

Construction noise and vibration Monthly Report – October 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 October 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 site management and security, bored and sheet piling, pile trimming, concreting works and dewatering were underway;
- West Ruislip Retained Embankment worksite (ref.:WRRE), where site setup, site management and security, hoarding and fencing, stone column installation, footpath construction, drainage works and dewatering were underway;
- South Ruislip Ventilation Shaft worksite (ref.: SRVS), where site preparation works for future start of the diaphragm walling works were underway;
- Harvil Road worksite (ref.: HR), where work activities included site setup, site management and security, bored and sheet piling, pile trimming, concreting works and dewatering.

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

- Ruislip Golf Course and Ickenham Road where power utility works were underway;
- Harvil Road embankment, where compound setup, site management and security, hoarding and fencing installation, temporary road diversion, haul road installation, bulk excavation, installation and use of conveyor system, culvert surveys, utility connections, track drainage surveys were underway;
- Copthall Retained Embankment / Trough, where compound setup, site management and security, hoarding and fencing installation, haul road installation,

bulk excavation, sheet piling, culvert surveys, utility connections, track drainage surveys and permanent rotary piling were underway;

- Northern Sustainable Placement Area, where compound setup, site management and security, hoarding and fencing installation, haul road installation, traffic management, installation and use of conveyor system, stockpiling, culvert surveys, utility connections, track drainage surveys were underway;
- Southern Sustainable Placement Area, where compound setup, site management and security, hoarding and fencing installation, haul road installation were underway.

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 31st October 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);
 - installation of sheet pile, piling works, including support plant, installation of reinforcement cage, concrete pouring and bored pile breaking out works;
 - civil works;
 - earthworks;
 - drainage works; and
 - ground investigation works;
- West Ruislip Portal Worksite, ref.: WRP (see Plan 3 in Appendix A), where work activities included:
 - site management and security;
 - bored and sheet piling;
 - pile trimming;
 - concreting works; and
 - dewatering.
- South Ruislip Ventilation Shaft worksite, ref.: SRVS (see Plan 4 in Appendix A), where work activities included:
 - site preparation works for future start of the diaphragm walling works.
- West Ruislip Retained Embankment Worksite, ref.: WRRE, where work activities included:
 - site setup;
 - site management and security;
 - hoarding and fencing;
 - stone column installation;
 - footpath construction;
 - drainage works; and
 - dewatering.

- Harvil Road worksite, ref.: HR (see Plan 2 in Appendix A), where work activities included:
 - site setup;
 - site management and security;
 - bored and sheet piling;
 - pile trimming;
 - concreting works; and
 - dewatering.

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

- Ruislip Golf Course and Ickenham Road where power utility works were underway;
- Harvil Road embankment, where compound setup, site management and security, hoarding and fencing installation, temporary road diversion, haul road installation, bulk excavation, installation and use of conveyor system, culvert surveys, utility connections, track drainage surveys were underway;
- Copthall Retained Embankment / Trough, where compound setup, site management and security, hoarding and fencing installation, haul road installation, bulk excavation, sheet piling, culvert surveys, utility connections, track drainage surveys and permanent rotary piling were underway;
- Northern Sustainable Placement Area, where compound setup, site management and security, hoarding and fencing installation, haul road installation, traffic management, installation and use of conveyor system, stockpiling, culvert surveys, utility connections, track drainage surveys were underway;
- Southern Sustainable Placement Area, where compound setup, site management and security, hoarding and fencing installation, haul road installation 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 Thirteen noise and two vibration monitoring installations were active in October in the LBH area. Table 2 summarises the position of noise and vibration monitoring installations within the LBH area in October 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 | Breakspeare 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 | Weekly 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 | 57.5 (58.3) | 57.6 (58.7) | 56.3 (57.7) | 55.9 (57.3) | 55.5 (57.2) | 57.3 (58.6) | 57.0 (57.8) | 56.5 (60.0) | 55.9 (57.4) | 55.4 (56.3) | 56.2 (58.5) | 55.6 (57.5) |
| | CVV-DL-NMP3 | Dew's Farm Cottages, Dews Lane, Harefield, Uxbridge, | Free-field | 57.5 (63.4) | 62.4 (64.1) | 52.7 (66.5) | 49.4 (60.1) | 47.0 (54.6) | 55.6 (58.4) | 59.3 (64.3) | 50.6 (53.6) | 50.3 (55.0) | 46.0 (50.4) | 51.2 (59.5) | 47.3 (55.2) |
| CVV-MR | CVV-MR-NMP1 | Weir Cottage, Denham Garden Village, Denham, Buckinghamshire | Free-field | 51.8 (54.6) | 56.6 (63.3) | 51.6 (57.3) | 48.4 (56.3) | 46.6 (57.3) | 51.6 (54.8) | 52.4 (53.6) | 51.2 (52.0) | 50.6 (56.3) | 45.3 (55.3) | 50.2 (58.1) | 46.7 (56.3) |
| | CVV-MR-NMP2 | Harefield Marina, Moorhall Road, London, Greater London | Free-field | 51.2 (54.7) | 55.7 (66.8) | 48.1 (50.7) | 47.0 (53.5) | 45.0 (58.5) | 51.4 (54.0) | 52.0 (59.6) | 47.4 (52.6) | 48.0 (53.2) | 44.2 (49.4) | 49.6 (60.5) | 45.4 (54.1) |
| | CVV-MR-NMP3 | Peerless Drive, Harefield, Uxbridge | Free-field | 53.5 (57.0) | 58.9 (62.4) | 49.4 (54.3) | 47.3 (55.5) | 45.1 (55.0) | 50.1 (52.2) | 50.8 (52.7) | 49.2 (51.9) | 49.3 (55.2) | 43.6 (48.9) | 50.2 (61.0) | 45.4 (55.3) |
| WRP | N048 | West Ruislip Golf Club, Ickenham Rd, Ruislip | Free-field | 60.3 (62.9) | 63.2 (69.0) | 56.1 (62.5) | 53.9 (57.5) | 51.3 (59.4) | 58.9 (61.5) | 60.4 (65.3) | 53.4 (56.4) | 53.4 (57.5) | 49.0 (55.3) | 54.2 (61.4) | 50.8 (57.1) |
| | N056 | 83 The Greenway, Ickenham, Ruislip | Free-field | 61.0 (62.0) | 60.0 (61.2) | 60.3 (61.5) | 59.0 (61.0) | 54.3 (59.9) | 55.5 (59.1) | 58.1 (59.4) | 56.4 (62.1) | 55.6 (63.1) | 49.6 (59.3) | 55.4 (60.3) | 53.6 (58.8) |

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| Worksite Reference | Measurement Reference | Site Address | Free-field or Façade Measurement | Weekly 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 |
| WRP | N057 | 123 The Greenway, Ickenham, Ruislip | Free-field | 56.6 (61.6) | 57.0 (61.4) | 55.3 (57.2) | 54.8 (65.2) | 50.2 (56.6) | 51.6 (55.7) | 55.8 (57.1) | 52.0 (56.1) | 52.9 (64.6) | 45.4 (55.3) | 52.2 (64.8) | 50.4 (61.3) |
| WRRE | N065 | Breakspear Road South, Harefield, Uxbridge | Free-field | 64.9 (66.7) | 64.6 (66.4) | 64.5 (65.8) | 62.4 (66.0) | 57.9 (64.9) | 62.4 (62.7) | 64.6 (65.9) | 64.3 (65.7) | 62.2 (65.3) | 56.2 (63.7) | 63.1 (68.4) | 58.1 (65.8) |
| | N066 | Hoylake Crescent, Ickenham, Uxbridge | Free-field | 56.9 (60.9) | 61.2 (74.6) | 55.6 (56.3) | 54.4 (56.3) | 50.5 (55.2) | 52.5 (55.2) | 55.9 (63.8) | 51.9 (55.2) | 52.4 (55.8) | 48.3 (54.2) | 51.9 (57.0) | 50.3 (54.7) |
| SRVS | N061 | Cineworld South Ruislip car park, Ruislip | Free-field | 61.3 (72.4) | 63.7 (66.4) | 63.1 (67.3) | 61.8 (66.4) | 57.1 (66.8) | 59.6 (60.6) | 62.7 (63.9) | 62.5 (63.3) | 62.9 (68.3) | 57.1 (63.4) | 62.4 (74.5) | 57.8 (64.1) |
| HR | N067 | Harvil Road worksite south boundary | Free-field | 55.5 (60.0) | 59.9 (62.0) | 57.1 (65.2) | 55.6 (61.5) | 50.0 (56.6) | 54.2 (55.1) | 57.8 (61.7) | 58.5 (69.5) | 55.6 (64.8) | 50.8 (61.0) | 56.3 (64.4) | 51.0 (63.2) |
| | HR-N002 | Certas Energy Bunker Site – Harefield | Free-field | 64.1 (67.8) | 63.8 (65.4) | 61.8 (64.6) | 59.3 (64.7) | 57.9 (67.6) | 61.9 (63.4) | 62.6 (63.8) | 60.9 (62.3) | 60.1 (67.8) | 54.0 (58.8) | 59.4 (67.0) | 56.7 (68.5) |

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 | 0.53 (Z-axis) |
| SRVS | SRVS-V001 | Braintree Industrial Estate - Building D4 | 0.94 (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 |
|--------------------|-----------------------|--|--|------------------------|--------------------------------|--------------------------------|
| CVV-DL | CVV-DL-NMP2 | Highway Farm House, Harvil Rd, Harefield, Uxbridge | All days | All periods | No exceedance | No exceedance |
| | CVV-DL-NMP3* | Dew's Farm Cottages, Dews Lane, Harefield, Uxbridge | All days | All periods | No exceedance | No exceedance |
| CVV-MR | CVV-MR-NMP1 | Weir Cottage, Denham Garden Village, Denham, Buckinghamshire | All days | All periods | No exceedance | No exceedance |
| | CVV-MR-NMP2 | Harefield Marina, Moorhall Road, London, Greater London | Weekdays | 0800-1800 | 4 | No exceedance |
| | CVV-MR-NMP3 | Peerless Drive, Harefield, Uxbridge | All days | All periods | No exceedance | No exceedance |
| WRP | N048 | West Ruislip Golf Club, Ickenham Rd, Ruislip | Weekdays Saturdays | 0800-1800 0800-1300 | 4 1 | No exceedance |
| | 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 | 20 4 | 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 | 6 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 | 21 4 | 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 October 2021. LOAEL exceedances have been recorded at noise monitoring location ref.: CVV-DL-NMP2, ref.: N048, ref.: N065, ref.: N066 and ref.: HR-N002 during normal 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

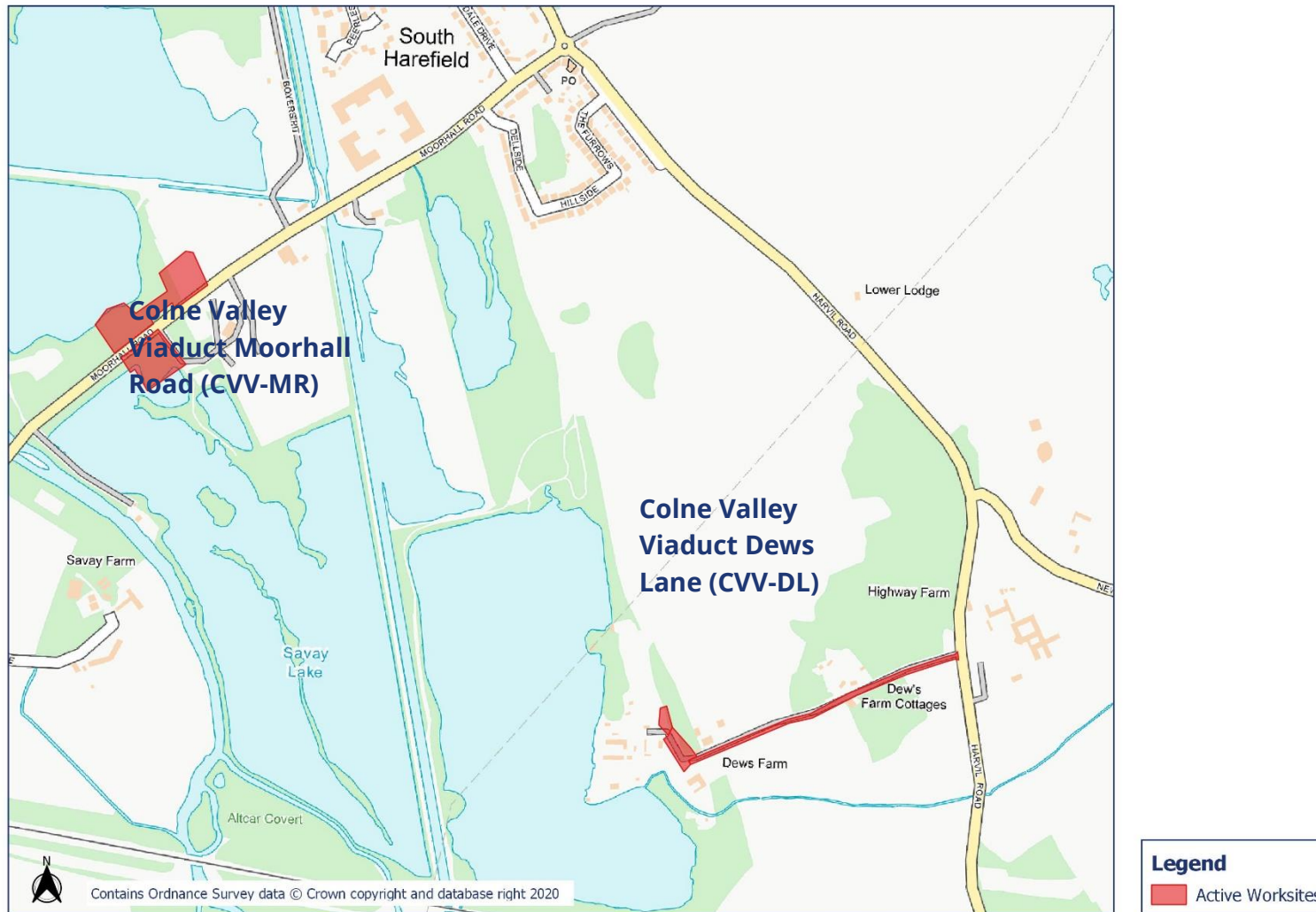
2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

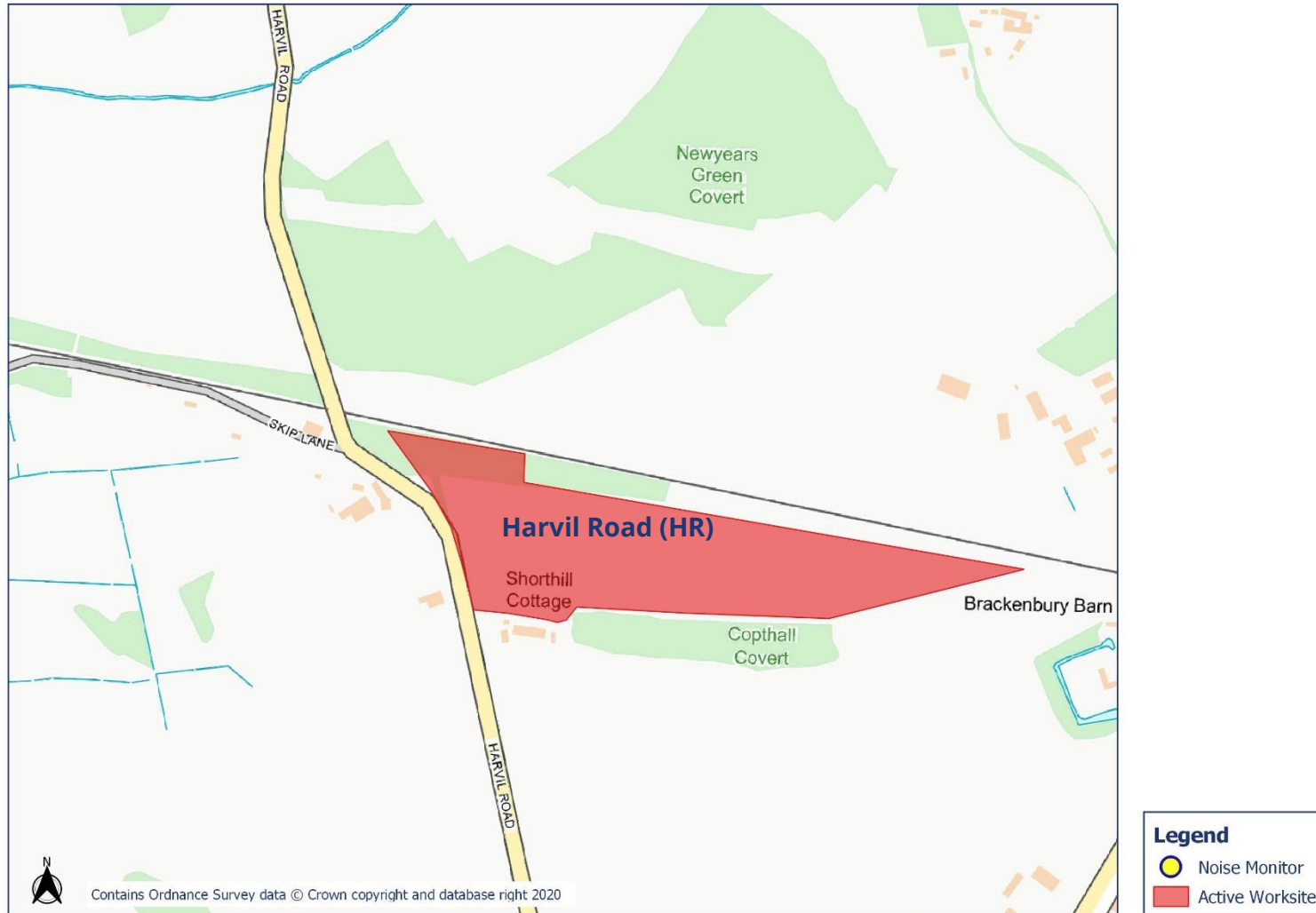
Table 7: Summary of Complaints

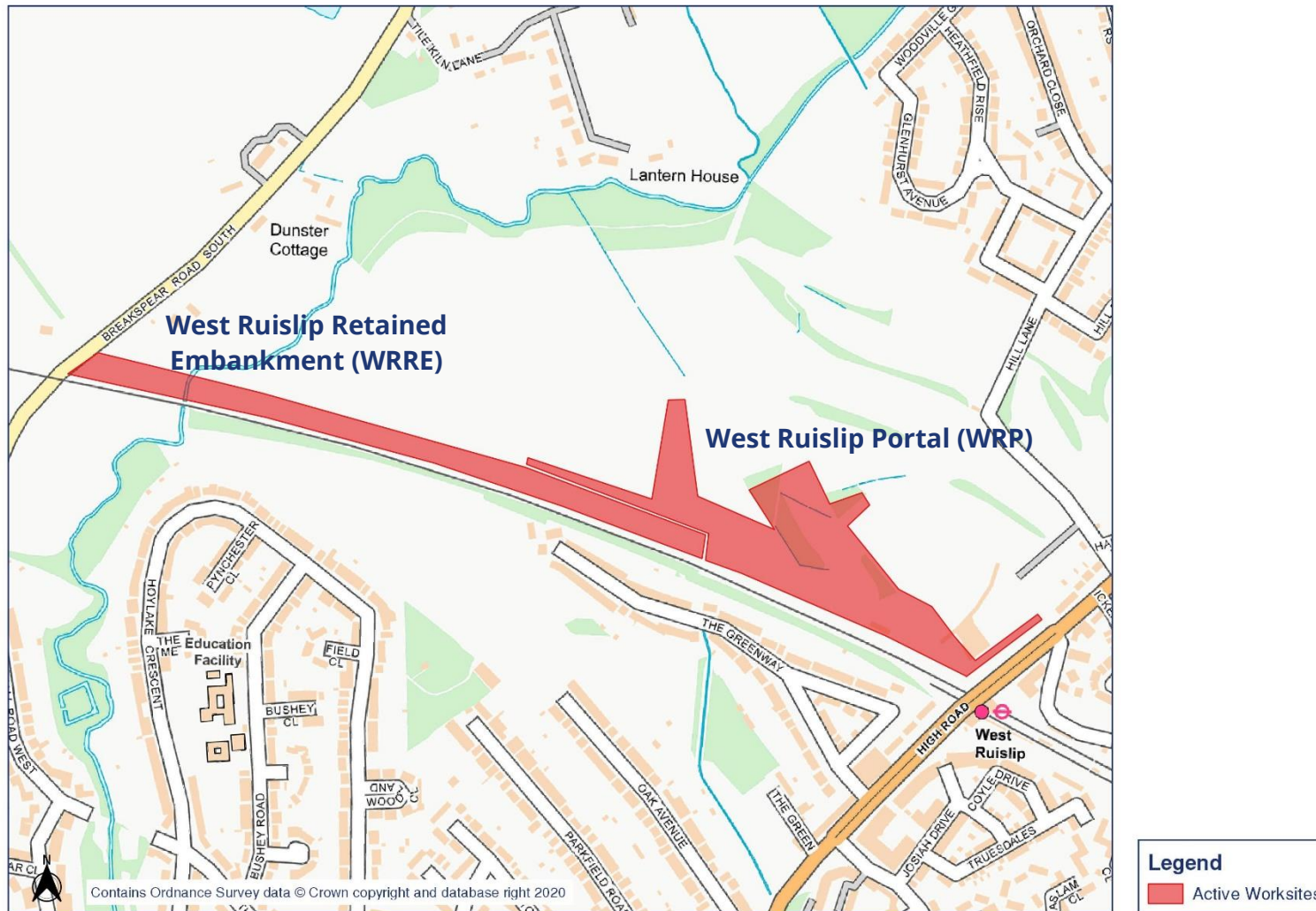
| Complaint Reference Number | Worksite Reference | Description of Complaint | Results of Investigation | Actions Taken |
|----------------------------|--------------------|---|---|--|
| HS2-21-42720-C | WRP/WRRE | Complaint due to noise disturbance in the early hours from the bucket of a digger being shaken. | Investigation shown that no nearby HS2 works that tie with type of noise reported were undertaken in the area as no night works took place at that time. | The complainant has been contacted and information provided. |
| HS2-21-42724-C | WRP/WRRE | Complaint due to noise disturbance from construction works during early hours. | Investigation shown that no night works or works outside normal core hours (8am-6pm) were undertaken. Noise assigned to works activities undertaken at local businesses near Newyears Green Lane just before 6am. | The complainant has been contacted and information provided. |
| HS2-21-42725-C | WRP/WRRE | Complaint about noise disturbance in the early hours described as metal clanging/banging. | Investigation shown that no night works or works outside normal core hours (8am-6pm) were undertaken. Noise assigned to work activities undertaken at local businesses near Newyears Green Lane just before 6am. | The complainant has been contacted and information provided. |

