HS2

September 2022

Construction noise and vibration Monthly Report – July 2022

London Borough of Hillingdon

gov.uk/hs2

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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 July 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, jetty piling, invasive vegetation removal works, ground investigation works, pier construction, installation of ducts, water pumping works, maintenance of the haul road, operation of satellite welfare and generator farms, stabilisation works, earthworks, fibre-reinforced concrete works, drainage works, concrete drilling, pontoon installation, surveys, compensation pond construction, material storage, fencing works, environmental maintenance works, river crossing construction, excavation works, dewatering, stockpiling, car park construction, launching girder and deck works and utility works were underway;
- Colne Valley Viaduct Moorhall Road site (ref.: CVV-MR), where piling, compound operation, ground investigation works, pier construction, installation of ducts, water pumping, maintenance of haul road, operation of satellite welfare and generator farms, concrete drilling, pontoon installation, surveys, compensation pond construction, material storage, excavation works, river crossing construction, launching grinder and deck works, fencing works, utility diversion works and environmental maintenance were underway;
- West Ruislip Portal worksite (ref.: WRP) where haul road widening, base slab construction, tunnel boring machine works, utility works, temporary storage area construction, drainage works, redevelopment of Ruislip Golf Course, preparation for soil treatment area and vegetation clearance were underway;
- West Ruislip Retained Embankment worksite (ref.: WRRE), where reinforcement of segment yard slab, soil removal, backfilling, bridge construction, vegetation clearance and conveyor installation works were underway;
- South Ruislip Ventilation Shaft worksite (ref.: SRVS), where utility connection works, waste removal, water tank fill up, installation of supporting structures, installation of pipeline, grouting works, installation of wells, dewatering works and installation of survey equipment and edge protection were underway;
- Harvil Road worksite (ref.: HR), where junction works and bridge construction were underway.

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

- The Greenway (West Ruislip) where sewer utility works were underway;
- Harvil Road embankment, where load test piling, working platform construction, Newyears Green borne works, earthworks for the new road alignment, and removal of redundant water valve and old section of Harvil Road were underway;
- Copthall Retained Embankment / Trough, where earthworks, fabrication of pre-cast conveyor bases and conveyor belt assembly, construction of treatment silos and tunnel boring machine material area, steel fixing and waterproof works for construction of the Copthall tunnel and drainage installation along haul road were underway;
- Northern Sustainable Placement Area, where operation and maintenance of conveyor system and earthworks mound construction were underway;
- Southern Sustainable Placement Area, where reinforced concrete works for the construction of the tunnel boring machine material storage, drainage installation along haul route, delivery of equipment, removal of topsoil, vegetation clearance, site set up, and construction of haul road, attenuation pond and fence installation were underway.

There were four (4) 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.

Five (5) complaints were received during the monitoring period. A description of the complaint, the results of investigation and any actions taken are detailed in Table 8 of this report.

Abbreviations and Descriptions

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

Table 1: Table of Abbreviations

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

1 Introduction

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

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

1.1.2 Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the London Borough of Hillingdon (LBH) for the period 1st to 31st July 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, ref.: CVV-DL (see Plan 1 in Appendix A), where work activities included:
  - piling including jetty piling, operation of support plant, test piling, de-sanding of pile bore, pile trimming, installation of reinforcement cages, concrete pouring and bored pile breaking out works;
  - compound operations (including de-sanding works);
  - invasive vegetation removal works;
  - ground investigation works;
  - pier construction, including yard supporting activities, leg post tensioning and tower crane mobilisation;
  - installation of ducts, including site preparation and earthworks;
  - water pumping works;
  - maintenance of the haul road;

- operation of satellite welfare and generator farms;
- stabilisation and earthworks;
- fibre-reinforced concrete works;
- drainage works;
- concrete drilling;
- pontoon installation and condition surveys;
- construction of compensation pond;
- material storage;
- fencing works;
- environmental maintenance works;
- construction of river crossing;
- excavation works;
- dewatering works;
- stockpiling;
- car park construction;
- deck and launching grinder works; and
- utility works.

- Colne Valley Viaduct Moorhall Road site, ref.: CVV-MR (see Plan 1 in Appendix A), where work activities included:
  - piling including operation of support plant, jetty piling, sheet piling, pile trimming, pile cap construction, installation of reinforcement cages, concrete pouring and bored pile breaking out works;
  - compound operations (including de-sanding works);
  - ground investigation works;
  - pier construction, including yard supporting activities, leg post tensioning and tower crane mobilisation;
  - installation of ducts, including site preparation and earthworks;
  - water pumping works;
  - maintenance of haul road;
  - operation of satellite welfare and generator farms ;

- concrete drilling;
- pontoon installation and condition surveys;
- construction of compensation pond;
- material storage;
- fencing works;
- environmental maintenance;
- construction of river crossing including emergency obstruction dismantling works;
- excavation works;
- launch grinder and deck works; and
- utility diversion works.

- West Ruislip Portal Worksite, ref.: WRP (see Plan 3 in Appendix A), where work activities included:
  - haul road widening;
  - construction of base slab;
  - tunnel boring machine works including assembly, placement of components parts and segment construction;
  - utility works;
  - construction of temporary storage area;
  - drainage works;
  - redevelopment of Ruislip Golf Course;
  - preparation for soil treatment area; and
  - vegetation clearance.
- West Ruislip Retained Embankment Worksite, ref.: WRRE, where work activities included:
  - reinforcement of segment yard slab;
  - soil removal;
  - granular fill;
  - bridge construction;
  - vegetation clearance;

- conveyor installation works including preparation works;
- removal of topsoil stockpile including relocation.

- South Ruislip Ventilation Shaft worksite, ref.: SRVS (see Plan 4 in Appendix A), where work activities included:
  - utility connection works;
  - waste removal;
  - water tank fill up;
  - installation of capping beams;
  - installation of pipeline;
  - jet and fissure grouting works;
  - installation of wells;
  - dewatering works; and
  - installation of inclinometer and edge protection.
- Harvil Road worksite, ref.: HR (see Plan 2 in Appendix A), where work activities included:
  - junction works; and
  - bridge construction.

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;
- Harvil Road embankment, where load test piling, working platform construction, Newyears Green borne works, earthworks for the new road alignment, and removal of redundant water valve and old section of Harvil Road were underway;
- Copthall Retained Embankment / Trough, where earthworks, fabrication of pre-cast conveyor bases and conveyor belt assembly, construction of treatment silos and tunnel boring machine material area, steel fixing and waterproof works for construction of the Copthall tunnel and drainage installation along haul road were underway;
- Northern Sustainable Placement Area, where operation and maintenance of conveyor system and earthworks mound construction were underway;
- Southern Sustainable Placement Area, where reinforced concrete works for the construction of the tunnel boring machine material storage, drainage installation along haul route, delivery of equipment, removal of topsoil, vegetation clearance,

site set up, and construction of haul road, attenuation pond and fence 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 (14) noise and two (2) vibration monitoring installations were active in July in the LBH area. Table 2 summarises the position of noise and vibration monitoring installations within the LBH area in July 2022.

1.2.2 An additional vibration monitor (ref.: GW-V001) was installed at 95 The Greenway close to West Ruislip Portal worksite (worksite ref.: WRP) on Friday 1st July 2022.

1.2.3 A temporary noise monitor (ref.: TKL-N001) was installed along Tile Kiln Lane at West Ruislip Retained Embankment worksite (worksite ref.: WRRE) on Tuesday 26th July 2022. The noise monitor was installed in response to a complaint.

1.2.4 On Saturday 9th July the noise monitor ref.: HR-N002, worksite ref.: HR, was removed due to ongoing power issues. The noise monitor was decommissioned following agreement with local authority and HS2.

1.2.5 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
	N048	Ruislip Golf Course, Ickenham Rd, Ruislip

Worksite Reference	Measurement Reference	Address
West Ruislip Portal (WRP)	N056	83 The Greenway, Ickenham, Ruislip
	N057	123 The Greenway, Ickenham, Ruislip
	GW-V001	95 The Greenway, Ickenham, Uxbridge
West Ruislip Retained Embankment (WRRE)	N065	Breakspear Road South, Harefield, Uxbridge
	N066	Hoylake Crescent, Ickenham, Uxbridge
	TKL-N001	Tile Kiln Lane, Harefield, 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 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 L_{Aeq} Data over the Monitoring Period

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
CVV-DL	CVV-DL-NMP2	Highway Farm House, Harvil Rd, Harefield, Uxbridge	Free-field	55.1 (61.3)	55.6 (61.7)	53.0 (54.8)	53.0 (57.5)	52.7 (56.0)	54.1 (55.0)	55.5 (58.6)	57.7 (64.4)	57.8 (80.8)	52.7 (54.0)	55.3 (67.1)	52.7 (55.9)
	CVV-DL-NMP3	Dew's Farm Cottages, Dews Lane, Harefield, Uxbridge,	Free-field	58.5 (62.1)	60.1 (66.6)	49.2 (57.7)	46.9 (55.5)	46.0 (55.8)	56.2 (58.7)	58.8 (61.6)	51.7 (54.5)	48.7 (53.9)	43.5 (49.0)	48.2 (58.5)	46.0 (55.3)
CVV-MR	CVV-MR-NMP1	Weir Cottage, Denham Garden Village, Denham, Buckinghamshire	Free-field	51.1 (52.5)	53.8 (59.6)	50.4 (55.6)	48.9 (52.5)	45.5 (54.6)	48.0 (49.0)	49.6 (50.6)	48.8 (49.5)	47.9 (51.8)	43.8 (48.8)	48.1 (53.6)	44.9 (53.2)
	CVV-MR-NMP2	Harefield Marina, Moorhall Road, London, Greater London	Free-field	51.9 (61.7)	66.7 (81.1)	54.6 (62.6)	52.8 (65.9)	45.2 (56.5)	46.1 (48.7)	48.4 (50.5)	45.8 (46.9)	46.6 (53.2)	42.5 (46.6)	46.6 (53.7)	43.5 (54.9)
	CVV-MR-NMP3	Peerless Drive, Harefield, Uxbridge	Free-field	49.6 (55.7)	56.2 (60.6)	47.0 (56.4)	45.5 (50.2)	43.2 (57.7)	46.0 (52.8)	47.8 (50.1)	46.8 (49.2)	46.7 (53.5)	42.4 (50.9)	47.9 (59.1)	43.1 (53.1)
WRP	N048	West Ruislip Golf Club, Ickenham Rd, Ruislip	Free-field	56.5 (72.0)	60.1 (62.5)	52.4 (59.0)	49.9 (59.3)	47.1 (61.7)	51.7 (56.0)	58.4 (62.4)	53.1 (55.9)	51.1 (57.2)	46.3 (50.8)	51.7 (57.7)	47.1 (54.3)
	N056	83 The Greenway, Ickenham, Ruislip	Façade	59.2 (62.0)	59.4 (60.4)	59.8 (62.9)	58.3 (61.5)	53.1 (61.9)	58.7 (59.1)	59.5 (60.5)	59.1 (60.4)	58.9 (62.0)	50.8 (59.1)	58.8 (61.8)	54.6 (60.1)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
	N057	123 The Greenway, Ickenham, Ruislip	Façade	55.5 (58.1)	56.2 (58.1)	56.7 (59.6)	55.9 (60.2)	50.3 (58.6)	55.1 (56.3)	55.8 (56.7)	55.8 (57.8)	55.6 (61.2)	48.5 (57.4)	55.6 (60.7)	51.3 (56.8)
WRRE	N065	Breakspear Road South, Harefield, Uxbridge	Free-field	64.2 (66.3)	64.9 (72.3)	63.6 (64.5)	62.1 (64.6)	58.1 (69.8)	64.3 (72.7)	65.6 (74.8)	63.4 (64.1)	63.2 (66.6)	57.2 (62.2)	62.2 (66.3)	58.0 (64.5)
	N066	Hoylake Crescent, Ickenham, Uxbridge	Free-field	54.6 (56.9)	54.8 (56.6)	55.3 (59.7)	53.7 (57.6)	50.0 (58.8)	53.0 (54.6)	54.3 (54.9)	54.2 (55.4)	54.2 (59.0)	51.2 (61.3)	54.1 (58.6)	51.7 (60.3)
	TKL-N001	Tile Kiln Lane, Harefield, Uxbridge	Free-field	43.7 (45.1)	49.4 (55.2)	42.9 (44.4)	41.8 (44.1)	41.1 (47.9)	45.8 (45.8)	48.9 (48.9)	48.3 (48.3)	44.9 (47.0)	40.1 (42.3)	46.0 (48.5)	36.5 (37.6)
SRVS	N061	Cineworld South Ruislip car park, Ruislip	Free-field	58.2 (65.1)	62.1 (67.5)	61.9 (66.5)	61.4 (65.4)	54.9 (61.4)	58.3 (59.4)	61.5 (61.9)	61.6 (62.4)	61.5 (66.9)	54.8 (65.8)	60.1 (63.2)	54.5 (59.5)
HR	N067	Harvil Road worksite south boundary	Free-field	53.6 (58.8)	55.5 (58.7)	55.6 (63.7)	56.1 (63.8)	49.7 (60.5)	49.7 (52.9)	54.3 (57.7)	54.1 (57.0)	56.2 (64.2)	51.1 (61.8)	54.8 (65.1)	50.5 (57.3)
	HR-N002	Certas Energy Bunker Site – Harefield	Free-field	62.6 (63.0)	63.1 (65.5)	60.0 (61.0)	58.6 (61.3)	56.6 (63.4)	58.5 (58.5)	61.6 (61.6)	-* -*	-* -*	-* -*	-* -*	-* -*

* No data measured due to ongoing power supply issues and so the noise monitor uninstalled on Saturday 9th July.

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
WRP	GW-V001	95 The Greenway, Ickenham, Uxbridge	1.80 (Y-axis)
SRVS	SRVS-V001	Braintree Industrial Estate - Building D4	2.42 (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	Weekday	0800-1800	15	4
	CVV-MR-NMP3	Peerless Drive, Harefield, Uxbridge	All days	All periods	No exceedance	No exceedance
WRP	N048	West Ruislip Golf Club, Ickenham Rd, Ruislip	All days	All periods	No exceedance	No exceedance
	N056	83 The Greenway, Ickenham, Ruislip	Weekday Weekday Saturday Sunday Night	1800-1900 1900-2200 1400-2200 0700-2200 2200-0700	1 40 16 34 78	No exceedance No exceedance No exceedance No exceedance No exceedance
	N057	123 The Greenway, Ickenham, Ruislip	Weekday Saturday Sunday Night	1900-2200 1400-2200 0700-2200 2200-0700	2 1 2 18	No exceedance No exceedance No exceedance 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	N065	Breakspear Road South, Harefield, Uxbridge	Weekday Saturday	0800-1800 0800-1300	15 3	No exceedance No exceedance
WRRE	N066	Hoylake Crescent, Ickenham, Uxbridge	All days	All period	No exceedance	No exceedance
	TKL-N1	Tile Kiln Lane, Harefield, Uxbridge	Night	2200-0700	4	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 periods	No exceedance	No exceedance
	HR-N002	Certas Energy Bunker Site – Harefield	Weekday	0800-1800	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 Exceedances of the LOAEL were recorded at six (6) monitoring locations during the month of July 2022. LOAEL exceedances were recorded during weekdays, Saturdays, Sundays and night-time working hours.

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

Table 6: Summary of Total Exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
CVV-MR	CVV-MR-NMP2	Harefield Marina, Moorhall Road, London, Greater London	4

2.2.8 Four (4) SOAEL exceedances were recorded due to HS2 construction works during July 2022. The exceedance occurred at monitoring location CCV-MR-NMP2 during core hours.

2.3 Exceedances of Trigger Level

2.3.1 Table 7 provides a summary of exceedances of the Section 61 trigger noise levels determined to be due to HS2 related construction noise measured during the reporting period, along with the findings of any investigation.

Table 7: Summary of Exceedances of Trigger Levels

Complaint Reference Number (if applicable)	Worksite Reference	Date and Time Period	Identified Source	Results of Investigation (including noise monitoring results)	Actions Taken
-	-	-	-	-	-

2.4 Complaints

2.4.1 Table 8 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

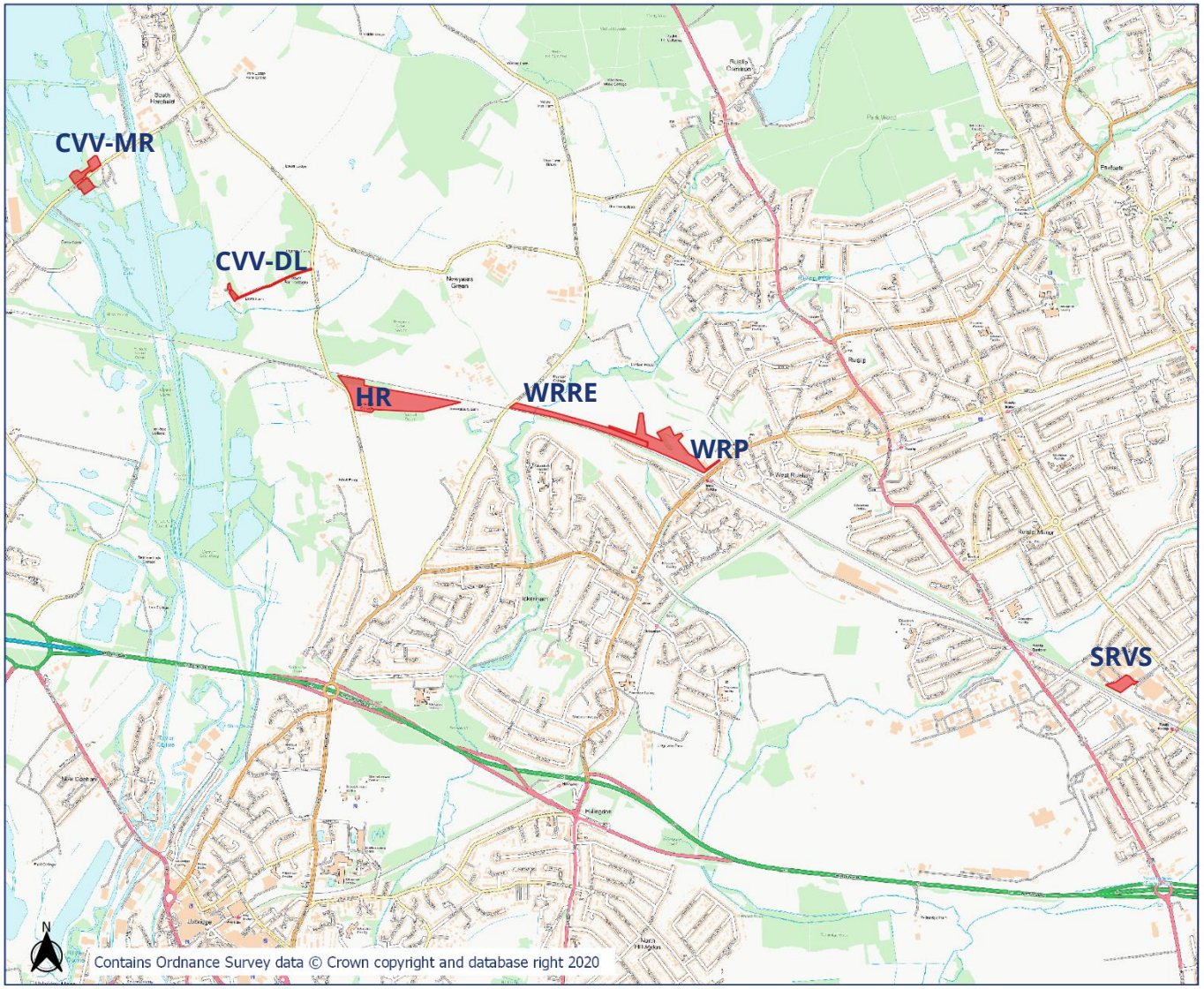
Table 8: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-22-43797-C	WRRE	Complaint about noise from bulldozers during weekend periods.	The investigation showed that works were being undertaken in compliance with approved Section 61. Best Practical Means (BPM) were used during all phases of works.	The resident was contacted to provide a response. A noise monitor has been temporarily installed to collect continuous noise data.

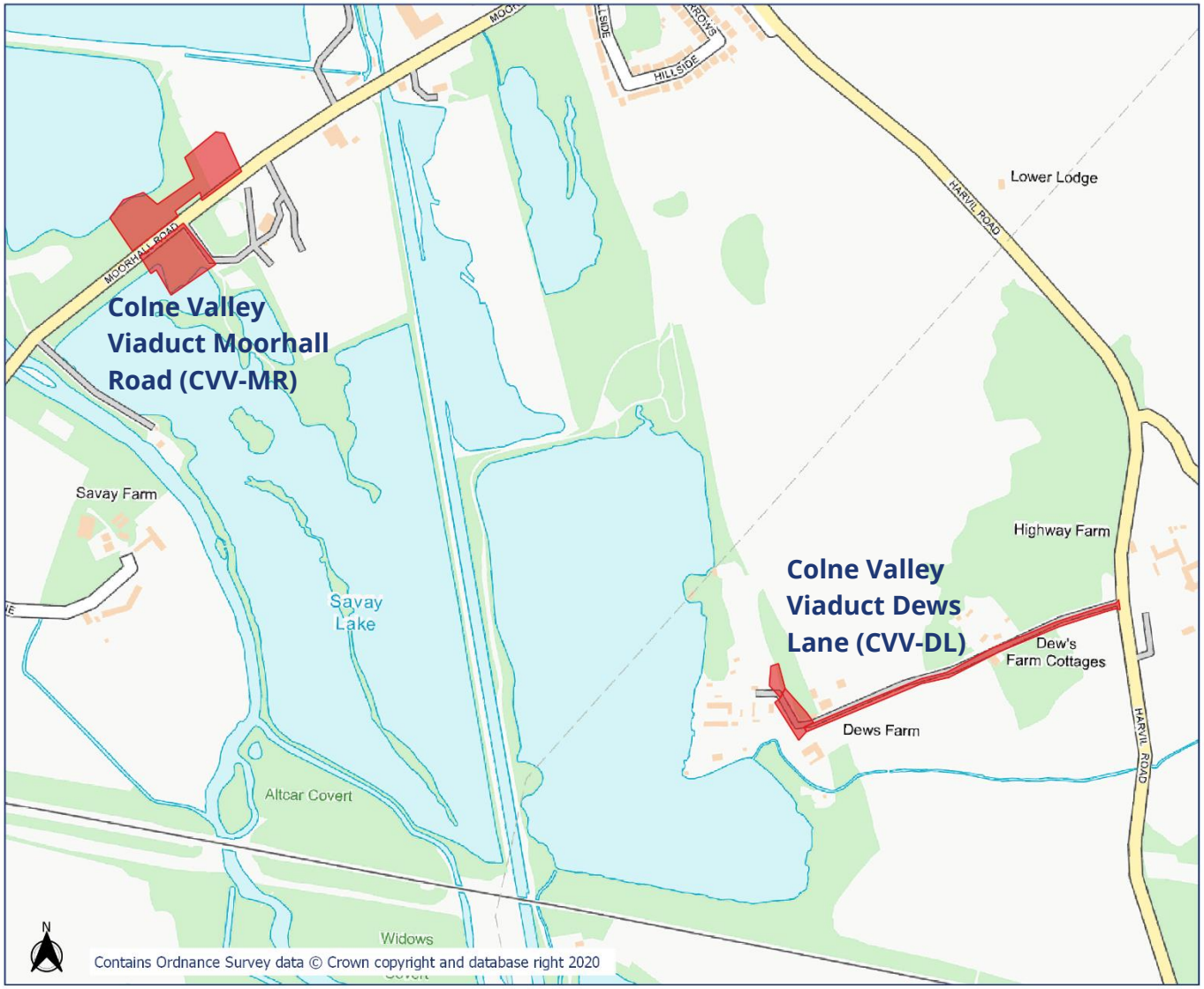
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-22-43804-C	WRP	Complaint regarding drilling noise during the night-time	The complaint may be associated with noise from the engine of the self-propelled modular transporter used to mobilise the crane and may have been audible. Works were undertaken in compliance with approved Section 61, noise levels were within the limits and BPM were used.	A response was provided to the resident.
HS2-22-43793-C	WRP	Noise complaint regarding loud hammering noise and sound from reversing alarms during night-time periods.	The complaint was associated with works for steel reinforcement placement and lifting of the tunnel boring machine parts into the launch chamber using a crane. Works were undertaken in compliance with approved Section 61, noise levels were within the limits and BPM were used.	A response was provided to the resident.
HS2-22-43806-C	WRRE	Complaint about noise during the early mornings.	The investigation showed that works were being undertaken in compliance with approved Section 61. BPM were used during all phases of works.	A response was provided to the resident.
HS2-22-80800-E-C	CVV-DL	Complaint regarding noise disturbance occurring every couple of minutes and that sounds similar to a foghorn.	The investigation showed that the noise was from the safety warning alarms on the gantry cranes and launching grinder operations.	The alarms have been optimised/reduced as far as possible within safe parameters.
HS2-22-43848-C	CVV-DL	Complaint due to noise disturbance during night-time periods.	Ongoing.	Ongoing.

