

## **Construction Noise and Vibration Monthly Report – December 2021**

### **London Borough of Ealing**

<b>Non-Technical Summary</b>	<b>1</b>
<b>Abbreviations and Descriptions</b>	<b>3</b>
<b>1 Introduction</b>	<b>4</b>
1.2 Measurement Locations	7
<b>2 Summary of Results</b>	<b>9</b>
2.1 Summary of Measured Noise and Vibration Levels	9
2.2 Exceedances of the SOAEL	13
2.3 Exceedances of Trigger Level	16
2.4 Complaints	16
<b>Appendix A Site Locations</b>	<b>17</b>
<b>Appendix B Monitoring Locations</b>	<b>26</b>
<b>Appendix C Data</b>	<b>33</b>

### List of tables

Table 1: Table of Abbreviations	3
Table 2: Monitoring Locations	7
Table 3: Summary of Measured dB $L_{Aeq}$ Data over the Monitoring Period	10
Table 4: Summary of Measured PPV Data over the Monitoring Period	13
Table 5: Summary of Exceedances of SOAEL	14
Table 6: Summary of Total Exceedances of SOAEL	15
Table 7: Summary of Exceedances of Trigger Levels	16
Table 8: Summary of Complaints	16

# 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 December 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 roads, drainage works, concrete pouring, segment storage area works, construction of waste bin, steel works, dig and trim works, excavation works, installation of drilling piles, installation of shutters, conveyor works and installation of lighting.
- Noise and vibration monitoring were undertaken in the vicinity of the Willesden EuroTerminal worksite (ref. WET), where concreting works, drainage works, installation of spoil conveyors, setting up of edge protection along the stockpile bays and installation of pedestrian beacons.
- Noise monitoring was undertaken in the vicinity of the Victoria Road Crossover Box worksite (worksite ref. VRCB), where:
  - diaphragm wall works, ground works, concreting works for the welfare slab, concreting works for the footpath and installation of drainage pipes were underway.
  - At the Victoria Road Ancillary Shaft, steel works, installation of formworks, cleaning out the pouring area and pre-pour inspections of the reinforcement and cast-in-situ works were underway.
- Noise monitoring was undertaken in the vicinity of the Flat Iron compound (worksite ref. FIC), where concrete pouring, fencing works, installation of drawcords with ductwork, installation of earthing straps, grouting for conveyor bases and excavation works were underway.
- Noise and vibration monitoring were undertaken in proximity of the Old Oak Common depot worksite (ref. OOC), where fit-out works, vegetation clearance, demolition works, construction of temporary site haul roads, drainage works, piling works, diaphragm wall works, construction of conveyor foundations, steel works and asphaltting works 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 and hoarding works were underway.
- Noise and vibration monitoring were undertaken in proximity of the Green Park Way Ventilation Shaft worksite (ref. GPWVS), where concrete pouring and installation of kerbs, grouting and drilling works, finishing off works to the site haul

road, manhole adjustment works, installation of concrete pad foundations, installation of towers and bridges and finishing off works to the carpark area were underway.

- Noise monitoring was undertaken in proximity of the Westgate Ventilation Shaft (ref. WVS), where excavation works, sprayed concrete lining works and hand trimming works were undertaken.

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; and
- Wormwood Scrubs where sheet piling, hoarding set-up works and electrical installations 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 five (5) 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.

Two (2) complaints were received during the monitoring period. A description of complaints, the results of investigation and any actions taken are detailed in Table 8 of this report.



# Abbreviations and Descriptions

The abbreviations, descriptions and project terminology used within this report can be found in Table 1.

Table 1: Table of Abbreviations

Acronym/Term	Definition
$L_{Aeq,T}$	See equivalent continuous sound pressure level
Ambient sound	A description of the all-encompassing sound at a given location and time which will include sound from many sources near and far. Ambient sound can be quantified in terms of the equivalent continuous sound pressure level, $L_{pAeq,T}$
Decibel(s), or dB	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140dB.
Decibel(s) A-weighted, or dB(A)	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.
Equivalent continuous sound pressure level, or $L_{Aeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Exclusion of data	Measurement of noise levels can be affected by weather conditions such as prolonged periods of rain, winds speeds higher than 5m/s and snow/ice ground cover. Noise levels measured during these periods are considered not representative of normal noise conditions at the site and, for the purposes of this report, are excluded from the assessment of exceedances and calculation of typical noise levels and are also greyed out in charts. Identifiable incongruous noise and vibration events not attributable to HS2 construction noise are also excluded.
Façade	A facade noise level is the noise level 1m in front of a large reflecting surface. The effect of reflection, is to produce a slightly higher (typically +3 dB) sound level than it would be if the reflecting surface was not there.
Free-field	A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
Peak particle velocity, or PPV	Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position. The PPV is a simple indicator of perceptibility and risk of damage to structures due to vibration. It is usually measured in mm/s.
SOAEL	Significant Observed Adverse Effect Level - the level above which significant adverse effects on health and quality of life occur.
Sound pressure level	The parameter by which sound levels are measured in air. It is measured in decibels. The threshold of hearing has been set at 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB at a distance of 1 metre and a change of 3dB in a time varying sound signal is commonly regarded as being just detectable. A change of 10dB is subjectively twice, or half, as loud.
Vibration dose value, or VDV	An index used to evaluate human exposure to vibration in buildings. While the PPV provides information regarding the magnitude of single vibration events, the VDV provides a measure of the total vibration experienced over a specified period of time (typically 16h daytime and 8h night-time). It takes into account the magnitude, the number and the duration of vibration events and can be used to quantify exposure to continuous, impulsive, occasional and intermittent vibration. The vibration dose value is measured in $m/s^{1.75}$ .

# 1 Introduction

1.1.1 HS2 is required to undertake noise (and vibration) monitoring as necessary to comply with the requirements of the High Speed Rail (London-West Midlands) Environmental Minimum Requirements, including specifically Annex 1: Code of Construction Practice, in addition to any monitoring requirements arising from conditions imposed through consents under Section 61 of the Control of Pollution Act, 1974 or through Undertakings & Assurances given to third parties. Such monitoring may be undertaken for the following purposes:

- monitoring the impact of construction works;
- to investigate complaints, incidents and exceedance of trigger levels; or
- monitoring the effectiveness of noise and vibration control measures.

1.1.2 Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the London Borough of Ealing (LBE) (including one monitoring location on the boundary with the London Borough of Hammersmith and Fulham) during the month for the period 1<sup>st</sup> to 31<sup>st</sup> December 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 concreting works, concrete pouring and installation of shutters for drainage channels;
  - Concrete pouring for welfare walls and slab;
  - Segment storage area works included concrete pours and striking of shutters, installation of mastic to joints and levelling of stone;
  - Construction of muck bin for future tunneling;
  - Fabrication of steel tubular props and waler beams;
  - Drainage works to haul road, including installation of chamber, installation of surcharge filter and excavation and installation of channels;

- Work to capping beam for the Logistics Tunnel Launch ramp, including pouring blinding between secant piles, dig and trim works, excavation and installation of the sump, cutting veins for pump, lifting down steel to ring beam area, drilling piles and installation of shutters;
- Conveyor works, including base construction works, grouting works and installation of conveyor pylons, spans and handrails; and
- Installation of the lightening around site.
- Willesden EuroTerminal worksite, ref. WET (see plan 5 in Appendix A), where work activities included:
  - Concreting works;
  - Installation of channel drain;
  - Installation of spoil conveyors, including reinforced concrete works and installation of towers and spans;
  - Drainage works, including attenuation tank works, installation of drainage manholes, pipes and chamber bedding;
  - Set-up of the edge protection around the spoil stockpile bays; and
  - Installation of pedestrian beacons.
- Victoria Road Crossover Box worksite, ref. VRCB (see plan 6 in Appendix A), where work activities included:
  - Construction of diaphragm wall, including excavation works and lifting of cages and tremies;
  - Ground works;
  - Concreting works for the welfare slab, footpath; and
  - installation of drainage pipes and channel drains.
  - At the Victoria Road Ancillary Shaft steel fixing works, formworks installations, cleaning out of the pouring area, pre-pour inspections of the reinforcement and cast-in-situ works were underway.
- Flat Iron compound, worksite ref. FIC (see plan 6 in Appendix A), where work activities included:
  - Concrete pouring;
  - Fencing works;
  - Drawcord installation within ductwork;
  - Earthing straps installations and grouting for conveyor bases; and

- excavation works.
- 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:
  - Fit out works for the permanent accommodation building;
  - Vegetation clearance;
  - Demolition works;
  - Construction of temporary site haul roads;
  - Drainage works;
  - Piling and diaphragm wall works;
  - Breaking down of diaphragm walls;
  - Conveyor foundation construction works;
  - Conveyor steel erection works; and
  - Asphaltting 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:
  - Concrete pouring and installation of kerbs;
  - Grouting works including pre-drilling, drilling and jet grouting works;
  - Finishing off works to the site haul road;
  - Manhole adjustment works;
  - Installation of concrete pad foundations to the groundwater discharge route;
  - Installation of towers and bridge; and
  - Finishing off works to the carpark area.

- Westgate Ventilation Shaft worksite, reference WVS (see plan 3 in Appendix A), where work activities included:
  - Shaft excavation works, including Sprayed Concrete Lining works and hand trimming 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 sheet piling, hoarding set-up works and electrical installations 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 December 2021 in the LBE area. Table 2 summarises the position of noise and vibration monitoring installations within the LBE area in December 2021.

1.2.2 The vibration monitor V055 (worksite ref.: MRVS) was relocated to a more representative location of the nearest receptor on the 17<sup>th</sup> of December 2021.

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

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
AR	N032	Shaftesbury Gardens
	N033	Outside The Collective, Atlas Road / Victoria Road
	N060	Atlas Road next to Bashey Road
WET	N034	Stephenson Street (north)
	N035	Stephenson Street (south)
	N041	Junction of Stephenson Street / Goodhall Street
	V052	Stephenson Street (north)

Worksite Reference	Measurement Reference	Address
	V057	37, Stephenson Street
VRCB	N031	School Road, outside Acton Business Centre
	N050	Acton Square, outside North Acton Station
FIC	N029	Braitrim House, Victoria Road
	N042	Boden House Car Park
	N049	Flat Iron compound railway fence, Victoria Rd North Acton
OOC	OOC-N01	Old Oak Common Lane
	OOC-N02	Old Oak Common Lane, Hilltop Works
	OOC-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-Old	Mandeville Road
	V055-New	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	61.5 (66.8)	63.8 (65.7)	62.0 (64.1)	61.0 (68.1)	58.0 (66.5)	58.6 (60.2)	62.6 (65.5)	62.3 (64.1)	62.0 (66.3)	58.8 (66.8)	61.5 (68.1)	57.3 (61.6)
	N033	Outside The Collective, Atlas Road/Victoria Road	Free-field	65.3 (68.5)	67.8 (78.0)	64.8 (67.1)	64.0 (69.9)	61.2 (68.1)	61.7 (63.7)	65.6 (69.4)	65.1 (67.3)	66.2 (73.3)	61.9 (68.3)	63.8 (66.5)	60.7 (65.1)
	N060	Atlas Road next to Bashey Road	Free-field	54.6 (60.0)	60.3 (68.7)	53.5 (59.6)	54.9 (65.1)	53.9 (64.3)	54.7 (58.7)	56.1 (58.9)	52.3 (54.6)	56.0 (73.4)	56.4 (75.5)	56.0 (72.5)	52.6 (59.0)
WET	N034	Stephenson Street (north)	Free-field	52.7 (56.3)	56.3 (62.6)	53.5 (58.2)	52.4 (57.7)	48.7 (58.5)	51.1 (55.4)	55.0 (57.3)	52.9 (53.6)	52.2 (54.6)	46.9 (50.8)	53.3 (60.2)	47.0 (51.2)
	N035	Stephenson Street (south)	Free-field	53.2 (56.9)	57.8 (68.7)	51.8 (61.4)	50.7 (54.3)	48.4 (57.2)	53.6 (64.1)	55.2 (57.3)	51.6 (53.3)	51.2 (55.9)	47.2 (52.5)	51.6 (59.1)	47.1 (52.9)
	N041	Junction of Stephenson Street/Goodhall Street	Free-field	53.5 (55.7)	59.1 (65.0)	56.1 (64.7)	54.1 (61.4)	50.0 (61.6)	51.7 (54.3)	58.3 (62.4)	54.9 (55.4)	54.5 (56.4)	50.3 (55.4)	54.0 (58.7)	48.5 (52.2)



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
VRCB	N031	School Road, outside Acton Business Centre	Free-field	59.2 (67.8)	61.5 (64.8)	60.0 (64.9)	57.5 (61.8)	53.9 (63.3)	56.0 (58.6)	59.5 (62.5)	59.2 (61.4)	58.3 (62.6)	52.8 (58.4)	57.5 (63.6)	51.5 (56.4)
	N050	Acton Square, outside North Acton Station	Free-field	64.2 (68.3)	63.6 (65.6)	62.5 (64.2)	62.1 (75.2)	58.8 (68.8)	61.8 (65.0)	65.6 (67.4)	61.8 (64.9)	62.0 (65.9)	58.5 (63.9)	62.3 (67.1)	58.0 (62.8)
FIC	N029	Braitrim House, Victoria Road	Free-field	56.4 (68.1)	62.3 (80.3)	52.8 (60.9)	53.8 (65.0)	52.8 (66.4)	53.1 (58.8)	57.8 (64.2)	51.3 (54.0)	51.2 (57.4)	49.2 (61.2)	50.8 (58.6)	50.4 (61.2)
	N042	Bodens car park	Free-field	56.5 (59.5)	59.8 (63.7)	55.6 (59.0)	54.8 (57.4)	53.6 (68.1)	54.5 (55.7)	56.6 (58.9)	55.8 (58.6)	55.3 (64.2)	53.0 (58.4)	54.5 (57.5)	52.7 (54.9)
	N049	Flat Iron compound	Free-field	54.2 (58.1)	61.7 (80.9)	55.6 (61.5)	54.7 (61.9)	55.0 (71.1)	53.2 (55.6)	54.7 (57.4)	53.2 (55.9)	51.6 (57.8)	51.9 (60.1)	51.9 (59.3)	54.6 (69.5)
OOC	OOC-N01	Old Oak Common Lane	Free-field	62.8 (67.6)	68.4 (76.9)	62.2 (65.1)	60.7 (65.9)	57.4 (69.2)	57.8 (58.5)	60.8 (61.8)	61.3 (62.3)	61.3 (70.5)	58.0 (63.5)	60.2 (64.7)	56.7 (63.3)
	OOC-N02	Old Oak Common Lane, Hilltop Works	Free-field	66.6 (69.5)	69.1 (72.5)	67.7 (69.6)	66.4 (69.4)	62.6 (70.5)	63.7 (65.5)	68.0 (69.7)	67.5 (68.2)	67.8 (74.4)	62.8 (67.7)	66.4 (69.4)	62.3 (67.0)
MRVS	N040	Badminton Close	Free-field	54.1 (56.3)	57.7 (62.1)	54.5 (58.0)	54.8 (59.6)	52.9 (70.5)	55.0 (58.4)	54.8 (57.3)	53.8 (57.4)	54.1 (57.1)	52.3 (57.5)	54.1 (58.0)	50.8 (55.4)
	N058	Mandeville Road	Free-field	53.9 (56.3)	60.2 (74.8)	53.5 (57.2)	53.5 (59.5)	50.7 (70.1)	49.8 (55.0)	55.7 (63.4)	50.3 (56.5)	51.1 (56.5)	47.1 (54.0)	51.6 (55.3)	47.9 (54.5)

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	58.6 (60.4)	61.9 (66.0)	58.4 (61.7)	58.8 (63.9)	56.1 (71.8)	55.8 (59.5)	57.5 (60.8)	55.8 (59.8)	56.9 (60.4)	54.5 (59.0)	57.5 (59.9)	54.5 (58.7)
GPWVS	N059	Green Park Way Ventilation Shaft	Free-field	57.6 (64.7)	61.5 (67.7)	54.6 (63.0)	54.2 (62.6)	52.0 (65.2)	53.6 (57.9)	55.0 (62.8)	52.1 (60.2)	52.8 (60.5)	48.3 (58.9)	54.4 (65.3)	48.5 (54.6)
	N064	Green Park Way Ventilation Shaft	Façade	59.4 (66.7)	62.3 (66.1)	59.8 (62.3)	59.6 (62.3)	56.9 (68.2)	57.8 (58.8)	57.5 (62.5)	56.6 (64.4)	57.9 (67.6)	49.9 (56.6)	57.5 (70.5)	51.7 (57.5)
WVS	N062	Westgate Ventilation Shaft	Free-field	63.5 (71.1)	66.1 (71.8)	60.4 (65.0)	63.3 (71.1)	61.1 (73.2)	58.4 (59.9)	61.1 (69.4)	58.0 (60.8)	58.7 (64.8)	55.7 (61.2)	57.5 (65.8)	56.7 (64.0)

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)	1.13 (Z-axis)
	V057	37, Stephenson Street	0.86 (Z-axis)
OOC	OOC-V01	25 Wells House Road	2.39 (X-axis)
	OOC-V02	Kildun Court, Old Oak Common Lane	1.22 (Z-axis)
	OOC-V03	Wells House Road Alleyway	1.77 (Z-axis)
GPWVS	V053	Green Park Way, Greenford	1.44 (Z-axis)
	V054	Green Park Way Ventilation Shaft	1.22 (Y-axis)
MRVS	V055-Old	Mandeville Road	2.60 (Z-axis)
	V055-New	Mandeville Road	2.45 (Z-axis)
	V056	Mandeville Road	6.84* (Y-axis)

\* High vibration levels are due to works undertaken in close proximity of the vibration monitoring location. The nearest residential receptors are further away from the works and vibration levels at the receptors 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	Saturday Sunday Night	1400-2200 0700-2200 2200-0700	1 4 9
WET	N034	Stephenson Street (north)	All days	All periods	No exceedance
	N035	Stephenson Street (south)	All days	All periods	No exceedance
	N041	Junction of Stephenson Street / Goodhall Street	All days	All periods	No exceedance
VRCB	N031	School Road, outside Acton Business Centre	All days	All periods	Not applicable*
	N050	Acton Square, outside North Acton Station	Night	2200-0700	2
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

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
	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	All days	All periods	No exceedance
	N063	Mandeville Road	All days	All periods	No exceedance
GPWVS	N059	Green Park Way Ventilation Shaft	All days	All periods	Not applicable*
	N064	Green Park Way Ventilation Shaft	All days	All periods	Not applicable*
WVS	N062	Westgate Ventilation Shaft	All days	All periods	Not applicable*

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

\*\* Noise levels measured in excess of the SOAEL at monitors N029 and OCC-NO1 were from works in close proximity to the monitor and do not represent an exceedance of the SOAEL at the nearest residential receptor.

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
AR	N060	Atlas Road next to Bashey Road	2
VRCB	N050	Acton Square, outside North Acton Station	2
FIC	N049	Flat Iron compound	1

2.2.6 Five (5) exceedances of the SOAEL were recorded due to HS2 construction works during December 2021. The exceedance occurred at:

- Monitoring locations N060 during one weekend and one weeknight periods and two night-time periods due to conveyor installation works;
- Monitoring location N050 during two weeknight periods due to diaphragm wall work and secondary lining works;

- Monitoring locations N049 during one daytime period due to conveyor 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

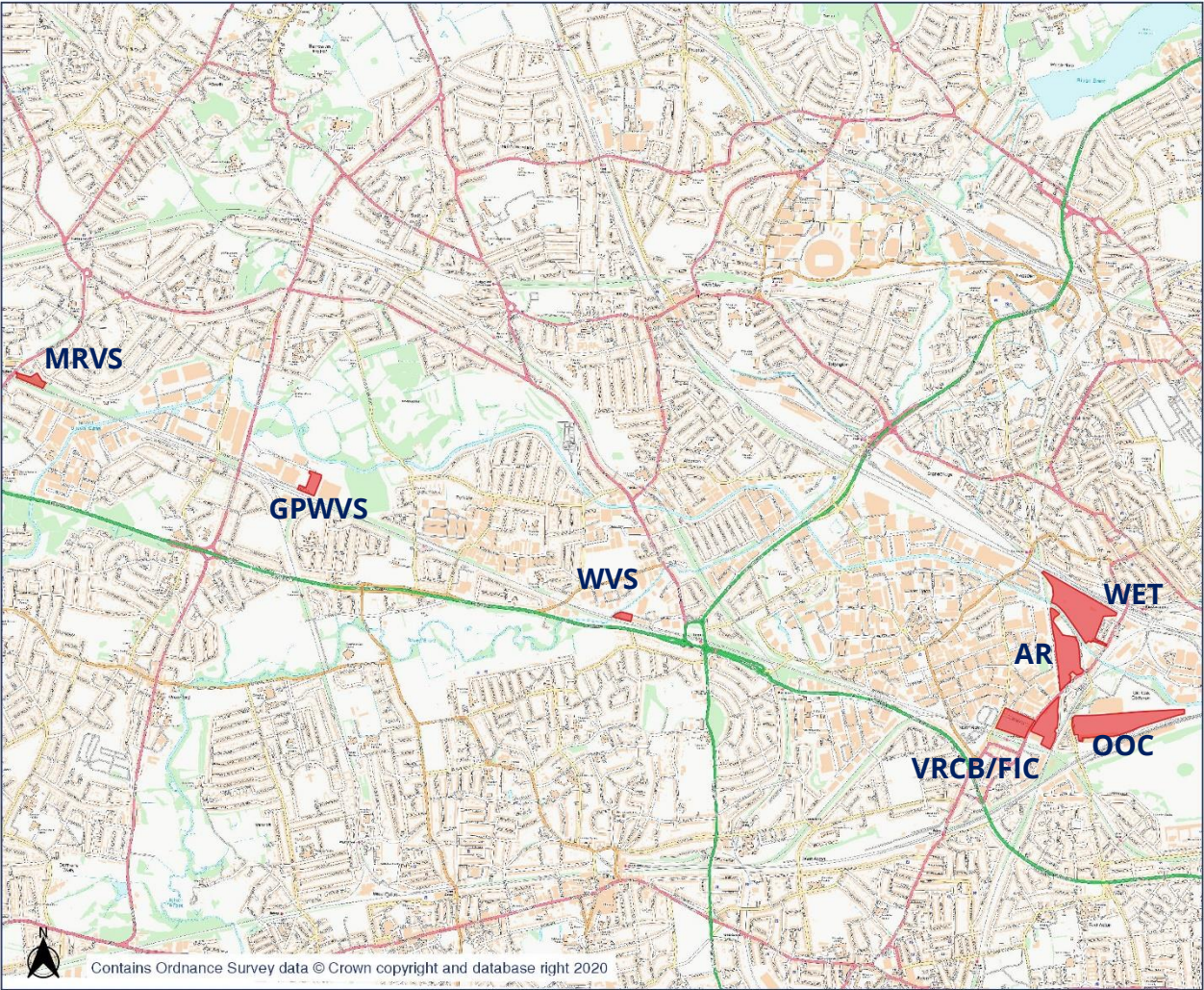
2.4.1 Table 8 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 8: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-43064-C	OOC	Complaint due to loud noise and shouting disturbance at 6.15am coming from the worksite.	Investigations shown that people were working on site at the time of the complaint.	The site records have been reviewed and the team on site has been advised to keep noise levels to a minimum. The Complainant has been contacted and information about action taken was provided.
HS2-21-70426-E	OOC	Complaint due to vibrations felt within their property.	Investigation shows that at the time of the complaint breaking works were undertaken on site. However, works were undertaken in line with Section 61 consent and Best Practicable Means were in place.	The Stakeholder was provided with information outlining the results of investigation and was invited to report any further vibration concerns.

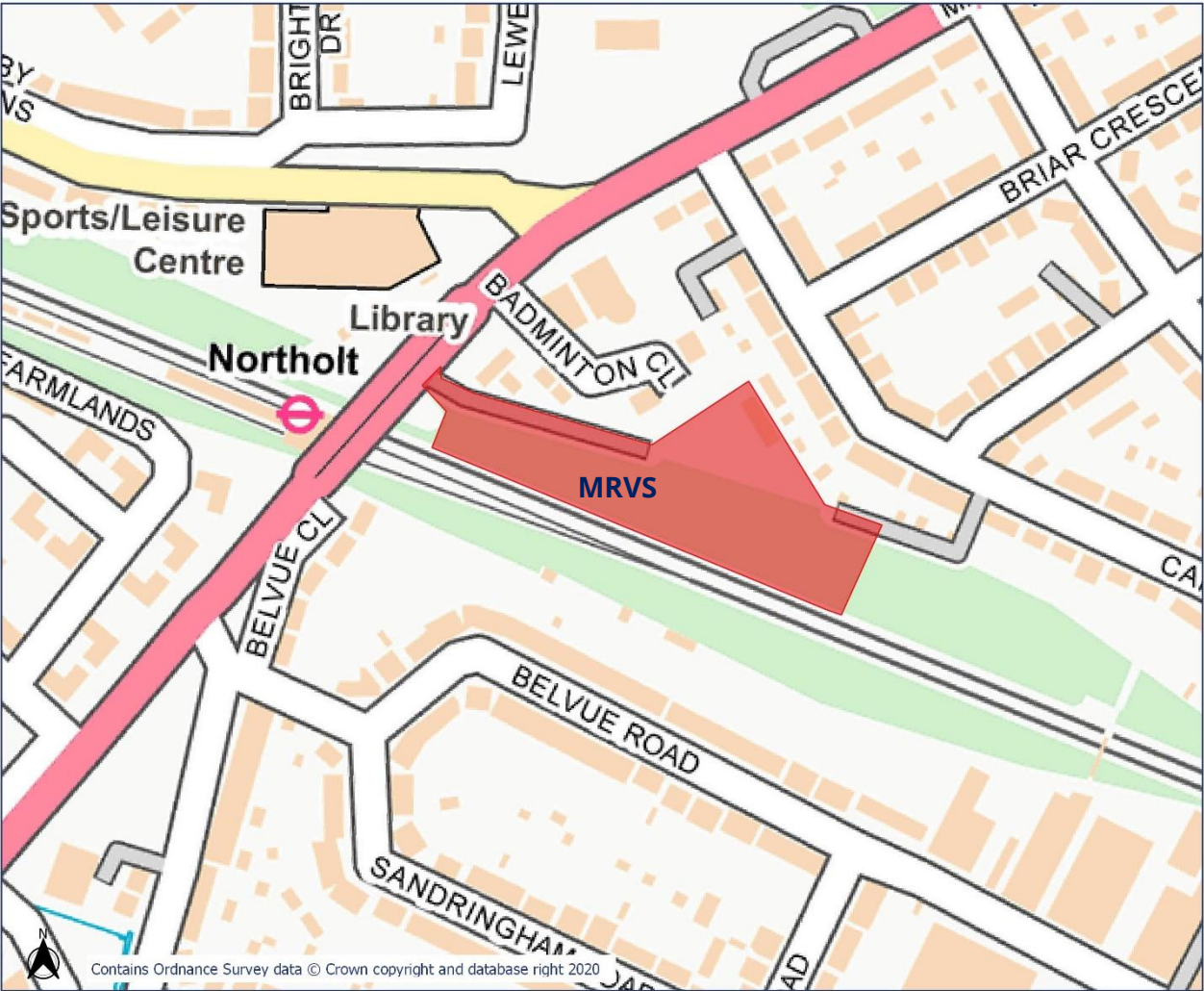
# Appendix A Site Locations



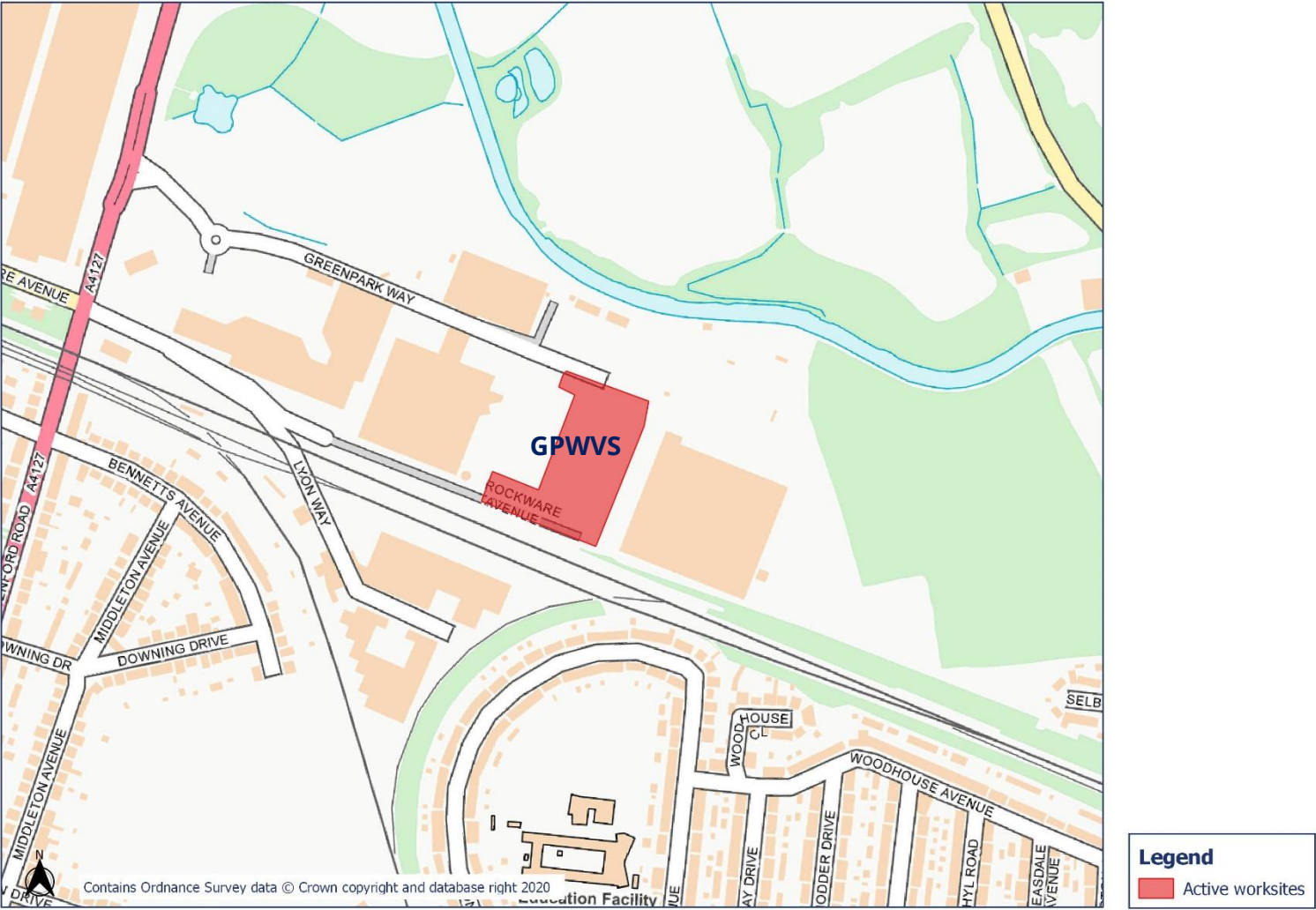


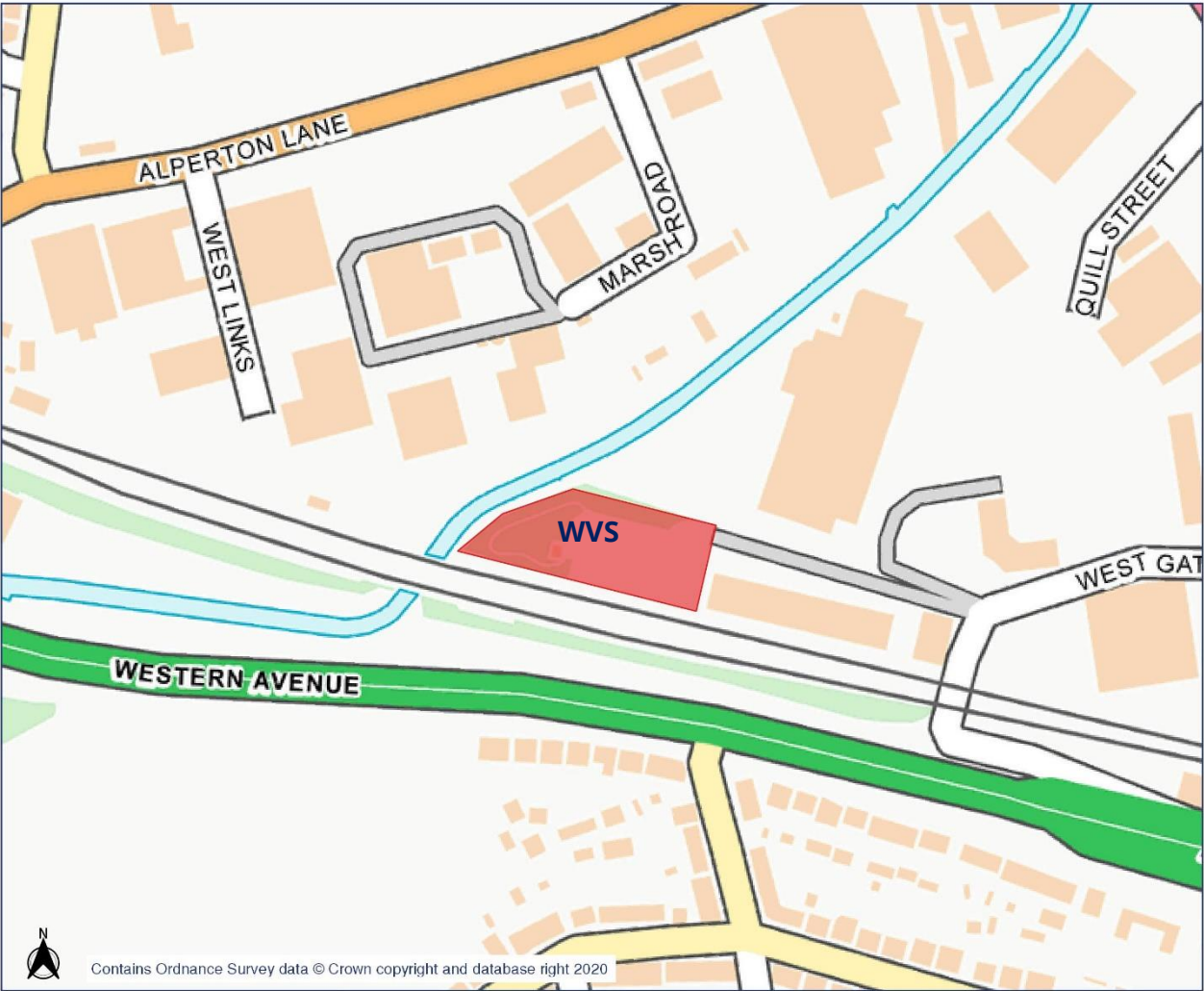
**Legend**  
Active worksites



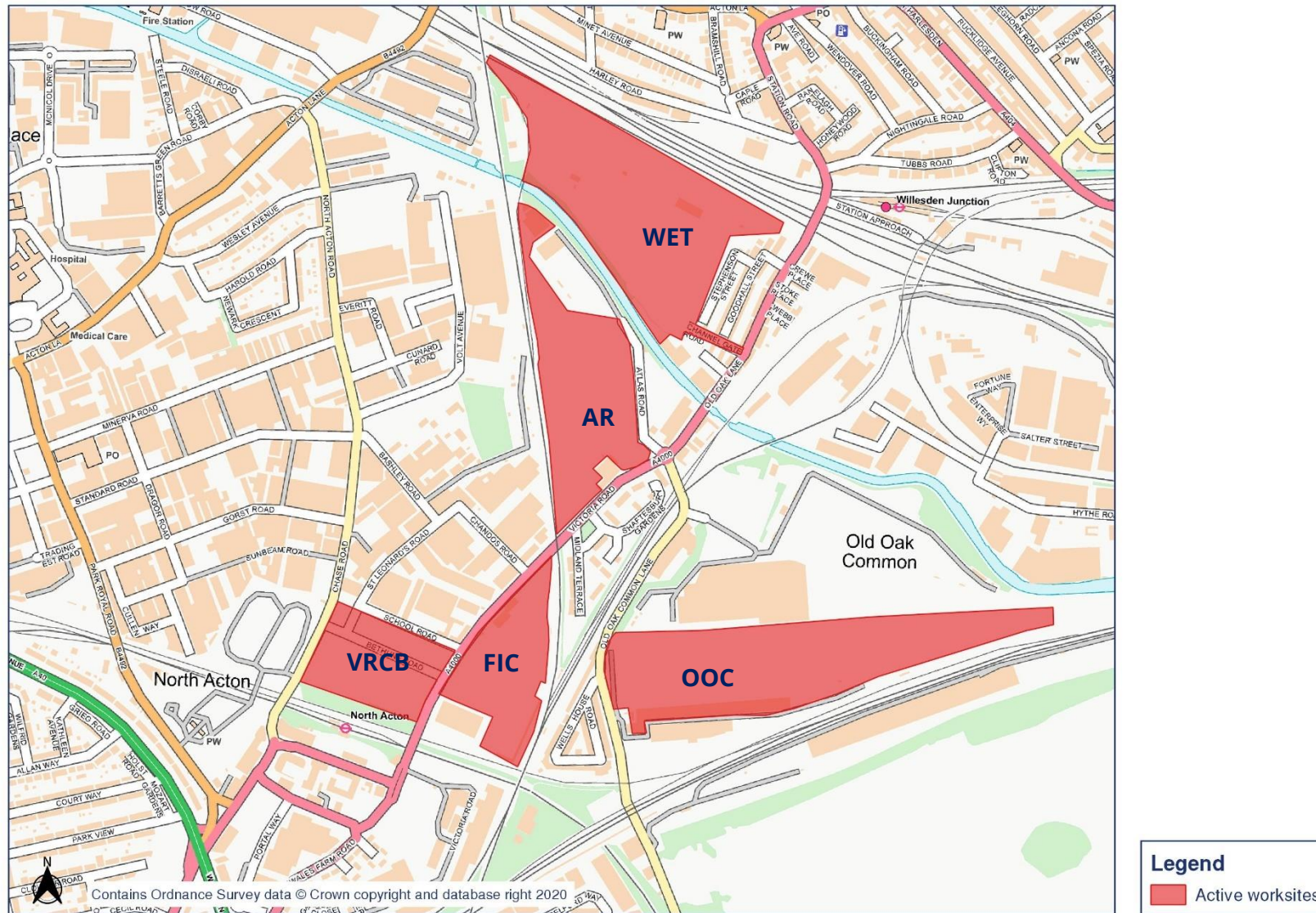


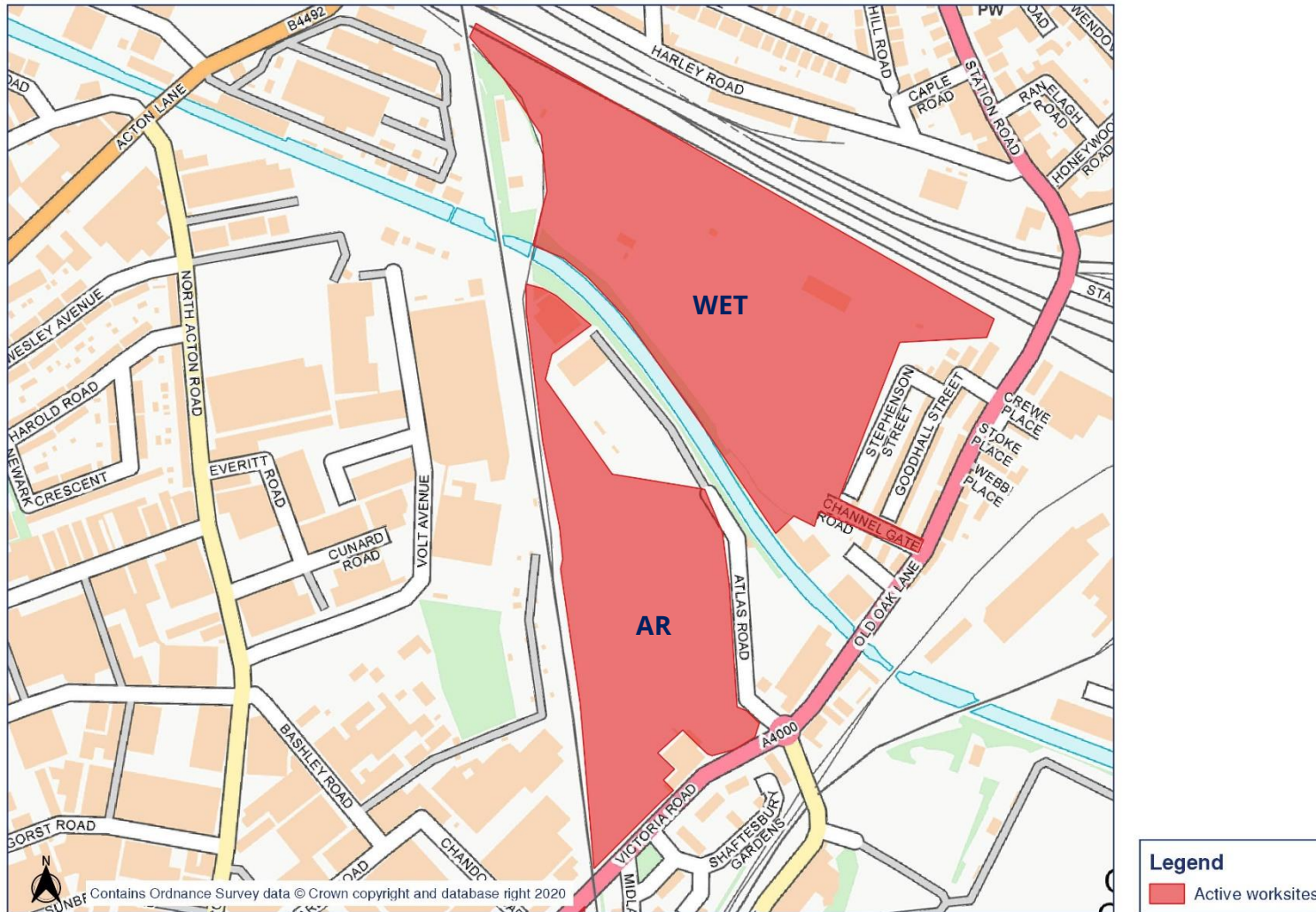
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Active worksites



