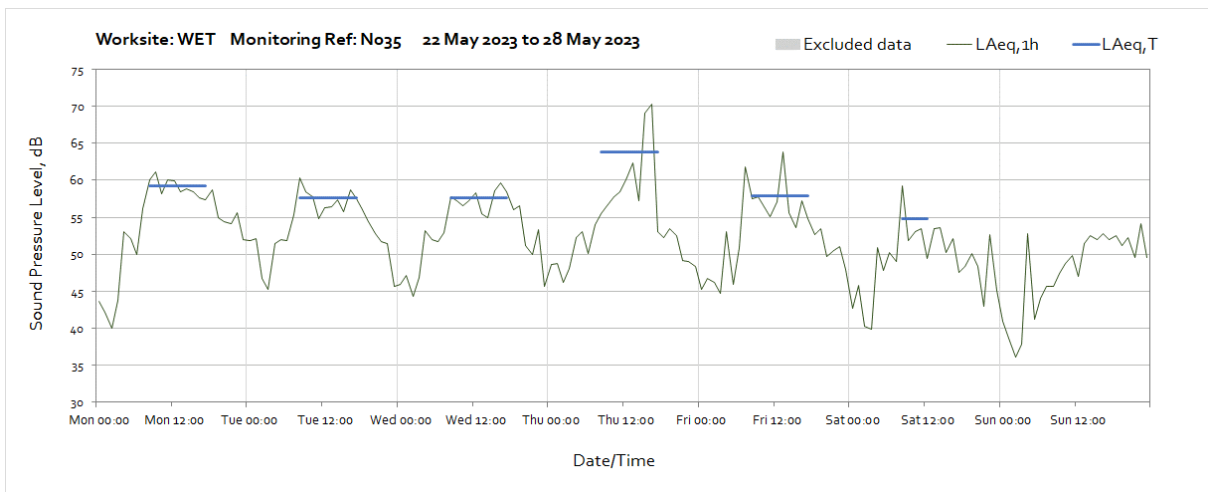
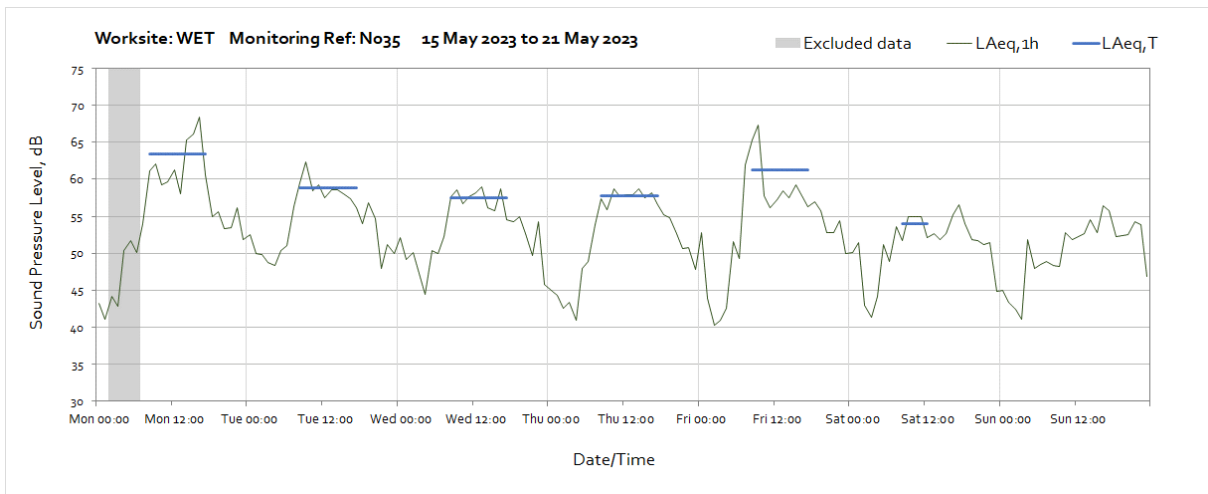
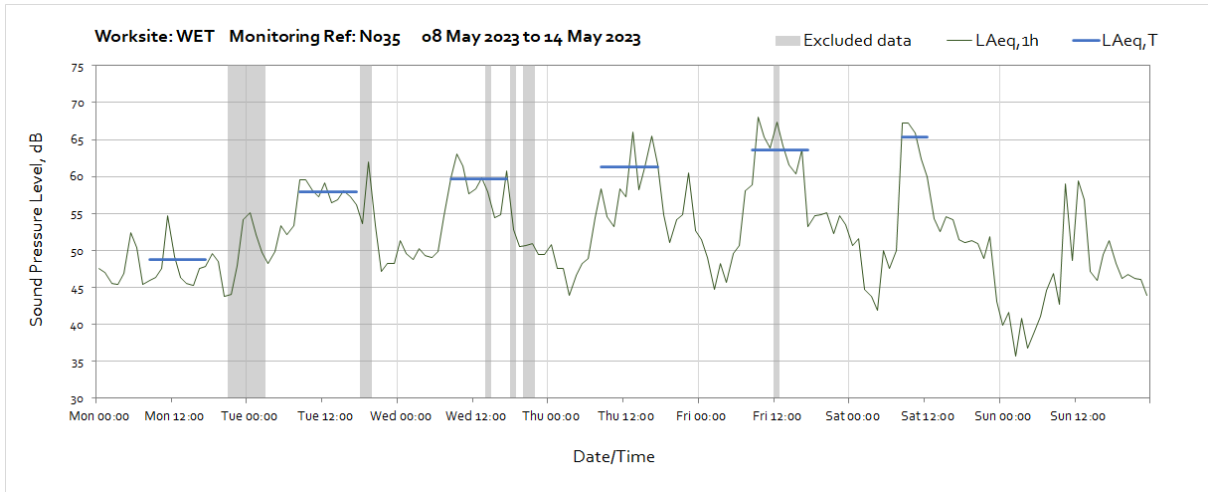


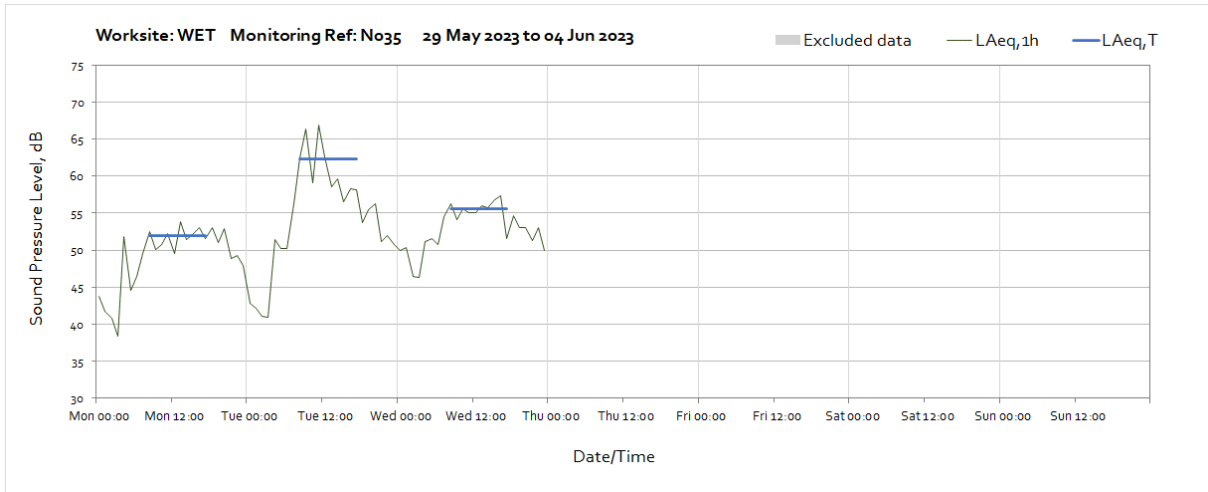
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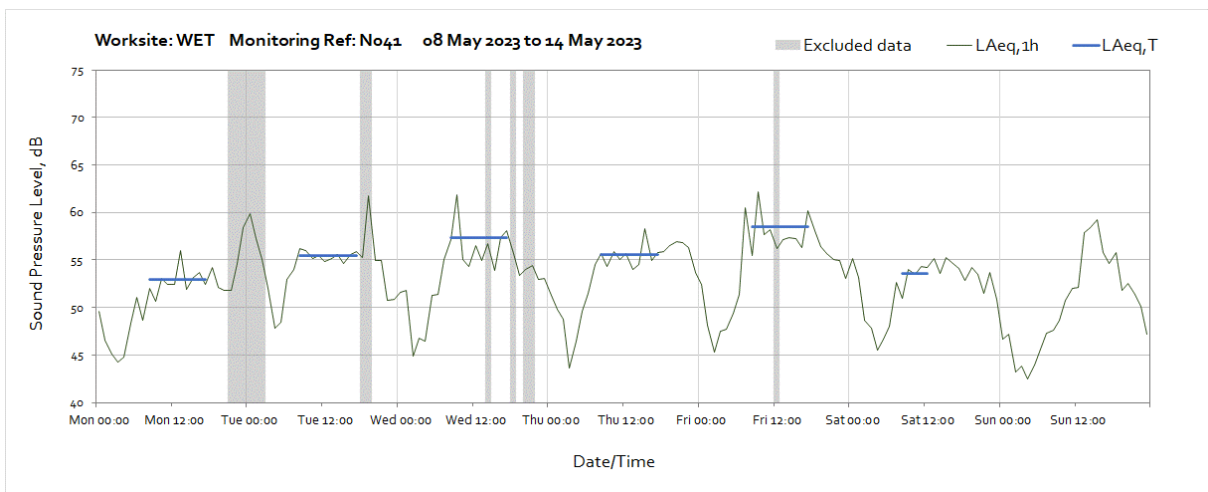
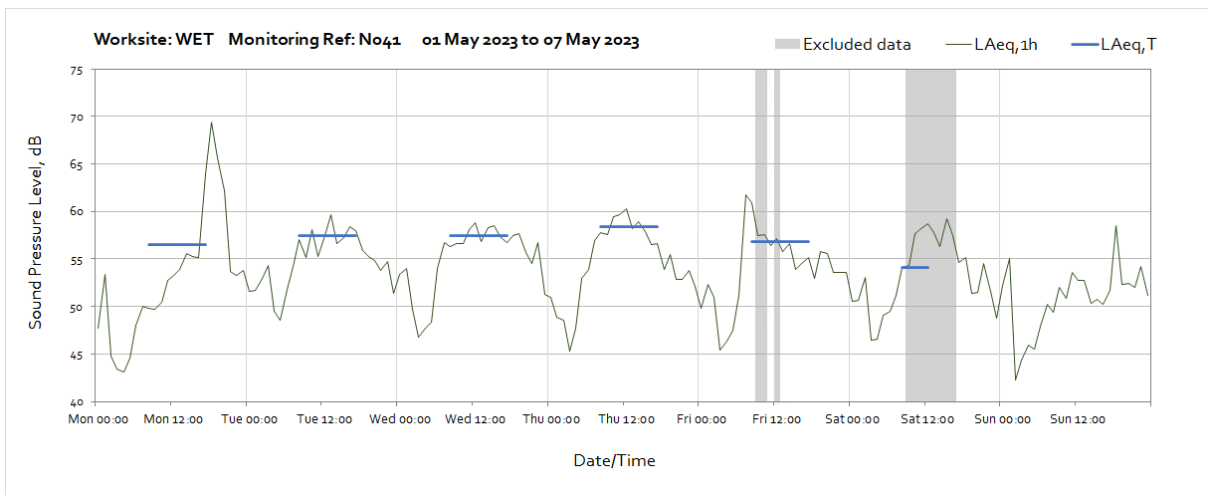
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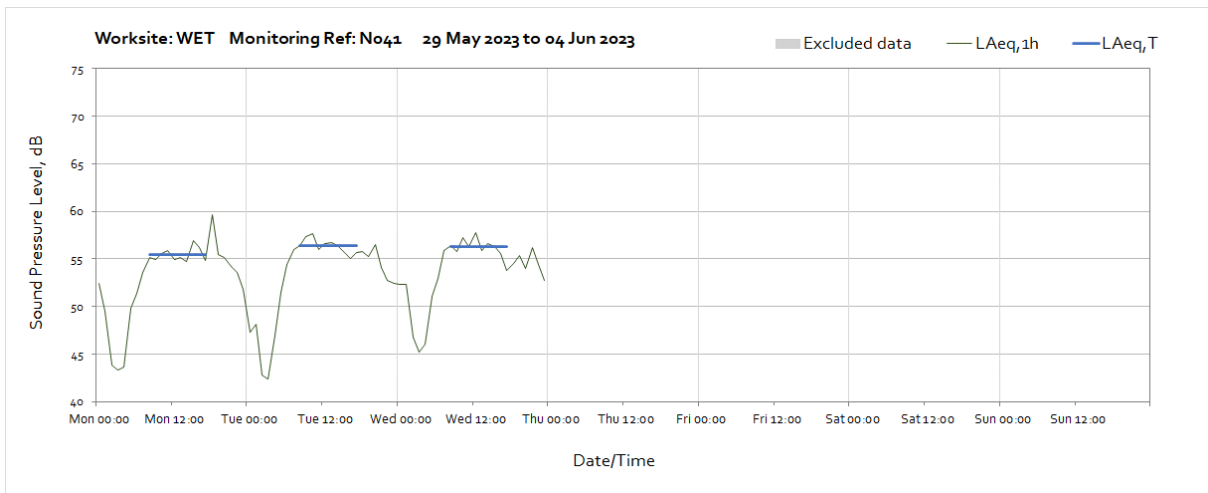
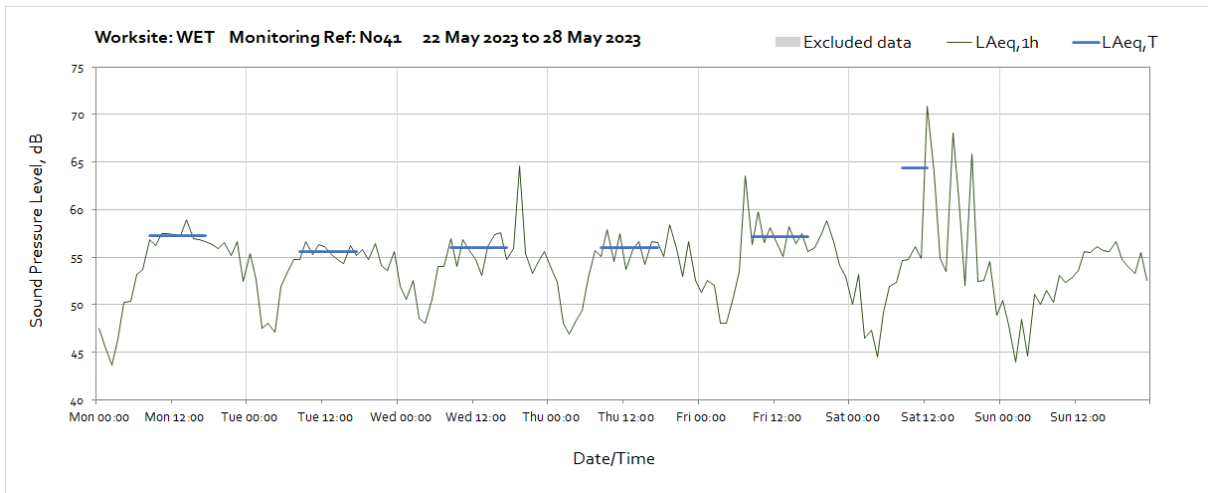
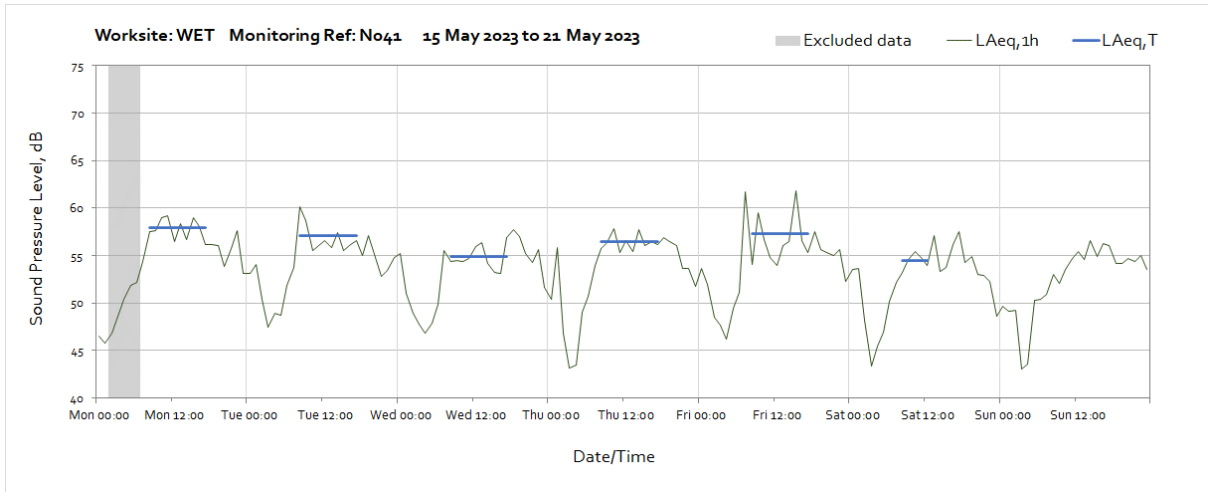




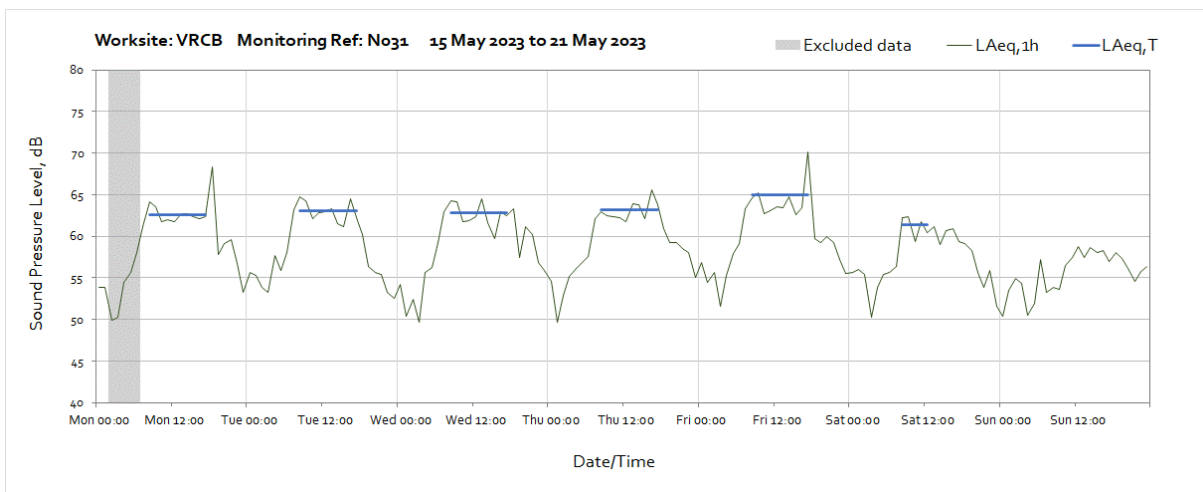
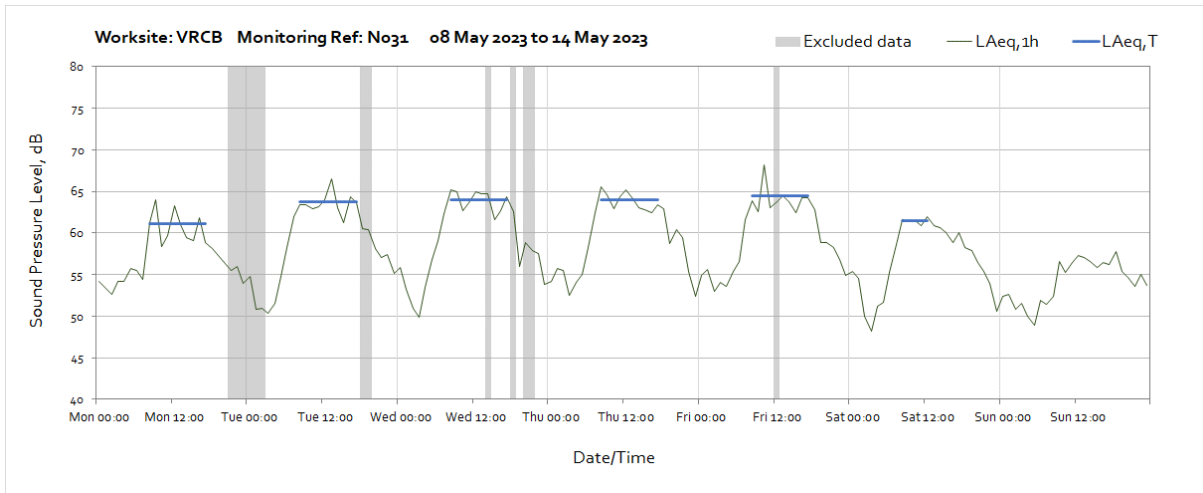
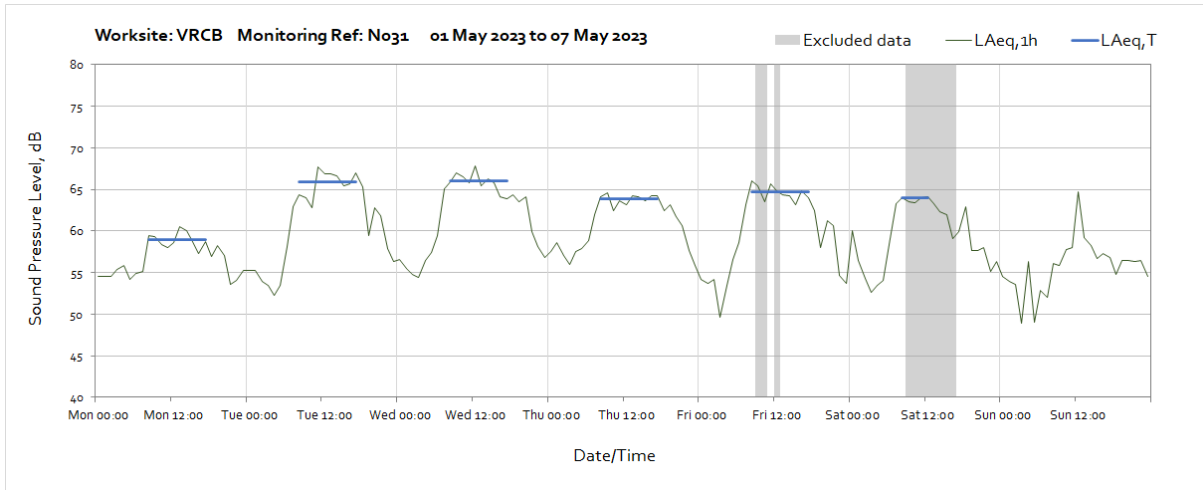


