

## **Construction noise and vibration Monthly Report – April 2023**

**London Borough of Hillingdon**

<b>Non-Technical Summary</b>	<b>1</b>
<b>Abbreviations and Descriptions</b>	<b>3</b>
<b>1 Introduction</b>	<b>4</b>
1.2 Measurement Locations	7
<b>2 Summary of Results</b>	<b>9</b>
2.1 Summary of Measured Noise Levels	9
2.2 Exceedances of the LOAEL and SOAEL	13
2.3 Exceedances of Trigger Level	16
2.4 Complaints	16
<b>Appendix A Site Locations</b>	<b>18</b>
<b>Appendix B Monitoring Locations</b>	<b>24</b>
<b>Appendix C Data</b>	<b>29</b>

#### **List of tables**

Table 1: Table of Abbreviations	3
Table 2: Monitoring Locations	7
Table 3: Summary of Measured dB $L_{Aeq}$ Data over the Monitoring Period	10
Table 4: Summary of Measured PPV Data over the Monitoring Period	13
Table 5: Summary of Exceedances of LOAEL and SOAEL	14
Table 6: Summary of Exceedances of Trigger Levels	16
Table 7: Summary of Complaints	16

# 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 April 2023.

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

- Colne Valley Viaduct site (ref.: CVV), where compound operation, maintenance and operation of the haul road and jetty, ground investigation works, pier construction, site preparation works, bulk earthworks, drainage works, water pumping works, installation of satellite welfare and generator farms, concrete drilling, South Abutment works, pile trimming, canal works, fencing works, environmental maintenance works, cofferdam excavation, stockpiling, river crossing construction, landscaping works, launching girder and deck works, construction of diaphragm wall and concrete works were underway.
- West Ruislip Portal worksite (ref.: WRP) where tunnel boring machine operations, conveyor belt installation, operation and extension, material delivery and removal, segment yard operation, attenuation pond depth increase, construction of tunnel boring machine water treatment plant, redevelopment of Golf Course and car park expansion were underway.
- Breakspear Road worksite (ref.: BR), where earthworks, tunnel boring machine material storage and in situ treatment, drainage works, construction of bridges, construction of protection slab, installation of conveyor bridge and conveyor belt were underway.
- South Ruislip Ventilation Shaft worksite (ref.: SRVS), where road sweeping, waterproofing, steel fixing, general site management, dewatering operations concrete pours and secondary lining and foam concreting were underway.
- Harvil Road worksite (ref.: HR), where road works, drainage and water treatment works, vegetation clearance, Siltbuster operations, assembly of conveyor belt, earthworks, soil compacting, construction of treatment silos and bridges, and tunnel boring machine material storage were underway.
- Northern Sustainable Placement Area worksite (ref.: NSPA) where construction of placement area was underway.

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

- Copthall North, where excavation works, material movement, vegetation clearance, construction of Copthall Tunnel, construction of site access gate, tunnel boring machine material storage and treatment works were underway.
- Bridgewater Road, Rabournmead Drive, Harvil Road and the Greenway (West Ruislip) where utility works for sewer lining 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.

Three (3) complaints were received during the monitoring period. A description of the complaint, the results of investigation and any actions taken are detailed in Table 7 of this report.

# Abbreviations and Descriptions

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

Table 1: Table of Abbreviations

Acronym/Term	Definition
$L_{Aeq,T}$	See equivalent continuous sound pressure level
Ambient sound	A description of the all-encompassing sound at a given location and time which will include sound from many sources near and far. Ambient sound can be quantified in terms of the equivalent continuous sound pressure level, $L_{pAeq,T}$
Decibel(s), or dB	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140dB.
Decibel(s) A-weighted, or dB(A)	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.
Equivalent continuous sound pressure level, or $L_{Aeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Exclusion of data	Measurement of noise levels can be affected by weather conditions such as prolonged periods of rain, winds speeds higher than 5m/s and snow/ice ground cover. Noise levels measured during these periods are considered not representative of normal noise conditions at the site and, for the purposes of this report, are excluded from the assessment of exceedances and calculation of typical noise levels and are also greyed out in charts. Identifiable incongruous noise and vibration events not attributable to HS2 construction noise are also excluded.
Façade	A facade noise level is the noise level 1m in front of a large reflecting surface. The effect of reflection, is to produce a slightly higher (typically +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 1<sup>st</sup> to 30<sup>th</sup> April 2023.

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

- Colne Valley Viaduct worksite, ref.: CVV (see Plan 1 in Appendix A), where work activities included:
  - Compound operations, including de-sanding works.
  - Maintenance and operation of the haul road and jetty.
  - Ground investigation works.
  - Pier construction, including formwork, reinforcement, post tensioning and tower crane mobilisation and demobilisation.
  - Site preparation works.
  - Bulk earthworks.
  - Drainage works.
  - Water pumping management works.
  - Installation of satellite welfare and generator farms.

- Concrete drilling.
- South Abutment works, including earthworks, stabilisation works, formwork, reinforcement, drainage works, removal of sheet piles and yard supporting activities.
- Pile trimming.
- Canal works, including operation and maintenance.
- Fencing works.
- Environmental maintenance works.
- Cofferdam excavation.
- Stockpiling.
- Construction of River Colne crossing including emergency obstruction dismantling works.
- Launching girder works, including grouting works, steel structure erection, post tensioning and dismantling works.
- Deck works, including preparation and operation of storage yards, installation of access provision, traffic management, parapets, noise barriers, troughs, pipes, access ramps, steel works, foundation works, support plant operations, construction of kerbs and concrete stitch, filling of voids.
- Construction of diaphragm walls.
- Concrete works.
- Landscaping works, including removal of cofferdams.
- West Ruislip Portal worksite, ref.: WRP (see Plan 2 in Appendix A), where work activities included:
  - Tunnel boring machine operations.
  - Conveyor belt installation, operation and extension.
  - Material delivery and removal.
  - Segment yard operation.
  - Attenuation ponds depth increase, including removal of concrete.
  - Construction of tunnel boring machine water treatment plant.
  - Redevelopment of golf course, including vegetation clearance, tree pruning, and ecological mitigation works.

- Car park expansion works.
- Breakspear Road worksite, ref.: BR (see Plan 2 in Appendix A), where work activities included:
  - Earthworks, including backfill.
  - Tunnel boring machine material storage and in situ treatment.
  - Drainage works.
  - Construction of bridges, including concrete pours, installation of deck, steel fixing, waterproofing, construction of embankment wall, installation of formworks and shutters.
  - Construction of protection slab.
  - Installation of conveyor bridge and conveyor belt.
- South Ruislip Ventilation Shaft worksite, ref.: SRVS (see Plan 4 in Appendix A), where work activities included:
  - Road sweeping.
  - Waterproofing.
  - Steel fixing.
  - General site management.
  - Dewatering operations.
  - Secondary lining and foam concreting.
  - Concrete pours.
- Harvil Road worksite, ref.: HR (see Plan 2 in Appendix A), where work activities included:
  - Road works, including haul road construction, drainage and excavation works.
  - Drainage and water treatment works.
  - Vegetation clearance.
  - Siltbuster operations.
  - Assembly of conveyor belt.
  - Earthworks.
  - Soil compacting works, including soil movements.



- Construction of treatment silos and tunnel boring machine testing area, including roof and pug mill installation.
- Construction of bridges, including concreting and backfill works.
- Tunnel boring machine material storage.
- Northern Sustainable Placement Area worksite, ref.: NSPA (see Plan 3 in Appendix A), where construction of placement area was underway.

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

- Copthall North, where excavation works, material movement, vegetation clearance, construction of Copthall Tunnel, construction of site access gate, tunnel boring machine material storage and treatment works were underway.
- Bridgewater Road, Roubournmead Drive, Harvil Road and the Greenway (West Ruislip) where utility works including sewer lining 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 Eighteen (18) noise and two (2) vibration monitoring installations were active in April in the LBH area. Table 2 summarises the position of noise and vibration monitoring installations within the LBH area in April 2023.

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	DLC-NMP	Dew's Farm Cottages, Dews Lane, Harefield, Uxbridge
	WRC-NMP	Weir Cottage, Denham Garden Village, Denham, Buckinghamshire
	HFM-NMP	Harefield Marina, Moorhall Road, London Borough of Hillingdon
	PLD-NMP	Peerless Drive, Harefield, Uxbridge
WRP	N048	Ruislip Golf Course, Ickenham Rd, Ruislip
	N056	83 The Greenway, Ickenham, Ruislip

Worksite Reference	Measurement Reference	Address
	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
	SRVS-V001a	Braintree Road, Ruislip
HR	N067	Harvil Road worksite south boundary
	SSPA-HR	Harvil Road
	BSR-N001	Breakspear Road
	DGT-N001	Dogs Trust West London
NSPA	NSPA-N001	Newyears Green Lane
	NSPA-N002	Newyears Green Lane

## 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	DLC-NMP	Dew's Farm Cottages, Dews Lane, Harefield, Uxbridge,	Façade	56.7 (59.5)	62.6 (65.2)	54.5 (58.1)	50.6 (56.4)	49.5 (59.6)	53.5 (56.2)	60.6 (66.6)	54.0 (58.0)	52.5 (69.1)	47.6 (56.3)	50.8 (59.9)	48.3 (57.8)
	WRC-NMP	Weir Cottage, Denham Garden Village, Denham,	Free-field	53.6 (55.4)	53.0 (55.3)	51.4 (53.1)	49.5 (52.4)	47.9 (57.4)	51.8 (52.8)	53.2 (54.3)	51.9 (53.0)	51.9 (67.2)	48.6 (68.6)	50.3 (54.8)	46.0 (54.9)
	HFM-NMP	Harefield Marina, Moorhall Road, London	Free-field	54.7 (58.2)	58.8 (62.8)	53.7 (56.9)	52.6 (55.7)	51.0 (55.5)	52.2 (53.1)	54.5 (56.6)	53.3 (54.8)	52.8 (58.7)	50.5 (55.6)	52.5 (58.2)	49.9 (53.9)
	PLD-NMP	Peerless Drive, Harefield, Uxbridge	Façade	55.5 (57.5)	58.4 (65.4)	52.9 (56.8)	50.1 (55.5)	52.0 (62.5)	52.8 (54.4)	53.2 (54.6)	52.3 (54.7)	53.5 (64.1)	51.0 (60.4)	52.4 (56.4)	48.5 (60.2)
WRP	N048	West Ruislip Golf Club, Ickenham Rd, Ruislip	Free-field	60.9 (63.8)	57.9 (60.9)	52.6 (56.6)	52.1 (56.7)	50.3 (58.3)	58.5 (62.3)	57.4 (66.8)	51.6 (53.1)	51.7 (57.7)	48.4 (52.4)	51.9 (56.2)	49.3 (58.5)
	N056	83 The Greenway, Ickenham, Ruislip	Façade	62.5 (64.6)	61.4 (62.3)	61.5 (63.5)	60.5 (62.5)	56.7 (62.2)	61.3 (62.1)	61.6 (64.5)	60.7 (61.3)	60.6 (62.3)	54.7 (60.1)	60.0 (63.4)	57.3 (61.8)
	N057	123 The Greenway, Ickenham, Ruislip	Façade	57.3 (59.2)	56.8 (59.7)	56.8 (60.3)	55.9 (63.8)	51.8 (57.7)	56.6 (57.8)	56.5 (57.6)	56.1 (57.8)	56.2 (63.6)	49.4 (55.3)	55.4 (61.9)	52.4 (57.5)
BR	N065	Breakspear Road South, Harefield, Uxbridge	Free-field	60.6 (67.8)	60.4 (67.0)	60.0 (66.4)	58.5 (67.8)	54.7 (66.4)	59.3 (63.9)	58.7 (65.3)	59.3 (66.8)	59.6 (68.0)	54.2 (61.3)	58.2 (68.3)	55.7 (66.5)

OFFICIAL

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
	N066	Hoylake Crescent, Ickenham, Uxbridge	Free-field	58.8 (73.6)	57.0 (58.1)	56.8 (58.8)	55.2 (57.5)	53.5 (64.6)	59.3 (62.0)	56.9 (57.7)	55.5 (56.5)	55.4 (57.5)	51.8 (63.1)	55.4 (58.9)	52.4 (59.4)
	TKL-N001	Tile Kiln Lane, Harefield, Uxbridge	Free-field	50.0 (52.7)	49.7 (53.3)	47.4 (55.0)	46.6 (53.9)	46.9 (54.4)	48.6 (49.8)	48.7 (50.8)	48.0 (49.8)	48.6 (54.1)	47.1 (55.5)	48.2 (52.5)	46.0 (52.8)
SRVS	N061	Cineworld South Ruislip car park, Ruislip	Free-field	58.2 (60.2)	61.7 (63.5)	62.1 (64.0)	62.1 (67.5)	55.5 (71.5)	58.4 (58.7)	61.3 (61.9)	61.0 (61.6)	61.6 (69.0)	56.8 (69.8)	60.7 (67.6)	55.0 (62.4)
	TCA-N001	Trenchard Avenue, Ruislip	Free-field	59.0 (60.7)	60.5 (67.1)	59.9 (63.3)	58.3 (62.3)	54.2 (59.6)	58.1 (58.4)	58.8 (60.2)	58.0 (59.5)	57.8 (60.6)	51.9 (56.6)	57.9 (62.6)	54.5 (58.5)
HR	N067	Harvil Road worksite south boundary	Free-field	56.7 (59.5)	60.7 (64.0)	58.0 (68.4)	57.2 (71.8)	52.2 (63.5)	54.6 (55.5)	60.6 (63.3)	60.0 (62.9)	59.5 (67.7)	52.0 (63.9)	56.5 (66.7)	50.9 (57.1)
	SSPA-HR	Harvil Road	Free-field	61.3 (63.0)	62.8 (66.4)	59.7 (62.0)	57.4 (60.4)	54.9 (63.2)	59.1 (60.0)	60.6 (65.2)	62.8 (68.2)	58.4 (66.7)	52.3 (56.4)	57.3 (60.6)	53.5 (63.0)
	BSR-N001	Breakspear Road	Free-field	64.3 (69.6)	62.5 (68.3)	62.8 (67.4)	60.0 (68.9)	56.3 (67.9)	62.9 (65.5)	62.3 (66.9)	62.8 (67.5)	61.2 (68.3)	53.1 (61.5)	60.0 (70.3)	56.9 (68.2)
	DGT-N001	Dogs Trust West London	Façade	52.8 (56.3)	53.7 (57.0)	48.7 (54.1)	47.0 (53.0)	47.2 (57.7)	51.0 (54.5)	53.2 (55.3)	54.9 (58.9)	50.5 (61.7)	46.4 (54.3)	49.3 (64.7)	45.6 (55.2)
NSPA	NSPA-N001	Newyears Green Lane	Free-field	57.4 (60.3)	59.0 (62.4)	56.4 (61.3)	49.2 (54.5)	46.6 (56.0)	53.9 (58.8)	55.5 (60.3)	54.1 (59.9)	52.0 (62.2)	44.9 (52.8)	48.7 (51.9)	45.1 (54.7)

OFFICIAL

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
	NSPA-N002	Newyears Green Lane	Free-field	52.1 (57.0)	55.4 (75.9)	51.6 (57.1)	46.5 (53.5)	43.5 (55.1)	49.9 (52.9)	51.1 (52.3)	50.3 (51.5)	48.7 (64.8)	42.2 (47.4)	45.9 (54.5)	41.2 (48.3)

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	0.45 (Y-axis)
SRVS	SRVS-V001a	Braintree Road, Ruislip	1.96 (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	DLC-NMP	Dew's Farm Cottages, Dews Lane, Harefield, Uxbridge	Weekdays	0700-0800	1	No exceedance
			Saturdays	1900-2200	2	No exceedance
				0800-1300	1	No exceedance
			1400-2200	3	No exceedance	
	Sundays	0700-2200	4	No exceedance		
WRC-NMP	Weir Cottage, Denham Garden Village, Denham,	All days	All periods	No exceedance	No exceedance	
HFM-NMP	Harefield Marina, Moorhall Road, London	Weekdays	0800-1800	1	No exceedance	
			1800-1900	2	No exceedance	
		Saturdays	1900-2200	7	No exceedance	
			1400-2200	2	No exceedance	
			Sundays	0700-2200	8	No exceedance
Nights	2200-0700	153	No exceedance			
PLD-NMP	Peerless Drive, Harefield, Uxbridge	Saturdays	1400-2200	3	No exceedance	
WRP	N048	West Ruislip Golf Club, Ickenham Rd, Ruislip	Weekdays	0700-0800	4	No exceedance
	N056	83 The Greenway, Ickenham, Ruislip	Saturdays	0800-1300	1	No exceedance
				Weekdays	0700-0800	8
N057	123 The Greenway, Ickenham, Ruislip	Saturdays	1800-1900	4	No exceedance	
			1900-2200	38	No exceedance	
Nights	Weekdays	1400-2200	36	No exceedance		
		2200-0700	68	No exceedance		
Sundays	Weekdays	0700-2200	1	No exceedance		
		1900-2200	1	No exceedance		
Nights	Saturdays	1400-2200	1	No exceedance		
		2200-0700	18	No exceedance		
BR	N065	Breakspear Road South, Harefield, Uxbridge	Weekdays	0700-0800	8	No exceedance
				0800-1800	8	No exceedance
				1800-1900	6	No exceedance
				1900-2200	1	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
			Saturdays	0700-0800 0800-1300 1300-1400 1400-2200	3 2 3 7	No exceedance No exceedance No exceedance No exceedance
			Sundays	0700-2200	13	No exceedance
			Nights	2200-0700	21	No exceedance
	N066	Hoylake Crescent, Ickenham, Uxbridge	Weekdays	0700-0800 1900-2200	2 20	No exceedance No exceedance
			Saturdays	0700-0800 1400-2200	2 16	No exceedance No exceedance
			Nights	2200-0700	58	No exceedance
	TKL-N1	Tile Kiln Lane, Harefield, Uxbridge	Weekdays	1900-2200	1	No exceedance
			Saturdays	1400-2200	1	No exceedance
			Nights	2200-0700	98	No exceedance
SRVS	N061	Hoylake Crescent, Ickenham, Uxbridge	All days	All periods	Not applicable*	Not applicable*
	TCA-N001	Trenchard Avenue, Ruislip	Weekdays	0800-1800 1900-2200	1 1	No exceedance No exceedance
			Sundays	0700-2200	3	No exceedance
			Nights	2200-0700	49	No exceedance
HR	N067	Harvil Road worksite south boundary	Weekdays	1800-1900 1900-2200	3 2	No exceedance No exceedance
			Saturdays	1300-1400 1400-2200	2 2	No exceedance No exceedance
			Sundays	0700-2200	26	No exceedance
			Nights	2200-0700	20	No exceedance
	SSPA-HR	Harvil Road	All days	All periods	No exceedance	No exceedance
	BSR-N001	Breakspear Road	Weekdays	0700-0800 1900-2200	9 1	No exceedance No exceedance
			Saturdays	1300-1400 1400-2200	1 1	No exceedance No exceedance
			Nights	2200-0700	18	No exceedance
	DGT-N001	Dogs Trust West London	Saturdays	1400-2200	2	No exceedance
			Sundays	0700-2200	3	No exceedance
			Nights	2200-0700	74	No exceedance
NSPA	NSPA-N001	Newyears Green Lane	All days	All periods	No exceedance	No exceedance
	NSPA-N002	Newyears Green Lane	All days	All periods	No exceedance	No exceedance

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

2.2.6 Exceedances of the LOAEL were recorded at thirteen (13) monitoring locations. The LOAEL exceedances were recorded during weekdays, Saturdays, Sundays and night-time working hours.

2.2.7 No exceedances of SOAEL were recorded due to HS2 construction works during the reporting period.

## 2.3 Exceedances of Trigger Level

2.3.1 Table 6 provides a summary of exceedances of the Section 61 trigger noise levels determined to be due to HS2 related construction noise measured during the reporting period, along with the findings of any investigation.

Table 6: Summary of Exceedances of Trigger Levels

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

## 2.4 Complaints

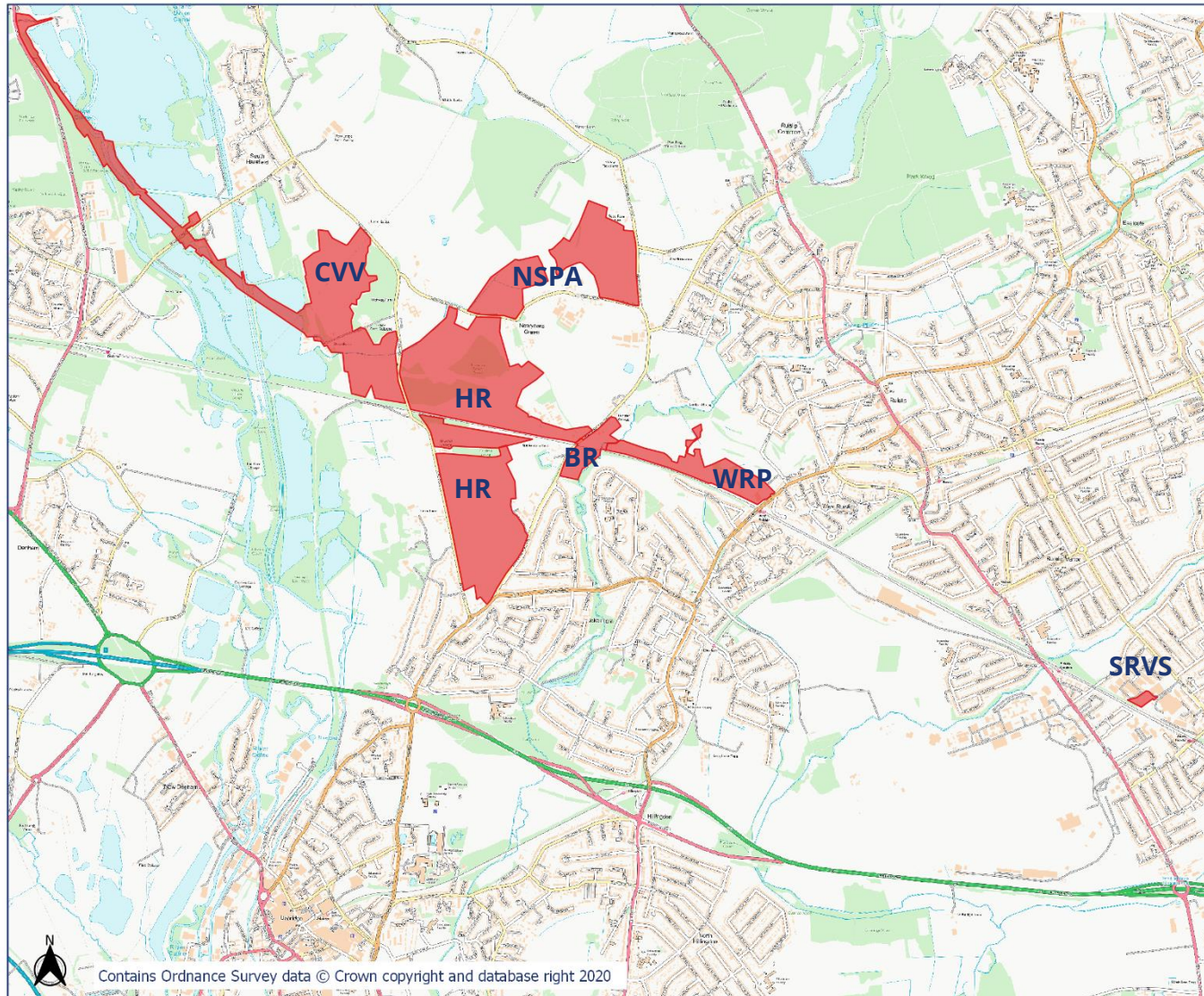
2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 7: Summary of Complaints

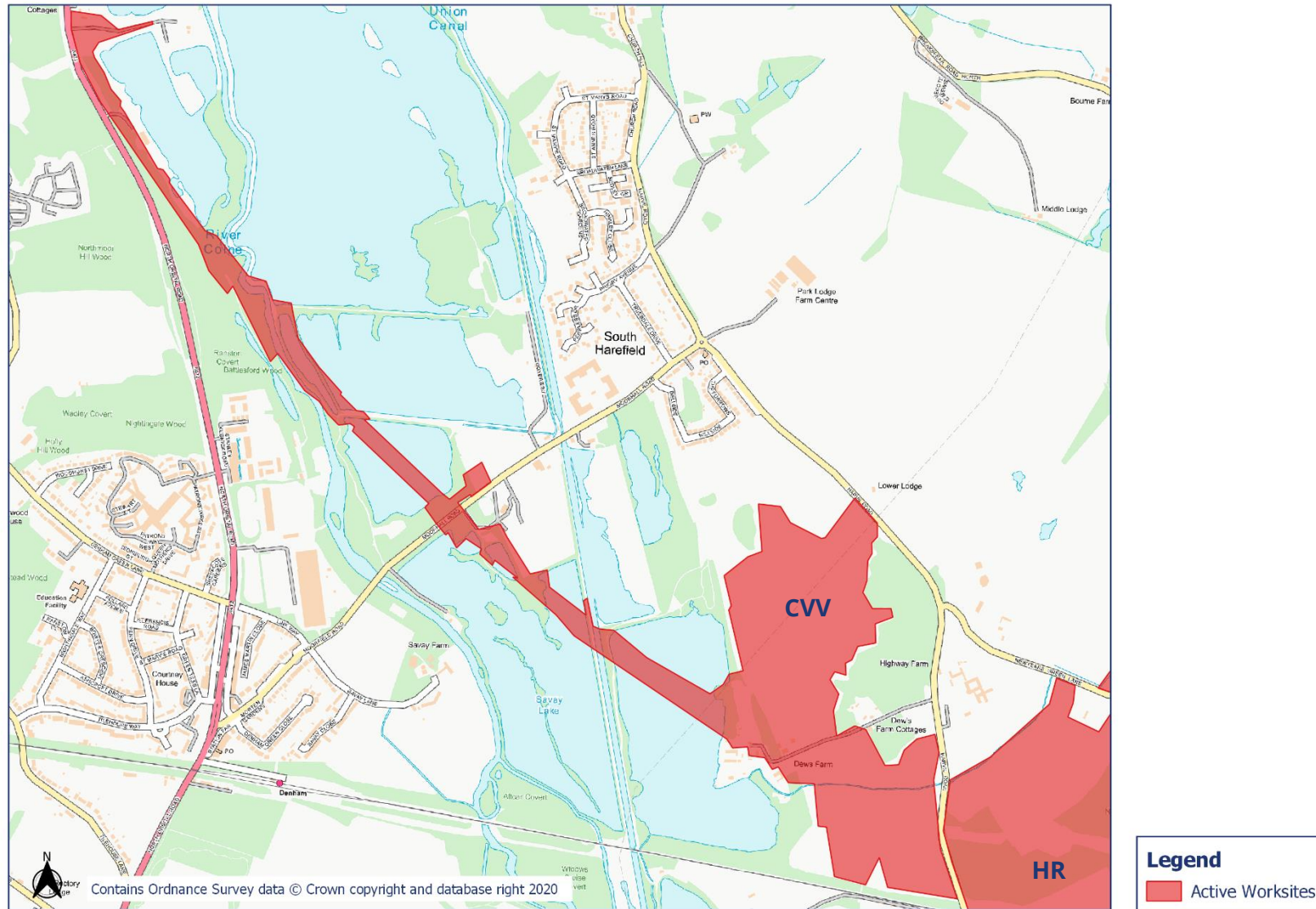
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-23-93345-E-C	WRP	Complaint regarding construction noise at night.	Measured noise levels were within the predicted levels and Best Practical Means were adopted.	A response was provided to the complainant detailing the findings of the investigation.
HS2-23-93604-E-C	WRP/SRVS	Complaint regarding ground-borne/motorised noise being heard intermittently at night.	No ground-borne noise generating activities were ongoing at the time of the complaint.	A response was provided to the complainant detailing the findings of the investigation.
HS2-23-44581-C	WRP	Complaint due to noise from conveyor belt system.	Testing of the conveyor belt was undertaken at the time of the complaint, required to be performed	Additional mitigation will be applied to complete the conveyor according to design specification.

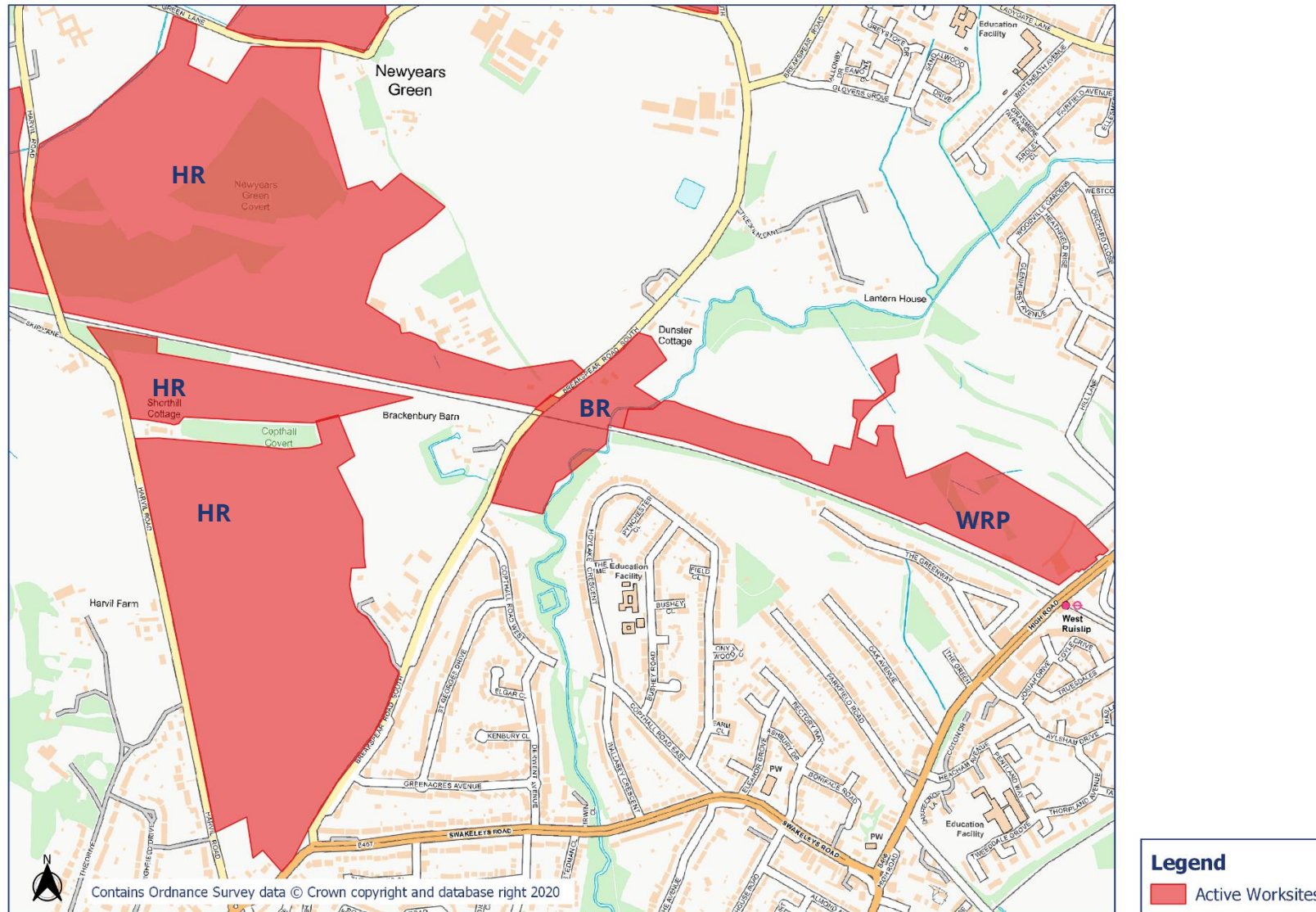
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
			before further construction could be undertaken. The measured noise levels were within the predicted levels and Best Practical Means were adopted.	A response was provided to the complainant detailing the steps to further mitigate and monitor the effects of the conveyor.

