

Construction noise and vibration Monthly Report – November 2021

London Borough of Hillingdon

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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 monitoring carried out within the London Borough of Hillingdon during the month of November 2021.

Within this period noise and vibration monitoring was undertaken at the following worksites:

- Colne Valley Viaduct Dews Lane site (ref.: CVV-DL), where jetty piling works, compound operation, construction of Harefield compensation pond, civil works, earthworks, drainage works and ground investigation works were underway;
- Colne Valley Viaduct Moorhall Road site (ref.: CVV-MR), where piling works, compound operations, civil works, ground investigation works, earthworks and drainage works were underway;
- West Ruislip Portal worksite (ref.: West Ruislip Portal) where main activities included bored and sheet piling, stone column installation, pile trimming, excavations works, steelworks and formworks installation, concreting works, dewatering and site set-up for tunnelling activities;
- West Ruislip Retained Embankment worksite (ref.: WRRE), where main activities included bored and sheet piling, stone column installation, pile trimming, footpath construction, bulk excavations, steelworks and formworks installation, dewatering and site set-up for tunnelling activities;
- South Ruislip Ventilation Shaft worksite (ref.: SRVS), where diaphragm walling works, excavation and slurry works, installation of cages and concrete pouring works were underway;
- Harvil Road worksite (ref.: HR), where main activities included bored and sheet piling, pile trimming, Harvil Road diversion works and bridge installation works.

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

- Ruislip Golf Course where power utility works were underway;
- Harvil Road embankment, where main activities included vegetation clearance, temporary road diversion, haul road installation, embankment construction and installation and use of conveyor system;
- Copthall Retained Embankment / Trough, where main activities included vegetation clearance, haul road installation, bulk excavation, installation and use of conveyor system and works for the Copthall Tunnel West Portal (including piling, excavation and portal construction);

- Northern Sustainable Placement Area, where main activities included vegetation clearance, haul road installation, installation and use of conveyor system, stockpiling and localised service connection works;
- Southern Sustainable Placement Area, where main activities included vegetation clearance, haul road installation, stockpiling and localised service connection works.

There were no exceedances of 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>), during the reporting period.

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

Three (3) 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 Hillingdon (LBH) for the period 1st to 30th November 2021.

1.1.3 Construction sites in the local authority area where monitoring was undertaken during this period include:

- Colne Valley Viaduct Dews Lane site, ref.: CVV-DL (see Plan 1 in Appendix A), where work activities included:
 - jetty piling works;
 - compound operations (including de-sanding works);
 - installation of sheet pile, piling works, including support plant, installation of reinforcement cage, concrete pouring and bored pile breaking out works;
 - construction of Harefield compensation pond;
 - civil works;
 - earthworks;
 - drainage works; and
 - ground investigation works.

- Colne Valley Viaduct Moorhall Road site, ref.: CVV-MR (see Plan 1 in Appendix A), where work activities included:
 - jetty piling works;
 - compound operations (including de-sanding works);
 - civil works;
 - earthworks;
 - drainage works;
 - ground investigation works; and
 - installation of sheet pile, piling works, including support plant, installation of reinforcement cage, concrete pouring and bored pile breaking out works.

- West Ruislip Portal Worksite, ref.: WRP (see Plan 3 in Appendix A), where work activities included:
 - bored and sheet piling;
 - stone column installation;
 - pile trimming;
 - excavation works;
 - steelworks and formworks installation;
 - concreting works;
 - dewatering; and
 - tunnelling activities set-up.

- South Ruislip Ventilation Shaft worksite, ref.: SRVS (see Plan 4 in Appendix A), where work activities included:
 - diaphragm walling works;
 - excavation and slurry works;
 - installation of cages; and
 - concrete pouring.

- West Ruislip Retained Embankment Worksite, ref.: WRRE, where work activities included:
 - bored and sheet piling;
 - stone column installation;

- pile trimming;
 - footpath construction;
 - bulk excavation;
 - steelworks and formworks installation;
 - dewatering; and
 - tunnelling activities set-up.
- Harvil Road worksite, ref.: HR (see Plan 2 in Appendix A), where work activities included:
 - bored and sheet piling;
 - pile trimming;
 - Harvil Road diversion works; and
 - bridge installation works.

1.1.4 Further works, where monitoring did not take place, were also undertaken at the following location:

- Ruislip Golf Course where power utility works were underway;
- Harvil Road embankment, where main activities included vegetation clearance, temporary road diversion, haul road installation, embankment construction and installation and use of conveyor system;
- Cophthall Retained Embankment / Trough, where main activities included vegetation clearance, haul road installation, bulk excavation, installation and use of conveyor system and works for the Cophthall Tunnel West Portal (including piling, excavation and portal construction);
- Northern Sustainable Placement Area, where main activities included vegetation clearance, haul road installation, installation and use of conveyor system, stockpiling and localised service connection works;
- Southern Sustainable Placement Area, where main activities included vegetation clearance, haul road installation, stockpiling and localised service connection works.

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 Twelve noise and two vibration monitoring installations were active in November in the LBH area. Table 2 summarises the position of noise and vibration monitoring installations within the LBH area in November 2021.

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

Table 2: Monitoring Locations

| Worksite Reference | Measurement Reference | Address |
|--|-----------------------|---|
| Colne Valley Viaduct Dews Lane (CVV-DL) | CVV-DL-NMP2 | Highway Farm House, Harvil Rd, Harefield, Uxbridge |
| | CVV-DL-NMP3 | Dew's Farm Cottages, Dews Lane, Harefield, Uxbridge |
| Colne Valley Viaduct Moorhall Road (CVV-MR) | CVV-MR-NMP1 | Weir Cottage, Denham Garden Village, Denham, Buckinghamshire |
| | CVV-MR-NMP2 | Harefield Marina, Moorhall Road, London Borough of Hillingdon, London, Greater London |
| | CVV-MR-NMP3 | Peerless Drive, Harefield, Uxbridge |
| West Ruislip Portal (WRP) | N048 | West Ruislip Golf Club, Ickenham Rd, Ruislip |
| | N056 | 83 The Greenway, Ickenham, Ruislip |
| | N057 | 123 The Greenway, Ickenham, Ruislip |
| West Ruislip Retained Embankment (WRRE) | N065 | Breakspears Road South, Harefield, Uxbridge |
| | N066 | Hoylake Crescent, Ickenham, Uxbridge |
| | HL-V001 | 152 Hoylake Crescent, Ickenham, Uxbridge |
| South Ruislip Ventilation Shaft (SRVS) | N061 | Cineworld South Ruislip car park, Ruislip |
| | SRVS-V001 | Braintree Industrial Estate - Building D4 |
| Harvil Road (HR) | N067 | Harvil Road worksite south boundary |
| | HR-N002 | Certas Energy Bunker Site - Harefield |

2 Summary of Results

2.1 Summary of Measured Noise 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 |
| CVV-DL | CVV-DL-NMP2 | Highway Farm House, Harvil Rd, Harefield, Uxbridge | Free-field | 57.4 (59.4) | 57.6 (60.1) | 56.4 (58.4) | 56.1 (58.4) | 57.0 (83.2) | 56.6 (57.6) | 58.2 (60.5) | 57.5 (59.1) | 56.7 (58.3) | 55.3 (56.2) | 56.8 (69.3) | 55.3 (57.0) |
| | CVV-DL-NMP3 | Dew's Farm Cottages, Dews Lane, Harefield, Uxbridge, | Free-field | 59.5 (63.9) | 62.6 (68.7) | 50.7 (54.5) | 48.8 (57.4) | 46.4 (55.4) | 53.8 (60.9) | 58.3 (60.9) | 51.8 (53.4) | 49.4 (53.7) | 40.9 (47.2) | 47.7 (61.5) | 44.2 (53.1) |
| CVV-MR | CVV-MR-NMP1 | Weir Cottage, Denham Garden Village, Denham, Buckinghamshire | Free-field | 53.6 (55.0) | 59.0 (68.3) | 52.0 (60.8) | 50.3 (71.6) | 46.1 (55.3) | 51.0 (53.0) | 53.1 (54.6) | 52.8 (57.9) | 52.0 (57.6) | 44.6 (50.2) | 51.0 (55.3) | 45.7 (52.1) |
| | CVV-MR-NMP2 | Harefield Marina, Moorhall Road, London, Greater London | Free-field | 51.3 (53.9) | 55.8 (65.8) | 48.8 (52.5) | 47.7 (60.4) | 44.5 (54.0) | 48.7 (51.0) | 53.1 (60.6) | 50.2 (54.9) | 50.1 (56.1) | 41.3 (46.2) | 47.1 (51.9) | 42.3 (50.6) |
| | CVV-MR-NMP3 | Peerless Drive, Harefield, Uxbridge | Free-field | 52.3 (55.5) | 59.2 (70.7) | 50.5 (69.9) | 47.6 (55.5) | 45.1 (54.3) | 49.7 (52.6) | 50.3 (52.3) | 50.6 (54.1) | 53.1 (69.8) | 42.5 (47.4) | 48.3 (52.2) | 43.8 (54.9) |
| WRP | N048 | West Ruislip Golf Club, Ickenham Rd, Ruislip | Free-field | 61.1 (66.7) | 65.9 (68.0) | 58.1 (65.8) | 56.0 (62.9) | 54.0 (62.9) | 59.4 (65.3) | 62.5 (66.0) | 57.5 (62.8) | 56.1 (72.3) | 49.9 (66.5) | 53.0 (59.7) | 48.5 (57.4) |
| | N056 | 83 The Greenway, Ickenham, Ruislip | Free-field | 61.6 (62.8) | 60.2 (61.5) | 60.6 (61.7) | 59.2 (61.2) | 54.4 (62.9) | 58.6 (59.1) | 59.9 (61.1) | 60.2 (60.7) | 59.7 (64.3) | 51.7 (58.6) | 58.8 (62.6) | 53.9 (58.8) |

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| Worksite Reference | Measurement Reference | Site Address | Free-field or Façade Measurement | Weekday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) | | | | | Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) | | | | | Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) | |
|--------------------|-----------------------|--|----------------------------------|--|----------------|----------------|----------------|----------------|---|----------------|----------------|----------------|----------------|--|----------------|
| | | | | 0700 - 0800 | 0800 - 1800 | 1800 - 1900 | 1900 - 2200 | 2200 - 0700 | 0700 - 0800 | 0800 - 1300 | 1300 - 1400 | 1400 - 2200 | 2200 - 0700 | 0700 - 2200 | 2200 - 0700 |
| | N057 | 123 The Greenway, Ickenham, Ruislip | Free-field | 57.3 (58.2) | 56.7 (57.8) | 56.9 (59.4) | 55.5 (65.0) | 51.2 (59.9) | 55.1 (55.7) | 57.6 (59.1) | 56.3 (56.7) | 58.9 (73.3) | 48.0 (54.6) | 56.1 (67.8) | 50.2 (55.0) |
| WRRE | N065 | Breakspear Road South, Harefield, Uxbridge | Free-field | 63.5 (65.8) | 64.0 (65.8) | 62.8 (65.7) | 60.8 (69.3) | 56.7 (63.9) | 61.1 (62.8) | 62.8 (65.7) | 63.6 (64.3) | 62.1 (64.9) | 54.5 (61.1) | 59.9 (66.3) | 54.3 (64.7) |
| | N066 | Hoylake Crescent, Ickenham, Uxbridge | Free-field | 56.7 (57.9) | 58.3 (64.8) | 55.6 (56.9) | 54.7 (66.6) | 50.3 (56.0) | 54.1 (55.8) | 57.1 (63.2) | 57.1 (59.5) | 56.0 (62.7) | 48.2 (54.7) | 54.6 (59.8) | 49.9 (53.9) |
| SRVS | N061 | Cineworld South Ruislip car park, Ruislip | Free-field | 59.8 (62.0) | 63.2 (65.7) | 62.4 (64.4) | 62.4 (69.0) | 57.0 (64.7) | 60.1 (61.4) | 63.2 (65.2) | 63.4 (65.1) | 62.8 (66.3) | 56.1 (63.1) | 60.9 (63.8) | 55.0 (60.0) |
| HR | N067 | Harvil Road worksite south boundary | Free-field | 56.6 (59.5) | 60.6 (63.6) | 55.6 (59.7) | 55.6 (64.3) | 52.6 (60.6) | 56.7 (57.5) | 60.3 (61.6) | 60.0 (63.0) | 58.2 (62.3) | 51.5 (55.6) | 57.4 (64.4) | 50.6 (58.5) |
| | HR-N002 | Certas Energy Bunker Site – Harefield | Free-field | 64.1 (65.7) | 63.4 (65.0) | 62.1 (65.9) | 59.4 (64.1) | 57.9 (67.1) | 62.4 (63.2) | 63.5 (66.0) | 63.8 (66.3) | 61.2 (65.8) | 54.9 (59.6) | 61.8 (73.6) | 59.2 (73.3) |

2.1.2 Table 4: Summary of Measured PPV Data over the Monitoring Period 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 |
|--------------------|-----------------------|---|--|
| WRRE | HL-V001 | 152 Hoylake Crescent, Ickenham, Uxbridge | 0.36 (Z-axis) |
| SRVS | SRVS-V001 | Braintree Industrial Estate - Building D4 | 6.16 (Z-axis) |

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 LOAEL and SOAEL

2.2.1 The lowest observed adverse effect level (LOAEL) is defined in the Planning Practice Guidance – Noise (PPG) as the level above which "noise starts to cause small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life".

2.2.2 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."

2.2.3 HS2 Phase One Information Paper E23: Control of Construction Noise and Vibration sets out the LOAELs and SOAELs for construction noise.

2.2.4 Where reported construction noise levels exceed the LOAEL and SOAEL, relevant periods will be identified. Summary statistics to evaluate ongoing qualification for noise insulation and temporary rehousing are also presented where relevant.

2.2.5 Table 5 presents a summary of recorded exceedances of the LOAEL and SOAEL at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 5: Summary of Exceedances of LOAEL and SOAEL

| Worksite Reference | Measurement Reference | Site Address | Day (Weekday, Saturday, Sunday, Night) | Time period | Number of exceedances of LOAEL | Number of exceedances of SOAEL |
|--------------------|-----------------------|--|--|------------------------|--------------------------------|--------------------------------|
| CVW-DL | CVW-DL-NMP2 | Highway Farm House, Harvil Rd, Harefield, Uxbridge | All days | All periods | No exceedance | No exceedance |
| | CVW-DL-NMP3* | Dew's Farm Cottages, Dews Lane, Harefield, Uxbridge | All days | All periods | No exceedance | No exceedance |
| CVW-MR | CVW-MR-NMP1 | Weir Cottage, Denham Garden Village, Denham, Buckinghamshire | Weekdays | 0800-1800 | 5 | No exceedance |
| | CVW-MR-NMP2 | Harefield Marina, Moorhall Road, London, Greater London | Weekdays | 0800-1800 | 3 | No exceedance |
| | CVW-MR-NMP3 | Peerless Drive, Harefield, Uxbridge | Weekdays | 0800-1800 | 2 | No exceedance |
| WRP | N048 | West Ruislip Golf Club, Ickenham Rd, Ruislip | Weekdays | 0800-1800 | 18 | No exceedance |
| | | | Saturdays | 0800-1300 | 2 | |
| | N056 | 83 The Greenway, Ickenham, Ruislip | All days | All periods | No exceedance | No exceedance |
| | N057 | 123 The Greenway, Ickenham, Ruislip | All days | All periods | No exceedance | No exceedance |
| WRRE | N065 | Breakspear Road South, Harefield, Uxbridge | Weekdays Saturdays | 0800-1800 0800-1300 | 17 2 | No exceedance |

| Worksite Reference | Measurement Reference | Site Address | Day (Weekday, Saturday, Sunday, Night) | Time period | Number of exceedances of LOAEL | Number of exceedances of SOAEL |
|--------------------|-----------------------|---------------------------------------|--|------------------------|--------------------------------|--------------------------------|
| WRRE | N066 | Hoylake Crescent, Ickenham, Uxbridge | Weekdays Saturdays | 0800-1800 0800-1300 | 3 1 | No exceedance |
| SRVS | N061 | Hoylake Crescent, Ickenham, Uxbridge | All days | All period | Not applicable** | Not applicable** |
| HR | N067 | Harvil Road worksite south boundary | All days | All period | No exceedance | No exceedance |
| | HR-N002 | Certas Energy Bunker Site – Harefield | Weekdays Saturdays | 0800-1800 0800-1300 | 22 3 | No exceedance |

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

** The defined LOAEL and SOAEL criteria are not applicable to non-residential receptors

2.2.6 No exceedance of the SOAEL was recorded due to HS2 construction works during November 2021. LOAEL exceedances have been recorded at noise monitoring location ref.: CVV-DL-NMP3, ref.: CVV-MR-NMP1, ref.: CVV-MR-NMP2, ref.: CVV-MR-NMP3, ref.: N048, ref.: N065, ref.: N066 and ref.: HR-N002 during core hours.

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.

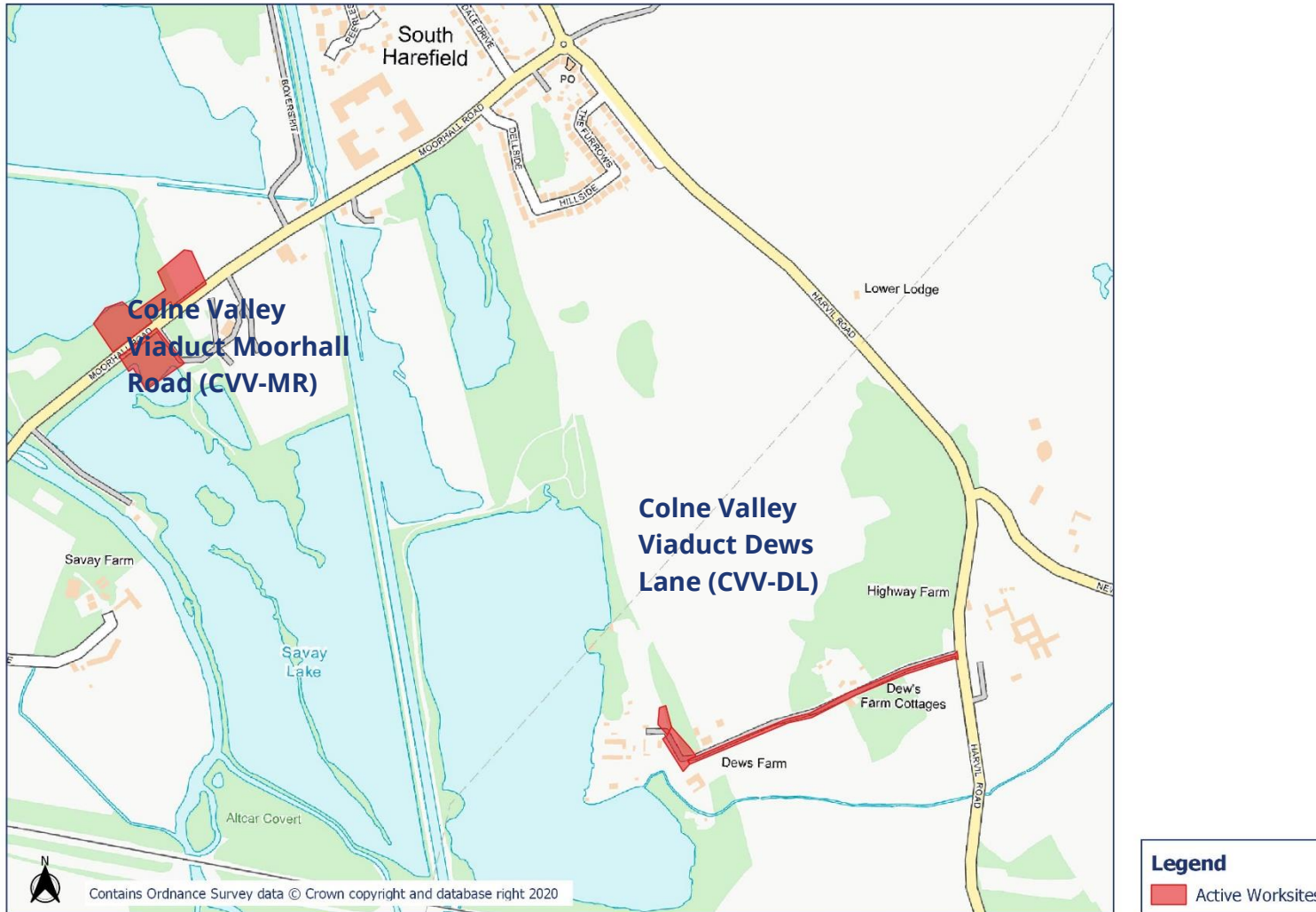
Table 7: Summary of Complaints

| Complaint Reference Number | Worksite Reference | Description of Complaint | Results of Investigation | Actions Taken |
|----------------------------------|--------------------|--|---|--|
| HS2-21-68622-E | WRP | Complaint due to use of road sweeper which caused noise disturbances to the residents. | Wheel washer and spray lance are used within the compound, however, use of the road sweeper has been continued due to numerous complaints about mud on the road. Based on current protocol the sweeper should follow vehicles out but operates only if there is evidence of any mud on the road. The inclement weather has exacerbated the situation. | Site team has been informed to enforcing the current protocol and not just turning it on every time. |
| HS2-21-42899-C | WRP | Residents at West Ruislip were disturbed by loud noise that sounded like pile driving that went on at 23:30. | Not related to activities at the portal. Only works being undertaken were excavation and placement of soil on the driving range, no piling being undertaken at that time. | Complainant was contacted to further discuss the complaint and inform of the findings. |
| HS2-21-42900-C HS2-21-42889-C | SRVS | Complaint about excessive vibration causing workshop to rattle and things | Due to the absence of a second operator subcontractors were hitting the concrete piling platform with the grab to remove clay from the skip. This caused high vibration levels and is not | A review meeting with the subcontractor was held the next morning |

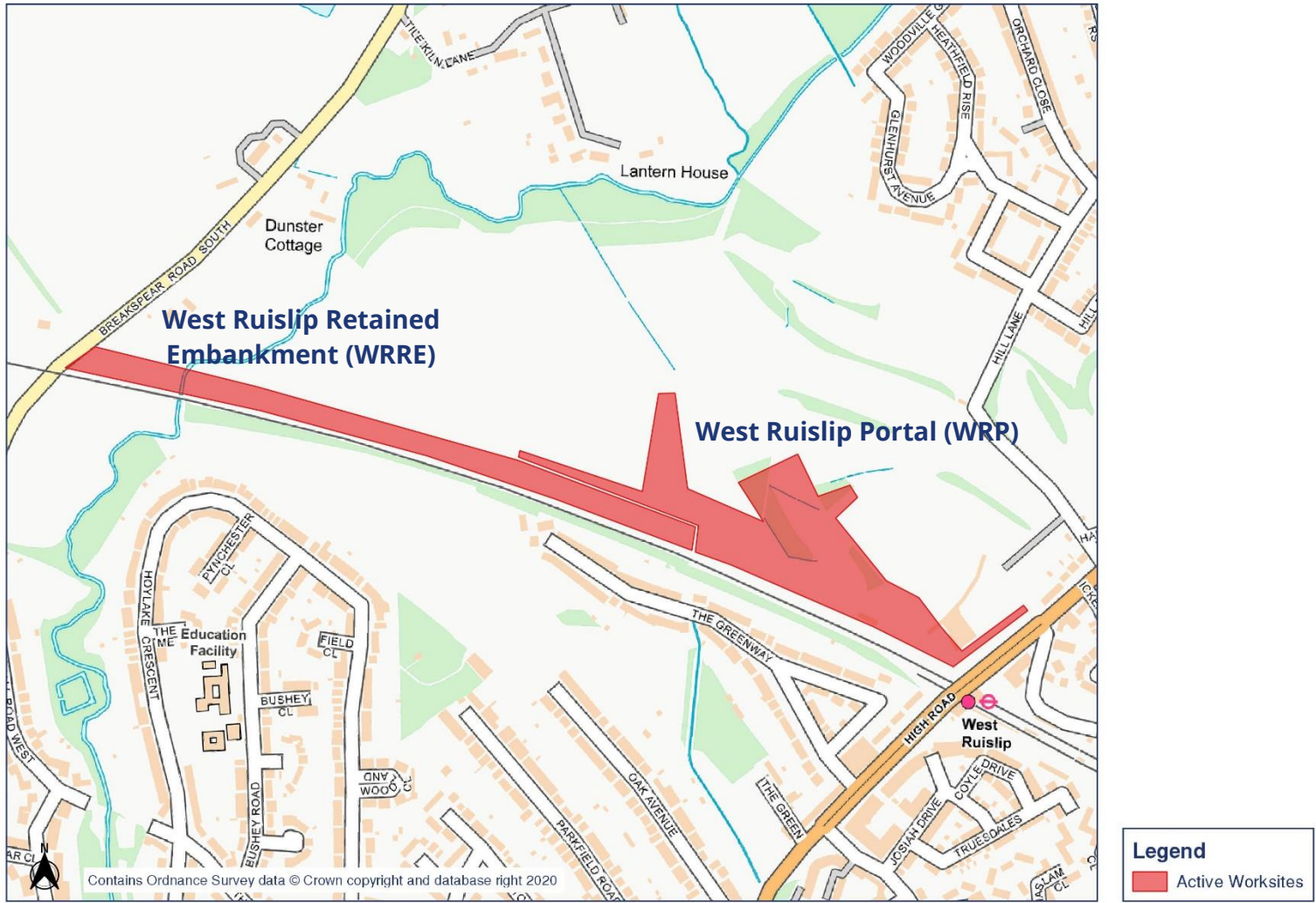
| Complaint Reference Number | Worksite Reference | Description of Complaint | Results of Investigation | Actions Taken |
|----------------------------|--------------------|--------------------------|--|--------------------------------------|
| | | to fall off the shelves. | something allowed for in the Section 61 for the works, the Environmental manager called multiple times to stop the activity causing the disturbance, with the activity paused each time and resumed shortly after with same methodology. | regarding the failure to stop works. |

