

Construction noise and vibration Monthly Report – December 2022

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 December 2022.

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

- Colne Valley Viaduct Dews Lane site (ref.: CVV-DL), where compound operation, piling works, maintenance and operation of the haul road and jetty, ground investigation works, pier construction, water pumping works, installation of satellite welfare and generator farms, concrete drilling, stabilisation works, earthworks, drainage works, canal works, material storage, fencing works, utility diversion works, environmental maintenance works, cofferdam excavation, demolition of slabs, river crossing construction, launching girder and deck works were underway.
- Colne Valley Viaduct Moorhall Road site (ref.: CVV-MR), where compound operation, piling works, maintenance and operation of the haul road and jetty, ground investigation works, pier construction, water pumping works, installation of satellite welfare and generator farms, concrete drilling, construction of the compensation pond, material storage, fencing works, utility diversion works, environmental maintenance works, cofferdam excavation, demolition of bentonite slabs, river crossing construction, launching girder and deck works were underway.
- West Ruislip Portal worksite (ref.: WRP) where tunnel boring machine operations, conveyor belt operation and extension, material delivery, grouting plant installation and commissioning, soil treatment works, construction of tunnel boring machine water treatment plant, redevelopment of Golf Course, grout plant commissioning and concrete works were underway.
- Breakspear Road worksite (ref.: BR), where bored piling works, earthworks, construction of bridges, construction of protection slab, soil removal, granular filling works and stockpiling were underway.
- South Ruislip Ventilation Shaft worksite (ref.: SRVS), where removal of waste materials, vehicles movement, road sweeping, dewatering works, removal of bentonite plant slab, main shaft works and installation of dewatering pumps were underway.
- Harvil Road worksite (ref.: HR), where road works, installation of hoarding, water management works, drainage works, silt buster operation, earthworks, concrete works, utility works, assembly of conveyor belt, vegetation clearance, soil compacting works, ditches digging works, material storage, construction of

treatment silos, bridges and tunnel boring machine material testing area were underway.

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

- The Greenway (West Ruislip) where sewer utility works were underway.
- Copthall North, where excavation works, material movement, construction of haul road, sheet piling, steel fixing, waterproof works for construction of Copthall Tunnel, drainage works, earthworks, filling works, construction of site access gate, construction of footpath, bell mouth construction and concrete pours were underway.
- Northern Sustainable Placement Area, Copthall North, where haul road and footpath maintenance, construction of temporary crane platform were underway.
- Bridgewater Road, Great Central Avenue, where utility and enabling works were underway.
- Bridgewater Road, West End Road, where asset protection and strengthening works were underway.

The HS2 threshold levels for significant noise impacts, which are defined in Information Paper E23 (<https://www.gov.uk/government/publications/hs2-information-papers-environment>), were not exceeded during the reporting period.

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

No complaints were received during the monitoring period.

Abbreviations and Descriptions

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

Table 1: Table of Abbreviations

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

1 Introduction

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

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

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

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

- Colne Valley Viaduct Dews Lane site, which is partly located in the London Borough of Buckinghamshire, ref.: CVV-DL (see Plan 1 in Appendix A), where work activities included:
 - Piling works, including jetty piling, boring pile, de-sanding of pile bore, grout curtain, installation of reinforcement cages and concrete pile, plant maintenance and clean up, pile trimming, piling platform relocation and stockpiling.
 - Compound operations, including de-sanding works.
 - Maintenance and operation of the haul road and jetty.
 - Ground investigation works.
 - Pier construction, including formwork, reinforcement and concrete works and tower crane mobilisation and demobilisation.
 - Water pumping management works.

- Installation of satellite welfare and generator farms.
- Concrete drilling.
- Stabilisation, earthworks and drainage works.
- Canal works, including operation and maintenance.
- Material storage.
- Fencing works.
- Utility diversion works.
- Environmental maintenance works.
- Cofferdam excavations.
- Demolition of bentonite slabs.
- Construction of river crossing including emergency obstruction dismantling works.
- Launching girder works, including grouting works, steel structure erection works and dismantling works.
- Deck works, including preparation and operation of storage yards, installation of access provision, traffic management, noise barriers, troughs, pipes, carrier drainpipe and access ramps, steel works, filling of voids and concrete works.
- Colne Valley Viaduct Moorhall Road site, which is partly located in the London Borough of Buckinghamshire, ref.: CVV-MR (see Plan 1 in Appendix A), where work activities included:
 - Piling works, including jetty piling, boring pile, de-sanding of pile bore, grout curtain, installation of reinforcement cages and concrete pile, plant maintenance and clean up, pile trimming, piling platform relocation works and stockpiling.
 - Compound operations, including de-sanding works.
 - Maintenance and operation of the haul road and jetty.
 - Ground investigation works.
 - Pier construction, including formwork, reinforcement and concrete works tower crane mobilisation and demobilisation.
 - Water pumping management works.
 - Installation of satellite welfare and generator farms.
 - Concrete drilling.

- Construction of compensation pond.
- Material storage.
- Fencing works.
- Utility diversion works.
- Environmental maintenance works.
- Cofferdam excavations.
- Demolition of bentonite slabs.
- Construction of river crossing including emergency obstruction dismantling works.
- Launching girder works, including grouting works, steel structure erection works and dismantling works.
- Deck works, including preparation and operation of storage yards, installation of access provision, traffic management, noise barriers, troughs, pipes, carrier drainpipe and access ramps, steel works, filling of voids and concrete works.
- West Ruislip Portal Worksite, ref.: WRP (see Plan 3 in Appendix A), where work activities included:
 - Conveyor belt operation and extension.
 - Tunnel boring machine operations.
 - Material delivery.
 - Grouting plant installation and commissioning.
 - Soil treatment works, including construction of haul road, topsoil and stripping works and conveyor base installation.
 - Construction of tunnel bored machine water treatment plant.
 - Redevelopment of Golf Course, including vegetation clearance, tree pruning, setting up security fence and hoarding, archaeology works, ecological mitigation works and commissioning of grout plant.
 - Concrete works, including placement of material and creation of railway extension.
- Breakspear Road Worksite, ref.: BR (see Plan 2 in Appendix A), formerly West Ruislip Retained Embankment, where work activities included:
 - Bored piling works.
 - Earthworks, including backfill.

- Construction of bridges, including installation of abutment wall, concrete pours, installation of formwork and reinforcement, installation of deck, steel fixing, waterproofing and installation of shutters.
- Construction of protection slab.
- Soil removal.
- Granular filling works.
- Stockpiling.
- South Ruislip Ventilation Shaft worksite, ref.: SRVS (see Plan 4 in Appendix A), where work activities included:
 - Removal of waste materials.
 - Vehicle movements.
 - Road sweeping.
 - Dewatering works.
 - Removal of bentonite plant slab.
 - Main shaft works, including construction of base slab steel and capping beam, concrete pours, waterproofing, secondary lining and foam concreting works.
 - Installation of dewatering pumps.
- Harvil Road worksite, ref.: HR (see Plan 2 in Appendix A), where work activities included:
 - Road works, including haul road, installation of traffic lights, construction of road alignment, drainage and excavation works.
 - Installation of hoarding.
 - Water management works.
 - Drainage works, including construction of attenuation pond.
 - Silt buster operation.
 - Earthworks.
 - Concrete works.
 - Utility works.
 - Assembly of conveyor belt.
 - Vegetation clearance.

- Soil compacting works.
- Ditches digging works.
- Construction of treatment silos and tunnel boring machine testing area.
- Construction of bridges, including concreting and backfill works.
- Material storage.

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

- The Greenway (West Ruislip) where sewer utility works were underway.
- Copthall North, where excavation works, material movement, construction of haul road, sheet piling, steel fixing, waterproof works for construction of Copthall Tunnel, drainage works, earthworks, filling works, construction of site access gate, construction of footpath, bell mouth construction and concrete pours were underway.
- Northern Sustainable Placement Area, Copthall North, where haul road and footpath maintenance, construction of temporary crane platform were underway.
- Bridgewater Road, Great Central Avenue, where utility and enabling works were underway.
- Bridgewater Road, West End Road, where asset protection and strengthening works 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 Sixteen (16) noise and one (1) vibration monitoring installations were active in December in the LBH area. Table 2 summarises the position of noise and vibration monitoring installations within the LBH area in December 2022.

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
CVV-DL	CVV-DL-NMP2	Highway Farm House, Harvil Rd, Harefield, Uxbridge
	CVV-DL-NMP3	Dew's Farm Cottages, Dews Lane, Harefield, Uxbridge
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
WRP	N048	Ruislip Golf Course, Ickenham Rd, Ruislip
	N056	83 The Greenway, Ickenham, Ruislip
	N057	123 The Greenway, Ickenham, Ruislip
	GW-V001	95 The Greenway, Ickenham, Uxbridge
BR	N065	Breakspear Road South, Harefield, Uxbridge
	N066	Hoylake Crescent, Ickenham, Uxbridge
	TKL-N001	Tile Kiln Lane, Harefield, Uxbridge
SRVS	N061	Cineworld South Ruislip car park, Ruislip
	TCA-N001	Trenchard Avenue, Ruislip
HR	N067	Harvil Road worksite south boundary
	SSPA-HR	Harvil Road
	BSR-N001	Breakspear Road

2 Summary of Results

2.1 Summary of Measured Noise and Vibration Levels

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

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

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekday Average LAeq,T (highest day LAeq,T)					Saturday Average LAeq,T (highest day LAeq,T)					Sunday / Public Holiday Average LAeq,T (highest day LAeq,T)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
CVV-DL	CVV-DL-NMP2	Highway Farm House, Harvil Rd, Harefield, Uxbridge	Façade	57.7 (59.5)	57.8 (60.6)	57.0 (58.9)	56.8 (64.1)	55.8 (58.9)	57.7 (60.0)	58.2 (59.2)	58.1 (59.2)	57.2 (58.5)	56.1 (57.7)	56.7 (58.6)	55.9 (58.6)
	CVV-DL-NMP3	Dew's Farm Cottages, Dews Lane, Harefield, Uxbridge,	Façade	57.6 (64.4)	59.6 (65.2)	53.3 (56.2)	51.1 (56.8)	48.2 (56.7)	52.7 (56.3)	58.1 (63.9)	54.4 (56.5)	52.6 (59.8)	45.7 (50.1)	49.4 (55.8)	46.9 (55.0)
CVV-MR	CVV-MR-NMP1	Weir Cottage, Denham Garden Village, Denham, Buckinghamshire	Free-field	51.7 (54.9)	52.5 (53.7)	50.9 (53.3)	49.1 (53.1)	45.8 (52.4)	50.7 (52.0)	53.1 (54.8)	52.0 (52.9)	50.2 (53.1)	45.4 (52.0)	49.5 (52.4)	44.7 (50.9)
	CVV-MR-NMP2	Harefield Marina, Moorhall Road, London, Greater London	Free-field	52.7 (56.8)	54.8 (60.0)	51.0 (55.4)	50.2 (54.0)	48.2 (54.2)	52.3 (54.8)	54.1 (56.4)	52.2 (53.5)	51.0 (53.4)	48.4 (51.3)	50.2 (54.1)	47.9 (52.6)
	CVV-MR-NMP3	Peerless Drive, Harefield, Uxbridge	Façade	51.7 (55.4)	54.7 (59.7)	48.9 (52.8)	47.2 (52.0)	43.7 (53.3)	50.9 (54.9)	52.9 (54.0)	52.4 (53.7)	49.9 (53.9)	43.5 (52.6)	48.0 (52.4)	42.9 (53.2)
WRP	N048	West Ruislip Golf Club, Ickenham Rd, Ruislip	Free-field	60.2 (69.8)	59.3 (64.5)	54.0 (58.0)	52.4 (59.5)	49.7 (58.7)	59.6 (69.6)	57.4 (62.6)	54.6 (57.4)	54.0 (56.9)	49.8 (55.9)	52.1 (55.3)	48.6 (57.4)
	N056	83 The Greenway, Ickenham, Ruislip	Façade	55.1 (62.2)	59.1 (61.6)	57.2 (63.1)	57.0 (62.0)	52.2 (60.5)	53.8 (59.6)	59.6 (61.3)	59.2 (62.3)	57.2 (62.4)	50.9 (60.0)	54.2 (61.6)	52.0 (59.9)

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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	Façade	51.6 (57.4)	55.2 (57.1)	53.4 (59.8)	53.1 (57.4)	48.4 (56.4)	50.9 (55.4)	55.8 (58.3)	55.0 (58.4)	53.6 (58.7)	49.7 (64.3)	50.4 (57.5)	48.3 (56.1)
BR	N065	Breakspear Road South, Harefield, Uxbridge	Free-field	64.9 (67.5)	66.1 (68.9)	66.3 (67.9)	64.3 (68.4)	59.5 (66.8)	62.7 (63.9)	66.2 (67.9)	67.1 (68.4)	66.0 (68.3)	59.5 (63.6)	64.4 (67.2)	59.5 (65.8)
	N066	Hoylake Crescent, Ickenham, Uxbridge	Free-field	52.0 (56.7)	55.1 (56.9)	53.4 (57.6)	52.2 (56.4)	48.0 (55.4)	50.5 (54.5)	55.4 (56.8)	55.2 (57.8)	54.0 (61.0)	48.4 (55.3)	49.9 (55.9)	48.3 (55.2)
	TKL-N001	Tile Kiln Lane, Harefield, Uxbridge	Free-field	48.5 (53.2)	50.9 (58.6)	48.5 (51.3)	47.4 (52.2)	44.5 (52.3)	48.0 (51.5)	51.5 (53.5)	51.0 (52.2)	49.8 (54.8)	44.9 (50.7)	47.1 (51.6)	42.4 (49.4)
SRVS	N061	Cineworld South Ruislip car park, Ruislip	Free-field	58.4 (61.5)	63.0 (65.0)	62.8 (65.3)	62.0 (67.5)	56.4 (67.3)	60.2 (62.9)	64.6 (65.7)	64.3 (66.9)	63.6 (67.3)	55.5 (61.0)	59.5 (66.7)	54.2 (63.5)
	TCA-N001	Trenchard Avenue, Ruislip	Free-field	56.6 (58.6)	58.1 (61.3)	57.2 (60.9)	56.6 (59.7)	52.6 (58.4)	57.0 (58.7)	58.5 (61.1)	57.3 (59.7)	56.7 (61.0)	52.6 (58.5)	54.7 (63.5)	51.3 (58.3)
HR	N067	Harvil Road worksite south boundary	Free-field	54.2 (60.0)	62.8 (67.4)	55.1 (61.4)	52.7 (62.8)	49.9 (61.4)	53.7 (56.6)	63.6 (65.4)	61.5 (67.1)	59.3 (68.5)	51.9 (61.3)	59.6 (70.0)	47.2 (55.6)
	SSPA-HR	Harvil Road	Free-field	59.5 (61.9)	60.6 (62.9)	59.1 (60.9)	57.1 (59.6)	53.8 (61.7)	57.8 (60.1)	60.5 (61.9)	60.7 (61.8)	58.9 (61.8)	53.9 (59.3)	57.0 (63.5)	53.6 (61.4)

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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
	BSR-N001	Breakspear Road	Free-field	67.8 (70.1)	68.1 (69.8)	67.8 (69.4)	65.5 (69.5)	60.9 (69.6)	64.5 (66.0)	68.6 (69.1)	69.4 (70.3)	67.4 (69.8)	60.2 (64.2)	65.6 (68.9)	61.2 (68.2)

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

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

Worksite Reference	Measurement Reference	Monitor Address	Highest PPV measured in any axis, mm/s
WRP	GW-V001	95 The Greenway, Ickenham, Uxbridge	1.60 (Y-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	Nights	2200-0700	220	No exceedance
	CVW-DL-NMP3	Dew's Farm Cottages, Dews Lane, Harefield, Uxbridge	Nights	2200-0700	33	No exceedance
CVW-MR	CVW-MR-NMP1	Weir Cottage, Denham Garden Village, Denham, Buckinghamshire	All days	All period	No exceedance	No exceedance
	CVW-MR-NMP2	Harefield Marina, Moorhall Road, London	Nights	2200-0700	104	No exceedance
	CVW-MR-NMP3	Peerless Drive, Harefield, Uxbridge	All days	All period	No exceedance	No exceedance
WRP	N048	West Ruislip Golf Club, Ickenham Rd, Ruislip	Weekdays	0700-0800	8	No exceedance
	N056	83 The Greenway, Ickenham, Ruislip	Weekdays	1900-2200	12	No exceedance
			Saturdays	1300-1400	1	No exceedance
N057	123 The Greenway, Ickenham, Ruislip	Saturdays	1400-2200	9	No exceedance	
BR	N065	Breakspear Road South, Harefield, Uxbridge	Weekdays	0700-0800	4	No exceedance
			Weekdays	0800-1800	7	No exceedance
			Weekdays	1800-1900	7	No exceedance
			Weekdays	1900-2200	20	No exceedance
			Saturdays	0800-1300	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
	N066	Hoylake Crescent, Ickenham, Uxbridge	All days	All period	No exceedance	No exceedance
	TKL-N1	Tile Kiln Lane, Harefield, Uxbridge	All days	All period	No exceedance	No exceedance
SRVS	N061	Hoylake Crescent, Ickenham, Uxbridge	All days	All period	Not applicable*	Not applicable*
	TCA-N001	Trenchard Avenue, Ruislip	All days	All period	No exceedance	No exceedance
HR	N067	Harvil Road worksite south boundary	Weekdays	0800-1800	1	No exceedance
	SSPA-HR	Harvil Road	All days	All period	No exceedance	No exceedance
	BSR-N001	Breakspear Road	Weekdays Saturdays	0800-1800 0800-1300	22 5	No exceedance No exceedance

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

2.2.6 No SOAEL exceedances were recorded due to HS2 construction works during reporting period. Exceedances of the LOAEL were recorded at eight (8) monitoring locations. The LOAEL exceedances were recorded during weekdays, Saturdays, Sundays and night-time working 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.

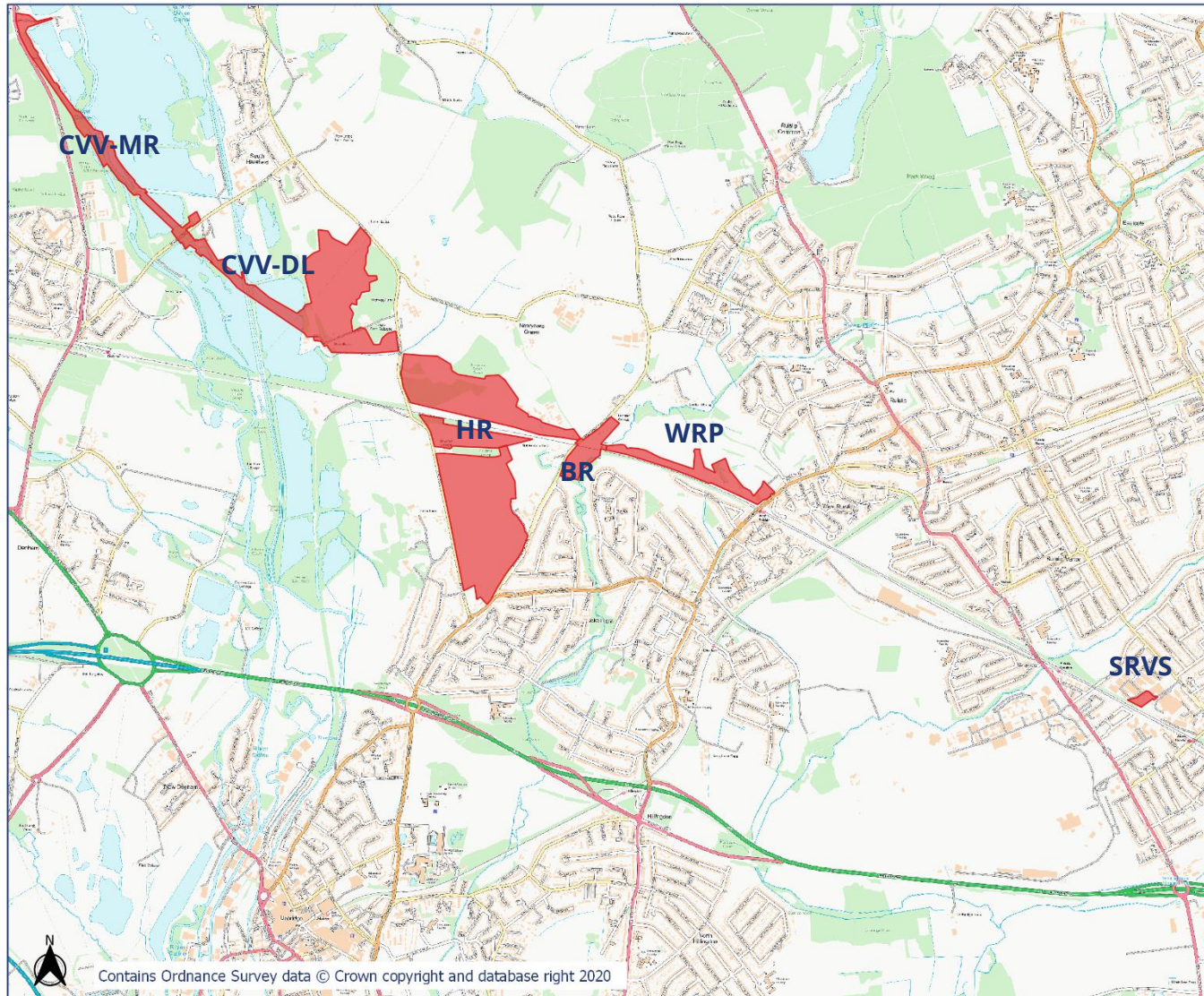
Table 7: Summary of Complaints

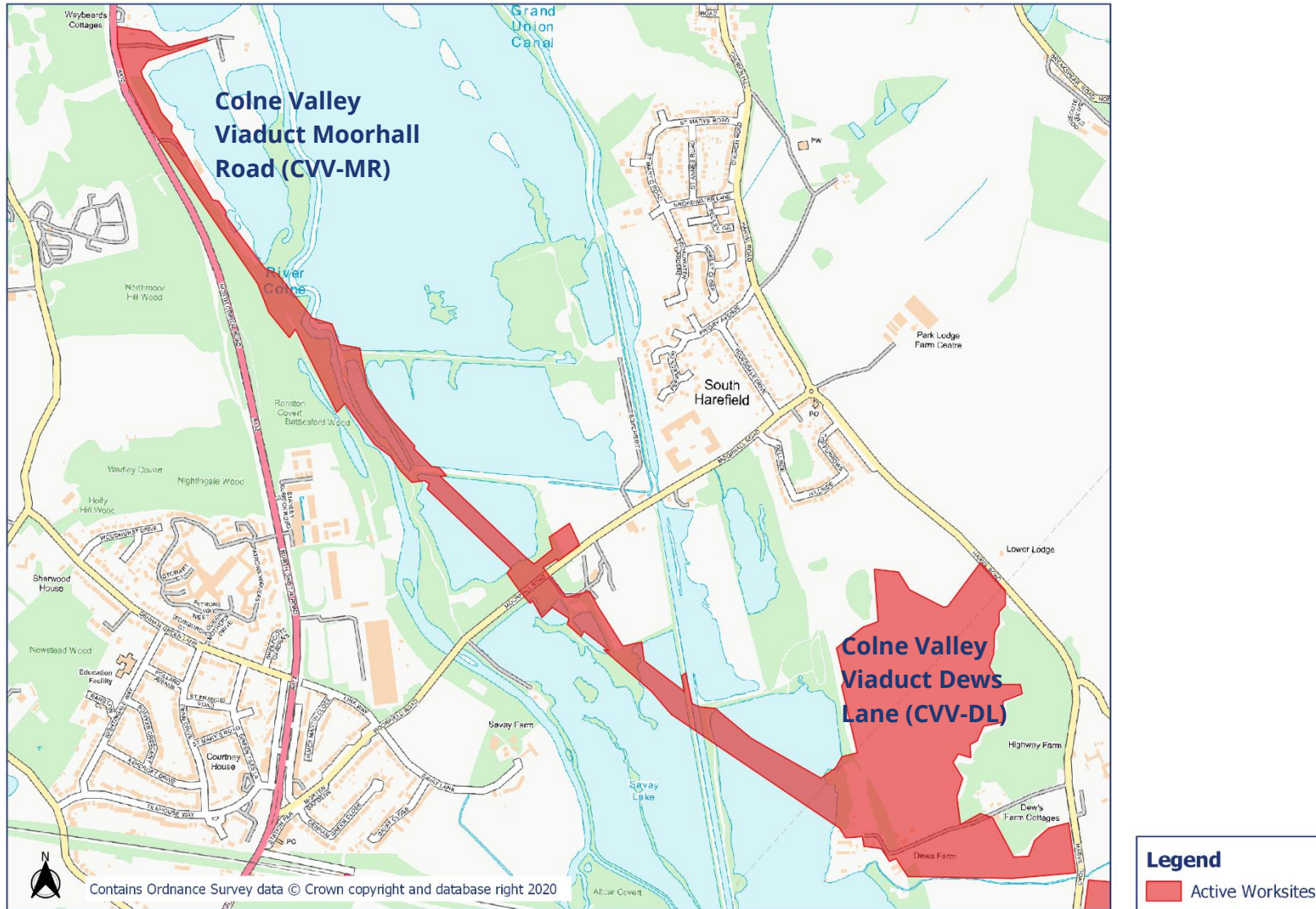
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
-	-	-	-	-