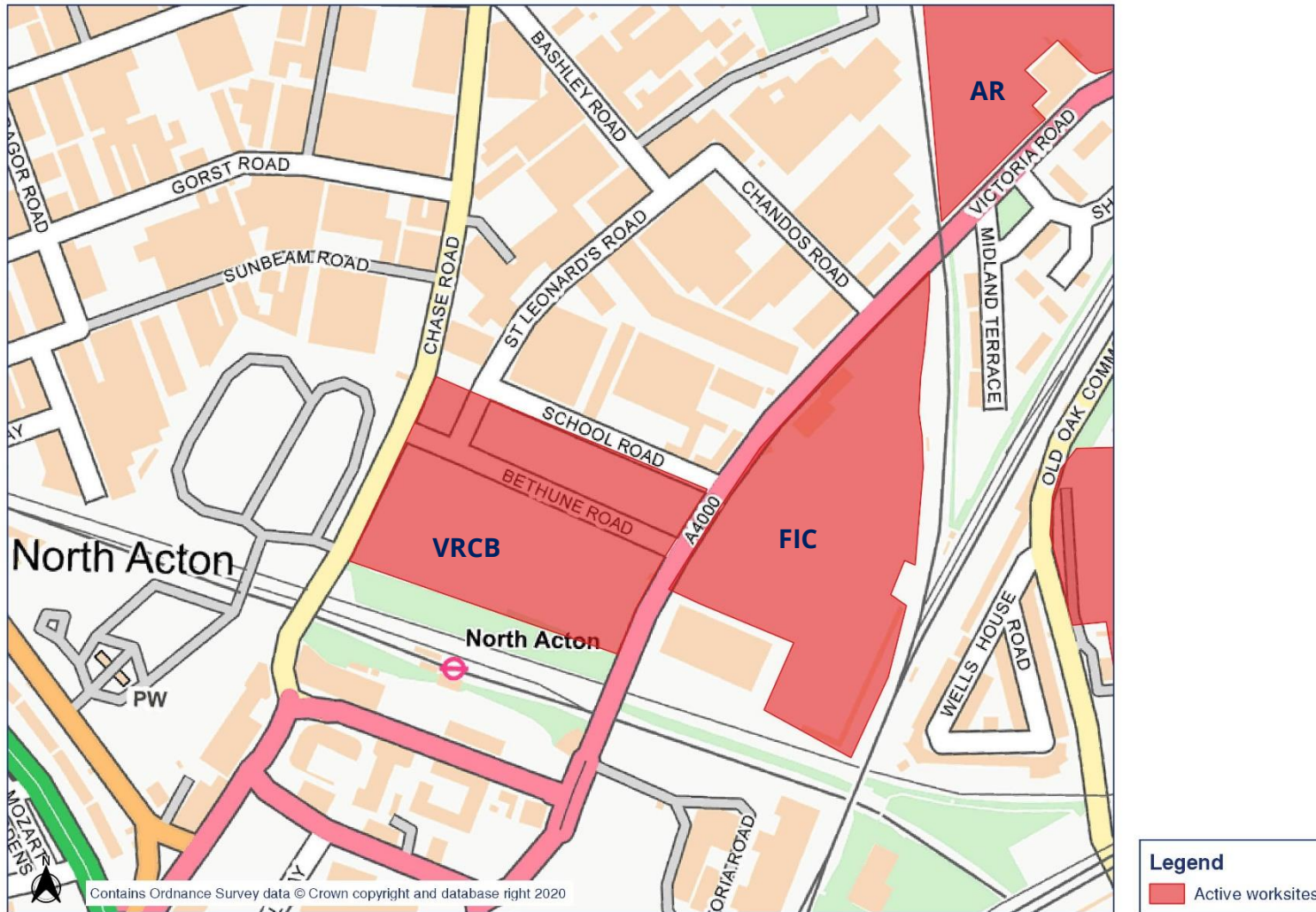


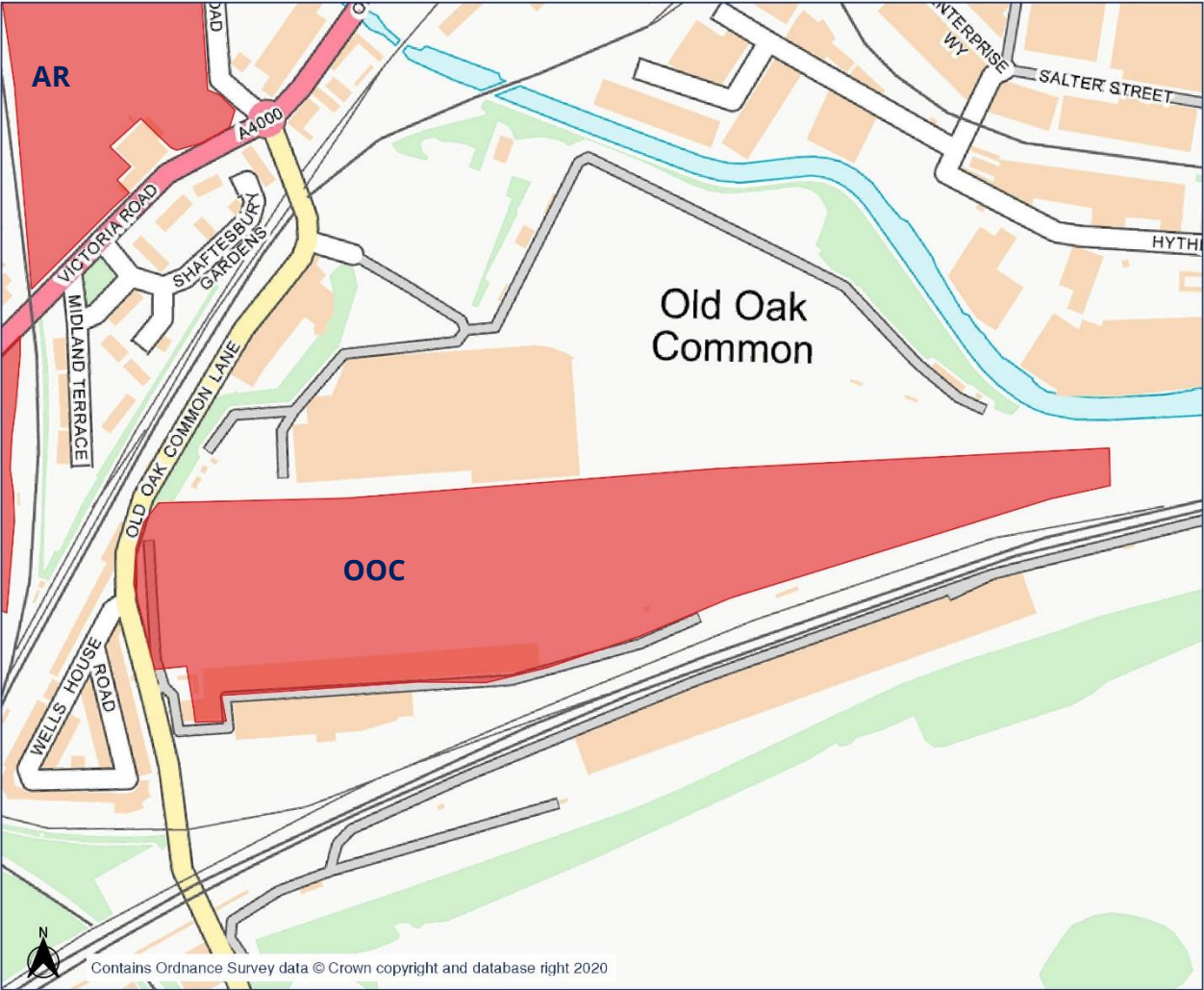










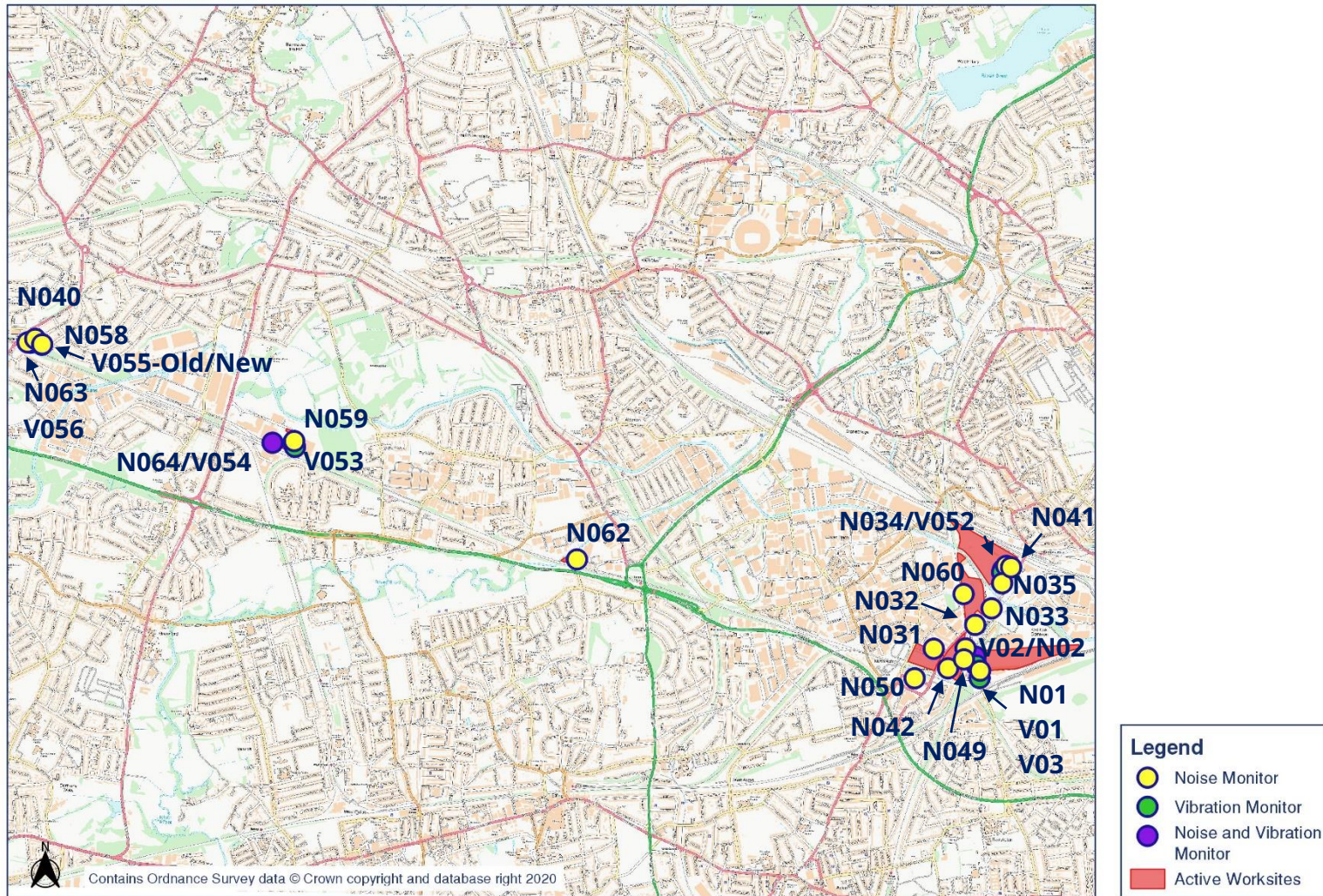


**Legend**  
Active worksites

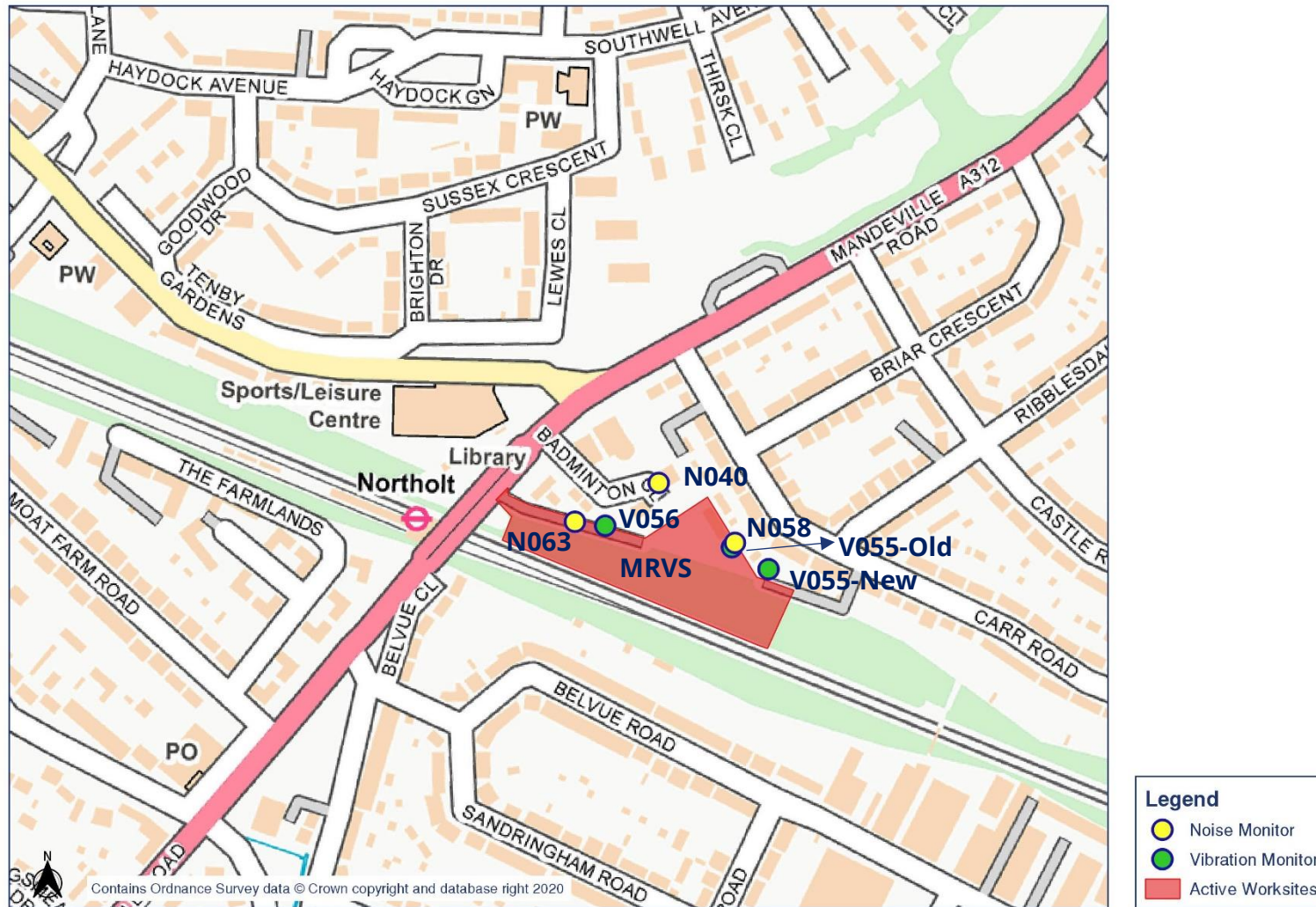
# Appendix B Monitoring Locations

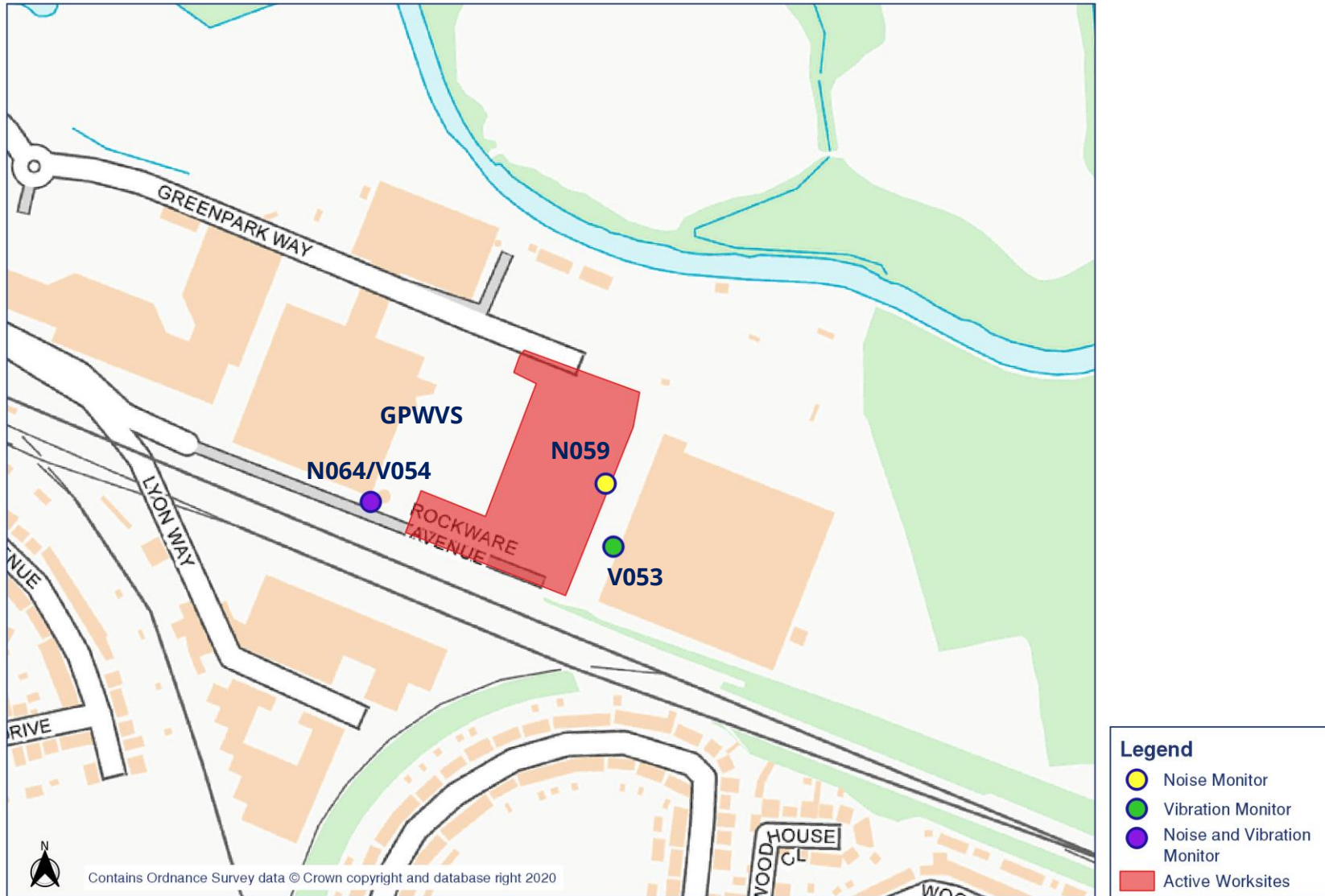


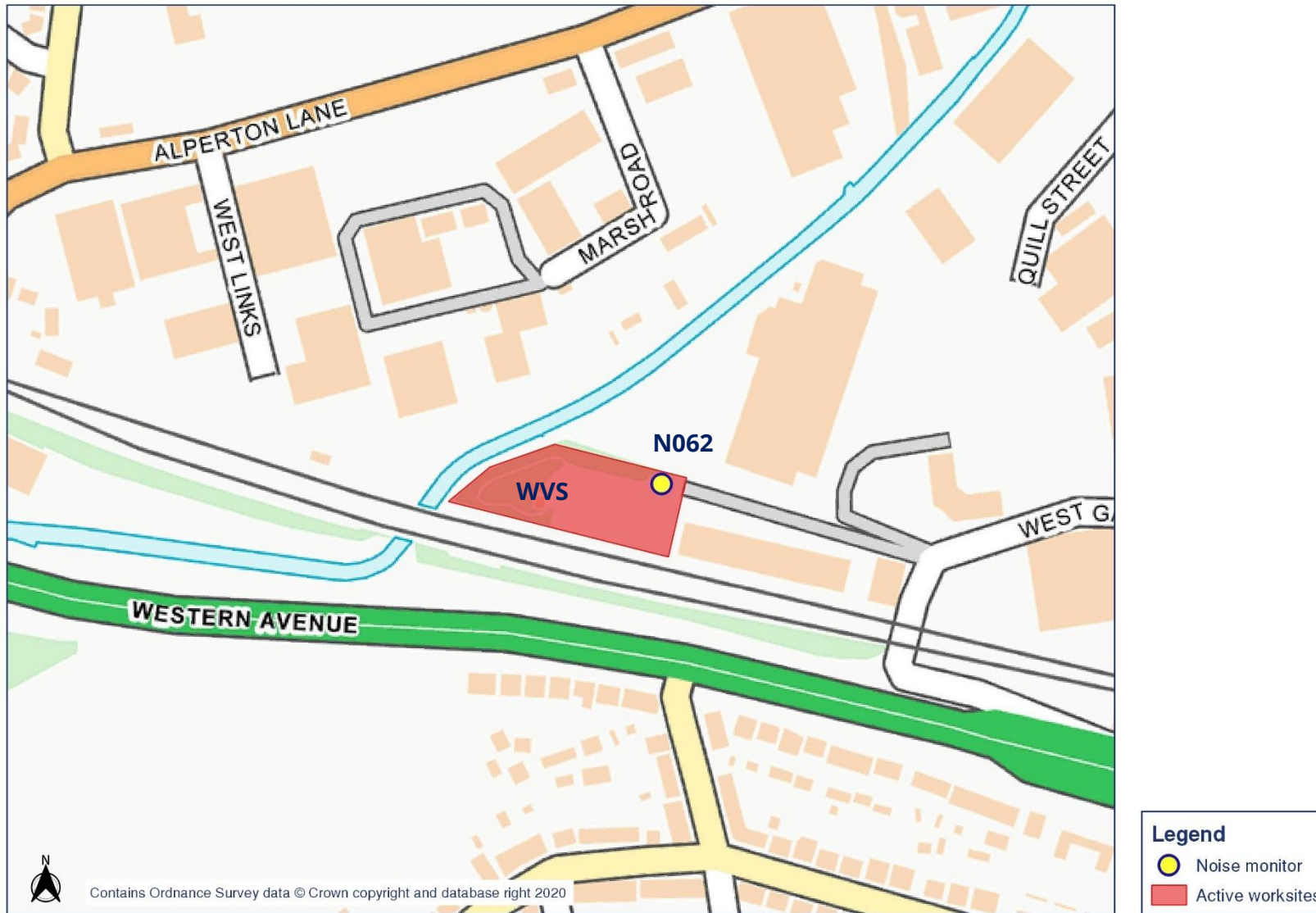
# HS2 Noise and vibration monitoring plan - Overview



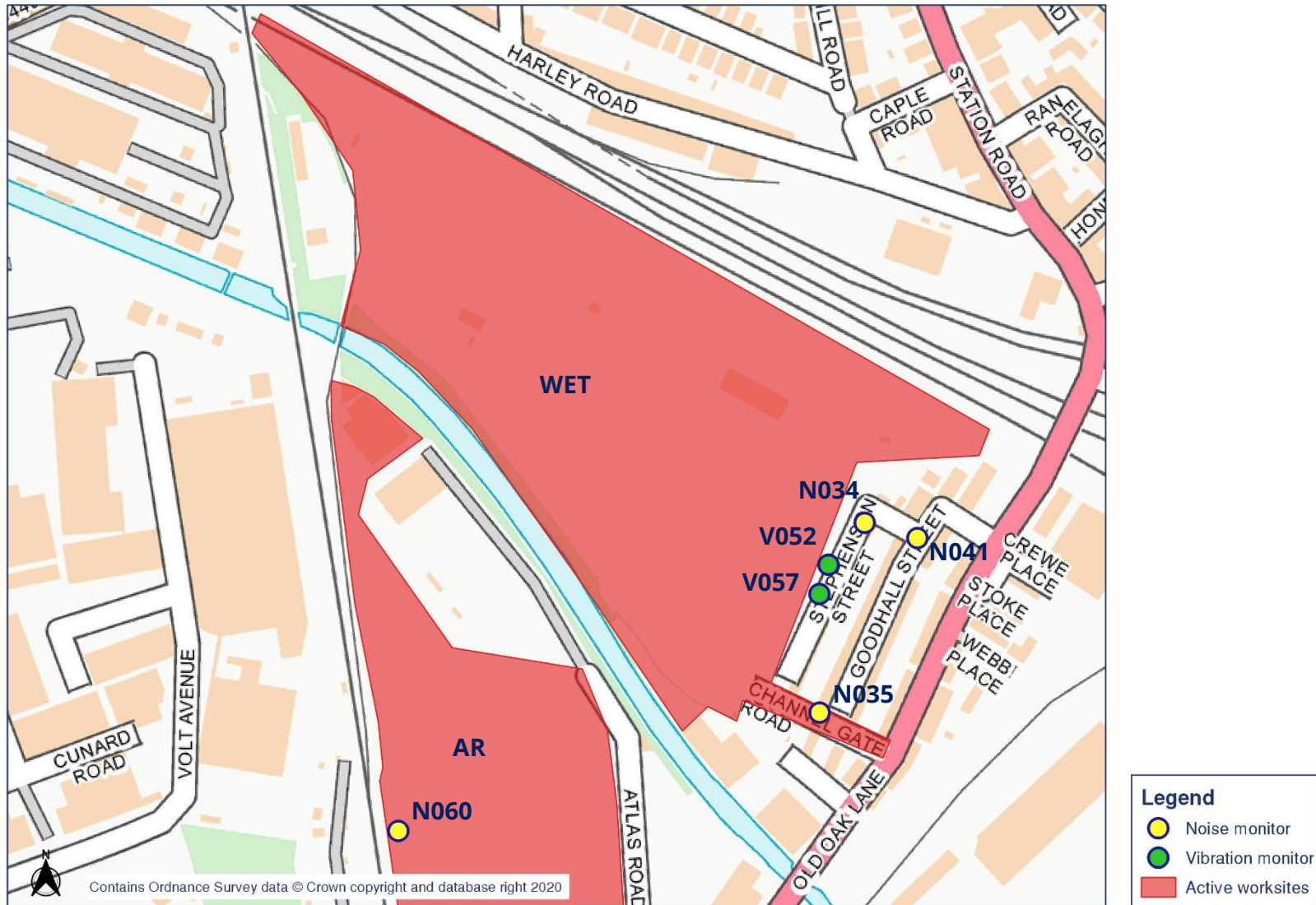


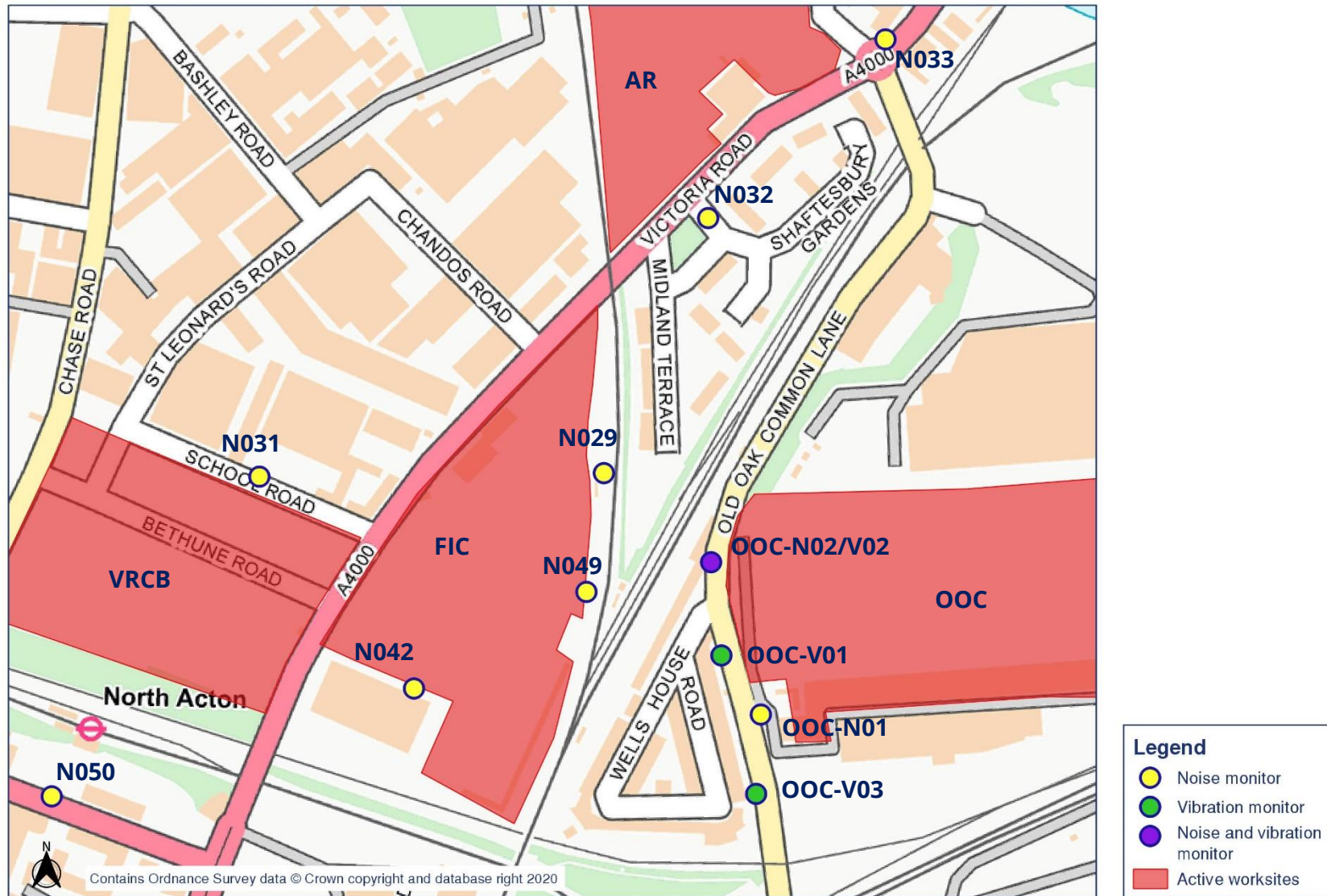










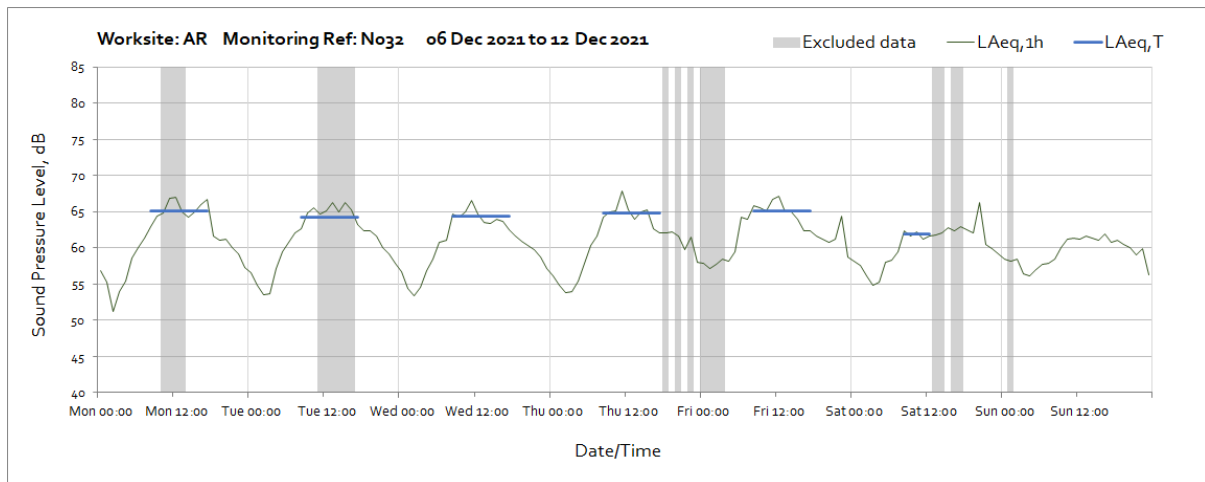
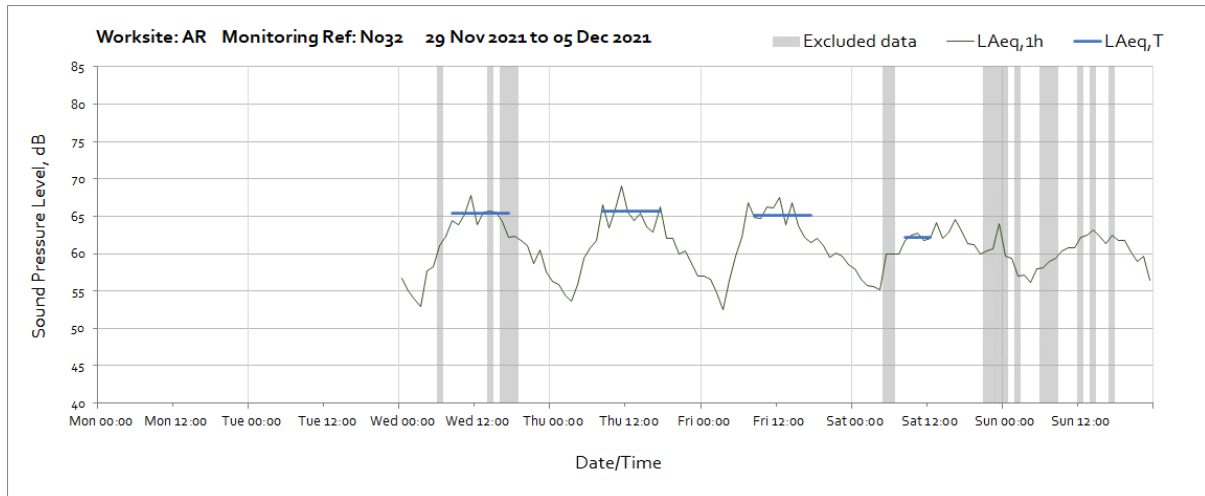


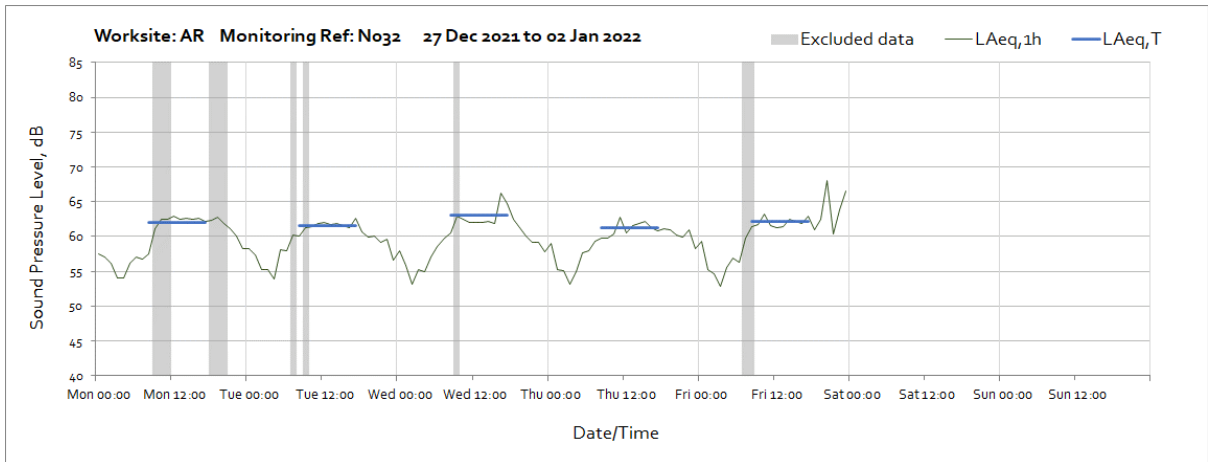
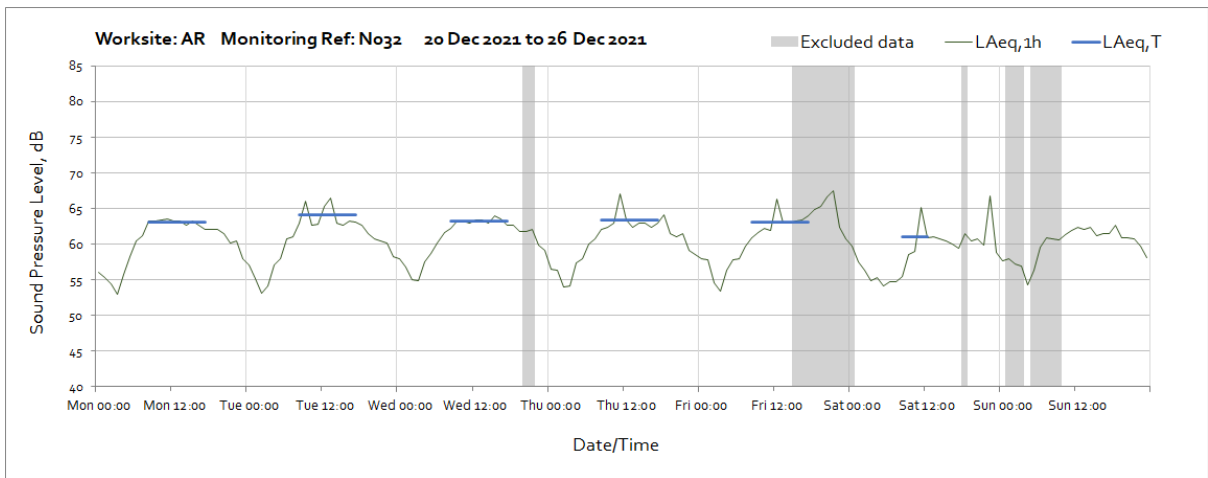
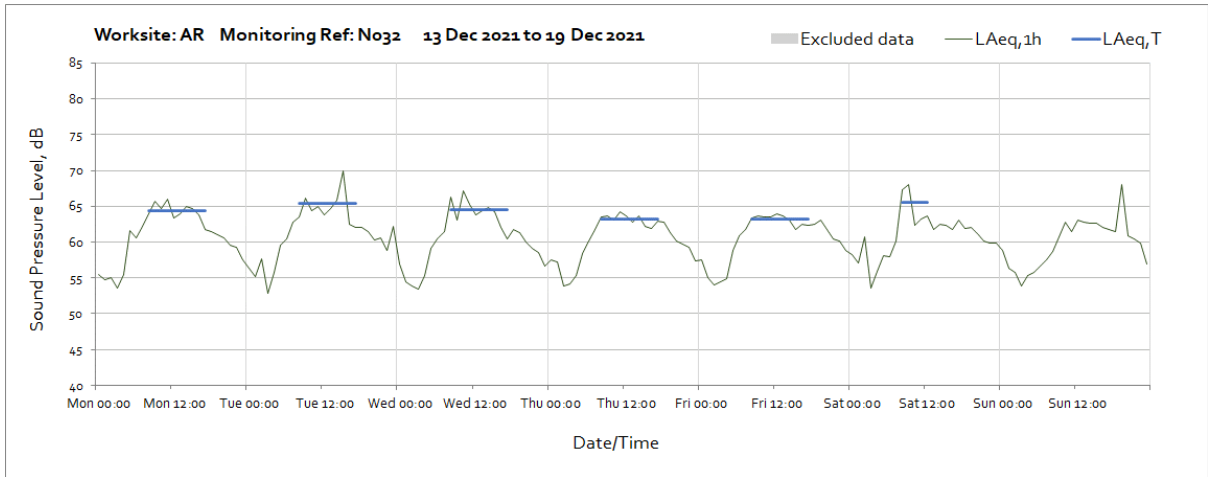
# Appendix C Data

