

Construction Noise and Vibration Monthly Report – March 2022

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 2022.

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken in the vicinity of the Atlas Road worksite (ref. AR) where construction of the site haul roads, construction of ramps, installation of beams and props, drainage installation, construction of platform, installation of staircase, conveyor works and slab pouring were underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Willesden EuroTerminal worksite (ref. WET), where deliveries and removal of waste, fencing works, conveyor works, storage slab joint works, foundation works and works on the site haul road including asphalt breaking out, construction of spoil storage bays, preparation works for new gantry crane, concrete pouring and hoarding works were underway.
- Noise monitoring was undertaken in the vicinity of the Victoria Road Crossover Box worksite (worksite ref. VRCB), where:
 - diaphragm wall works, excavations, construction of the welfare slab, conveyor works and installation of fencing were underway.
 - At the Victoria Road Ancillary Shaft, shaft installation works were underway.
- Noise monitoring was undertaken in the vicinity of the Flat Iron compound (worksite ref. FIC), where steel works, installation of shuttering, conveyor works, building and excavation works were underway.
- Noise and vibration monitoring were undertaken in proximity of the Old Oak Common depot worksite (ref. OOC), where building fit-out, excavations, concrete works, haul road construction, drainage installations, wall stabilisation works, piling, steelworks, construction of slab foundations and crane mat were underway.
- Noise monitoring was undertaken in proximity of the Mandeville Road Ventilation Shaft worksite (ref.: MRVS), where sheet piling and excavations works were underway.
- Noise and vibration monitoring were undertaken in proximity of the Green Park Way Ventilation Shaft worksite (ref. GPWVS), where hardstanding works, works to the car park and to the walkways, grouting and drilling works, installation of paving, installation of shutters, concrete works and installation of wheel wash and connection were underway.
- Noise monitoring was undertaken in proximity of the Westgate Ventilation Shaft (ref. WVS), where construction of ventilation openings, excavation works, sprayed

concrete lining works, hand trimming works, groundworks, concrete works, installation of shuttering and installation of wastewater pipe were undertaken.

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

- School Road, Bethune Road, Chase Road, Victoria Road and Atlas Road as part of utility diversion works; and
- Wormwood Scrubs where electrical installations were underway.

The HS2 threshold levels for significant noise impacts, which are defined in Information Paper E23 (<https://www.gov.uk/government/publications/hs2-information-papers-environment>), were exceeded on four (4) 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.

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

Abbreviations and Descriptions

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

Table 1: Table of Abbreviations

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

1 Introduction

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

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

1.1.2 Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the London Borough of Ealing (LBE) (including one monitoring location on the boundary with the London Borough of Hammersmith and Fulham) during the month for the period 1st to 31st March 2022.

1.1.3 Active construction sites in the local authority area, where noise and vibration monitoring were conducted during this period, include:

- Atlas Road worksite, ref. AR (see plan 5 in Appendix A), where work activities included:
 - Construction of the site haul road, including laying reinforcement and concrete pours;
 - Construction works of launch ramp, including steel fixing, shuttering, concreting works and excavations;
 - Drainage installation;
 - Installation of beams and props;
 - Construction of granular working platform and walkway;
 - Installation of staircase;
 - Conveyor works, including installation of bridges and framework;
 - Installation of reinforcement steel and formwork erection; and

- Slab pouring.
- Willesden EuroTerminal worksite, ref. WET (see plan 5 in Appendix A), where work activities included:
 - Deliveries and removal of waste;
 - Fencing works;
 - Conveyor works, including cast-in-situ concrete works and installation of conveyor elements;
 - Works to the gantry foundations, including asphalt breaking out and concrete works and repairs to the site haul road;
 - Joint sealing works to the segment storage area;
 - Construction of spoil storage bays including water-proofing;
 - Preparation works of new gantry crane including removal, excavation and concreting works;
 - Concrete pouring works; and
 - Hoarding works.
- Victoria Road Crossover Box worksite, ref. VRCB (see plan 6 in Appendix A), where work activities included:
 - Construction of diaphragm wall, including excavation works and lifting of cages and concrete works;
 - Excavations;
 - Preparation works and construction of the welfare slab, including excavations and concrete works;
 - Conveyor works including formwork erection, steel works, concrete pouring, installation of lighting and kerbs and excavation works;
 - Installation of steel fencing; and
 - Victoria Road Ancillary Shaft works comprising installation of water barrier and trimming works for pipe installation.
- Flat Iron compound, worksite ref. FIC (see plan 6 in Appendix A), where work activities included:
 - Steel works;
 - Installation of shuttering;
 - Conveyor base works including breaking concrete, excavation and concrete works, installation of steel cage and formwork erection;

- Roof repairs; and
- Excavation works.
- Old Oak Common depot worksite, located in the London Borough of Hammersmith and Fulham (LBHF), ref. OOC (see plan 7 in Appendix A), where work activities included:
 - Building fit-out;
 - Excavation and concrete works;
 - Concrete and wall breaking;
 - Haul road construction;
 - Drainage installation;
 - Wall stabilisation works;
 - Piling works;
 - Construction of slab foundations; and
 - Crane mat construction including pipe laying.
- Mandeville Road Ventilation Shaft worksite, reference MRVS (see plan 1 in Appendix A), where work activities included:
 - Sheet piling; and
 - Excavation works.
- Green Park Way Ventilation Shaft worksite, reference GPWVS (see plan 2 in Appendix A), where work activities included:
 - Hardstanding works;
 - Works on walkways, including installation of clamps and maintenance works;
 - Grouting works including pre-drilling and drilling works;
 - Installation of tactile paving;
 - Installation of shutters for the silo bases;
 - Concrete pouring works; and
 - Installation of wheel wash and connection.
- Westgate Ventilation Shaft worksite, reference WVS (see plan 3 in Appendix A), where work activities included:
 - Construction of ventilation openings;

- Shaft excavation works, including Sprayed Concrete Lining works and hand trimming works;
- Concrete works;
- Installation of shuttering;
- Back filling; and
- Installation of wastewater pipe.

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

- Wormwood Scrubs where electrical installations were underway.

1.1.5 The applicable standards, guidance, and monitoring methodology are outlined in the construction noise and vibration monitoring methodology report which can be found at the following location <https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2>. Noise and vibration monitoring reports for previous months can also be found at this location.

1.2 Measurement Locations

1.2.1 Eighteen (18) noise and nine (9) vibration monitoring installations were active in March in the LBE area. Table 2 summarises the position of noise and vibration monitoring installations within the LBE area in March 2022.

1.2.2 On Friday 4th February 2022, the vibration monitor ref.: V052 located at worksite ref.: WET has been temporarily removed with the agreement of LBE due to hoarding works taking place at the worksite boundaries. The vibration monitor will be relocated in another location or, if no alternative location is possible, it will be placed back to its original one once the hoarding works has been completed.

1.2.3 On Tuesday 15th March 2022, the vibration monitor ref.: OOC-V01 located at worksite ref.: OOC-V01 has been removed as the number of localised events outweighed any activity caused by construction. A more suitable location representative of properties on Wells House Road is being planned.

1.2.4 The noise monitor ref.: N050 suffered power outage during the whole of March due to the column power supply and not the monitor itself. It is proposed to install temporary noise monitoring on southern site hoarding of worksite ref.: VRCB to provide cover until power supply issue resolved by LBE.

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

Table 2: Monitoring Locations

| Worksite Reference | Measurement Reference | Address |
|--------------------|-----------------------|---|
| AR | N032 | Shaftesbury Gardens |
| | N033 | Outside The Collective, Atlas Road / Victoria Road |
| | N060 | Atlas Road next to Bashey Road |
| WET | N034 | Stephenson Street (north) |
| | N035 | Stephenson Street (south) |
| | N041 | Junction of Stephenson Street / Goodhall Street |
| | V052 | Stephenson Street (north) |
| | V057 | 37, Stephenson Street |
| VRCB | N031 | School Road, outside Acton Business Centre |
| | N050 | Acton Square, outside North Acton Station |
| FIC | N029 | Braitrim House, Victoria Road |
| | N042 | Boden House Car Park |
| | N049 | Flat Iron compound railway fence, Victoria Rd North Acton |
| OOC | OOC-N01 | Old Oak Common Lane |
| | OOC-N02 | Old Oak Common Lane, Hilltop Works |
| | OOC-V01 | 25 Wells House Road |
| | OOC-V02 | Kildun Court, Old Oak Common Lane |
| | OOC-V03 | Wells House Road Alleyway |
| MRVS | N040 | Badminton Close |
| | N058 | Mandeville Road |
| | N063 | Mandeville Road |
| | V055 | Mandeville Road |
| | V056 | Mandeville Road |
| GPWVS | N059 | Green Park Way Ventilation Shaft |
| | N064 | Green Park Way Ventilation Shaft |
| | V053 | Green Park Way, Greenford |
| | V054 | Green Park Way Ventilation Shaft |
| WVS | N062 | Westgate Ventilation Shaft |

2 Summary of Results

2.1 Summary of Measured Noise and Vibration Levels

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

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

| Worksite Reference | Measurement Reference | Site Address | Free-field or Façade measurement | Weekday Average LAeq,T (highest day LAeq,T) | | | | | Saturday Average LAeq,T (highest day LAeq,T) | | | | | Sunday / Public Holiday Average LAeq,T (highest day LAeq,T) | |
|--------------------|-----------------------|--|----------------------------------|---|----------------|----------------|----------------|----------------|--|----------------|----------------|----------------|----------------|---|----------------|
| | | | | 0700 - 0800 | 0800 - 1800 | 1800 - 1900 | 1900 - 2200 | 2200 - 0700 | 0700 - 0800 | 0800 - 1300 | 1300 - 1400 | 1400 - 2200 | 2200 - 0700 | 0700 - 2200 | 2200 - 0700 |
| AR | N032 | Shaftesbury Gardens | Free-field | 63.6 (66.1) | 64.6 (66.4) | 63.7 (67.6) | 61.5 (67.5) | 59.1 (66.1) | 60.8 (61.7) | 63.3 (65.4) | 64.4 (66.1) | 62.7 (67.2) | 59.1 (61.9) | 61.9 (68.7) | 59.5 (63.1) |
| | N033 | Outside The Collective, Atlas Road/Victoria Road | Free-field | 66.8 (68.9) | 69.0 (72.4) | 65.0 (68.1) | 63.9 (71.0) | 61.1 (68.4) | 63.0 (64.5) | 68.9 (70.3) | 65.0 (67.8) | 64.7 (68.3) | 59.9 (65.8) | 62.9 (68.0) | 60.6 (65.6) |
| | N060 | Atlas Road next to Bashey Road | Free-field | 56.4 (62.8) | 68.5 (76.3) | 54.0 (58.1) | 57.2 (64.7) | 53.2 (63.0) | 55.3 (56.0) | 67.8 (73.9) | 53.1 (55.0) | 53.0 (60.5) | 47.8 (51.2) | 52.6 (63.3) | 54.8 (60.9) |
| WET | N034 | Stephenson Street (north) | Free-field | 53.7 (55.8) | 57.9 (61.2) | 56.2 (60.2) | 53.8 (58.9) | 48.8 (57.3) | 53.0 (54.7) | 55.6 (56.3) | 54.0 (57.4) | 54.6 (60.0) | 47.1 (52.8) | 52.2 (56.9) | 47.9 (53.2) |
| | N035 | Stephenson Street (south) | Free-field | 53.9 (56.8) | 56.9 (59.8) | 53.0 (57.8) | 50.9 (56.7) | 46.6 (54.1) | 50.9 (52.5) | 53.5 (53.9) | 53.5 (60.4) | 51.8 (56.9) | 44.1 (51.9) | 50.2 (62.6) | 45.7 (52.5) |
| | N041 | Junction of Stephenson Street/Goodhall Street | Free-field | 55.3 (58.4) | 60.7 (64.7) | 57.0 (60.4) | 55.0 (60.4) | 50.4 (56.1) | 53.7 (54.8) | 57.5 (58.5) | 56.8 (58.2) | 56.7 (62.9) | 49.8 (56.0) | 54.1 (60.8) | 50.7 (61.6) |

| Worksite Reference | Measurement Reference | Site Address | Free-field or Façade measurement | Weekday Average L _{Aeq,T} (highest day L _{Aeq,T}) | | | | | Saturday Average L _{Aeq,T} (highest day L _{Aeq,T}) | | | | | Sunday / Public Holiday Average L _{Aeq,T} (highest day L _{Aeq,T}) | |
|--------------------|-----------------------|--|----------------------------------|---|----------------|----------------|----------------|----------------|--|----------------|----------------|----------------|----------------|--|----------------|
| | | | | 0700 - 0800 | 0800 - 1800 | 1800 - 1900 | 1900 - 2200 | 2200 - 0700 | 0700 - 0800 | 0800 - 1300 | 1300 - 1400 | 1400 - 2200 | 2200 - 0700 | 0700 - 2200 | 2200 - 0700 |
| VRCB | N031 | School Road, outside Acton Business Centre | Free-field | 62.2 (65.7) | 63.1 (65.3) | 61.0 (64.7) | 58.3 (61.4) | 55.6 (64.2) | 56.6 (61.0) | 61.5 (64.1) | 61.1 (63.9) | 60.5 (64.3) | 54.2 (61.0) | 57.6 (61.2) | 53.1 (59.2) |
| FIC | N029 | Braitrim House, Victoria Road | Free-field | 54.0 (63.7) | 60.3 (64.1) | 54.5 (63.4) | 56.6 (71.2) | 54.8 (67.6) | 53.0 (59.6) | 55.7 (57.1) | 53.4 (55.8) | 52.3 (60.0) | 49.1 (60.3) | 49.5 (52.6) | 53.7 (63.0) |
| | N042 | Bodens car park | Free-field | 59.1 (62.6) | 63.3 (67.7) | 57.3 (64.1) | 56.8 (60.7) | 55.1 (62.9) | 56.9 (61.9) | 60.8 (62.8) | 58.3 (61.6) | 57.6 (62.1) | 54.2 (59.7) | 55.0 (59.8) | 53.9 (56.6) |
| | N049 | Flat Iron compound | Free-field | 56.7 (62.1) | 61.4 (63.9) | 56.7 (62.1) | 57.3 (68.0) | 57.8 (64.7) | 55.9 (59.3) | 57.3 (58.1) | 55.6 (57.5) | 54.2 (61.8) | 53.8 (63.1) | 53.1 (59.4) | 56.7 (64.7) |
| OOC | OOC-N01 | Old Oak Common Lane | Free-field | 66.9 (72.9) | 71.5 (74.1) | 64.1 (67.0) | 62.2 (68.2) | 58.9 (70.5) | 62.8 (63.2) | 66.5 (69.6) | 64.3 (66.7) | 63.1 (65.2) | 58.9 (64.8) | 61.5 (63.7) | 58.8 (65.2) |
| | OOC-N02 | Old Oak Common Lane, Hilltop Works | Free-field | 68.6 (71.2) | 72.1 (76.0) | 67.6 (69.3) | 65.7 (69.6) | 62.1 (68.9) | 64.9 (65.9) | 67.7 (68.6) | 67.4 (70.1) | 66.8 (70.5) | 61.6 (66.2) | 65.2 (68.6) | 62.0 (68.1) |
| MRVS | N040 | Badminton Close | Free-field | 54.4 (60.6) | 56.8 (59.2) | 53.2 (55.3) | 52.7 (55.9) | 51.4 (59.5) | 52.8 (54.5) | 54.1 (55.8) | 52.6 (55.1) | 52.9 (55.4) | 50.1 (53.6) | 52.6 (56.8) | 51.1 (57.3) |
| | N058 | Mandeville Road | Free-field | 55.1 (64.1) | 65.9 (73.9) | 54.8 (61.3) | 53.5 (57.7) | 51.4 (57.4) | 55.2 (55.9) | 66.7 (75.1) | 58.2 (62.3) | 56.5 (62.2) | 50.8 (60.2) | 53.4 (58.6) | 50.6 (57.6) |
| | N063 | Mandeville Road | Free-field | 58.7 (61.9) | 69.3 (75.1) | 57.1 (59.7) | 58.0 (64.2) | 54.9 (64.1) | 57.4 (59.2) | 61.5 (66.1) | 56.8 (59.1) | 57.5 (64.7) | 53.6 (57.6) | 56.5 (59.4) | 54.8 (60.0) |

| Worksite Reference | Measurement Reference | Site Address | Free-field or Façade measurement | Weekday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) | | | | | Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) | | | | | Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) | |
|--------------------|-----------------------|----------------------------------|----------------------------------|--|----------------|----------------|----------------|----------------|---|----------------|----------------|----------------|----------------|--|----------------|
| | | | | 0700 - 0800 | 0800 - 1800 | 1800 - 1900 | 1900 - 2200 | 2200 - 0700 | 0700 - 0800 | 0800 - 1300 | 1300 - 1400 | 1400 - 2200 | 2200 - 0700 | 0700 - 2200 | 2200 - 0700 |
| GPWVS | N059 | Green Park Way Ventilation Shaft | Free-field | 58.2 (61.8) | 65.3 (72.2) | 59.3 (64.6) | 61.2 (68.7) | 60.1 (69.3) | 53.3 (55.0) | 56.5 (59.8) | 54.1 (56.2) | 52.2 (55.4) | 47.2 (53.8) | 53.0 (69.0) | 49.0 (55.4) |
| | N064 | Green Park Way Ventilation Shaft | Façade | 57.1 (59.5) | 63.1 (65.6) | 58.3 (63.7) | 60.4 (65.0) | 58.4 (64.6) | 53.7 (55.6) | 56.0 (57.4) | 54.0 (57.5) | 53.1 (57.2) | 48.5 (52.3) | 53.0 (57.1) | 51.2 (57.5) |
| WVS | N062 | Westgate Ventilation Shaft | Free-field | 63.6 (69.2) | 67.0 (72.7) | 58.3 (61.2) | 62.0 (69.5) | 58.9 (72.4) | 57.1 (59.4) | 63.6 (67.4) | 56.9 (59.1) | 56.9 (61.3) | 54.1 (57.3) | 56.7 (62.4) | 55.5 (61.5) |

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 | V057 | 37, Stephenson Street | 0.78 (Z-axis) |
| OOC | OOC-V01 | 25 Wells House Road | 2.71 (Z-axis) |
| | OOC-V02 | Kildun Court, Old Oak Common Lane | 1.60 (Z-axis) |
| | OOC-V03 | Wells House Road Alleyway | 1.24 (Y-axis) |
| GPWVS | V053 | Green Park Way, Greenford | 0.68 (X-axis) |
| | V054 | Green Park Way Ventilation Shaft | 1.97 (X-axis) |
| MRVS | V055 | Mandeville Road | 4.27 (Z-axis)* |
| | V056 | Mandeville Road | 6.39 (Z-axis)* |

* High vibration levels are due to works undertaken in close proximity of the vibration monitoring location. The nearest residential receptors are further away from the works and vibration levels at the receptors will therefore be lower.

2.1.3 Appendix C presents graphs of the noise and vibration monitoring data over the month for each of the measurement locations. Noise data presented consists of the hourly L_{Aeq} values and, where relevant, the $L_{Aeq,T}$ values (where the time period T has been taken to be the averaging period as specified in Table 1 of HS2 Information Paper E23). Vibration data presented consist of hourly PPV values. The full data set for the monitoring equipment can be found at the following location: <https://data.gov.uk/dataset/24542ae7-dd44-444f-b259-871c4cc43b5e/environmental-monitoring-data>.

2.2 Exceedances of the SOAEL

2.2.1 The significant observed adverse effect level (SOAEL) is defined in the 'Planning Practice Guidance – Noise' as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

- 2.2.2 HS2 Phase One Information Paper E23: Control of Construction Noise and Vibration sets out the SOAELs for construction noise.
- 2.2.3 Where reported construction noise levels exceed the SOAEL, relevant periods will be identified. Summary statistics to evaluate ongoing qualification for noise insulation and temporary rehousing are also presented where relevant.
- 2.2.4 Table 5 presents a summary of recorded exceedances of the SOAEL at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 5: Summary of Exceedances of SOAEL

| Worksite Reference | Measurement Reference | Site Address | Day (Weekday, Saturday, Sunday, Night) | Time period | Number of exceedances of SOAEL |
|--------------------|-----------------------|--|--|-------------|--------------------------------|
| AR | N032 | Shaftesbury Gardens | All days | All periods | No exceedance |
| | N033 | Outside The Collective, Atlas Road / Victoria Road | All days | All periods | No exceedance |
| | N060 | Atlas Road next to Bashey Road | Weekdays | 0800-1800 | 2 |
| WET | N034 | Stephenson Street (north) | All days | All periods | No exceedance |
| | N035 | Stephenson Street (south) | All days | All periods | No exceedance |
| | N041 | Junction of Stephenson Street / Goodhall Street | All days | All periods | No exceedance |
| VRCB | N031 | School Road, outside Acton Business Centre | All days | All periods | Not applicable* |
| FIC | N029 | Braitrim House, Victoria Road | All days | All periods | No exceedance |
| | N042 | Bodens Car Park | All days | All periods | No exceedance |
| | N049 | Flat Iron compound | All days | All periods | No exceedance |
| OOC | OOC-N01 | Old Oak Common Lane | All days | All periods | No exceedance |
| | OOC-N02 | Old Oak Common Lane, Hilltop Works | Weekdays | 0800-1800 | 2 |
| MRVS | N040 | Badminton Close | All days | All periods | No exceedance |
| | N058 | Mandeville Road | All days | All periods | No exceedance** |

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

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

**Noise levels measured in excess of the SOAEL at monitors N058 and N063 were from works in close proximity to the monitor and do not represent an exceedance of the SOAEL at the nearest residential receptor.

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

Table 6: Summary of Total Exceedances of SOAEL

| Worksite Reference | Measurement Reference | Monitor Address | Total of SOAEL exceedances in the month |
|--------------------|-----------------------|------------------------------------|---|
| AR | N060 | Atlas Road next to Bashey Road | 2 |
| OOC | OOC-N02 | Old Oak Common Lane, Hilltop Works | 2 |

2.2.6 Four (4) exceedances of the SOAEL were recorded due to HS2 construction works during March 2022. Exceedances occurred at the noise monitor N060 and OOC-N02 during two weekday daytime periods.

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 |
|--|--------------------|----------------------|-------------------|---|---------------|
| - | - | - | - | - | - |

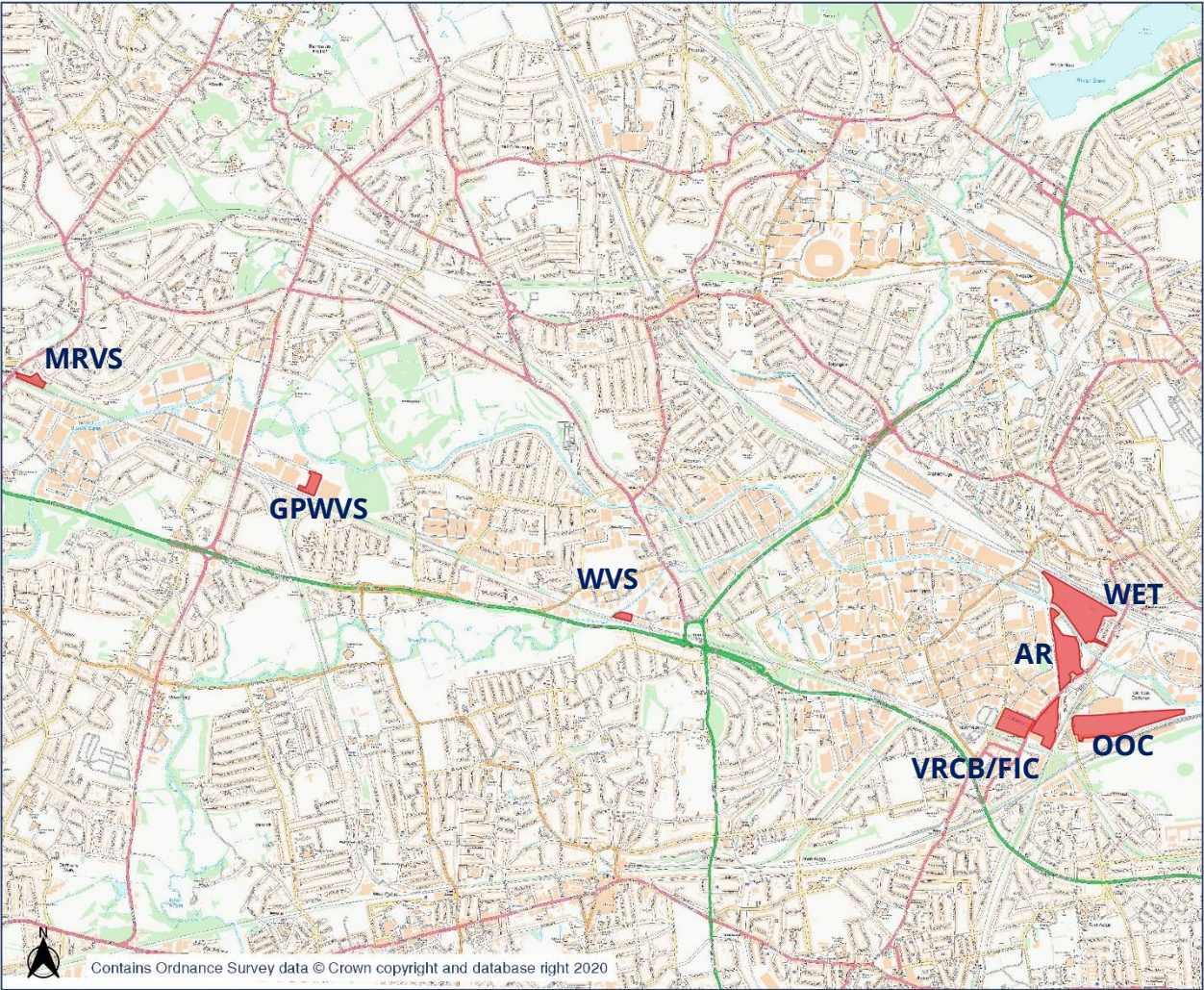
2.4 Complaints

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.

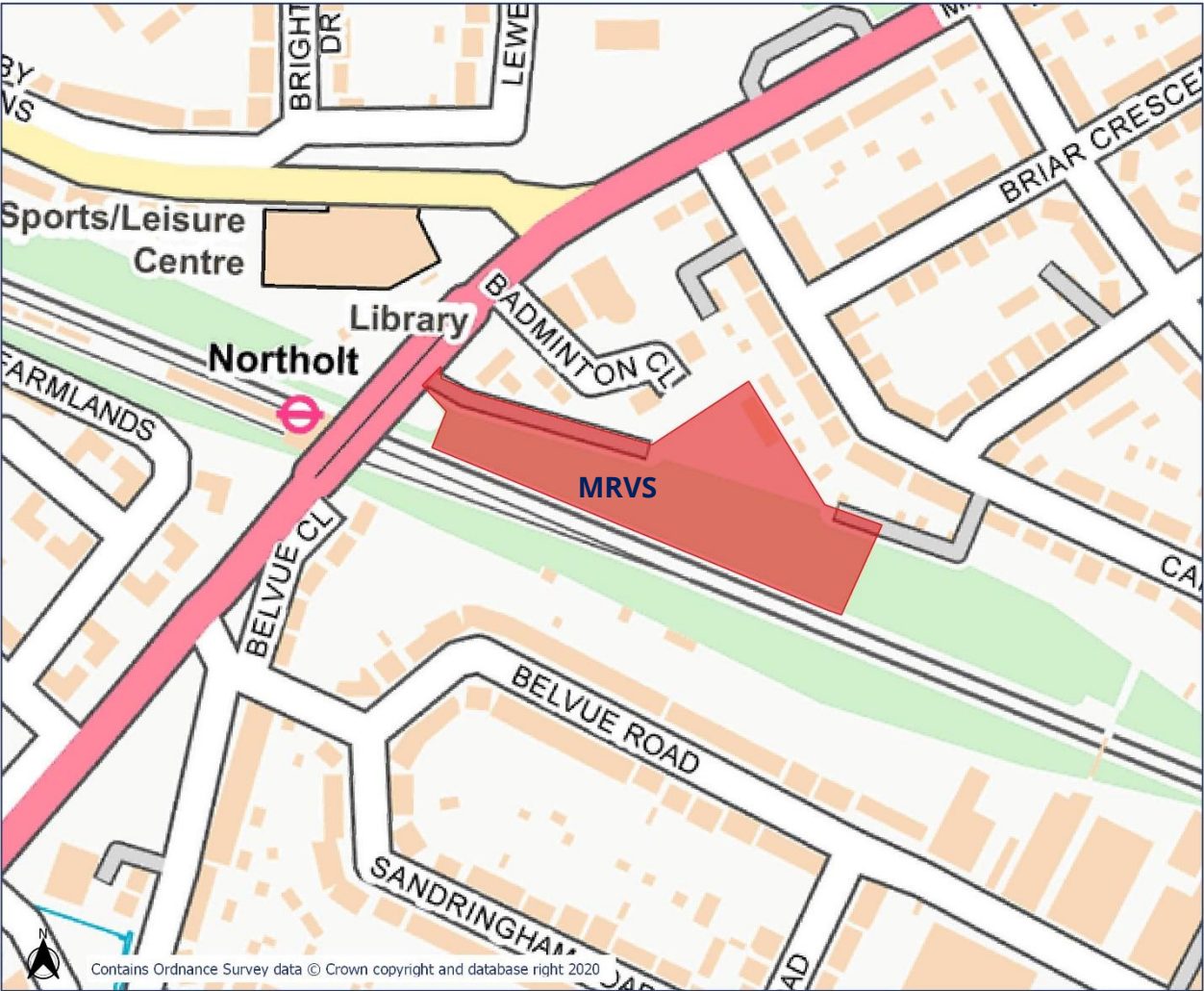
Table 8: Summary of Complaints

| Complaint Reference Number | Worksite Reference | Description of Complaint | Results of Investigation | Actions Taken |
|----------------------------|--------------------|--|---|--|
| HS2-22-74319-E | WET | Complaint about noise from loading works in Stephenson Street during the night-time. | Investigation showed that the noise was potentially from clam grabs unloading spoil into railway wagons. Monitoring data demonstrates compliance with Section 61 limits. | Logistics Team asked to remind excavator drivers to minimise noise from loading operations out of hours. |
| HS2-22-76568-E | MRVS | Complaint due to high vibration levels during a morning. | The vibration monitor located between the site and the complainant property measured 4.2mm/s, below the trigger level of 6mm/s at which to stop work. Works in the vicinity included sheet piling only, and it's understood that two sheet piles may have been turned over at this time to safely manoeuvre them for the crane lift. Best practicable measures were being used. | Communities team responded to complainant. Sheet piling works were completed at eastern end of the site on 10th March. |