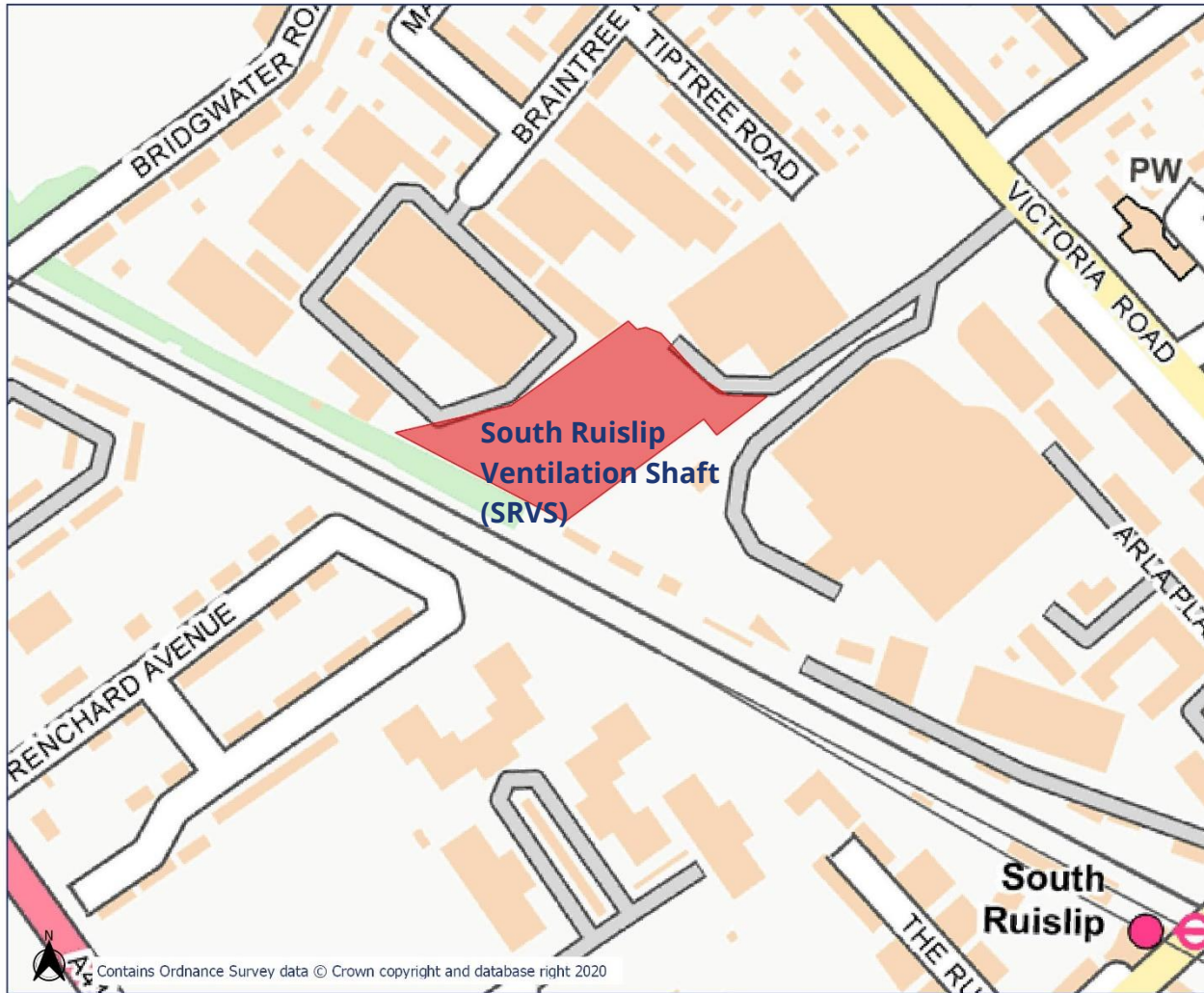
Appendix A Site Locations







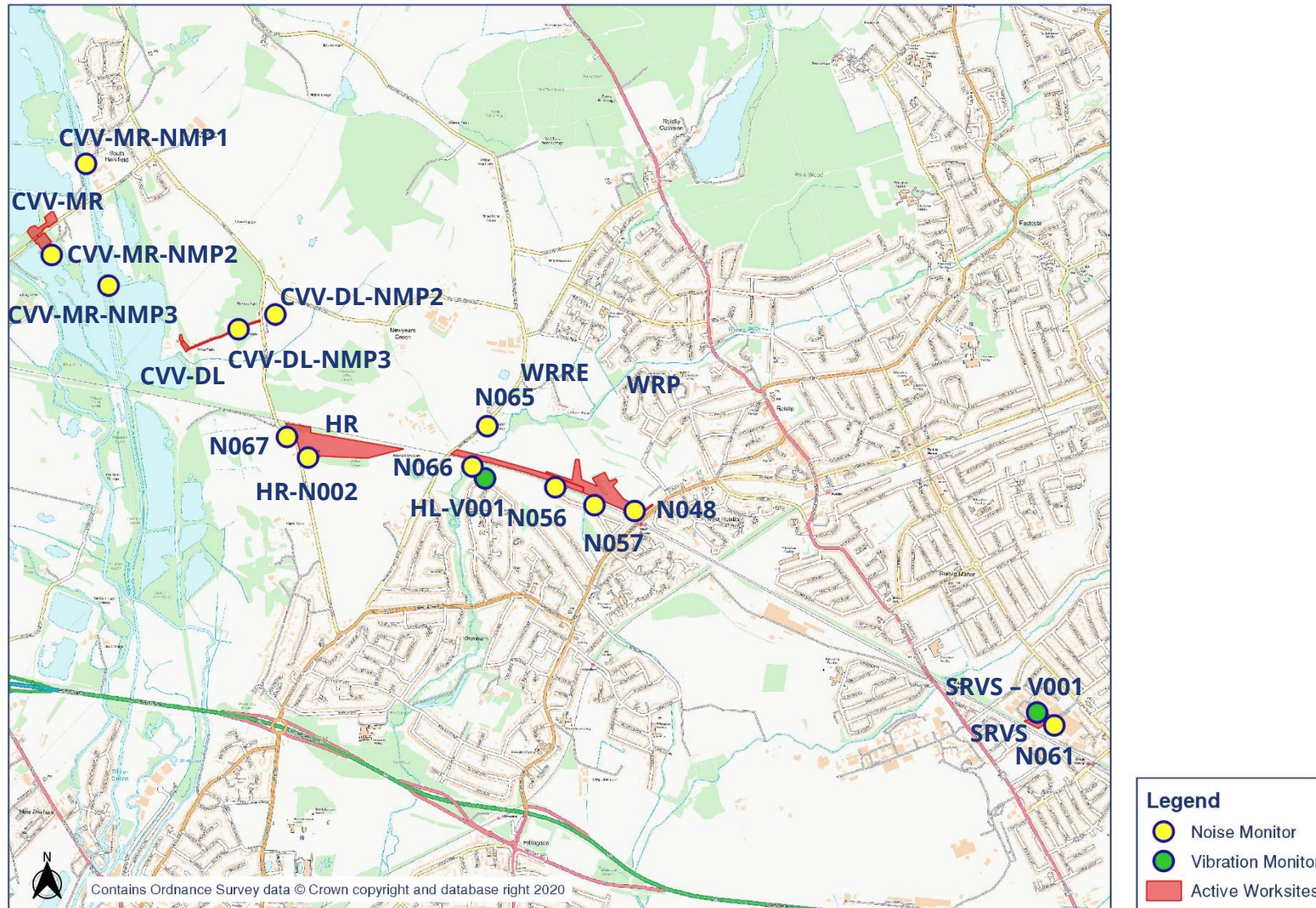


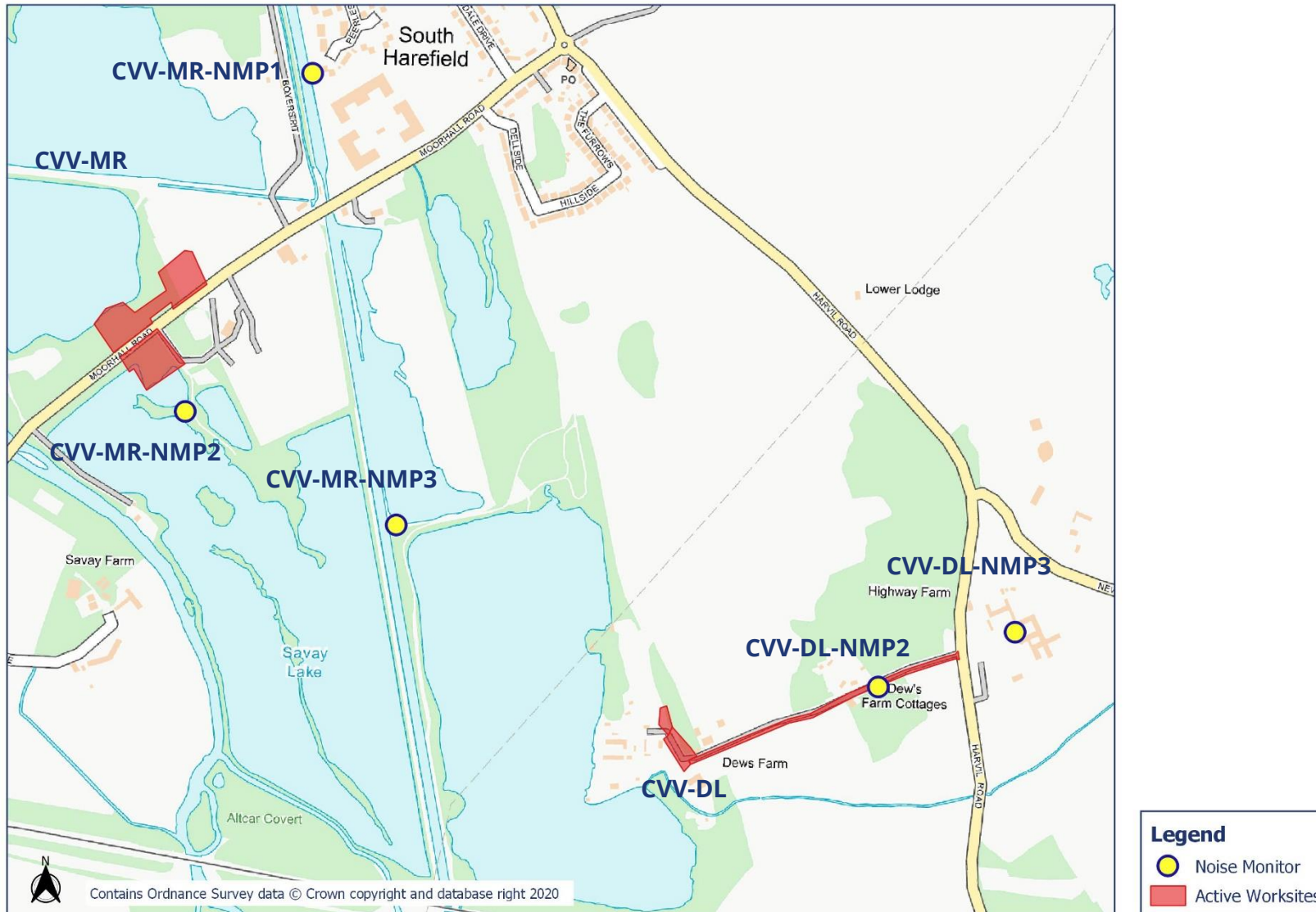


Appendix B Monitoring Locations

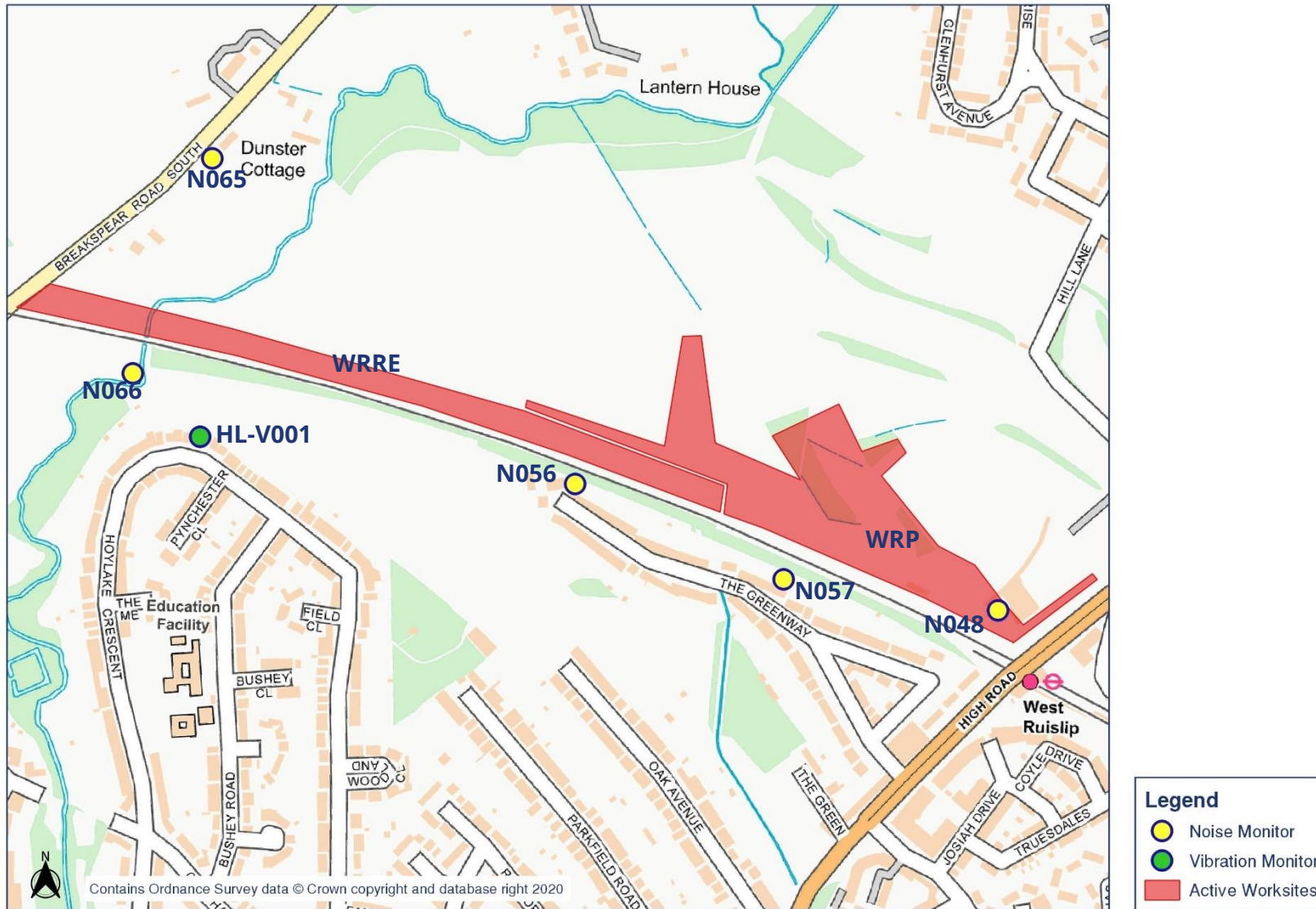
HS2

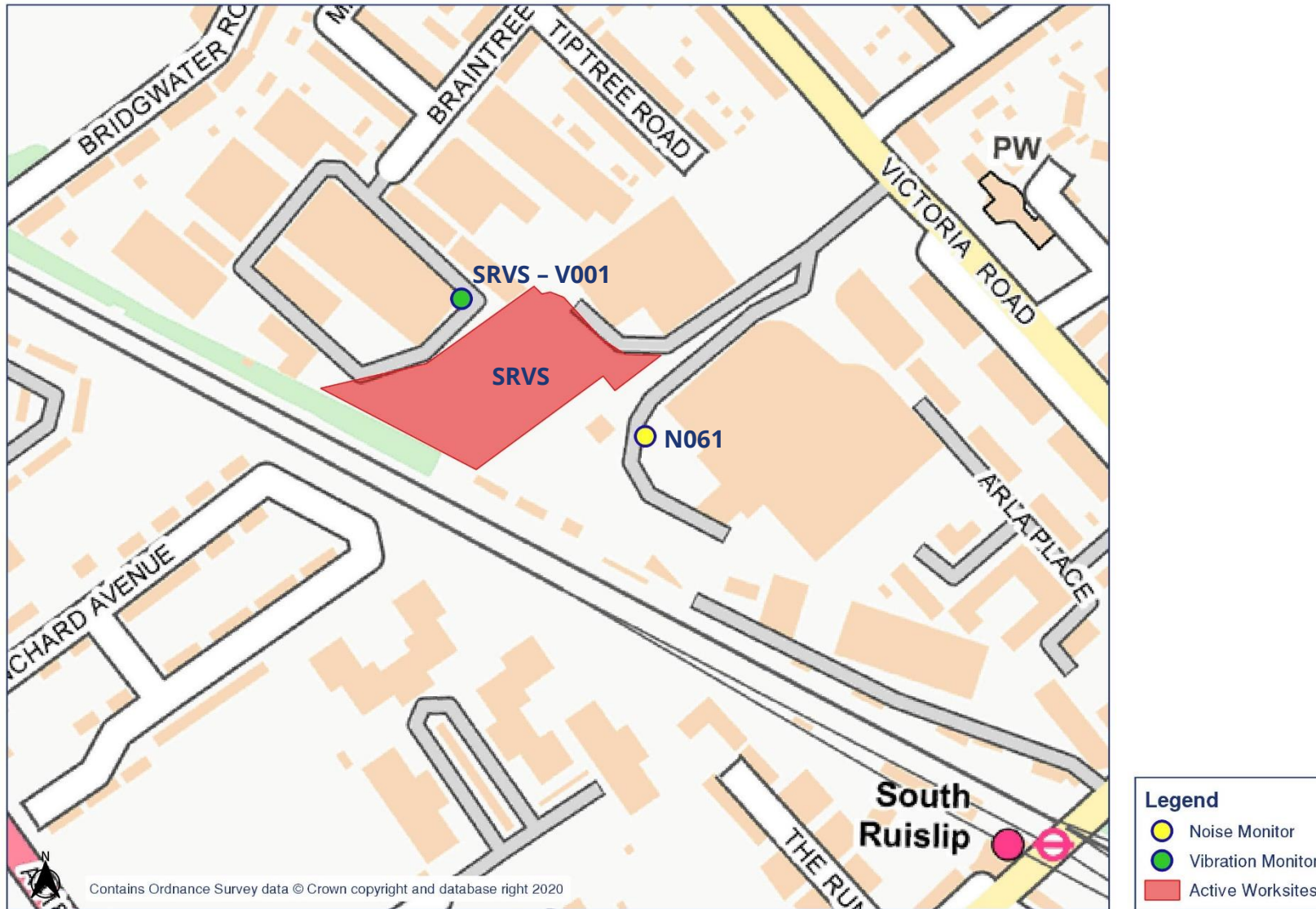
Noise monitoring plan - Overview











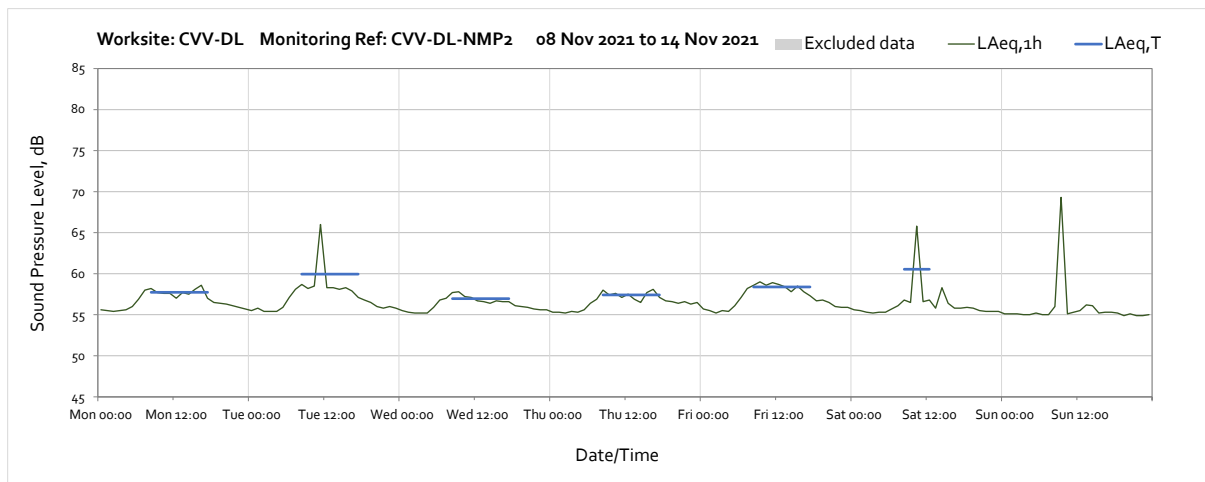
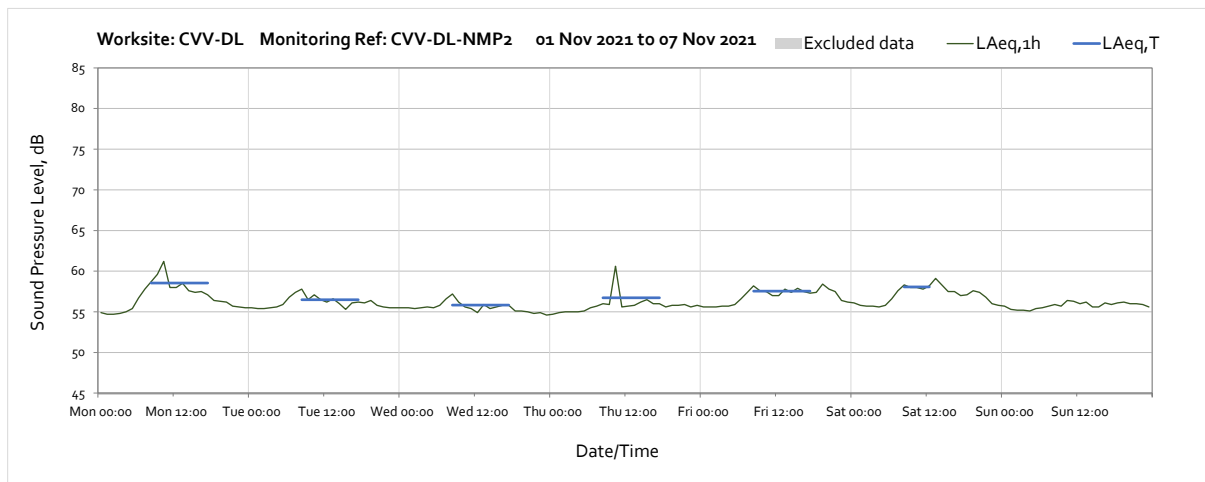
Appendix C Data

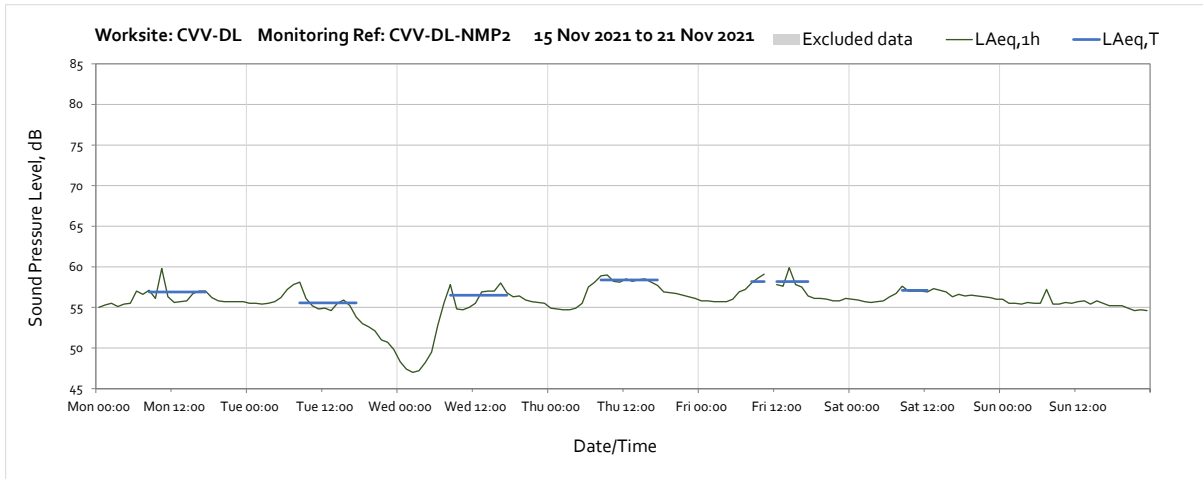
Noise

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.

