

## **Construction noise and vibration Monthly Report – October 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 October 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 construction of the site haul road, mesh and concrete pours, trimming and dug works, drainage works, piling works, conveyor works, excavation works for the access ramps, excavation of trenches for earthing and earthing installations, tarmac stripping works and ground levelling works were underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Willesden EuroTerminal worksite (ref. WET), where works continues fitting out of the Breadbin Building, excavation works, installation of channel drains, excavation works for the foundations of the conveyor bridge, blinding conveyor foundation and steel fixing for conveyor base were underway.
- Noise monitoring was undertaken in the vicinity of the Victoria Road Crossover Box worksite (worksite ref. VRCB), where:
  - diaphragm wall works, excavation works, de-sanding and concrete works, mixing of bentonite and rebar cage lifting and installation, shuttering works, steel fixing works, concrete pouring, groundworks, shutter installations, backfilling, power and water connection works and piling platform were underway.
  - At the Victoria Road Ancillary Shaft, segment concrete lining works, drilling works and drainage works, including excavation works and waterproofing works, welding and testing seams and installation of pipe works were underway.
- Noise monitoring was undertaken in the vicinity of the Flat Iron compound (worksite ref. FIC), where reinforced concrete works, drainage works and installation of lighting were underway.
- Noise and vibration monitoring were undertaken in proximity of the Old Oak Common depot worksite (ref. OOC), where construction of permanent accommodation building, vegetation clearance, internal soft strip works, construction of site haul road, drainage works, piling and diaphragm wall works, and conveyor foundation construction were underway.
- Noise monitoring was undertaken in proximity of the Mandeville Road Ventilation Shaft worksite (ref.: MRVS), where installation of steel sheet piles; excavation works, hoarding works were underway.

- Noise and vibration monitoring were undertaken in proximity of the Green Park Way Ventilation Shaft worksite (ref. GPWVS), where site management, including adjustment to site walkway and installation of additional signage, excavations and kerb installations, grouting works and construction of wells, concrete pouting, excavation for attenuation tank and preparation of base binding, temporary installation of staircases were underway.
- Noise monitoring was undertaken in proximity of the Westgate Ventilation Shaft (ref. WVS), where installation of the shaft collar, concrete pouring, vegetation clearance, installation of piling edge protections, construction of scaffold walkway, pre-cast concrete works, installation of concrete rings and excavation works were underway.

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

- School Road, Bethune Road, Chase Road, Victoria Road and Atlas Road as part of utility diversion works;
- Wormwood Scrubs, where Wormwood Scrubs, where piling works, construction and drainage 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>), were exceeded on fifteen (15) 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.

Seven (7) 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 1<sup>st</sup> to 31<sup>st</sup> October 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:
  - Construction of the site haul road, including shutters installation, mesh and concrete pouring, trimming for segment storage area and dug works for panel slab at wheel wash area;
  - Drainage works, including excavation works for attenuation tank, sand laying works, building and installing and backfilling attenuation tank;
  - Piling works, including pile cropping, steel fixing works and concrete pouring, striking shutters and blinding to capping beams for the ramp and box;
  - Conveyor works, including steel fixing and formwork, bolts setting, blinding and concrete pouring;
  - Completion of concrete pours;

- Main power connection works, including excavation of tranches for earthing and earthing installations; and
- Tarmac stripping works and ground levelling works.
- Willesden EuroTerminal worksite, ref. WET (see plan 5 in Appendix A), where work activities included:
  - Continuation of the fitting out works of Breadbin Building;
  - Excavation works for the tunnel segment storage slab and installation of channel drains; and
  - Works to the conveyor, including excavation works for the foundations of for the conveyor bridge, blinding conveyor foundation and steel fixing works for the conveyor base.
- Victoria Road Crossover Box worksite, ref. VRCB (see plan 6 in Appendix A), where work activities included:
  - Diaphragm wall works continues with excavation, de-sanding and concrete works;
  - Mixing of bentonite and rebar cage lifting and installation;
  - Works to the welfare facilities, including excavations, shuttering, steel fixing and concrete pouring;
  - Guide wall works, including groundworks, steel fixing, installation of shitters, concrete works, construction of wall bases and wall upstands and backfilling works;
  - Power and water connection works;
  - Concrete pouring;
  - Piling platform works.
  - At the Victoria Road Ancillary Shaft activities included segment concrete lining works, drilling works and drainage works, including bulk excavation, excavation of drainage chamber pit, installation of chamber base and ring, laying of geotextile and filter material, waterproofing works, welding and testing seams and Installation of the cast iron pipes.
- Flat Iron compound, worksite ref. FIC (see plan 6 in Appendix A), where work activities included:
  - Reinforced concrete works for conveyors;
  - Drainage works;
  - Installation of lighting;

- 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:
  - Construction of permanent accommodation building;
  - Vegetation clearance;
  - Internal soft fit works;
  - Construction of temporary site haul roads;
  - Drainage installation;
  - Piling and diaphragm wall works; and
  - Conveyor foundation construction works.
- Mandeville Road Ventilation Shaft worksite, reference MRVS (see plan 1 in Appendix A), where work activities included:
  - Installation of steel sheet piles;
  - Excavation works; and
  - Hoarding works.
- Green Park Way Ventilation Shaft worksite, reference GPWVS (see plan 2 in Appendix A), where work activities included:
  - Site management, including adjustment to site walkway and installation of additional signage;
  - Excavations and kerb installations;
  - Grouting works and construction of wells, including drilling works;
  - Slab pouring and concrete pouring works;
  - Continuation of excavation for attenuation tank and preparing for base binding;
  - Installation of temporary staircases along attenuation slab and scaffolding edge protection; and
- Westgate Ventilation Shaft worksite, reference WVS (see plan 3 in Appendix A), where work activities included:
  - Installation of the shaft collar, including concrete pouring and installation of hydraulic jacks and segments;
  - Vegetation clearance;
  - Installation of piling edge protections along walkway;



- Construction of scaffold walkway;
- Pre-cast concrete works and installation of concrete rings; and
- Material excavation works.

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

- School Road, Bethune Road, Chase Road, Victoria Road and Atlas Road as part of utility diversion works; and
- Wormwood Scrubs, where piling works, construction and drainage 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 Nineteen (19) noise and nine (9) vibration monitoring installations were active in October 2021 in the LBE area. Table 2 summarises the position of noise and vibration monitoring installations within the LBE area in October 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
VRCB	N031	School Road, outside Acton Business Centre
	N050	Acton Square, outside North Acton Station

Worksite Reference	Measurement Reference	Address
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-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	62.5 (64.5)	65.1 (76.1)	61.4 (67.7)	60.0 (63.7)	57.1 (66.2)	59.5 (60.8)	61.8 (62.5)	66.1 (76.8)	60.9 (64.1)	56.2 (59.6)	60.0 (65.3)	57.0 (62.5)
	N033	Outside The Collective, Atlas Road/Victoria Road	Free-field	67.4 (69.4)	69.4 (70.6)	65.2 (67.5)	64.4 (74.8)	60.9 (68.2)	63.7 (64.2)	65.3 (65.7)	64.0 (64.4)	64.4 (67.5)	59.9 (68.5)	64.1 (70.7)	60.8 (66.4)
	N060	Atlas Road next to Bashey Road	Façade	52.7 (58.5)	65.7 (73.7)	51.2 (57.8)	53.7 (61.0)	52.9 (62.5)	50.4 (51.3)	57.3 (70.2)	51.5 (58.1)	50.9 (59.3)	47.6 (51.4)	50.9 (64.2)	52.0 (59.6)
WET	N034	Stephenson Street (north)	Free-field	52.5 (54.7)	57.8 (70.3)	54.0 (62.6)	52.3 (57.1)	48.8 (57.8)	49.8 (50.6)	53.6 (55.3)	52.6 (53.8)	51.3 (59.0)	46.9 (52.7)	52.0 (61.7)	48.5 (54.5)
	N035	Stephenson Street (south)	Free-field	54.6 (59.6)	61.5 (68.5)	52.2 (57.7)	50.1 (55.7)	48.2 (62.2)	52.5 (57.9)	58.4 (66.0)	51.2 (54.2)	51.6 (60.3)	46.7 (51.8)	50.7 (61.0)	47.9 (54.4)
	N041	Junction of Stephenson Street/Goodhall Street	Free-field	54.1 (57.3)	58.5 (61.1)	55.2 (62.0)	54.8 (64.4)	50.0 (58.0)	51.5 (52.1)	55.0 (55.6)	54.7 (55.8)	53.9 (58.4)	49.1 (53.8)	53.4 (65.9)	50.0 (59.0)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
VRCB	N031	School Road, outside Acton Business Centre	Free-field	59.3 (62.5)	63.5 (64.7)	60.9 (63.7)	58.2 (62.1)	54.7 (60.8)	55.9 (57.6)	60.8 (62.6)	59.5 (60.6)	58.1 (62.6)	51.4 (59.9)	57.3 (61.7)	52.3 (58.9)
	N050	Acton Square, outside North Acton Station	Free-field	64.1 (66.1)	64.5 (66.3)	63.3 (66.9)	62.2 (65.1)	59.3 (72.7)	63.2 (64.6)	63.9 (65.0)	62.3 (63.1)	63.4 (68.1)	58.6 (63.8)	61.8 (65.4)	58.7 (64.9)
FIC	N029	Braitrim House, Victoria Road	Free-field	53.1 (62.1)	63.1 (68.2)	51.5 (60.1)	54.9 (62.5)	53.9 (66.5)	49.1 (51.2)	58.8 (61.0)	52.8 (56.1)	52.3 (65.8)	47.8 (57.3)	51.6 (65.1)	51.8 (61.1)
	N042	Bodens car park	Free-field	57.3 (63.7)	61.5 (63.2)	55.7 (56.9)	55.1 (59.0)	53.9 (58.8)	54.4 (55.4)	58.4 (59.5)	57.2 (62.5)	54.5 (57.1)	52.4 (54.7)	54.1 (57.8)	53.1 (55.2)
	N049	Flat Iron compound	Free-field	54.9 (56.8)	64.0 (79.7)	54.3 (58.2)	55.4 (59.4)	56.0 (65.6)	52.3 (54.6)	57.7 (61.3)	55.7 (58.0)	53.0 (60.6)	49.8 (55.3)	52.5 (61.6)	53.3 (59.8)
OOC	OOC-N01	Old Oak Common Lane	Free-field	64.8 (66.6)	70.6 (72.6)	62.6 (66.0)	60.2 (69.8)	57.0 (63.6)	64.0 (65.3)	64.9 (69.2)	62.6 (63.9)	60.4 (64.9)	57.8 (60.7)	59.3 (62.7)	56.9 (61.9)
	OOC-N02	Old Oak Common Lane, Hilltop Works	Free-field	68.4 (71.7)	70.9 (72.8)	67.9 (69.4)	66.1 (70.7)	61.8 (68.2)	65.5 (66.0)	67.9 (69.8)	67.4 (68.6)	67.3 (72.6)	61.3 (65.0)	65.4 (68.8)	61.4 (65.3)
MRVS	N040	Badminton Close	Free-field	54.9 (58.6)	58.7 (61.4)	54.3 (57.4)	54.2 (57.0)	51.9 (60.5)	52.6 (53.8)	54.0 (56.6)	52.8 (55.5)	54.5 (59.2)	52.0 (57.1)	55.1 (62.1)	52.2 (56.7)
	N058	Mandeville Road	Free-field	56.1 (58.0)	63.0 (68.5)	54.9 (57.3)	55.0 (57.4)	51.9 (60.8)	53.6 (54.3)	56.5 (63.4)	54.1 (56.5)	56.8 (61.6)	53.7 (61.8)	55.6 (68.1)	51.8 (58.2)

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	61.2 (62.8)	65.9 (69.4)	60.0 (62.2)	60.5 (62.6)	57.2 (62.0)	58.8 (60.1)	67.3 (71.7)	60.1 (61.5)	60.6 (65.3)	59.0 (64.3)	60.5 (67.5)	56.2 (60.1)
GPWVS	N059	Green Park Way Ventilation Shaft	Free-field	58.4 (63.1)	64.1 (66.8)	56.6 (64.0)	54.3 (62.5)	52.3 (59.5)	53.7 (60.5)	59.7 (64.3)	55.1 (63.5)	56.8 (73.3)	50.1 (55.3)	55.1 (64.9)	51.9 (56.5)
	N064	Green Park Way Ventilation Shaft	Façade	58.0 (60.7)	63.3 (66.8)	56.7 (58.9)	56.0 (66.1)	52.4 (59.0)	54.9 (56.7)	56.7 (59.6)	55.5 (57.1)	54.4 (58.0)	52.3 (59.7)	56.3 (63.0)	52.8 (58.9)
WVS	N062	Westgate Ventilation Shaft	Free-field	62.1 (67.7)	67.5 (73.3)	58.7 (61.7)	58.7 (65.9)	56.7 (65.5)	57.7 (59.9)	63.7 (74.2)	57.5 (59.6)	57.7 (60.9)	55.4 (61.2)	59.1 (63.4)	56.4 (61.0)

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

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

Worksite Reference	Measurement Reference	Monitor Address	Highest PPV measured in any axis, mm/s
WET	V052	Stephenson Street (north)	2.82 (Z-axis)
	V057	37, Stephenson Street	0.99 (Z-axis)
OOC	OOC-V01	25 Wells House Road	1.93 (Y-axis)
	OOC-V02	Kildun Court, Old Oak Common Lane	2.36 (Z-axis)
	OOC-V03	Wells House Road Alleyway	1.82 (Y-axis)
GPWVS	V053	Green Park Way, Greenford	0.94 (Z-axis)
	V054	Green Park Way Ventilation Shaft	1.59 (Z-axis)
MRVS	V055*	Mandeville Road	8.77 (Y-axis)
	V056	Mandeville Road	4.45 (Z-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)	Night	22:00-07:00	1
	N041	Junction of Stephenson Street / Goodhall Street	Night	22:00-07:00	2
VRCB	N031	School Road, outside Acton Business Centre	All days	All periods	Not applicable*
	N050	Acton Square, outside North Acton Station	All days	All periods	No exceedance
FIC	N029	Braitrim House, Victoria Road	All days	All periods	No exceedance
	N042	Bodens Car Park	All days	All periods	No exceedance
	N049	Flat Iron compound	Weekday	0800 -1800	1
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



Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
MRVS	N040	Badminton Close	Night	22:00-07:00	1
	N058	Mandeville Road	Night	22:00-07:00	5
	N063	Mandeville Road	Night	22:00-07:00	5
GPWVS	N059	Green Park Way Ventilation Shaft	All days	All periods	Not applicable*
	N064	Green Park Way Ventilation Shaft	All days	All periods	Not applicable*
WVS	N062	Westgate Ventilation Shaft	All days	All periods	Not applicable*

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

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

Table 6: Summary of Total Exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
WET	N035	Stephenson Street (south)	1
	N041	Junction of Stephenson Street / Goodhall Street	2
FIC	N049	Flat Iron compound	1
MRVS	N040	Badminton Close	1
	N058	Mandeville Road	5
	N063	Mandeville Road	5

2.2.6 15x no. exceedances of the SOAEL were recorded due to HS2 construction works during October 2021. The exceedance occurred at:

- Monitoring locations N035 during one night time period and N041 during two night time periods due to loading and departure of spoil train from WET worksite;
- Monitoring location N049 during one daytime period due to conveyor works;
- Monitoring locations N040 during one night time period and N058 and N063 during five night time periods due to night possession 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

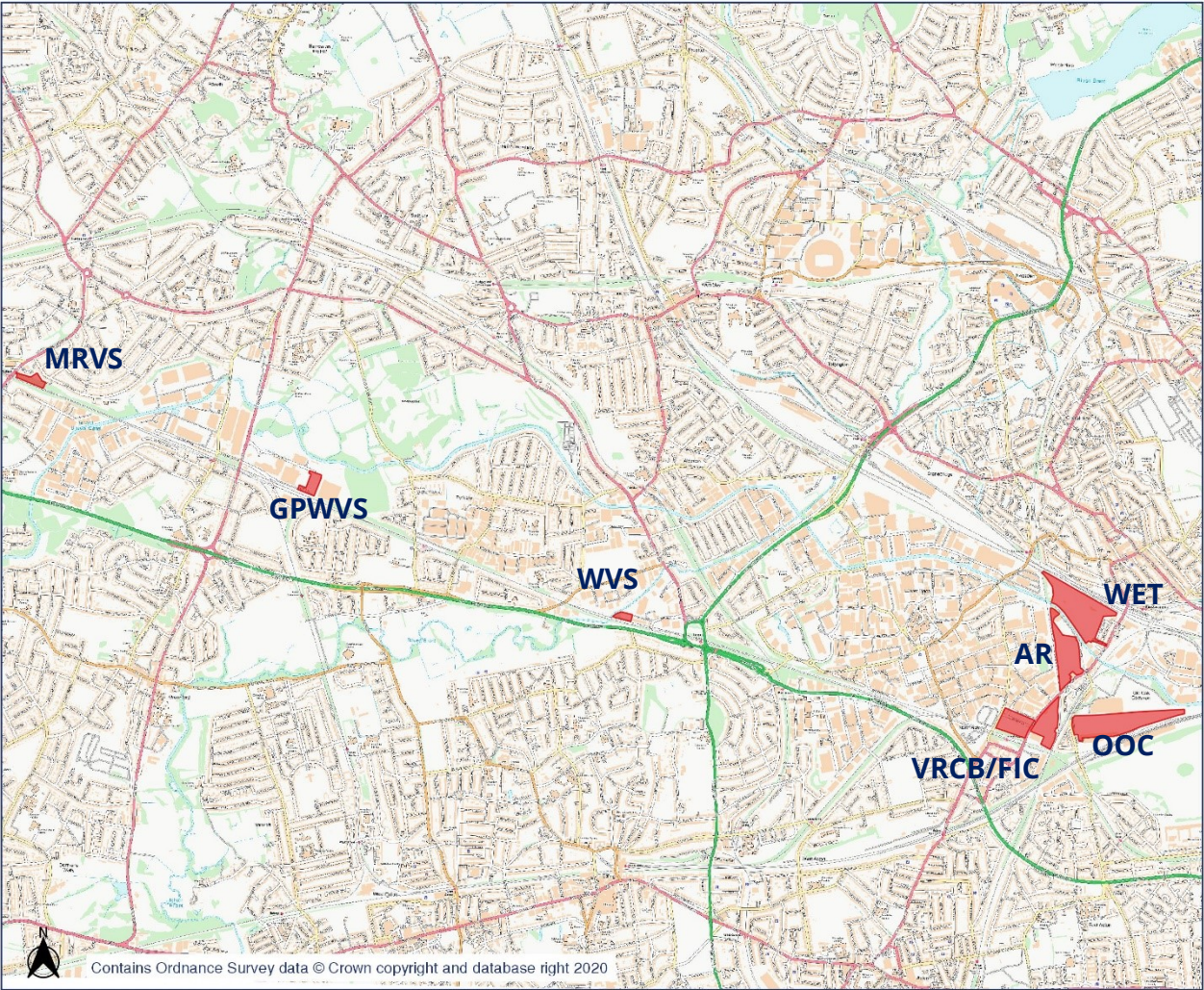
2.4.1 Table 8 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 8: Summary of Complaints

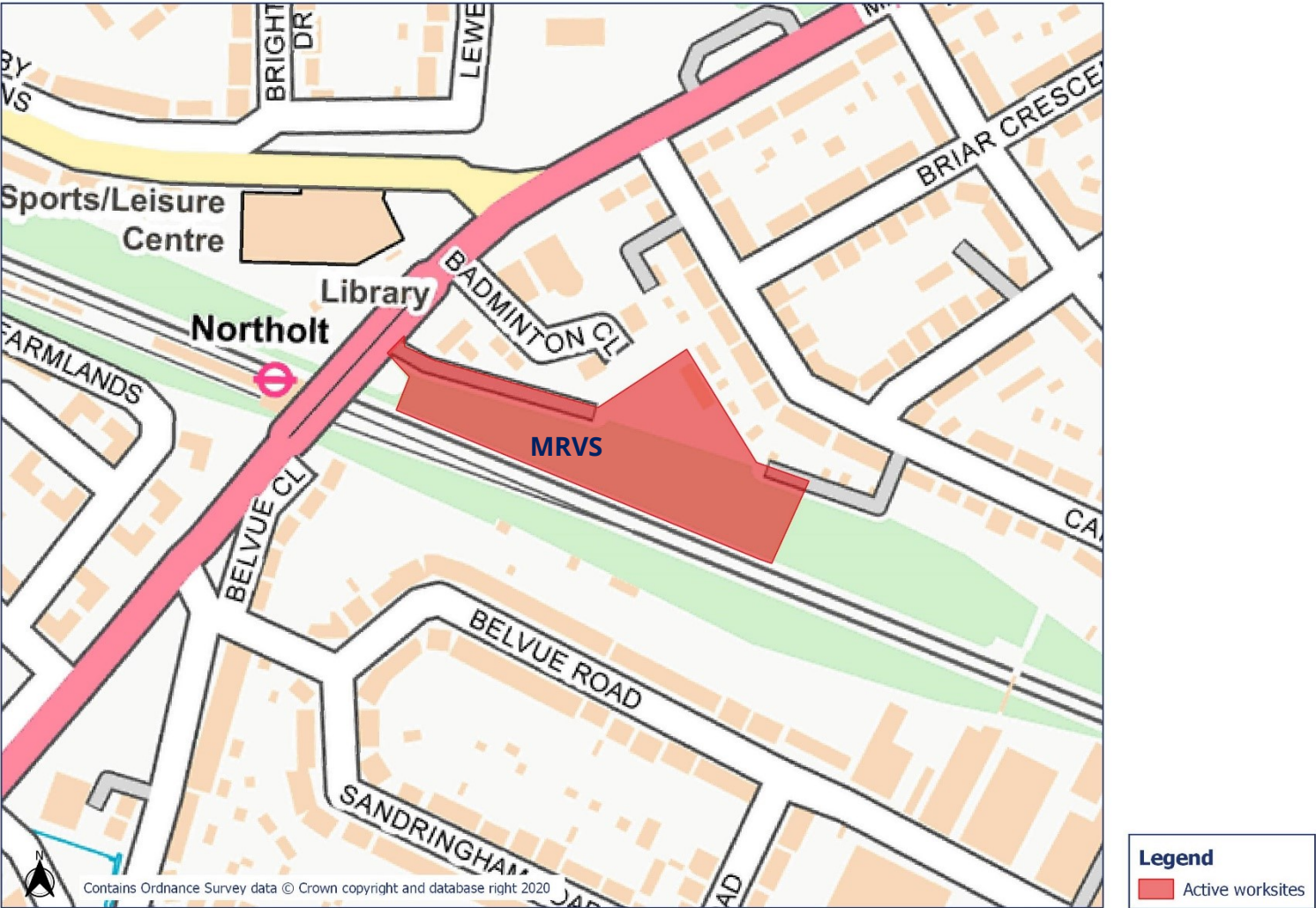
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-42647-C	OOO	Complaint due to multiple incidences of house shaking through the day.	No vibration levels have been triggered during the time of the complaint.	Vibration monitoring is undertaken to ensure any instances and triggers are recorded. The complainant has been contacted and information provided.
HS2-21-42650-C HS2-21-42651-C HS2-21-42652-C	WET	Complaint due to noise disturbance due to heavy machinery movements during night-time.	Investigations shown that at the time of the complaint contractor advises noise likely due to excavator bucket being cleaned out while carriages are loaded with materials.	The excavator drivers have been advised not to clear spoil from buckets during the night shift, but to leave until the core hours using approved methods. A clam shell grab will be delivered to replace the bucket and this will help to minimise the noise. The complainant has been contacted and information provided.
HS2-21-42672-C	MRVS	Complaint due to noise disturbance and distress from overnight works at Mandeville Road.	Investigation shown that advised works have been undertaken during railway closure at night.	The complainant has been contacted and reassured that in future such works will be included on the HS2 website.

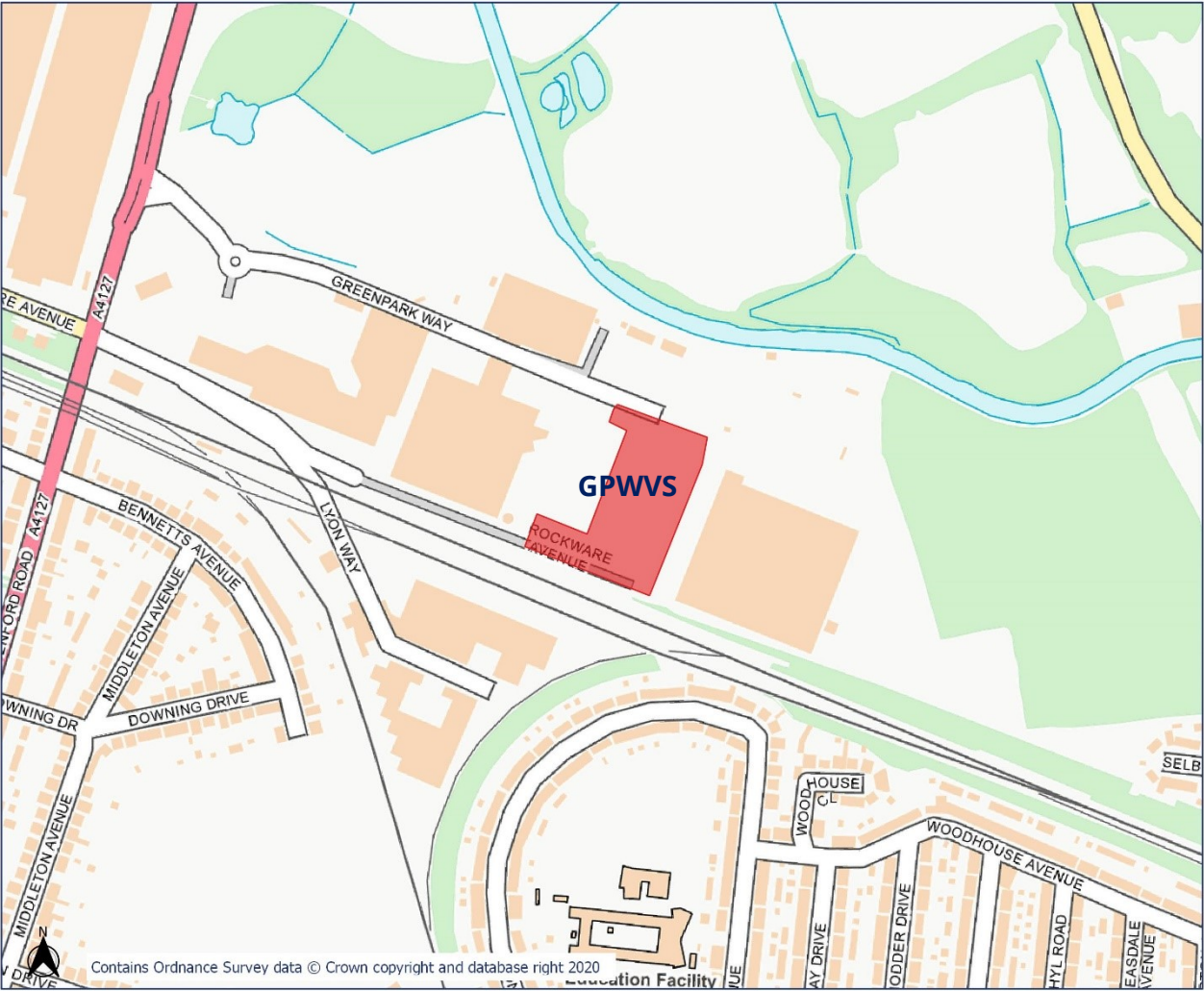
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-42726-C HS2-21-42778-C	OOC	Complaint due to noise disturbance from shouting on site prior to 7am and during the day due to HGV vehicles using their horns.	Investigations shown than abnormal loads have been arrived on site prior to 7am.	A reminder has been sent to all the contractors for disciplinary action to be taken if any contravention occurs. The complainant has been contacted and information provided.