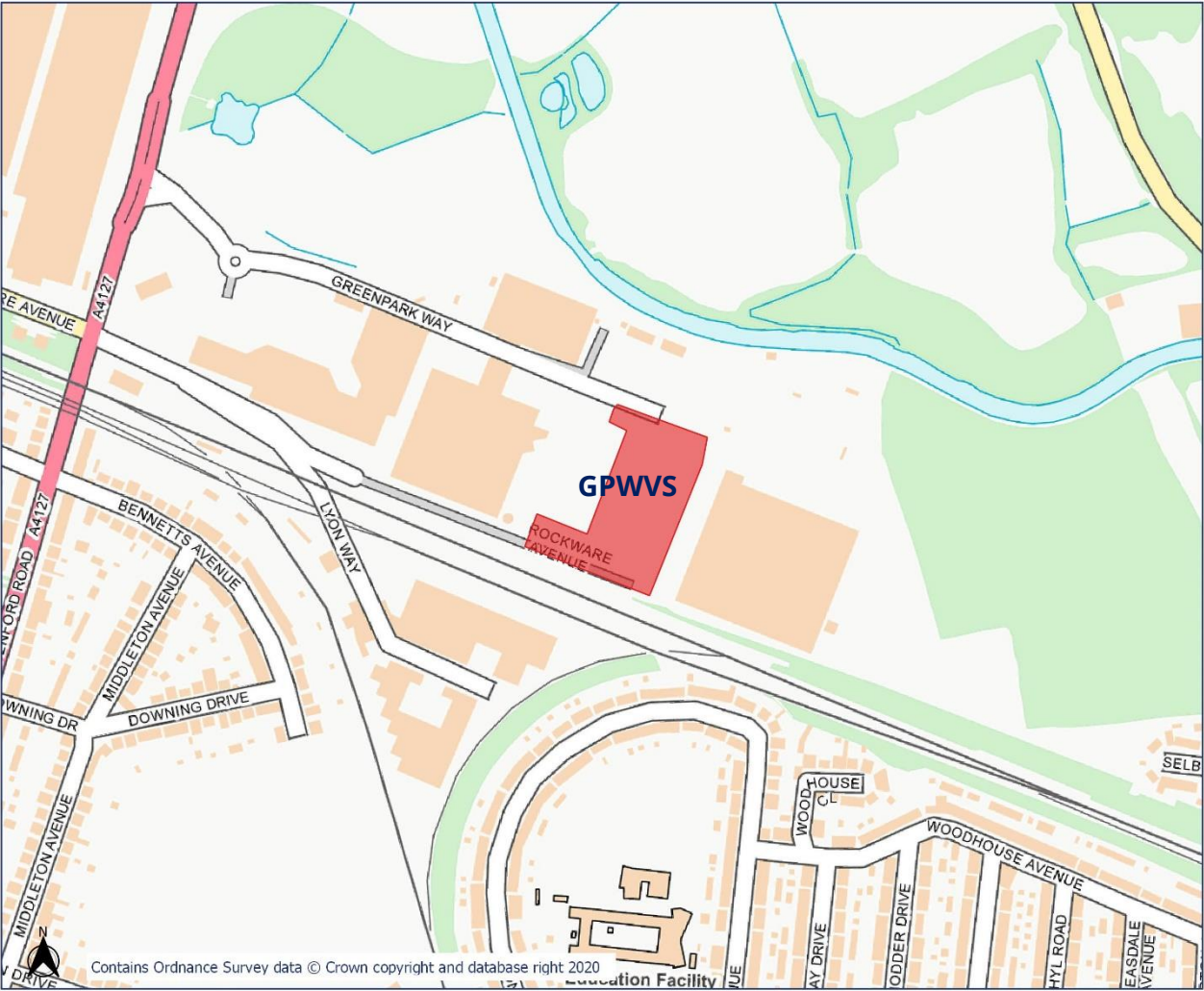
Appendix A Site Locations



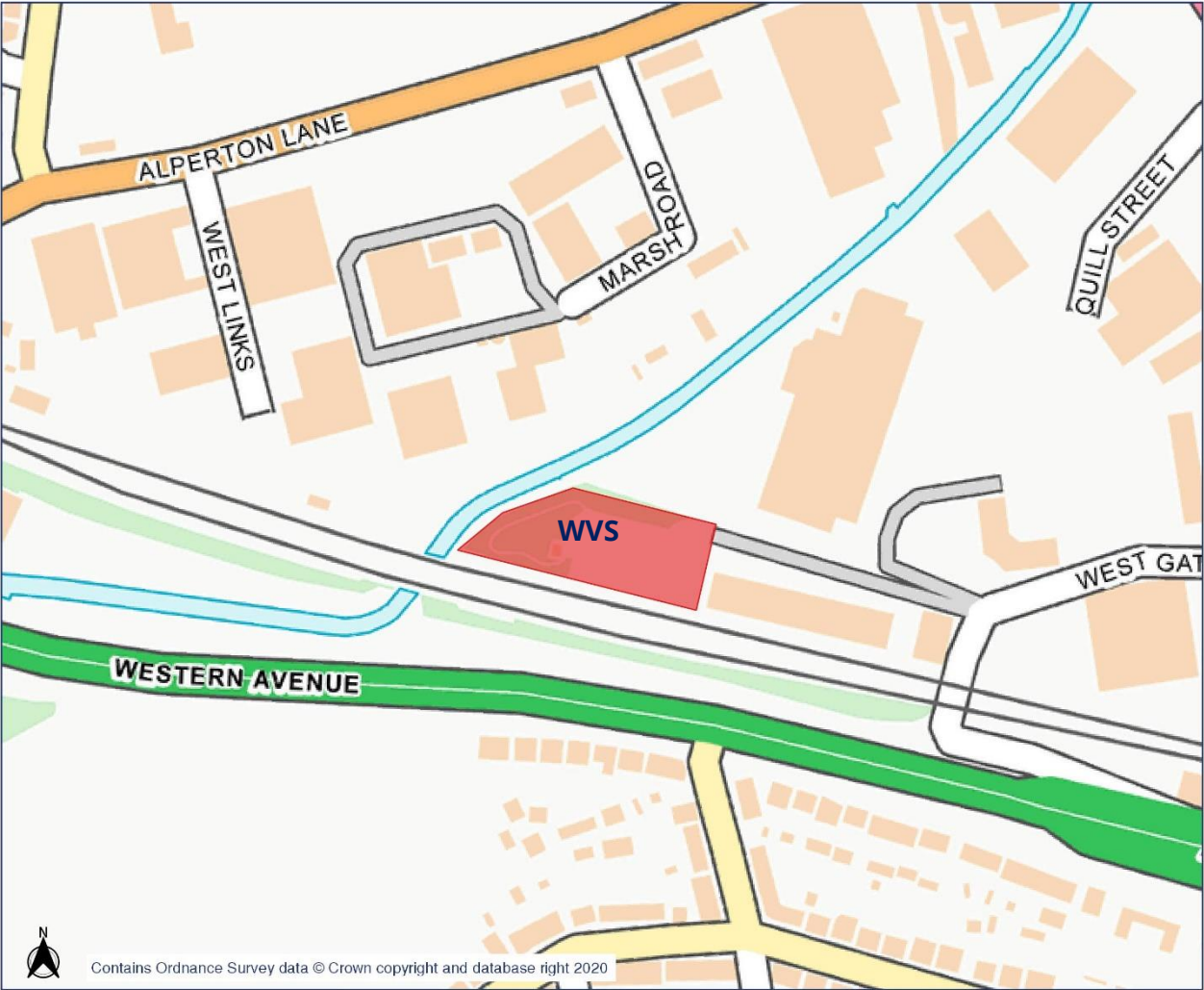
Legend
Active worksites

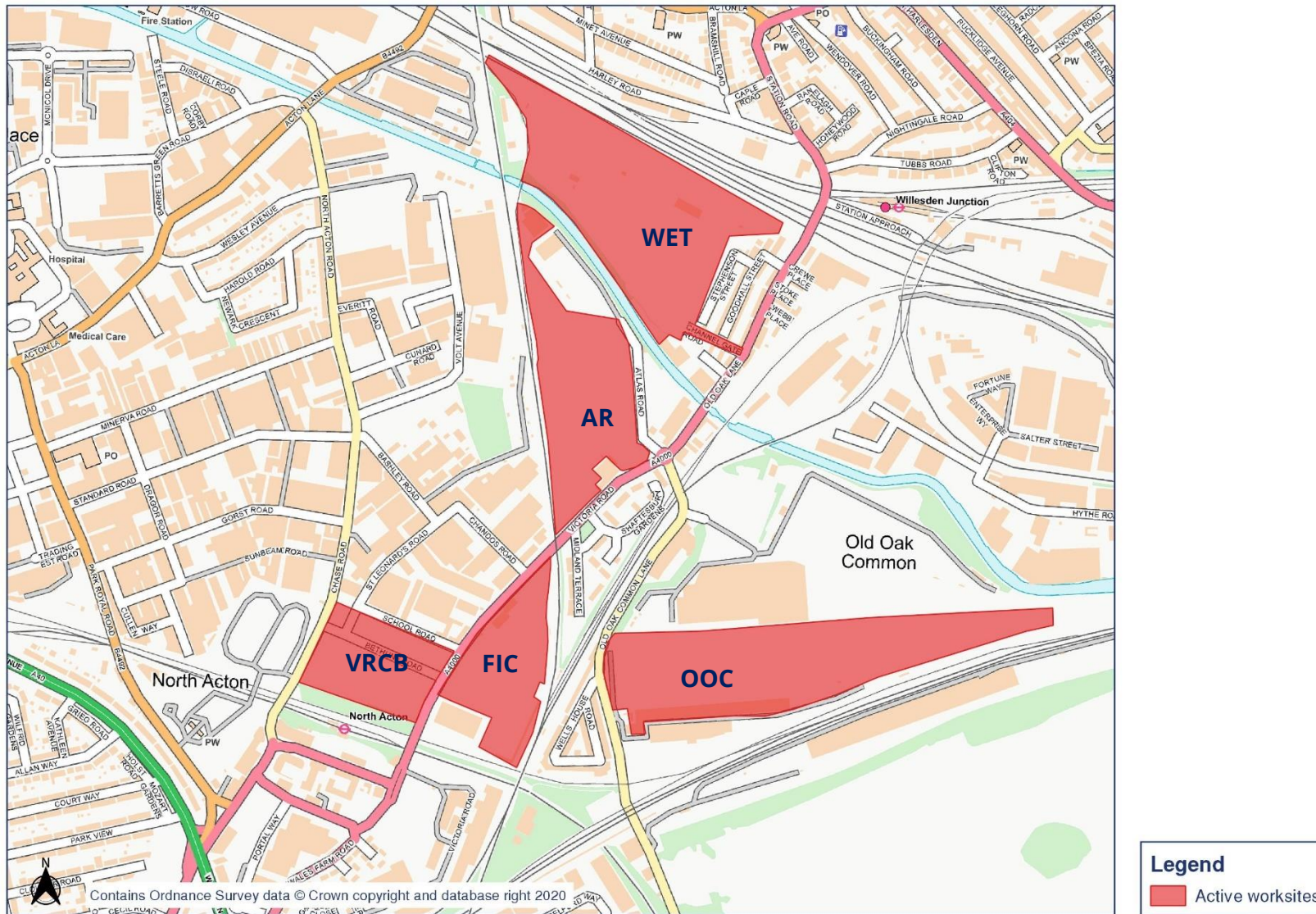


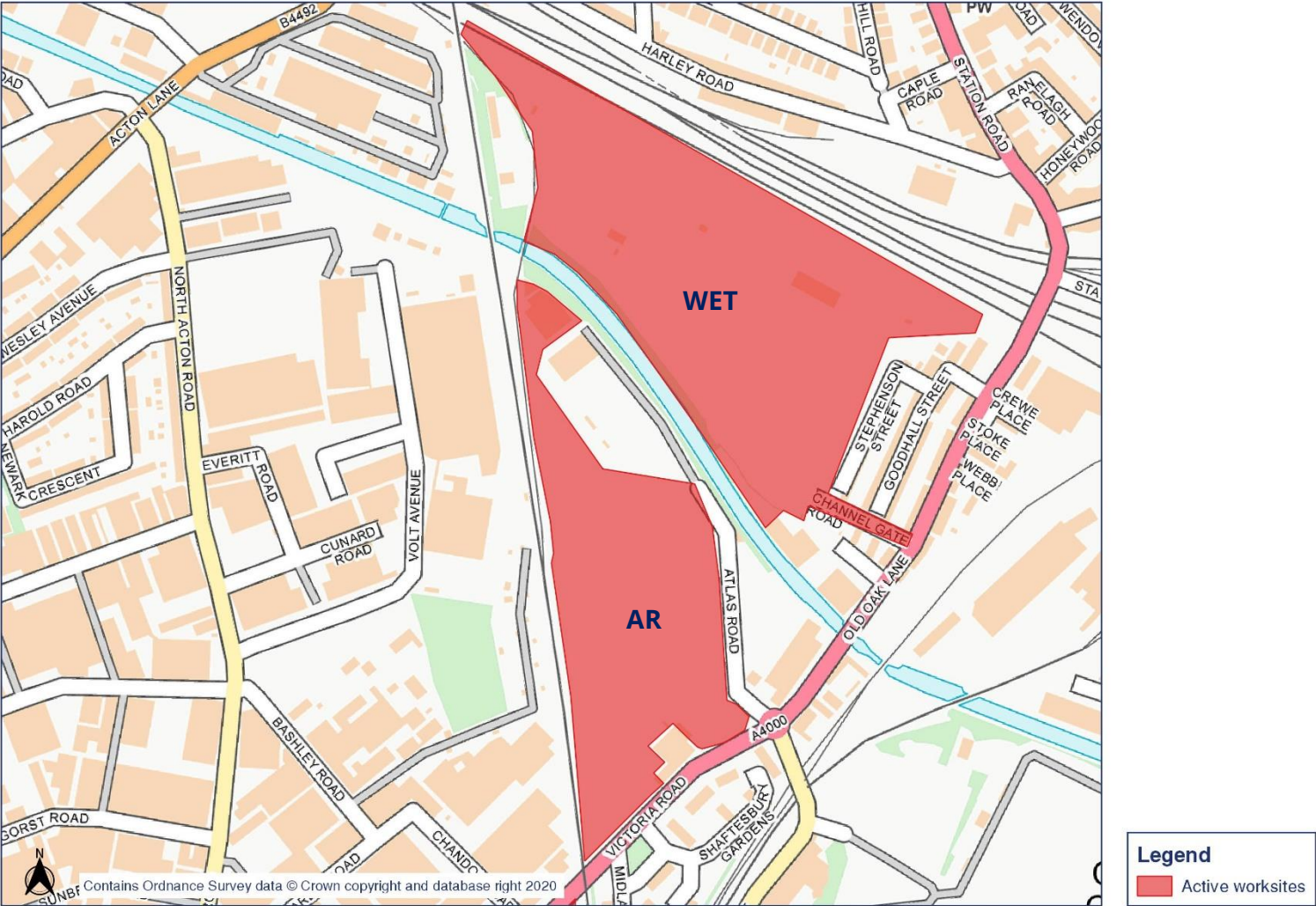
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Active worksites

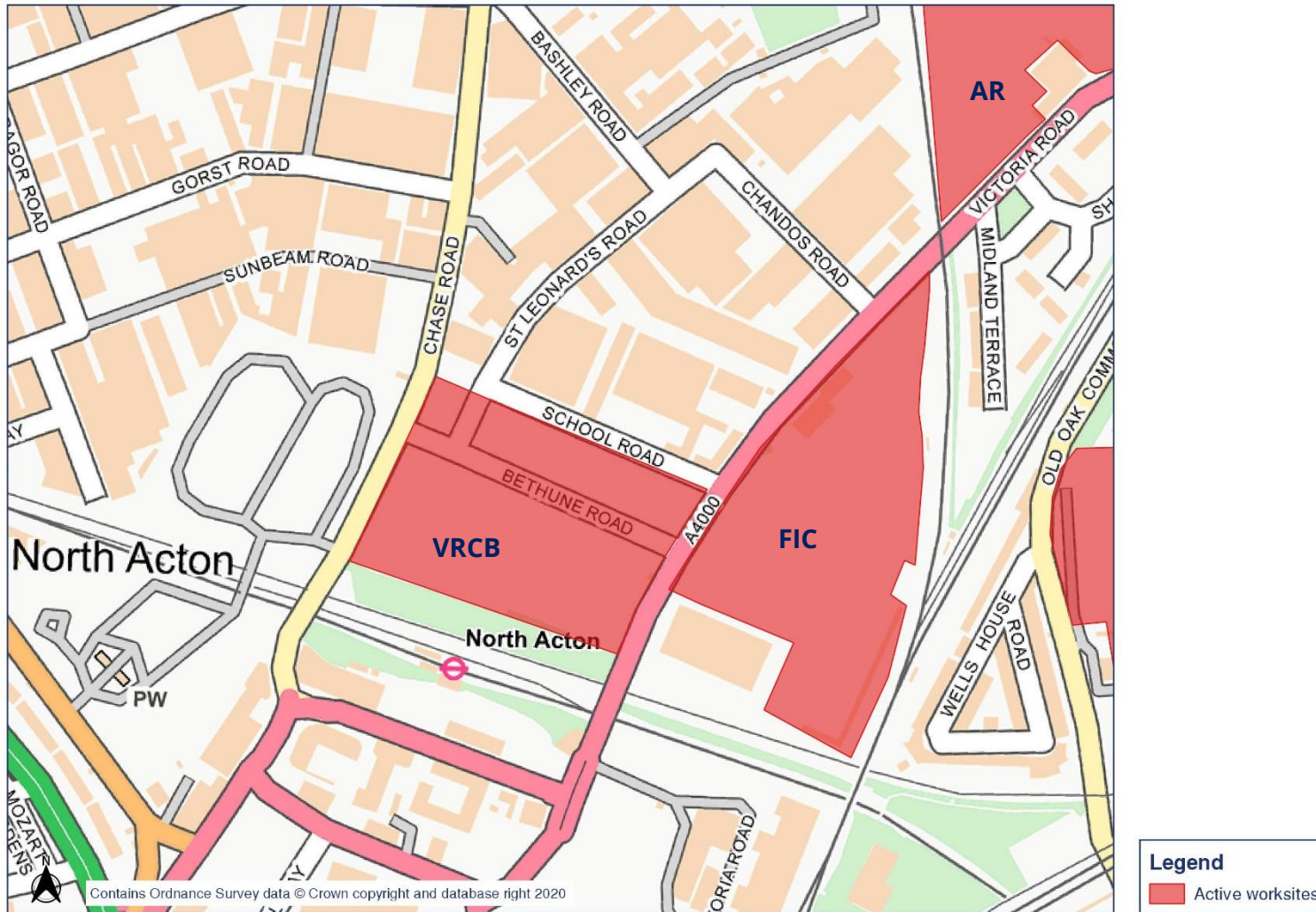


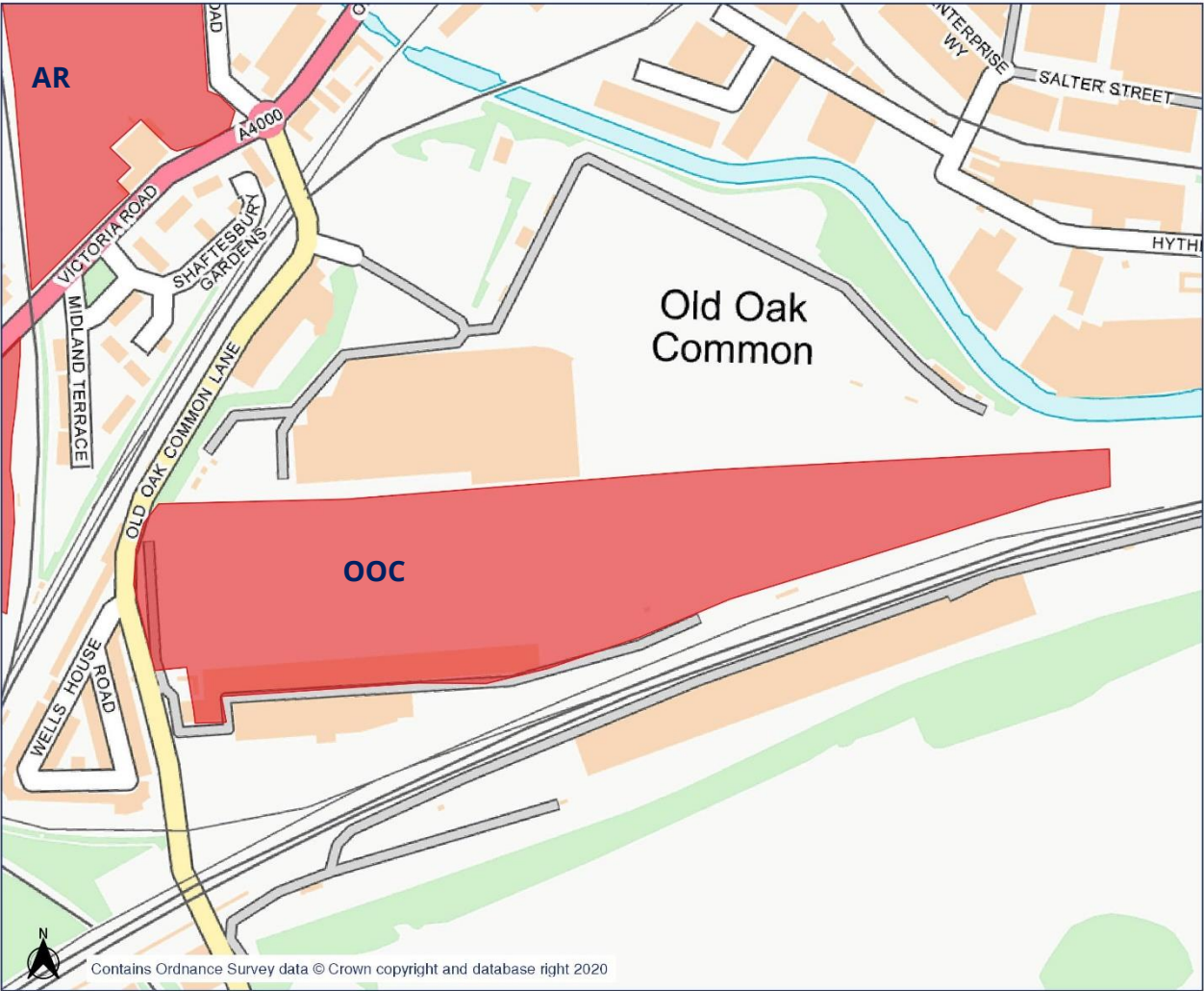
Legend
Active worksites





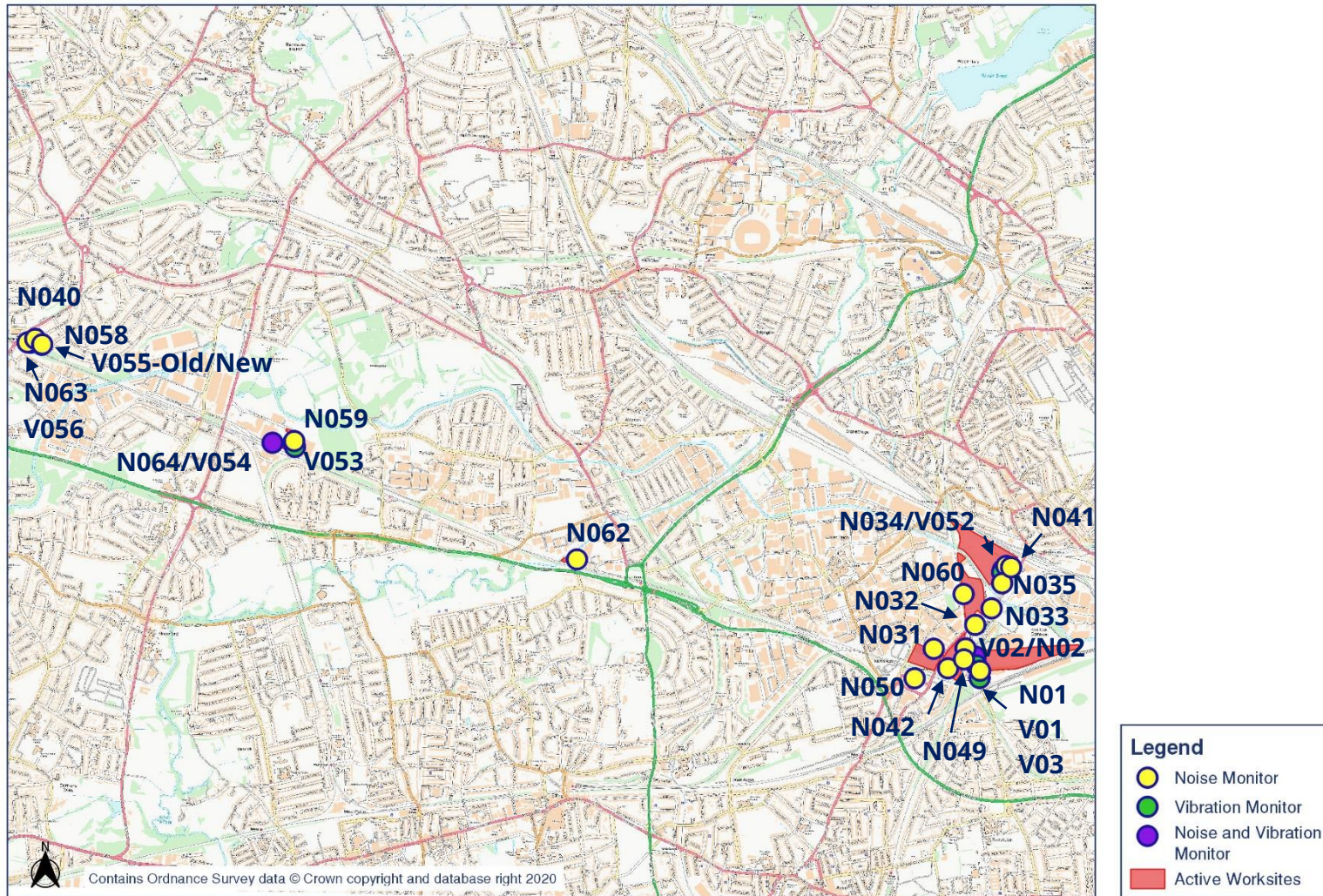


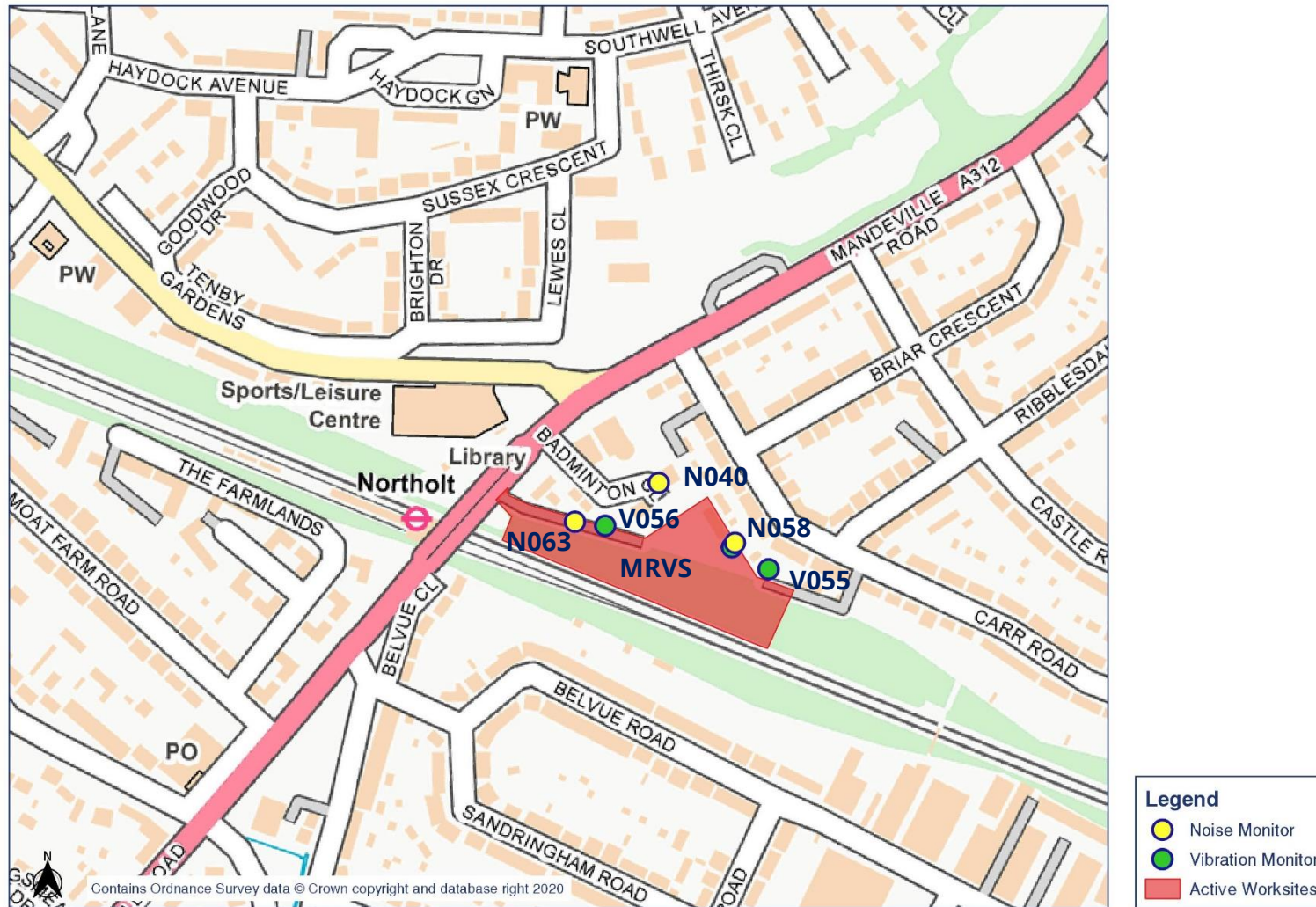


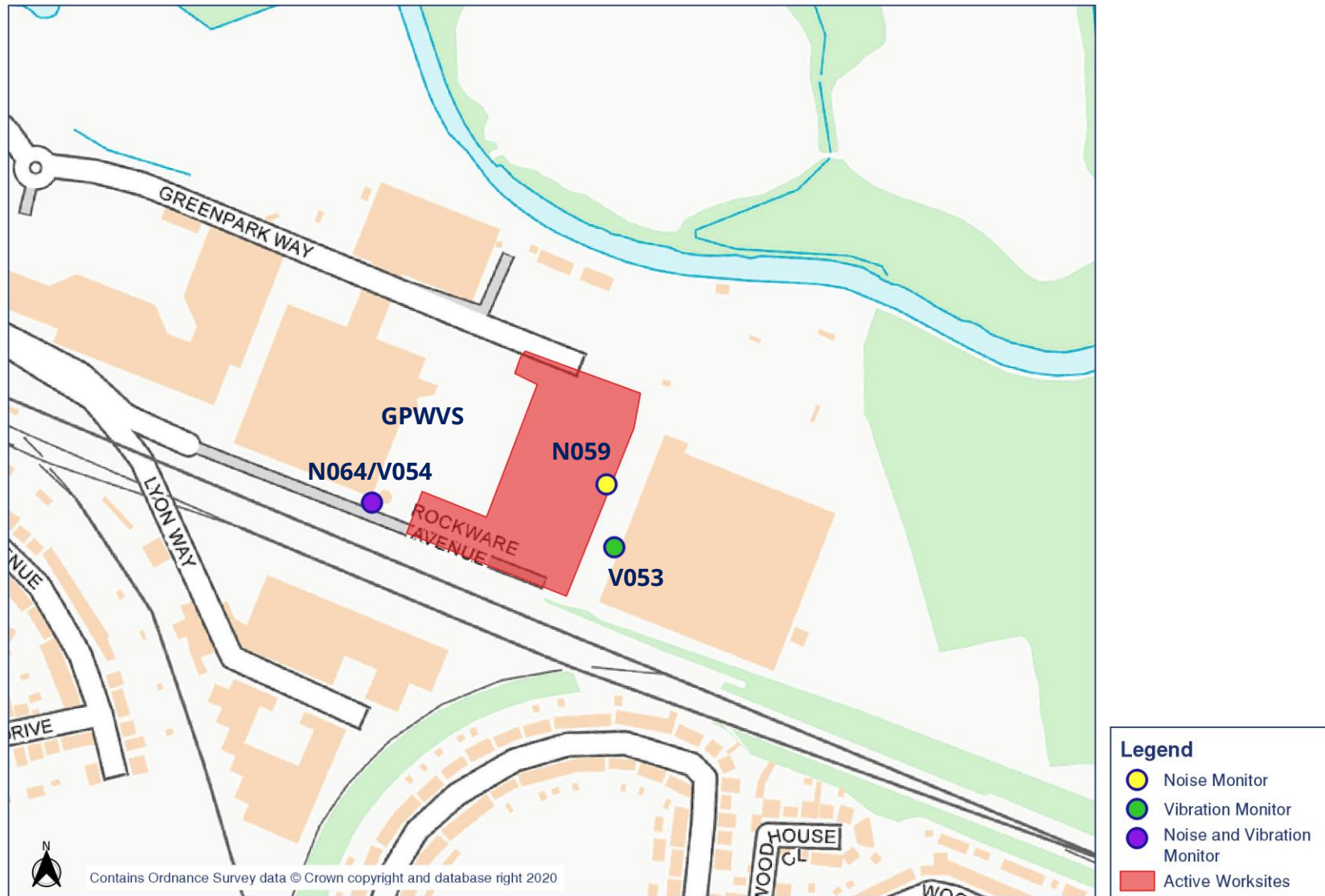


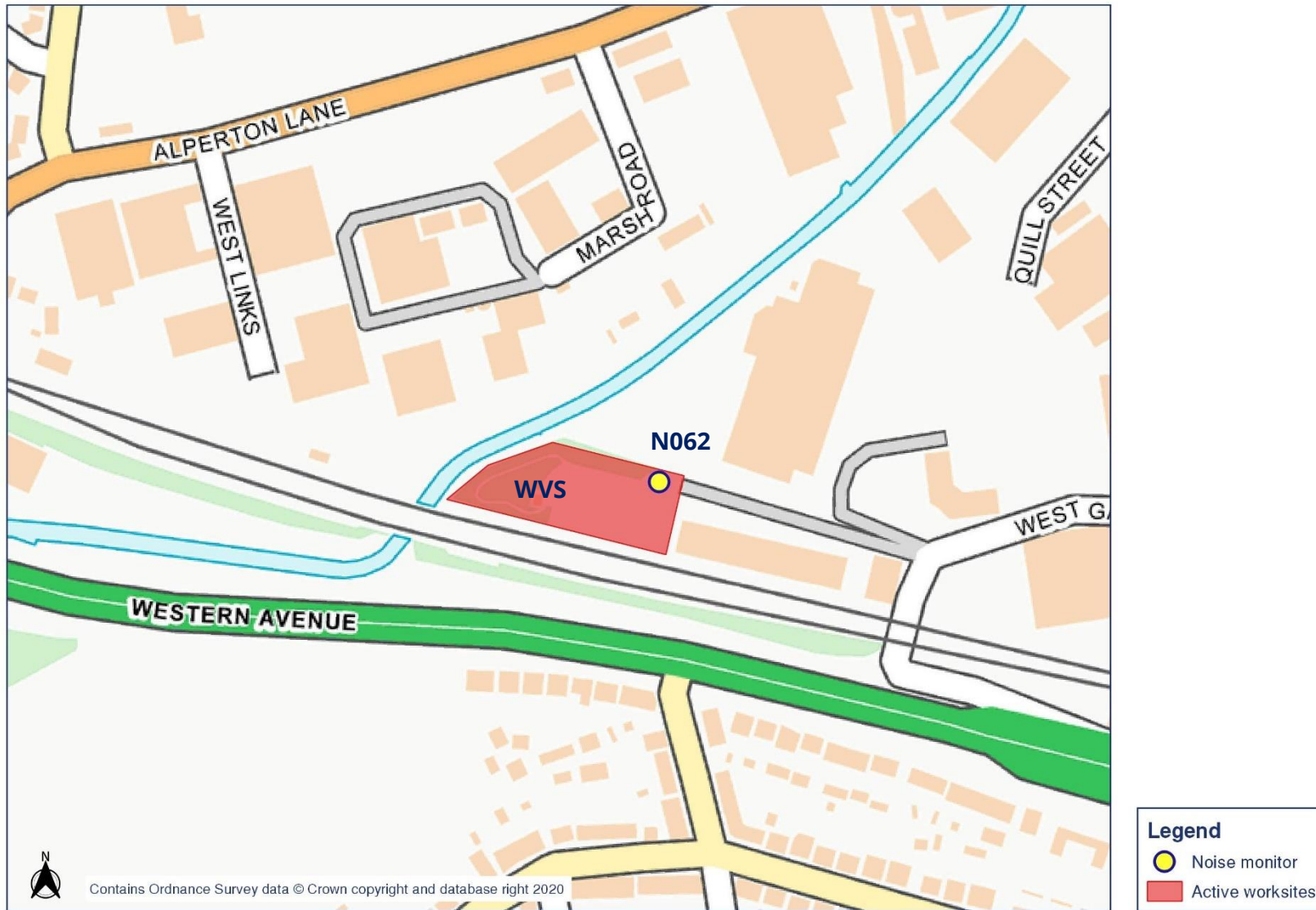
Appendix B Monitoring Locations

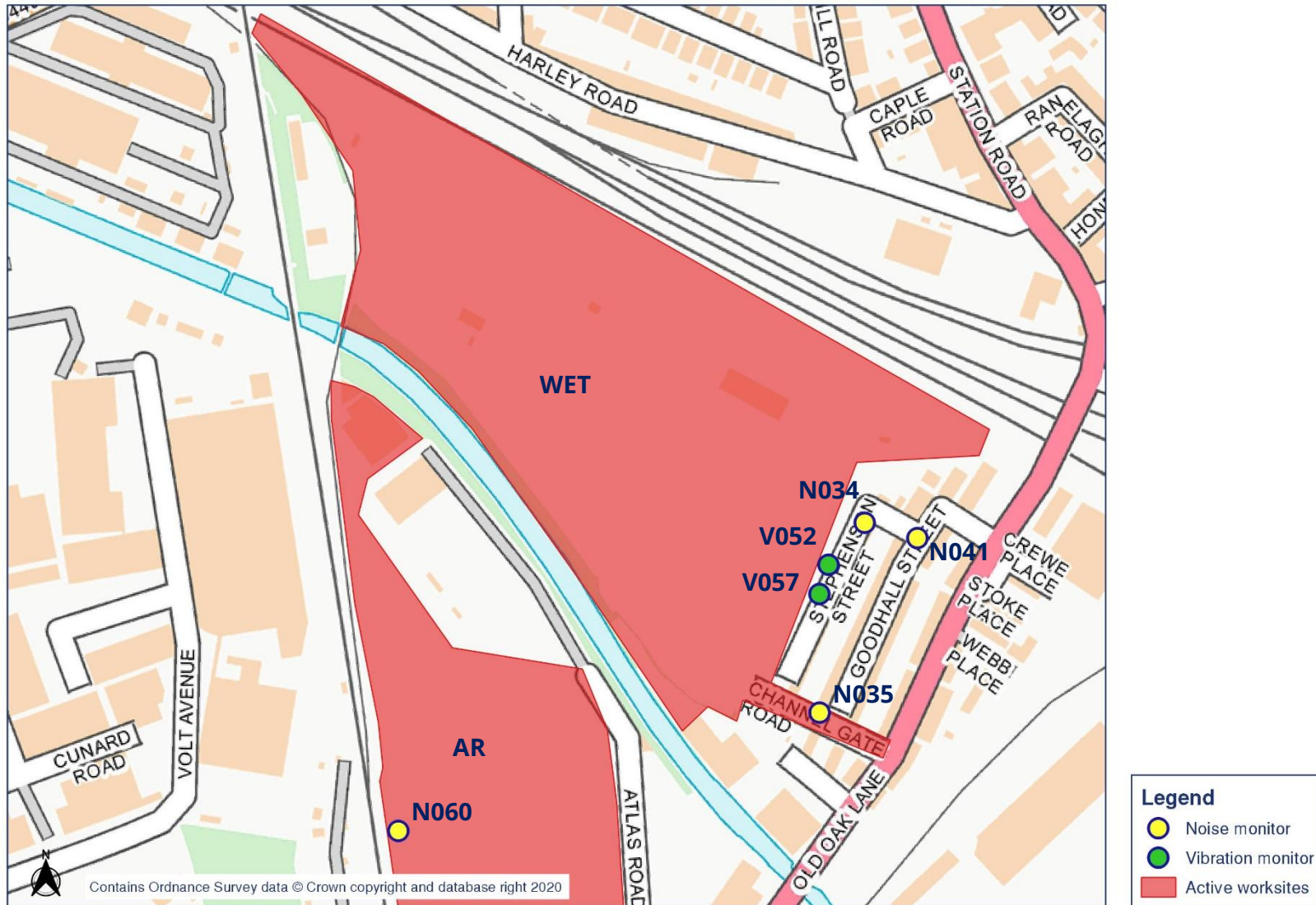
HS2 Noise and vibration monitoring plan - Overview

