

## **Construction noise and vibration Monthly Report – July 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	17
<b>Appendix A Site Locations</b>	<b>20</b>
<b>Appendix B Monitoring Locations</b>	<b>26</b>
<b>Appendix C Data</b>	<b>31</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 Total Exceedances of SOAEL	16
Table 7: Summary of Exceedances of Trigger Levels	16
Table 8: Summary of Complaints	17

# 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 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 works were underway.
- Breakspear Road worksite (ref.: BR), where earthworks, tunnel boring machine material storage and in situ treatment, drainage works, construction of bridges and embankment wall, and construction of protection slab 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, Great Central Avenue, West End 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 exceeded three (3) times during the reporting period.

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

Twenty-one (21) complaints were received during the monitoring period. A description of the complaints, the results of investigations 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 1<sup>st</sup> to 31<sup>st</sup> July 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 fibre-reinforced concrete works, post tensioning and tower crane mobilisation and demobilisation.
  - Site preparation works, including installation of ducts.
  - Bulk earthworks.
  - Drainage works.
  - Water pumping management works.
  - Installation of satellite welfare and generator farms.

- Concrete drilling.
- South Abutment works, including earthworks, stabilisation works, fibre-reinforced concrete works, 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.
- Earthworks.
- Construction of River Colne crossing including emergency obstruction dismantling works.
- Launching girder works, including grouting works, launching gantry, post tensioning works, steel structure erection and dismantling works.
- Deck works, including preparation and operation of storage yards, installation of access provision, traffic management, installation of parapets, noise barriers, troughs, pipes, access ramps, steel works, foundation works, material movements, concrete works, construction of diaphragm walls, support plant operations, construction of kerbs and concrete stitch, filling of voids, waterproofing.
- Landscaping works, including removal of cofferdams, earthworks and ground drainage.
- West Ruislip Portal worksite, ref.: WRP (see Plan 2 in Appendix A), where work activities included:
  - Tunnel boring machine operations, including in situ treatment.
  - Conveyor belt installation, operation and extension.
  - Material delivery and removal.
  - Segment yard operation.
  - Attenuation ponds depth increase works, including removal of concrete.
  - Construction of tunnel boring machine water treatment plant.
  - Redevelopment of golf course, including vegetation clearance 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, installation of formworks and shutters.
  - Construction of protection slab.
  - Construction of embankment wall.
- 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 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, Great Central Avenue, West End 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 (19) 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 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	WRP-N001	Ruislip Golf Course, Ickenham Rd, Ruislip
	N048	Ruislip Golf Course, Ickenham Rd, Ruislip
	N056	83 The Greenway, Ickenham, Ruislip
	N057	123 The Greenway, Ickenham, Ruislip

<b>Worksite Reference</b>	<b>Measurement Reference</b>	<b>Address</b>
	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	55.3 (57.4)	60.9 (62.5)	54.1 (58.7)	48.2 (68.8)	47.9 (58.1)	54.9 (56.6)	61.3 (63.5)	56.0 (61.2)	51.8 (61.9)	44.2 (49.9)	49.5 (61.4)	48.8 (57.3)
	WRC-NMP	Weir Cottage, Denham Garden Village, Denham,	Free-field	49.7 (52.1)	50.4 (52.8)	49.6 (55.8)	47.5 (53.8)	46.2 (62.5)	47.5 (51.8)	50.5 (53.3)	52.0 (59.4)	49.0 (57.1)	44.9 (51.0)	48.9 (58.8)	44.9 (51.2)
	HFM-NMP	Harefield Marina, Moorhall Road, London	Free-field	52.5 (58.3)	55.9 (59.7)	48.8 (55.2)	46.3 (51.8)	44.2 (52.2)	47.9 (48.8)	59.0 (68.5)	56.2 (67.7)	50.9 (63.3)	44.0 (48.9)	47.7 (52.0)	44.1 (50.5)
	PLD-NMP	Peerless Drive, Harefield, Uxbridge	Façade	51.2 (56.6)	56.4 (63.3)	49.1 (52.8)	47.5 (54.1)	45.6 (57.5)	47.8 (50.1)	50.3 (53.3)	51.2 (57.9)	49.5 (55.8)	45.8 (52.5)	49.0 (54.7)	45.3 (53.6)
WRP	WRP-N001	West Ruislip Golf Club, Ickenham Rd, Ruislip	Free-field	45.8 (49.4)	50.0 (53.3)	47.5 (52.6)	46.0 (50.0)	44.5 (52.4)	47.4 (48.6)	51.1 (53.7)	49.3 (54.4)	49.0 (56.4)	45.8 (51.5)	50.0 (53.8)	46.2 (50.4)
	N048	West Ruislip Golf Club, Ickenham Rd, Ruislip	Free-field	57.4 (63.7)	57.8 (59.8)	52.4 (56.7)	50.8 (54.5)	48.6 (56.0)	54.8 (60.3)	54.8 (58.8)	53.9 (58.4)	53.7 (61.9)	48.6 (55.2)	53.3 (58.2)	48.9 (56.1)
	N056	83 The Greenway, Ickenham, Ruislip	Façade	59.8 (62.2)	59.9 (60.9)	60.4 (61.6)	58.7 (61.2)	54.8 (60.6)	58.4 (60.0)	59.5 (60.5)	59.5 (61.4)	59.1 (62.3)	52.0 (59.5)	59.4 (65.3)	55.4 (60.7)
	N057	123 The Greenway, Ickenham, Ruislip	Façade	55.3 (57.1)	56.0 (58.4)	56.4 (61.1)	54.7 (58.4)	50.4 (56.6)	52.8 (55.9)	55.2 (57.5)	54.9 (55.3)	55.0 (62.2)	48.4 (65.0)	54.2 (57.3)	50.2 (55.0)



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
BR	N065	Breakspear Road South, Harefield, Uxbridge	Free-field	65.8 (67.0)	65.4 (69.3)	65.4 (66.5)	63.9 (69.4)	59.7 (66.6)	63.6 (64.0)	64.8 (65.6)	65.0 (65.8)	65.0 (67.9)	58.4 (61.7)	64.0 (66.9)	59.8 (66.4)
	N066	Hoylake Crescent, Ickenham, Uxbridge	Free-field	54.7 (62.6)	56.1 (63.8)	55.3 (61.9)	53.3 (55.6)	51.2 (64.8)	52.1 (55.0)	54.7 (56.6)	55.0 (56.3)	54.0 (58.4)	47.9 (59.0)	53.5 (55.9)	52.0 (63.9)
	TKL-N001	Tile Kiln Lane, Harefield, Uxbridge	Free-field	48.2 (50.7)	51.8 (53.7)	48.2 (52.1)	47.0 (50.8)	46.2 (59.9)	48.0 (48.9)	52.4 (54.6)	50.6 (54.5)	49.6 (55.3)	49.0 (62.4)	50.0 (54.7)	47.3 (52.2)
SRVS	N061	Cineworld South Ruislip car park, Ruislip	Free-field	58.4 (61.2)	62.6 (64.9)	61.9 (64.3)	61.4 (65.0)	55.1 (65.5)	58.7 (60.2)	62.4 (64.8)	62.5 (64.6)	62.4 (67.4)	55.1 (62.2)	60.4 (64.1)	61.6 (84.8)
	TCA-N001	Trenchard Avenue, Ruislip	Free-field	57.5 (58.8)	60.4 (68.5)	58.8 (61.4)	57.8 (63.5)	53.1 (58.8)	55.9 (57.8)	58.2 (60.9)	58.4 (60.8)	57.6 (62.5)	49.6 (56.9)	56.8 (62.8)	53.0 (62.4)
HR	N067	Harvil Road worksite south boundary	Free-field	57.3 (60.7)	57.7 (61.2)	57.8 (64.2)	55.5 (69.1)	51.1 (62.4)	55.6 (59.7)	58.0 (60.9)	57.3 (63.4)	55.4 (64.7)	51.9 (60.9)	57.0 (65.8)	51.7 (58.9)
	SSPA-HR	Harvil Road	Free-field	58.6 (60.6)	61.5 (65.2)	57.0 (59.1)	53.9 (57.9)	52.6 (61.6)	56.3 (58.7)	59.2 (60.7)	55.9 (59.3)	55.5 (61.7)	49.0 (57.0)	54.2 (59.1)	52.3 (62.3)
	BSR-N001	Breakspear Road	Free-field	67.8 (69.5)	67.3 (69.1)	67.1 (71.5)	65.2 (69.4)	60.8 (68.5)	64.9 (65.3)	67.9 (71.7)	66.3 (67.0)	66.2 (69.2)	59.2 (62.7)	65.1 (68.1)	60.9 (69.2)
	DGT-N001	Dogs Trust West London	Façade	51.1 (52.8)	53.2 (55.8)	47.6 (51.0)	44.8 (49.2)	43.7 (51.9)	49.3 (51.1)	52.5 (56.2)	53.6 (60.1)	49.9 (59.8)	43.4 (51.0)	48.4 (54.8)	44.3 (52.1)

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	NSPA-N001	Newyears Green Lane	Free-field	58.0 (59.5)	61.0 (64.6)	57.3 (61.0)	46.2 (54.8)	45.6 (56.8)	53.5 (57.3)	57.9 (59.9)	56.5 (58.2)	52.5 (61.2)	43.8 (52.8)	49.0 (51.9)	45.6 (54.8)
	NSPA-N002	Newyears Green Lane	Free-field	51.0 (55.1)	53.8 (63.3)	50.0 (54.3)	41.5 (46.7)	40.7 (55.3)	48.0 (53.6)	51.5 (54.1)	53.1 (56.5)	48.0 (56.0)	41.1 (54.6)	48.0 (55.6)	40.4 (47.0)

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	0.90 (Y-axis)
SRVS	SRVS-V001a	Braintree Road, Ruislip	2.87 (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	1900-2200	1	No exceedance
			Saturdays	1300-1400	1	
			Saturdays	1400-2200	4	
			Sundays	0700-2200	1	
WRC-NMP	Weir Cottage, Denham Garden Village, Denham,	Saturdays	1300-1400	1	No exceedance	
		Saturdays	1400-2200	5		
		Sundays	0700-2200	3		
HFM-NMP	Harefield Marina, Moorhall Road, London	Saturdays	0800-1300	1	No exceedance	
Saturdays	1400-2200	4				
PLD-NMP	Peerless Drive, Harefield, Uxbridge	All days	All periods	No exceedance	No exceedance	
WRP	WRP-N001	West Ruislip Golf Club, Ickenham Rd, Ruislip	All days	All periods	No exceedance	No exceedance
	N048	West Ruislip Golf Club, Ickenham Rd, Ruislip	All days	All periods	No exceedance	No exceedance
	N056	83 The Greenway, Ickenham, Ruislip	Weekdays	1800-1900	7	No exceedance
			Weekdays	1900-2200	8	No exceedance
Saturdays			1300-1400	2	No exceedance	
Saturdays			1400-2200	16	No exceedance	
Nights	2200-0700	7	14			
N057	123 The Greenway, Ickenham, Ruislip	All days	All periods	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
BR	N065	Breakspear Road South, Harefield, Uxbridge	All days	All periods	Not applicable**	No exceedance
	N066	Hoylake Crescent, Ickenham, Uxbridge	All days	All periods	No exceedance	No exceedance
	TKL-N1	Tile Kiln Lane, Harefield, Uxbridge	All days	All periods	No exceedance	No exceedance
SRVS	N061	Hoylake Crescent, Ickenham, Uxbridge	All days	All periods	Not applicable*	Not applicable*
	TCA-N001	Trenchard Avenue, Ruislip	Weekdays	0800-1800	1	No exceedance
HR	N067	Harvil Road worksite south boundary	All days	All periods	No exceedance	No exceedance
	SSPA-HR	Harvil Road	All days	All periods	Not applicable**	No exceedance
	BSR-N001	Breakspear Road	All days	All periods	Not applicable**	No exceedance
	DGT-N001	Dogs Trust West London	All days	All periods	No exceedance	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 LOAEL and SOAEL criteria are not applicable to non-residential receptor.

\*\* The LOAEL has not been assessed due to high baseline levels.

2.2.6 Exceedances of the LOAEL were recorded at five (5) monitoring locations. The LOAEL exceedances were recorded during weekdays, Saturdays, Sundays and nights.

2.2.7 For the purpose of reporting the number of days where the SOAEL is exceeded, 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
WRP	N056	83 The Greenway, Ickenham, Ruislip	3

2.2.8 Three (3) SOAEL exceedances were recorded due to HS2 construction works during July 2023. Exceedances occurred during night periods.

## 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
HS2-23-44790-C HS2-23-44792-C HS2-23-97248-E-C HS2-23-97918-E-C HS2-23-44824-C	SSPA	Complaint due to machinery noise at the weekend.	Disturbance linked to dozer with failed tracks. No exceedance of S61 trigger levels was recorded during activity of the faulty unit.	The faulty unit was removed from site and replaced as soon as the problem was identified.
HS2-23-44793-C	CVV	Complaint regarding noise and vibration at night.	Noise monitors were checked and were found to not exceed limits, permission to work outside scheduled hours on particular activities has been agreed with the Local Authority.	Findings were reported to resident.
HS2-23-97450-E-C	CVV	Complaint regarding alarm/siren noise during night-time	A "Load Finish" alarm from the batching plant could be heard overnight. The alarm sounds when a concrete wagon has completed loading. The alarm is safety critical. The noise levels measured at nearby fixed monitors were within permitted limits.	Contact made with the batching plant team who were able to perform maintenance and reduce the alarm level.
HS2-23-97446-E-C	WRP	Complaint about loud banging noise heard at night.	Noise experienced due to removal of waste material from TBM site to vehicles. Work methodology within consent conditions was used, best practicable means were adopted throughout the works and the noise levels measured at nearby fixed monitors were within permitted levels.	Methodology to be kept under review to ensure best practicable means are in place. A response was provided to the complainant.

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-23-97644-E-C	SSPA	Complaint due to tonal beeping noise.	Disturbance linked to a new dozer being utilised on site. It was also observed that alarms are prevalent at nearby farm.	The tonal beeper was replaced with white noise alarm. The contractor is currently looking to progress major exchange of fleet beepers; however, completion will take some time due to volume required. Explanation was provided to resident.
HS2-23-44814-C	SSPA	General noise complaint regarding clanking and beeping.	Clanking of conveyor belt was due to cover being open for visual inspection, which is now covered. Bulldozers assisting works are fitted with warning alarms, which have not exceeded noise levels, contractors are looking to replace with more quieter vehicles.	Information was provided to resident.
HS2-23-97840-E-C	WRP	Complaint due to engine running constantly at the back of property.	Complaint likely to be associated with the multi service vehicles stopping at that position to clean filters. The noise levels measured at nearby fixed monitors were within noise limits.	Drivers have been instructed to turn off vehicles while sitting idle. Information was provided to resident.
HS2-23-97856-E-C	WRP	Complaint about banging and crashing noise from site.	Noise likely to be associated with excavator operatives cleaning the buckets in the muck bin. The noise levels measured at nearby fixed monitors were within noise limits.	Operatives were instructed to use alternative; quieter methods are being sought.
HS2-23-97864-E-C	HR/SSPA	Complaint regarding ground borne noise and vibration from tunnelling works happening near their property.	The disturbance was likely to be associated with the tunnel boring machine up-line which was near the property around that day.	The resident was contacted to explain source of the disturbance. At the time of responding the tunnel boring machine was already moving further away resulting in noise and vibration levels diminishing.

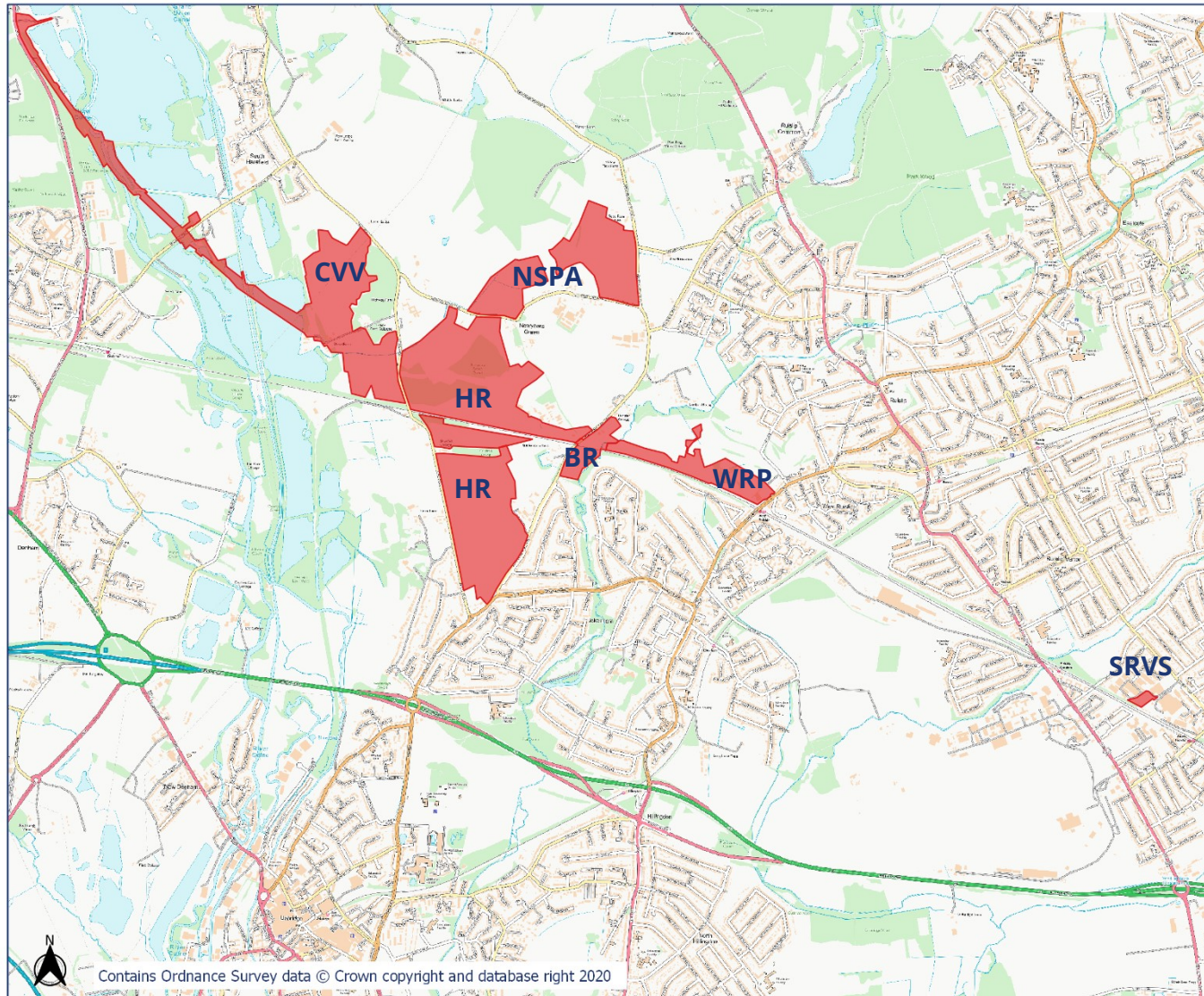


Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-23-97900-E-C HS2-23-44825-C	WRP	Complaint due to tonal alarm noise.	The complaint is likely to be associated with testing of the Phase 2 conveyor and the associated alarms signalling start of operations.	Options being reviewed to potentially swap the tonal alarms with broadband alarms; however, this may not be possible due to health and safety concerns.
HS2-23-44826-C	WRP	Complaint regarding noise from water bowzers.	Water bowzers and road sweepers are used on site to suppress dust in line with consent conditions. Noise levels measured are within consented limits.	Individual plant noise levels reviewed, and some units have been subsequently replaced with quieter models
HS2-23-98045-E-C	WRP	Complaint about noise during the night.	The noise is believed to be from bulldozers collecting material. Permissions in place to work at night. Noise levels measured are within consented limits.	The conveyor belt is now in full use therefore the use of dozers is only needed during core working hours. Information was provided to the resident.
HS2-23-98101-E-C	Utilities works on Bridgewater Road	Complaint due to engine noise from welfare van.	Confirmed noise was due to welfare van associated with utility works.	The van was relocated on receipt of the complaint and the site teams were briefed about idling engines. Utility works subsequently completed in the area.
HS2-23-98165-E-C	WRP	Complaint regarding high pitched "whine" noise coming from site.	Noise likely to have been due to use of conveyor moving spoil from tunnel. Noise levels measured are within consented limits.	Information was provided to resident.
HS2-23-98201-E-C	SSPA	Complaint about noise at night and dust issues.	On-going.	On-going.
HS2-23-98317-E-C	CVV	Complaint regarding noise at night.	Noise likely to be from viaduct segment precast factory.	The noise levels measured at fixed monitors were checked and were within noise limits.

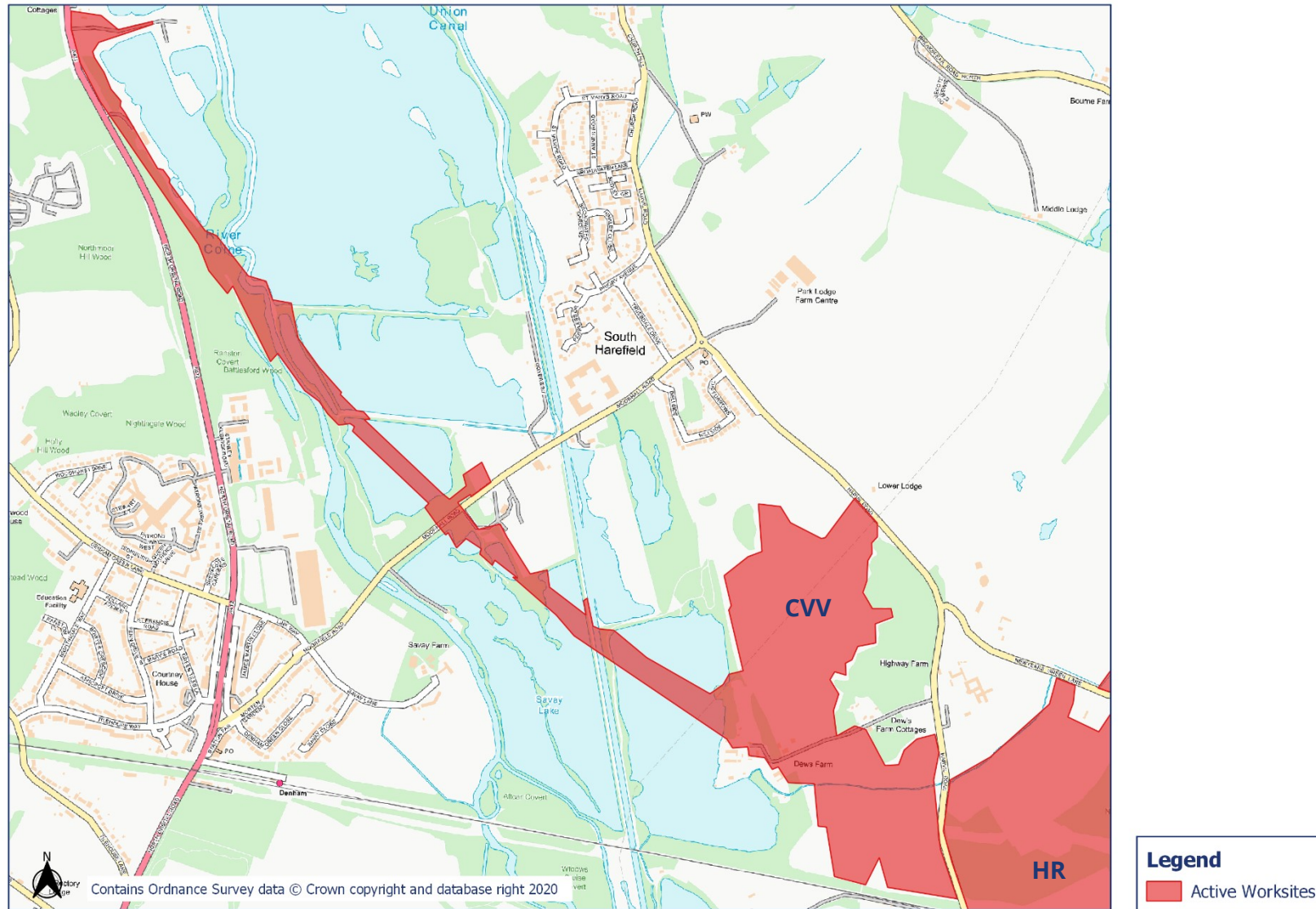
# Appendix A Site Locations

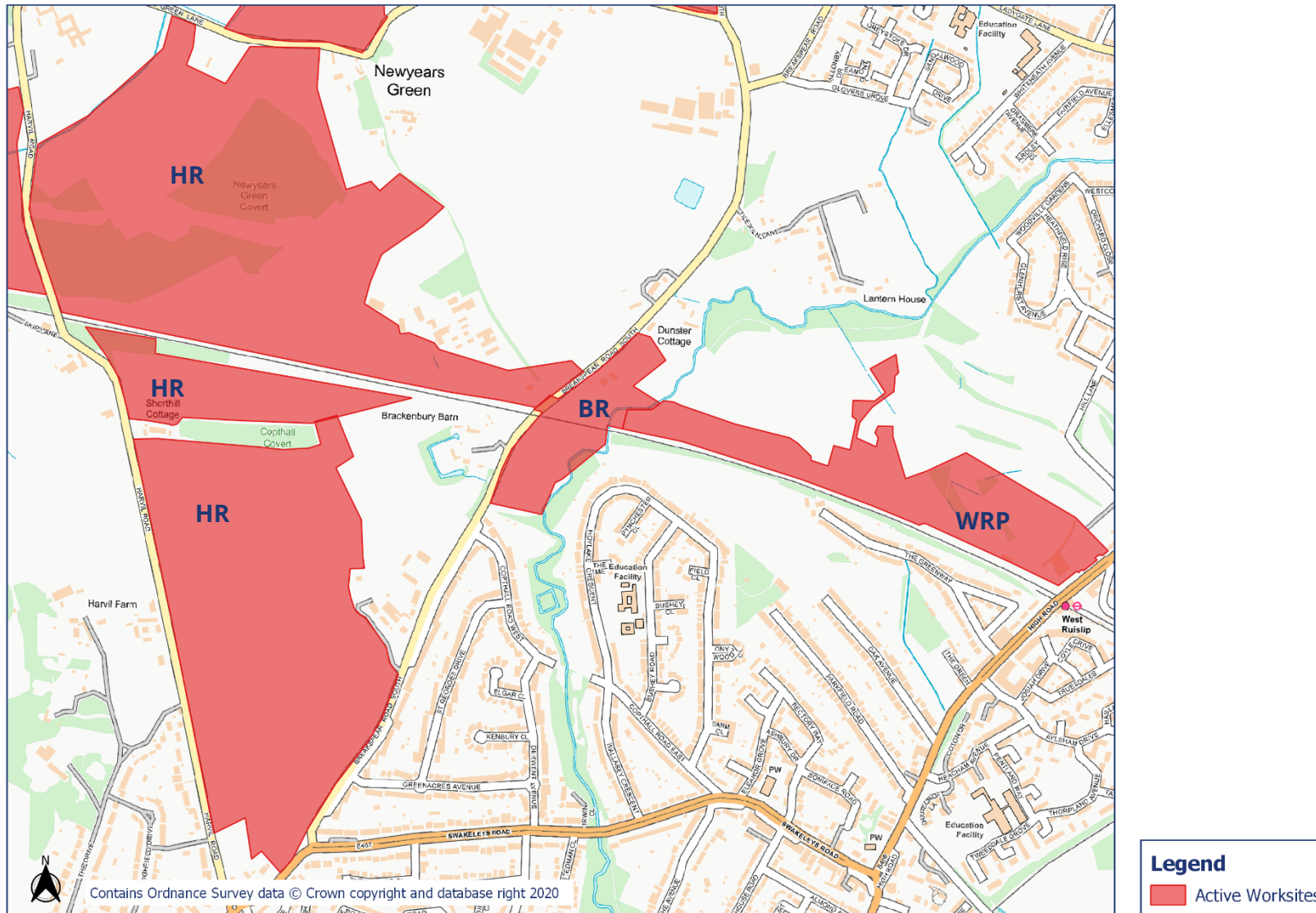
# HS2

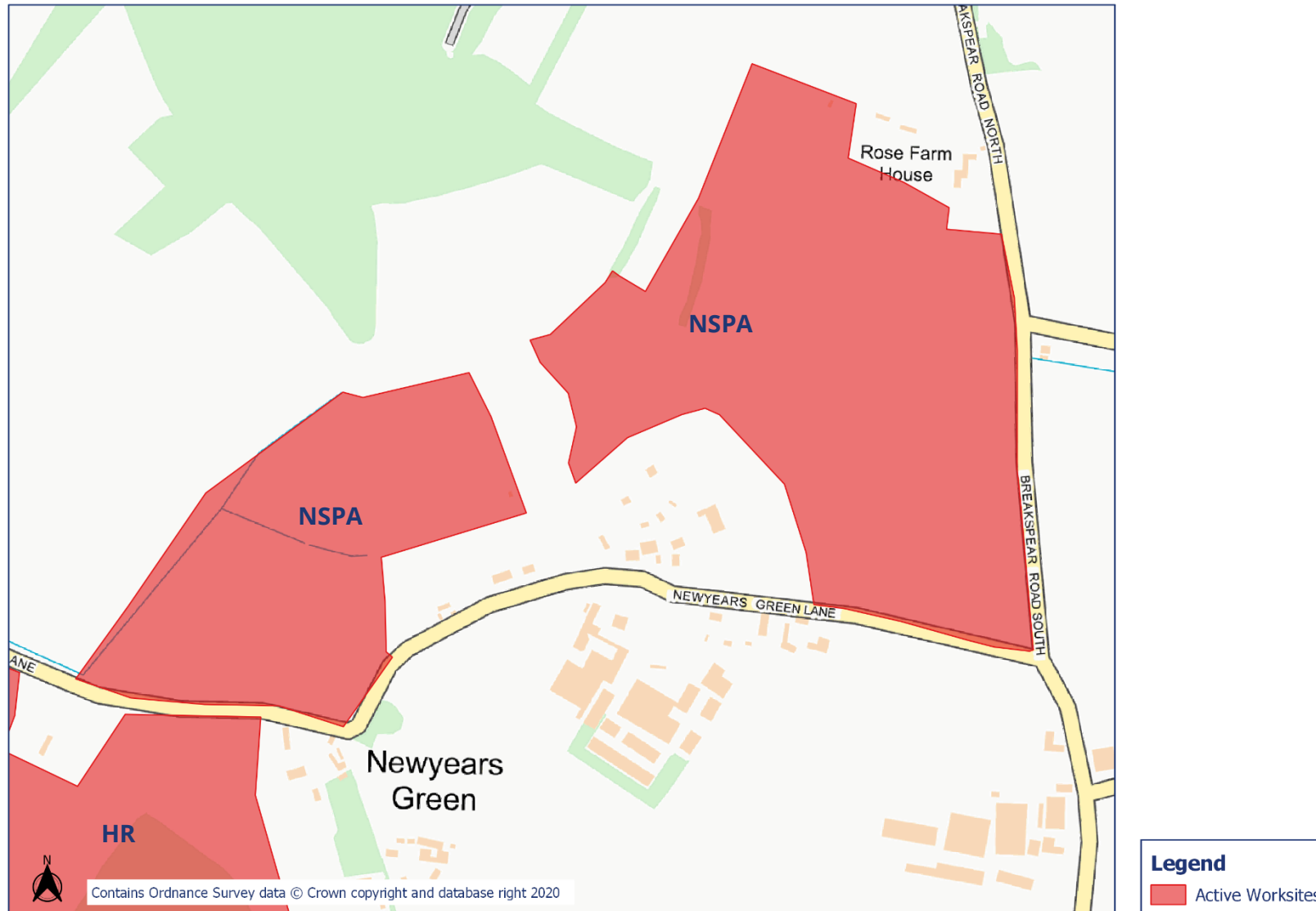
## Worksite Identification Plan - Overview