# Appendix A Site Locations

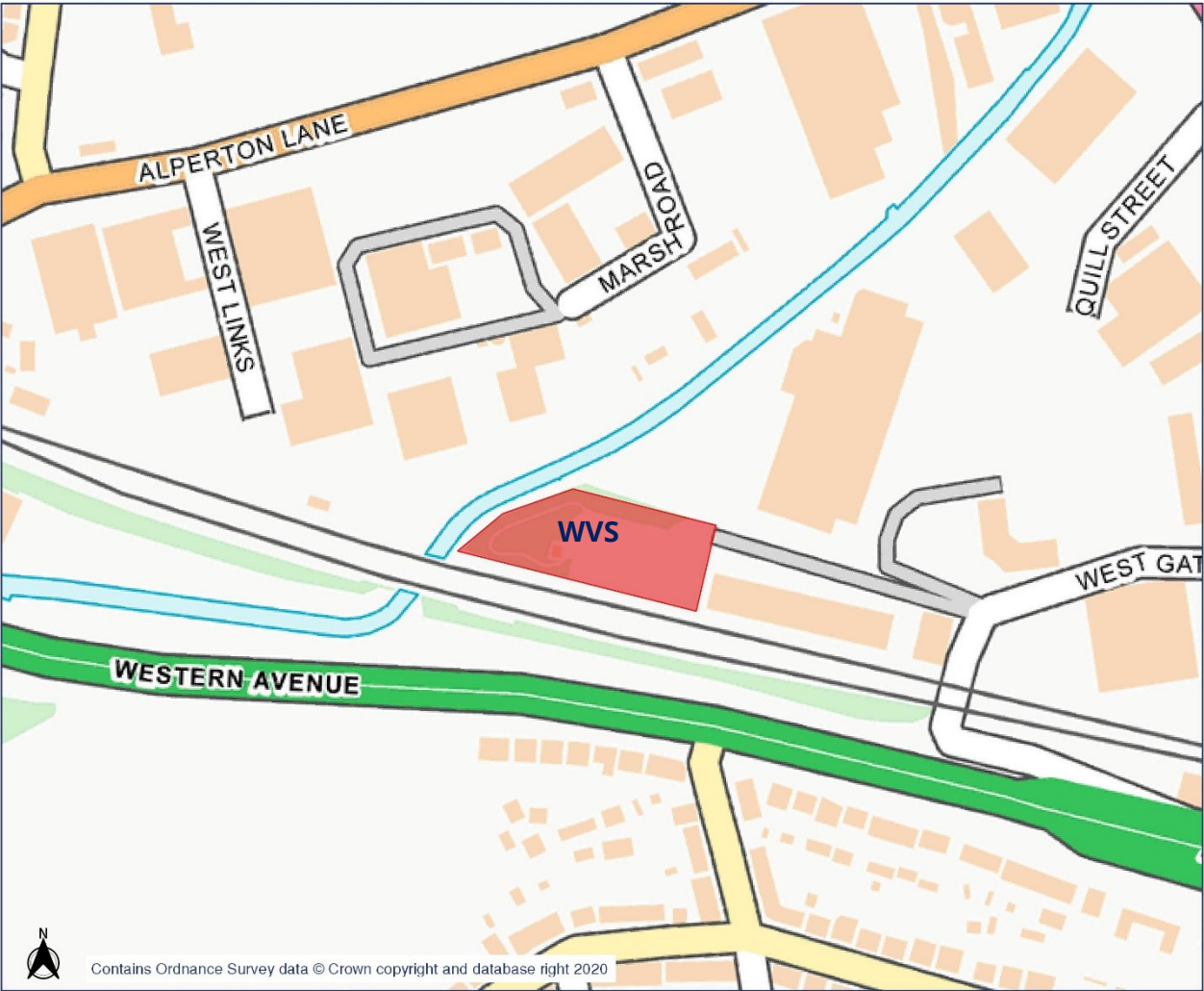


**Legend**  
Active worksites

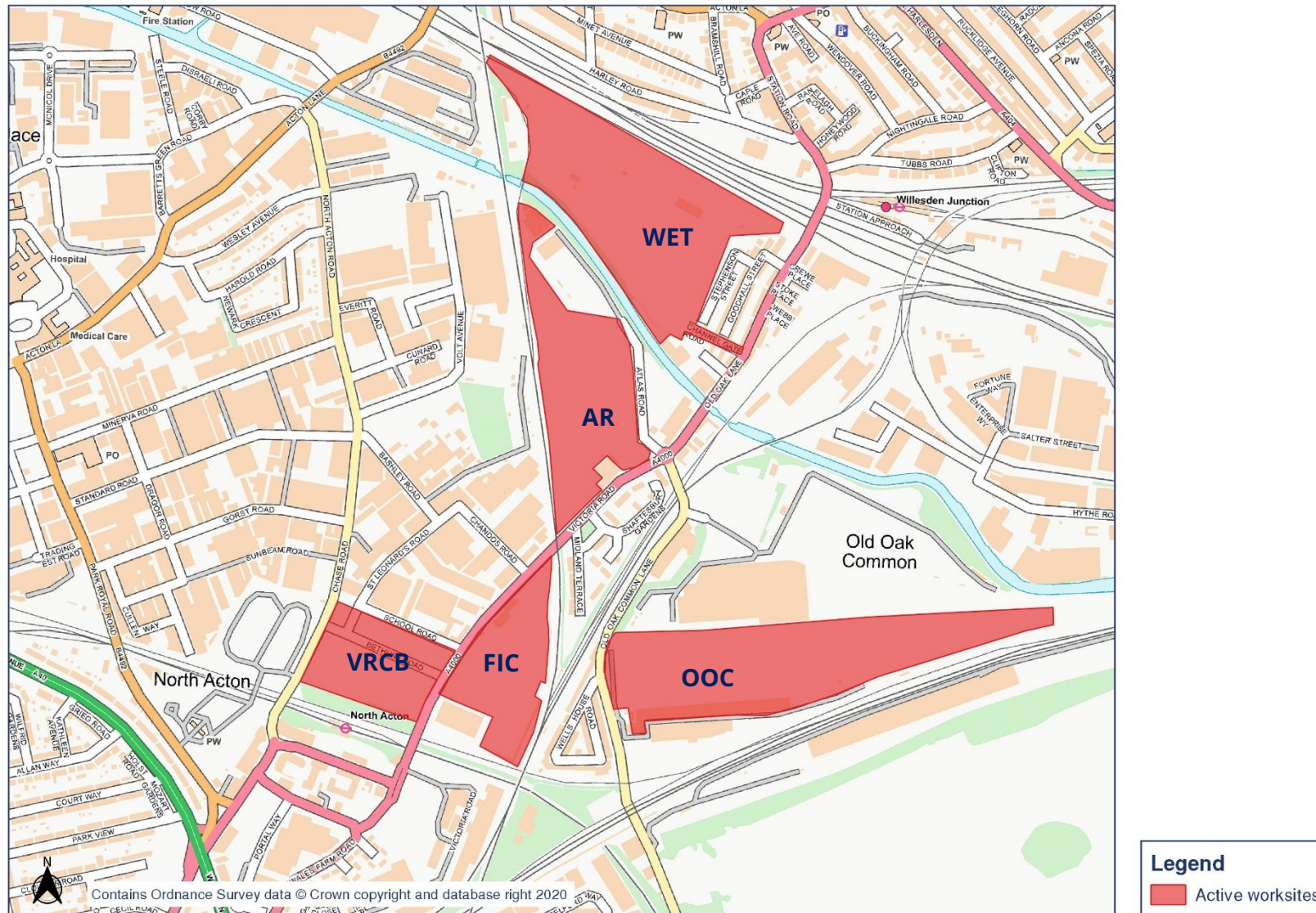


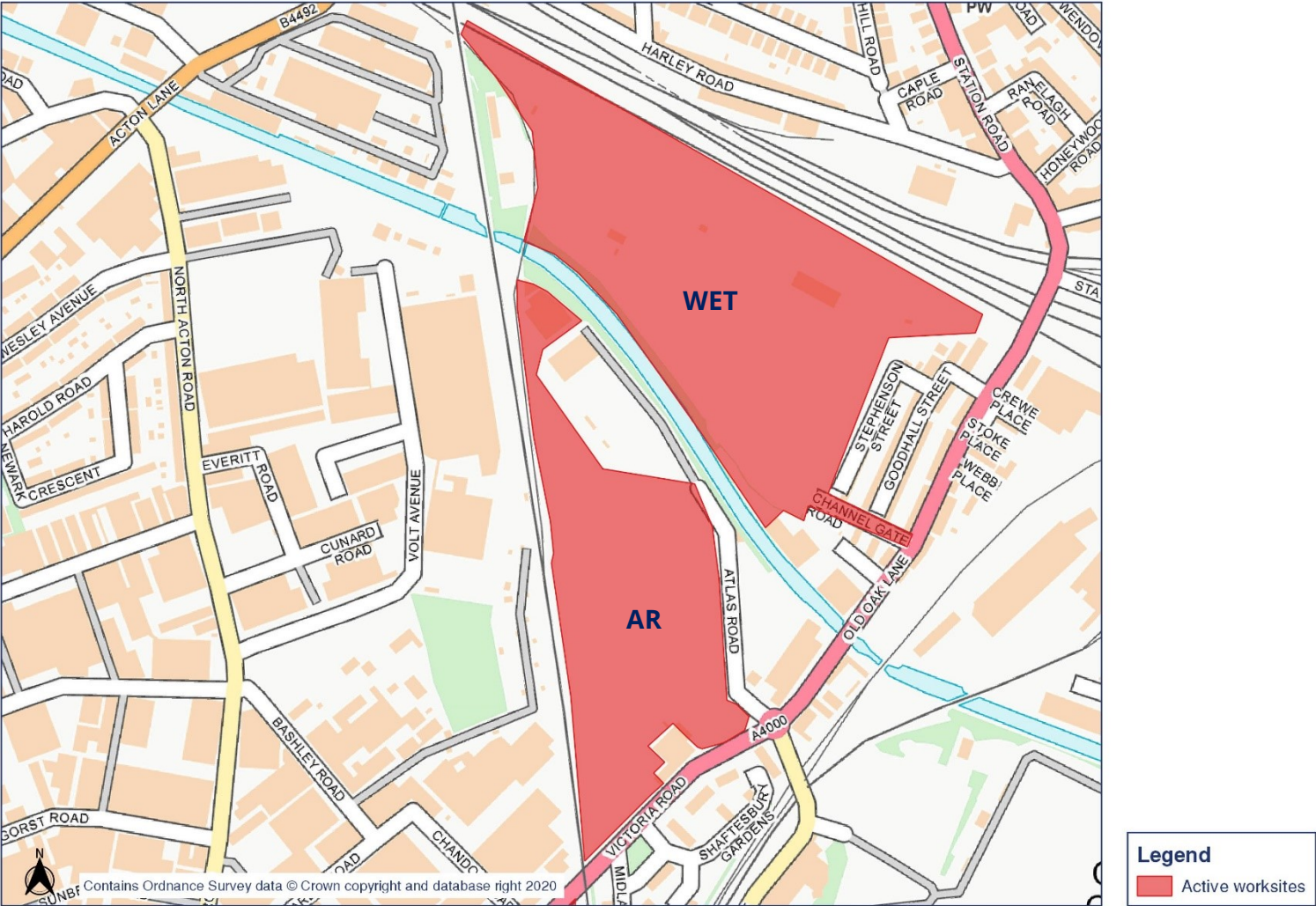


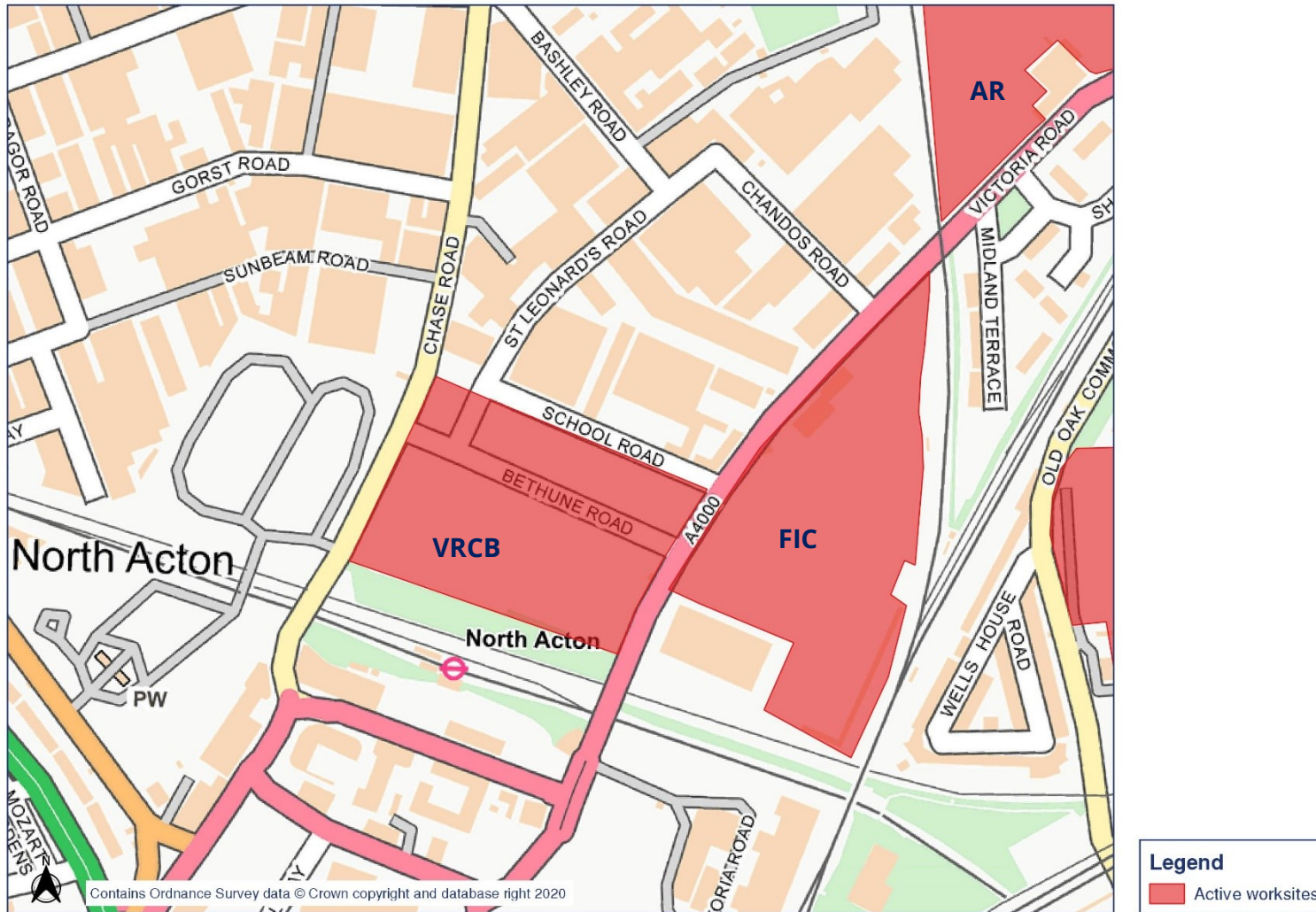
**Legend**  
Active worksites







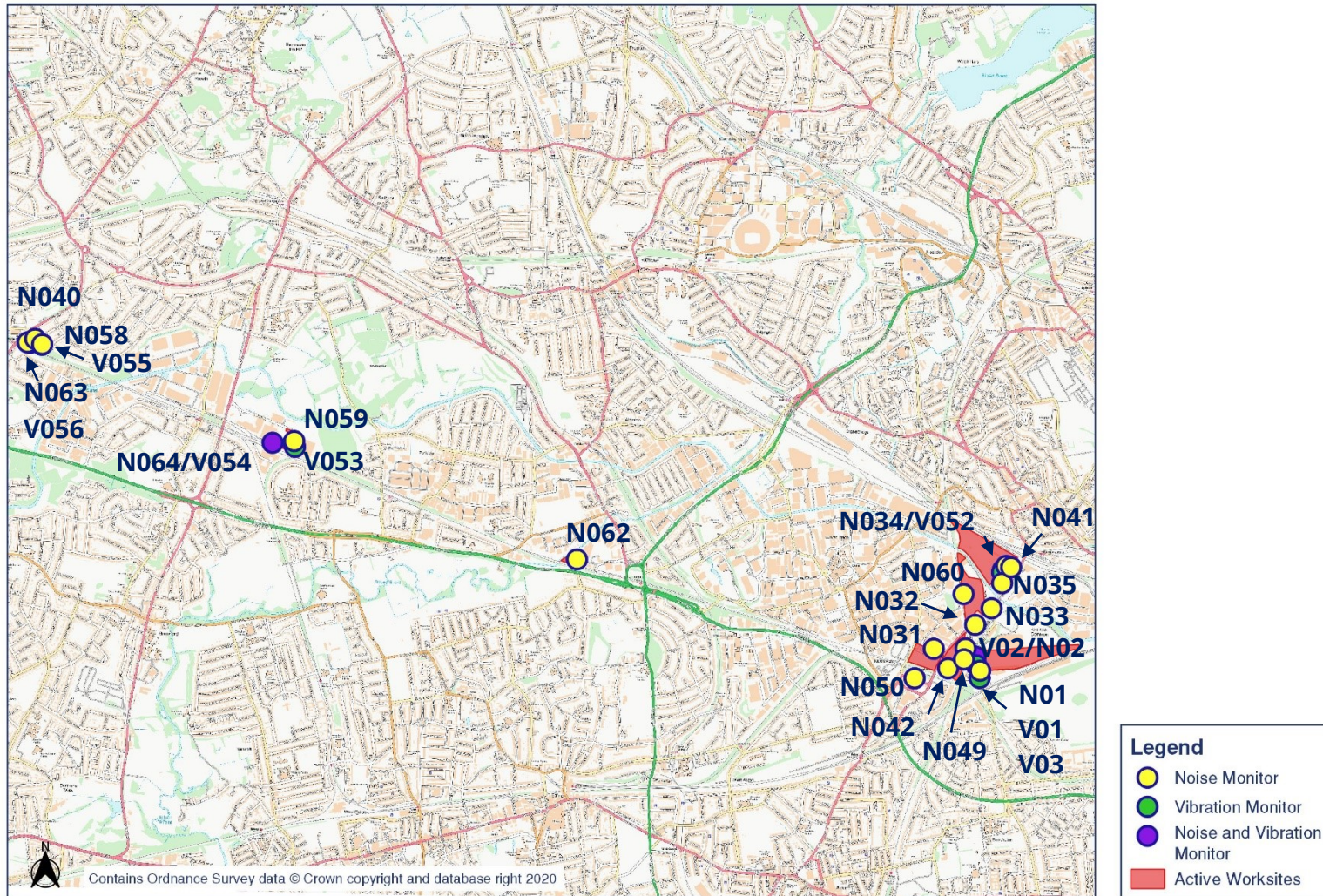


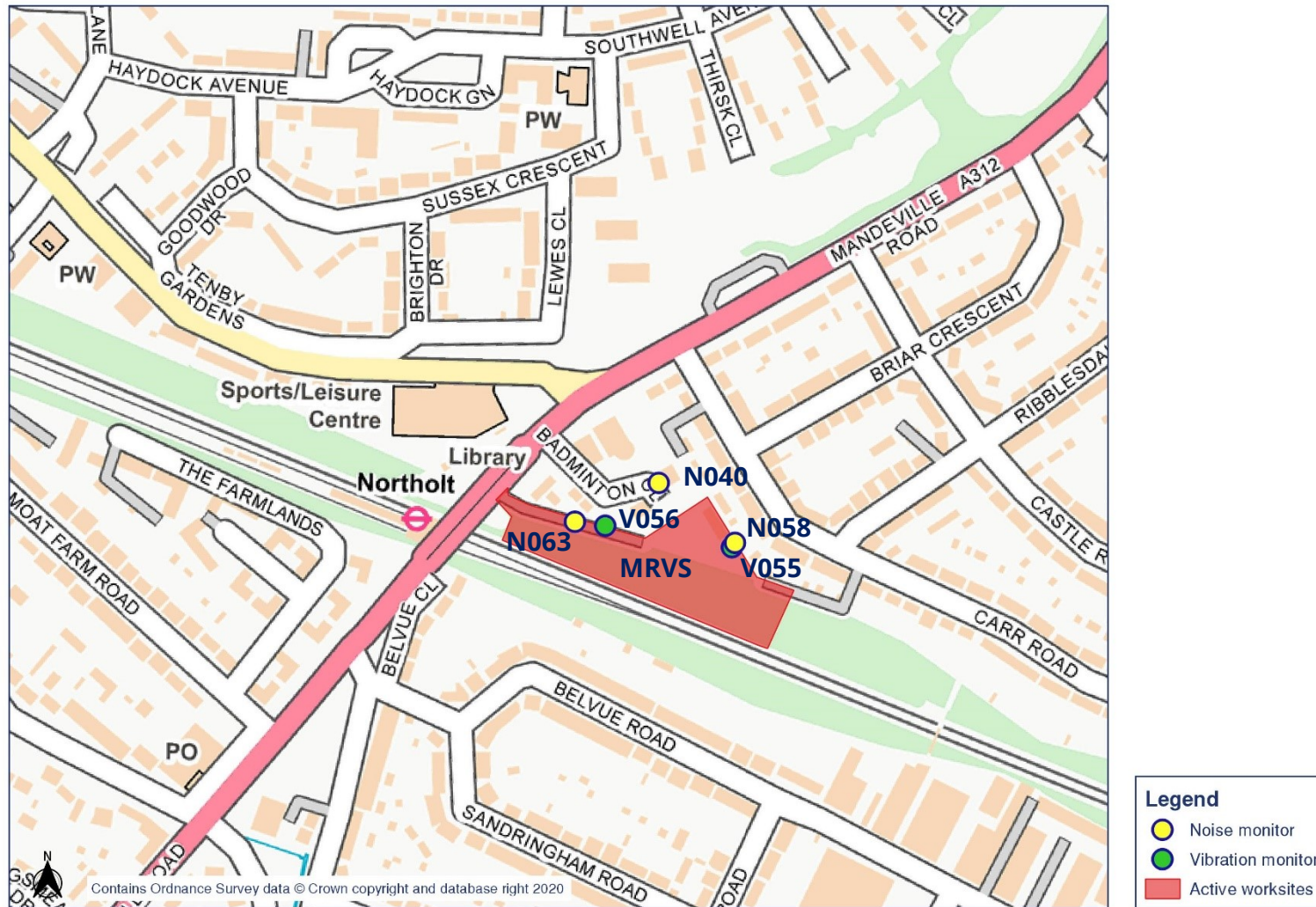


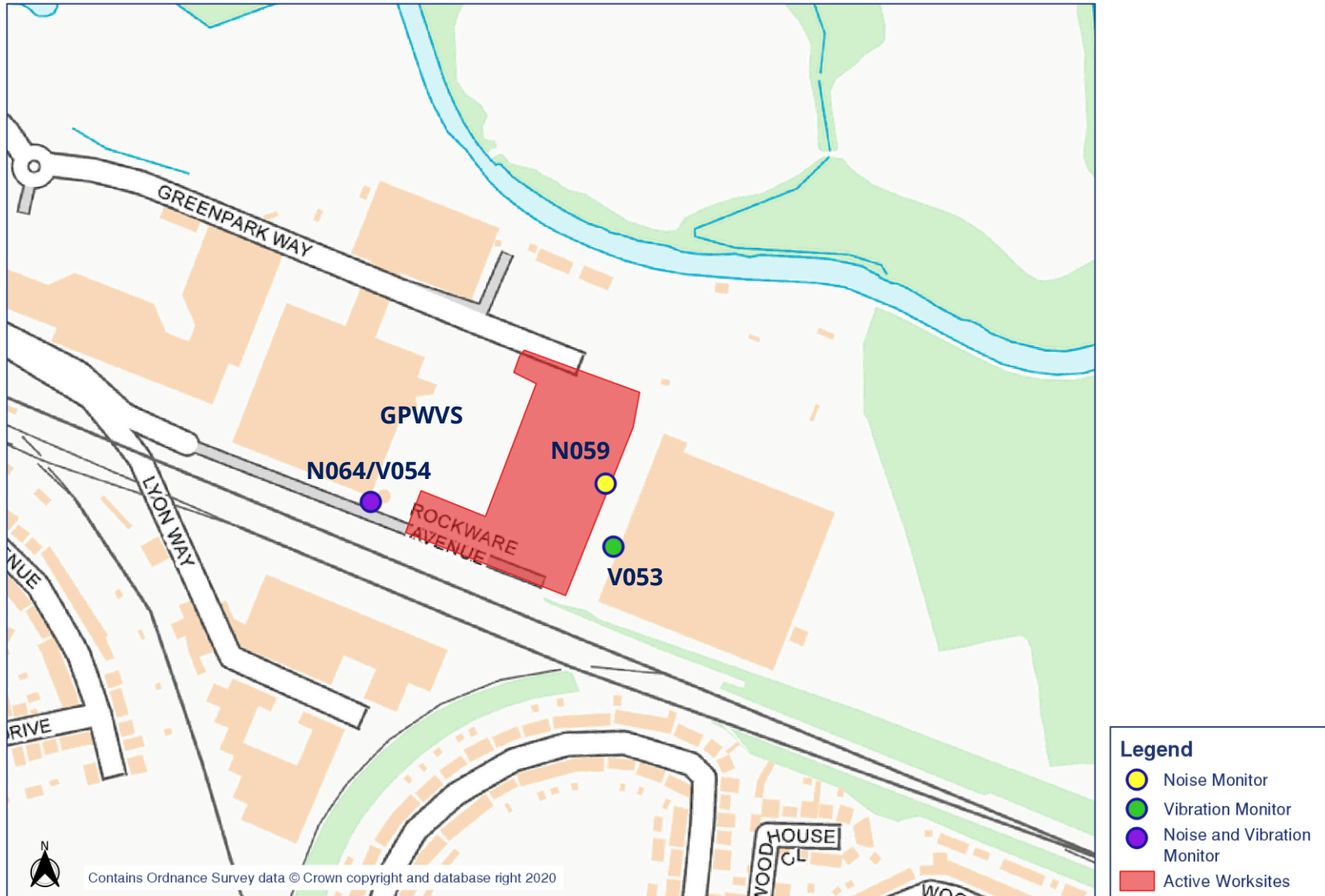


# Appendix B Monitoring Locations

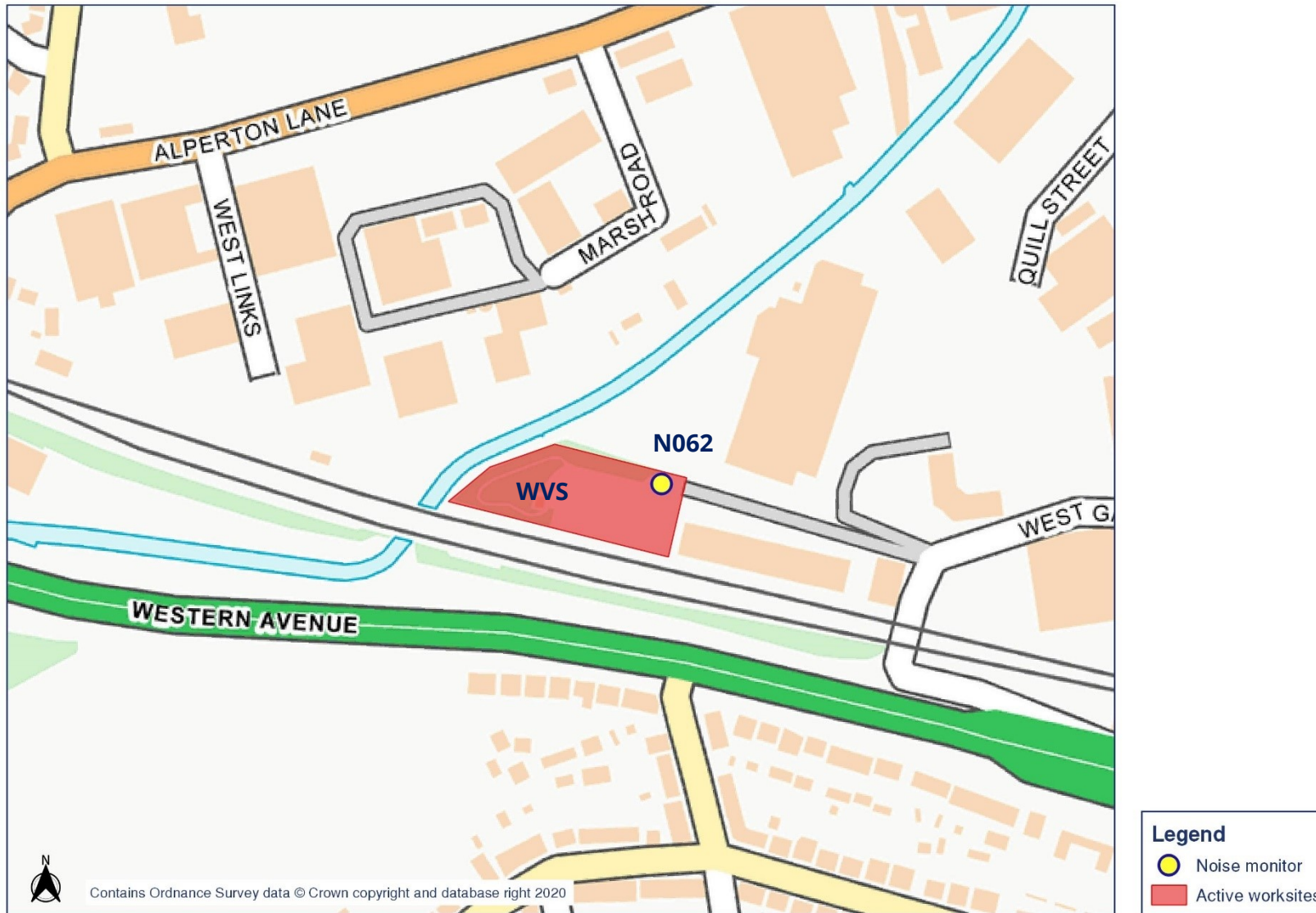
# HS2 Noise and vibration monitoring plan - Overview

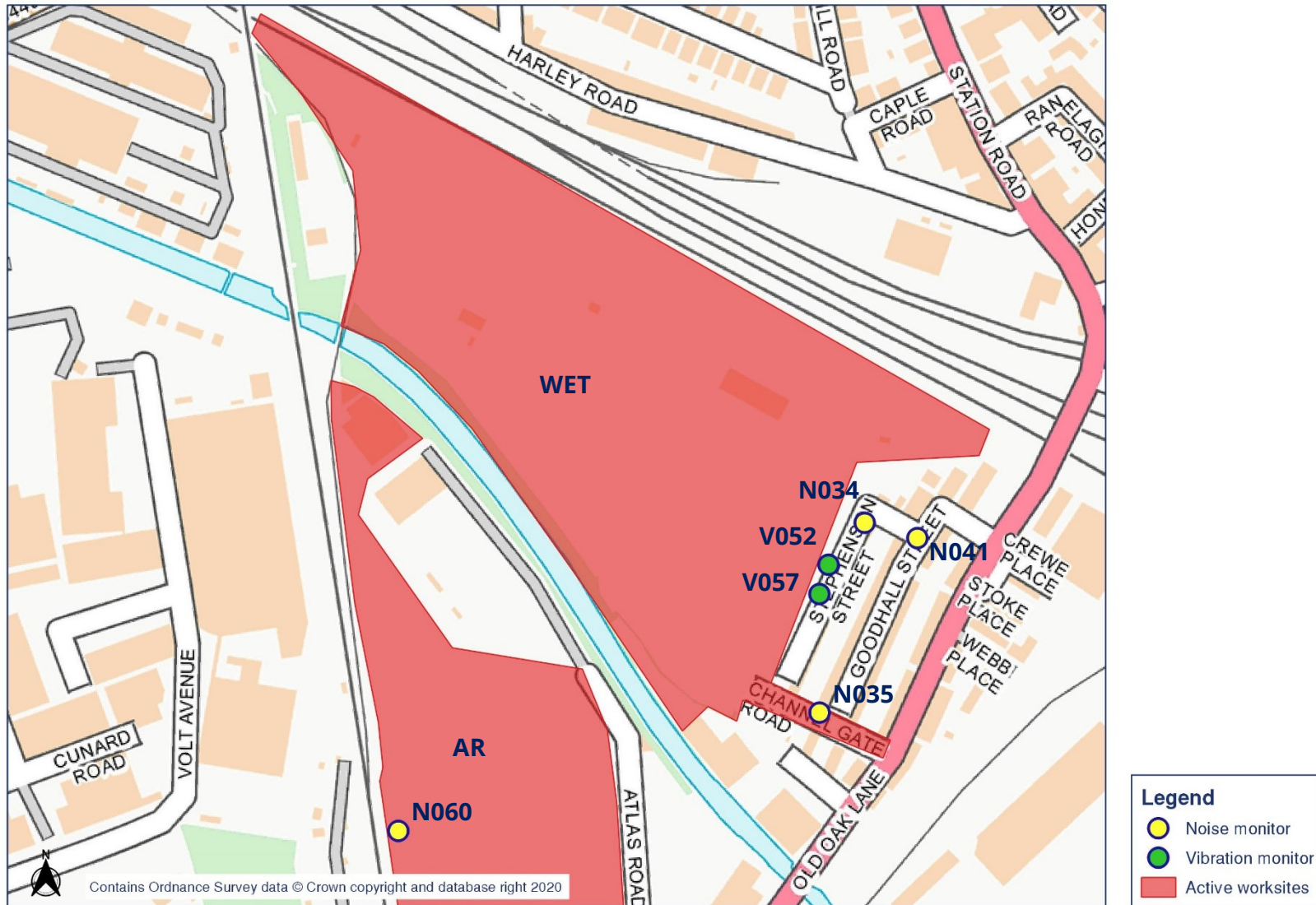


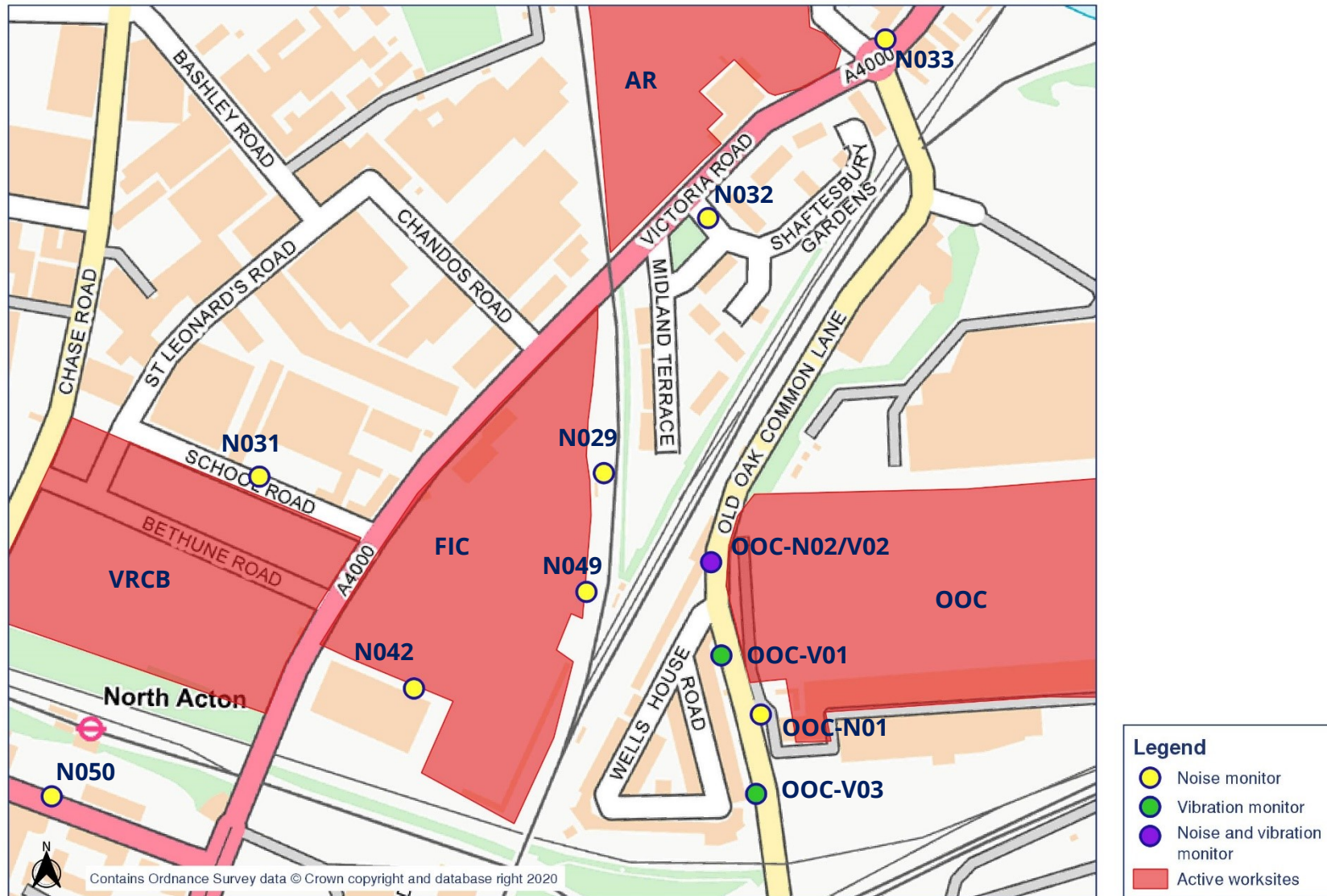










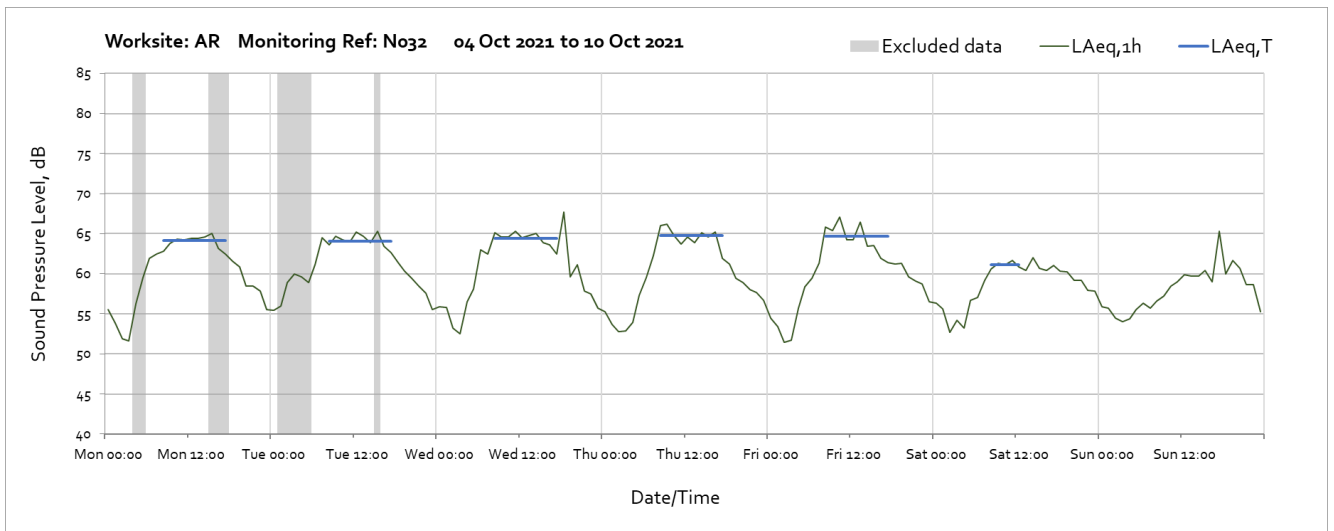
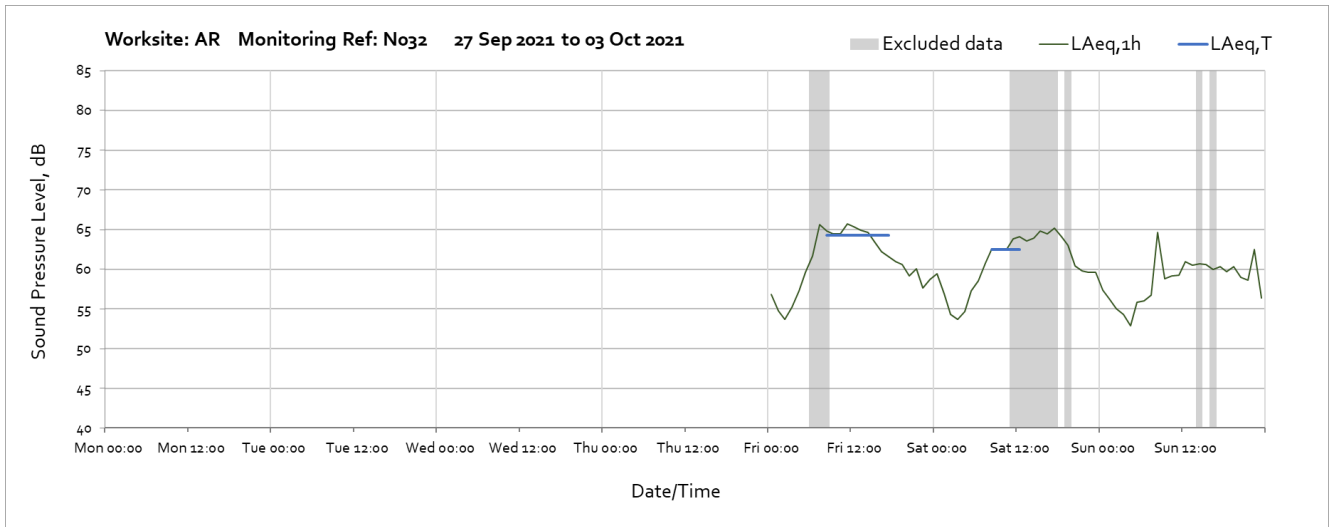


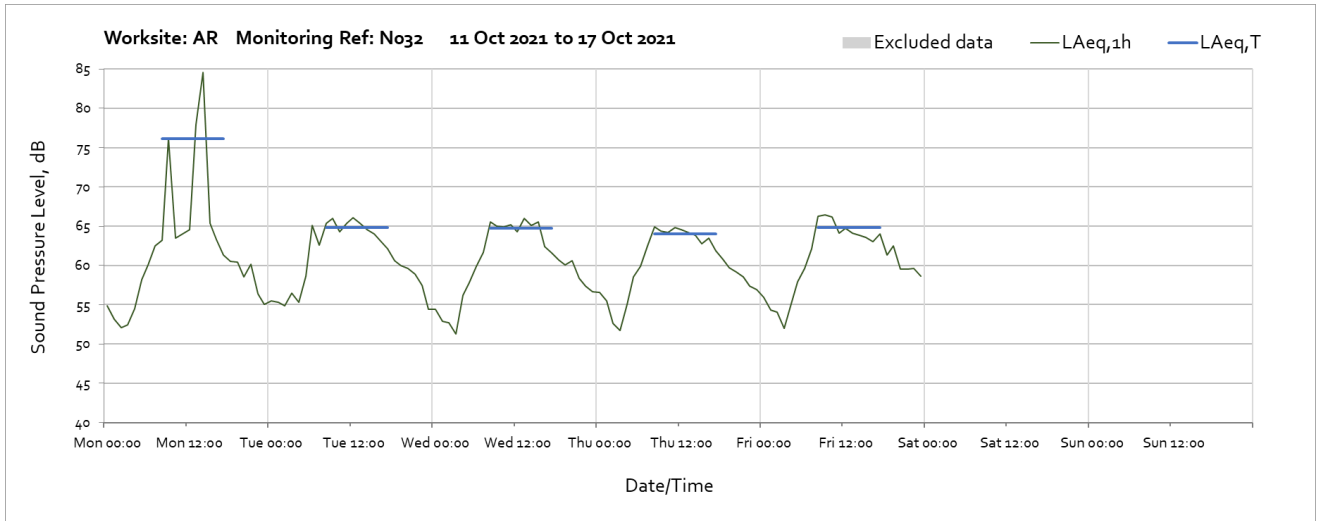
# Appendix C Data

## Noise

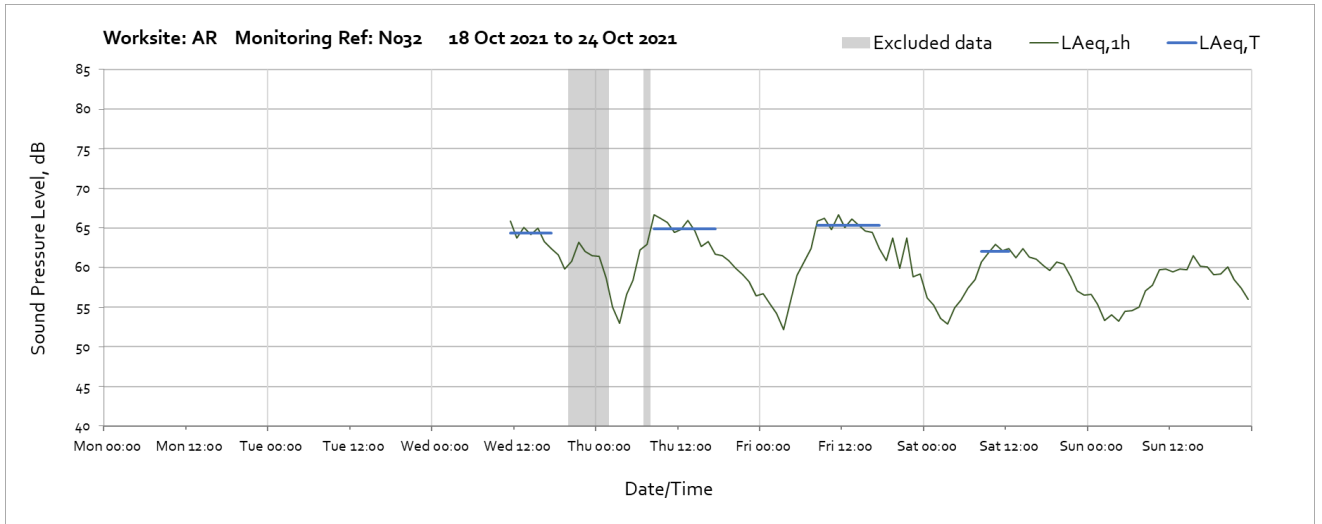
The following graphs show the hourly measured ambient noise level  $L_{Aeq,1h}$  and, where relevant, the averaged noise level  $L_{Aeq,T}$  values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and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

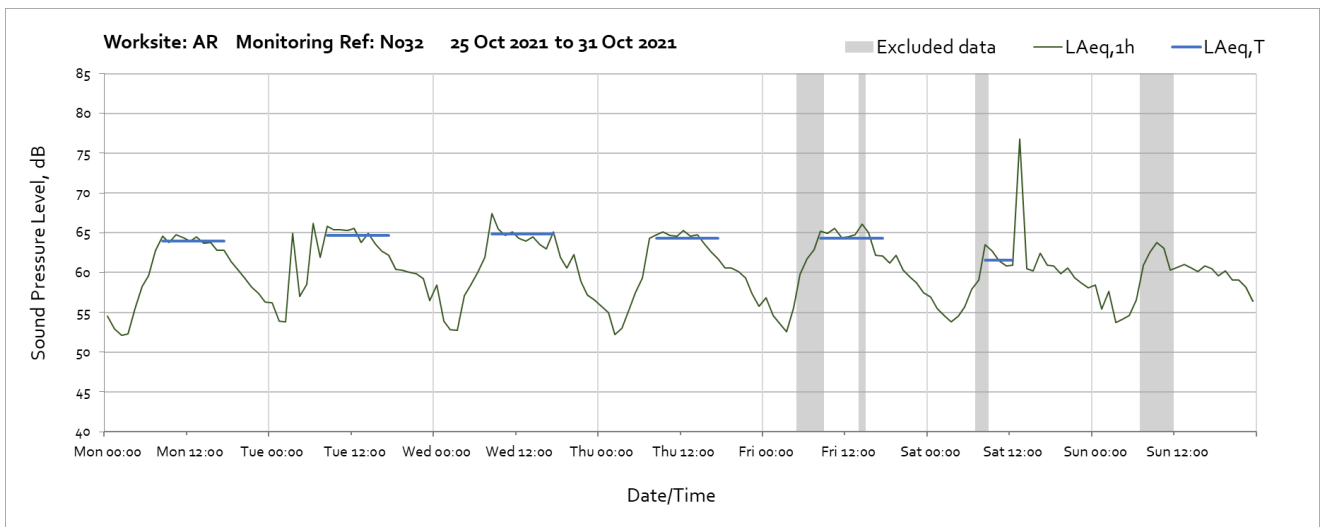




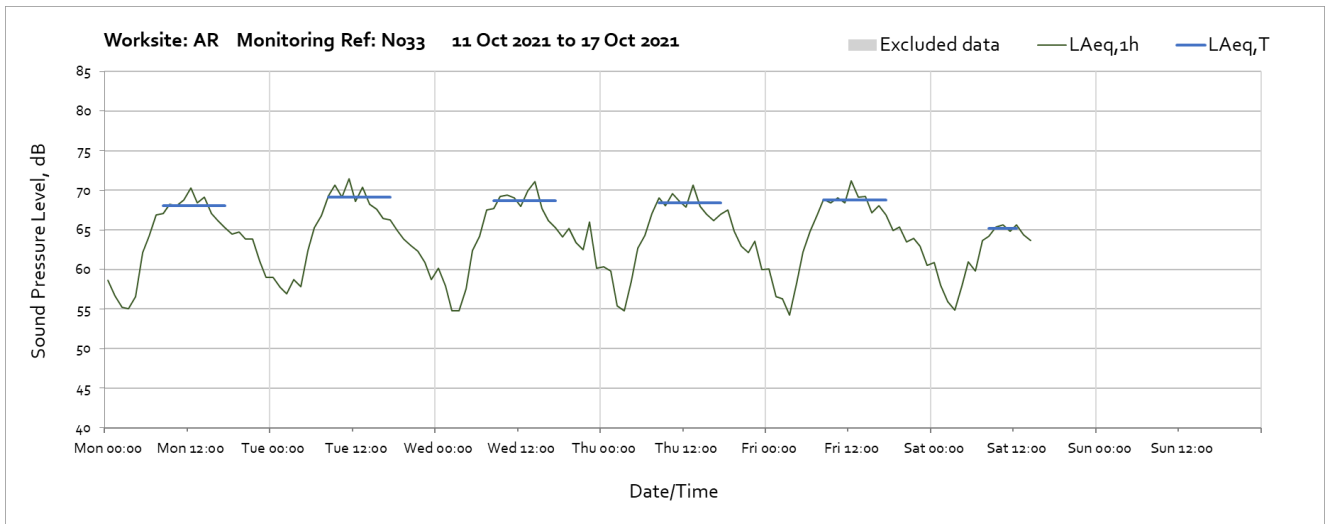
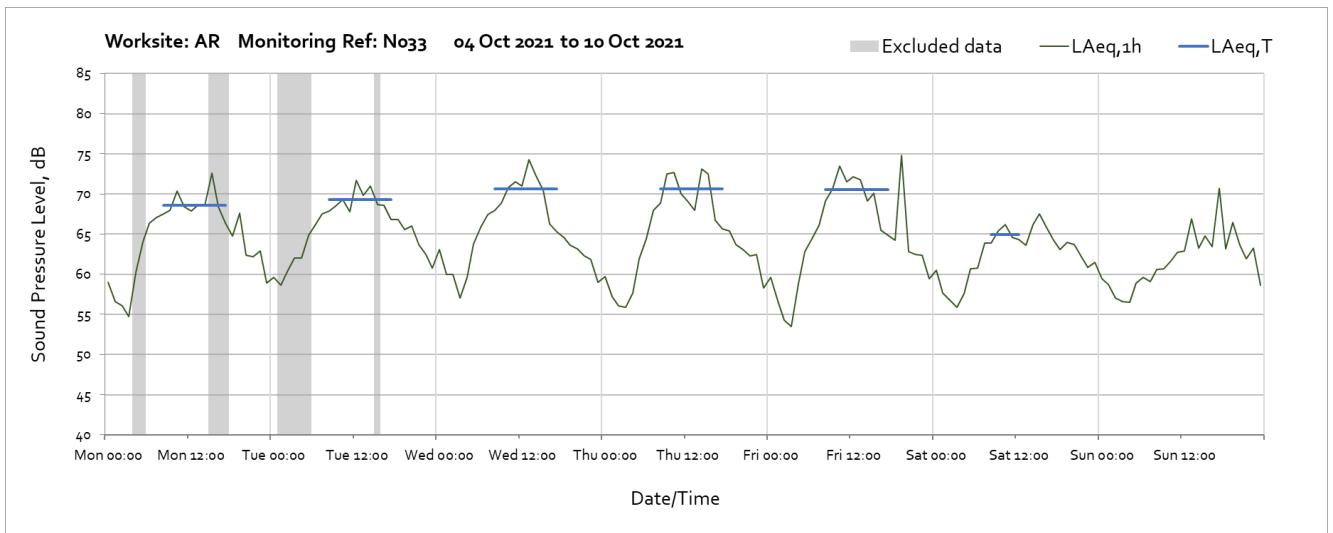
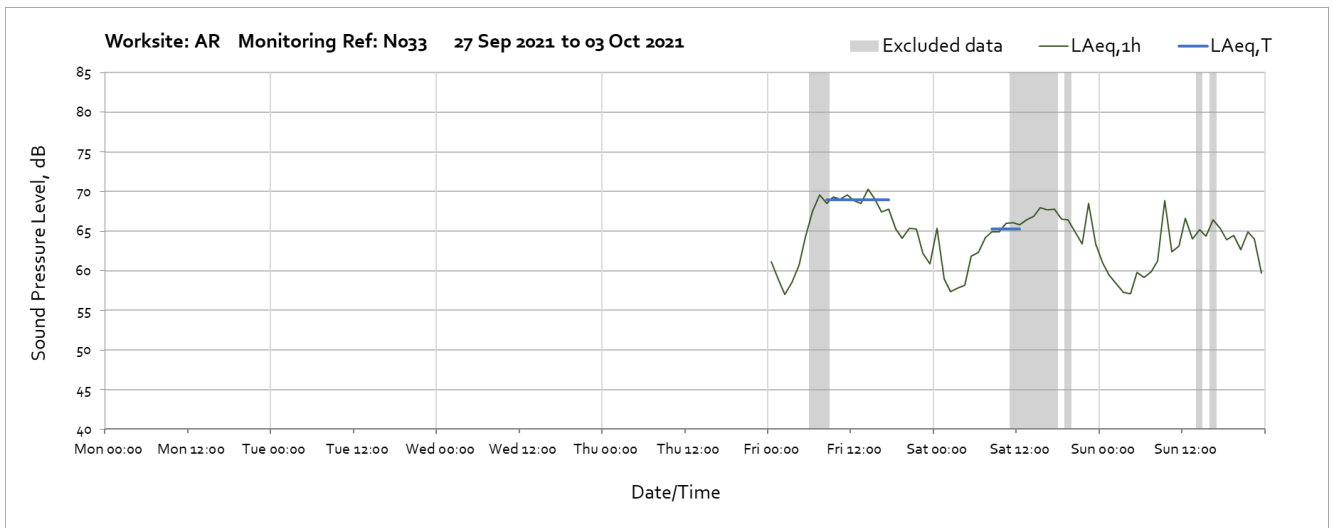
Note: Missing data between 00:00 on Saturday 16<sup>th</sup> October and 11:00 on Wednesday 20<sup>th</sup> October 2021 was due to memory card verification failure at the monitor location.



Note: Missing data between 00:00 on Saturday 16<sup>th</sup> October and 11:00 on Wednesday 20<sup>th</sup> October 2021 was due to memory card verification failure at the monitor location.

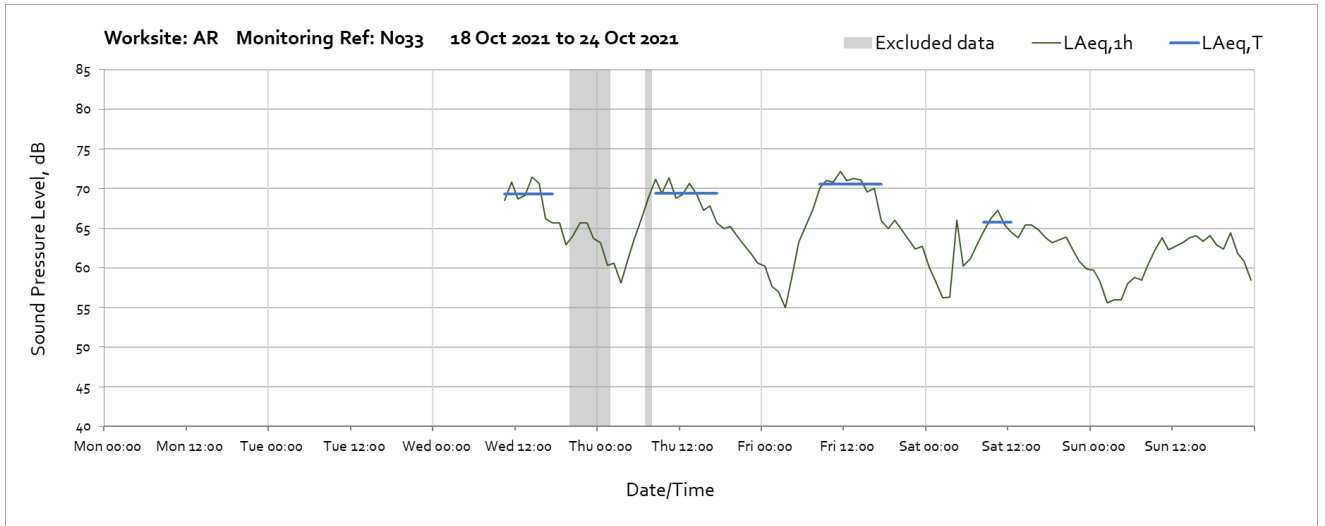


## Worksite: Atlas Road worksite (AR) – Monitoring Ref: N033

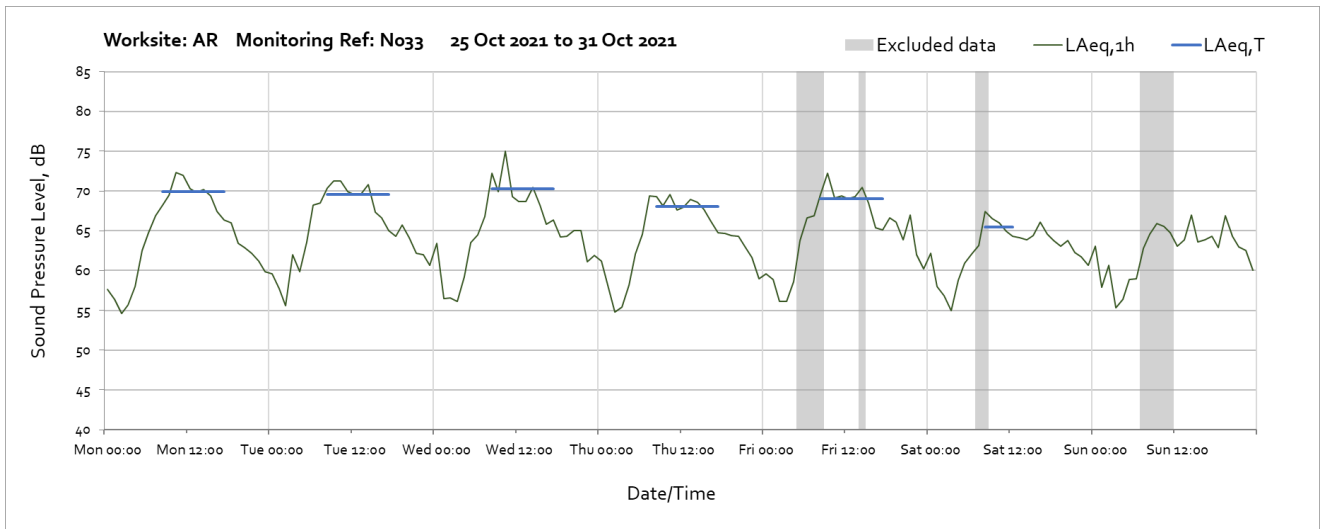


Note: Missing data between 15:00 on Saturday 16<sup>th</sup> October and 10:00 on Wednesday 20<sup>th</sup> October 2021 was due to memory card error and failure at the monitor location.

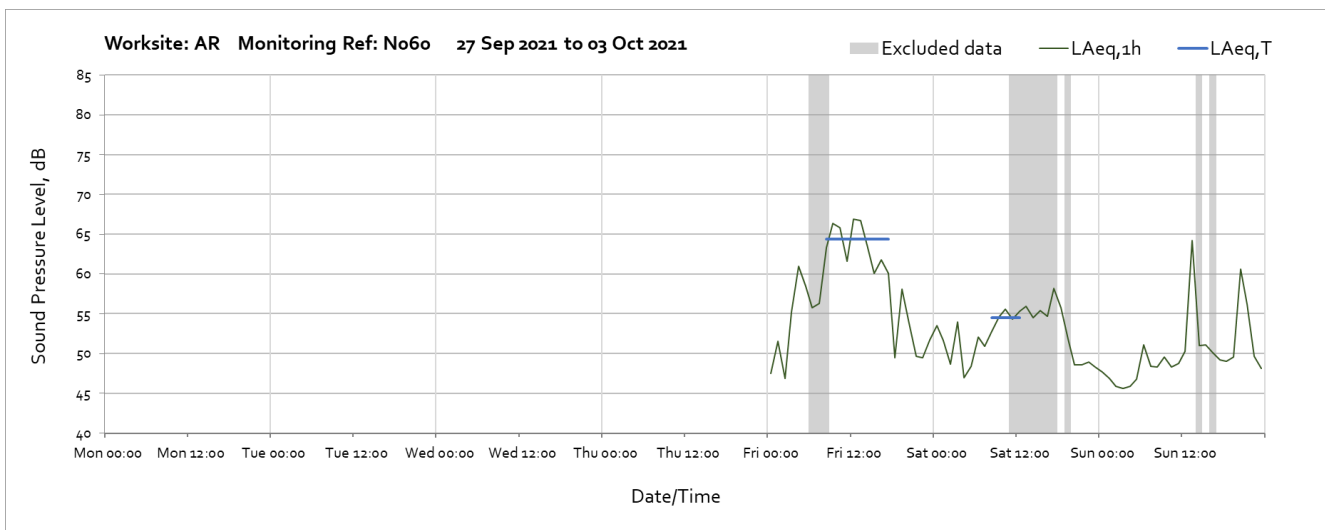
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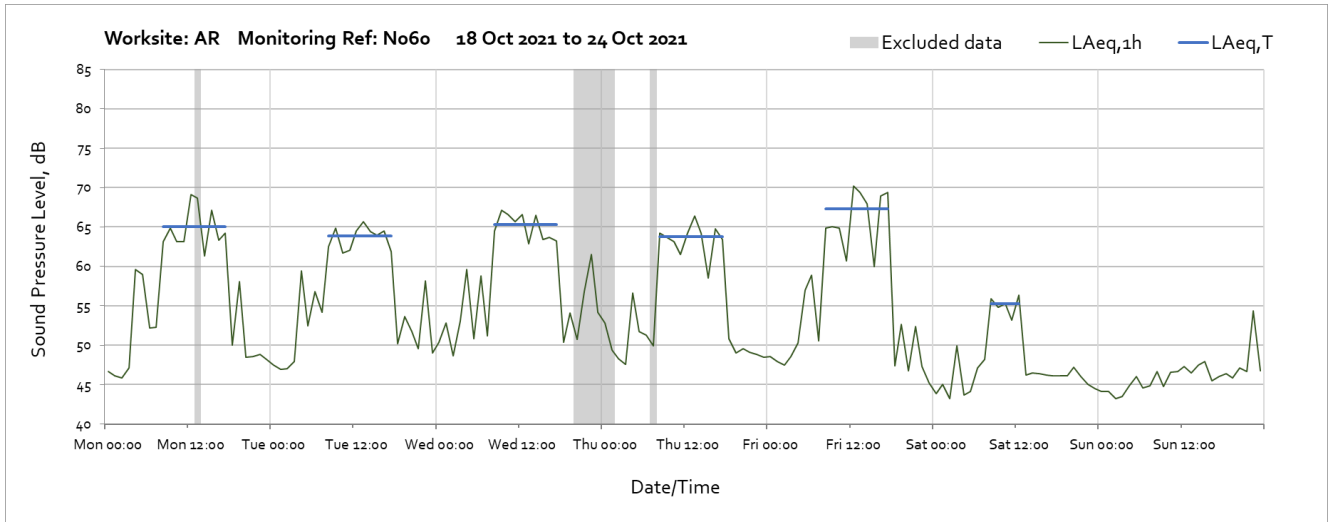
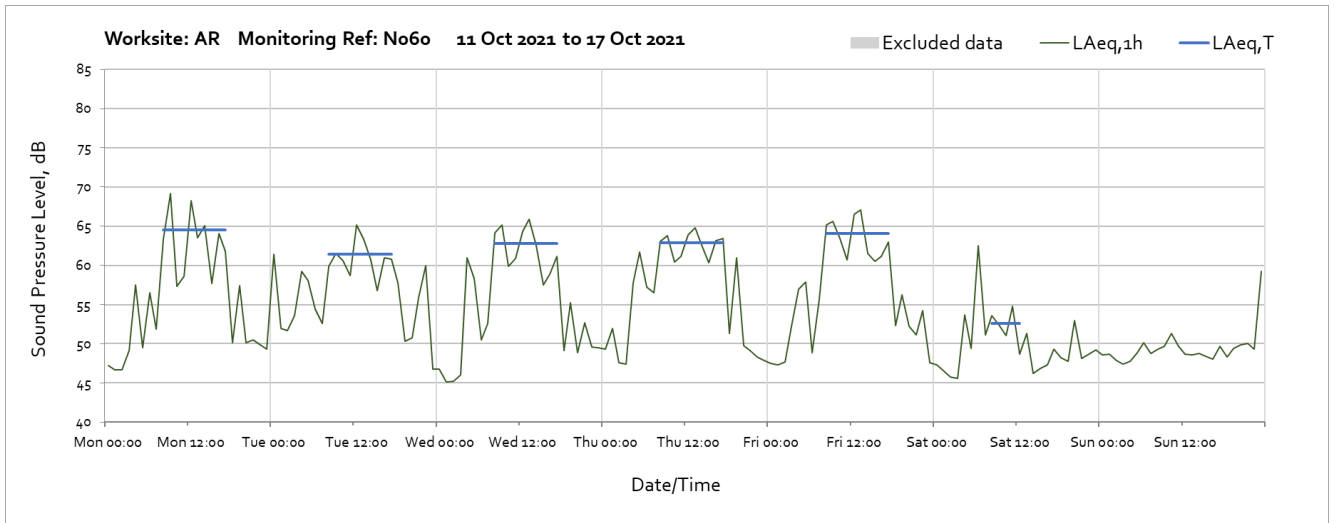
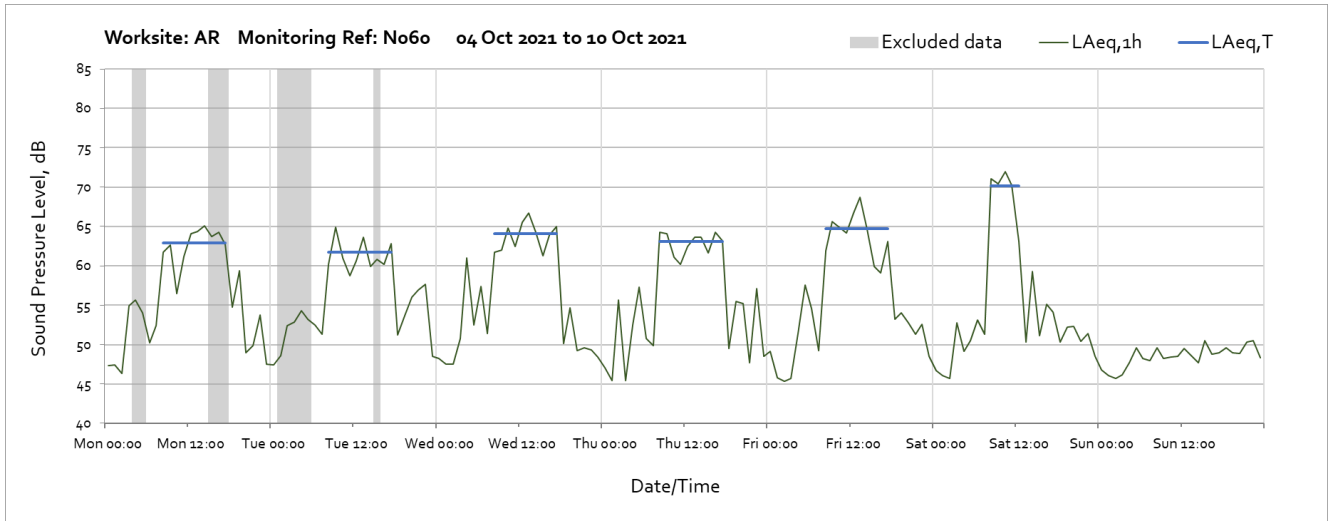


Note: Missing data between 15:00 on Saturday 16<sup>th</sup> October and 10:00 on Wednesday 20<sup>th</sup> October 2021 was due to memory card error and failure at the monitor location.

