

## **Construction noise and vibration Monthly Report – July 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 July 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 haul road construction, bearing tests, drainage works, removal of guide walls, piling, fitting out works to the new central welfare area, utility power connection works, vegetation clearance, hoarding works, removal of spoil and construction of new survey post bases were underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Willesden EuroTerminal worksite (ref. WET), where deliveries, construction of kerbs, construction of timber formworks, excavation works, installation of ducting, concrete and backfilling works, fitting out works of Breadbin Building, repair works to the site hoarding and reinforced concrete works were underway.
- Noise monitoring was undertaken in the vicinity of the Victoria Road worksite (ref. VRFIC), where:
  - removal of part of Bethune Road and old welfare facilities, fitting out works of the new site offices, groundworks, concrete and backfilling works, installation of gates, preparation for walling works, installation of pipework and plant deliveries, hoarding works, construction of diaphragm wall and piling platform, surfacing of the site haul road, sheet piling; and
  - At the Victoria Road Ancillary Shaft, excavation works and application of sprayed concrete lining, removal of spoil, installation of viewing platform and access stairs and trials for the fibreless concrete mix were underway.
- Noise monitoring was undertaken in the vicinity of the Flat Iron compound (within worksite ref. VRFIC), where construction of concrete slabs, installation of cabins for the new welfare area, concrete pouring, handrail installation and drainage works were underway.
- Noise and vibration monitoring were undertaken in proximity of the Old Oak Common depot worksite (ref. OOC), where groundworks, sheet piling, construction of permanent accommodation building, vegetation clearance, railway siding demolition, construction of temporary site haul roads, drainage installation, set up of concrete batching and polymer plant, piling, excavation works, construction of platforms and guide wall and removal of spoil were underway.
- Noise monitoring was undertaken in proximity of the Mandeville Road Ventilation Shaft worksite (ref.: MRVS), where site preparation works including construction of

working platforms and foundations for the new welfare building, hoarding works, power and water utility connection works and vegetation clearance were underway.

- Noise and vibration monitoring were undertaken in proximity of the Green Park Way Ventilation Shaft worksite (ref. GPWVS), where concrete pouring, construction of concrete slabs and working platforms, installation of cabins, drainage works, excavation works, installation of manhole box, removal of old welfare cabins and trench boxes, laying of pipes, borehole works, power utility works, dewatering, backfilling, drilling works and removal of spoil were underway.
- Noise monitoring was undertaken in proximity of the Westgate Ventilation Shaft (ref. WVS), where concrete pouring, installation of spoil bin, excavation works, installation of boreholes, installation of mains water system, lifting and installation of silos, installation of crane and vegetation clearance were underway.

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

- School Road, Victoria Road and Atlas Road as part of power utility works; and
- Wormwood Scrubs, as part of vegetation clearance.

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 nine (9) 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.

Twenty-three (23) 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> July 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 site haul road, including construction of concrete slabs;
  - Bearing tests;
  - Installation of site drainage system, including installation of trench sheets, cable ducting and water pipes;
  - Piling works for the Atlas Road Tunnel Box;
  - Excavation works, removal of the guide walls and pile cropping works;
  - Fitting out works to the new area central welfare, including cleaning and installation of handrails, installation of bike shed, car charging point chambers, fencing, flood lights and walkways;
  - Hoarding works

- Utility power connection works;
  - Vegetation clearance;
  - Removal of spoil; and
  - Construction of new survey post bases.
- Willesden EuroTerminal worksite, ref. WET (see plan 5 in Appendix A), where work activities included:
    - Spoil deliveries;
    - Forming, pouring and painting of exterior kerbs;
    - Construction of timber formworks;
    - Excavation works;
    - Installation of the main power cable ducting;
    - Concrete and backfilling works;
    - Fitting out works of Breadbin Building;
    - Repair works to site hoardings; and
    - Reinforced concrete works.
  - Victoria Road worksite, ref. VRFIC (see plan 6 in Appendix A), where work activities included:
    - Removal of part of Bethune Road and old welfare facilities;
    - Fitting out works of the new site offices, including lift installation;
    - Groundworks;
    - Concreting and backfilling works;
    - Installation of gates;
    - Preparation for walling works;
    - Installation of pipework and plant deliveries;
    - Hoarding strengthening works
    - Construction of diaphragm wall and piling platform;
    - Surfacing of the site haul road;
    - Installation of sheet piles; and

- At the Victoria Road Ancillary Shaft activities included, excavation works and application of Sprayed Concrete Lining (SCL), removal of spoil, installation of viewing platform and access stairs and trials for the fibreless concrete mix.
- Flat Iron compound, within worksite ref. VRFIC (see plan 6 in Appendix A), where work activities included:
  - Construction of concrete slabs;
  - Installation of cabins for the new welfare area;
  - Concrete pouring of the stairwell base and installation of handrails; and
  - Drainage 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:
  - Groundworks;
  - Sheet piling installation;
  - Construction of permanent accommodation building;
  - Vegetation clearance;
  - Railway siding demolition works;
  - Construction of temporary site haul roads;
  - Drainage installation;
  - Setting up of concrete batching and polymer plant;
  - Piling and excavation works; and
  - Construction of platforms and guide walls; and
  - Removal of spoil.
- Mandeville Road Ventilation Shaft worksite, reference MRVS (see plan 1 in Appendix A), where work activities included:
  - Site preparation works, including construction of working platforms and foundation for the new welfare building;
  - Removal and installation of hoardings;
  - Power and water utility connection works; and
  - Vegetation clearance.



- Green Park Way Ventilation Shaft worksite, reference GPWVS (see plan 2 in Appendix A), where work activities included:
  - Concrete pouring for the new welfare walkway access;
  - Construction of concrete slabs and working platforms;
  - Installation of cabins;
  - Drainage works, including excavations, installation of manhole box, removal of trench, laying of pipes and backfilling works;
  - Remove of old welfare cabins;
  - Borehole works;
  - Power utility works;
  - Dewatering;
  - Backfilling;
  - Drilling works; and
  - Removal of spoil.
- Westgate Ventilation Shaft worksite, reference WVS (see plan 3 in Appendix A), where work activities included:
  - Concrete pouring for working platform;
  - Excavation works;
  - Installation of boreholes;
  - Installation of mains water system for the worksite;
  - Lifting and installation of silos;
  - Installation of crane; and
  - Vegetation clearance.

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

- School Road, Victoria Road and Atlas Road as part of power utility works; and
- Wormwood Scrubs, as part of vegetation clearance.

1.1.5 The applicable standards, guidance, and monitoring methodology are outlined in the construction noise and vibration monitoring methodology report which can be found at the following location

<https://www.gov.uk/government/collections/monitoring-the-environmental-effects->

[of-hs2](#). Noise and vibration monitoring reports for previous months can also be found at this location.

## 1.2 Measurement Locations

1.2.1 Nineteen noise and nine vibration monitoring installations were active in July 2021 in the LBE area. Table 2 summarises the position of noise and vibration monitoring installations within the LBE area in July 2021.

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

Table 2: Monitoring Locations

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

Worksite Reference	Measurement Reference	Address
GPWVS	N059	Green Park Way Ventilation Shaft
	N064	Green Park Way Ventilation Shaft
	V053	Green Park Way, Greenford
	V054	Green Park Way Ventilation Shaft
WVS	N062	Westgate Ventilation Shaft

## 2 Summary of Results

### 2.1 Summary of Measured Noise and Vibration Levels

2.1.1 Table 3 presents a summary of the measured noise levels at each monitoring location over the reporting period. The  $L_{Aeq,T}$  is presented for each of the relevant time periods averaged over the calendar month, along with the highest single period  $L_{Aeq,T}$  that was found to occur within the month.

Table 3: Summary of Measured dB LAeq Data over the Monitoring Period

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday Average LAeq,T (highest day LAeq,T)					Saturday Average LAeq,T (highest day LAeq,T)					Sunday / Public Holiday Average LAeq,T (highest day LAeq,T)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
AR	N032	Shaftesbury Gardens	Free-field	61.9 (64.0)	68.3 (73.5)	61.3 (65.2)	61.1 (71.0)	57.5 (68.3)	60.5 (63.6)	65.6 (70.2)	60.3 (64.1)	59.8 (64.2)	59.0 (70.8)	59.3 (64.4)	57.9 (64.7)
	N033	Outside The Collective, Atlas Road/Victoria Road	Free-field	66.6 (69.4)	69.0 (70.5)	64.5 (68.3)	64.3 (72.3)	60.8 (68.5)	62.3 (62.9)	64.1 (66.1)	63.3 (63.8)	63.4 (67.4)	62.2 (72.4)	61.5 (63.4)	60.8 (65.6)
	N060	Atlas Road next to Bashey Road	Façade	53.3 (59.3)	64.5 (67.1)	58.0 (68.5)	54.8 (63.9)	54.0 (66.9)	53.7 (59.6)	60.2 (61.7)	50.1 (55.7)	51.7 (65.0)	50.4 (62.6)	50.7 (61.8)	52.2 (60.5)
WET	N034	Stephenson Street (north)	Free-field	52.2 (60.7)	56.0 (59.1)	53.9 (60.8)	53.7 (61.0)	48.1 (59.3)	48.9 (51.0)	53.6 (58.7)	49.6 (53.3)	50.9 (60.4)	45.9 (53.7)	51.9 (67.1)	49.3 (68.2)
	N035	Stephenson Street (south)	Free-field	54.3 (60.2)	57.7 (60.5)	51.6 (54.5)	50.9 (56.9)	46.7 (56.5)	49.1 (50.9)	53.2 (57.2)	49.3 (53.8)	49.4 (60.5)	45.9 (52.8)	51.3 (66.9)	47.3 (63.1)
	N041	Junction of Stephenson Street/Goodhall Street	Free-field	54.5 (59.1)	59.8 (62.4)	55.4 (61.5)	55.9 (70.1)	49.3 (58.8)	53.3 (60.9)	55.2 (63.3)	53.6 (59.0)	54.2 (59.7)	49.4 (54.9)	53.1 (62.0)	49.7 (59.2)

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
VRVIC	N029	Braitrim House, Victoria Road	Free-field	50.7 (63.8)	57.9 (64.9)	56.0 (63.6)	53.2 (71.6)	53.0 (72.6)	48.0 (51.1)	51.3 (53.1)	48.2 (51.8)	49.2 (55.5)	50.9 (64.7)	48.1 (56.0)	50.2 (59.7)
	N042	Bodens car park	Free-field	56.7 (60.8)	63.2 (68.4)	53.9 (56.8)	53.1 (62.1)	50.7 (61.0)	54.3 (58.6)	58.6 (65.2)	51.3 (53.1)	51.3 (53.6)	51.3 (61.7)	50.8 (54.4)	49.4 (52.0)
	N031	School Road, outside Acton Business Centre	Free-field	58.0 (62.0)	64.0 (71.8)	55.9 (60.2)	53.2 (61.5)	50.3 (61.9)	54.6 (57.3)	57.3 (60.5)	52.9 (54.7)	52.4 (57.6)	51.2 (60.6)	50.1 (54.3)	49.4 (54.1)
	N049	Flat Iron compound	Free-field	54.8 (64.1)	65.6 (75.8)	56.6 (61.6)	54.4 (62.4)	55.3 (68.4)	52.7 (54.7)	55.8 (64.1)	51.1 (53.9)	51.5 (60.1)	51.9 (64.2)	50.3 (60.4)	52.8 (60.9)
	N050	Acton Square, outside North Acton Station	Free-field	63.8 (65.7)	64.2 (66.7)	62.9 (67.5)	62.7 (71.1)	58.7 (65.1)	63.1 (65.6)	62.9 (64.5)	61.5 (62.3)	62.1 (66.9)	58.2 (61.7)	62.0 (70.5)	58.2 (63.3)
OOC	OOC-N01	Old Oak Common Lane	Free-field	63.8 (65.2)	71.6 (76.8)	61.9 (66.9)	58.9 (66.1)	55.2 (68.8)	60.6 (63.3)	61.7 (63.9)	58.5 (61.7)	56.6 (60.9)	57.3 (66.2)	54.4 (59.2)	55.0 (61.4)
	OOC-N02	Old Oak Common Lane, Hilltop Works	Free-field	64.9 (67.7)	69.2 (71.6)	65.3 (71.3)	63.8 (69.6)	57.8 (68.5)	60.9 (63.8)	63.3 (65.0)	63.8 (65.1)	63.0 (68.6)	59.1 (69.0)	59.9 (64.5)	57.9 (62.6)
MRVS	N040	Badminton Close	Free-field	53.4 (56.4)	55.7 (58.6)	53.3 (56.4)	53.2 (57.1)	50.0 (55.8)	50.8 (52.3)	53.6 (56.4)	52.3 (53.7)	52.4 (55.1)	50.9 (56.3)	52.7 (56.5)	49.3 (54.1)
	N058	Mandeville Road	Free-field	55.6 (59.7)	62.9 (72.0)	54.1 (64.4)	54.3 (58.9)	50.8 (70.0)	51.4 (53.0)	56.0 (66.1)	52.4 (54.1)	53.1 (57.1)	49.9 (56.5)	51.9 (55.1)	48.7 (55.8)

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Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
	N063	Mandeville Road	Free-field	62.4 (73.0)	65.7 (78.6)	61.3 (63.7)	61.3 (63.1)	57.4 (63.8)	59.3 (60.3)	60.5 (61.2)	60.5 (61.7)	60.6 (62.3)	56.8 (60.8)	60.3 (63.0)	57.5 (67.9)
GPWVS	N059	Green Park Way Ventilation Shaft	Façade	52.0 (54.9)	61.8 (63.5)	52.1 (54.1)	52.4 (56.1)	50.0 (55.3)	51.4 (53.7)	60.5 (64.1)	52.5 (55.5)	50.7 (54.2)	48.3 (52.4)	51.4 (60.4)	48.2 (52.9)
	N064	Green Park Way Ventilation Shaft	Façade	57.3 (64.7)	64.6 (71.7)	55.5 (58.2)	54.4 (57.3)	50.2 (64.2)	53.1 (54.9)	57.3 (65.2)	56.7 (66.6)	53.2 (55.5)	48.7 (53.5)	53.2 (56.6)	48.8 (55.1)
WVS	N062	Westgate Ventilation Shaft	Free-field	62.1 (67.0)	66.3 (71.7)	58.0 (61.9)	58.0 (64.1)	55.2 (62.0)	56.6 (58.4)	63.4 (70.3)	55.8 (57.2)	56.3 (61.7)	54.2 (57.8)	59.5 (71.6)	54.5 (60.8)

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

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

Worksite Reference	Measurement Reference	Monitor Address	Highest PPV measured in any axis, mm/s
WET	V052	Stephenson Street (north)	1.34 (Z-axis)
	V057	37, Stephenson Street	0.87 (Z-axis)
OOC	OOC-V01	25 Wells House Road	2.55 (Y-axis)
	OOC-V02	Kildun Court, Old Oak Common Lane	1.85 (Z-axis)
	OOC-V03	Wells House Road Alleyway	1.00 (X-axis)
GPWVS	V053	Green Park Way, Greenford	1.27 (Z-axis)
	V054	Green Park Way Ventilation Shaft	3.19 (Y-axis)
MRVS	V055	Mandeville Road	1.80 (Z-axis)
	V056	Mandeville Road	3.41* (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)	All days	All periods	No exceedance
	N041	Junction of Stephenson Street / Goodhall Street	All days	All periods	No exceedance
VRFIC	N029	Braitrim House, Victoria Road	All days	All periods	No exceedance
	N042	Bodens Car Park	All days	All periods	No exceedance
	N031	School Road, outside Acton Business Centre	All days	All periods	Not applicable**
	N049	Flat Iron compound	Weekdays	0800-1800	2
	N050	Acton Square, outside North Acton Station	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	OOC-N01	Old Oak Common Lane	Weekdays	0800-1800	2
	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	Weekdays Night	0800-1800 2200-0700	3 7
GPWVS	N059	Green Park Way Ventilation Shaft	All days	All periods	Not applicable**
	N064	Green Park Way Ventilation Shaft	All days	All periods	Not applicable**
WVS	N062	Westgate Ventilation Shaft	All days	All periods	Not applicable**

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

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

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

Table 6: Summary of Total Exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
VRFC	N049	Flat Iron compound	2
OOC	OOC-N01	Old Oak Common Lane	2
MRVS	N063	Mandeville Road	5

2.2.6 9x no. exceedances of the SOAEL were recorded due to HS2 construction works during July 2021. The exceedances occurred at monitoring location N049 during 2x no. daytime periods due to stockpiling works, at monitoring location OOC-N01 during 2x no. daytime due to vegetation clearance and at monitoring location N063 during 2x no. night-time period due to a generator which was accidentally left operating outside of work hours and during 3x no. daytime due to site preparation works being completed in line with Section 61 consent.

## 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
HS2-21-42234-C	OOO	Complaint due to banging noise coming from the site.	Investigations confirmed that works (demolition works) were carried out at the time of the complaint.	The complainant has been contacted and information about works, timeframes and mitigation in place have been provided.
HS2-21-42263-C	OOO	Complaint due to noise coming from site and concerns about adverse impact to health.	Investigations confirmed that works were undertaken in line with Section 61 consent and mitigation measures were applied.	The complainant has been contacted and information of mitigation measures in place have been provided. Information about eligibility for special cases has been also provided due to health concerns raised.
HS2-21-42294-C HS2-21-42298-C	OOO	Complaint due to high level of vibrations felt in property.	Investigations confirmed that works (demolition works) were carried out at the time of the complaint.	The complainant has been contacted and information about mitigation measures in place and eligibility for special cases process have been provided.
HS2-21-42296-C	OOO	Complaint due to noise coming from the	Investigations confirmed that works	The complainant has been contacted and information

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
		site that have been affecting residents working from home.	(demolition works) were carried out at the time of the complaint.	about works, timeframes and mitigation in place have been provided. Information about special cases policy has also been provided.
HS2-21-42308-C	OOC	Complaint due to prolonged noise during early mornings.	Investigations shown that works (concrete breaking out) were carried out within construction hours and in line with Section 61 consent. Acoustic barriers mitigation and Best Practicable Means (BPM) were applied.	No exceedances of trigger levels were recorded. The complainant has been contacted and information about special cases panel provided.
HS2-21-42310-C	OOC	Complaint due noise disturbance during daytime.	Investigations shown that works (concrete breaking out) were carried out within construction hours and in line with Section 61 consent. Acoustic barriers mitigation and Best Practicable Means (BPM) were applied.	Quiet periods were monitored and no exceedances of trigger levels were recorded. The complainant has been contacted and information about special cases panel provided.
HS2-21-42311-C	OOC	Complaint due to drilling noise.	Investigations shown that acoustic barriers have been in place to minimise noise propagation from the site.	The complainant has been contacted and information about mitigation in place provided. Noise monitoring has also been undertaken in line with the Code of Conduction Practice.
HS2-21-42312-C	OOC	Complaint due to persistent noise disturbance.	Investigations confirmed that works were undertaken at the time of the complaint.	Noise and vibration levels have been monitored on site and no exceedances of trigger levels have been recorded. The complainant has been contacted and details of HS2's E23:Control of construction noise and vibration standard have been provided.
HS2-21-42315-C	OOC	Complaint due to noise between 7-8am.	Investigations shown that noise was due to start-up activities on site with were in line	The complainant has been contacted and information about noise mitigation measures in place and

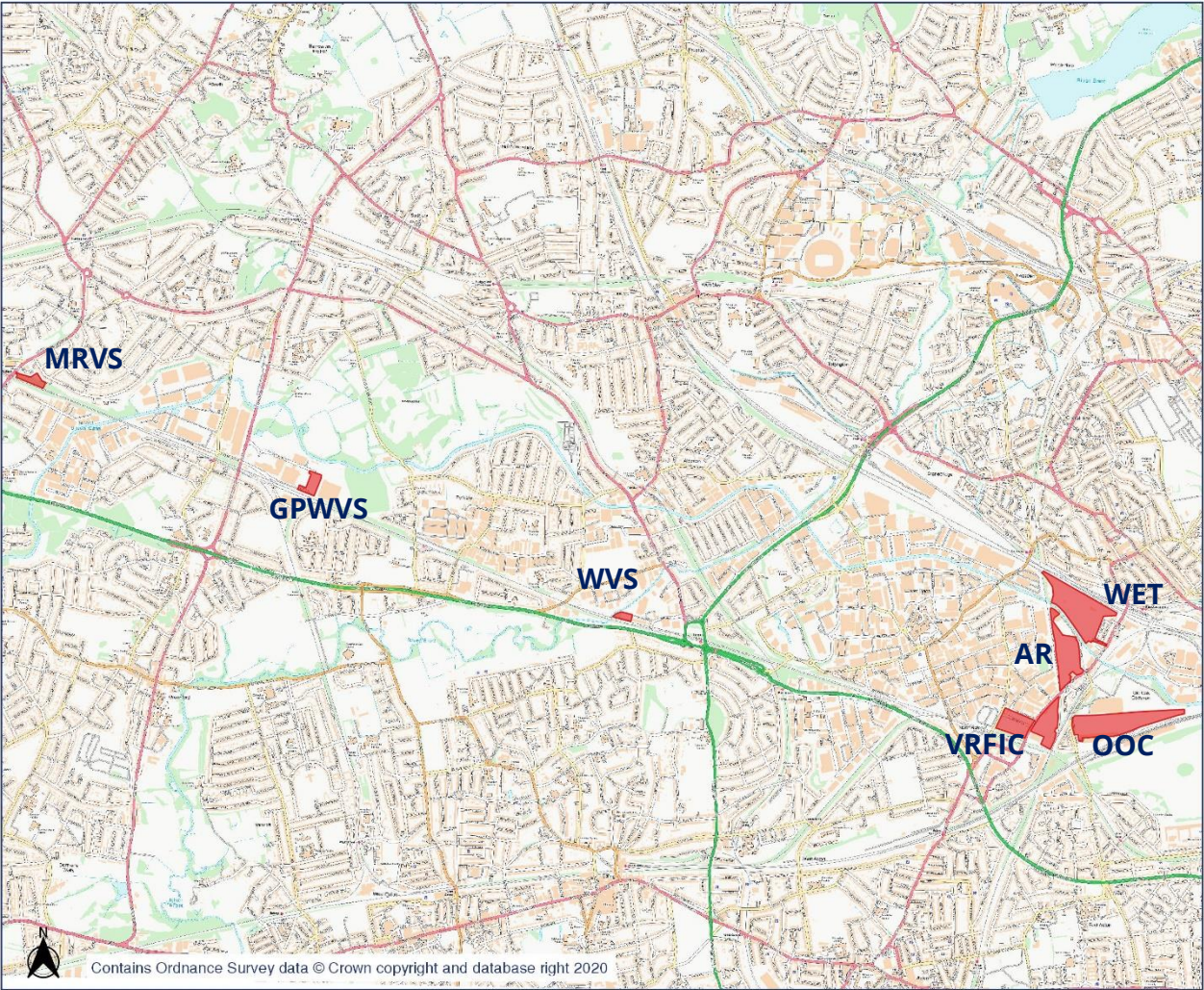
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
			with Section 61 consent.	explanation of working hours permission have been provided.
HS2-21-42316-C	OOC	Complaint due to shouting noise coming from site.	Investigations shown that HS2 works were ongoing at the time of the complaint.	Site manager has re-briefed the site staff to keep shouting and raised voices to a minimum.
HS2-21-42317-C	OOC	Complaint due to noise coming from site.	Investigations shown that noise was likely to be due to demolition works of the Heathrow Express Depot. The levels of noise monitored at the time of the complaint have been checked but no exceedances have been found.	The complainant has been contacted and information provided. Details of hours of work and timing of quiet periods have also been provided.
HS2-21-42250-C	AR	Complaint due to increased level of construction noise.	Investigations shown that works (construction of site haul road, drainage works and piling works) were underway at the time of the complaint.	The complainant has been contacted and information about works and noise mitigation measures has been provided.
HS2-21-62257-E	WET	Complaint due to noise at night.	Investigations shown that noise could have been related to railway operations.	The complainant has been contacted by the rail logistics team and explanation about regular maintenance works on the railway tracks has been provided. Information about on-going works needed (arrangement of greasing guns for installation on the railway tracks) has been also provided. These works will be undertaken as soon as possible to assist with minimising the noise.
HS2-21-42266-C	AR	Complaint due to banging noise from site before 8am.	Investigations shown that no works were undertaken before 8am.	The complainant has been contacted and information provided.

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-42279-C	MRVS	Complaint due to generator noise coming from site.	Investigations confirmed that generator has been on at the time of the complaint.	Mains power connection is due to be finalised during August and the generator will be removed. The complainant has been contacted and information provided.
HS2-21-42292-C HS2-21-64106-E HS2-21-62666-E	MRVS AR OOC	Complaint due to high levels of noise coming from site.	Investigations shown that works were carried out in line with Section 61 consent and Best Practicable Means (BPMs) were applied.	The complainant has been contacted and information provided.
HS2-21-42303-C	MRVS	Complaint due to generator noise coming from site during night-time.	Investigations confirmed that the generator was accidentally left on during night.	A face-to-face meeting has been held and details has been provided to the complainant. Security team has been briefed to turn the generator off as last operative leaves the site.
HS2-21-42338-C	VRFIC	Complaint due to noise from beeping crane during night-time.	Investigations shown that the crane works were carried out on site at the time of the complaint.	Construction noise levels have been monitored and no exceedances have been found. However, alternative to the crane safety alarm is being investigated.
HS2-21-63032-E	AR	Complaint due to high vibration levels.	Investigations shown that works were carried out in line with Section 61 consent and Best Practicable Means (BPMs) were applied.	The complainant has been contacted and information provided.
N/A	OOC	Complaint due to construction noise outside during evening time.	Investigation shown that works were undertaken in line with Section 61 consent and Best Practicable Means (BPMs) were in place.	The complainant has been contacted and information about the consented working hours and previous notification of this works have been provided. However, the complainant has raised further concerns about the noise impact of the consented works and further investigations are on-going.
N/A	OOC	Complaint due to construction noise.	Investigation shown that works were	The complainant has been contacted and information

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
			undertaken in line with Section 61 consent and noise mitigation measures were applied.	about works and mitigation measures in place were provided.

# Appendix A Site Locations

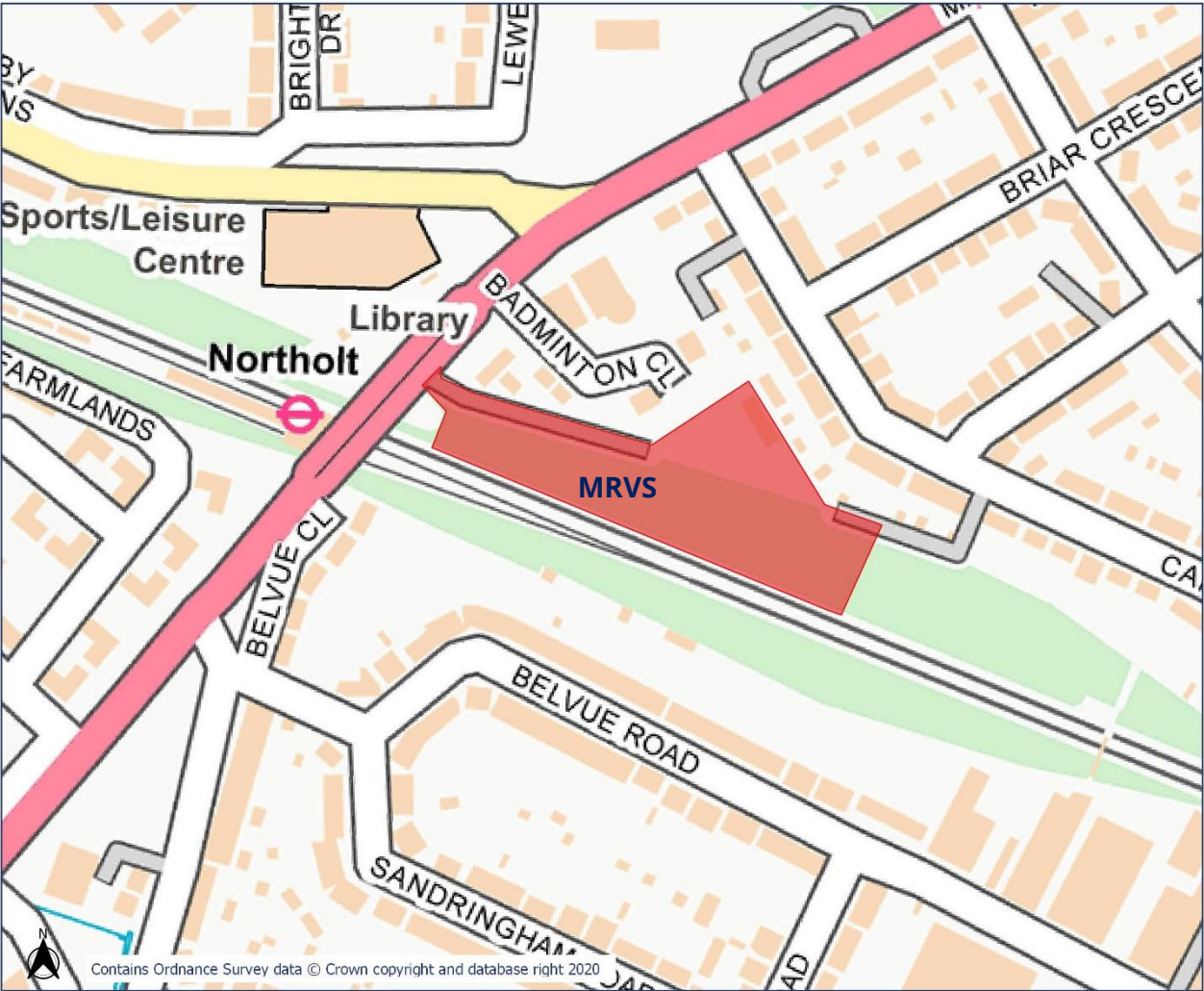


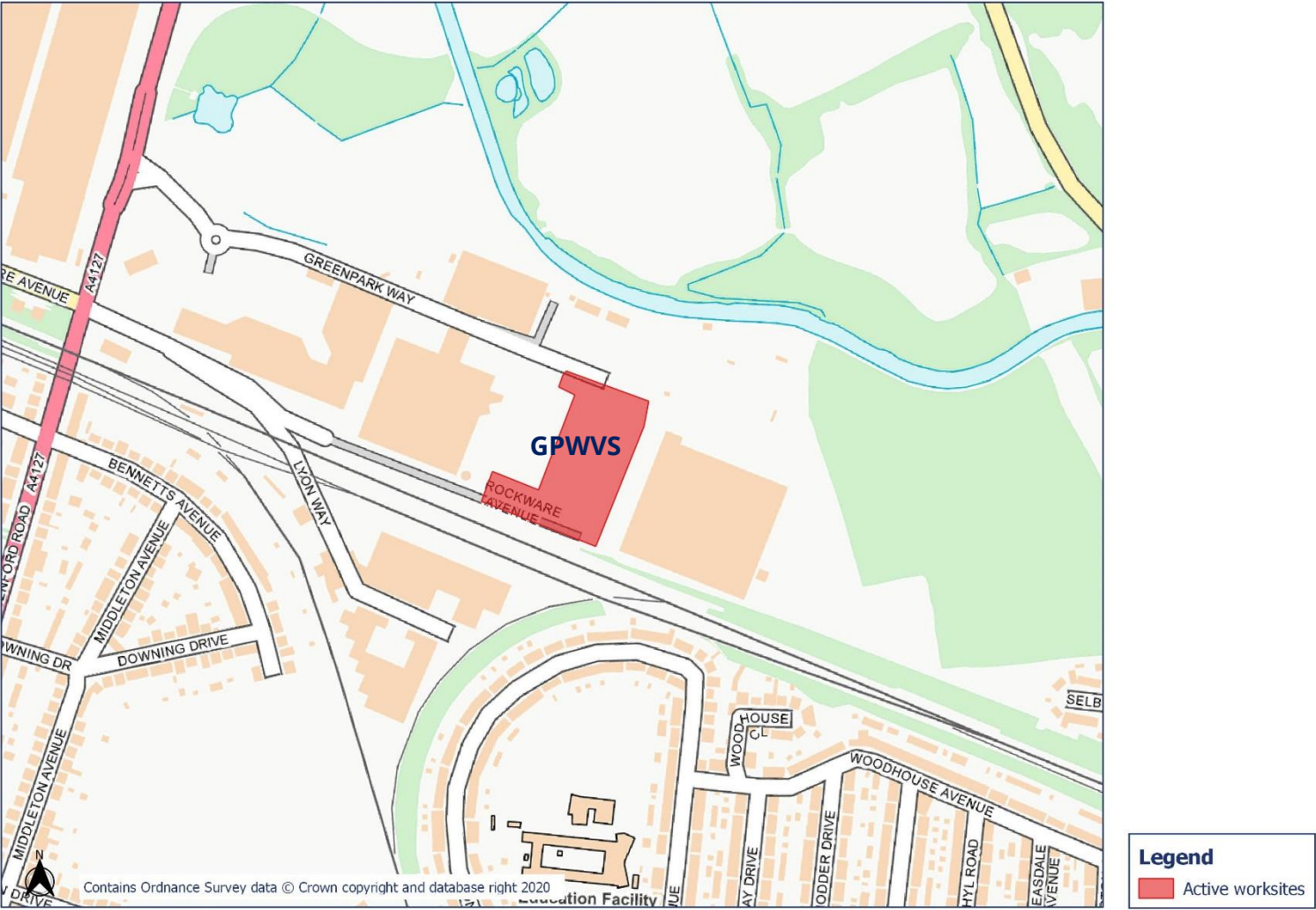


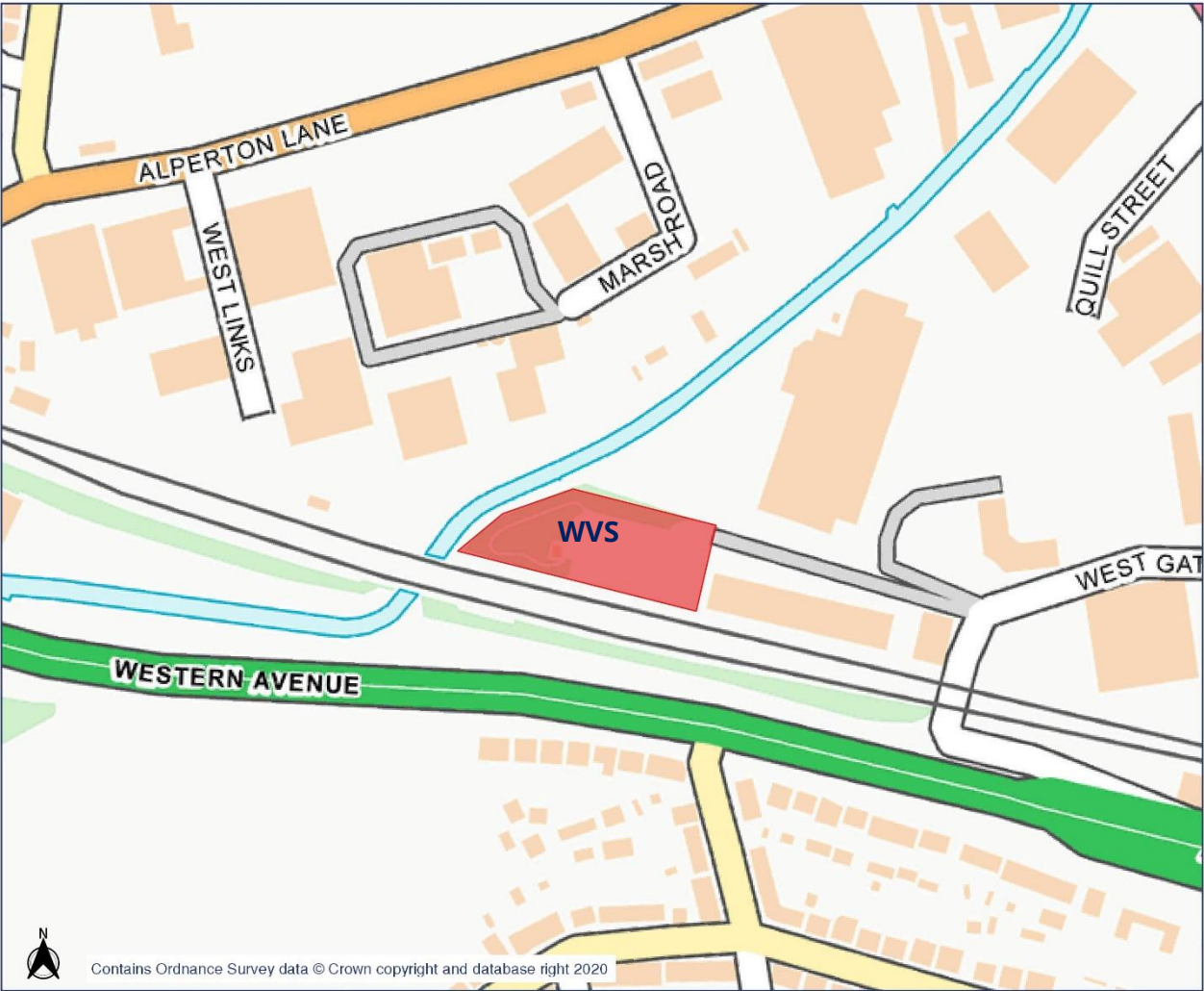
**Legend**  
Active worksites

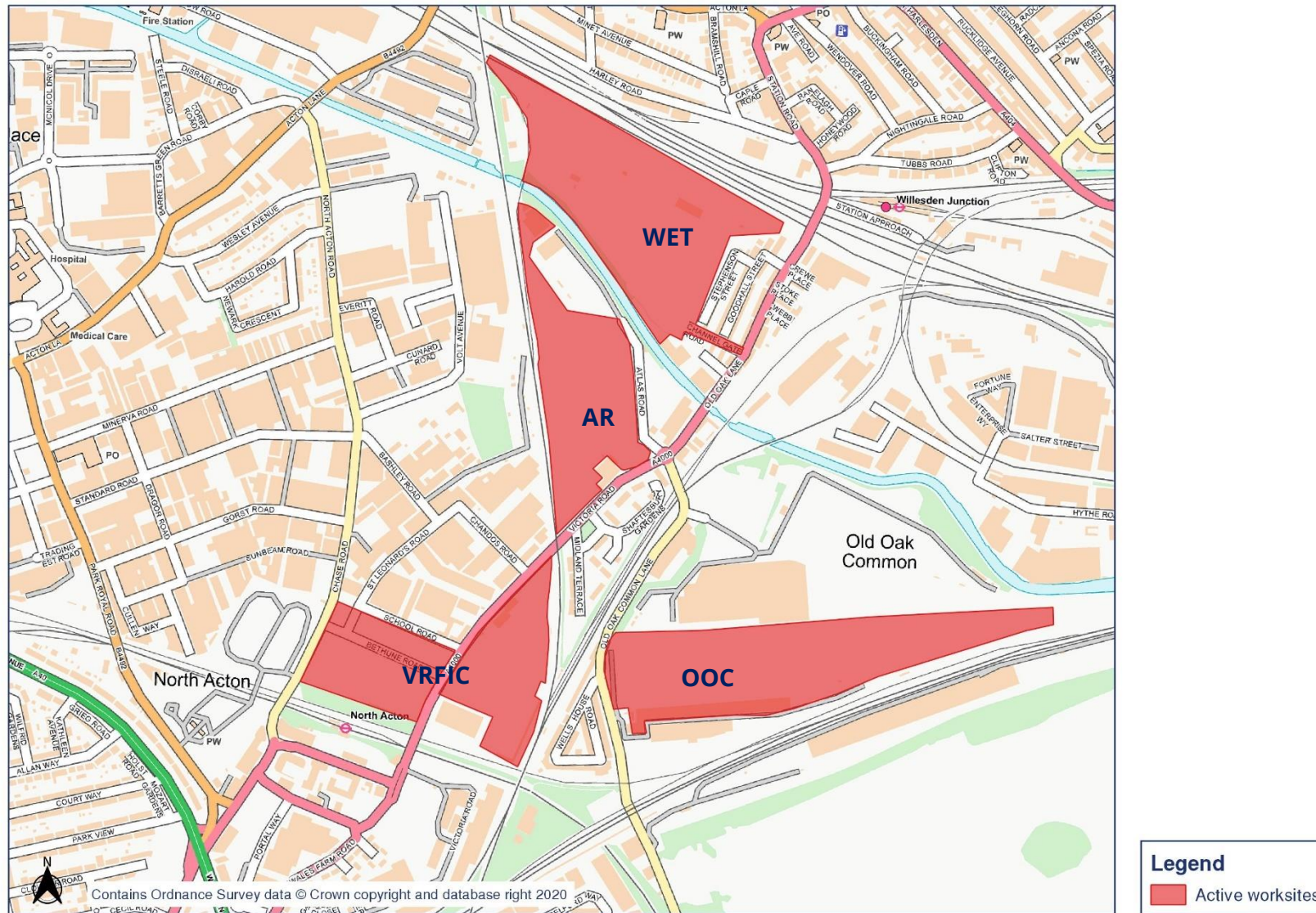
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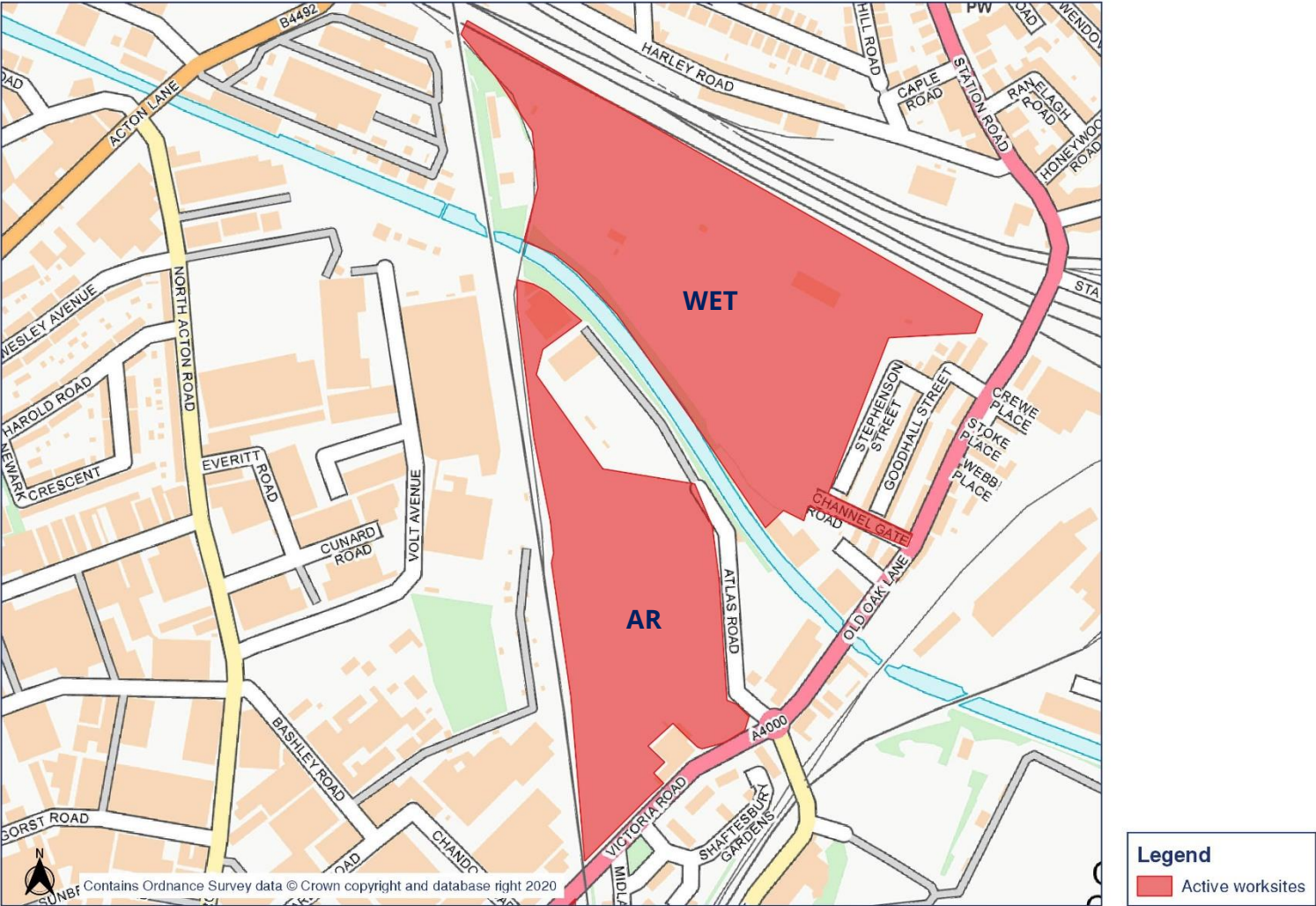
## Worksite identification plan - 1