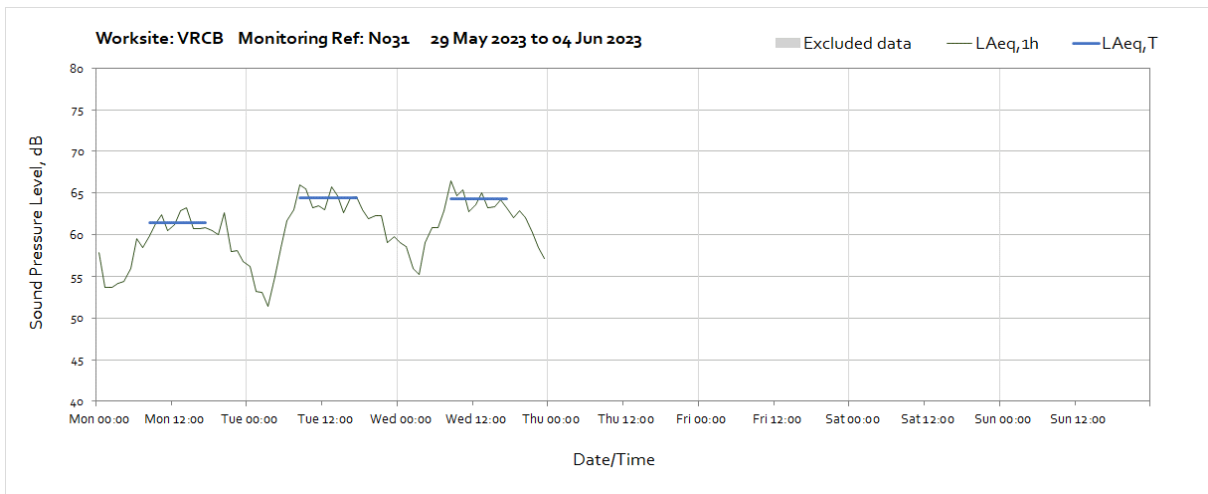
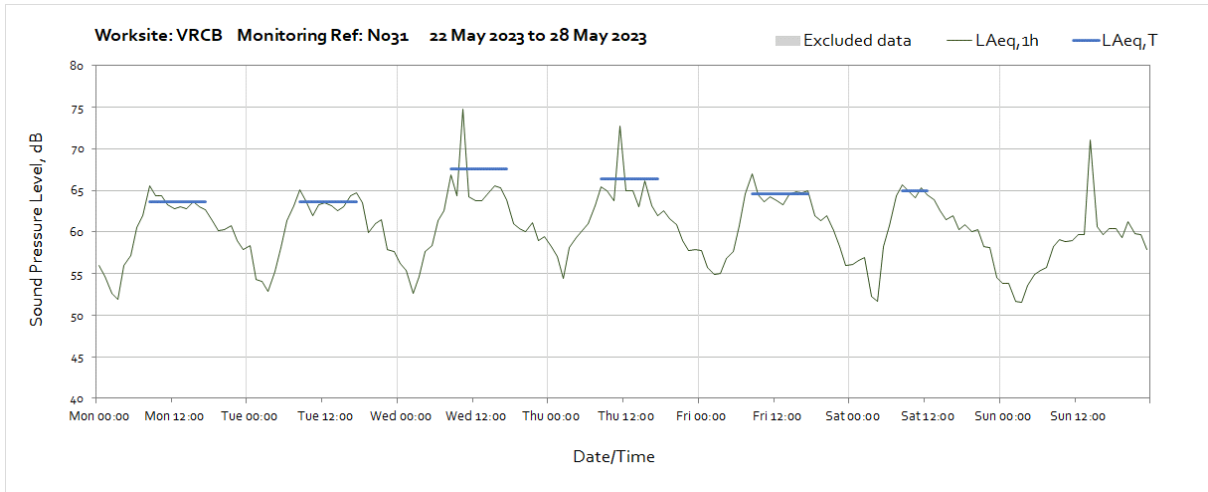
**Worksite: WET - Monitoring Ref: N041**



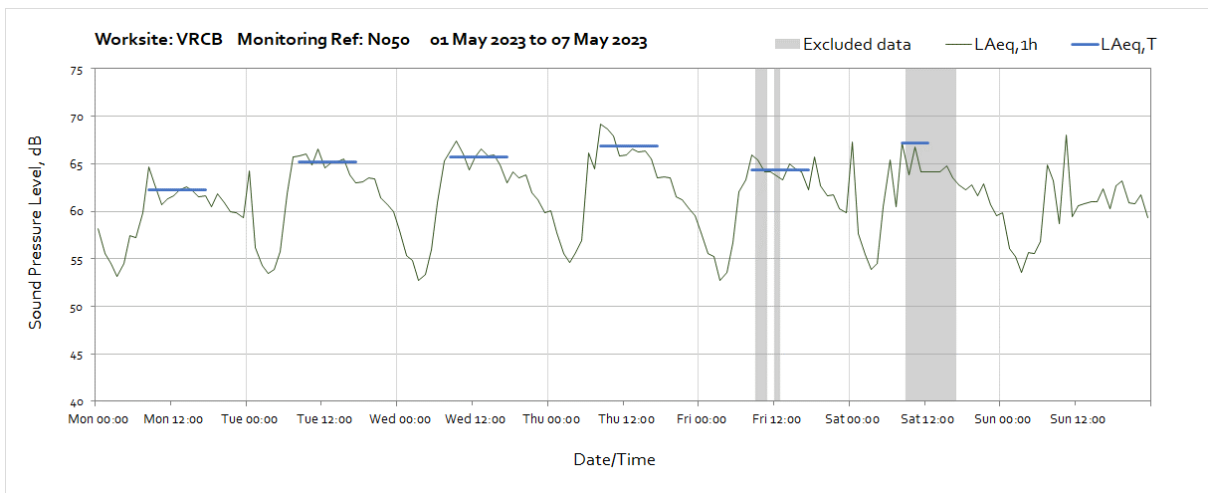


## Worksite: VRCB – Monitoring Ref: N031

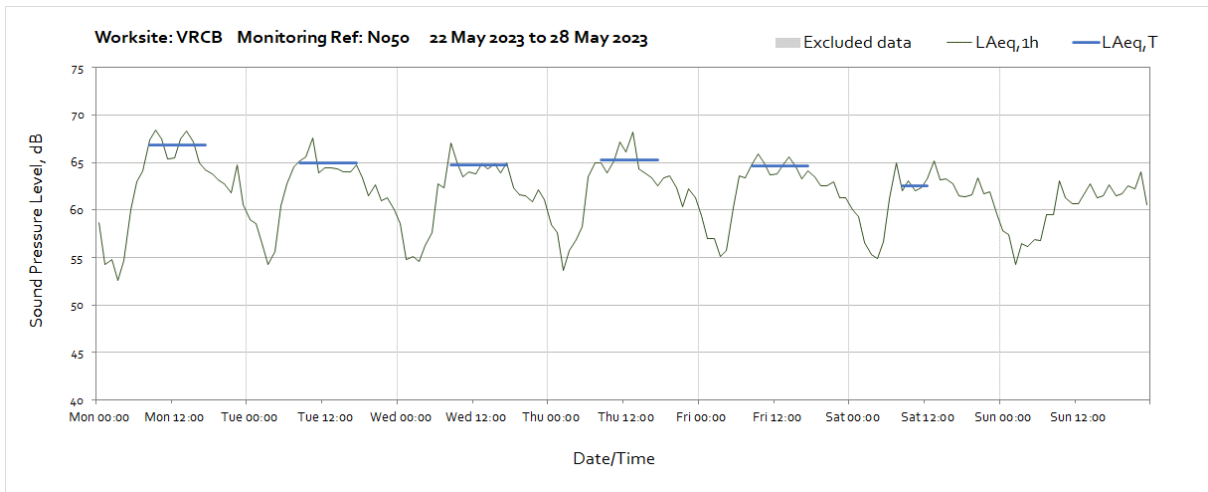
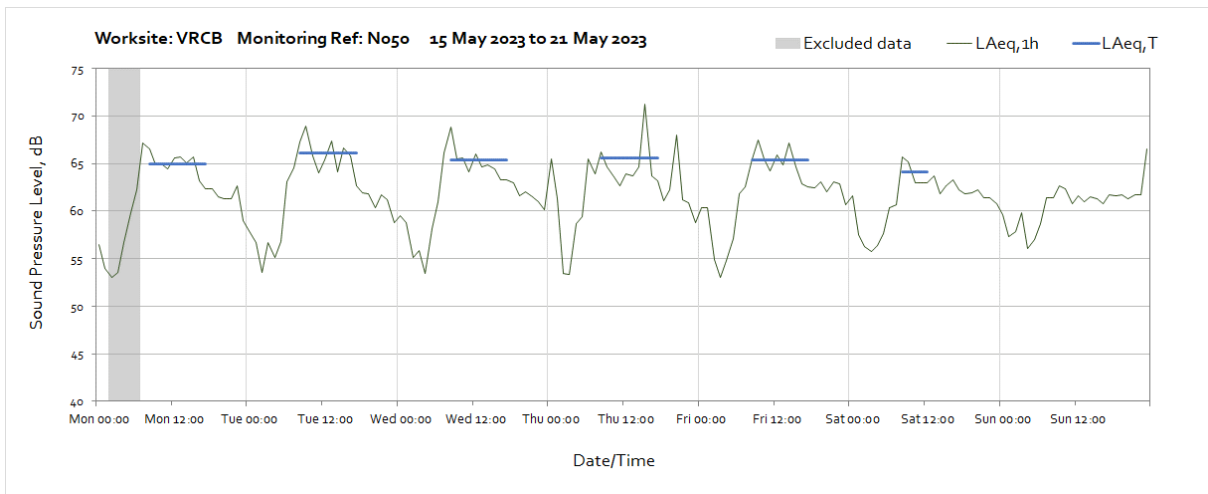
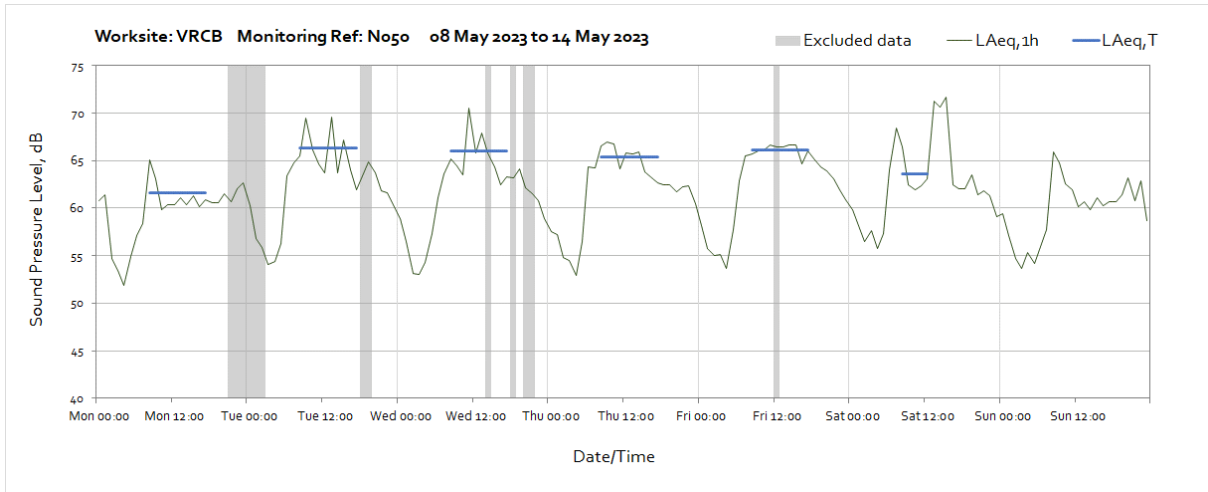


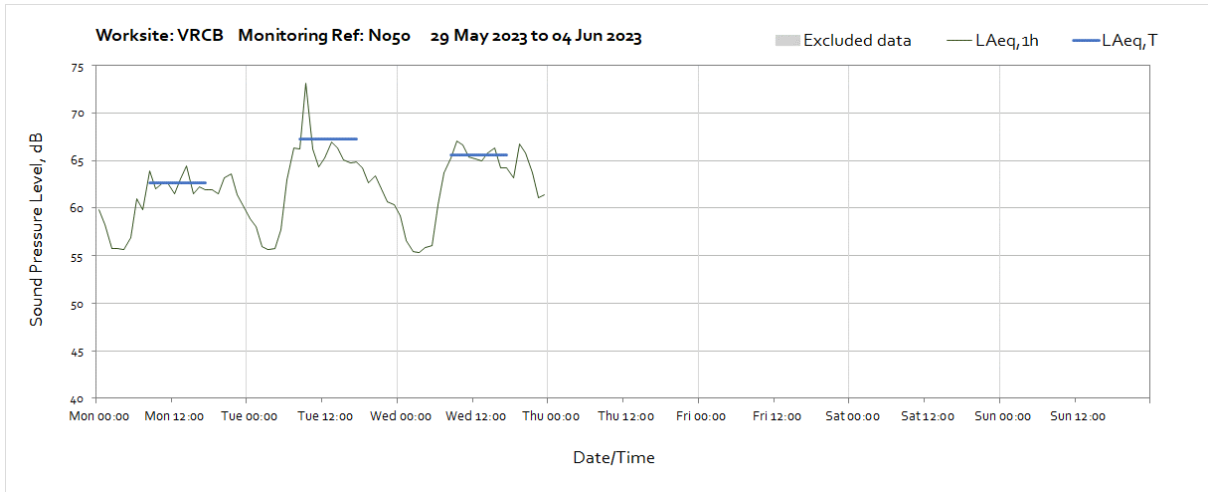


**Worksite: VRCB - Monitoring Ref: N050**

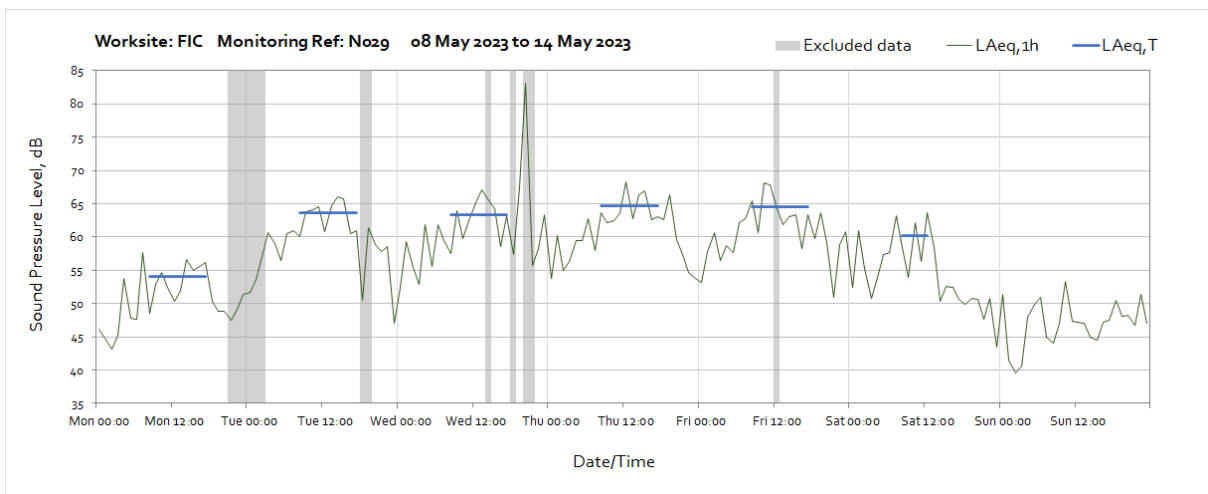
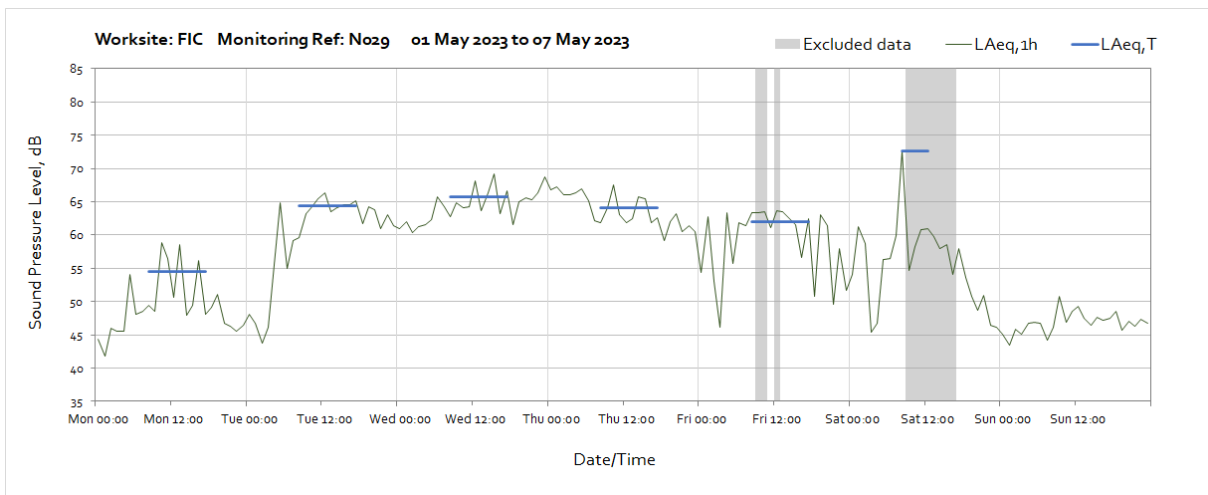