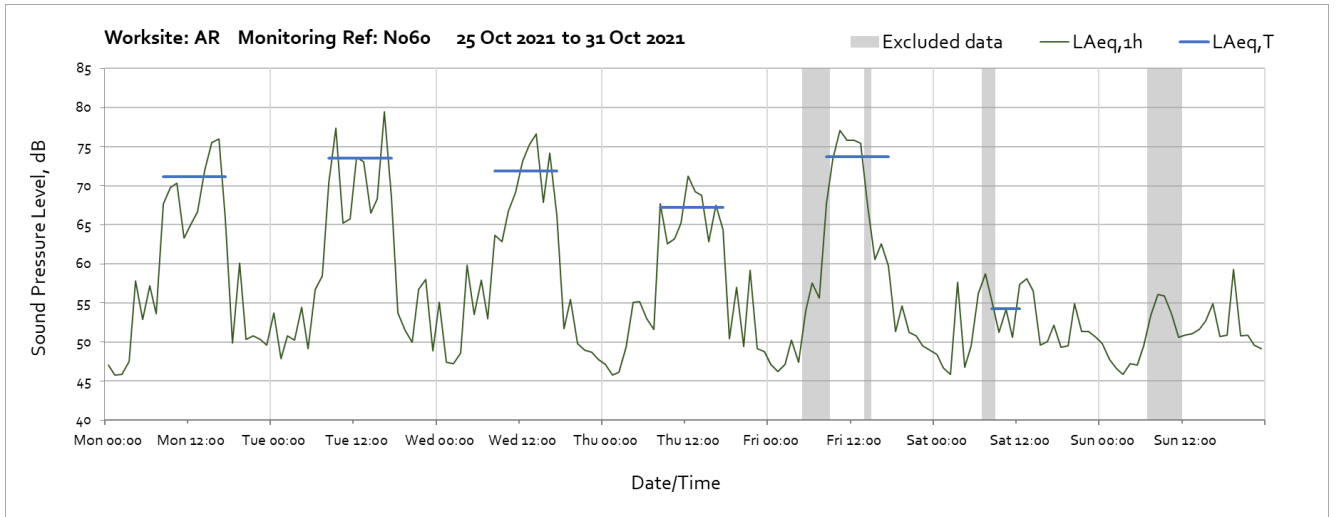


### Worksite: Atlas Road worksite (AR) - Monitoring Ref: N060

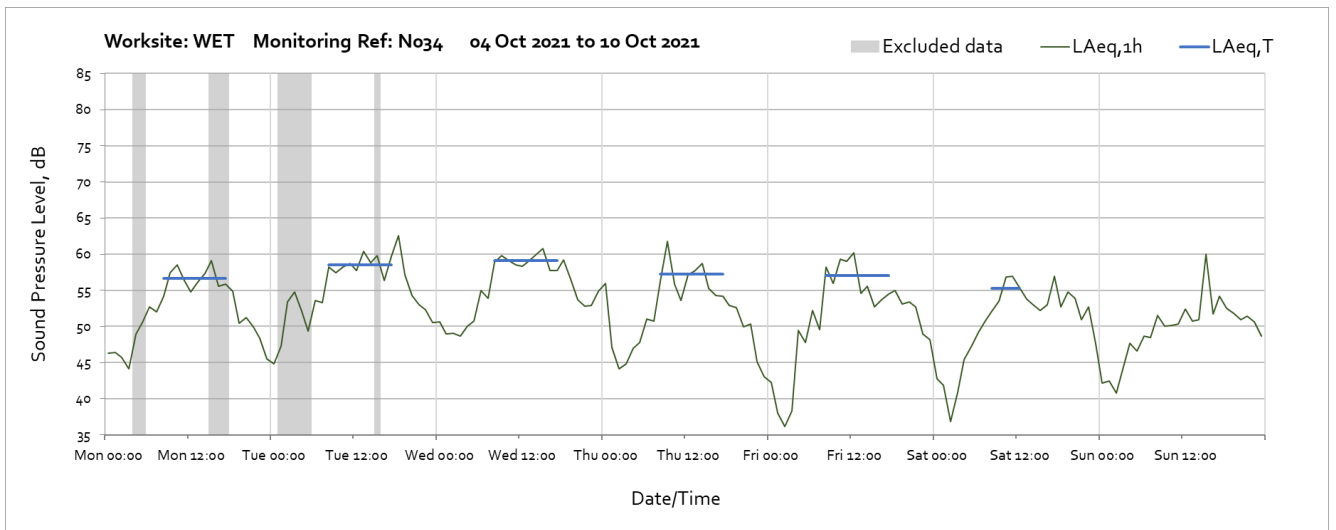
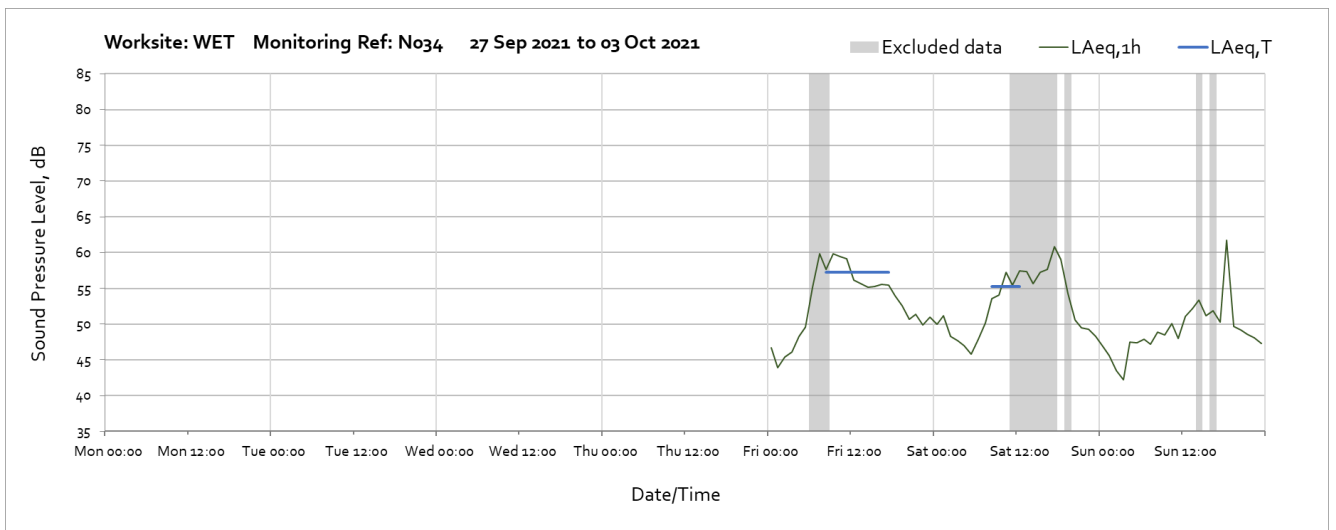


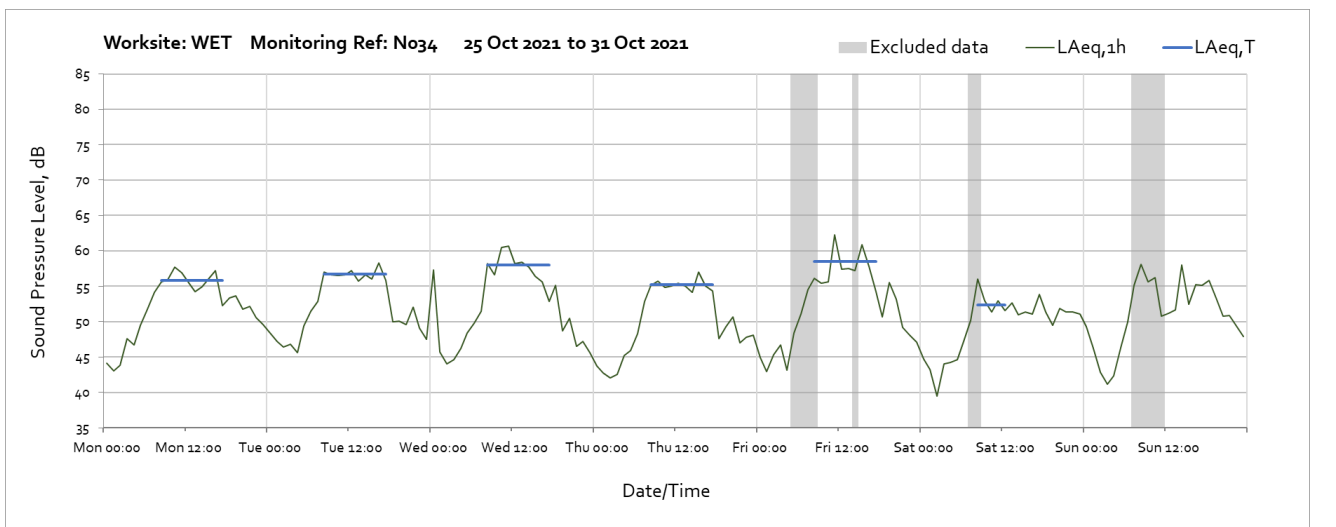
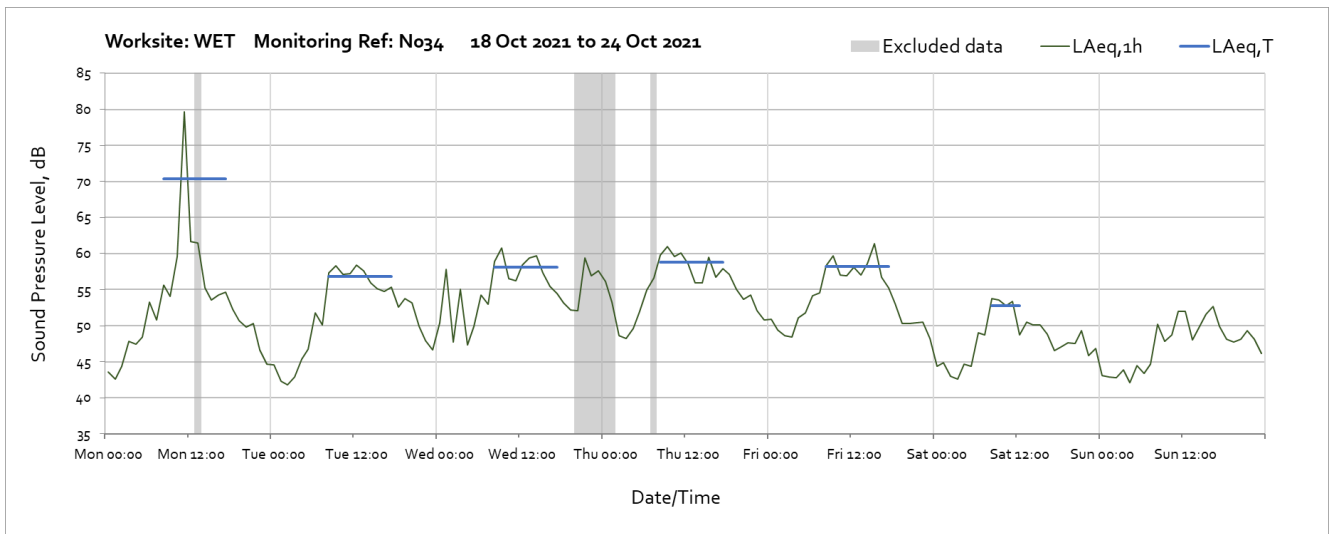
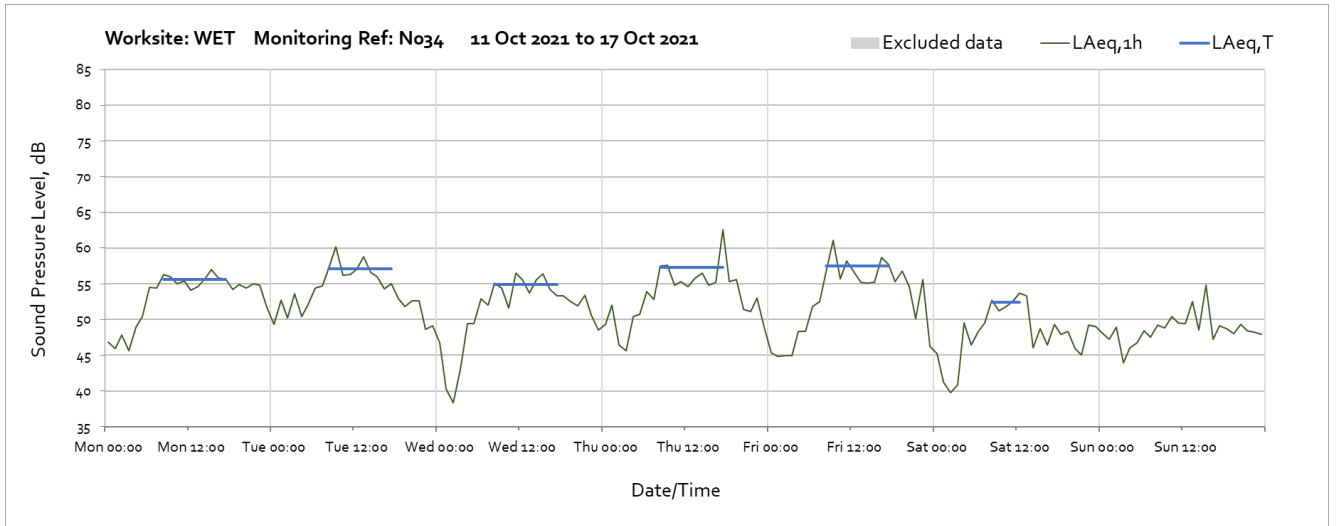




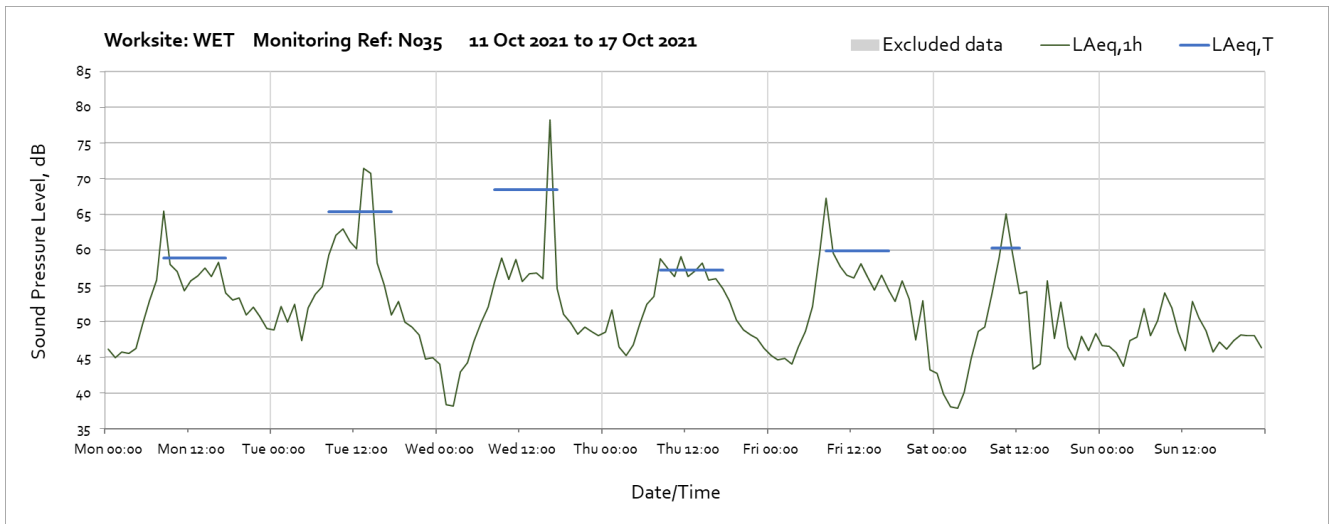
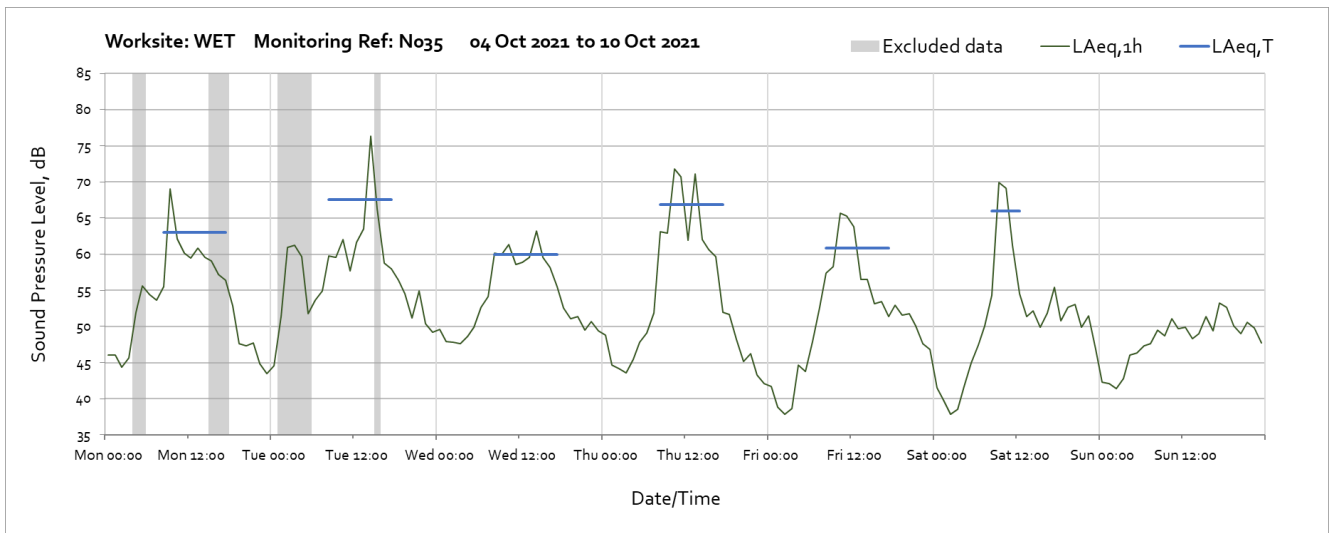
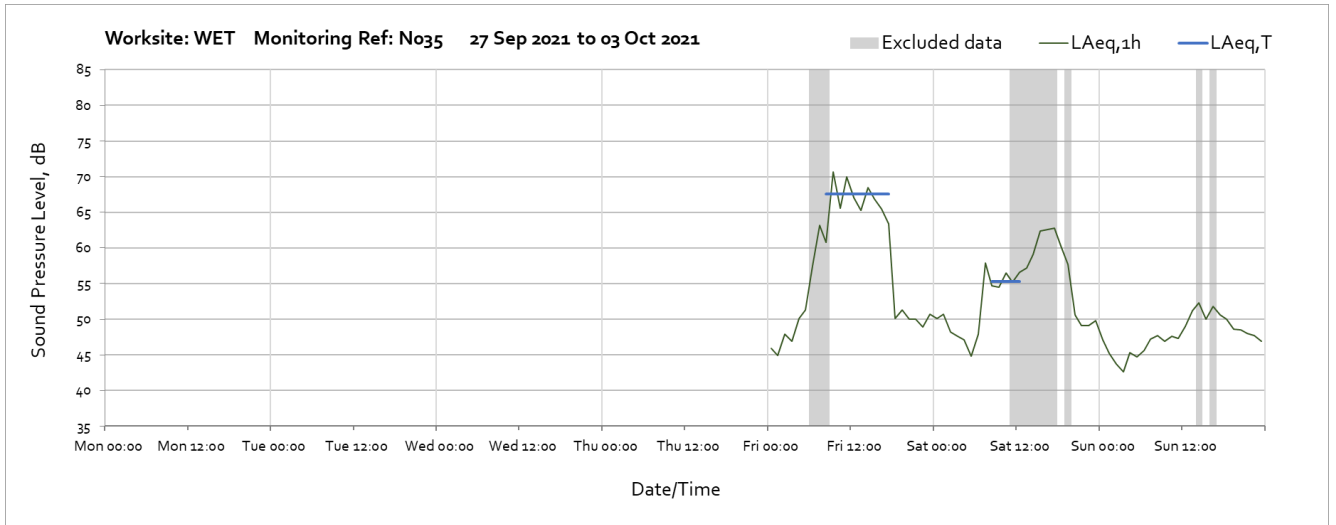


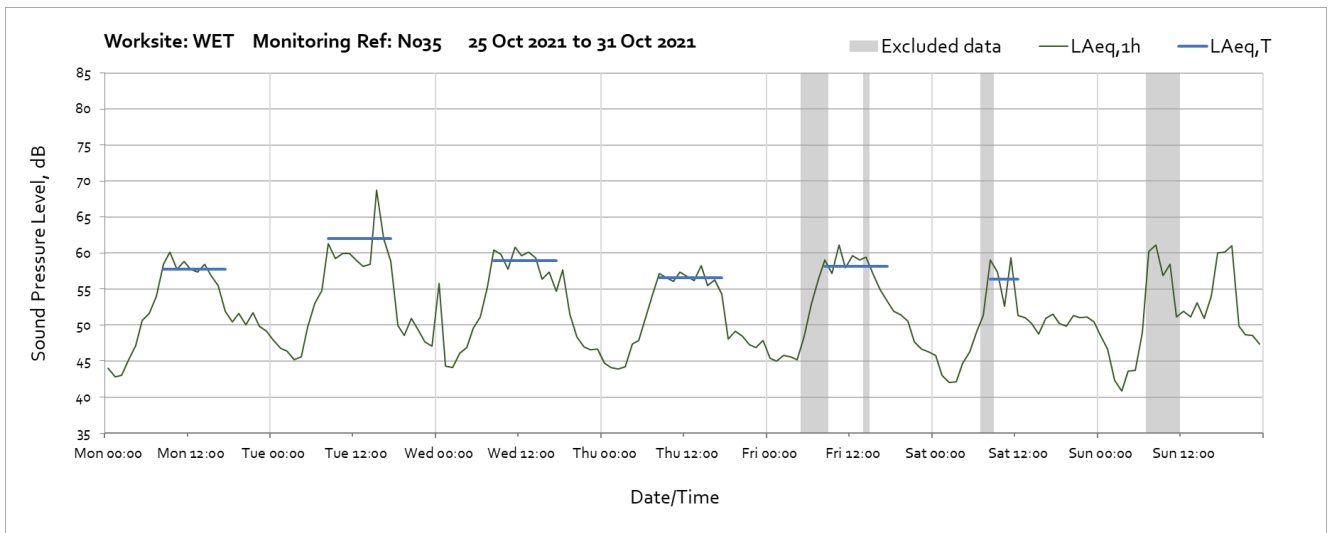
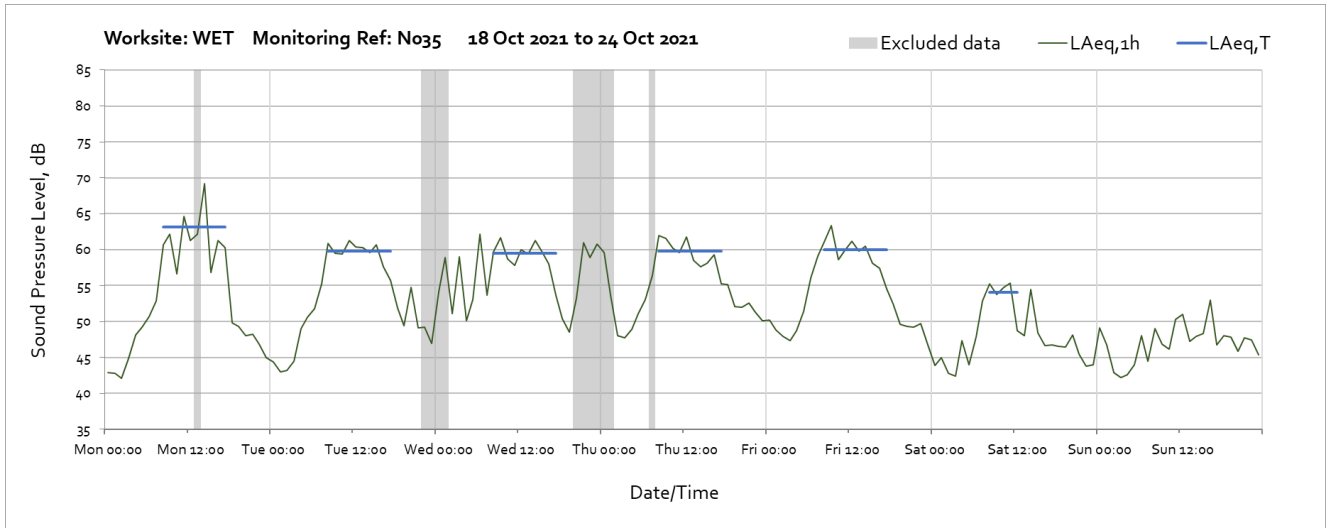
**Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: N034**



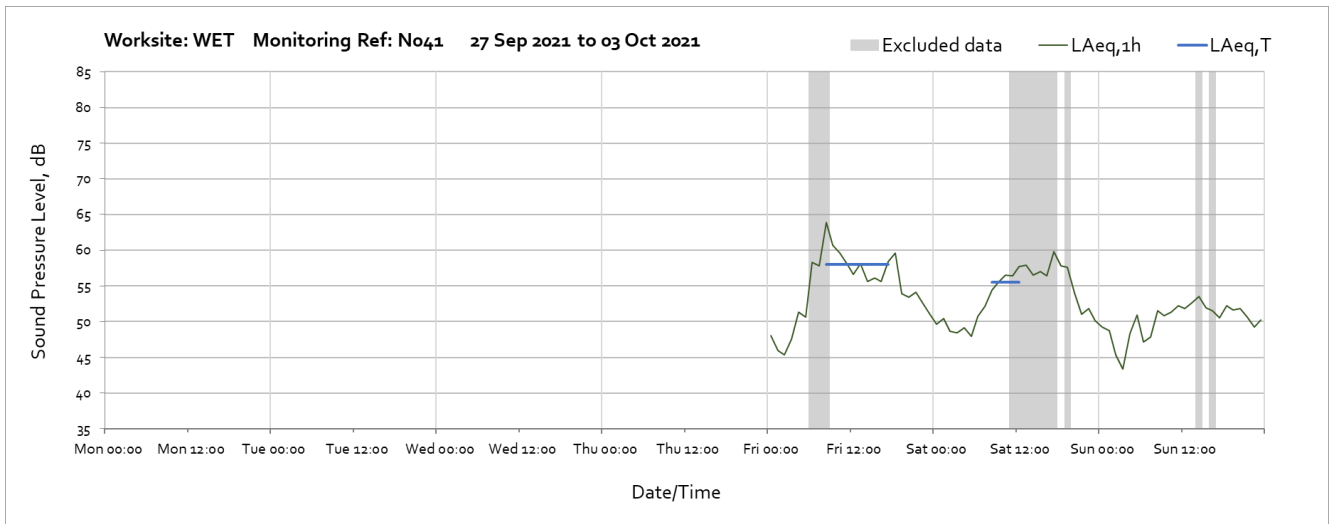


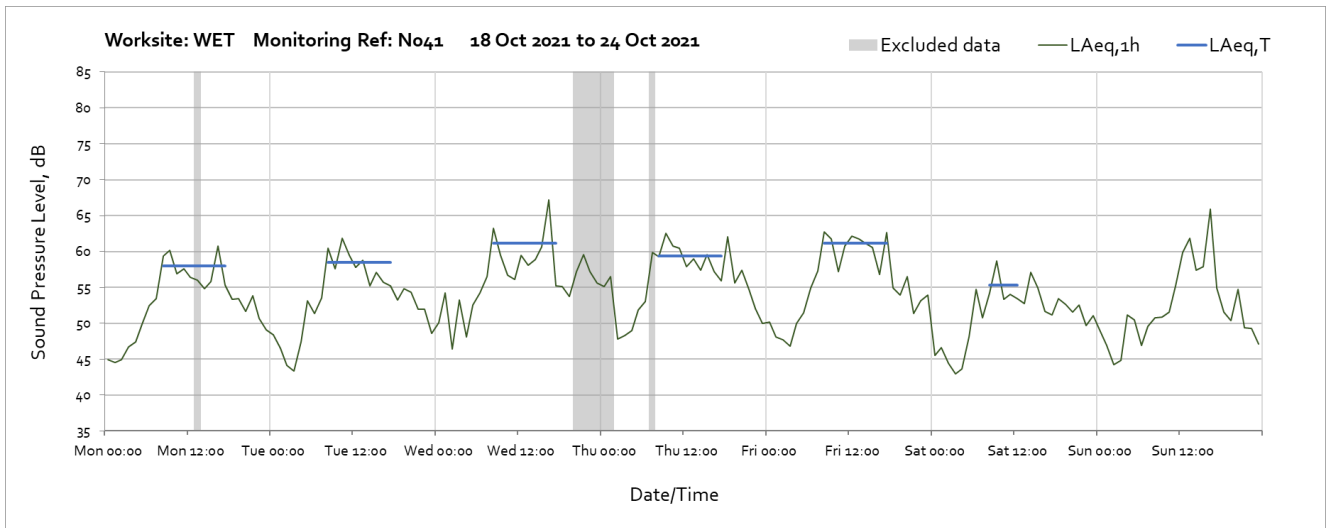
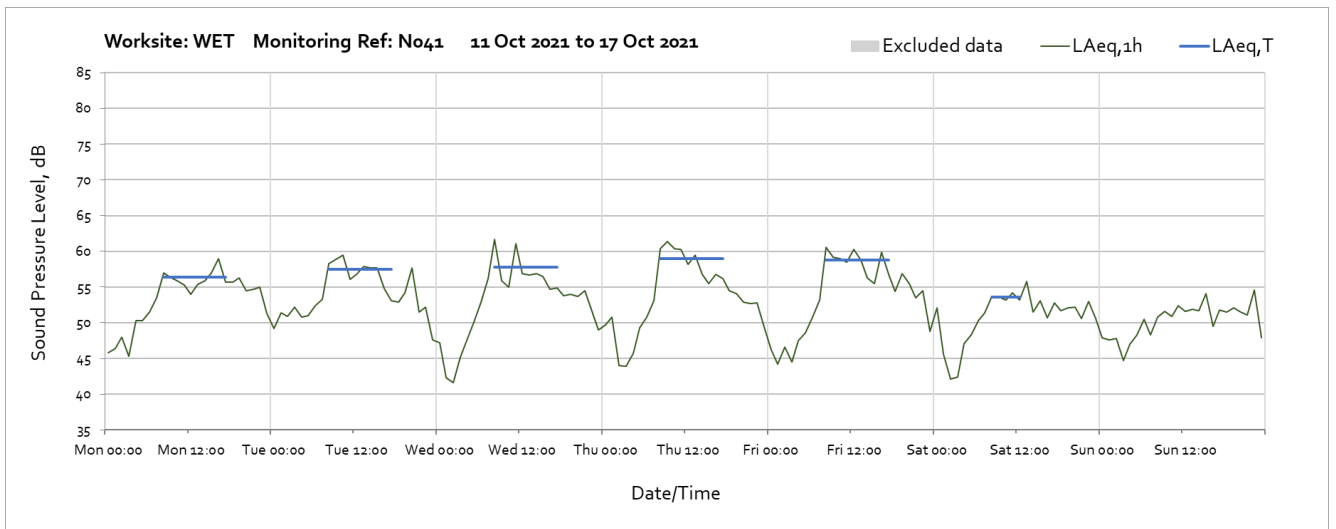
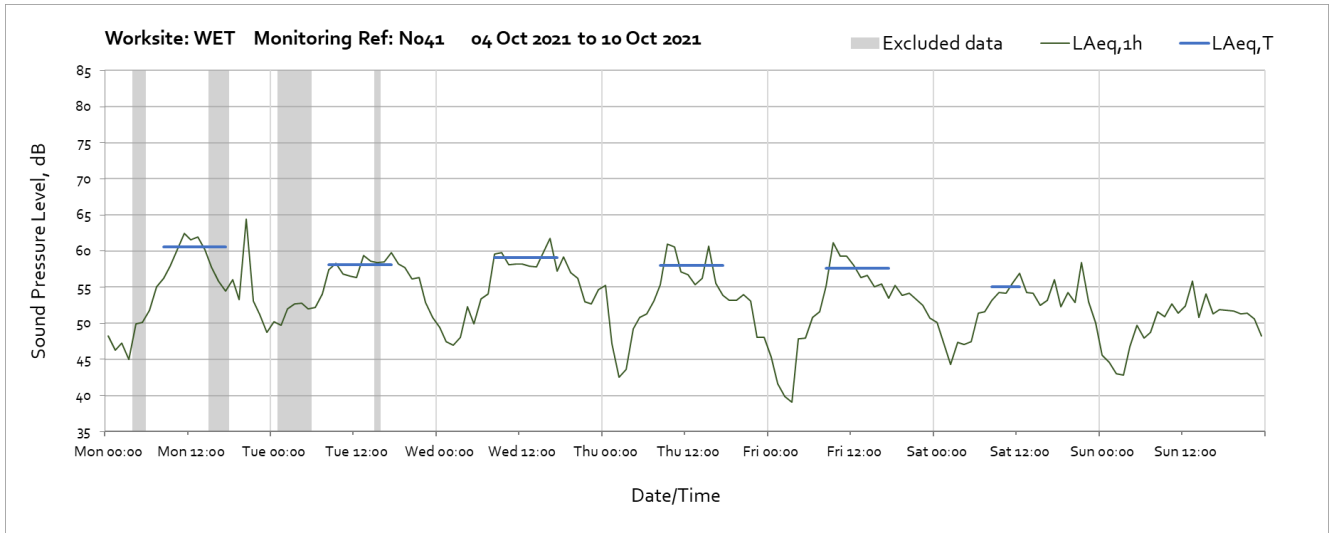
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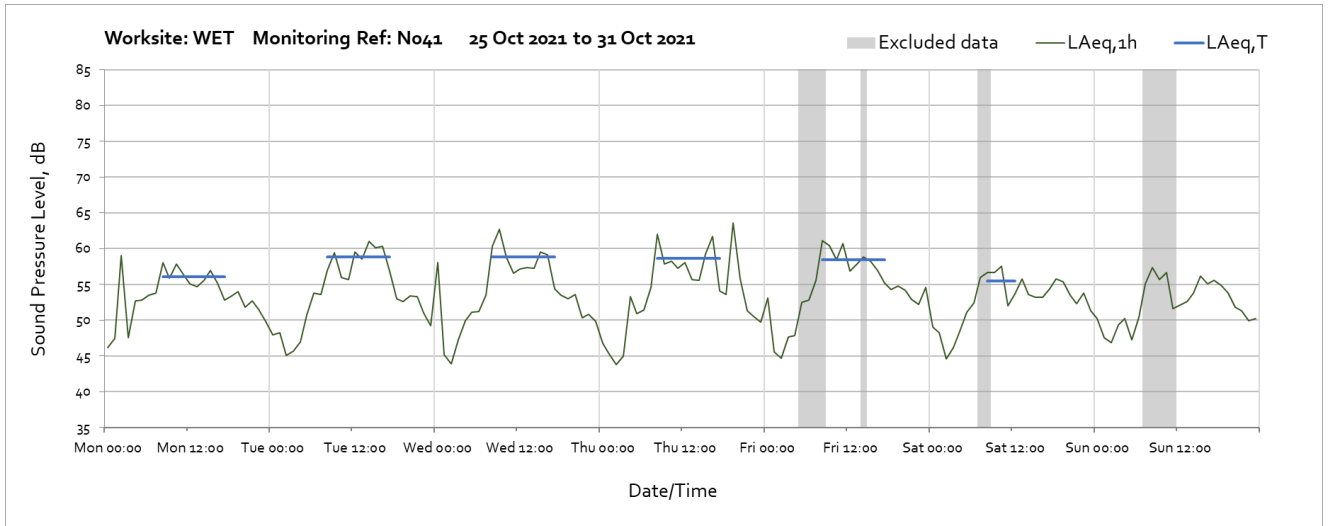




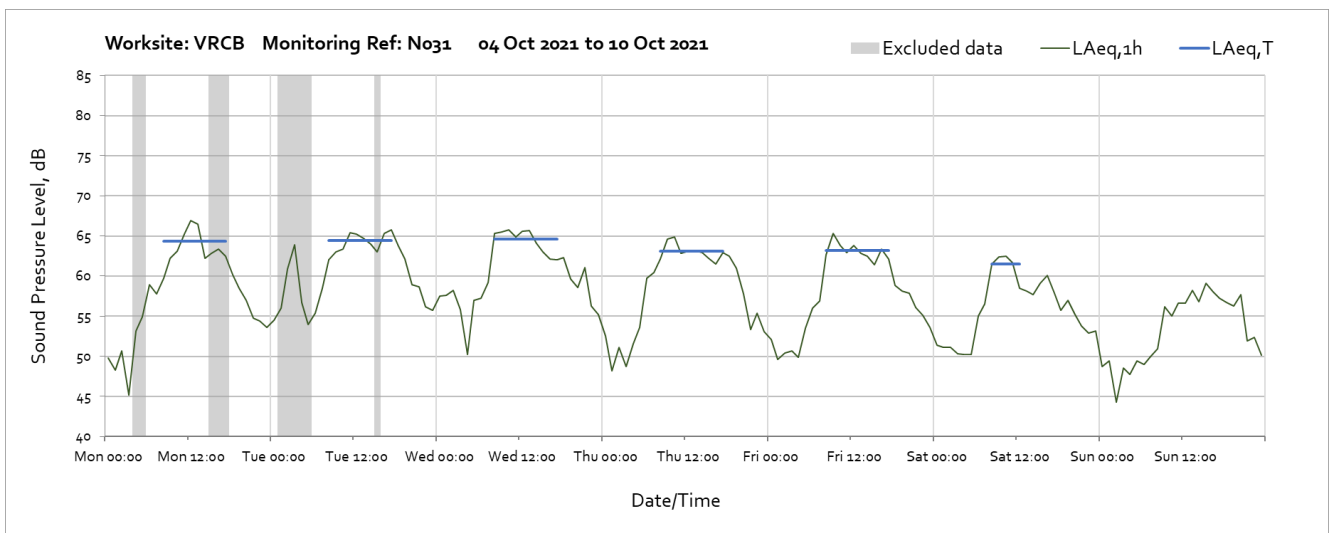
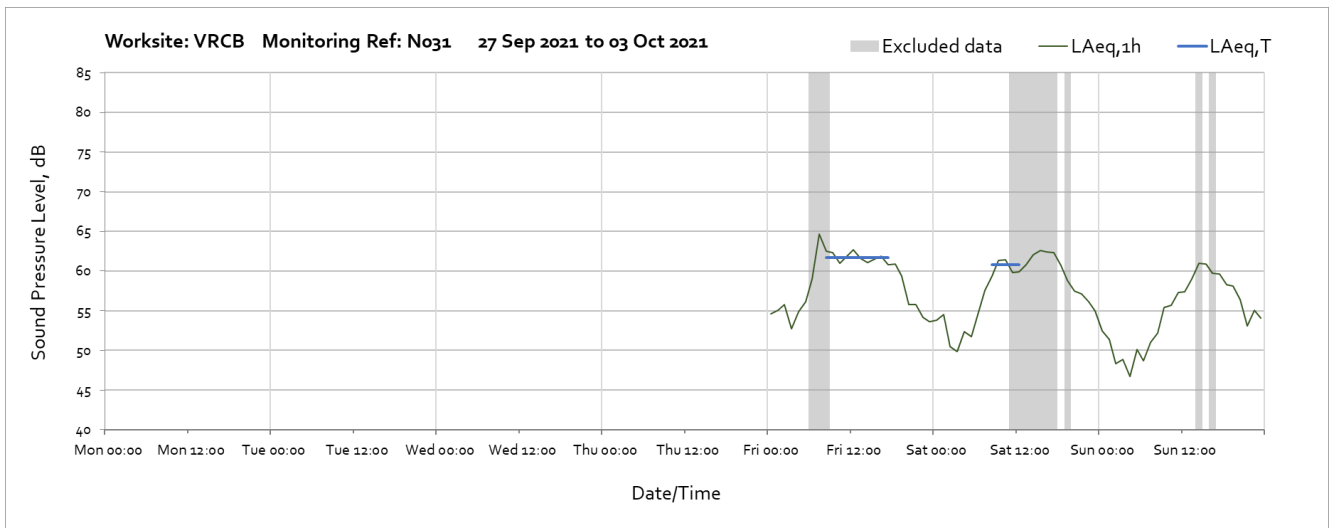
**Worksite: Willesden Euro Terminal (WET) - Monitoring Ref: N041**

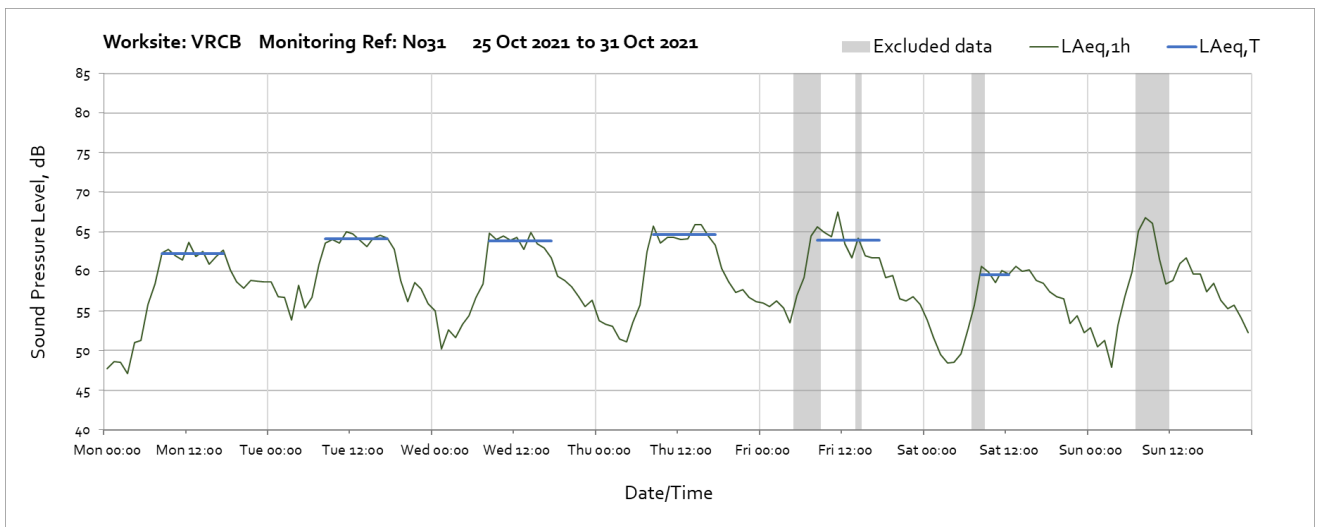
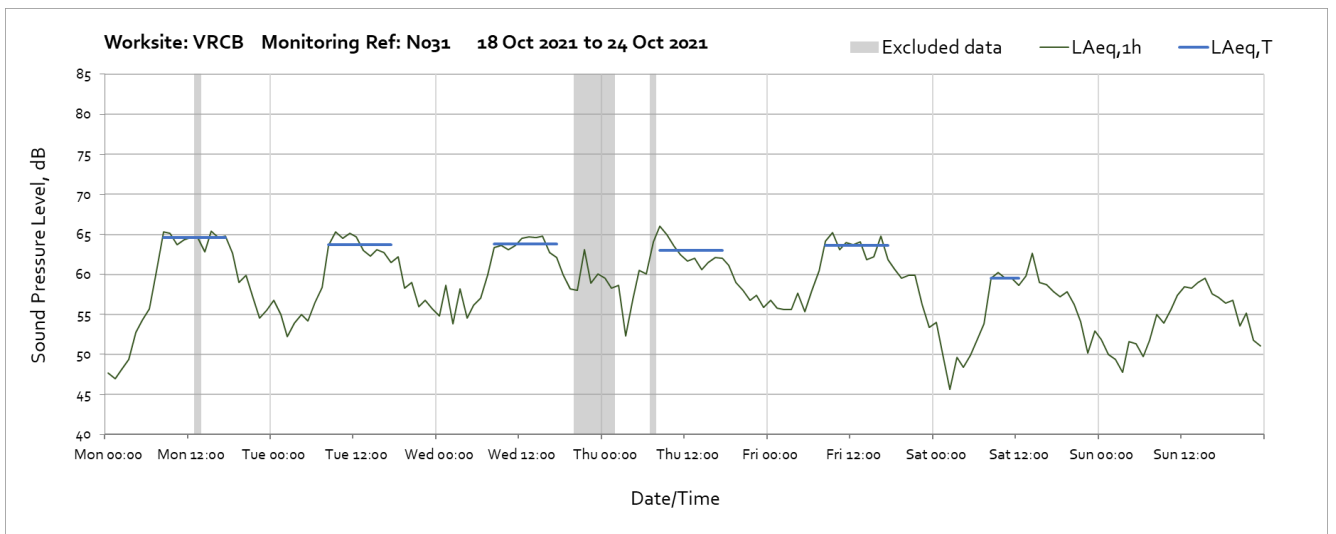
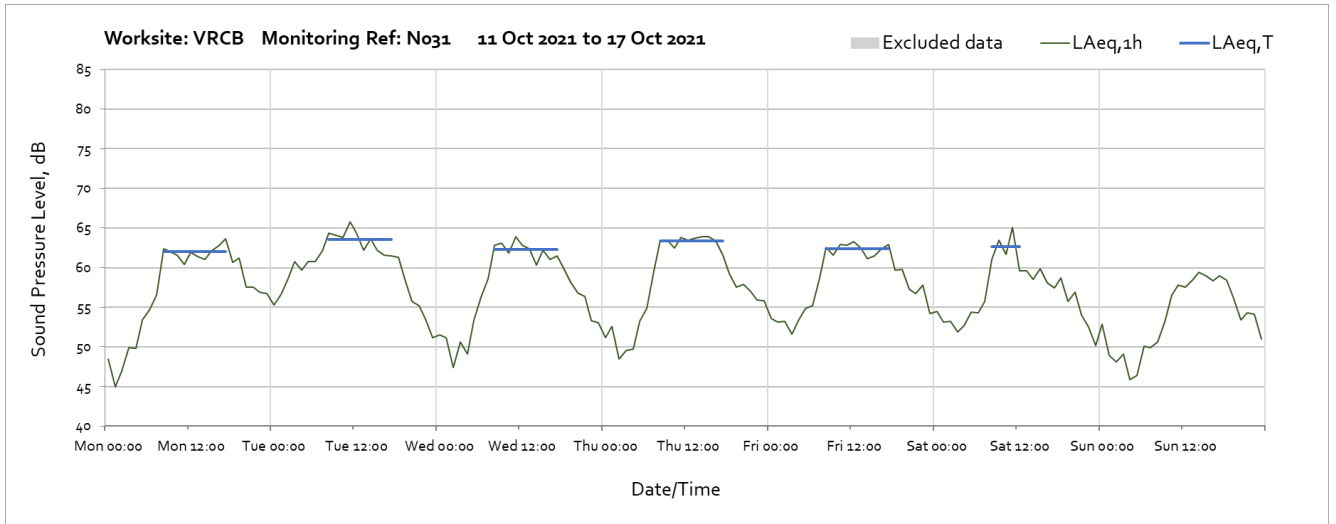