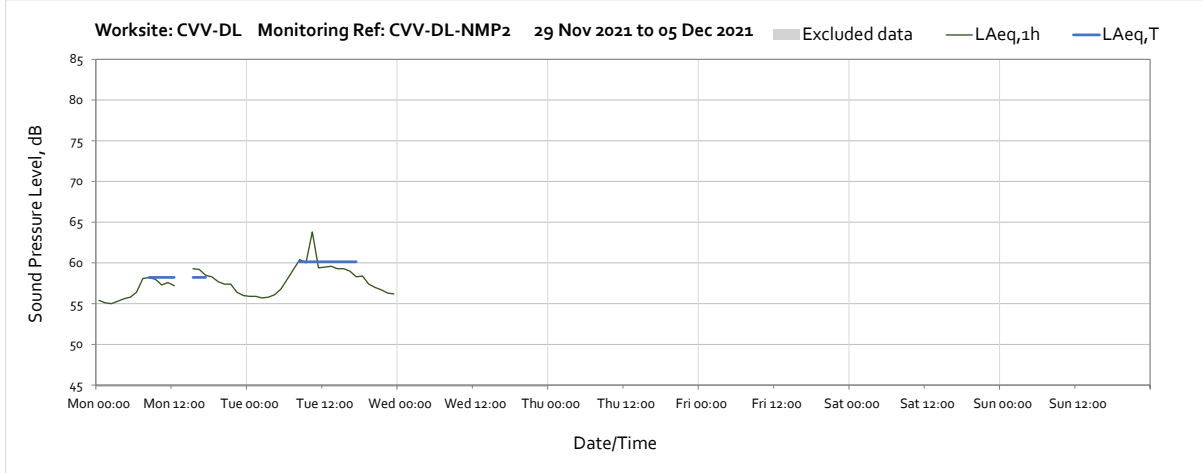
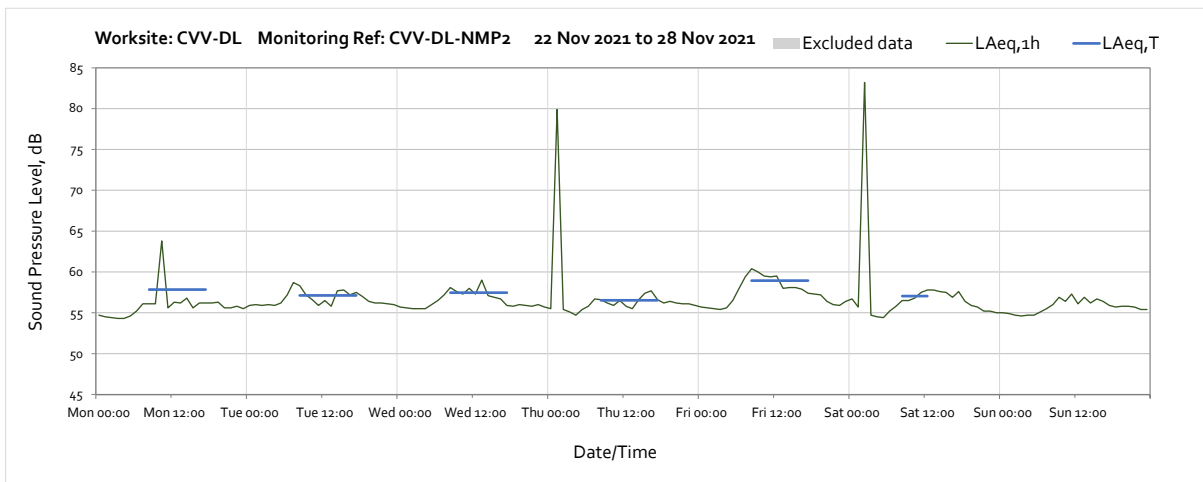
Worksite: Colne Valley Viaduct Dews Lane (CVV-DL)

Monitoring Ref: CVV-DL-NMP2





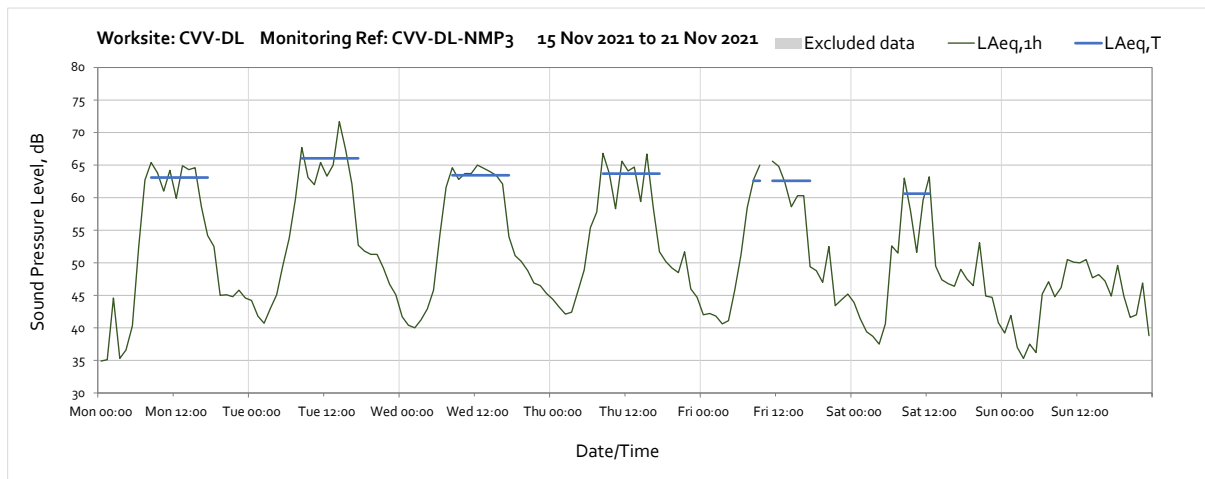
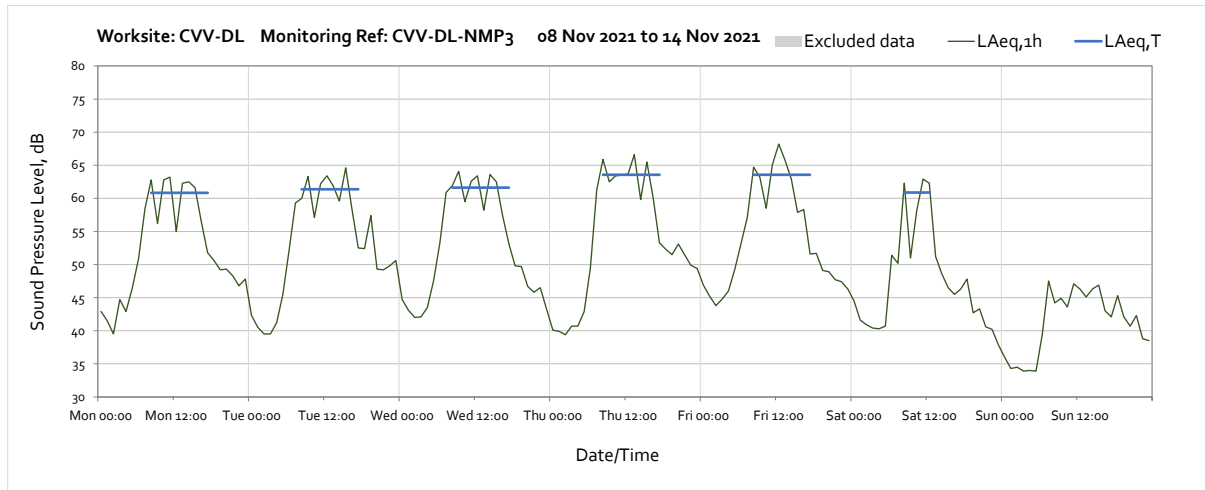
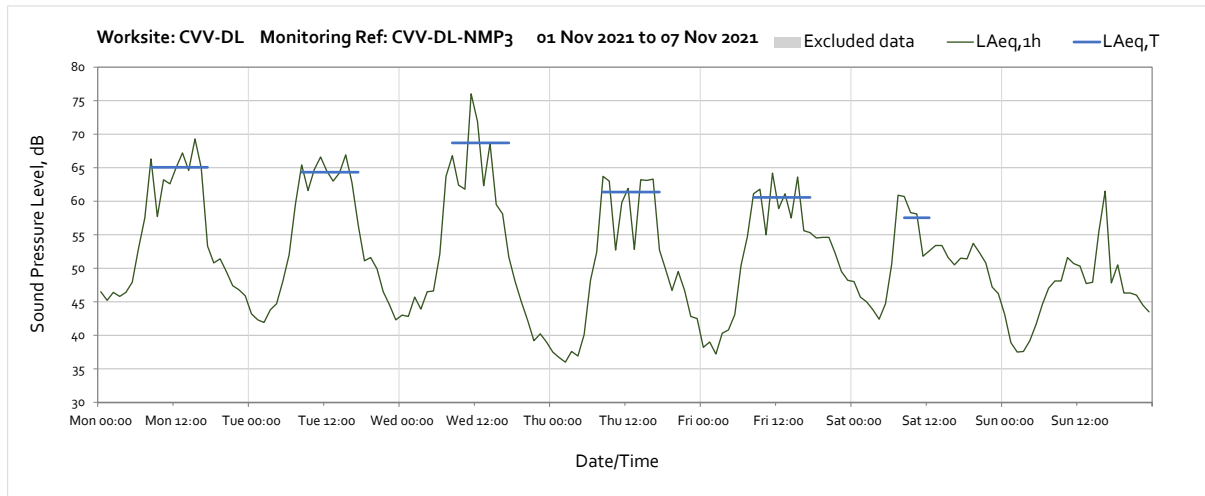
Note: Missing data between 11:00 and 12:00 on Friday 19th November 2021 was due to field calibration.



Note: Missing data between 13:00 and 15:00 on Monday 29th November 2021 was due to monitoring station maintenance.

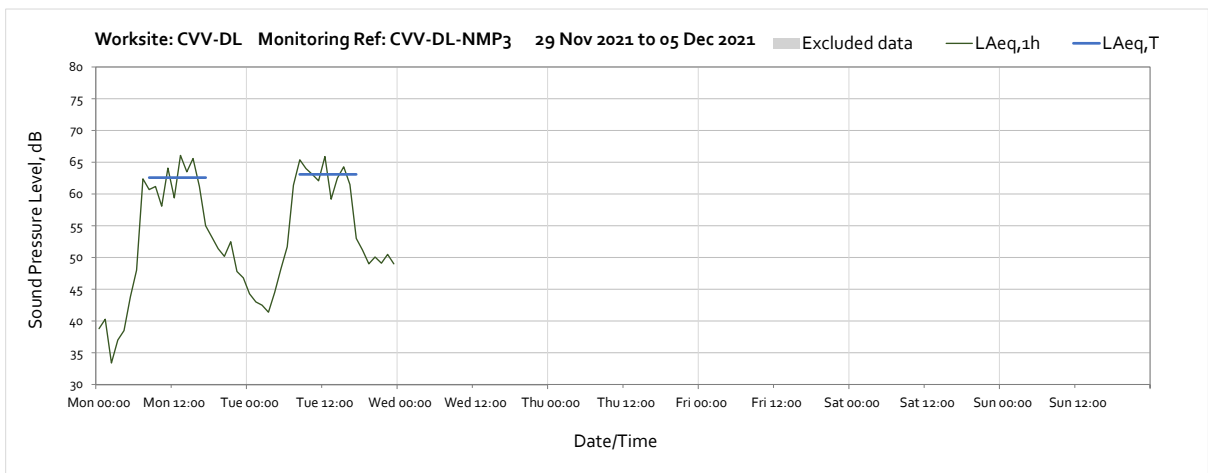
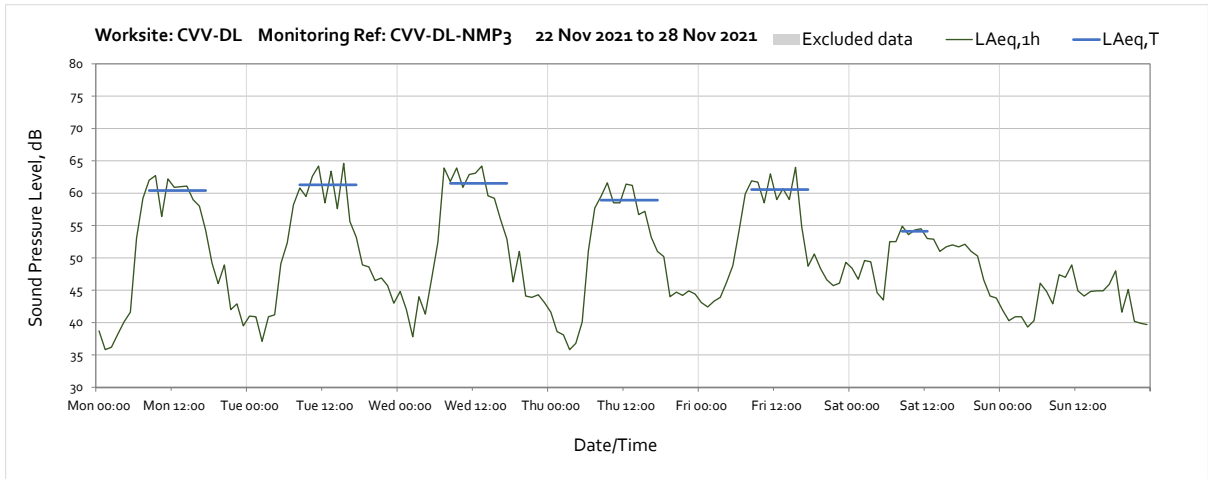
Worksite: Colne Valley Viaduct Dews Lane (CVV-DL)

Monitoring Ref: CVV-DL-NMP3



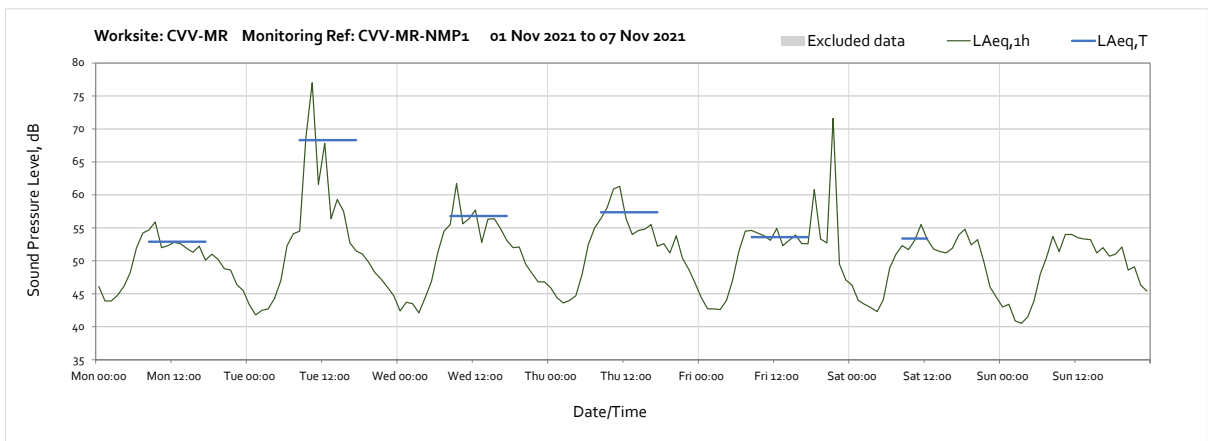
Note: Missing data between 10:00 and 11:00 on Friday 19th November 2021 was due to field calibration.

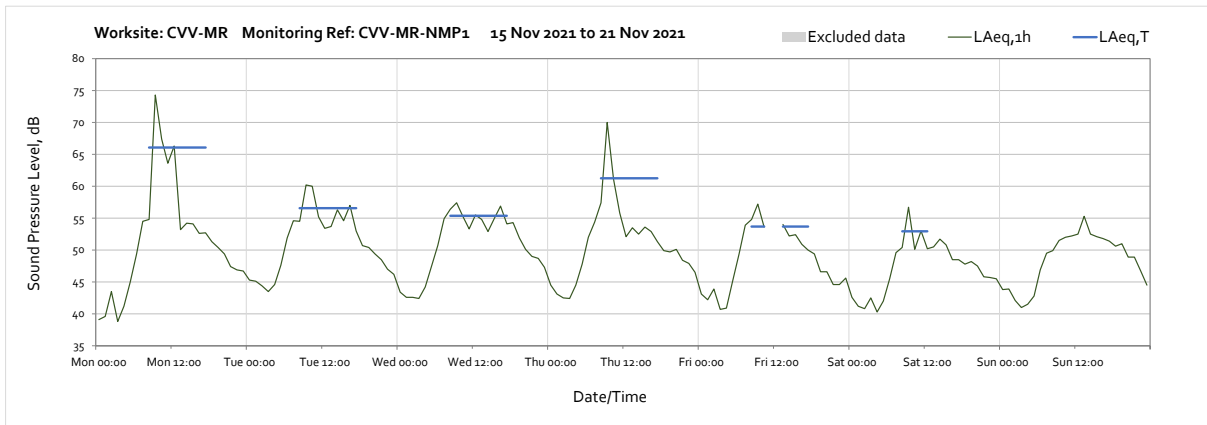
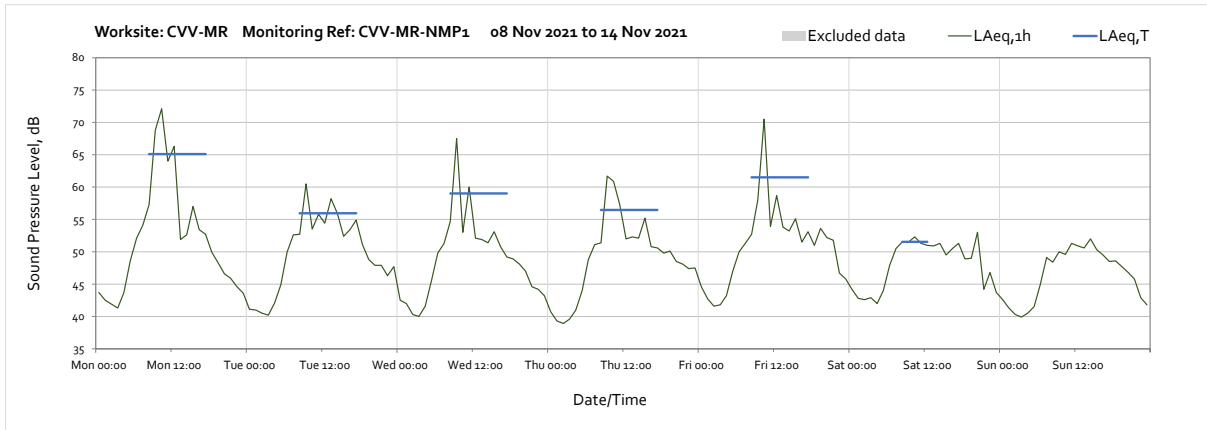
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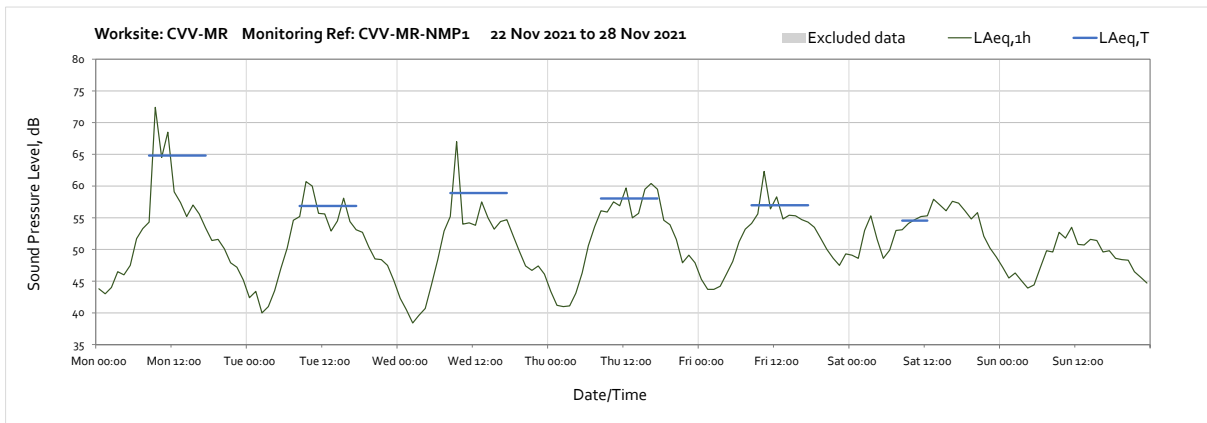
Worksite: Colne Valley Viaduct Moorhall Road (CVV-MR)