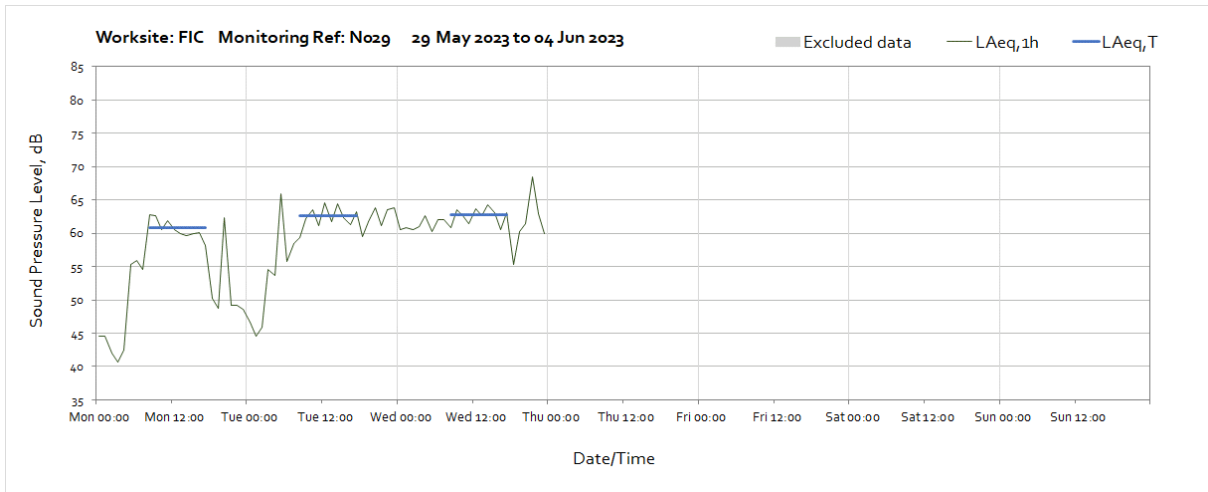
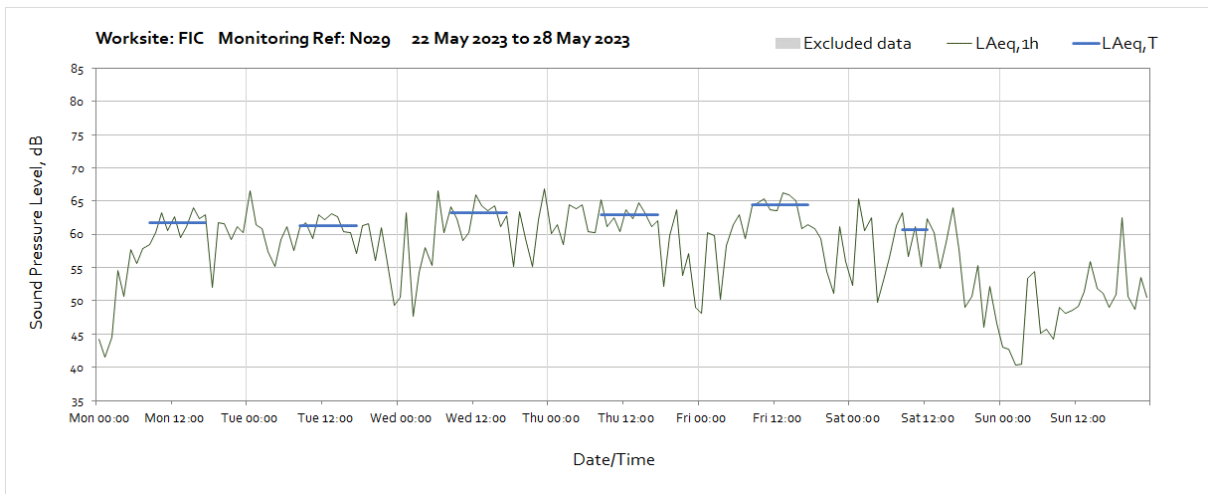
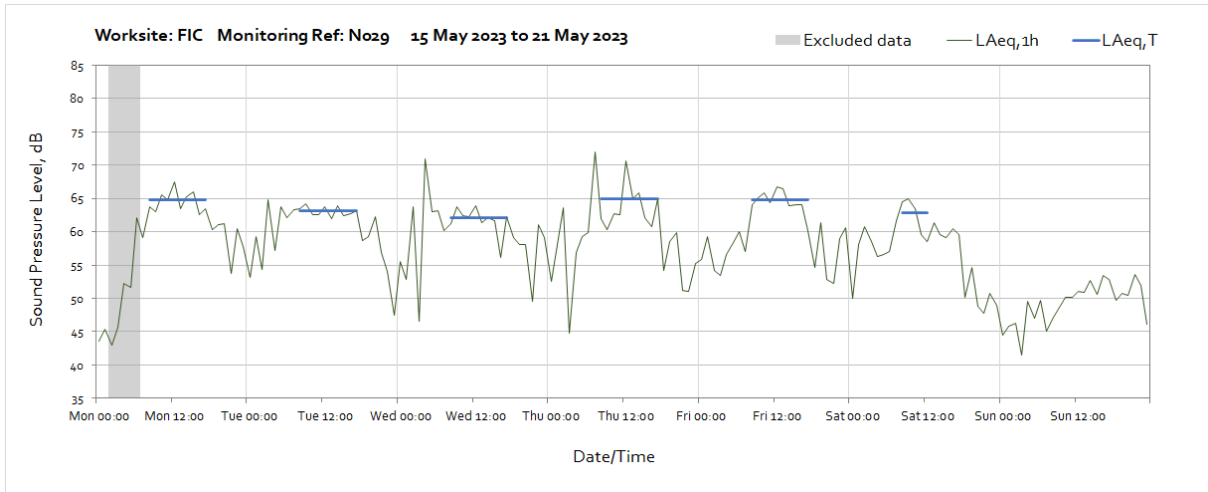




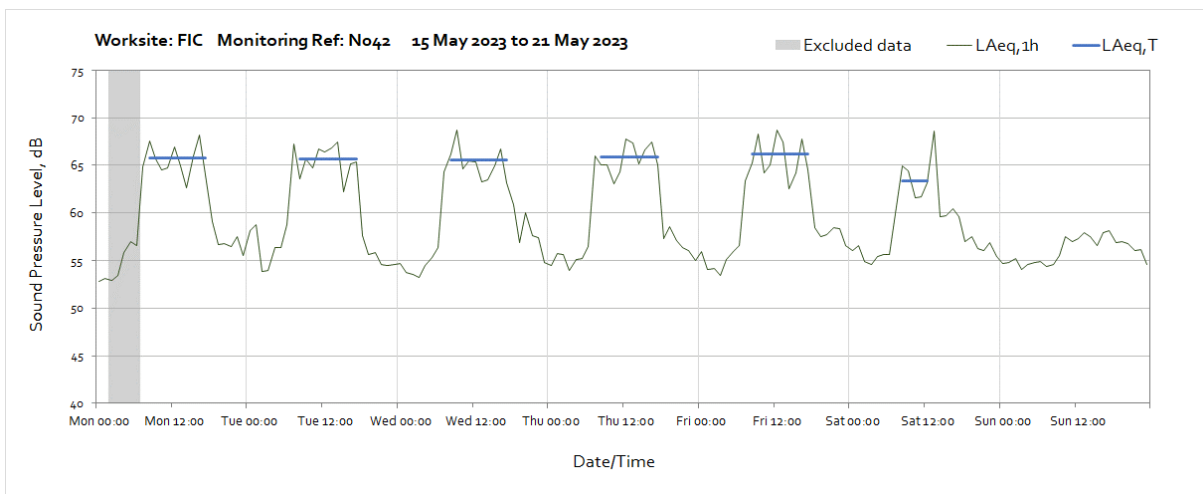
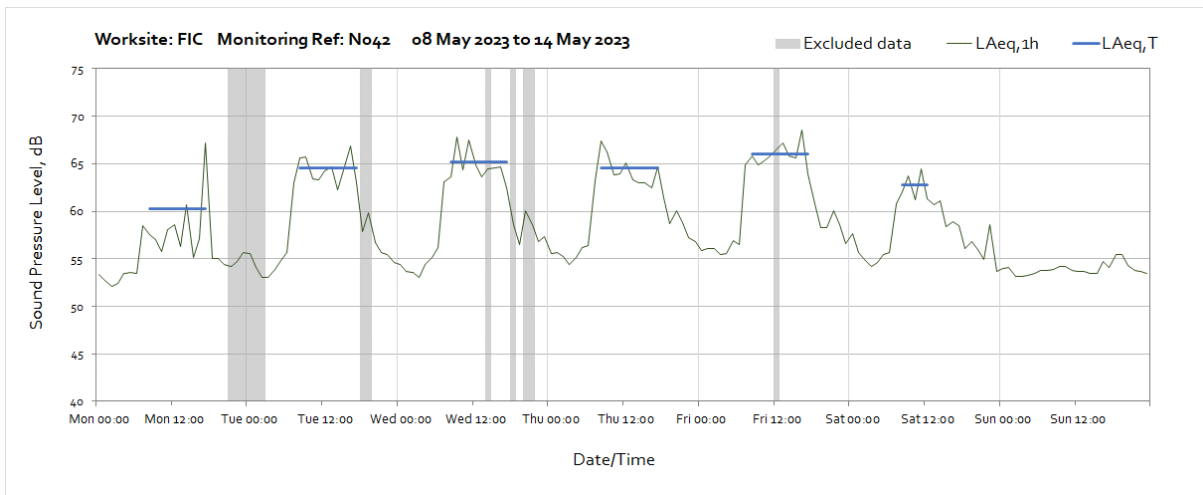
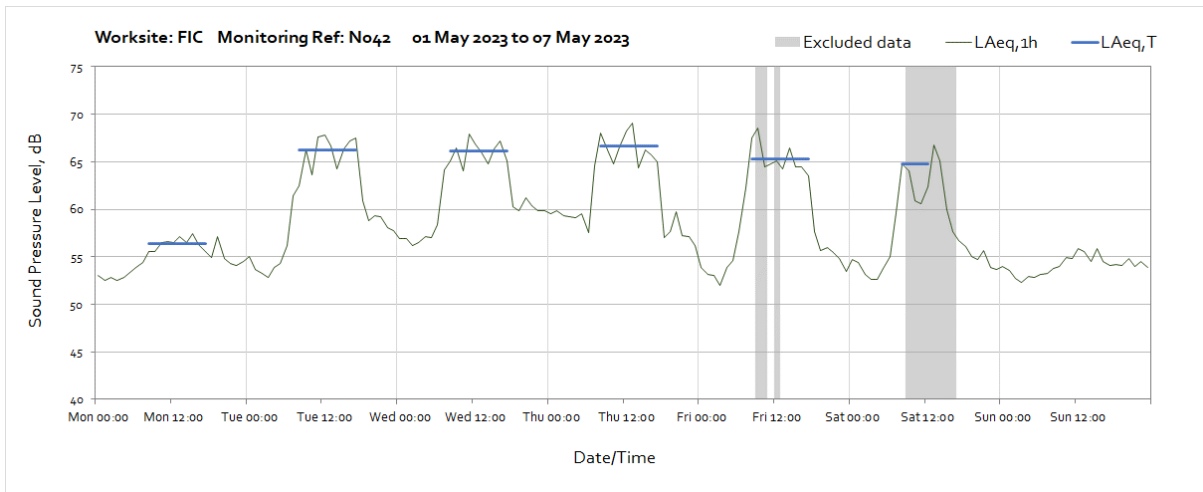


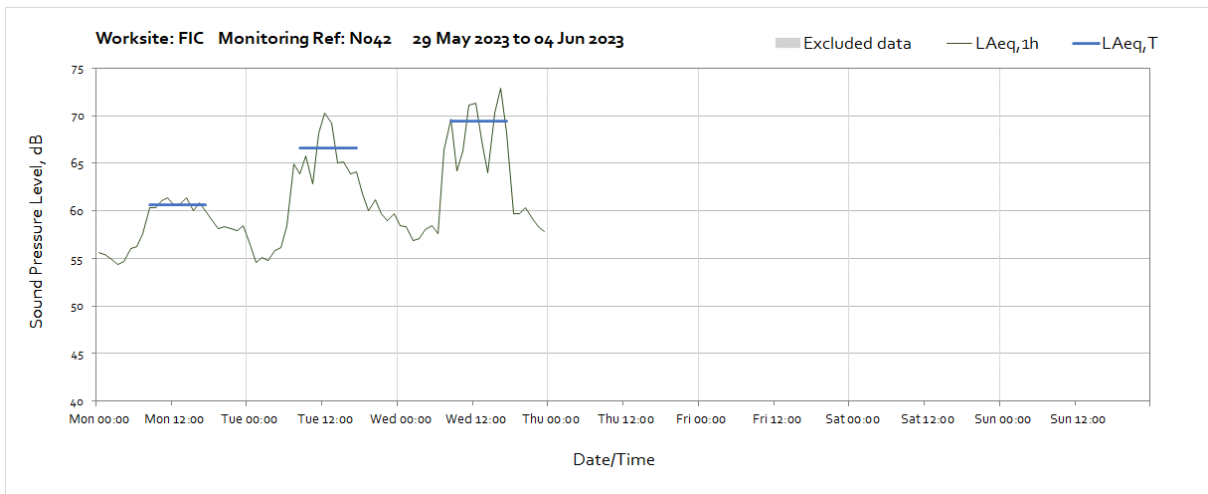
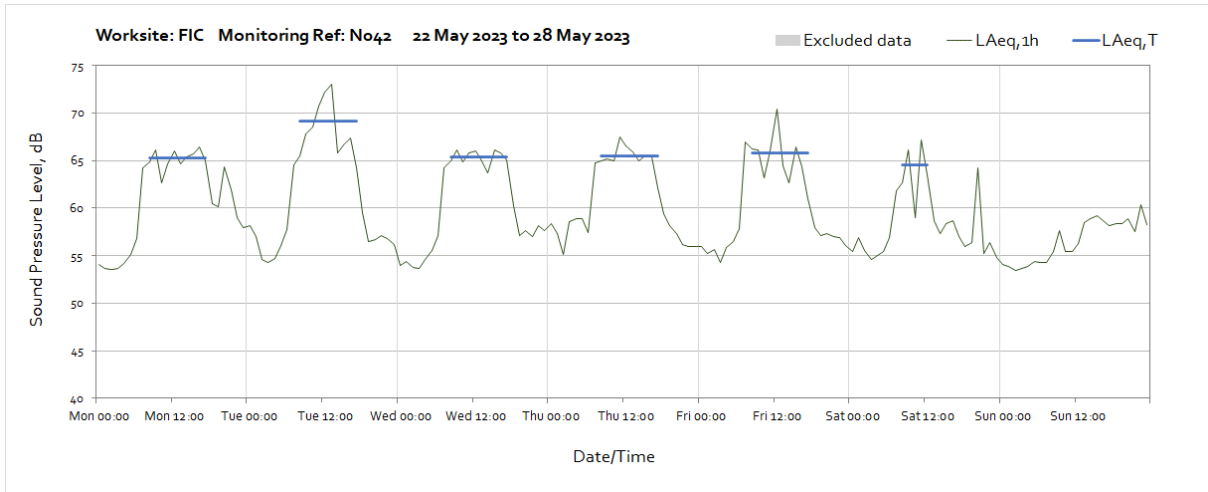
**Worksite: FIC – Monitoring Ref: N029**



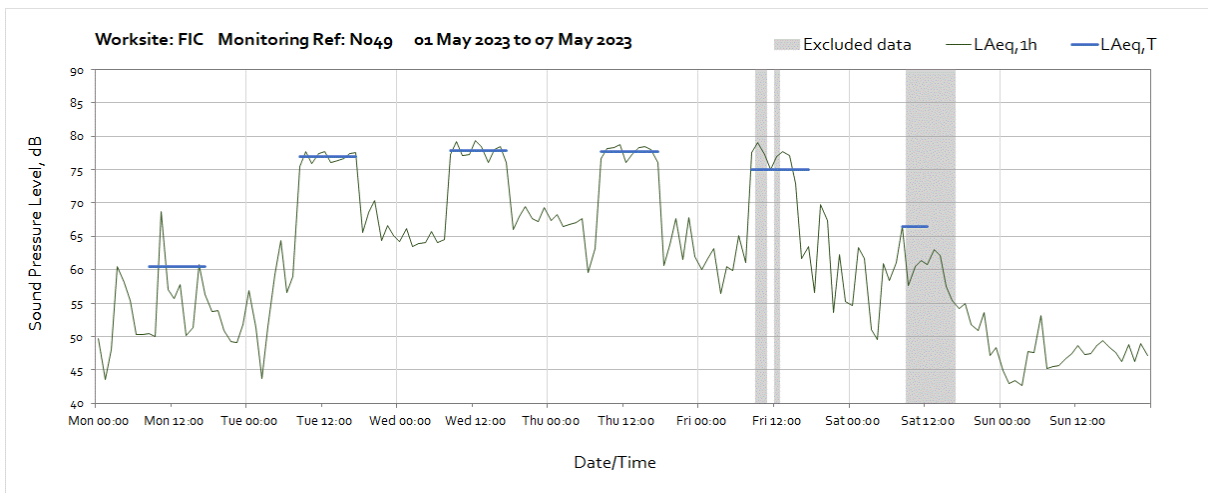


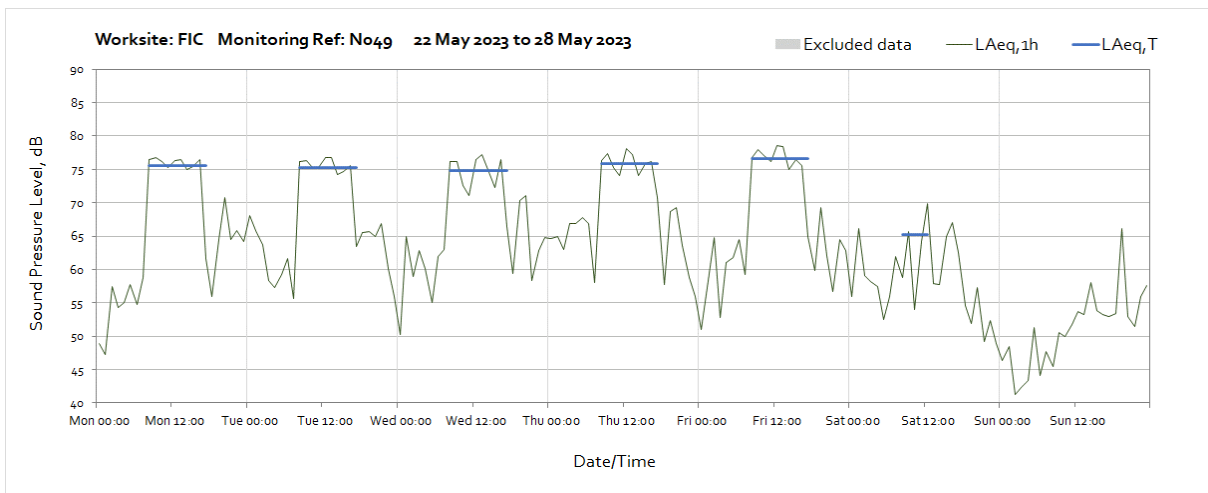
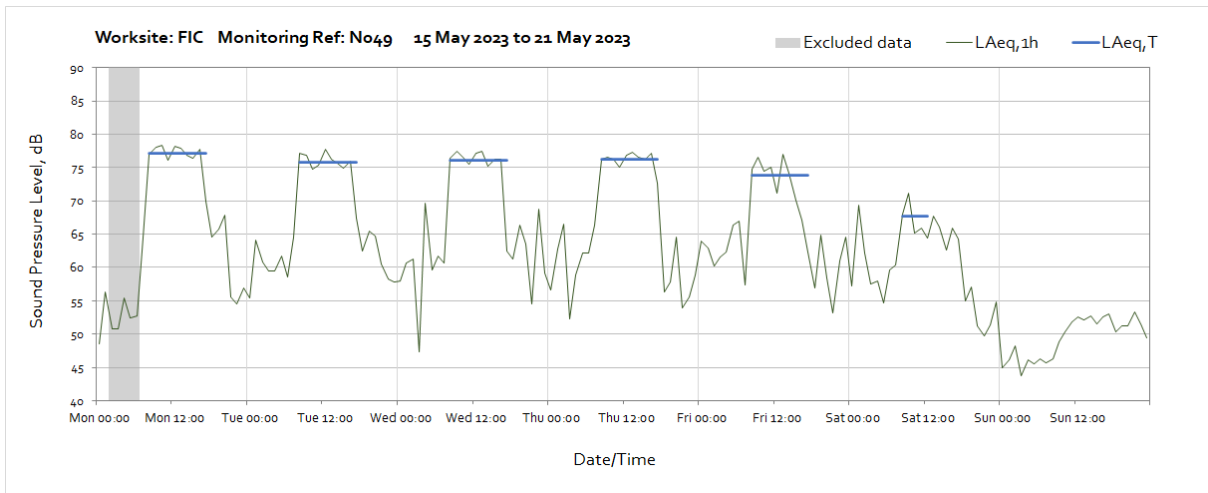
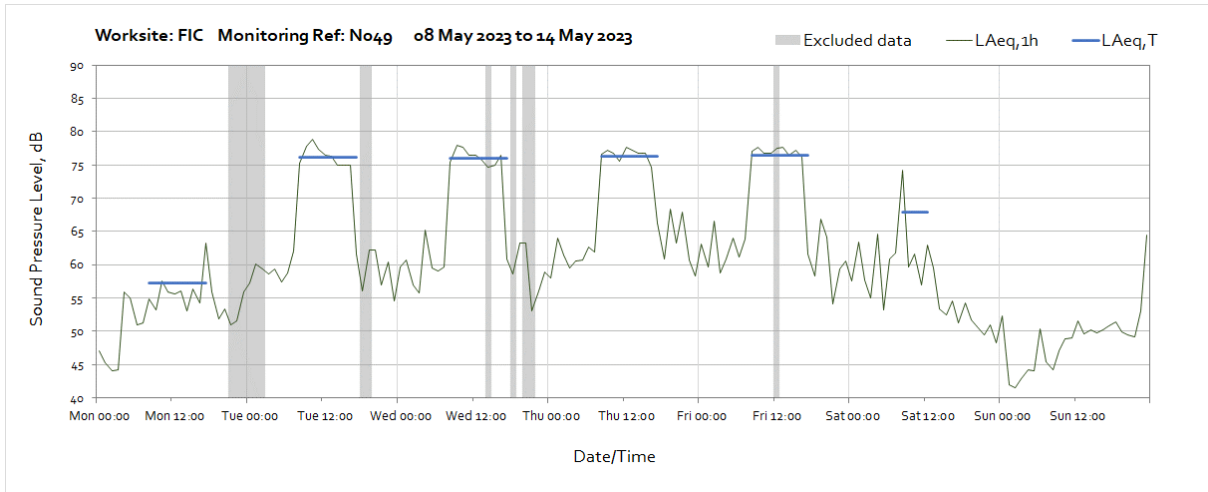
## Worksite: FIC – Monitoring Ref: N042

