

Construction noise and vibration Monthly Report – May 2021

Buckinghamshire

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Non-Technical Summary

This Noise and Vibration Monitoring Report fulfils HS2 Limited's commitment detailed in the Environmental Minimum Requirements (EMRs), Annex 1, Code of Construction Practice, to present the results of noise monitoring carried out within Buckinghamshire (BS) during the month of May 2021.

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken in the vicinity of Shepherds Furze Farm worksite (ref.: SFF) where compaction works, deliveries via rail and stockpiling were undertaken.
- Noise monitoring was undertaken in the vicinity of School Hill Compound worksite (ref.: SHC) where batching plant assembly was underway.
- Noise monitoring was undertaken in the vicinity of the School Hill UTX worksite (ref.: SHU) where site setup was underway.
- Noise monitoring was undertaken in the vicinity of the Calvert South worksite reference (ref: CALS) where construction of concrete slabs and, material deliveries, stockpiling were underway.
- Noise monitoring was undertaken in the vicinity of Quainton Access Road (ref: QAR), where construction of drainage and hardstanding at the Station Road satellite compound, installation of geogrid and aggregates, ground investigations, installation of culvert and construction of concrete slabs were underway.
- Noise monitoring was undertaken in the vicinity of Hall Farm, Bicester Road worksite (ref: HF) where site mobilisation, installation of tree protection, vegetation and site clearance and excavation works were underway.
- Noise monitoring was undertaken in the vicinity of Little Missenden Vent Shaft worksite (ref.: CVV-LM) where site setup, piling, earthworks, ground treatment and water treatment were underway.
- Noise monitoring was undertaken in the vicinity of Amersham Vent Shaft worksite (ref.: CVV-AM), where site setup; grouting and drilling, earthworks, installation of vehicle restraint system, civil works, installation of storage, installation of crane bases and workshops, and excavation works were underway.
- Noise and vibration monitoring were undertaken in the vicinity of Bottom House Farm Lane worksite (ref.: BHFL), where relocation and construction of fencing and footpaths, installation of drainage, earthworks, landscaping, installation of gates and utility works were underway.

- Noise monitoring was undertaken in the vicinity of Chalfont St Giles Vent Shaft worksite (ref.: CSG) where earthworks, ground and water treatment works and structural wall installation works were underway.
- Noise monitoring was undertaken in the vicinity of Chalfont St Peter Vent Shaft worksite (ref.: CSP), where stockpile management, shaft dewatering and excavation, commissioning of auxiliary plant, grouting and emergency site surface stabilisation and post-treatment injection works were in progress.
- Noise monitoring was undertaken in the vicinity of Load Test Pile 1 worksite (ref.: LTP #1), where utility works, construction of compound access roads, compound operation, haul road construction works, ground investigation works, piling, River Colne to the Grand Union Canal vegetation removal, River Colne and New Years Green Bourne realignment and diversion of Thames water were underway.

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

- Chetwode where de-vegetation, fencing, trial trenching and bore holes were underway.
- Wendover Dean where archaeological works, site clearance, clearance of woodlands, installation of fencing and tree plantation works were undertaken.
- Quainton where trial pitting and repair of trial pit on topside of structure and localised concrete breakouts were underway.
- Featherbed Lane where fencing works were undertaken.
- Hartwell where trial archaeological works were undertaken.
- Aylesbury Park Golf Course where archaeological works and boundary fencing were undertaken.
- Turweston where construction of bat houses and ground works were undertaken.
- Great Moor Sailing Club where construction of new access route, installation of slipways and concrete bases for shipping containers were undertaken.
- Putlowes Drive where site clearance and preparation work for herds mitigation were undertaken.
- Wormleighton where archaeological works were undertaken.
- Ladbroke where archaeological and ecological mitigation works were undertaken.
- North of Great Missenden where expansion of permanent pond, building of temporary chalk embankment and vegetation clearance were underway.
- Wendover where early works for the installation batching plant were undertaken.

- Small Dean Lane where soil stripping and stone placing were underway.
- Twyford - West Street where stone deliveries were made.
- A422 North Compound where topsoil stripping, stockpiling of stone, delivery of drainage pipes were undertaken.
- A422 South Compound where construction of temporary compound, stripping of topsoil, placing of stone, construction of access roads were undertaken.
- A41 Bicester Road Main Compound and Roundabout where construction of the main compound area and roundabout were underway.
- A41 Bicester Road Batch Plant where construction of the compound and batch plant setup were undertaken.
- Risborough Road where site access road including installation of culvert crossing, utility crossings, stripping of topsoil and stockpiling were undertaken.
- Vegetation clearance at various location along the HS2 route was undertaken.

There were no exceedances of the HS2 threshold levels for significant noise impacts, which are defined in Information Paper E23 (<https://www.gov.uk/government/publications/hs2-information-papers-environment>), during the reporting period at any monitoring position.

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

Six complaints were received within Buckinghamshire during the monitoring period. A description of complaints, the results of investigations and any action taken are detailed in Table 7 of this report.

Abbreviations and Descriptions

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

Table 1: Table of Abbreviations

Acronym/Term	Definition
$L_{Aeq,T}$	See equivalent continuous sound pressure level
Ambient sound	A description of the all-encompassing sound at a given location and time which will include sound from many sources near and far. Ambient sound can be quantified in terms of the equivalent continuous sound pressure level, $L_{pAeq,T}$
Decibel(s), or dB	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140dB.
Decibel(s) A-weighted, or dB(A)	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.
Equivalent continuous sound pressure level, or $L_{Aeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Exclusion of data	Measurement of noise levels can be affected by weather conditions such as prolonged periods of rain, winds speeds higher than 5m/s and snow/ice ground cover. Noise levels measured during these periods are considered not representative of normal noise conditions at the site and, for the purposes of this report, are excluded from the assessment of exceedances and calculation of typical noise levels and are also greyed out in charts. Identifiable incongruous noise and vibration events not attributable to HS2 construction noise are also excluded.
Façade	A facade noise level is the noise level 1m in front of a large reflecting surface. The effect of reflection, is to produce a slightly higher (typically +2.5 to +3 dB) sound level than it would be if the reflecting surface was not there.
Free-field	A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
Peak particle velocity, or PPV	Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position. The PPV is a simple indicator of perceptibility and risk of damage to structures due to vibration. It is usually measured in mm/s.
SOAEL	Significant Observed Adverse Effect Level - the level above which significant adverse effects on health and quality of life occur.
Sound pressure level	The parameter by which sound levels are measured in air. It is measured in decibels. The threshold of hearing has been set at 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB at a distance of 1 metre and a change of 3dB in a time varying sound signal is commonly regarded as being just detectable. A change of 10dB is subjectively twice, or half, as loud.
Vibration dose value, or VDV	An index used to evaluate human exposure to vibration in buildings. While the PPV provides information regarding the magnitude of single vibration events, the VDV provides a measure of the total vibration experienced over a specified period of time (typically 16h daytime and 8h night-time). It takes into account the magnitude, the number and the duration of vibration events and can be used to quantify exposure to continuous, impulsive, occasional and intermittent vibration. The vibration dose value is measured in $m/s^{1.75}$.

