

## **Construction noise and vibration Monthly Report – March 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 March 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 concrete slabs and piling platforms, drainage works, excavation and backfilling works, construction of storage bays, installation of welfare cabins and breaking out of foundations were underway.
- Noise and vibration monitoring was undertaken in the vicinity of the Willesden EuroTerminal worksite (ref. WET), where construction of storage bays, construction of the site haul road, office fit-out, track works and works at the Grand Union Bridge were underway.
- Noise monitoring was undertaken in the vicinity of the Victoria Road worksite (ref. VRFIC), where construction of the site haul road, drainage works, slab and platform construction, and installation of fence and working platforms were underway.
- Noise monitoring was undertaken in the vicinity of the Flat Iron compound (within worksite ref. VRFIC), where slab construction, excavation works, surveys and drainage works were underway.
- Noise and vibration monitoring were undertaken in proximity of the Old Oak Common depot worksite (ref. OOC), where drainage works, dewatering works, pile probing works, installation of pile mat, drilling works and works for temporary welfare were underway.
- Noise monitoring was undertaken in proximity of the Mandeville Road Badminton Close compound (ref. BC Compound), where excavations, construction of platforms, installation of utility tranches, installation of hoarding and trial pits were underway.
- Noise and vibration monitoring were undertaken in proximity of the Green Park Way Ventilation Shaft worksite (ref. GPWVS), where utility works, excavations, construction of site haul road and concrete slabs, drainage works, installation of gates and hoardings were underway.

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

- School Road, Bethune Road, Chase Road, Victoria Road, Atlas Road as part of power utility works;
- Horsenden Lane, Perivale as part of water utility works;
- the Westgate Ventilation Shaft (concrete works, excavation works, preparatory works for sheet piling and hoardings installation); and

- the Old Oak Common satellite compound (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 two occasions due to HS2 works in the Local Authority Area during March 2021.

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

Six complaints were received during the monitoring period. A description of complaints, the results of investigation and any actions taken are detailed in Table 7 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> March 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 4 in Appendix A), where work activities included:
  - Construction of concrete slabs;
  - Construction of piling platform;
  - Drainage works including excavation and installation of trench, installation of carrier pipe, backfilling and removal of trench boxes;
  - Excavation and backfilling works;
  - Construction of storage bays;
  - Proving works of the service ducts and installation of cable ducts;
  - Installation of welfare cabins, including internal fit-out, external staircase, safety boundary railings and service ducts; and
  - Breaking out of gate foundations.

- Willesden EuroTerminal worksite, ref. WET (see plan 4 in Appendix A), where work activities included:
  - Construction of storage bays;
  - Construction of the site haul roads, including excavation, placement and compaction of the sub-base and surfacing;
  - Office fit-out works;
  - Track works, including installation of tracks and track maintenance; and
  - Works at Grand Union Canal bridge, including construction of ballast wall, construction of piling platforms, high voltage cable diversion, trimming of sheet piles and construction of the approach ramp.
- Victoria Road worksite, ref. VRFIC (see plan 5 in Appendix A), where work activities included:
  - Construction of site haul road, including excavation works and backfilling works, installation of kerbing;
  - Drainage works;
  - Slab and platform construction;
  - Trial holes;
  - Installation of working platforms;
  - Installation of fencing and removal of hoardings; and
  - Excavation works, drainage works and construction of crane platform at the Victoria Road Ancillary Shaft.
- Flat Iron compound, within worksite ref. VRFIC (see plan 5 in Appendix A), where work activities included:
  - Slab construction;
  - Excavation of foundations;
  - Excavation for ducts and street lighting installation;
  - Surveys; and
  - Drainage works.
- Old Oak Common depot worksite, located in the London Borough of Hammersmith and Fulham (LBHF), ref. OOC (see plan 6 in Appendix A), where work activities included:
  - Drainage works;

- Pile probing works;
  - Installation of pile mat for sheet piling;
  - Drilling works;
  - Dewatering works;
  - Laying track mats; and
  - Works for new temporary welfare, including steel fixing and shuttering works.
- Mandeville Road Ventilation Shaft worksite, reference MRVS (see plan 1 in Appendix A), where work activities included:
    - Excavation and backfilling;
    - Construction of working platforms;
    - Installation of utility trenches, pipes and ducts;
    - Installation of hoarding;
    - Excavation of trial pits; and
    - Preparation works to install foundation blocks of the new site gates.
  - Green Park Way Ventilation Shaft worksite, reference GPWVS (see plan 2 in Appendix A), where work activities included:
    - Utility works;
    - Excavation works, including for haul road and working platforms;
    - Construction of the site haul road;
    - Construction of concrete slab;
    - Excavation of trial holes;
    - Breakout of concrete and tarmac;
    - Drainage works, including installation of catchpit and manhole rings; and
    - Installation of gates and hoardings.

- 1.1.4 Further works, where monitoring did not take place, were undertaken at:
- School Road, Bethune Road, Chase Road, Victoria Road, Atlas Road as part of power utility works;
  - Horsenden Lane, Perivale, as part of water utility works;
  - the Westgate Ventilation Shaft, including concrete pouring, construction of concrete slabs, excavation works, preparatory works for sheet piling and hoarding installation; and
  - the Old Oak Common satellite compound, including vegetation clearance.

1.1.5 The applicable standards, guidance, and monitoring methodology is 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 Fifteen noise and four vibration monitoring installations were active in March 2021 in the LBE area. Table 2 summarises the position of noise and vibration monitoring installations within the LBE area in March 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)
VRFC	N029	Braitrim House, Victoria Road
	N042	Boden House Car Park
	N031	School Road, outside Acton Business Centre

Worksite Reference	Measurement Reference	Address
	N049	Flat Iron compound railway fence, Victoria Rd North Acton
	N050	Acton Square, outside North Acton Station
OOC	N027	Old Oak Common Lane
	N028	Old Oak Common Lane, Hilltop Works
	V045	25 Wells House Road
	V051	Kildun Court, Old Oak Common Lane
MRVS	N040	Badminton Close
GPWVS	N059	Green Park Way Ventilation Shaft
	V053	Green Park Way 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	63.8 (65.7)	65.4 (68.0)	63.6 (65.6)	62.2 (65.0)	59.3 (64.9)	62.1 (63.0)	63.9 (64.6)	62.9 (63.6)	63.1 (67.1)	58.3 (62.5)	61.8 (65.2)	59.1 (64.6)
	N033	Outside The Collective, Atlas Road/Victoria Road	Free-field	66.5 (71.1)	69.0 (73.9)	64.9 (70.0)	63.8 (69.6)	60.9 (68.1)	64.8 (67.9)	68.3 (71.4)	66.3 (70.9)	66.2 (71.8)	58.5 (62.3)	62.7 (69.0)	61.9 (74.1)
	N060	Atlas Road next to Bashey Road	Façade	56.4 (64.4)	65.7 (74.1)	60.4 (72.5)	55.9 (69.7)	54.9 (70.0)	57.7 (61.3)	65.2 (67.3)	53.1 (58.2)	53.7 (66.6)	48.5 (52.4)	53.4 (66.5)	57.2 (71.6)
WET	N034	Stephenson Street (north)	Free-field	53.5 (59.1)	56.7 (62.3)	54.3 (58.5)	52.2 (64.2)	49.0 (59.8)	52.4 (55.0)	57.6 (59.8)	53.0 (55.0)	53.1 (61.2)	46.7 (50.9)	52.4 (57.7)	47.0 (50.8)
	N035	Stephenson Street (south)	Free-field	56.2 (61.4)	57.9 (61.0)	53.4 (57.4)	50.7 (59.8)	48.6 (58.2)	55.1 (57.1)	58.8 (61.3)	52.5 (54.4)	51.4 (56.3)	47.0 (51.4)	50.8 (58.1)	47.1 (52.0)
	N041	Junction of Stephenson Street/Goodhall Street	Free-field	55.4 (60.2)	57.6 (64.0)	56.2 (61.6)	54.1 (62.0)	49.4 (56.8)	54.3 (56.3)	56.3 (58.2)	54.9 (56.4)	54.5 (58.6)	48.5 (52.6)	53.8 (58.8)	48.4 (53.2)



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
VRFIC	N029	Braitrim House, Victoria Road	Free-field	53.3 (58.4)	57.9 (59.8)	56.8 (63.8)	54.3 (64.3)	53.6 (62.7)	53.6 (62.2)	55.7 (59.0)	52.8 (55.2)	53.0 (64.4)	50.0 (64.6)	51.5 (63.7)	51.5 (59.1)
	N042	Bodens car park	Free-field	56.3 (60.2)	61.6 (66.3)	53.7 (57.5)	52.3 (56.5)	50.7 (60.7)	54.4 (55.6)	58.1 (59.5)	53.9 (56.5)	53.0 (57.2)	49.1 (52.4)	52.2 (56.0)	49.4 (52.7)
	N031	School Road, outside Acton Business Centre	Free-field	56.1 (66.7)	62.6 (67.3)	56.8 (60.4)	55.0 (66.9)	52.0 (67.2)	54.2 (60.8)	59.6 (65.4)	54.4 (58.0)	56.6 (65.5)	53.2 (67.0)	54.8 (64.4)	50.8 (56.8)
	N049	Flat Iron compound	Free-field	54.3 (59.6)	60.1 (63.4)	56.8 (61.1)	55.2 (64.1)	55.2 (64.5)	54.7 (61.0)	56.8 (59.7)	54.3 (56.3)	53.9 (63.7)	49.7 (56.6)	53.0 (63.7)	53.6 (60.1)
	N050	Acton Square, outside North Acton Station	Free-field	64.1 (66.9)	64.0 (65.5)	63.0 (65.3)	62.3 (68.0)	58.0 (64.1)	63.4 (65.7)	62.8 (63.9)	62.8 (64.7)	63.4 (73.8)	58.7 (64.9)	62.1 (66.4)	58.4 (65.1)

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
OOC	N027	Old Oak Common Lane	Free-field	64.5 (66.0)	67.4 (72.7)	61.5 (64.1)	59.3 (62.3)	56.2 (63.6)	59.9 (61.0)	60.5 (61.6)	60.2 (62.5)	59.8 (61.8)	59.9 (64.6)	61.6 (64.9)	58.4 (64.9)
	N028	Old Oak Common Lane, Hilltop Works	Free-field	67.1 (69.5)	69.5 (72.8)	67.4 (71.0)	66.2 (78.9)	61.5 (75.9)	65.0 (65.4)	66.3 (66.7)	65.7 (66.1)	66.8 (72.0)	60.6 (67.4)	64.7 (68.2)	60.9 (67.4)
MRVS	N040	Badminton Close	Free-field	54.9 (60.8)	55.3 (58.9)	54.0 (57.0)	53.3 (56.9)	51.5 (61.6)	54.1 (57.1)	55.6 (61.3)	52.8 (54.2)	54.2 (56.8)	51.2 (55.8)	54.2 (60.9)	51.7 (56.1)
GPWVS	N059	Green Park Way Ventilation Shaft	Façade	56.5 (69.3)	62.7 (68.5)	54.2 (57.7)	53.1 (56.9)	52.3 (65.4)	53.9 (58.3)	55.4 (61.5)	51.5 (54.4)	53.1 (59.6)	49.3 (54.1)	54.1 (66.5)	50.7 (54.9)

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

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

Worksite Reference	Measurement Reference	Monitor Address	Highest PPV measured in any axis, mm/s
WET	V052	Stephenson Street (north)	2.67 (Y-axis)
OOC	V045	25 Wells House Road	1.84 (Y-axis)
	V051	Kildun Court, Old Oak Common Lane	0.95 (Z-axis)
GPWVS	V053	Green Park Way Ventilation Shaft	5.15* (Y-axis)

\* High vibration levels are due to the proximity of the construction activities to the vibration monitor. The nearest residential receptors are further away (over 25m 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	Night	2200-0700	7
	N050	Acton Square, outside North Acton Station	All days	All periods	No exceedance
OOC	N027	Old Oak Common Lane	All days	All periods	No exceedance
	N028	Old Oak Common Lane, Hilltop Works	All days	All periods	No exceedance
MRVS	N040	Badminton Close	Night	All periods	No exceedance
GPWVS	N059	Green Park Way Ventilation Shaft	All days	All periods	Not applicable*

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

2.2.5 Seven exceedances of the SOAEL were recorded due to HS2 construction works during March 2021. These were due to works taking place outside normal core hours in line with the Consented Dispensation.

2.2.6 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

## 2.3 Exceedances of Trigger Level

2.3.1 Table 6 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 6: 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 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 7: Summary of Complaints

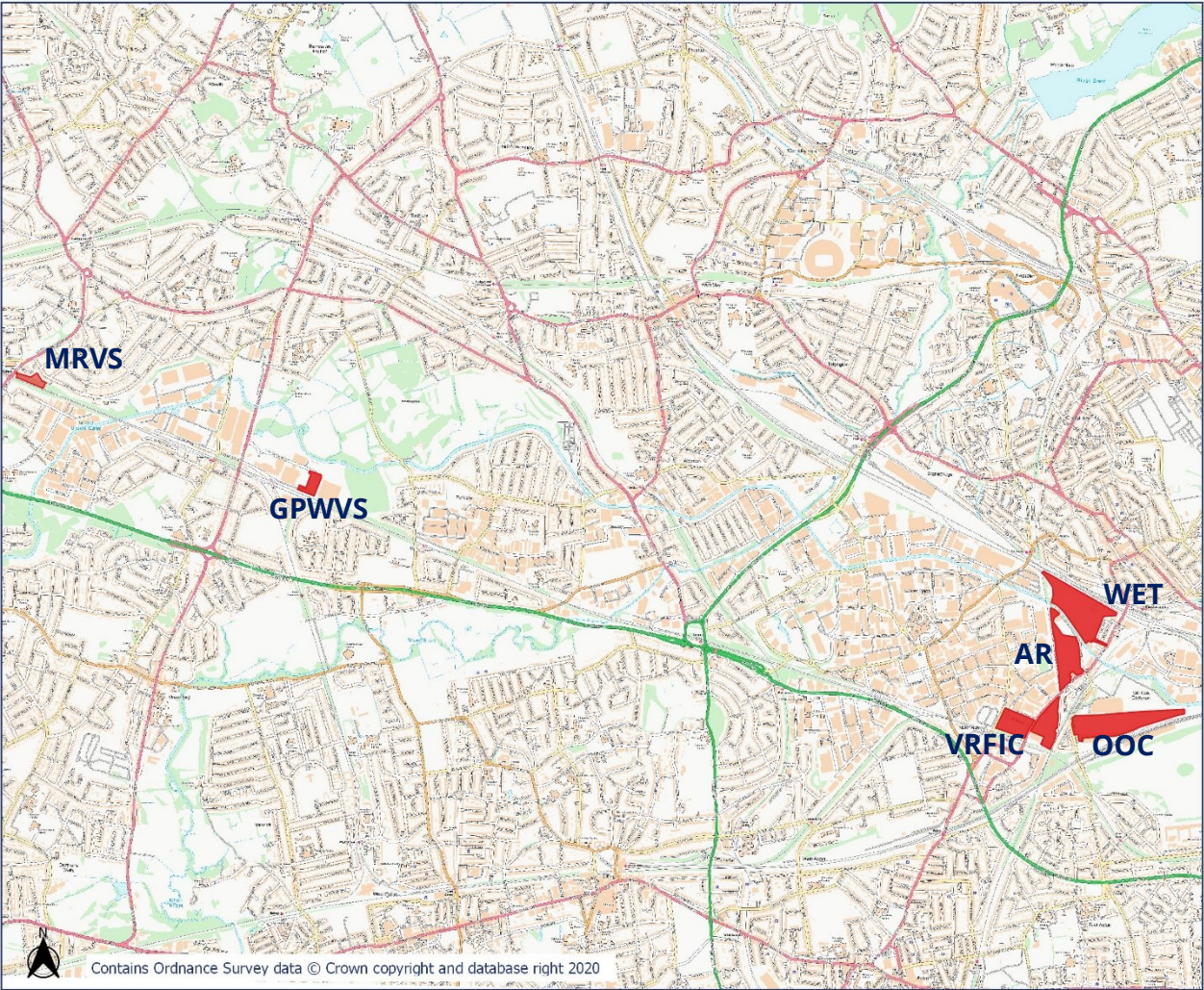
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-41657-C	OCC	Complaint due to noise from whistles coming from the worksite.	Investigation shown that whistles were used at the entrance of the site at the time of the complaint.	The volume of whistles has been reduced and an alternative longer term solution is being investigated.
HS2-21-41687-C	OCC	Complaint due to noise from whistles and high levels of vibrations.	Investigation shown that at the time of the complaint whistles were used at the entrance of the site and works activities comprised the use of a compactor which could have caused perceptible vibration levels. However works were carried out in line with Section 61 application and BPM.	The whistles volumes have been adjusted and a longer term solution is being looked into. Information about the timescales of works undertaken with the compactor has been provided to the complainant. No actions considered to be required for works on site which were in line with the Section 61 application coverage.
HS2-21-41605-C HS2-21-56812-E	WET	Complaint due to construction noise during the day.	Investigation shown that works were carried out in line with Section 61 application and BPM.	The complainant has been contacted. No further actions considered to be required for works on site which were in line with the Section 61 application coverage.
HS2-21-41651-C	WET	Complaint due to constant drilling noise during the day.	Contractor investigation found that the reported noise was unlikely to be due to works at the HS2 site.	Contractor has discussed with stakeholder and will remain in contact. A vibration monitor is also to be fitted to the front of property to monitor vibration levels.
HS2-21-55410-E	OCC	Complaint due to vibrations during the day.	Investigation shown that works were carried out in line with Section 61 application and BPM.	The complainant has been contacted. No further actions considered to be required for works on site which were in line with the Section 61 application coverage.