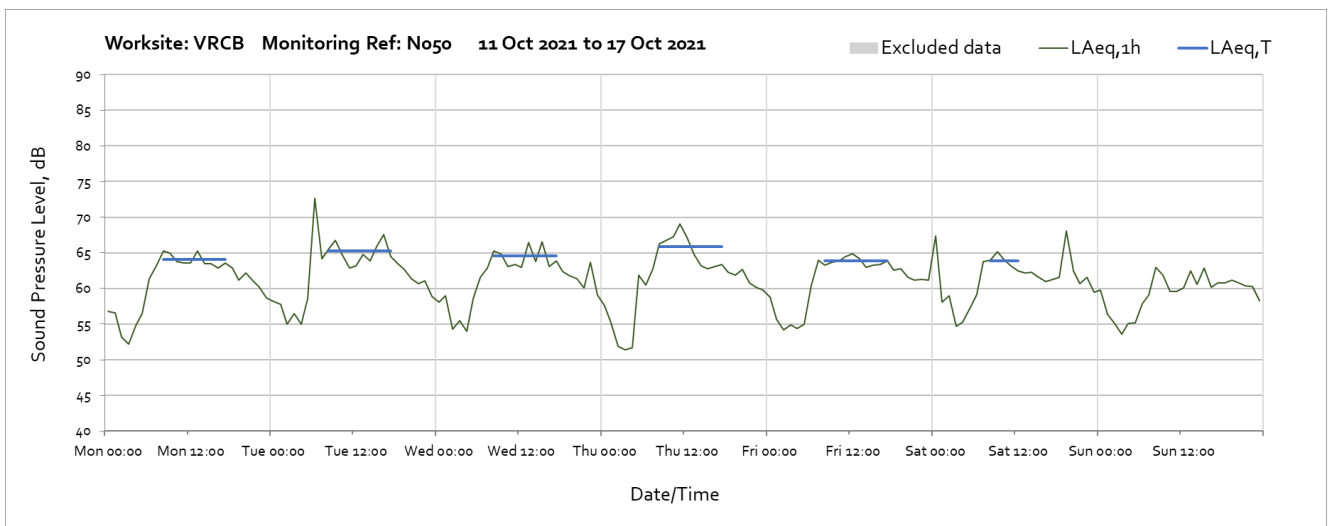
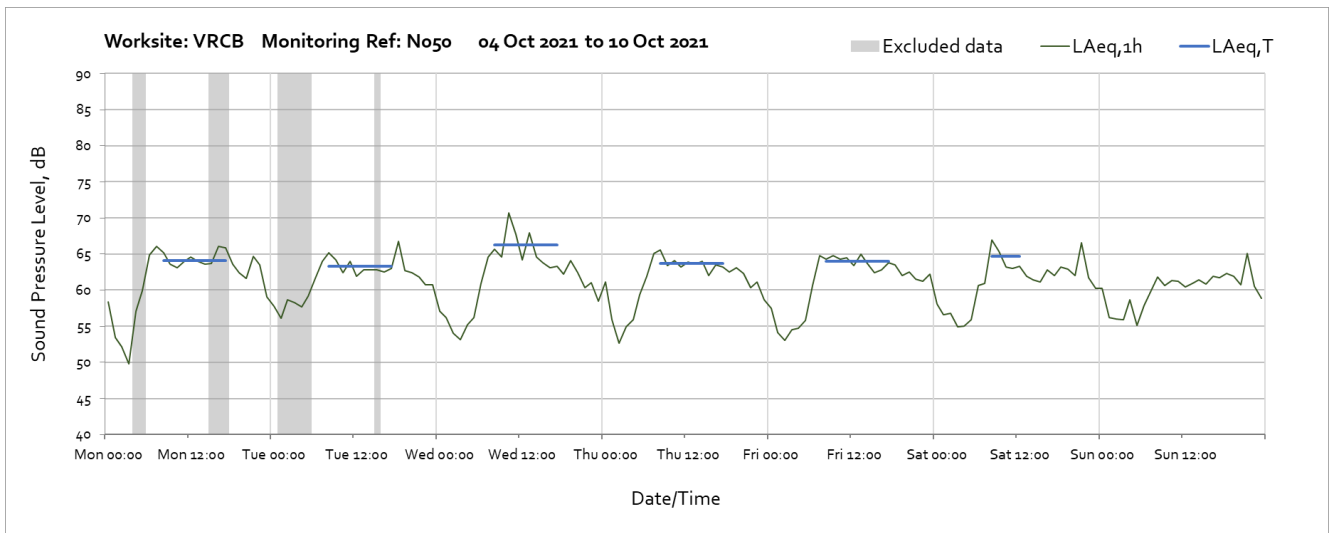
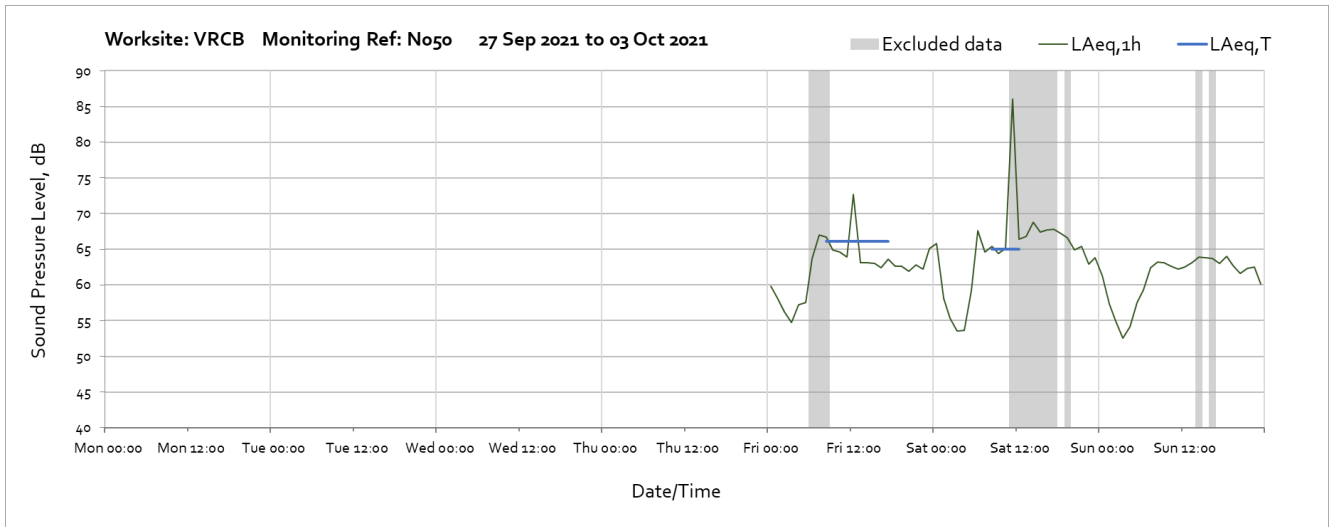


**Worksite: Victoria Road Crossover Box (VRCB) – Monitoring Ref: N031**



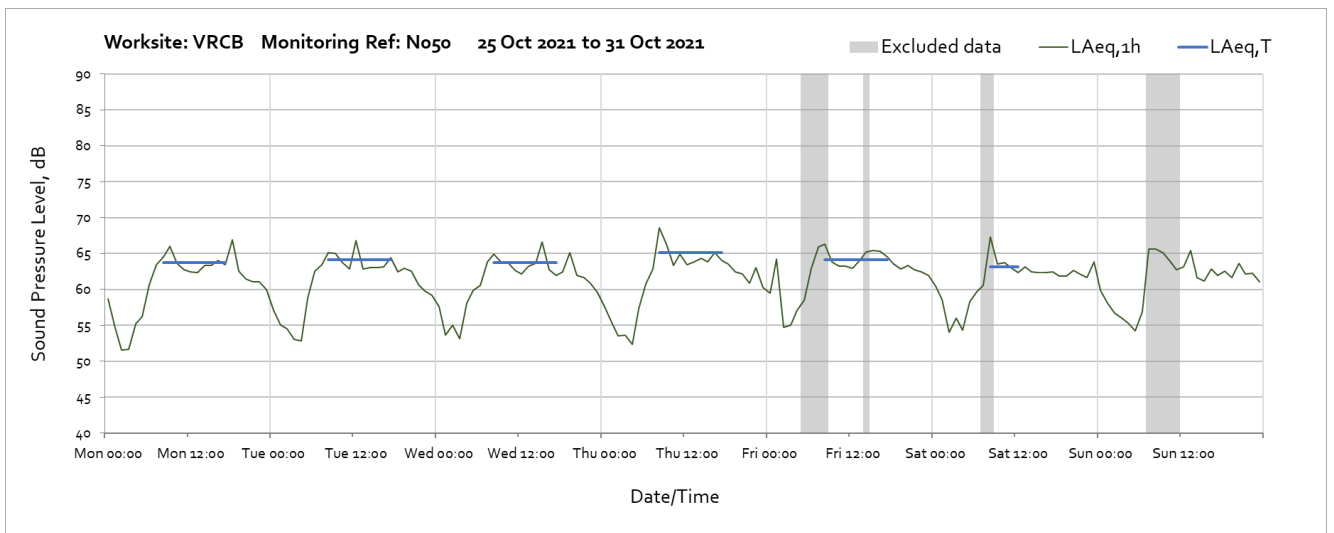
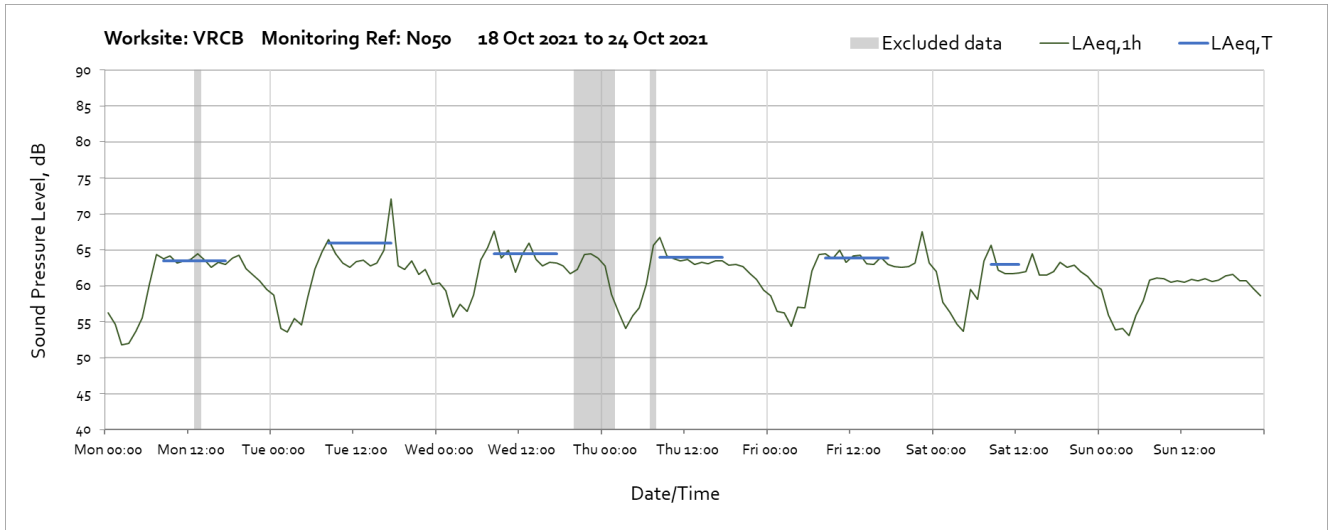


## Worksite: Victoria Road Crossover Box (VRCB) – Monitoring Ref: N050

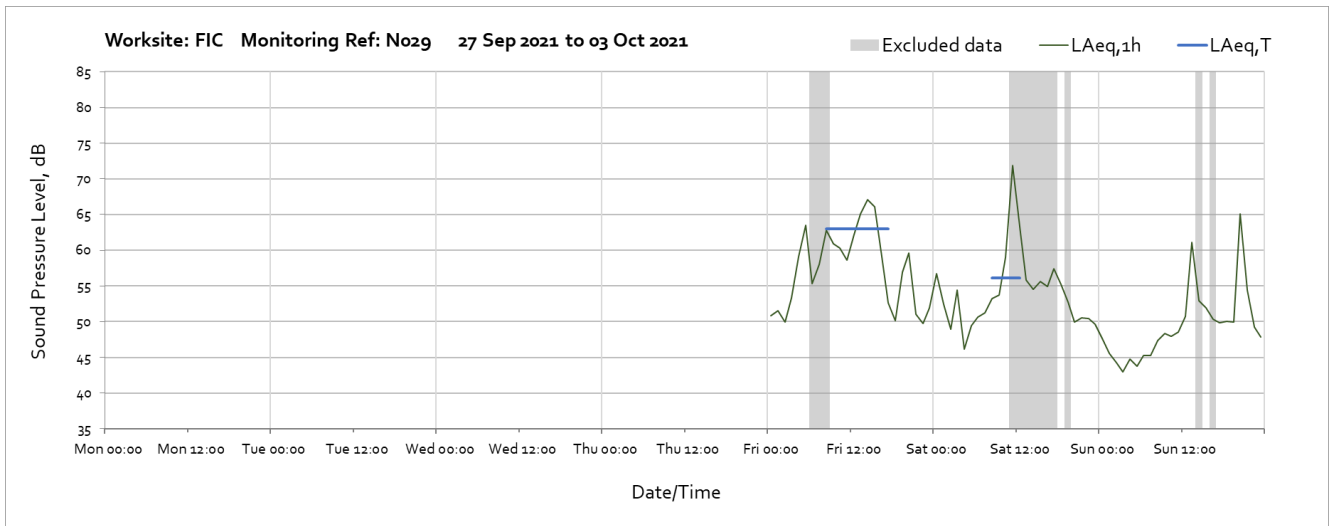


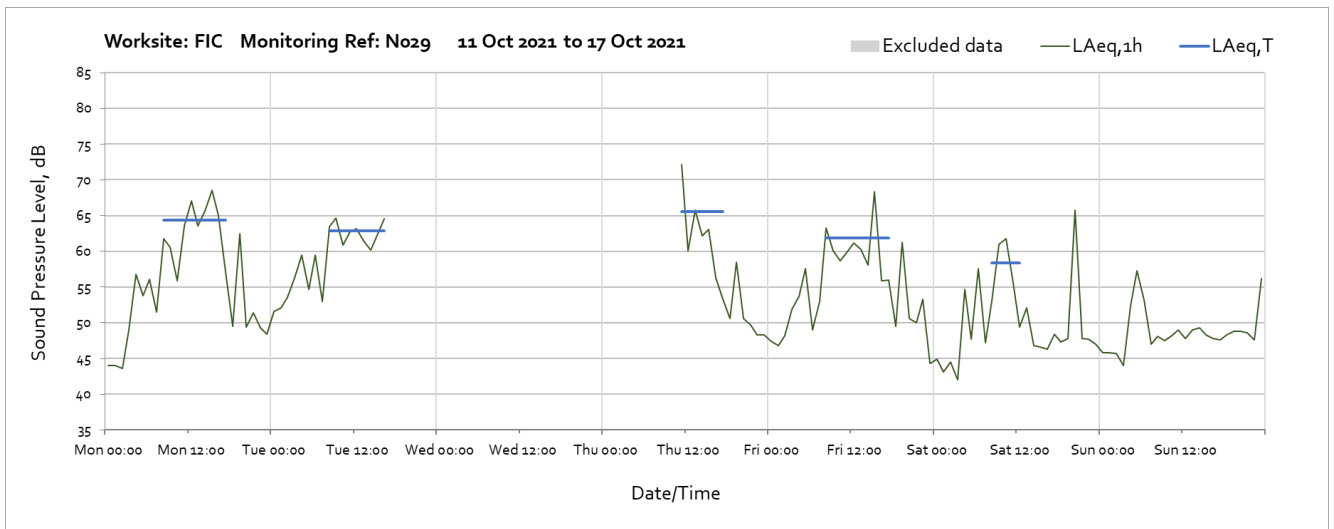
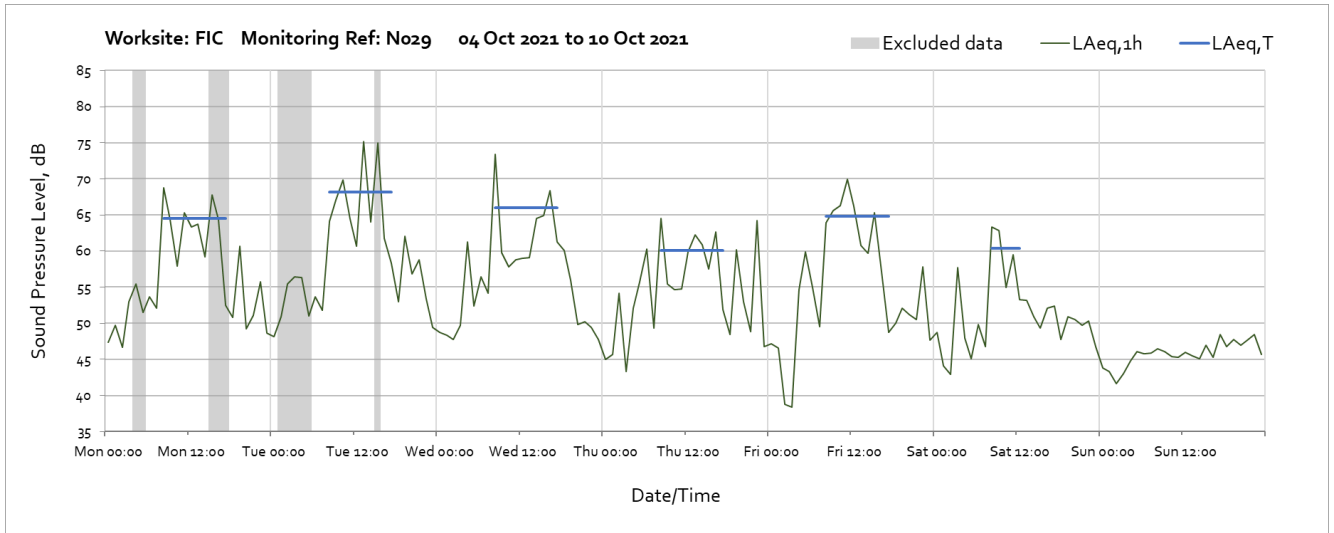
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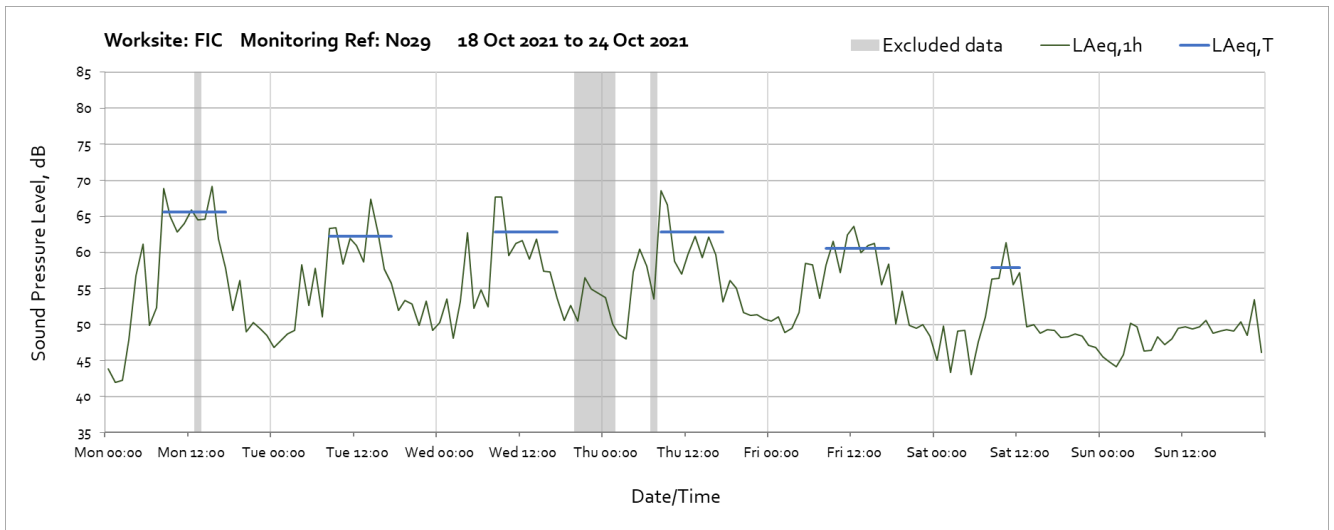


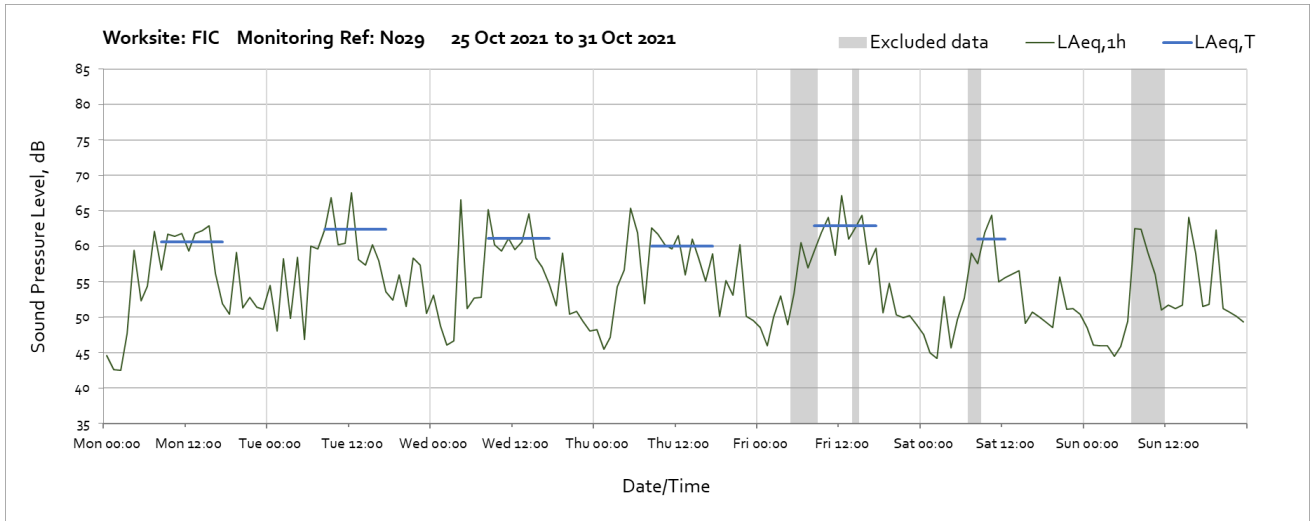
**Worksite: Flat Iron Compound (FIC) – Monitoring Ref: N029**



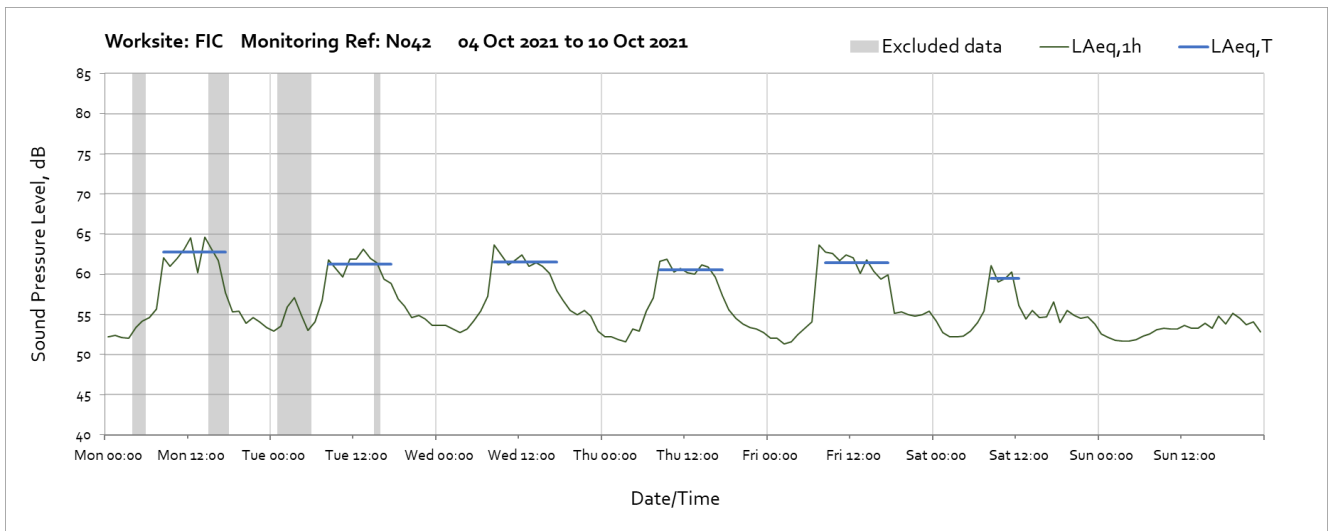
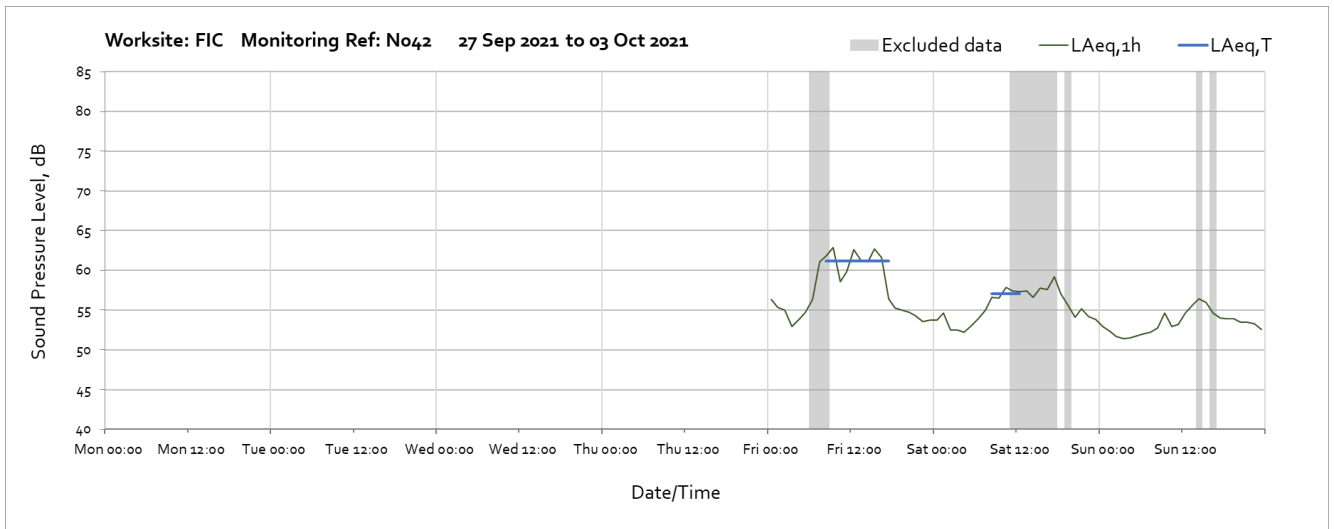


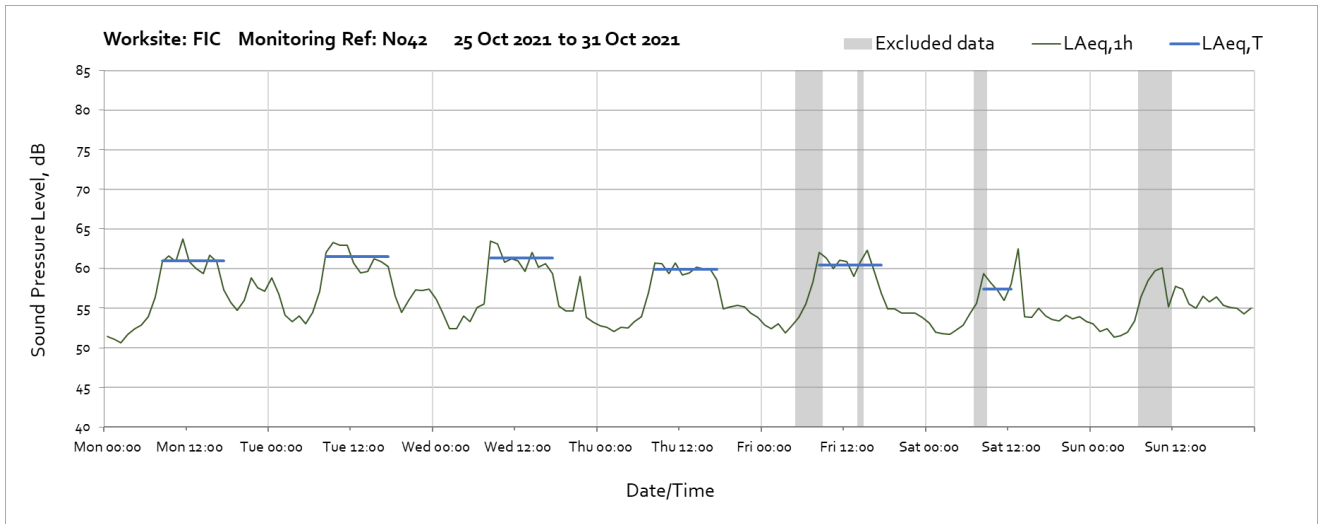
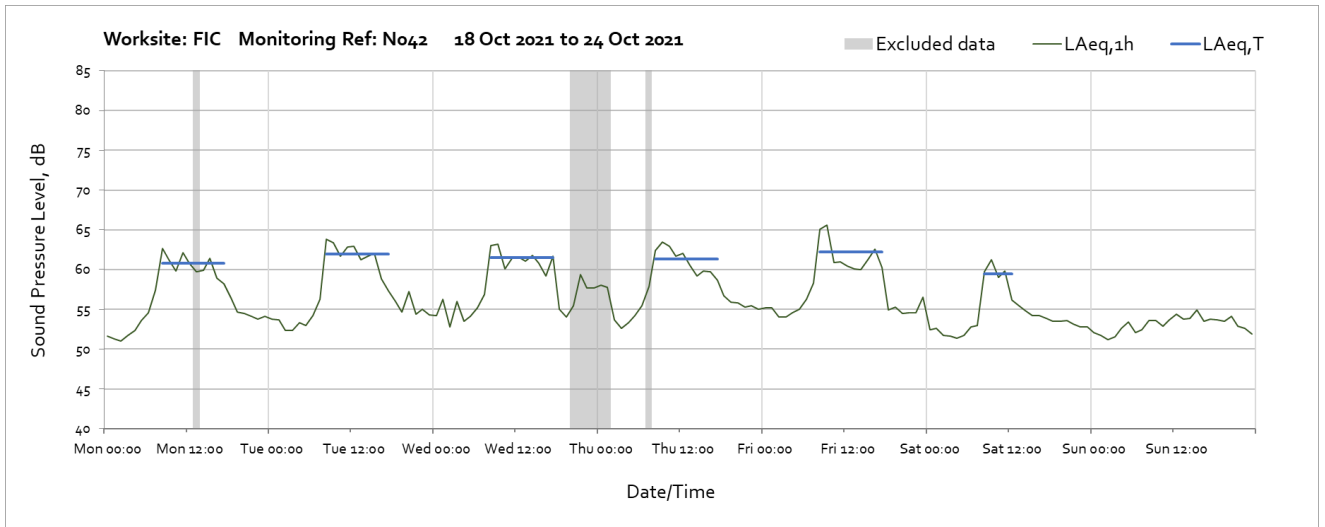
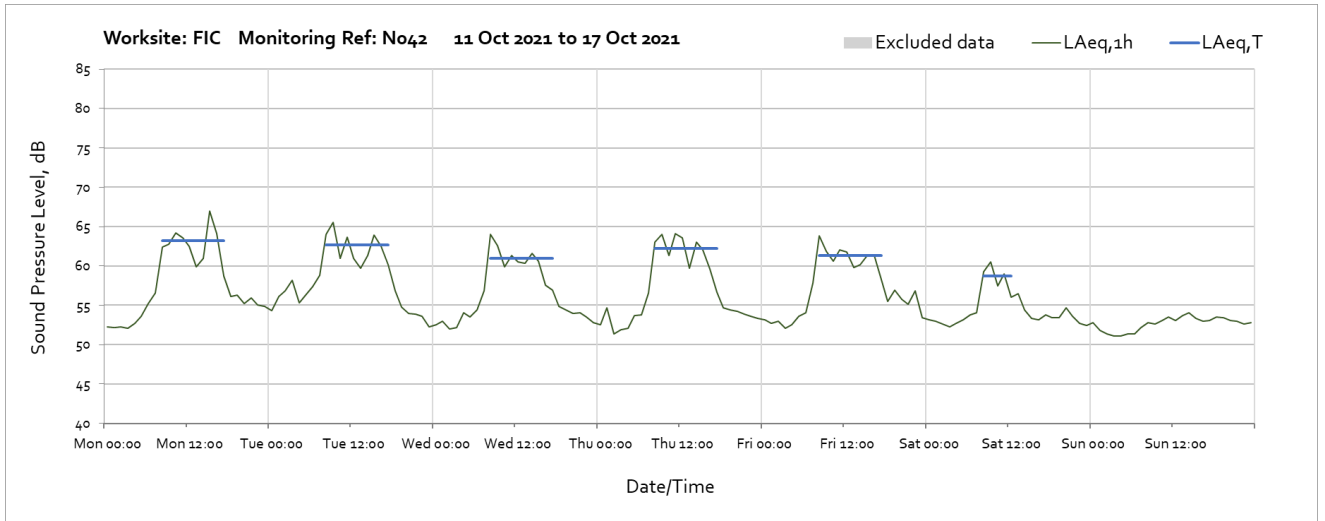
Note: Missing data between 17:00 on Tuesday 12<sup>th</sup> October and 07:00 on Thursday 14<sup>th</sup> October 2021 was due to memory card error and failure at the monitor location.



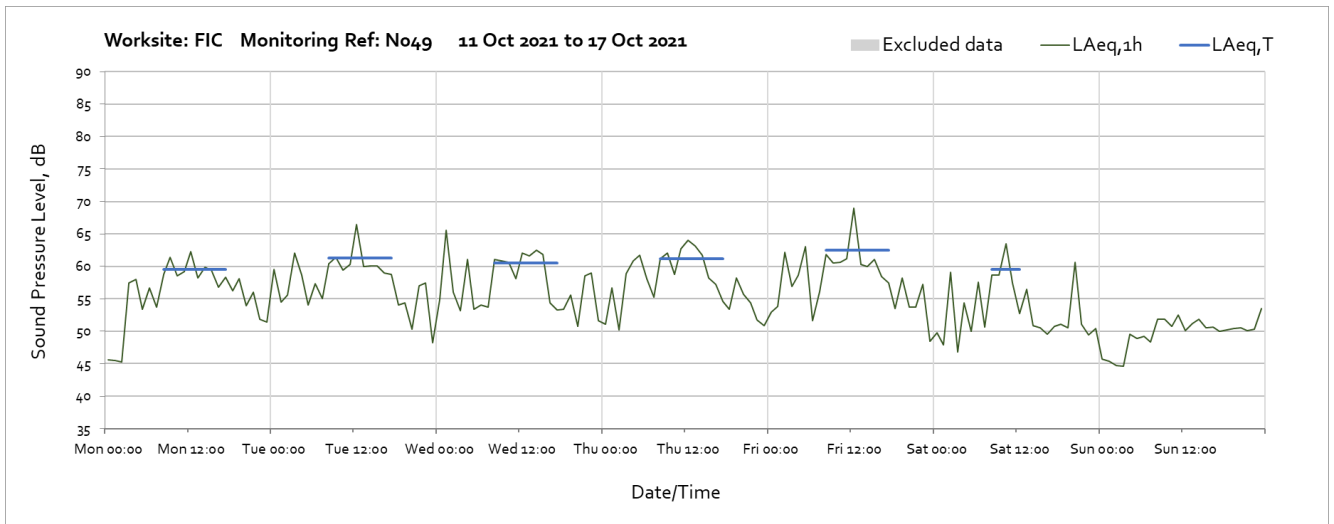
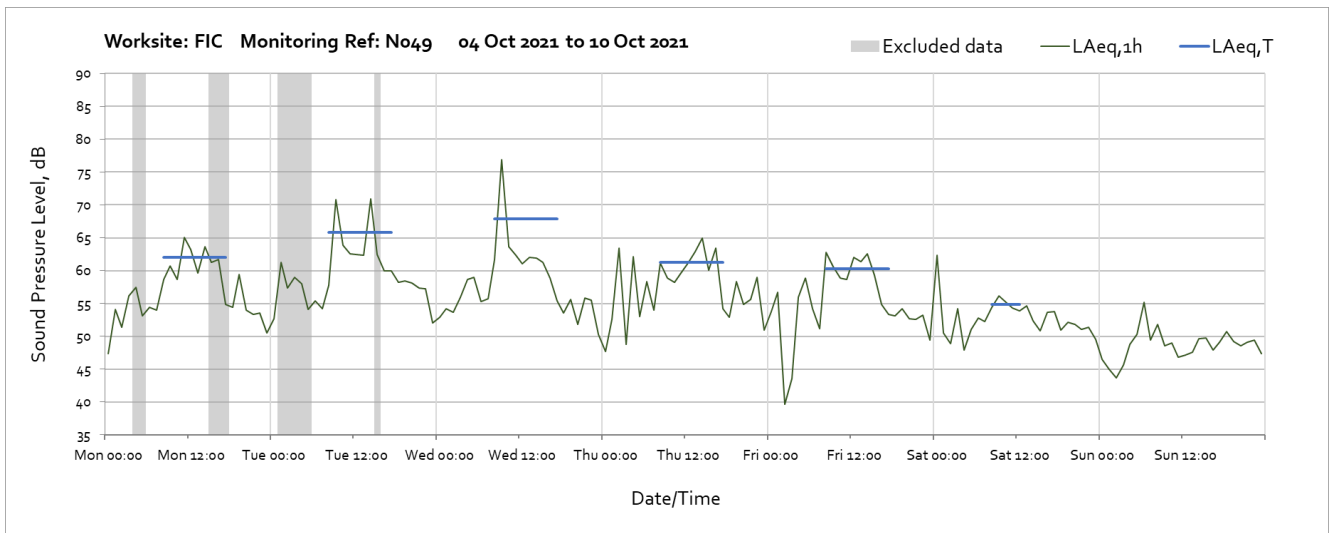
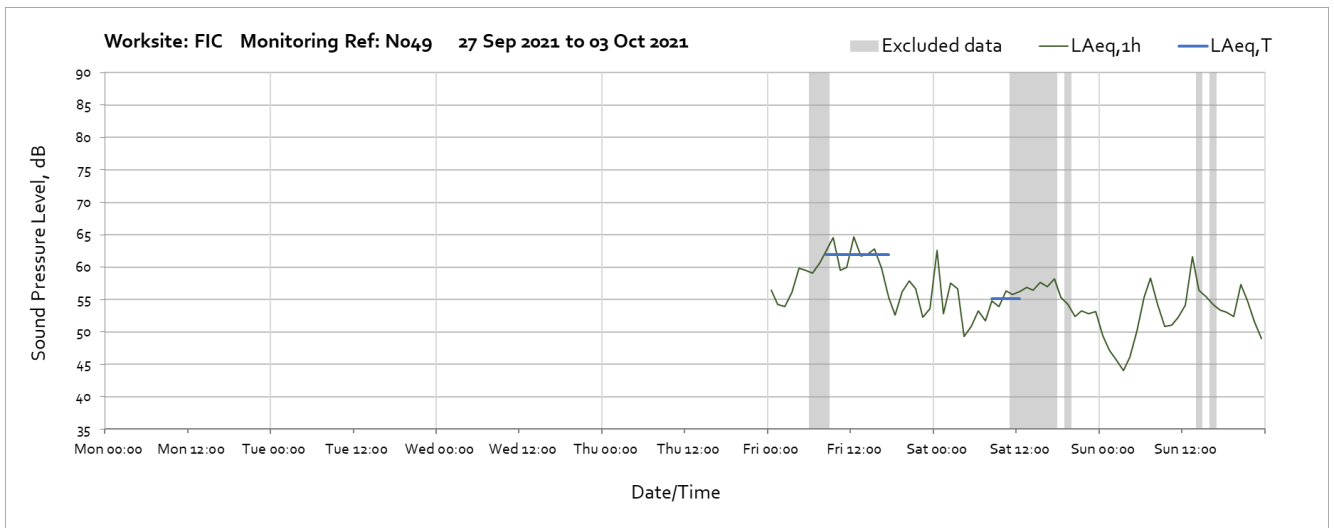


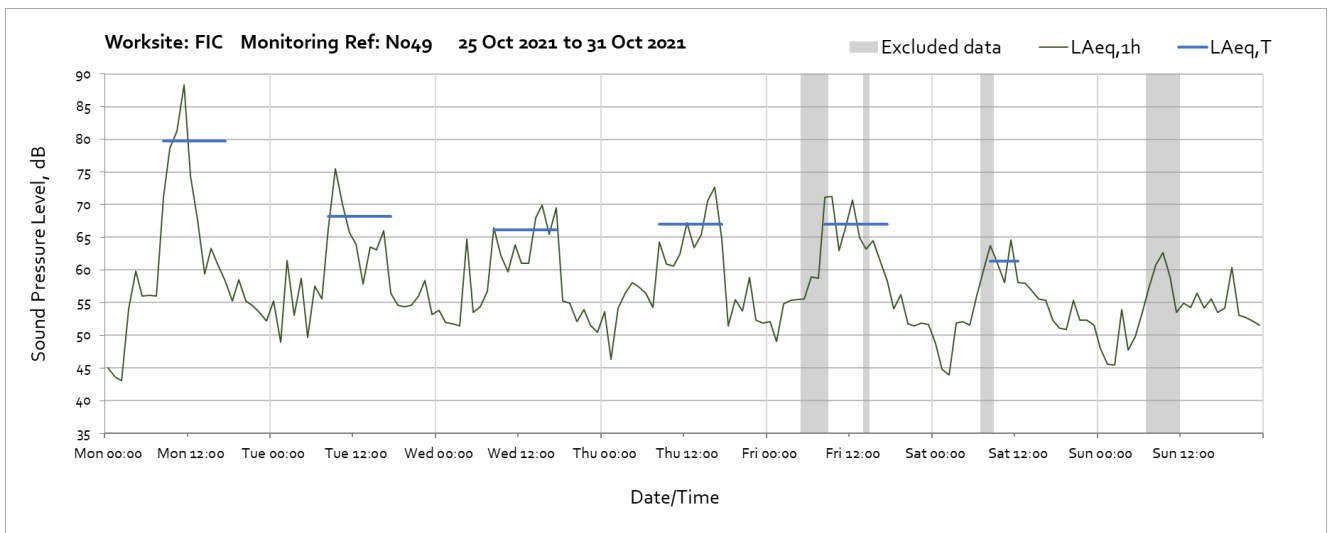
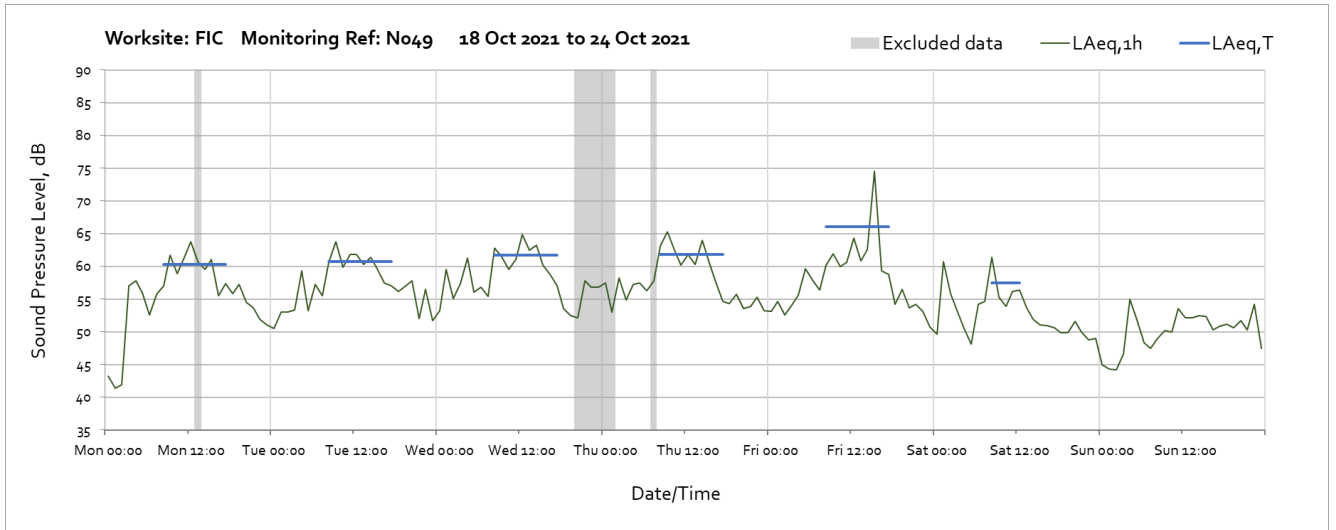
**Worksite: Flat Iron Compound (FIC) - Monitoring Ref: N042**