## 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.

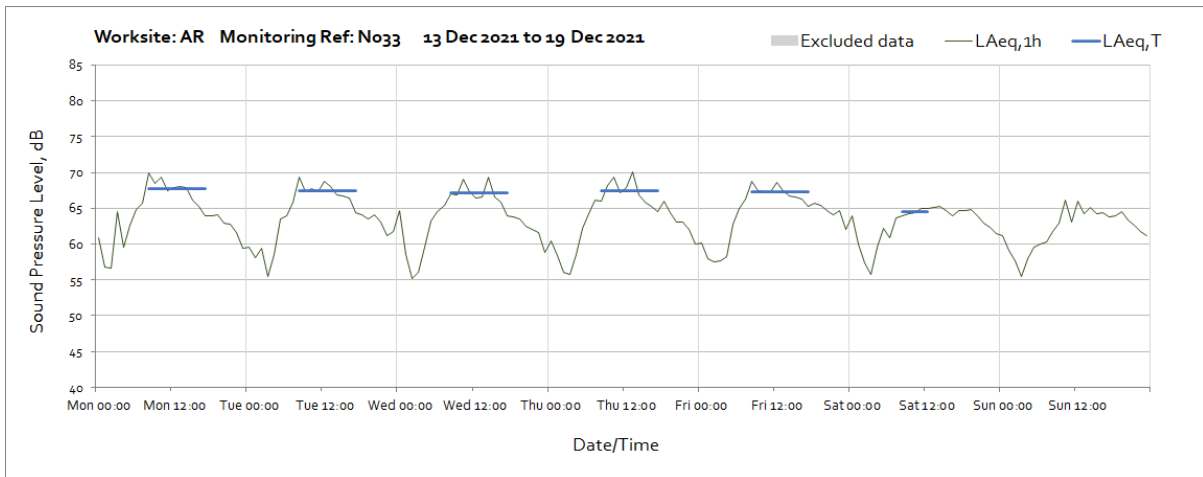
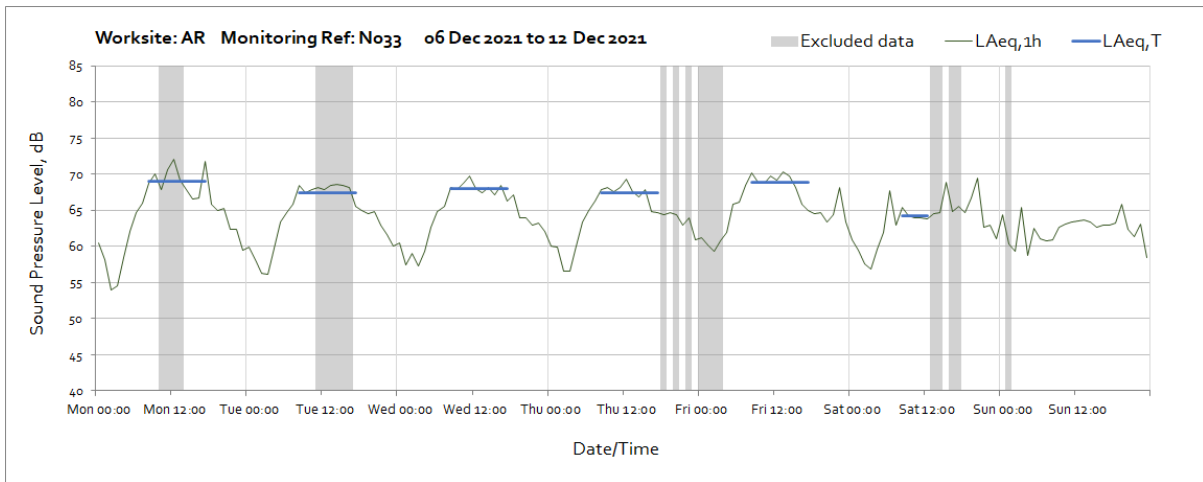
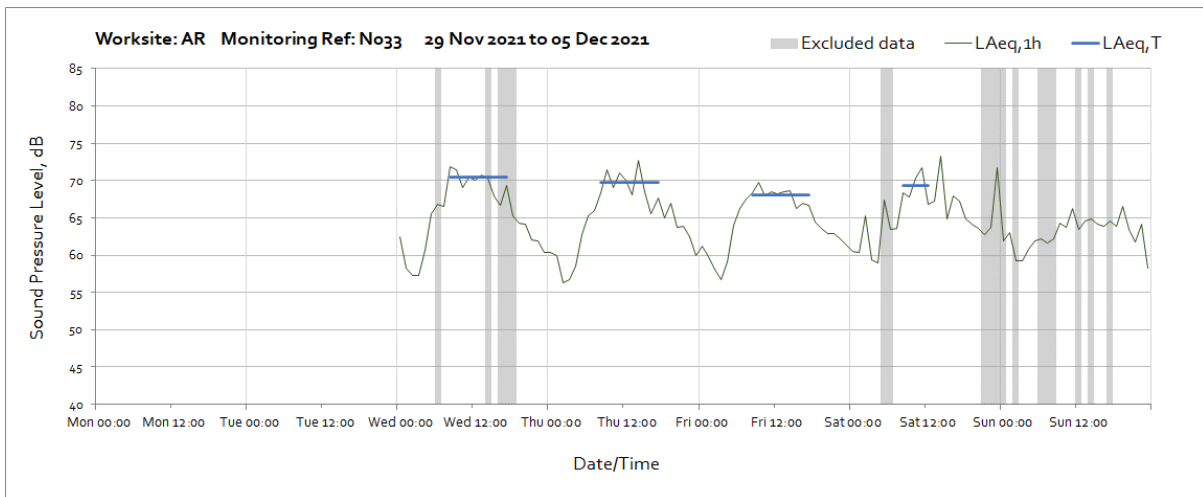
### Worksite: Atlas Road worksite (AR) – Monitoring Ref: N032



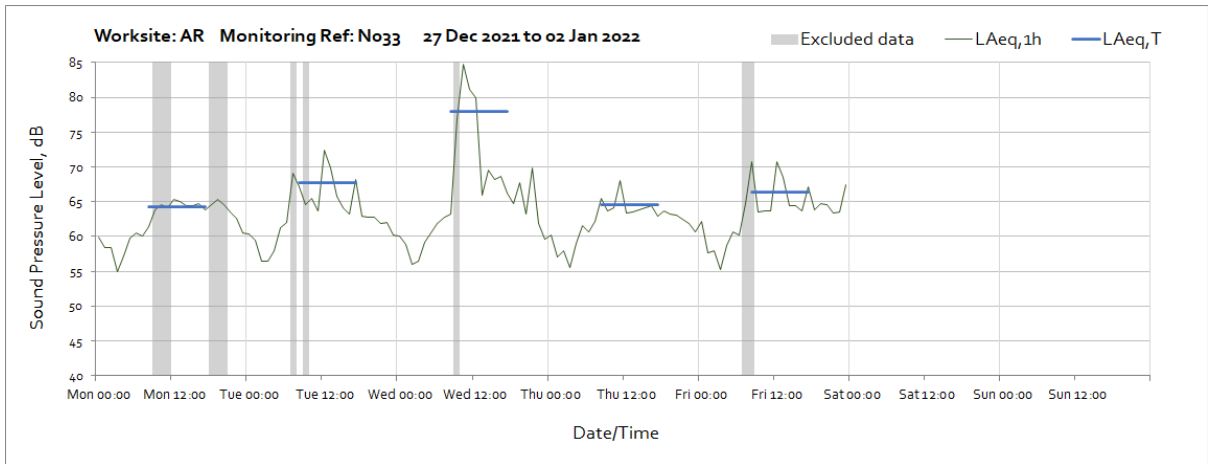
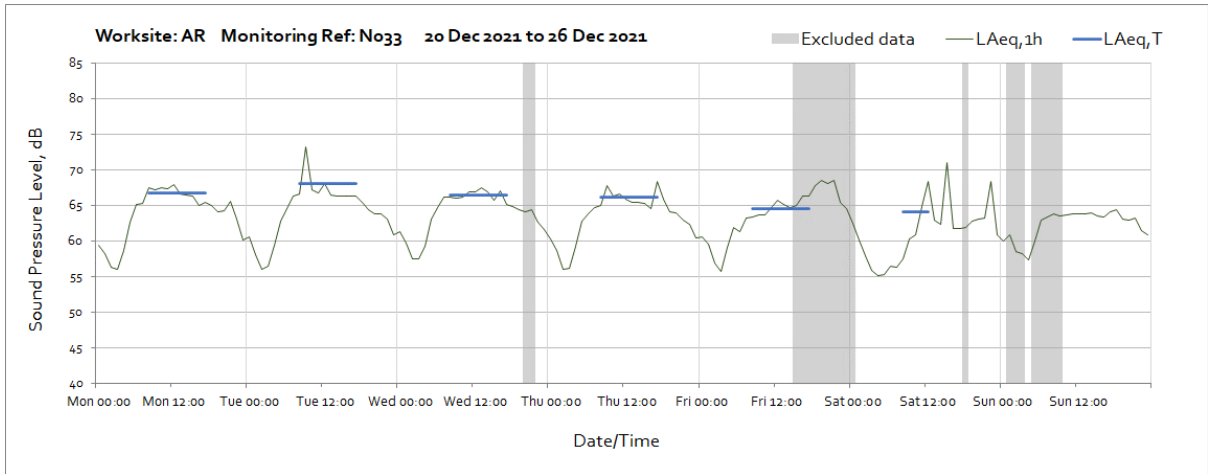




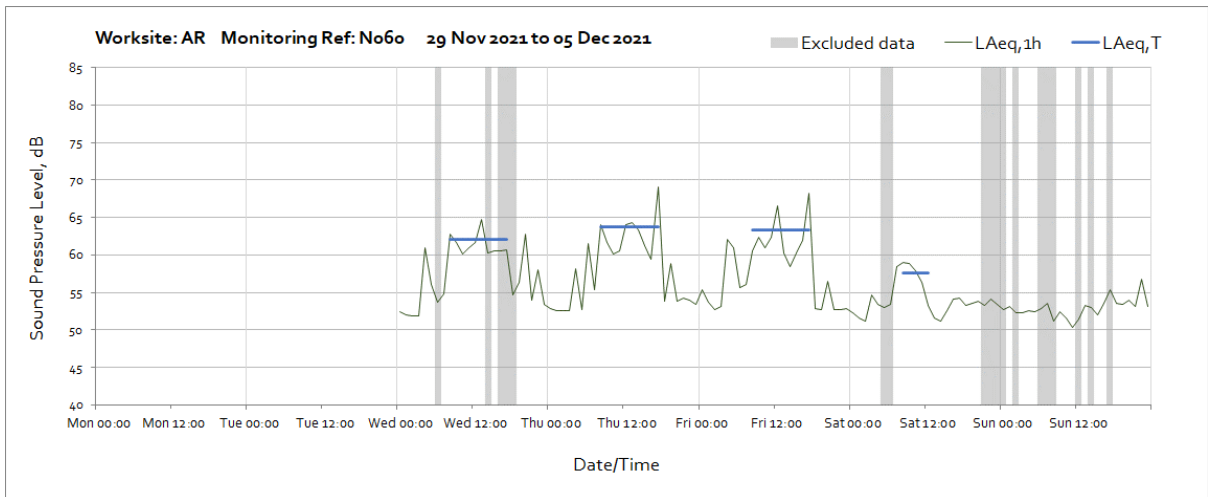
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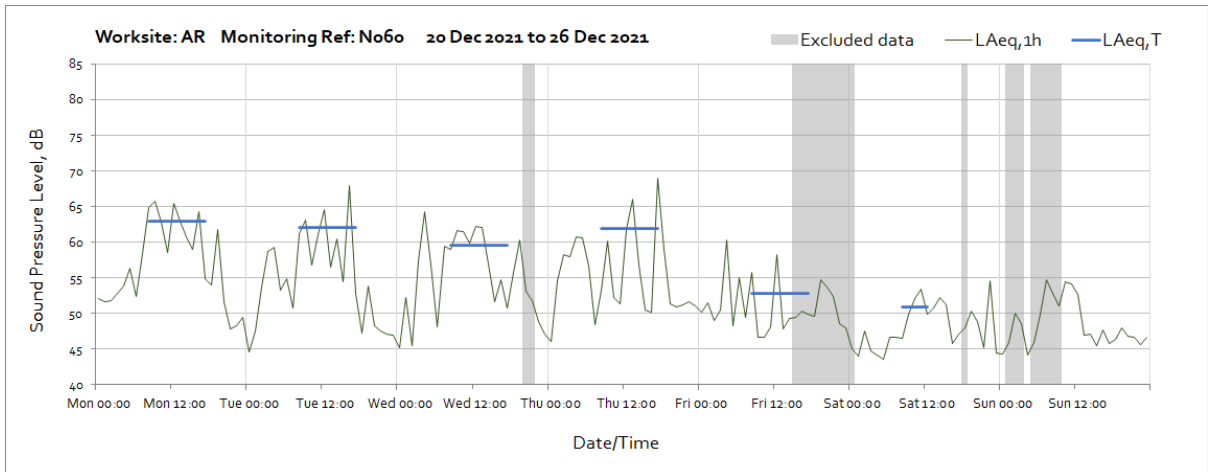
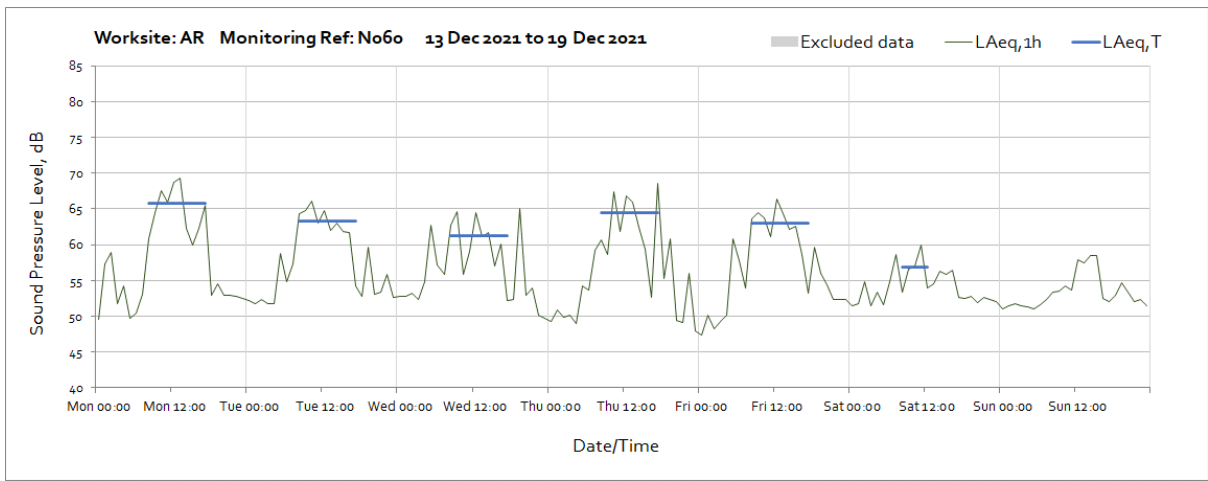
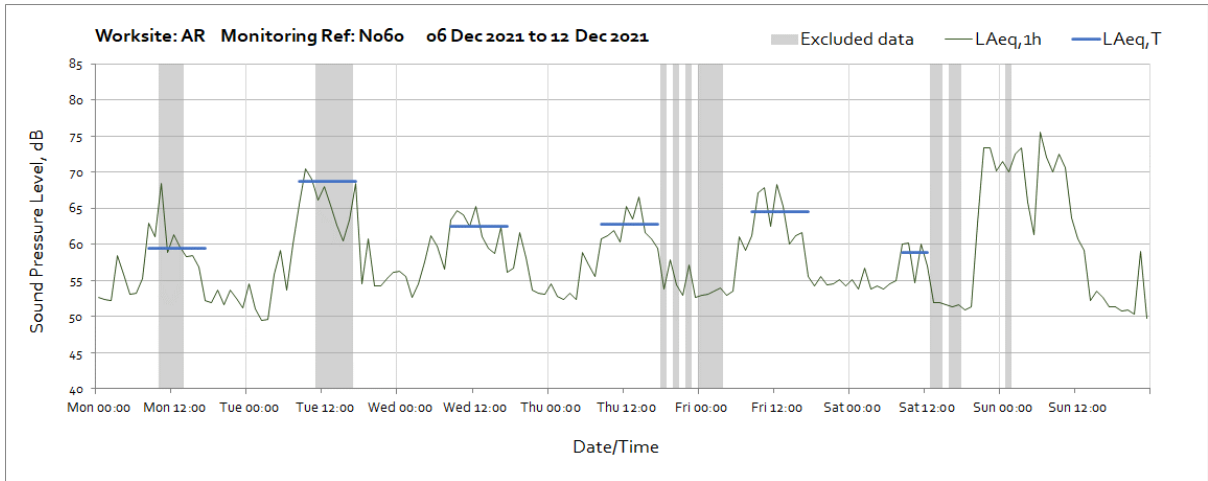


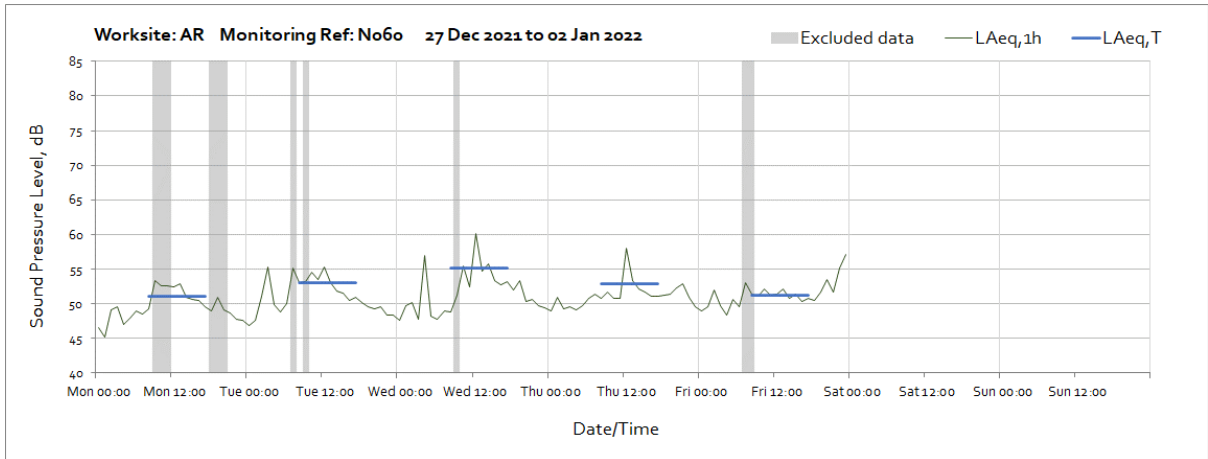
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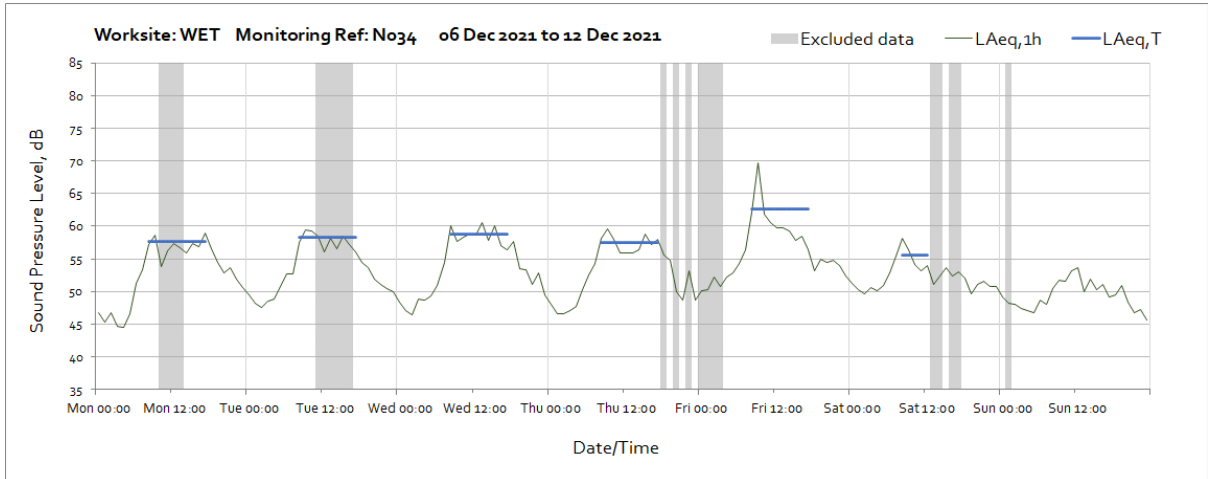
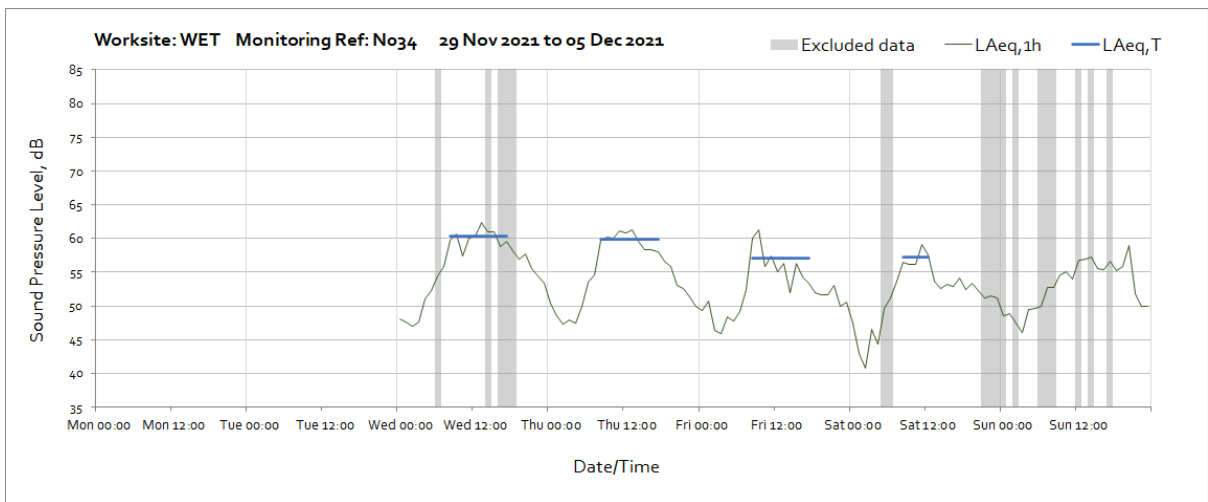
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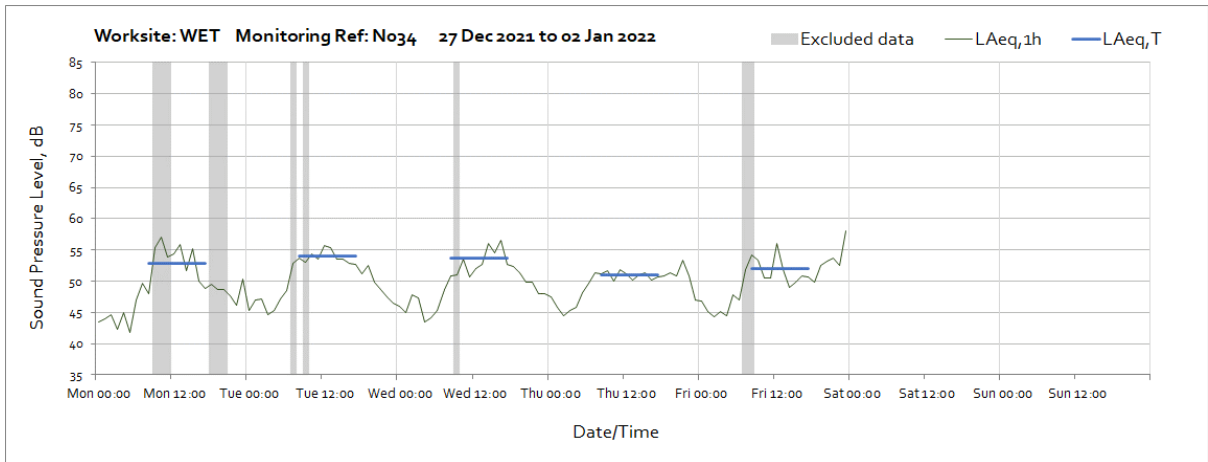
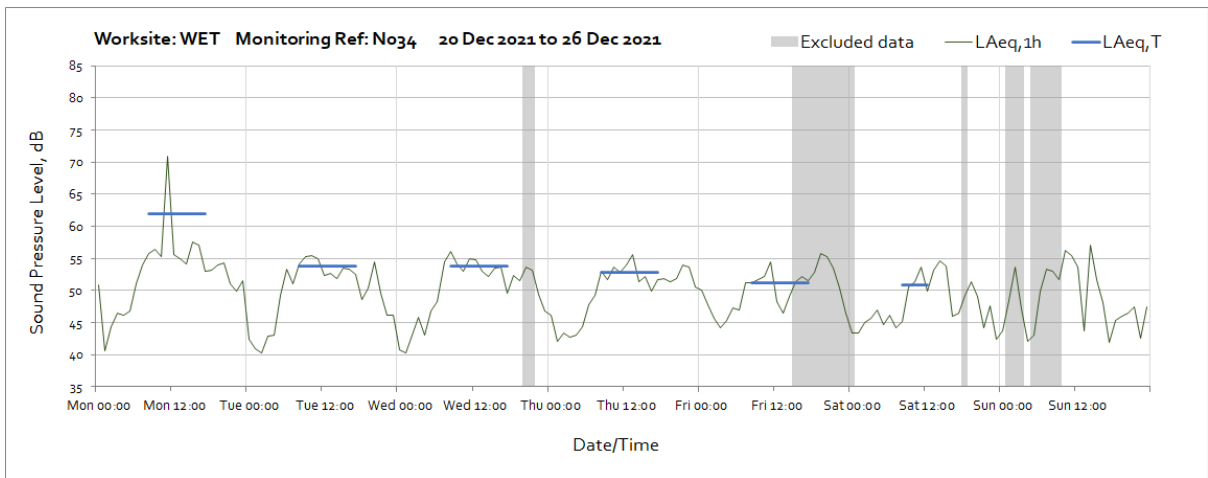
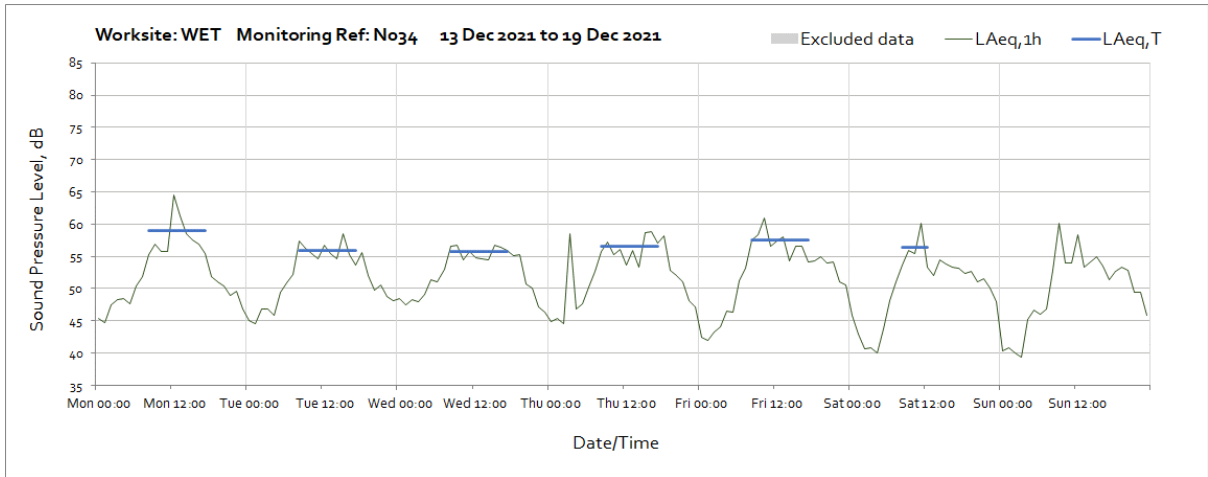




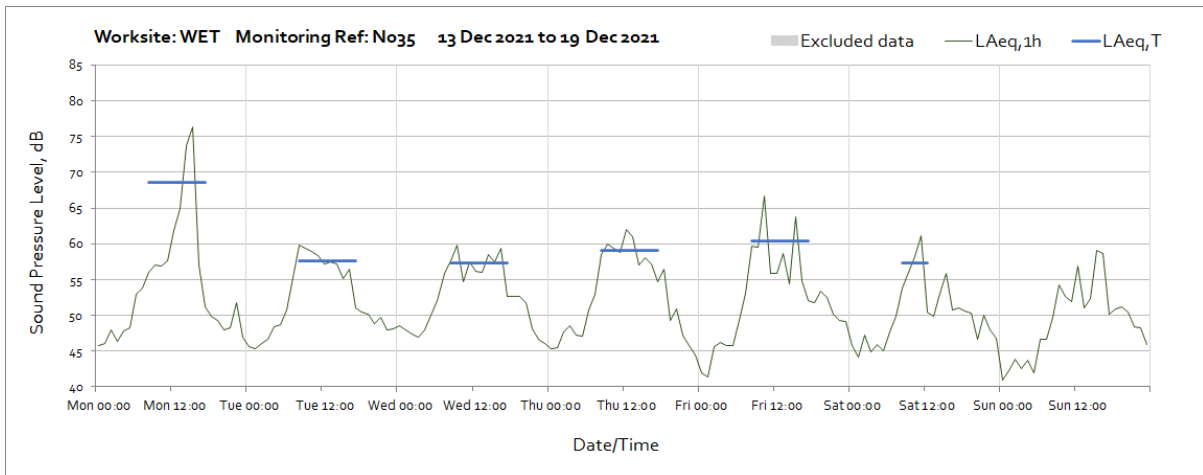
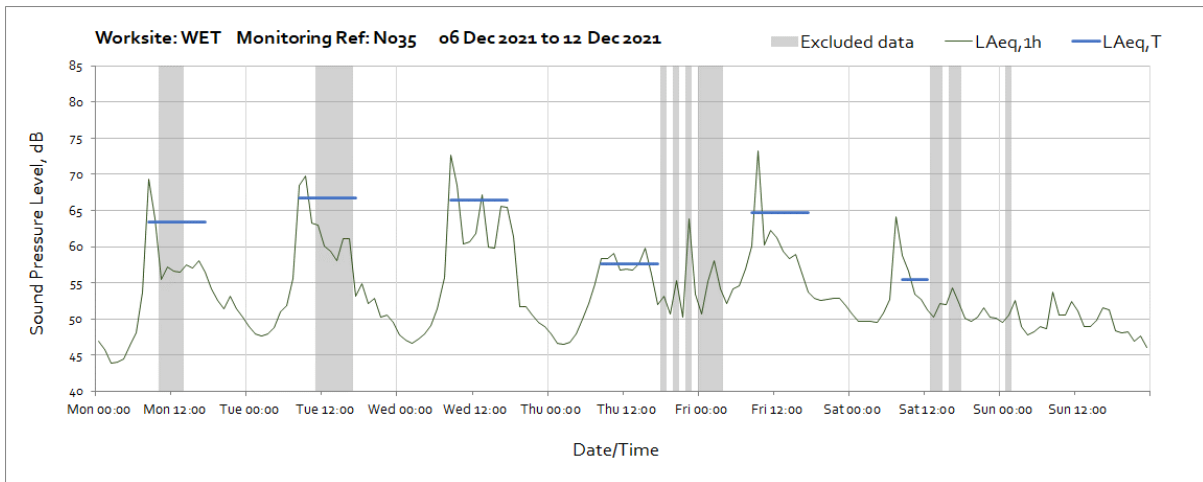
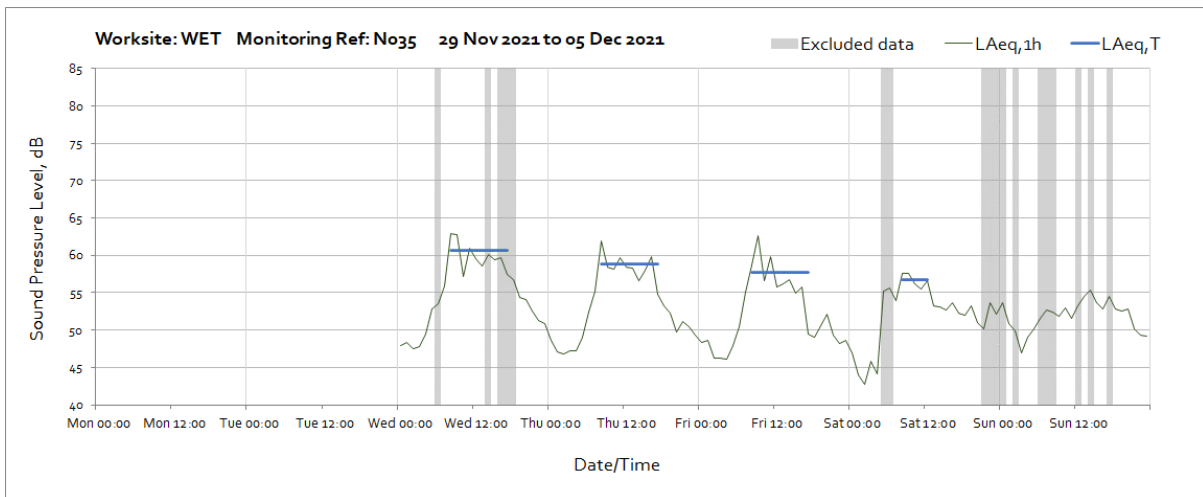


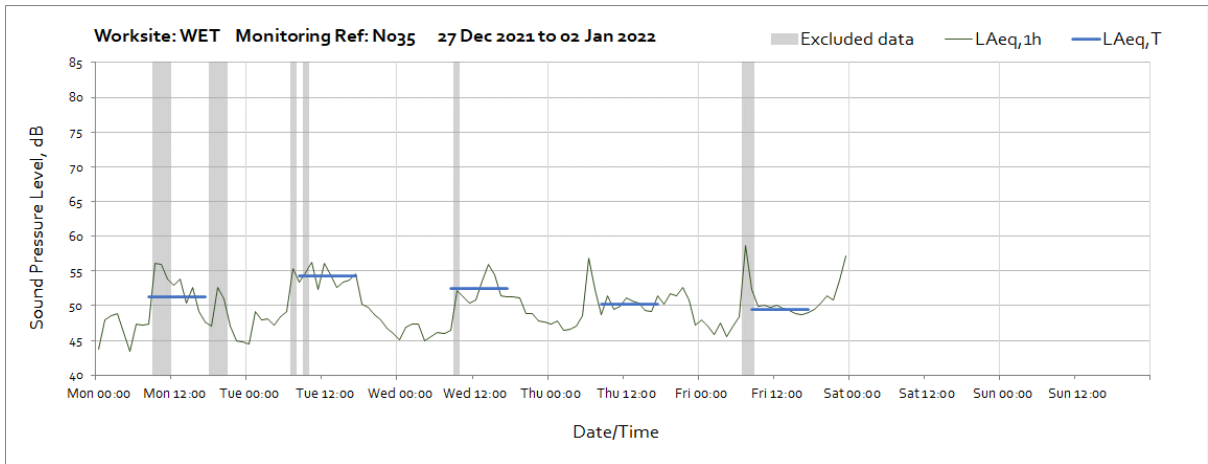
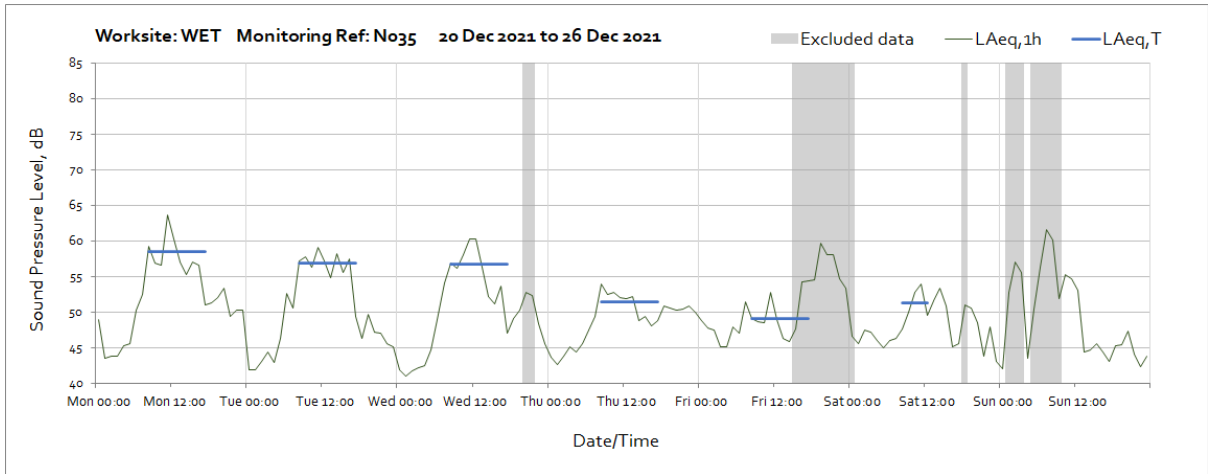
**Worksite: Willesden Euro Terminal (WET) - Monitoring Ref: N034**



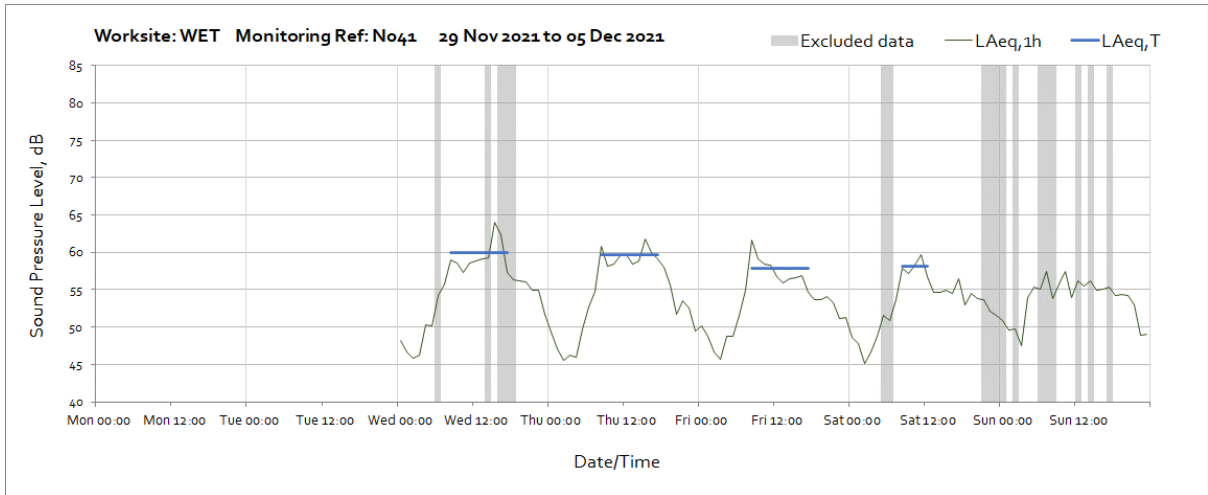


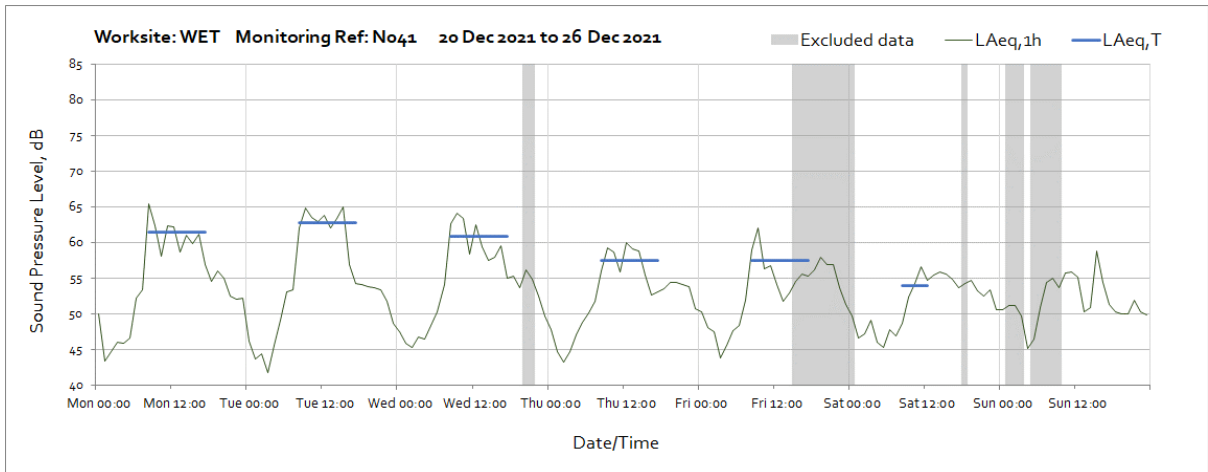
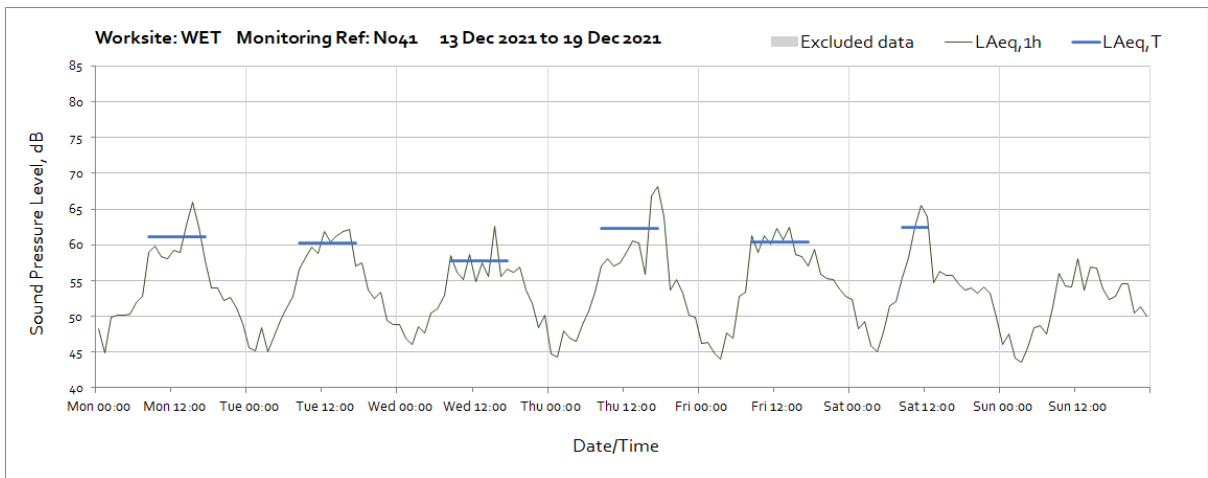
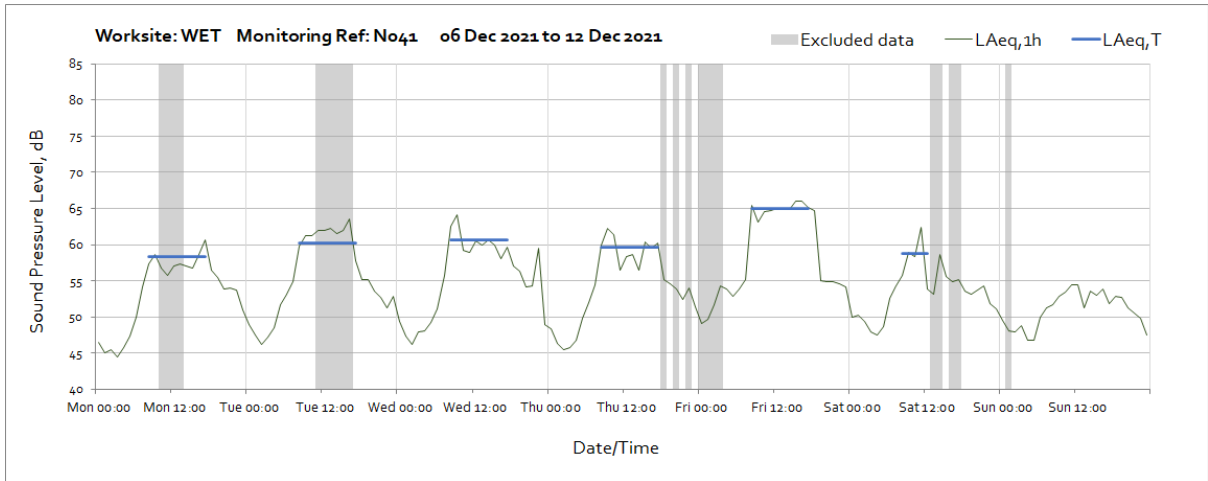
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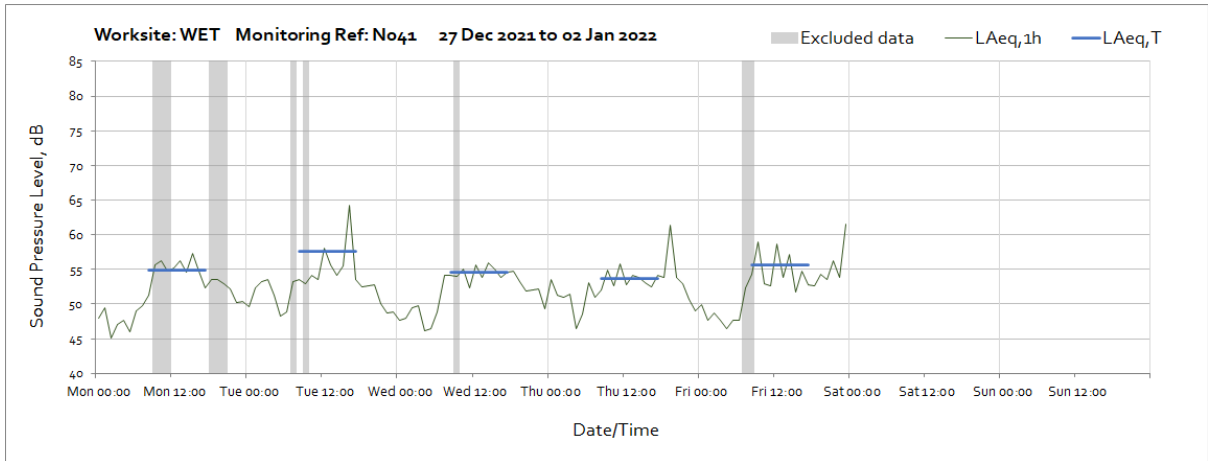