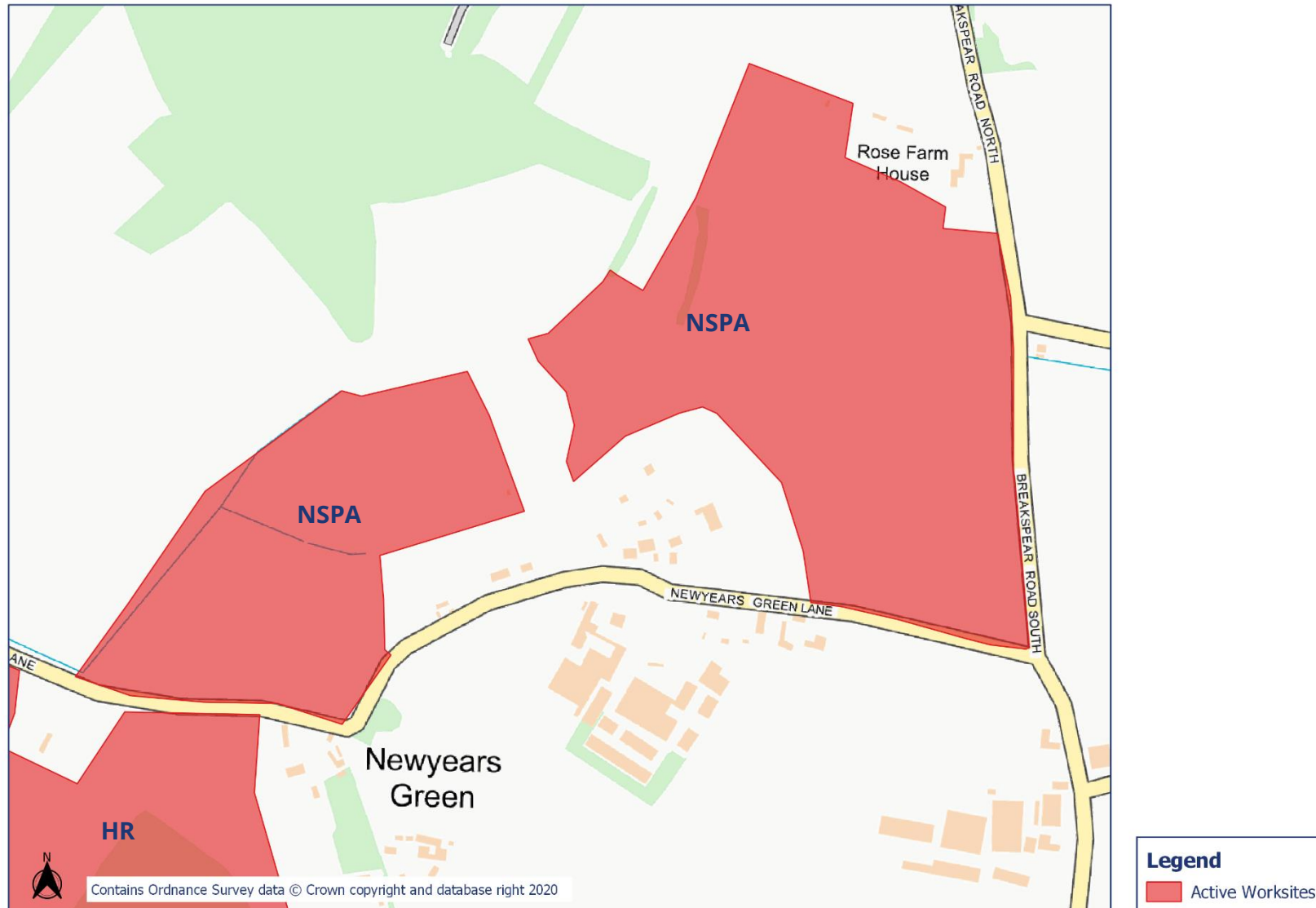
# Appendix A Site Locations



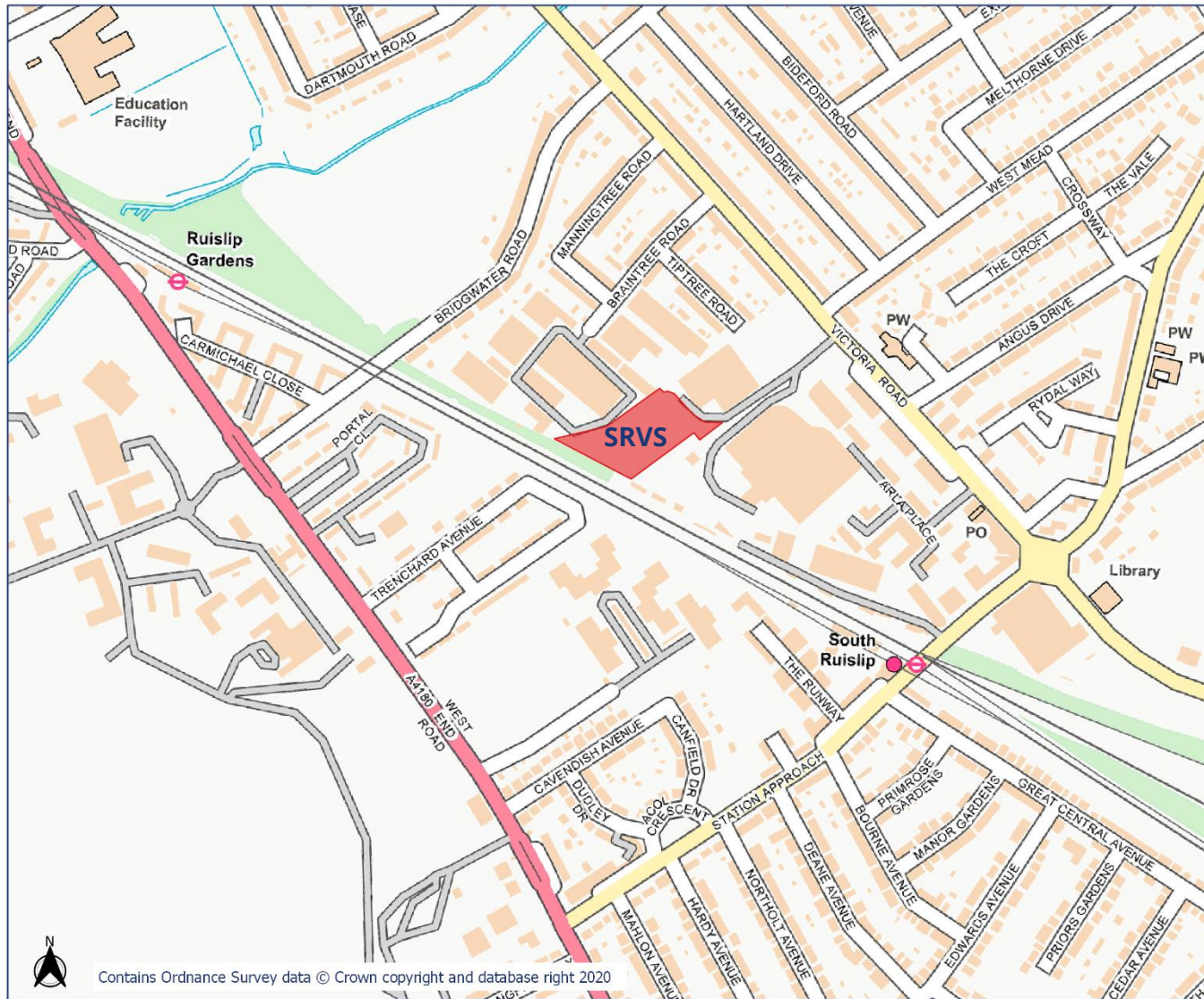




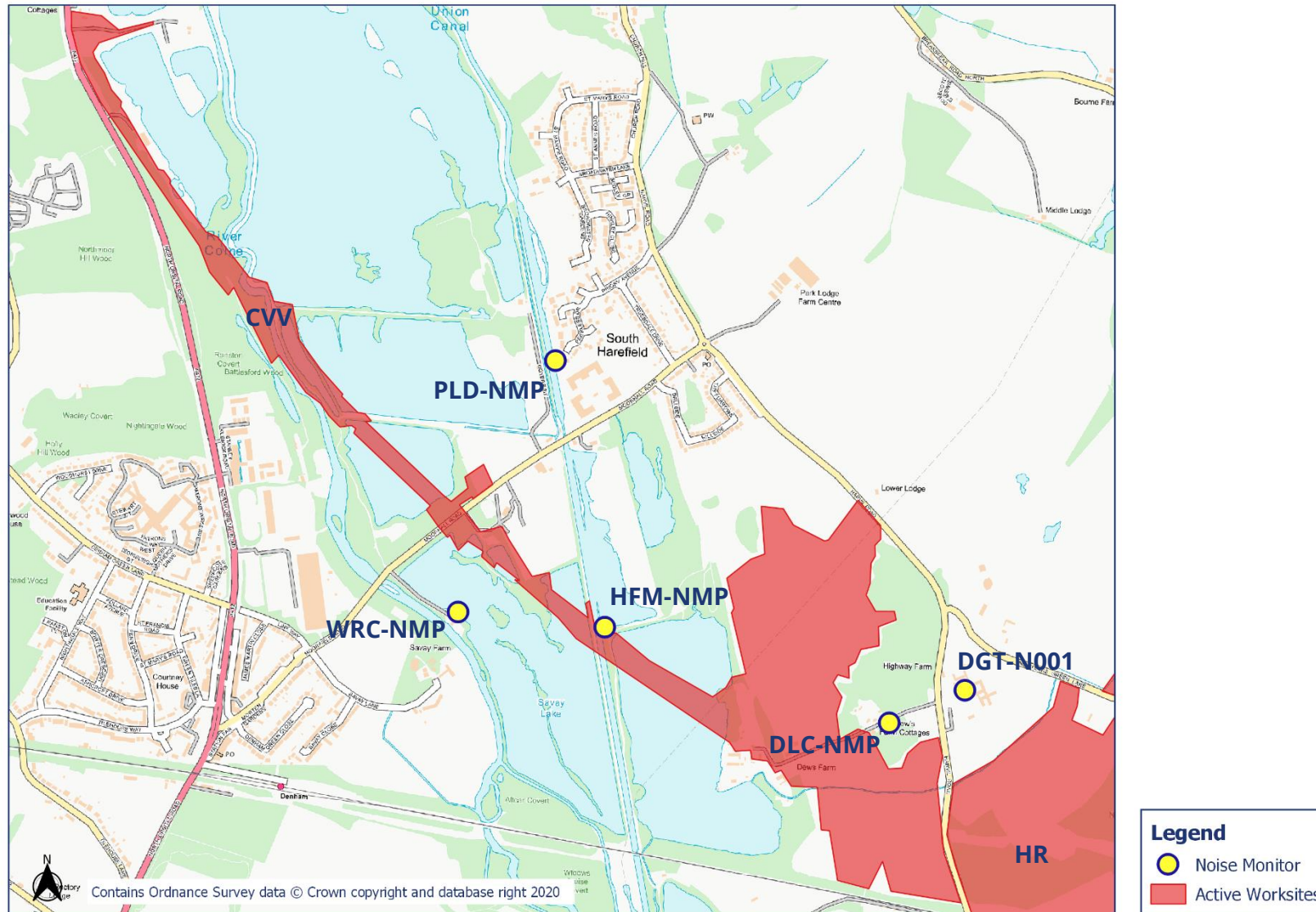




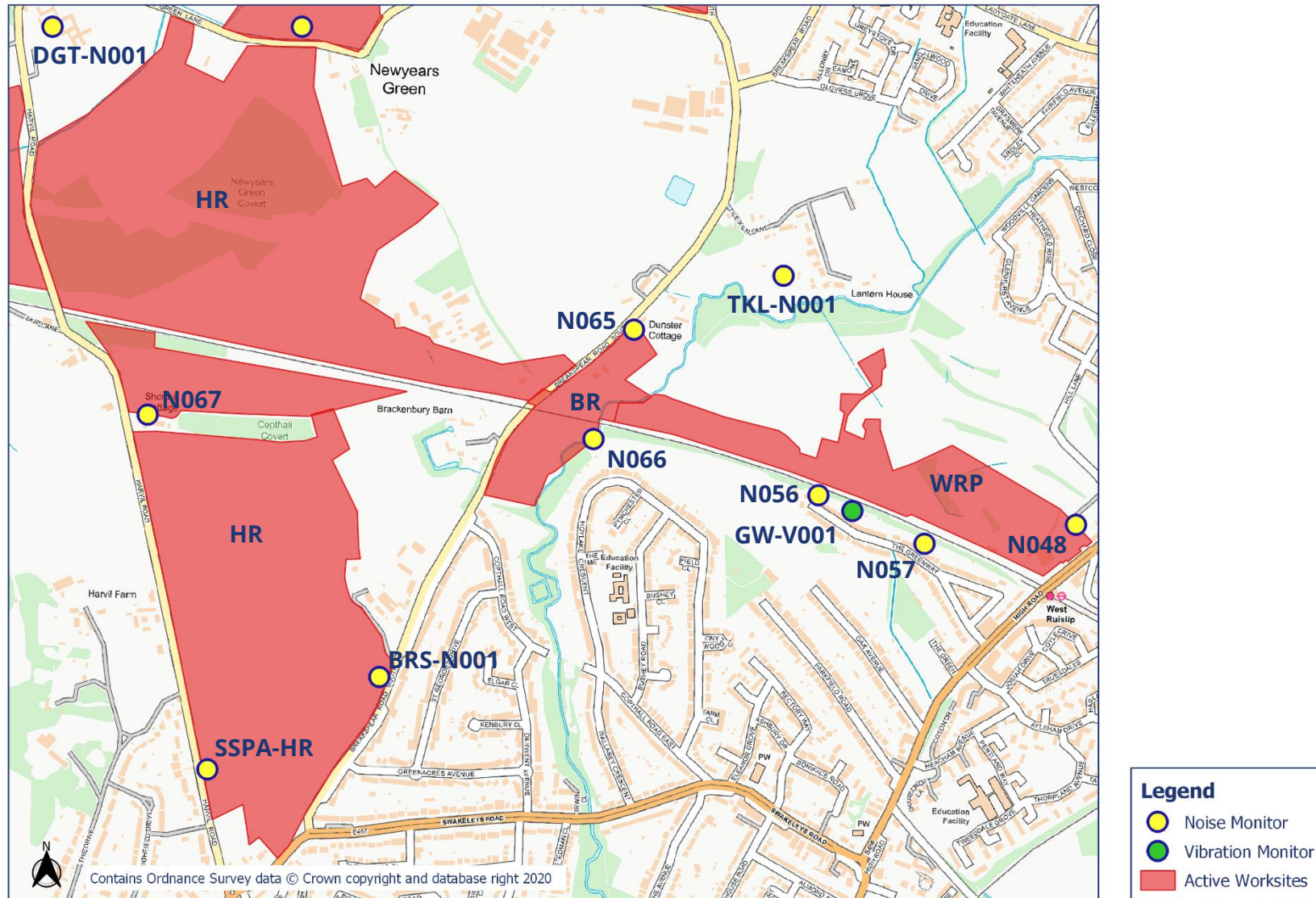


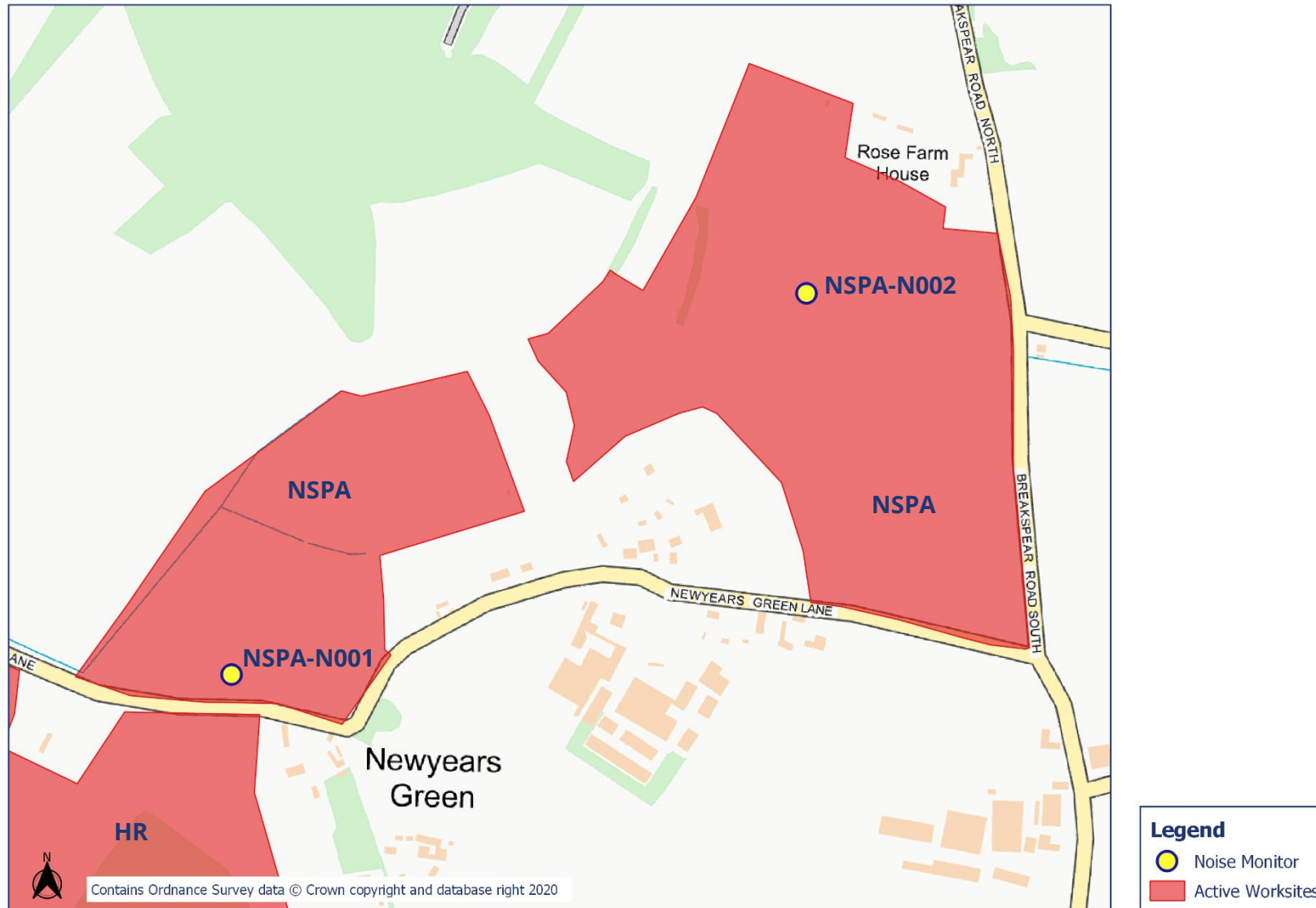


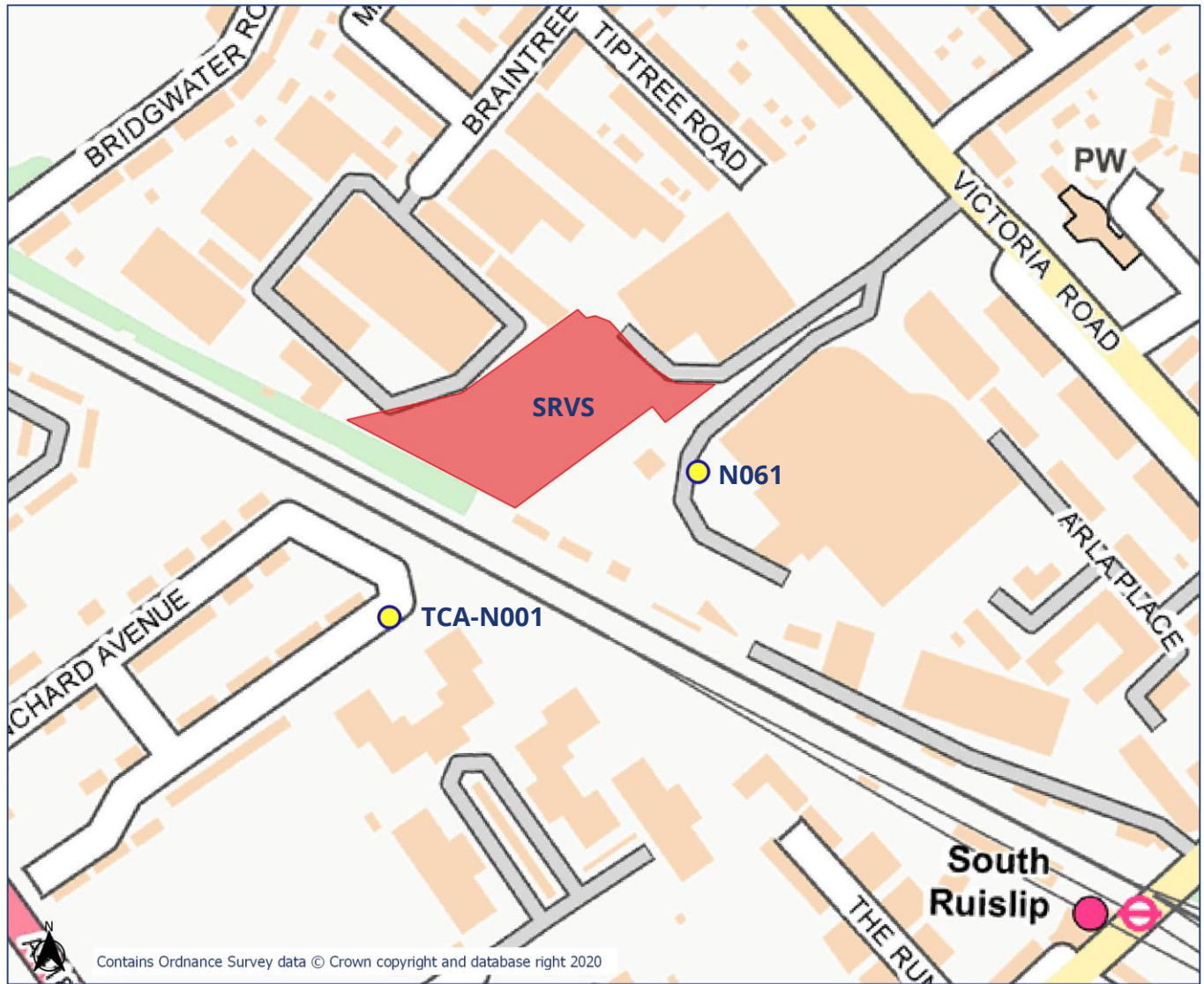
# Appendix B Monitoring Locations











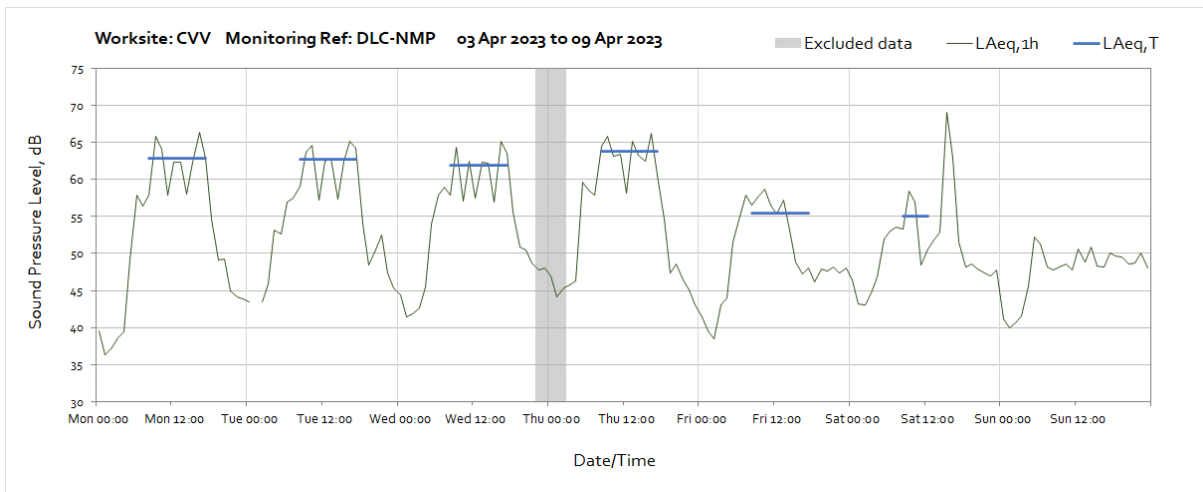
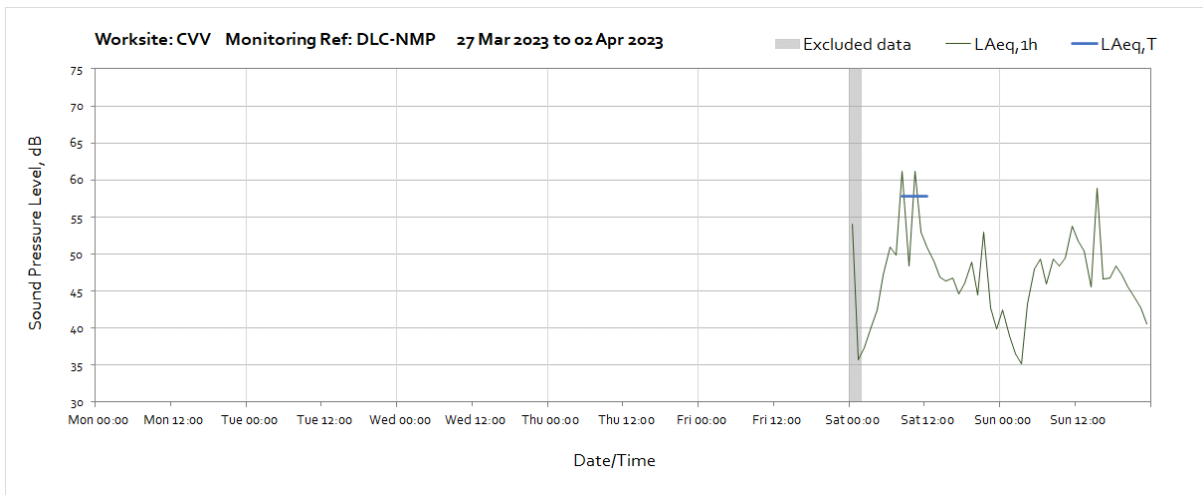


# Appendix C Data

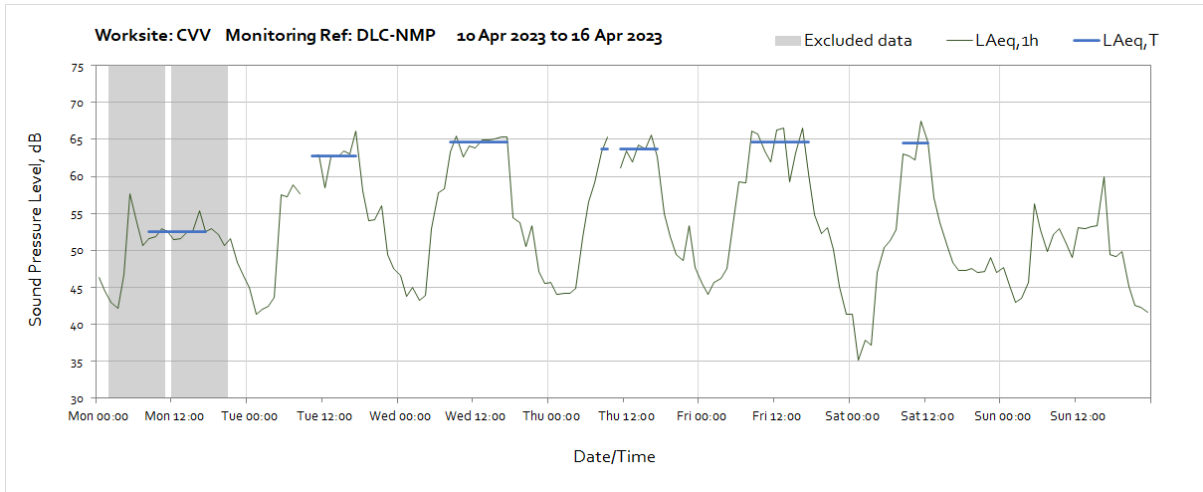
## Noise

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

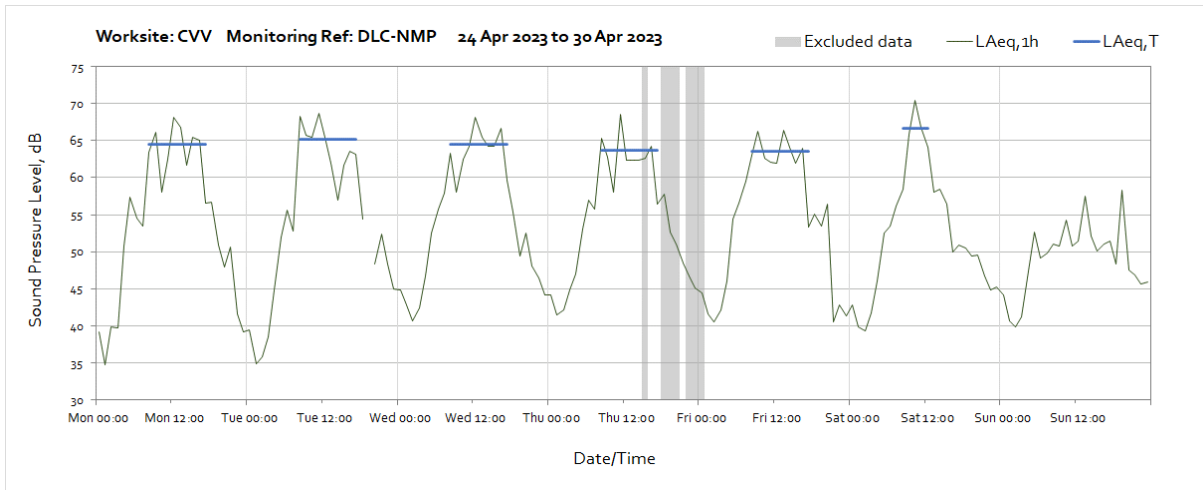
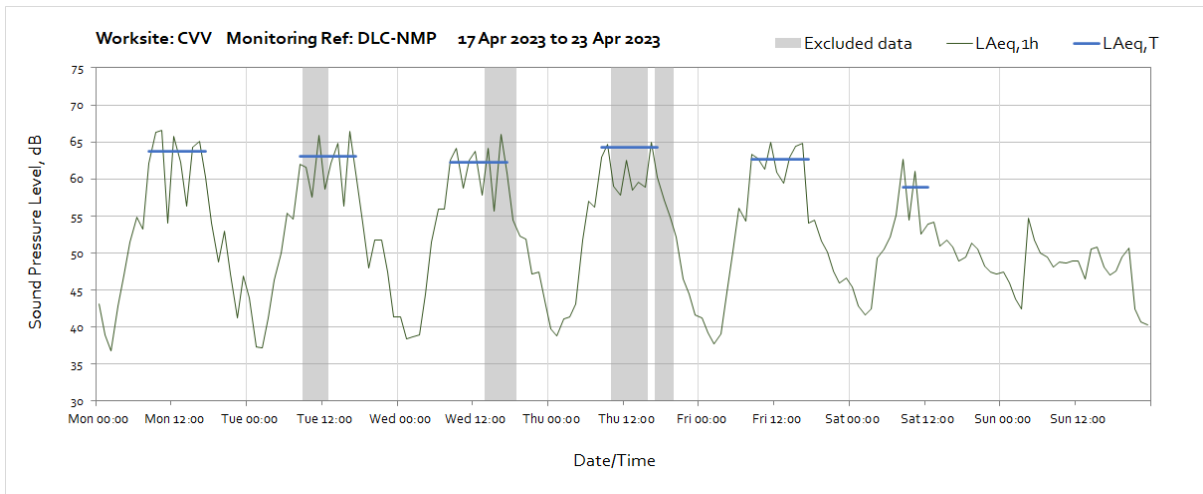
### Worksite: CVV – Monitoring Ref: DLC-NMP



Note: Missing data between 01:00 and 02:00 on Tuesday 4<sup>th</sup> April was due to a settings update at the monitoring station.