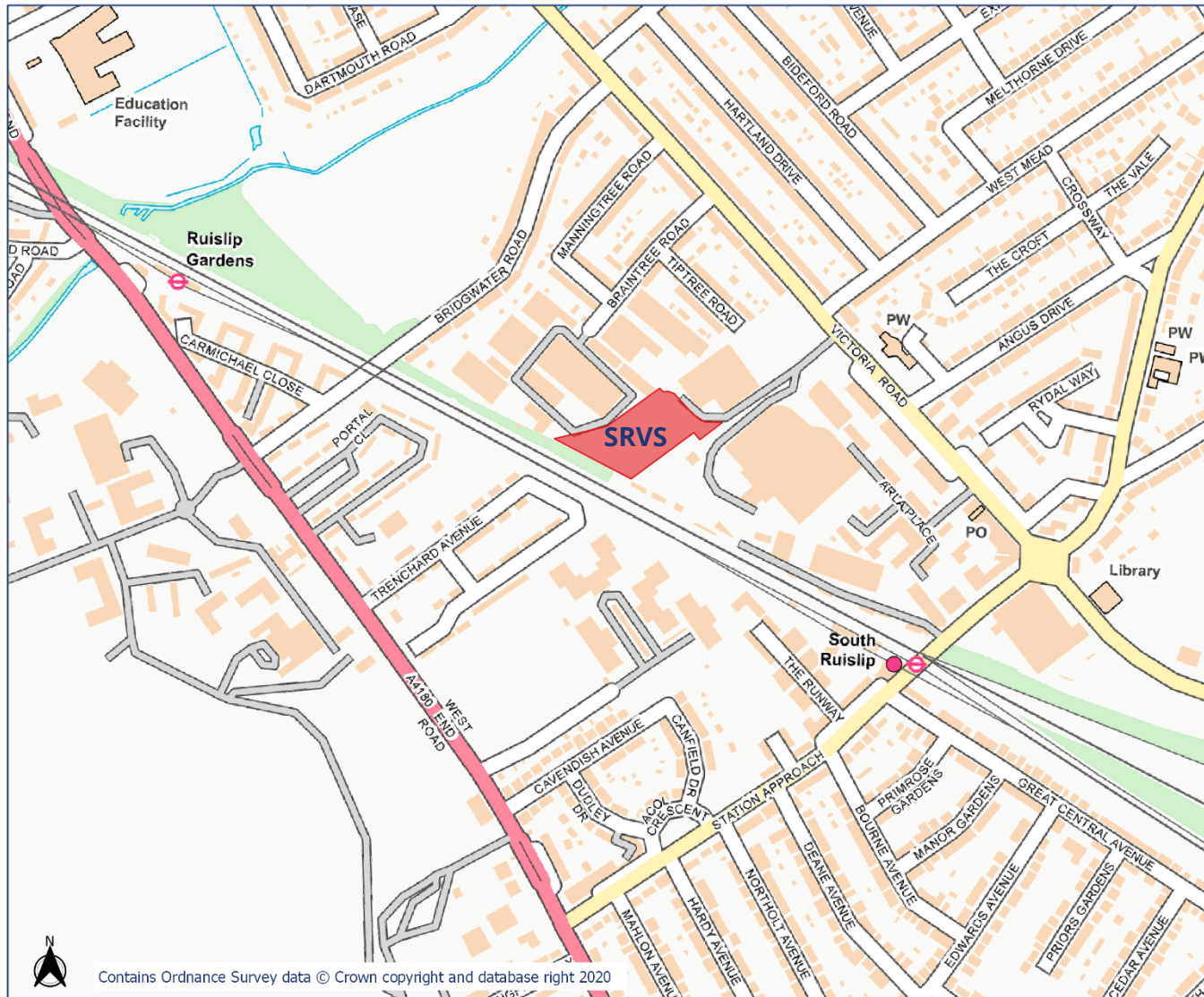






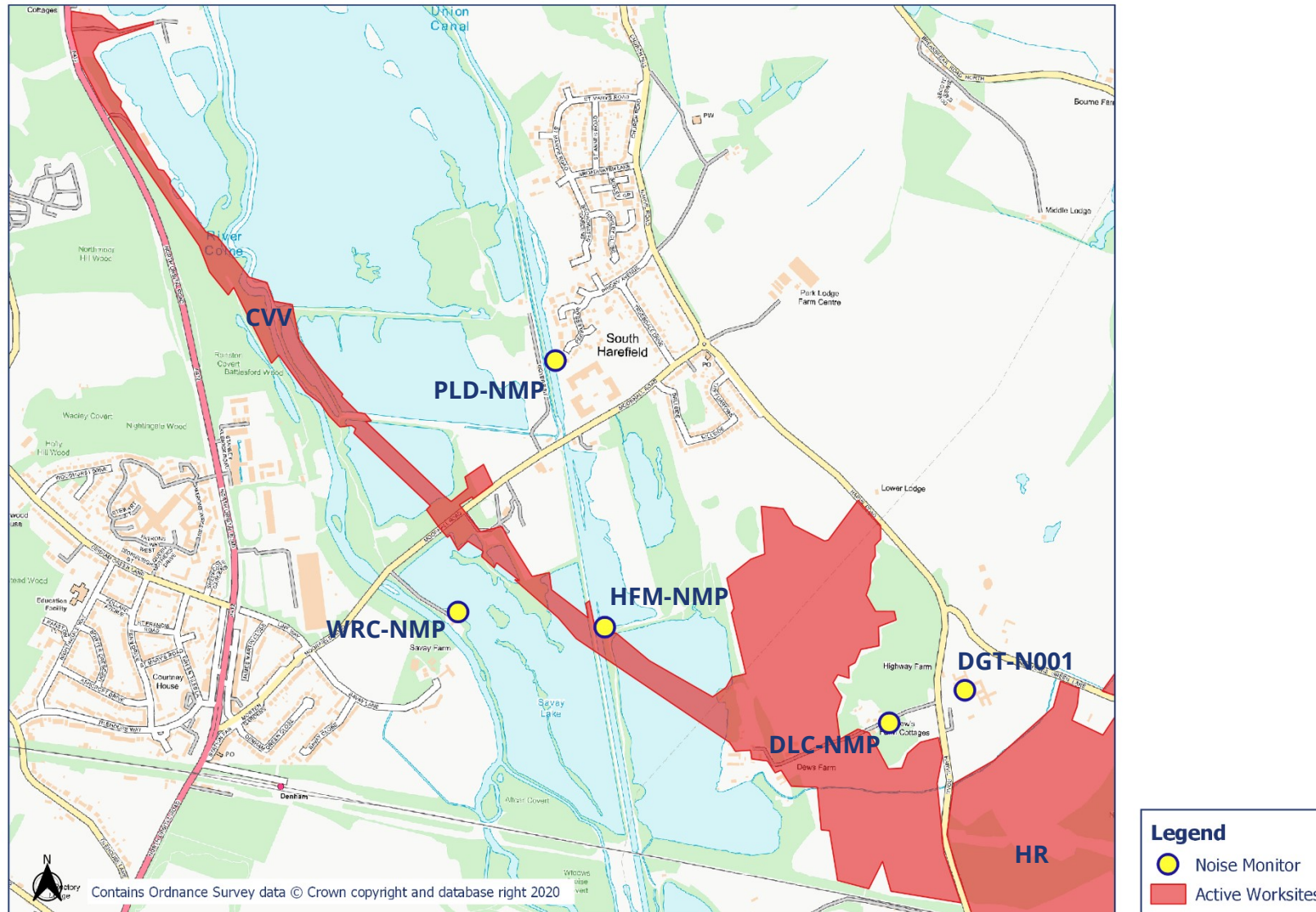


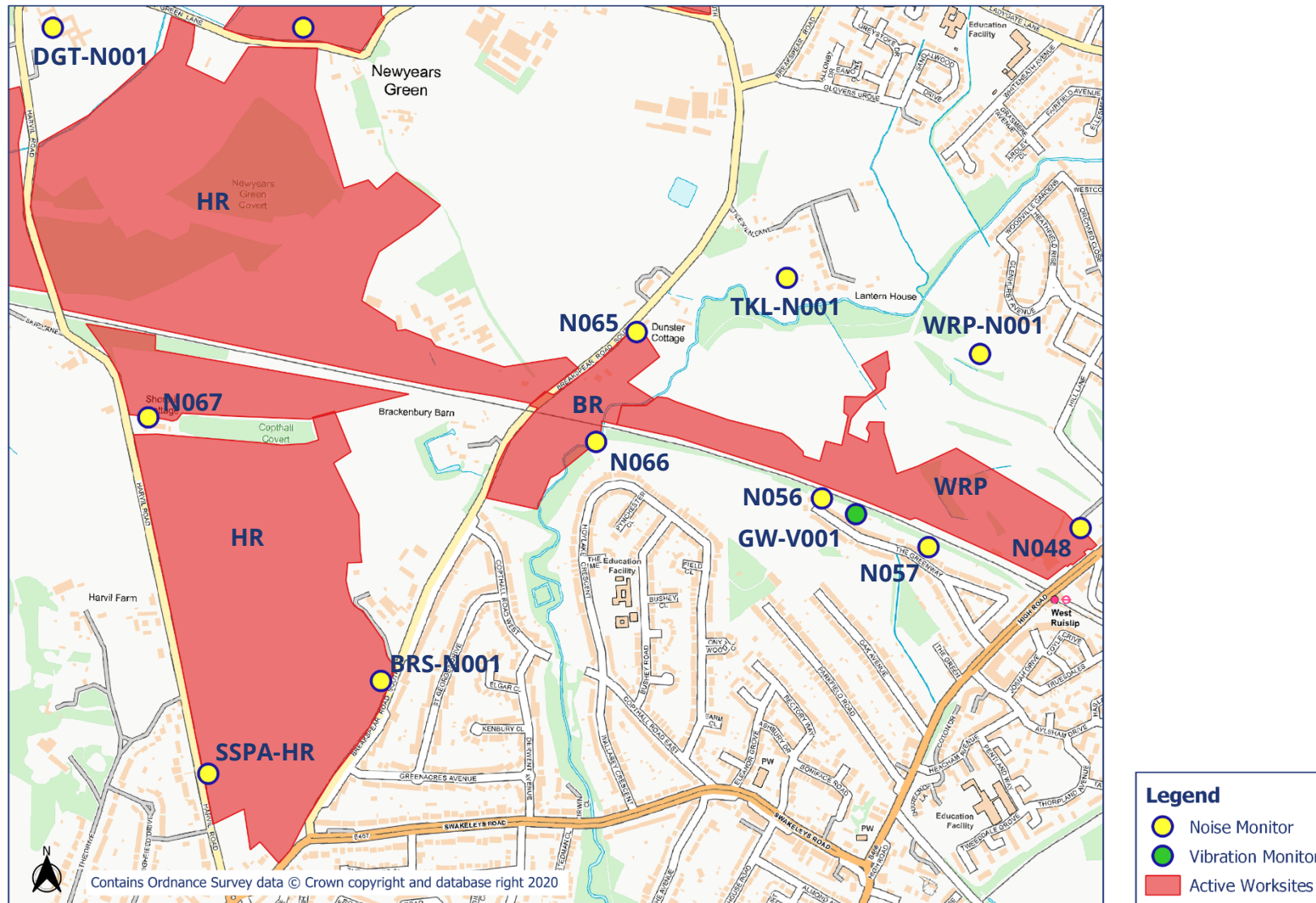


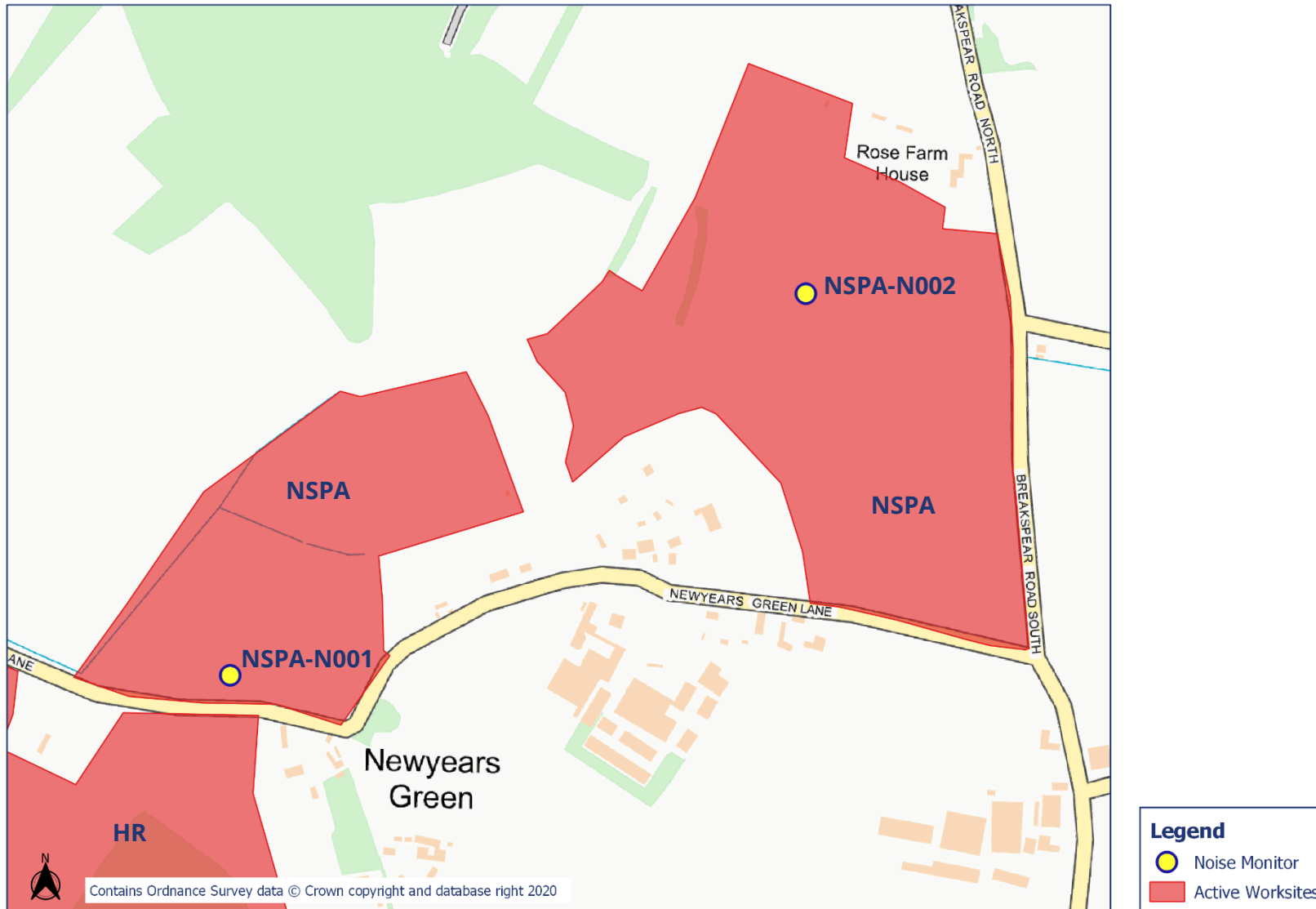


# Appendix B Monitoring Locations











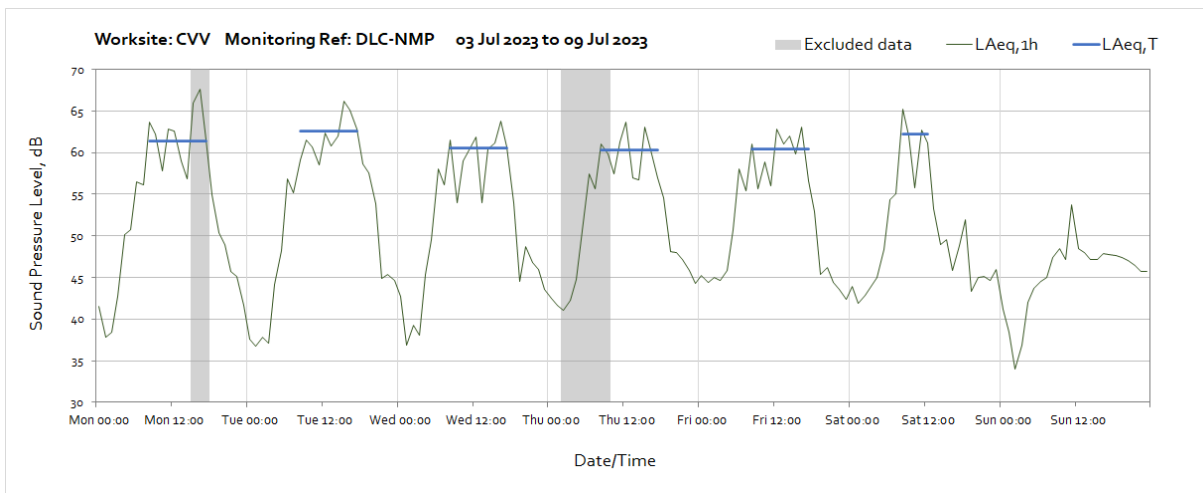
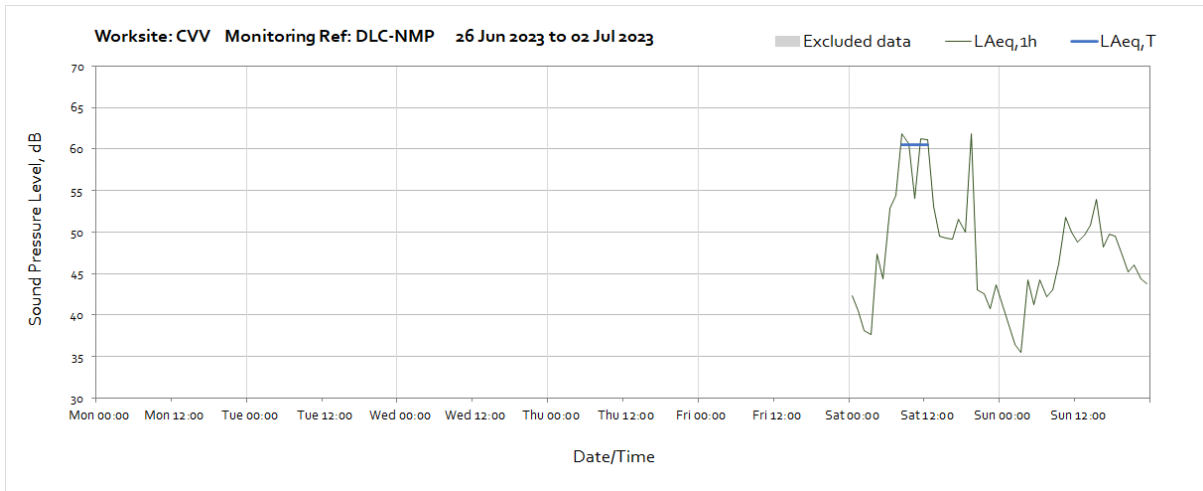


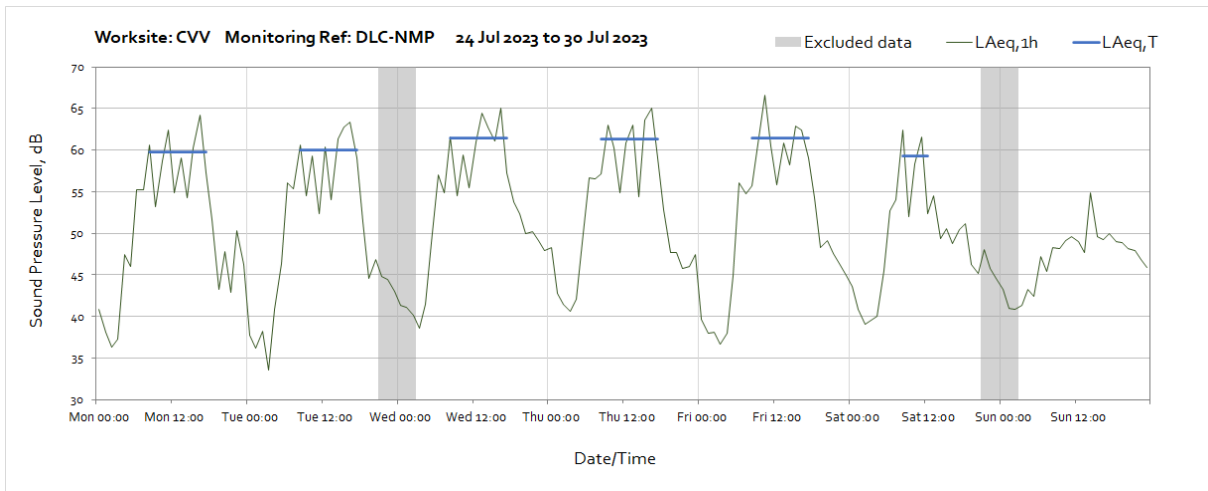
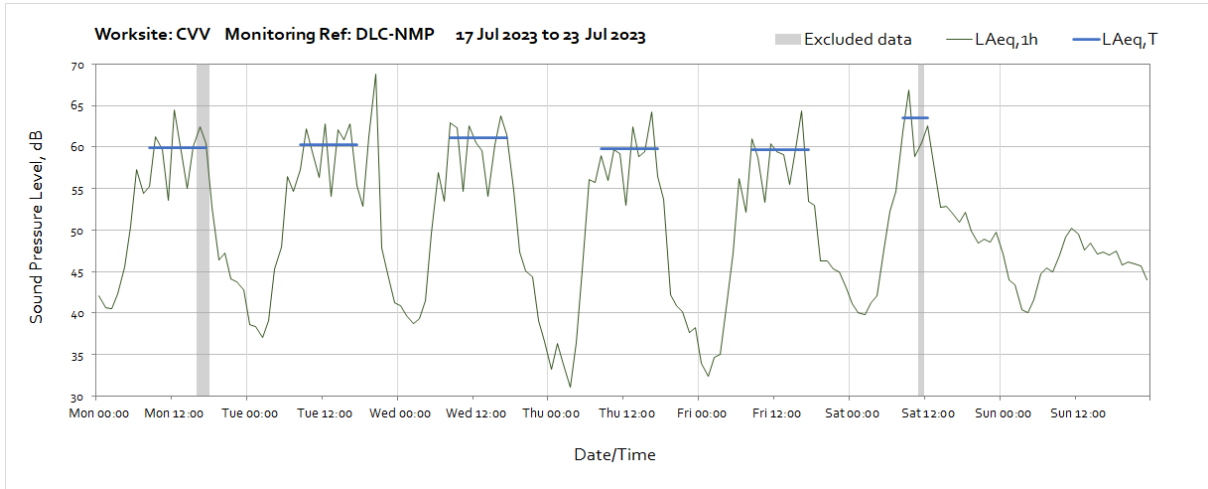
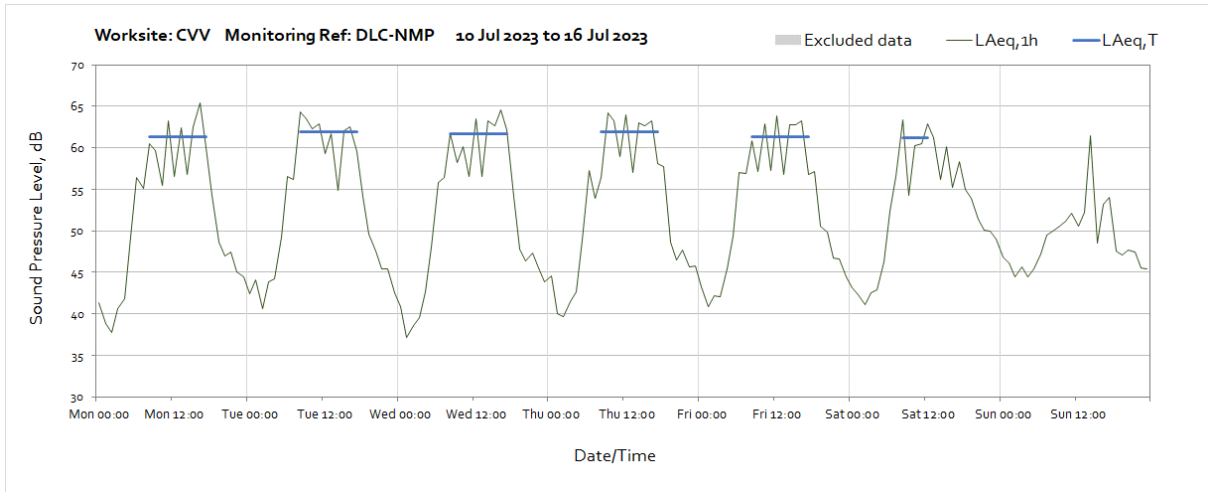
# Appendix C Data

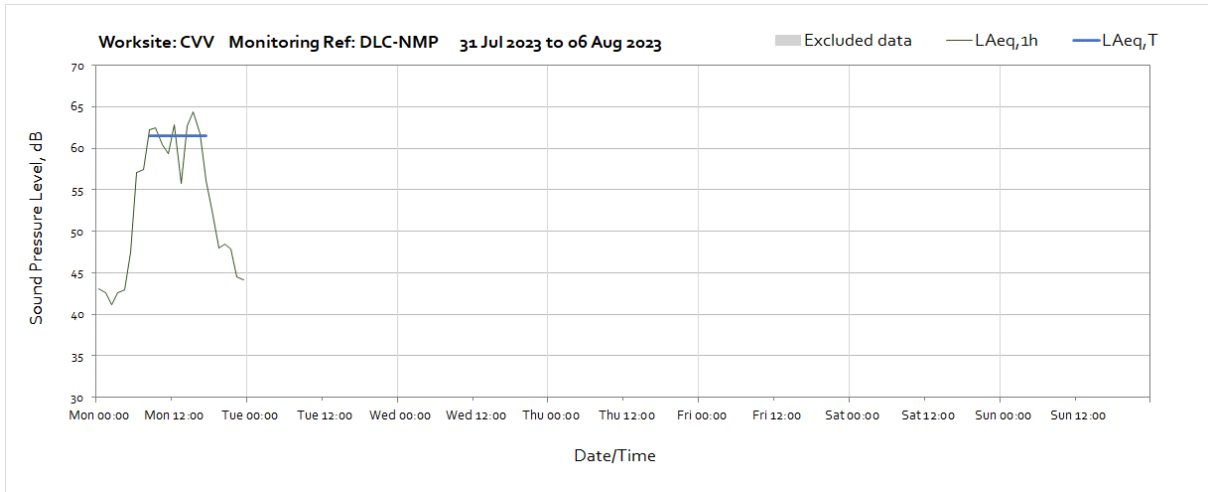
## Noise

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.

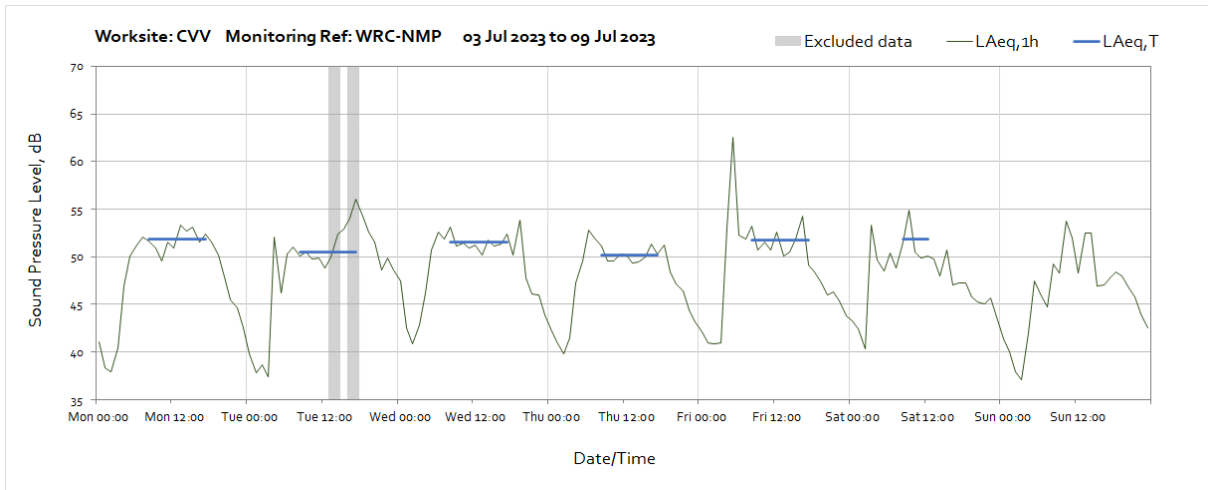
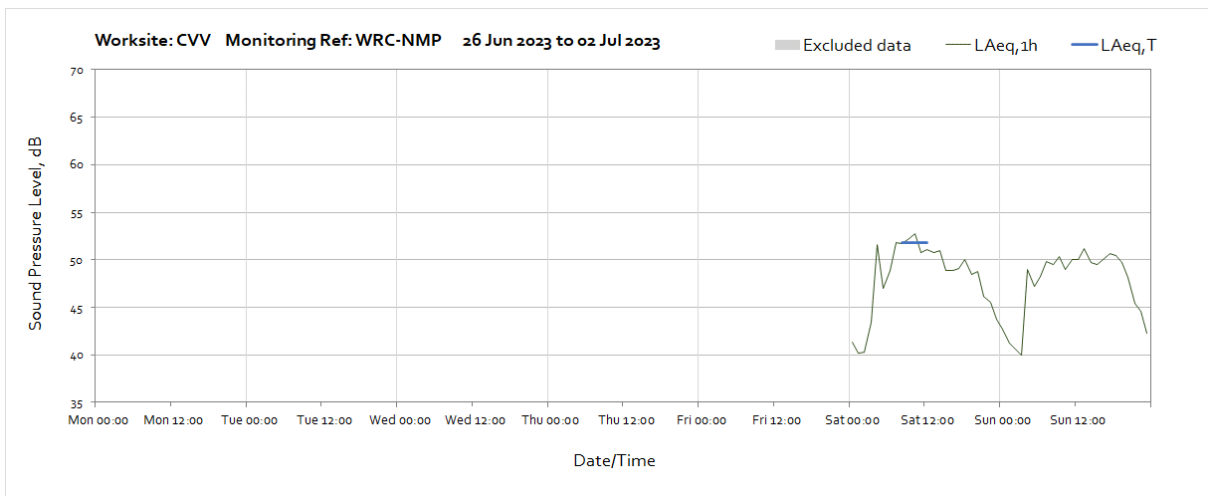
### Worksite: CVV – Monitoring Ref: DLC-NMP

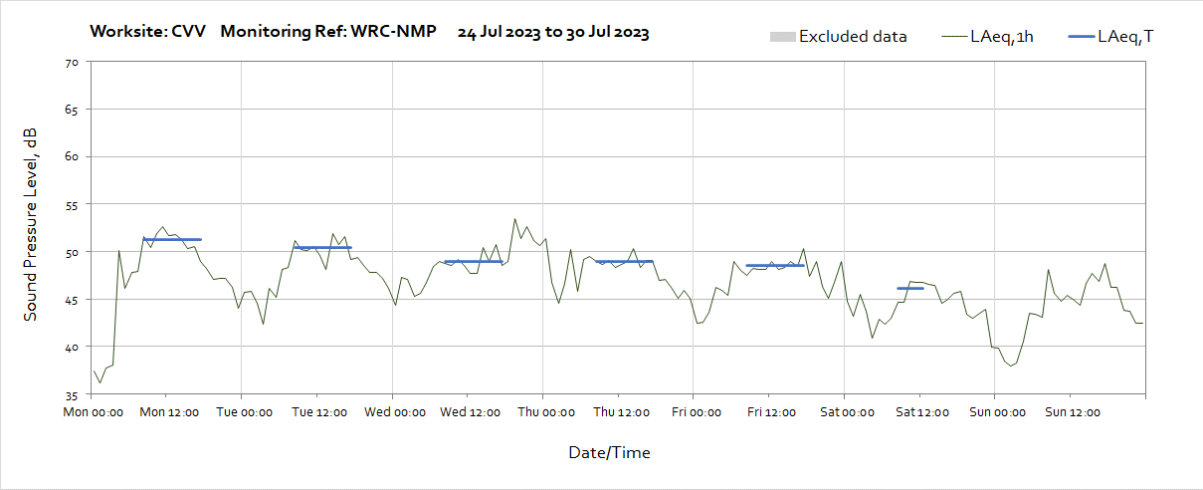
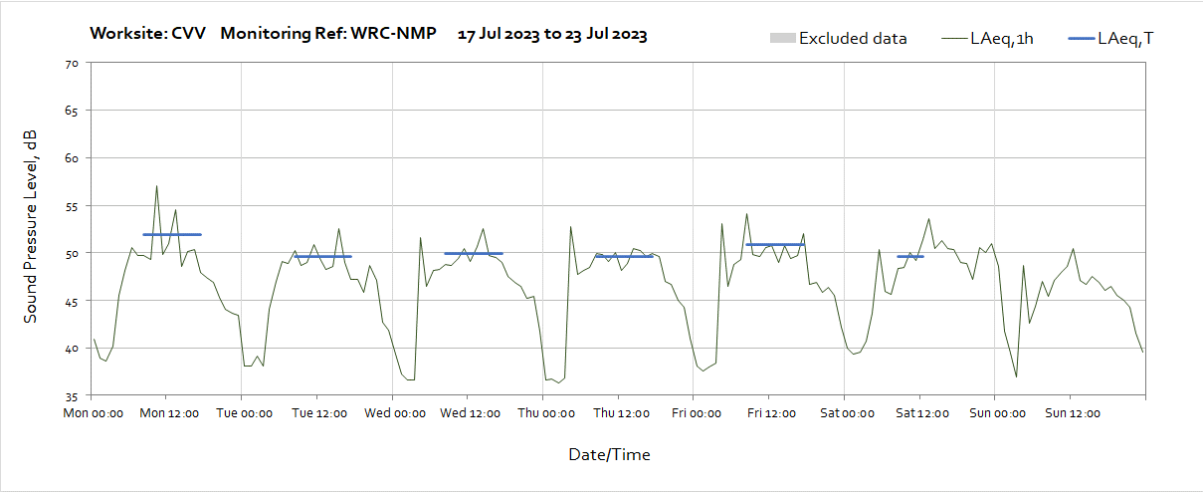
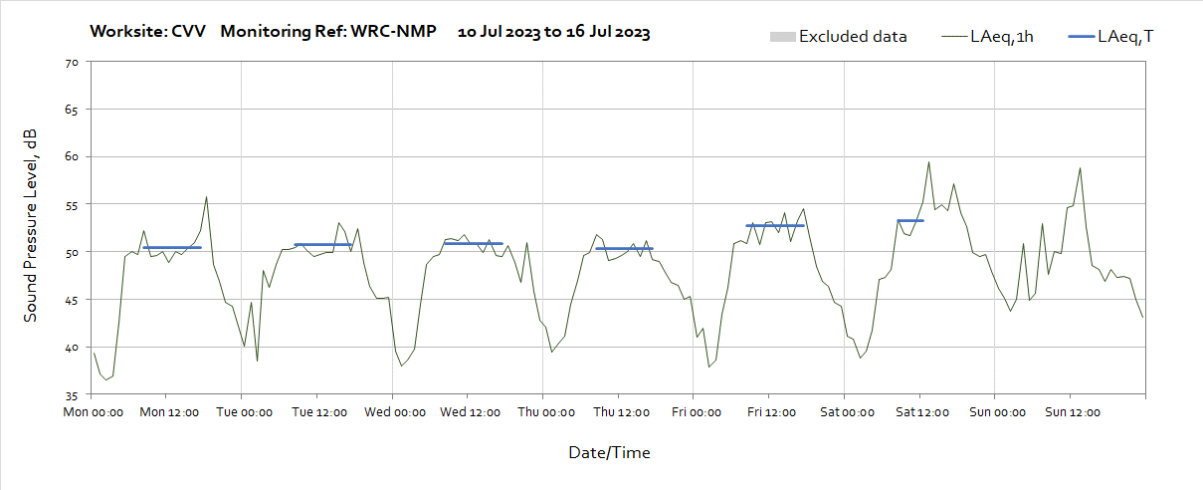