**Worksite: Willesden Euro Terminal (WET) - Monitoring Ref: N041**

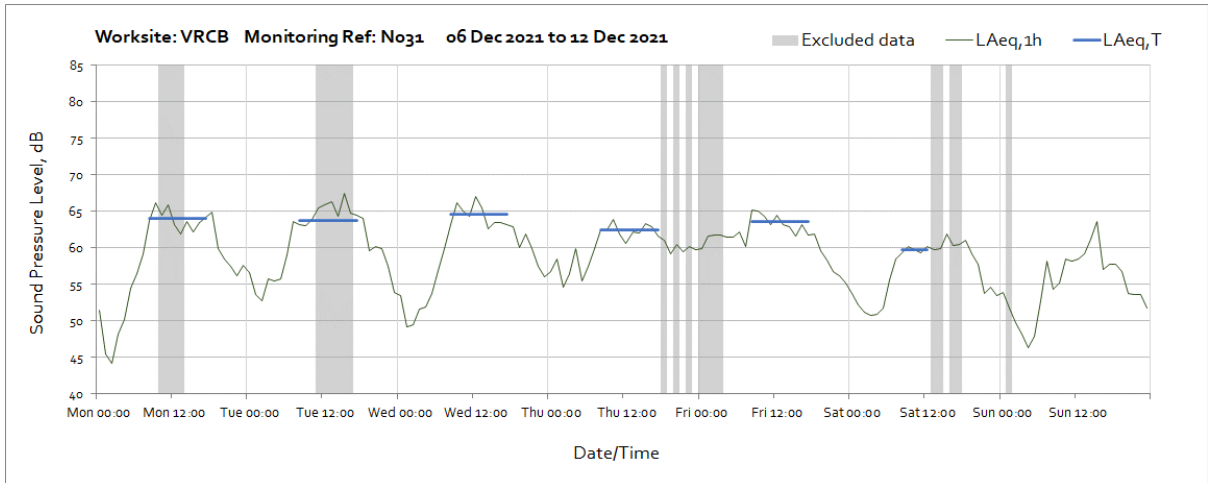
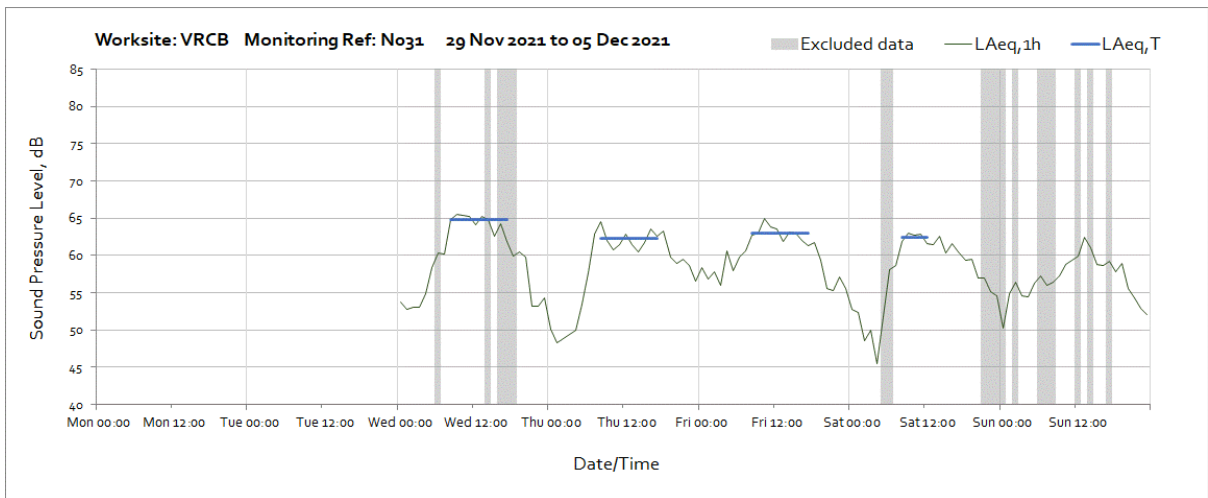


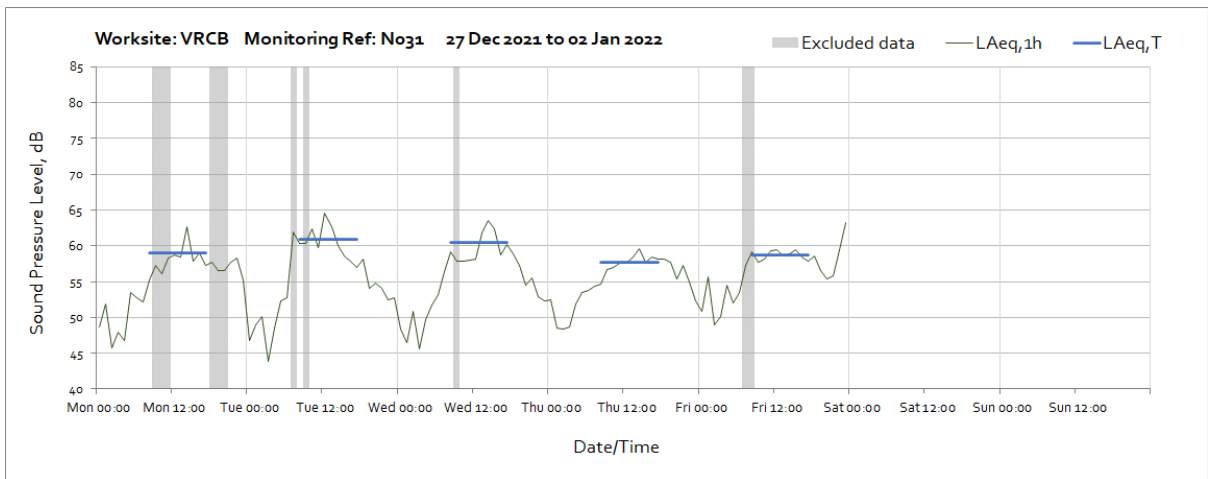
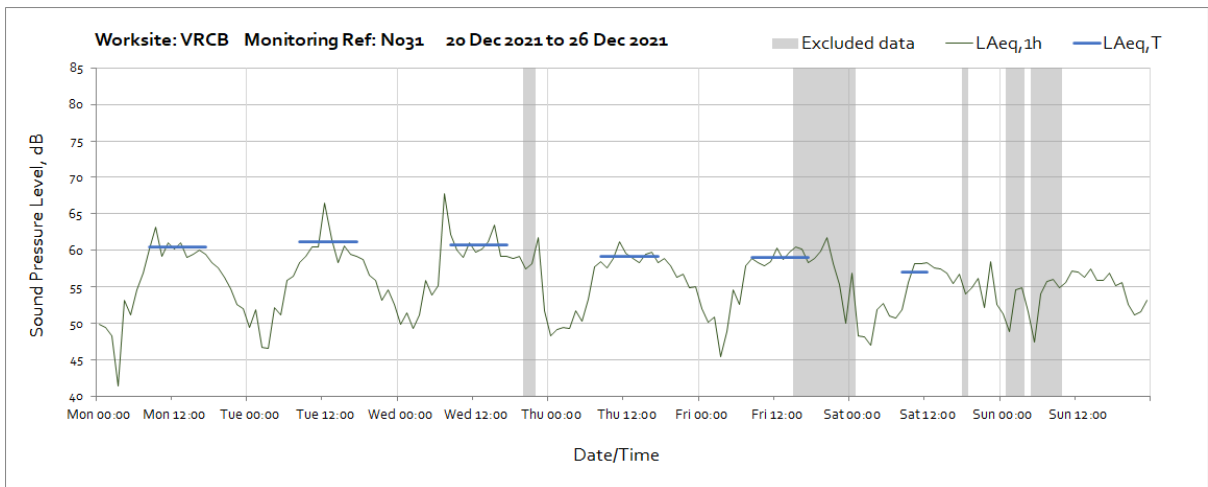
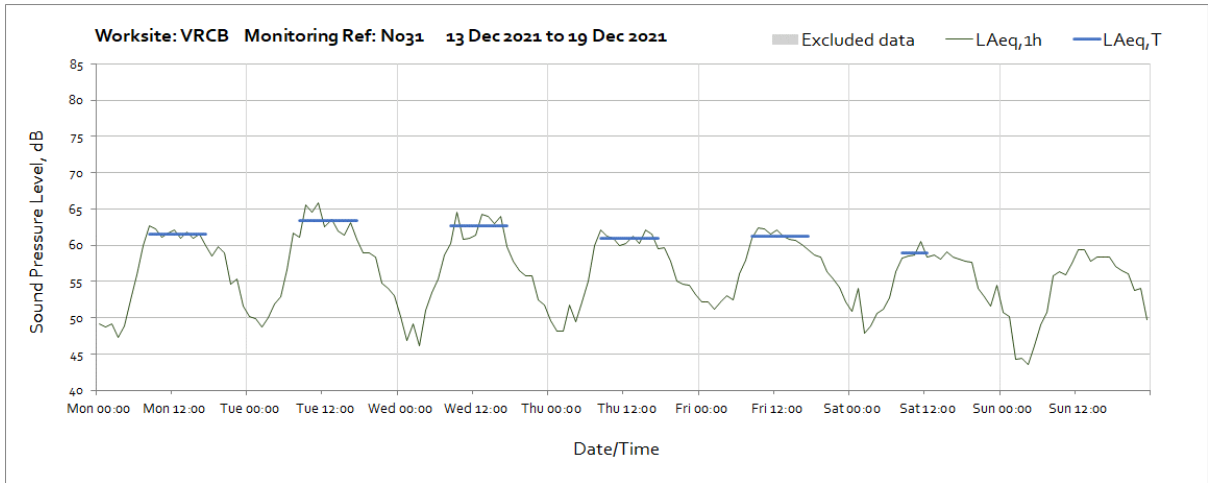




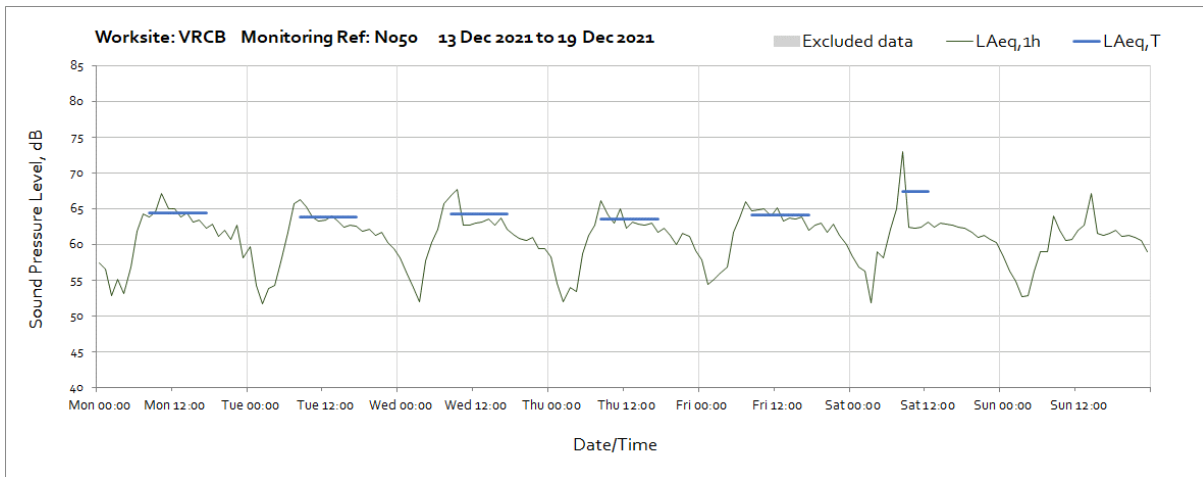
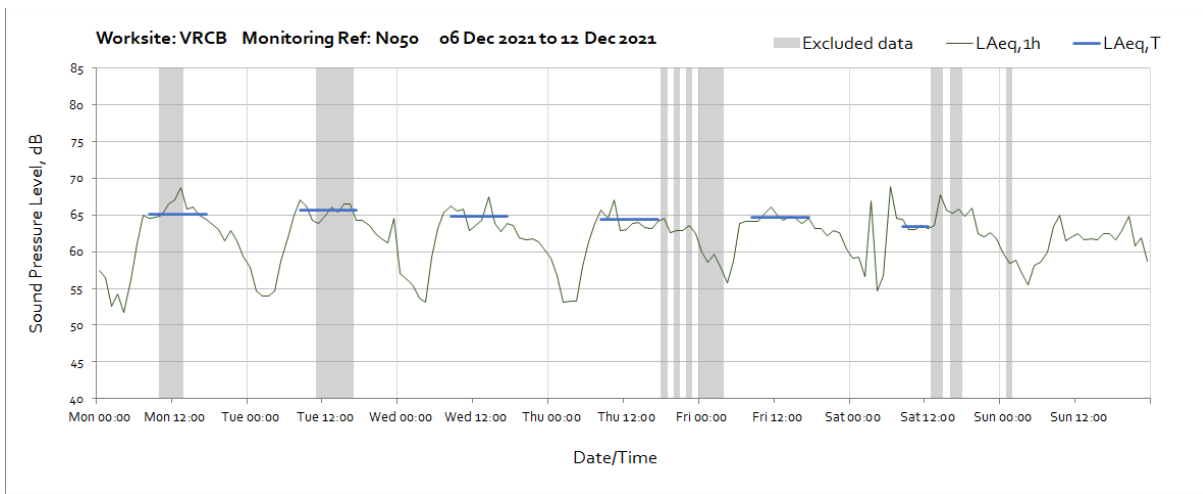
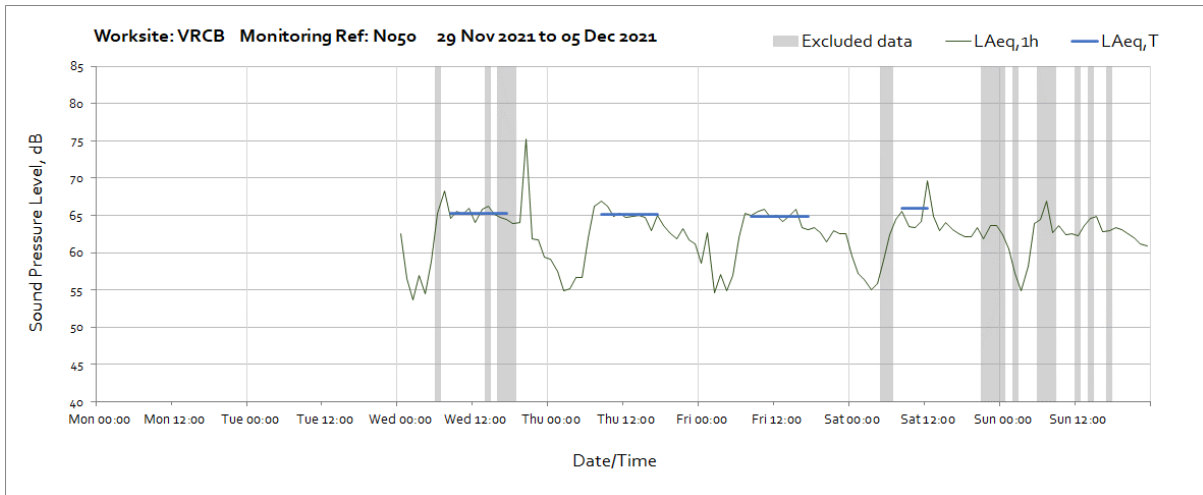


**Worksite: Victoria Road Crossover Box (VRCB) – Monitoring Ref: N031**

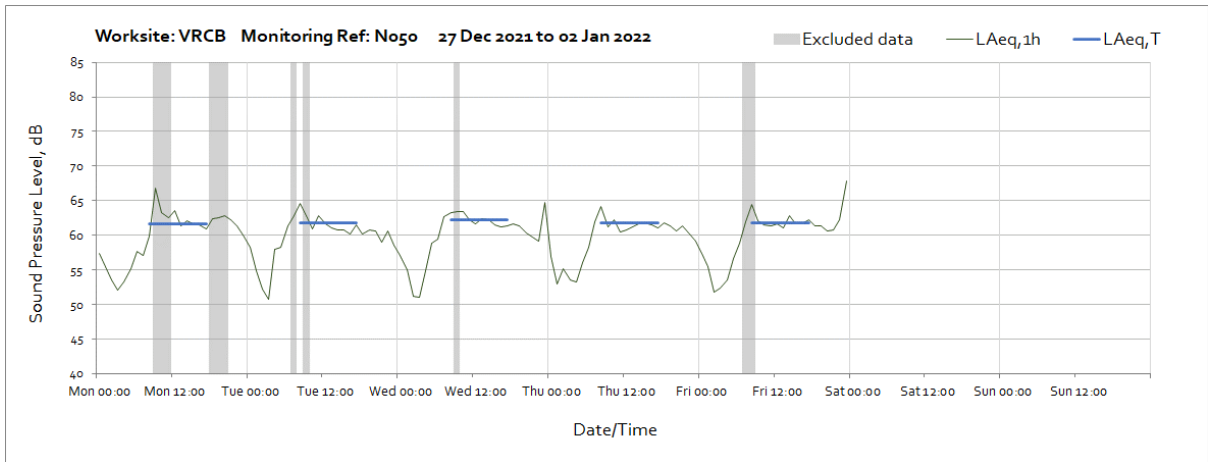
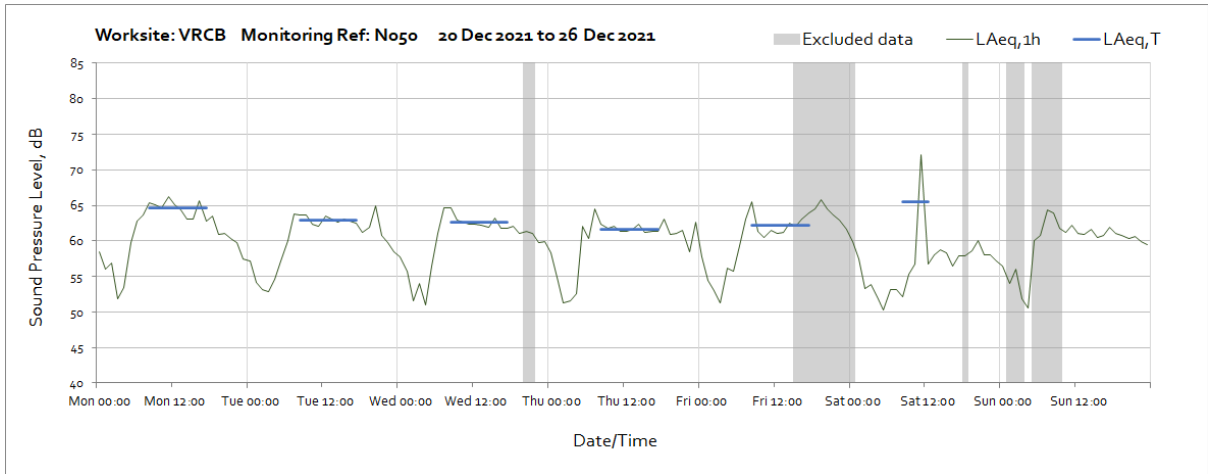




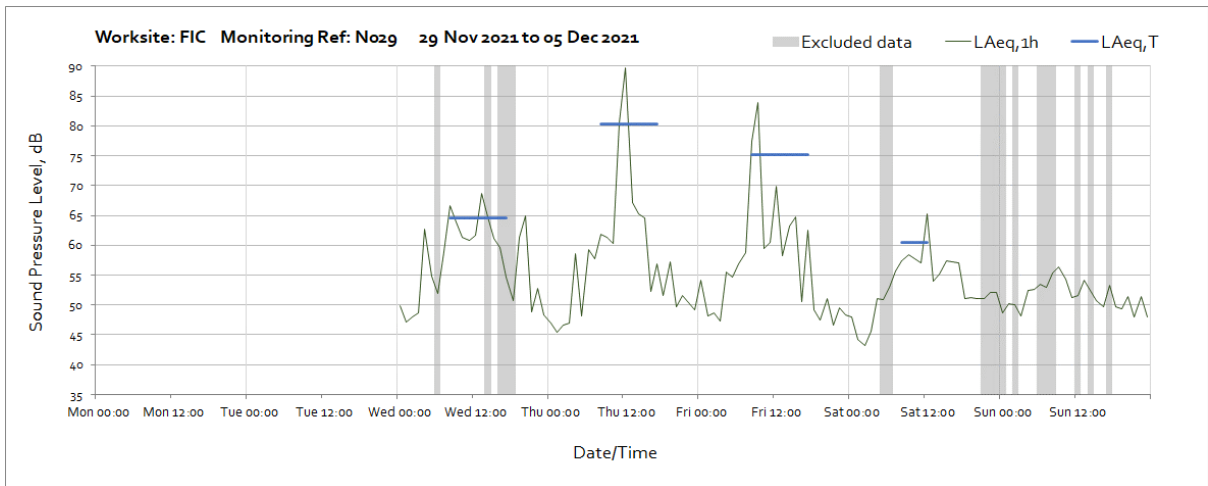
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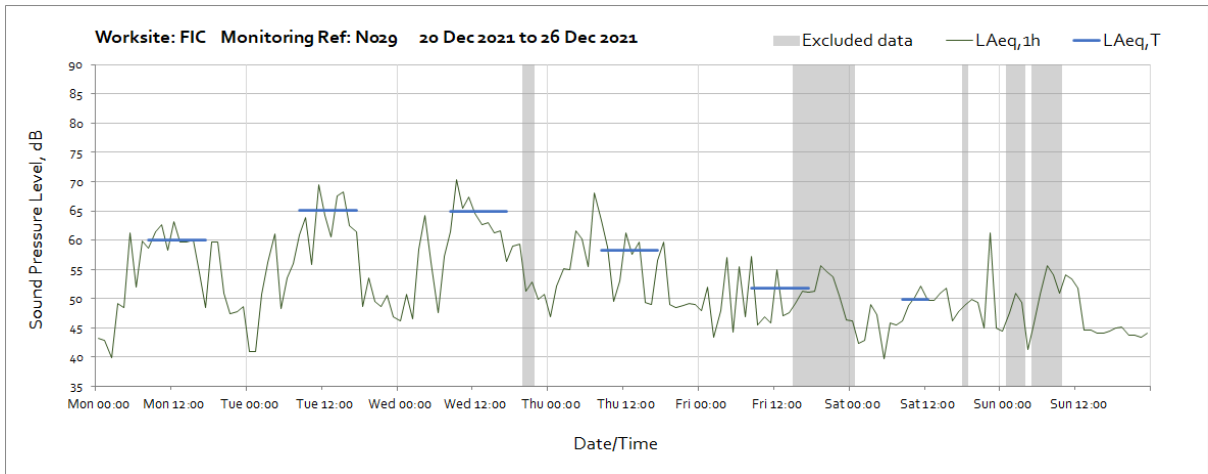
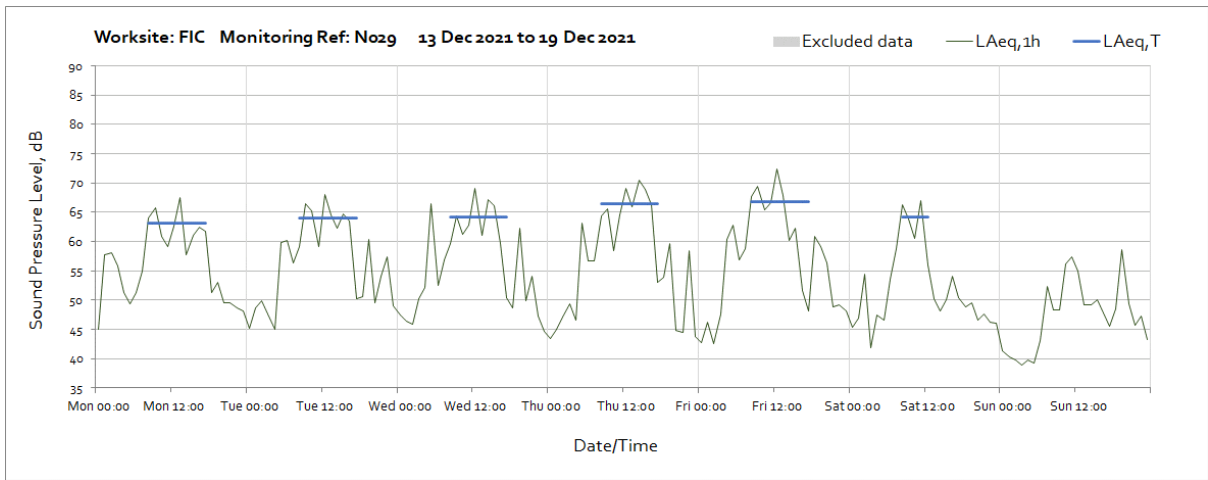
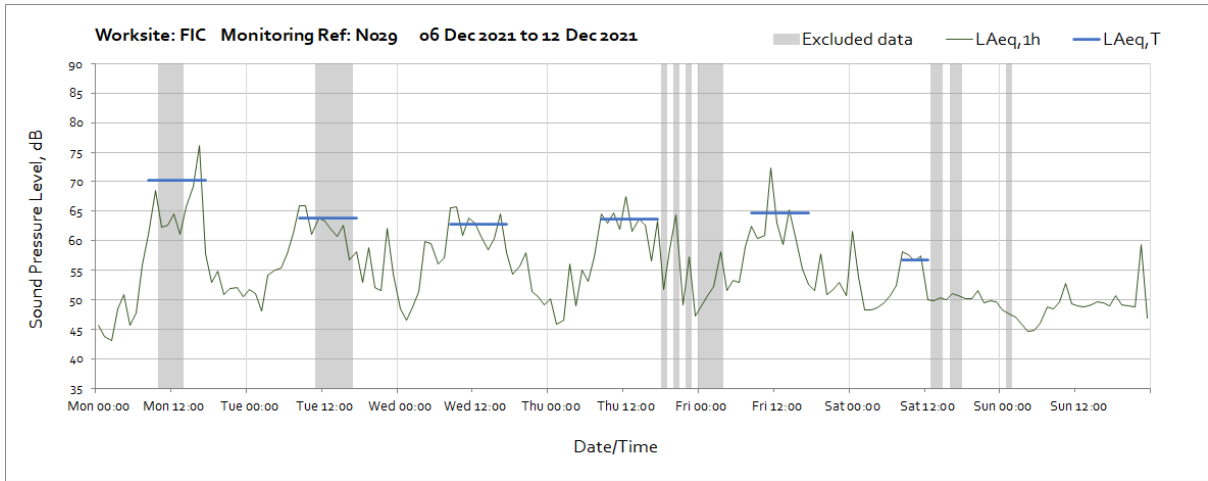


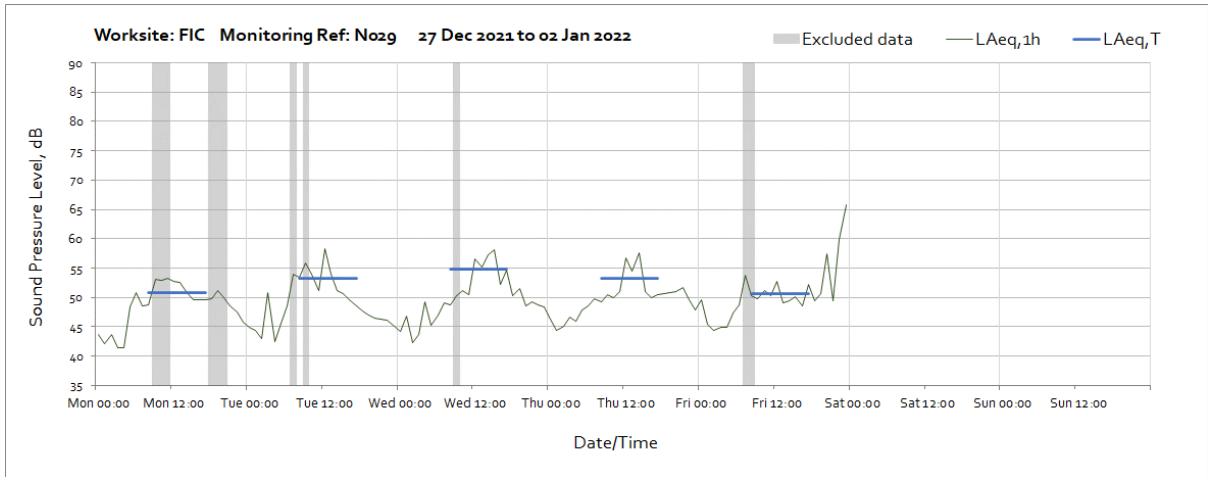
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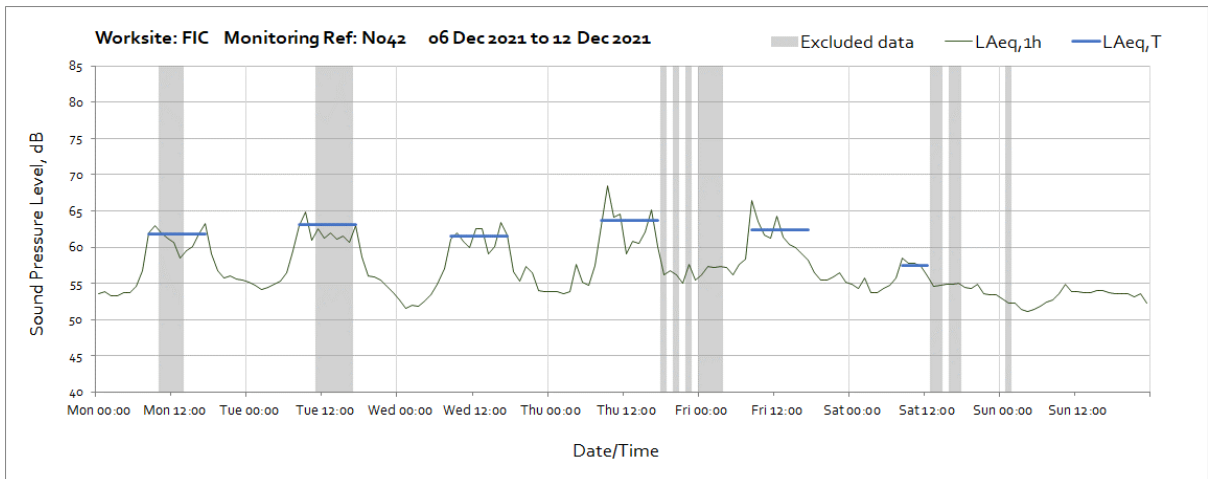
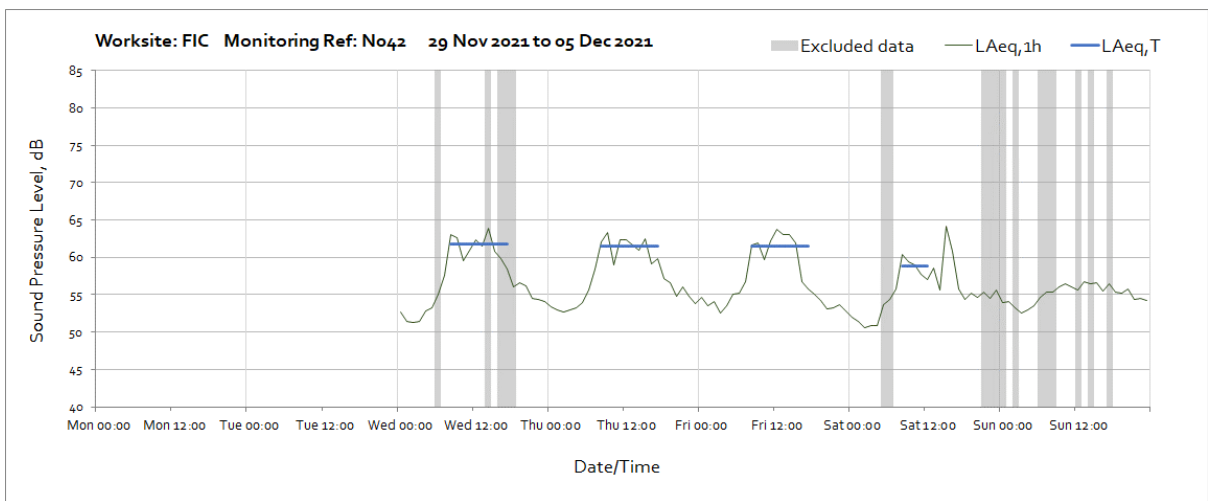
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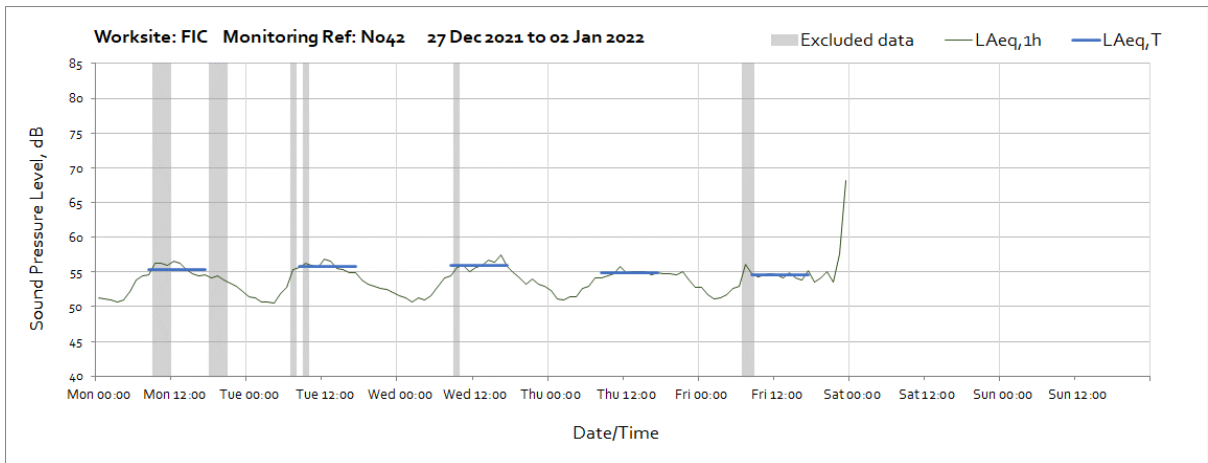
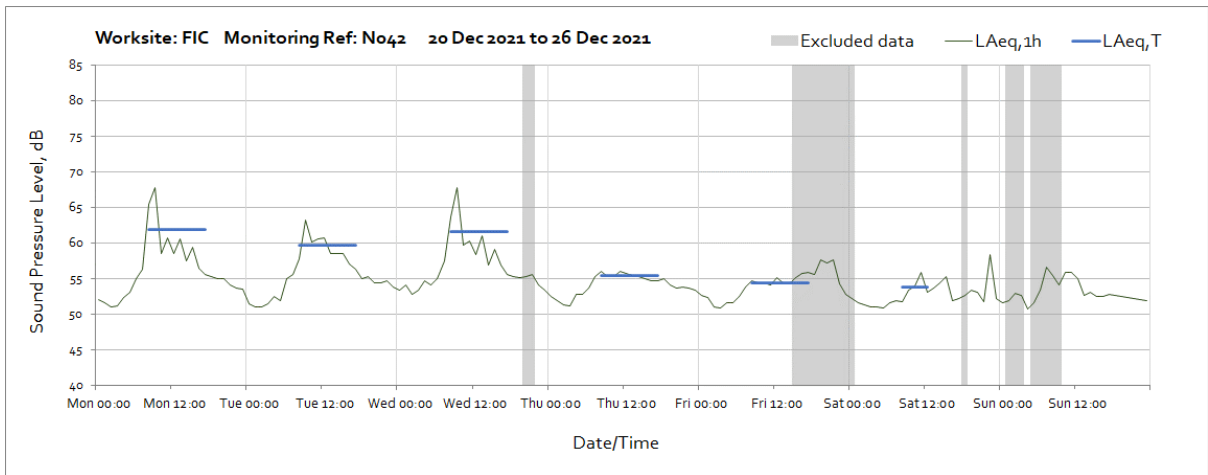
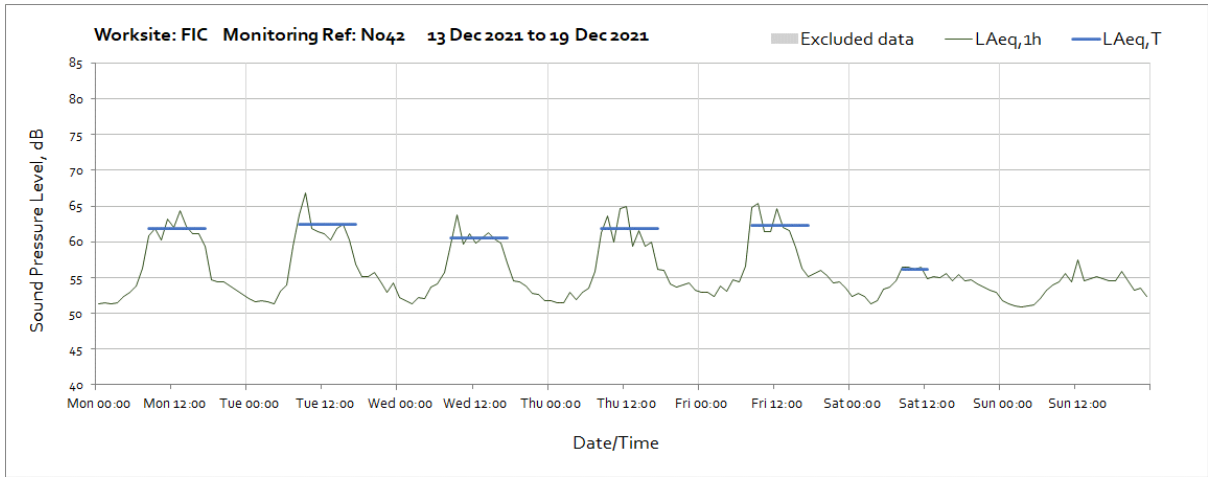