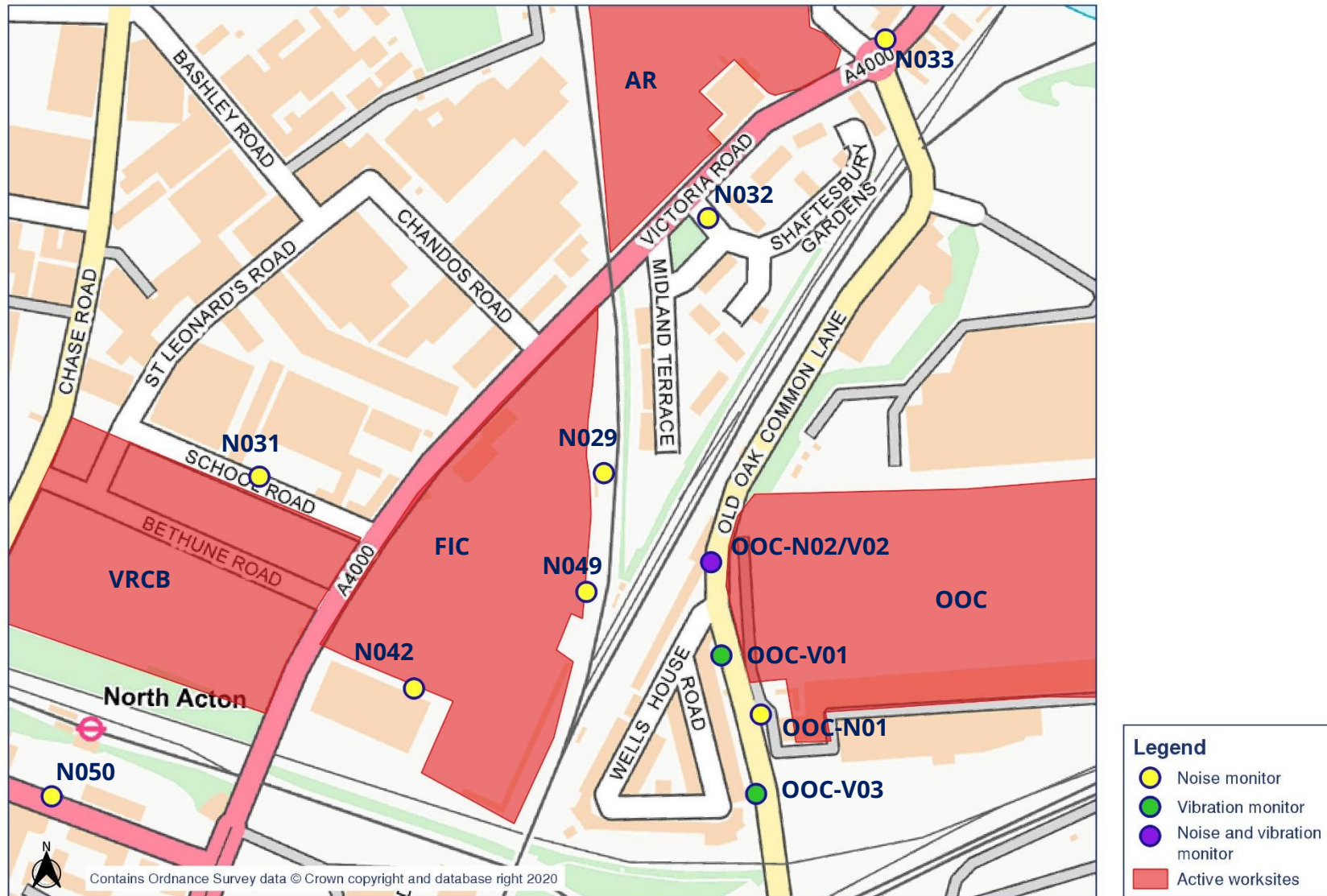










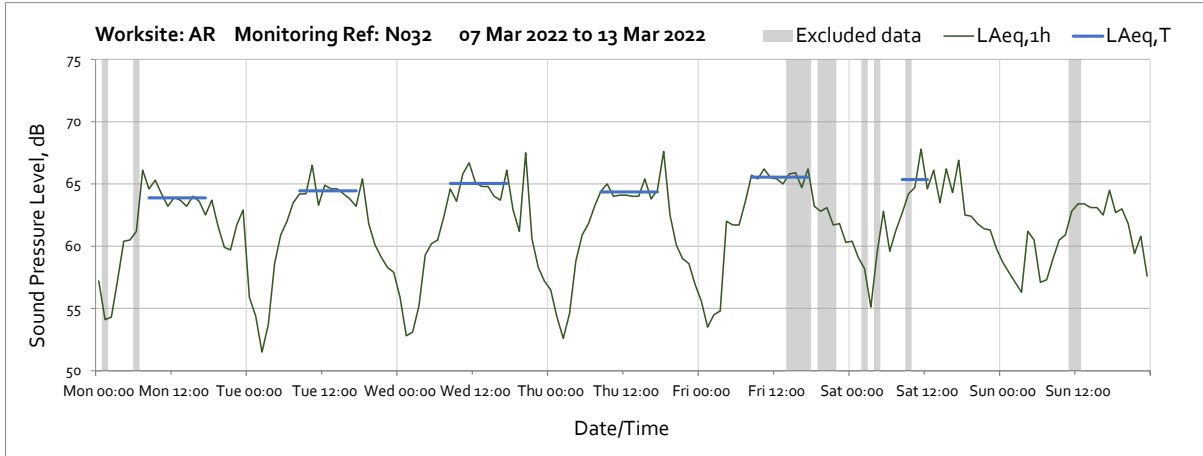
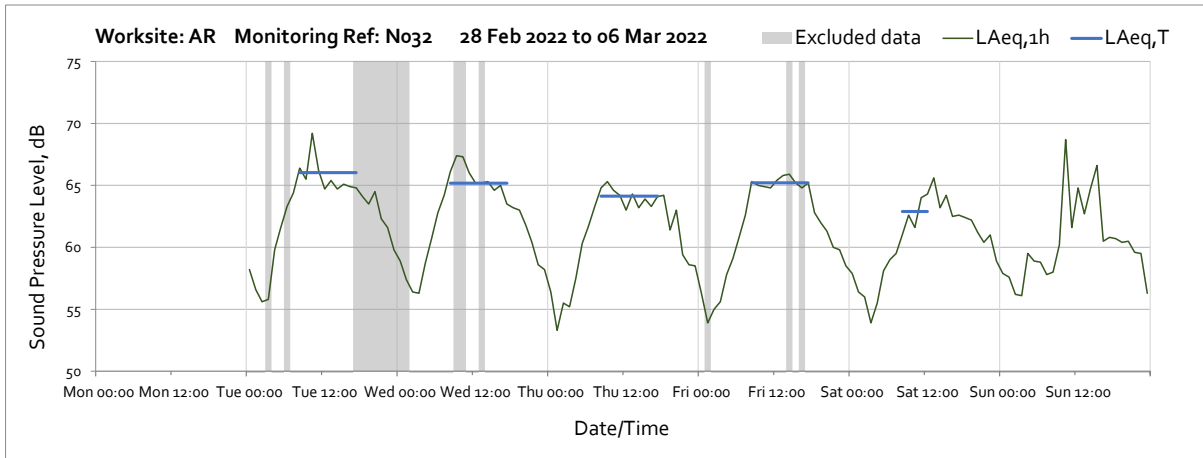


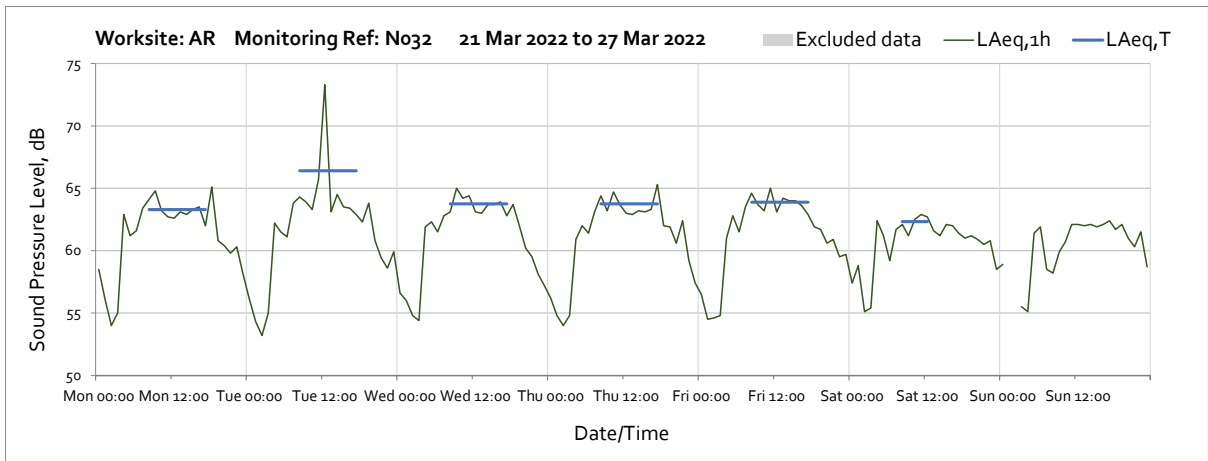
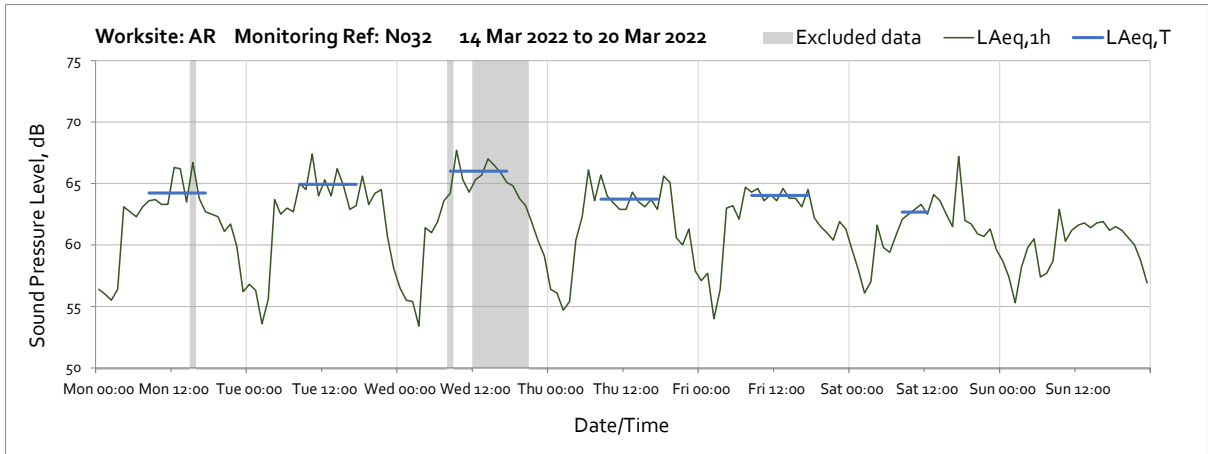
Appendix C Data

Noise

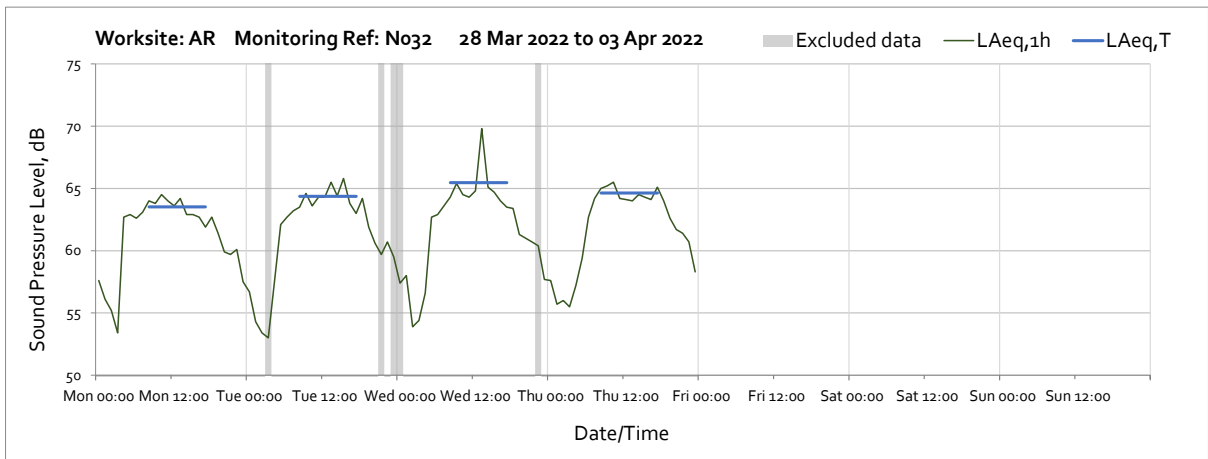
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

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

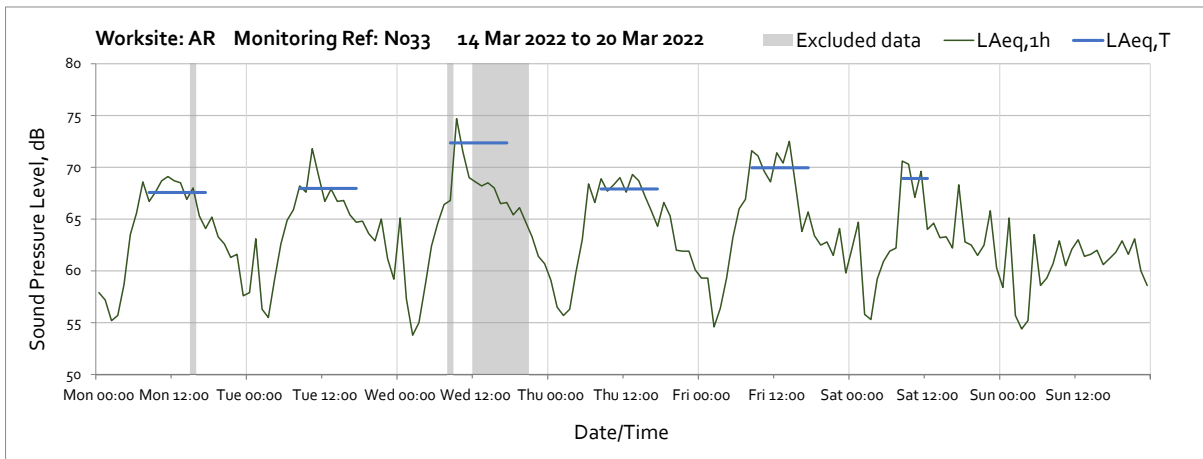
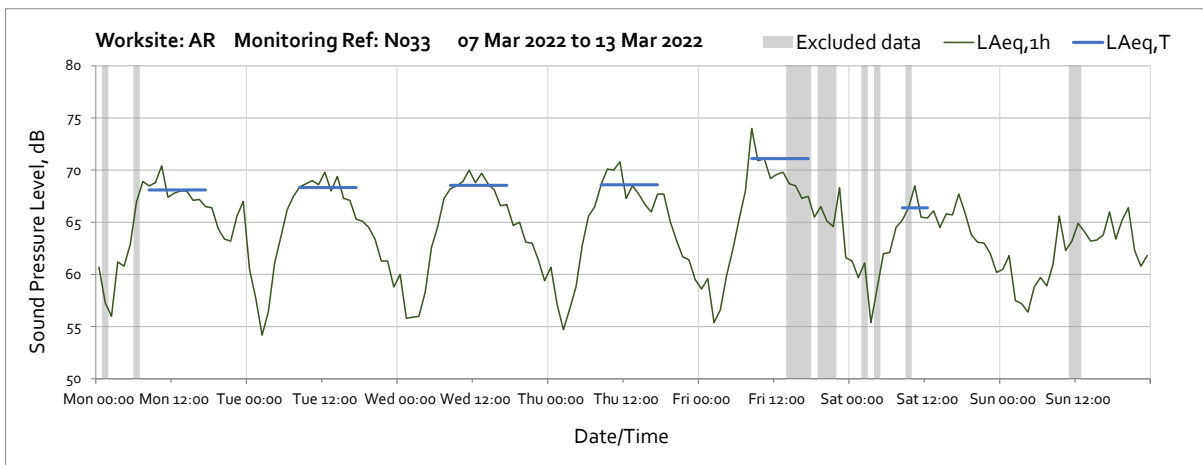
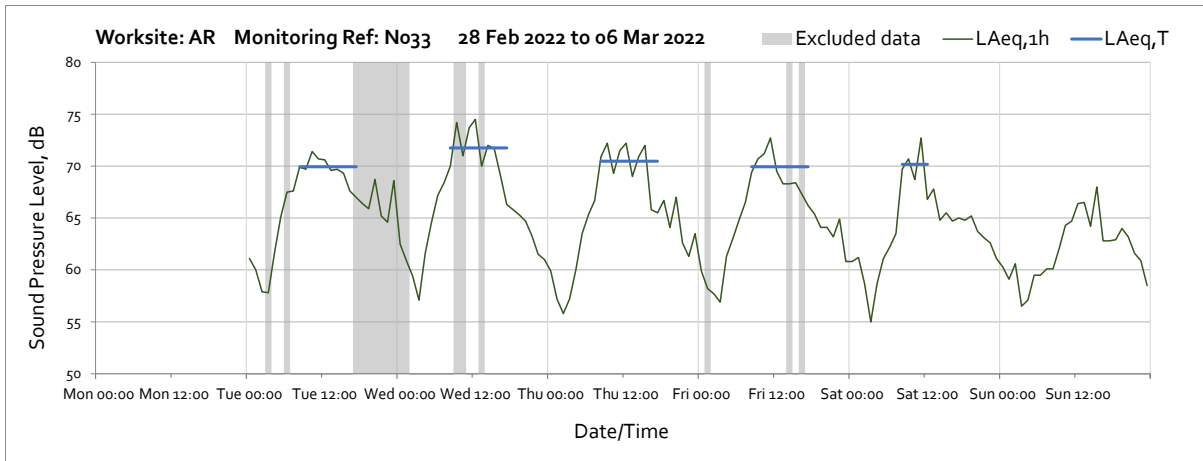


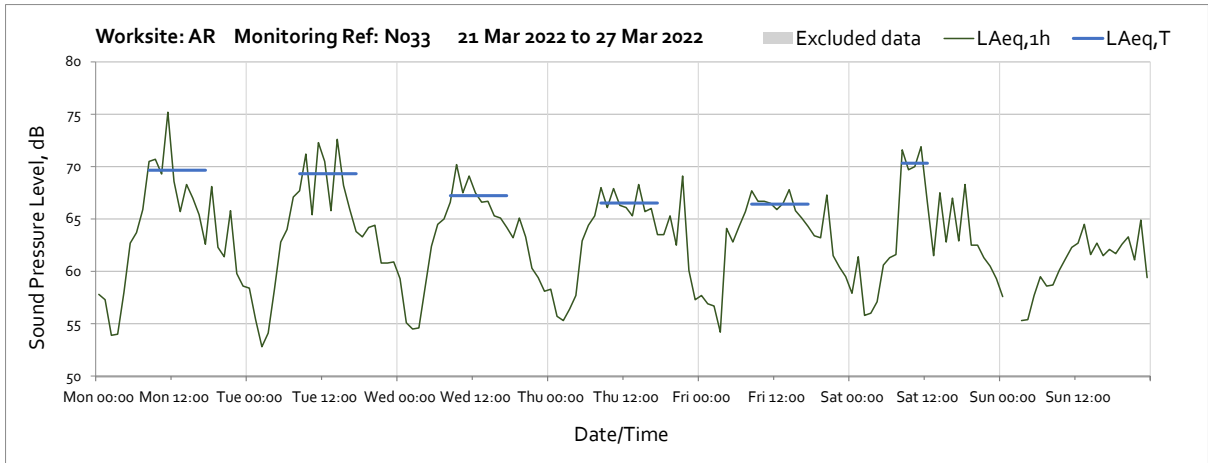


Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.

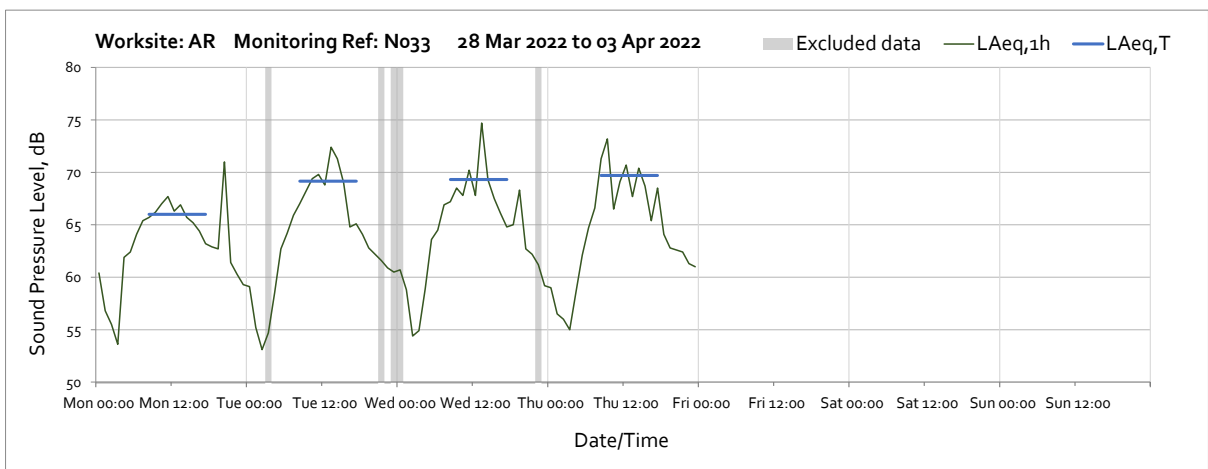


Worksite: Atlas Road worksite (AR) – Monitoring Ref: N033

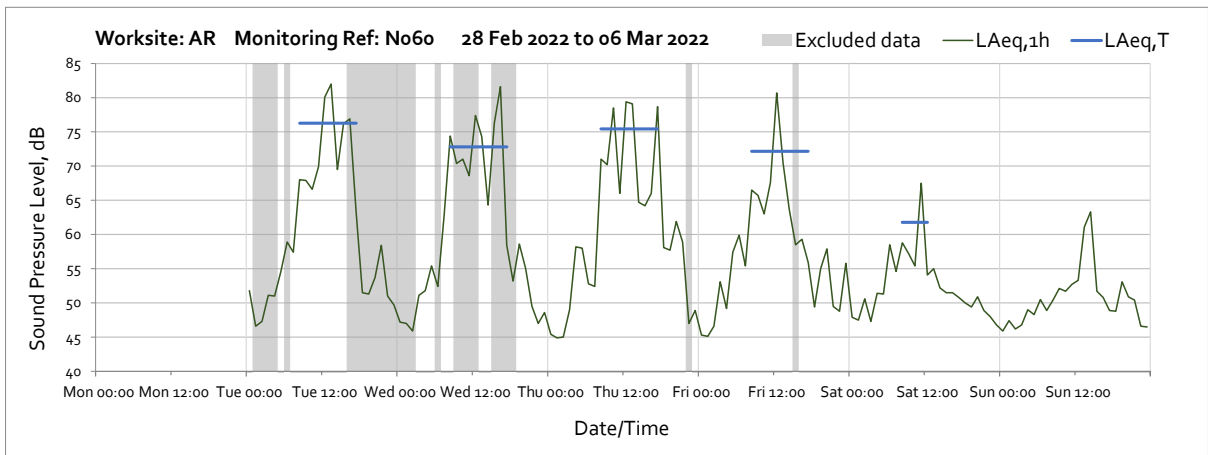


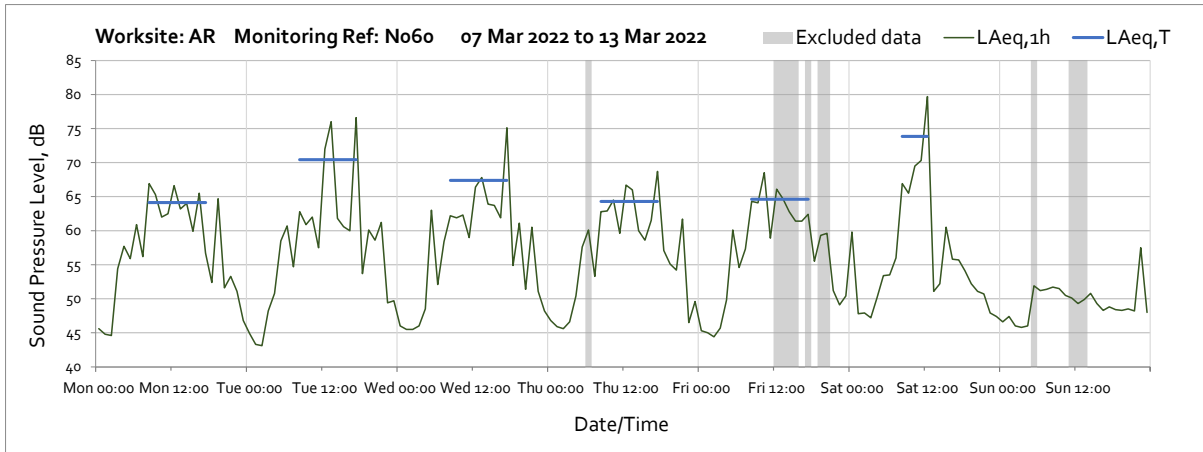


Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.



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



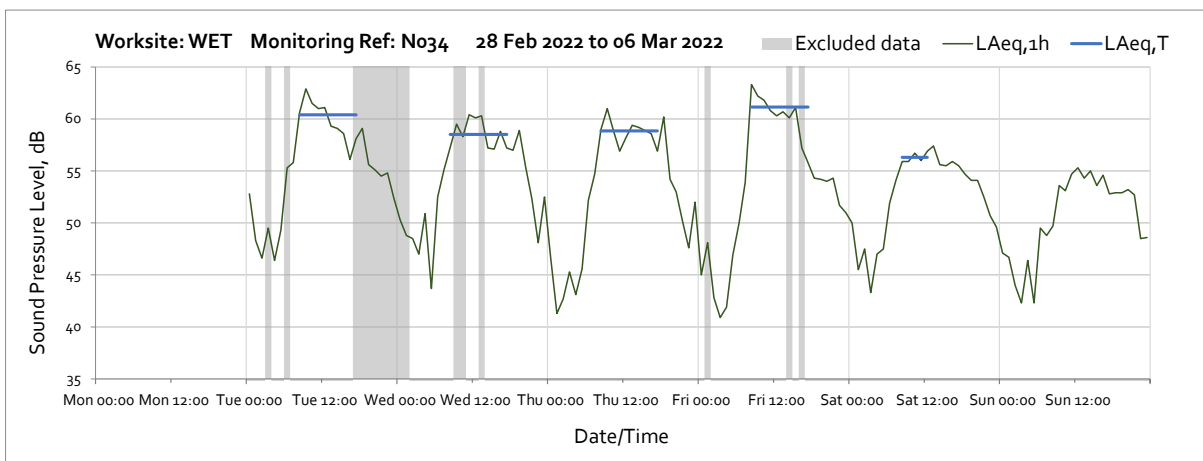


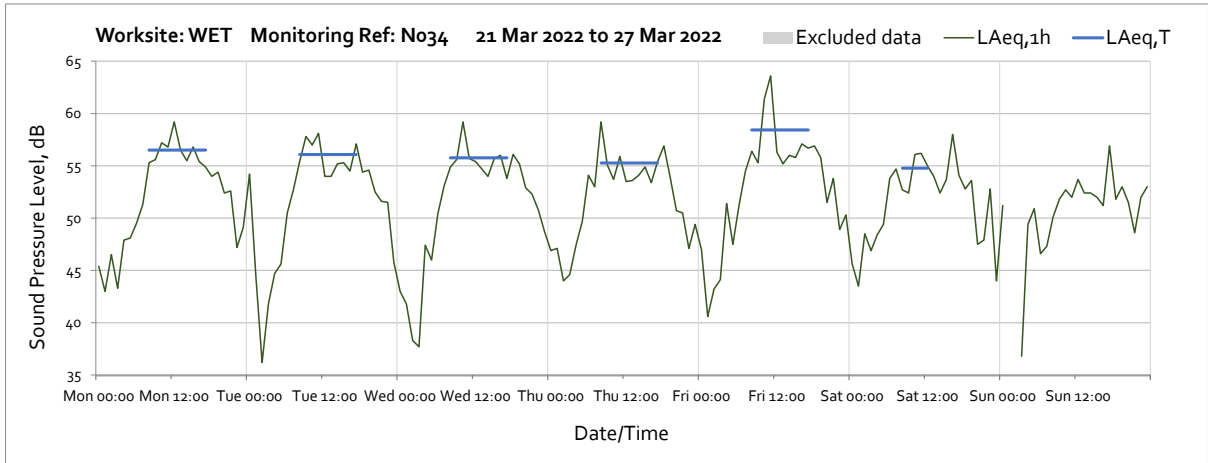
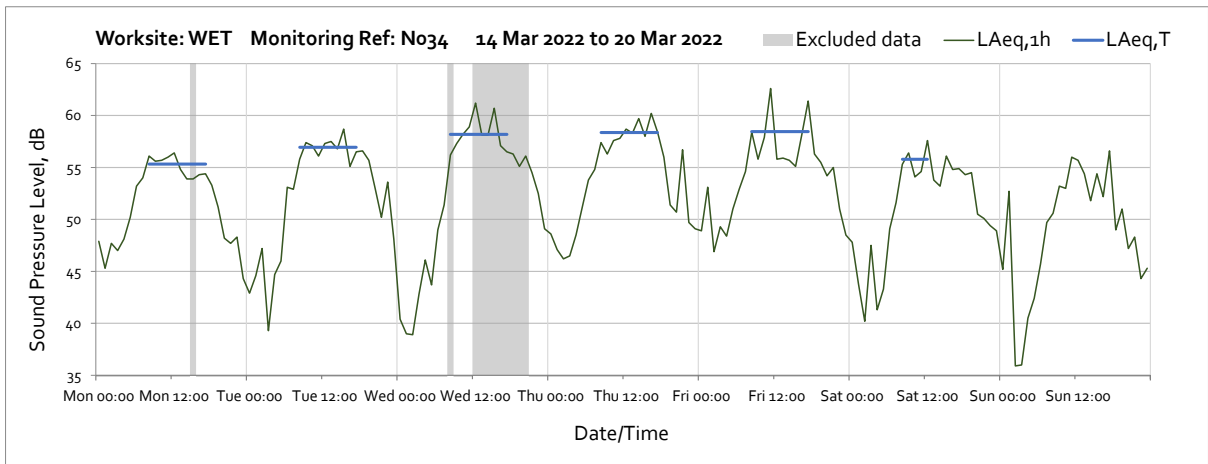
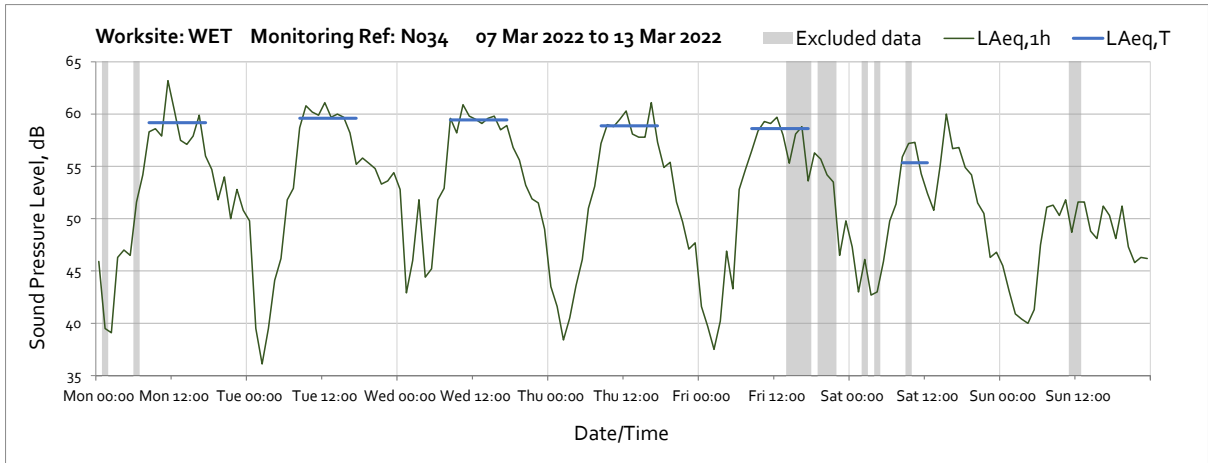
Note: Missing data in between 00:00 on Monday 14th March 2022 and 14:00 on Tuesday 29th March 2022 was due to loss of power at the monitoring station. The power connection will be restored after access permission is granted.



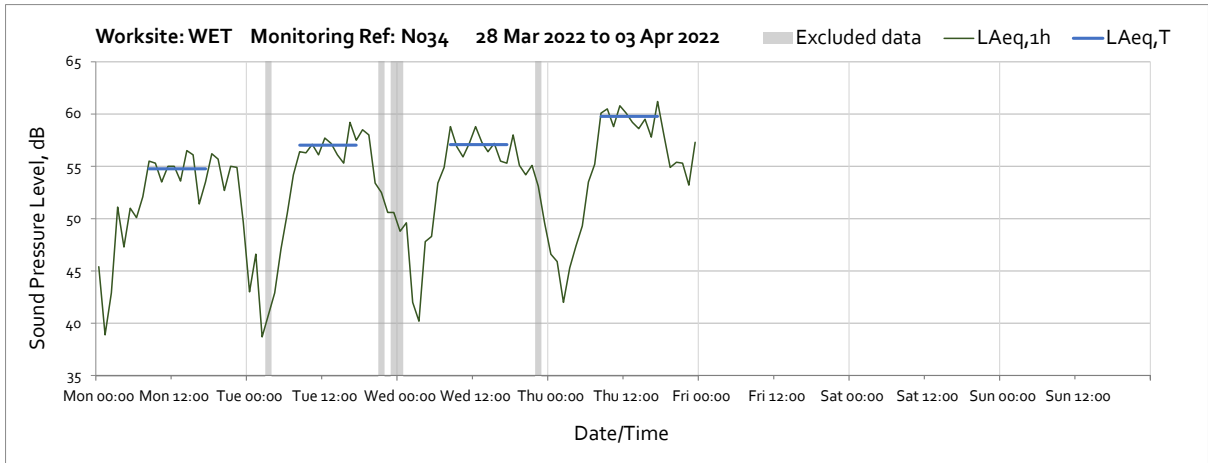
Note: Missing data in between 00:00 on Monday 14th March 2022 and 14:00 on Tuesday 29th March 2022 was due to loss of power at the monitoring station. The power connection will be restored after access permission is granted.

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

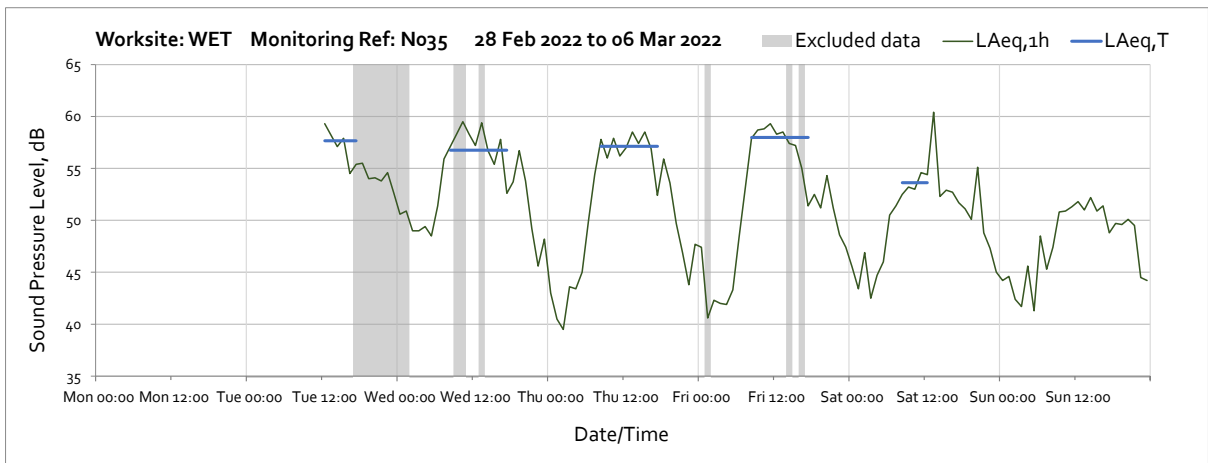




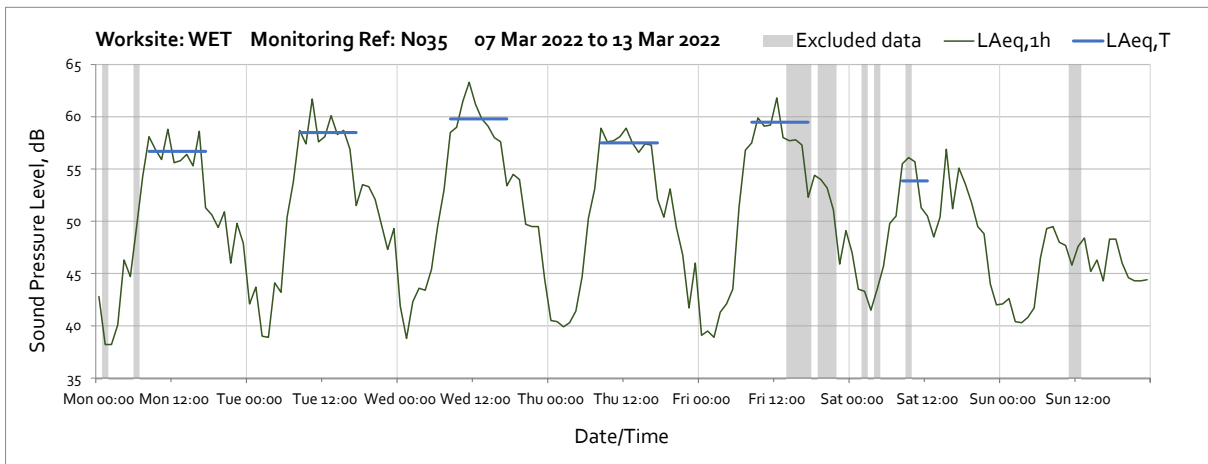
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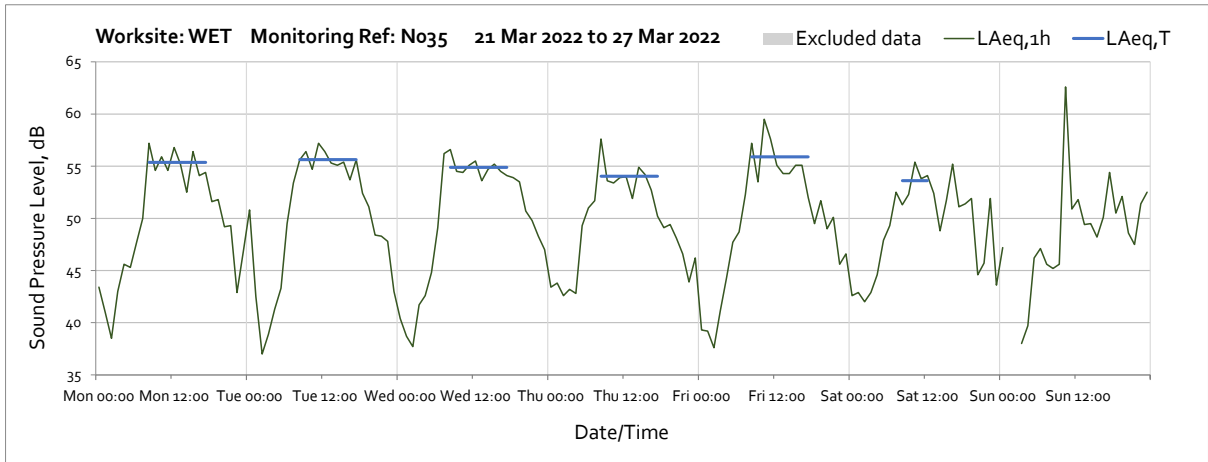
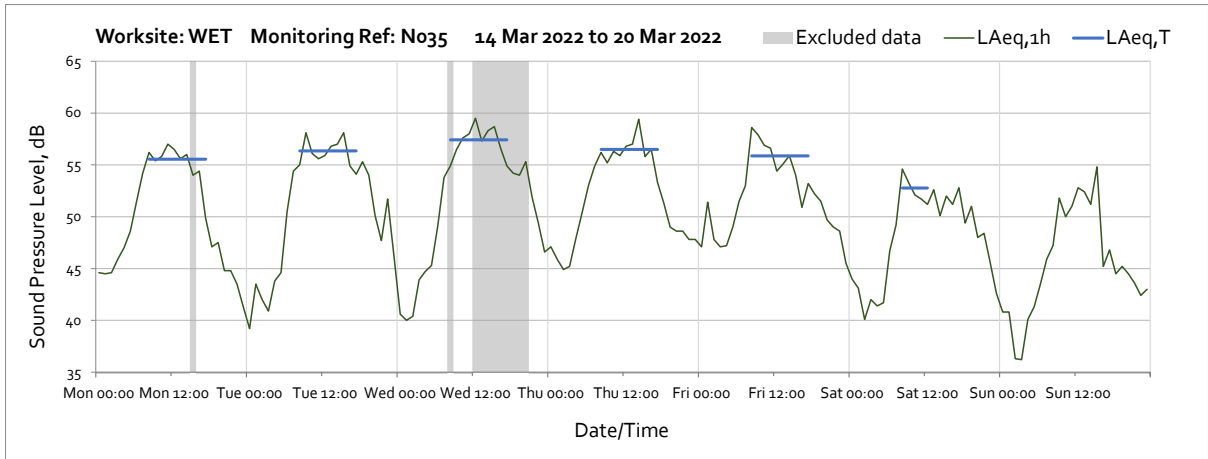


Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: N035

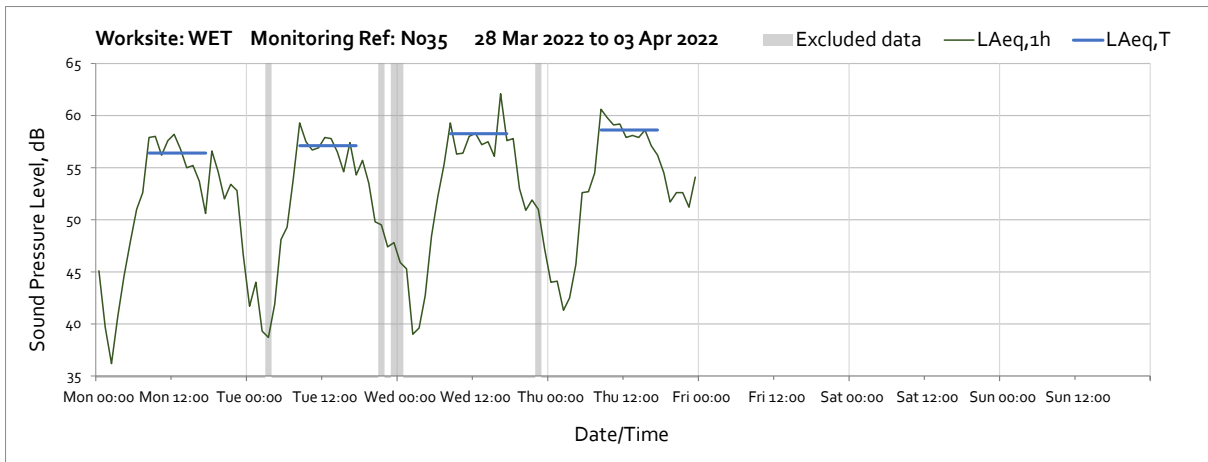


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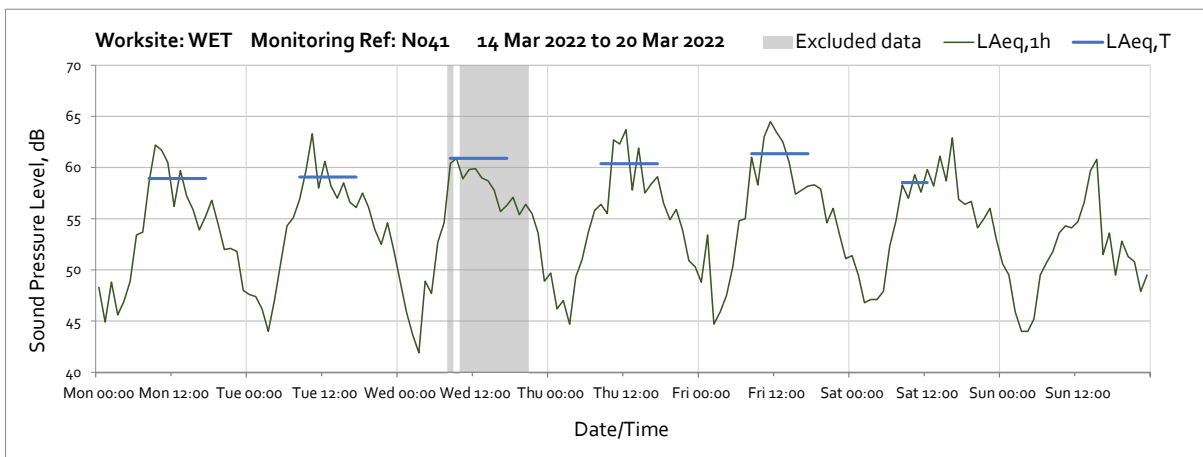
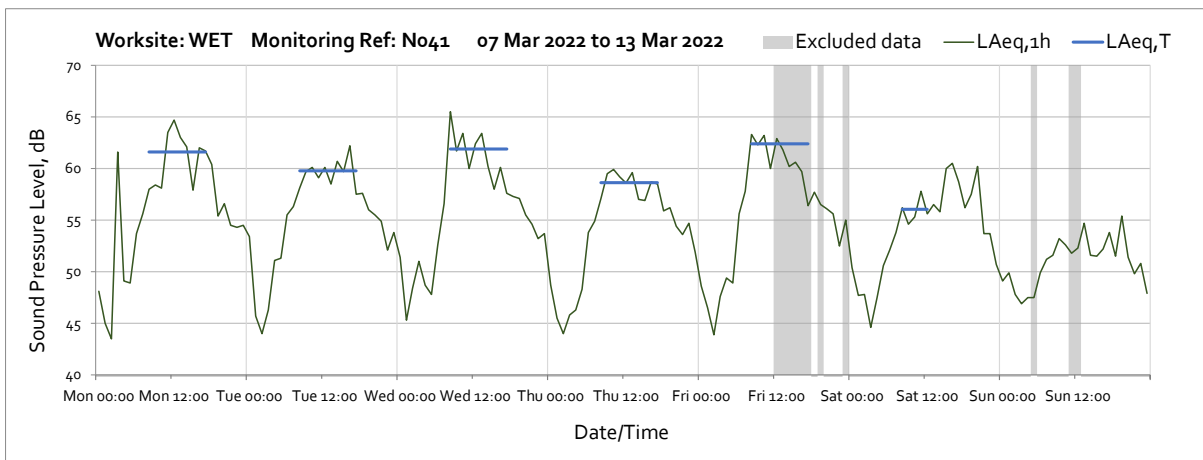
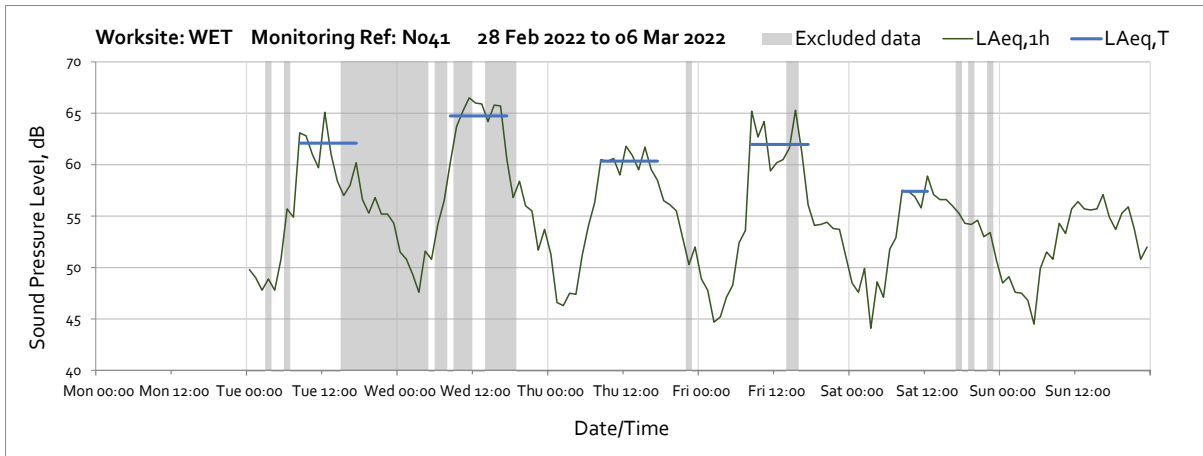




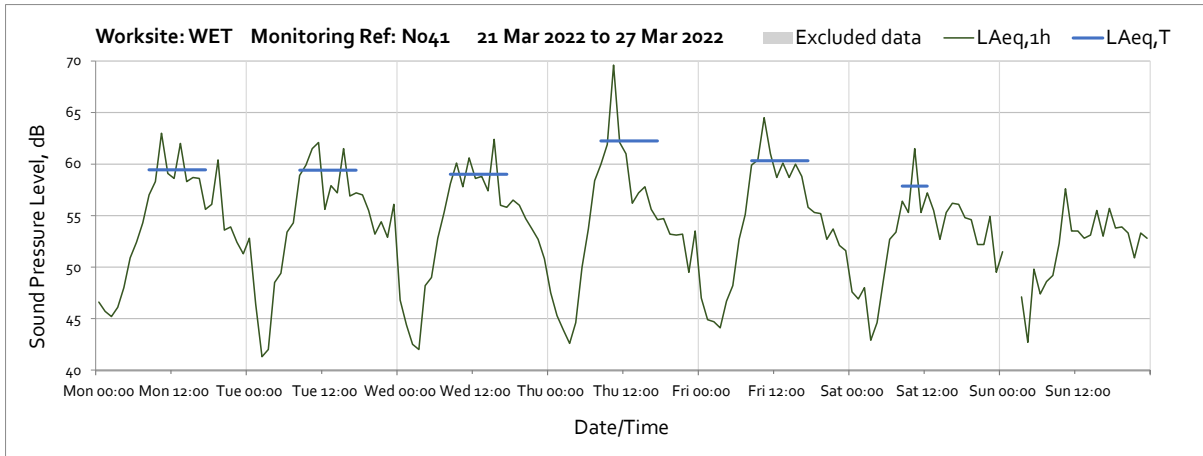
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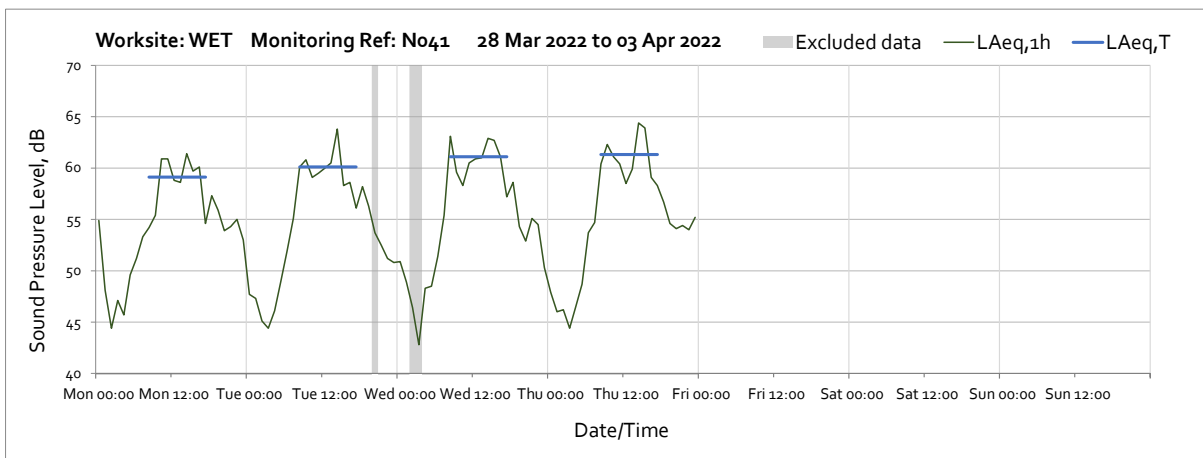
Worksite: Willesden Euro Terminal (WET) – Monitoring Ref: N041



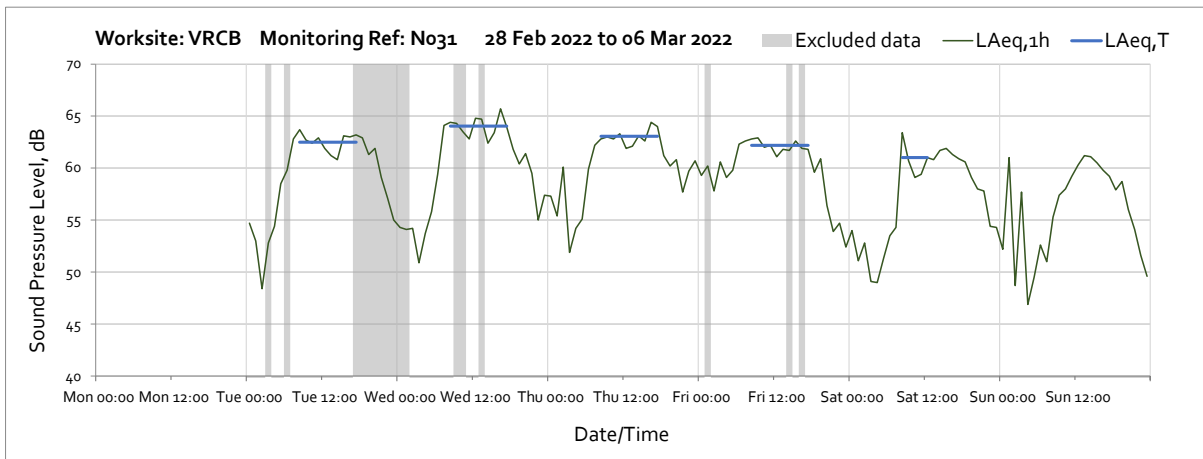
OFFICIAL

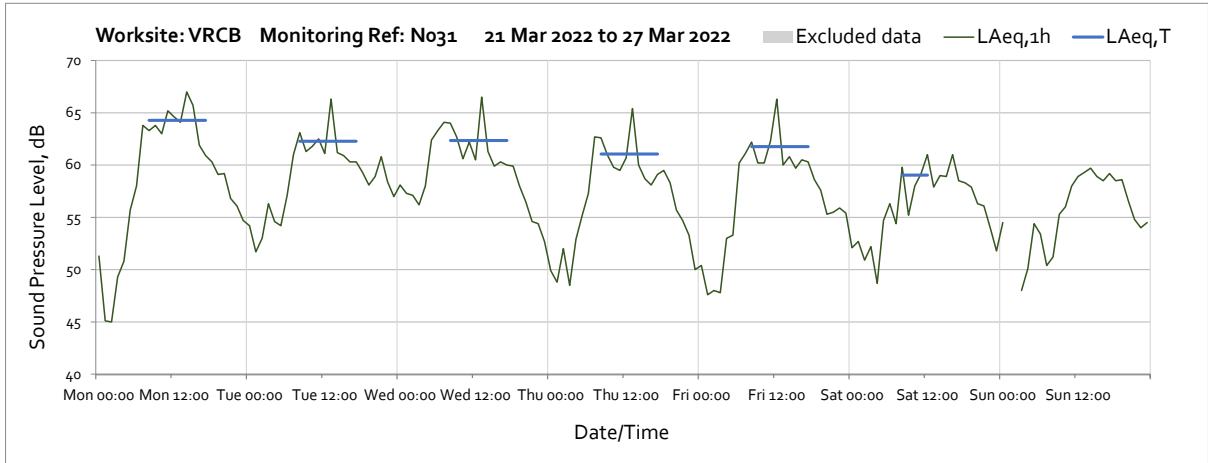
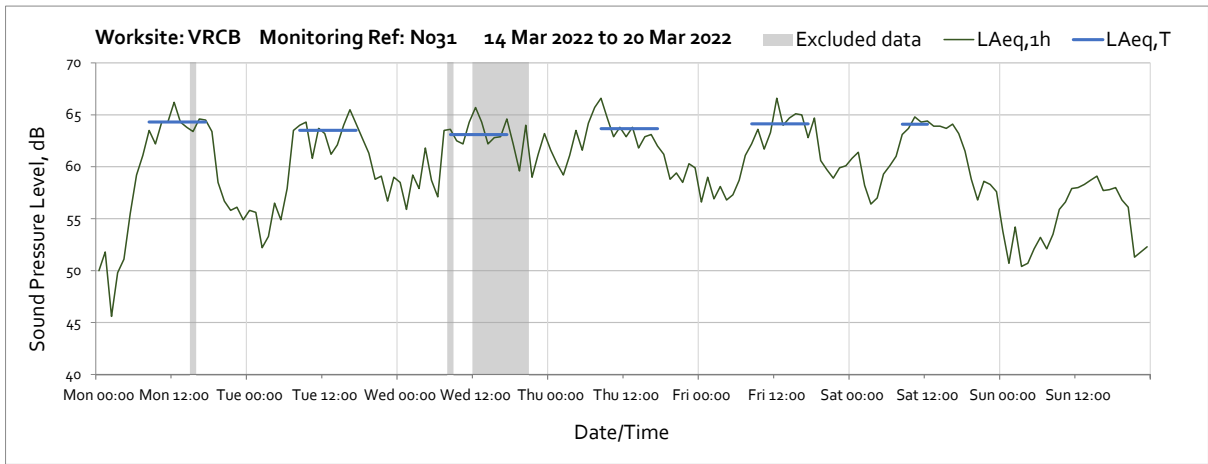
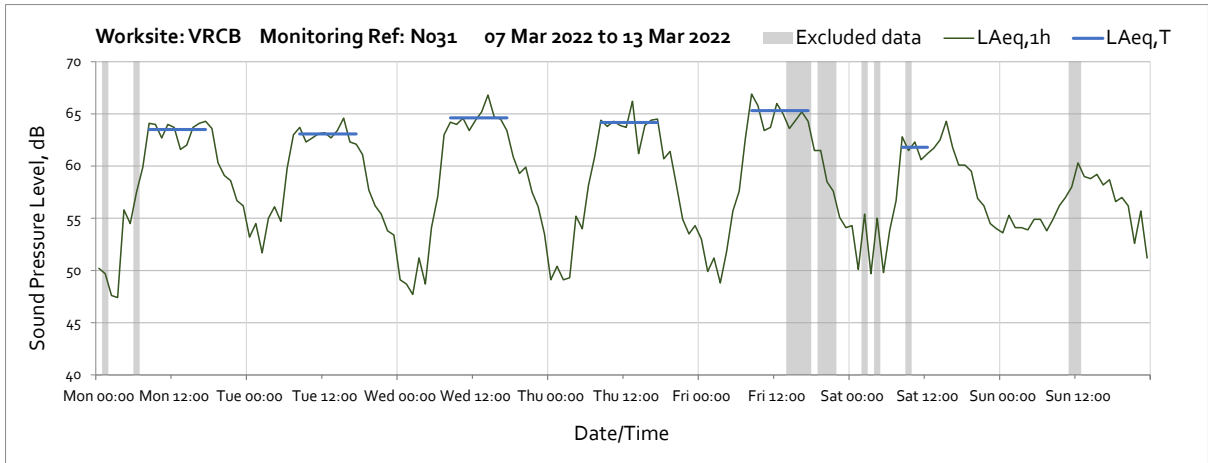


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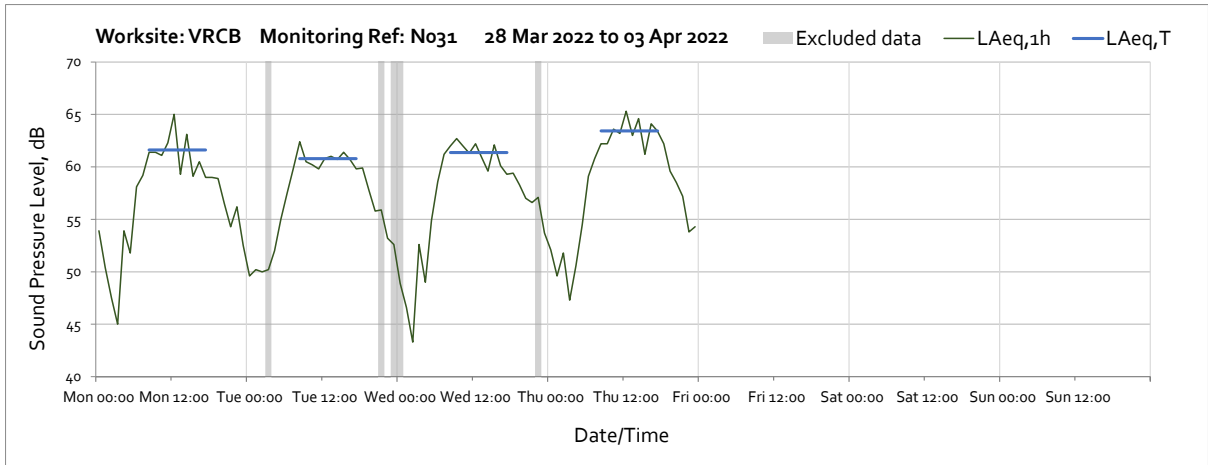


Worksite: Victoria Road Crossover Box (VRCB) – Monitoring Ref: N031

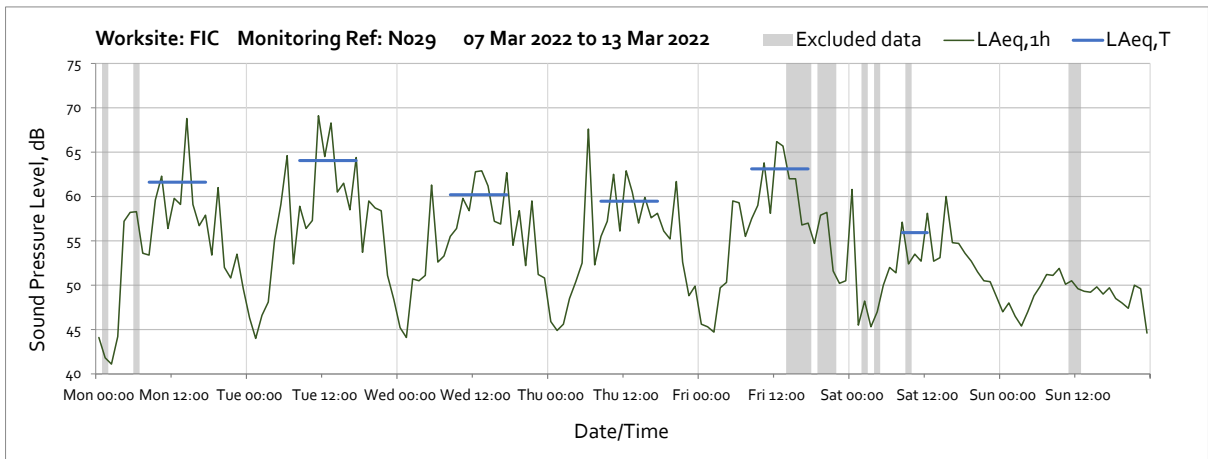
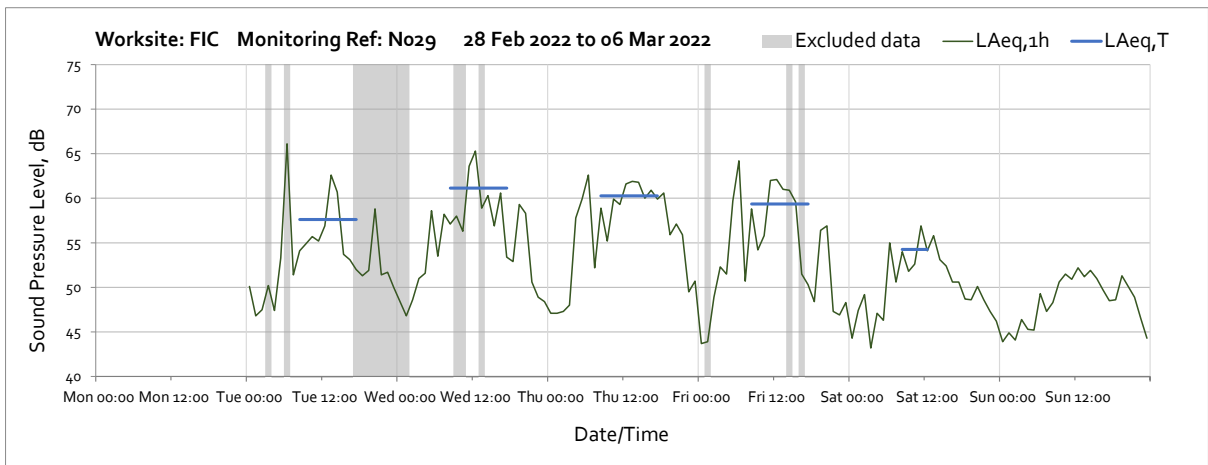


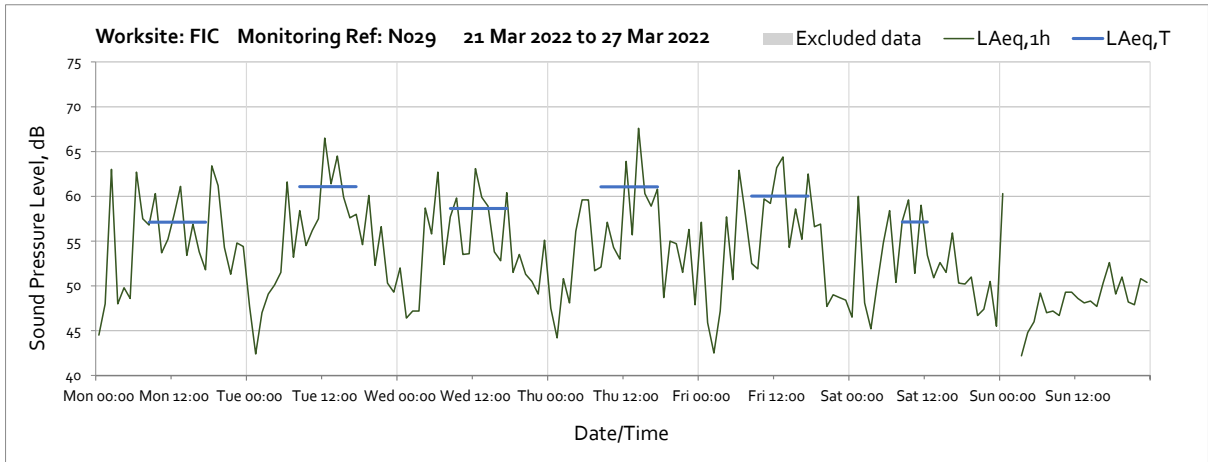
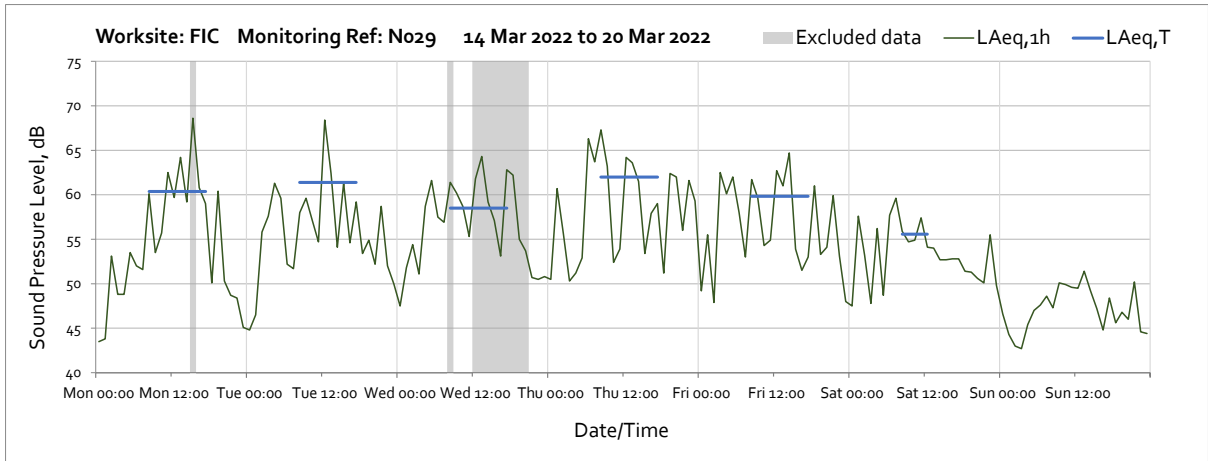


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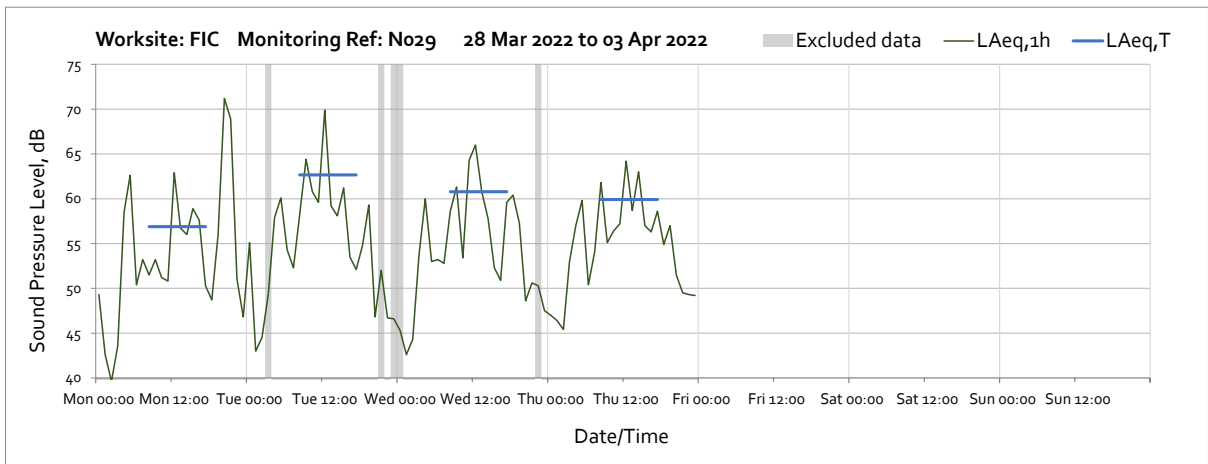


Worksite: Flat Iron Compound (FIC) – Monitoring Ref: N029

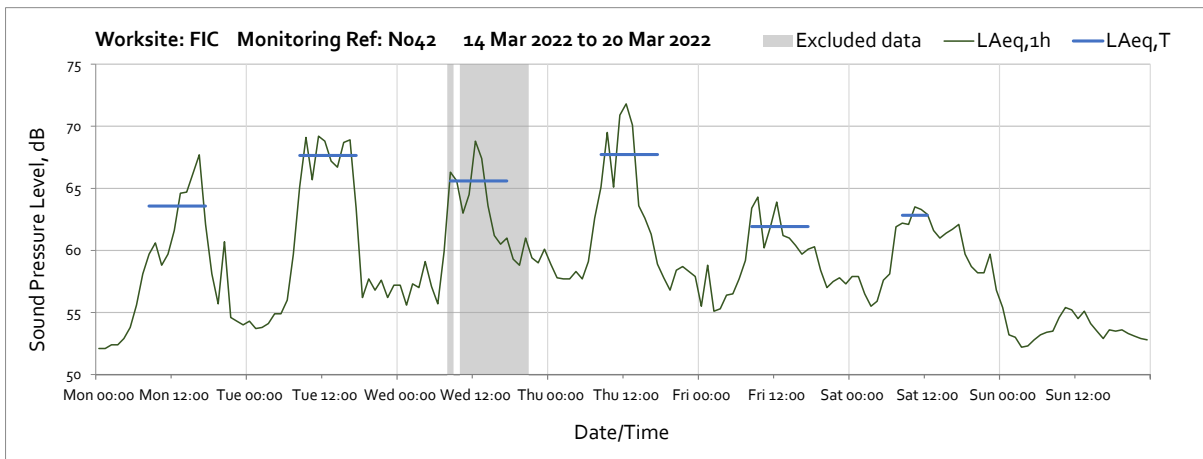
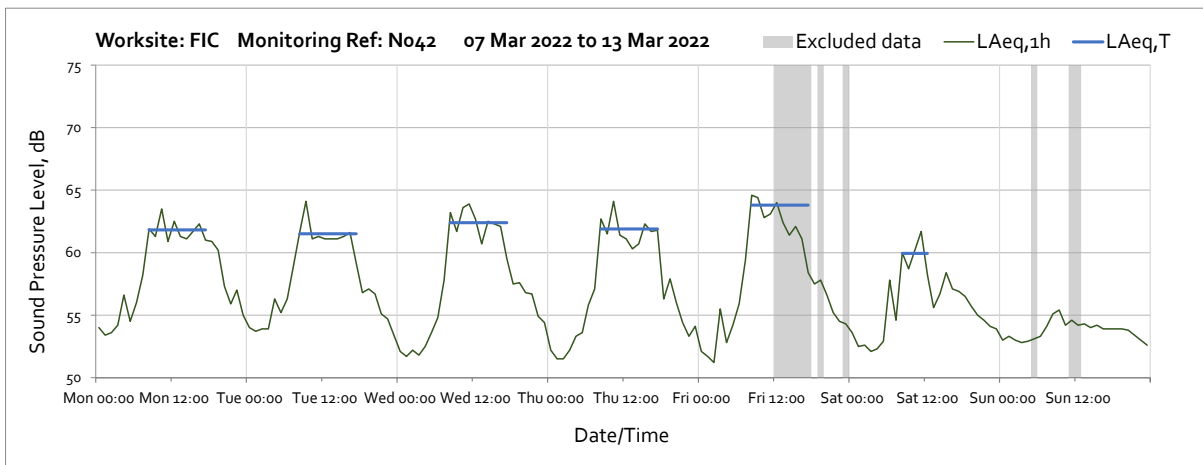
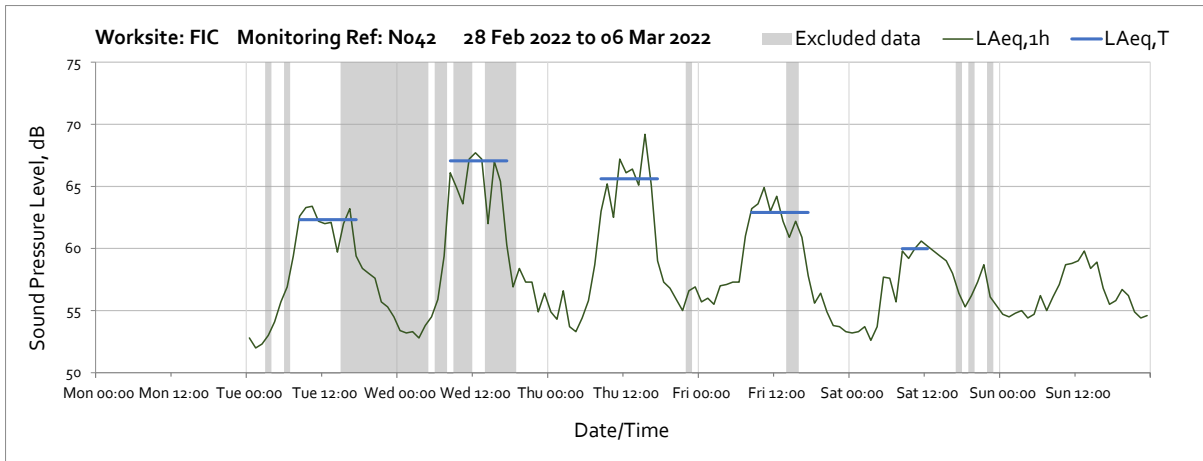


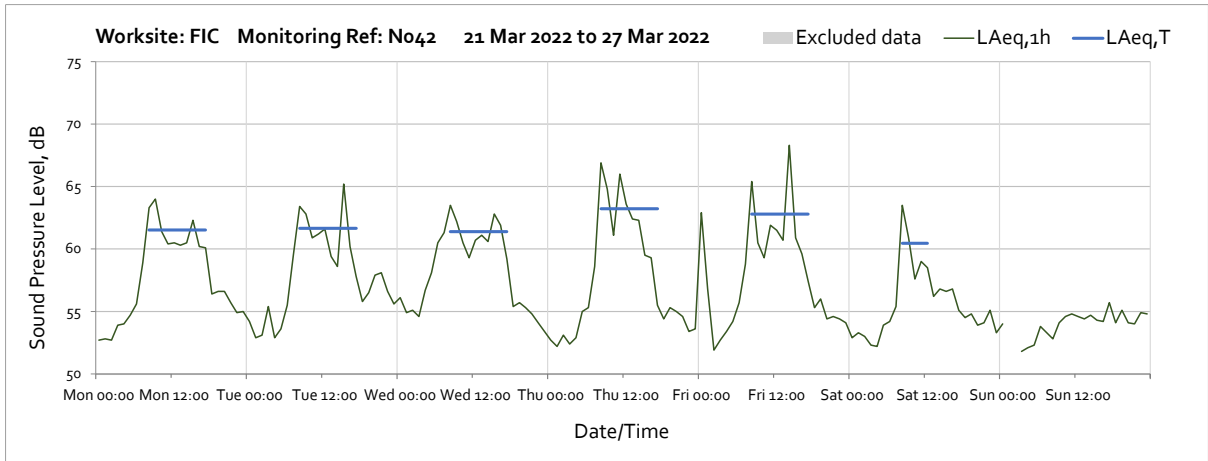


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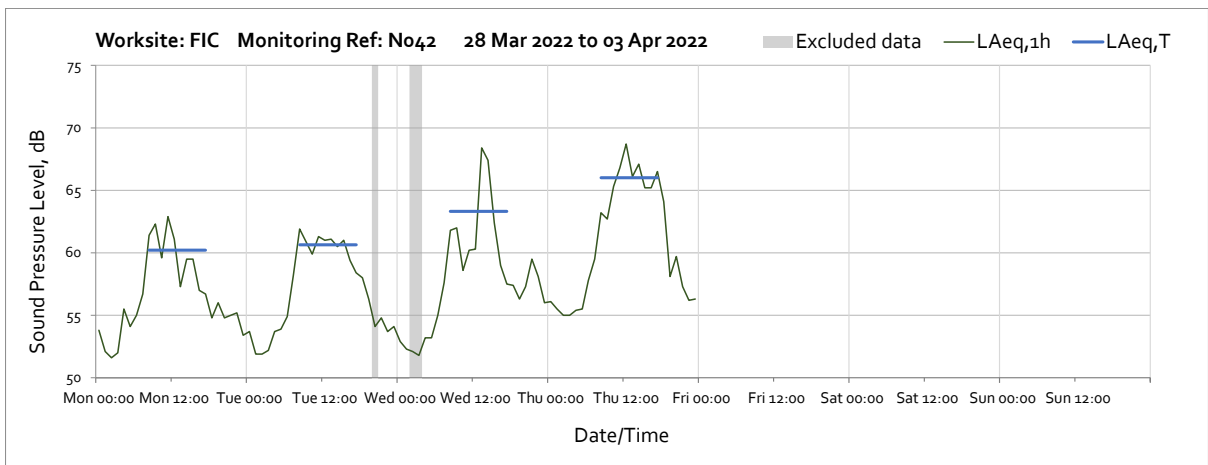


