

Construction noise and vibration Monthly Report – June 2021

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 June 2021.

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 installation of hoardings and gates, removal of spoils, excavation and concrete works, installation of mesh and shutters, construction of walkways and access roads, tarmac laying works, bearing tests, drainage works, power utility works, digging of trial pits, piling and trimming works, guide wall construction, piling platform construction, cleaning works and fitting out works to the new area central welfare, concrete pouring, concrete breaking out works installation of lightning and protection of earthing network were underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Willesden EuroTerminal worksite (ref. WET), where reinforced concrete works, spoil deliveries, shuttering and concrete pouring, fitting out works at the entrance of the site, installation of hoardings and construction of entrance boardwalk, utilities works, installation of access ramps and structural surveys were underway.
- Noise monitoring was undertaken in the vicinity of the Victoria Road worksite (ref. VRFIC), where:
 - Utility water and power connection works, ground works and concrete works, piling works, installation of silos, installation of kerbs and white lining, installation of gates, hoarding strengthening works and installation of lighting, excavation and backfilling works; and
 - At the Victoria Road Ancillary Shaft, excavation works and sprayed concrete lining, installation of ventilation ducts and service lines were underway.
- Noise monitoring was undertaken in the vicinity of the Flat Iron compound (within worksite ref. VRFIC), where installation of manholes, inspection chambers and pipe runs, ground levelling works, backfilling and compacting works, excavation and concrete works, cleaning works and removal of cabins, drainage works and road white lining works were underway.
- Noise and vibration monitoring were undertaken in proximity of the Old Oak Common depot worksite (ref. OOC), where ground works, demolition works, sheet piling works, excavation works, construction of permanent accommodation building, construction of temporary site haul roads, drainage works and installation and setting up of concrete batching and polymer plant.

- Noise monitoring was undertaken in proximity of the Mandeville Road Ventilation Shaft worksite (ref.: MRVS), where site preparation works, construction of working platforms, demolition of existing building, hoarding works, drainage works and utility works were underway.
- Noise and vibration monitoring were undertaken in proximity of the Green Park Way Ventilation Shaft worksite (ref. GPWVS), where installation of fencings, cleaning works and preparation works for the new walkway area, drainage works, preparation works for sheet piling, sheet piling, backfilling works, utility power connection works, fitting out works of the new welfare area, including removal of existing welfare units and utility water and power connections, ground levelling works, installation of high-voltage transformer, concrete pouring, ground investigation works and installation of automated tracking station on the railway lines were underway.
- Noise monitoring was undertaken in proximity of the Westgate Ventilation Shaft (ref. WVS), where ground investigation works and in-situ testing, water and power connection works, fitting out works and construction of the welfare facilities, including reinforced concrete slab works, deliveries, preparation and construction of concrete bases, hoarding works, and sheet piling works were underway.

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

- School Road, Bethune Road, Chase Road, Victoria Road, Atlas Road as part of power utility works;
- Wormwood Scrubs, as part of vegetation clearance
- Horsenden Lane, Perivale, as part of water utility works.

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

There were no exceedances of trigger levels as defined in Section 61 consents during the reporting period at any monitoring position.

Nine 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 +2.5 to +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 June 2021.

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:
 - Installation of hoardings and gates and construction of ramps;
 - Removal of spoil;
 - Excavation works and concrete pouring;
 - Installation of mesh and shutters
 - Construction of walkways and access roads;
 - Tarmac laying works;
 - California Bearing Ratio (CBR) tests;
 - Drainage works, including water main cable installation, excavation and backfilling works, installation of pipes and installation of manholes;

- Power utility works;
 - Trial pit digging;
 - Piling works and trimming works;
 - Guide wall construction;
 - Piling platform extension works;
 - Cleaning works and fitting out works to the new area central welfare, including installation of lifts, floor repairing works, installation of plumbing and rainwater harvesting tanks, installation of IT equipment, TV units and temporary fire alarm and installation of handrails;
 - Concrete pouring;
 - Breaking out and installation of lightning and protection of earthing network.
- Willesden EuroTerminal worksite, ref. WET (see plan 5 in Appendix A), where work activities included:
 - Reinforced concrete works,
 - Spoil deliveries;
 - Shuttering and concrete pouring;
 - Fitting out works at the entrance of the site, including carpark rearrangement works, removal of existing posts and installation of lighting;
 - Installation of hoarding and construction of entrance boardwalk;
 - Utilities works, including installation of ducts and pits and concrete works for backfilling ducting trenches;
 - Refitting works of the Breadbin Building and installation of the access ramp to the building; and
 - Structural surveys.
 - Victoria Road worksite, ref. VRFIC (see plan 6 in Appendix A), where work activities included:
 - Utility water and power connection works to the site welfare and cleaning works;
 - Ground works and concrete works;
 - Piling works;
 - Installation of silos;

- Installation of kerbs and white lining along haul road;
- Hoarding strengthening works and installation of lighting on hoarding; and
- Excavation, backfilling works and kerb installation for wheel wash platform;
- At the Victoria Road Ancillary Shaft, excavation works and Sprayed Concrete Lining (SCL), installation of ventilation ducts and service lines;
- Flat Iron compound, within worksite ref. VRFIC (see plan 6 in Appendix A), where work activities included:
 - Installation of manholes, inspection chambers and pipe runs;
 - Ground levelling works for the welfare strip footing foundation;
 - Backfilling and compacting works for the welfare platform;
 - Excavation and concrete works;
 - Cleaning works and removal of old cabins;
 - Drainage works; and
 - White lining works in the vehicle holding area and access road
- 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:
 - Ground works;
 - Building demolition works;
 - Sheet piling works and excavation works;
 - Construction of permanent accommodation building;
 - Railway siding demolition works;
 - Construction of temporary site haul roads;
 - Drainage works; and
 - Installation and setting up of Concrete Batching and Polymer plant
- Mandeville Road Ventilation Shaft worksite, reference MRVS (see plan 1 in Appendix A), where work activities included:
 - Site preparation works, including construction of working platforms, demolition of existing building, installation of hoardings; and
 - Drainage utility works.

- Green Park Way Ventilation Shaft worksite, reference GPWVS (see plan 2 in Appendix A), where work activities included:
 - Installation of fencings;
 - Cleaning works and preparing works for the new walkway area;
 - Drainage works, including breaking out of hard standing, excavation of trenches, installation of pipeworks and manholes and air tests on installed pipe runs;
 - Preparation works for sheet piling;
 - Backfilling works;
 - Utility power connection works, including drilling works for earthing rods;
 - Fitting out works of cabins for new welfare area, including live tests for the ground floor, installation of plumbing rainwater harvesting tank and installation of fire alarm system;
 - Removal of the existing welfare units;
 - Utility power and water connection works to the new welfare area and lighting installation;
 - Ground levelling works and concrete pouring for the welfare walkway;
 - Installation of high voltage transformer;
 - Ground investigation works; and
 - Installation of Automated Tracking Station (ATS) on the railway lines.
- Westgate Ventilation Shaft worksite, reference WVS (see plan 3 in Appendix A), where work activities included:
 - Ground investigation works and in-site testing;
 - Water and power connection works;
 - Construction and fitting out works of welfare facilities, including reinforced concrete slab works;
 - Deliveries;
 - Preparation and construction of concrete bases;
 - Hoarding works; and
 - Sheet piling.

- 1.1.4 Further works, where monitoring did not take place, were undertaken at:
- School Road, Bethune Road, Chase Road, Victoria Road, Atlas Road as part of power utility works;
 - Wormwood Scrubs, as part of vegetation clearance; and
 - Horsenden Lane, Perivale, as part of water utility works.
- 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 Nineteen noise and nine vibration monitoring installations were active in June 2021 in the LBE area. Table 2 summarises the position of noise and vibration monitoring installations within the LBE area in June 2021.
- 1.2.2 Maps showing the position of noise and vibration monitoring installations are presented in Appendix B.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
AR	N032	Shaftesbury Gardens
	N033	Outside The Collective, Atlas Road / Victoria Road
	N060	Atlas Road next to Bashey Road
WET	N034	Stephenson Street (north)
	N035	Stephenson Street (south)
	N041	Junction of Stephenson Street / Goodhall Street
	V052	Stephenson Street (north)
	V057	37, Stephenson Street
VRFIC	N029	Braitrim House, Victoria Road
	N042	Boden House Car Park
	N031	School Road, outside Acton Business Centre
	N049	Flat Iron compound railway fence, Victoria Rd North Acton
	N050	Acton Square, outside North Acton Station

Worksite Reference	Measurement Reference	Address
OOC	OOC-N01	Old Oak Common Lane
	OOC-N02	Old Oak Common Lane, Hilltop Works
	OOC-V01	25 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	61.9 (63.7)	65.9 (73.3)	62.0 (63.4)	60.3 (63.1)	57.1 (66.0)	59.3 (60.0)	63.1 (67.4)	60.7 (61.6)	61.0 (65.5)	56.6 (67.4)	59.5 (63.1)	56.4 (62.1)
	N033	Outside The Collective, Atlas Road/Victoria Road	Free-field	66.8 (69.4)	68.6 (70.1)	65.0 (68.9)	63.7 (67.3)	60.7 (67.2)	63.6 (63.7)	65.6 (67.6)	64.4 (64.6)	64.4 (71.2)	59.6 (66.5)	62.3 (66.0)	60.6 (65.6)
	N060	Atlas Road next to Bashey Road	Façade	55.8 (62.0)	64.4 (68.2)	53.7 (61.1)	54.1 (63.4)	54.2 (65.2)	54.4 (58.9)	59.0 (63.2)	49.1 (50.4)	54.2 (67.5)	49.1 (56.7)	50.8 (56.4)	53.1 (60.0)
WET	N034	Stephenson Street (north)	Free-field	52.5 (59.5)	57.2 (70.7)	53.2 (58.6)	52.4 (63.3)	47.9 (59.5)	49.8 (50.7)	51.9 (52.8)	50.9 (52.9)	51.0 (56.1)	45.7 (57.0)	50.2 (59.1)	46.5 (51.9)
	N035	Stephenson Street (south)	Free-field	53.9 (57.4)	58.5 (69.4)	51.2 (56.5)	50.3 (56.6)	46.6 (55.5)	50.1 (51.8)	52.2 (55.0)	47.8 (50.5)	49.1 (53.1)	43.4 (48.1)	47.9 (54.9)	46.3 (50.1)
	N041	Junction of Stephenson Street/Goodhall Street	Free-field	54.9 (65.5)	57.6 (63.0)	54.9 (57.9)	54.4 (61.3)	49.8 (61.1)	52.5 (54.5)	54.0 (55.6)	54.0 (55.1)	54.4 (62.0)	49.5 (57.7)	53.0 (57.0)	49.9 (56.6)

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
VRVIC	N029	Braitrim House, Victoria Road	Free-field	49.0 (53.6)	57.0 (60.3)	52.1 (61.0)	51.9 (60.6)	50.9 (61.2)	50.0 (57.0)	51.1 (54.9)	48.0 (50.6)	49.3 (53.6)	46.9 (61.9)	47.0 (52.5)	50.3 (60.0)
	N042	Bodens car park	Free-field	54.9 (56.8)	64.8 (71.3)	53.9 (55.8)	52.3 (56.3)	49.8 (56.8)	53.3 (57.6)	60.5 (68.8)	52.8 (56.5)	51.9 (54.7)	49.0 (58.8)	50.9 (53.9)	49.6 (53.7)
	N031	School Road, outside Acton Business Centre	Free-field	56.8 (60.6)	61.6 (65.2)	55.3 (58.1)	53.0 (62.0)	49.7 (58.2)	51.7 (54.5)	57.9 (63.3)	53.3 (54.9)	52.1 (54.0)	49.0 (57.4)	51.2 (54.4)	50.9 (59.6)
	N049	Flat Iron compound	Free-field	53.2 (64.1)	64.2 (68.3)	55.7 (61.9)	53.9 (64.8)	53.9 (65.3)	50.7 (55.1)	52.3 (53.2)	50.9 (53.6)	51.1 (58.3)	48.0 (59.9)	49.8 (55.5)	53.4 (65.3)
	N050	Acton Square, outside North Acton Station	Free-field	63.5 (66.3)	64.1 (65.7)	63.4 (71.8)	62.7 (68.2)	58.9 (71.6)	64.1 (64.9)	62.6 (63.7)	62.4 (63.6)	62.6 (68.2)	58.9 (64.1)	62.5 (69.5)	57.6 (61.0)
OOC	OOC-N01	Old Oak Common Lane	Free-field	64.6 (67.3)	70.2 (73.9)	60.7 (64.5)	58.5 (65.1)	56.0 (63.1)	59.4 (63.1)	62.1 (64.9)	58.8 (60.2)	58.9 (62.3)	58.1 (63.9)	58.9 (66.6)	56.6 (63.1)
	OOC-N02	Old Oak Common Lane, Hilltop Works	Free-field	67.0 (68.6)	70.7 (73.8)	66.6 (70.7)	65.2 (69.1)	61.4 (70.0)	65.0 (65.8)	66.9 (68.1)	66.7 (67.7)	67.1 (71.1)	62.4 (71.2)	64.8 (66.4)	61.1 (68.8)
MRVS	N040	Badminton Close	Free-field	54.3 (59.0)	56.1 (68.5)	54.1 (73.0)	53.6 (59.5)	50.5 (59.2)	52.2 (53.7)	59.0 (72.3)	51.6 (52.0)	52.6 (55.9)	49.7 (53.6)	53.8 (69.0)	49.8 (53.8)
	N058	Mandeville Road	Free-field	56.4 (61.0)	66.4 (73.5)	53.0 (55.6)	54.4 (58.8)	51.1 (66.4)	54.3 (60.0)	64.2 (68.0)	51.6 (51.8)	53.6 (59.0)	48.5 (54.3)	52.7 (54.6)	51.4 (57.4)

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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
	N063	Mandeville Road	Free-field	62.4 (67.7)	64.2 (69.4)	61.1 (63.1)	61.4 (63.5)	57.4 (62.4)	60.5 (60.5)	64.7 (69.9)	59.8 (60.2)	61.0 (63.2)	55.1 (60.6)	60.4 (62.0)	55.4 (60.7)
GPWVS	N059	Green Park Way Ventilation Shaft	Façade	51.8 (53.9)	61.1 (72.3)	51.7 (54.2)	52.1 (58.0)	49.9 (61.5)	50.8 (52.1)	58.1 (58.6)	51.3 (53.4)	50.3 (51.8)	47.0 (51.2)	49.5 (54.0)	48.5 (55.2)
	N064	Green Park Way Ventilation Shaft	Façade	57.5 (67.9)	63.6 (67.9)	54.7 (57.1)	54.0 (57.7)	51.0 (65.9)	54.5 (55.2)	56.1 (56.8)	54.1 (55.2)	53.6 (55.3)	48.4 (52.7)	53.5 (56.1)	50.1 (55.4)
WVS	N062	Westgate Ventilation Shaft	Free-field	60.7 (64.6)	68.7 (76.9)	57.1 (61.5)	56.2 (61.7)	54.7 (61.1)	59.8 (65.4)	65.7 (70.1)	58.8 (61.2)	57.6 (65.2)	53.0 (56.5)	55.1 (59.0)	54.4 (59.8)

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	Stephenson Street (north)	1.24 (Z-axis)
	V057	37, Stephenson Street	1.03 (Z-axis)
OOC	OOC-V01	25 Wells House Road	2.73 (Z-axis)
	OOC-V02	Kildun Court, Old Oak Common Lane	1.75 (Z-axis)
	OOC-V03	Wells House Road Alleyway	2.89 (Z-axis)
GPWVS	V053	Green Park Way, Greenford	1.46 (Z-axis)
	V054	Green Park Way Ventilation Shaft	1.90 (Z-axis)
MRVS	V055	Mandeville Road	8.06* (Z-axis)
	V056	Mandeville Road	2.86 (Y-axis)

* High vibration levels are due to the proximity of the construction activities to the vibration monitor. The nearest residential receptors are further away from the works and vibration levels at the receptor will therefore be lower.

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
VRFIC	N029	Braitrim House, Victoria Road	All days	All periods	No exceedance
	N042	Bodens Car Park	All days	All periods	No exceedance
	N031	School Road, outside Acton Business Centre	All days	All periods	Not applicable**
	N049	Flat Iron compound	All days	All periods	No exceedance
	N050	Acton Square, outside North Acton Station	Night	2200-0700	13

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
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
MRVS	N040	Badminton Close	All days	All periods	No exceedance
	N058*	Mandeville Road	Weekdays	0800-1800	1
	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**

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

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

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

Table 6: Summary of Total Exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
VRFC	N050	Acton Square, outside North Acton Station	3
MRVS	N058	Mandeville Road	1

2.2.6 4x no. exceedances of the SOAEL were recorded due to HS2 construction works during June 2021. The exceedances occurred at monitoring location N050 during 3x no. night-time periods due to Ancillary Shaft construction works and at monitoring location N058 during 1x no. daytime period due to building demolition works.

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

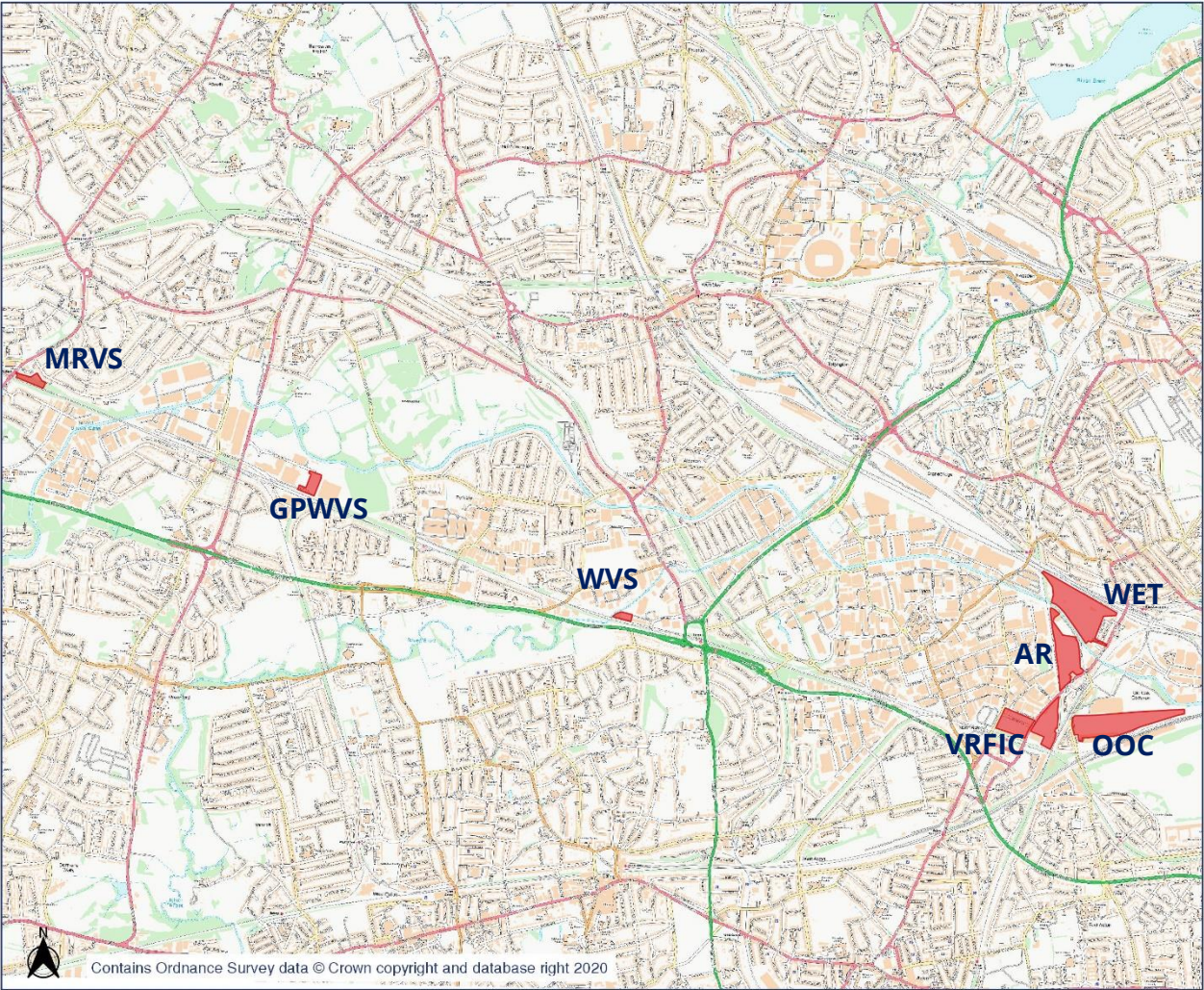
2.4.1 Table 8 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 8: Summary of Complaints

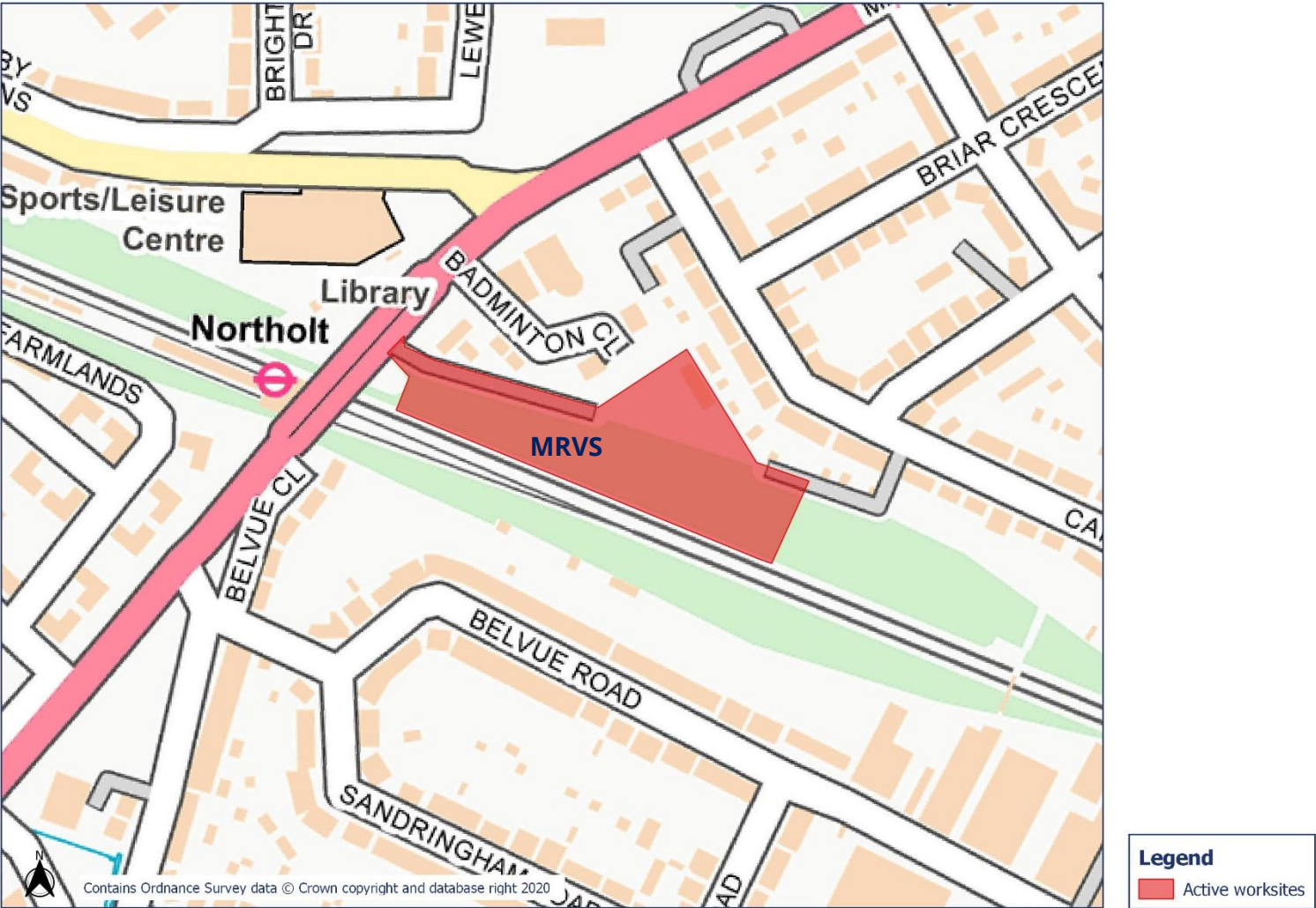
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-42198-C	OOO	Complaint due to generator noise during night-time.	Investigation confirmed that the generator has been required to pump water from site. Works were undertaken in line with the Section 61 consent and Best Practicable Means (BPM) were applied.	Residents have been contacted and information provided. Going forward the use of the generator will be limited to working hours only.
HS2-21-42173-C	OOO	Complaint due to tapping noise coming from the site.	Noise coming from the Crossrail site has been reported also by members of site team.	The complainant has been contacted and information of findings provided. The complainant has been advised to contact the engagement managers again if any further issue will occur.
HS2-21-42176-C	OOO	Complaint due to noise coming from the site.	Investigations confirmed that works (demolitions works) were carried out in	Noise levels have been reviewed and there were confirmed to be in line with Section 61

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
			accordance with Section 61 consent and BPM were used to reduce noise as far as practicable.	consent. The complainant has been contacted and information provided.
HS2-21-42063-C	OOC	Complaint due to noise from staff on site and lorries beeping at the site entrance.	Investigations confirmed that horns have been used at the site entrance.	Drivers and traffic marshals have been re-briefed to advise that horns should only be used in the event of necessity for safety reason. The workforce has been re-briefed on keeping an appropriate conduct in order to limit the noise on site.
HS2-21-42177-C	AR	Complaint due to noise during night-time coming from the site.	Investigations shown that no works were undertaken at the time of the complaint and therefore it was not related to HS2 works.	The complainant has been contacted and information provided.
HS2-21-42193-C	MRVS	Complaint due to high vibration levels.	Investigations shown that concrete breaking out works (demolition works) were undertaken at the time of the complaint.	Works were stopped and an alternative method has been used to complete the activity. The complainant has been contacted and information provided.
HS2-21-42123-C	MRVS	Complaint due to generator noise.	Investigations confirmed that a generator is working at the site in line with Section 61 consent.	The complainant has been contacted and information about working hours and site set up times have been provided.
HS2-21-42174-C HS2-21-42133-C	VRFIC	Complaint due to noise during night-time.	Investigation confirmed that sprayed concrete lining works were undertaken at the time of the complaint. However, works were undertaken in line with the Section 61 consent and Best Practicable Means (BPM) were applied.	Best Practicable Means (BPM) have been reviewed. The complainant has been contacted and advised to contact the engagement managers again if any further issue will occur.

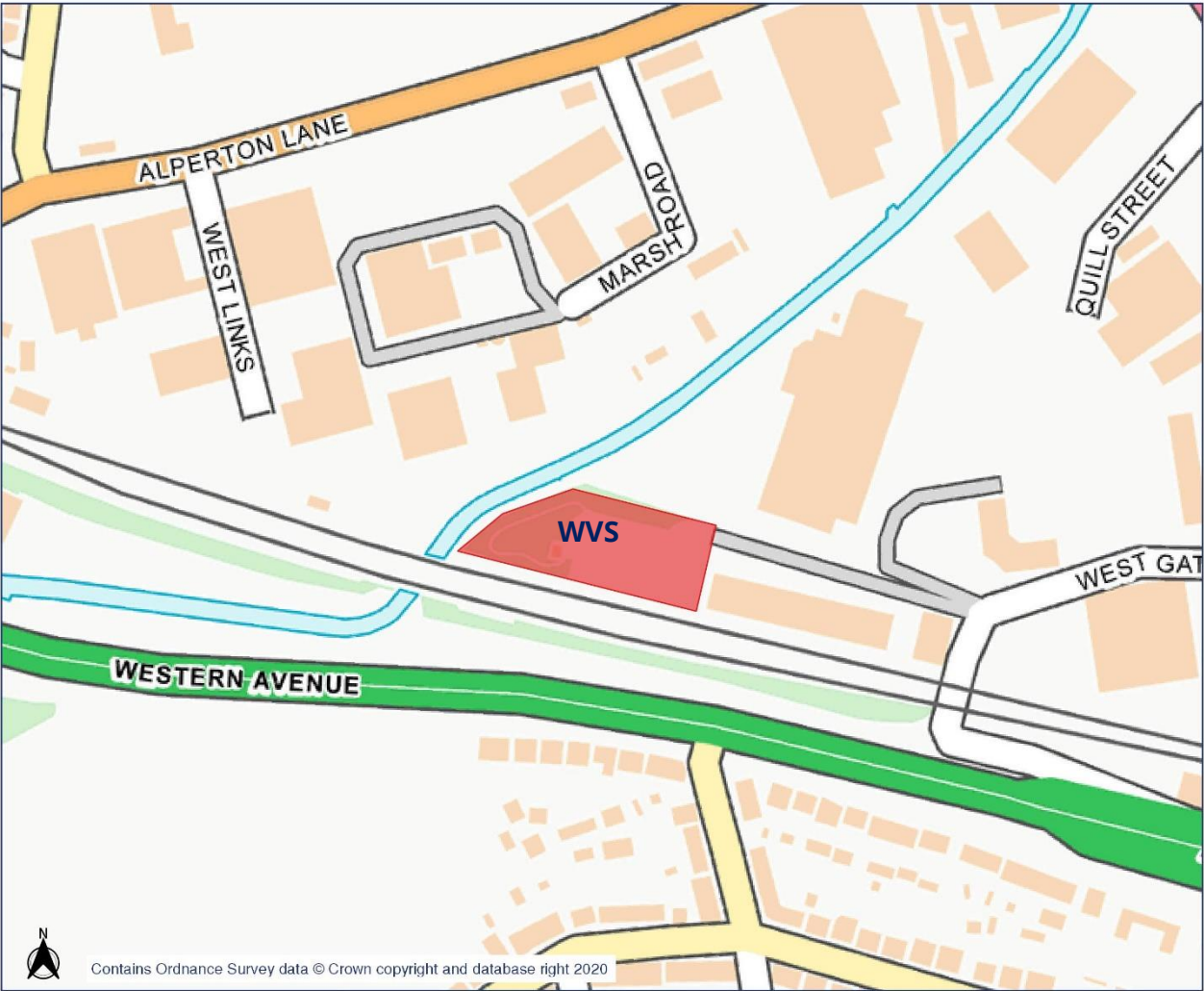
Appendix A Site Locations

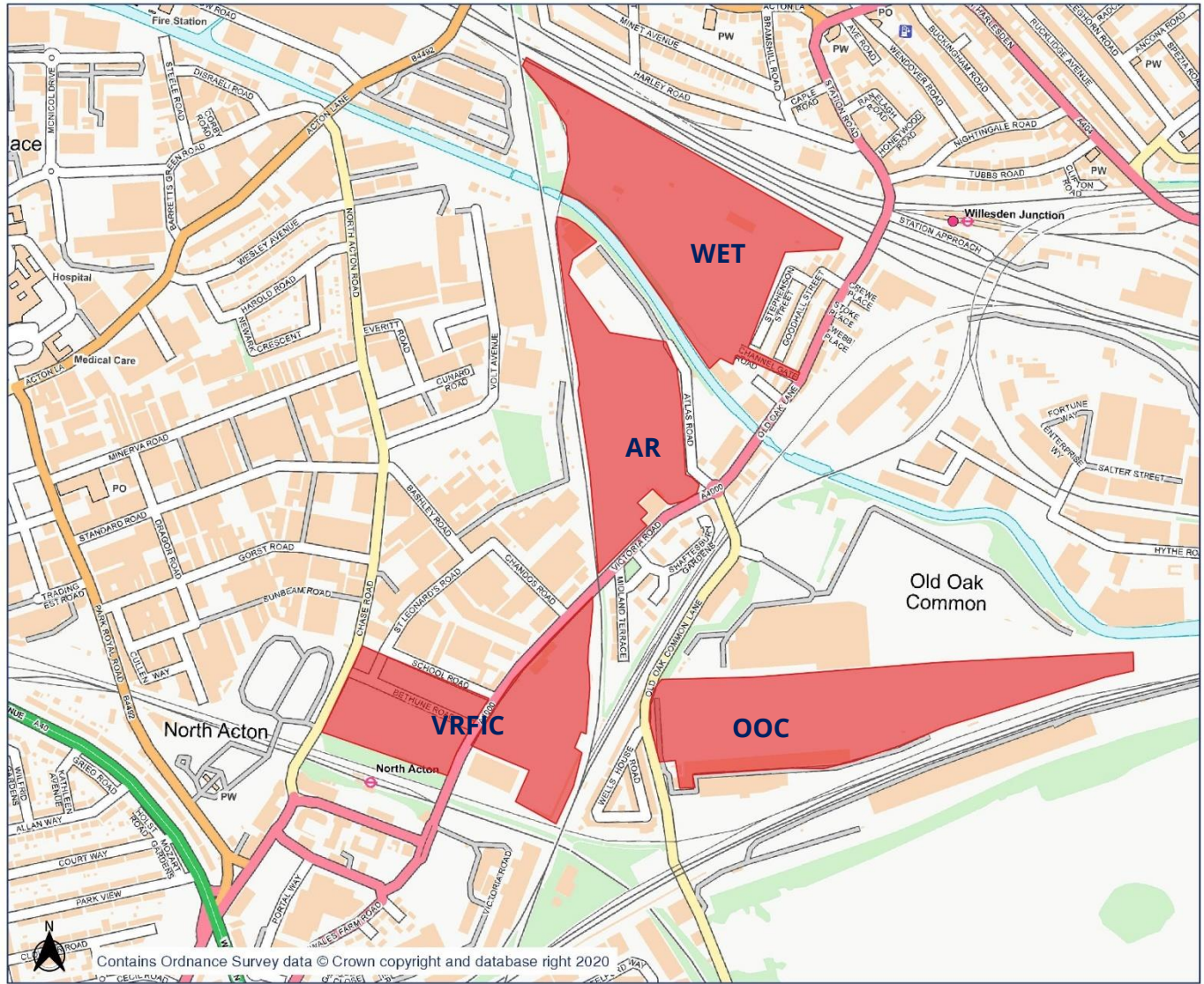


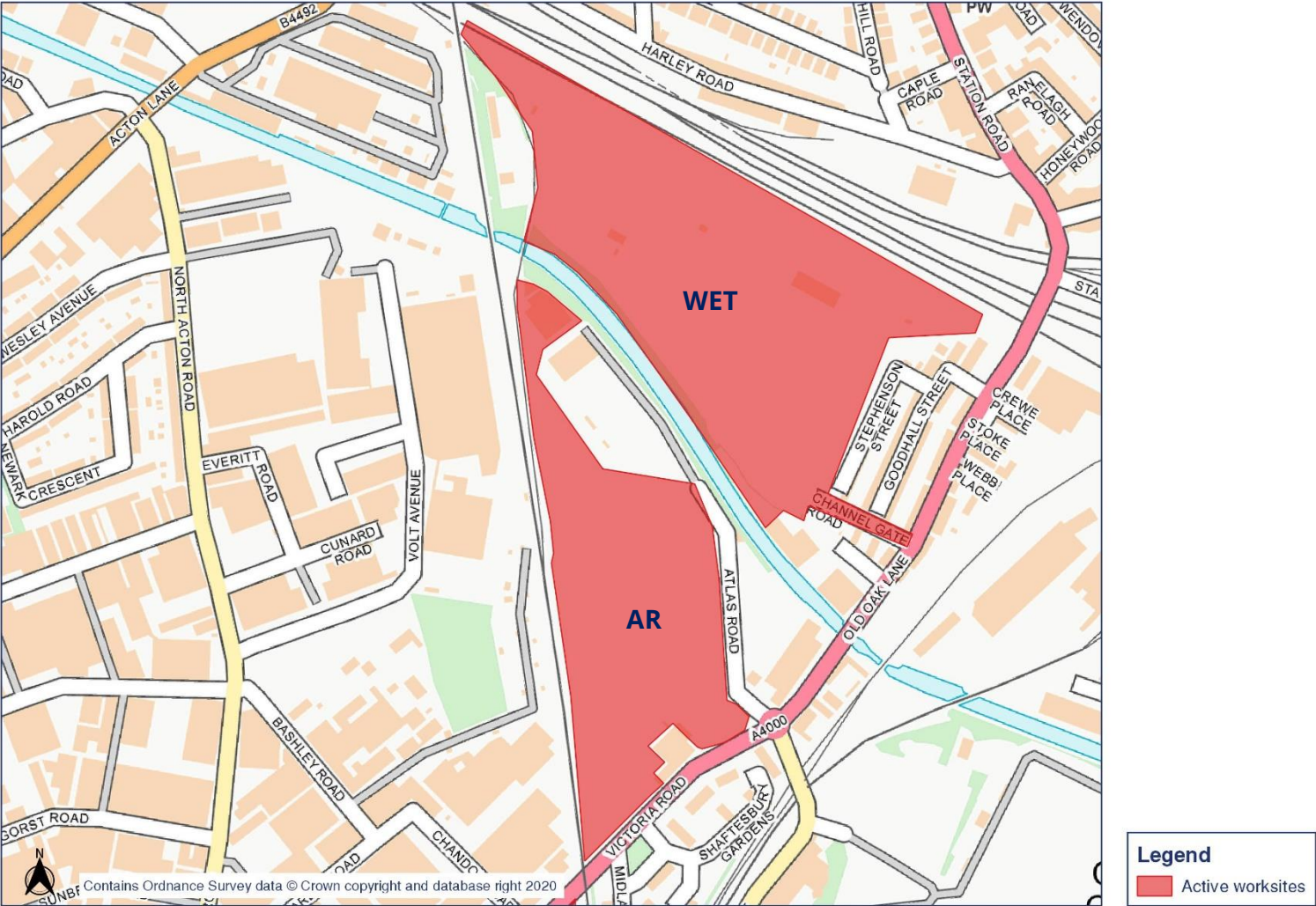
Legend
Active worksites

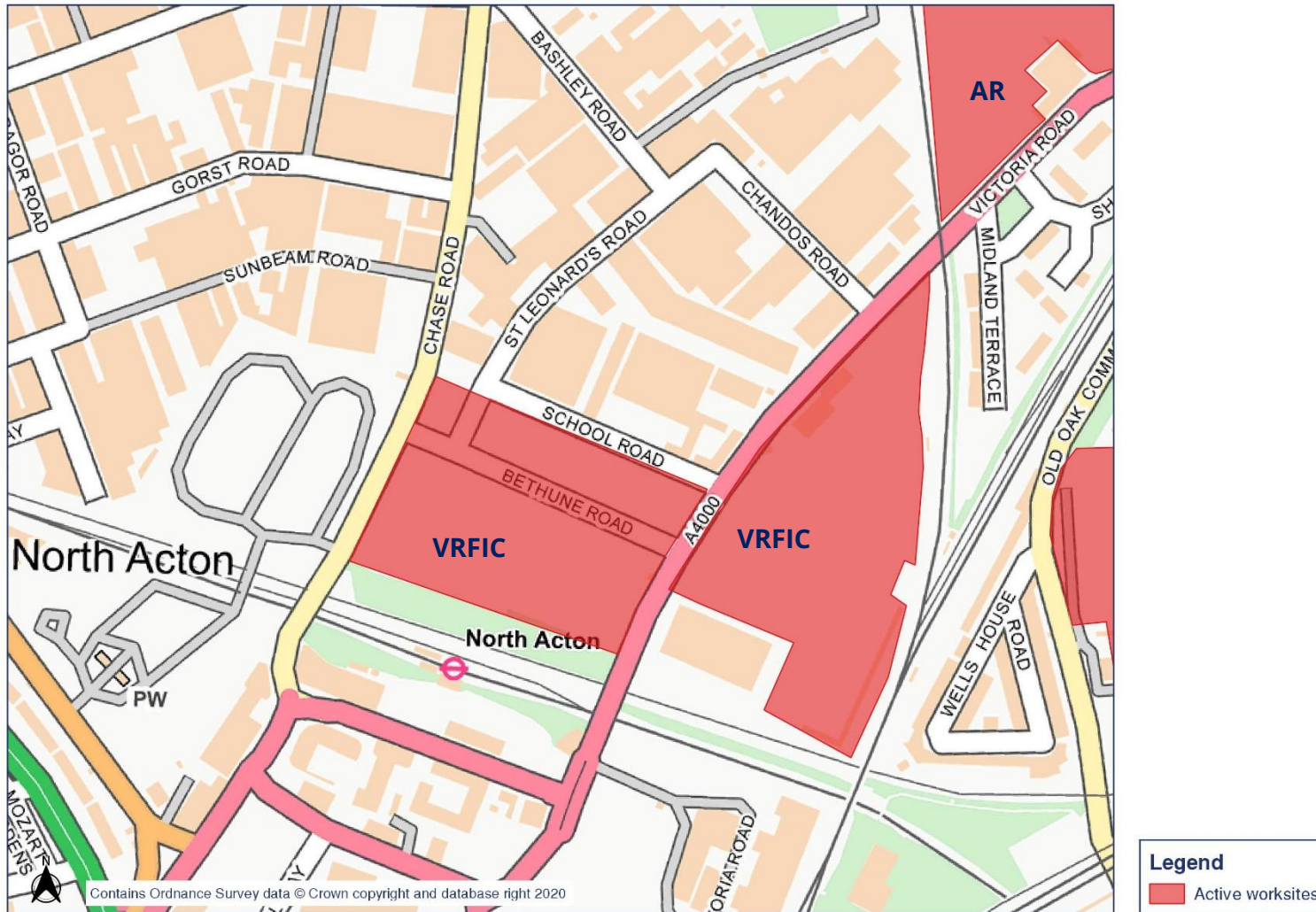








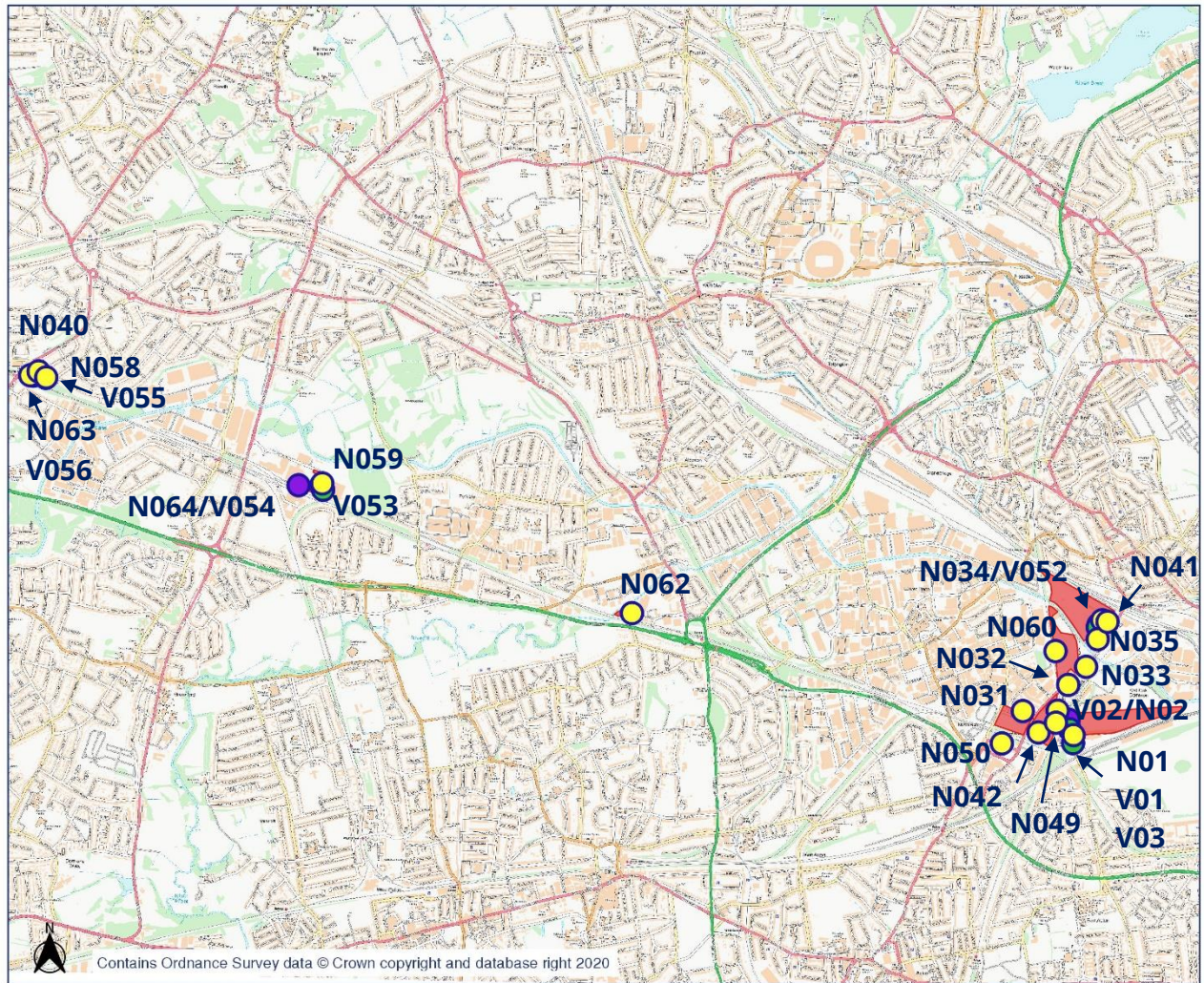






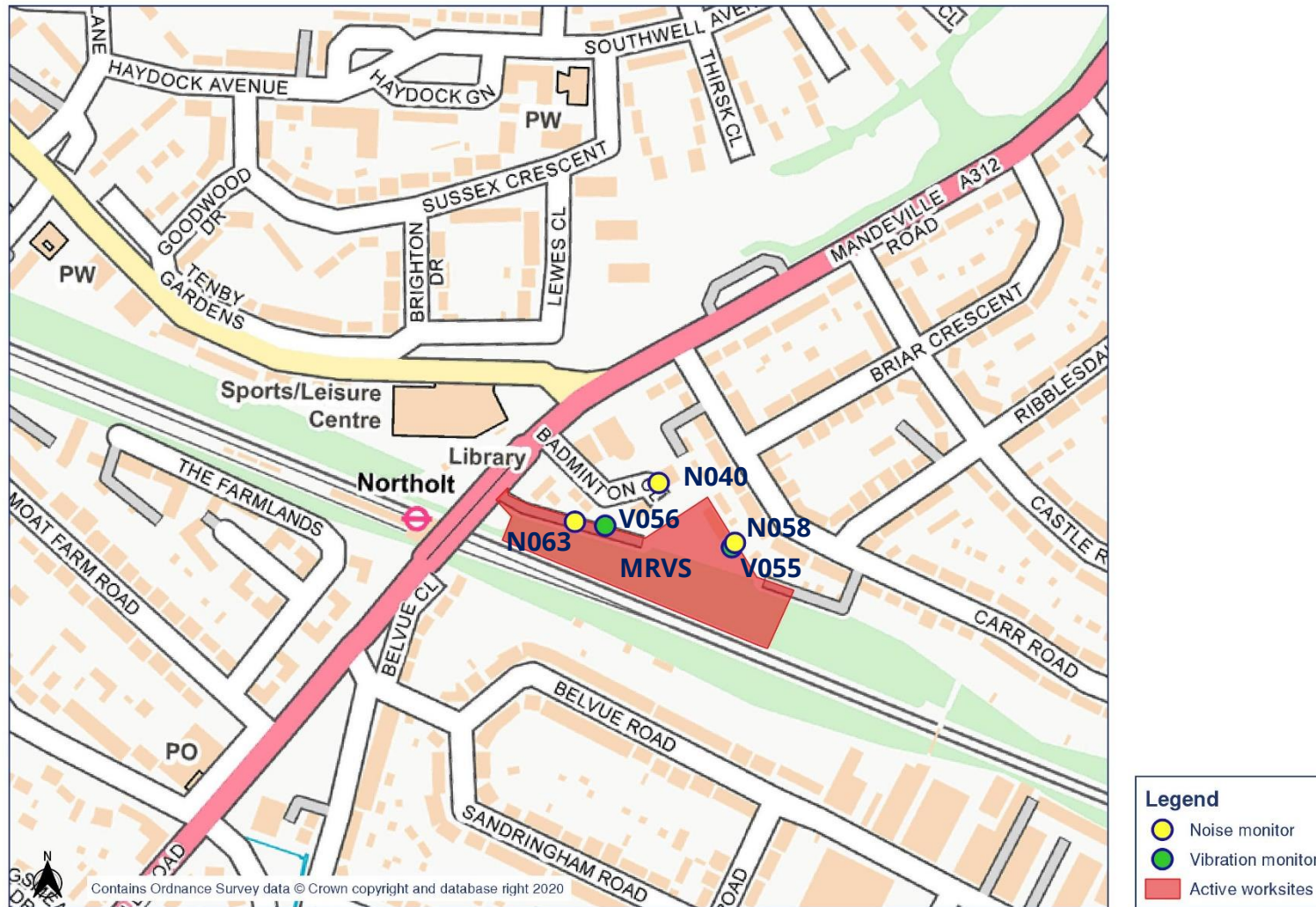
Appendix B Monitoring Locations

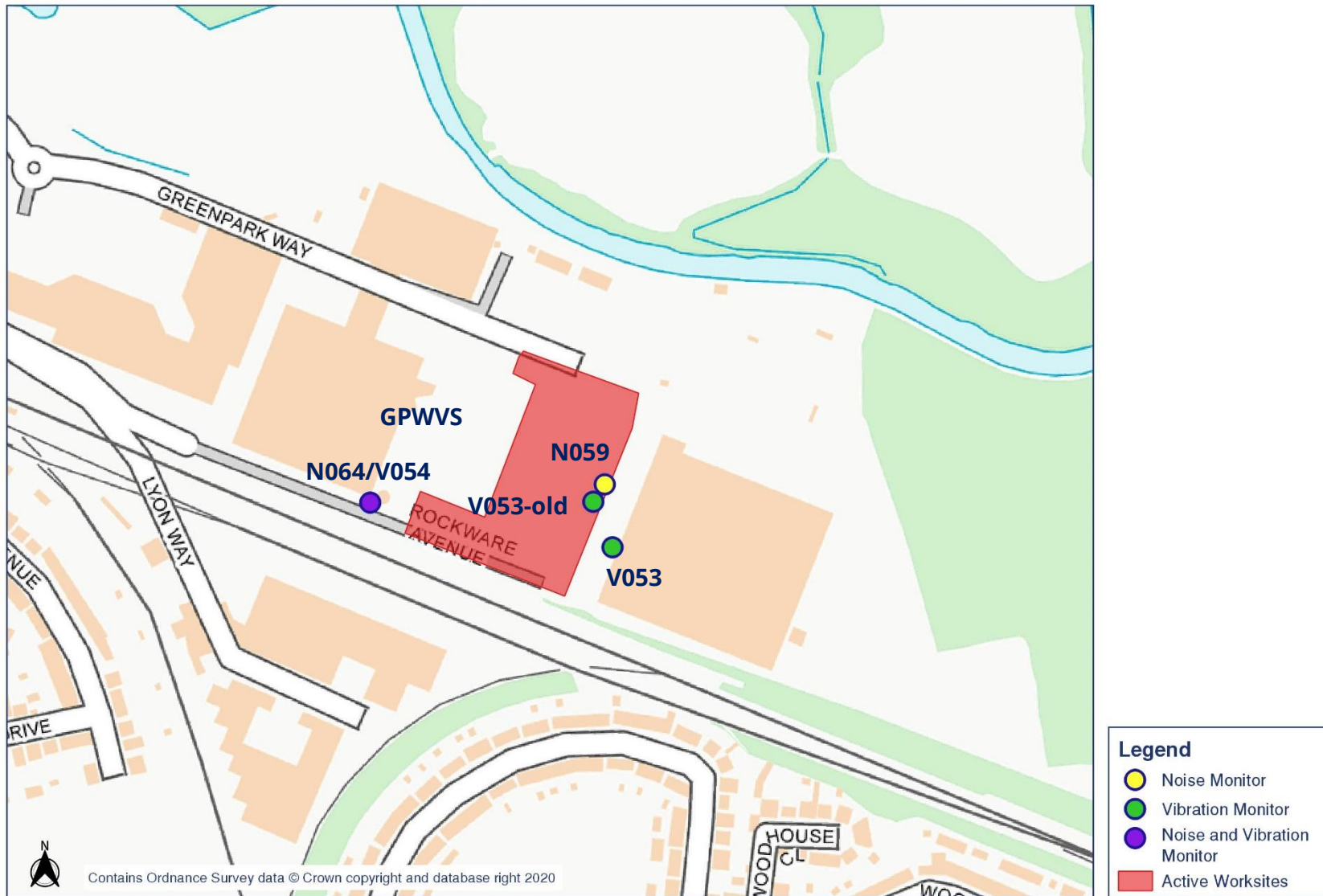
HS2 Noise and vibration monitoring plan - Overview