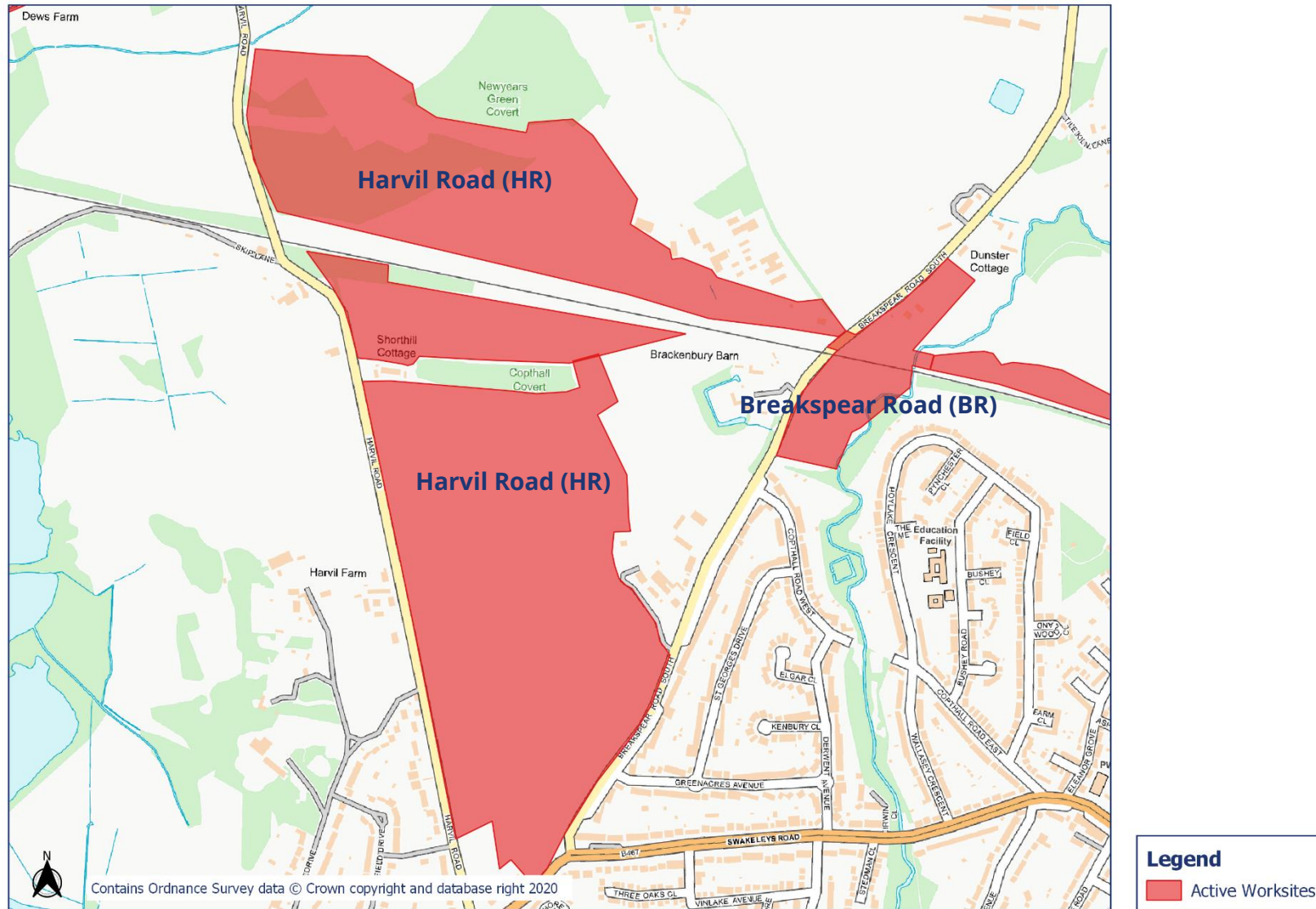
Appendix A Site Locations

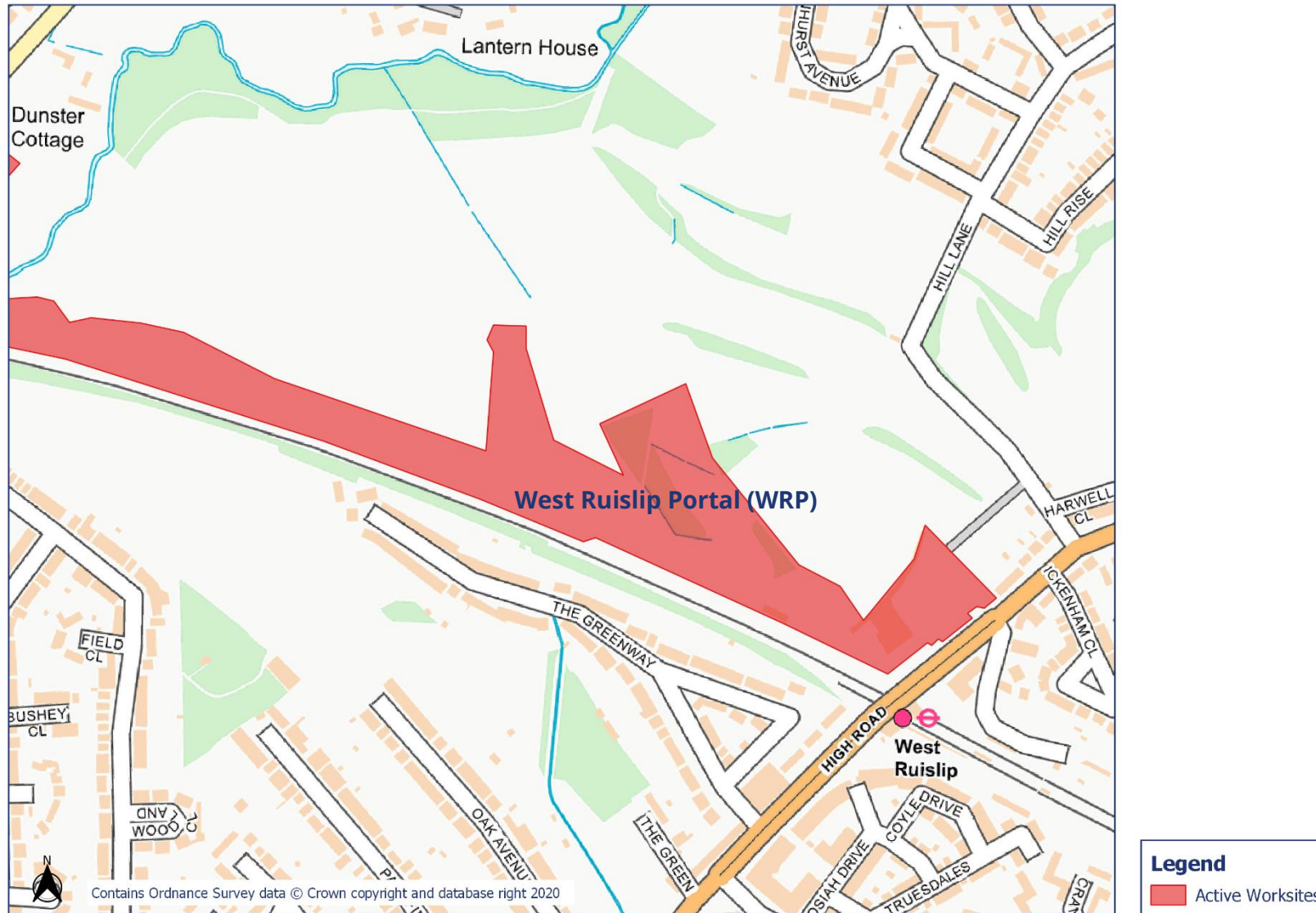
HS2

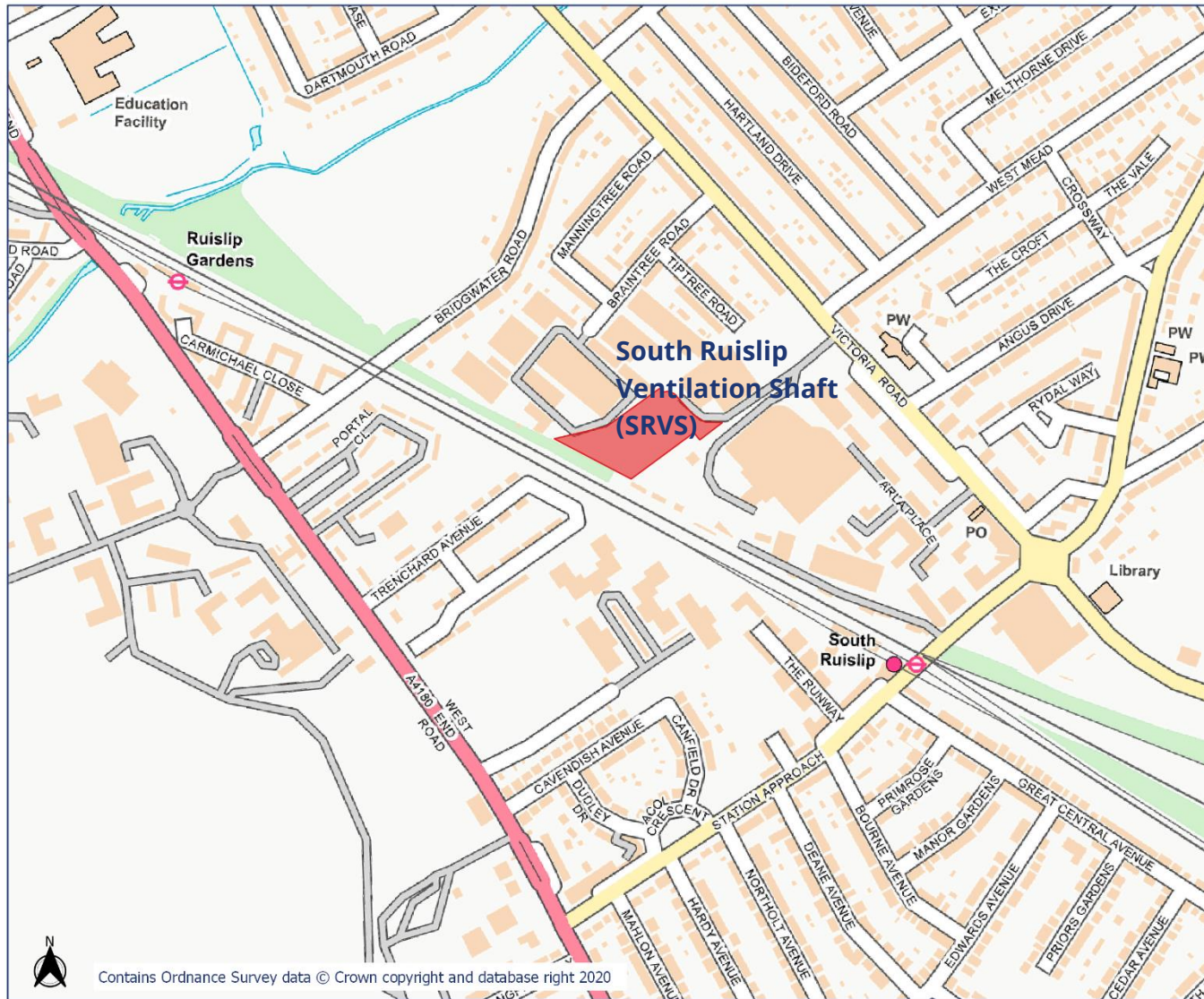
Worksite Identification Plan - Overview











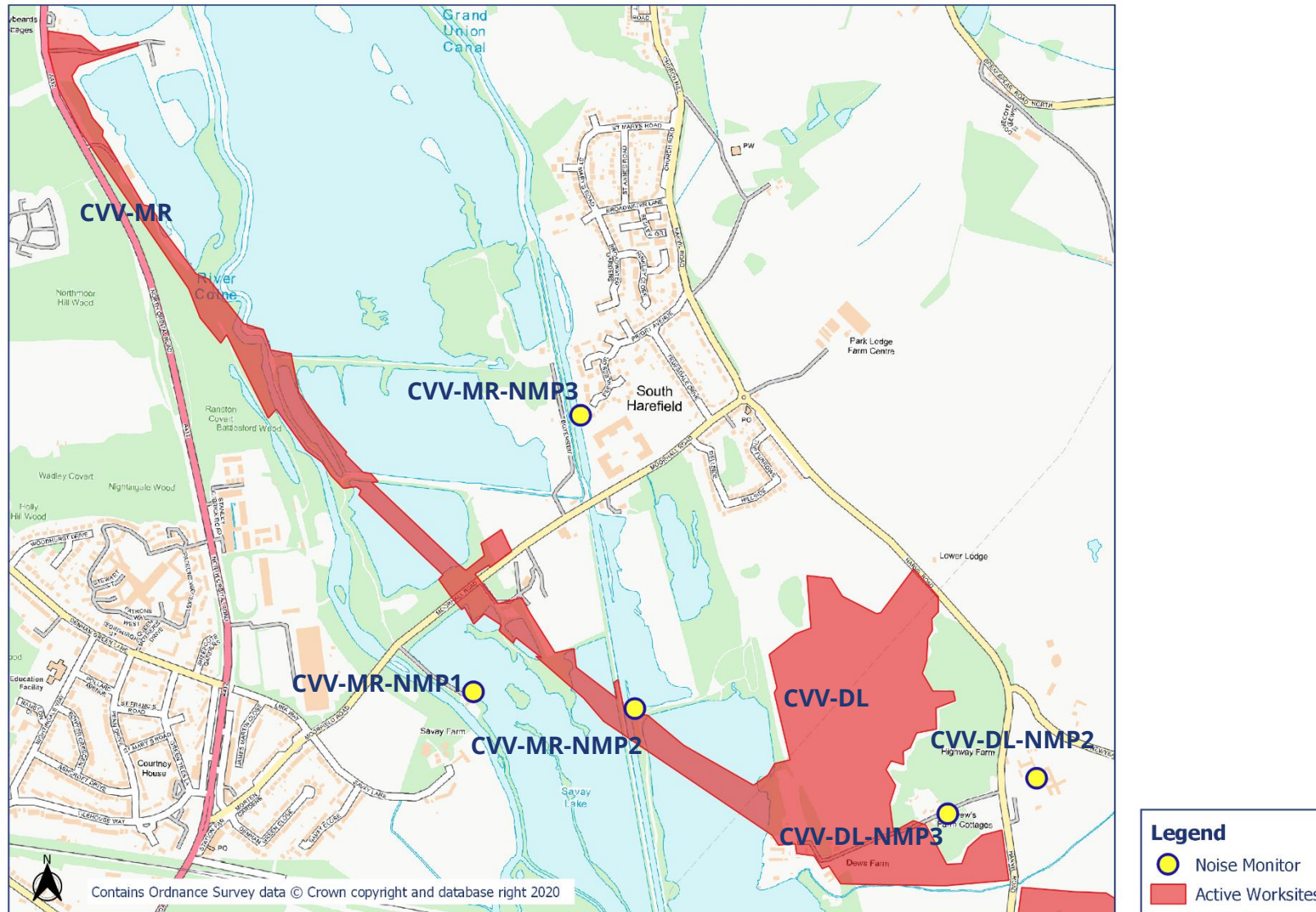
Legend

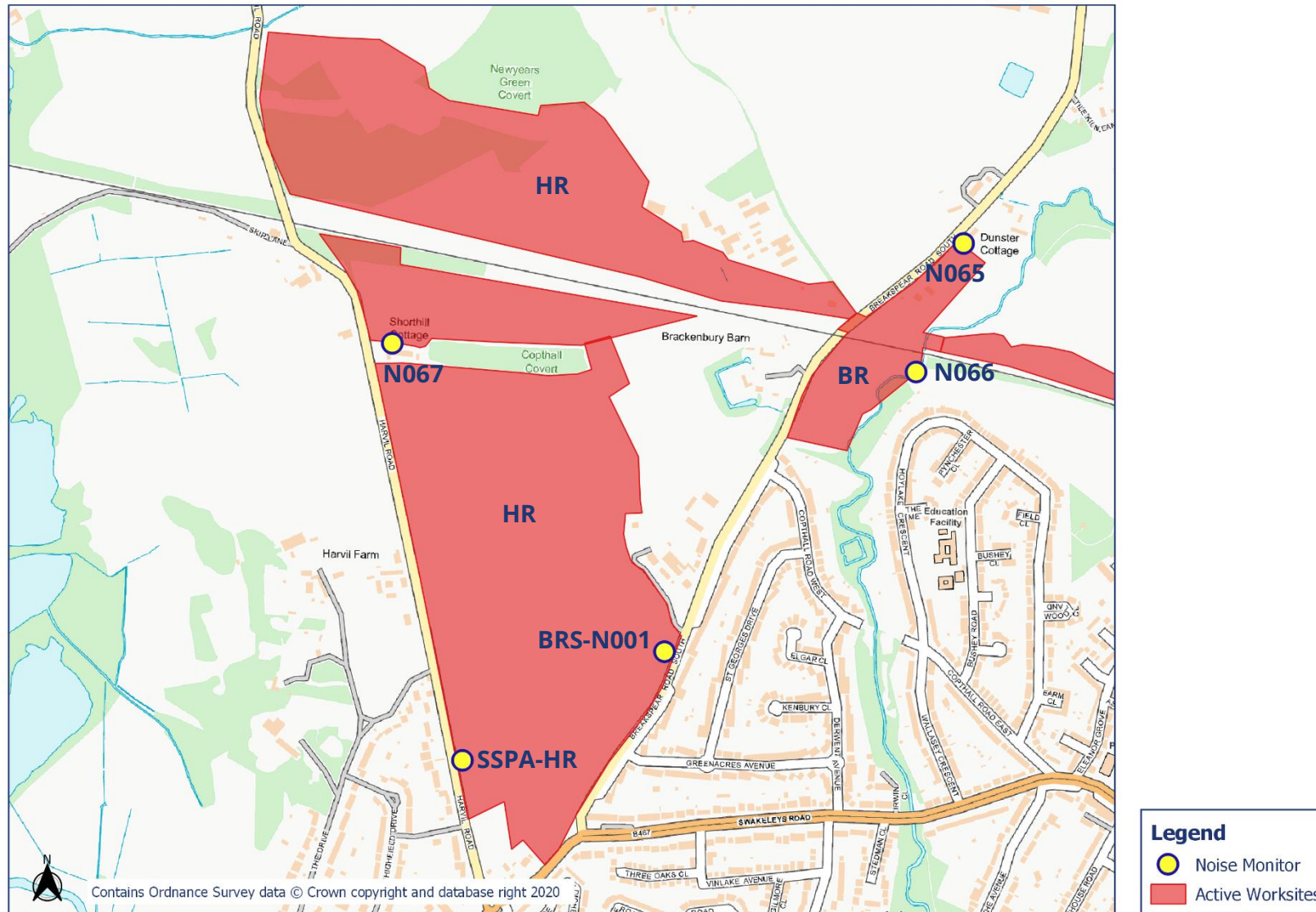
- Active Worksites

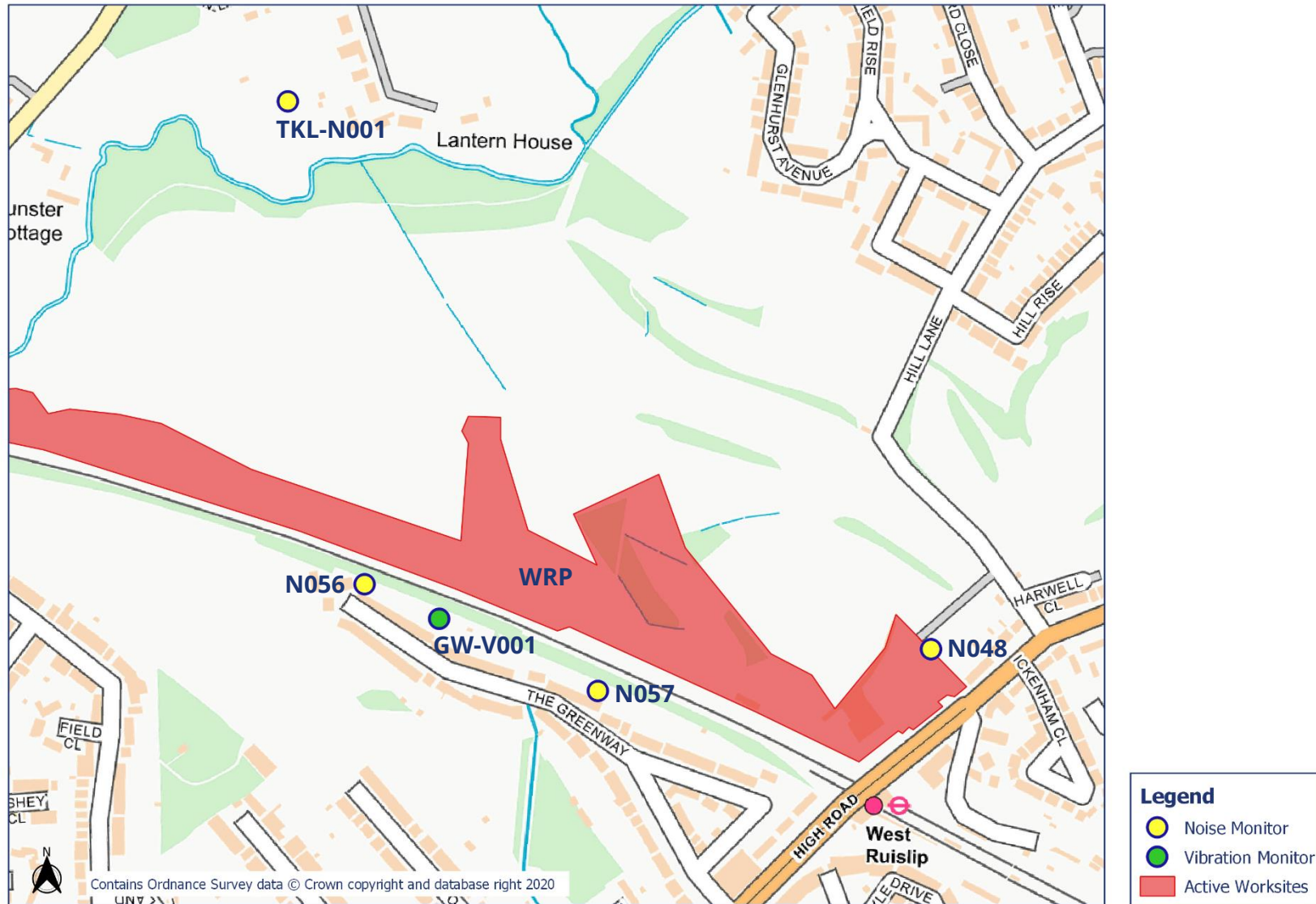
Appendix B Monitoring Locations

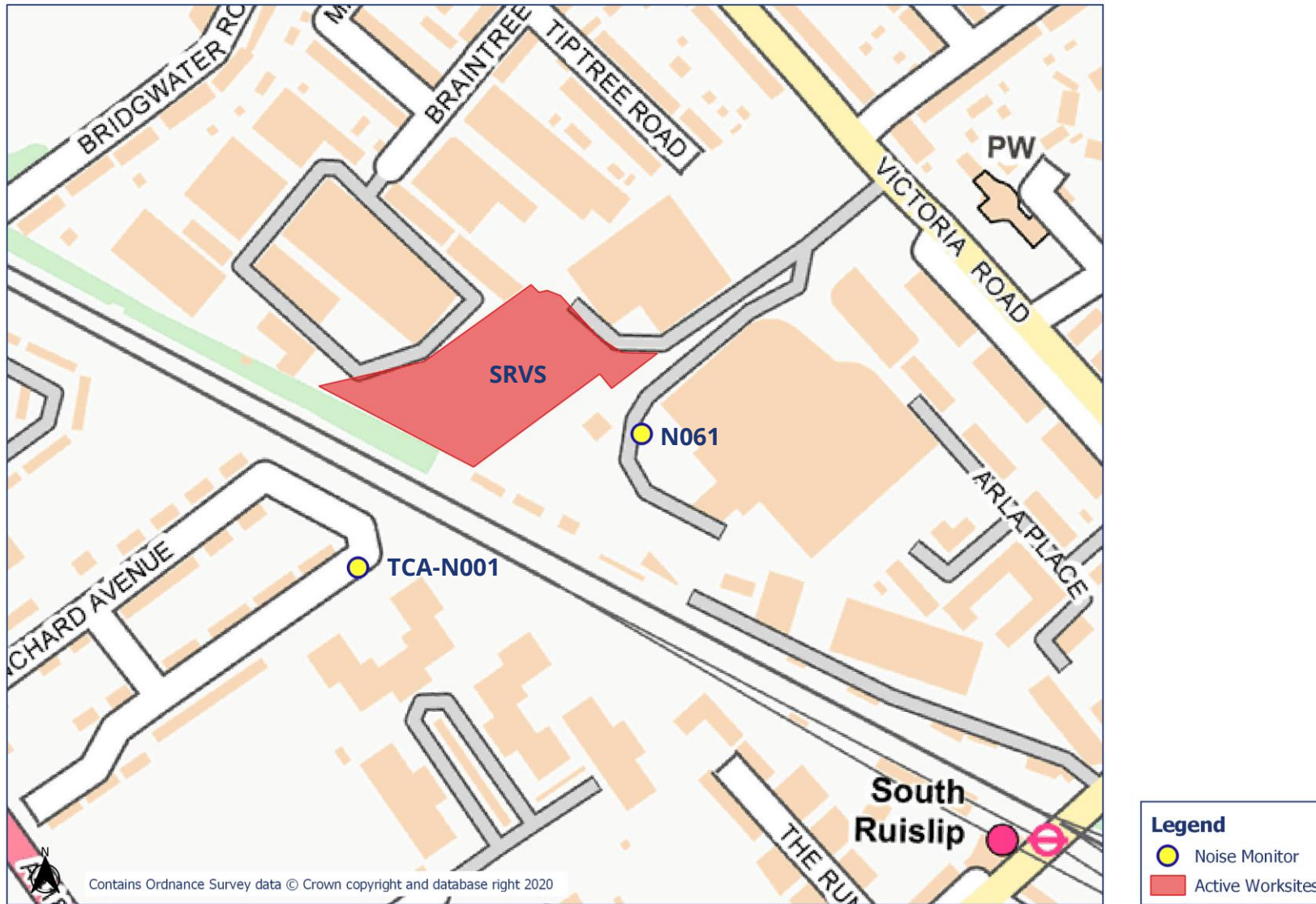
HS2

Noise and Vibration Monitoring Plan - 1









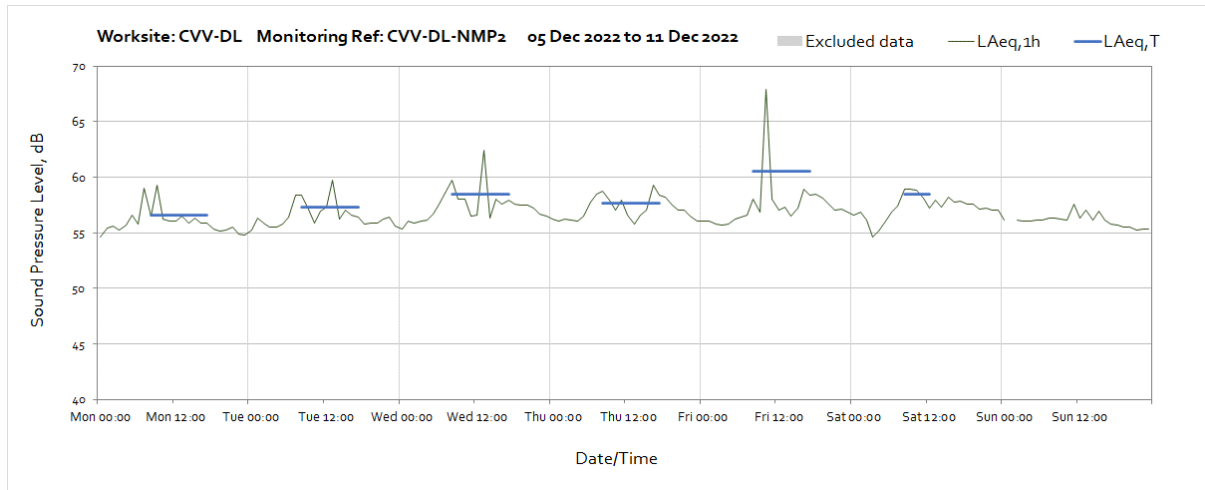
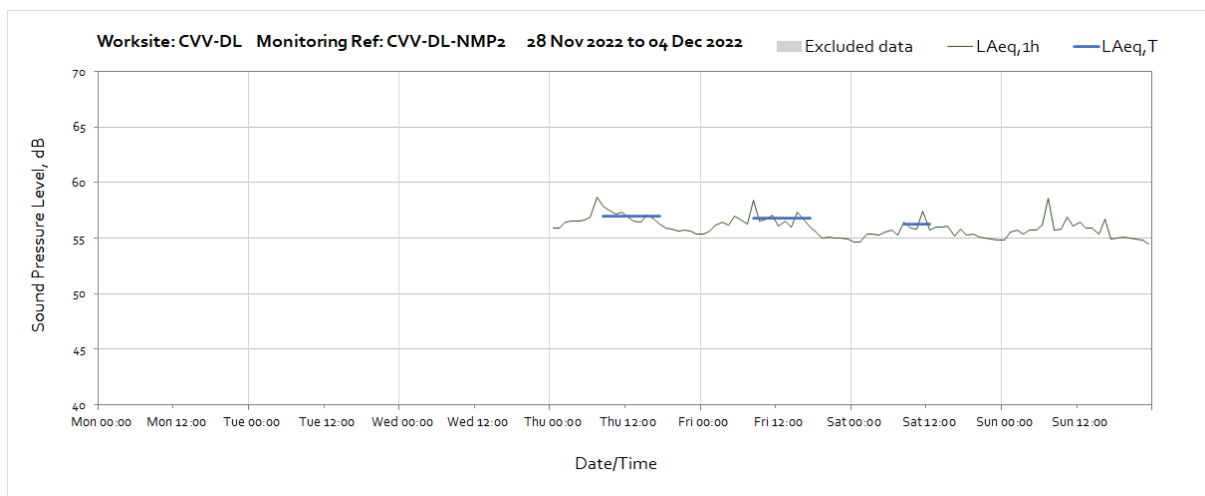
Appendix C Data