Worksite: Flat Iron Compound (FIC) – Monitoring Ref: N042

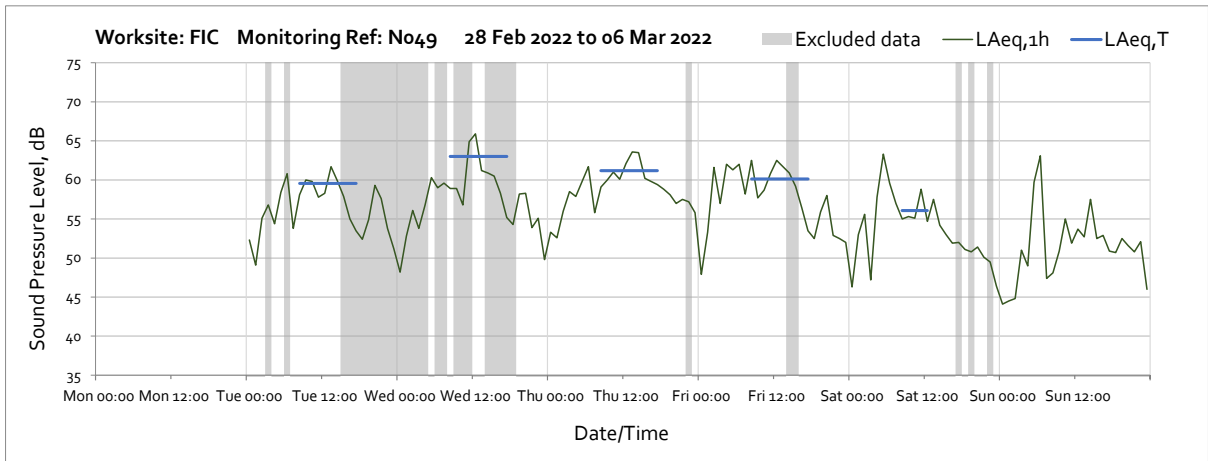


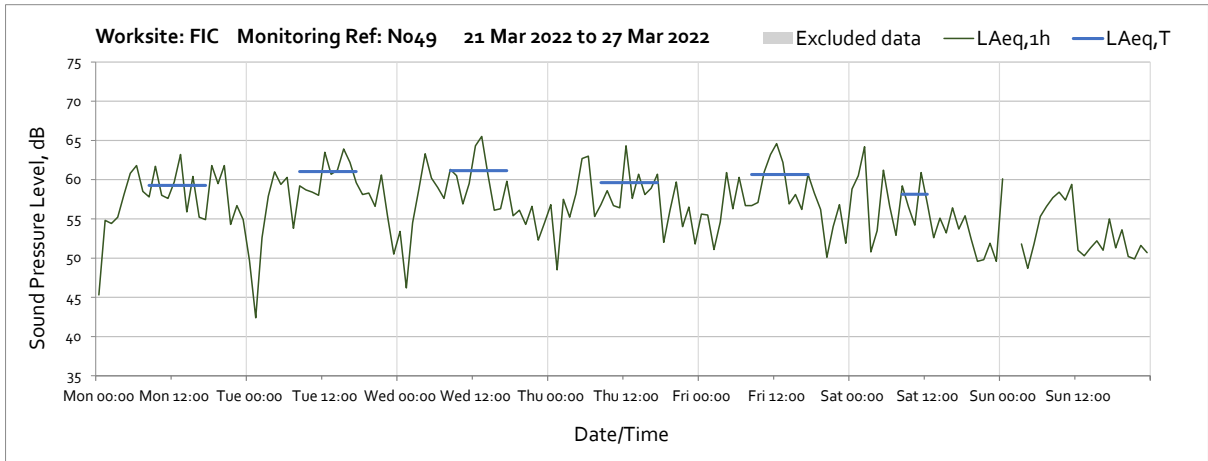
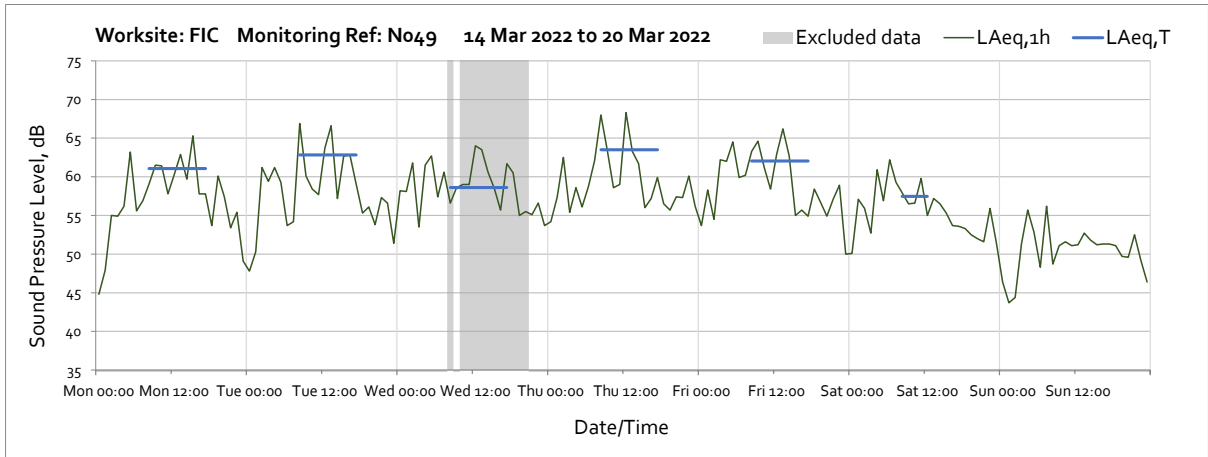
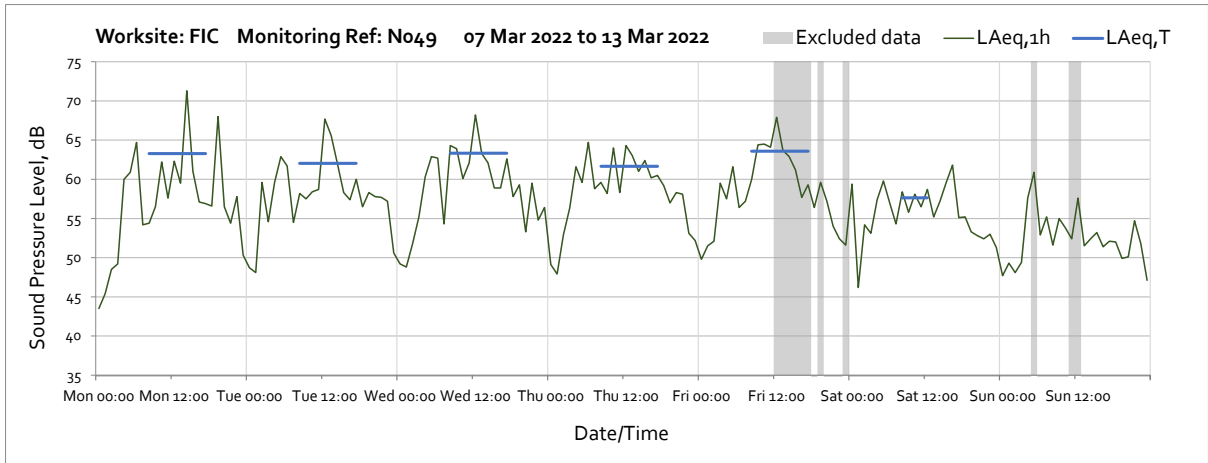


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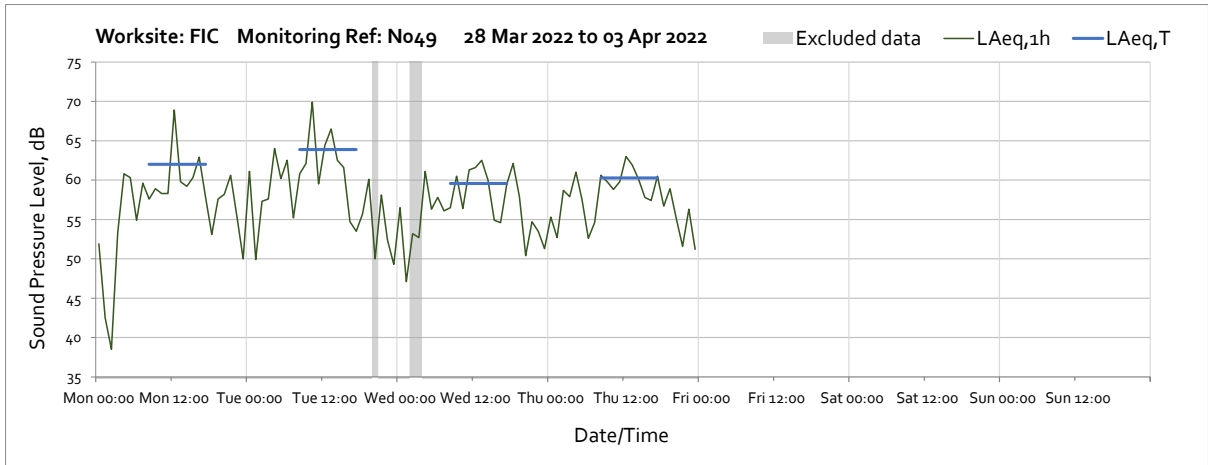


Worksite: Flat Iron Compound (FIC) - Monitoring Ref: N049

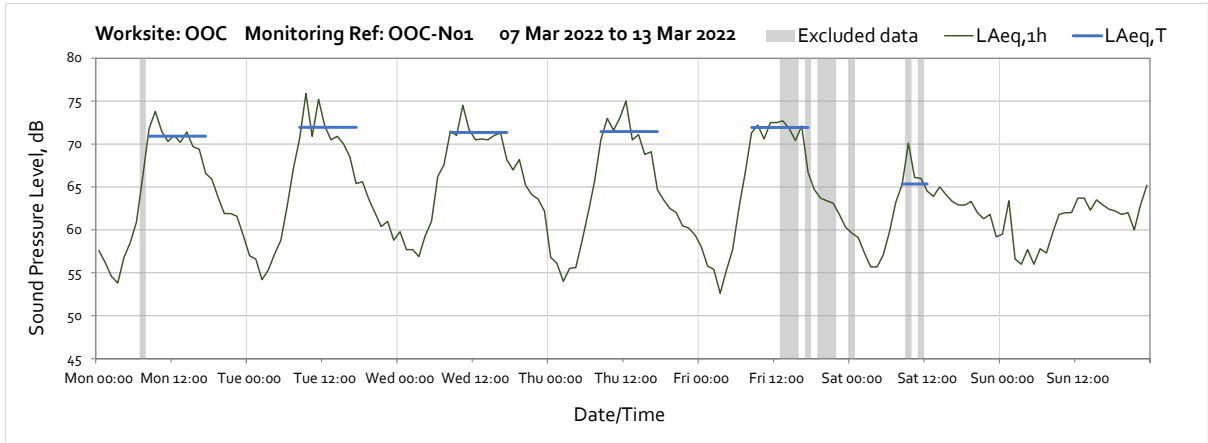
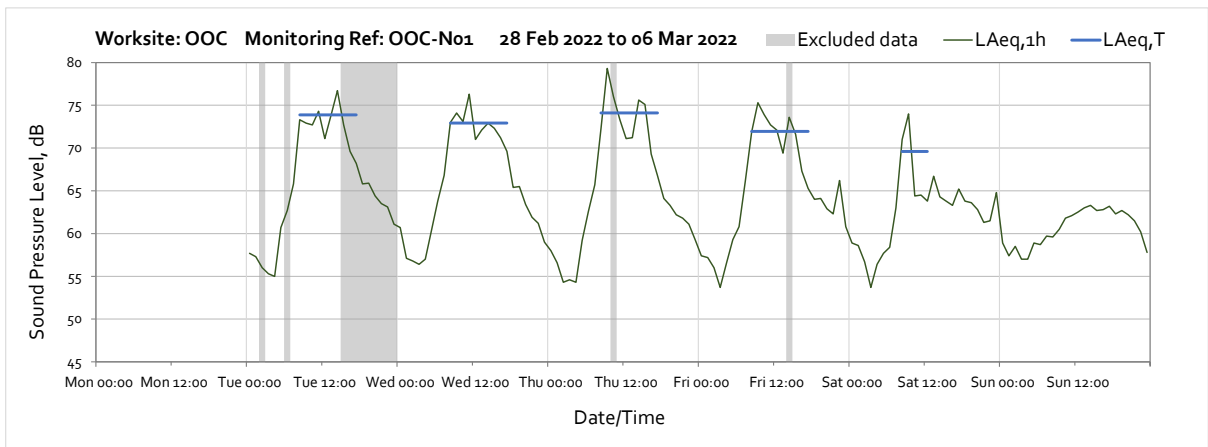


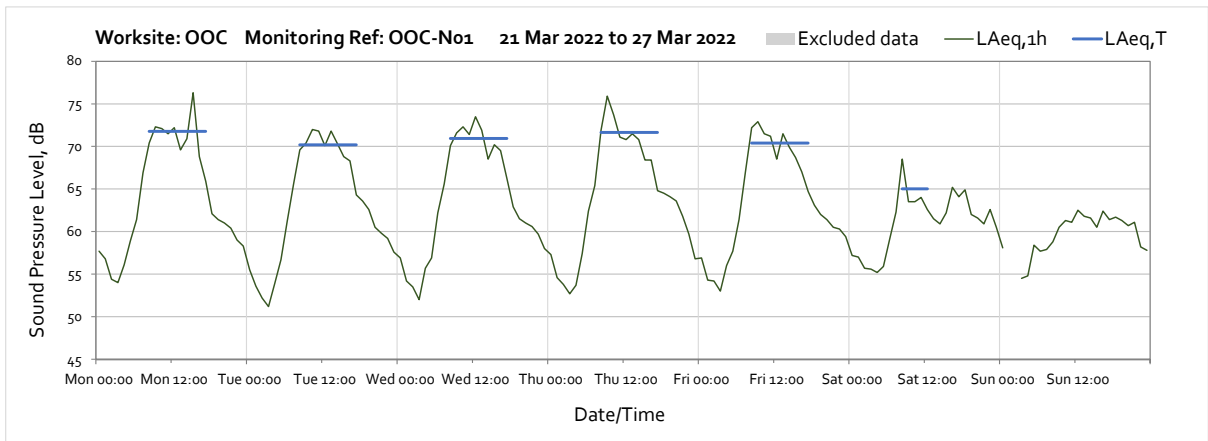
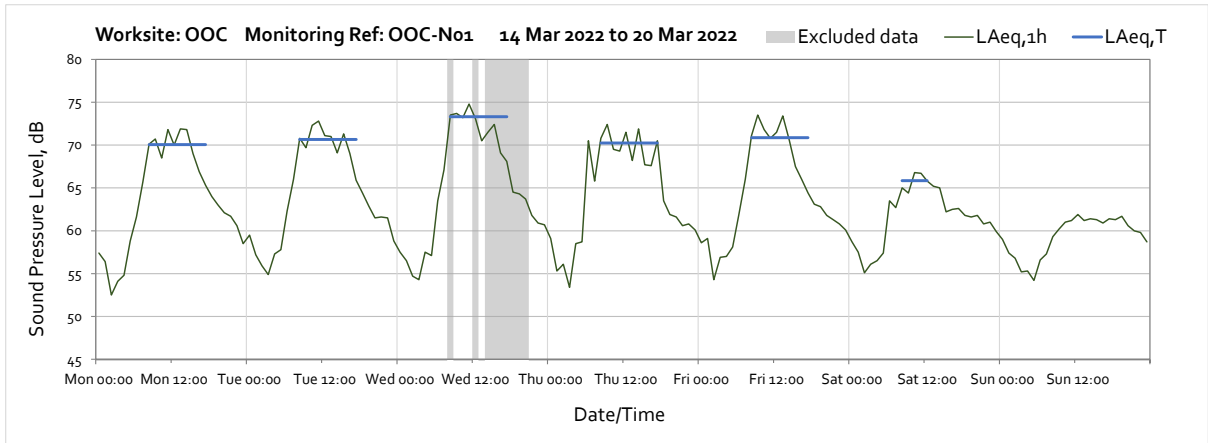


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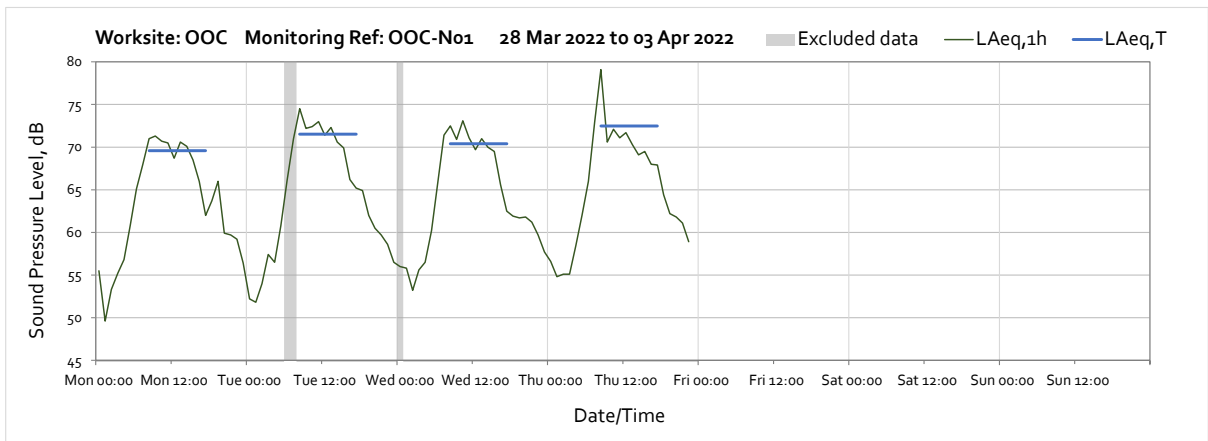


Worksite: Oal Oak Common (OOC) – Monitoring Ref: OOC-N01

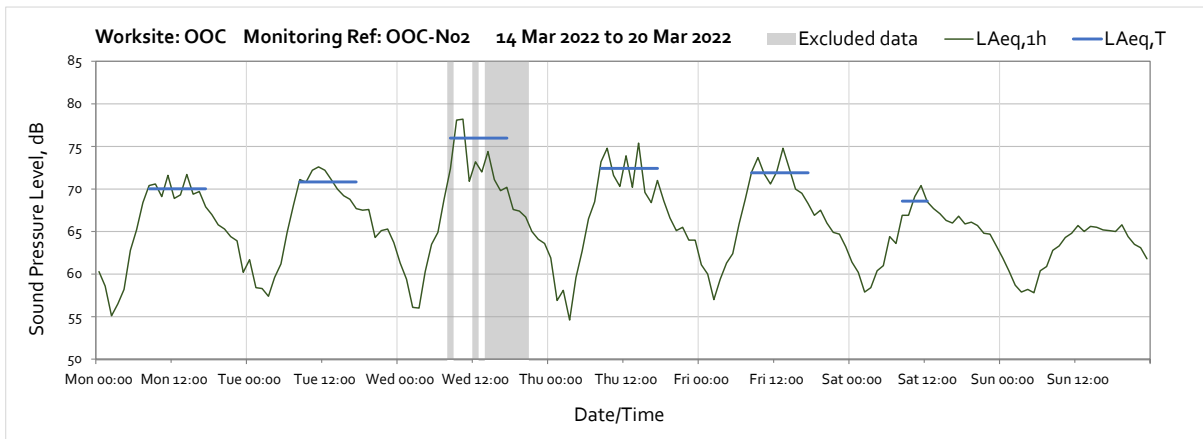
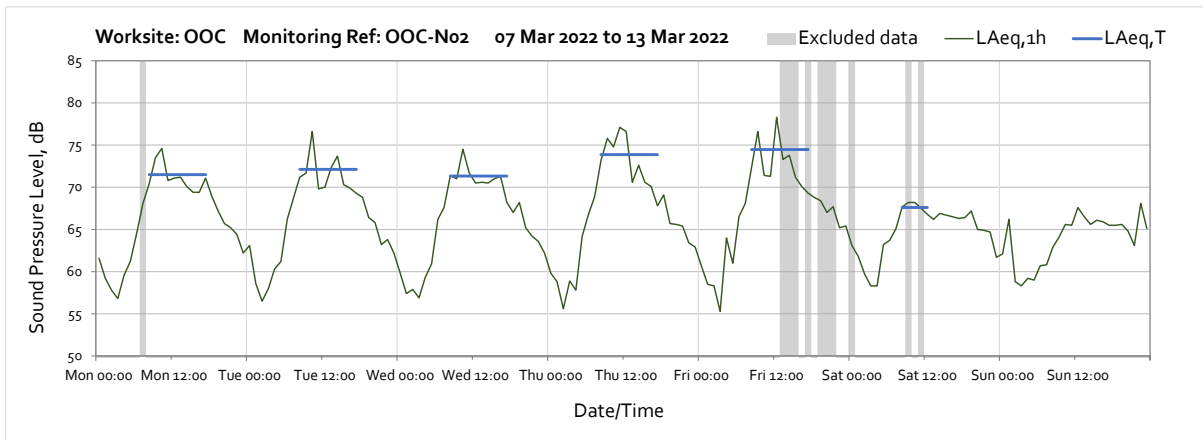
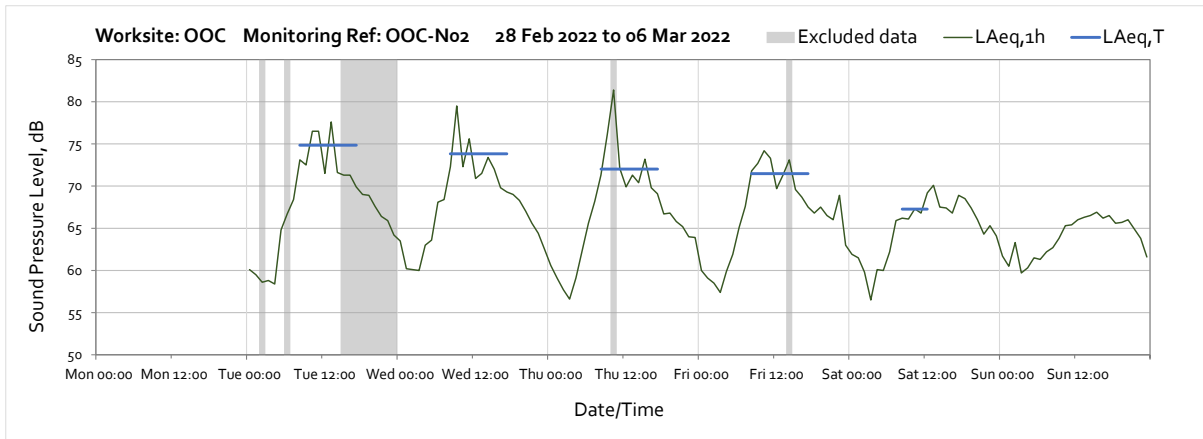


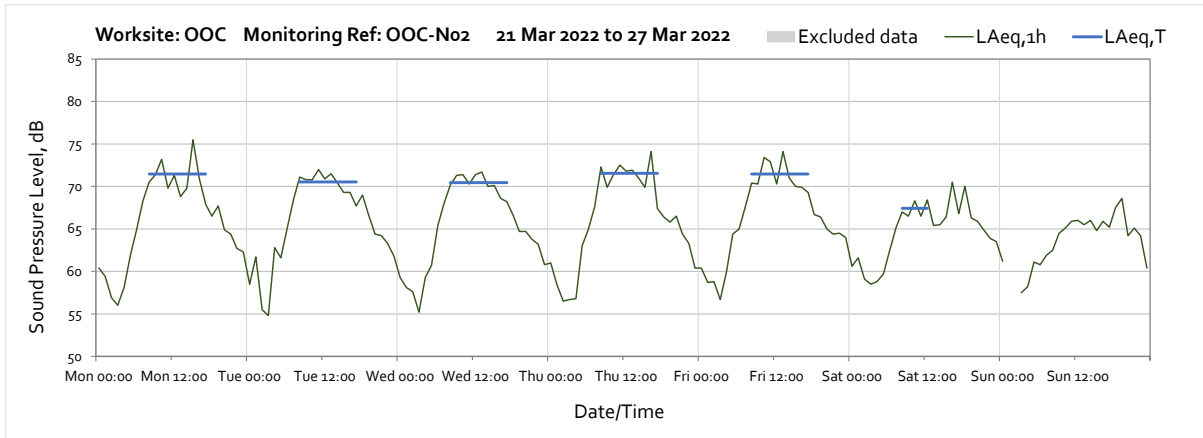


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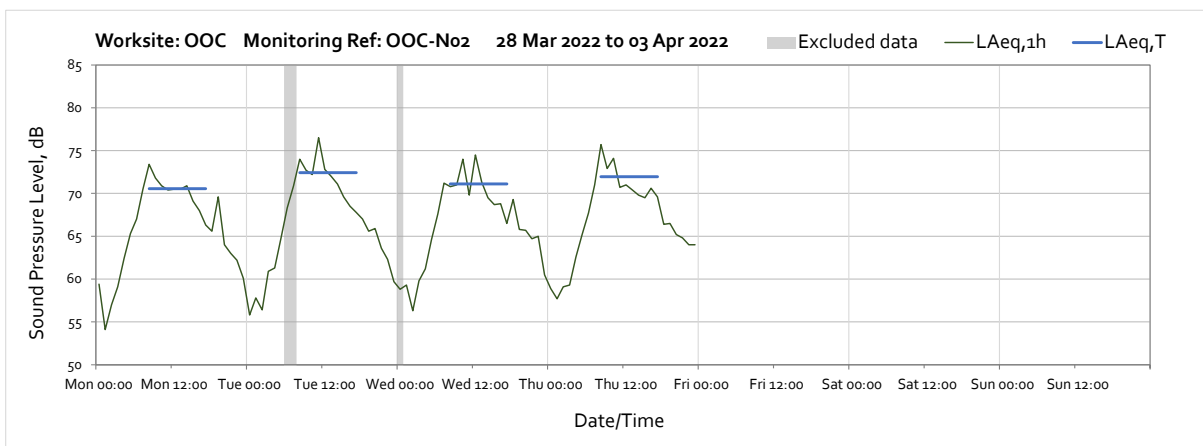


Worksite: Oal Oak Common (OOC) – Monitoring Ref: OOC-N02

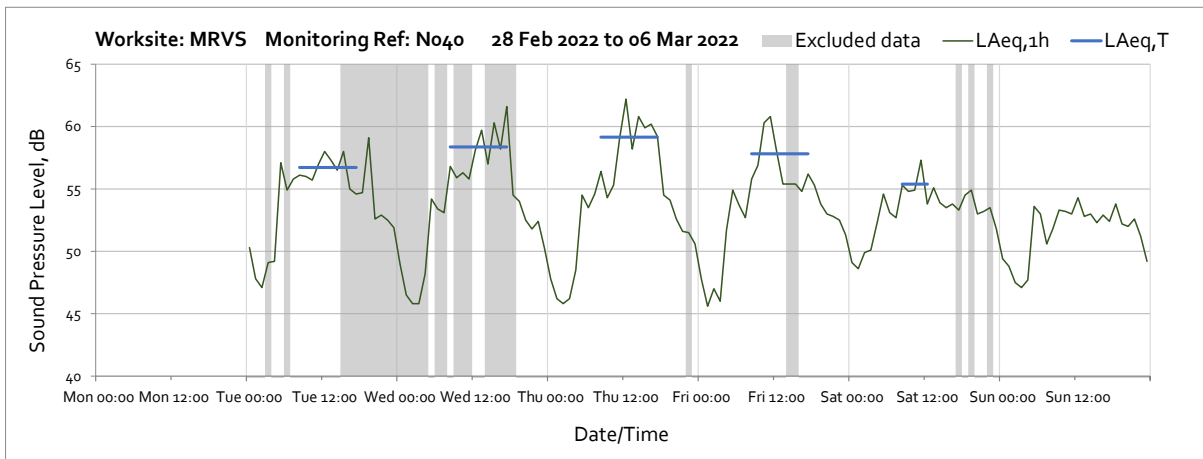


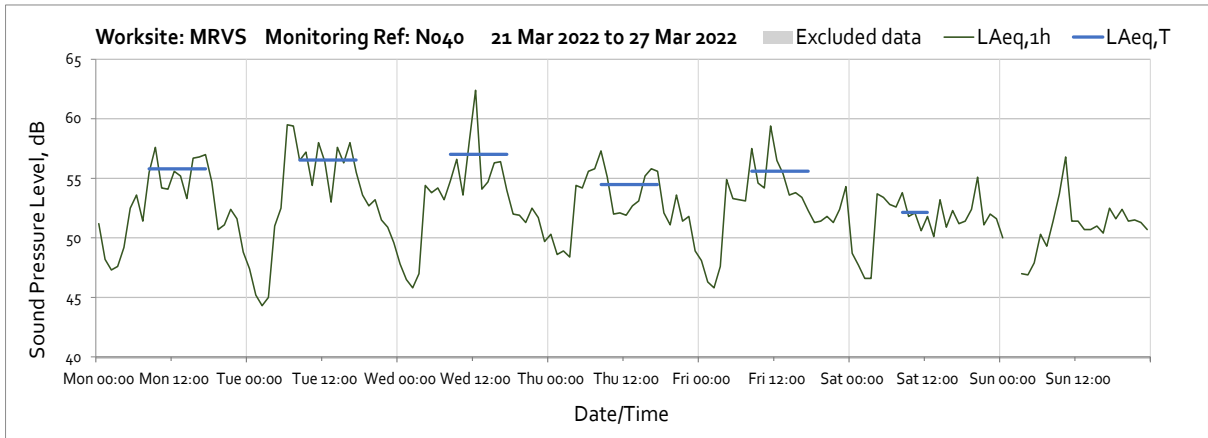
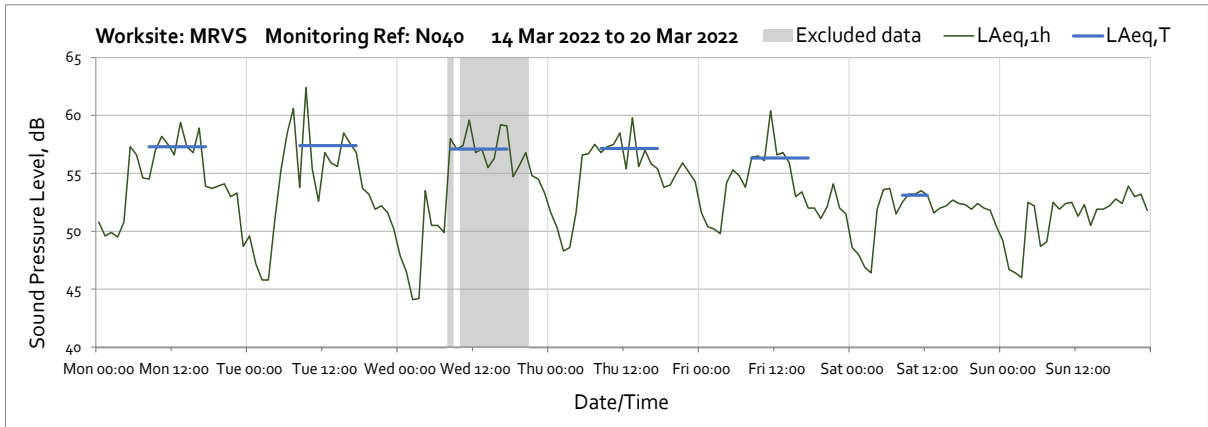
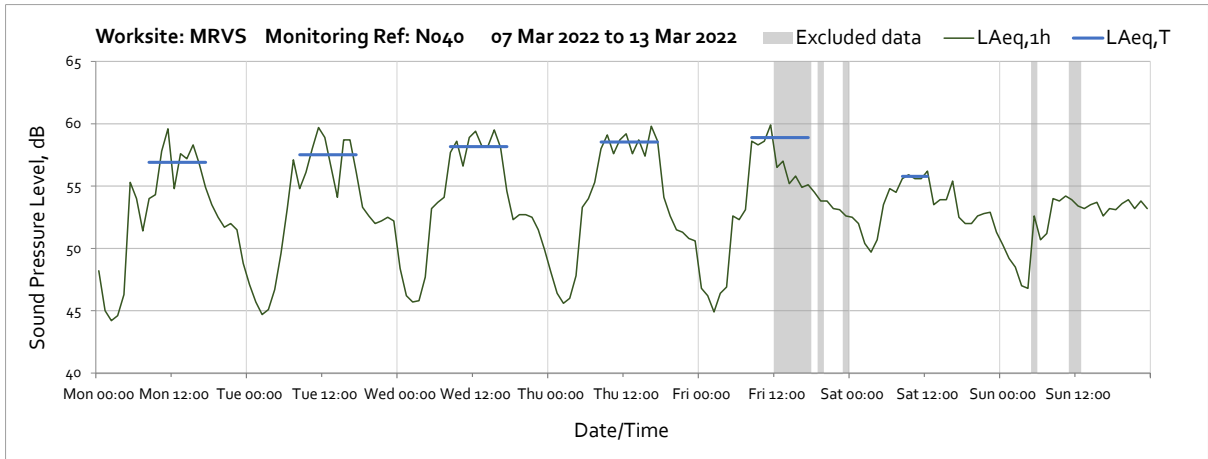


Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.