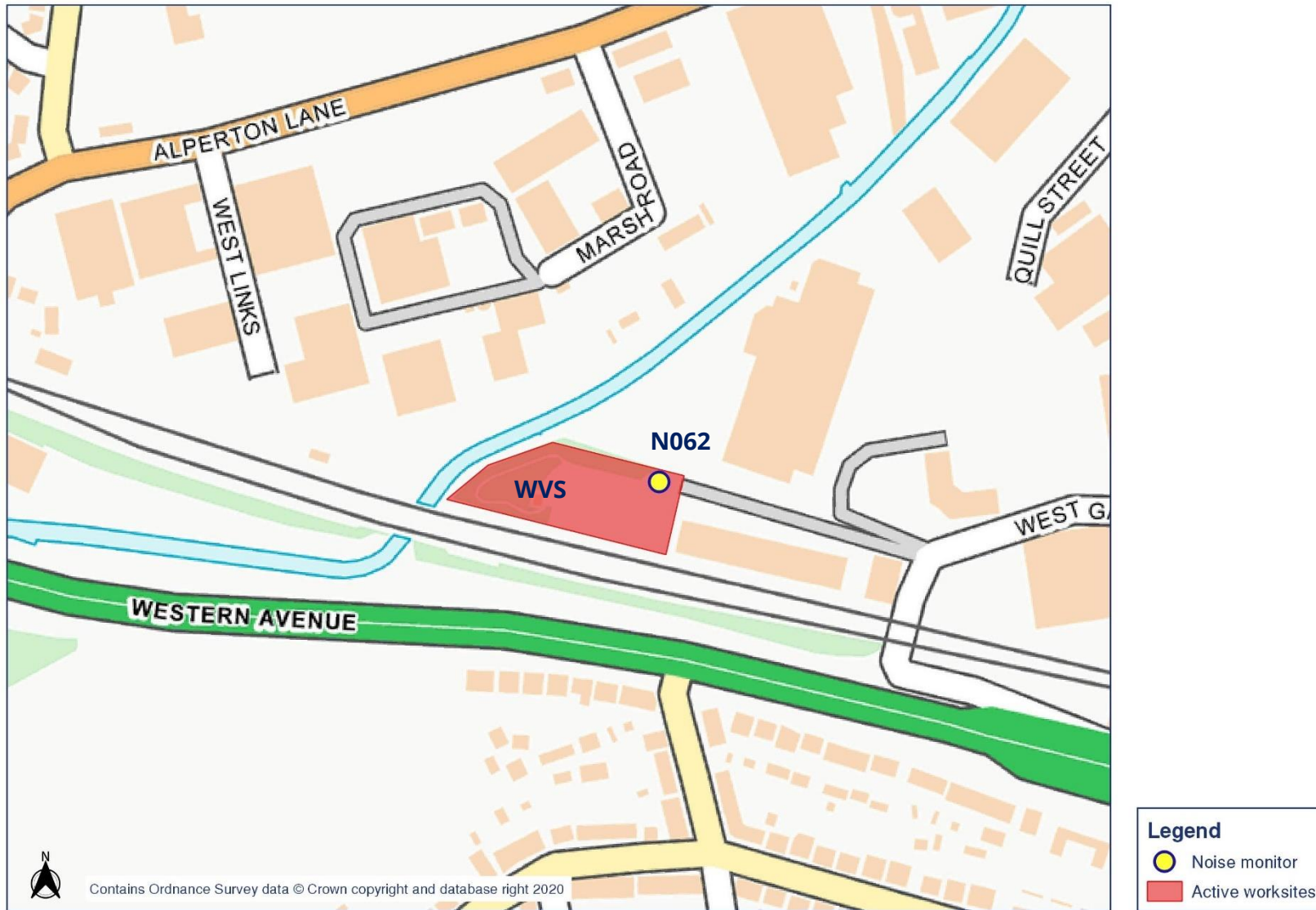


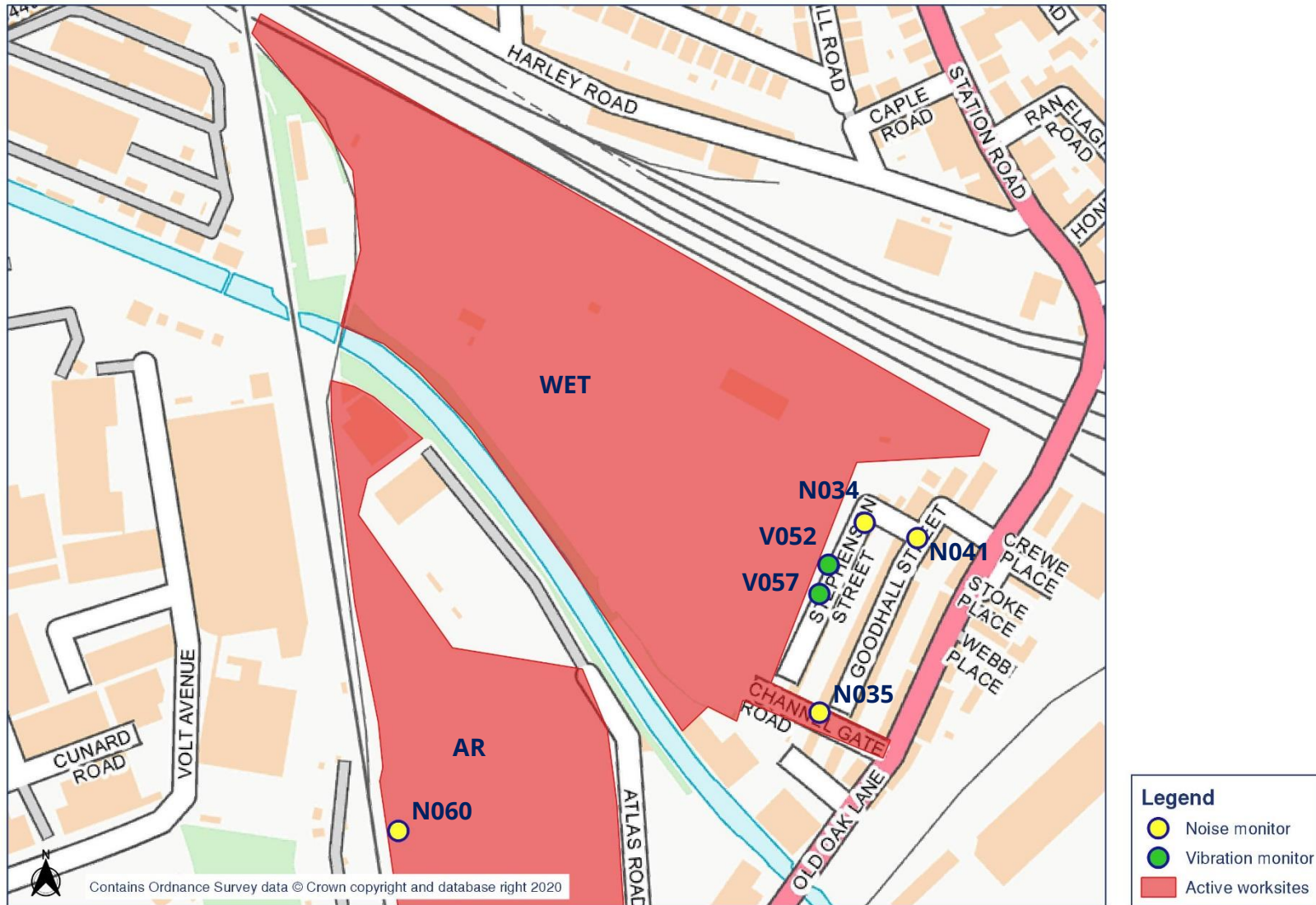
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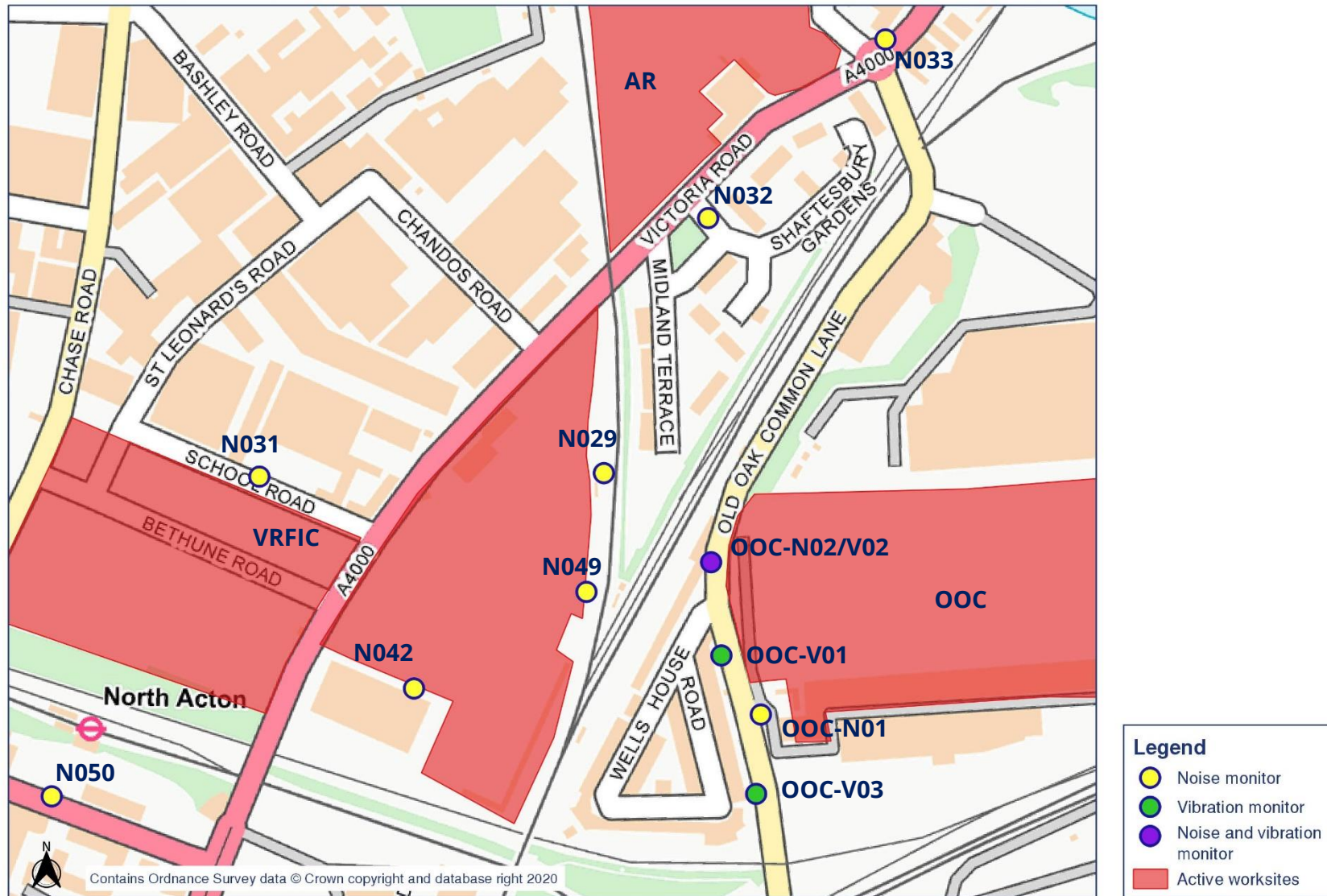
- Noise Monitor
- Vibration Monitor
- Noise and Vibration Monitor
- Active Worksites









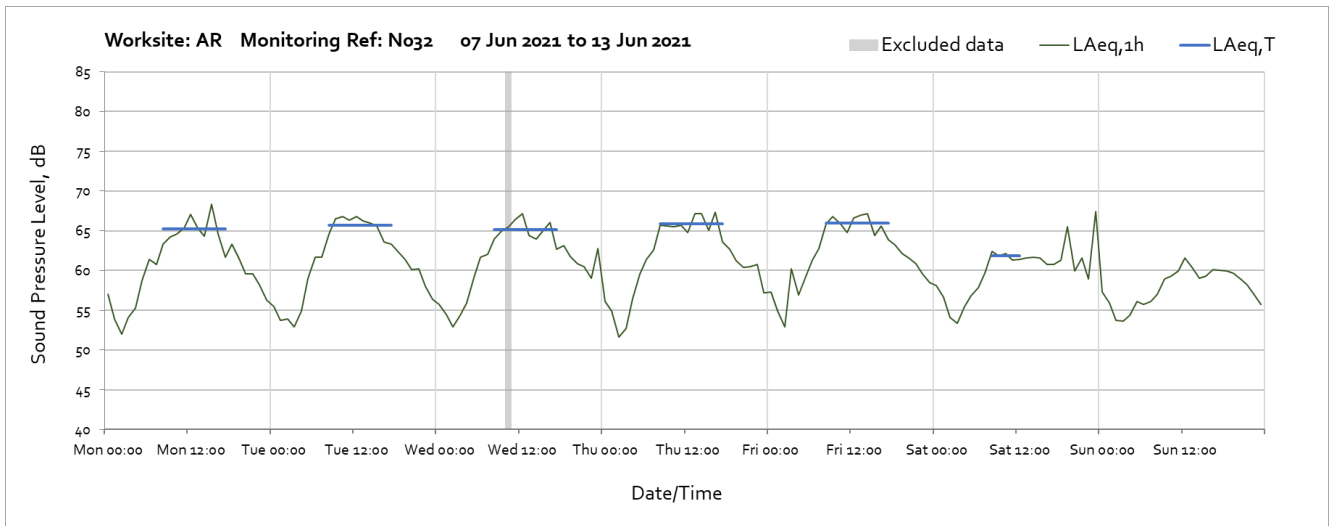
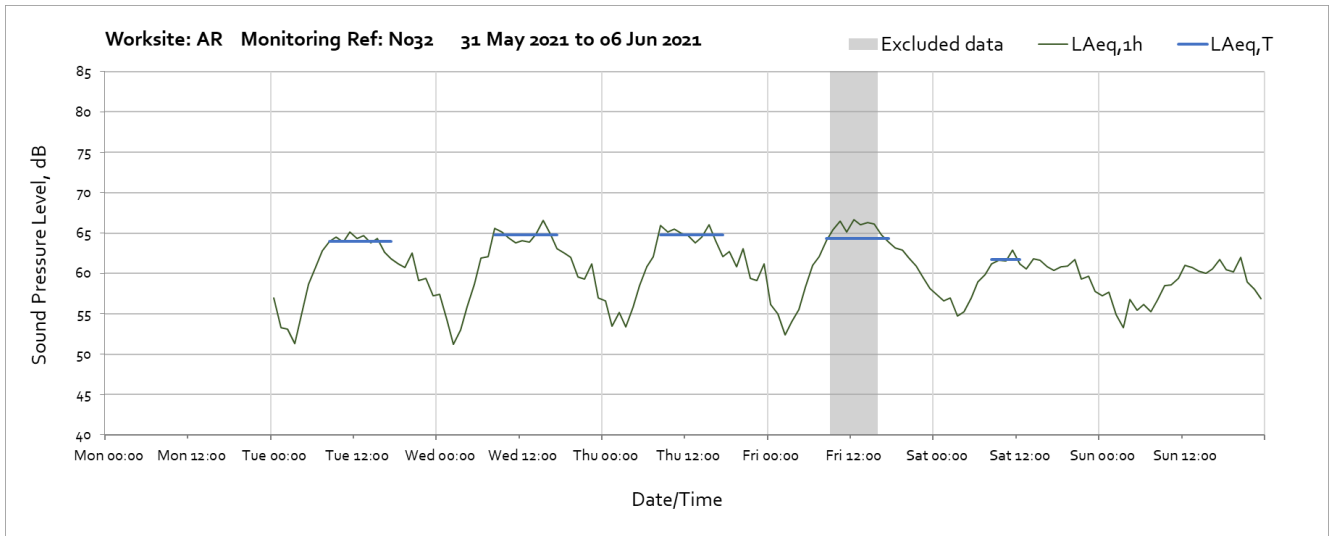


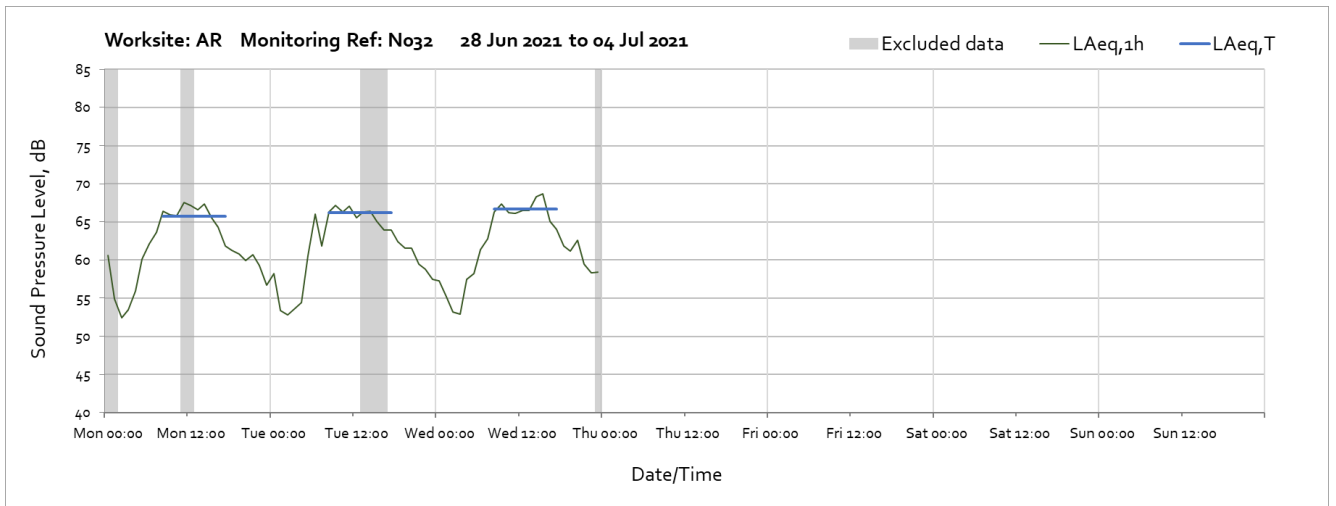
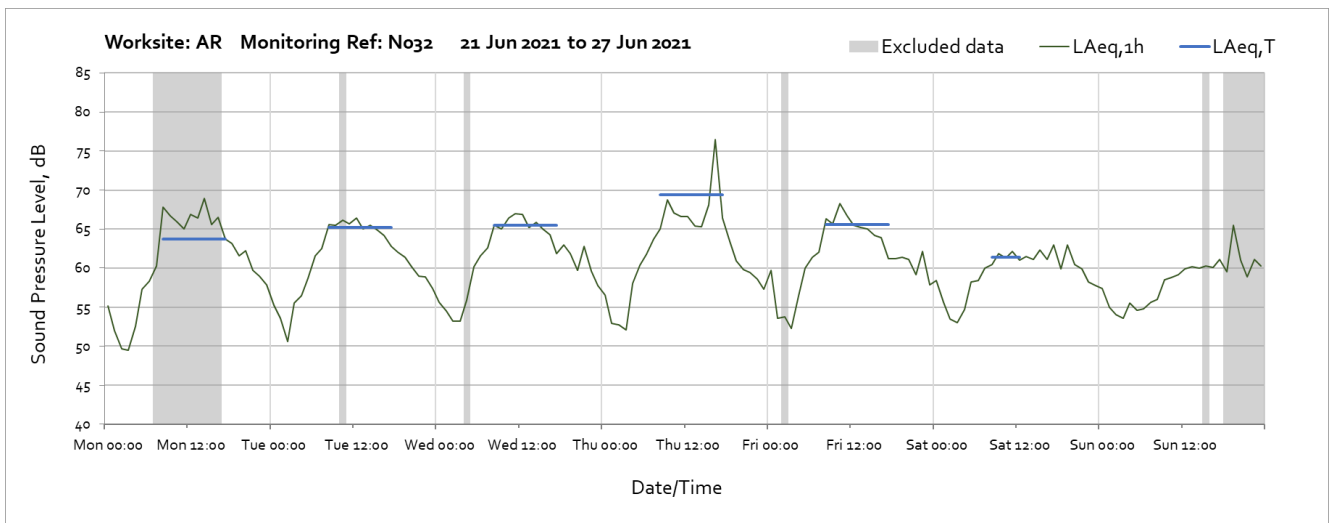
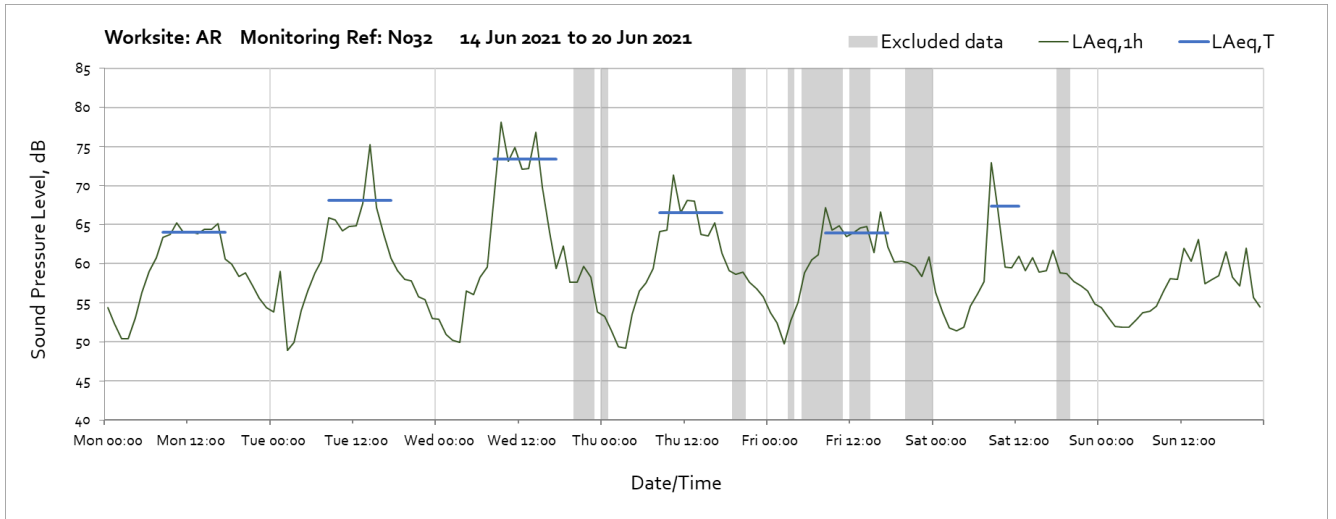
Appendix C Data

Noise

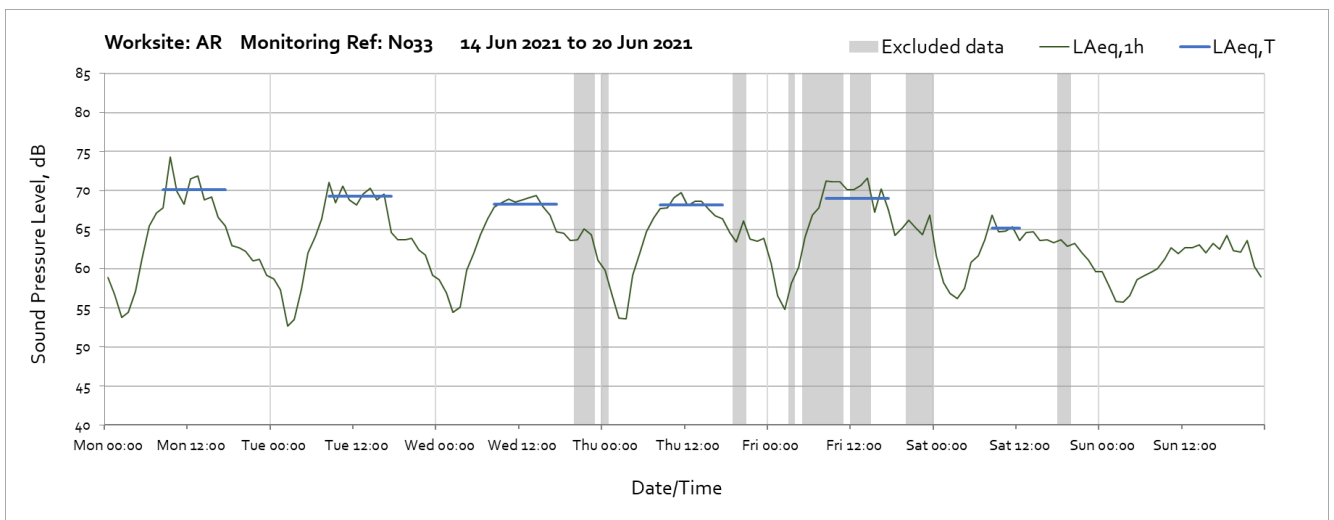
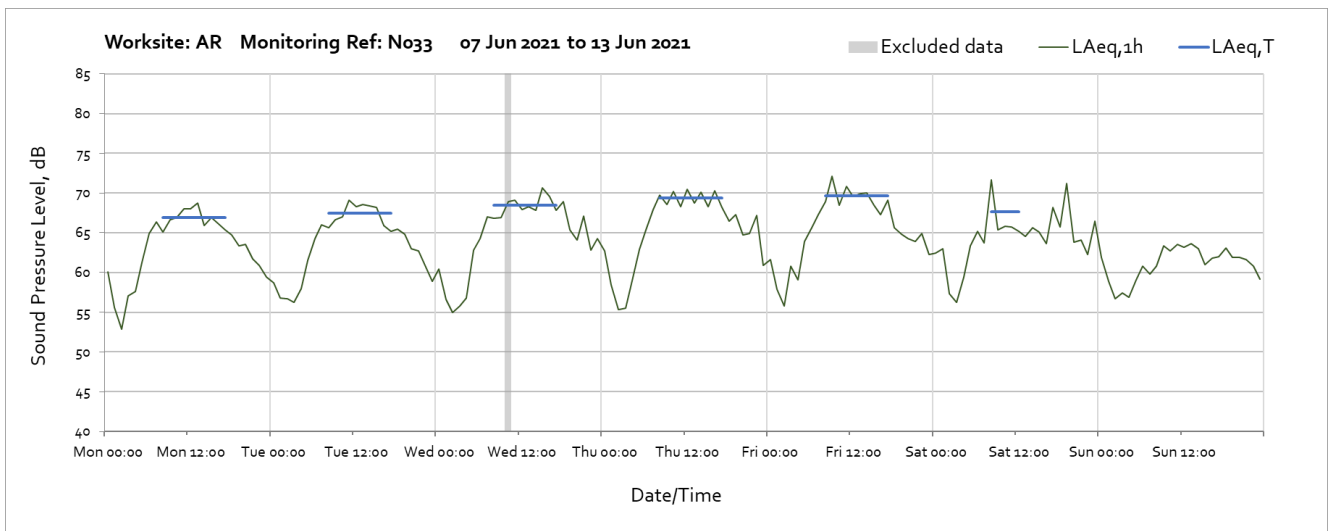
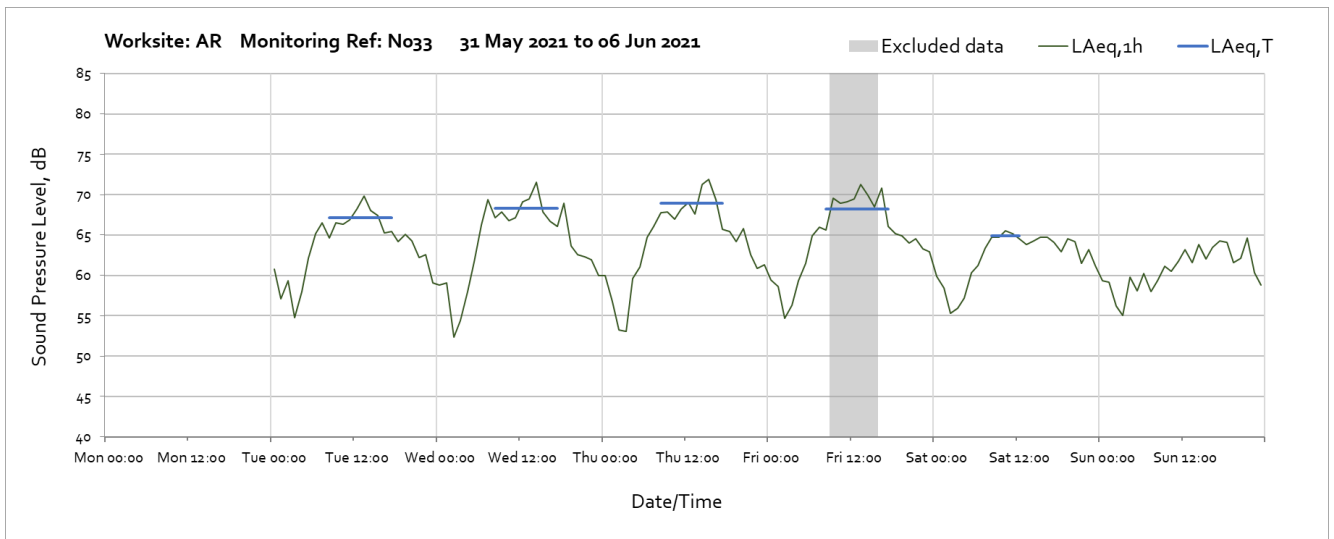
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

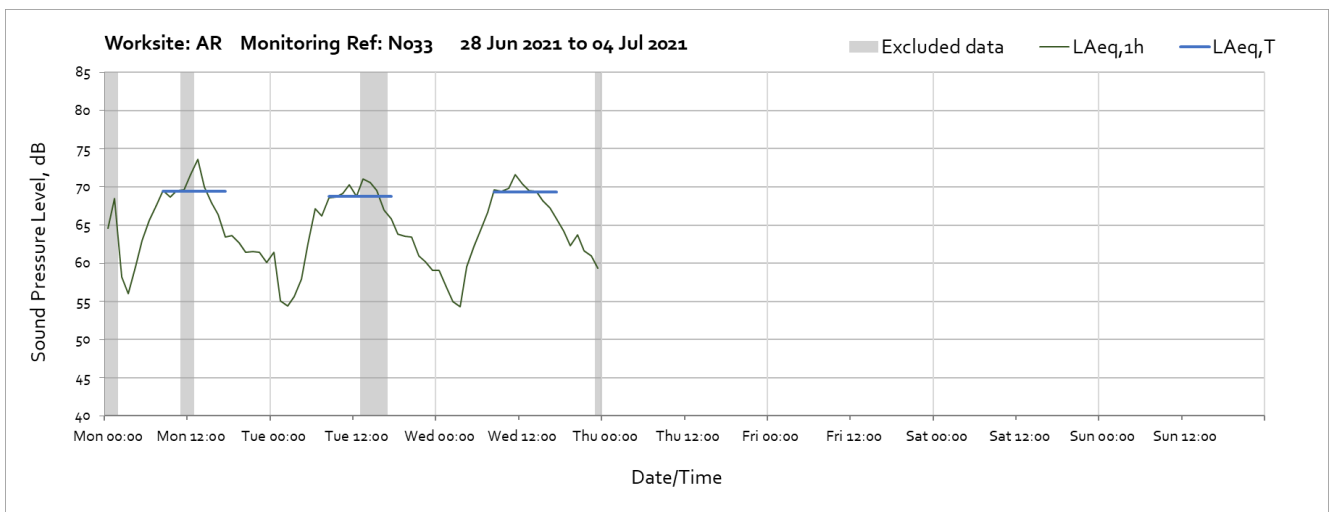
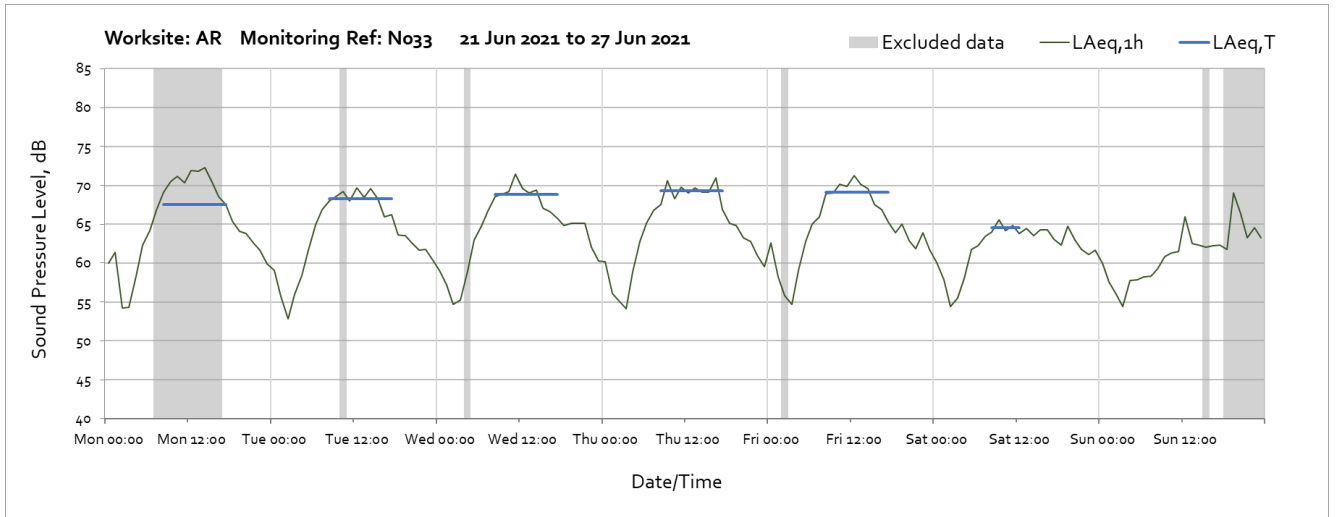
Worksite: Atlas Road worksite (AR) – Monitoring Ref: N032



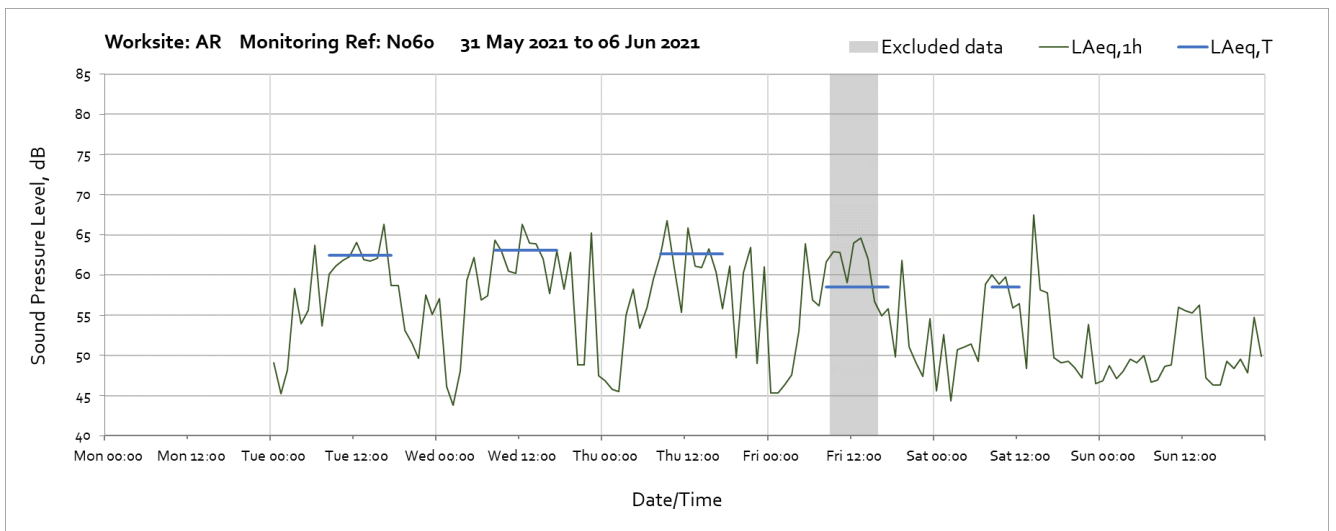


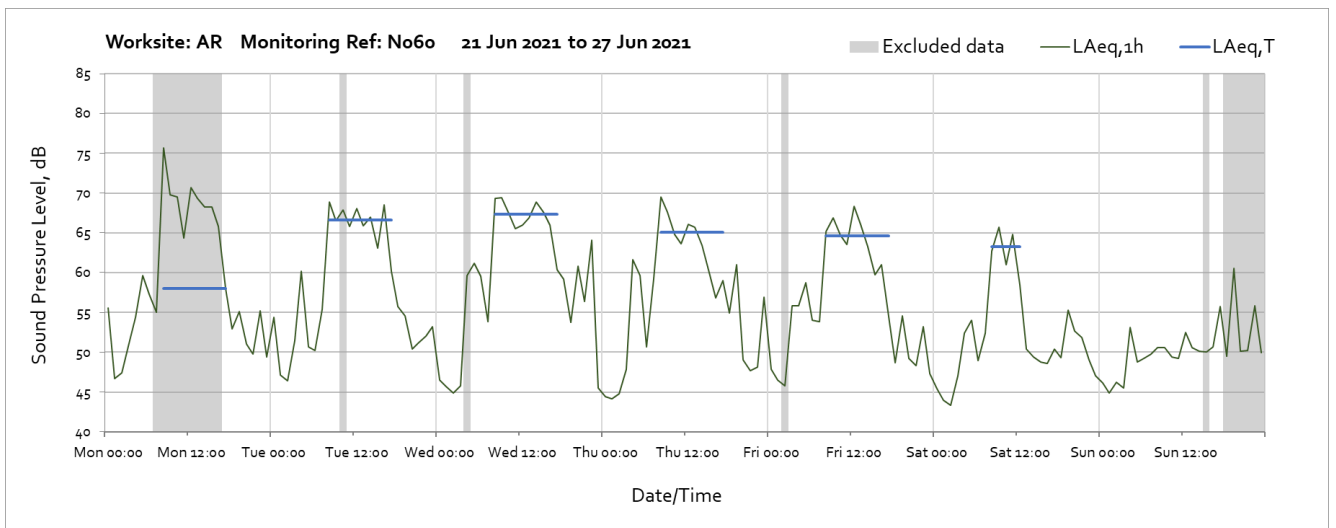
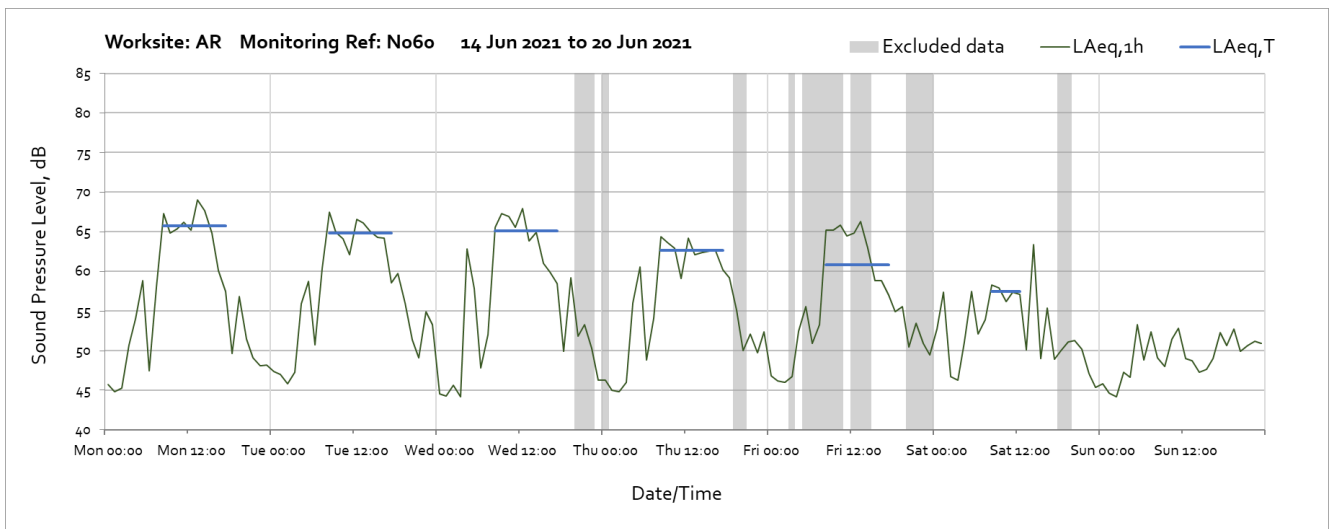
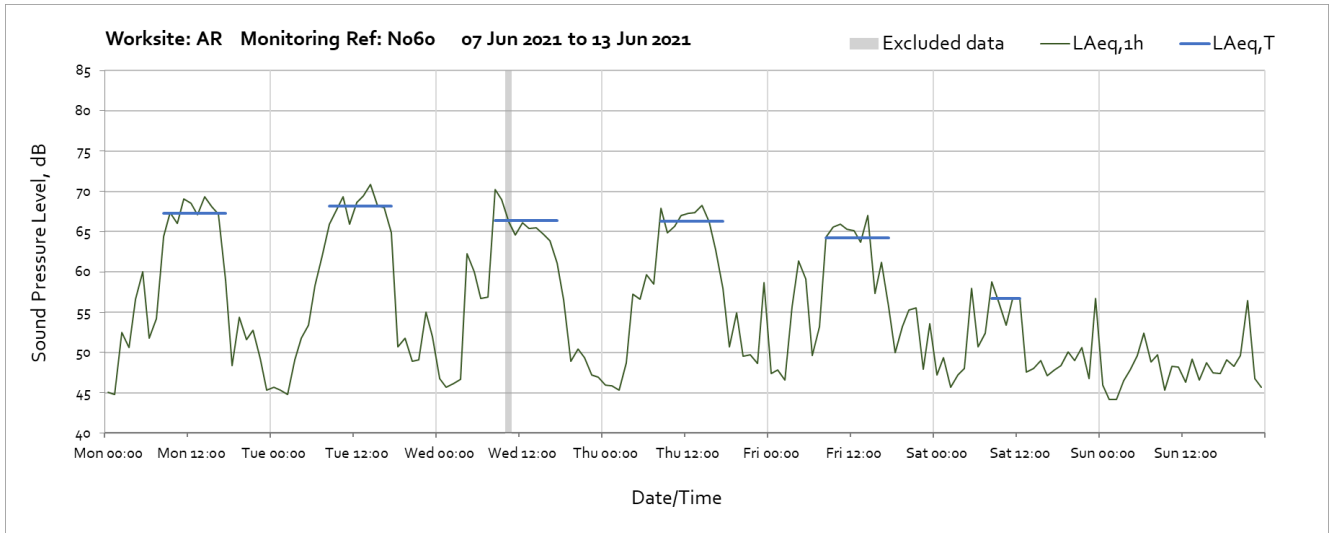
Worksite: Atlas Road worksite (AR) - Monitoring Ref: N033