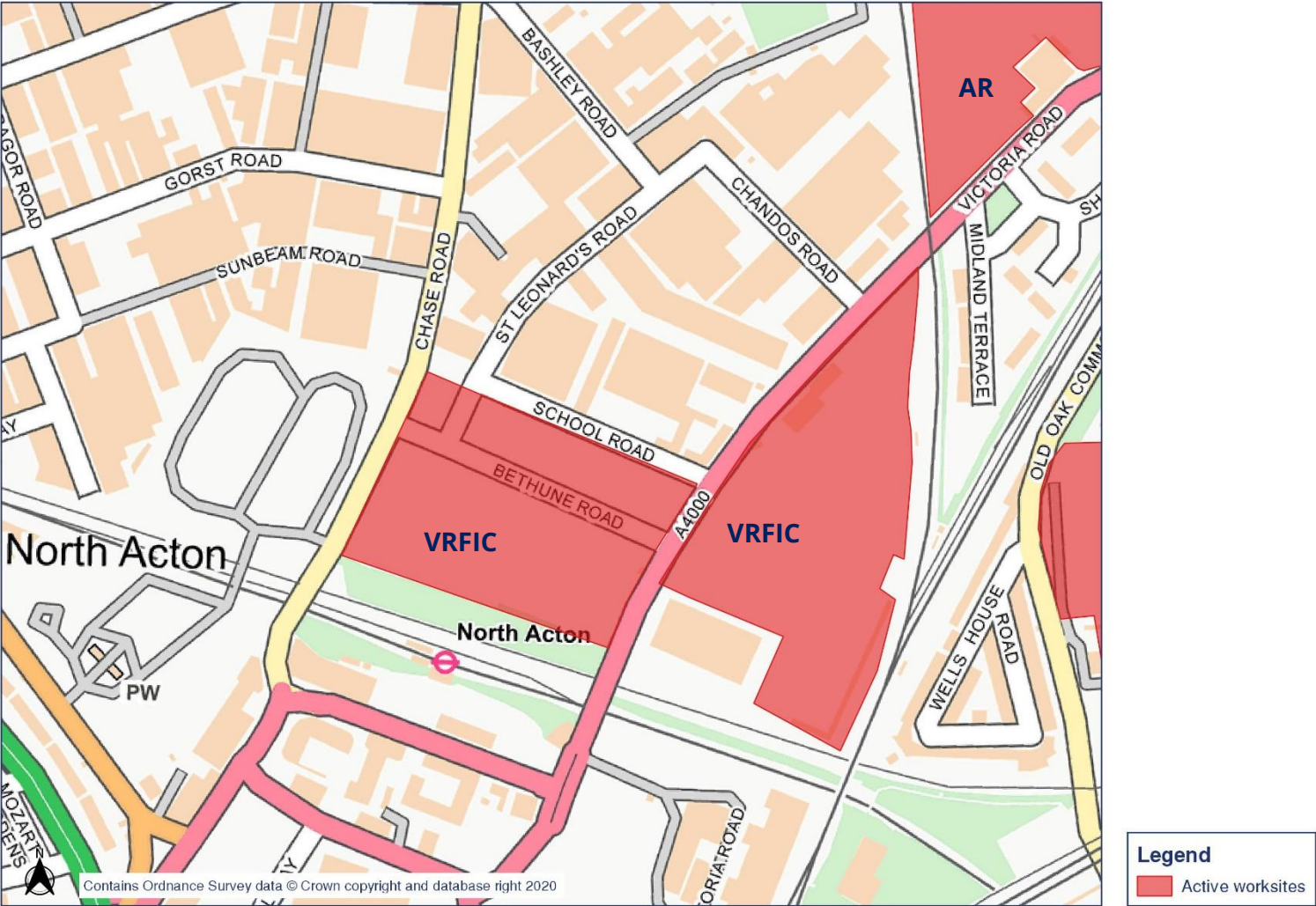


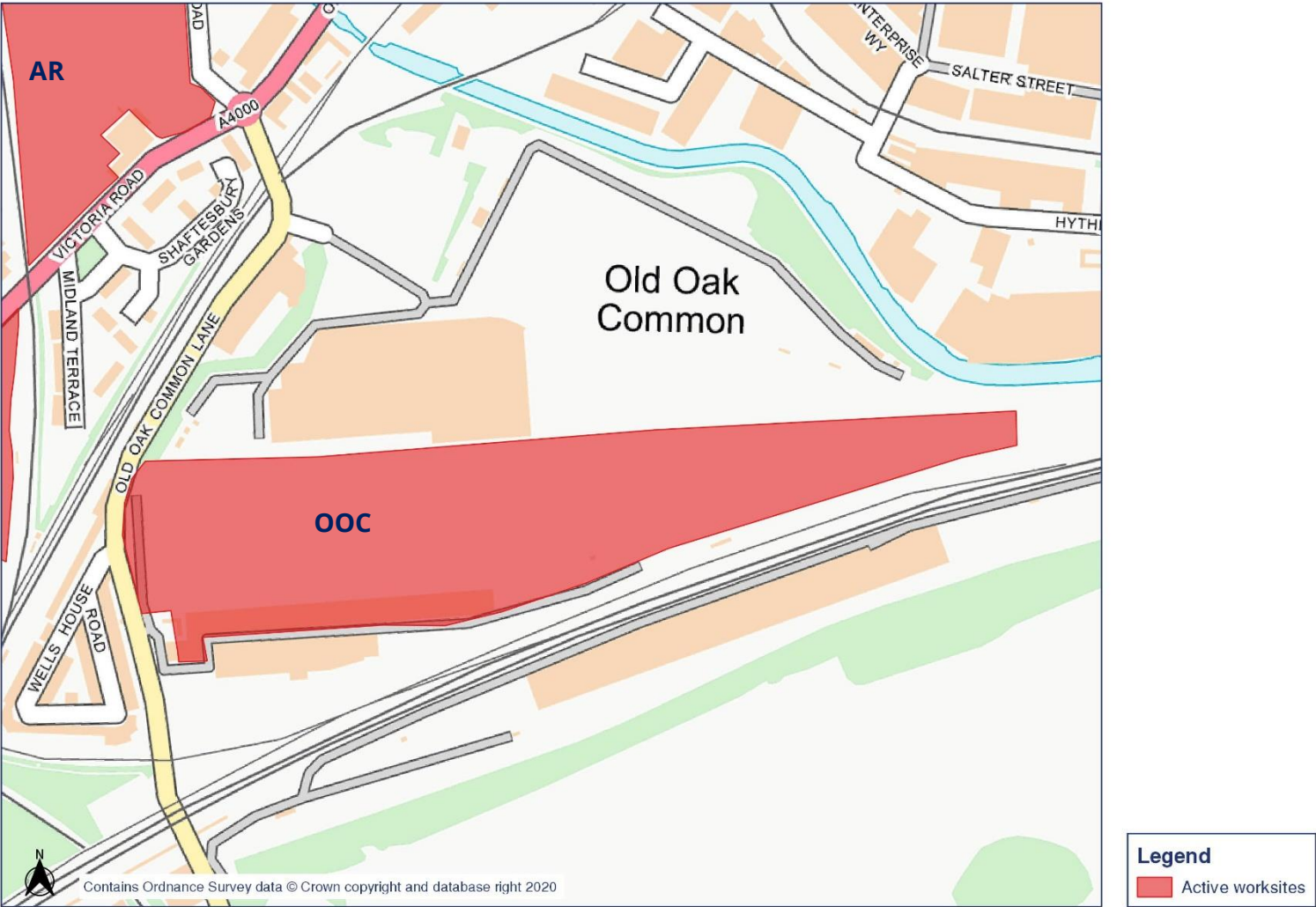








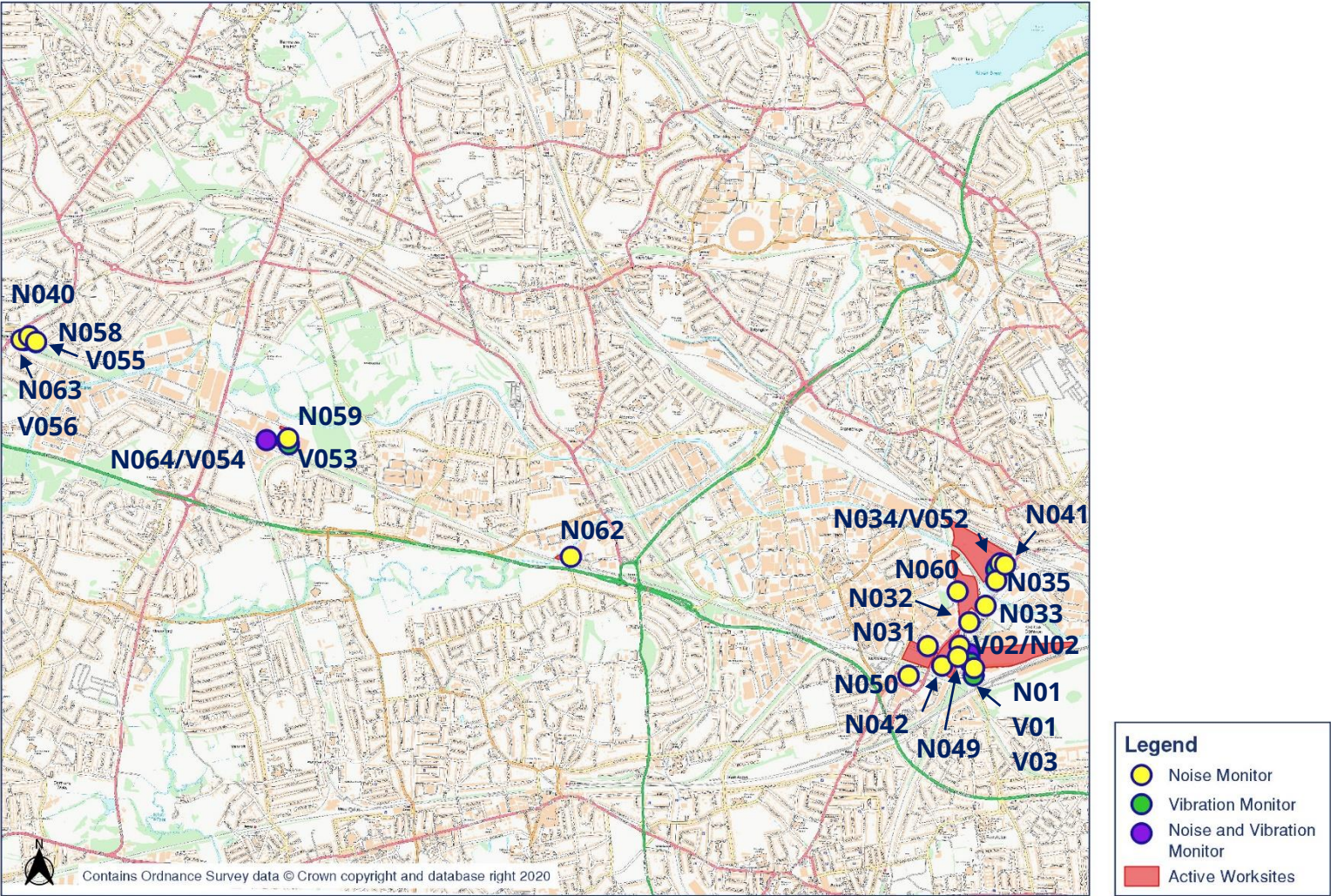


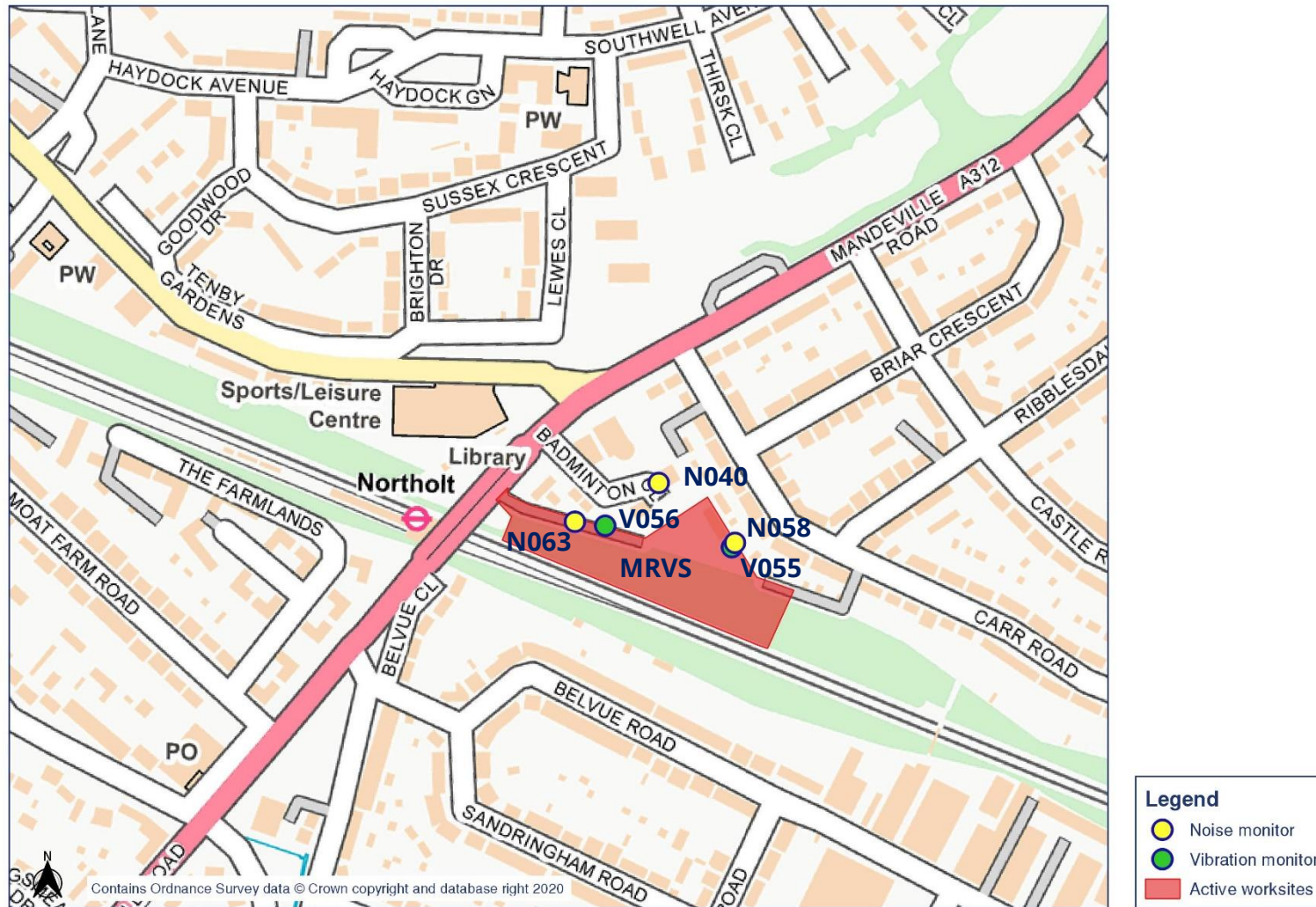


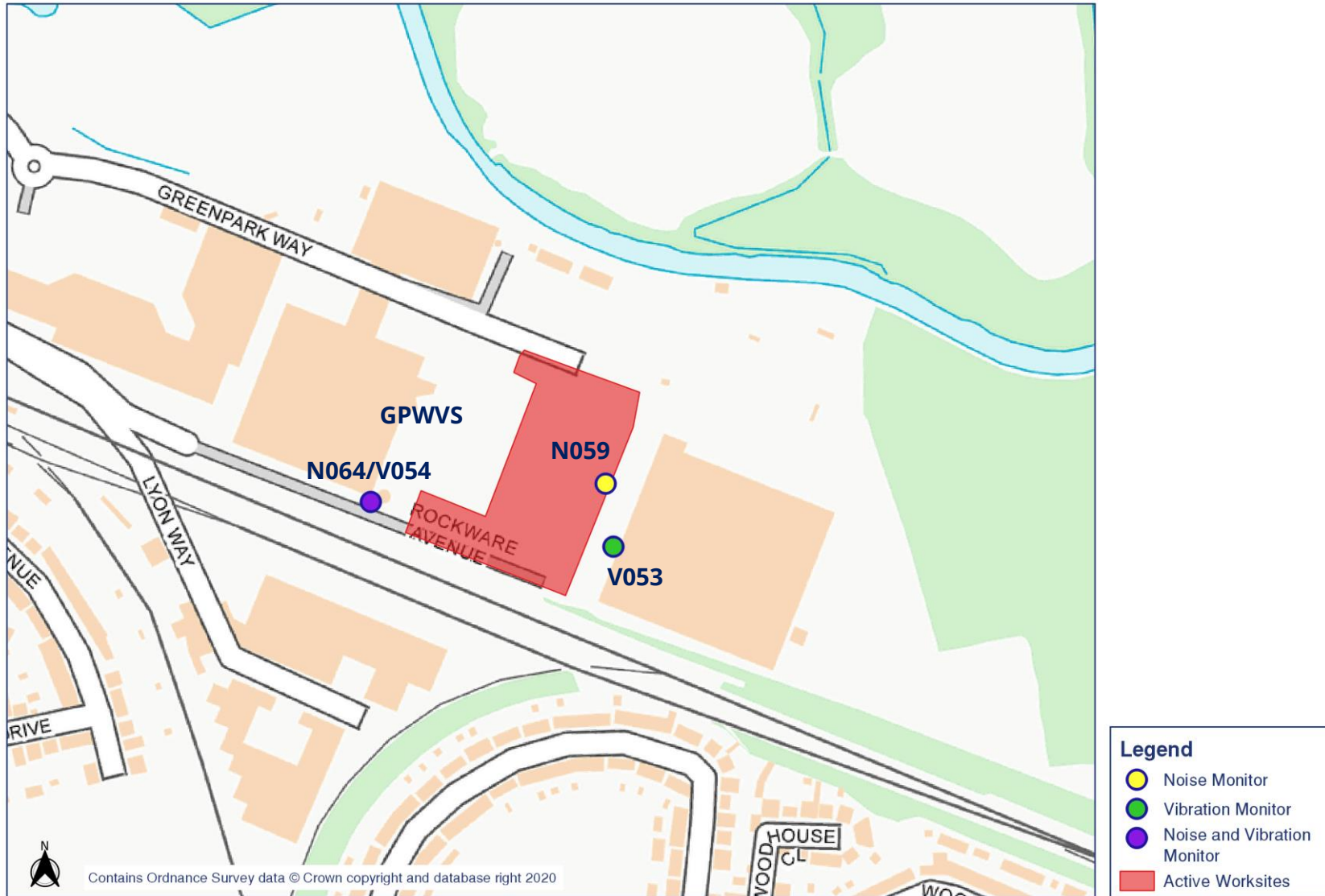


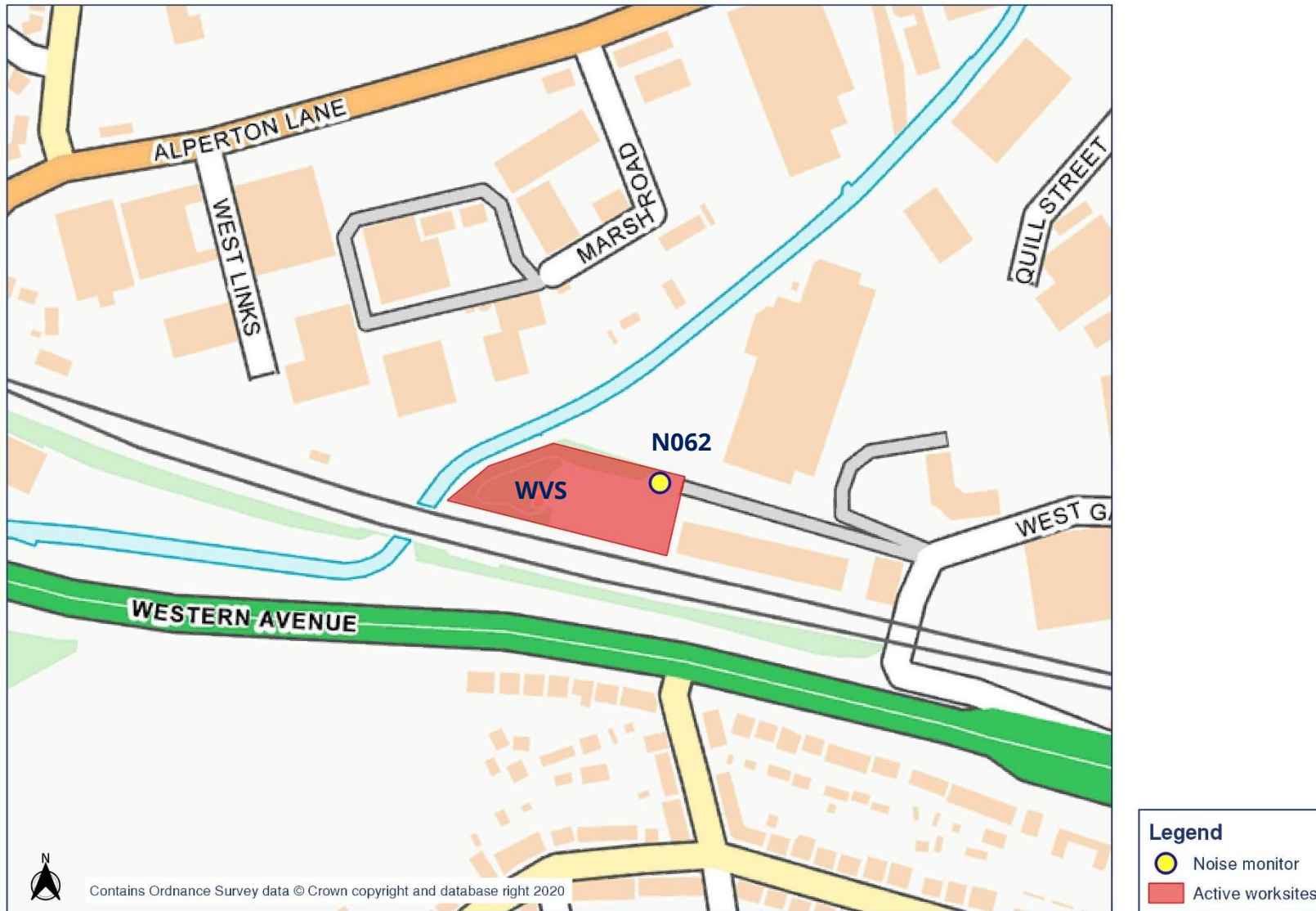
# Appendix B Monitoring Locations

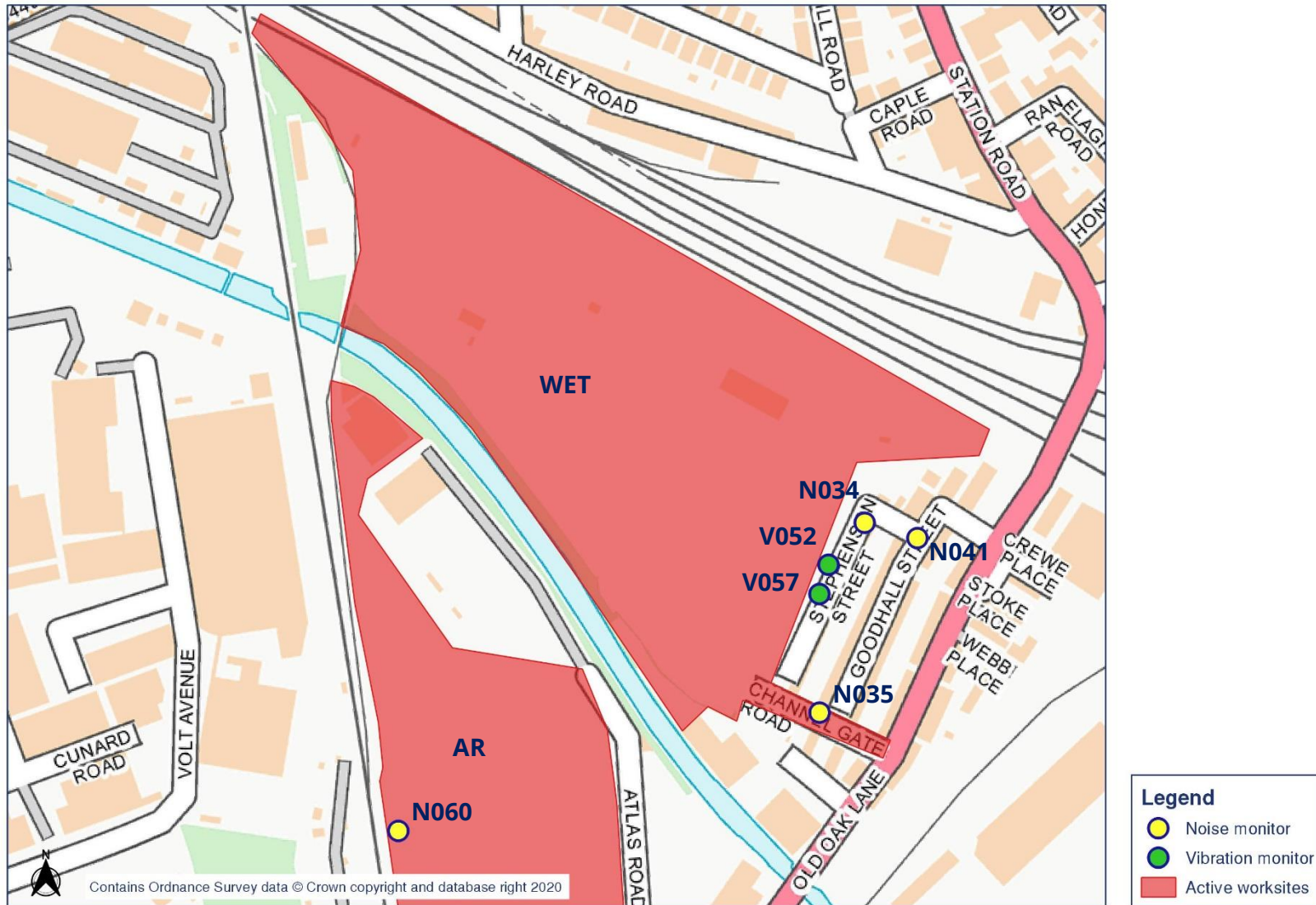
# HS2 Noise and vibration monitoring plan - Overview

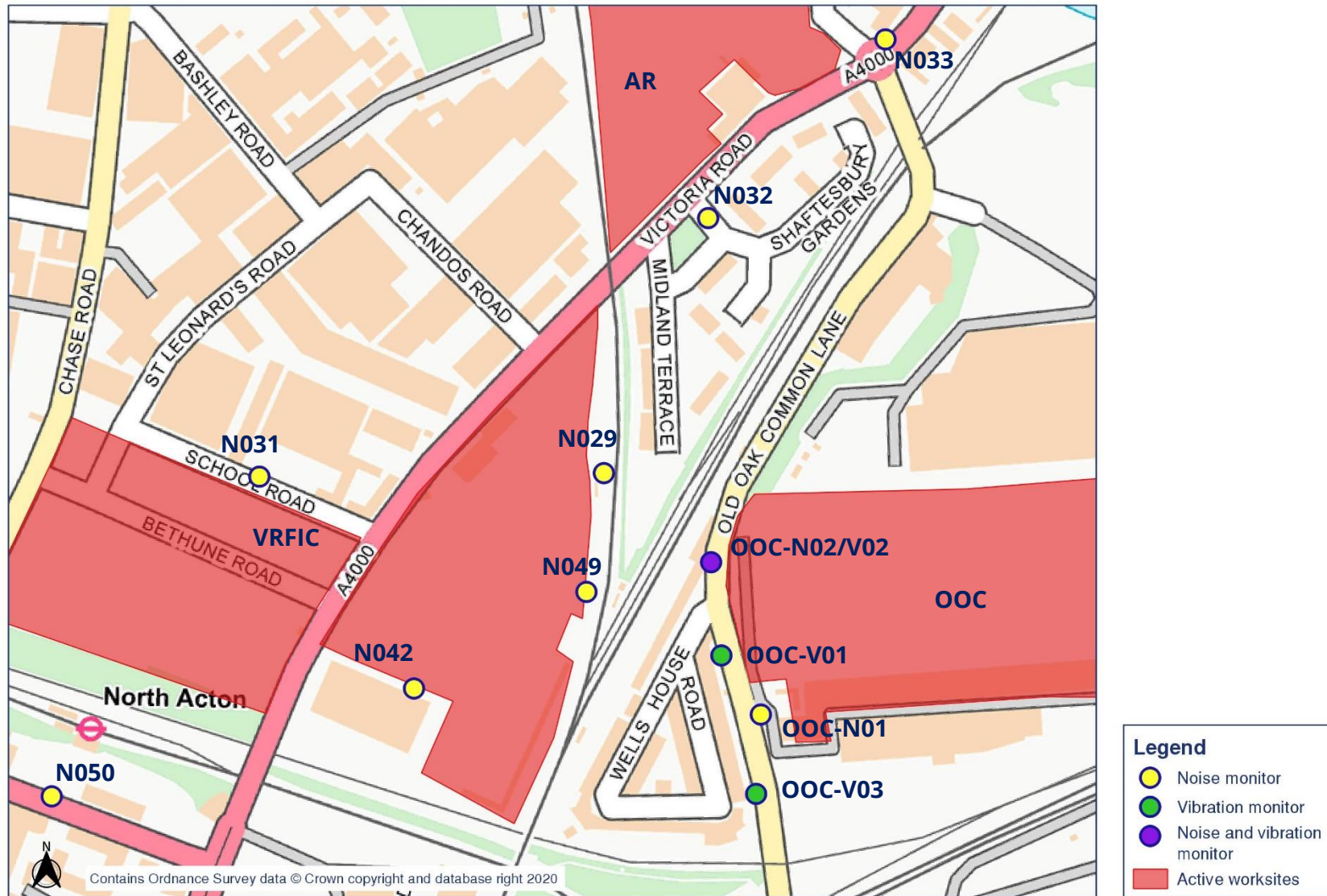










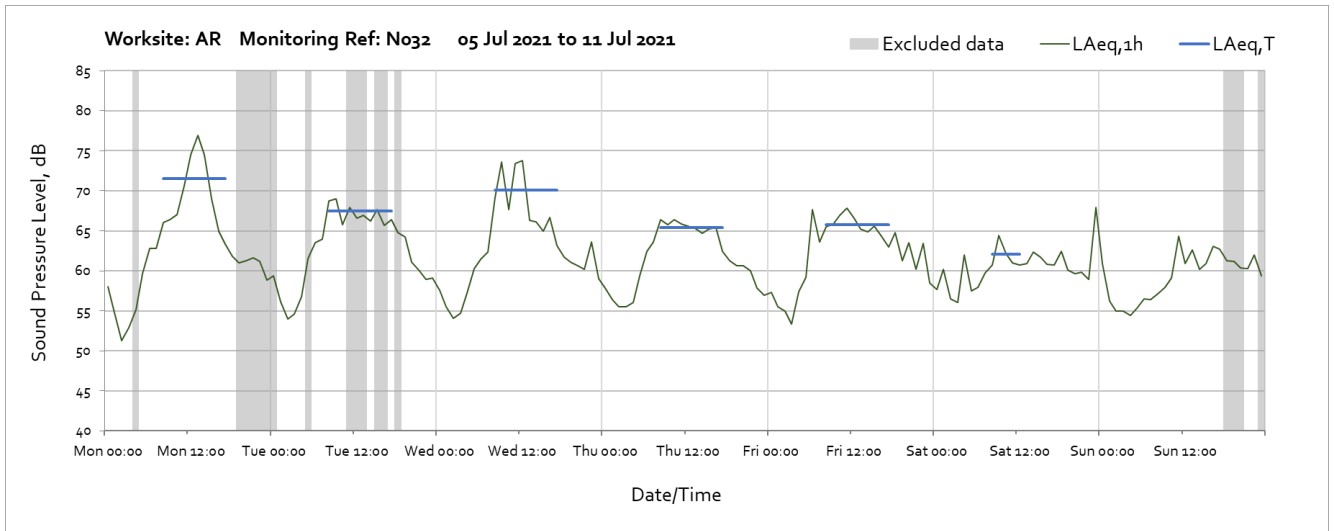
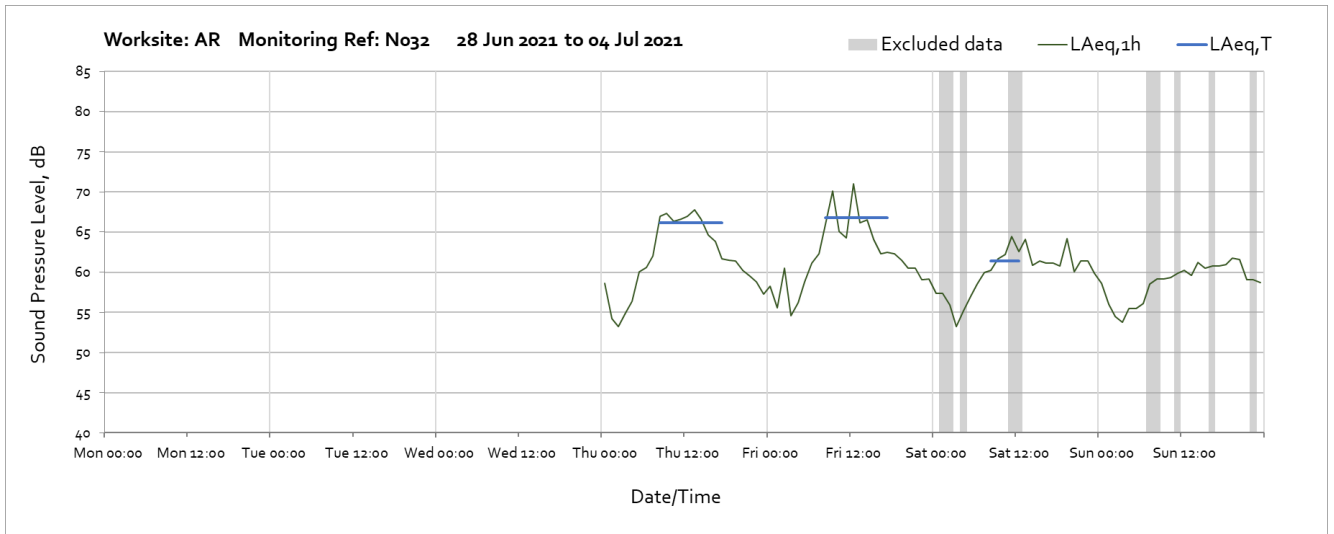


# Appendix C Data

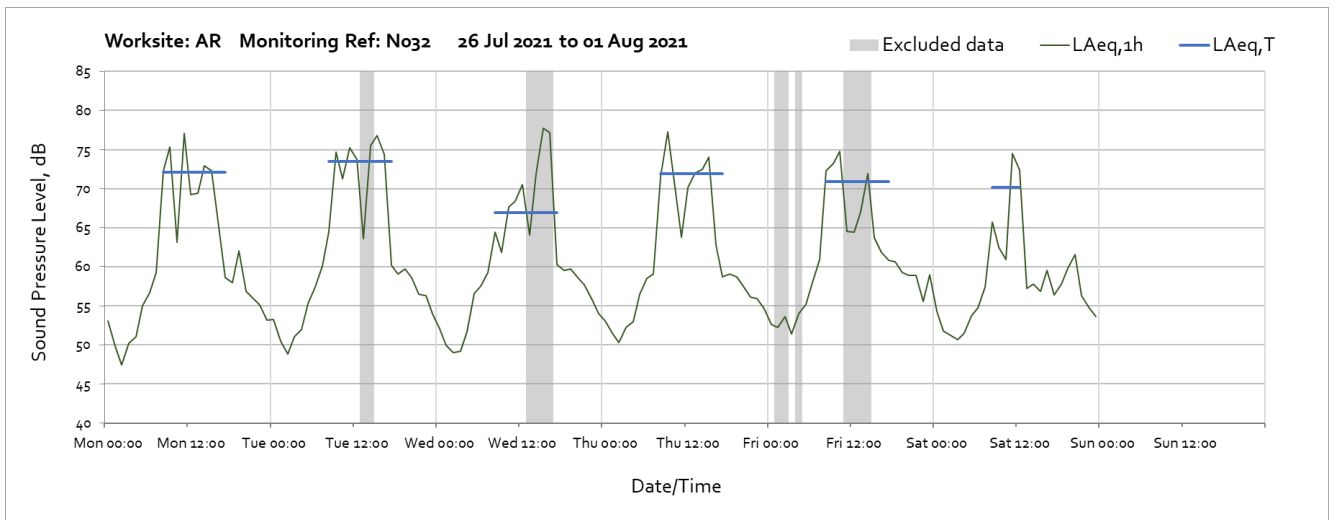
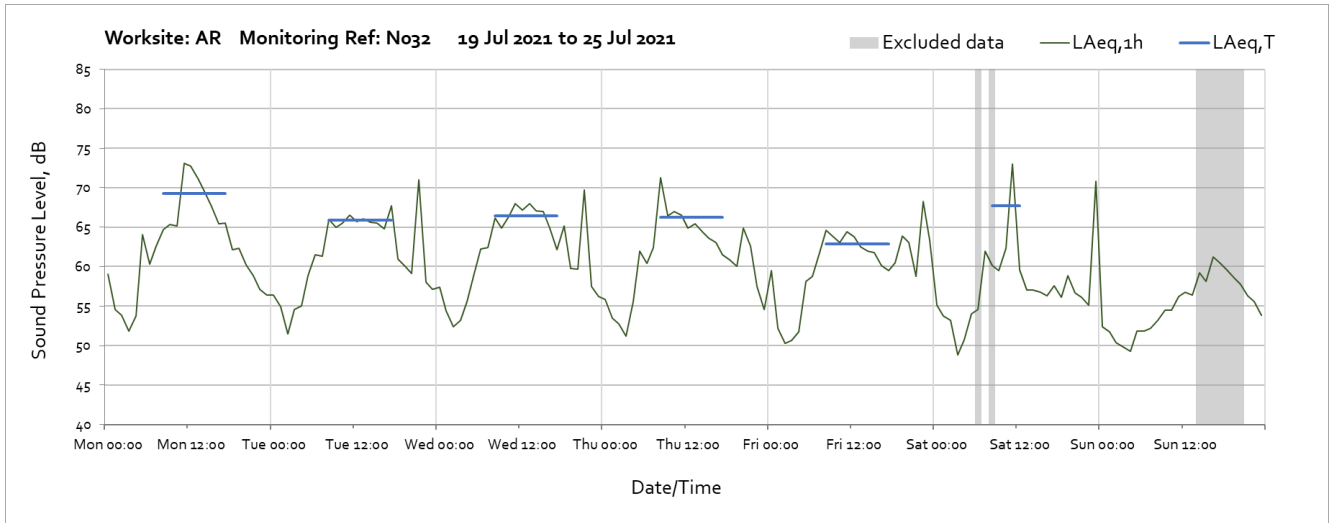
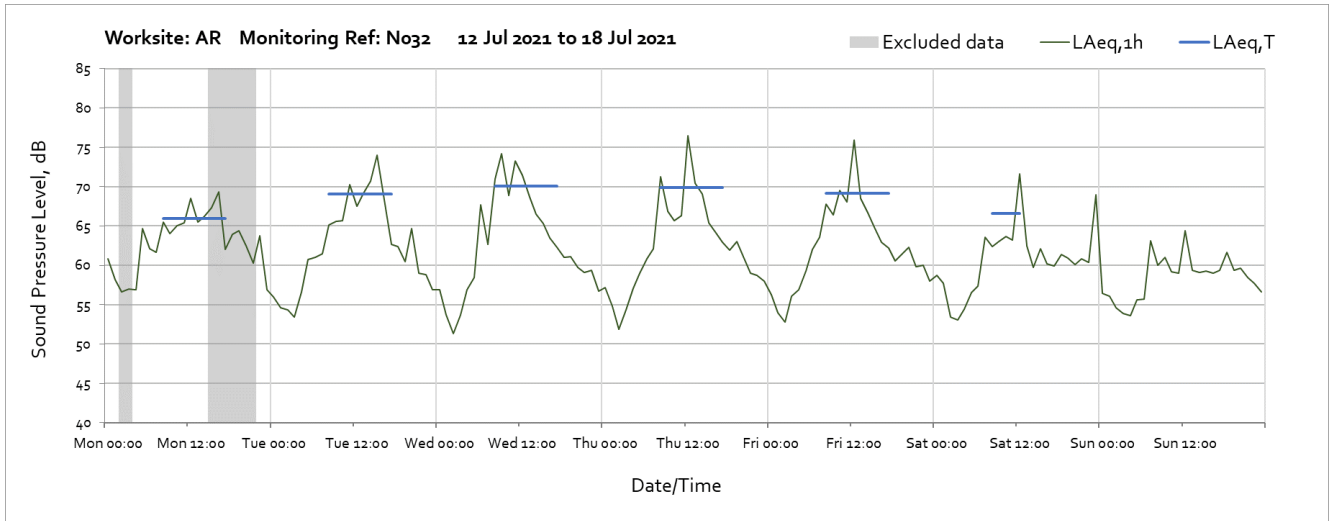
## Noise

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.

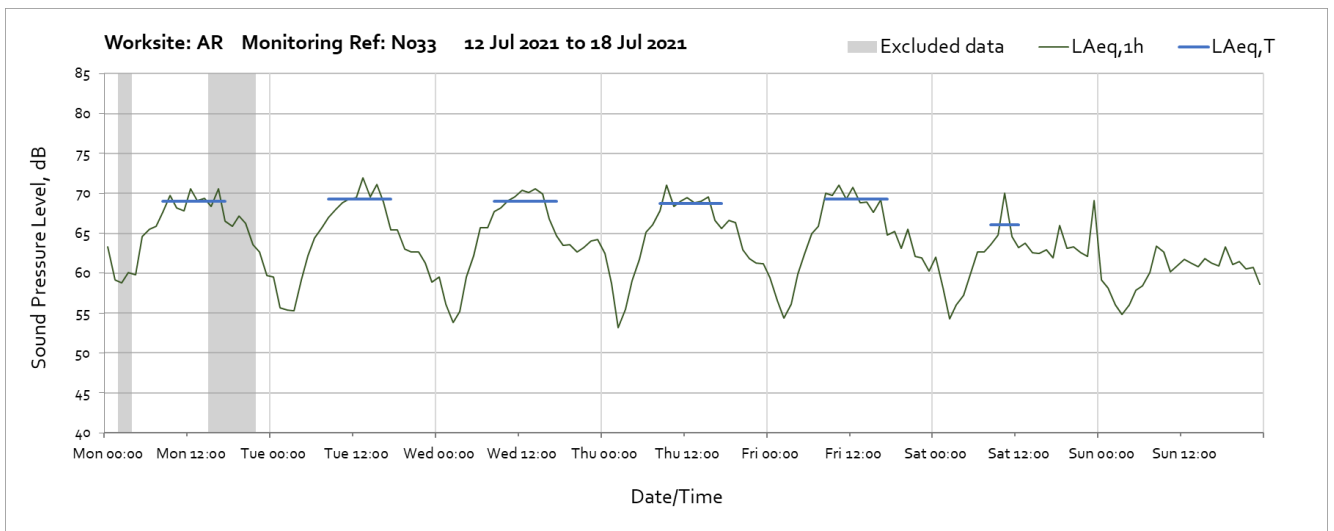
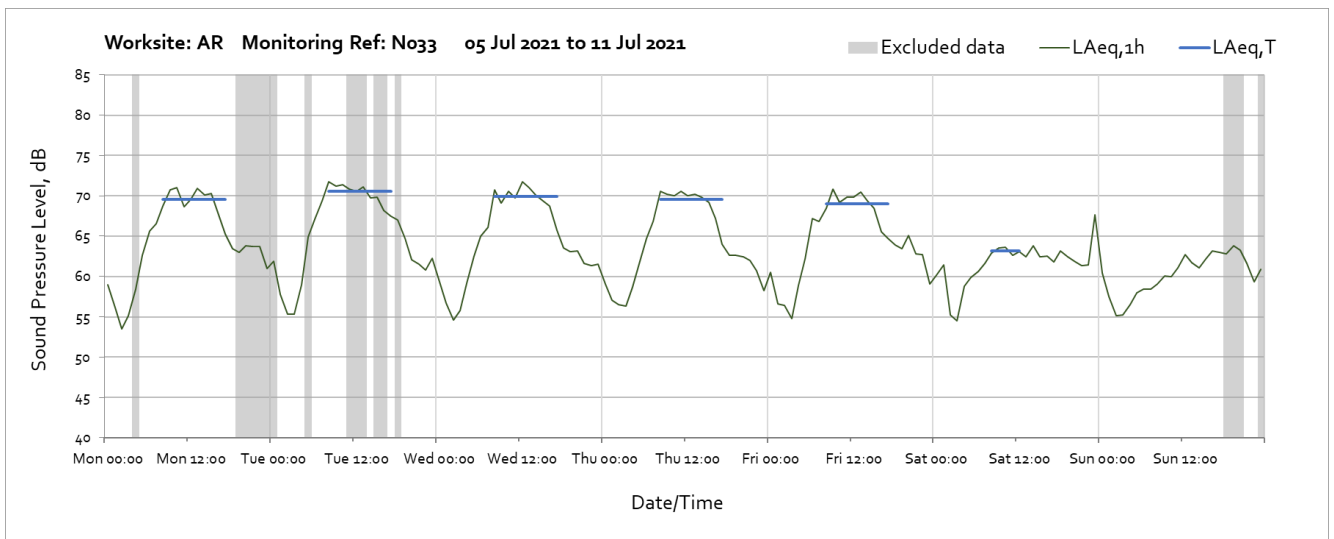
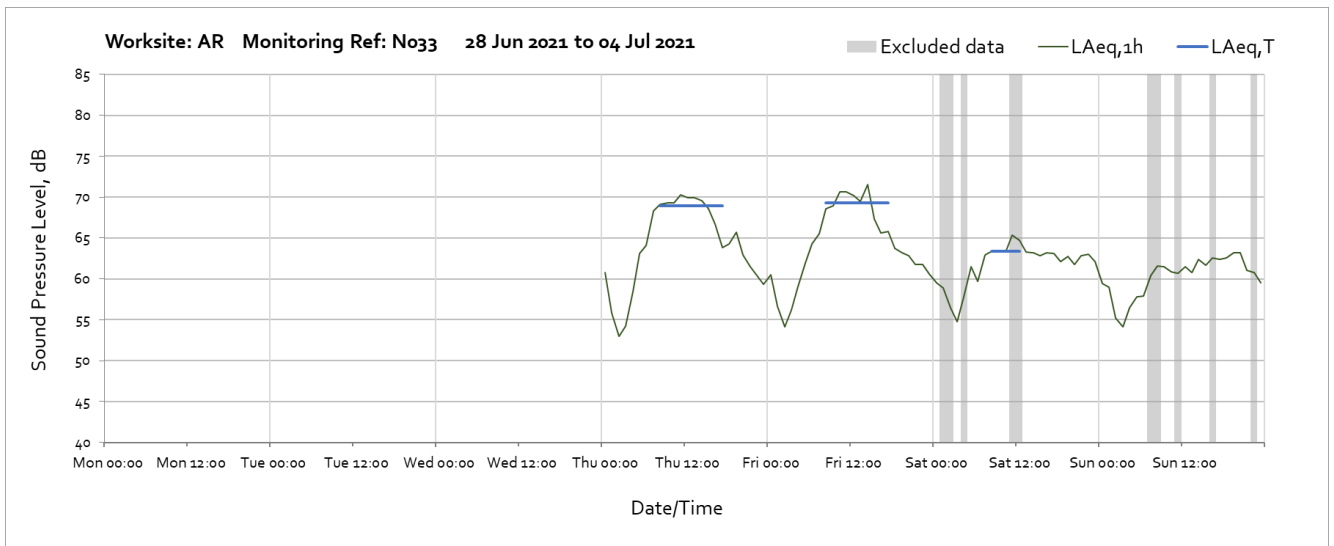
### Worksite: Atlas Road worksite (AR) – Monitoring Ref: N032