Appendix A Site Locations

HS2 Worksite Identification Plan - Overview

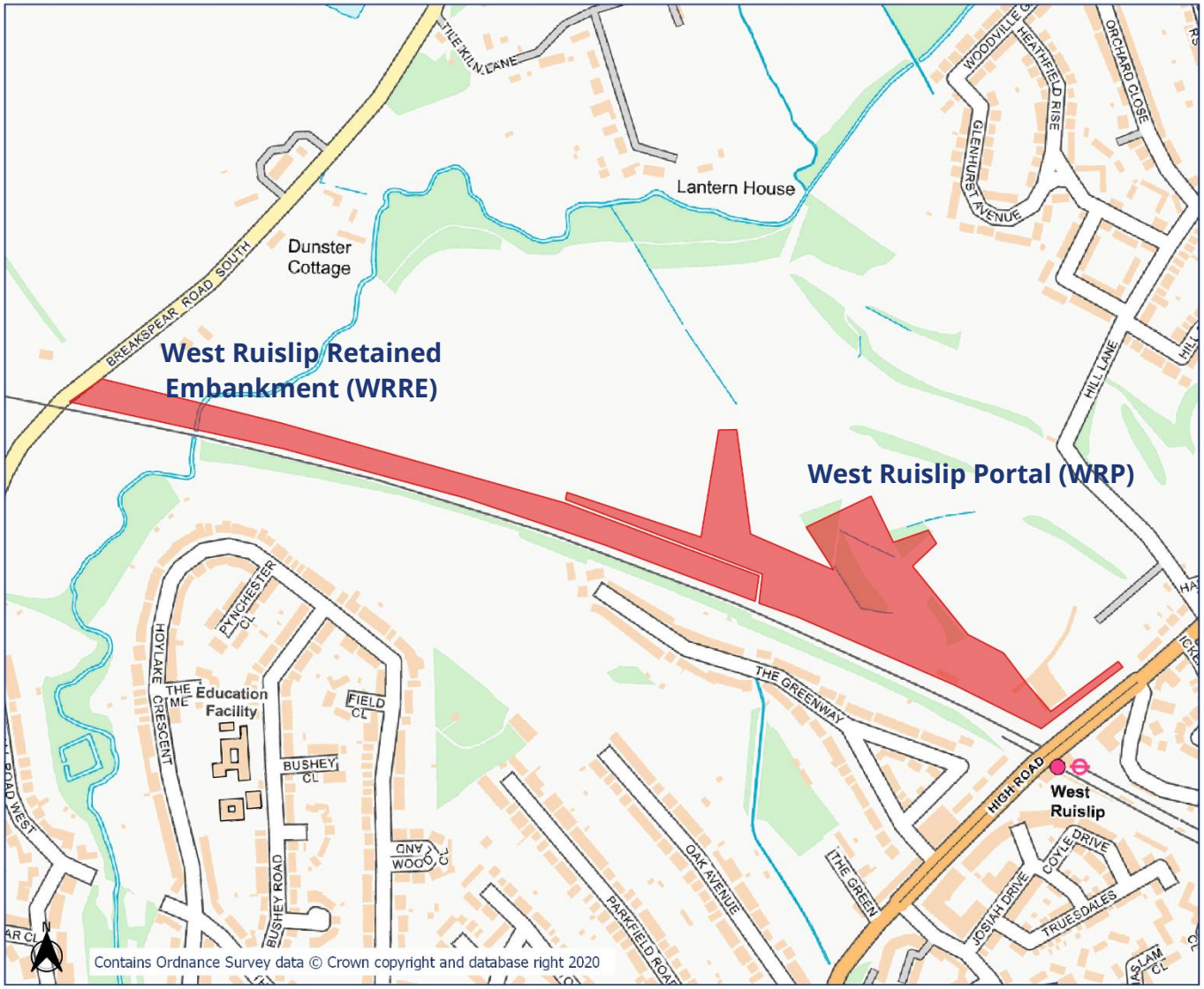


Worksite Identification Plan - 1

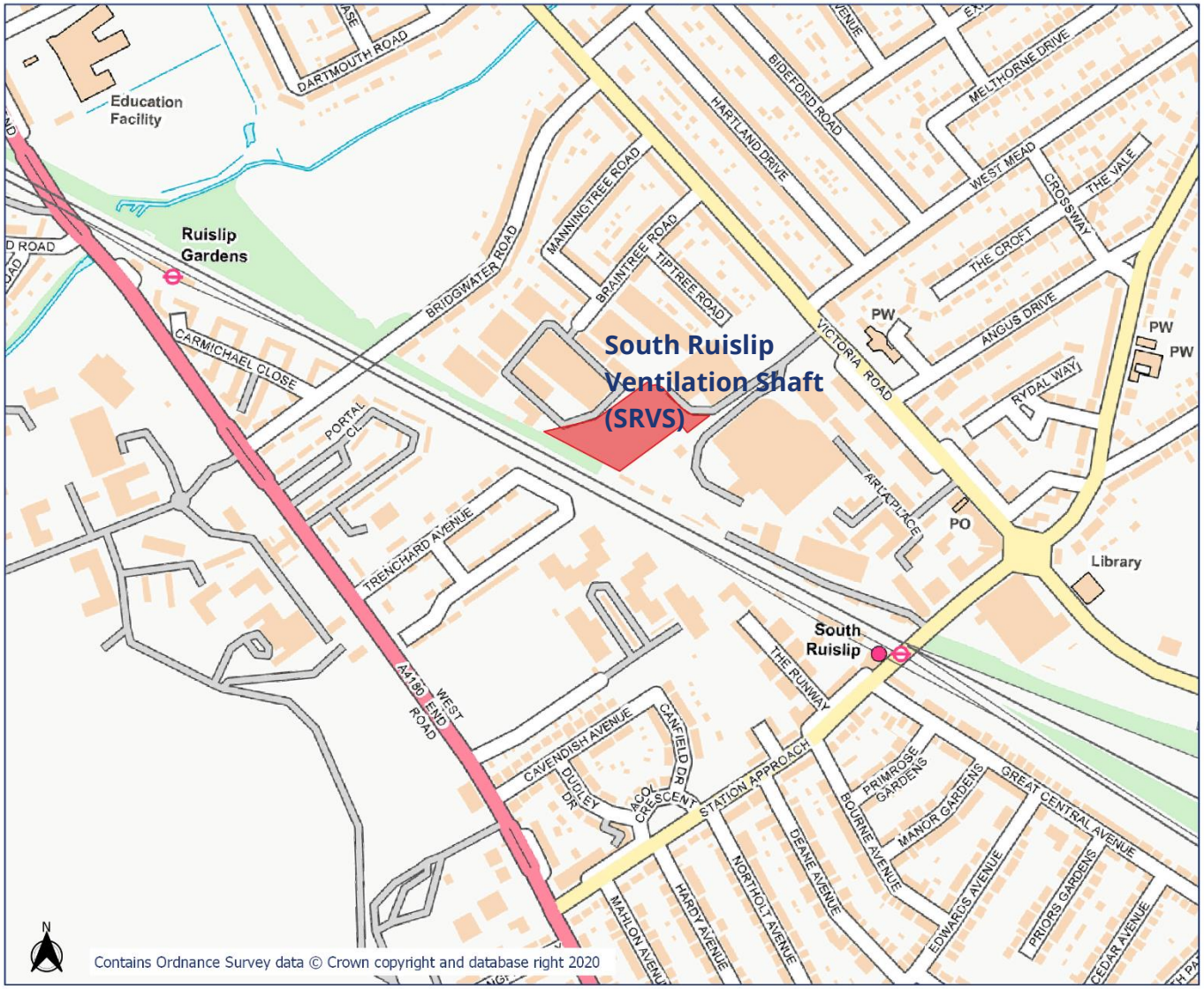


Worksite Identification Plan - 2

Worksite Identification Plan - 3

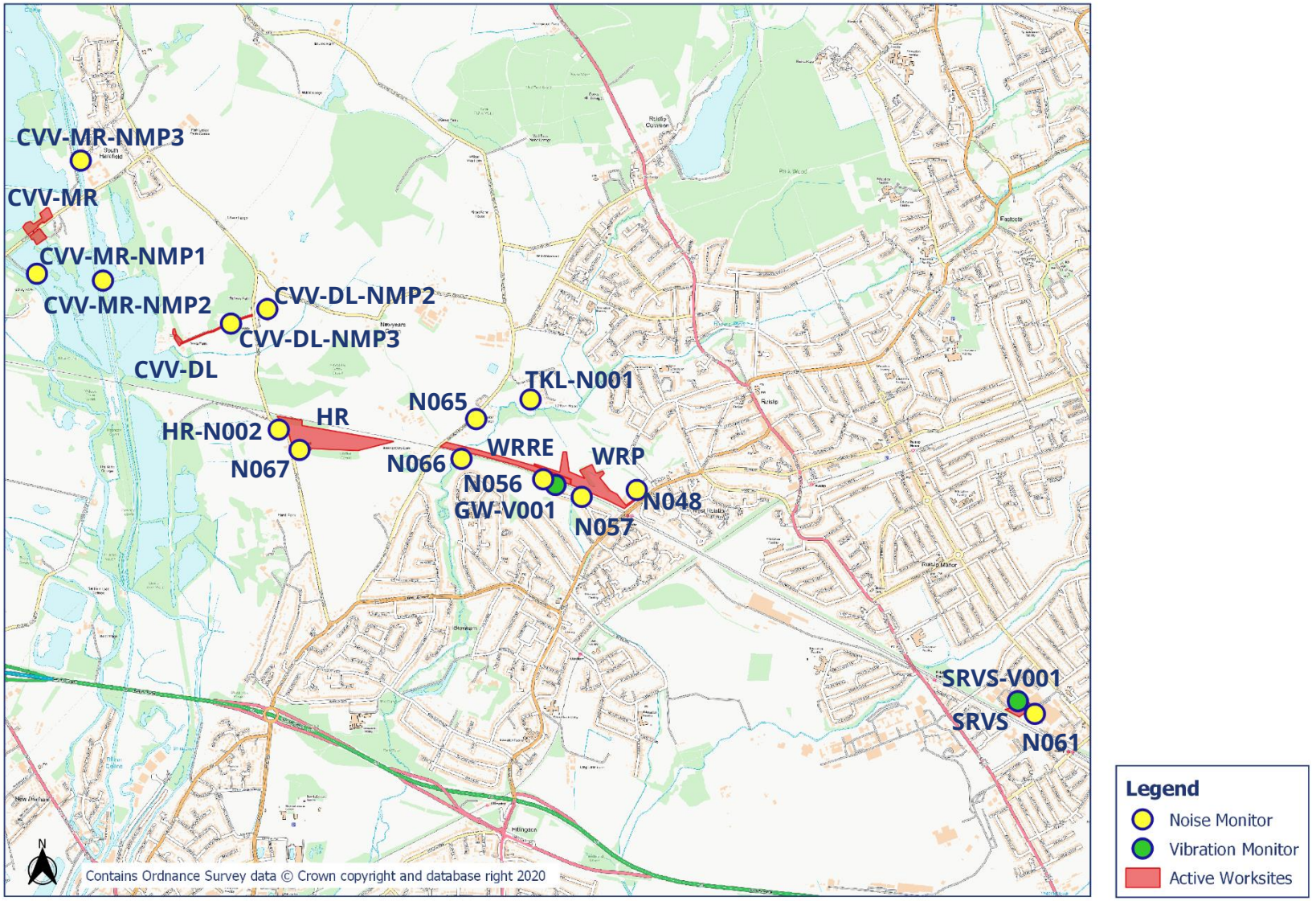


Worksite Identification Plan - 4

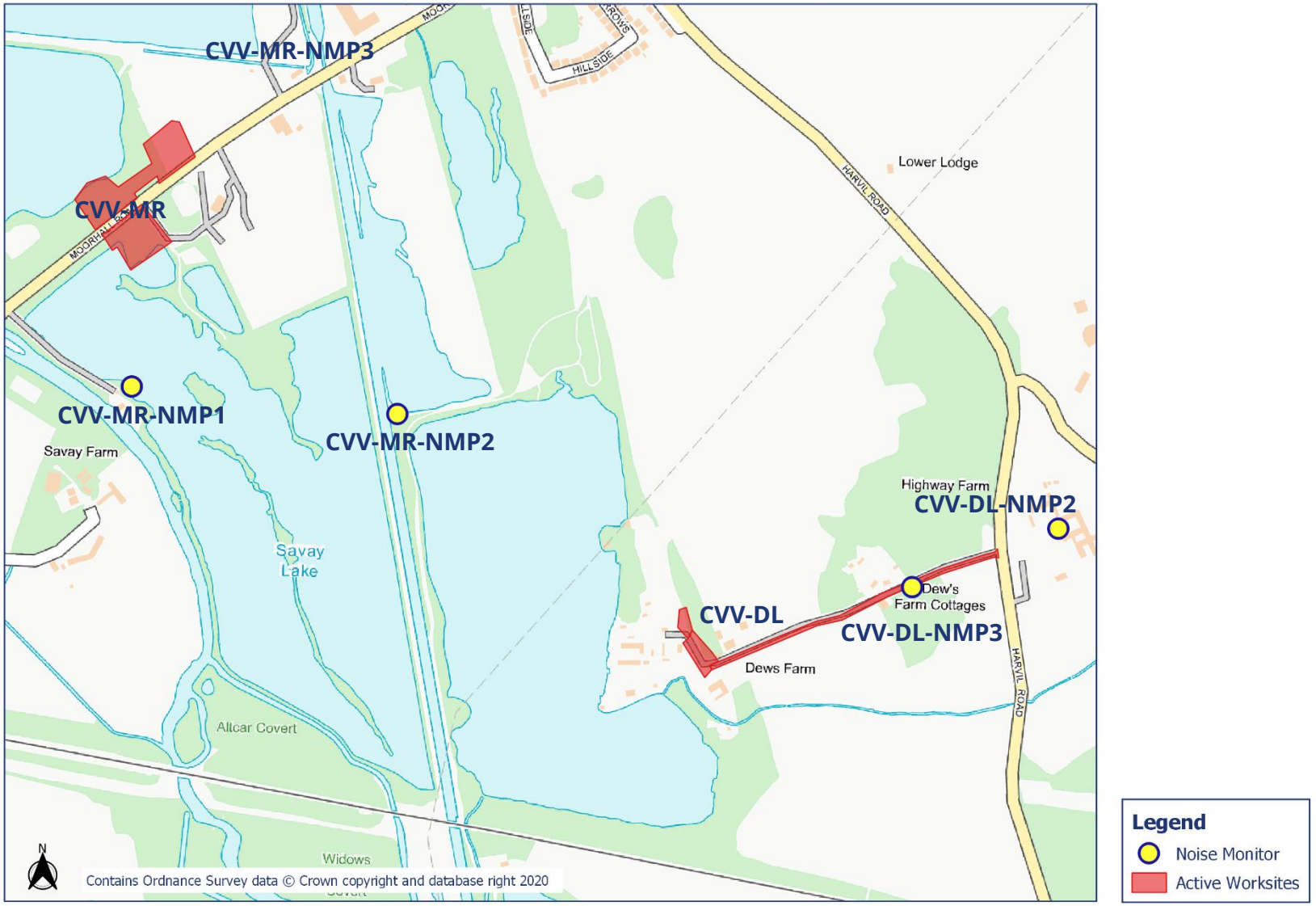


Appendix B Monitoring Locations

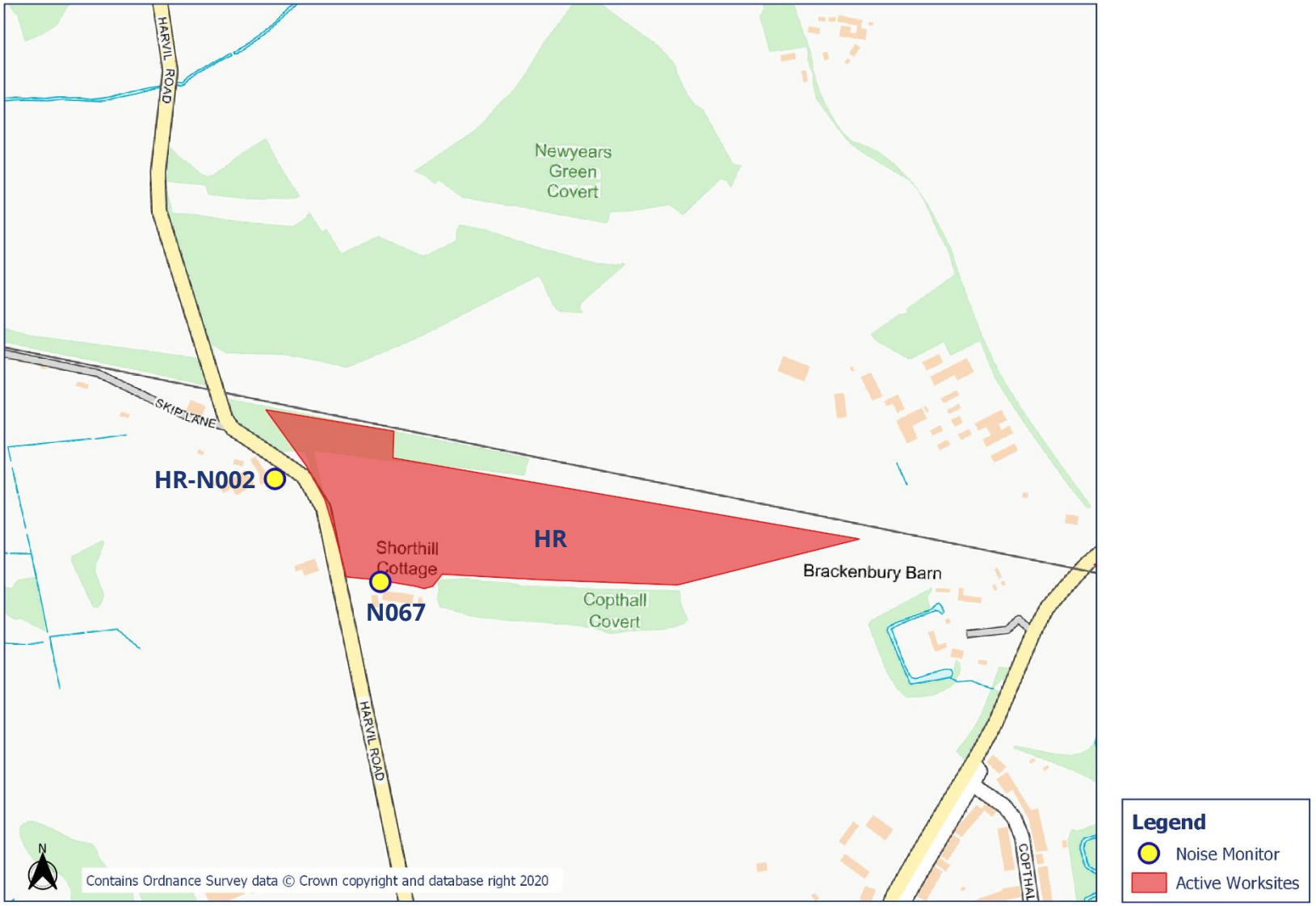
HS2 Noise and Vibration Monitoring Plan - Overview



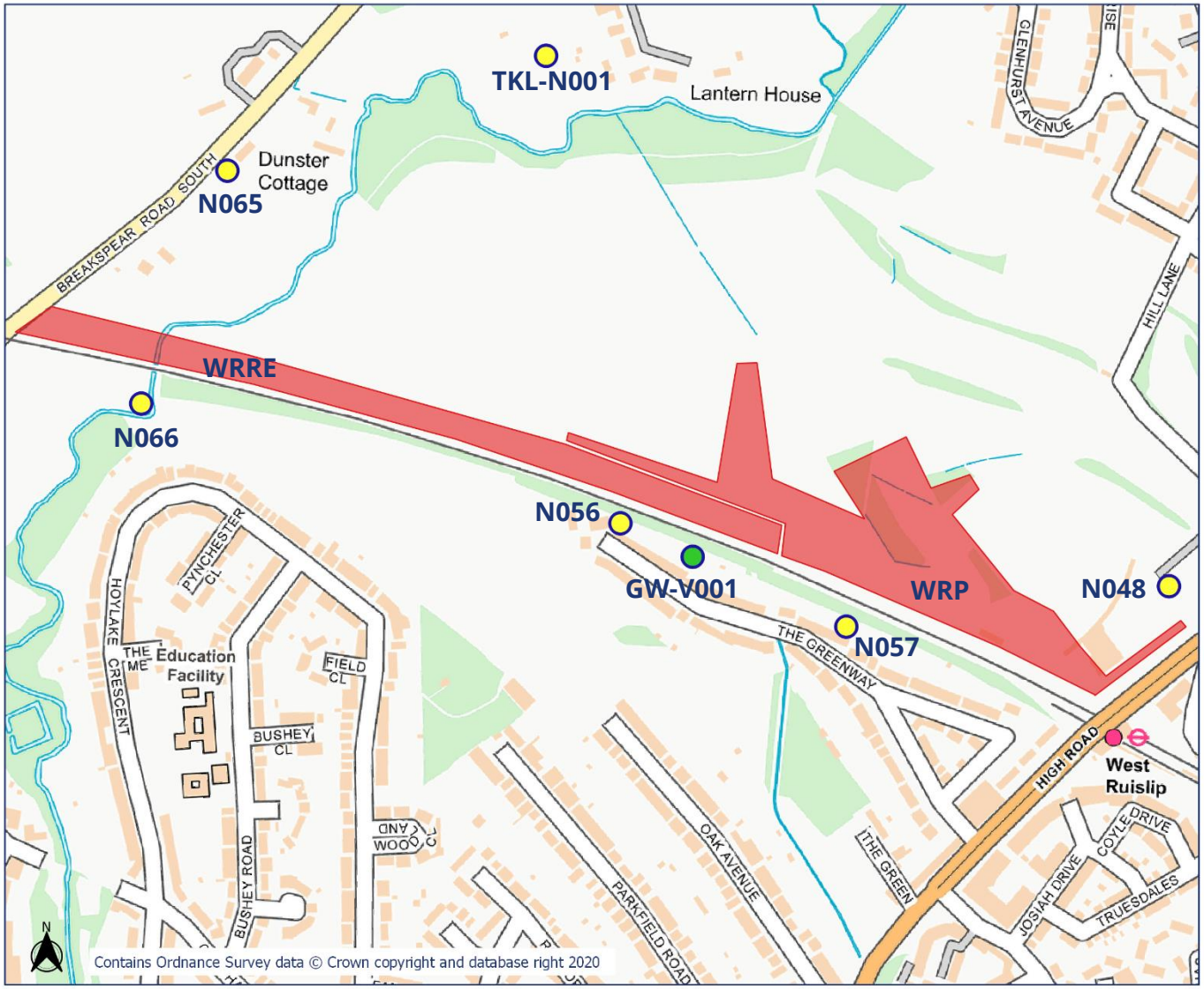
HS2 Noise and Vibration Monitoring Plan - 1