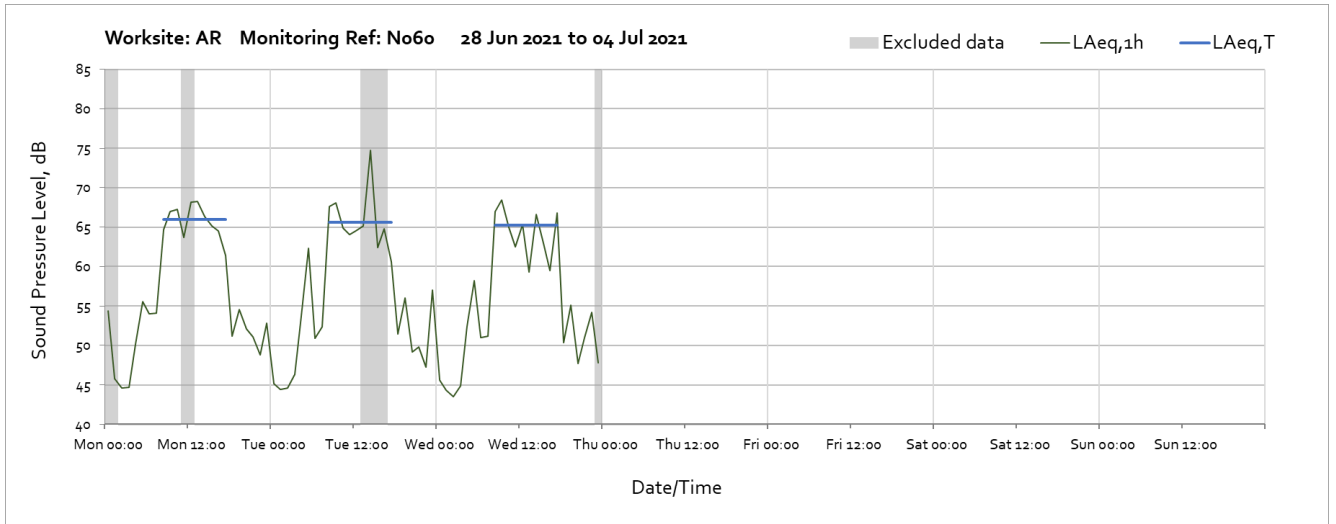




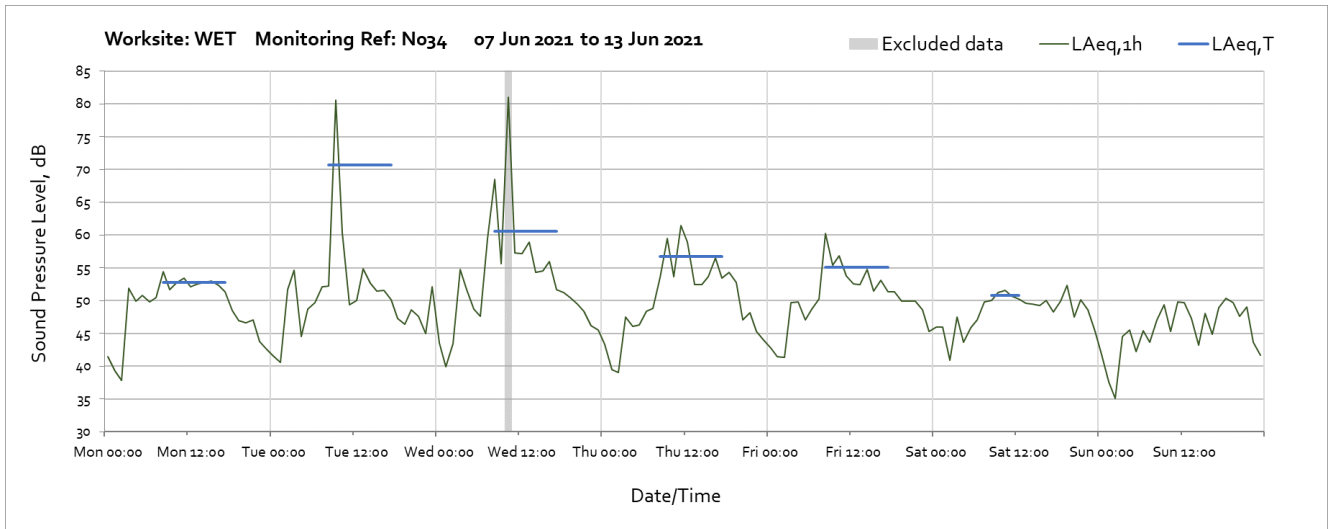
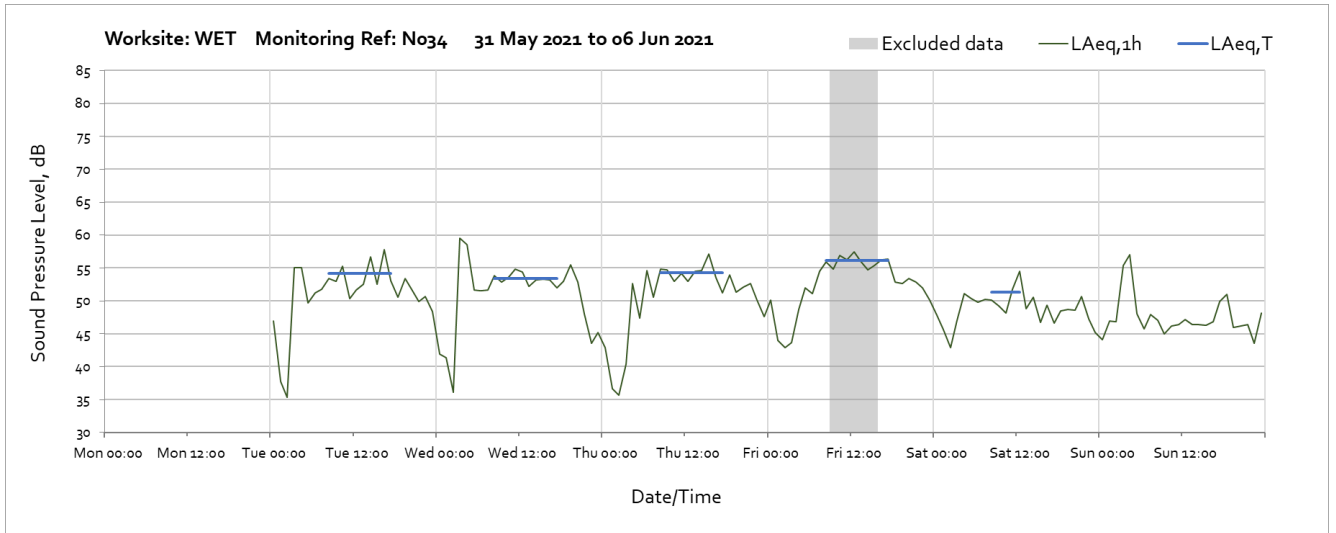
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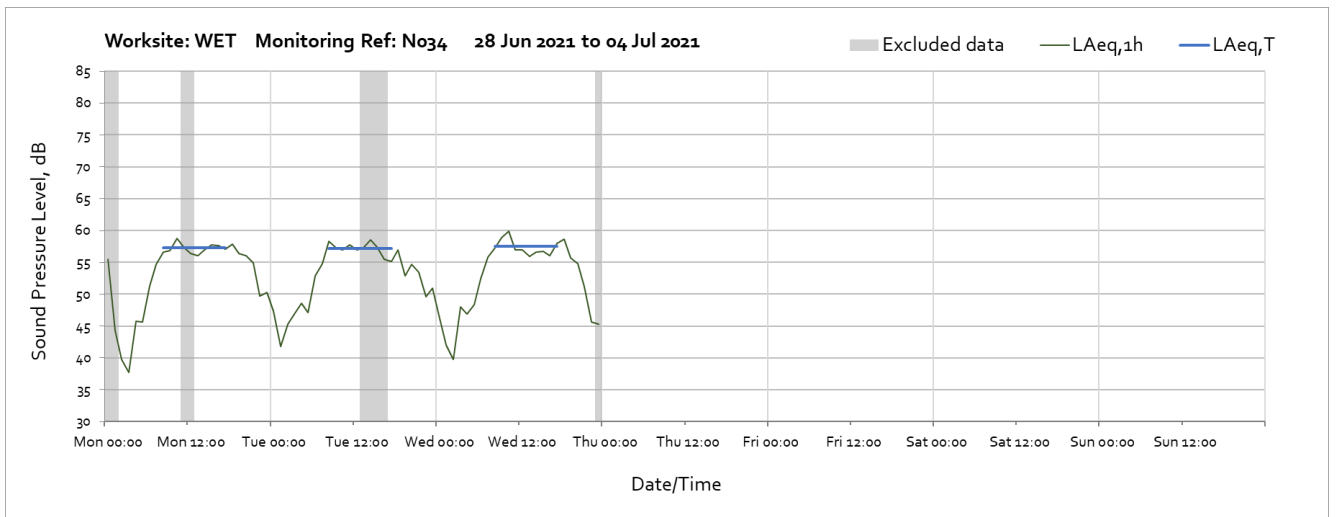
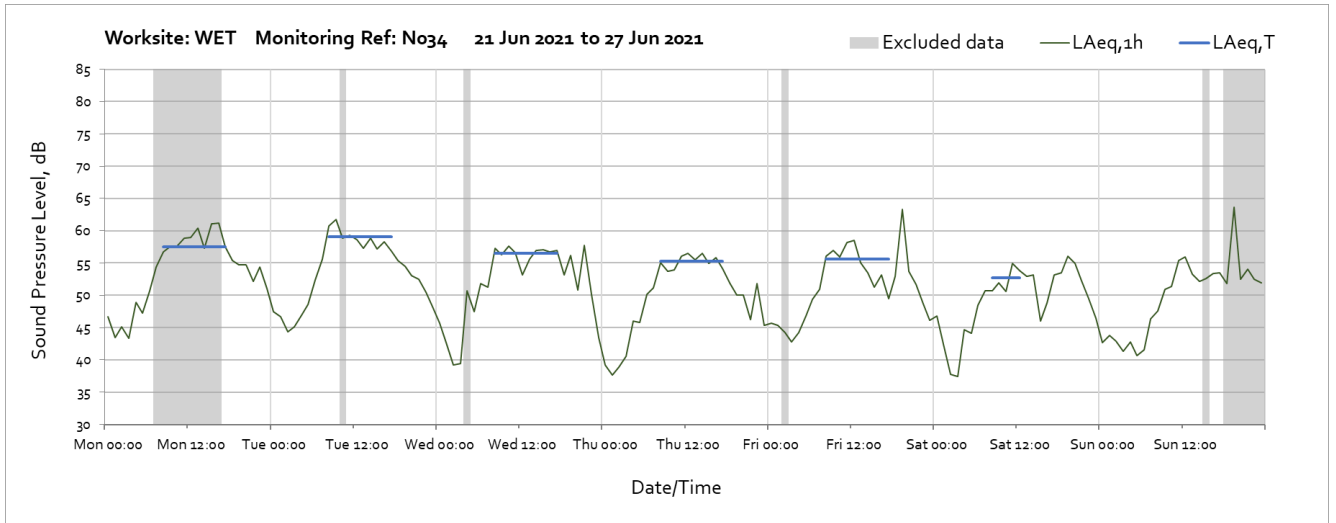
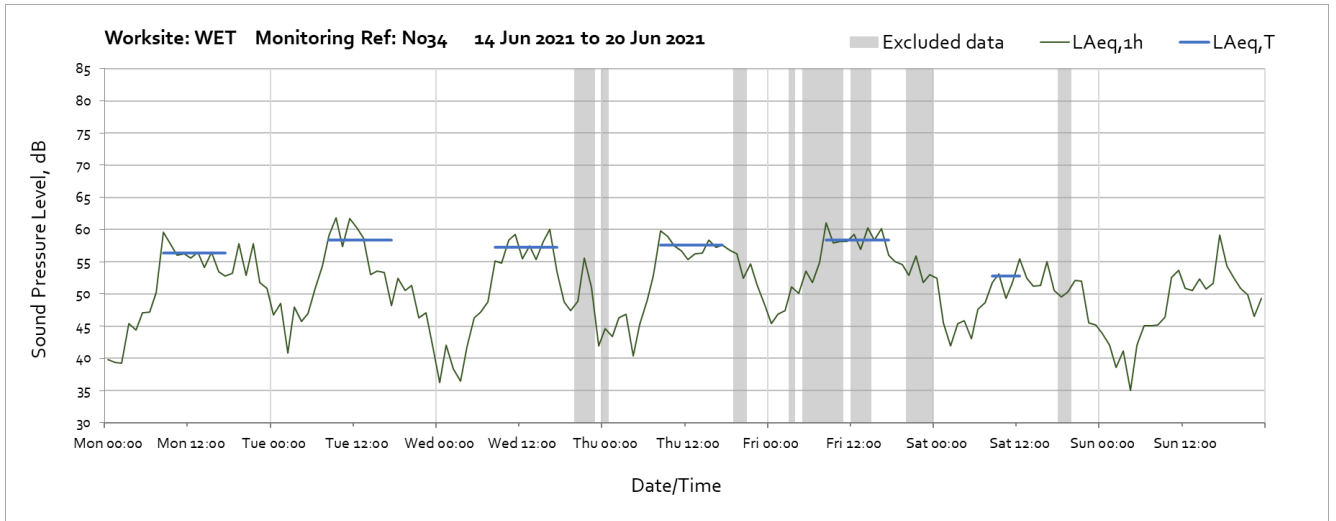




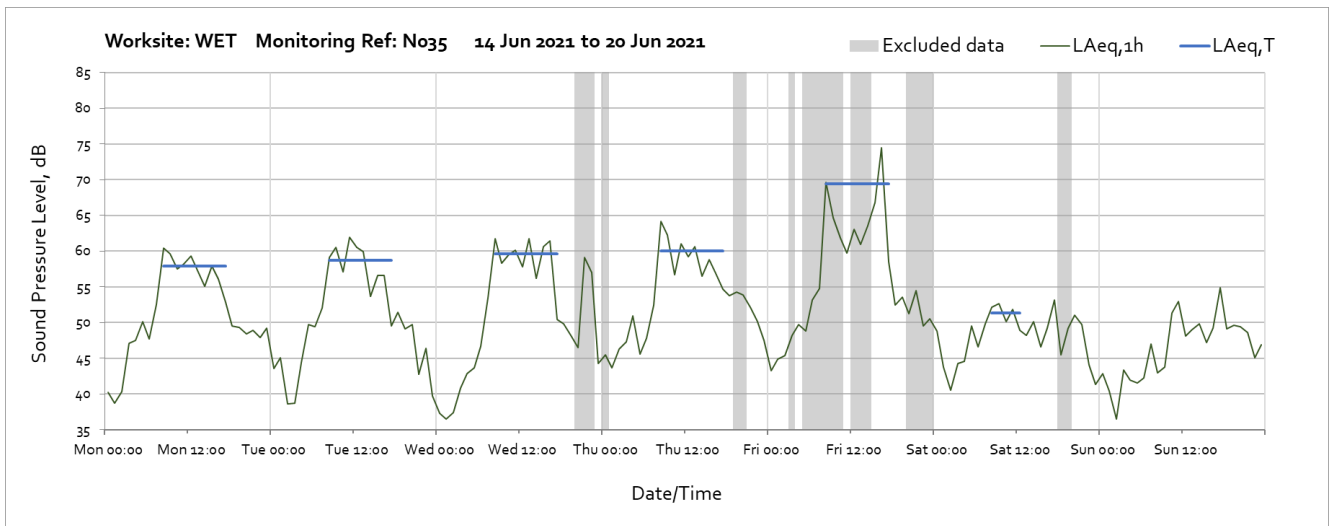
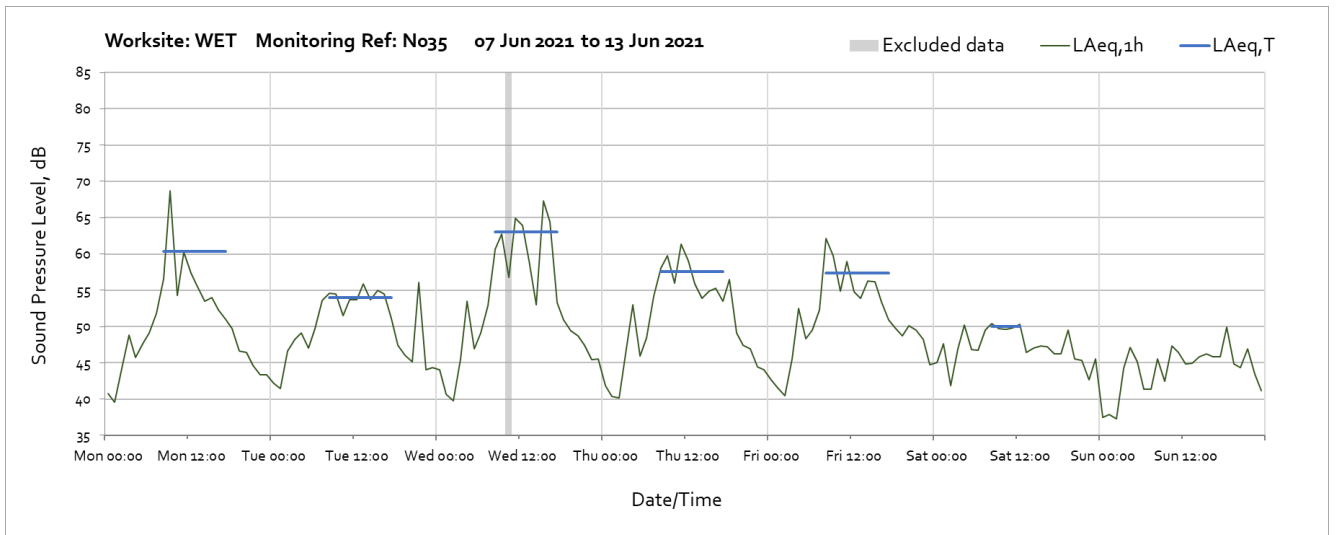
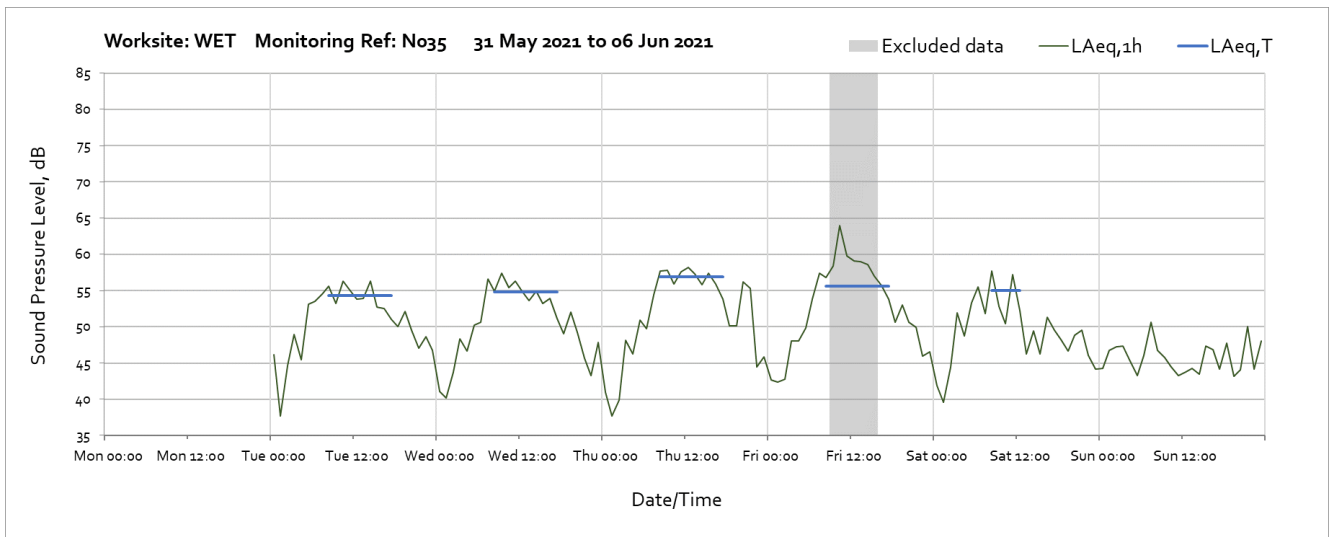


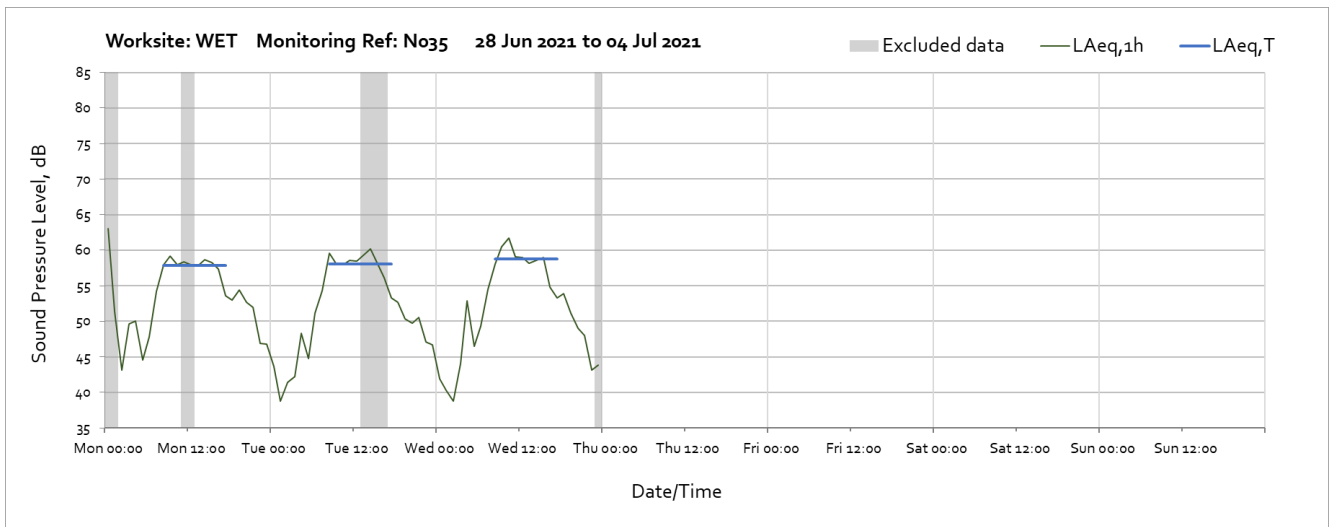
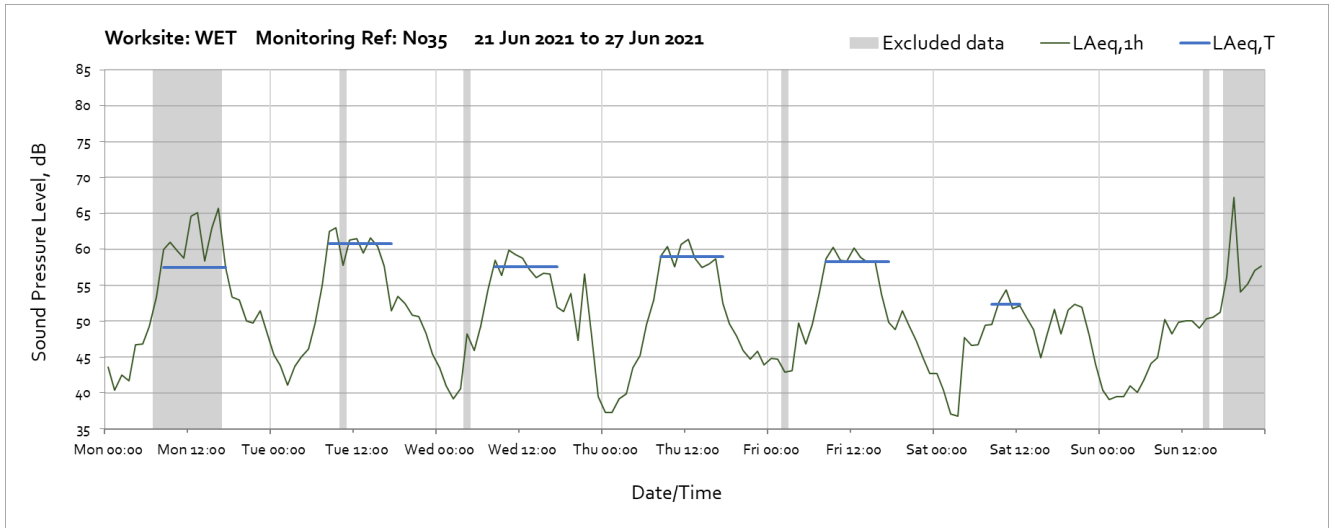
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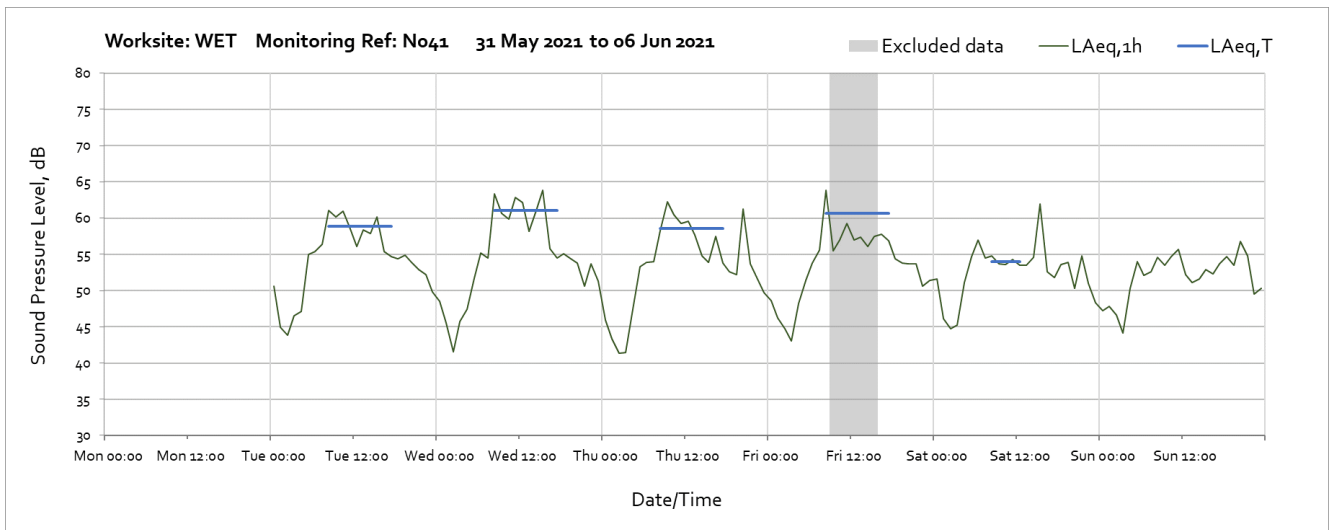


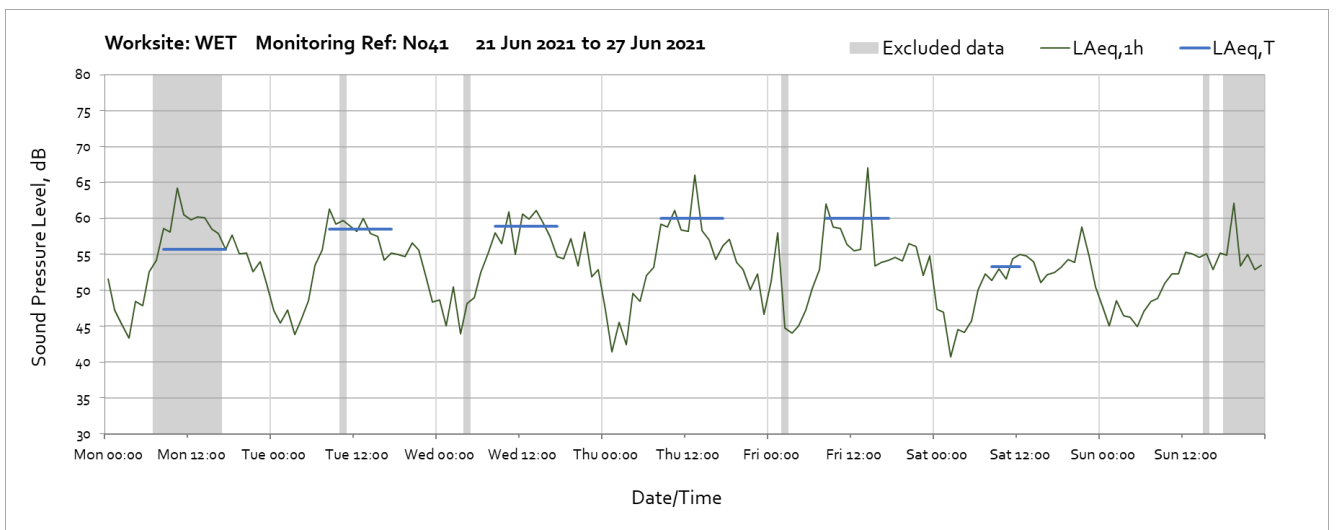
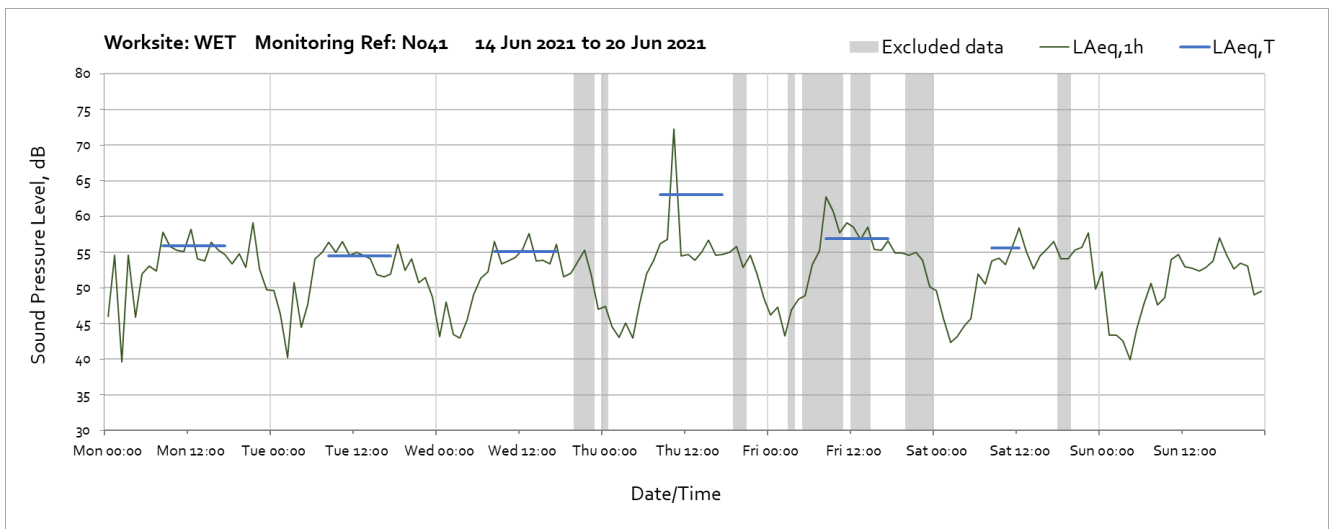
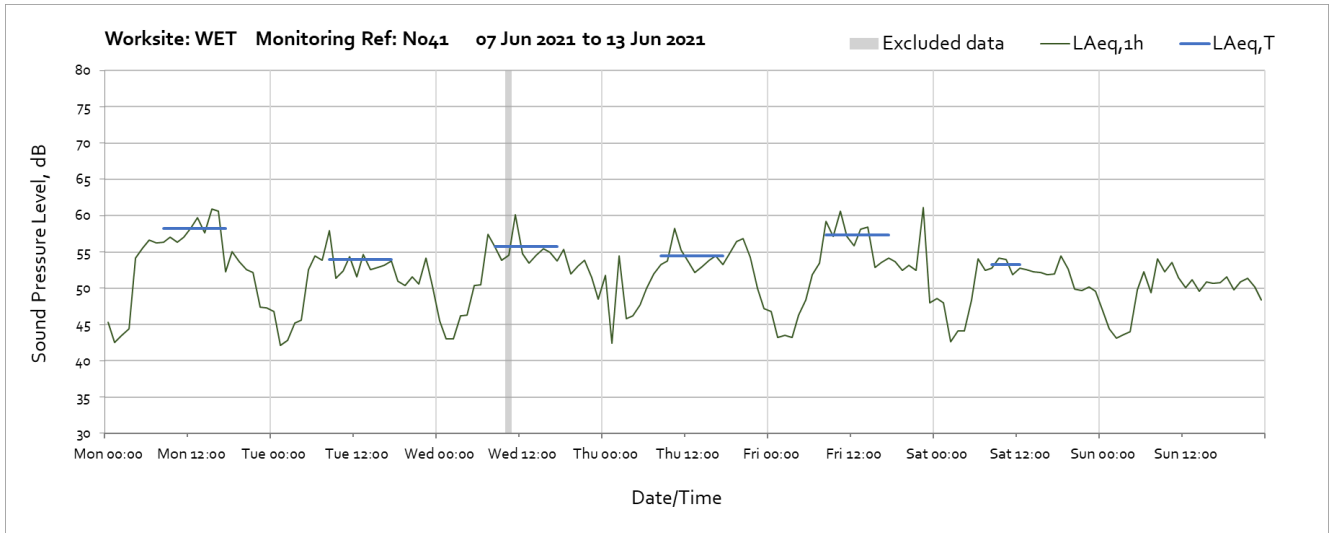
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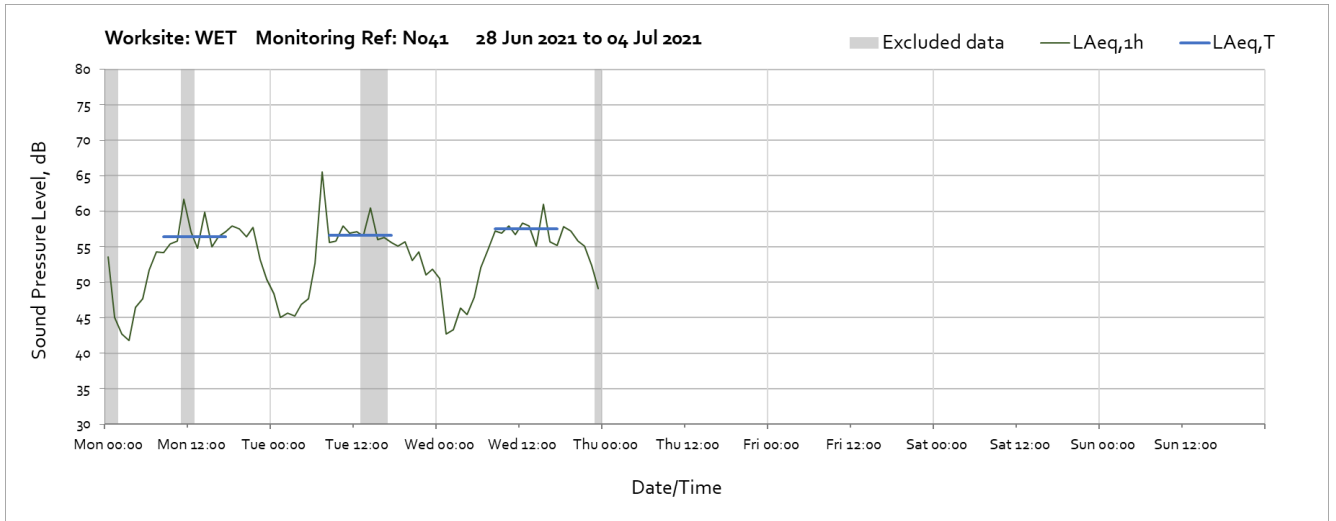




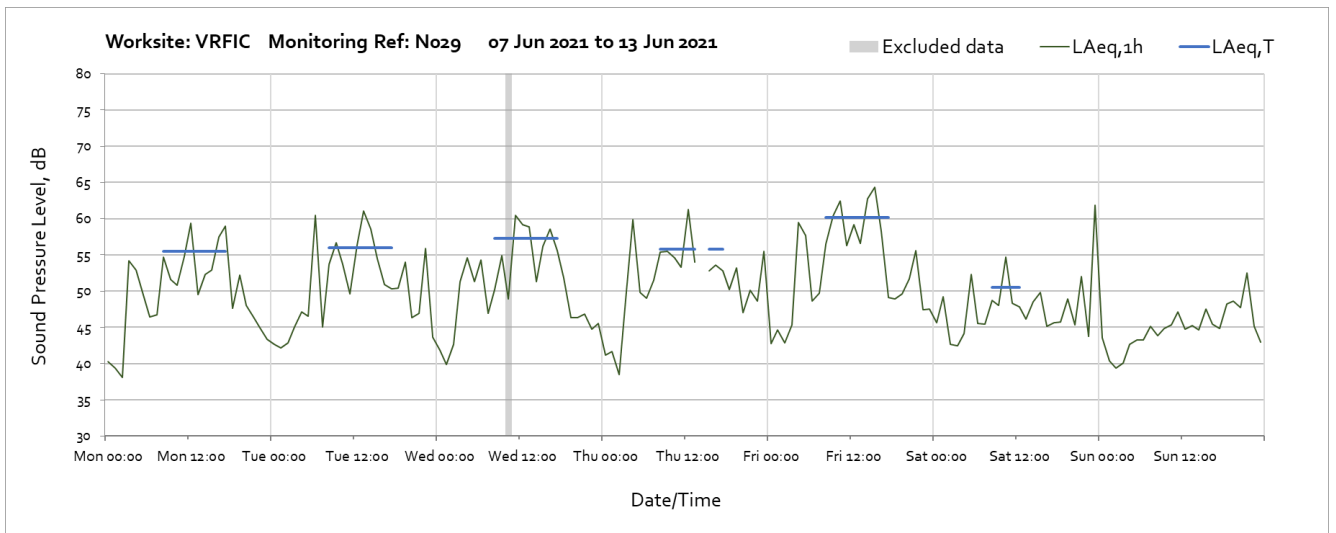
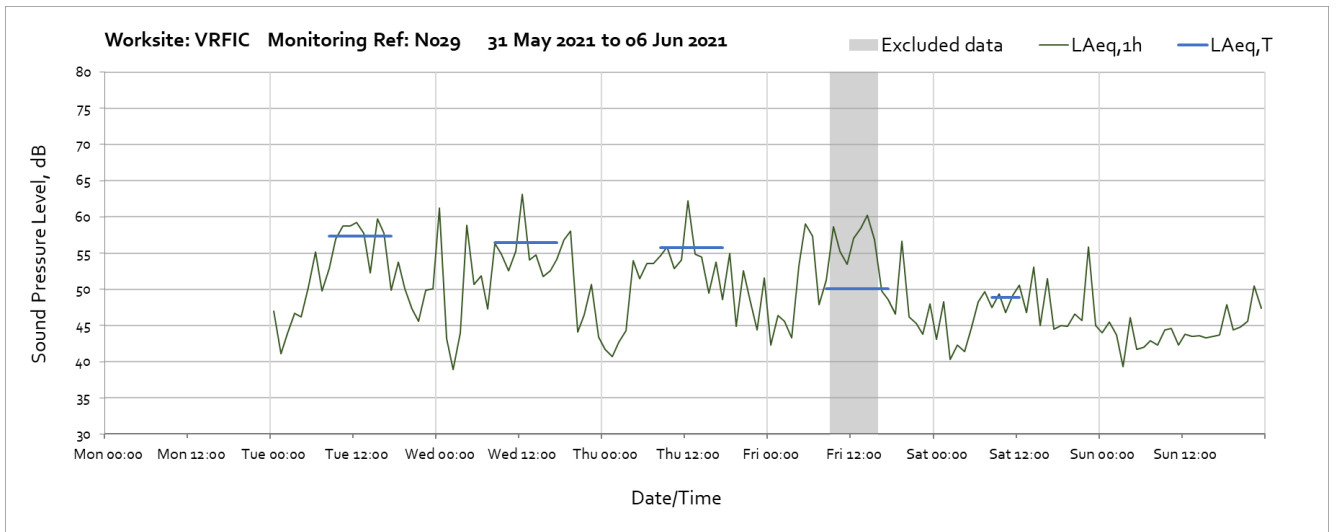
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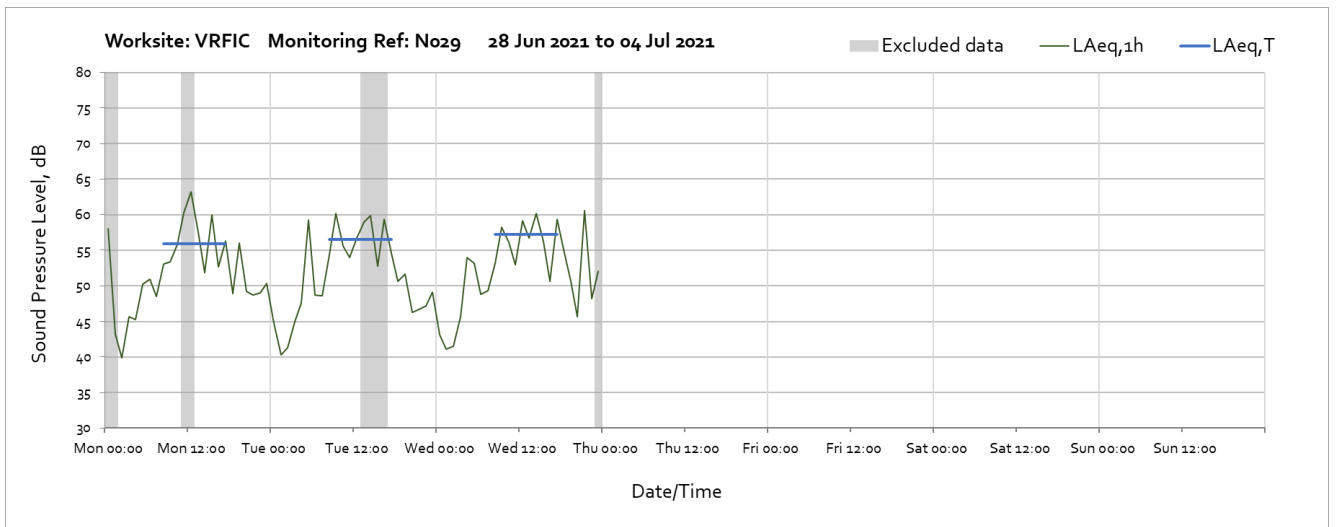
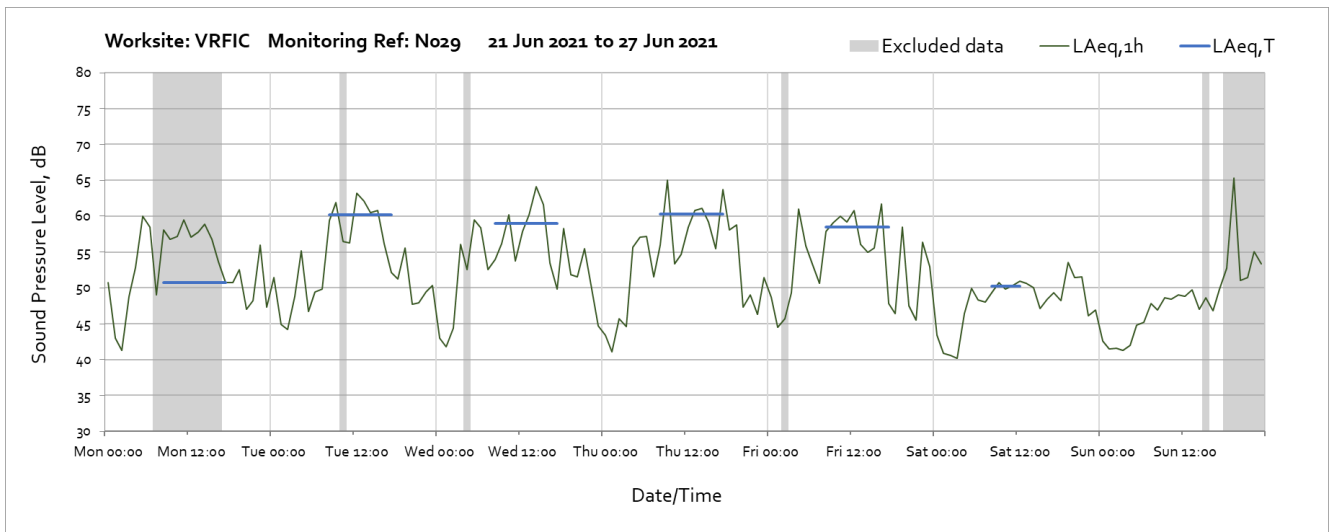
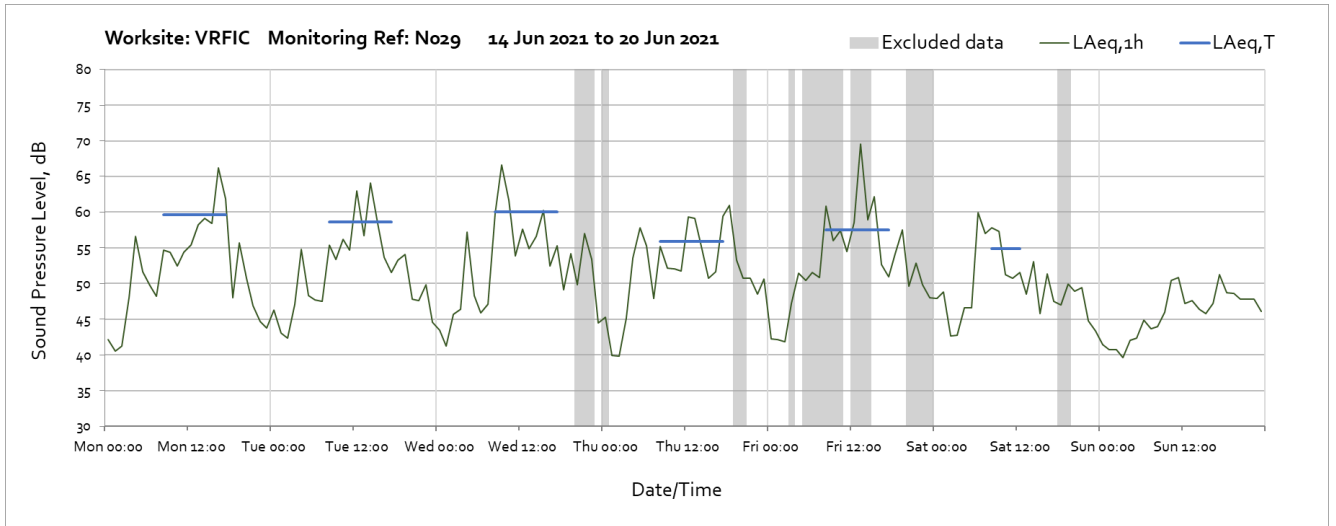