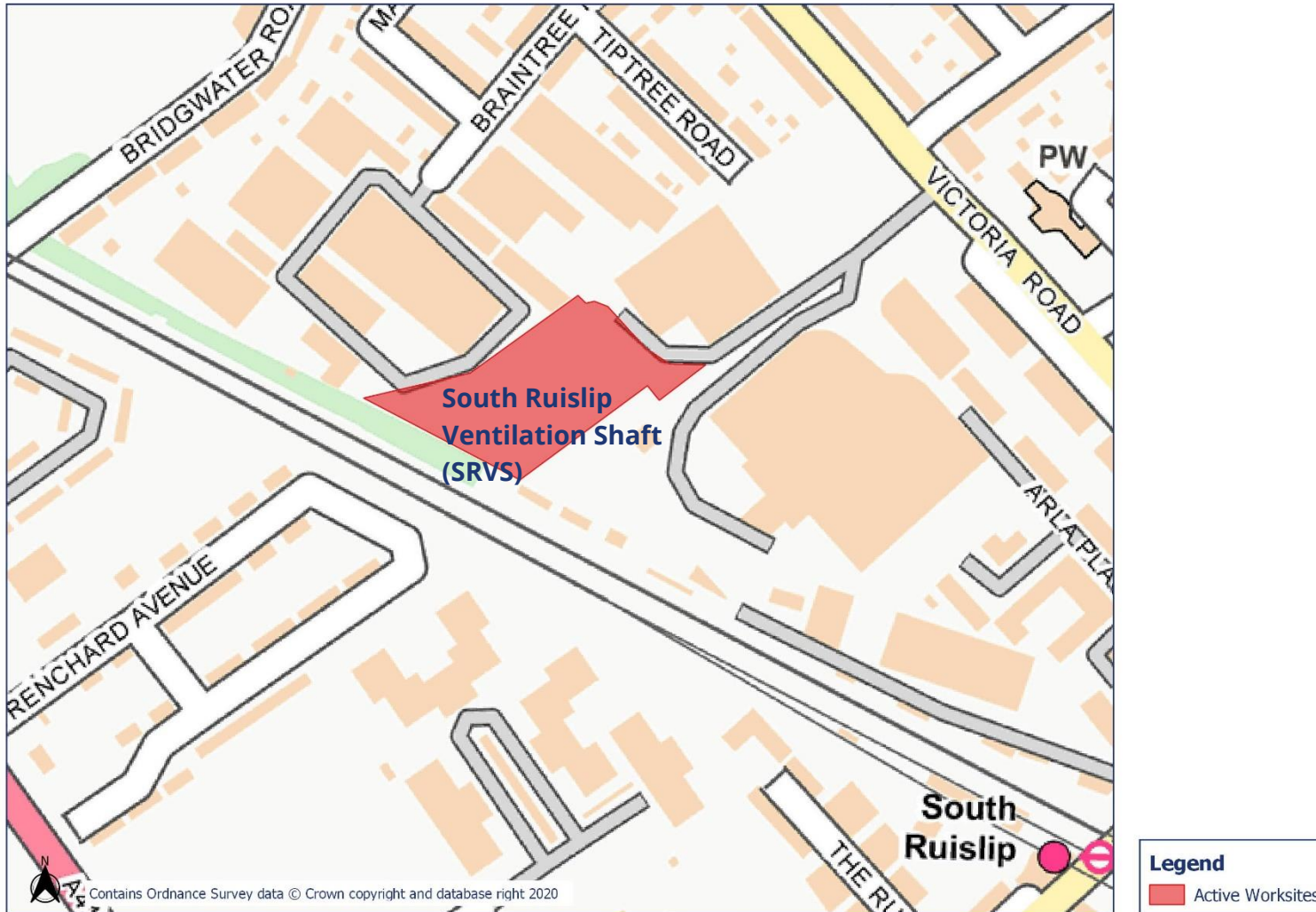
Appendix A Site Locations



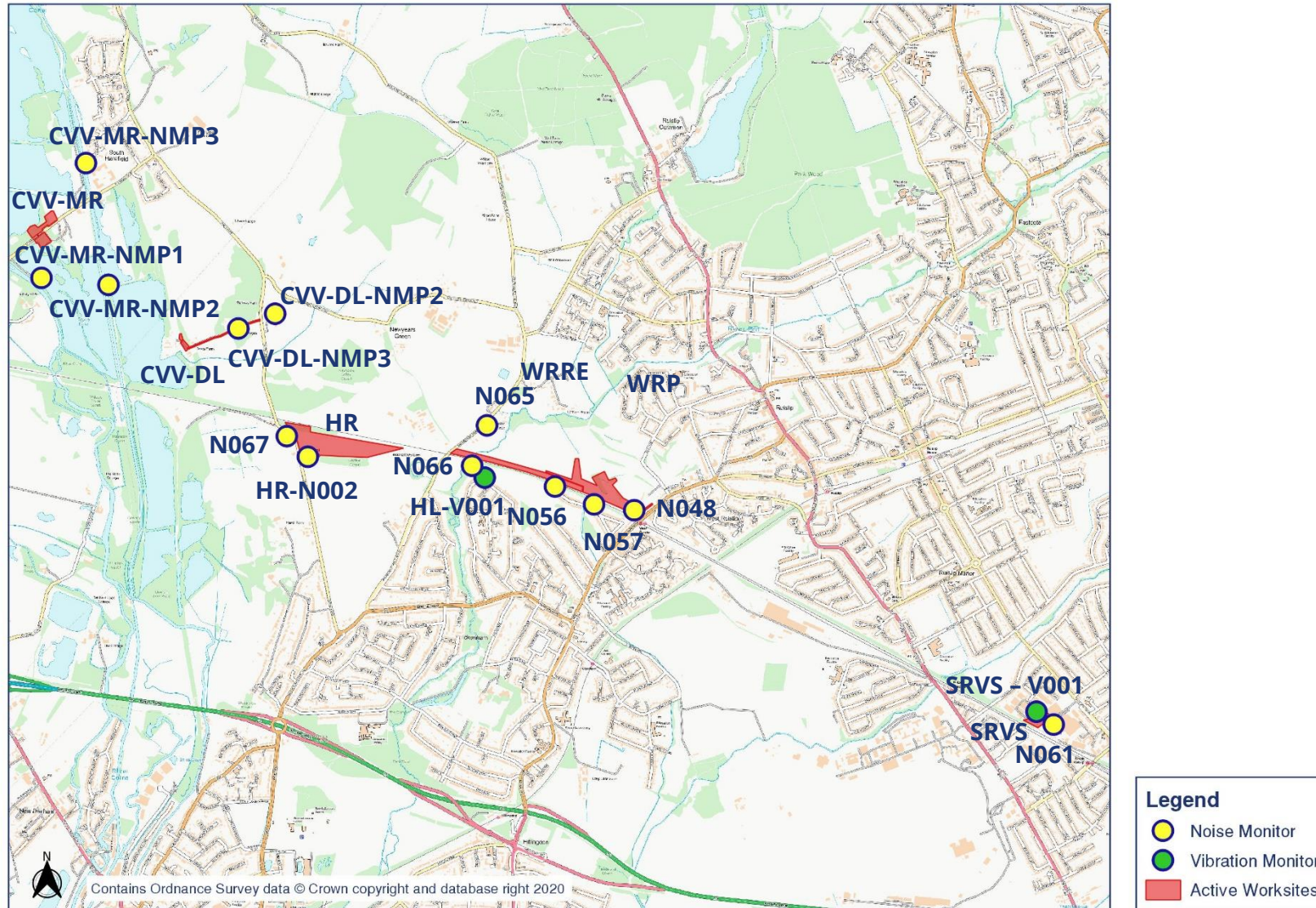




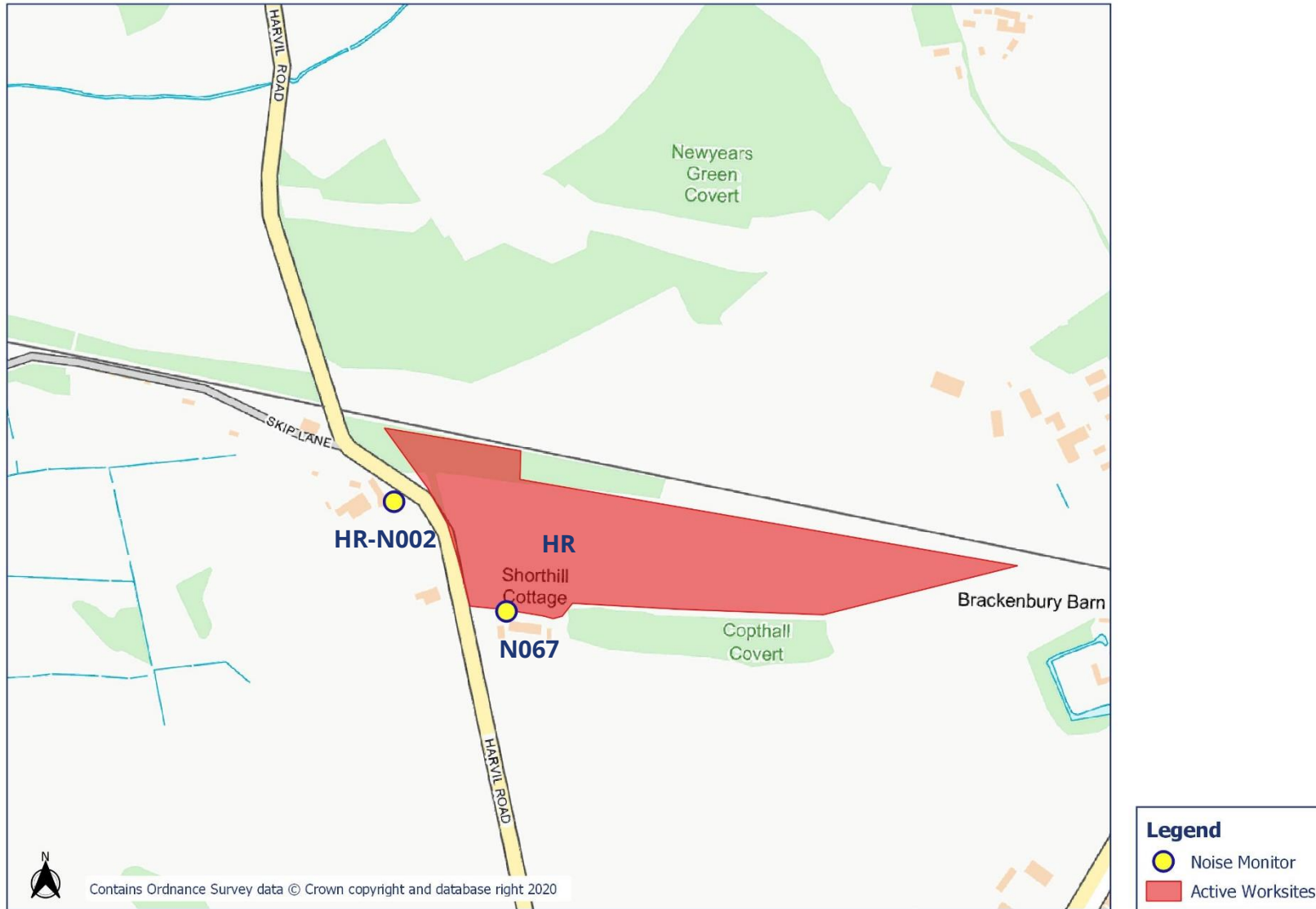


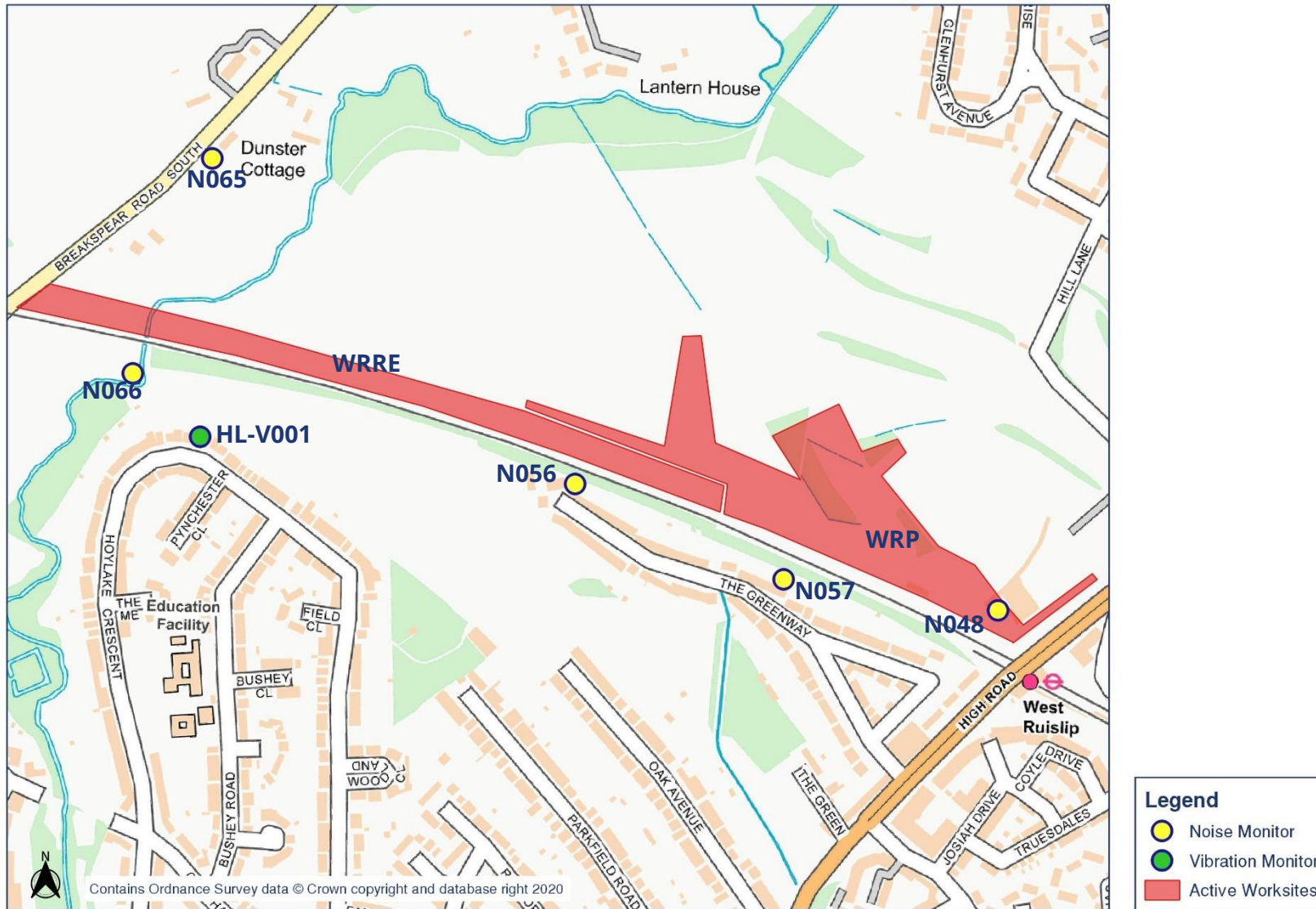


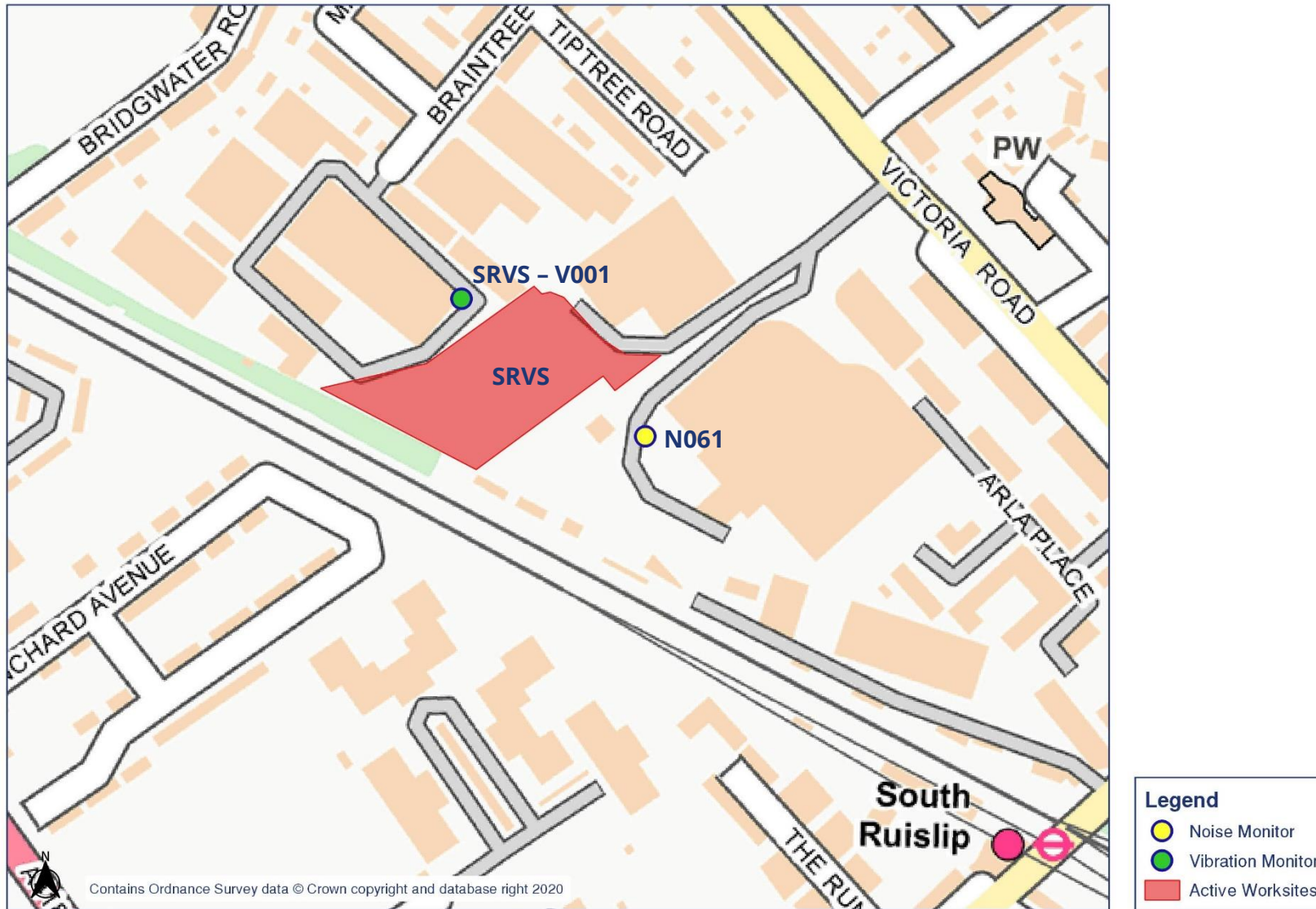
Appendix B Monitoring Locations











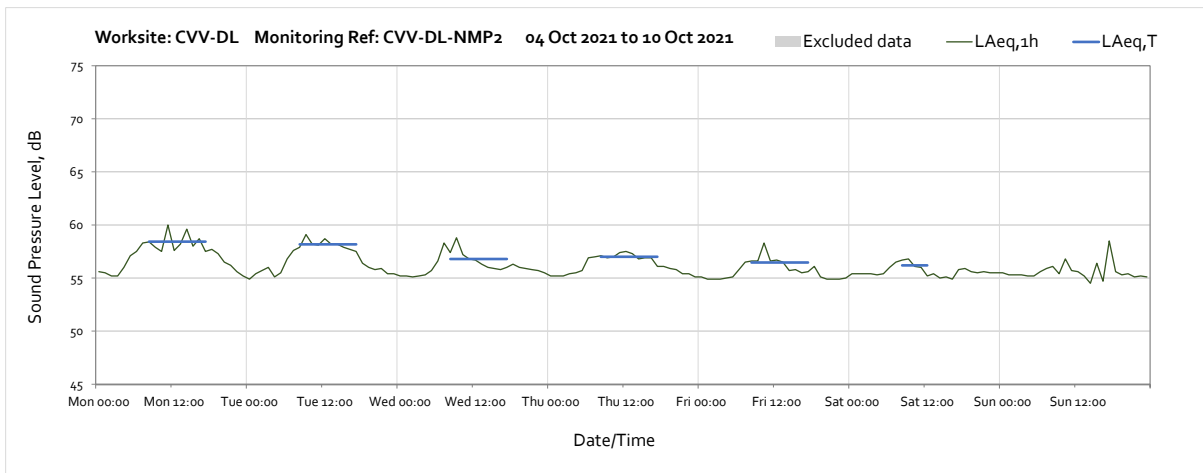
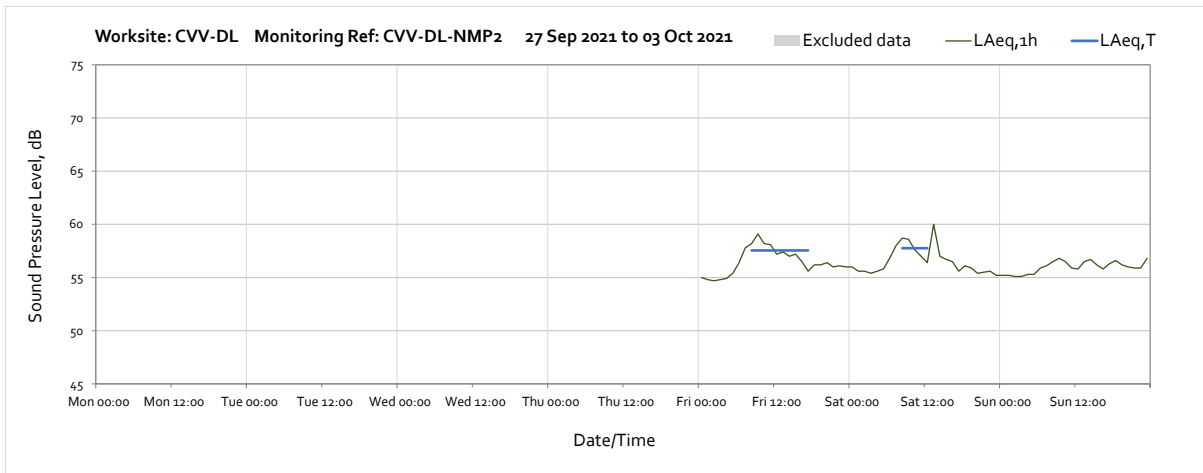
Appendix C Data