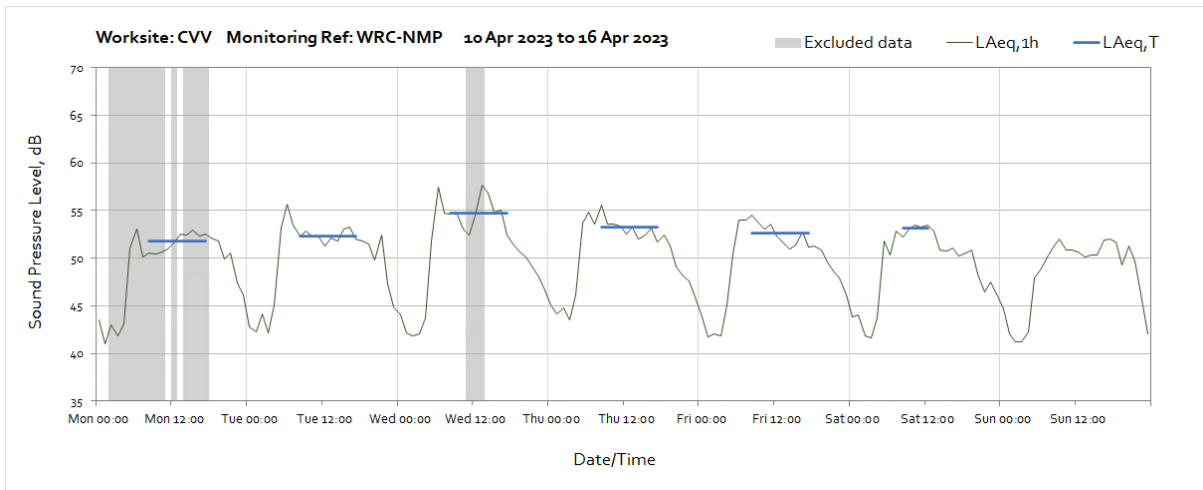
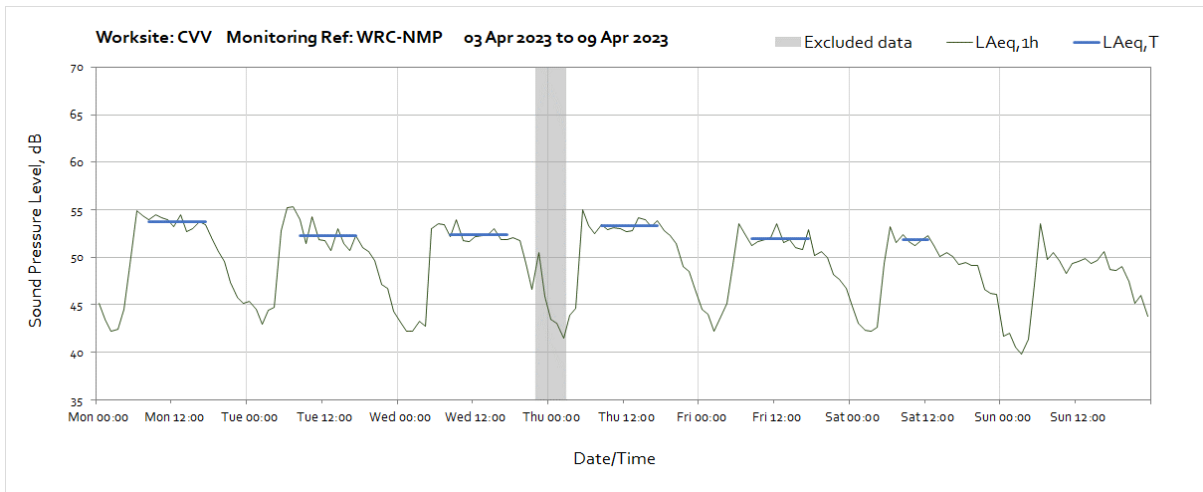
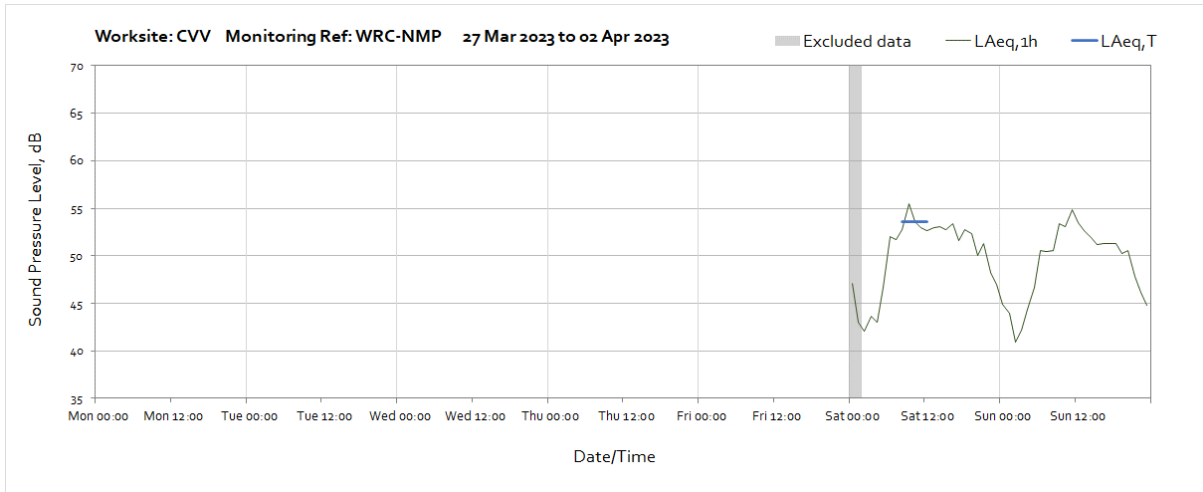
Note: Missing data between 09:00 and 10:00 on Tuesday 11<sup>th</sup> April and between 10:00 and 11:00 on Thursday 13<sup>th</sup> April was due to remote connection issues at the monitoring station.

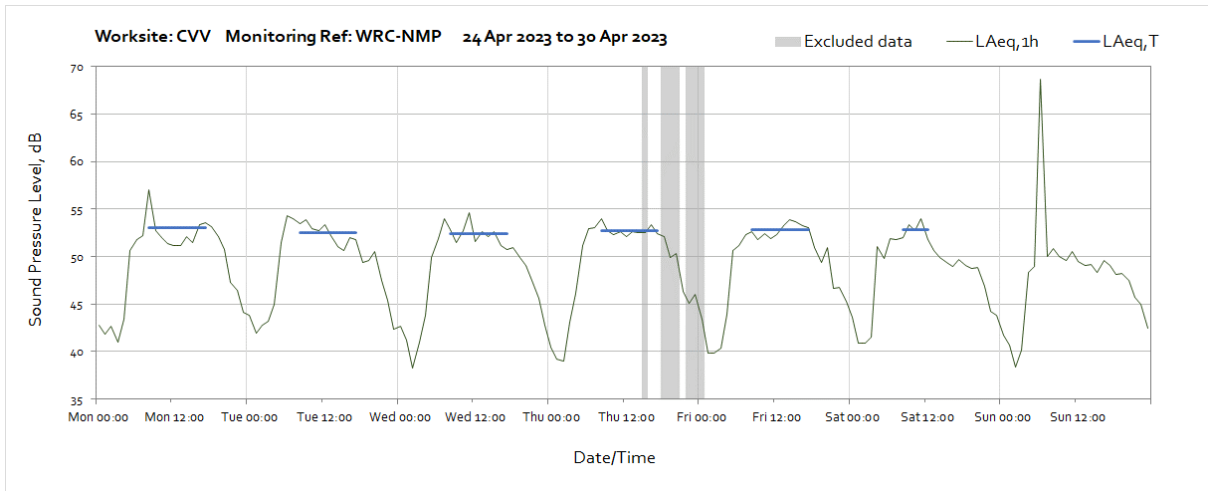
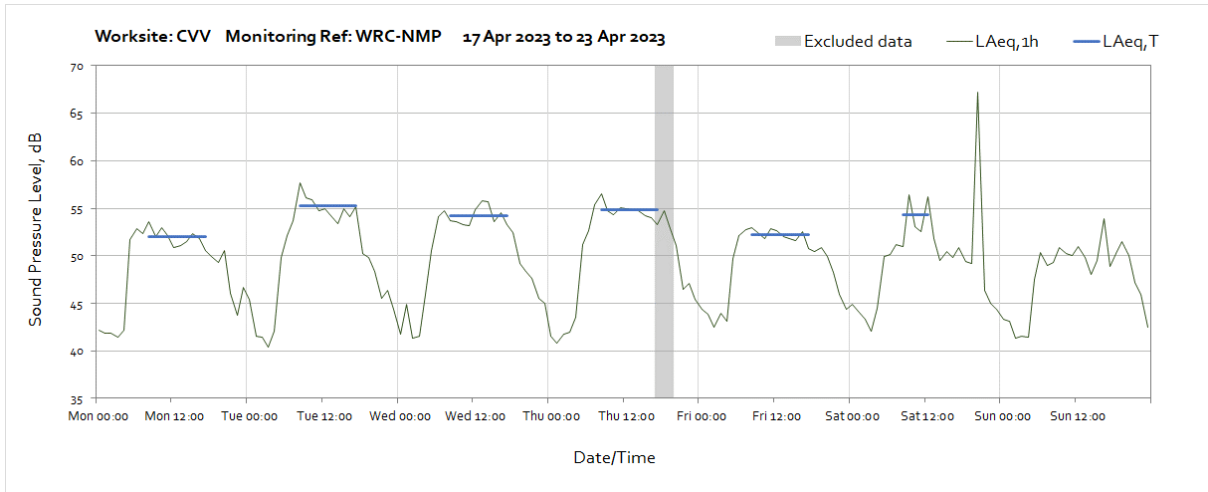


Note: Missing data between 19:00 and 20:00 on Tuesday 25<sup>th</sup> April was due to data transfer issues from the monitoring station.

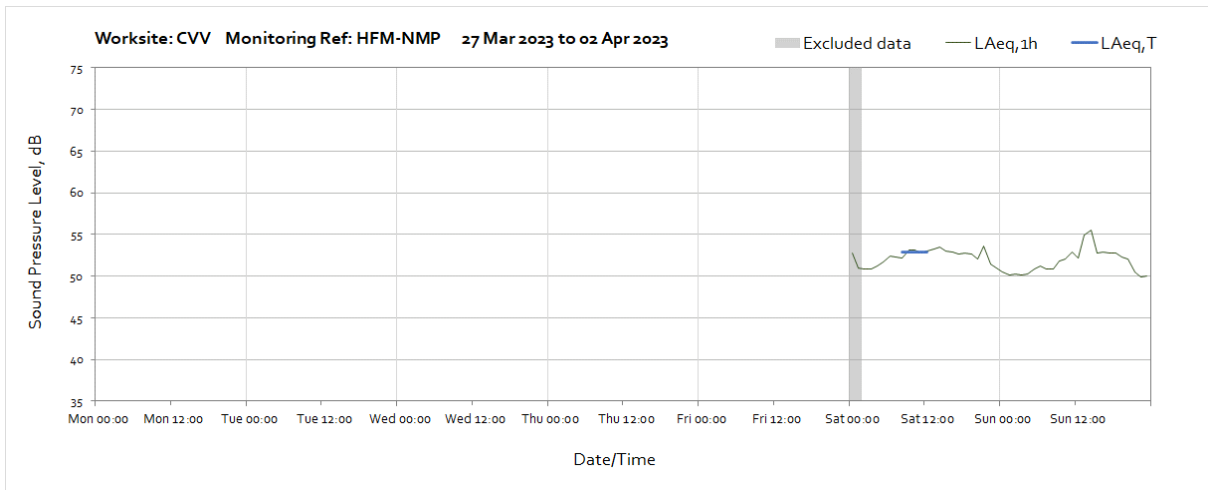


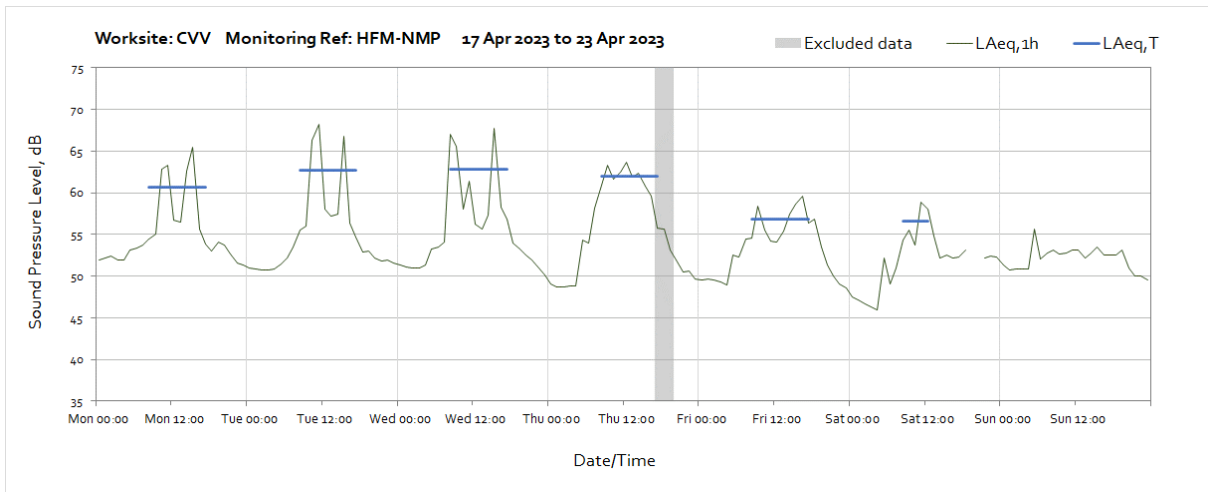
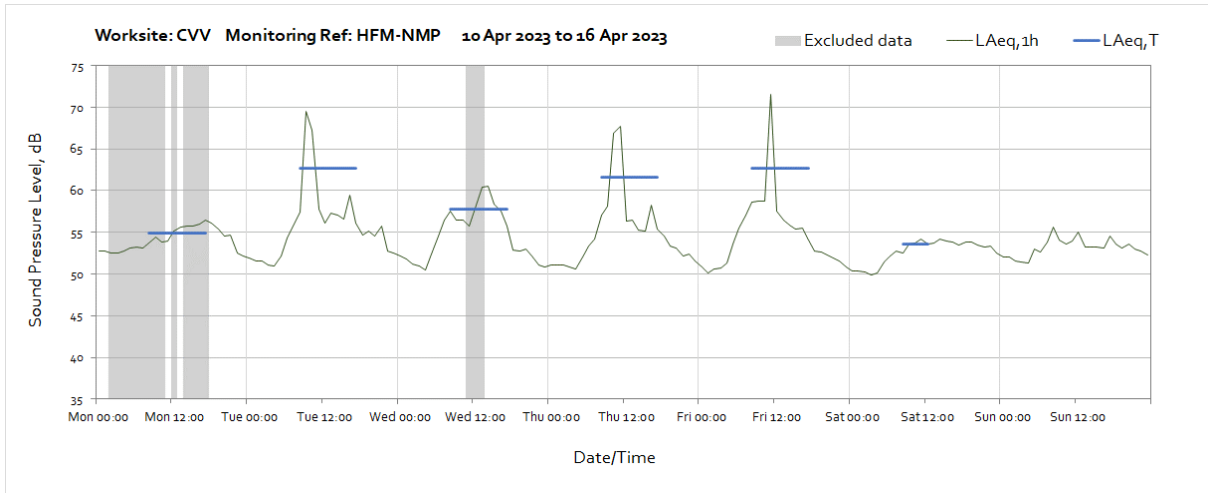
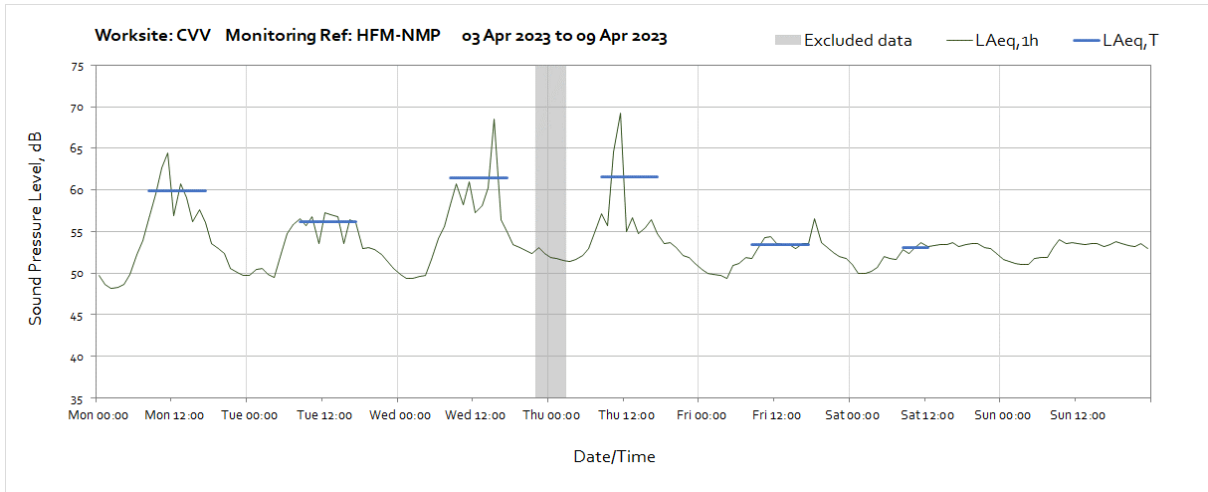
## Worksite: CVV – Monitoring Ref: WRC-NMP



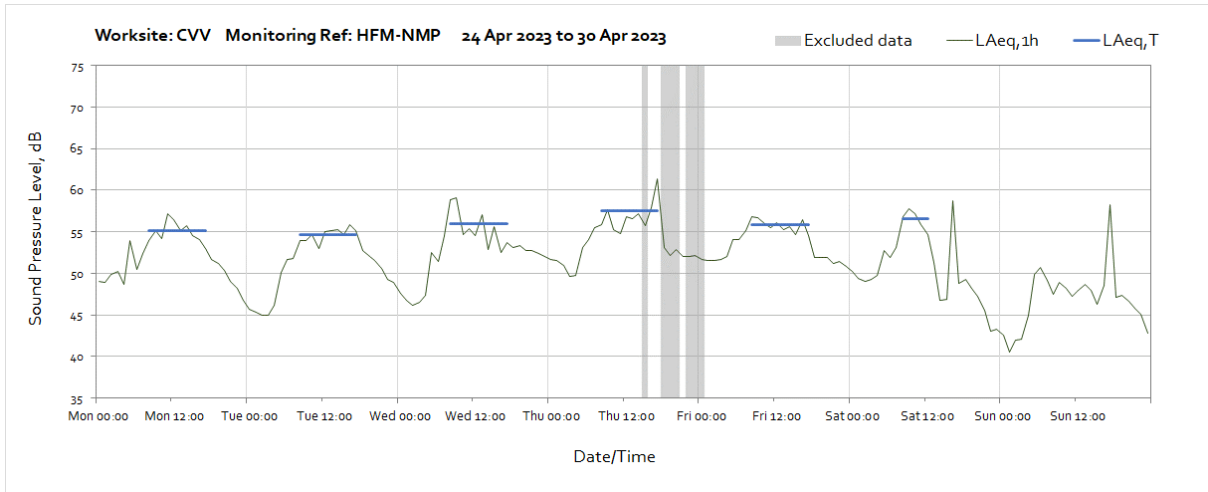


**Worksite: CVV - Monitoring Ref: HFM-NMP**

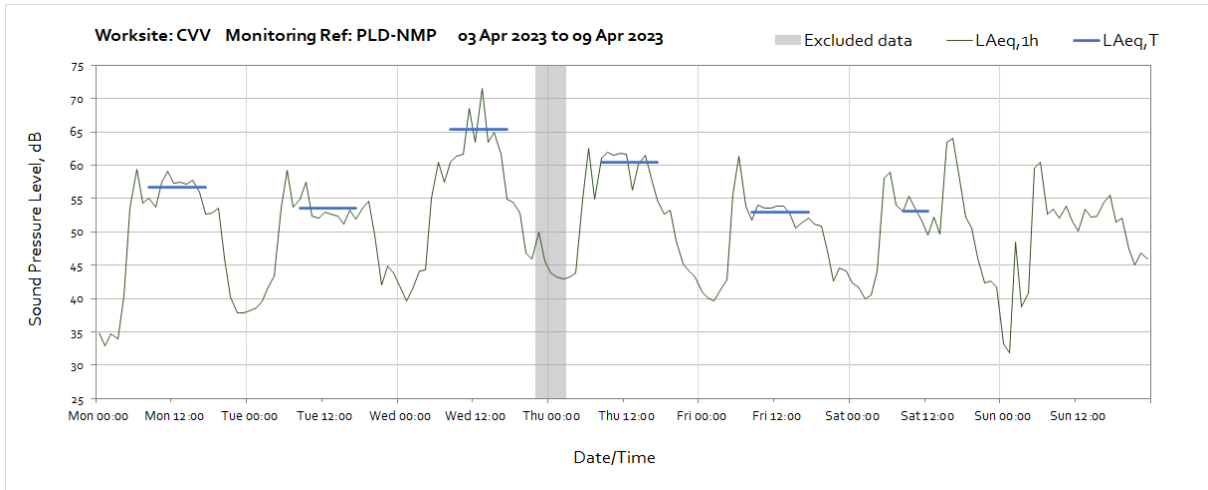
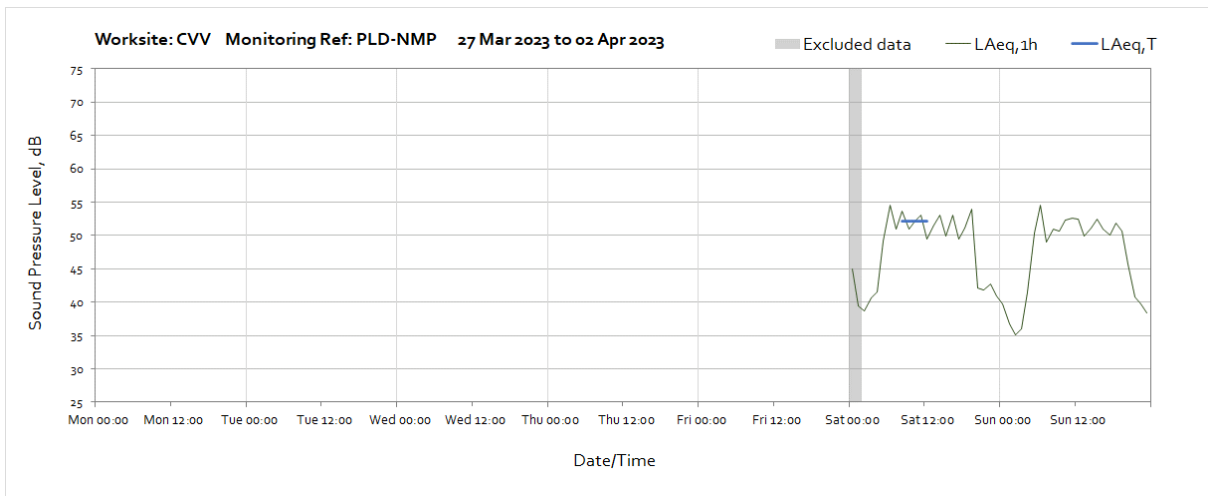


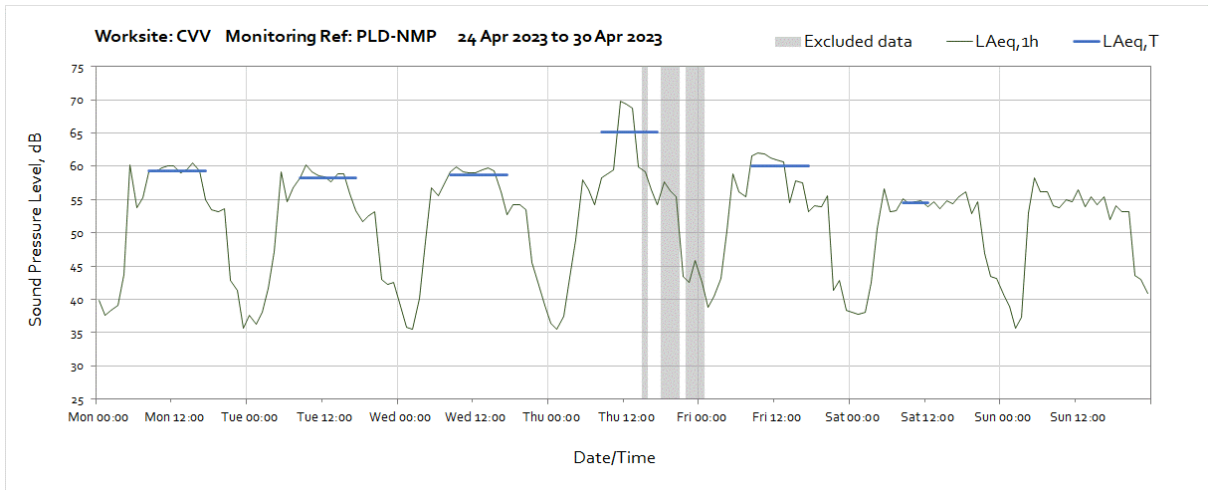
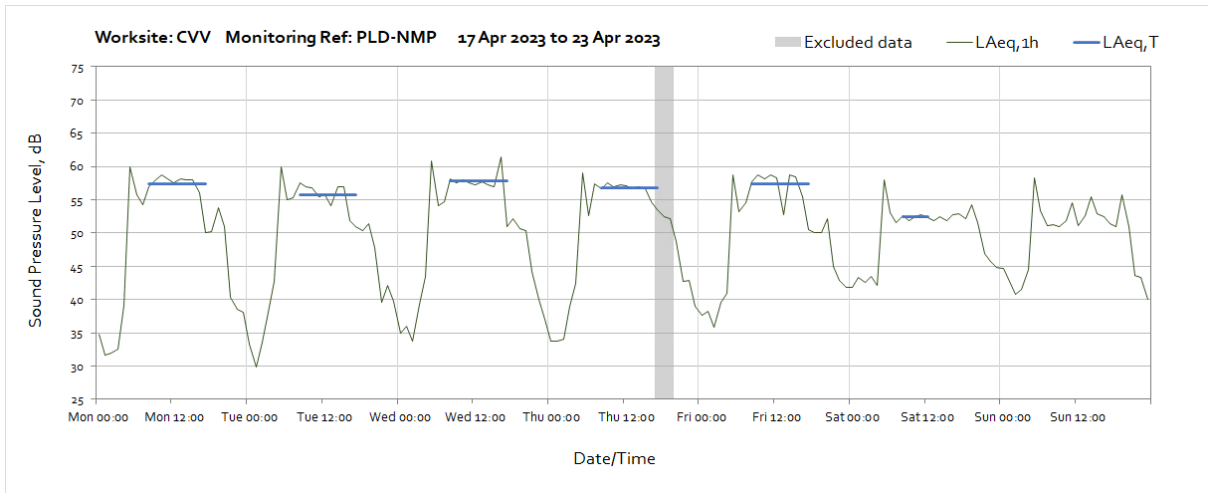
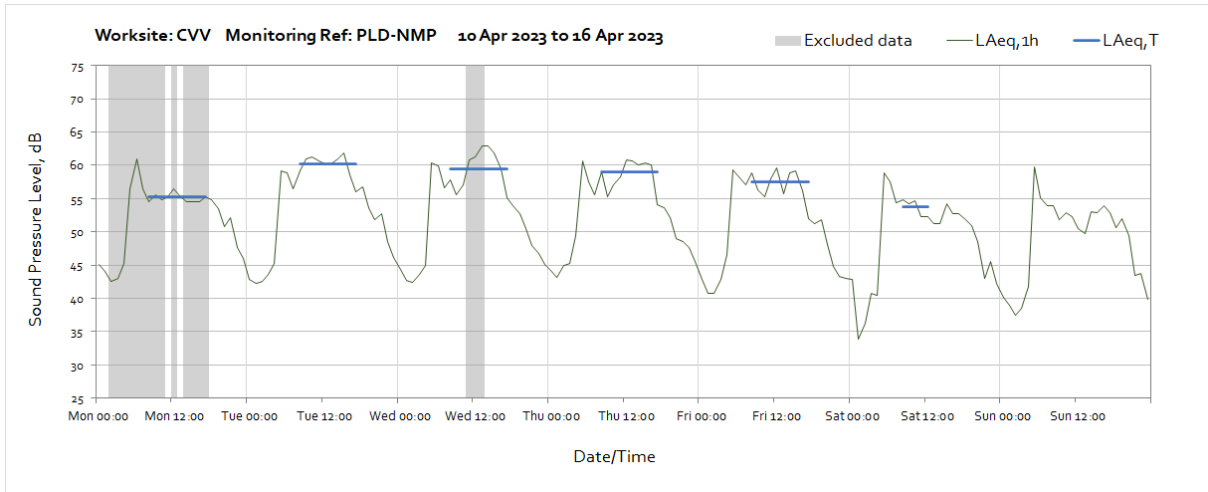


Note: Missing data between 19:00 and 21:00 on Saturday 22<sup>nd</sup> April was due to data transfer issues from the monitoring station.