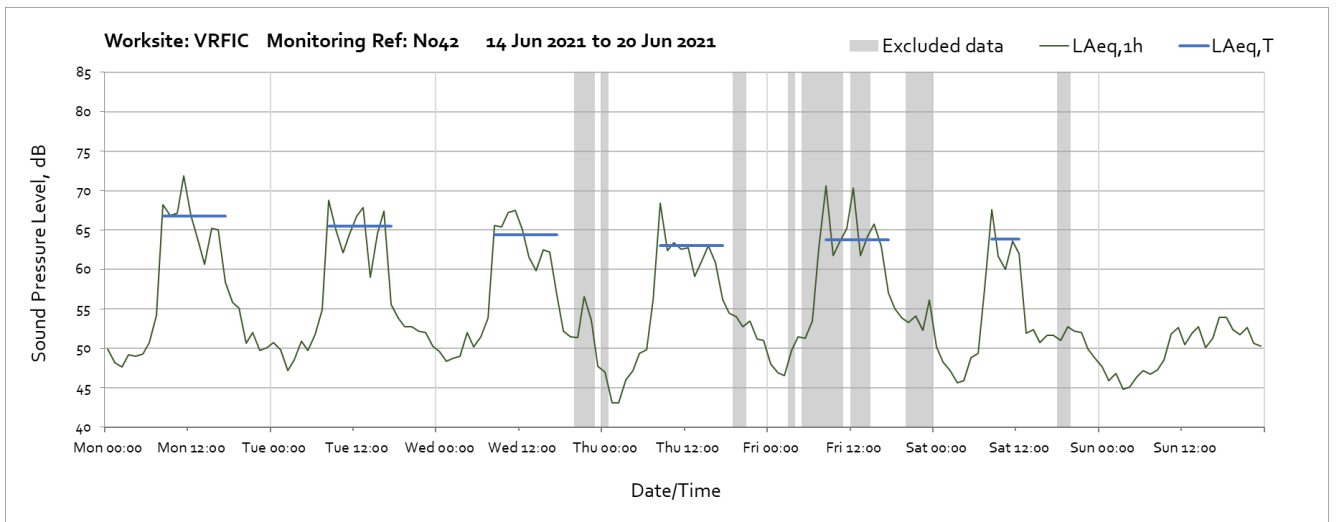
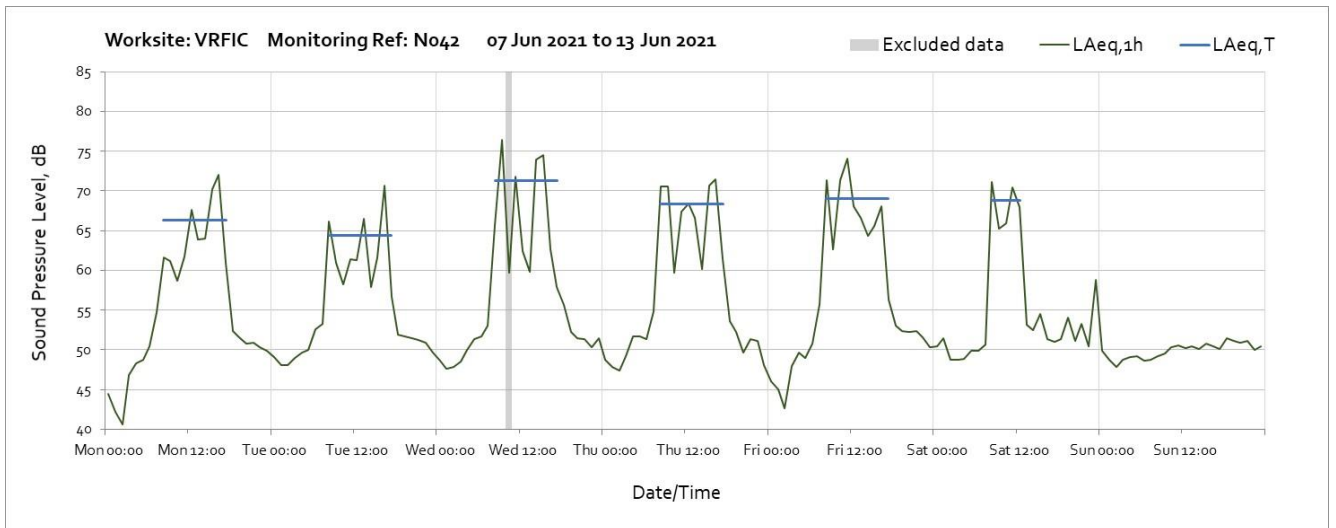
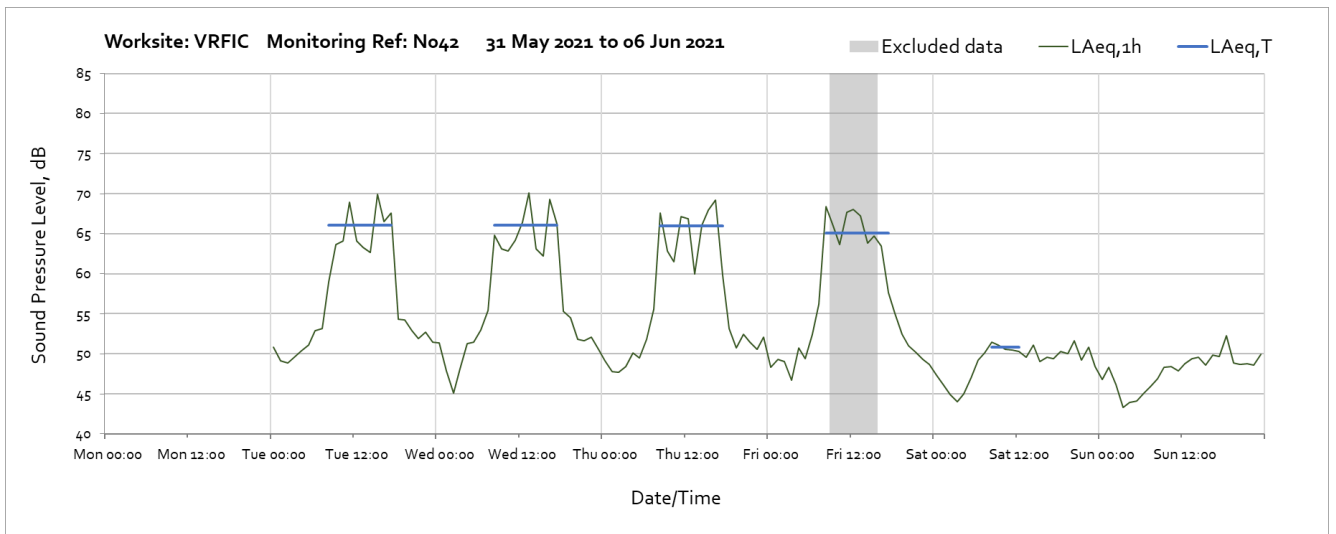
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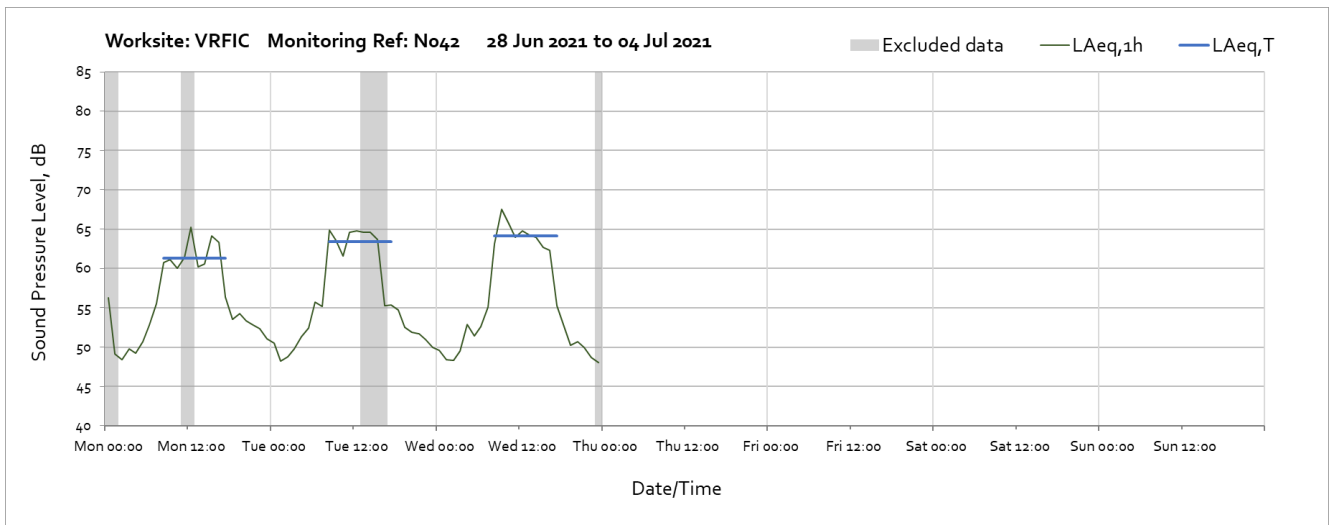
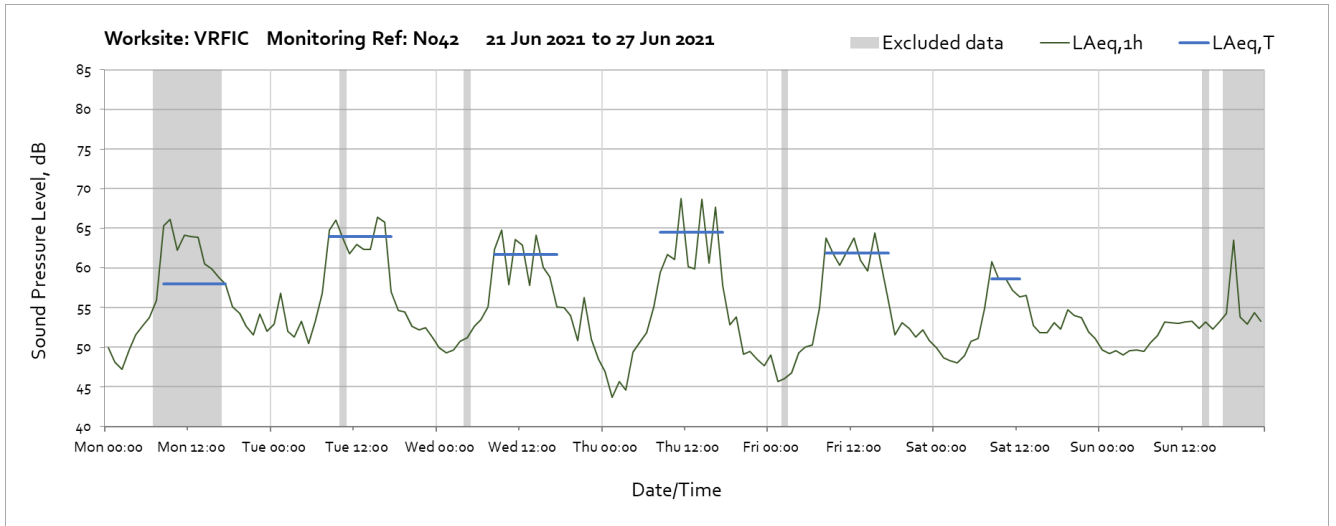


Note: Missing data at 14:00 on Thursday 10th June 2021 was due to maintenance of the noise monitor.

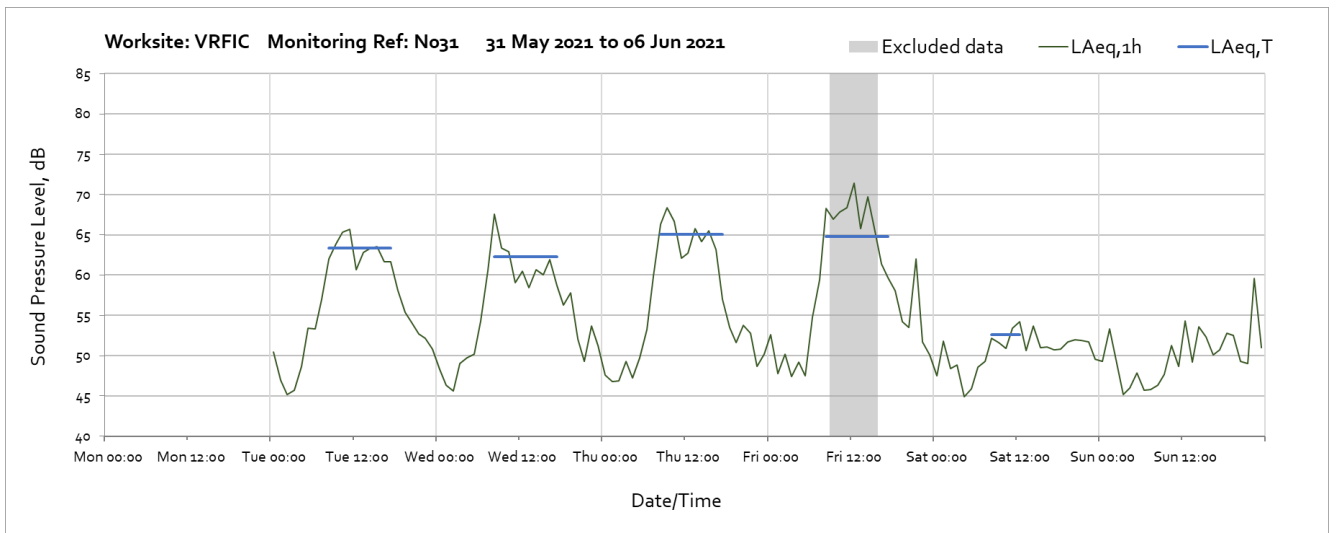


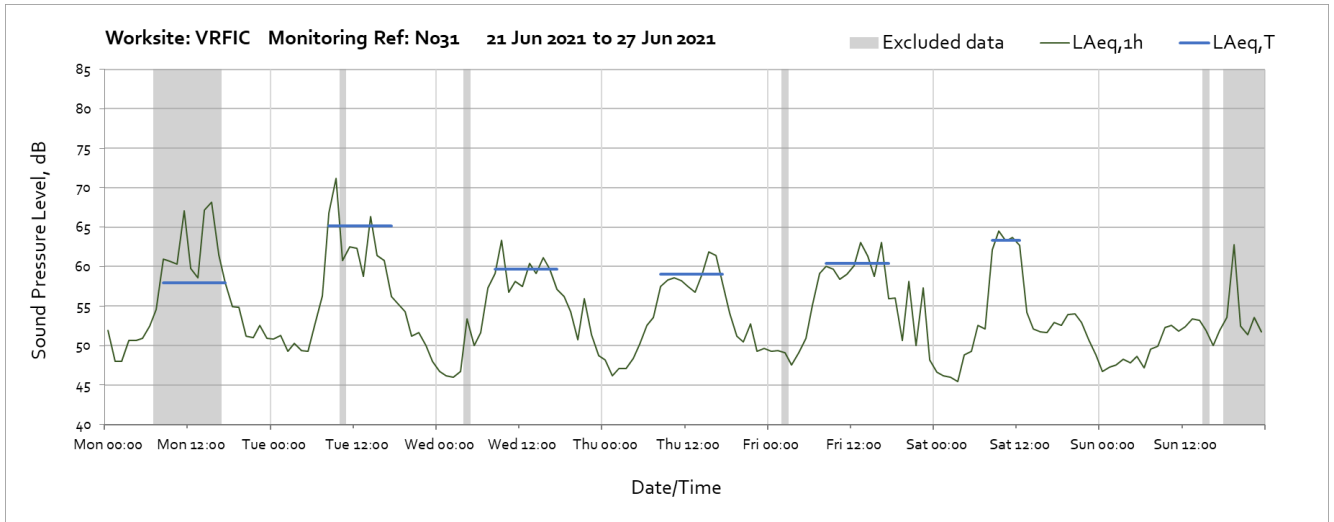
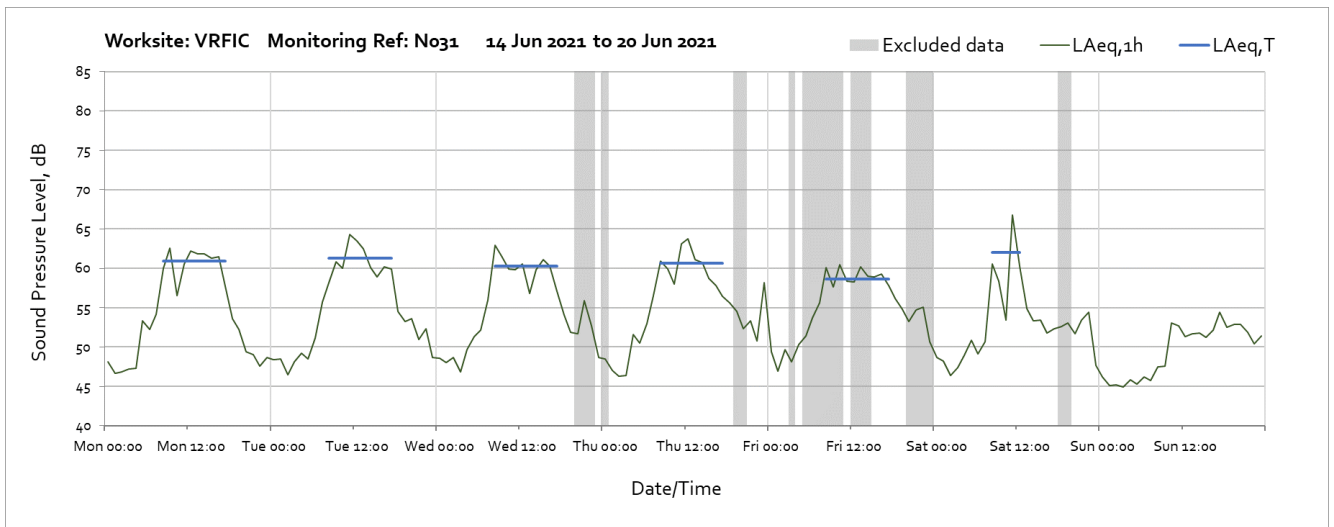
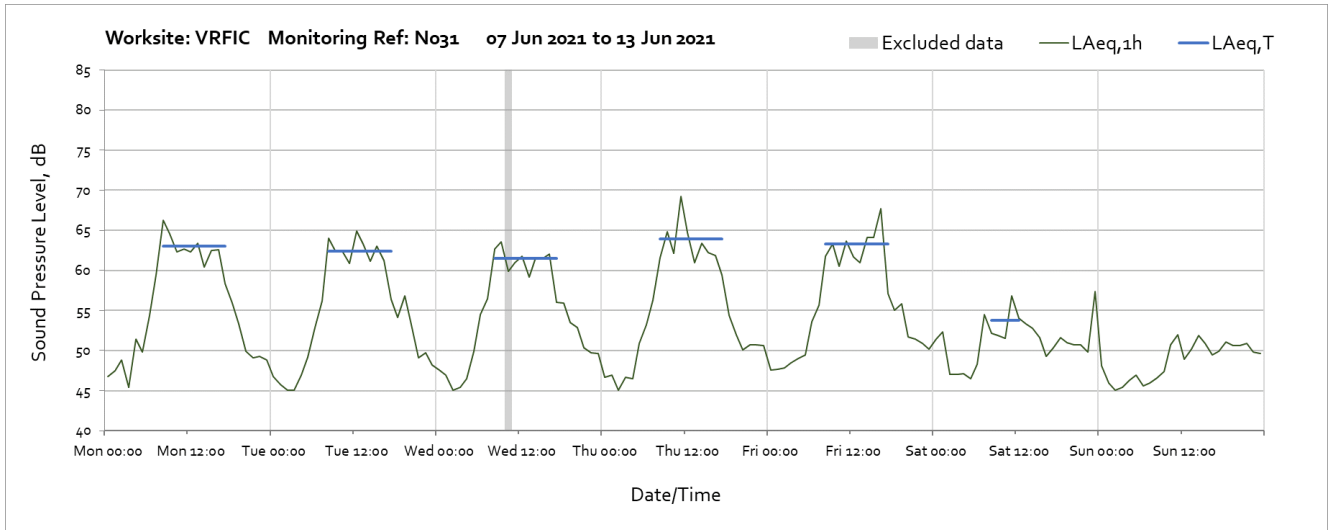
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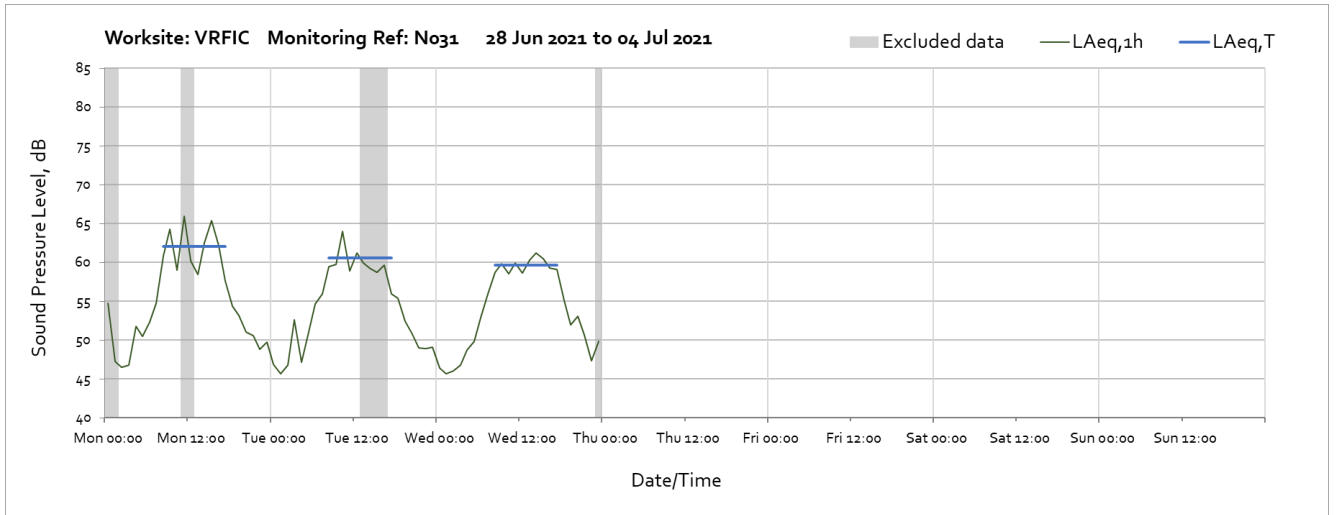




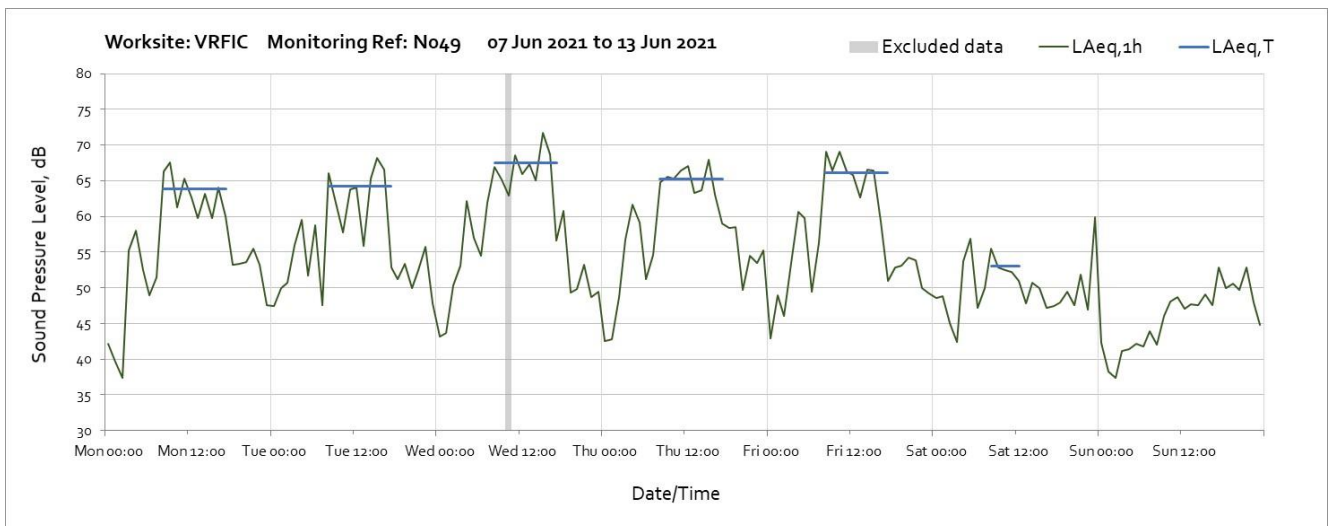
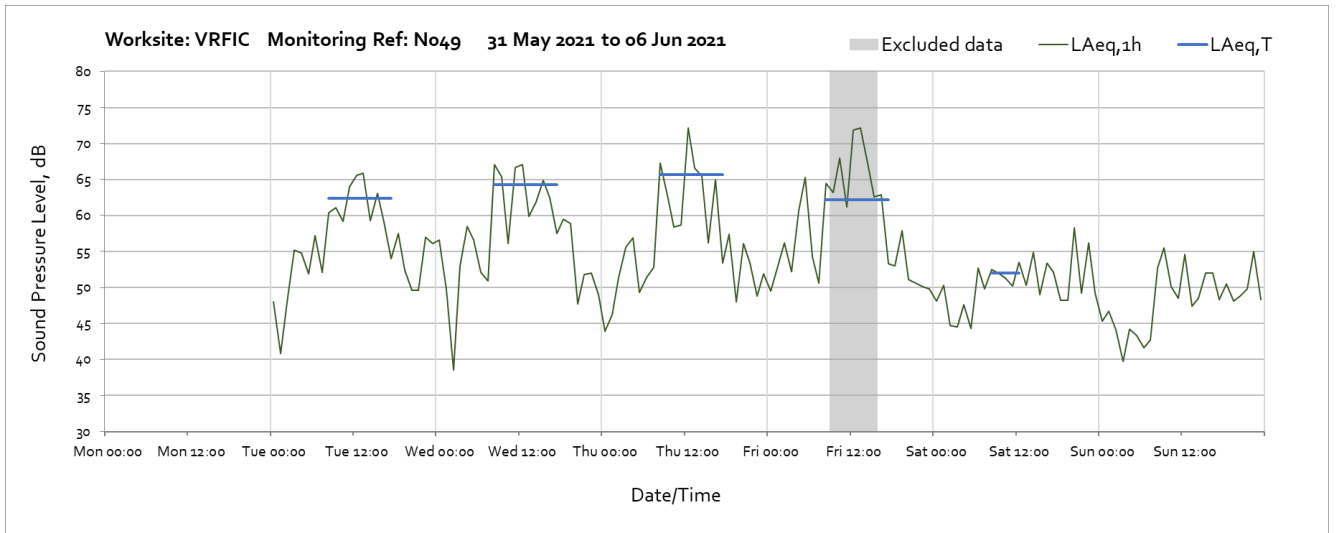
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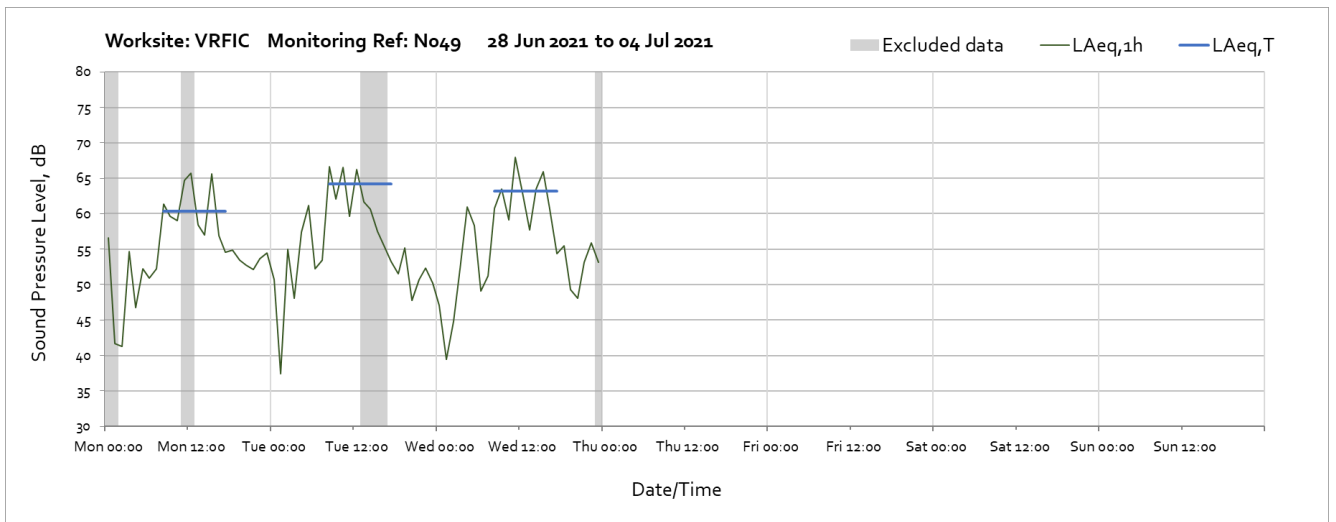
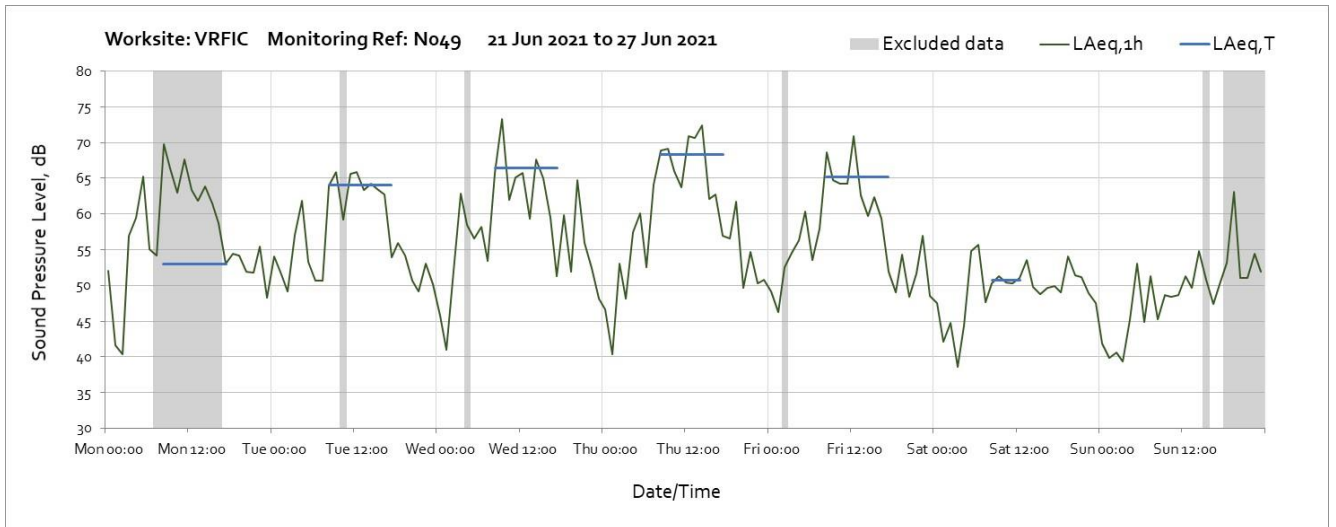
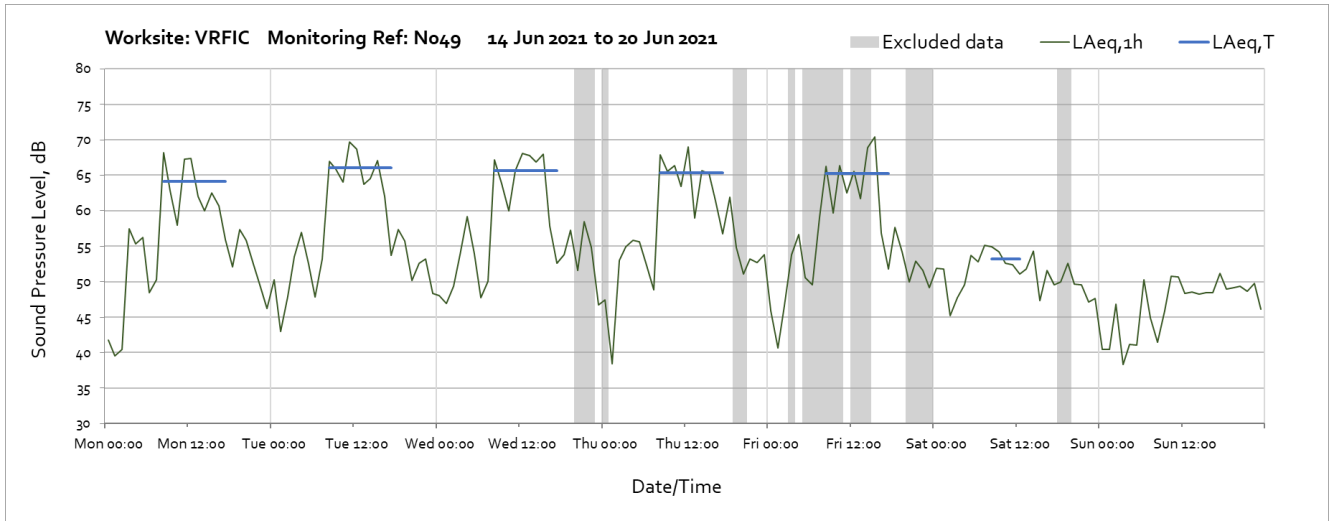




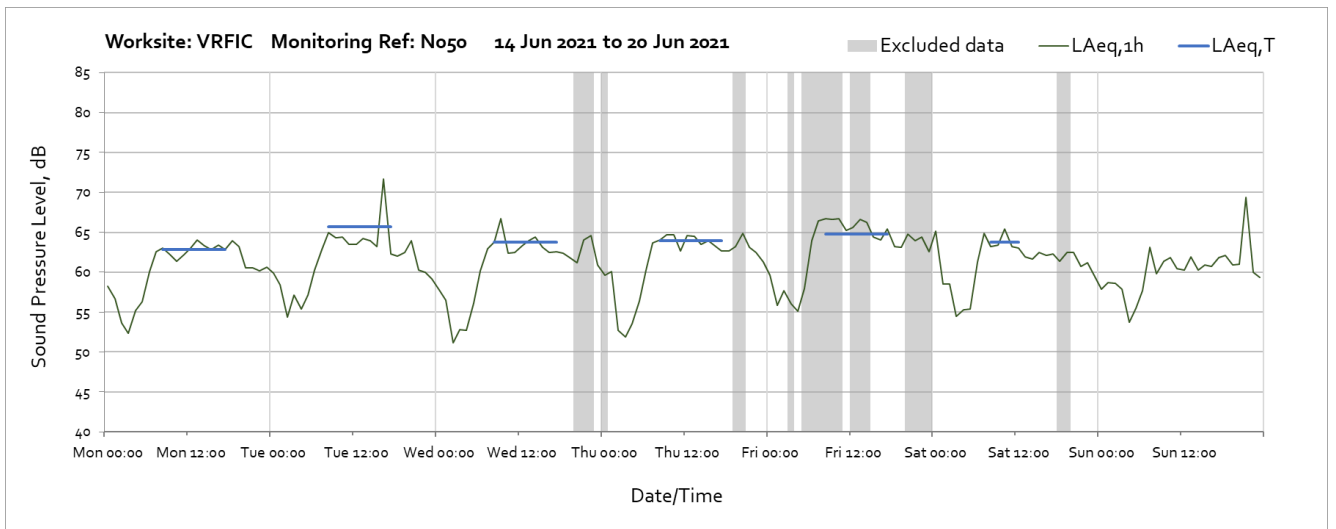
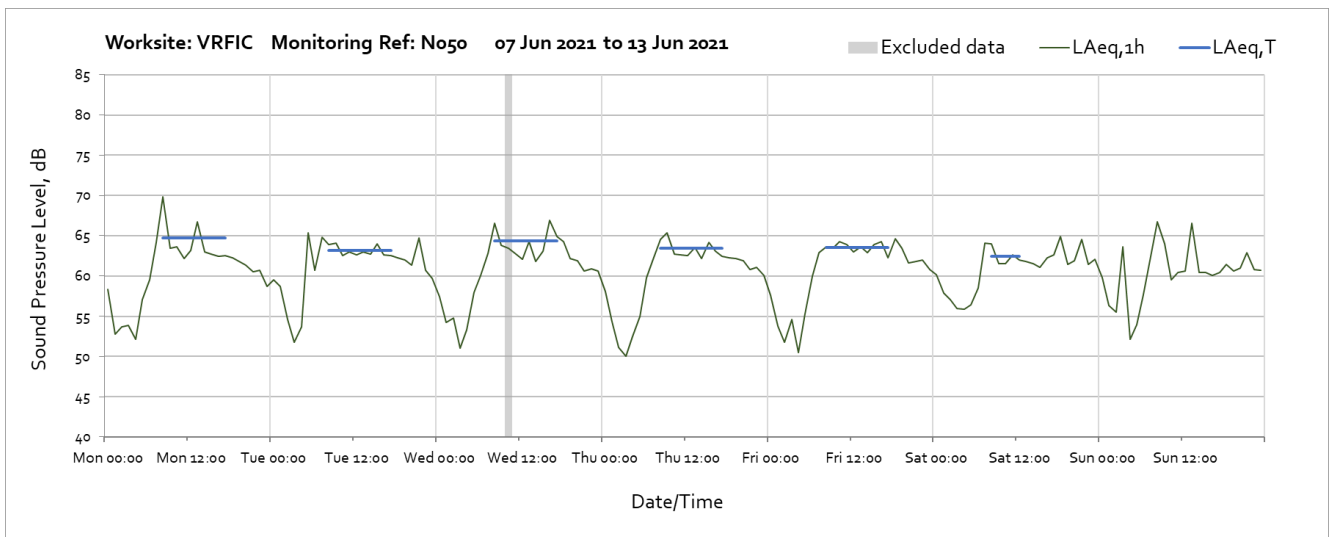
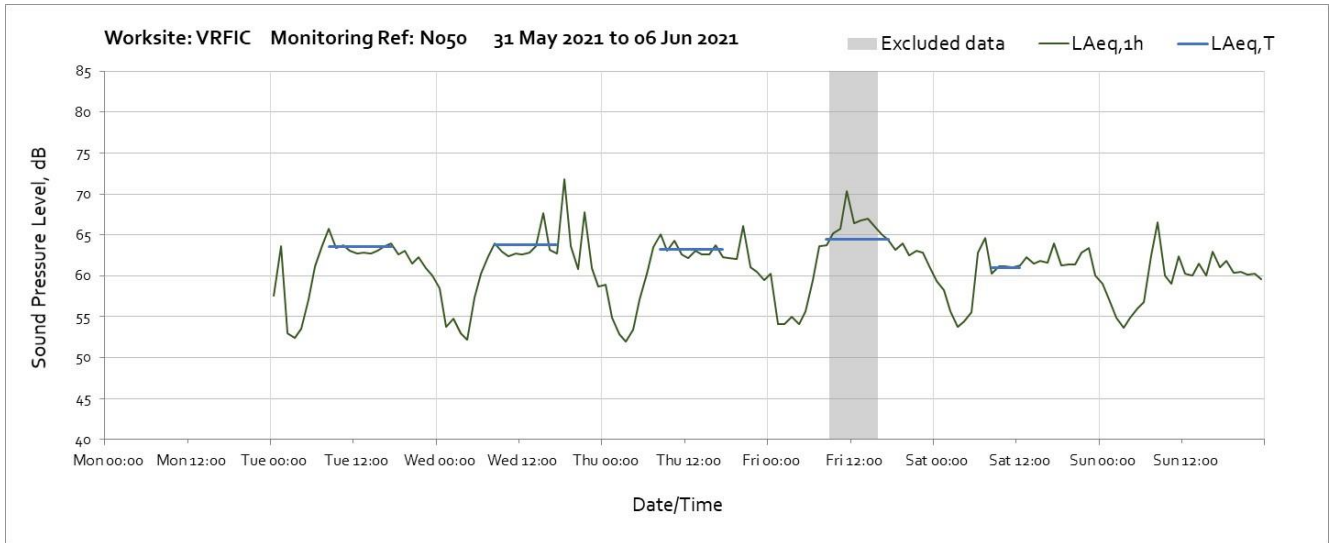


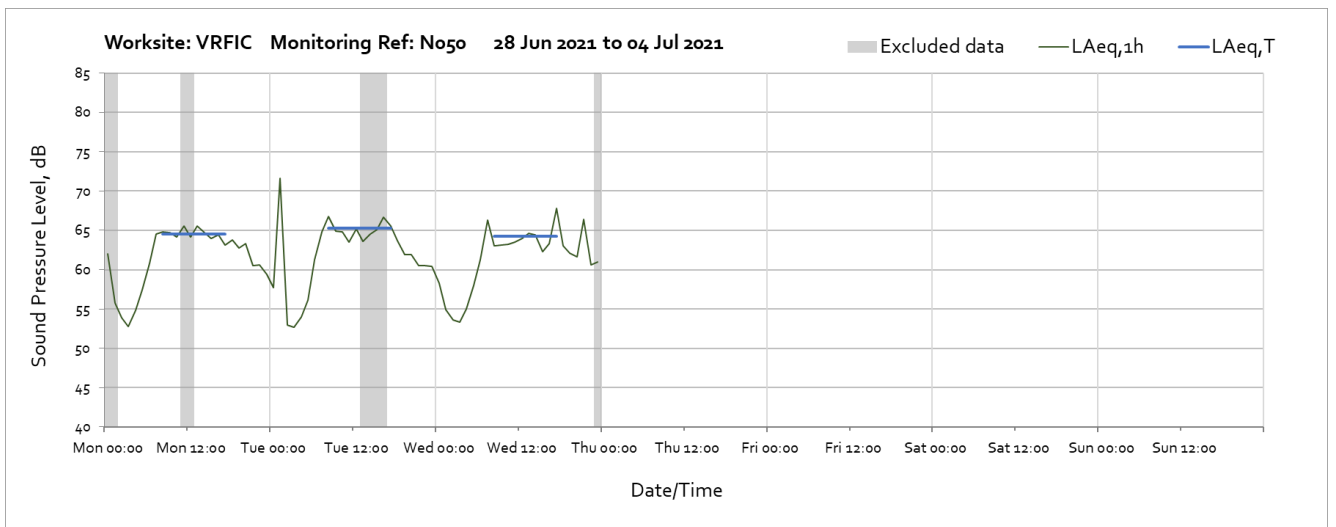
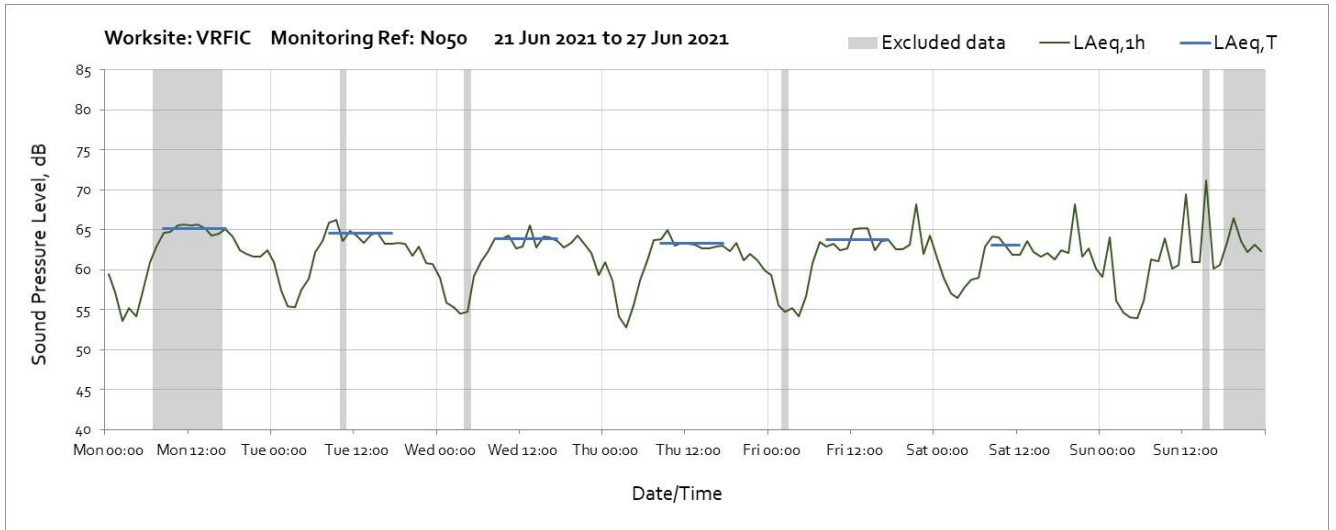
Worksite: Victoria Road and Flat Iron Compound (VRFIC) – Monitoring Ref: N049