Noise

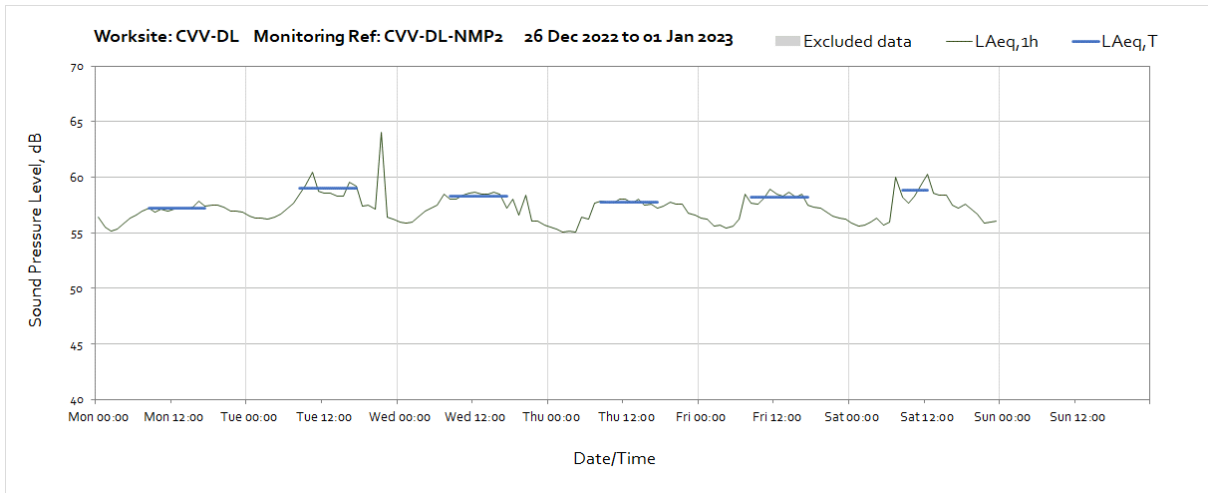
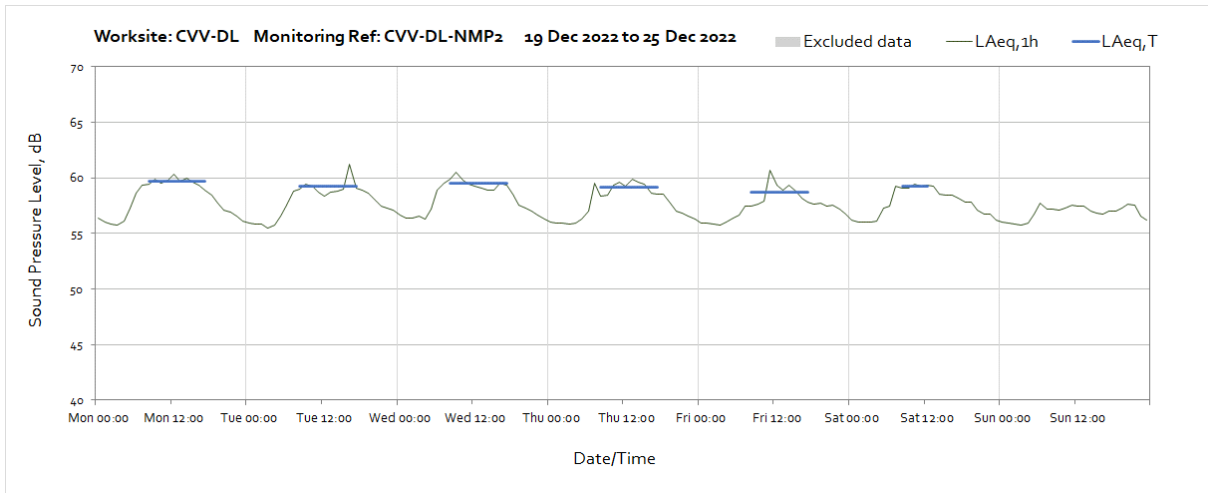
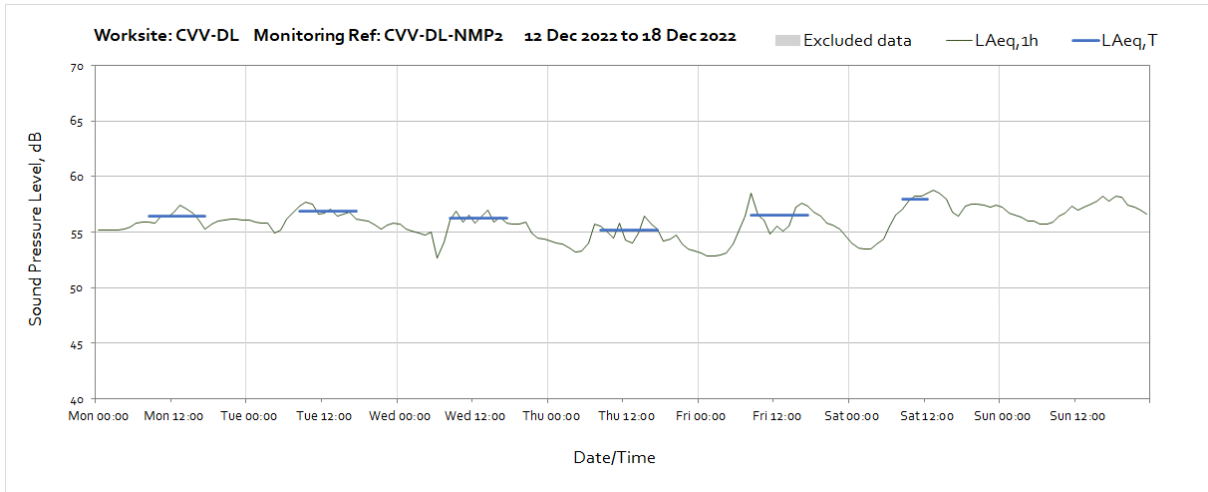
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

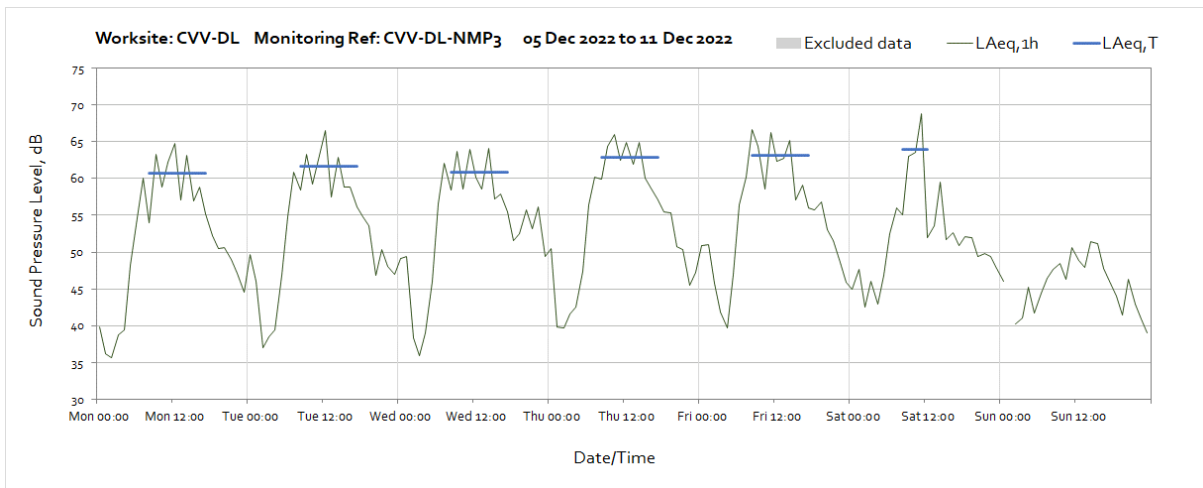
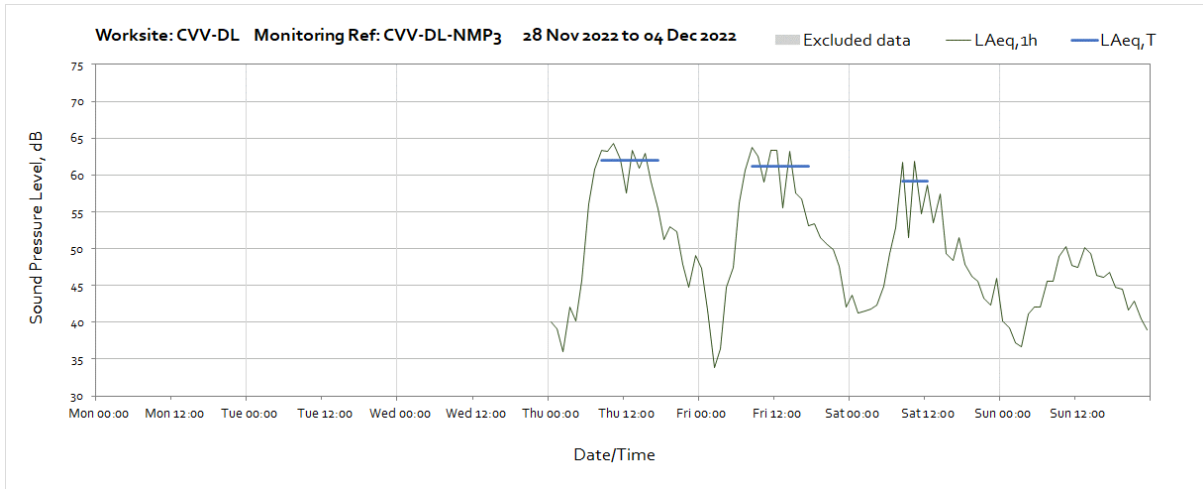


Note: Missing data at 01:00 on Sunday 11th December was due to a data extraction issue.

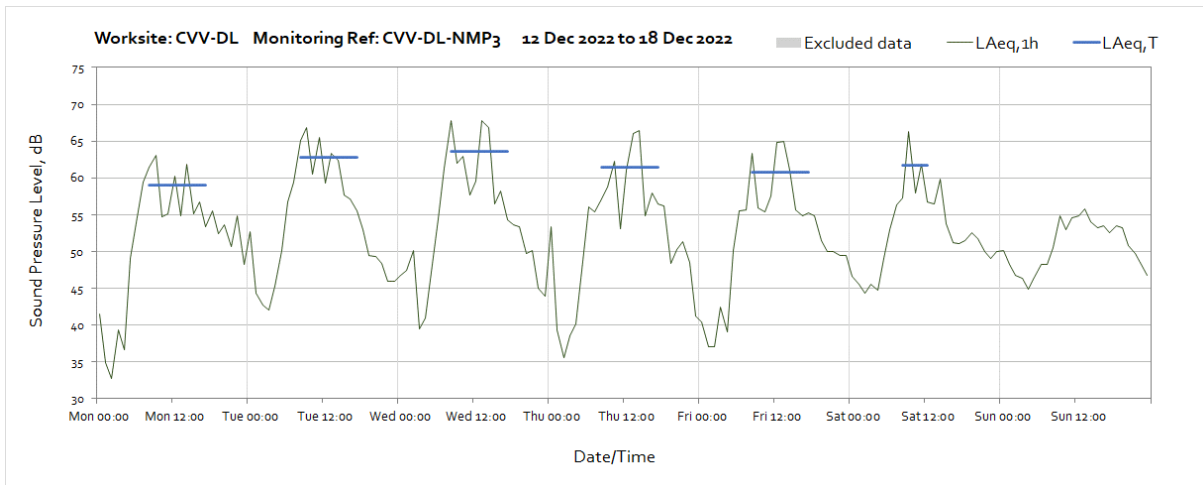


Worksite: Colne Valley Viaduct Dews Lane (CVV-DL)

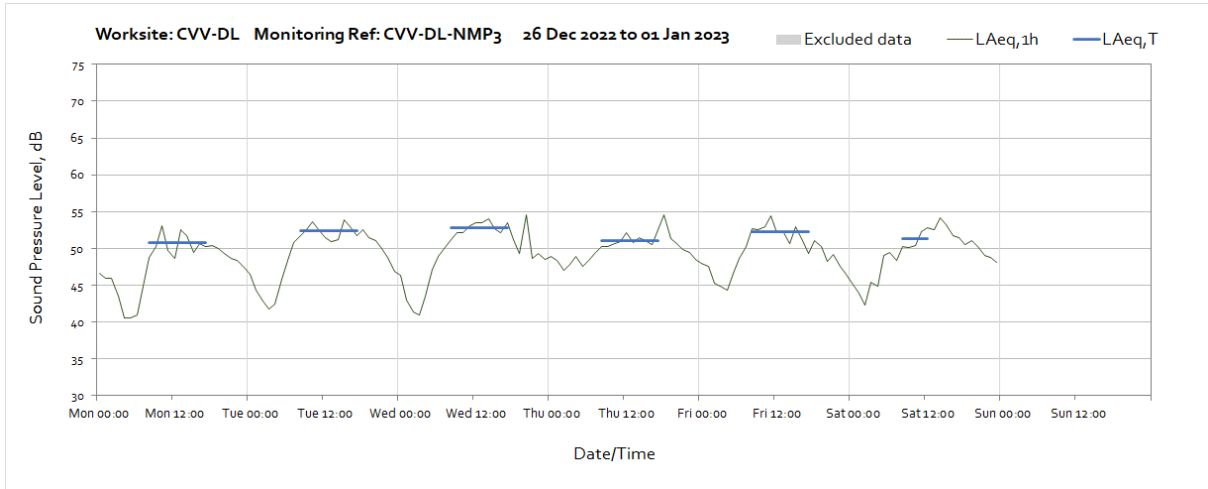
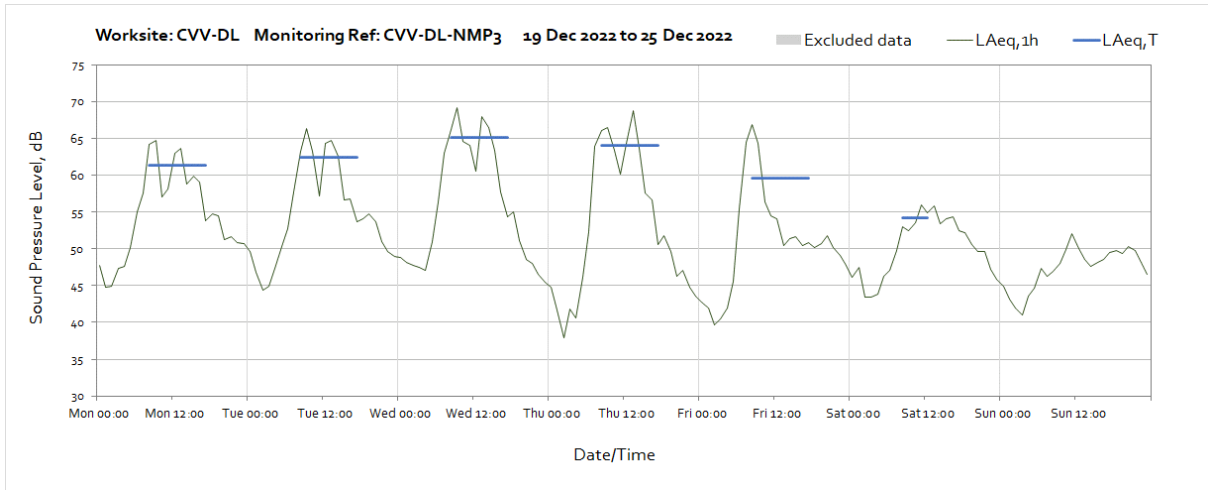
Monitoring Ref: CVV-DL-NMP3



Note: Missing data at 01:00 on Sunday 11th December was due to a data extraction issue.

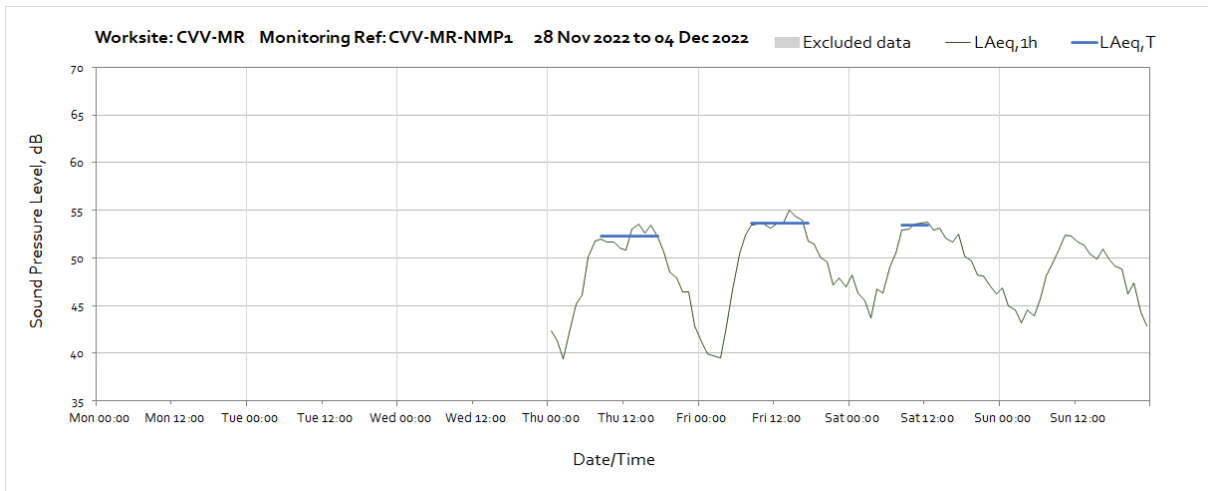


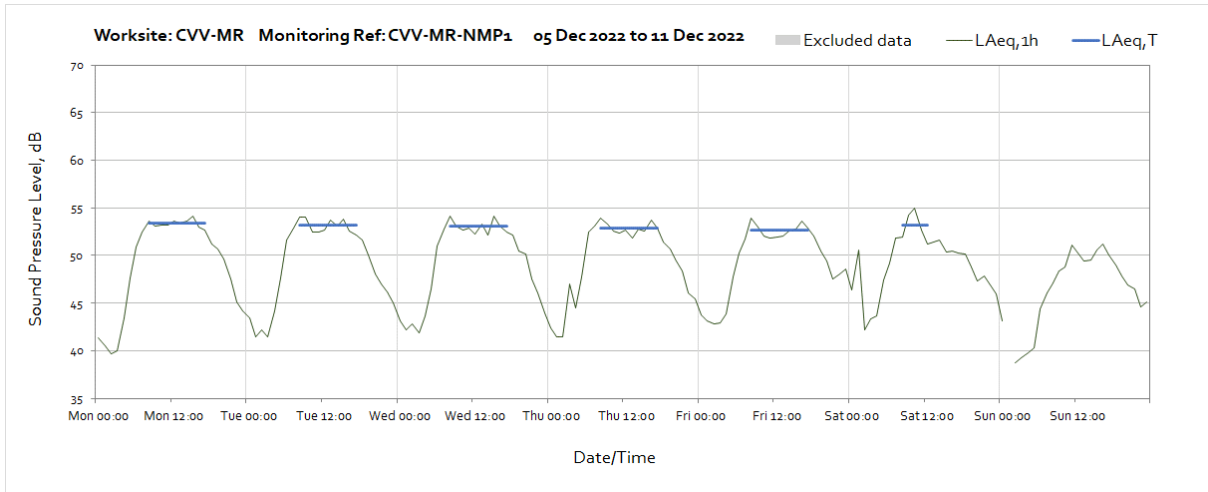
OFFICIAL



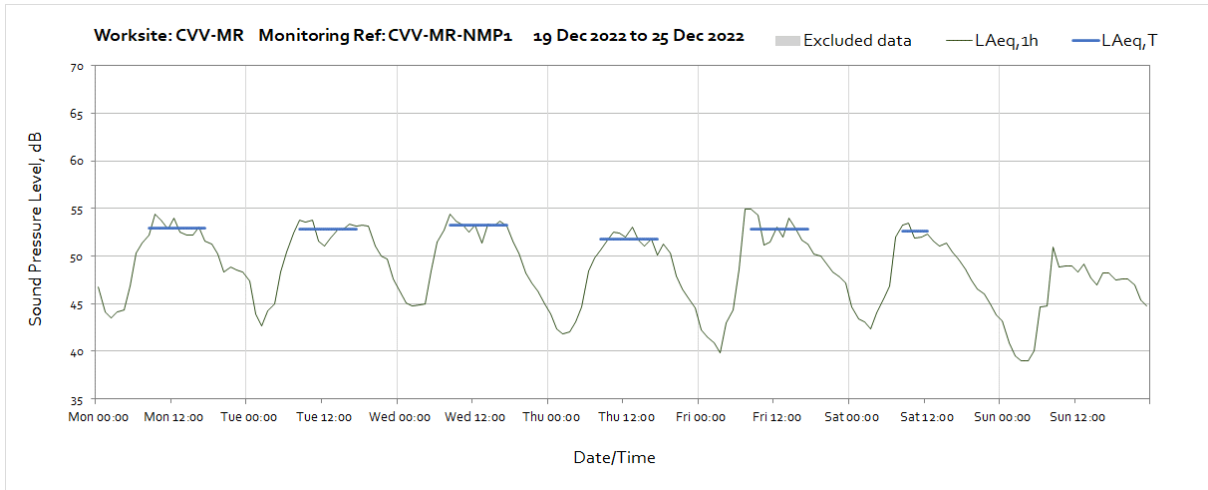
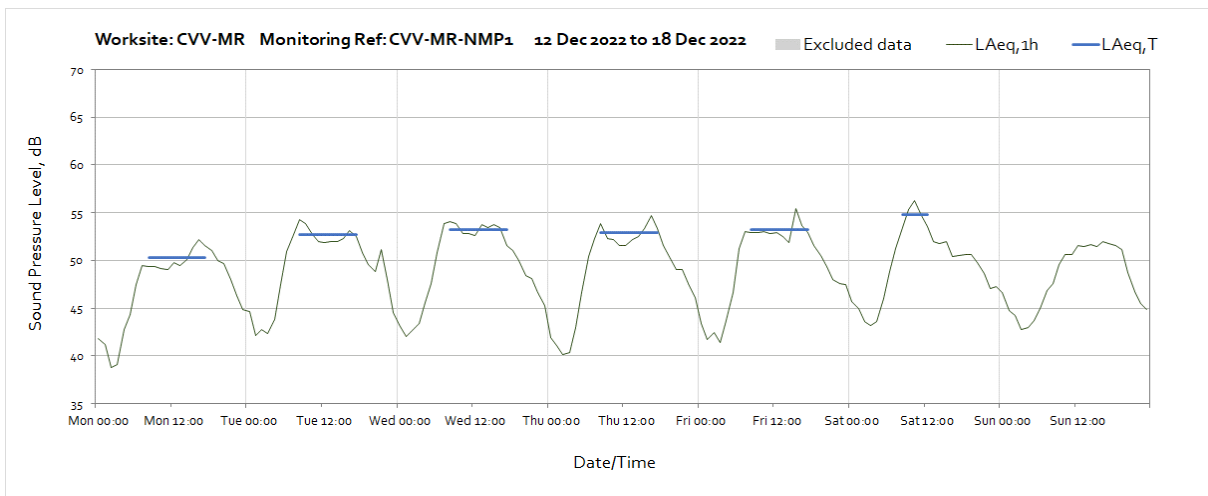
Worksite: Colne Valley Viaduct Moorhall Road (CVV-MR)