1 Introduction

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

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

1.1.2 Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the Buckinghamshire (BS) Local Authority area for the period 1st to 31st May 2021.

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

- Shepherds Furze Farm worksite reference SFF (see plan 1 in Appendix A), where works activities included:
 - trail compaction works;
 - delivery via train; and
 - stockpiling.
- School Hill Compound worksite reference SHC (see plan 1 in Appendix A), where works activities included:
 - assembly of the batching plant.
- School Hill UTX worksite reference - SHU (see plan 1 in Appendix A), where works activities included:
 - construction of launch compound north and south (including the bell mouth);
 - construction of accommodation compound; and

- construction of reception compound.
- Calvert South Worksite, near Calvert, reference - CALS (see plan 1 in Appendix A), where works activities included:
 - construction of high voltage concrete slabs;
 - concrete pouring;
 - site clearance;
 - spoil stockpiling and movement of spoils;
 - delivery of stone; and
 - ground compaction.
- Quanton Access Road Worksite, reference - QAR (see plan 2 in Appendix A), where works activities included:
 - construction of drainage and hardstanding at Station Road satellite compound;
 - installation of geogrid and aggregates;
 - ground investigation;
 - installation of culvert; and
 - protection slab construction.
- Hall Farm, Bicester Road Worksite, reference – HF (see plan 3 in Appendix A), where works activities included:
 - site mobilisation;
 - installation of tree protection;
 - vegetation and site clearance; and
 - excavation for new carriageway.
- Colne Valley Viaduct - Little Missenden Vent Shaft worksite reference – CVV-LM (see plan 4 in Appendix A), where works activities included:
 - site establishment (including office establishment, piling platform, site roads formation level and other site facilities);
 - earthworks (including stockpile management);
 - ground pre and post treatment (drilling and grouting); and
 - water treatment.
- Colne Valley Viaduct - Amersham Vent Shaft Worksite, reference – CVV - AM (see plan 5 in Appendix A), where works activities included:

- ground pre and post treatment (drilling and grouting)
 - site establishment works;
 - earthworks (including stockpile management);
 - installation of vehicle restraint system;
 - civil works, delivery and assembly;
 - installation of storage, installation of crane bases and workshops; and
 - excavations to shaft piling platform level.
- Bottom House Farm Lane Worksite, reference - BHFL (see plan 6 in Appendix A), where work activities included:
 - drainage installation (including trenches excavation, pumping out of groundwater, placing geotextile membrane, laying of bedding materials and pipes, backfill trench and close membrane);
 - earthworks (including compaction, stockpile management, construction of landowner accesses, batter finishing works and topsoiling, installation of fences and gates);
 - landscaping works (including rotavating soil, raking stones and seeding verges); and
 - construction of fences and erecting gates.
- Colne Valley Viaduct - Chalfont St Giles Vent Shaft Worksite, reference - CVV-CSG (see plan 6 in Appendix A), where works activities included:
 - earthworks (stockpile management);
 - ground pre and post treatment (drilling and grouting) and water treatment; and
 - structural wall installation works (including excavation, desanding, mud treatment and concreting).
- Colne Valley Viaduct - Chalfont St Peter Vent Shaft Worksite, reference – CVV-CSP (see plan 7 in Appendix A), where works activities included:
 - stockpile management;
 - shaft dewatering and excavation (including mobilisation and site setup, break out of temporary slabs, trimming of structural wall, construction of capping beam and excavations);
 - commissioning of auxiliary plant;
 - grouting;

- emergency site surface stabilisation works; and
- post-treatment injection works.
- Colne Valley Viaduct - Load Test Pile 1 Worksite, reference – CVV-LTP #1 (see plan 8 in Appendix A), where works activities included:
 - utility works;
 - piling for the construction of the jetty;
 - sheet piling for the construction of a cofferdam;
 - main piling works (including boring pile, de-sanding, installation of reinforcement cage and concrete pile, break-out of bored pile to prepare pile cap and installation of grout curtain around viaduct pile)
 - Denham Water Ski Club and North Embankment compound operation, pavement construction and de-sanding;
 - civil works, earthworks, drainage and finishing works on haul road;
 - ground investigation works;
 - construction of access road to affinity waters;
 - River Colne to the Grand Union Canal devegetation works;
 - realignment of River Colne and New Years Green Bourne; and
 - diversion of Thames water.

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

- Chetwode where de-vegetation, fencing, trial trenching and bore holes were underway.
- Wendover Dean where archaeological works, site clearance, clearance of woodlands, installation of fencing and tree plantation works were undertaken.
- Quainton where trial pitting and repair of trial pit on topside of structure and localised concrete breakouts were underway
- Featherbed Lane where fencing works were undertaken.
- Hartwell where trial archaeological works were undertaken.
- Aylesbury Park Golf Course where archaeological works and boundary fencing were undertaken.
- Turweston where construction of bat houses and ground works were undertaken.

- Great Moor Sailing Club where construction of new access route, installation of slipways and concrete bases for shipping containers were undertaken.
- Putlowes Drive where site clearance and preparation work for herds mitigation were undertaken.
- Wormleighton where archaeological works were undertaken.
- Ladbroke where archaeological and ecological mitigation works were undertaken.
- North of Great Missenden where expansion of permanent pond, building of temporary chalk embankment and vegetation clearance were underway.
- Wendover where early works for the installation batching plant were undertaken.
- Small Dean Lane where soil stripping and stone placing were underway.
- Twyford - West Street where stone deliveries were made.
- A422 North Compound where top soil stripping, stockpiling of stone, delivery of drainage pipes were undertaken.
- A422 South Compound where construction of temporary compound, stripping of topsoil, placing of stone, construction of access roads were undertaken
- A41 Bicester Road Main Compound and Roundabout where construction of the main compound area and roundabout were underway.
- A41 Bicester Road Batch Plant where construction of the compound and batch plant setup were undertaken.
- Risborough Road where site access road including installation of culvert crossing, utility crossings, stripping of top soil and stockpiling were undertaken.
- Vegetation clearance at various location along the HS2 route was undertaken.

1.1.5 The applicable standards, guidance, and monitoring methodology are outlined in the construction noise and vibration monitoring methodology report which can be found at the following location <https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2>. Noise and vibration monitoring reports for previous months can also be found at this location.