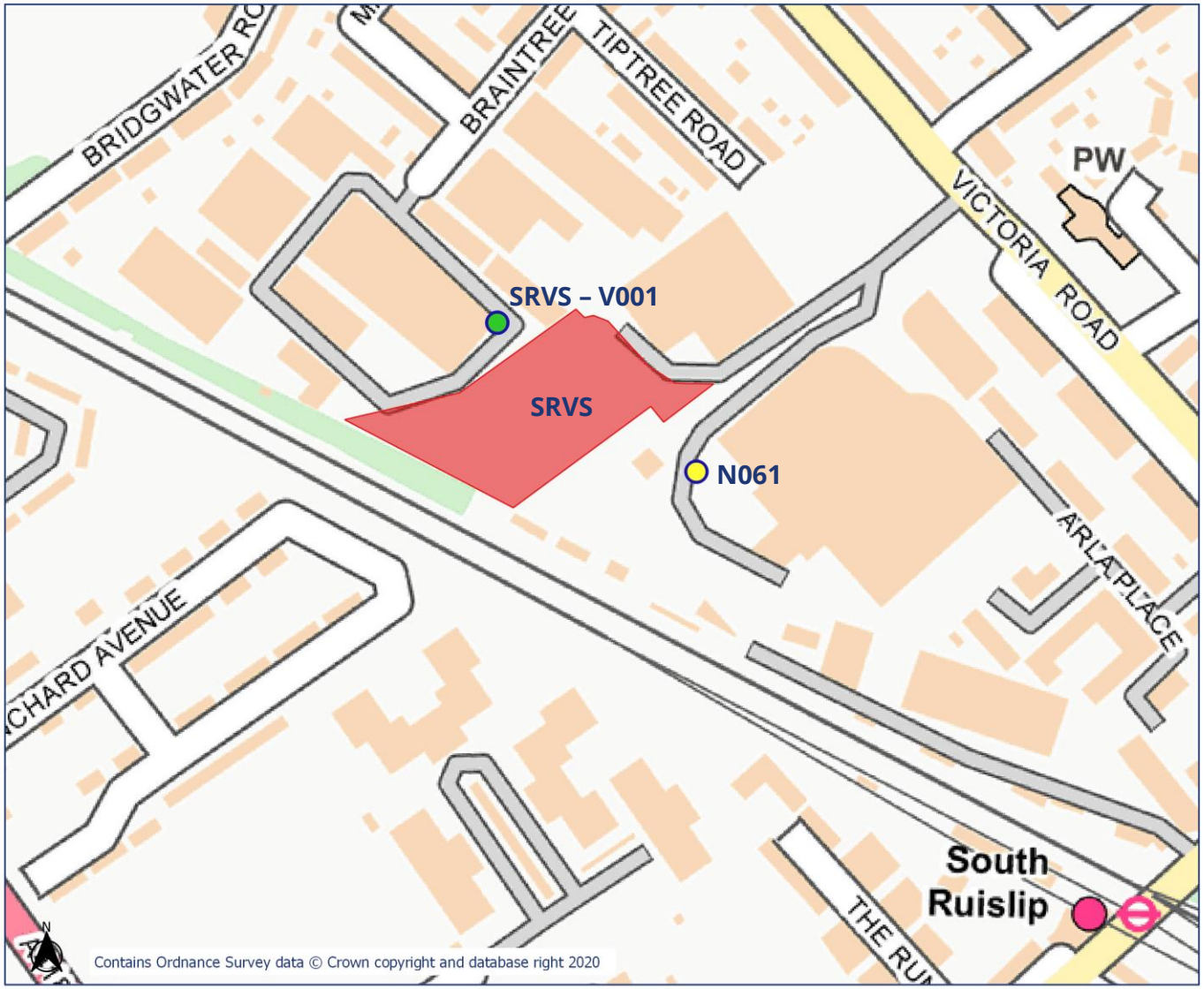
Noise and Vibration Monitoring Plan - 2



HS2 Noise and Vibration Monitoring Plan - 3



HS2 Noise and Vibration Monitoring Plan - 4



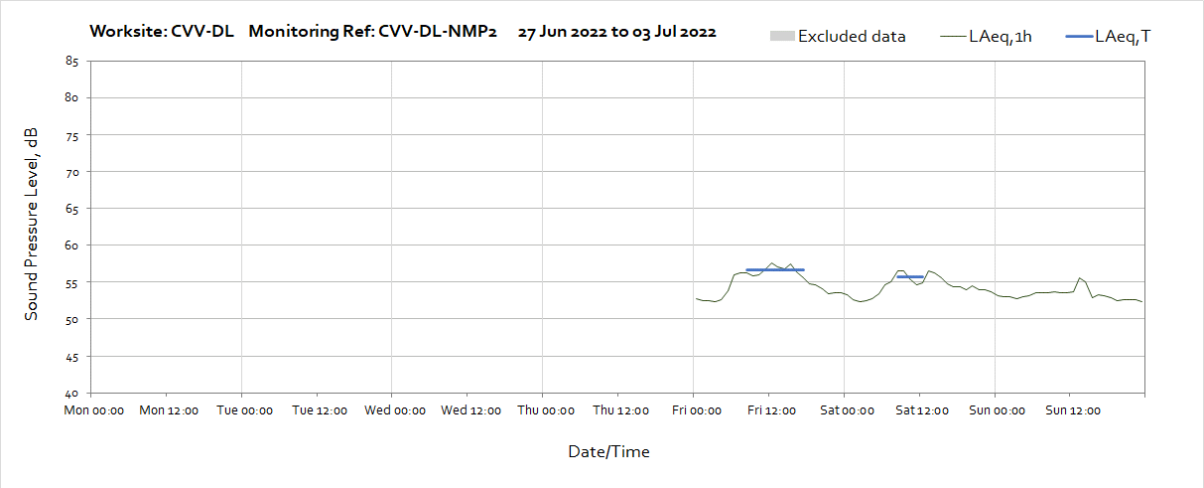
Appendix C Data

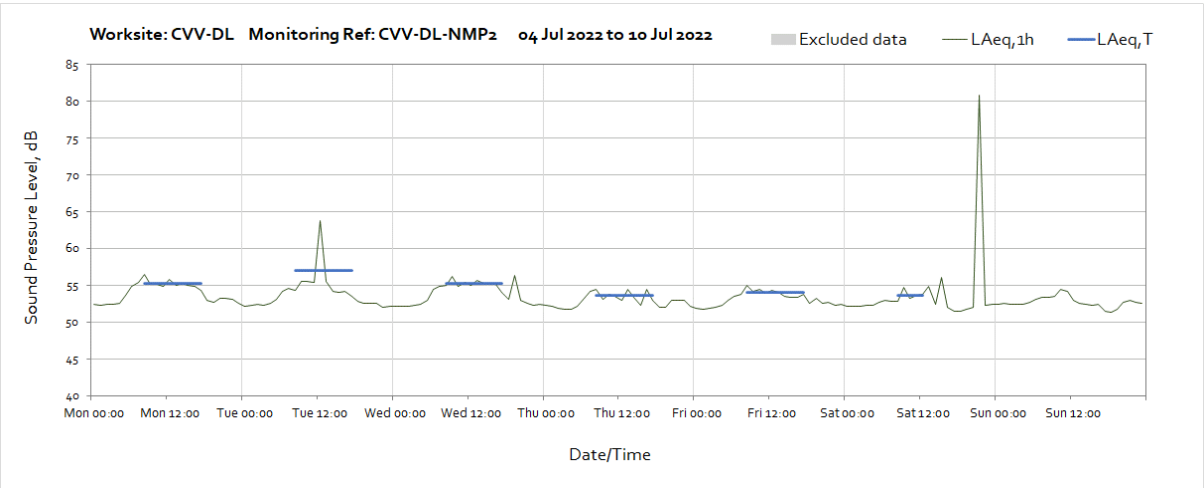
Noise

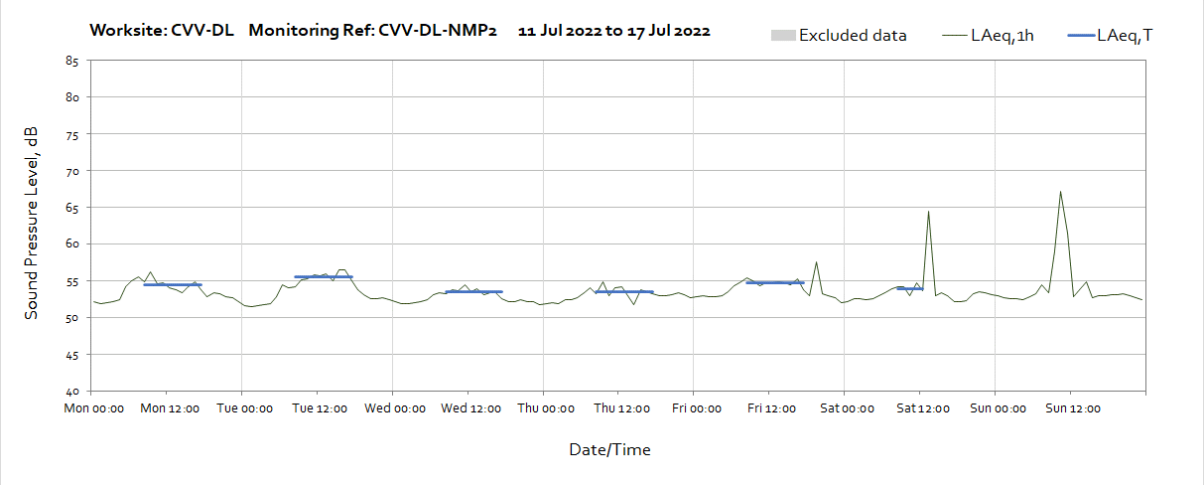
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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



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Excluded data
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LAeq,T
Sound Pressure Level, dB
85
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75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
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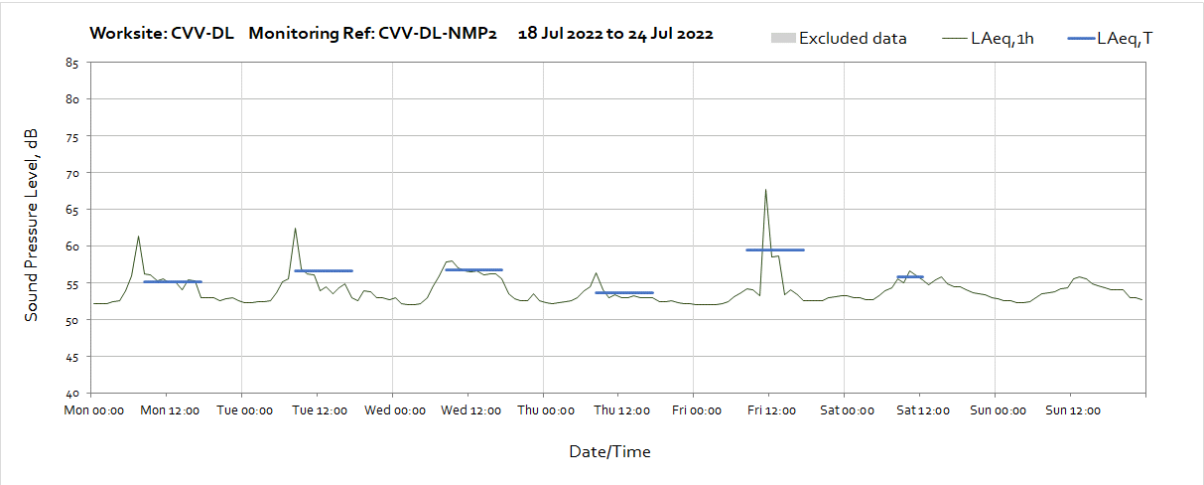
Sun 00:00
Sun 12:00
Date/Time


Worksite: CVV-DL Monitoring Ref: CVV-DL-NMP2 18 Jul 2022 to 24 Jul 2022
Excluded data
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LAeq,T
Sound Pressure Level, dB
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Tue 12:00
Wed 00:00
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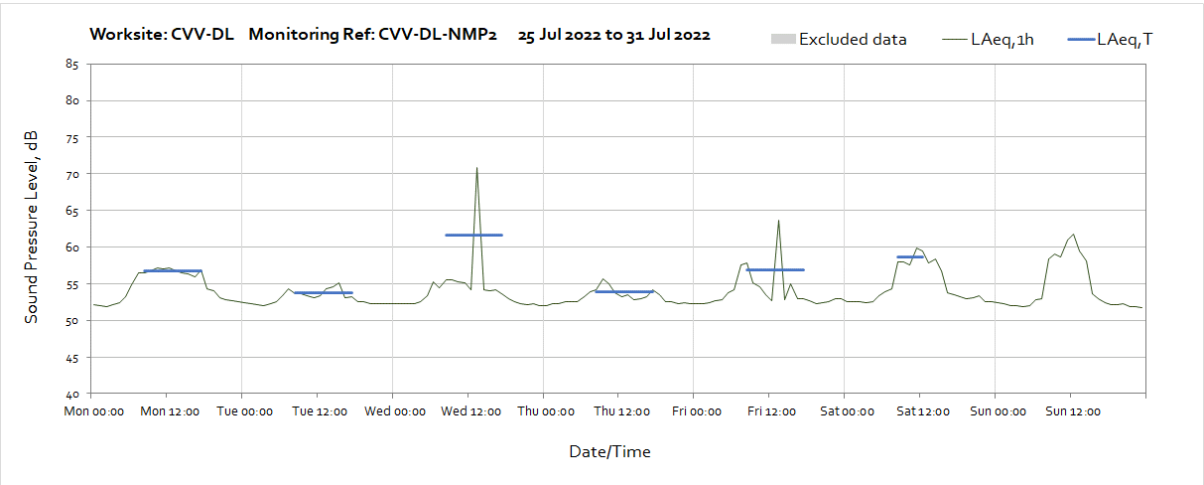
Date/Time


Worksite: CVV-DL Monitoring Ref: CVV-DL-NMP2 25 Jul 2022 to 31 Jul 2022
Excluded data
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LAeq,T
Sound Pressure Level, dB
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Tue 12:00
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Wed 12:00
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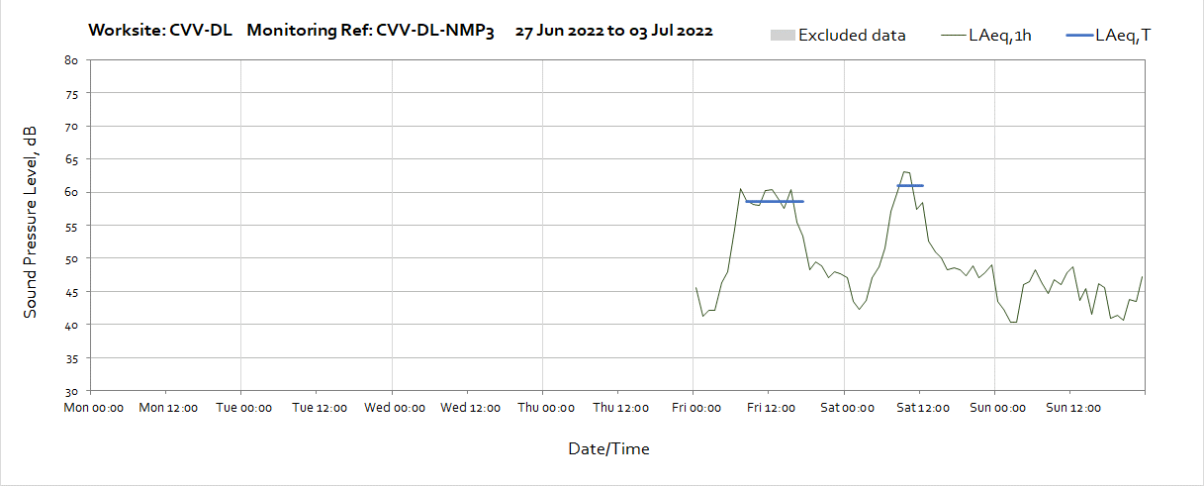
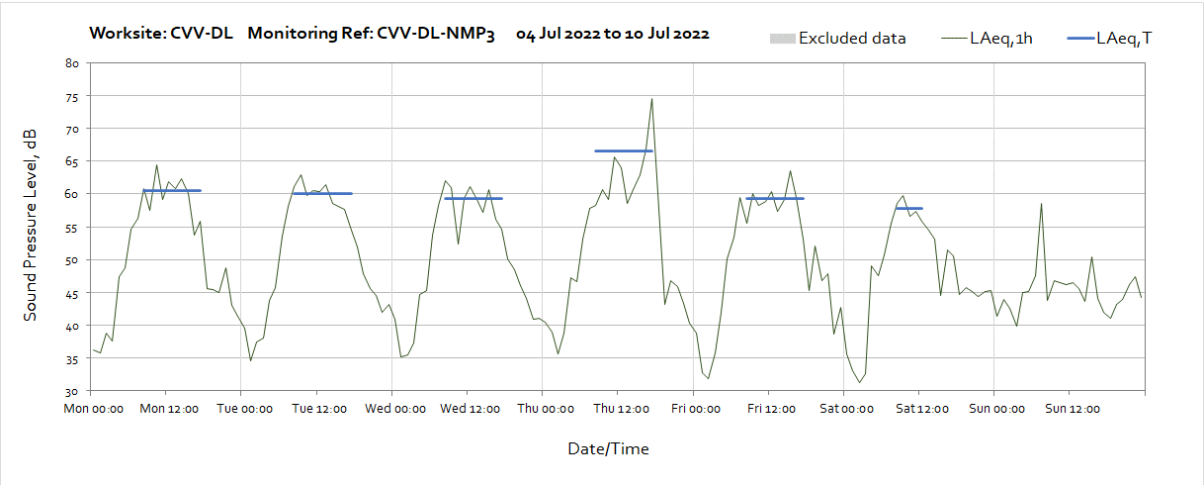
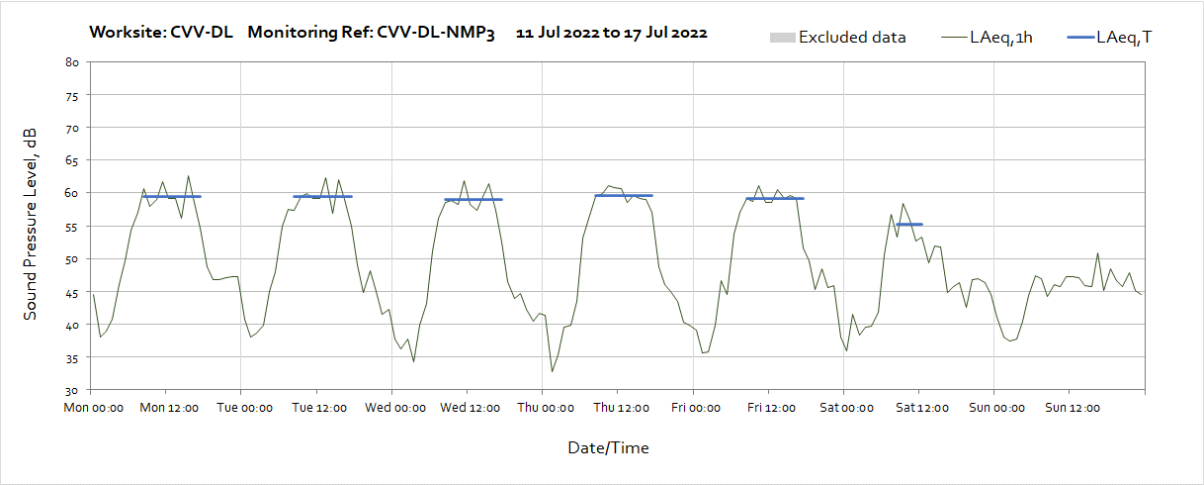
Date/Time

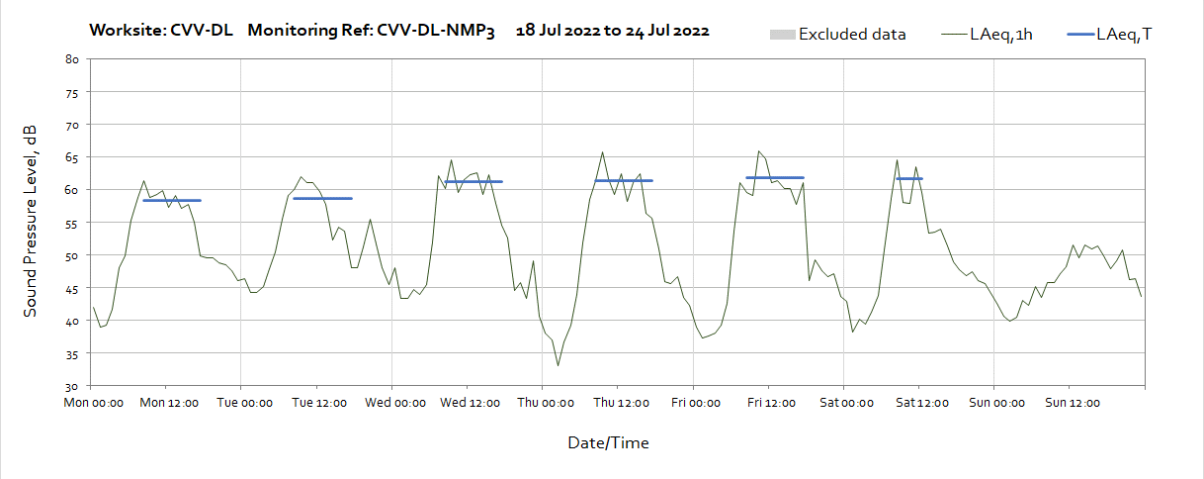
Worksite: Colne Valley Viaduct Dews Lane (CVV-DL)