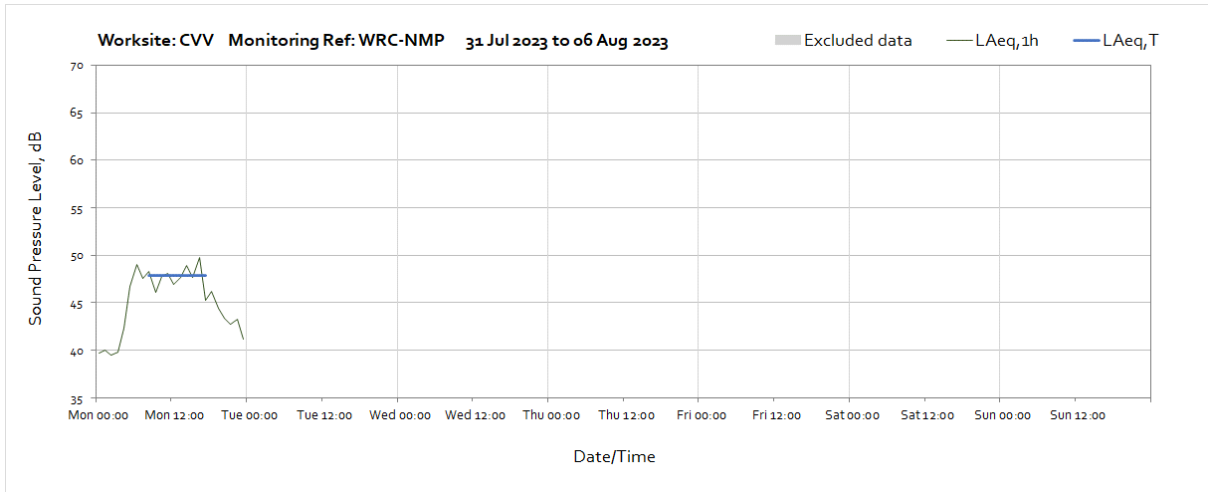


**Worksite: CVV - Monitoring Ref: WRC-NMP**

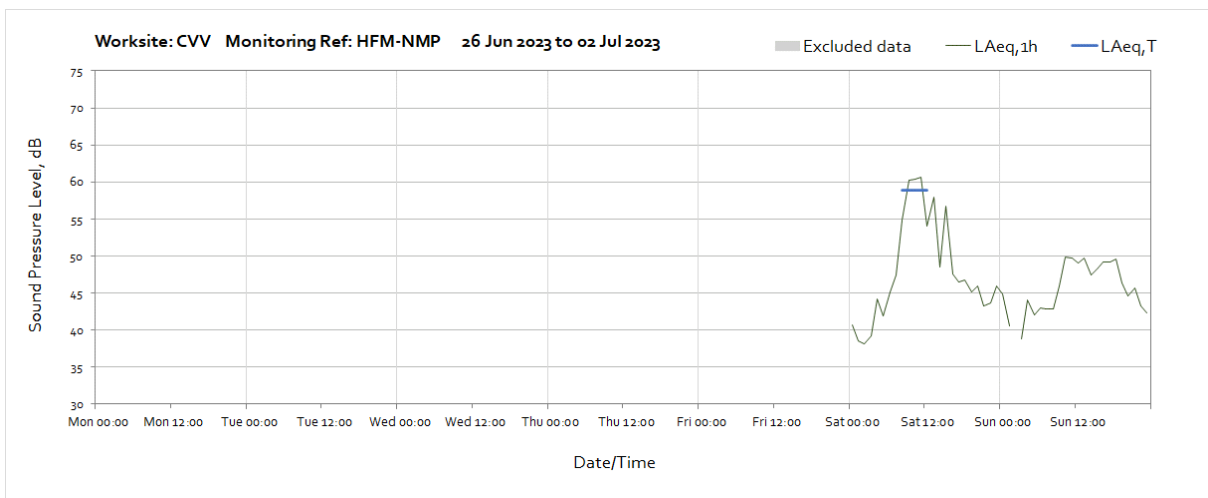




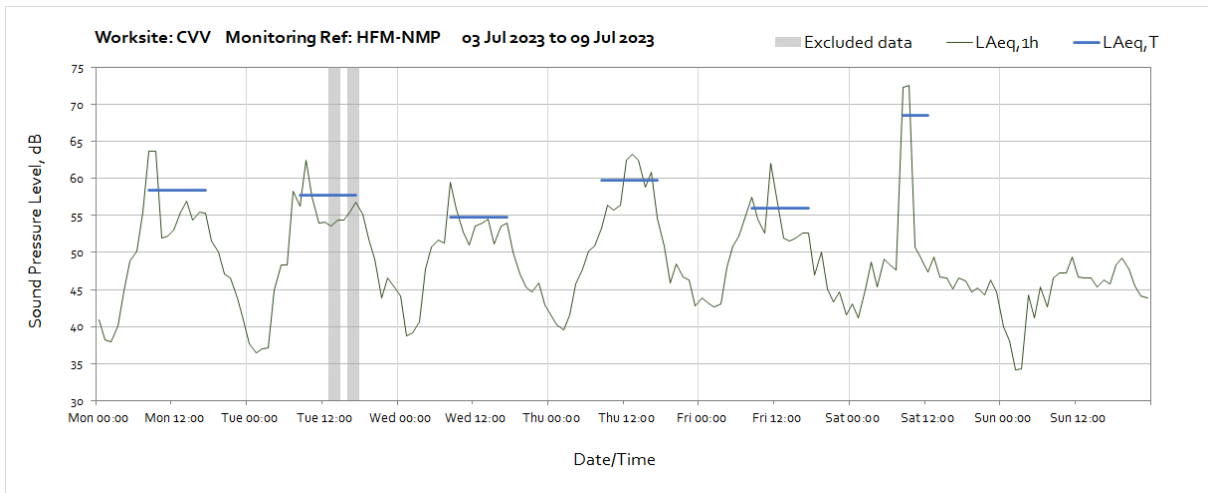


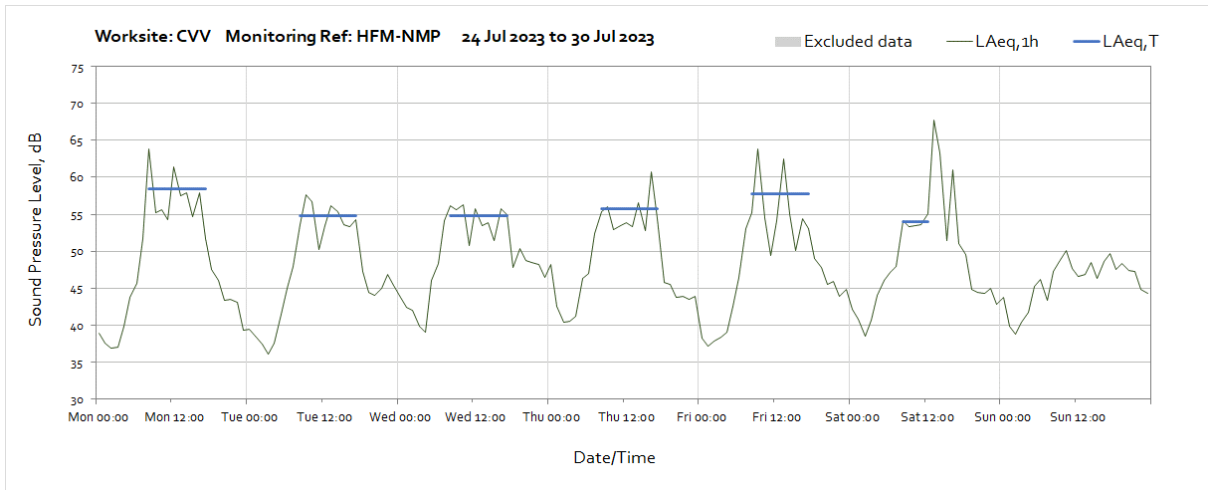
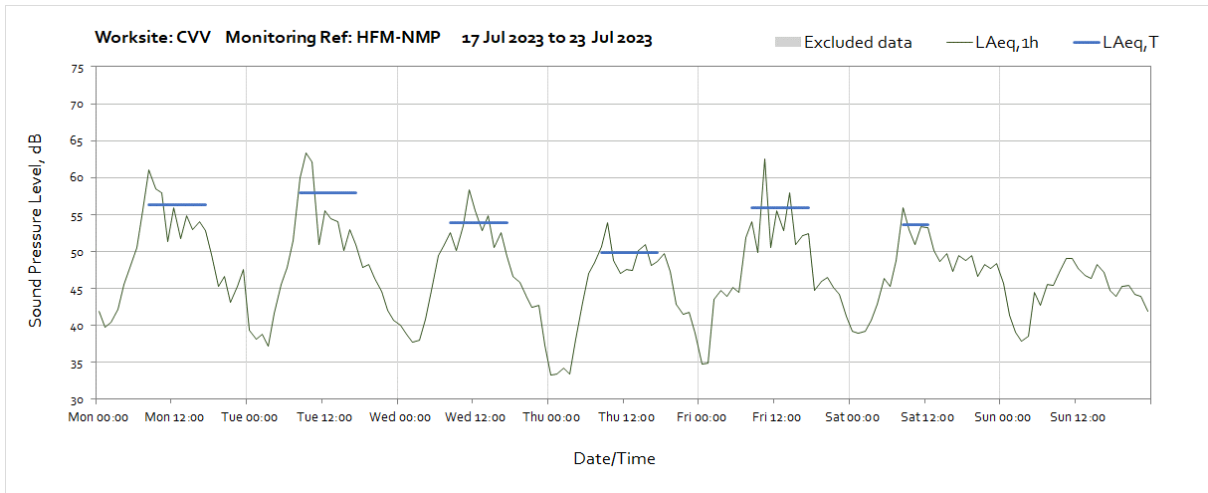
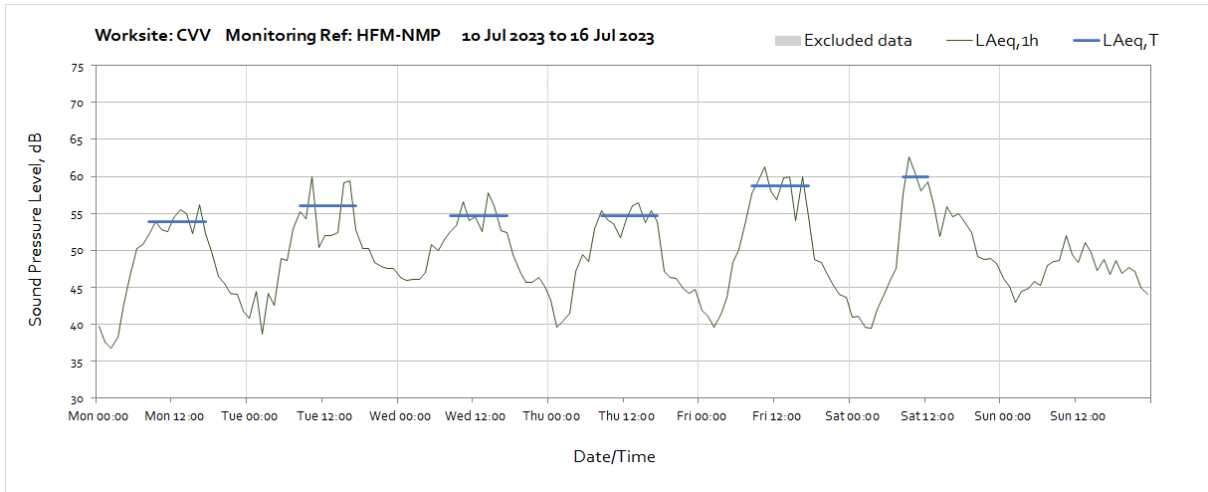


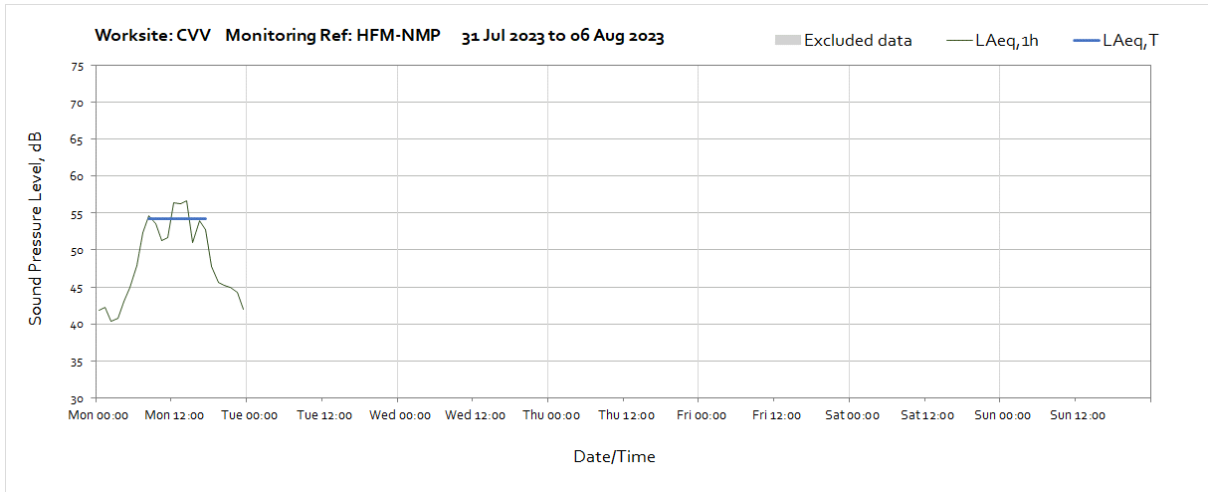
**Worksite: CVV – Monitoring Ref: HFM-NMP**



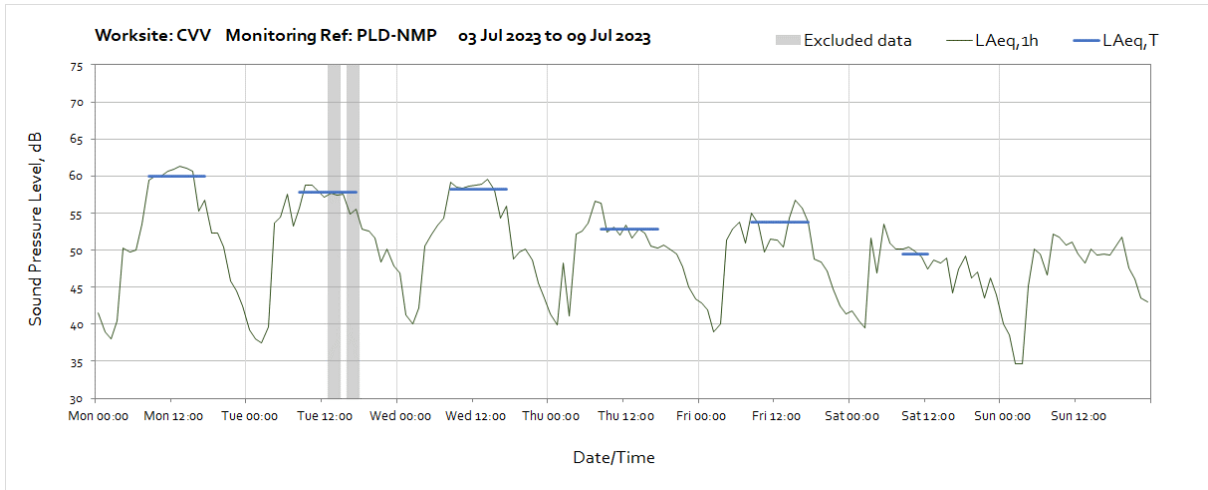
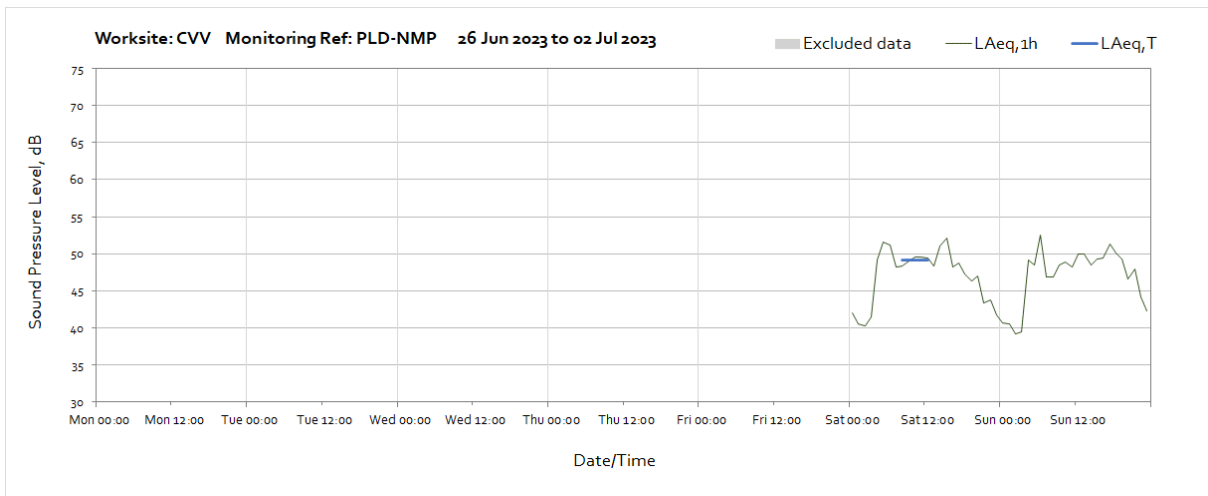
Note: Missing data between 01:00 and 02:00 on Sunday 2<sup>nd</sup> July was due to a server communication error.

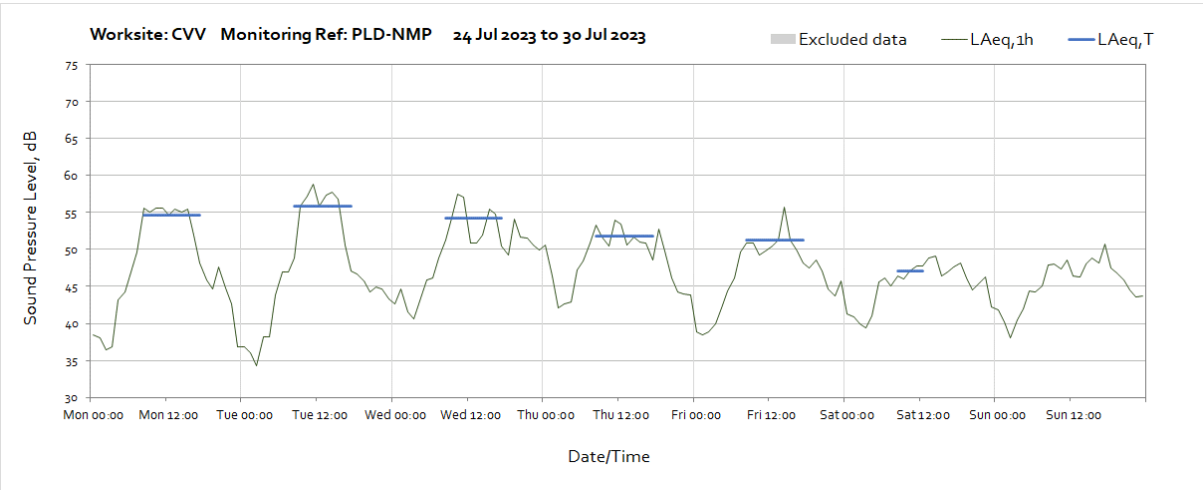
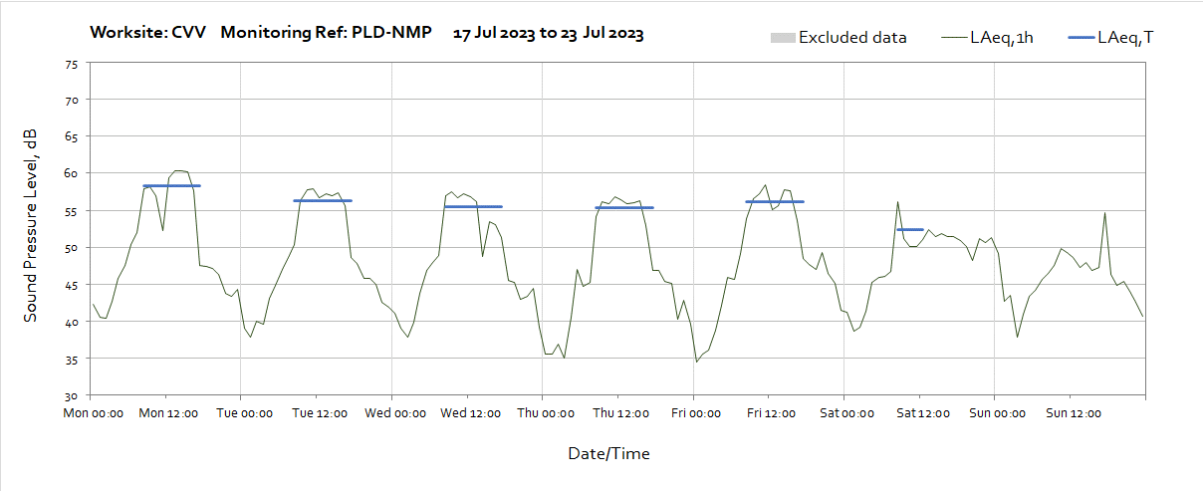
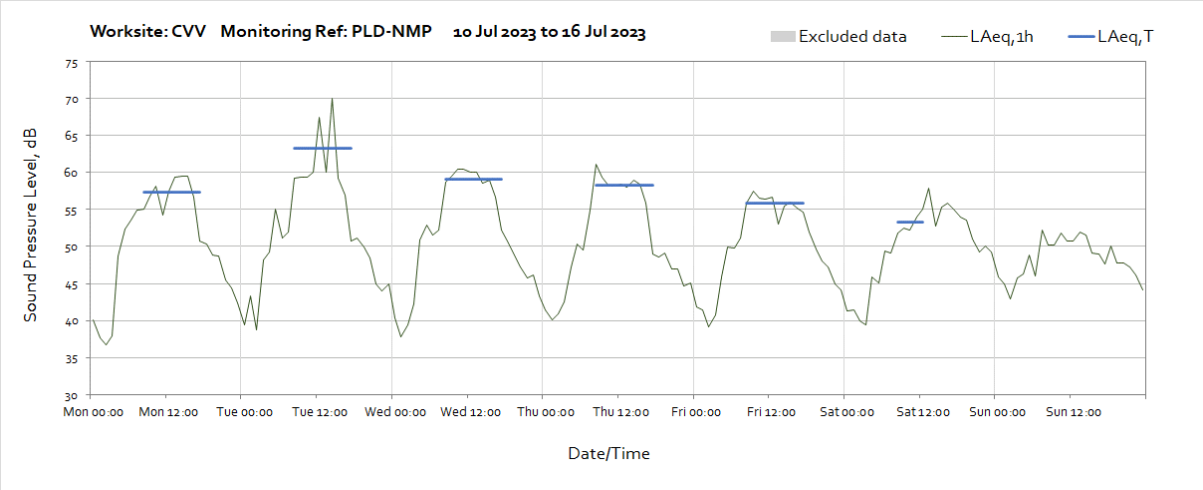


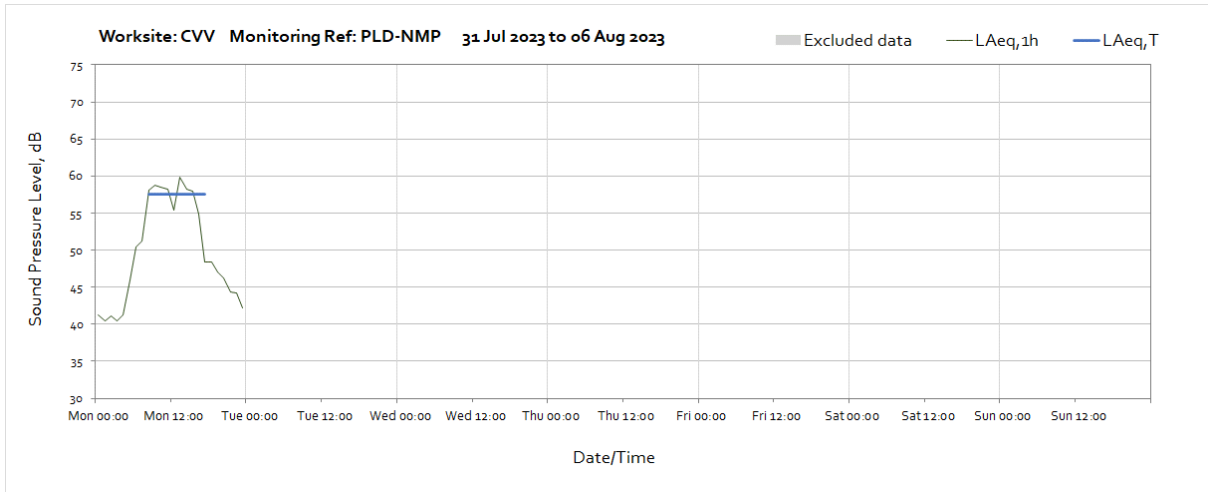




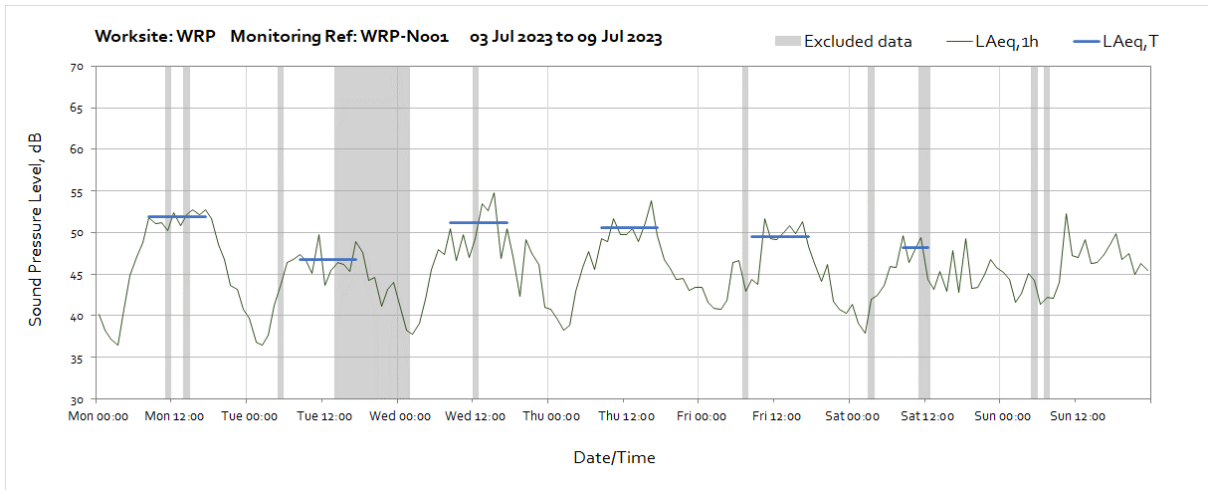
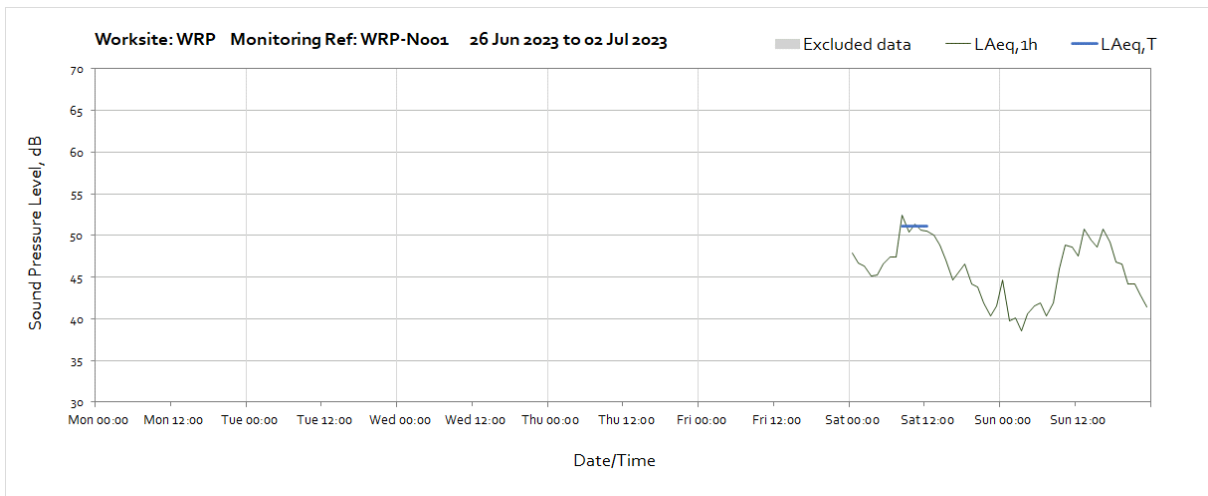
**Worksite: CVV - Monitoring Ref: PLD-NMP**

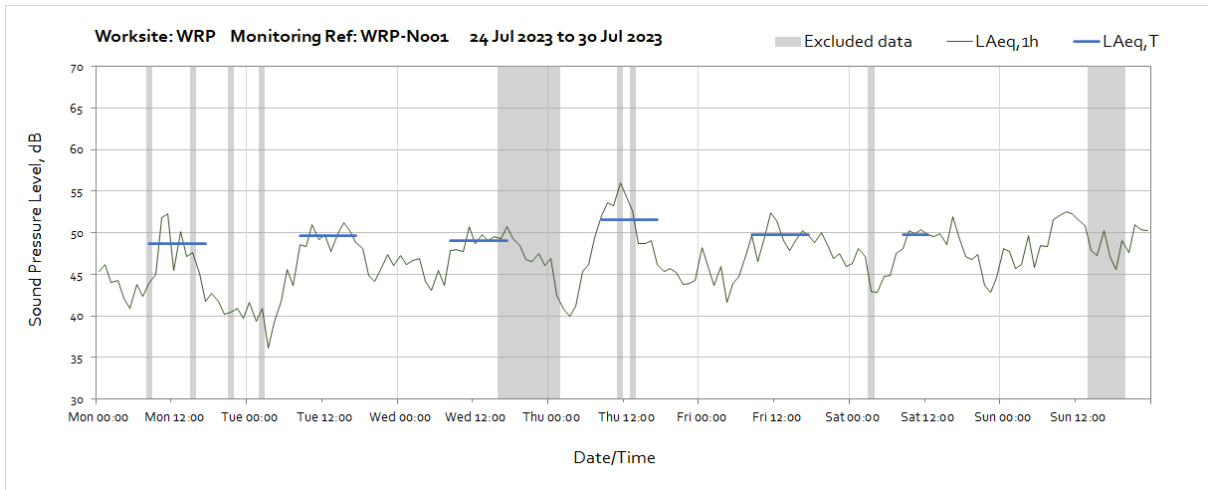
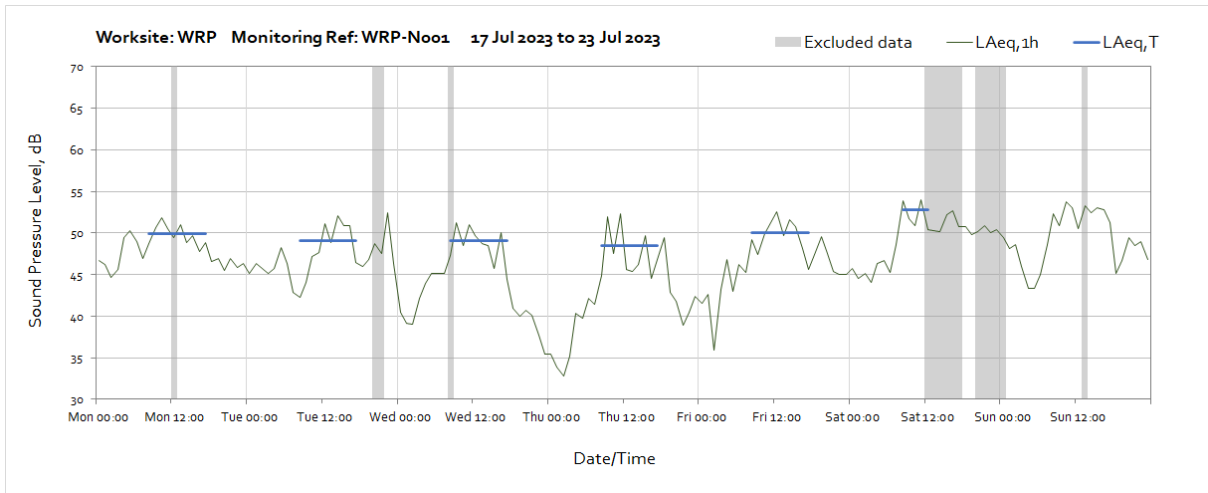
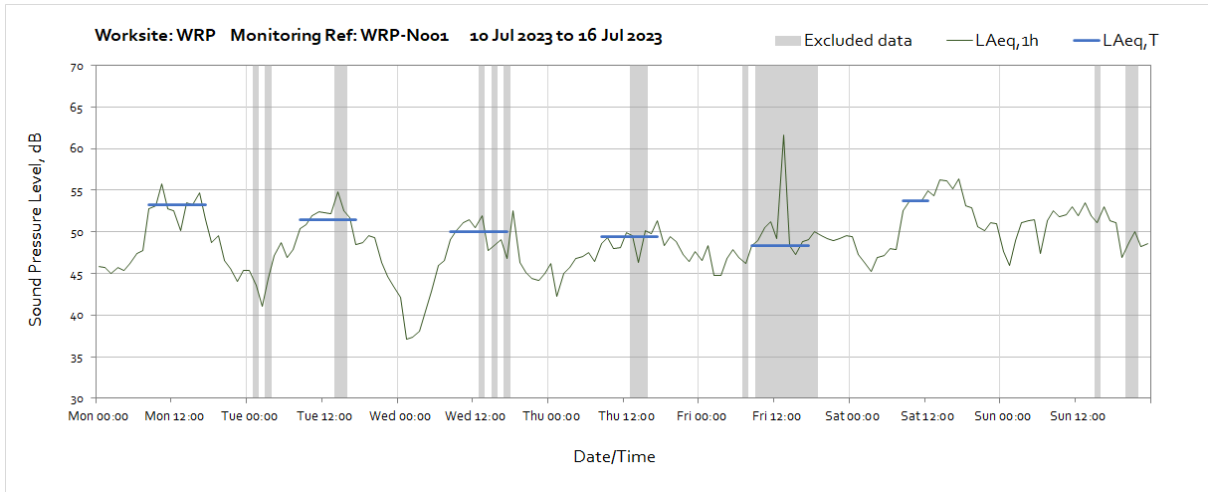