1.2 Measurement Locations

- 1.2.1 Sixteen noise and one vibration monitoring installations were active in May in the BS area. Table 2 summarises the position of noise monitoring installations within the BS area in May 2021.
- 1.2.2 Maps showing the position of noise monitoring installations are presented in Appendix B.
- 1.2.3 The noise monitor SFF-NMP1 was installed in proximity to the Shepherds Furze Farm worksite, ref.: SFF, on the 7th of May.
- 1.2.4 The noise monitor SHC-NMP1 was installed in proximity to the School Hill Compound worksite, ref.: SHC, on the 7th of May.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
SFF	SFF-NMP1	Shepherds Furze Farm, Calvert
SHC	SHC-NMP1	School Hill Compound, Calvert
SHU	SHU-NMP1	70 Cotswold Way, Calvert
CALS	CALS-NMP1	Site boundary adjacent to Red Kite View, Calvert
QAR	QAR-NMP1	1 Woodlands Farm Cottages, Quainton
HF	HF-NMP1	Hall Farm, Bicester Road, Waddesdon
CVV-AM	CVV-AM-NMP1	Amersham Vent Shaft Worksite, Whielden Lane, Amersham
CVV-LM	CVV-LM-NMP1	Little Missenden Vent Shaft Worksite, Amersham
BHFL	BHFL-NMP1	Elm Tree Cottage, Bottom House Farm Lane
	BHFL-Vib 1	Pine Cottage, Bottom House Farm Lane
CVV-CSG	CVV-CSG-NMP1	Chalfont St Giles Vent Shaft Worksite, Bottom House Farm Lane
	CVV-CSG-NMP2	Chalfont St Giles Vent Shaft Worksite, Bottom House Farm Lane
CVV-CSP	CVV-CSP-NMP1	Chalfont St Peter Vent Shaft Worksite, Chesham Lane, Chalfont St. Peter
	CVV-CSP-NMP2	Chalfont St Peter Vent Shaft Worksite, Chesham Lane, Chalfont St. Peter
	CVV-CSP-NMP3	Chalfont St Peter Vent Shaft Worksite, Chesham Lane, Chalfont St. Peter
CVV-LTP #1	CVV-LTP #1-NMP1	Northern boundary, Load Test Pile 1 Worksite, Denham Water Ski Club
	CVV-WYC-NMP1	Wyatt's Covert, Tilehouse Lane, Denham, Denham Garden Village

2 Summary of Results

2.1 Summary of Measured Noise Levels

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

Table 3: Summary of Measured dB L_{Aeq} Data over the Monitoring Period

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Saturday Average L _{Aeq,T} (highest day L _{Aeq,T})					Sunday / Public Holiday Average L _{Aeq,T} (highest day L _{Aeq,T})	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
SFF	SFF-NMP1	Shepherds Furze Farm, Calvert	Free-field	67.0 (74.7)	70.2 (74.8)	69.7 (72.6)	57.5 (67.1)	47.4 (63.7)	69.3 (70.8)	69.5 (72.8)	54.8 (69.7)	46.2 (55.9)	38.0 (45.9)	NA NA	NA NA
SHC	SHC-NMP1	School Hill Compound, Calvert	Free-field	50.4 (60.4)	57.4 (67.4)	47.6 (54.9)	45.5 (55.0)	44.5 (57.3)	46.9 (49.3)	48.4 (51.4)	45.7 (50.3)	46.2 (51.7)	43.0 (46.3)	46.1 (50.5)	43.6 (50.5)
SHU	SHU-NMP1	70 Cotswold Way, Calvert	Free-field	53.7 (57.7)	56.2 (61.0)	52.4 (58.1)	52.6 (63.1)	49.0 (57.0)	53.3 (58.3)	53.9 (57.3)	51.5 (56.2)	56.4 (69.9)	49.0 (60.7)	55.0 (65.7)	49.2 (57.0)
CALS	CALS-NMP1	Site boundary adjacent to Red Kite View, Calvert	Free-field	58.3 (61.2)	56.7 (59.1)	49.5 (56.5)	46.9 (53.4)	47.9 (59.4)	49.8 (53.7)	48.4 (52.1)	47.4 (50.1)	46.3 (53.3)	44.3 (53.7)	46.4 (51.5)	47.0 (58.4)
QAR	QAR-NMP1	1 Woodlands Farm Cottages, Quainton	Free-field	53.5 (58.4)	53.4 (60.1)	50.3 (56.0)	48.9 (54.1)	46.9 (56.7)	50.1 (52.7)	51.8 (52.9)	50.8 (53.4)	49.6 (54.3)	44.5 (50.8)	51.9 (70.5)	45.3 (54.2)
HF	HF-NMP1	Hall Farm, Bicester Road, Waddesdon	Free-field	65.7 (68.5)	65.3 (67.4)	65.9 (68.3)	63.7 (66.1)	59.1 (66.4)	62.9 (63.4)	64.8 (65.2)	65.1 (65.5)	64.1 (66.0)	57.9 (63.5)	62.9 (65.5)	58.6 (64.5)
CVV-AM	CVV-AM-NMP1	Whielden Lane, Amersham	Free-field	70.1 (71.7)	70.4 (73.0)	69.7 (72.4)	67.5 (73.0)	62.7 (70.8)	67.9 (69.3)	70.0 (71.0)	70.1 (72.2)	68.5 (73.5)	61.3 (68.5)	67.8 (71.3)	61.5 (68.3)
CVV-LM	CVV-LM-NMP1	Little Missenden Vent Shaft Worksite	Free-field	66.4 (67.8)	66.5 (74.7)	66.2 (68.1)	63.0 (66.2)	58.4 (65.9)	63.4 (64.6)	65.3 (66.6)	65.5 (66.5)	64.3 (66.8)	57.1 (61.0)	63.9 (66.5)	57.5 (64.9)
			Free-field	54.2	56.4	53.6	52.0	49.3	51.9	53.4	52.8	54.4	51.7	51.9	48.5