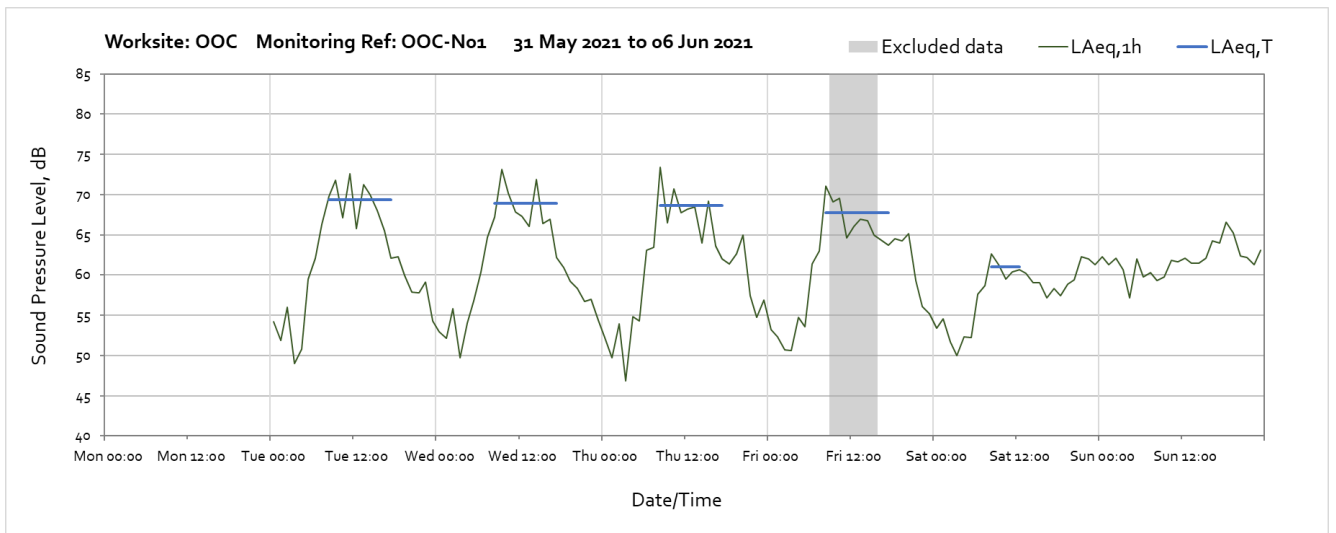


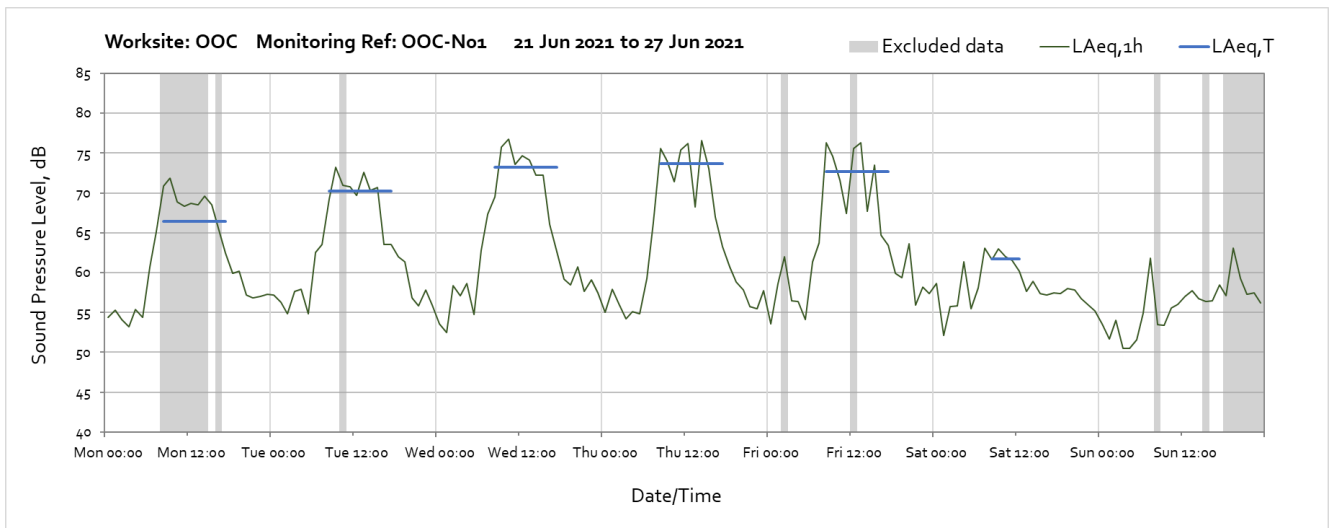
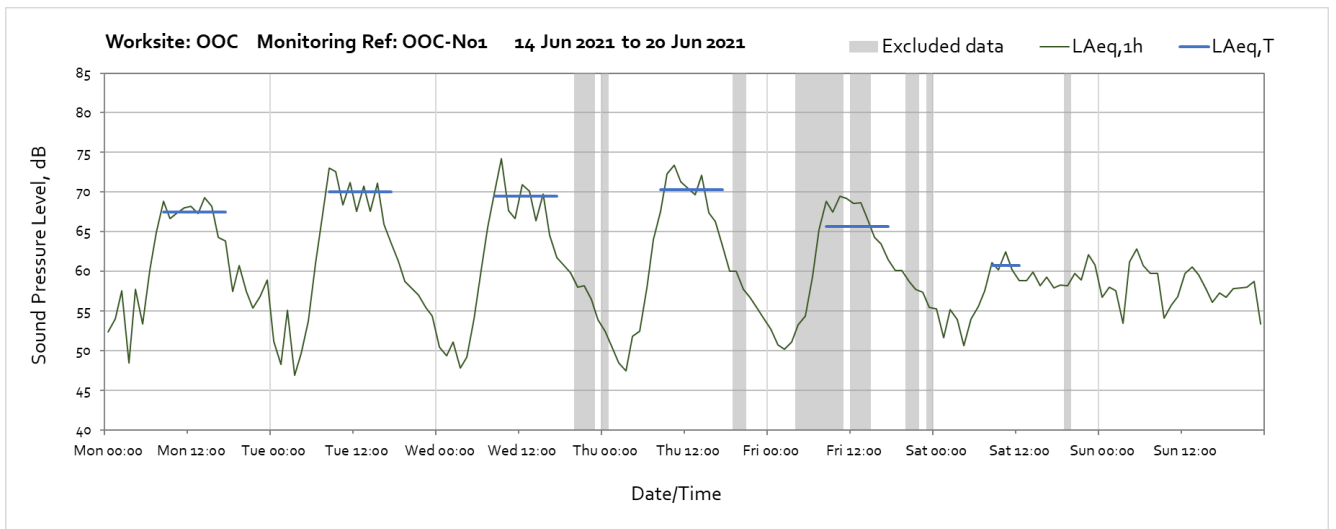
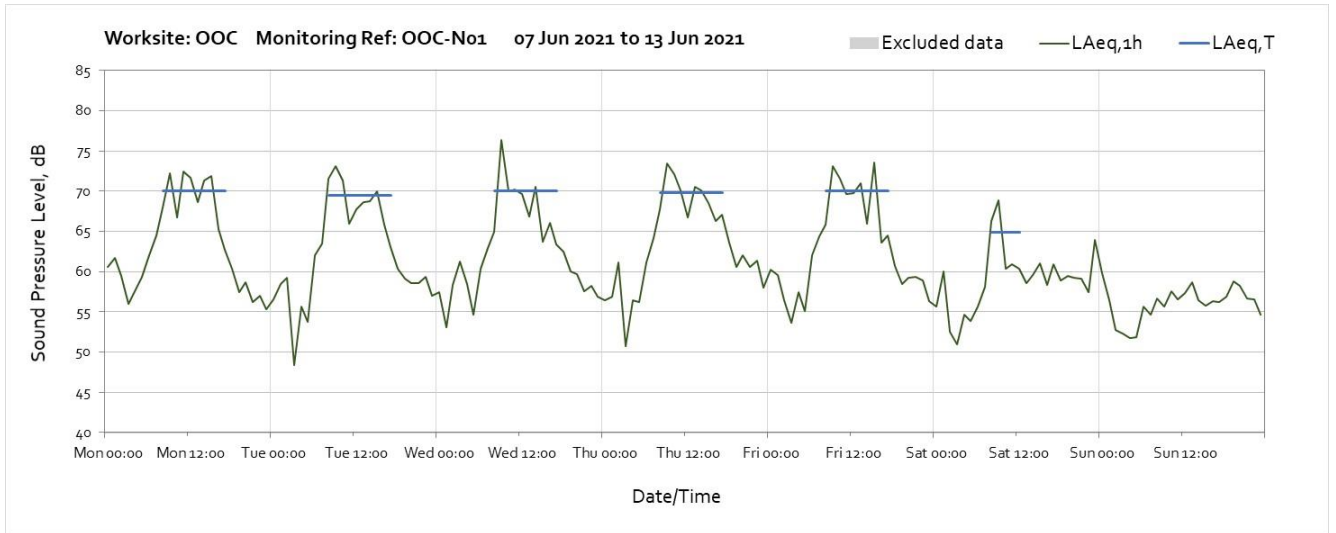
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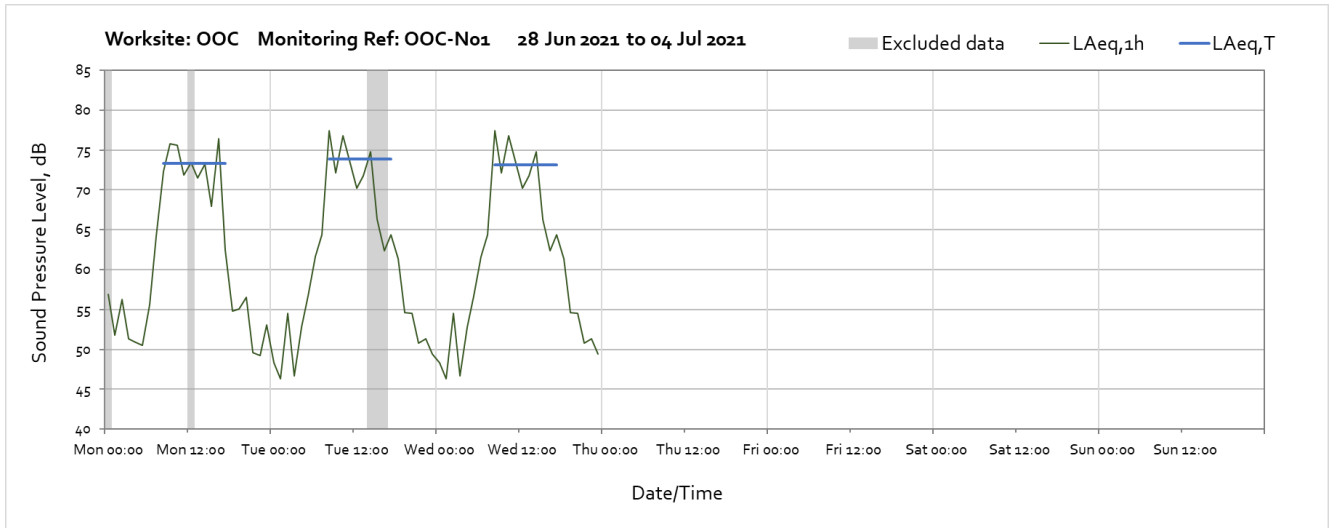




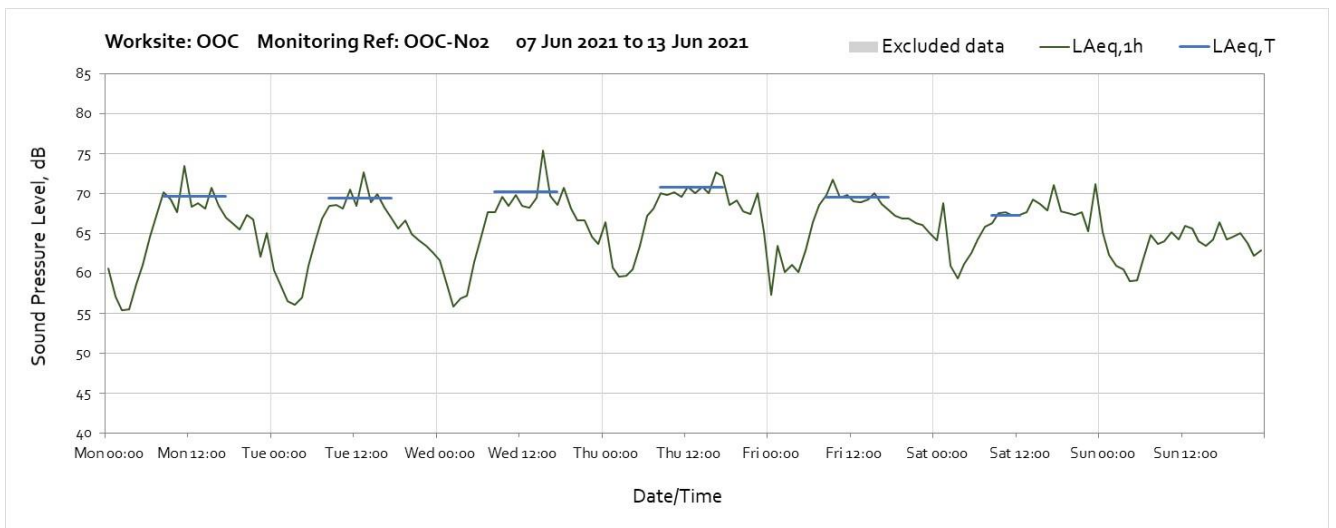
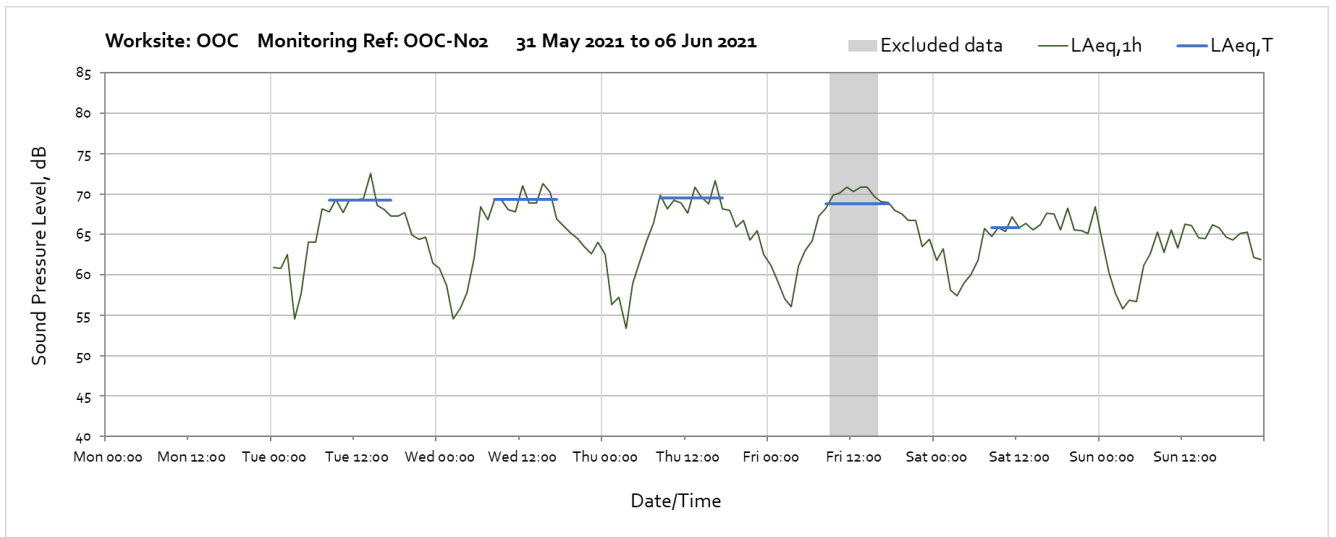
Worksite: Oal Oak Common (OOC) - Monitoring Ref: OOC-N01

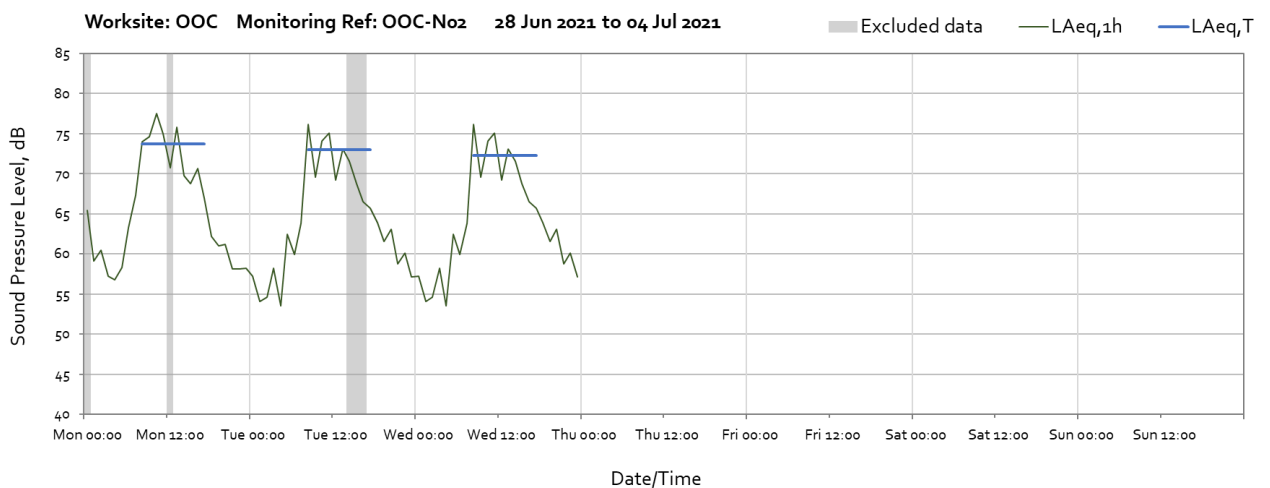
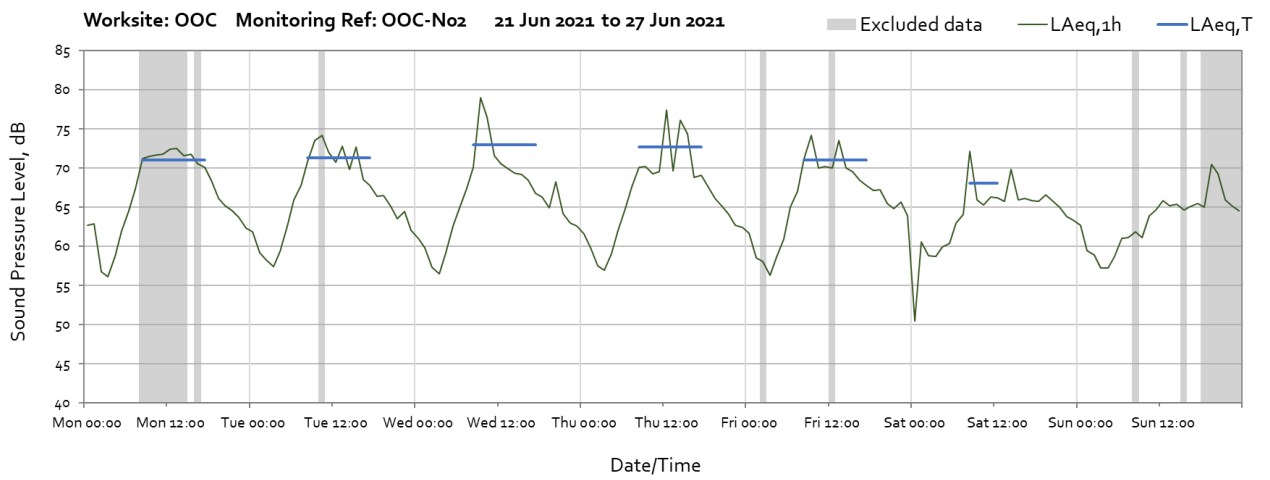
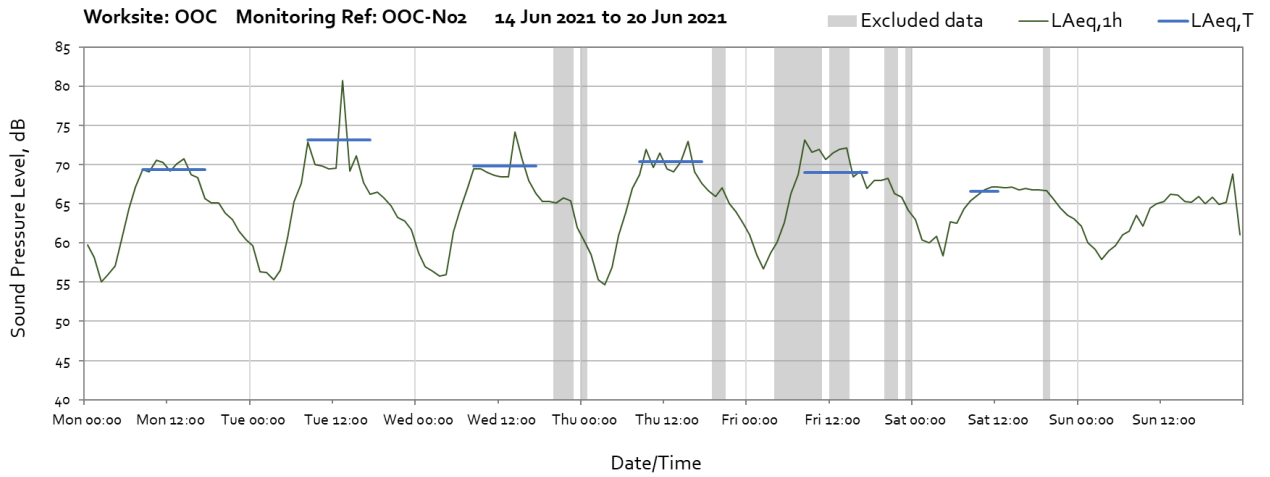




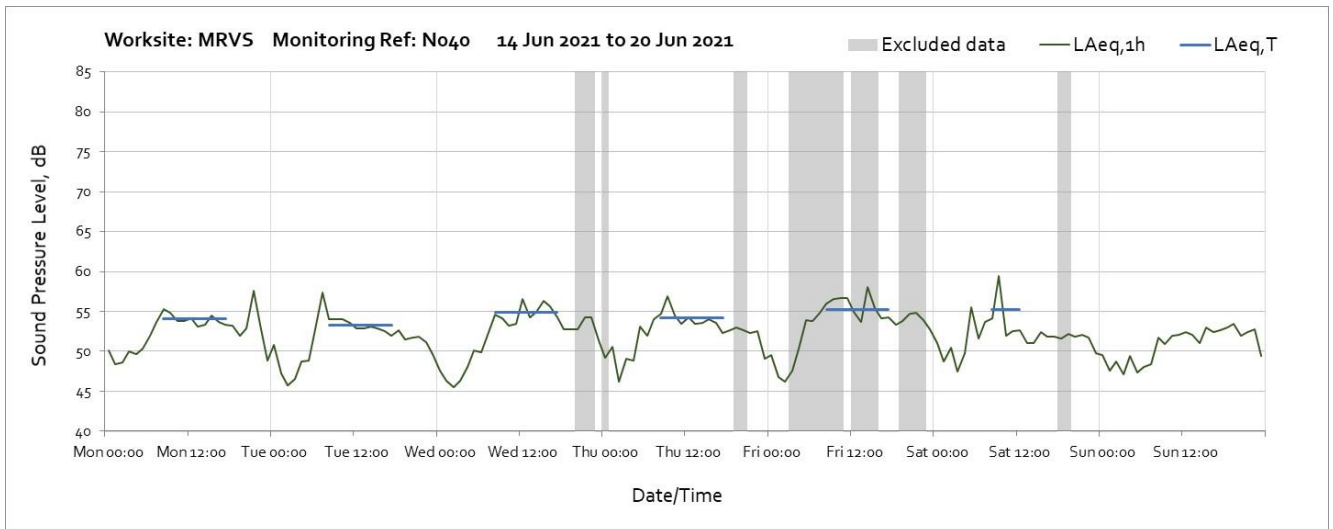
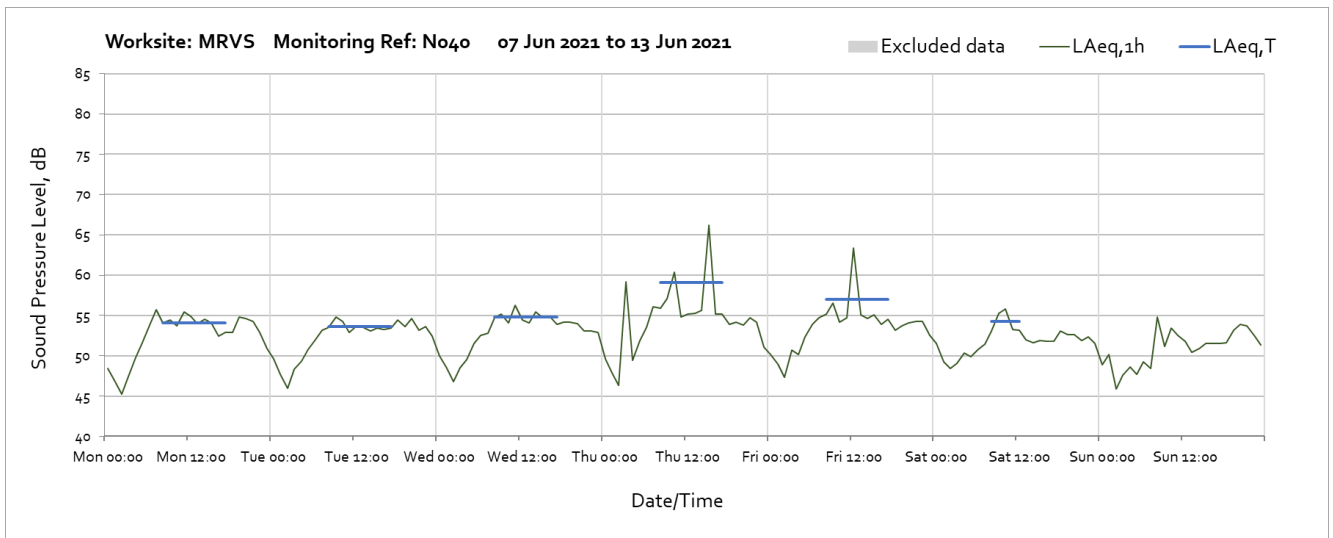
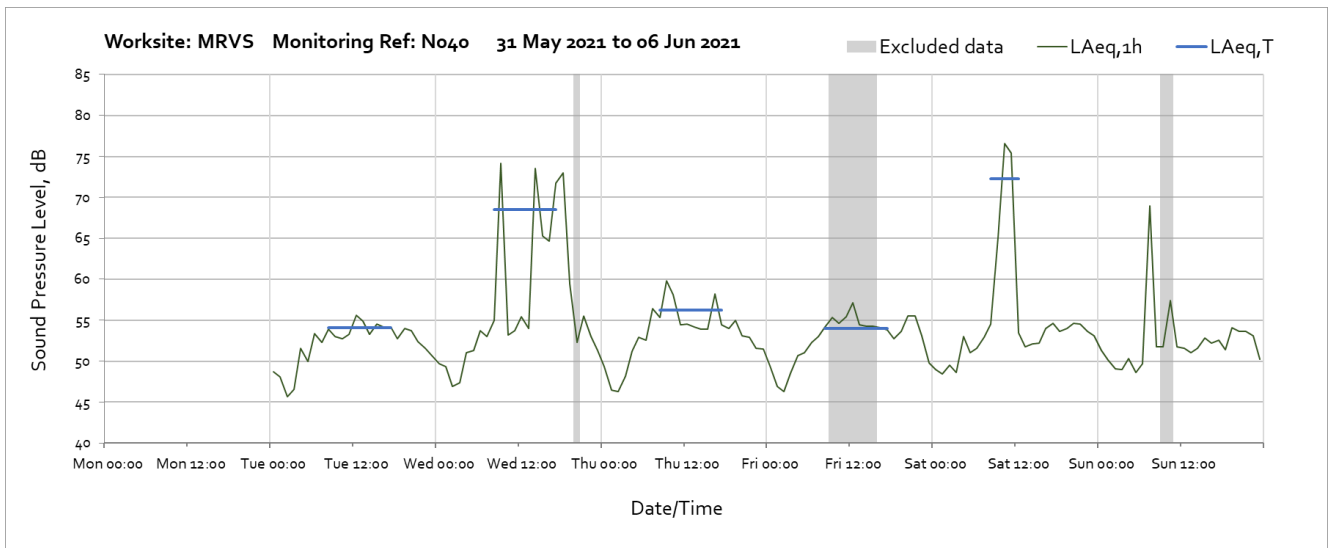


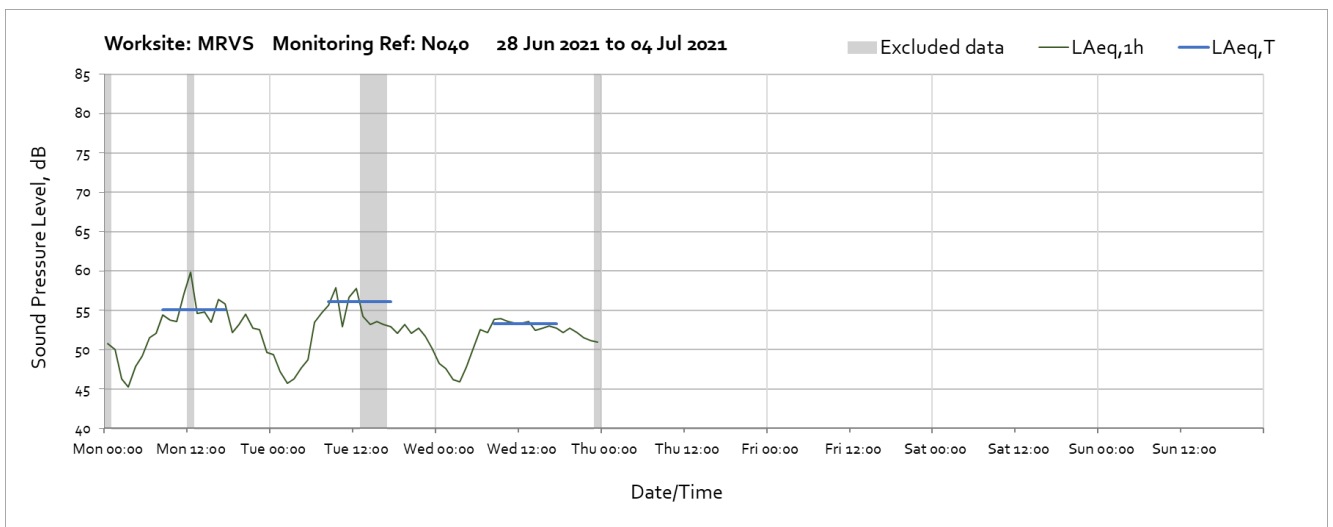
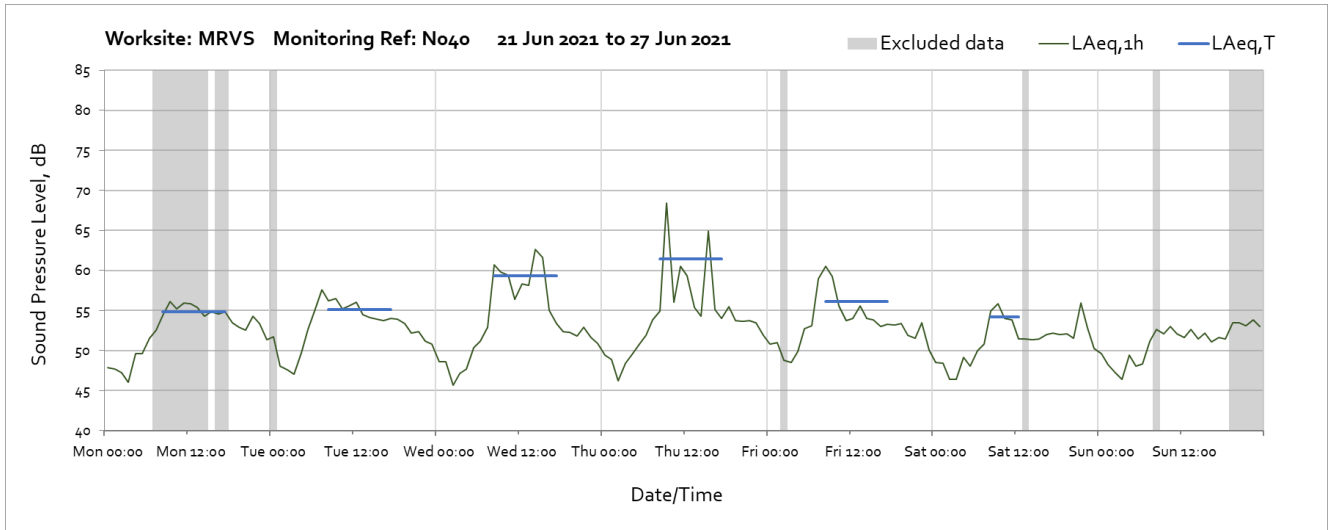
Worksite: Oal Oak Common (OOC) – Monitoring Ref: OOC-N02



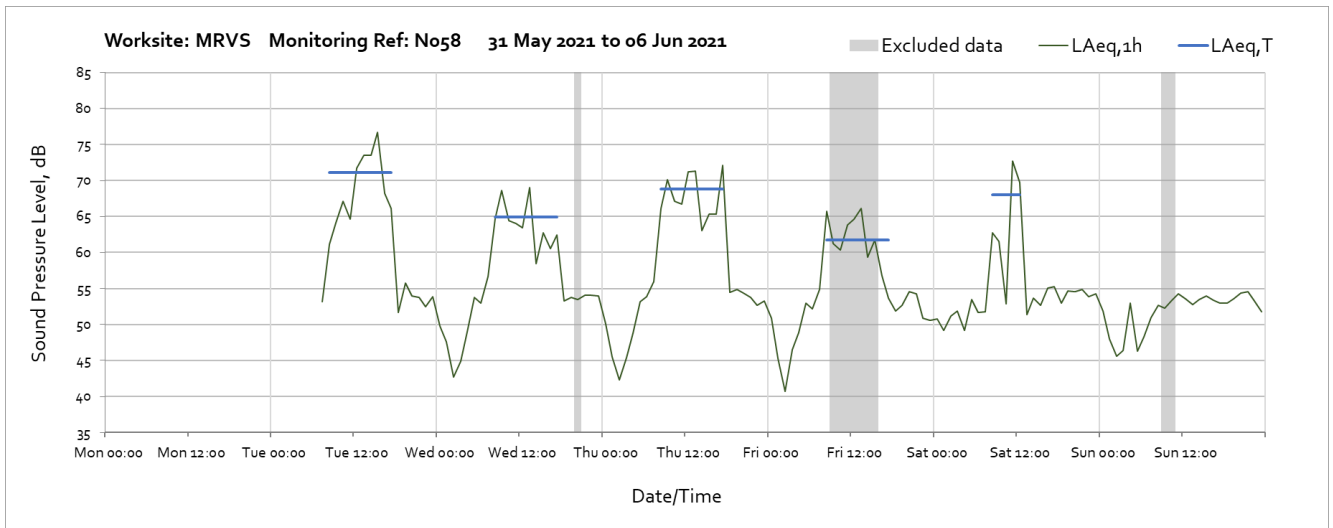


Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N040

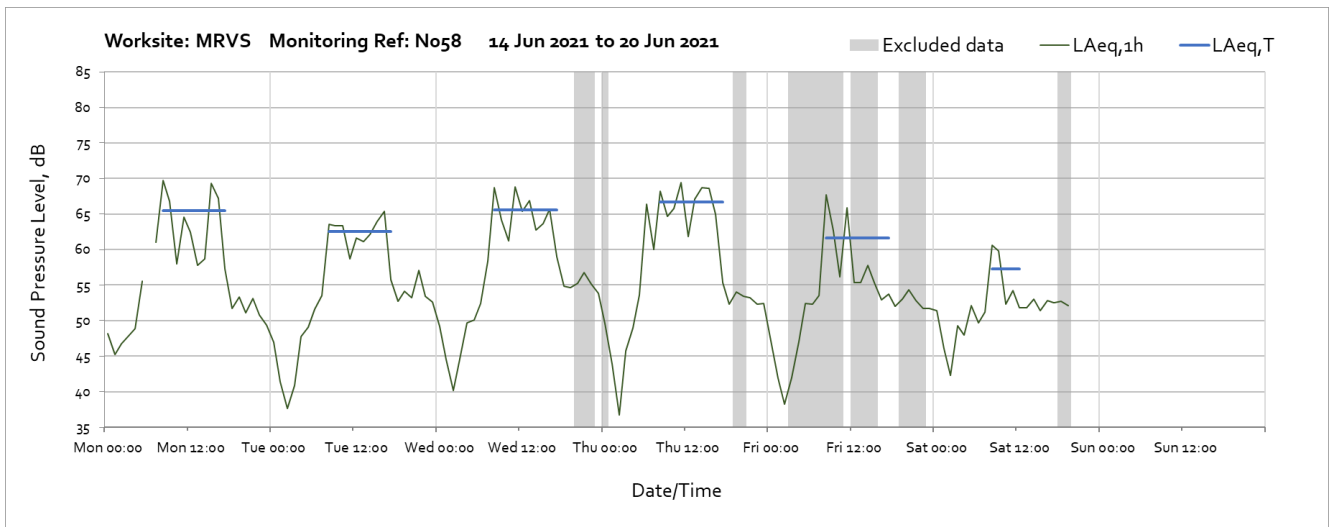
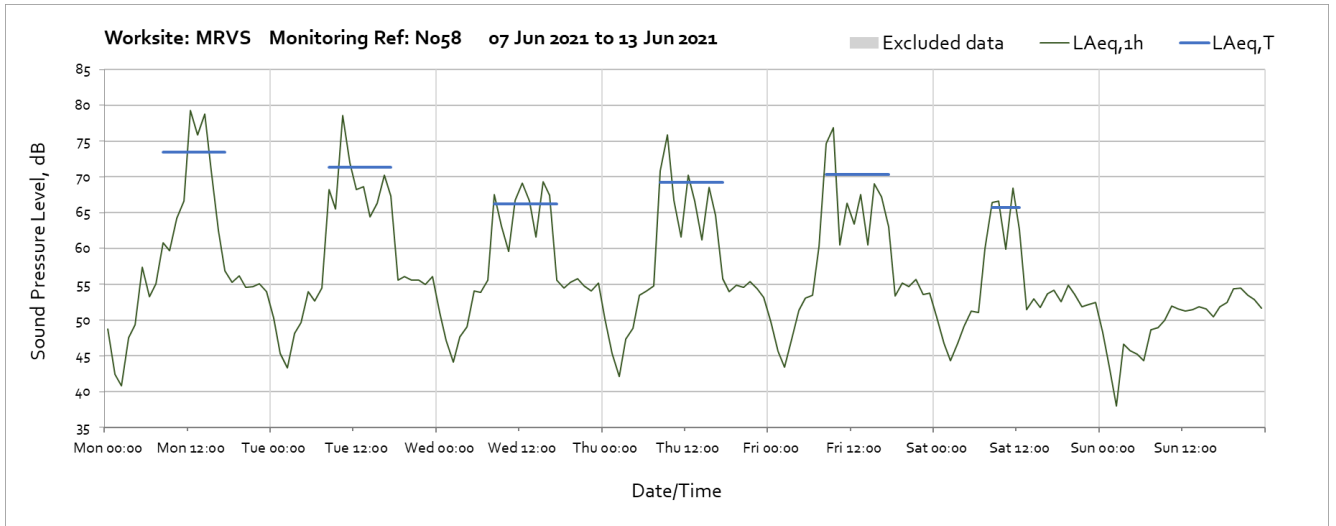




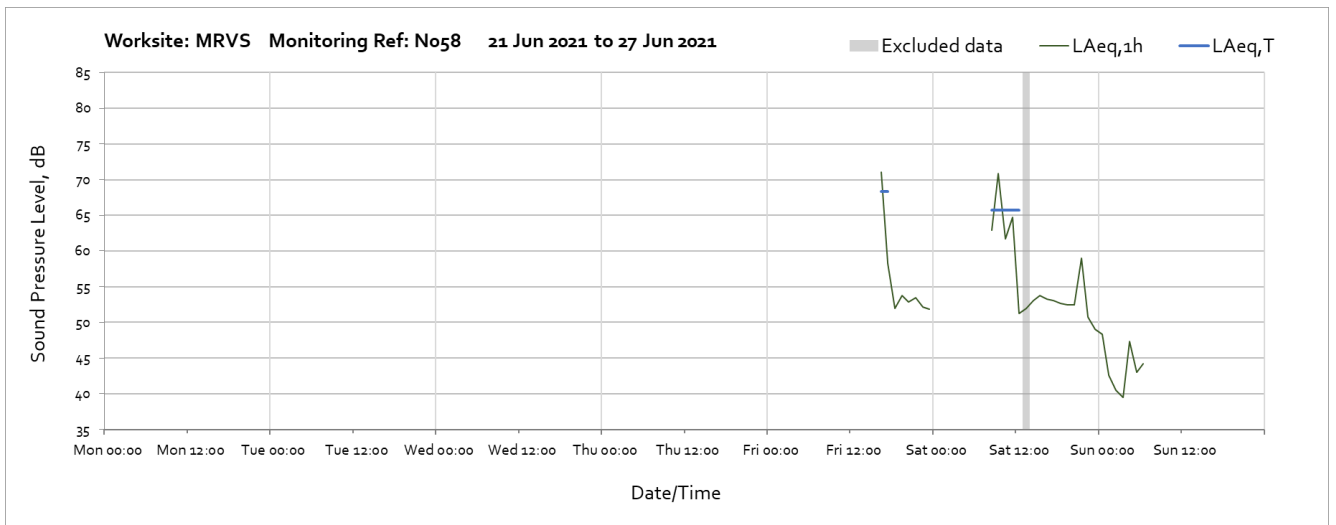
Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N058



Note: Missing data between 00:00 and 07:00 on Tuesday 1st June 2021 was due to loss of power at the monitor location.

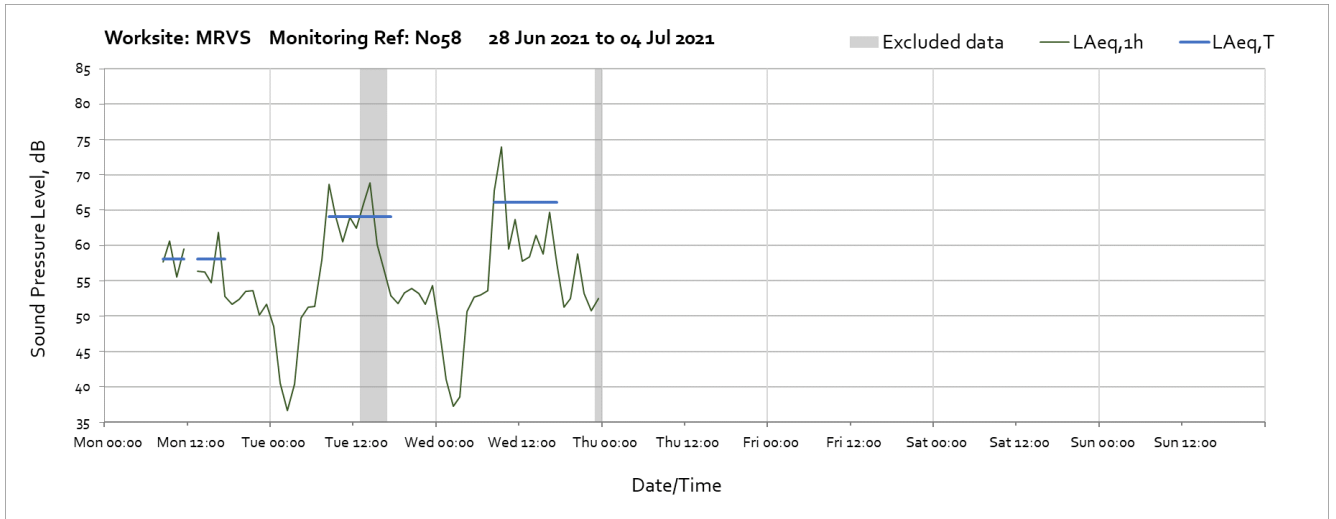


Note: Missing data at 06:00 on Monday 14th June 2021 and between 20:00 on Sunday 20th June 2021 and 15:00 on Friday 25th June 2021 was due to loss of power at the monitor location. The main power connection had to be disconnected due to building demolition works and site team is working on reestablished a stable connection as soon as possible.