# Appendix A Site Locations



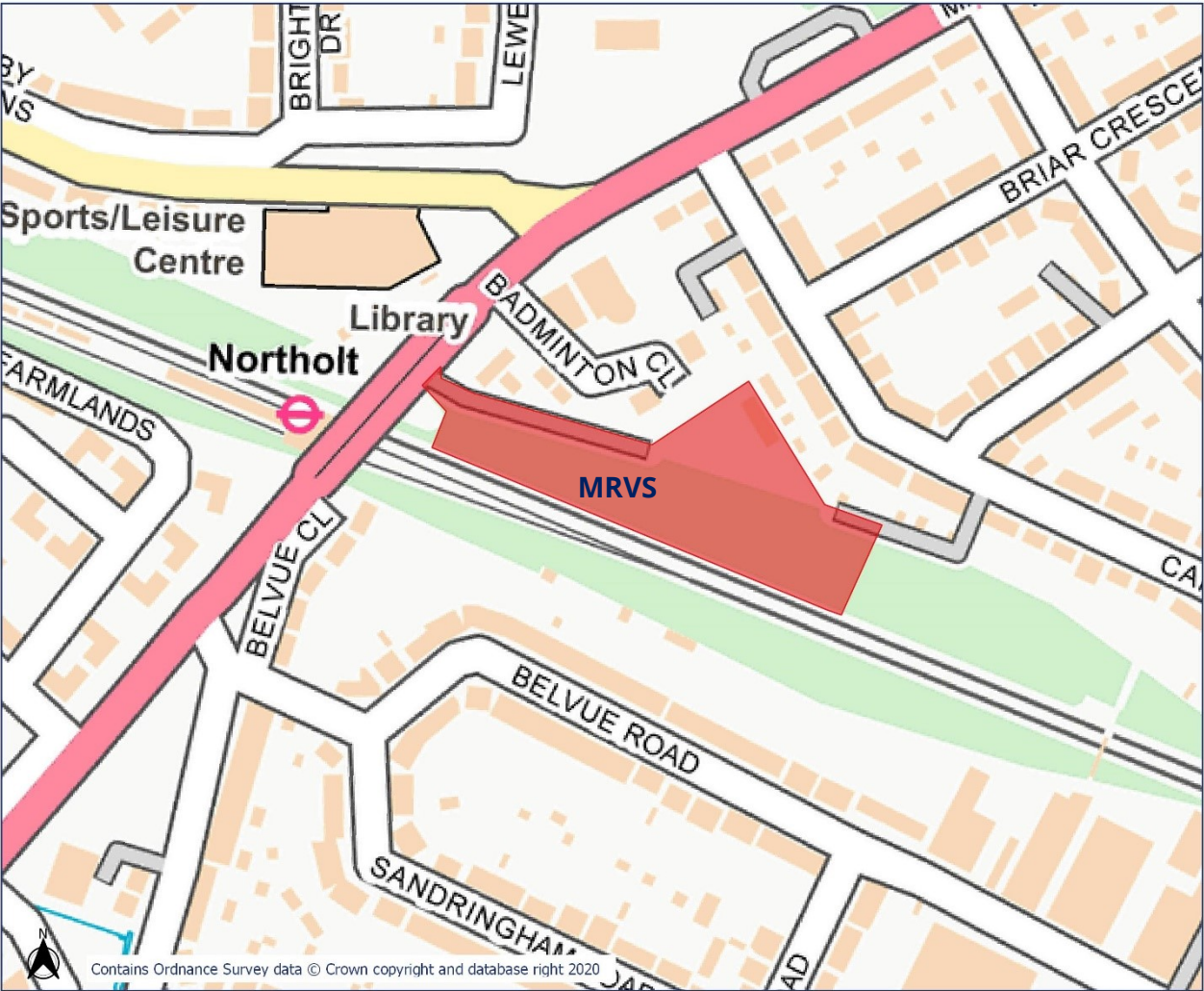
# HS2

## Worksite identification plan - Overview



**Legend**  
Active worksites

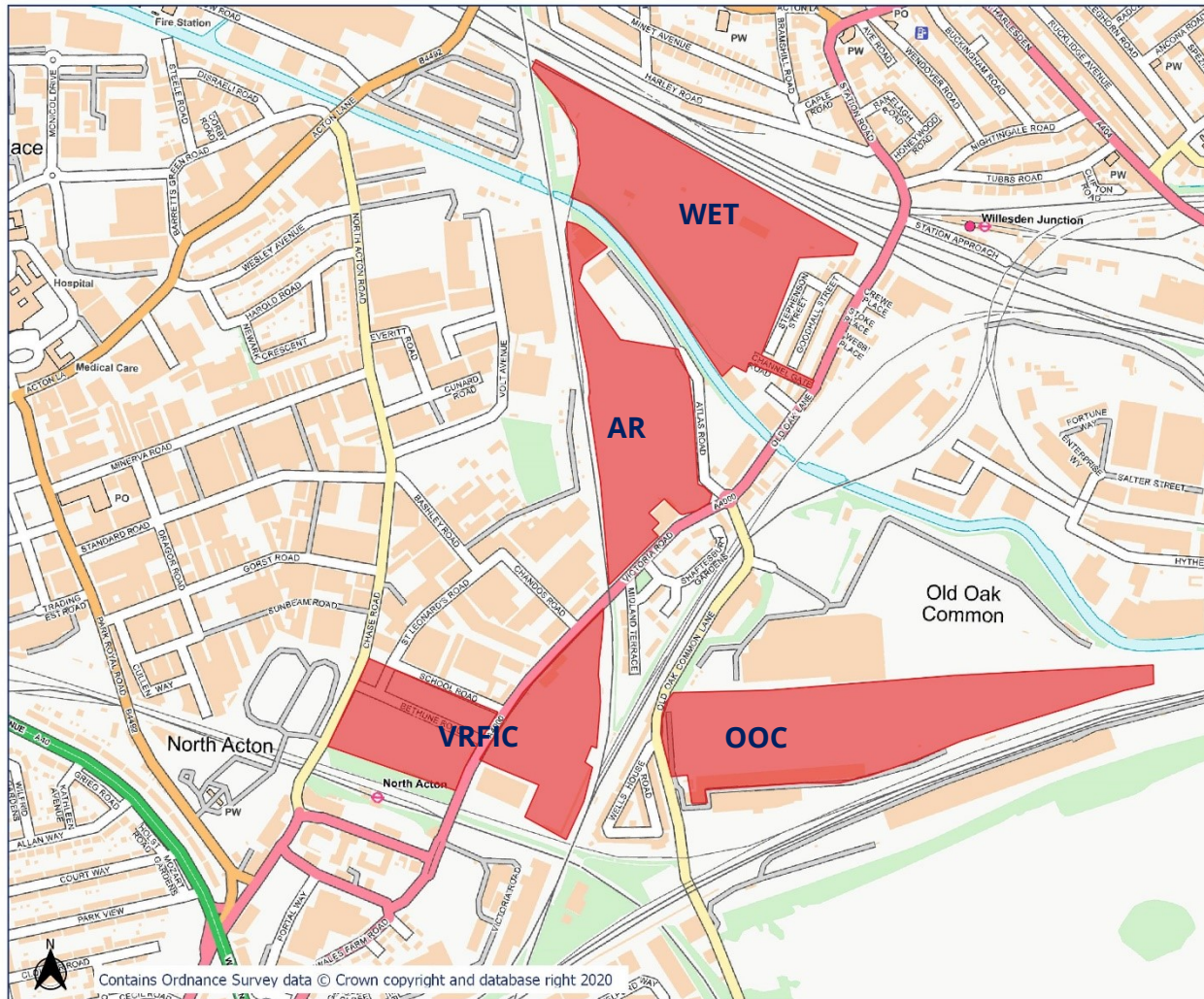


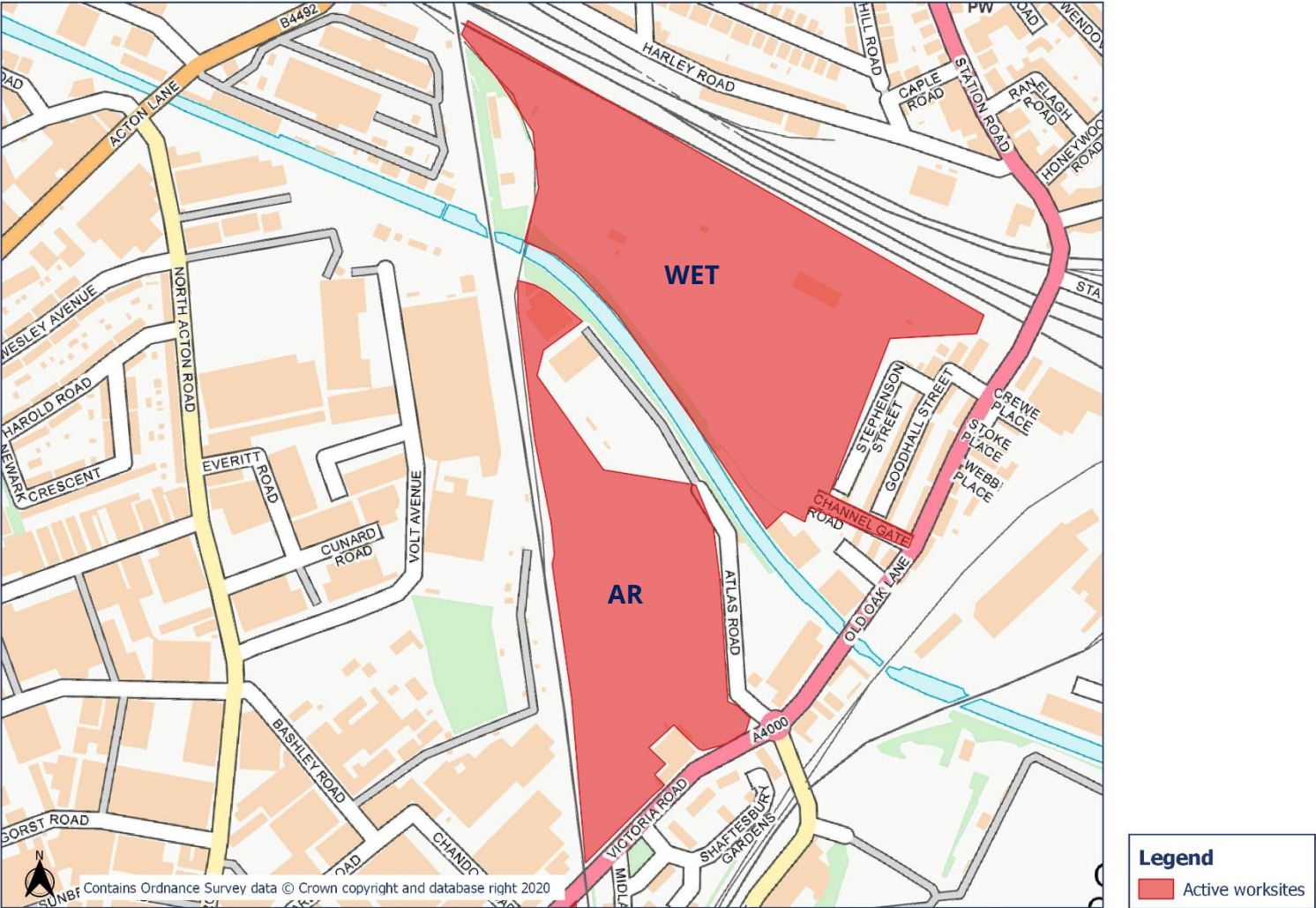


**Legend**  
Active worksites

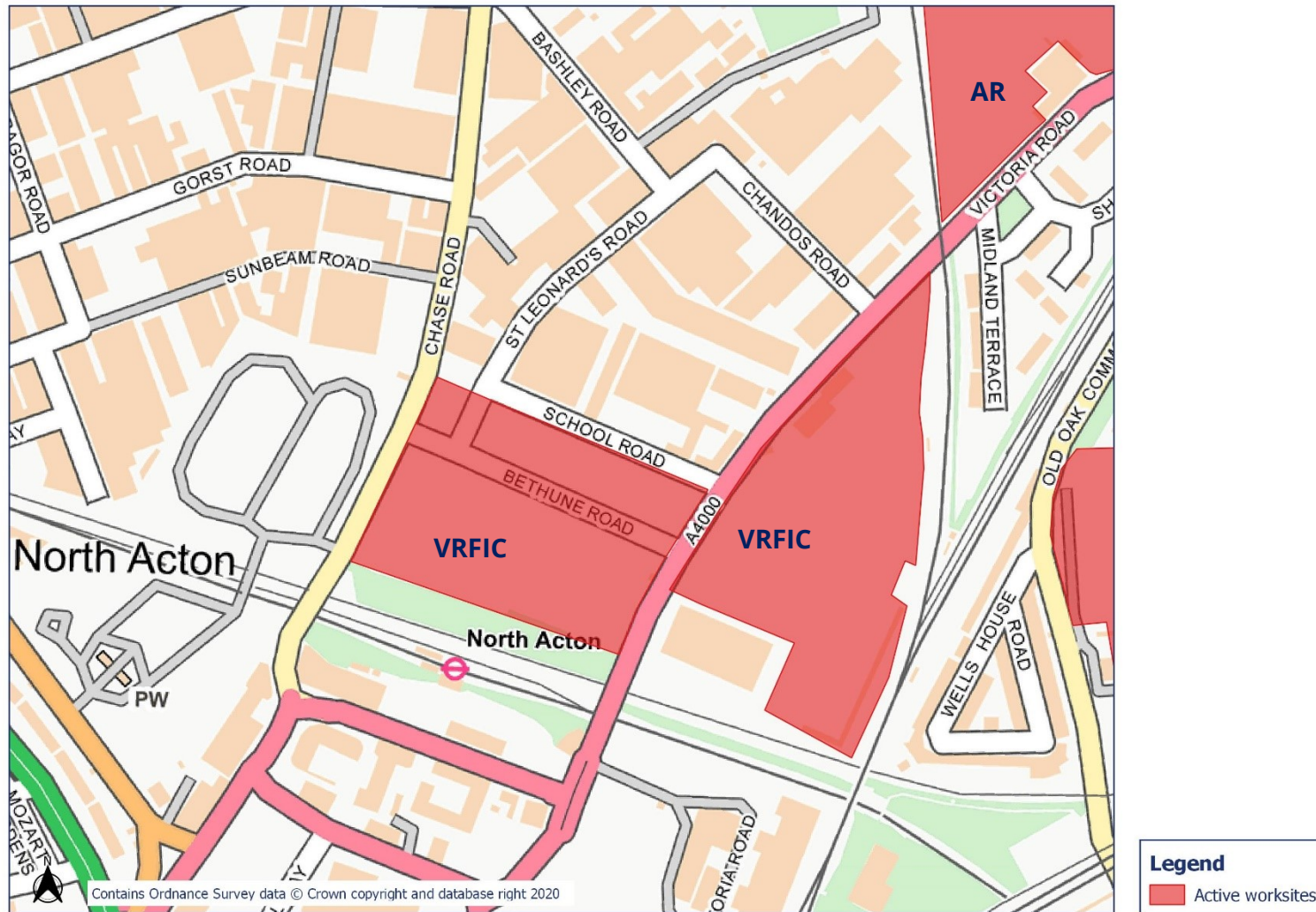


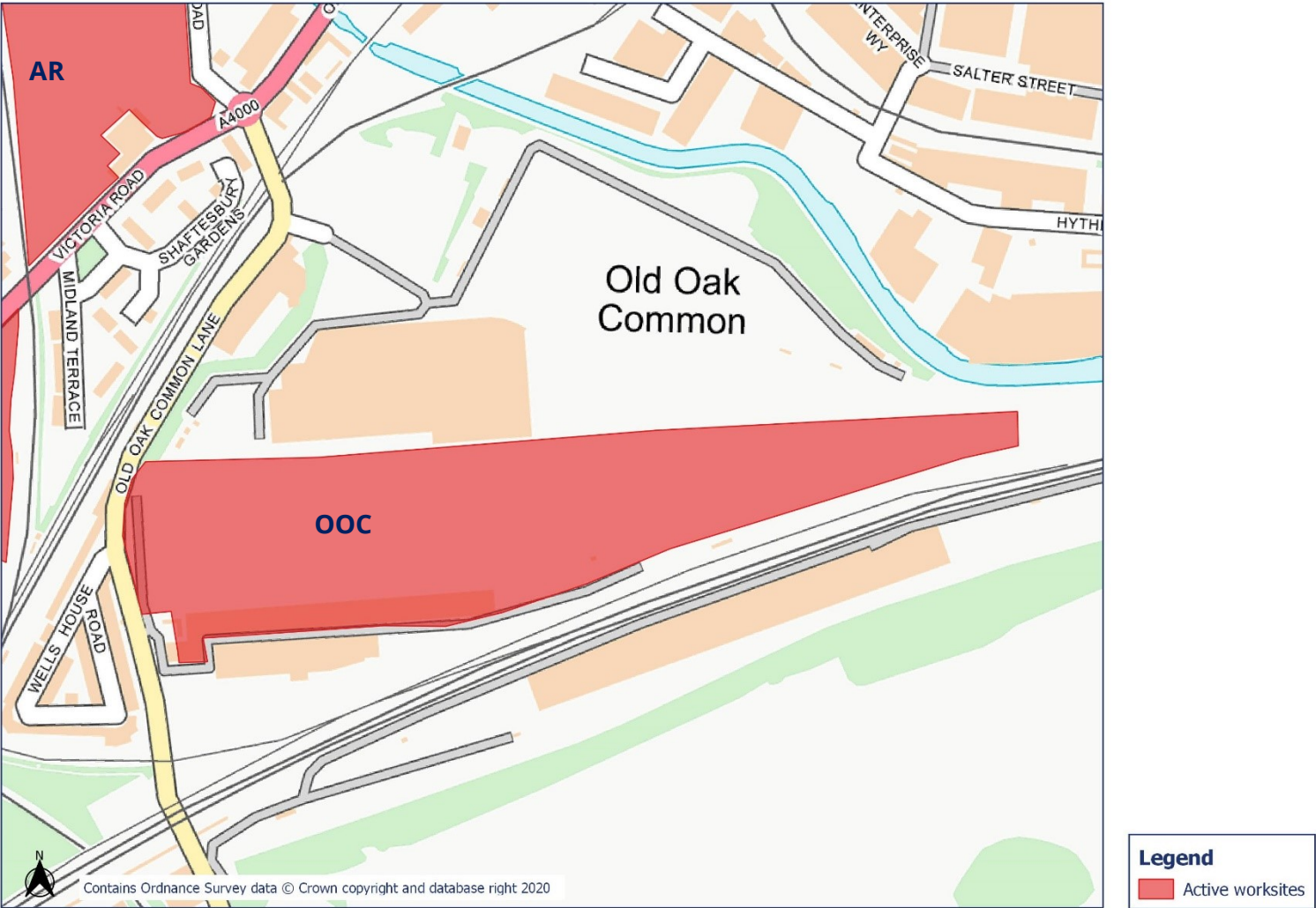








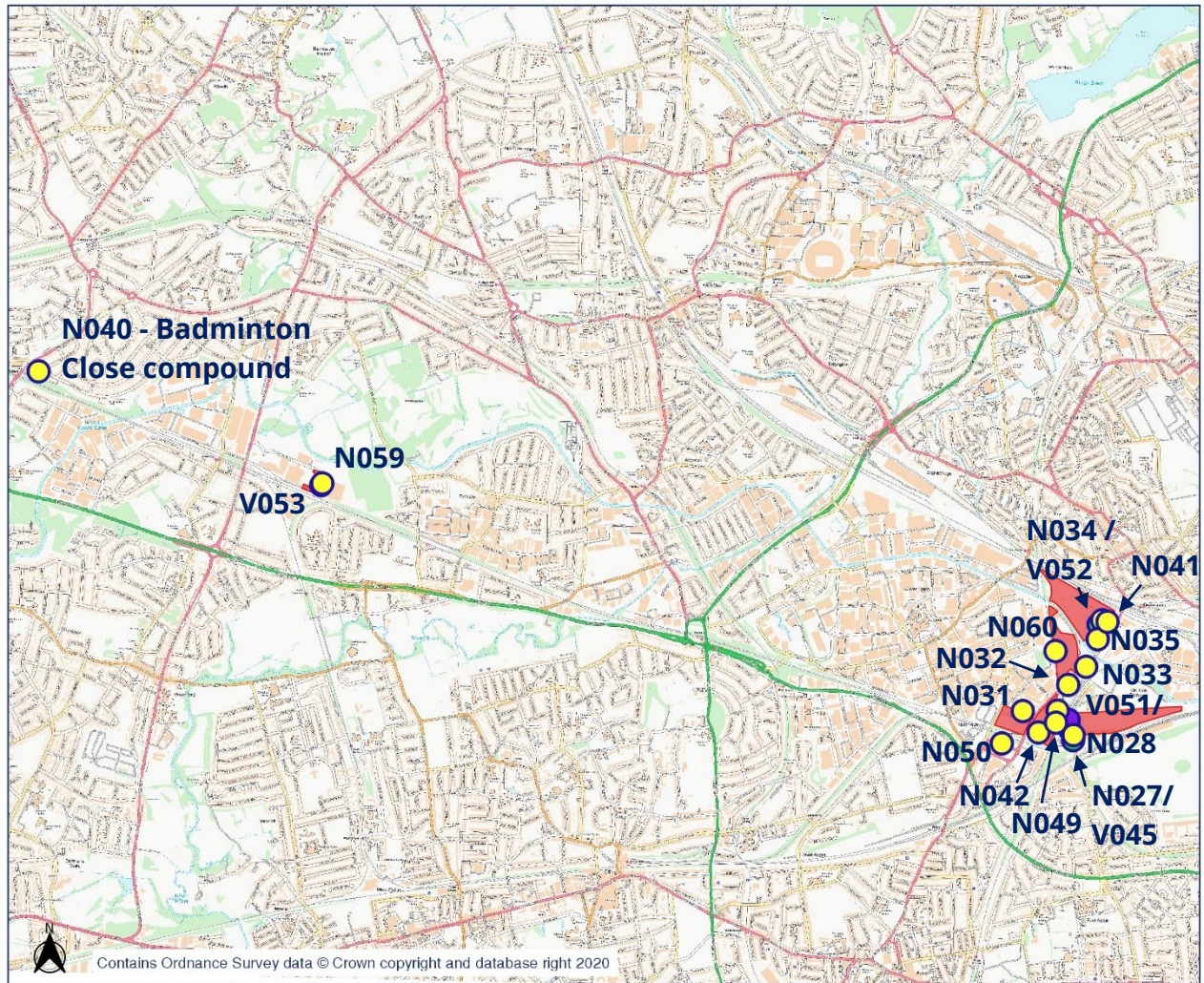




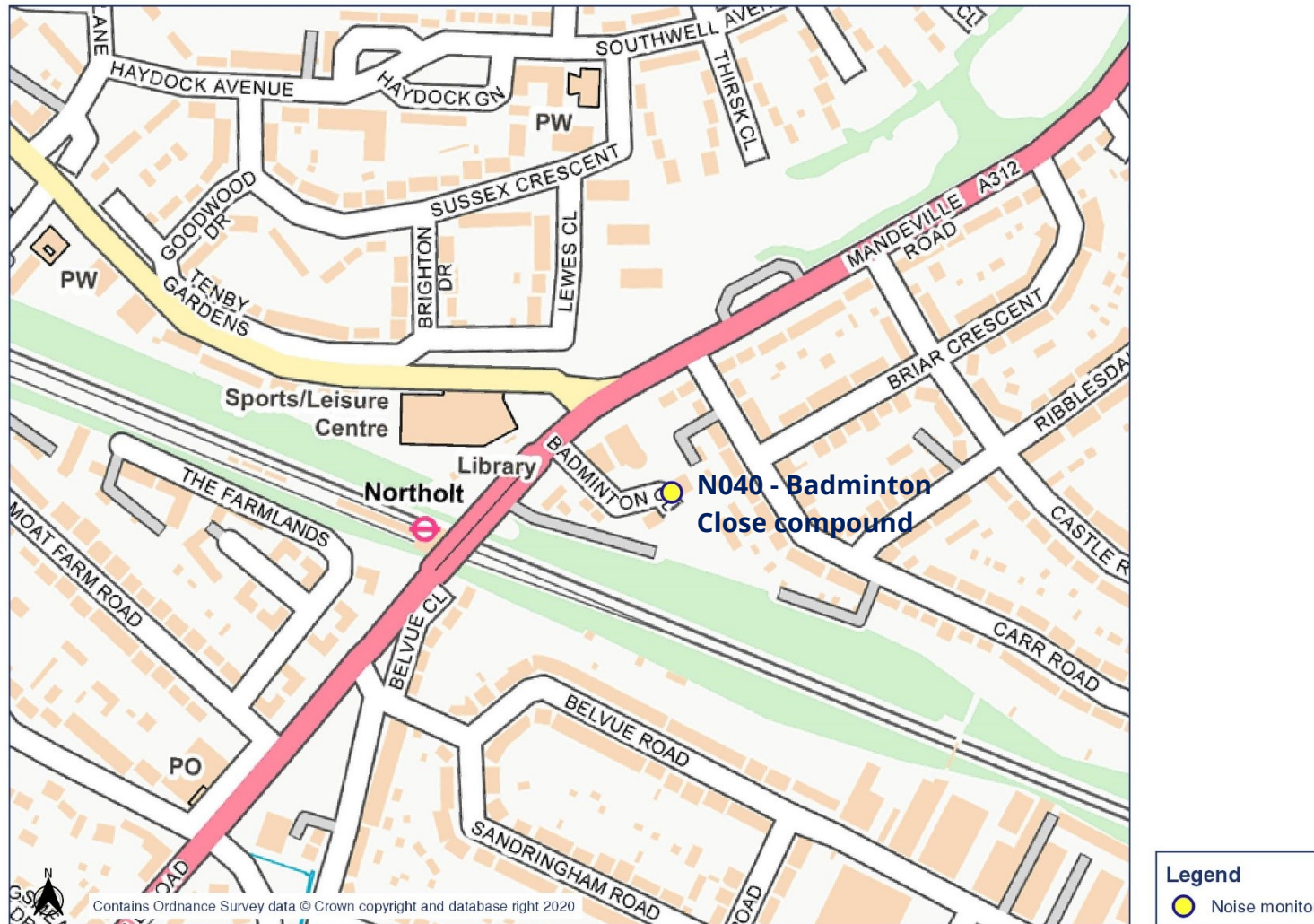
# Appendix B Monitoring Locations



# HS2 Noise and vibration monitoring plan - Overview

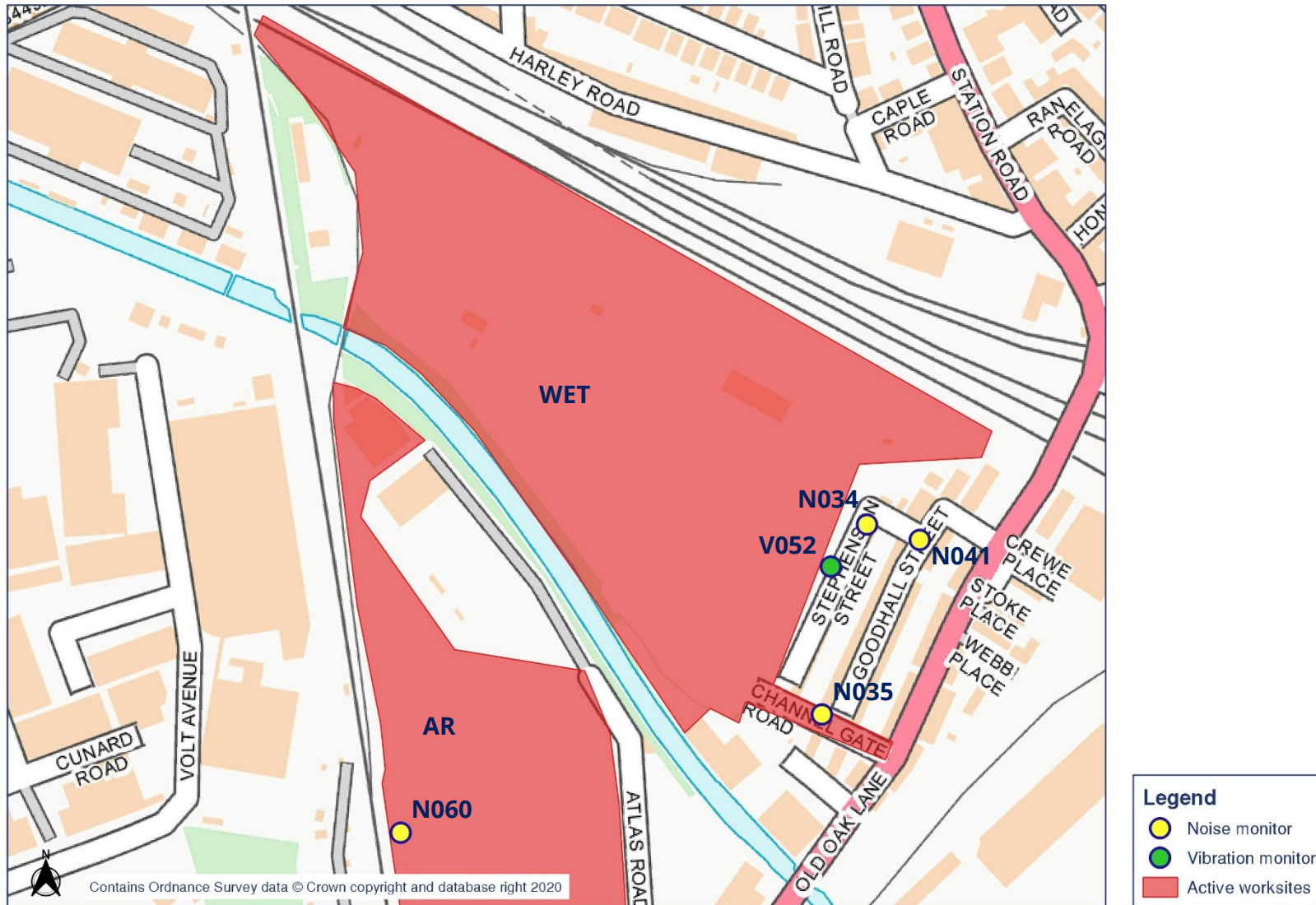


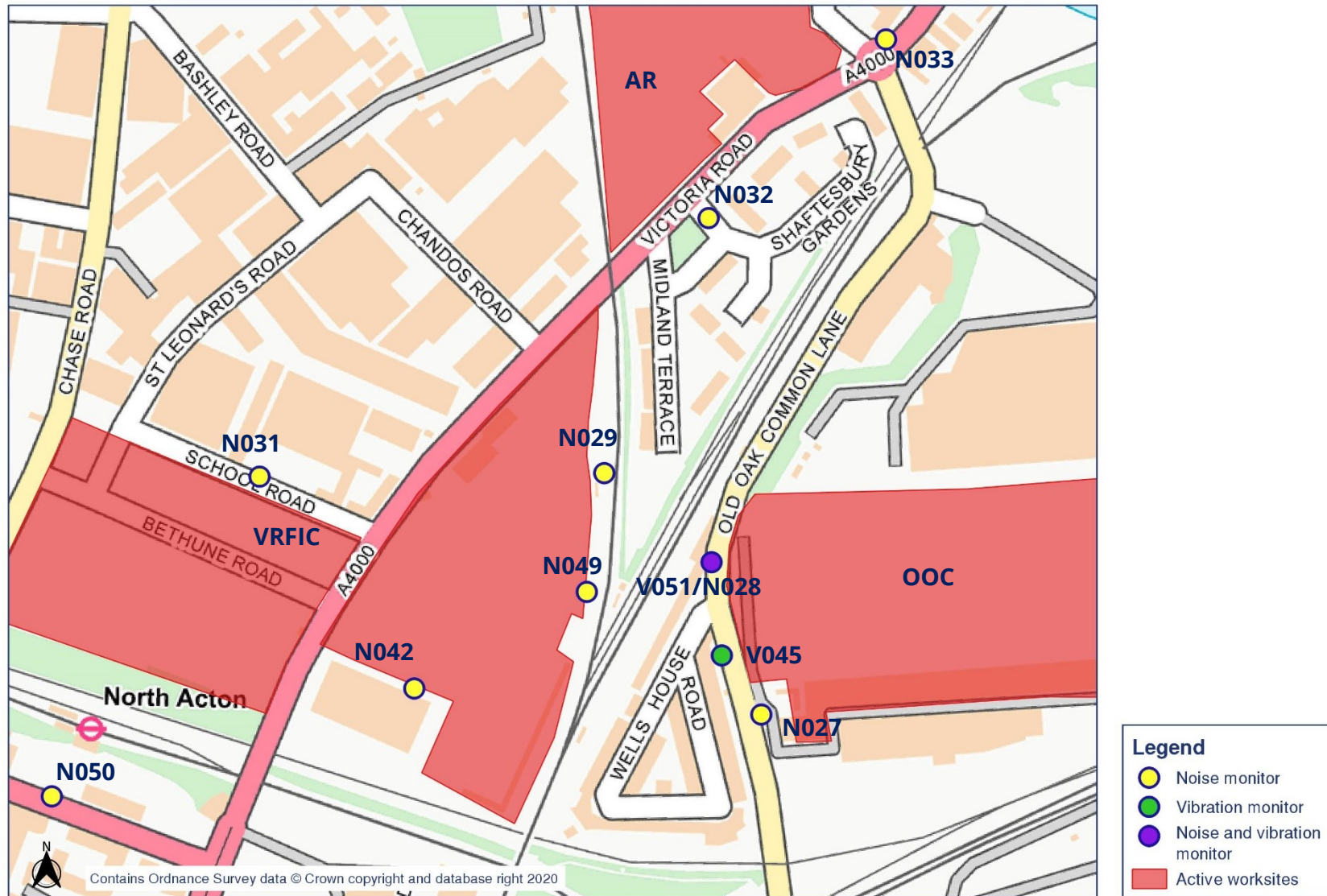










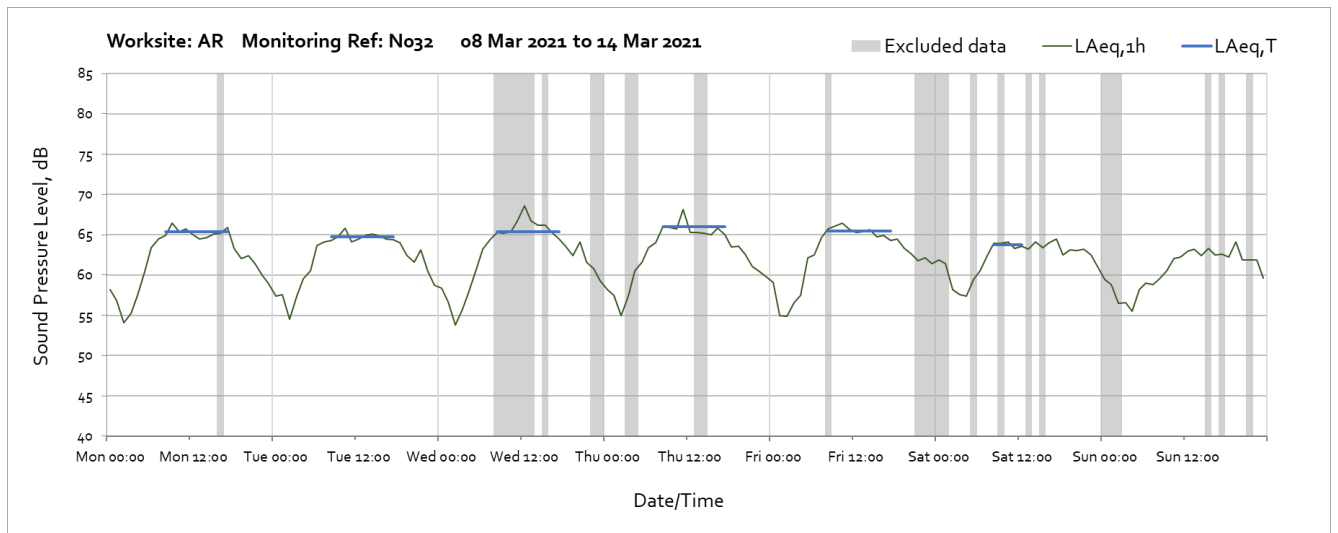
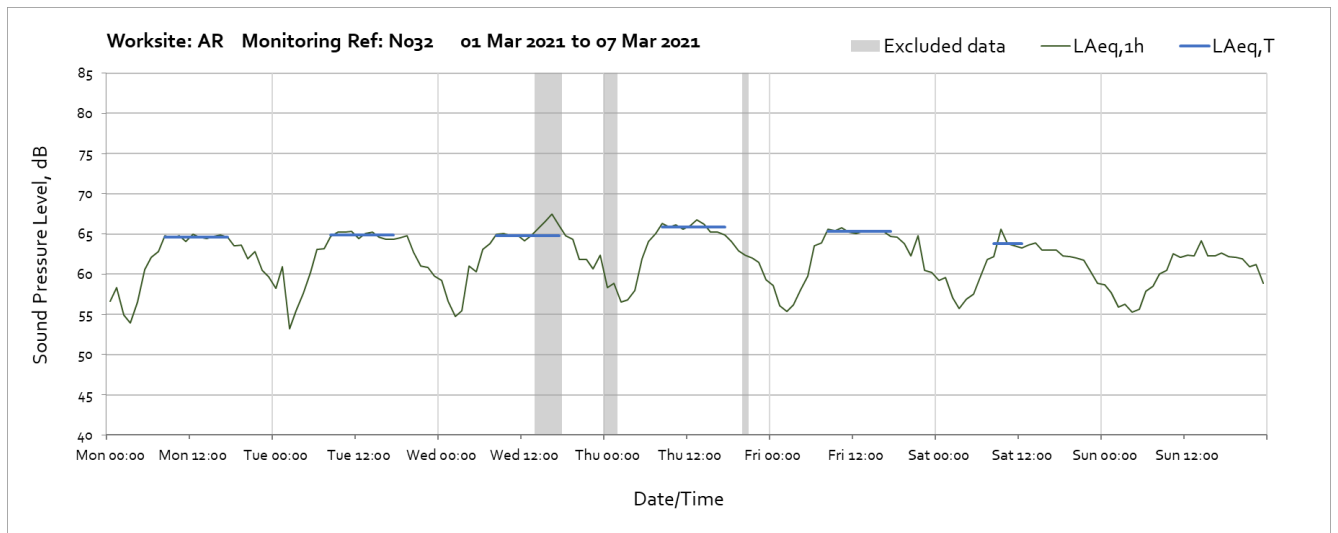


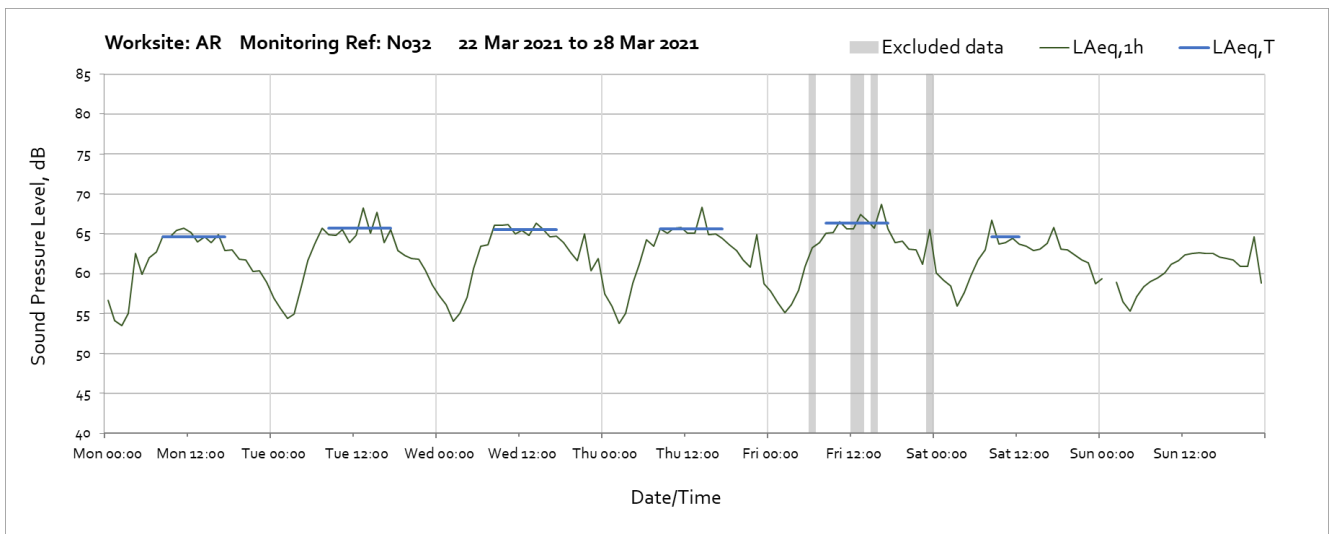
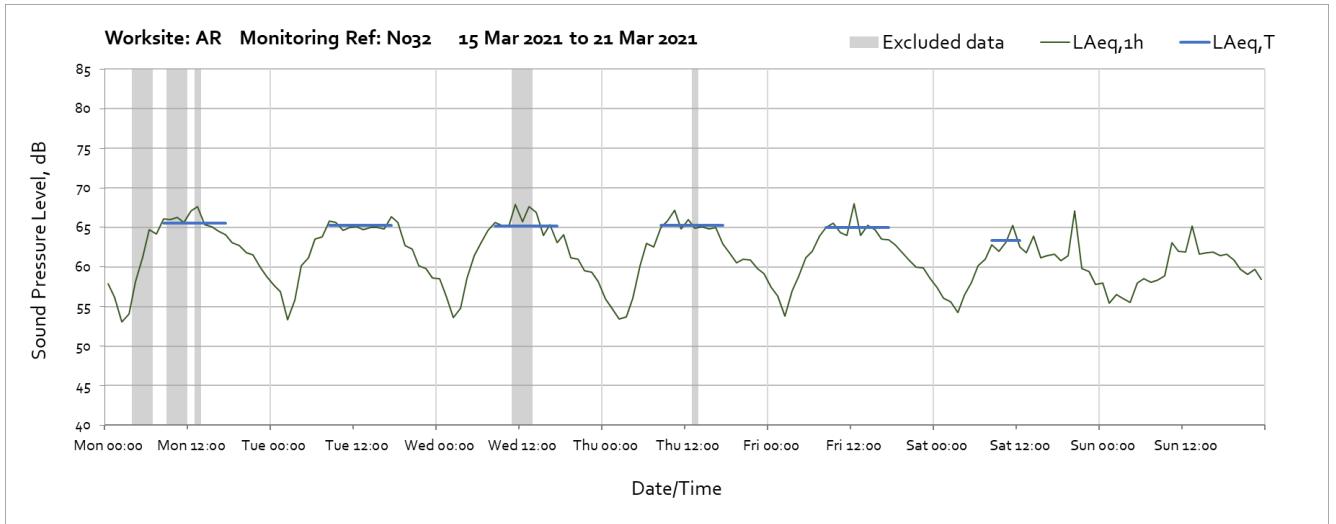
# Appendix C Data

## Noise

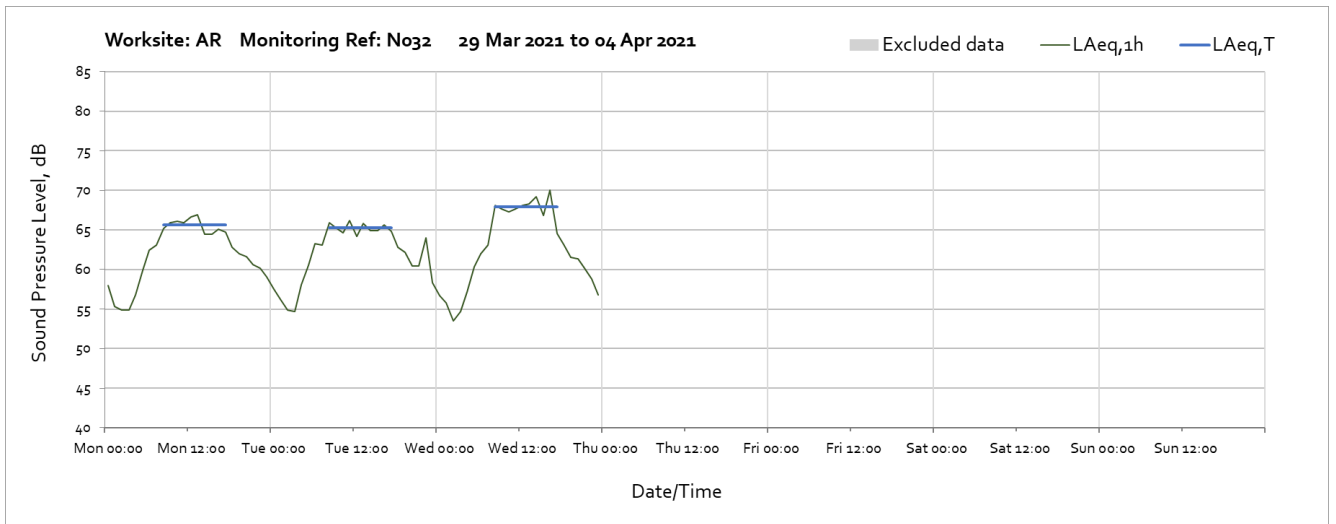
The following graphs show the hourly measured ambient noise level  $L_{Aeq,1h}$  and, where relevant, the averaged noise level  $L_{Aeq,T}$  values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and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

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

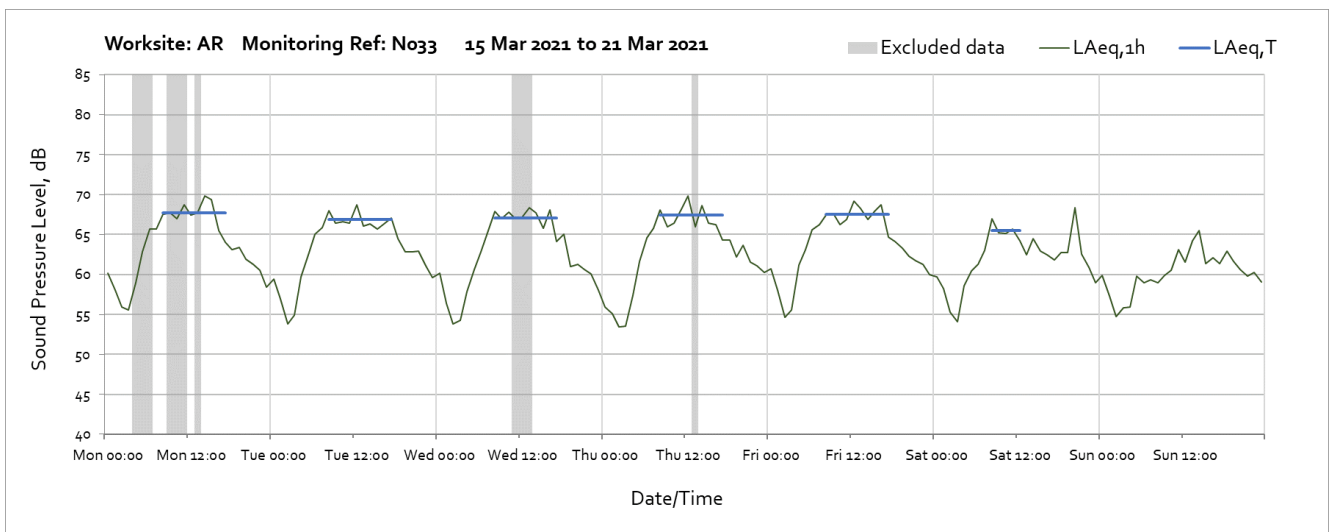
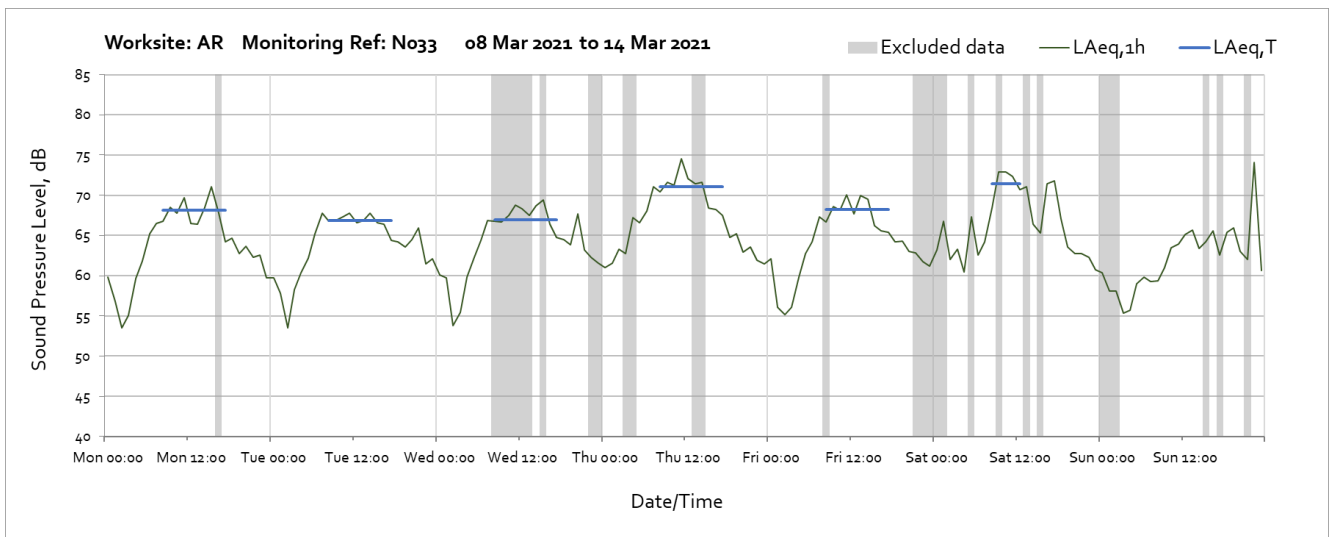
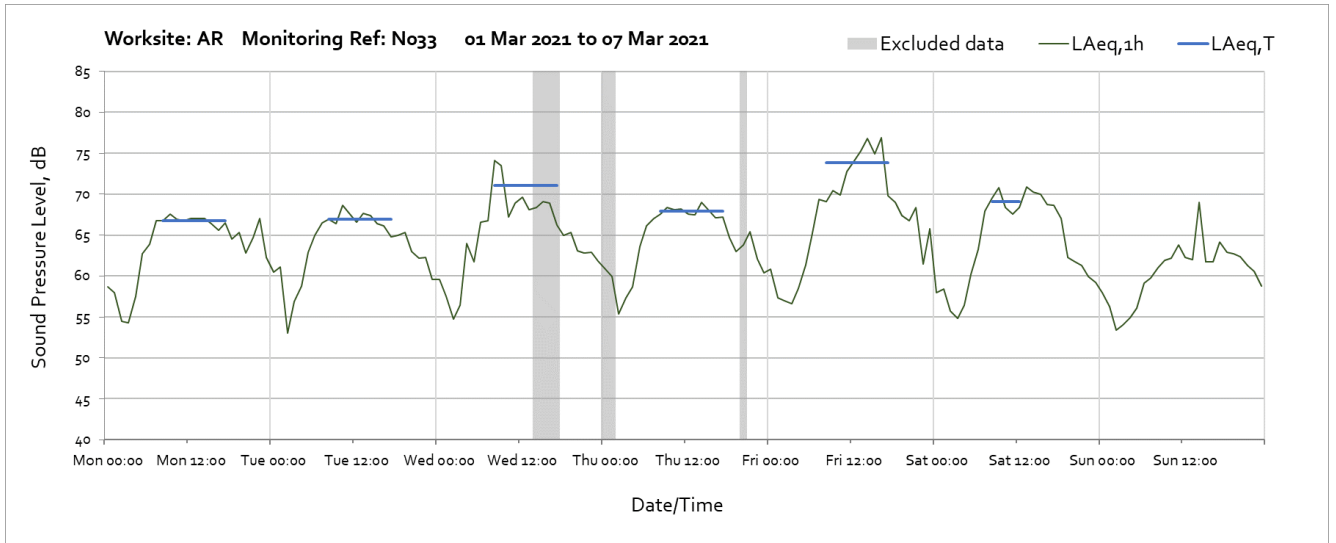