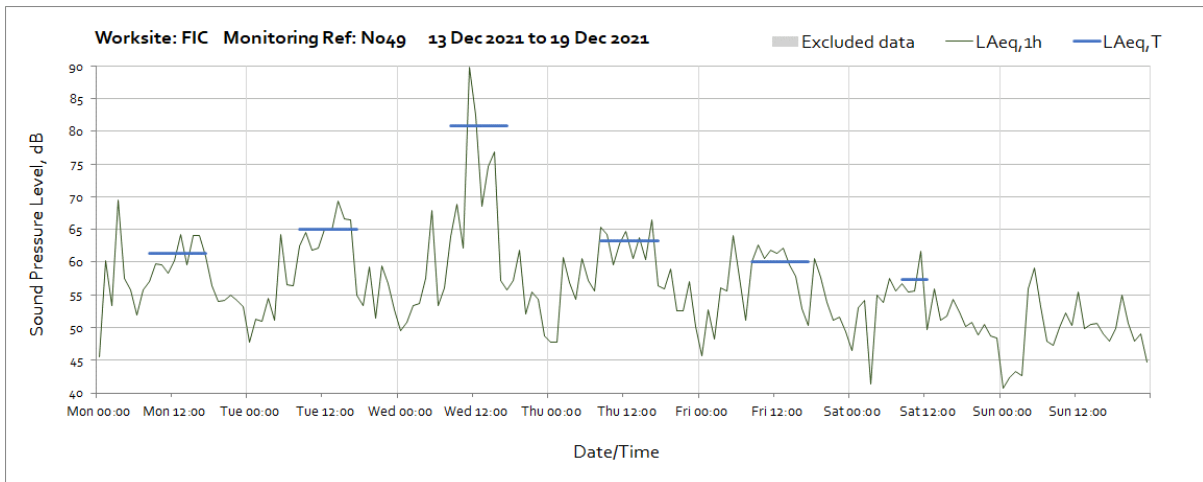
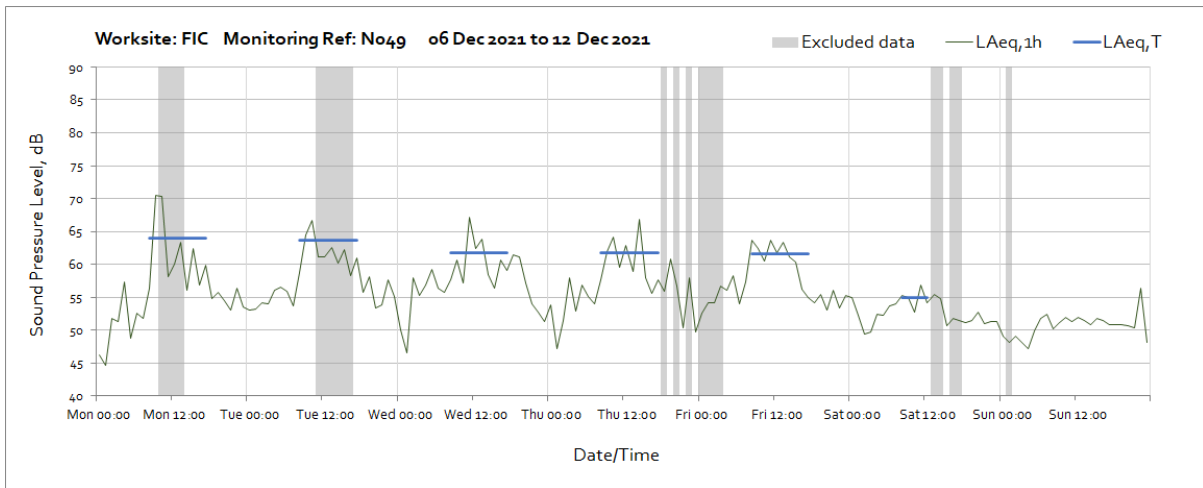
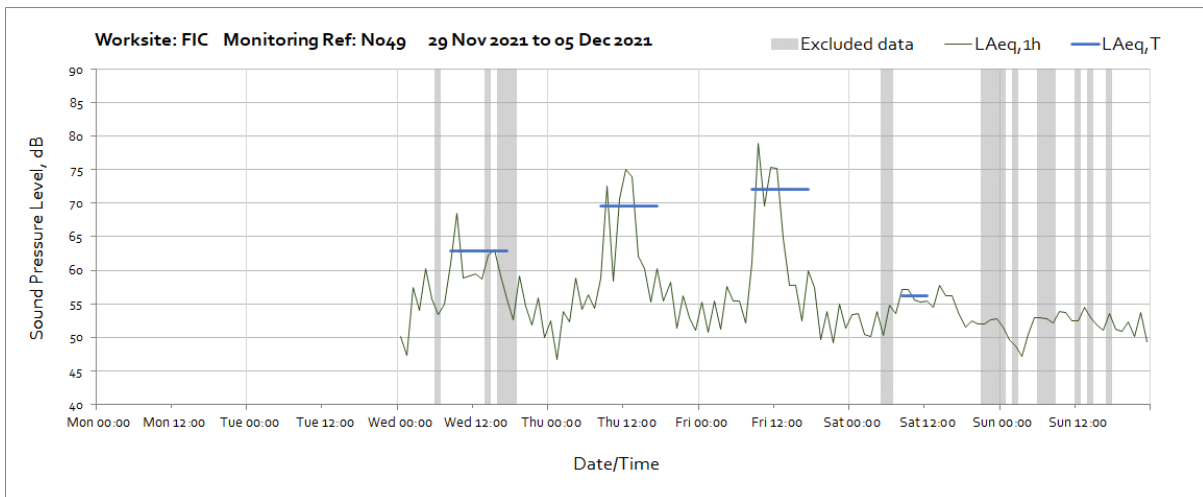


**Worksite: Flat Iron Compound (FIC) – Monitoring Ref: N042**



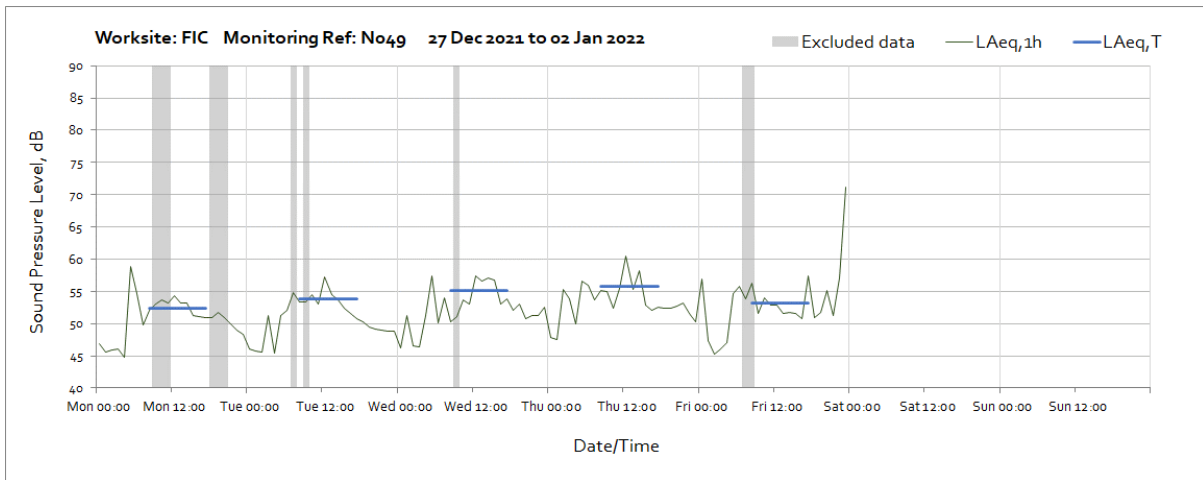
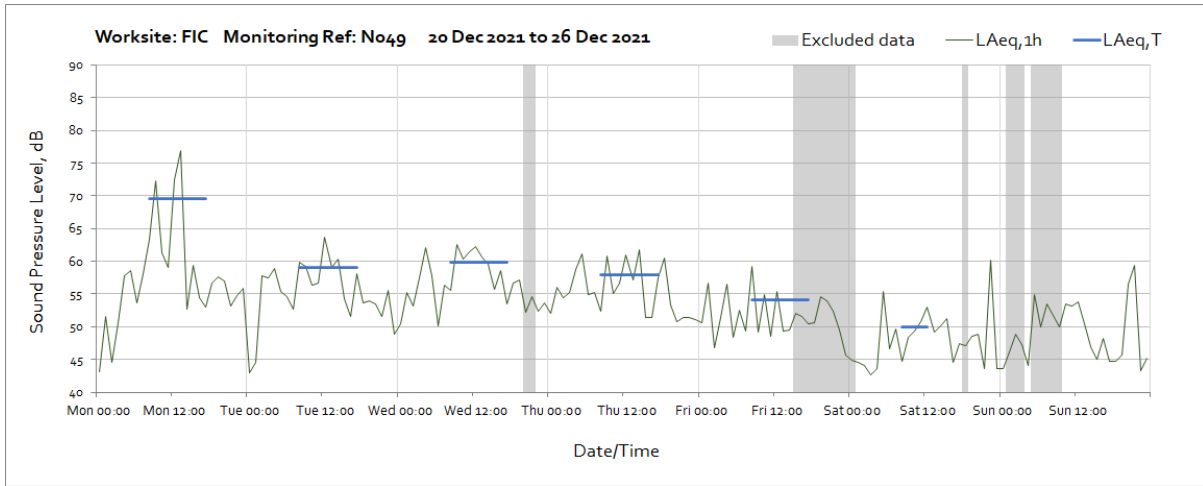


## Worksite: Flat Iron Compound (FIC) – Monitoring Ref: N049

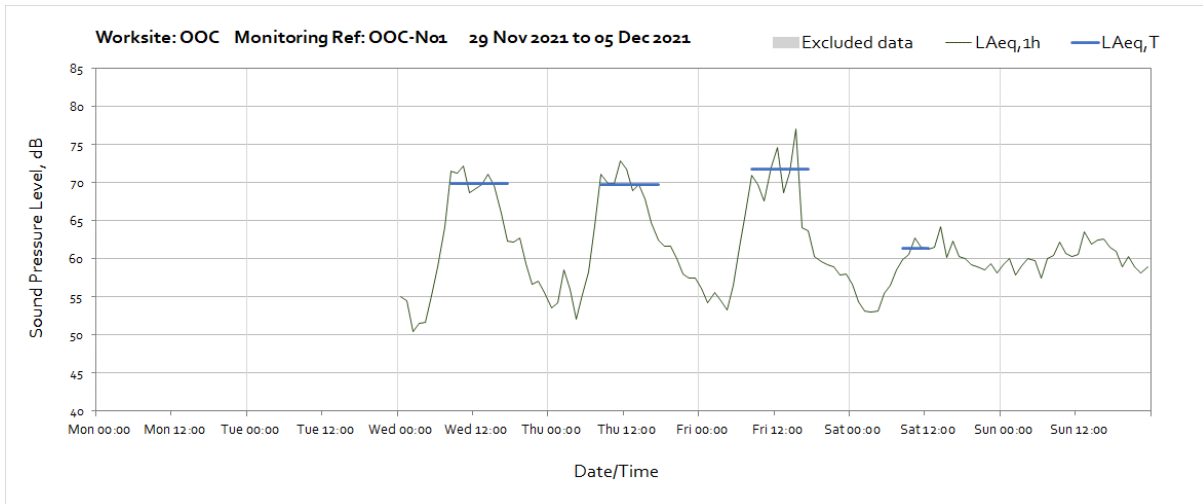


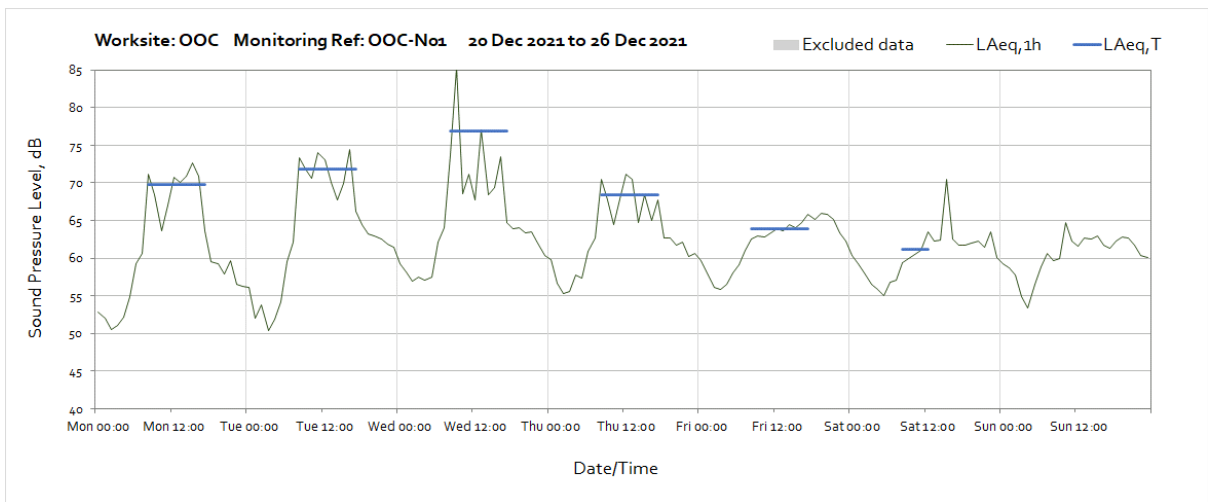
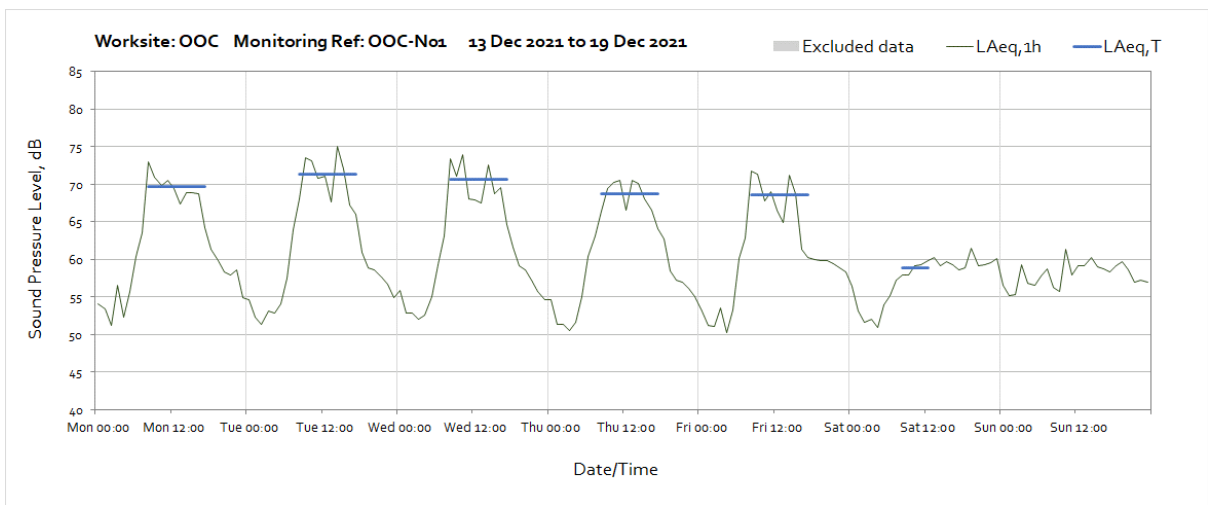
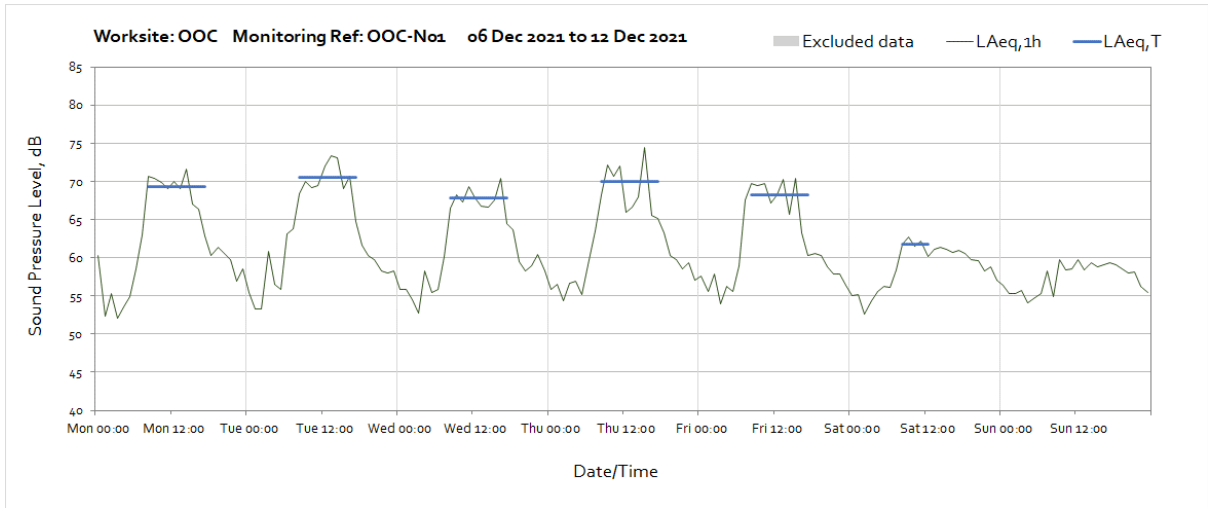
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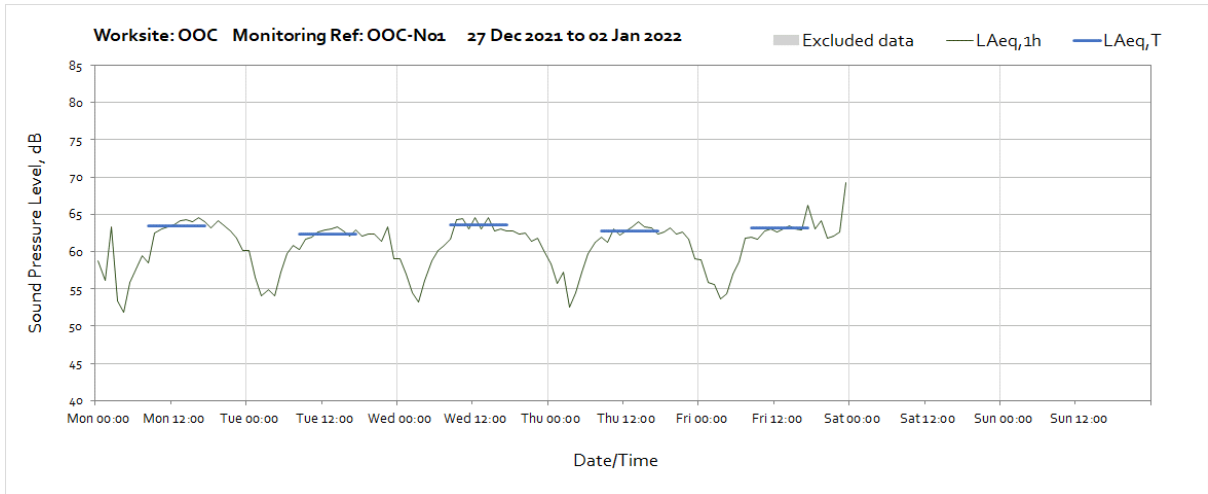




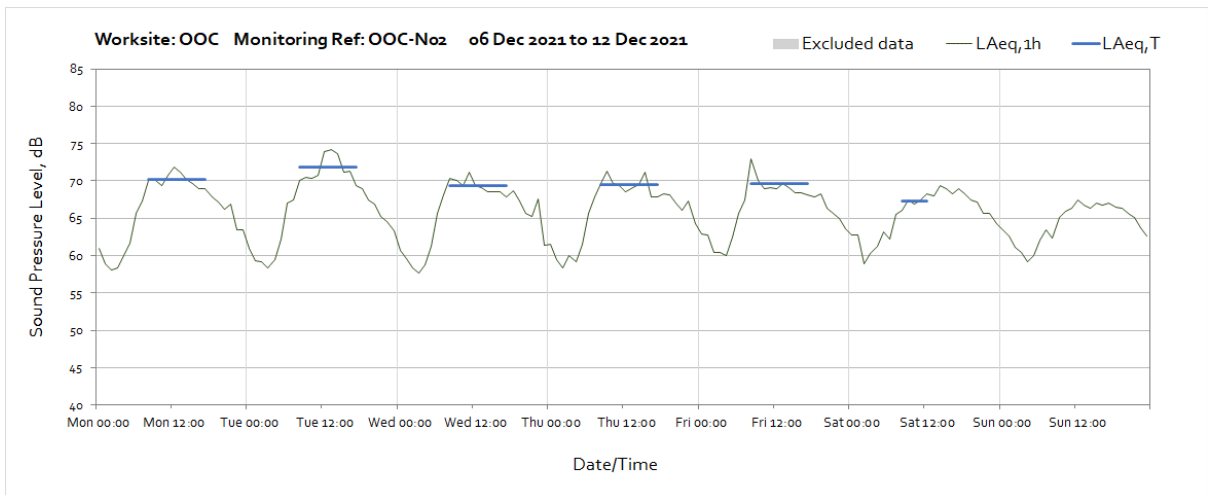
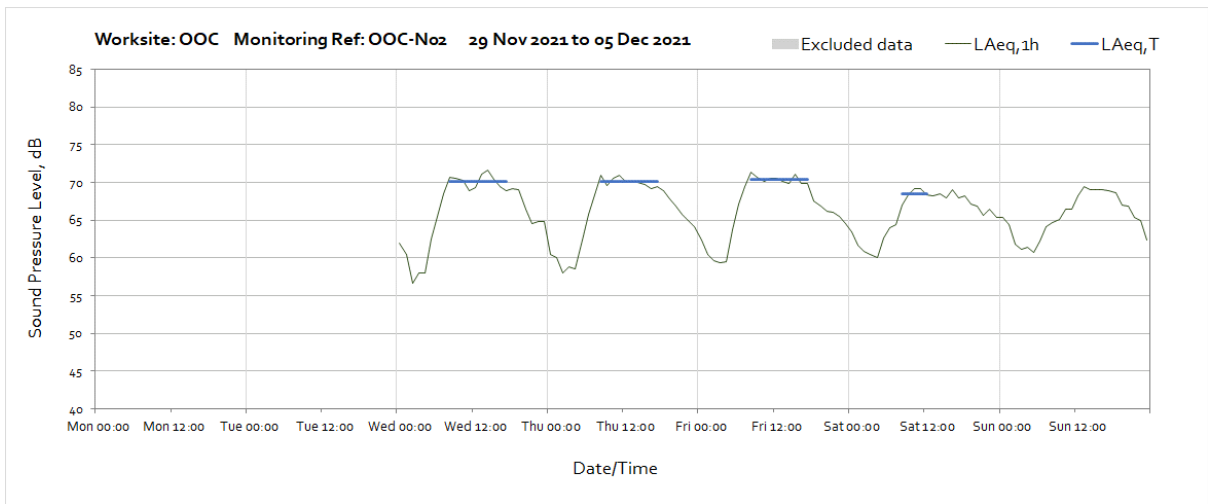
**Worksite: Oal Oak Common (OOC) – Monitoring Ref: OOC-N01**

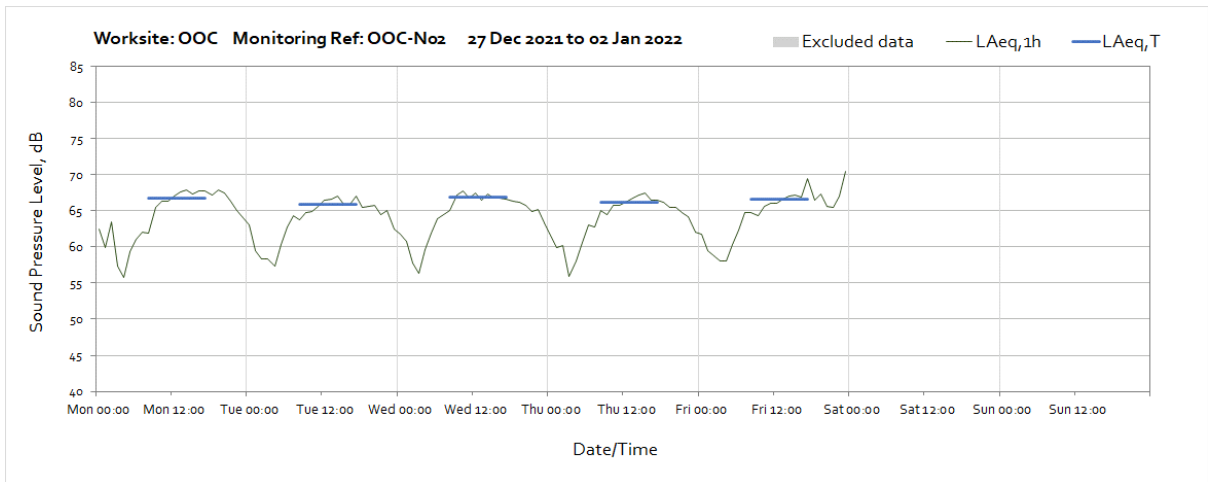
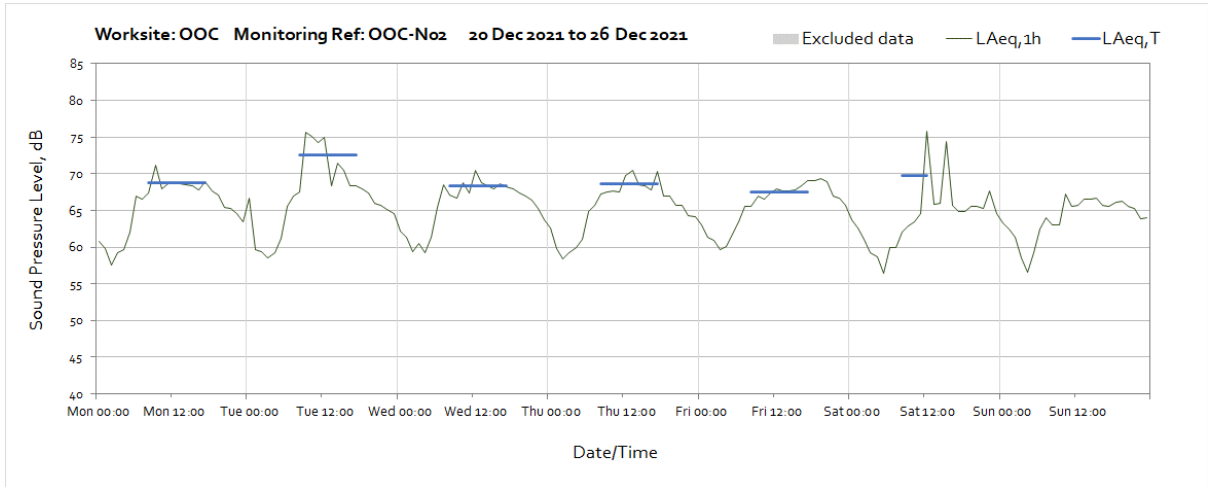
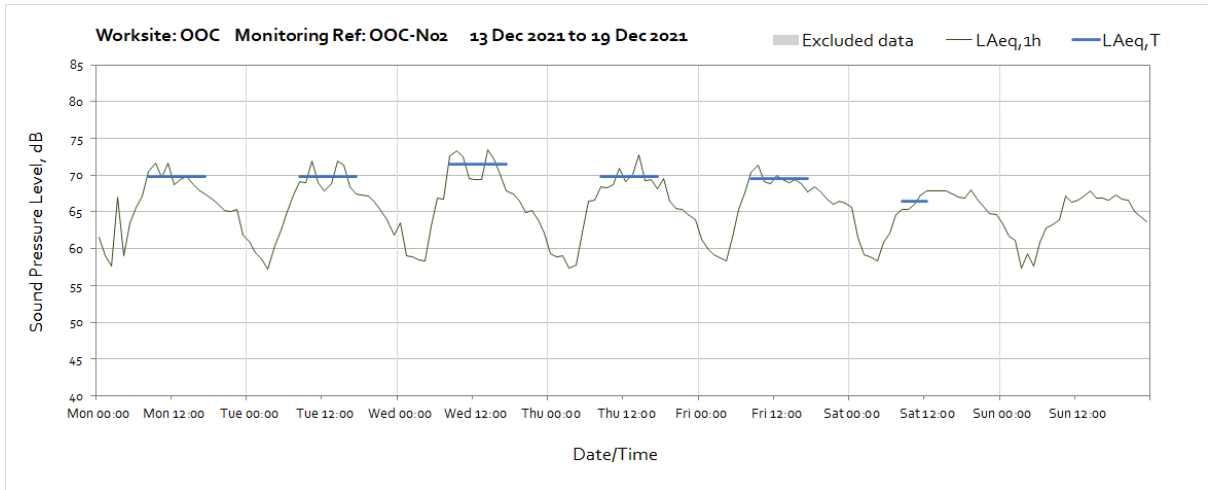






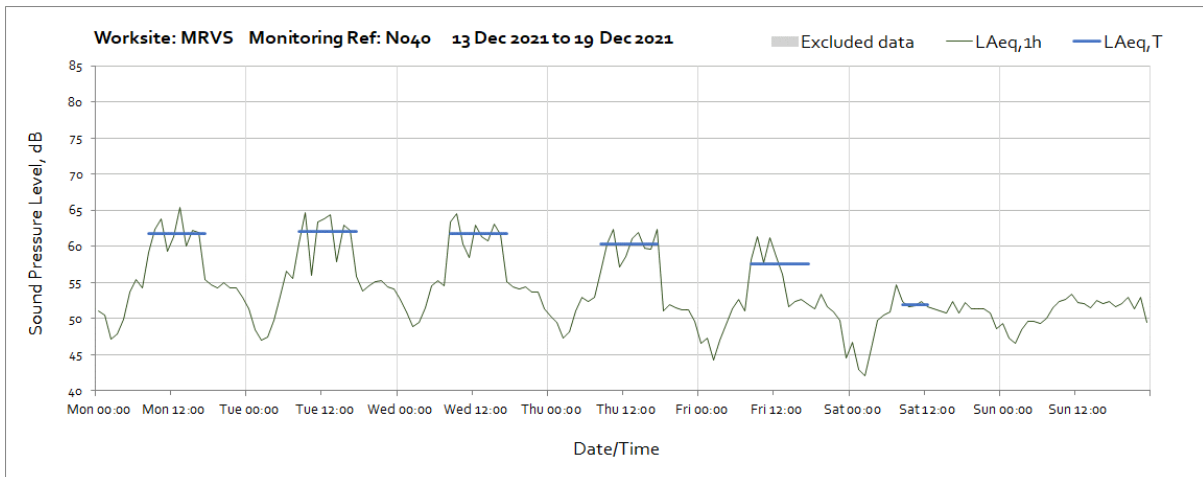
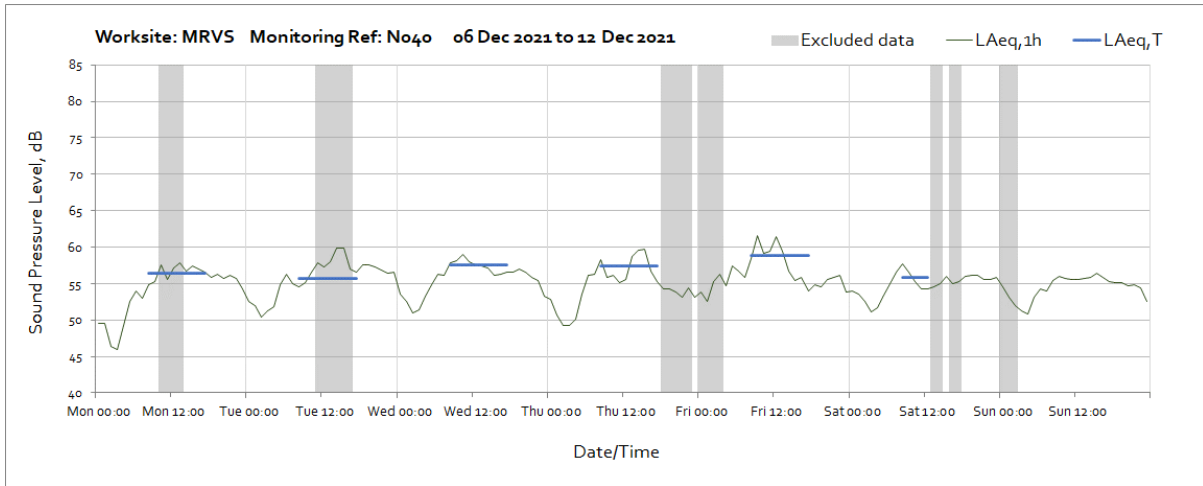
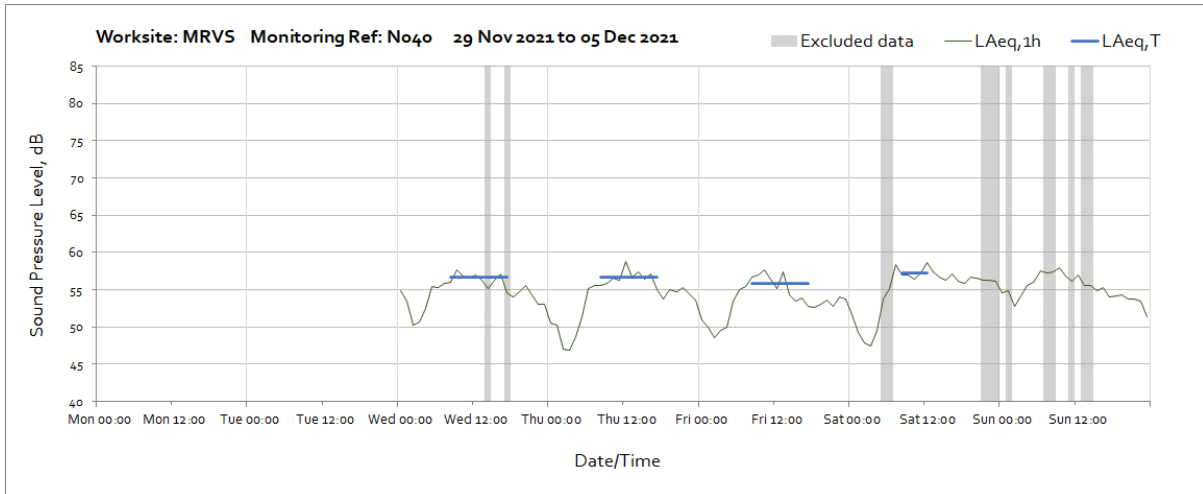
**Worksite: Oal Oak Common (OOC) – Monitoring Ref: OOC-N02**

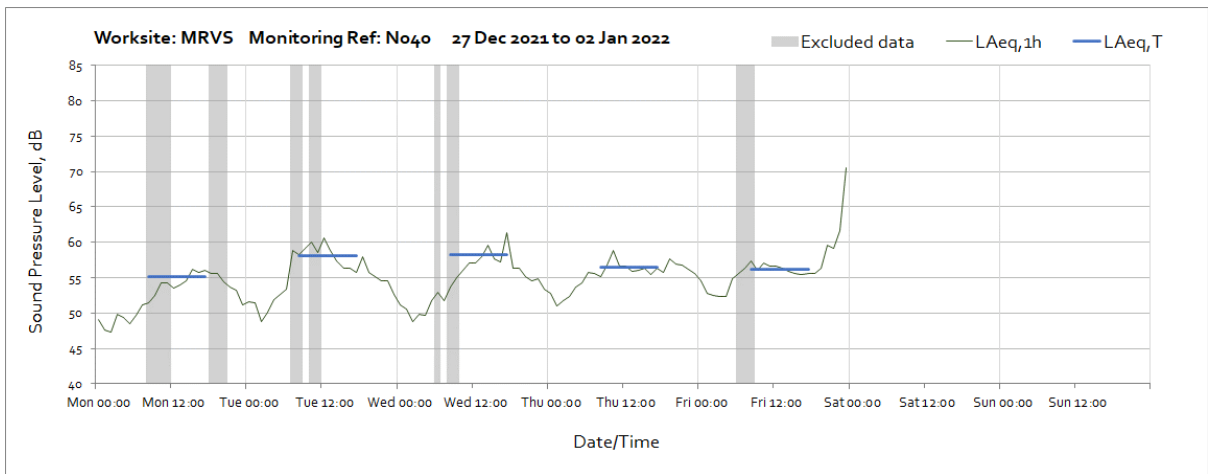
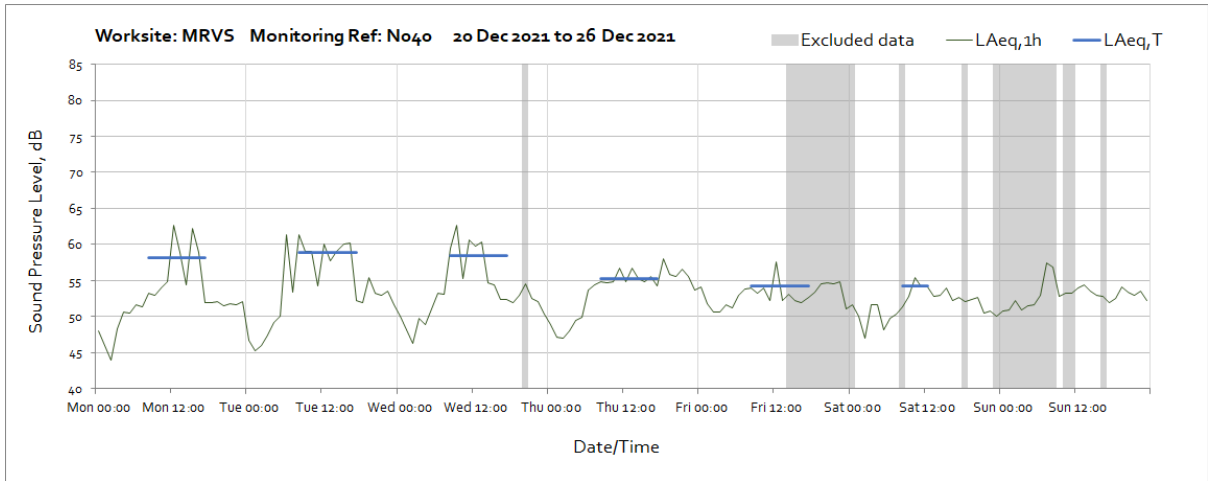




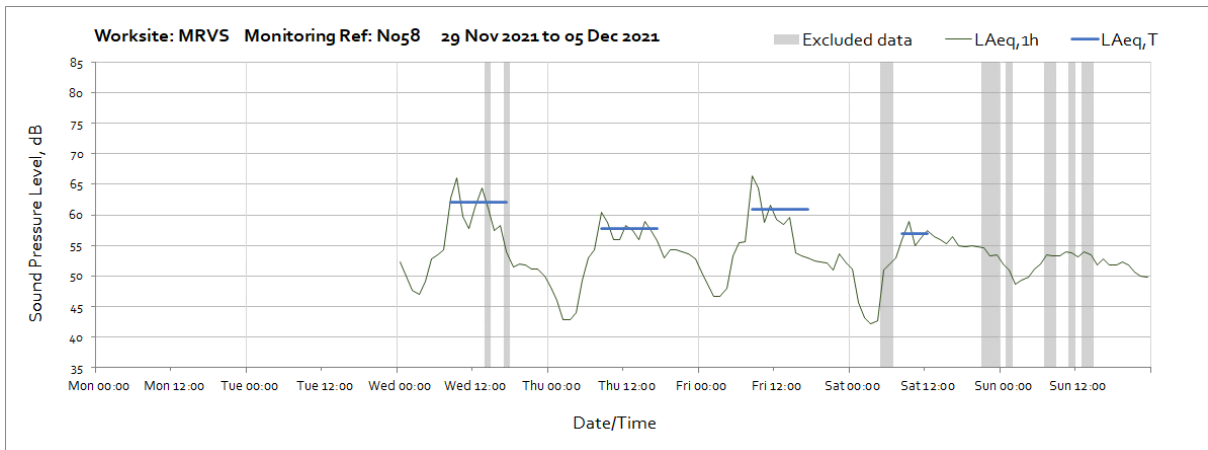


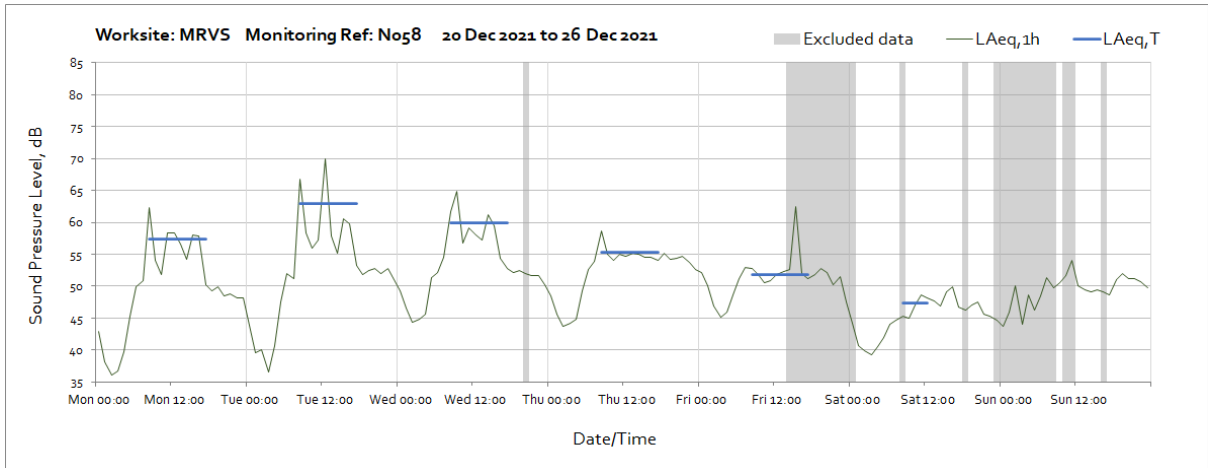
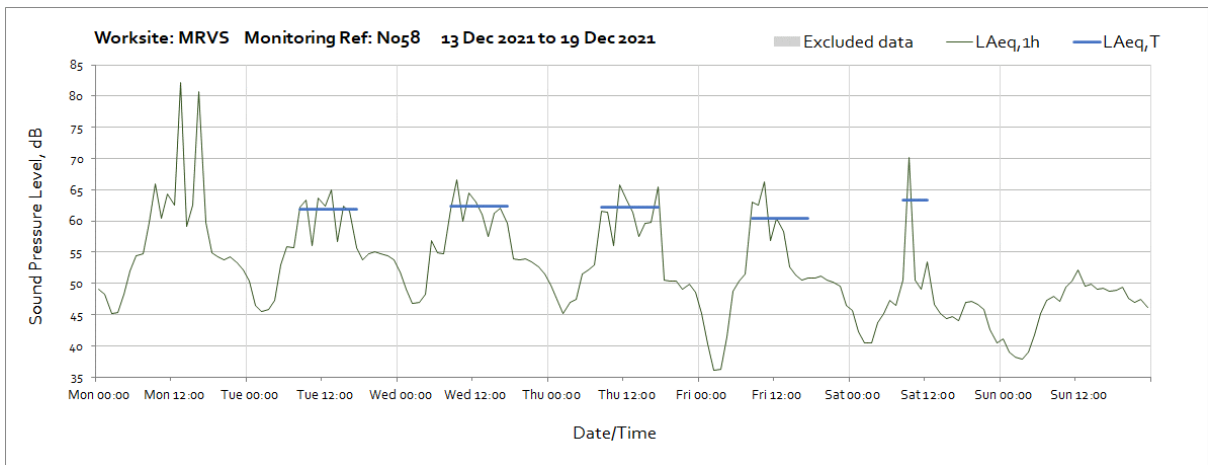
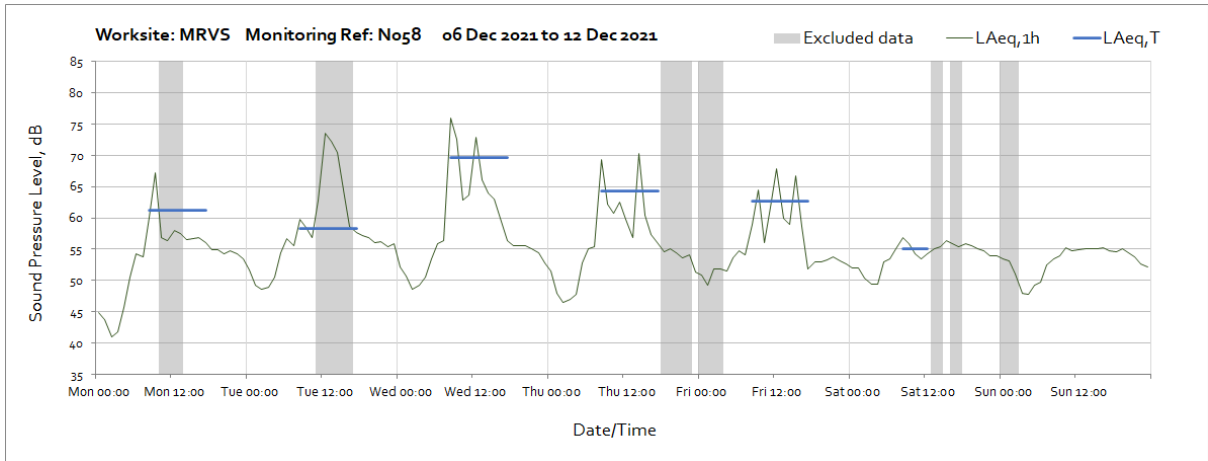
## Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N040