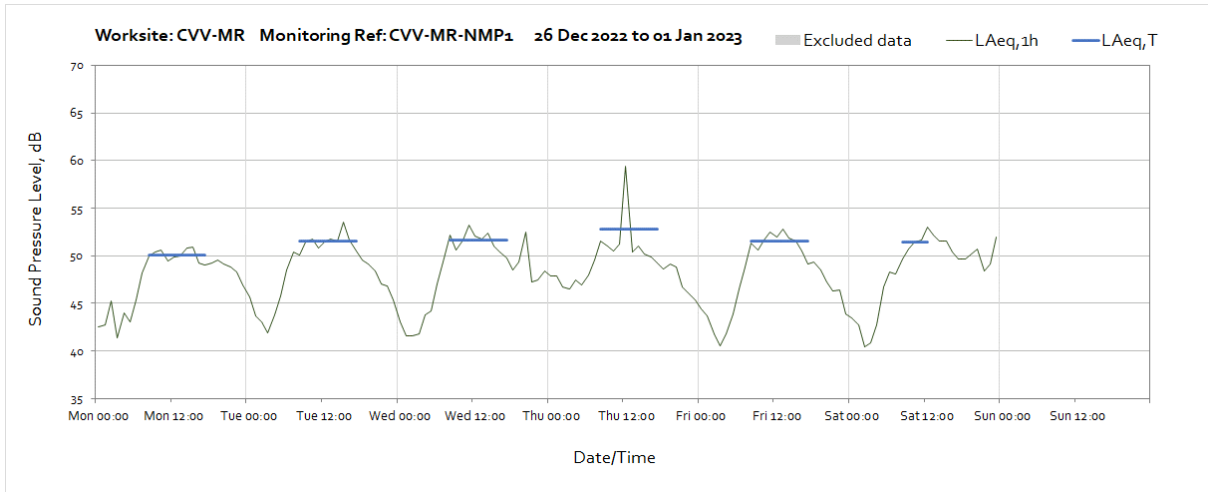
Monitoring Ref: CVV-MR-NMP1





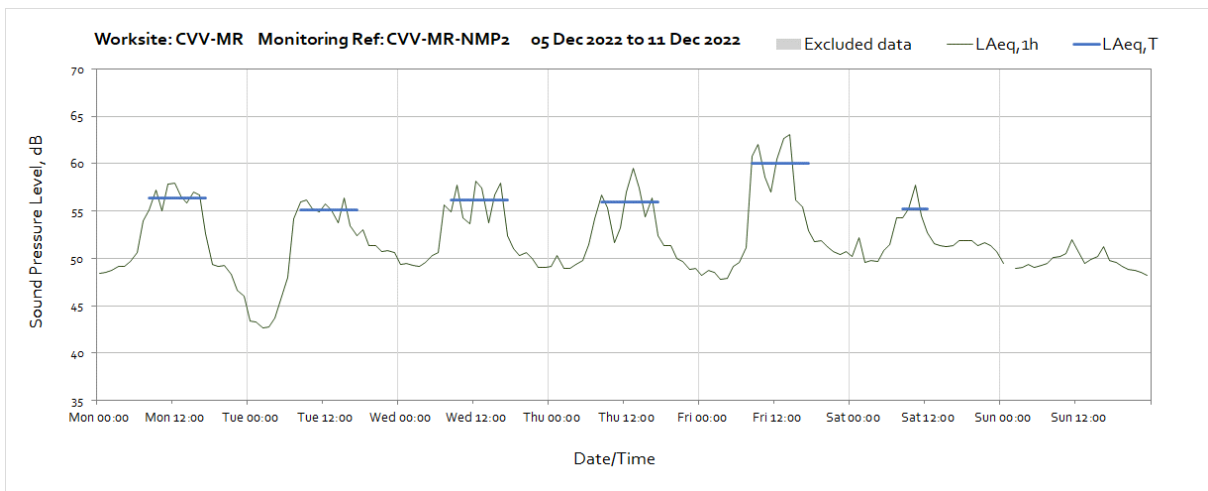
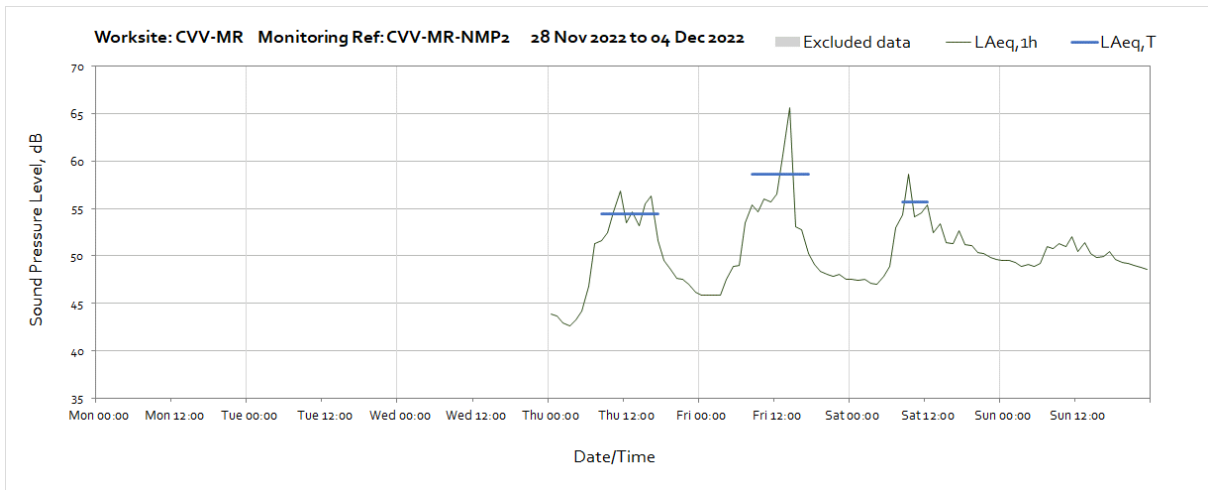
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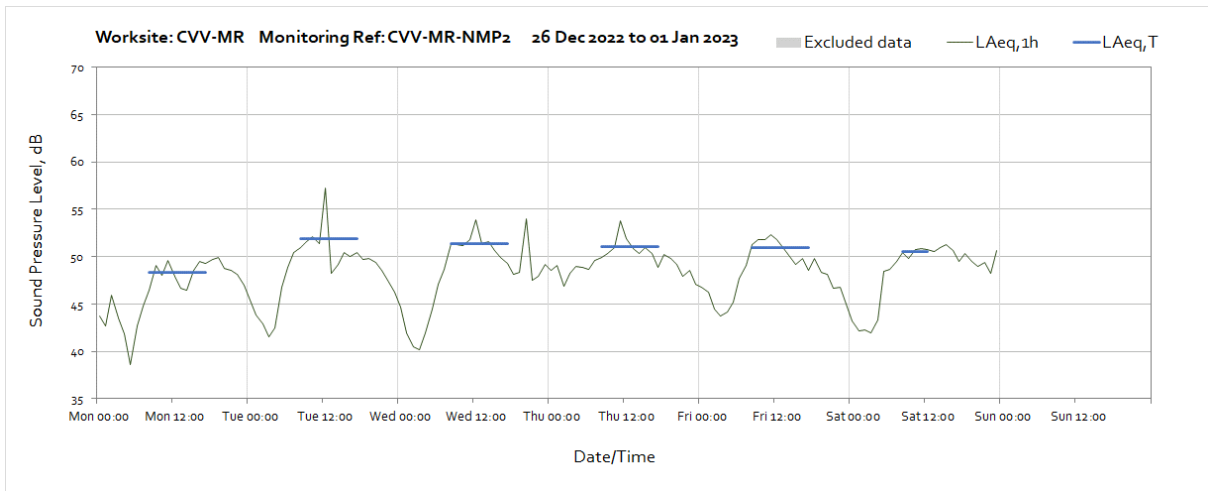
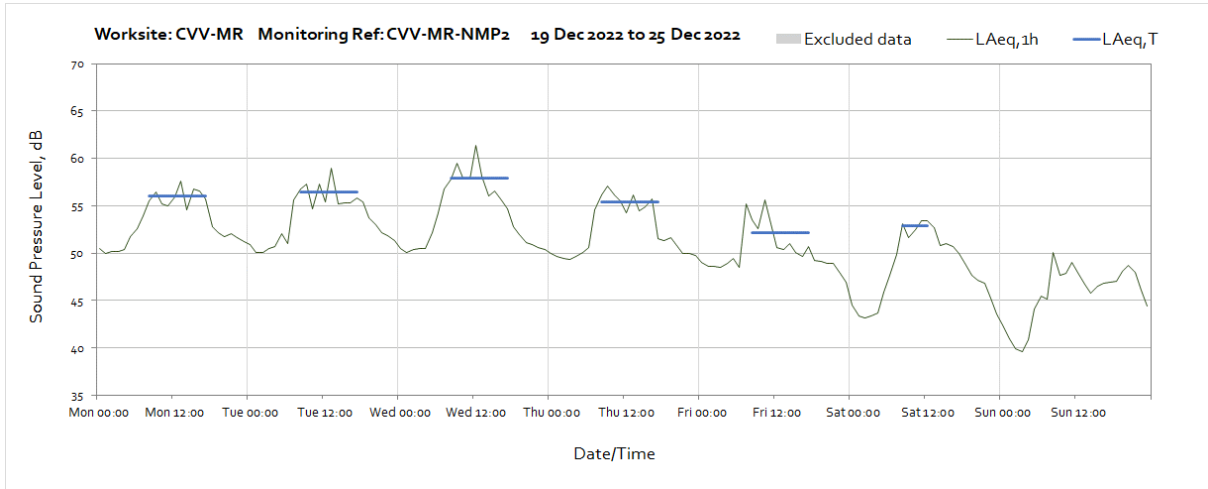
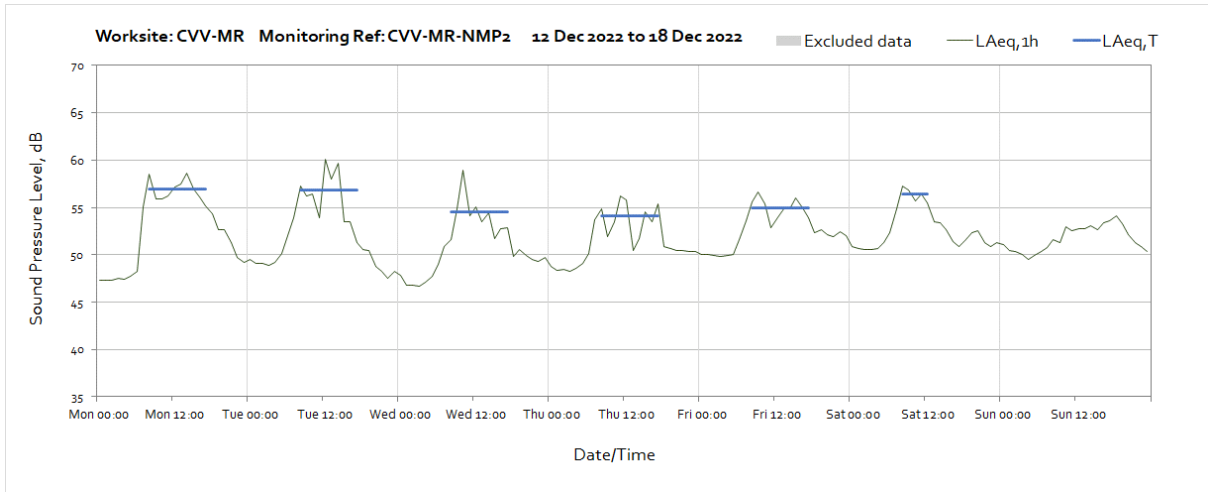


Worksite: Colne Valley Viaduct Moorhall Road (CVV-MR)

Monitoring Ref: CVV-MR-NMP2

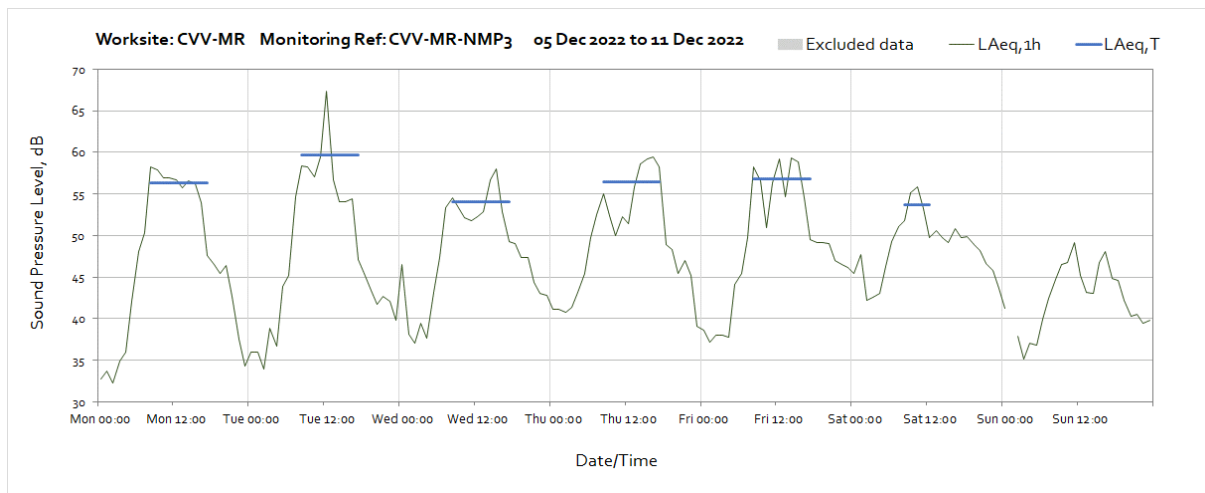
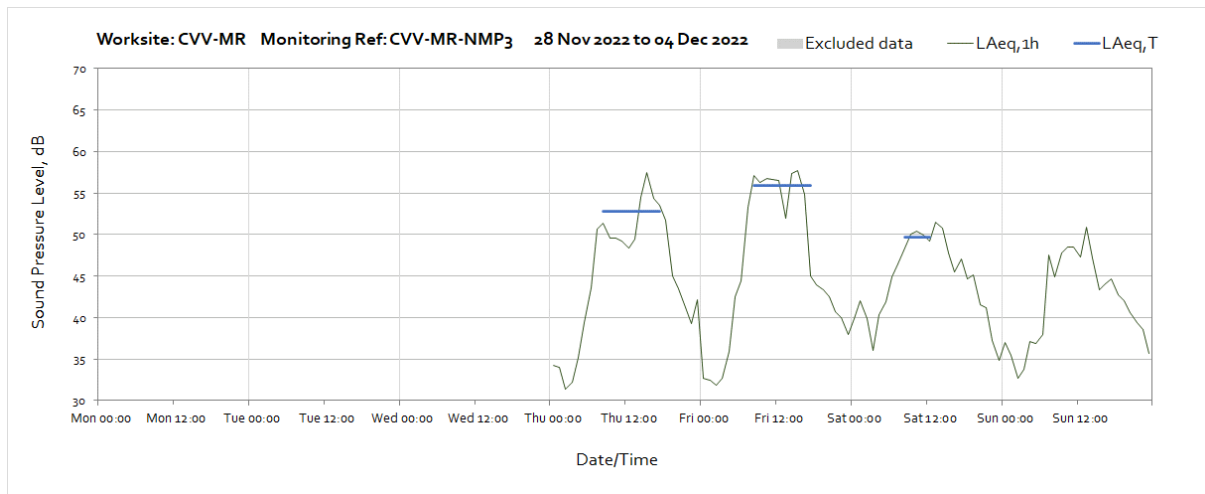


Note: Missing data at 01:00 on Sunday 11th December was due to a data extraction issue.

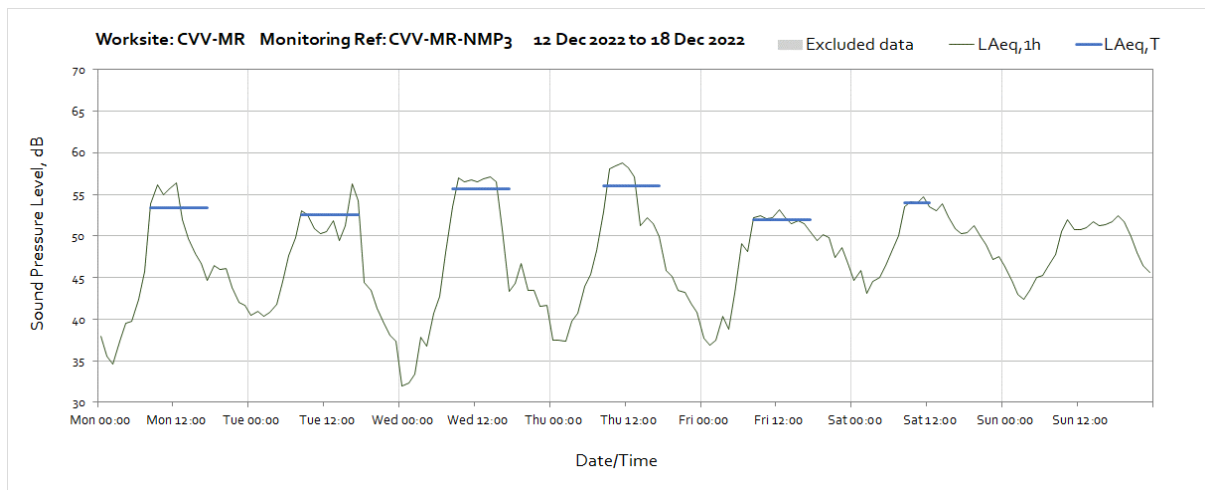


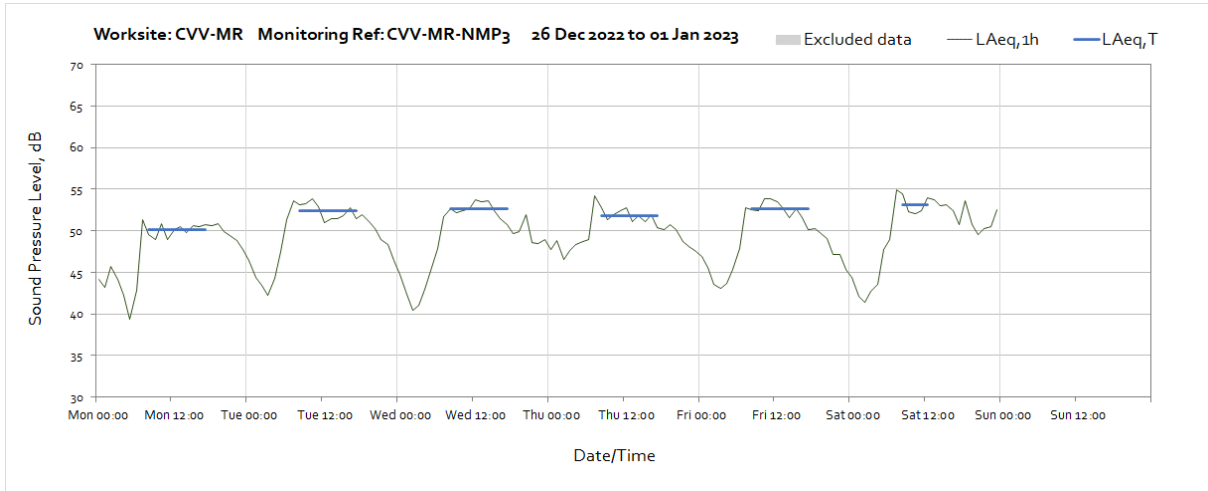
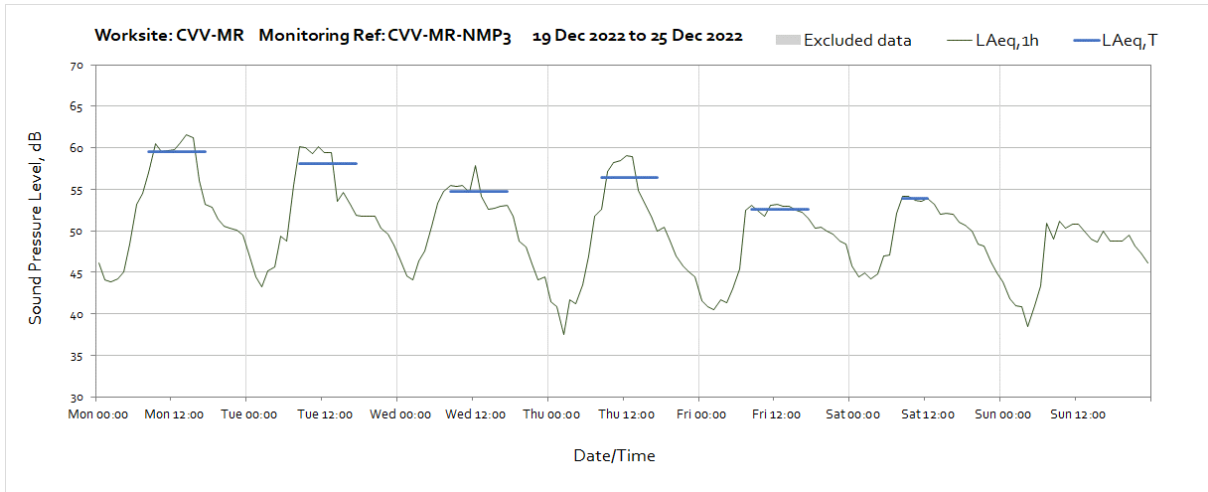
Worksite: Colne Valley Viaduct Moorhall Road (CVV-MR)

Monitoring Ref: CVV-MR-NMP3

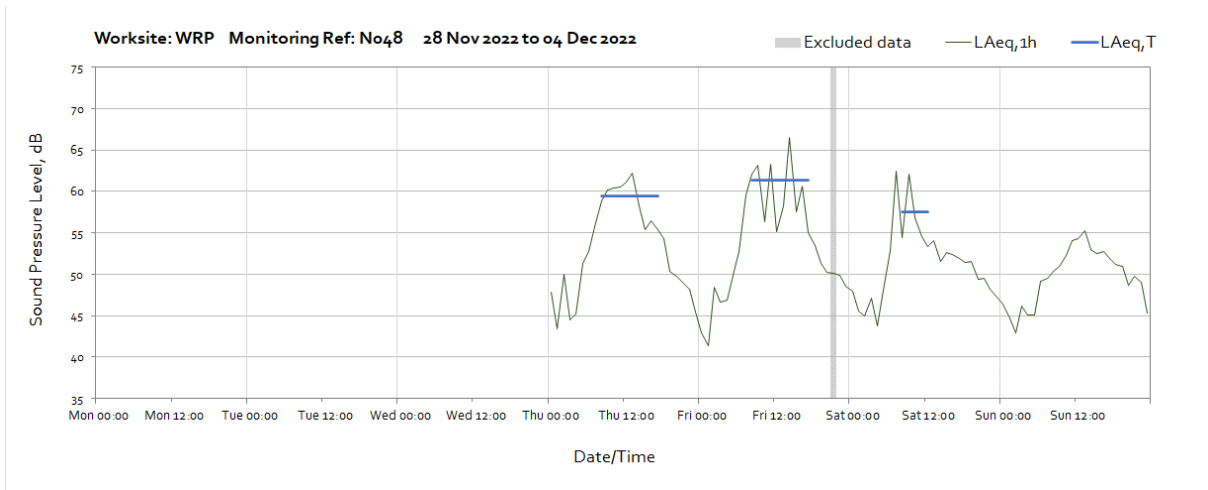


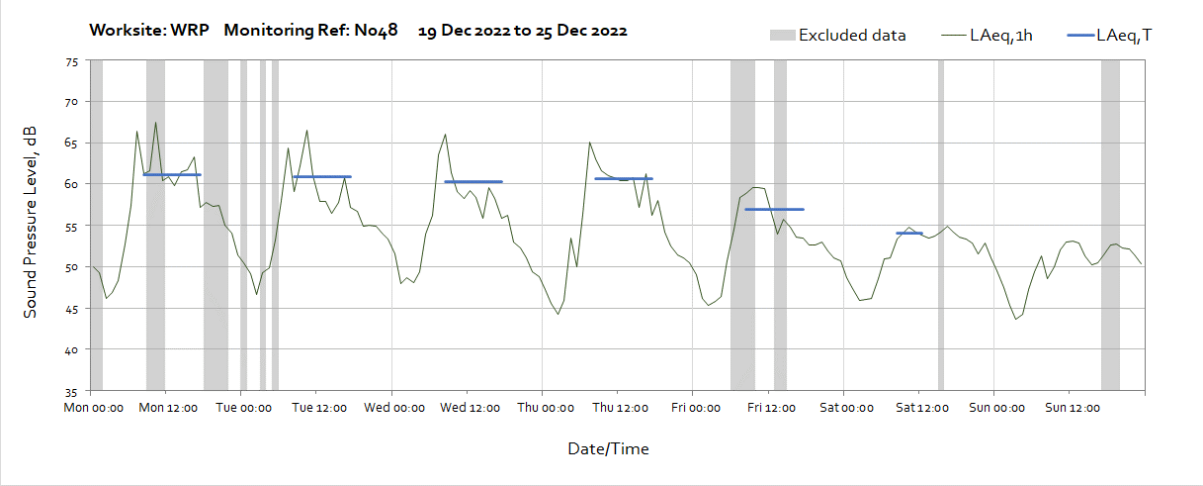
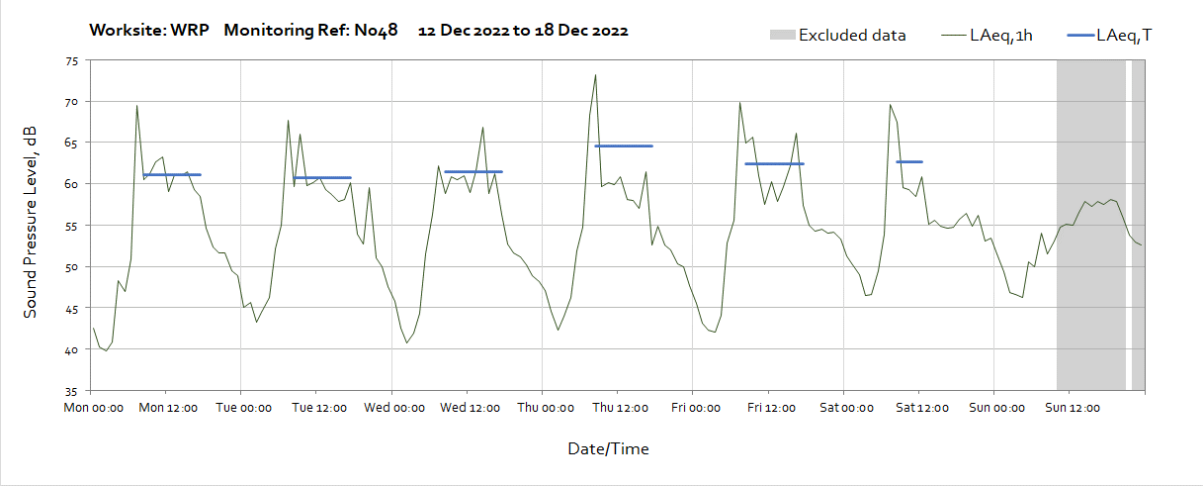
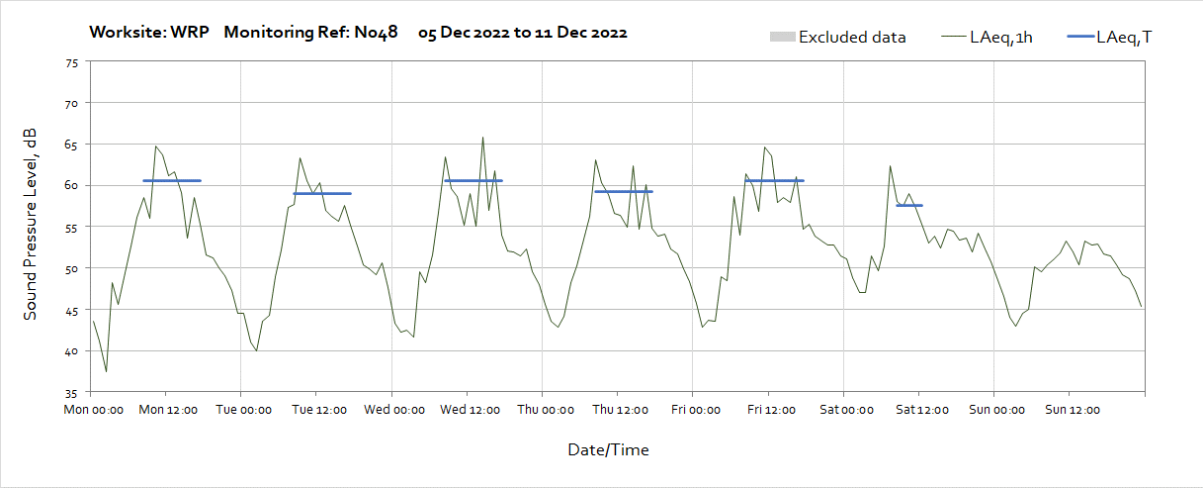
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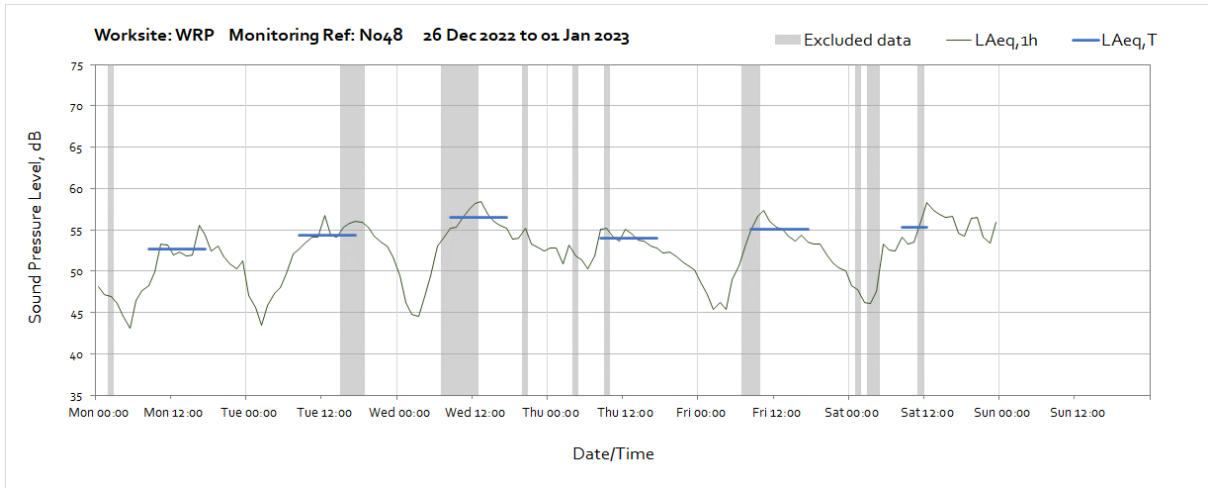