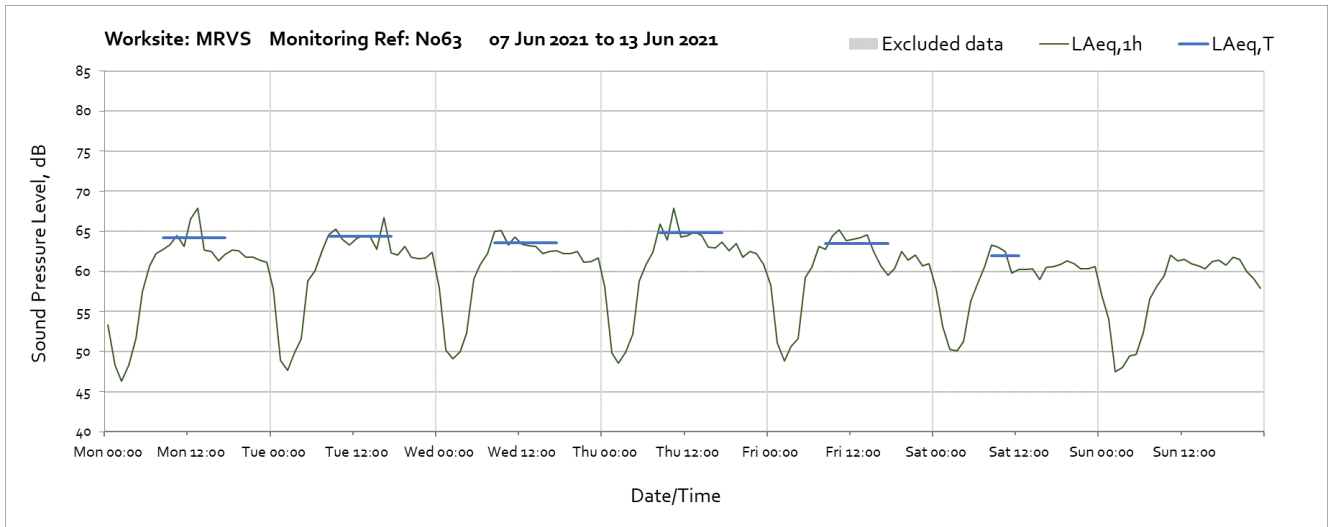
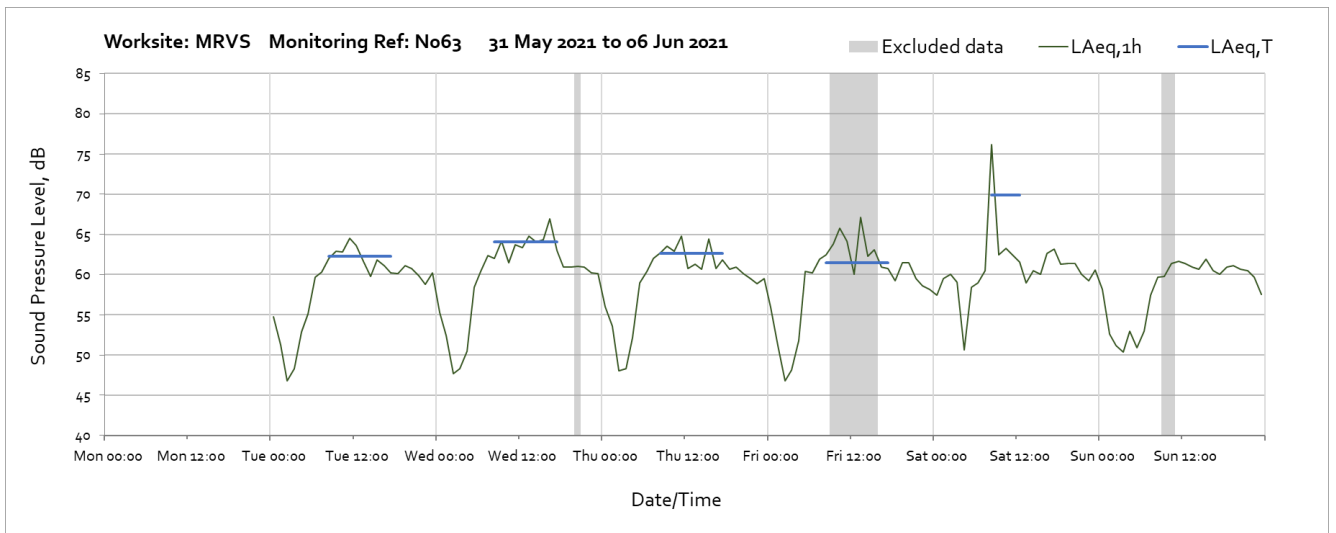
Note: Missing data across the week was due to loss of power at the monitor location.

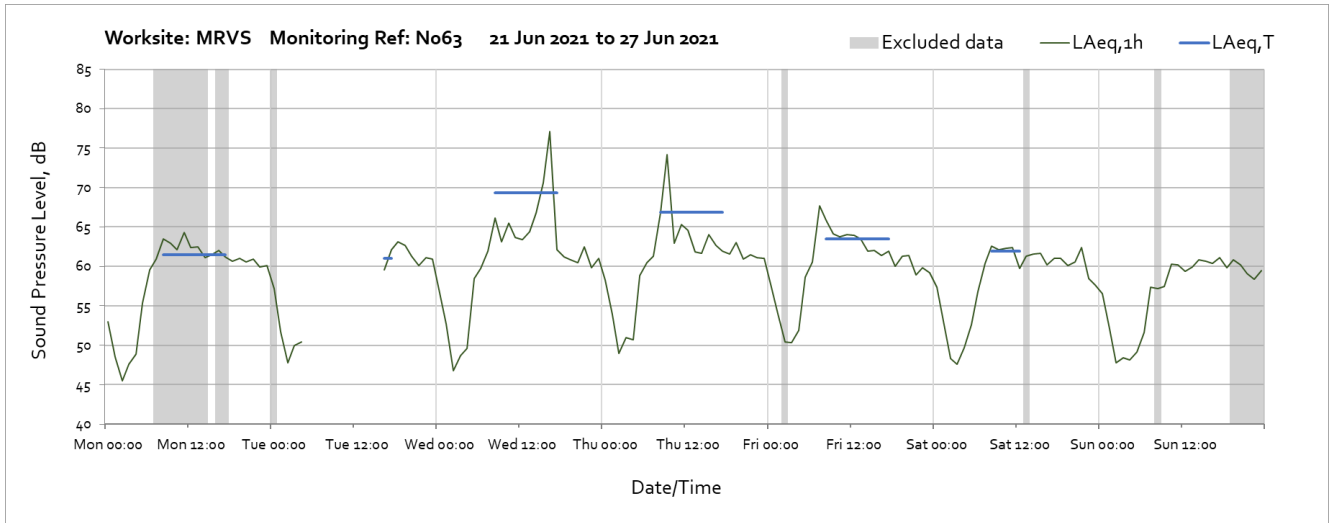
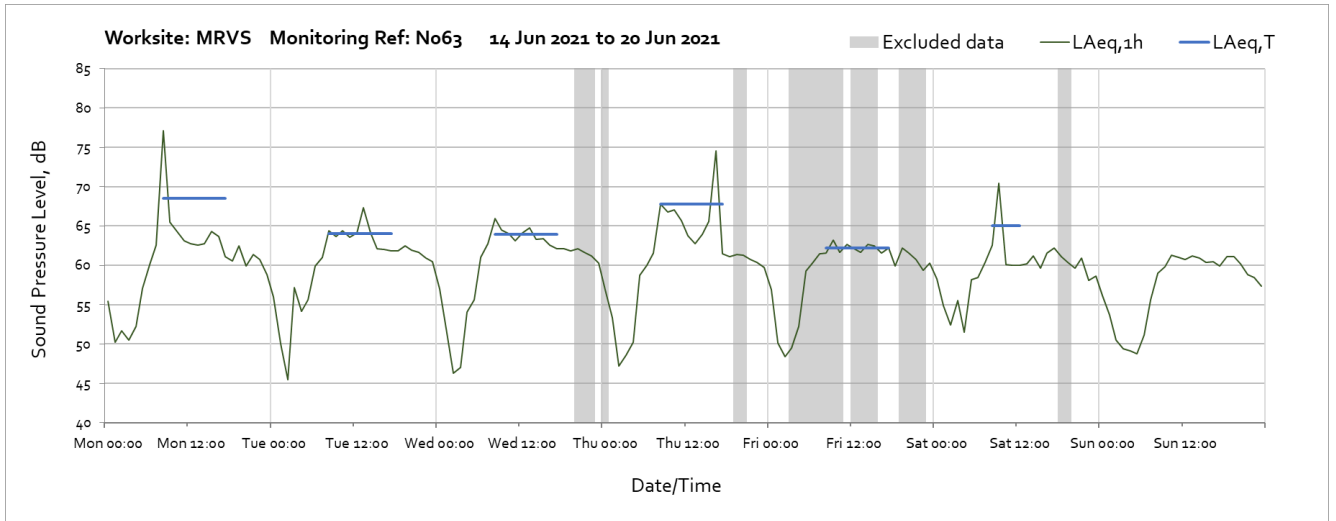
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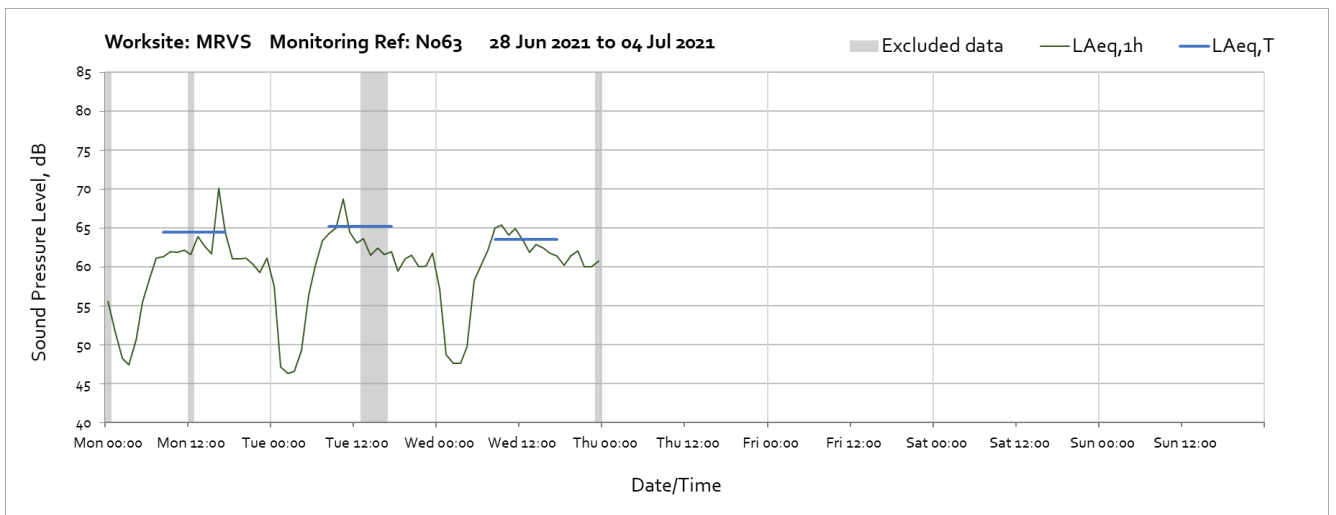
Note: Missing data between 07:00 on Sunday 27th and 08:00 on Monday 28th June 2021 and at 12:00 on Monday 28th June 2021 was due to loss of power at the monitor location.

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

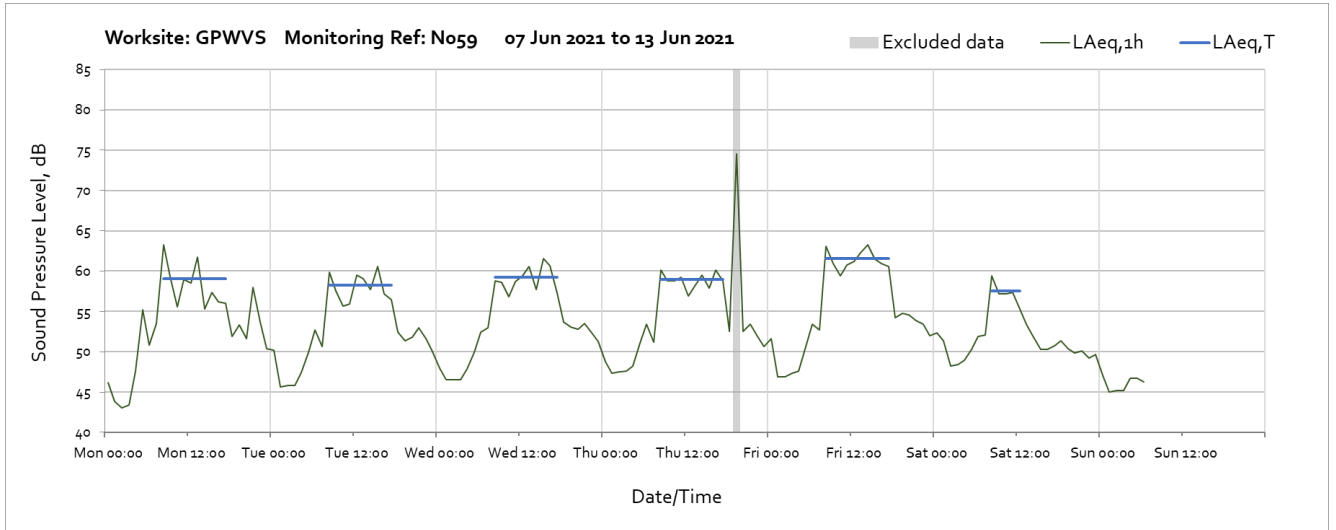
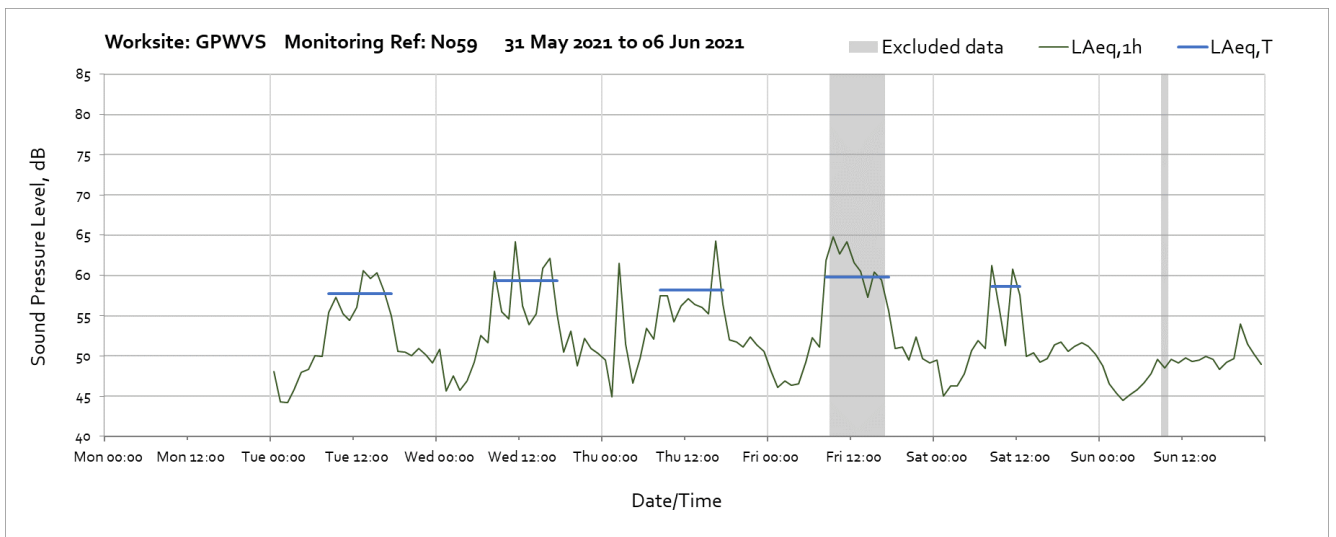




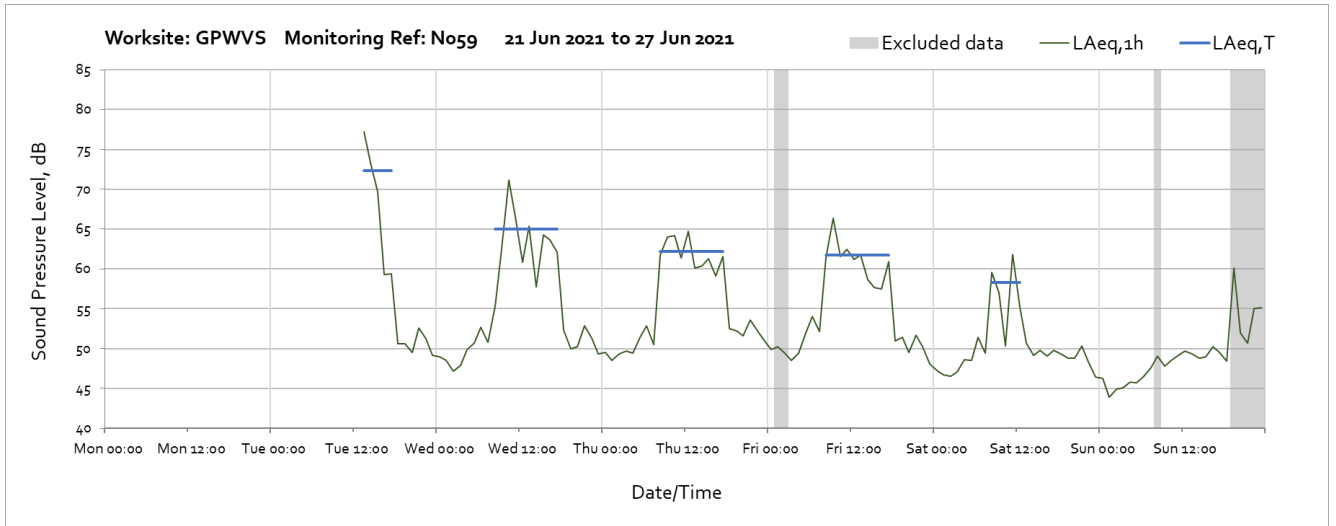
Note: Missing data between 05:00 and 16:00 on Tuesday 22nd June 2021 was due to loss of power at the monitor location.



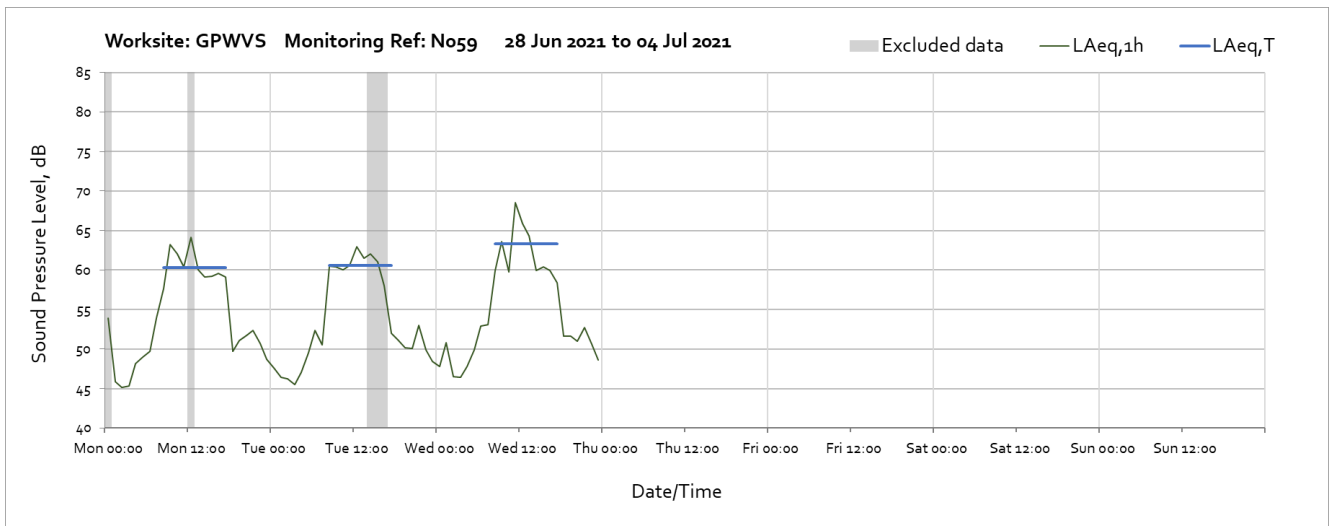
Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: N059



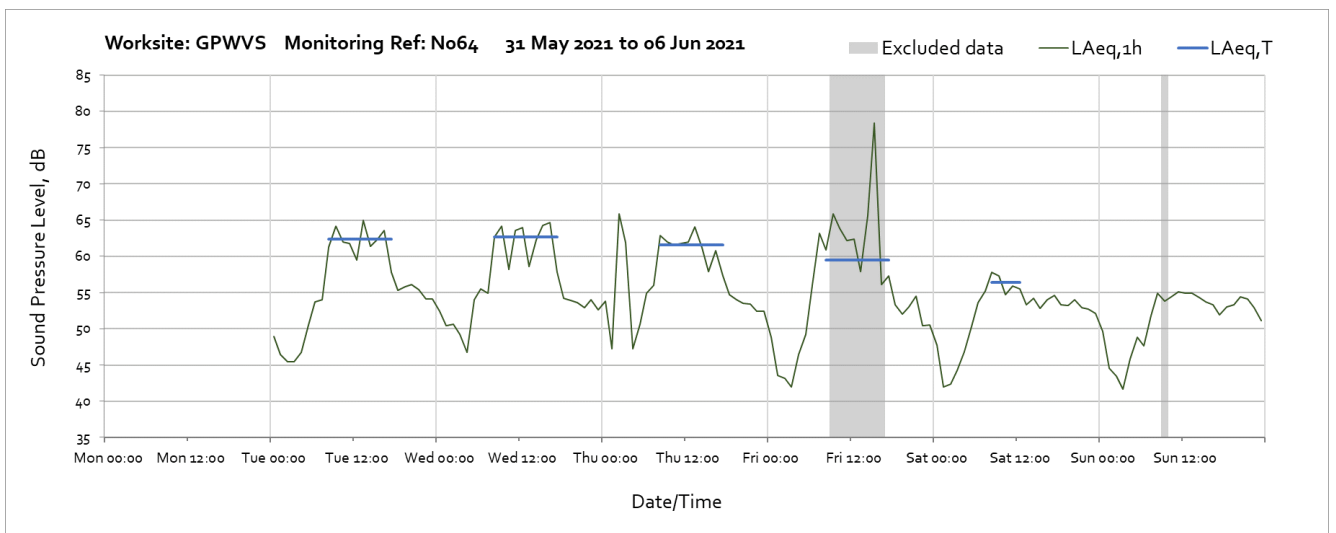
Note: Missing data from 07:00 on Sunday 13th June 2021 and 13:00 on Tuesday 22nd June 2021 was due to loss of power at the monitor location.

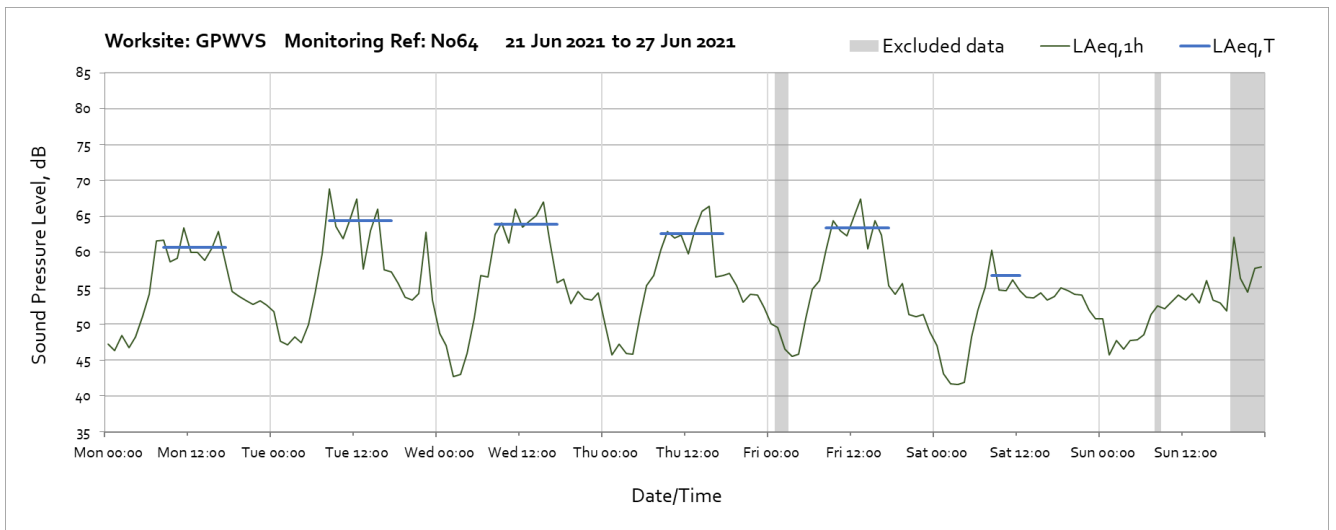
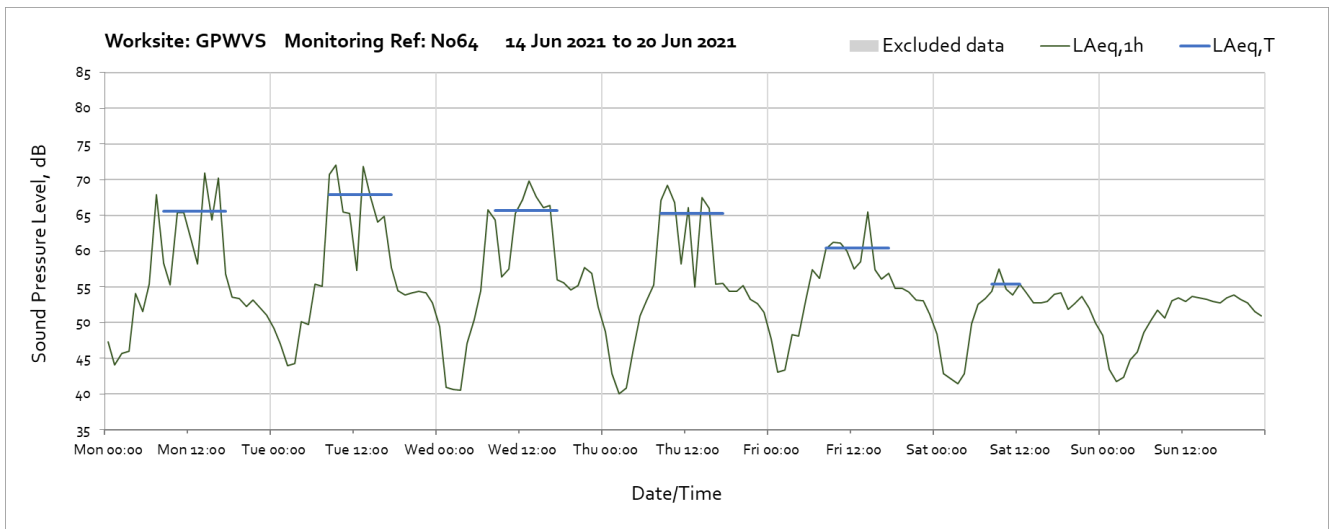
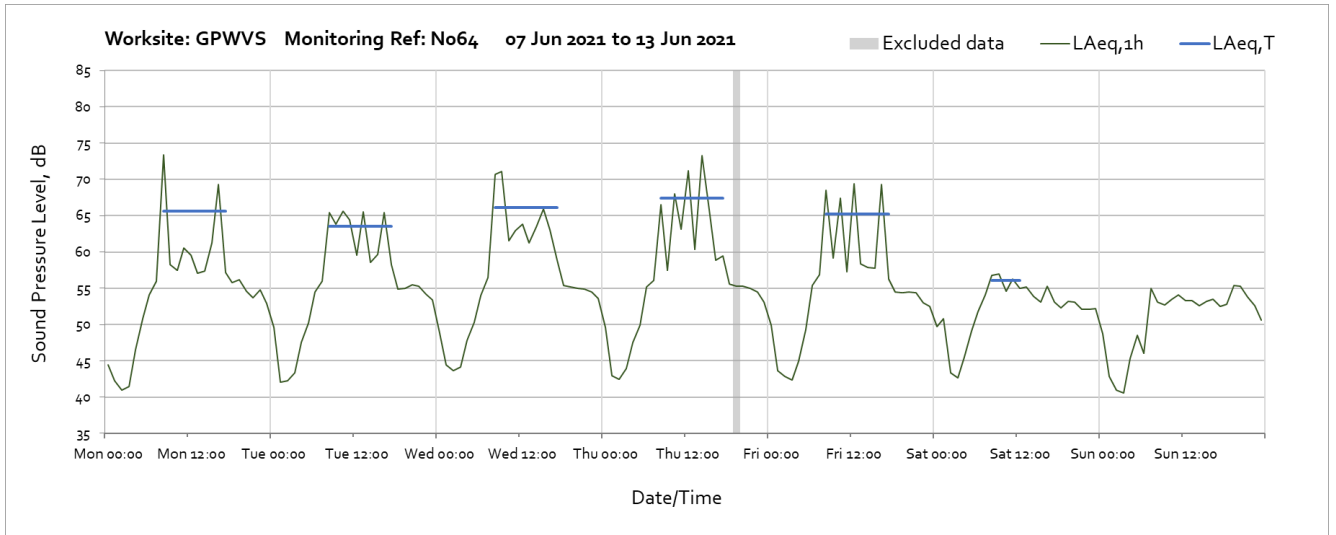


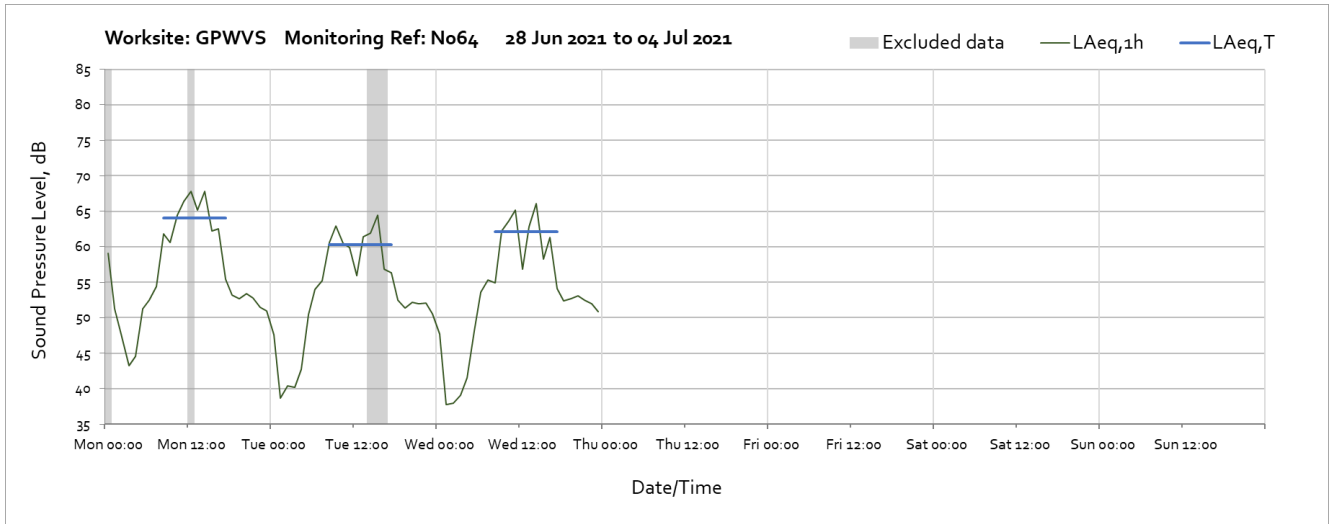
Note: Missing data from 07:00 on Sunday 13th June 2021 and 13:00 on Tuesday 22nd June 2021 was due to loss of power at the monitor location.



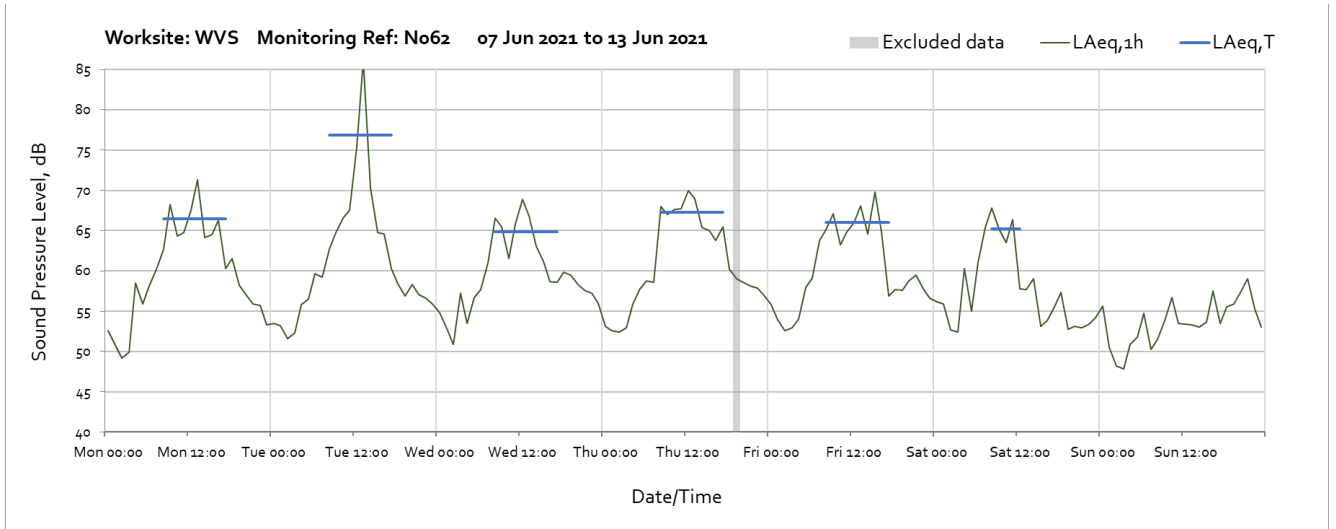
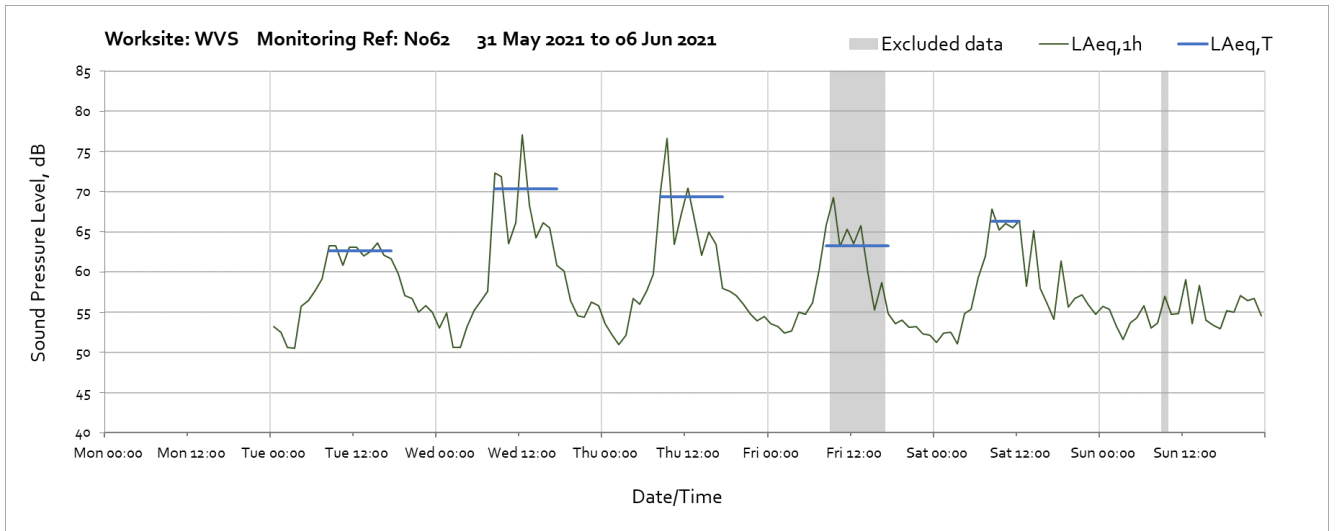
Worksite: Green Park Way Vent Shaft (GPWVS) - Monitoring Ref: N064

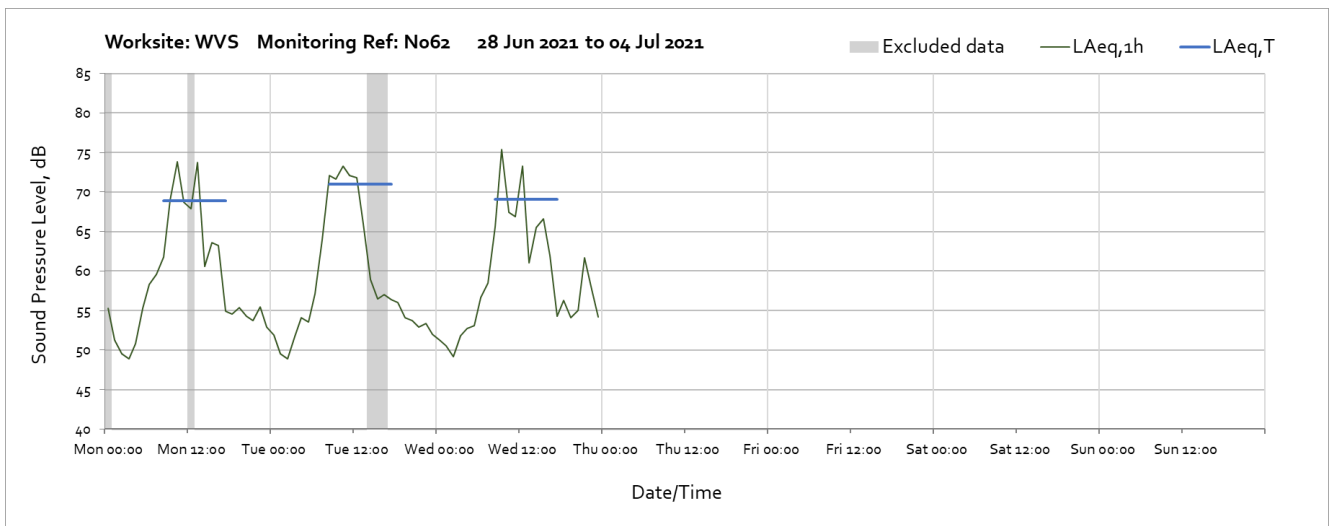
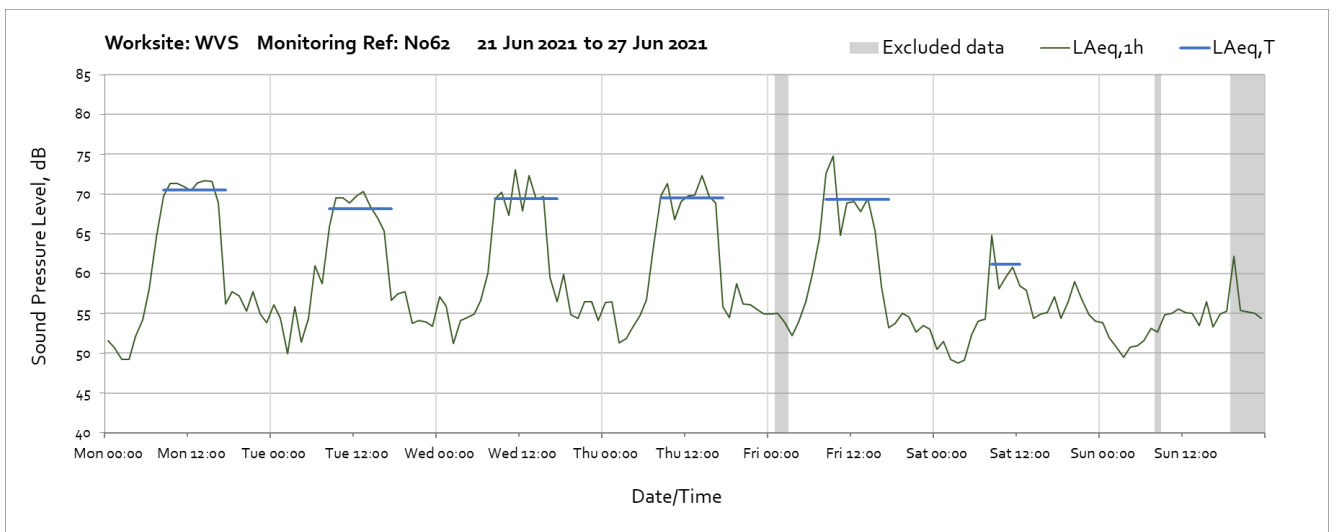
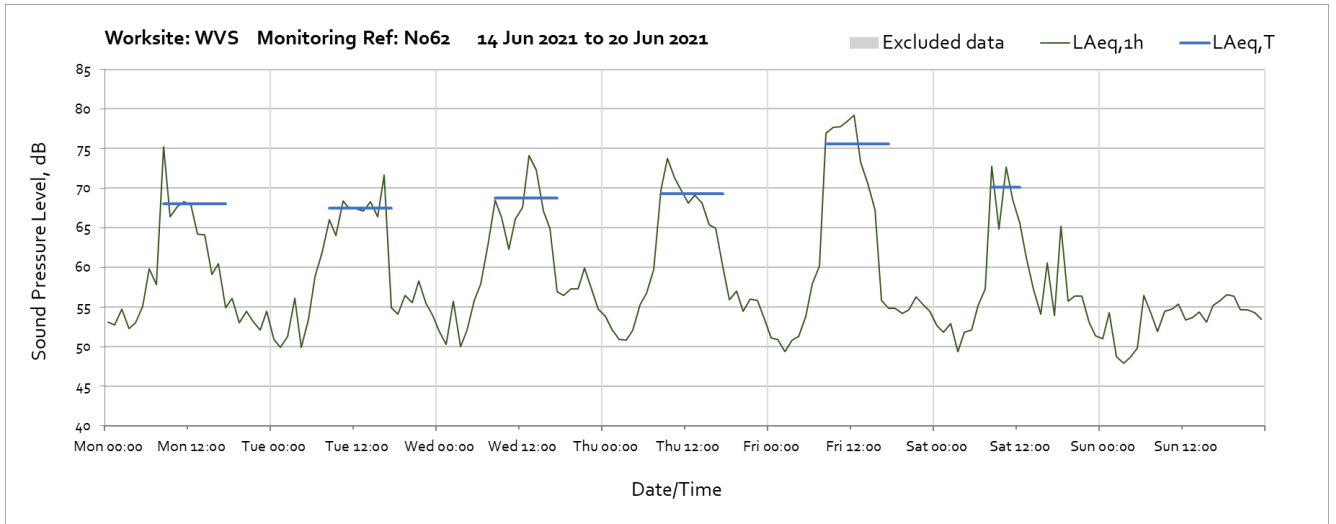






Worksite: Westgate Ventilation Shaft (WVS) - Monitoring Ref: N062

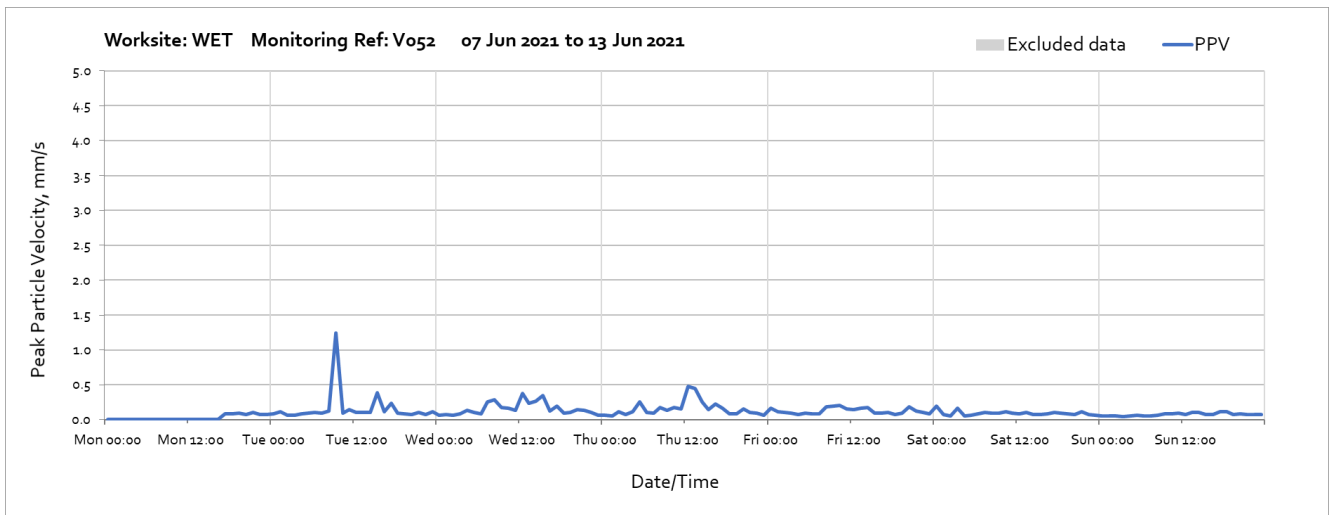
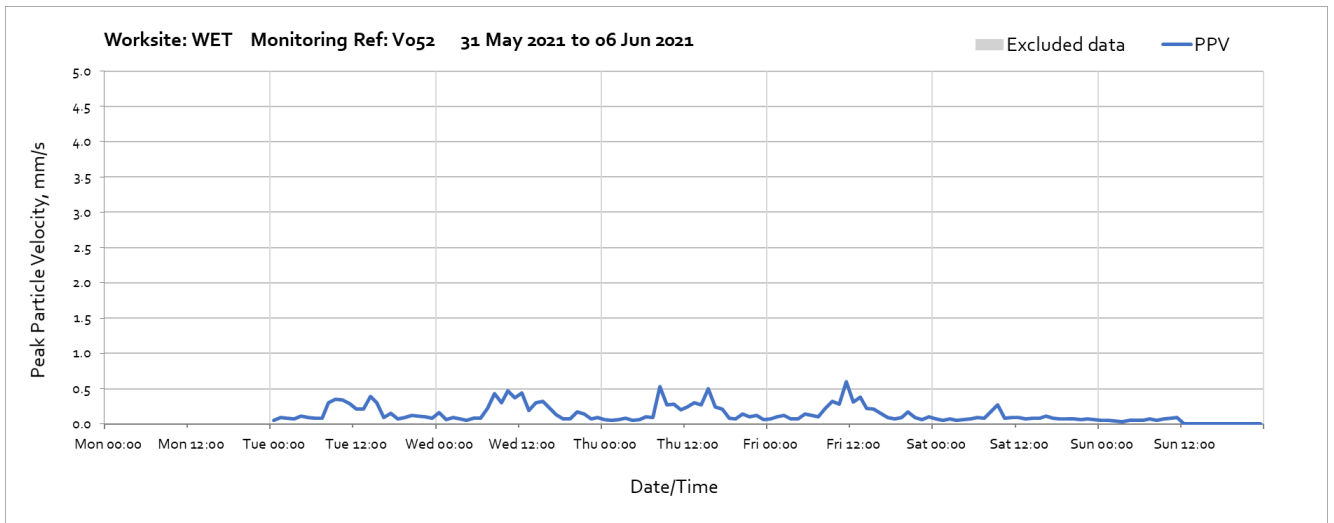