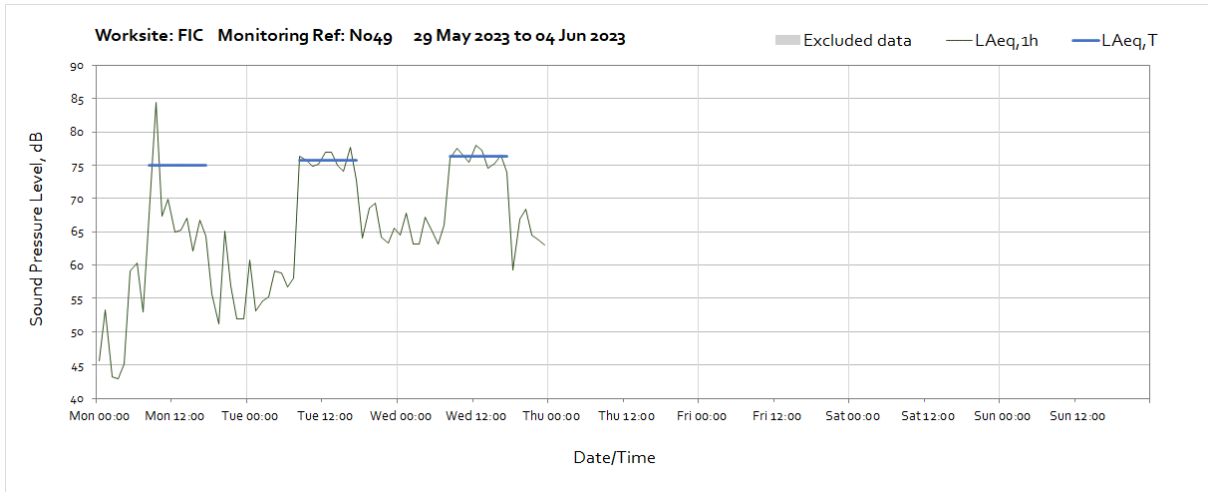




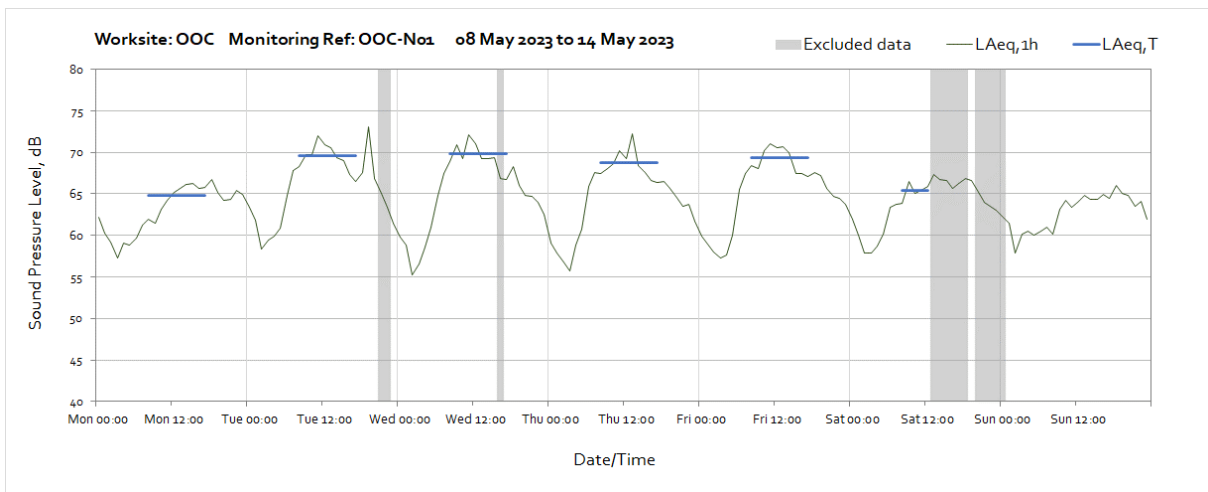
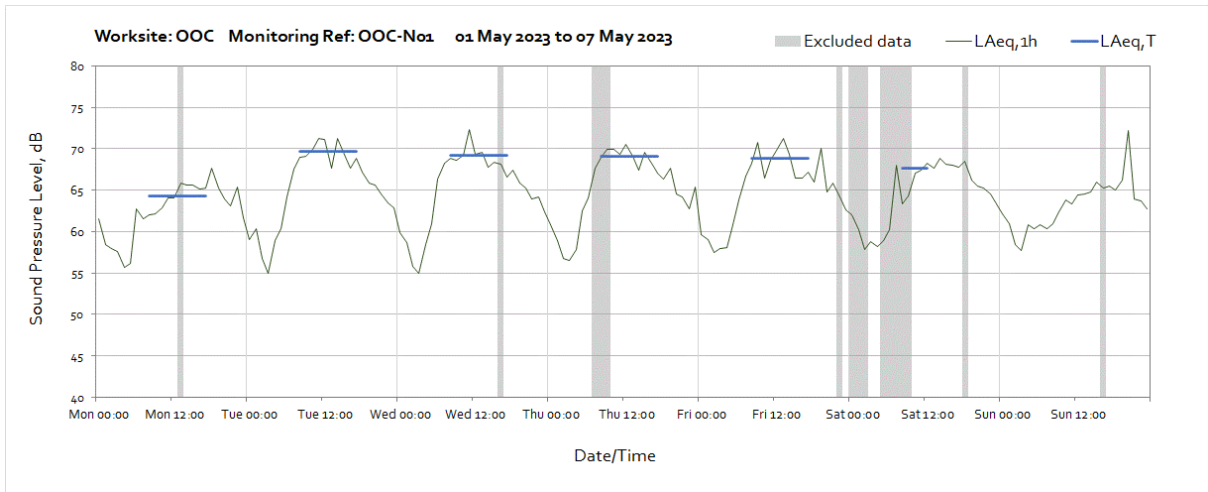
### Worksite: FIC - Monitoring Ref: N049



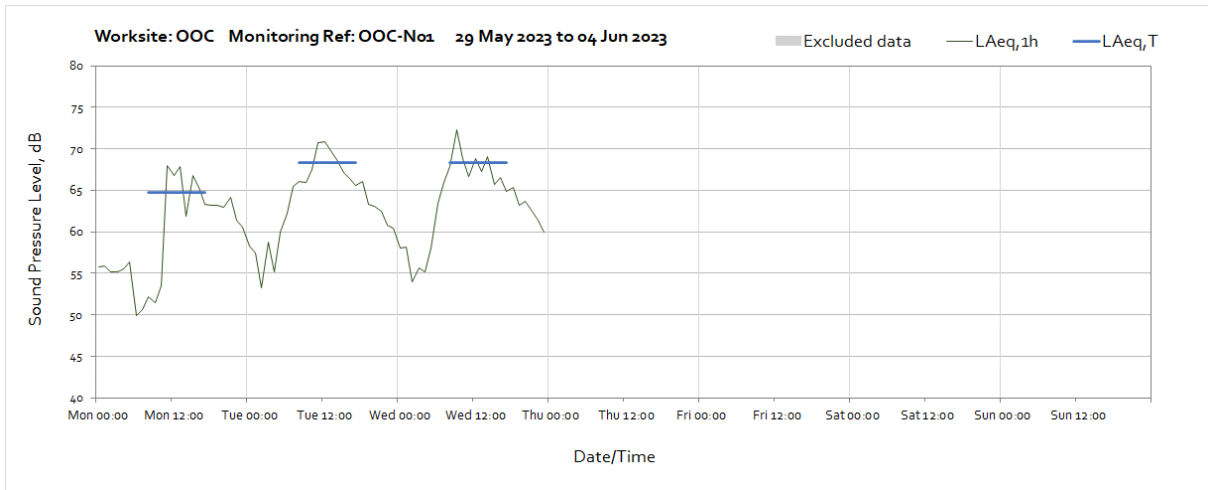
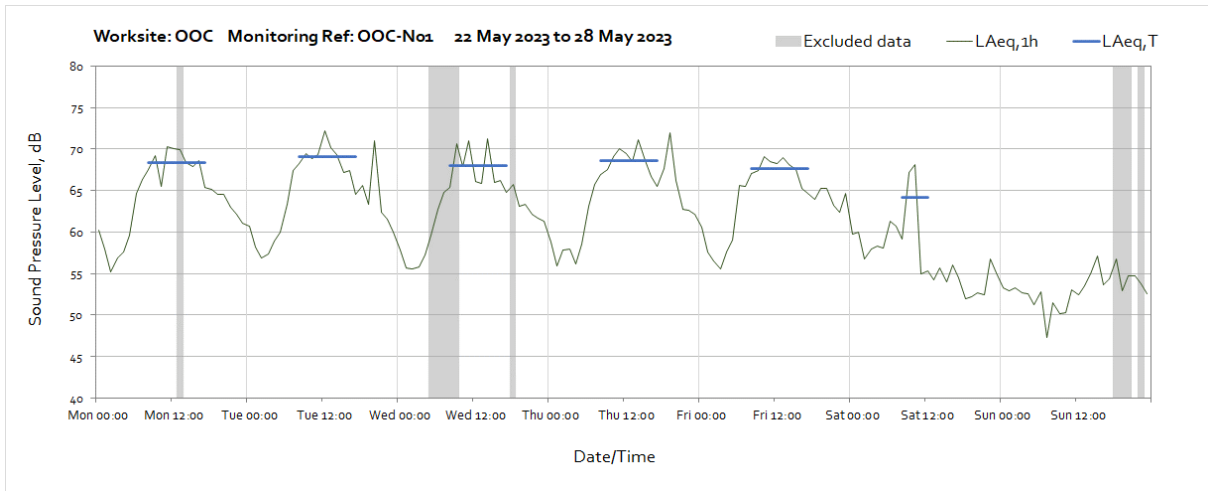
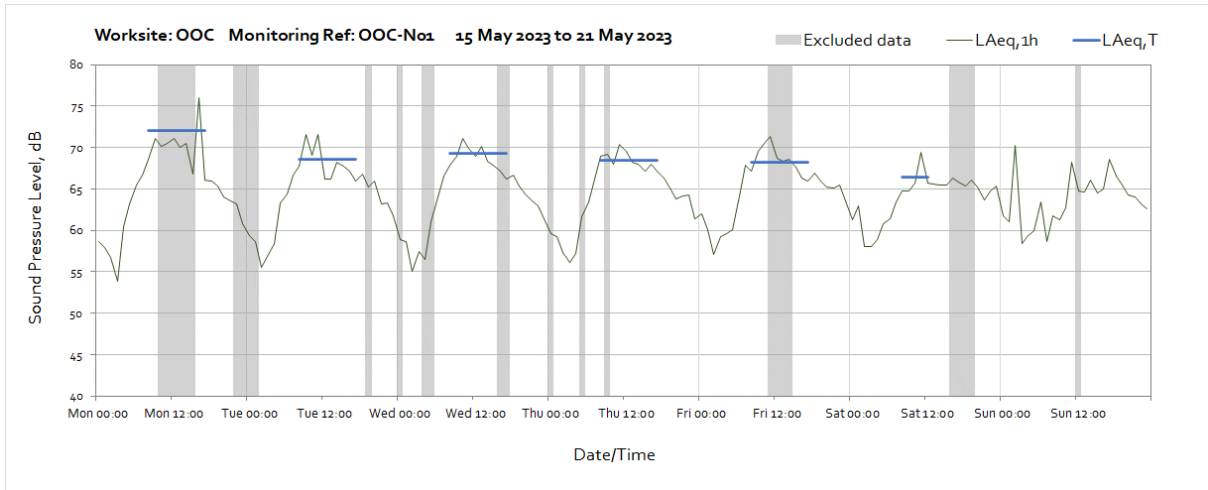




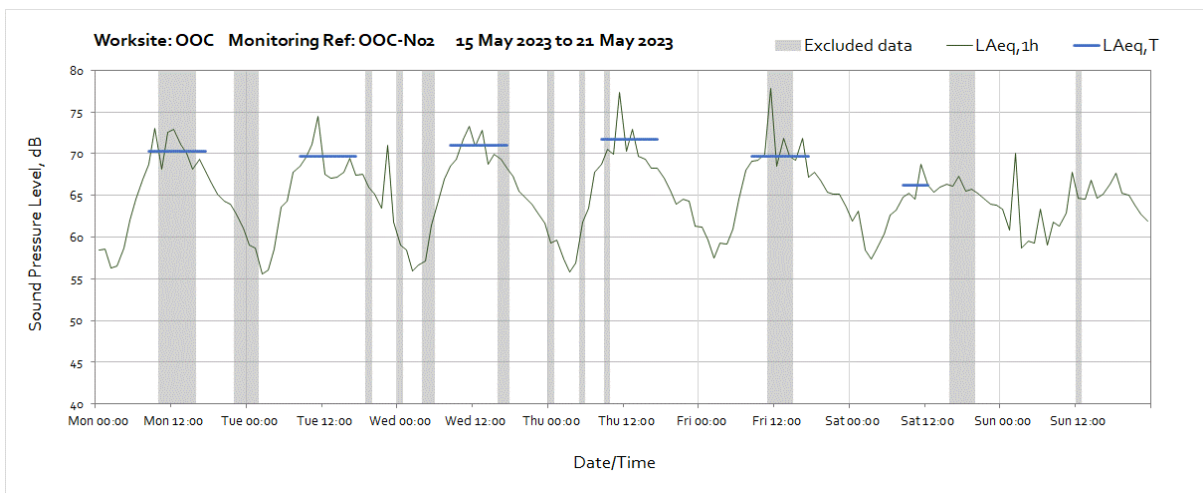
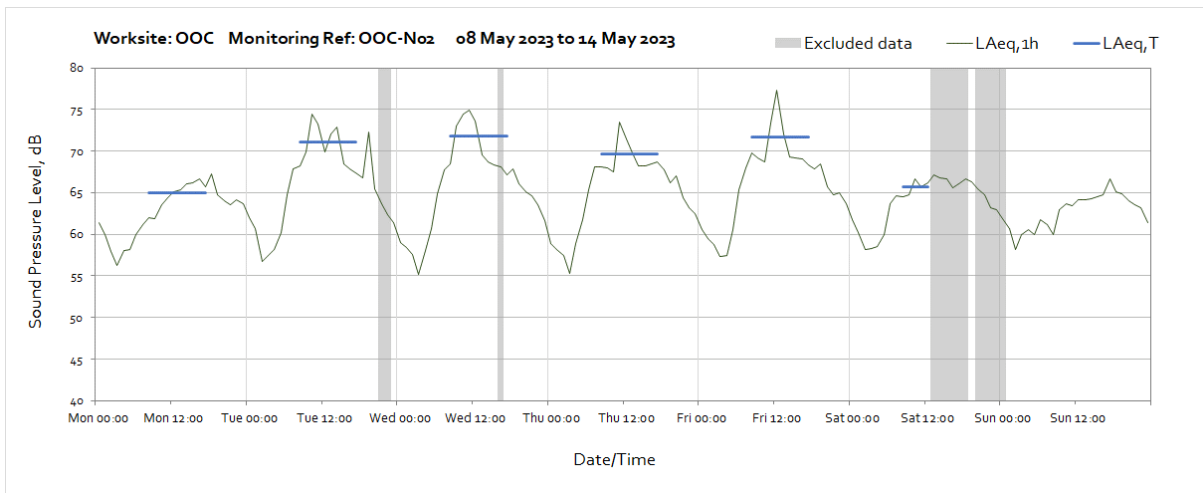
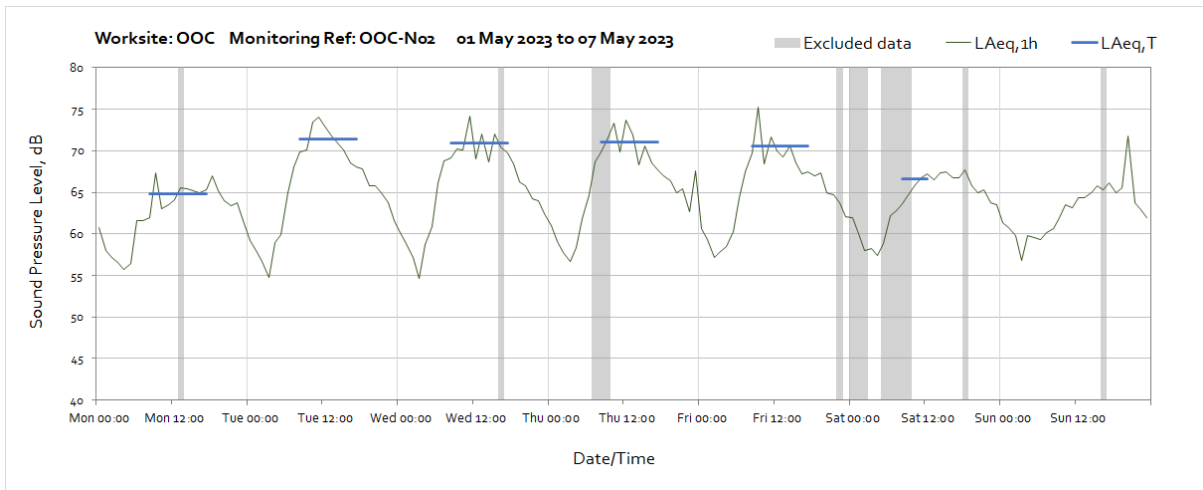
**Worksite: OOC – Monitoring Ref: OOC-N01**

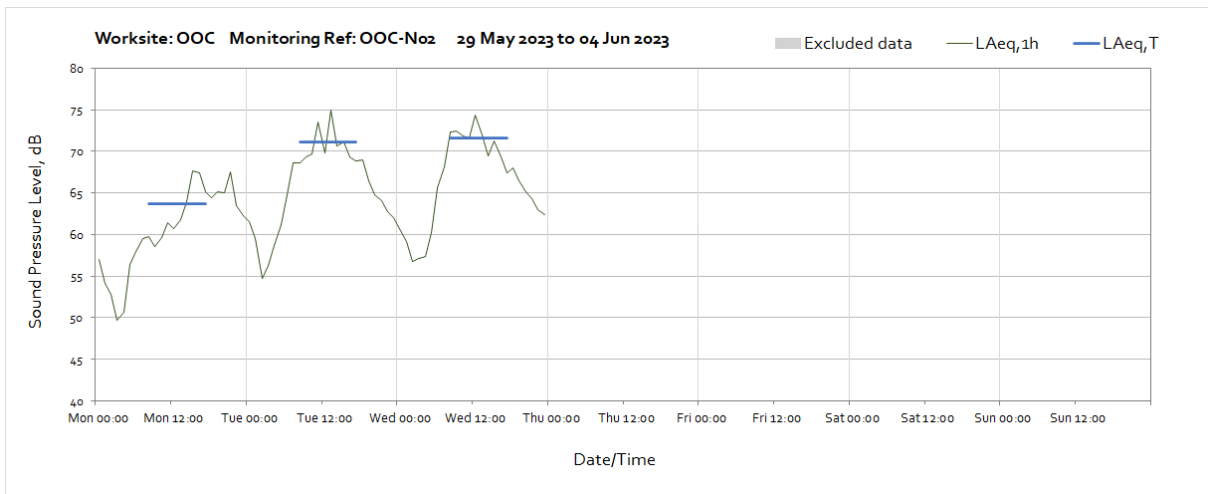
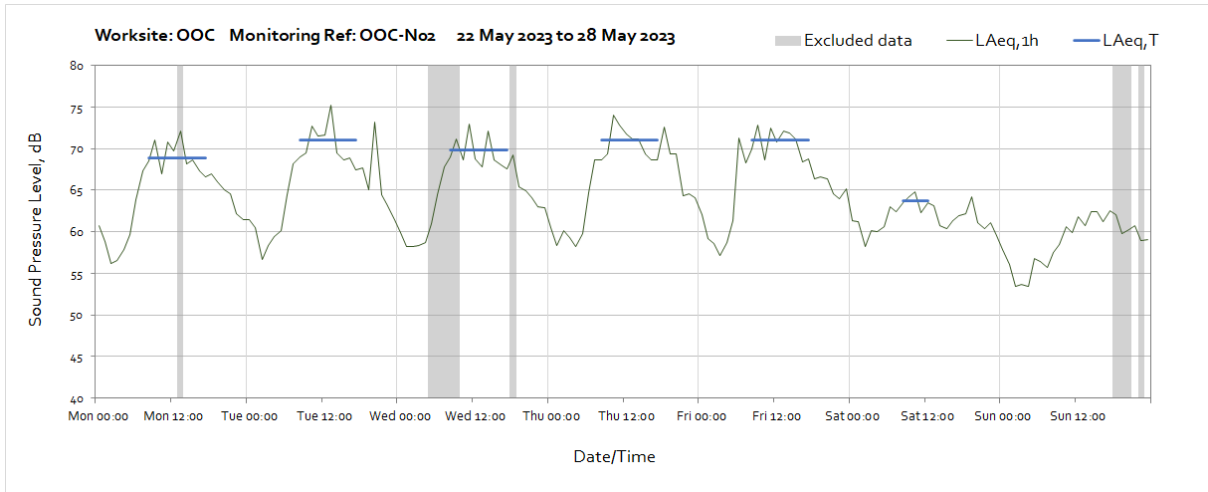