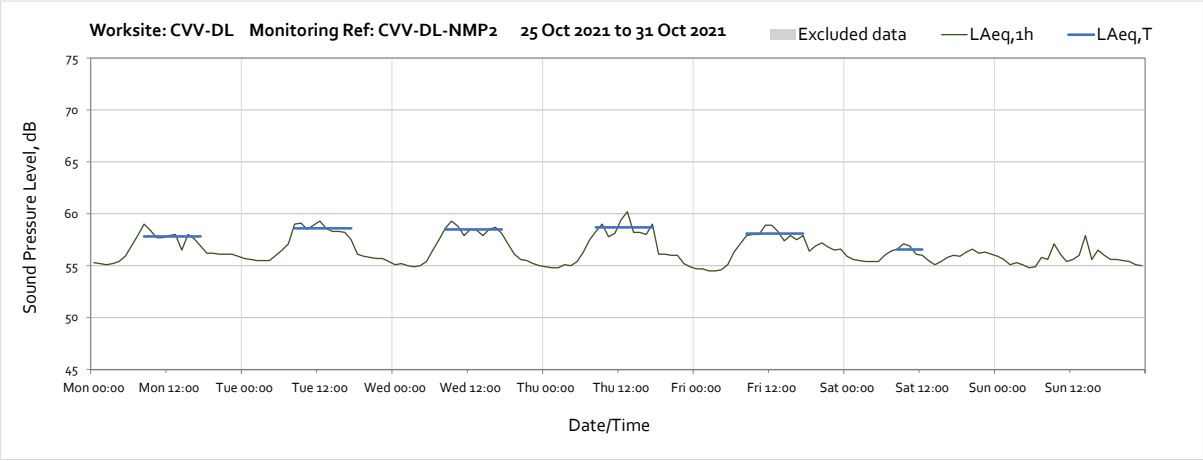
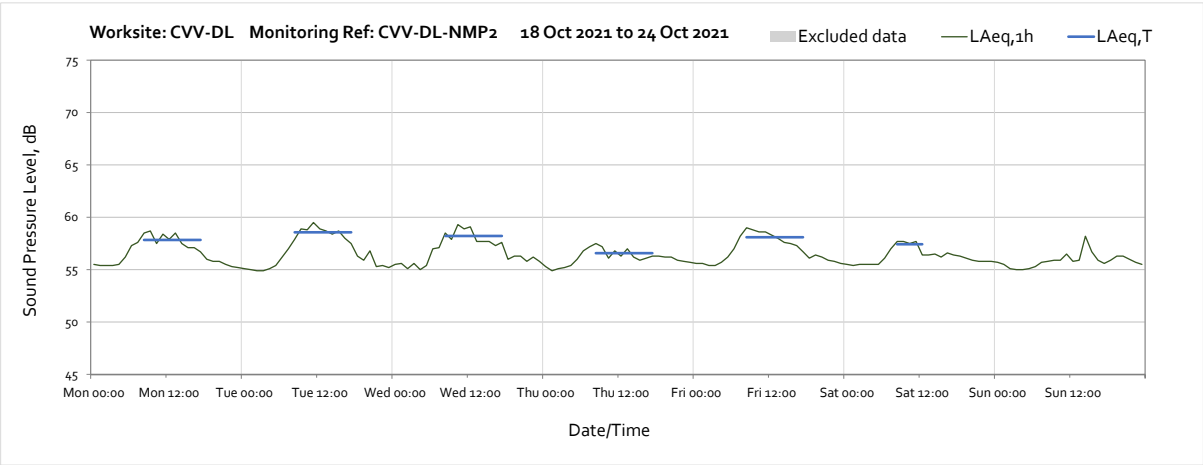
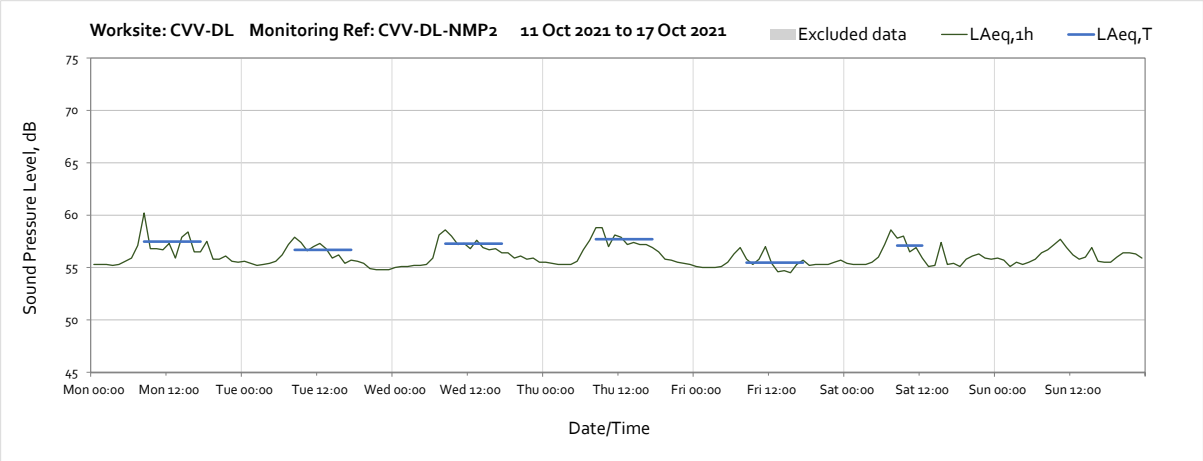
Noise

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)

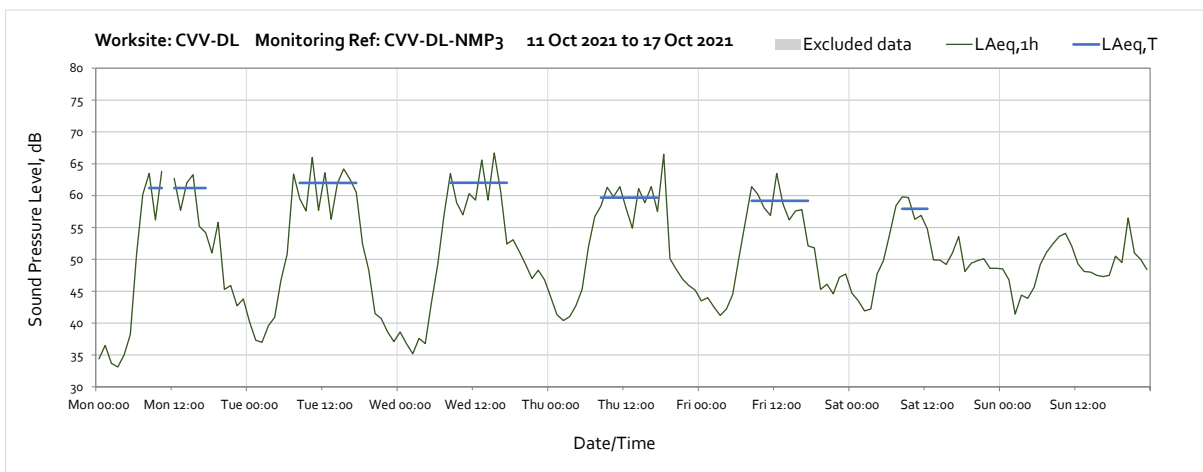
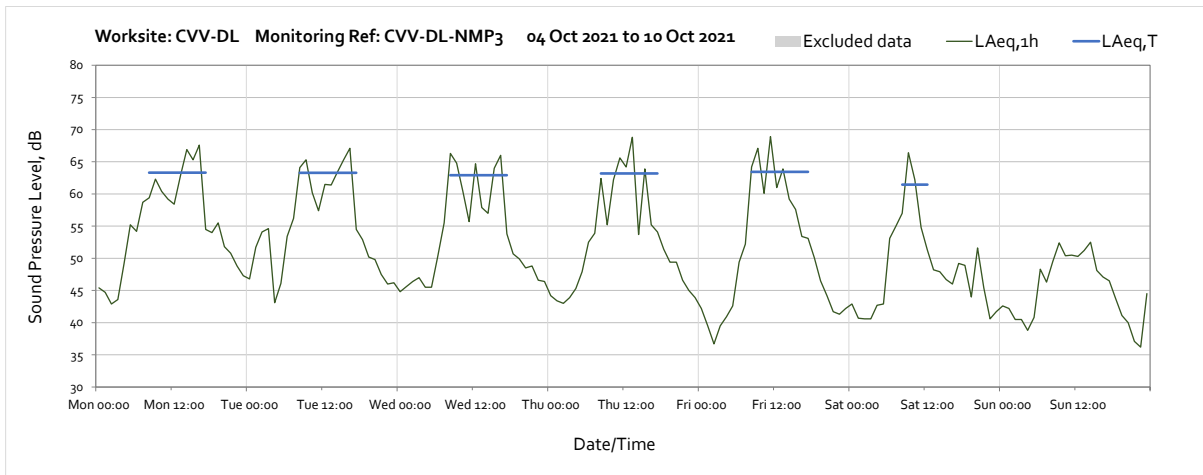
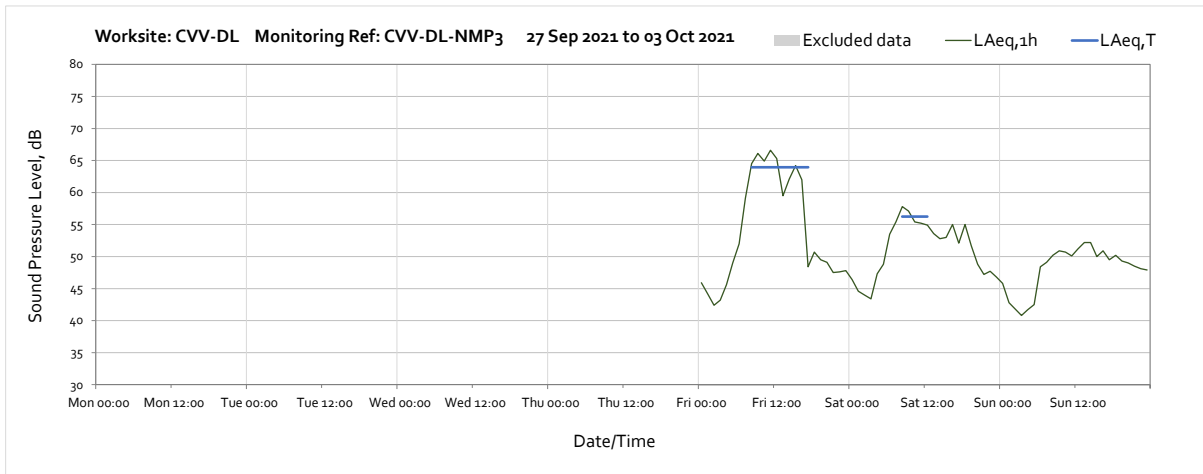
Monitoring Ref: CVV-DL-NMP2





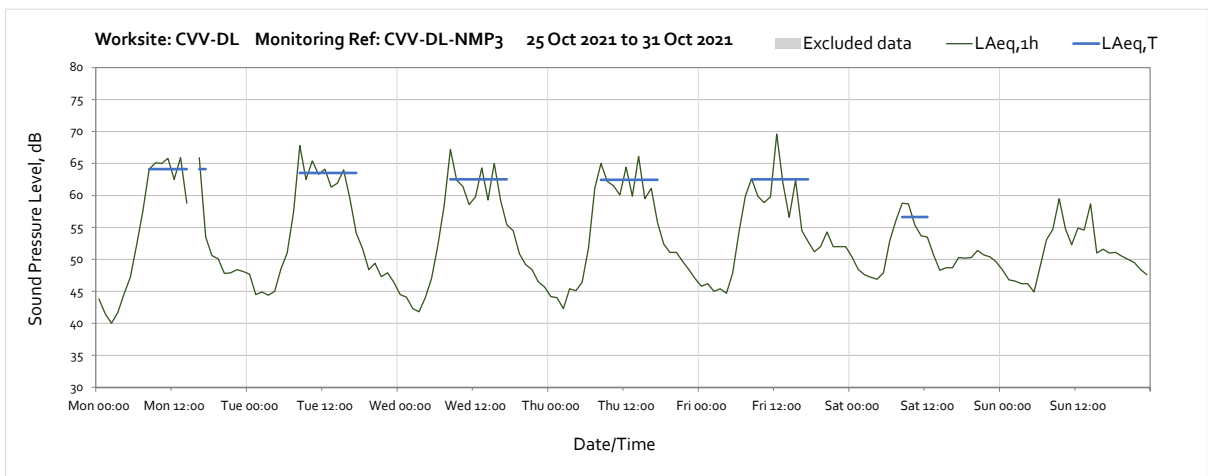
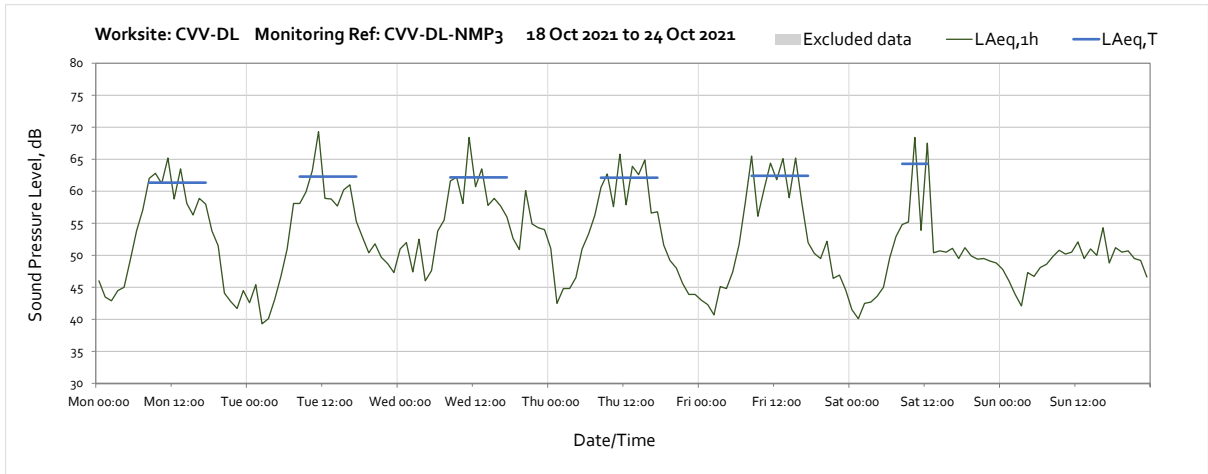
Worksite: Colne Valley Viaduct Dews Lane (CVV-DL)

Monitoring Ref: CVV-DL-NMP3



Note: Missing data between 11:00 and 12:00 on Monday 11th October 2021 was due to monitoring station maintenance.

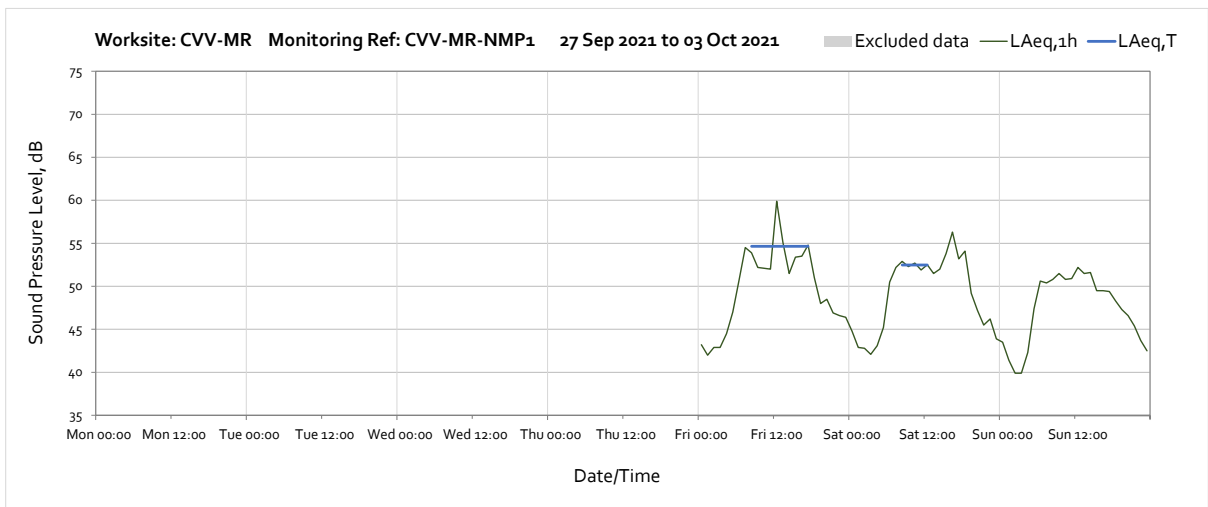
OFFICIAL

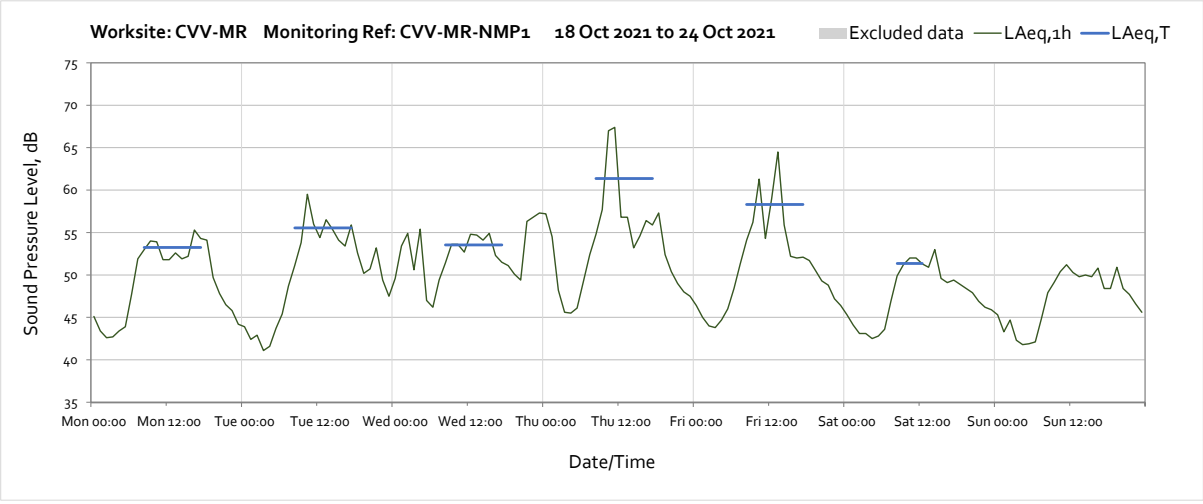
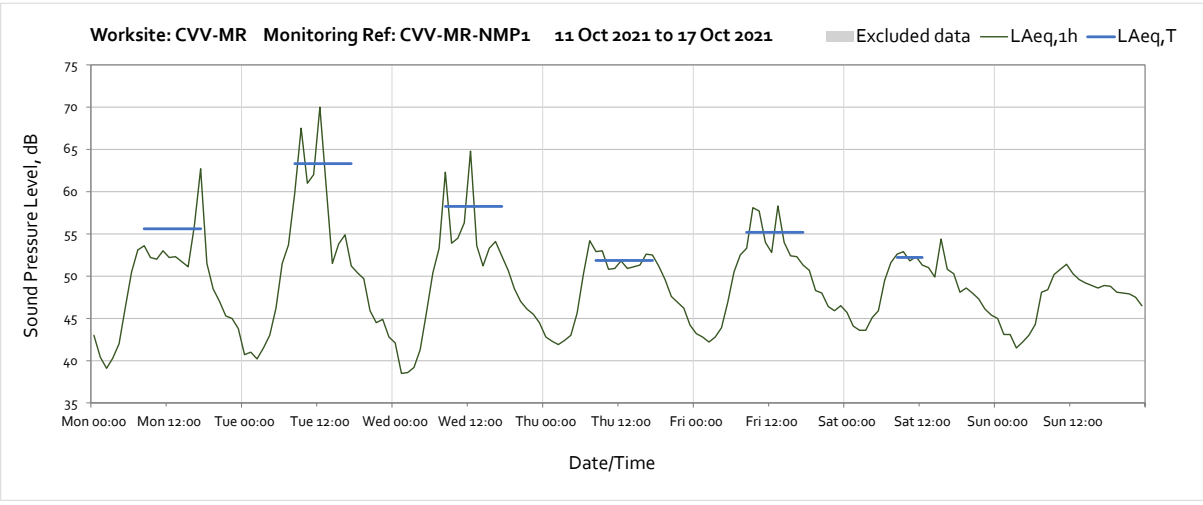
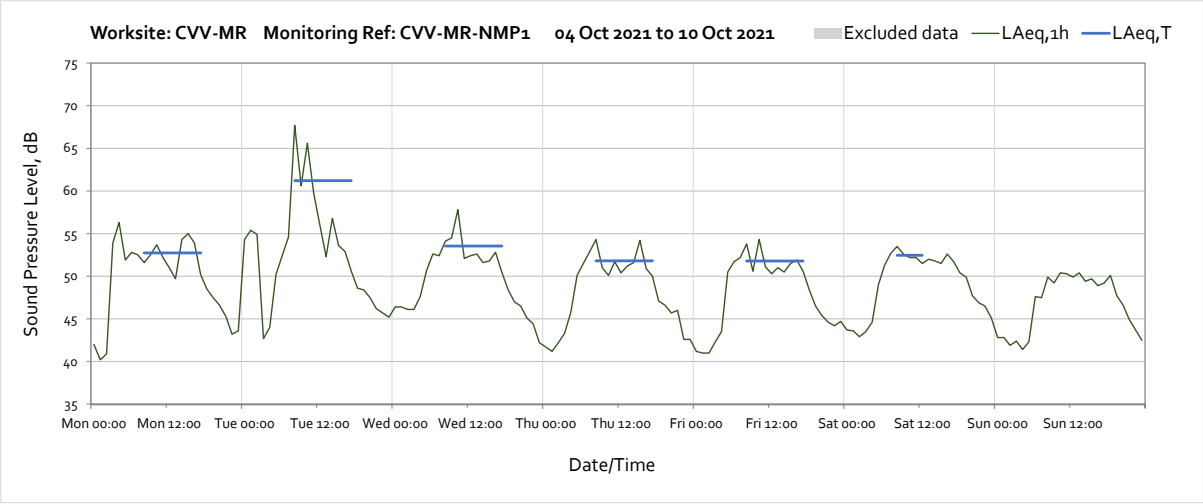


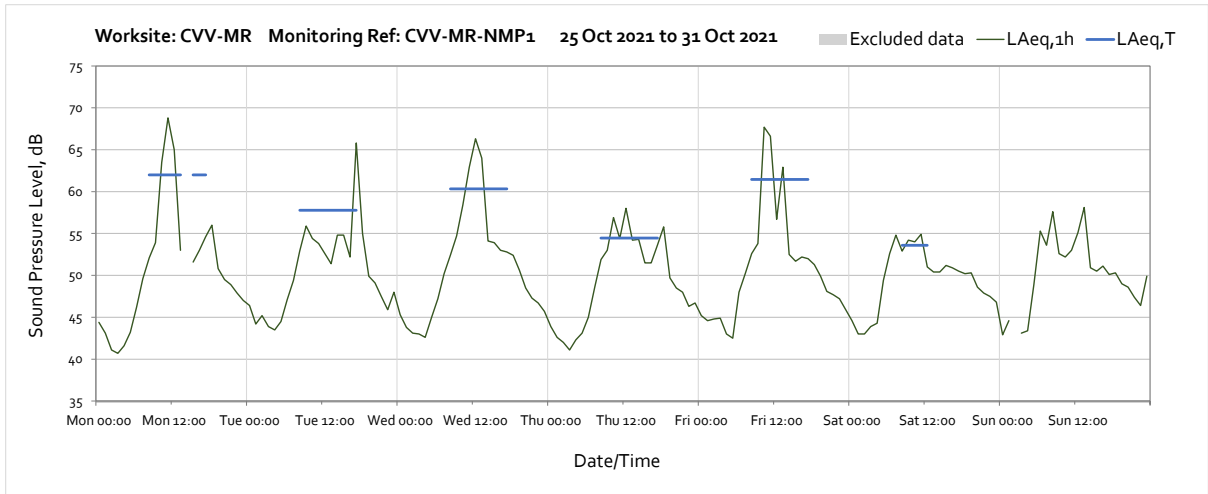
Note: Missing data between 15:00 and 16:00 on Monday 25th October 2021 was due to monitoring station maintenance.