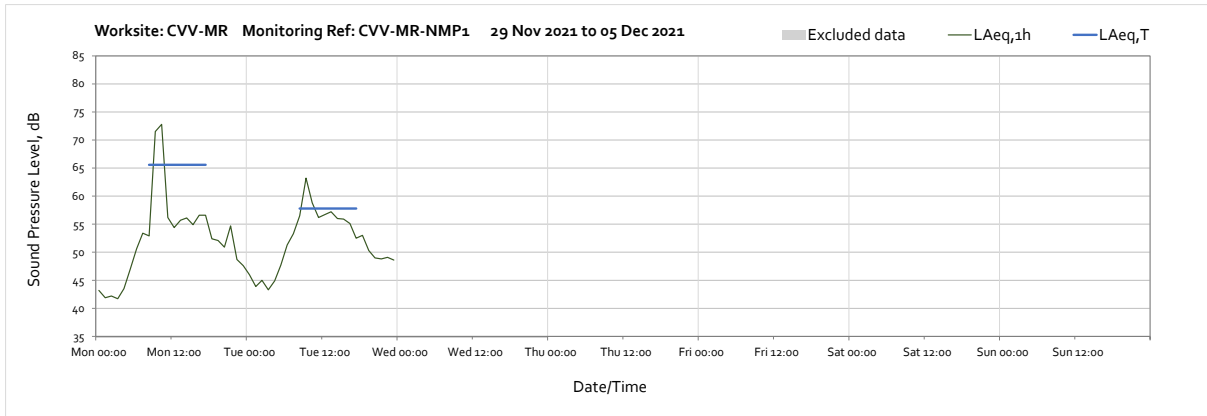
Monitoring Ref: CVV-MR-NMP1





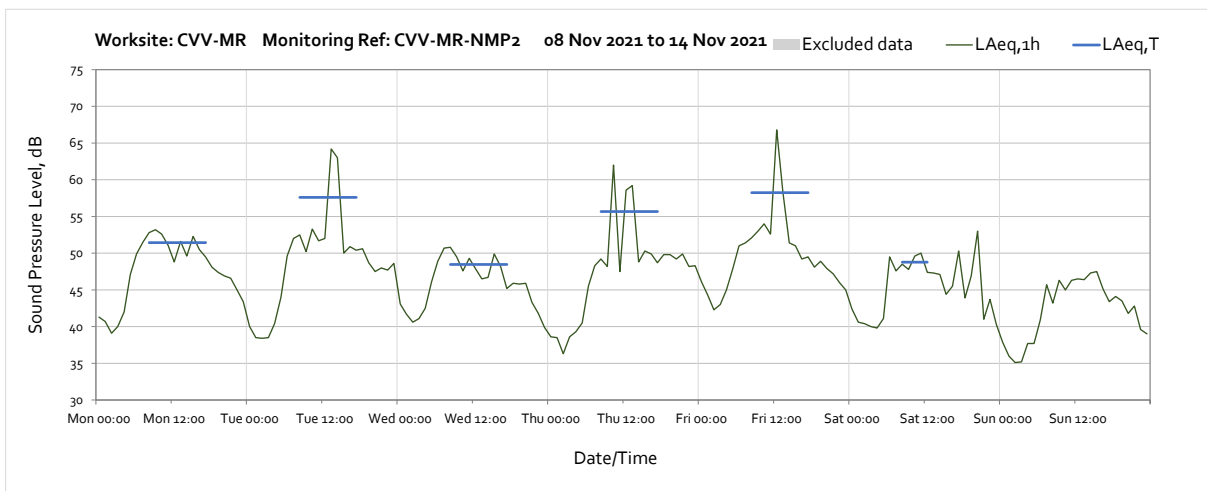
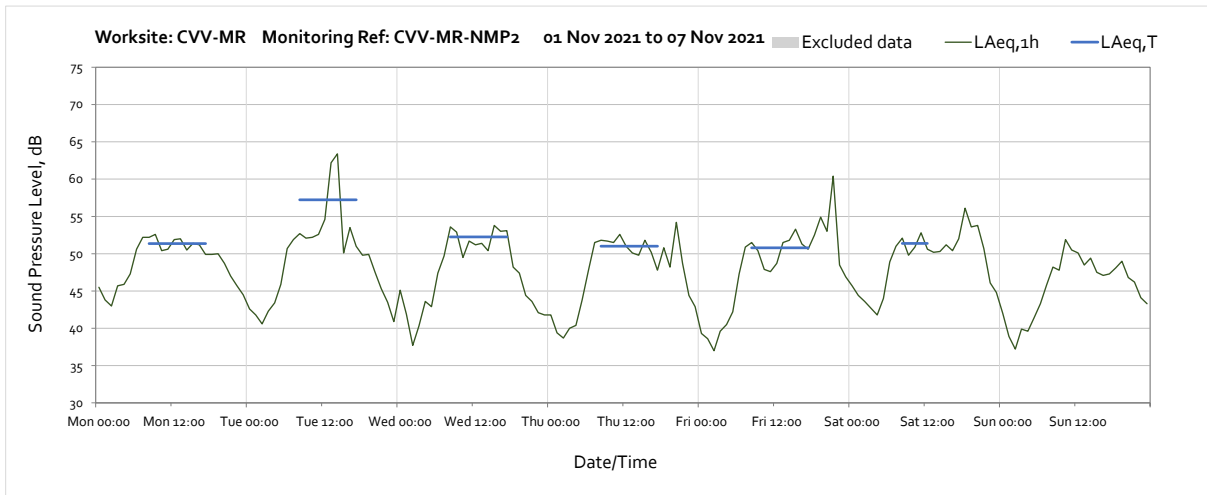
Note: Missing data between 11:00 and 13:00 on Friday 19th November 2021 was due to field calibration.

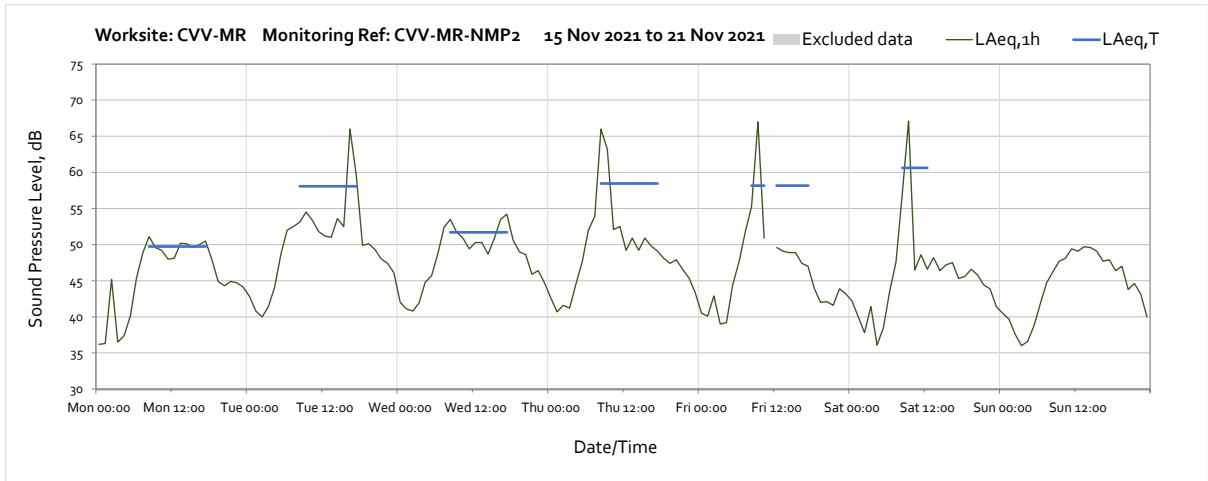




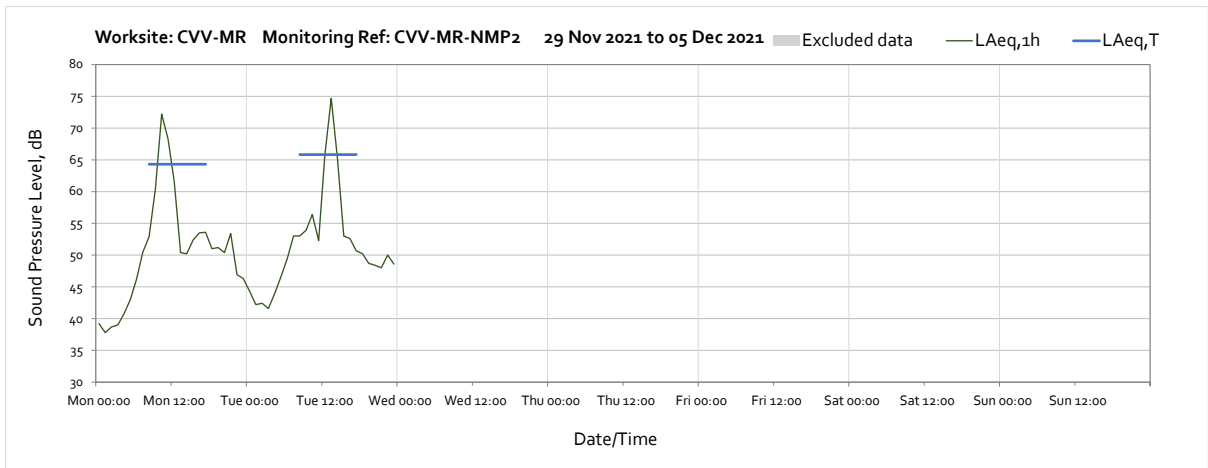
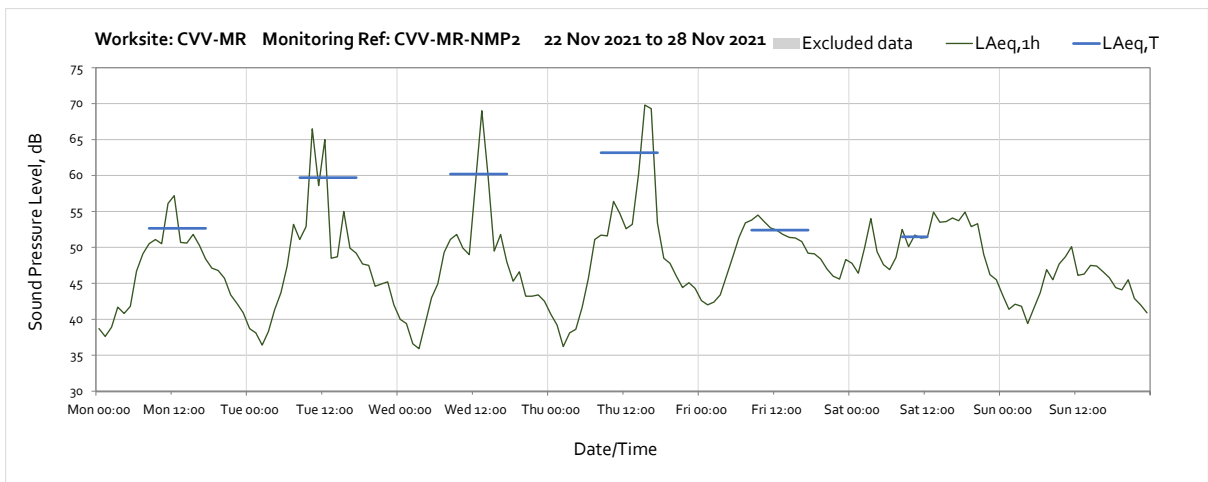
Worksite: Colne Valley Viaduct Moorhall Road (CVV-MR)

Monitoring Ref: CVV-MR-NMP2



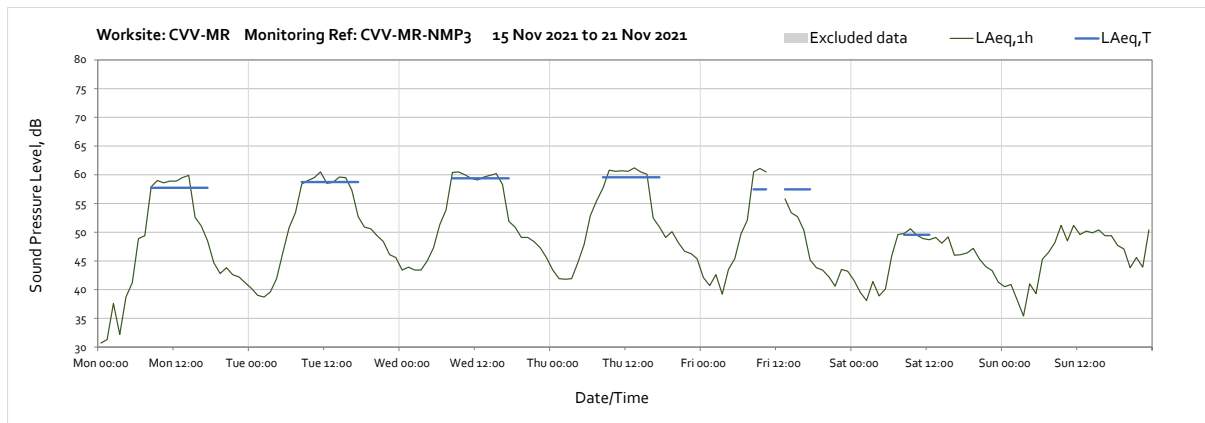
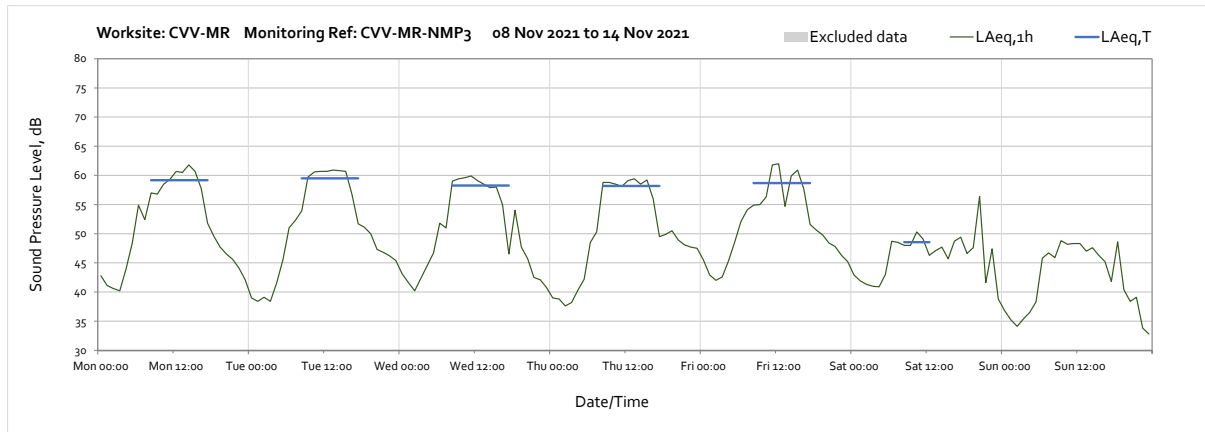
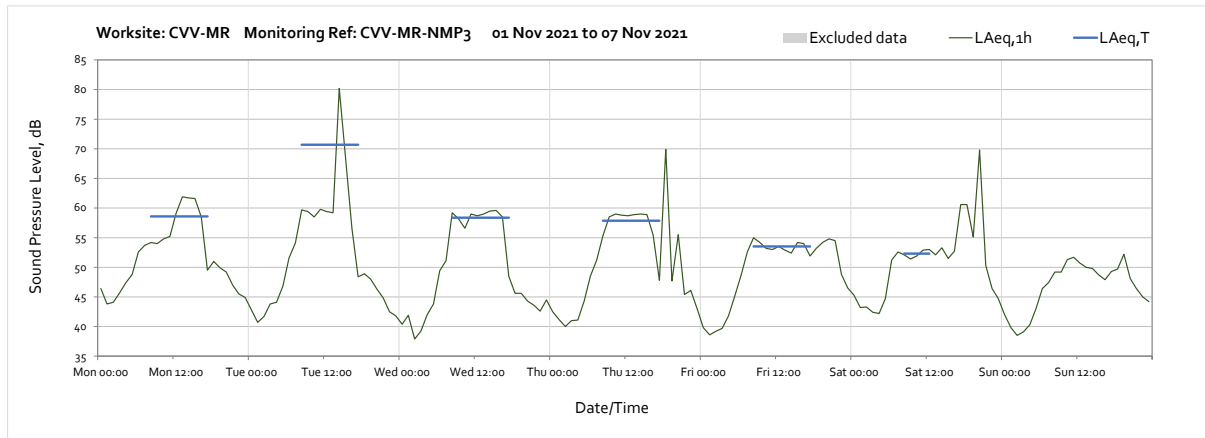


Note: Missing data between 11:00 and 12:00 on Friday 19th November 2021 was due to field calibration.

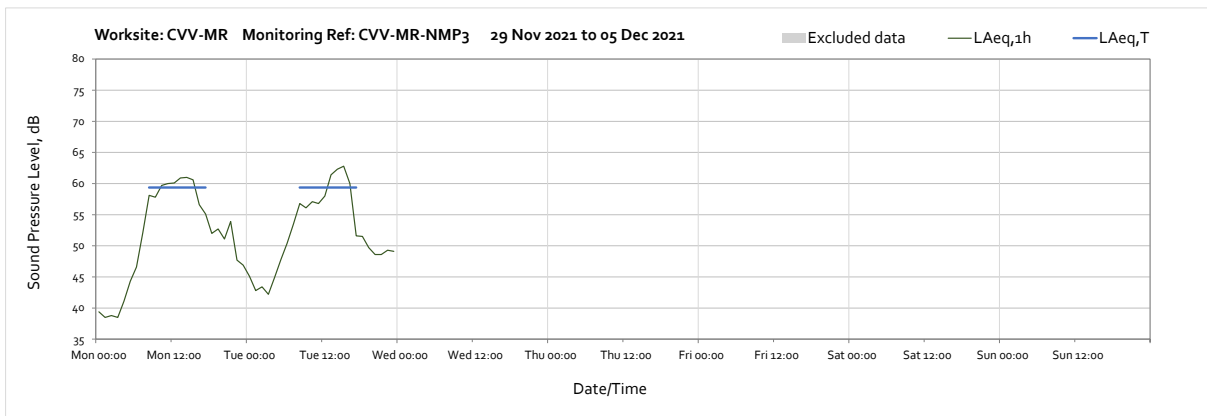
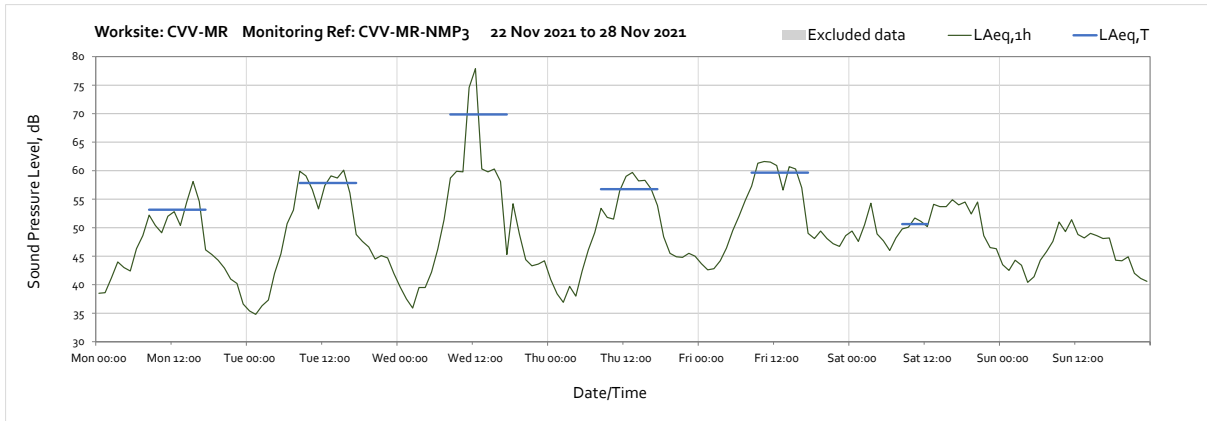


Worksite: Colne Valley Viaduct Moorhall Road (CVV-MR)

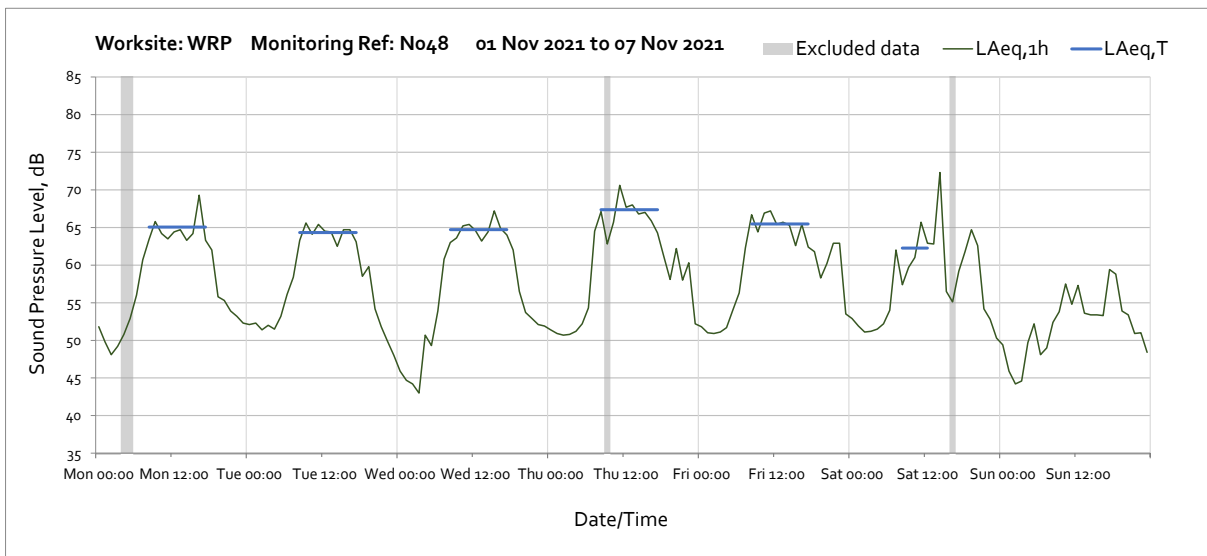
Monitoring Ref: CVV-MR-NMP3

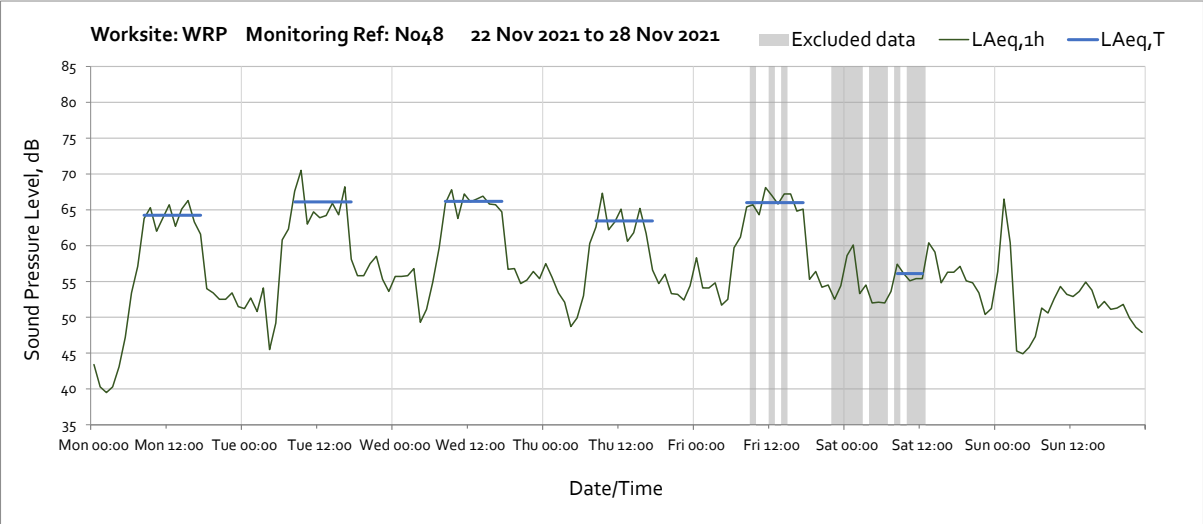
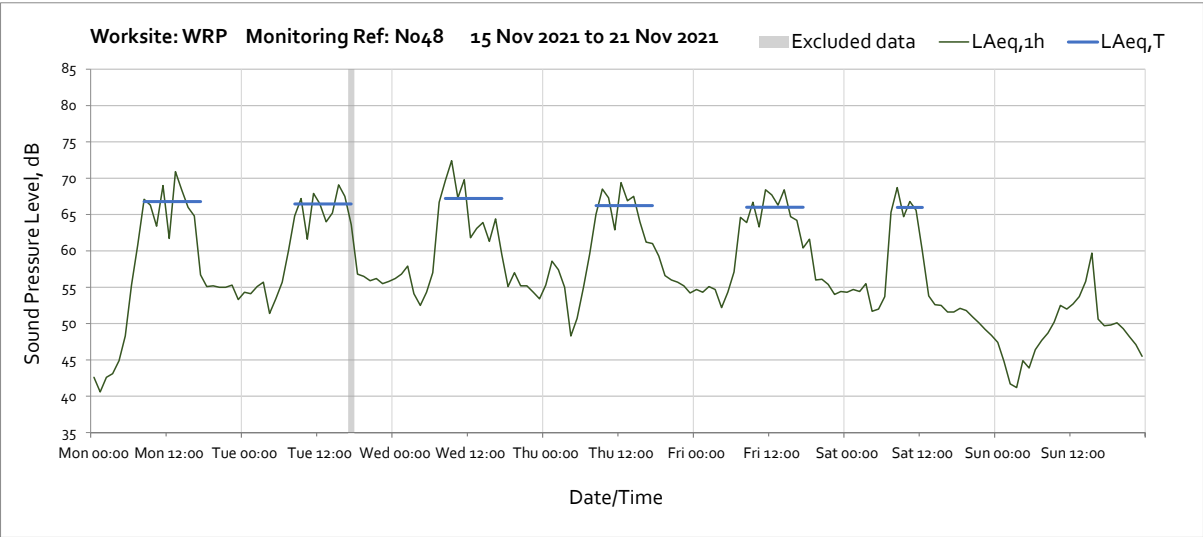
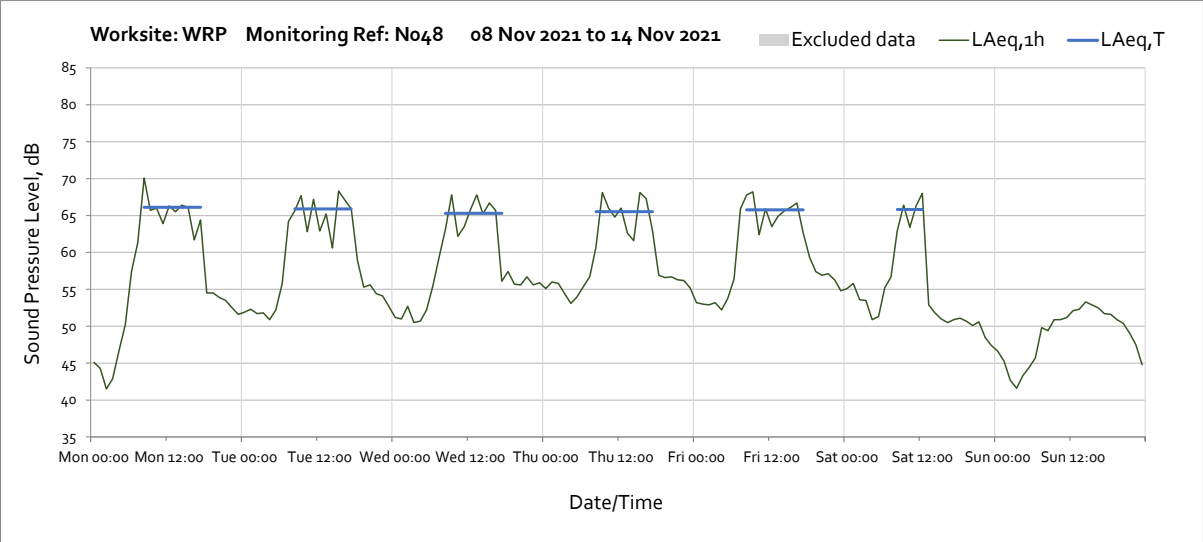