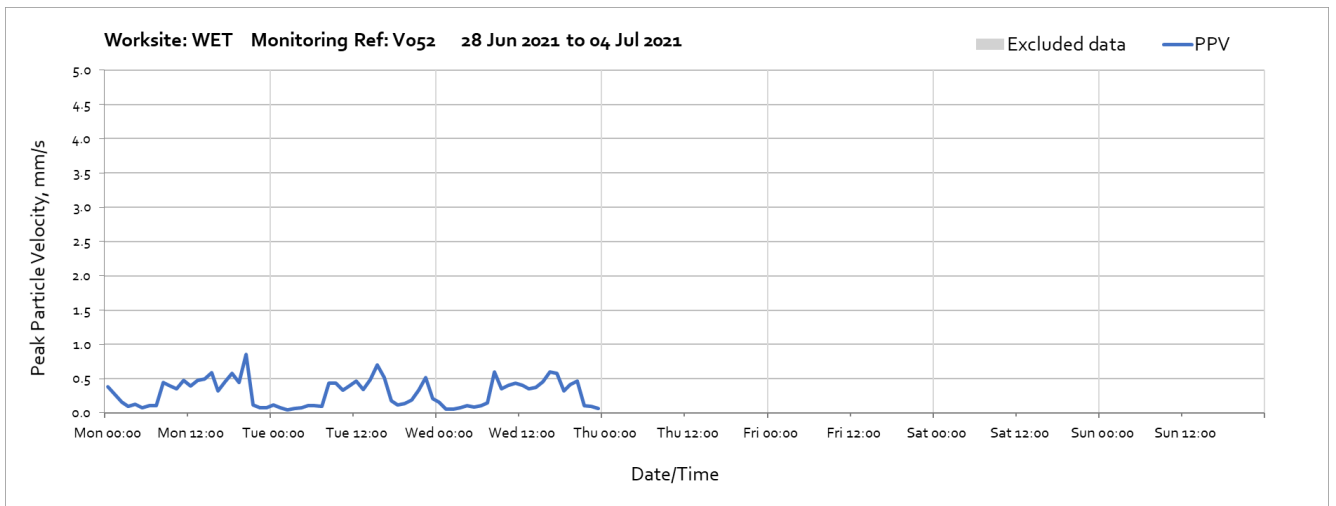
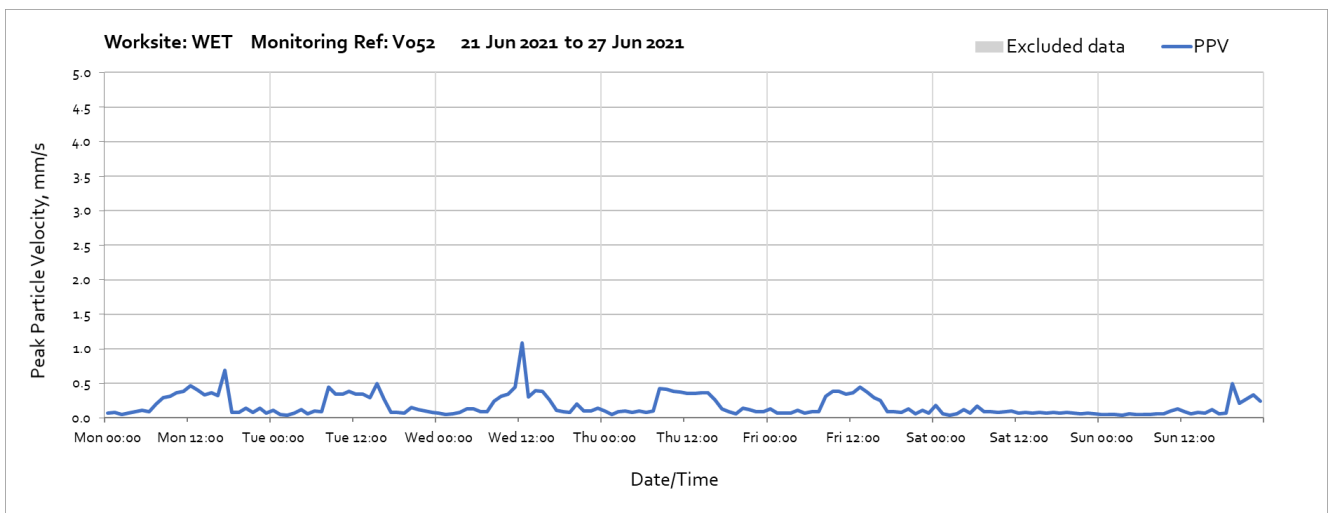
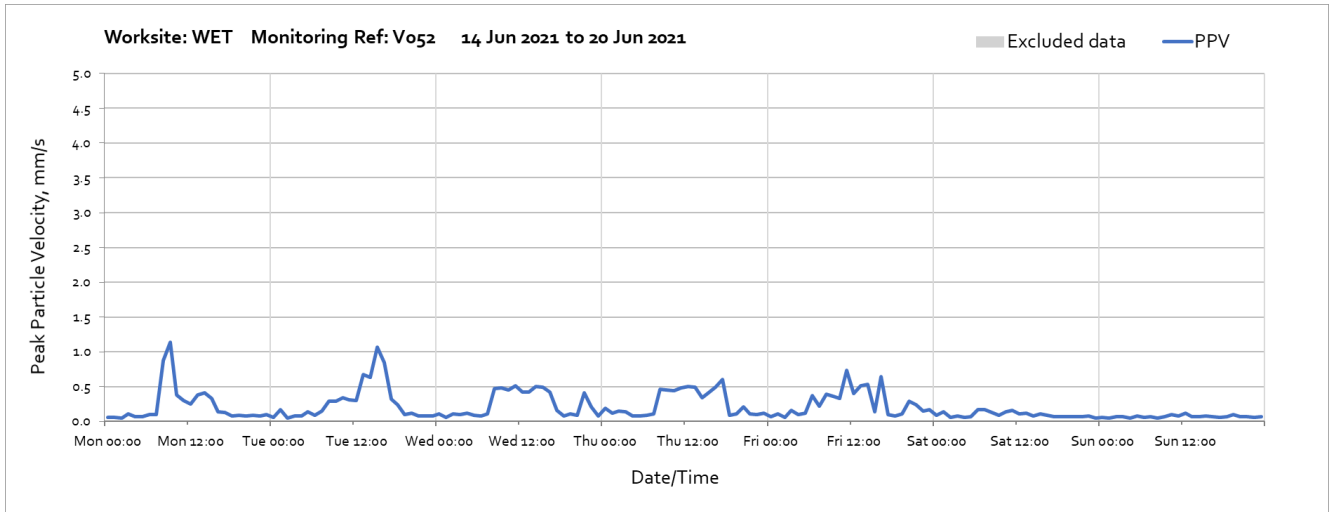


Vibration

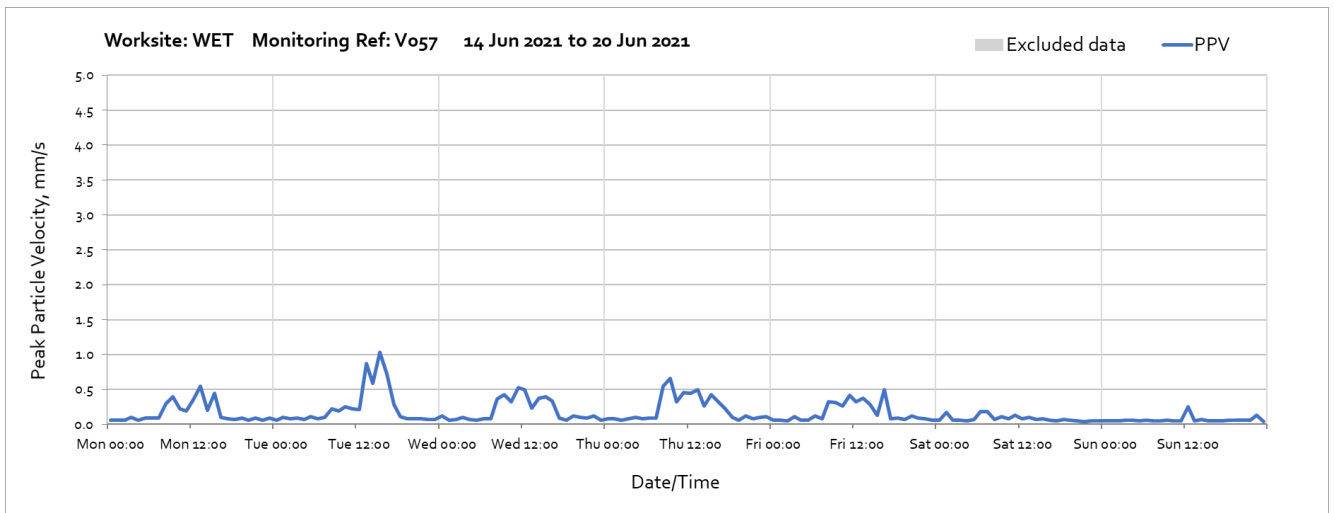
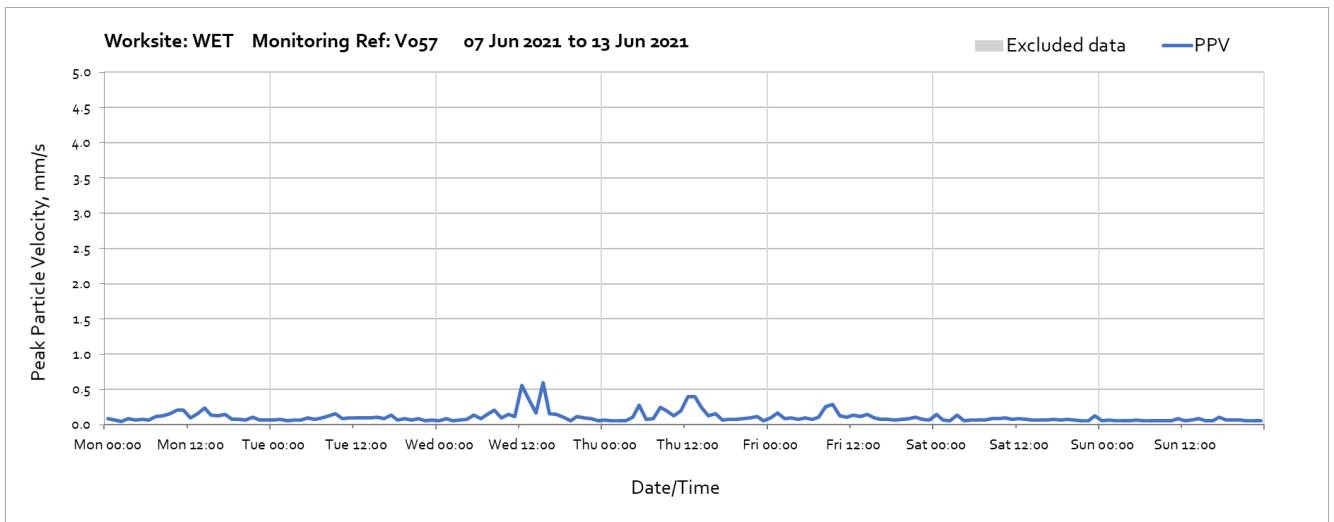
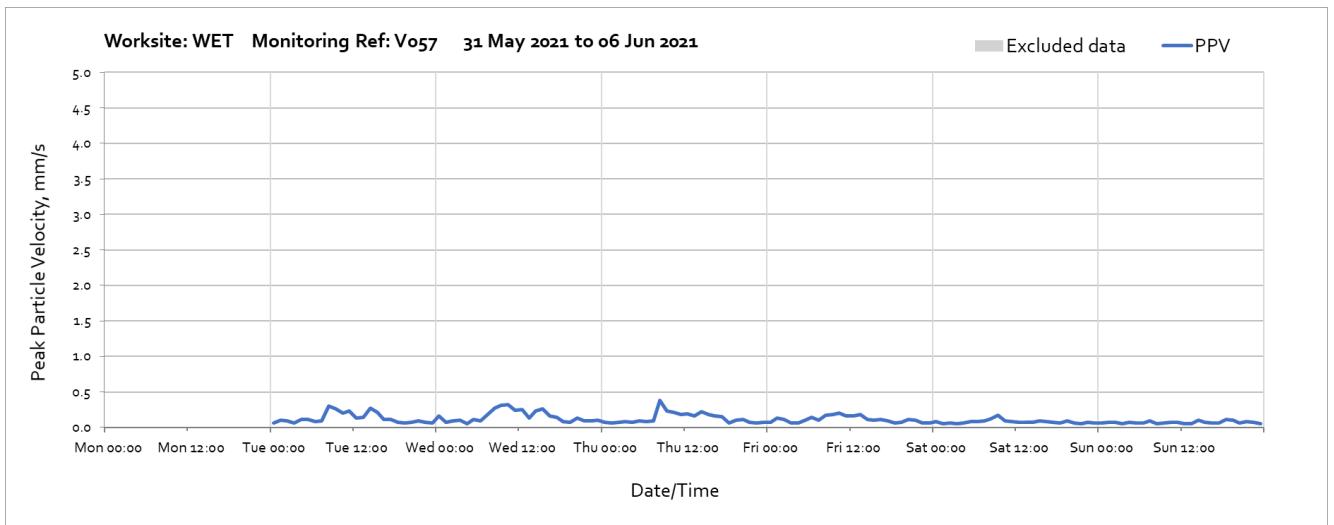
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative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

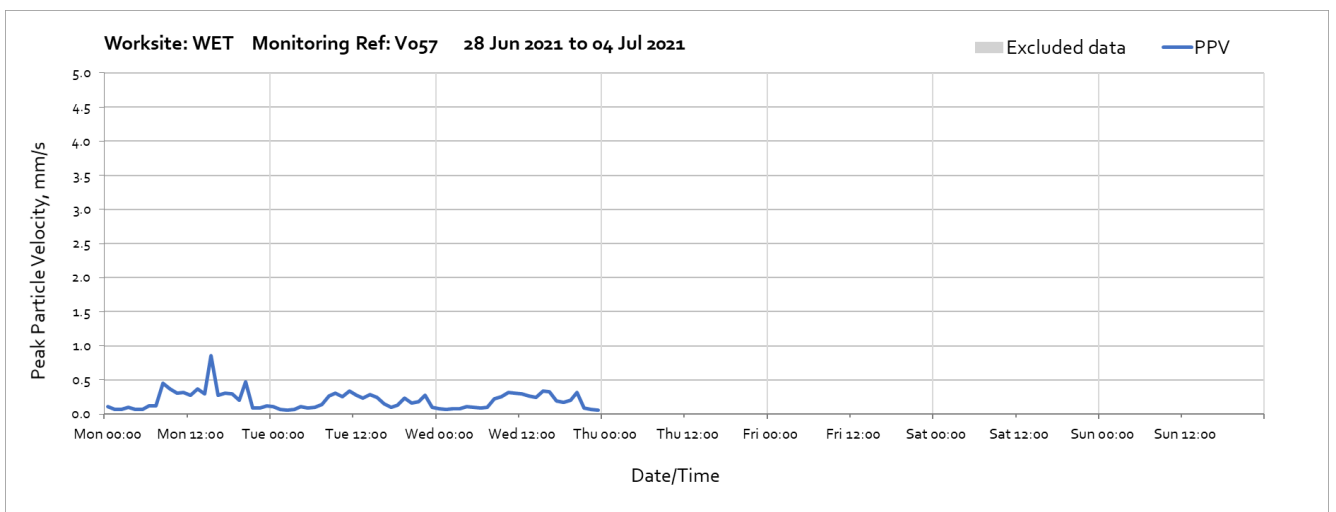
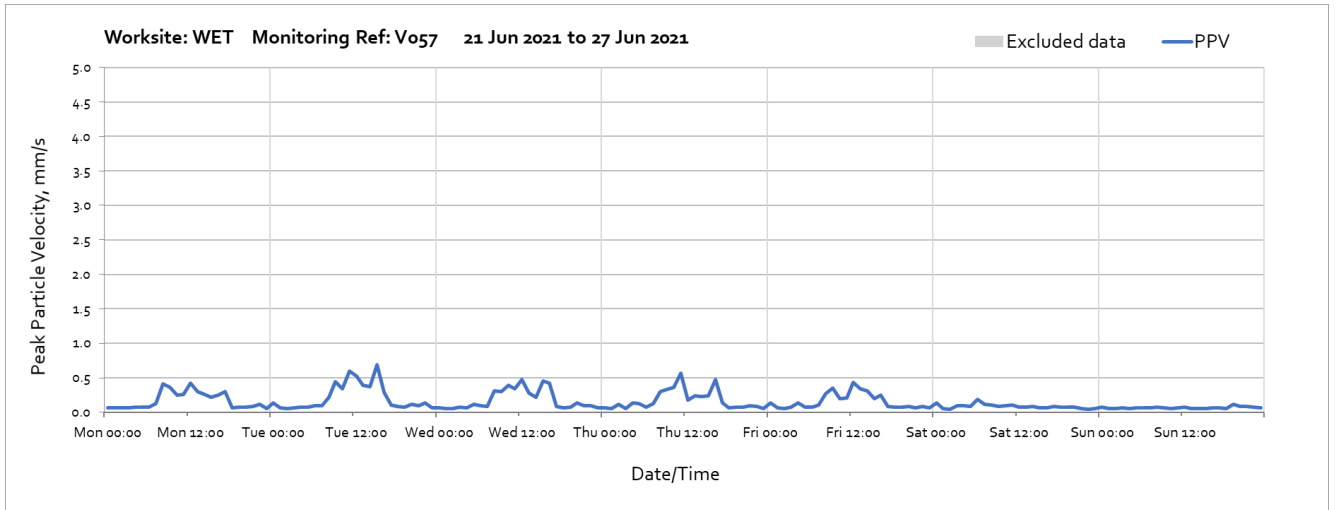
Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: V052



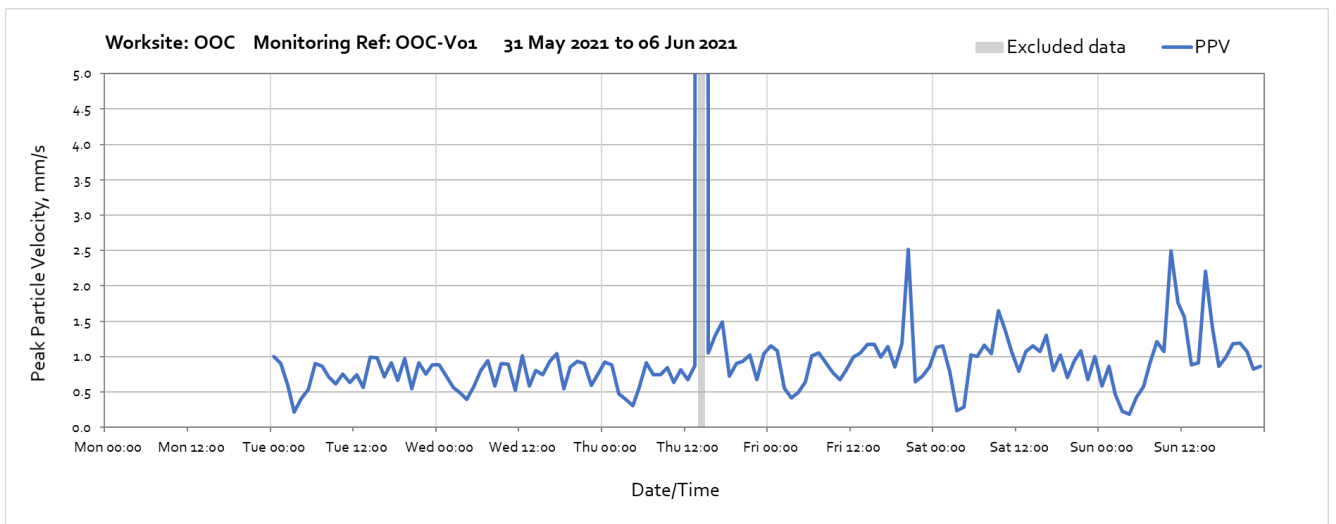


Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: V057

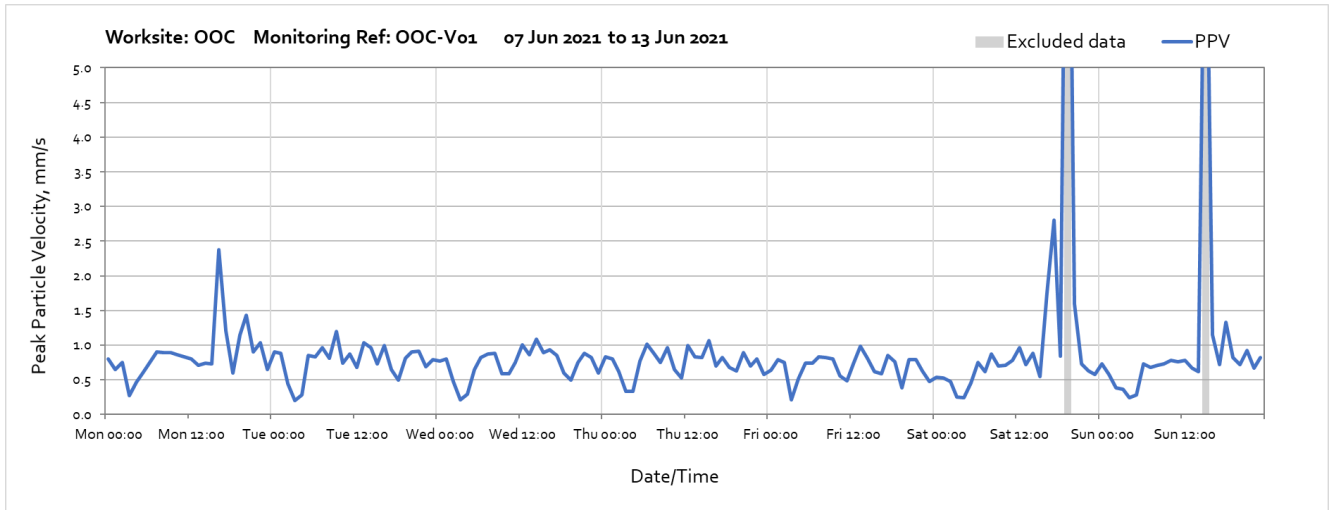




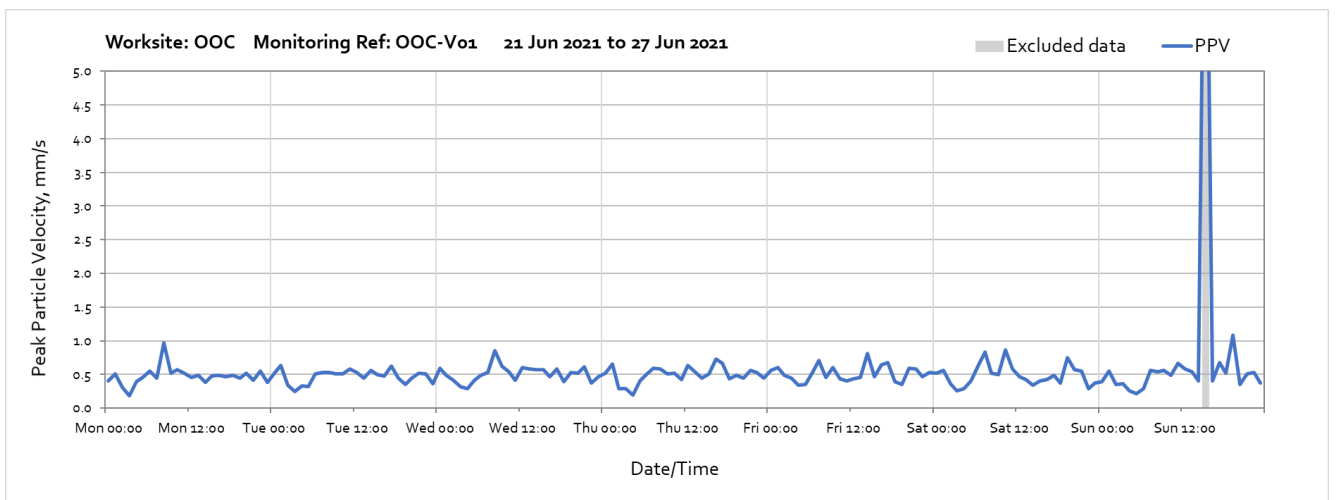
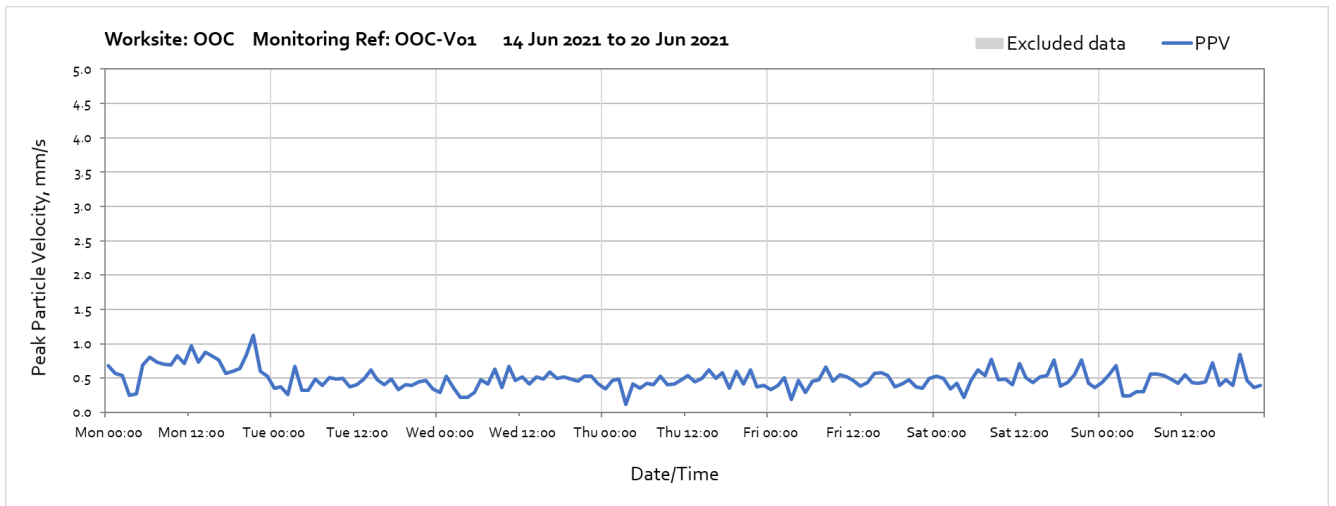
Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V01



Note: High vibration levels at 14:00 on Thursday 3rd June 2021 were due to local disturbance at the monitor location.

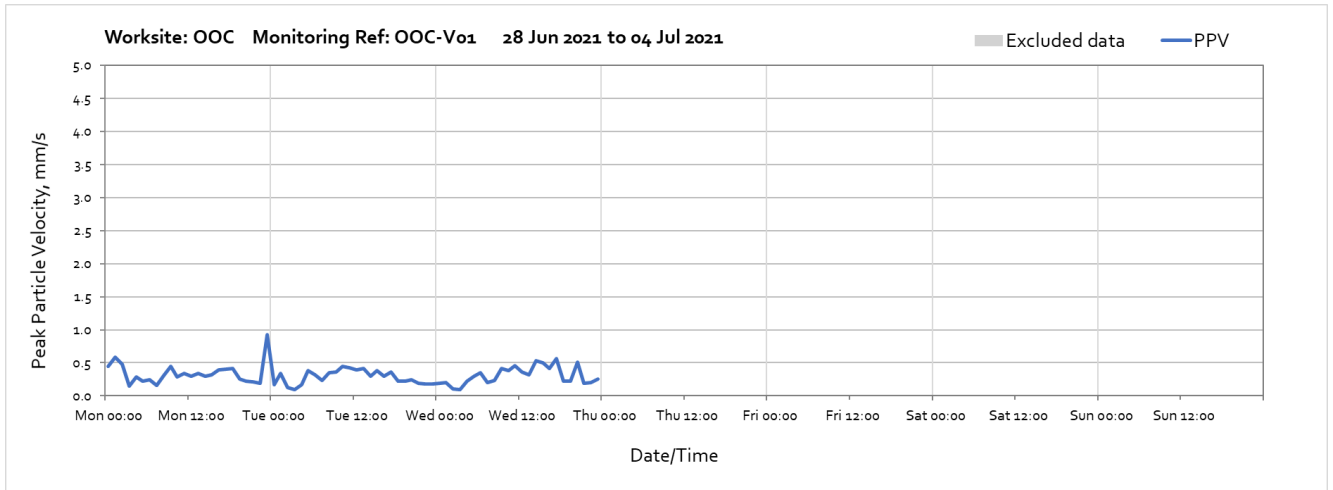


Note: High vibration levels at 19:00 on Saturday 12th June 2021 and 15:00 on Sunday 13th June 2021 were due to local disturbance at the monitor location.

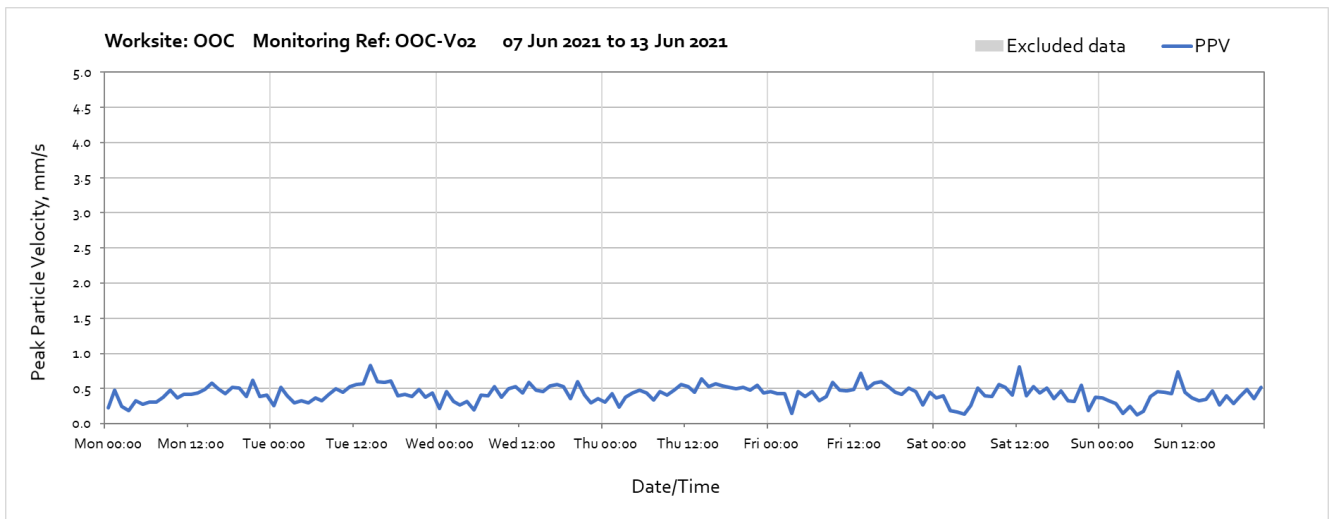
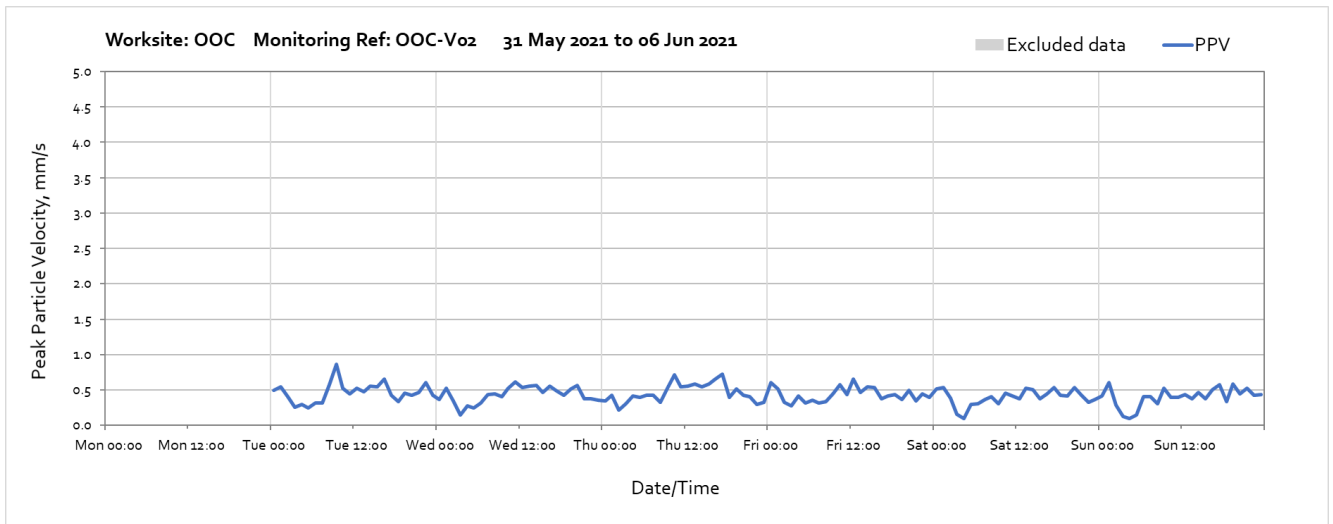


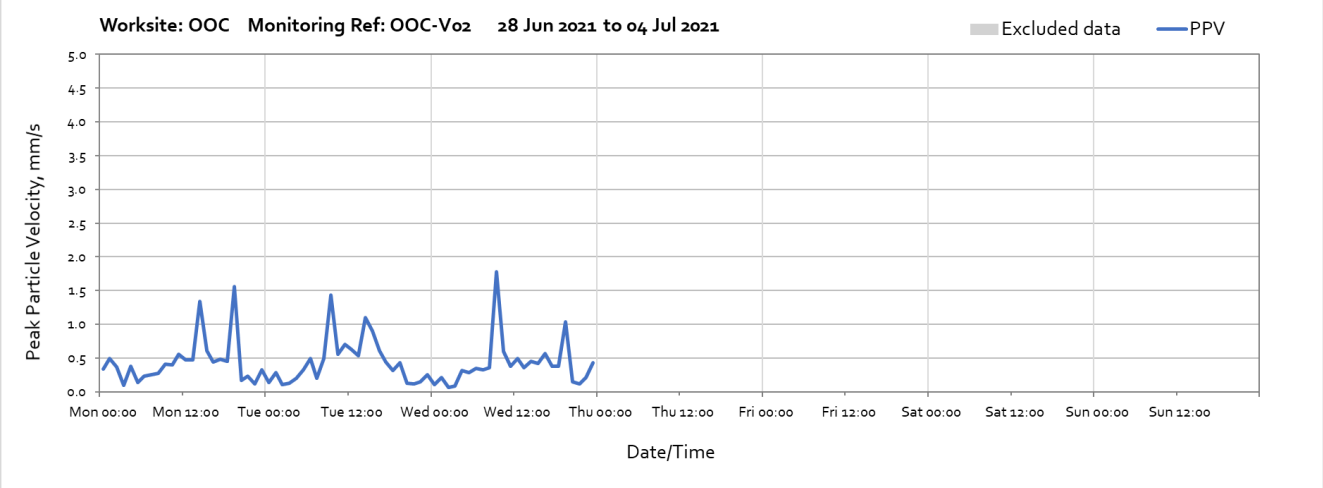
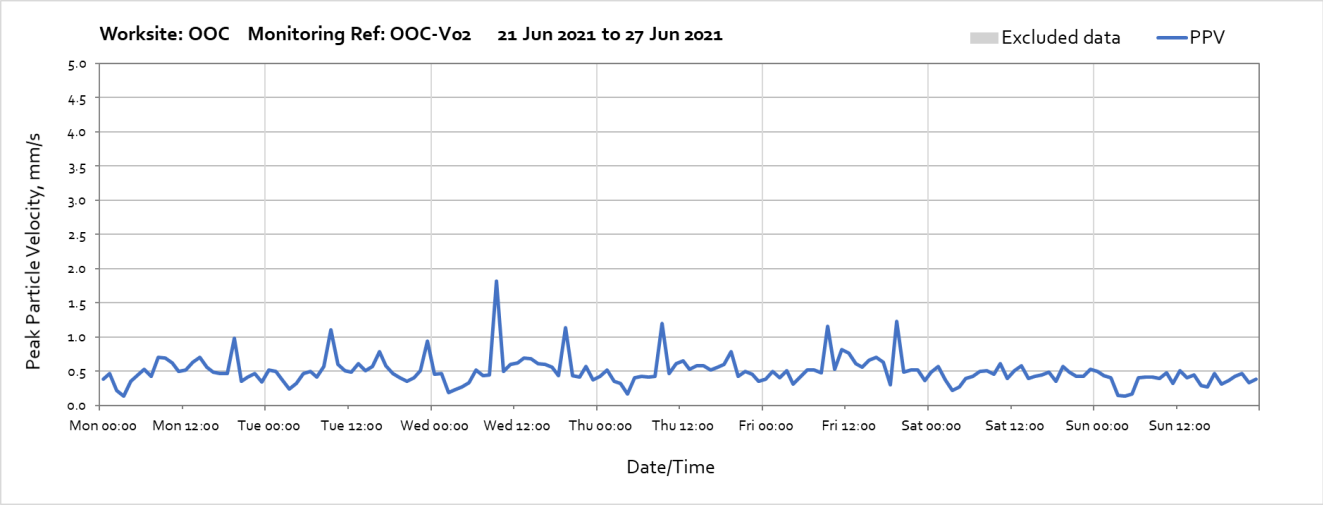
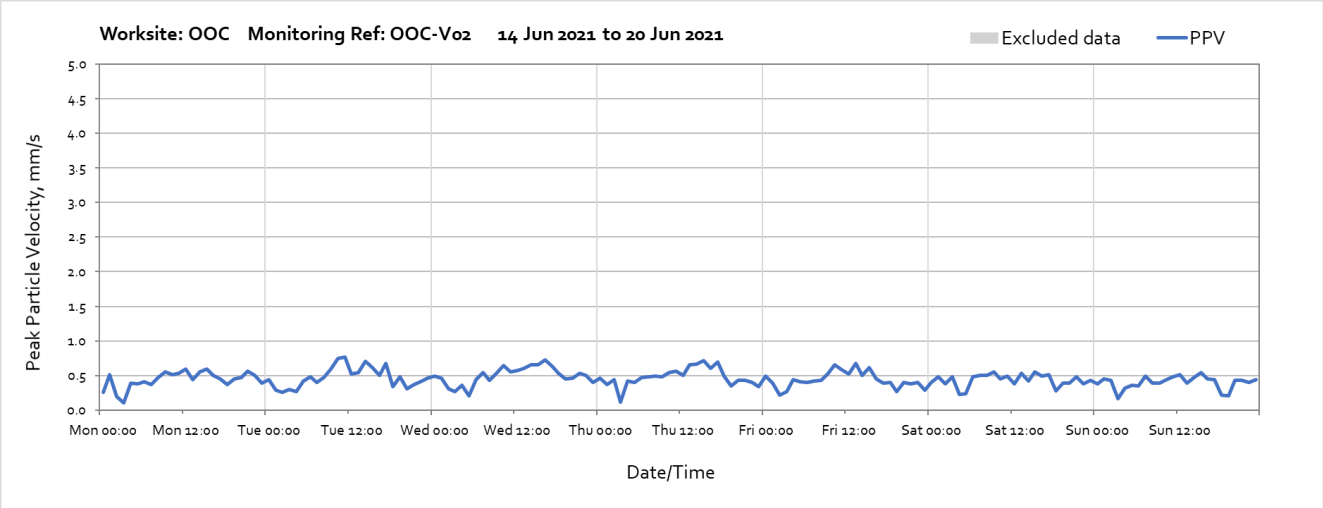
Note: High vibration levels at 15:00 on Sunday 27th June 2021 were due to local disturbance at the monitor location.

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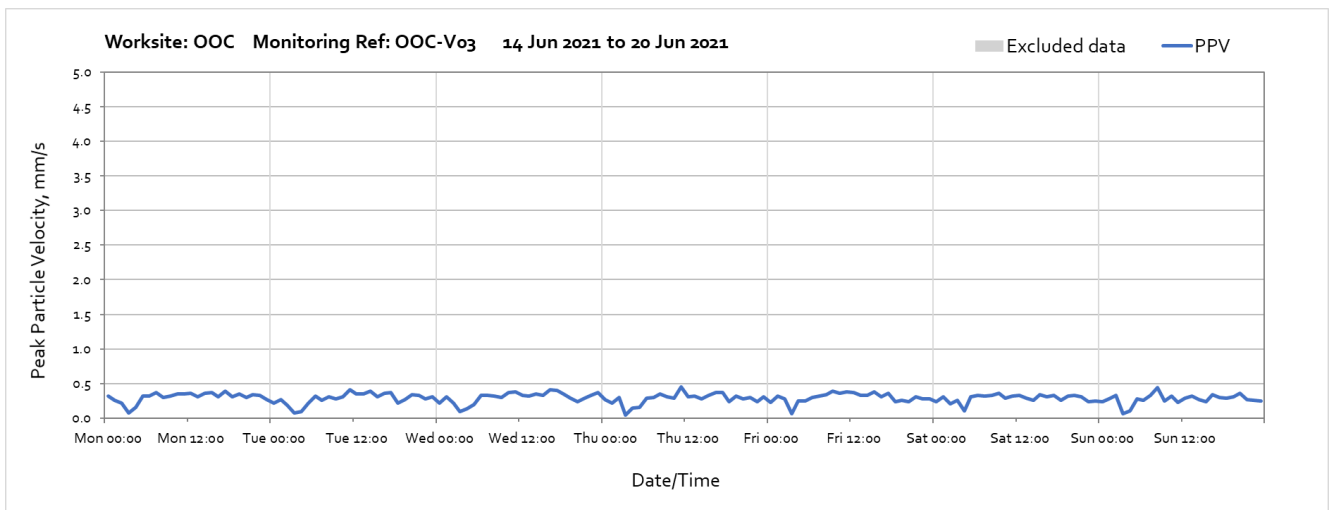
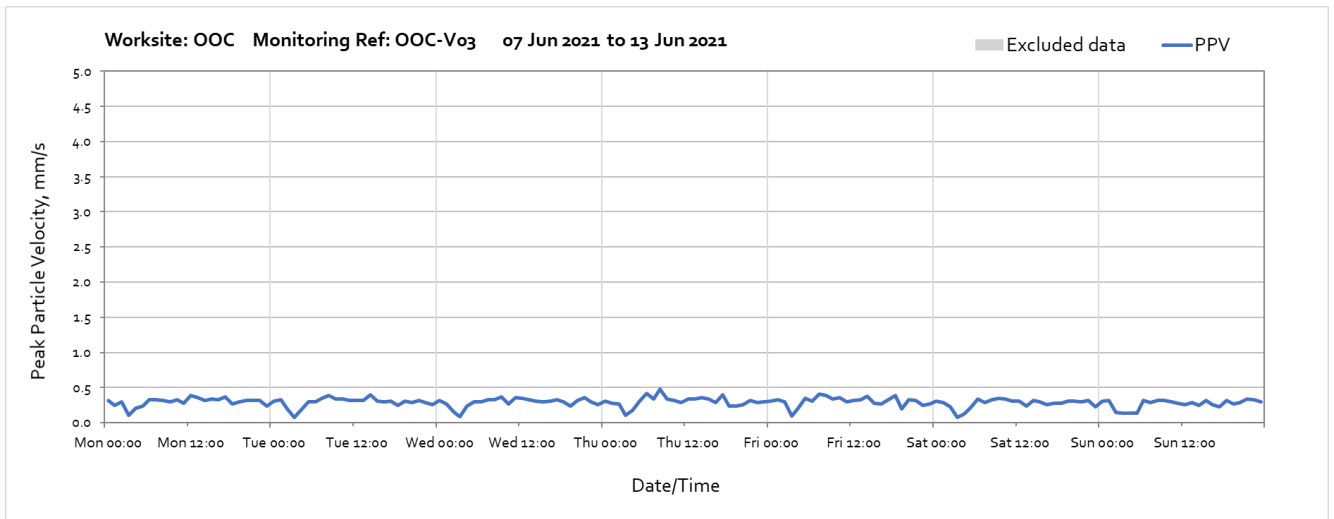
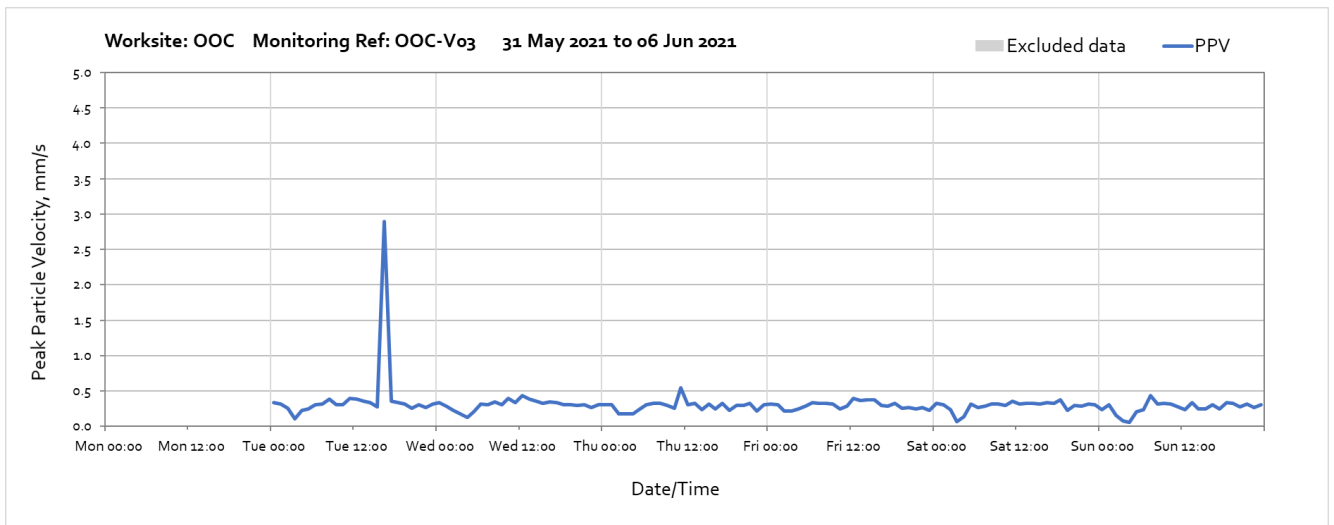