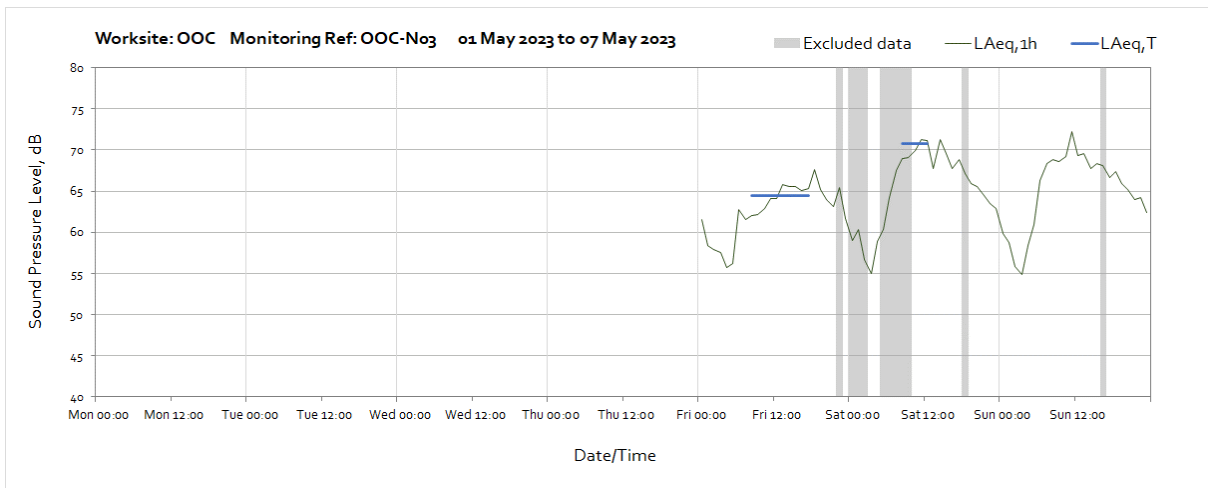


## Worksite: OOC – Monitoring Ref: OOC-N02

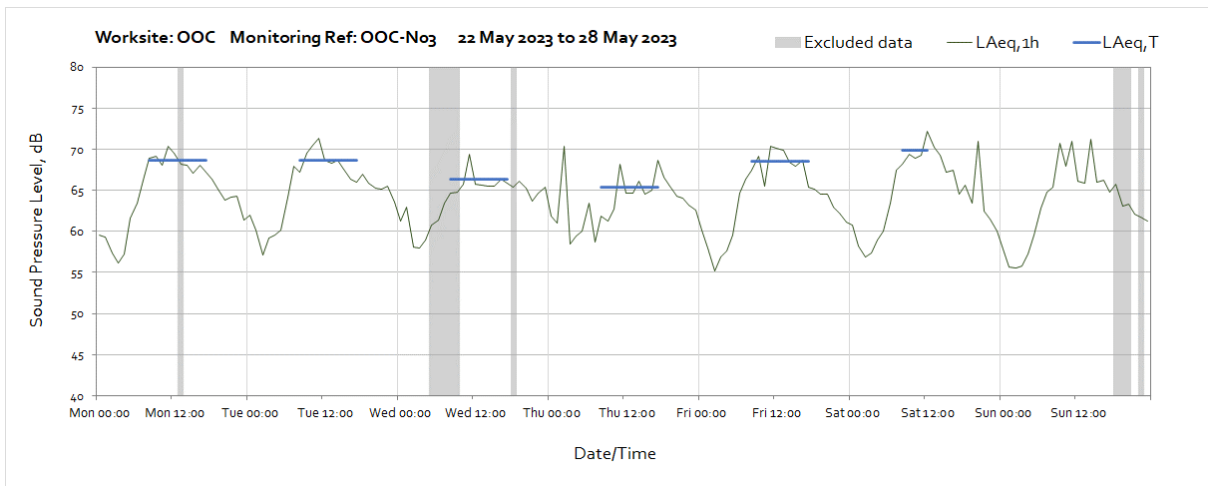
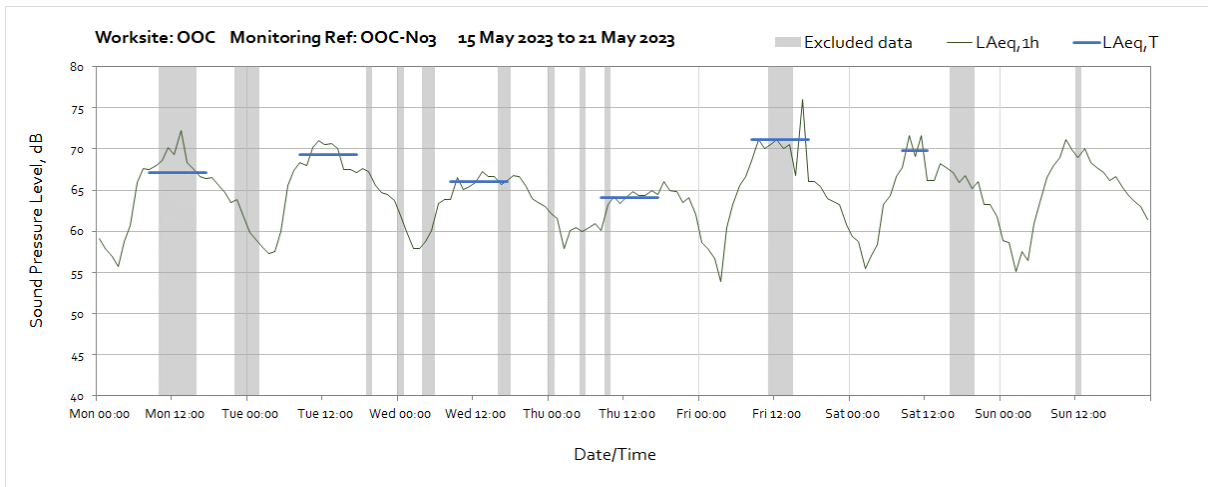
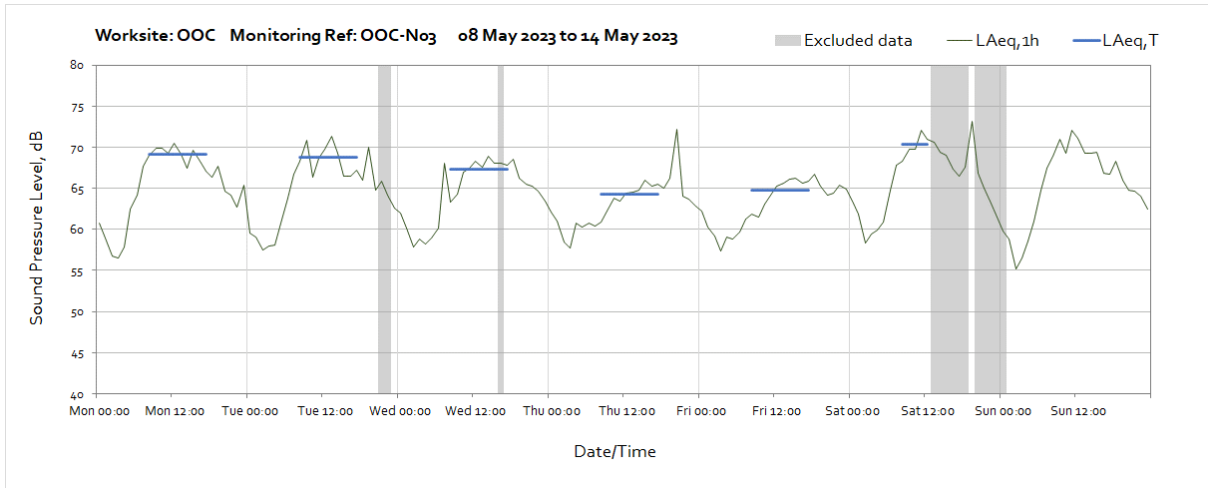


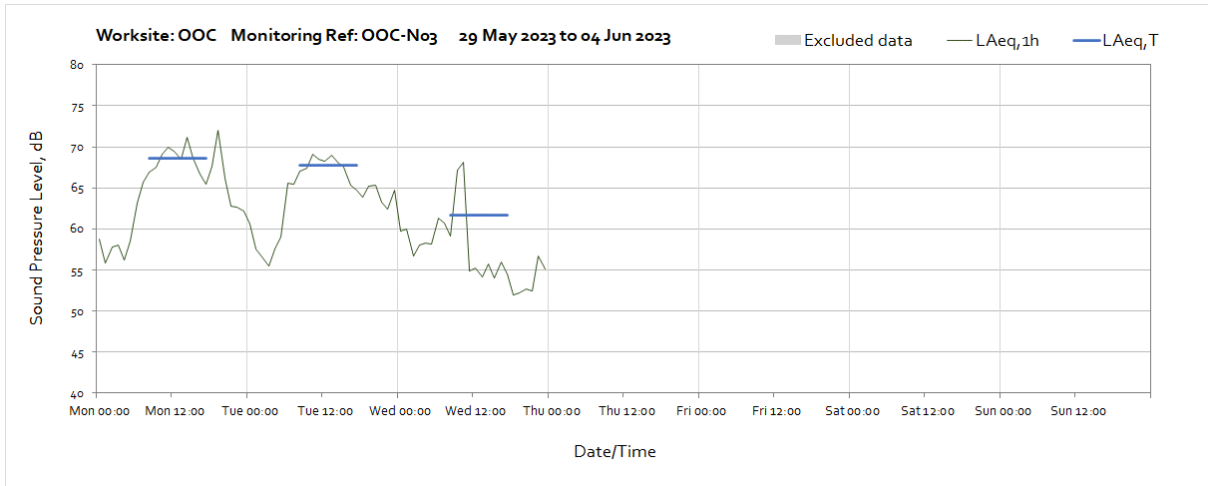


**Worksite: OOC - Monitoring Ref: OOC-N03**

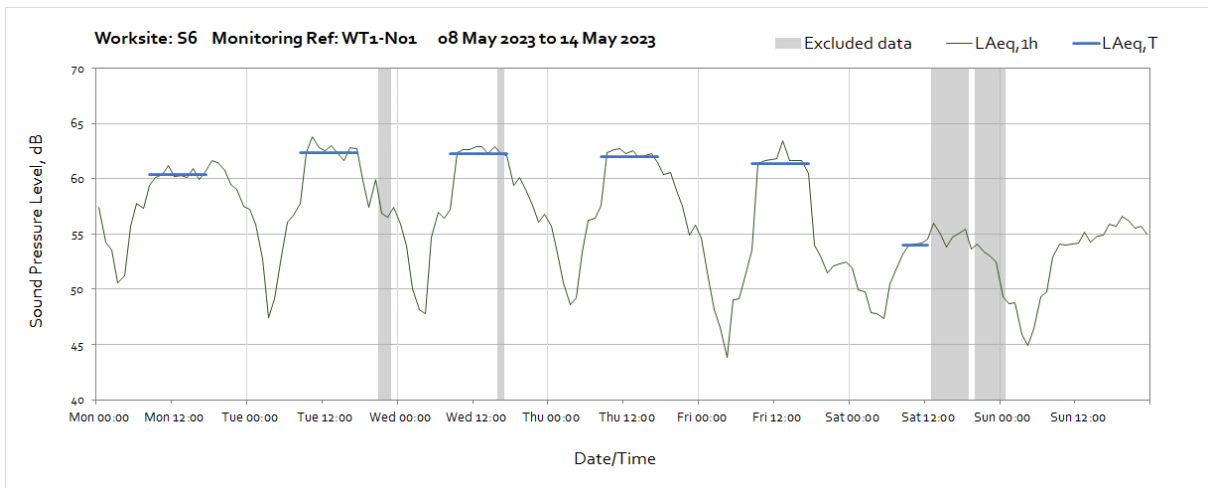
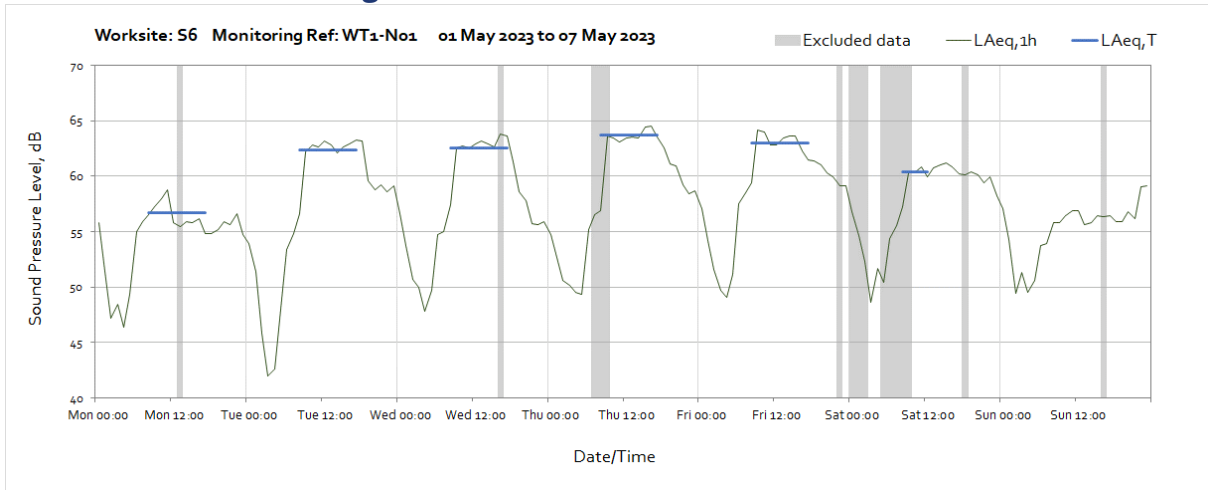


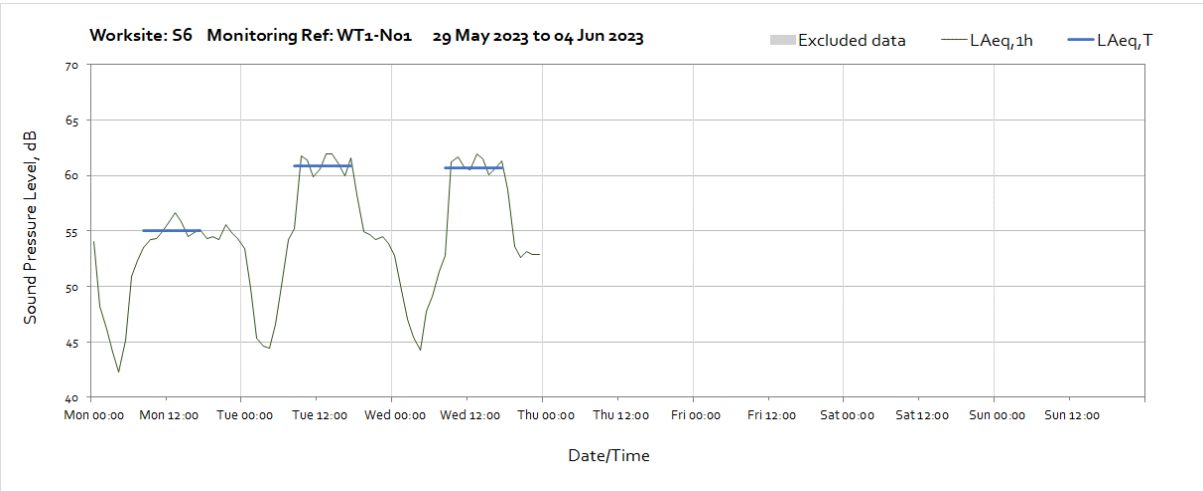
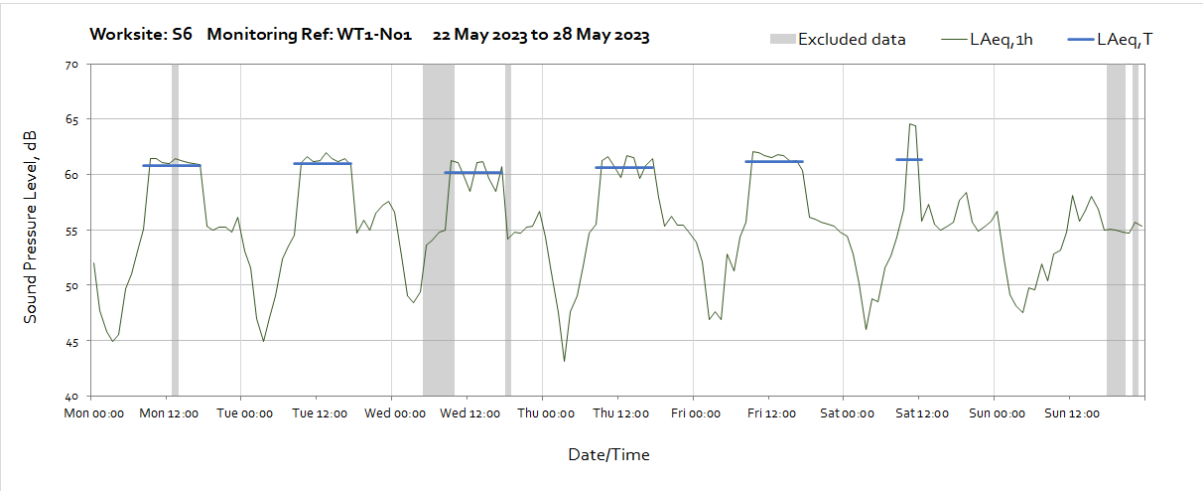
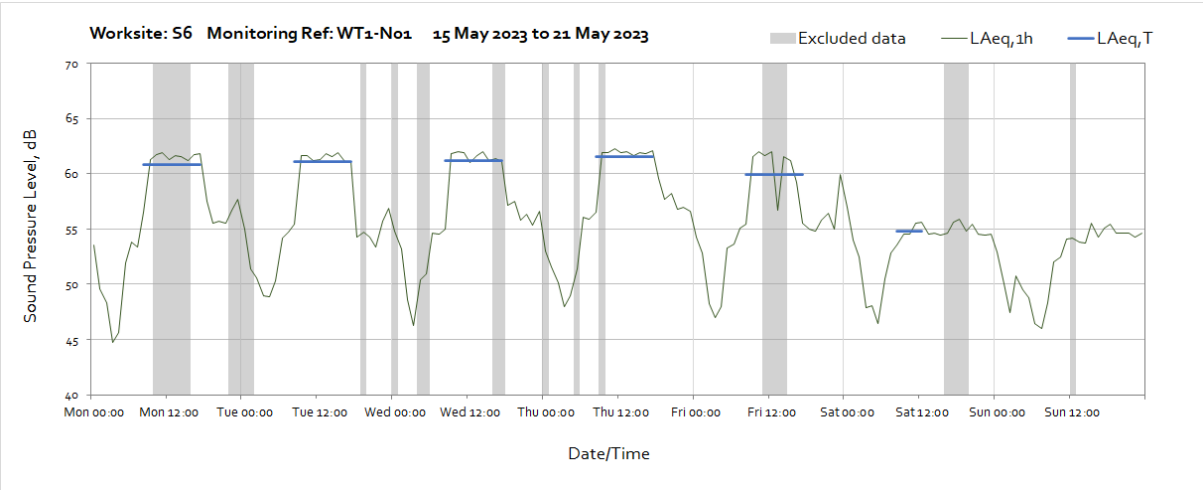
Note: Missing data between 00:00 Monday 1<sup>st</sup> and 23:00 Thursday 4<sup>th</sup> May was due to monitor power loss from insufficient solar power.