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

Monitoring Ref: CVV-MR-NMP1

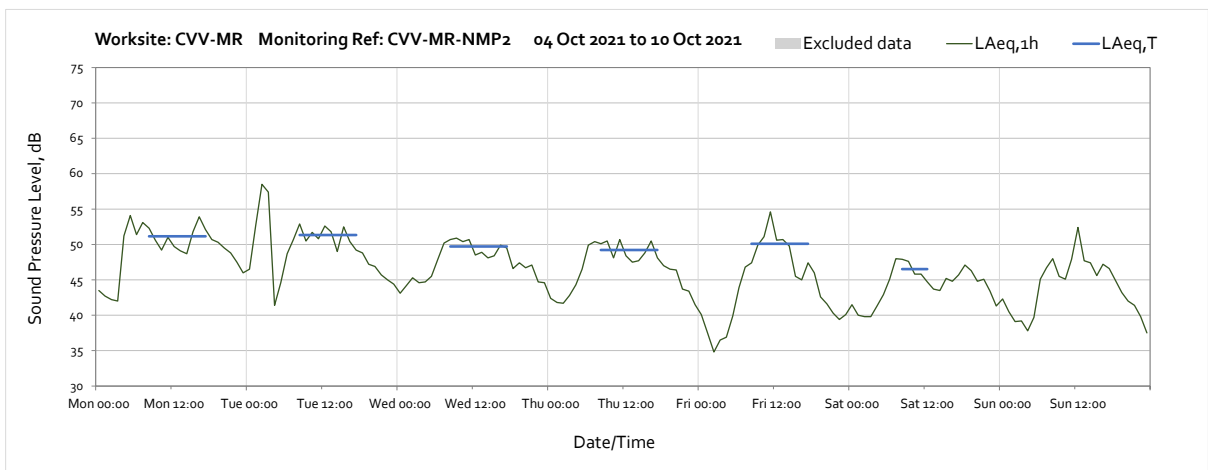
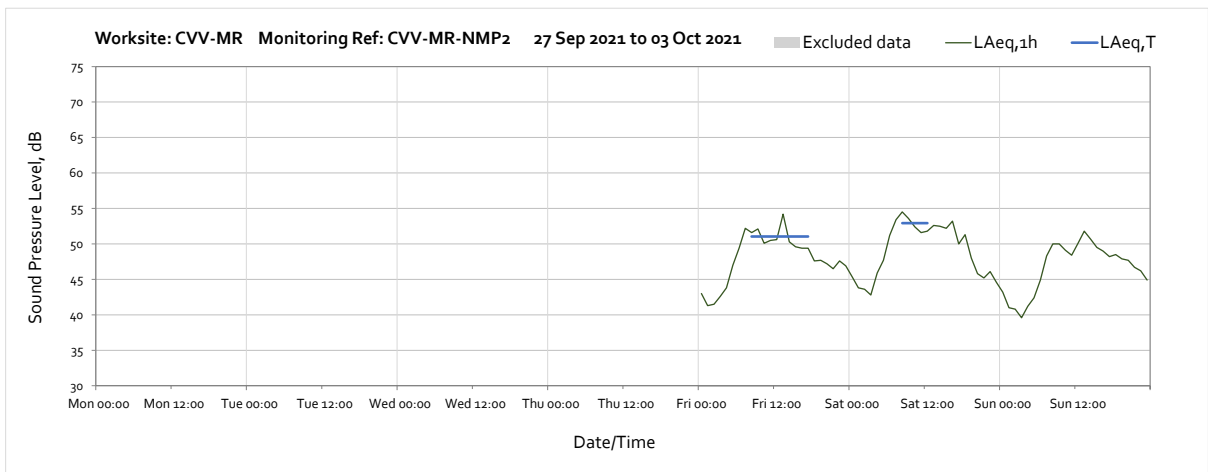


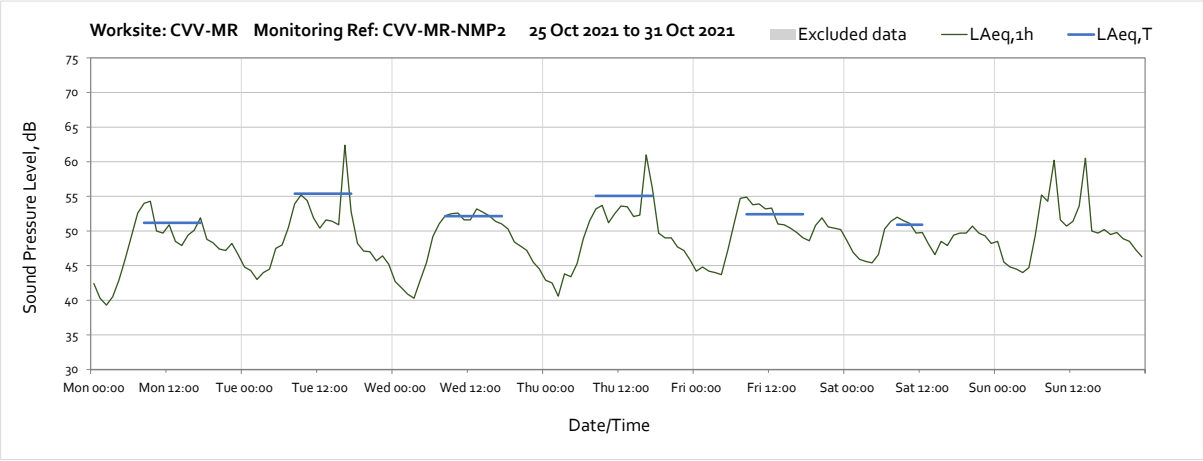
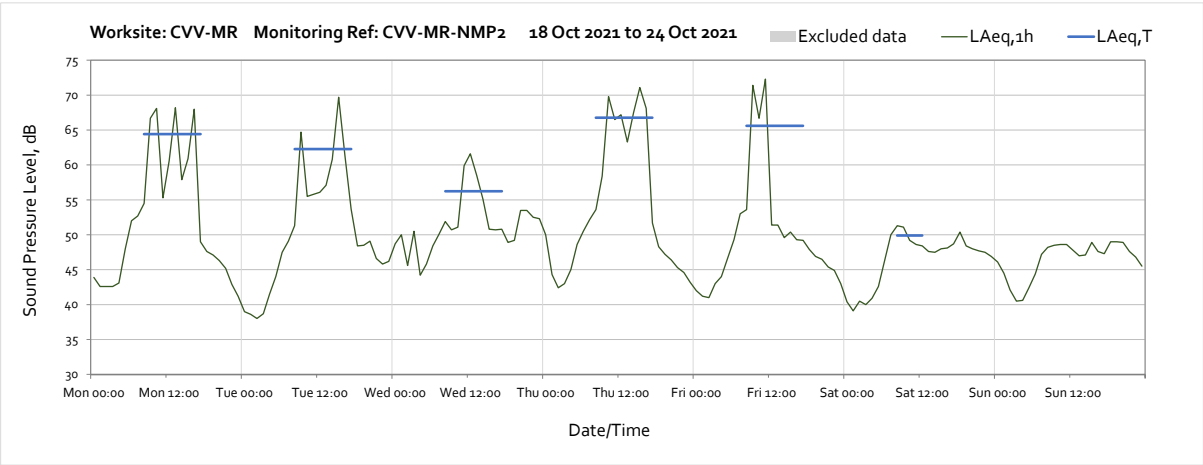
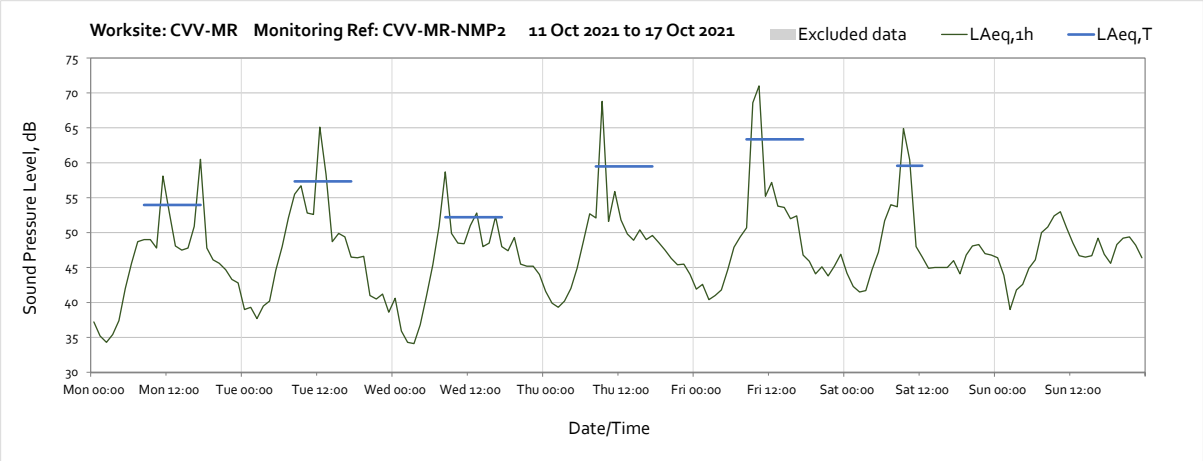




Note: Missing data from 14:00 until 15:00 on Monday 25th October 2021 was due to monitoring station maintenance and from 01:00 until 02:00 on Sunday 31st October was due to monitoring station loss of connection.

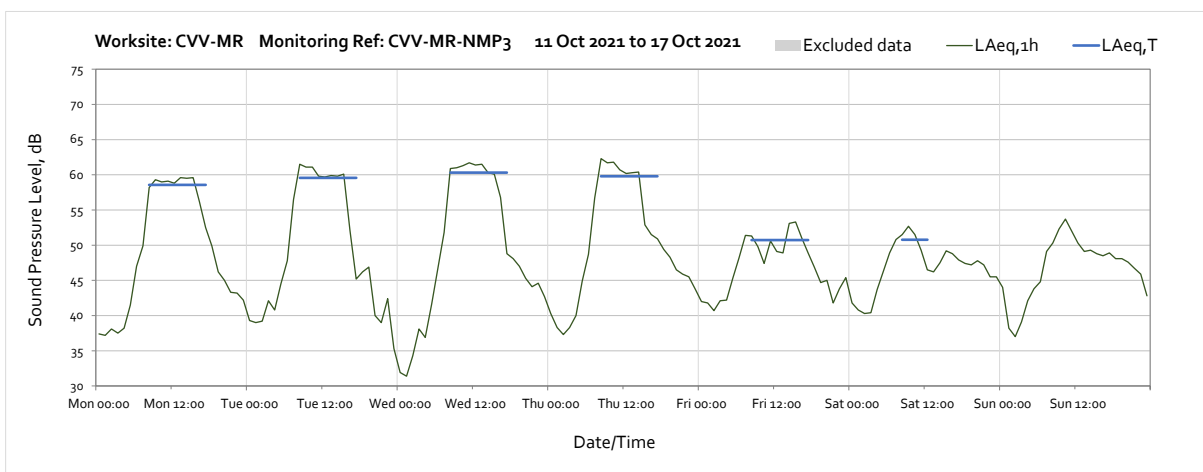
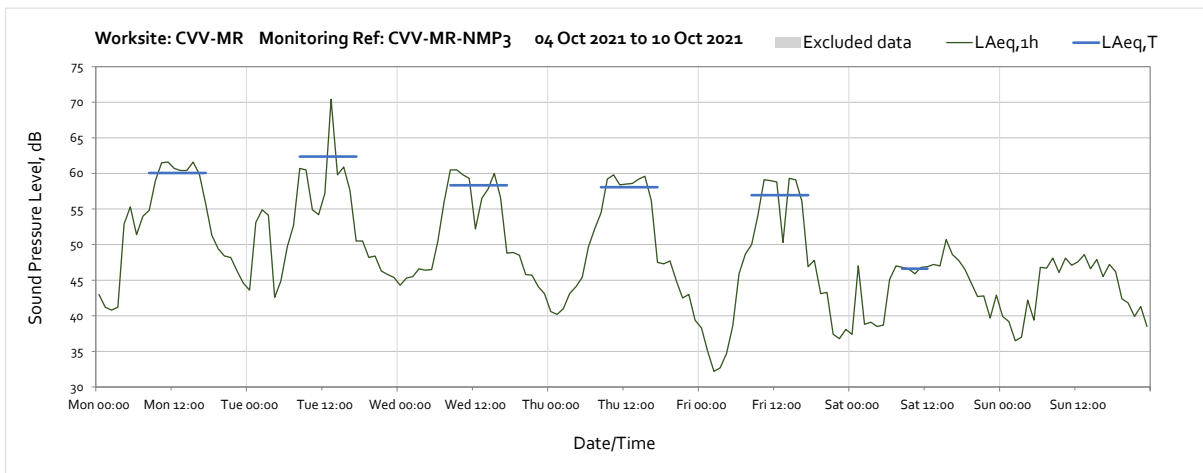
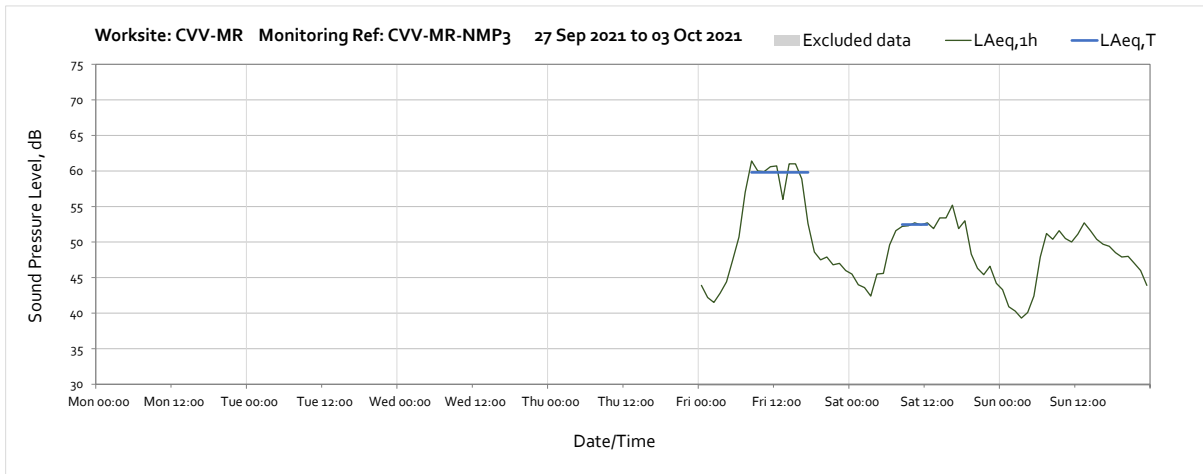
Monitoring Ref: CVV-MR-NMP2

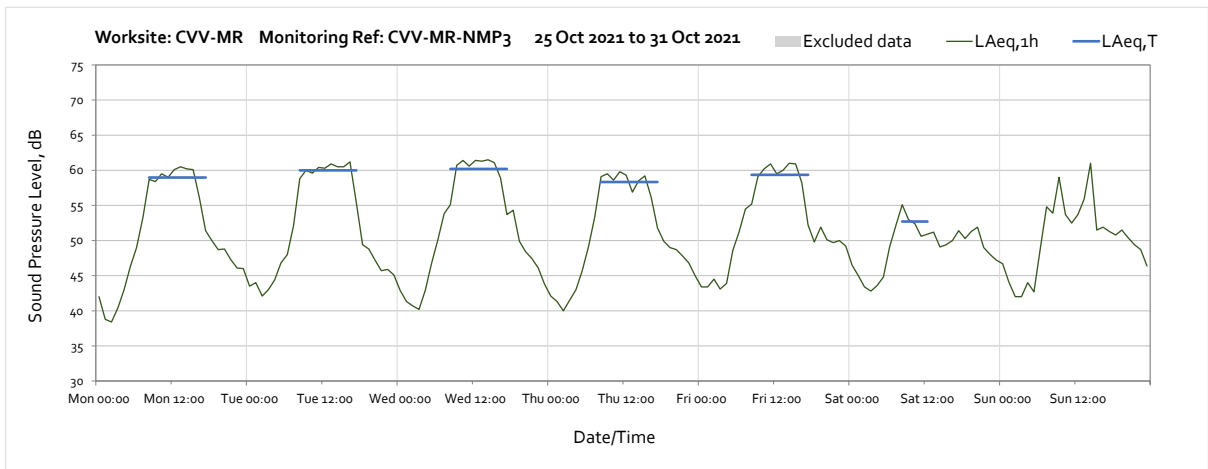
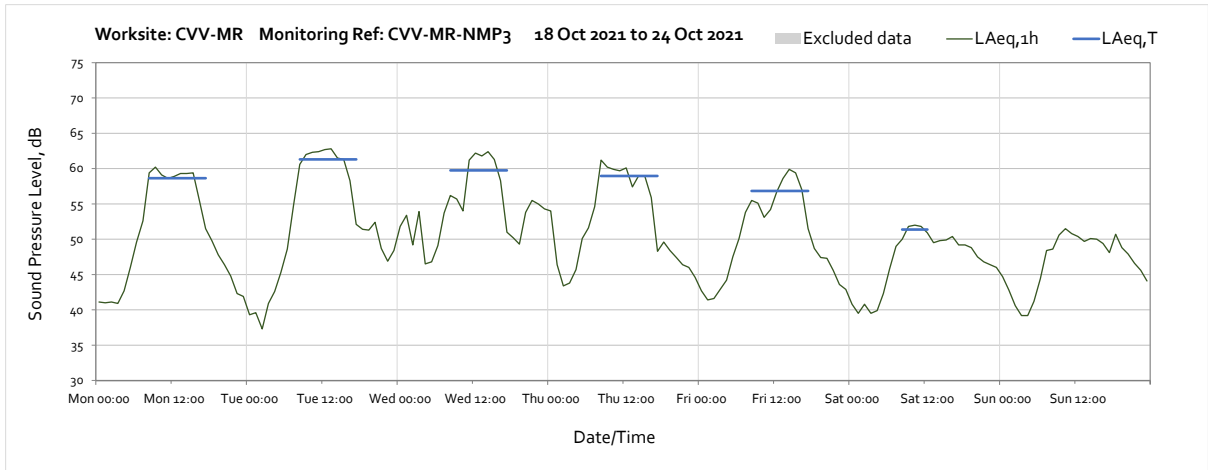




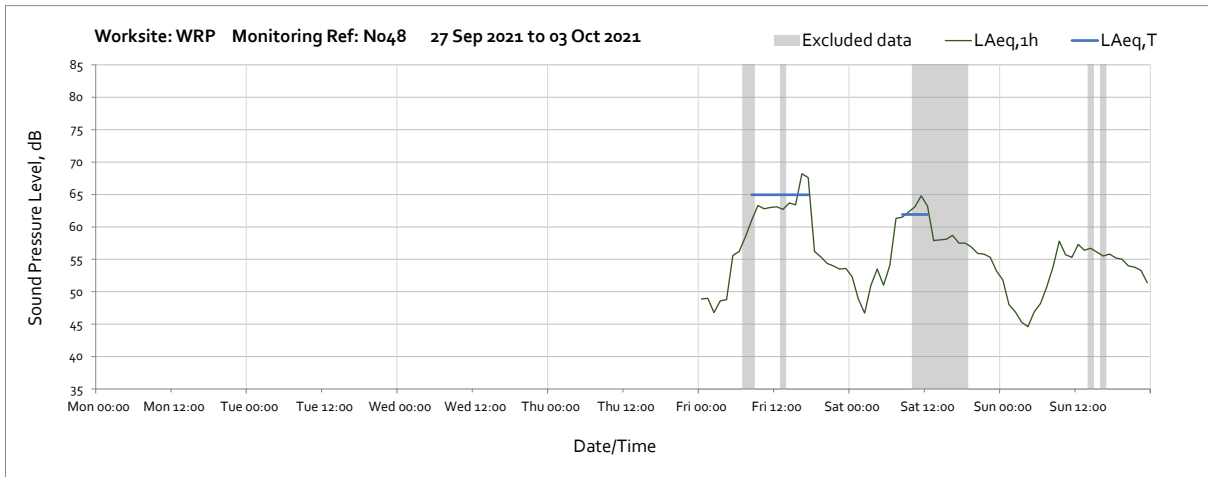
Worksite: Colne Valley Viaduct Moorhall Road (CVV-MR)