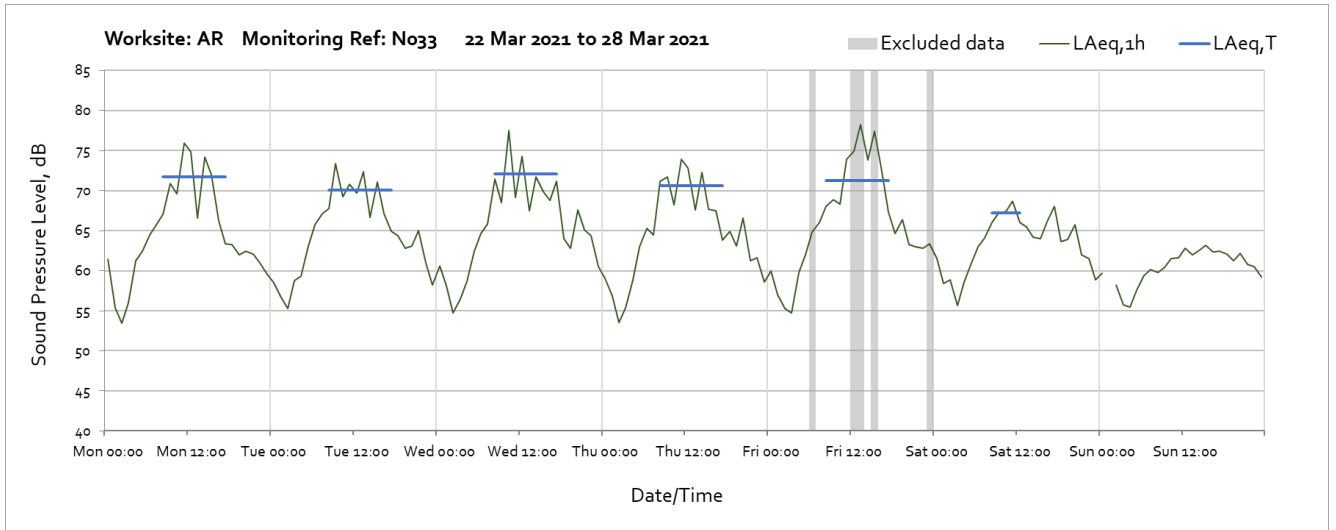
Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.



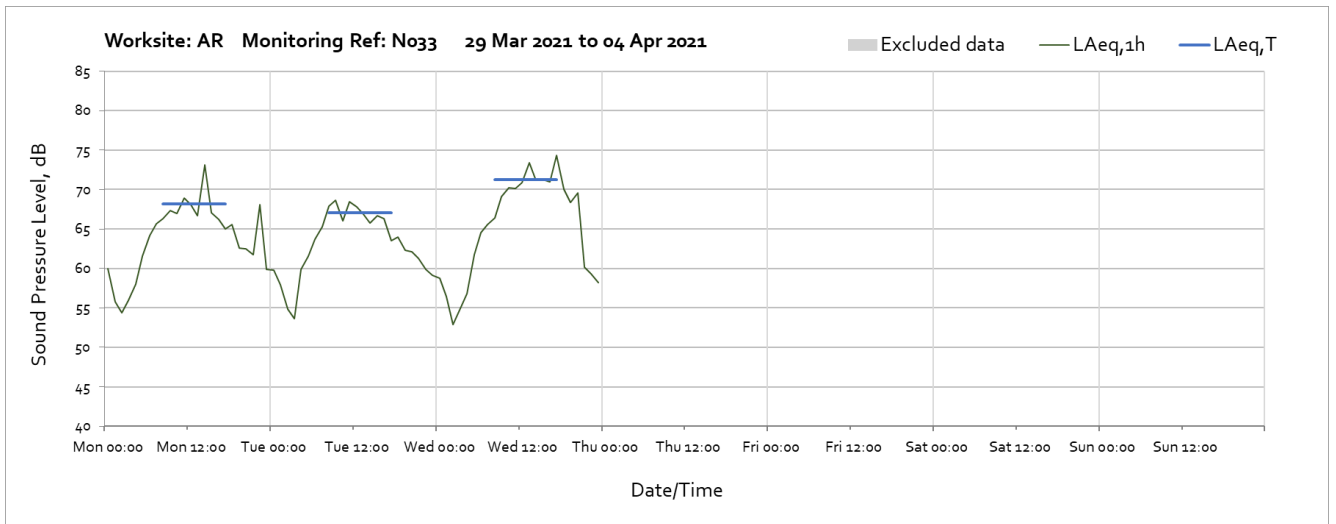
## Worksite: Atlas Road worksite (AR) – Monitoring Ref: N033





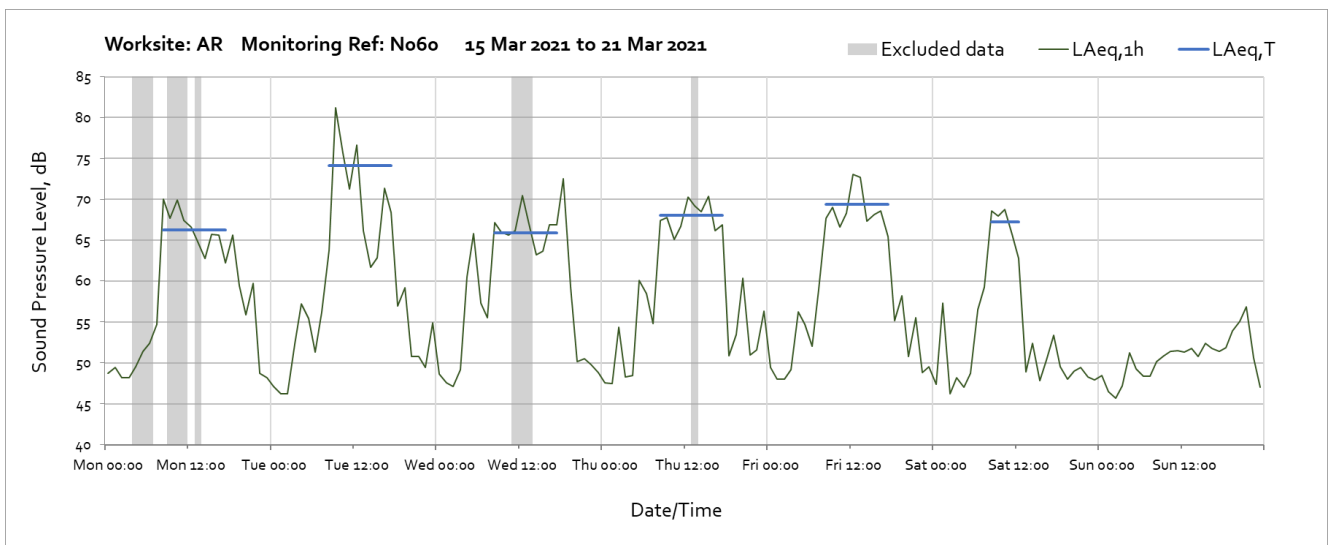
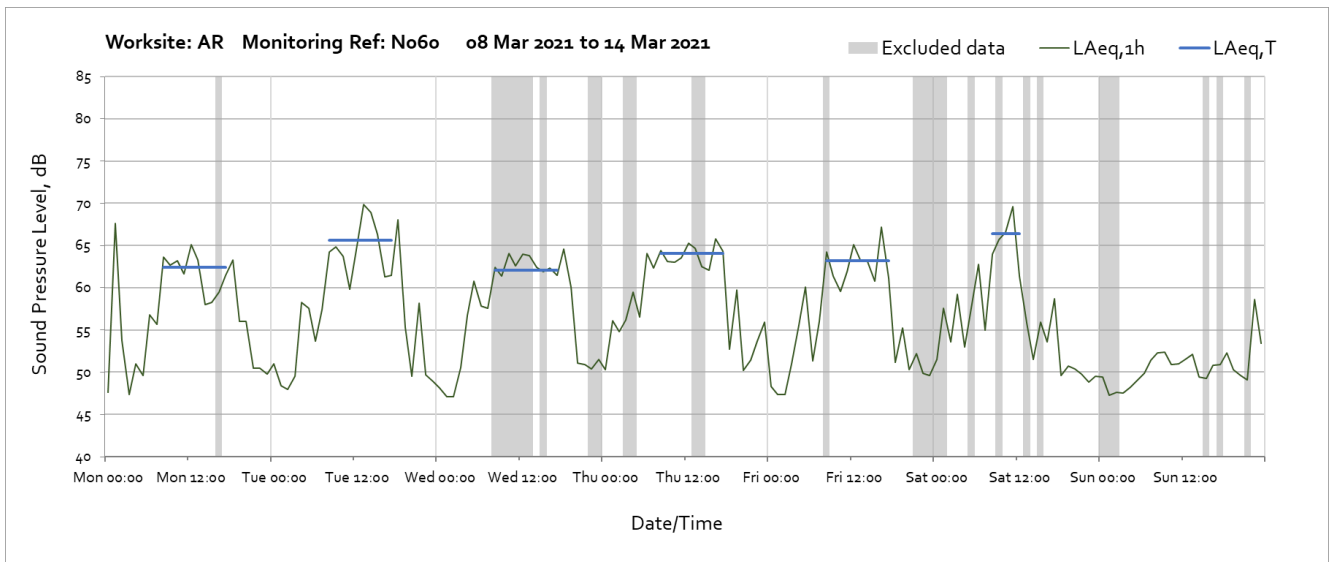
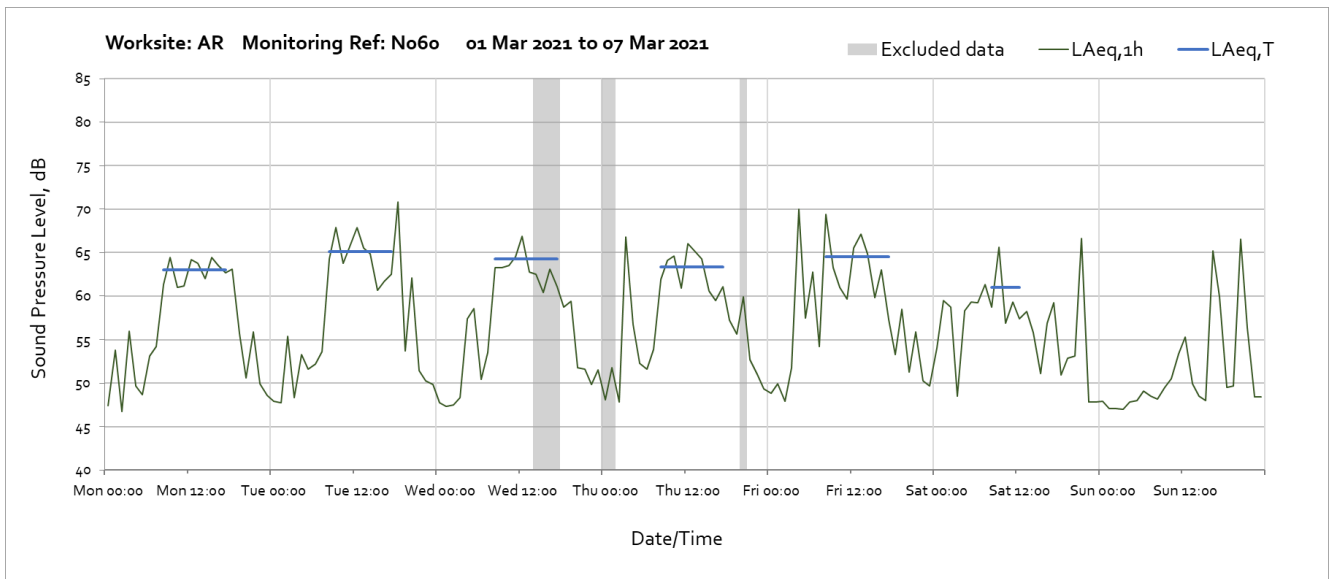


Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.

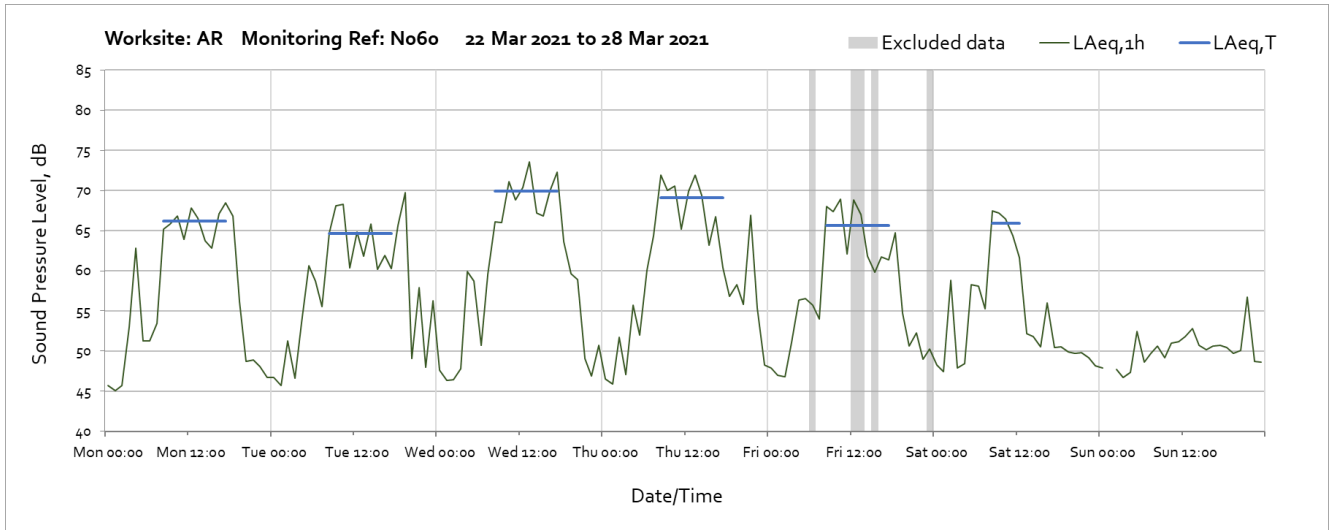




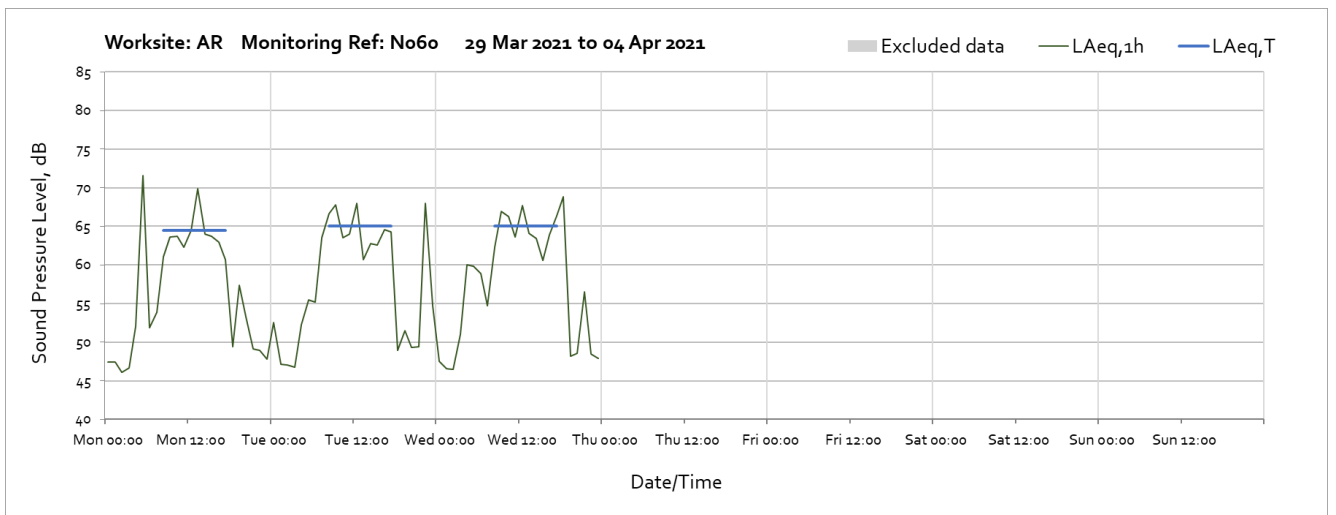
# Worksite: Atlas Road worksite (AR) – Monitoring Ref: N060



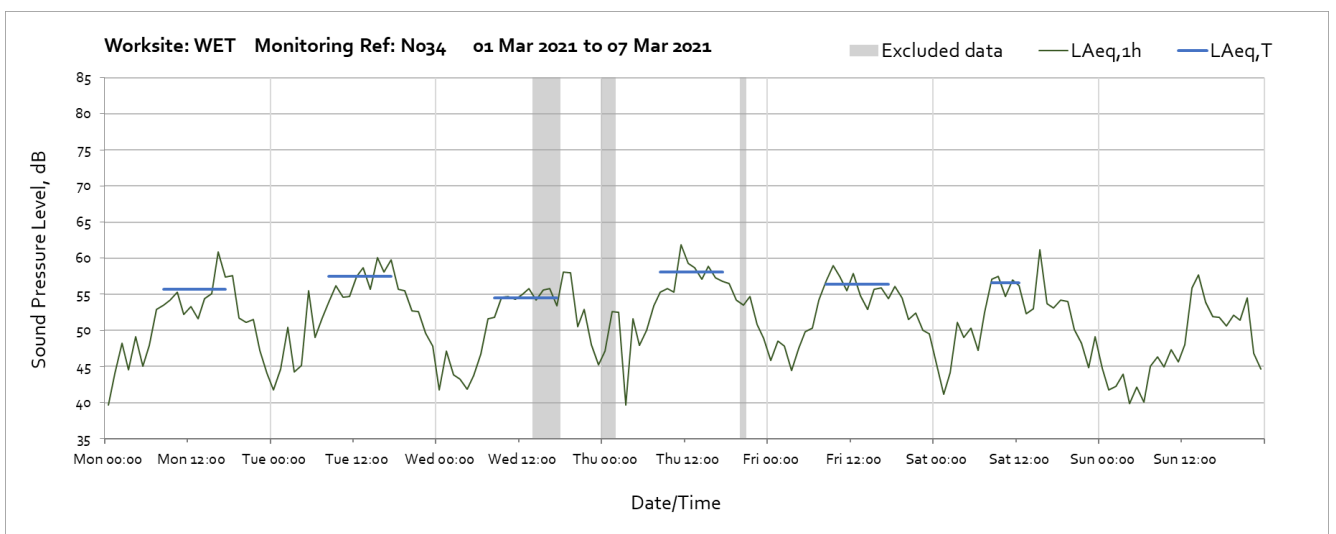
OFFICIAL

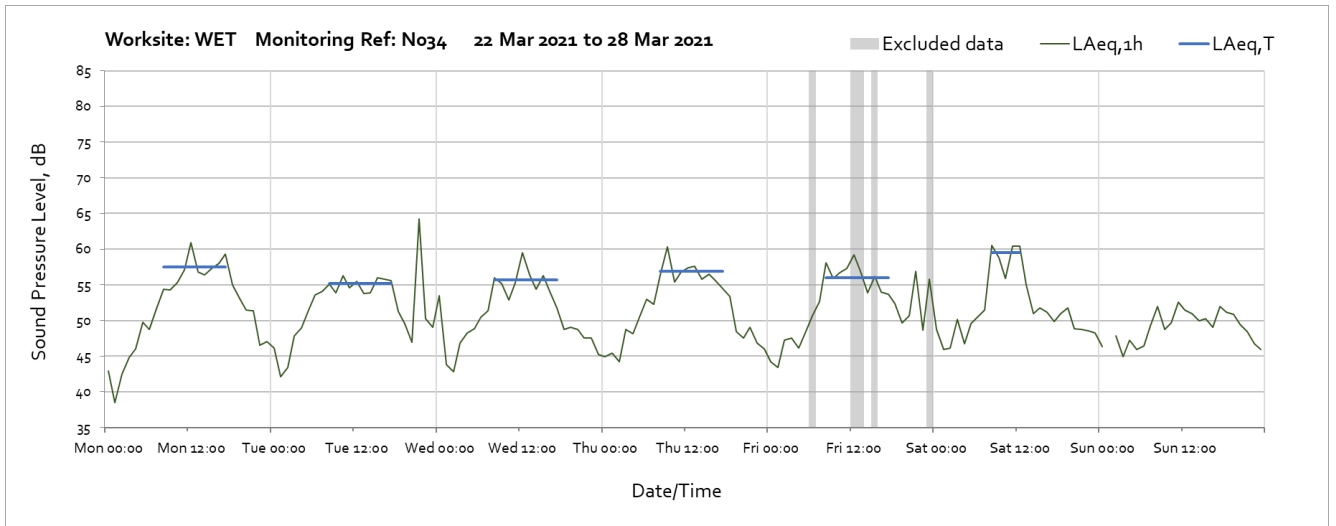
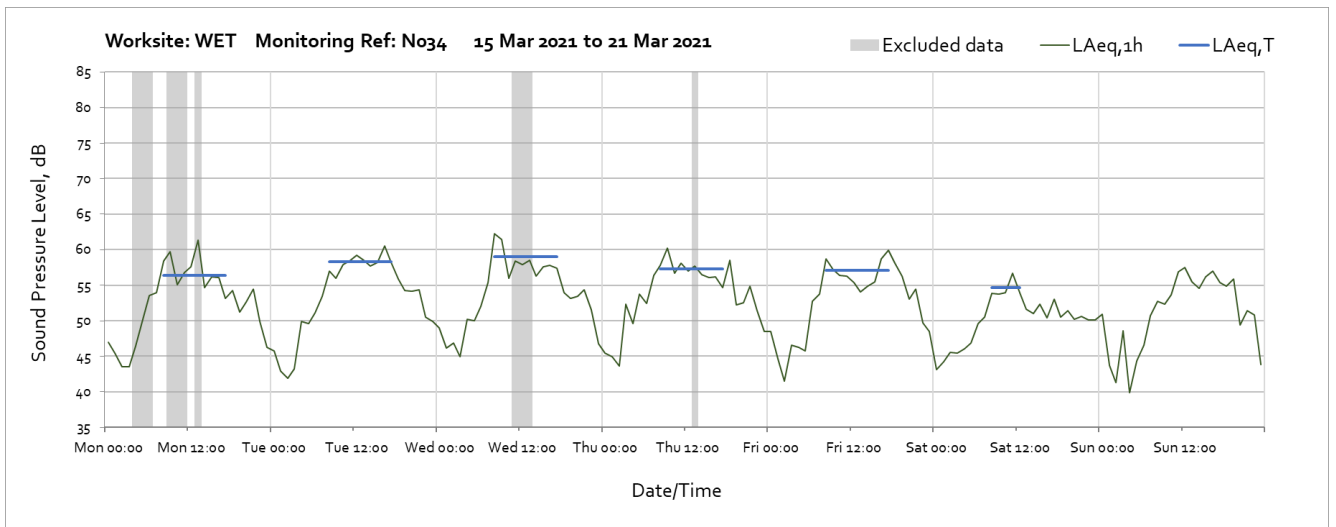
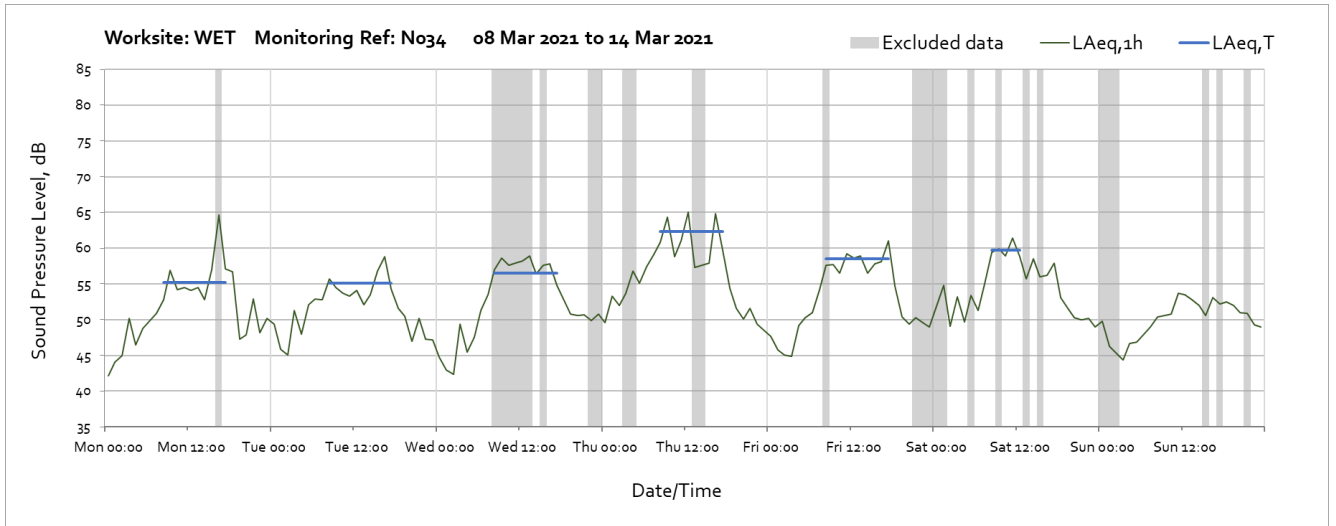


Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.

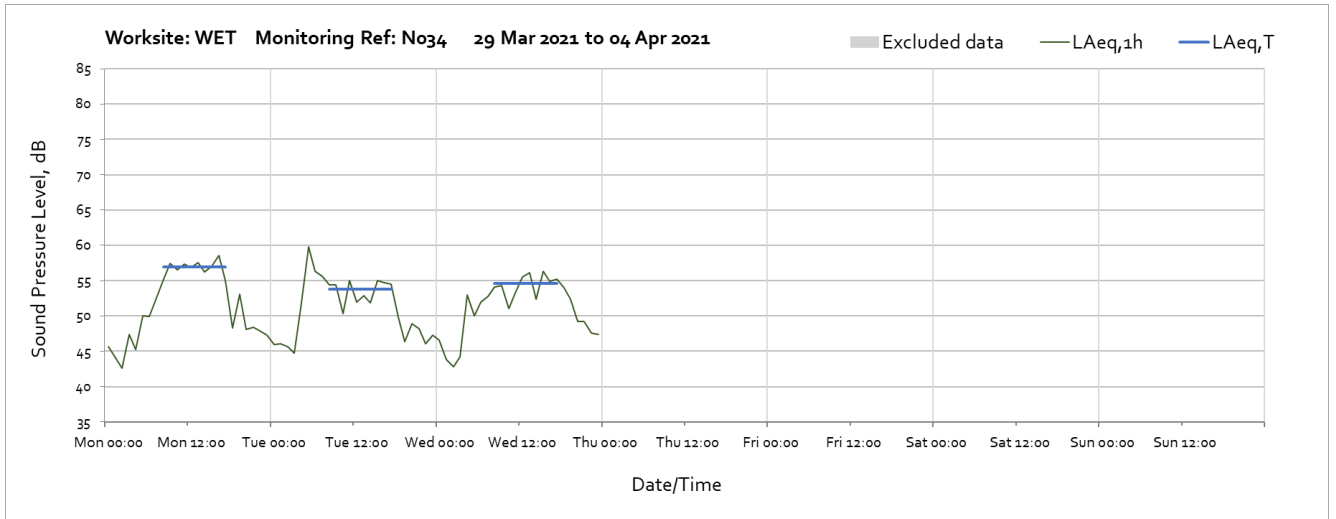


**Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: N034**

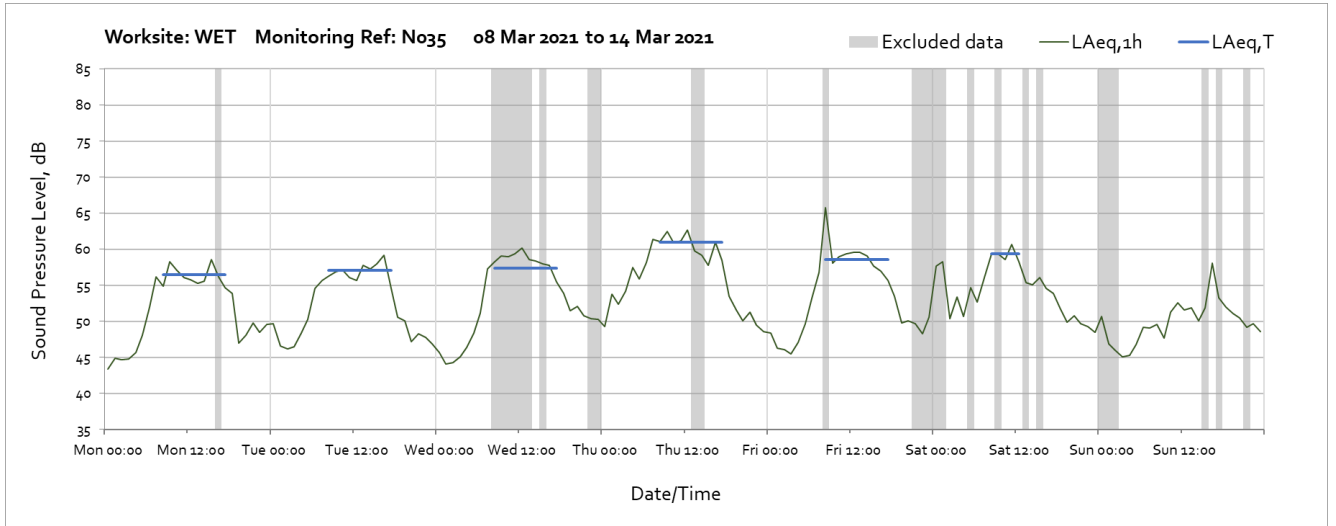
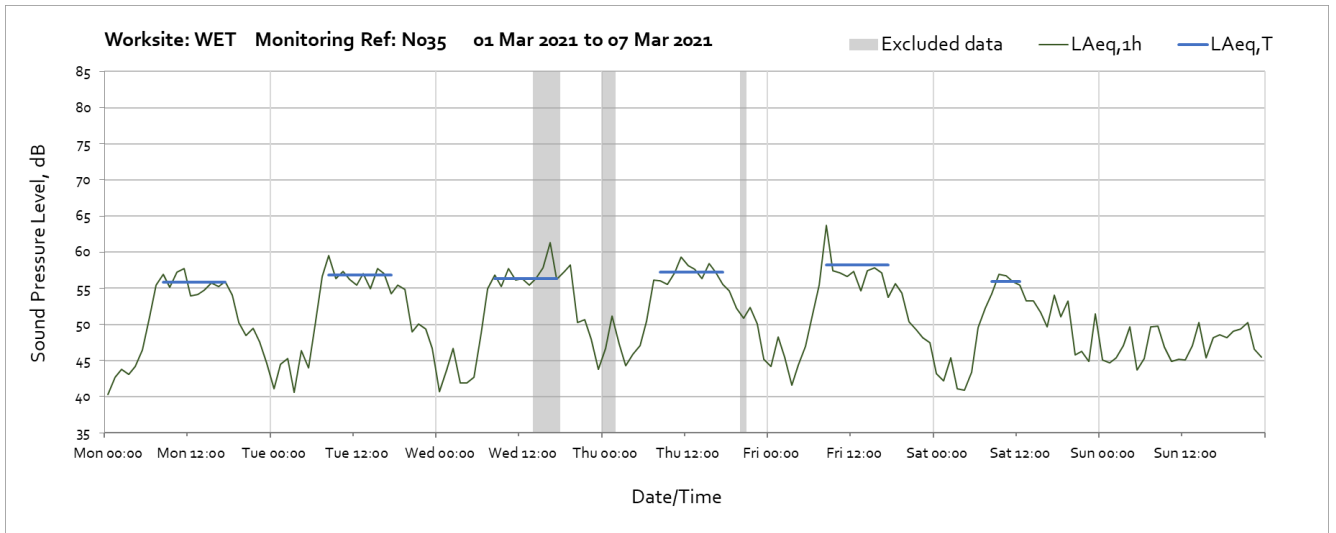