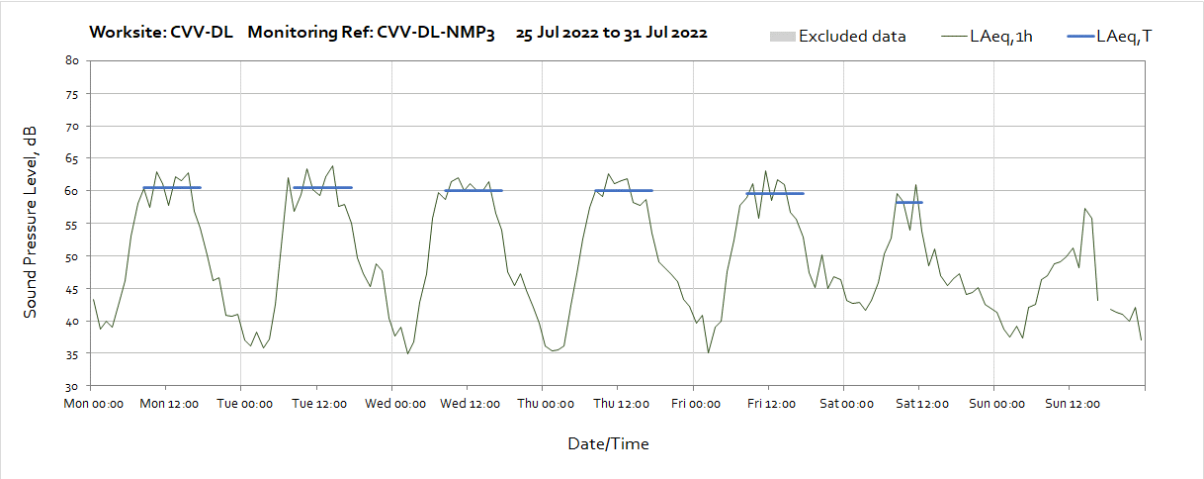
Monitoring Ref: CVV-DL-NMP3







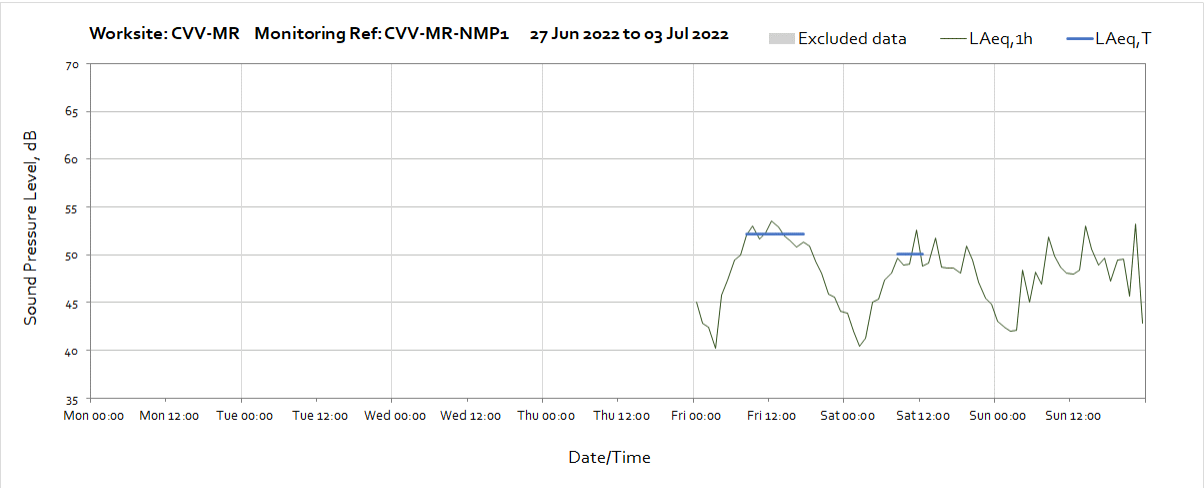


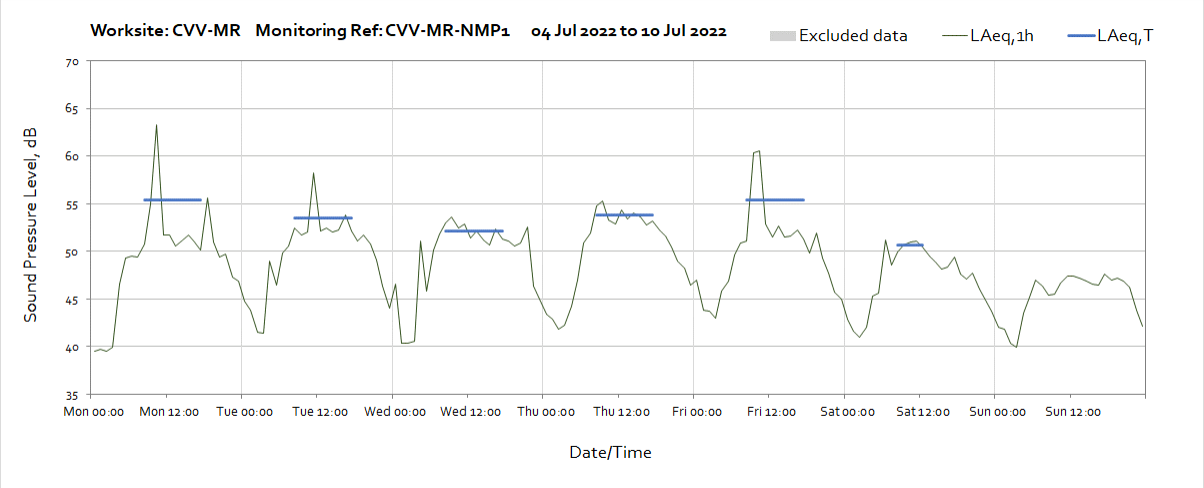


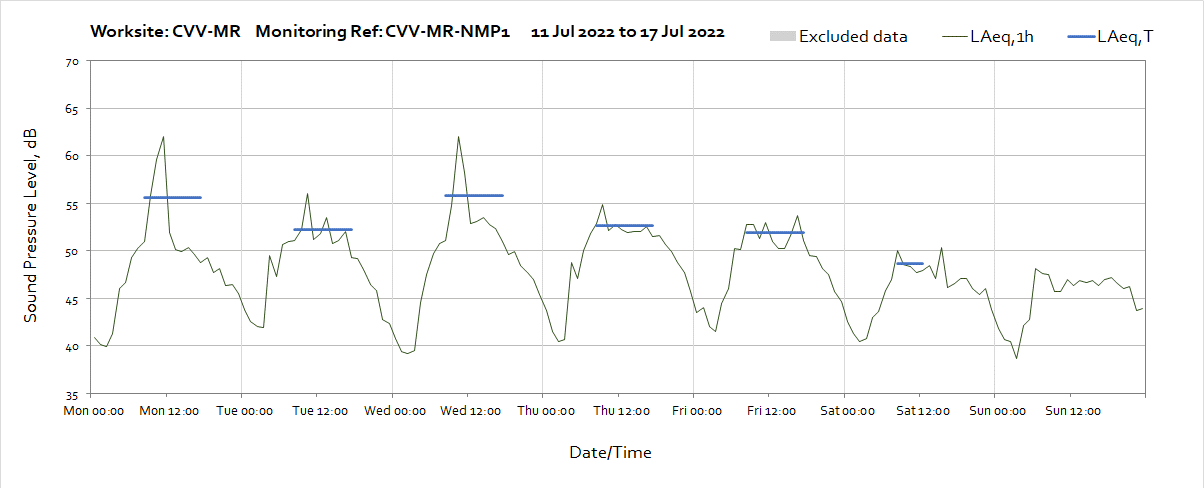
Note: Missing data at 17:00 on Sunday 31st July 2022 were due to monitor settings update.

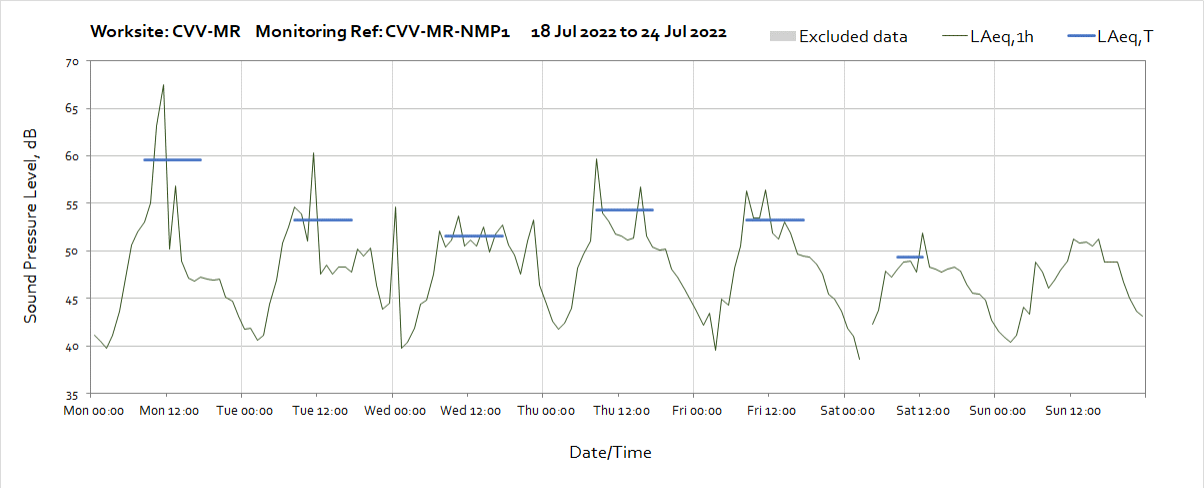
Worksite: Colne Valley Viaduct Moorhall Road (CVV-MR)

Monitoring Ref: CVV-MR-NMP1

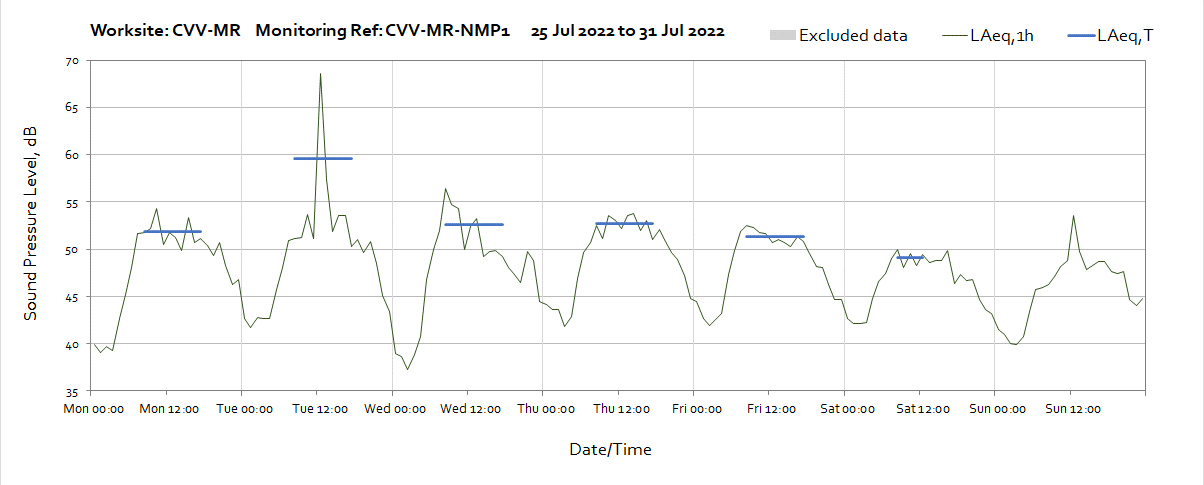






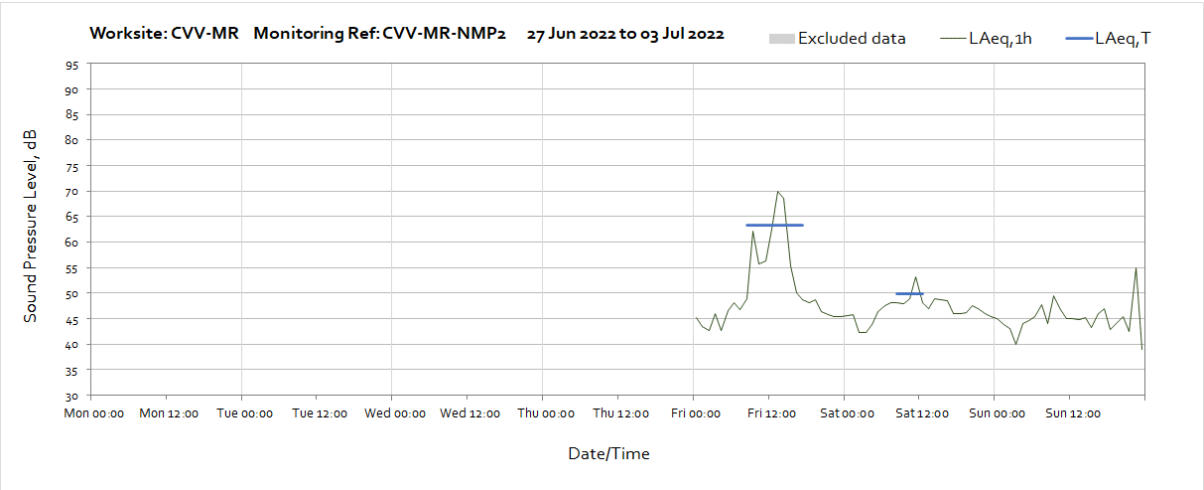


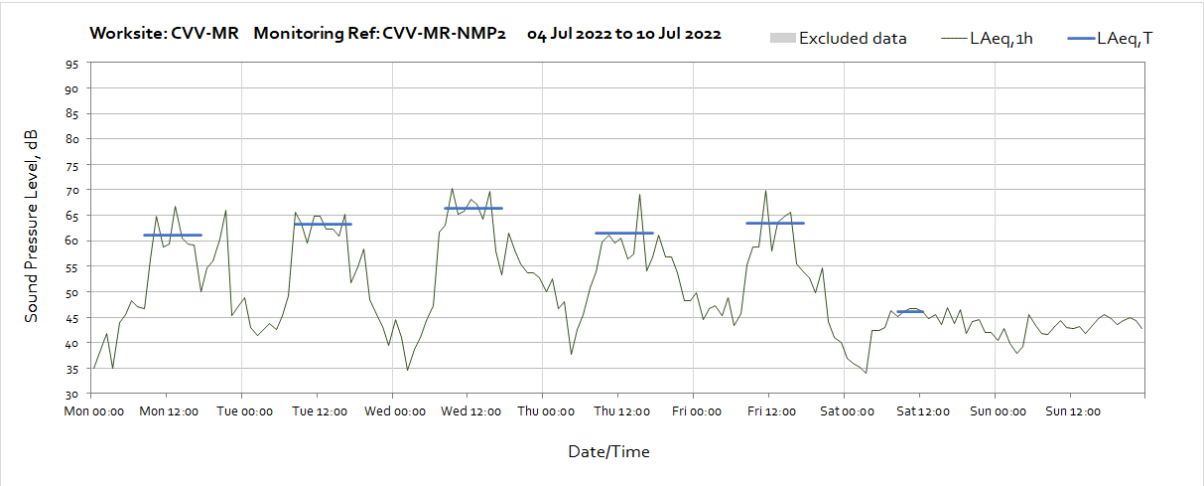
Note: Missing data at 03:00 on Saturday 23rd July 2022 were due to monitor settings update.

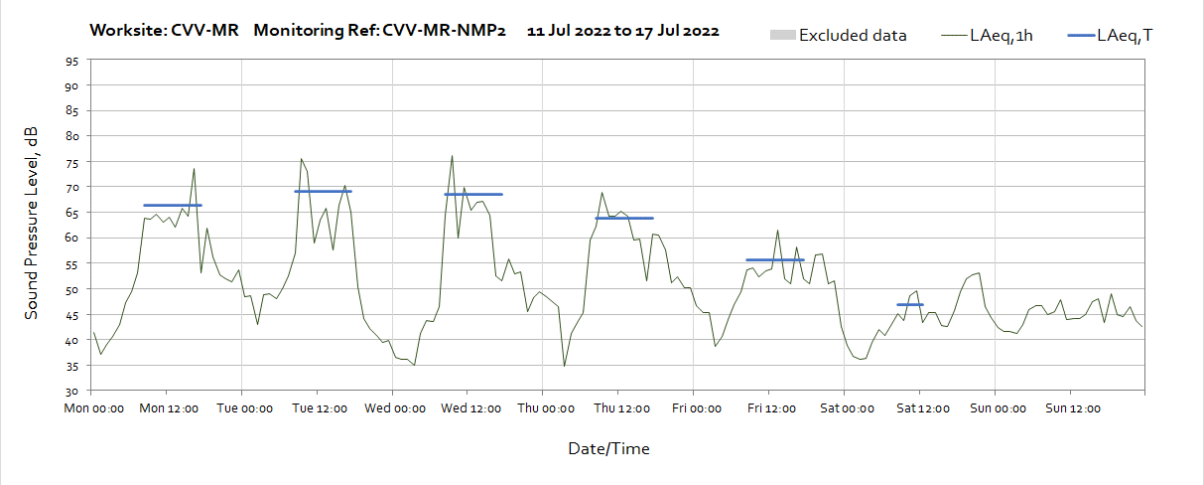


Worksite: Colne Valley Viaduct Moorhall Road (CVV-MR)

Monitoring Ref: CVV-MR-NMP2



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LAeq,T
Sound Pressure Level, dB
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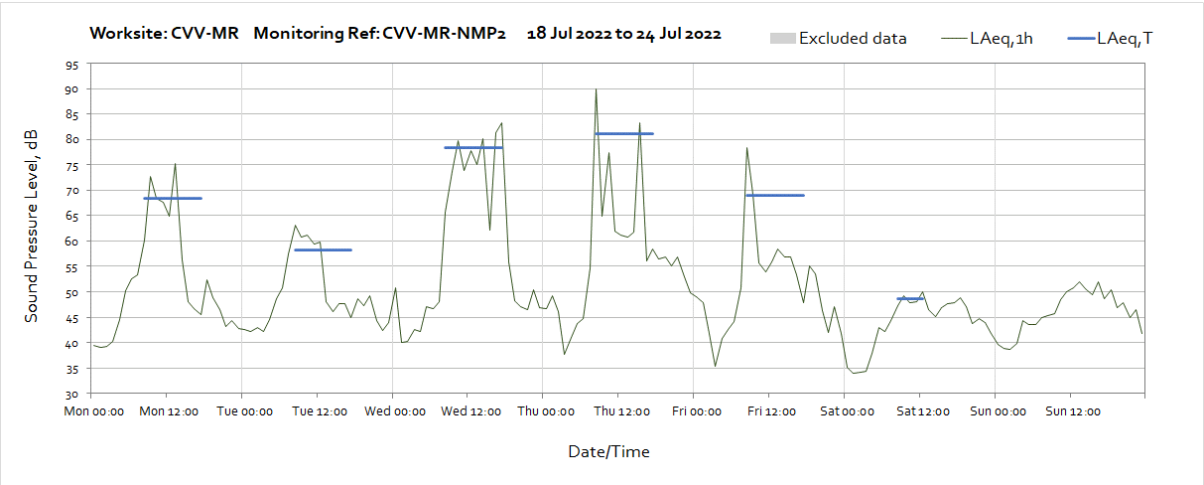
Date/Time


Worksite: CVV-MR Monitoring Ref: CVV-MR-NMP2 18 Jul 2022 to 24 Jul 2022
Excluded data
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LAeq,T
Sound Pressure Level, dB
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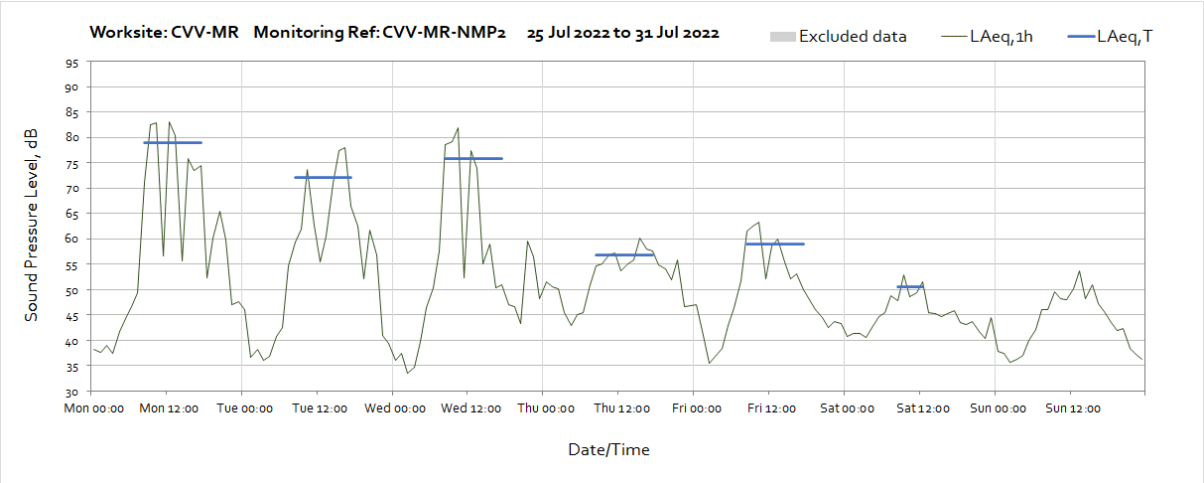
Date/Time


Worksite: CVV-MR Monitoring Ref: CVV-MR-NMP2 25 Jul 2022 to 31 Jul 2022
Excluded data
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LAeq,T
Sound Pressure Level, dB
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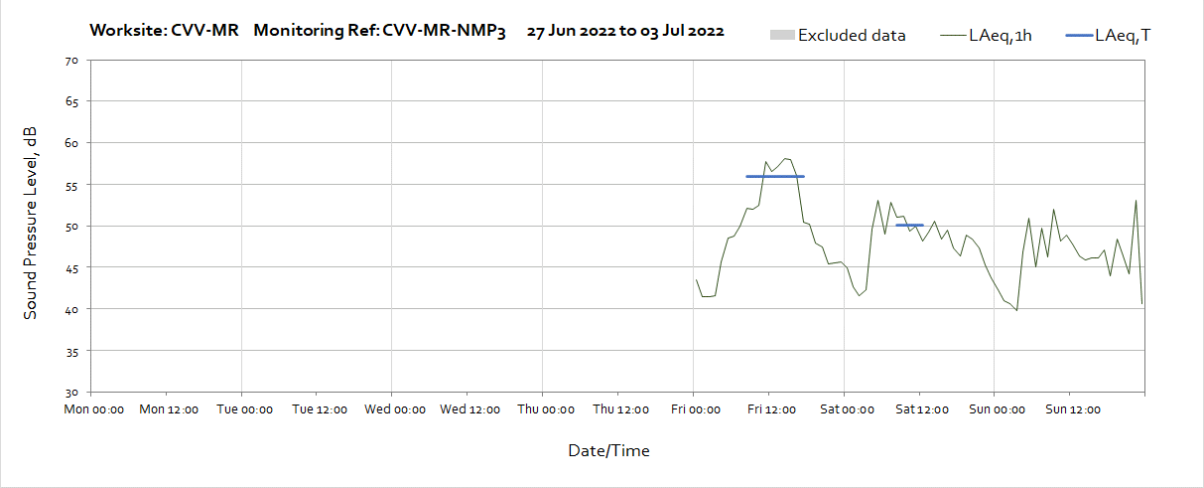
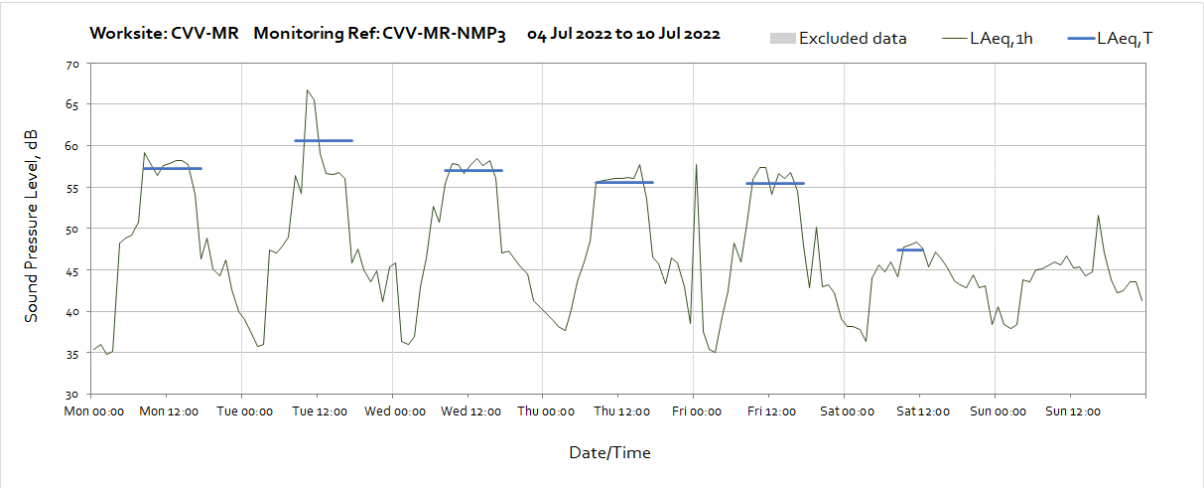
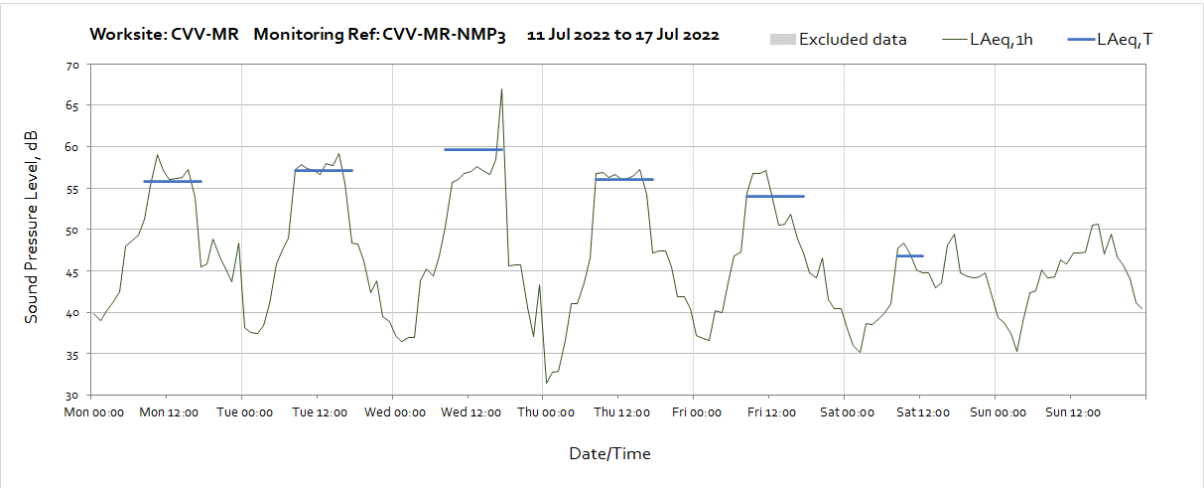
Date/Time