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Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$)					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
BHFL	BHFL-NMP1	Elm Tree Cottage, Bottom House Farm Lane		(58.4)	(64.2)	(59.0)	(62.8)	(57.8)	(54.4)	(55.2)	(55.3)	(67.2)	(72.1)	(56.4)	(56.6)
CVV-CSG	CVV-CSG-NMP1	Chalfont St Giles Vent Shaft Worksite, Bottom House Farm Lane	Free-field	52.3 (54.7)	57.8 (68.0)	51.7 (56.9)	51.1 (57.3)	47.9 (56.5)	50.6 (52.6)	50.7 (51.2)	48.4 (49.7)	47.9 (54.9)	45.2 (53.3)	50.6 (58.8)	46.8 (54.3)
	CVV-CSG-NMP2	Chalfont St Giles Vent Shaft Worksite, Bottom House Farm Lane	Free-field	52.9 (59.1)	60.7 (67.0)	51.2 (54.7)	50.3 (56.4)	47.7 (77.6)	49.2 (56.1)	49.5 (54.8)	48.9 (61.2)	46.1 (50.9)	43.8 (53.3)	48.1 (57.5)	43.9 (51.1)
CVV-CSP	CVV-CSP-NMP1	Chalfont St Peter Vent Shaft Worksite	Free-field	65.7 (69.1)	67.7 (70.5)	63.8 (68.3)	58.9 (67.6)	53.2 (61.4)	63.7 (72.0)	66.2 (69.0)	62.0 (63.1)	59.7 (63.2)	51.5 (58.7)	59.7 (66.0)	51.5 (58.8)
	CVV-CSP-NMP2	Chalfont St Peter Vent Shaft Worksite	Free-field	48.8 (54.3)	52.4 (56.4)	49.4 (54.4)	46.6 (55.6)	43.7 (55.6)	49.1 (53.3)	49.3 (53.1)	47.2 (52.4)	46.6 (50.8)	42.6 (54.1)	48.5 (57.5)	43.8 (50.2)
	CVV-CSP-NMP3	Chalfont St Peter Vent Shaft Worksite	Free-field	57.4 (61.4)	57.6 (60.2)	57.3 (60.5)	54.9 (60.0)	51.9 (68.5)	54.2 (56.0)	56.9 (58.7)	56.7 (59.6)	55.7 (59.1)	51.5 (62.7)	55.8 (62.9)	52.9 (65.6)
CVV-LTP #1	CVV-LTP #1-NMP1	Northern boundary, Load Test Pile 1 Worksite	Free-field	62.0 (64.5)	62.3 (68.3)	61.5 (64.2)	59.2 (63.3)	56.1 (62.6)	59.1 (60.3)	60.7 (61.3)	60.5 (61.5)	59.3 (62.6)	53.7 (56.9)	59.2 (64.1)	54.8 (61.5)
	CVV-WYC-NMP1	Wyatt's Covert, Tilehouse Lane, Denham	Free-field	56.4 (63.8)	58.2 (63.5)	56.5 (59.6)	54.3 (60.8)	52.2 (60.8)	53.8 (56.8)	56.8 (59.2)	57.9 (62.4)	55.4 (66.9)	50.6 (58.1)	55.8 (60.7)	51.7 (58.7)

2.1.2 Table 4 presents a summary of the measured vibration levels at the 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
BHFL	BHFL-Vib 1	Pine Cottage, Bottom House Farm Lane	1.00 (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 at nearby receptors, 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 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	Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
SFF	SFF-NMP1*	Shepherds Furze Farm, Calvert	All days	All periods	No exceedance	No exceedance
SHC	SHC-NMP1*	School Hill Compound, Calvert	All days	All periods	No exceedance	No exceedance
SHU	SHU-NMP1	70 Cotswold Way, Calvert	All days	All periods	No exceedance	No exceedance
CALS	CALS-NMP1	Site boundary adjacent to Red Kite View, Calvert	All days	All periods	No exceedance	No exceedance
QAR	QAR-NMP1	1 Woodlands Farm Cottages, Quainton	All days	All periods	No exceedance	No exceedance
HF	HF-NMP1	Hall Farm, Bicester Road, Waddesdon	All days	All periods	No exceedance	No exceedance
CVV-AM	CVV-AM-NMP1*	Whielden Lane, Amersham	All days	All periods	No exceedance	No exceedance
CVV-LM	CVV-LM-NMP1*	Little Missenden Vent Shaft Worksite	All days	All periods	No exceedance	No exceedance
BHFL	BHFL-NMP1	Elm Tree Cottage, Bottom House Farm Lane	All days	All periods	1	No exceedance

Worksite Reference	Measurement Reference	Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
CVW-CSG	CVW-CSG-NMP1*	Chalfont St Giles Vent Shaft	All days	All periods	No exceedance	No exceedance
	CVW-CSG-NMP2*	Chalfont St Giles Vent Shaft	Night	2200-0700	2	No exceedance
CVW-CSP	CVW-CSP-NMP1*	Chalfont St Peter Vent Shaft Worksite	All days	All periods	No exceedance	No exceedance
	CVW-CSP-NMP2*	Chalfont St Peter Vent Shaft Worksite	All days	All periods	No exceedance	No exceedance
	CVW-CSP-NMP3*	Chalfont St Peter Vent Shaft Worksite	All days	All periods	No exceedance	No exceedance
CVW-LTP #1	CVW-LTP #1-NMP1*	Northern boundary, Load Test Pile 1 Worksite	All days	All periods	1	No exceedance
	CVW-WYC-NMP1	Wyatt's Covert, Tilehouse Lane, Denham	Weekday Weekday Weekday Weekday Saturday Saturday Sunday Night	0700-0800 0800-1800 1800-1900 1900-2200 1300-1400 1400-2200 0700-2200 2200-0700	3 1 6 22 3 15 39 71	No exceedance No exceedance No exceedance No exceedance No exceedance No exceedance No exceedance No exceedance

* A distance correction has been applied when calculating exceedances of the LOAEL and SOAEL.

2.2.6 No exceedances of the SOAEL were recorded due to HS2 construction works during May 2021. Exceedances of the LOAEL were recorded at BHFL-NMP1, CSG-NMP2, CVW-LTP #1-NMP1 and CVW-WYC-NMP1.

2.3 Exceedances of Trigger Level

2.3.1 Table 6 provides a summary of exceedances of the S61 trigger noise levels determined to be due to HS2 related construction noise measured during the reporting period, along with the findings of any investigation.