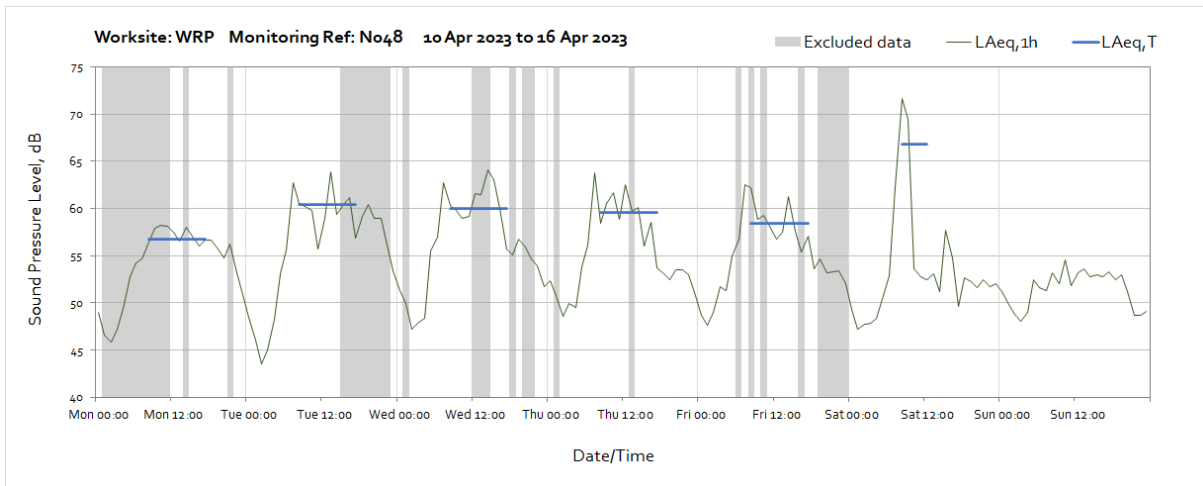
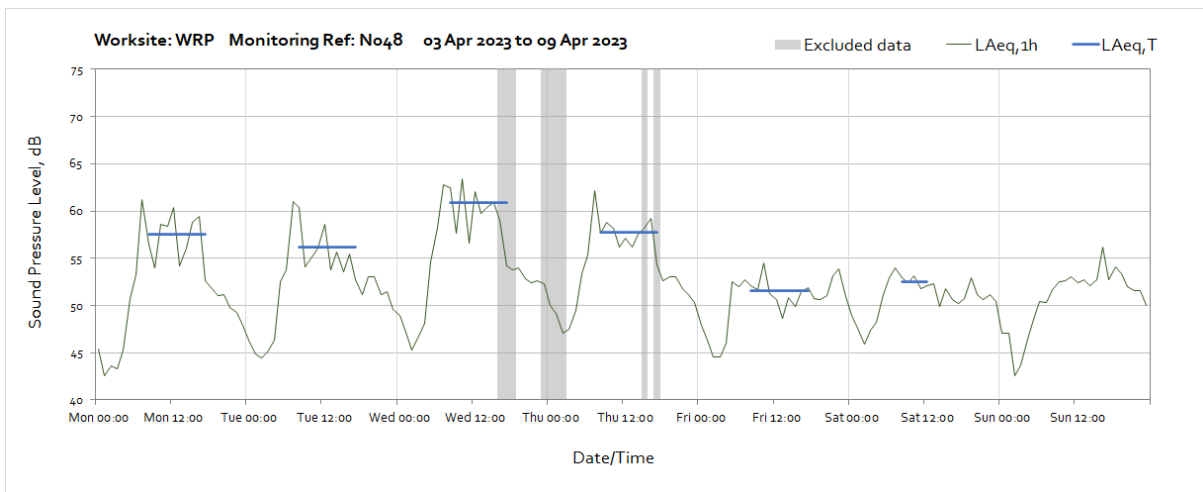
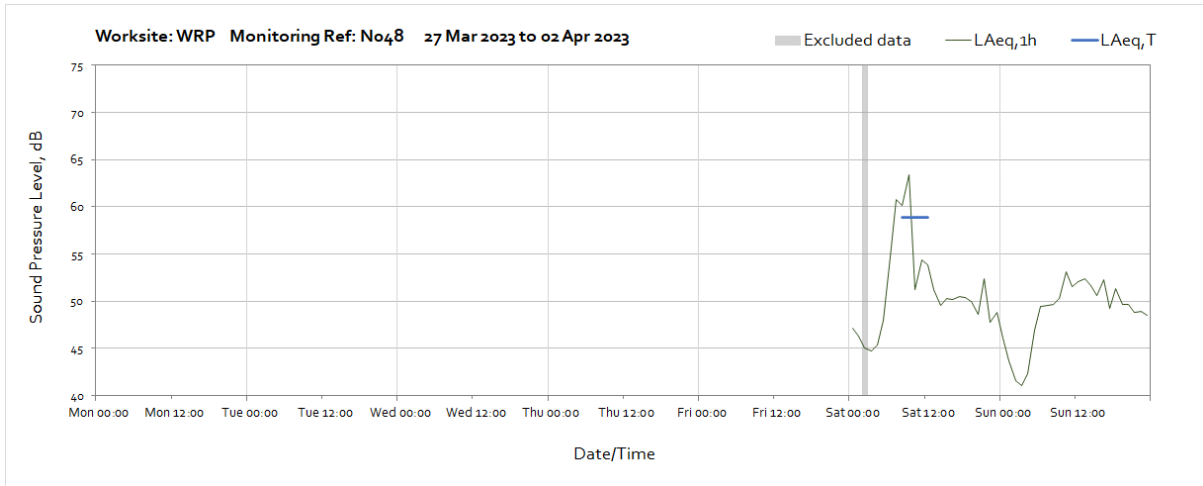


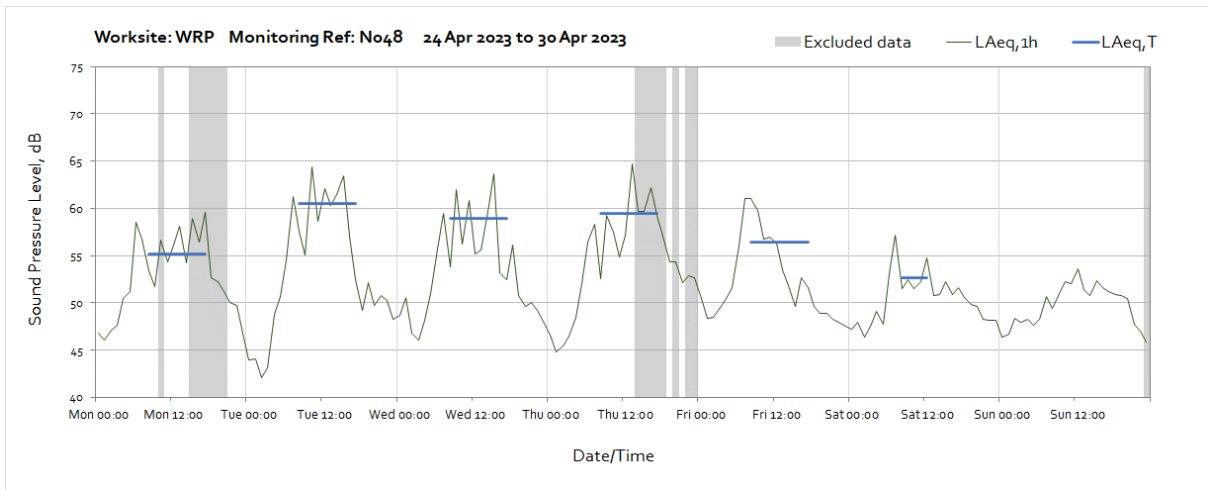
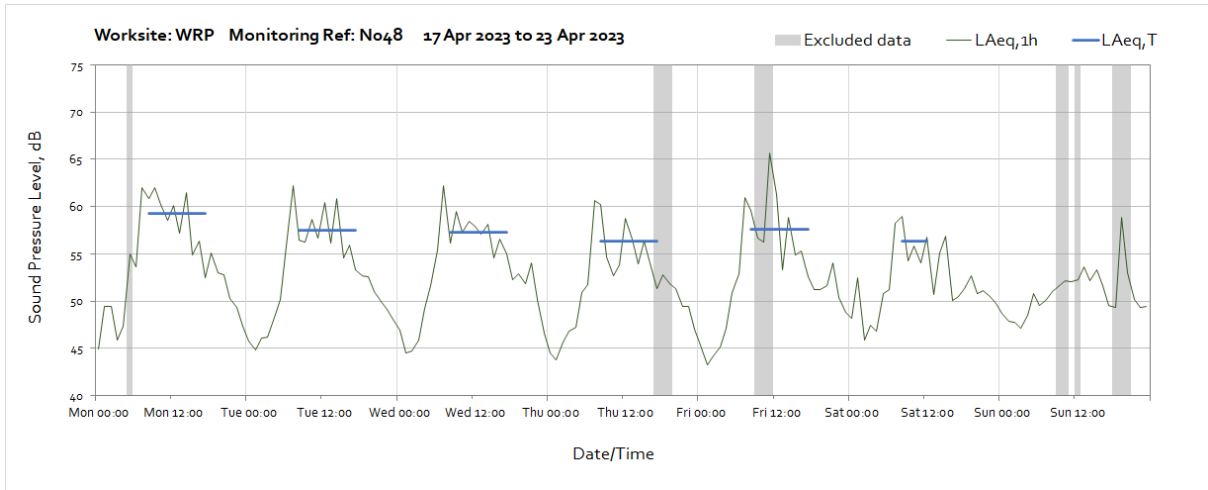
**Worksite: CVV - Monitoring Ref: PLD-NMP**



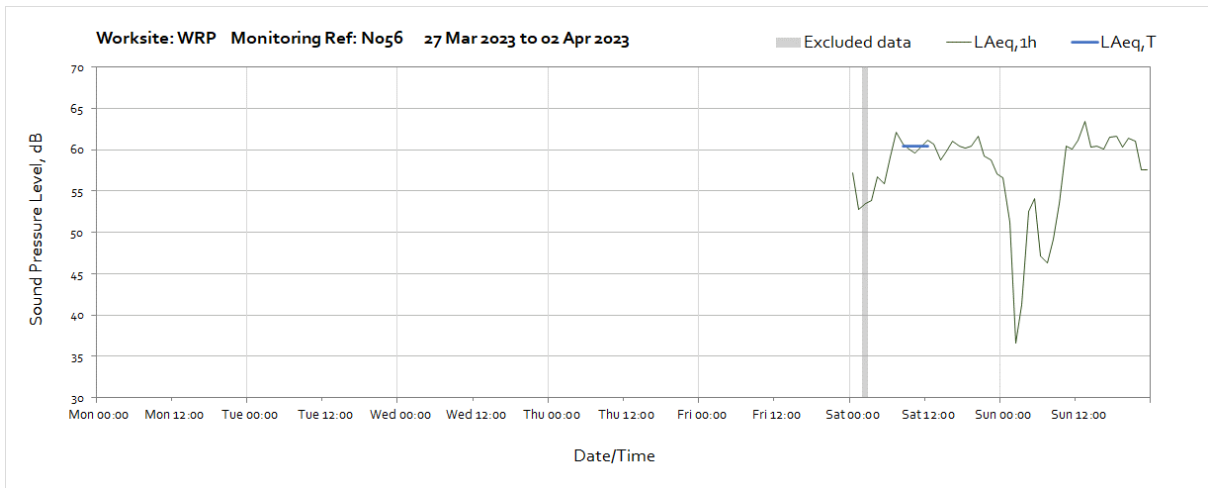


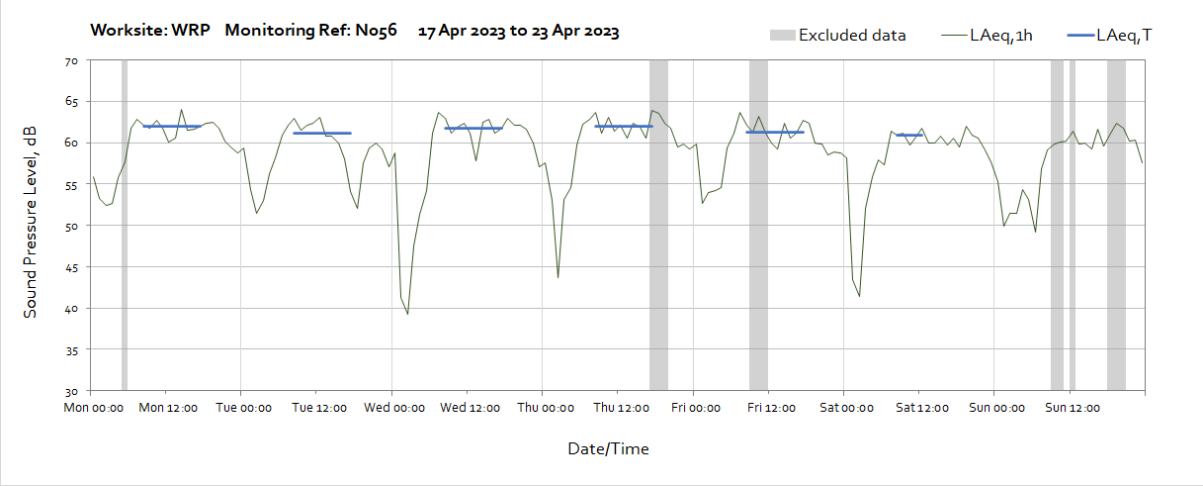
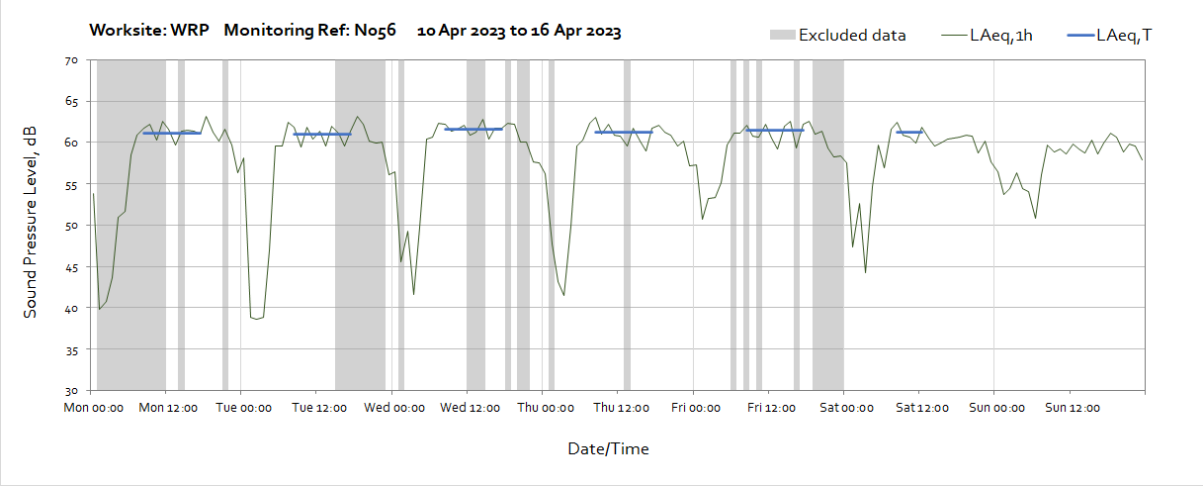
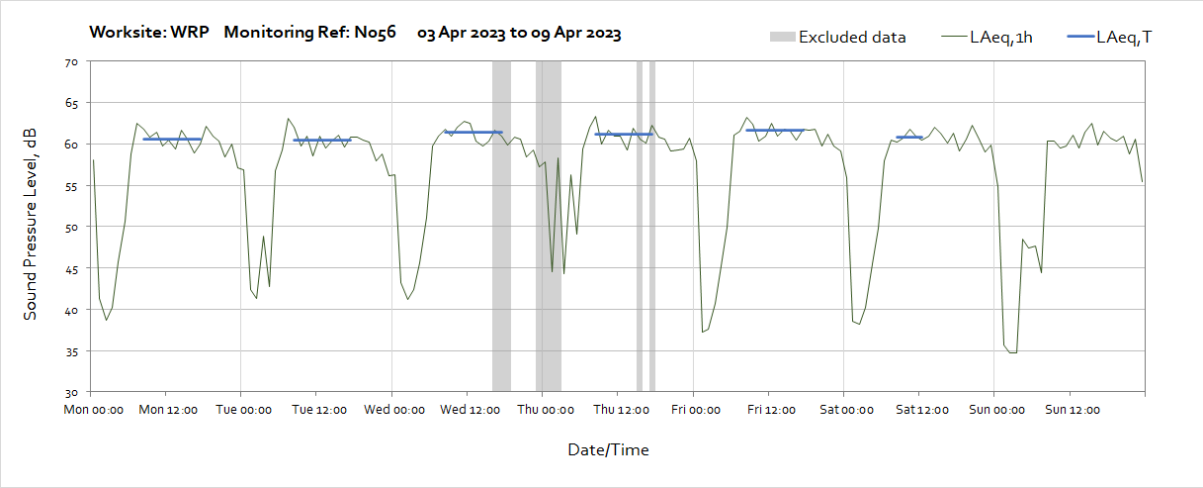
## Worksite: WRP – Monitoring Ref: N048



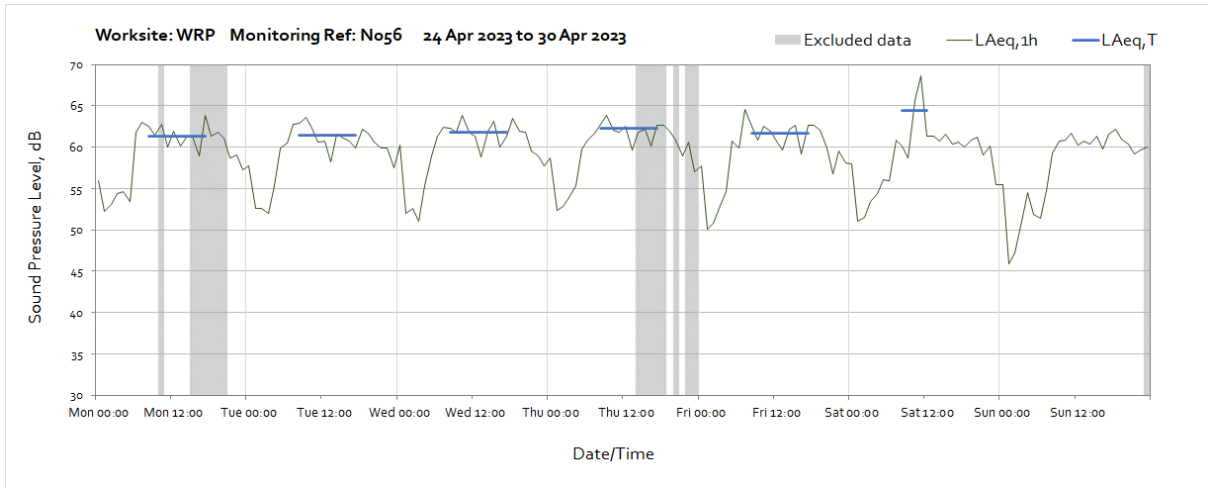


**Worksite: WRP – Monitoring Ref: N056**

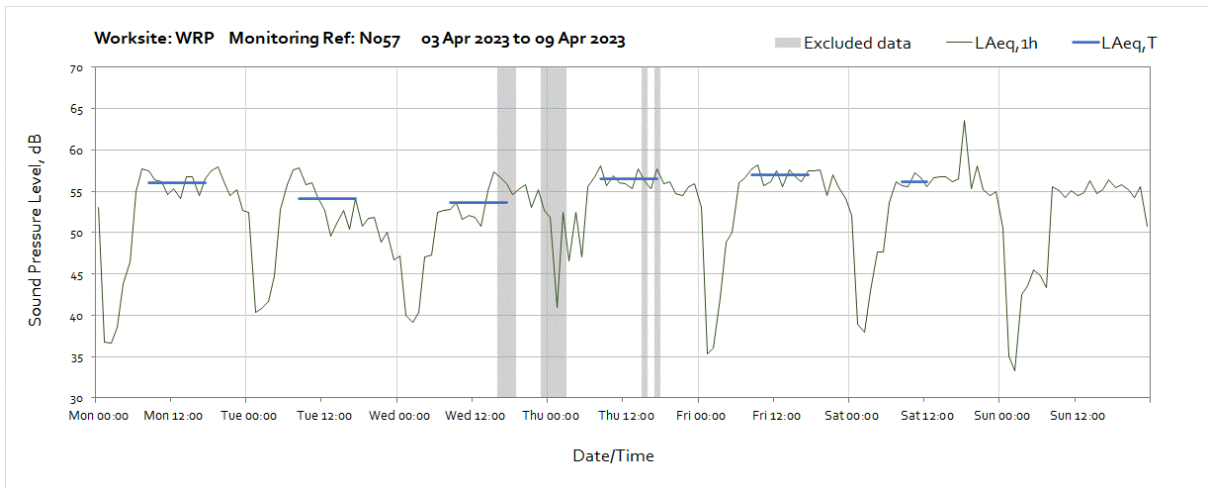
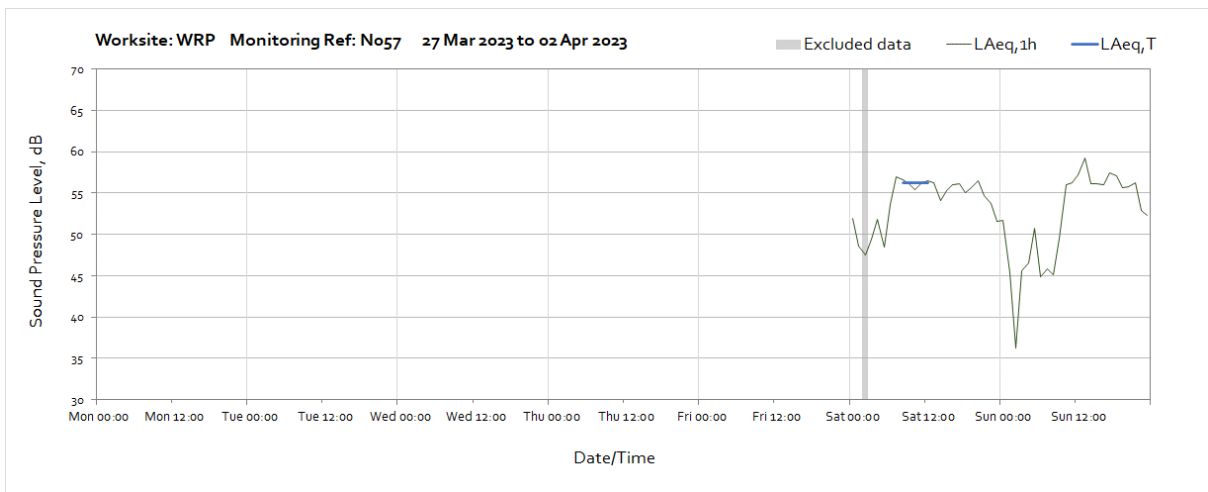


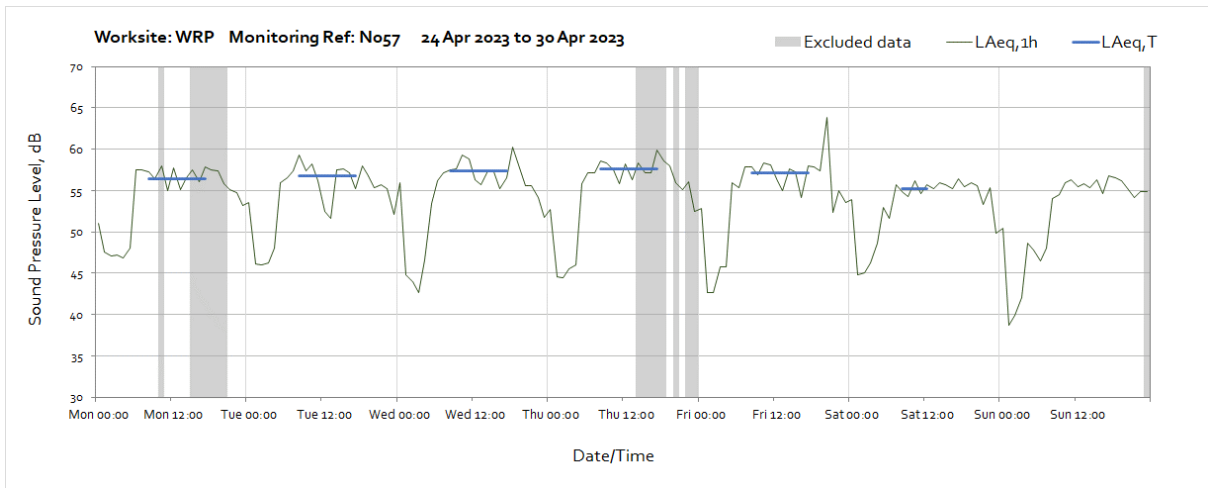
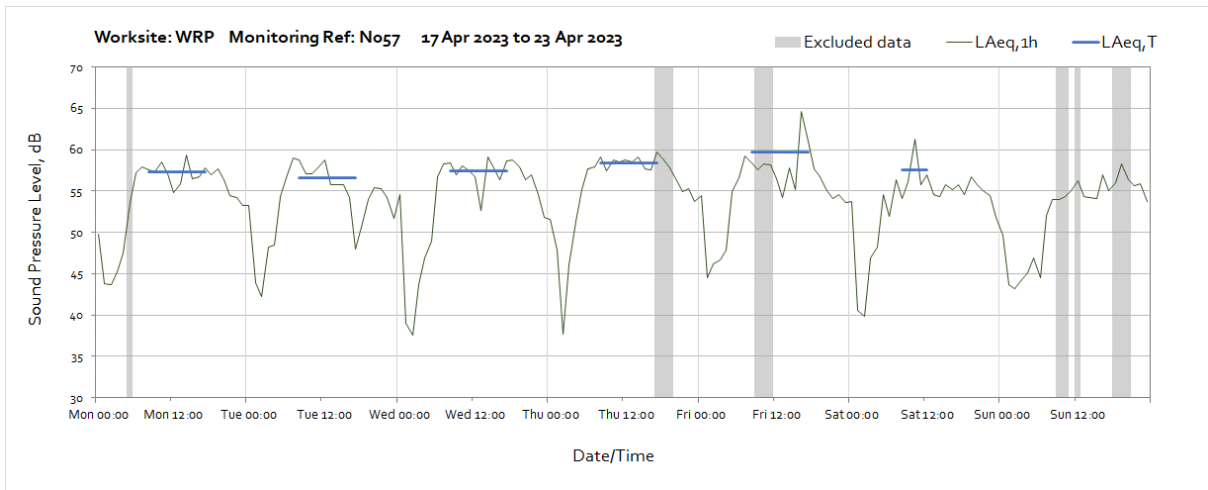
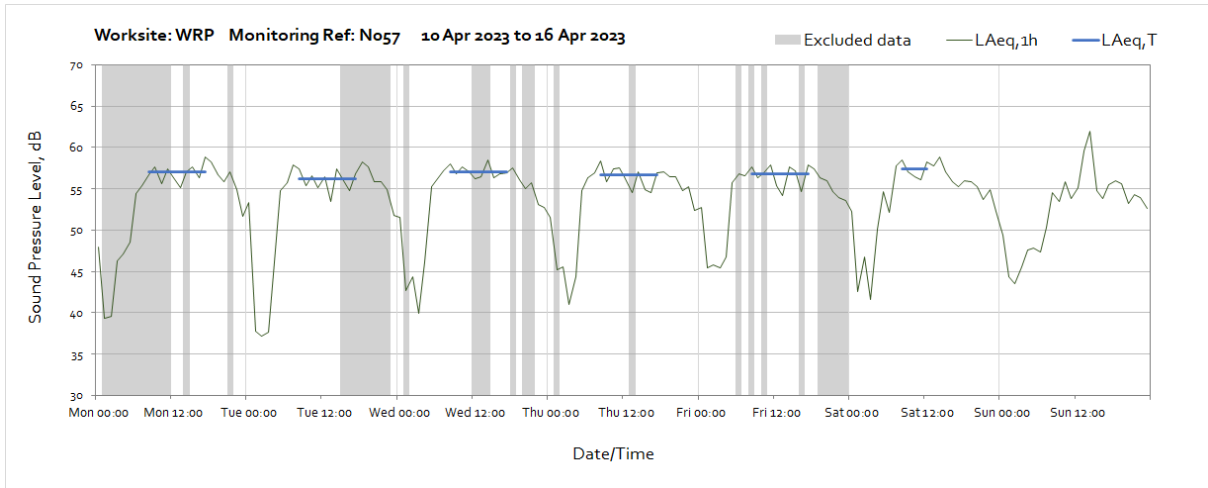