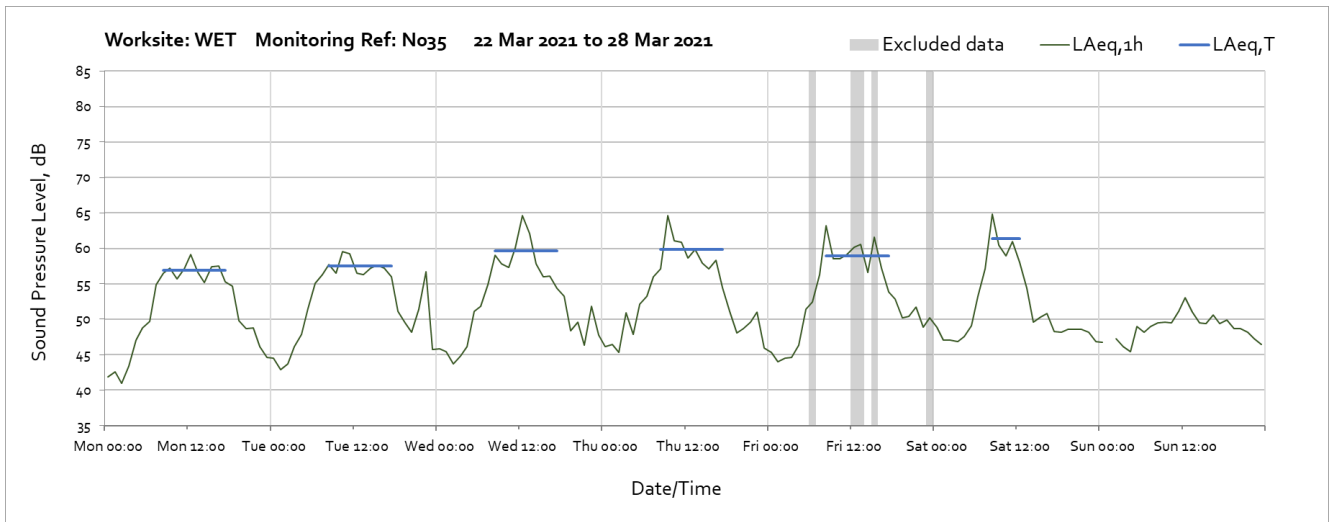
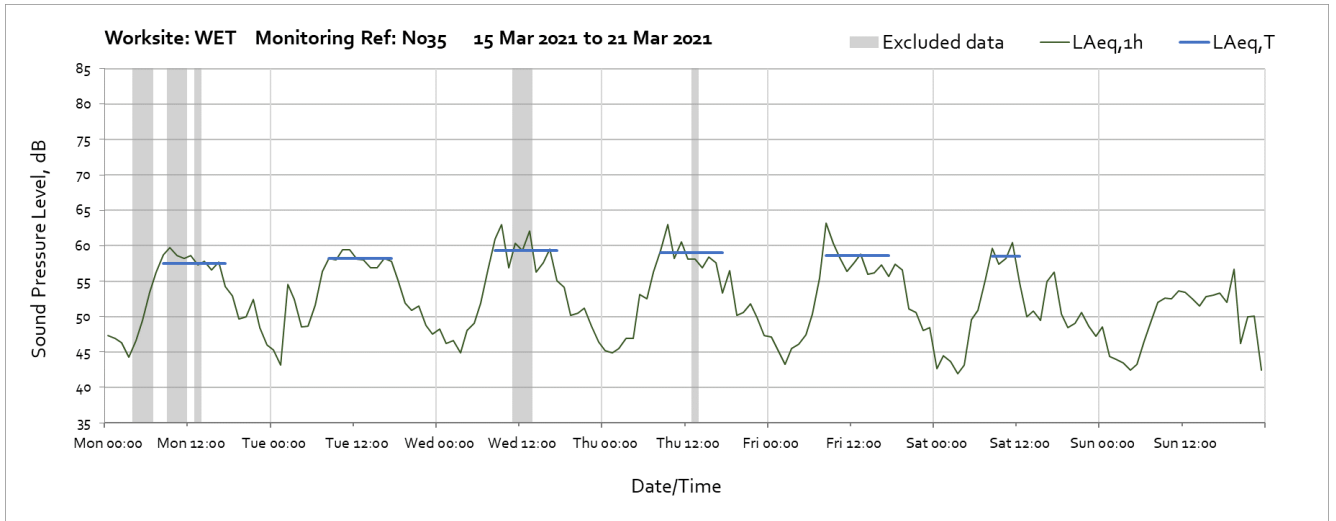


Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.

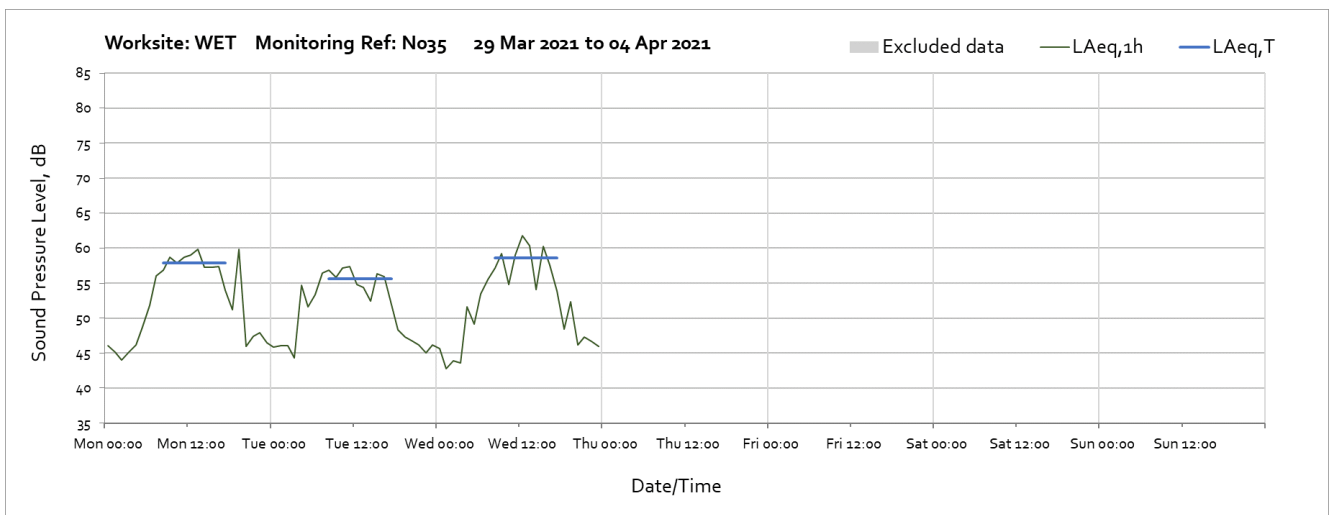


**Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: N035**



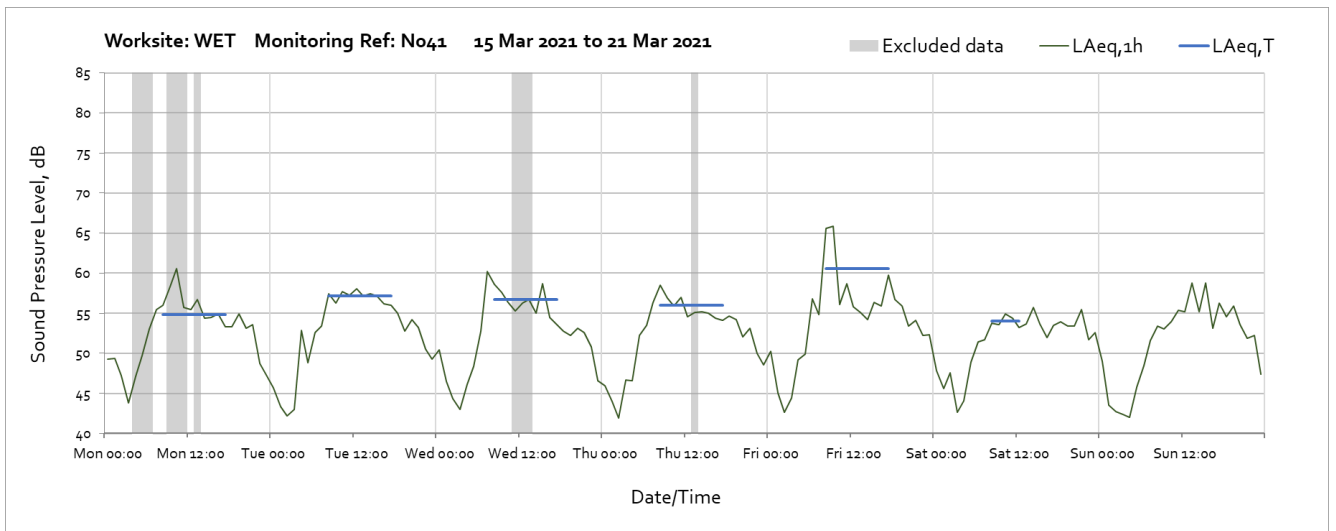
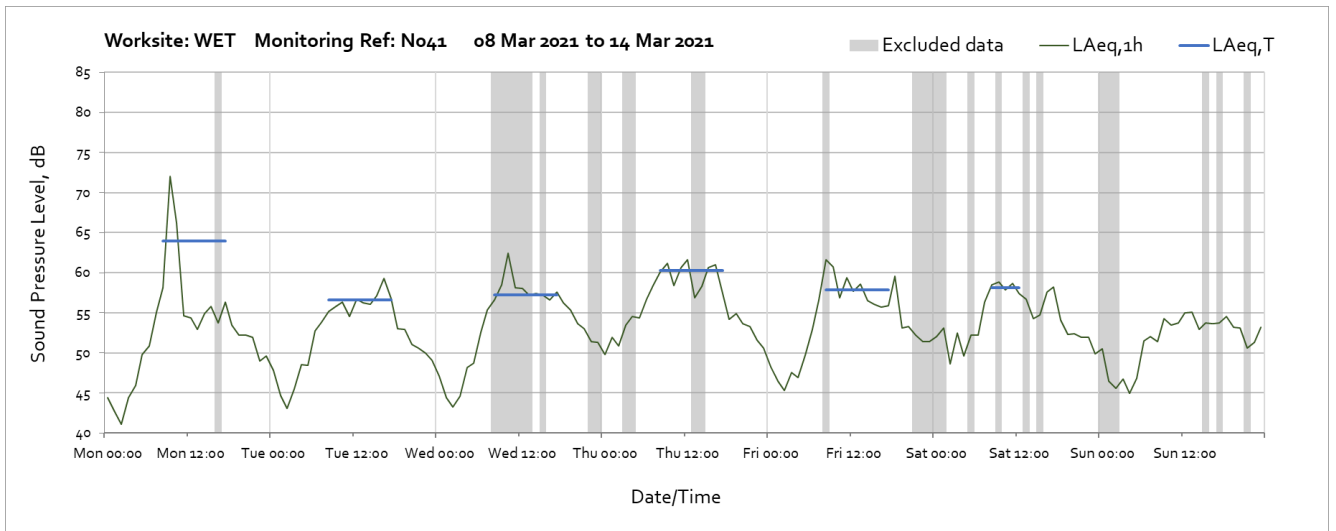
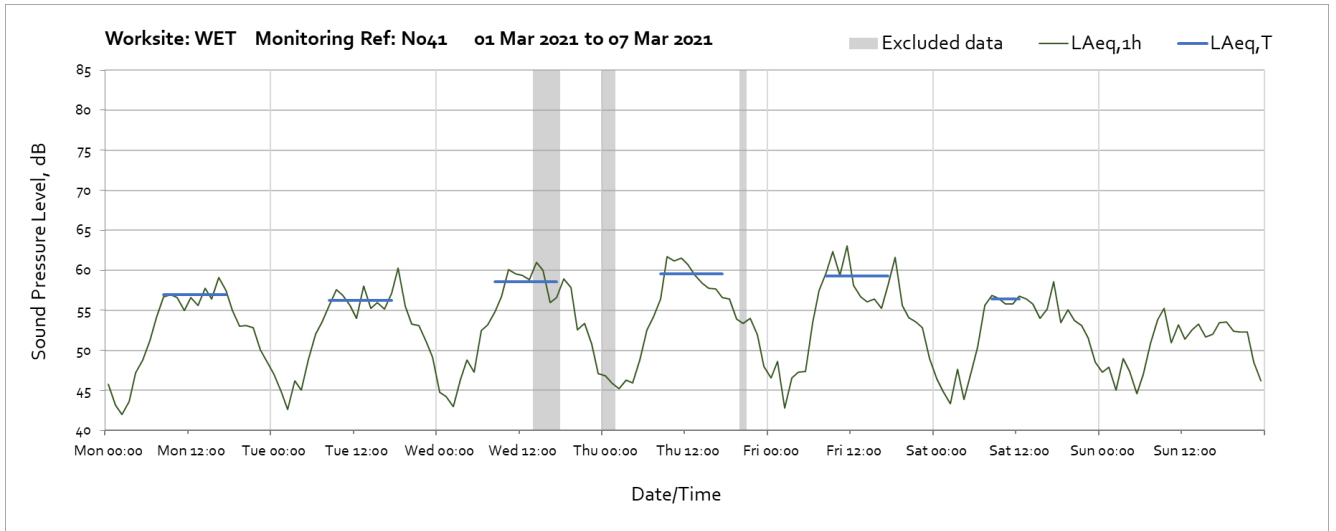


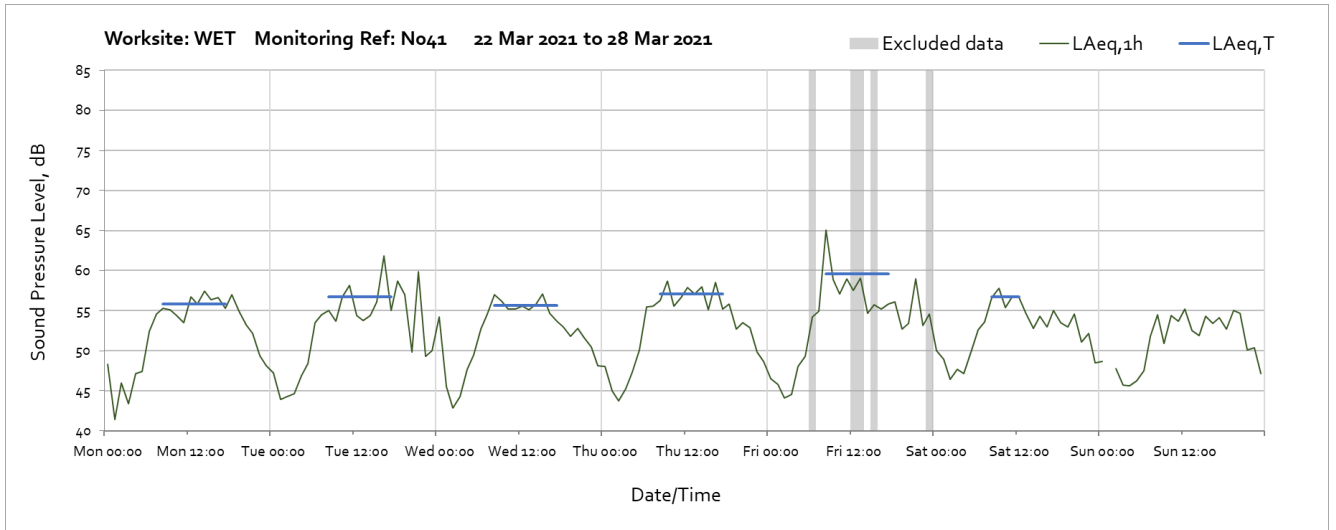
Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.



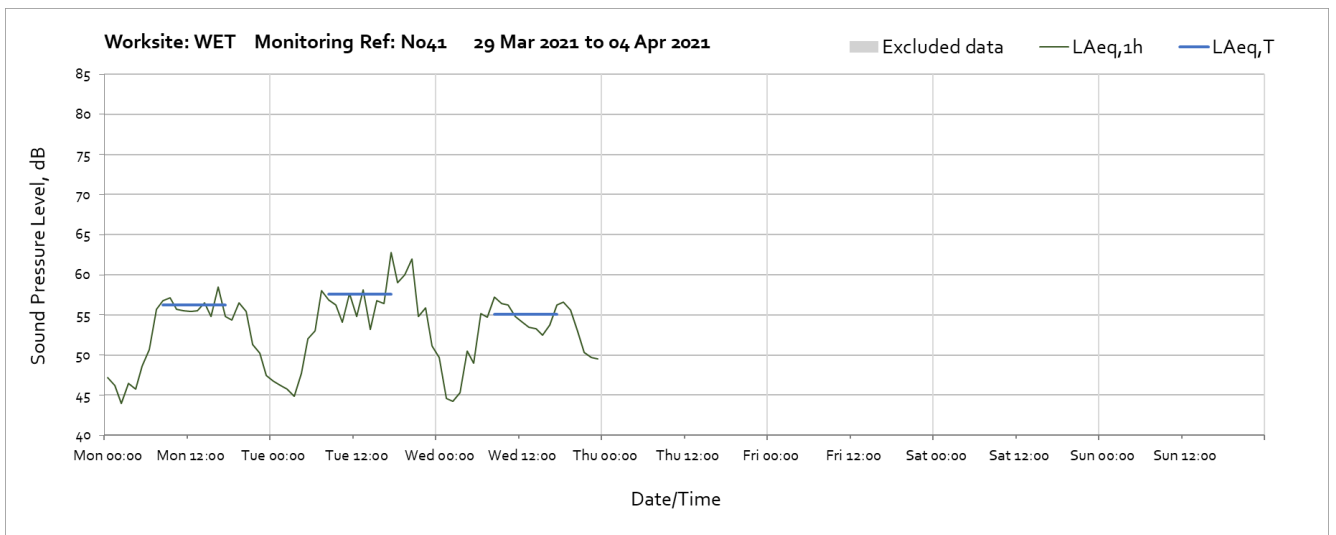


## Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: N041

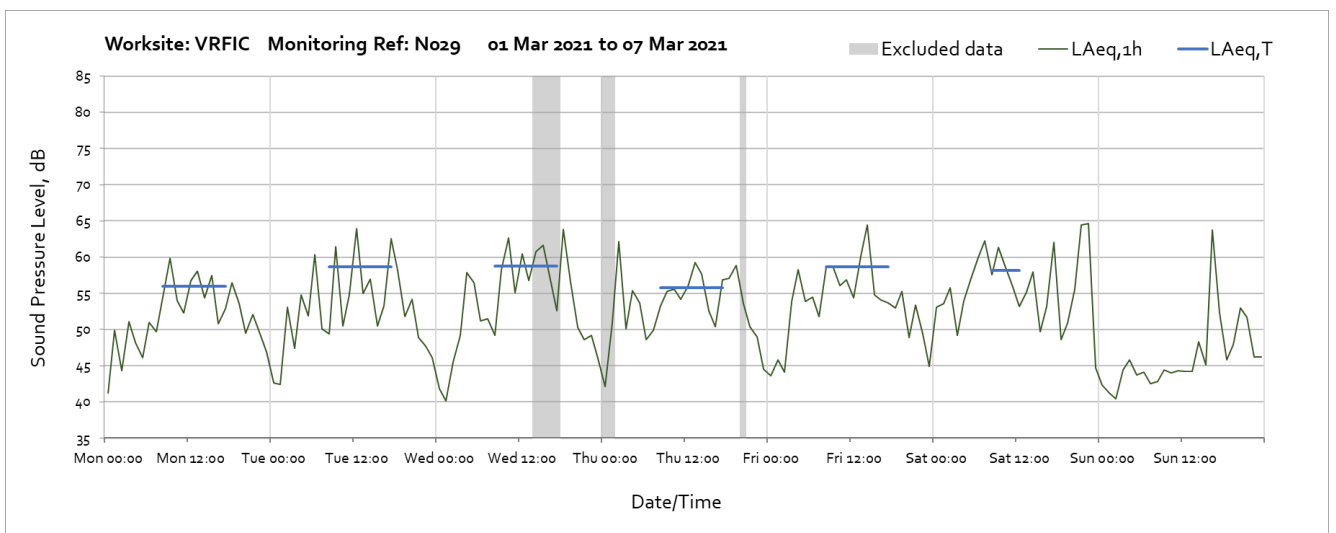


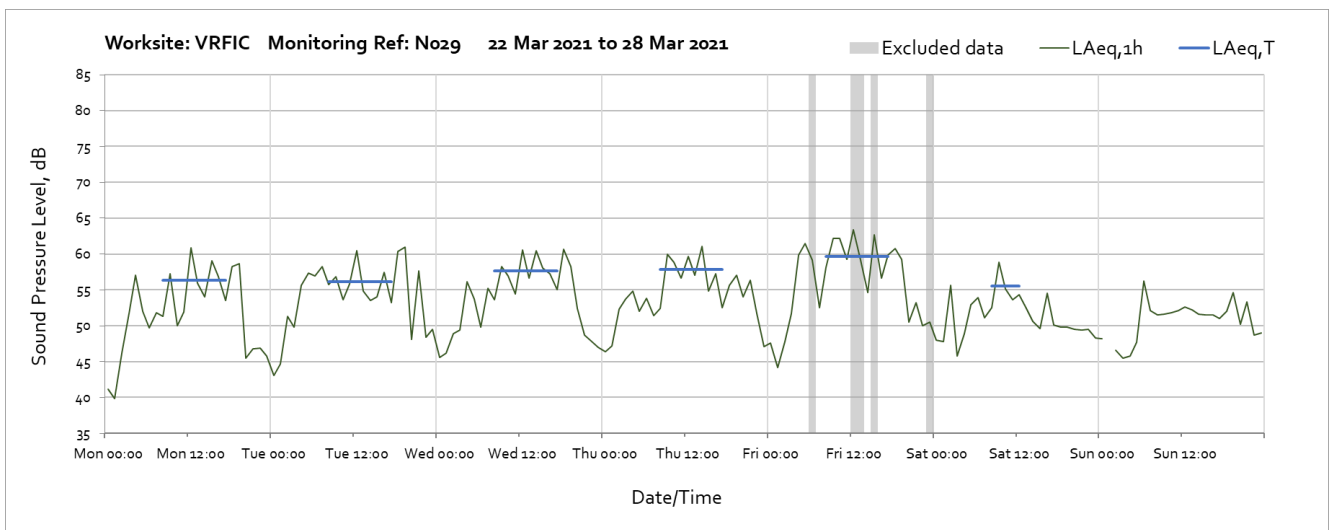
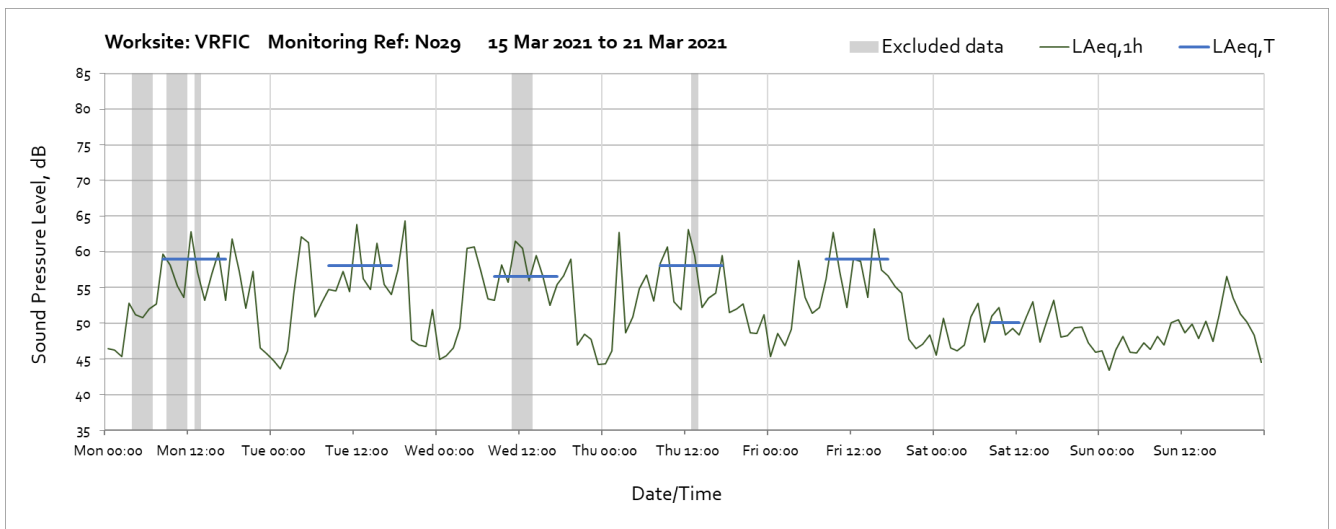
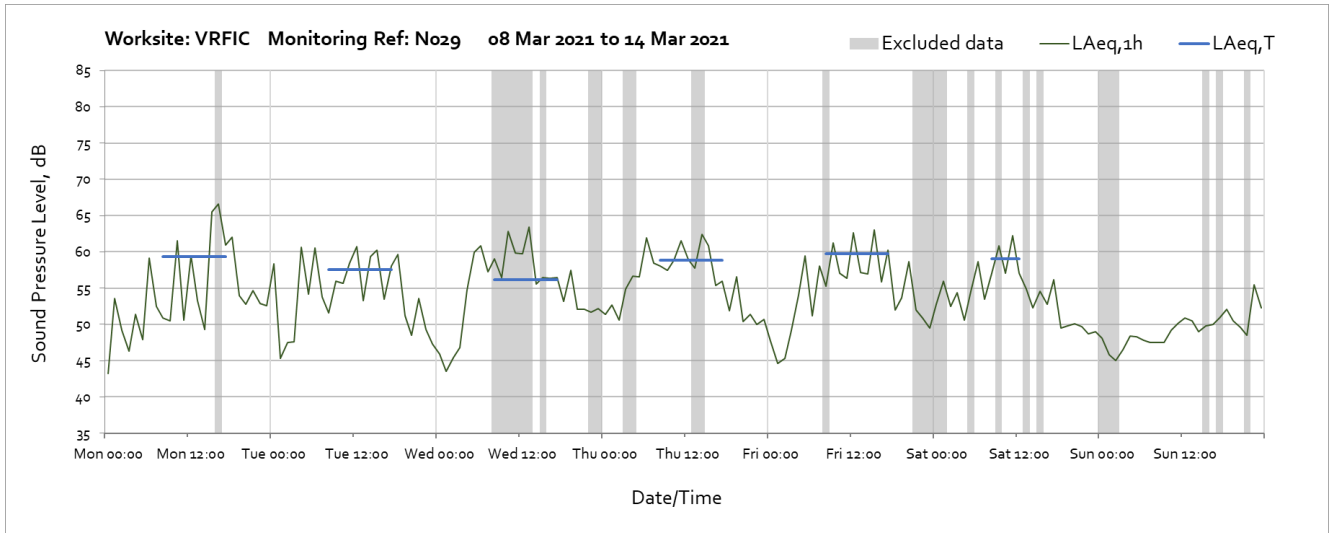


Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.

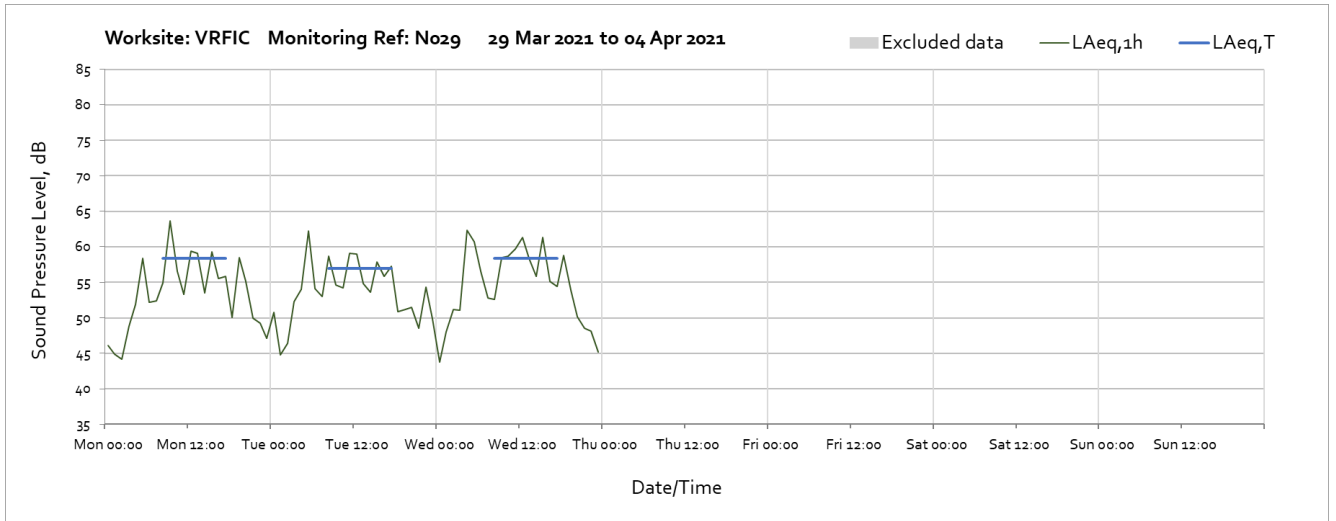


### Worksite: Victoria Road and Flat Iron Compound (VRFIC) - Monitoring Ref: N029

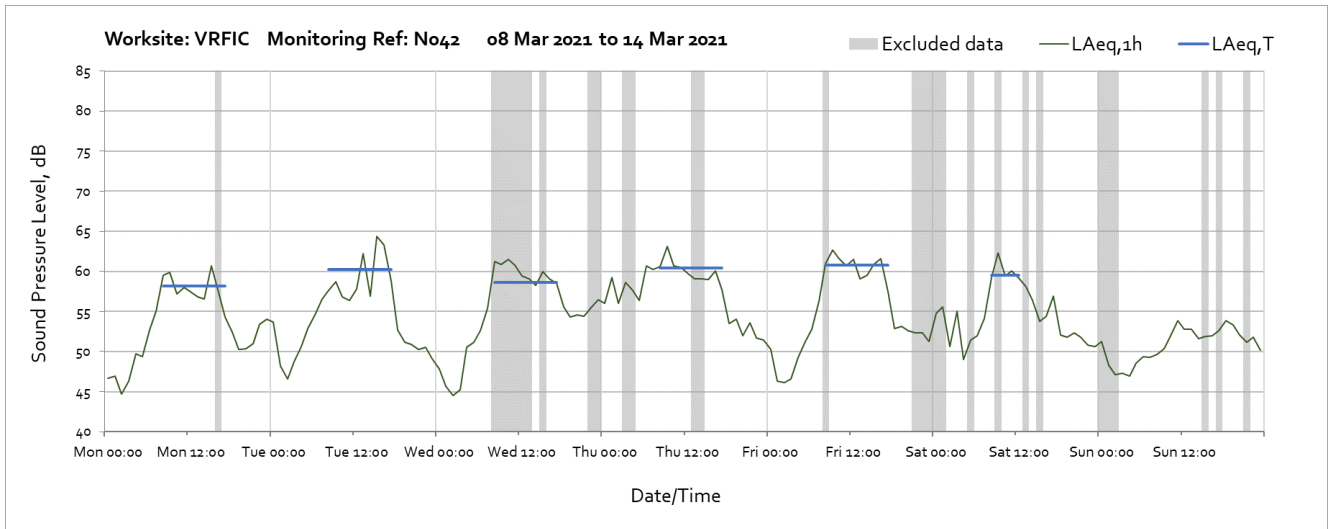
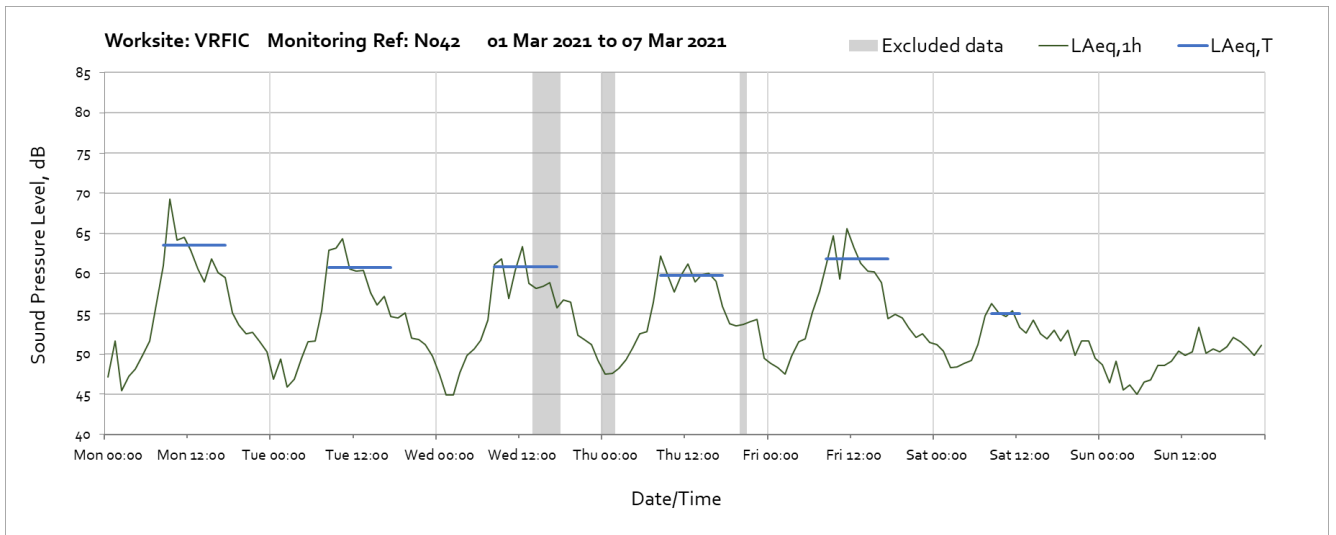