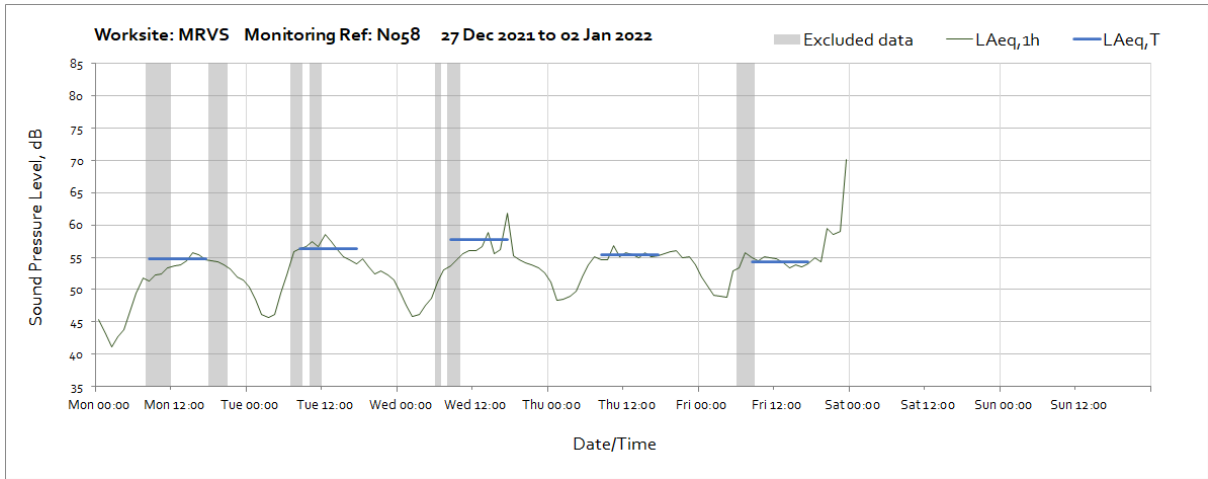




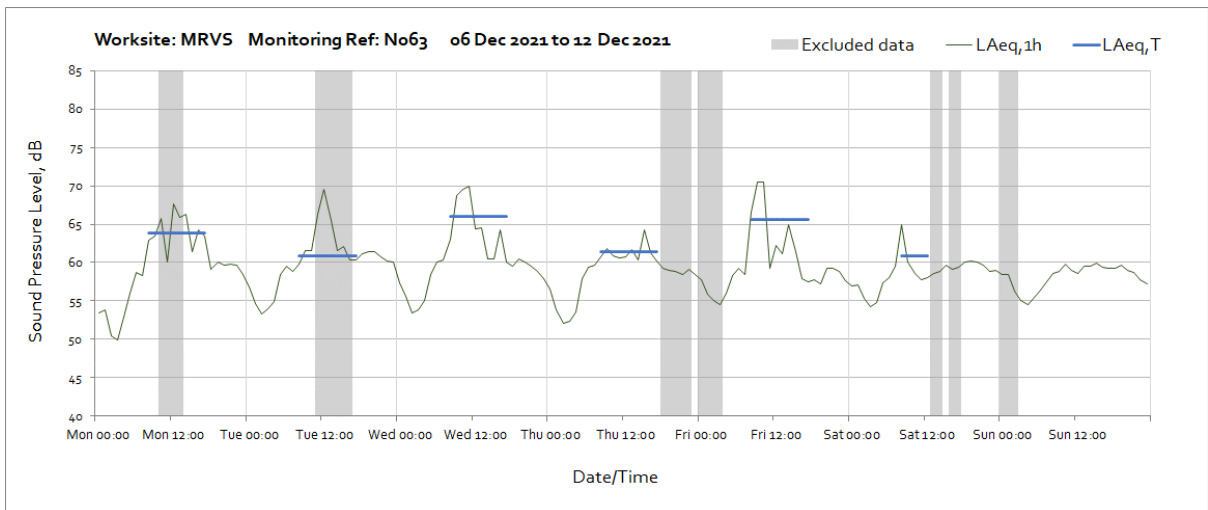
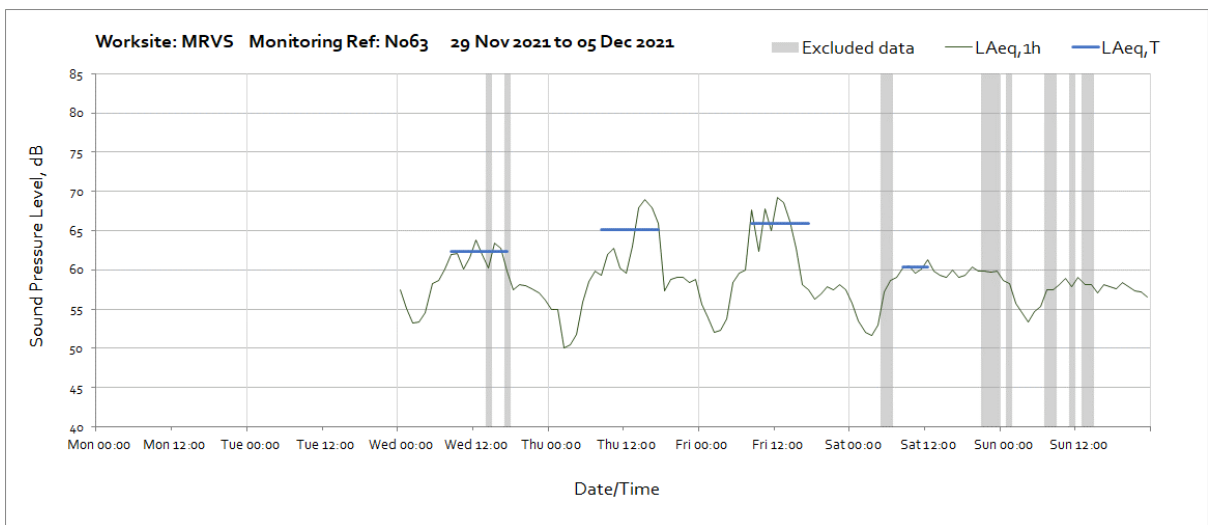
**Worksite: Mandeville Road Ventilation Shaft (MRVS) - Monitoring Ref: N058**



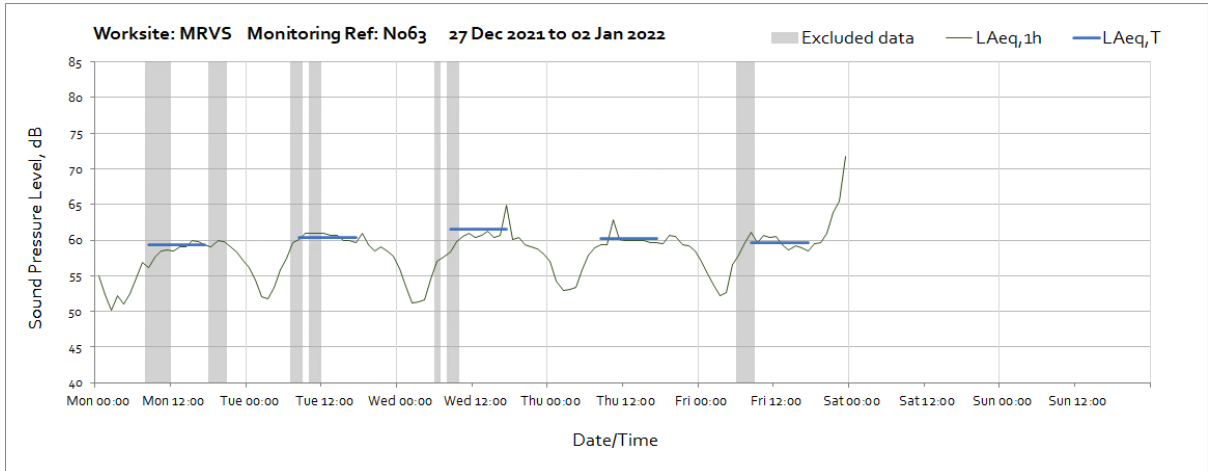
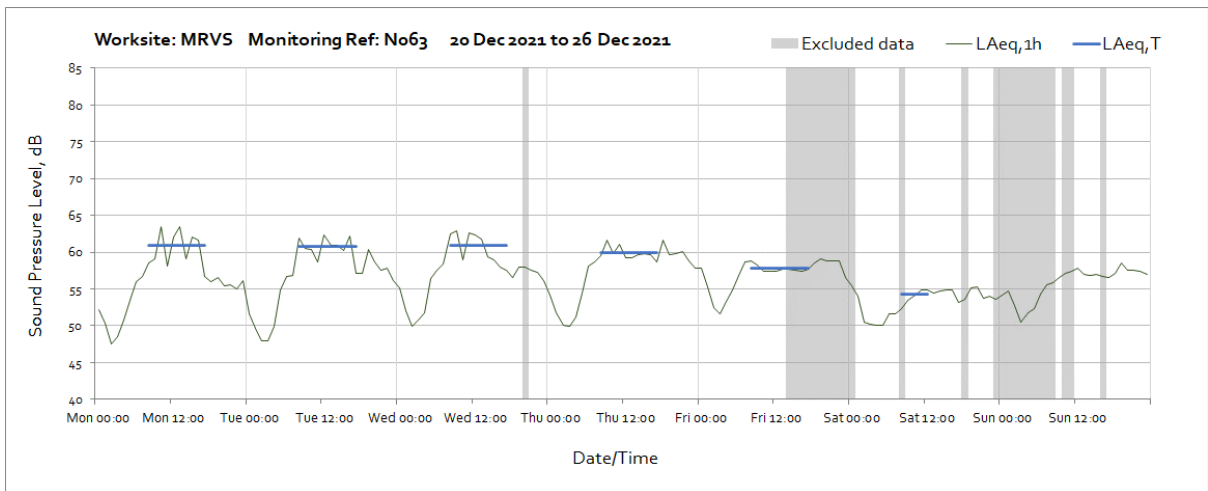
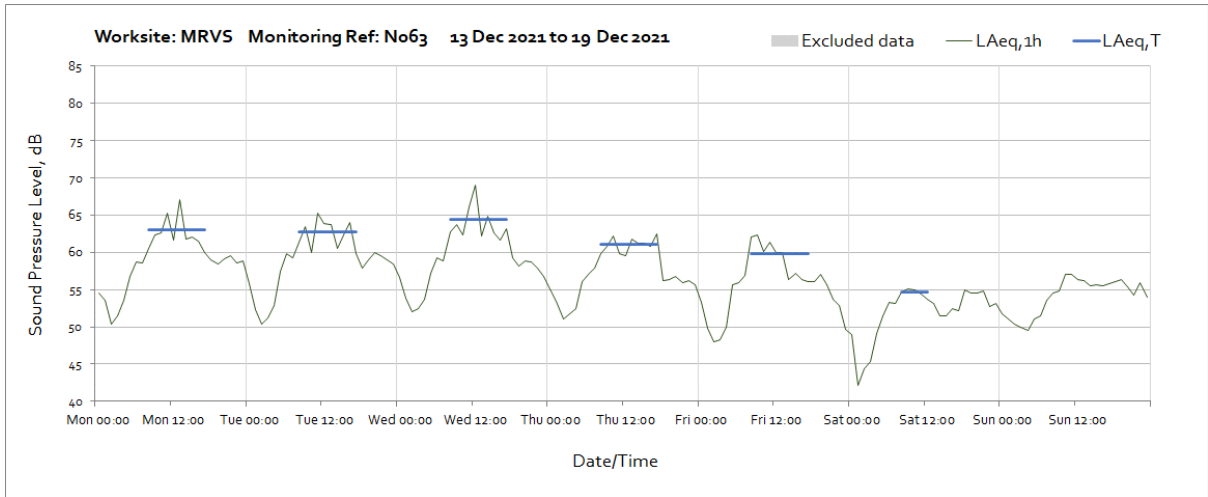




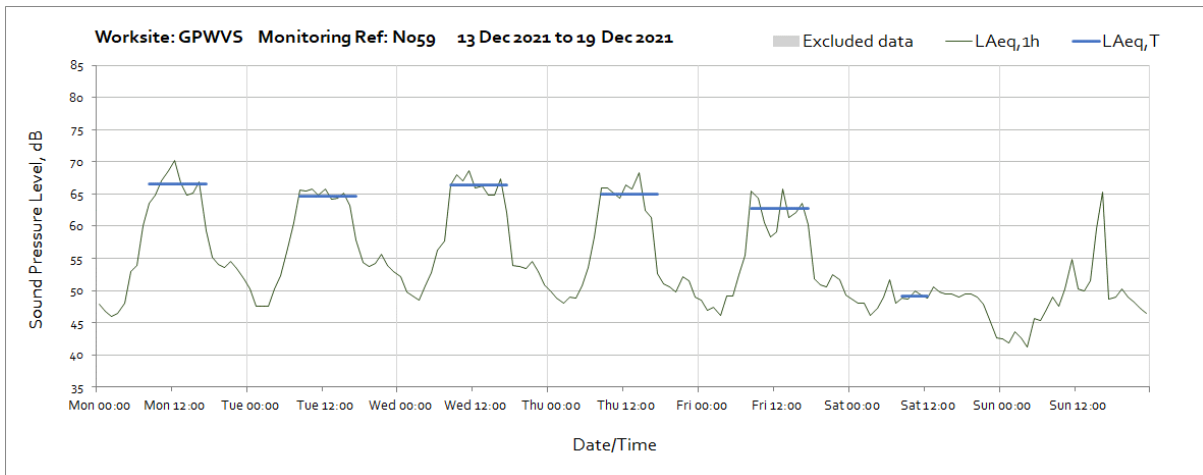
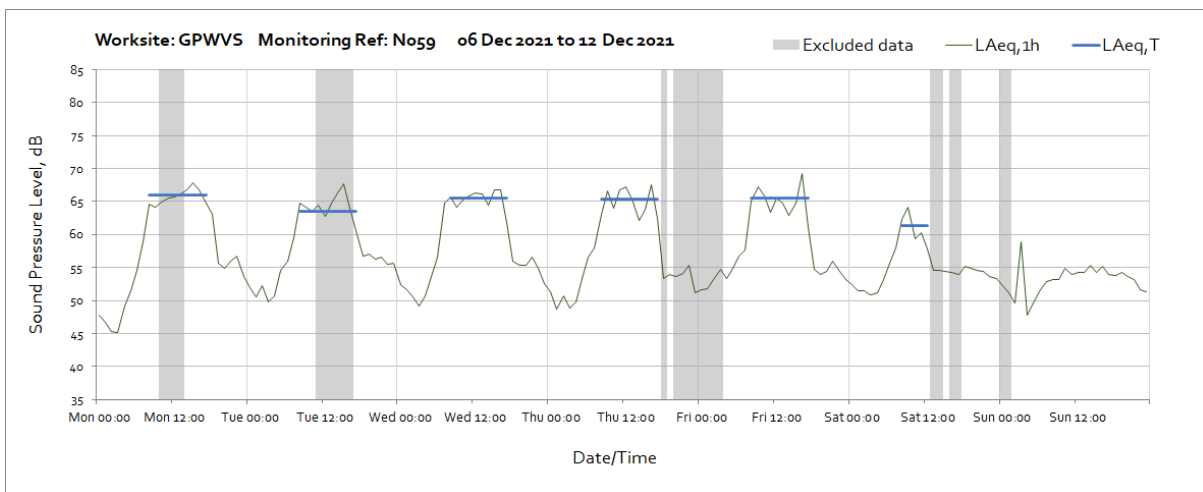
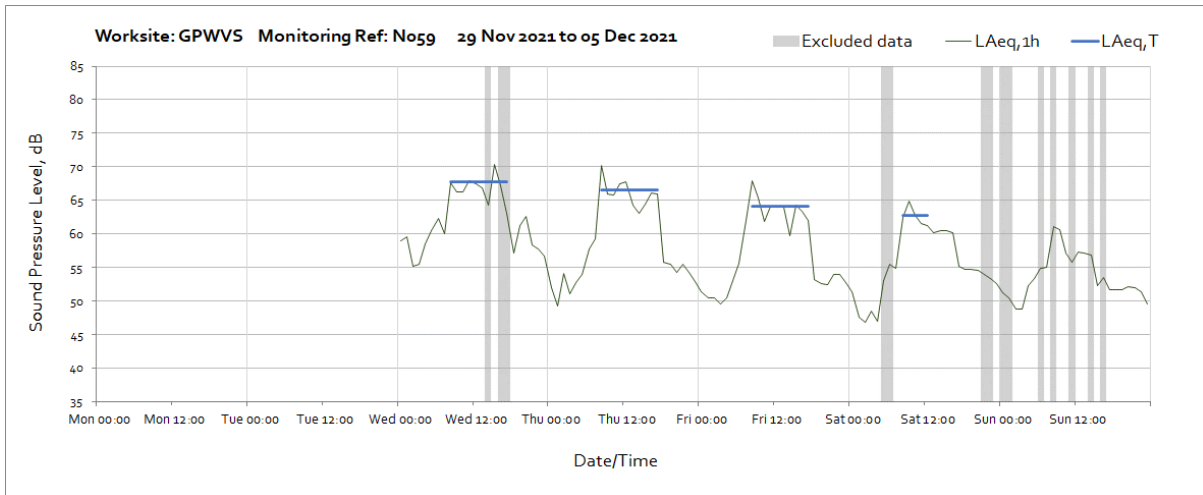
**Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N063**

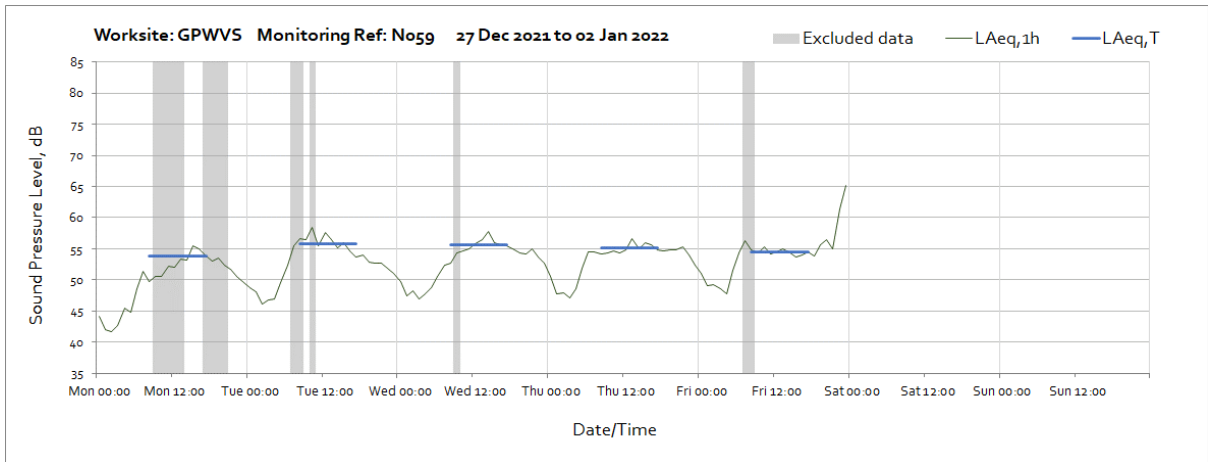
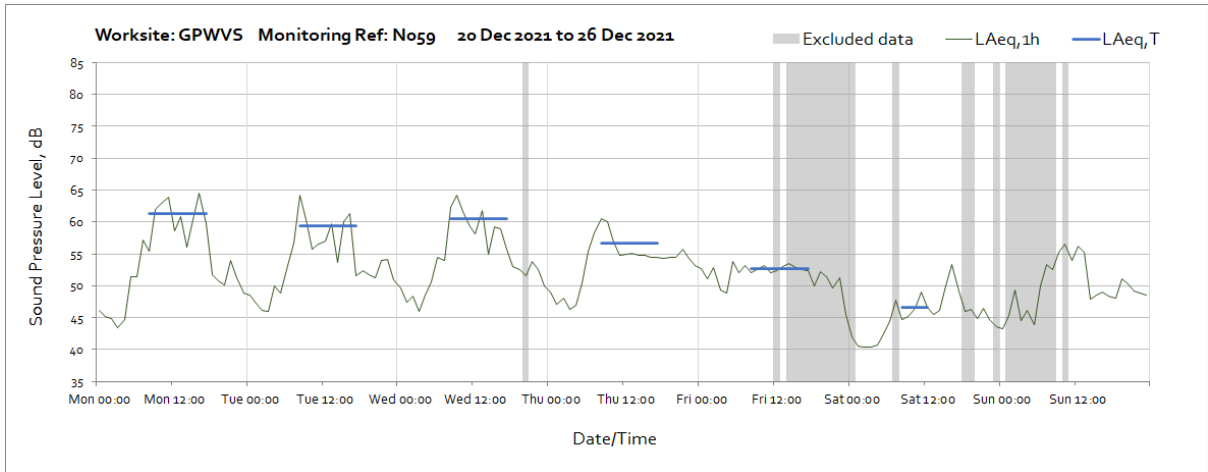




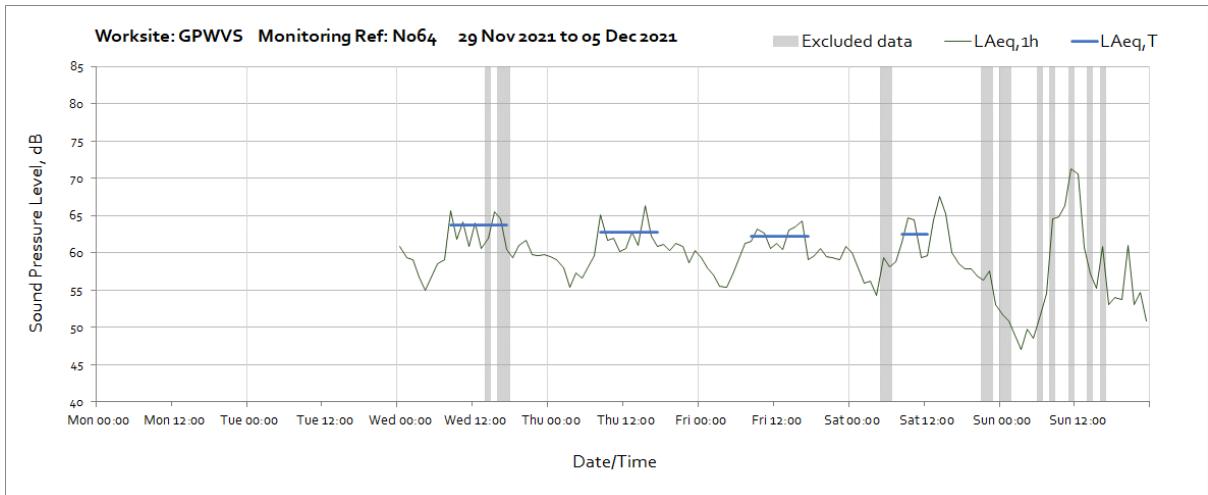


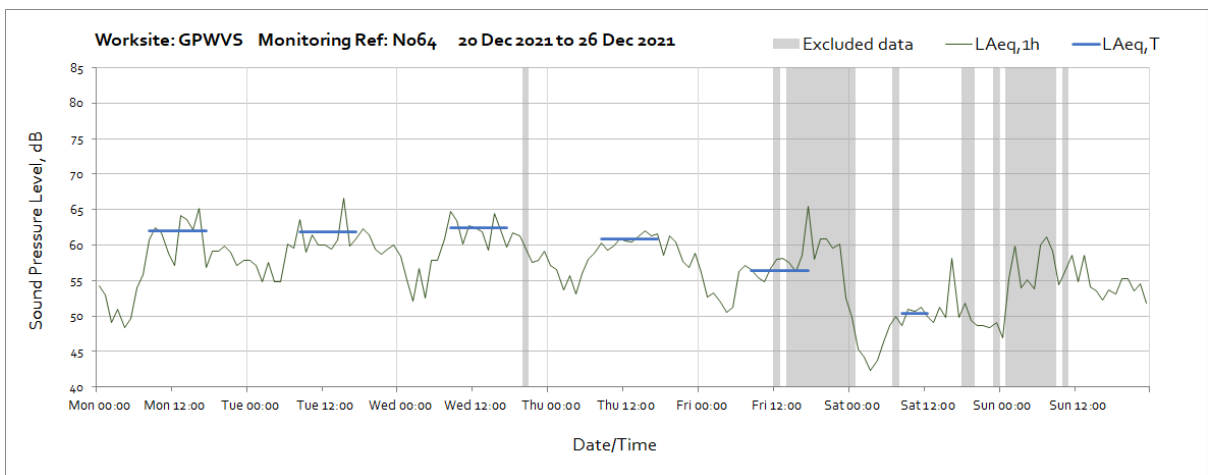
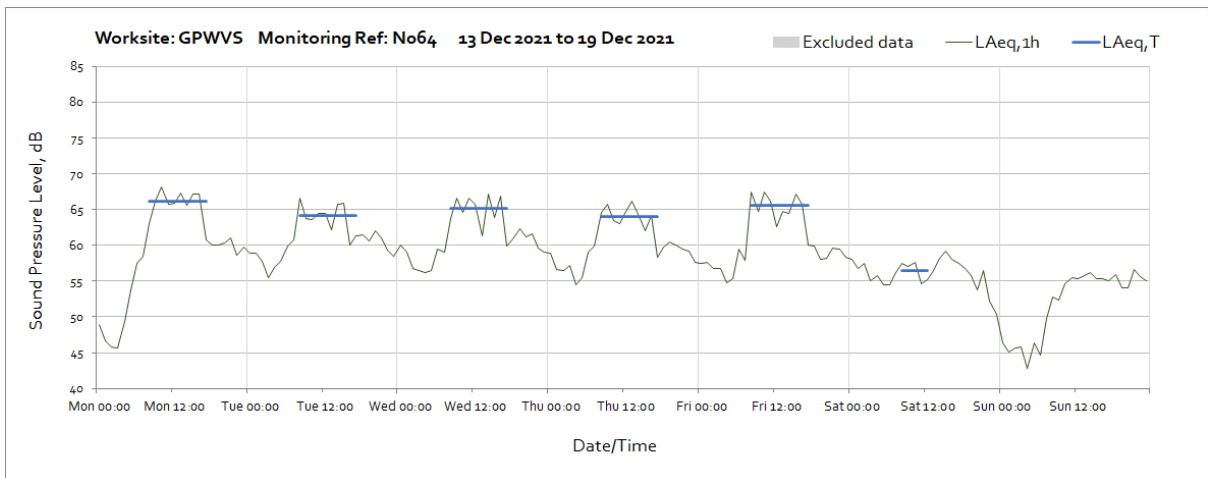
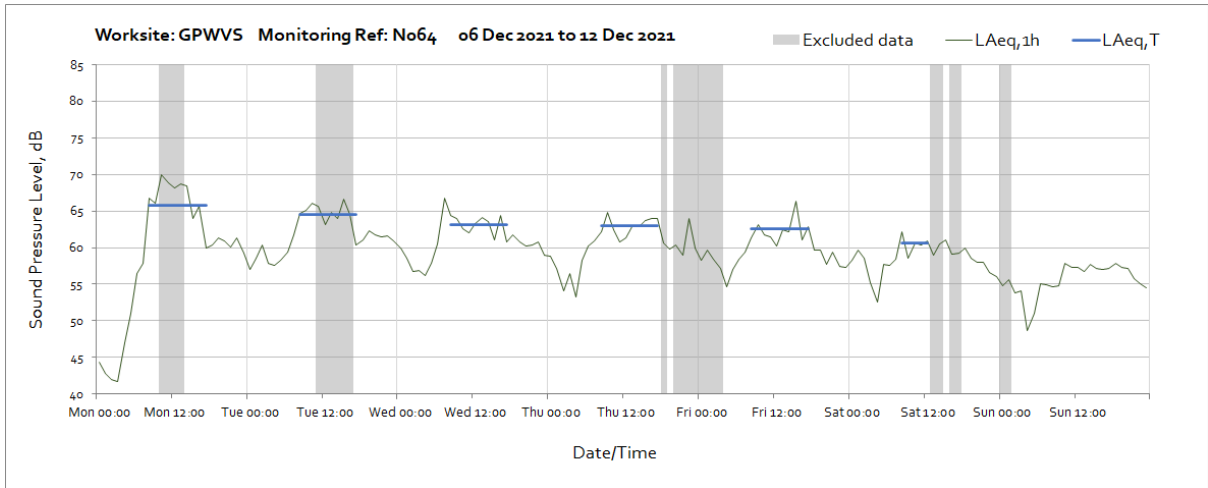
## Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: N059

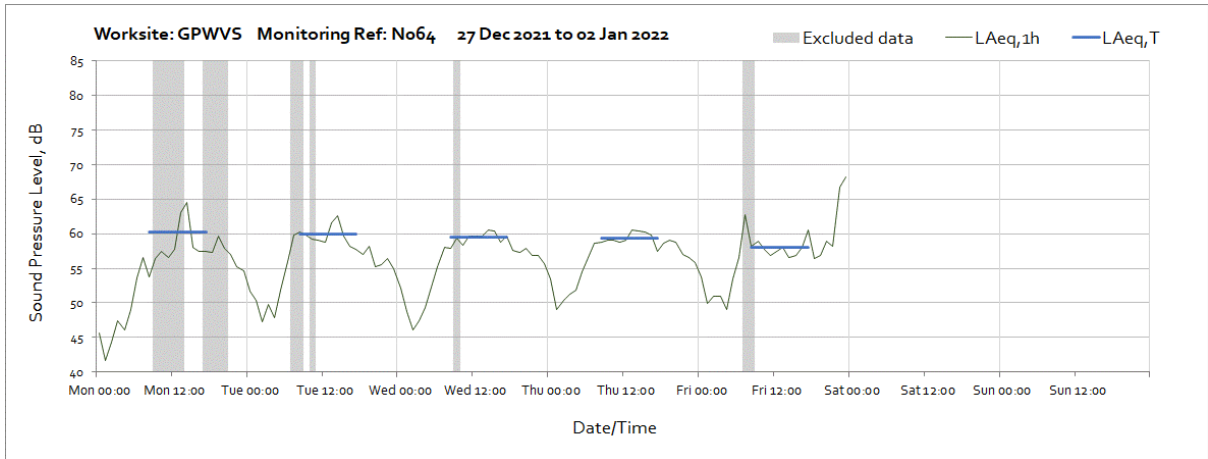




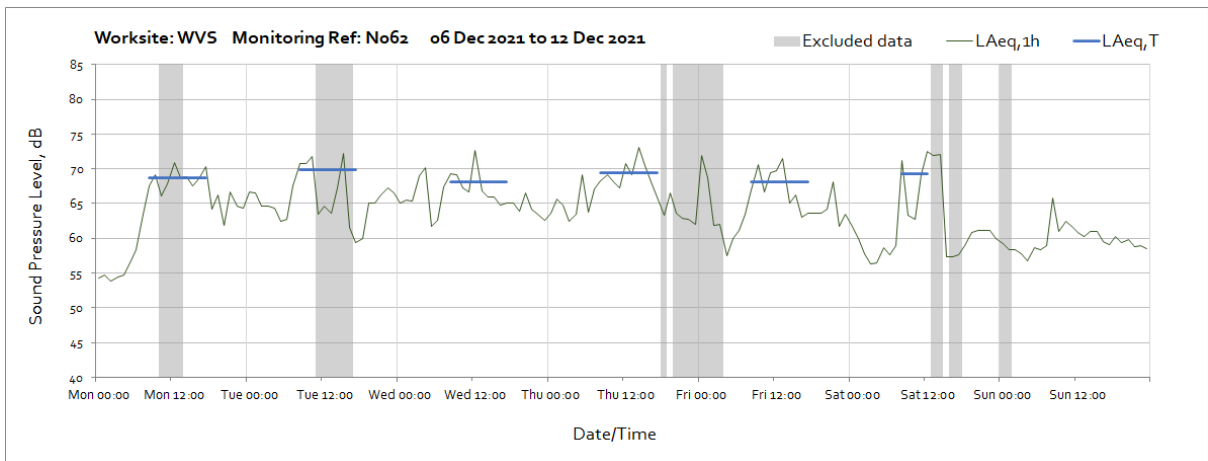
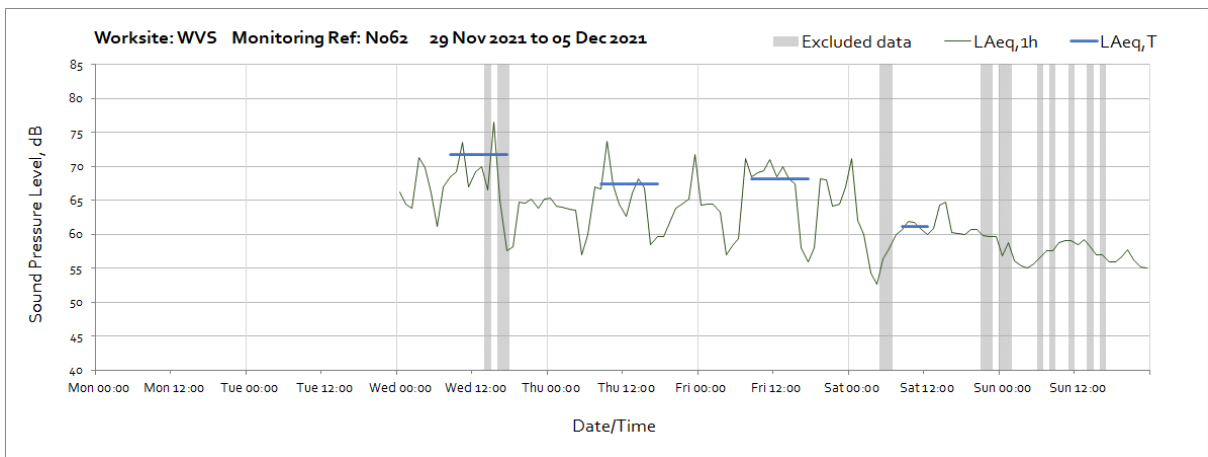
**Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: N064**



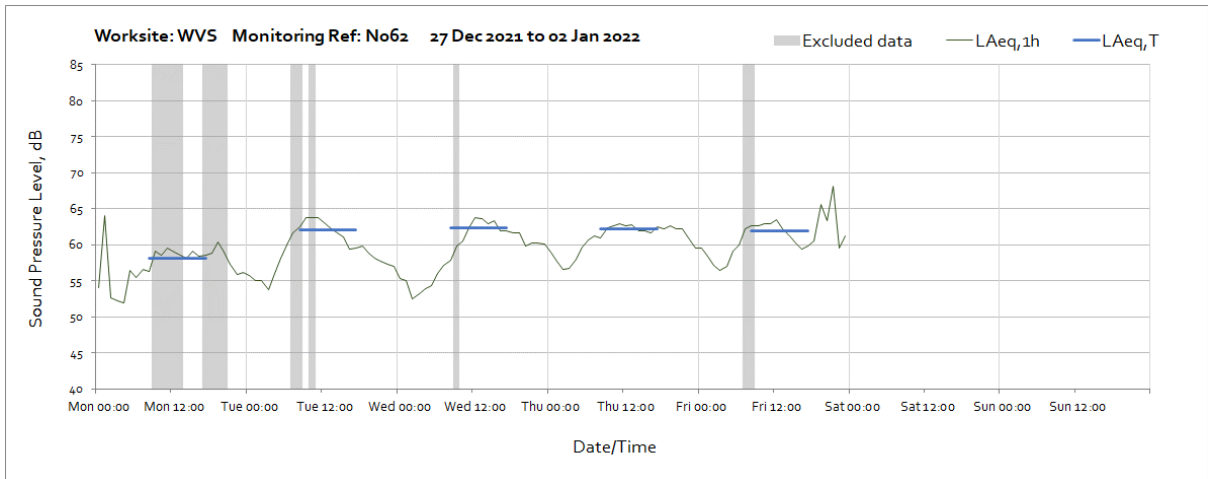
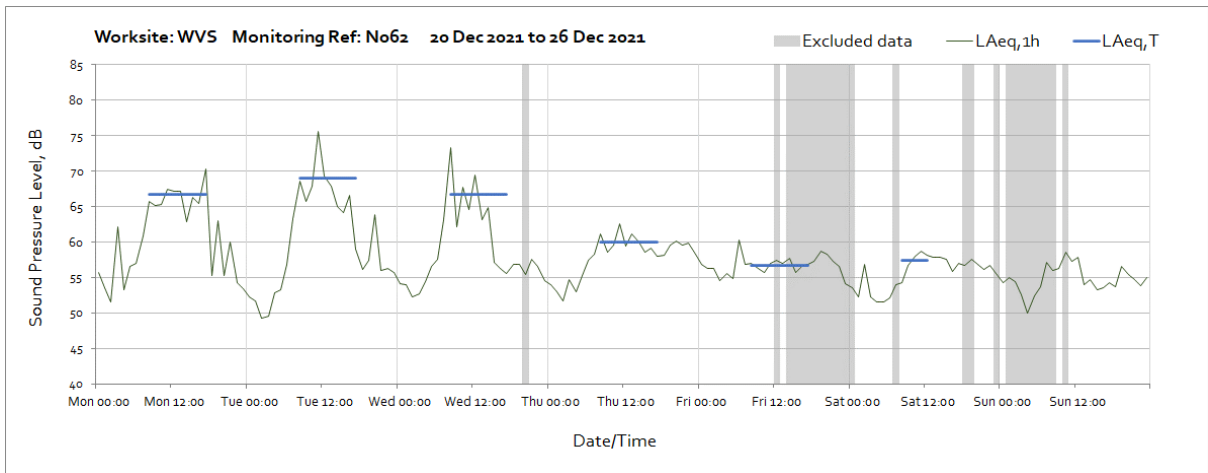
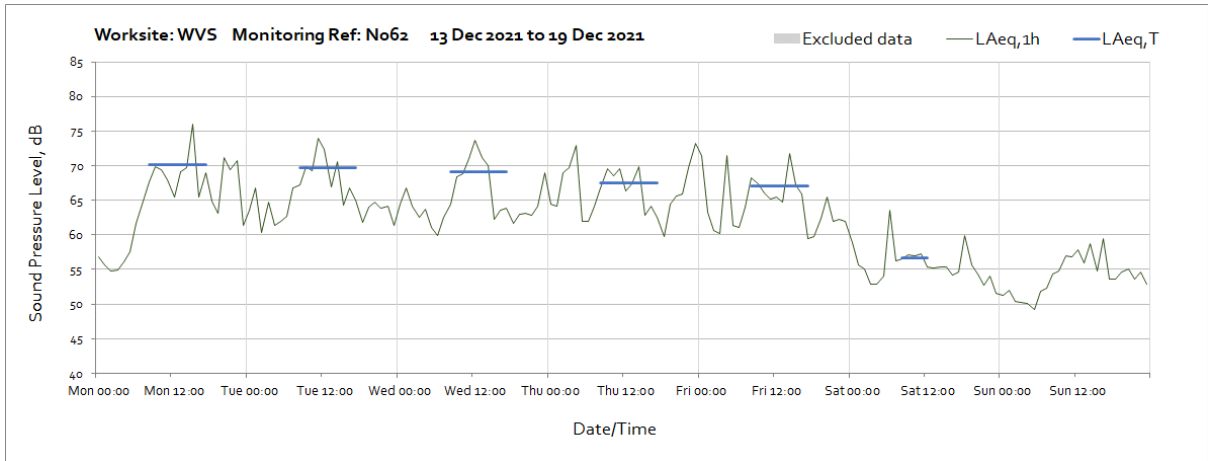




**Worksite: Westgate Ventilation Shaft (WVS) – Monitoring Ref: N062**



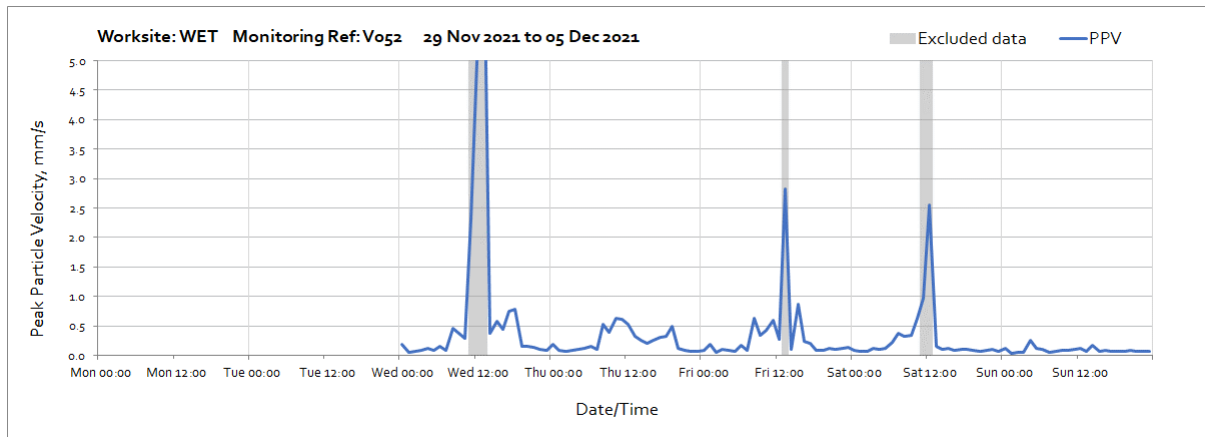




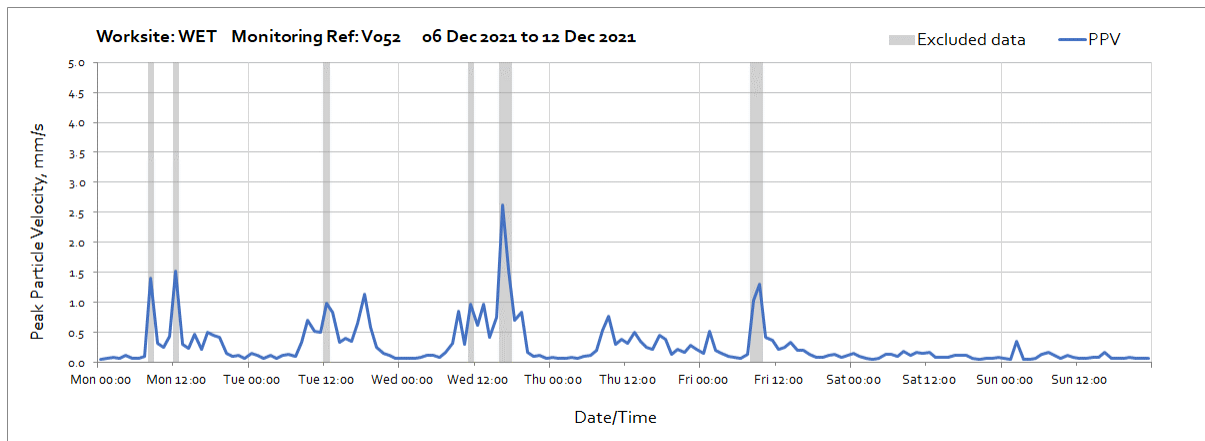
## Vibration

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.