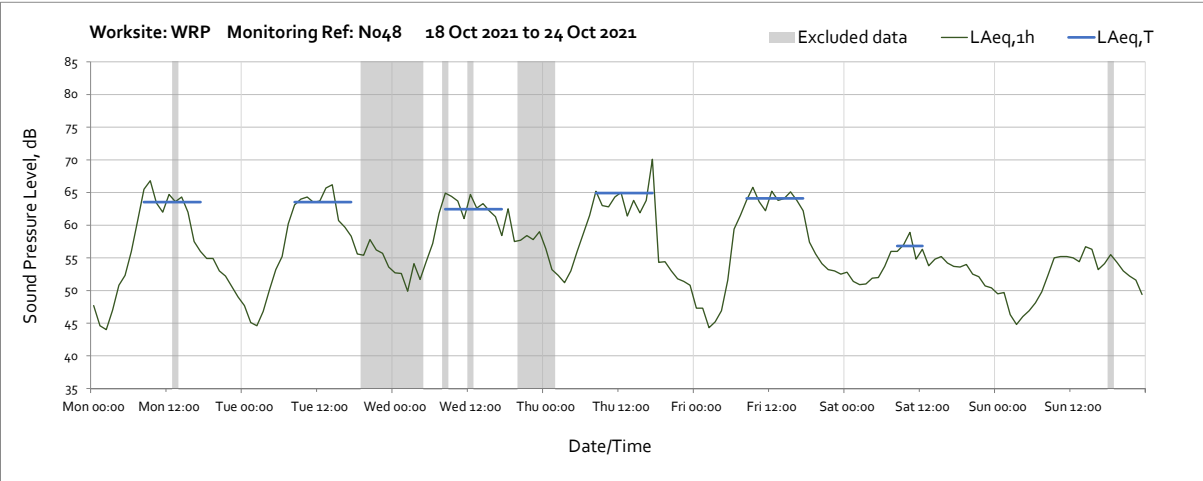
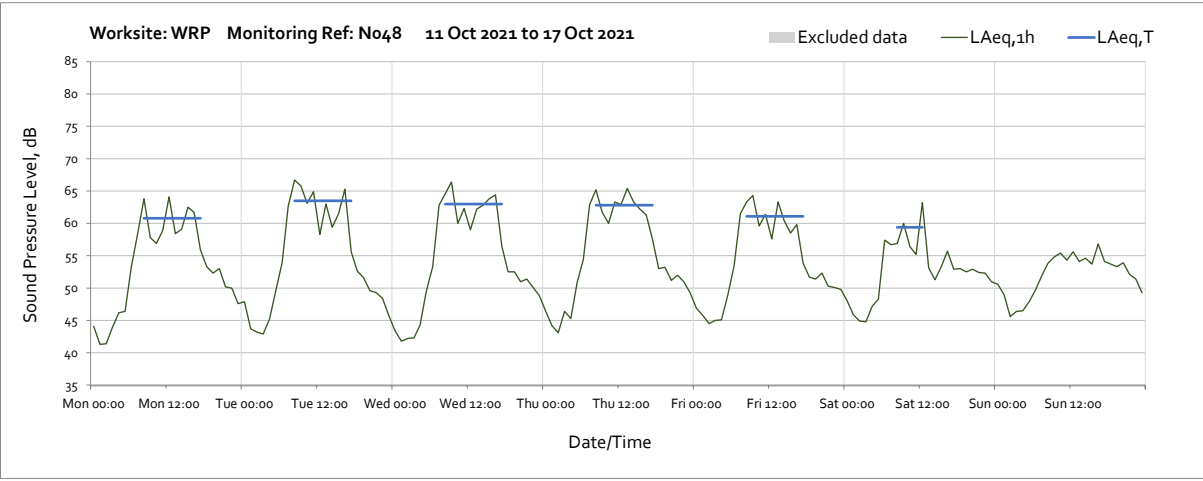
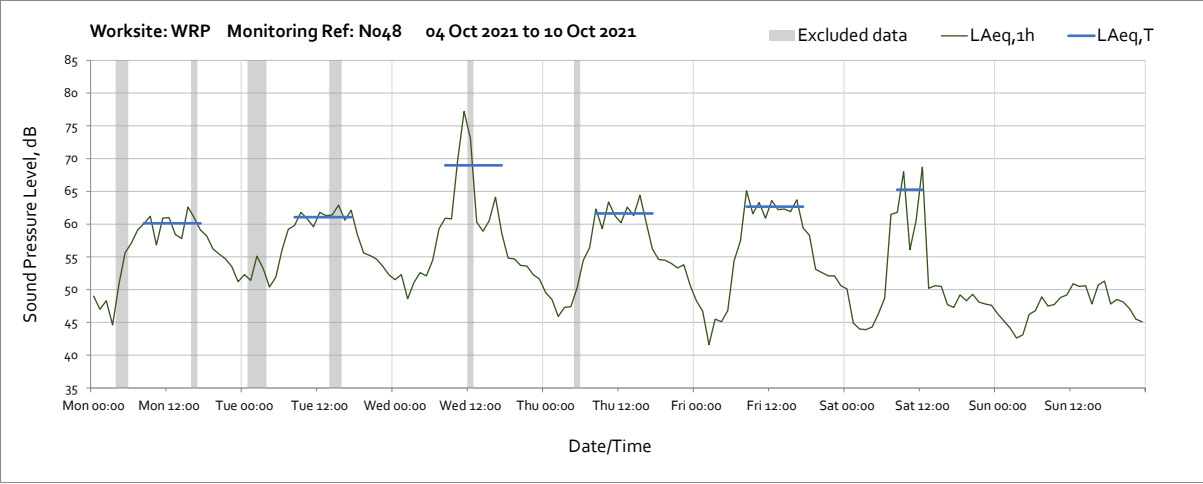
Monitoring Ref: CVV-MR-NMP3

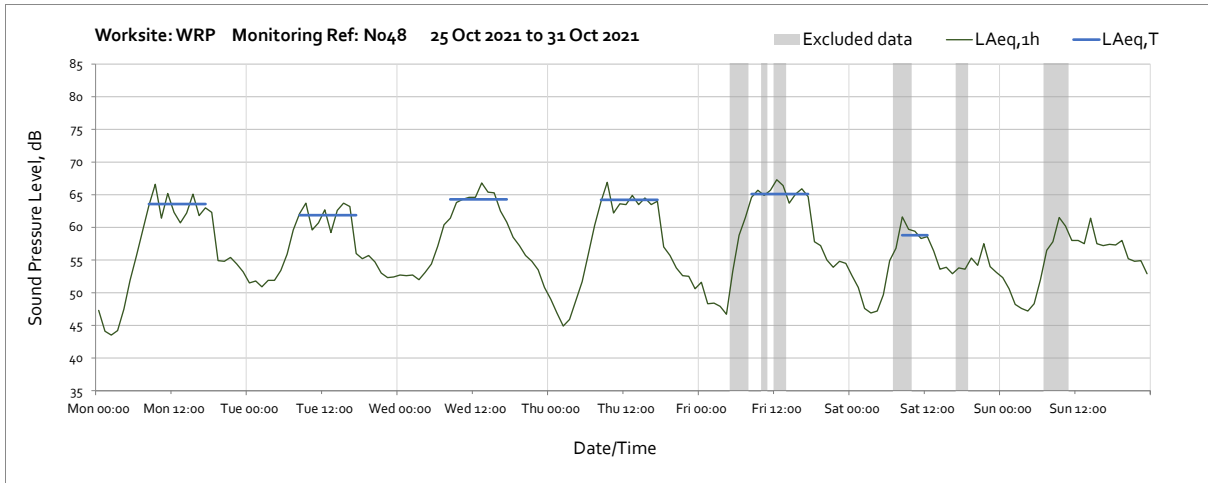




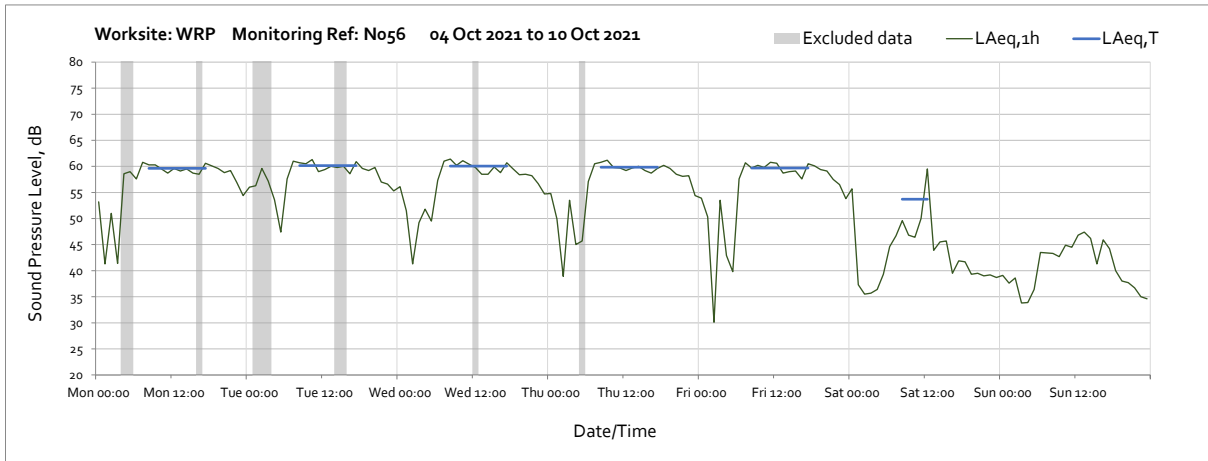
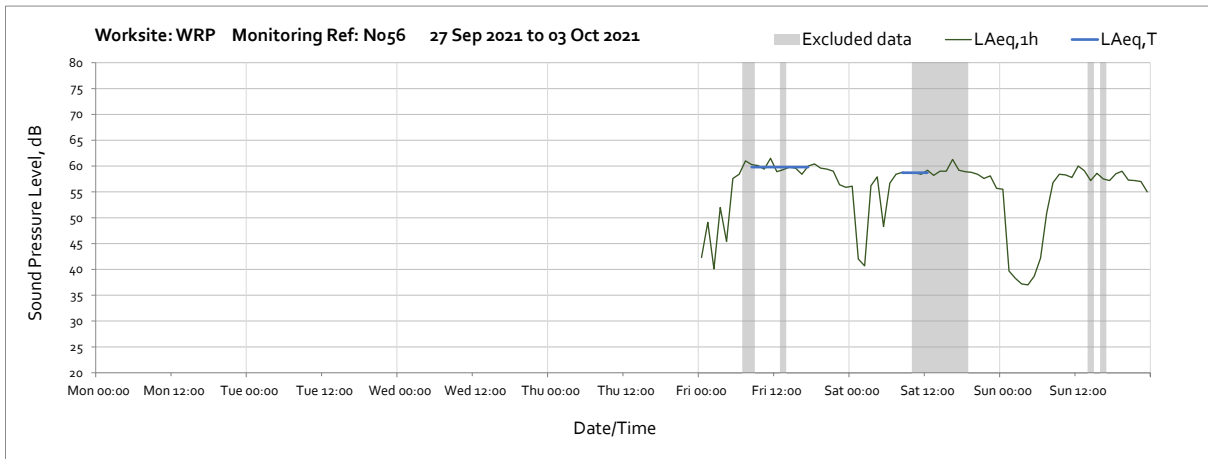
Worksite: West Ruislip Portal (WRP) - Monitoring Ref: N048

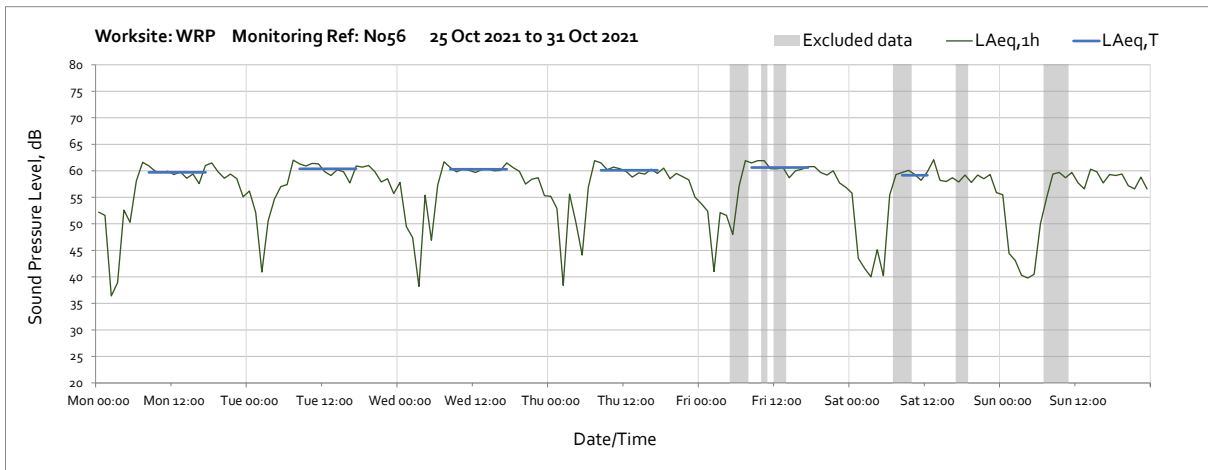
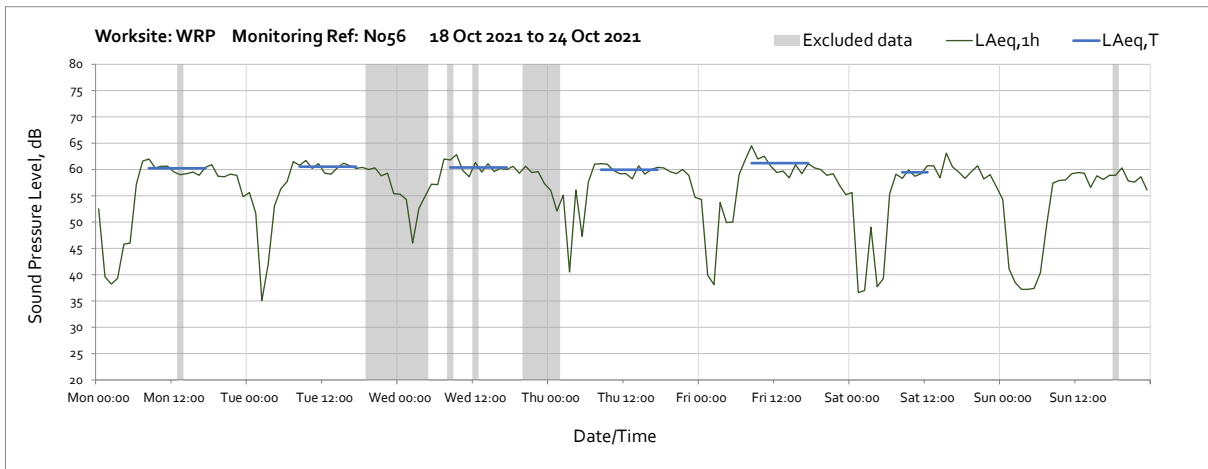
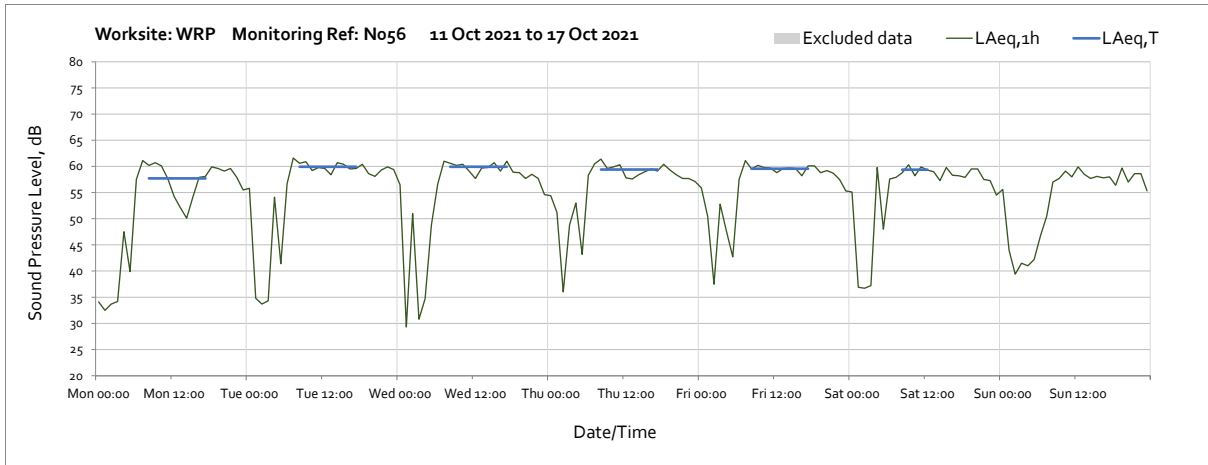




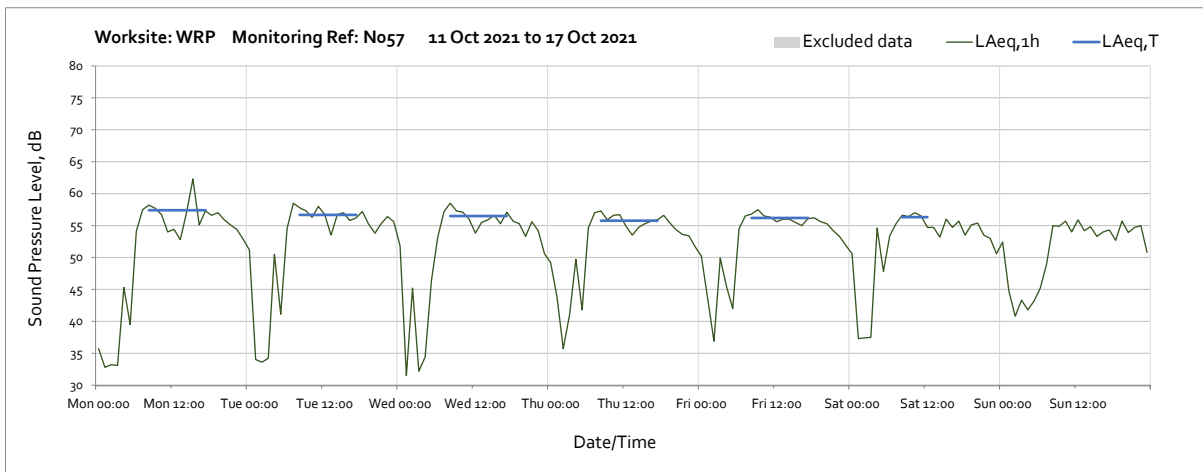
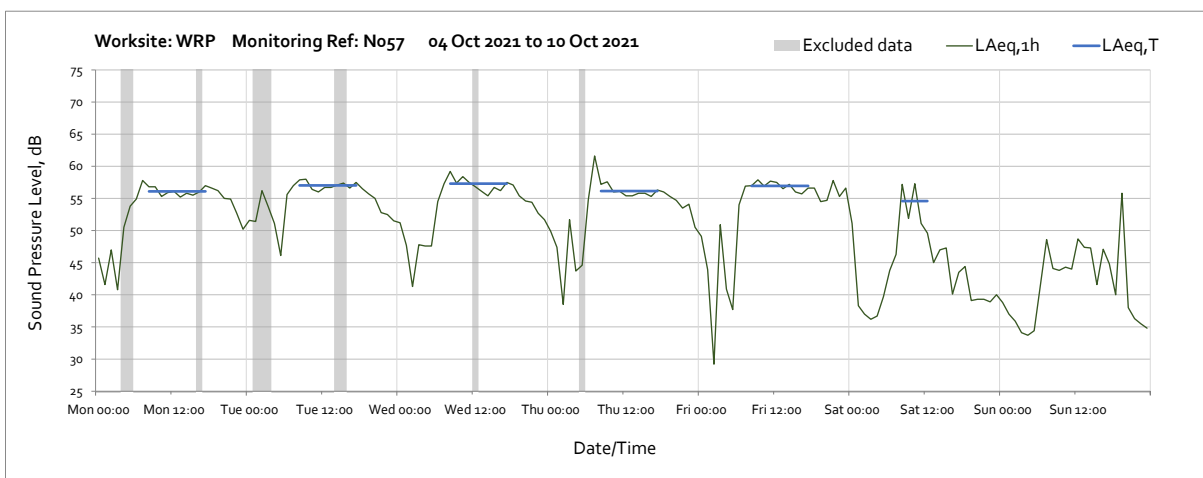
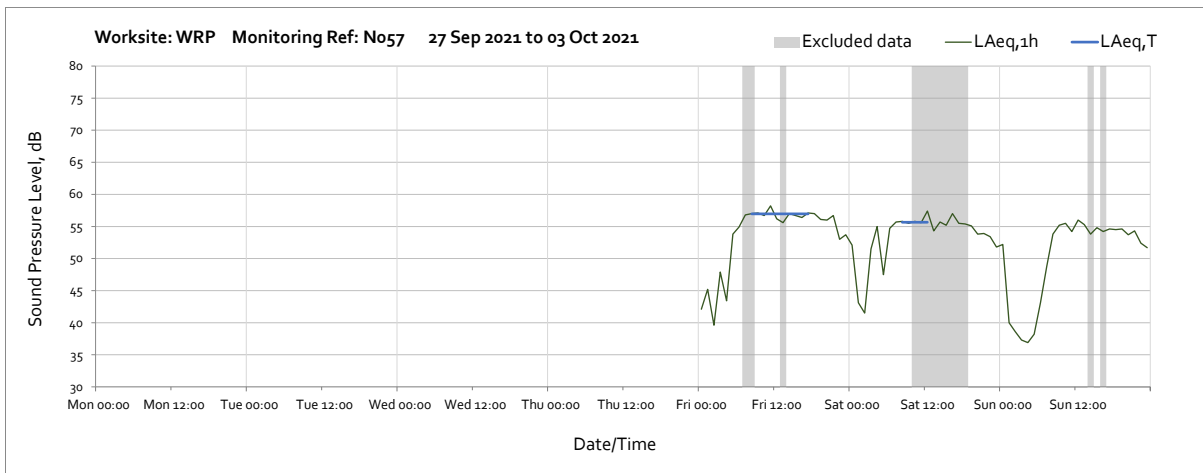


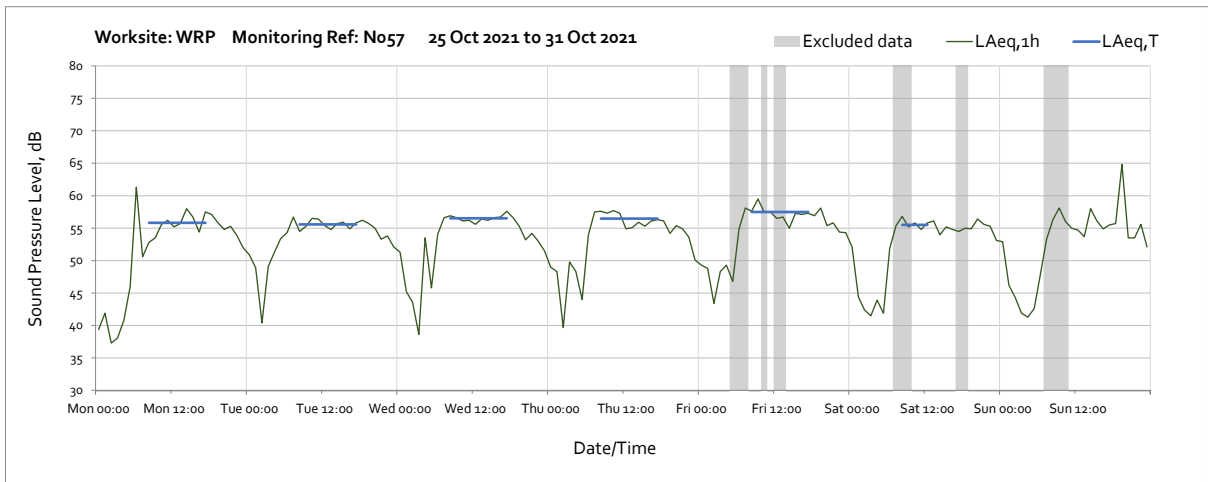
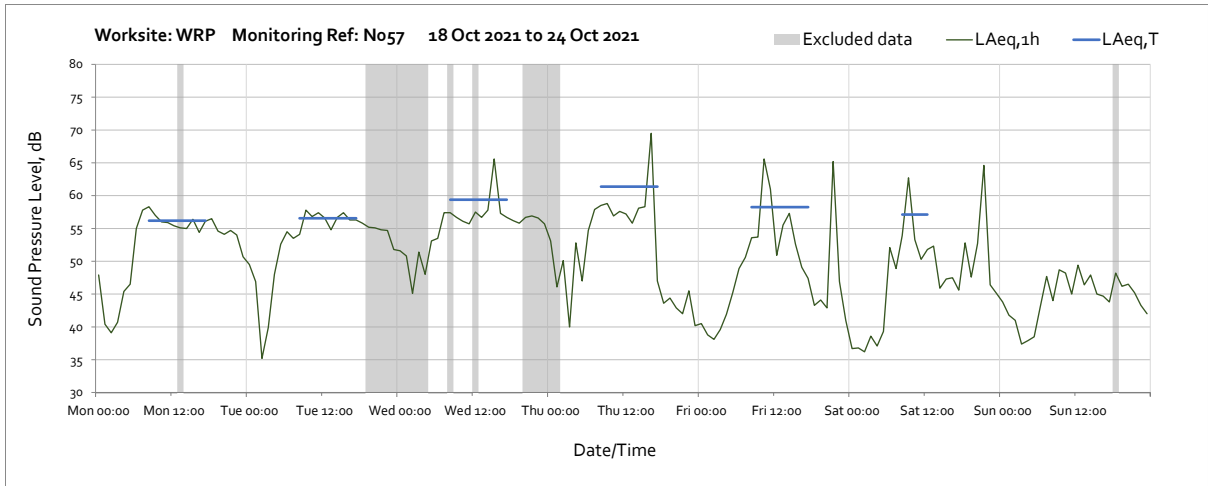
Worksite: West Ruislip Portal (WRP) - Monitoring Ref: N056