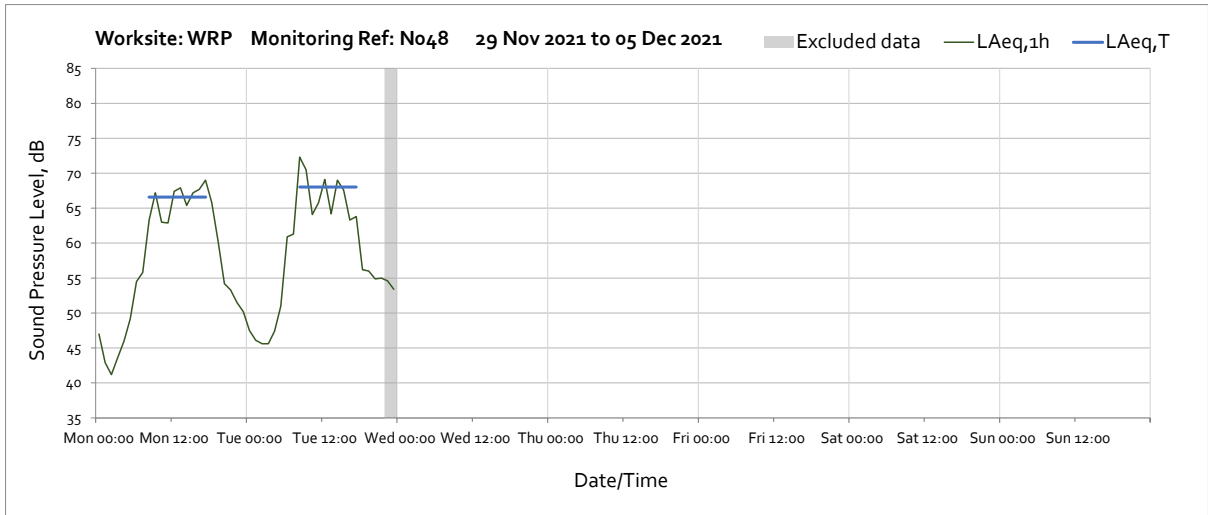
Note: Missing data between 11:00 and 13:00 on Friday 19th November 2021 was due to field calibration.



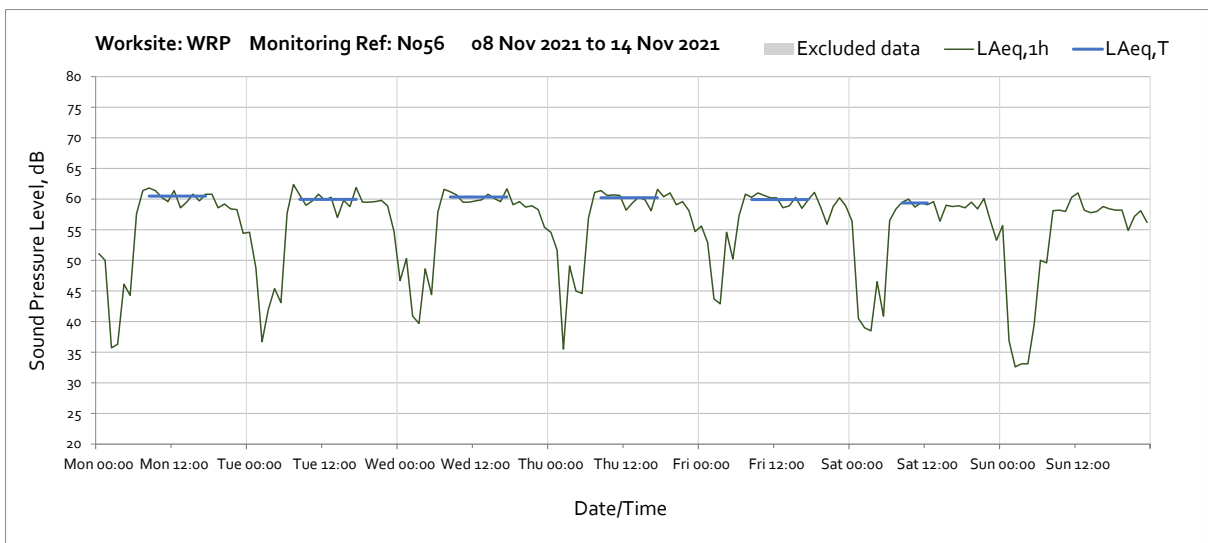
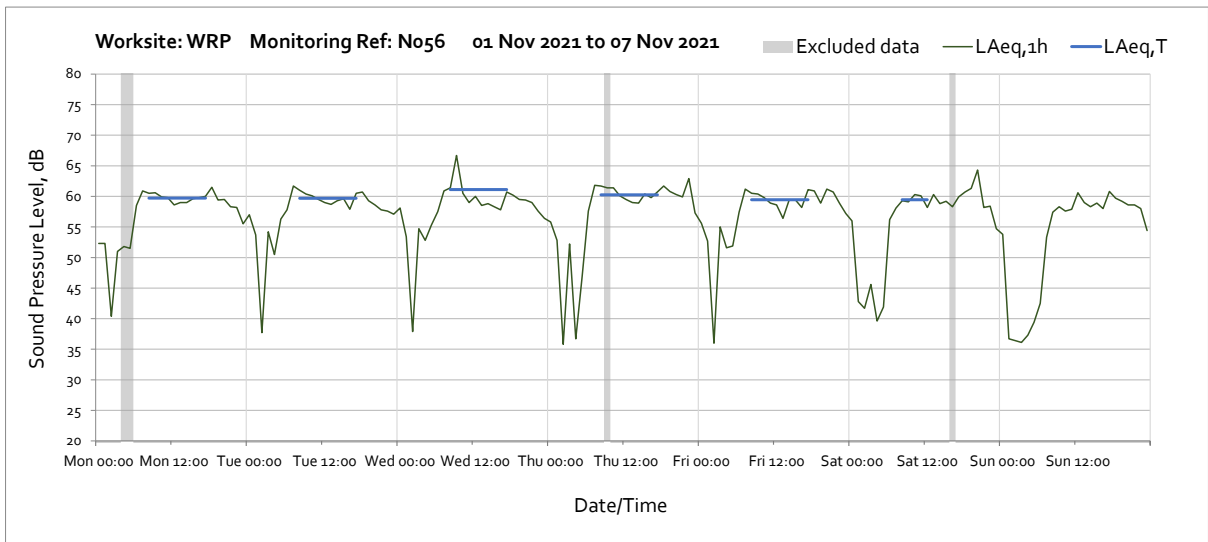
Worksite: West Ruislip Portal (WRP) - Monitoring Ref: N048

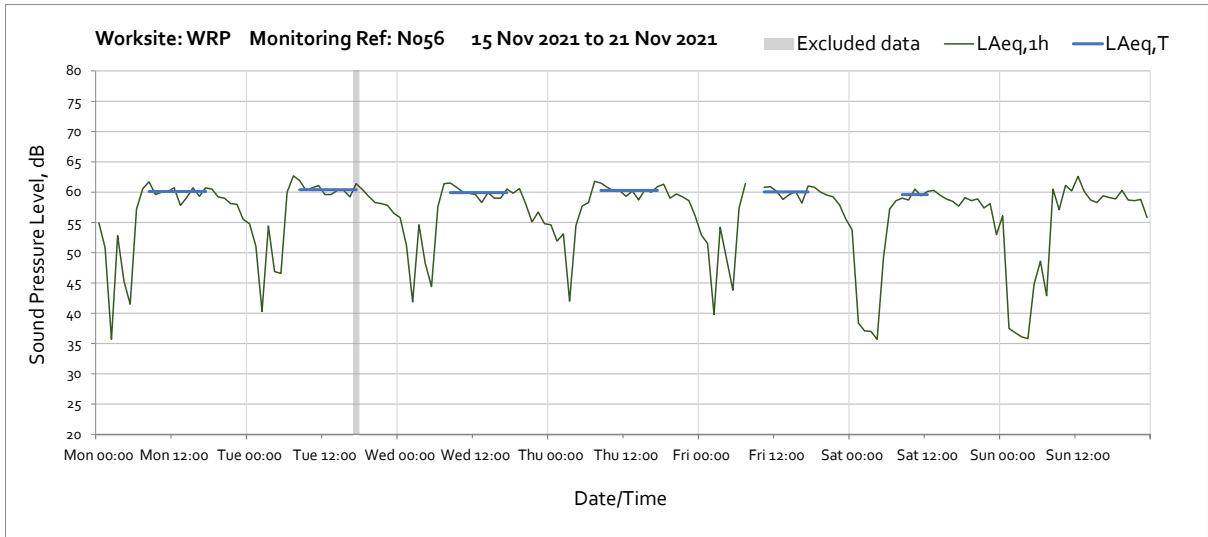




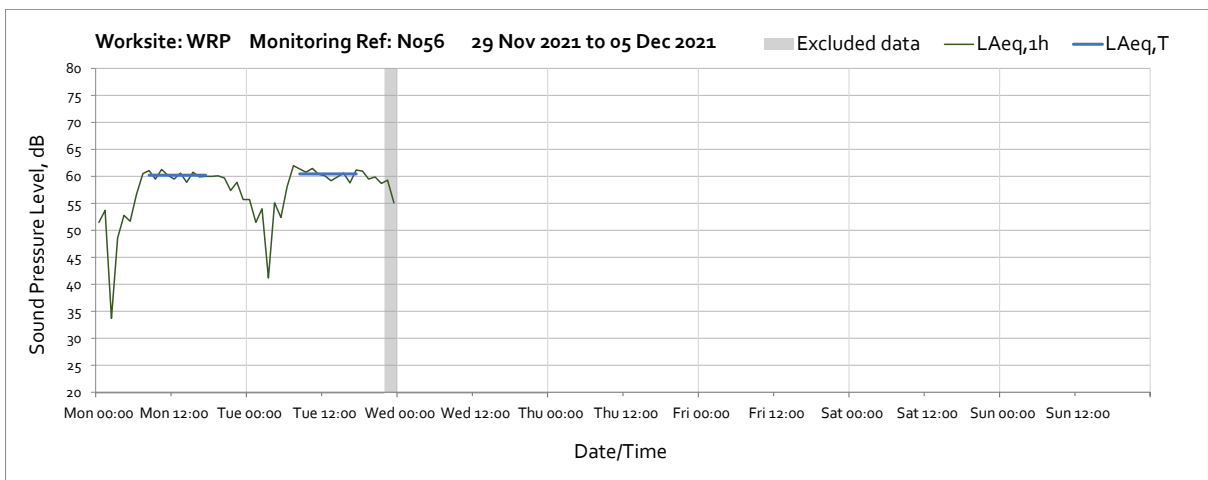
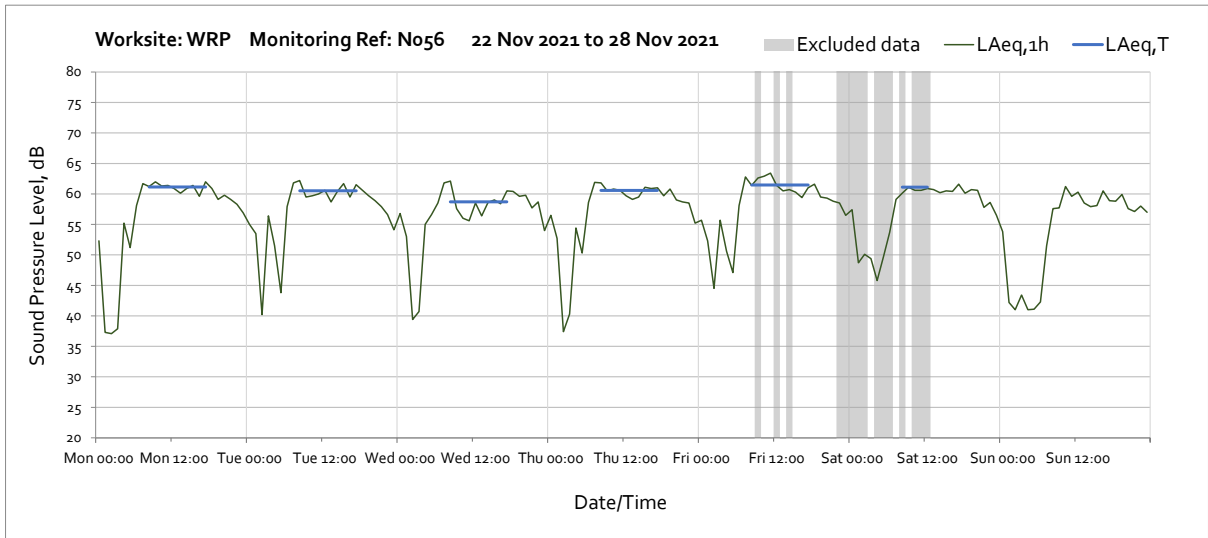


Worksite: West Ruislip Portal (WRP) – Monitoring Ref: N056

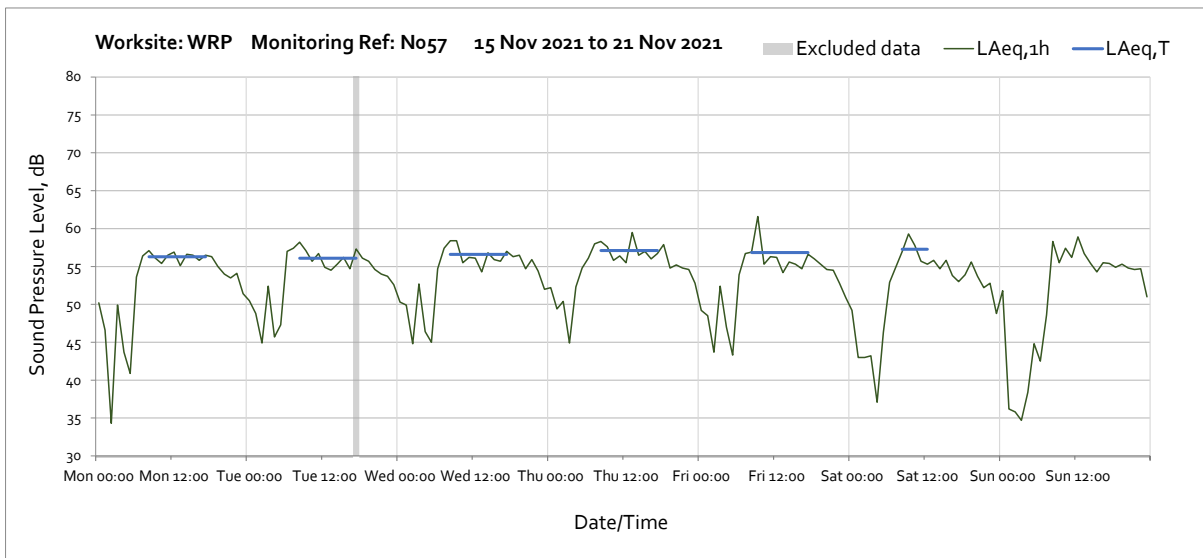
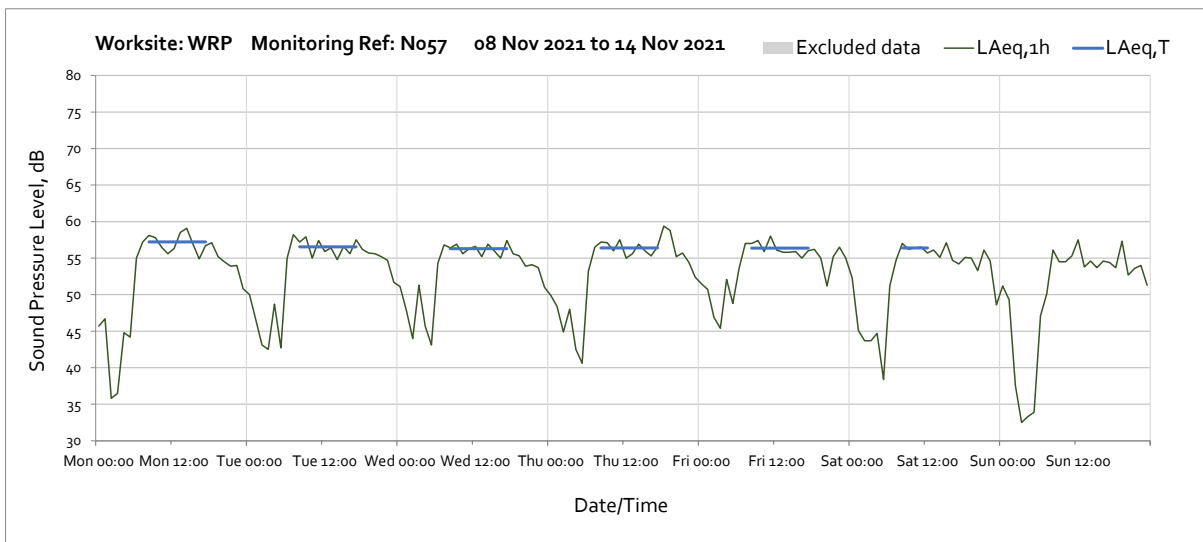
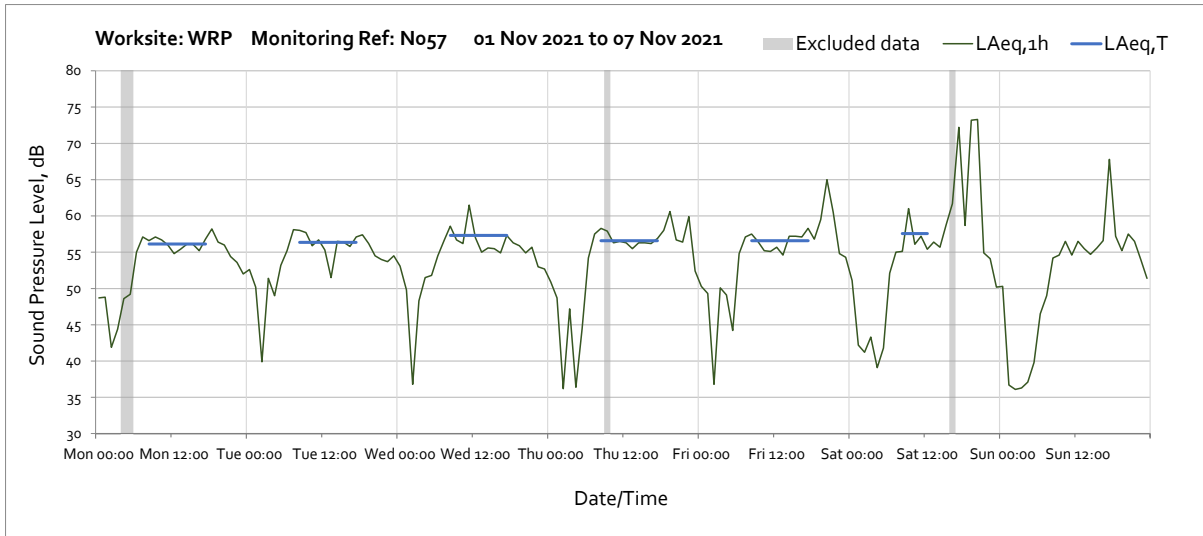


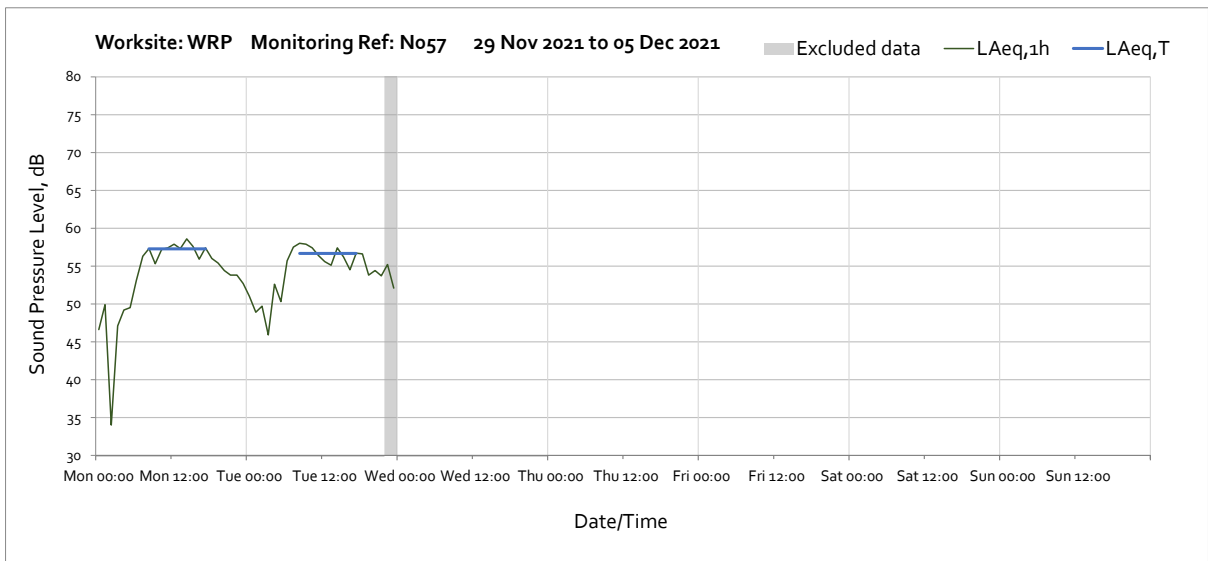
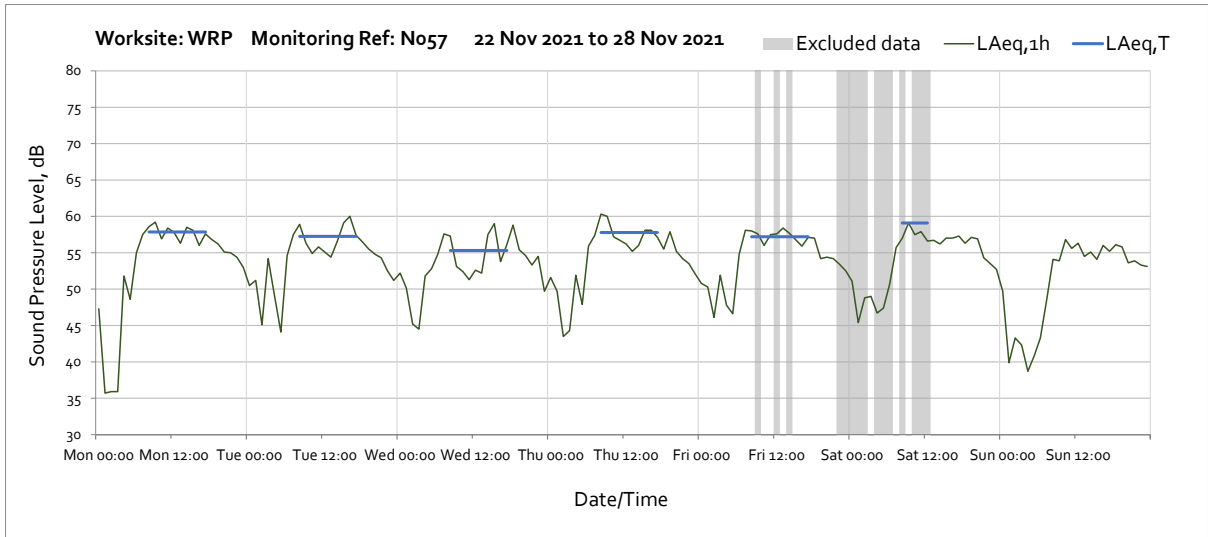


Note: Missing data between 08:00 and 10:00 on Friday 19th November 2021 was due to memory card fault at the monitoring station.