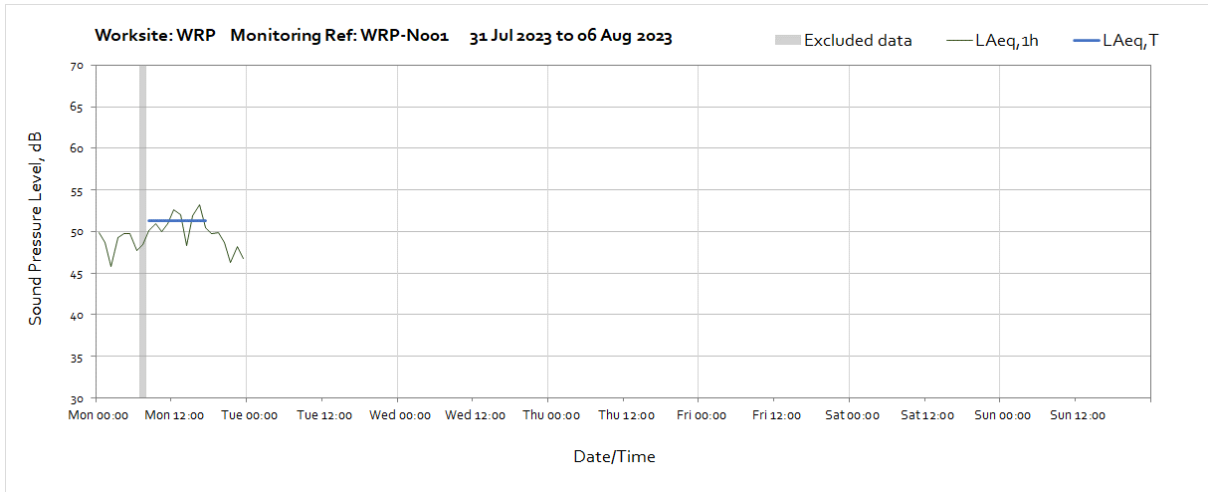




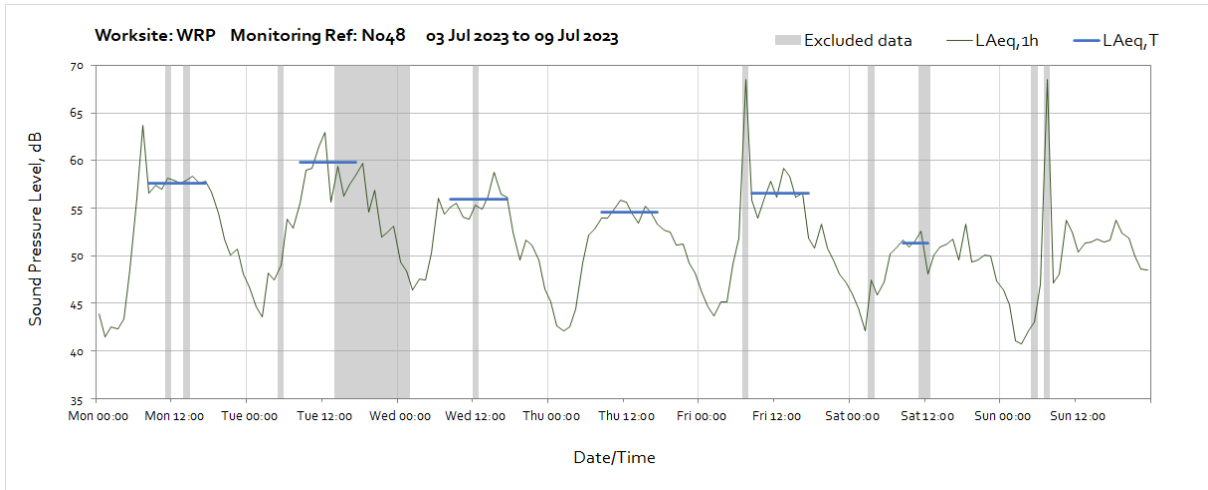
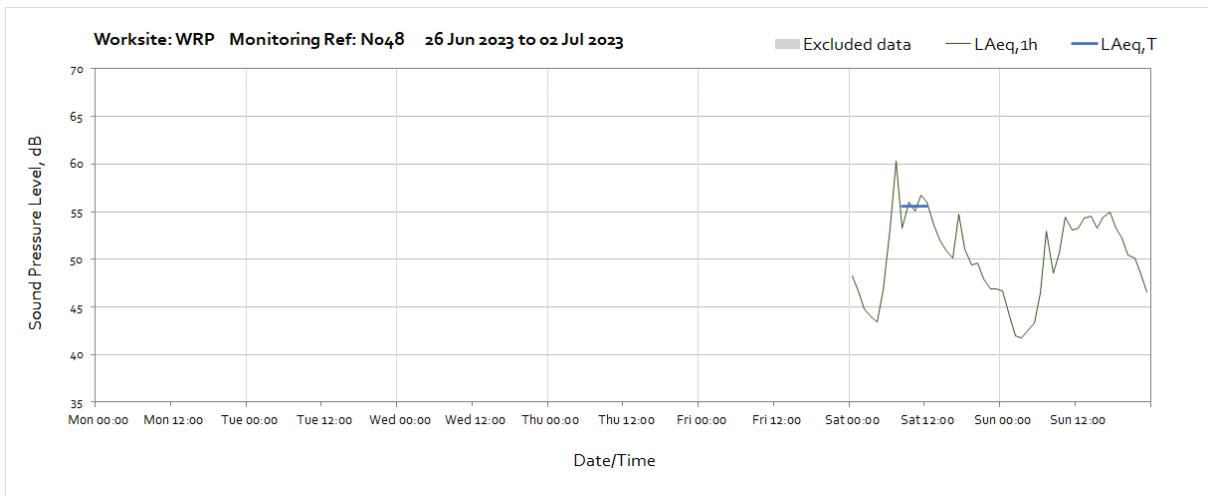
**Worksite: WRP – Monitoring Ref: WRP-N001**

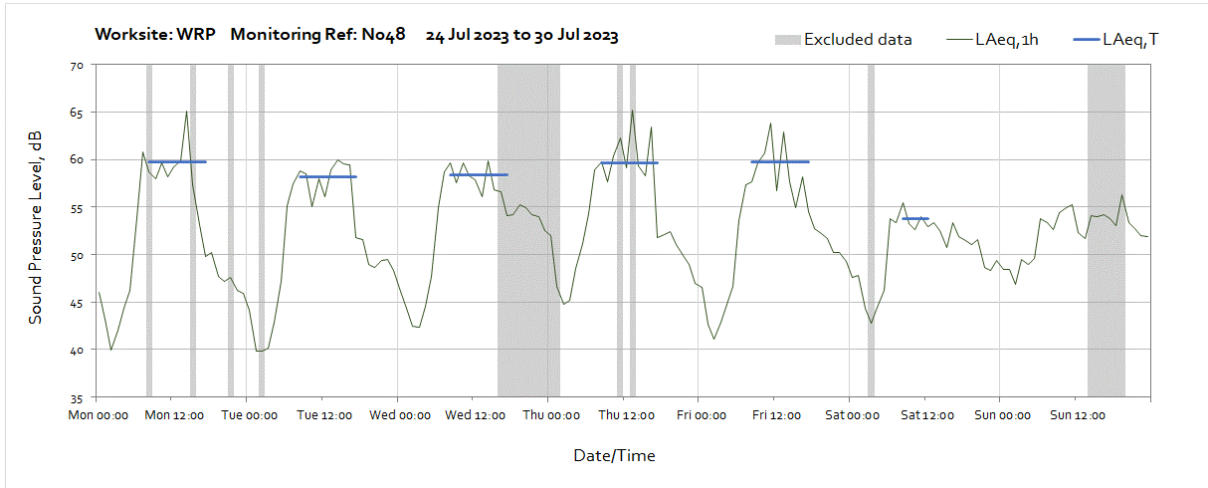
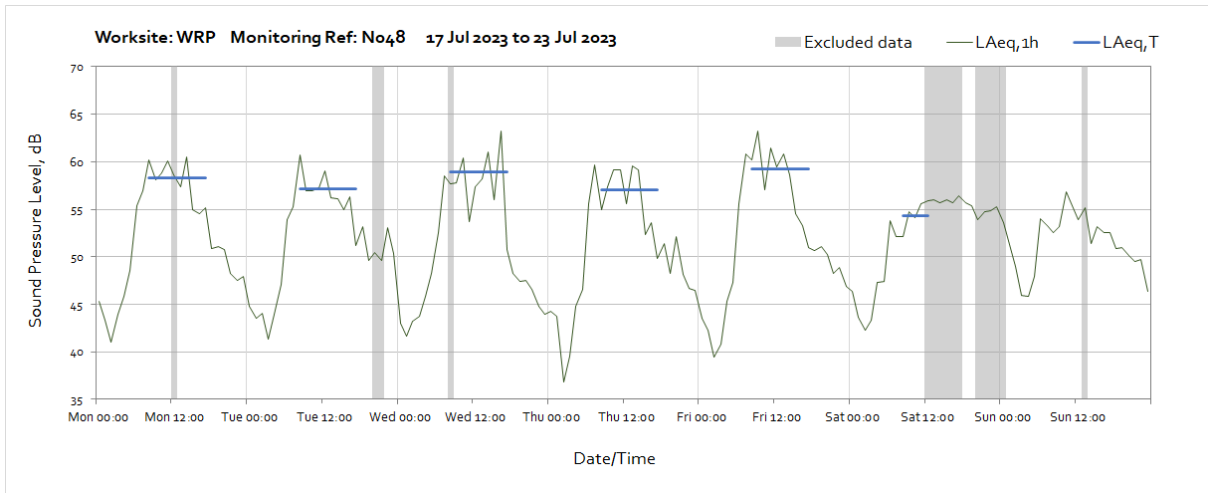
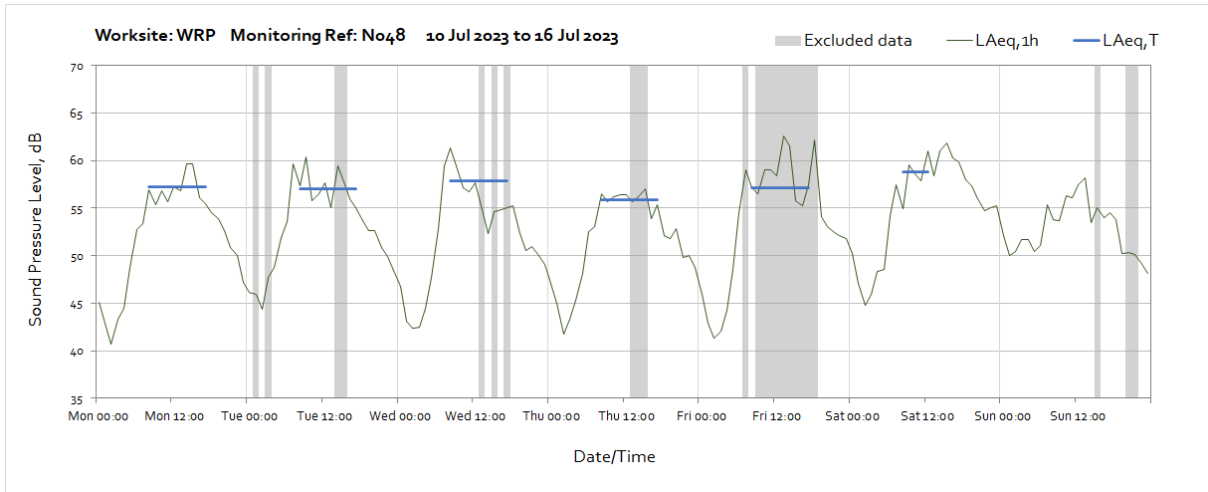




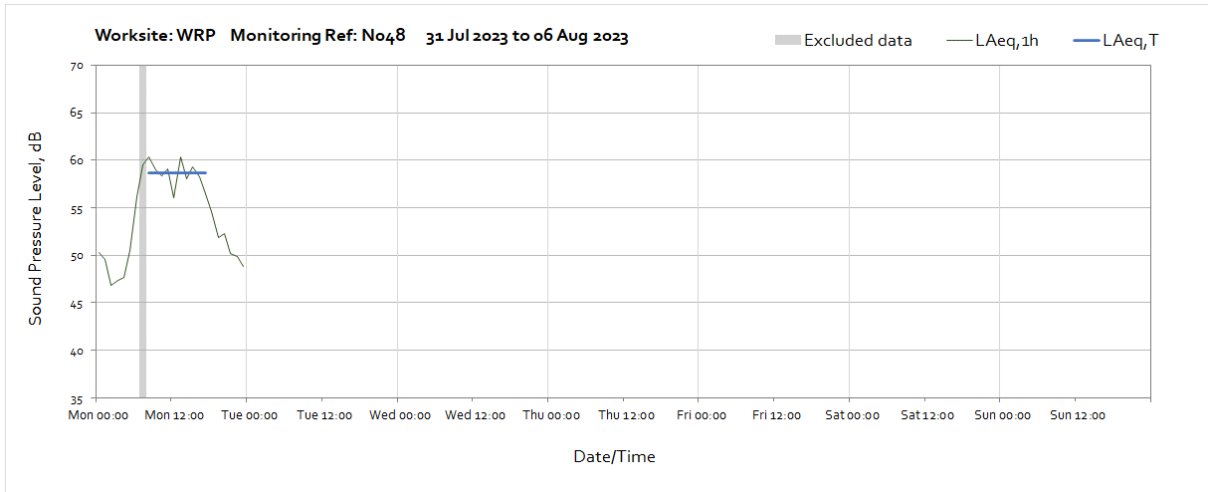


**Worksite: WRP – Monitoring Ref: N048**

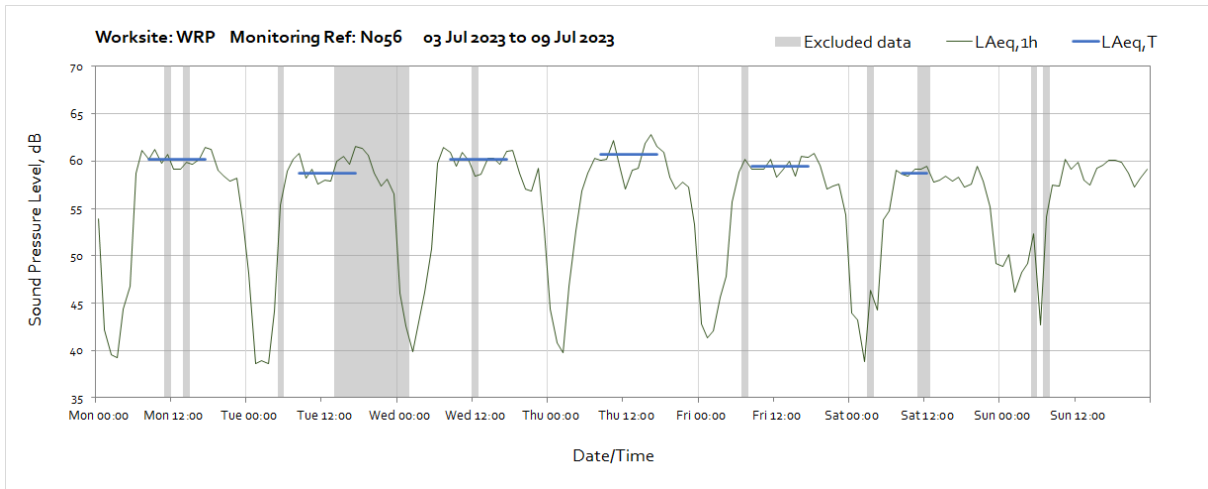
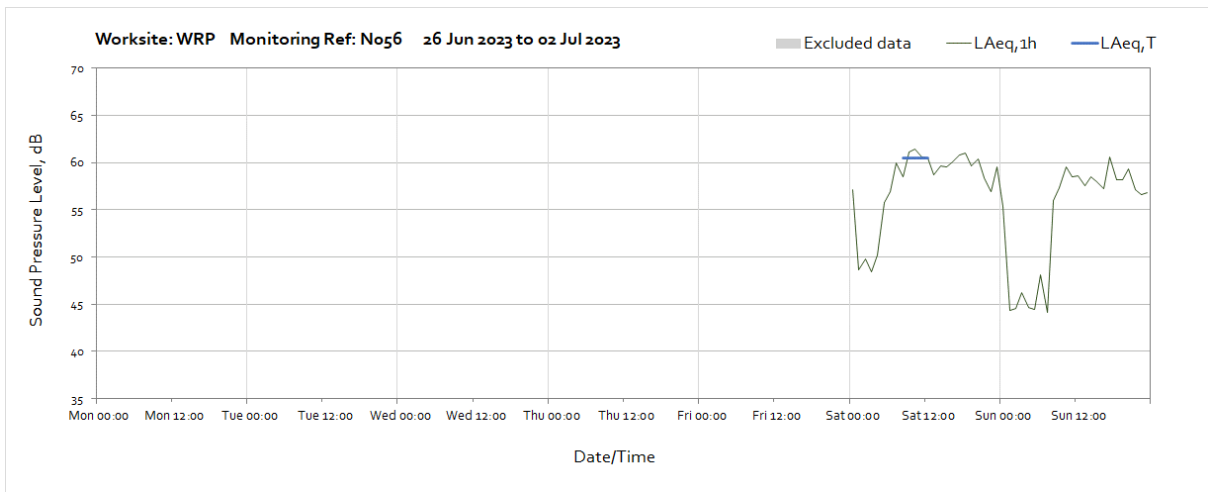


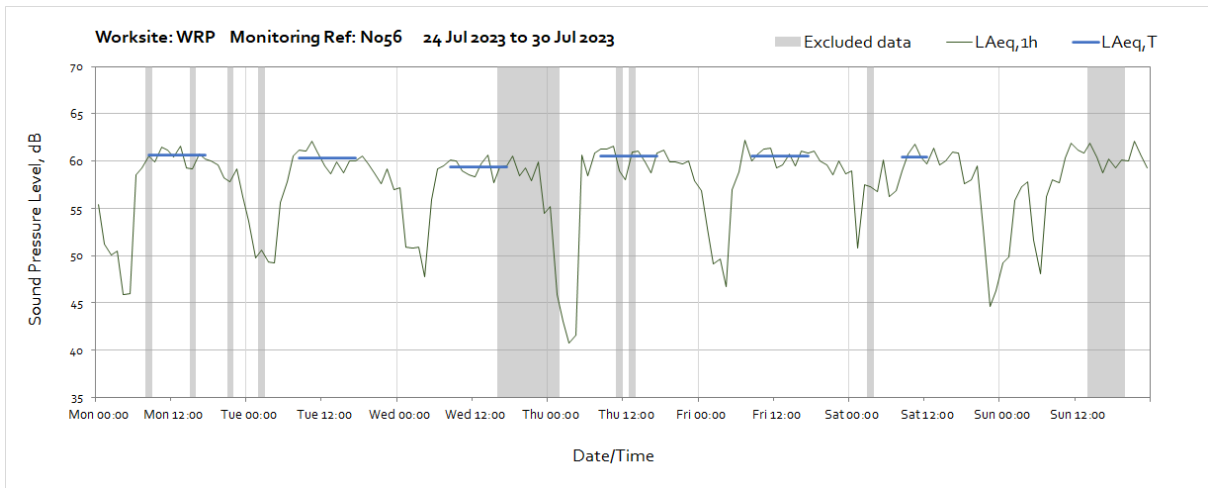
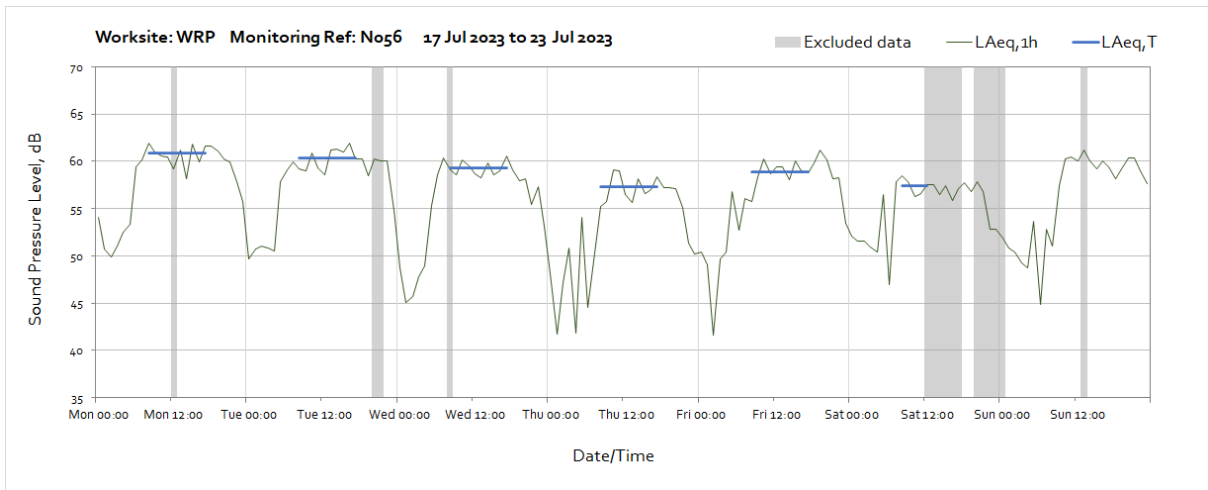
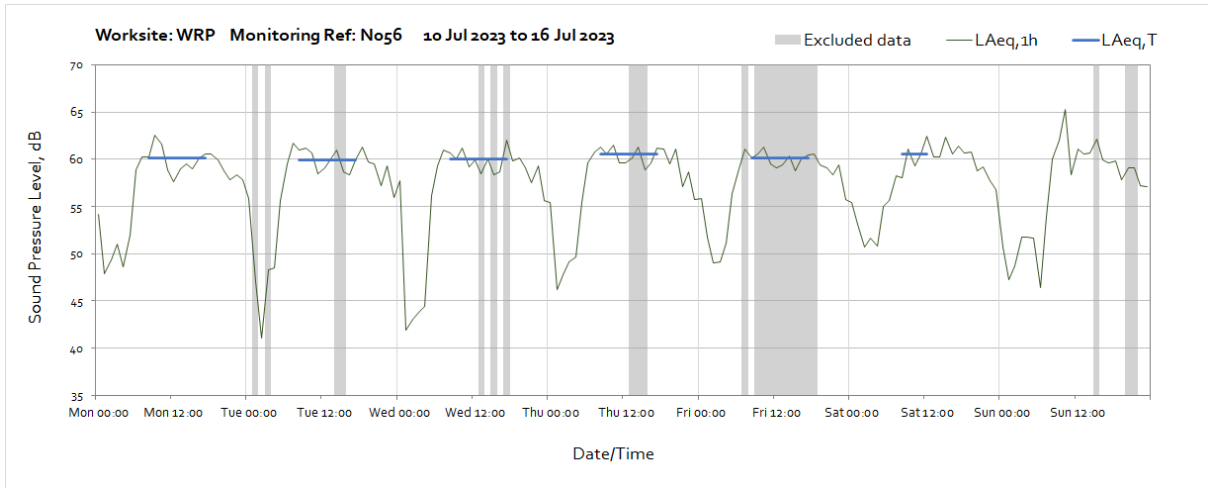


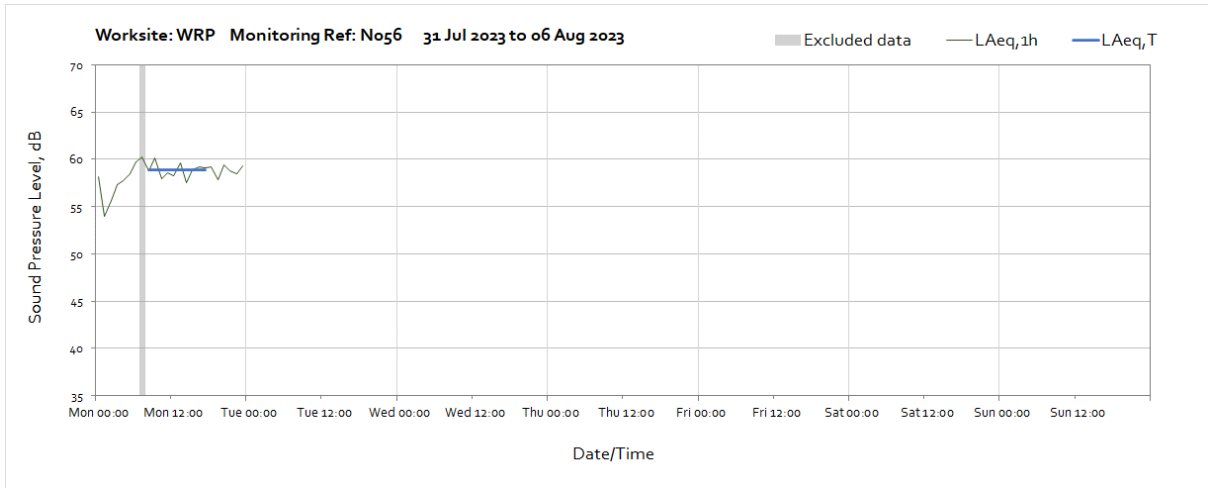




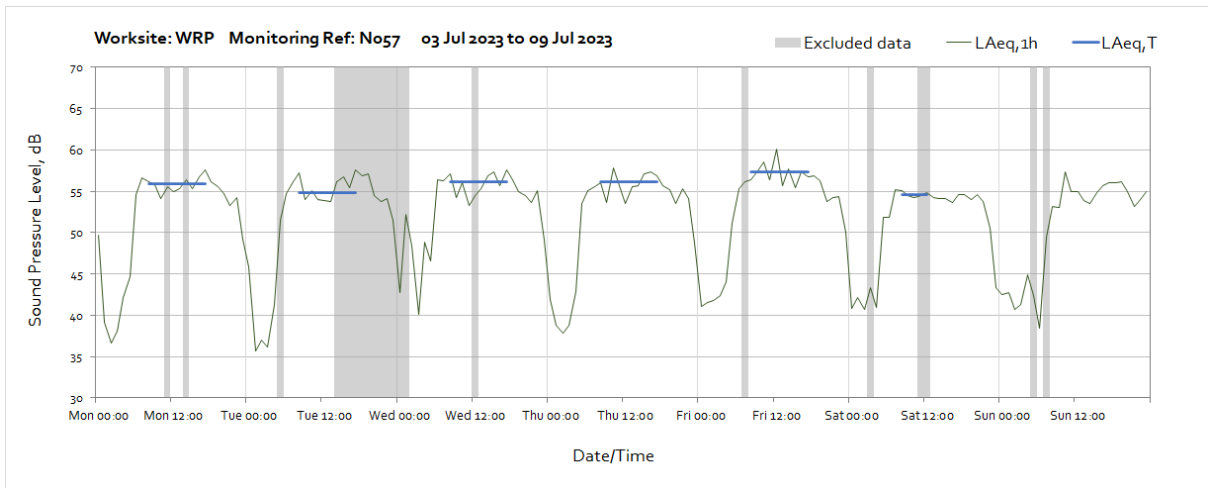
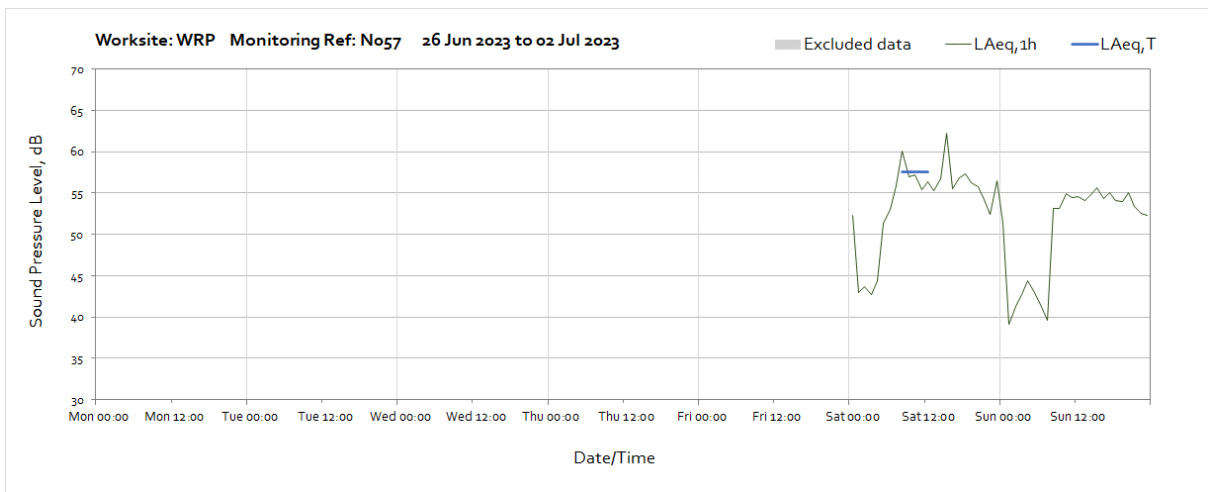
**Worksite: WRP – Monitoring Ref: N056**

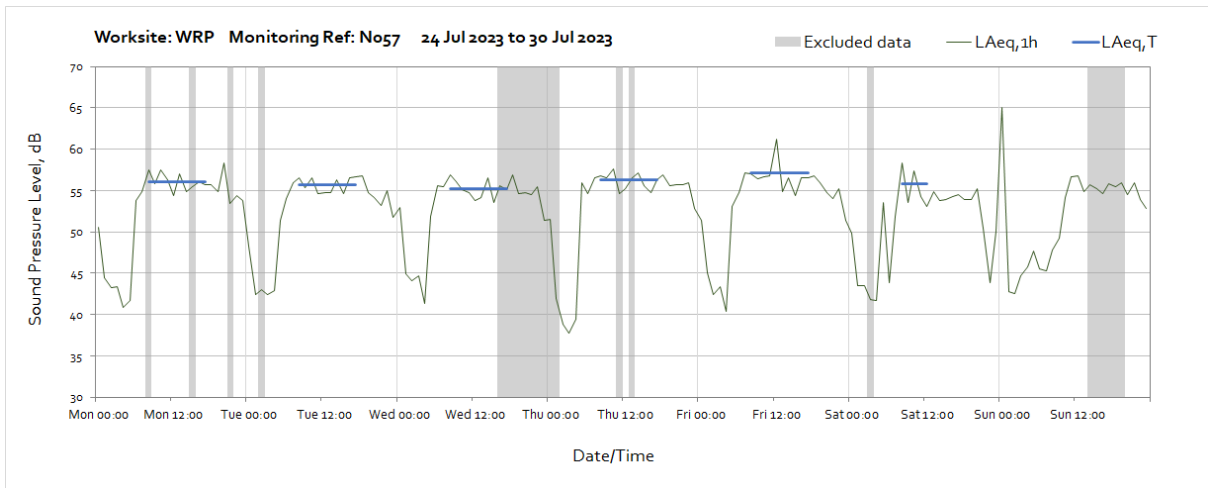
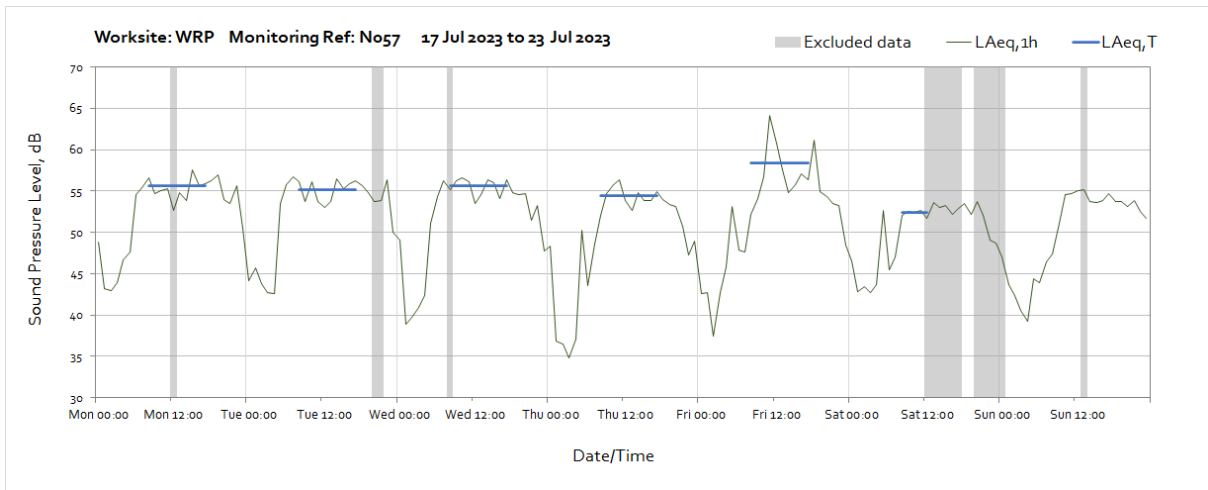
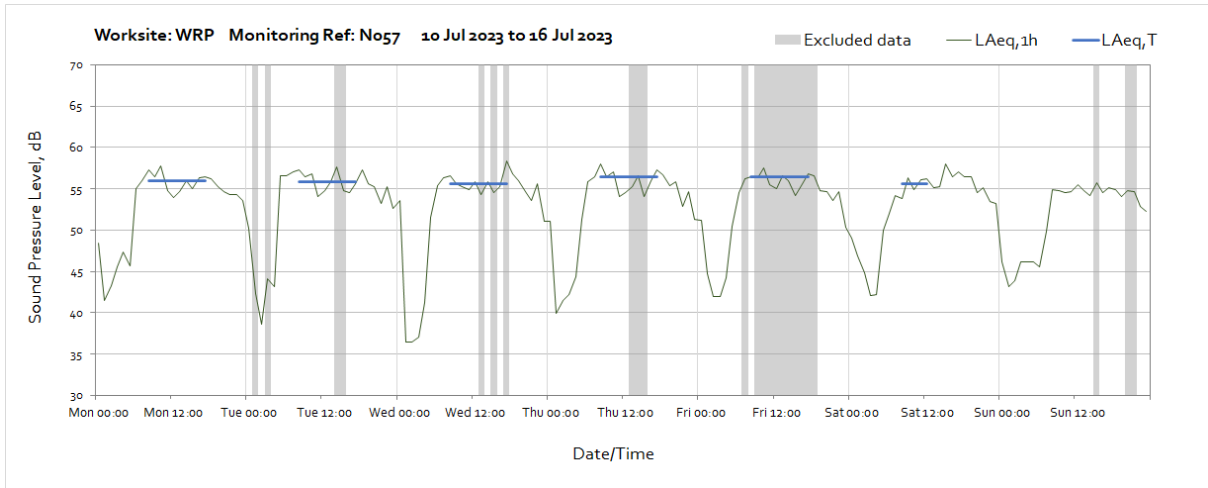