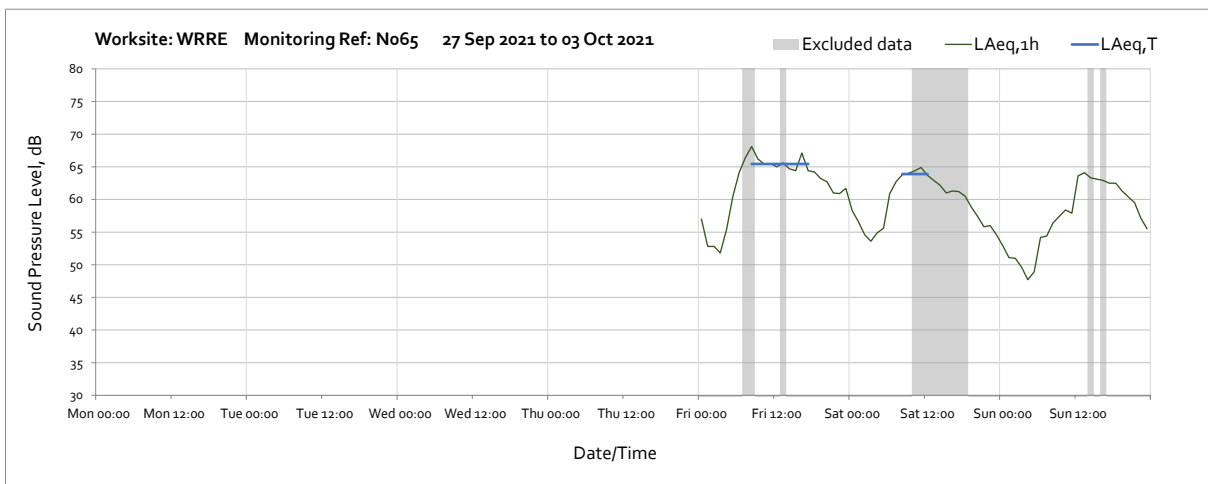


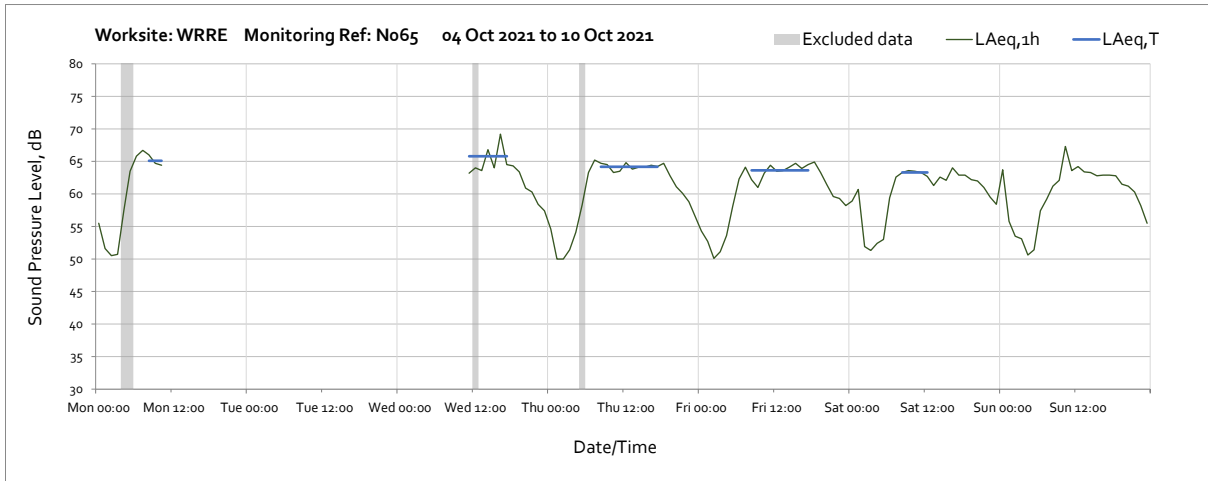
Worksite: West Ruislip Portal (WRP) – Monitoring Ref: N057



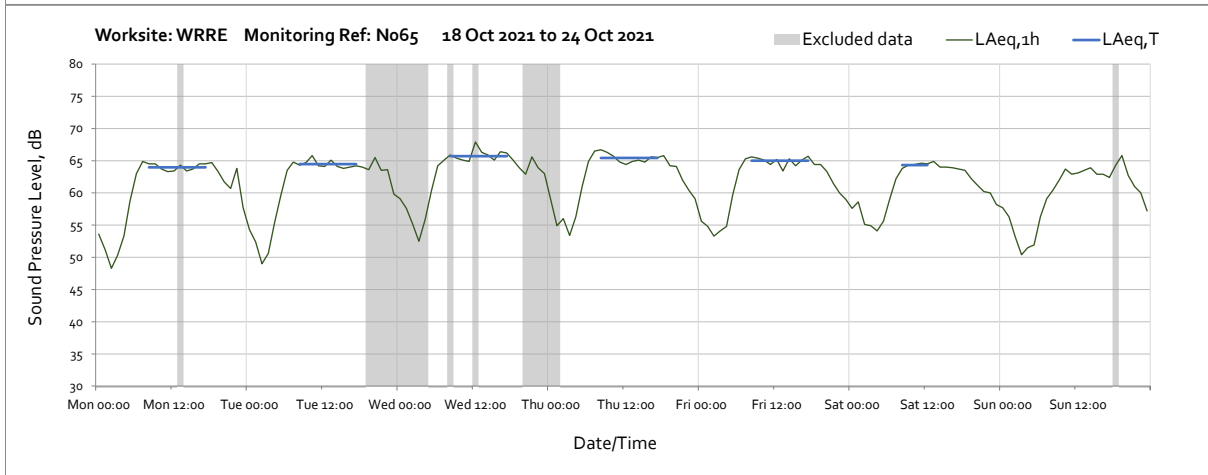
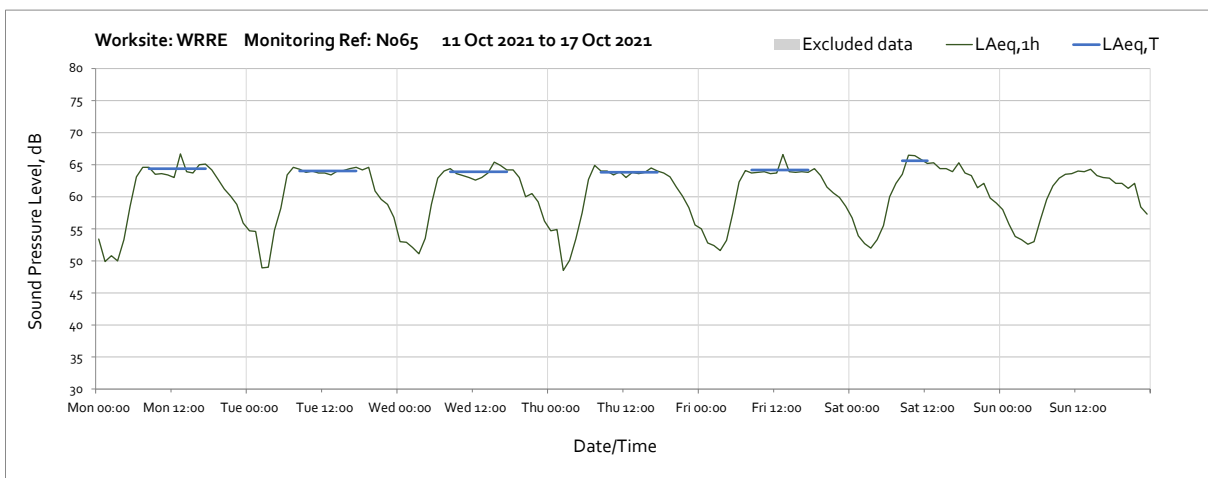


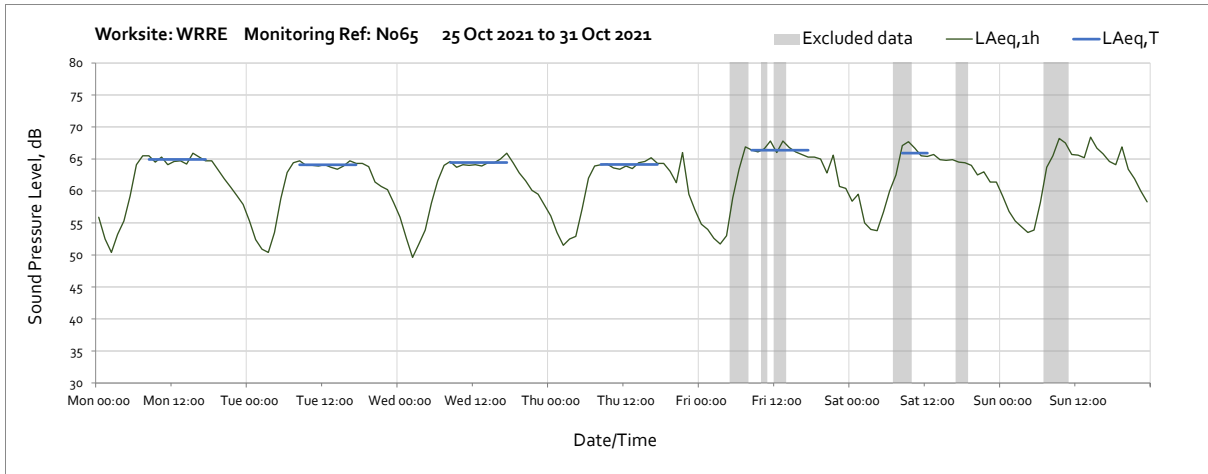
Worksite: West Ruislip Retained Embankment (WRRE) - Monitoring Ref: N065



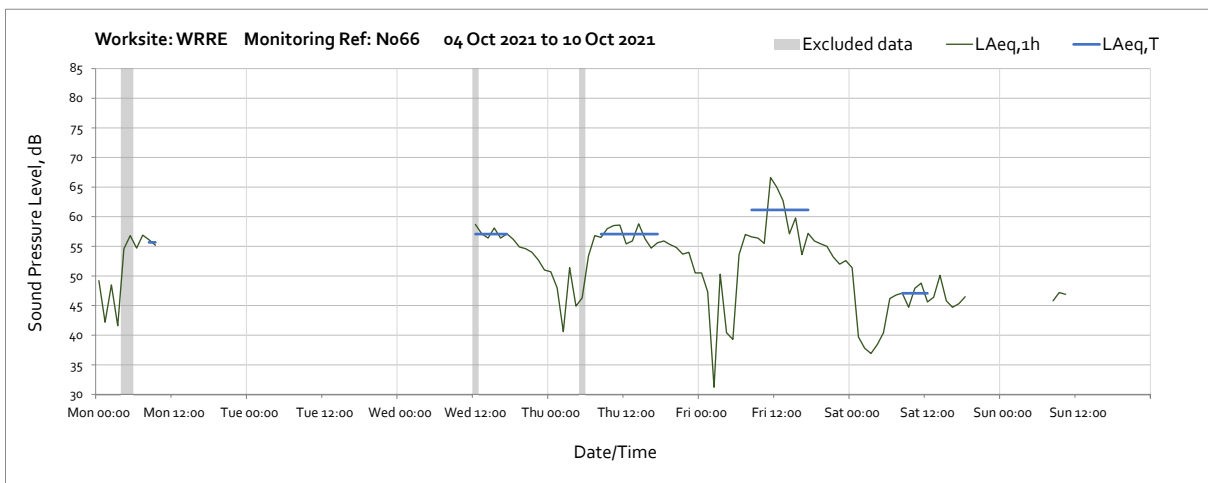
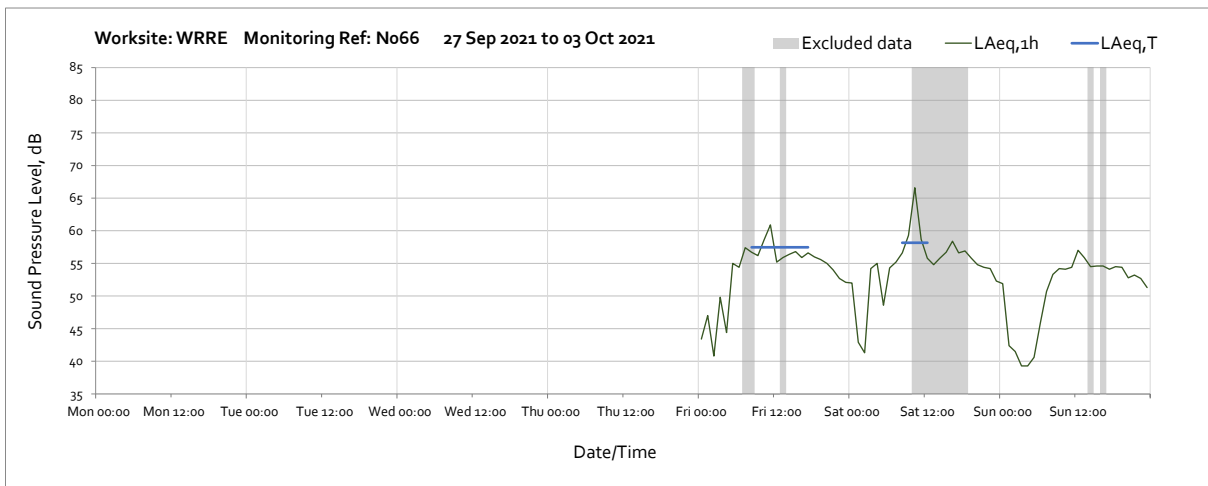


Note: Missing data between 10:00 on Monday 4th October 2021 and 11:00 on Wednesday 6th October 2021 was due to loss of connection at the monitoring station.

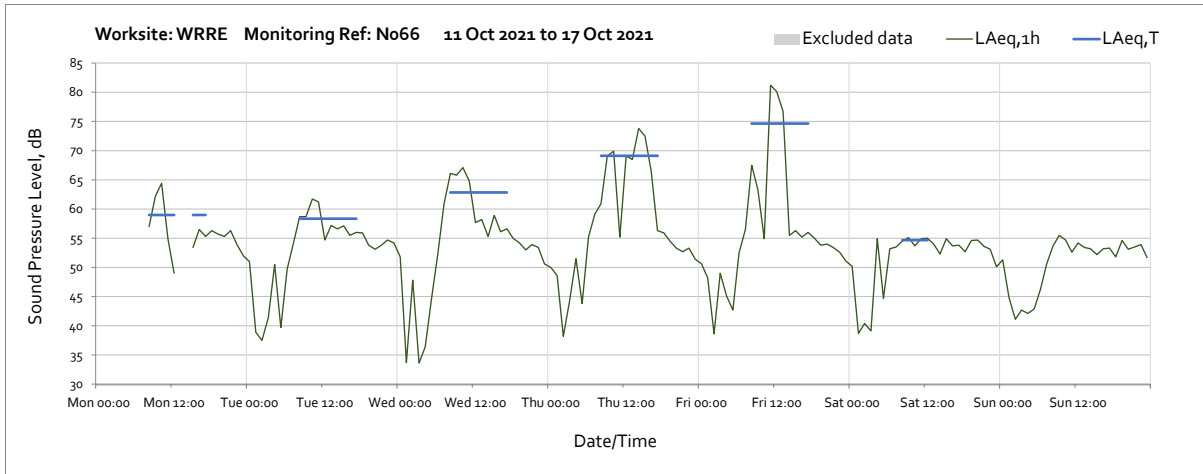




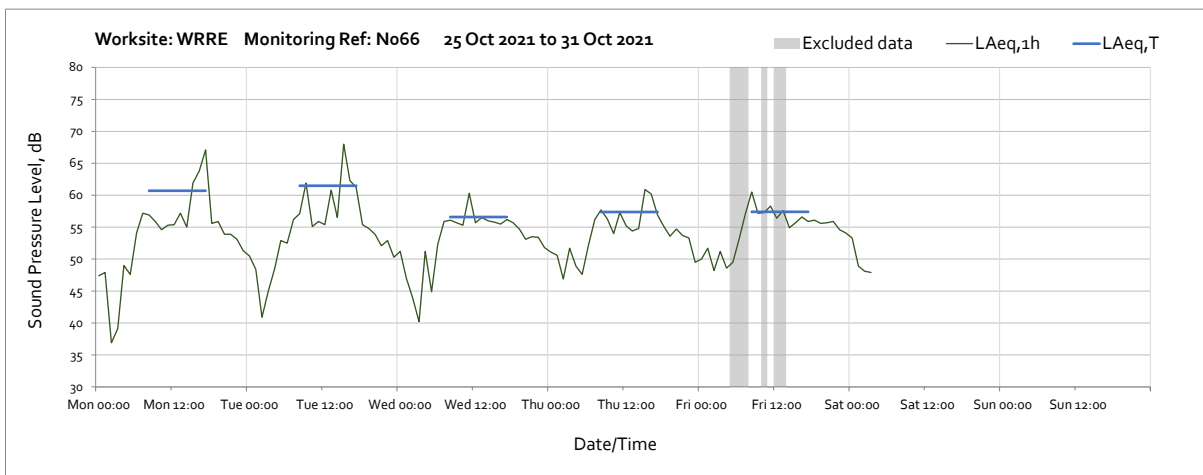
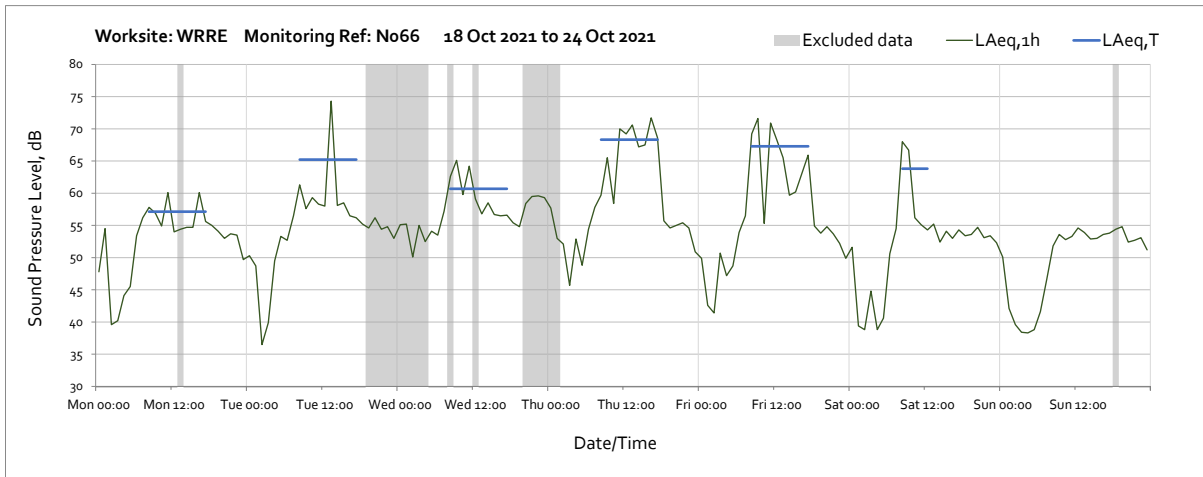
Worksite: West Ruislip Retained Embankment (WRRE) – Monitoring Ref: N066



Note: Missing data between 10:00 on Monday 4th October 2021 and 12:00 on Wednesday 6th October 2021 was due to loss of connection at the monitoring station. Missing data from 18:00 on Saturday 9th October 2021 until 08:00 on Sunday 10th October 2021 and from 11:00 on Sunday 10th October 2021 until 08:00 on Monday 11th October 2021 was due to loss of battery power at the monitoring station.