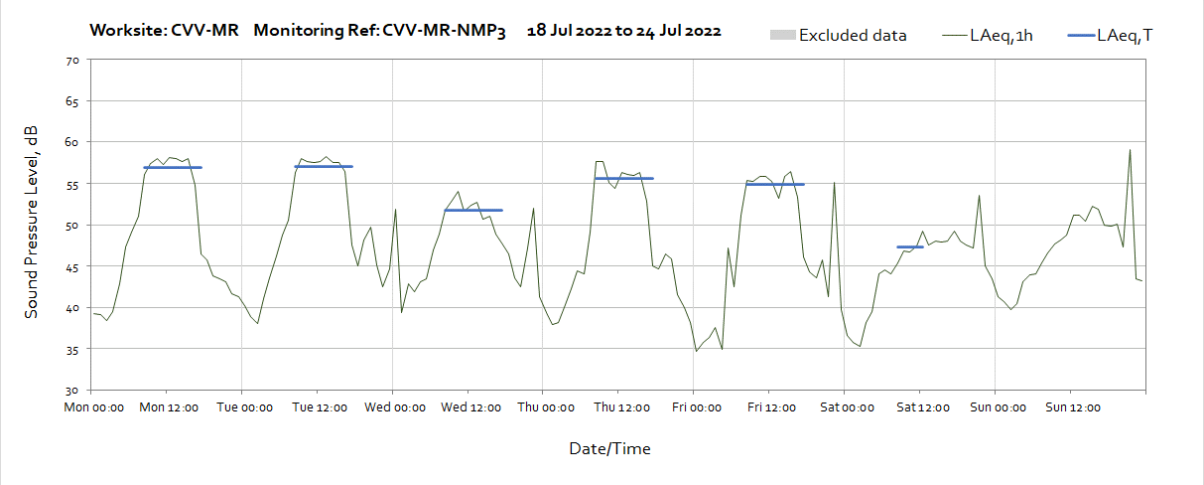
Worksite: Colne Valley Viaduct Moorhall Road (CVV-MR)

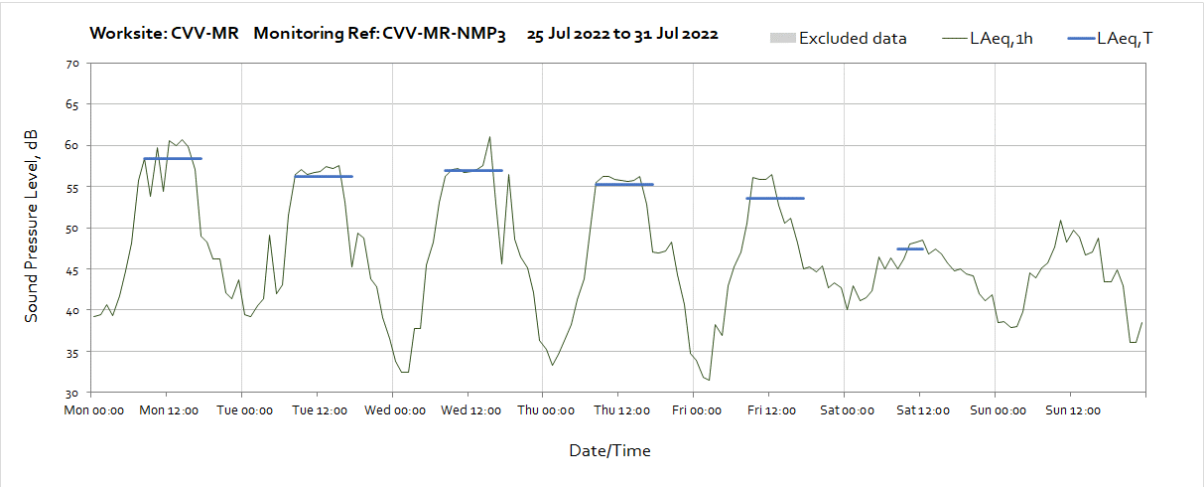
Monitoring Ref: CVV-MR-NMP3



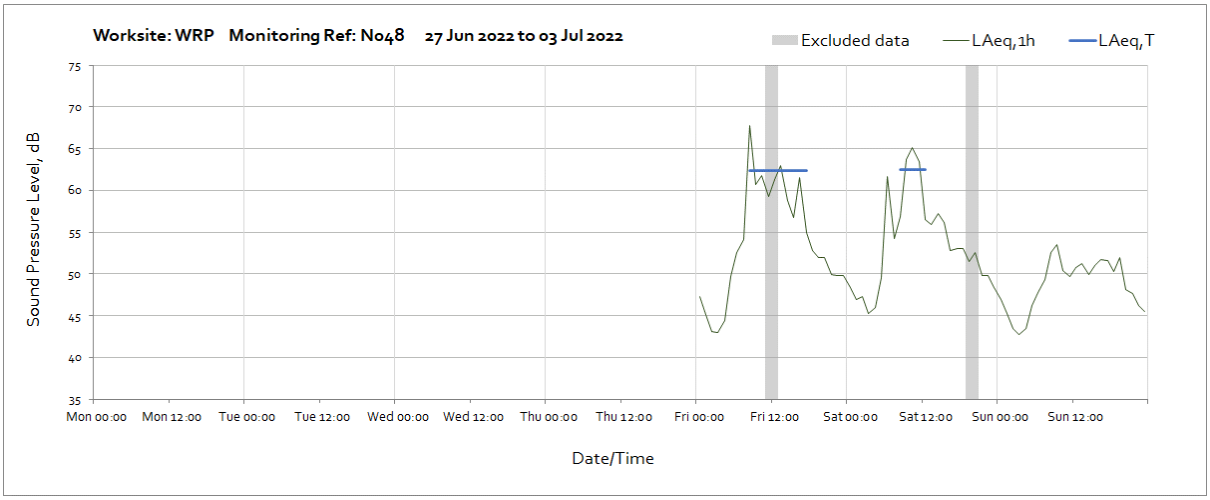


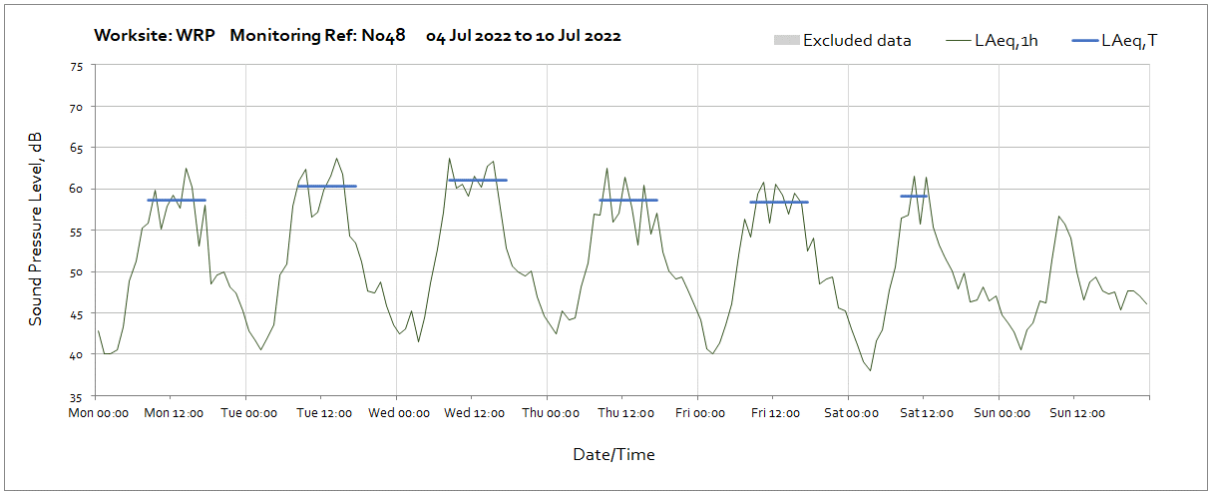






Worksite: West Ruislip Portal (WRP) – Monitoring Ref: N048




Worksite: WRP Monitoring Ref: No48 04 Jul 2022 to 10 Jul 2022
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LAeq,T
Sound Pressure Level, dB
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70
65
60
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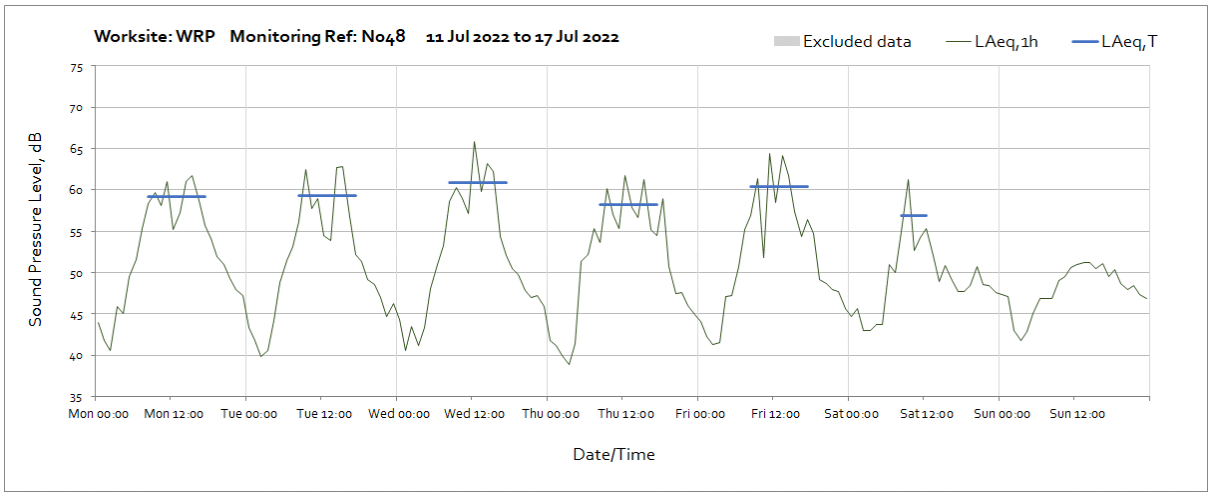
Sun 12:00
Date/Time


Worksite: WRP Monitoring Ref: No48 11 Jul 2022 to 17 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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70
65
60
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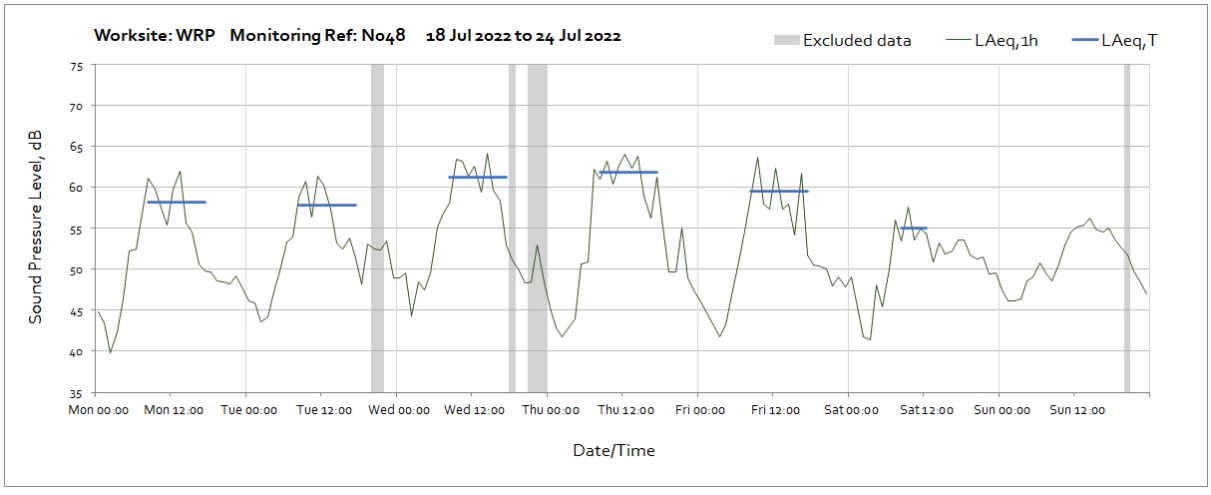
Date/Time


Worksite: WRP Monitoring Ref: No48 18 Jul 2022 to 24 Jul 2022
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LAeq,T
Sound Pressure Level, dB
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Tue 12:00
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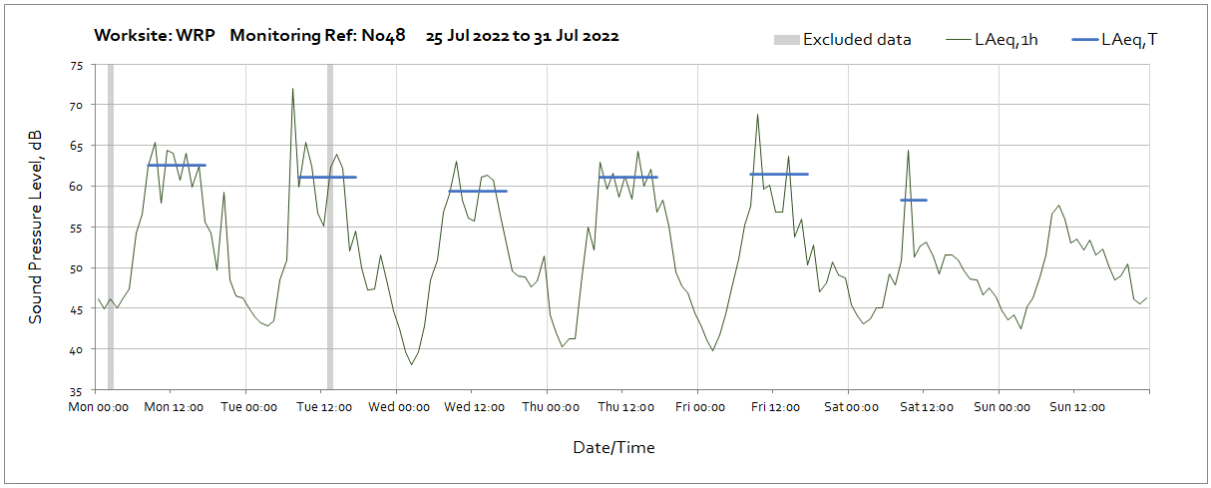
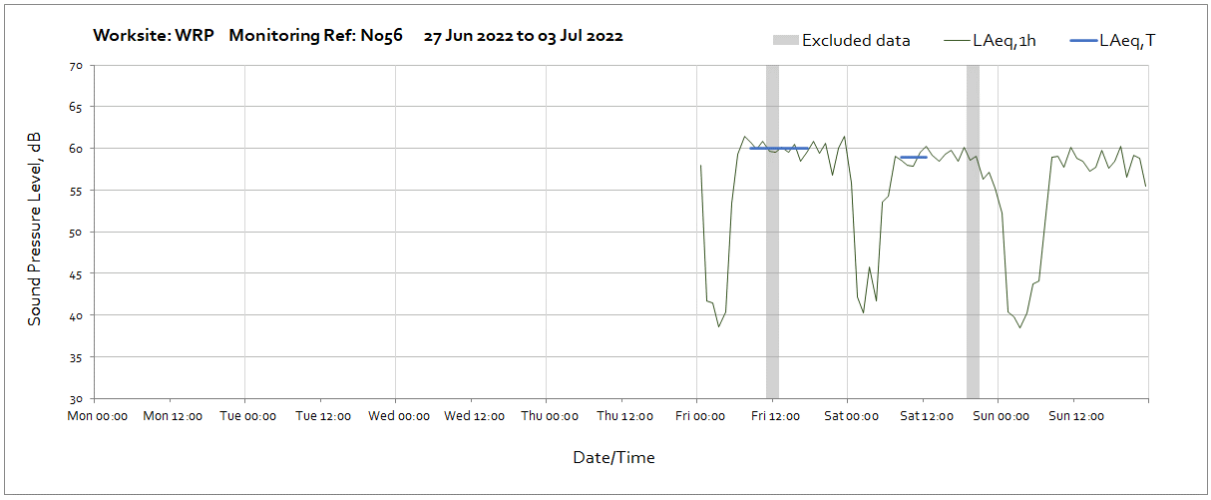
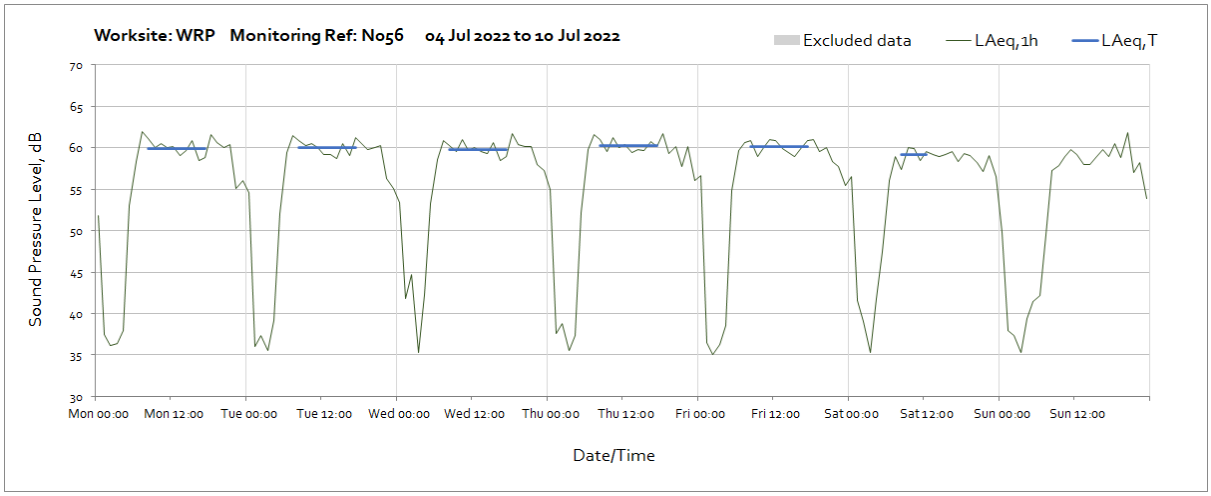
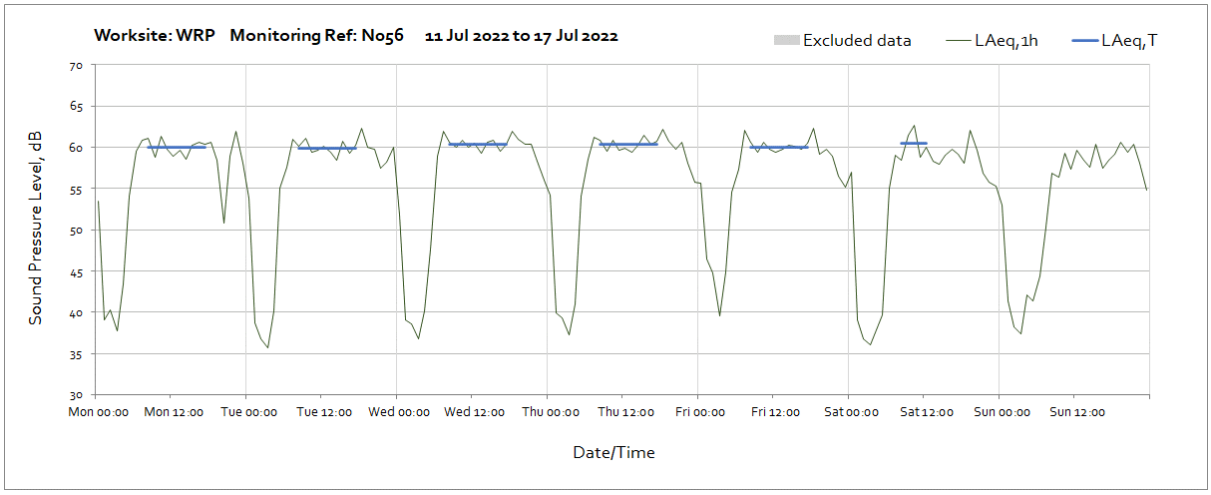
Date/Time

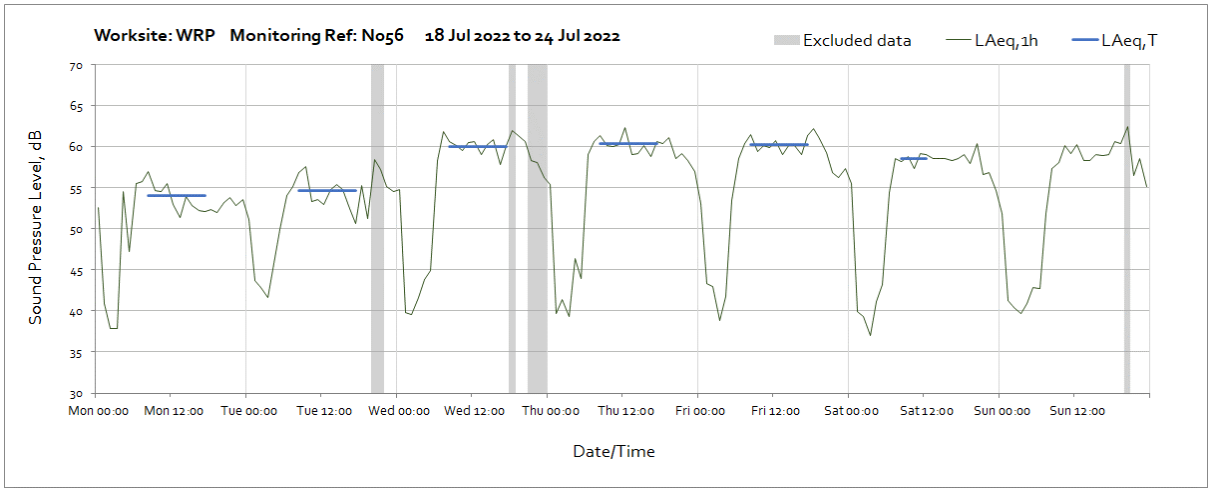


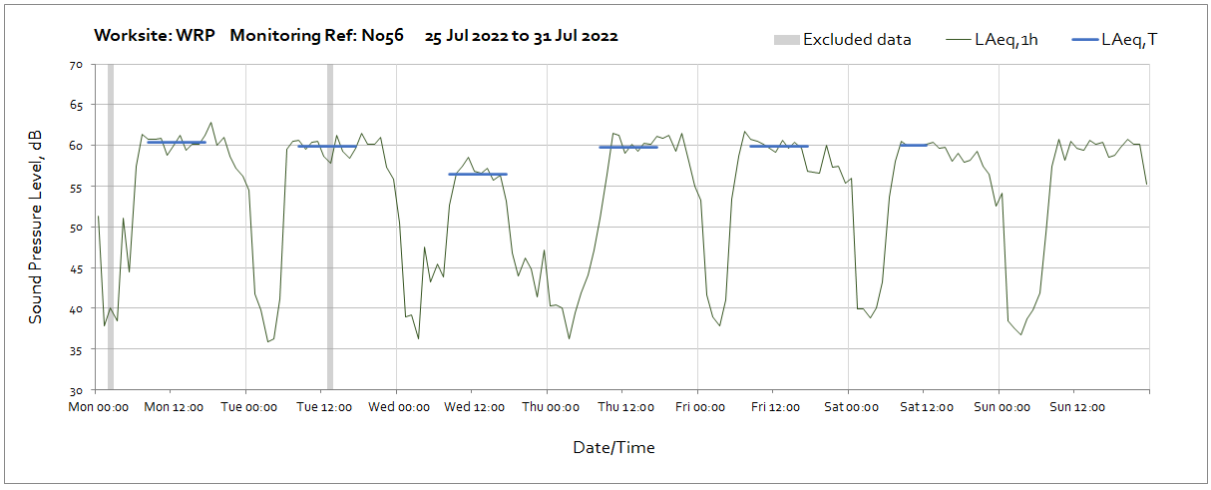
Worksite: West Ruislip Portal (WRP) – Monitoring Ref: N056