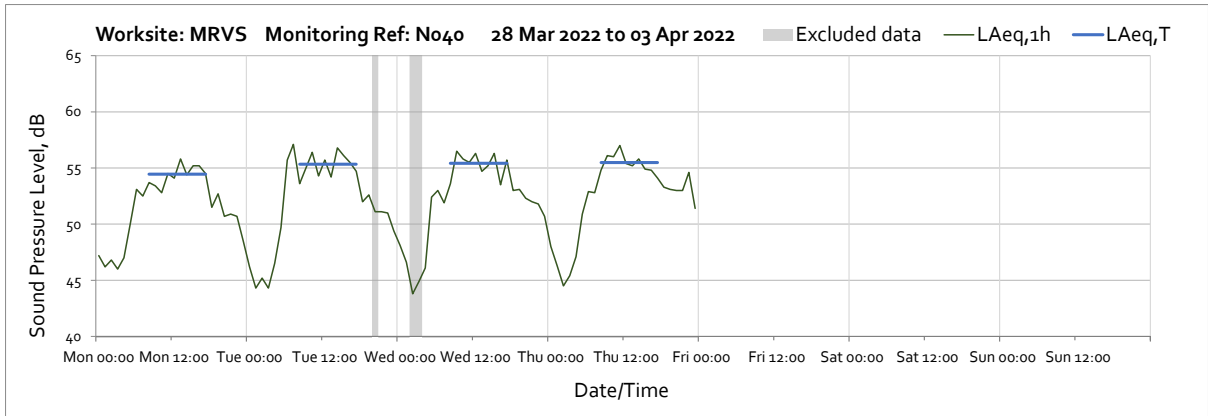


Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N040

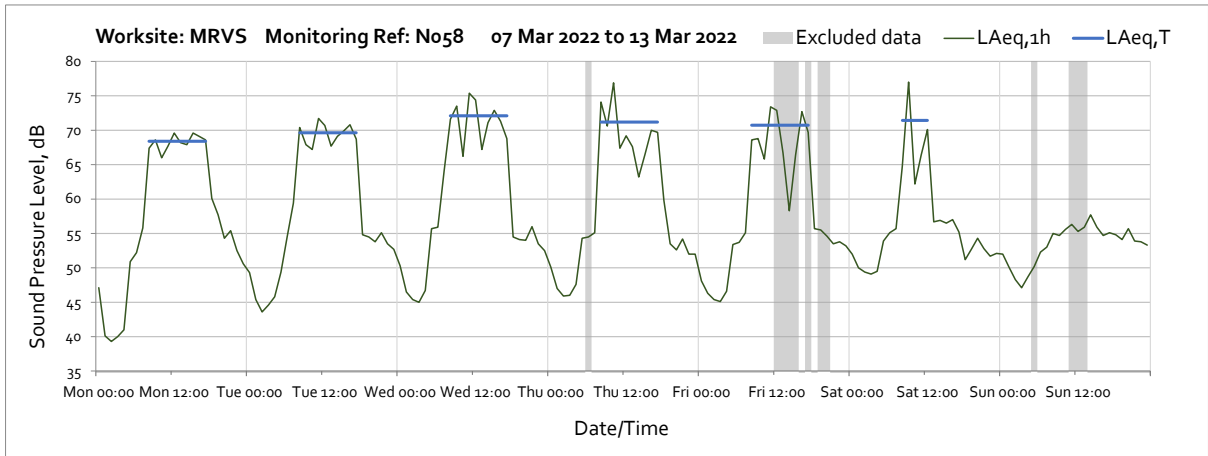
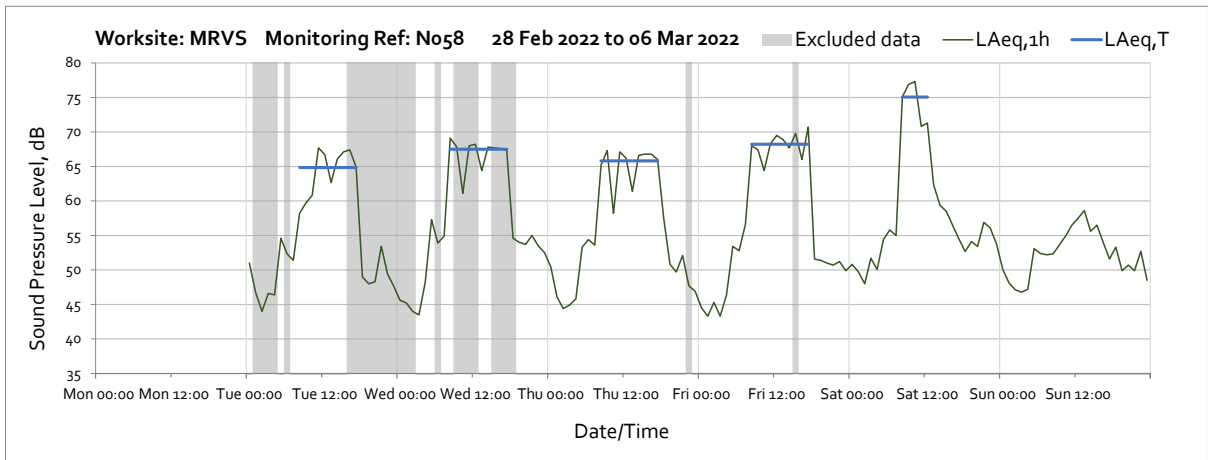


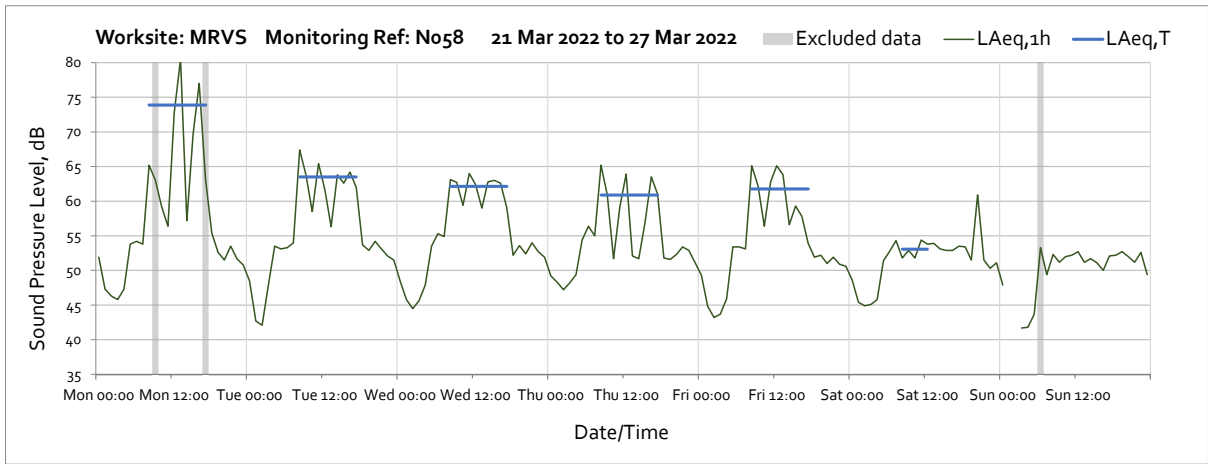
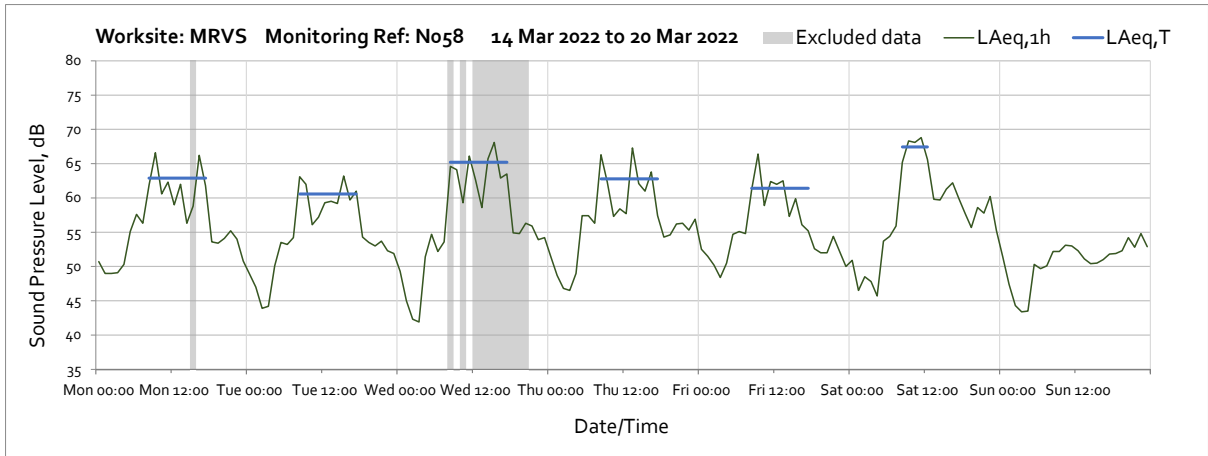


Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.

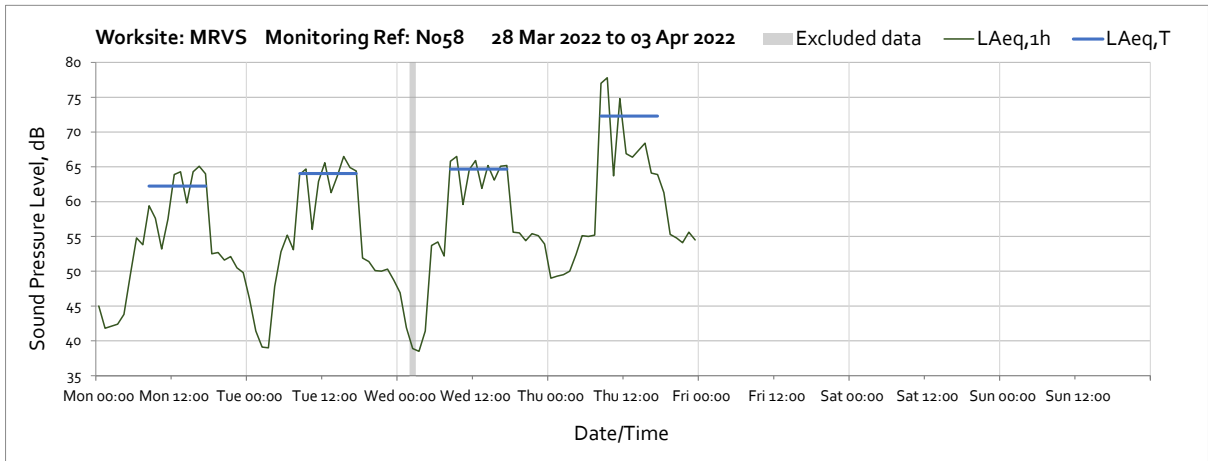


Worksite: Mandeville Road Ventilation Shaft (MRVS) - Monitoring Ref: N058

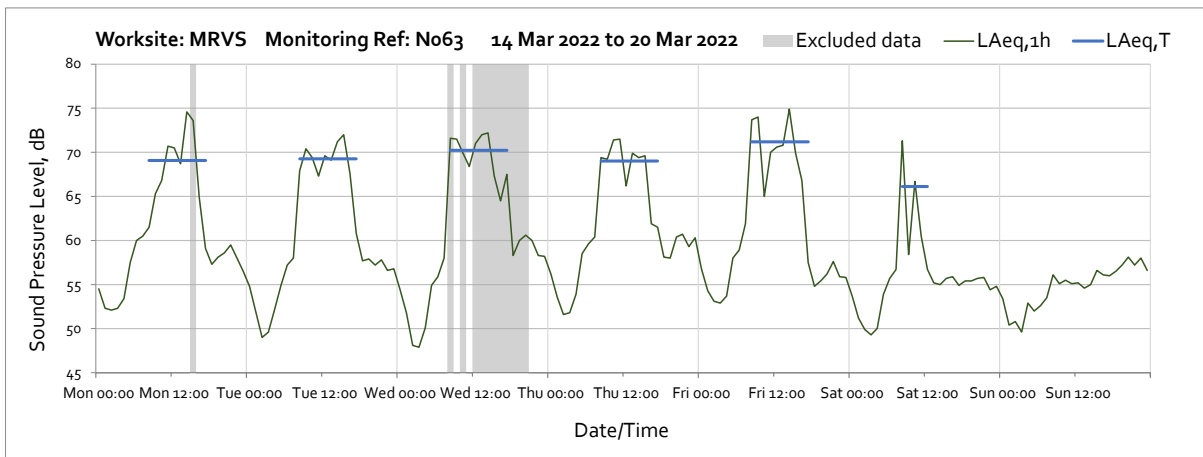
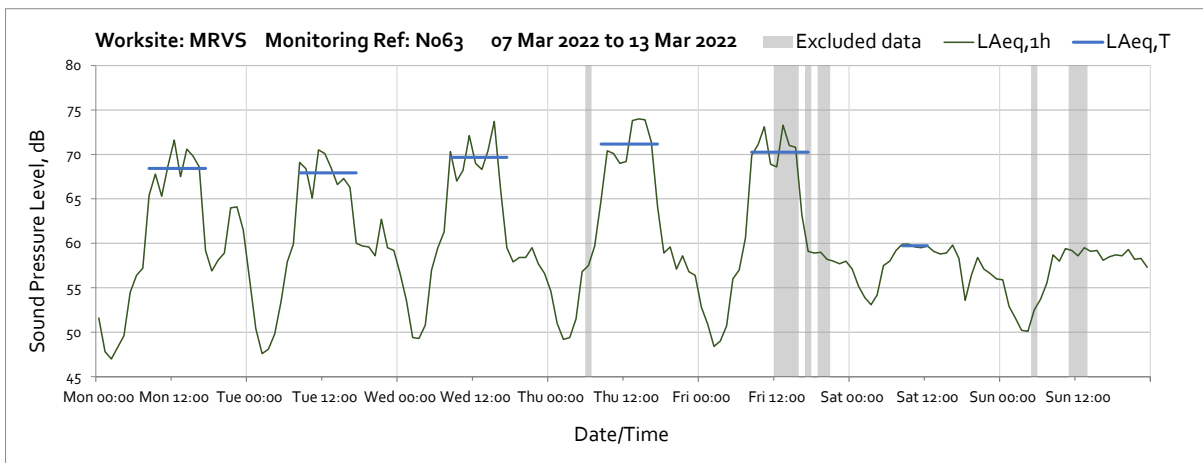
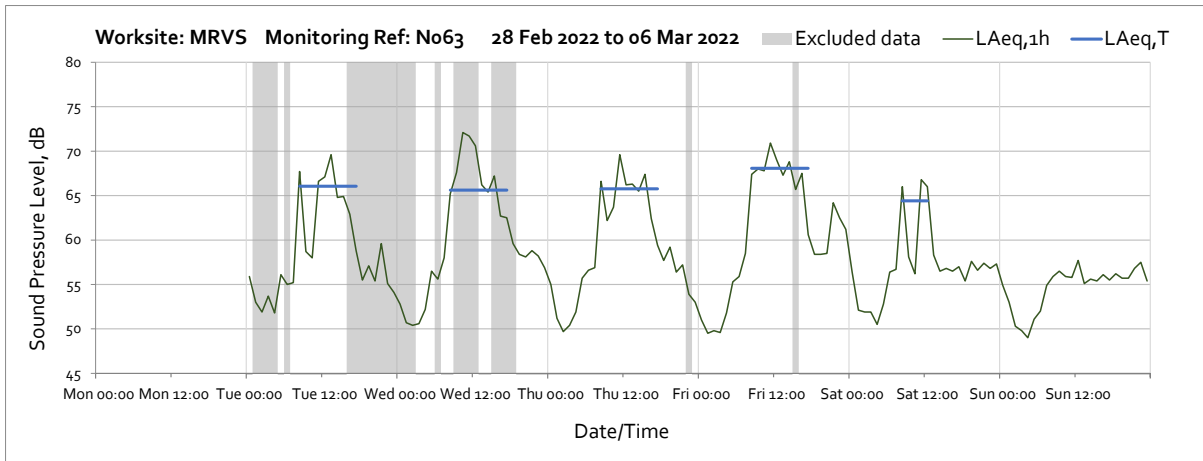


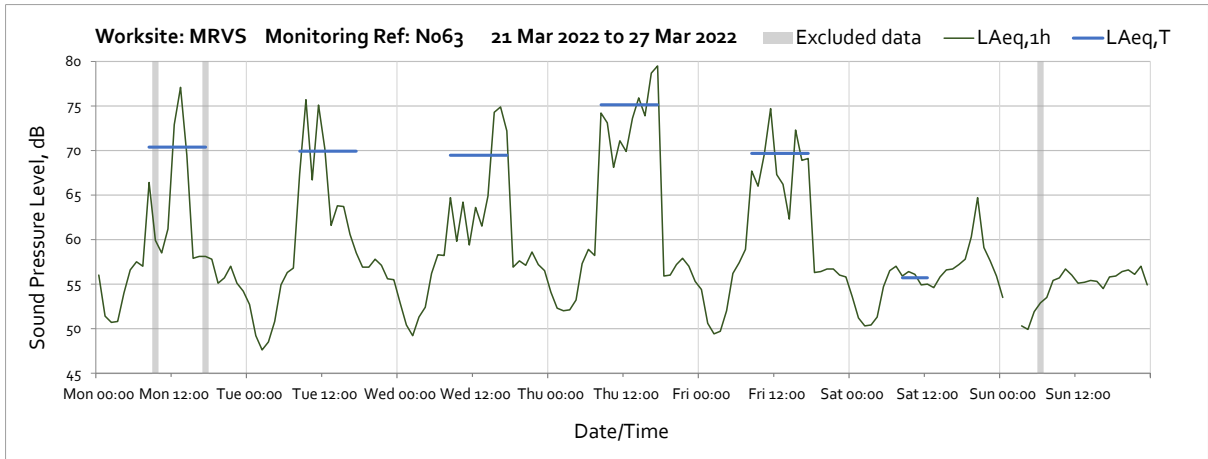


Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.

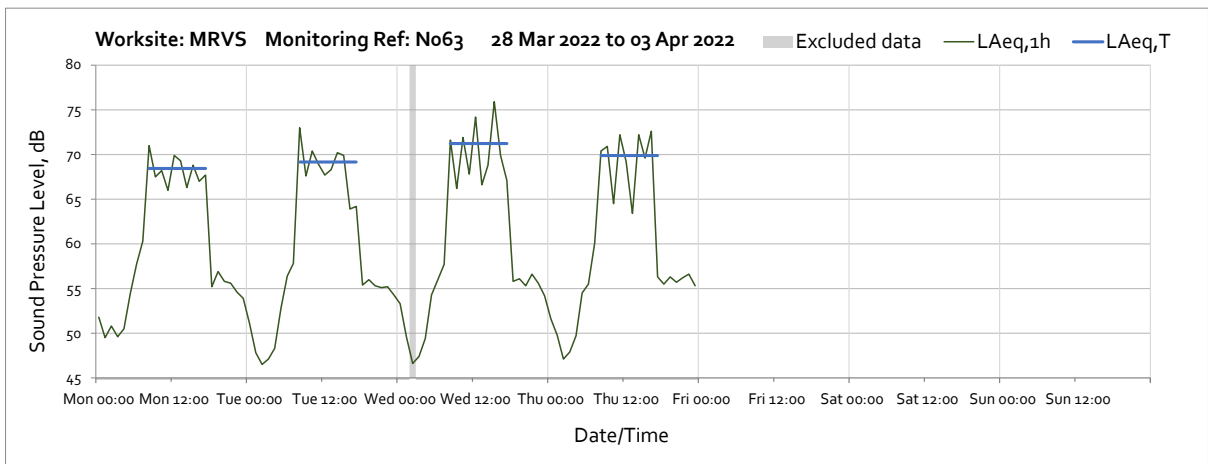


Worksite: Mandeville Road Ventilation Shaft (MRVS) – Monitoring Ref: N063

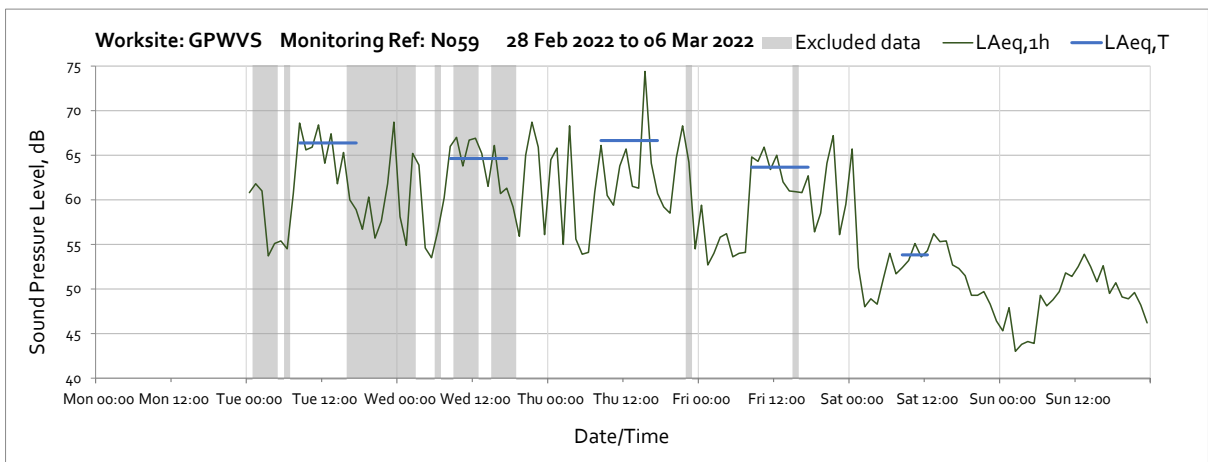


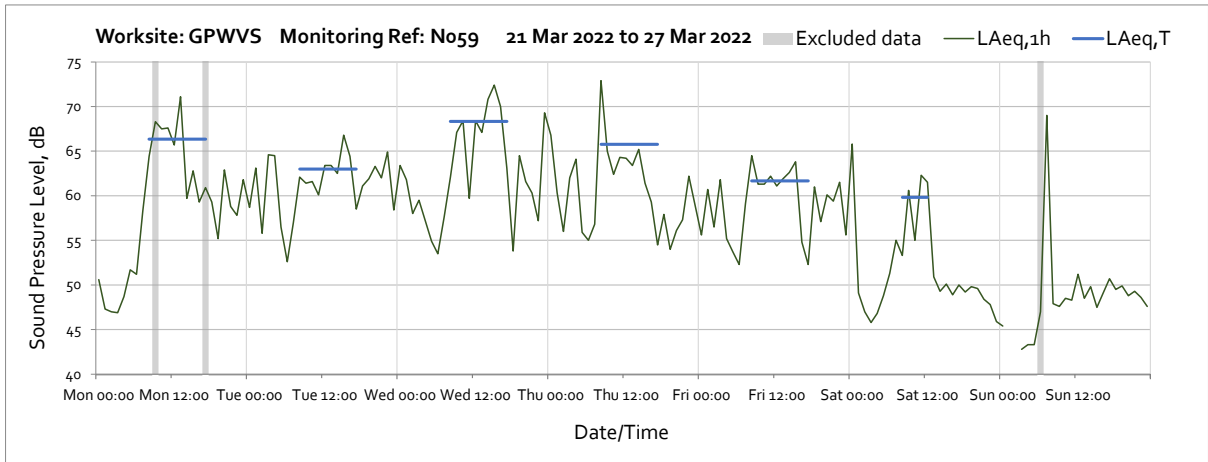
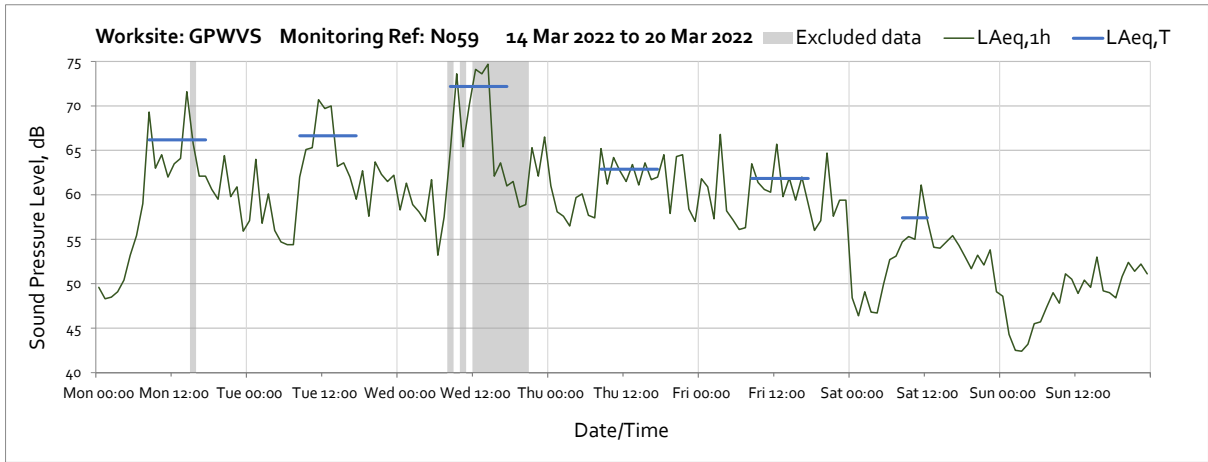
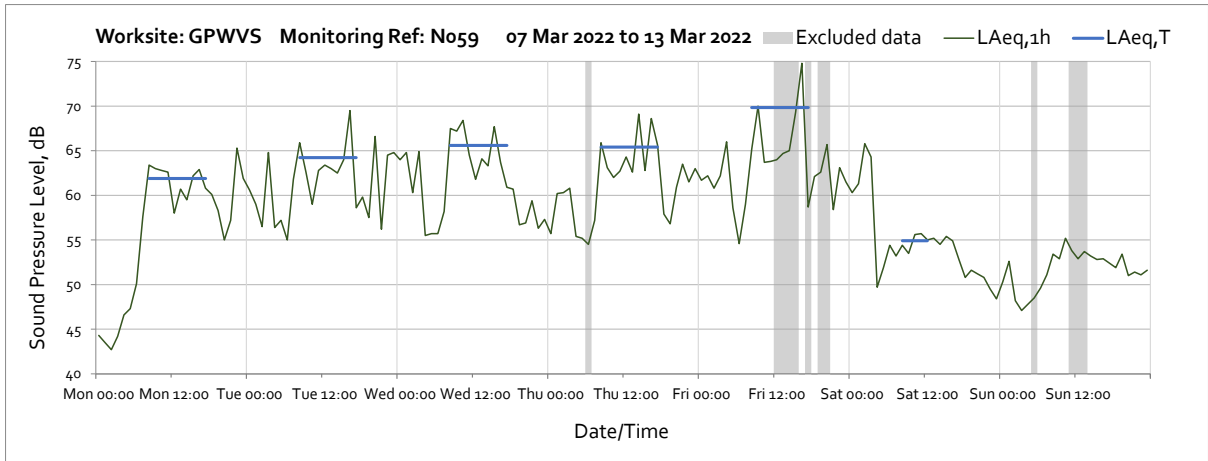


Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.

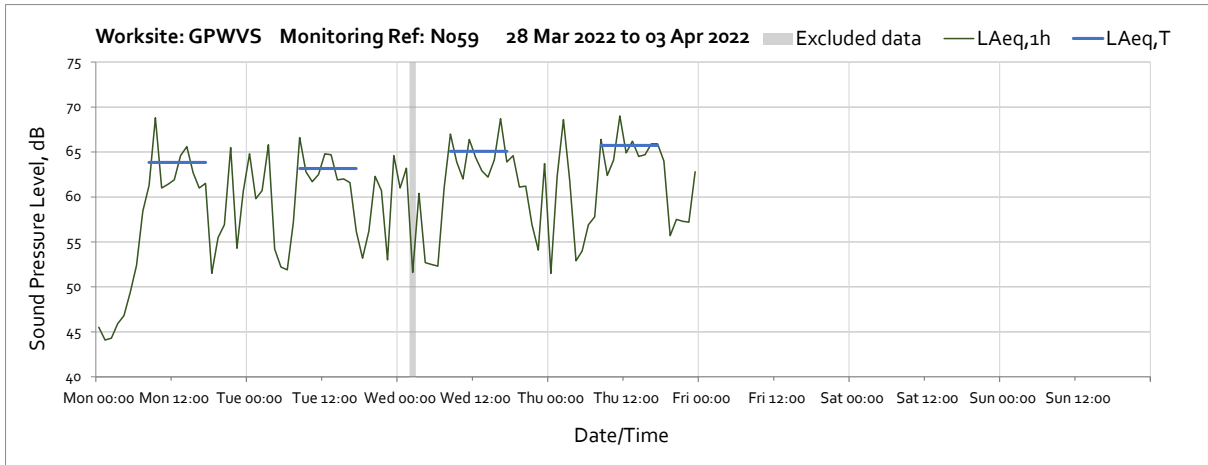


Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: N059

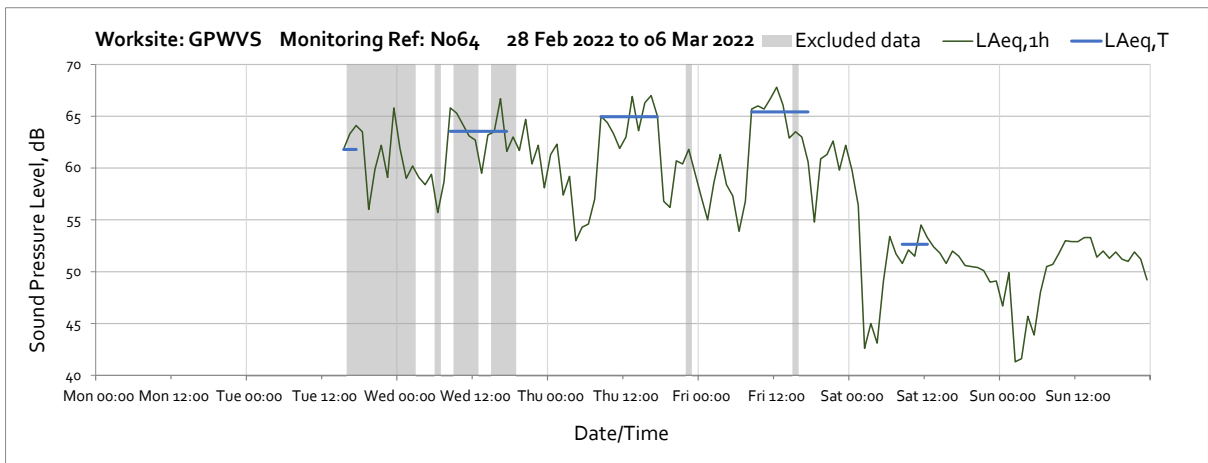




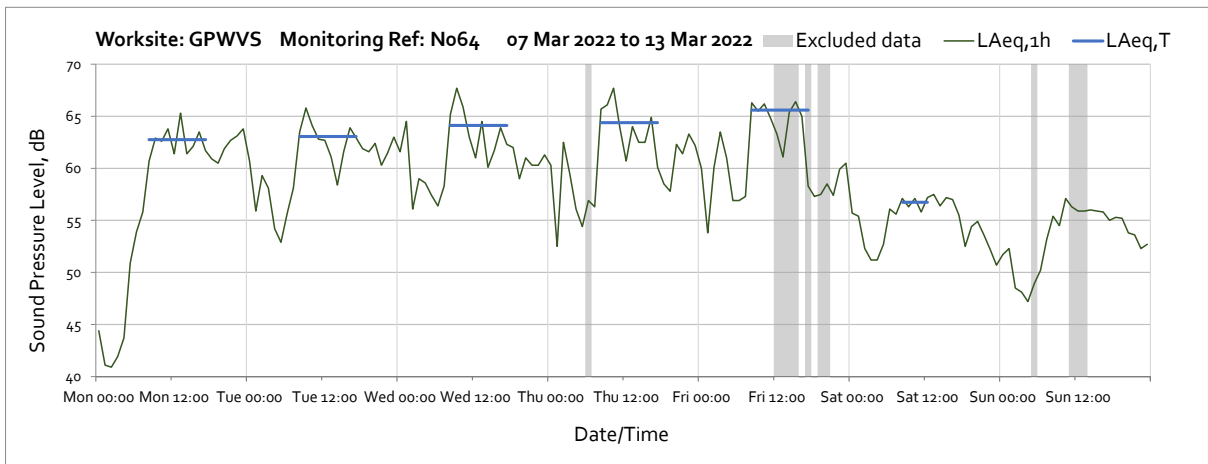
Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.

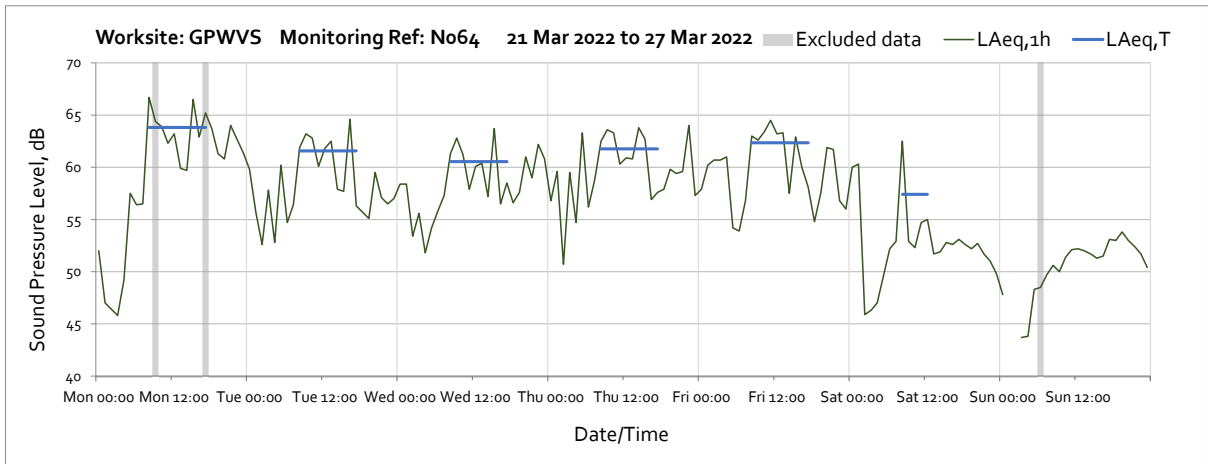
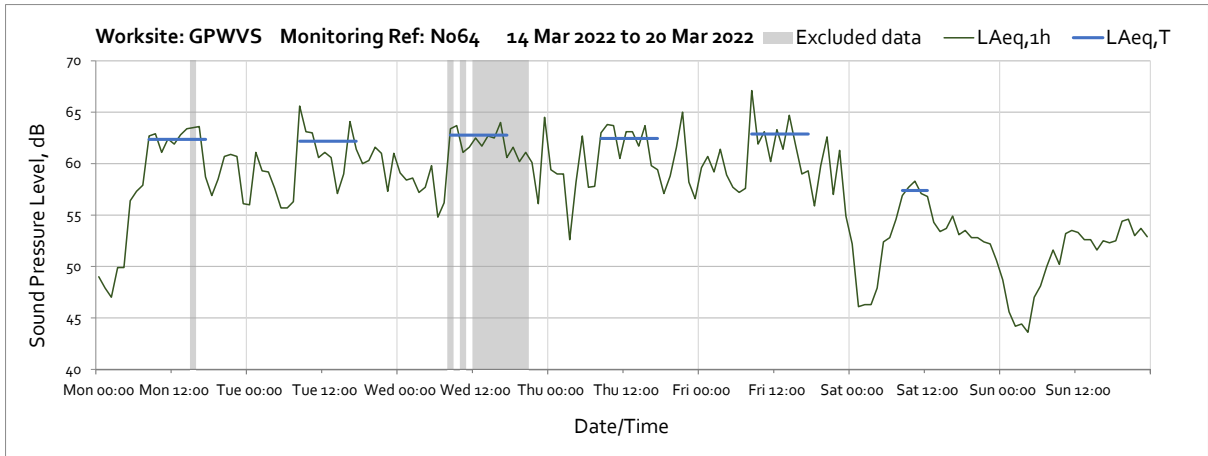


Worksite: Green Park Way Vent Shaft (GPWVS) - Monitoring Ref: N064

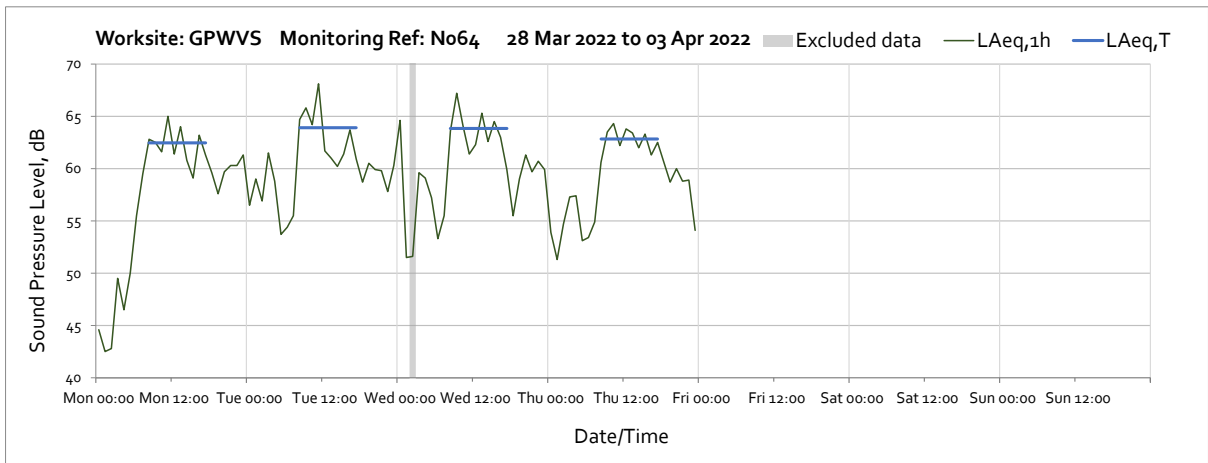


Note: Missing data between 00:00 and 14:00 on Tuesday 1st March 2022 was due to loss of power at the monitoring station.