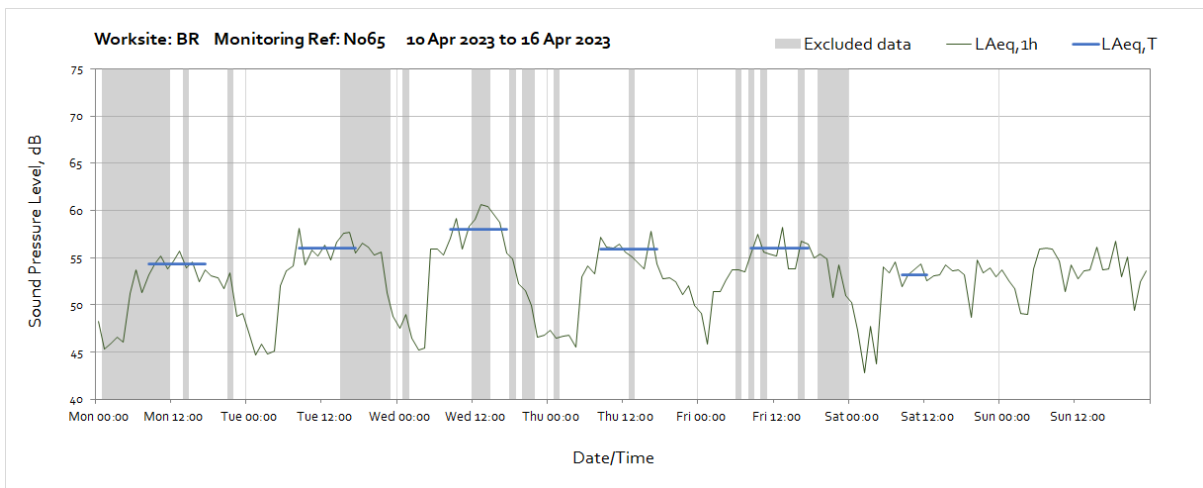
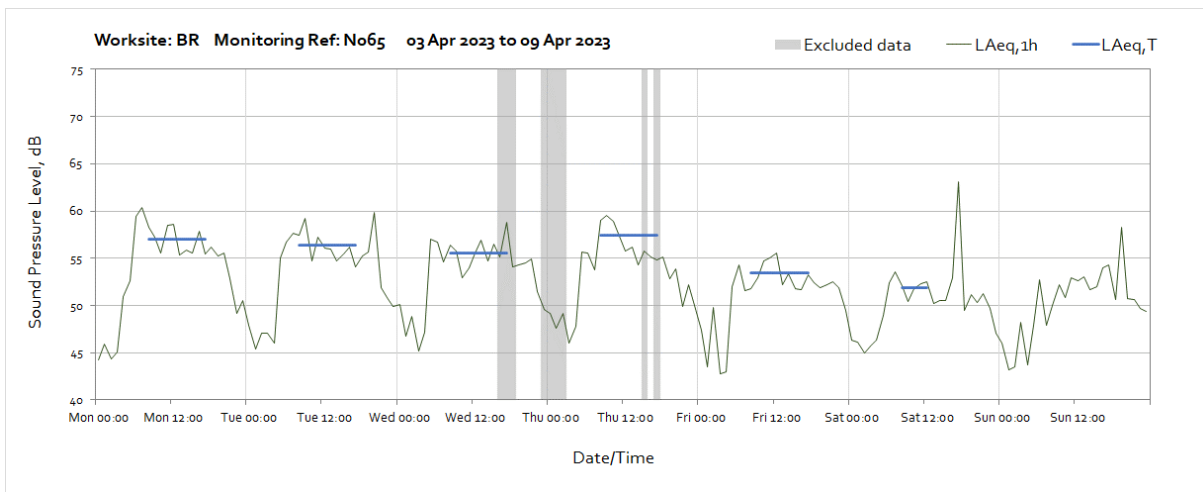
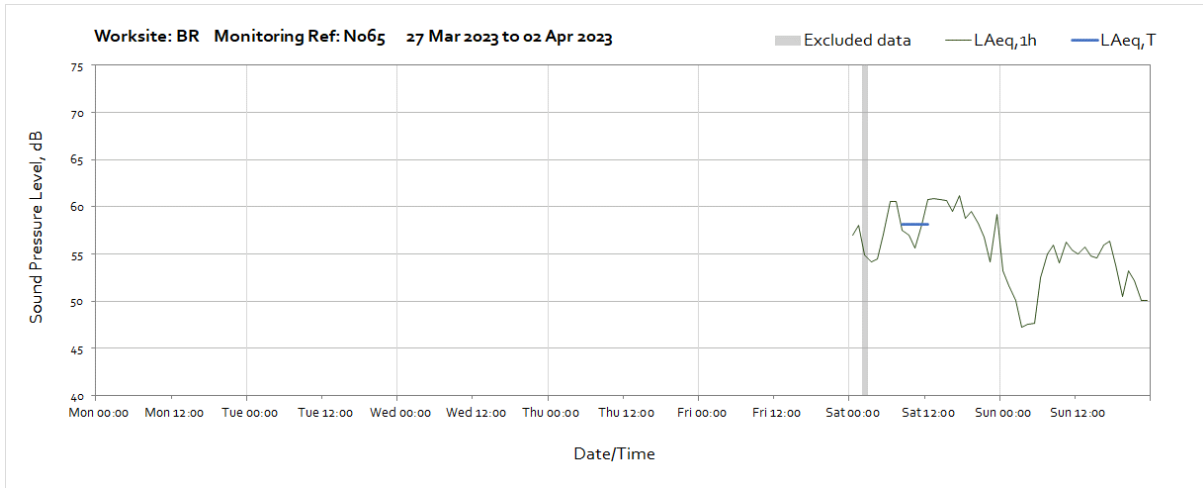


**Worksite: WRP – Monitoring Ref: N057**

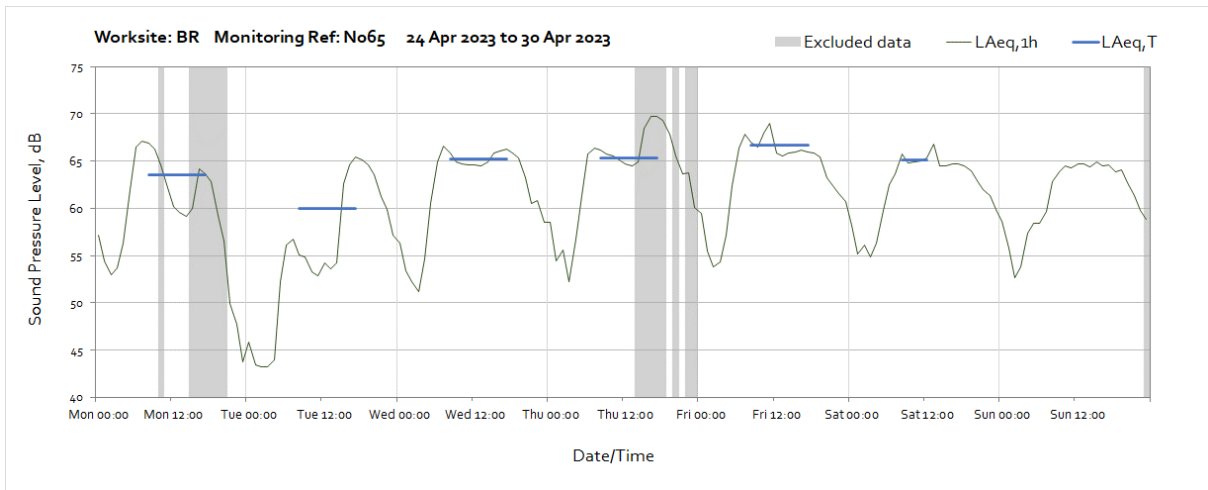
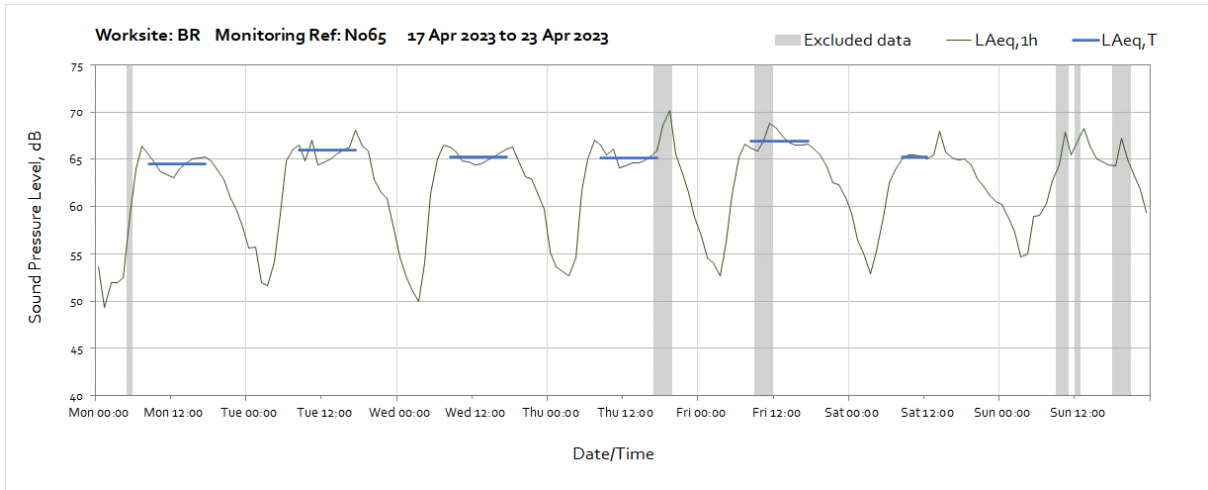




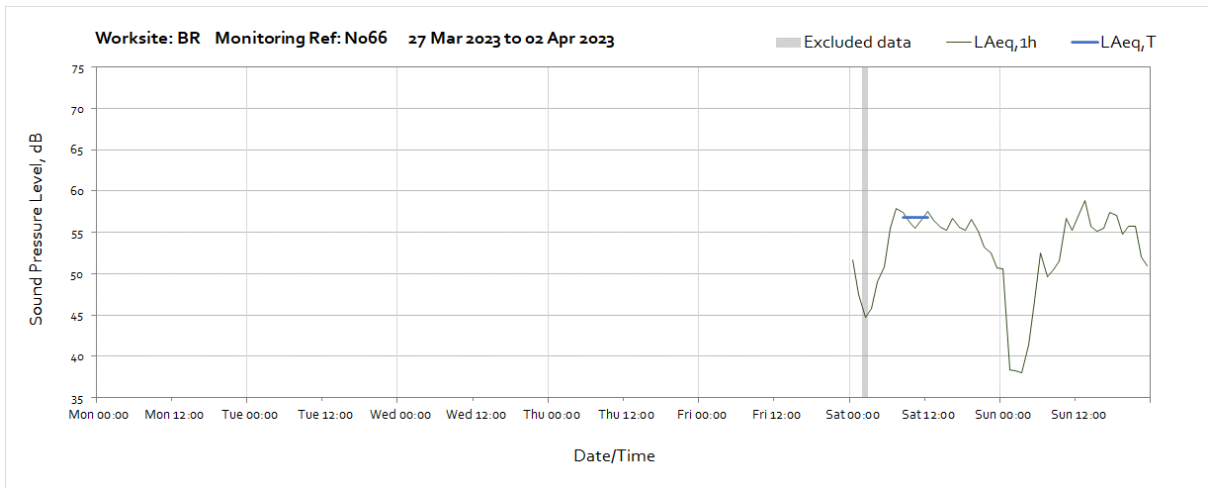
## Worksite: BR – Monitoring Ref: N065

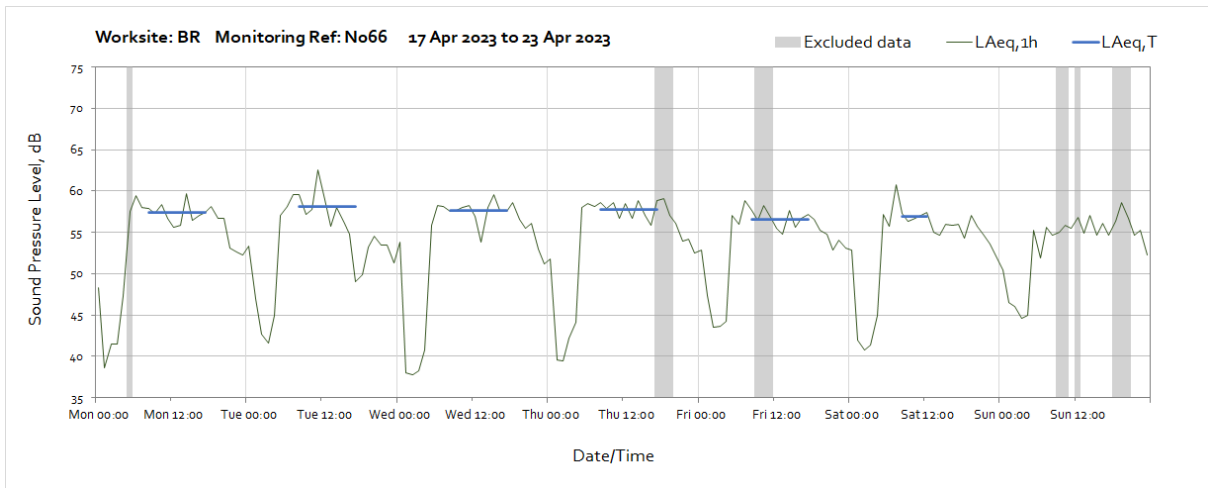
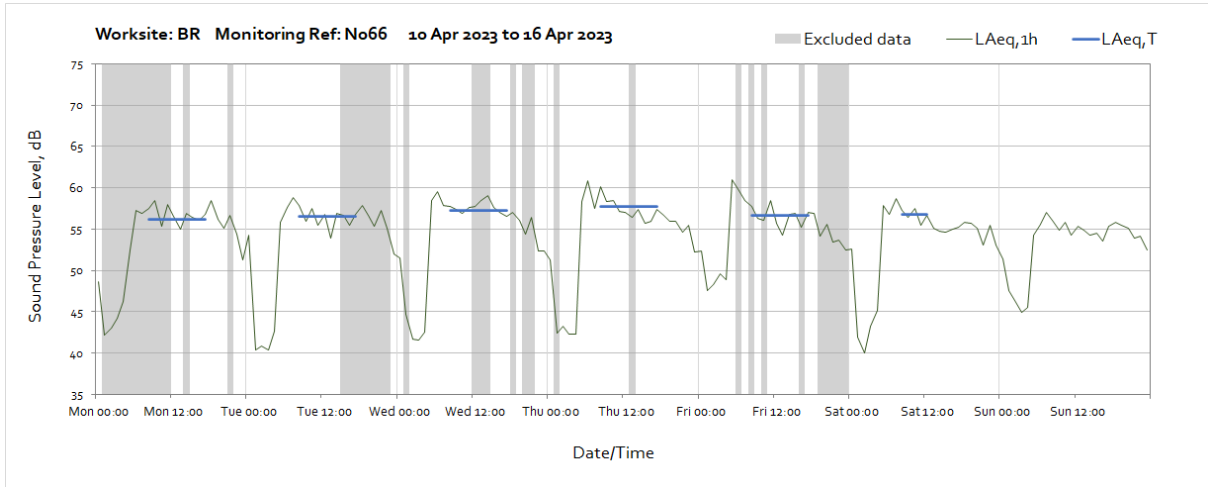
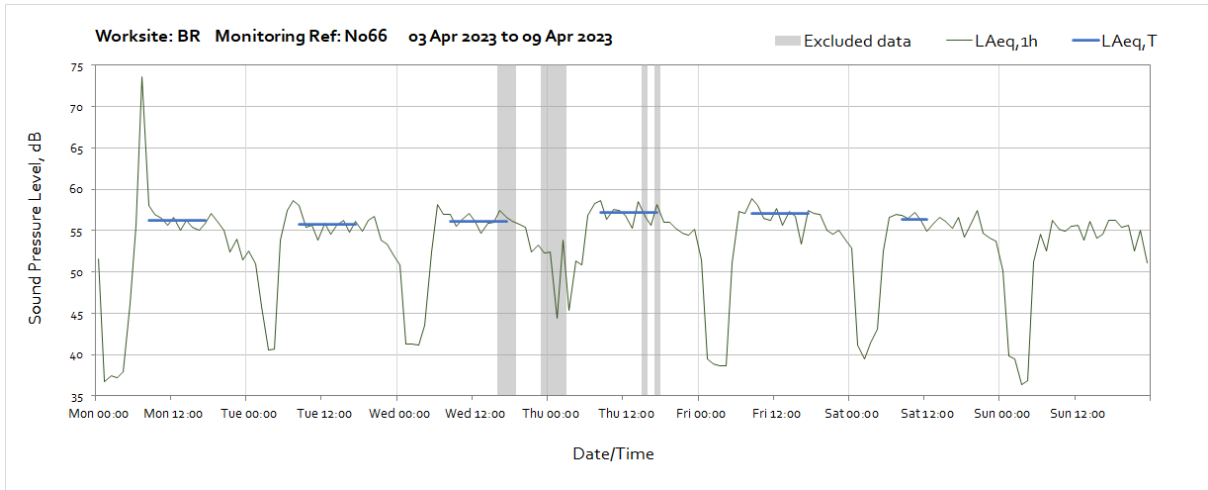


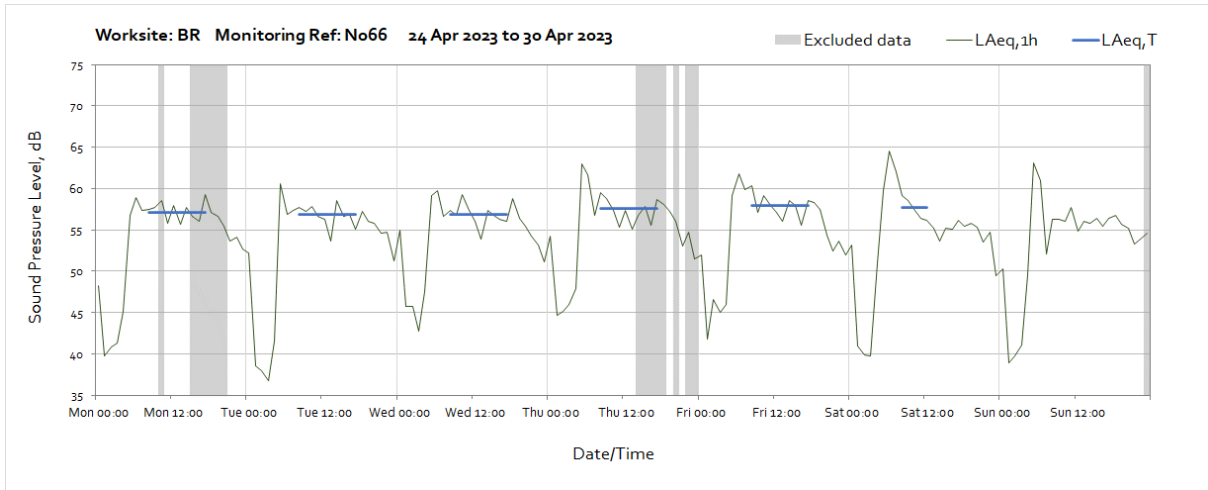
OFFICIAL



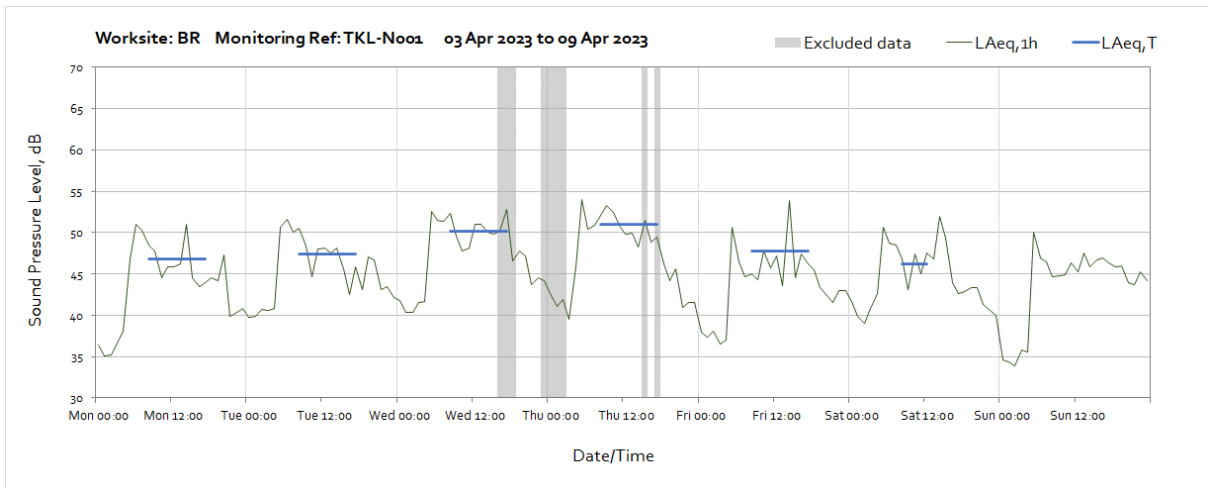
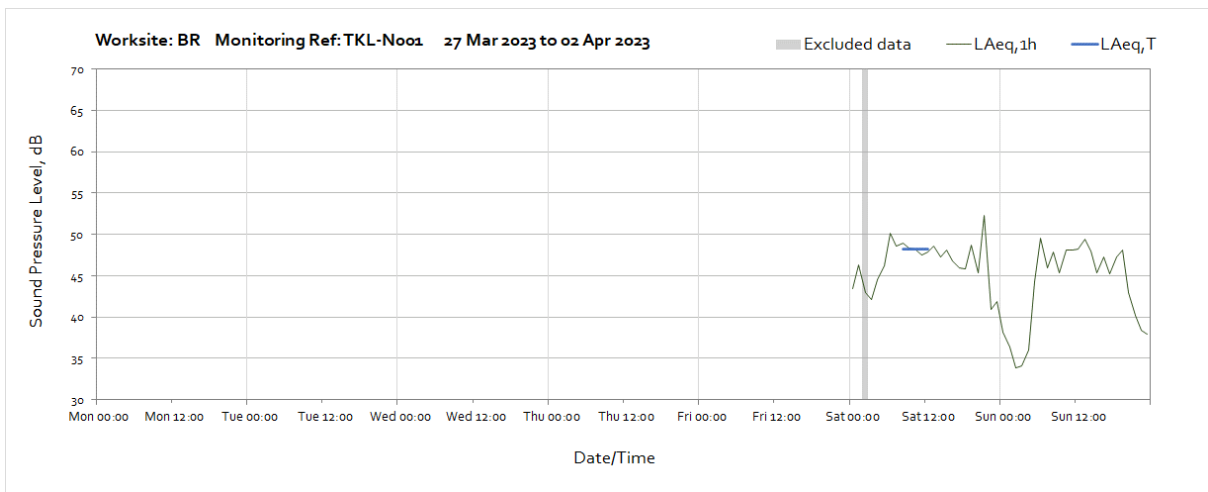
**Worksite: BR – Monitoring Ref: N066**



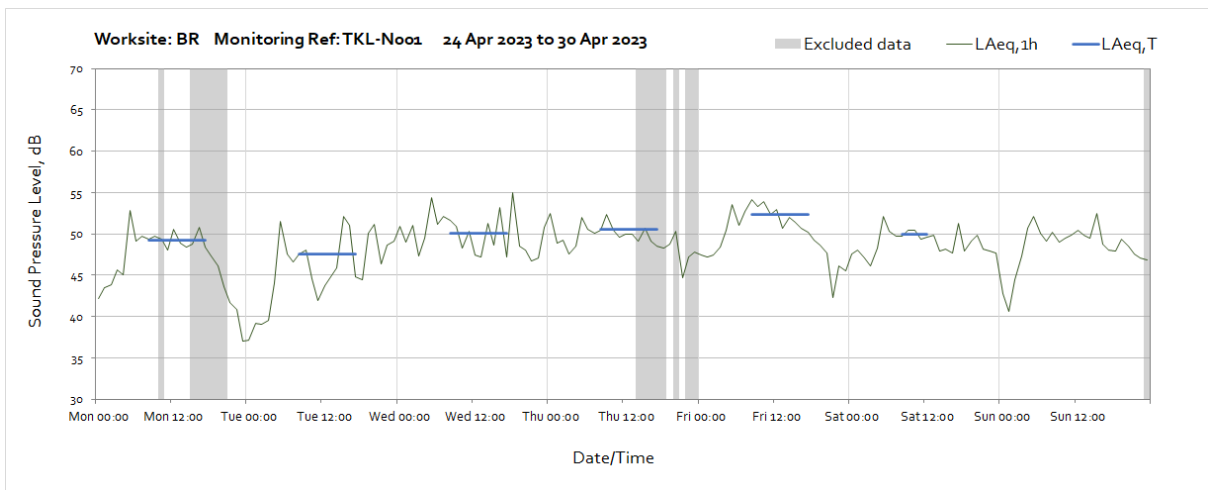
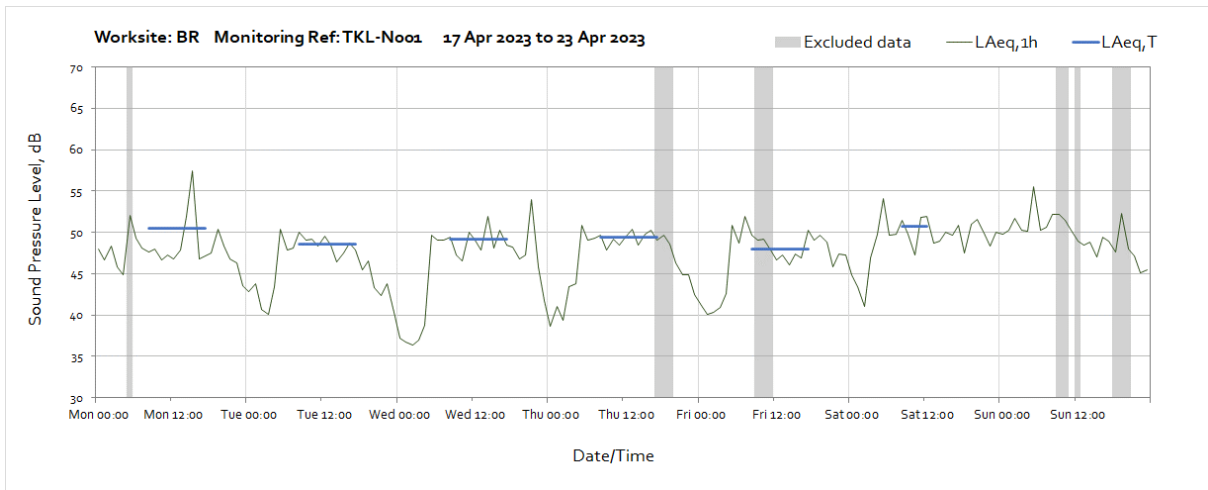
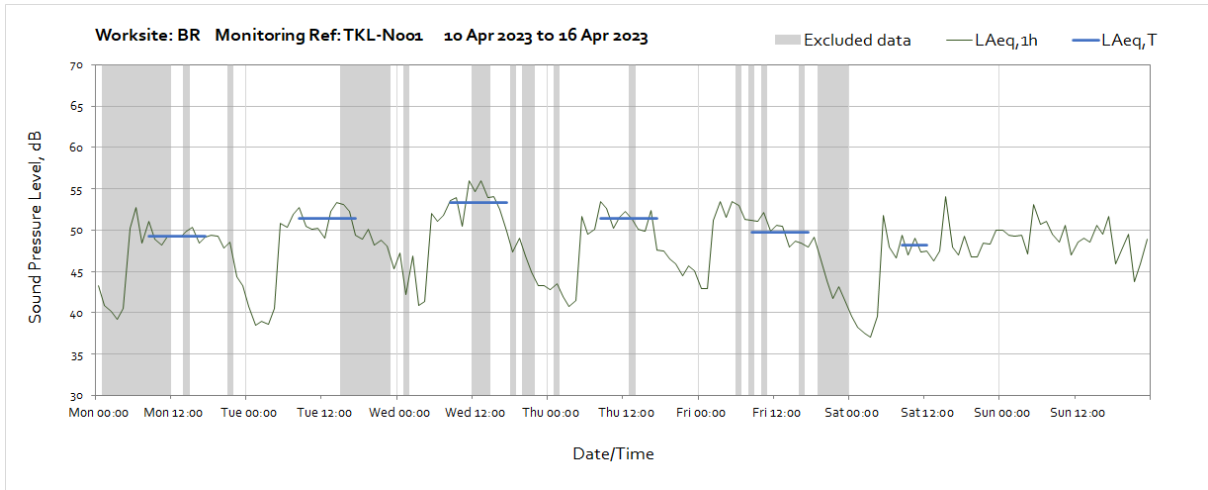