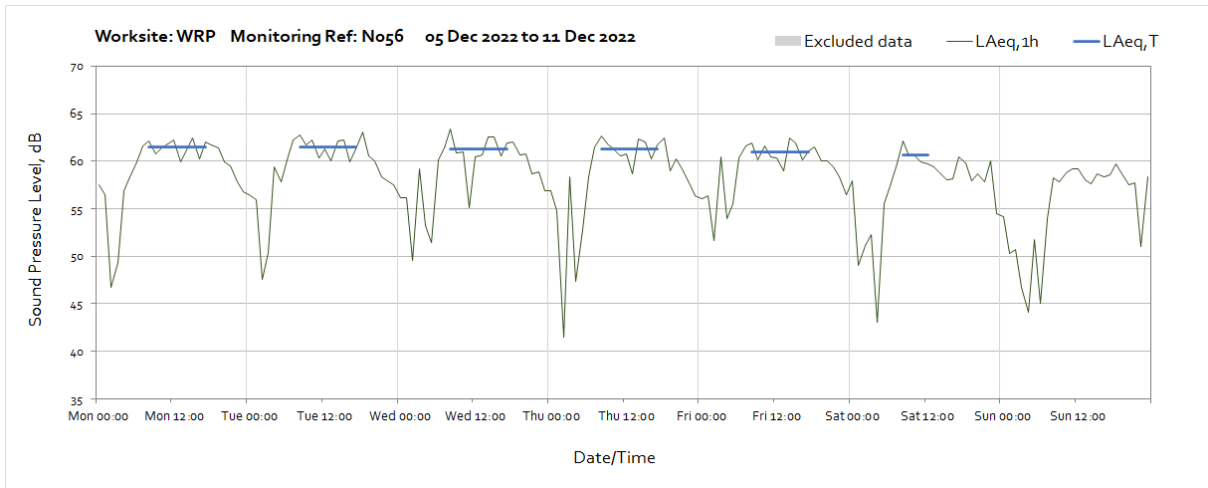
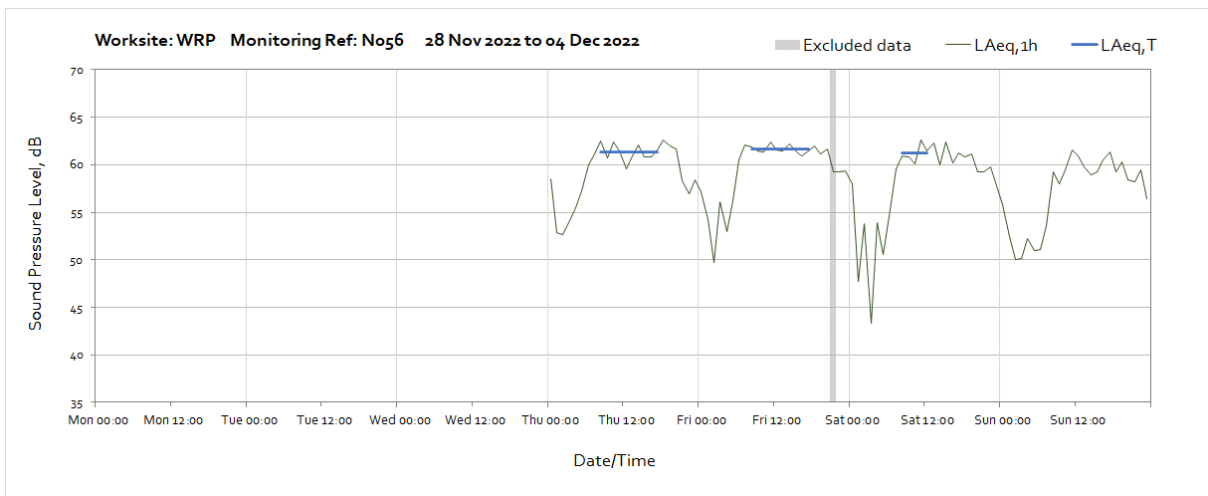
Worksite: West Ruislip Portal (WRP) - Monitoring Ref: N048

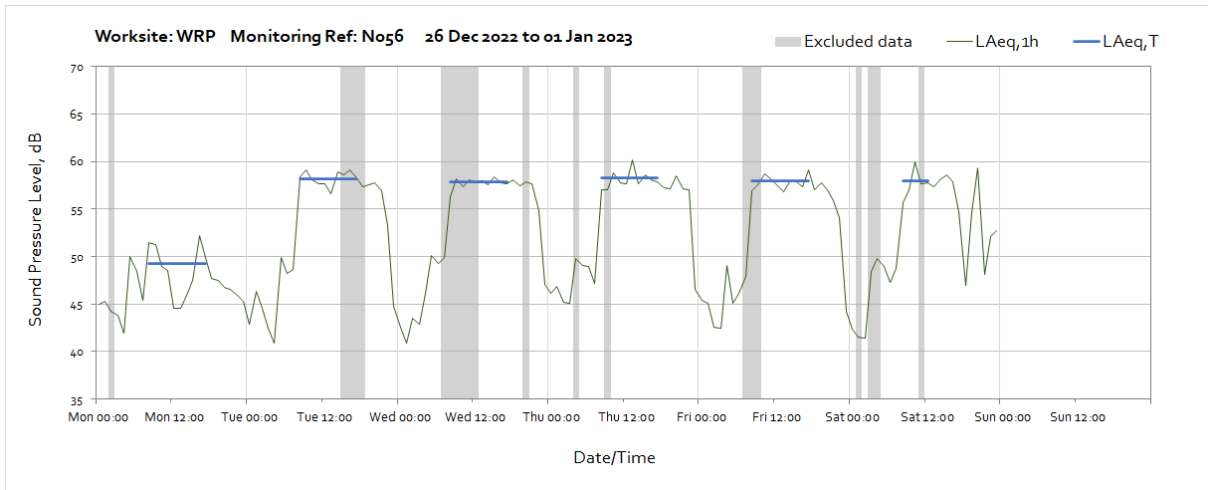
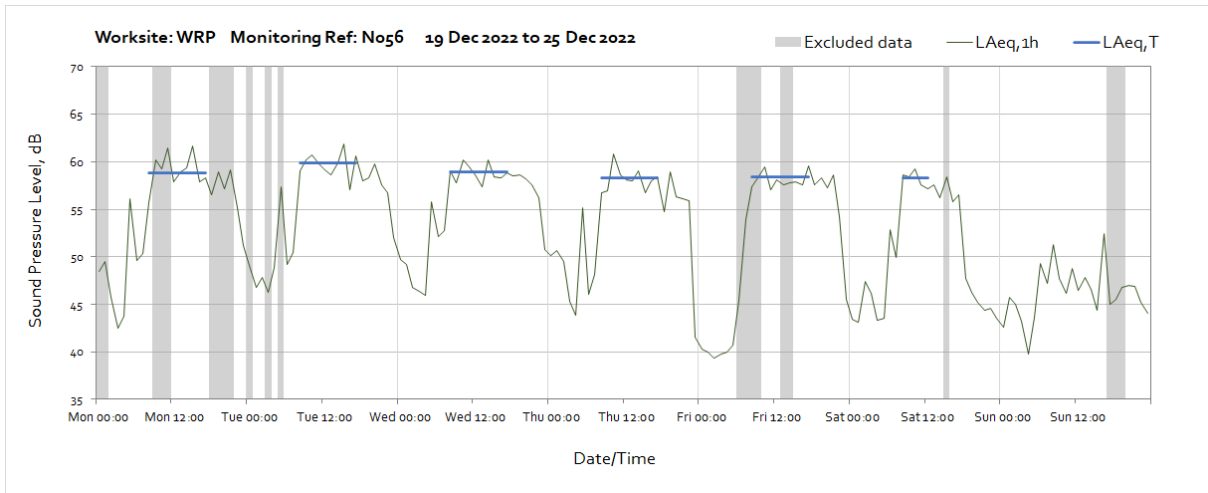
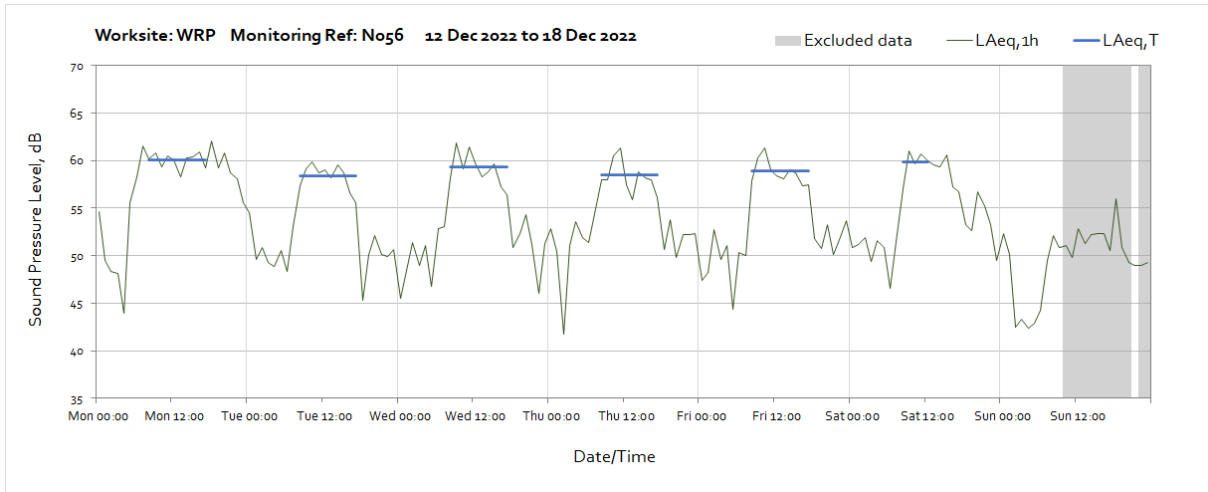




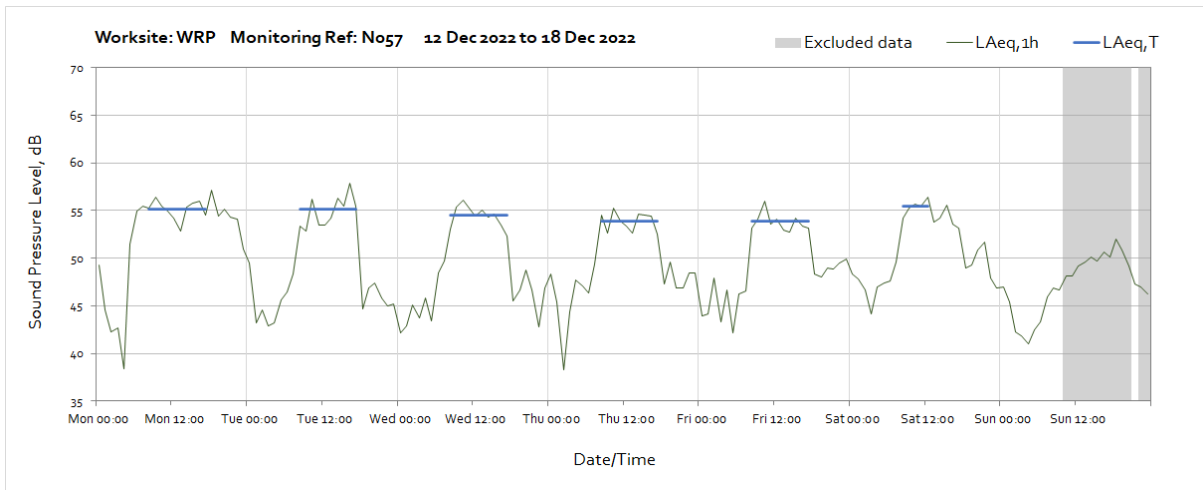
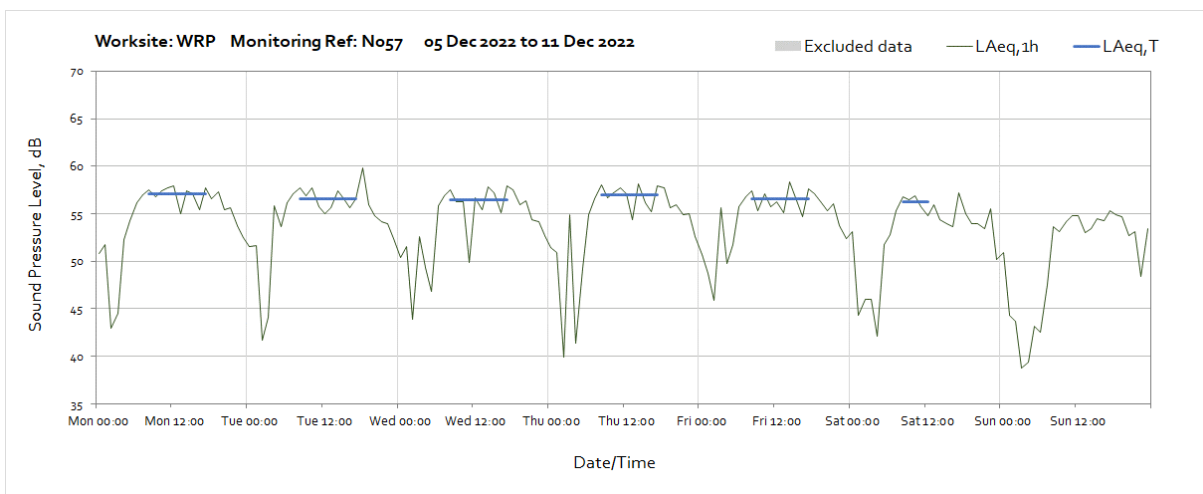
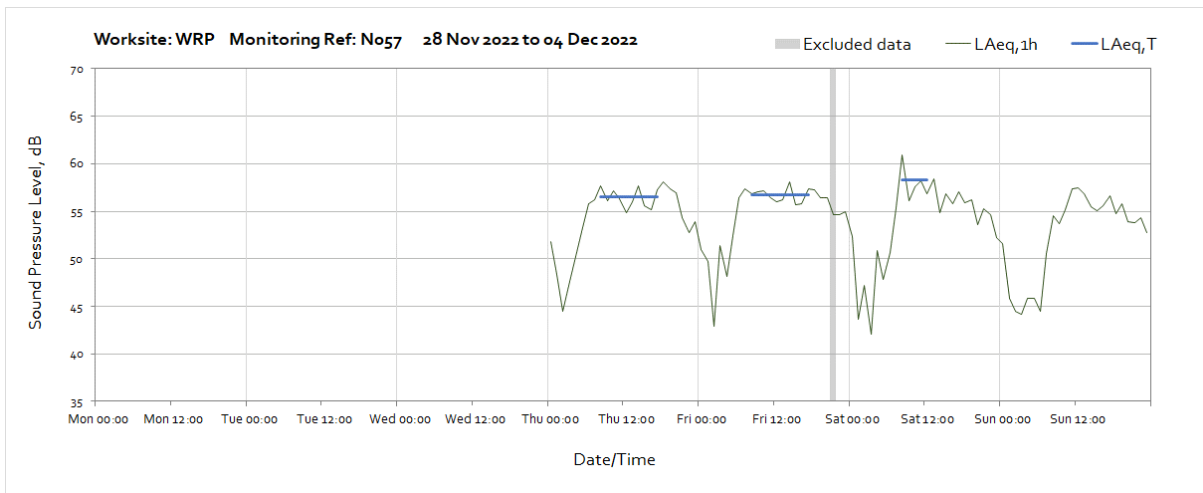


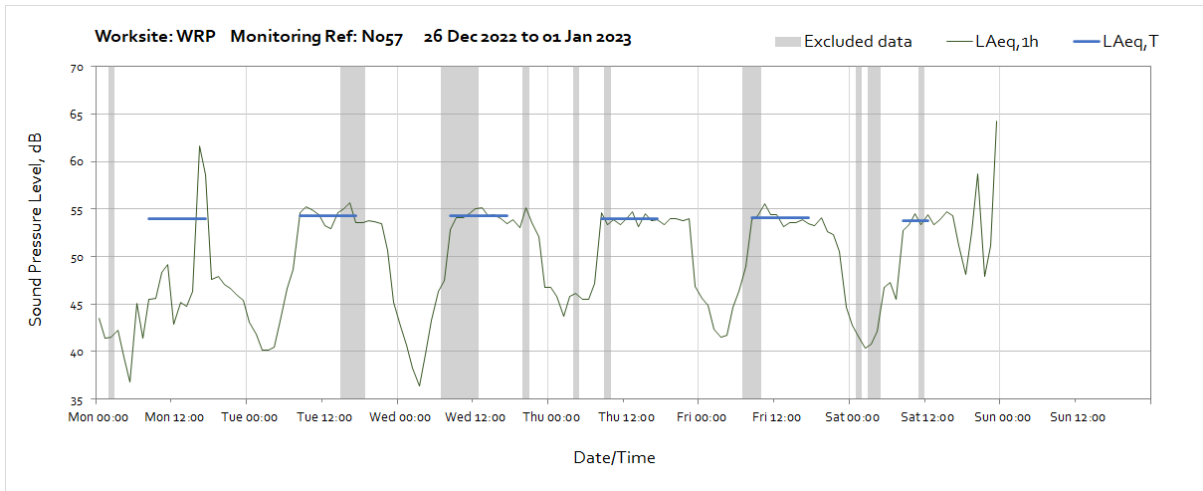
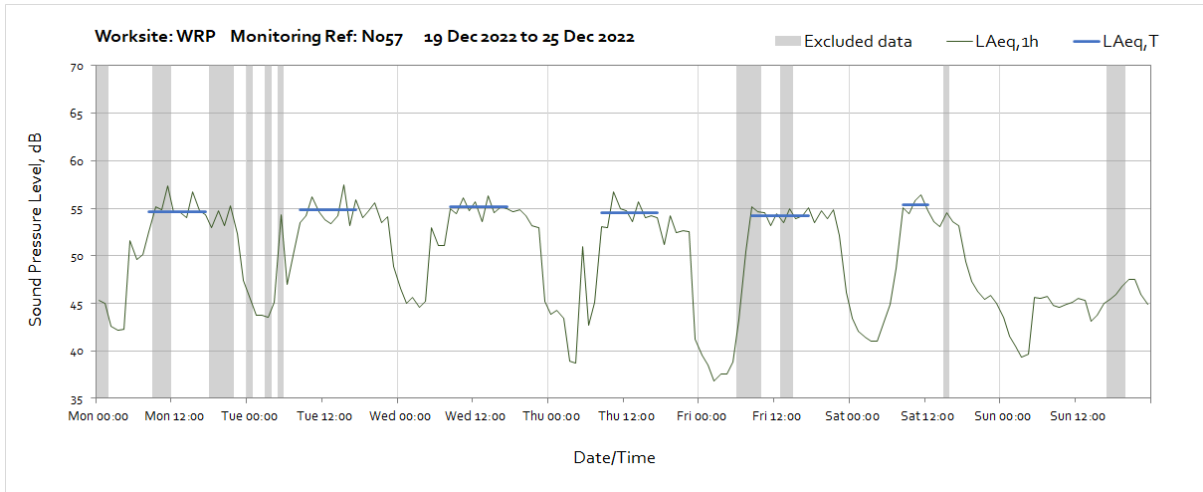
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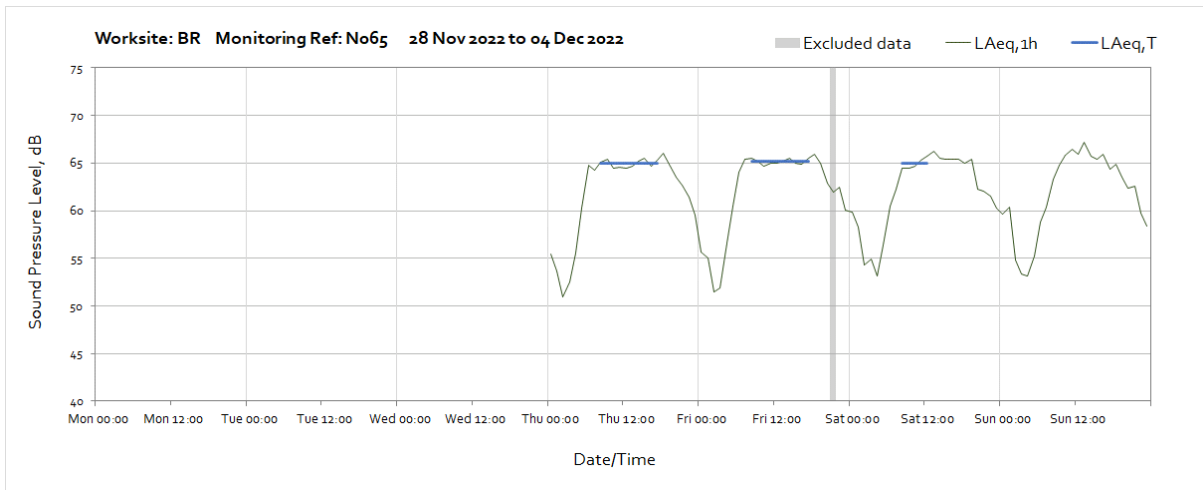
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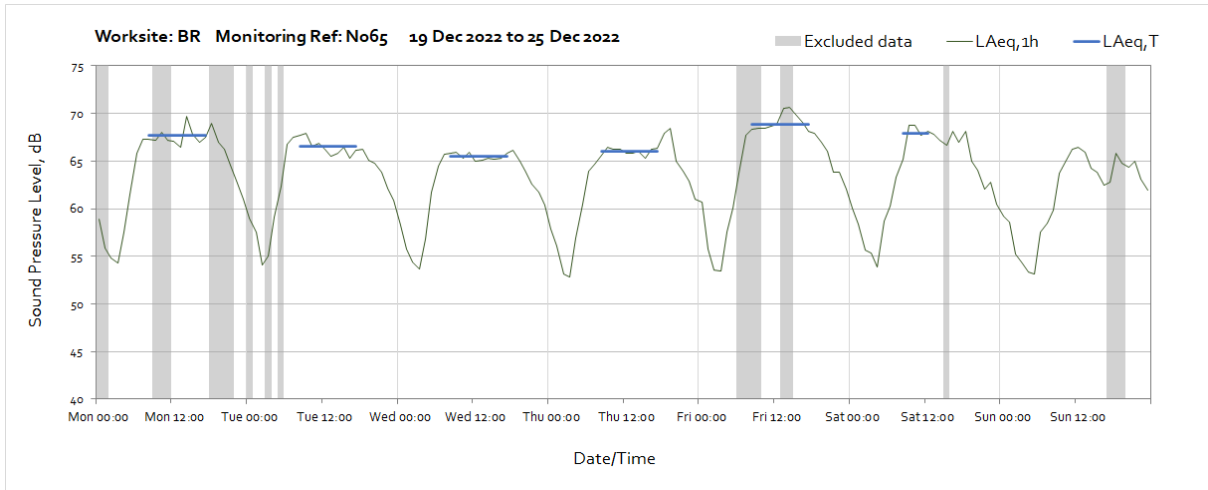
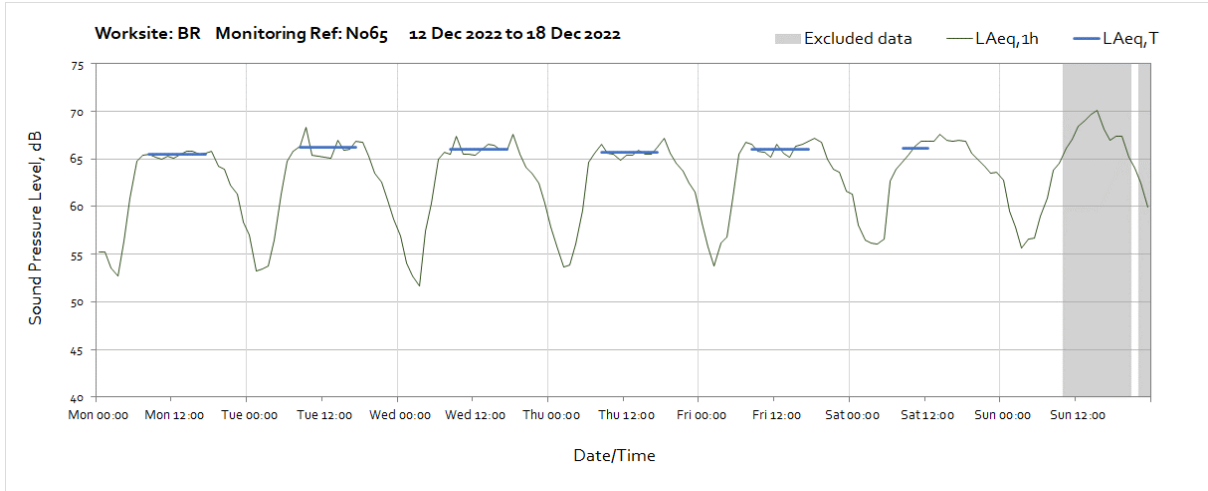
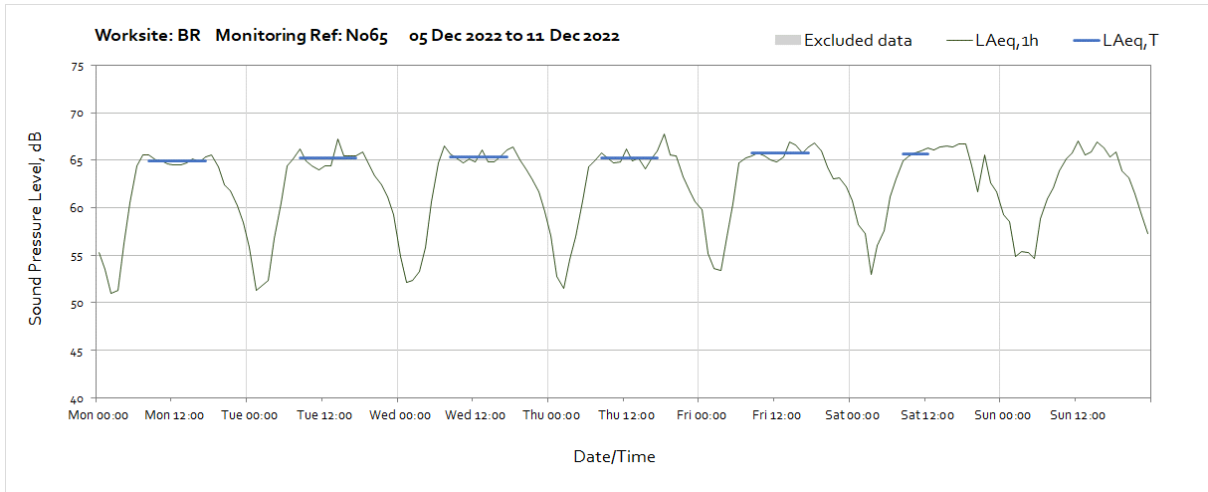