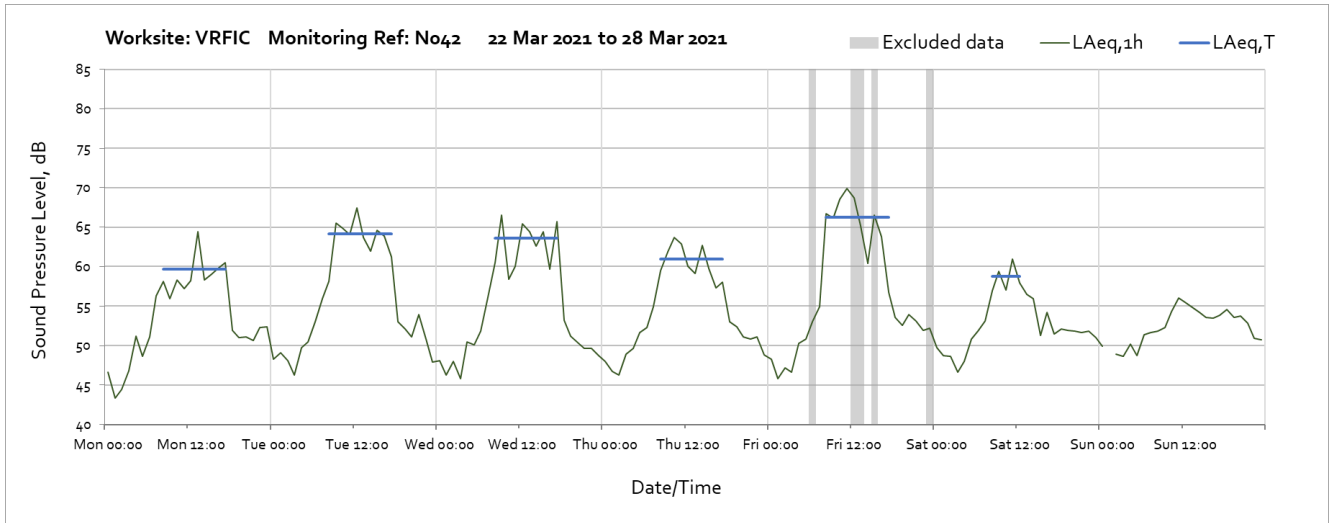
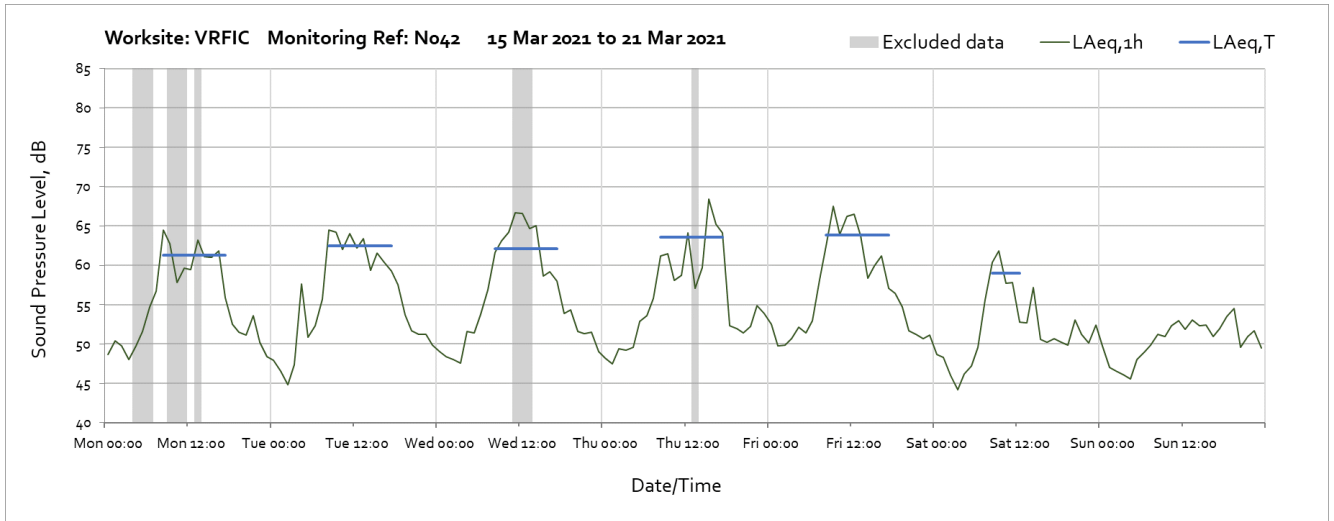


Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.

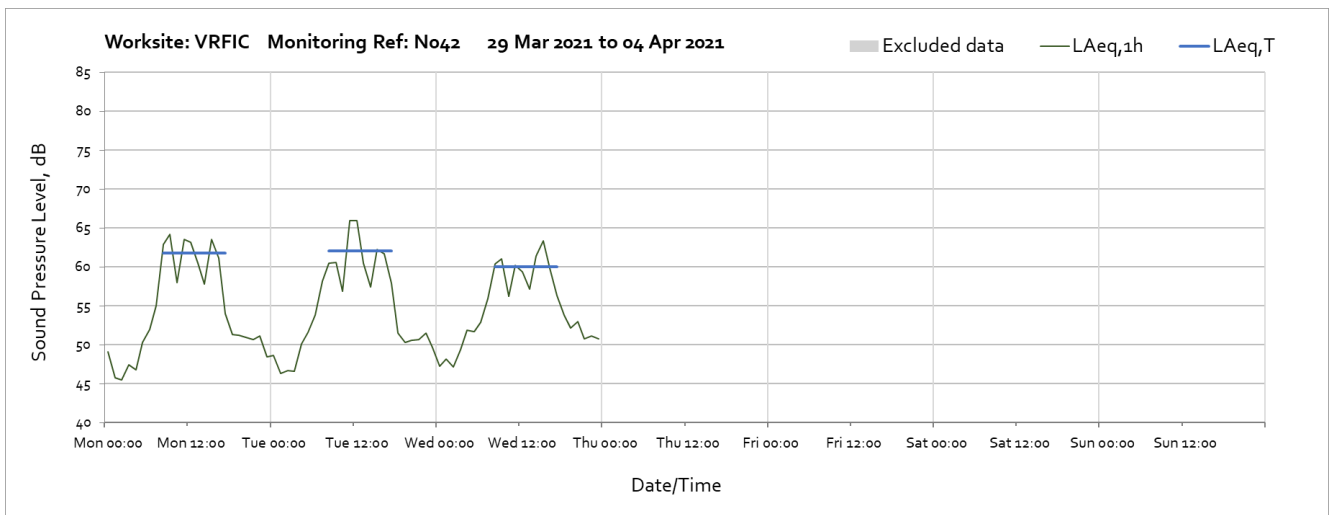


**Worksite: Victoria Road and Flat Iron Compound (VRFIC) – Monitoring Ref: N042**



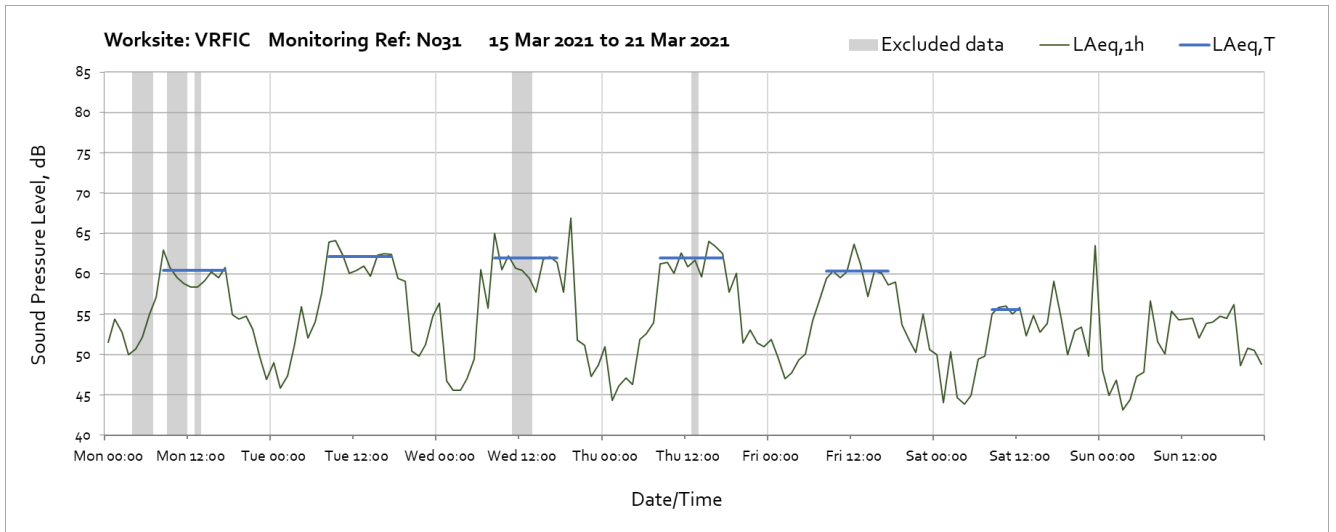
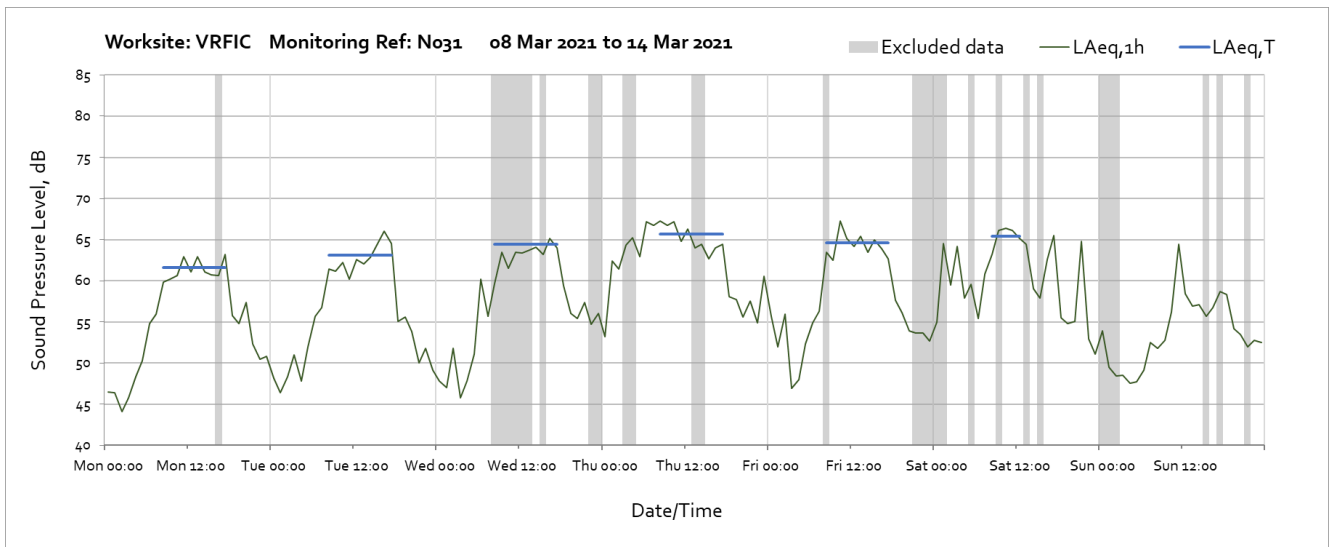
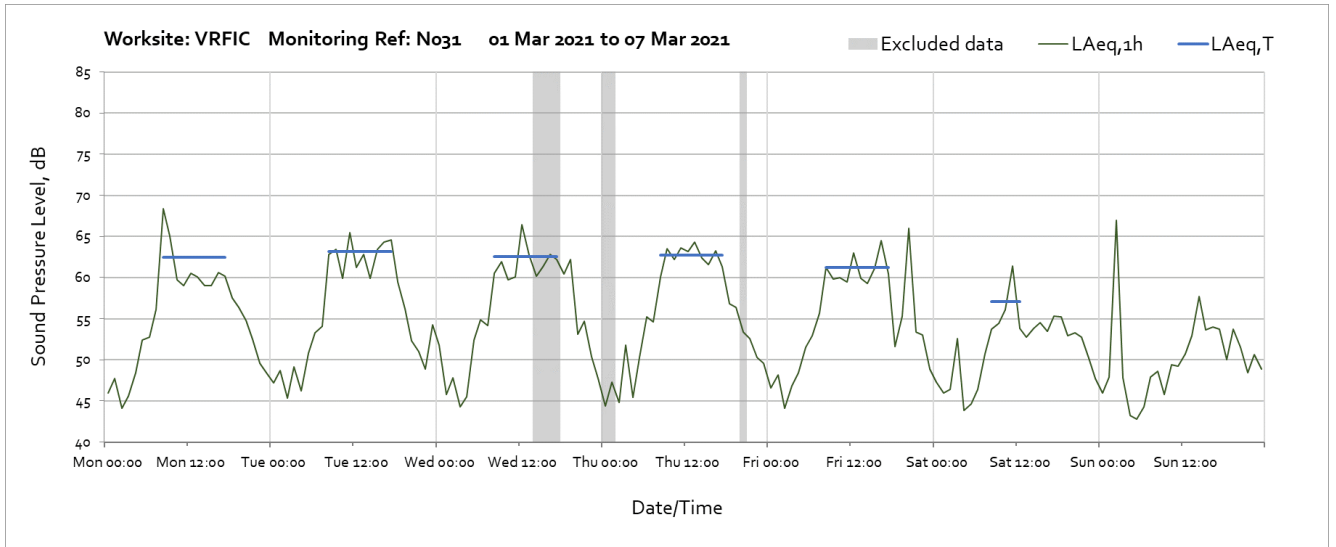


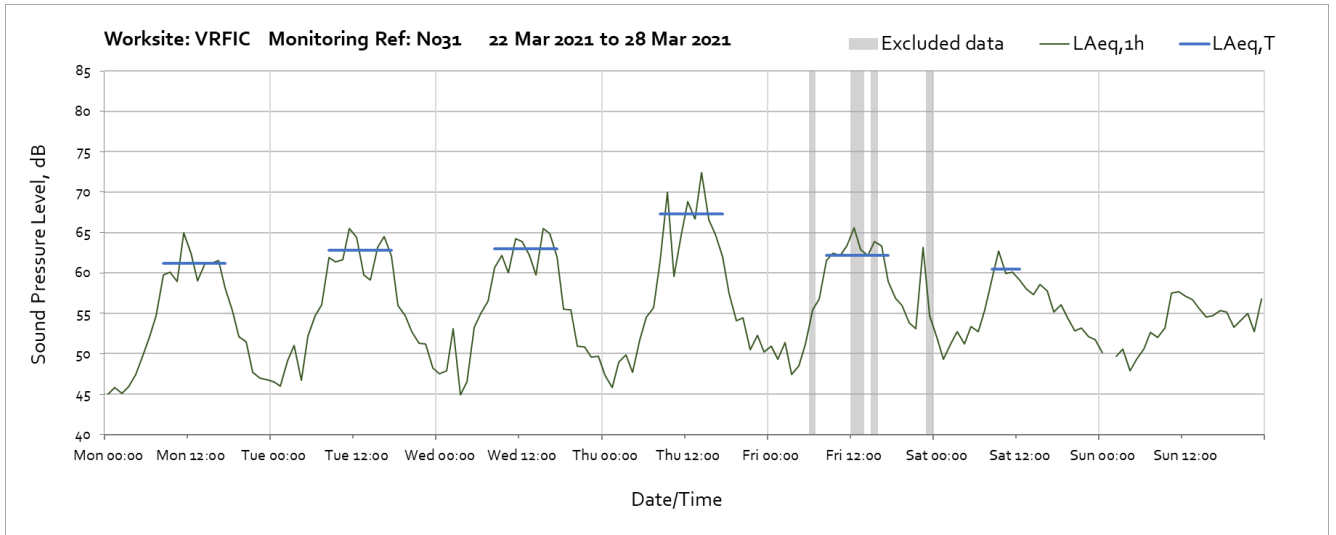
Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.



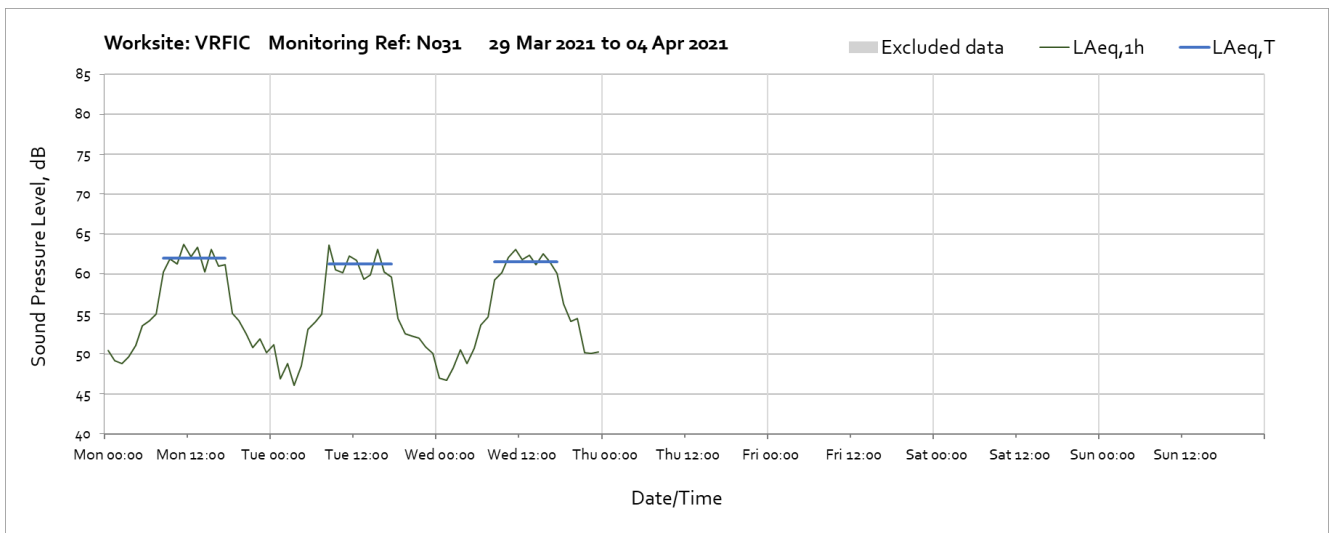


## Worksite: Victoria Road and Flat Iron Compound (VRFIC) – Monitoring Ref: N031

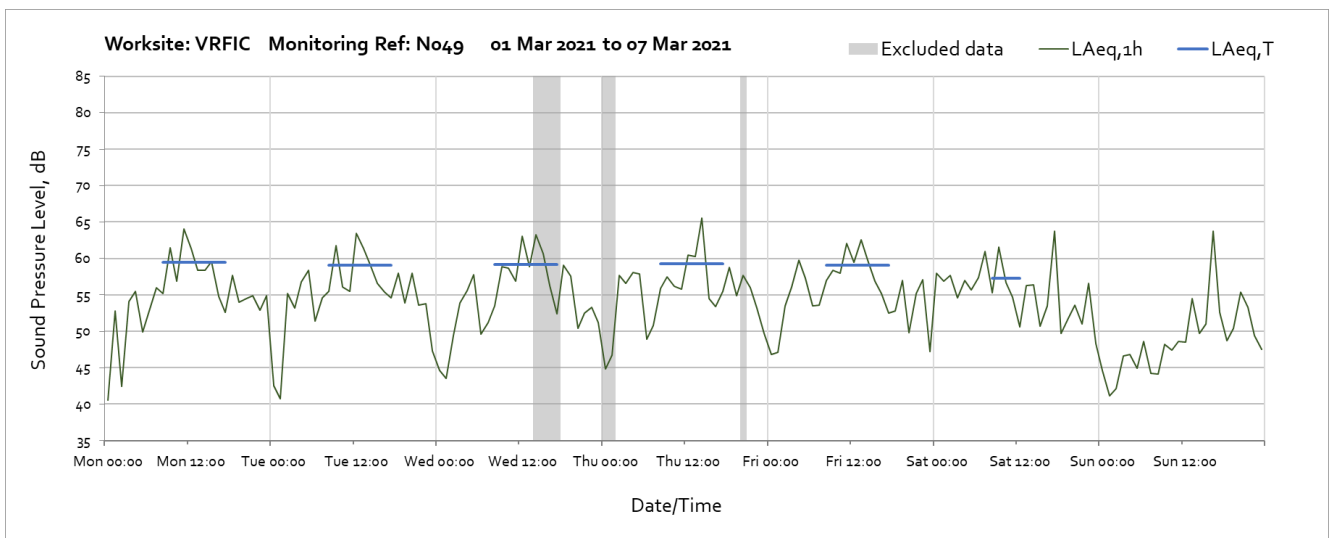


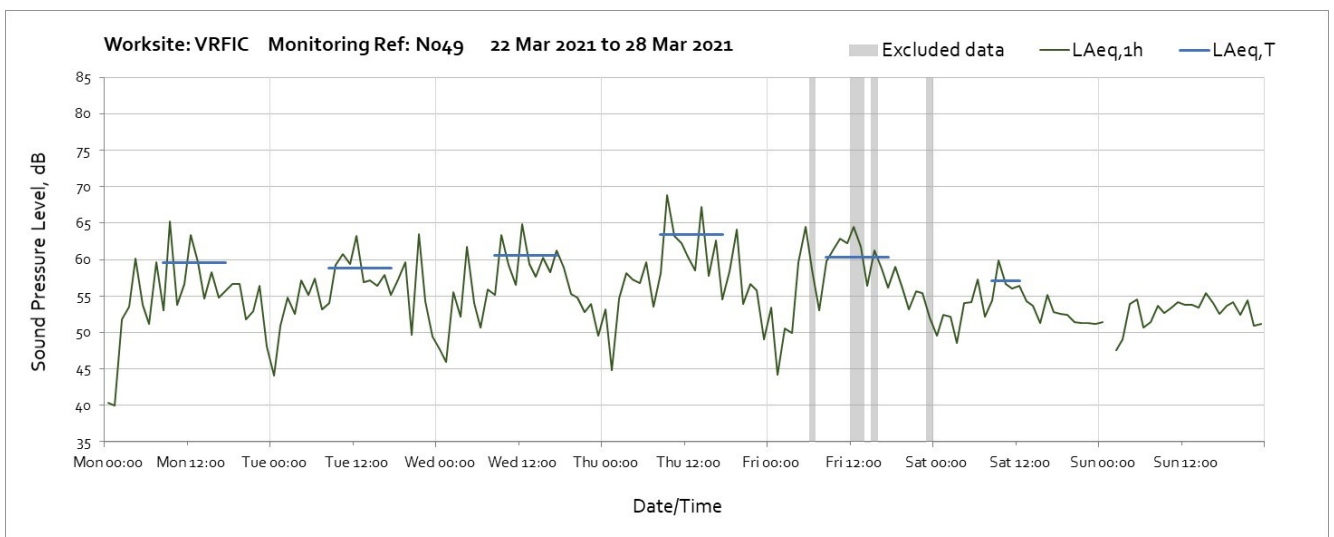
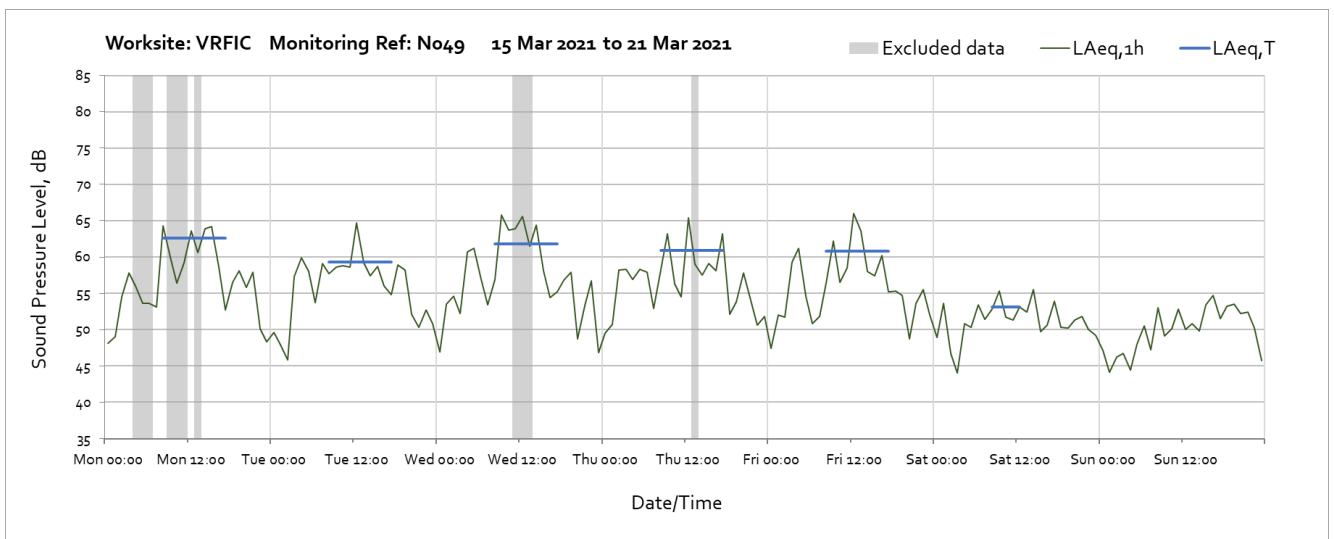
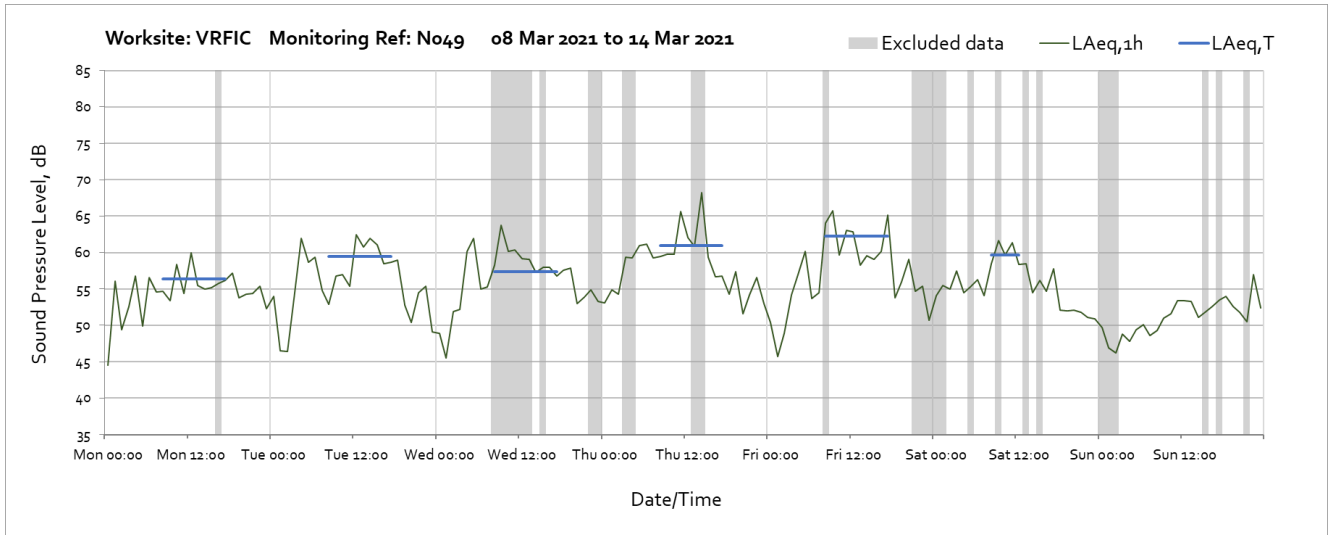


Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.