Table 6: Summary of Exceedances of Trigger Levels

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

2.4 Complaints

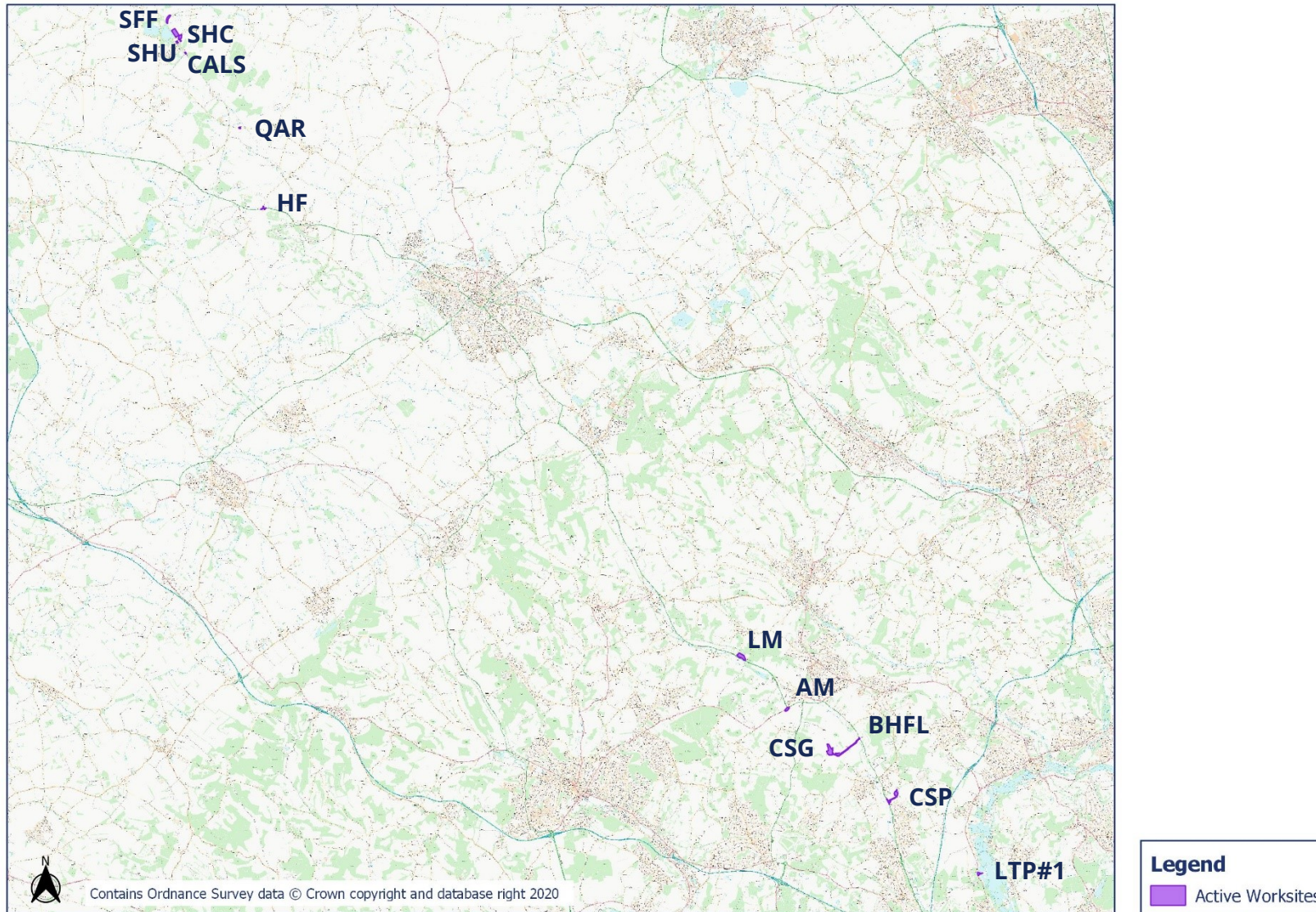
2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

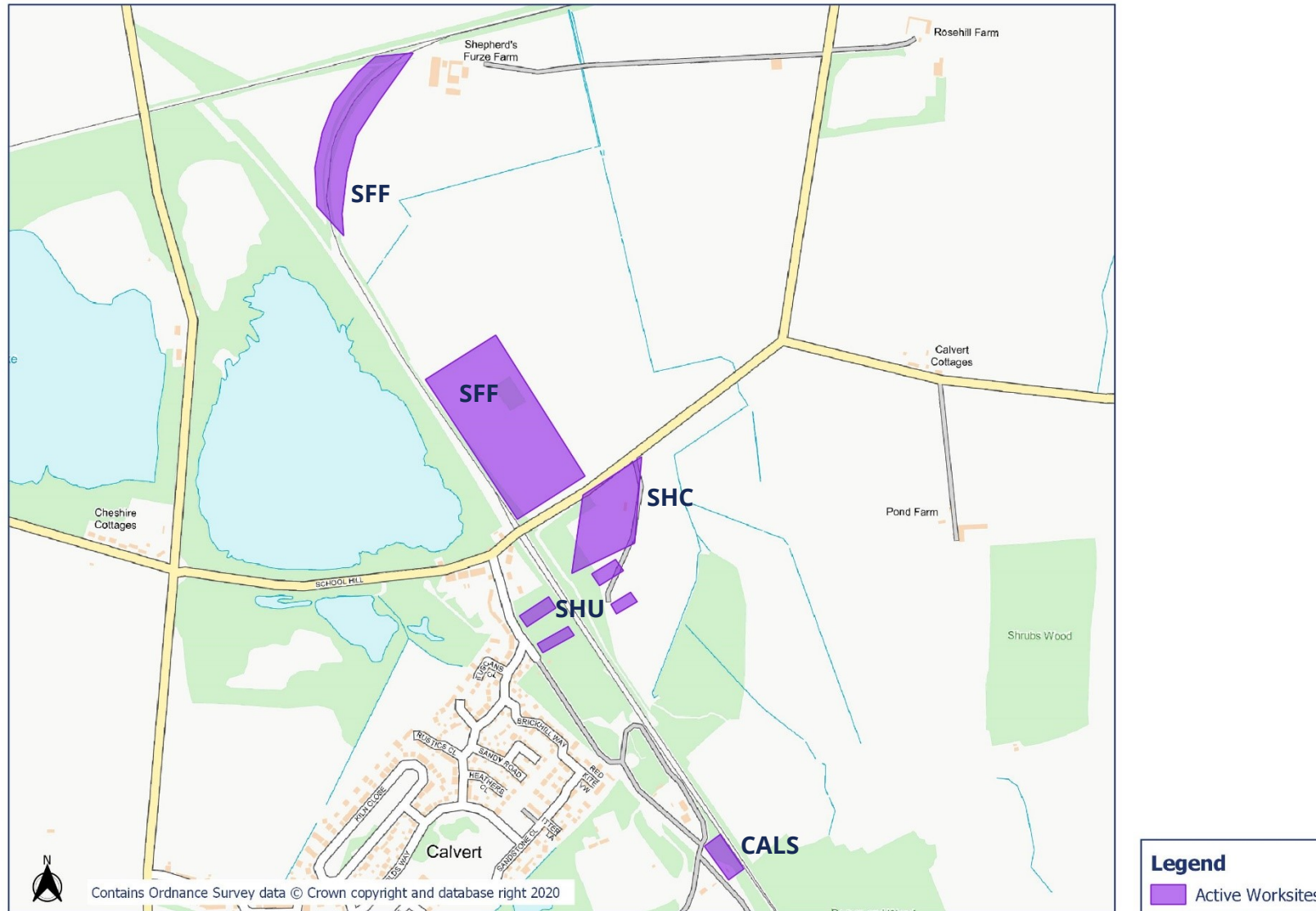
Table 7: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-41902-C	CVV-LTP #1	Loud drilling noise.	The noise is attributed to the commencement of main piling works, creations of jetties and cofferdams. Monitoring demonstrates compliance with Section 61 requirements.	Information was provided to the Stakeholder confirming that works and noise levels are being monitored. Contractor made offer to meet stakeholder to discuss further which was declined by the stakeholder.
HS2-21-41923-C	CVV-LTP #1	Loud drilling noise and vibration throughout the week.	The noise and vibration are confirmed to be from piling activity. Monitoring demonstrates compliance with Section 61 requirements.	Information was provided to the stakeholder confirming that works and noise levels are being monitored.
HS2-21-41927-C	CVV-LTP #1	Noise and vibration from piling activity.	The noise and vibration were caused by ongoing piling works. Monitoring demonstrates compliance with Section 61 requirements.	Face to face meeting held with stakeholder by the contractor whereby information was provided.