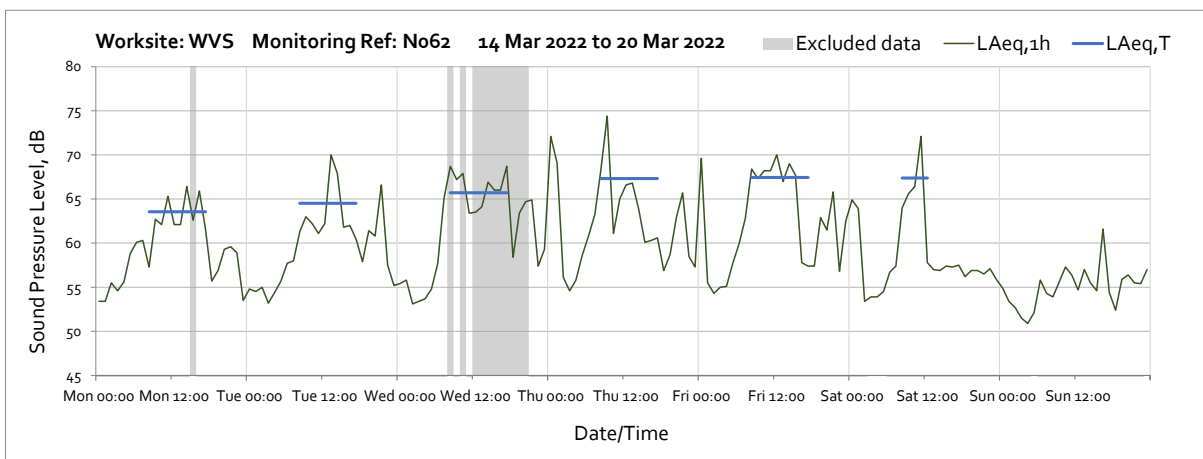
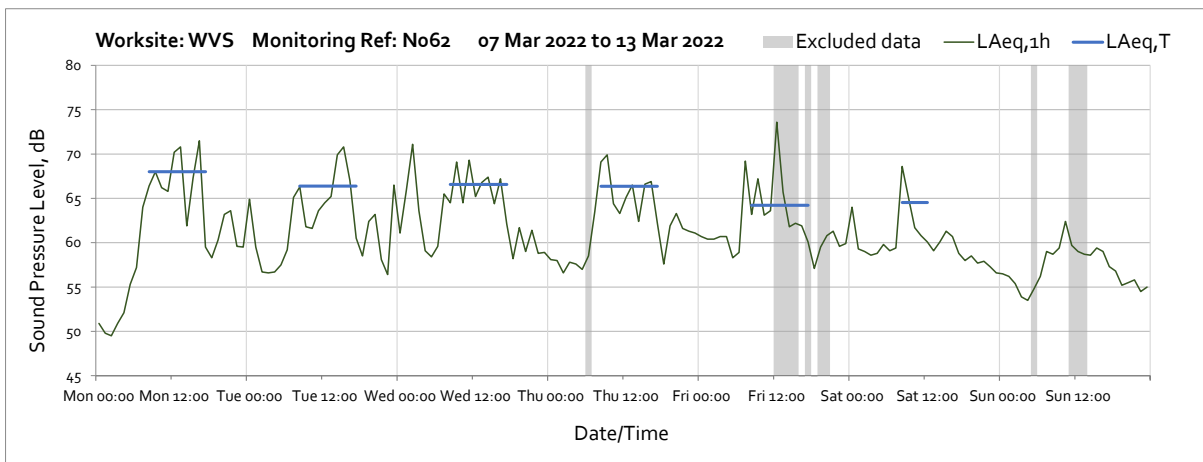
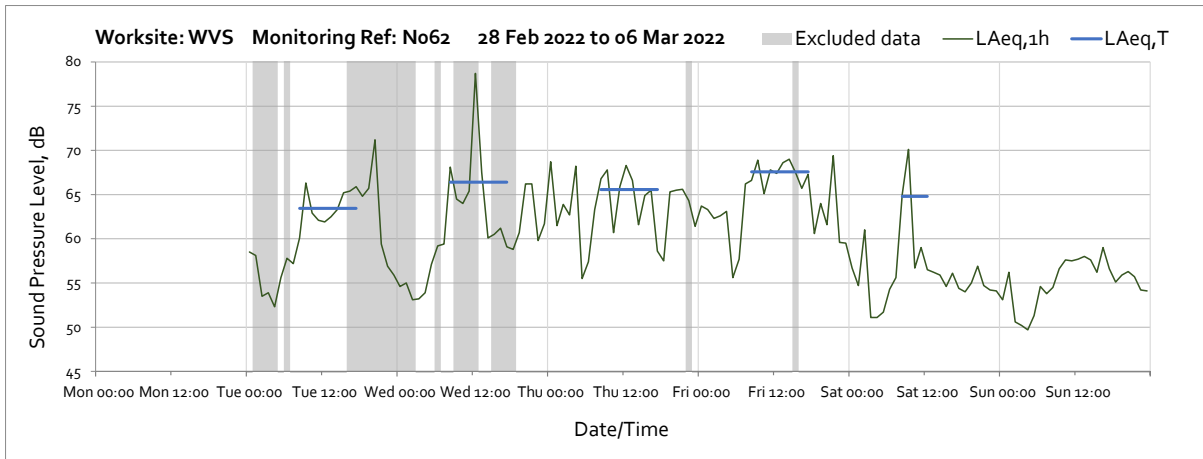


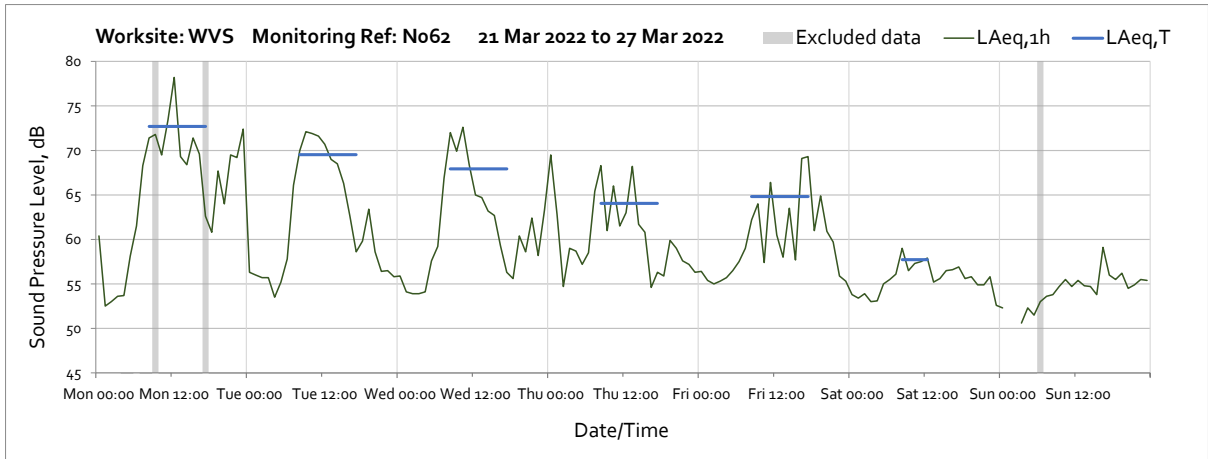


Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.

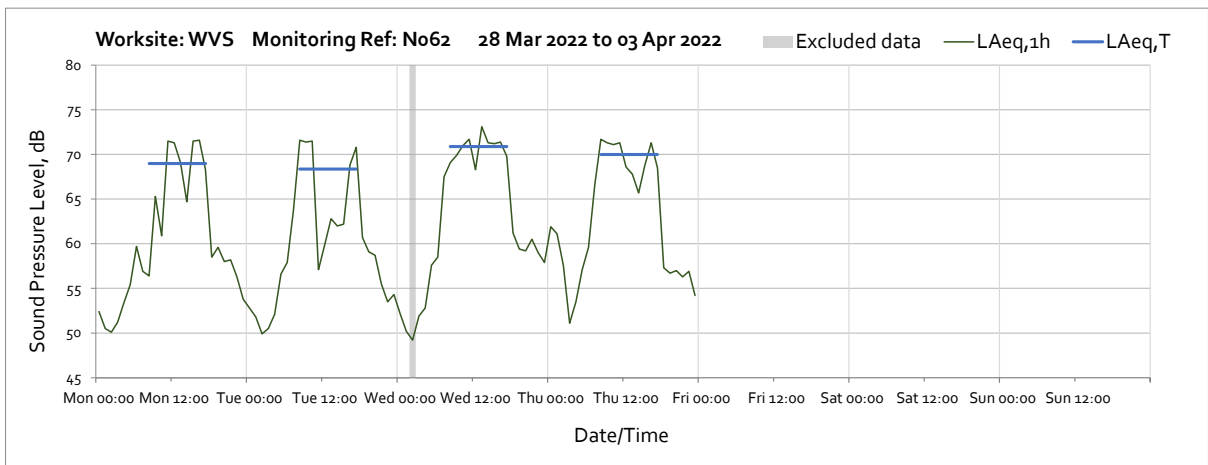


Worksite: Westgate Ventilation Shaft (WVS) – Monitoring Ref: N062





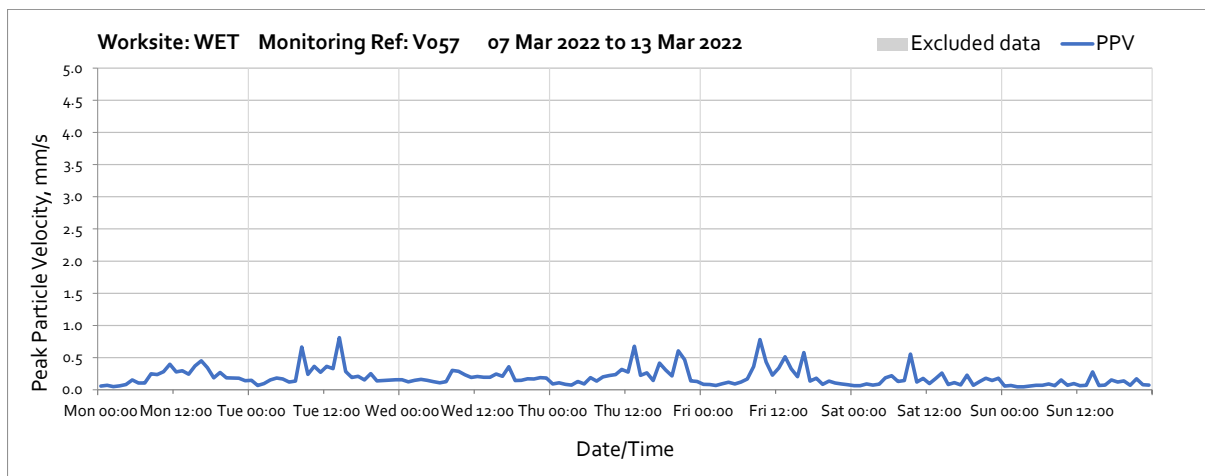
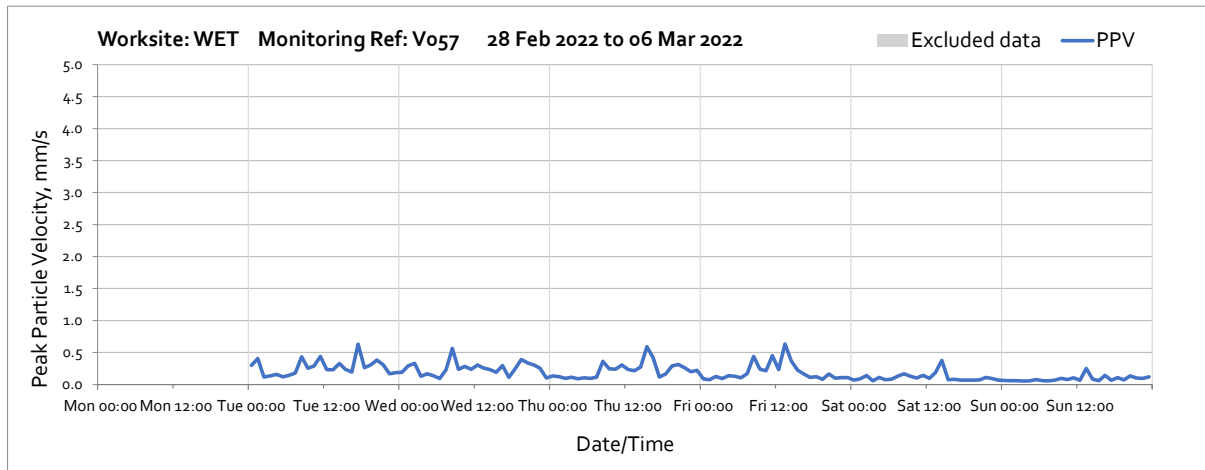
Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.

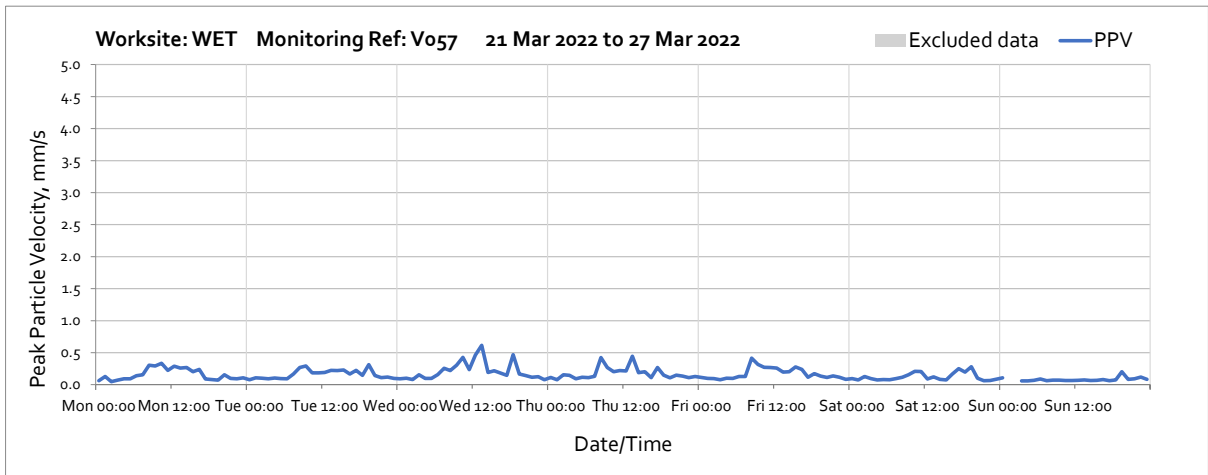
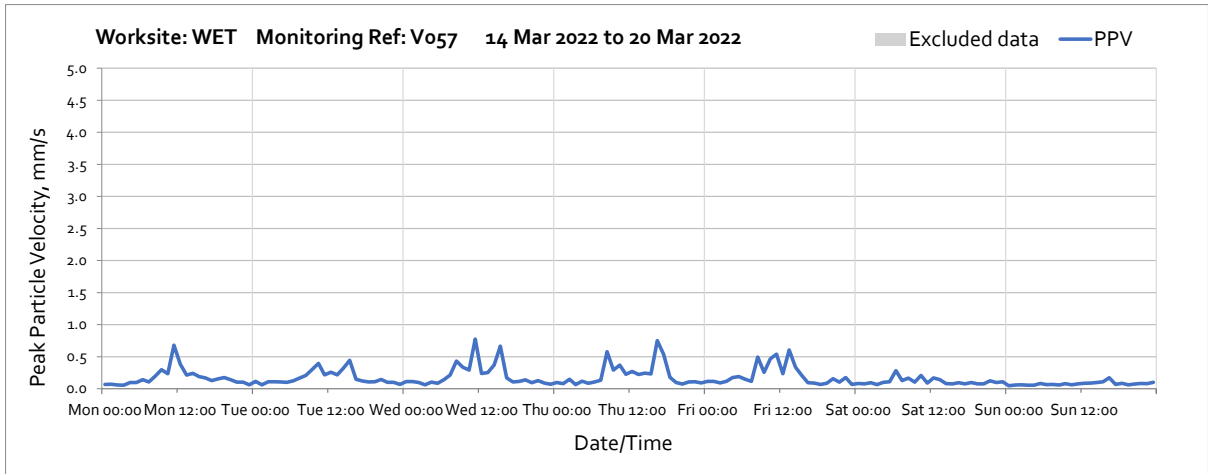


Vibration

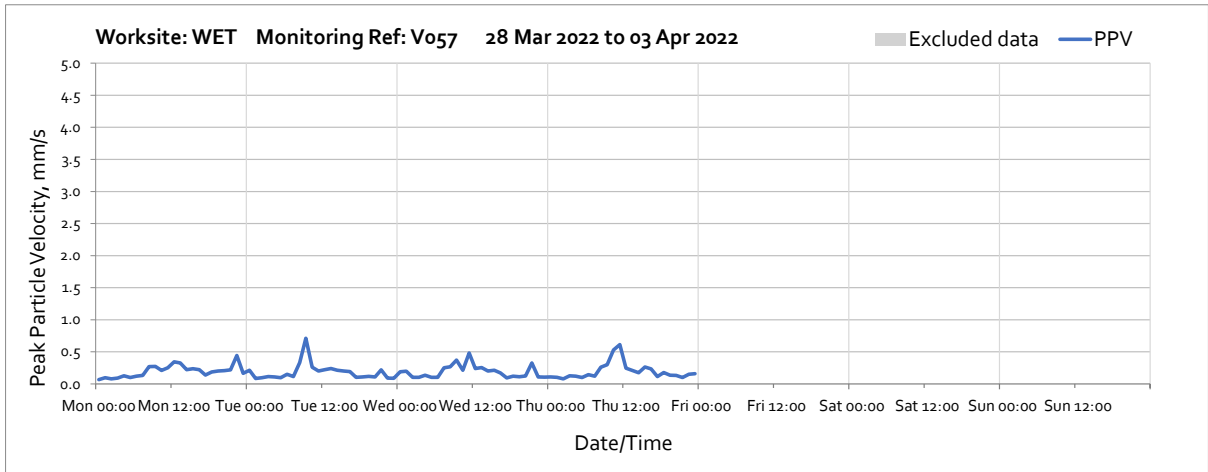
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative 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: V057

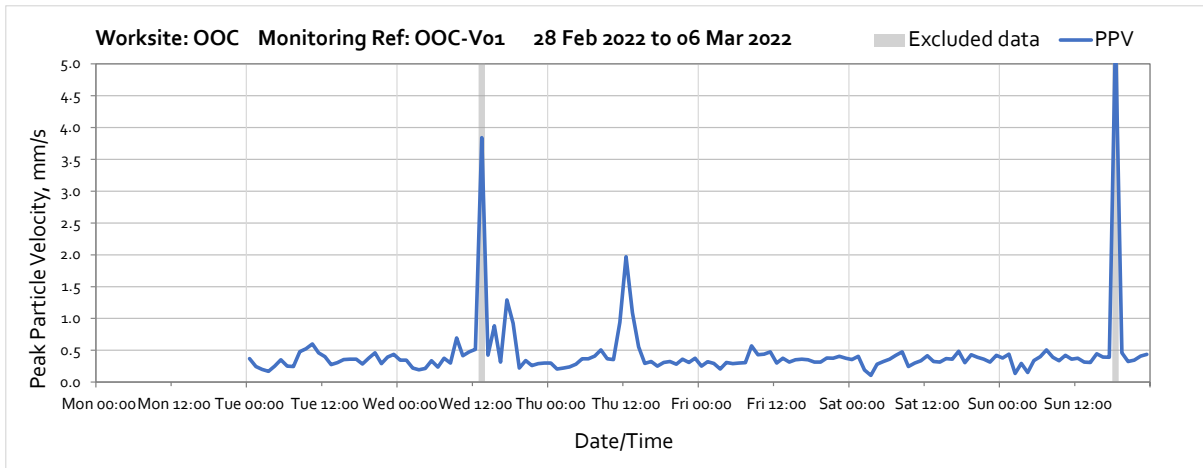




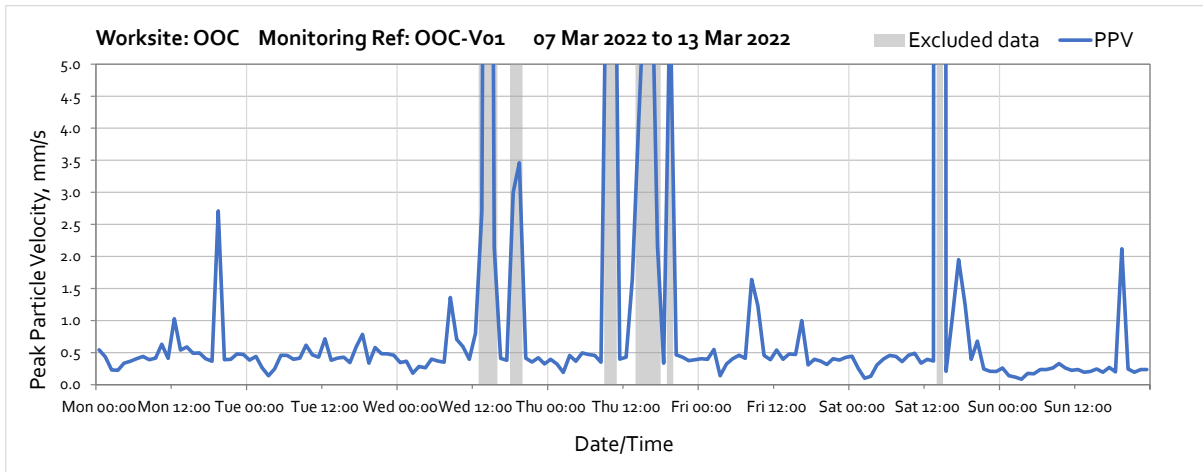
Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.



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



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



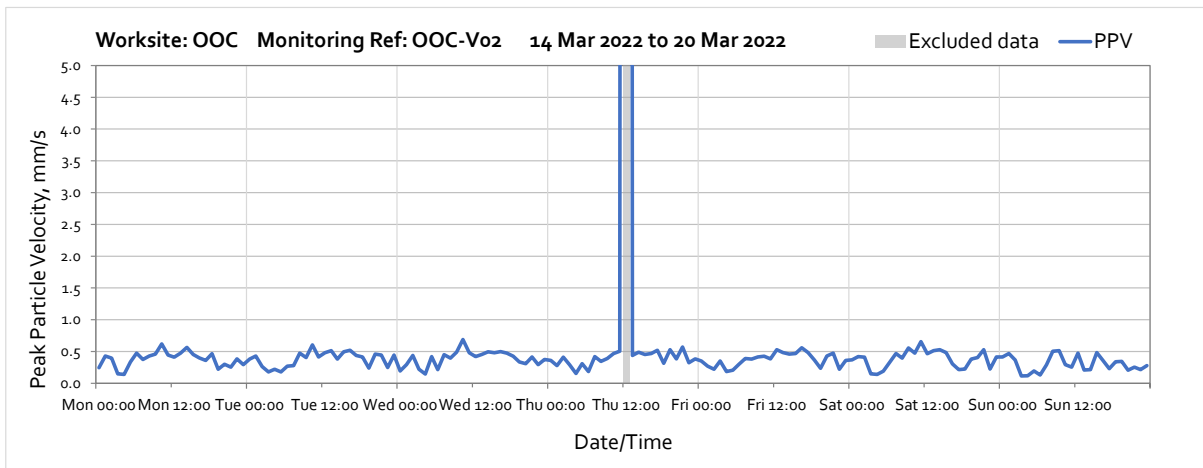
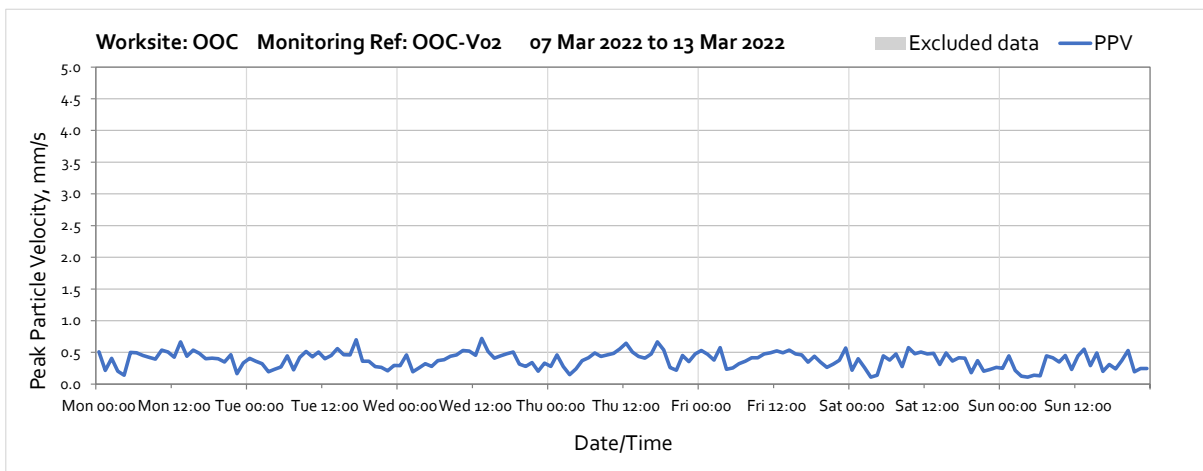
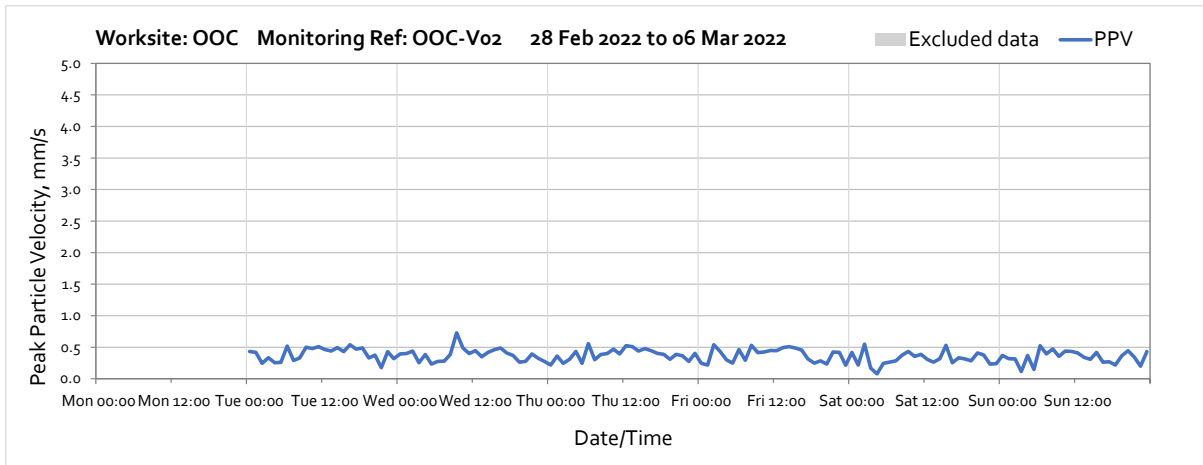
Note: High vibration levels measured across the week were due to local disturbance at the monitoring location and not representative of HS2 vibration levels at the receptor.



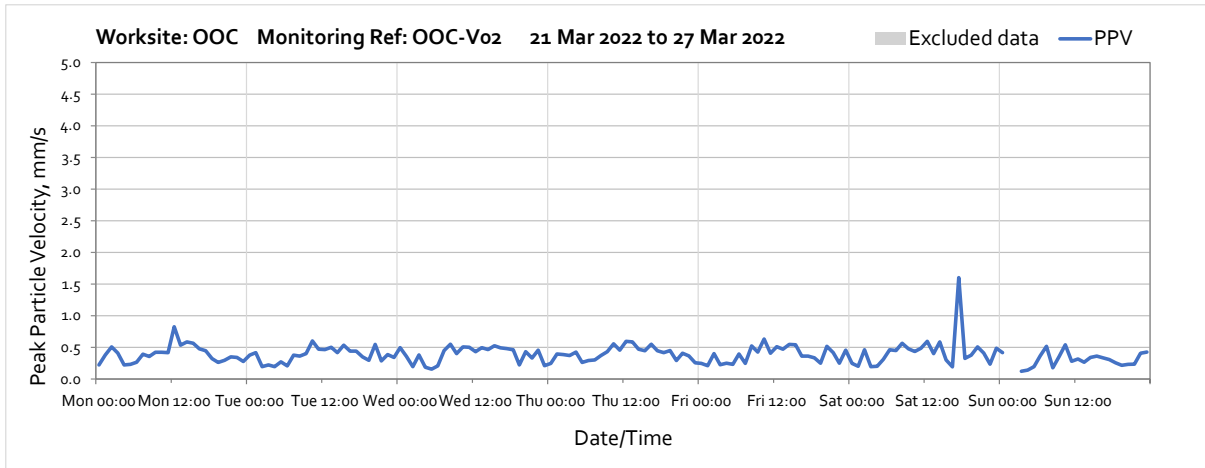
Note: High vibration levels measured across the week were due to local disturbance at the monitoring location and not representative of HS2 vibration levels at the receptor. The monitor has been removed from site on Tuesday 15th March 2022.

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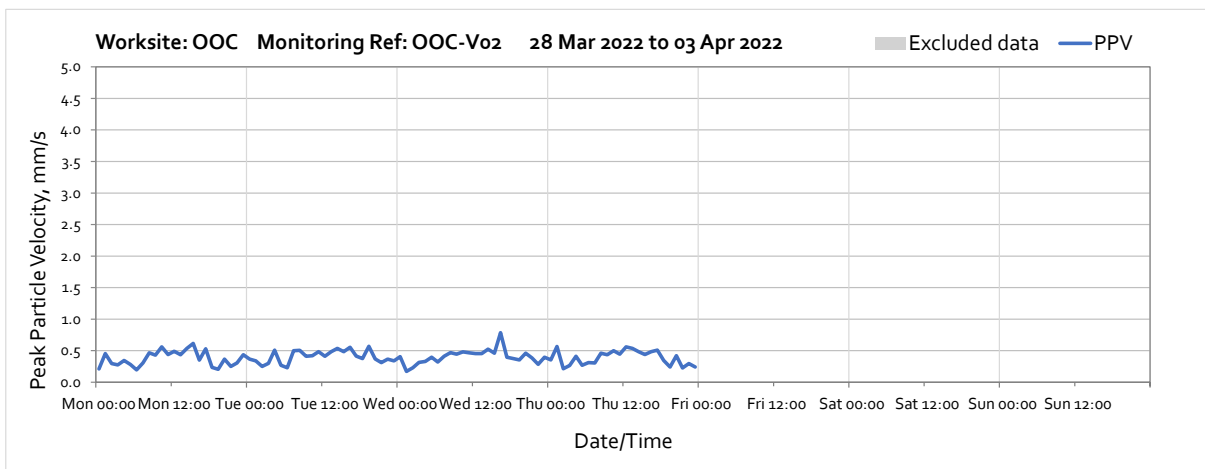
Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V02



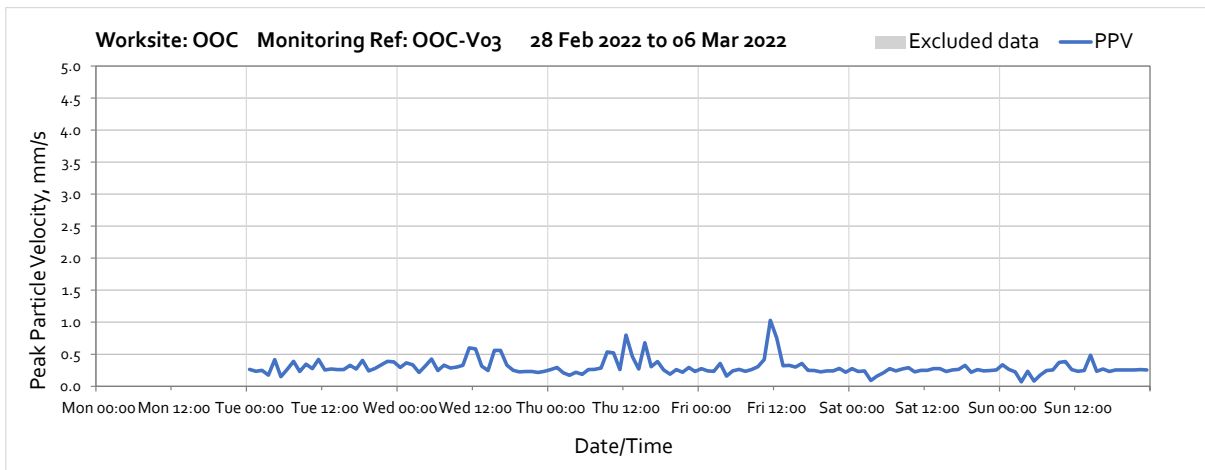
Note: High vibration levels measured at 12:00 on Thursday 17th March 2022 were due to local disturbance at the monitoring location and not representative of HS2 vibration levels at the receptor.

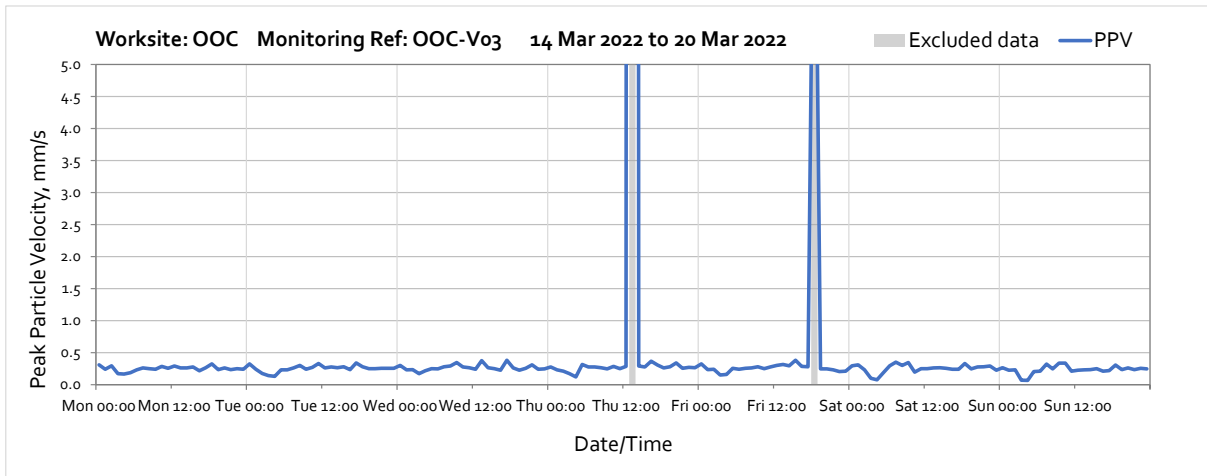
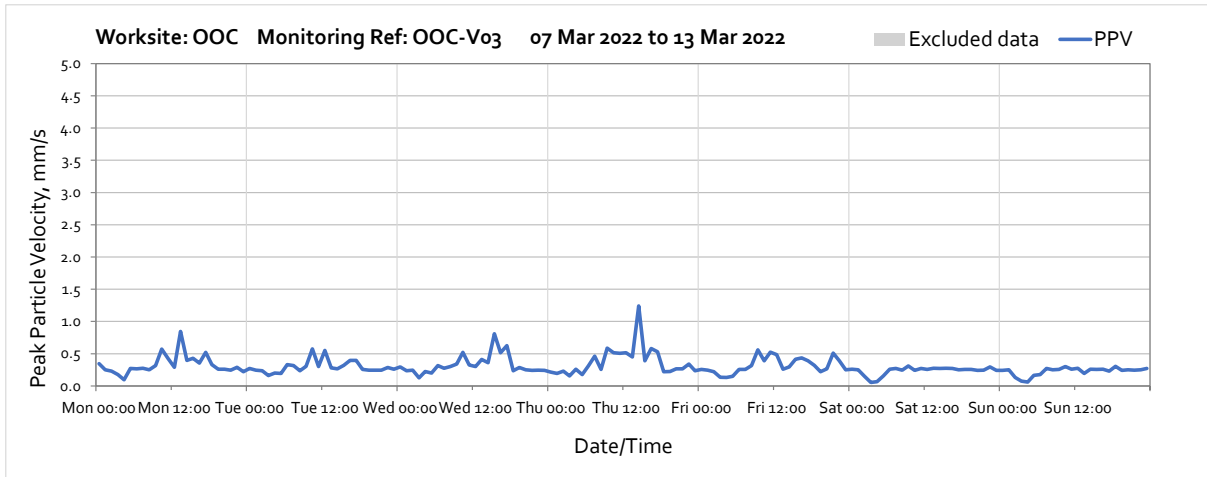


Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.