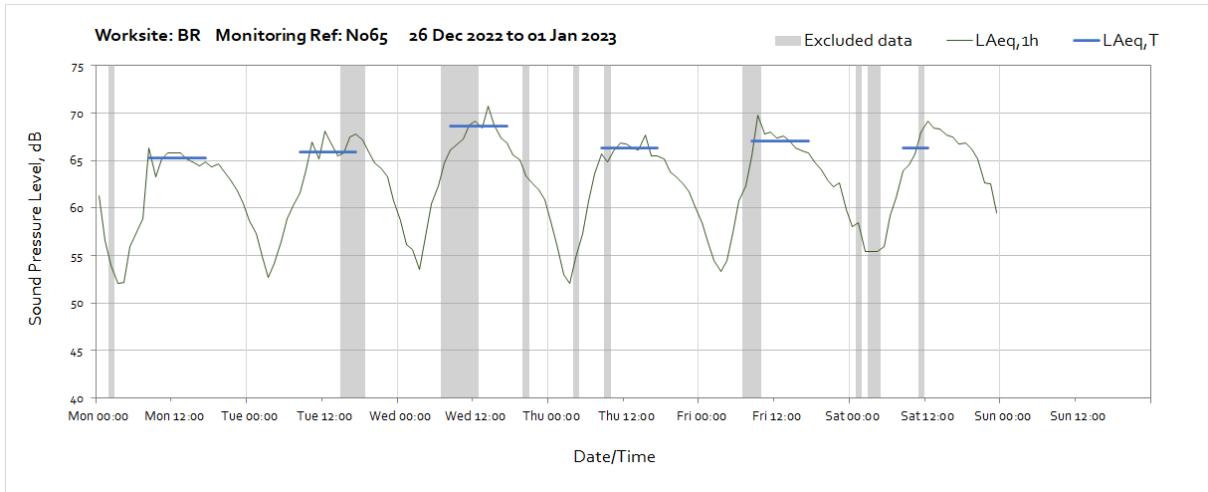


Note: High noise levels measured at 23:00 on Saturday 31st December were due to New Year Night celebration.

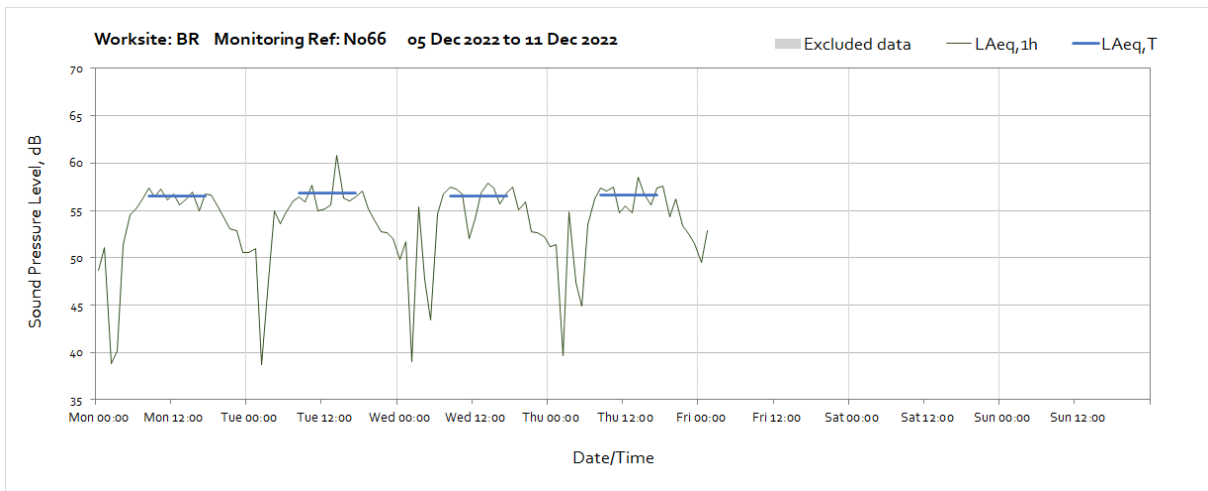
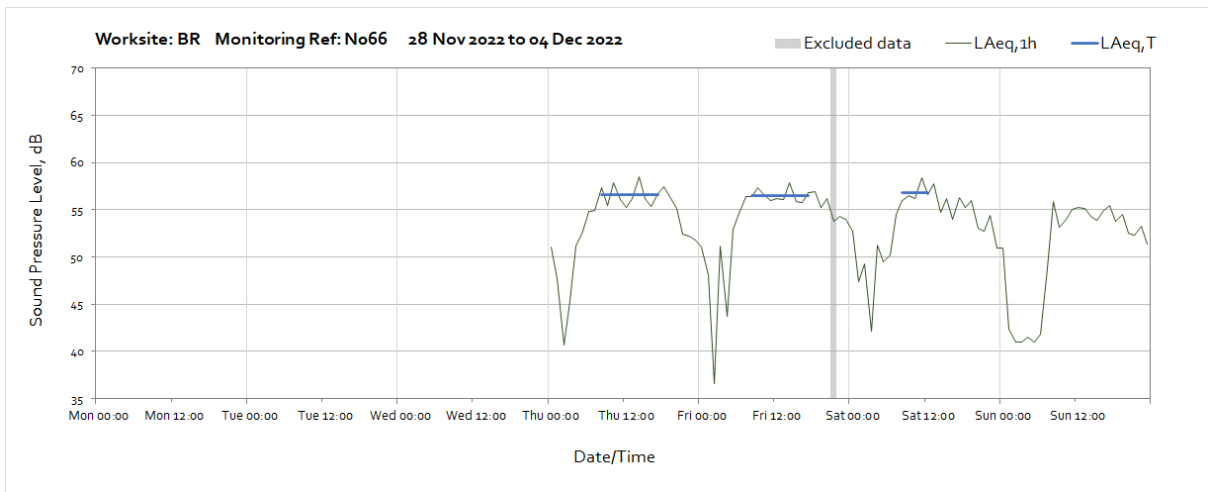
Worksite: Breakspear Road (BR) – Monitoring Ref: N065



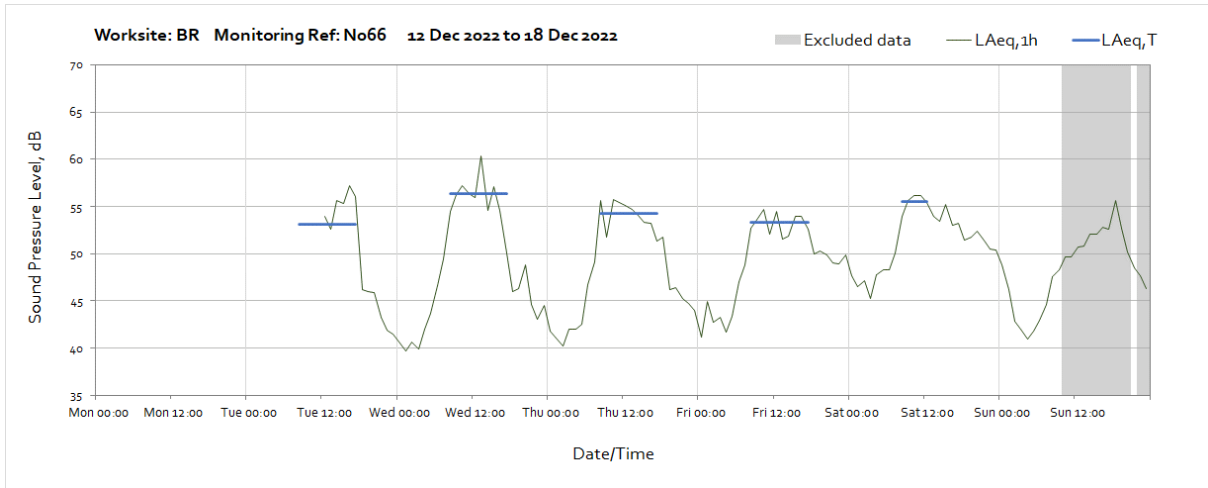




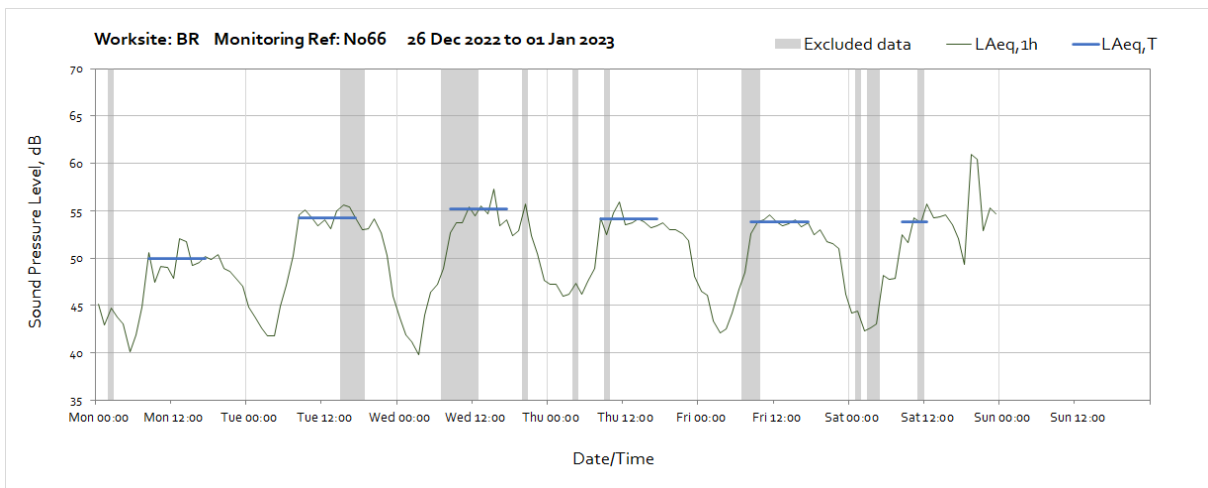
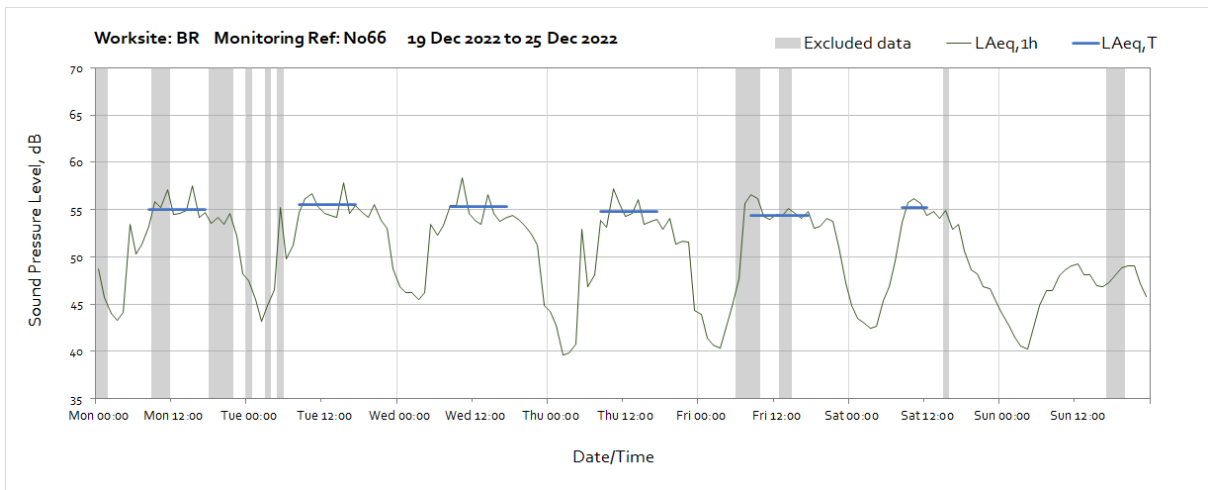
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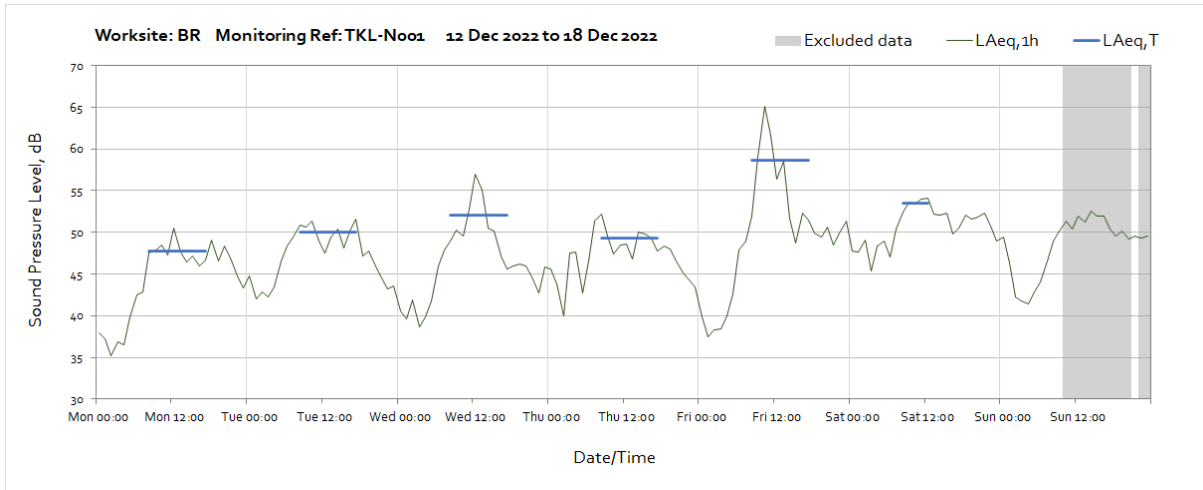
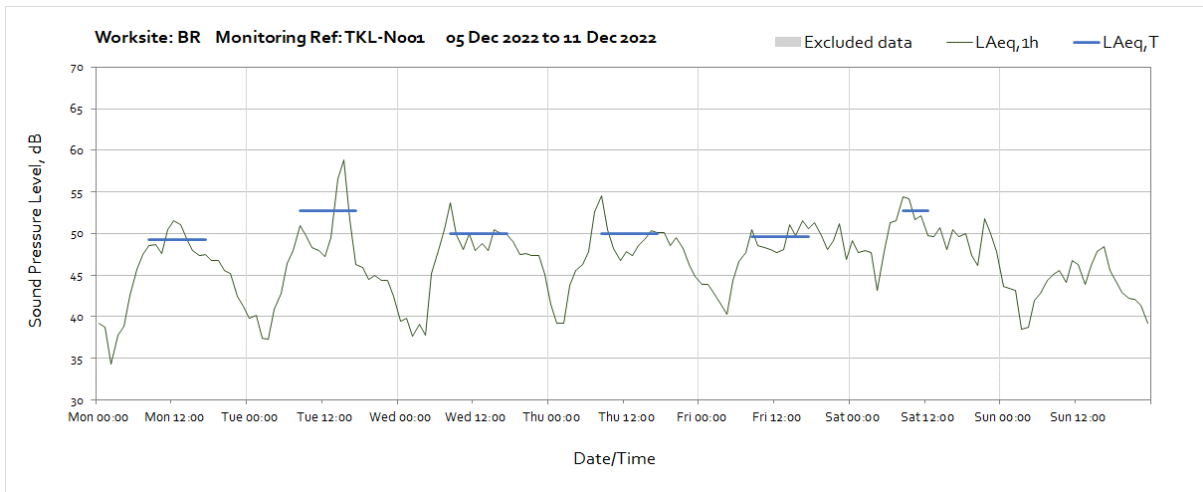
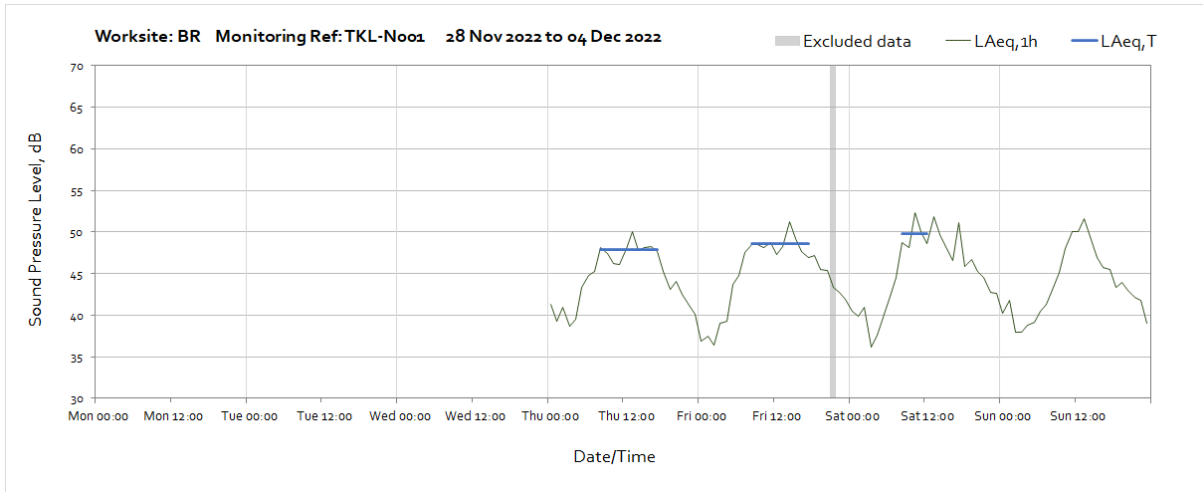
Note: Missing data between 02:00 on Friday 9th December and 11:00 on Tuesday 13th December was due to loss of battery power at the monitoring station.

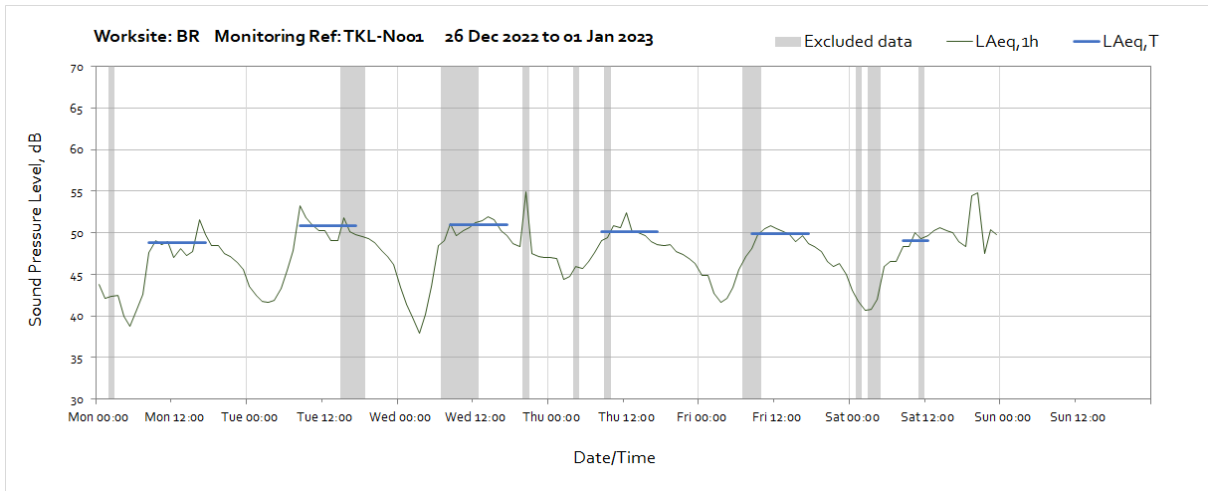
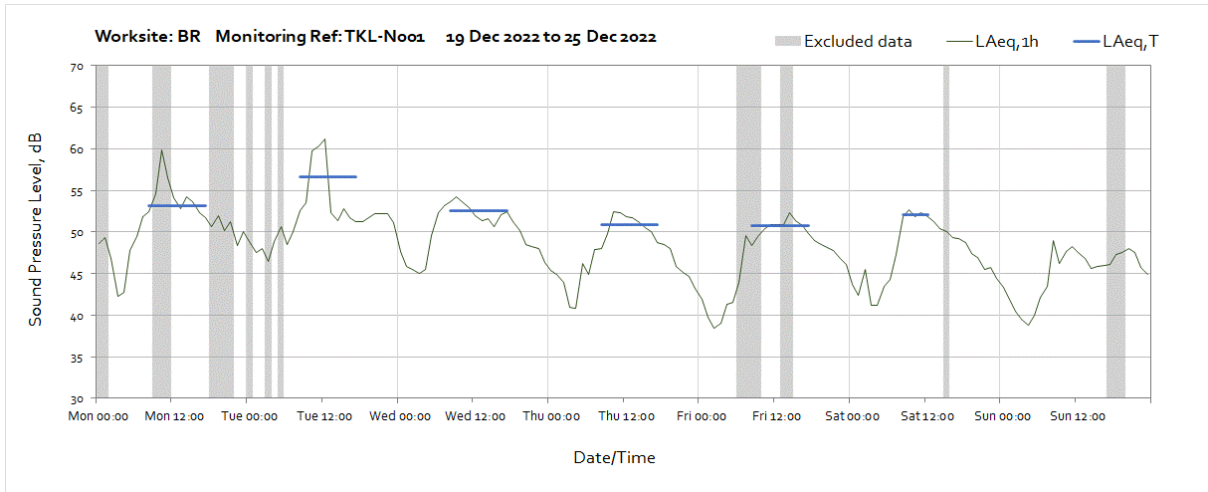


Note: Missing data between 02:00 on Friday 9th December and 11:00 on Tuesday 13th December was due to loss of battery power at the monitoring station.