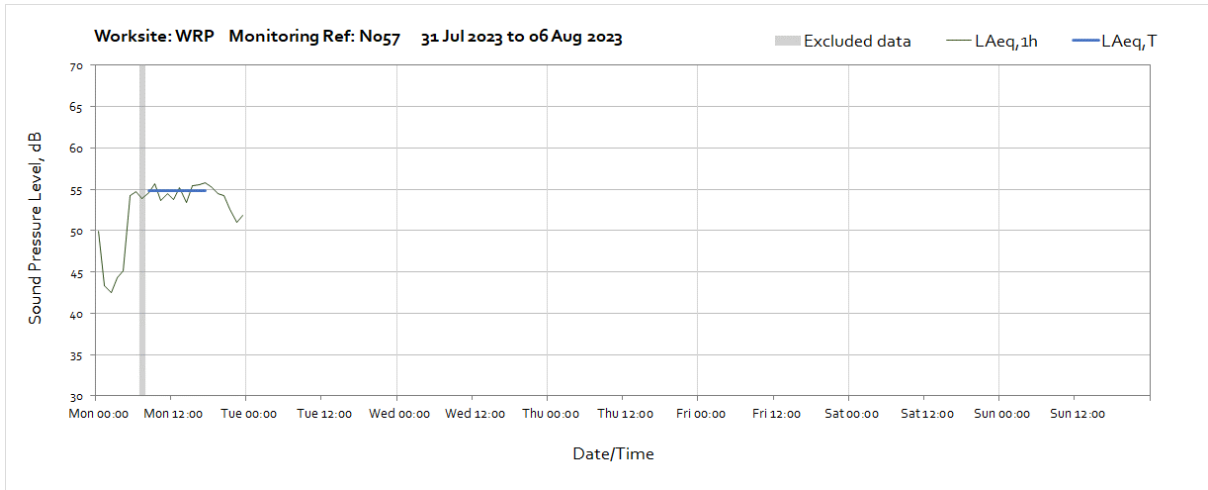




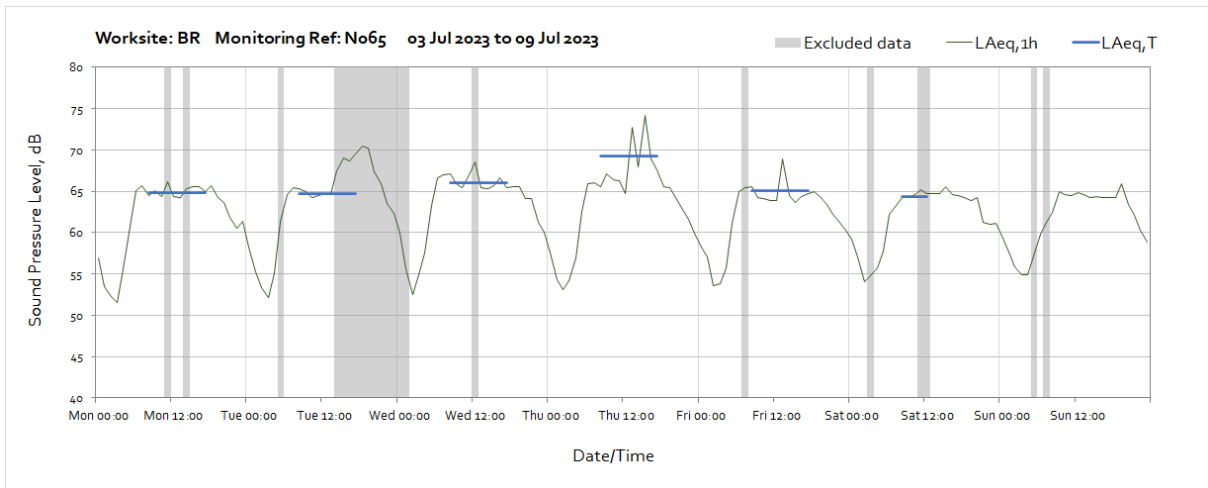
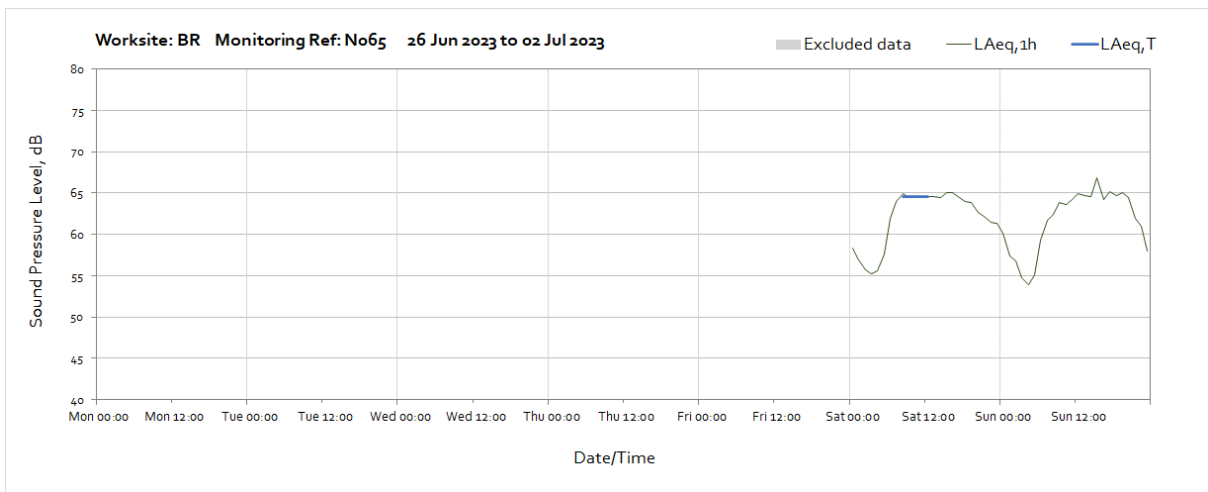
**Worksite: WRP – Monitoring Ref: N057**

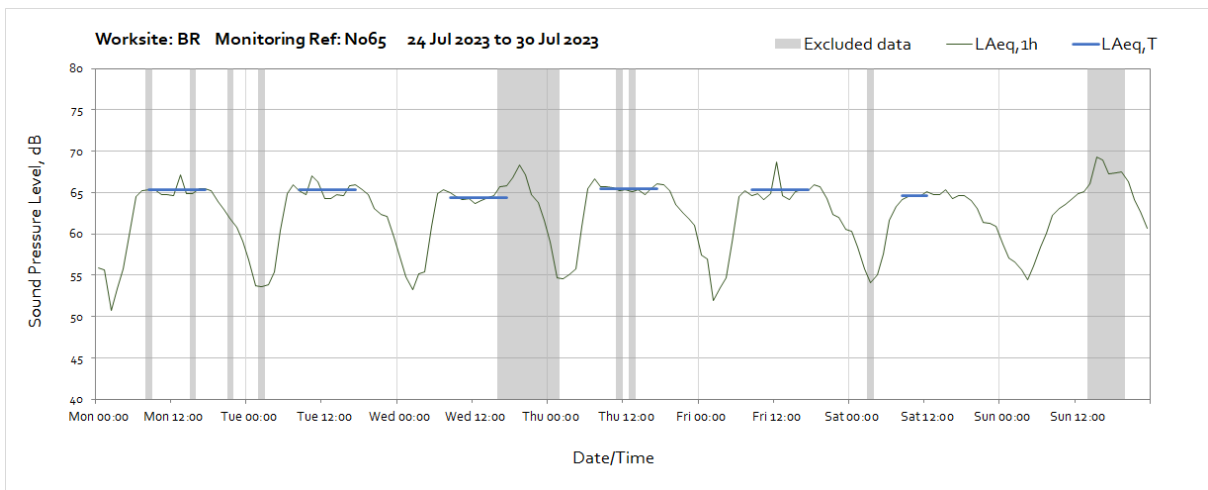
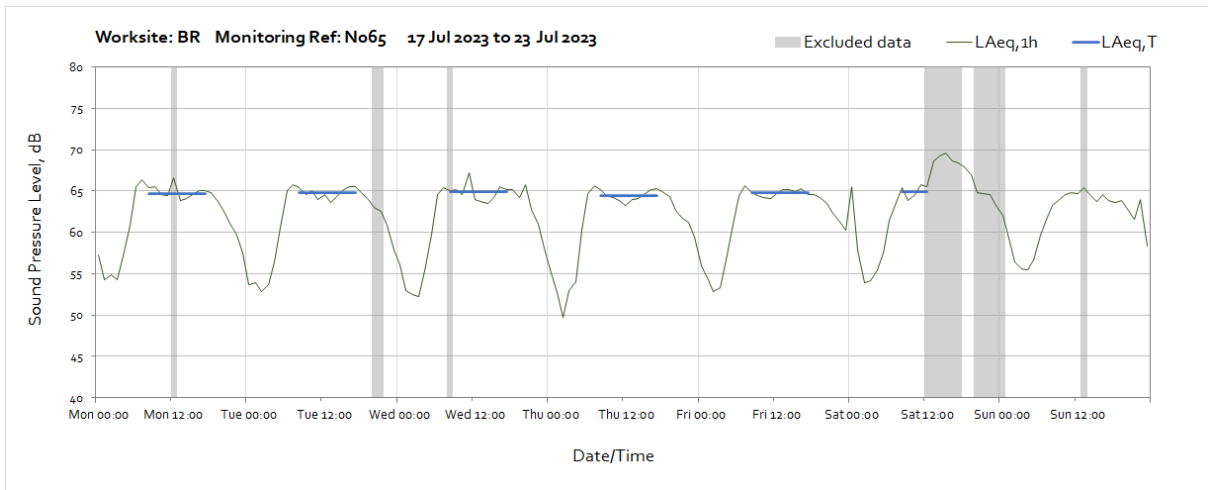
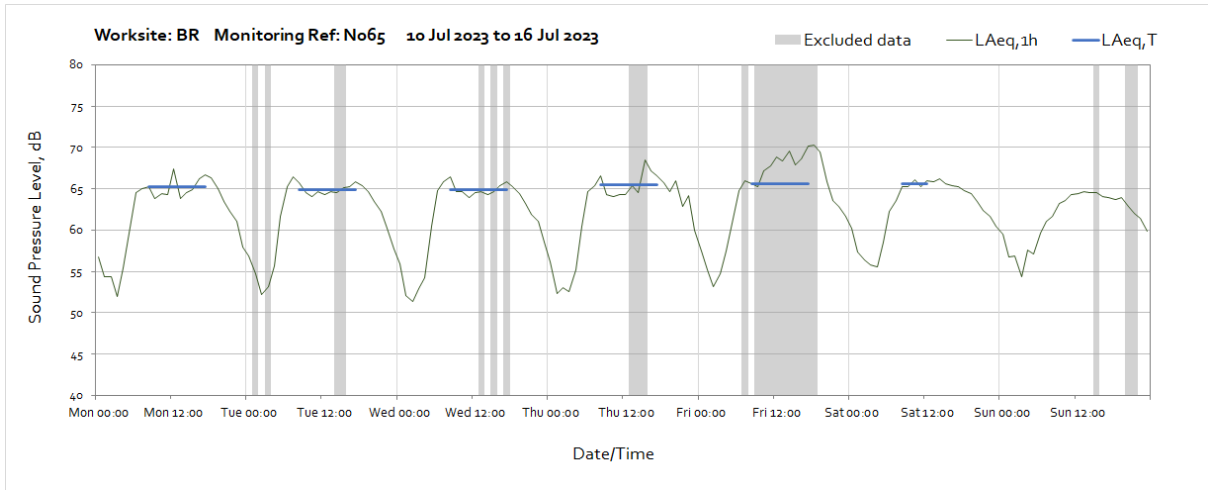


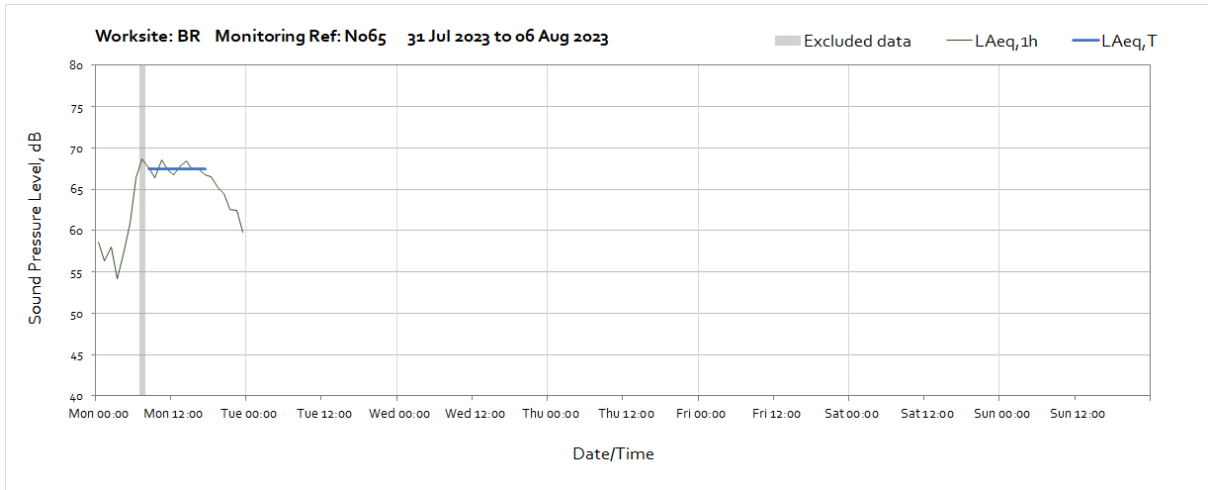




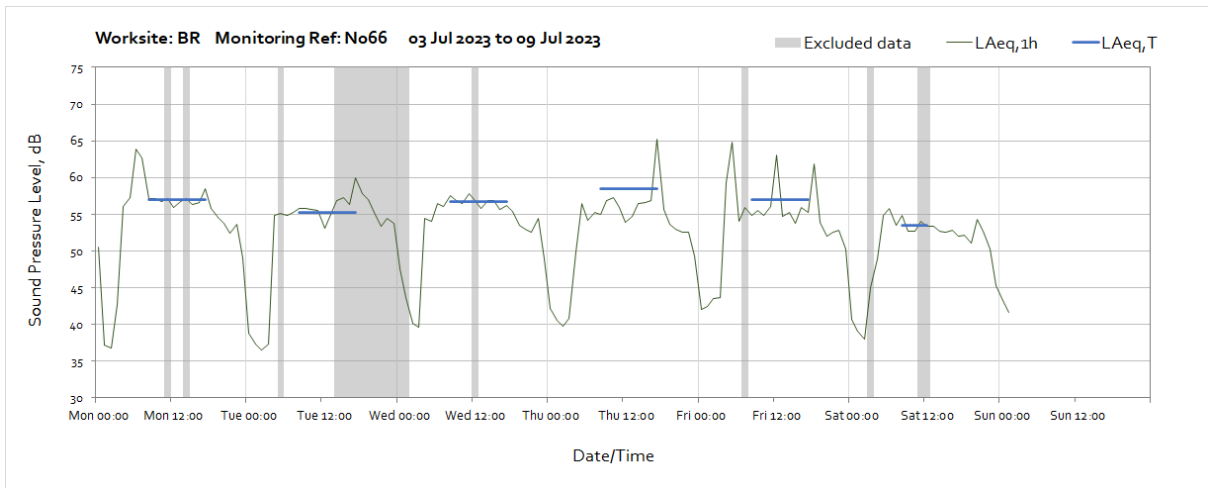
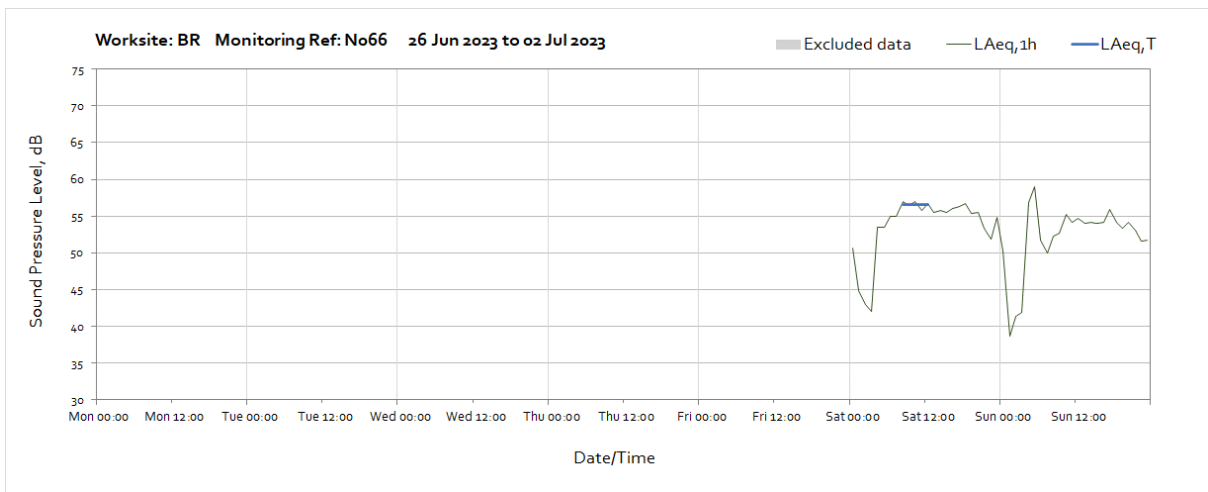
**Worksite: BR – Monitoring Ref: N065**



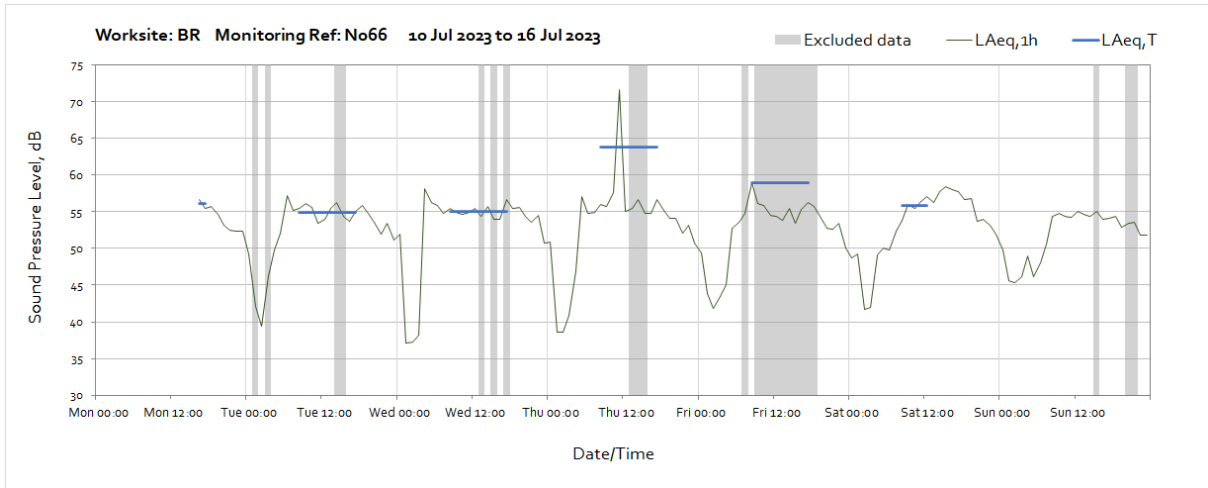




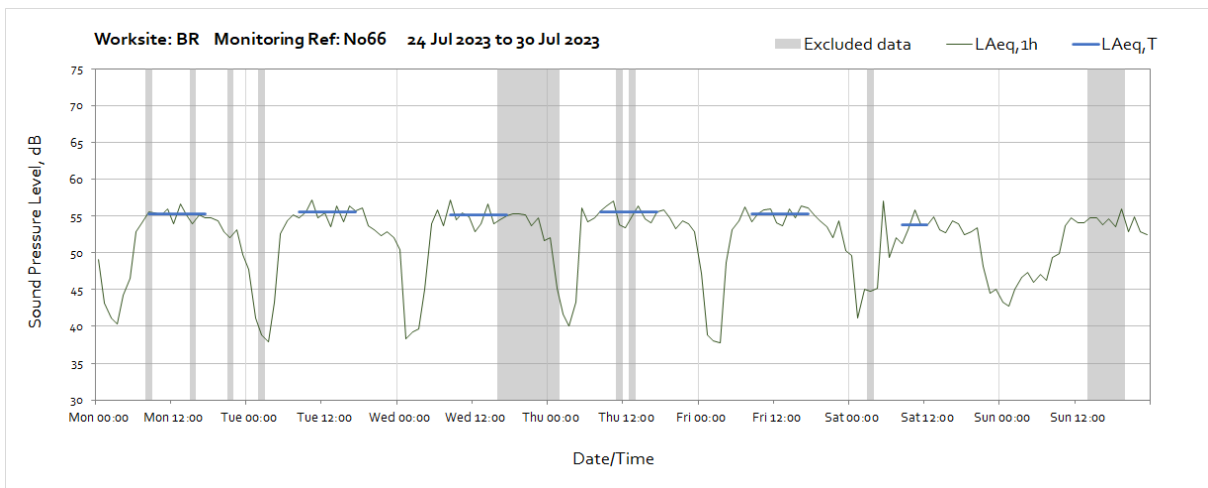
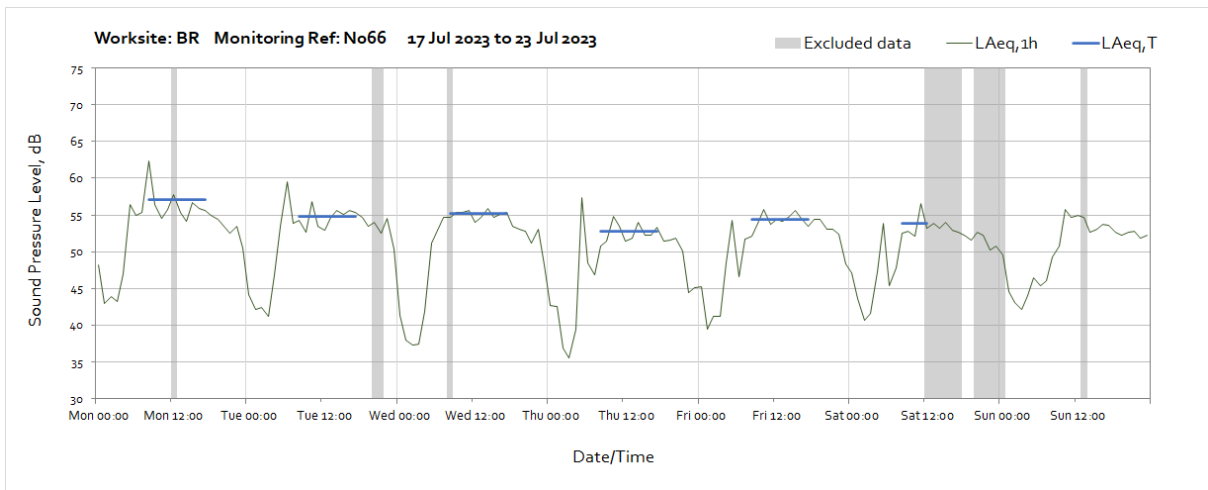
**Worksite: BR – Monitoring Ref: N066**



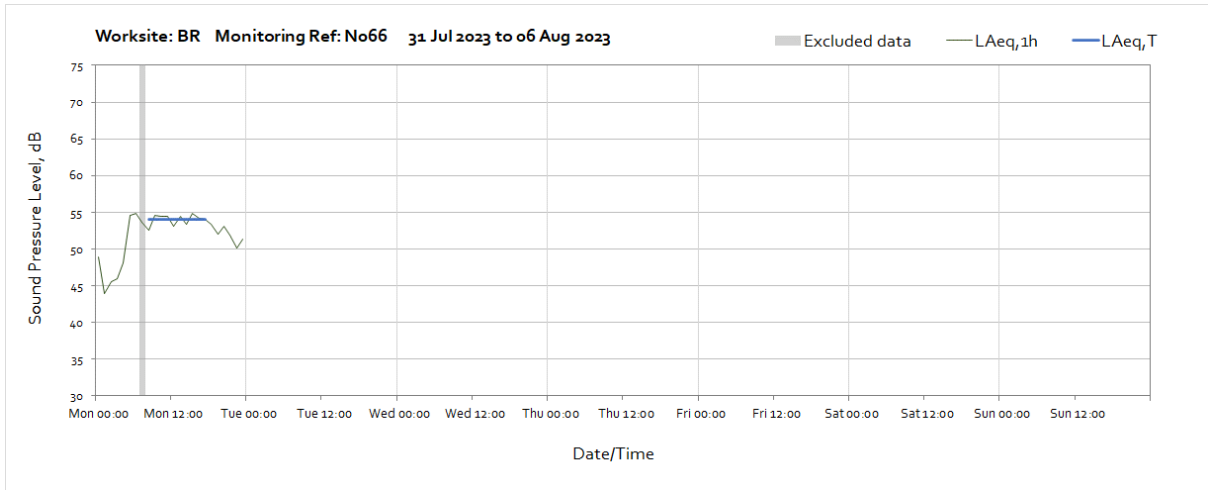
Note: Missing data between 02:00 on Sunday 9<sup>th</sup> July and 15:00 on Monday 10<sup>th</sup> July was due to a monitor's software crash.



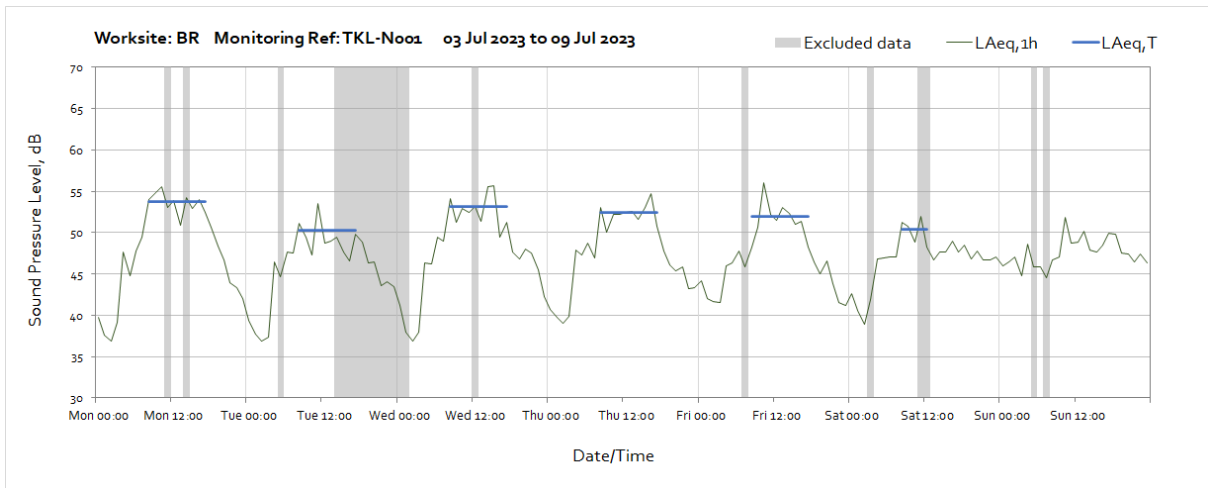
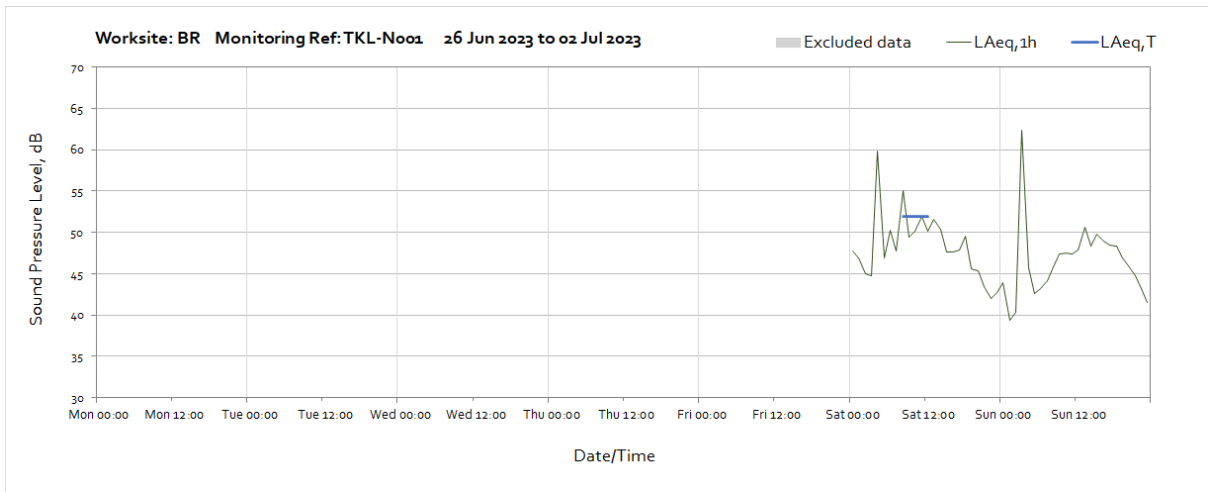
Note: Missing data between 02:00 on Sunday 9<sup>th</sup> July and 15:00 on Monday 10<sup>th</sup> July was due to a monitor's software crush.

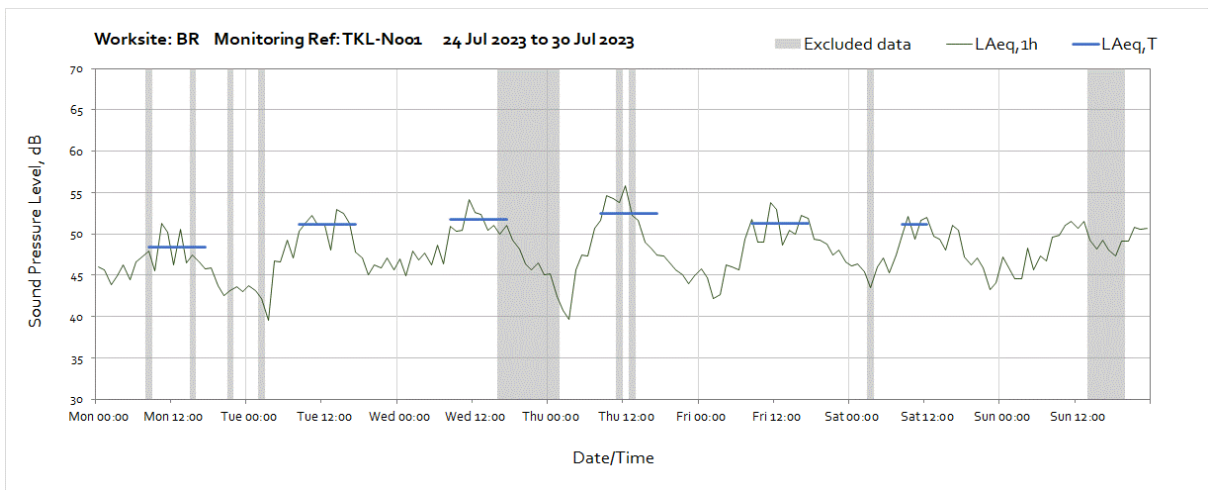
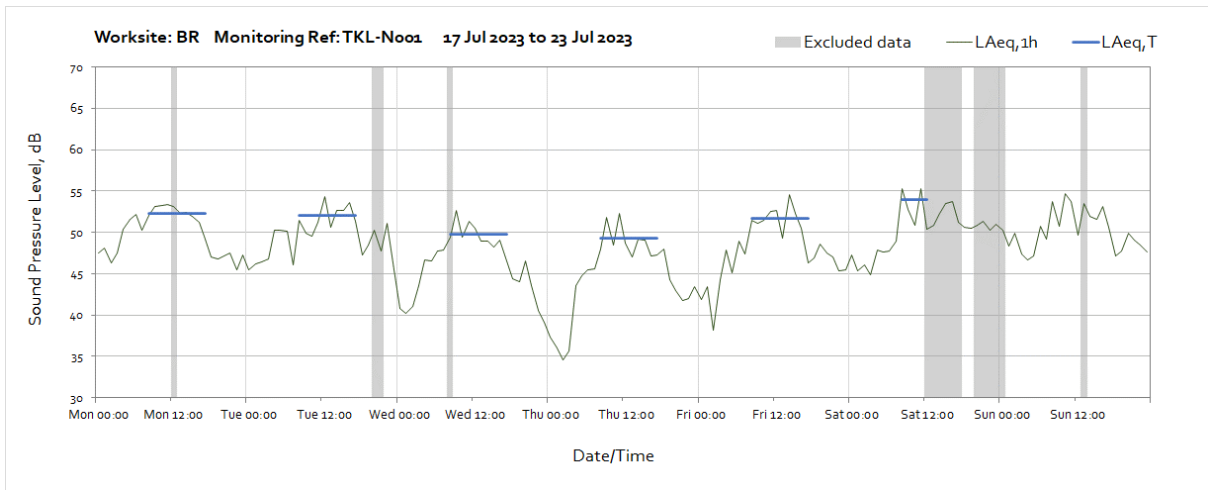
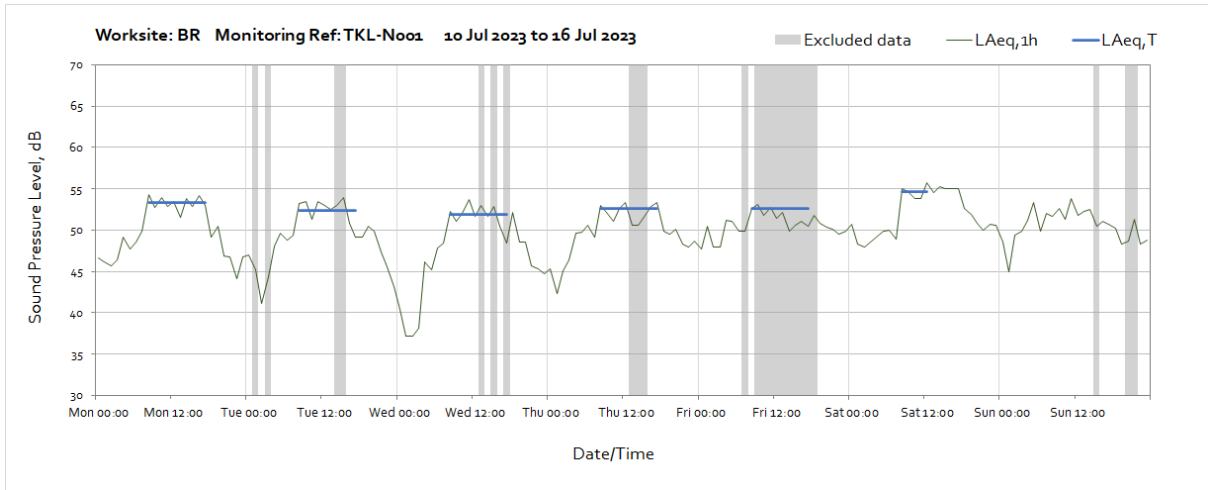