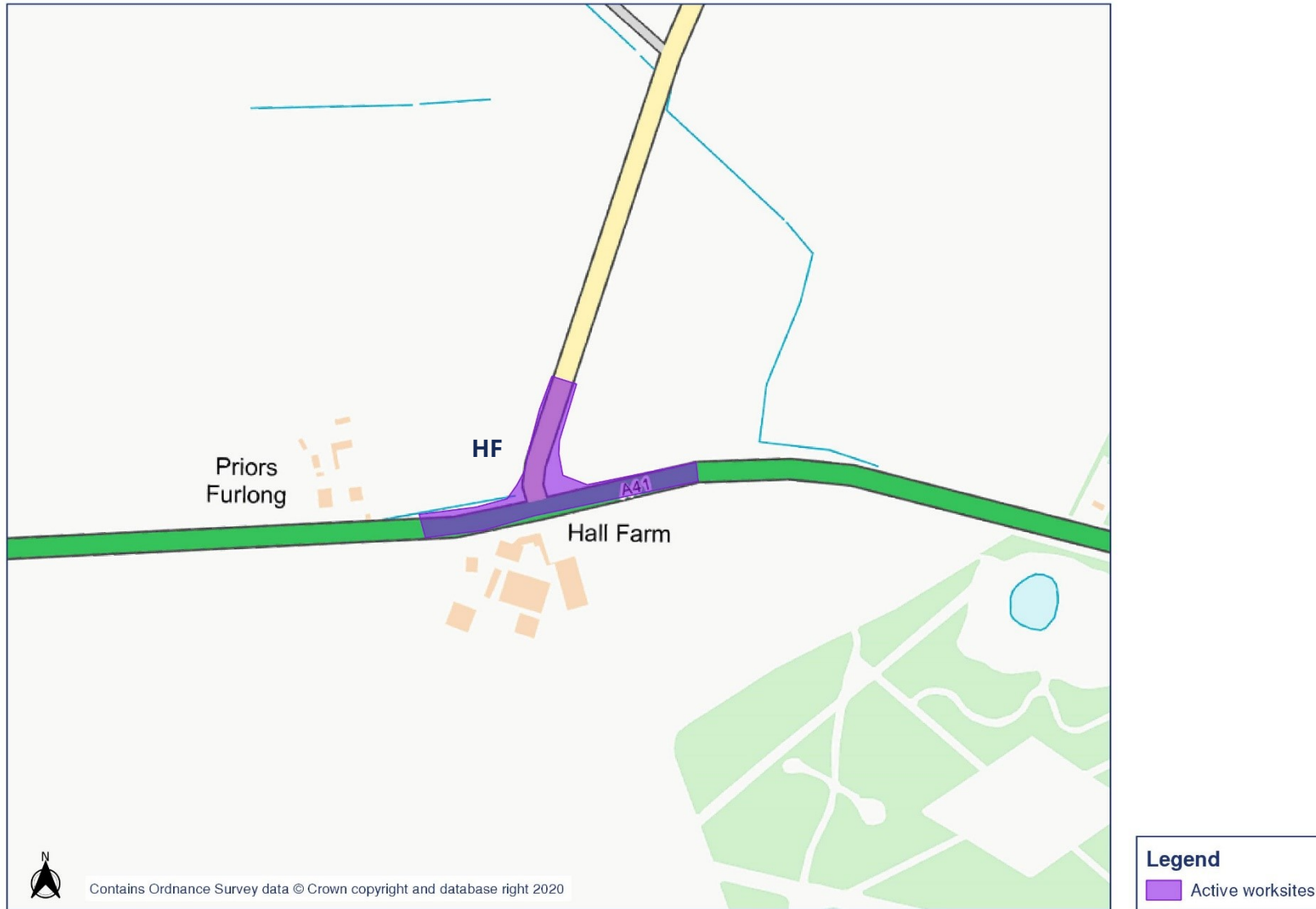
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-41961-C	CVV-LTP #1	General construction noise.	The noise was confirmed to be due to HS2 construction works. Monitoring demonstrates compliance with Section 61 requirements.	A previous offer to stakeholder to discuss face to face was declined. A new offer for a discussion has been extended.
HS2-21-42029-C	CVV-LTP #1	Drilling noise throughout the day.	The noise was associated with piling works relating to the construction of the viaduct. Monitoring demonstrates compliance with Section 61 requirements.	Information was provided to the stakeholder confirming the mitigation measures that are in place to reduce noise and the process for special cases.
HS2-21-42015-C	CVV-AM	Increased noise levels during day above what stakeholder thinks is acceptable.	Emergency gas utility works were undertaken on site when a gas main was found. These works were not related to HS2.	Information was provided to the stakeholder.