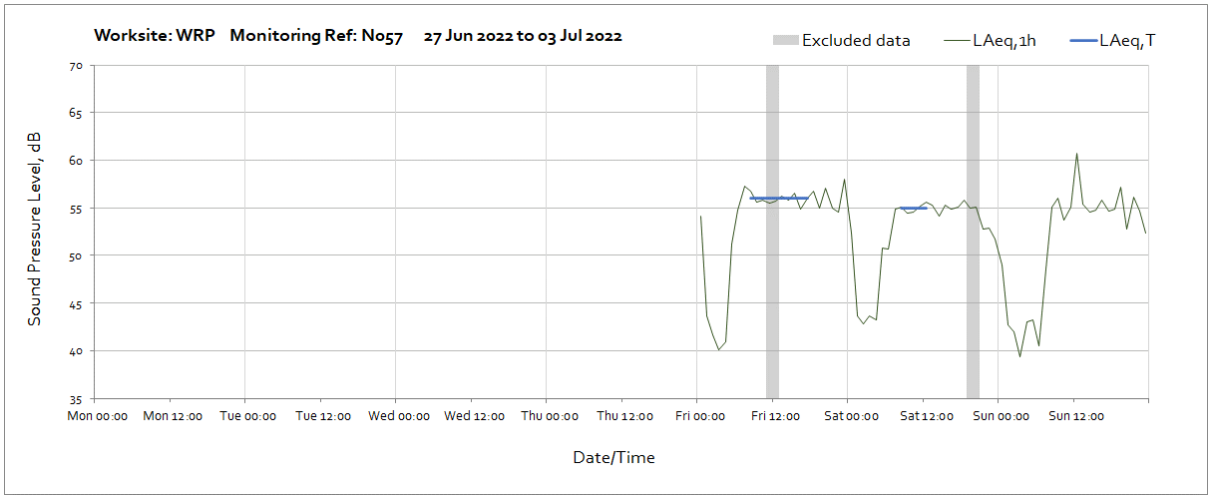


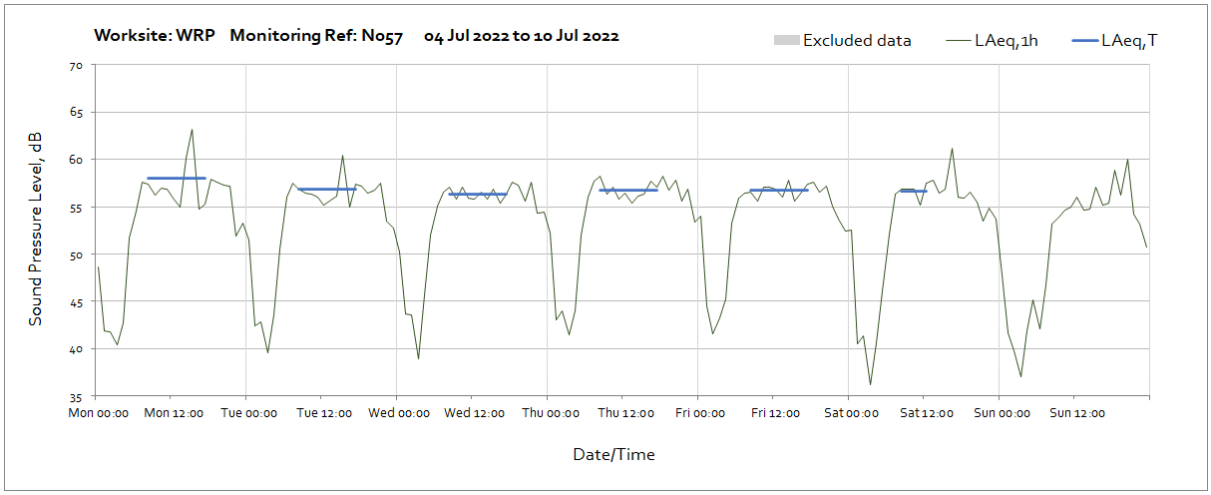

Worksite: WRP Monitoring Ref: No56 11 Jul 2022 to 17 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
70
65
60
55
50
45
40
35
30
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

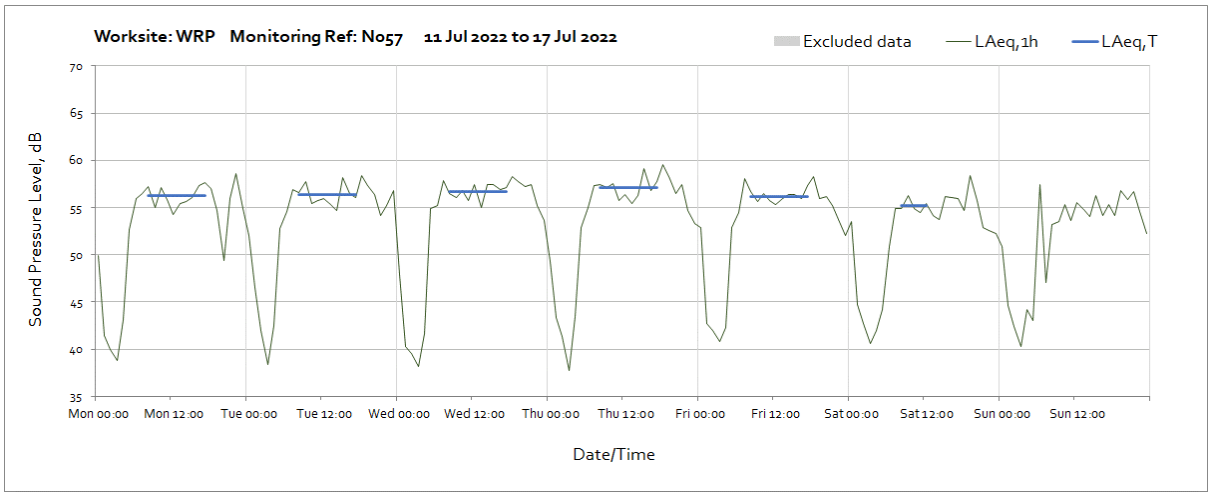

Worksite: WRP Monitoring Ref: No56 18 Jul 2022 to 24 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
70
65
60
55
50
45
40
35
30
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

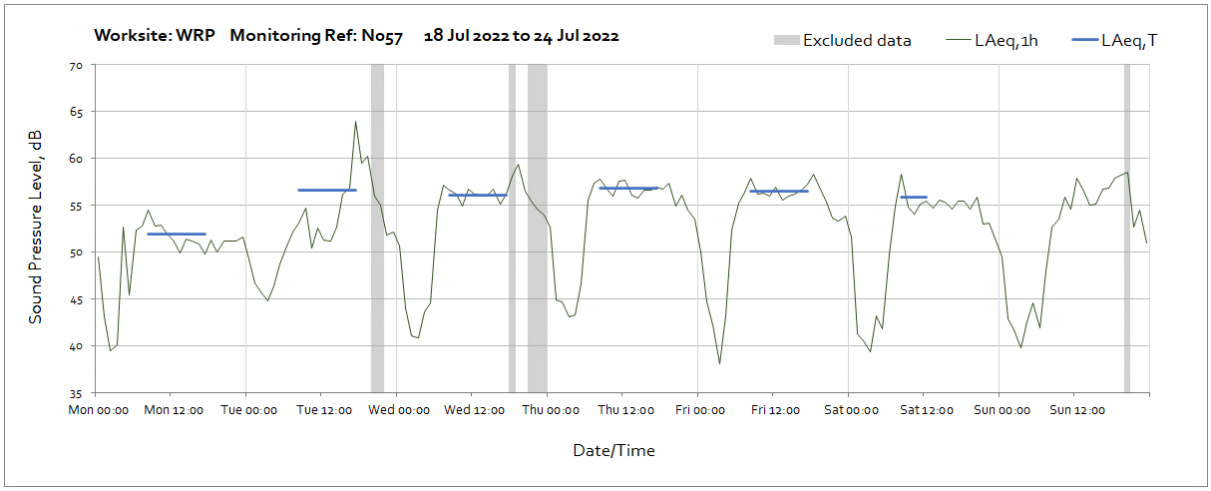

Worksite: WRP Monitoring Ref: No56 25 Jul 2022 to 31 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
70
65
60
55
50
45
40
35
30
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

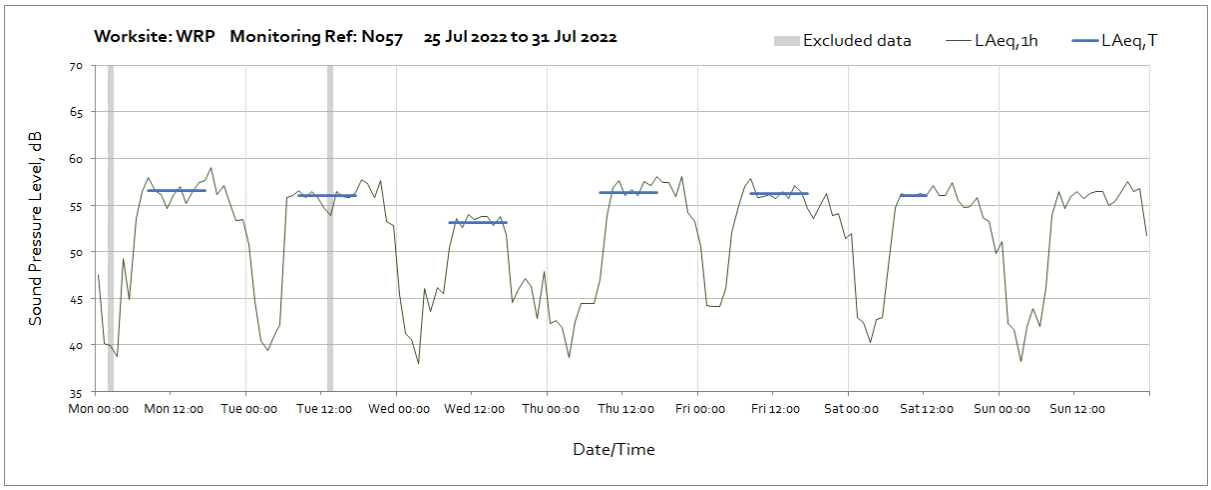
Worksite: West Ruislip Portal (WRP) – Monitoring Ref: N057



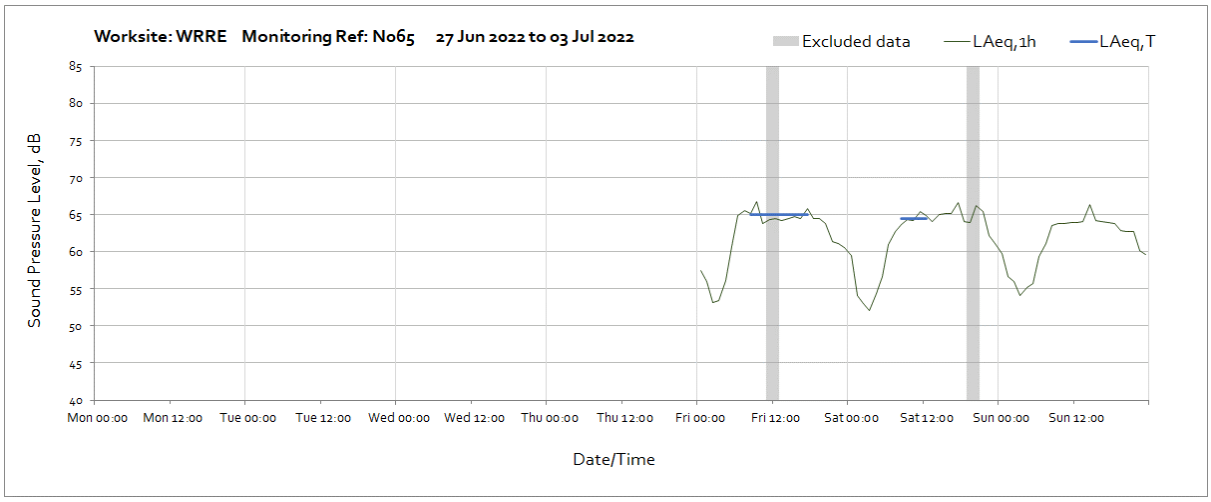


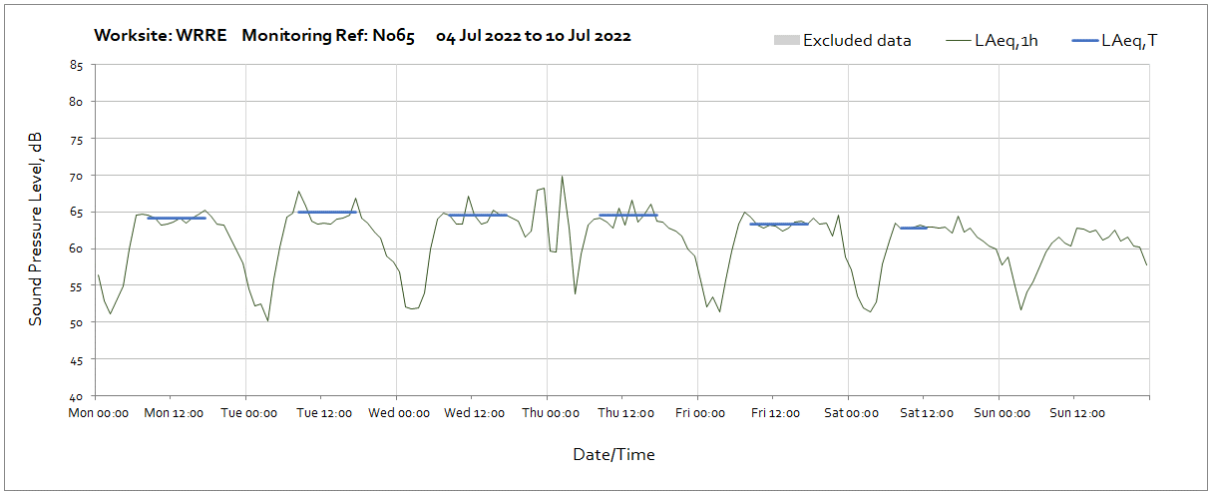


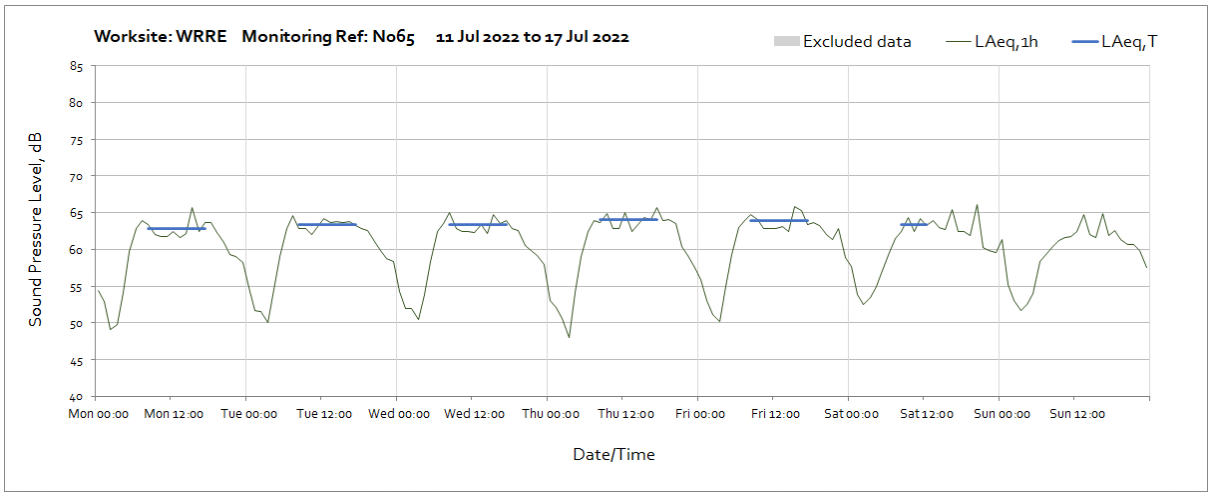


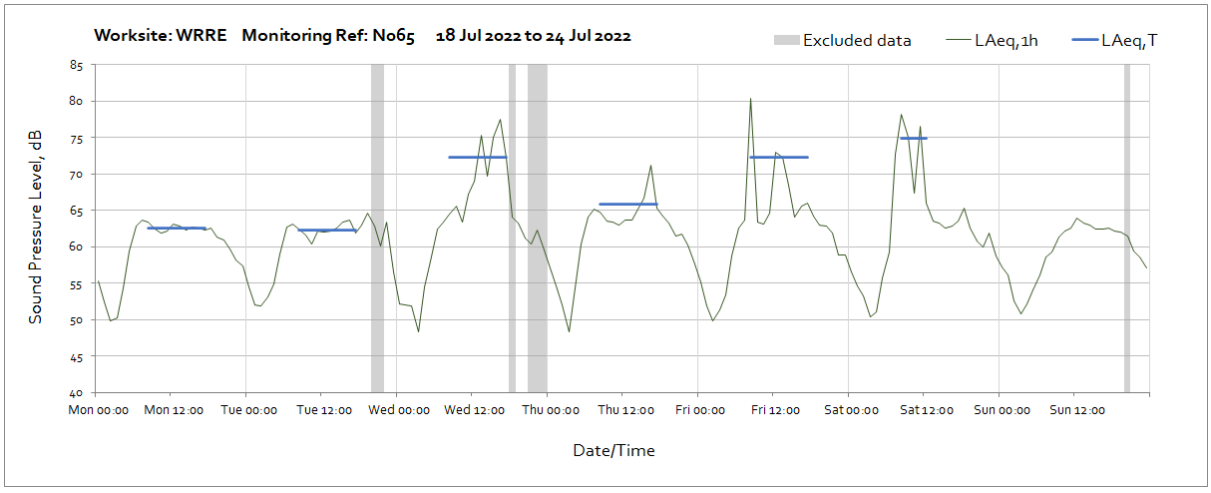


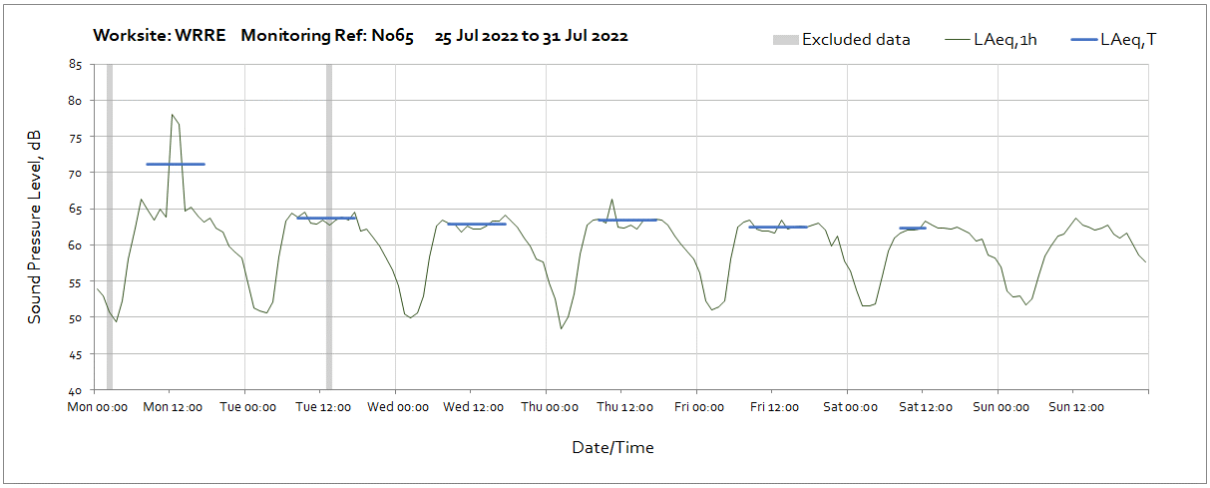
Worksite: West Ruislip Retained Embankment (WRRE) – Monitoring Ref: N065



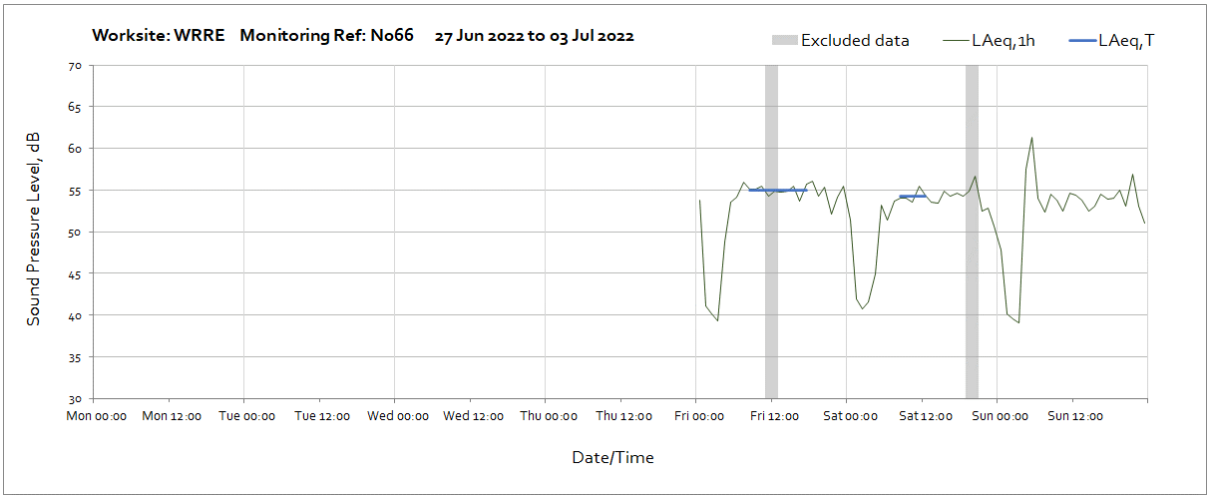

Worksite: WRRE Monitoring Ref: No65 04 Jul 2022 to 10 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

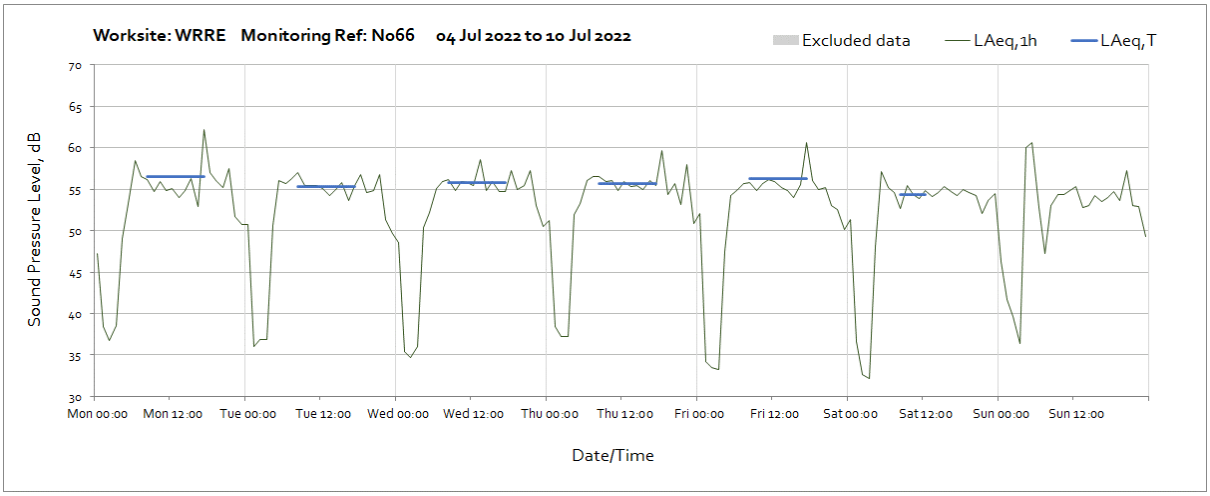

Worksite: WRRE Monitoring Ref: No65 11 Jul 2022 to 17 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