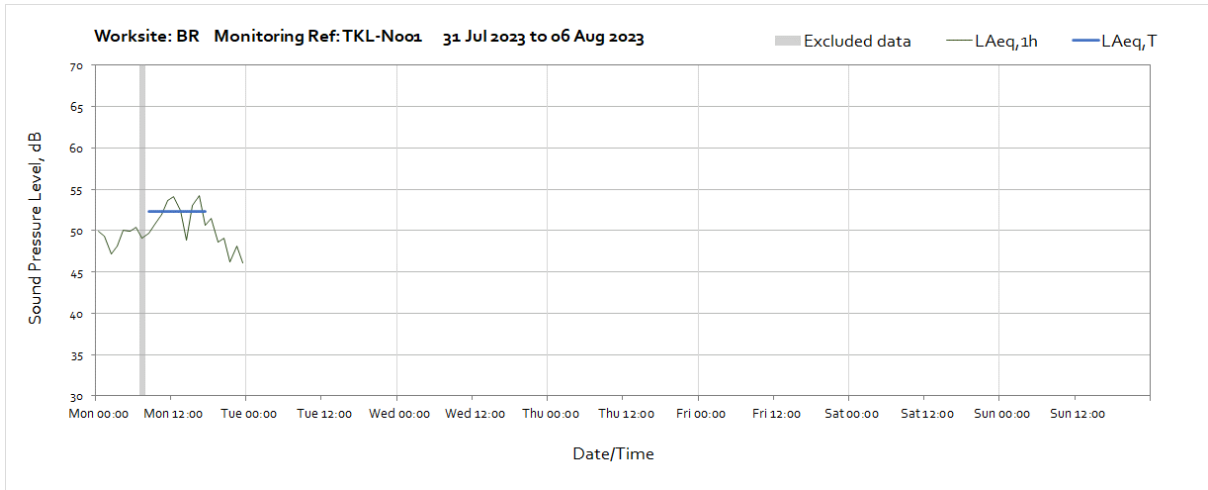




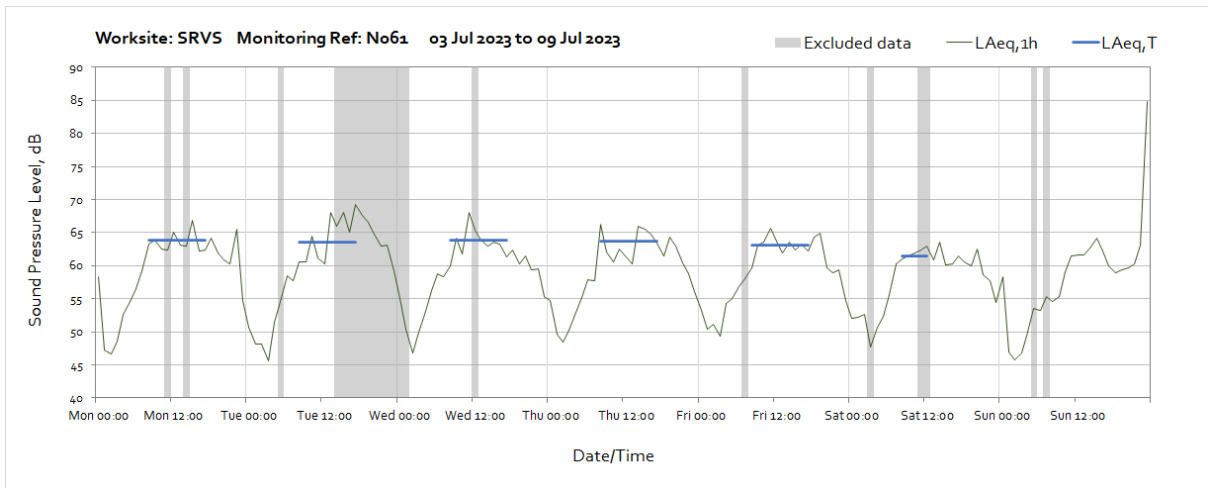
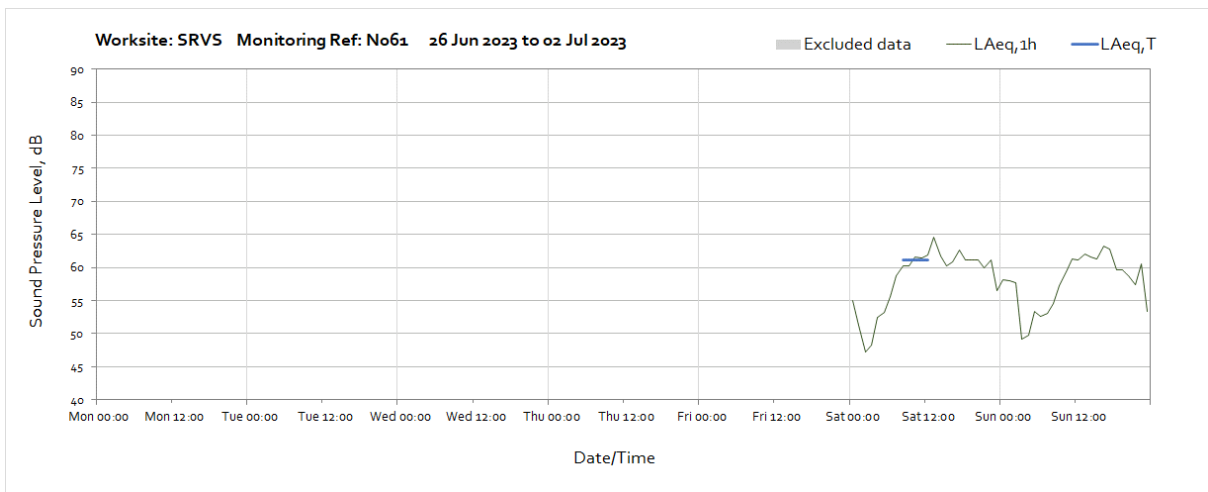
**Worksite: BR – Monitoring Ref: TKL-N001**

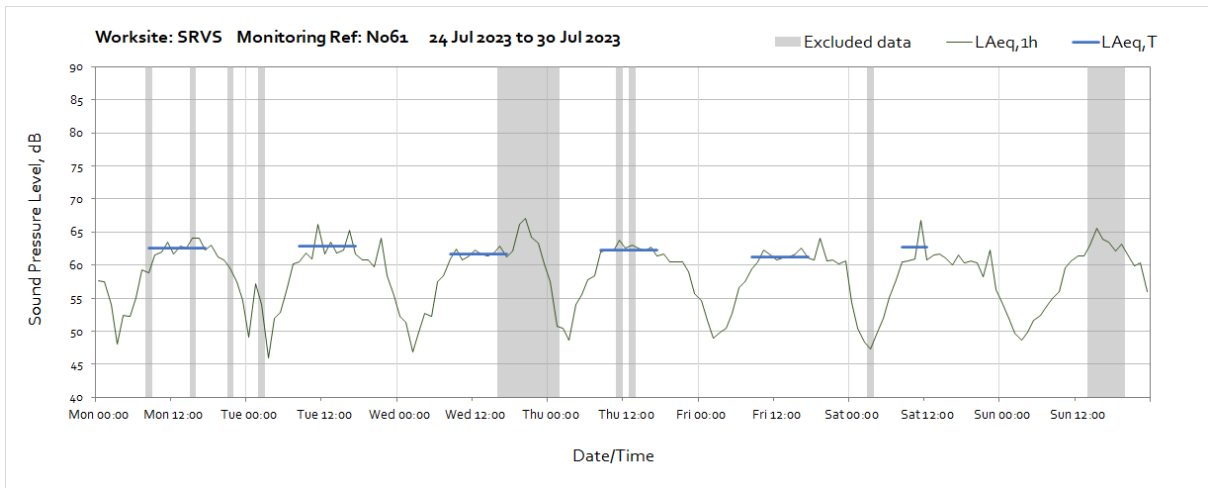
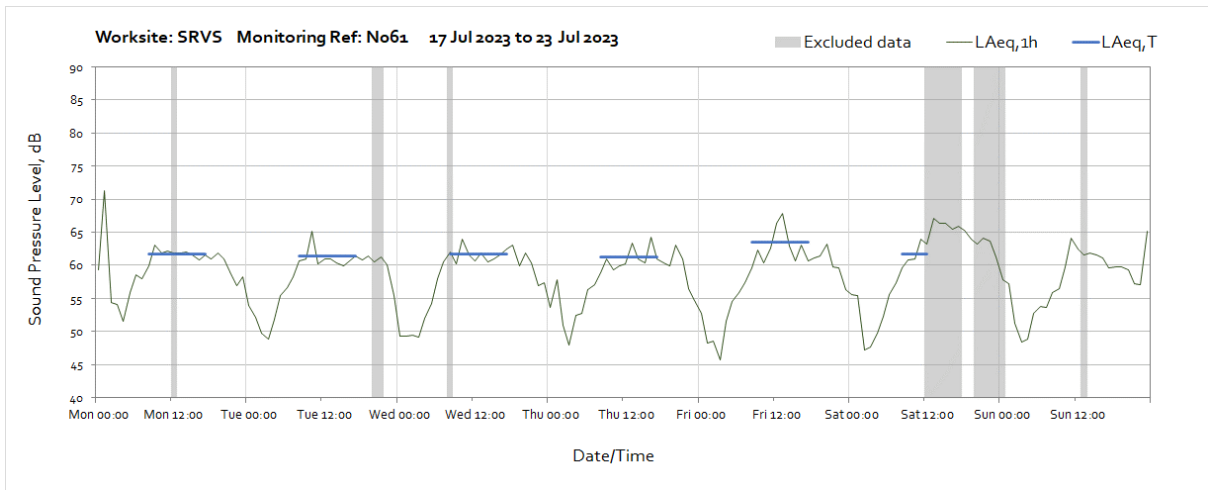
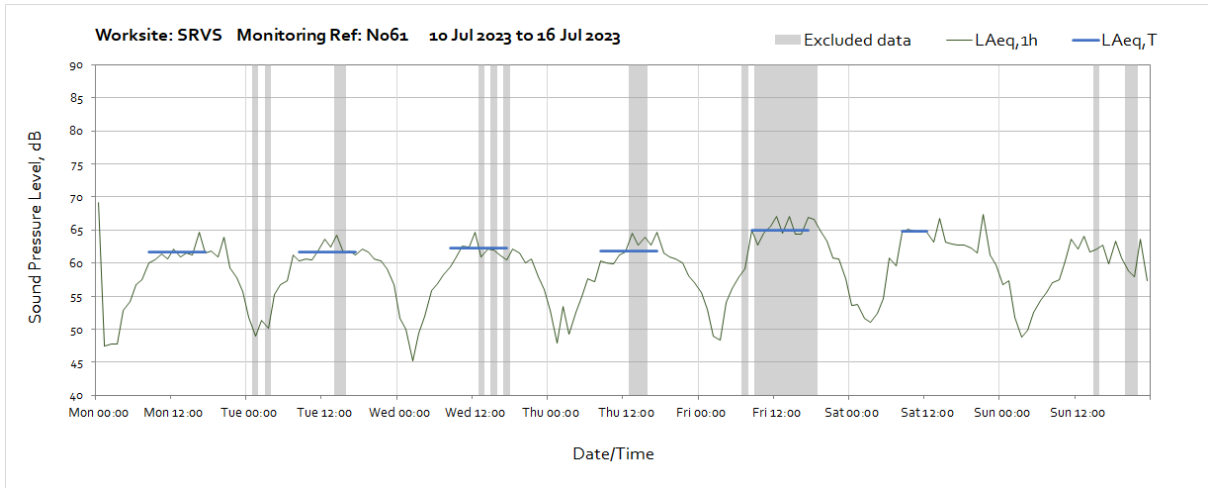


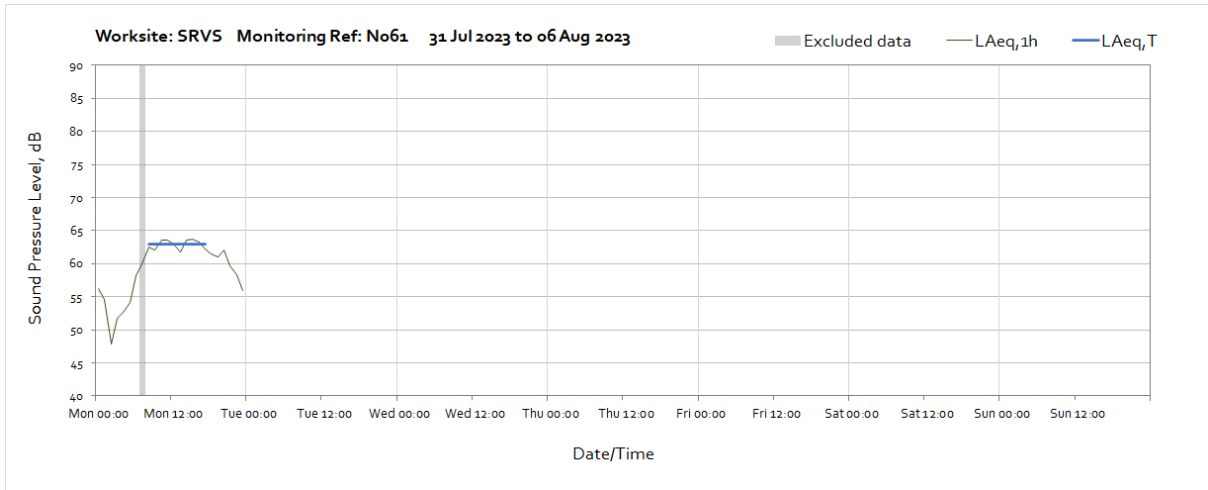




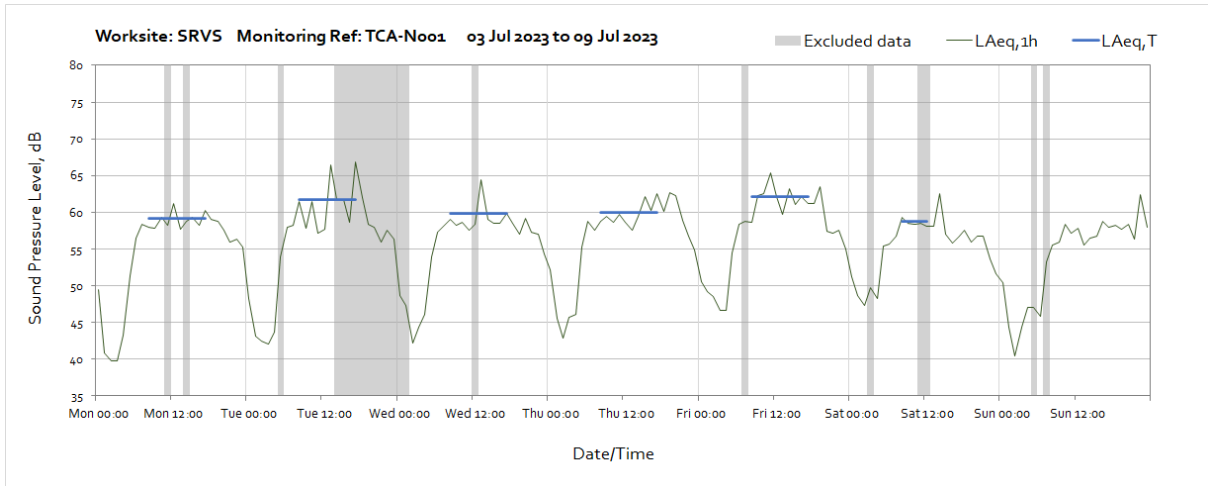
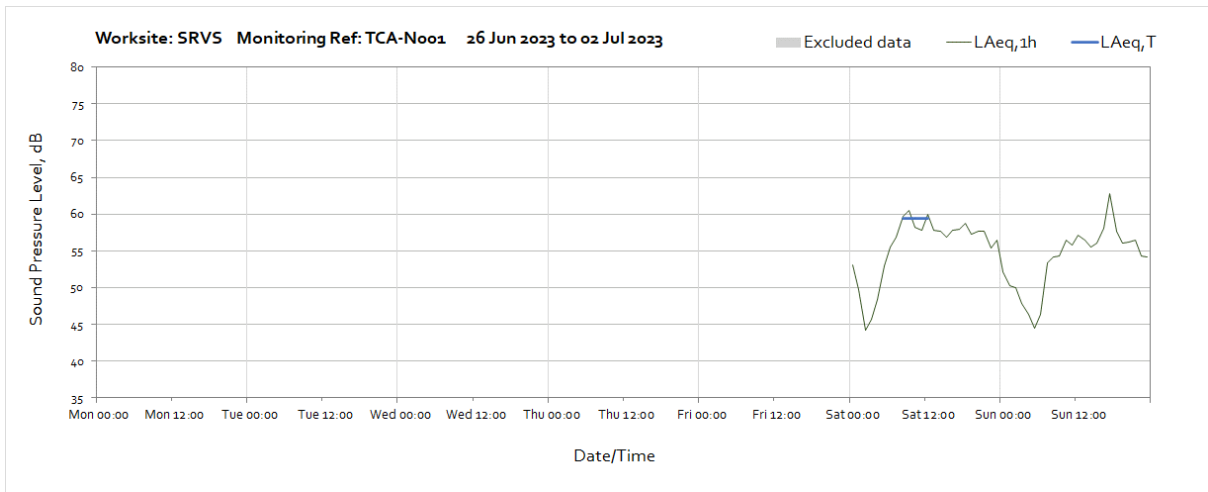
**Worksite: SRVS – Monitoring Ref: N061**

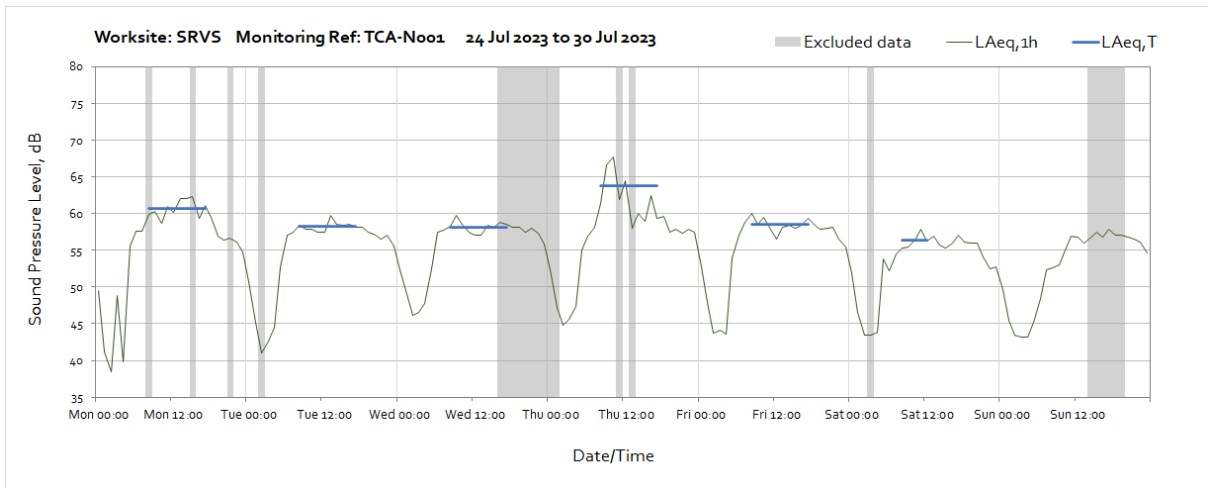
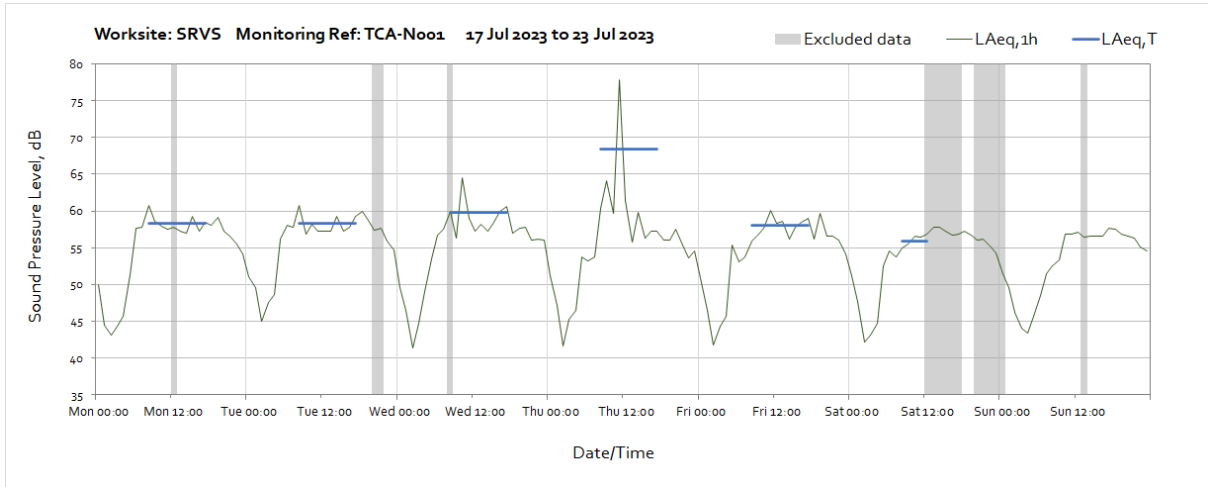
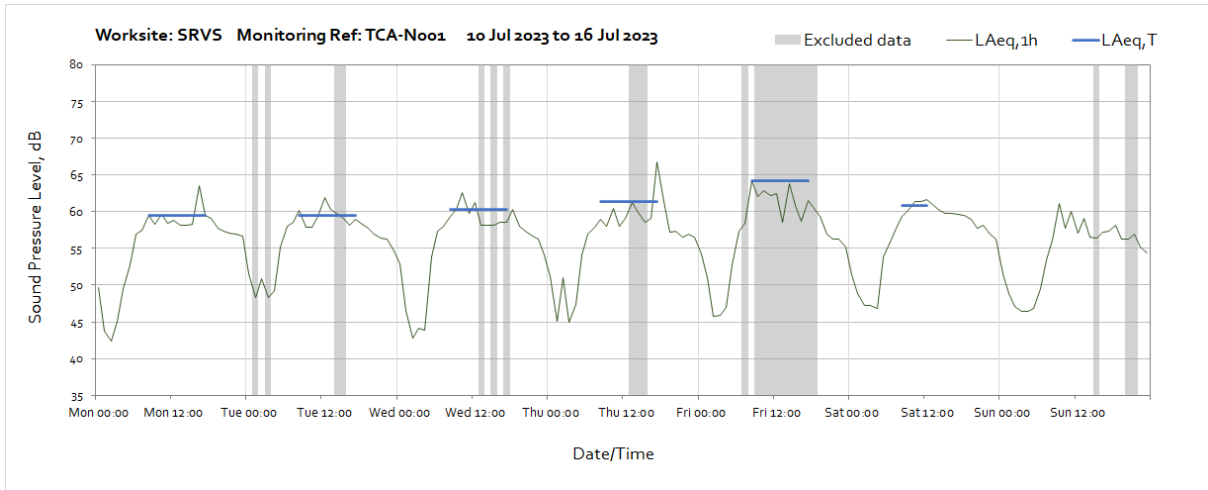


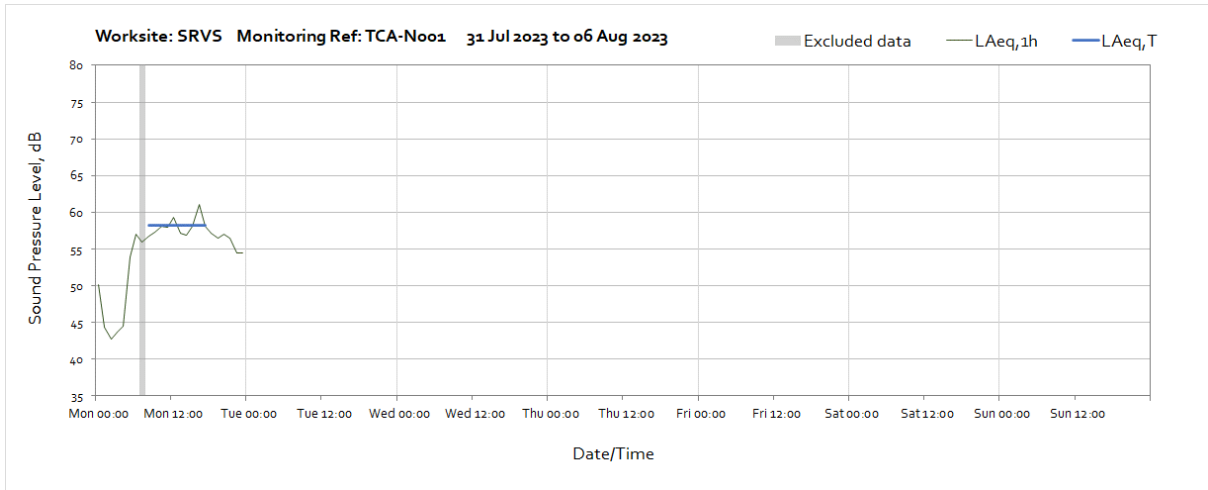




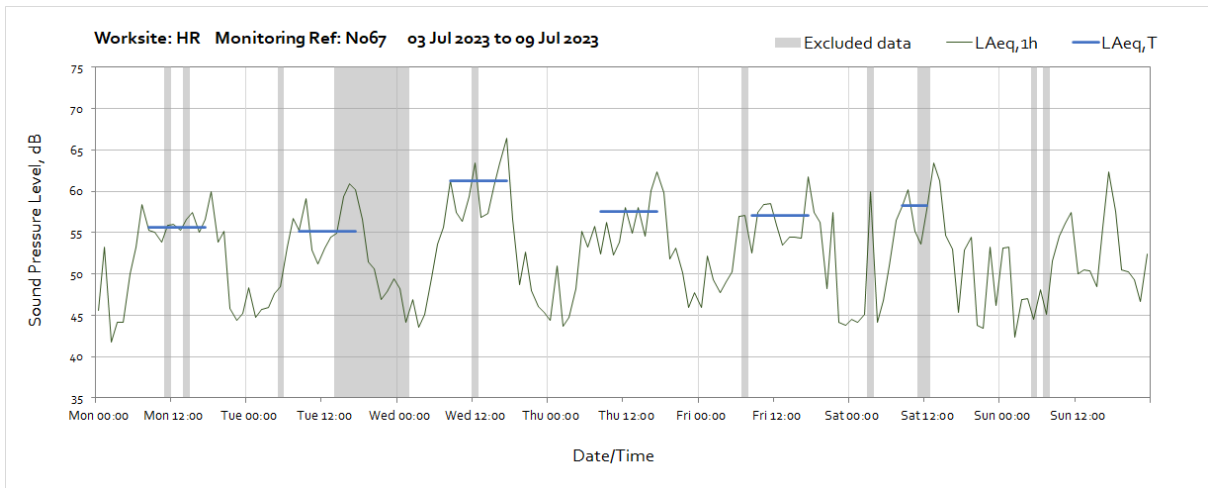
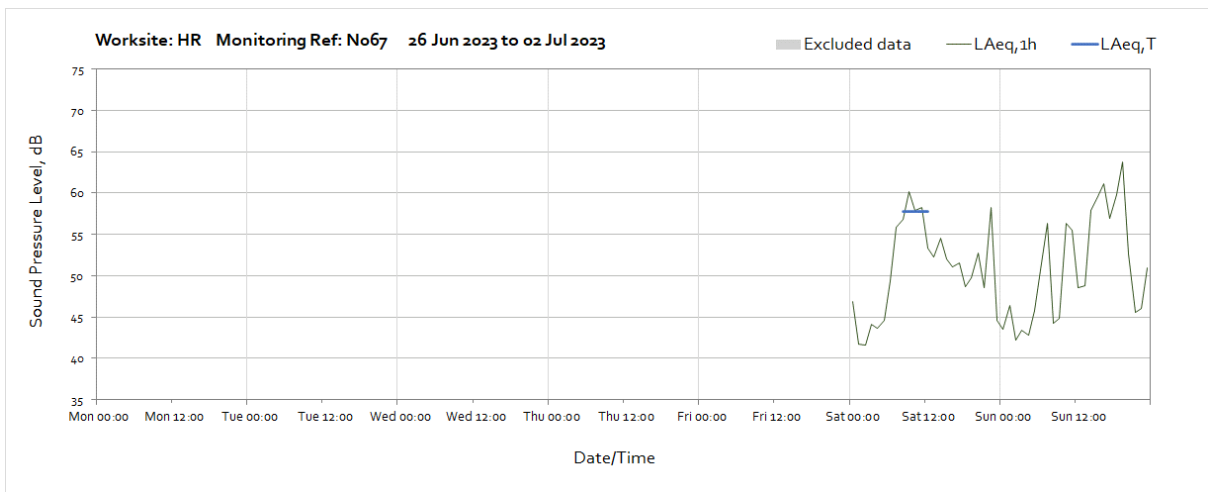
**Worksite: SRVS – Monitoring Ref: TCA-N001**

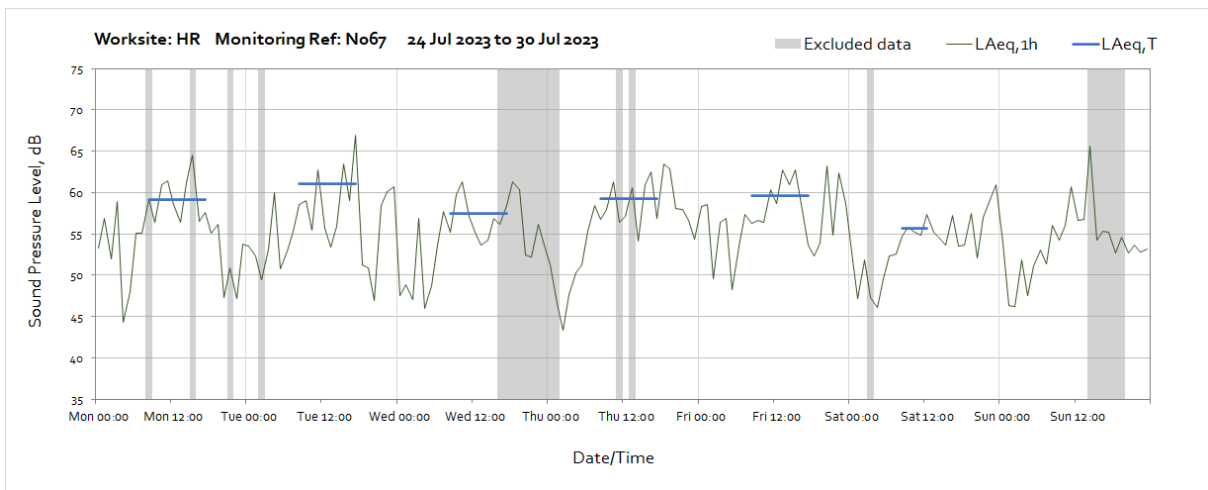
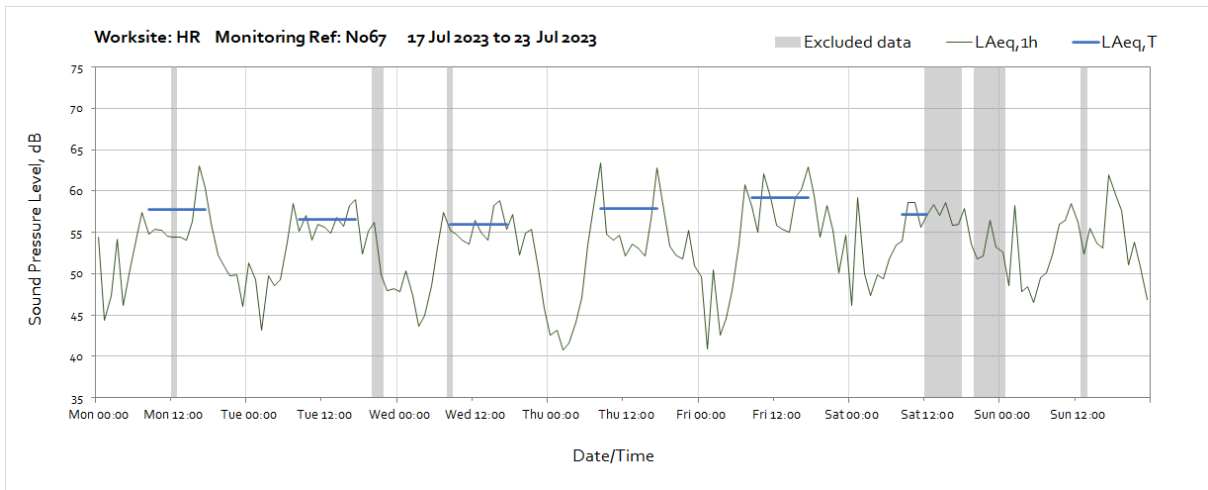
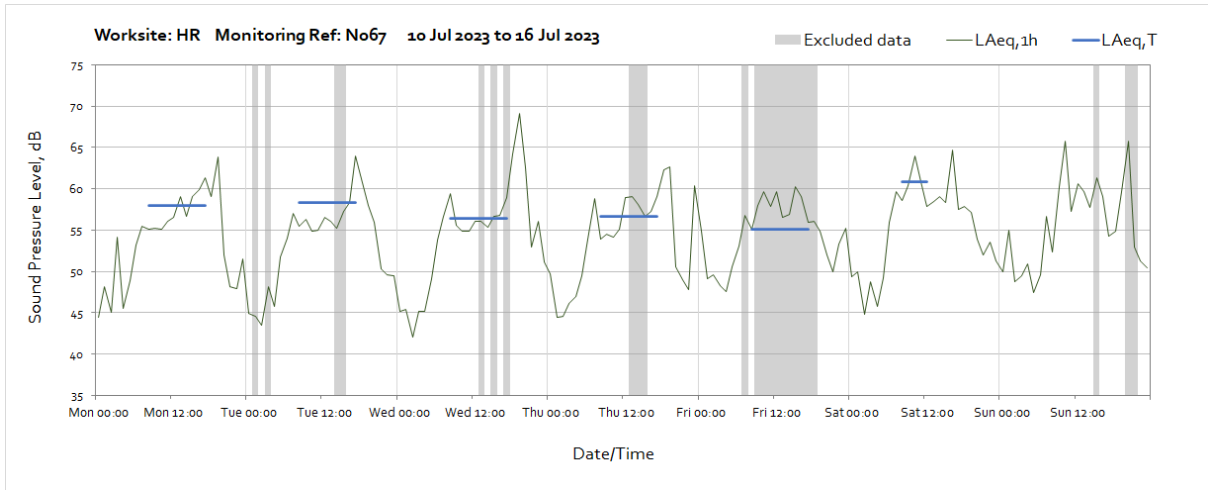