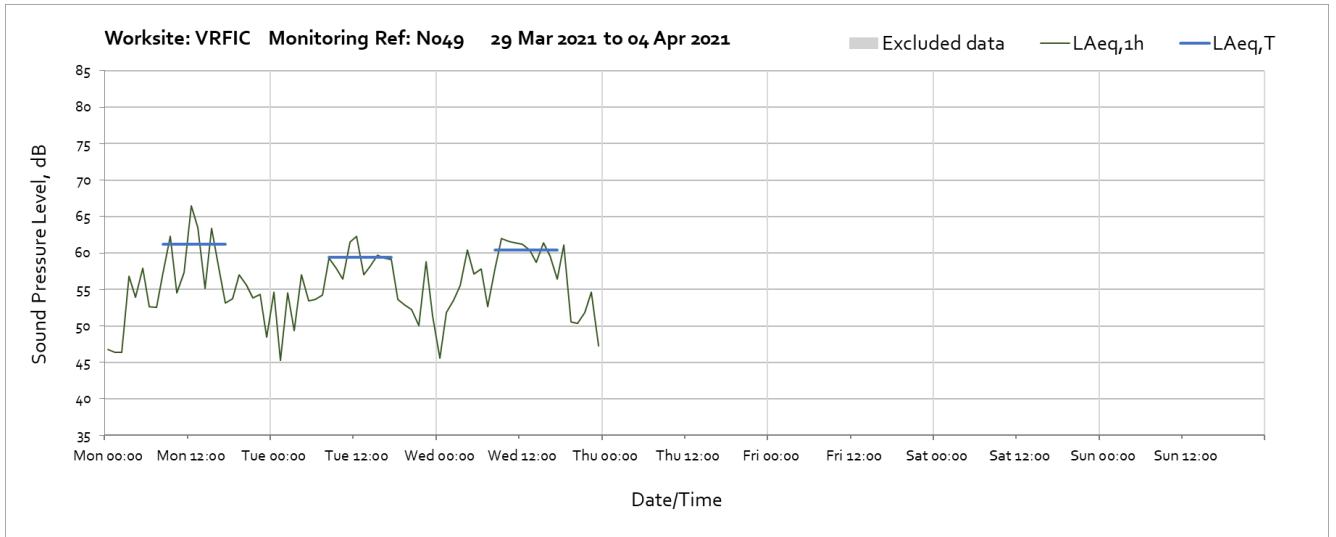


**Worksite: Victoria Road and Flat Iron Compound (VRFC) – Monitoring Ref: N049**

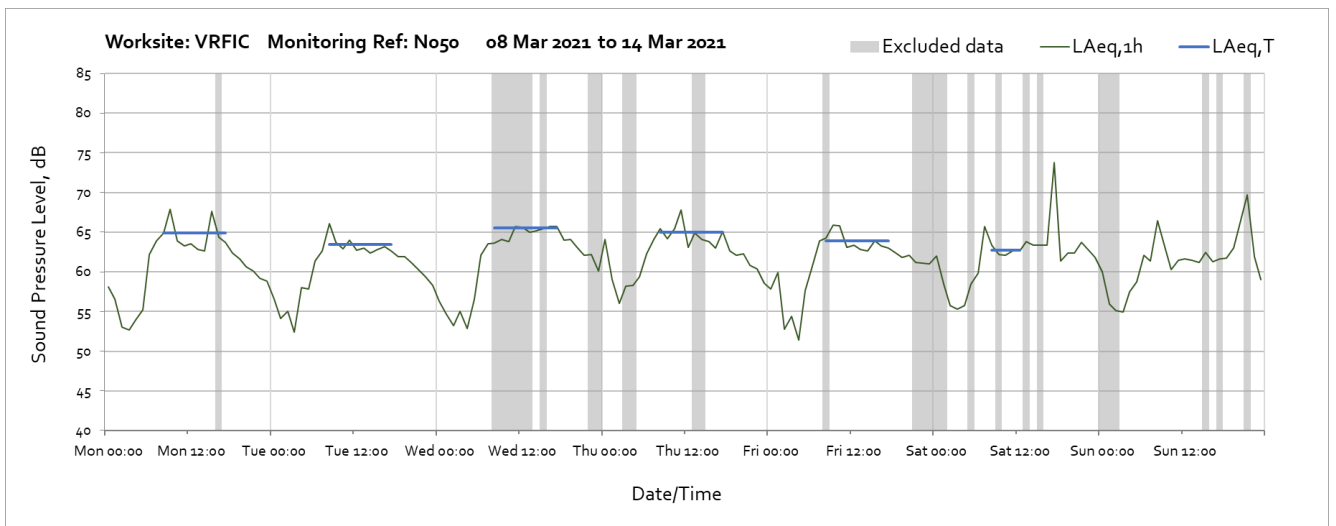
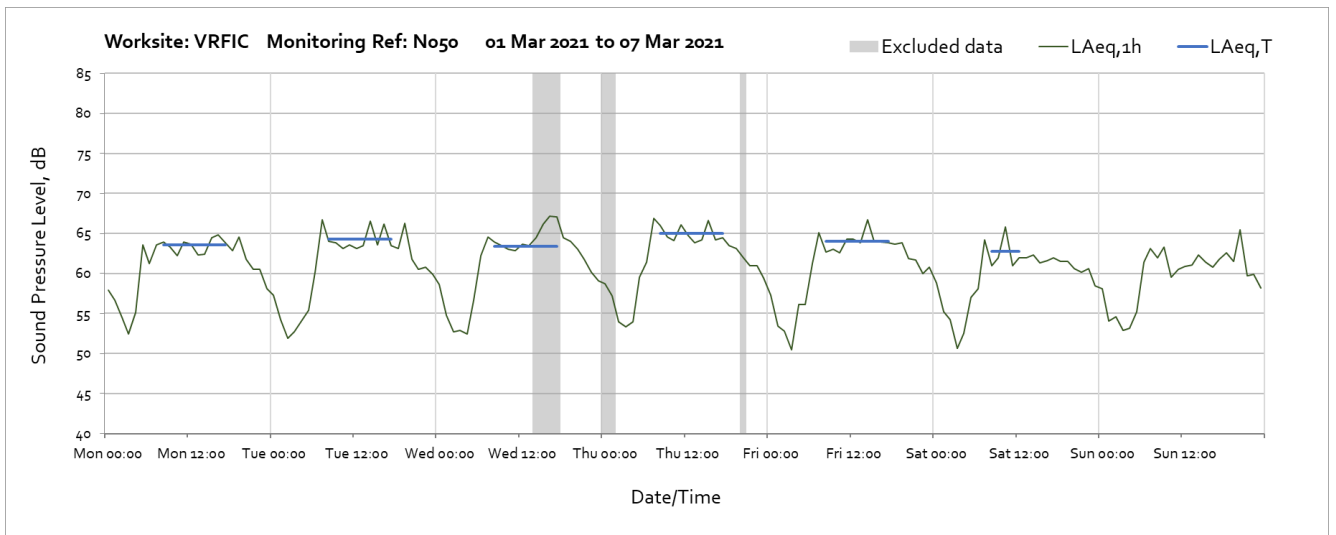


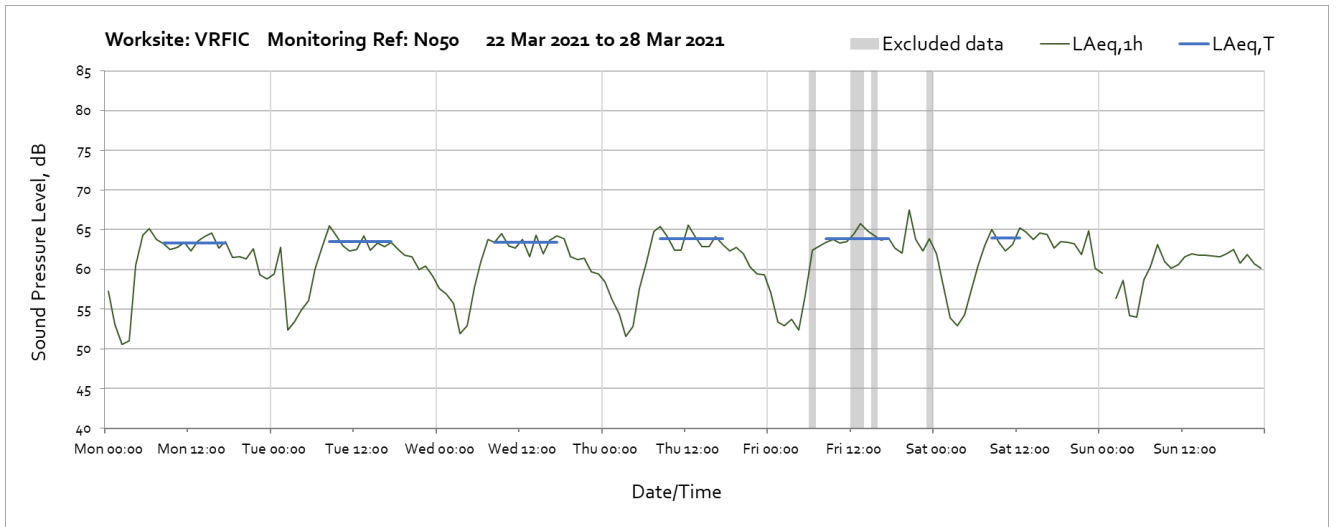
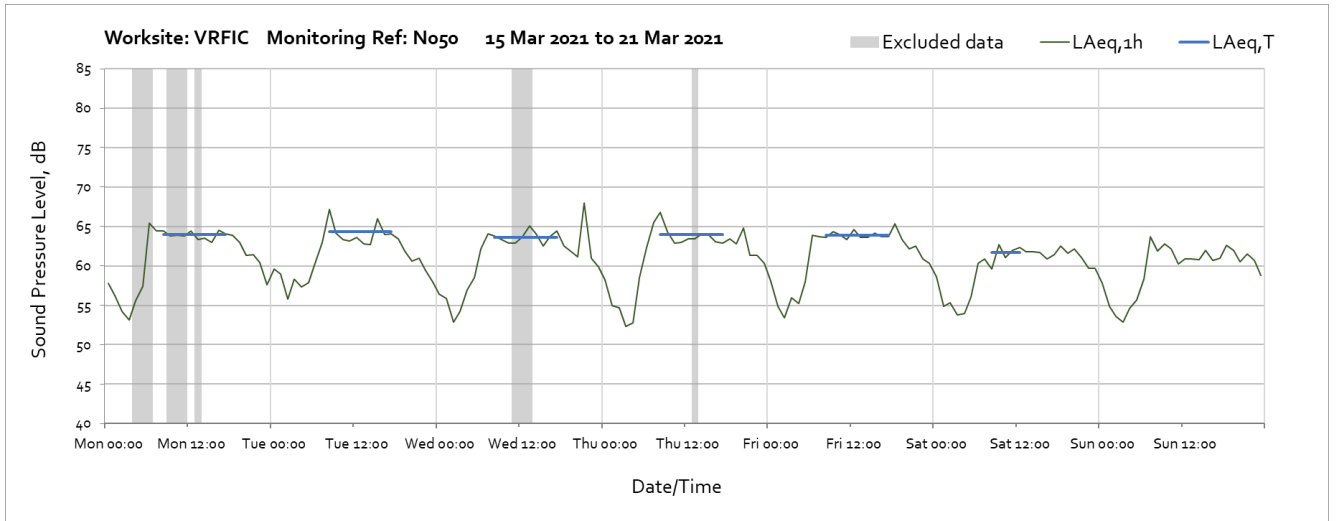


Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.

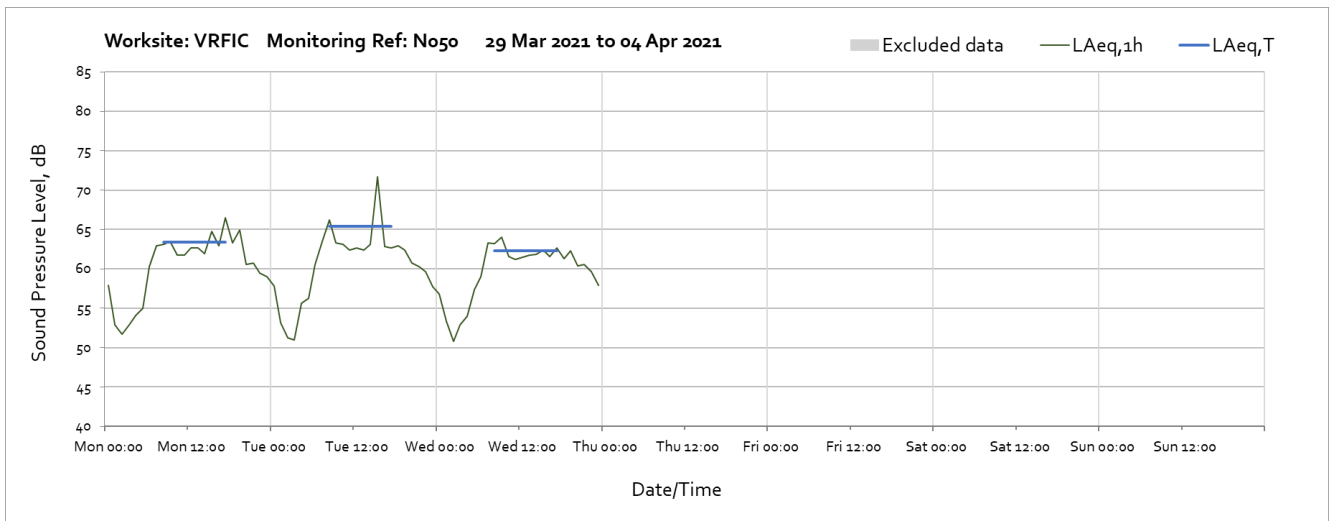


**Worksite: Victoria Road and Flat Iron Compound (VRFIC) – Monitoring Ref: N050**



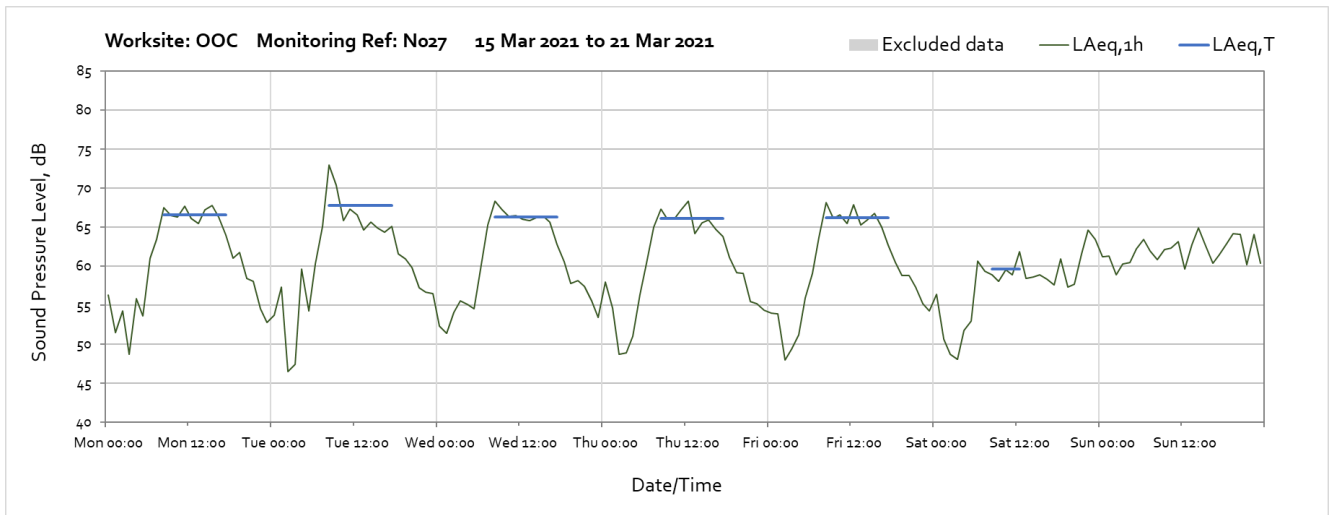
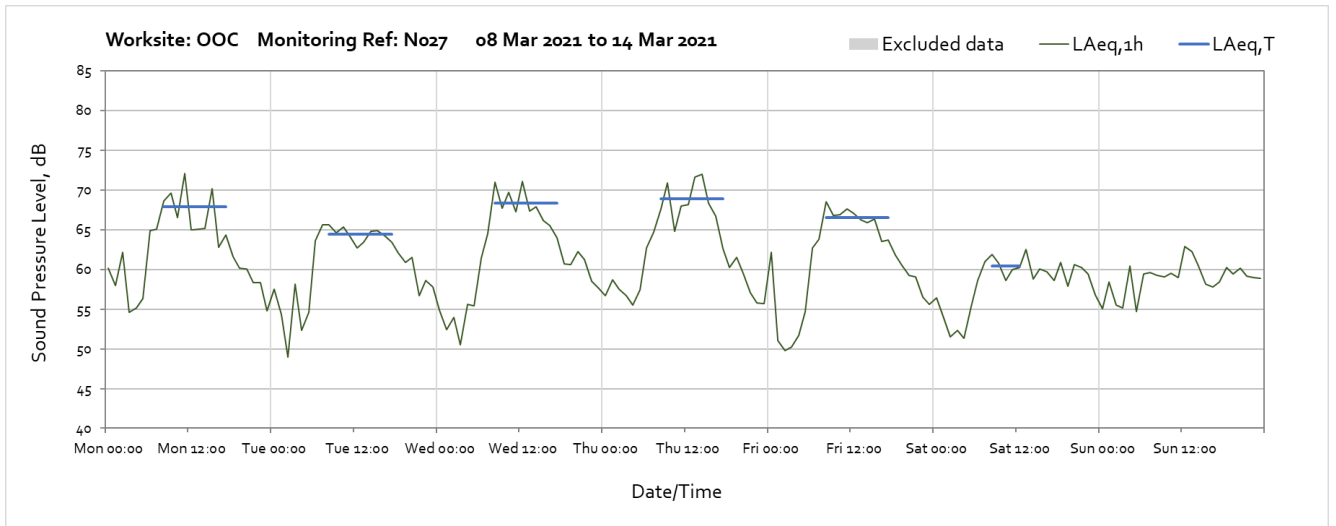
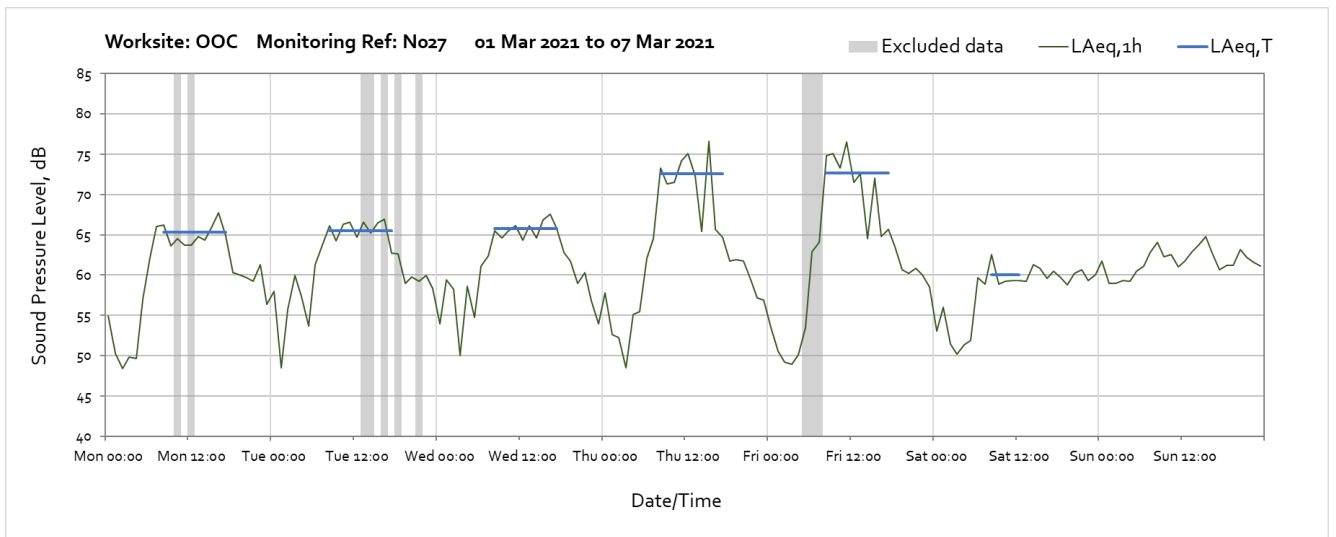


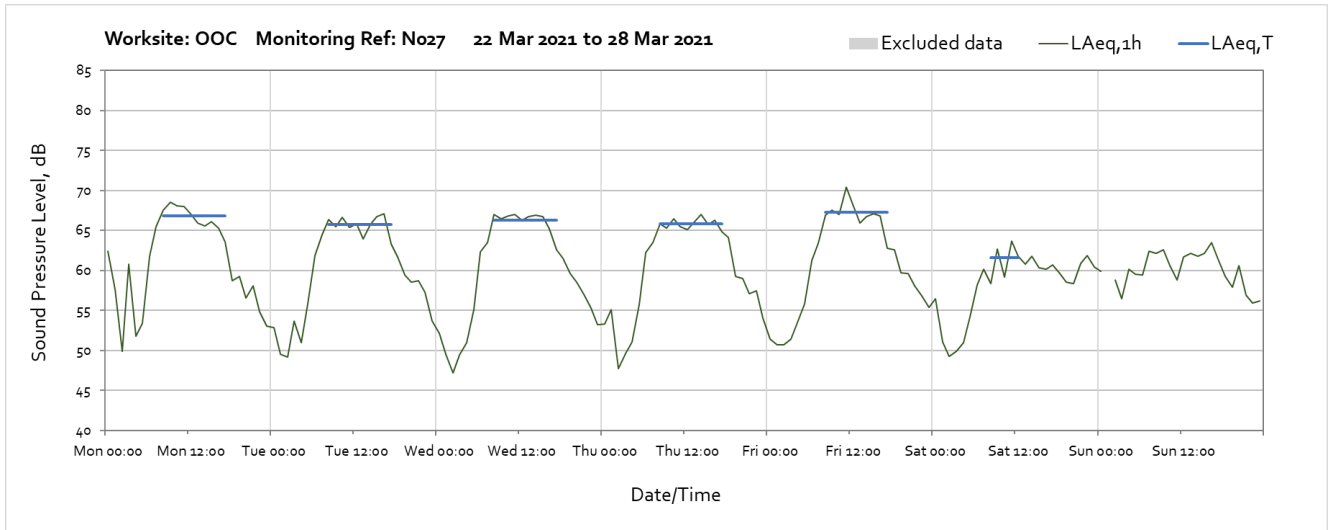
Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.



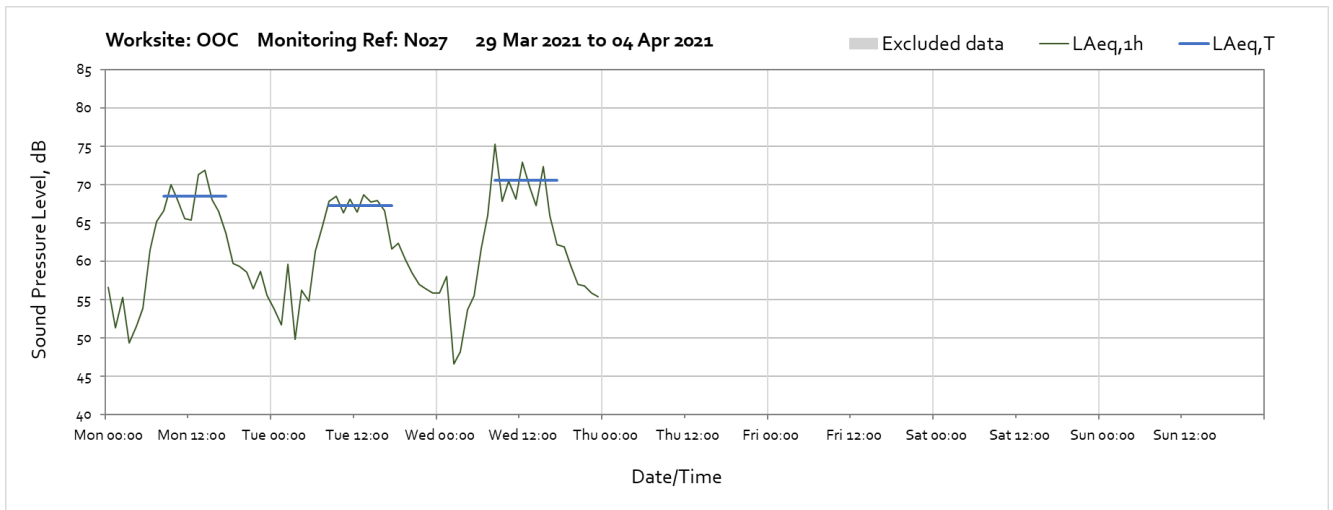


## Worksite: Oal Oak Common (OOC) – Monitoring Ref: N027

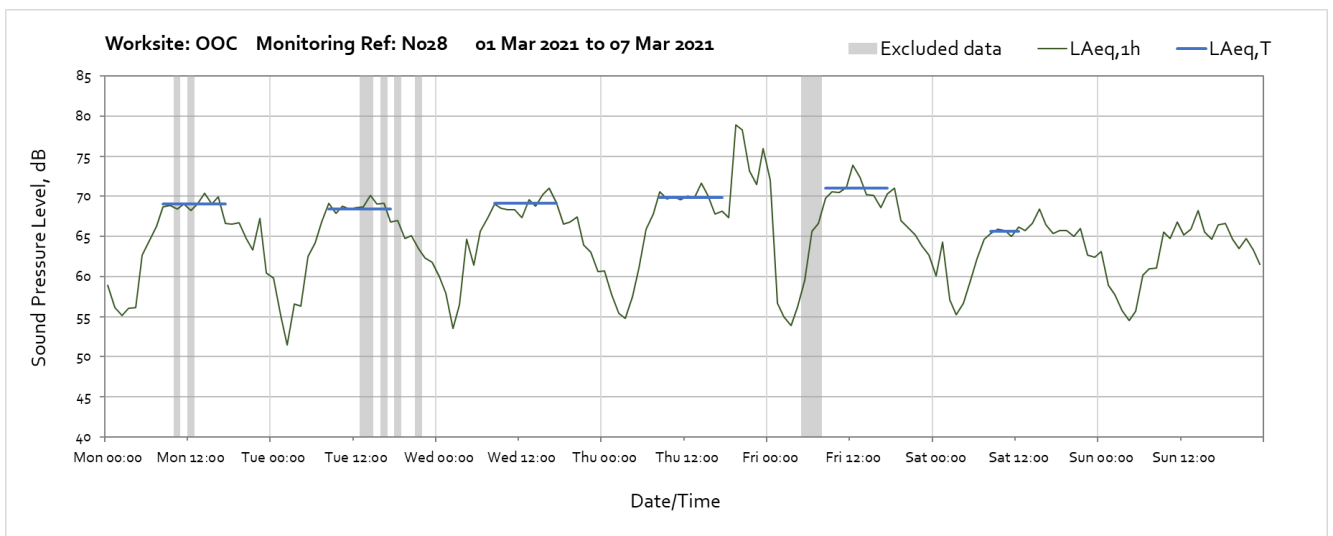


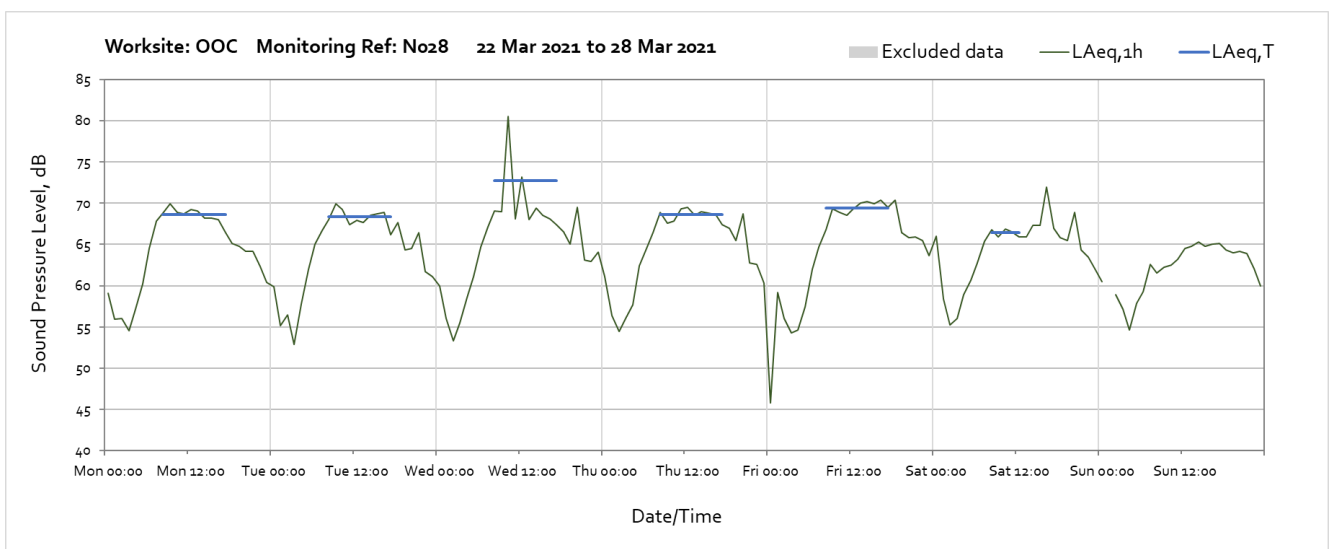
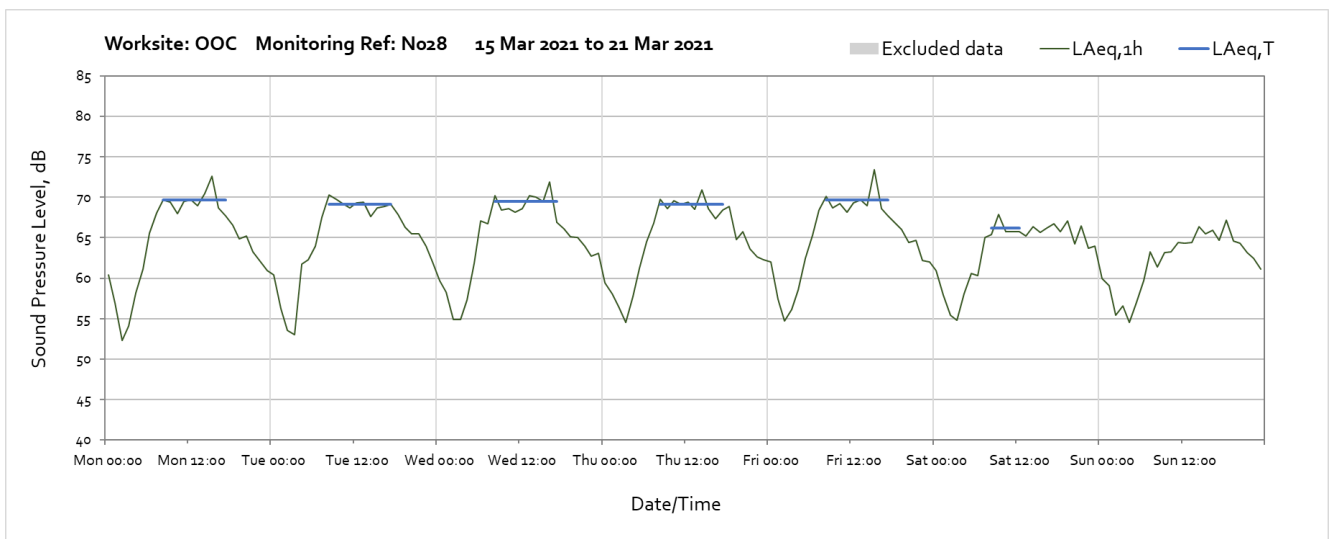
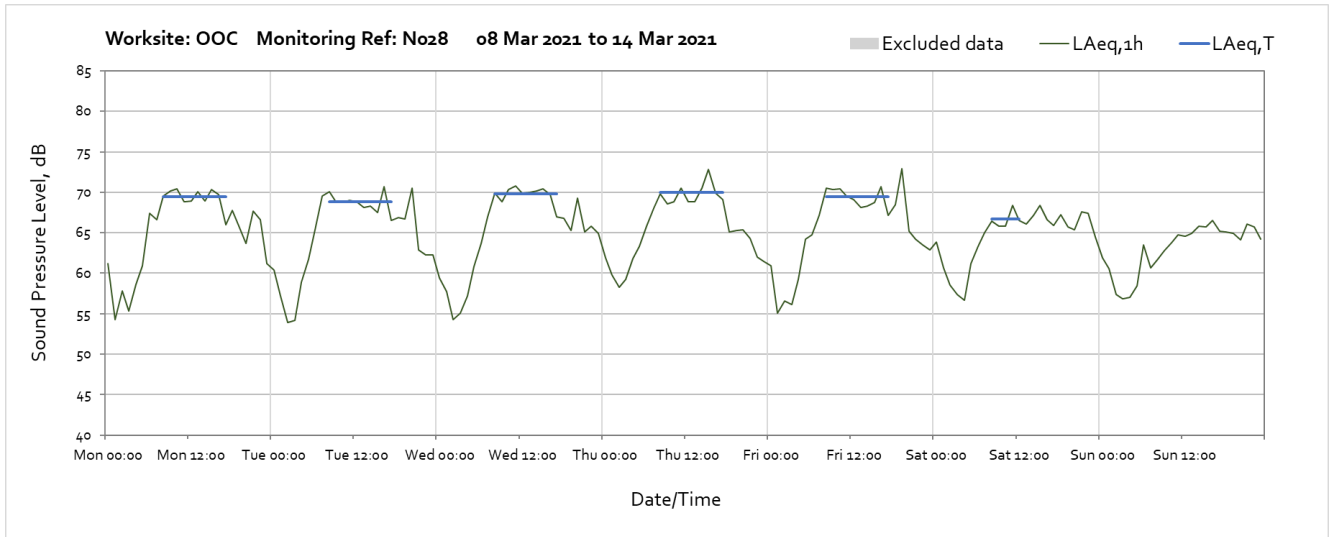


Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.