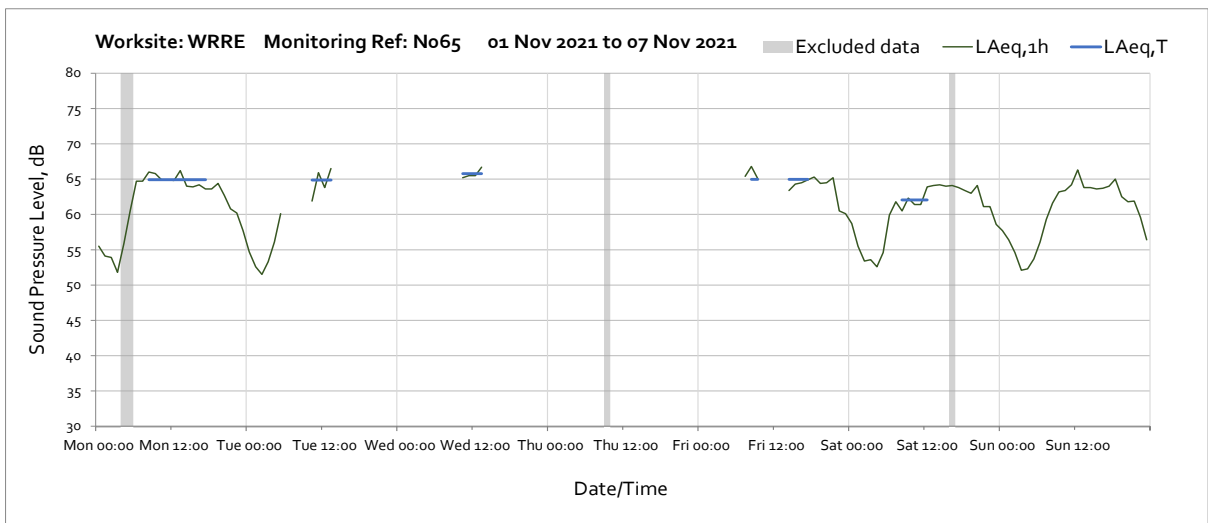


Worksite: West Ruislip Portal (WRP) - Monitoring Ref: N057



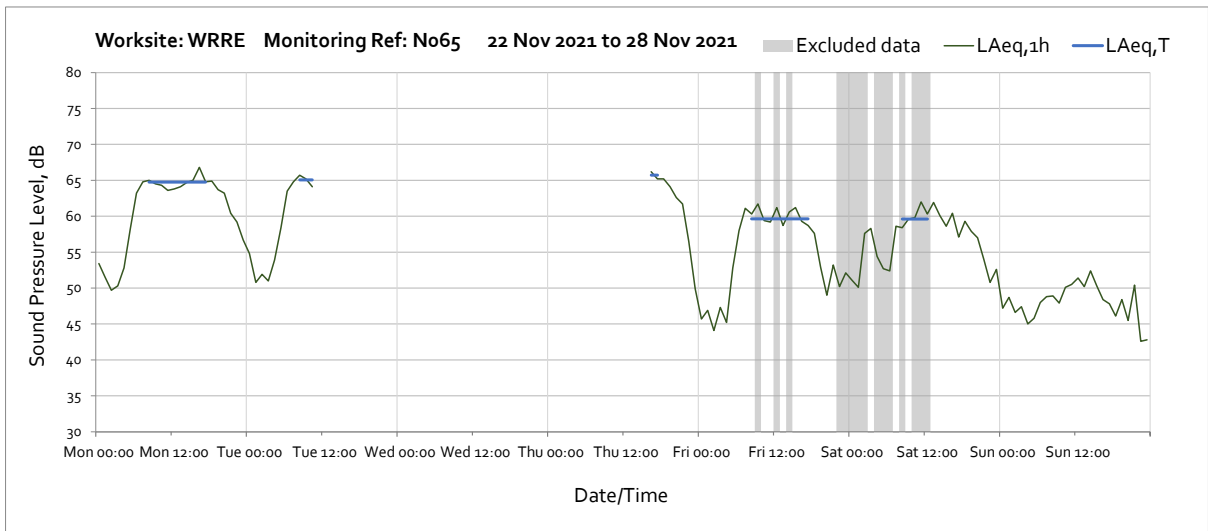
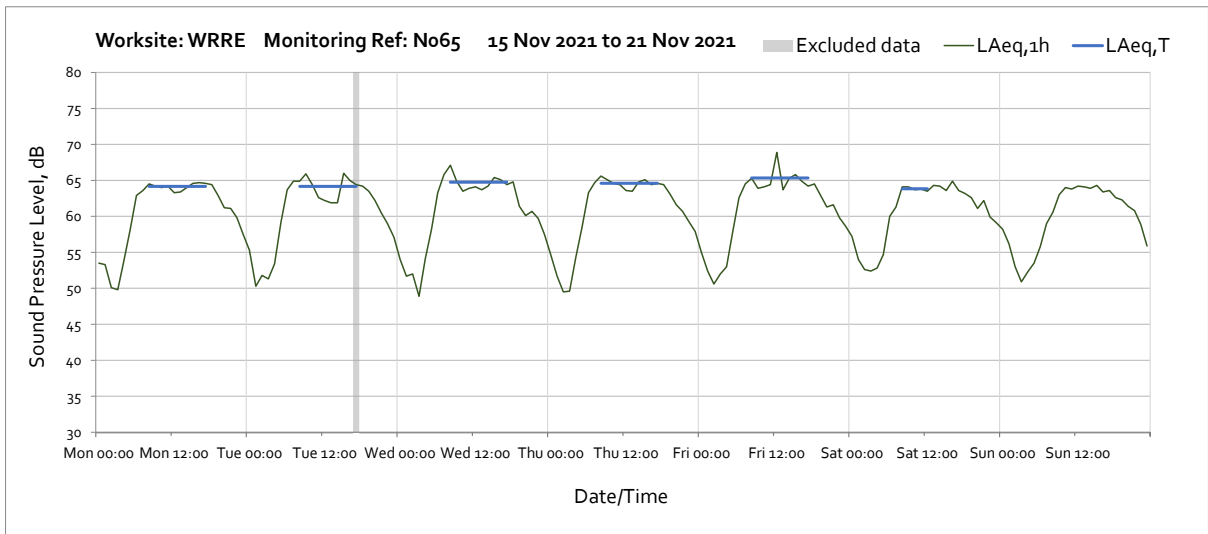
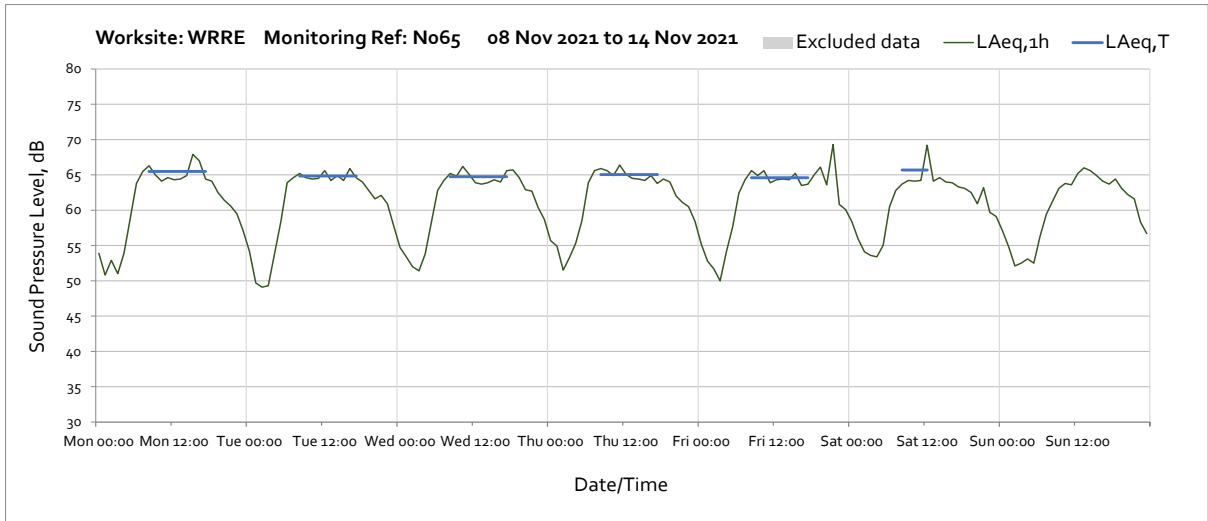


Worksite: West Ruislip Retained Embankment (WRRE) - Monitoring Ref: N065

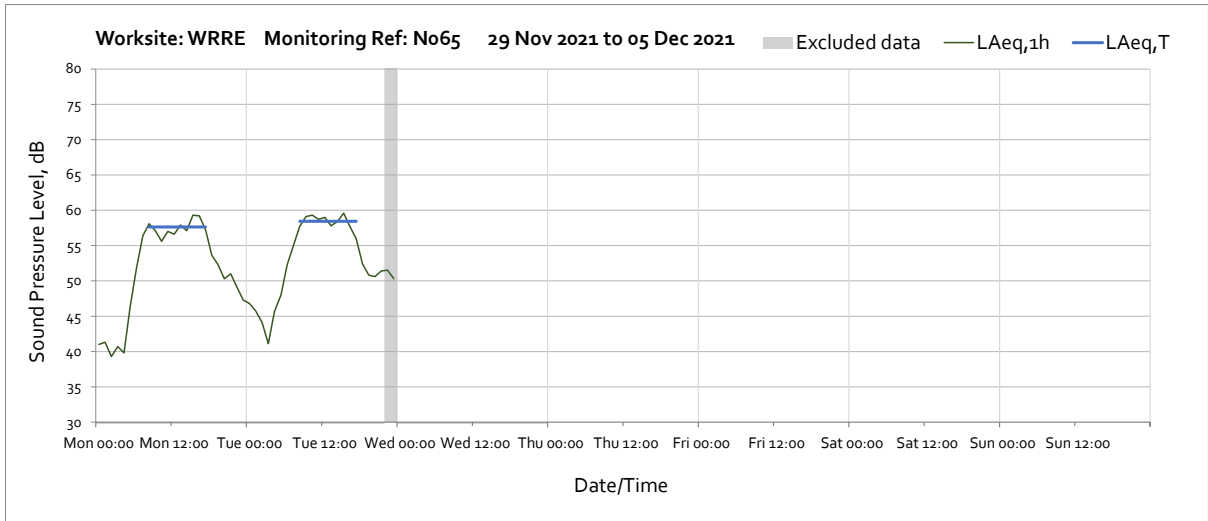


Note: Missing data throughout the week was due to loss of battery power at the monitoring station.

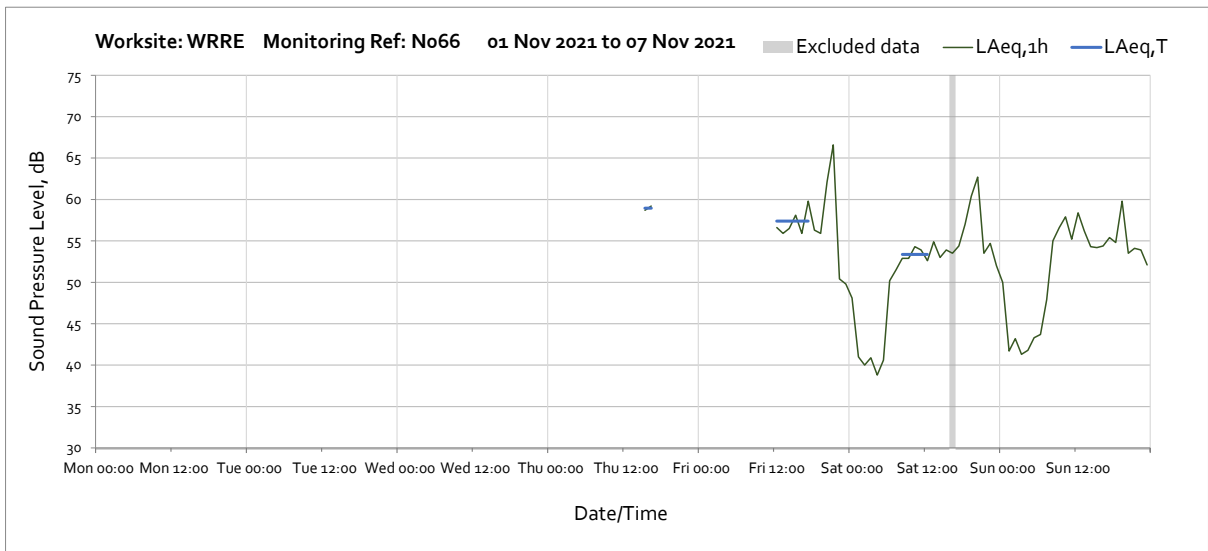
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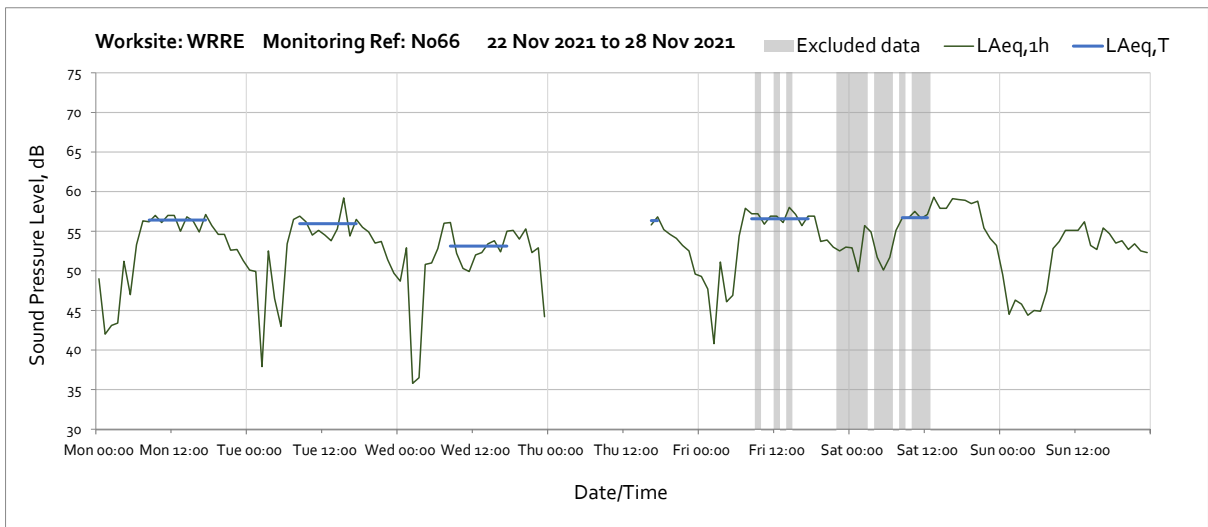
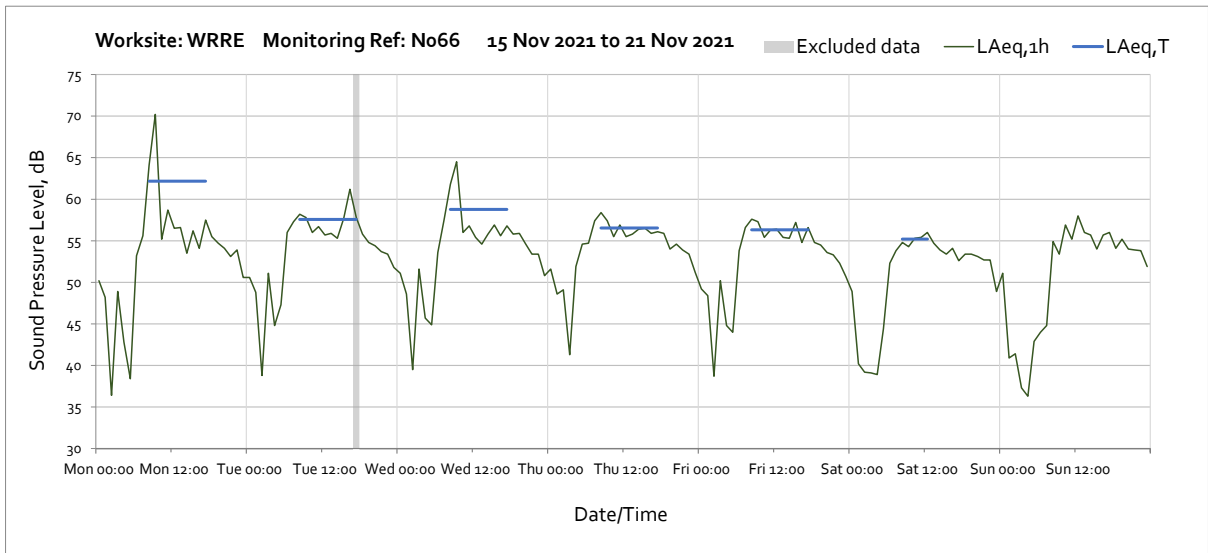
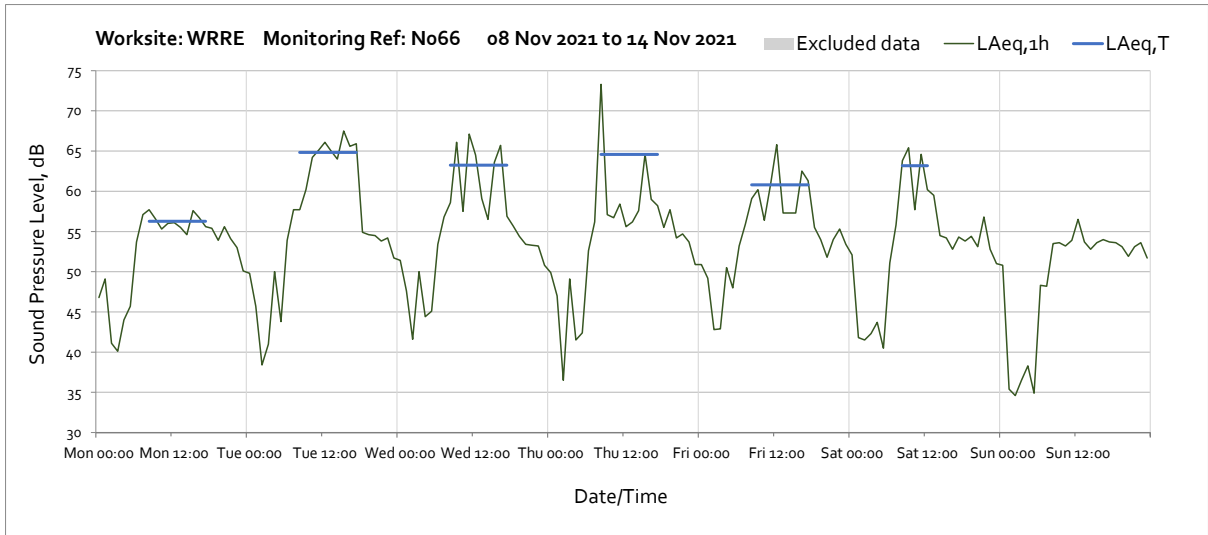
Note: Missing data between 11:00 on Tuesday 23rd November 2021 and 16:00 on Thursday 25th November 2021 was due to loss of battery power at the monitoring station.



Worksite: West Ruislip Retained Embankment (WRRE) – Monitoring Ref: N066

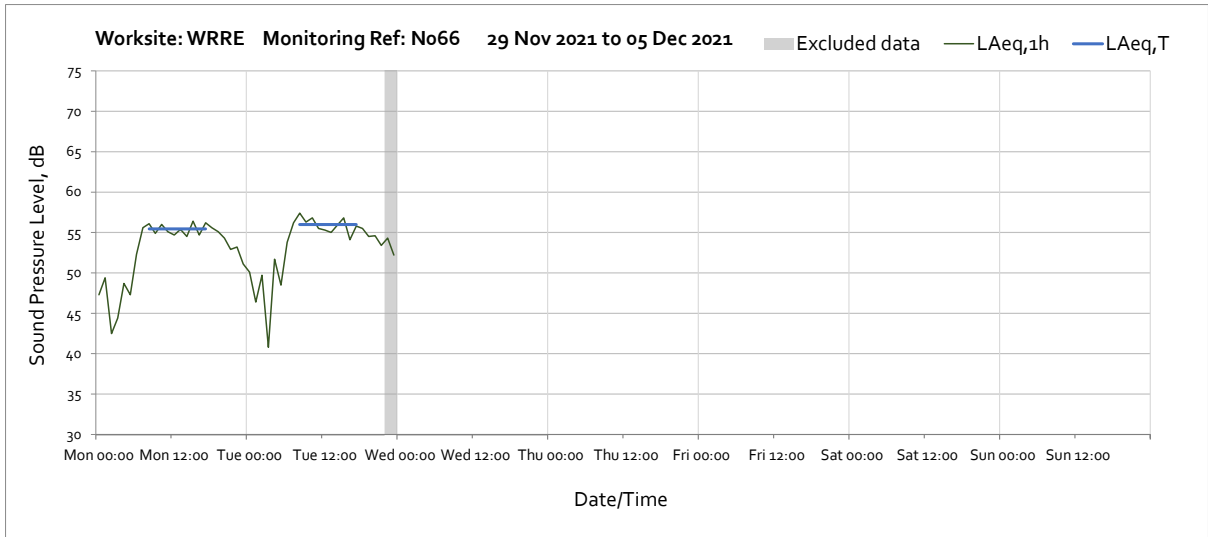


Note: Missing data from 00:00 on Monday 1st November 2021 until 15:00 on Thursday 4th November 2021 and from 17:00 on Thursday 4th November 2021 until 12:00 on Friday 5th November 2021 was due to loss of battery power at the monitoring station.