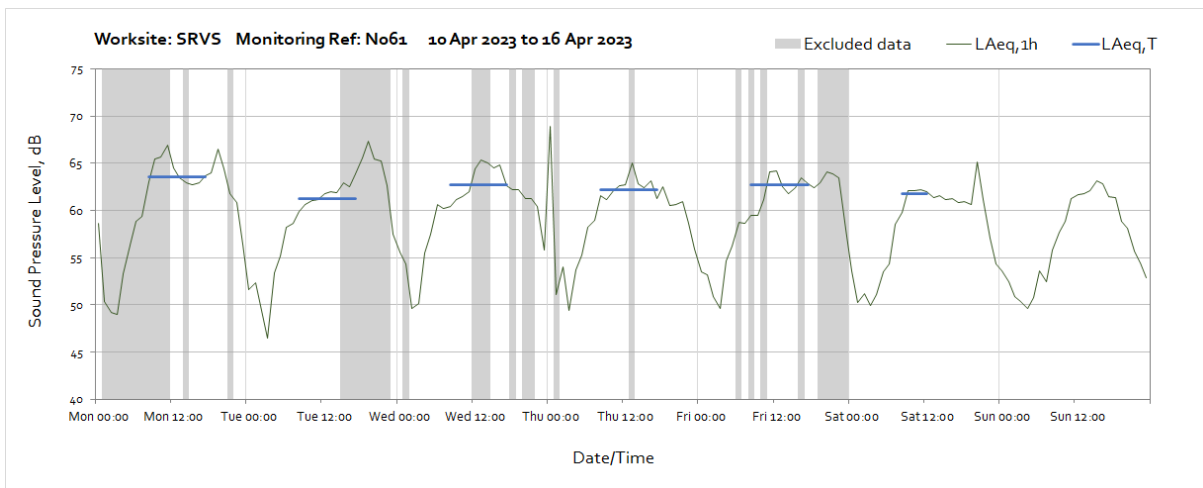
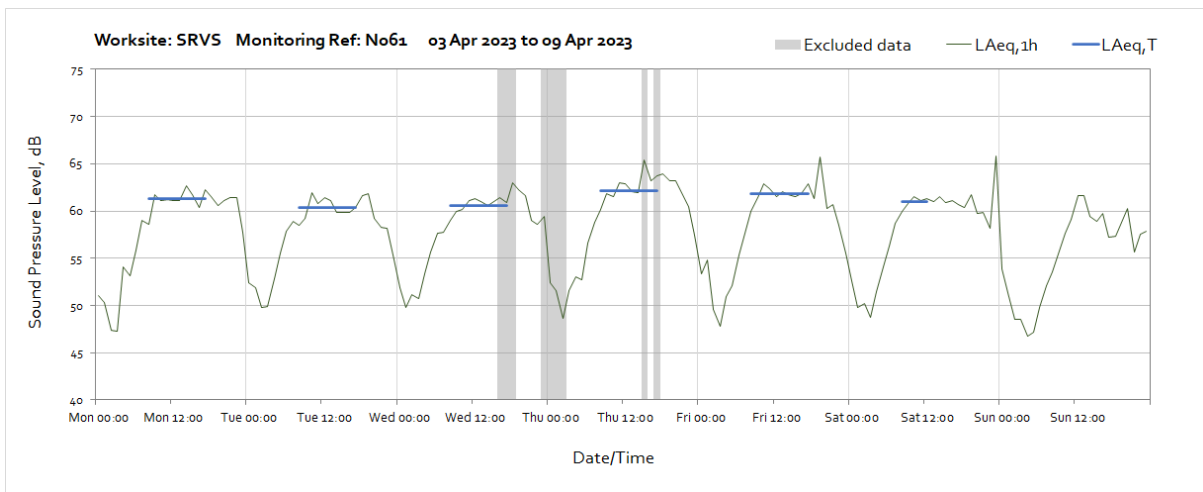
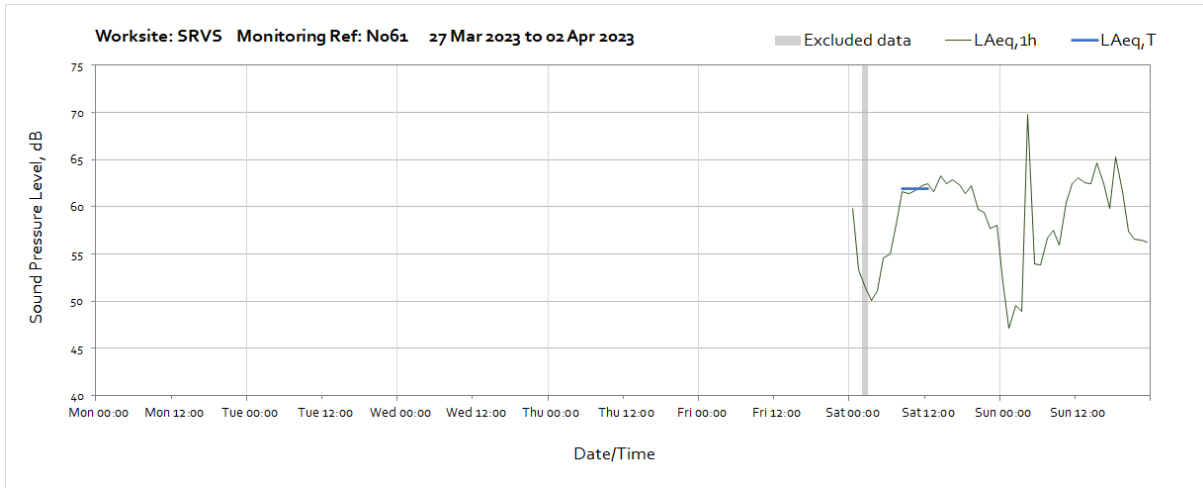
**Worksite: BR – Monitoring Ref: TKL-N001**

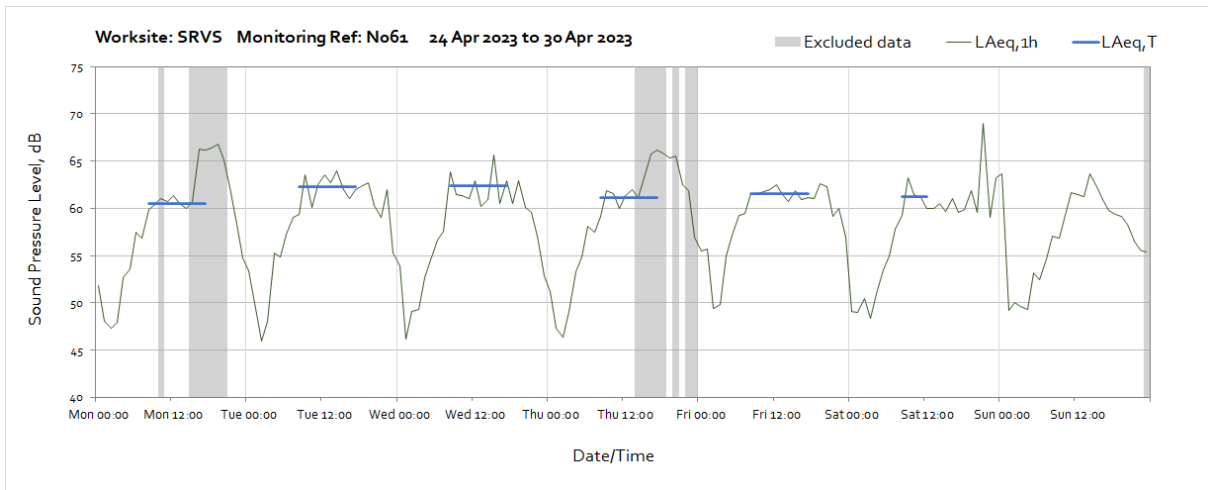
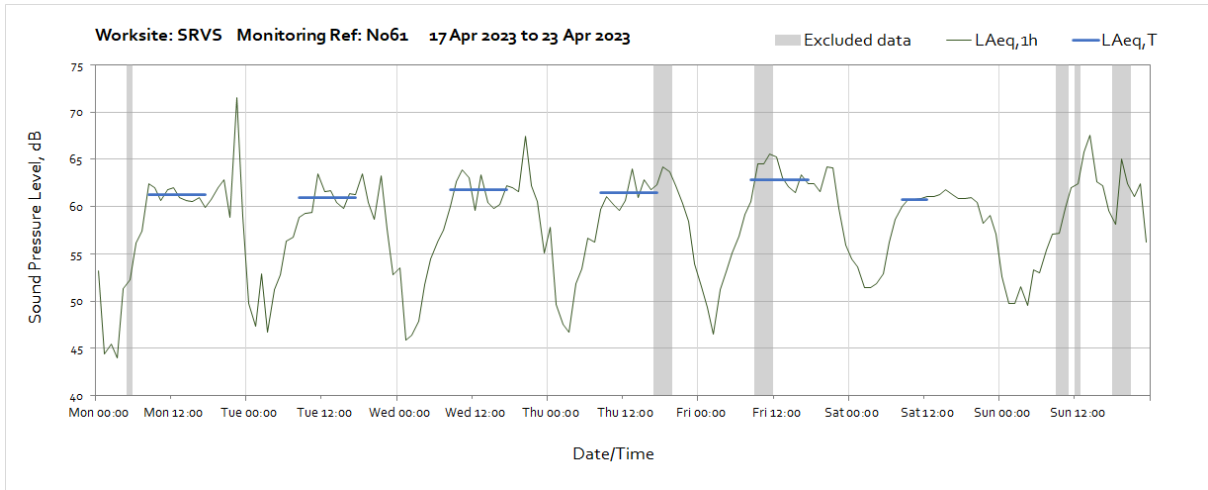




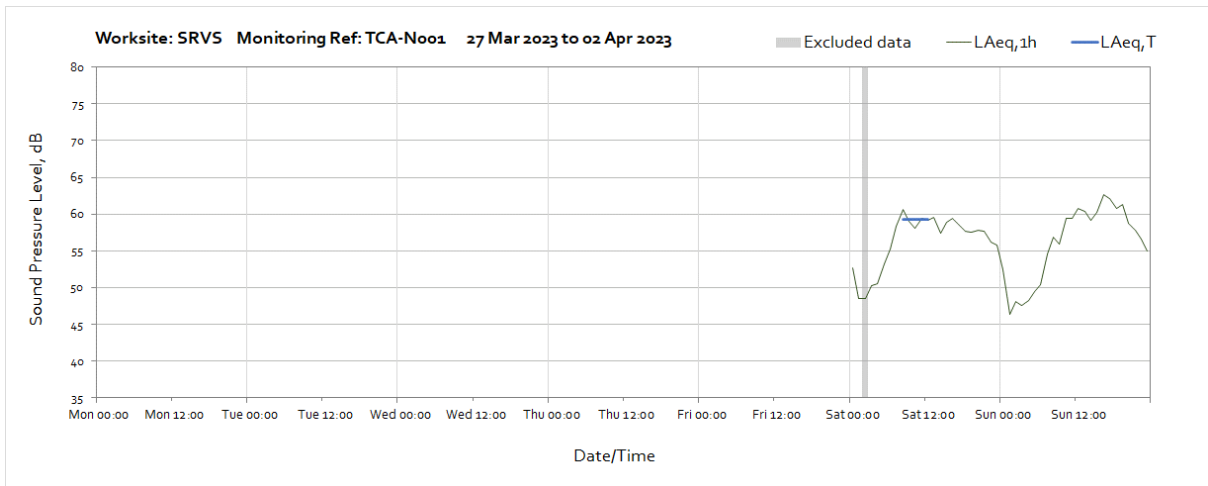


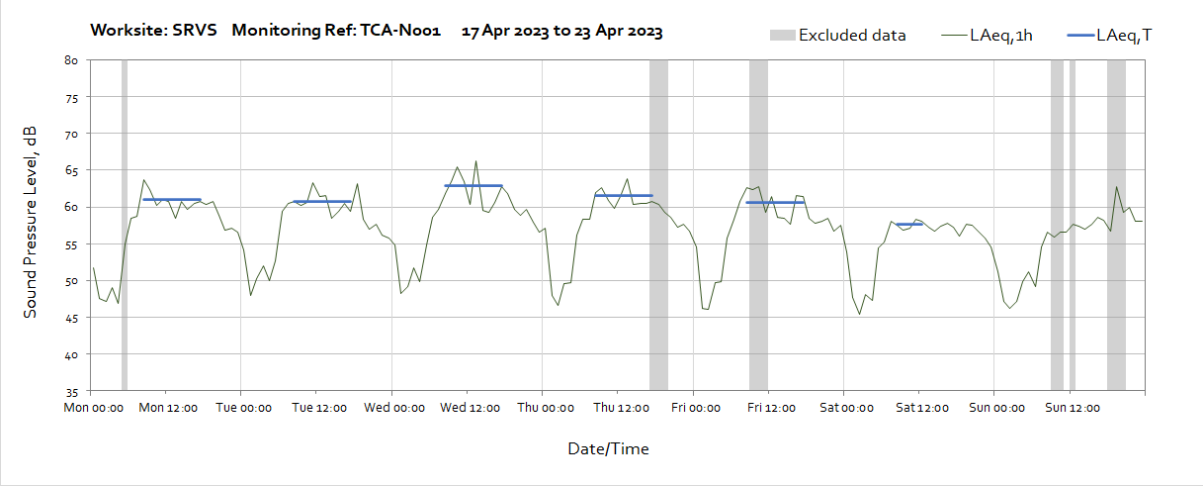
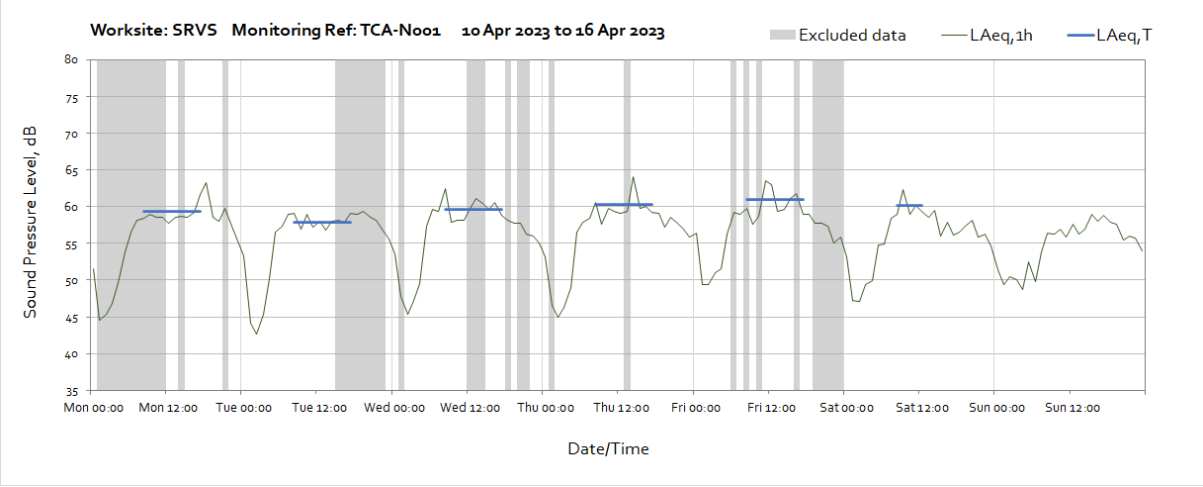
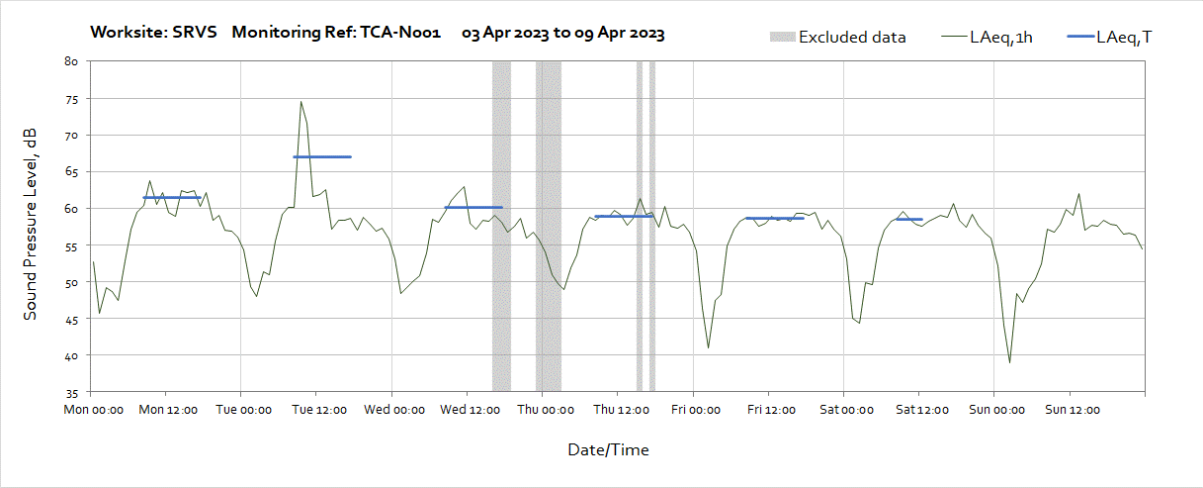
# Worksite: SRVS – Monitoring Ref: N061

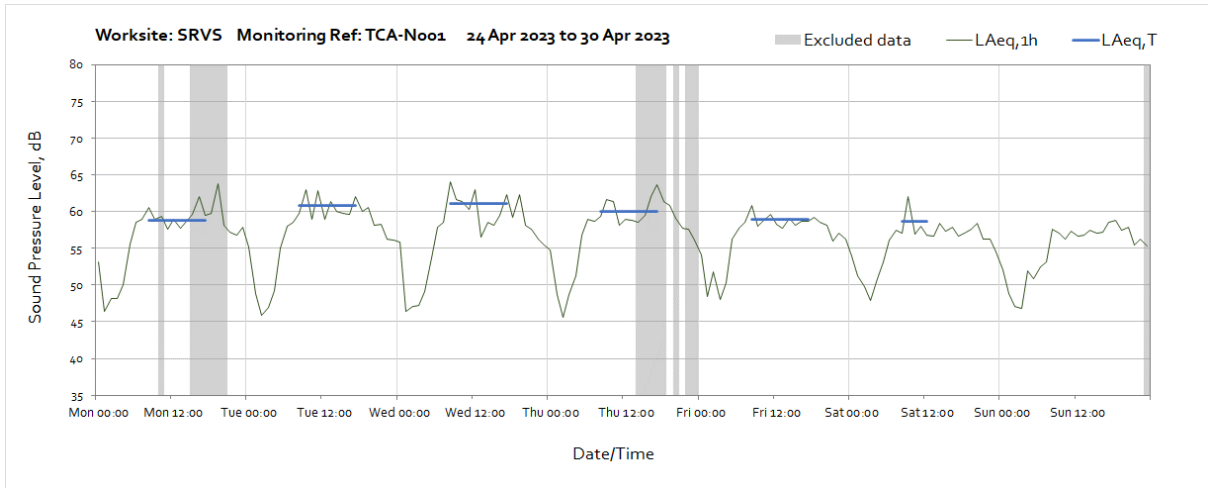




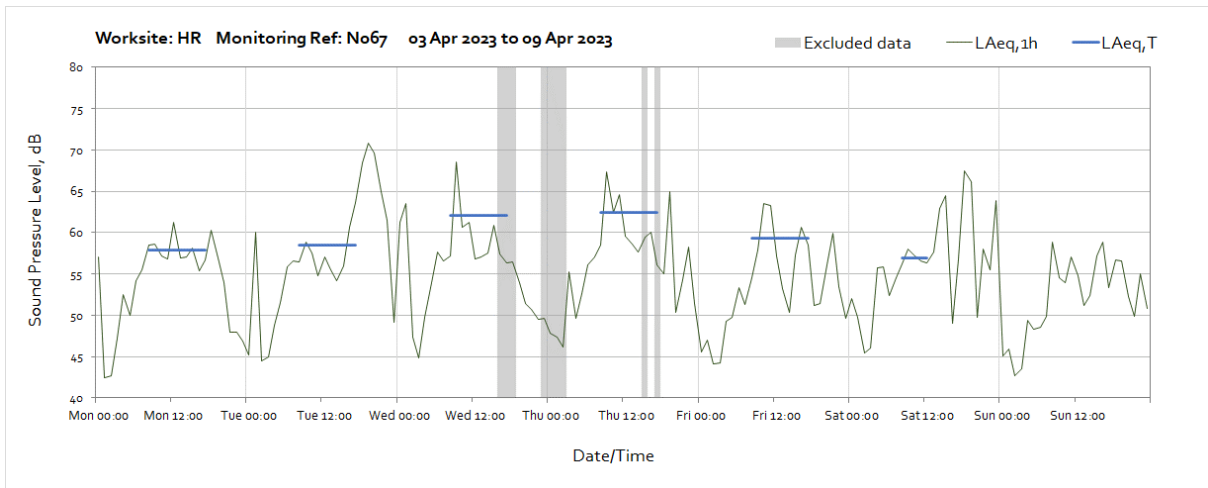
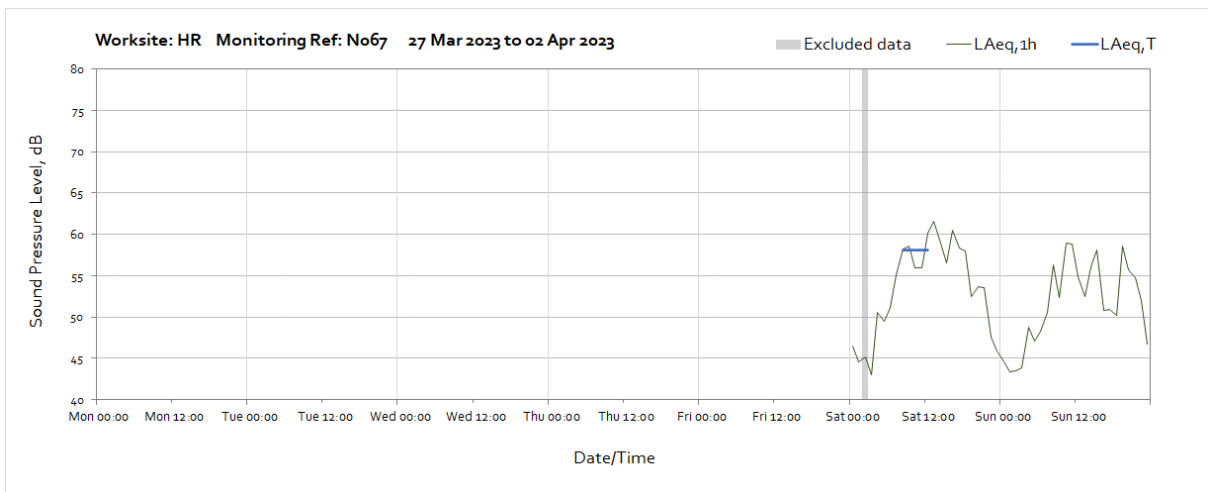
**Worksite: SRVS – Monitoring Ref: TCA-N001**

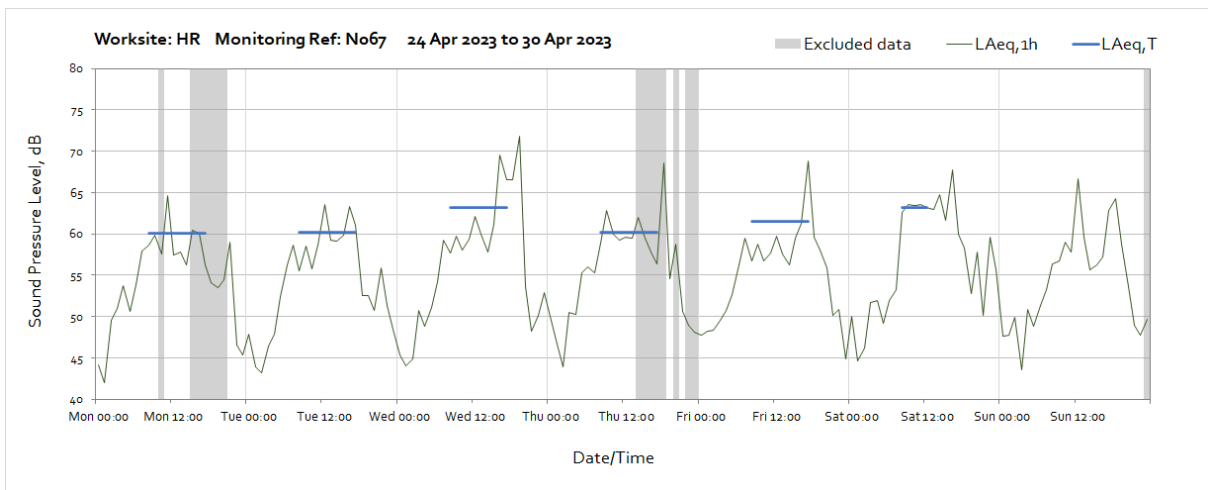
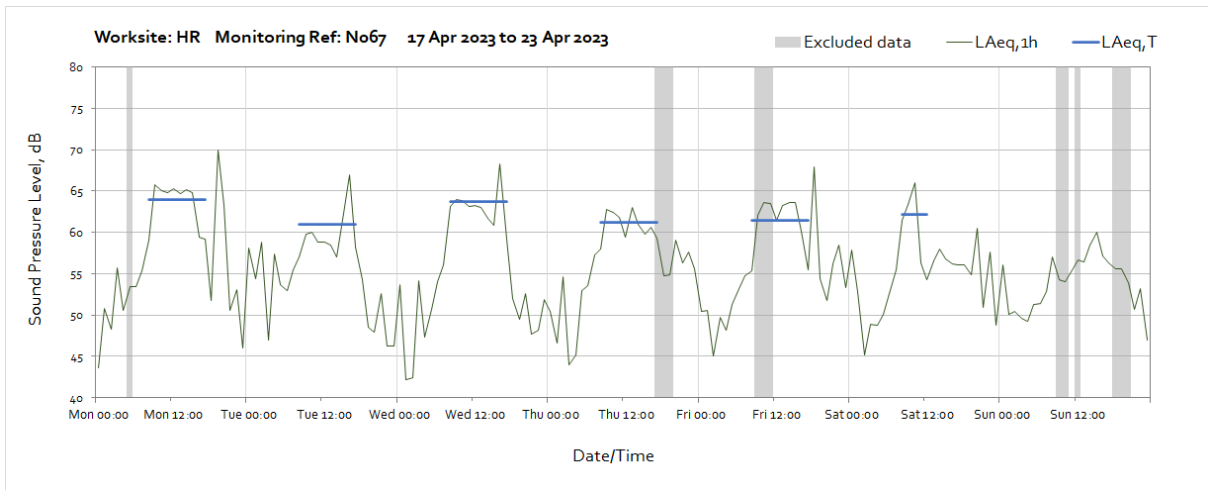
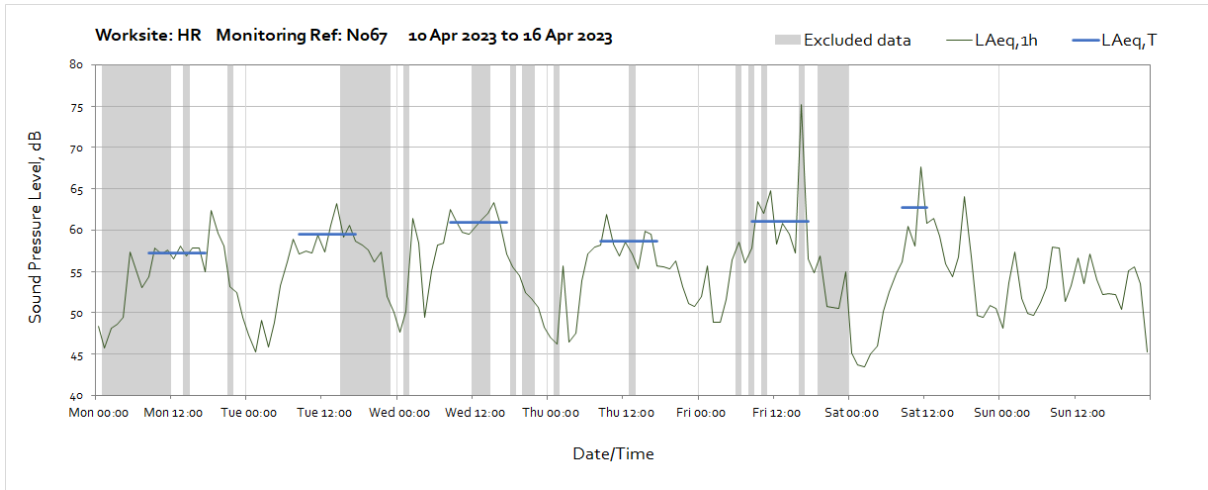