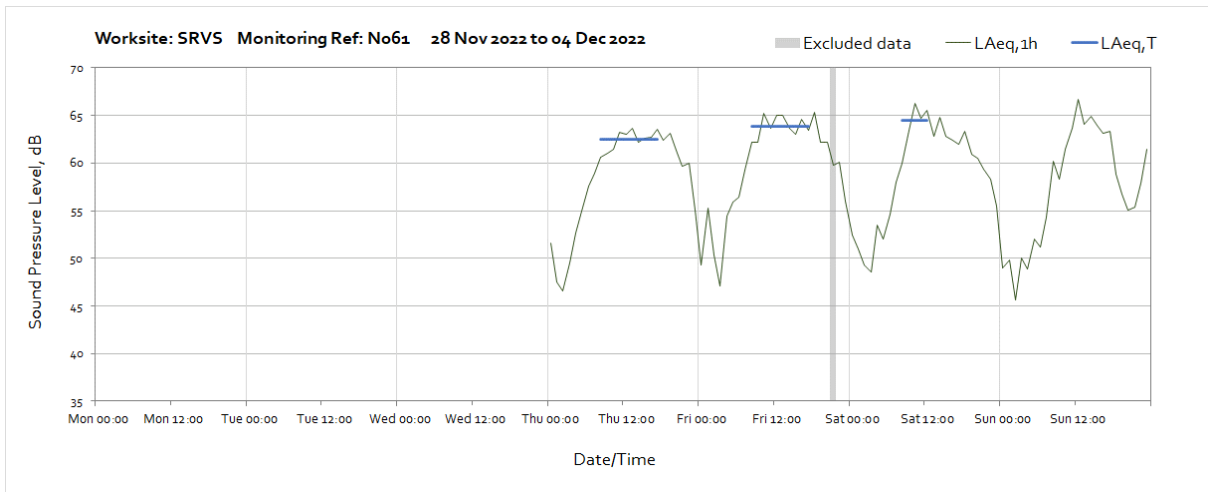


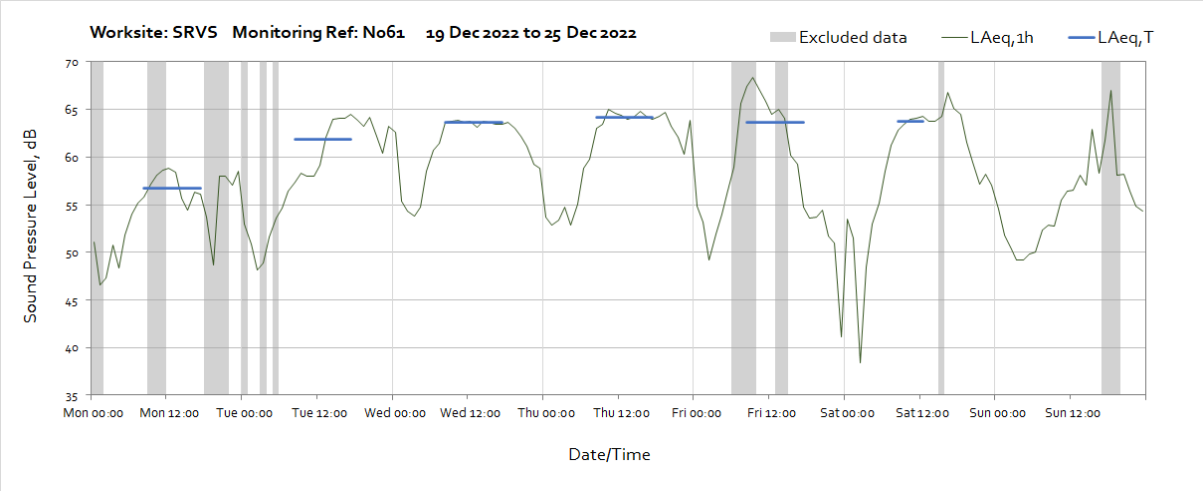
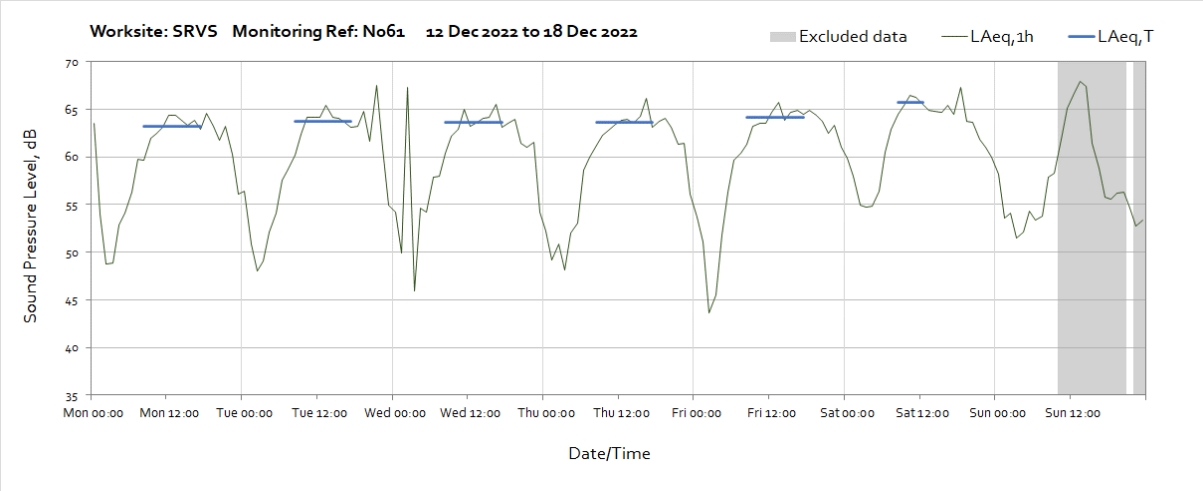
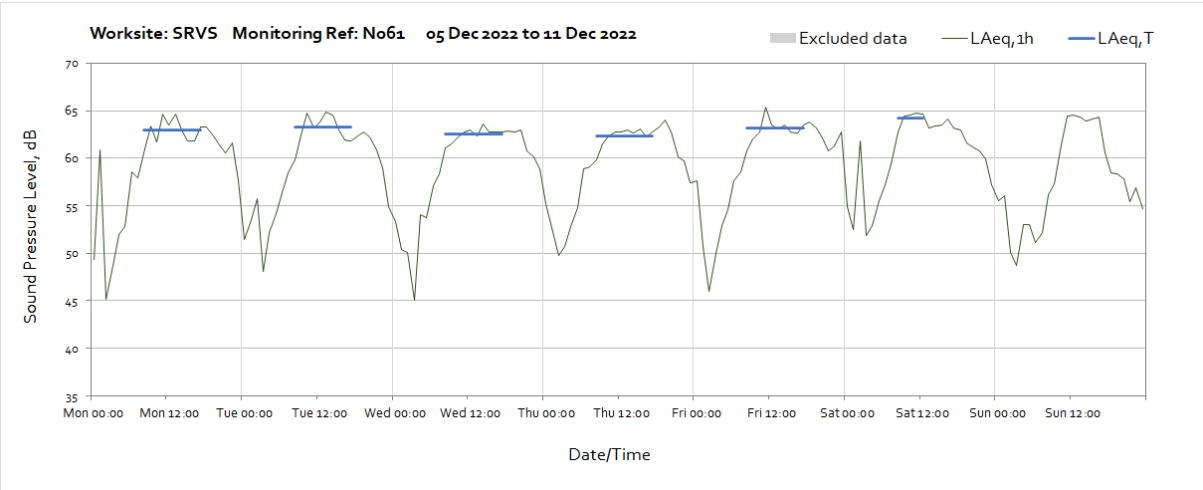
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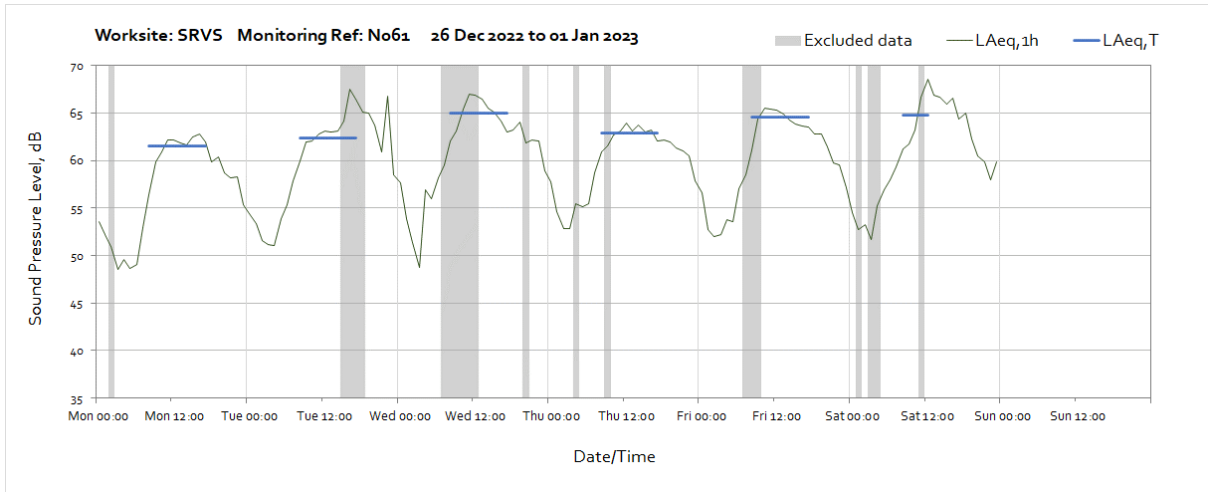




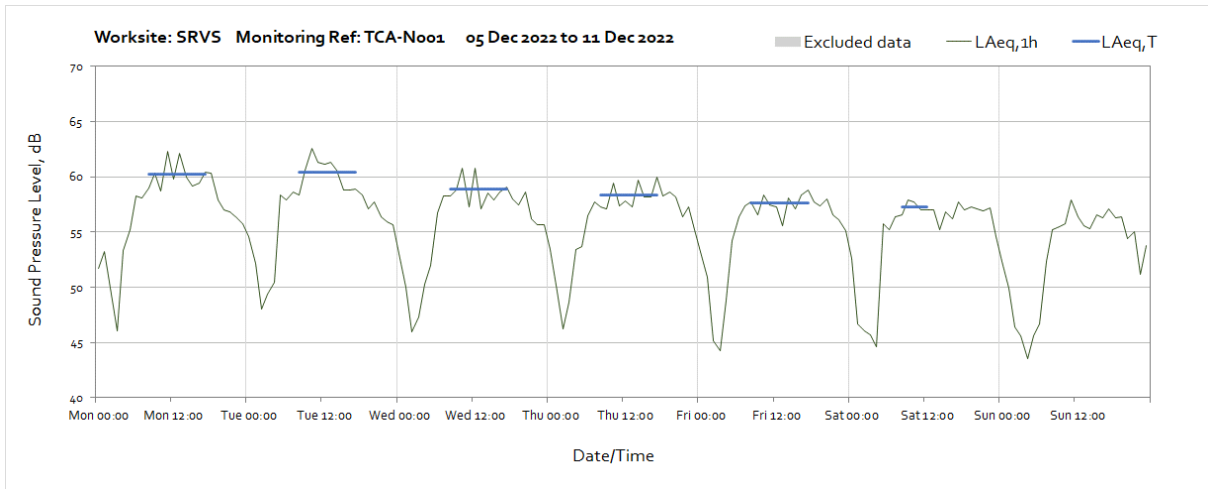
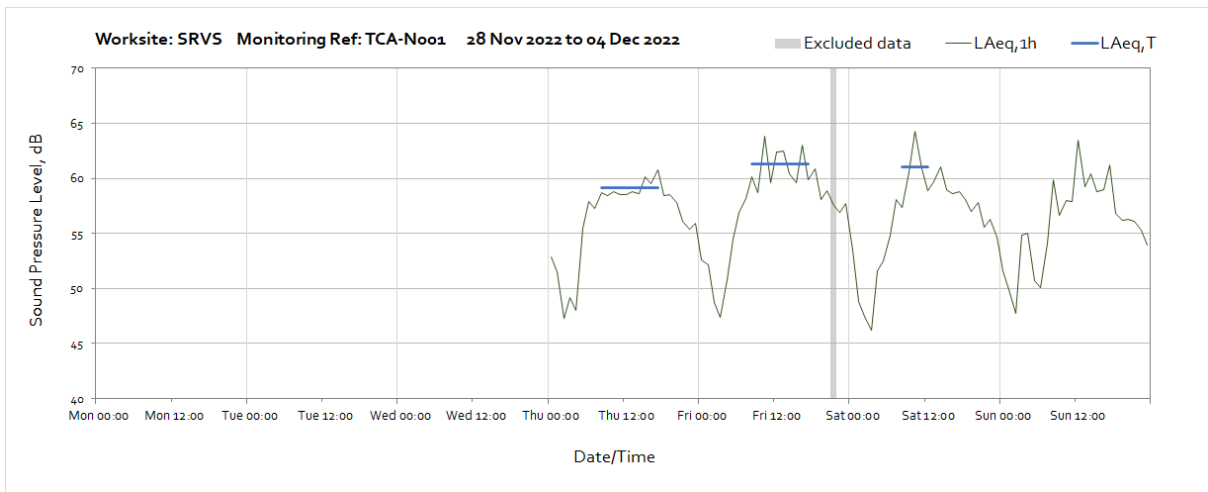
Worksite: South Ruislip Ventilation Shaft (SRVS) - Monitoring Ref: N061

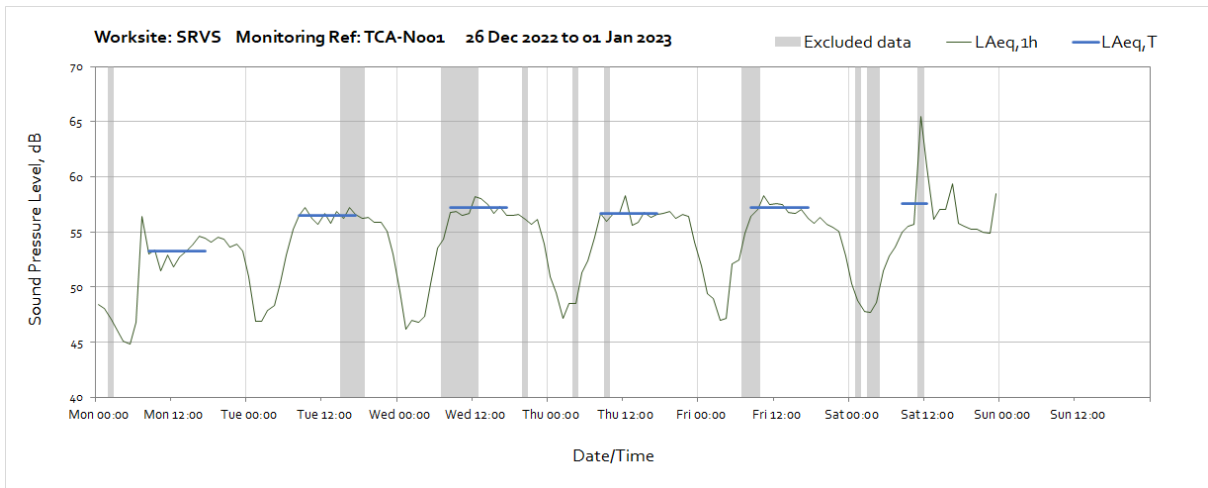
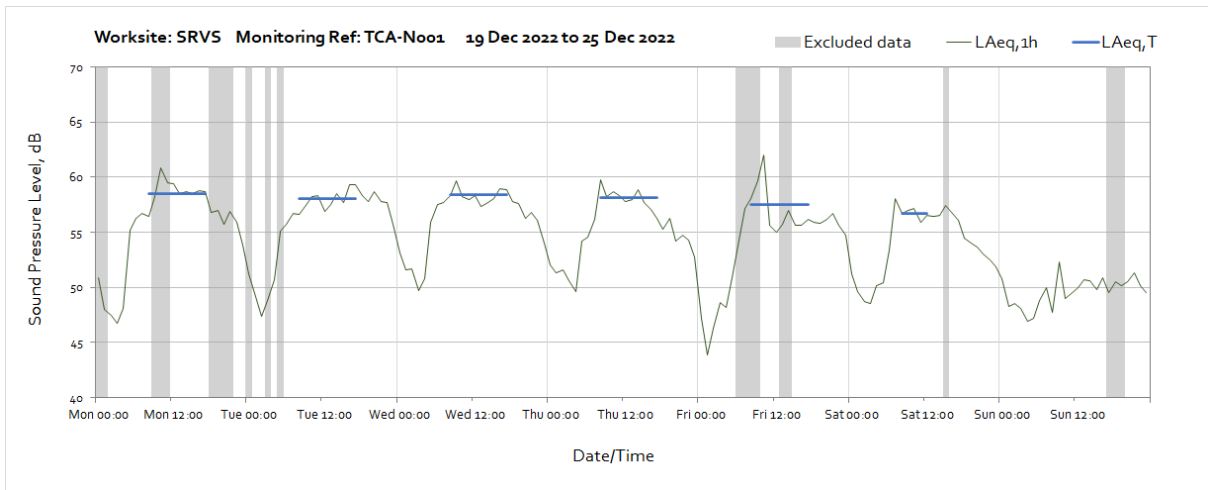
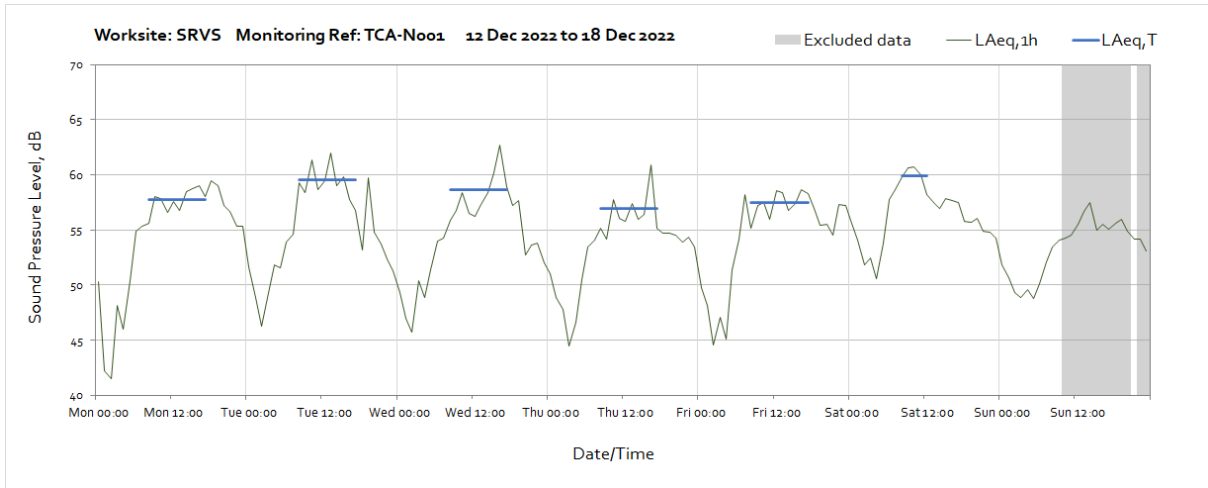




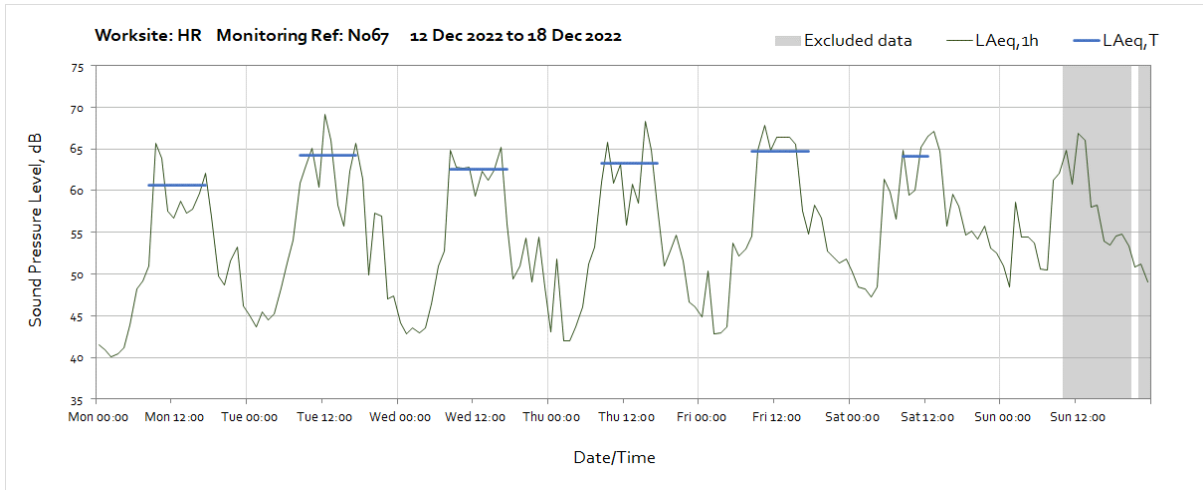
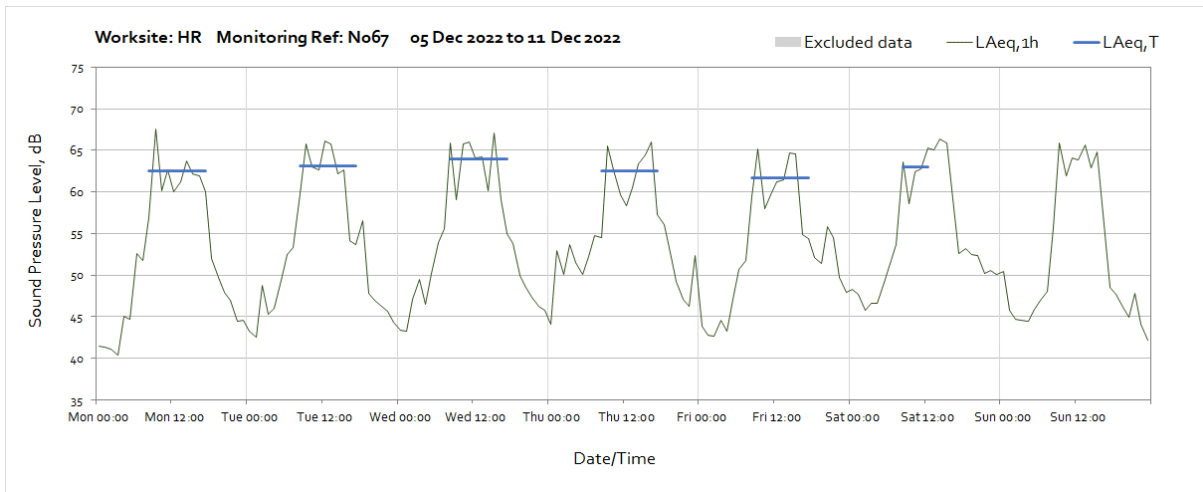
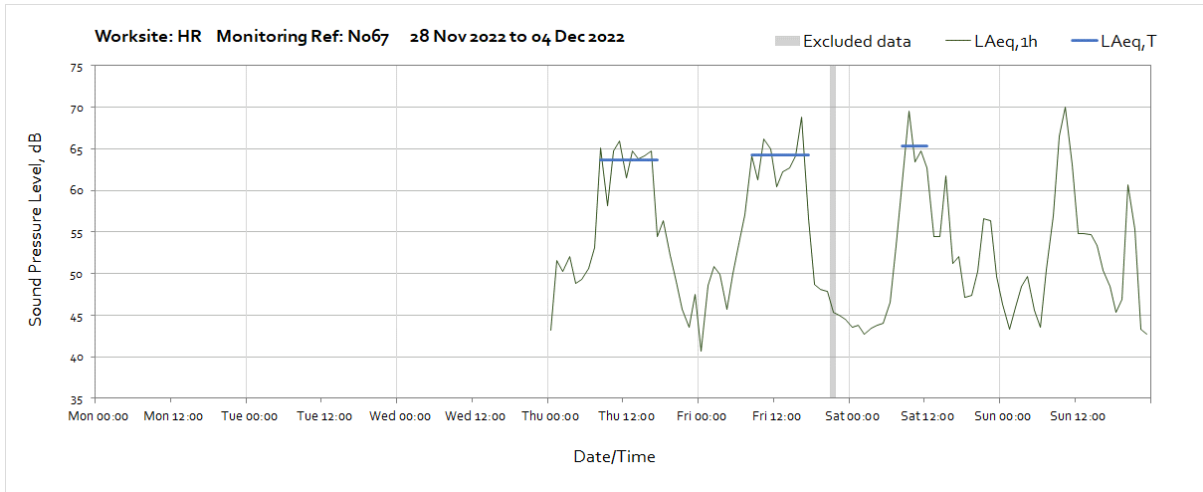


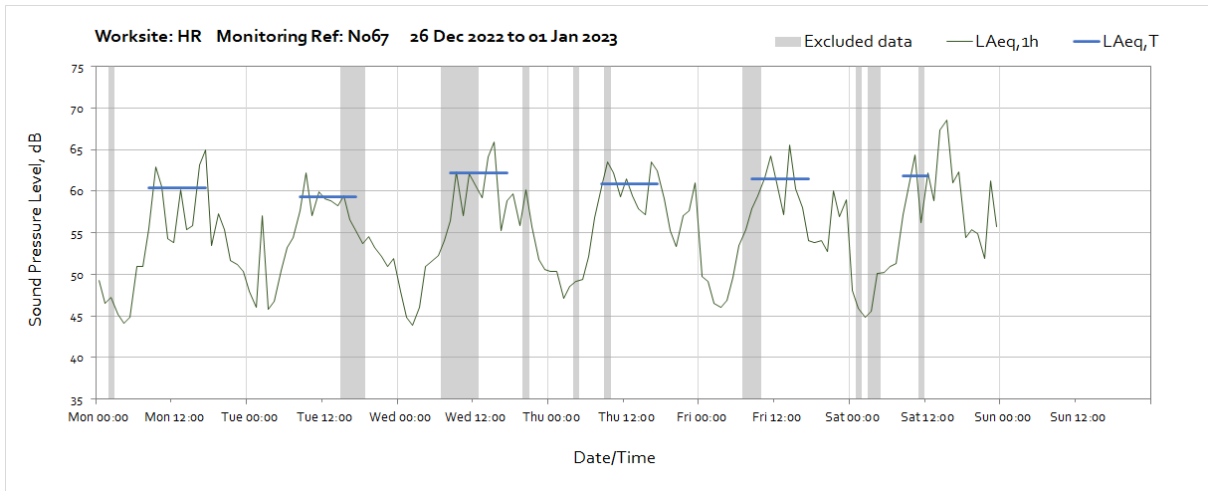
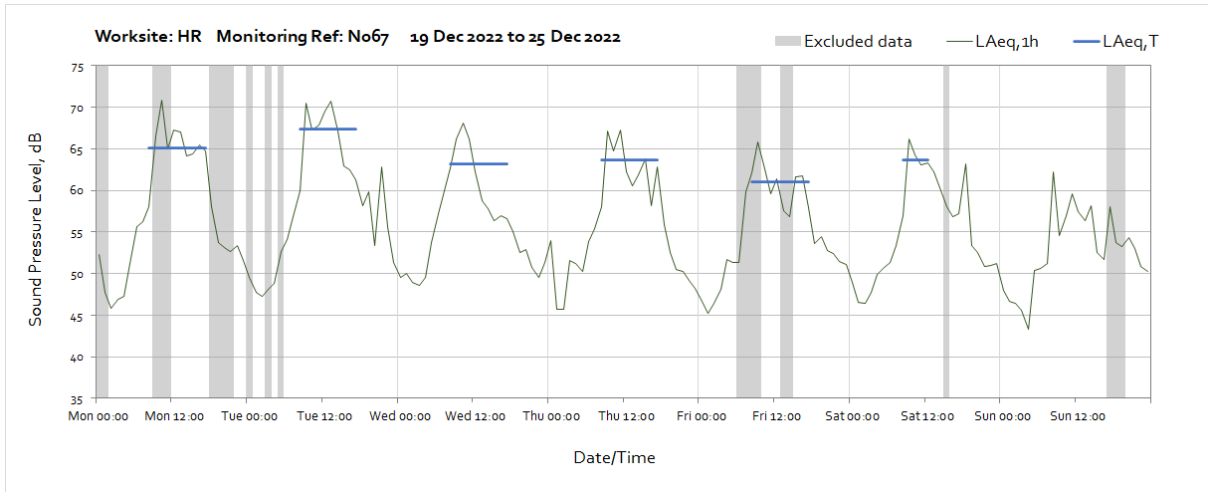
Worksite: South Ruislip Ventilation Shaft (SRVS) - Monitoring Ref: TCA-N001