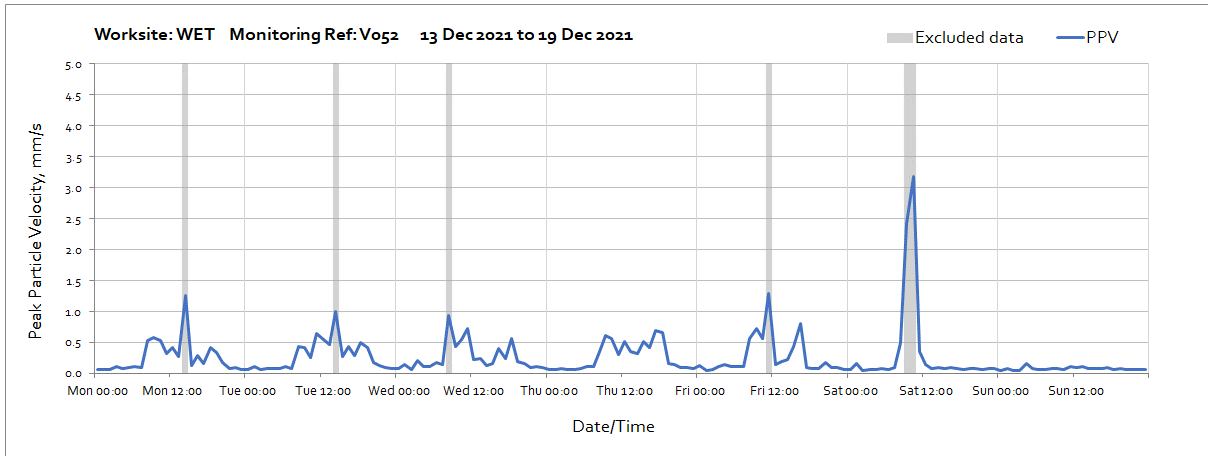
### Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: V052



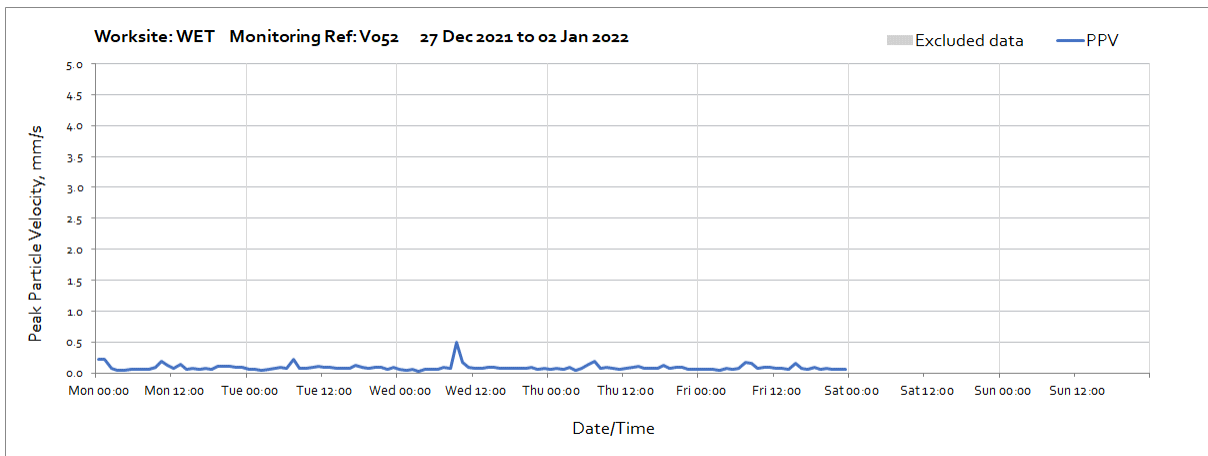
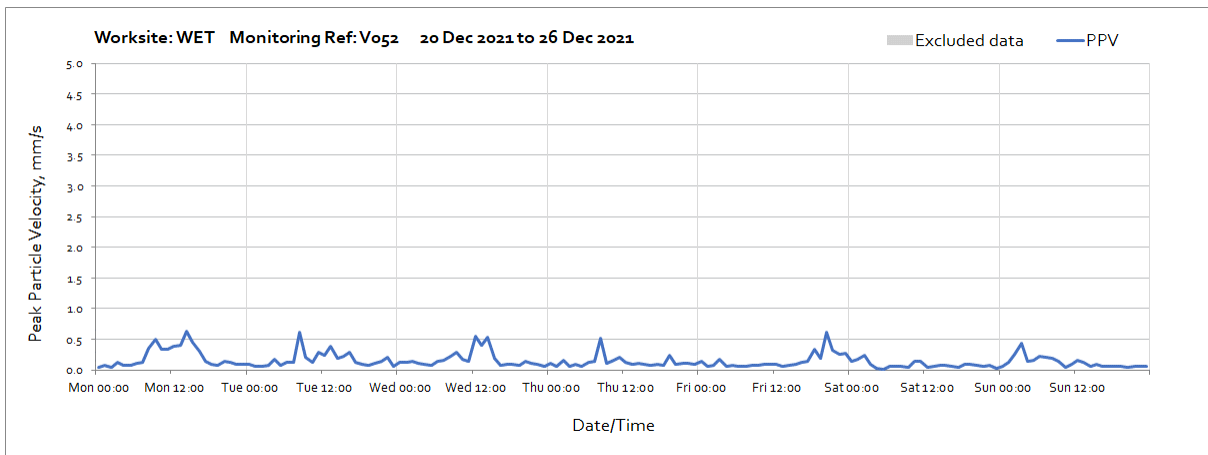
Note: High vibration levels measured across the week were due to local disturbance at the monitoring station and not representative of HS2 vibration levels.



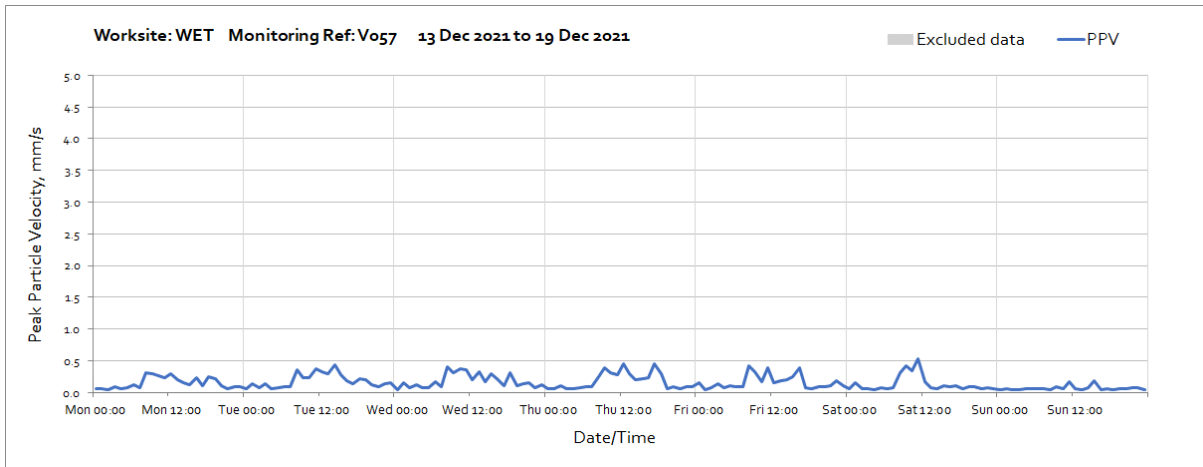
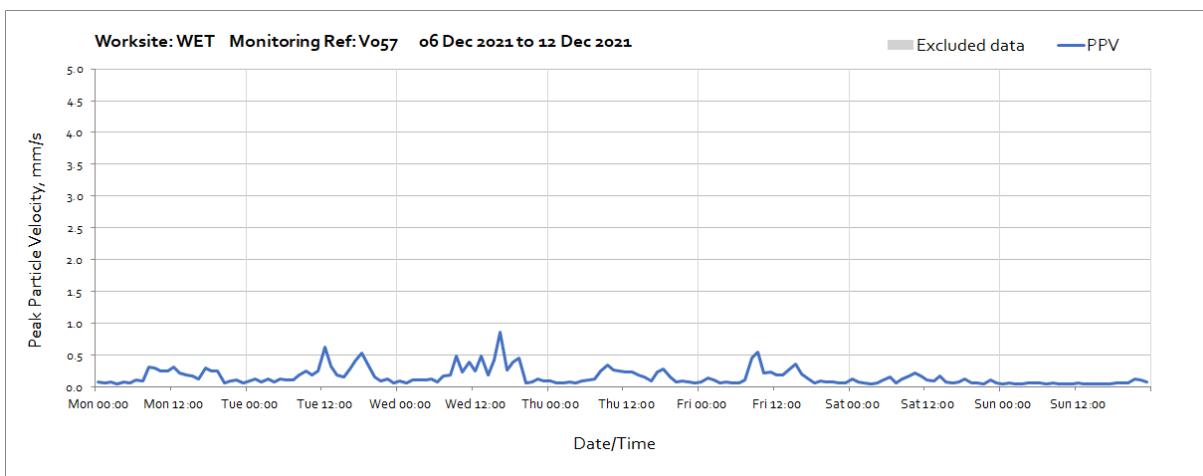
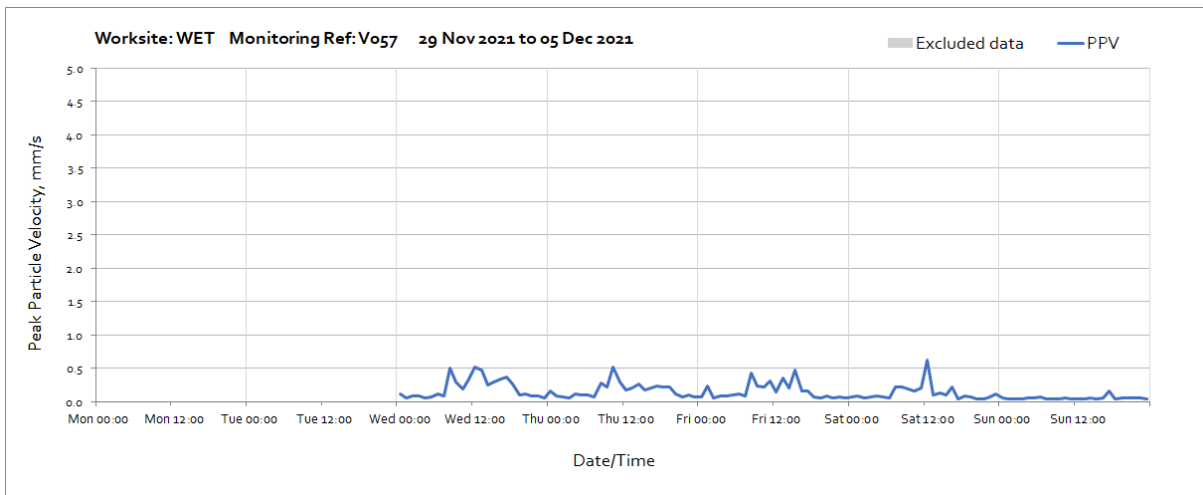
Note: High vibration levels measured across the week were due to local disturbance at the monitoring station and not representative of HS2 vibration levels.



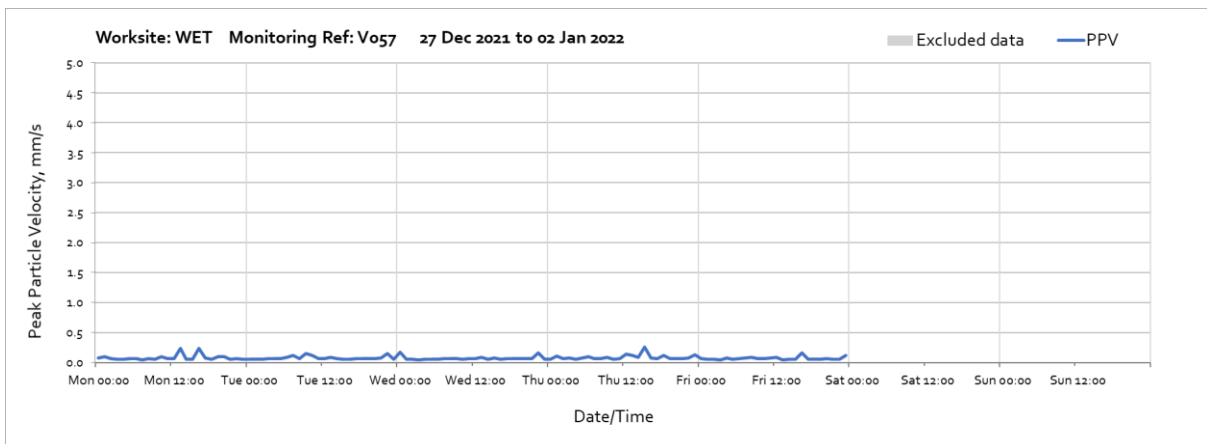
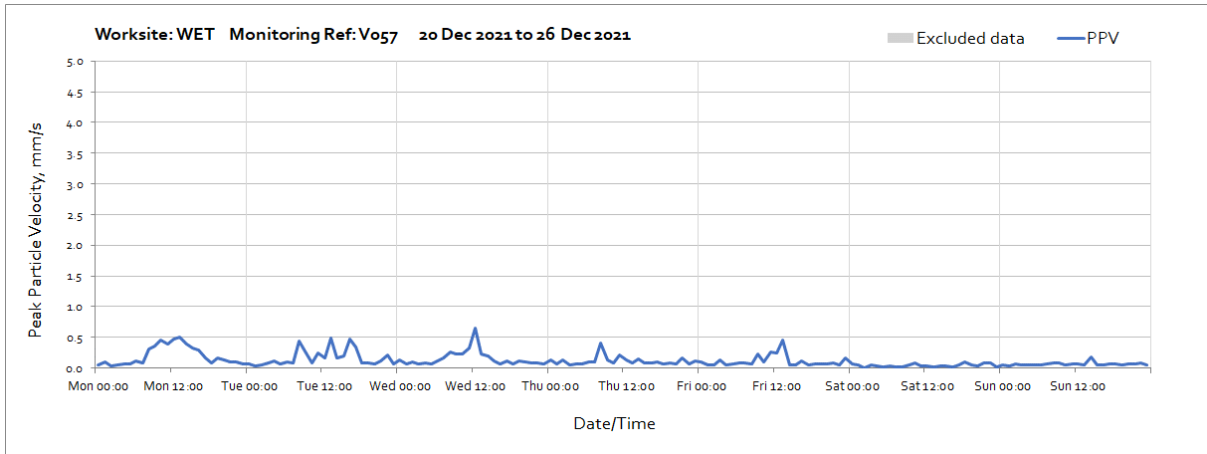
Note: High vibration levels measured across the week were due to local disturbance at the monitoring station and not representative of HS2 vibration levels.



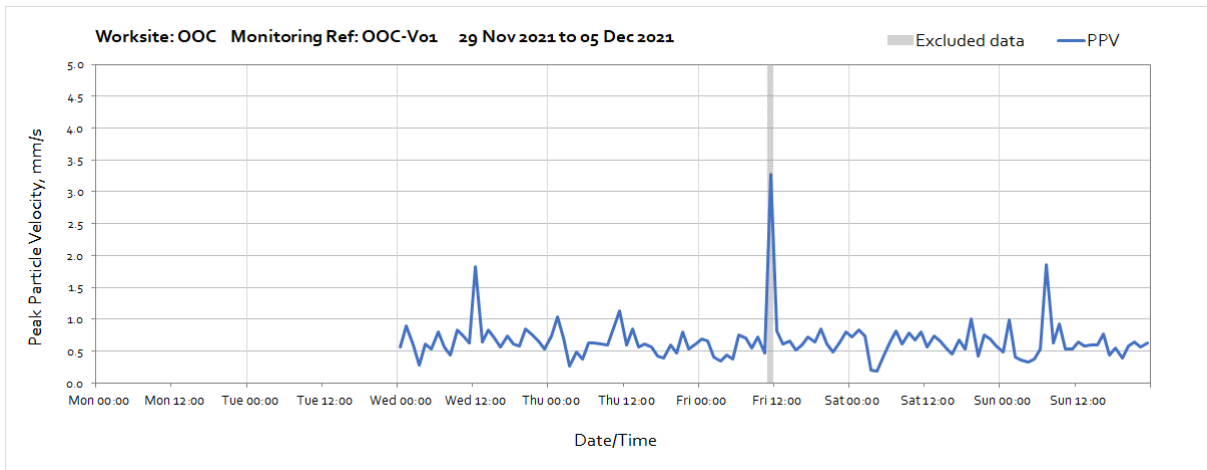
## Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: V057



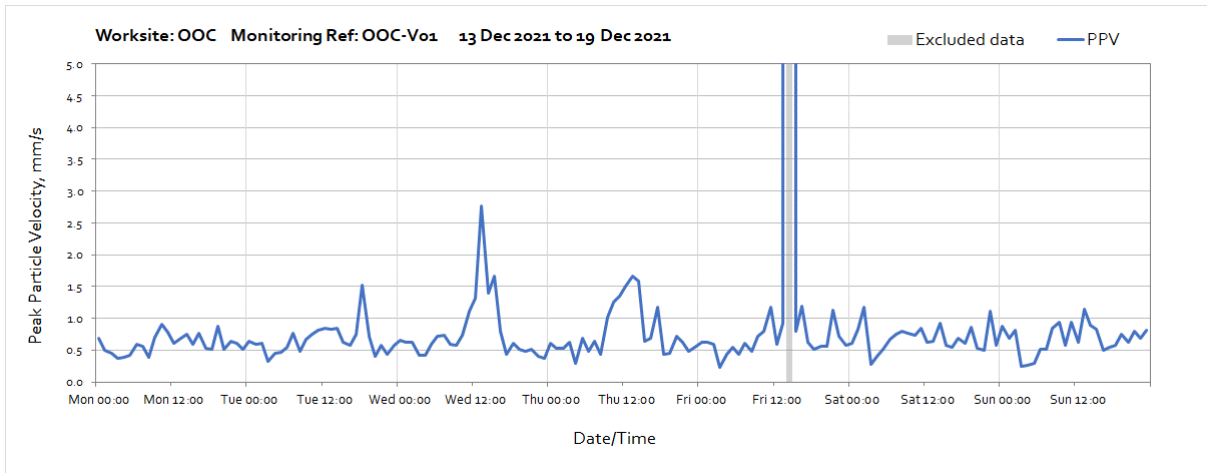
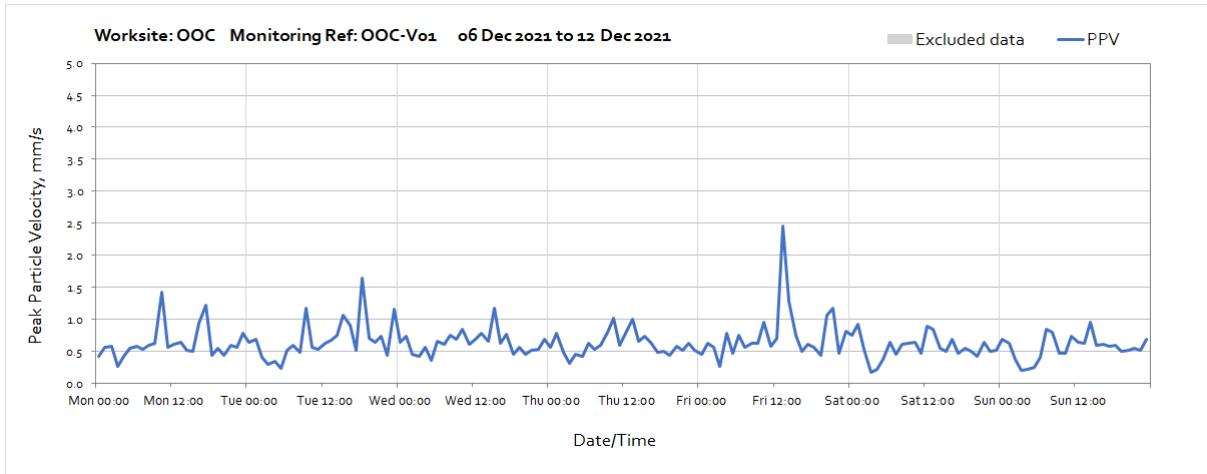
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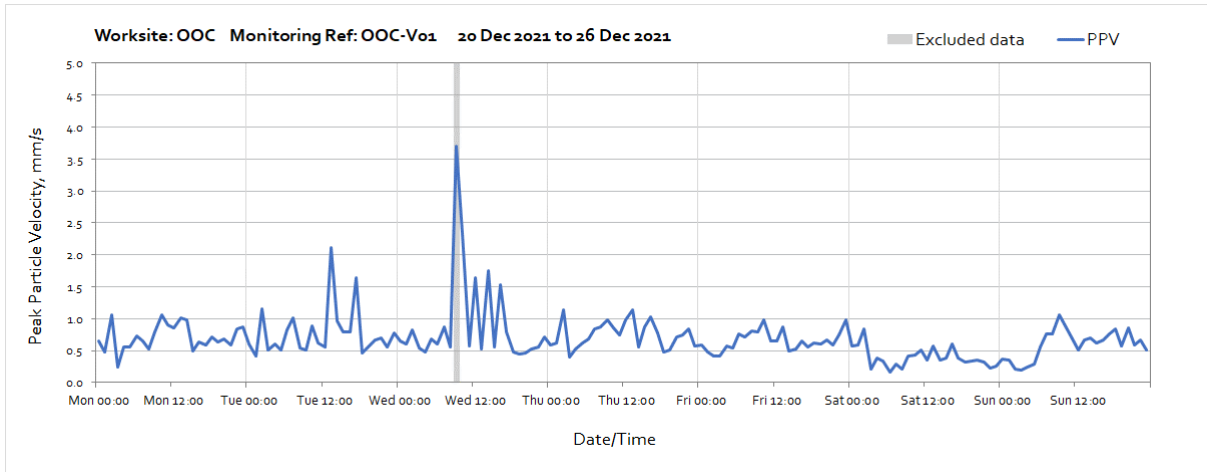
**Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V01**



Note: High vibration levels measured at 11:00 on Friday 3<sup>rd</sup> December were due to local disturbance of the vibration monitoring station and not representative of HS2 vibration levels.

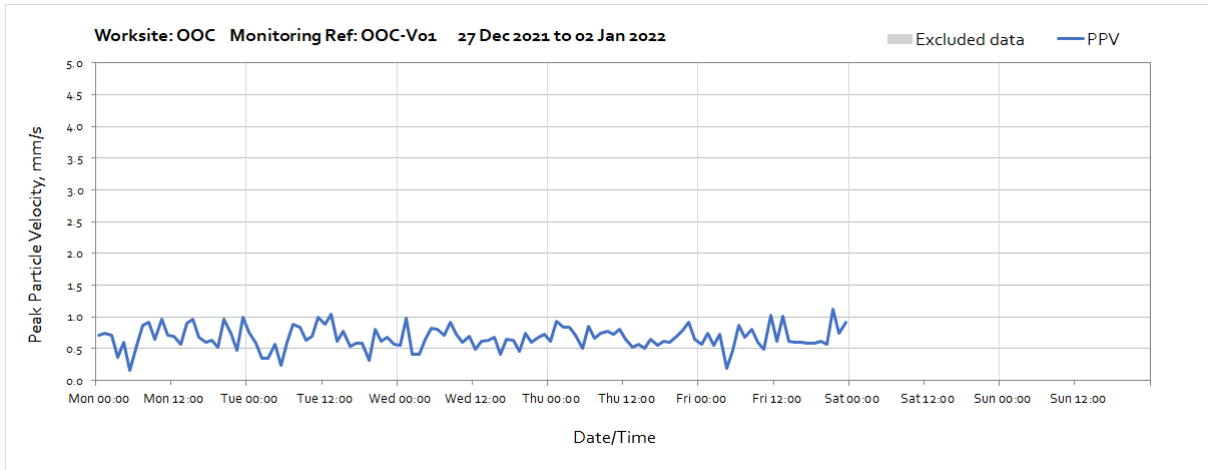


Note: High vibration levels measured at 14:00 on Friday 17<sup>th</sup> December were due to maintenance of the vibration monitor and not representative of HS2 vibration levels.

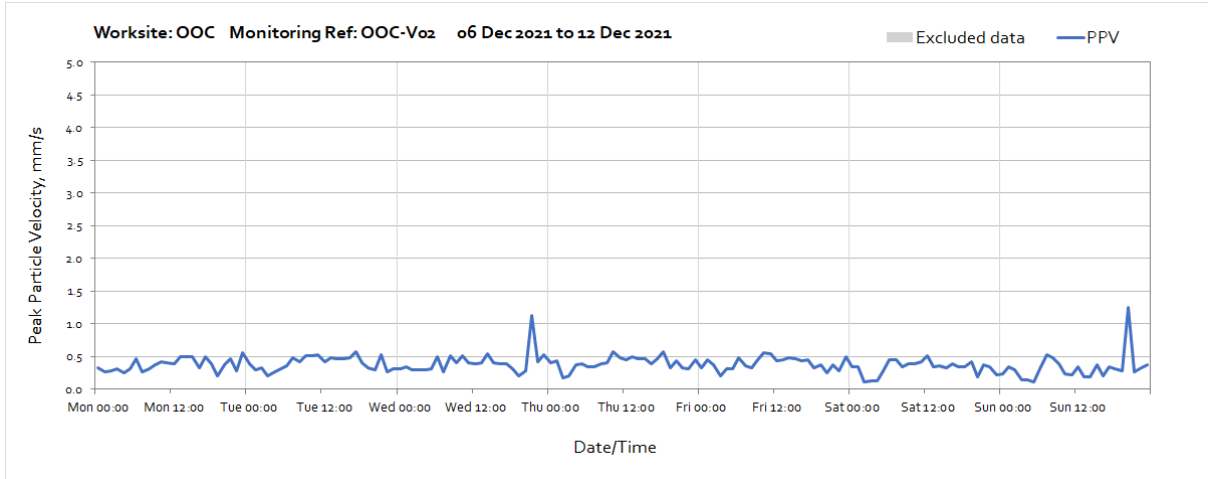
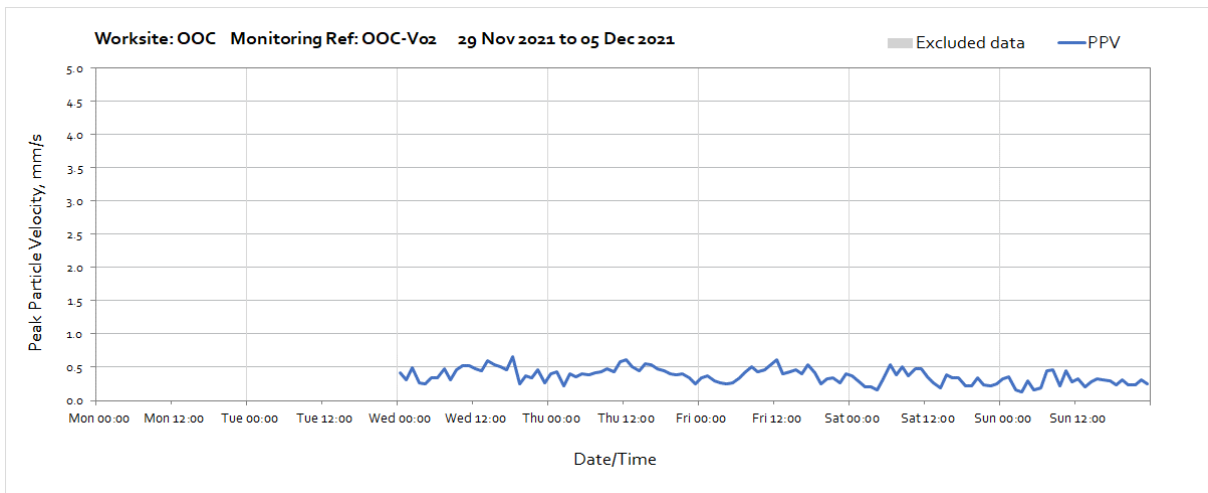


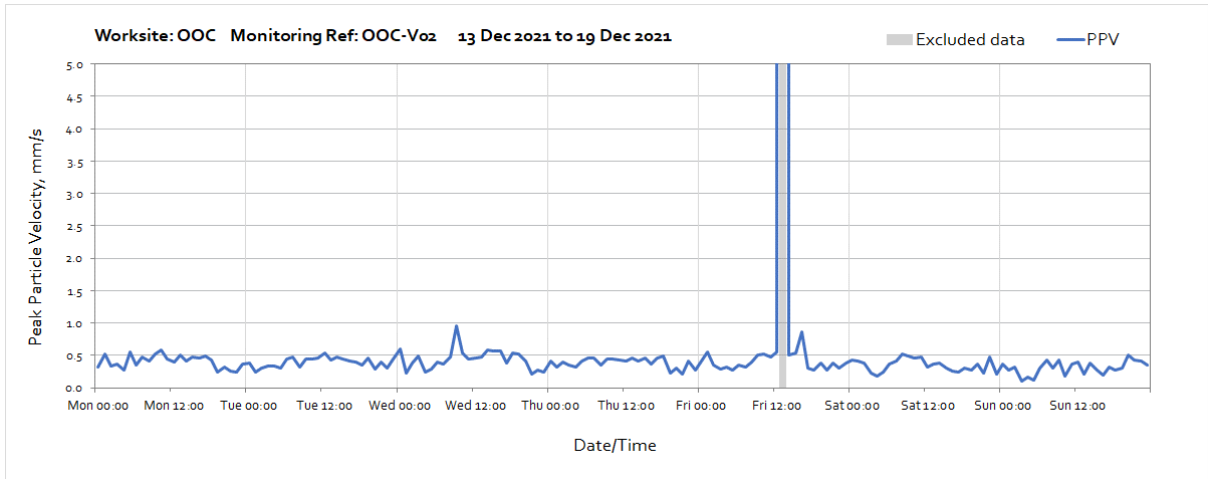
Note: High vibration levels measured at 09:00 on Wednesday 12<sup>th</sup> December were due to local disturbance of the vibration monitoring station and not representative of HS2 vibration levels .



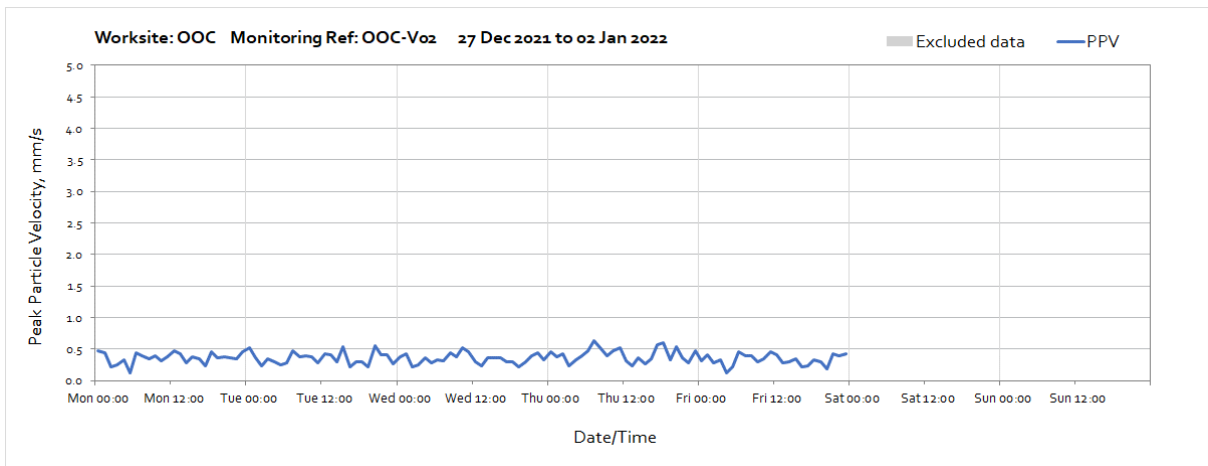
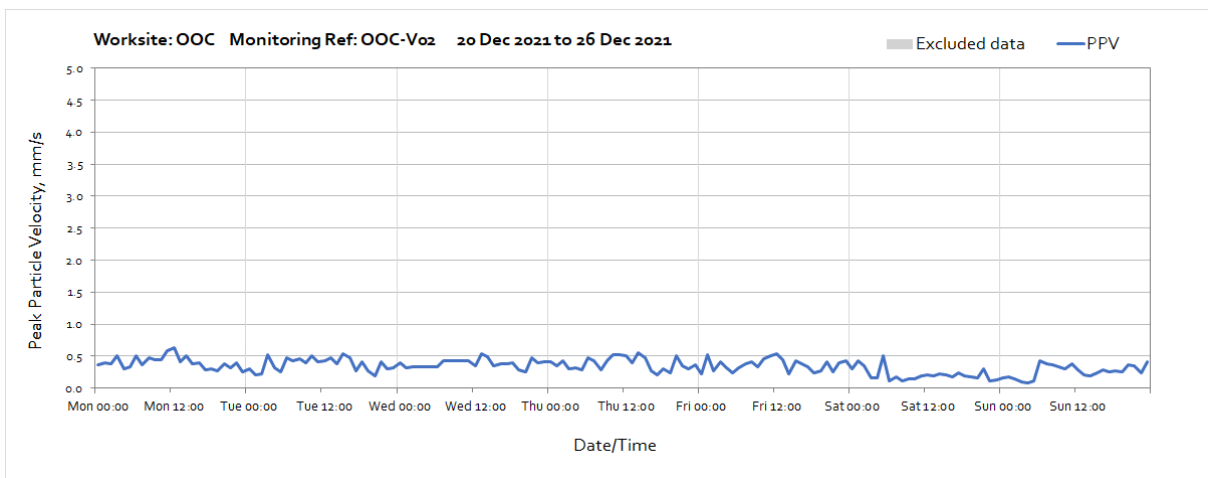


**Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V02**

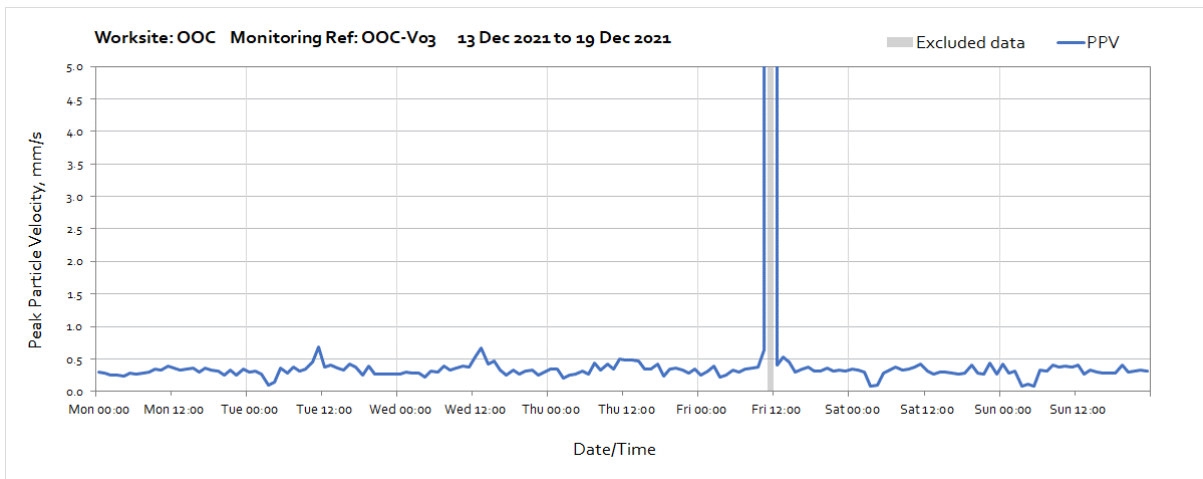
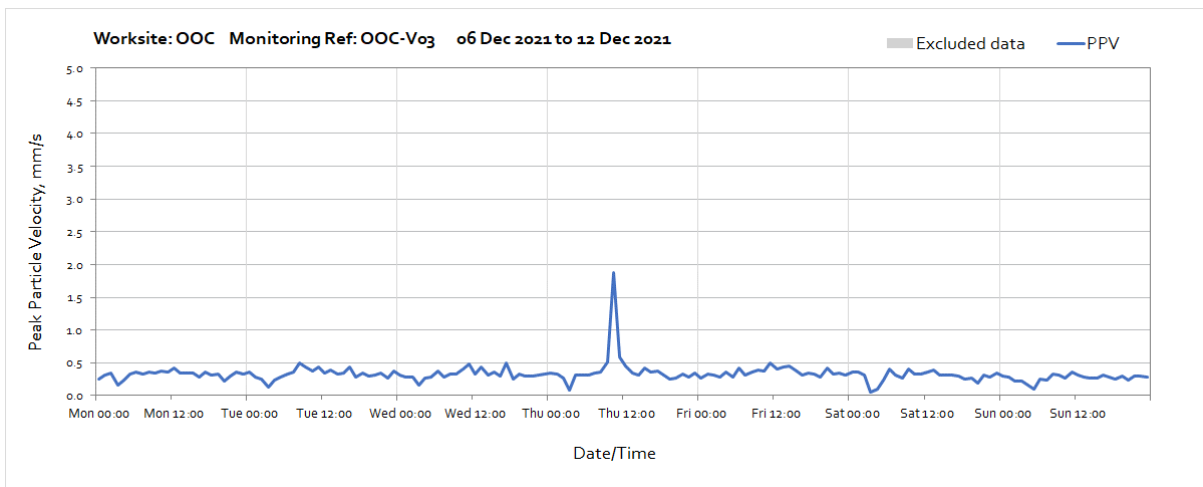
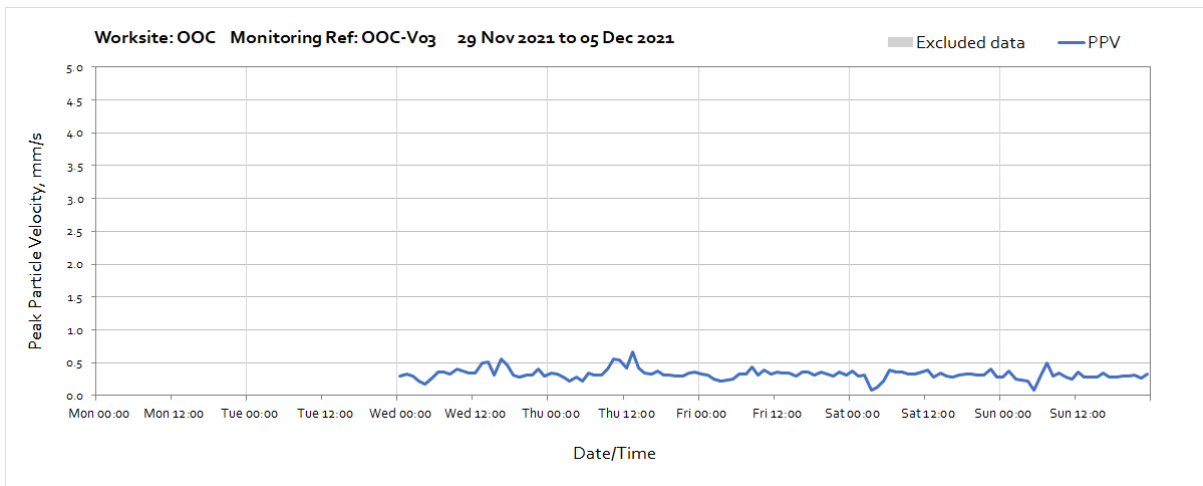




Note: High vibration levels measured at 14:00 on Friday 17<sup>th</sup> December were due to maintenance of the vibration monitor and not representative of HS2 vibration levels.