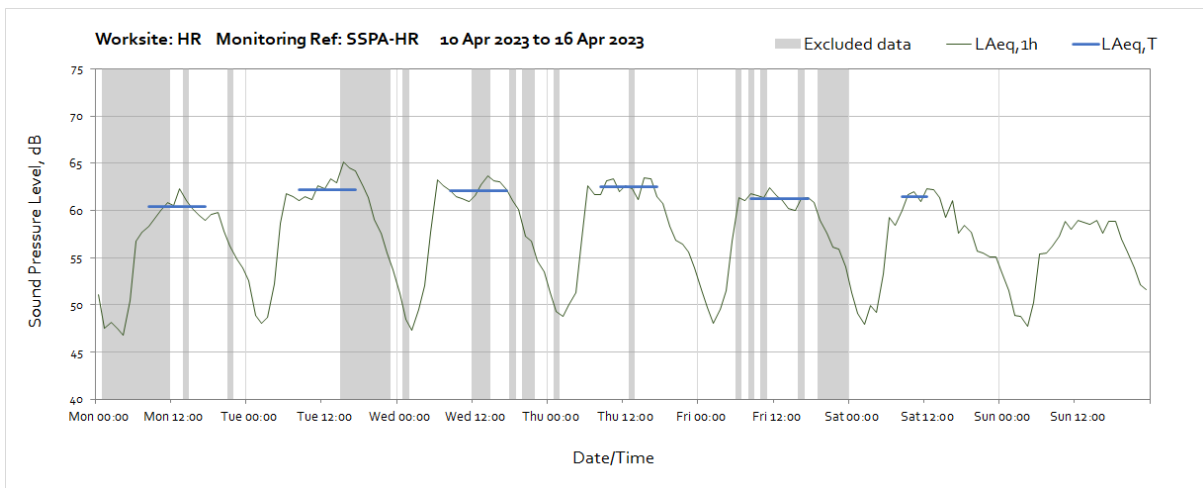
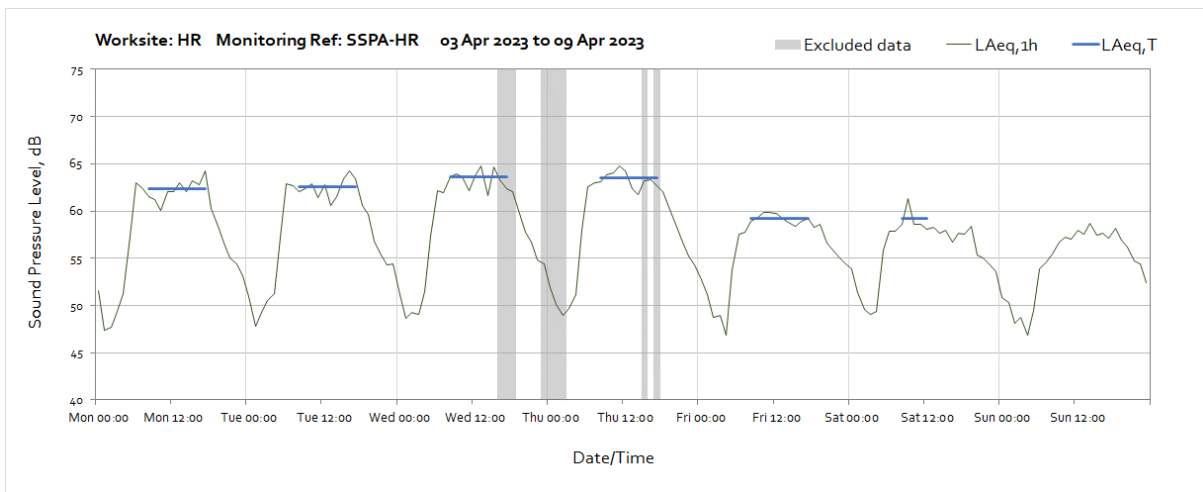
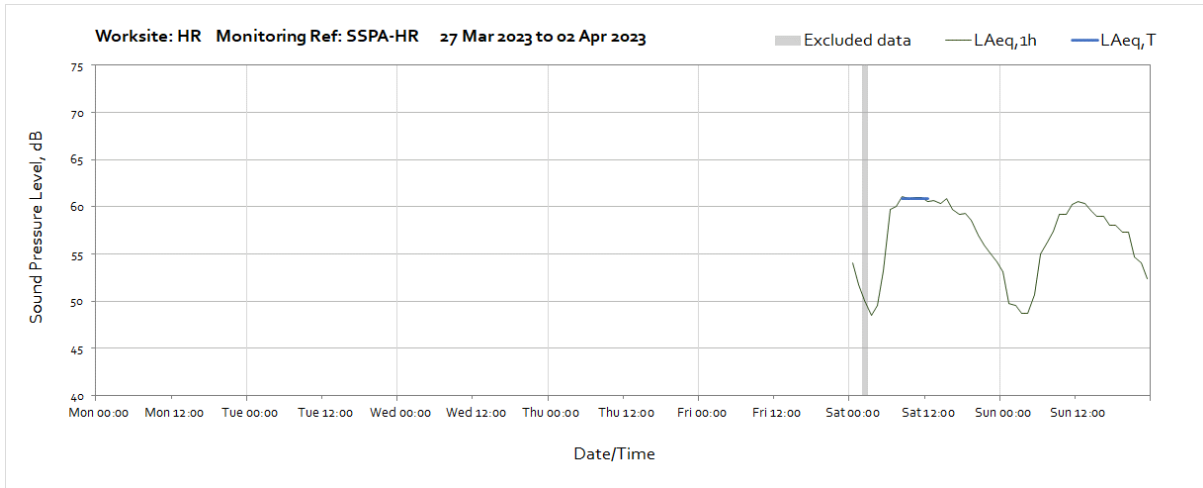
**Worksite: HR - Monitoring Ref: N067**



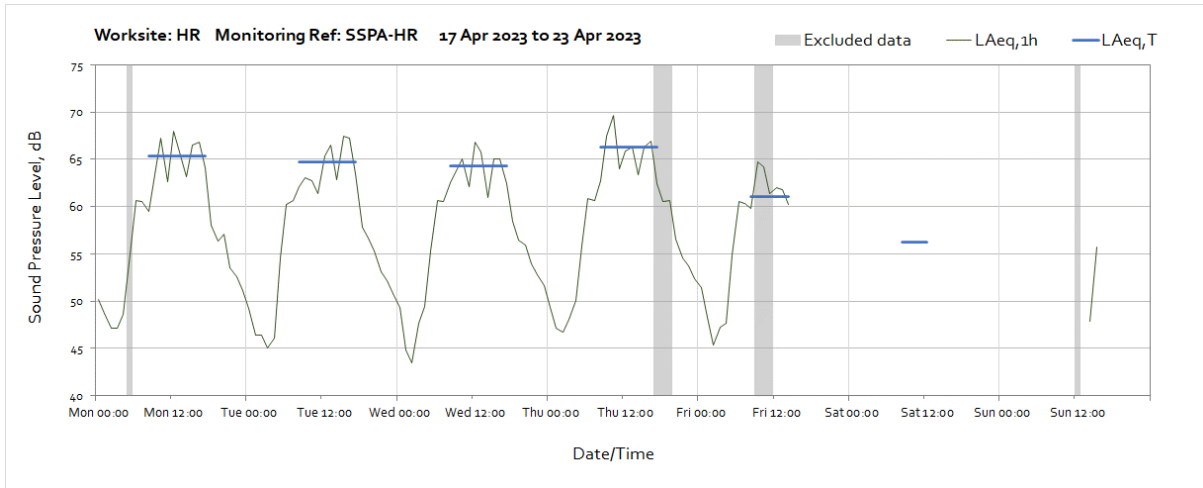




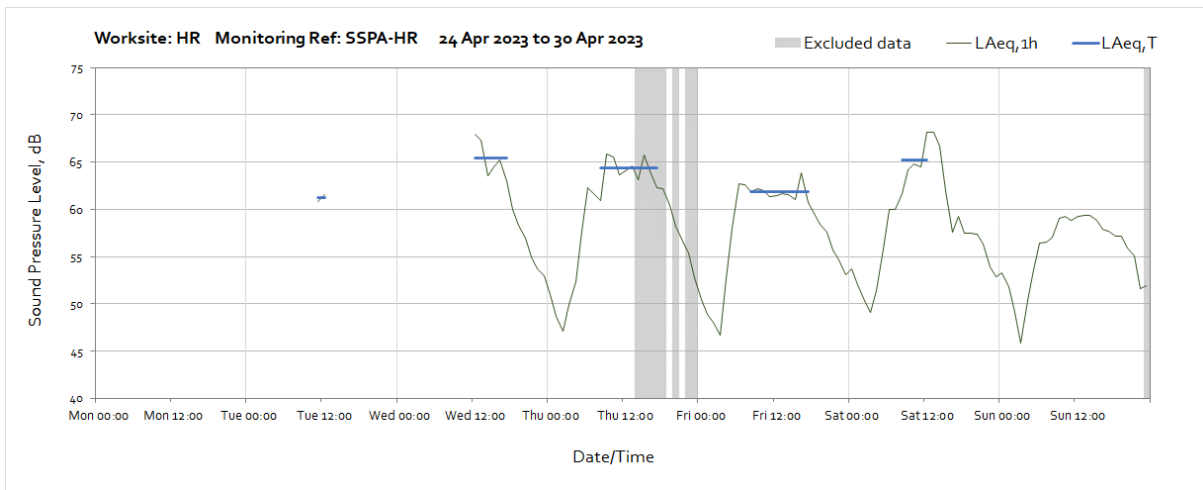
## Worksite: HR – Monitoring Ref: SSPA-HR



OFFICIAL

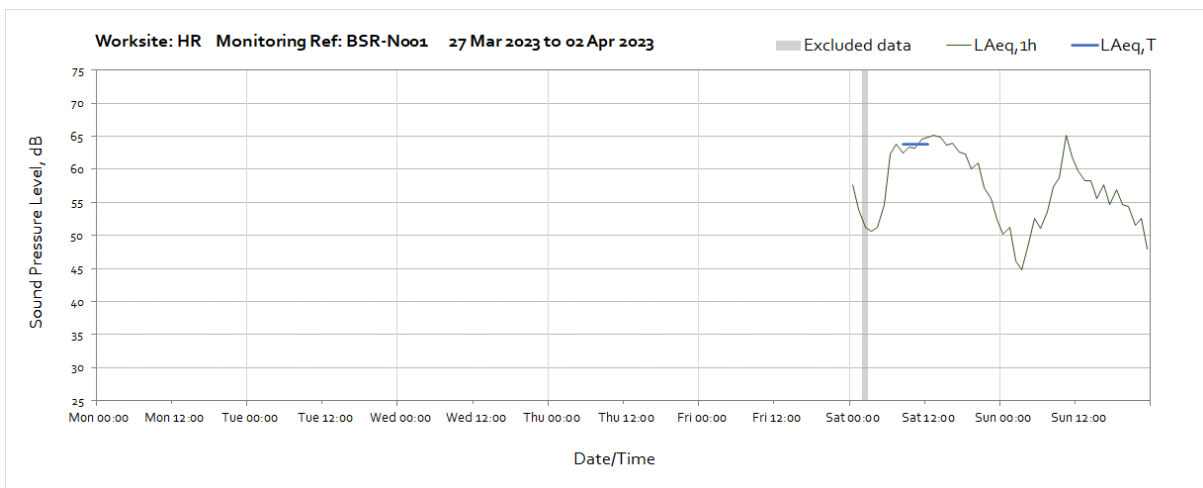


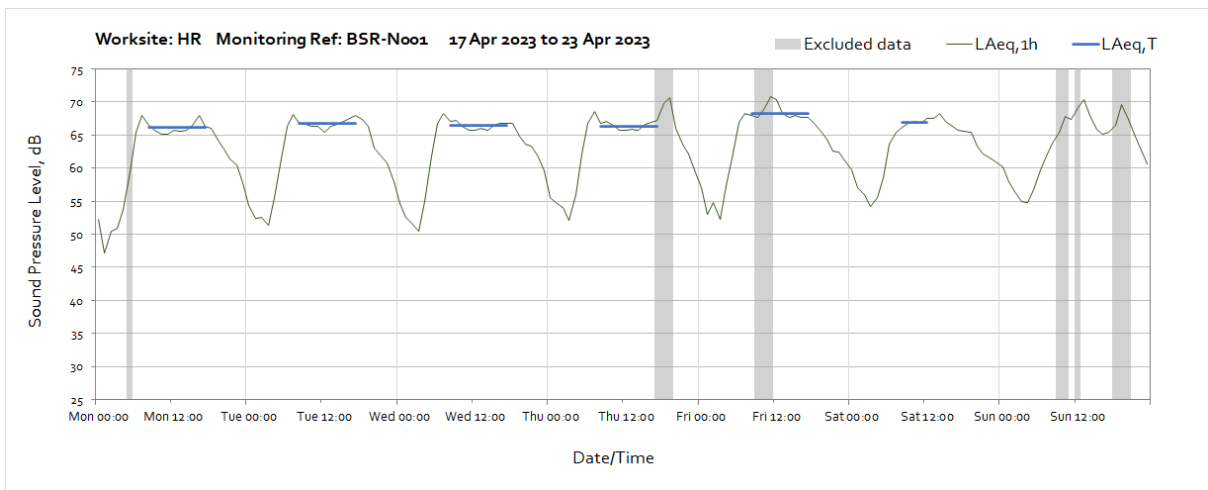
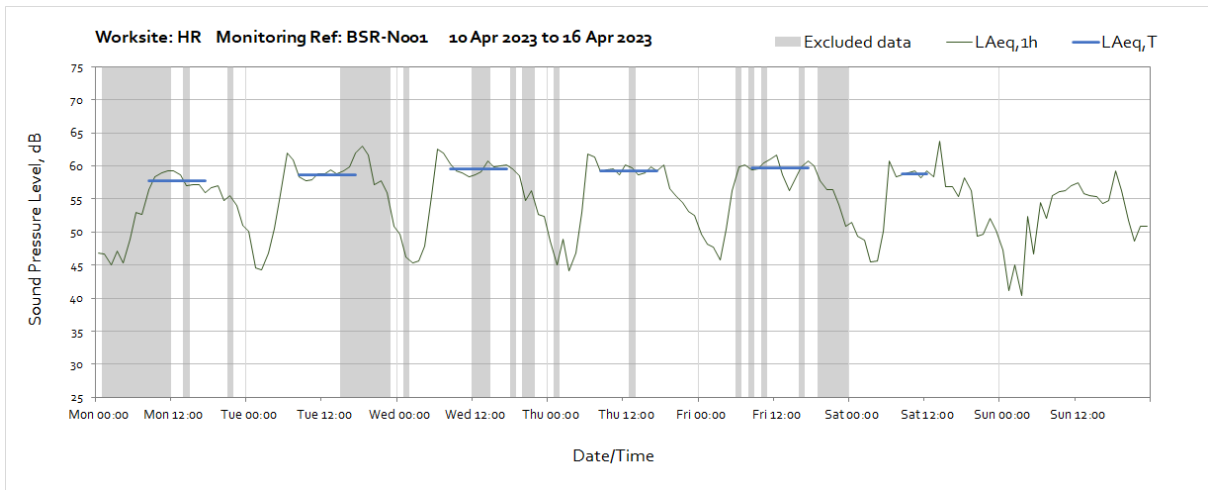
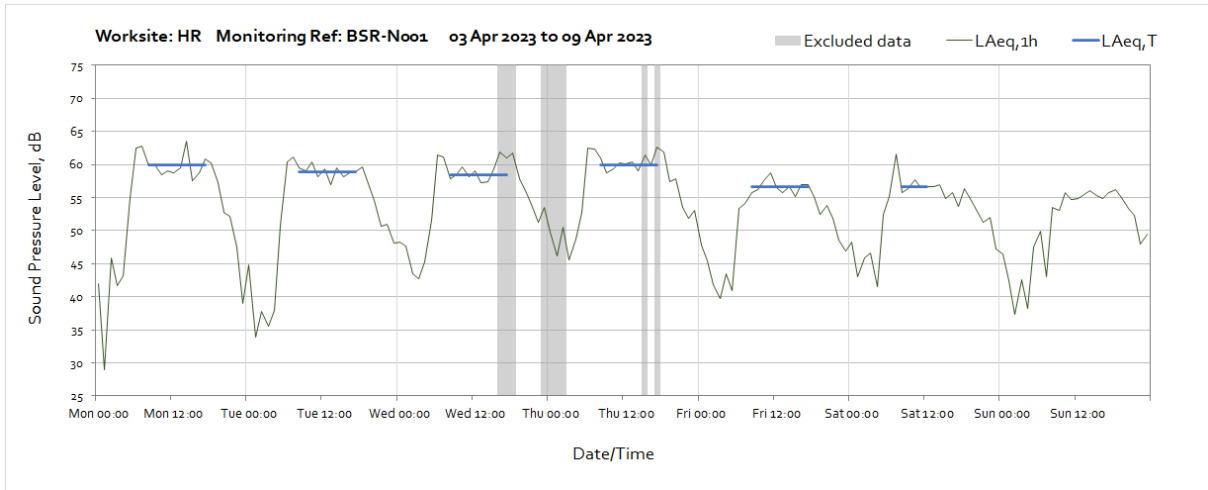
Note: Missing data towards the end of the week was due to monitor power loss from insufficient solar power.

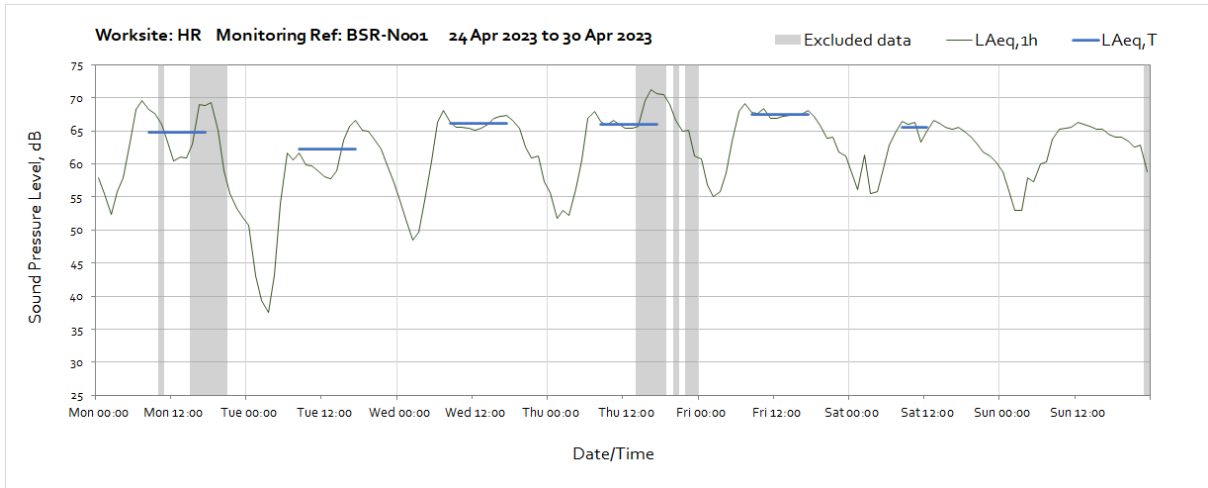


Note: Missing data at the beginning of the week was due to monitor power loss from insufficient solar power.

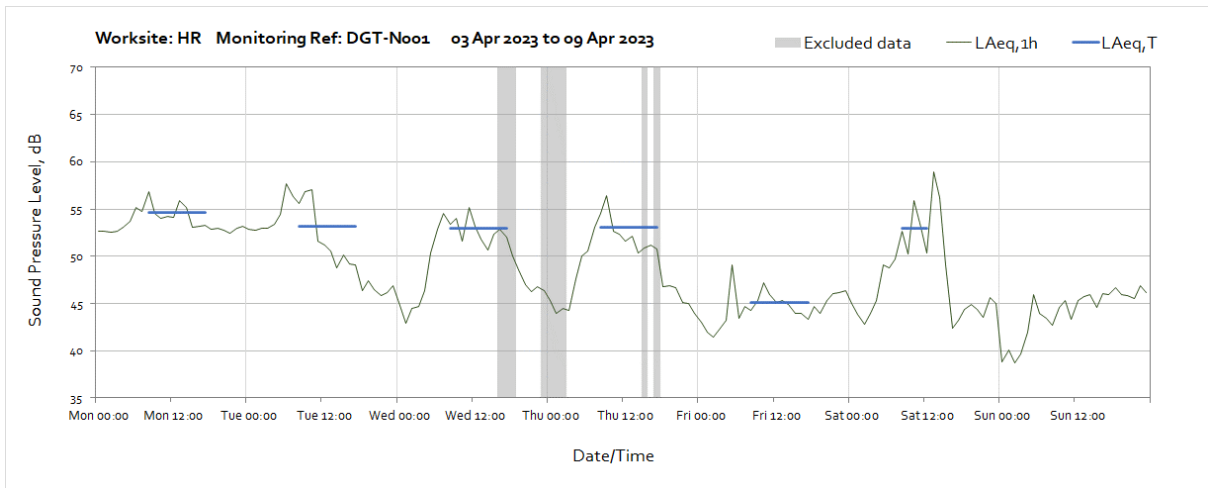
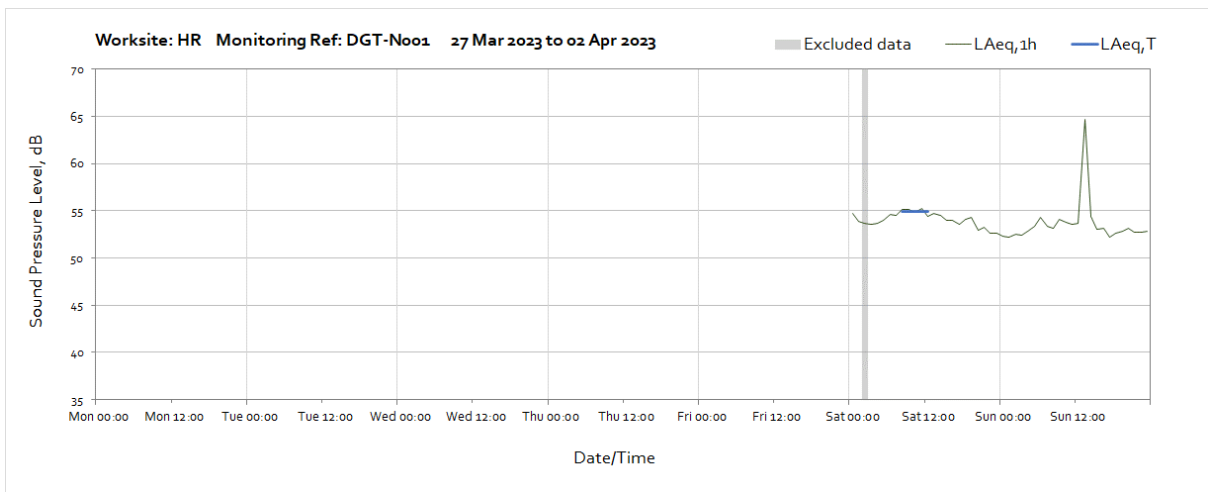
### Worksite: HR – Monitoring Ref: BSR-N001

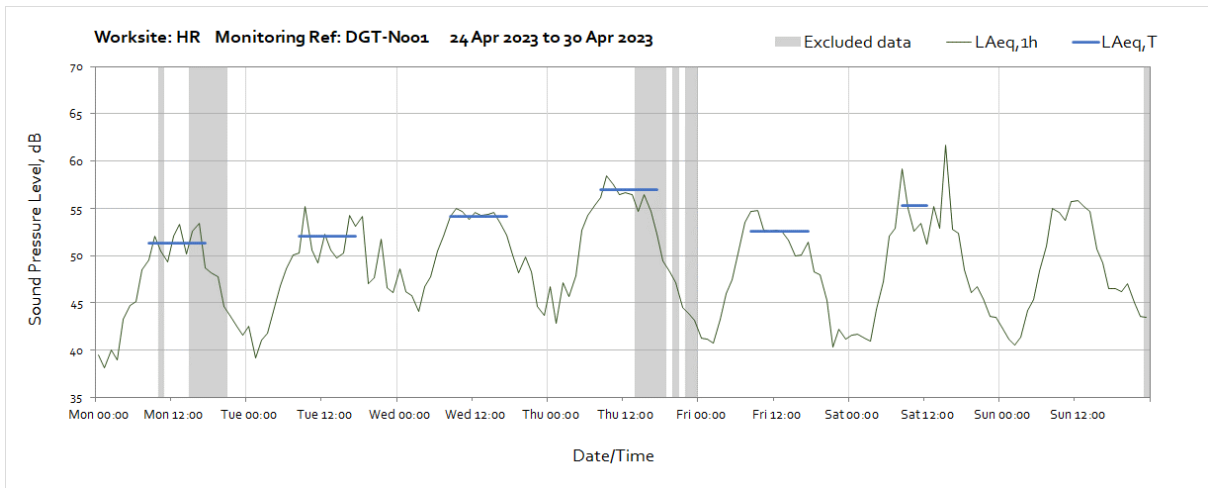
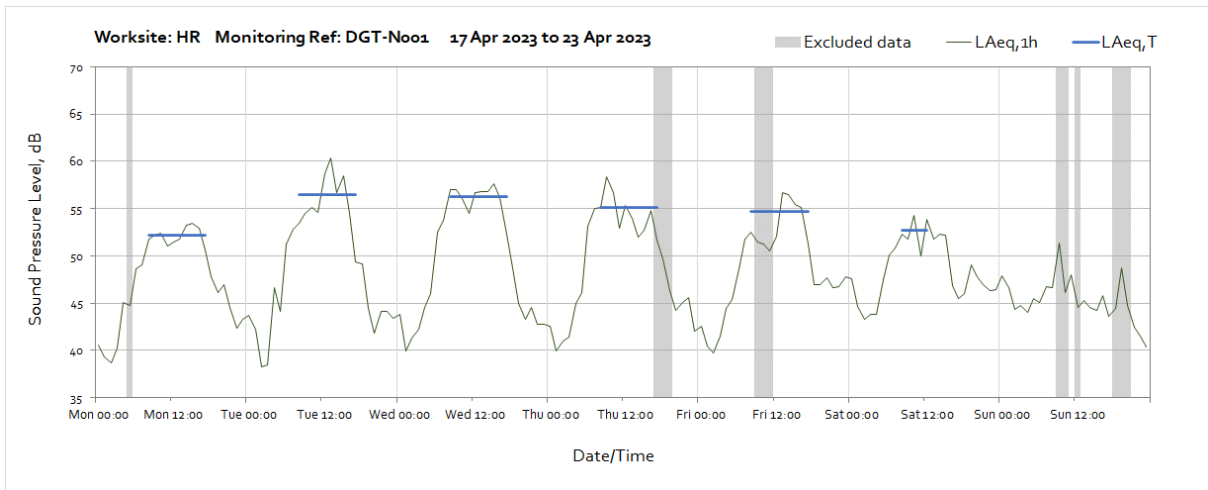
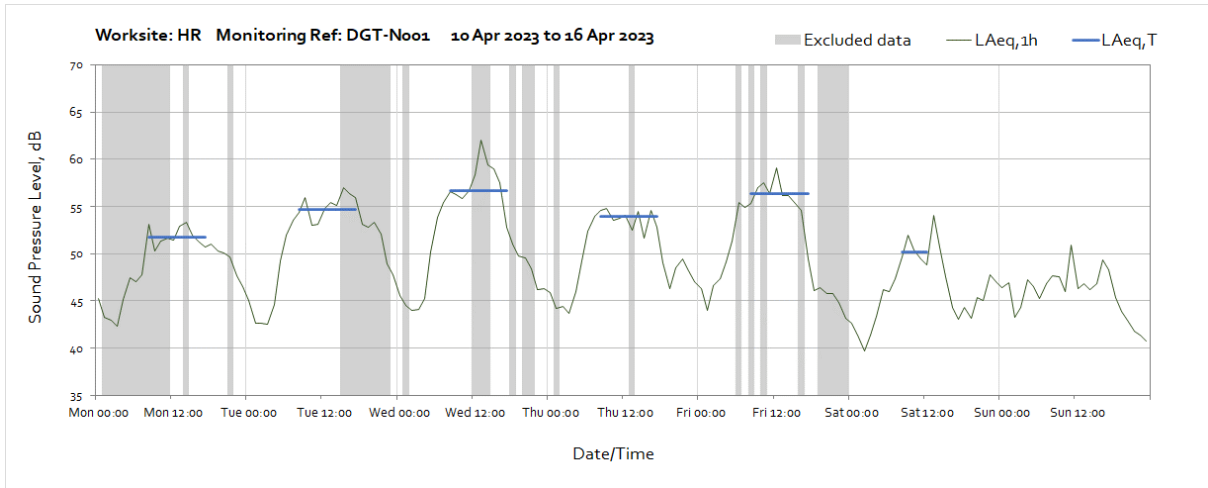




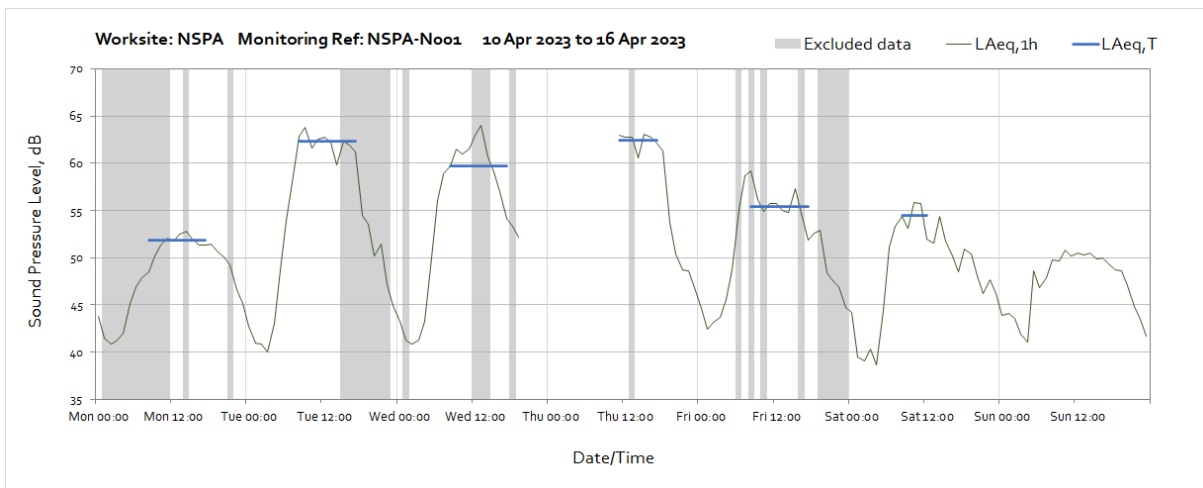
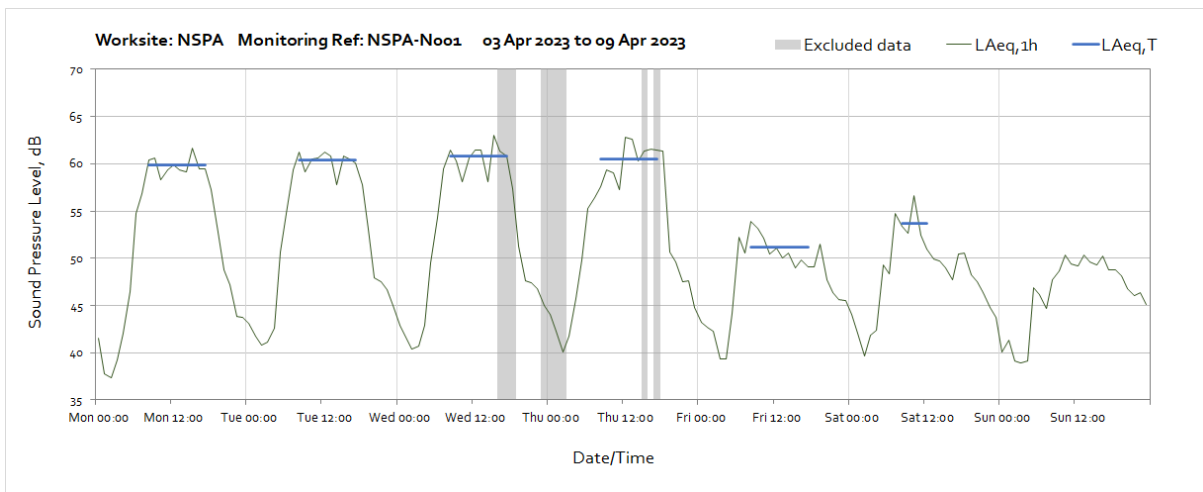
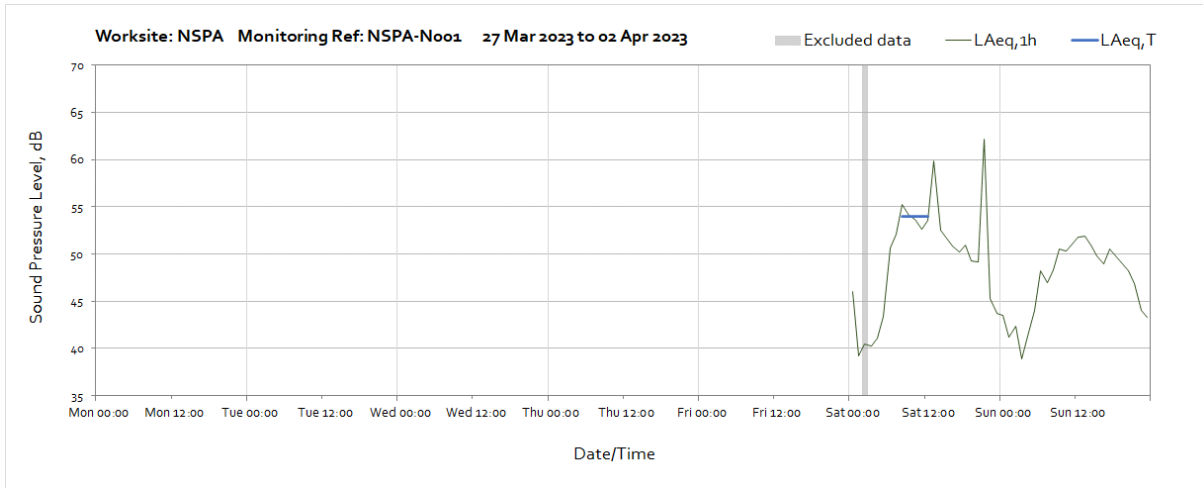