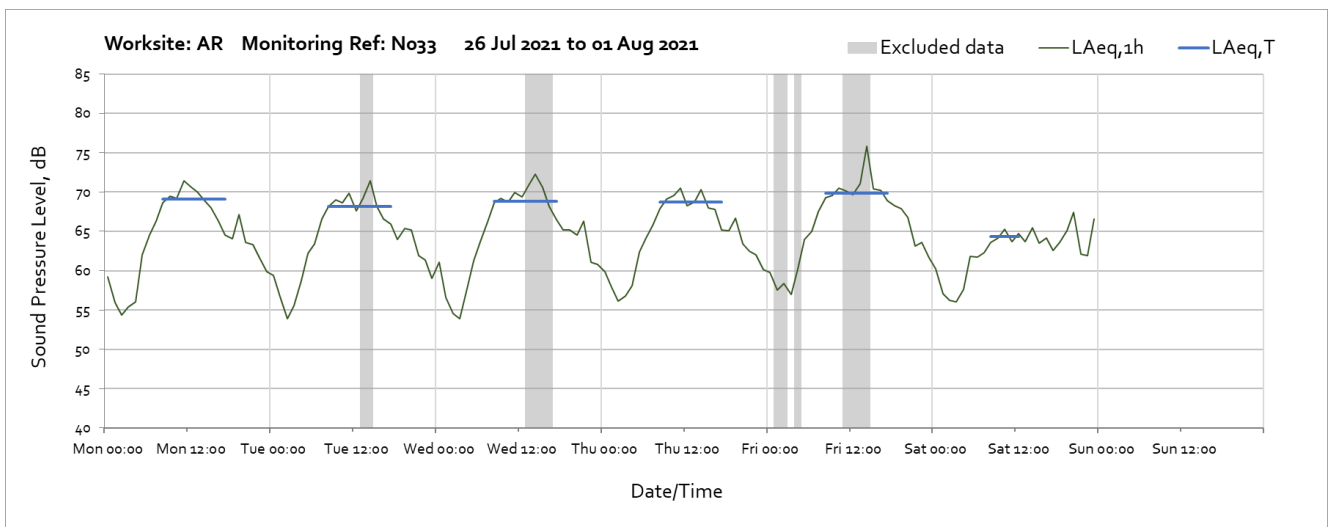
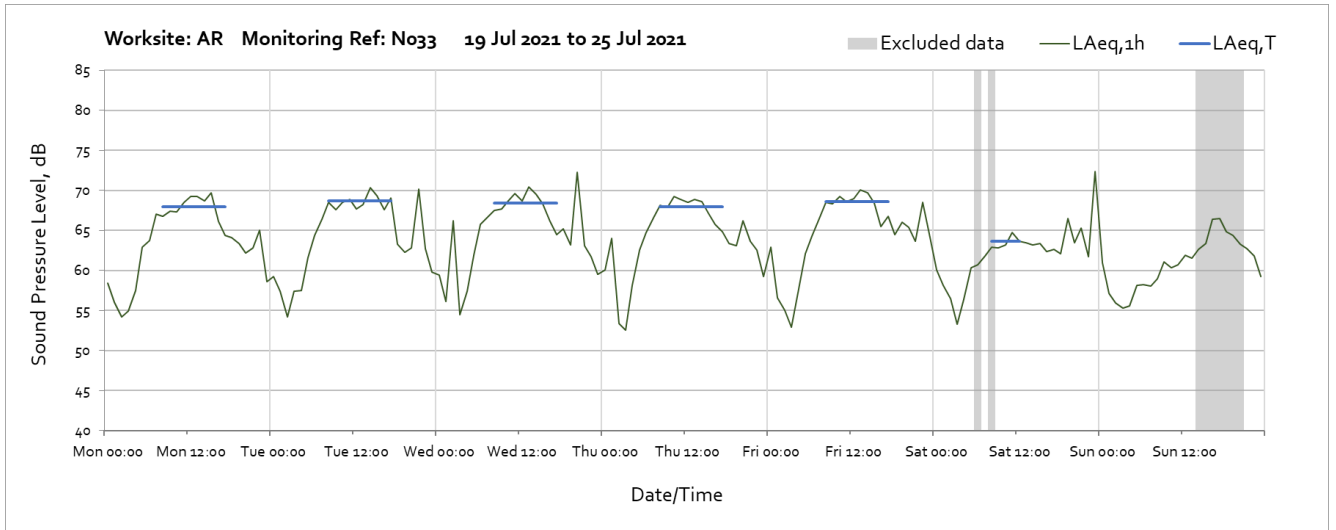




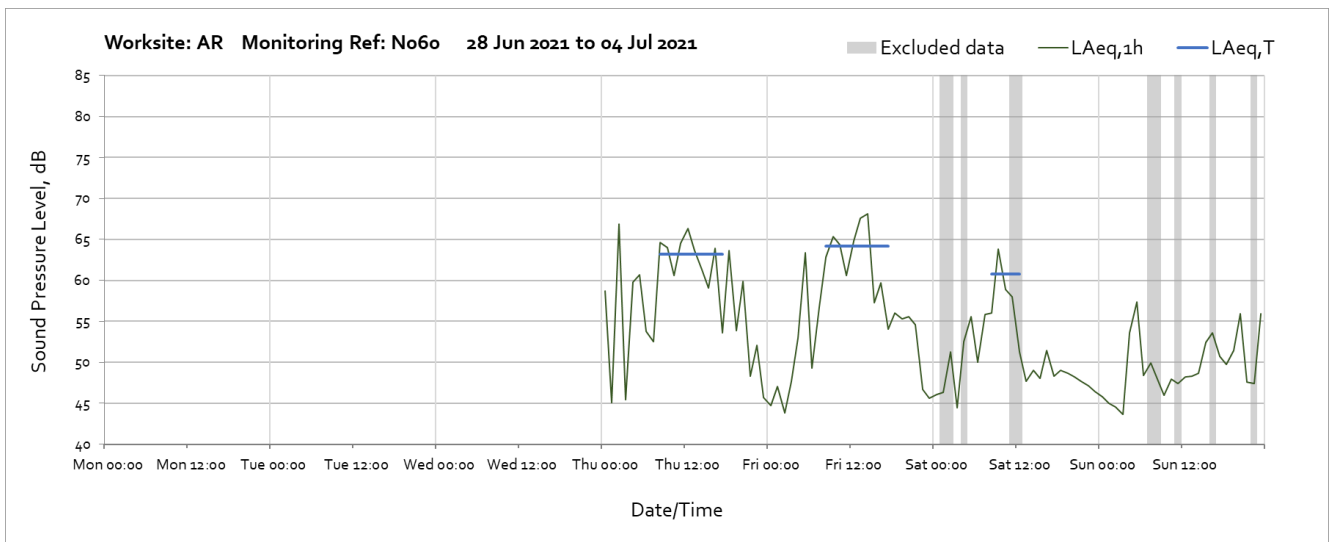


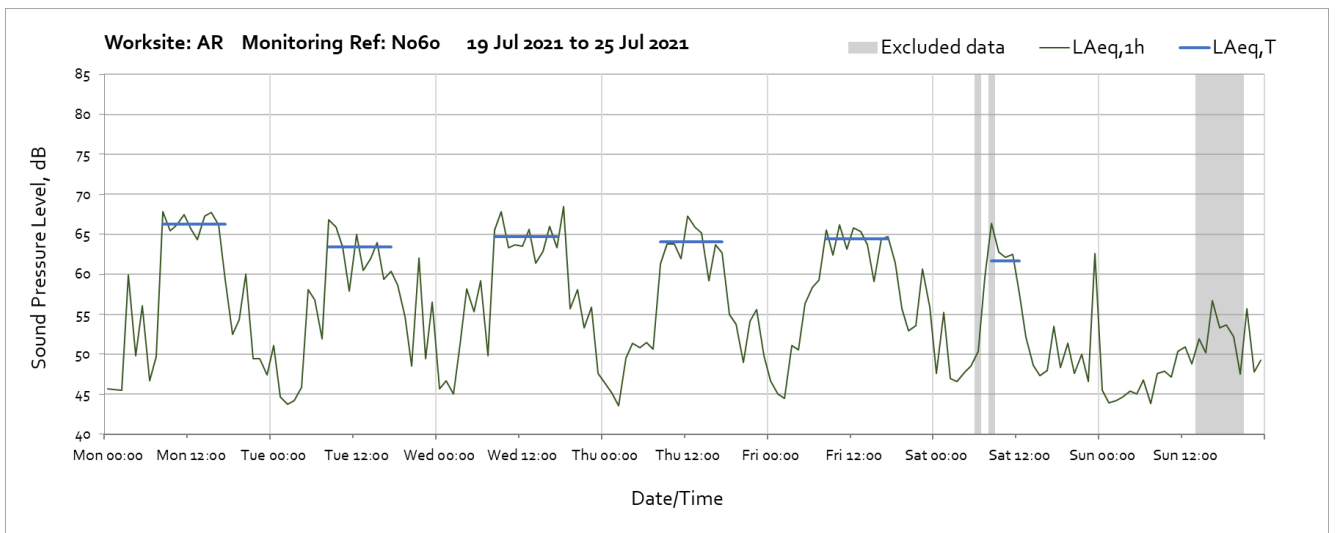
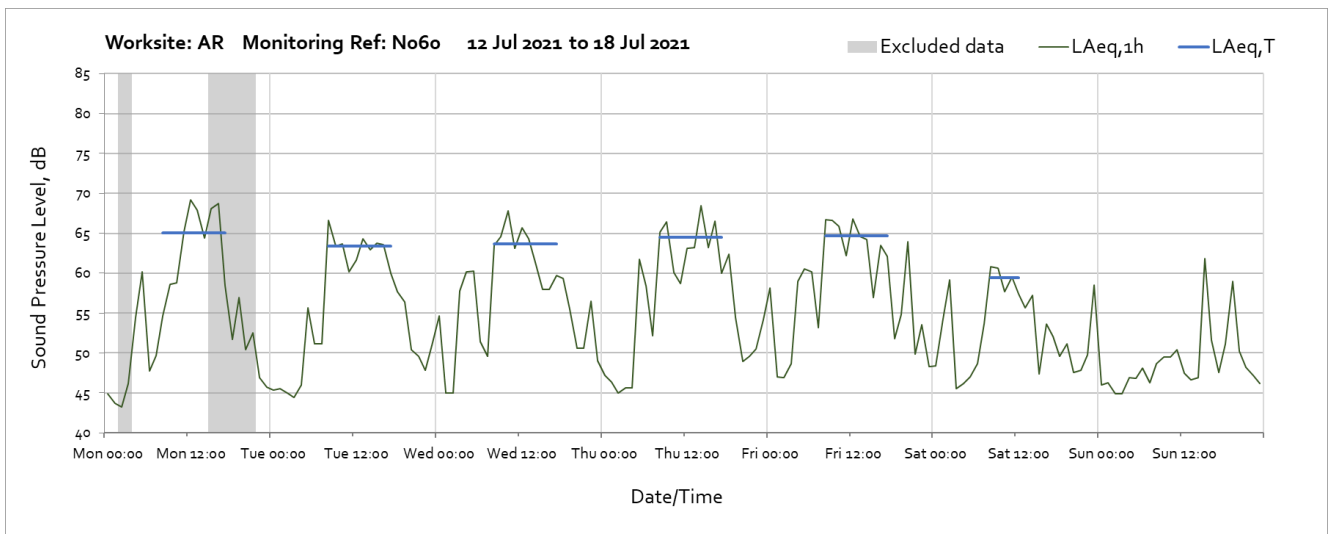
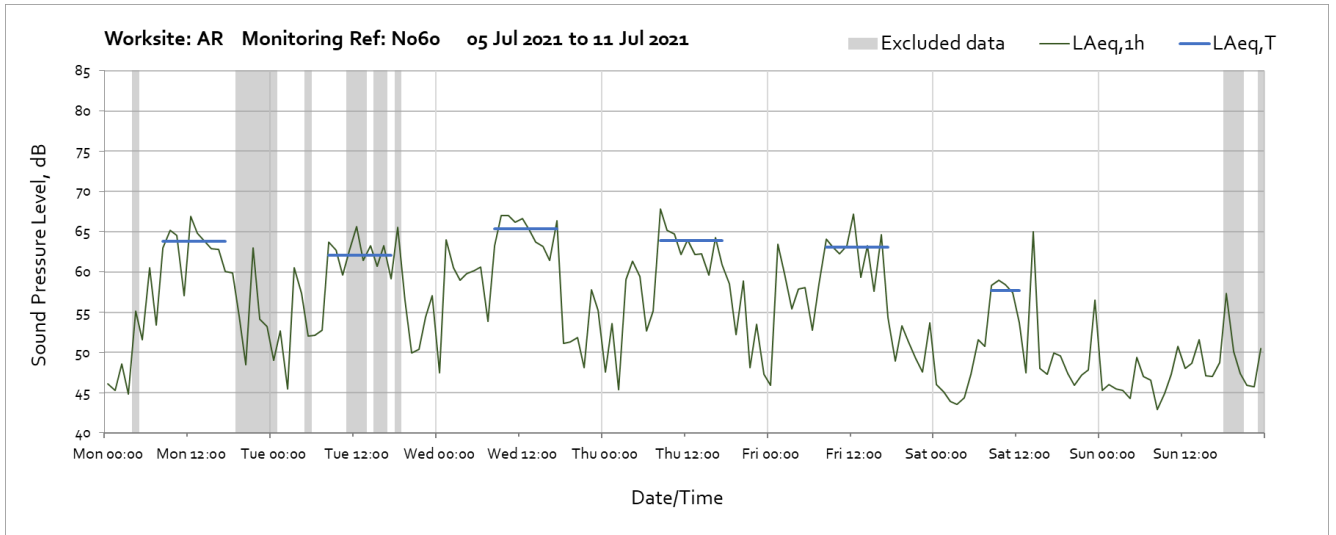
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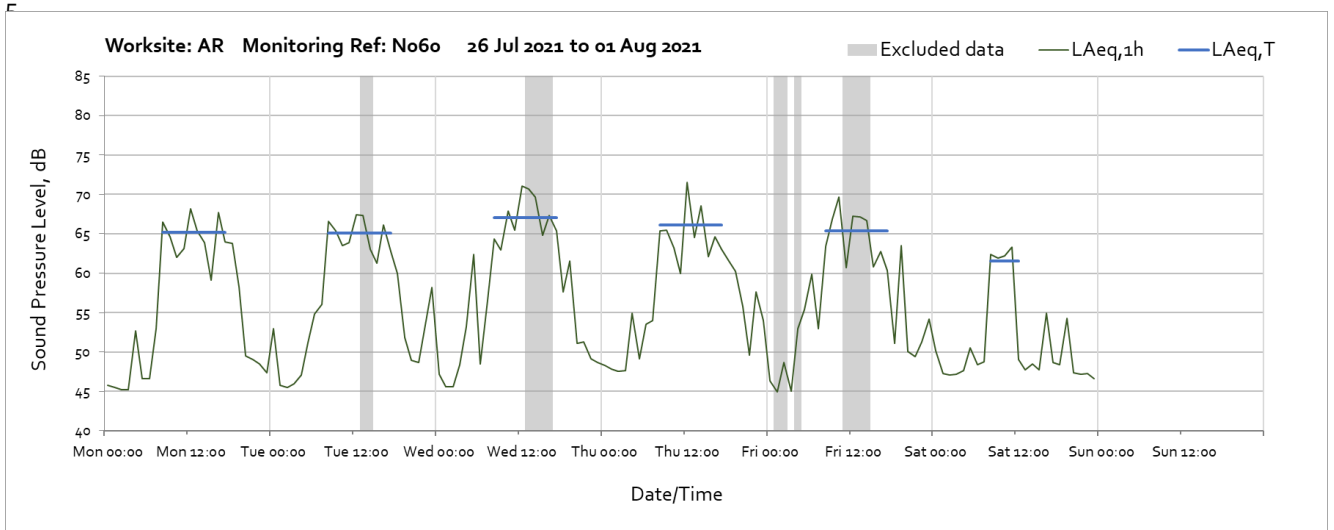




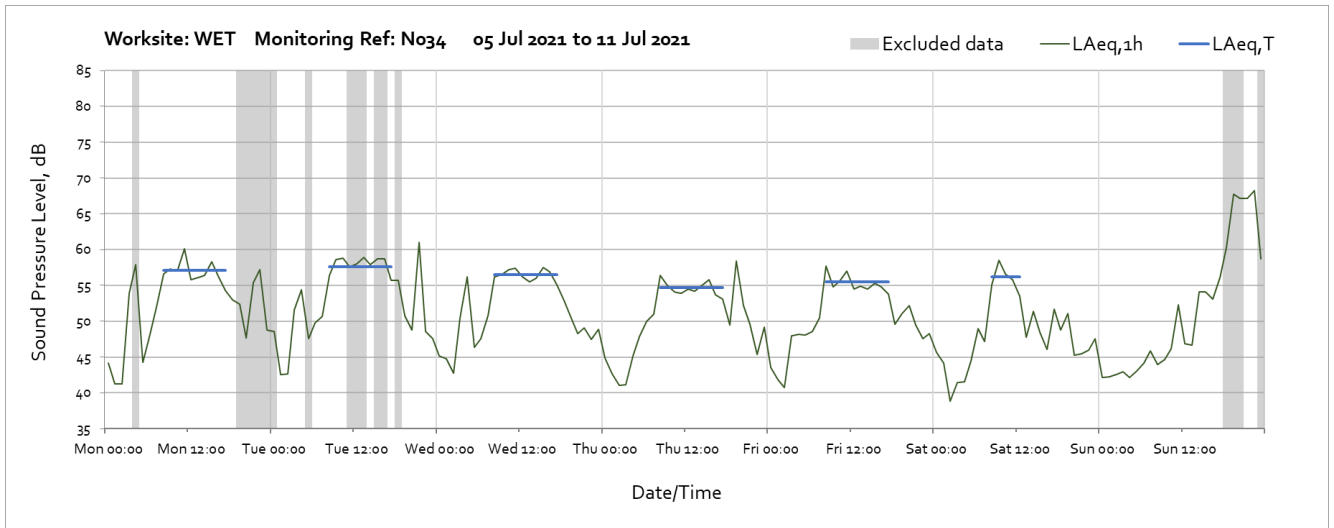
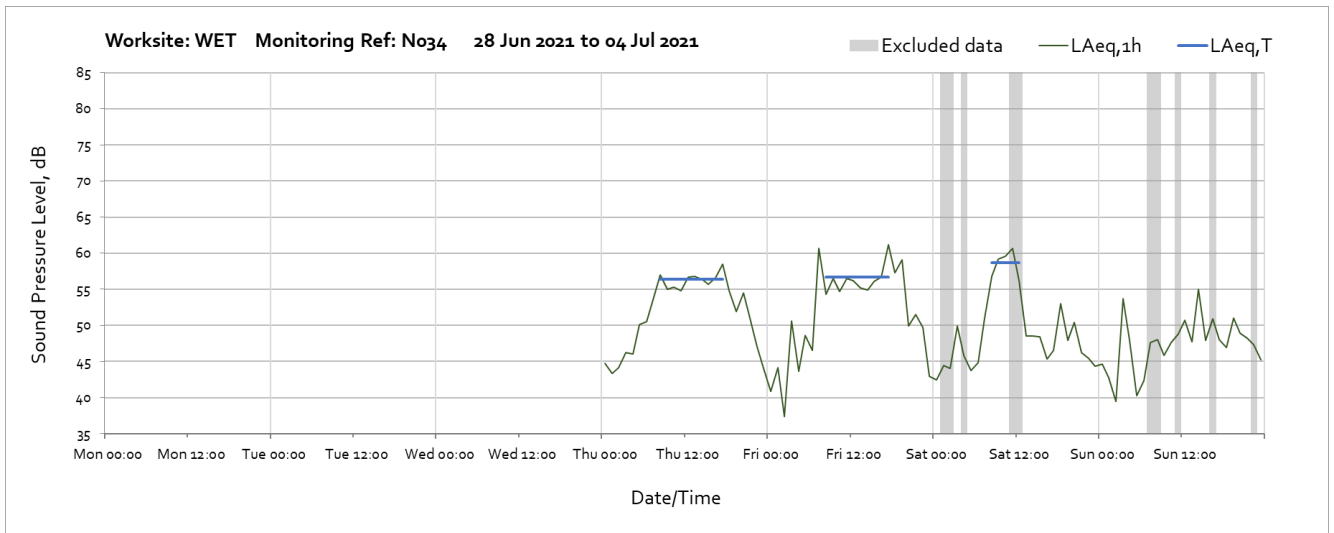
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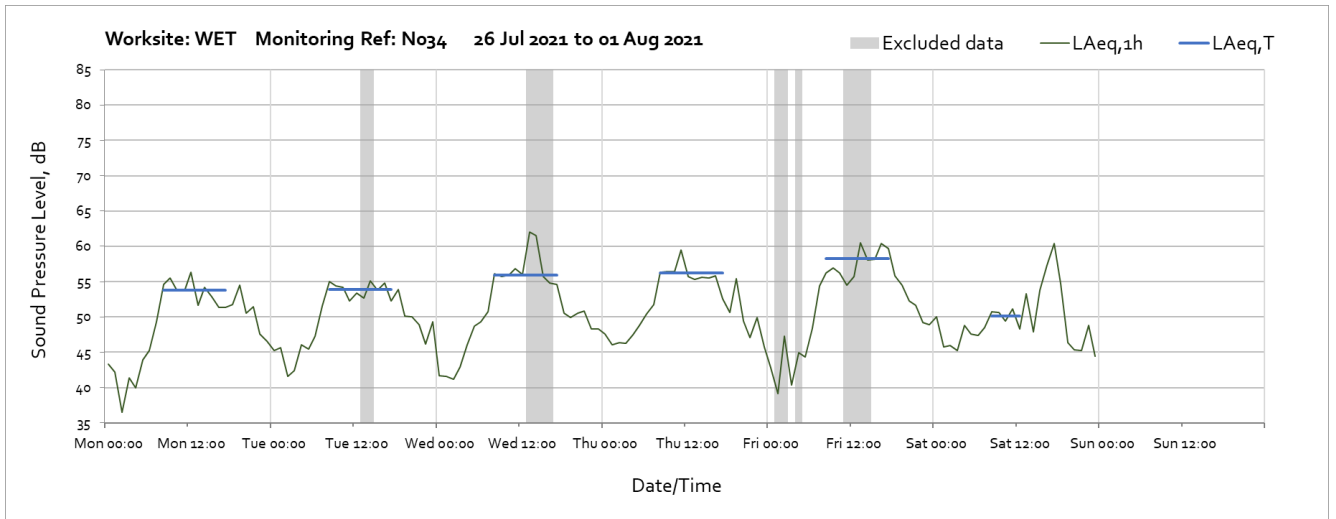
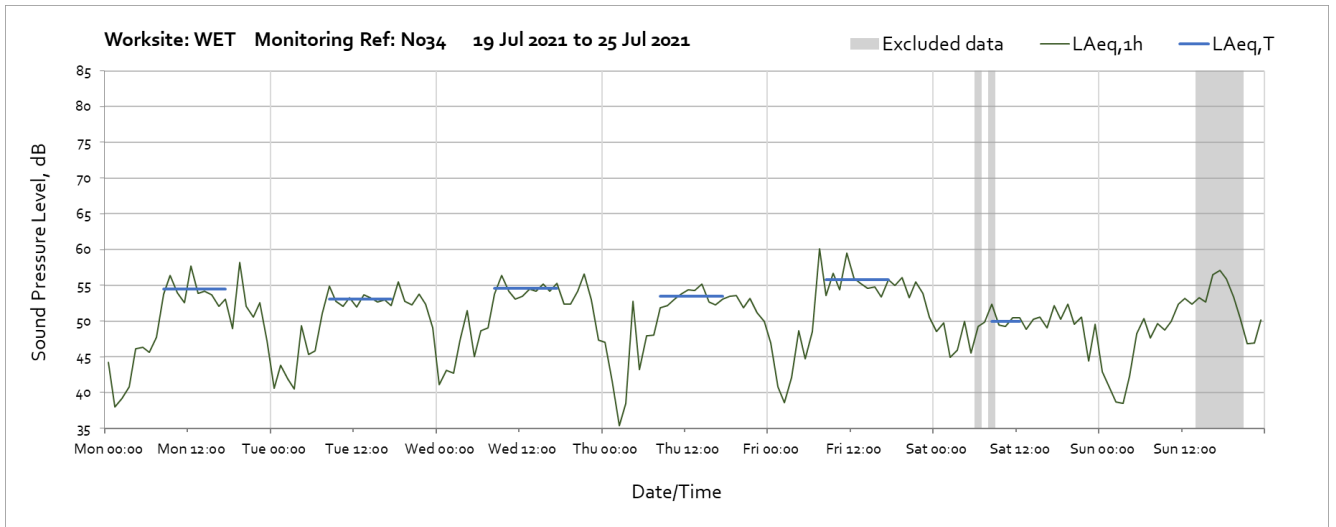
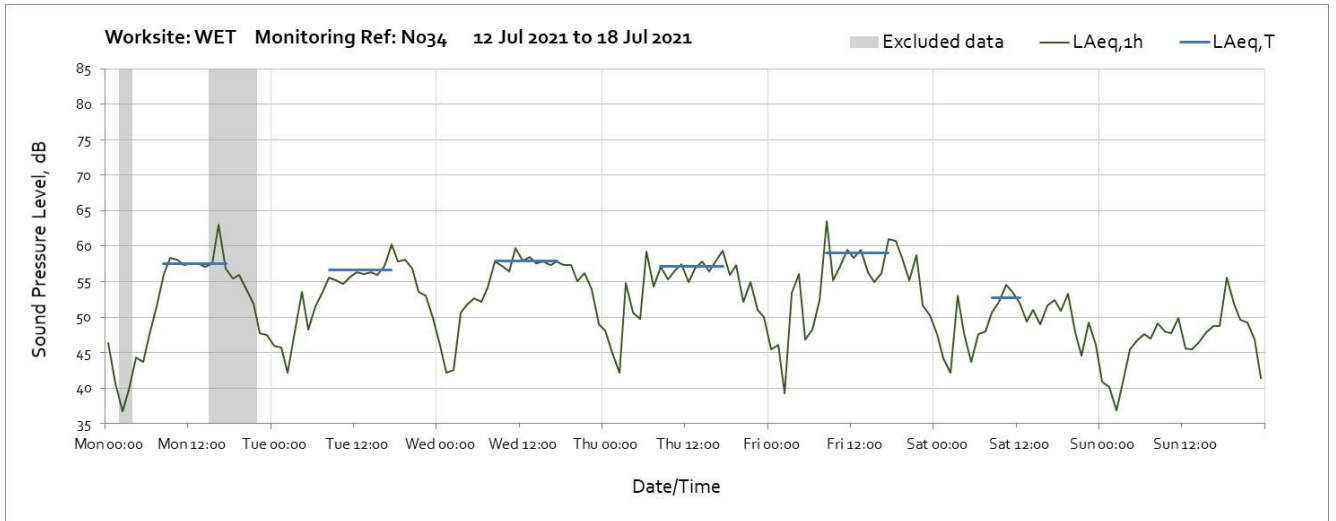




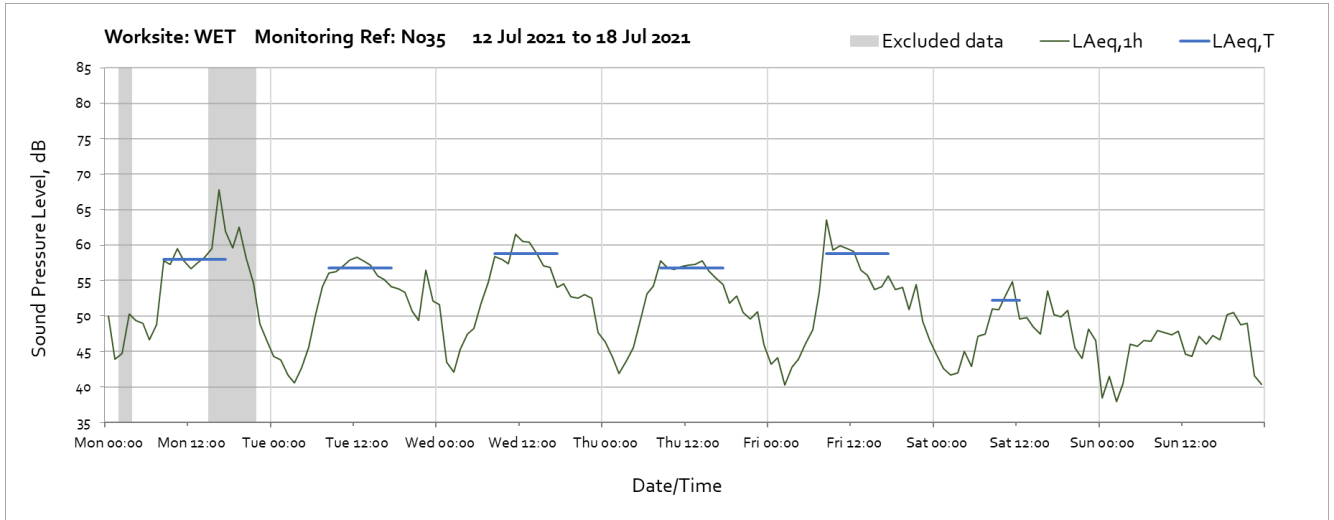
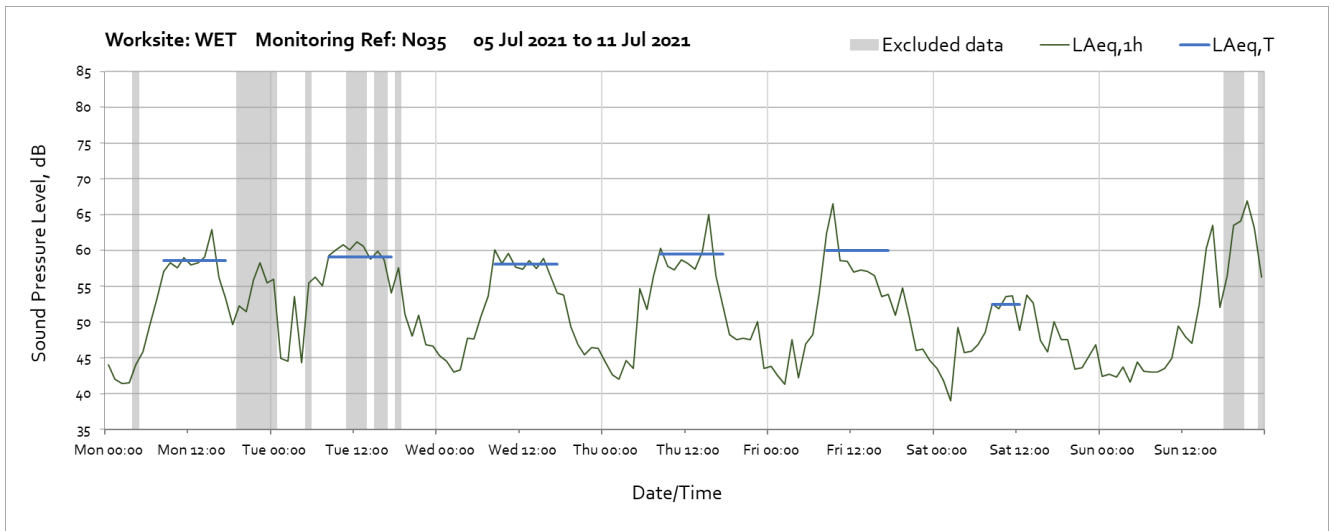
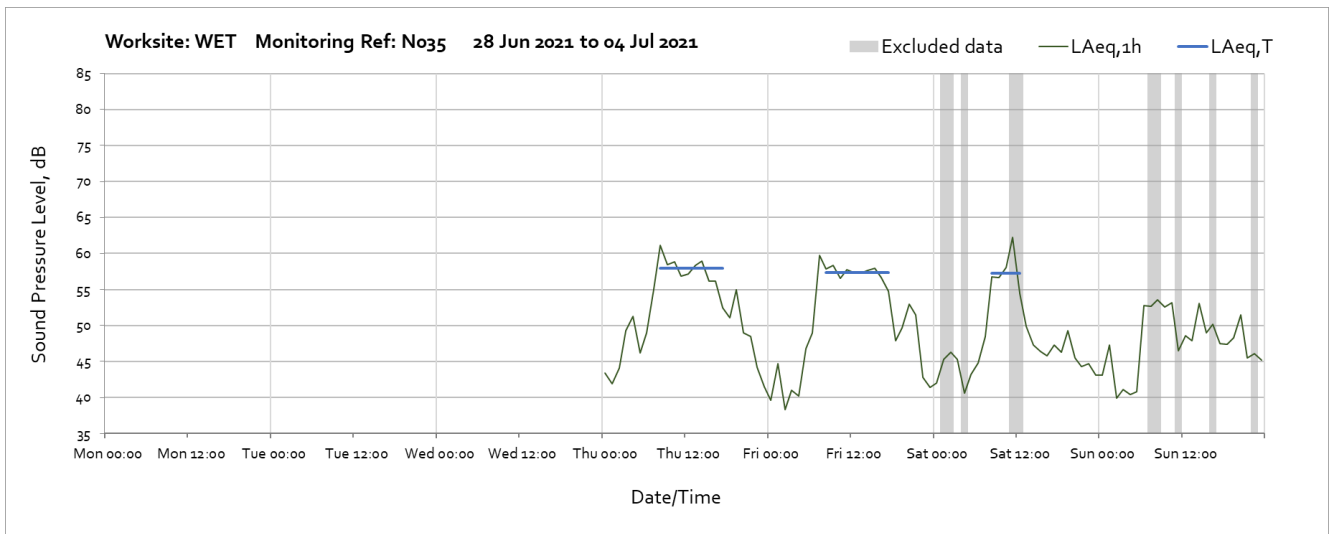


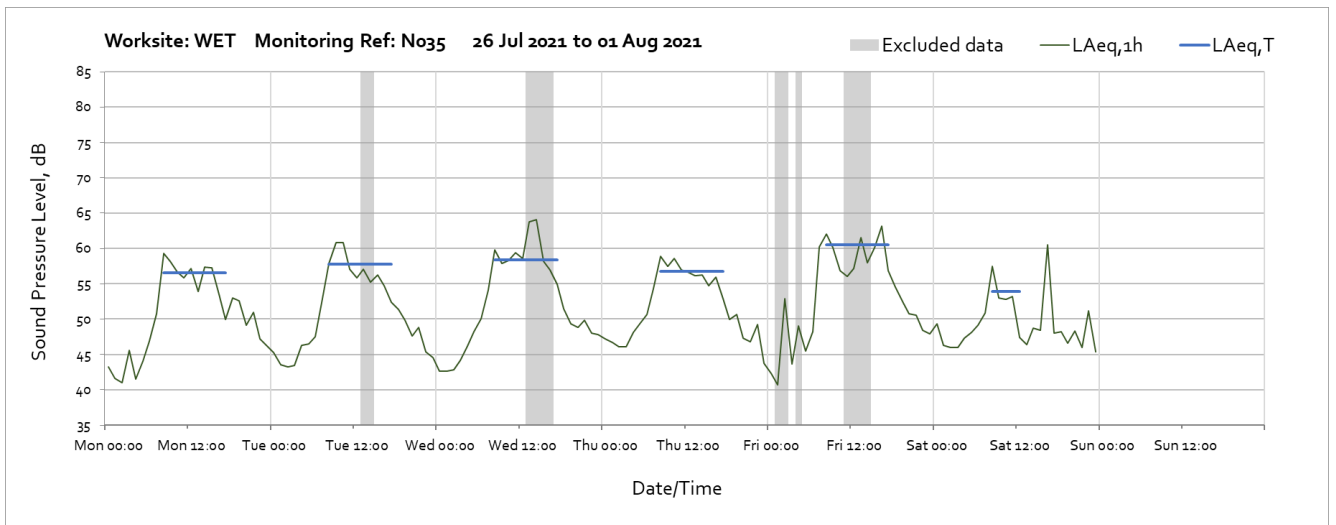
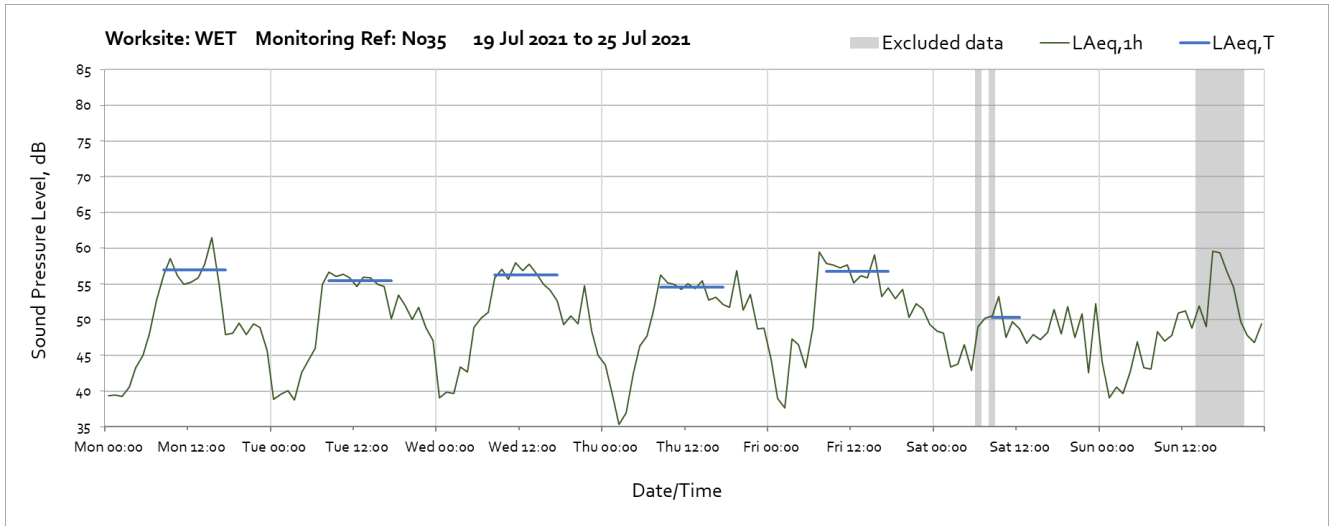
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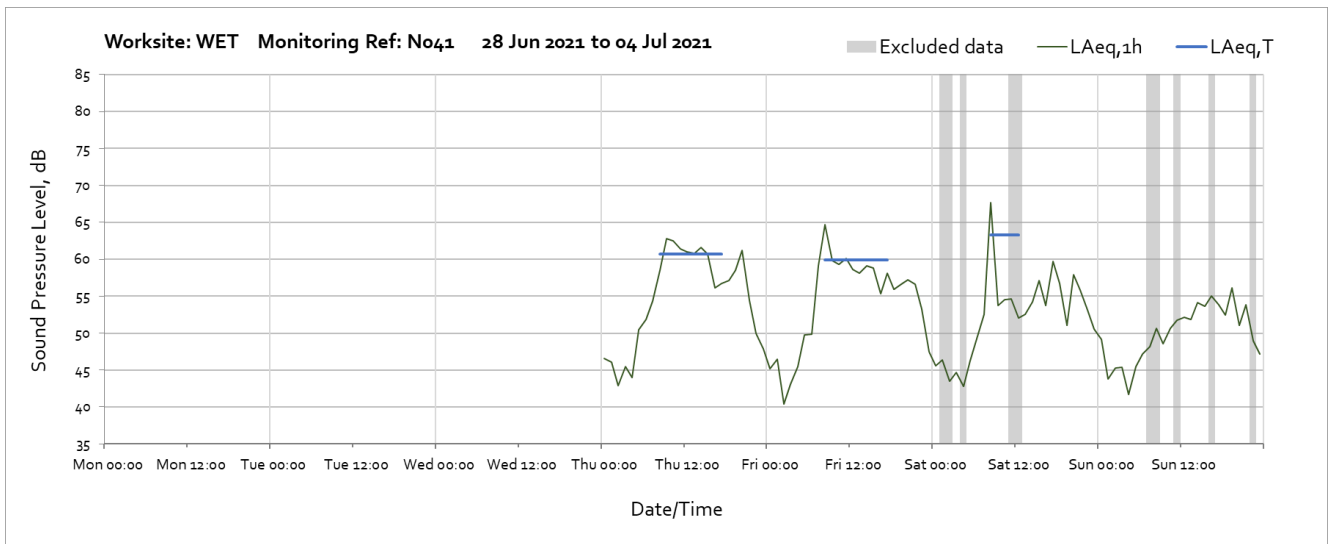


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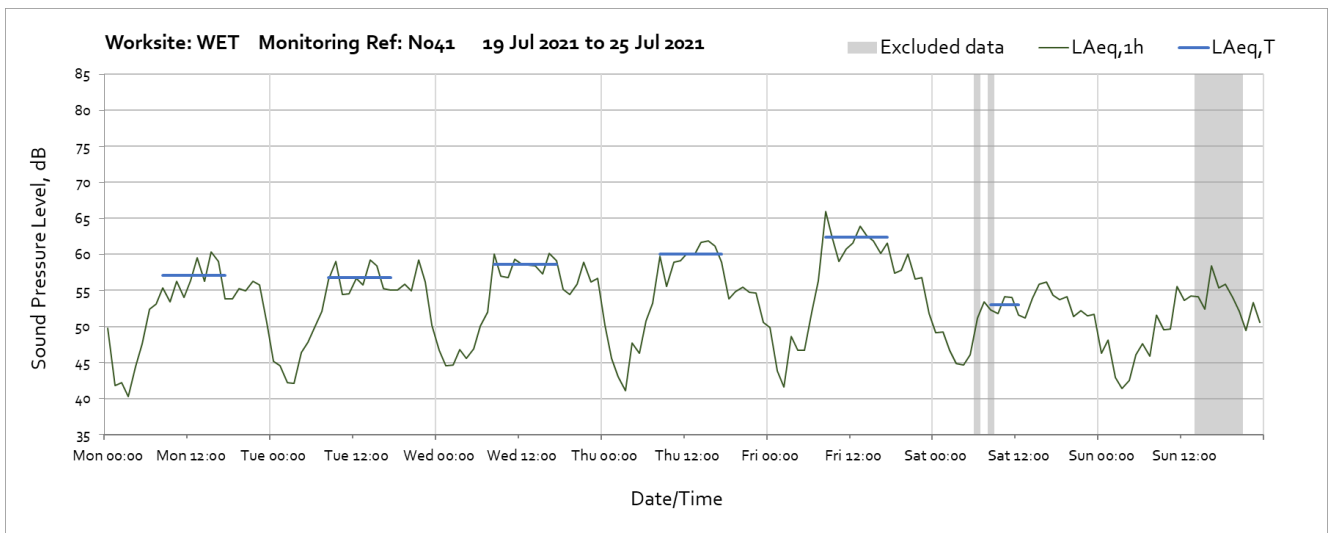
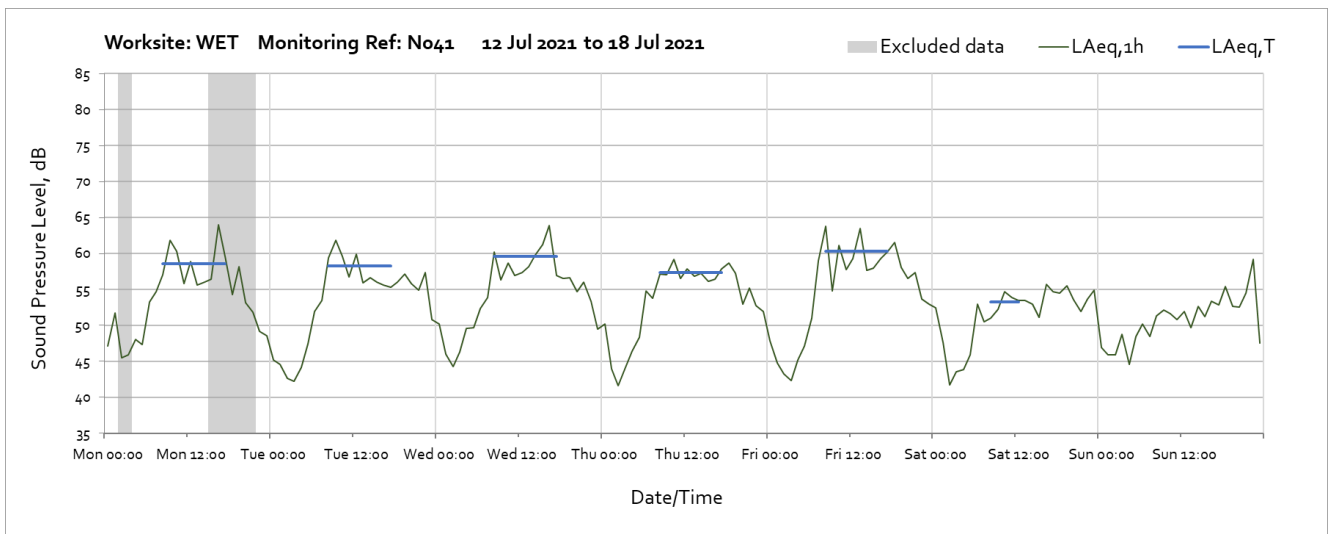
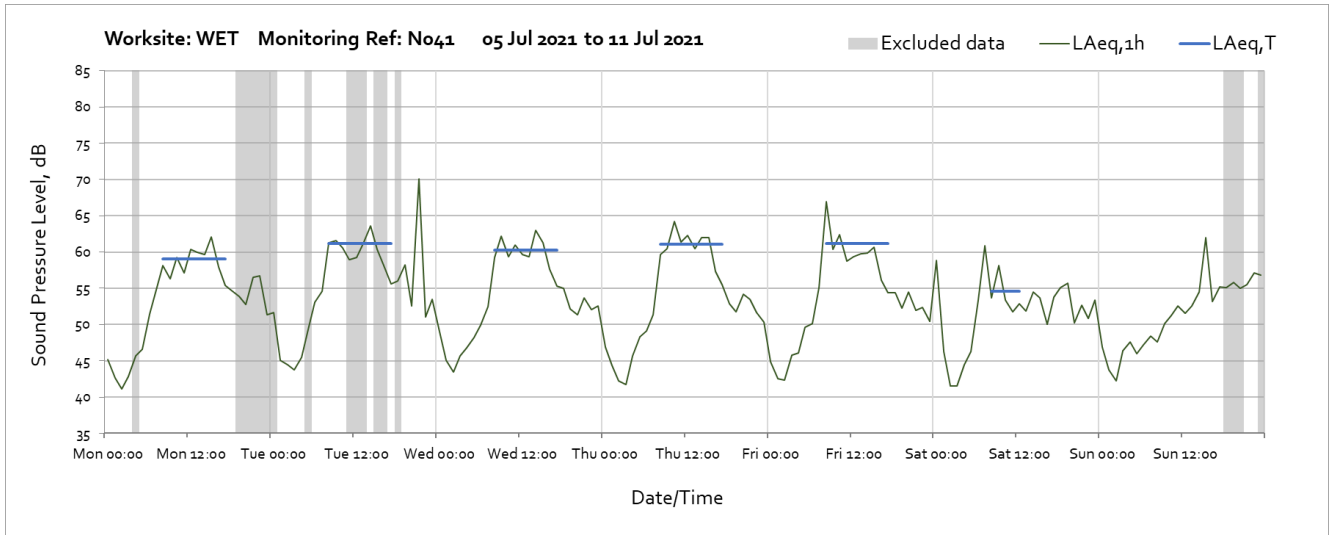