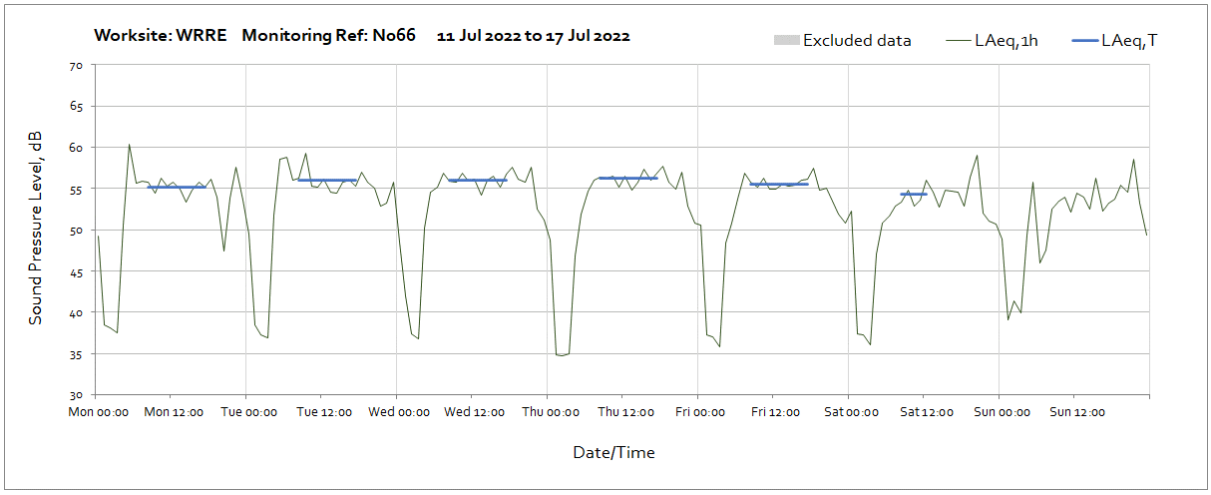

Worksite: WRRE Monitoring Ref: No65 18 Jul 2022 to 24 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

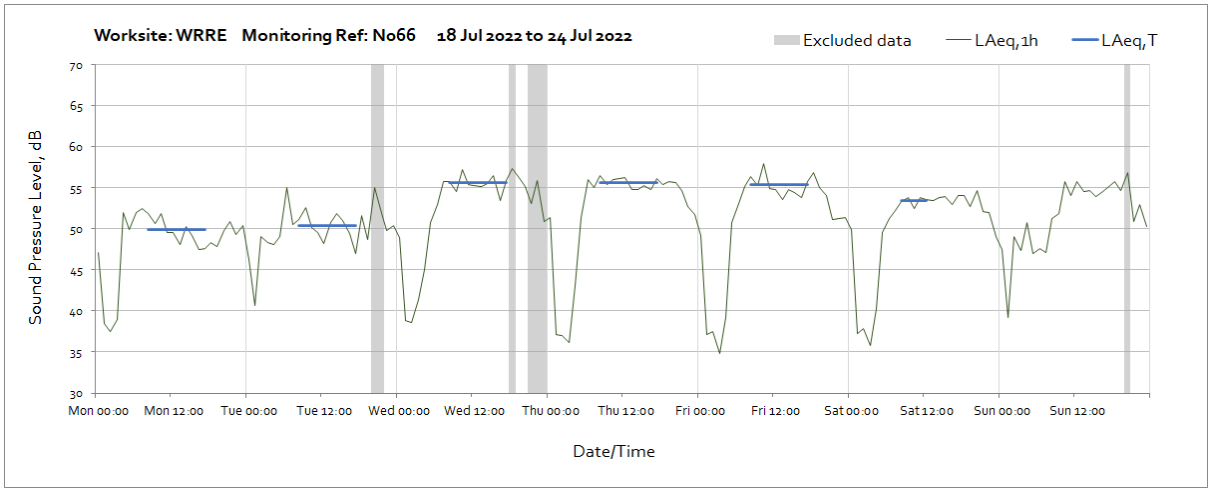


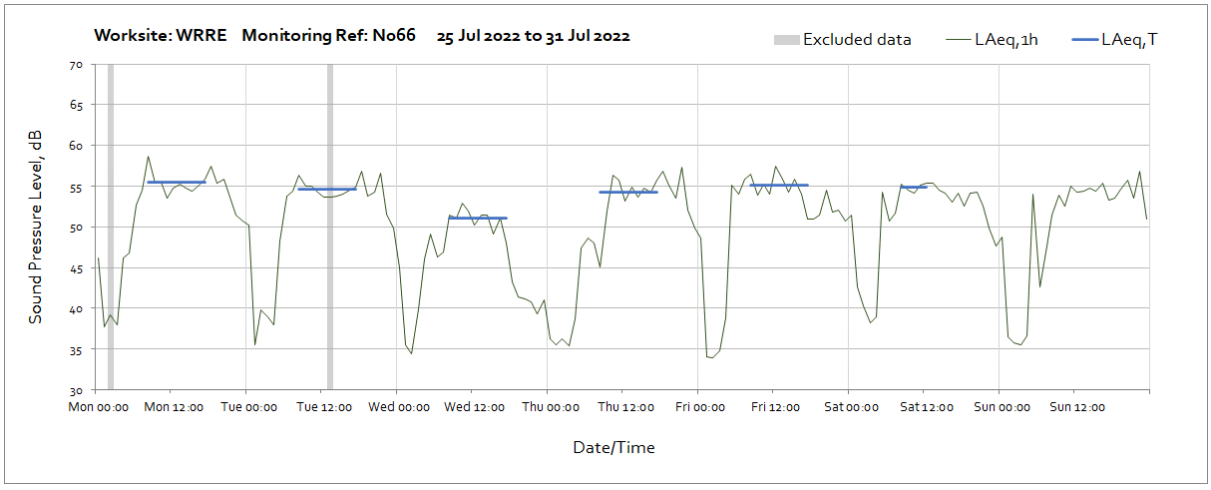
Worksite: West Ruislip Retained Embankment (WRRE) – Monitoring Ref: N066



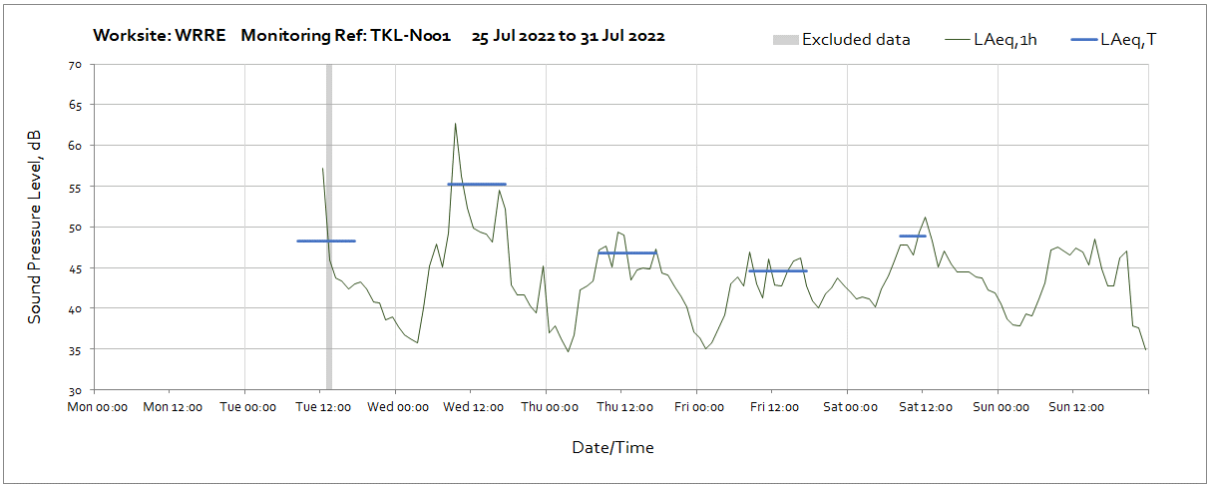



Worksite: WRRE Monitoring Ref: No66 11 Jul 2022 to 17 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
70
65
60
55
50
45
40
35
30
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: WRRE Monitoring Ref: No66 18 Jul 2022 to 24 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
70
65
60
55
50
45
40
35
30
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

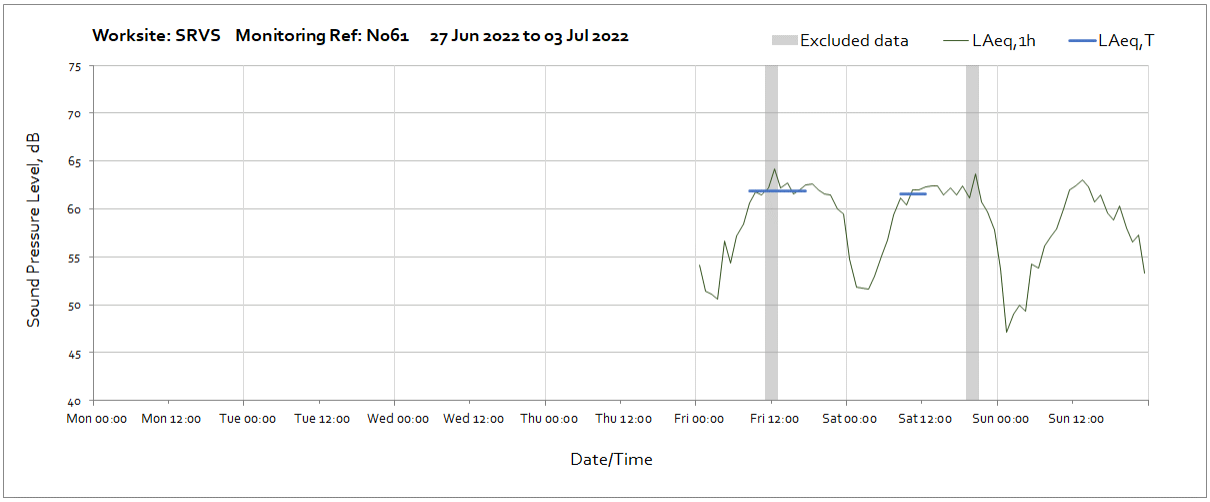

Worksite: WRRE Monitoring Ref: No66 25 Jul 2022 to 31 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
70
65
60
55
50
45
40
35
30
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

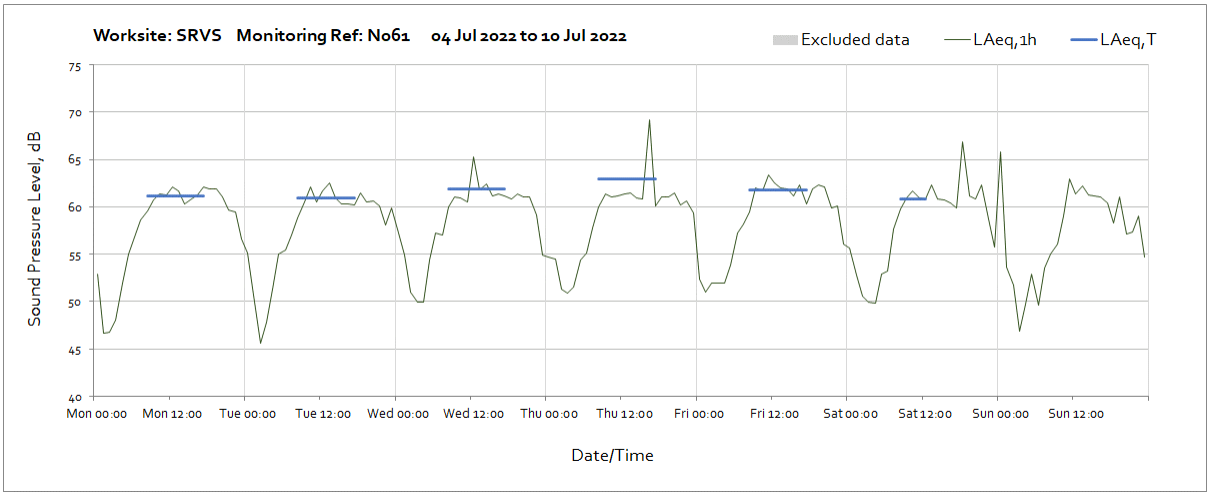
Worksite: West Ruislip Retained Embankment (WRRE) – Monitoring Ref: TKL-N001

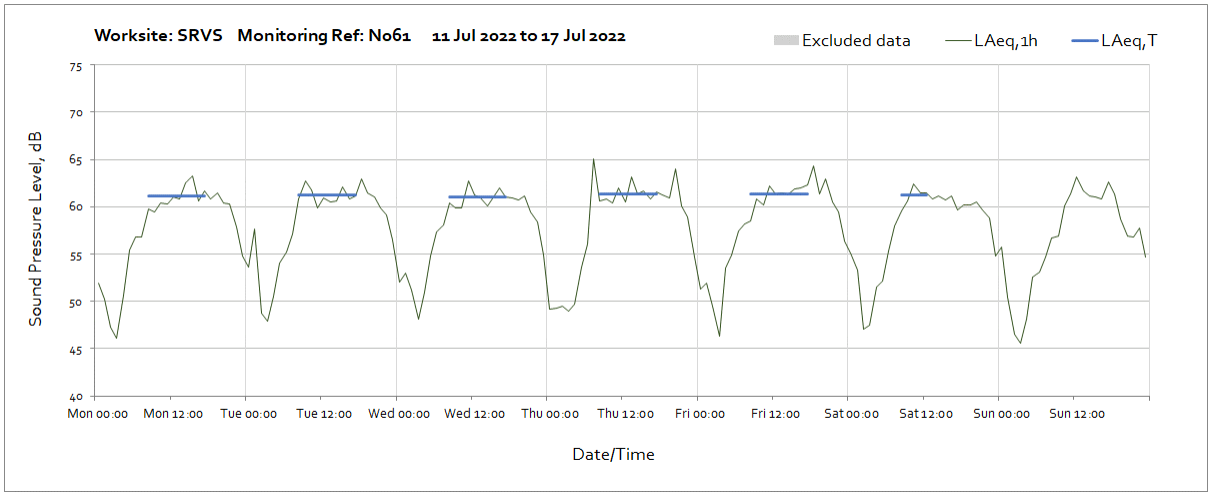


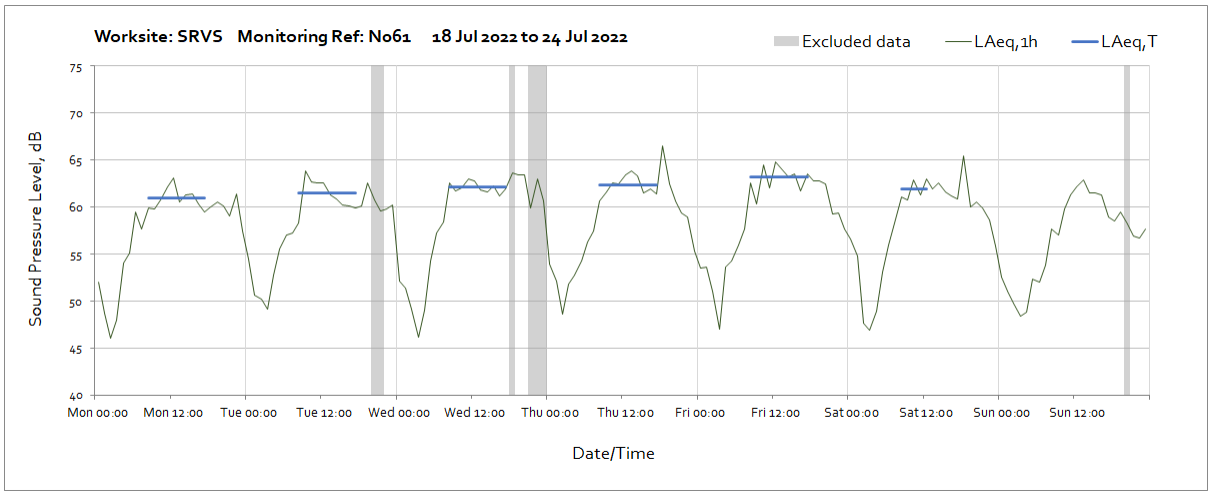
Note: Noise monitor installed at 12:00 on Tuesday 26th July.

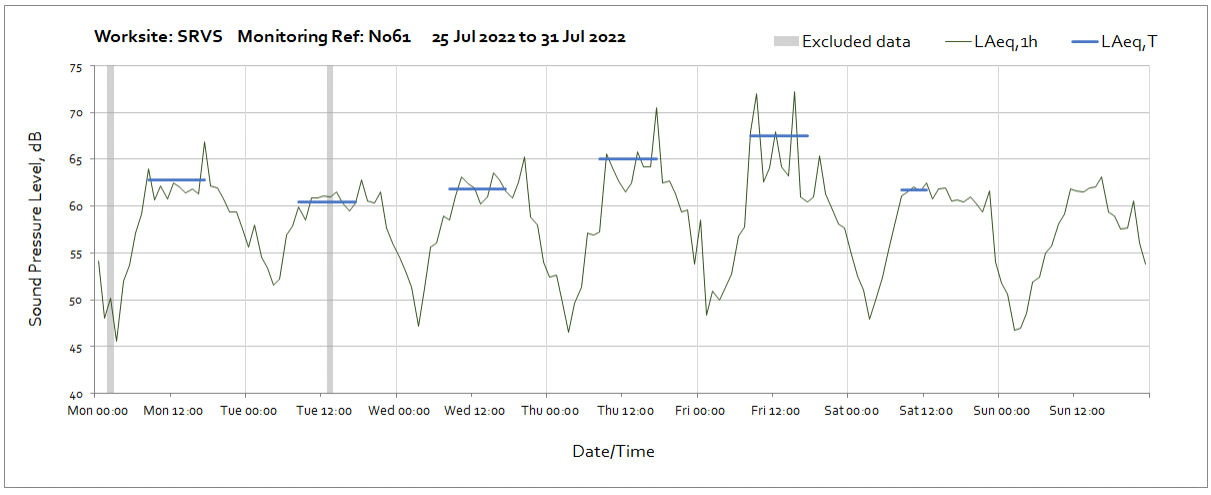
Worksite: South Ruislip Ventilation Shaft (SRVS) – Monitoring Ref: N061



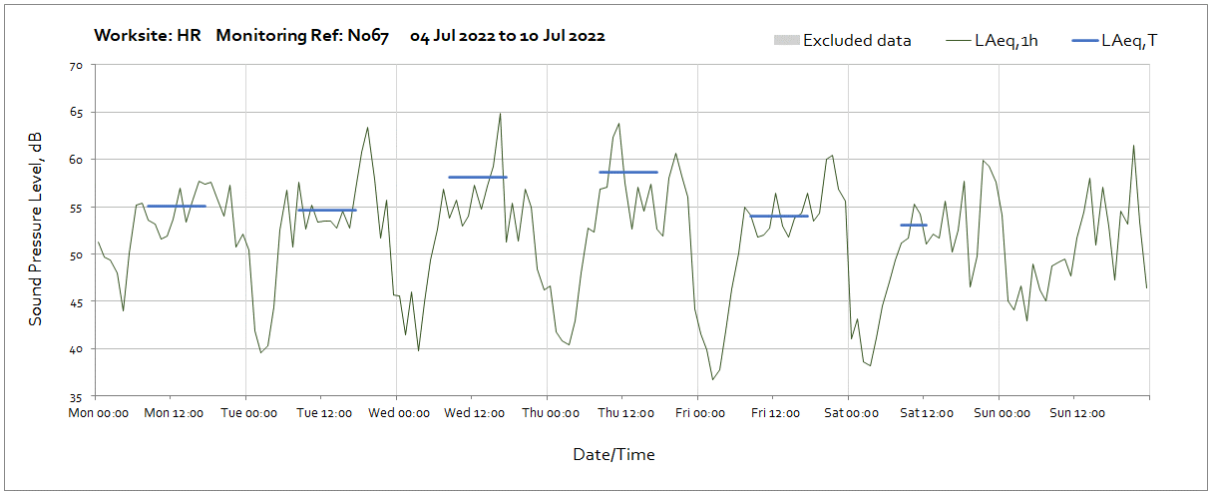


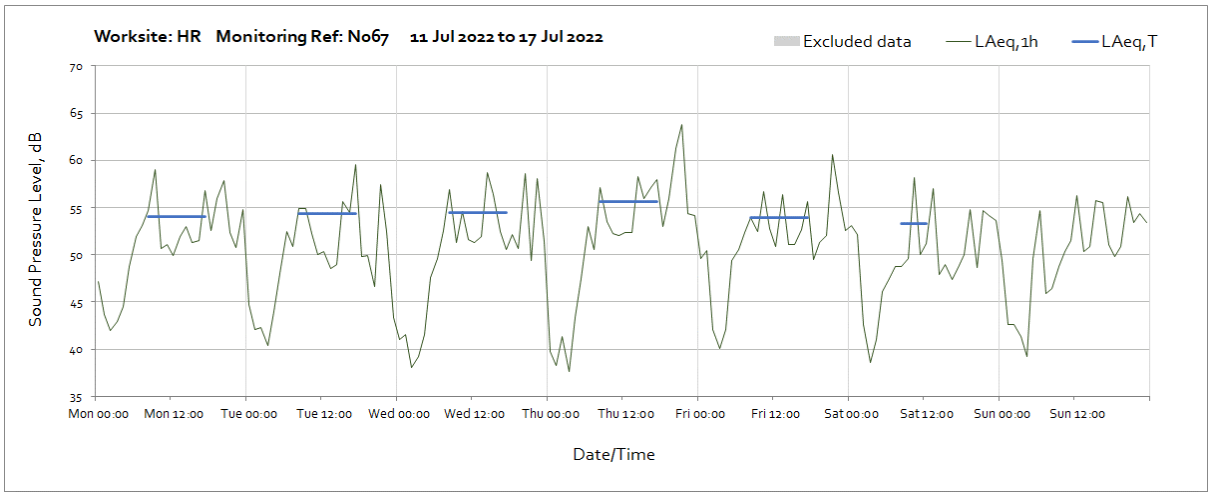

Worksite: SRVS Monitoring Ref: No61 11 Jul 2022 to 17 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

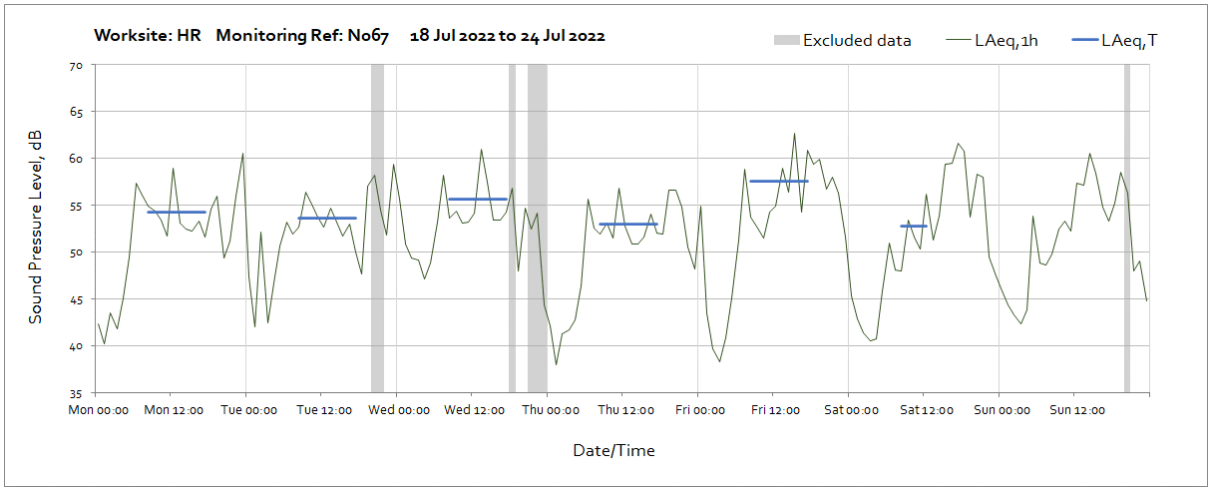

Worksite: SRVS Monitoring Ref: No61 18 Jul 2022 to 24 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