**Worksite: HR - Monitoring Ref: DGT-N001**



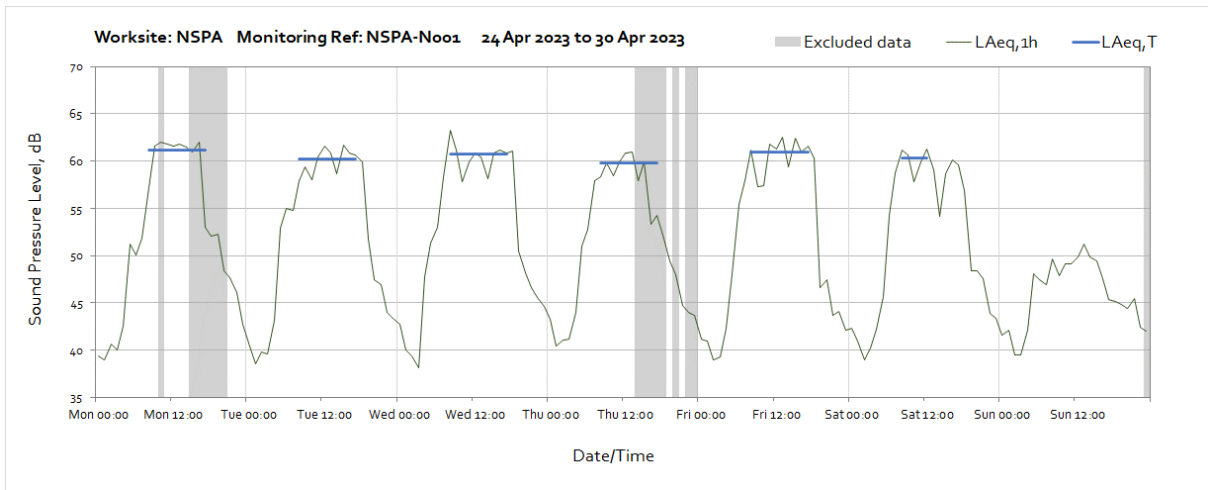
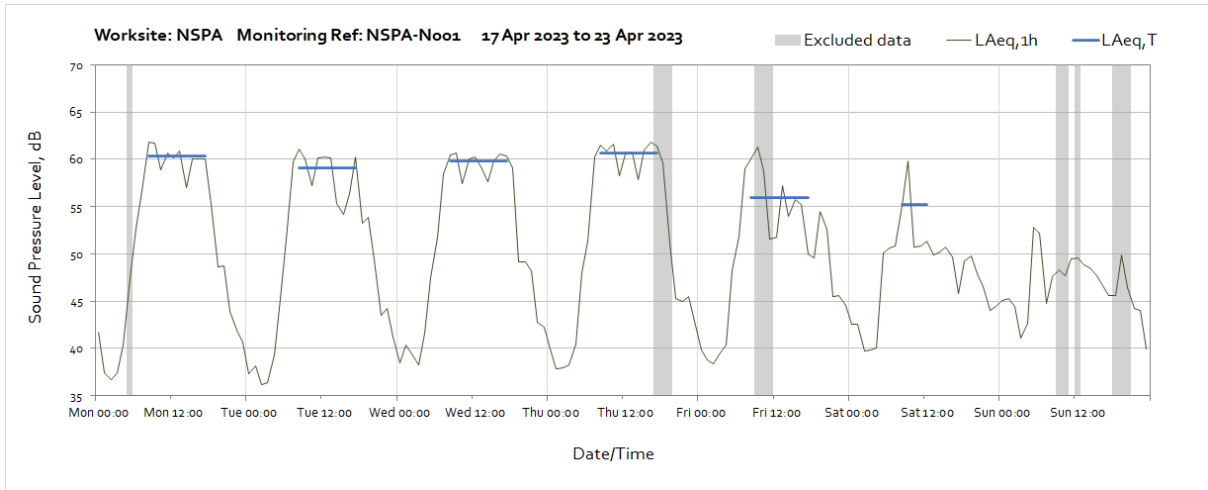


## Worksite: NSPA – Monitoring Ref: NSPA-N001

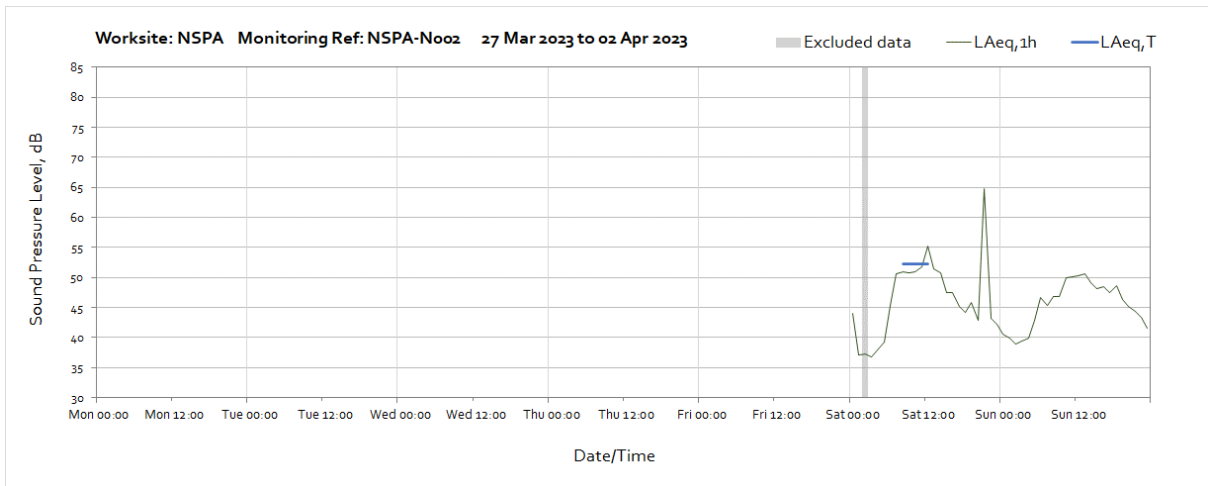


Note: Missing data between 20:00 on Wednesday 12<sup>th</sup> April and 11:00 on Thursday 13<sup>th</sup> April was due to monitor power loss from insufficient solar power.

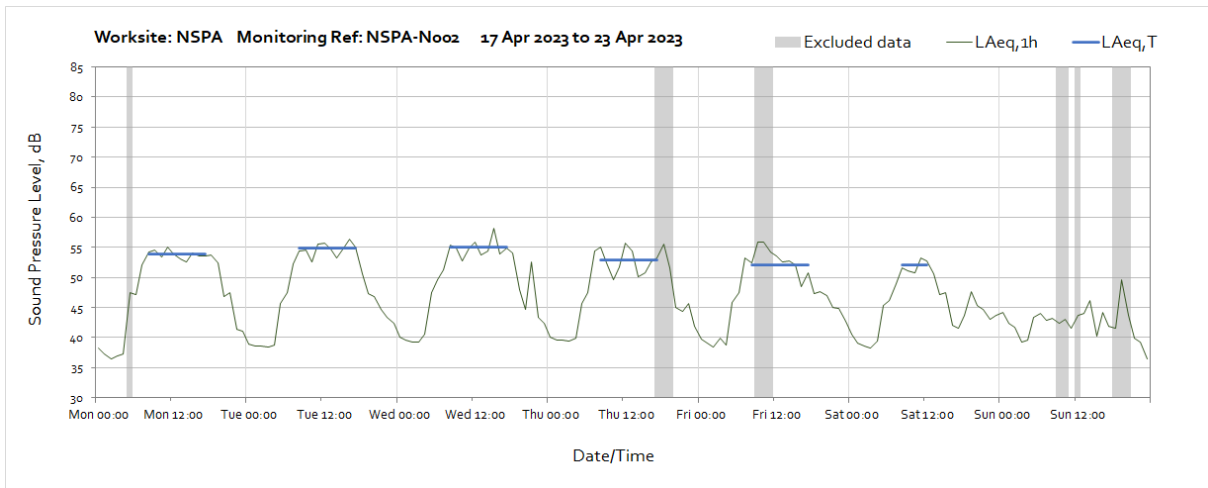
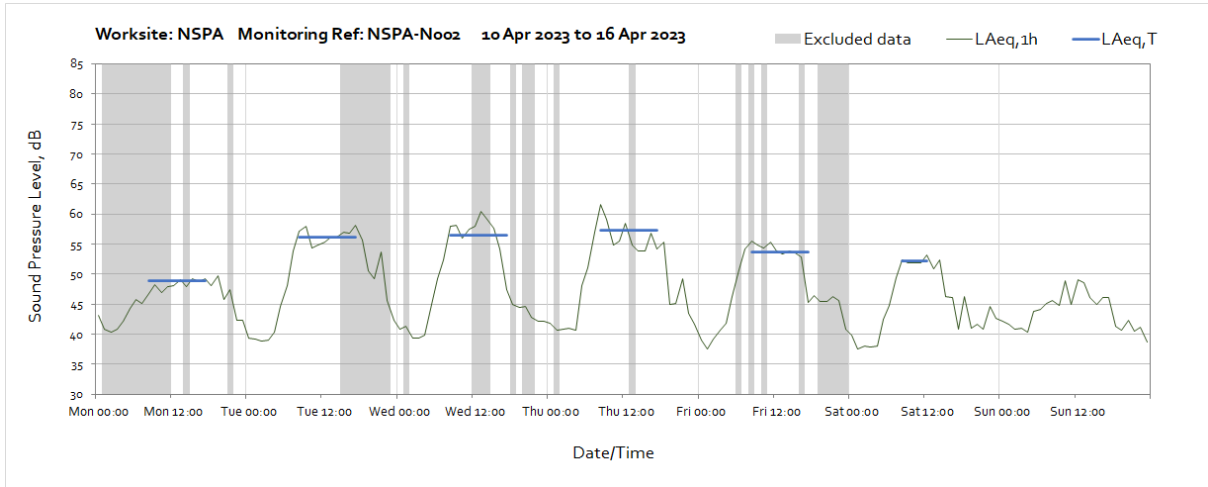
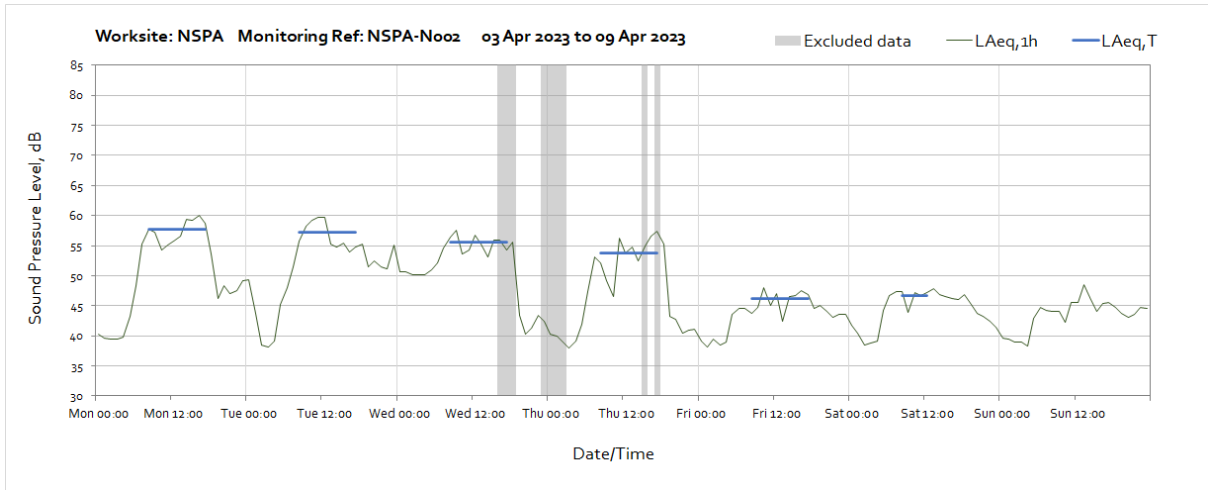
OFFICIAL

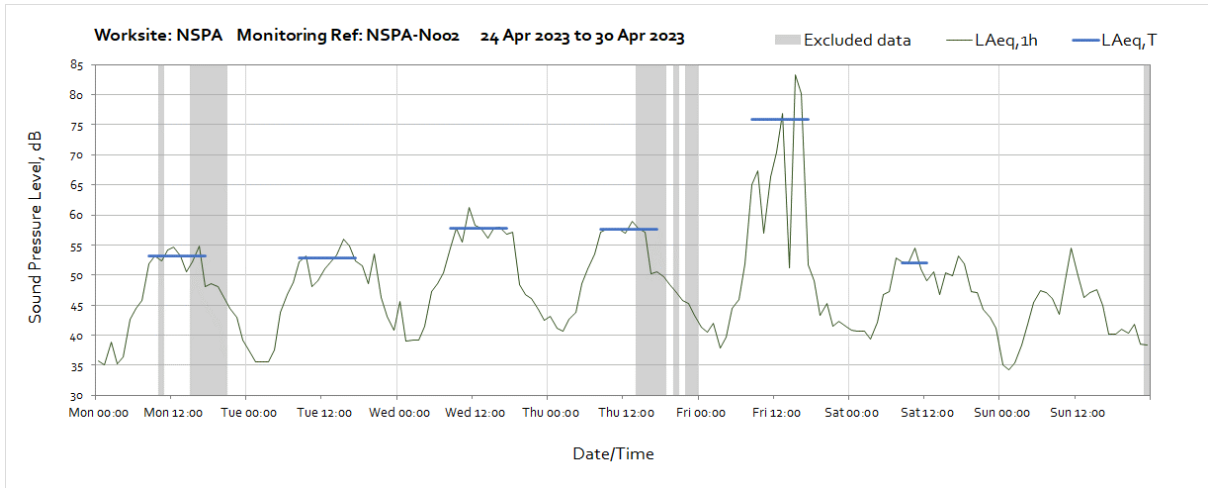


**Worksite: NSPA - Monitoring Ref: NSPA-N002**





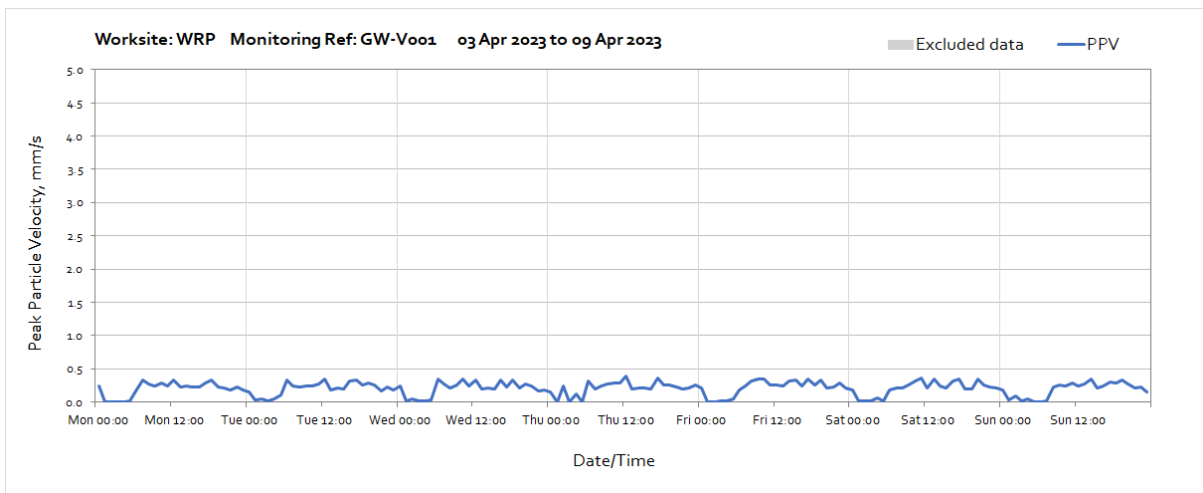
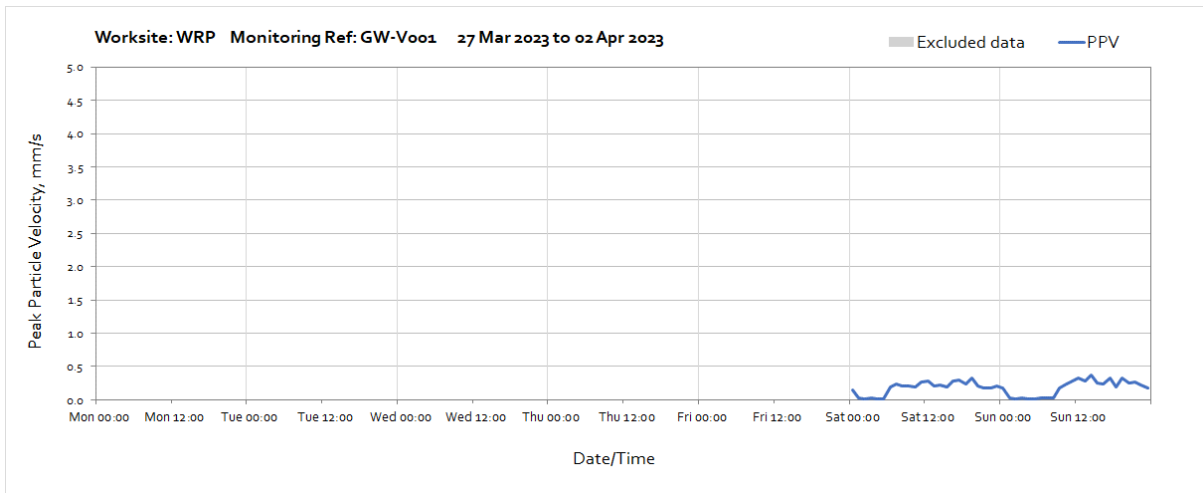


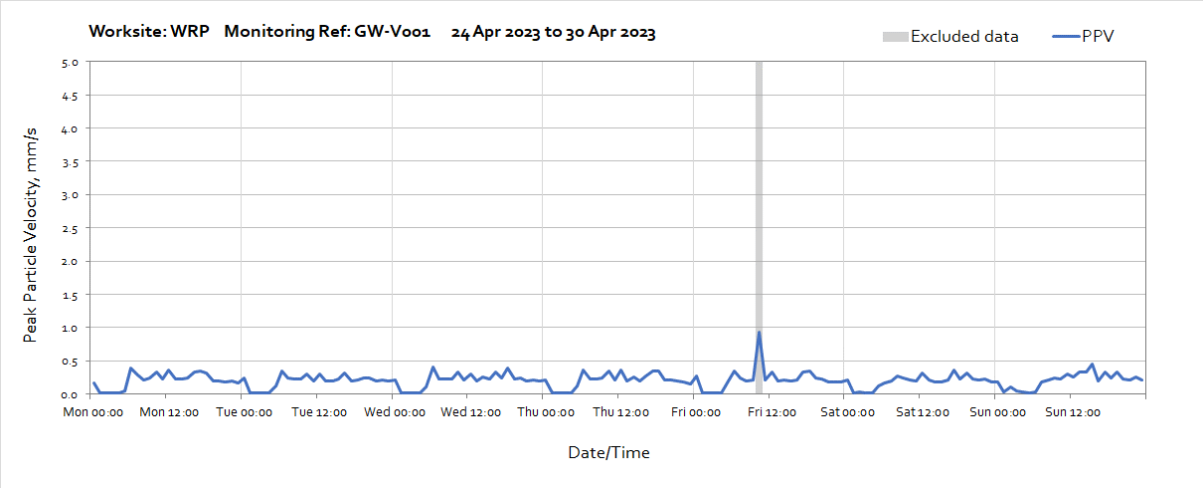
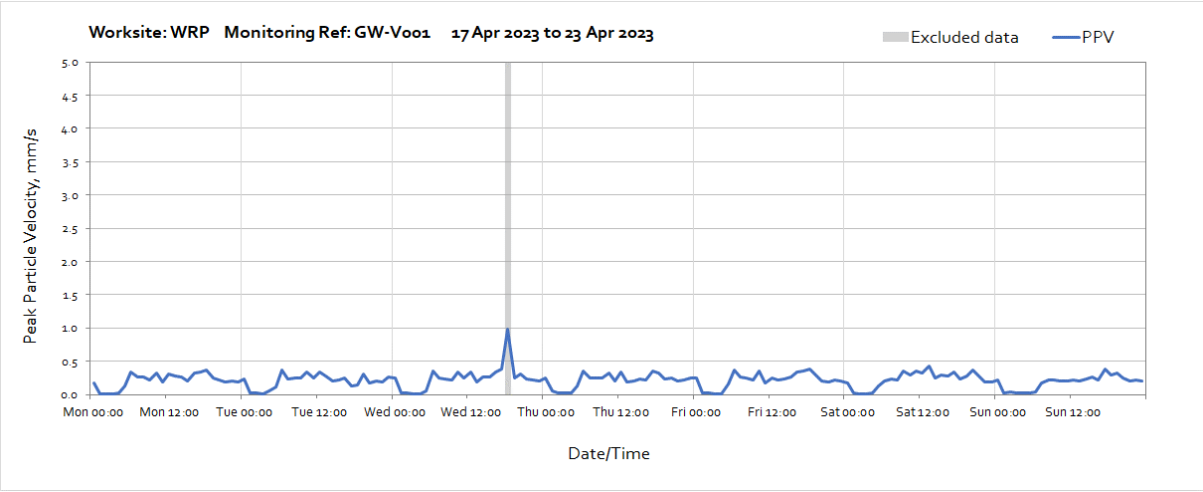
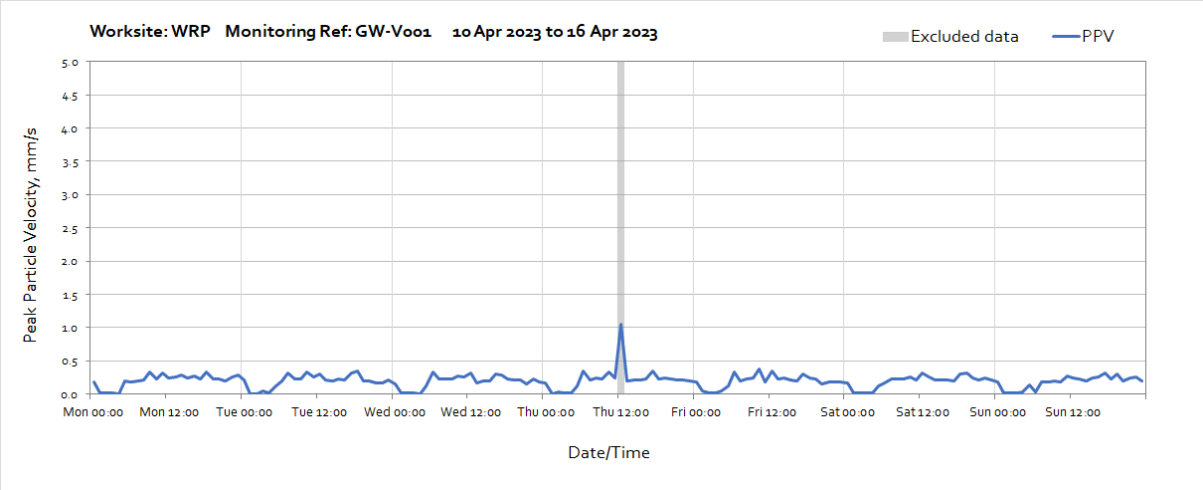


# Vibration

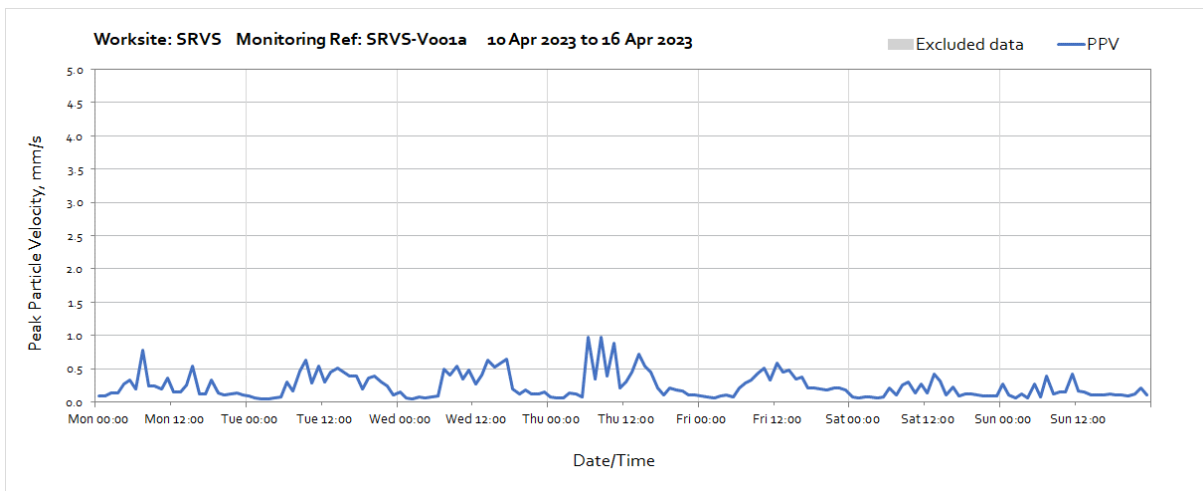
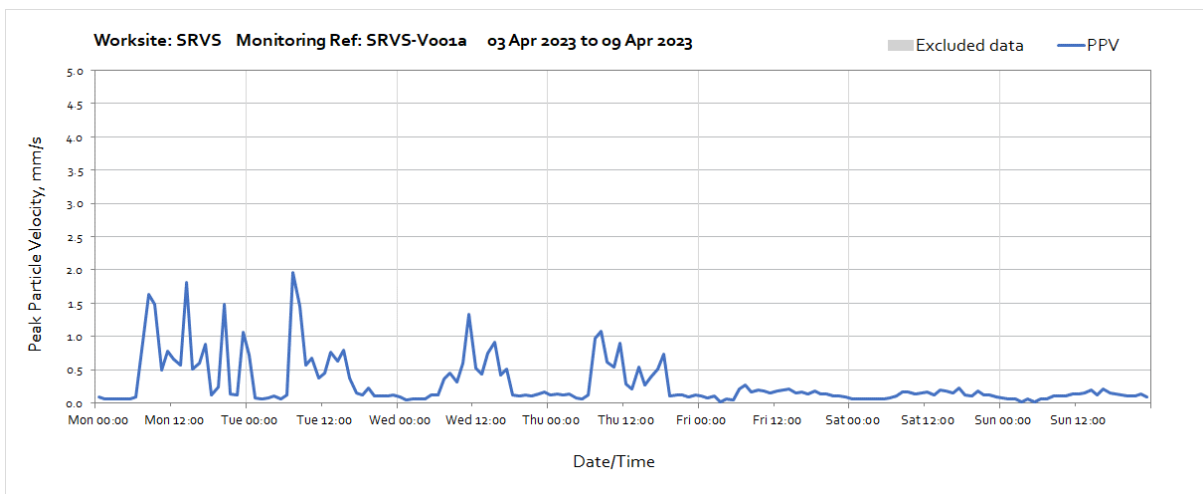
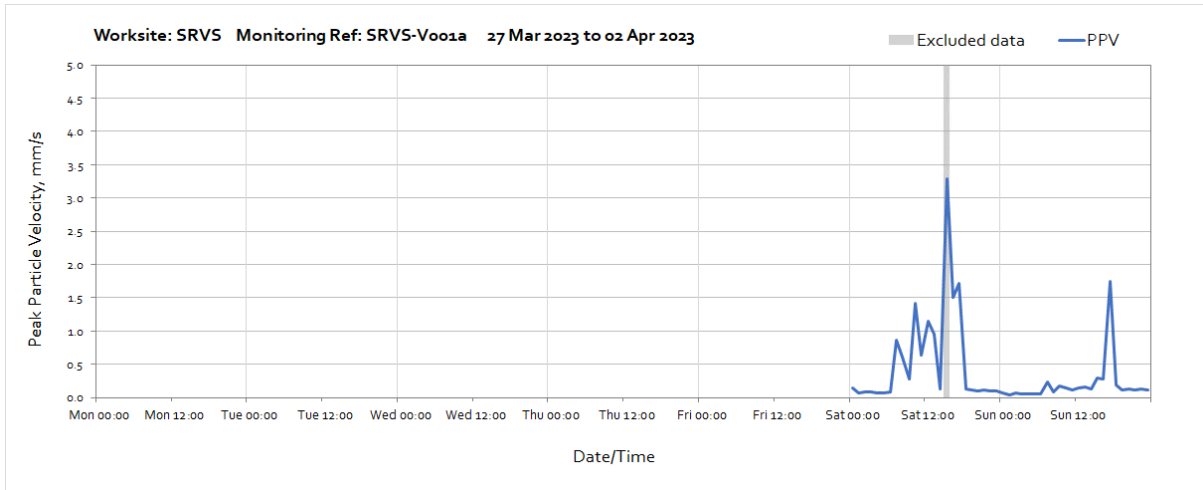
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative of HS2 construction works, these values have been greyed out in the following charts and have been excluded to calculate values in Table 4 of the main report.

## Worksite: WRP – Monitoring Ref: GW-V001





# Worksite: SRVS – Monitoring Ref: SRVS-V001a



OFFICIAL