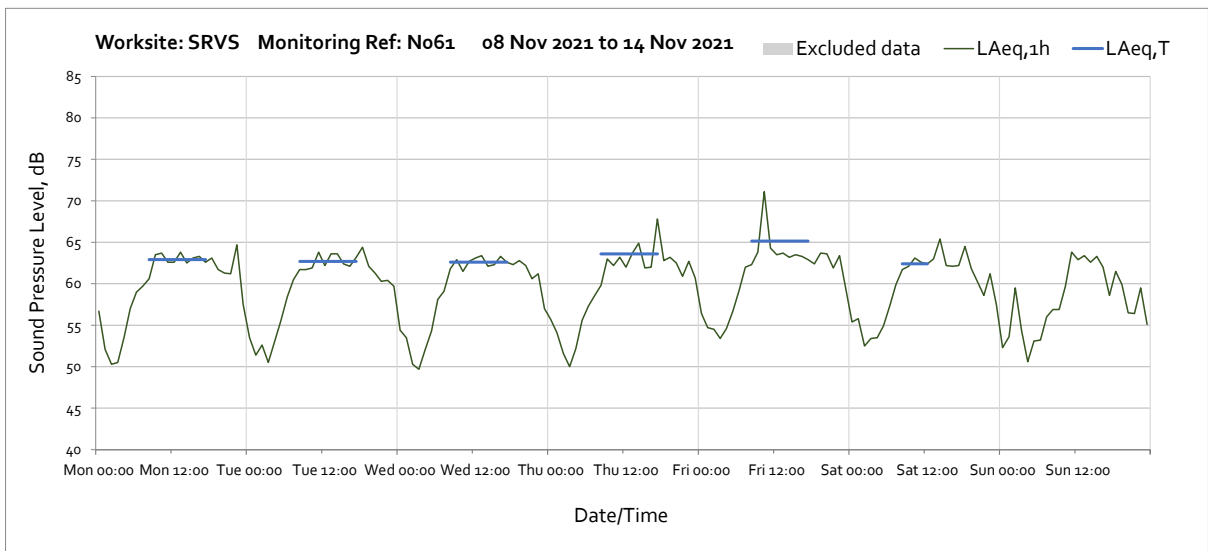
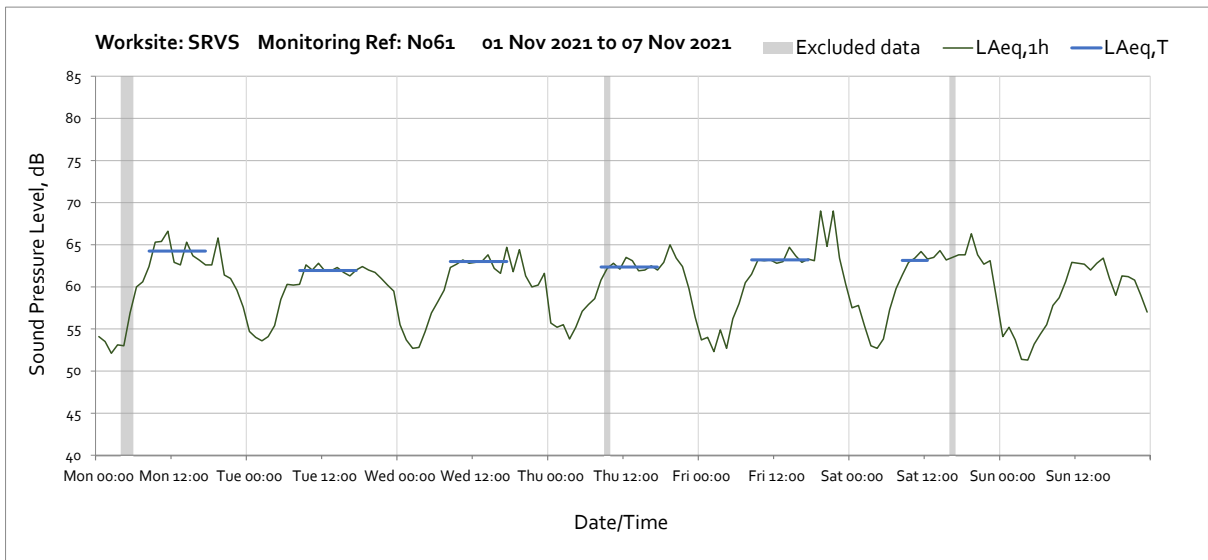


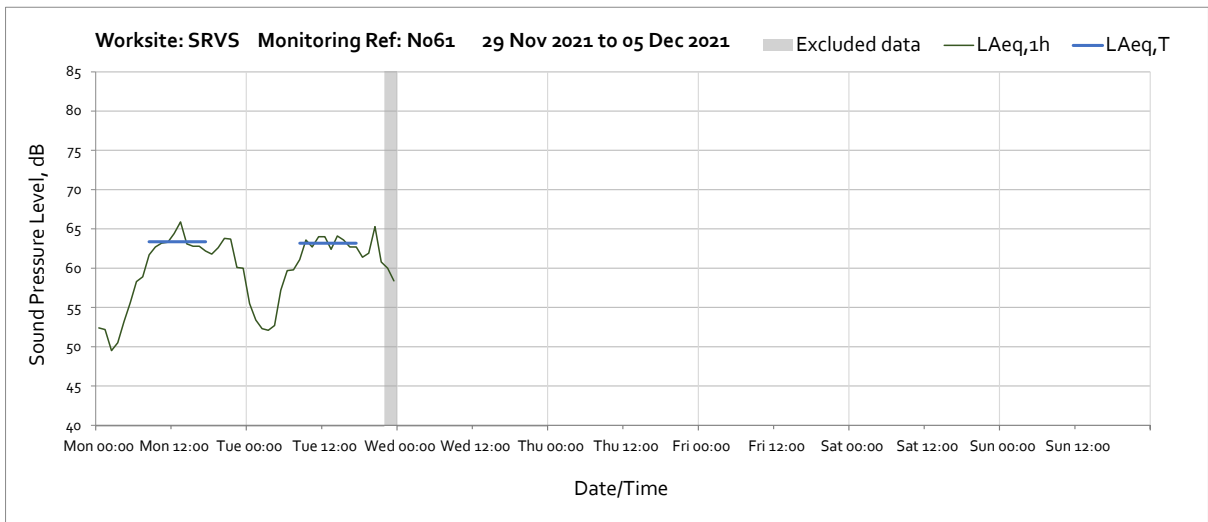
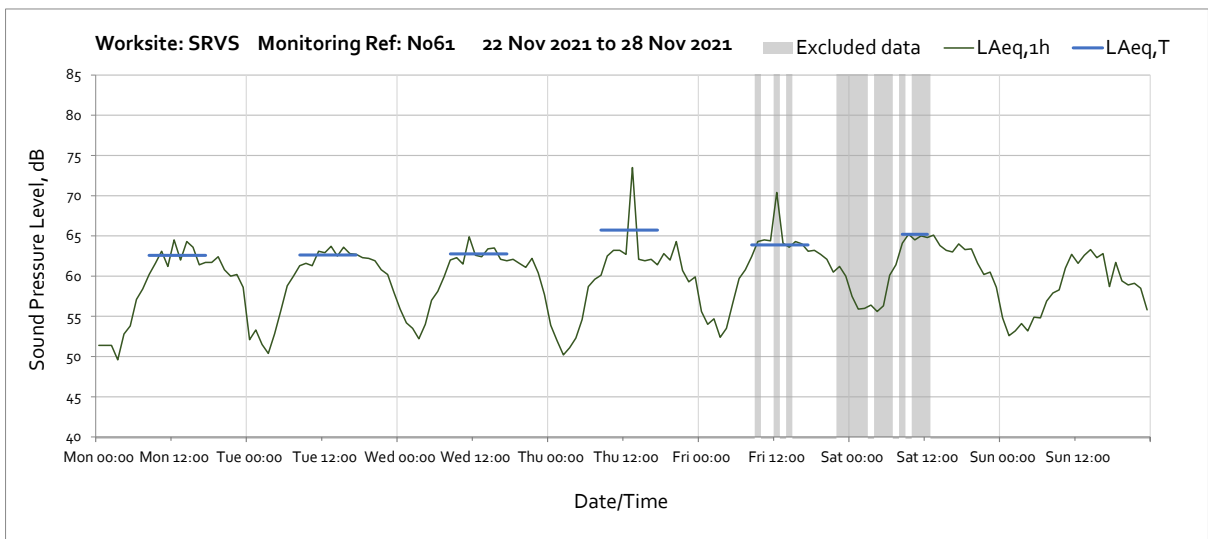
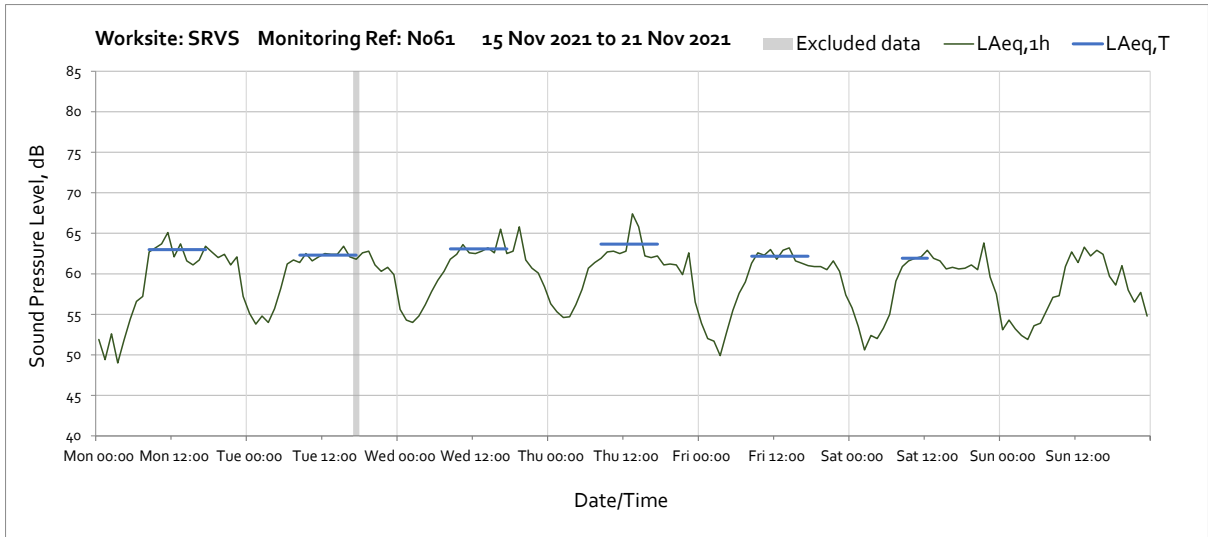
Note: Missing data between 00:00 and 16:00 on Thursday 25th November 2021 was due to loss of battery power at the monitoring station.

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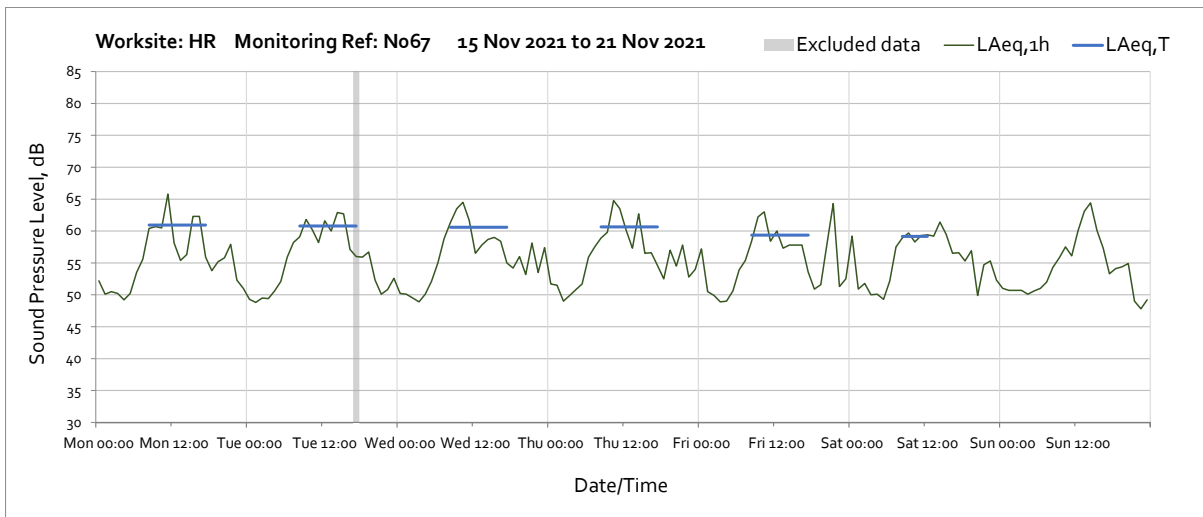
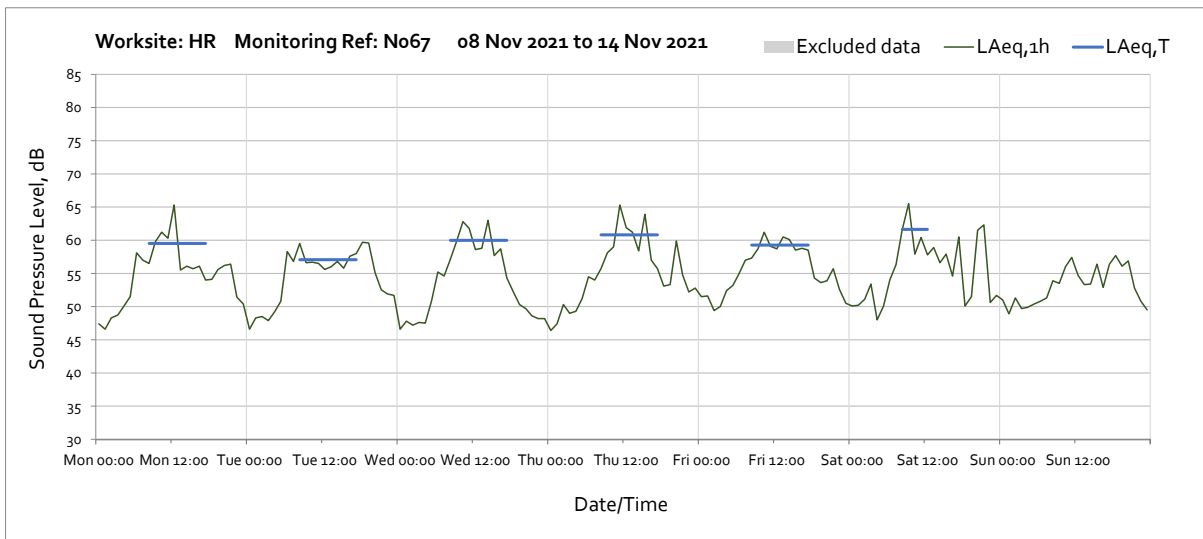
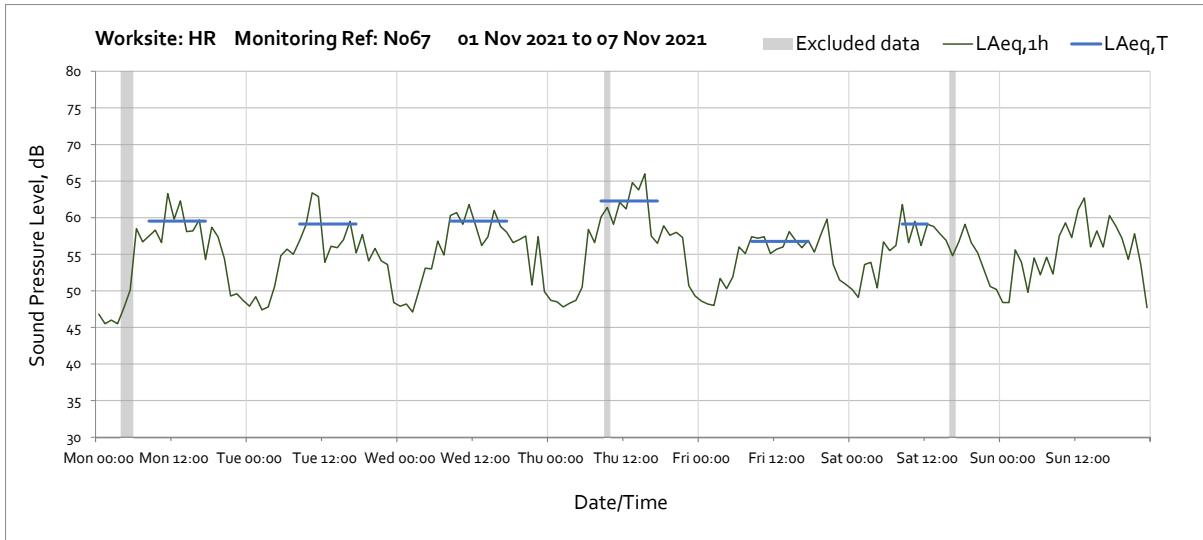


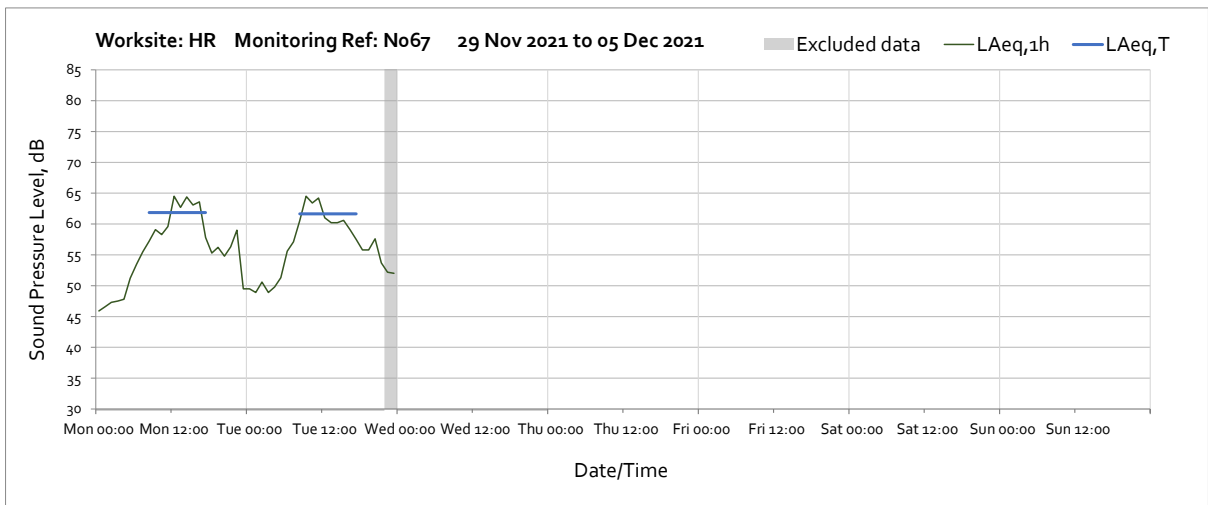
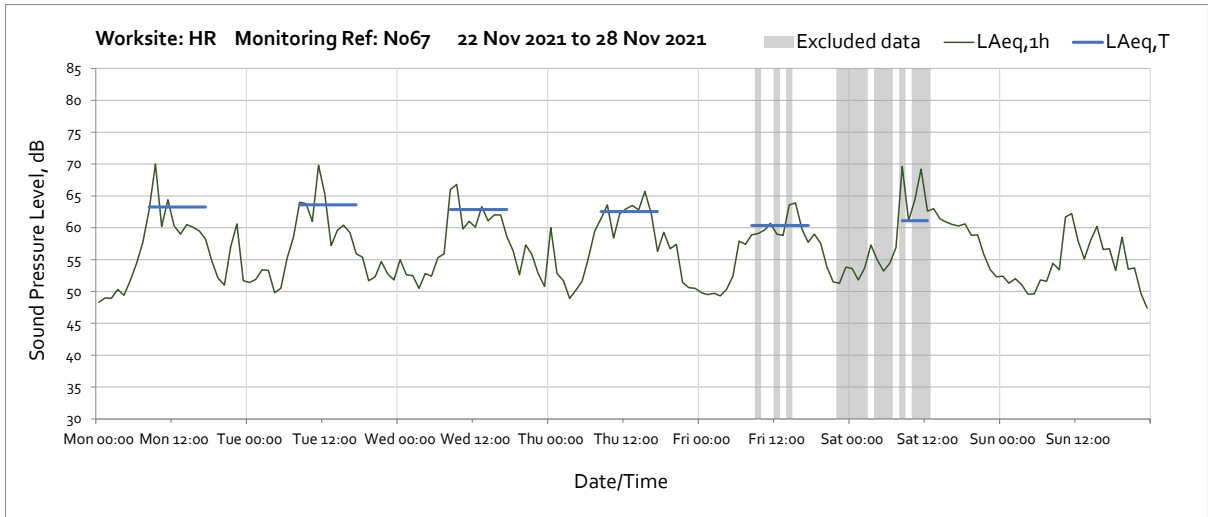
Worksite: South Ruislip Ventilation Shaft (SRVS) – Monitoring Ref: N061