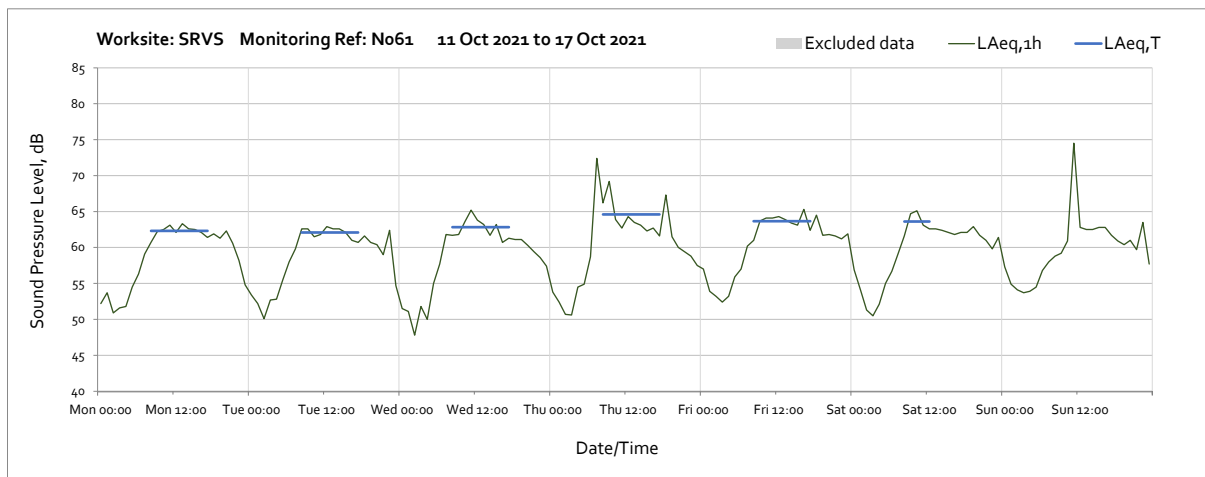
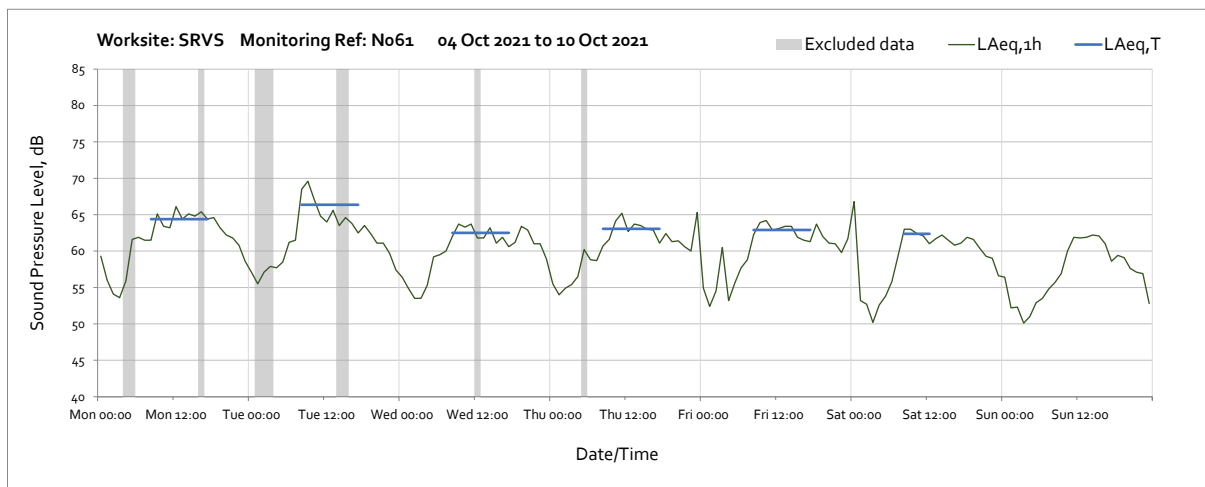
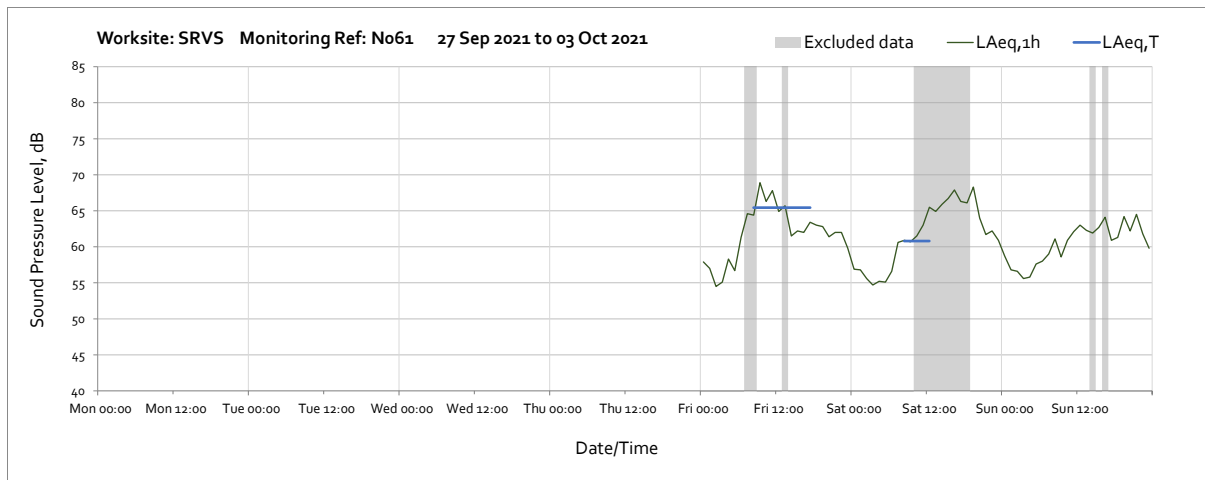


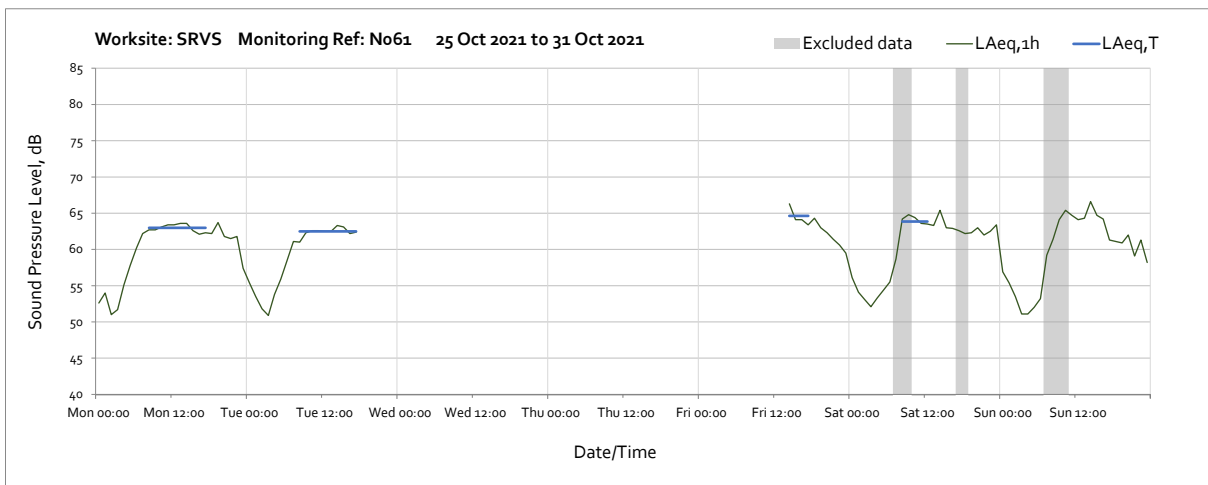
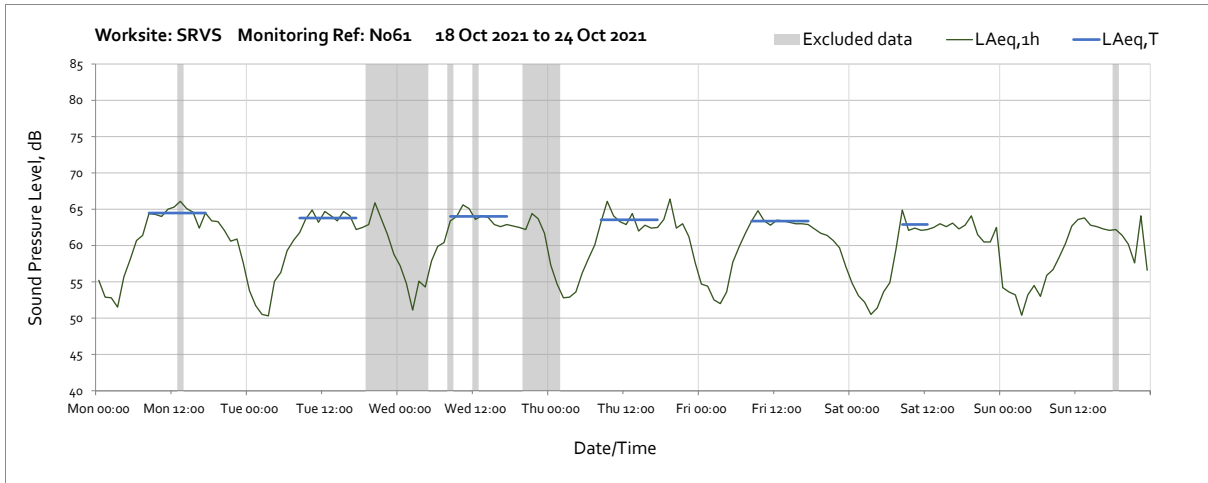
Note: Missing data from 11:00 on Sunday 10th October 2021 until 08:00 on Monday 11th October 2021 and between 13:00 and 15:00 on Monday 11th October 2021 was due to loss of connection at the monitoring station.



Note: Missing data between 04:00 on Saturday 30th October 2021 and 23:00 on Sunday 31st October 2021 was due to loss of battery power at the monitoring station.

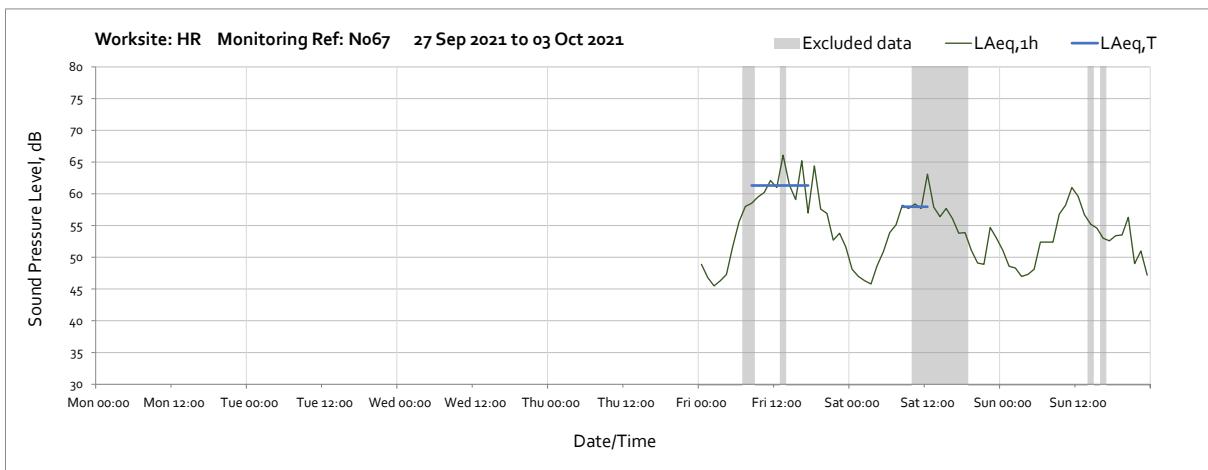
Worksite: South Ruislip Ventilation Shaft (SRVS) – Monitoring Ref: N061

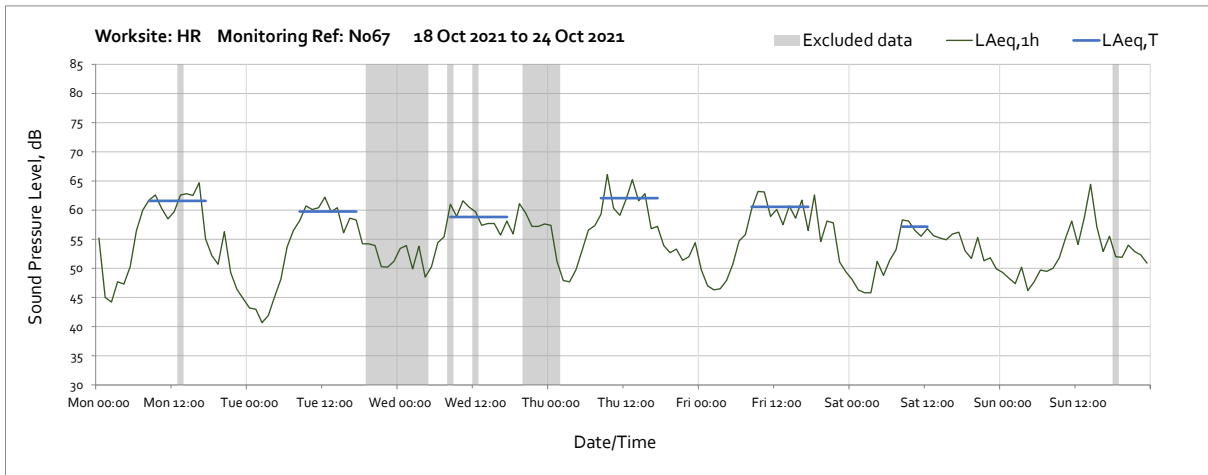
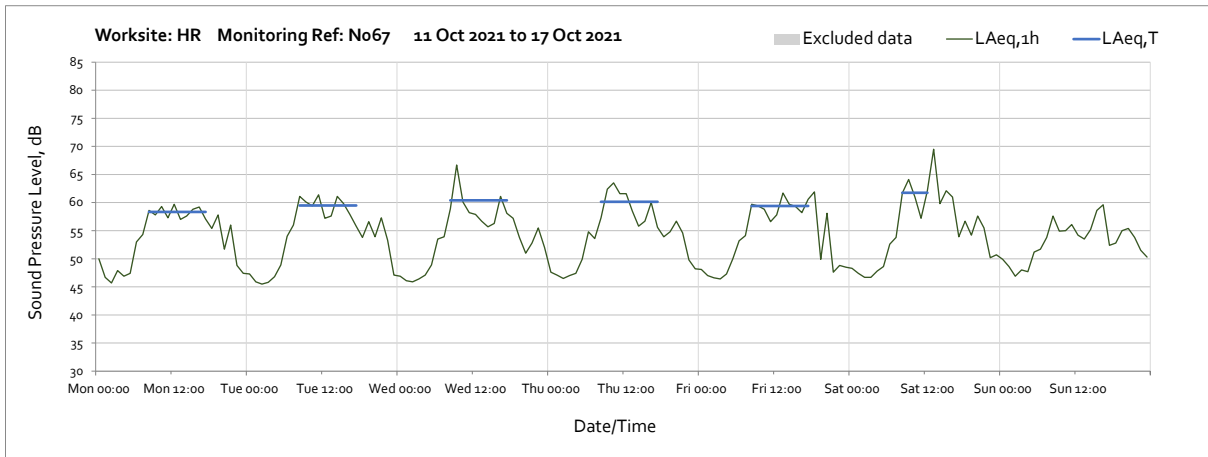
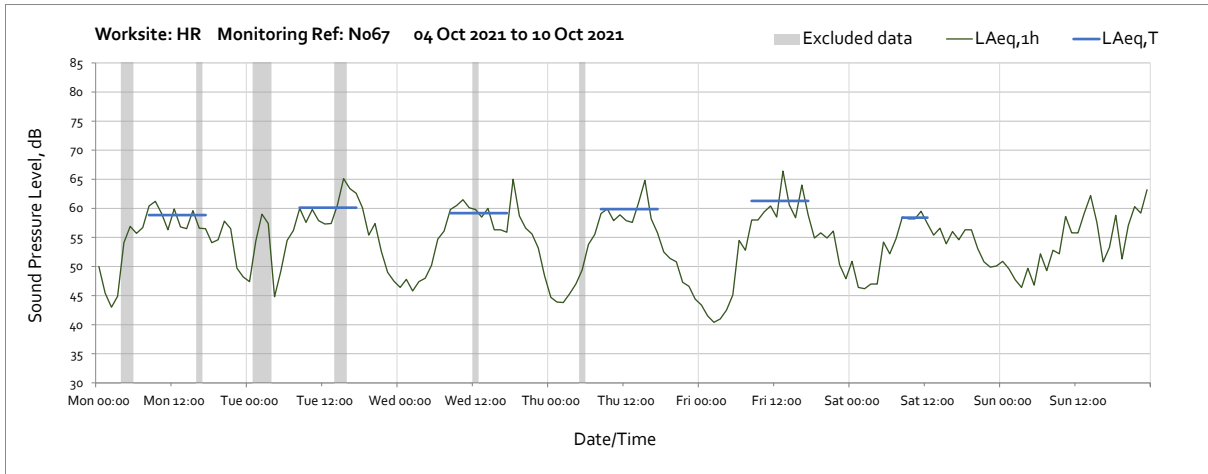


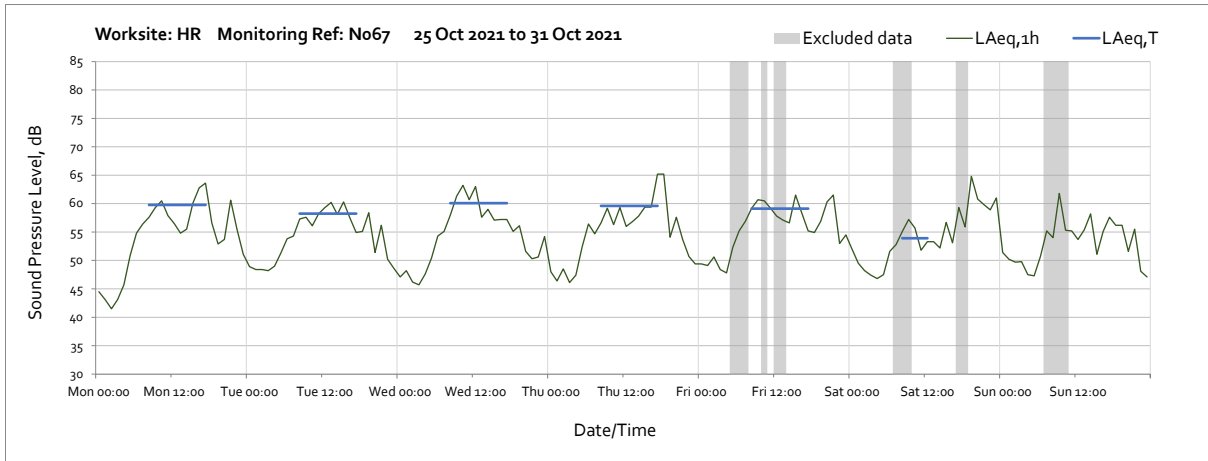


Note: Missing data between 18:00 on Tuesday 26th October 2021 and 14:00 on Friday 29th October 2021 was due to an internal fault of the noise monitor.

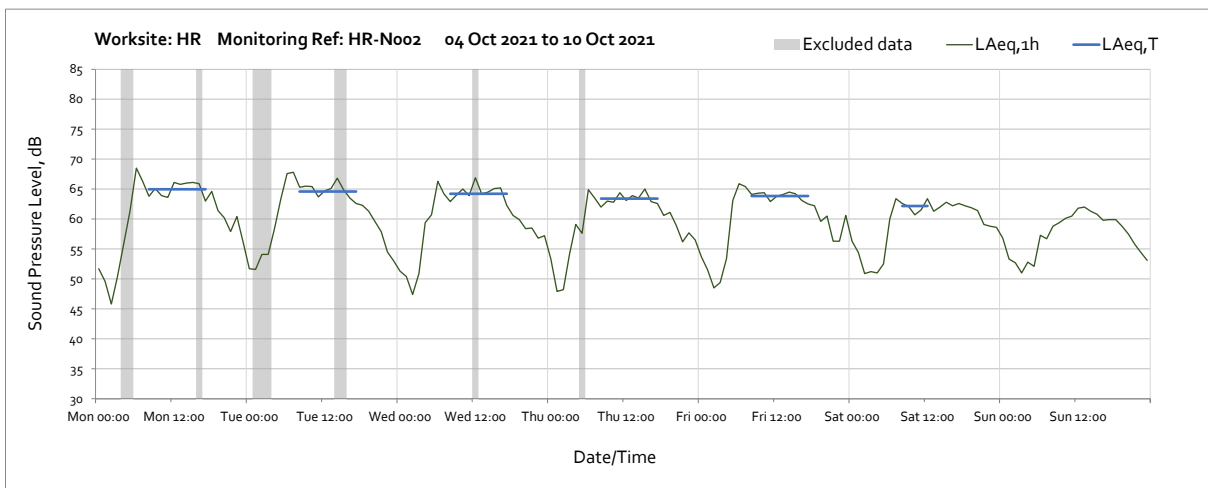
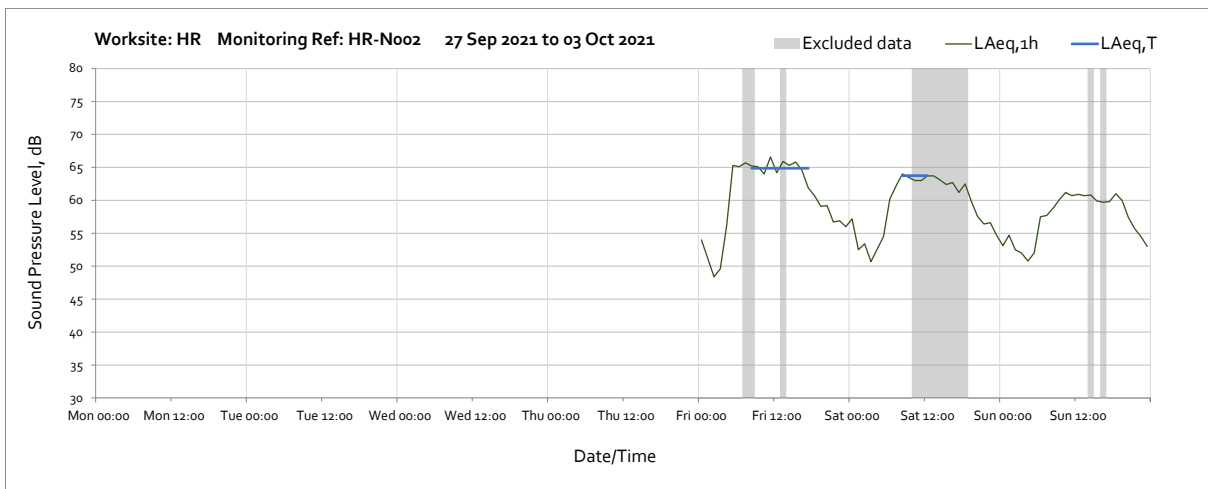
Worksite: Harvil Road (HR) – Monitoring Ref: N067