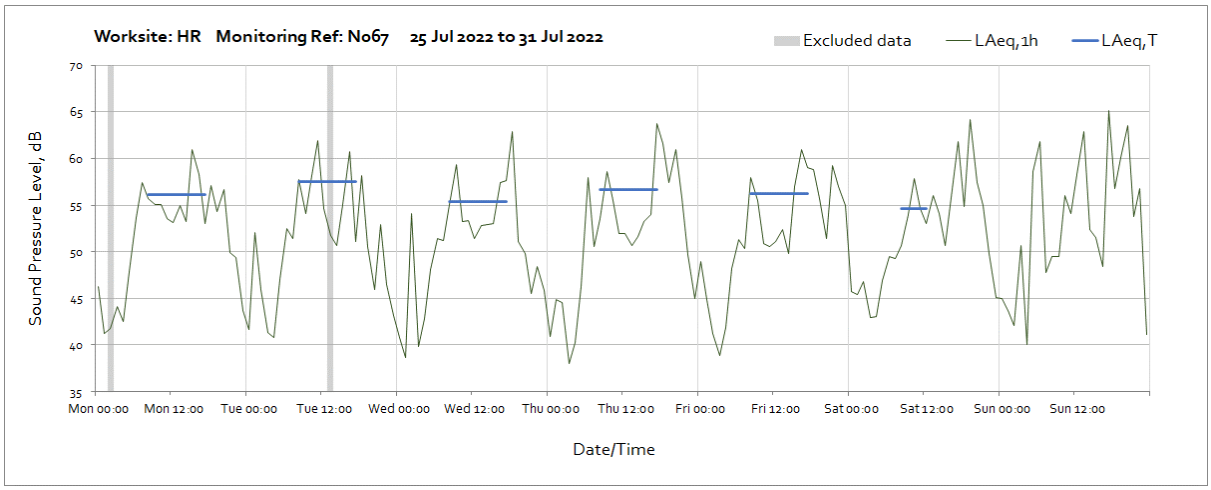

Worksite: SRVS Monitoring Ref: No61 25 Jul 2022 to 31 Jul 2022
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

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

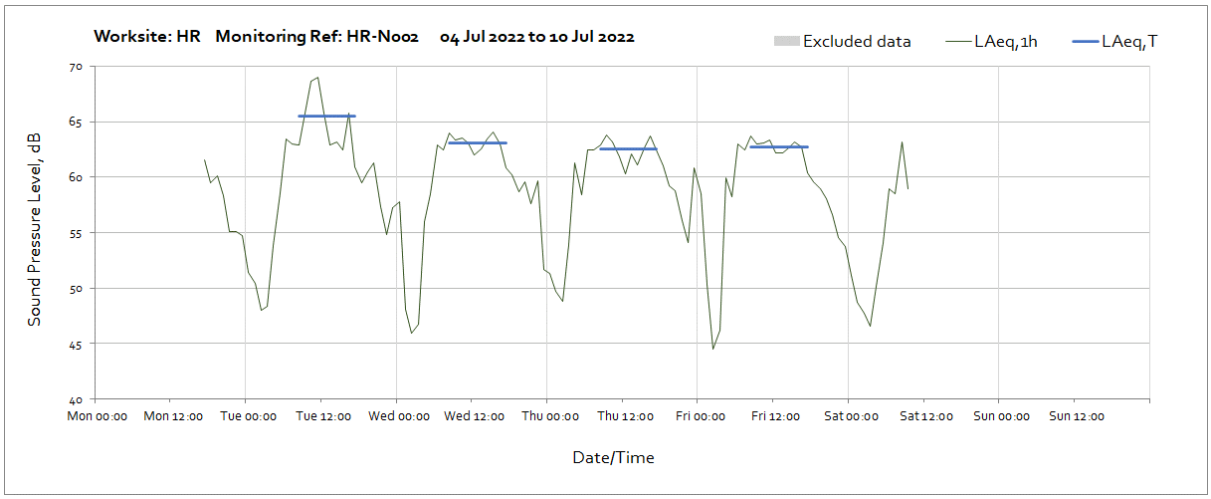








Worksite: Harvil Road (HR) – Monitoring Ref: HR-N002



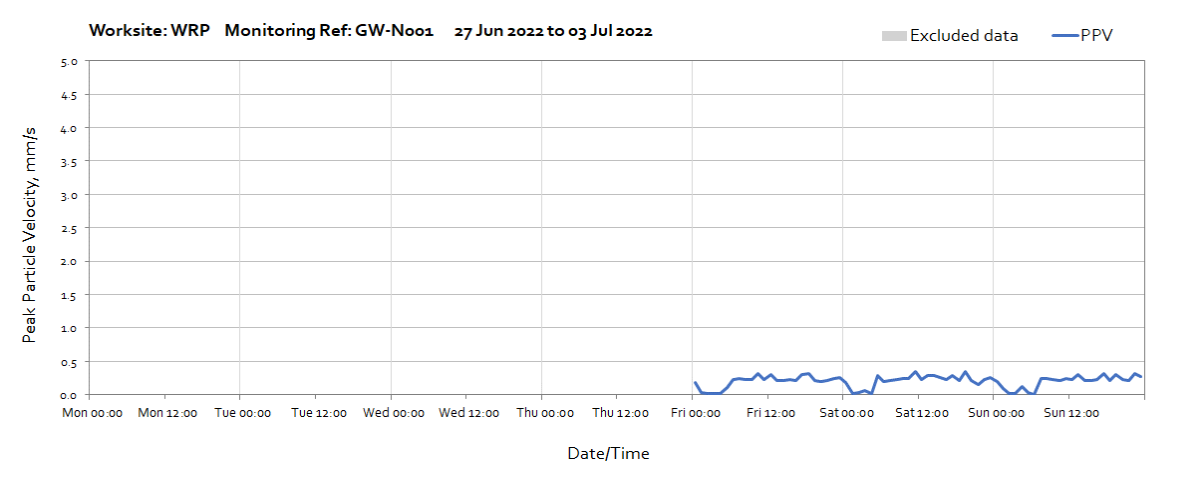
Note: Missing data from 00:00 on Friday 1st until 17:00 on Monday 4th July were due to loss of continuous site power at the monitoring station.

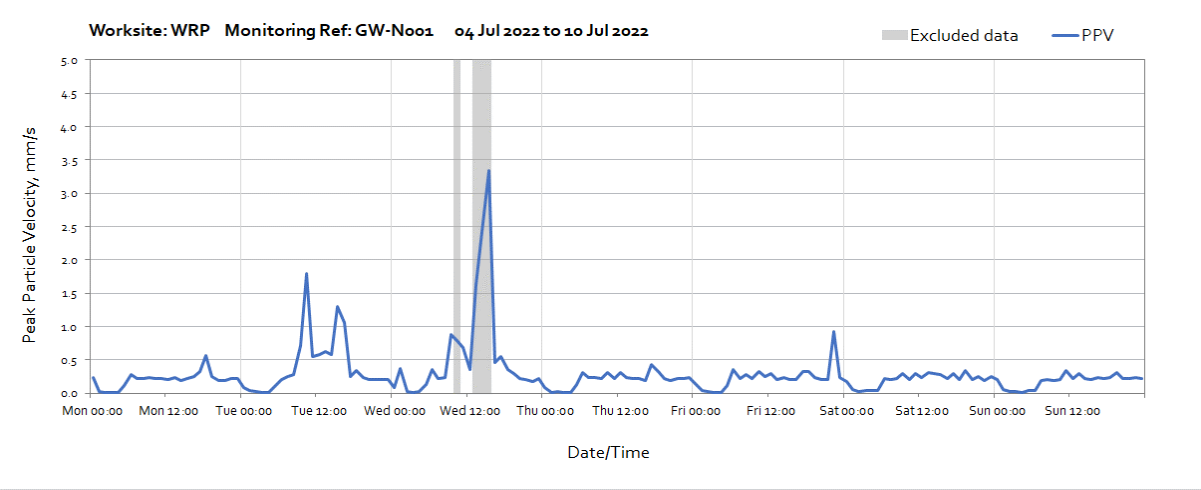
Note: The noise monitor has been uninstalled at 10:00 on Saturday 9th July due to ongoing power isues.

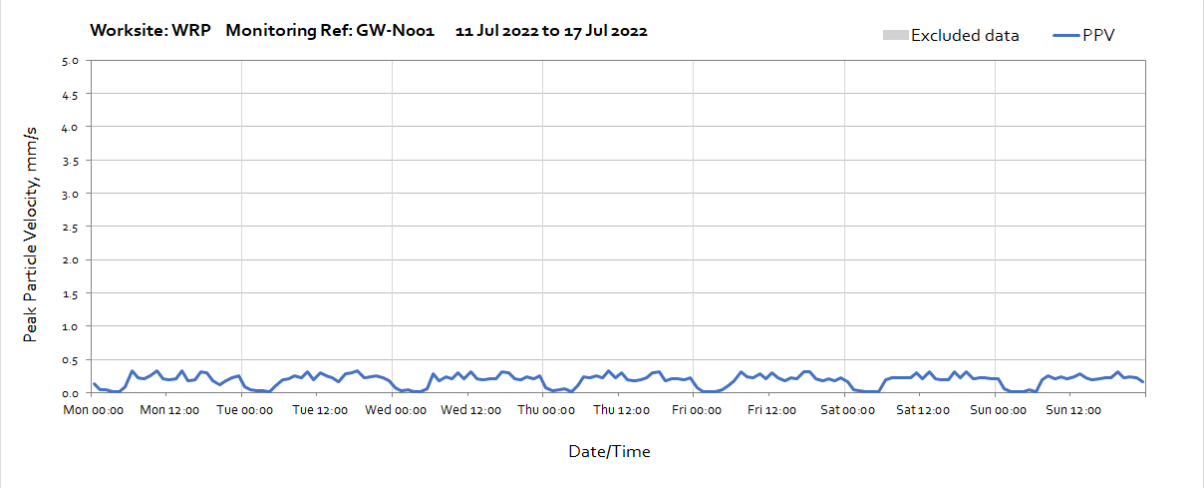
Vibration

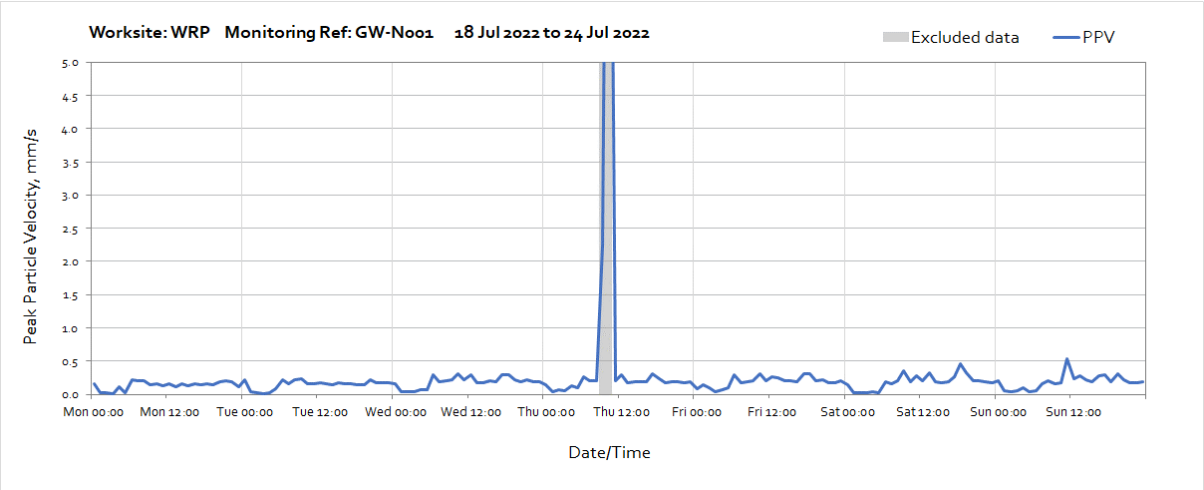
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative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

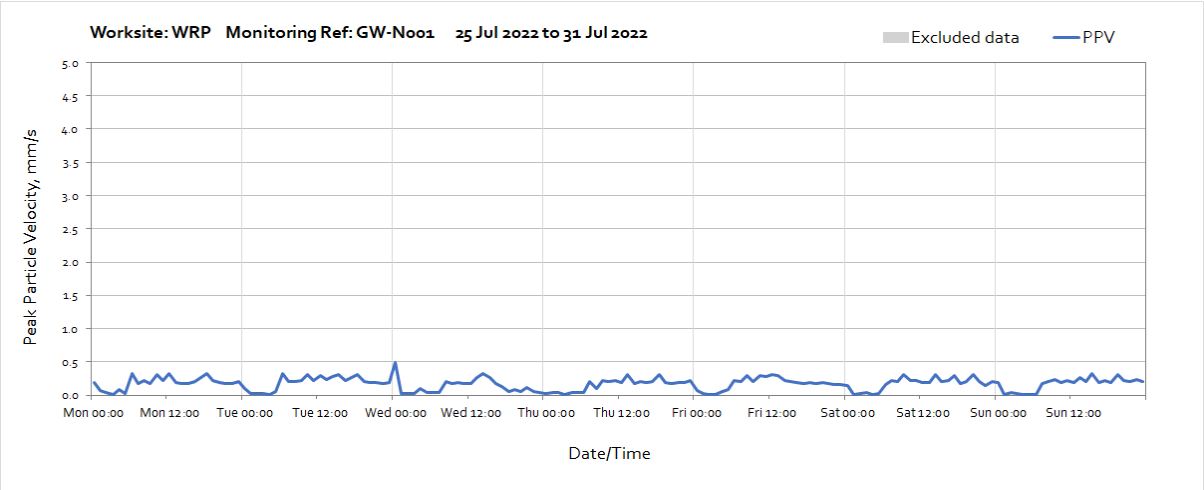
Worksite: West Ruislip Retained Embankment (WRP) – Monitoring Ref: GW-V001



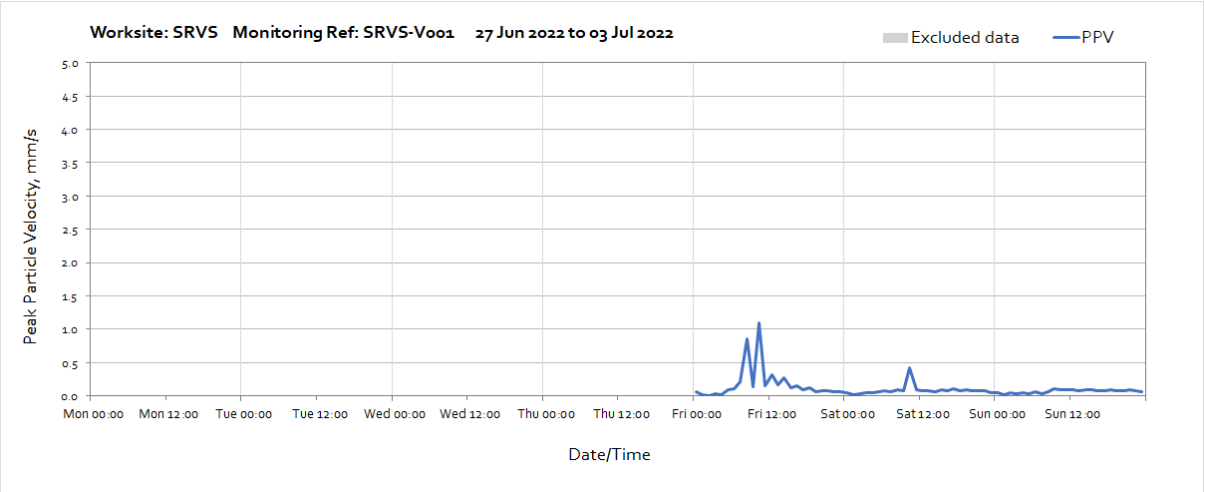


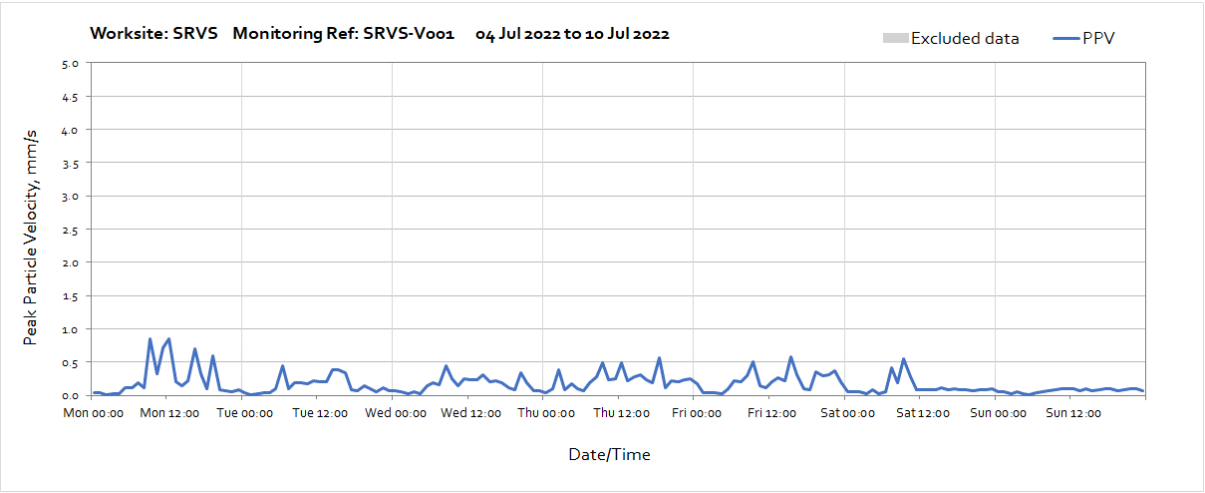

Worksite: WRP Monitoring Ref: GW-N001 11 Jul 2022 to 17 Jul 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

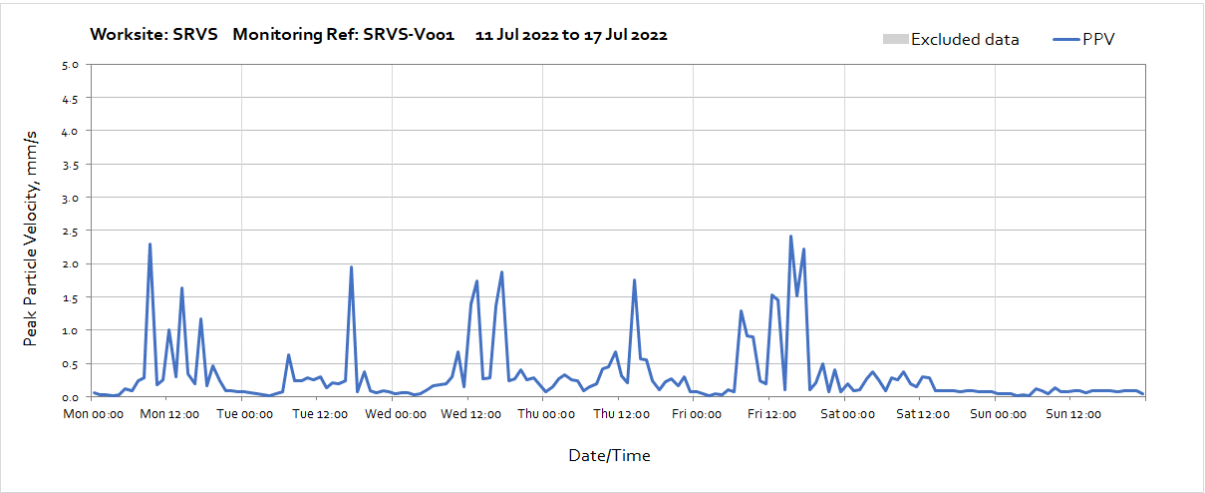

Worksite: WRP Monitoring Ref: GW-N001 18 Jul 2022 to 24 Jul 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

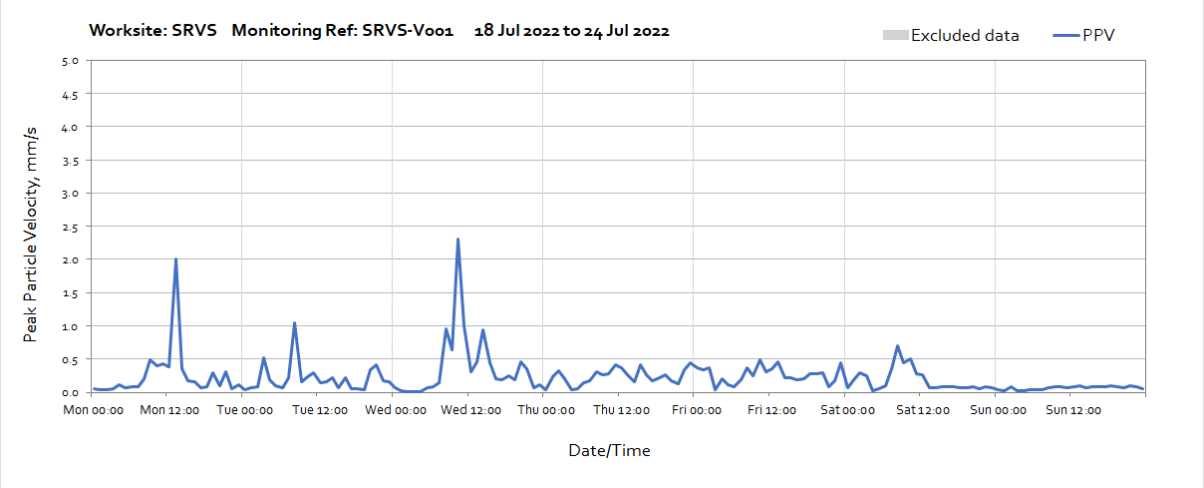

Worksite: WRP Monitoring Ref: GW-N001 25 Jul 2022 to 31 Jul 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

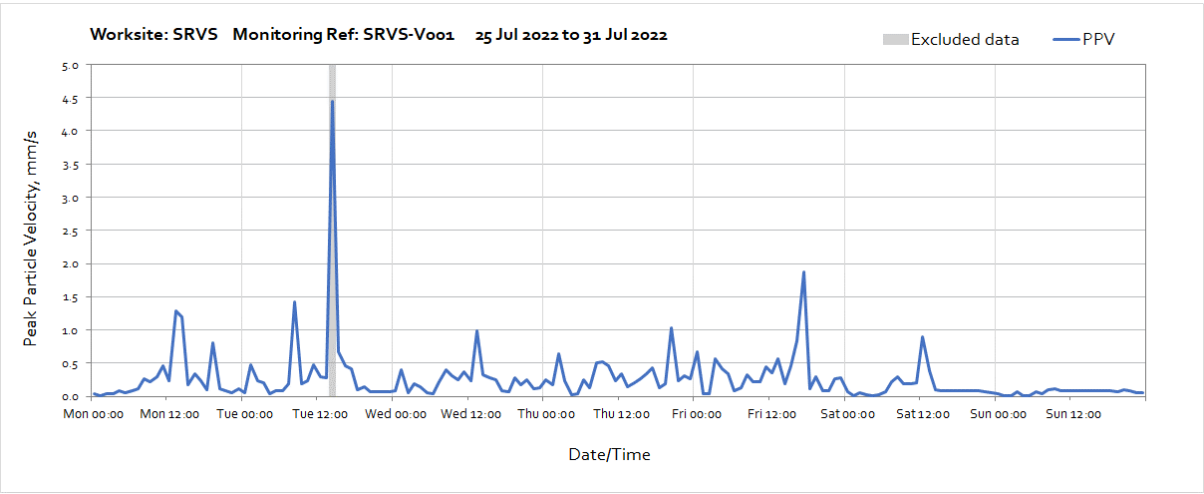
Worksite: South Ruislip Ventilation Shaft (SRVS) – Monitoring Ref: SRVS-V001








Worksite: SRVS Monitoring Ref: SRVS-Voo1 18 Jul 2022 to 24 Jul 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: SRVS Monitoring Ref: SRVS-Voo1 25 Jul 2022 to 31 Jul 2022
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time