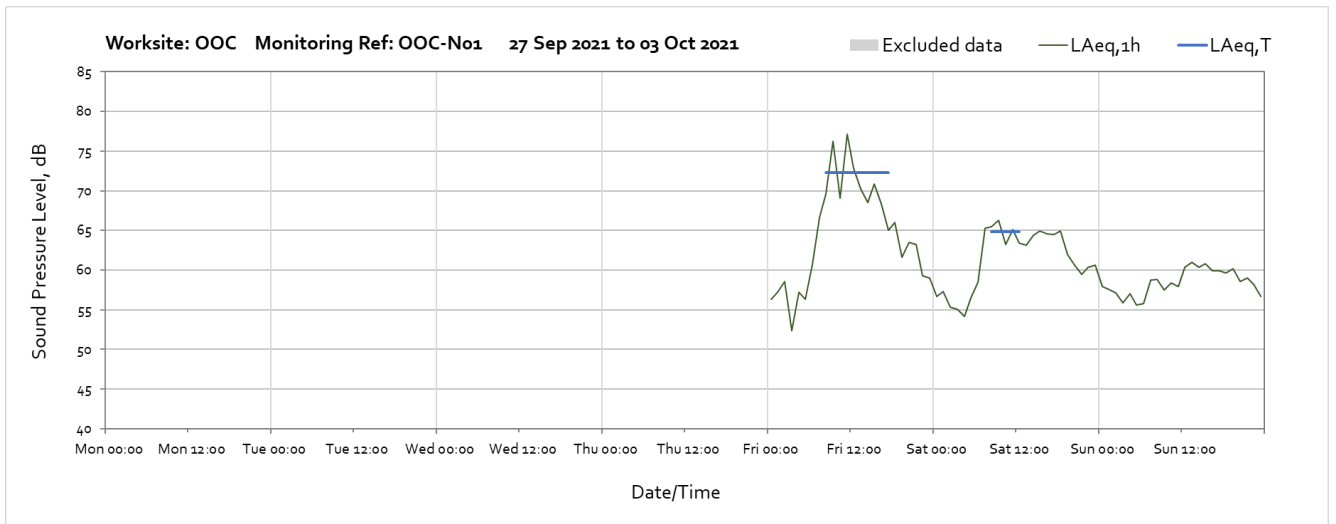


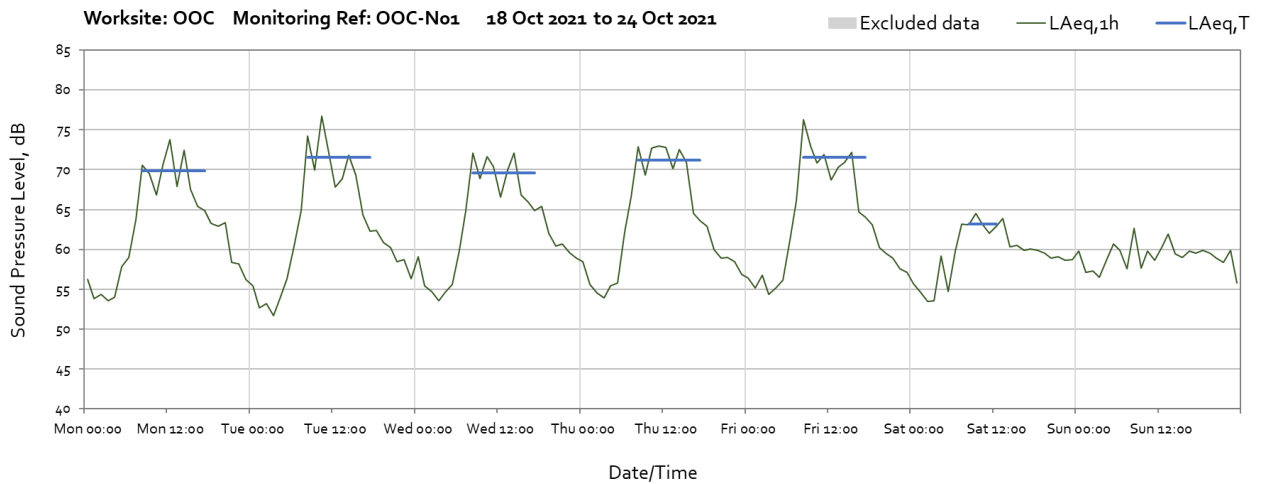
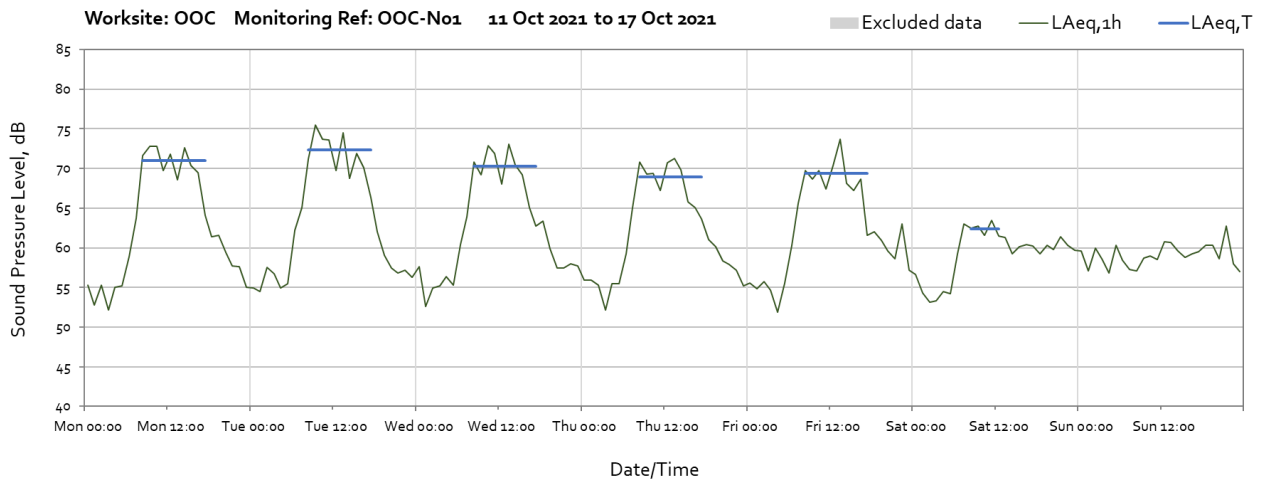
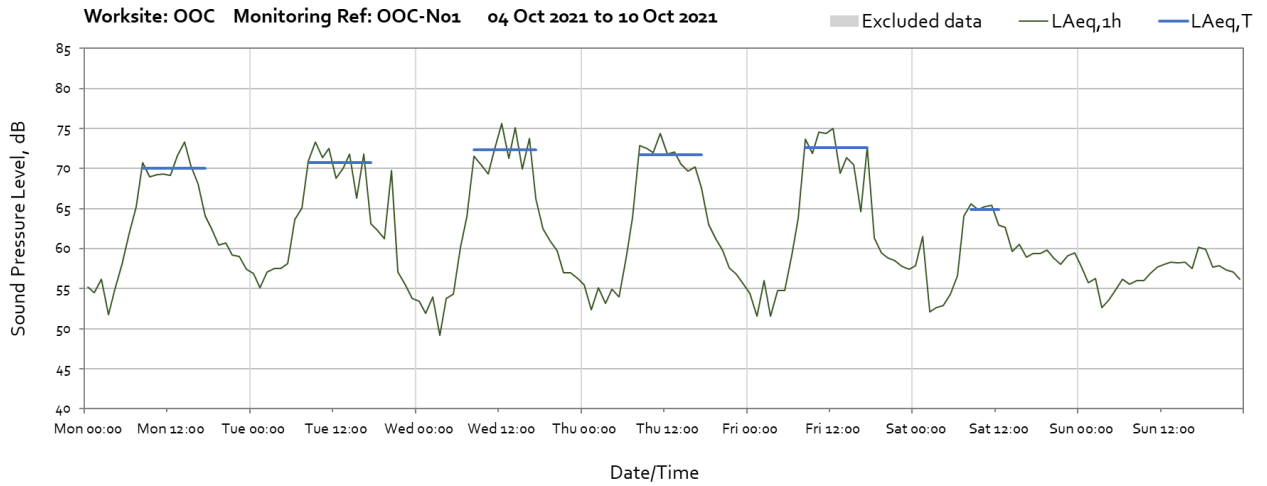
## Worksite: Flat Iron Compound (FIC) – Monitoring Ref: N049

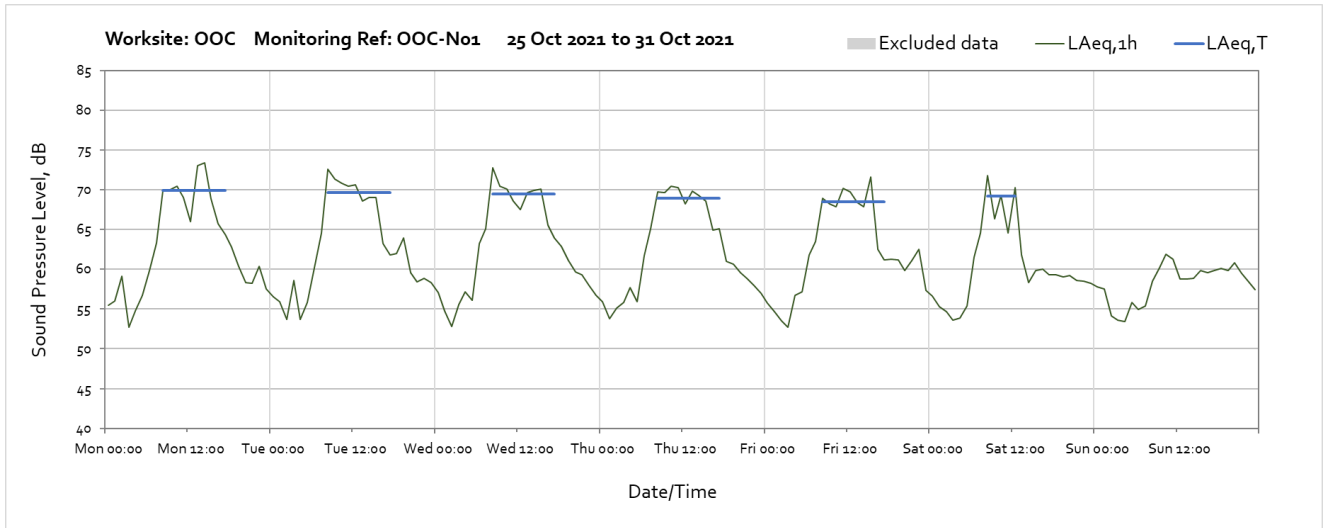




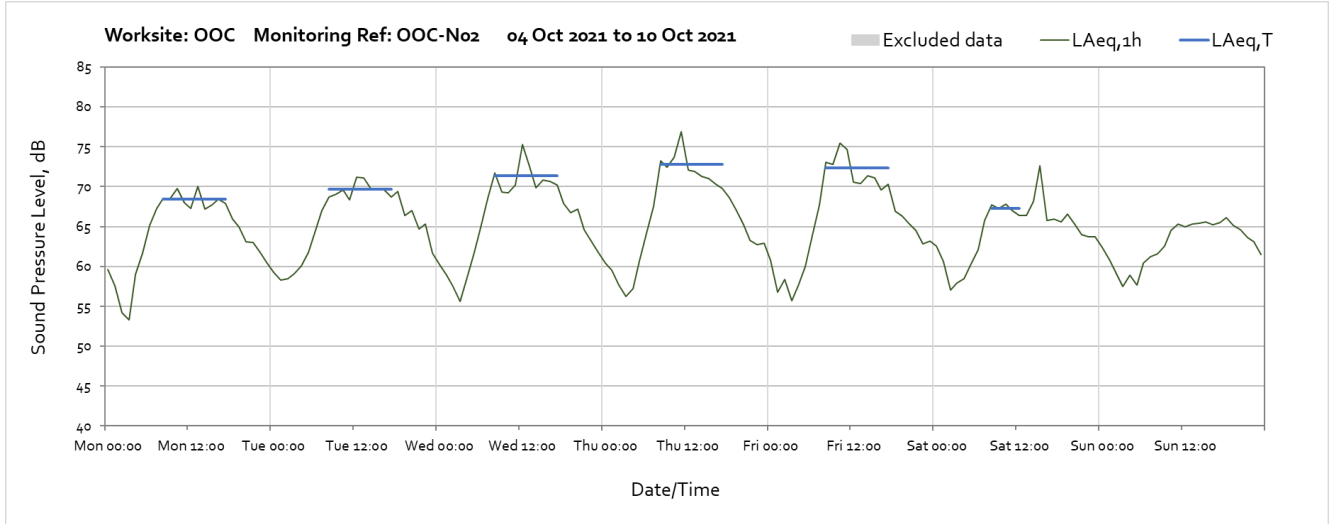
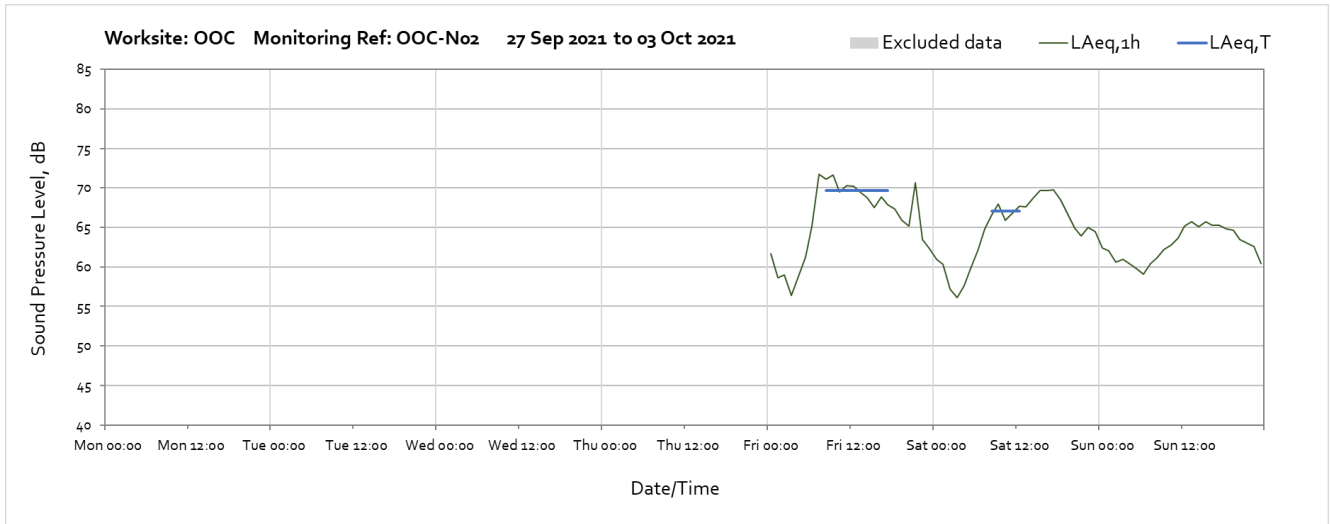
**Worksite: Oal Oak Common (OOC) - Monitoring Ref: OOC-N01**



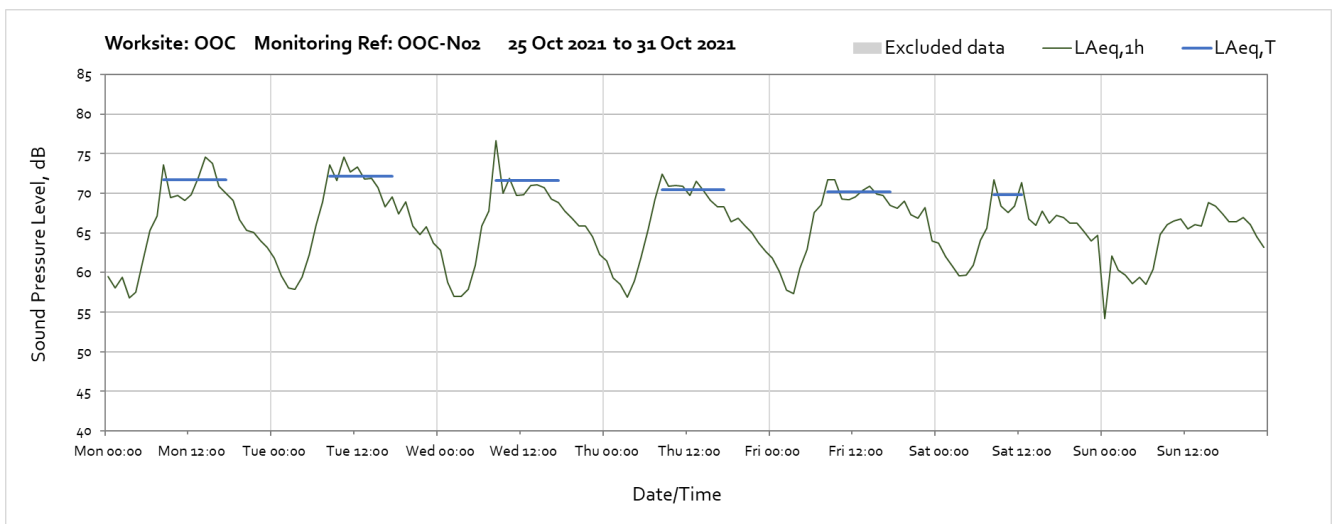
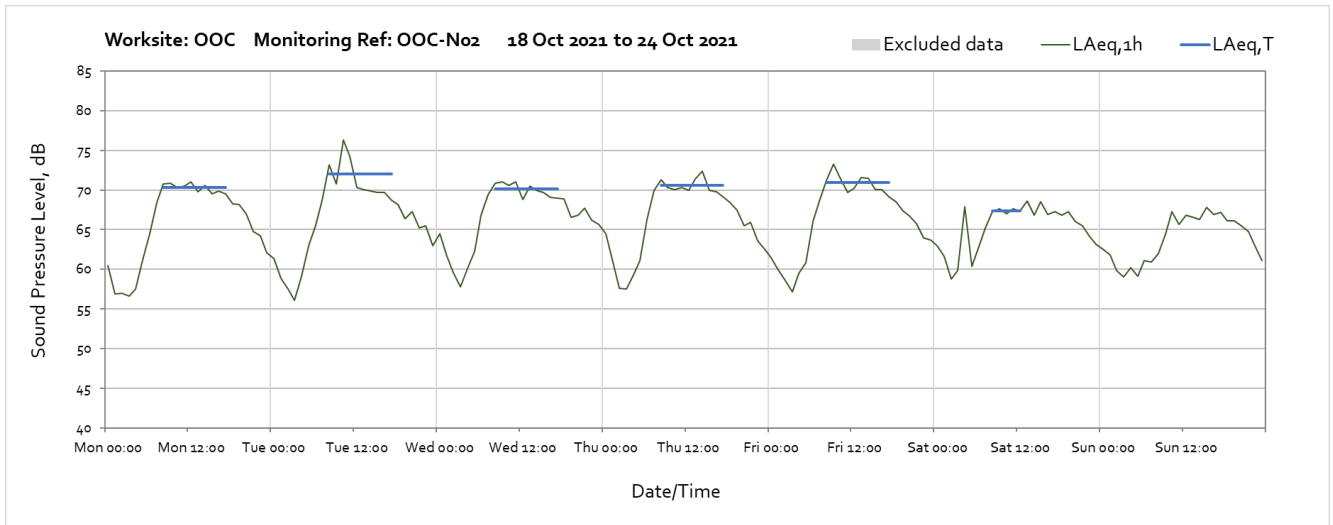
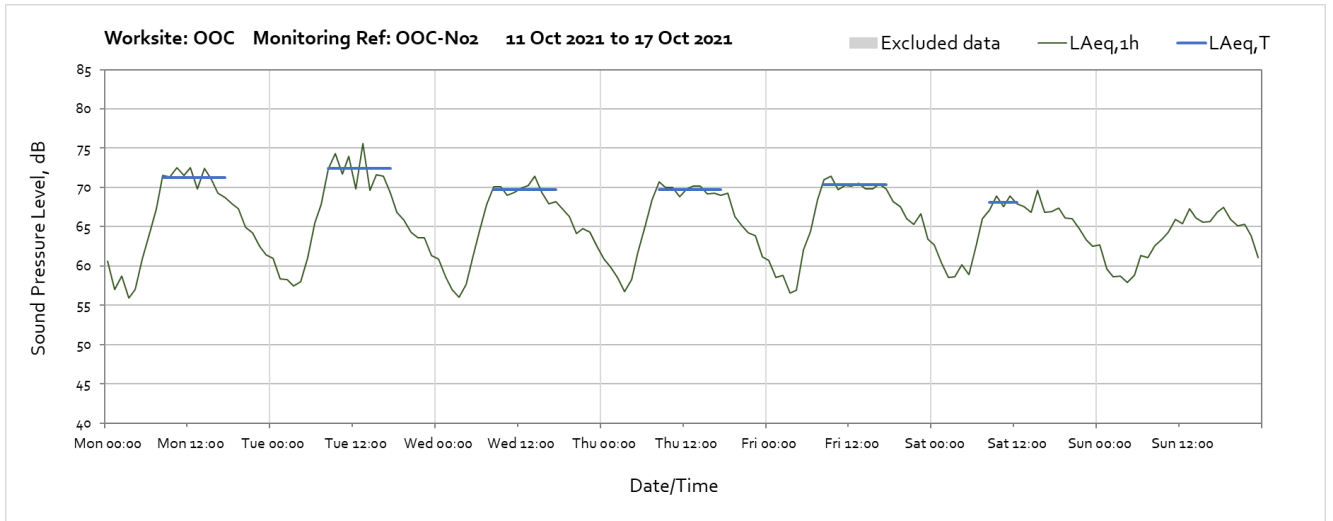




**Worksite: Oal Oak Common (OOC) – Monitoring Ref: OOC-N02**

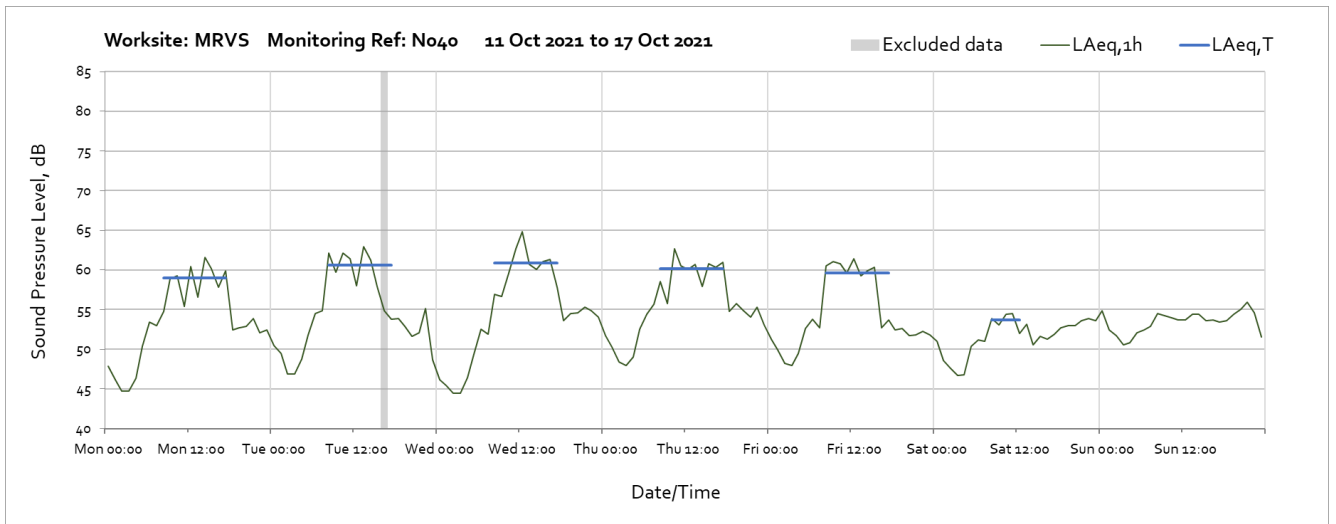
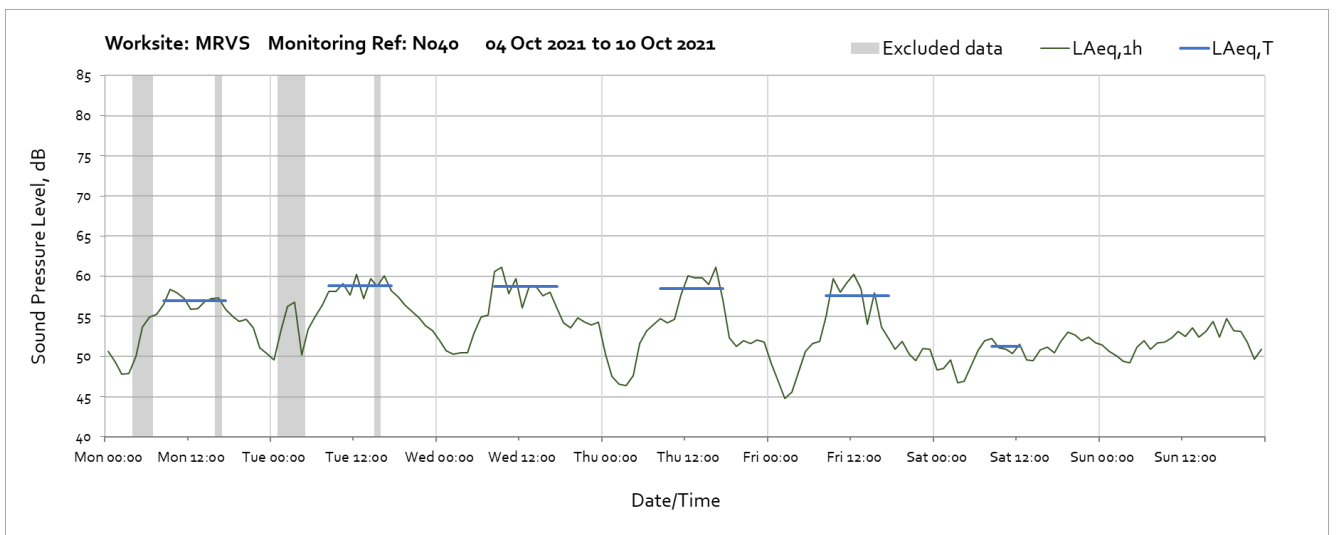
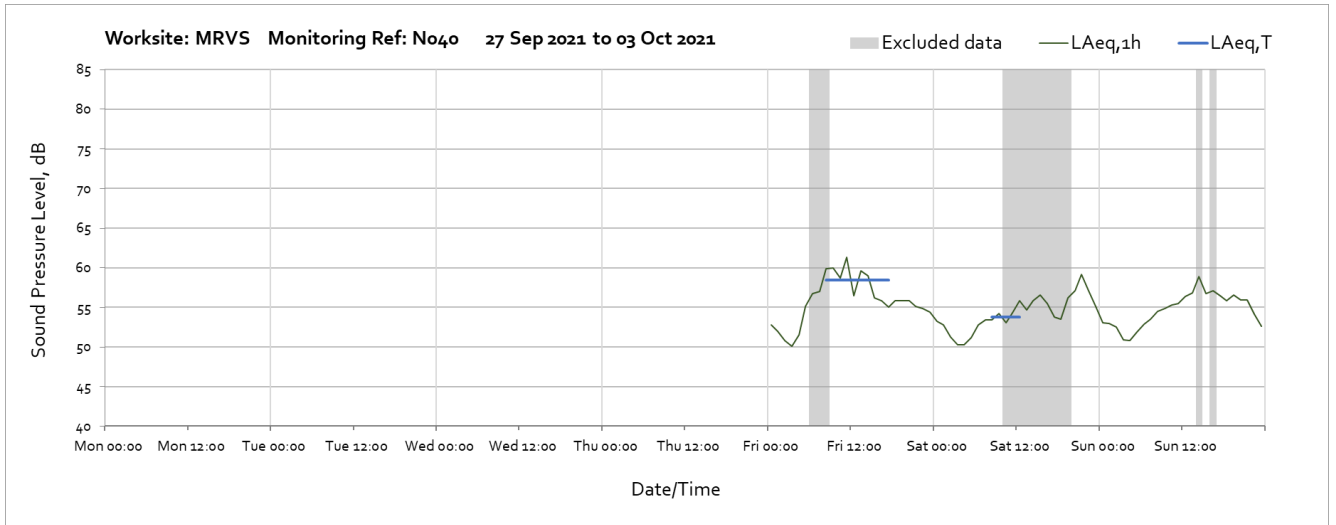


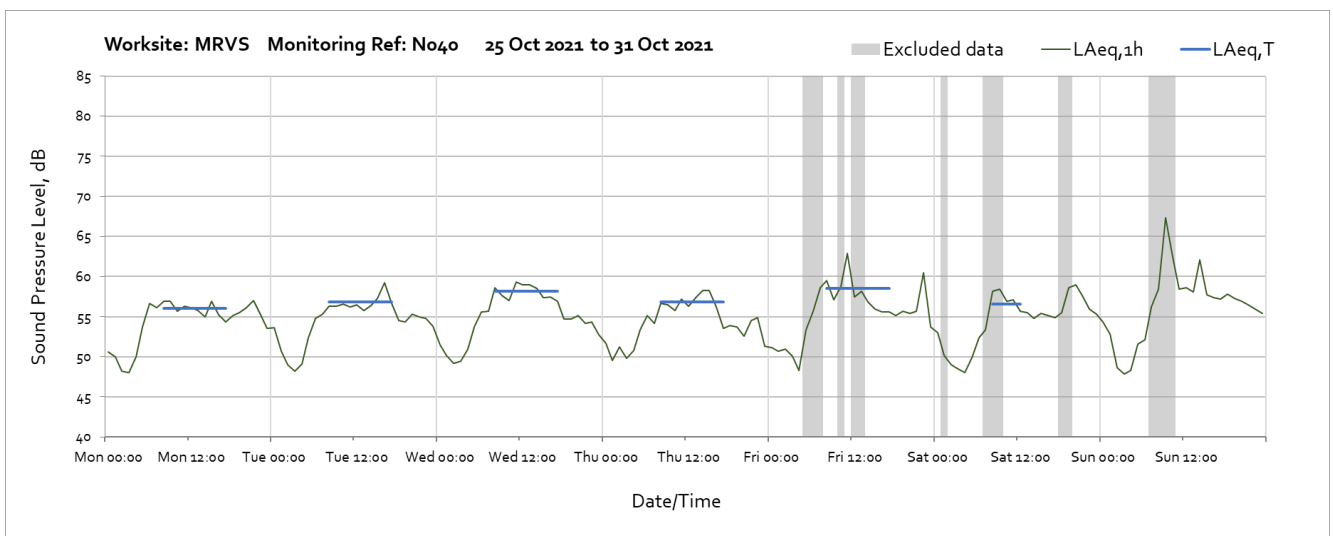
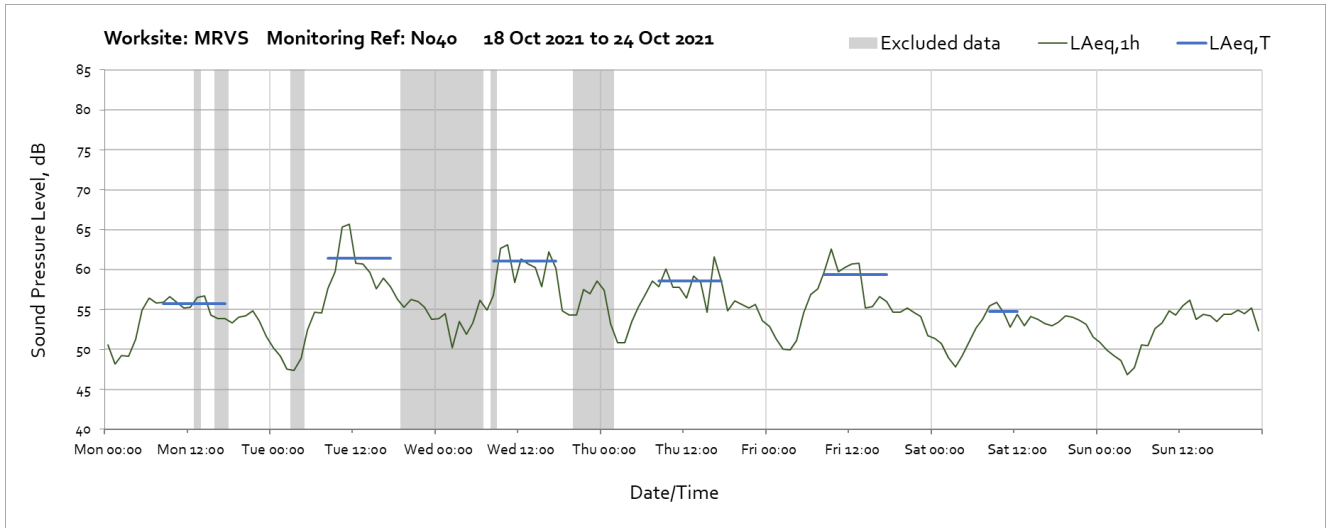




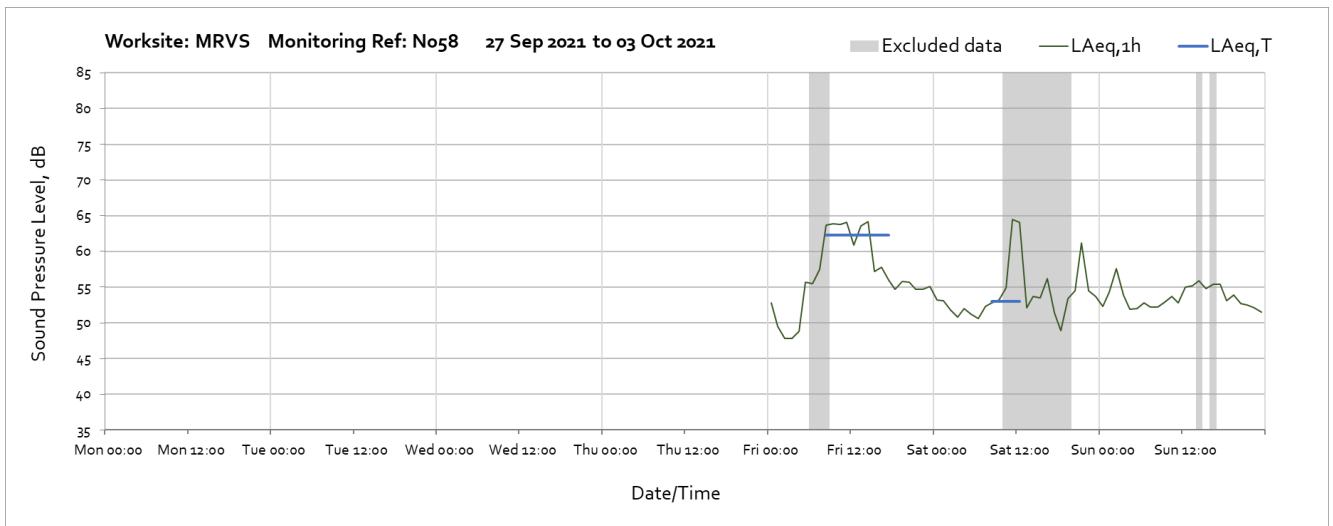
Note: Unusually low levels between 00:00 and 01:00 on the 31<sup>st</sup> October have been excluded due to a daylight saving adjustment.

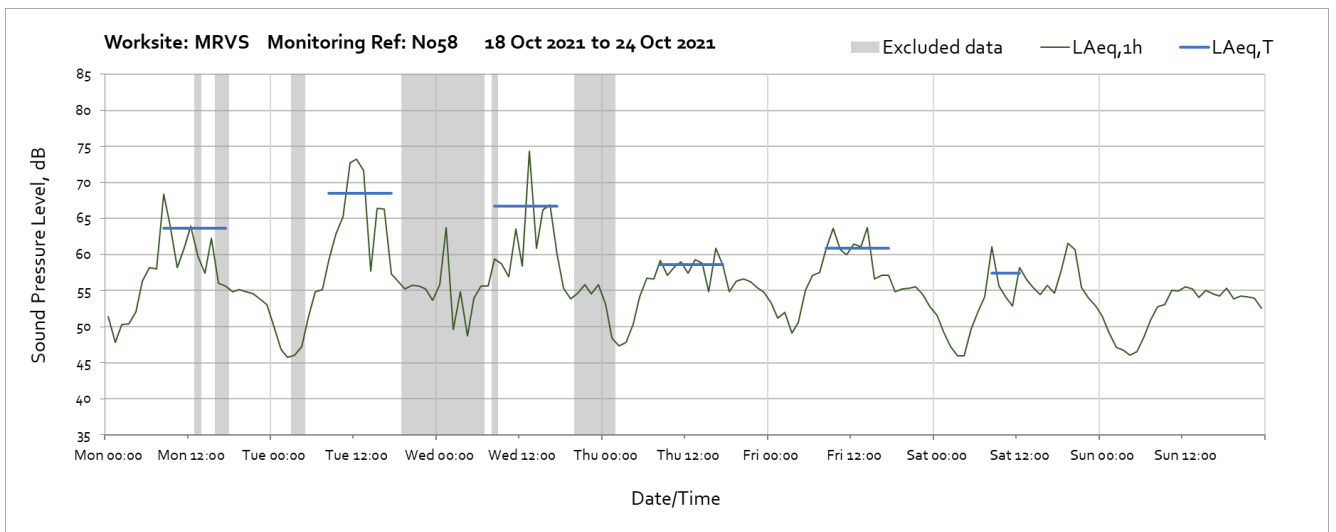
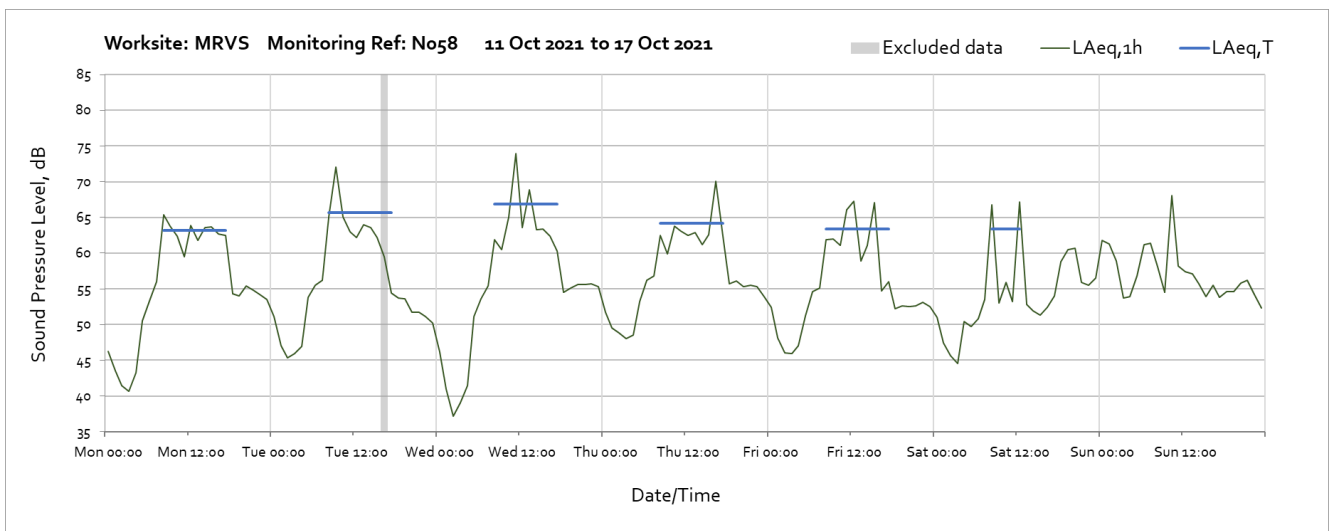
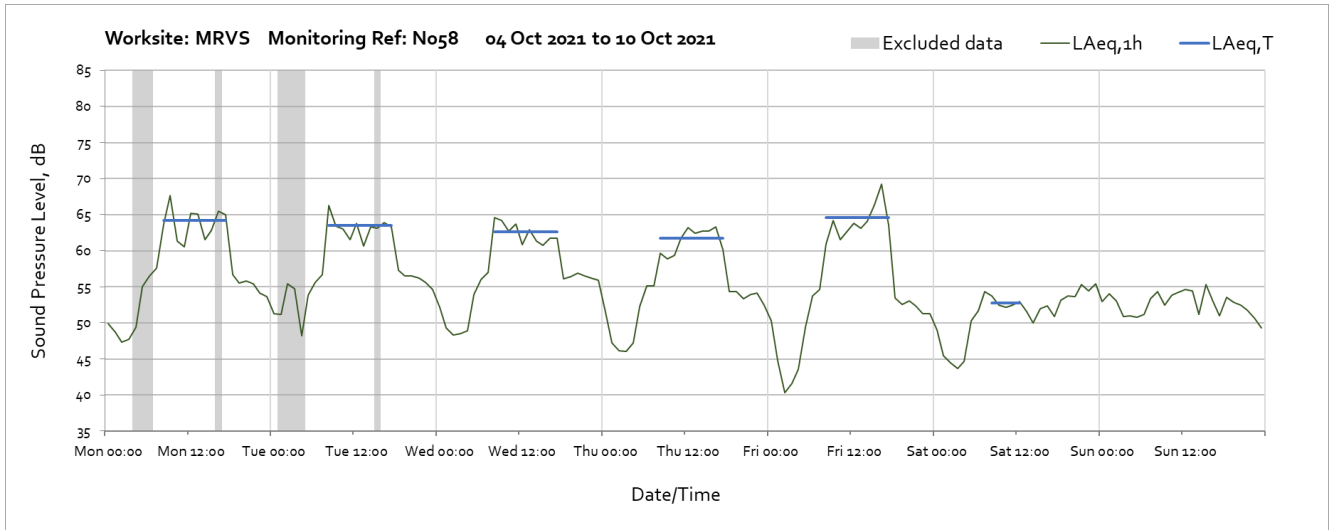
## Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N040

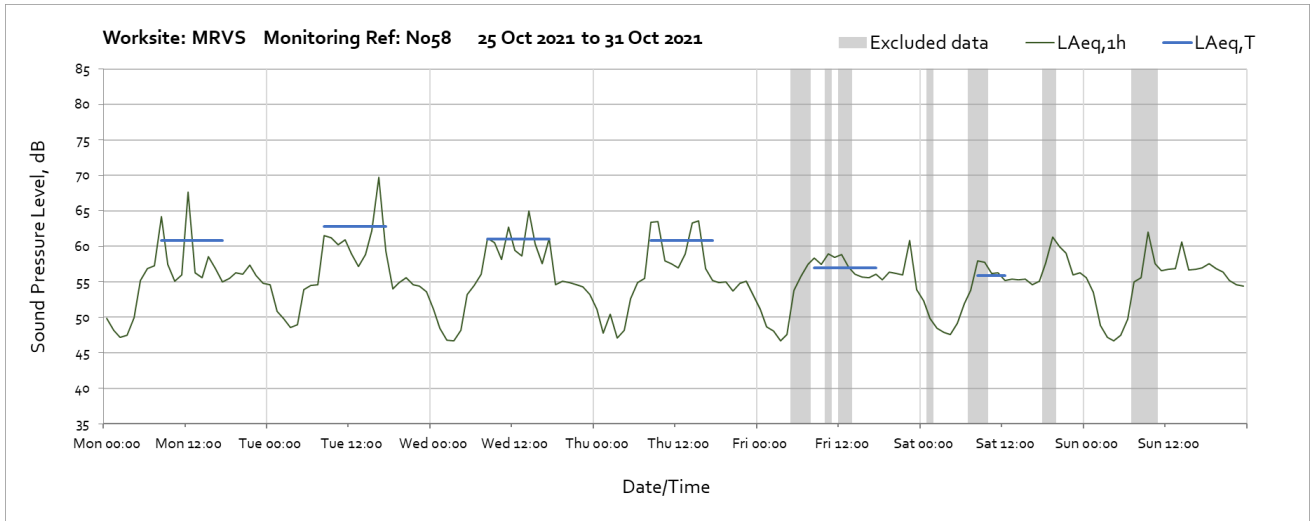




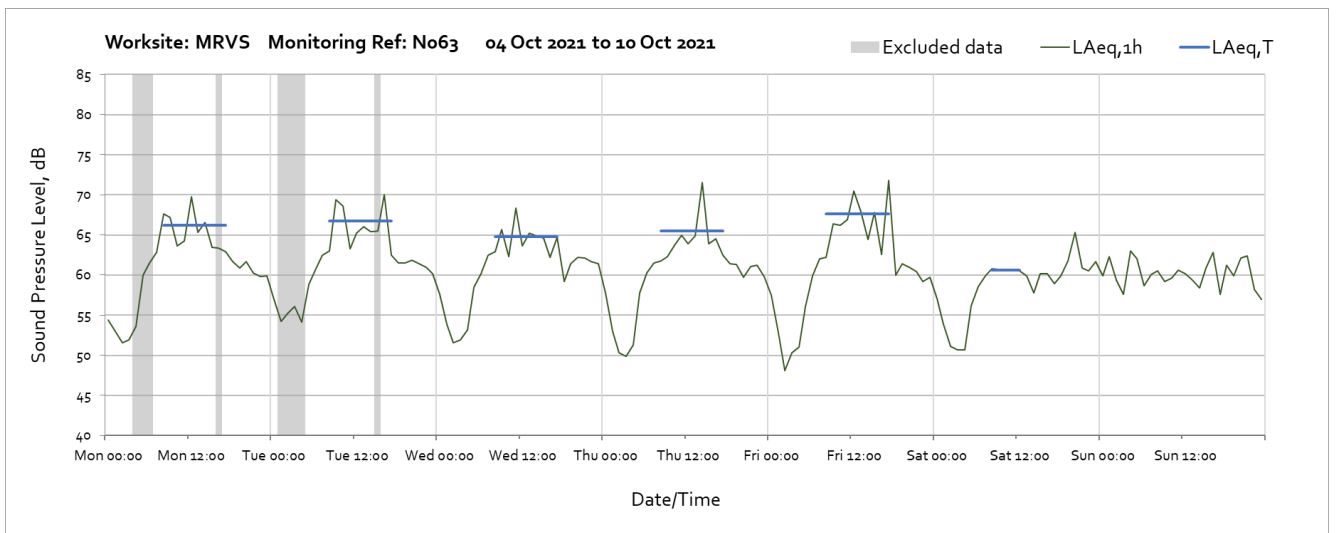
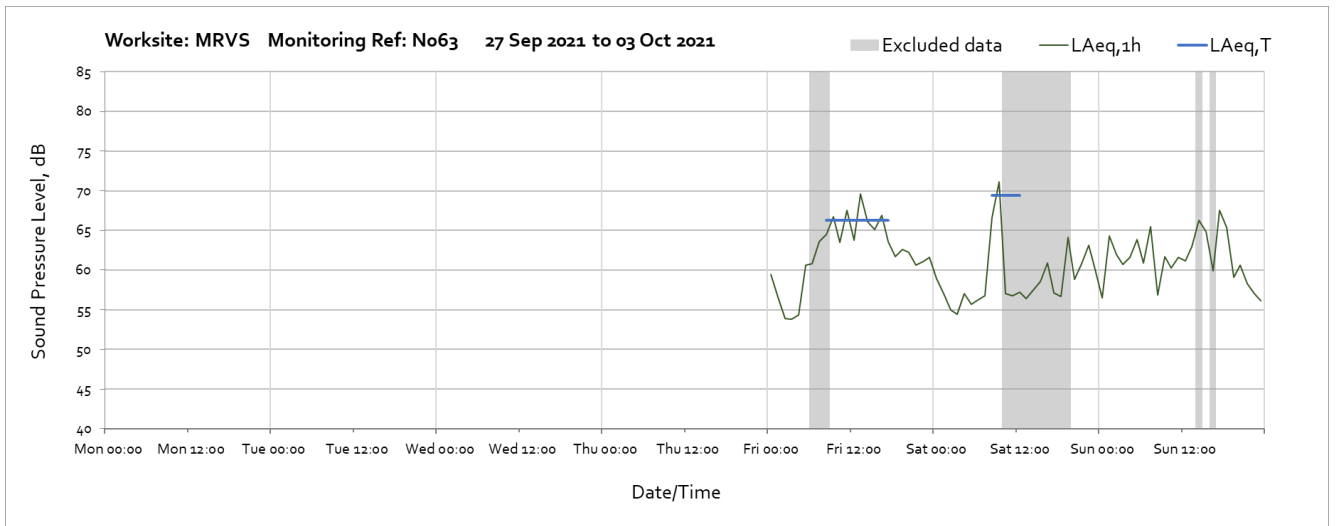
**Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N058**