Appendix A Site Locations

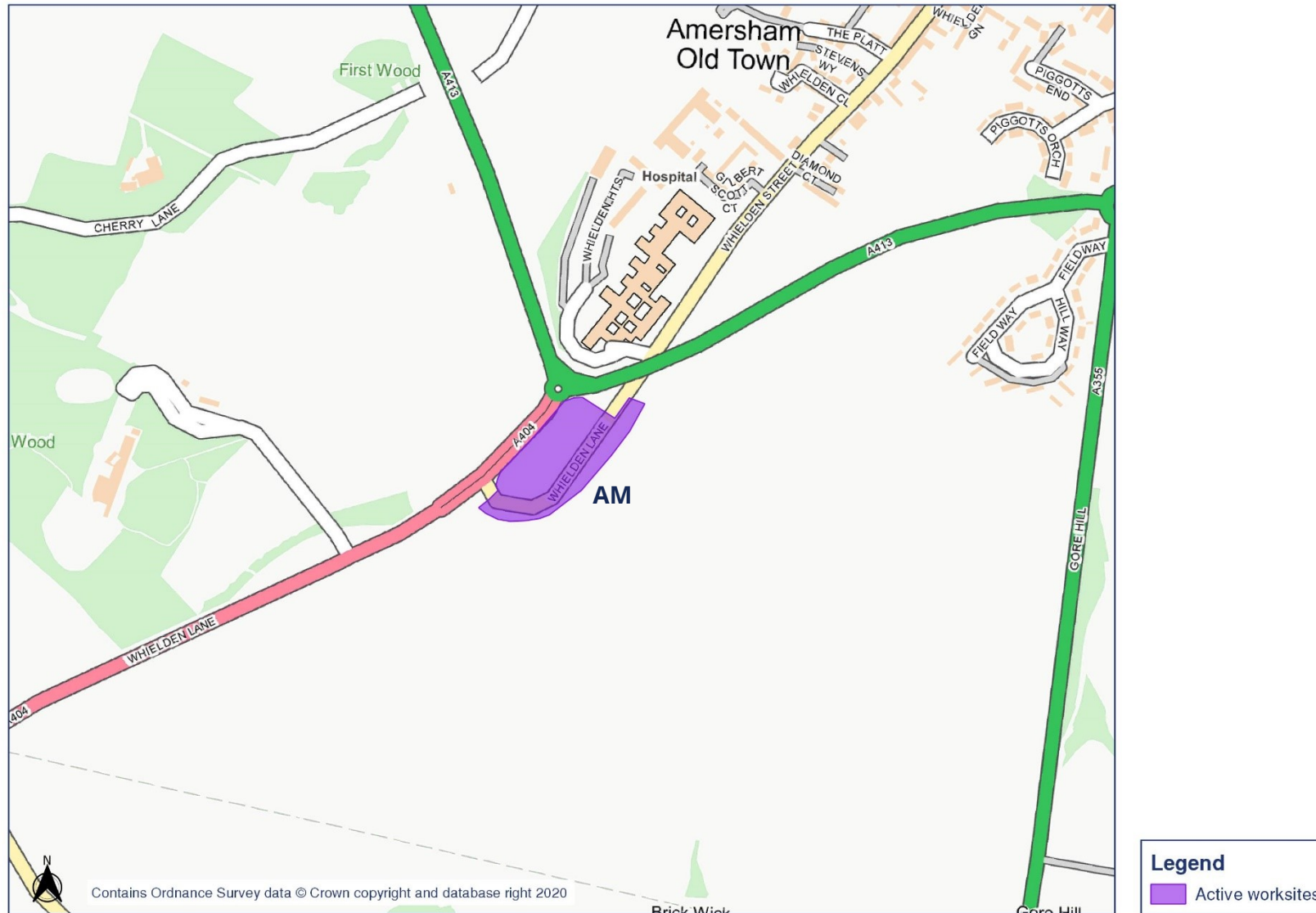






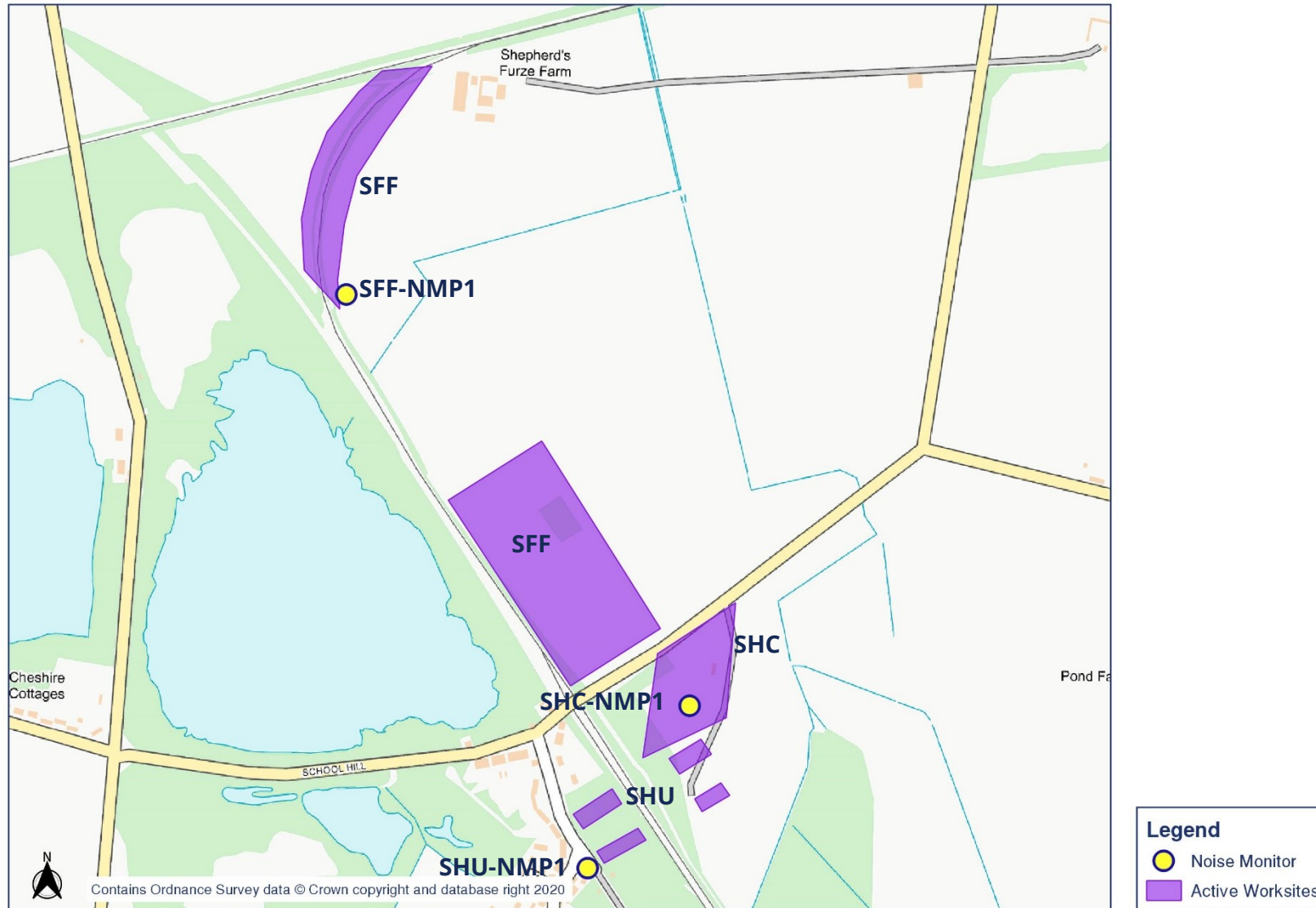