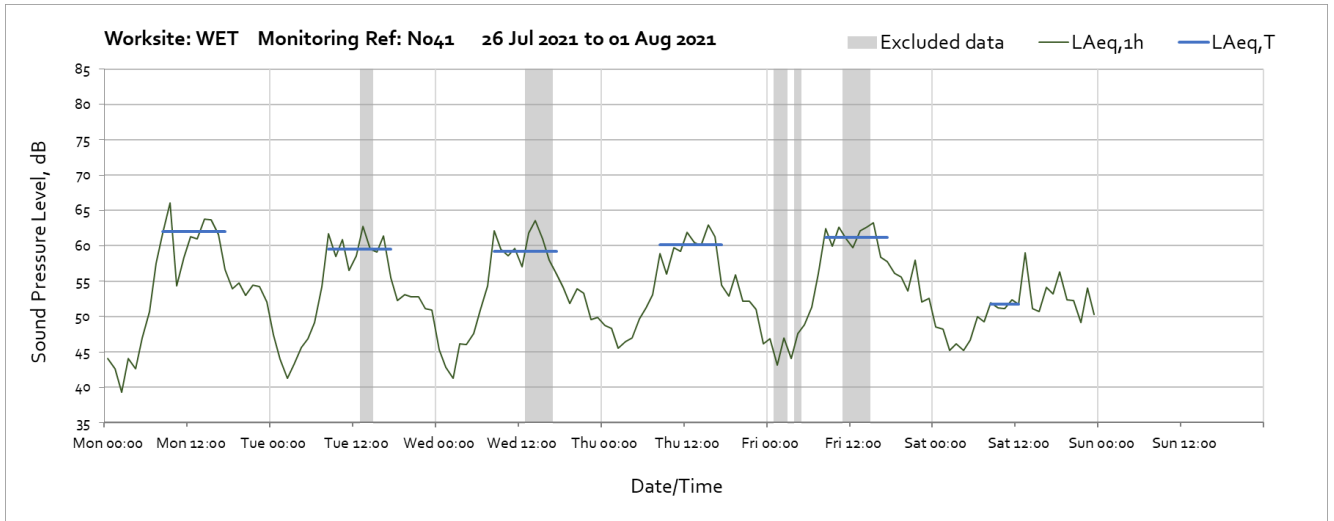


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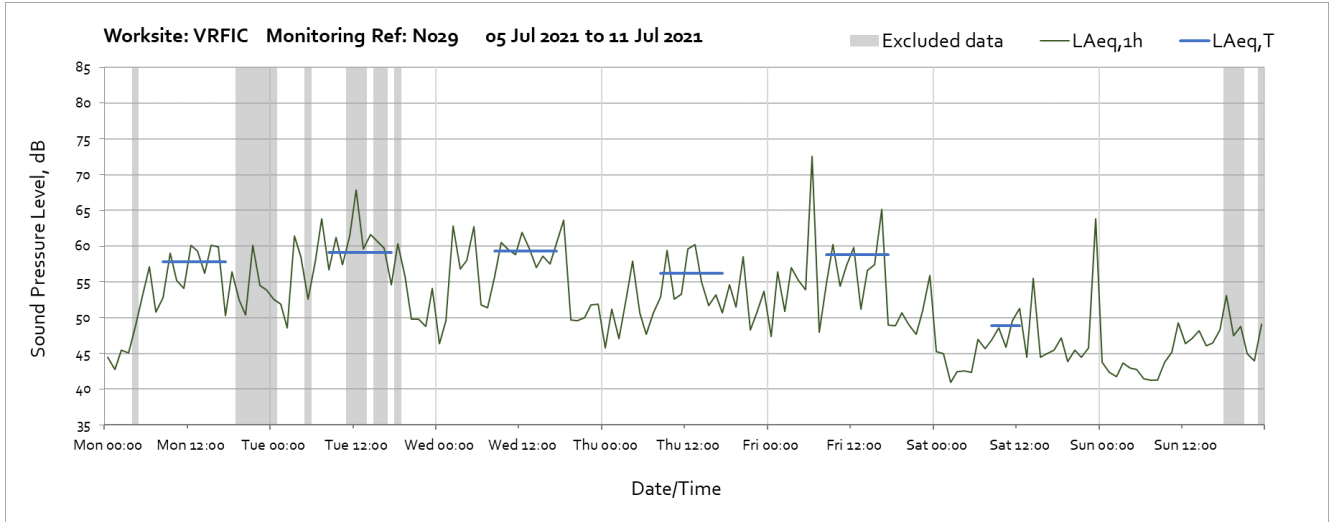
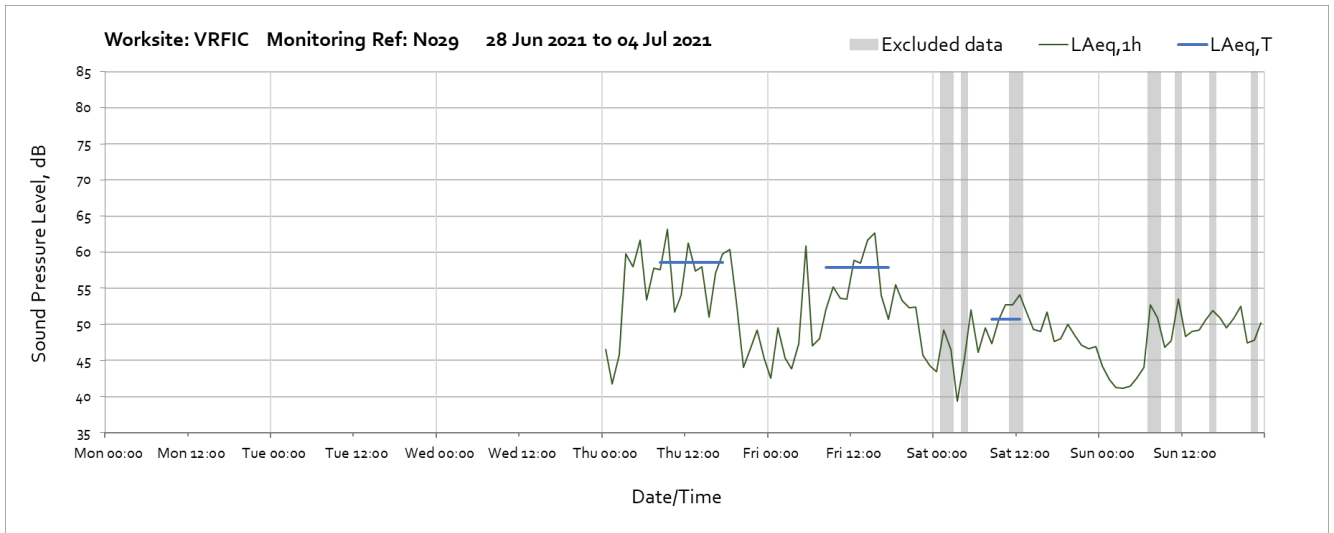


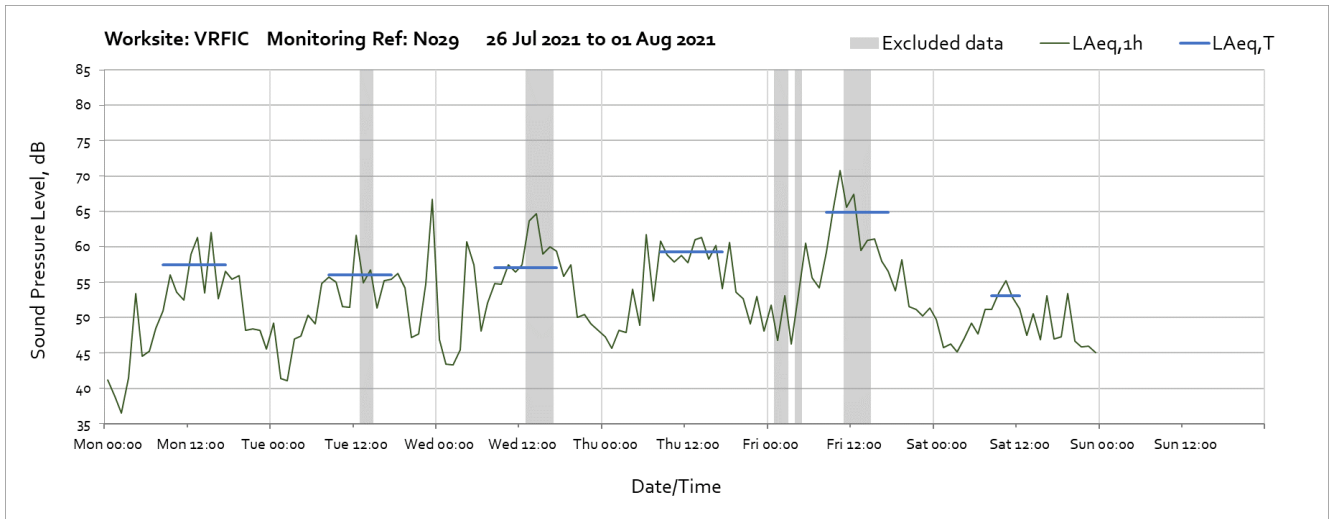
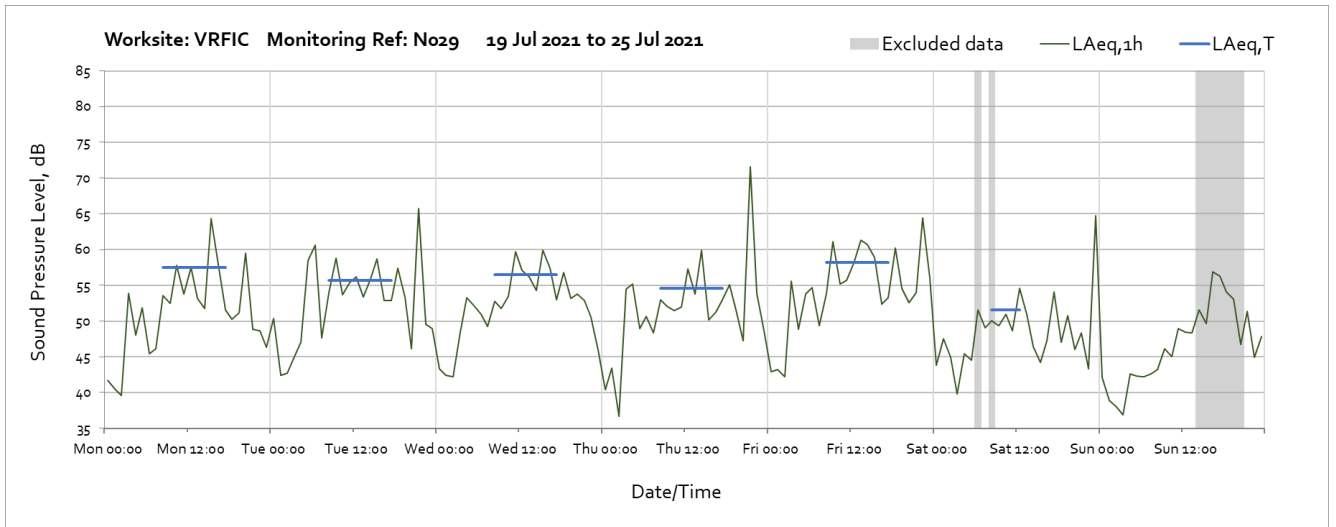
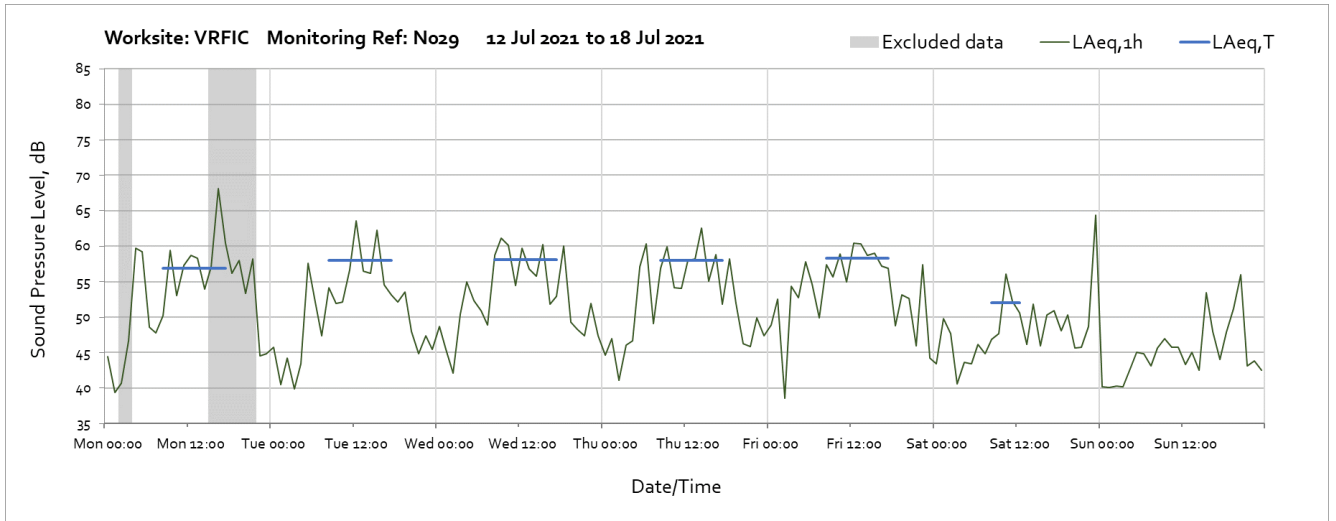




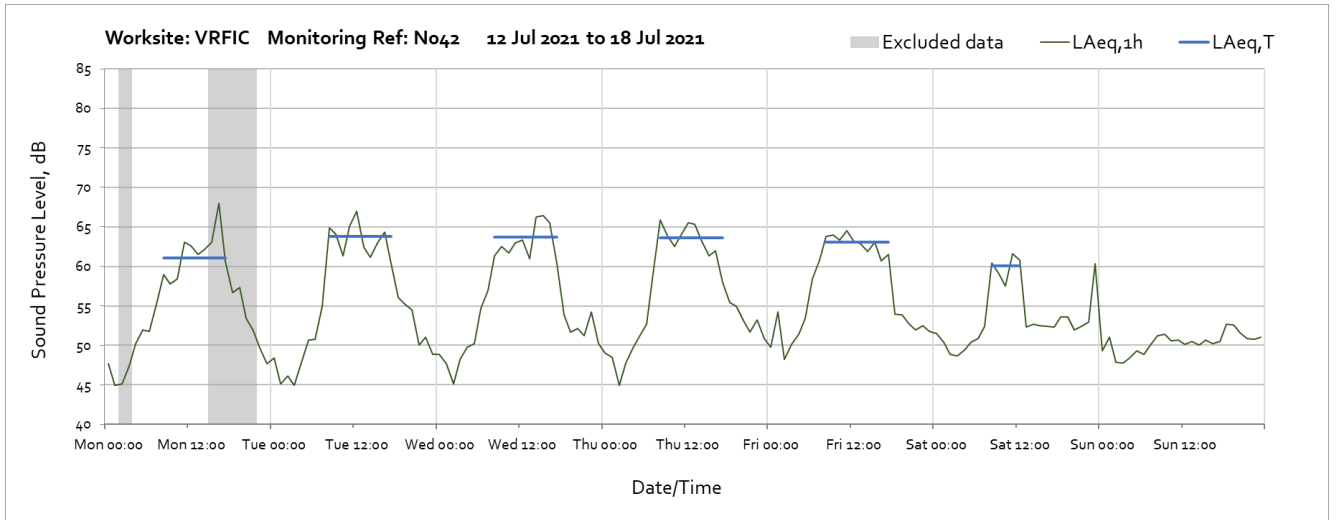
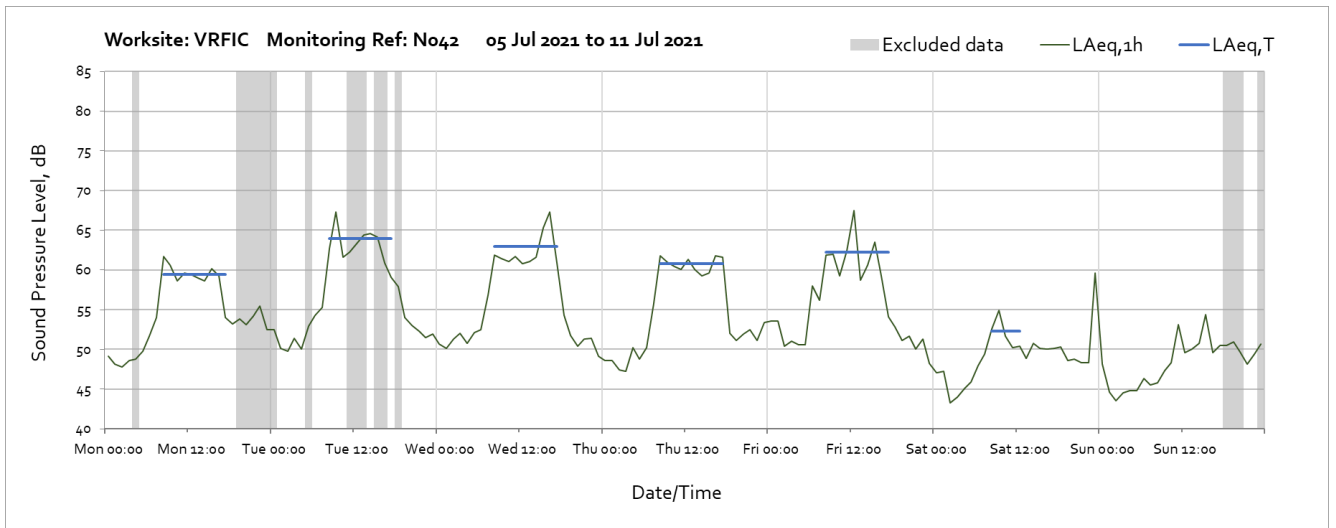
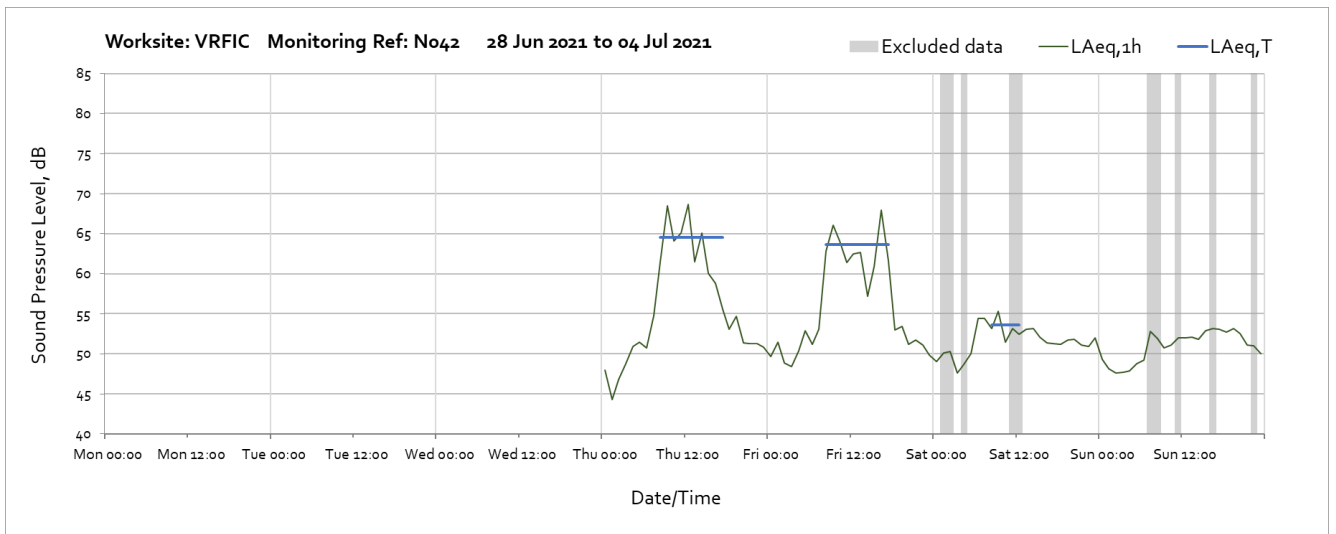


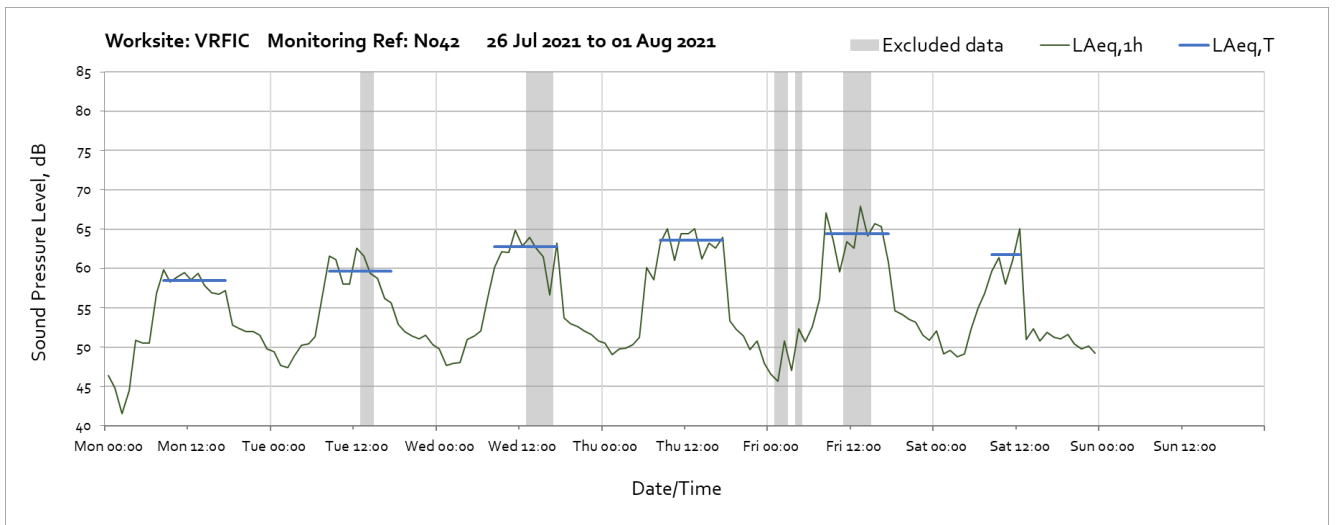
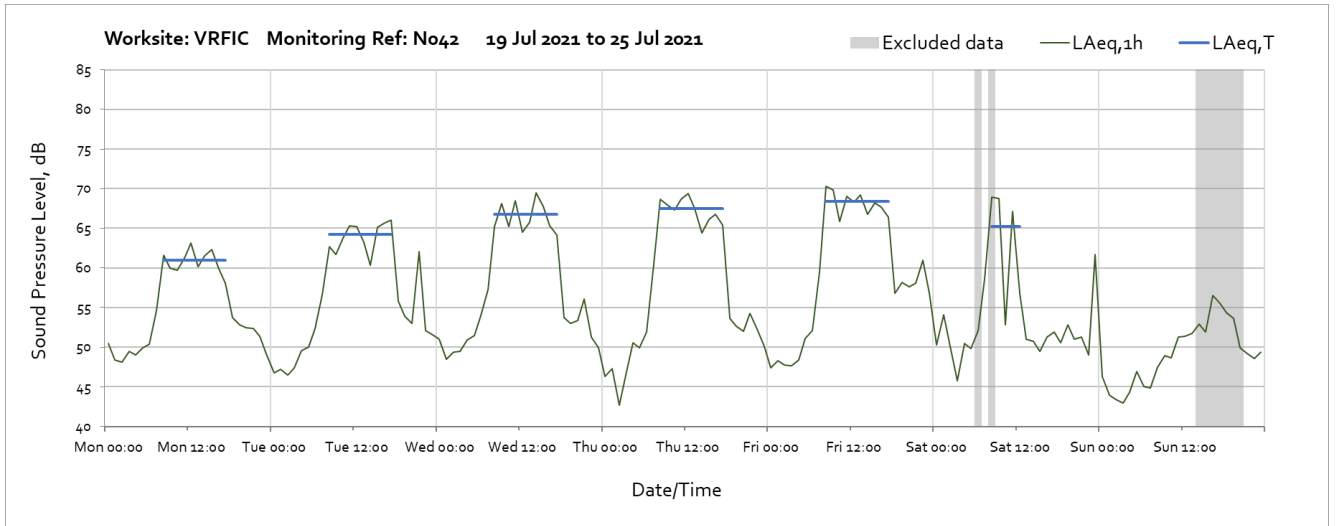
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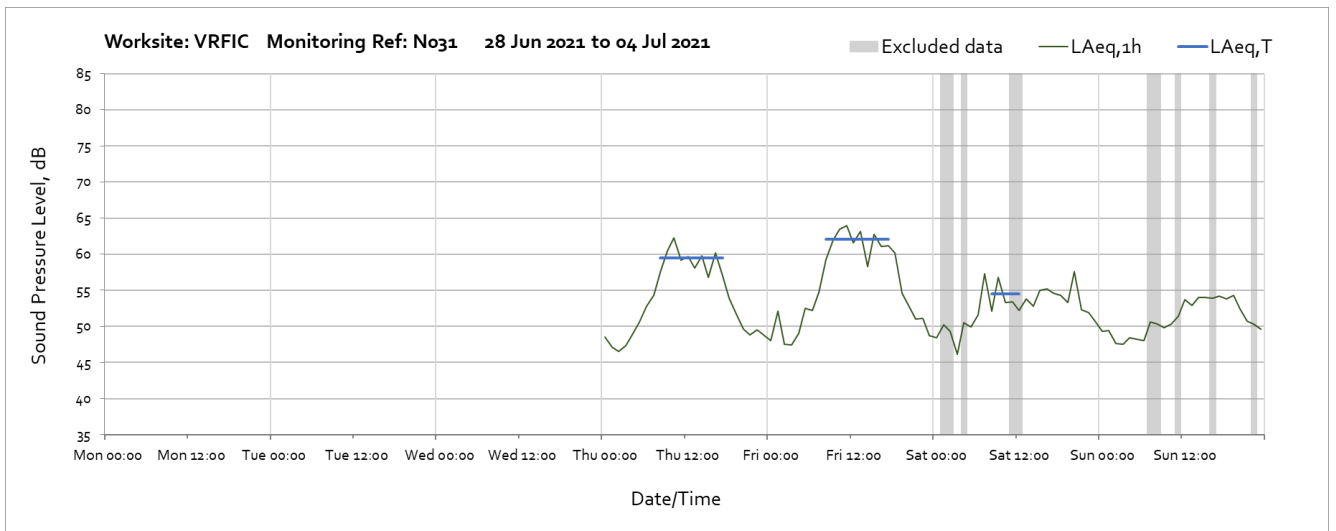


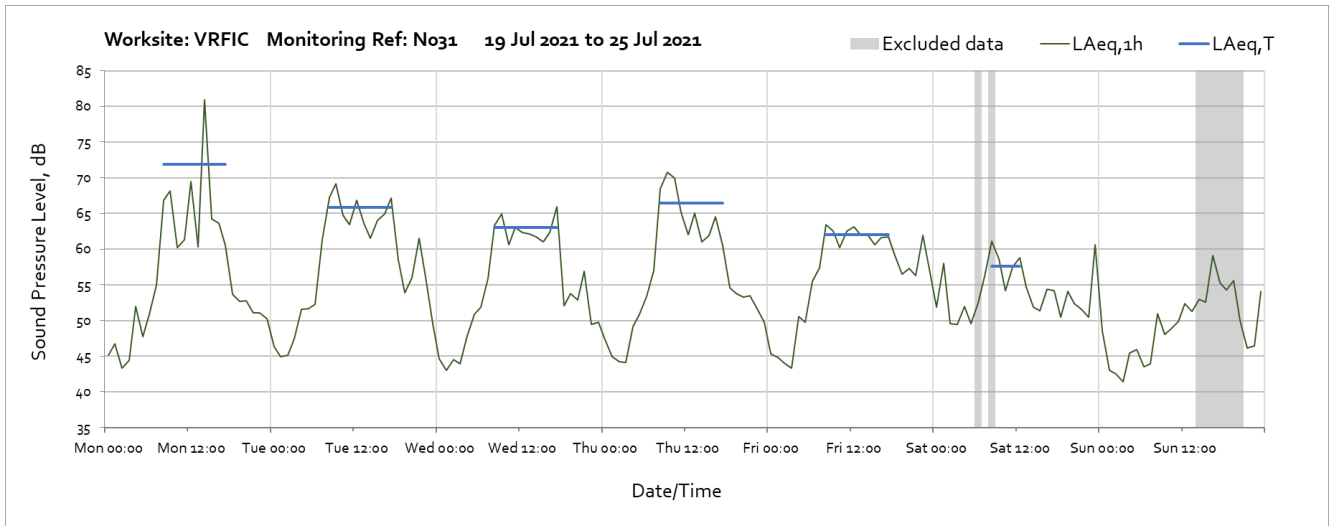
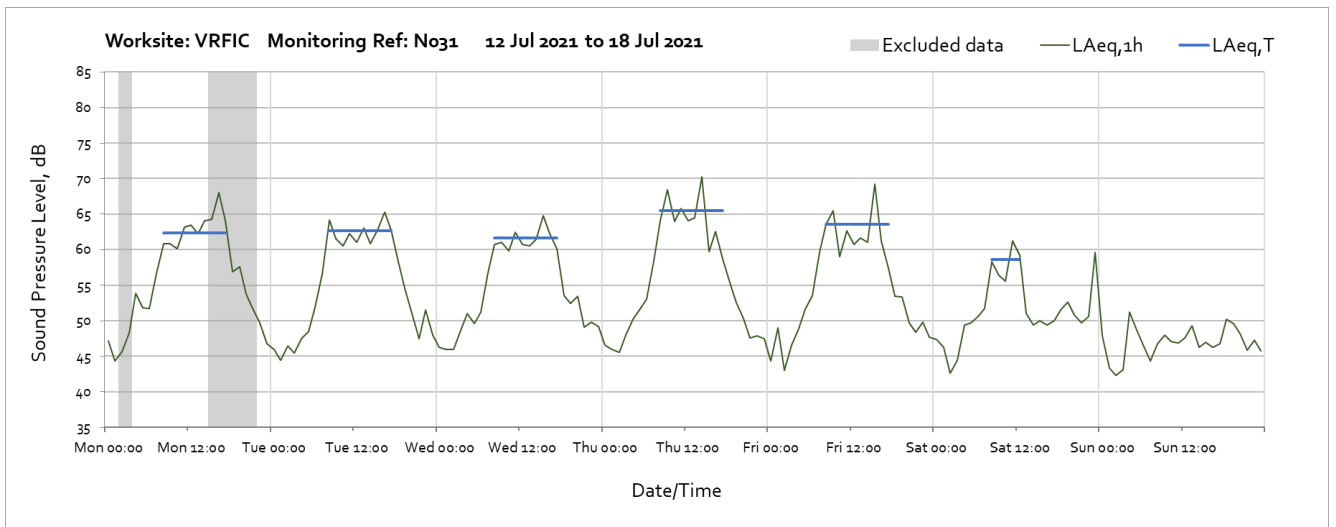
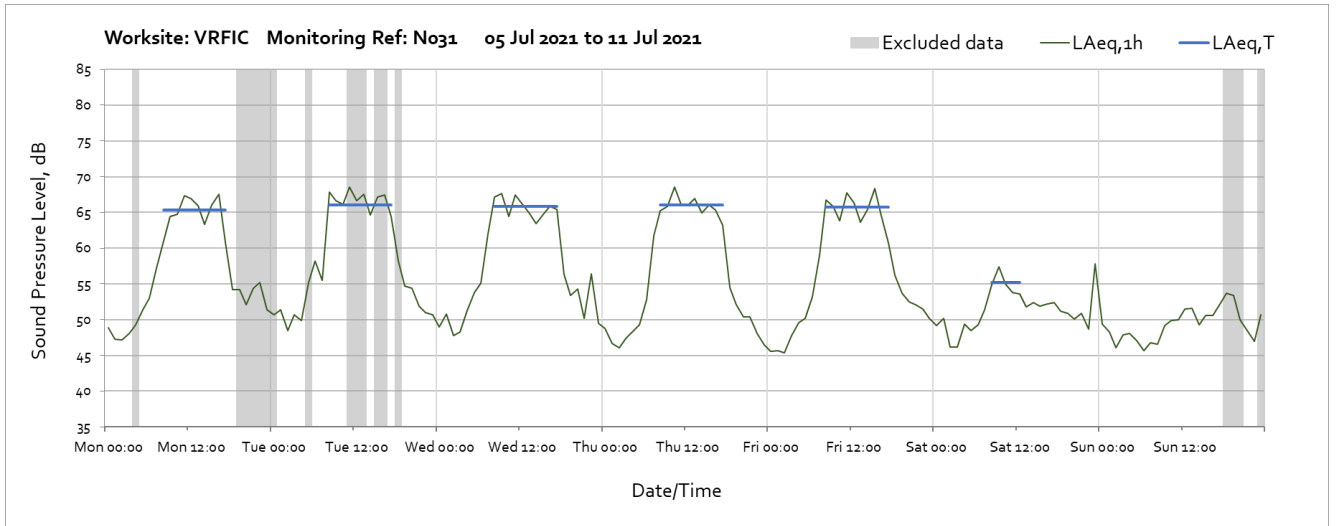
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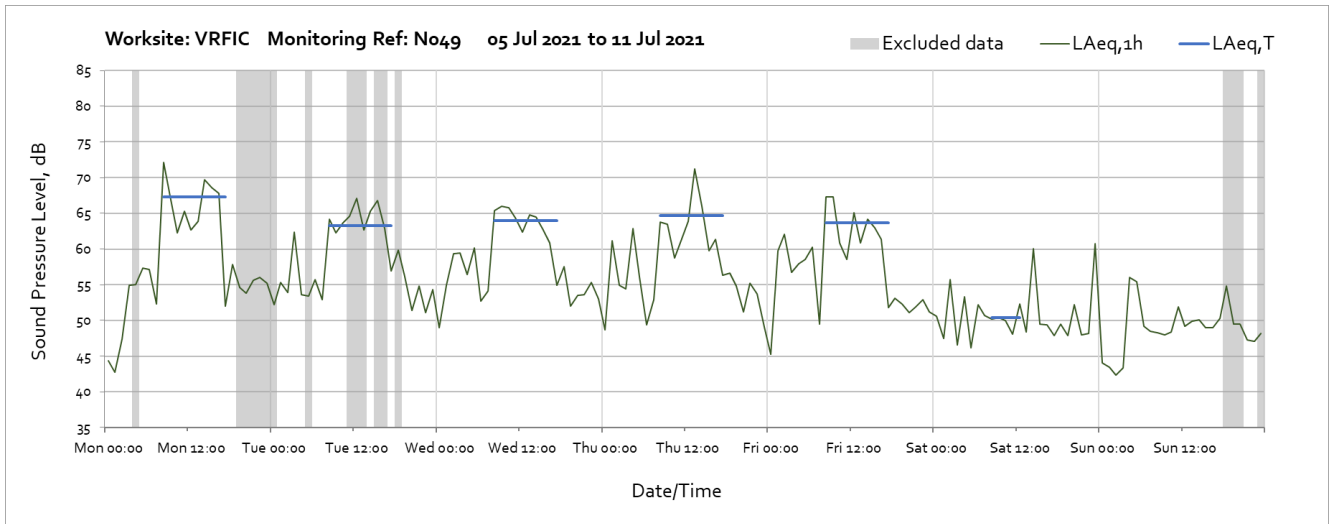
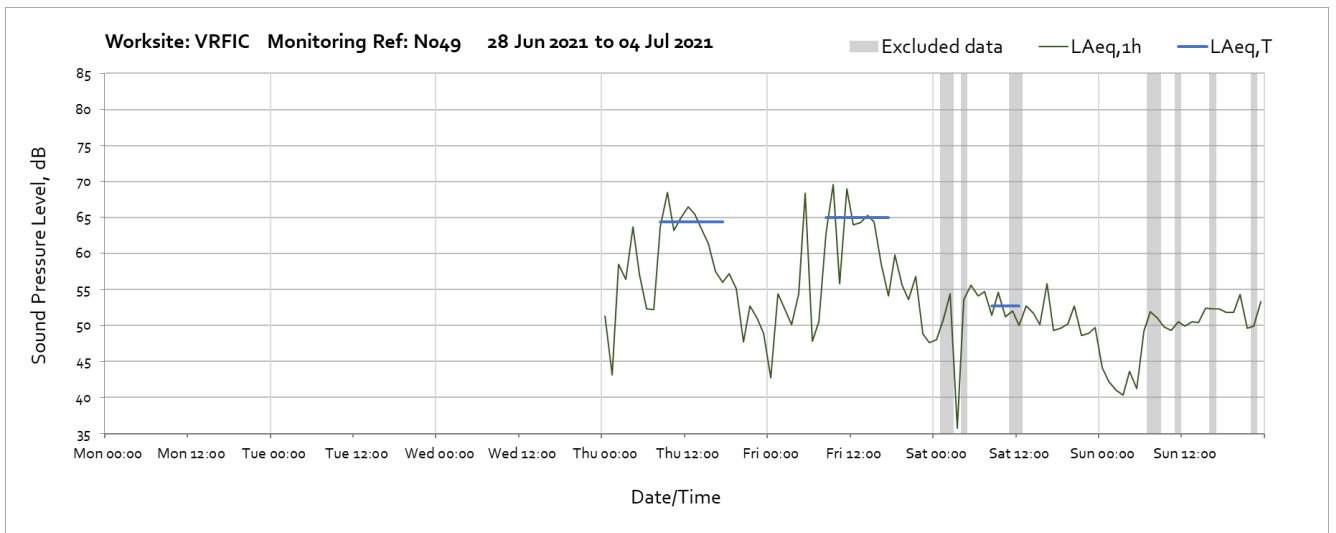
**Worksite: Victoria Road and Flat Iron Compound (VRFC) – Monitoring Ref: N031**

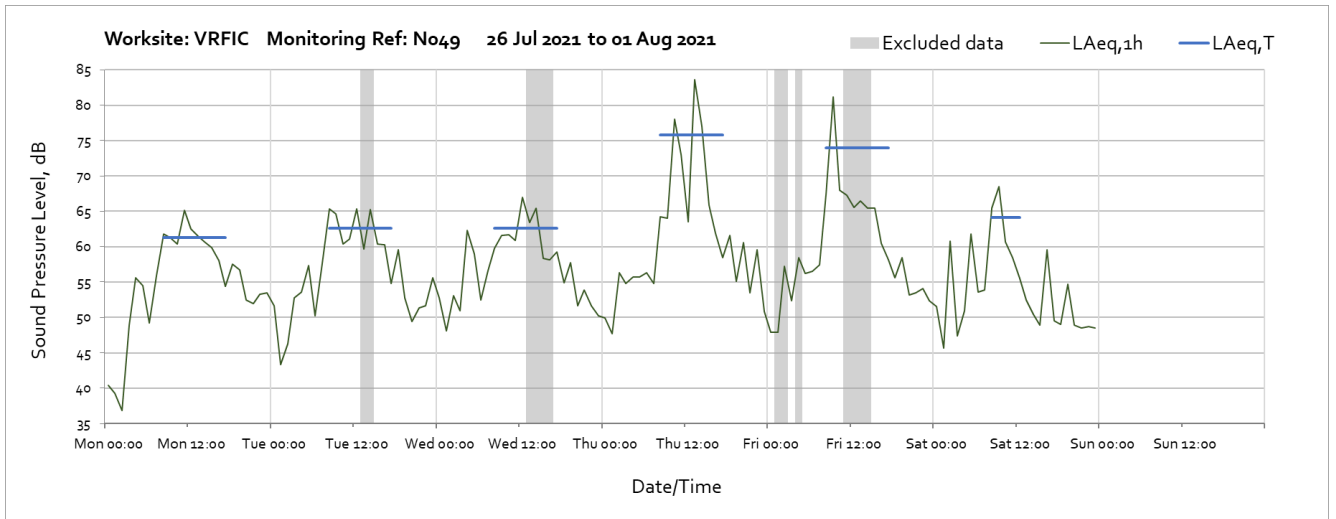
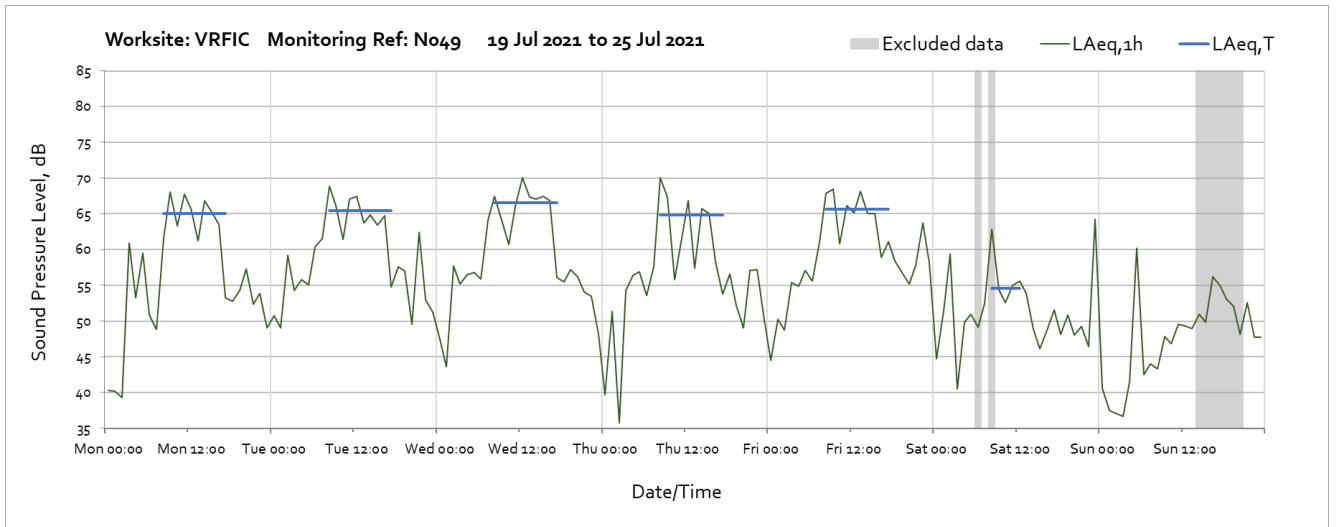
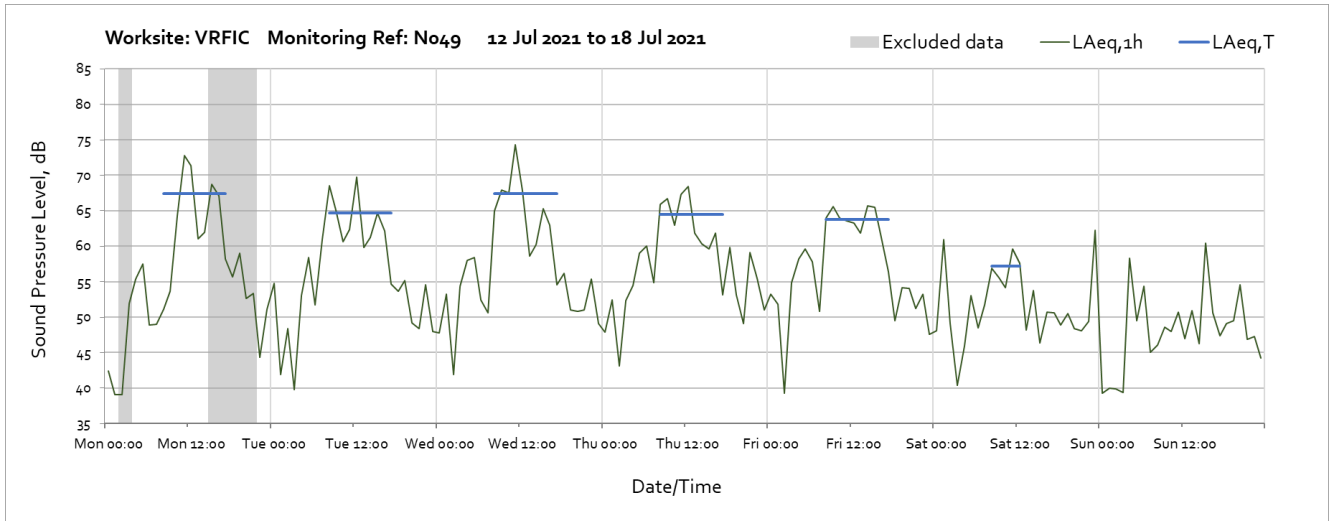






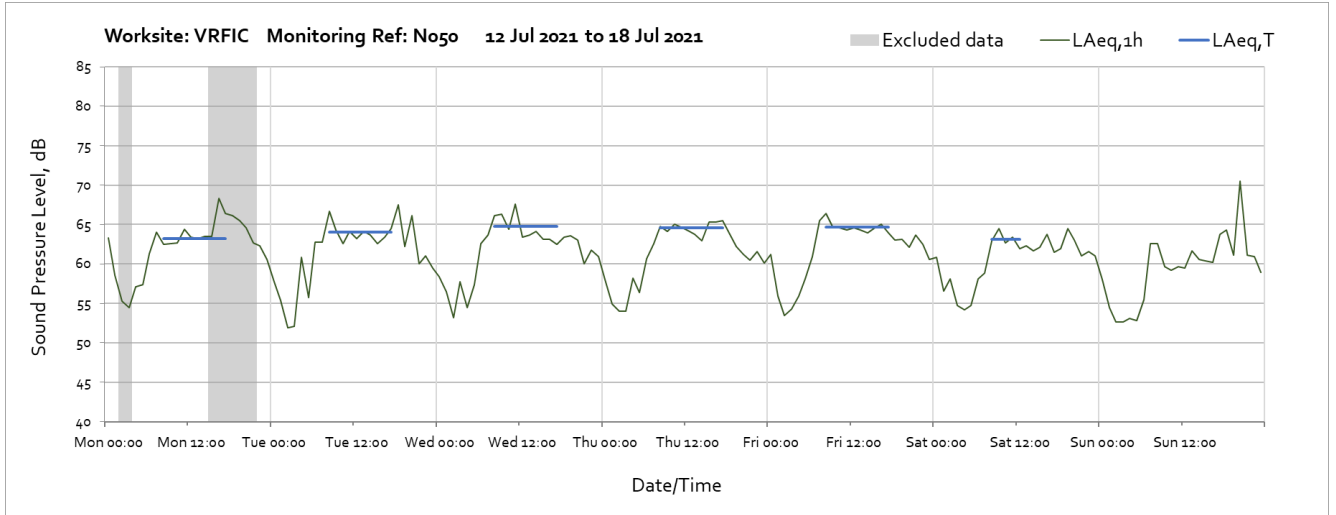
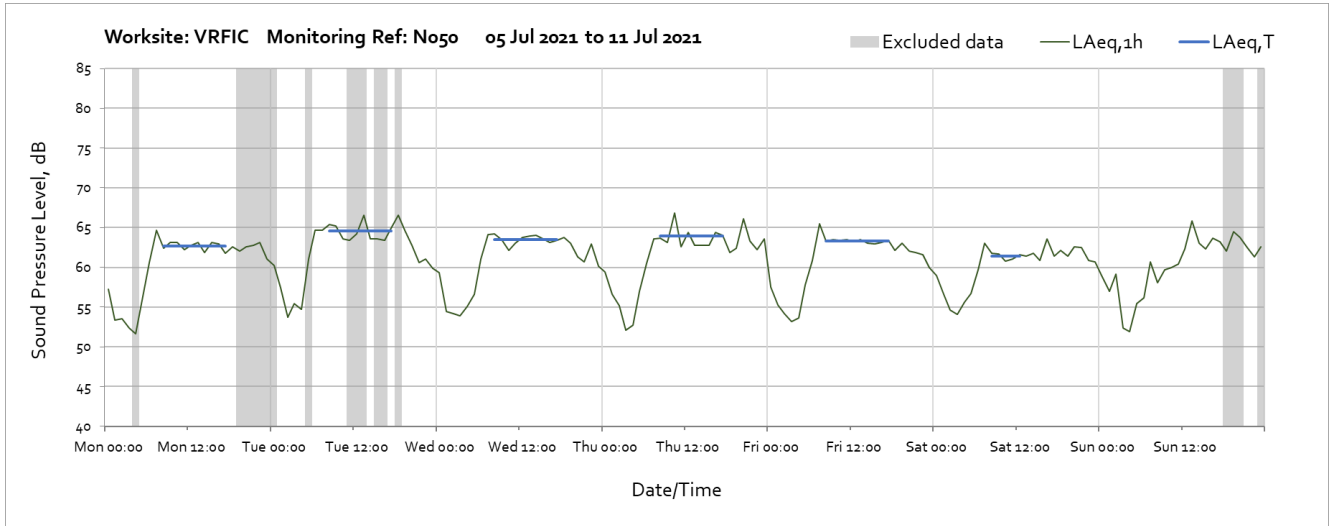
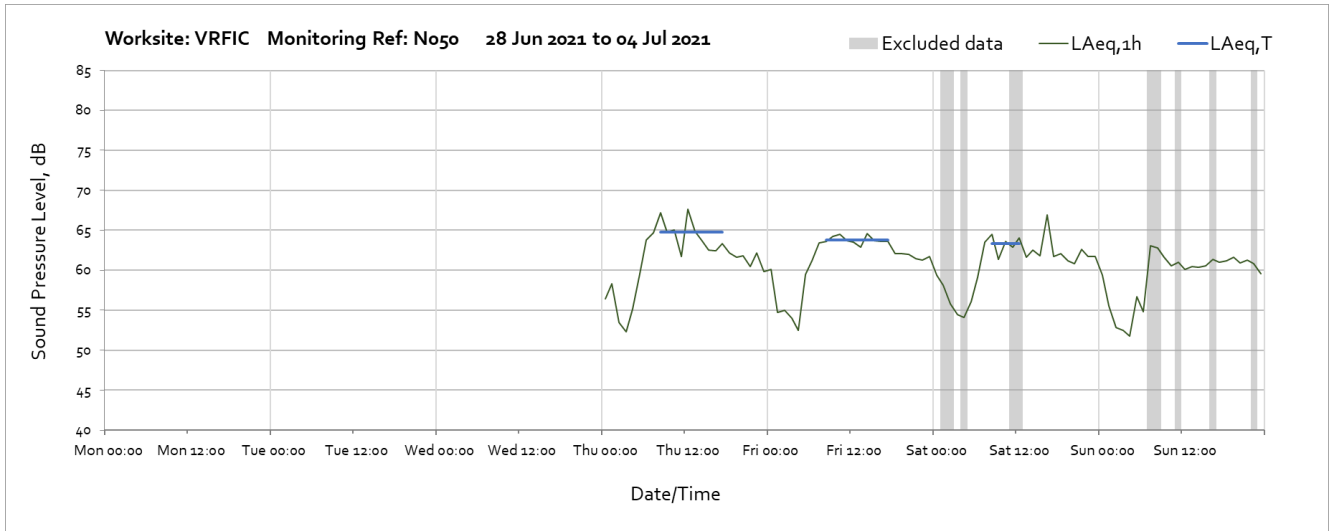
**Worksite: Victoria Road and Flat Iron Compound (VRFC) – Monitoring Ref: N049**