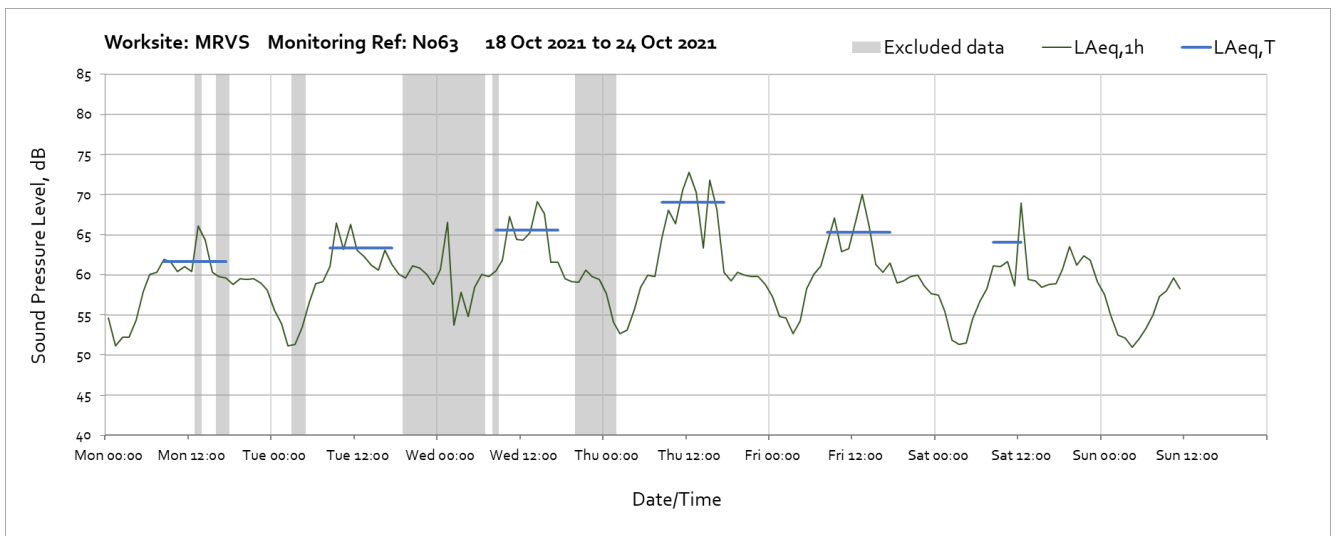
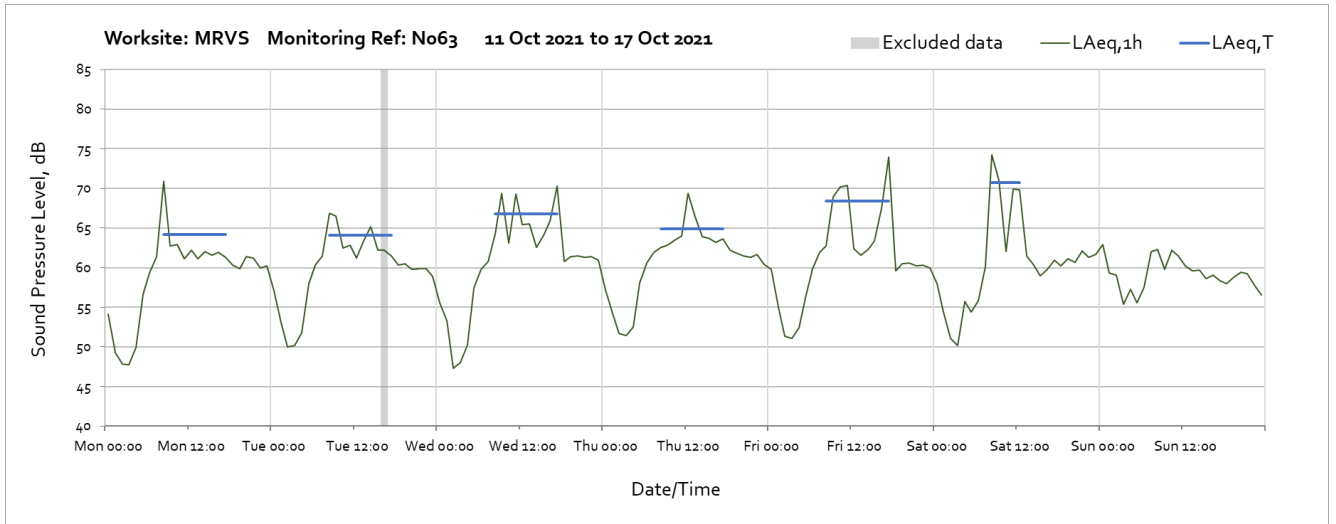




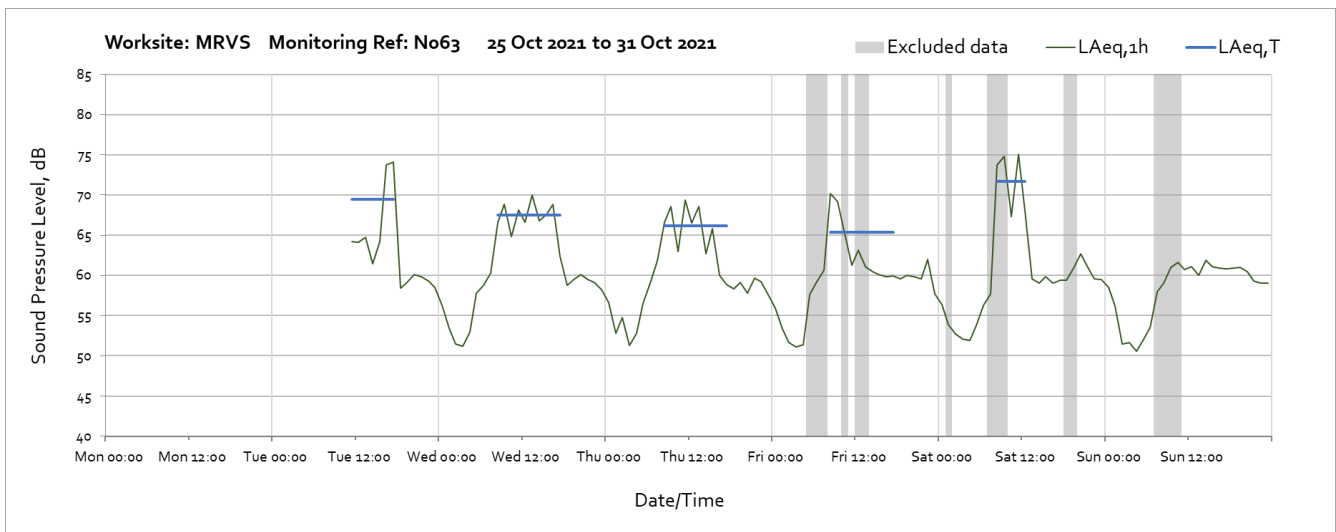


**Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N063**





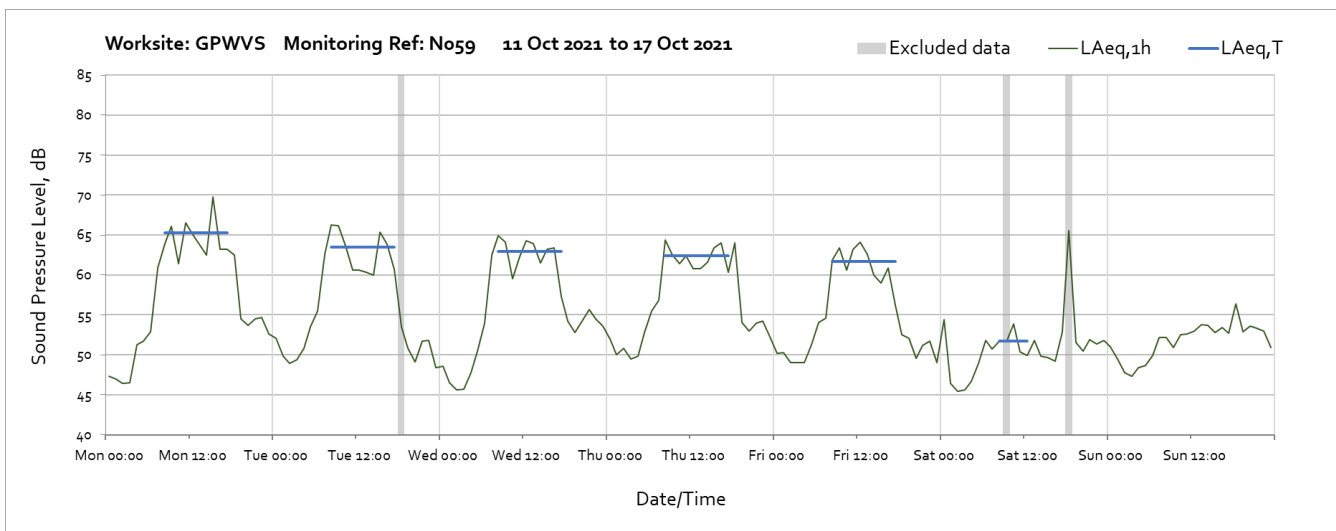
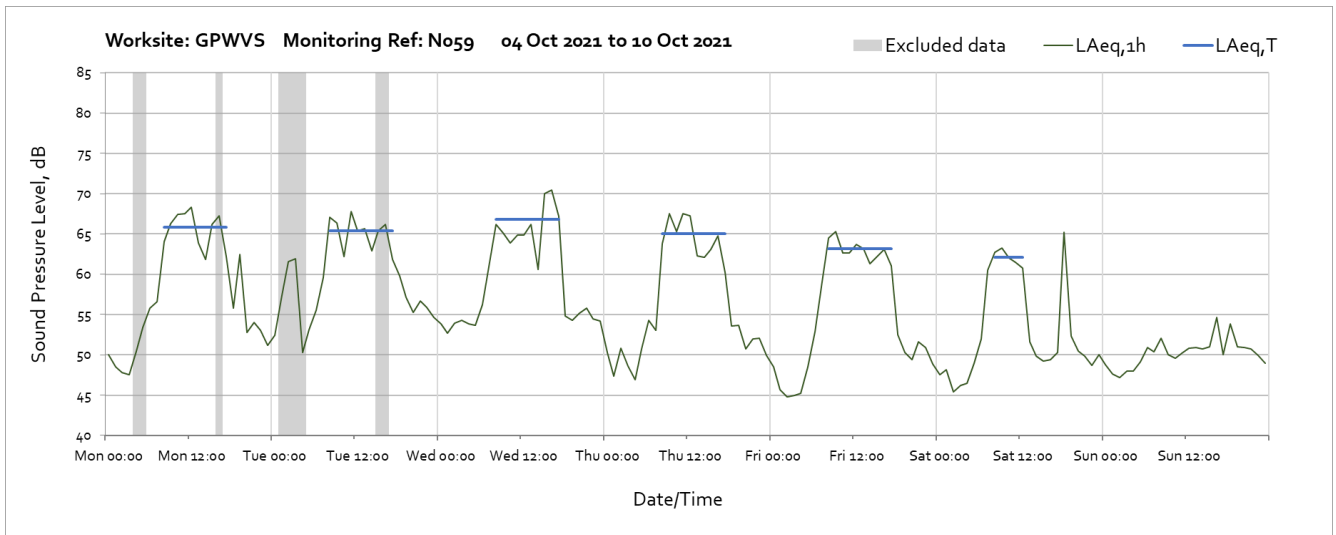
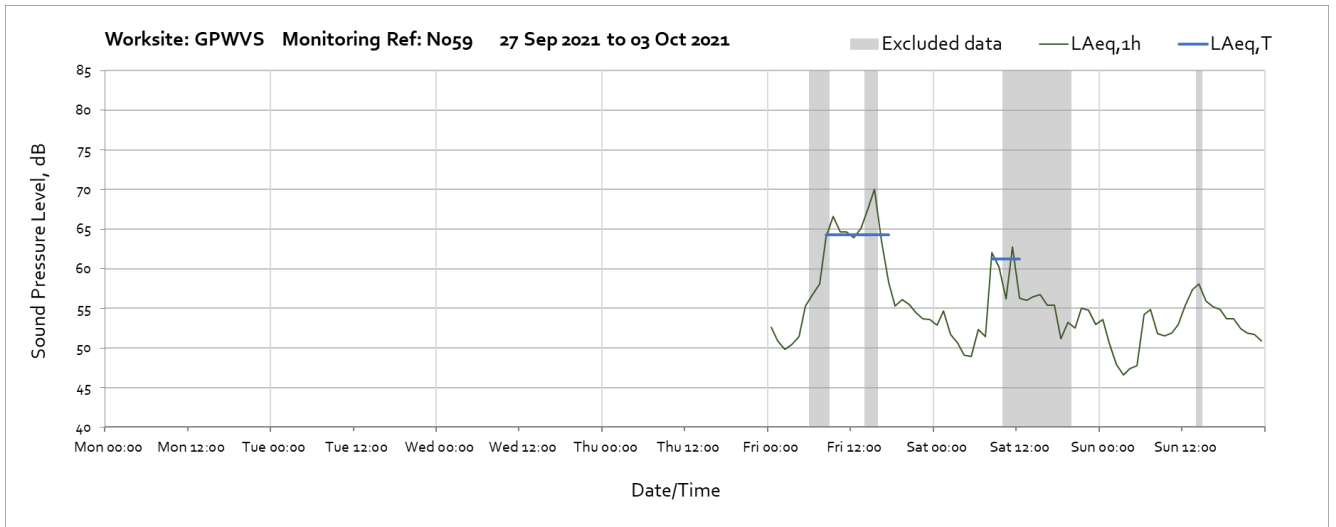
Note: Missing data between 12:00 on Sunday 24<sup>th</sup> October and 11:00 on Tuesday 26<sup>th</sup> October was due loss of continuous power at the monitoring station.

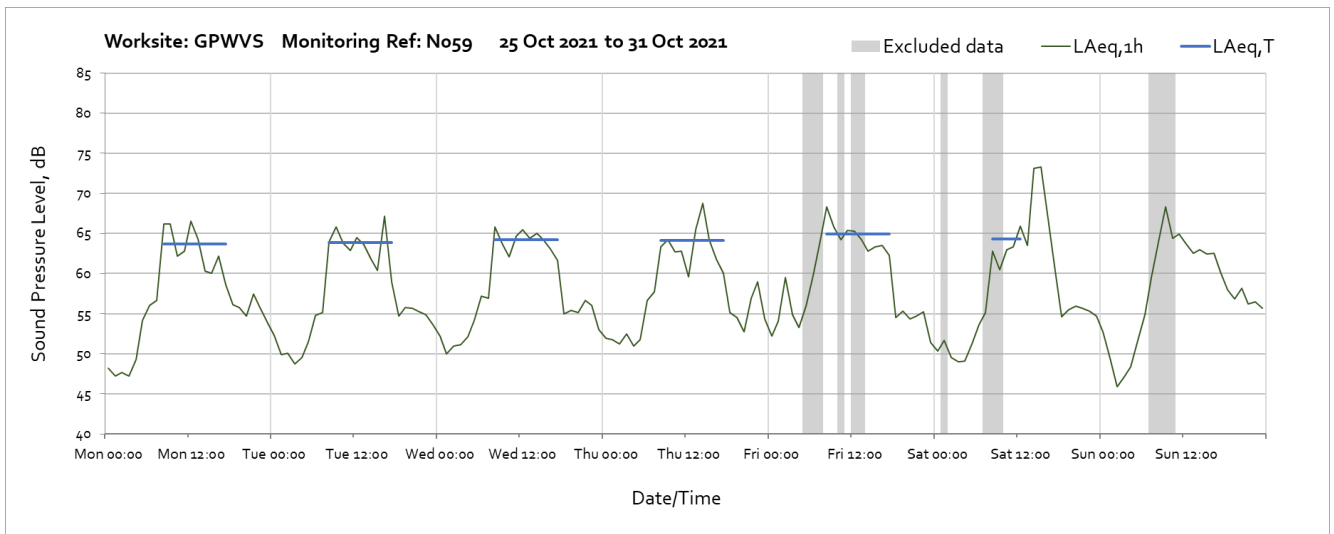
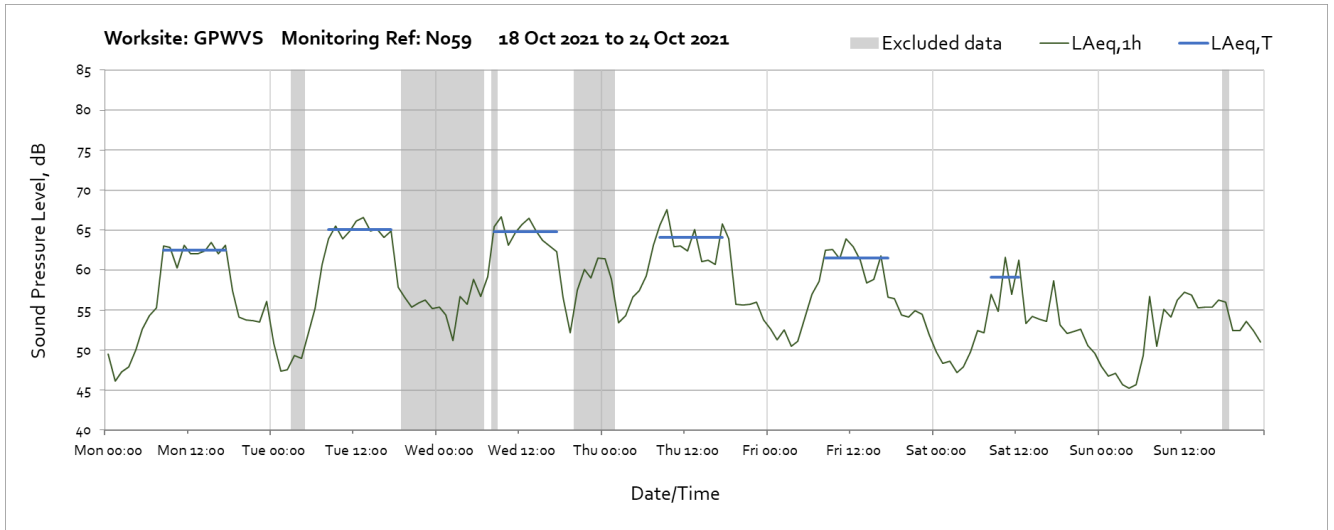


Note: Missing data between 12:00 on Sunday 24<sup>th</sup> October and 11:00 on Tuesday 26<sup>th</sup> October was due loss of continuous power at the monitoring station.

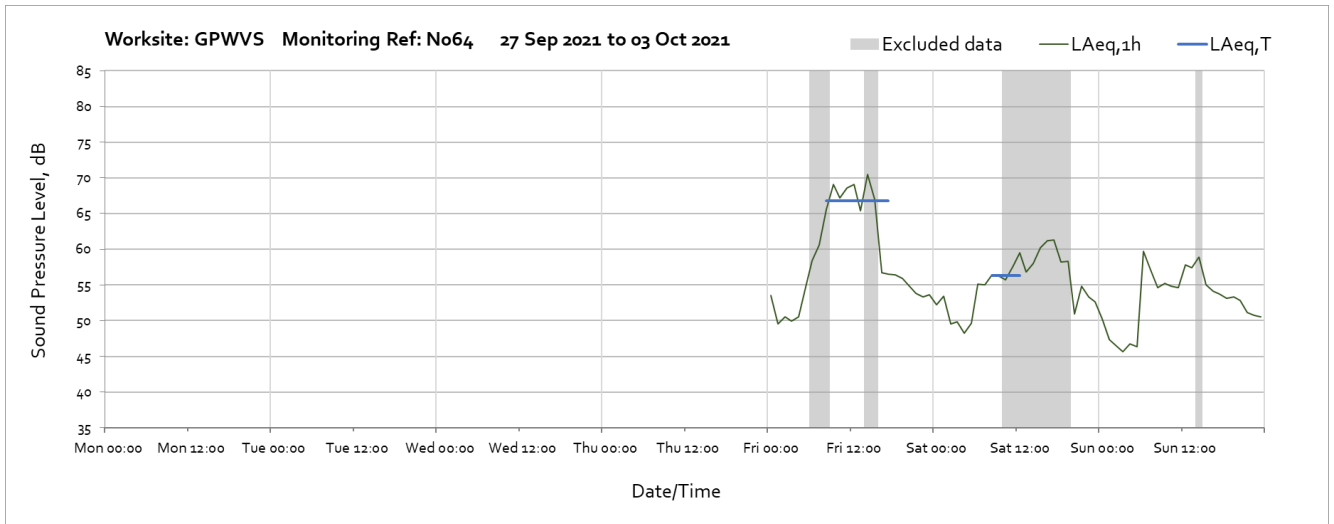
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## Worksite: Green Park Way Vent Shaft (GPWVS) - Monitoring Ref: N059

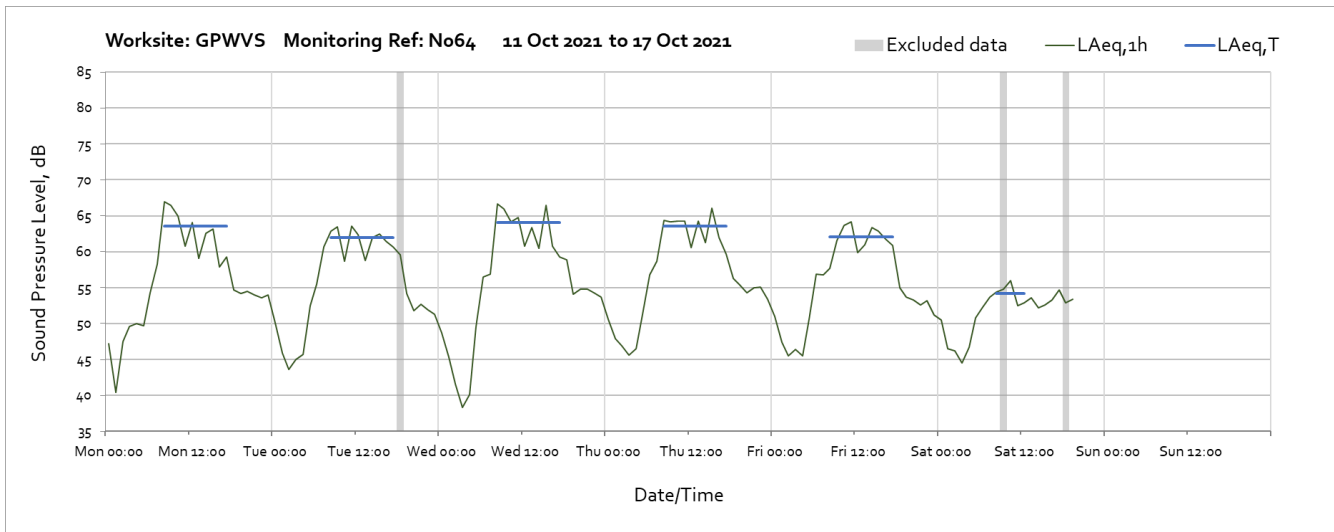
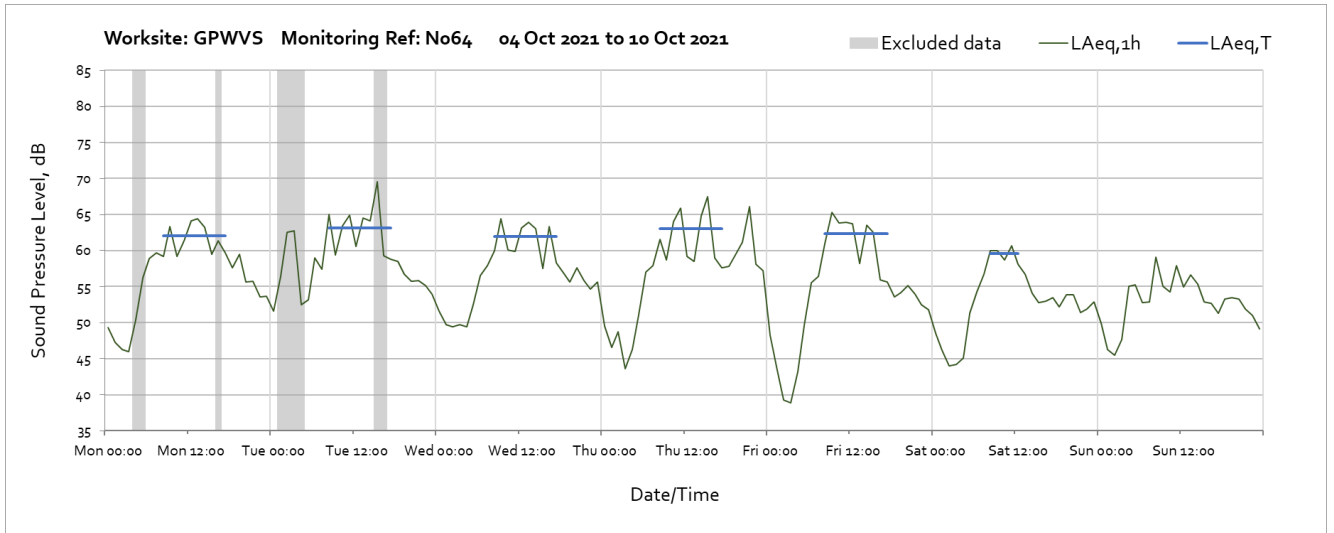




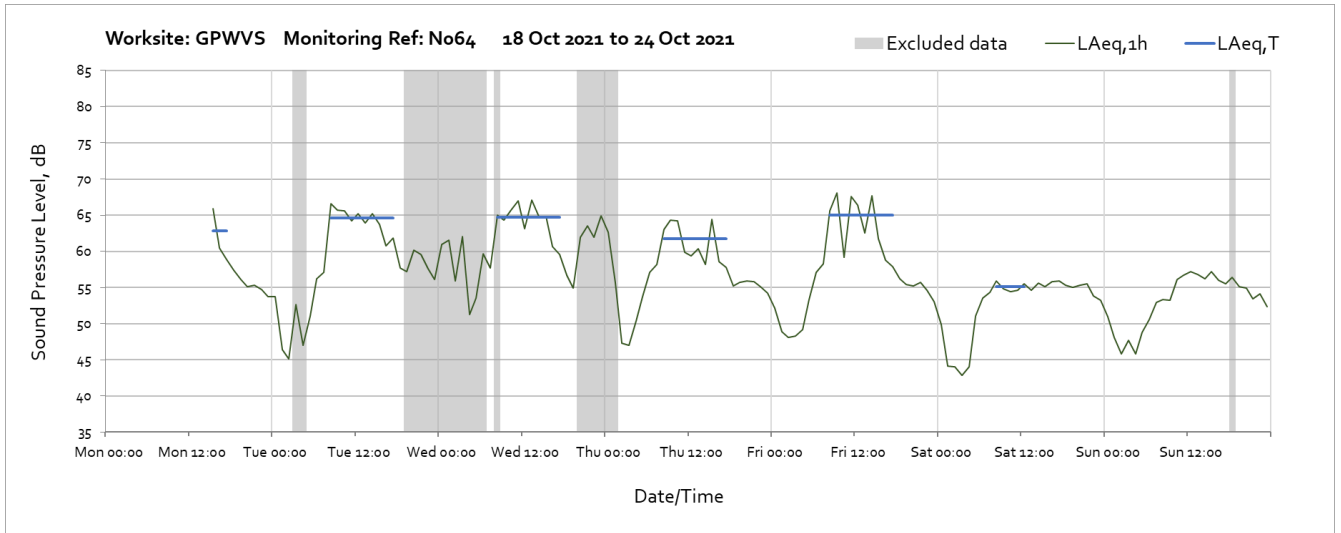
**Worksite: Green Park Way Vent Shaft (GPWVS) - Monitoring Ref: N064**



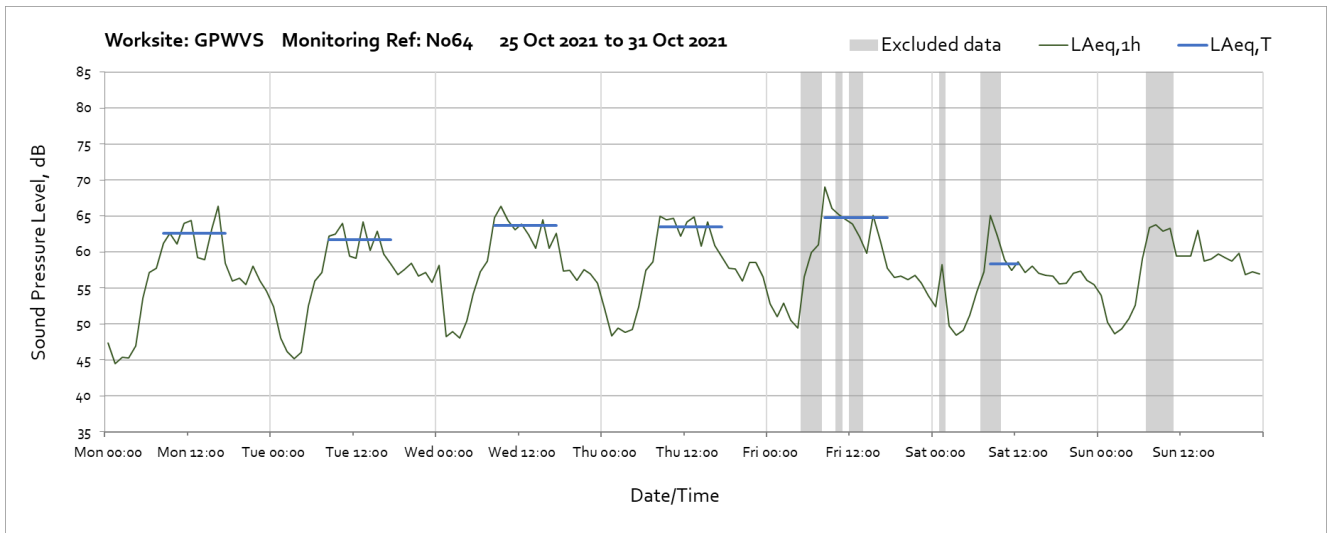




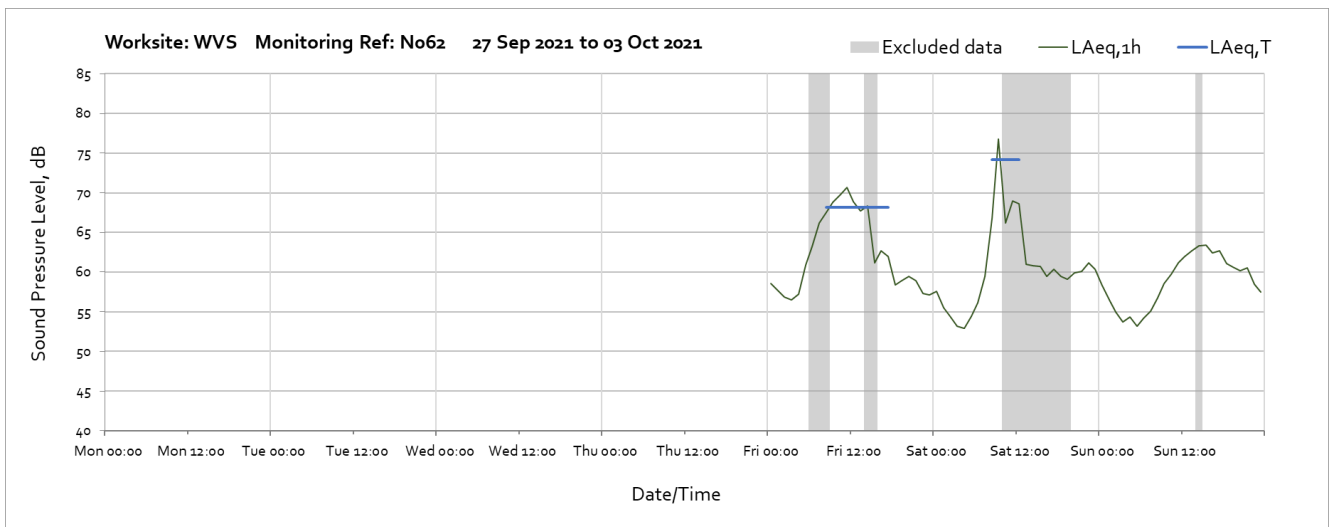
Note: Missing data between 20:00 on Saturday 16<sup>th</sup> October and 15:00 on Monday 18<sup>th</sup> October was due loss of continuous power at the monitoring station.

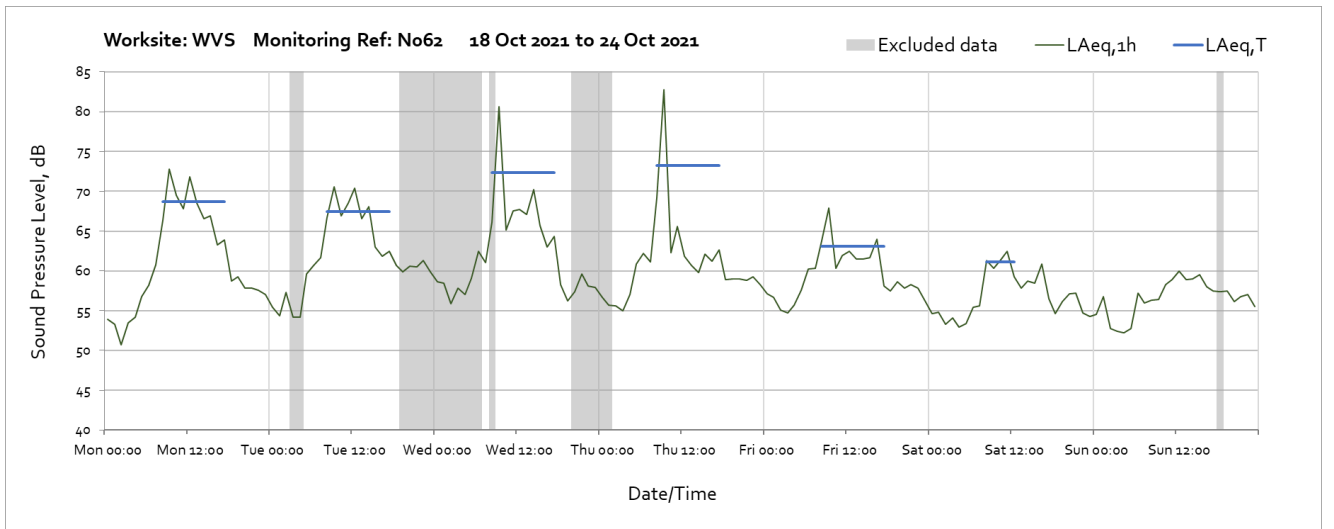
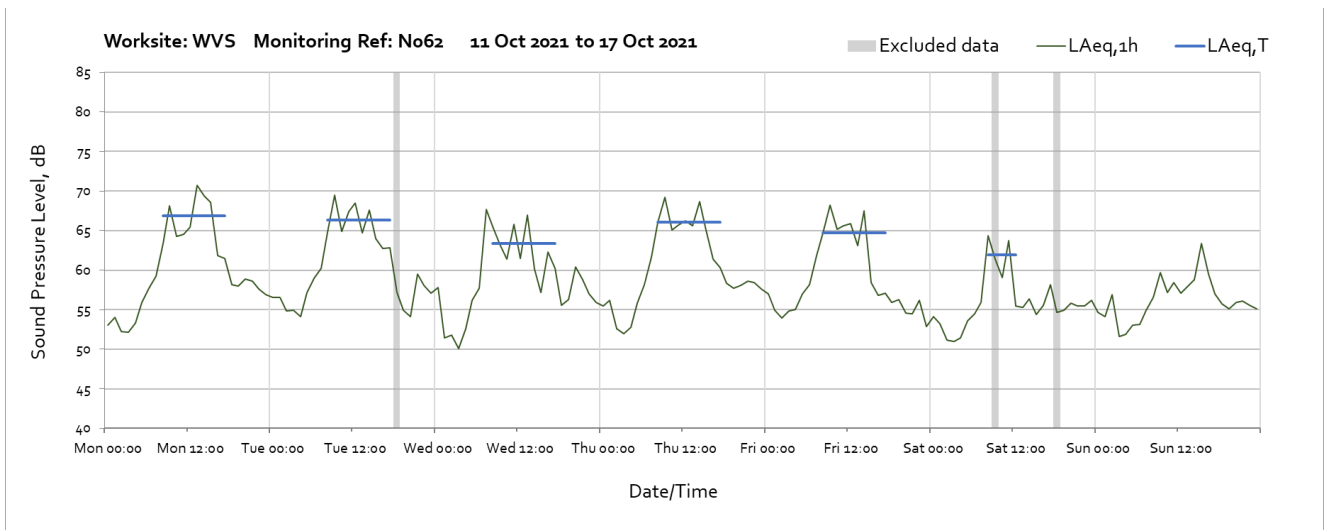
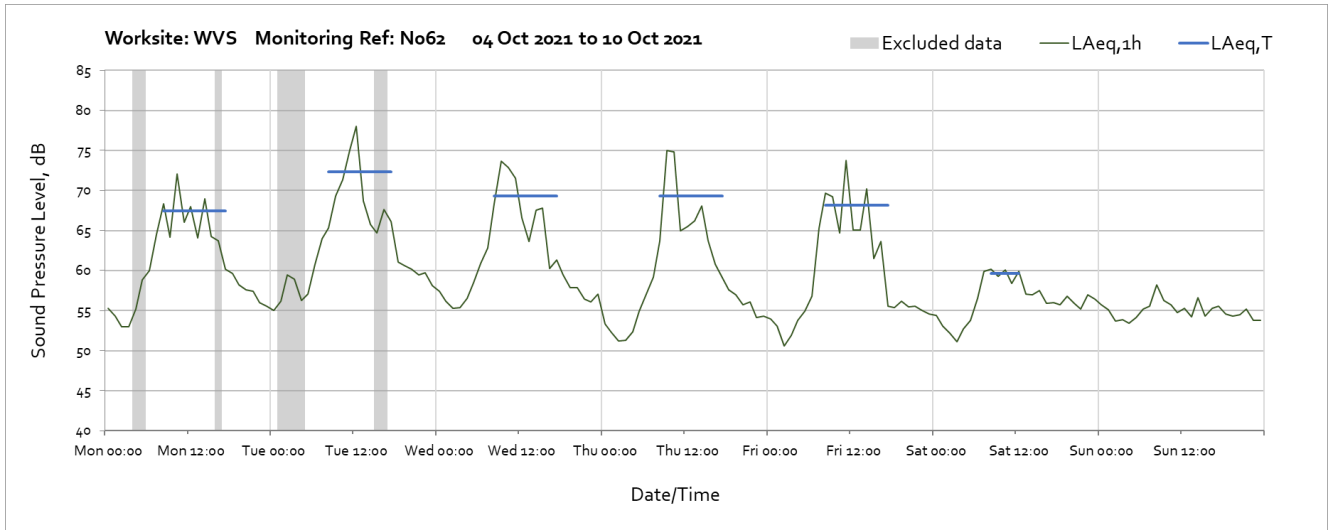


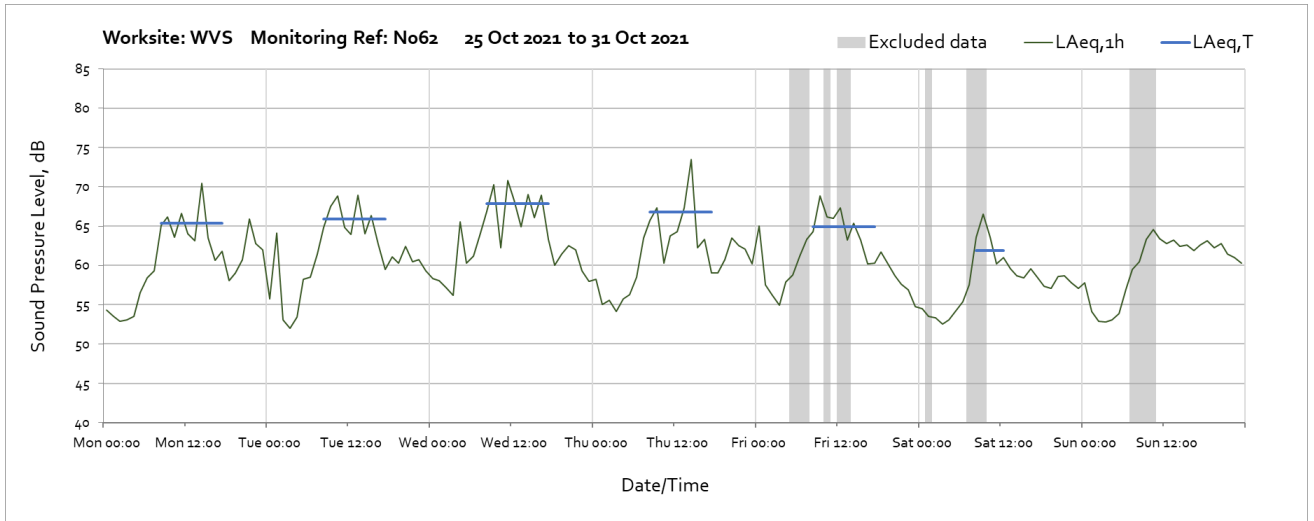
Note: Missing data between 20:00 on Saturday 16<sup>th</sup> October and 15:00 on Monday 18<sup>th</sup> October was due to loss of continuous power at the monitoring station.