**Worksite: S6 – Monitoring Ref: WT-N01**

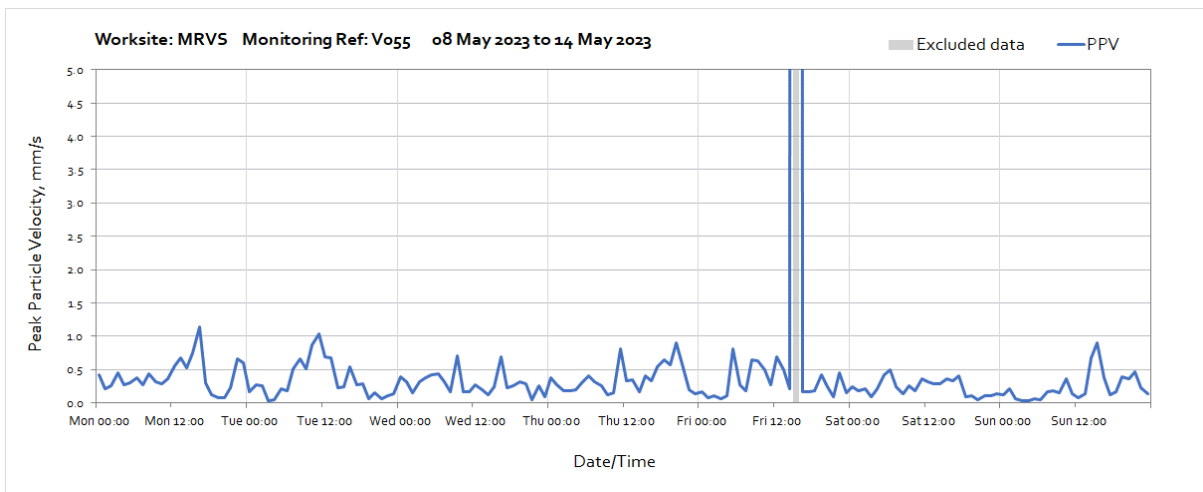
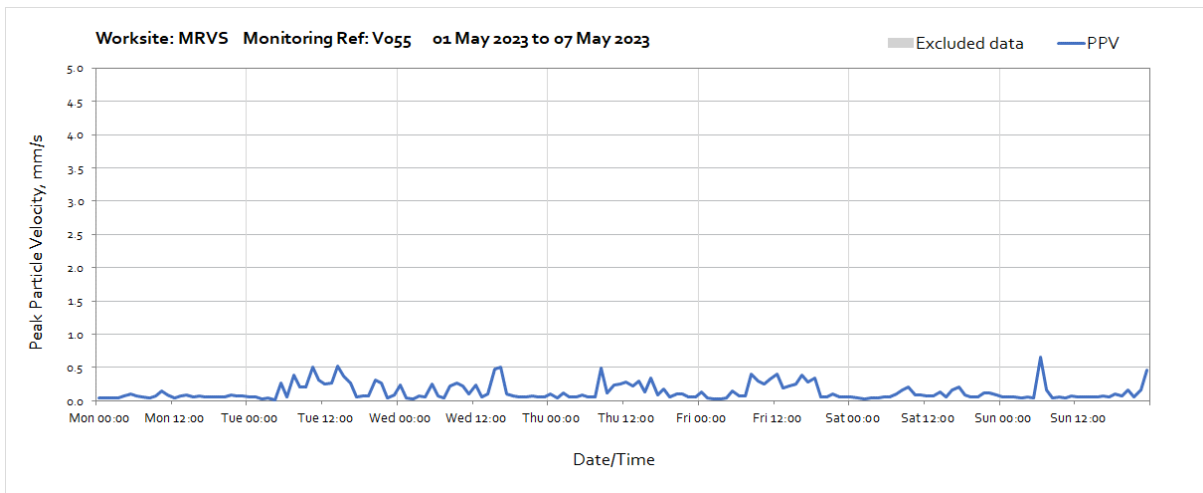




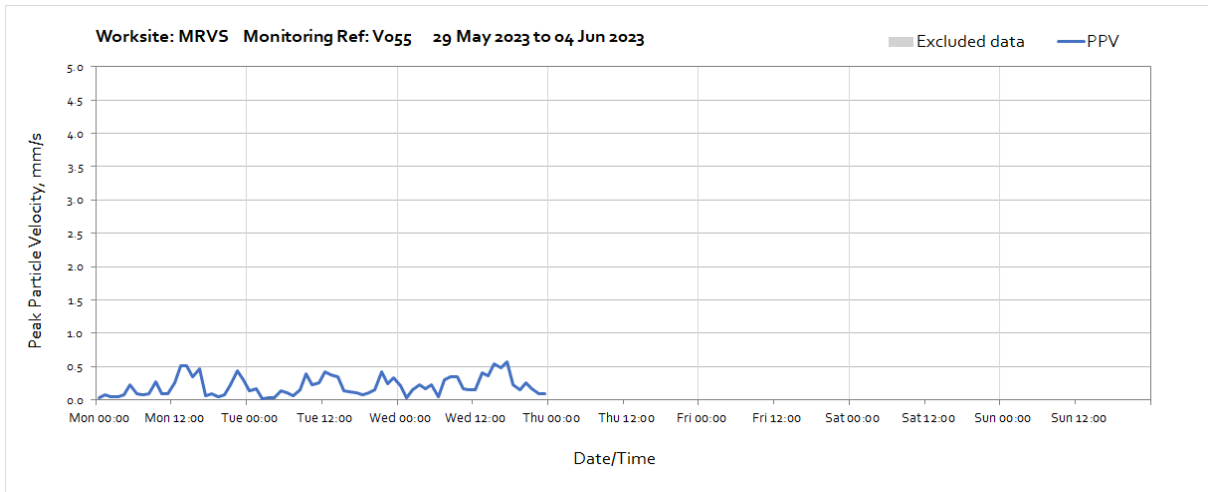
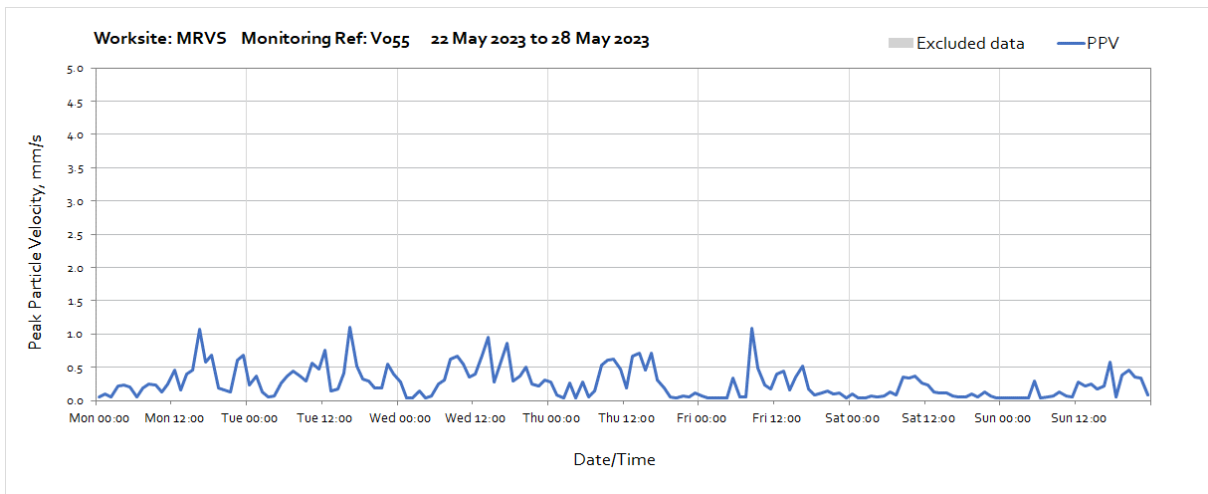
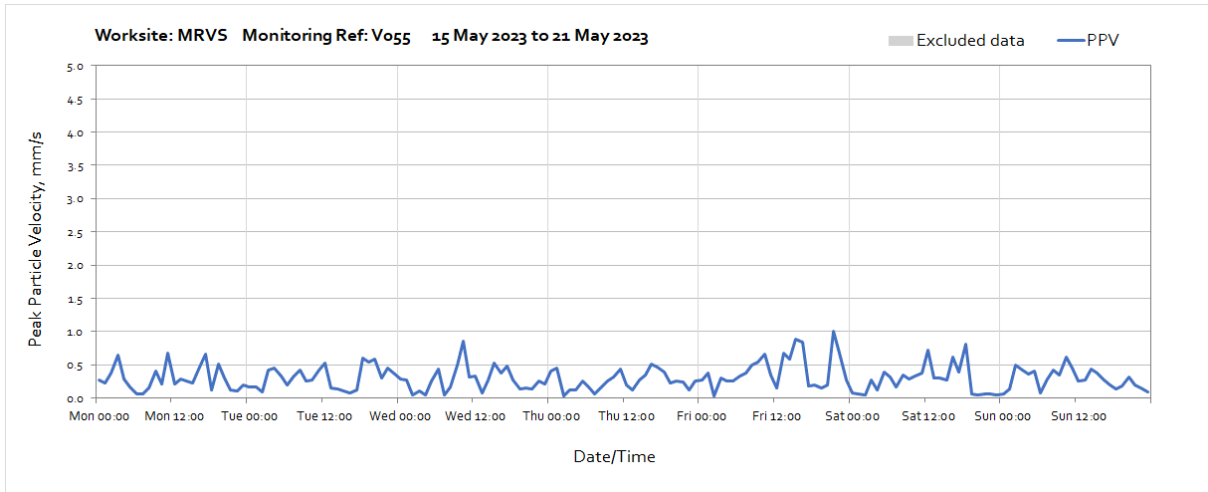
# Vibration

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.

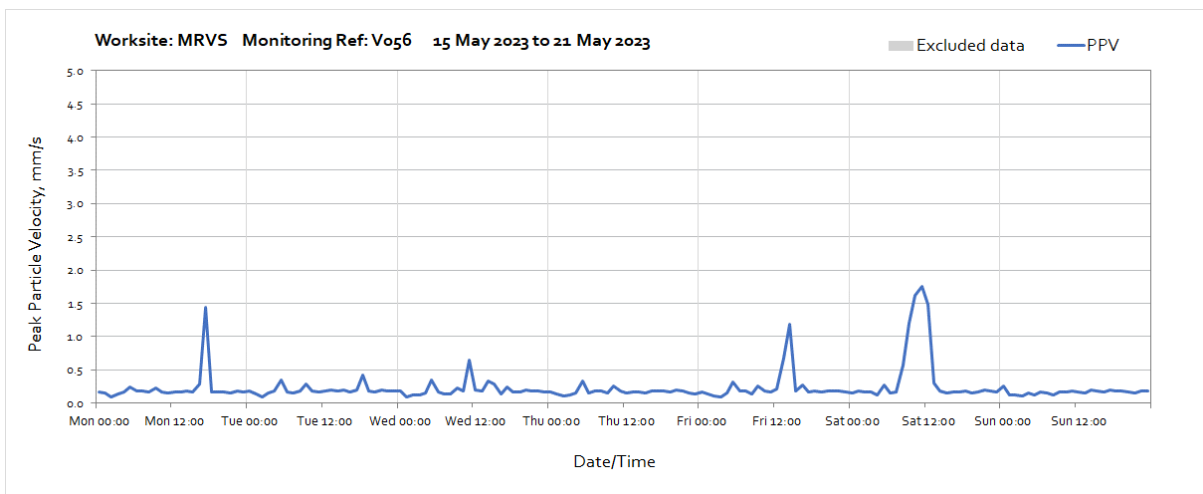
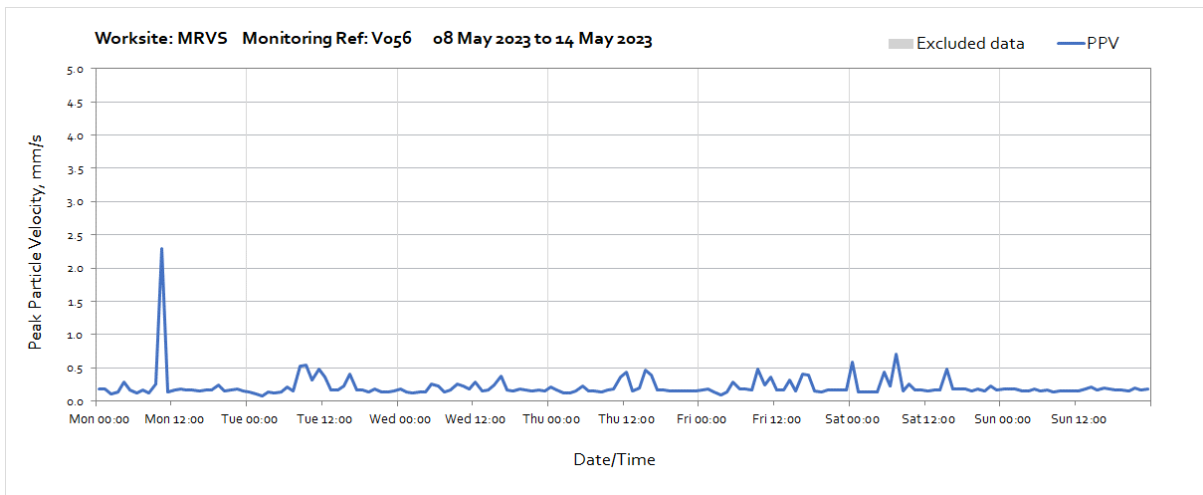
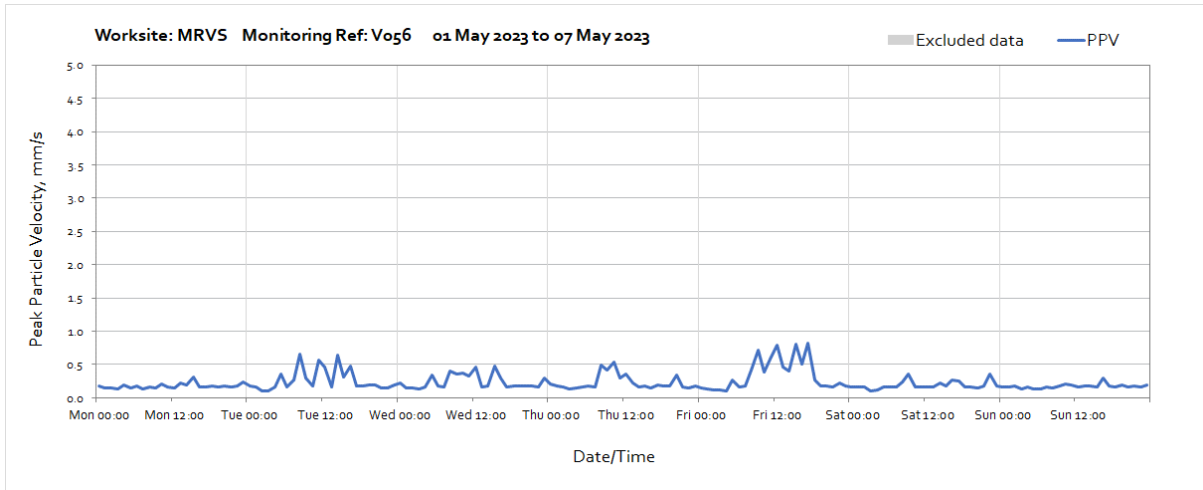
## Worksite: MRVS – Monitoring Ref: V055



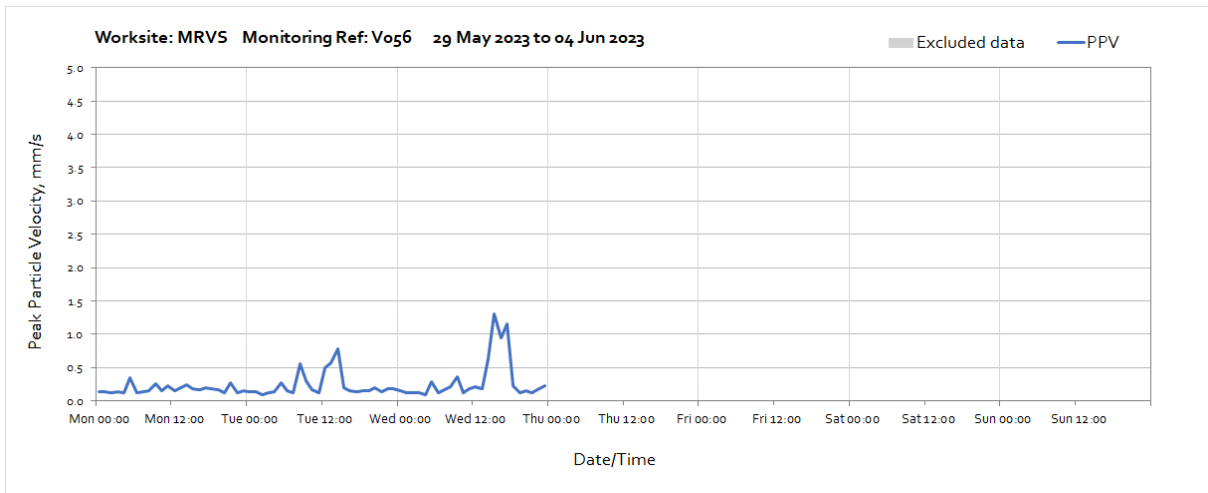
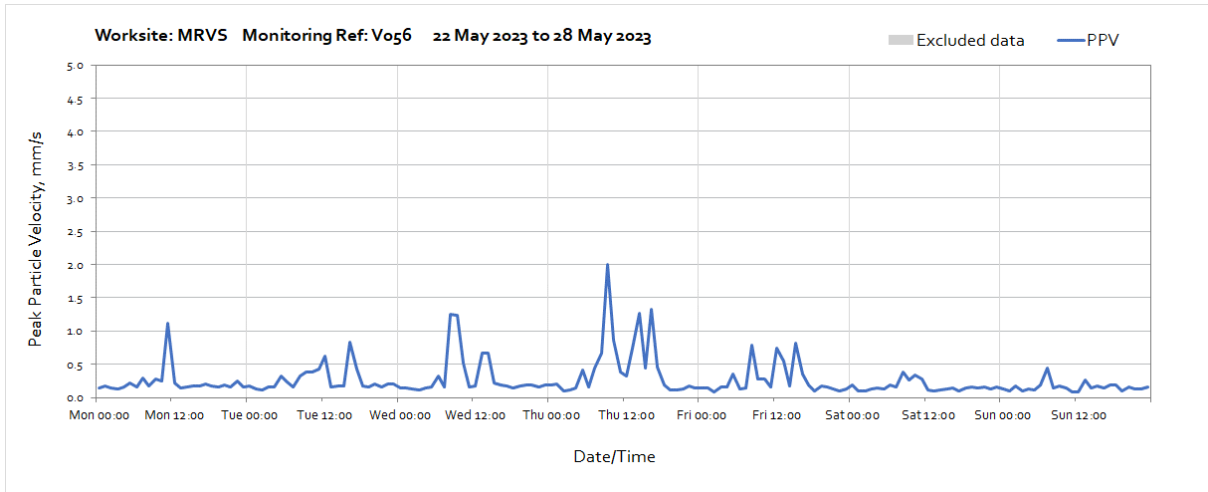




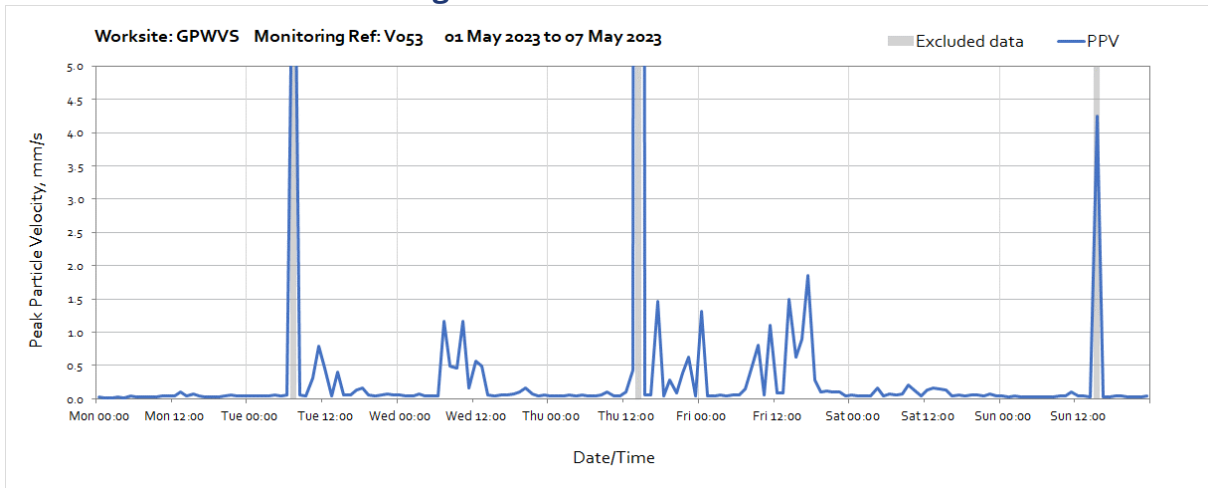
## Worksite: MRVS – Monitoring Ref: V056

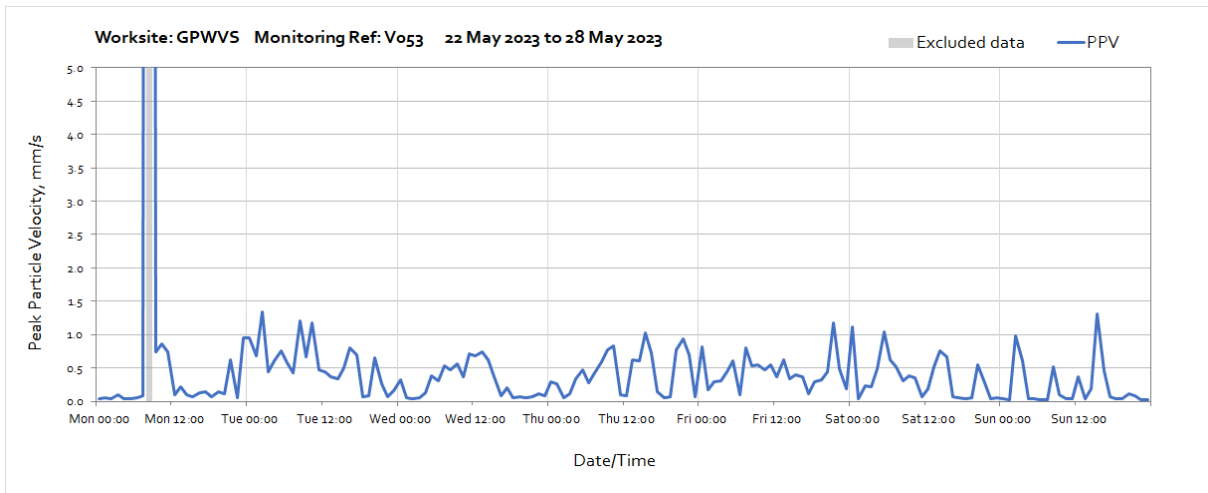
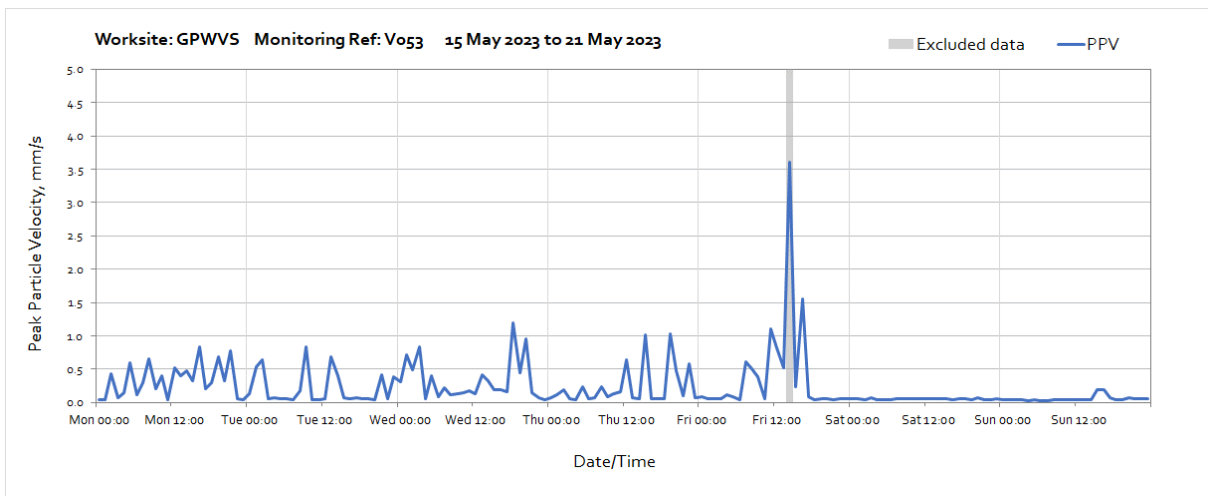
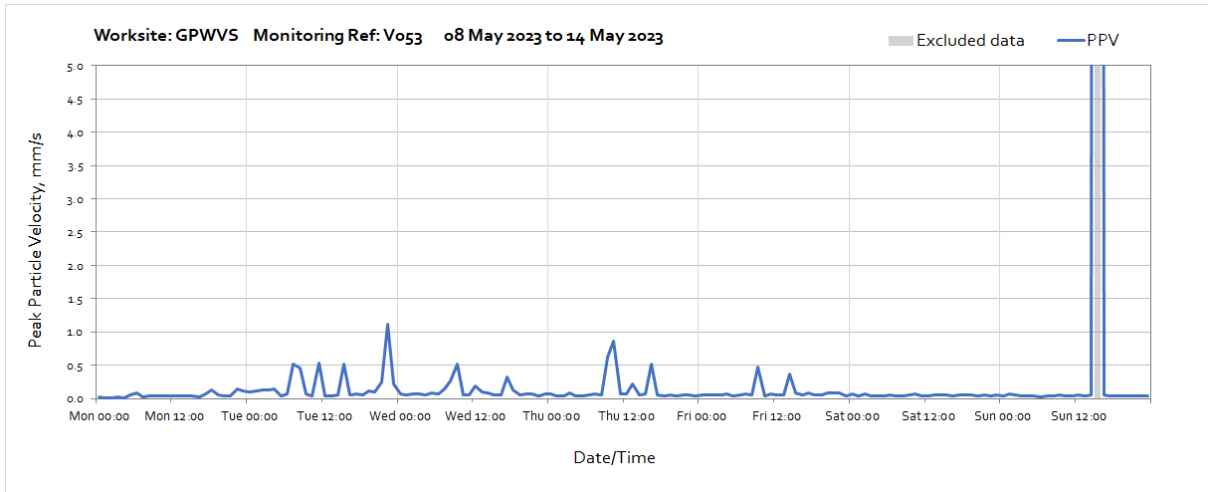