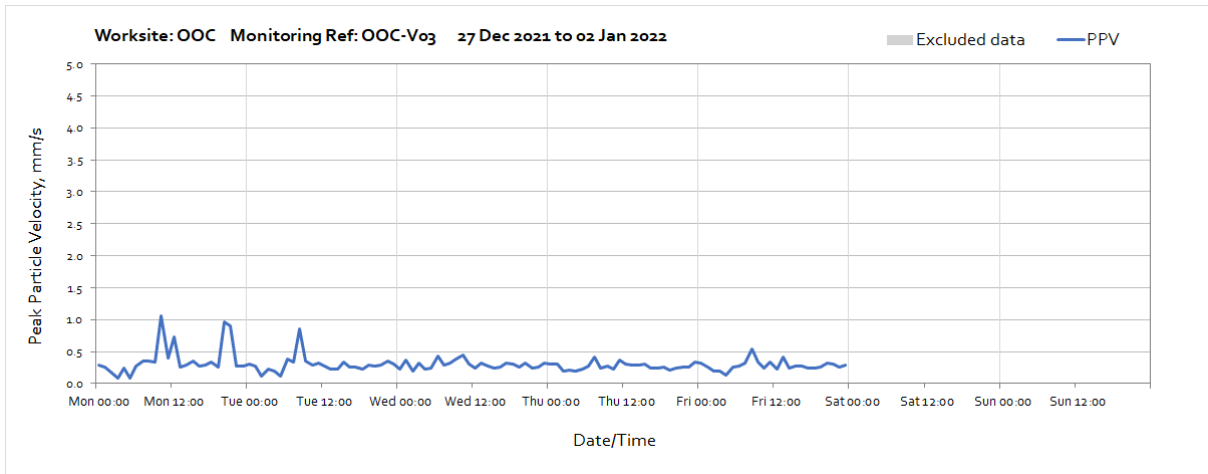
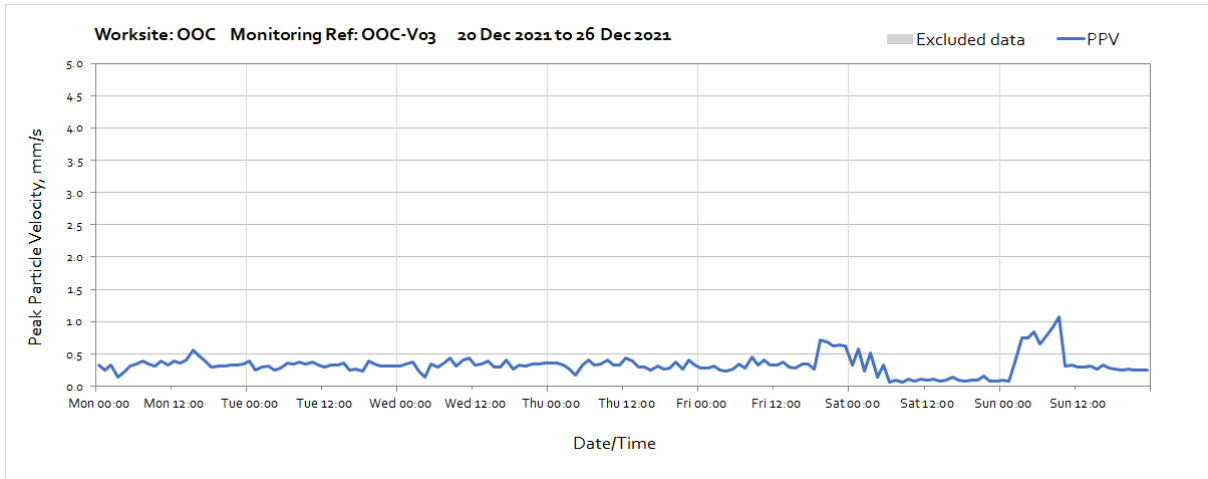


## Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V03

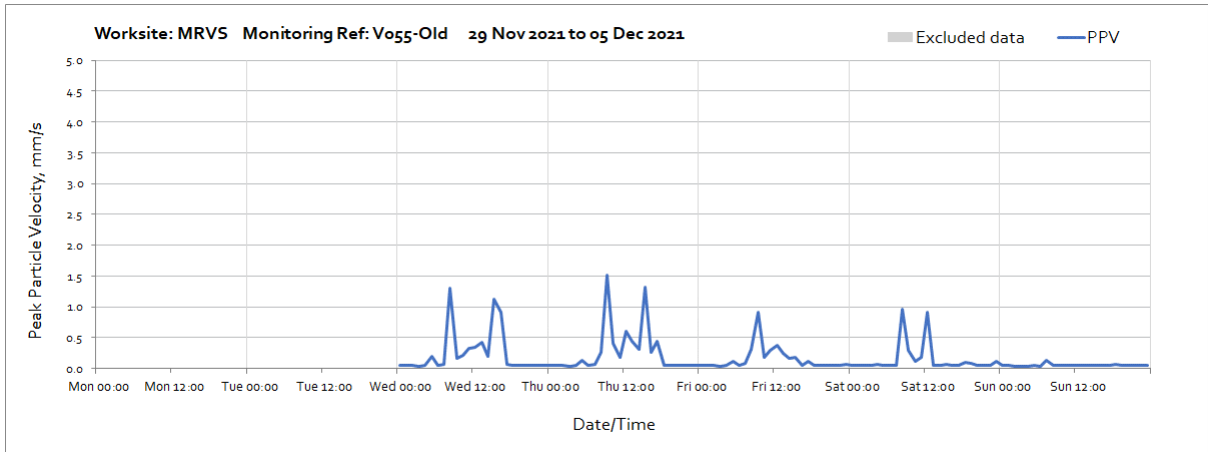


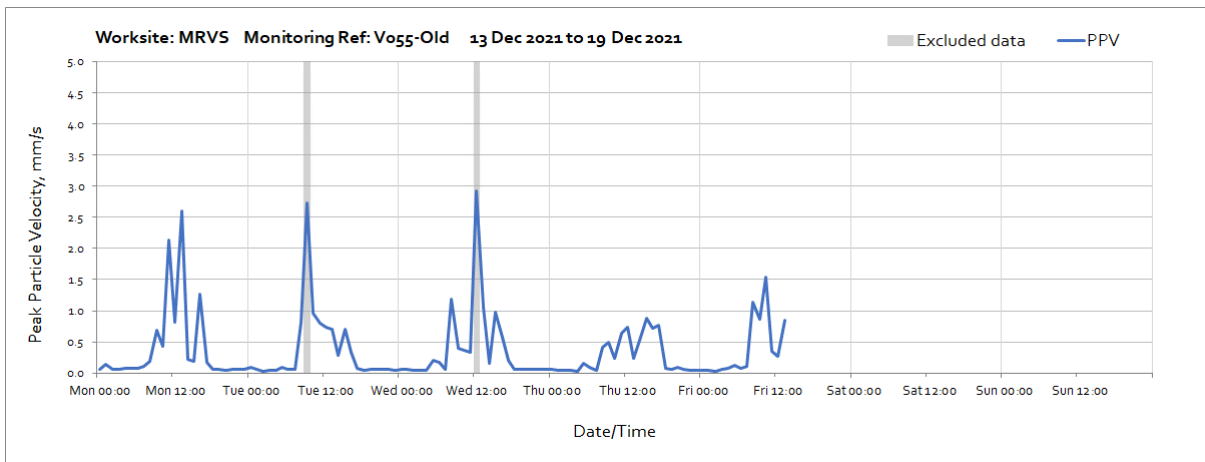
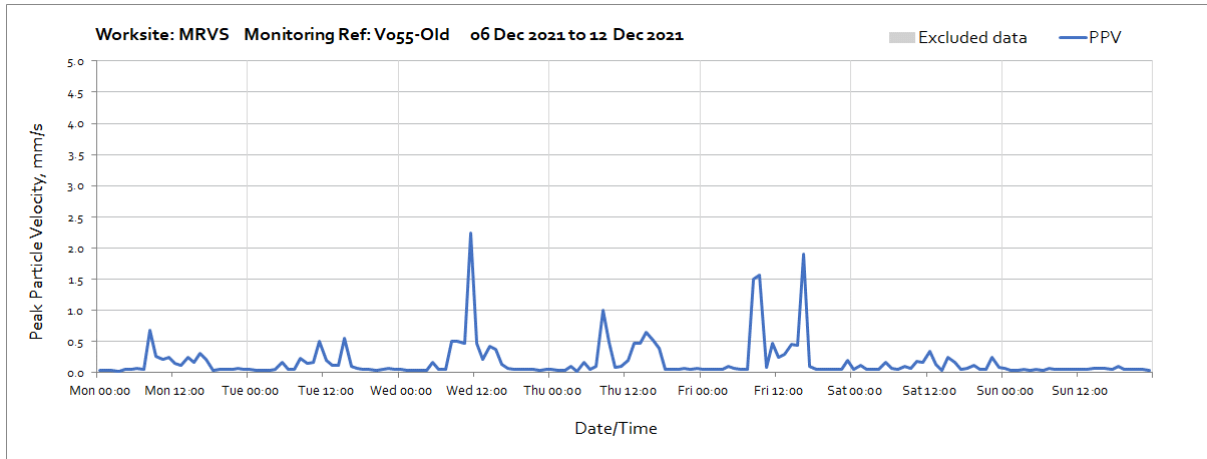
Note: High vibration levels measured at 14:00 on Friday 17<sup>th</sup> December were due to maintenance of the vibration monitor and not representative of HS2 vibration levels.

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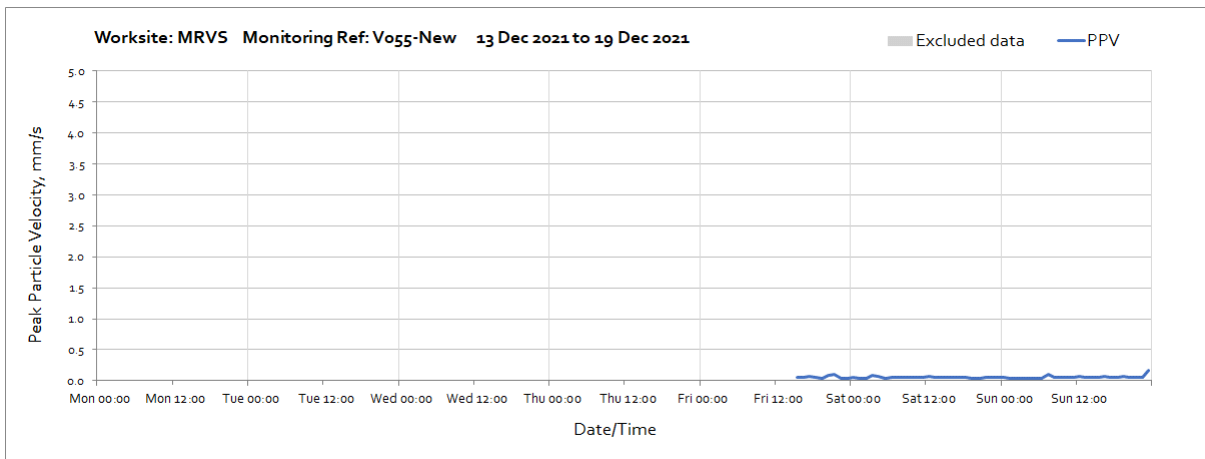
**Worksite: Mandeville Road Vent Shaft (MRVS) – Monitoring Ref: V055-Old**



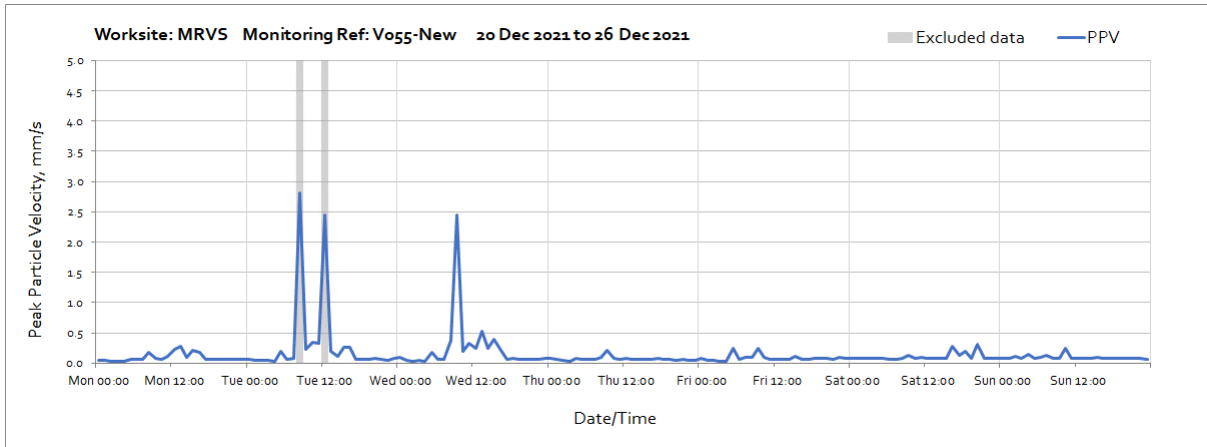


Note: High vibration levels measured at 09:00 on Tuesday 14<sup>th</sup> and at 12:00 on Wednesday 15<sup>th</sup> December were due to local disturbance of the monitoring station and not representative of HS2 vibration levels. The monitor has been relocated to a new position on Friday 17<sup>th</sup> December.

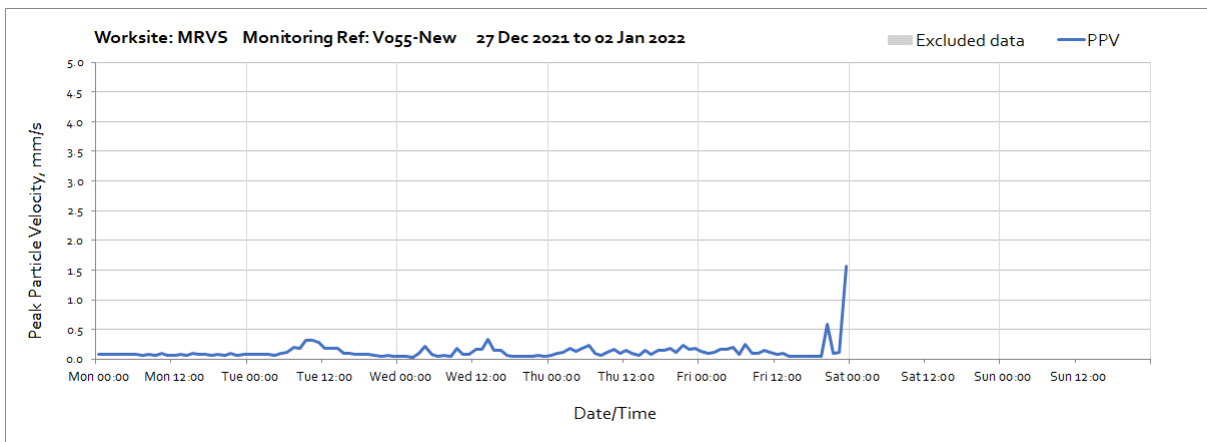
### Worksite: Mandeville Road Vent Shaft (MRVS) – Monitoring Ref: V055-New



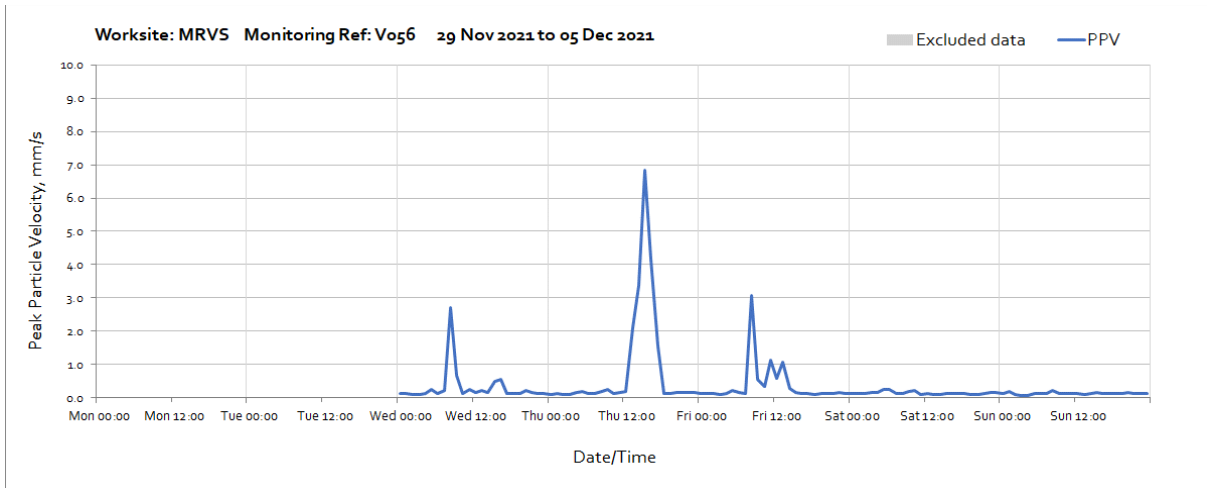
Note: The monitor has been relocated to this new position on Friday 17<sup>th</sup> December.



Note: High vibration levels measured at 08:00 and 12:00 on Tuesday 21<sup>st</sup> December were due to local disturbance of the monitoring station and not representative of HS2 vibration levels.

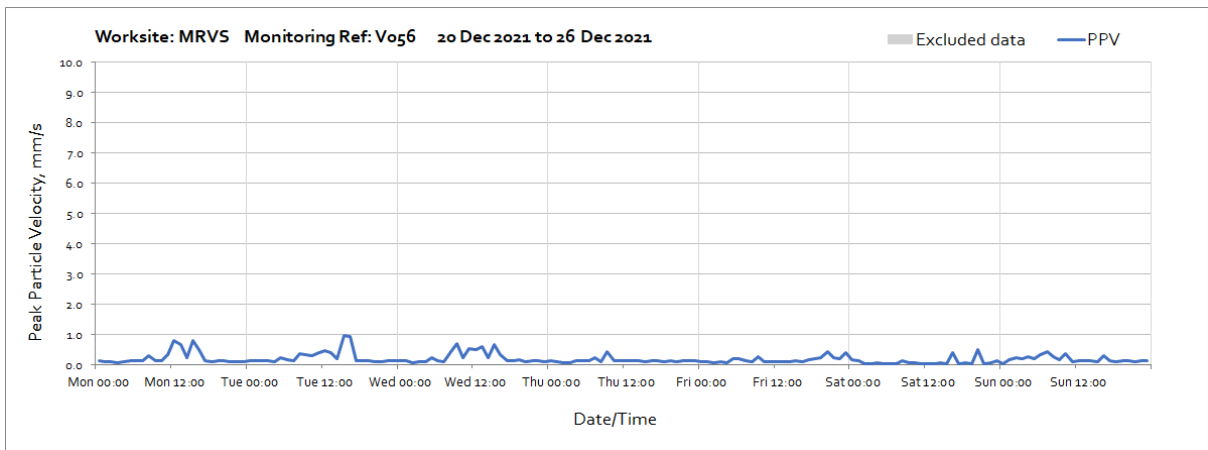
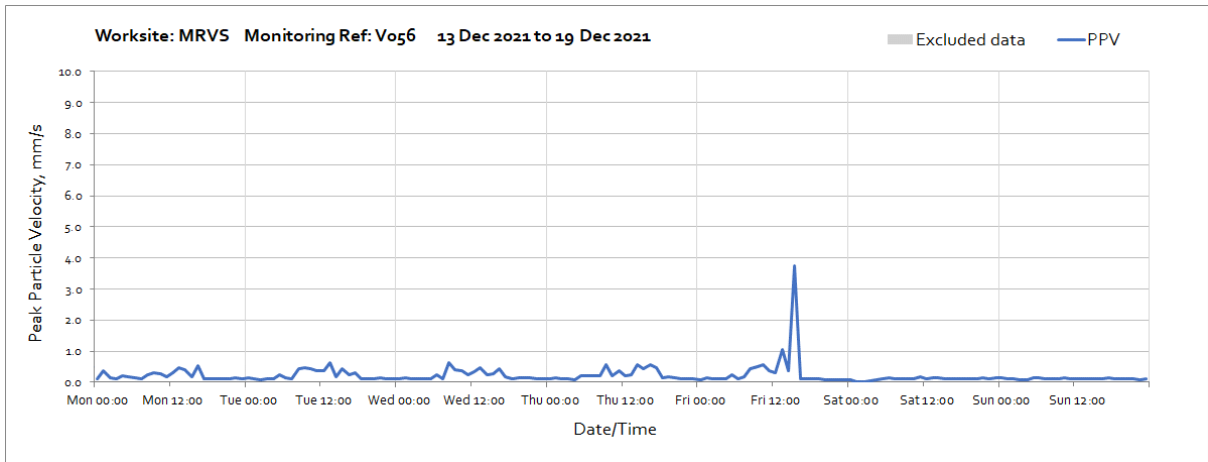
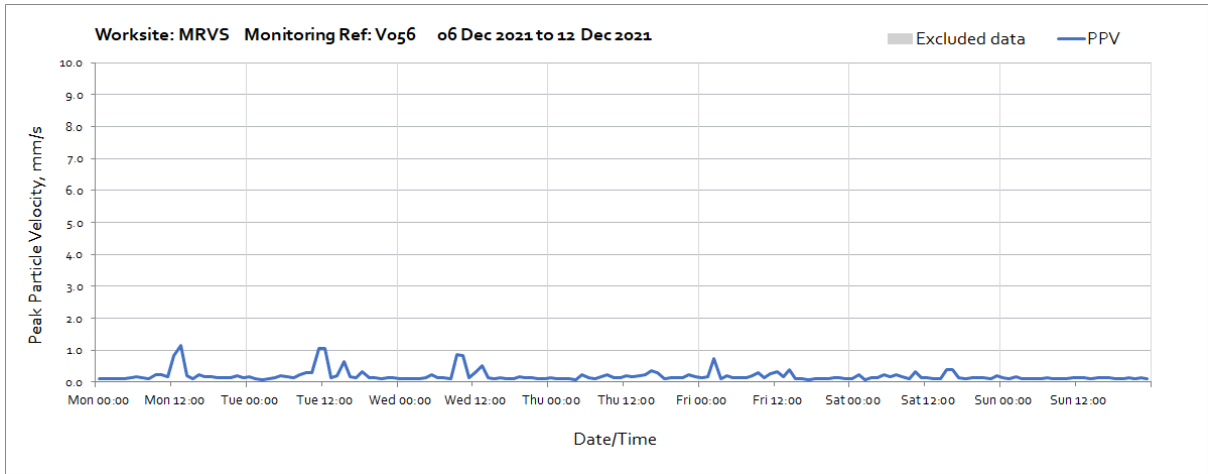


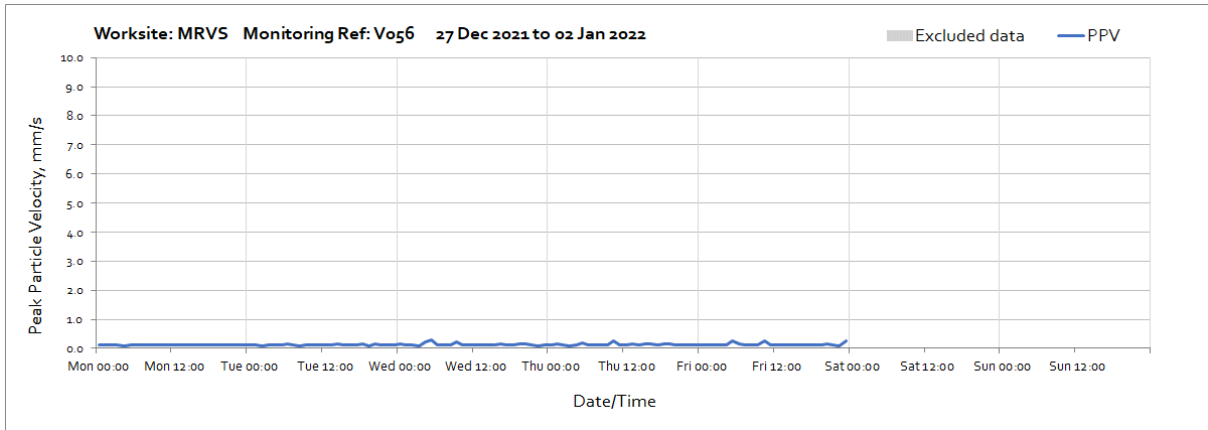
### Worksite: Mandeville Road Vent Shaft (MRVS) – Monitoring Ref: V056



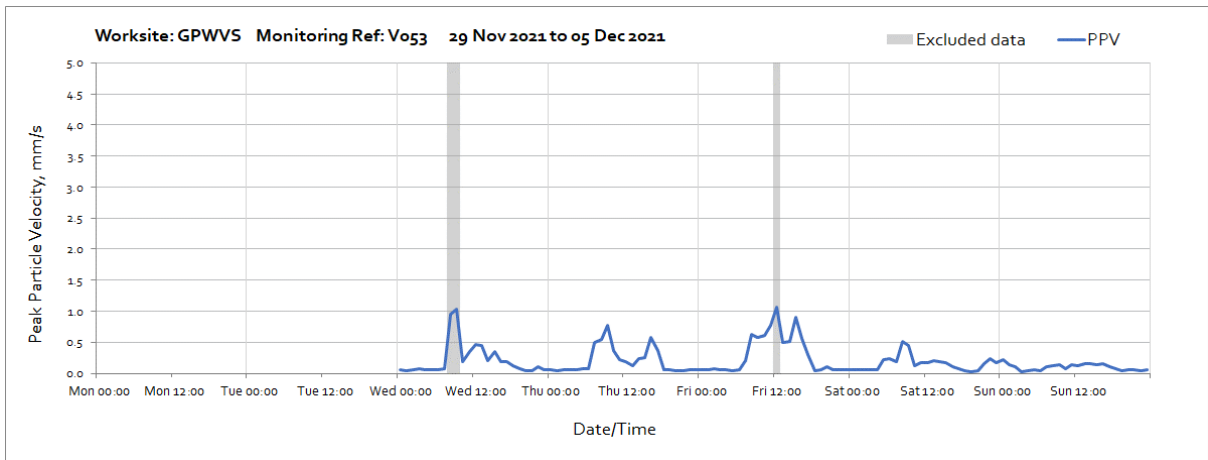
Note: High vibration levels measured between 13:00 and 17:00 on Thursday 2<sup>nd</sup> December was due to works undertaken in close proximity of the vibration monitoring location and therefore vibration levels at the receptors will be lower.



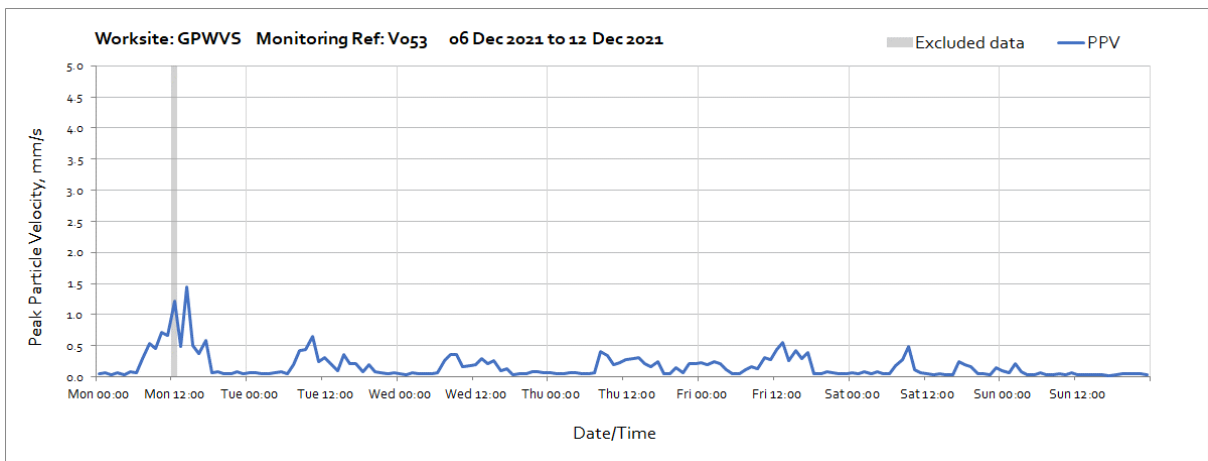




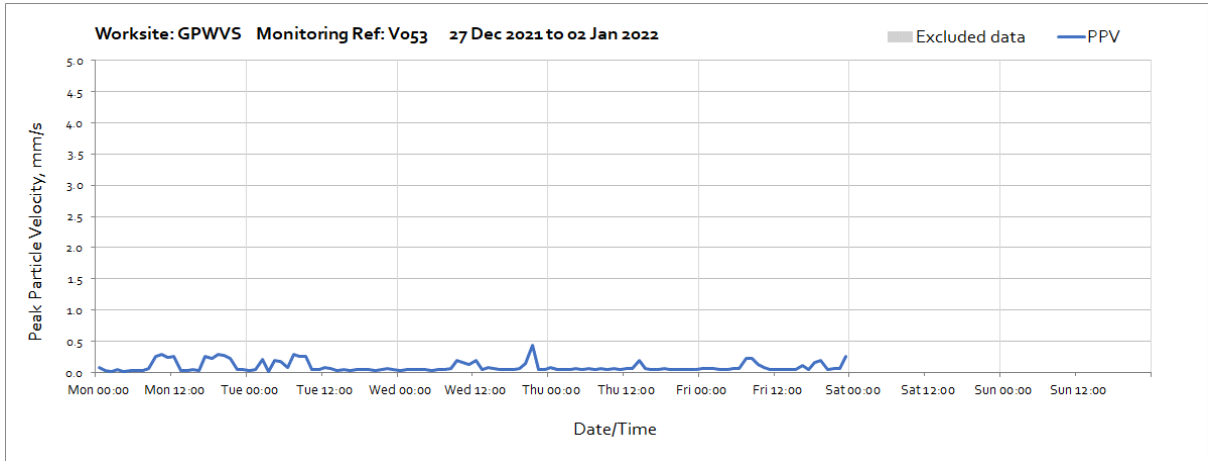
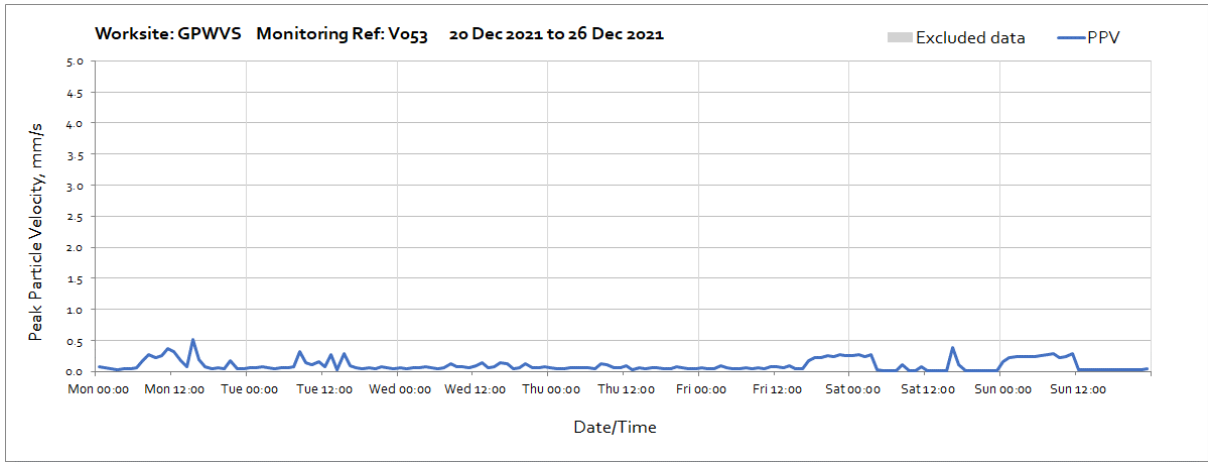
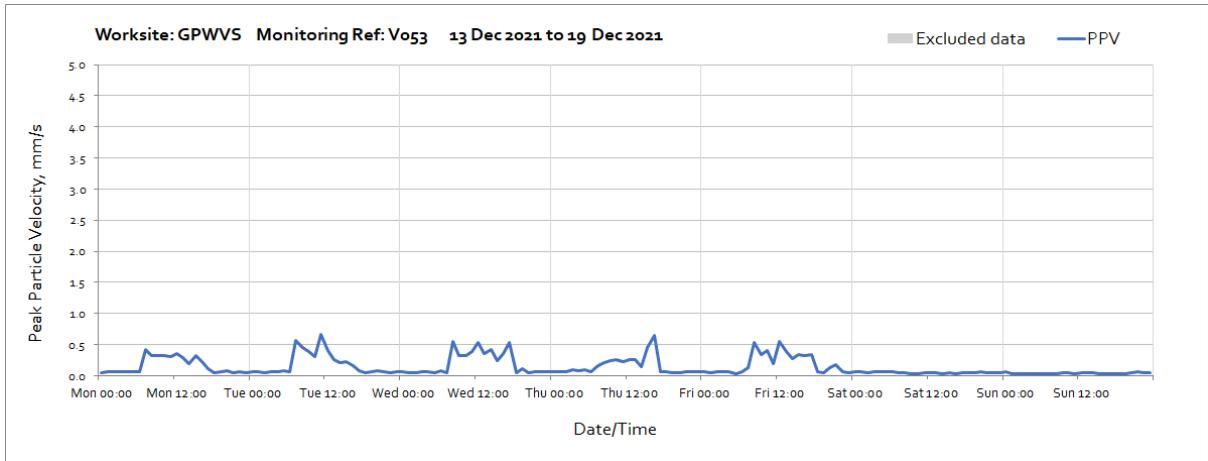
**Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: V053**



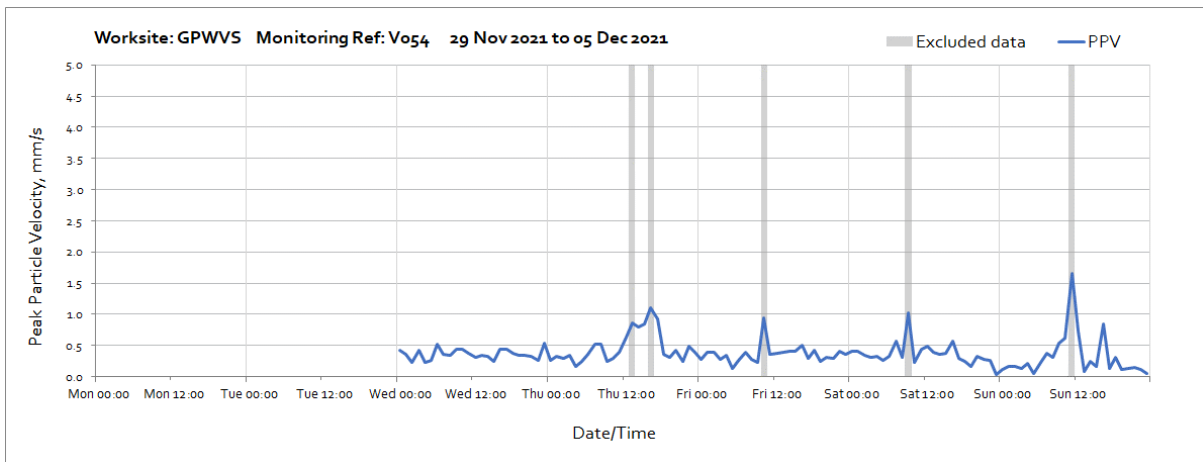
Note: High vibration levels measured between 08:00 and 09:00 on Wednesday 1<sup>st</sup> and at 12:00 on Friday 3<sup>rd</sup> December were due to local disturbance of the monitoring location and not representative of HS2 vibration levels.



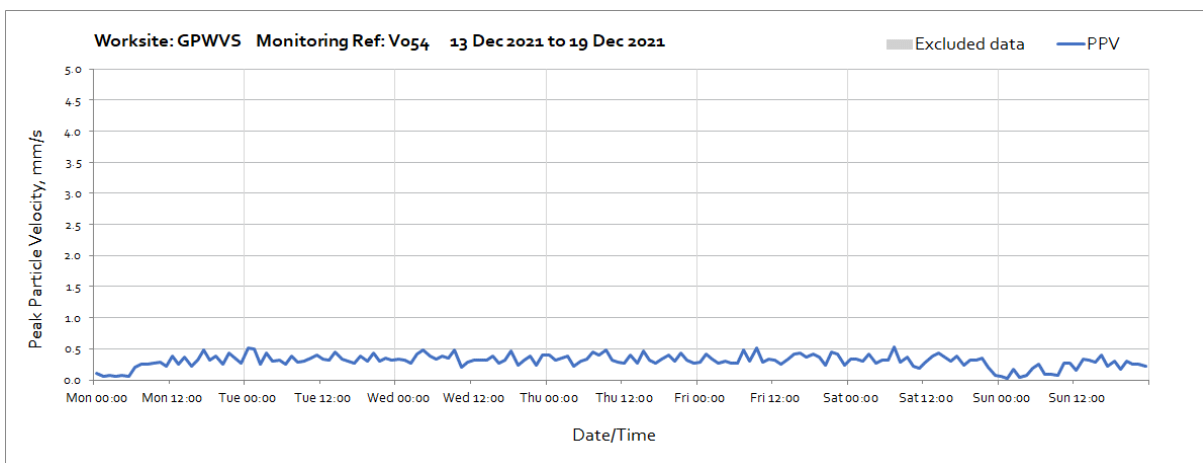
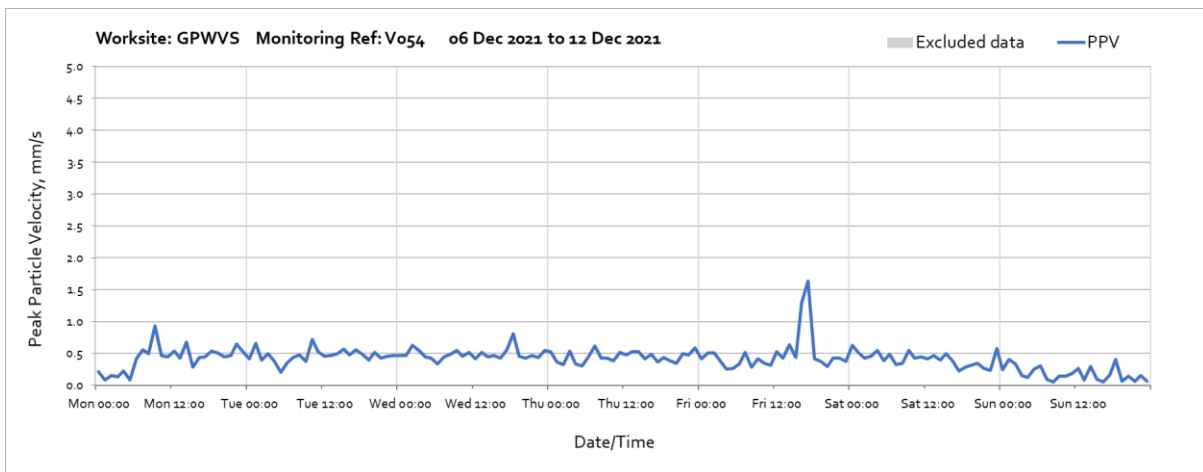
Note: High vibration levels measured at 12:00 on Monday 6<sup>th</sup> December were due to local disturbance of the monitoring location and not representative of HS2 vibration levels.

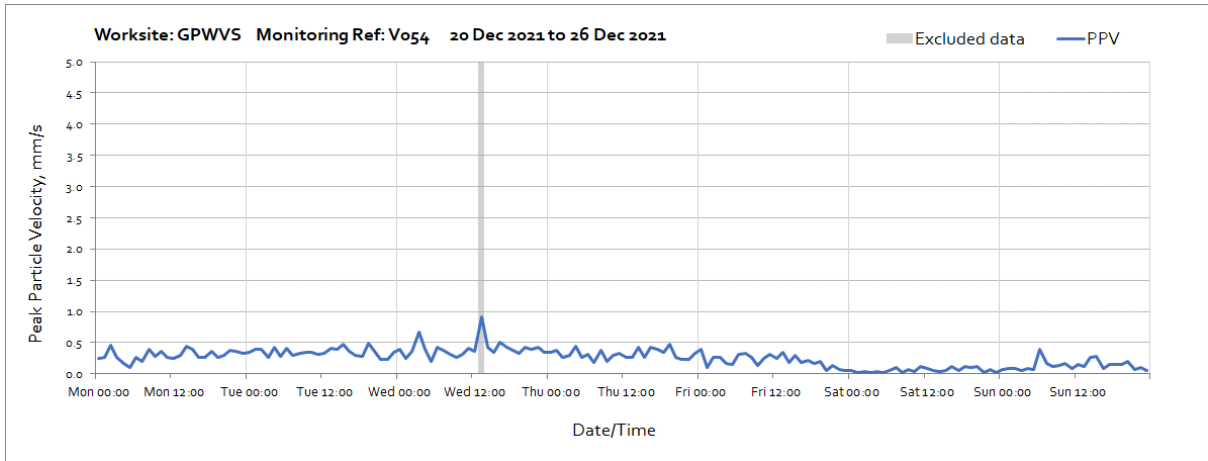


## Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: V054



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





Note: High vibration levels measured at 13:00 on Wednesday 22<sup>nd</sup> December were due to local disturbance of the monitoring station and not representative of HS2 vibration levels.