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



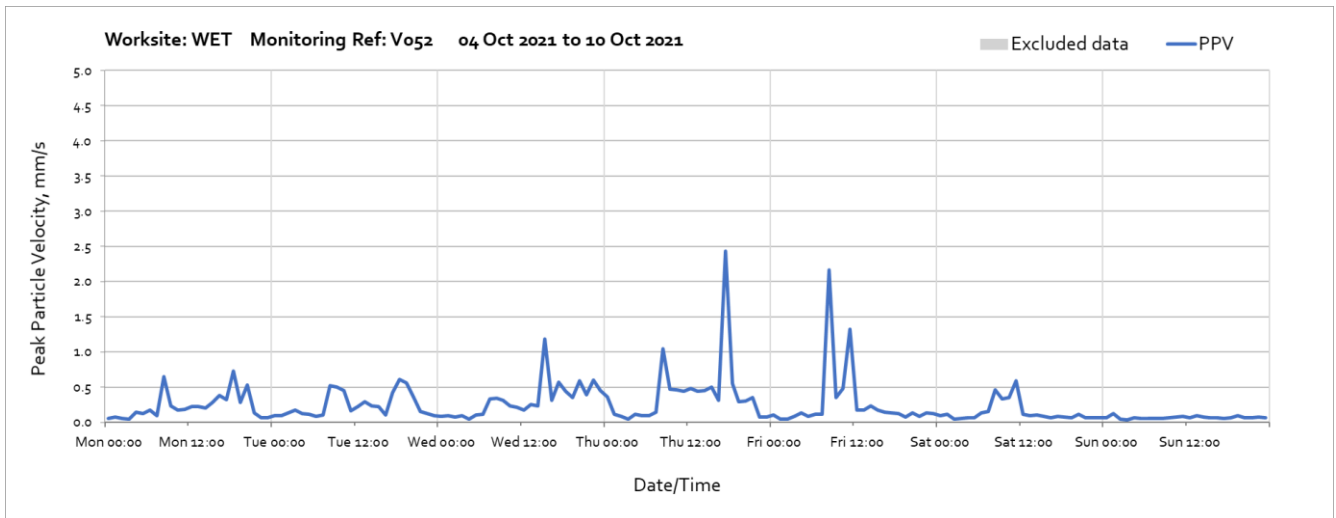
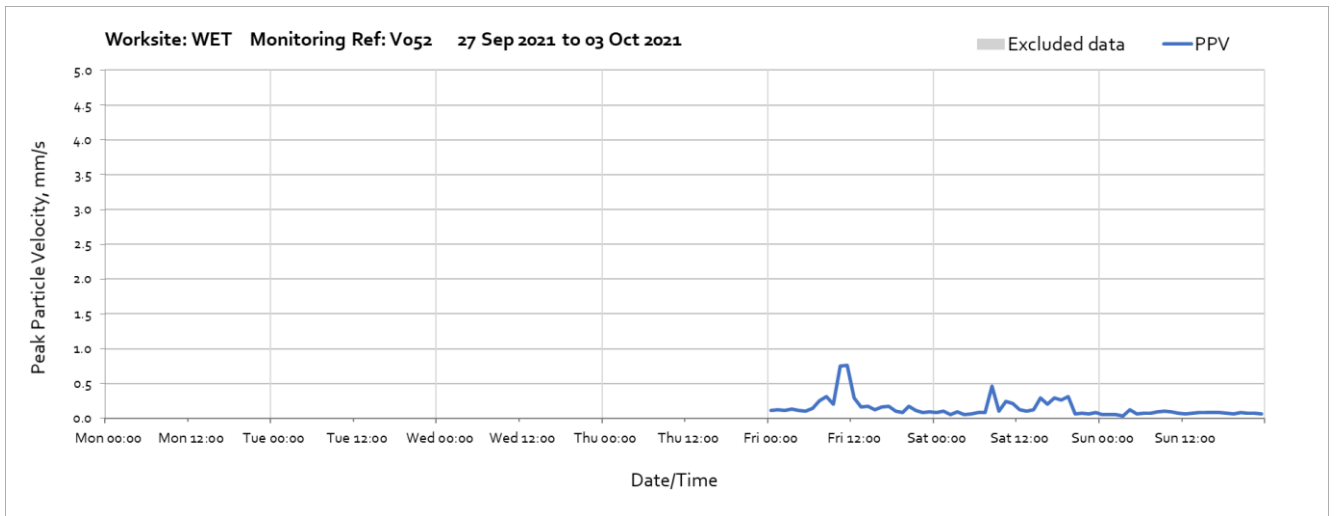


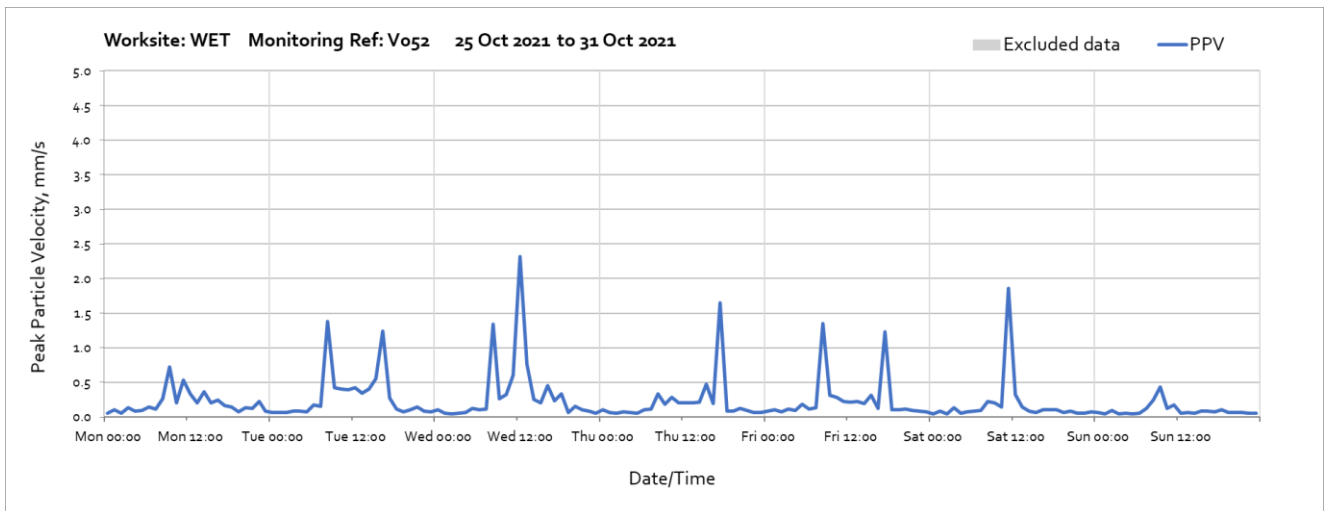
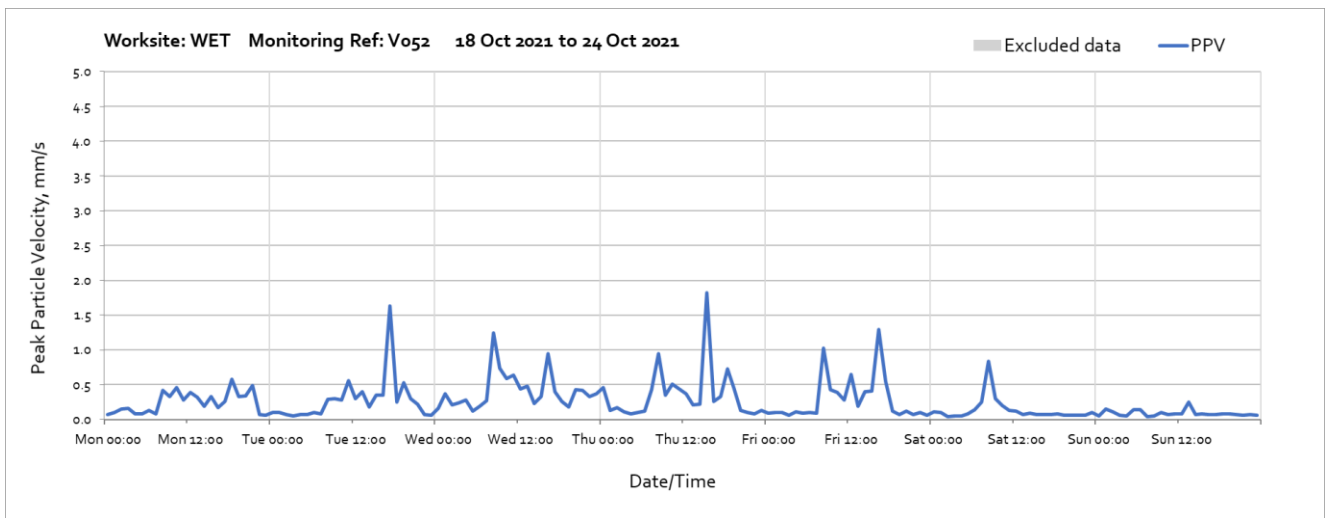
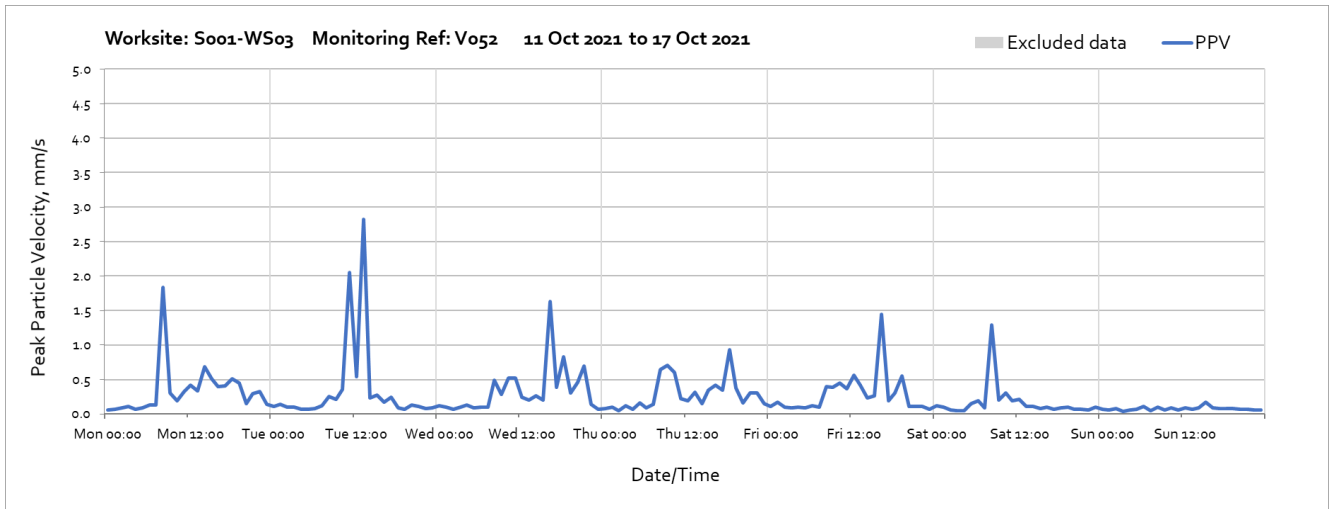


## Vibration

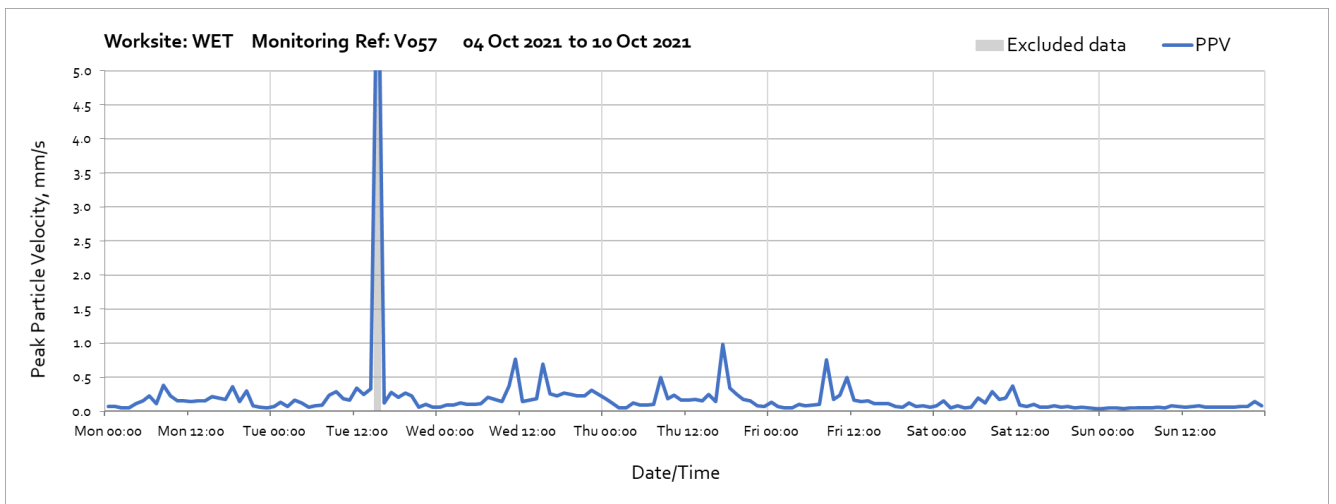
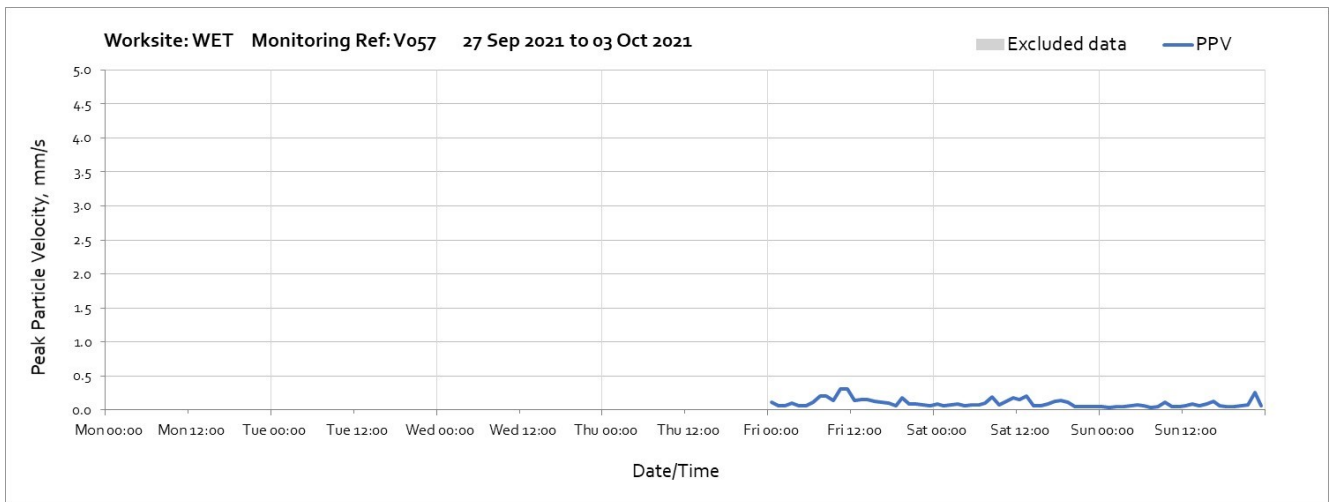
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative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

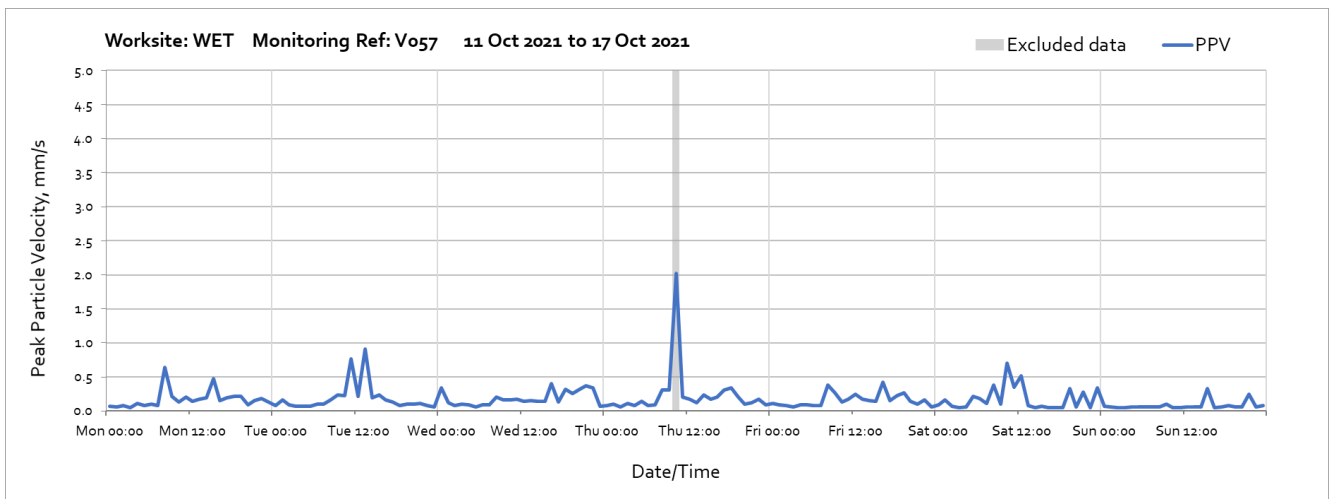




## Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: V057

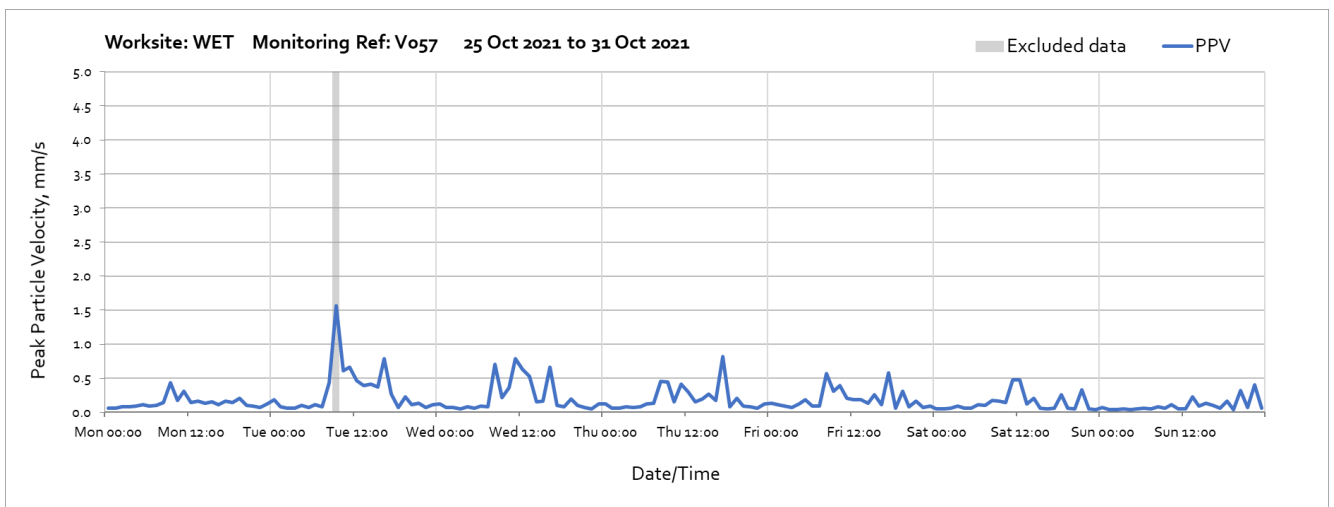
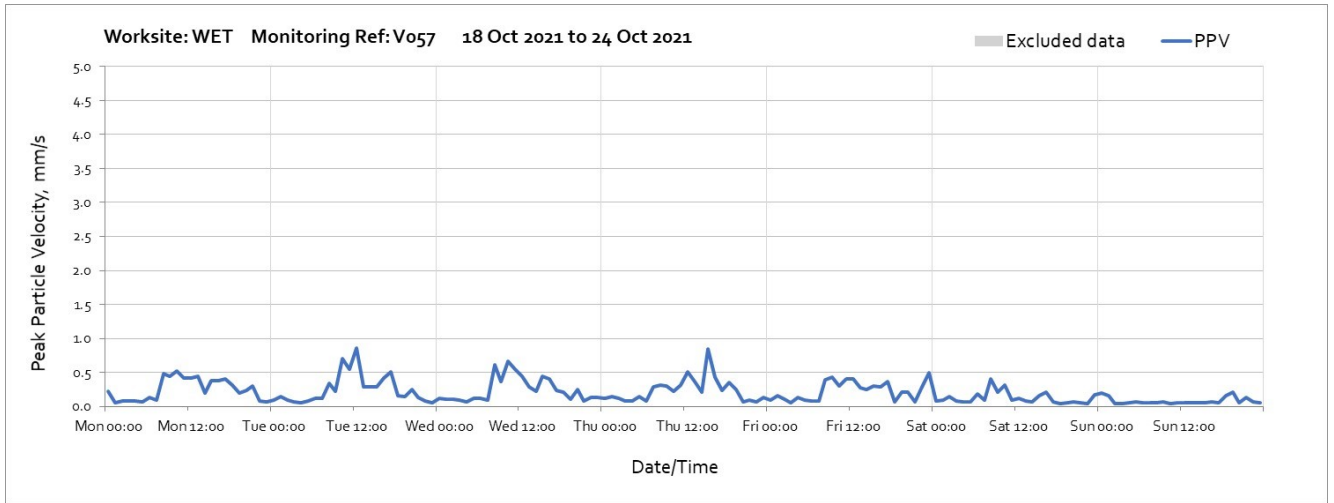


Note: High vibration levels measured at 15:00 on Tuesday 5<sup>th</sup> October were due to residents activity close to the vibration monitor and not representative of HS2 vibration levels.



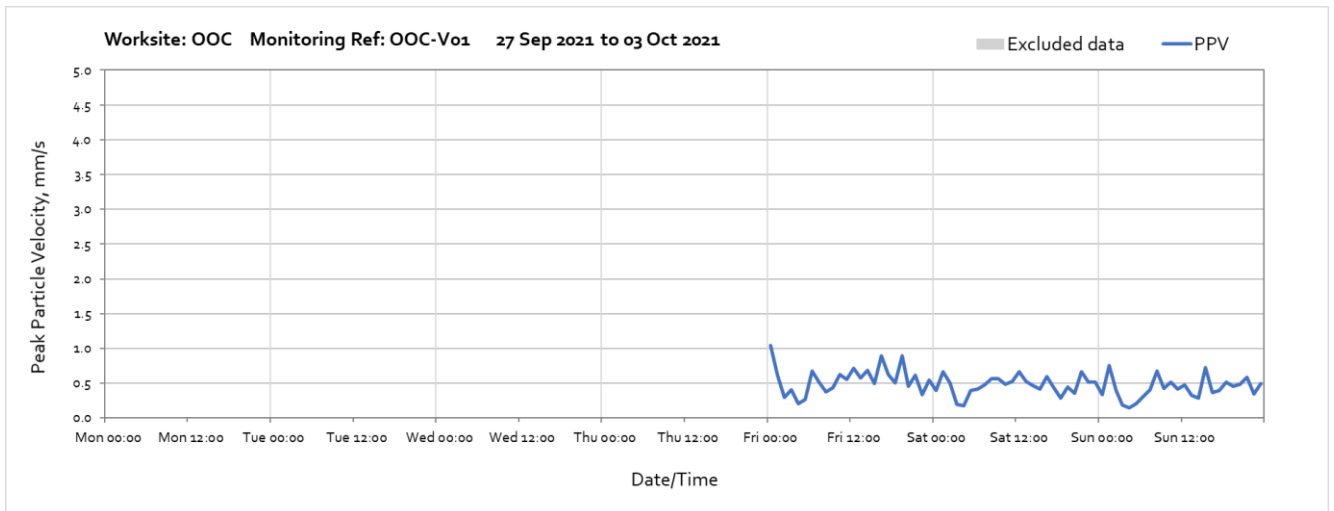
Note: High vibration levels measured at 10:00 on Thursday 14<sup>th</sup> October were due to residents activity close to the vibration monitor and not representative of HS2 vibration levels.

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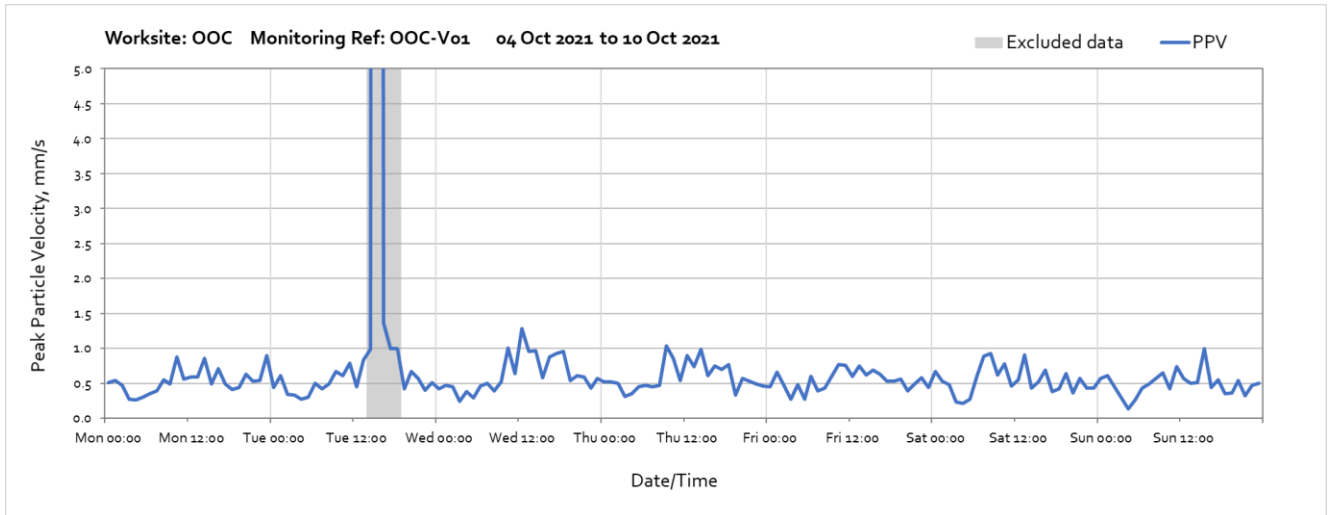


Note: High vibration levels measured at 09:00 on Tuesday 26<sup>th</sup> October were due to residents activity close to the vibration monitor and not representative of HS2 vibration levels.

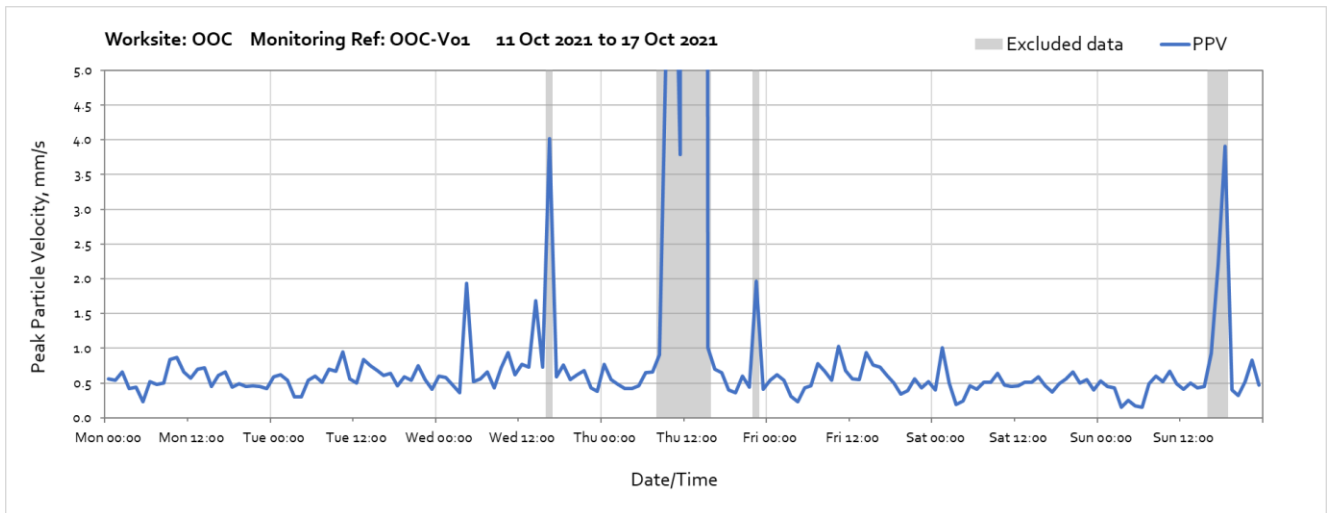
**Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V01**



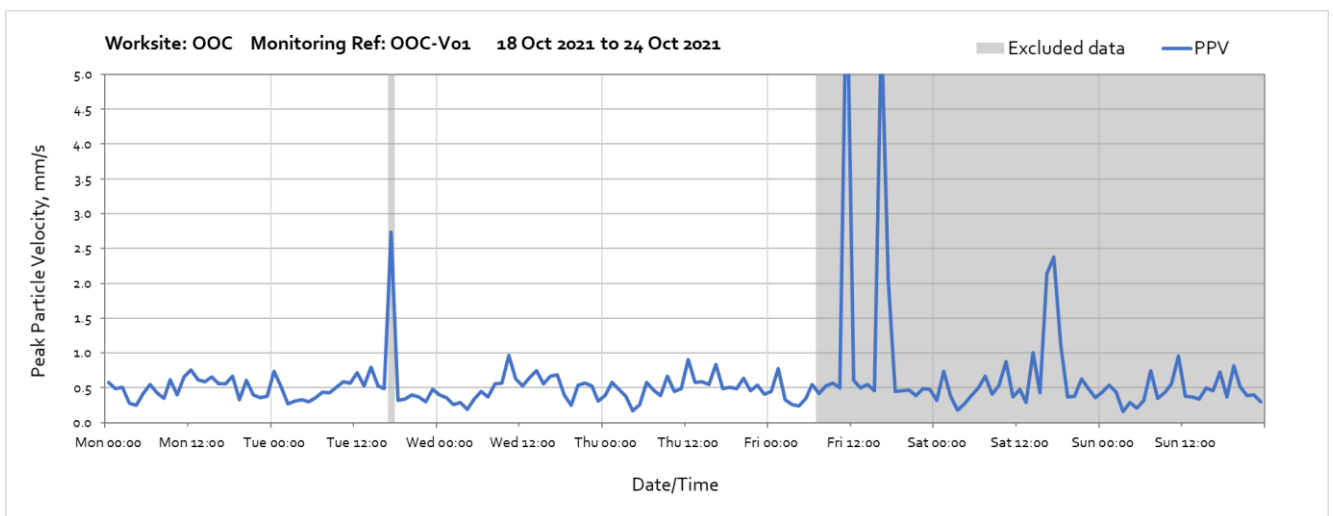




Note: High vibration levels measured between 14:00 and 18:00 on Tuesday 5<sup>th</sup> October were due to residents activity close to the vibration monitor and not representative of HS2 vibration levels.

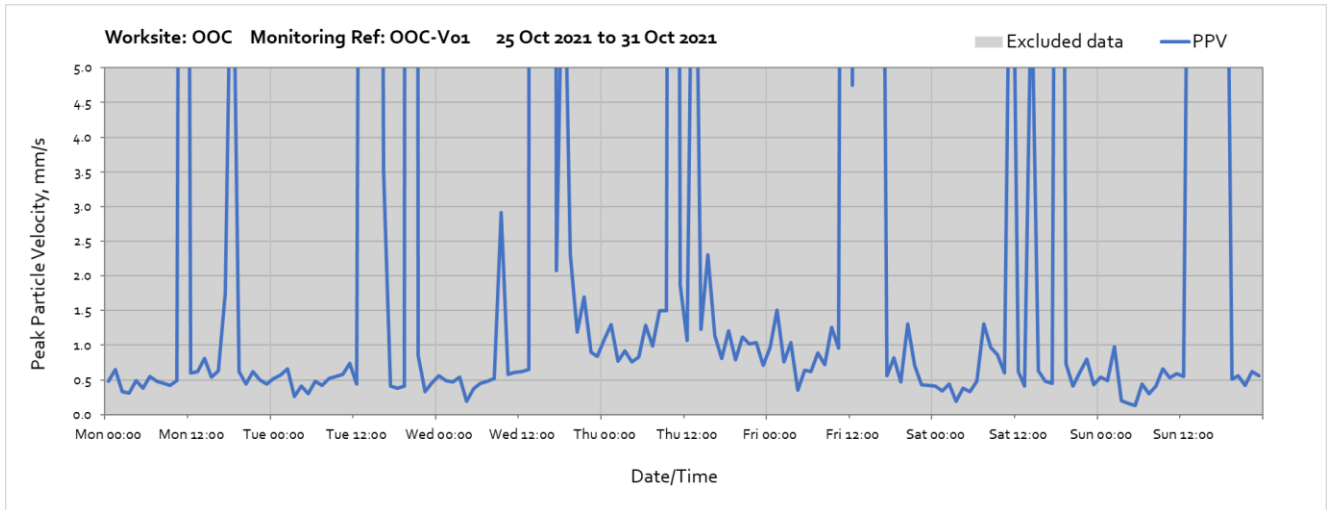


Note: High vibration levels measured across the week were due to residents activity close to the vibration monitor and not representative of HS2 vibration levels.



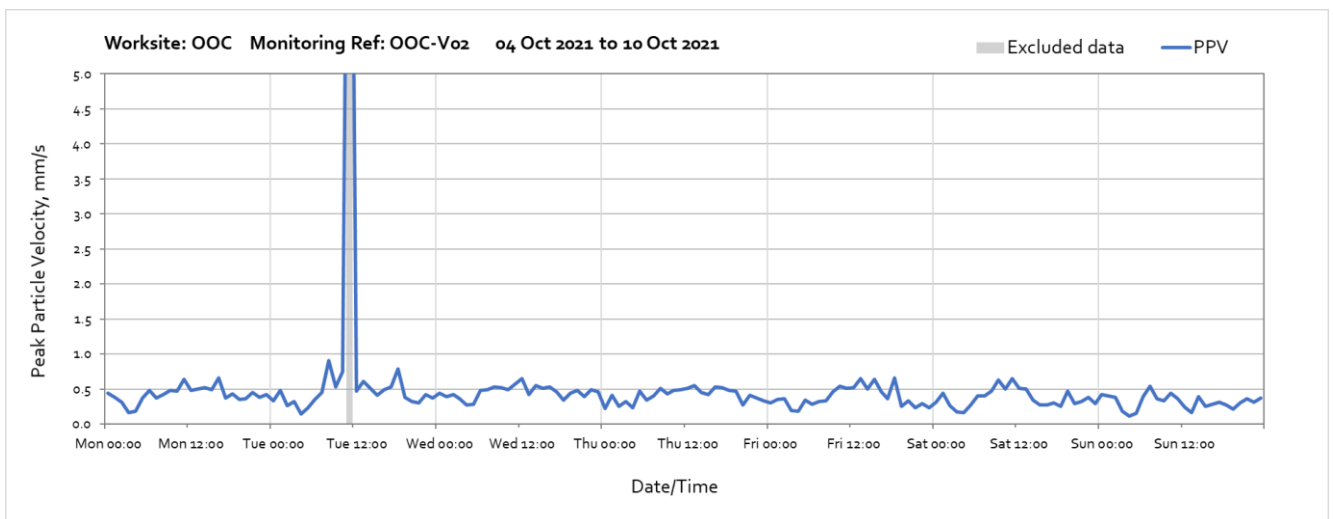
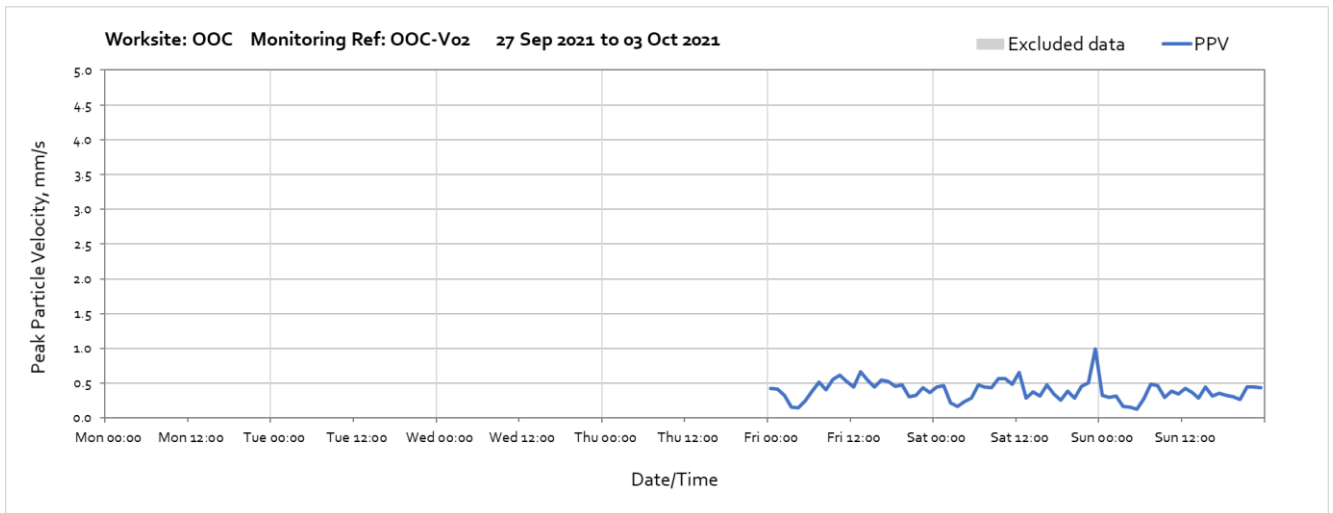
Note: High vibration levels measured across the week were due to residents activity close to the vibration monitor and not representative of HS2 vibration levels.

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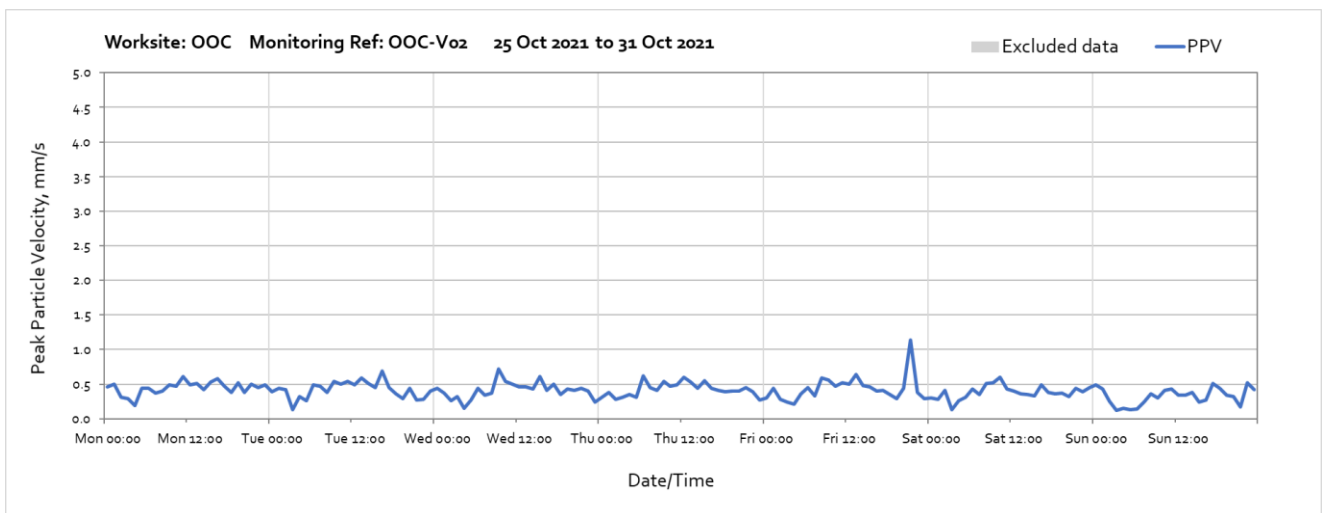
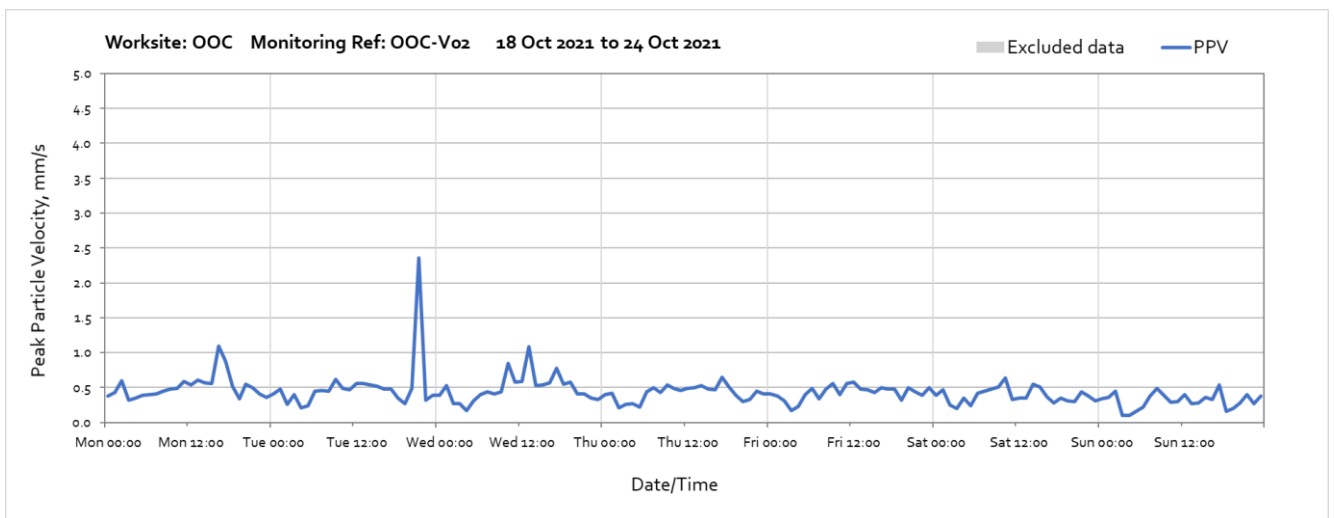
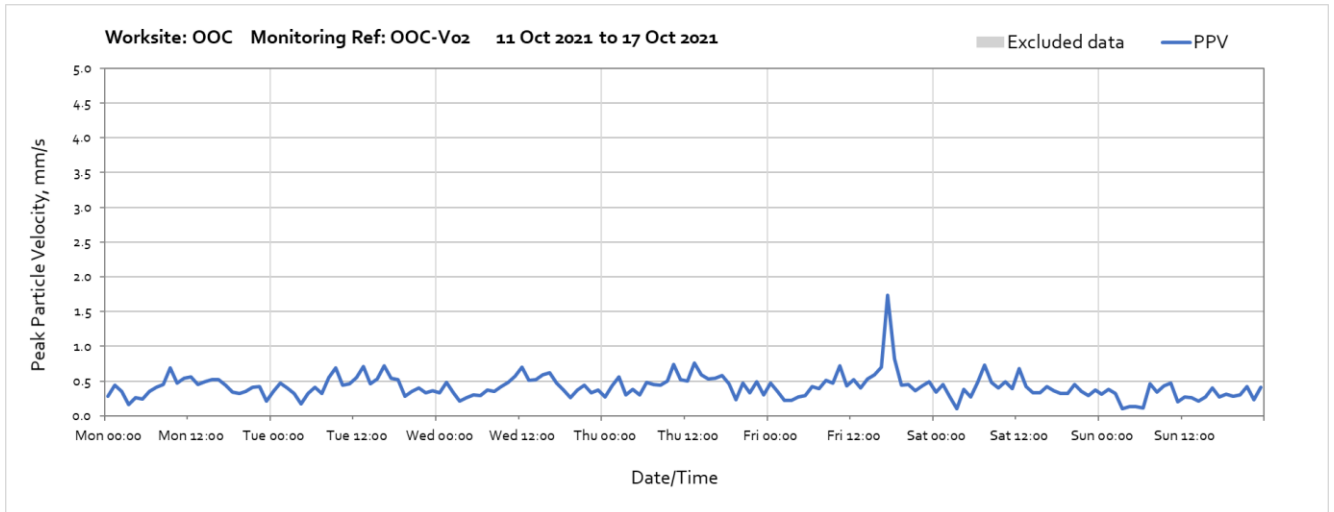
Note: High vibration levels measured across the week were due to slab movement undertaken by residents in close proximity to the vibration monitor and not representative of HS2 vibration levels.

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

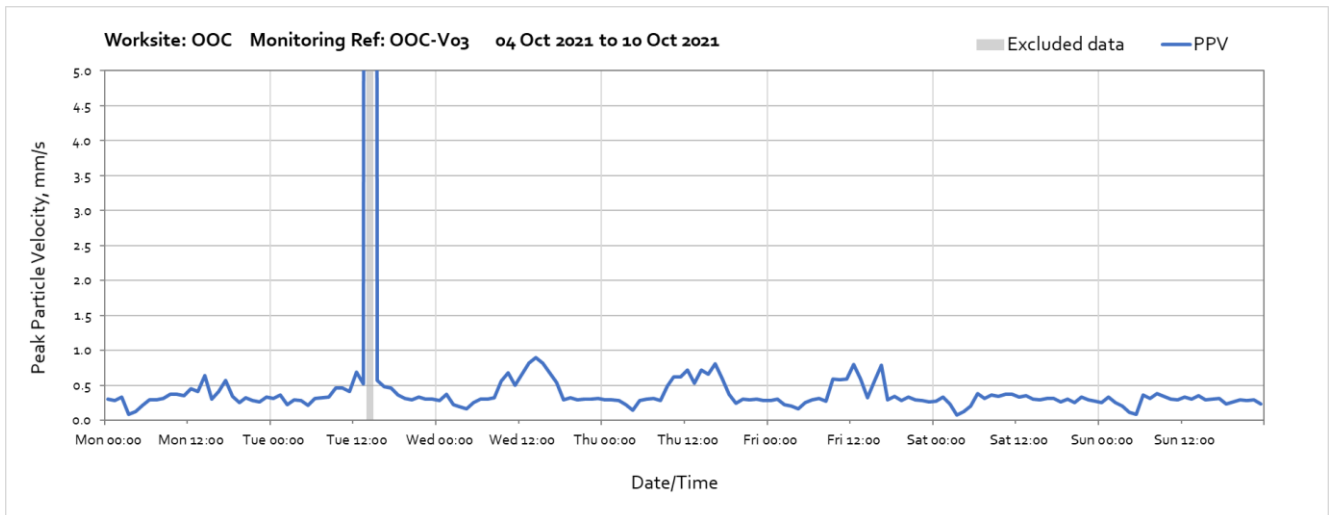
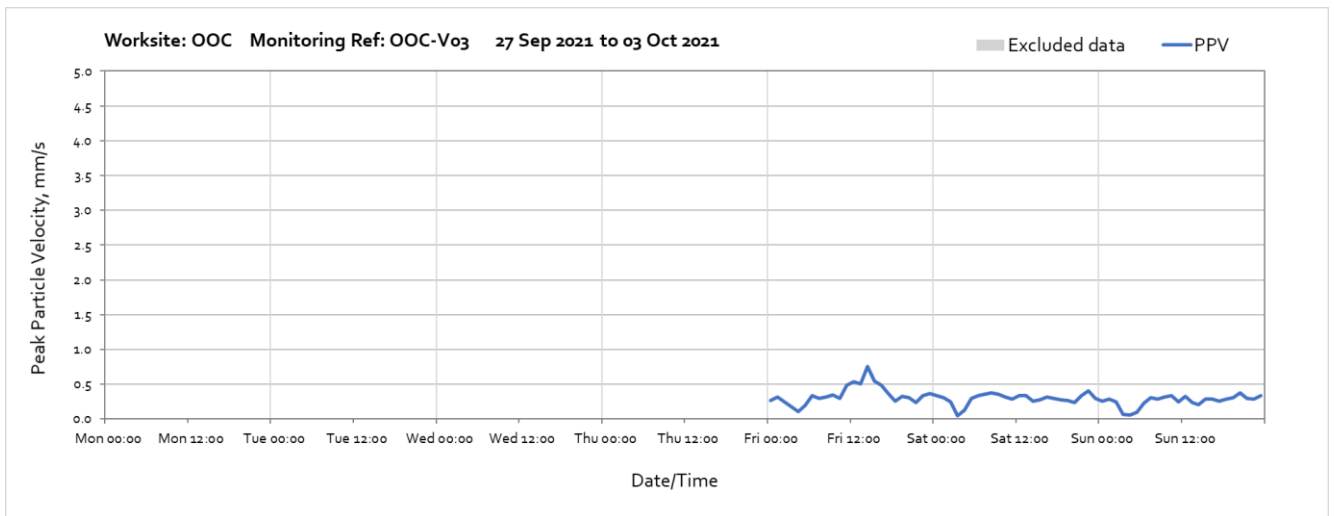


Note: High vibration levels measured at 11:00 on Tuesday 5<sup>th</sup> October were due battery changover at the monitoring station and not representative of HS2 vibration levels.