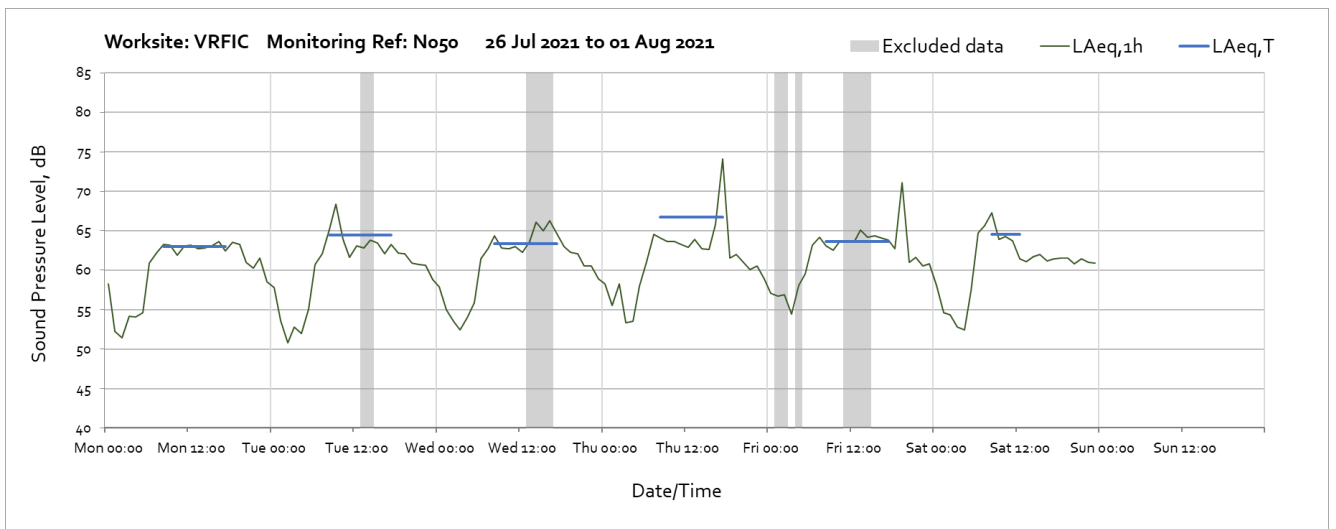
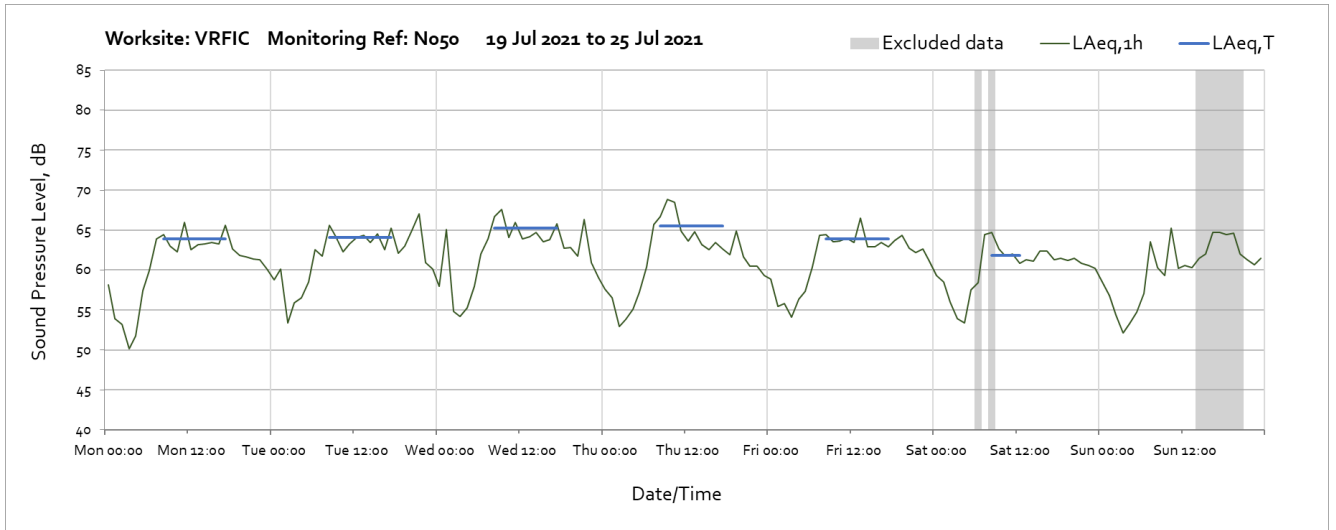




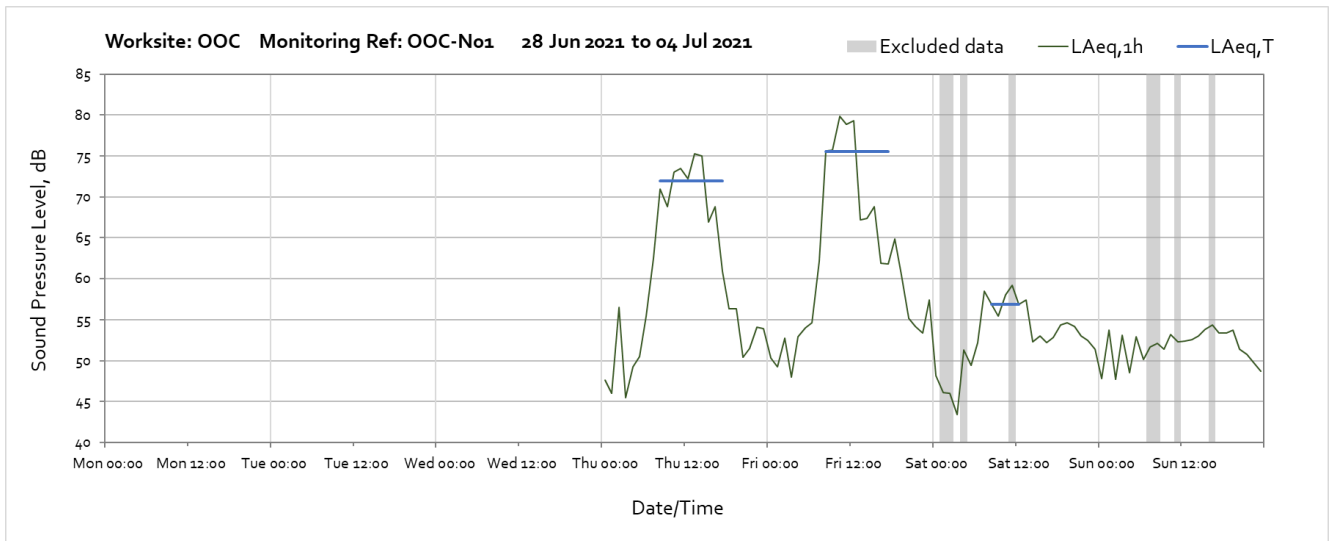


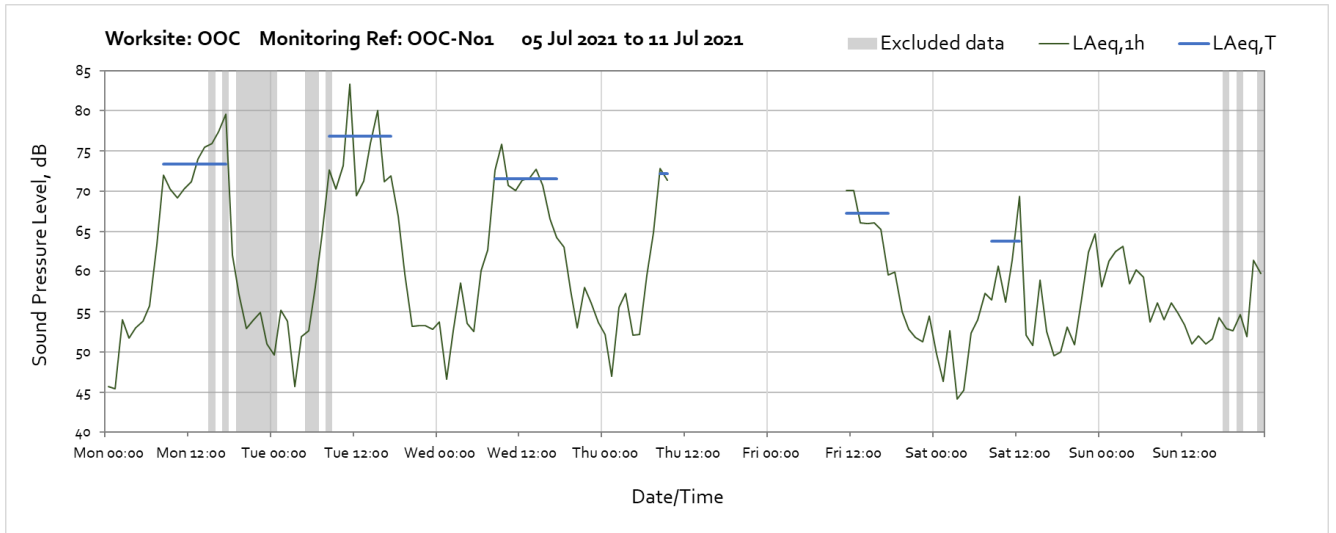
## Worksite: Victoria Road and Flat Iron Compound (VRFIC) – Monitoring Ref: N050



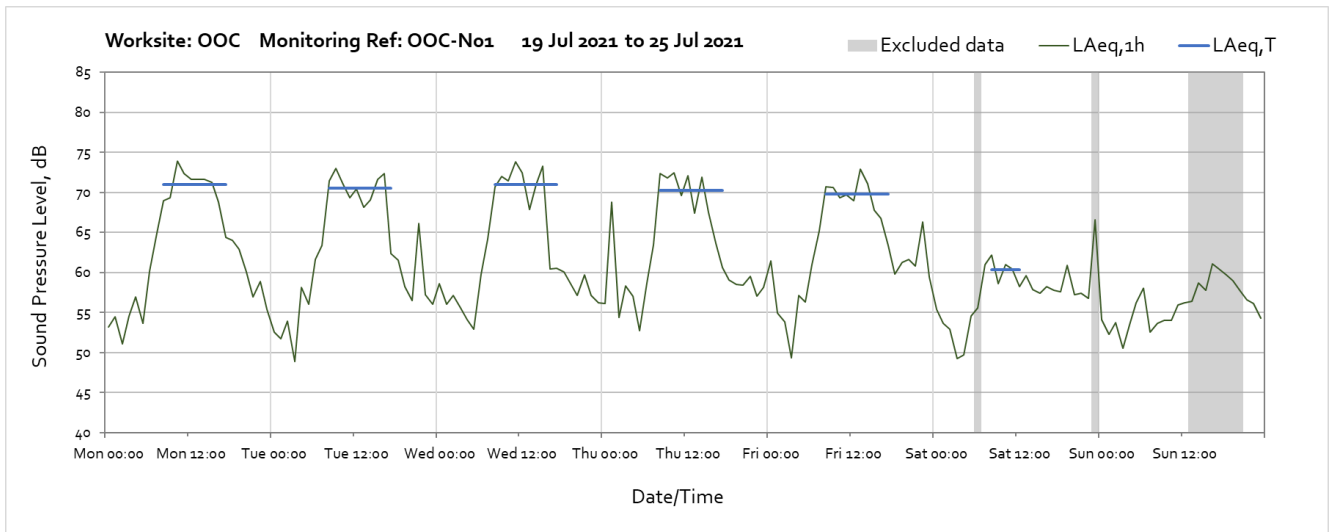
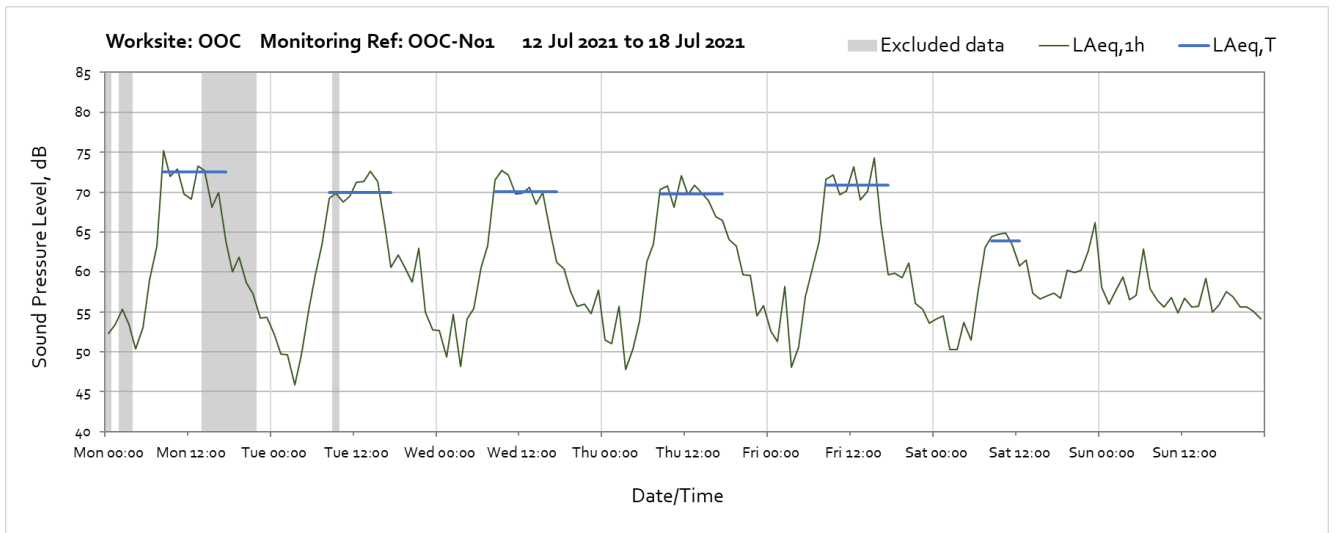


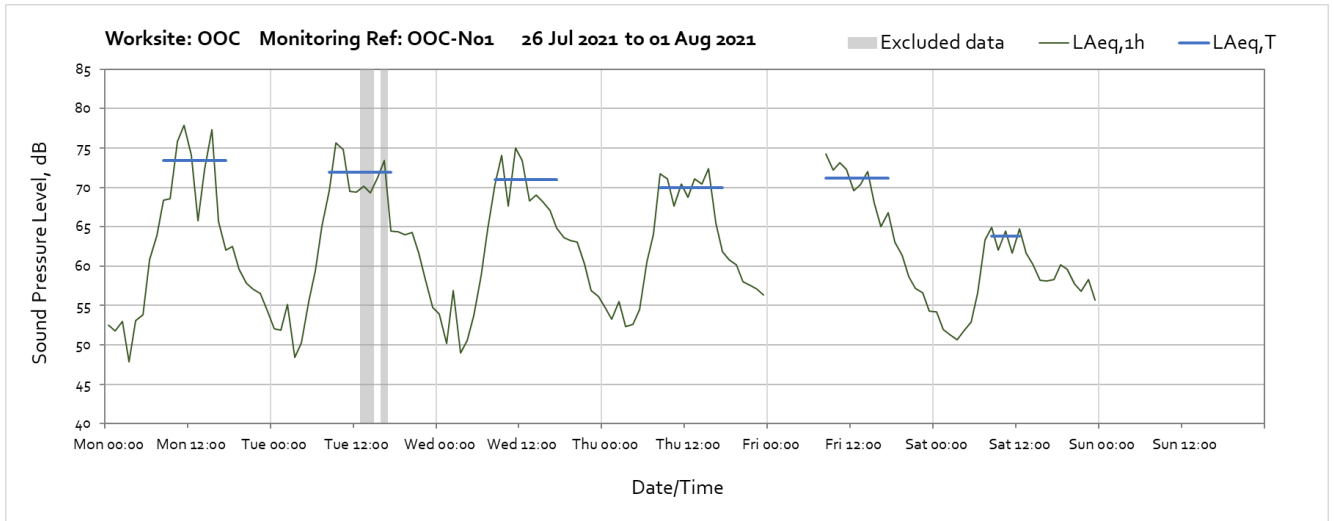
**Worksite: Oal Oak Common (OOC) - Monitoring Ref: OOC-N01**





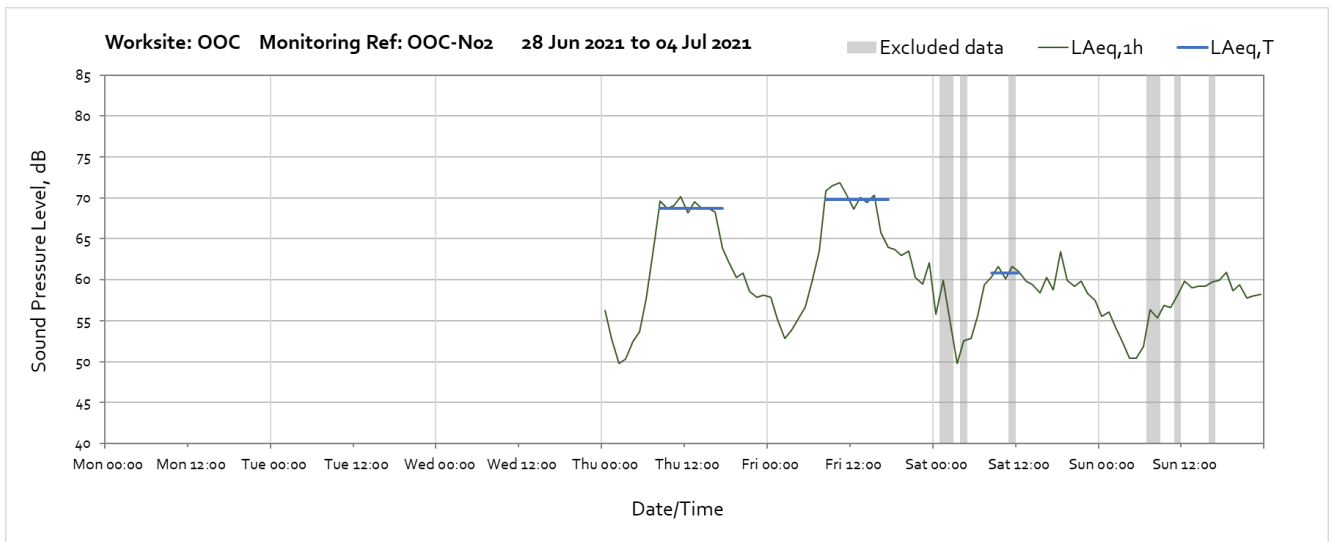
Note: Missing data between 10:00 on Thursday 8<sup>th</sup> July and 11:00 on Friday 9<sup>th</sup> July 2021 was due to removal of power at the monitoring location to enable vegetation clearance.

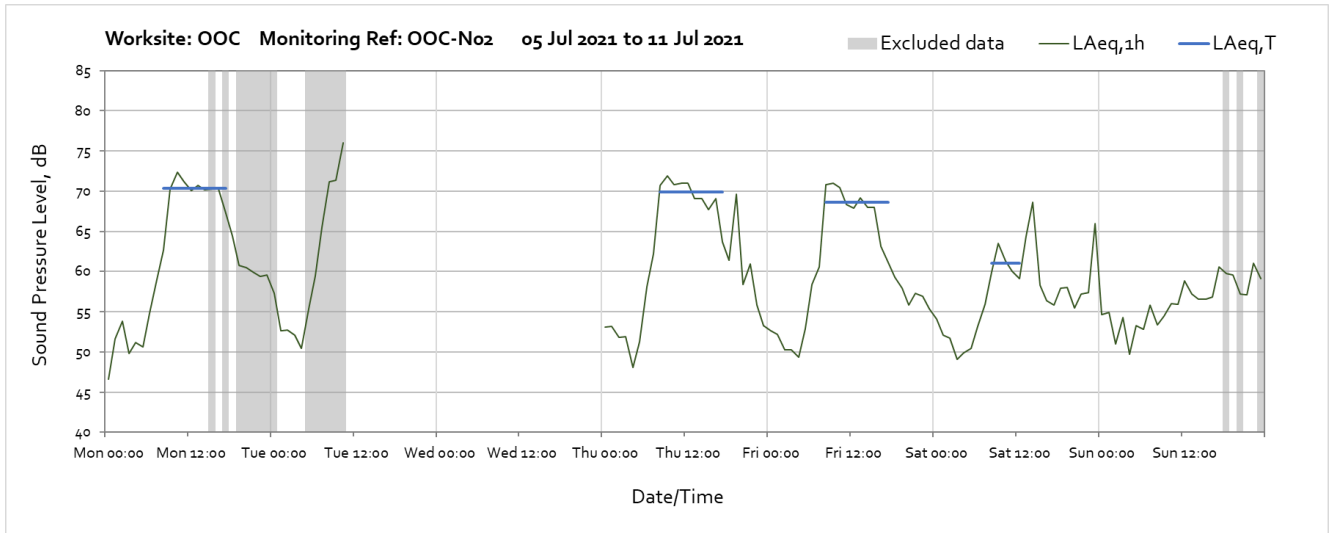




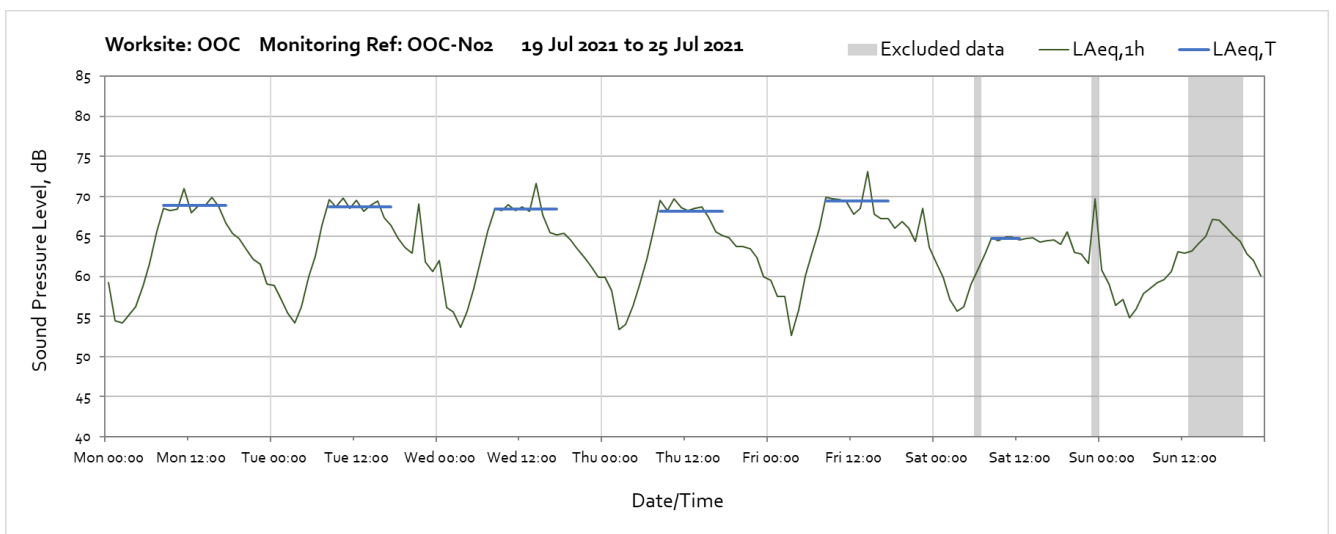
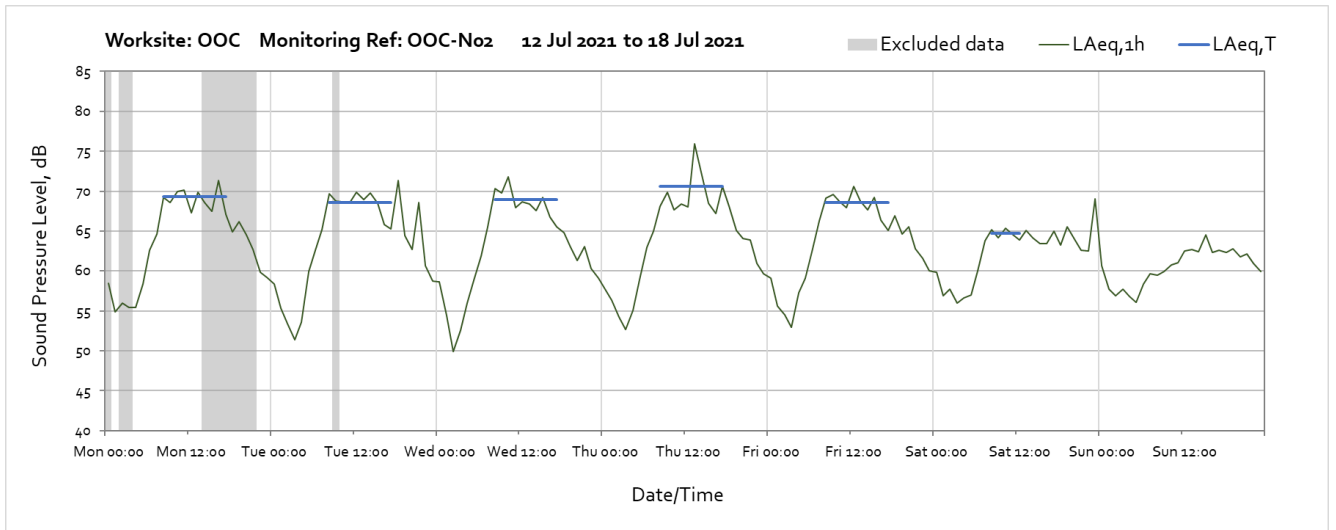
Note: Missing data between 00:00 and 08:00 on Friday 30<sup>th</sup> July 2021 was due to a monitoring station software error.

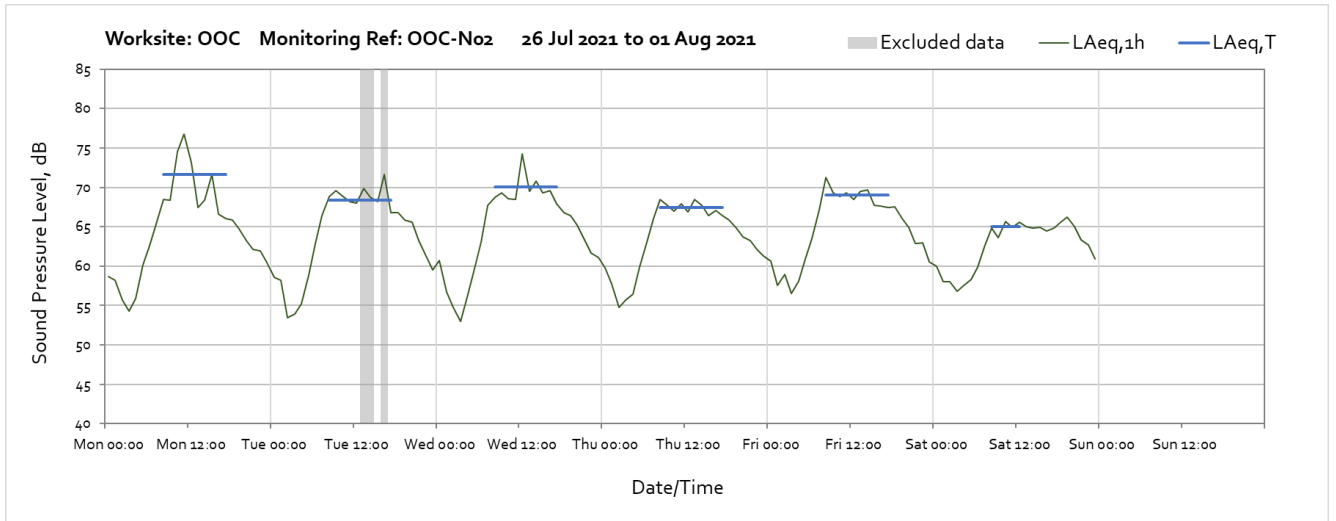
**Worksite: Oal Oak Common (OOC) – Monitoring Ref: OOC-N02**



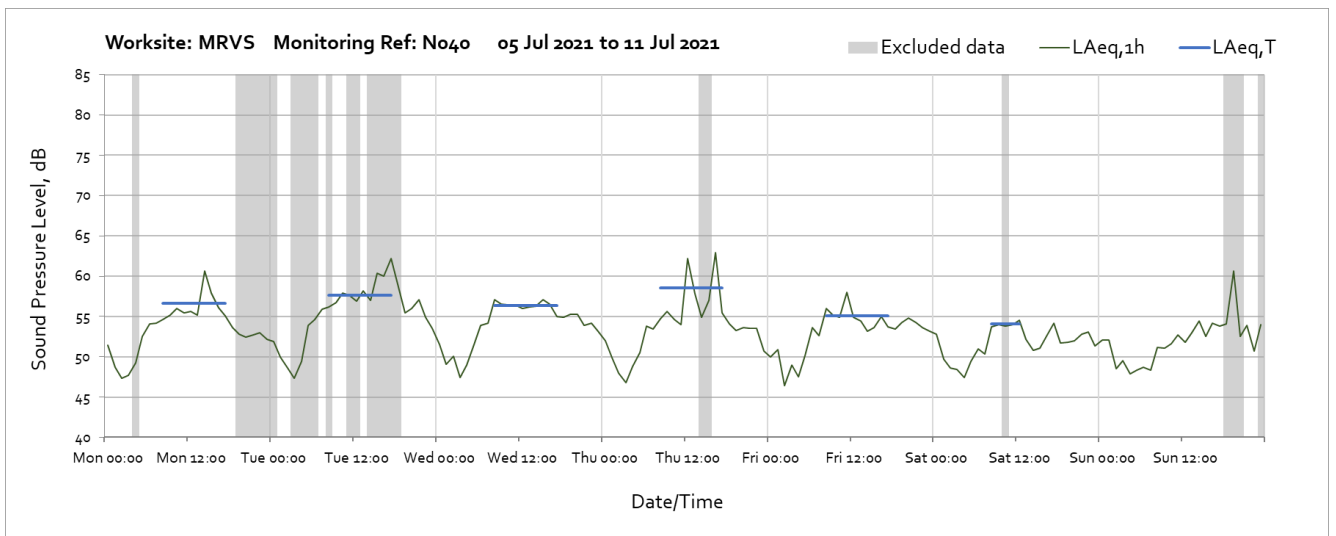
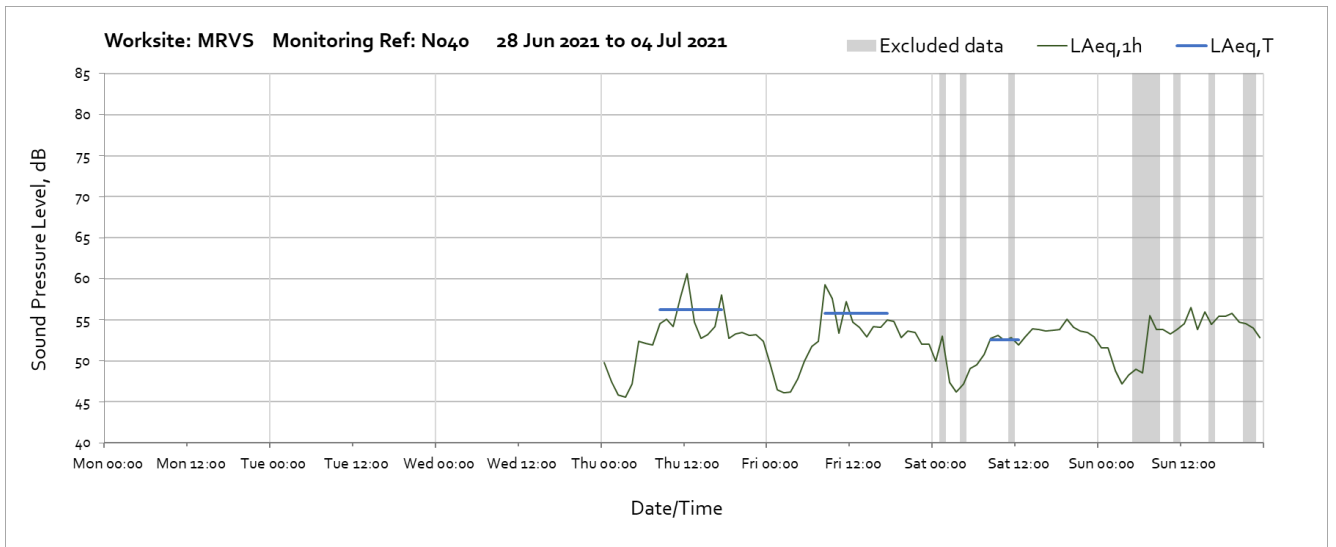


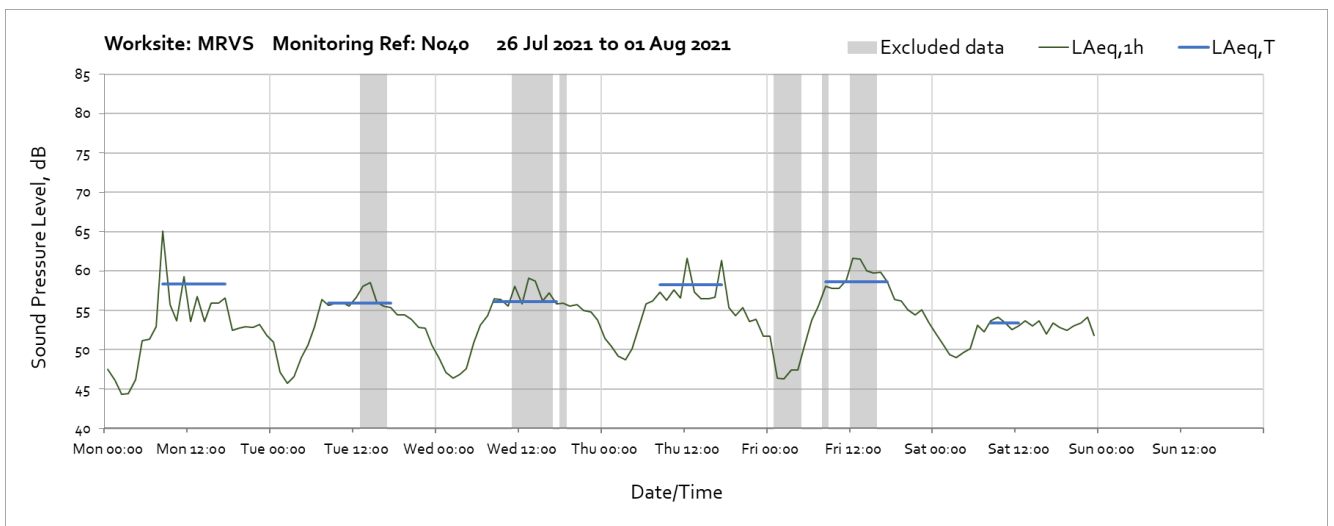
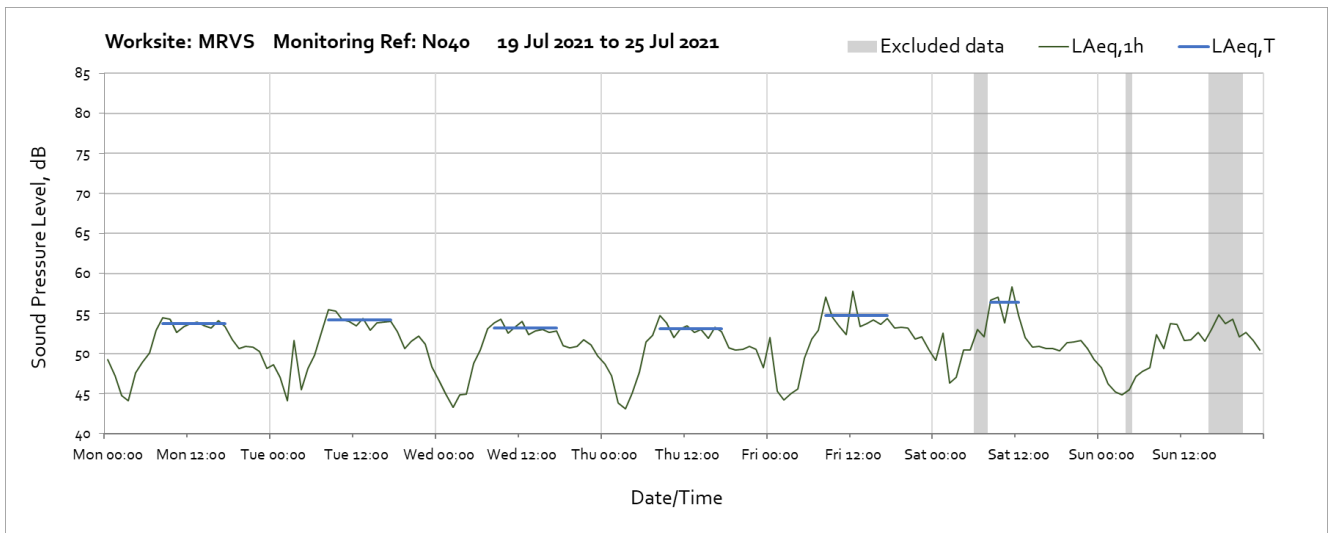
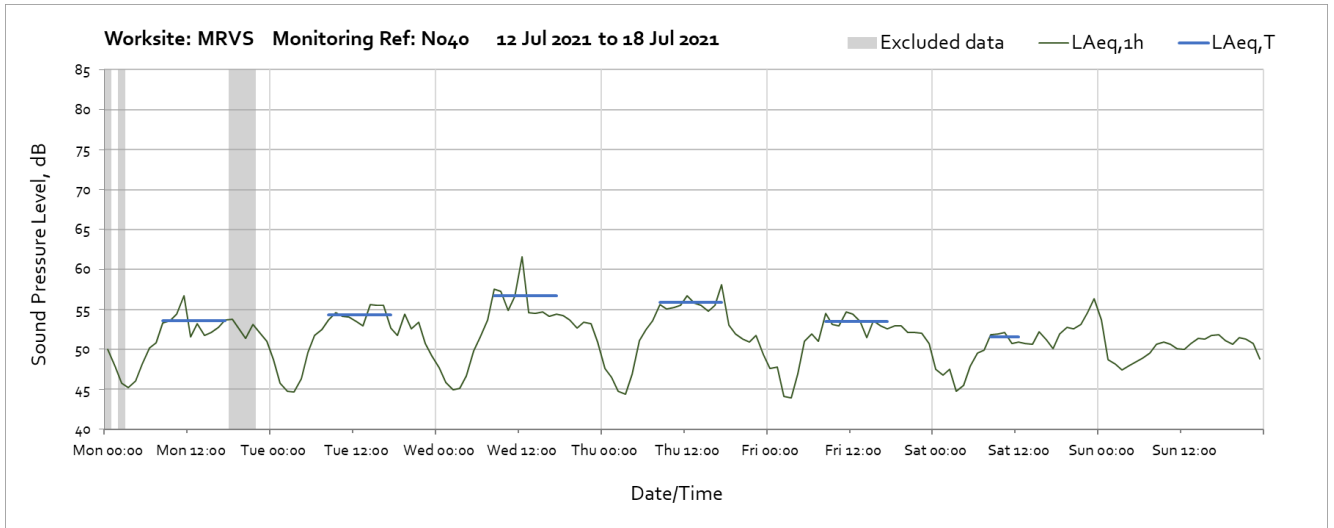
Note: High noise levels measured between 09:00 and 10:00 on Tuesday 6<sup>th</sup> July were due to routine maintenance at the monitoring station. Missing data between 11:00 on Tuesday 6<sup>th</sup> July and 00:00 on Thursday 8<sup>th</sup> July 2021 was due to a monitoring station software error.



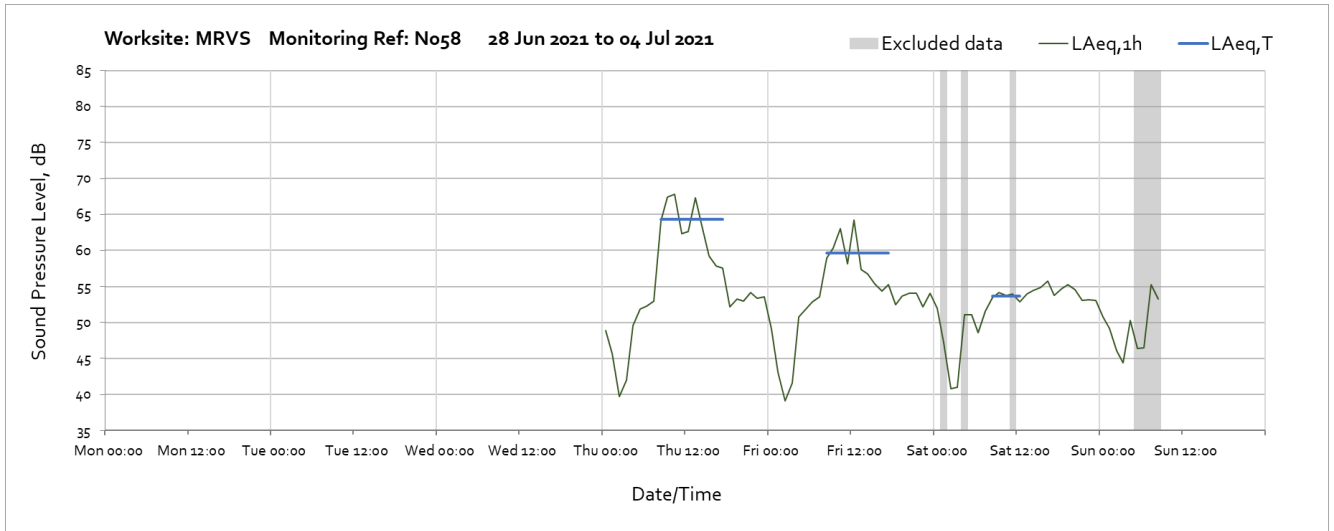


**Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N040**

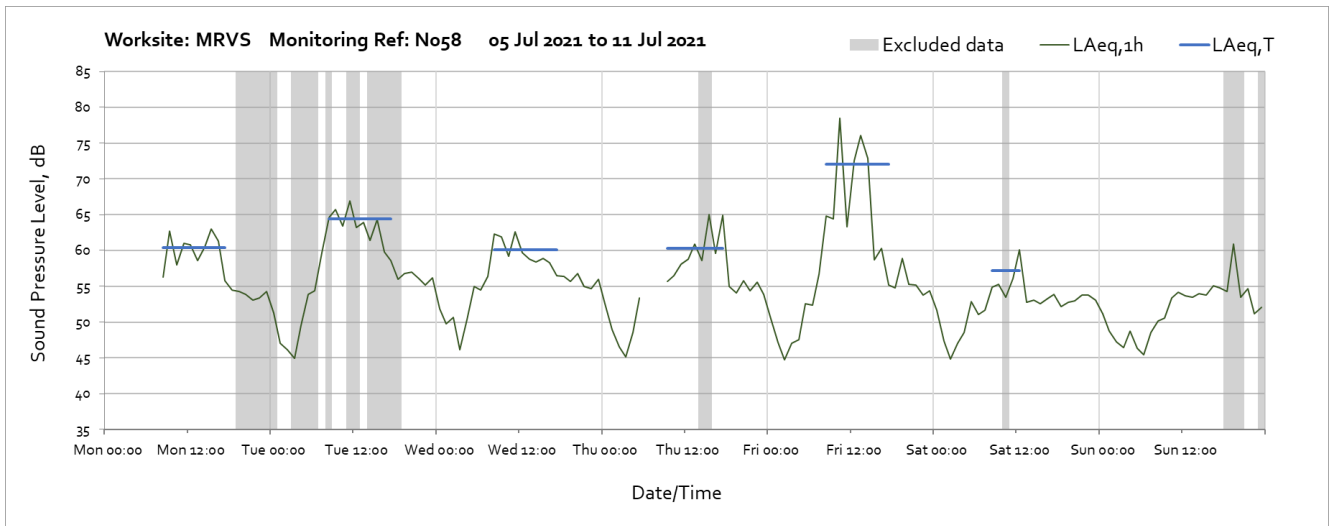




## Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N058

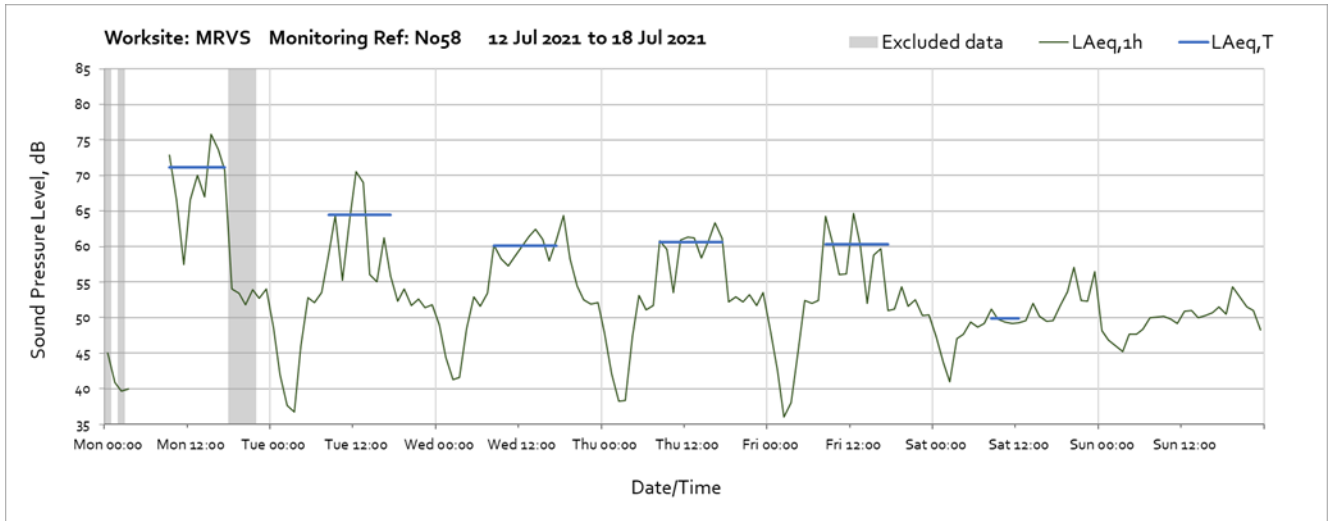


Note: Missing data between 09:00 on Sunday 4<sup>th</sup> July and 08:00 on Monday 5<sup>th</sup> July 2021 was due to loss of power at the monitor location.