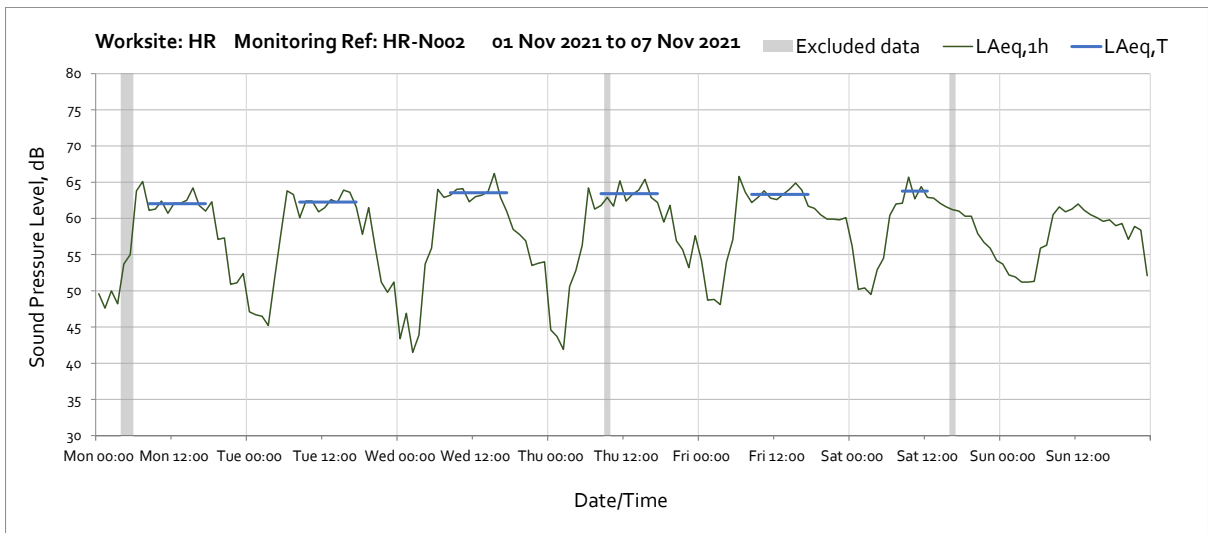


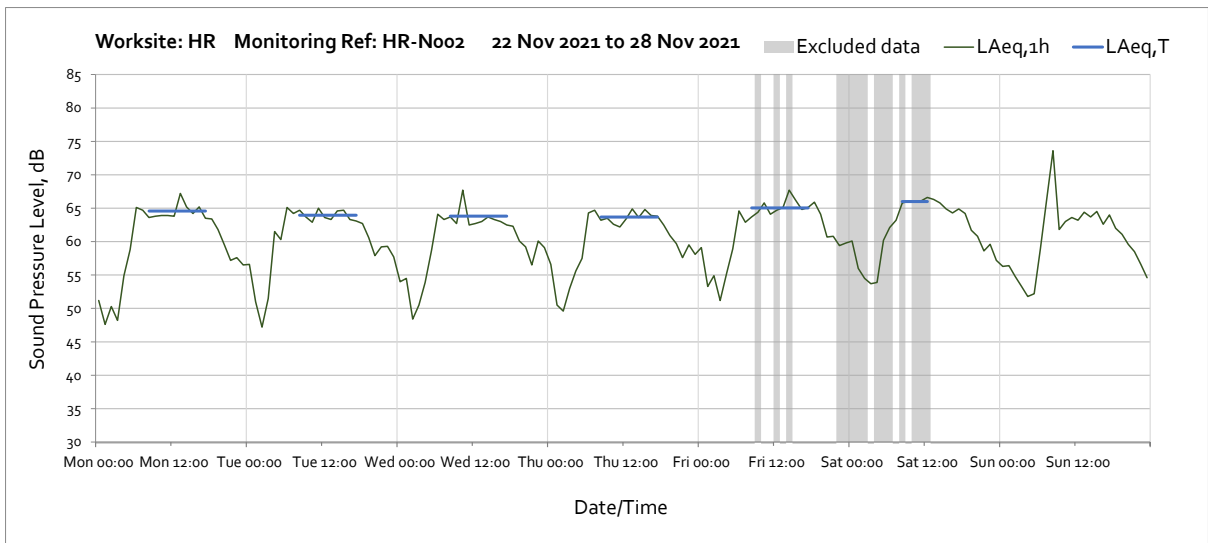
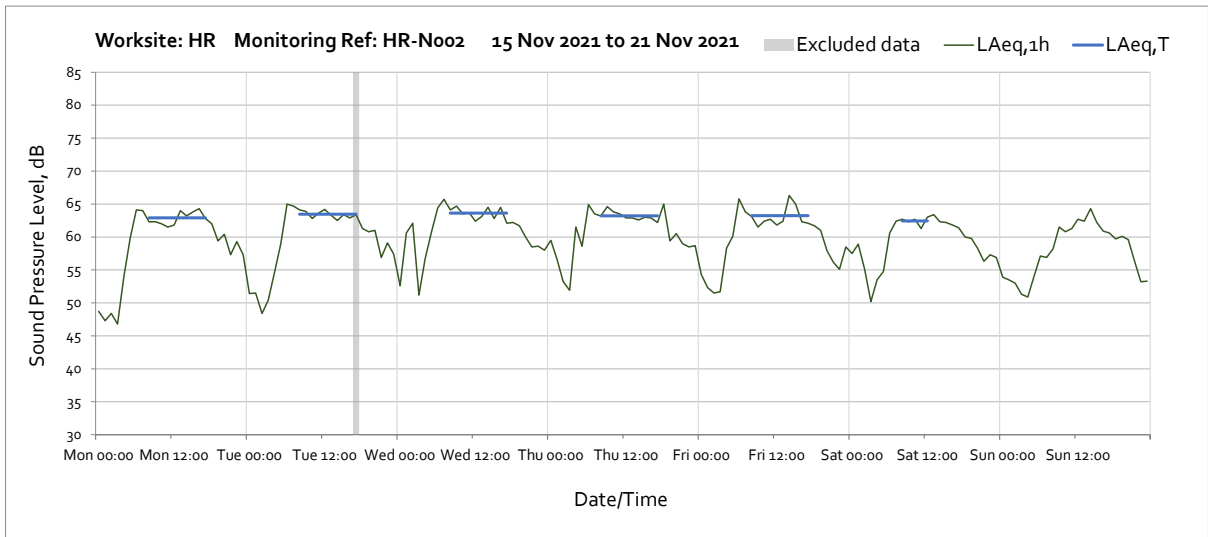
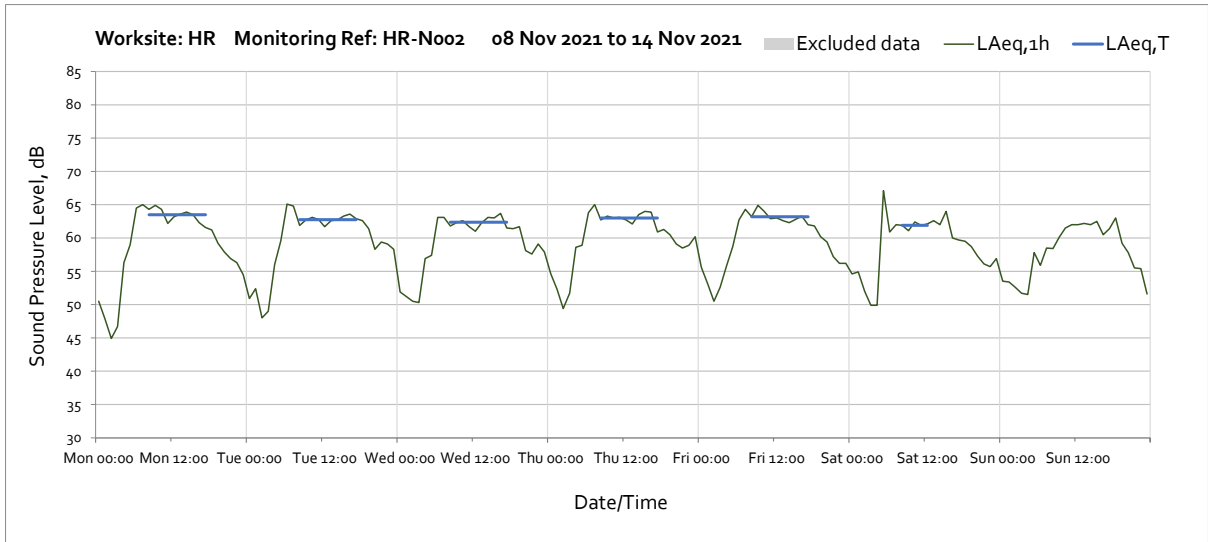
Worksite: Harvil Road (HR) – Monitoring Ref: N067

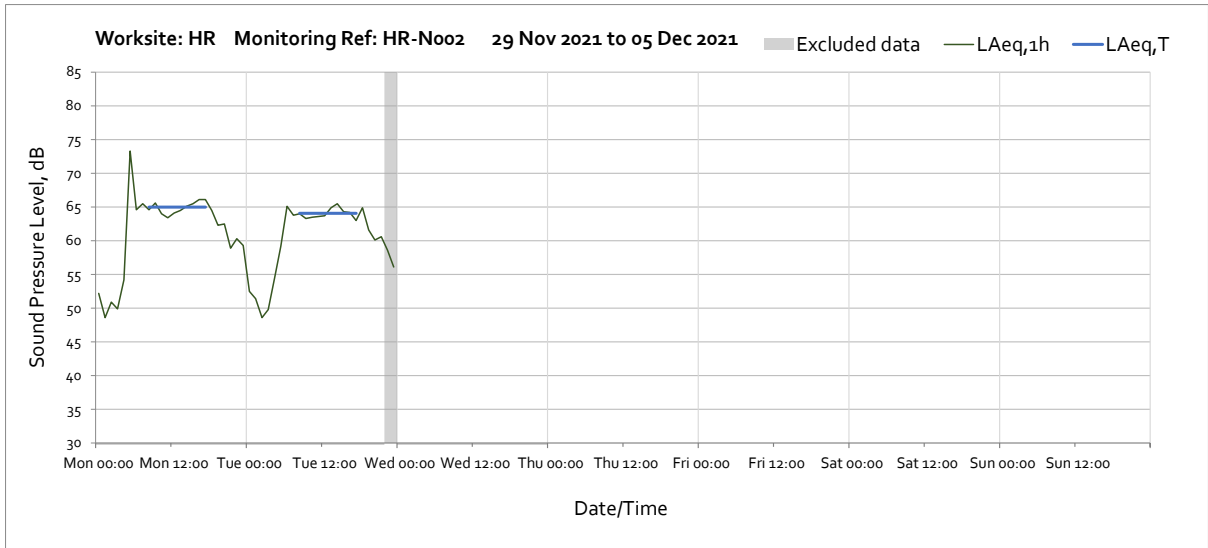




Worksite: Harvil Road (HR) - Monitoring Ref: HR-N002



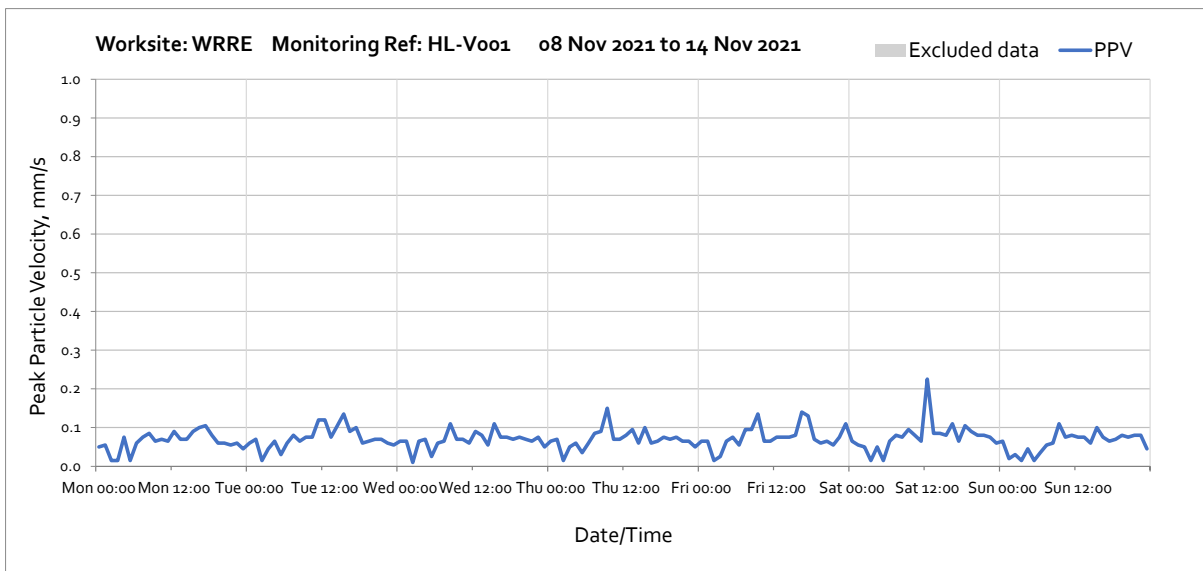
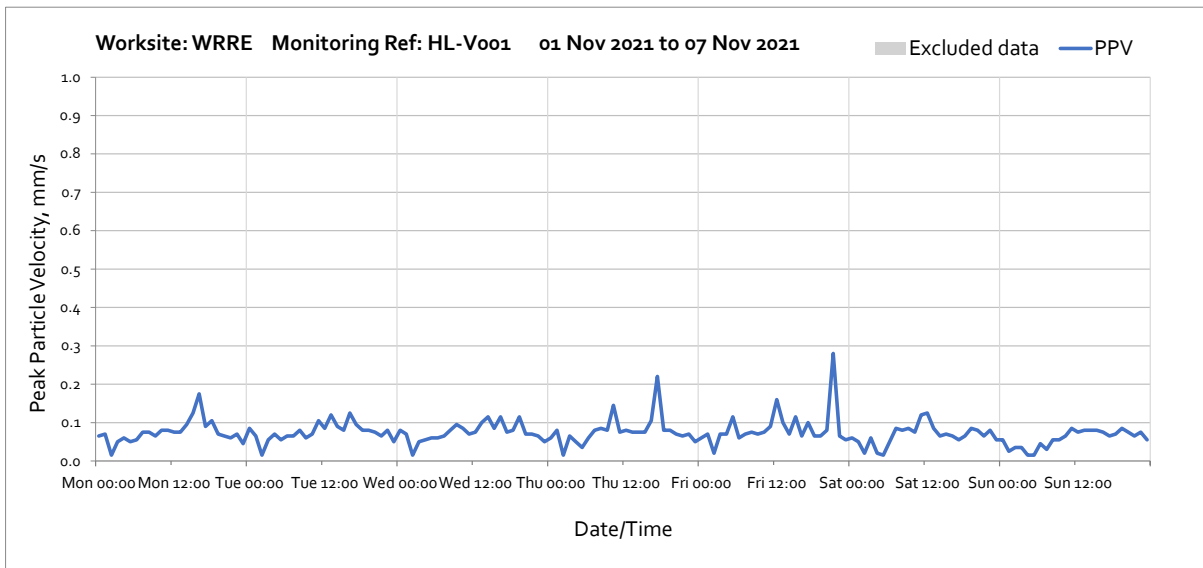


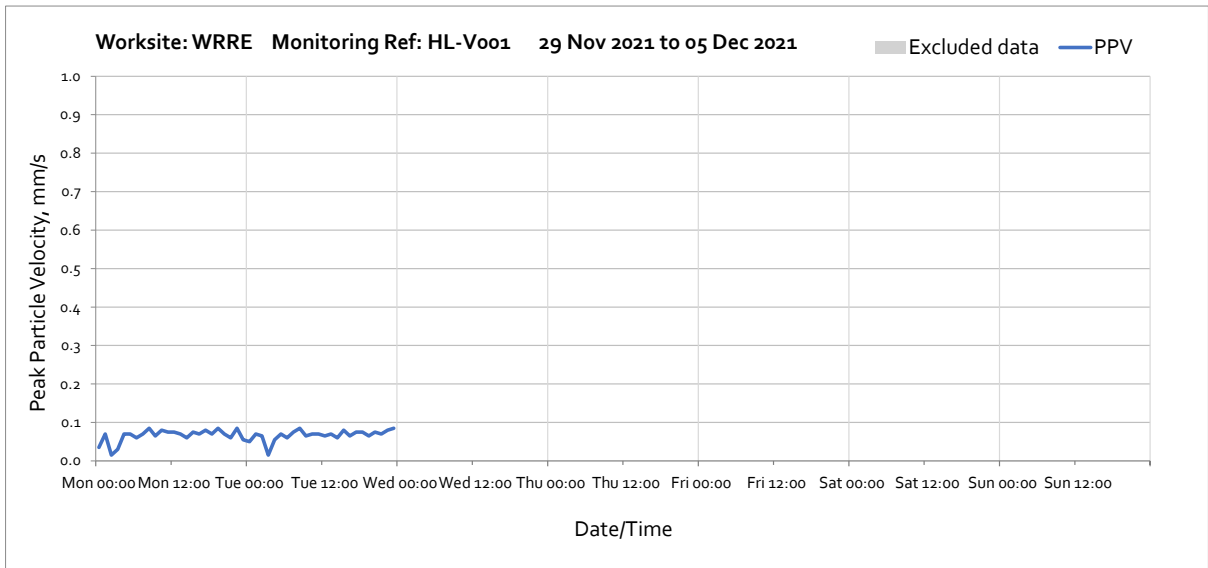
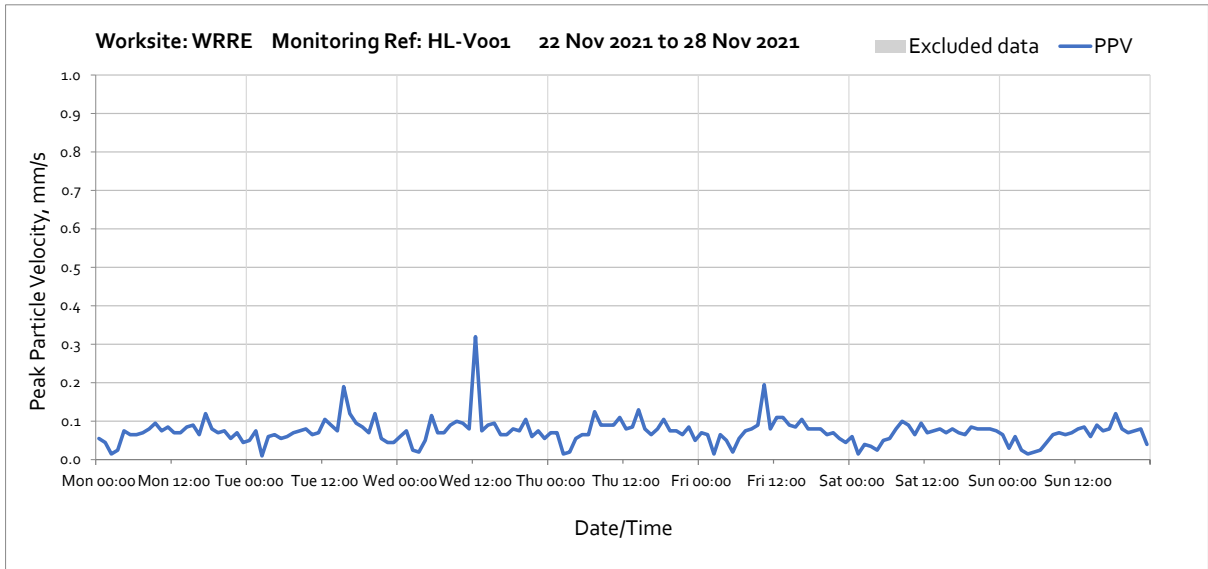
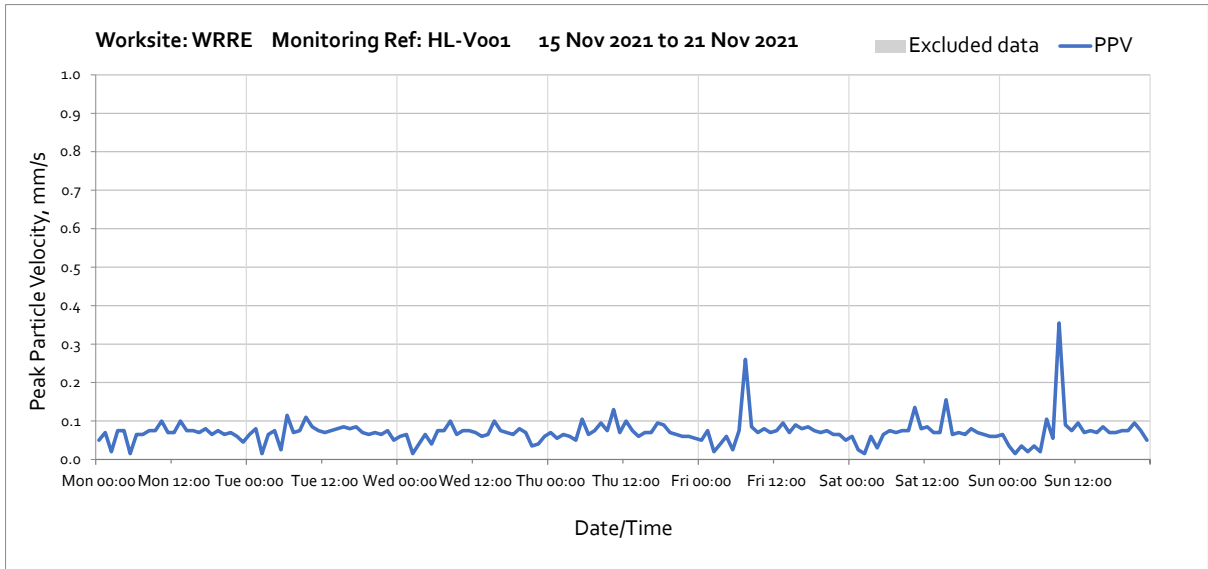


Vibration

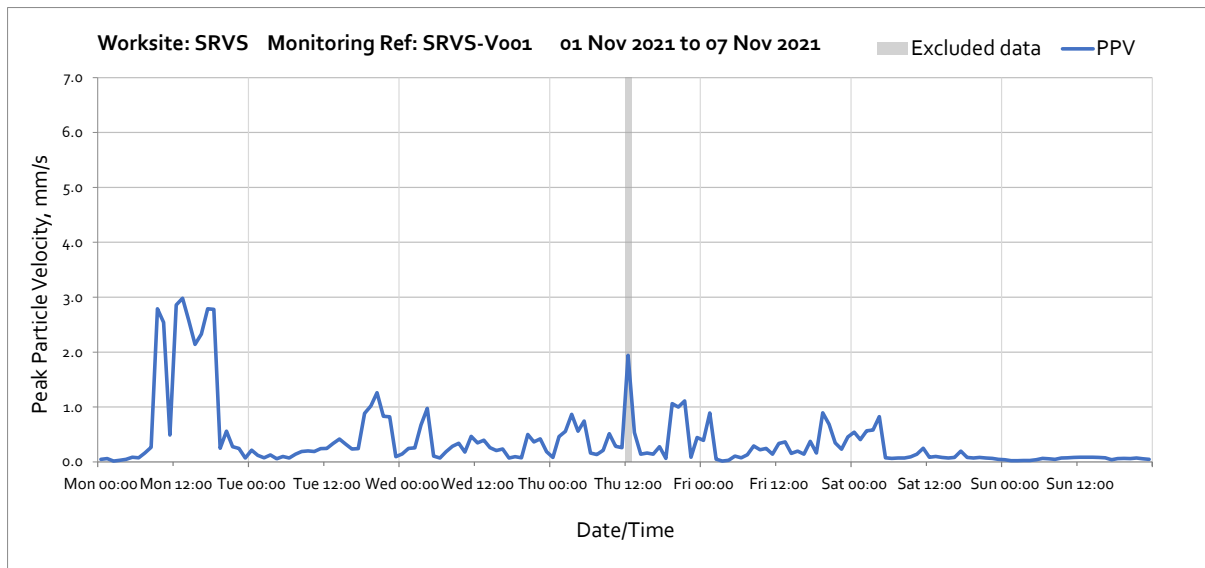
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative 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: West Ruislip Retained Embankment (WRRE) – Monitoring Ref: HL-V001

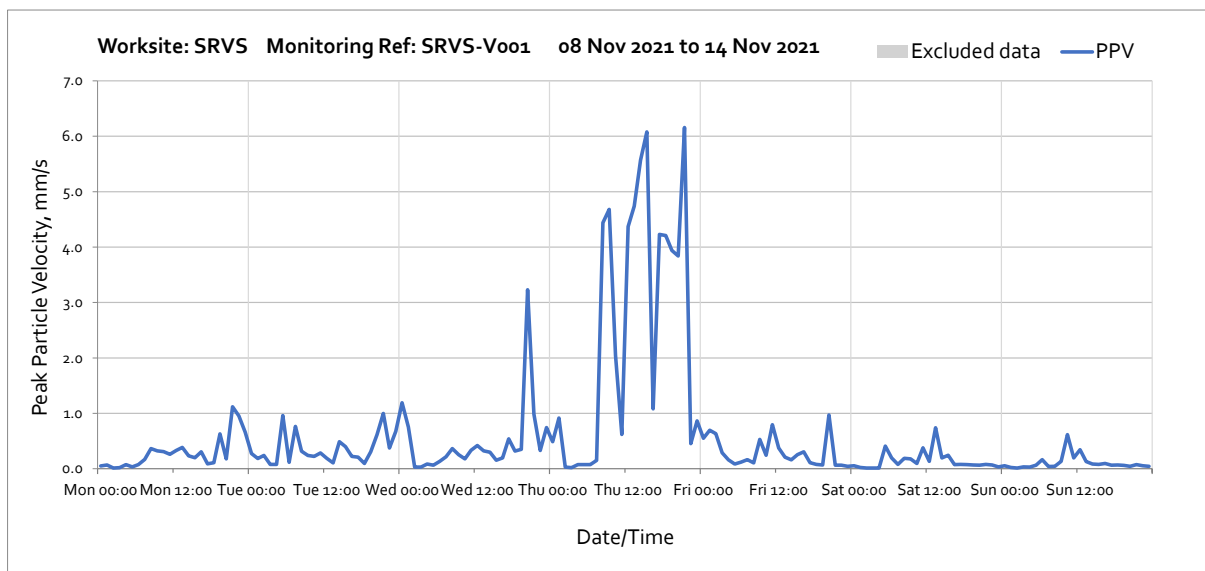




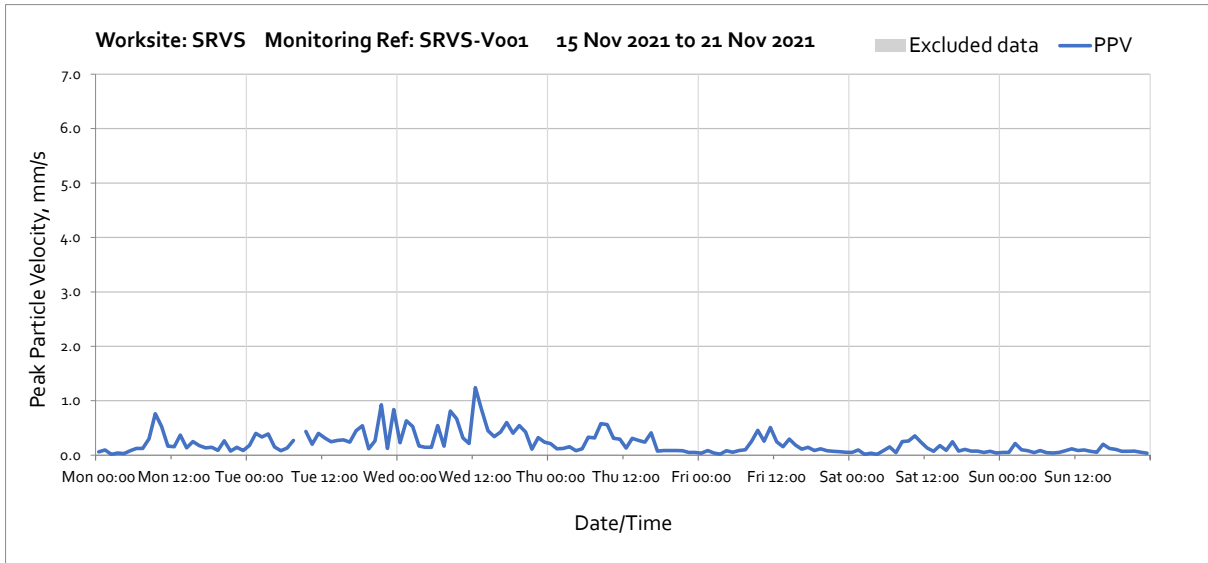
Worksite: South Ruislip Ventilation Shaft (SRVS) – Monitoring Ref: SRVS-V001



Note: High vibration levels measured in between 09:00 and 18:00 on Monday 1st November 2021 were due to the impact of the grab with concrete pilling platform.



Note: High vibration levels measured across the week were due to the impact of the grab with concrete pilling platform therefore work methodology subsequently changed.



Note: Missing data at 08:00 on Tuesday 16th November 2021 was due to loss of connection at the monitoring station.