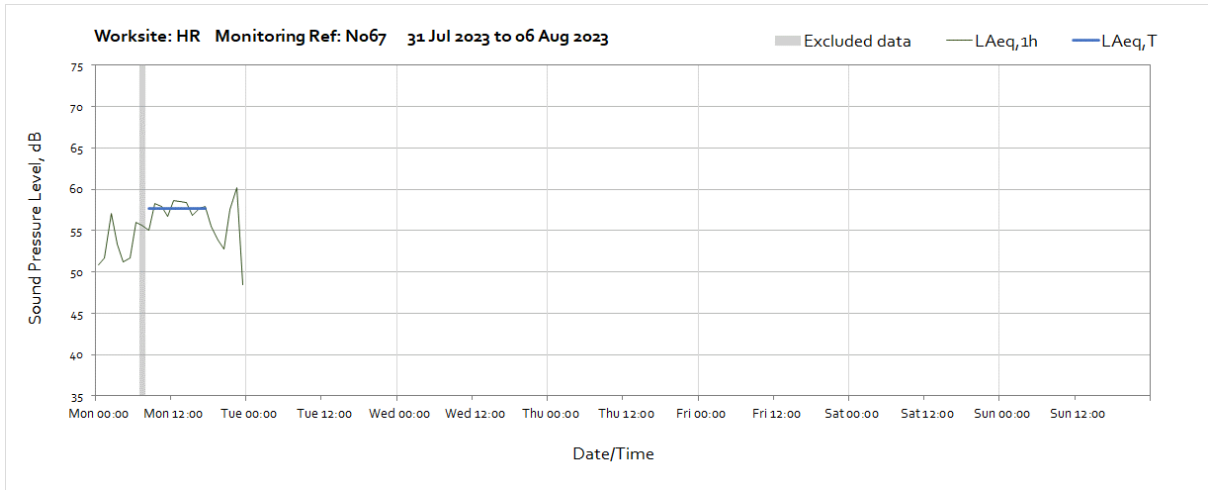


**Worksite: HR - Monitoring Ref: N067**

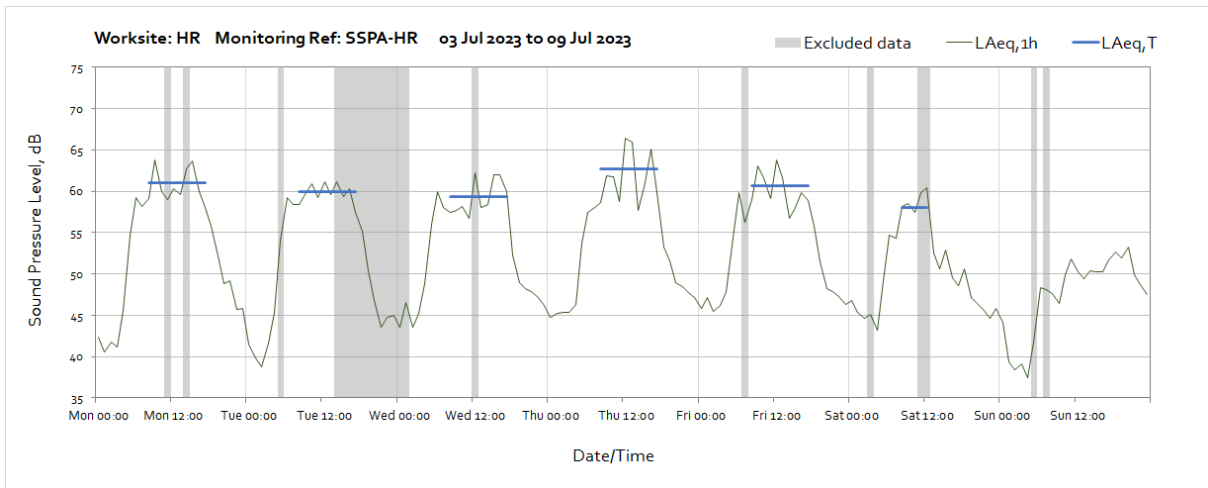
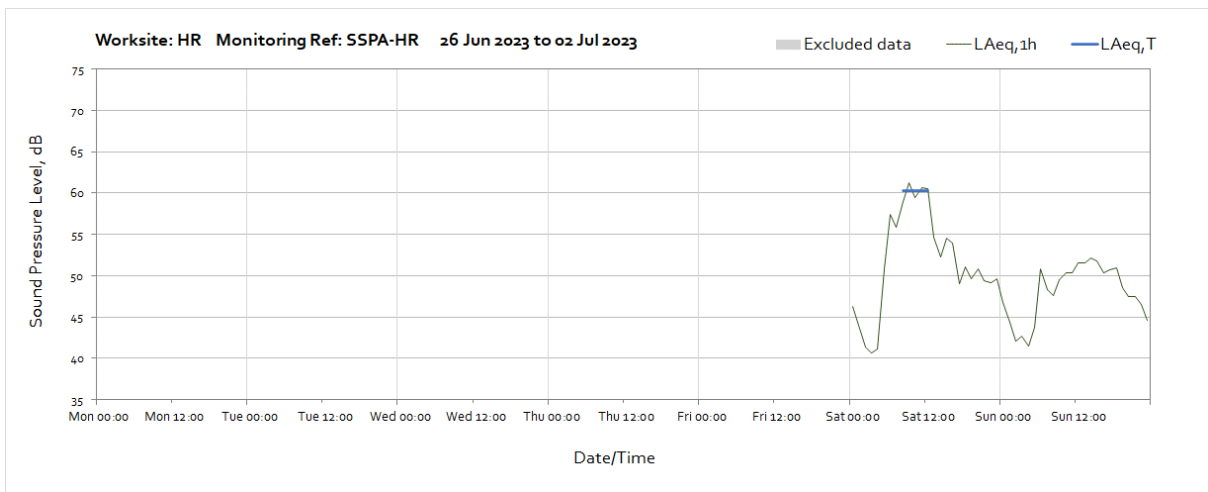


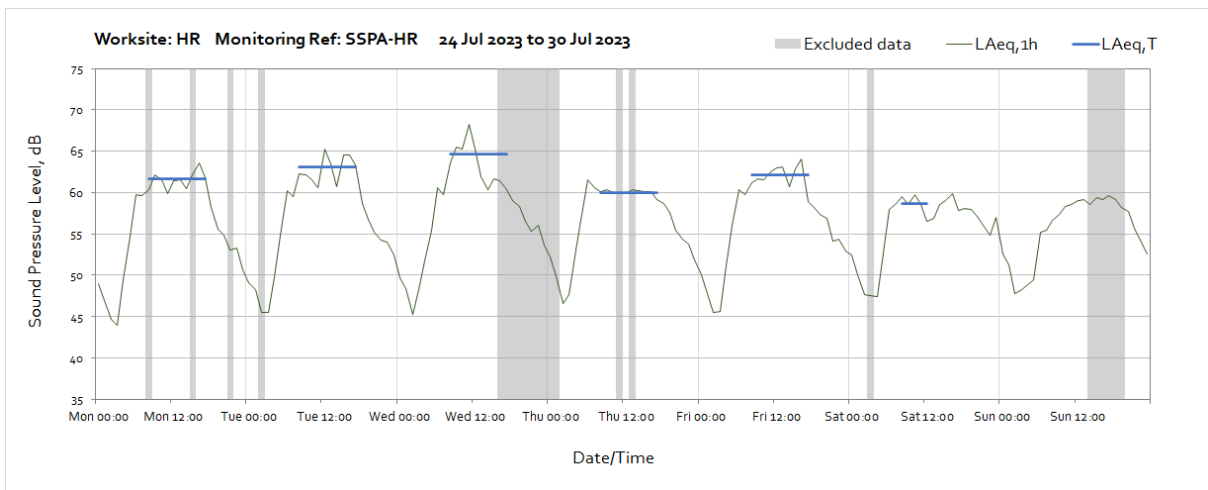
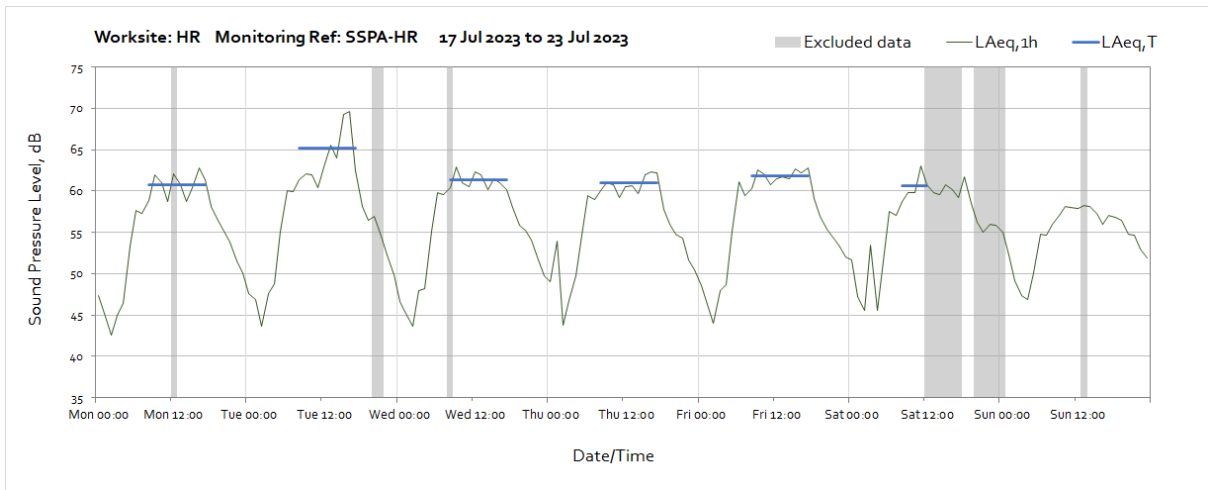
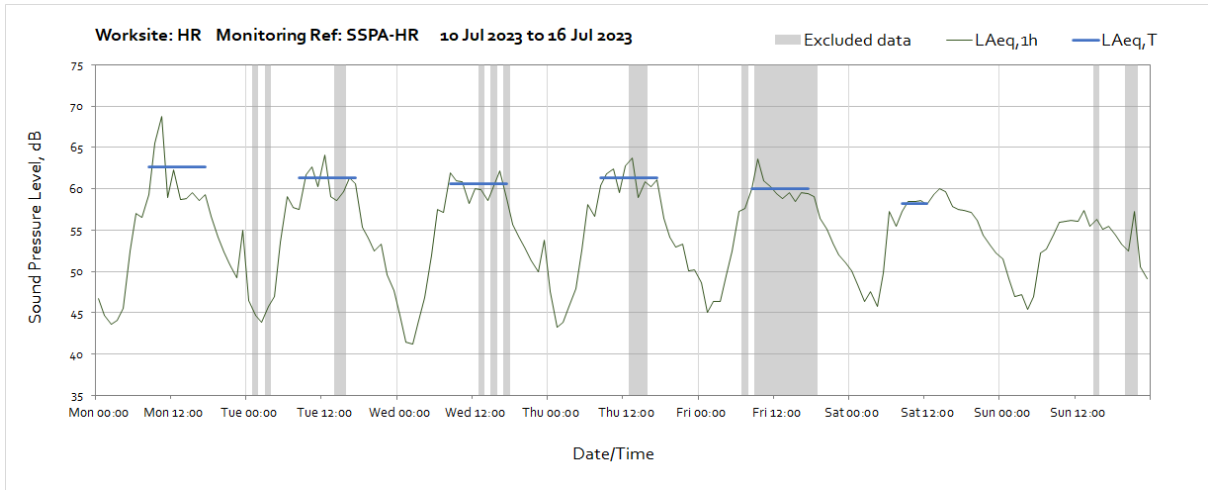


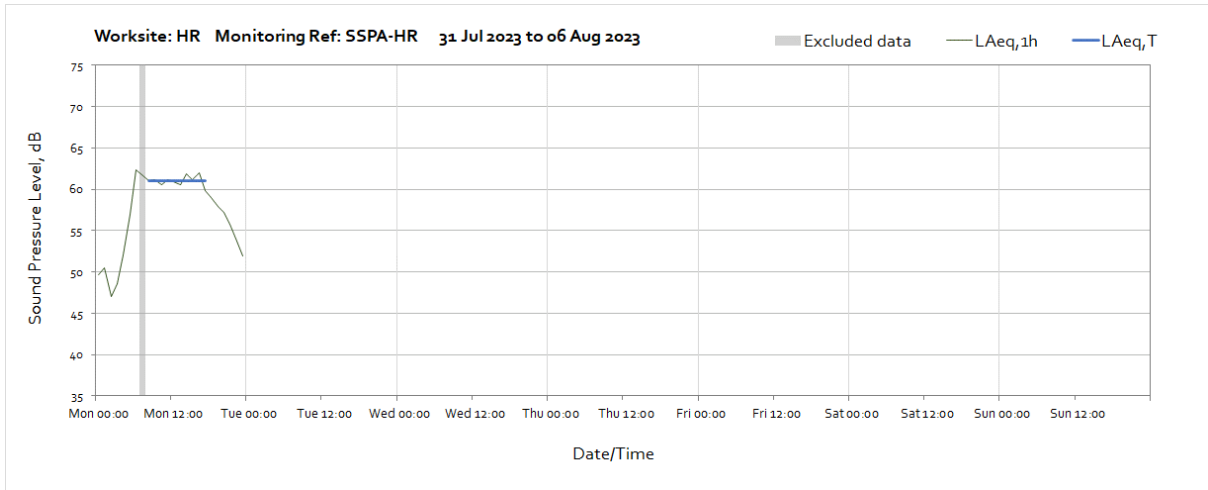




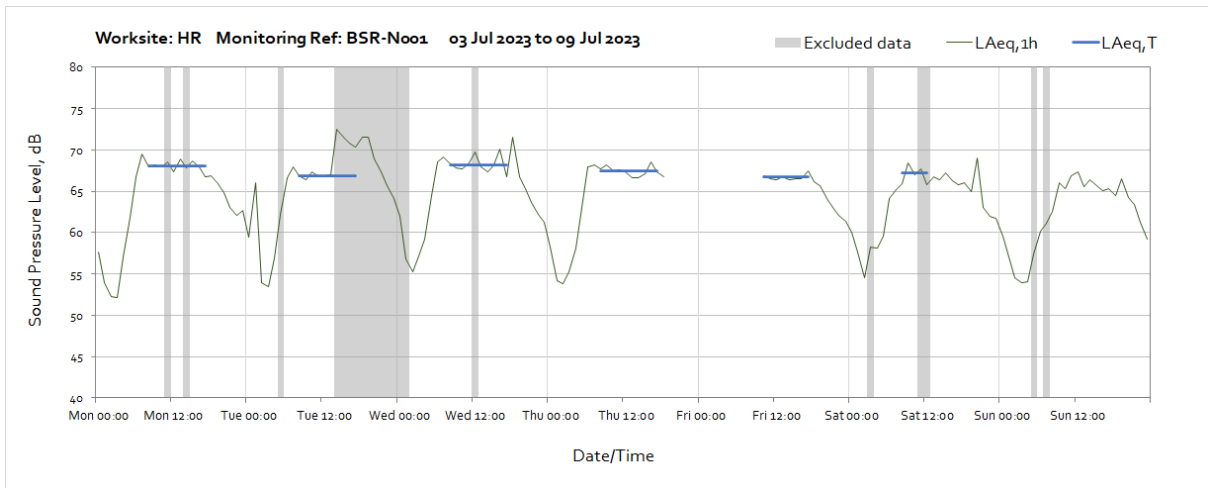
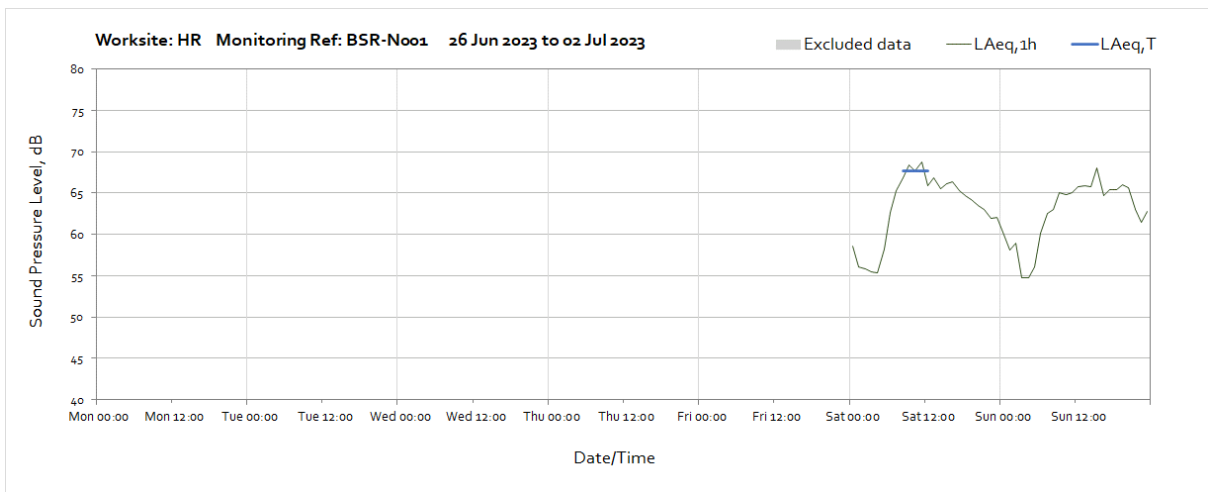
**Worksite: HR - Monitoring Ref: SSPA-HR**



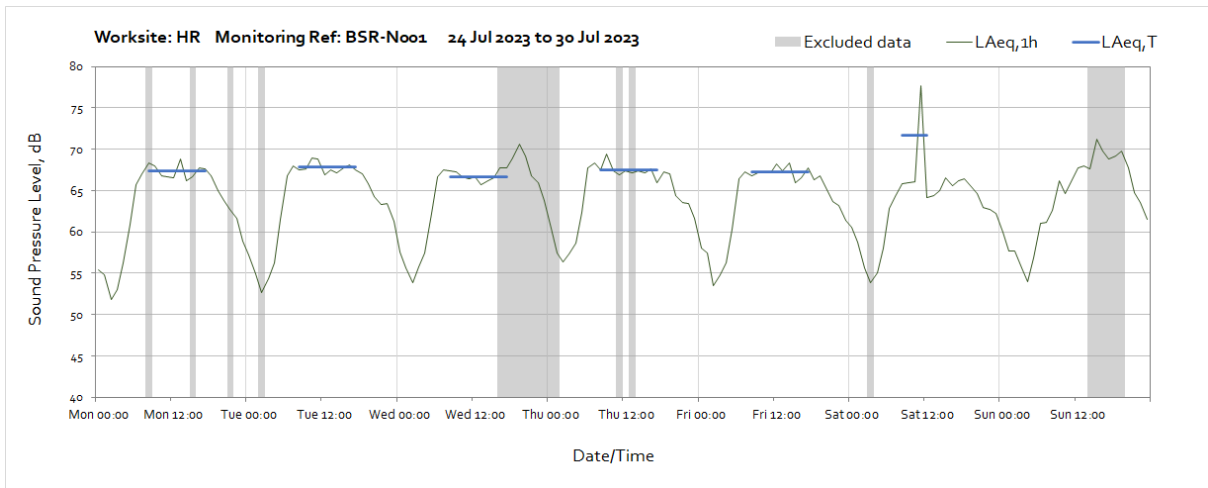
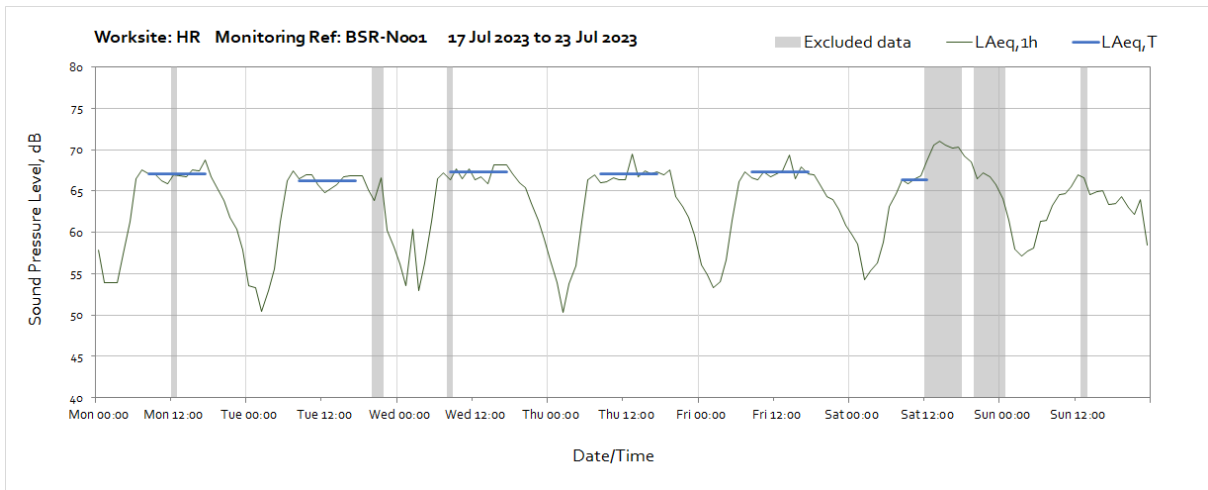
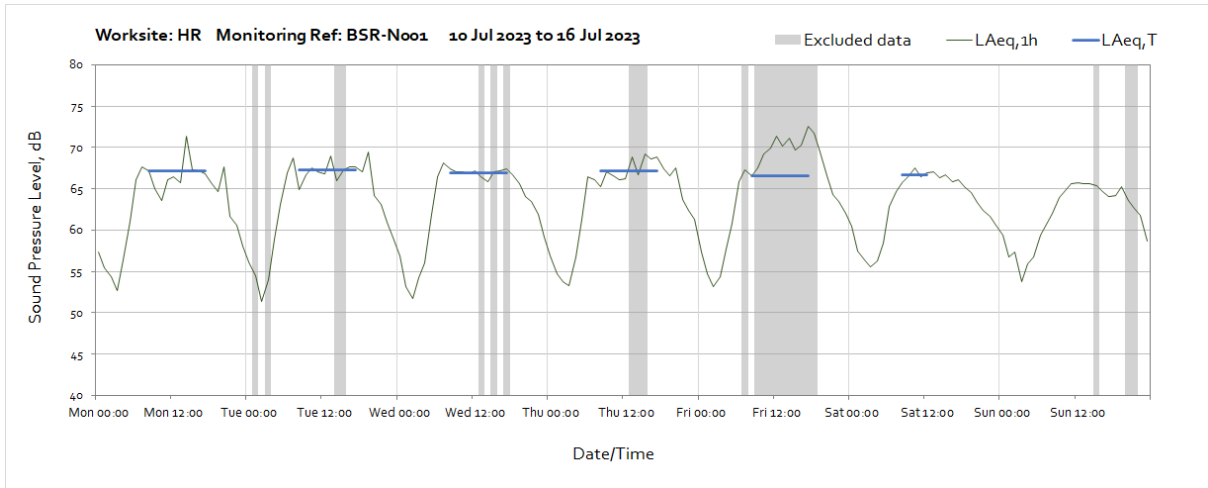


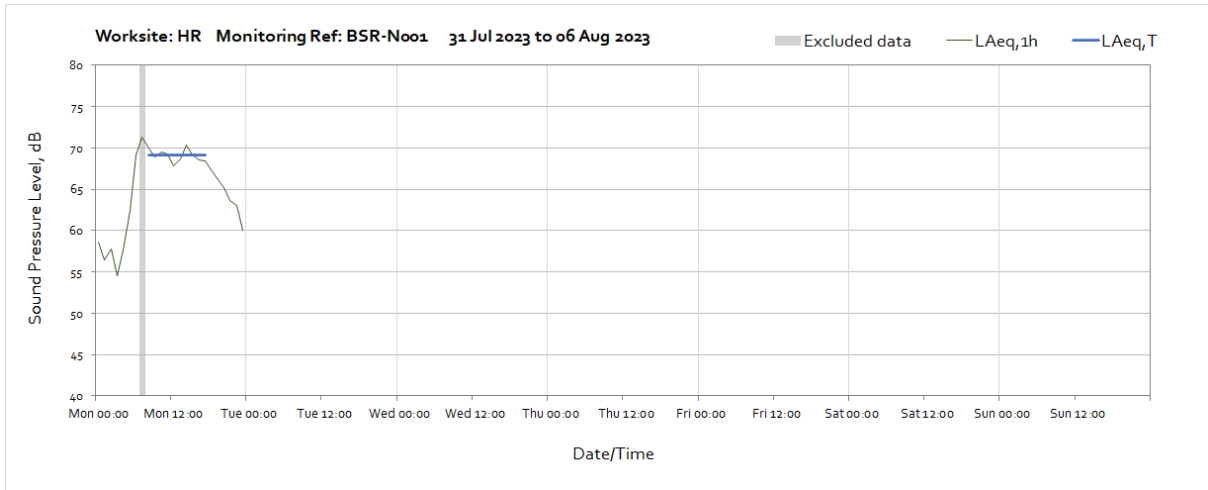


**Worksite: HR - Monitoring Ref: BSR-N001**

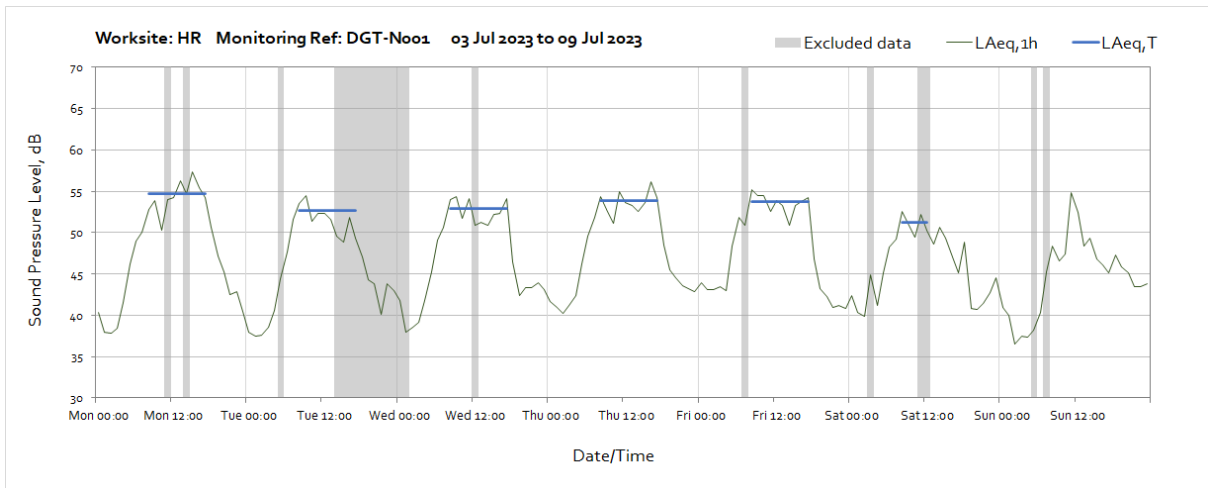
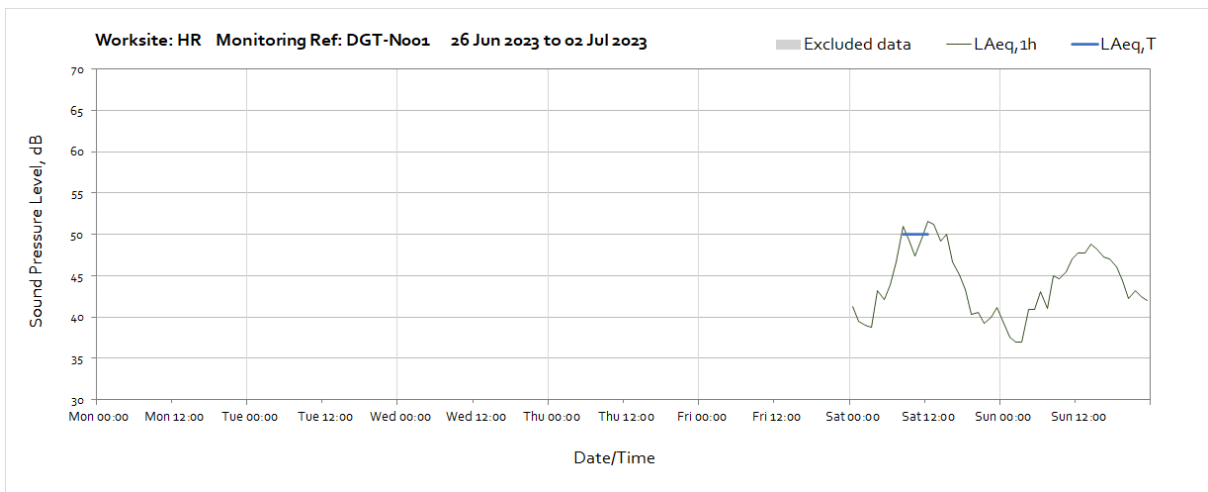


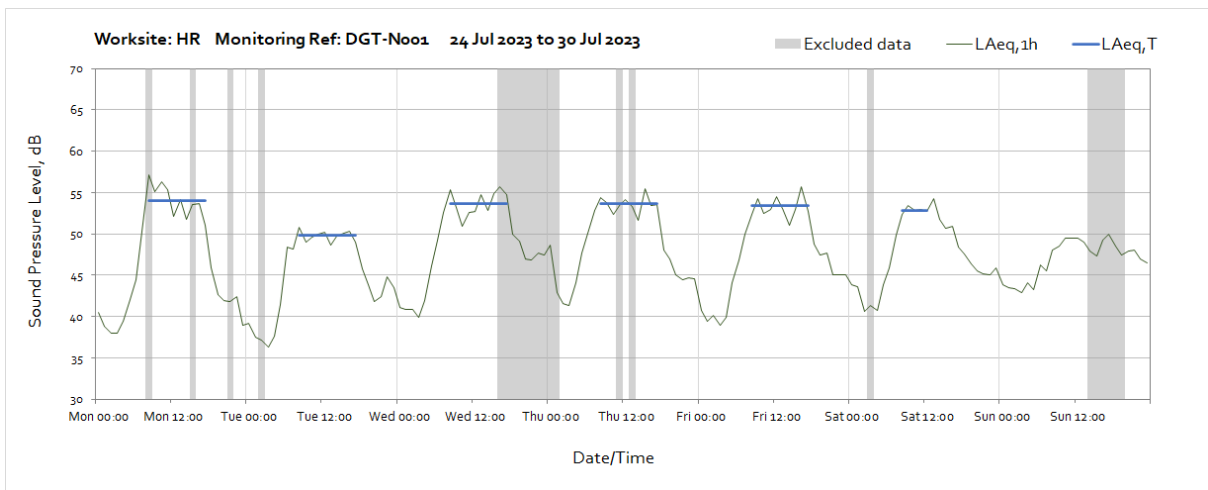
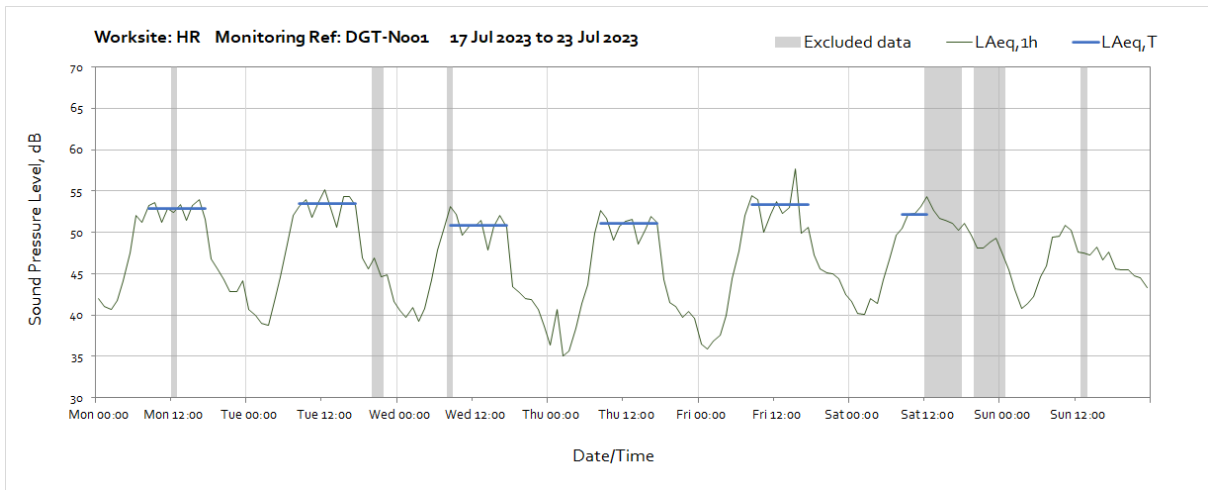
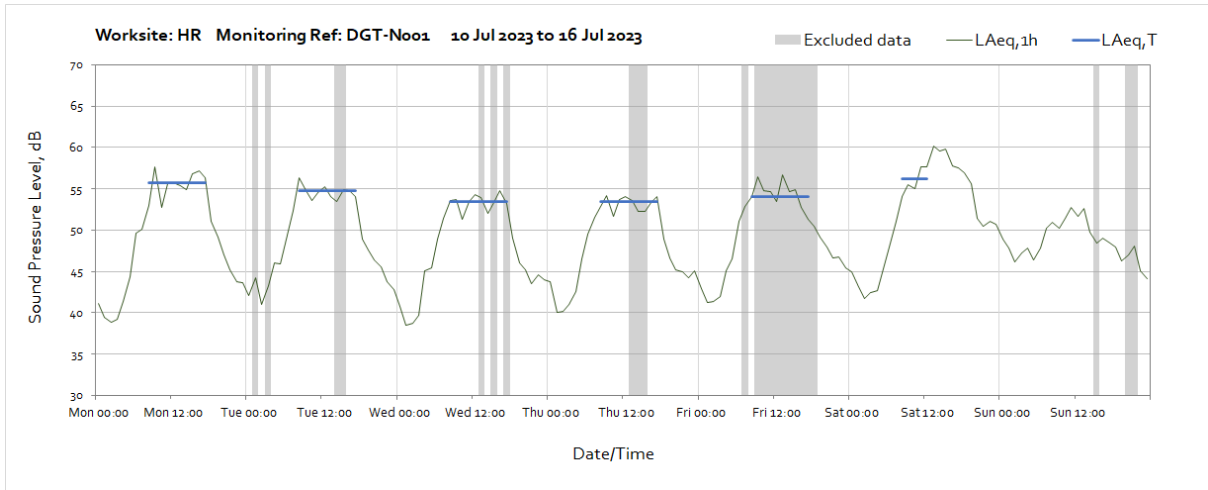
Note: Missing data between 19:00 on Thursday 6<sup>th</sup> July and 09:00 on Friday 7<sup>th</sup> July was due to loss of continuous power at the monitoring station.