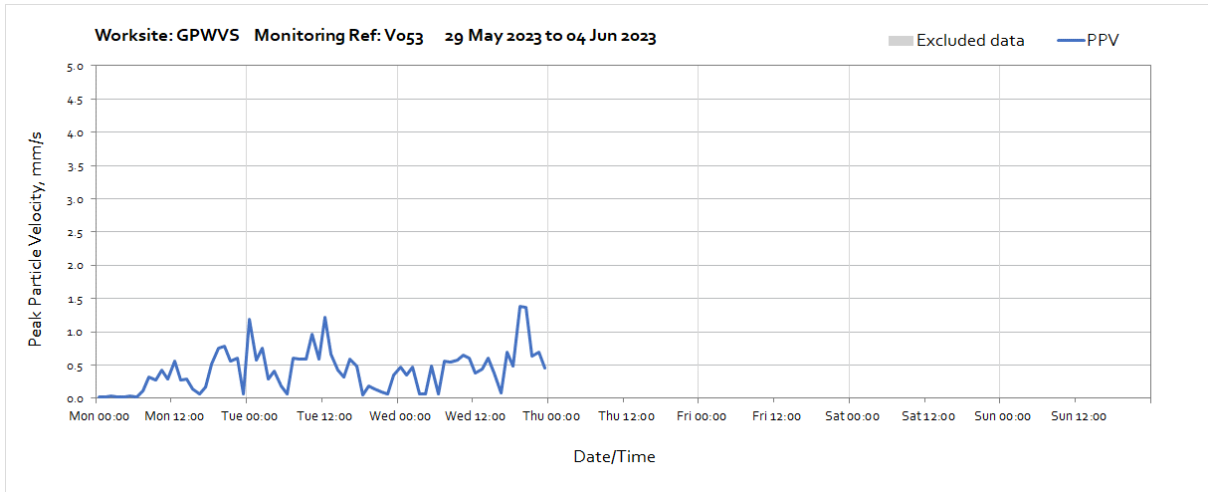
OFFICIAL



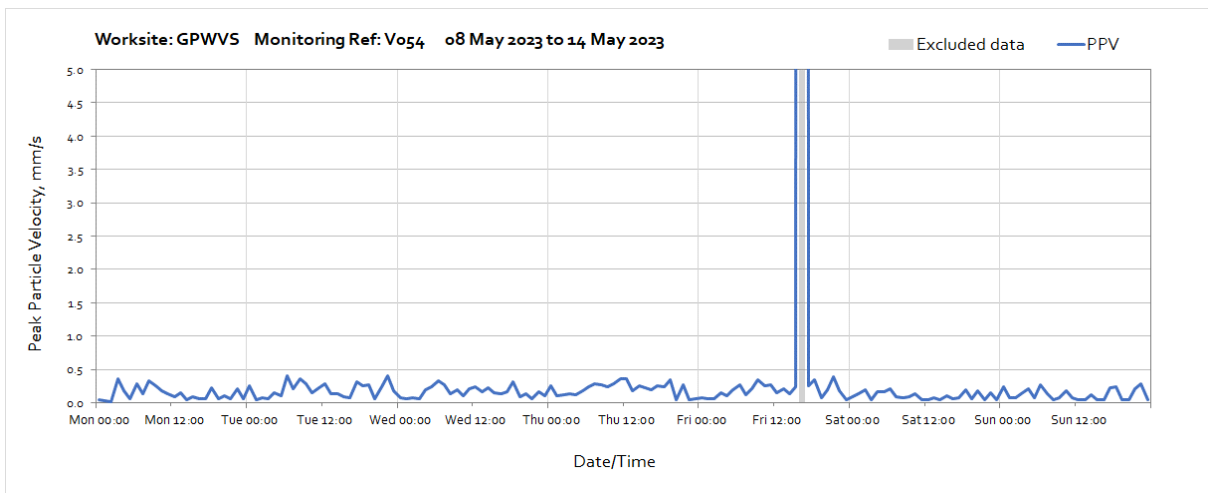
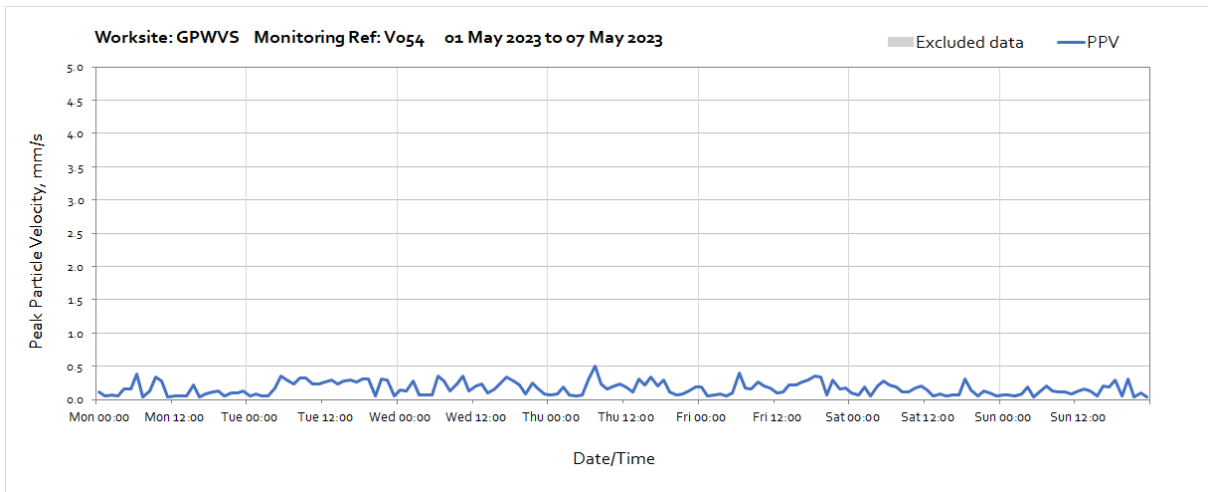
**Worksite: GPWVS – Monitoring Ref: V053**

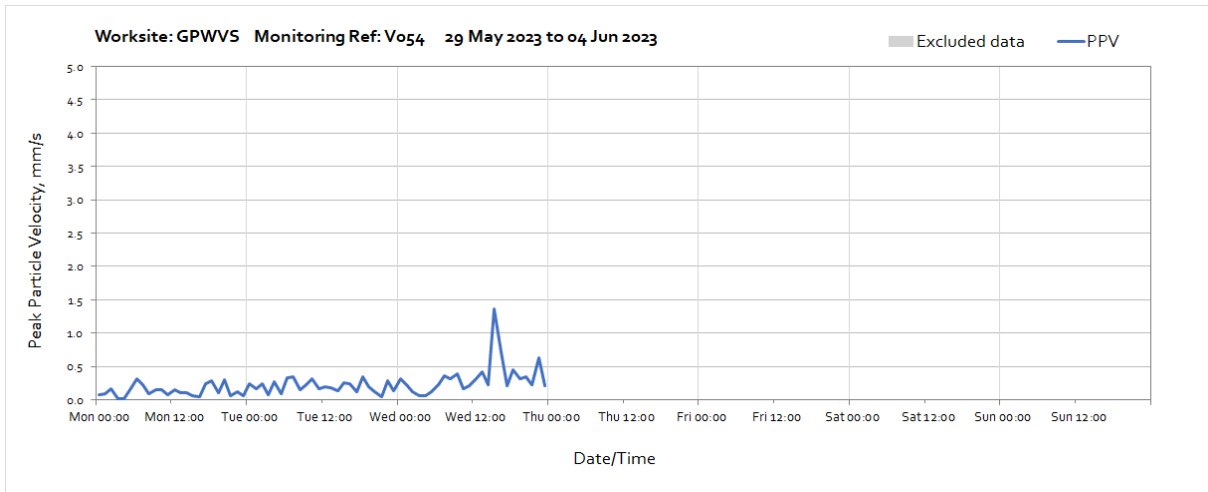
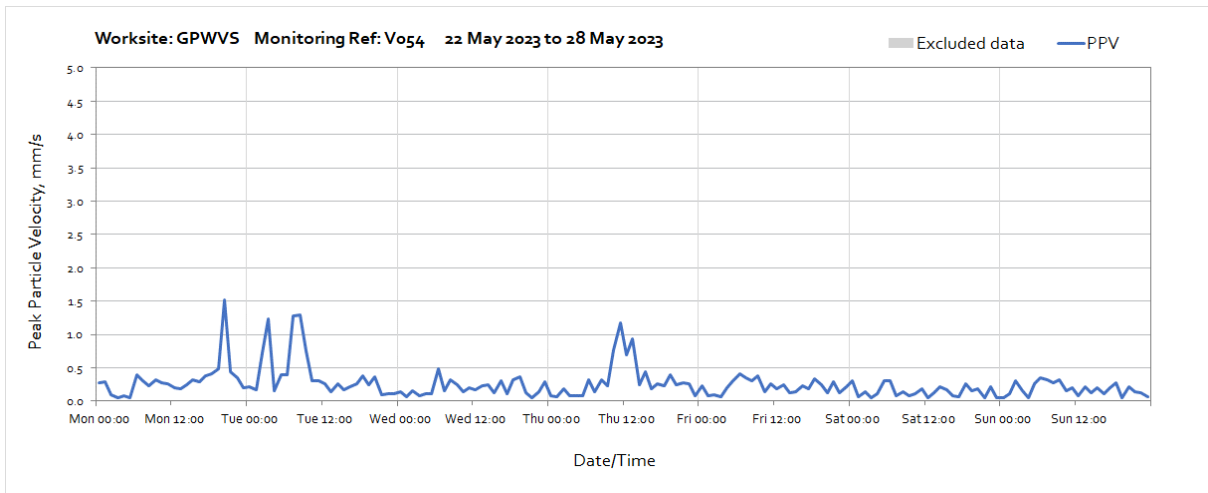
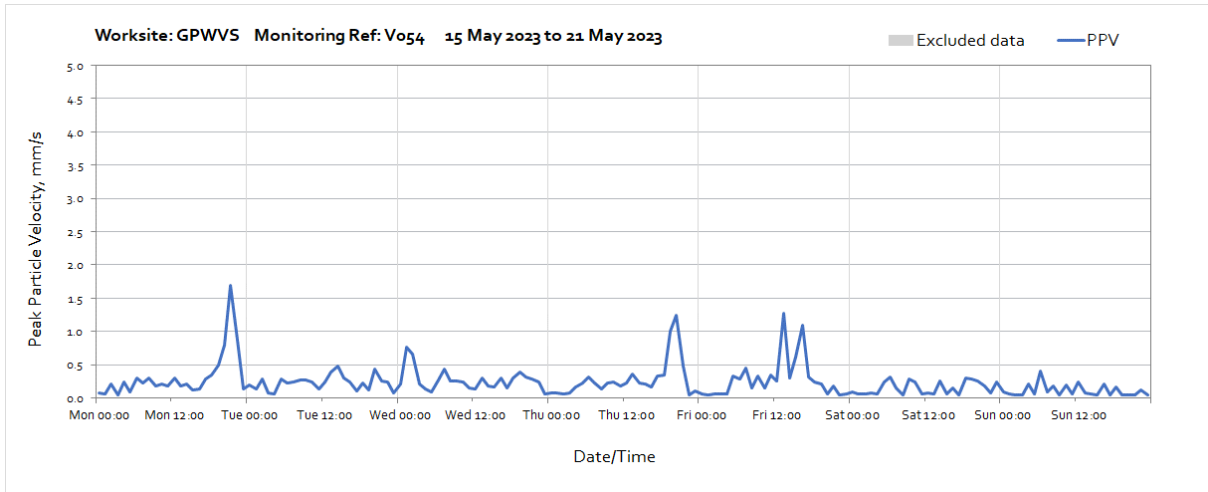




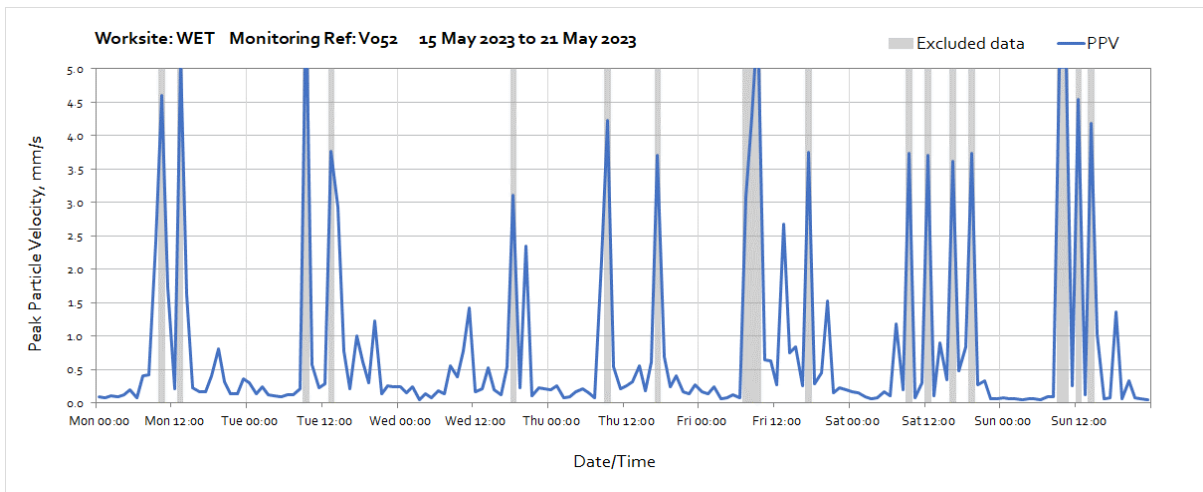
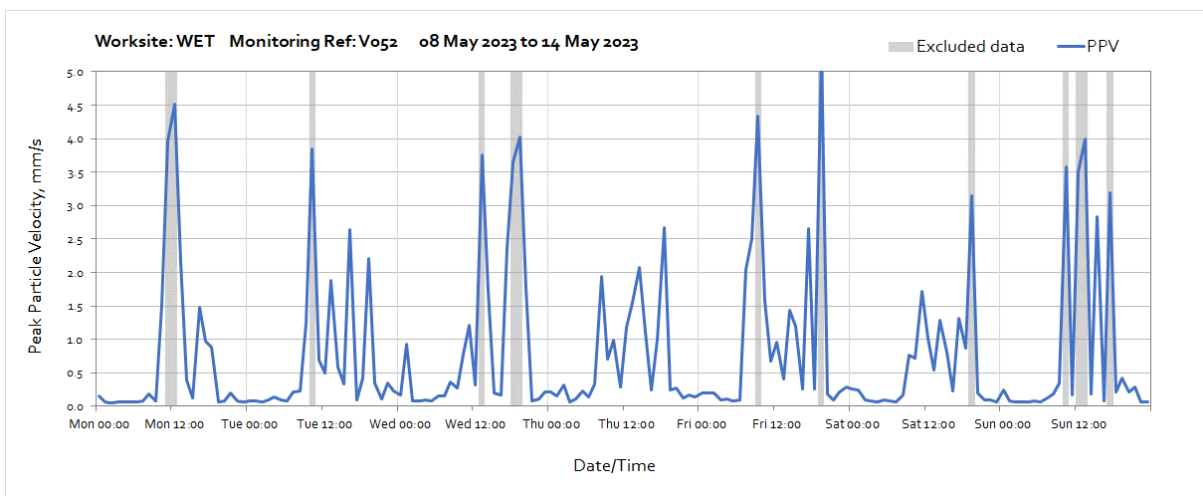
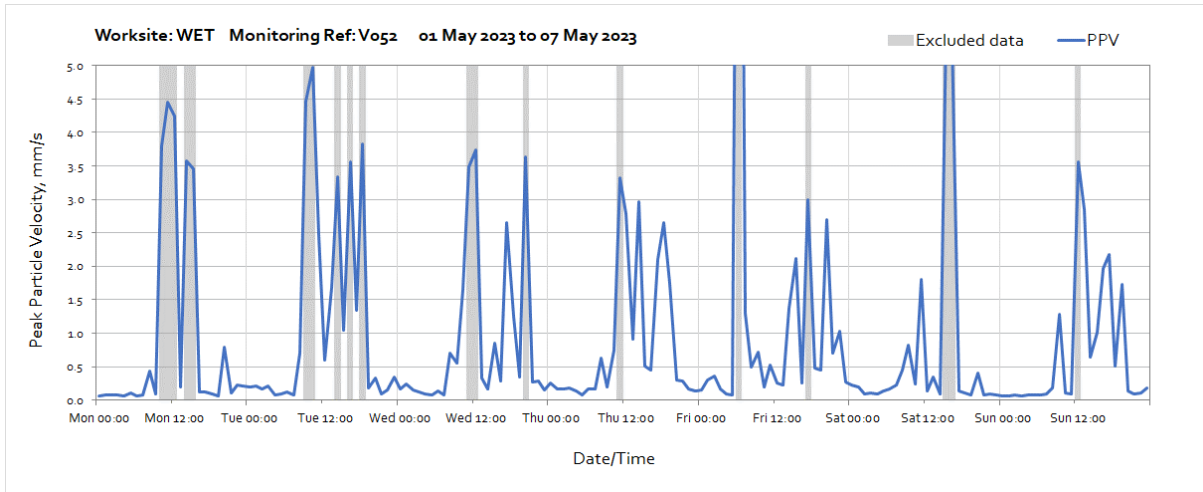