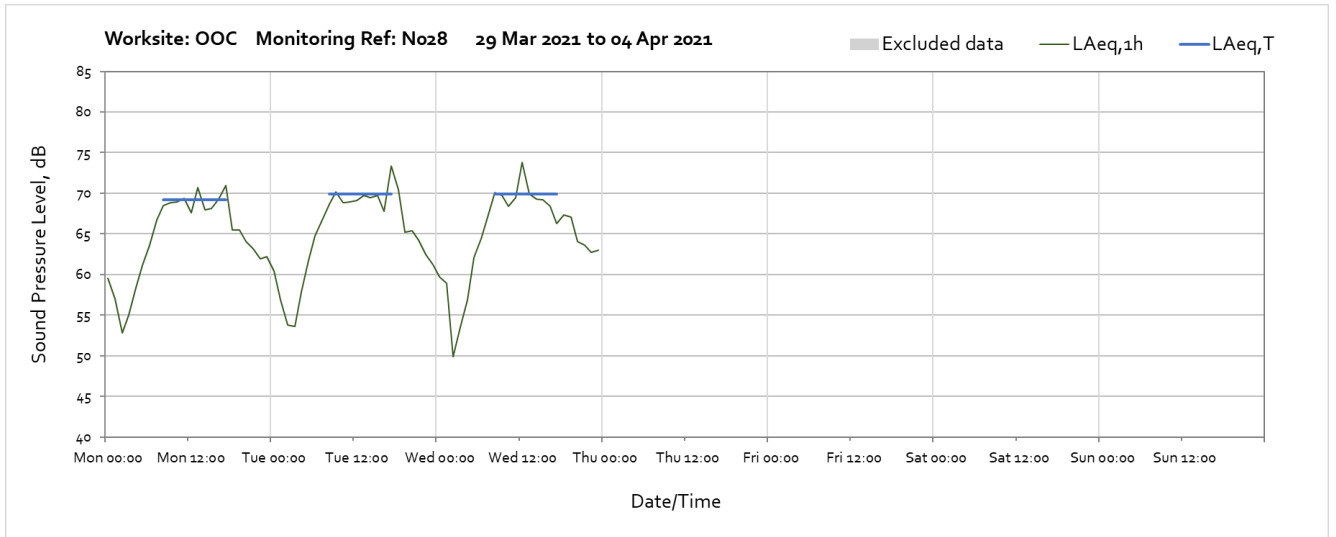


### Worksite: Oal Oak Common (OOC) – Monitoring Ref: N028

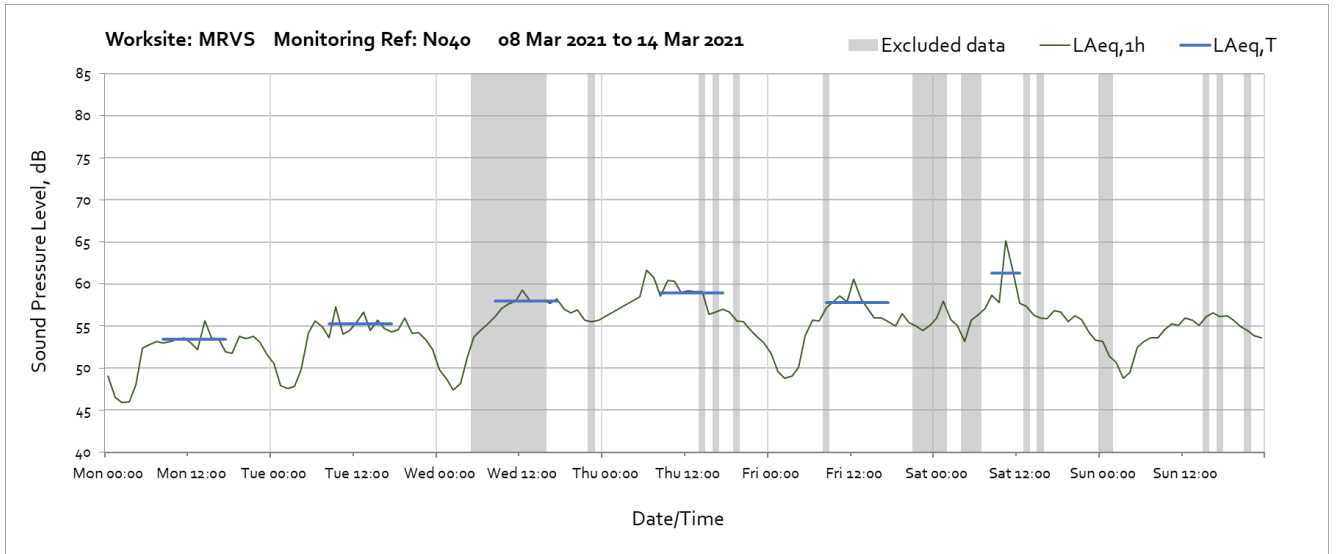
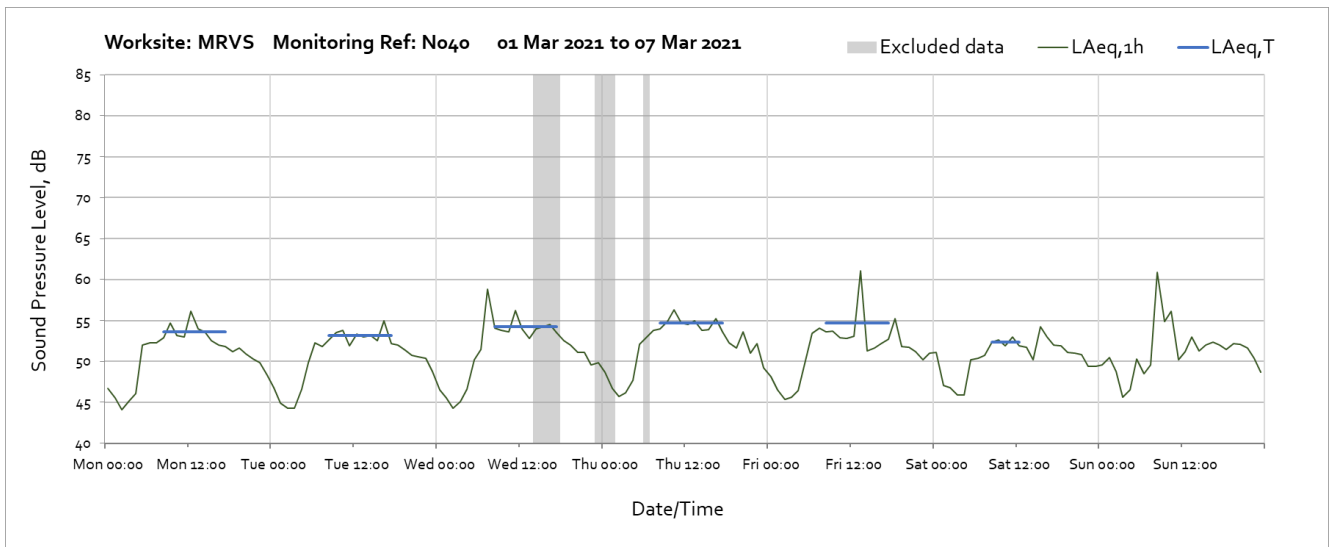


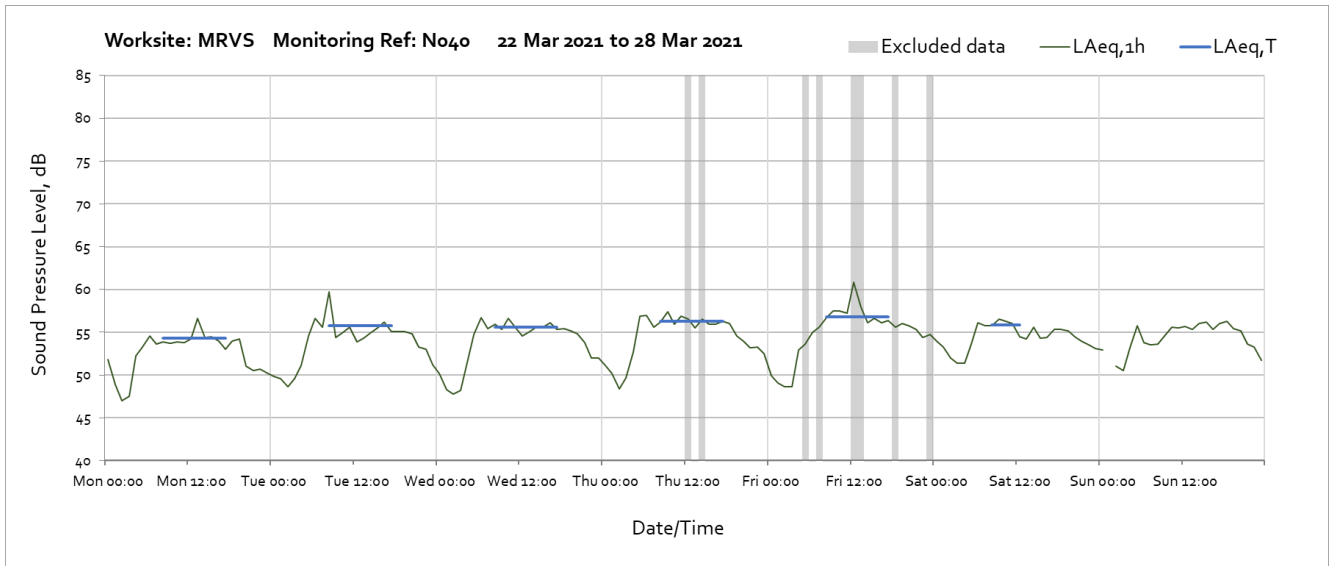
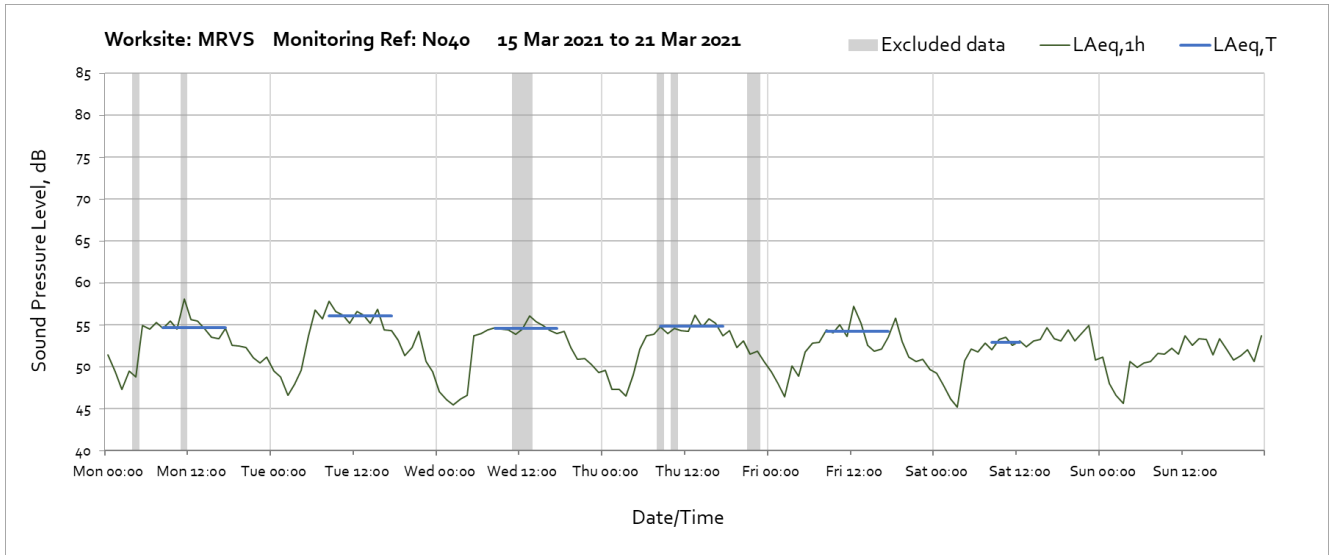


Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.



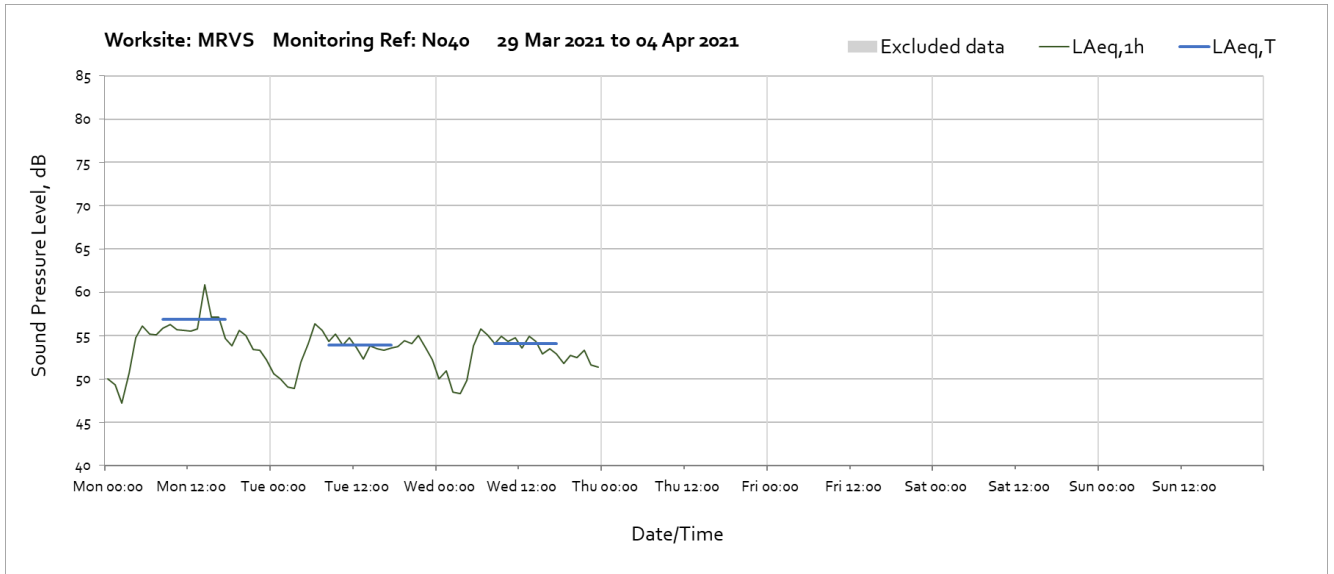
**Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N040**



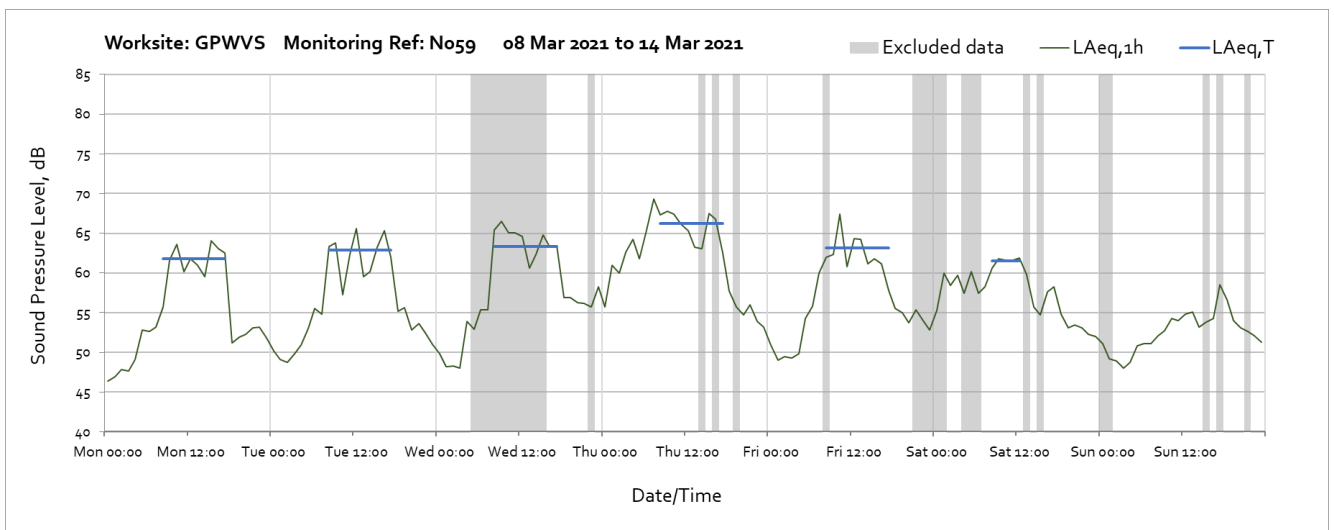
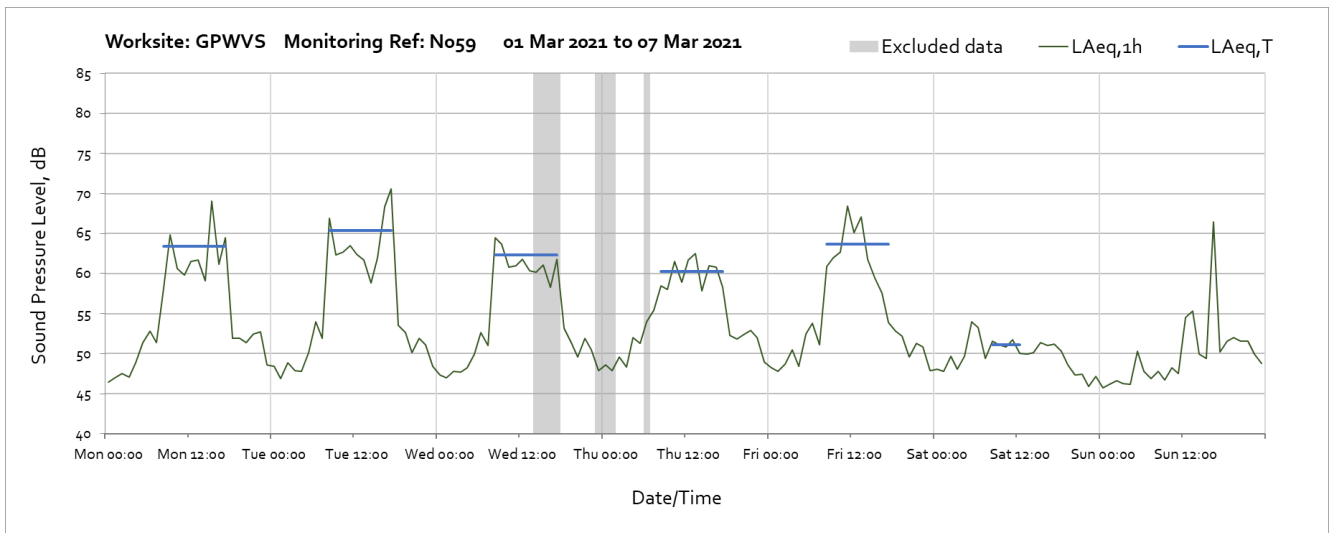


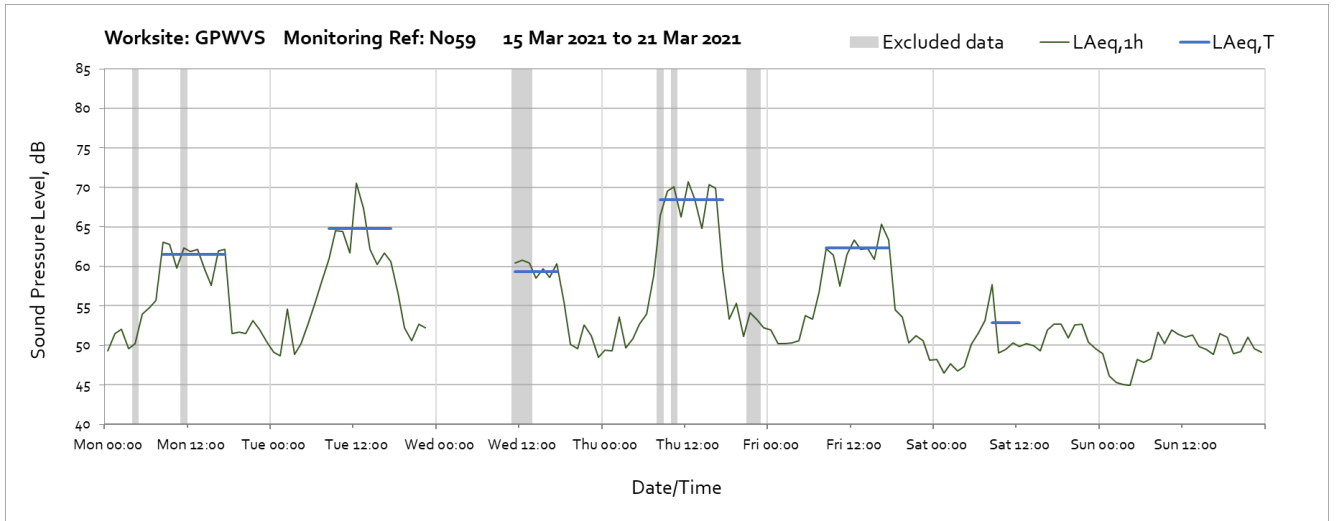
Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.



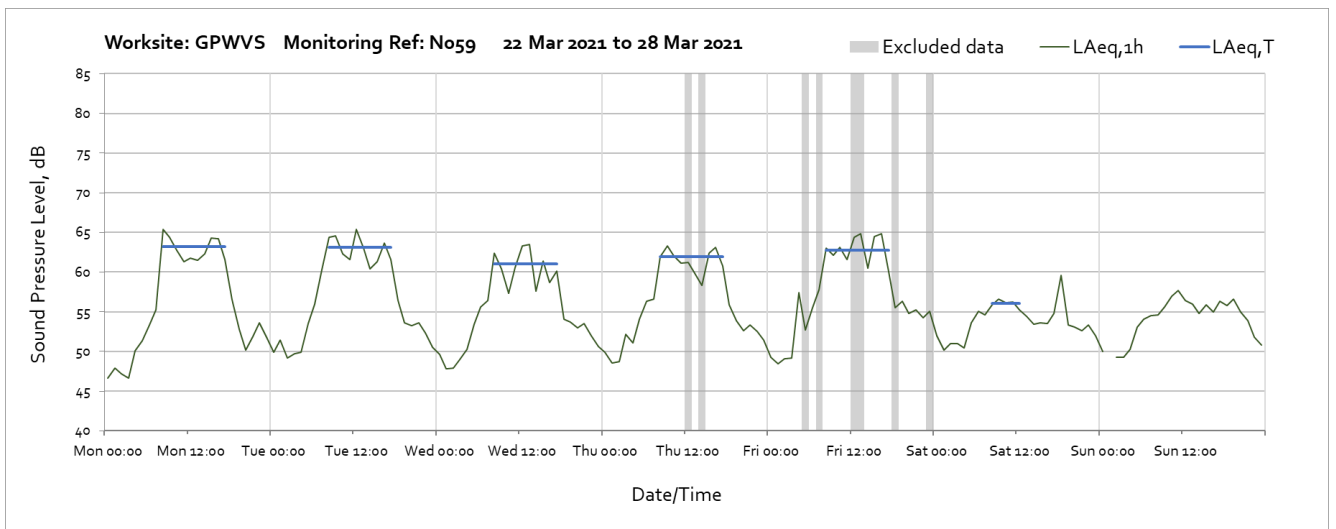


**Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: N059**

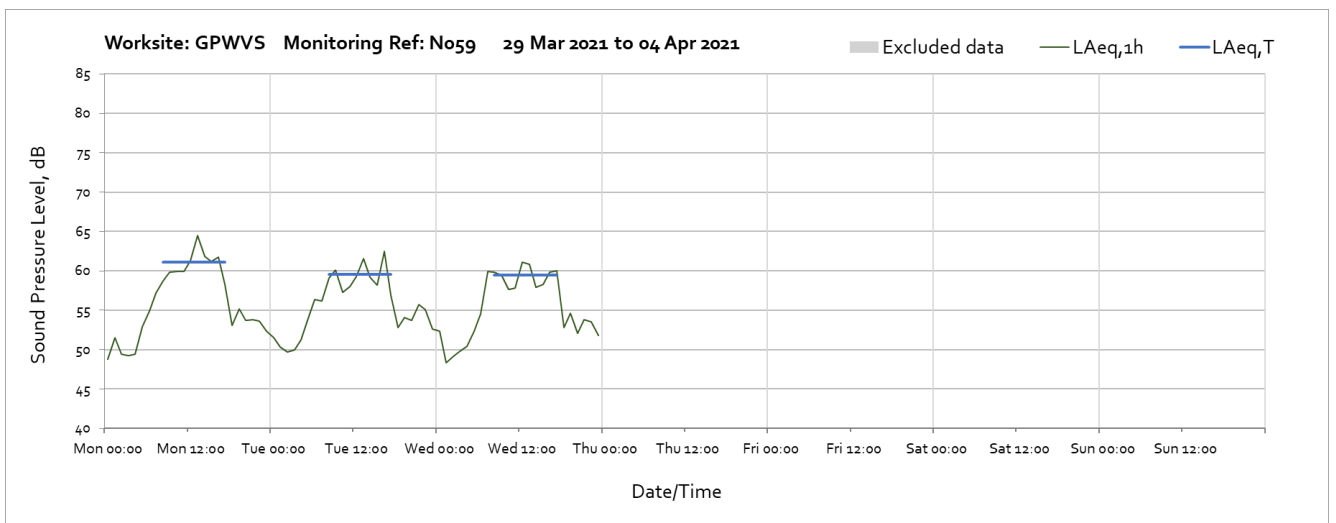




Note: Missing data between 23:00 on Tuesday 16<sup>th</sup> and 11:00 on Wednesday 17<sup>th</sup> March 2021 was due to a power supply issue which was rectified on Wednesday 17<sup>th</sup> March 2021.



Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.

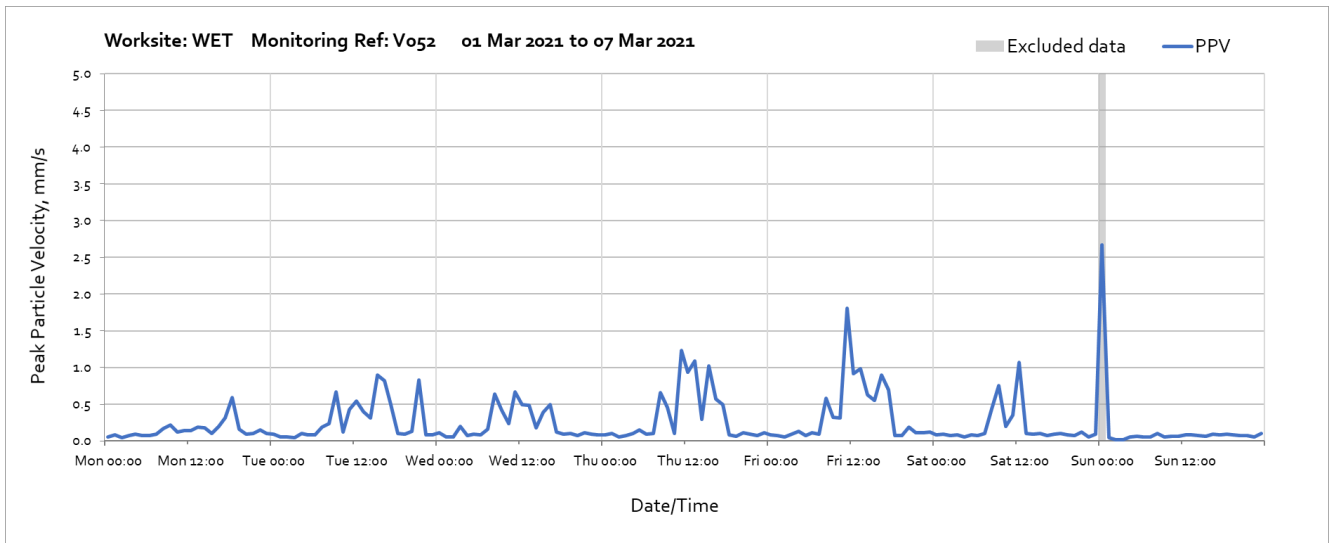




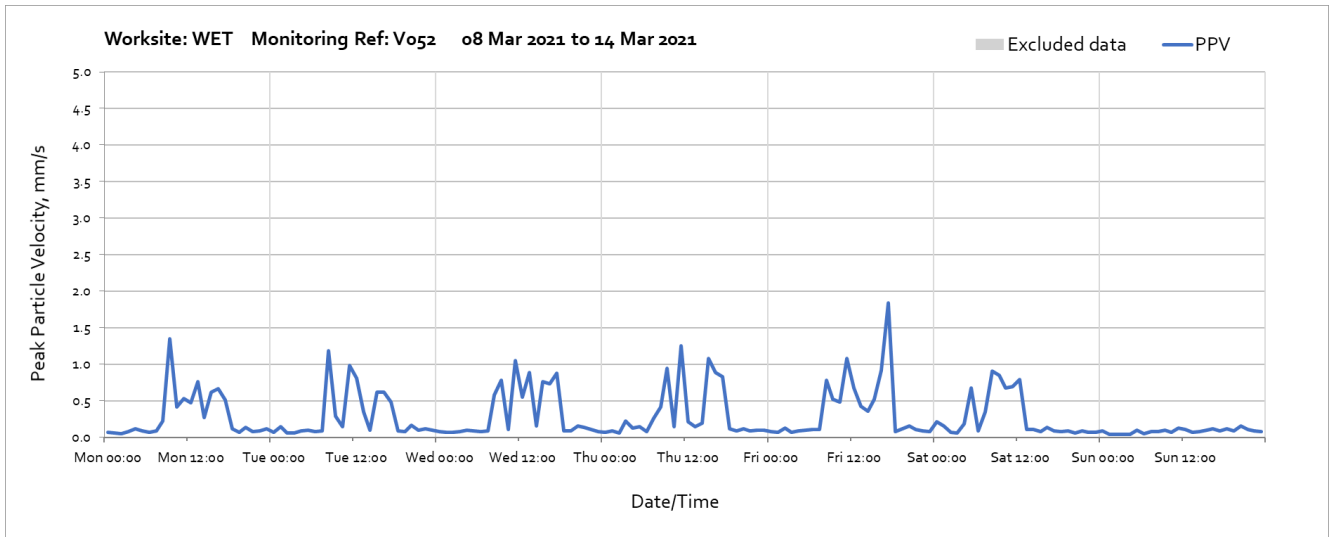
## Vibration

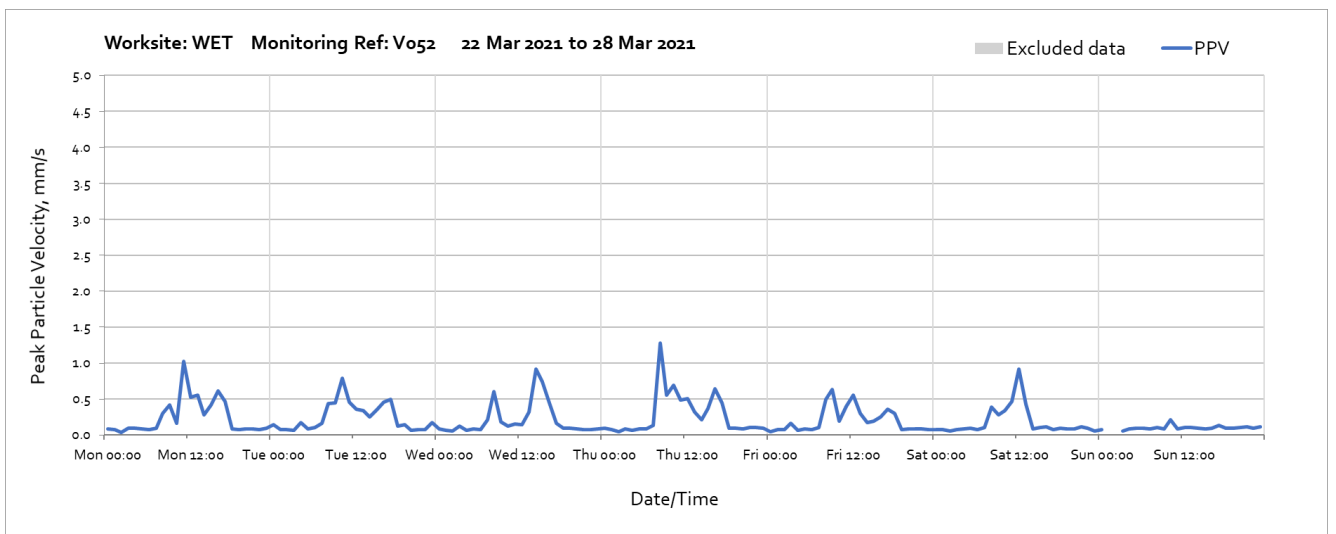
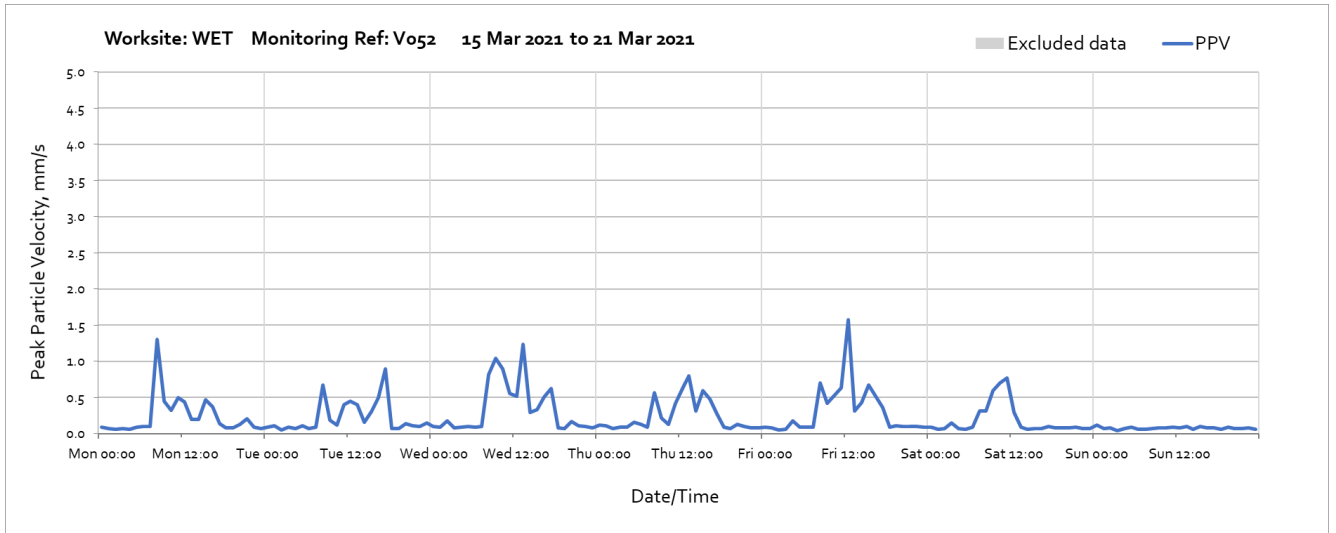
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative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

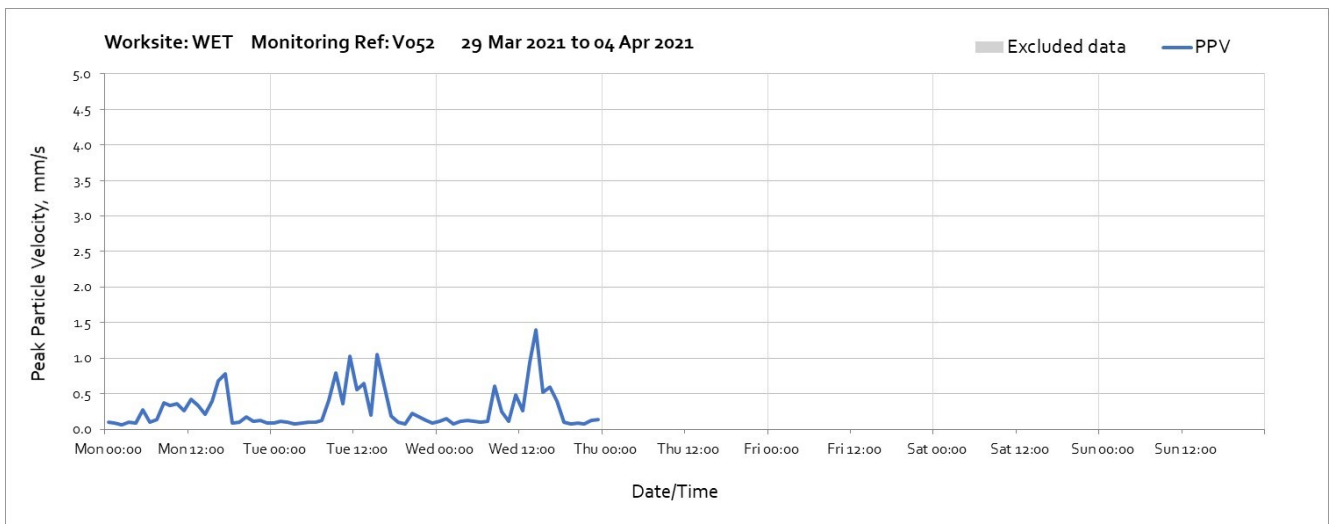


Note: High vibration levels measured at 00:00 on Sunday 7<sup>th</sup> March 2021 was not related to HS2 construction vibration.