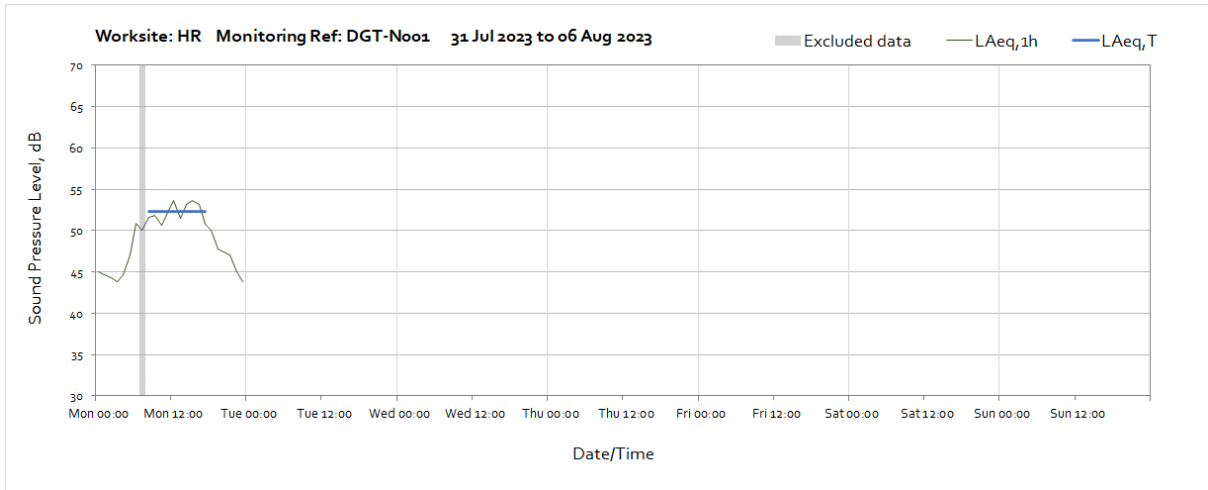




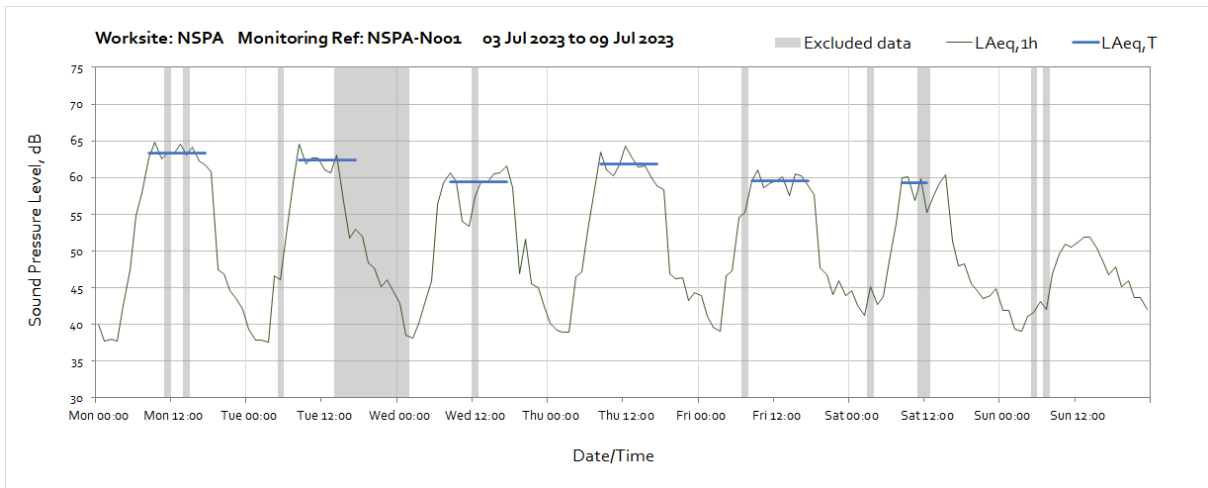
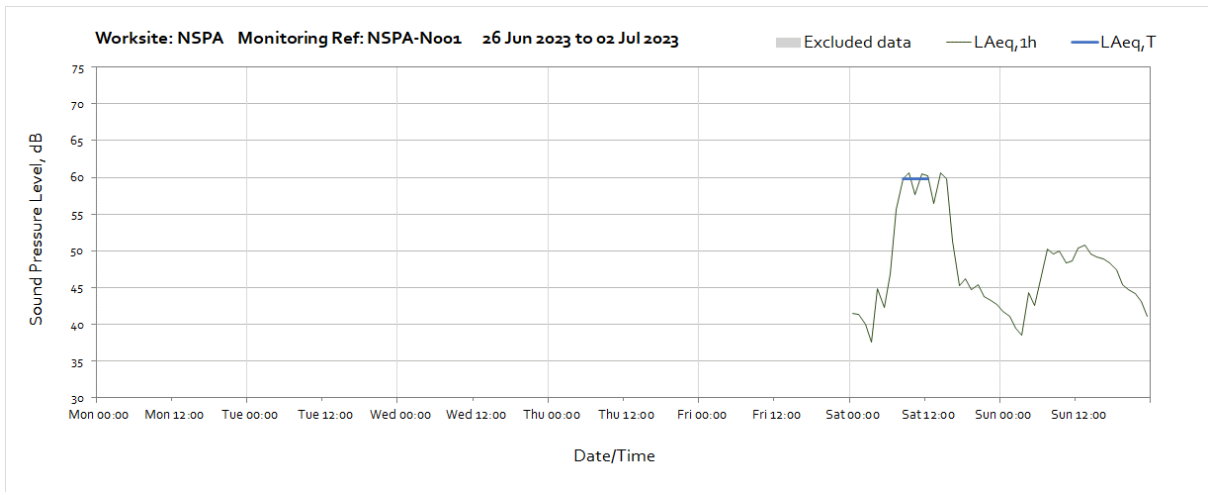
**Worksite: HR - Monitoring Ref: DGT-N001**

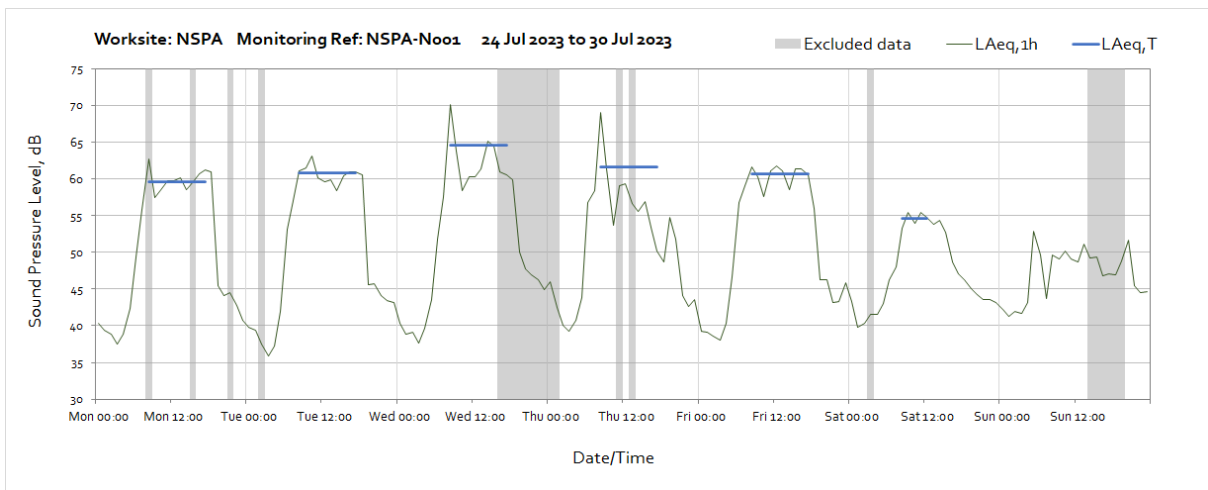
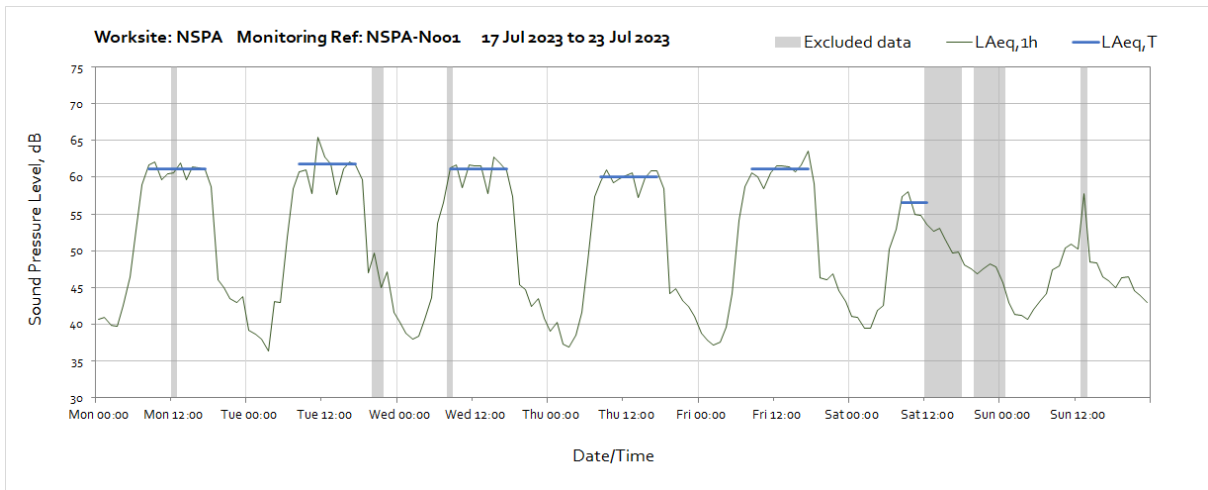
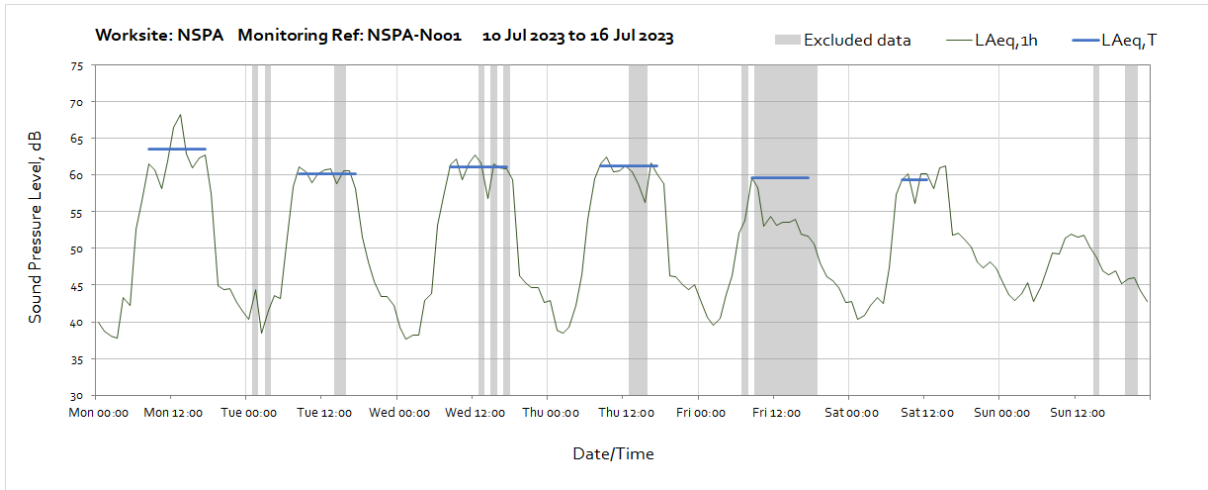




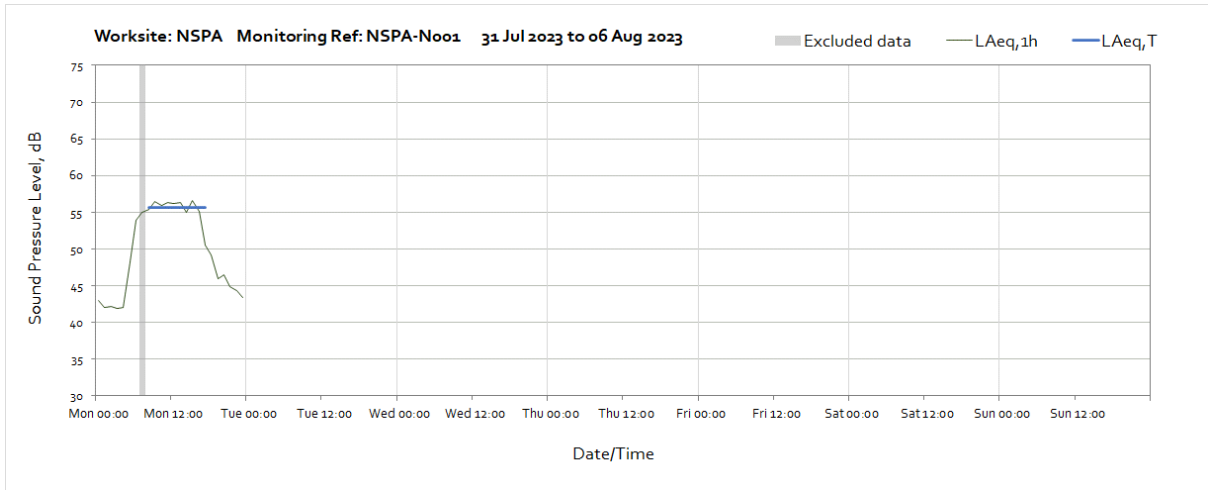


**Worksite: NSPA – Monitoring Ref: NSPA-N001**

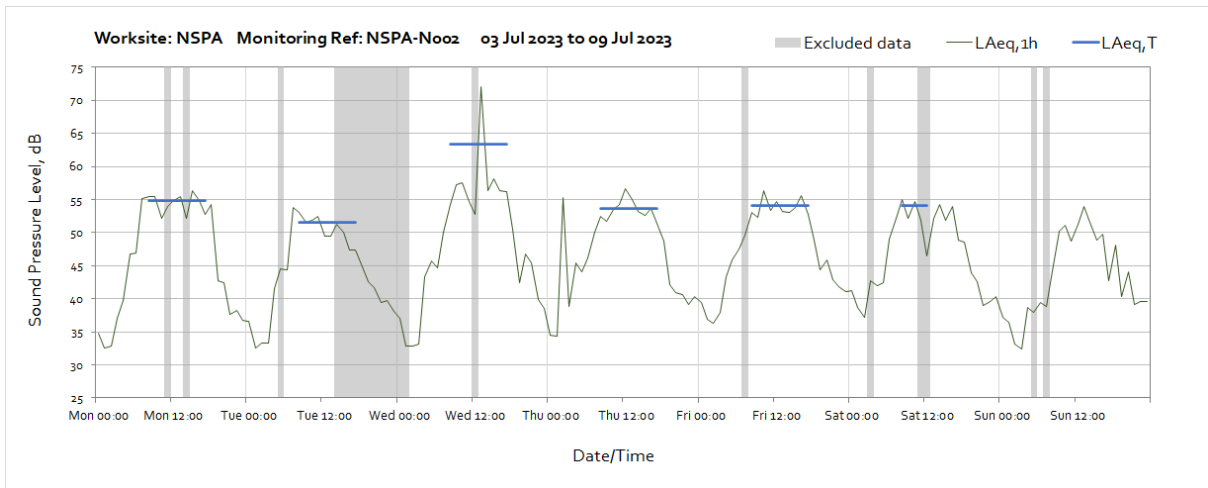
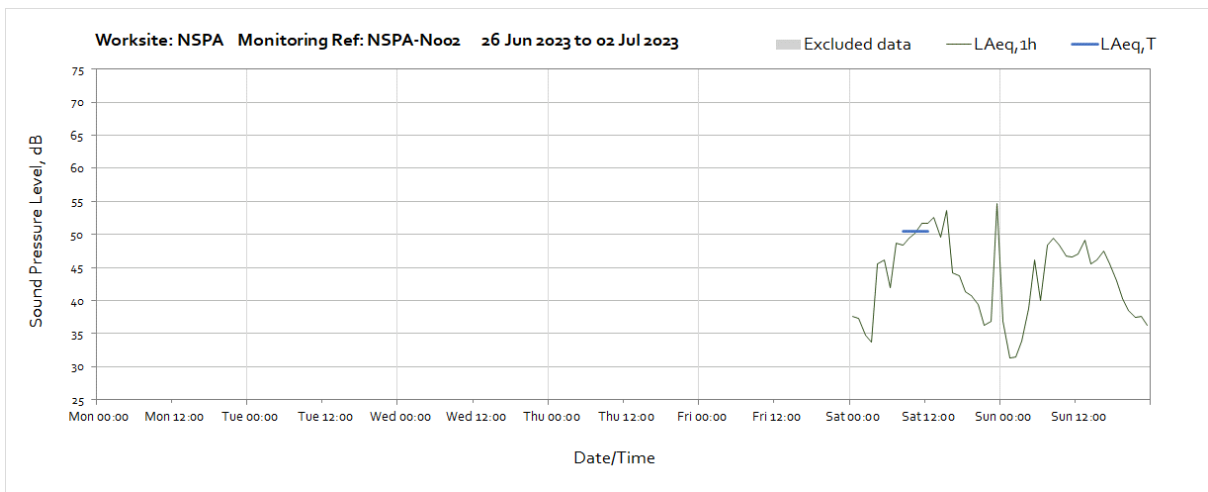


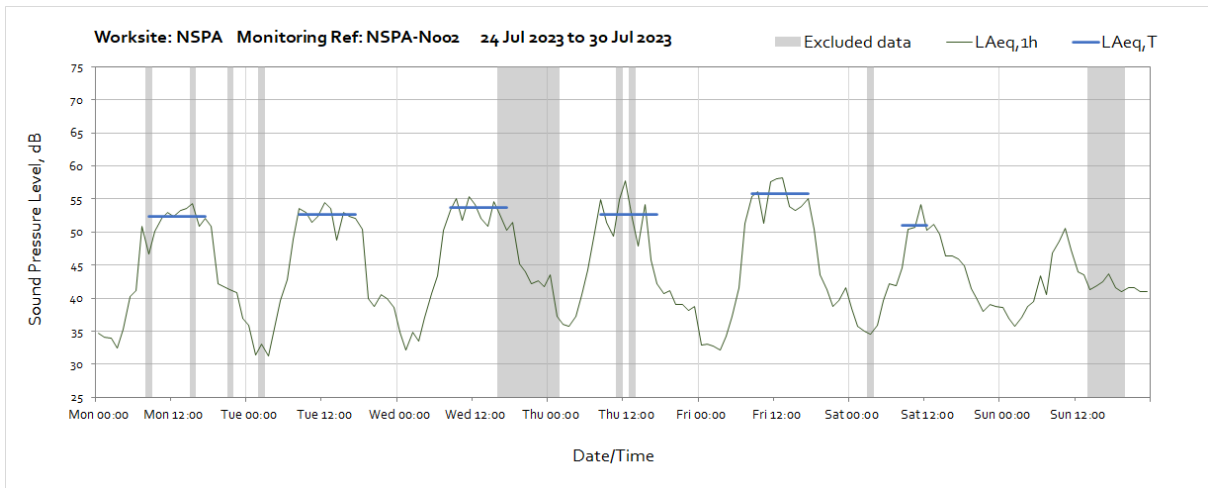
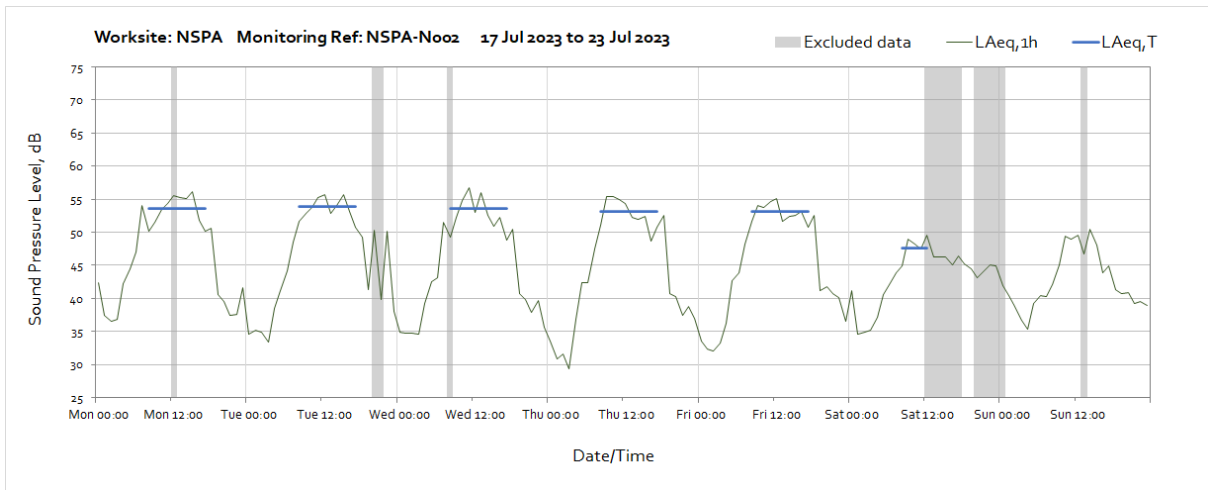
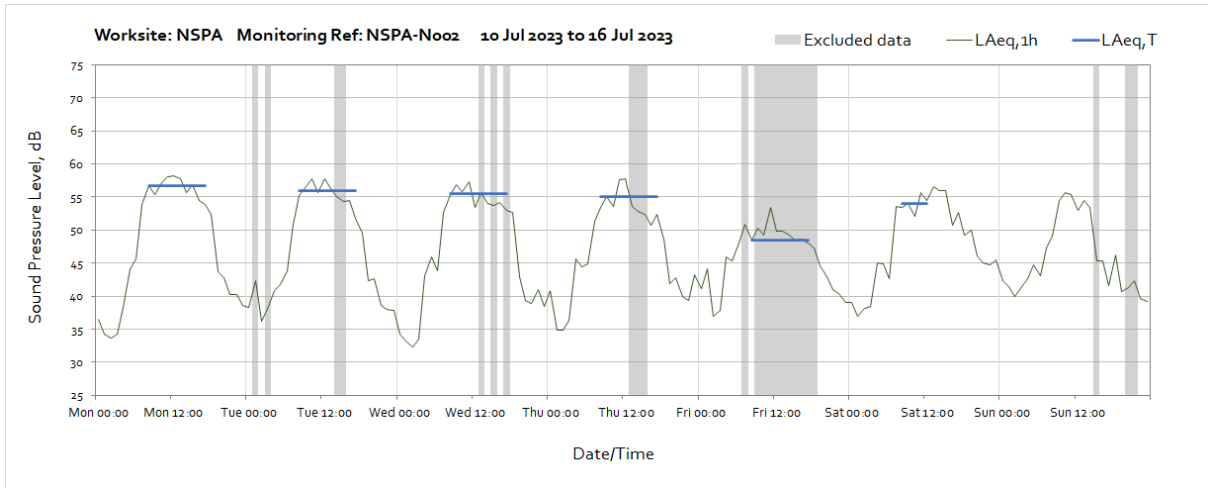


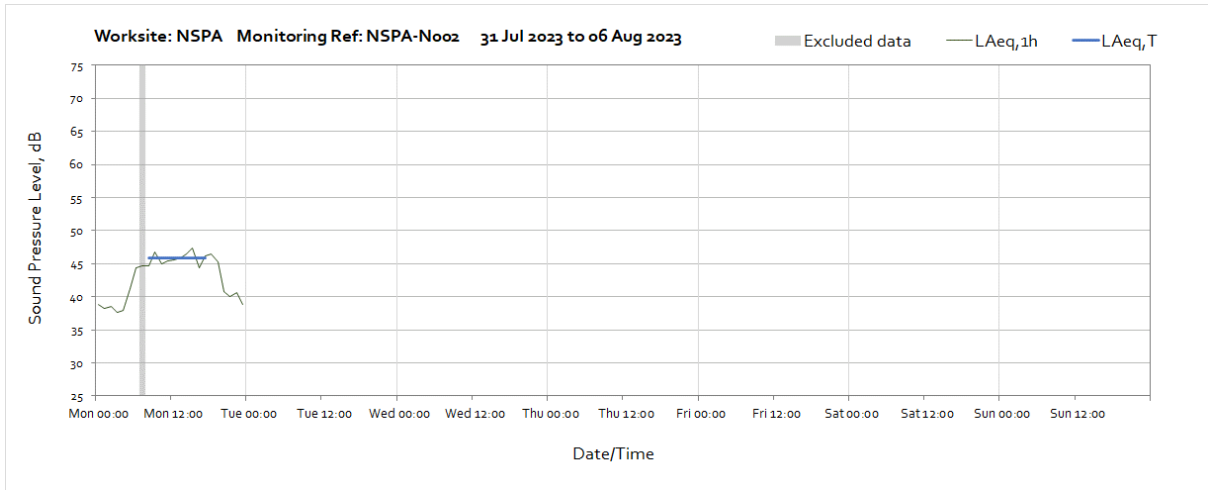




**Worksite: NSPA – Monitoring Ref: NSPA-N002**



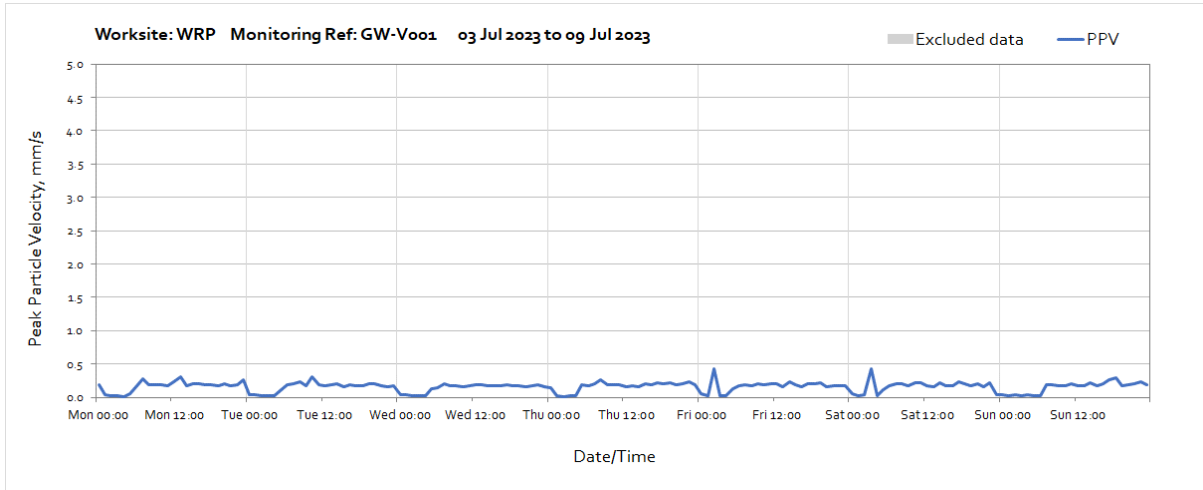
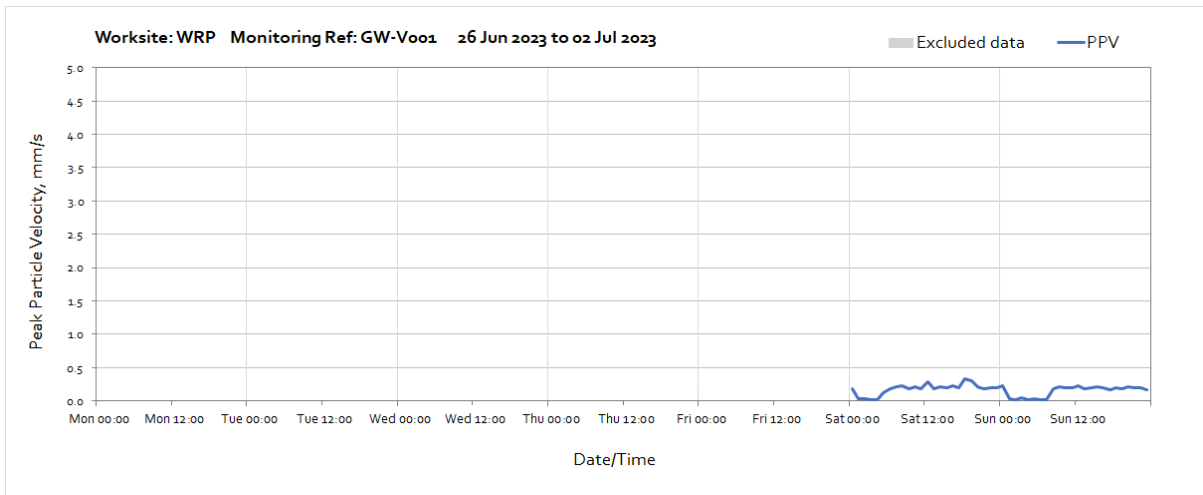


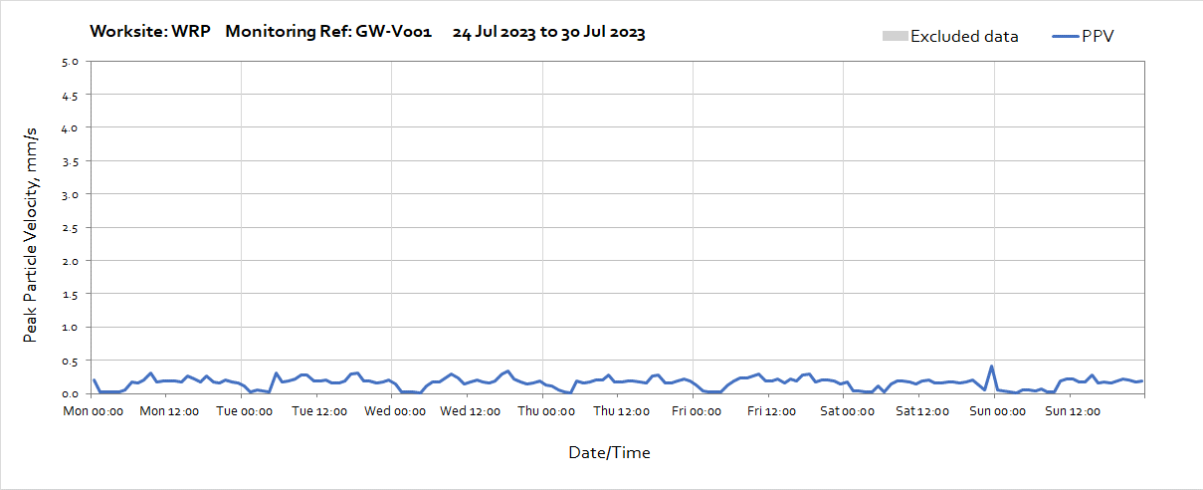
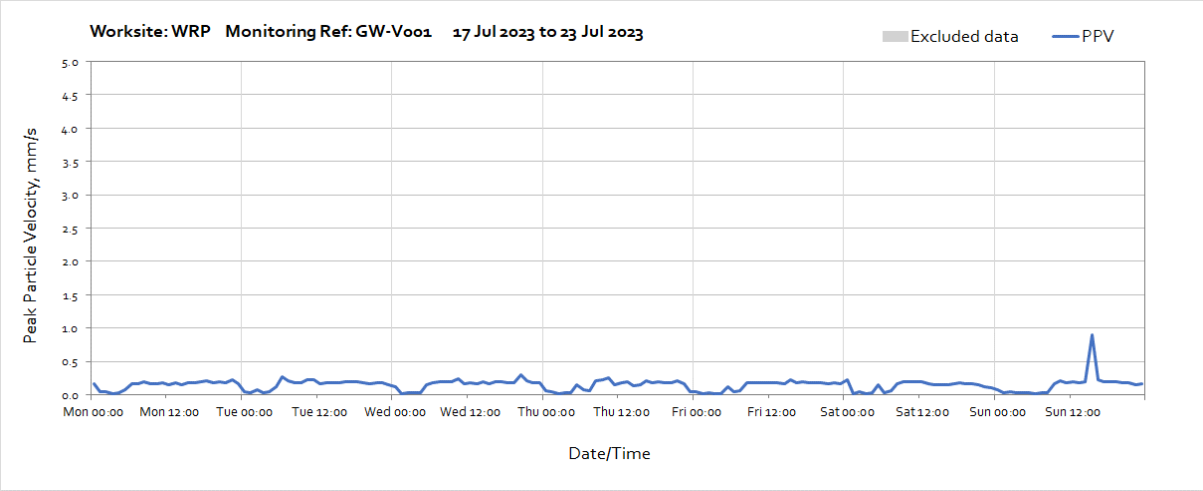
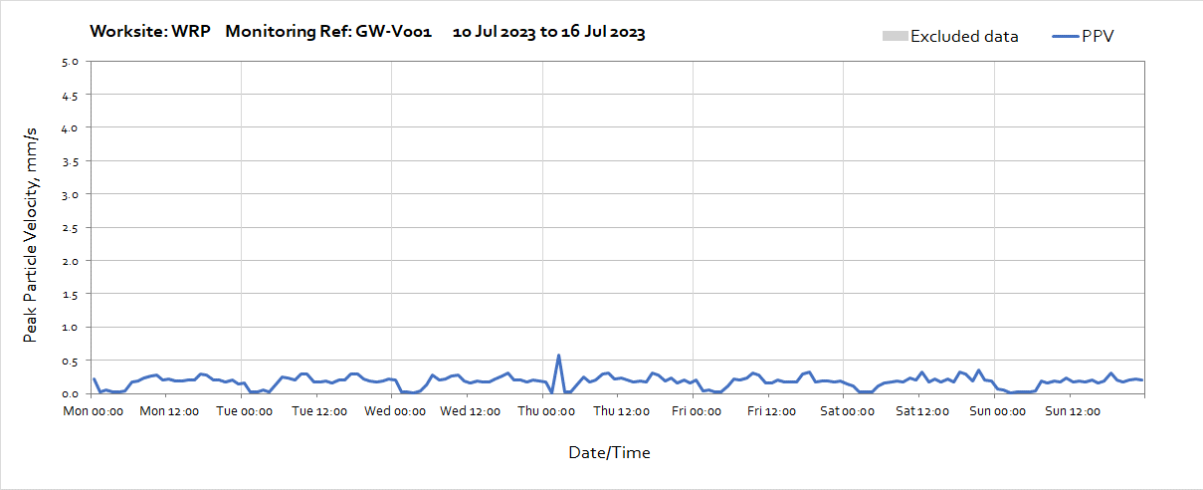


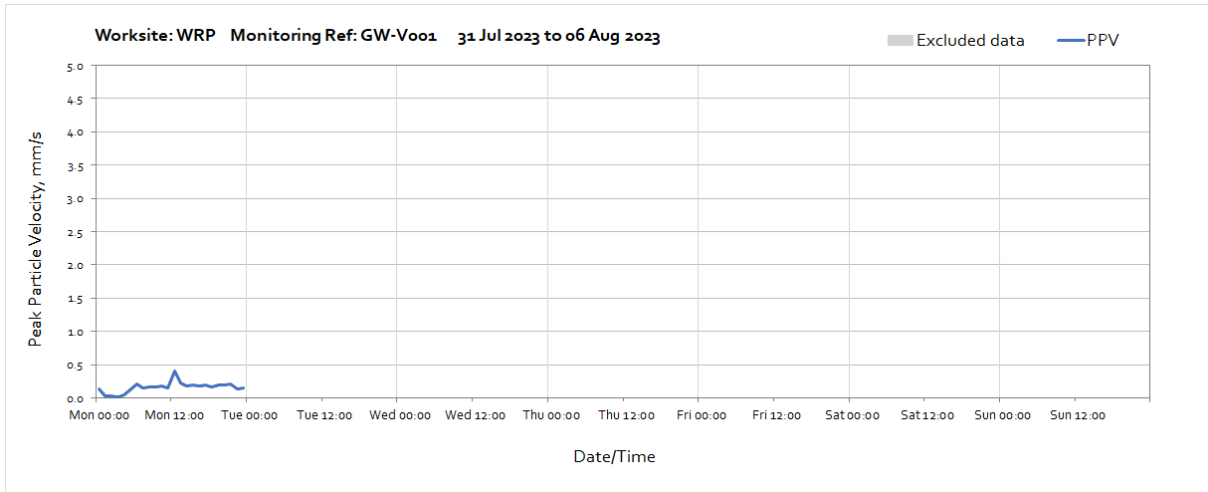
# Vibration

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**