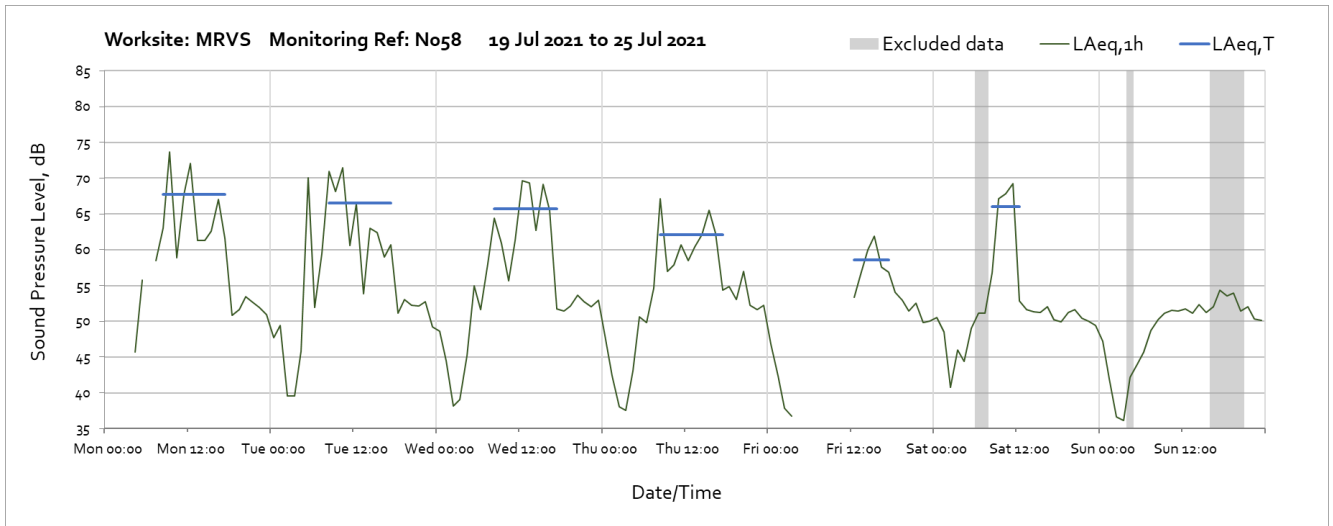


Note: Missing data between 09:00 on Sunday 4<sup>th</sup> July and 08:00 on Monday 5<sup>th</sup> July and between 06:00 and 08:00 on Thursday 8<sup>th</sup> July 2021 was due to loss of power at the monitor location.

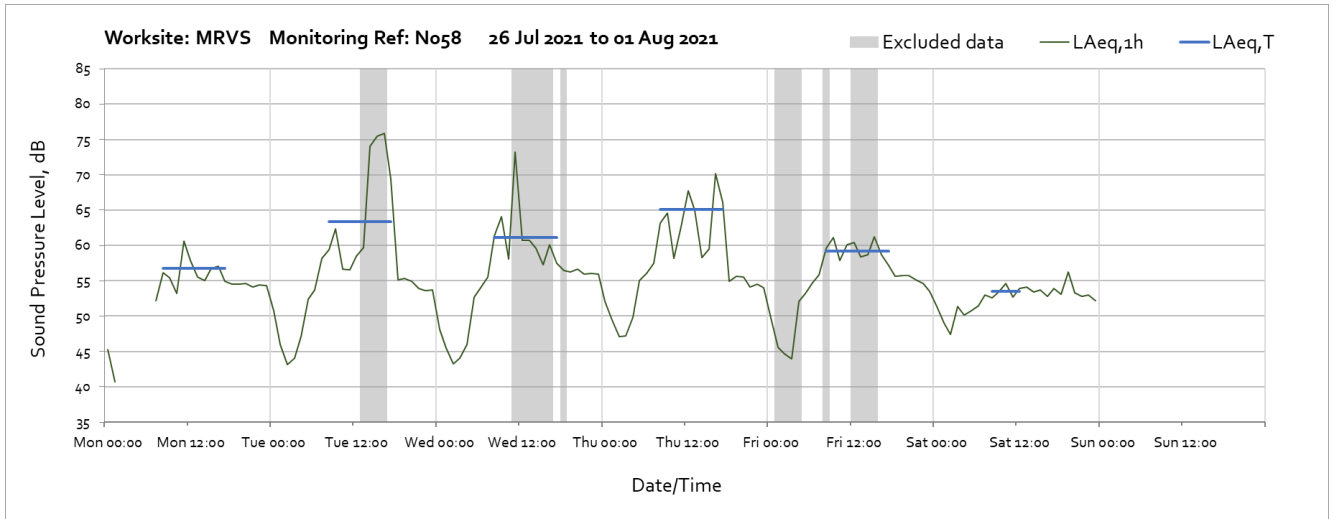




Note: Missing data between 04:00 and 08:00 on Monday 12<sup>th</sup> July 2021 was due to loss of power at the monitor location.

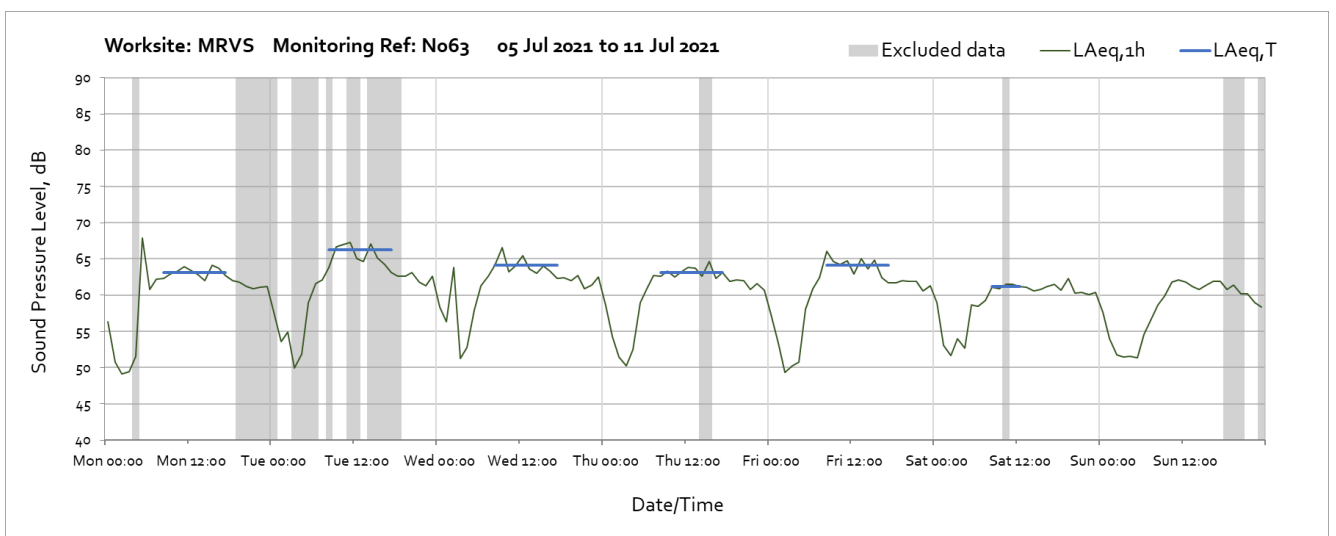
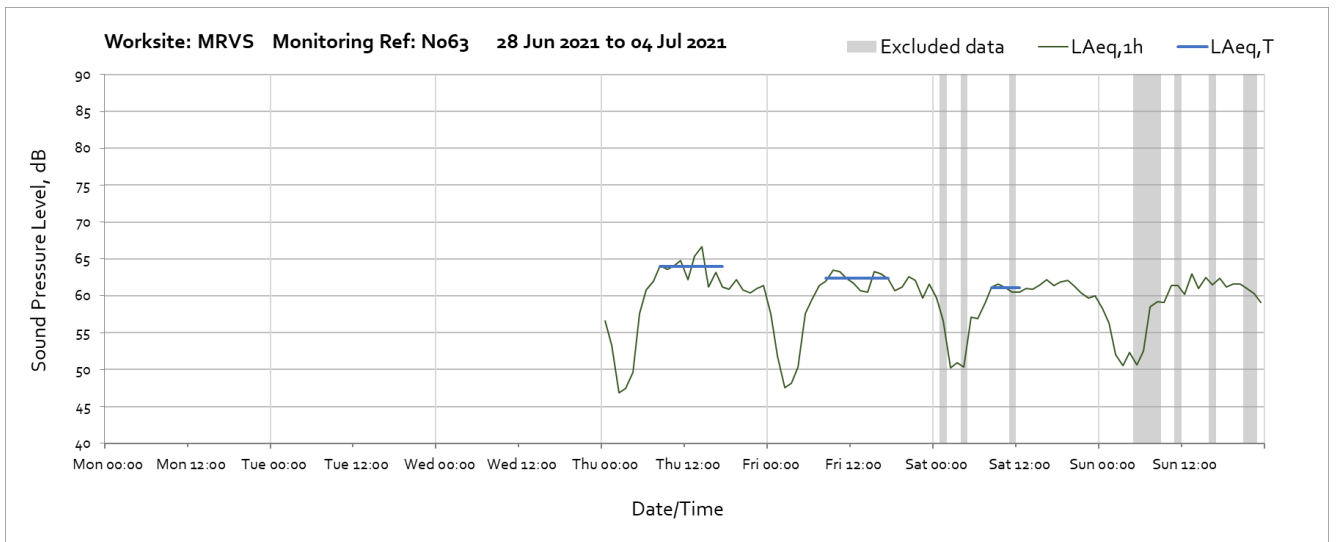


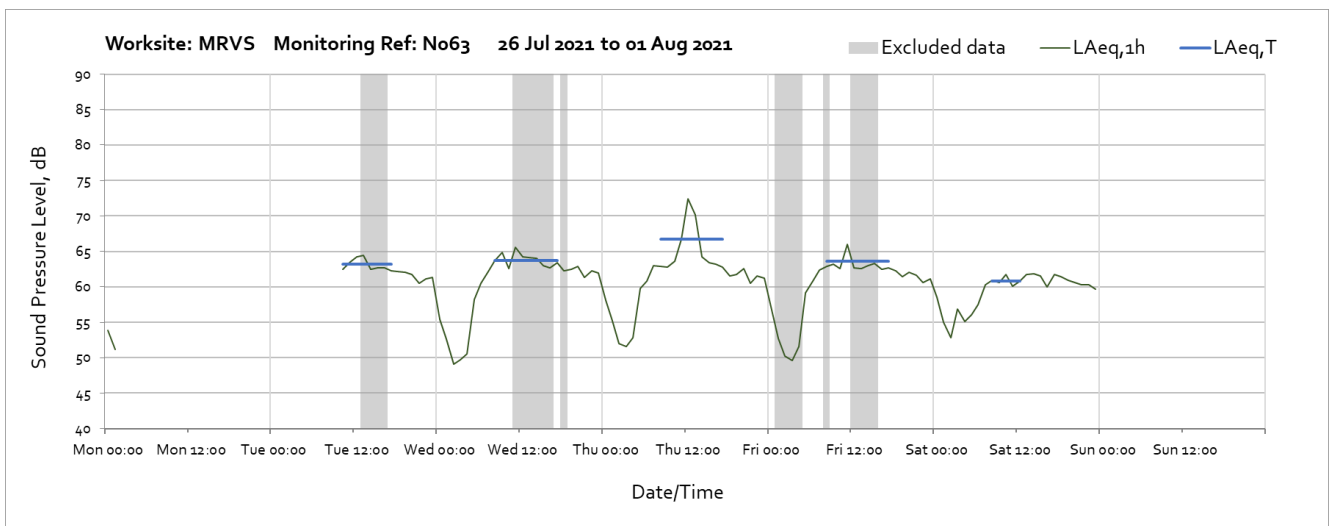
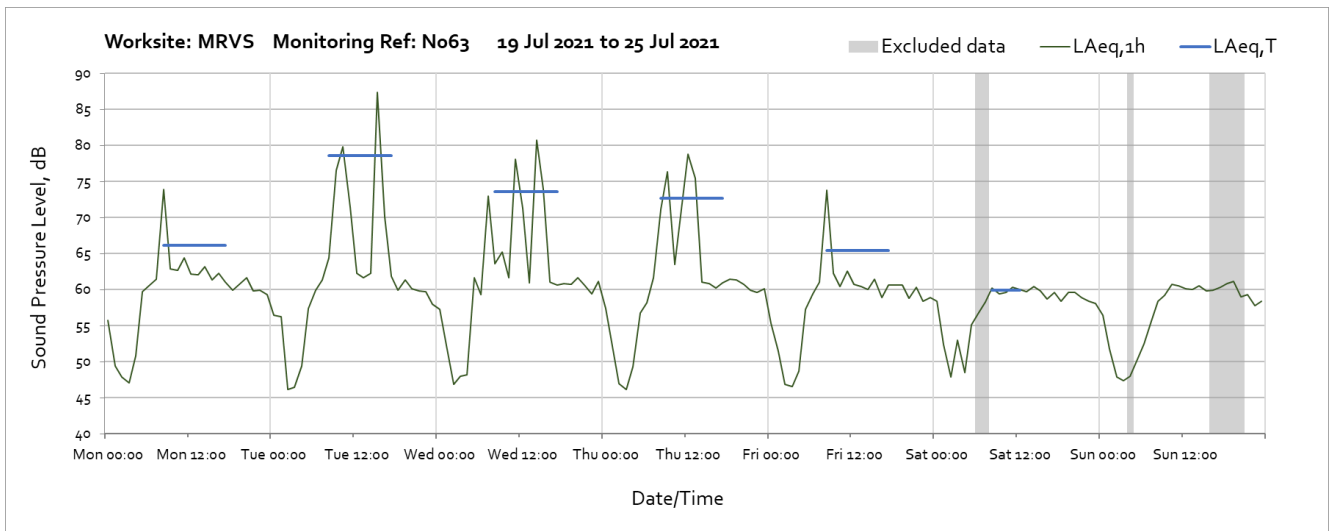
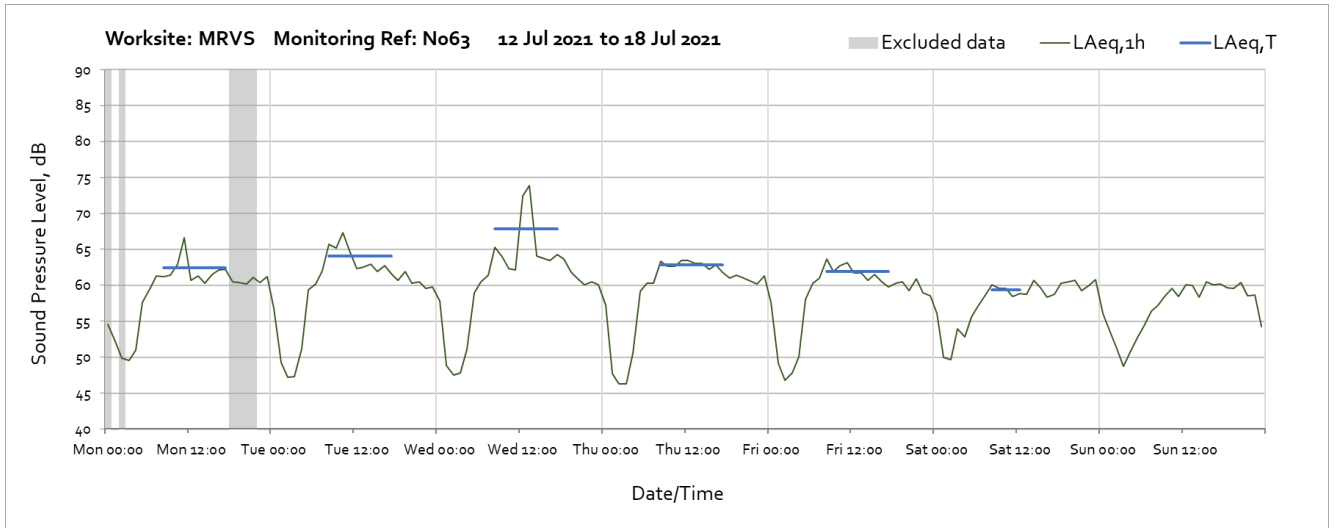
Note: Missing data between 00:00 and 06:00 on Monday 19<sup>th</sup> July 2021 was due to a monitoring station software error and missing data between 04:00 and 12:00 on Friday 23<sup>rd</sup> July 2021 was due to loss of power at the monitor location.



Note: Missing data between 02:00 and 07:00 on Friday 26<sup>th</sup> July 2021 was due to loss of power at the monitor location..

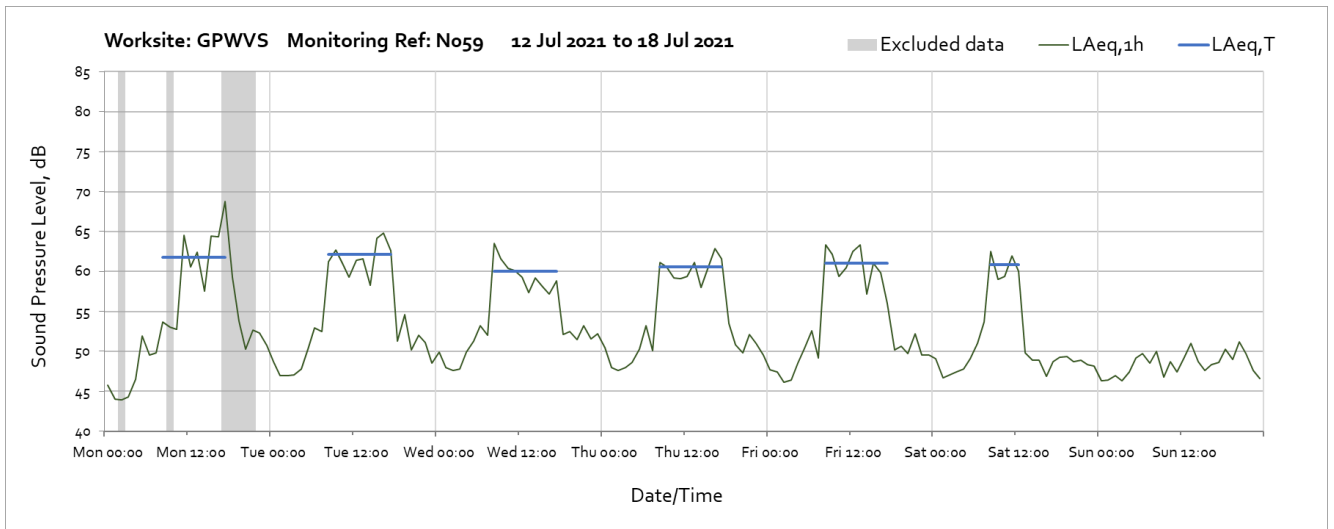
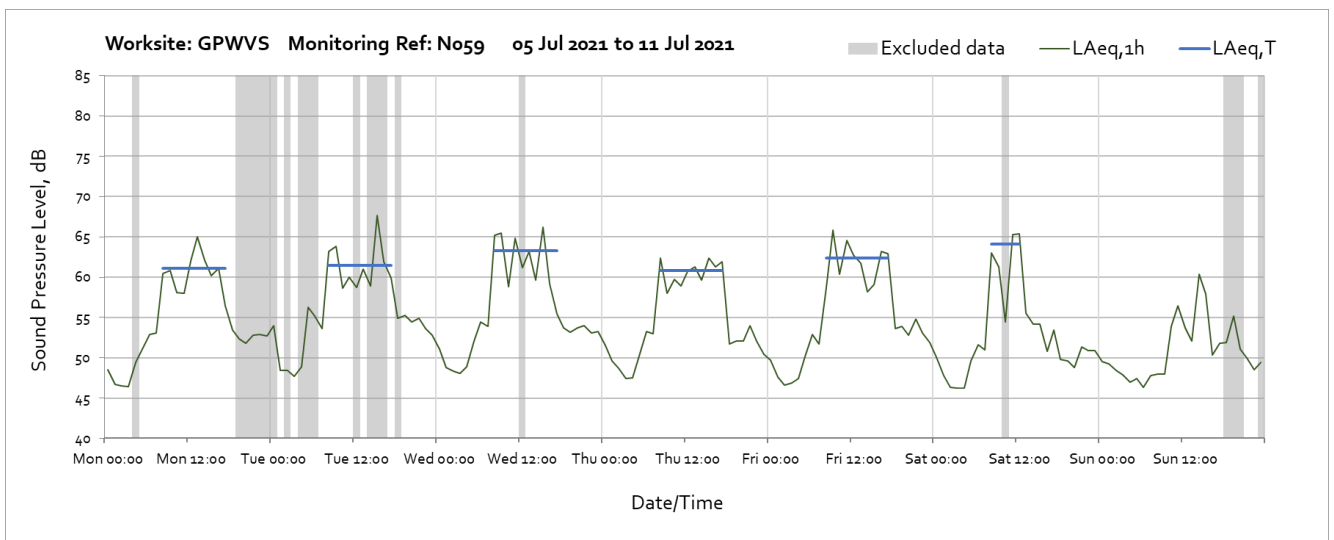
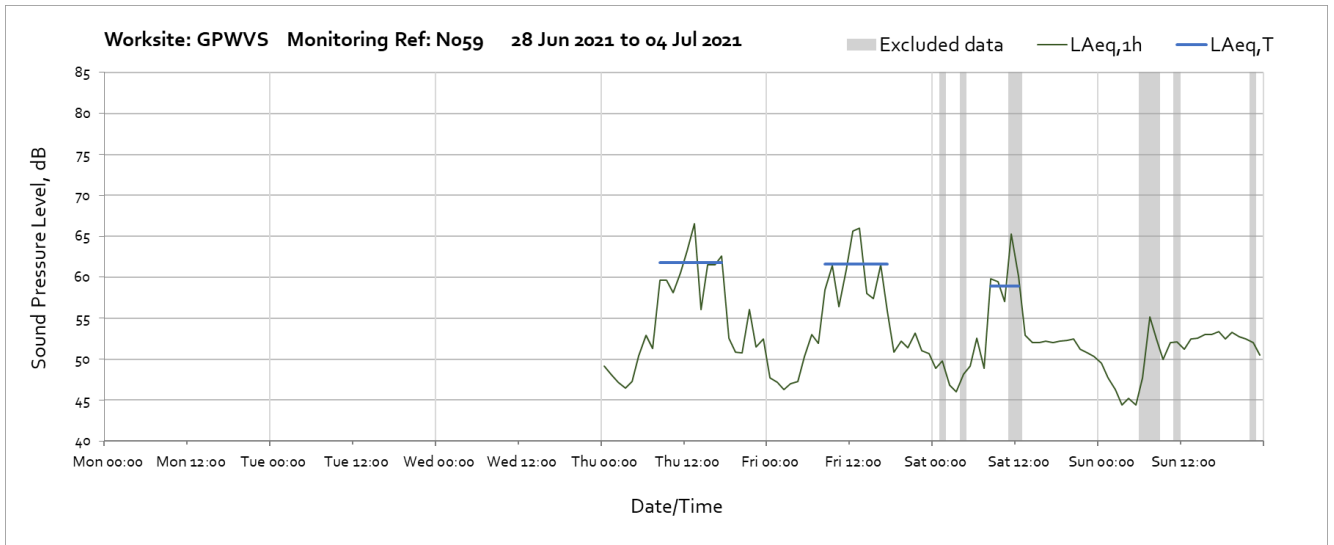
### Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N063

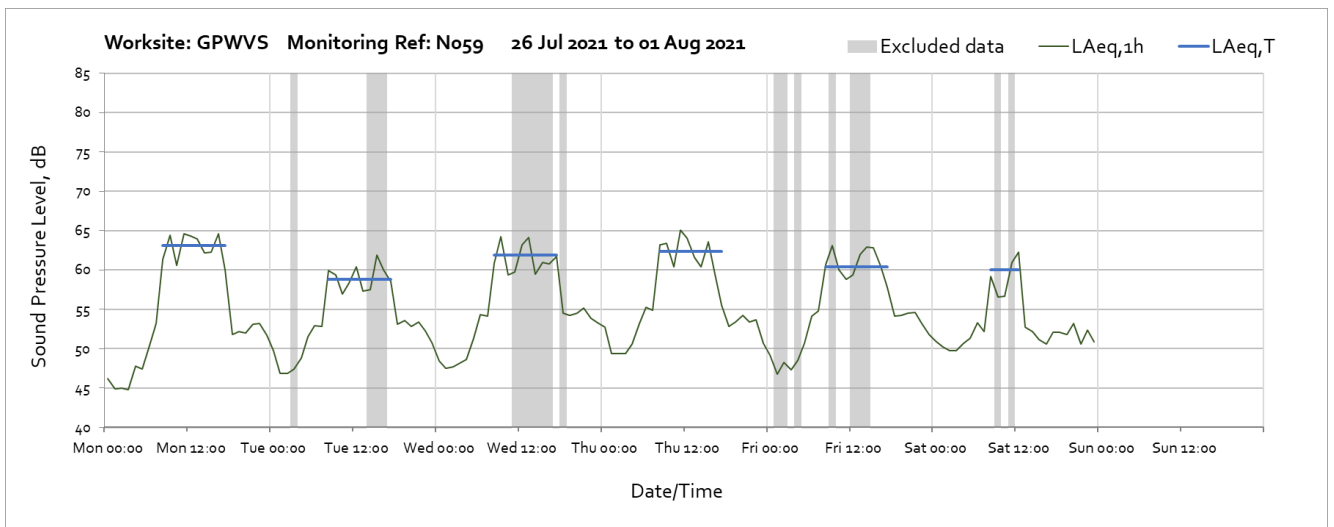
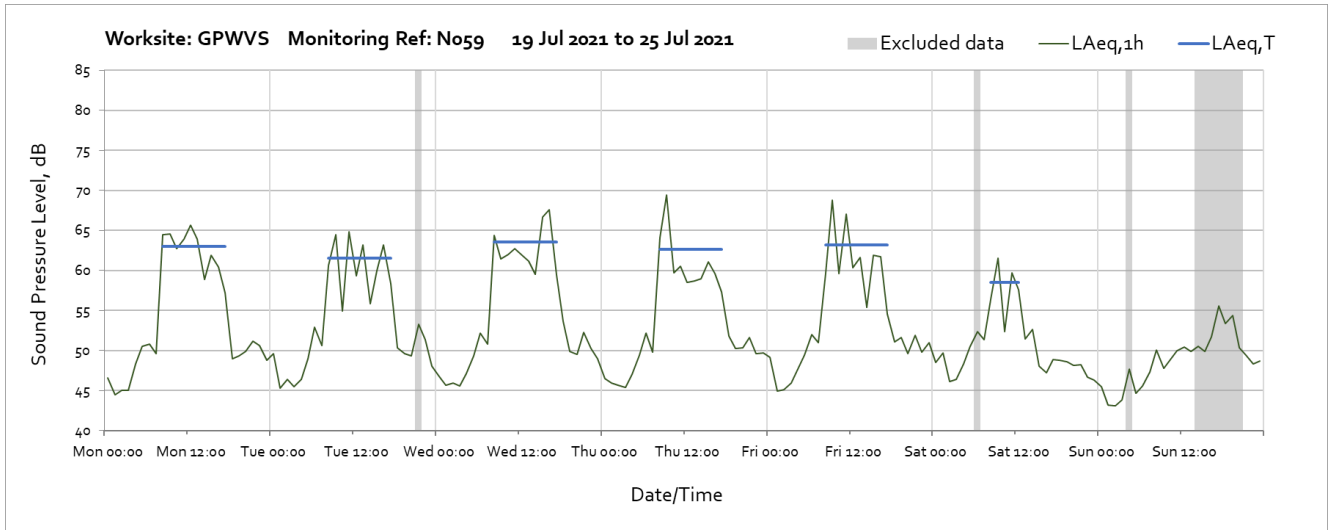




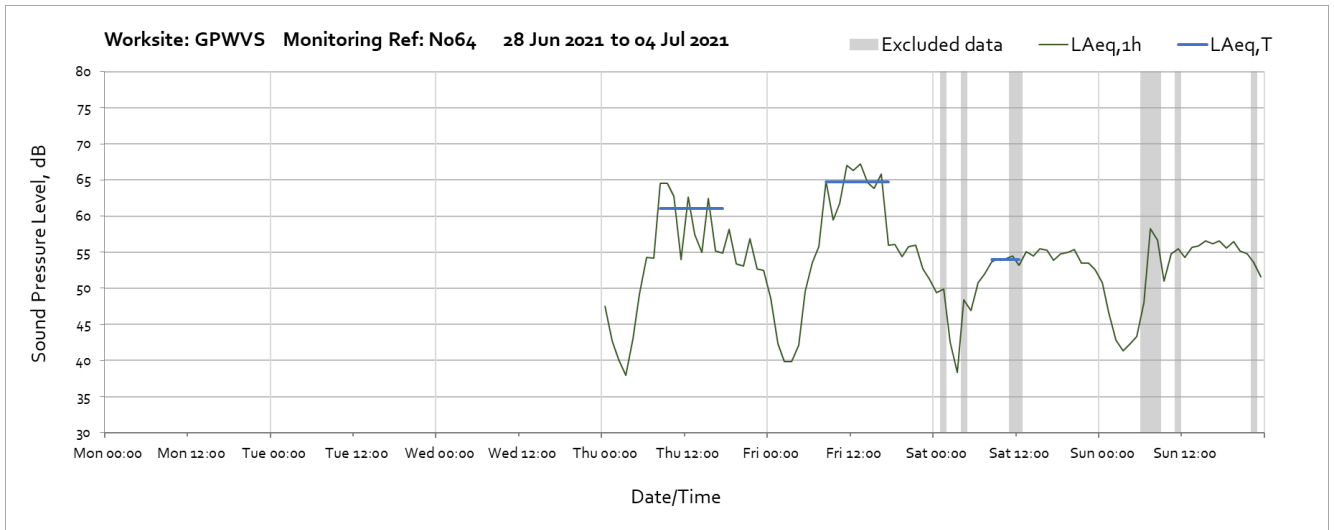
Note: Missing data between 02:00 on Monday 26<sup>th</sup> July and 10:00 on Tuesday 27<sup>th</sup> July 2021 was due to loss of power at the monitor location.

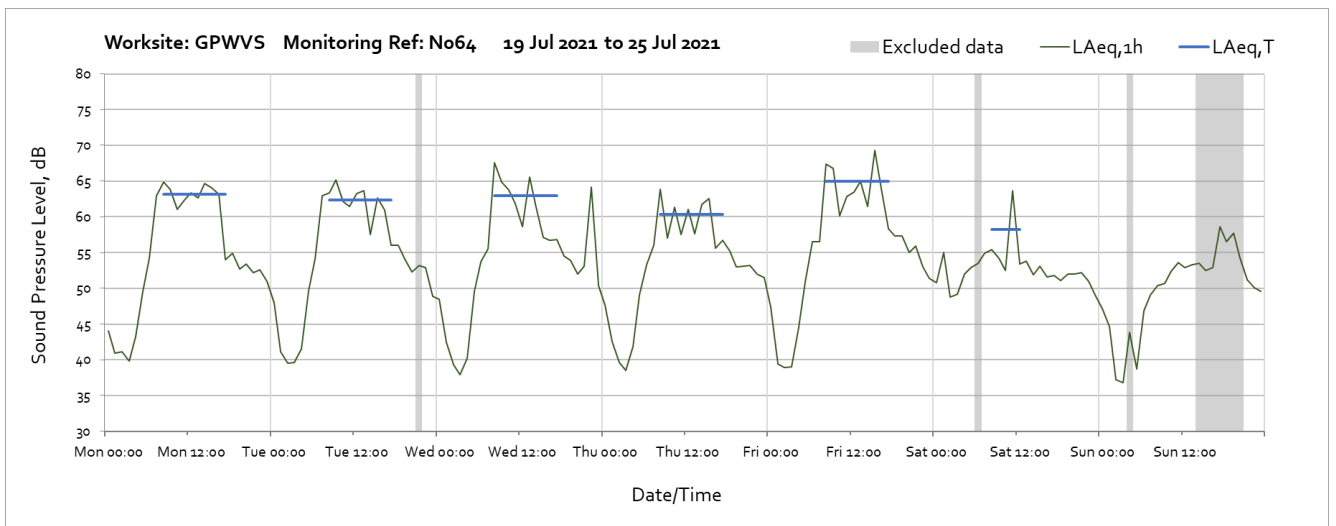
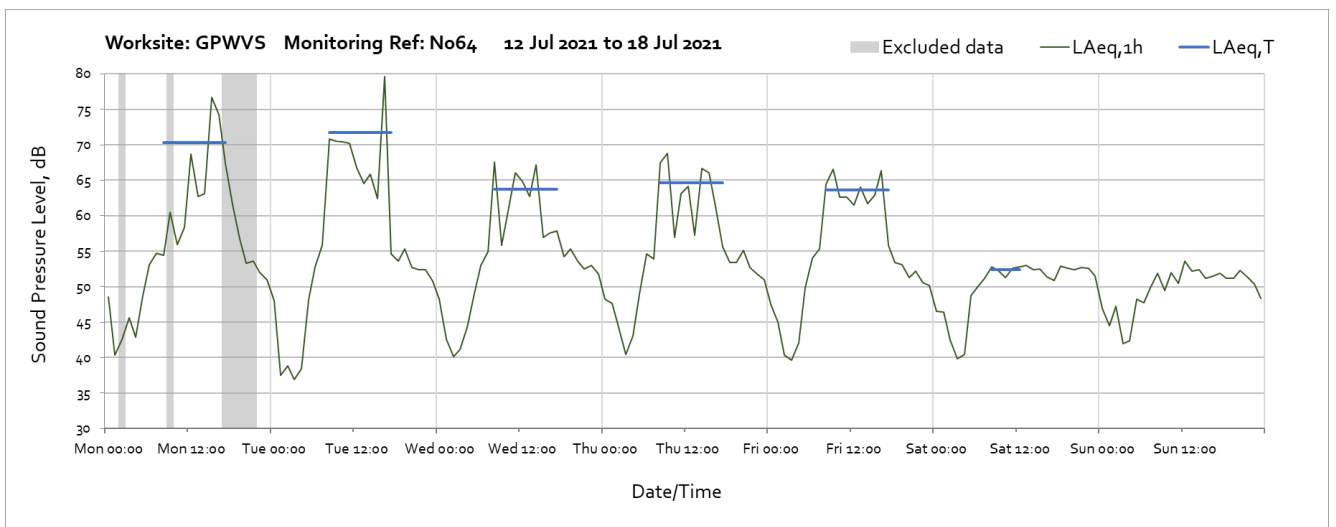
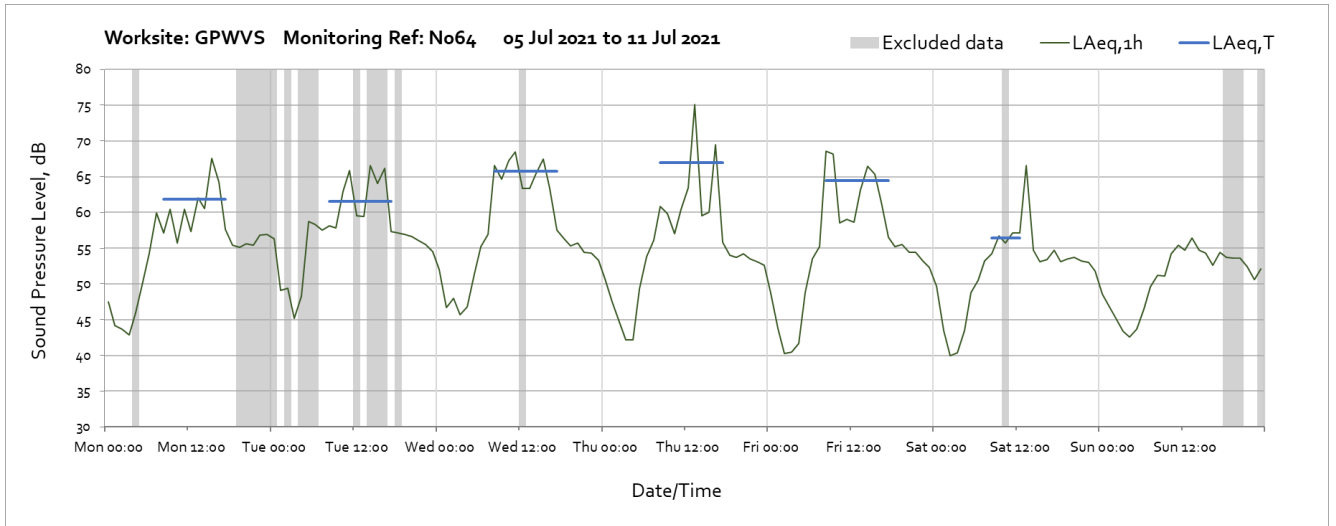
## Worksite: Green Park Way Vent Shaft (GPWVS) - Monitoring Ref: N059

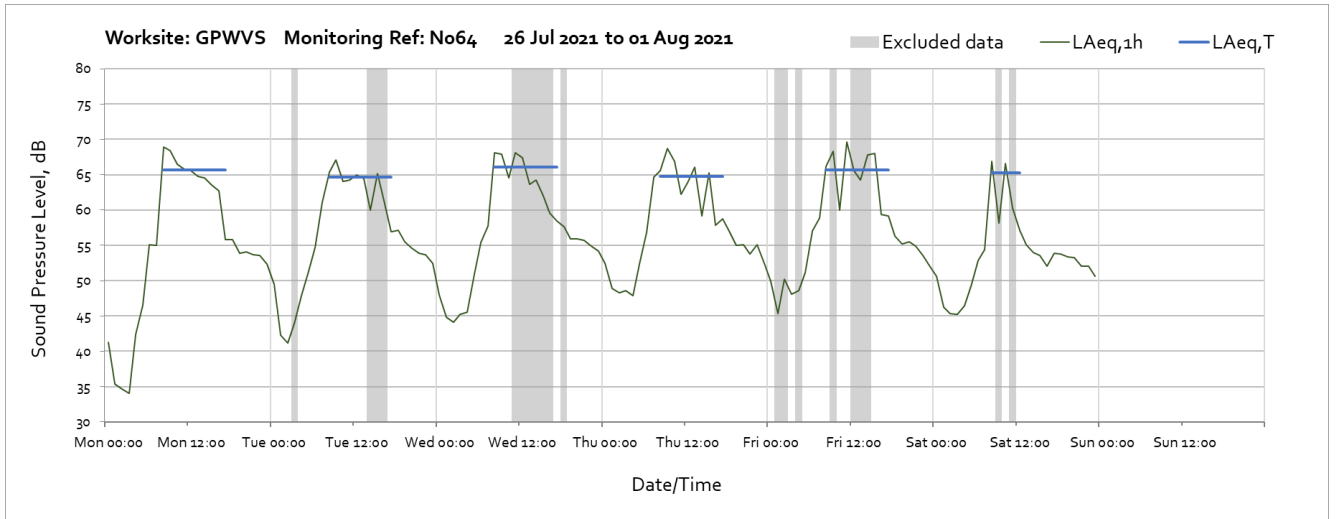




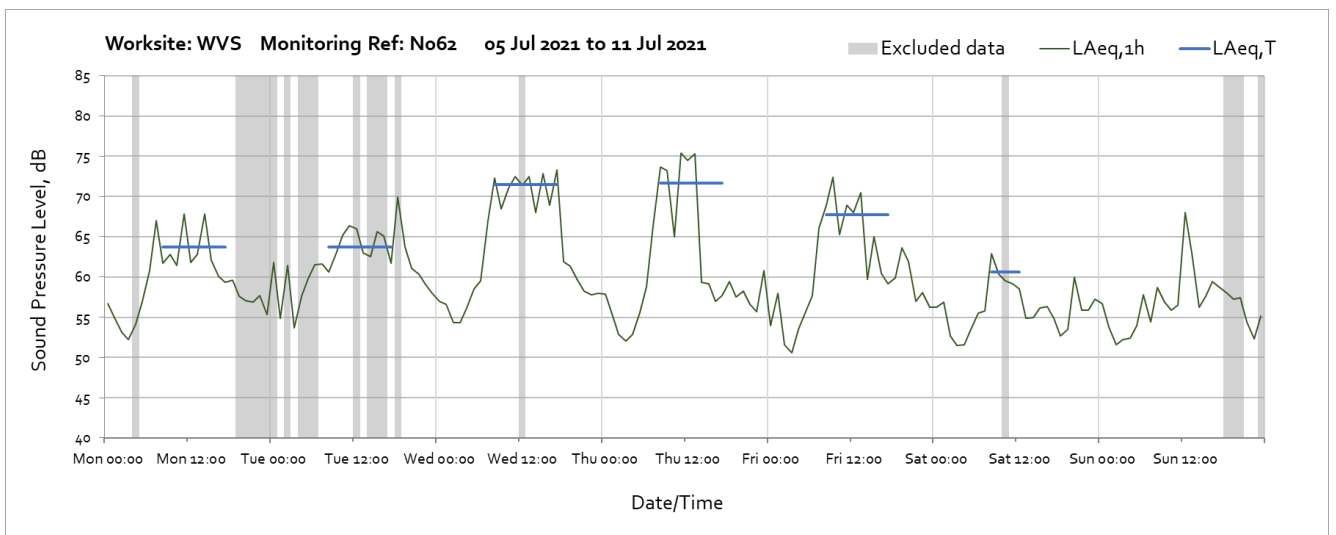
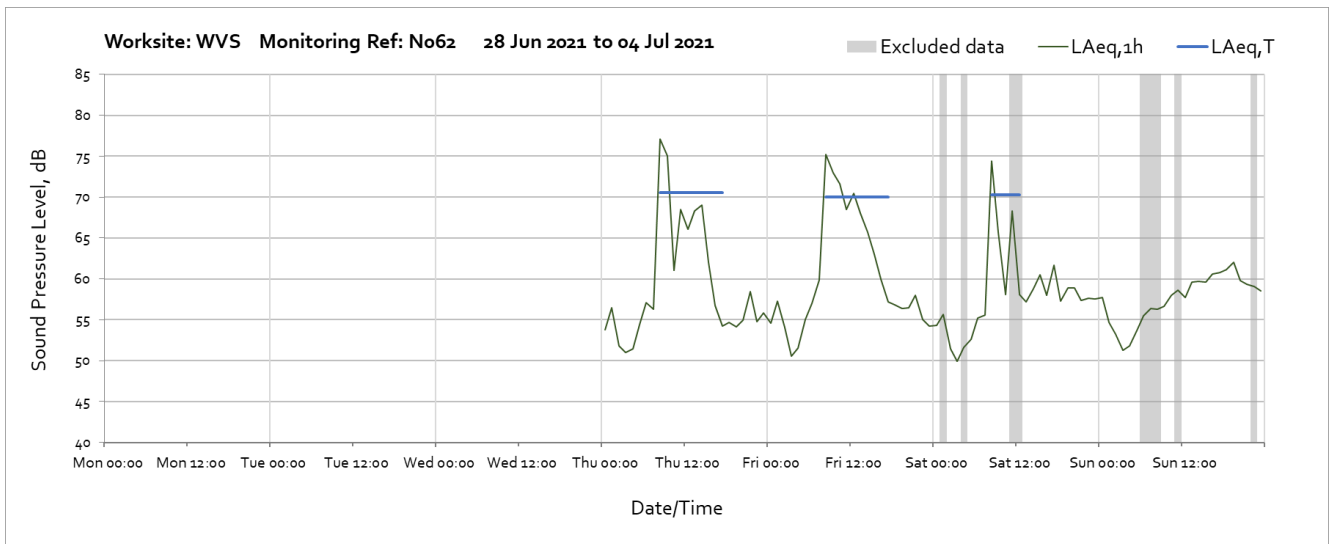
**Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: N064**