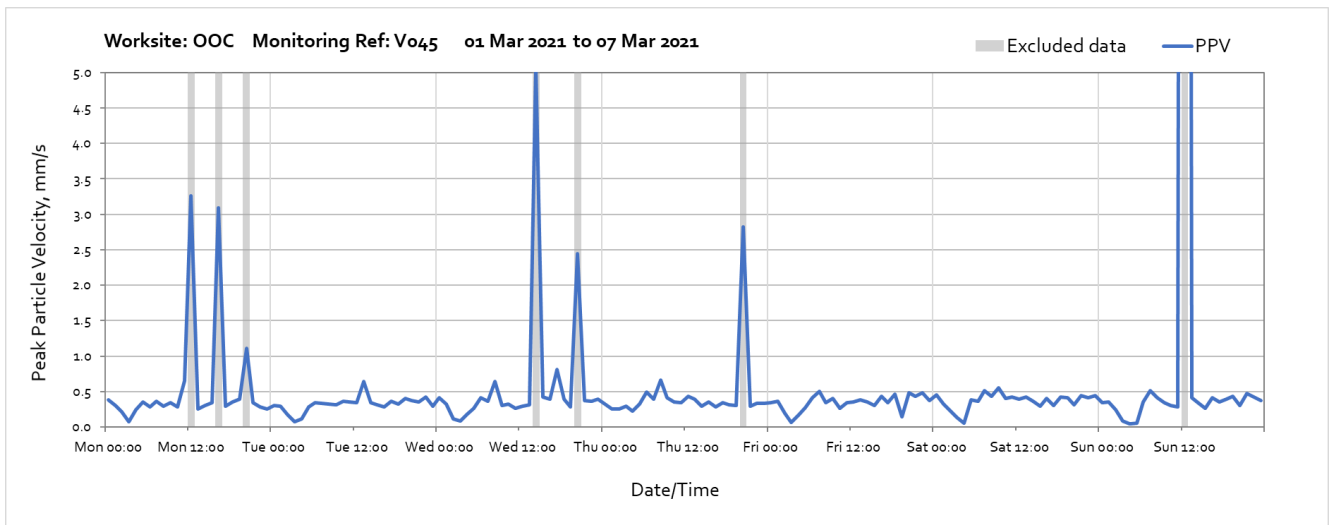


Note: Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.

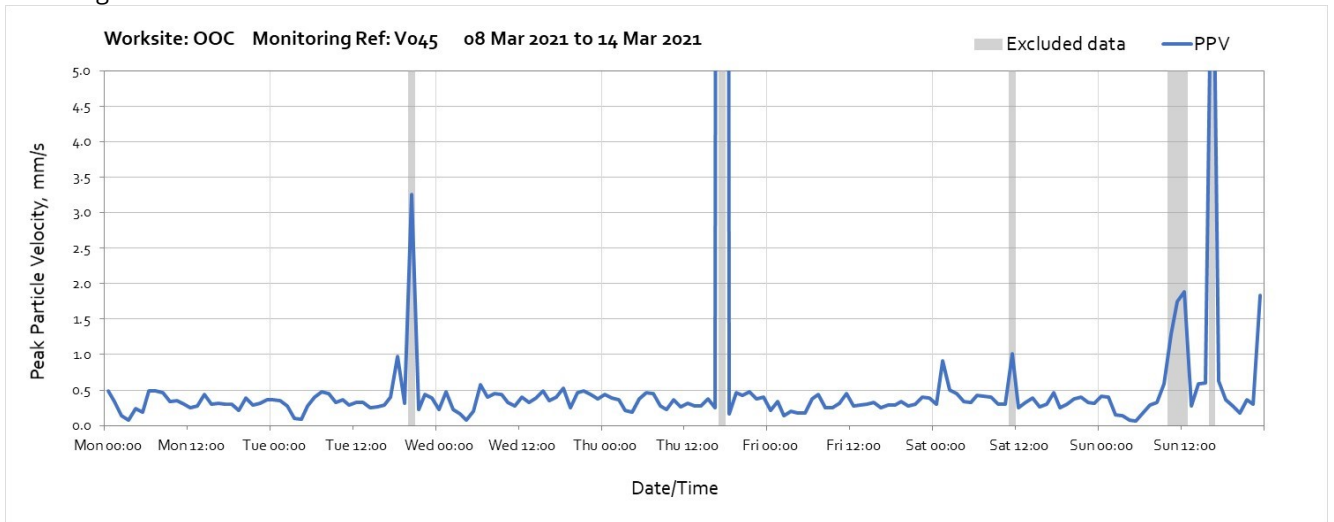




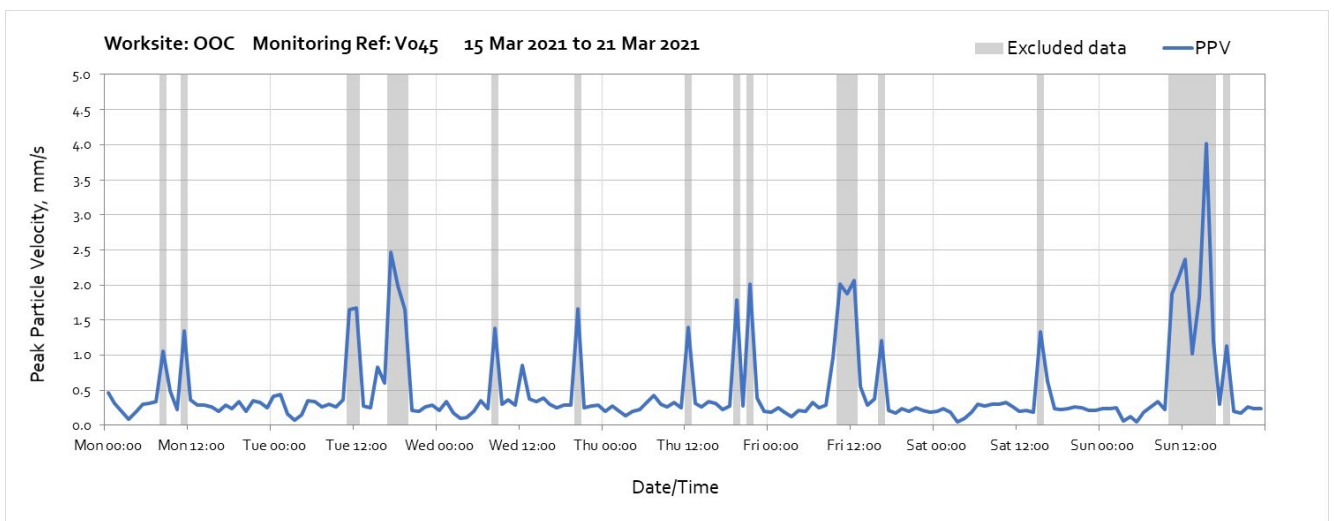
## Worksite: Oal Oak Common (OOC) – Monitoring Ref: V045



Note: High vibration levels measured across the week was not related to HS2 construction vibration.

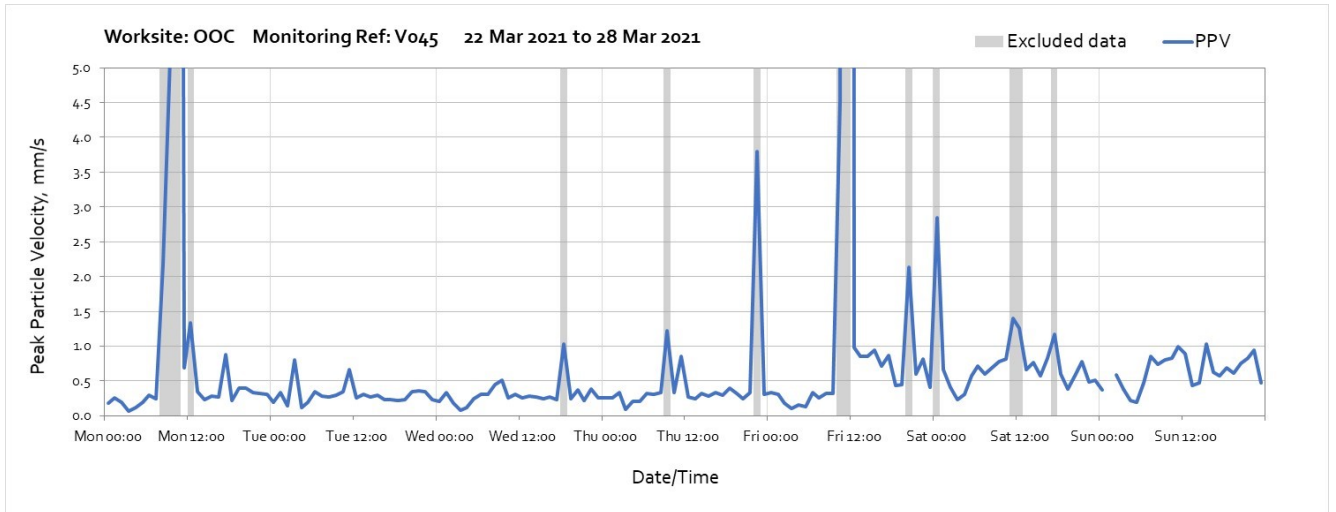


Note: High vibration levels measured across the week was not related to HS2 construction vibration.

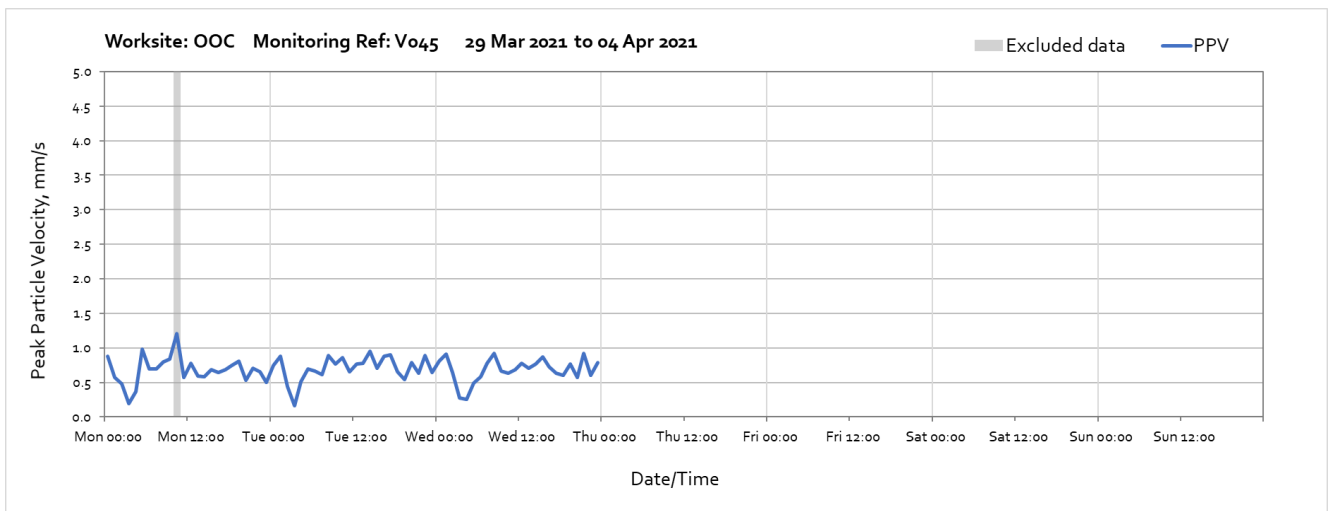


Note: High vibration levels measured across the week was not related to HS2 construction vibration.

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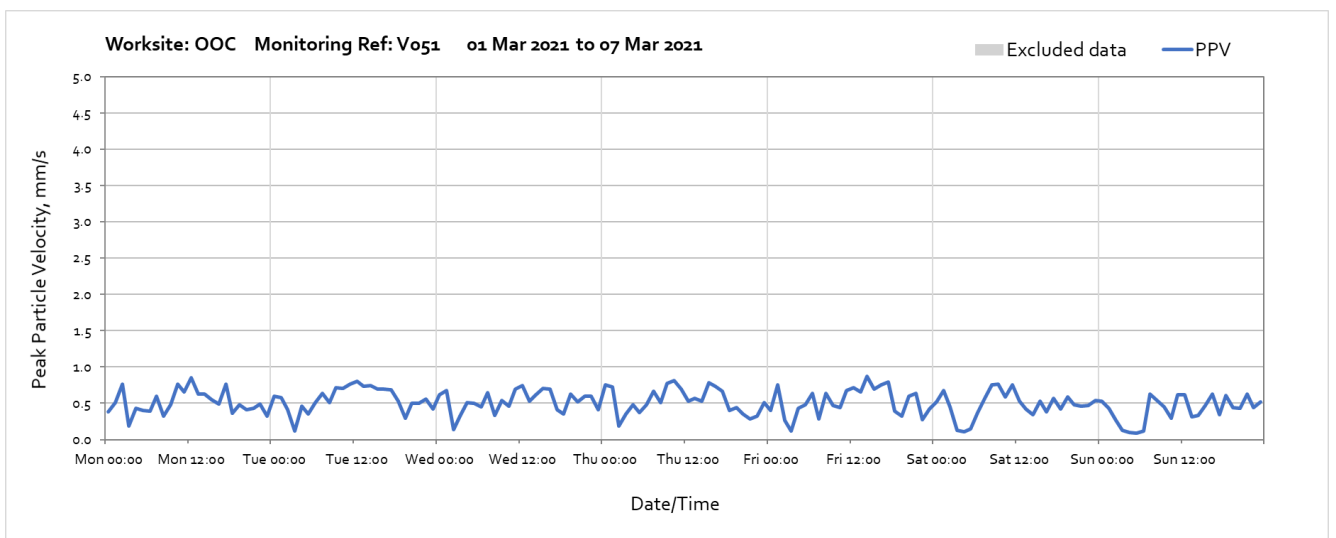


Note: High vibration levels measured across the week was not related to HS2 construction vibration. Missing data at 01:00 on Sunday 28<sup>th</sup> March 2021 was due to the clocks going forward at the start of British Summer Time.

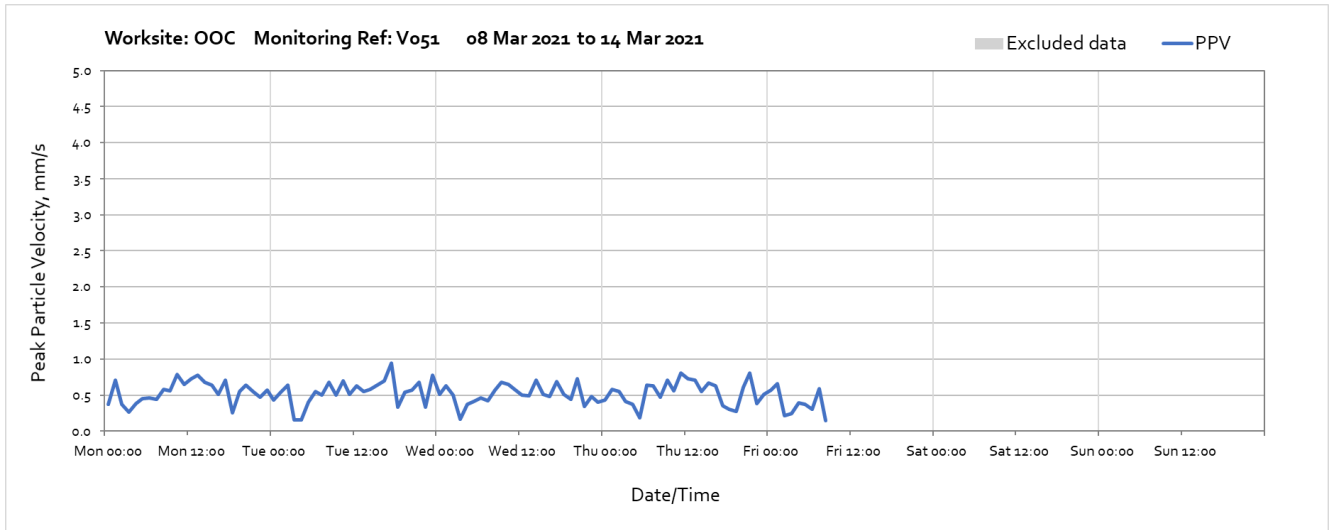


Note: High vibration levels measured across the week was not related to HS2 construction vibration.

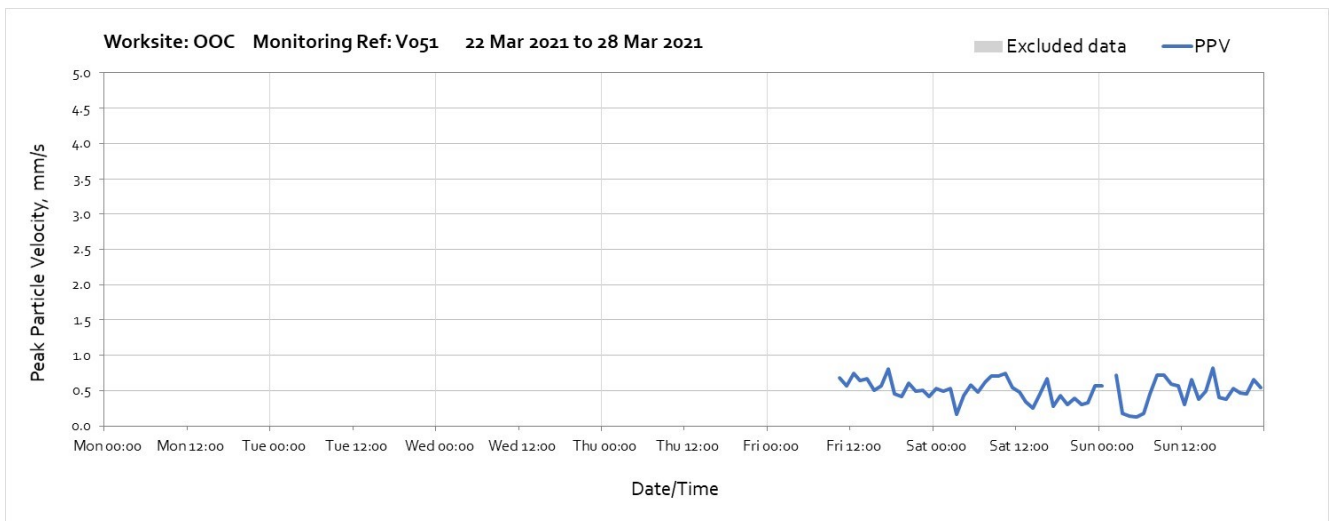
### Worksite: Oal Oak Coomon (OOC) - Monitoring Ref: V051



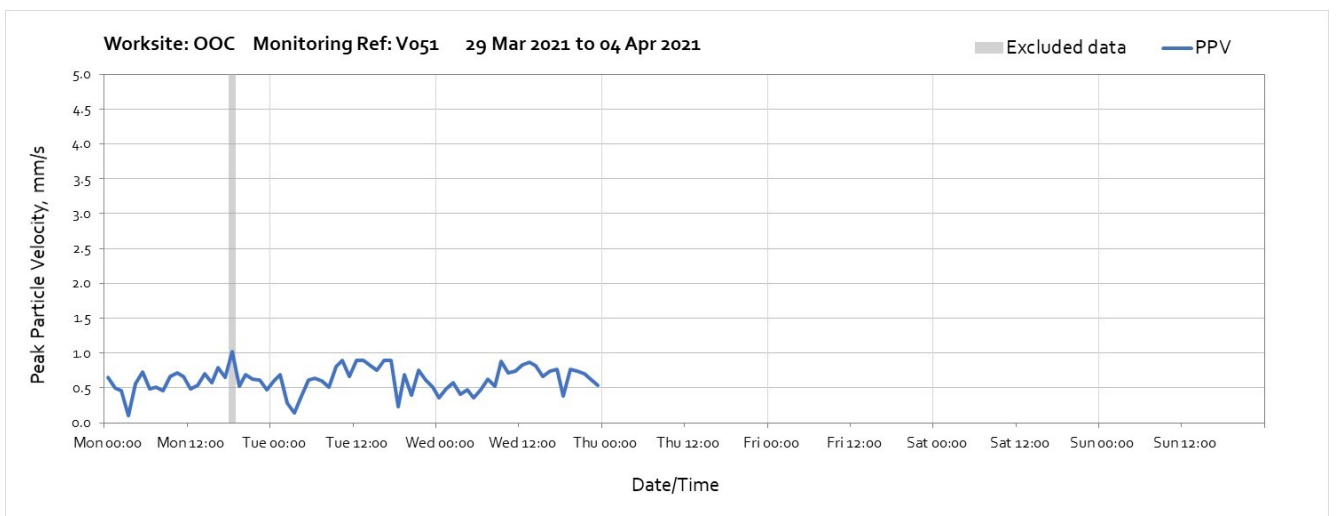
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Note: Missing data between 09:00 on Friday 12<sup>th</sup> March and 10:00 on Friday 26<sup>th</sup> March was due to discharging of the monitor's batteries. Batteries has been changed at 10:00 on Friday 26<sup>th</sup> March.

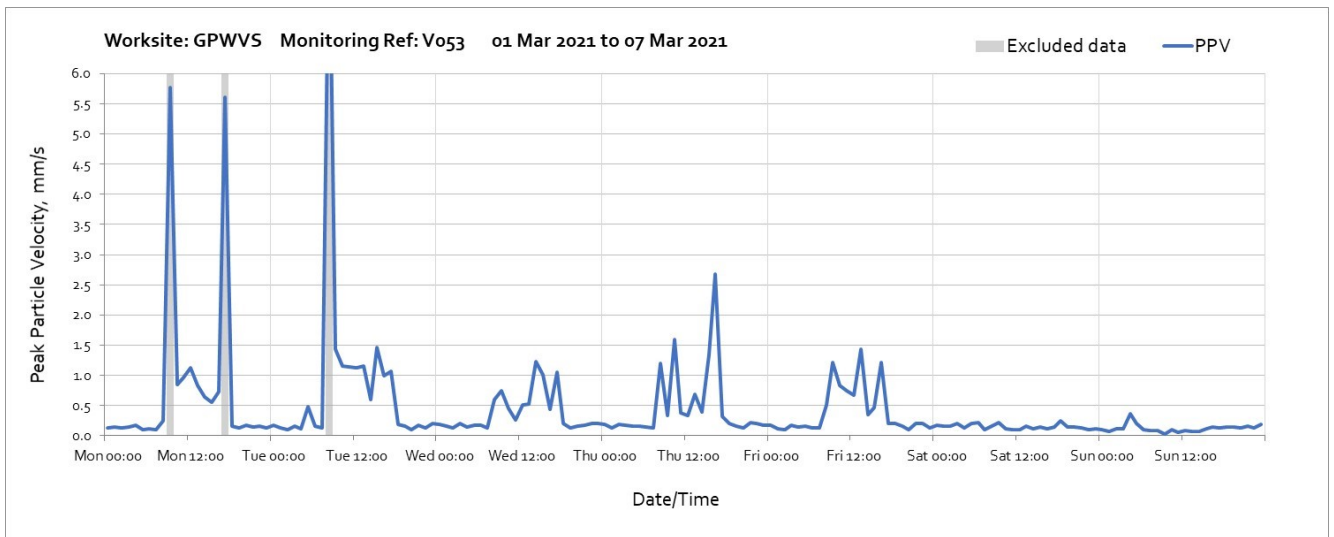


Note: Missing data between 09:00 on Friday 12<sup>th</sup> March and 10:00 on Friday 26<sup>th</sup> March was due to discharging of the monitor's batteries. Batteries has been changed at 10:00 on Friday 26<sup>th</sup> March. Missing data at 01:00 on Sunday 28<sup>th</sup> March was due ti the clocks going forward at the start of British Summer Time.

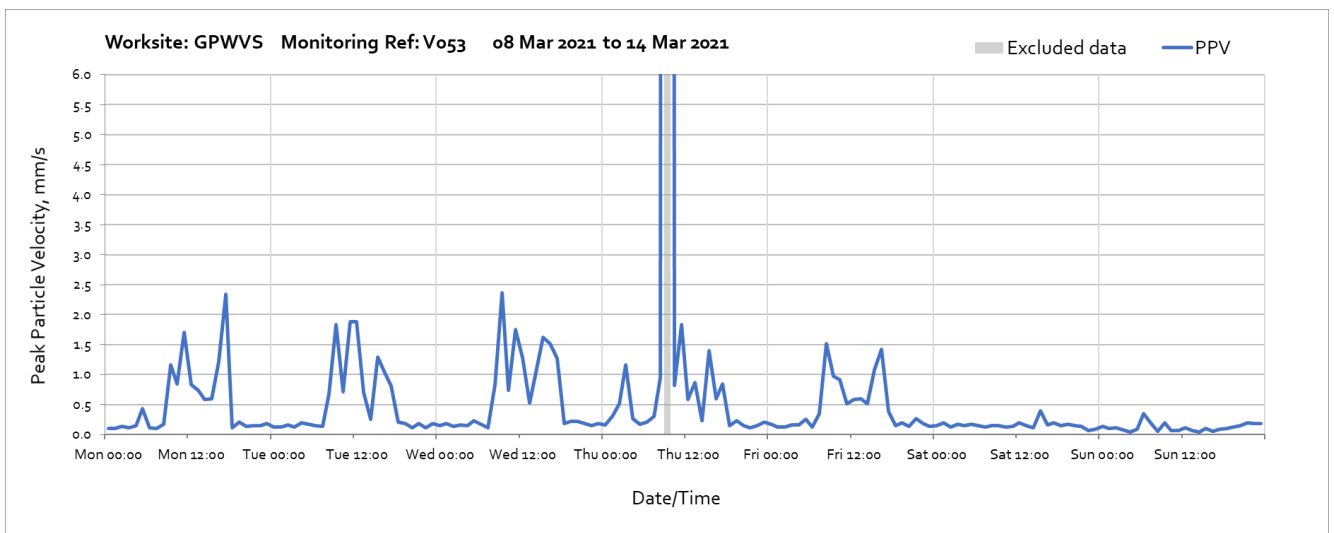


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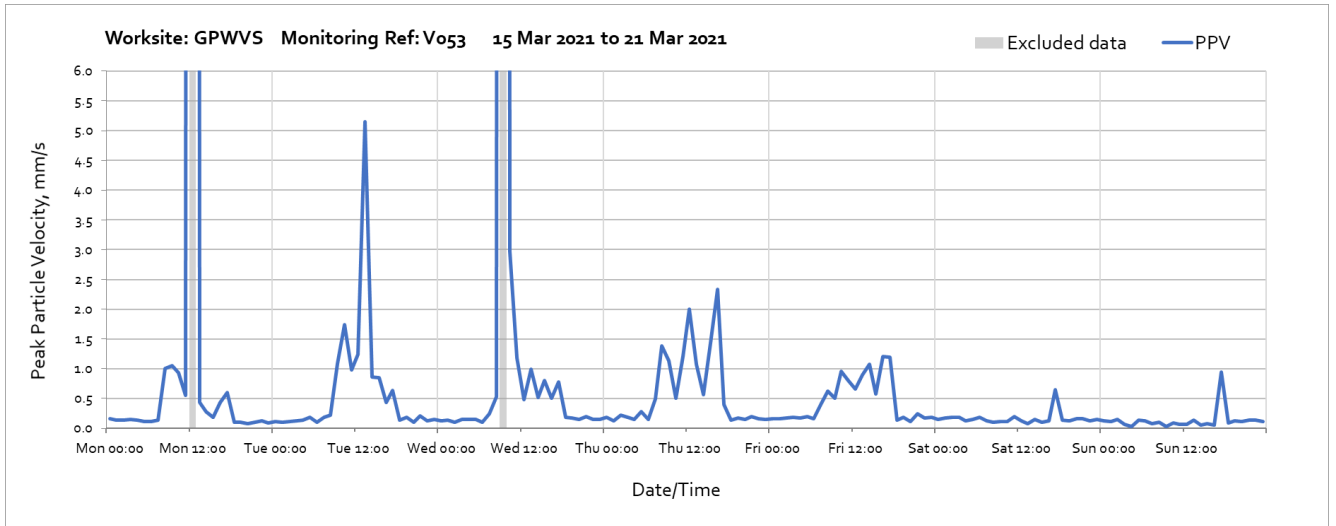
## Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: V053



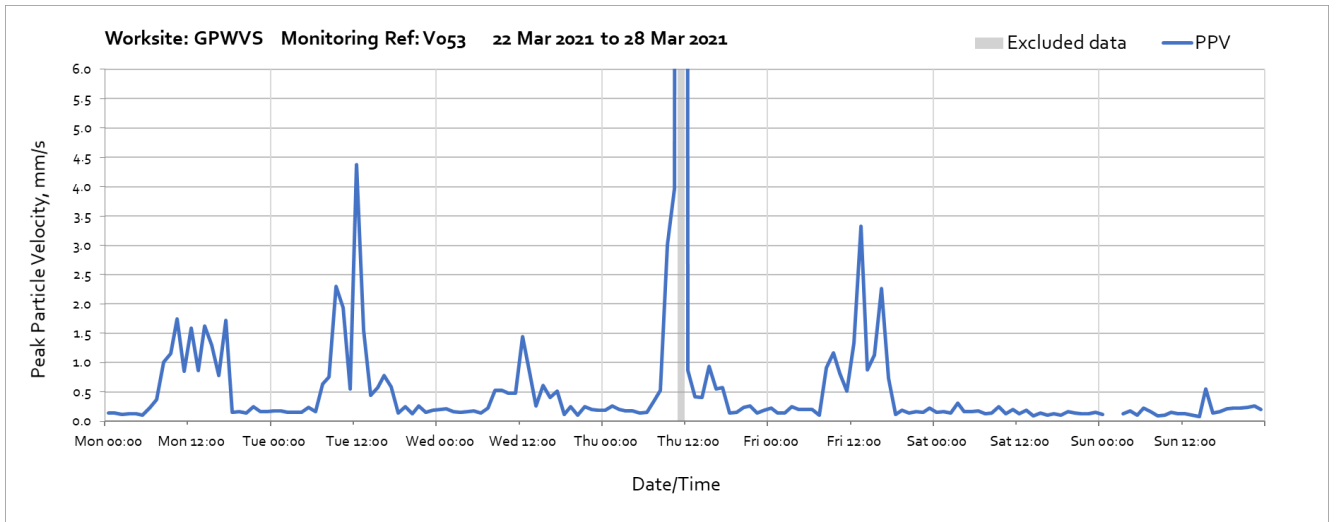
Note: High vibration levels measured at 09:00 and at 17:00 on Monday 1<sup>st</sup> March and at 08:00 on Tuesday 2<sup>nd</sup> March 2021 was due to disturbance of the monitor and are not representative of HS2 construction vibration.



Note: High vibration levels measured at 09:00 on Thursday 11<sup>th</sup> March 2021 was due to routine maintenance at the monitoring station.

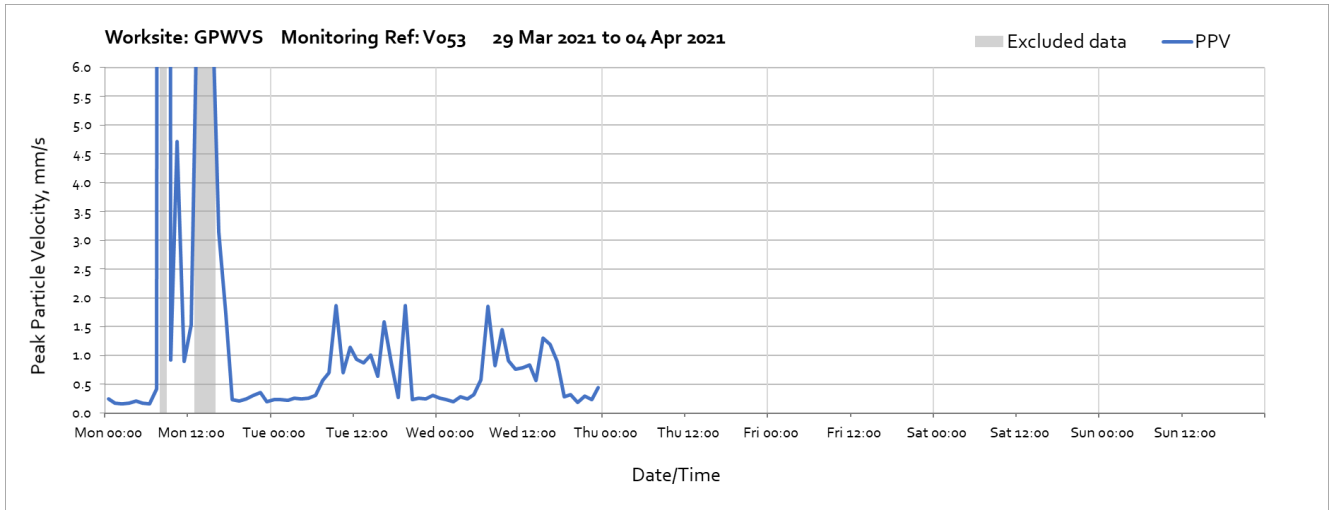


Note: High vibration levels measured at 12:00 on Monday 15<sup>th</sup> March and at 09:00 on Wednesday 17<sup>th</sup> March 2021 was due to disturbance of the monitor and are not representative of HS2 construction vibration.



Note: High vibration levels measured at 11:00 on Thursday 25<sup>th</sup> March 2021 was due to disturbance of the monitor and are not representative of HS2 construction vibration. Missing data between 01:00 and 02:00 on Sunday 28<sup>th</sup> March was due to the clocks going forward at the start of British Summer Time.





Note: High vibration levels measured at 08:00 and between 13:00 and 15:00 on Monday 29<sup>th</sup> March 2021 was due to disturbance of the monitor and are not representative of HS2 construction vibration.