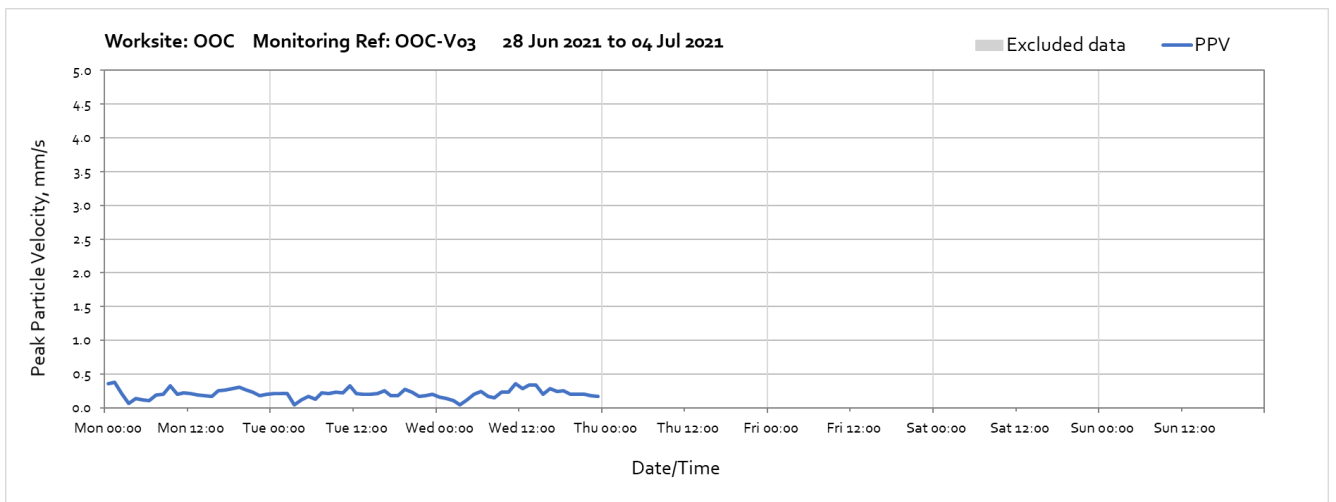
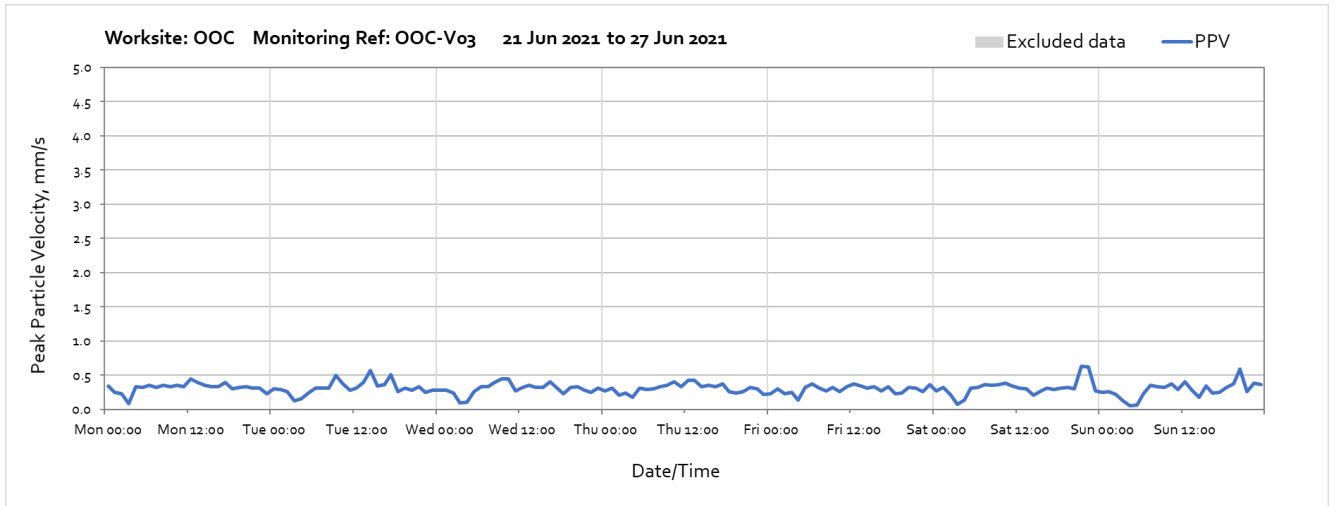
Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V02



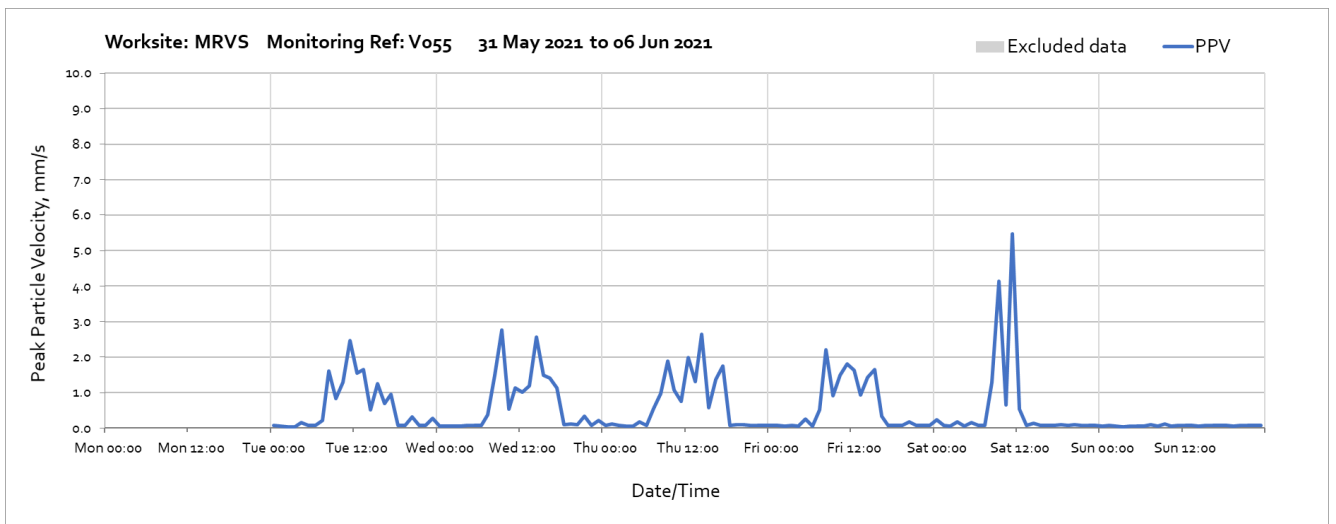


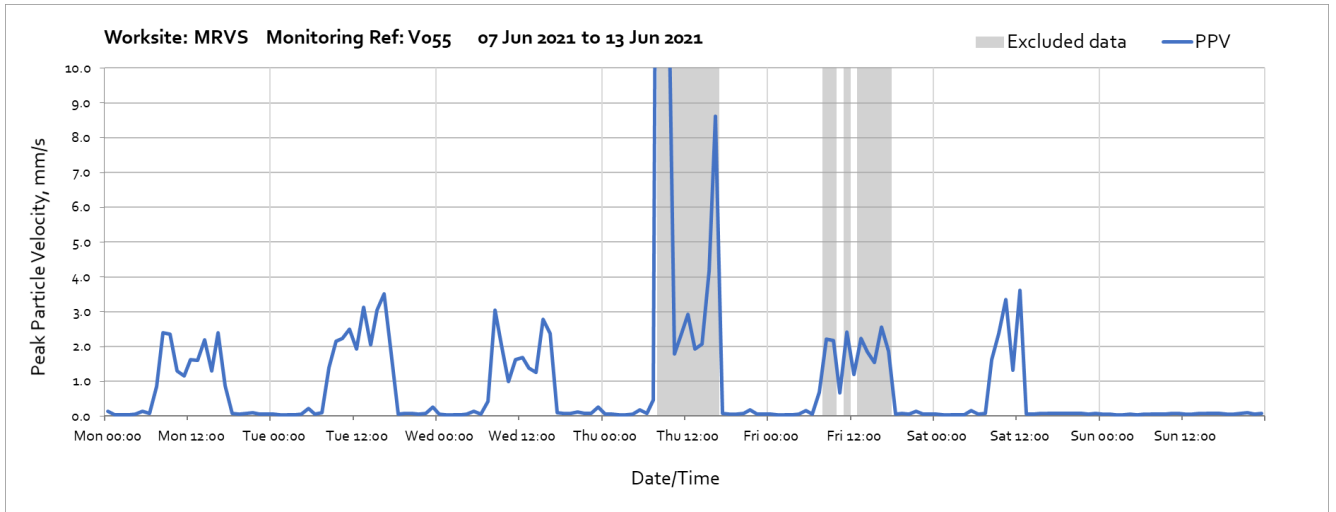
Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V03



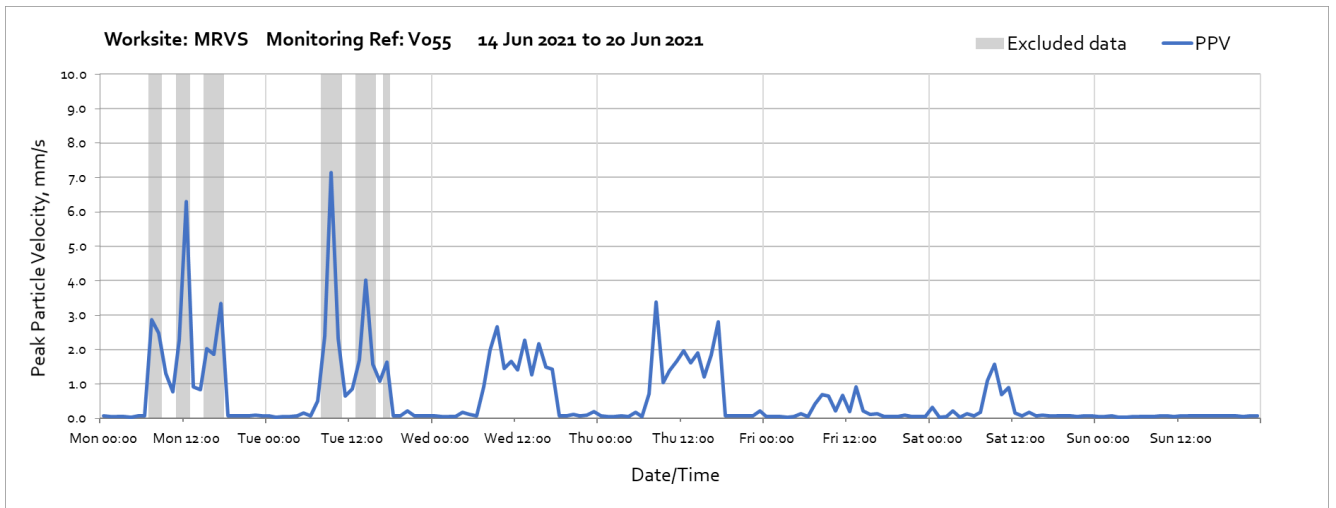


Worksite: Mandeville Road Vent Shaft (MRVS) - Monitoring Ref: V055

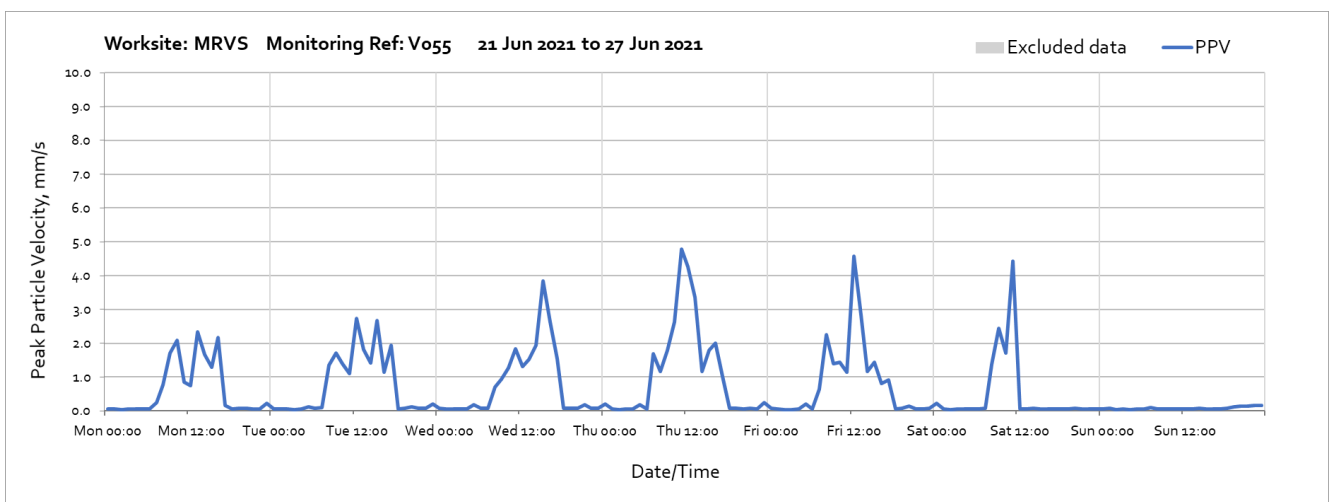


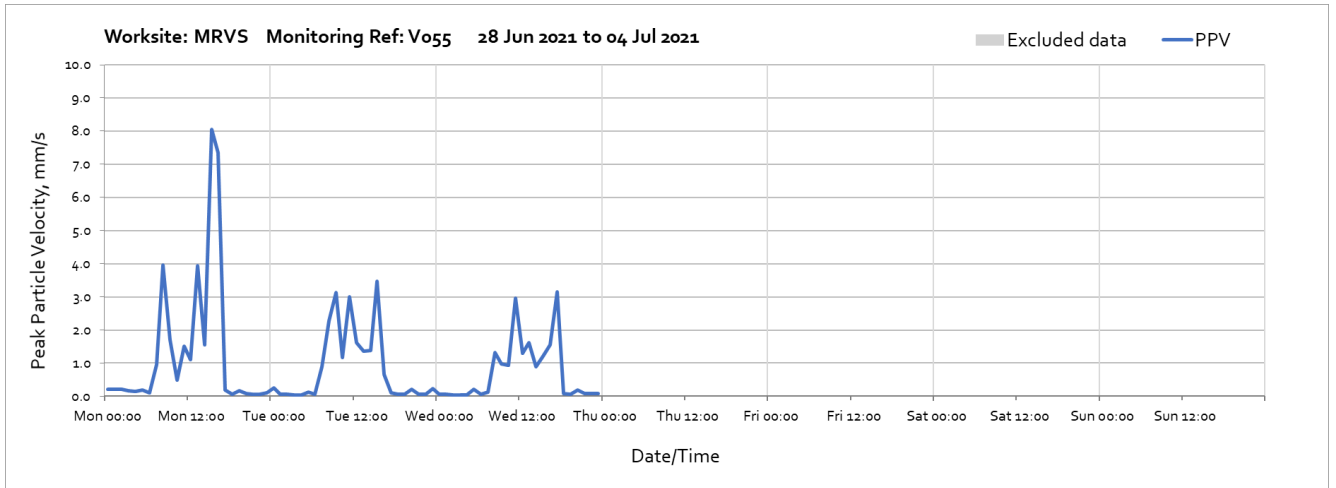


Note: High vibration levels measured across the week were due to local disturbance at the monitor location.



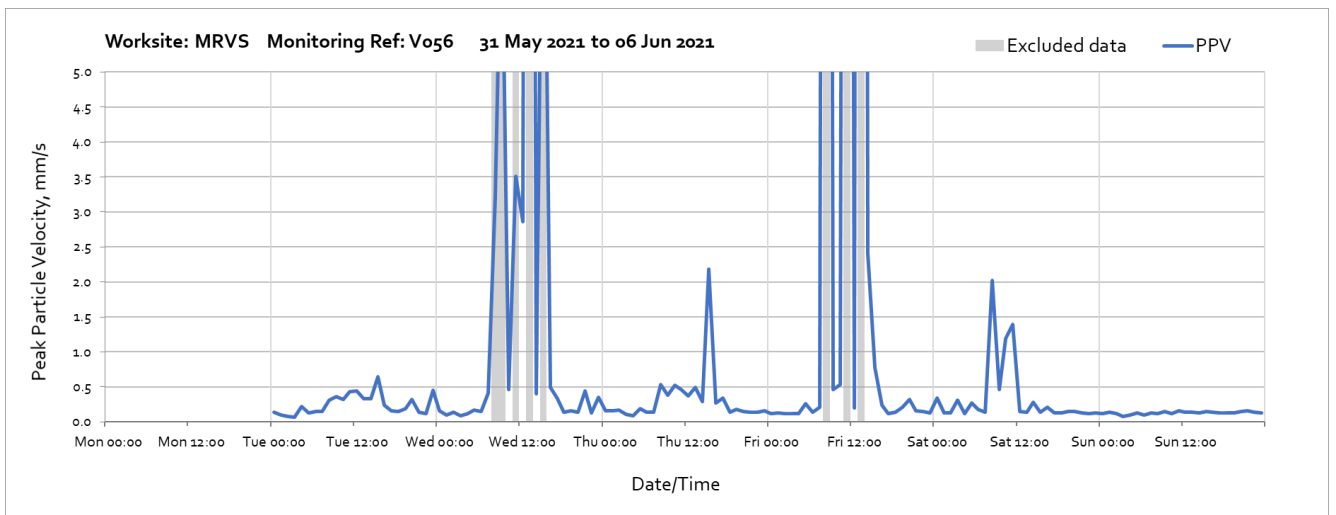
Note: High vibration levels measured across the week were due to local disturbance at the monitor location.



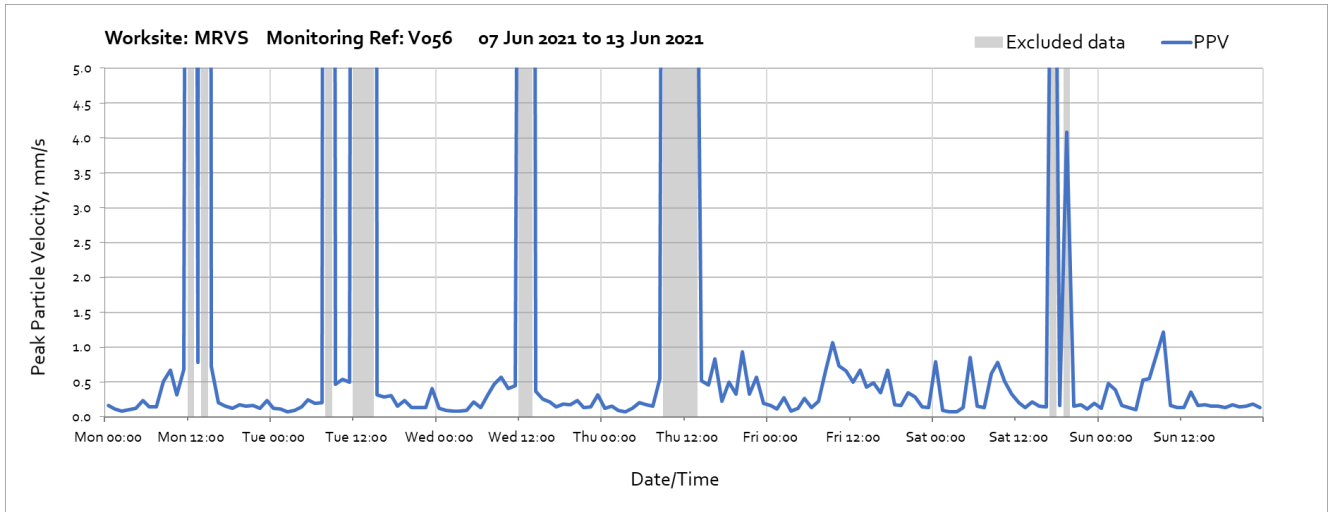


Note: High vibration levels measured between 08:00 and 17:00 on Monday 28th June 2021 was due to building demolition works undertaken near to the monitoring location. The nearest residential receptors are further away from the works and vibration levels at the receptor will therefore be lower.

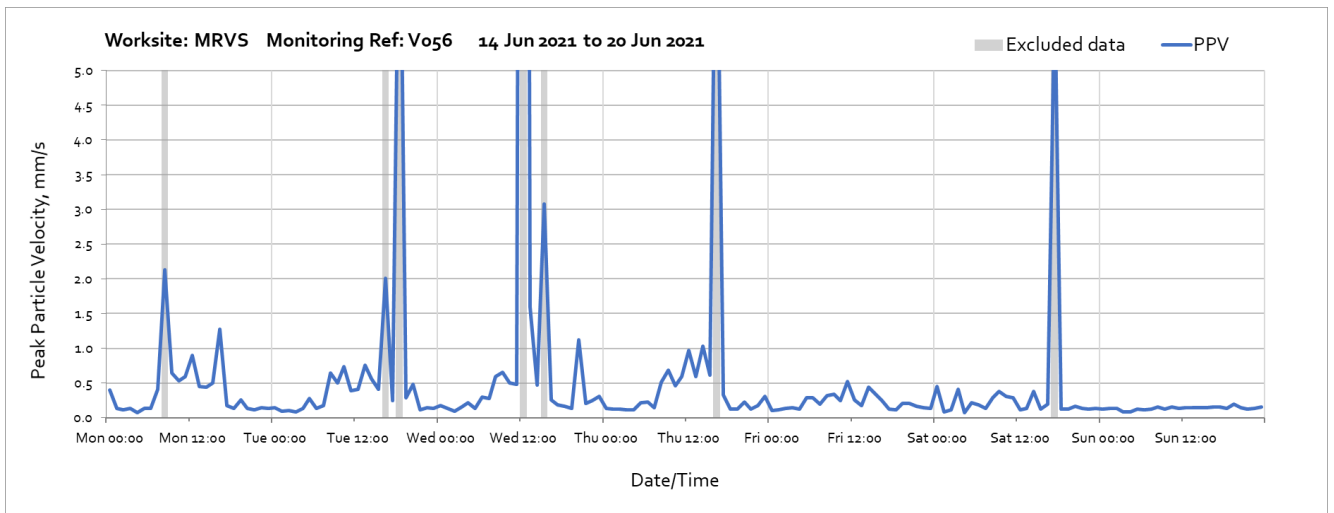
Worksite: Mandeville Road Vent Shaft (MRVS) – Monitoring Ref: V056



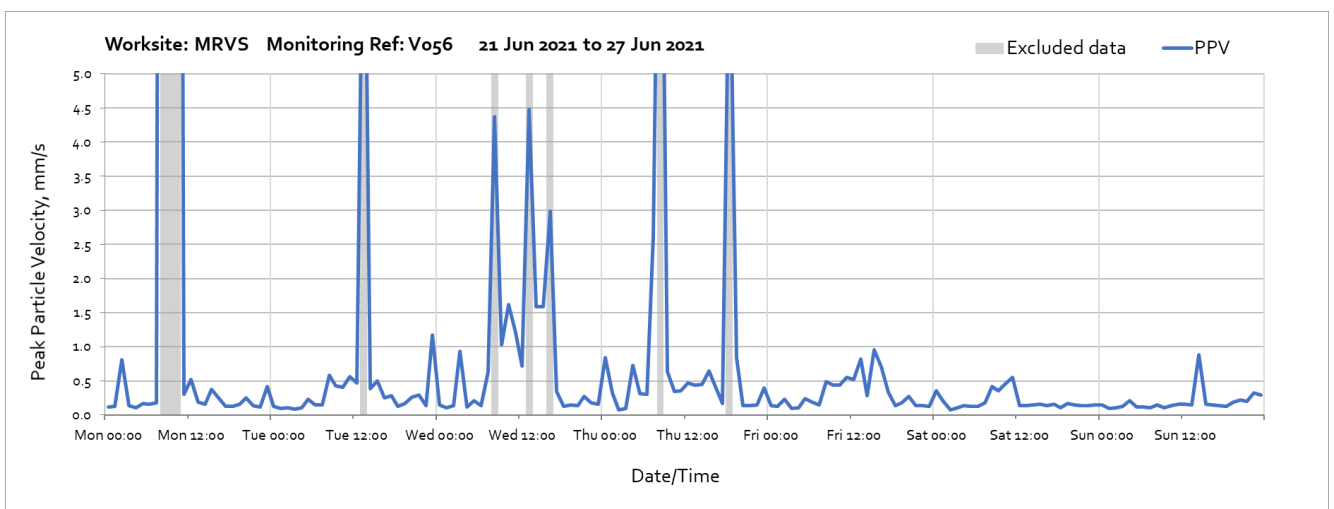
Note: High vibration levels measured across the week were due to local disturbance at the monitor location.



Note: High vibration levels measured across the week were due to local disturbance at the monitor location.

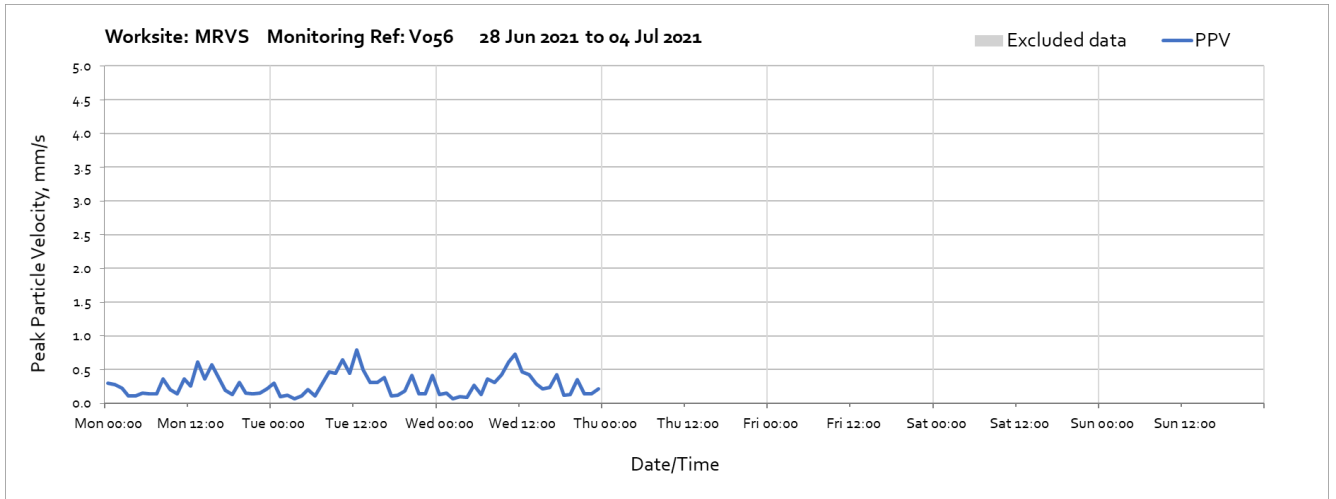


Note: High vibration levels measured across the week were due to local disturbance at the monitor location.

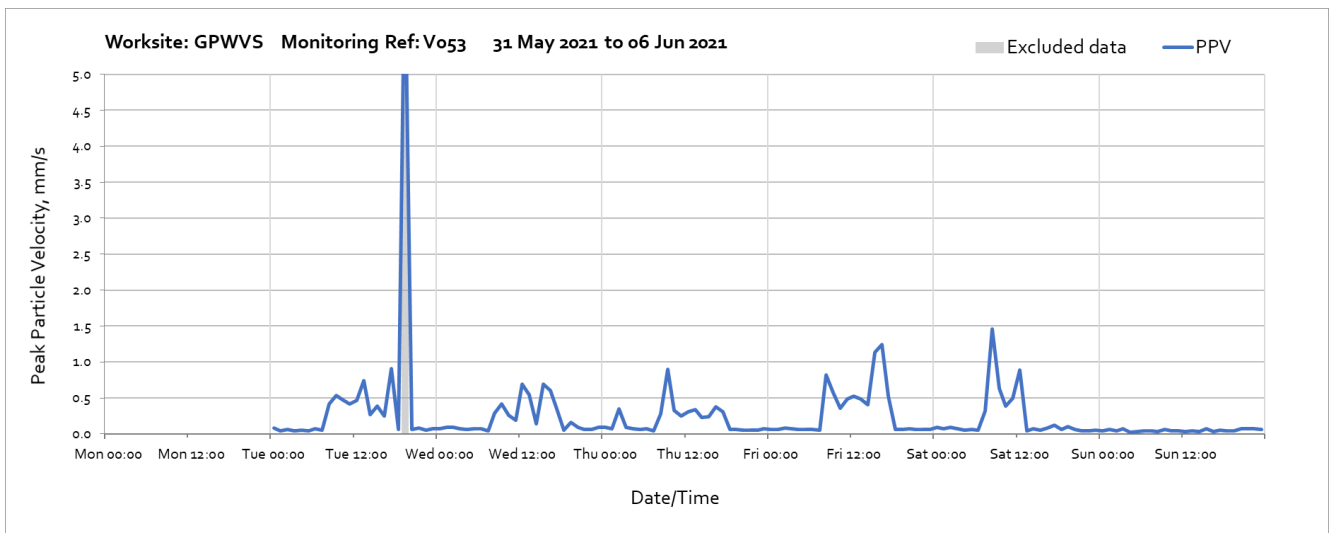


Note: High vibration levels measured across the week were due to local disturbance at the monitor location.

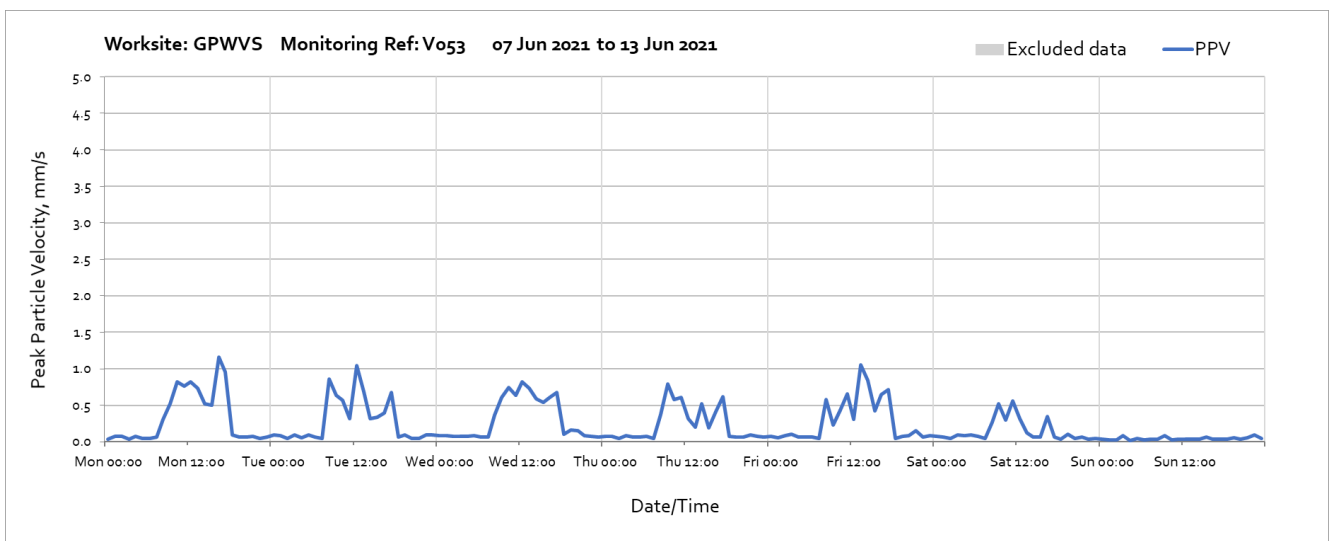
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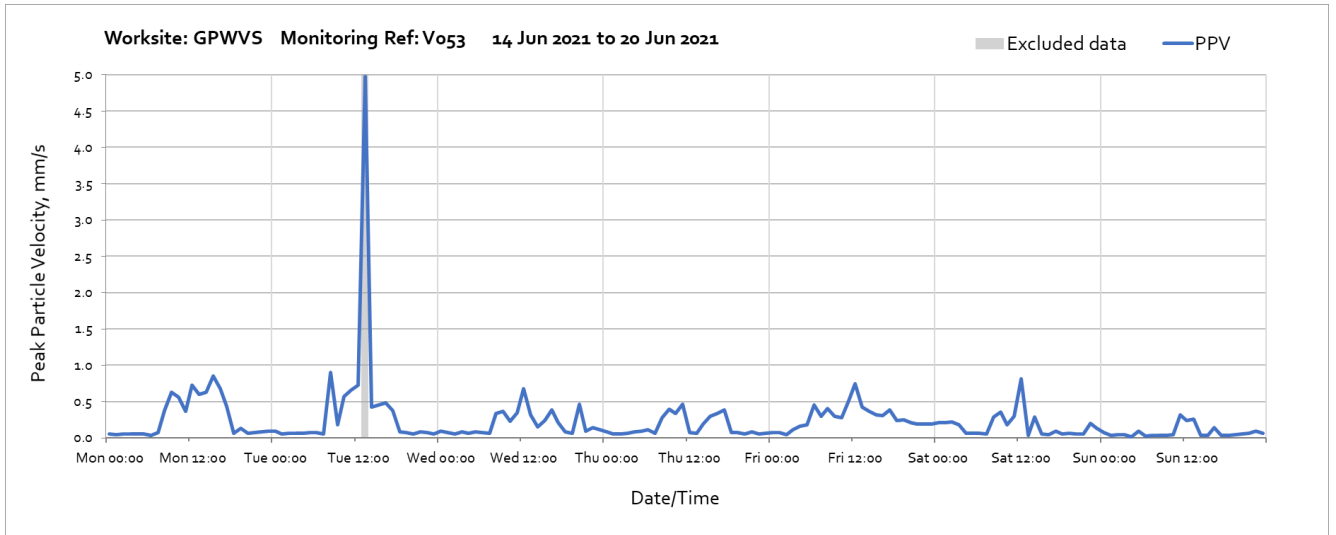


Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: V053

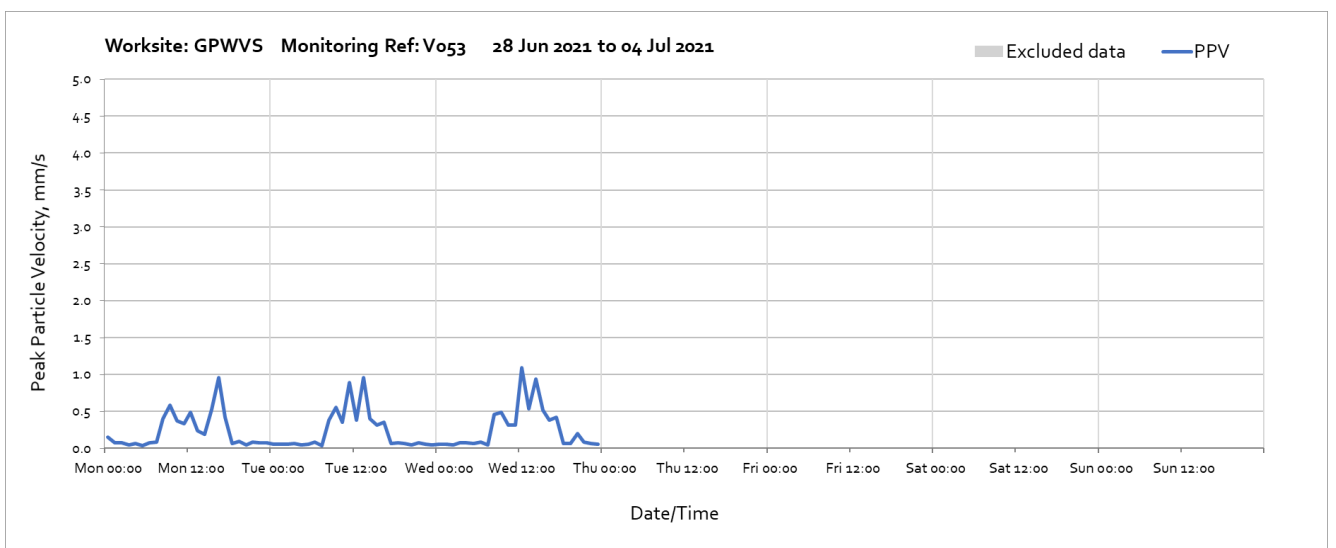
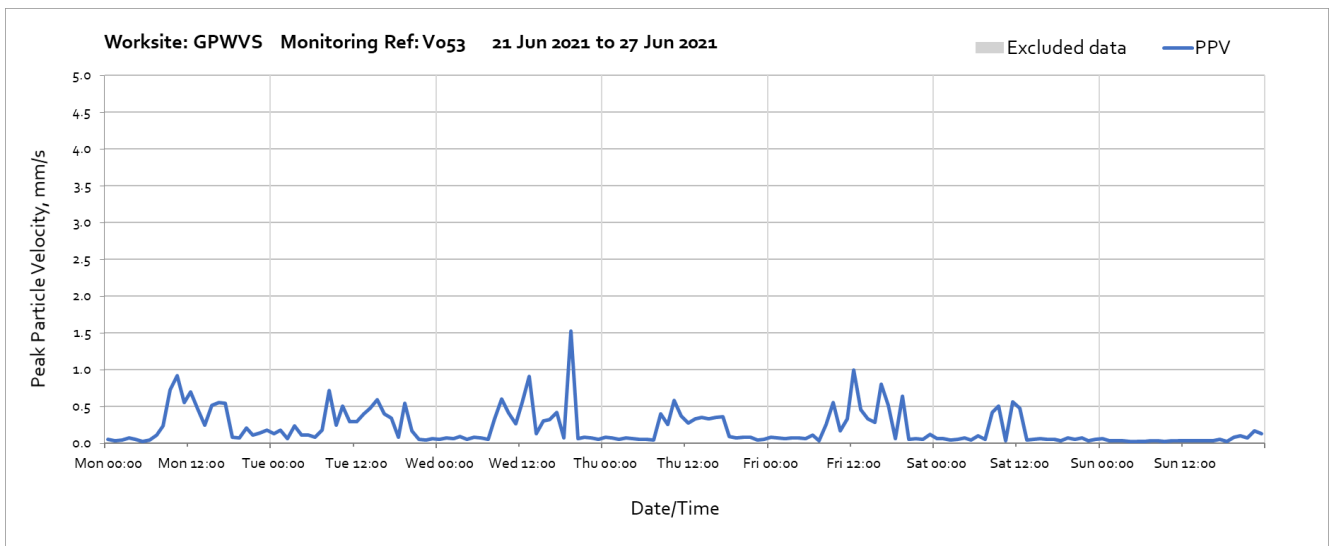


Note: High vibration levels measured at 19:00 on Tuesday 1st June 2021 were due to local disturbance at the monitor location.

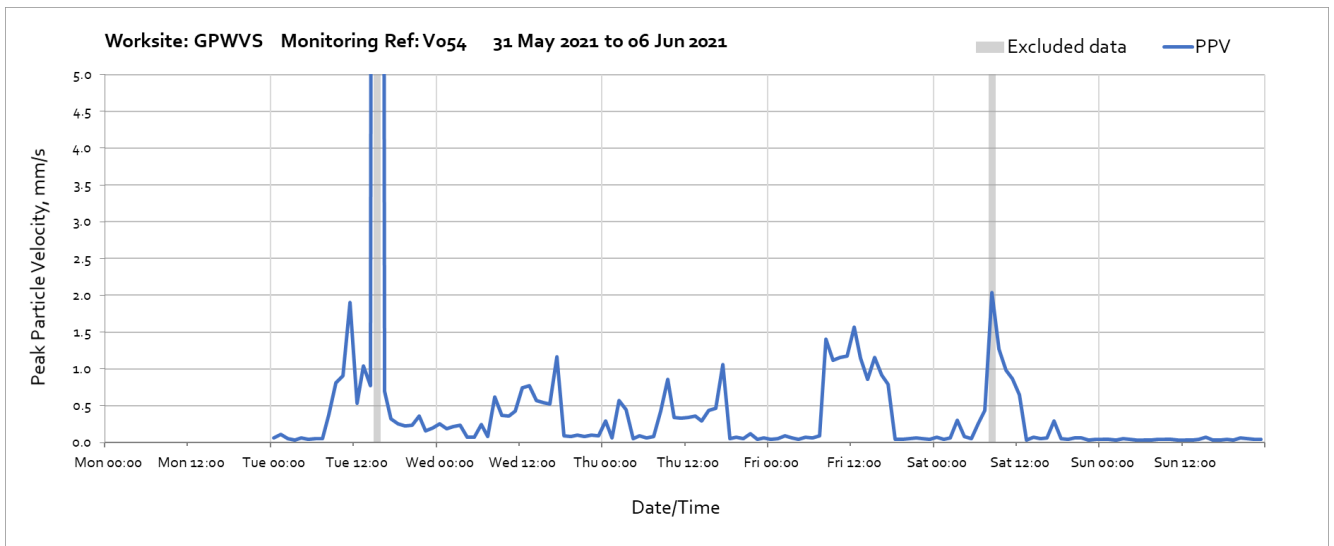




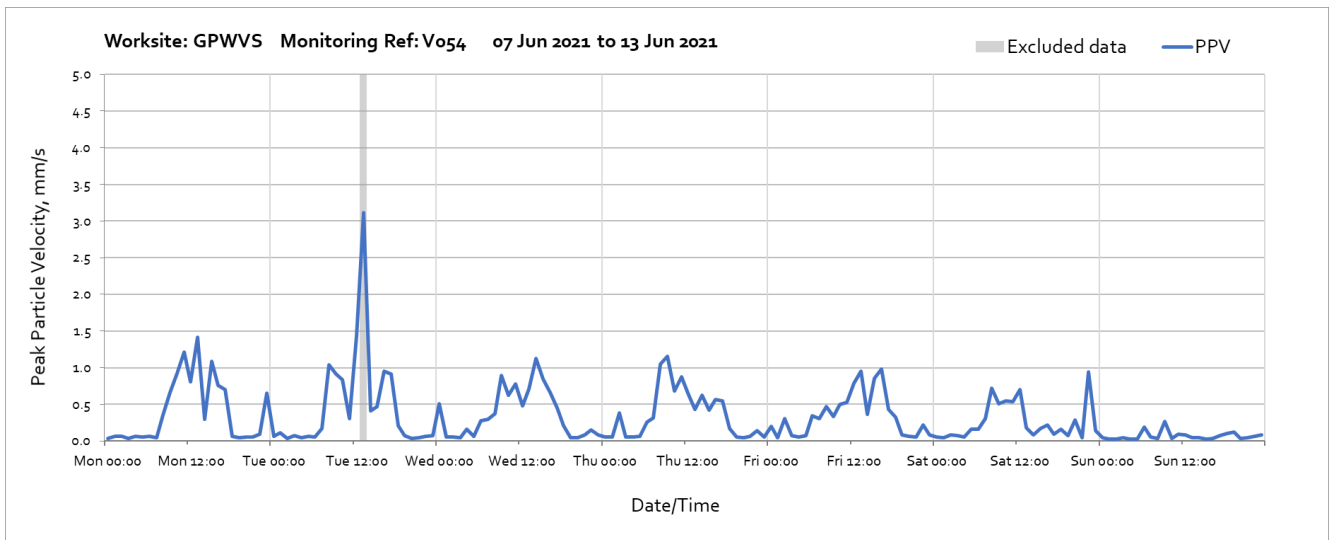
Note: High vibration levels measured at 13:00 on Tuesday 15th June 2021 were due to local disturbance at the monitor location.



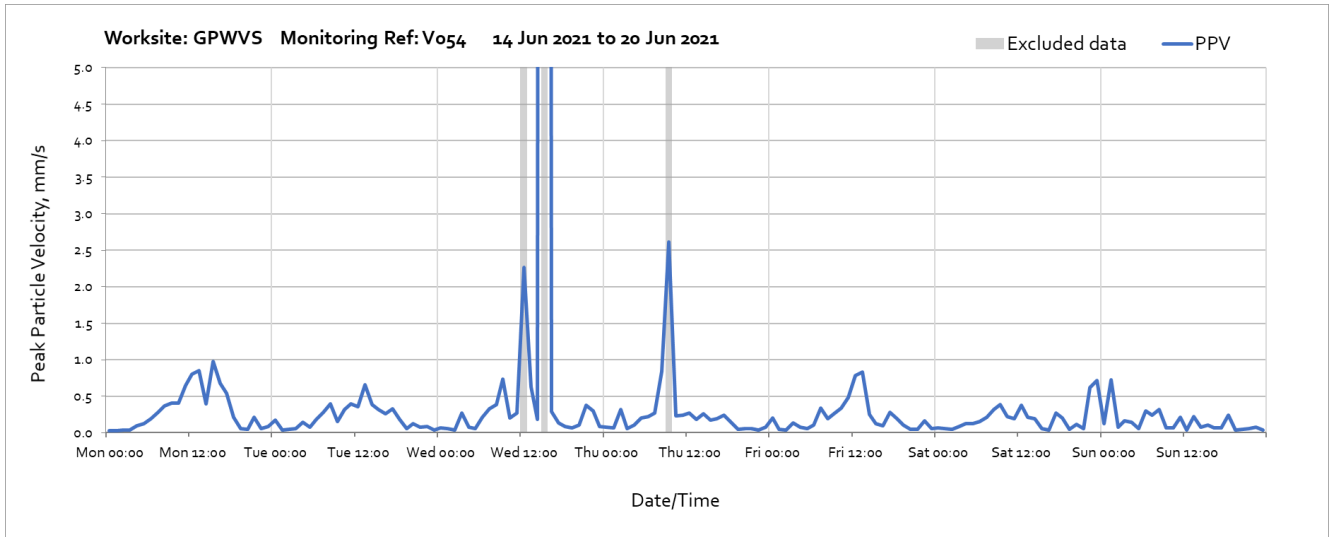
Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: V054



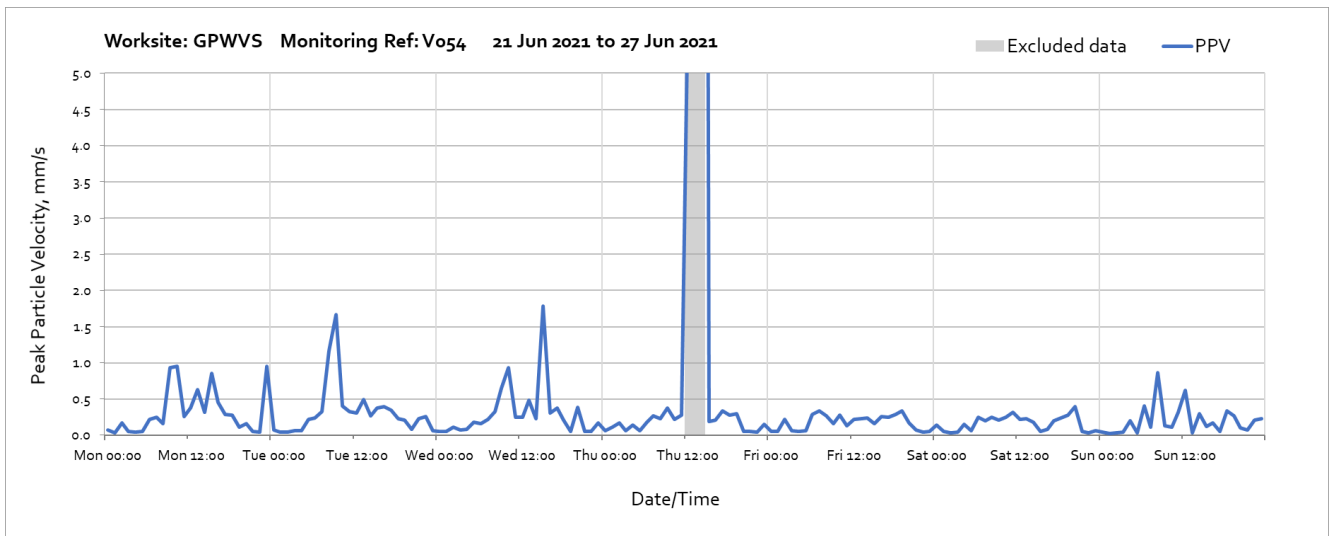
Note: High vibration levels measured at 15:00 on Tuesday 15th June 2021 and at 08:00 on Saturday 5th June 2021 were due to local disturbance at the monitor location.



Note: High vibration levels measured at 13:00 on Tuesday 8th June 2021 were due to local disturbance at the monitor location.



Note: High vibration levels measured between 12:00 and 15:00 on Wednesday 16th June 2021 and 09:00 on Thursday 17th June 2021 were due to local disturbance at the monitor location.



Note: High vibration levels measured between 12:00 and 14:00 on Thursday 24th June 2021 were due to local disturbance at the monitor location.