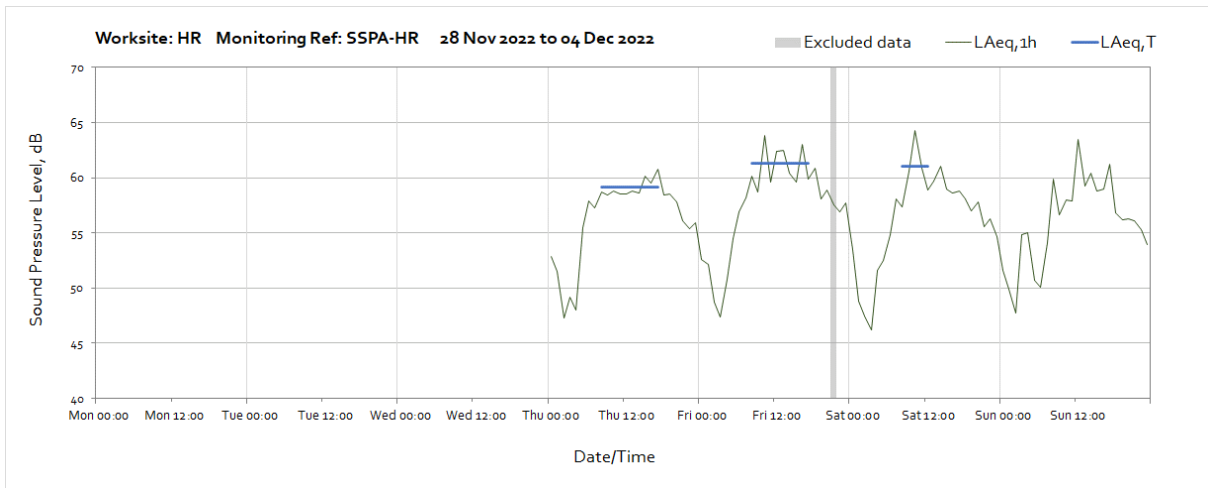


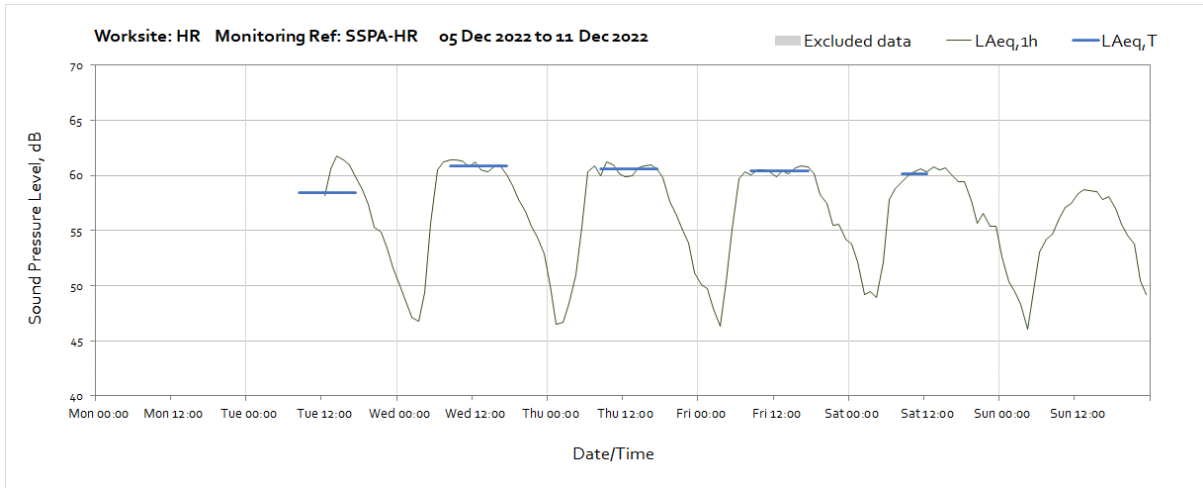
Worksite: Harvil Road (HR) – Monitoring Ref: N067



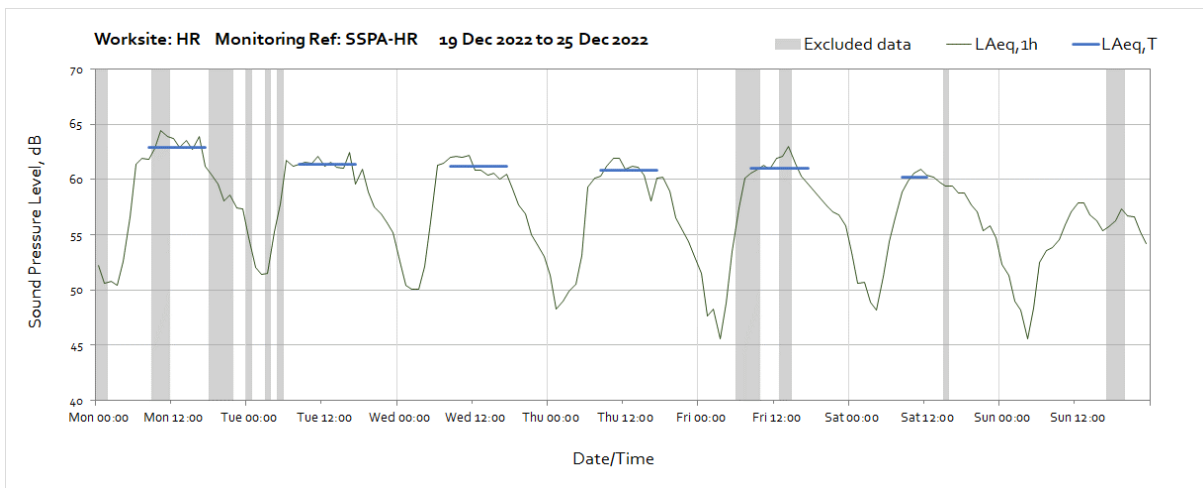
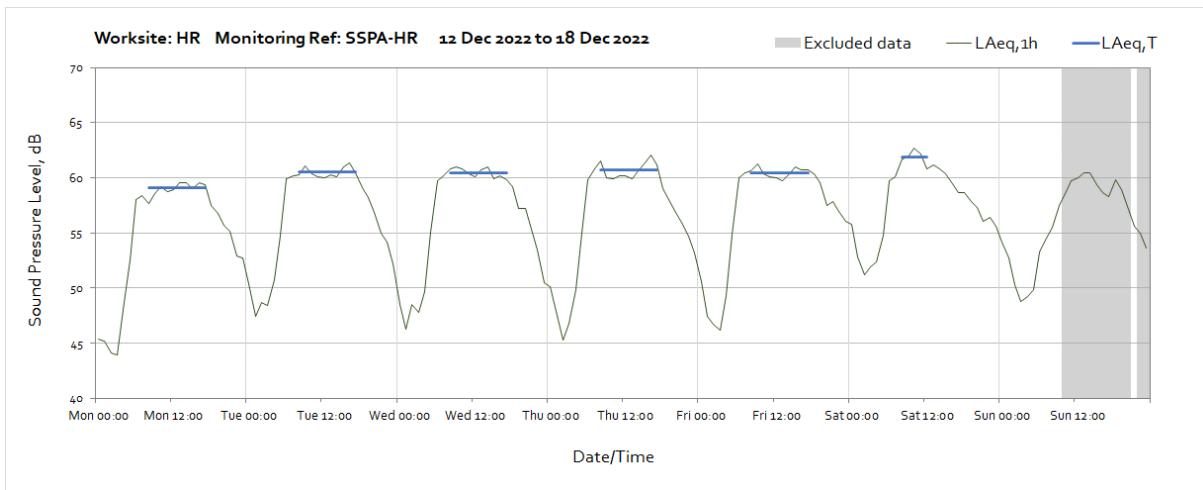


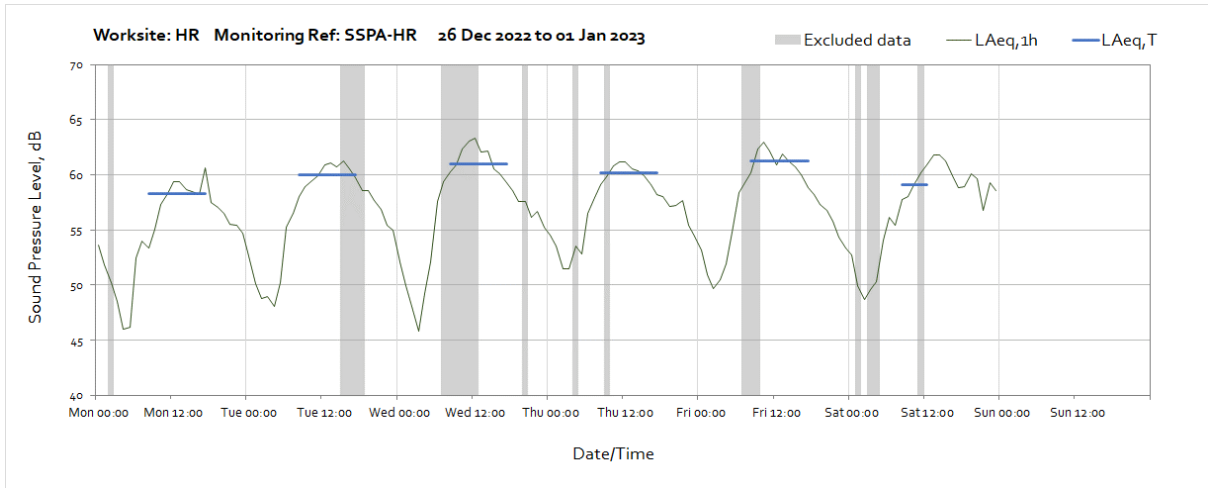
Worksite: Harvil Road (HR) - Monitoring Ref: SSPA-HR



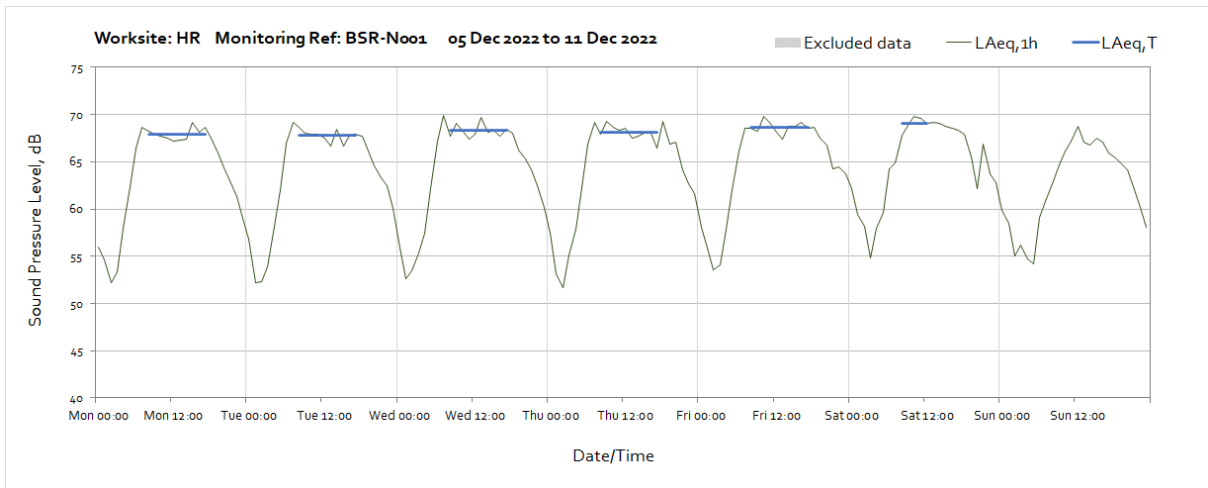
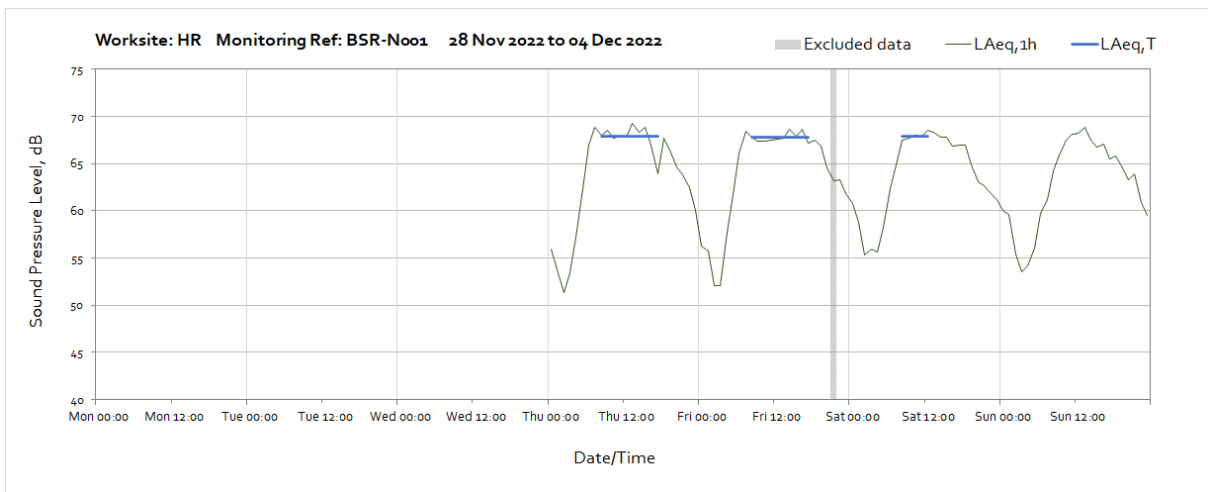


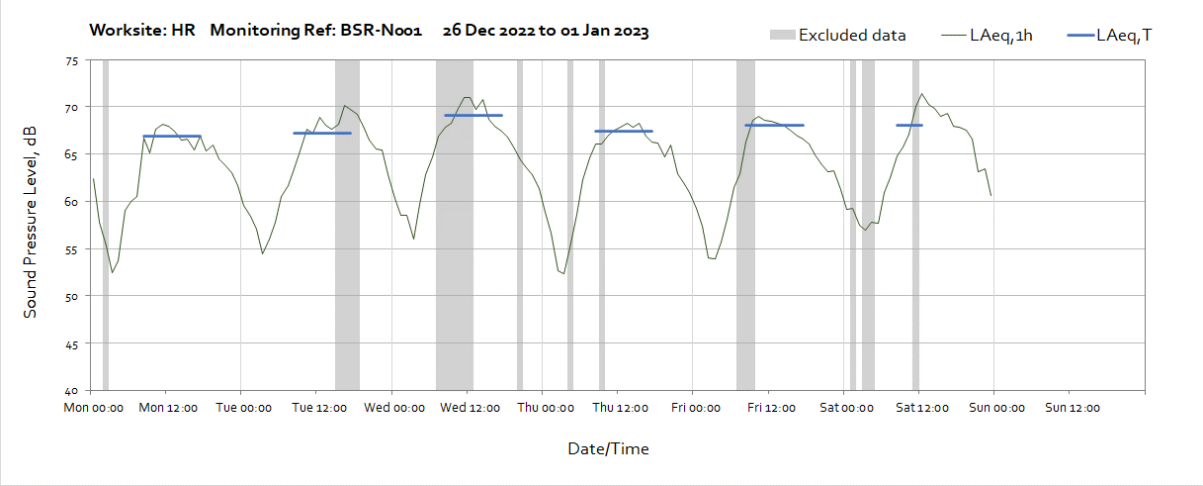
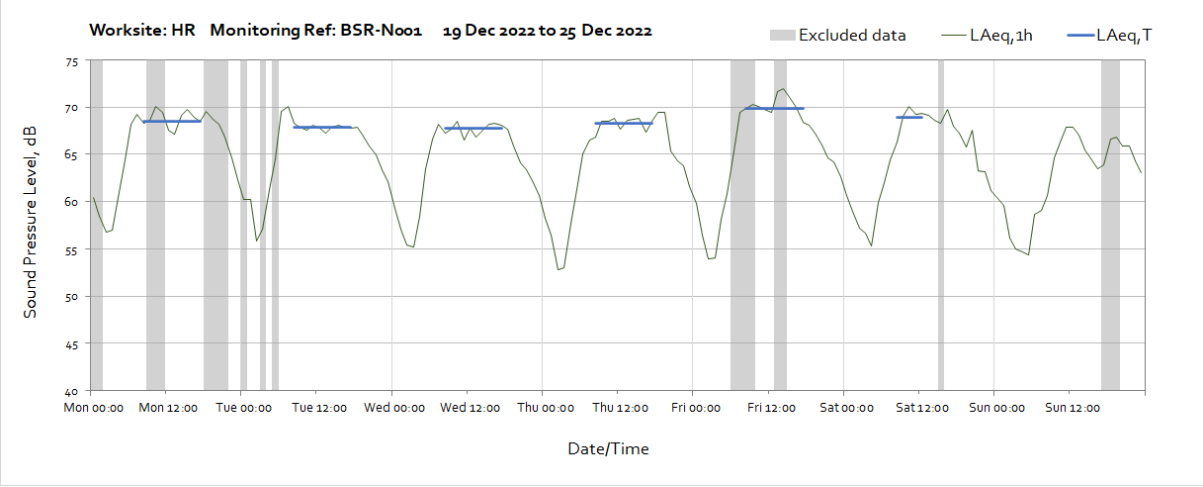
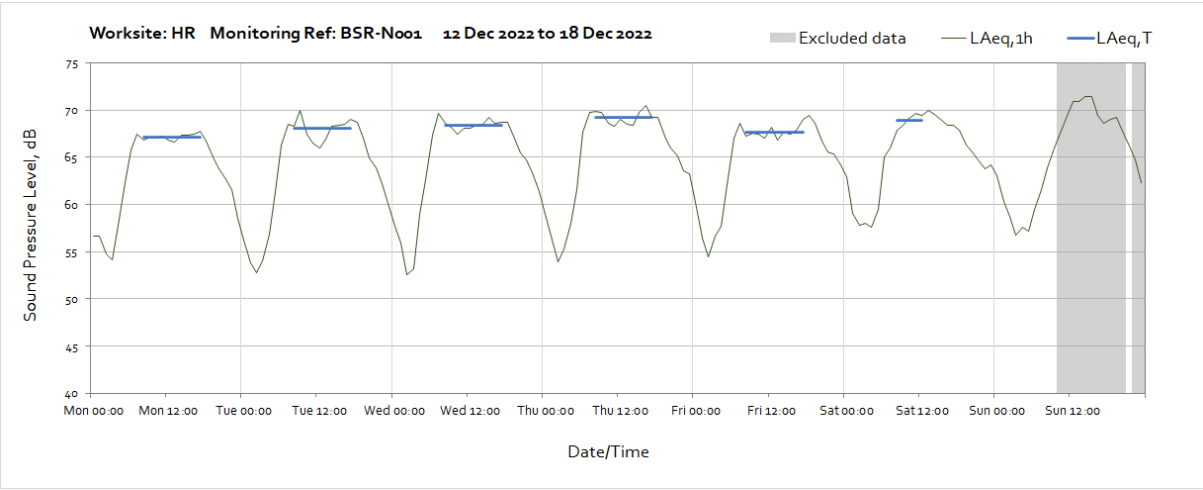
Note: Missing data between 00:00 on Monday 5th December and 11:00 on Tuesday 6th December was due to loss of battery power at the monitoring station.





Worksite: Harvil Road (HR) – Monitoring Ref: BSR-N001

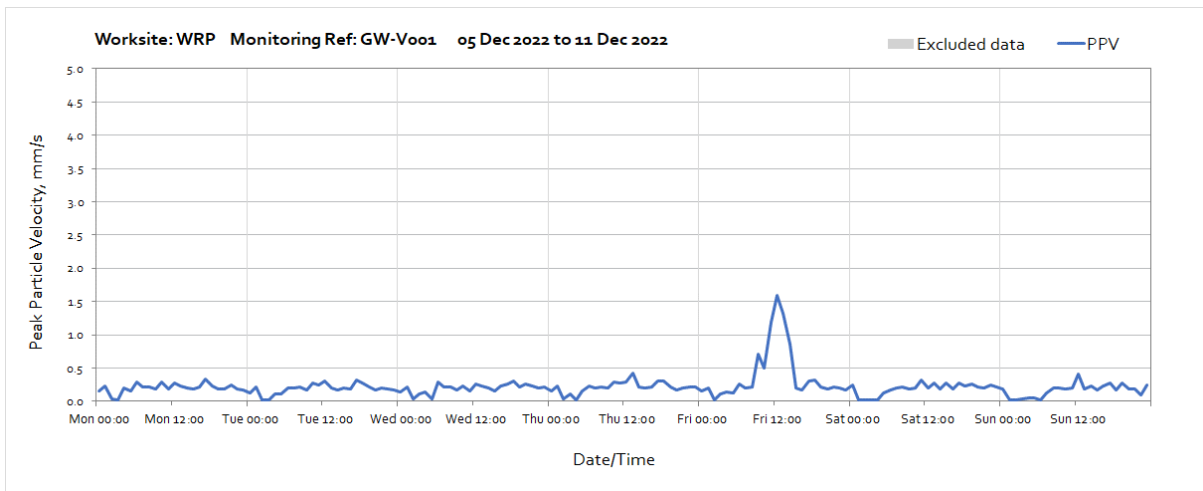
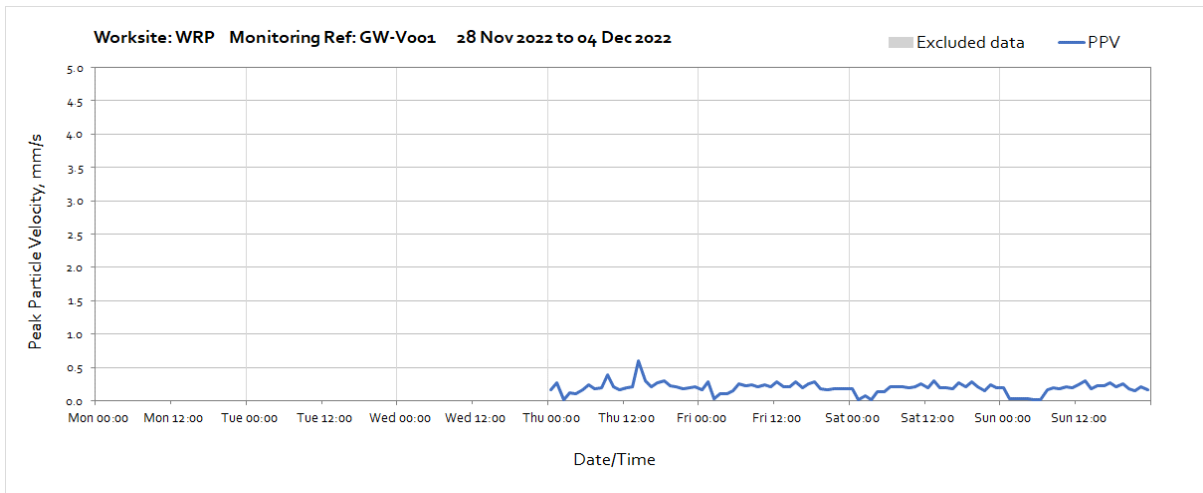


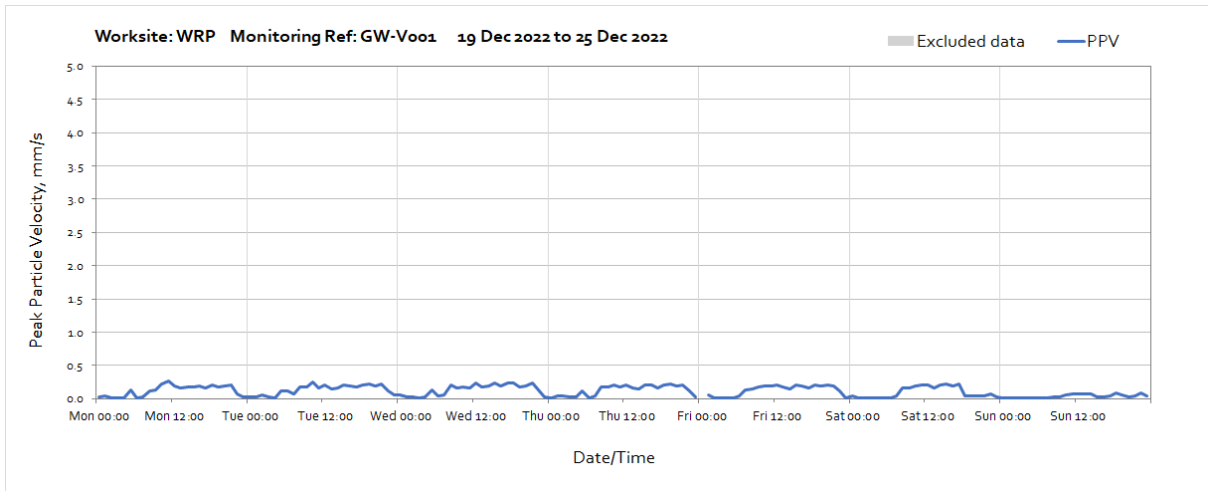
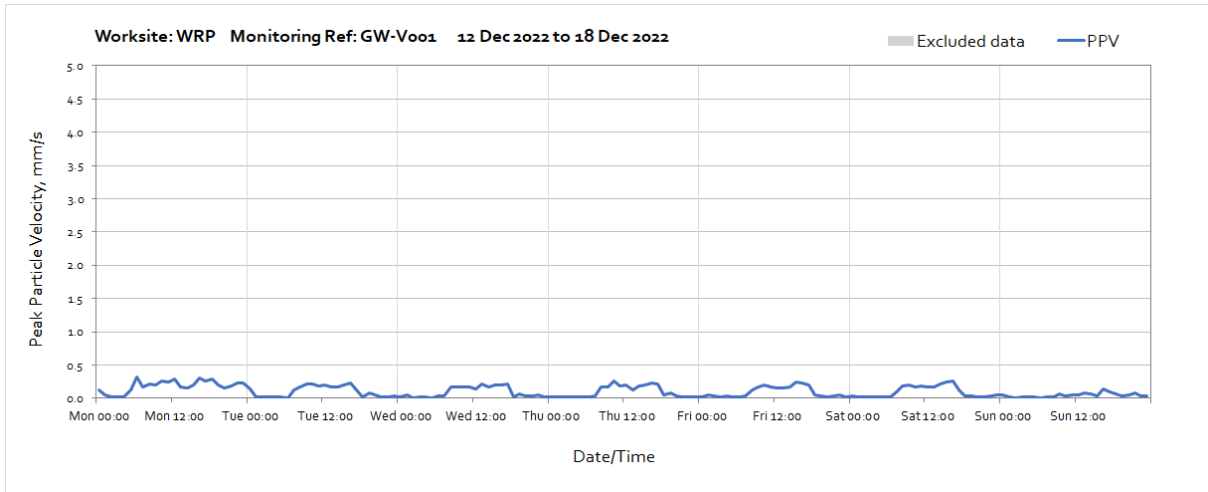


Vibration

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 Portal (WRP) – Monitoring Ref: GW-V001





Note: Missing data at 00:00 on Friday 23rd December was due to a system error at the monitoring station.