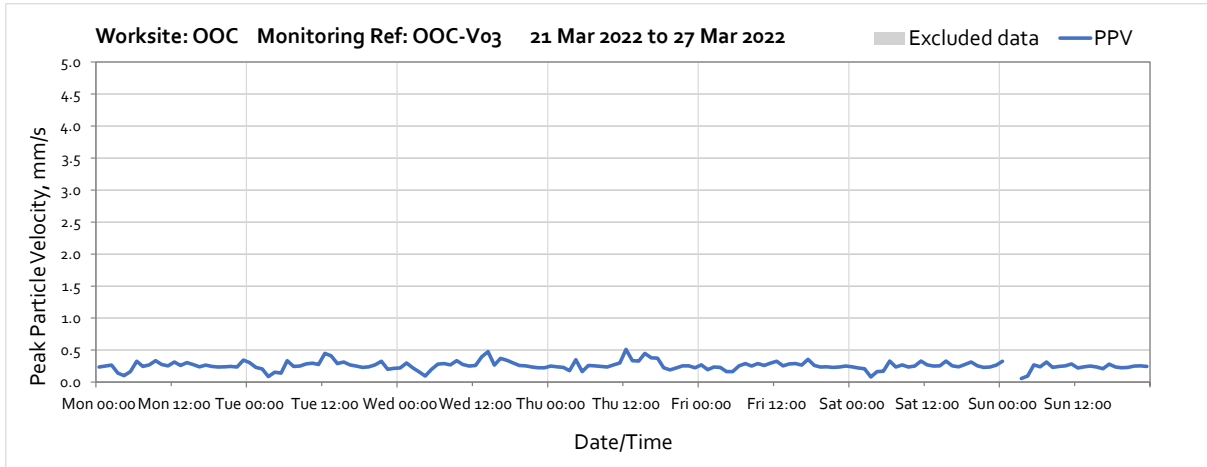


Worksite: Old Oak Common (OOC) – Monitoring Ref: OOC-V03

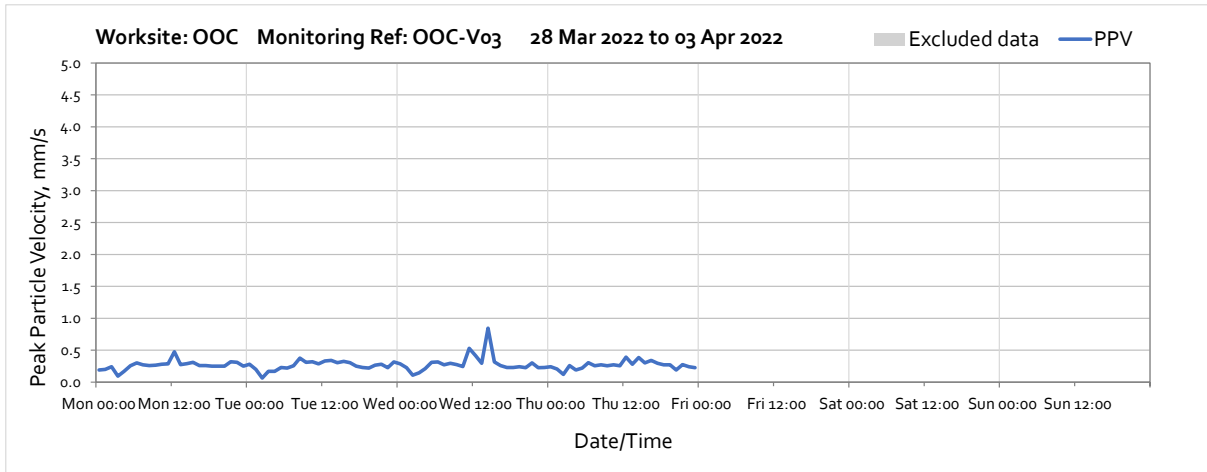




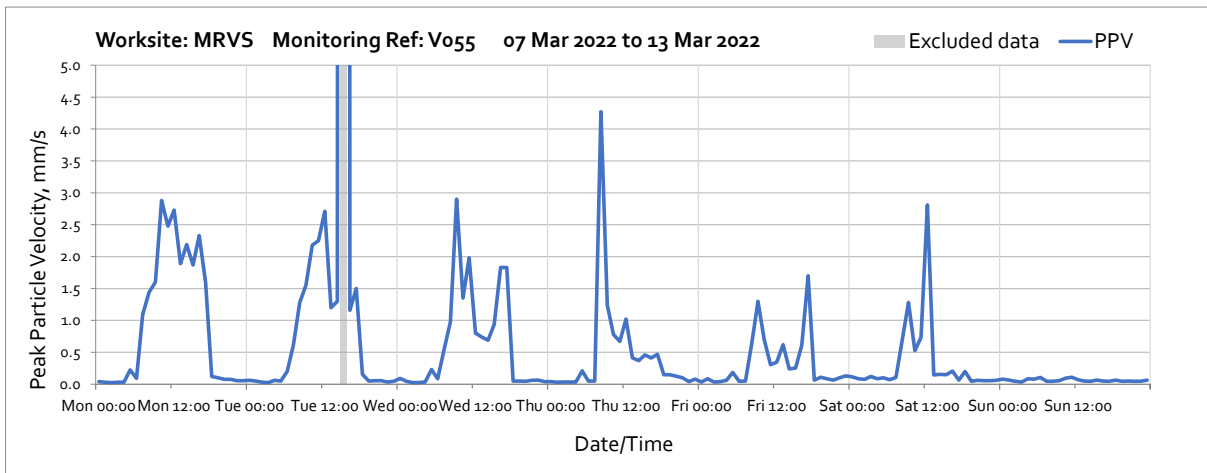
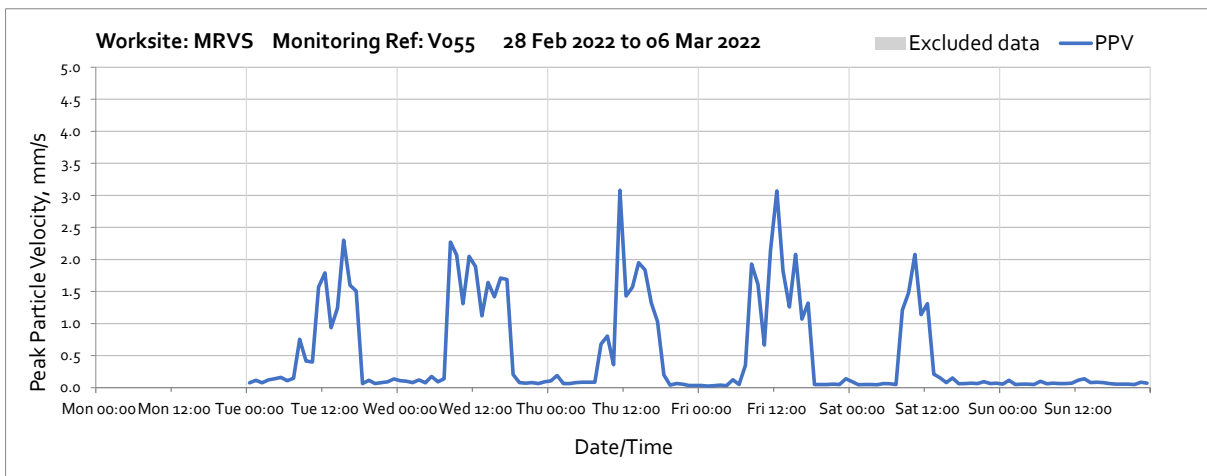
Note: High vibration levels measured across the week were due to local disturbance at the monitoring location and not representative of HS2 vibration levels at the receptor.



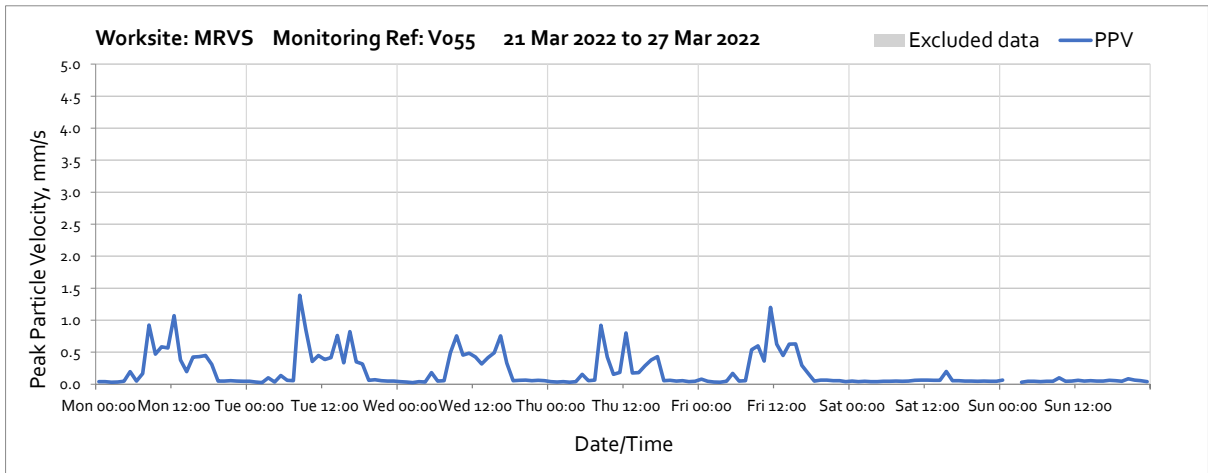
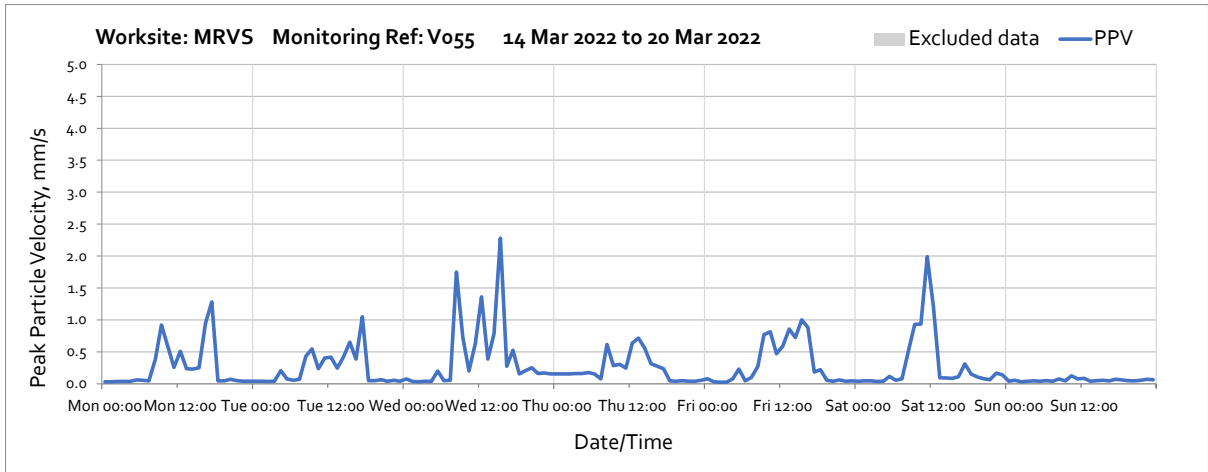
Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.



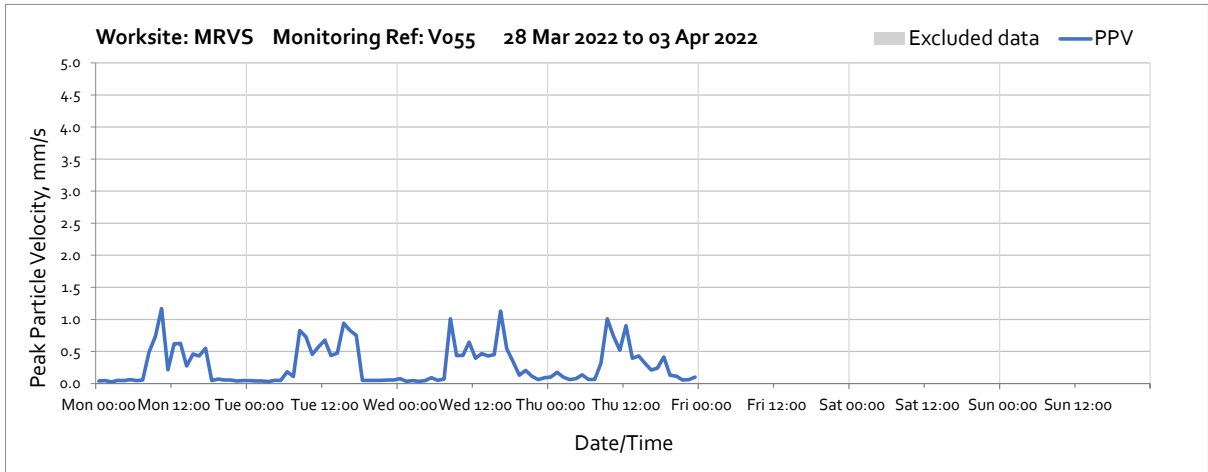
Worksite: Mandeville Road Vent Shaft (MRVS) – Monitoring Ref: V055



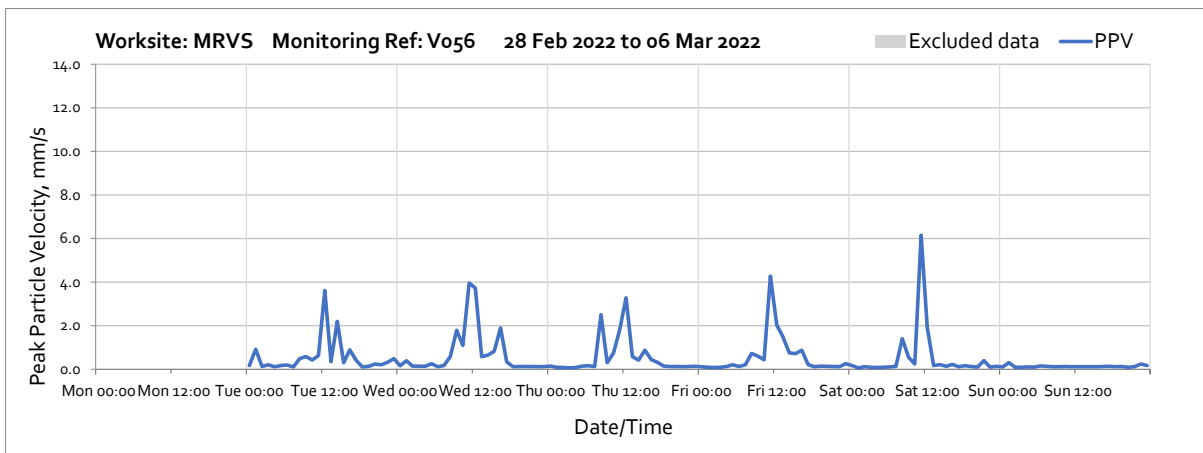
Note: High vibration levels measured at 15:00 on Tuesday 8th March 2022 were due to local disturbance at the monitoring location and not representative of HS2 vibration levels at the receptor.



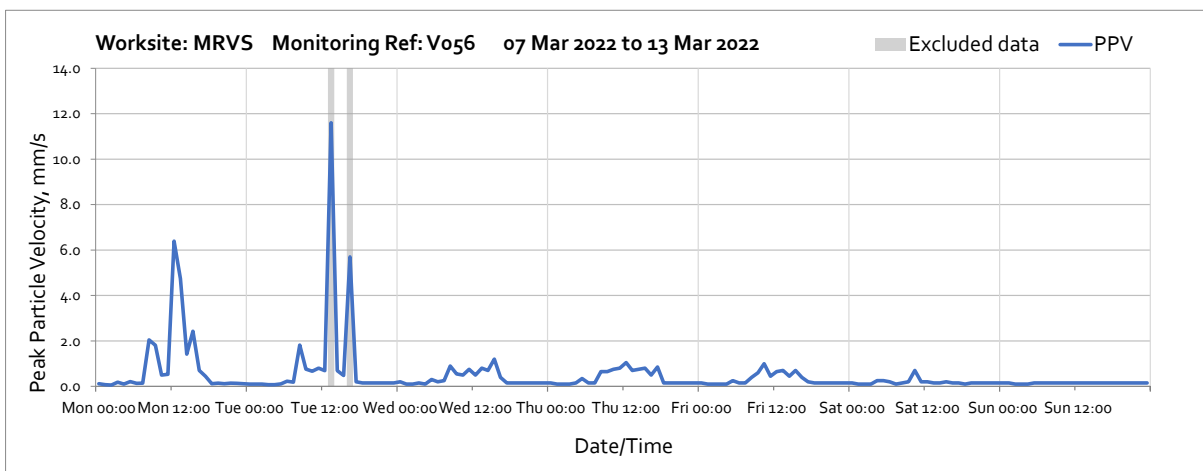
Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.



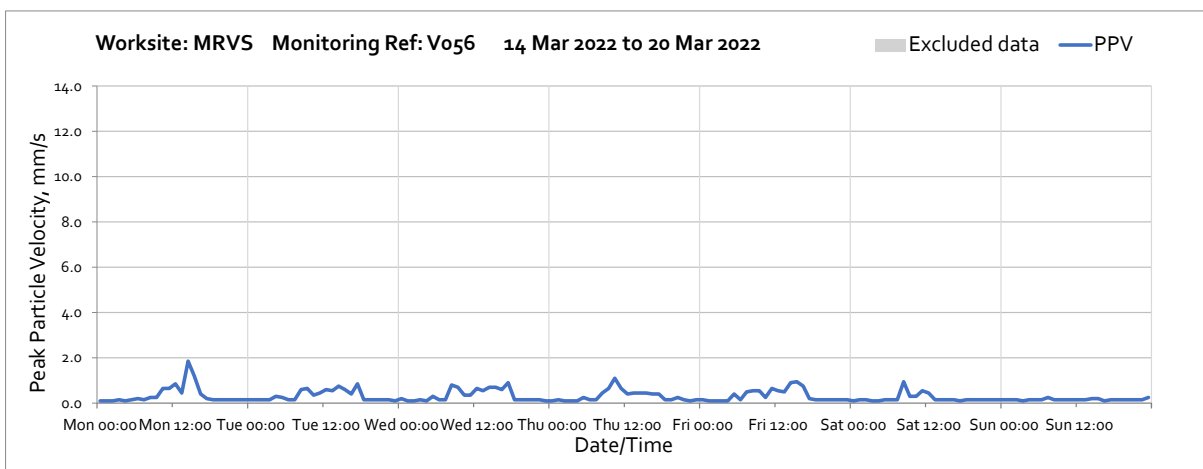
Worksite: Mandeville Road Vent Shaft (MRVS) – Monitoring Ref: V056

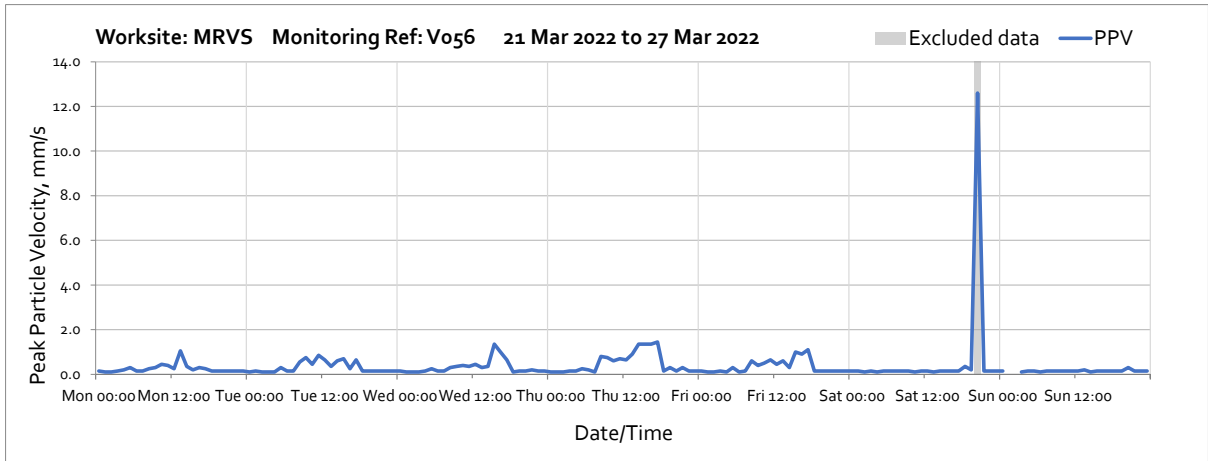


Note: High vibration levels measured at 11:00 on Saturday 5th March 2022 were due to piling works undertaken next to the monitoring station and therefore not representative of HS2 vibration levels at the receptor.

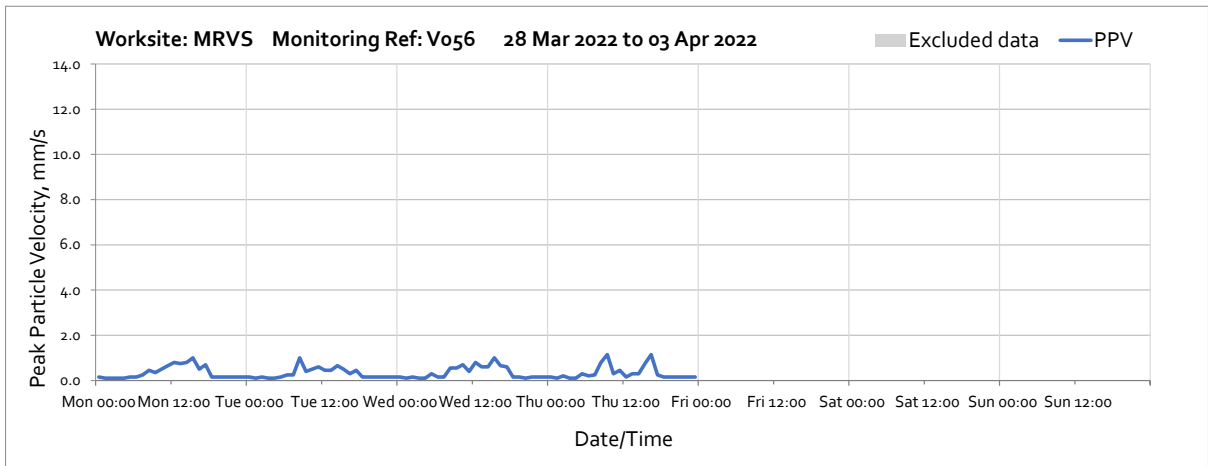


Note: High vibration levels measured at 12:00 on Monday 7th March 2022 were due to piling works undertaken next to the monitoring station and therefore not representative of HS2 vibration levels at the receptor. High vibration levels measured at 13:00 and 16:00 on Tuesday 8th March 2022 were due to local disturbance at the monitoring location and not representative of HS2 vibration levels at the receptor.

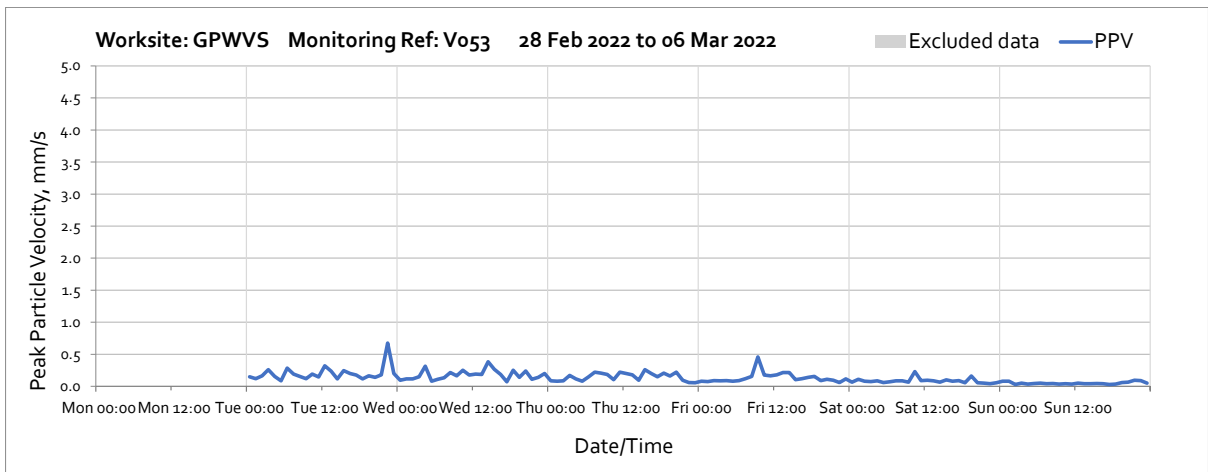


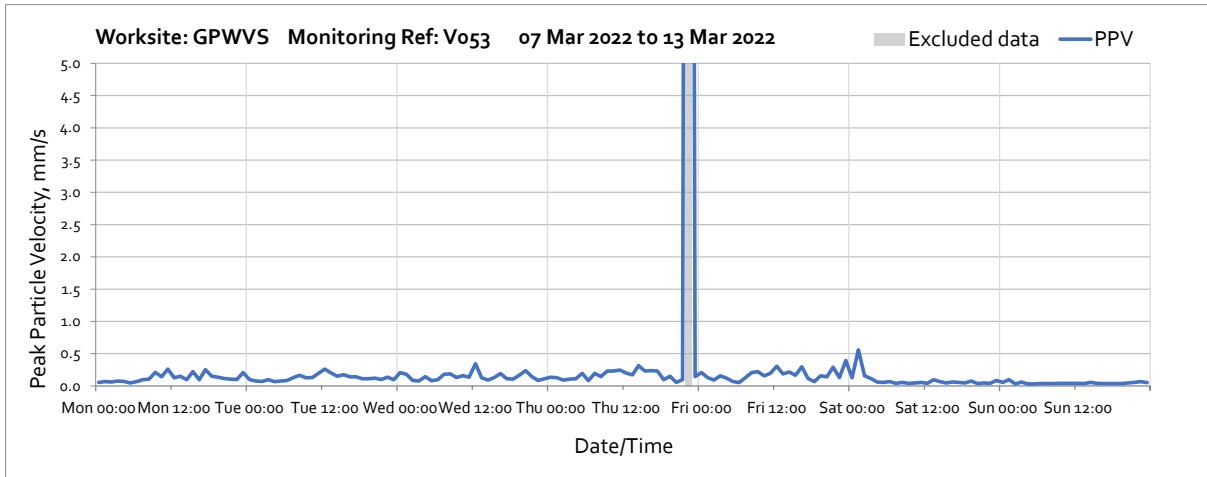


Note: High vibration levels measured at 20:00 on Saturday 26th March 2022 were due to local disturbance at the monitoring location and not representative of HS2 vibration levels at the receptor. Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.

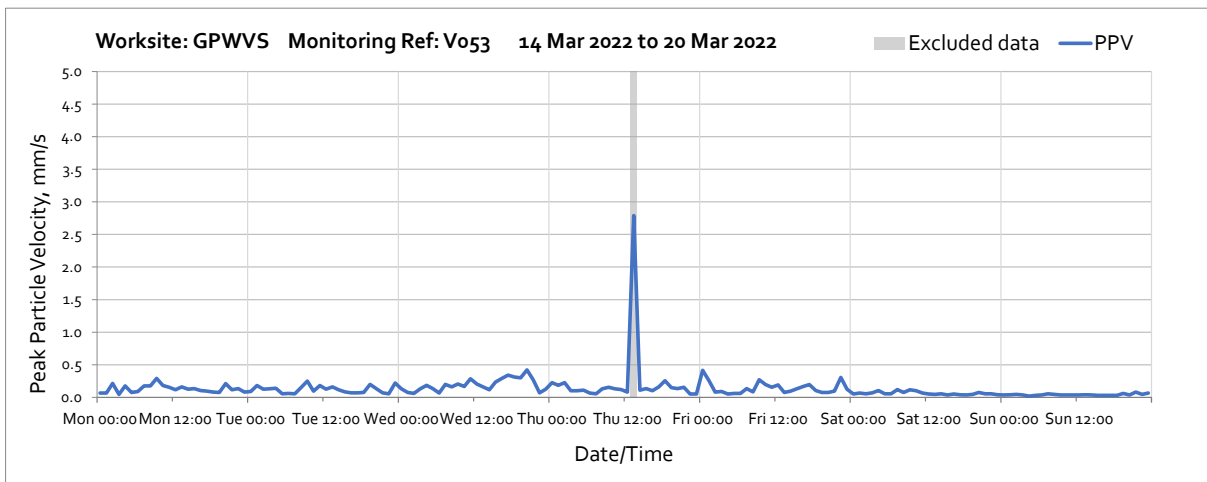


Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: V053

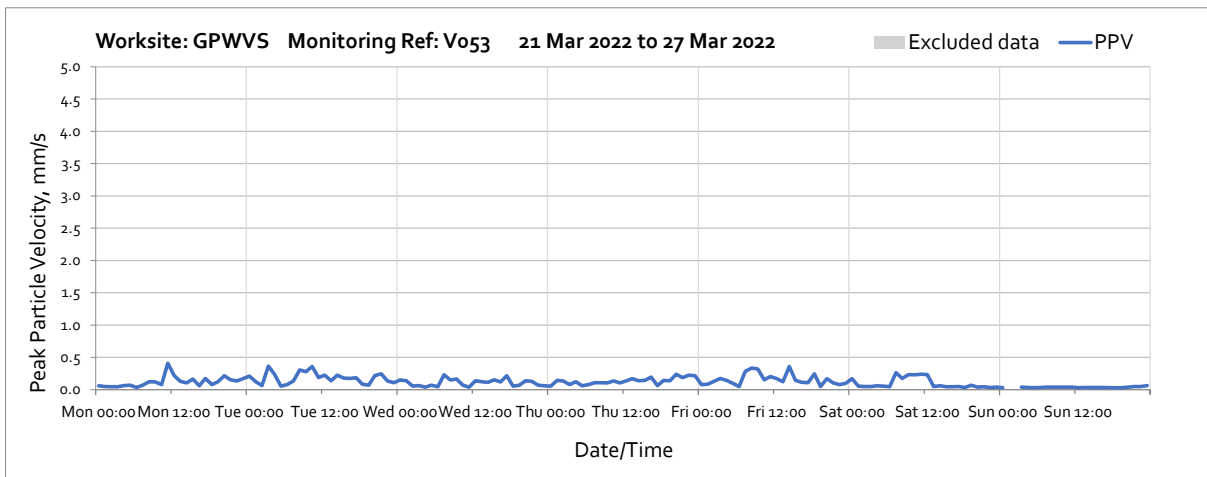




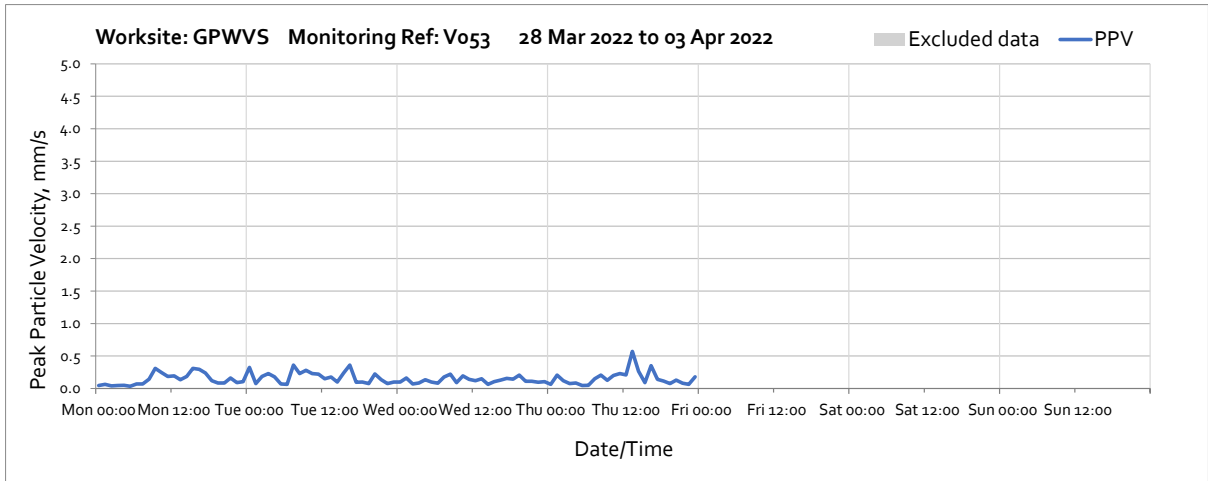
Note: High vibration levels measured at 22:00 on Thursday 10th March 2022 were due to local disturbance at the monitoring location and not representative of HS2 vibration levels at the receptor.



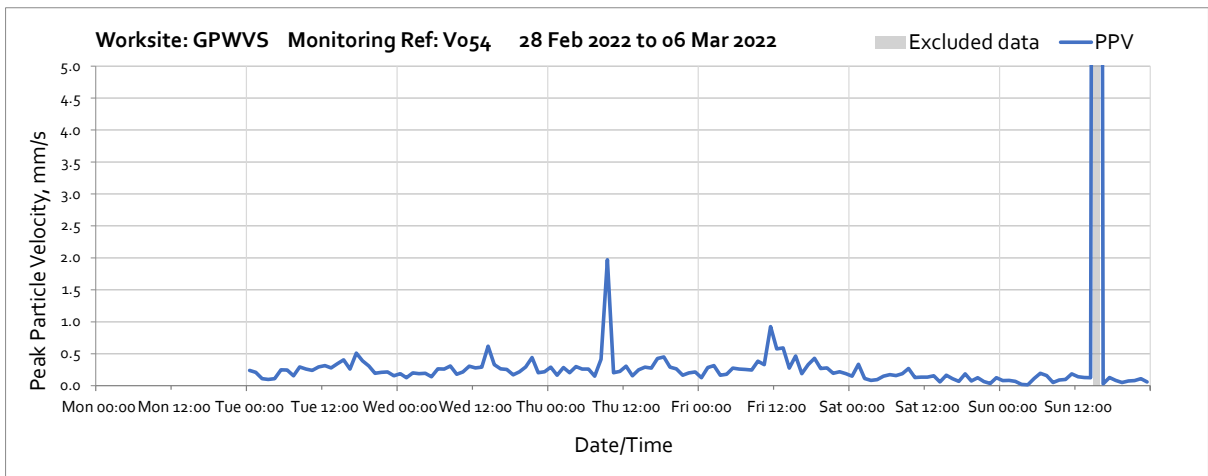
Note: High vibration levels measured at 13:00 on Thursday 17th March 2022 were due to local disturbance at the monitoring location and not representative of HS2 vibration levels at the receptor.



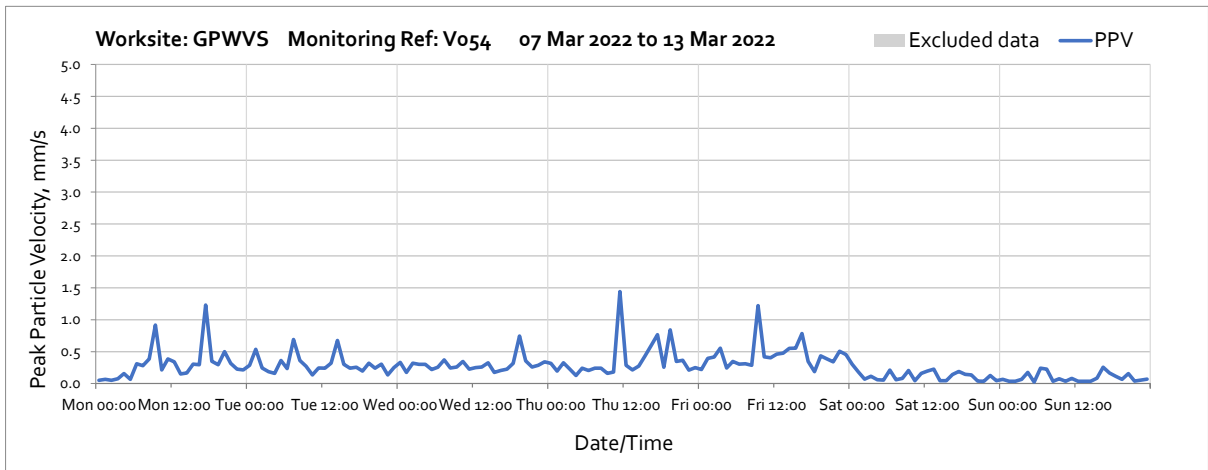
Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.

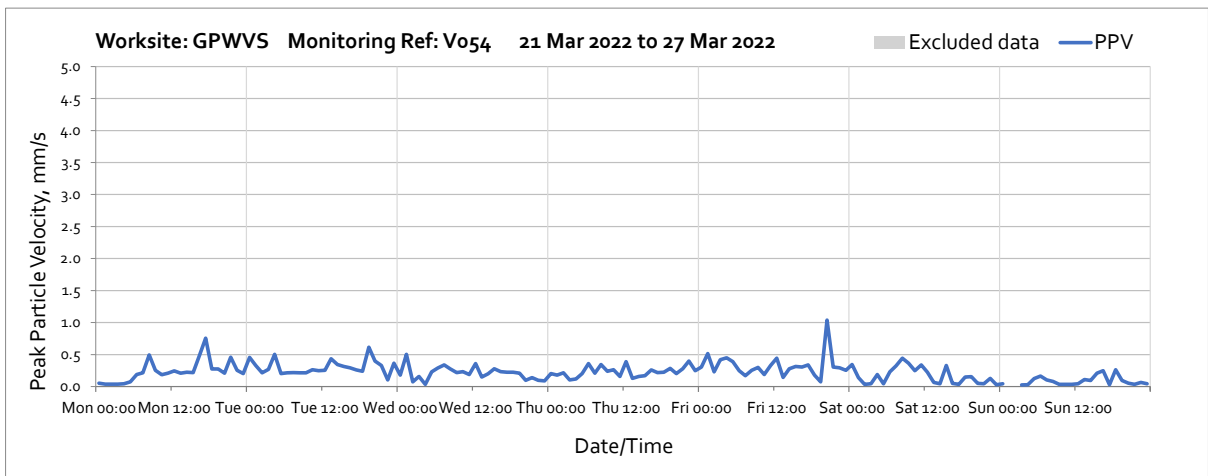
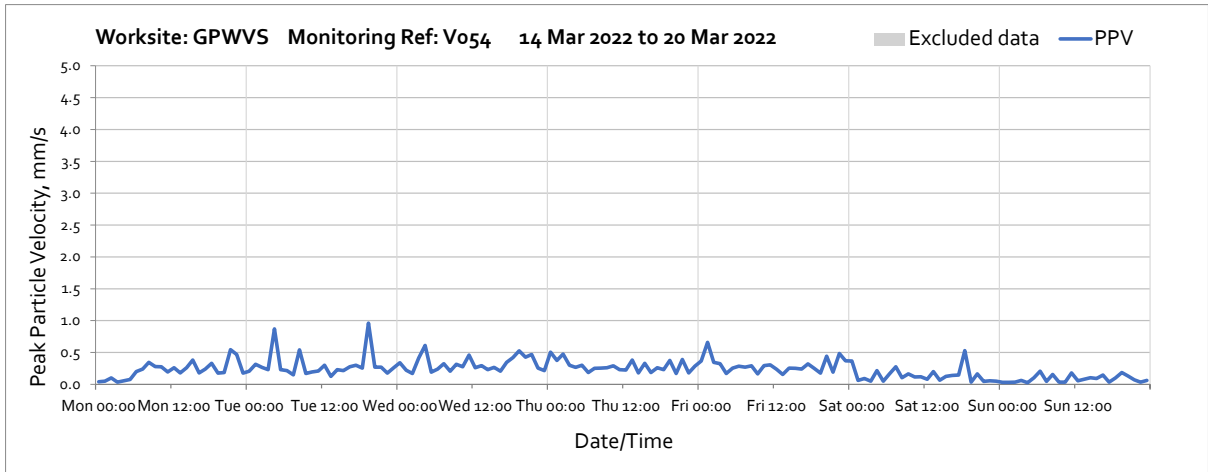


Worksite: Green Park Way Vent Shaft (GPWVS) – Monitoring Ref: V054



Note: High vibration levels measured at 15:00 on Sunday 6th March 2022 were due to local disturbance at the monitoring location and not representative of HS2 vibration levels at the receptor.





Note: Missing data in between 01:00 and 02:00 on Sunday 27th March was due to the clocks going forward at the start of British Summer Time.