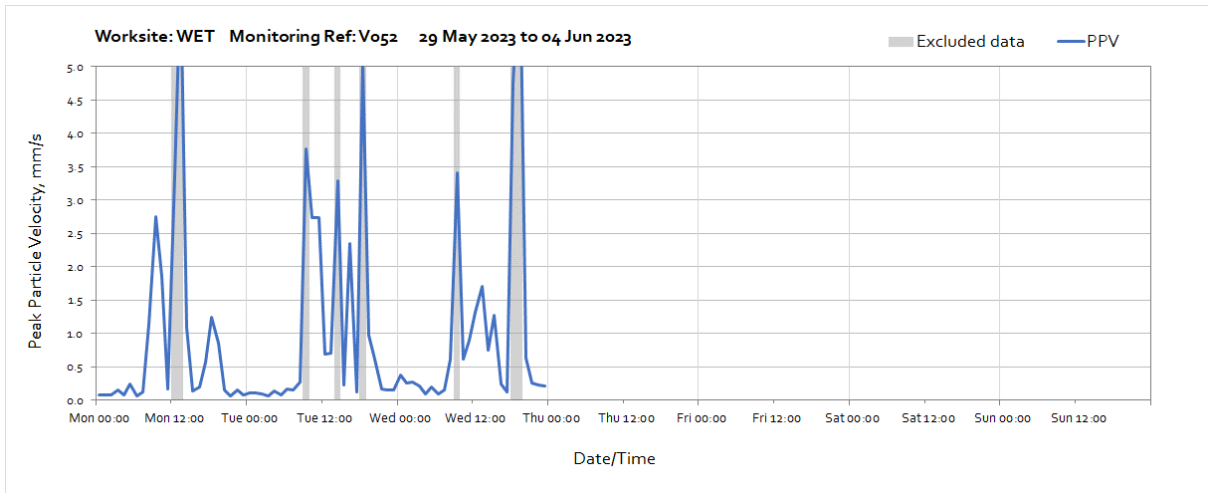
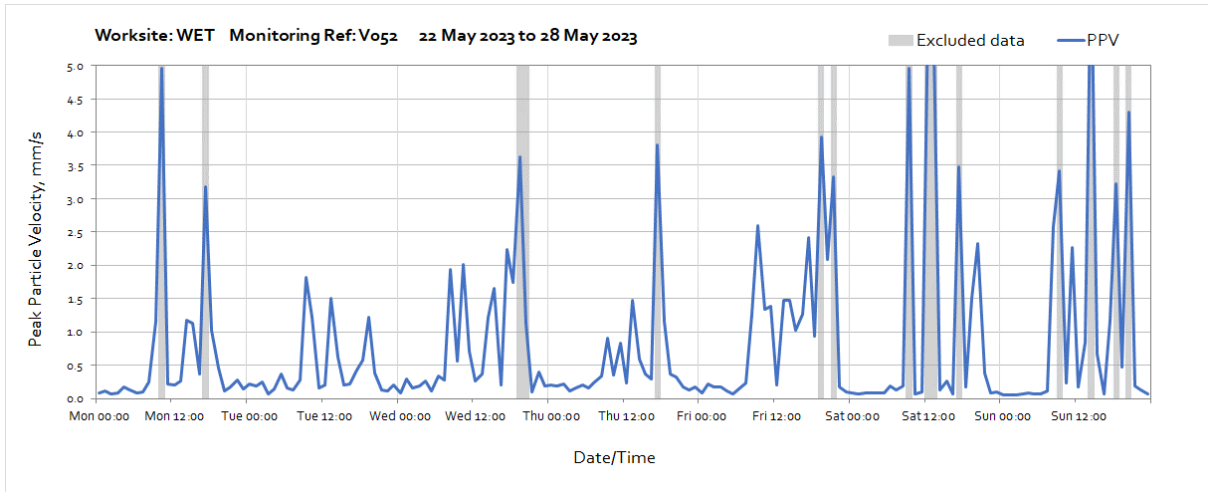
### Worksite: GPWVS – Monitoring Ref: V054



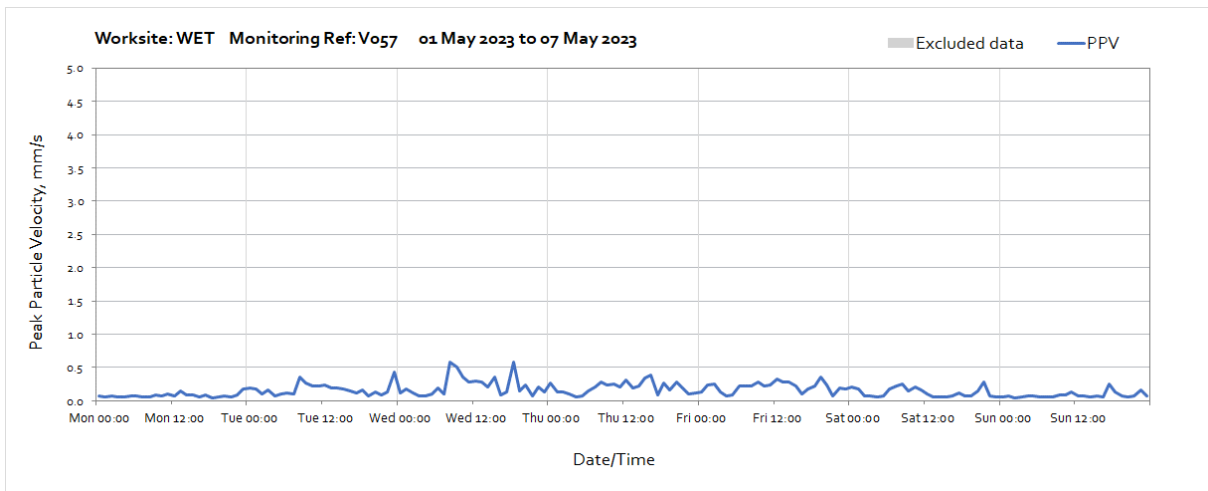


# Worksite: WET – Monitoring Ref: V052

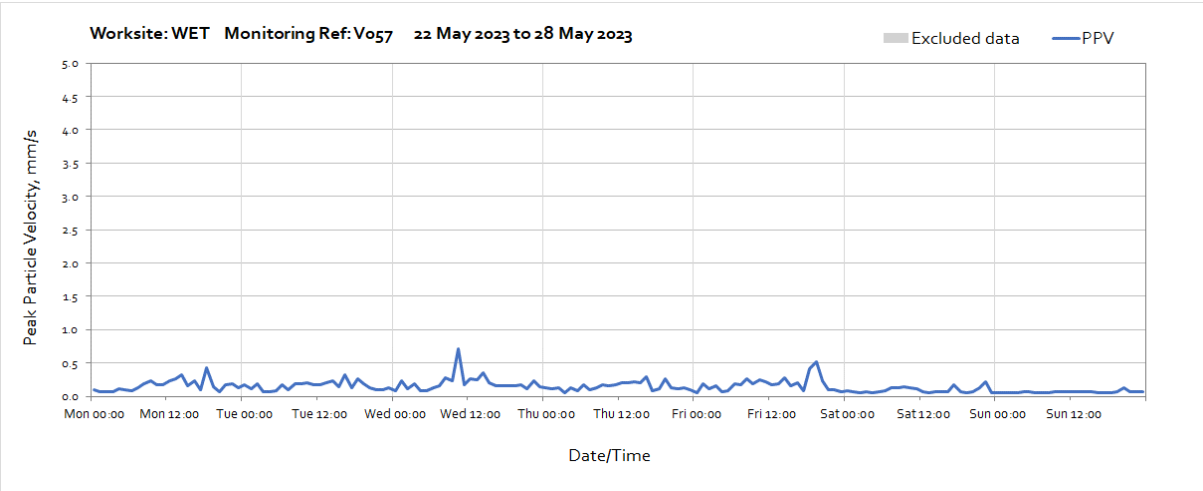
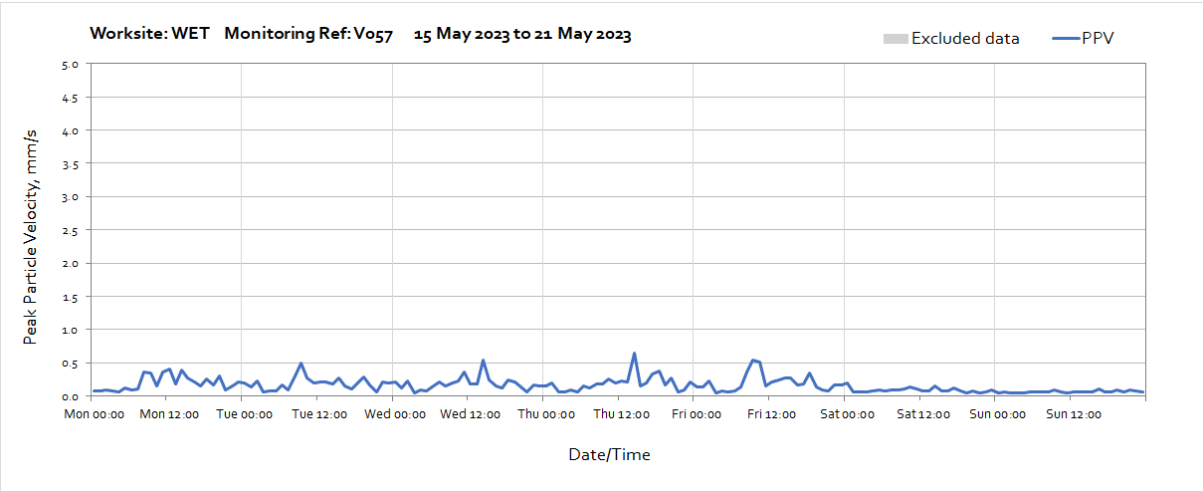
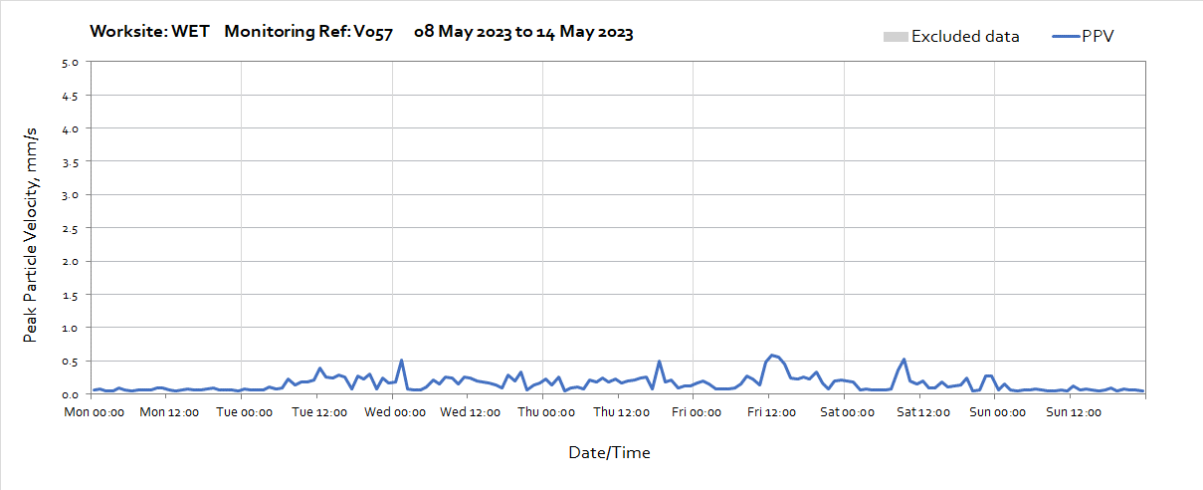


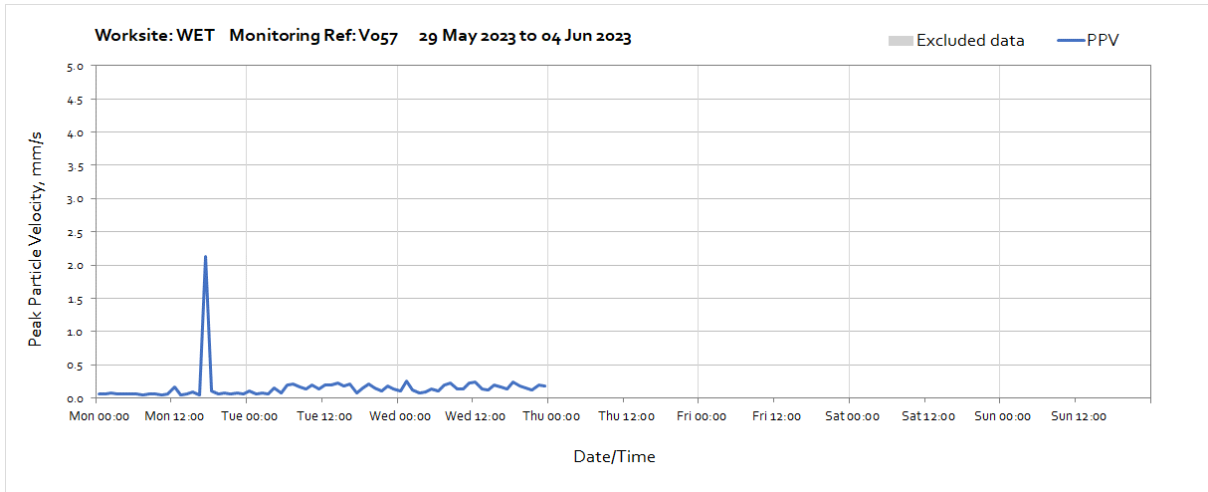


### Worksite: WET – Monitoring Ref: V057

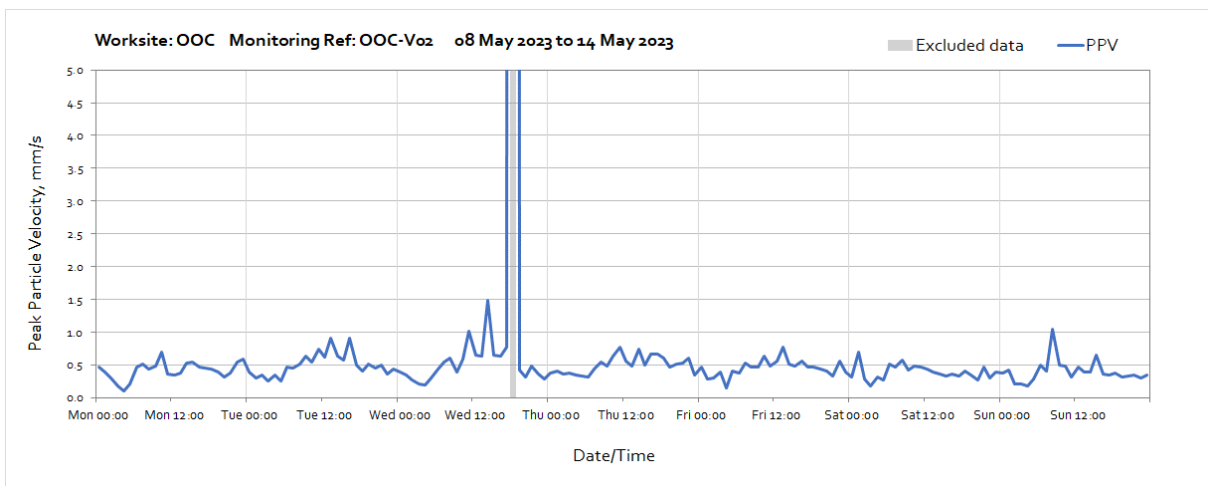
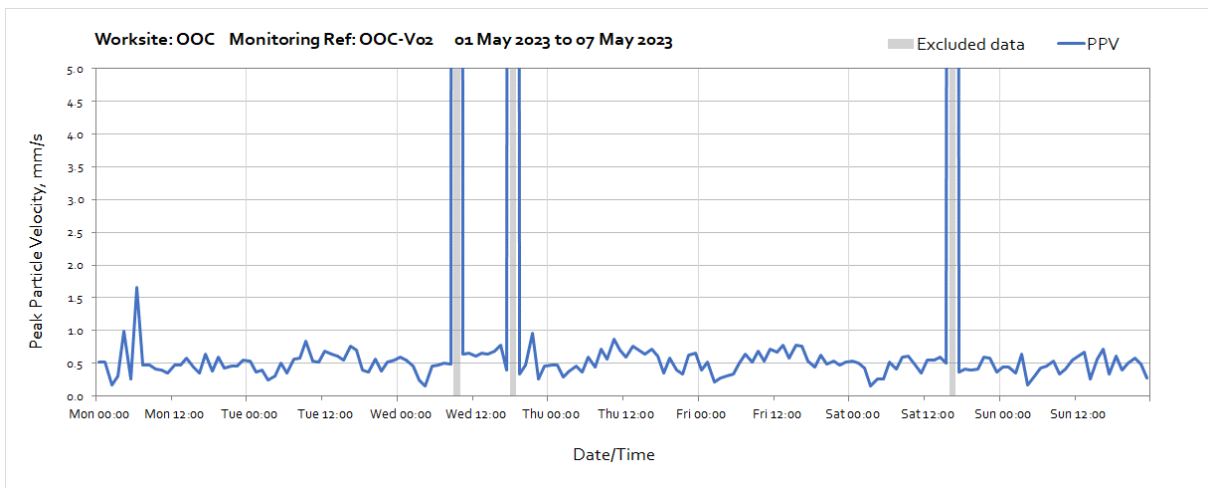


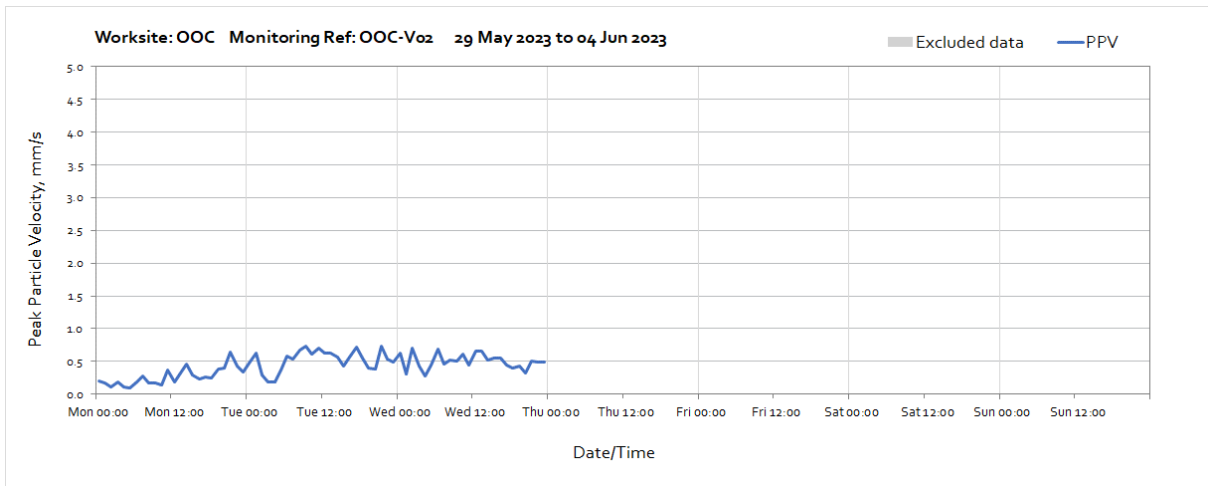
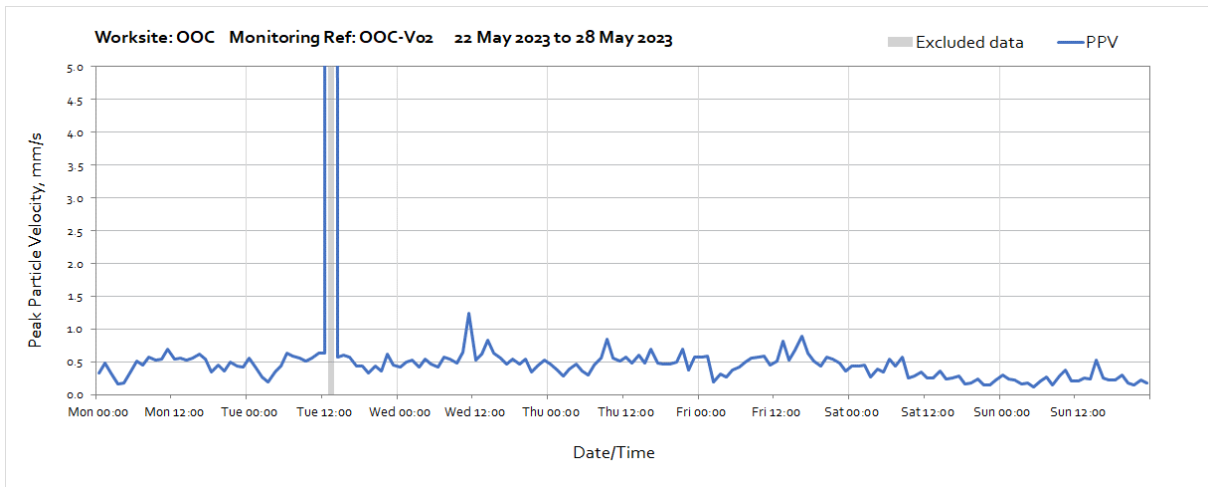
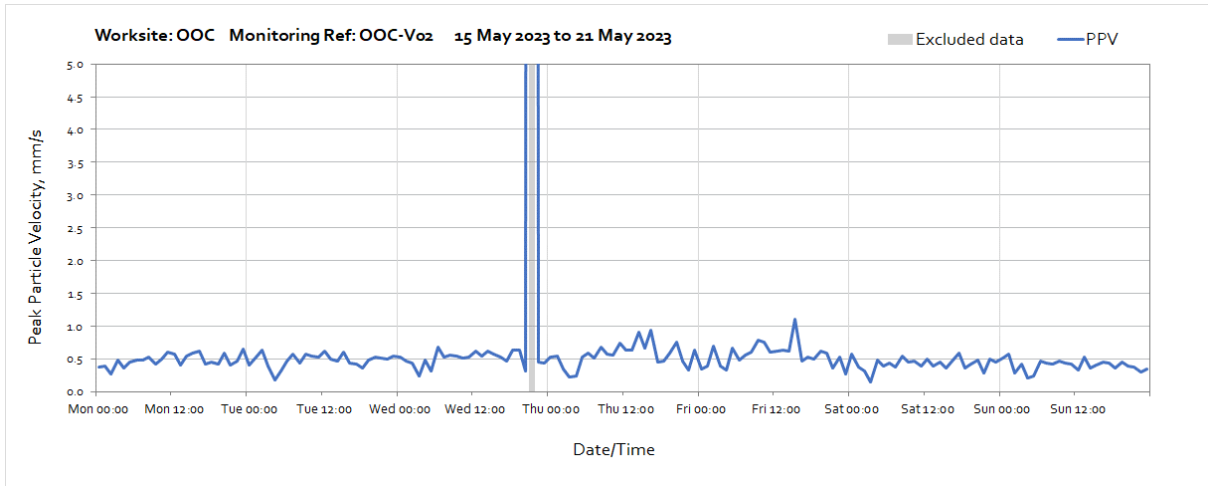






**Worksite: OOC – Monitoring Ref: OOC-V02**





## Worksite: OOC – Monitoring Ref: OOC-V03