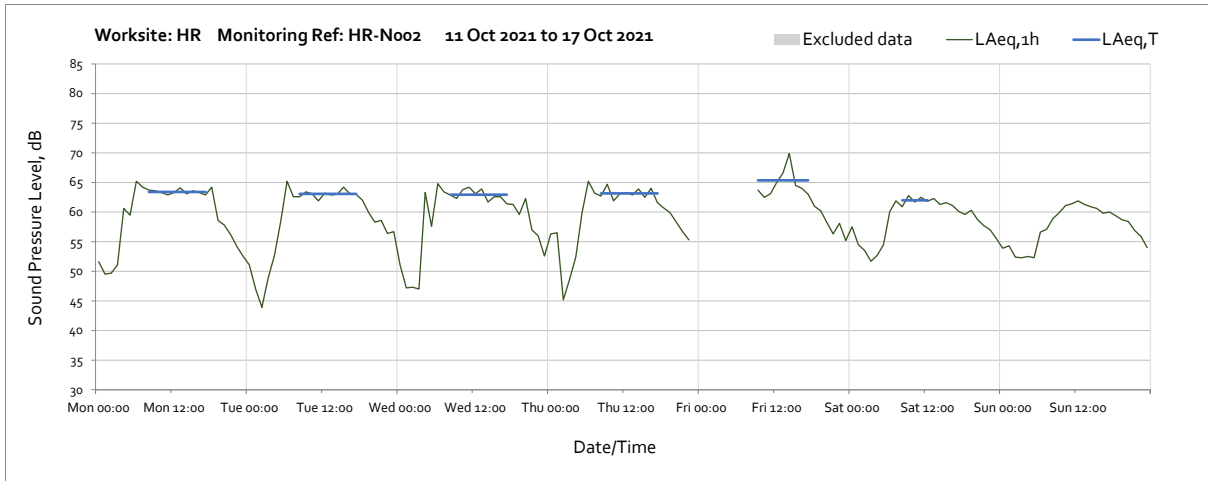




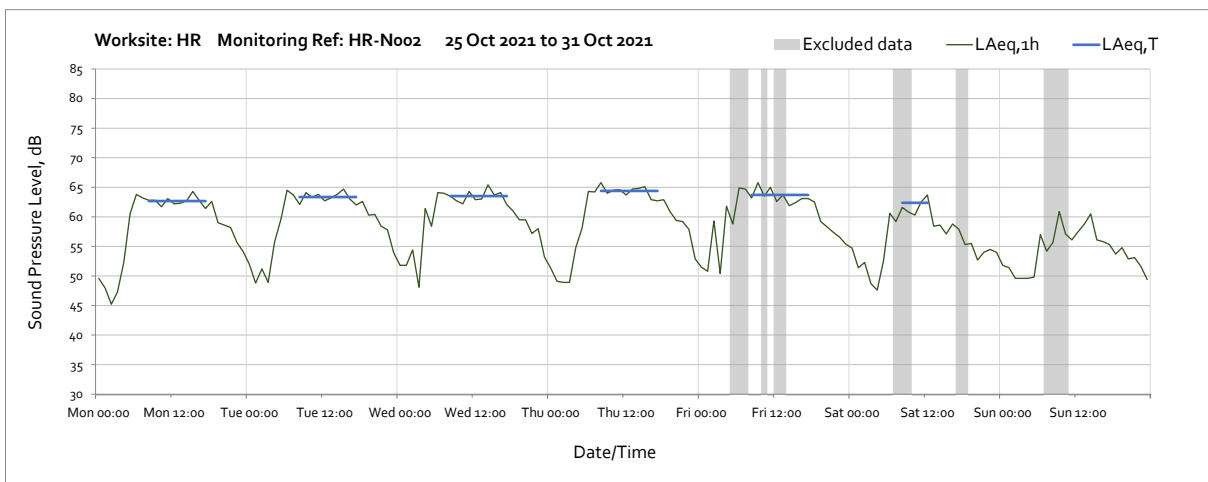
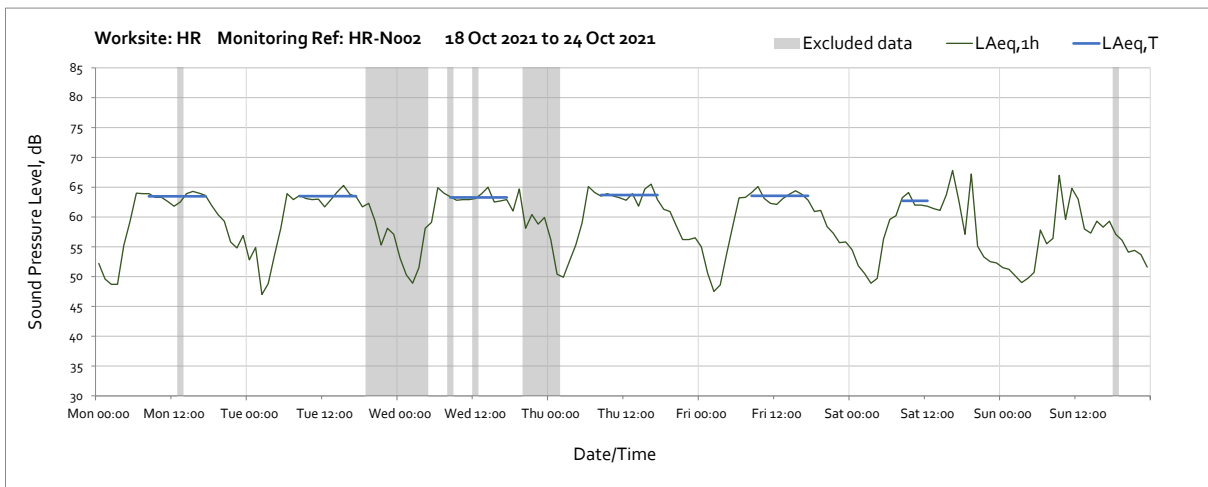


Worksite: Harvil Road (HR) - Monitoring Ref: HR-N002





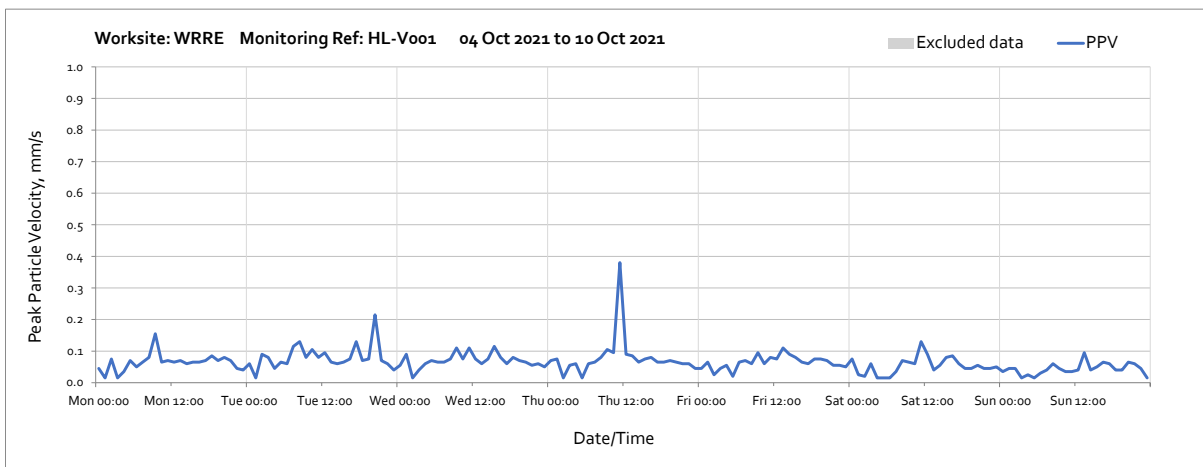
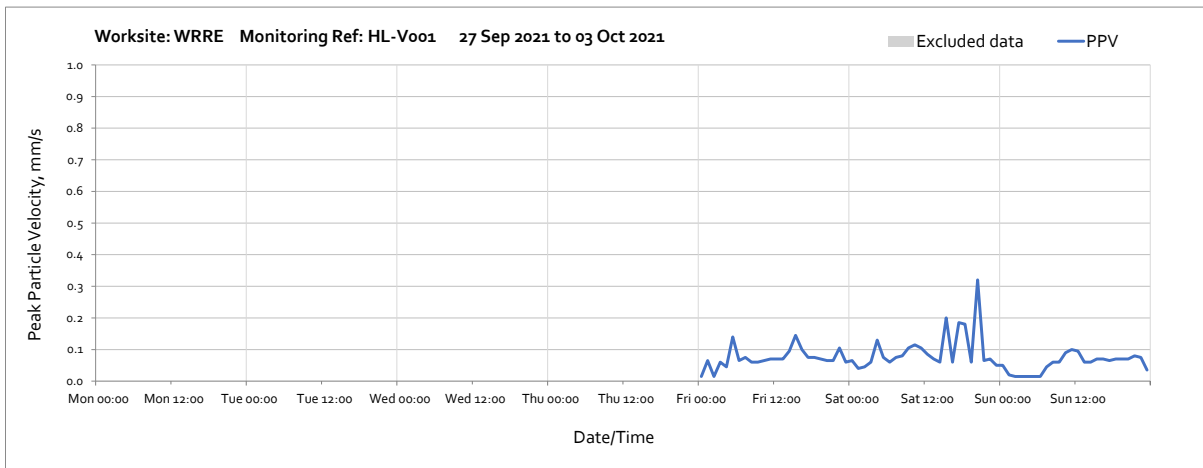
Note: Missing data from 23:00 on Thursday 14th October 2021 until 09:00 on Friday 15th October 2021 was due to loss of connection at the monitoring station.

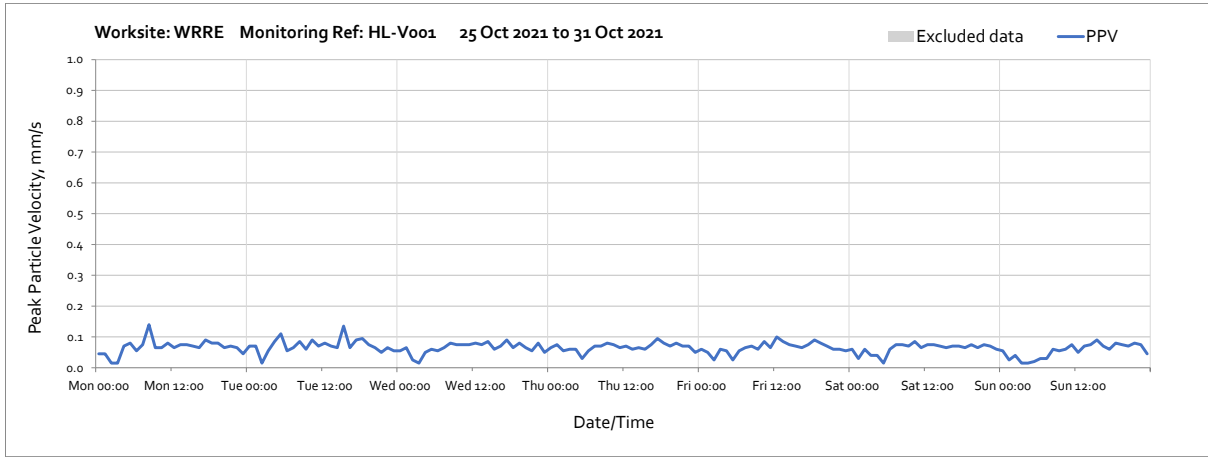
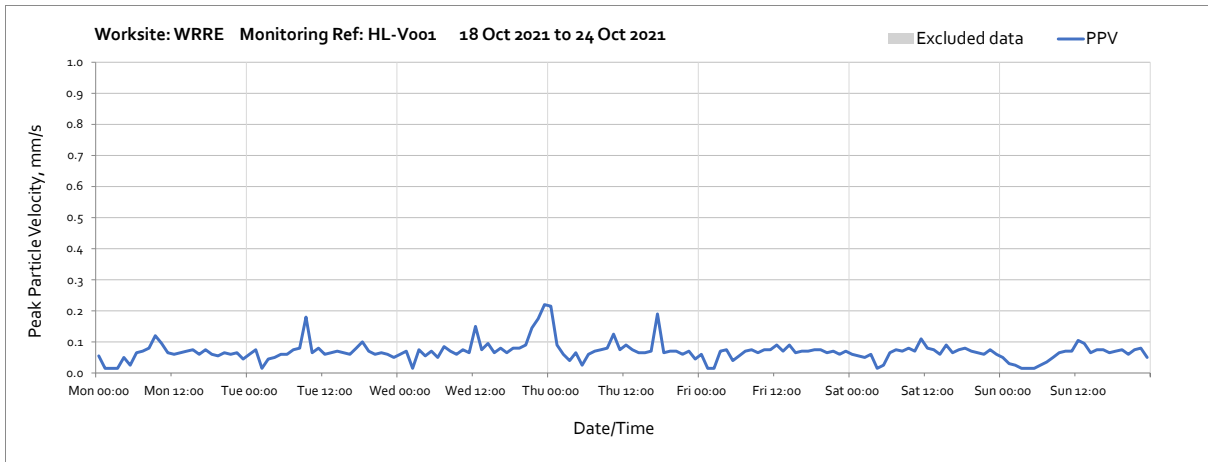
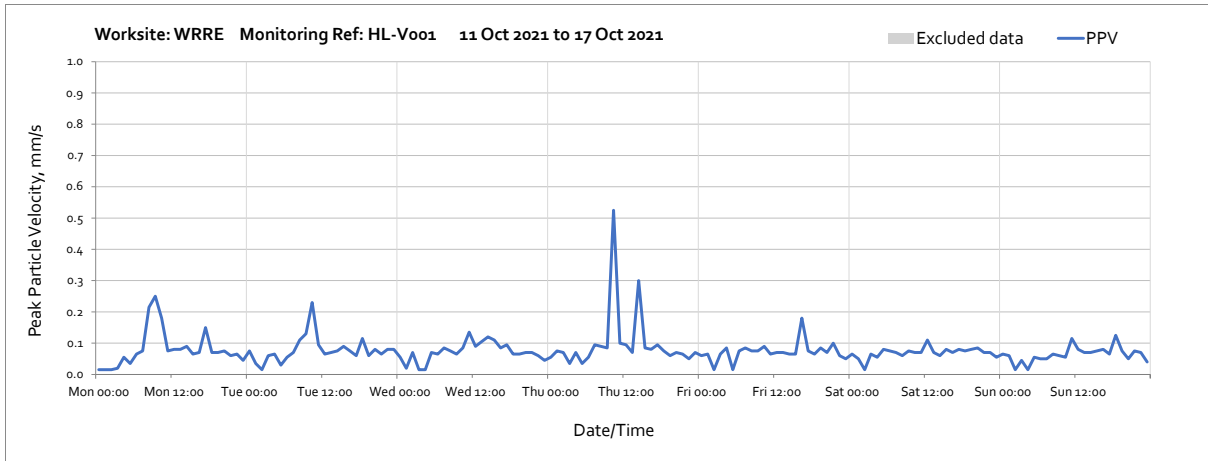


Vibration

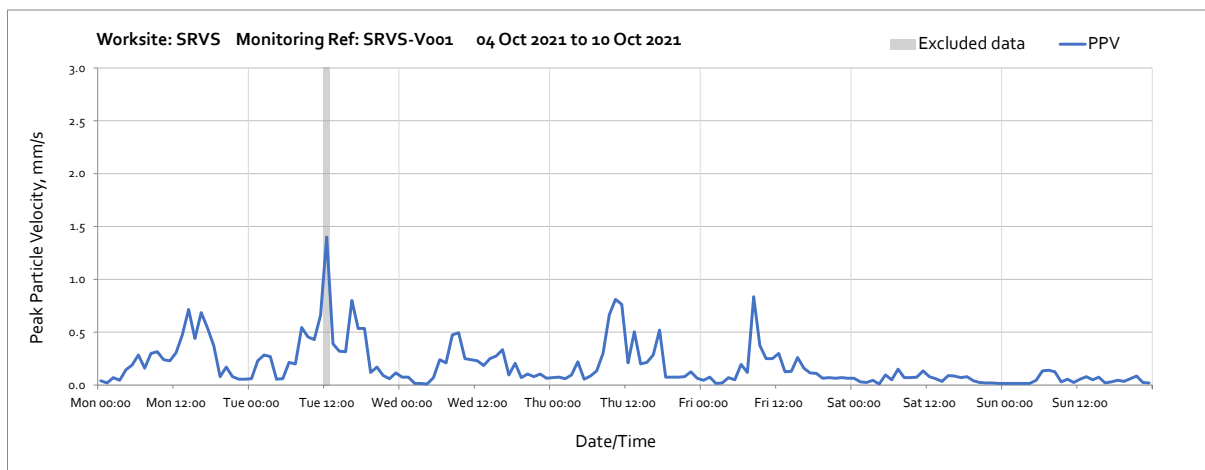
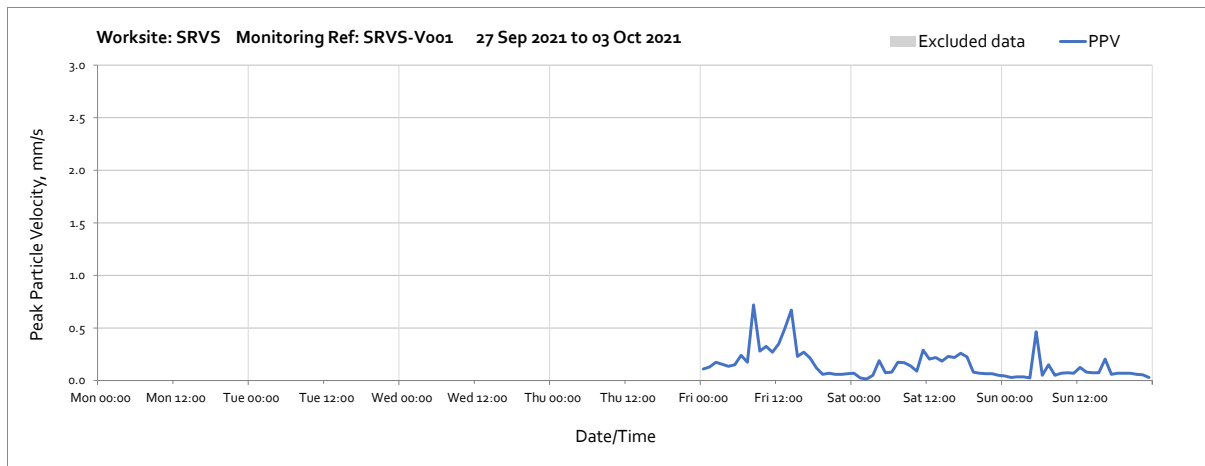
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative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

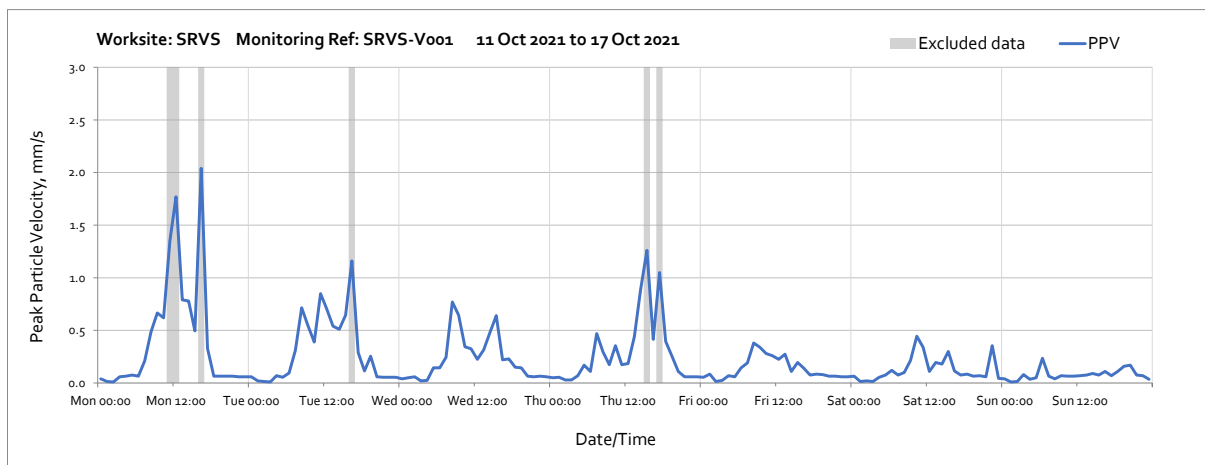




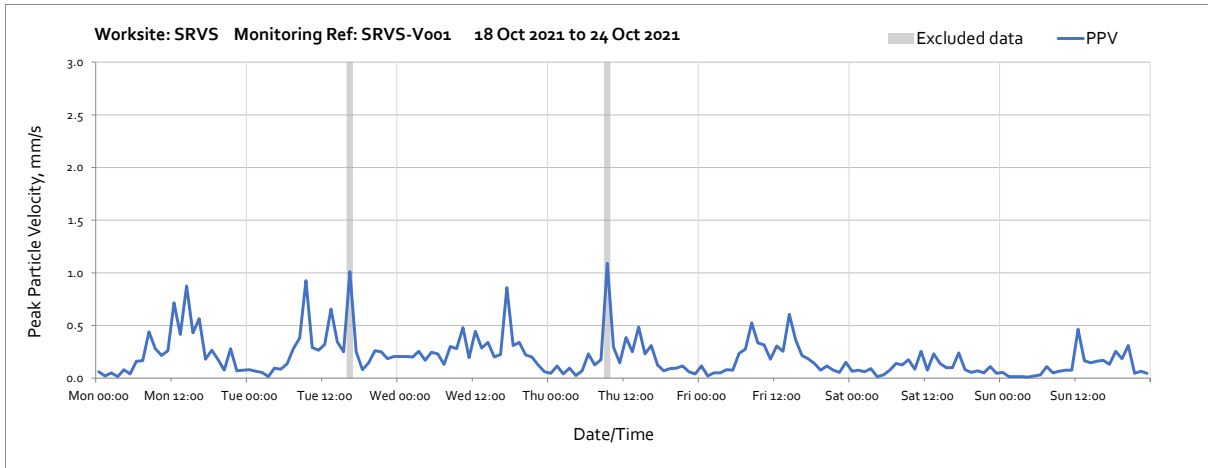
Worksite: South Ruislip Ventilation Shaft (SRVS) – Monitoring Ref: SRVS-V001



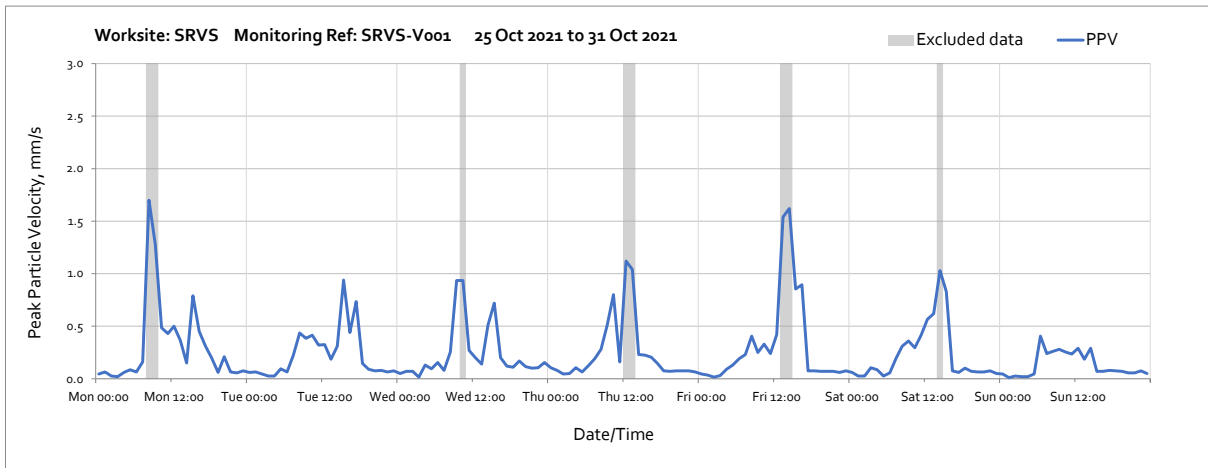
Note: High vibration levels measured in between 12:00 and 13:00 on Tuesday 5th October 2021 were due to pass-by of freight trains, local disturbance and not due to HS2 related works.



Note: High vibration levels measured across the week were due to pass-by of freight trains, local disturbance and not due to HS2 related works.



Note: High vibration levels measured from 16:00 until 17:00 on Tuesday 19th October 2021 and from 09:00 until 10:00 on Thursday 21st October 2021 were due to pass-by of freight trains, local disturbance and not due to HS2.



Note: High vibration levels measured across the week were due to pass-by of freight trains, local disturbance and not due to HS2 related works.