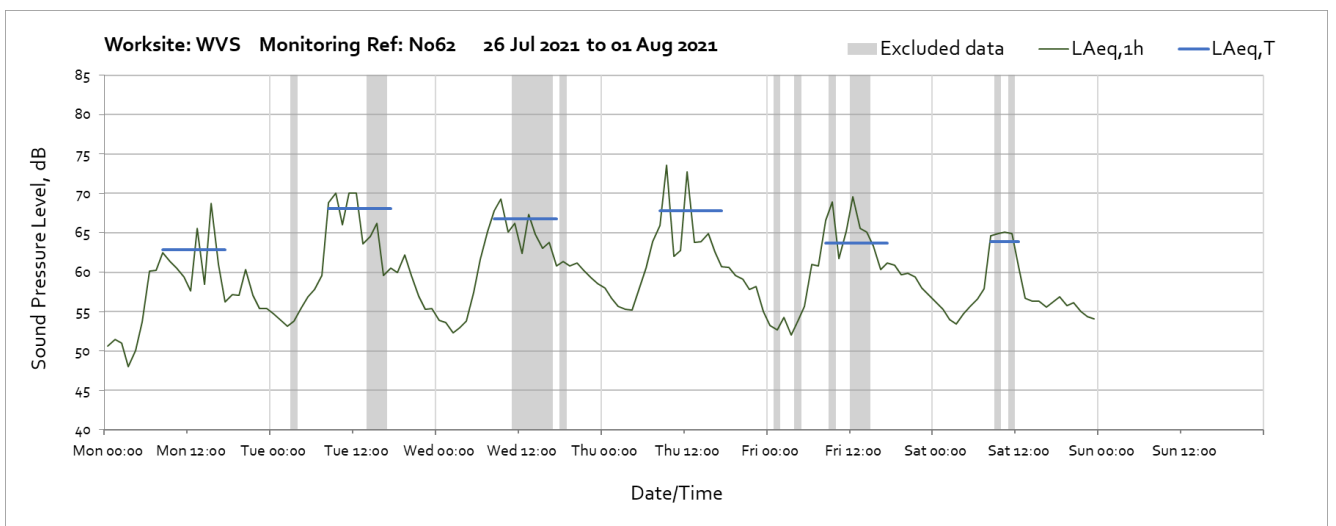
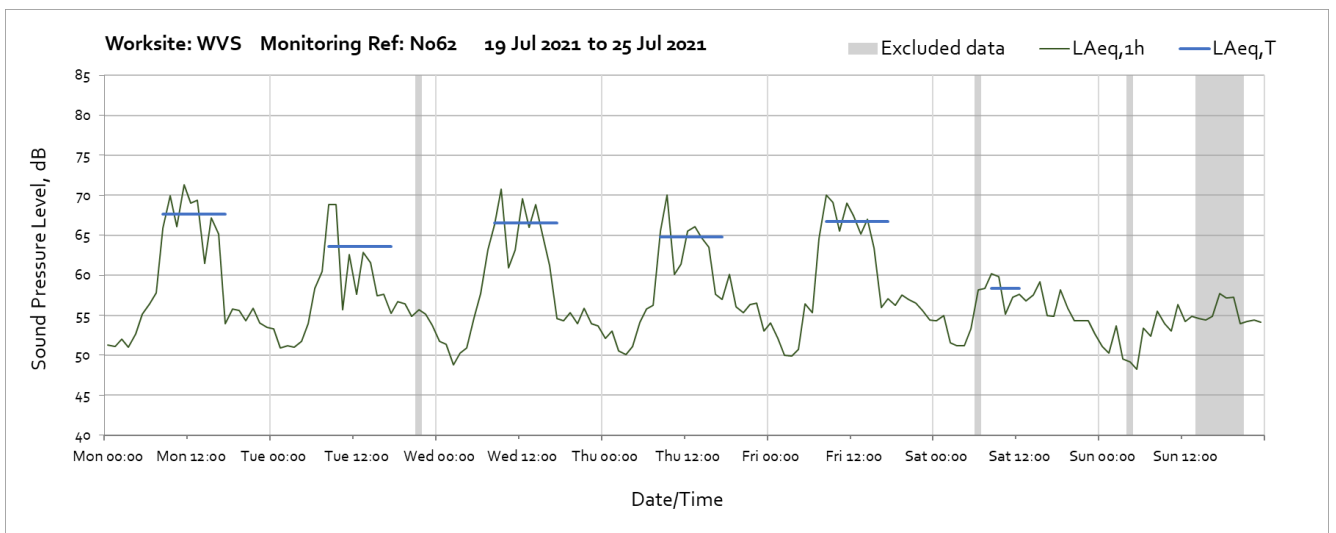
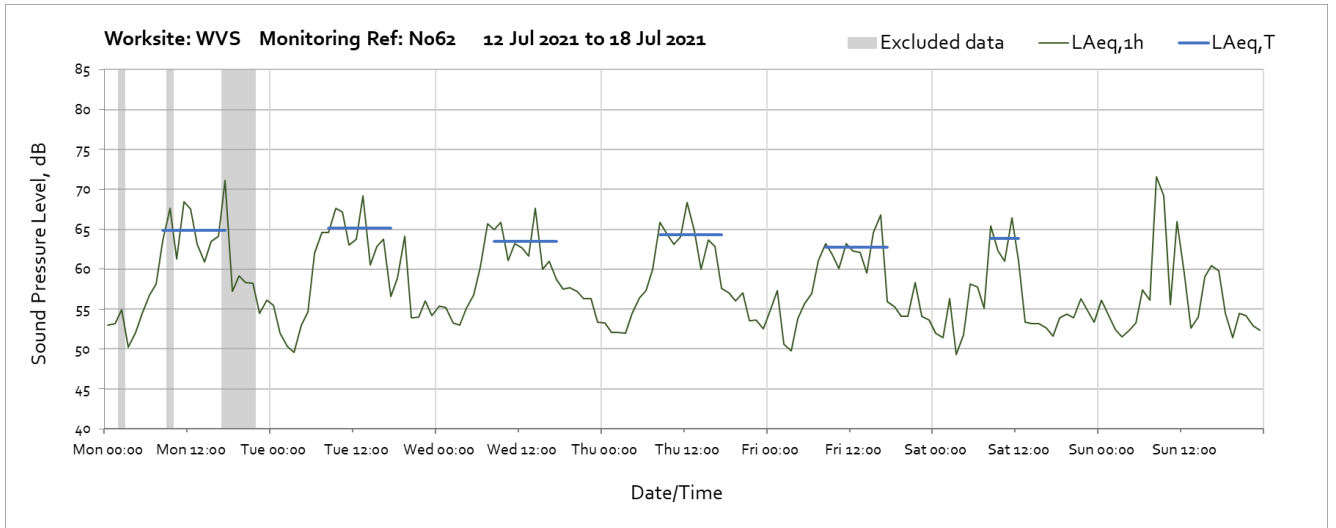






**Worksite: Westgate Ventilation Shaft (WVS) – Monitoring Ref: N062**



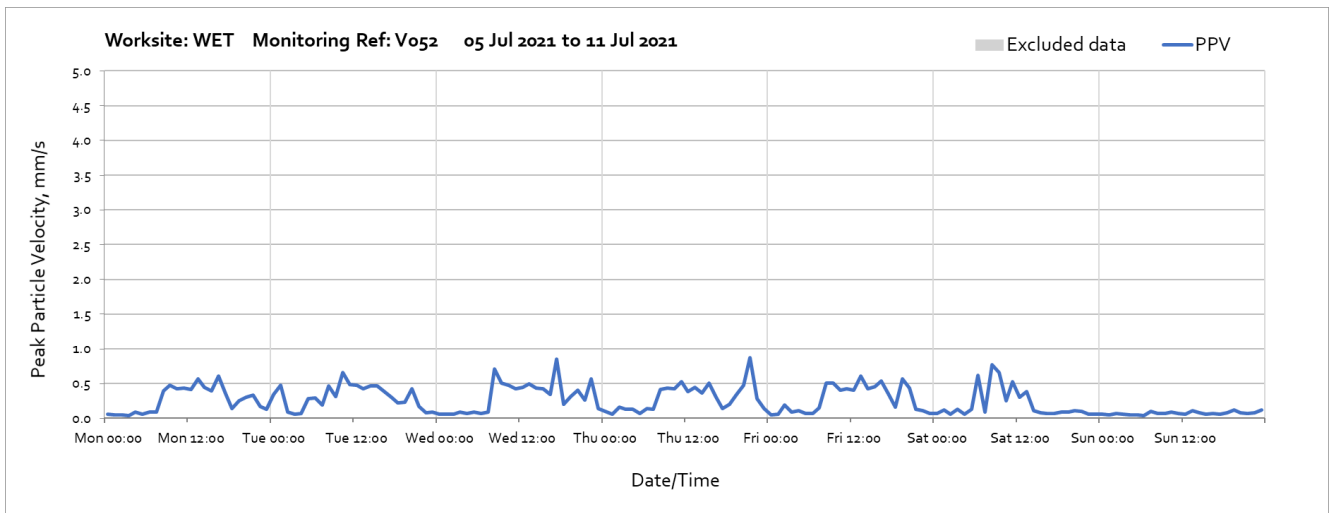
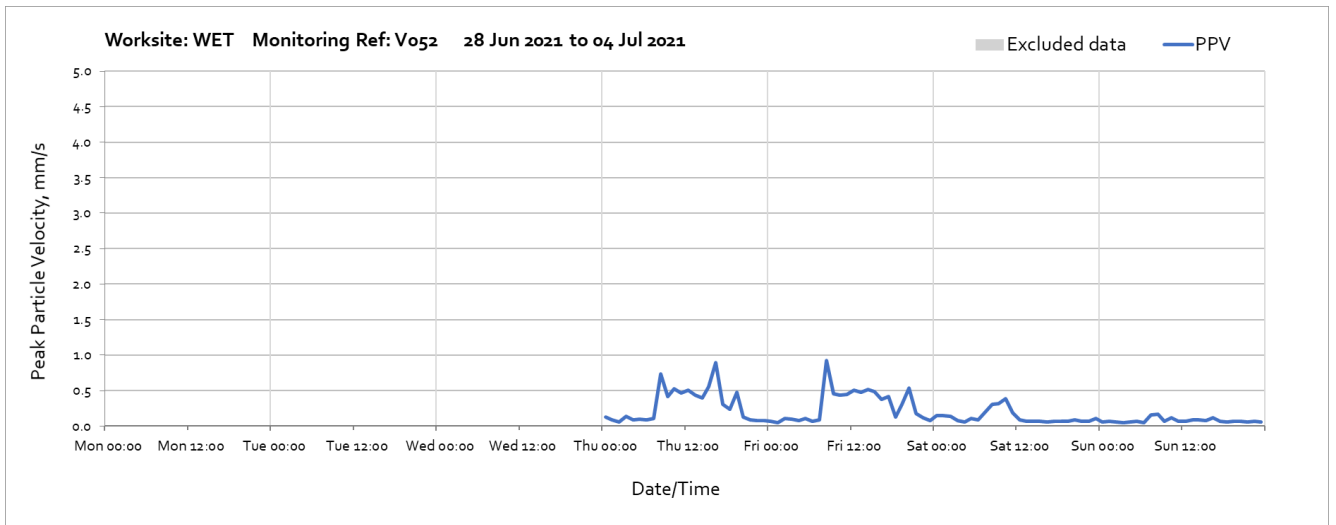


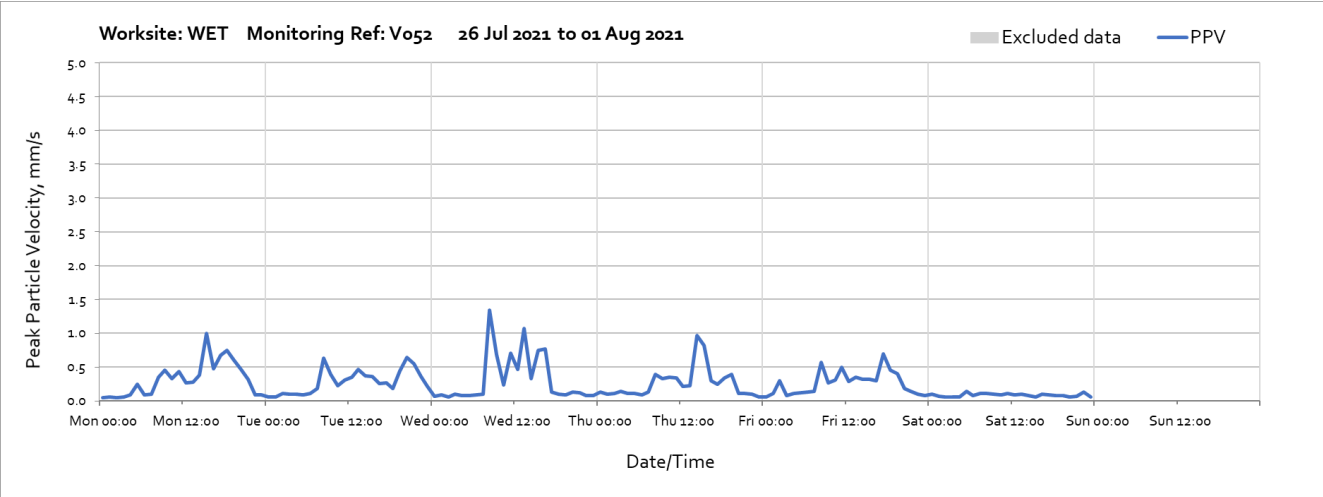
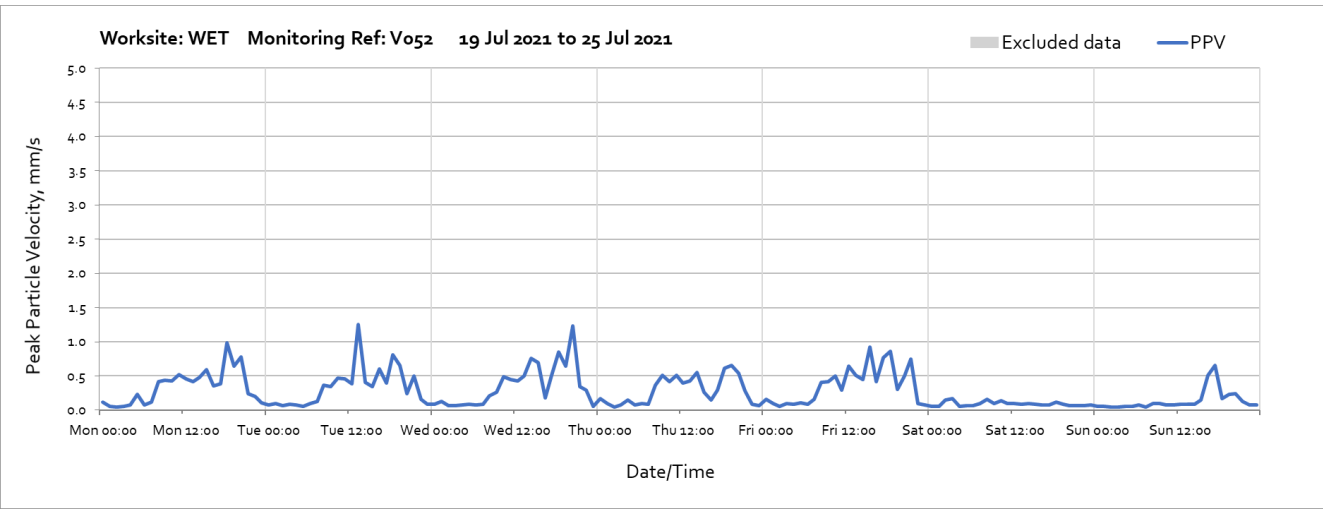
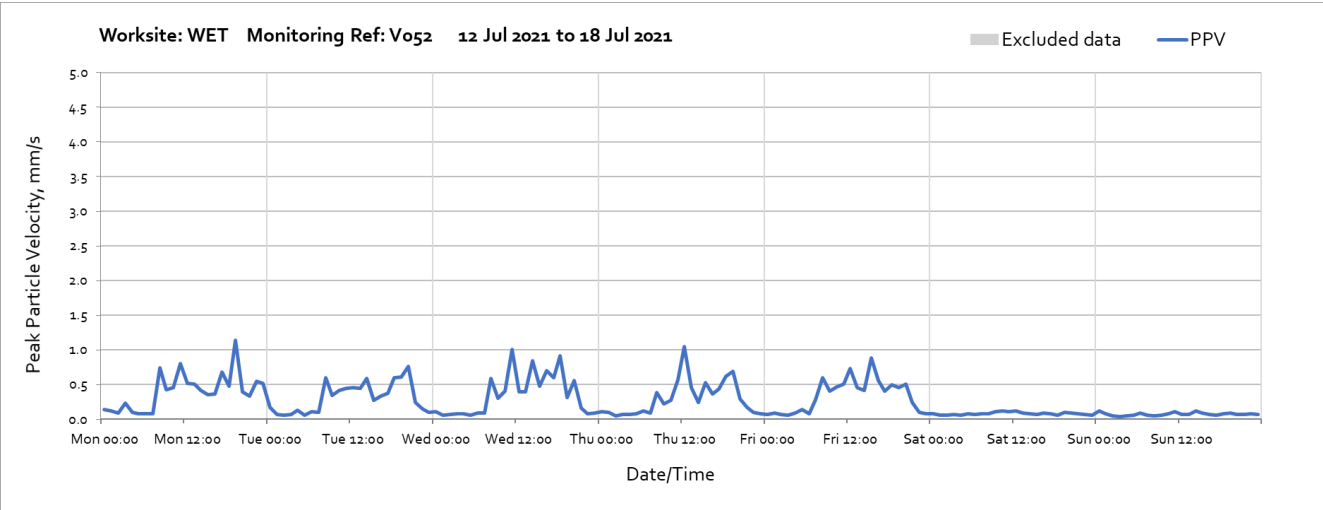


## Vibration

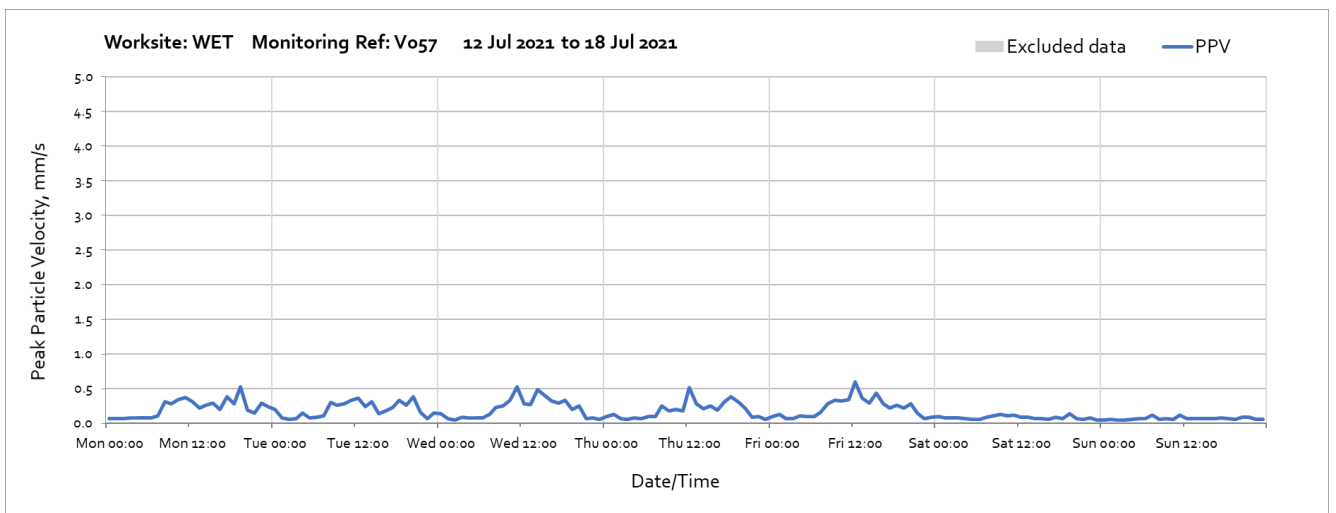
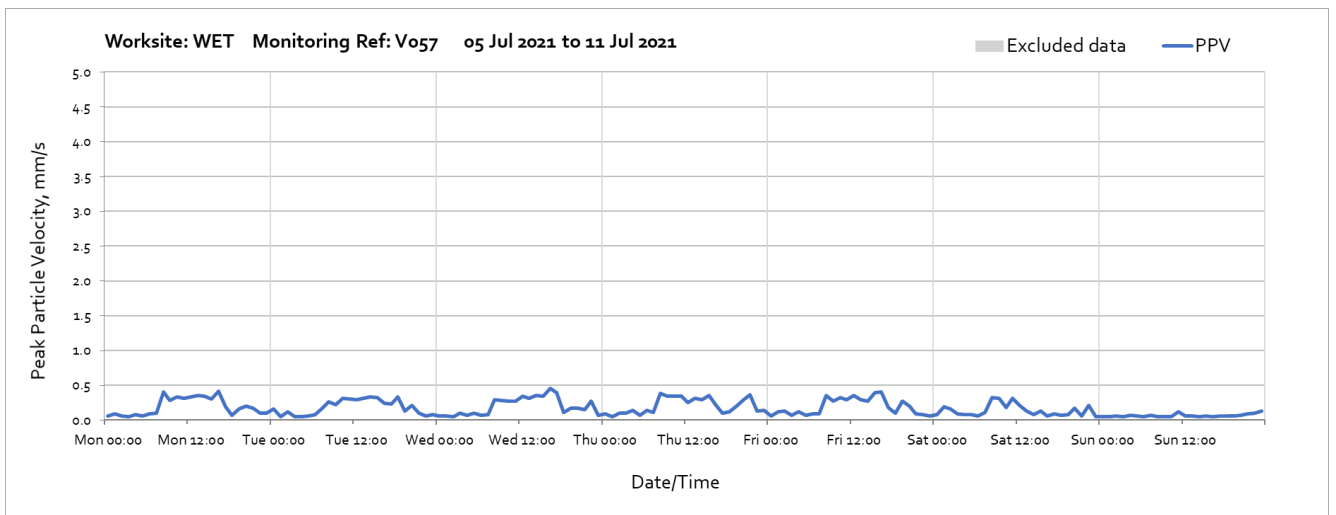
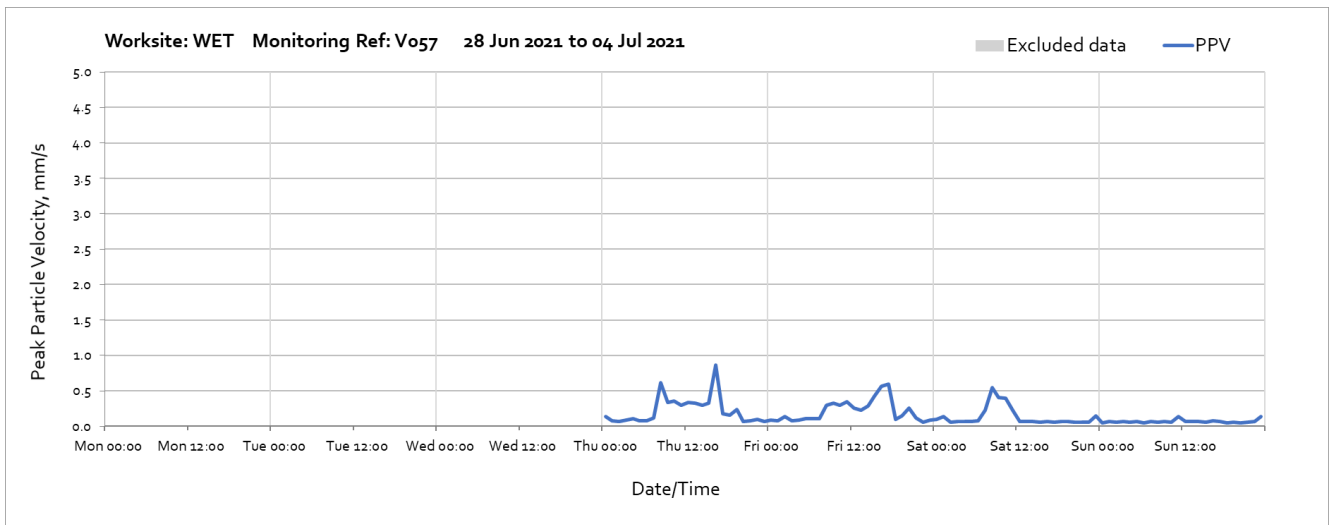
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative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

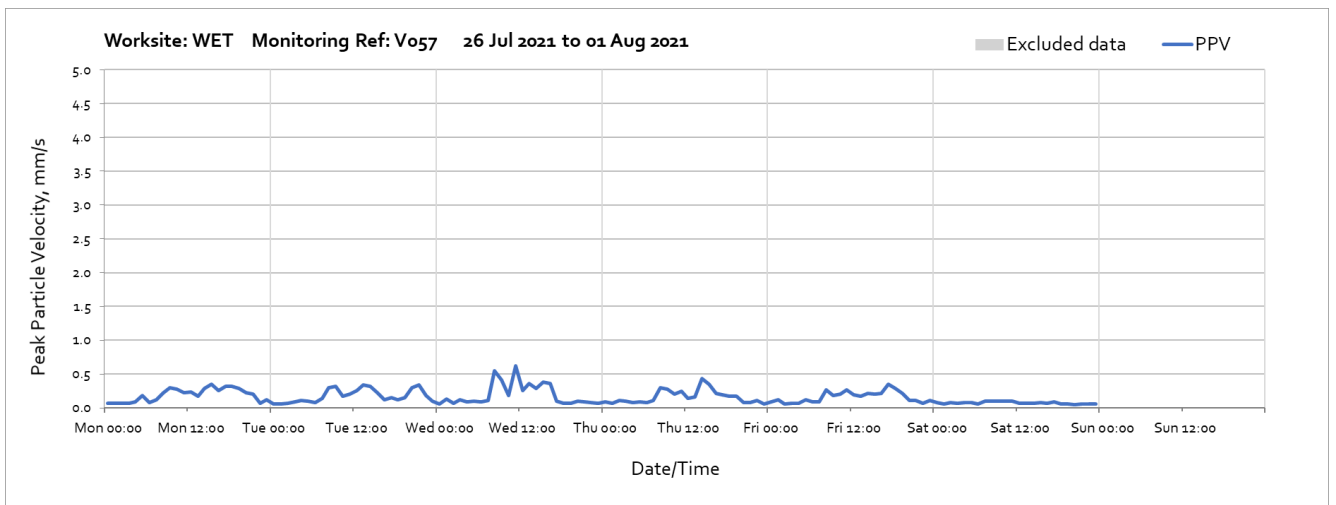
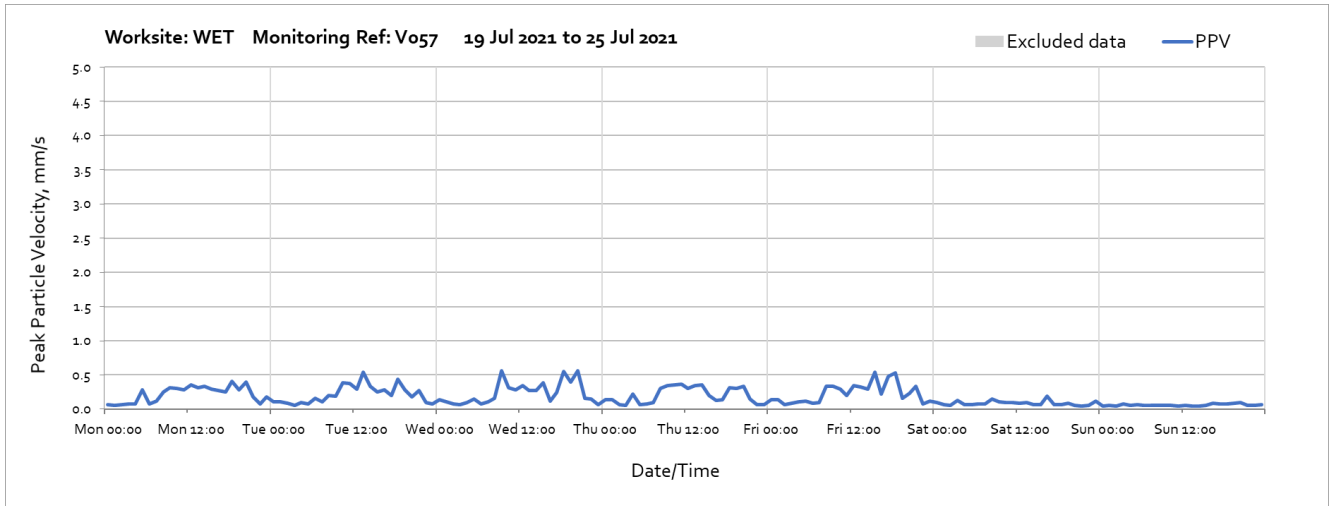
### Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: V052



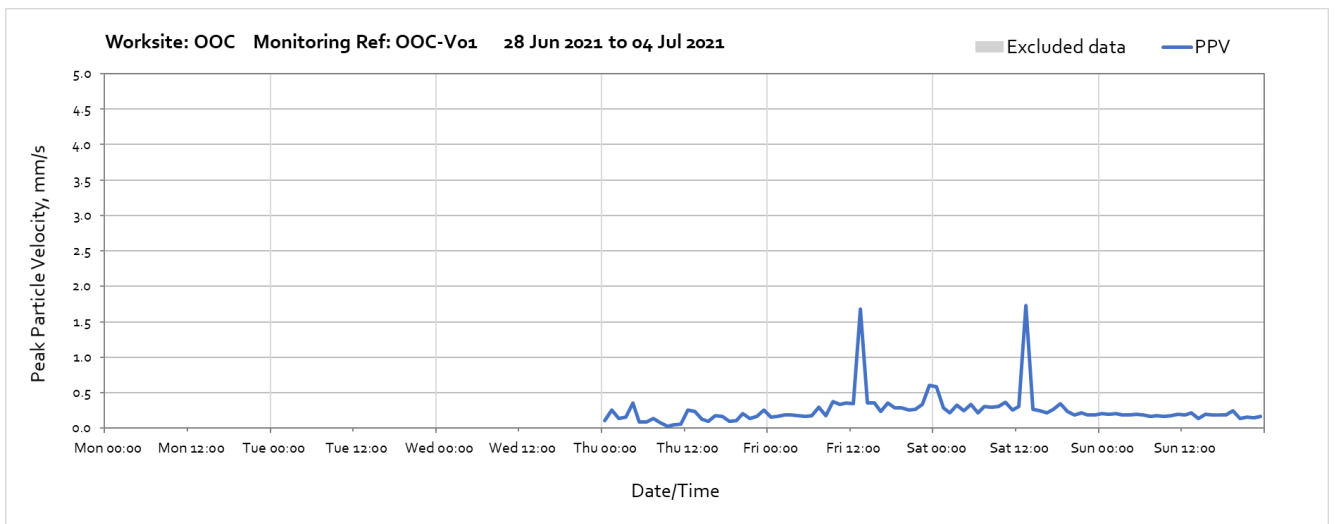


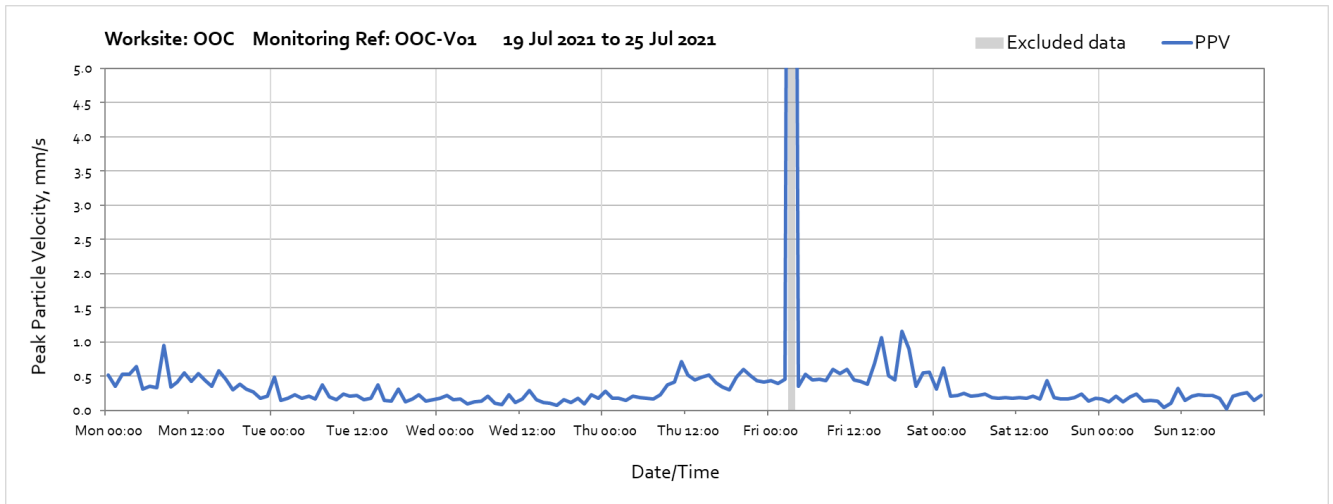
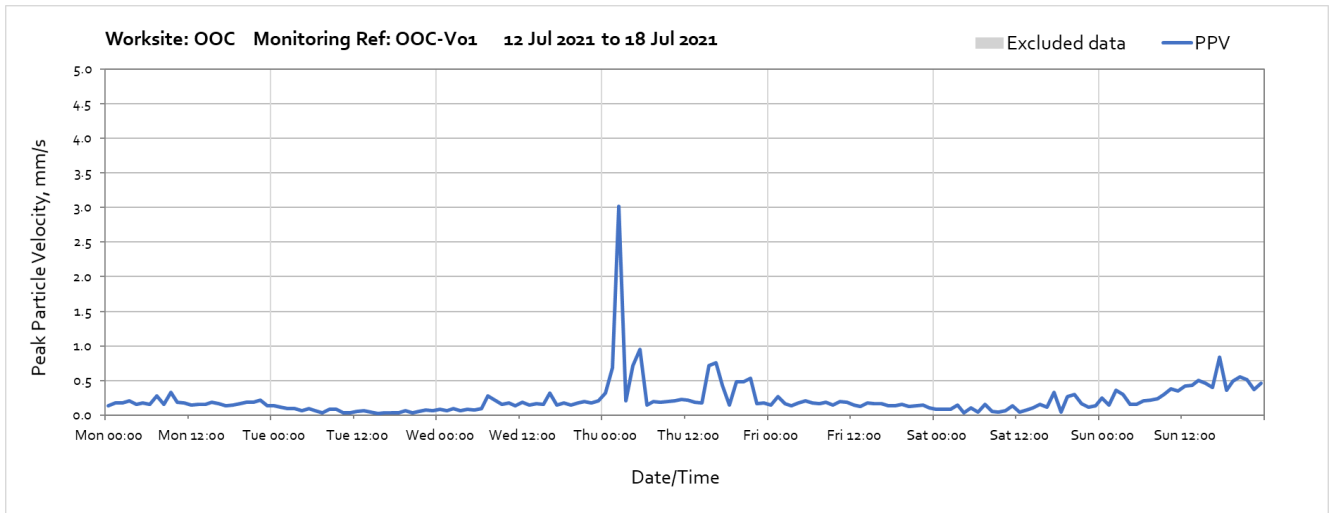
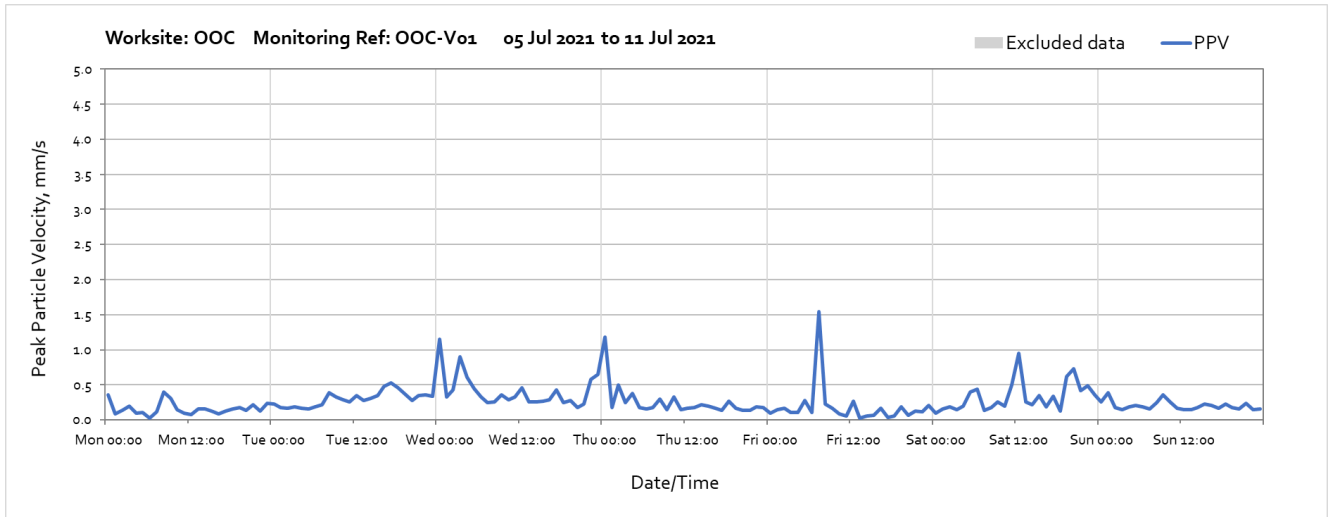
## Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: V057



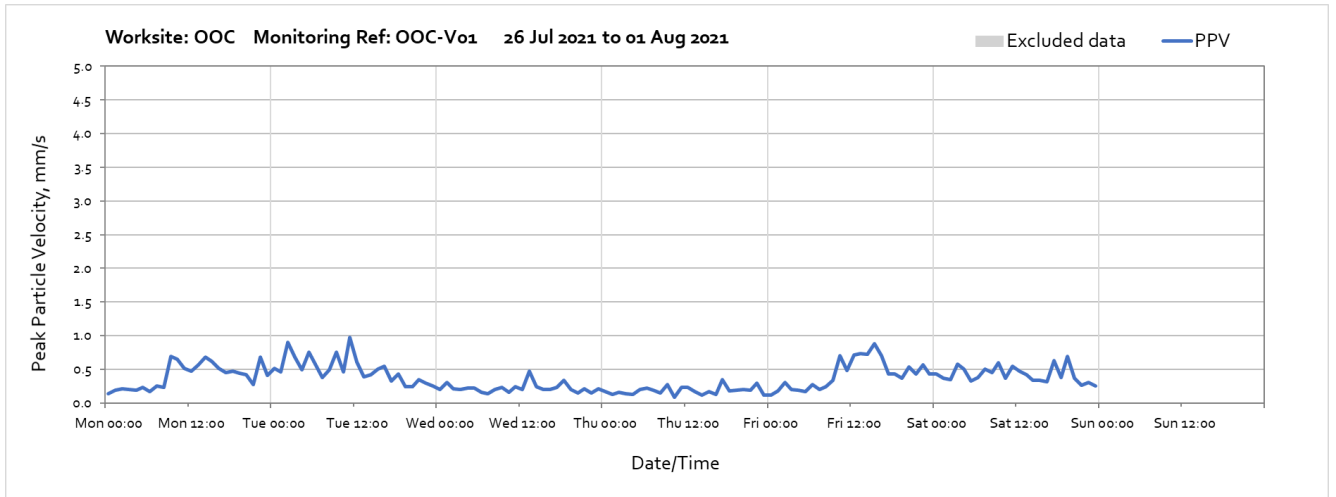


**Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V01**

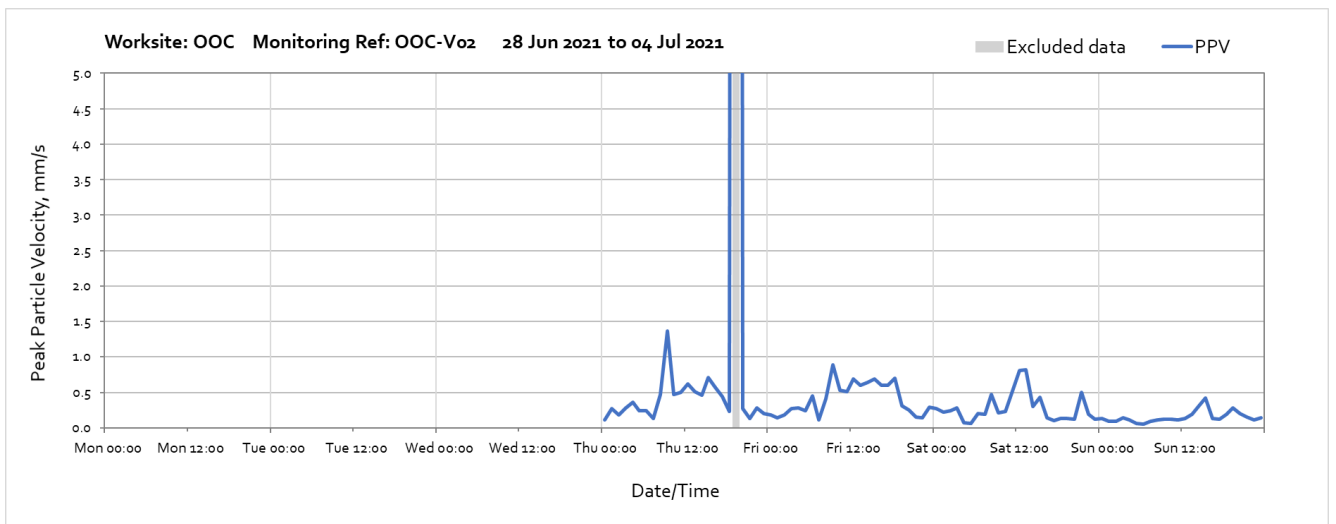




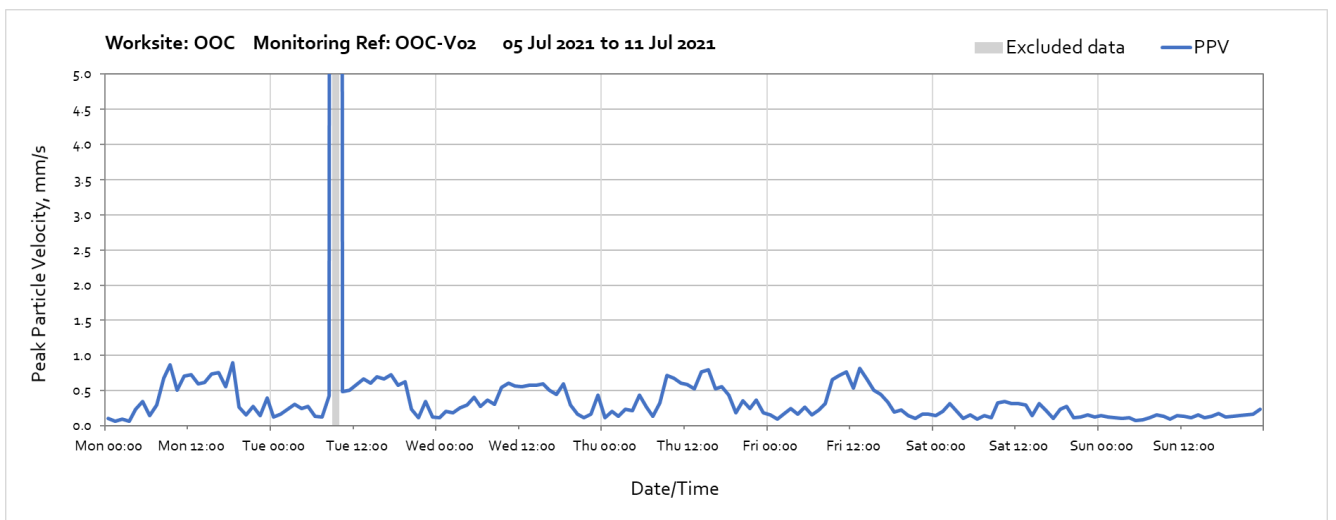
Note: High vibration levels measured at 03:00 on Friday 23<sup>rd</sup> July 2021 was due to local disturbance at the monitor station and not representative of HS2 works.



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

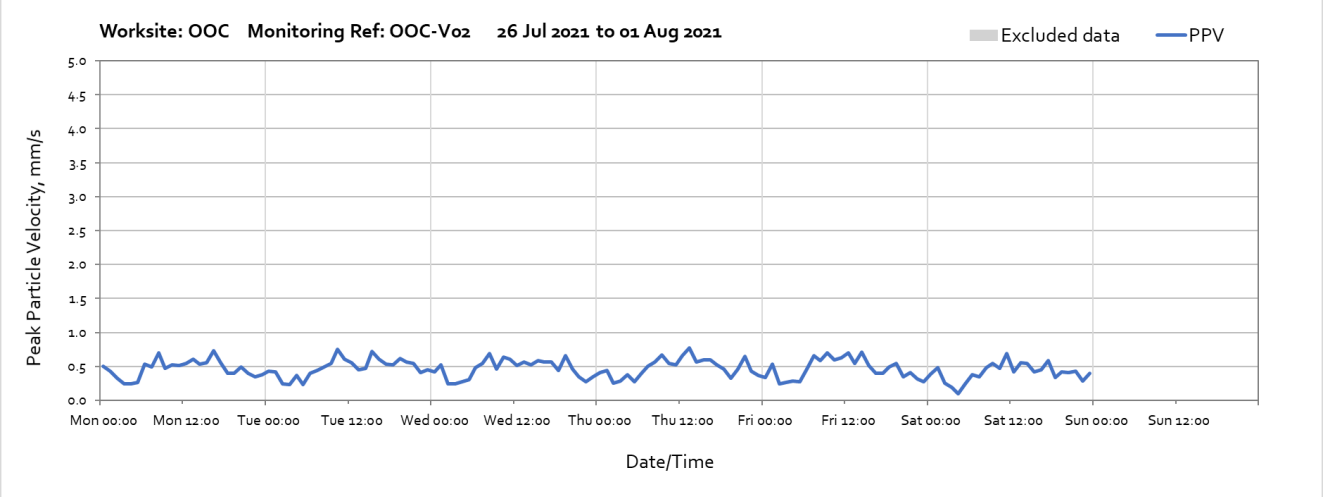
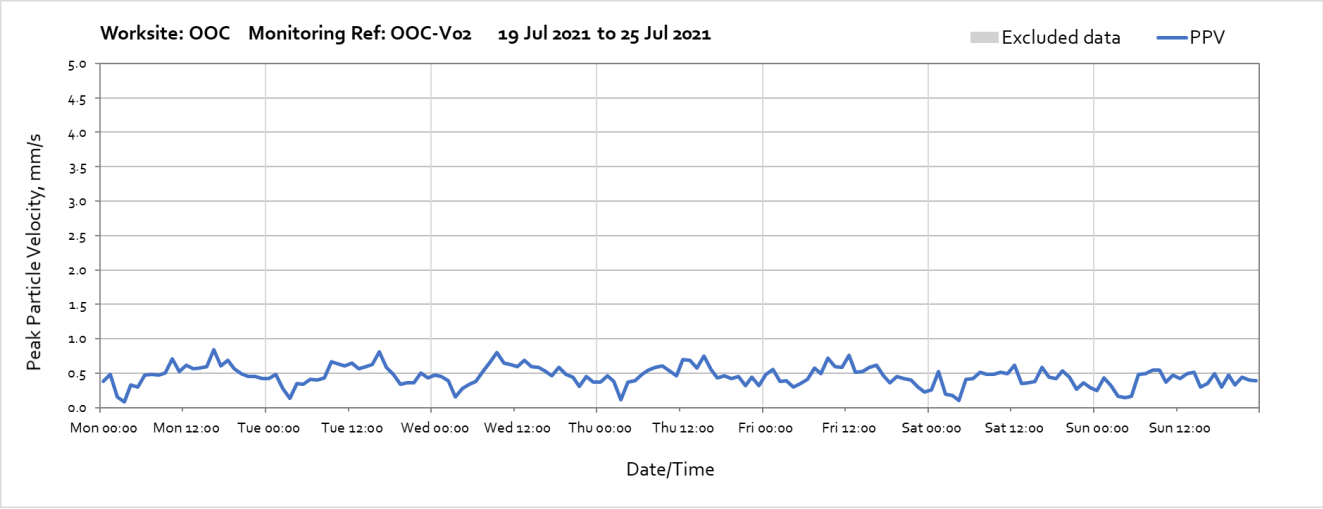
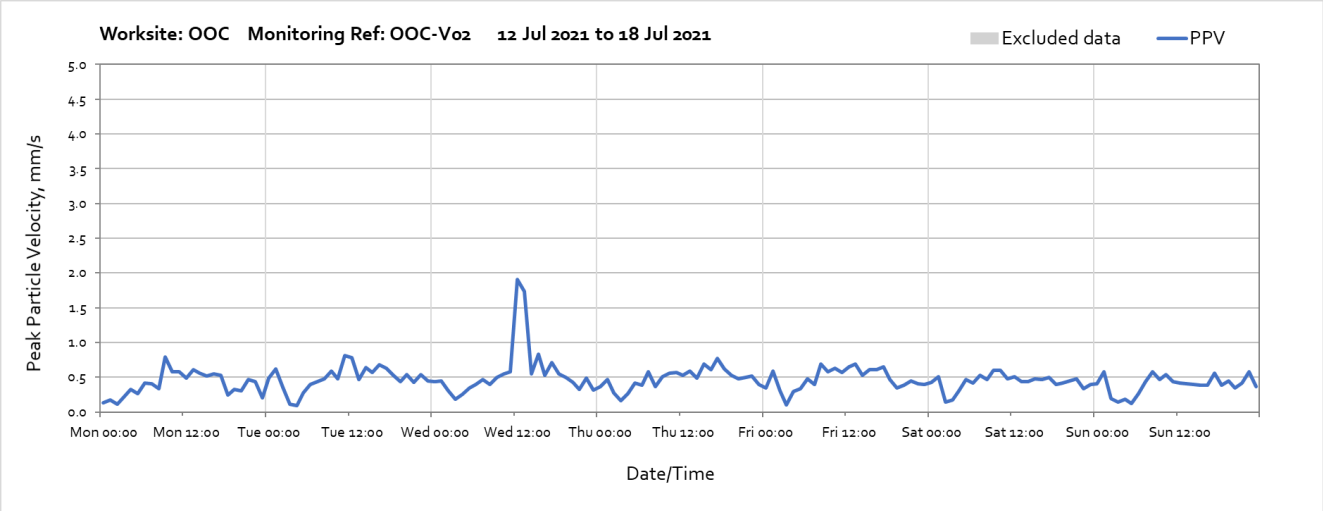


Note: High vibration levels measured at 19:00 on Thursday 1<sup>st</sup> July 2021 was due to local disturbance at the monitor station and not representative of HS2 works.