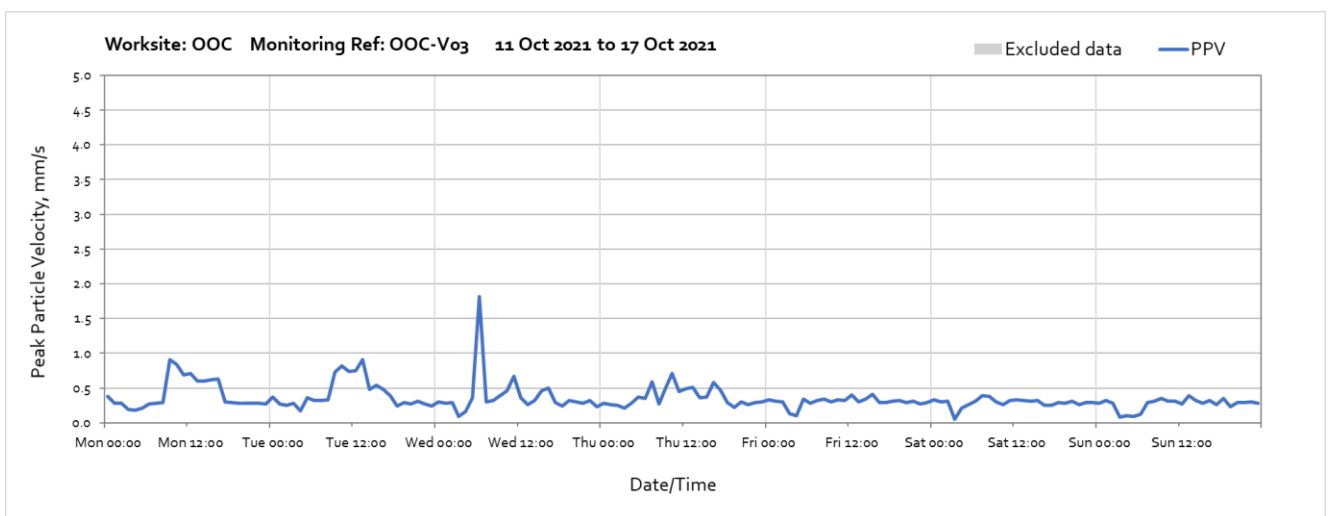
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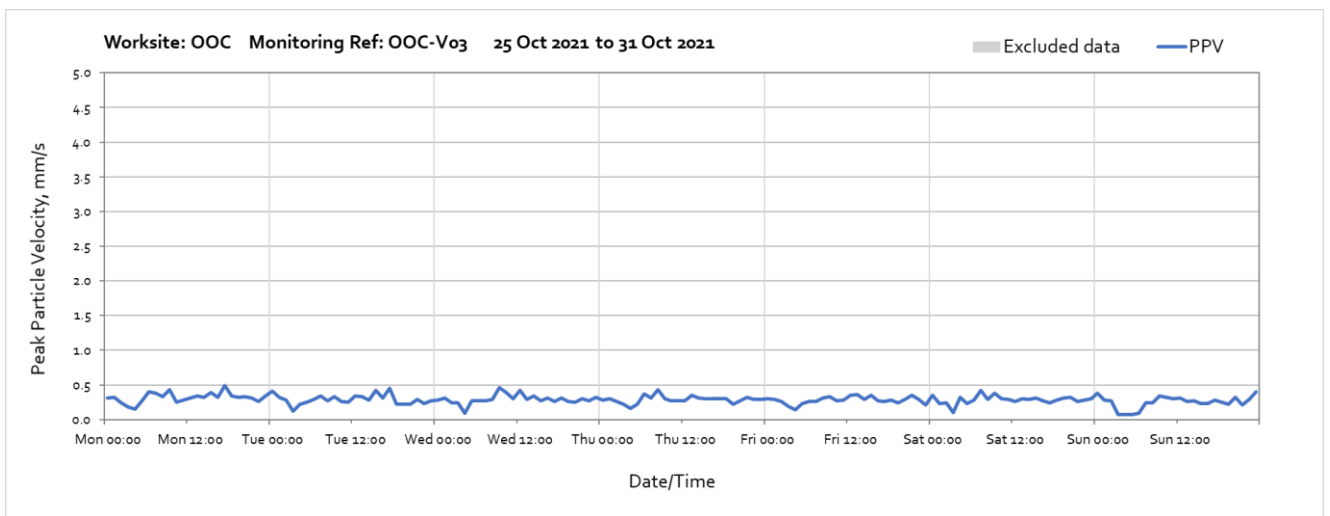
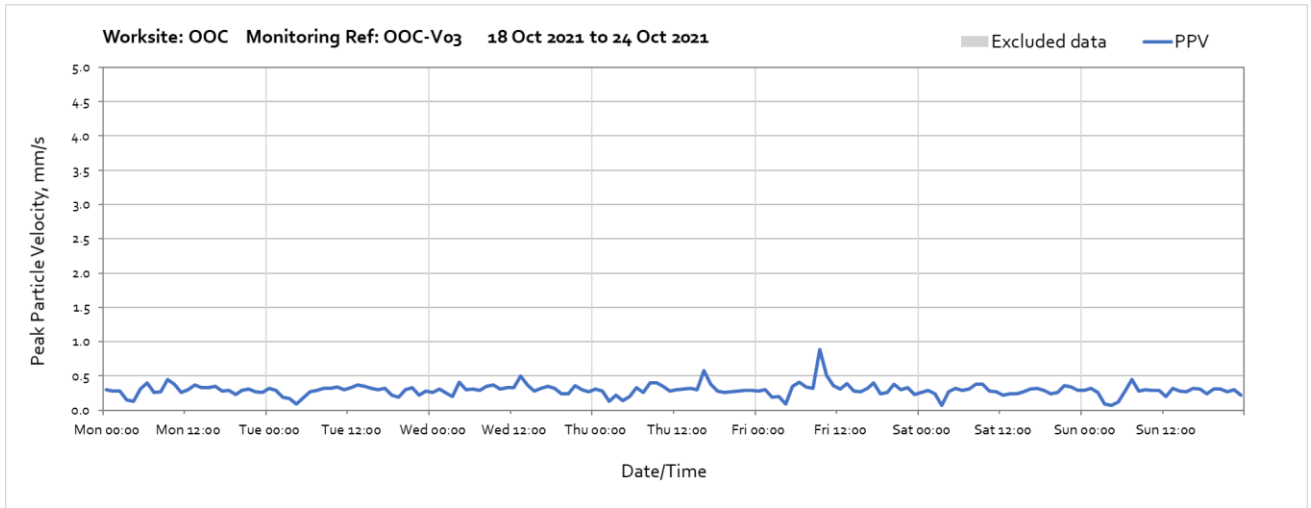


## Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V03

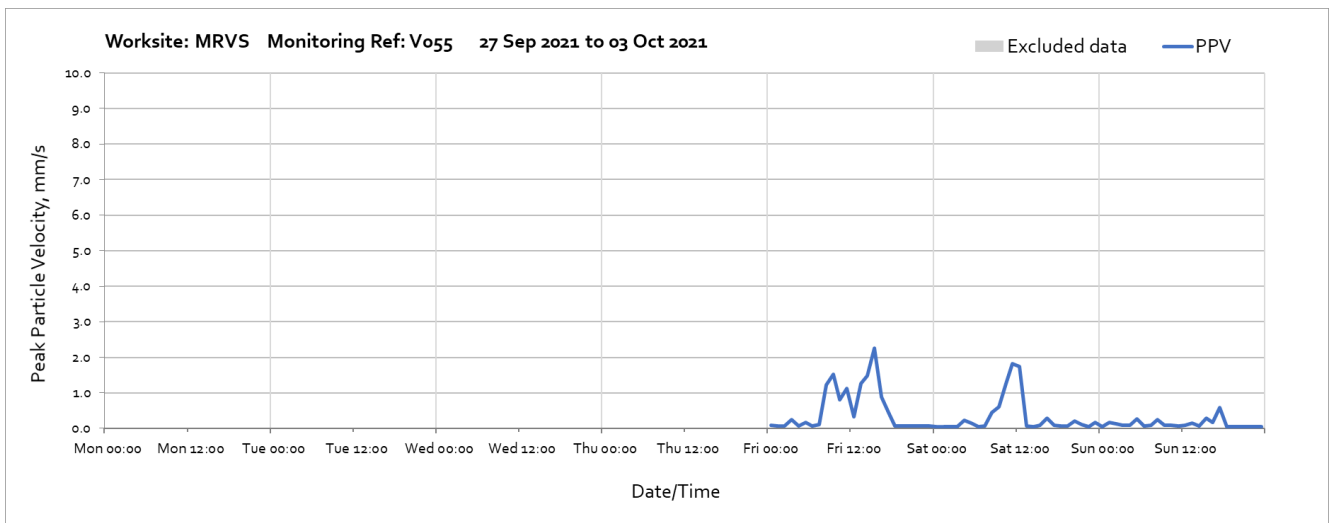


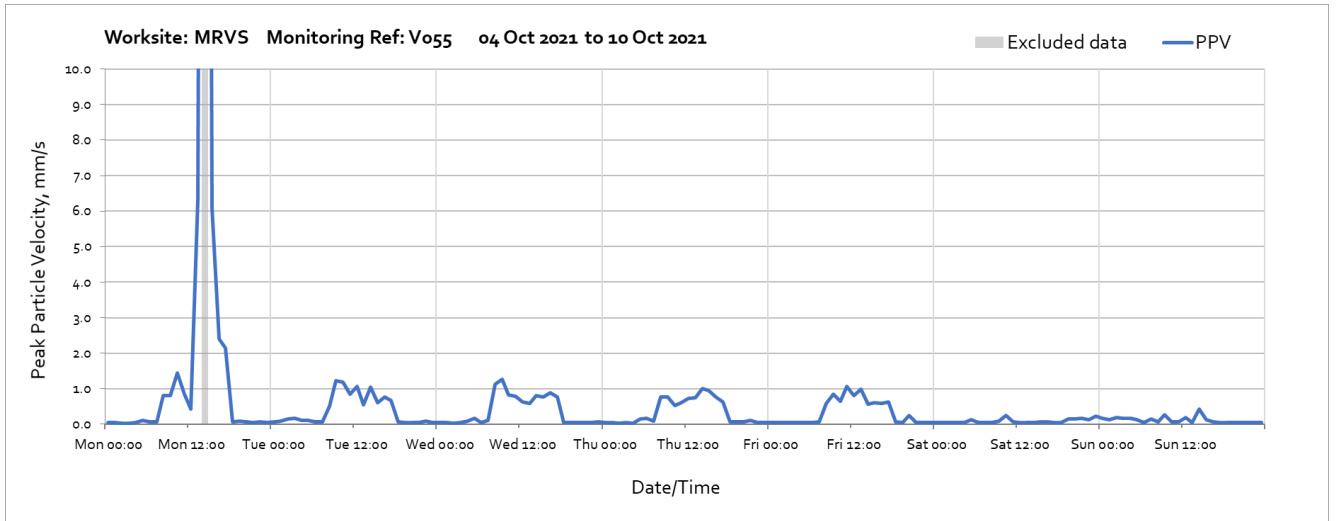
Note: High vibration levels measured at 14:00 on Tuesday 5<sup>th</sup> October were due battery changover at the monitoring station and not representative of HS2 vibration levels.



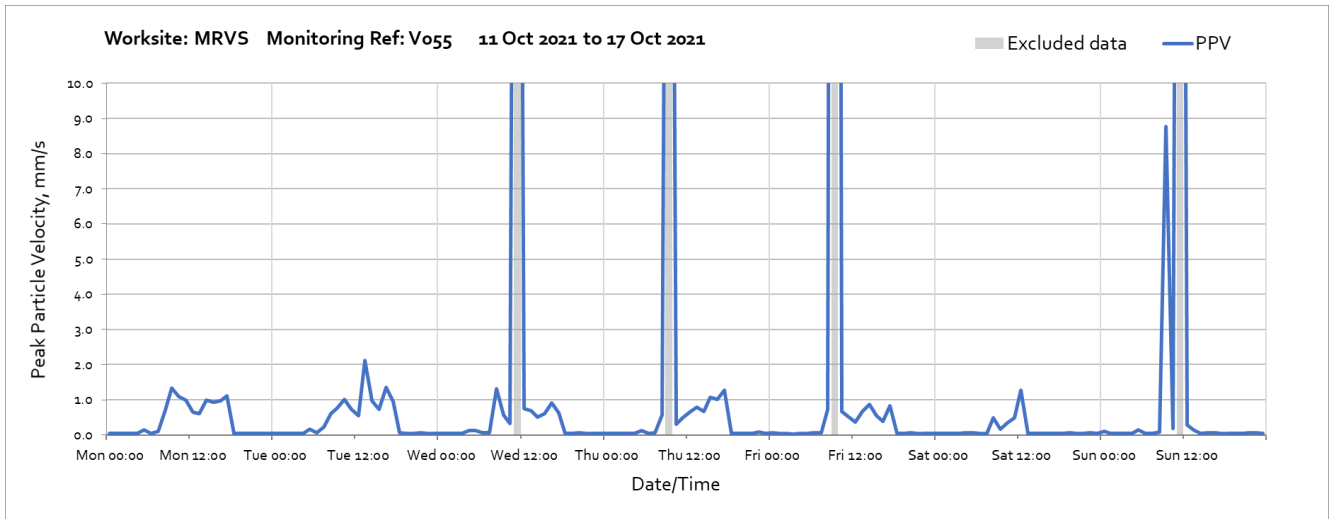


**Worksite: Mandeville Road Vent Shaft (MRVS) - Monitoring Ref: V055**

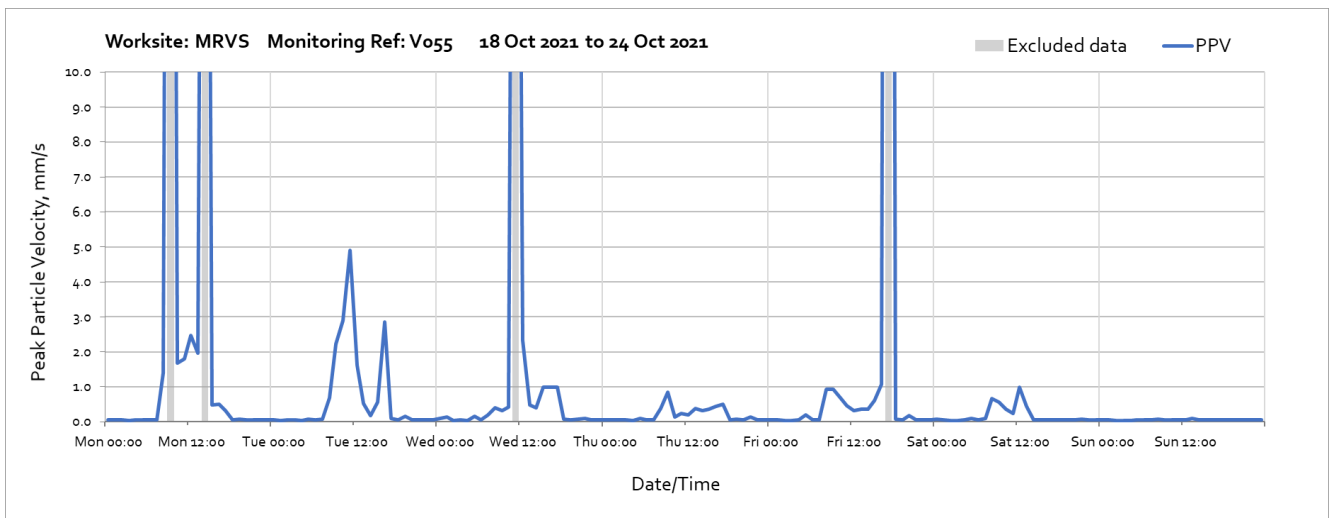




Note: High vibration levels measured at 14:00 on Monday 4<sup>th</sup> October were due to local disturbance at the monitoring location and not representative of HS2 vibration levels.

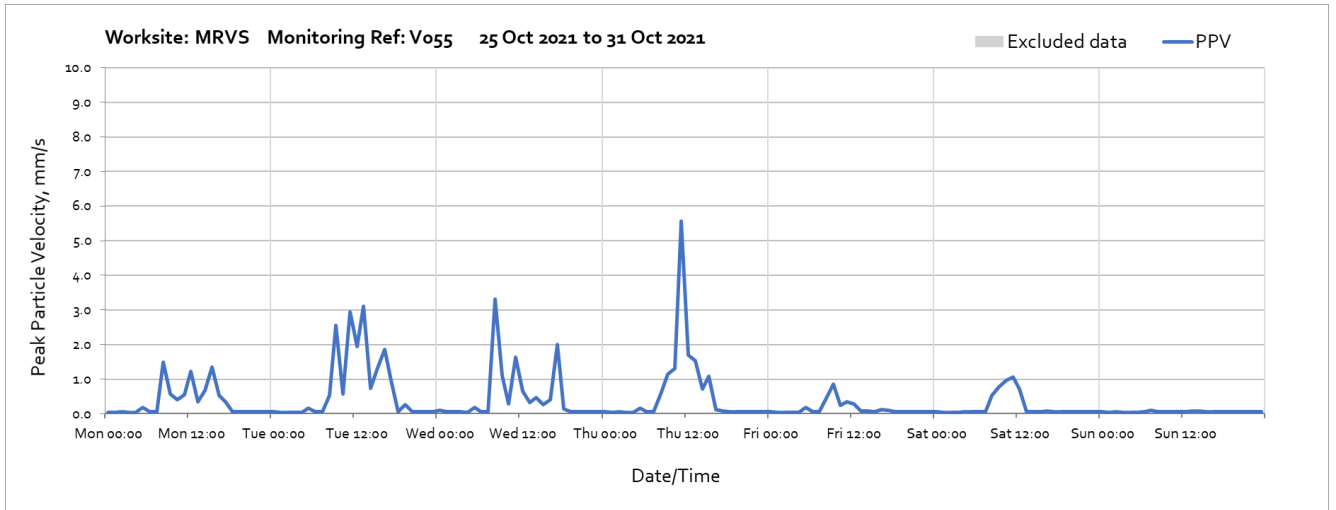


Note: High vibration levels measured across the week were due to local disturbance at the monitoring location and not representative of HS2 vibration levels.

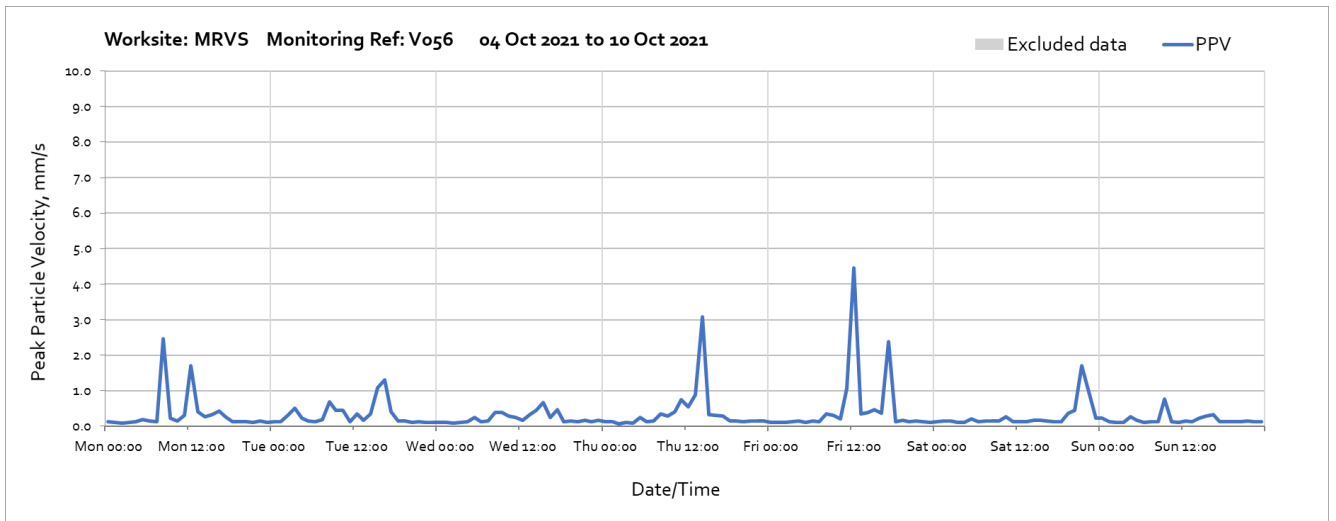
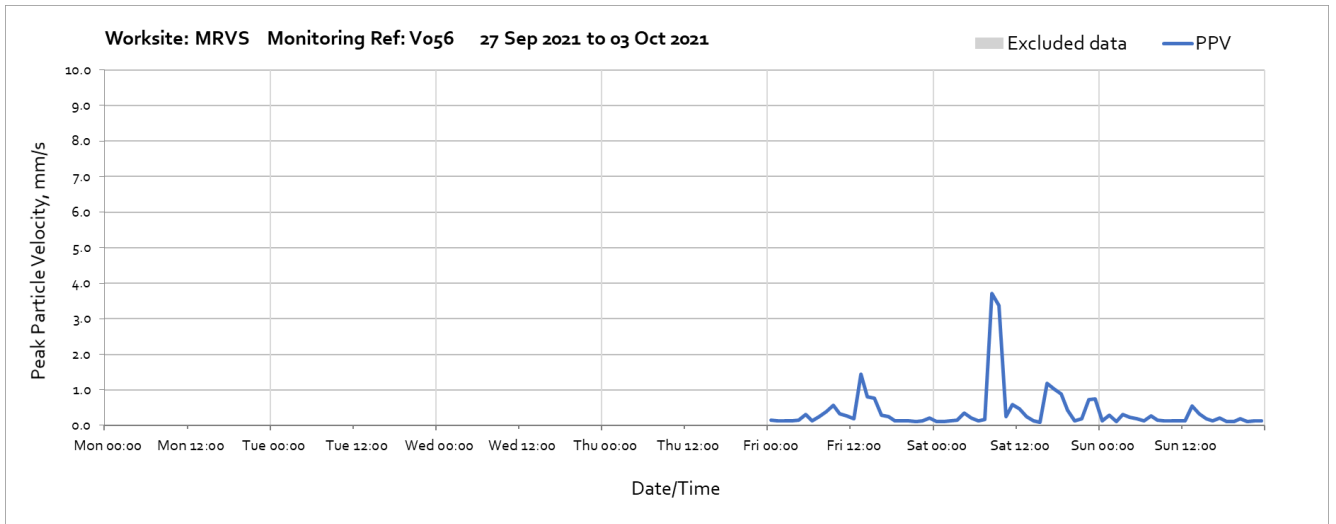


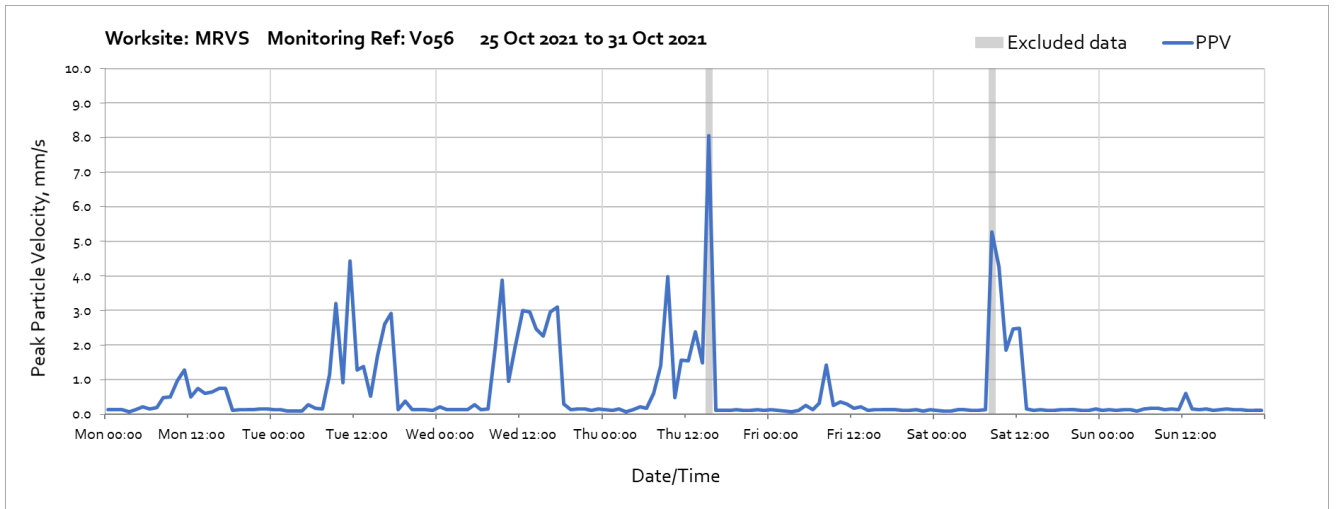
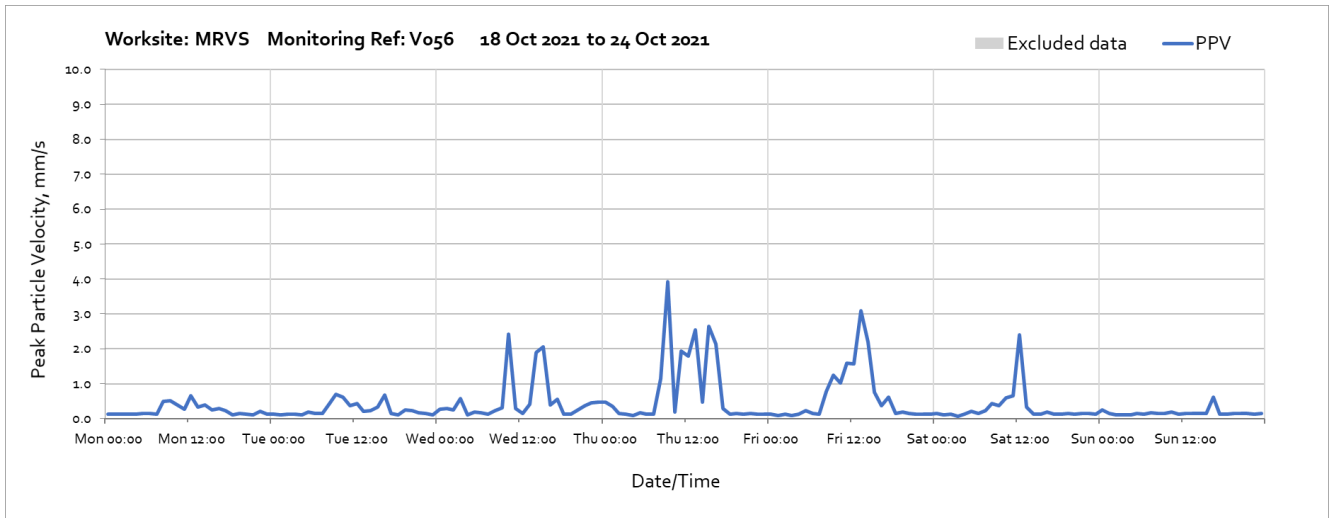
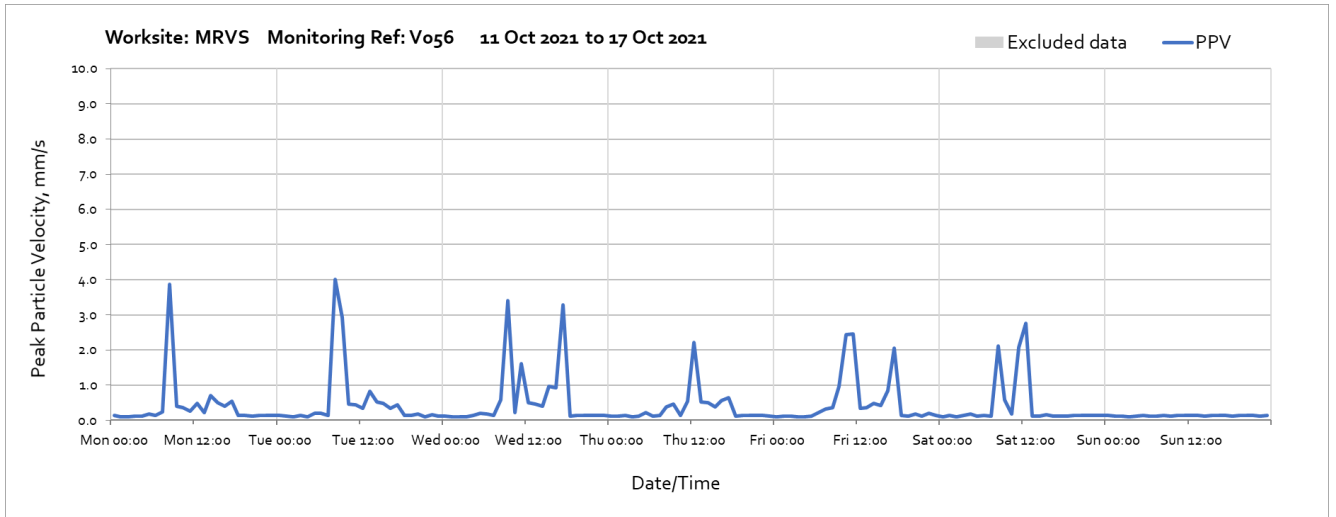
Note: High vibration levels measured across the week were due to local disturbance at the monitoring location and not representative of HS2 vibration levels.

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

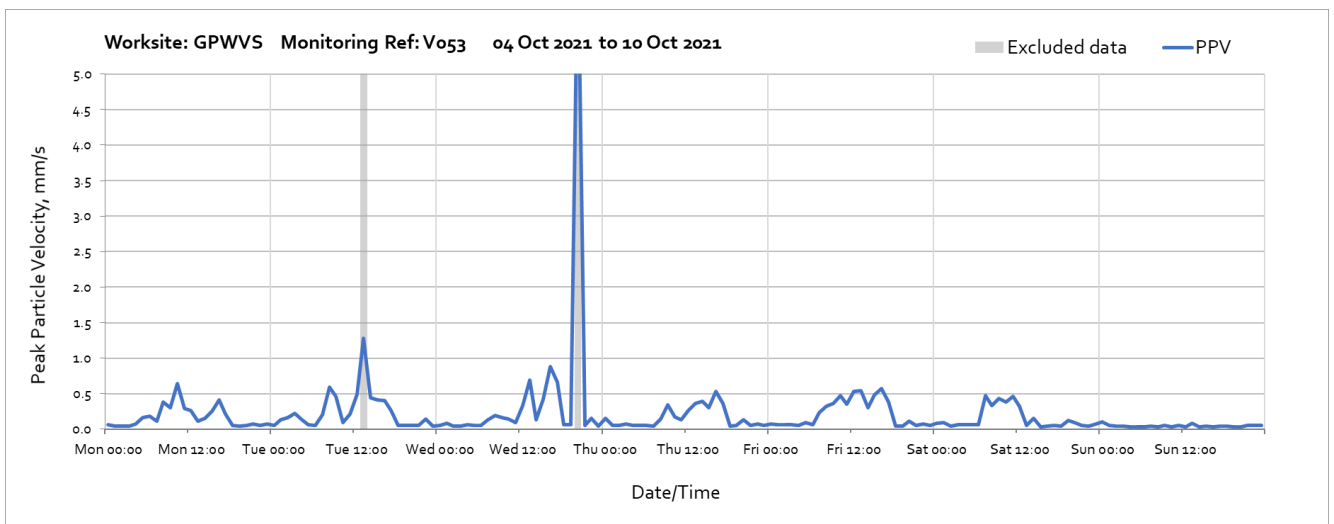
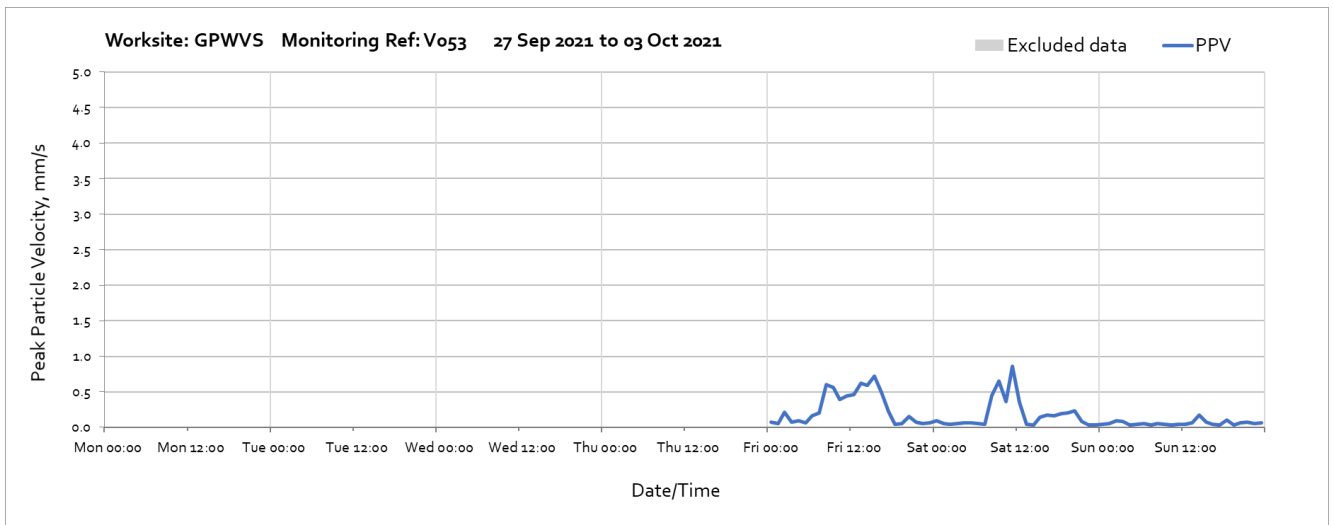




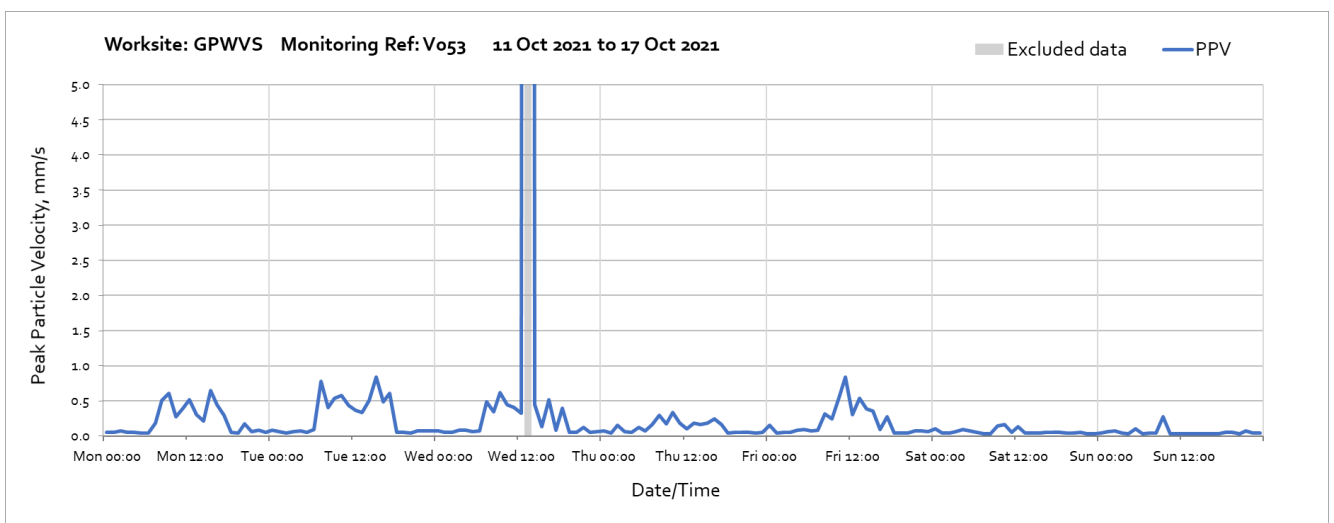
Note: High vibration levels measured across the week were due to local disturbance at the monitoring location and not representative of HS2 vibration levels.



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

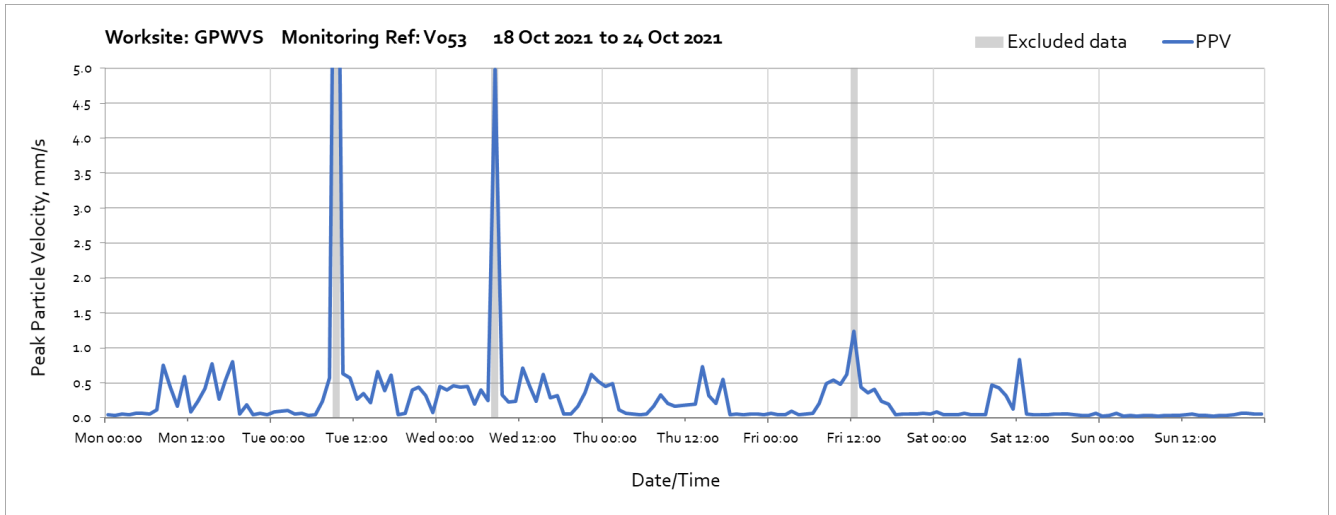


Note: High vibration levels measured across the week were due to local disturbance at the monitoring location and not representative of HS2 vibration levels.

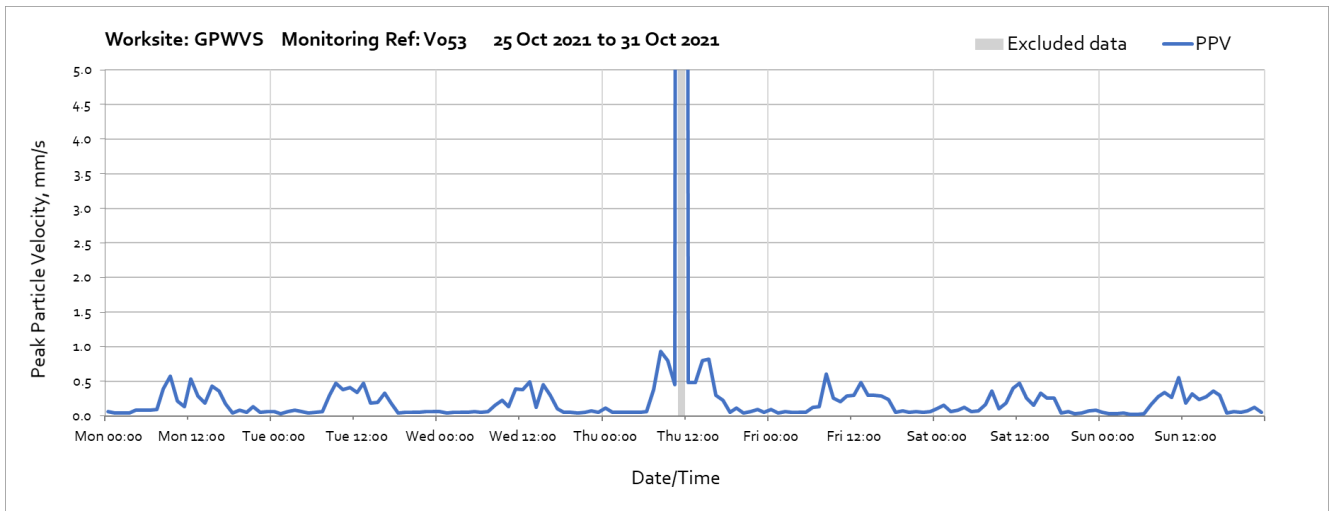


Note: High vibration levels measured at 13:00 on Wednesday 13<sup>th</sup> October were due to local disturbance at the monitoring location and not representative of HS2 vibration levels.

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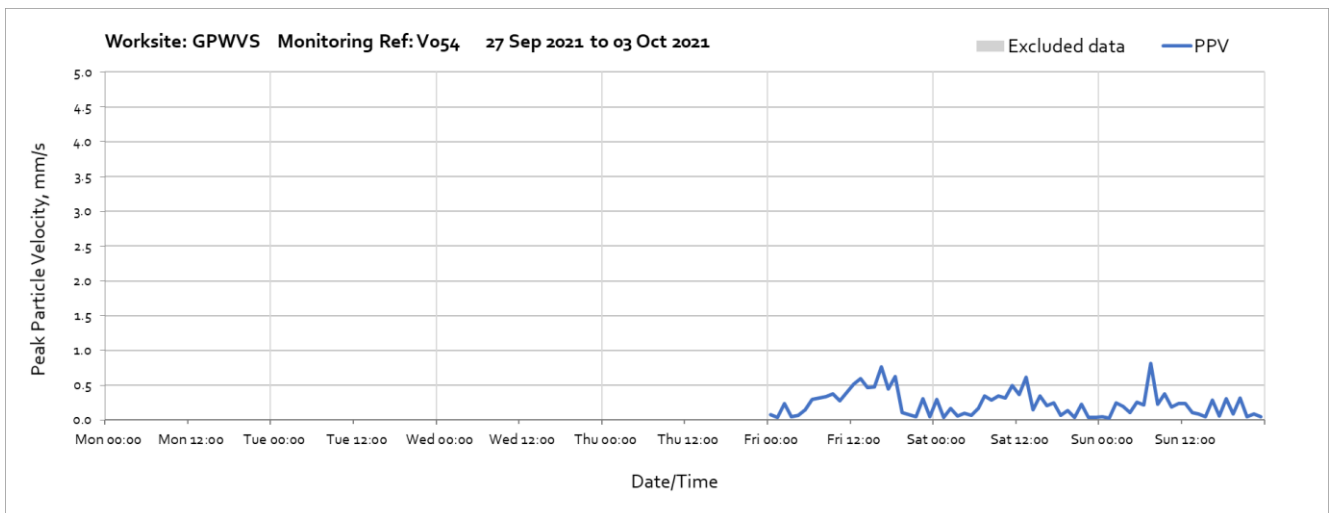


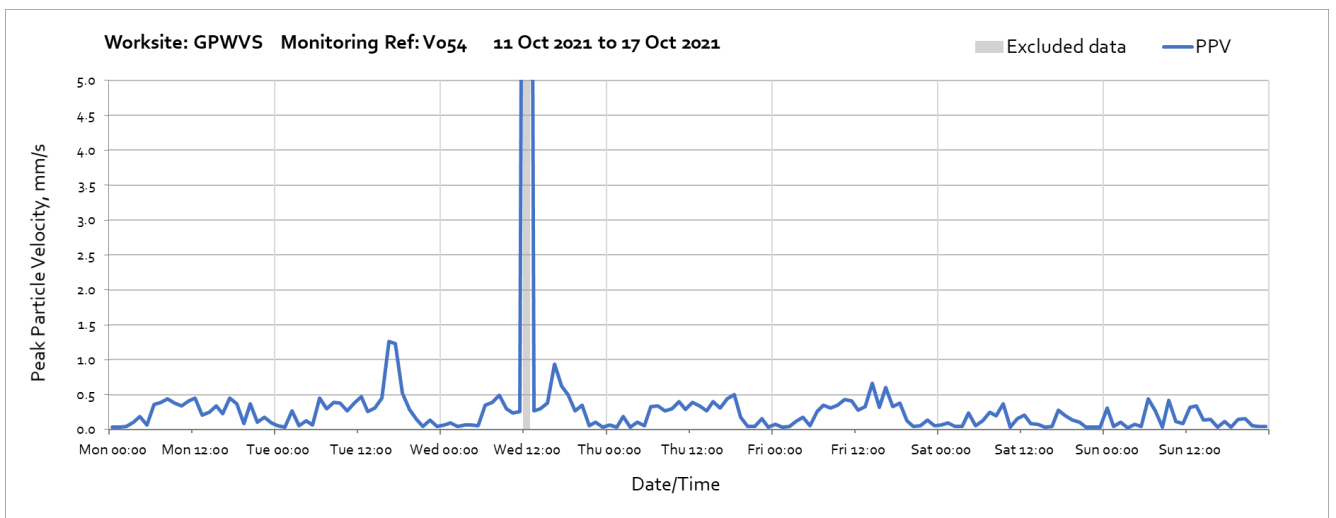
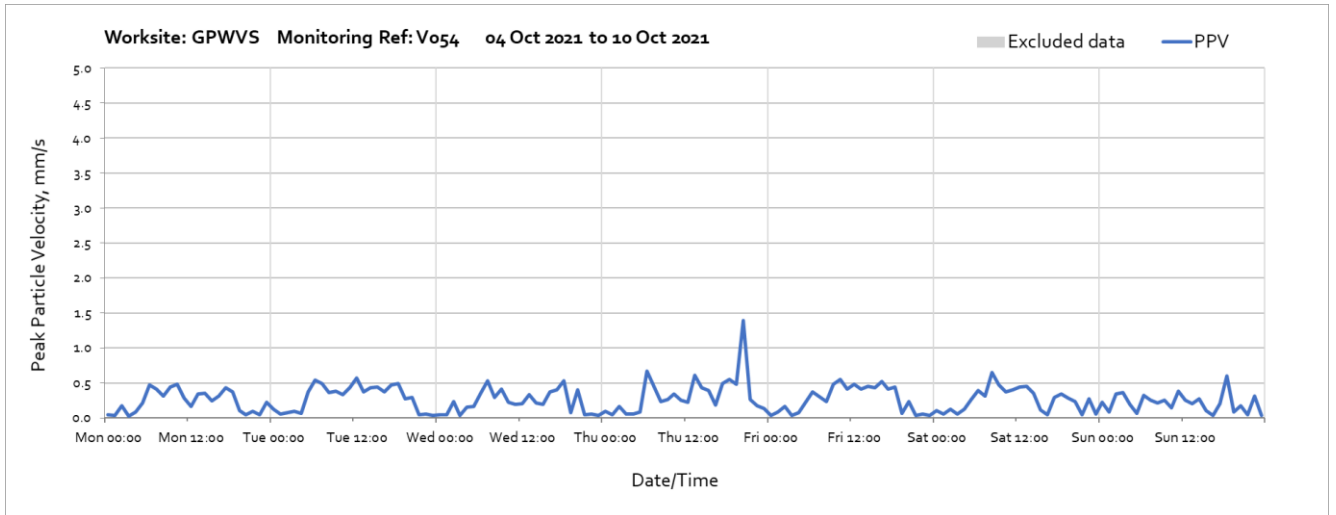
Note: High vibration levels measured across the week were due to local disturbance at the monitoring location and not representative of HS2 vibration levels.



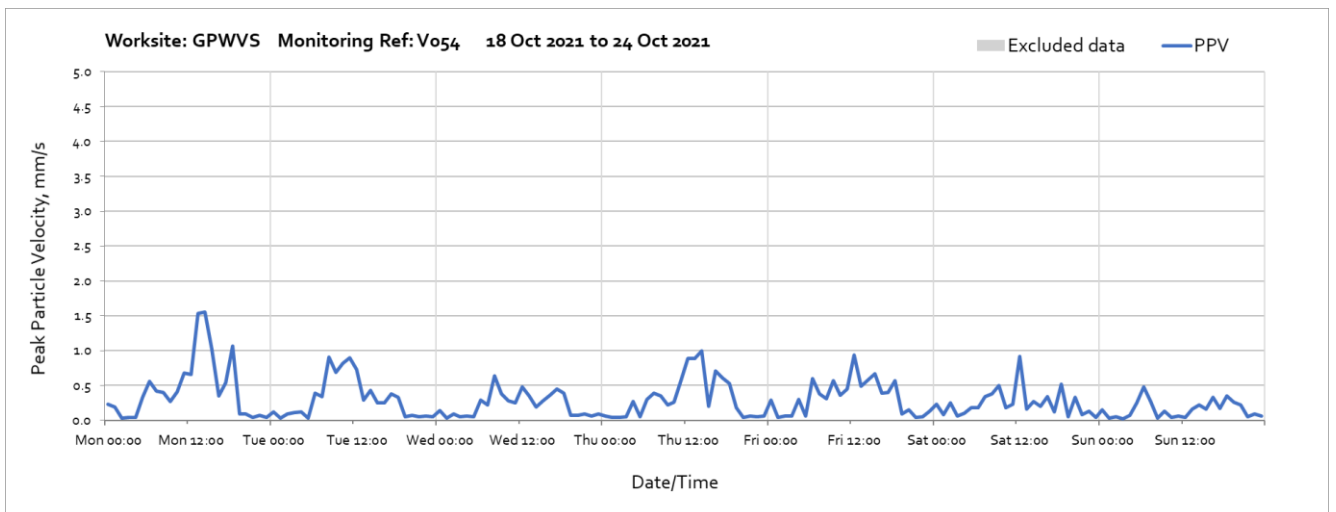
Note: High vibration levels measured at 11:00 on Wednesday 28<sup>th</sup> October were due to local disturbance at the monitoring location and not representative of HS2 vibration levels.

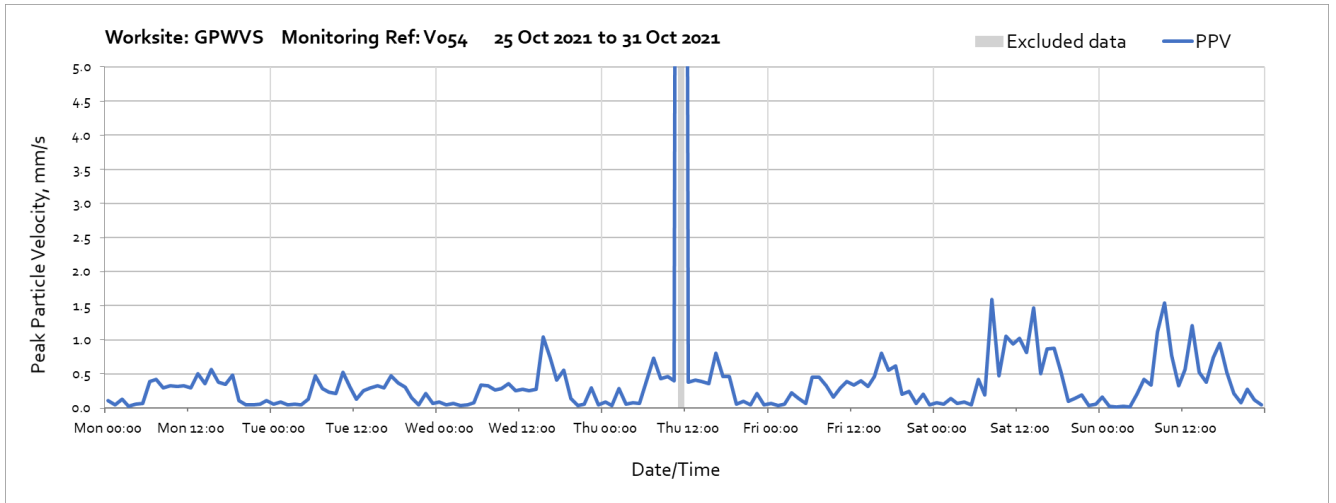
### Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: V054





Note: High vibration levels measured at 12:00 on Wednesday 13<sup>th</sup> October were due to local disturbance at the monitoring location and not representative of HS2 vibration levels.





Note: High vibration levels measured at 11:00 on Wednesday 28<sup>th</sup> October were due to local disturbance at the monitoring location and not representative of HS2 vibration levels.