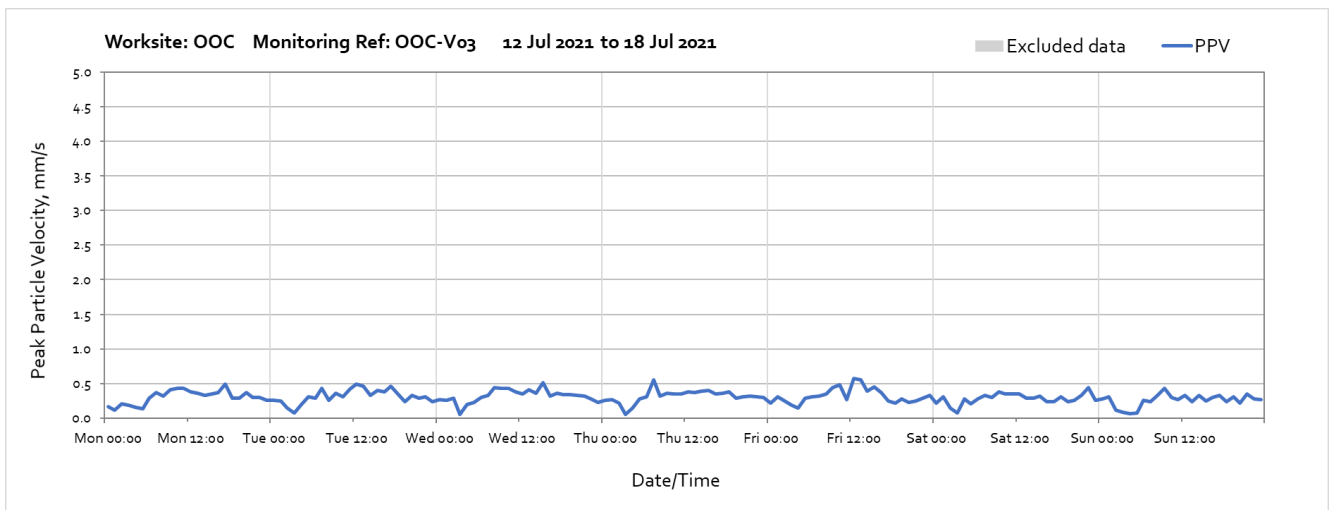
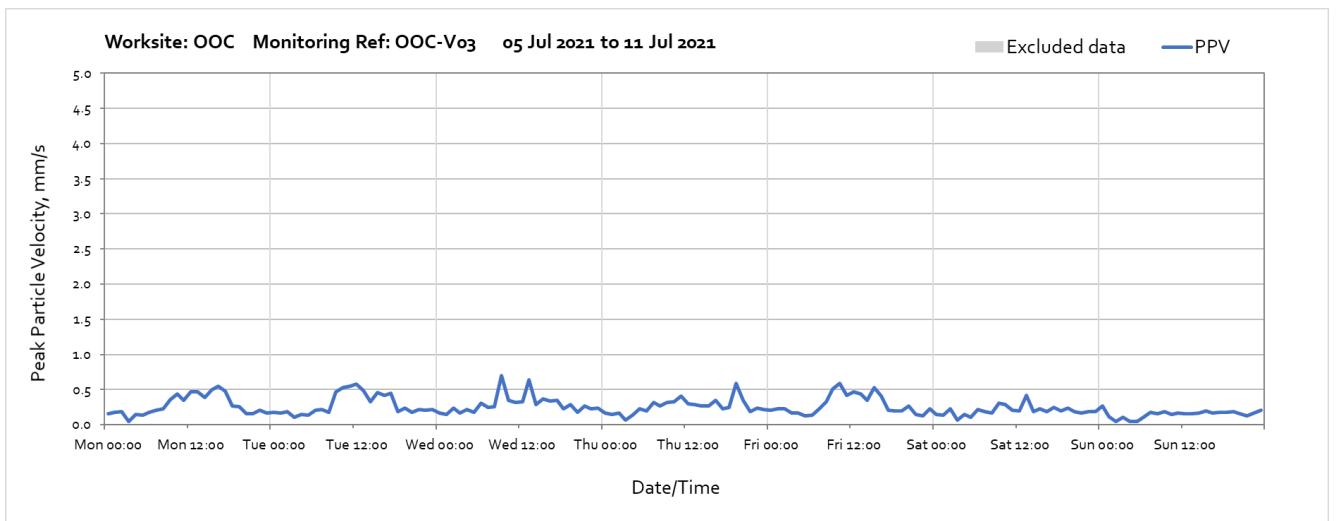
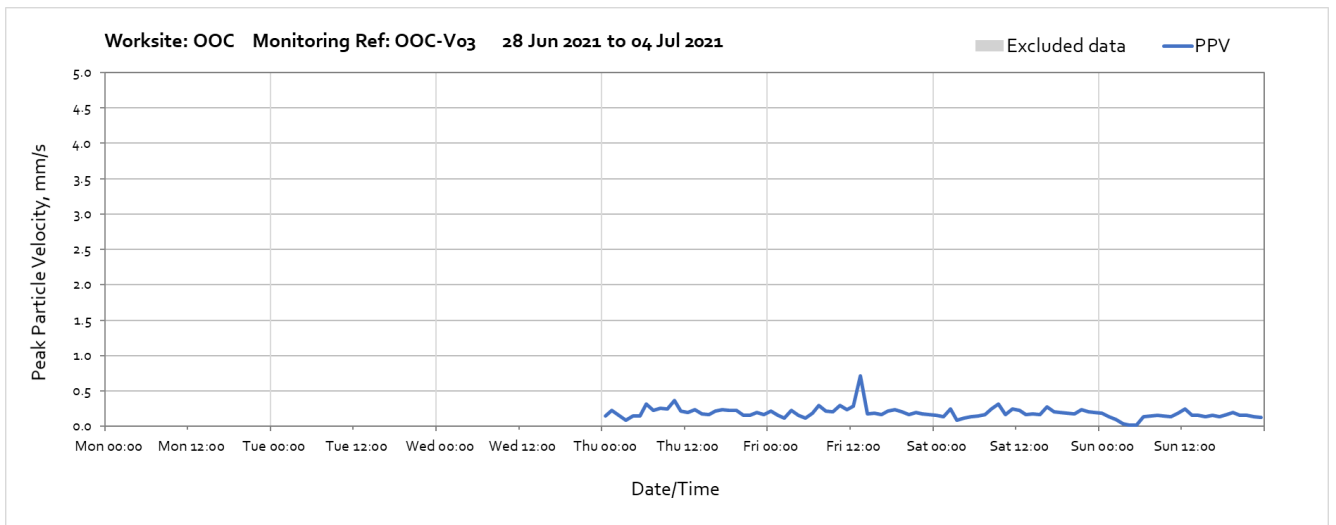


Note: High vibration levels measured at 09:00 on Tuesday 6<sup>th</sup> July 2021 was due to routine maintenance of the monitoring station.

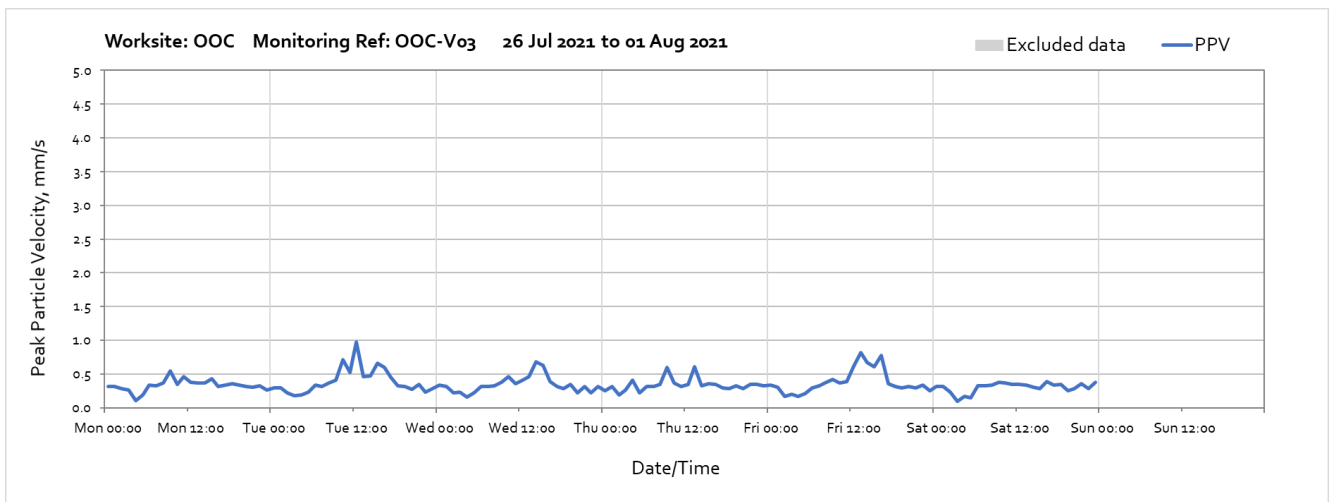
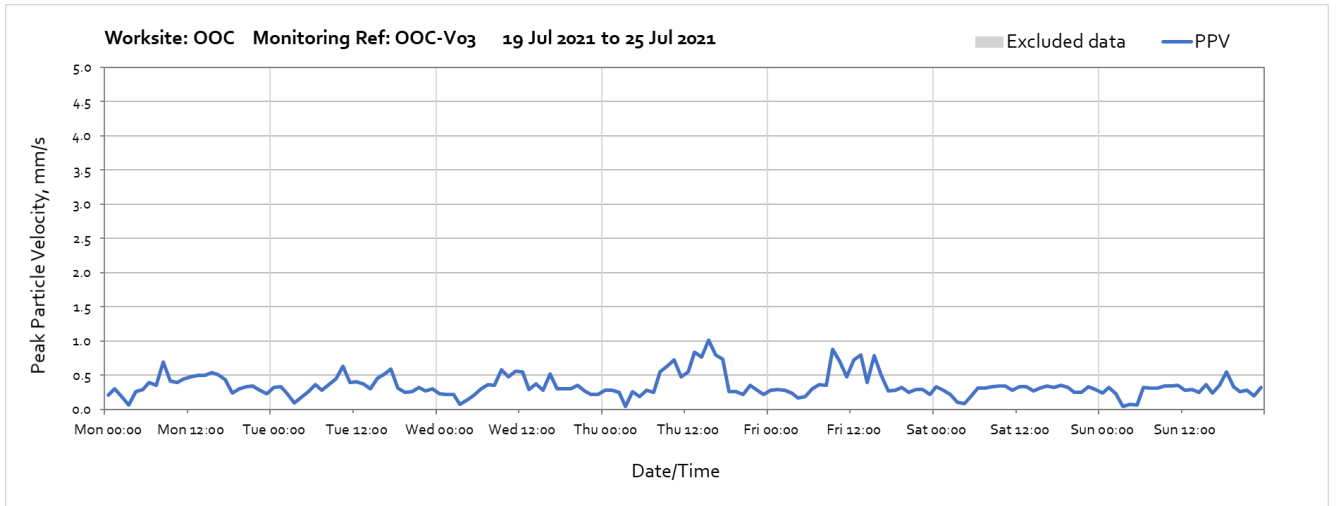
OFFICIAL



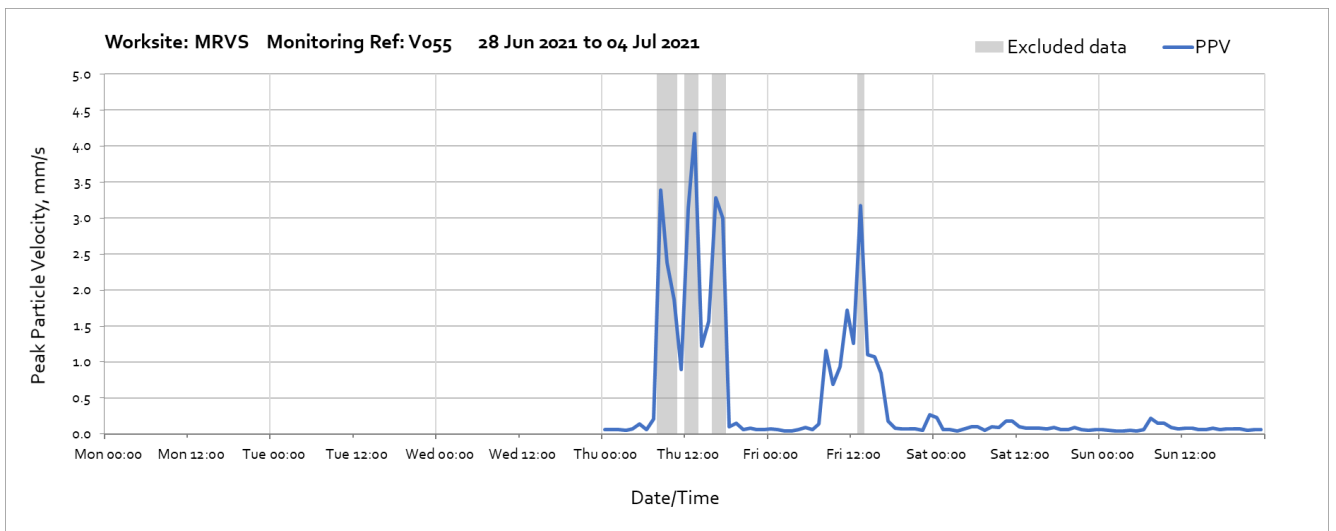
## Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V03





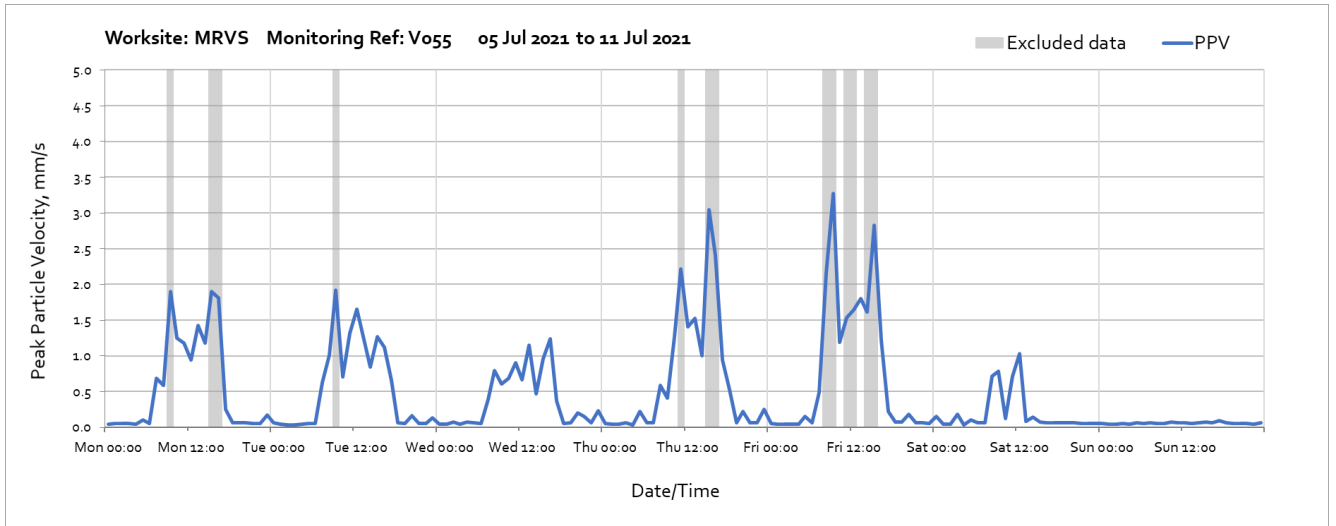


**Worksite: Mandeville Road Vent Shaft (MRVS) – Monitoring Ref: V055**

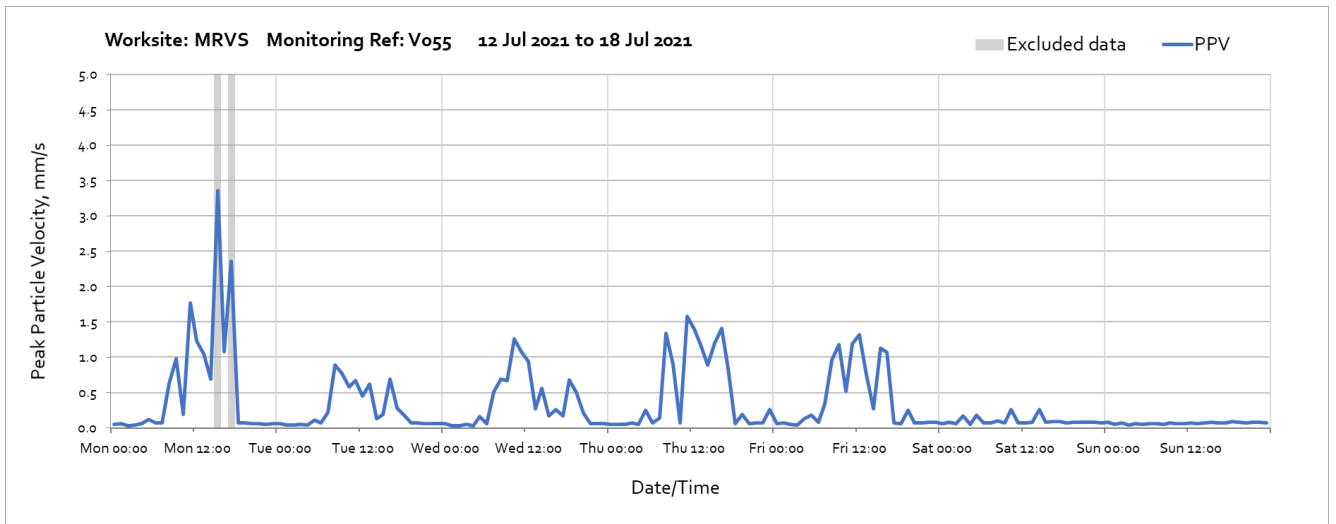


Note: High vibration levels measured across the week were due hoarding works undertaken near to the monitor location. The nearest residential receptors are further away from the works and vibration levels at the receptor will therefore be lower.

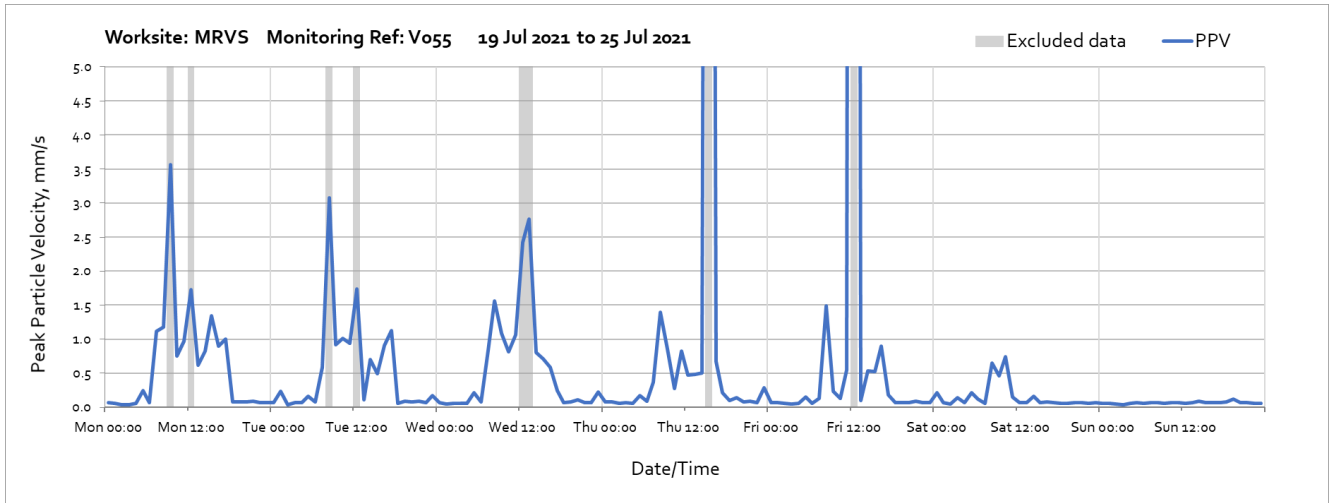
OFFICIAL



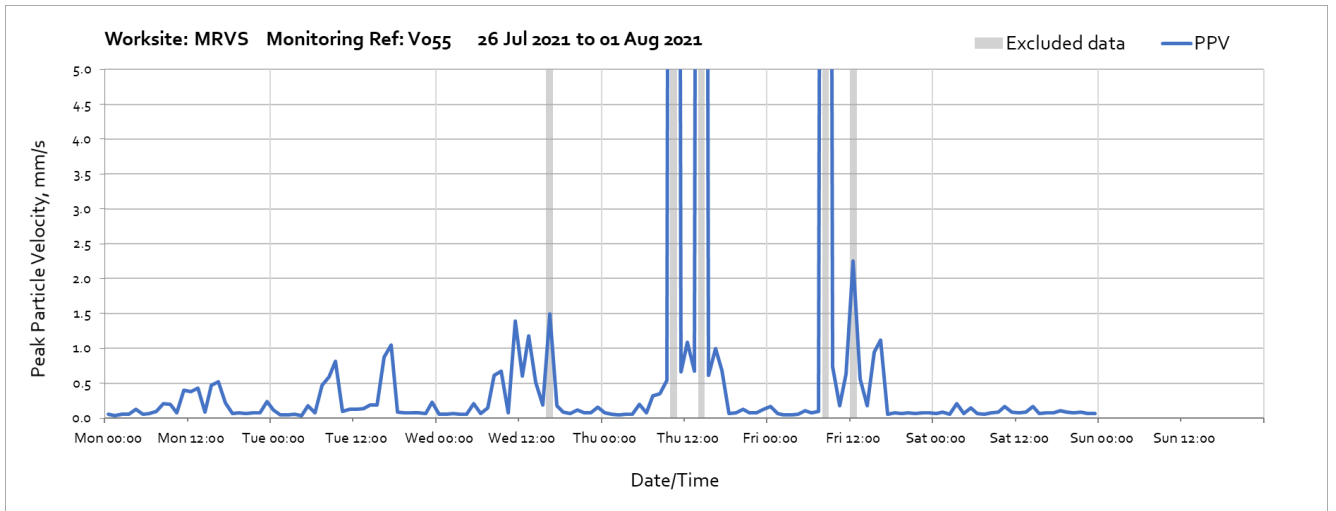
Note: High vibration levels measured across the week were due hoarding works undertaken near to the monitor location. The nearest residential receptors are further away from the works and vibration levels at the receptor will therefore be lower.



Note: High vibration levels measured across the week were due site maintenance works undertaken near to the monitor location. The nearest residential receptors are further away from the works and vibration levels at the receptor will therefore be lower.

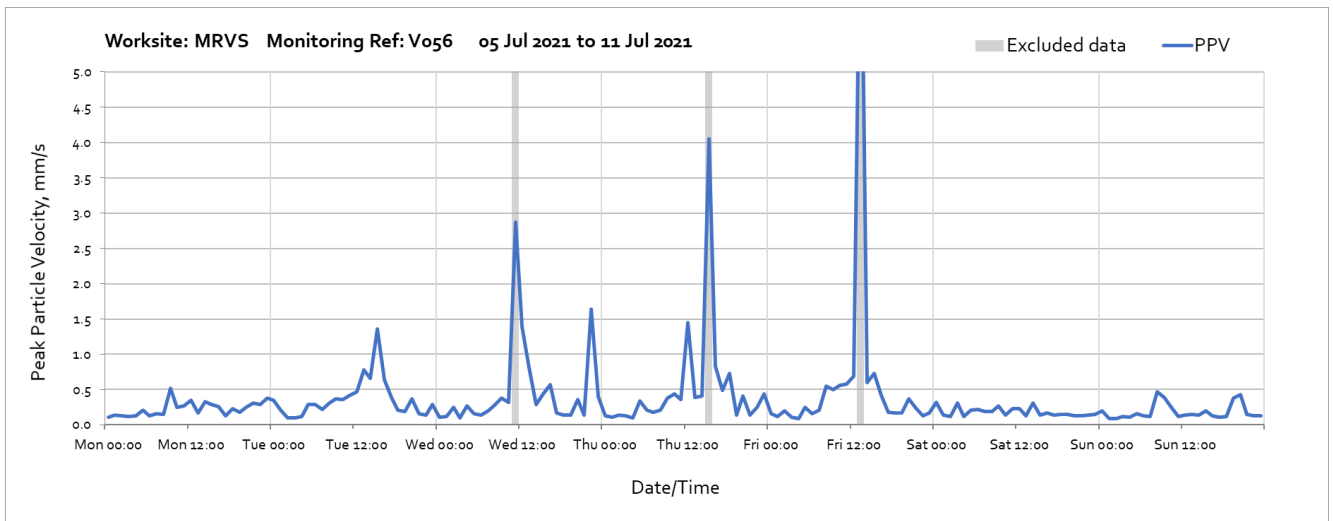
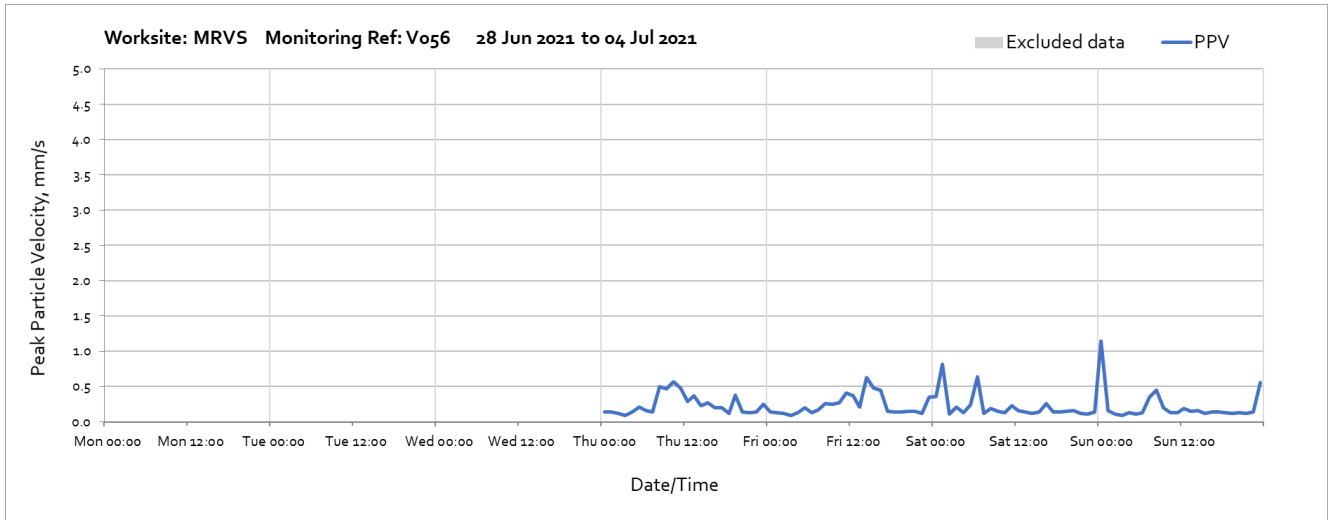


Note: High vibration levels measured across the week were due site maintenance works undertaken near to the monitor location. The nearest residential receptors are further away from the works and vibration levels at the receptor will therefore be lower. High vibration levels measured at 15:00 on Thursday 22<sup>nd</sup> July and 12:00 on Friday 23<sup>rd</sup> July 2021 were due to local disturbance at the monitor location and not representative of HS2 works.

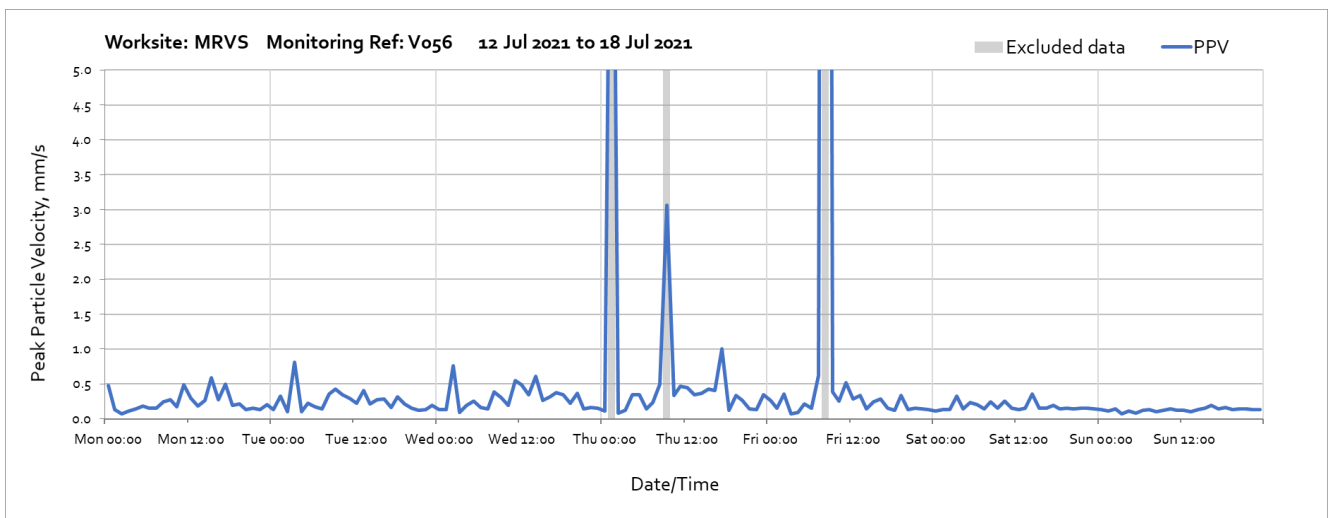


Note: High vibration levels measured on Thursday 29<sup>th</sup> July and Friday 30<sup>th</sup> July 2021 were due to local disturbance at the monitor location and not representative of HS2 works.

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

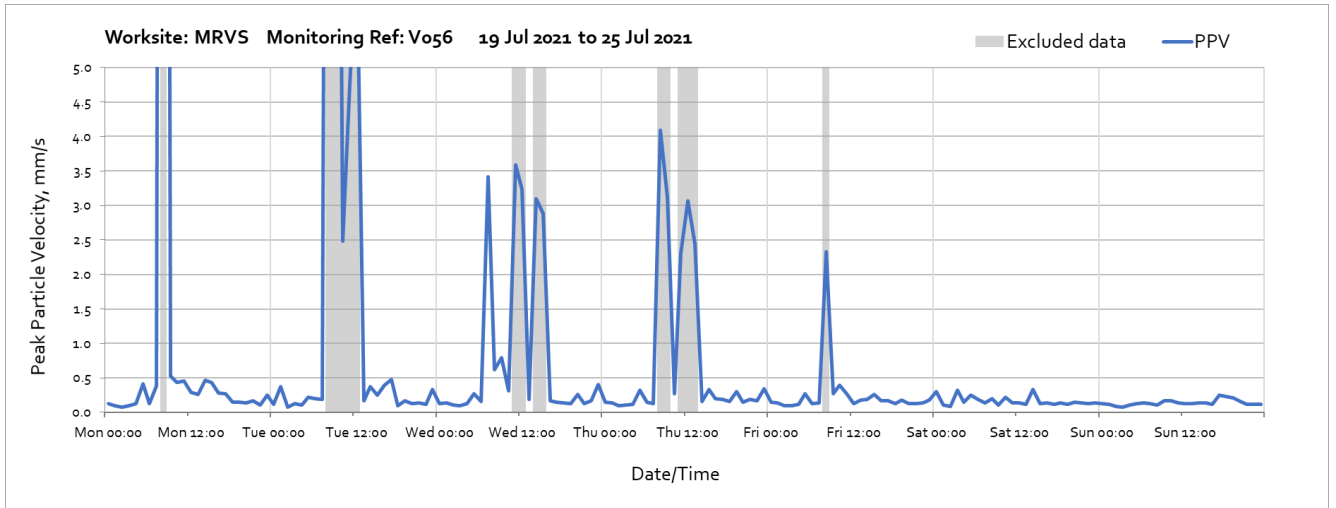


Note: High vibration levels measured across the week were due to local disturbance at the monitor location and not representative of HS2 works.

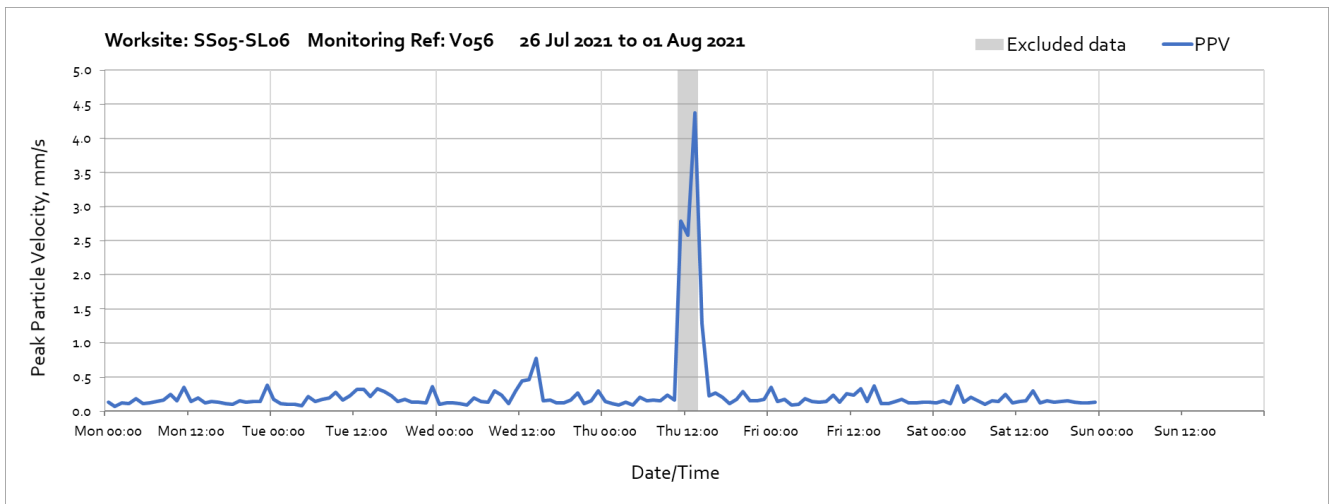


Note: High vibration levels measured across the week were due to local disturbance at the monitor location and not representative of HS2 works.

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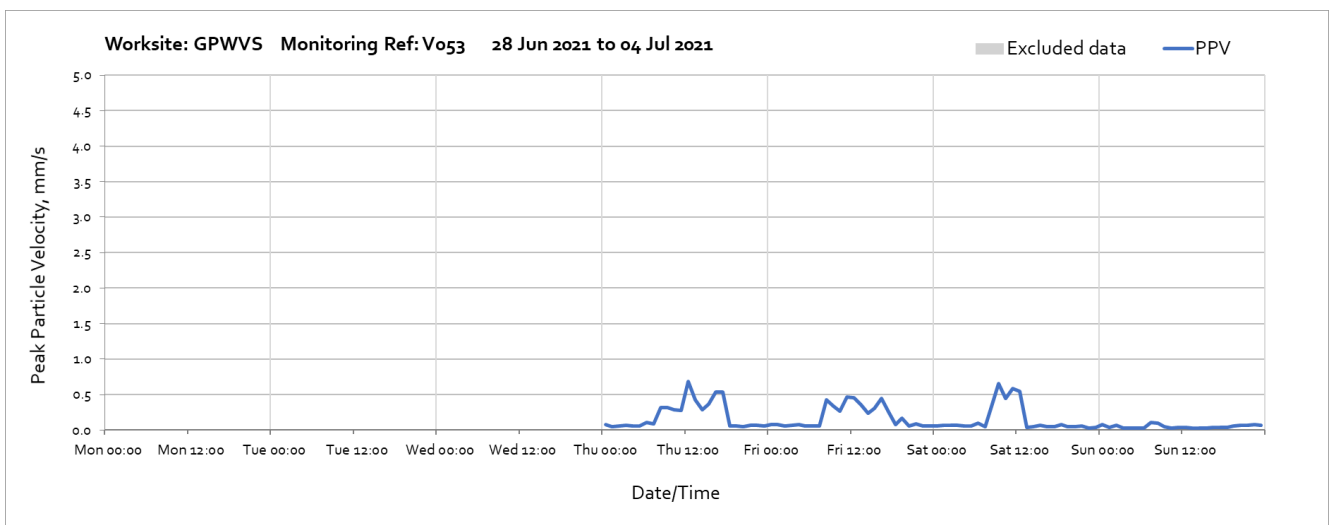


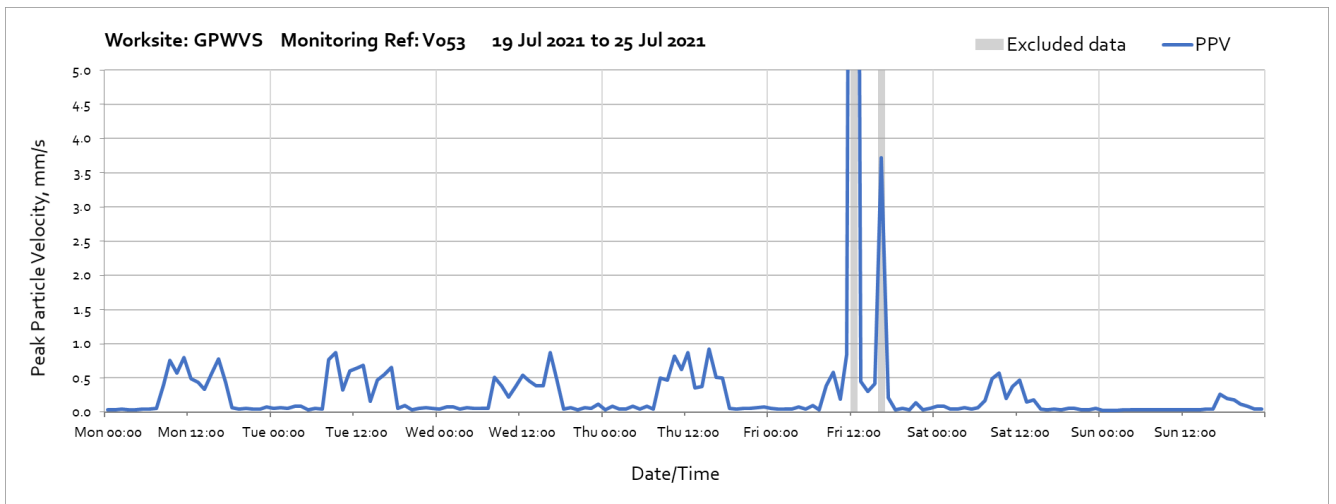
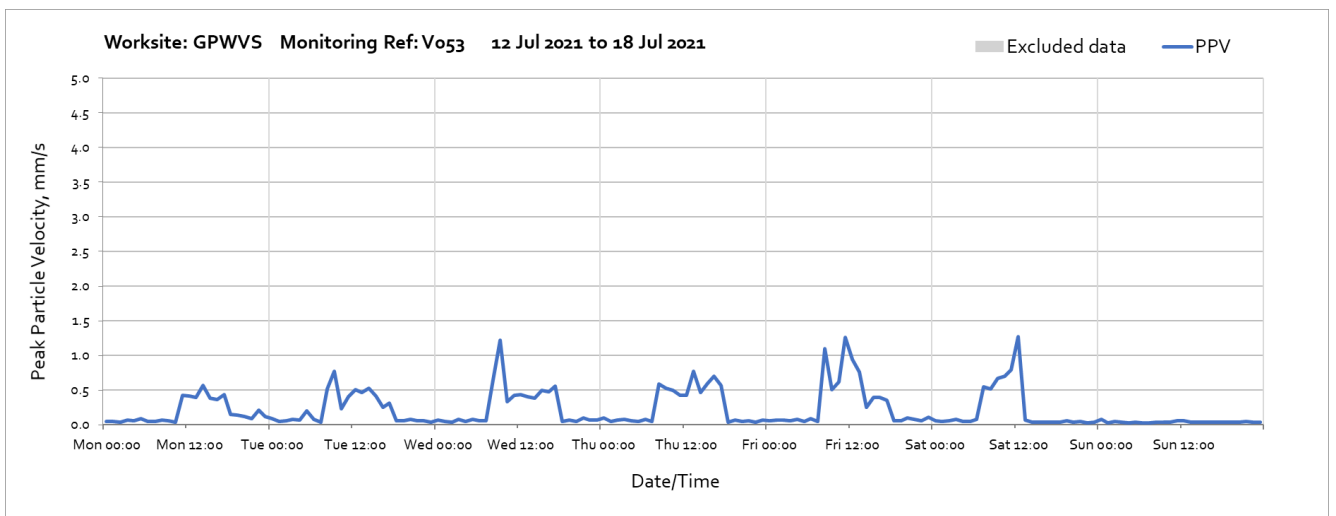
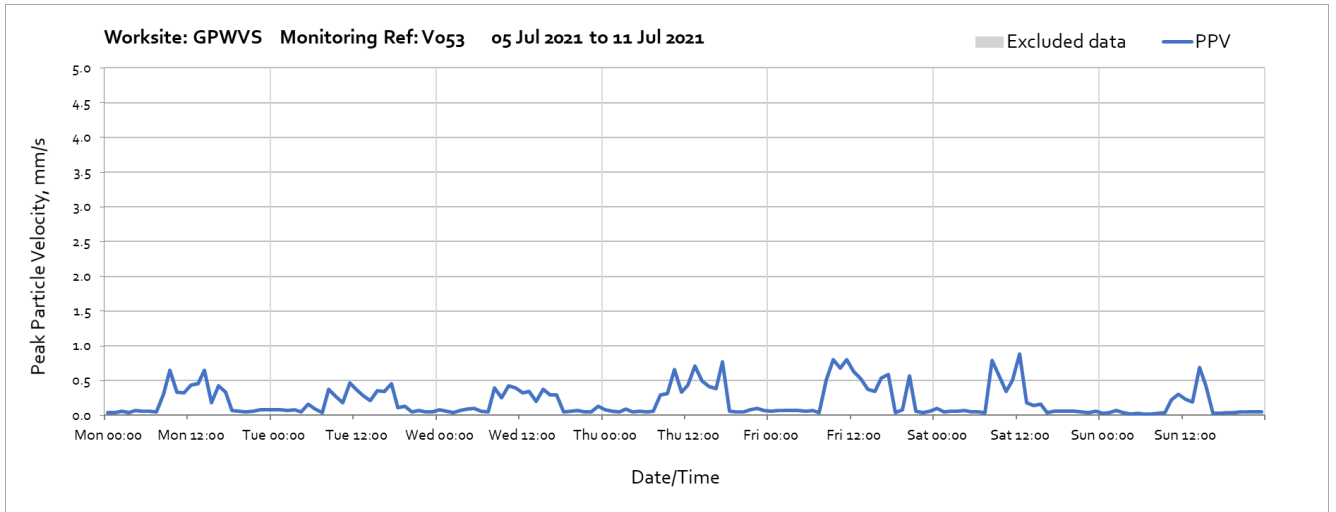
Note: High vibration levels measured across the week were due to local disturbance at the monitor location and not representative of HS2 works.



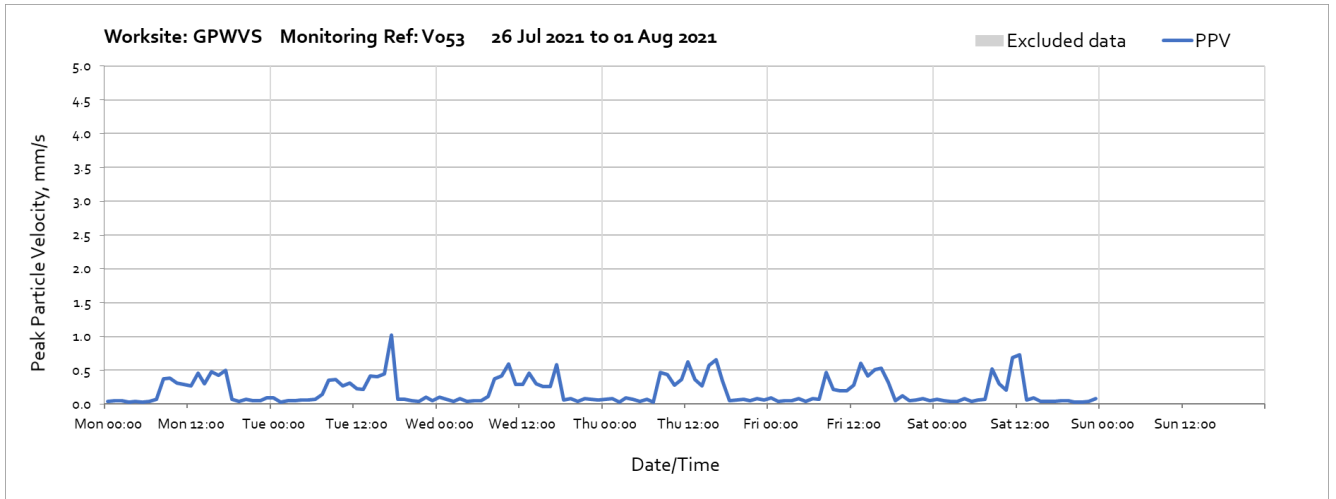
Note: High vibration levels measured between 11:00 and 13:00 on Thursday 29<sup>th</sup> July 2021 were due to local disturbance at the monitor location and not representative of HS2 works.

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





Note: High vibration levels measured at 12:00 and at 16:00 on Friday 23<sup>rd</sup> June 2021 were due to local disturbance at the monitor location and not representative of HS2 works.



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