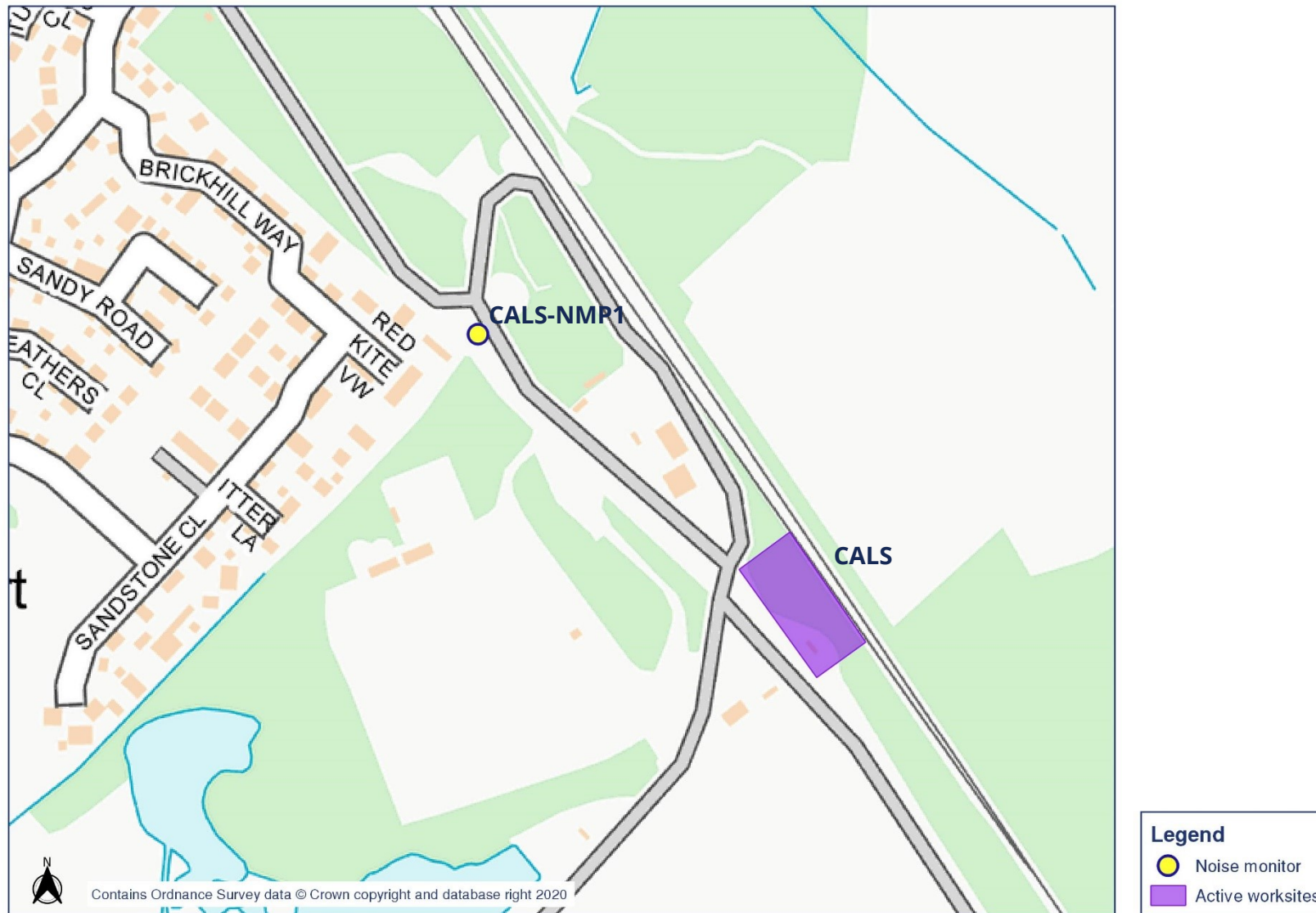






Appendix B Monitoring Locations

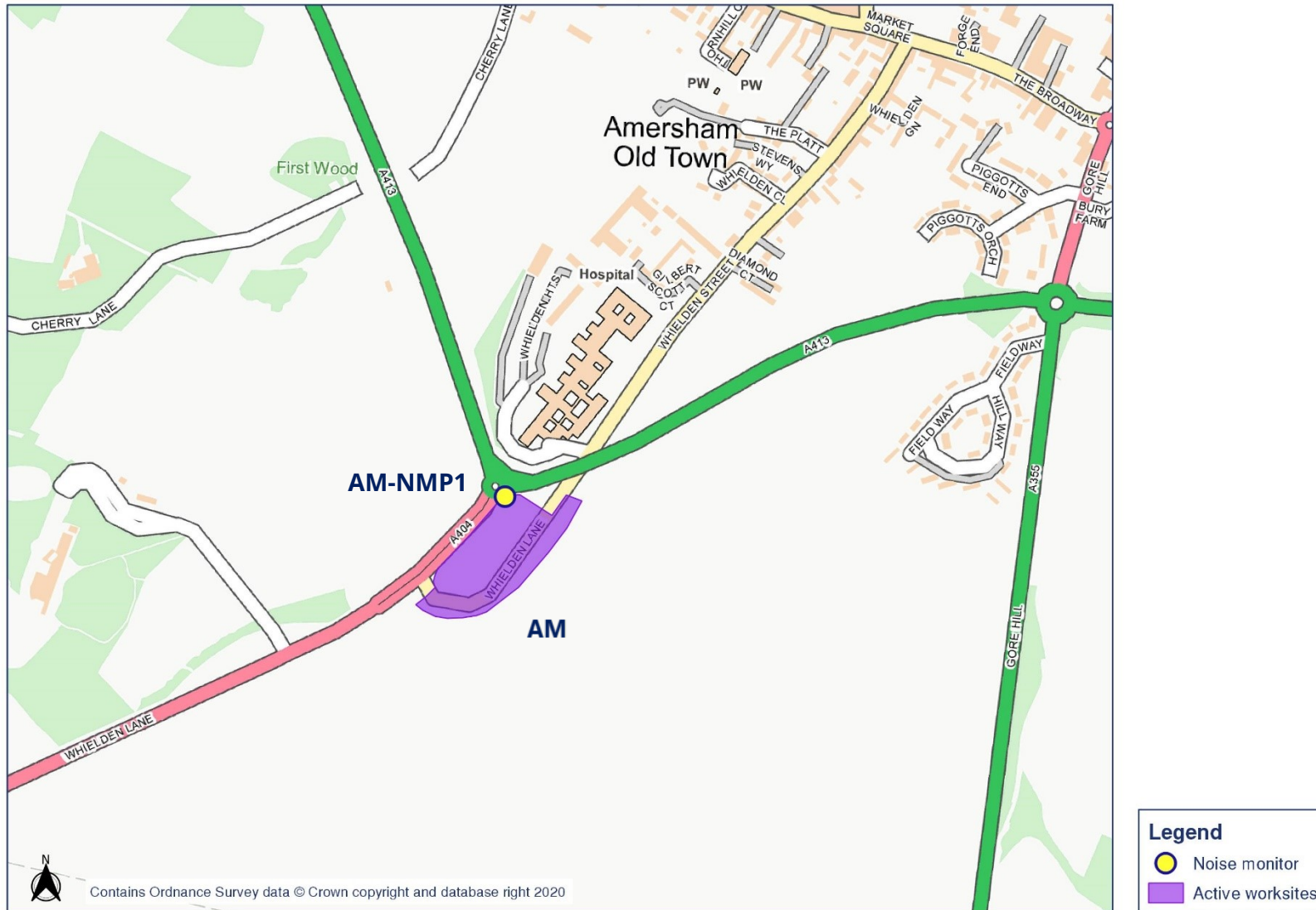


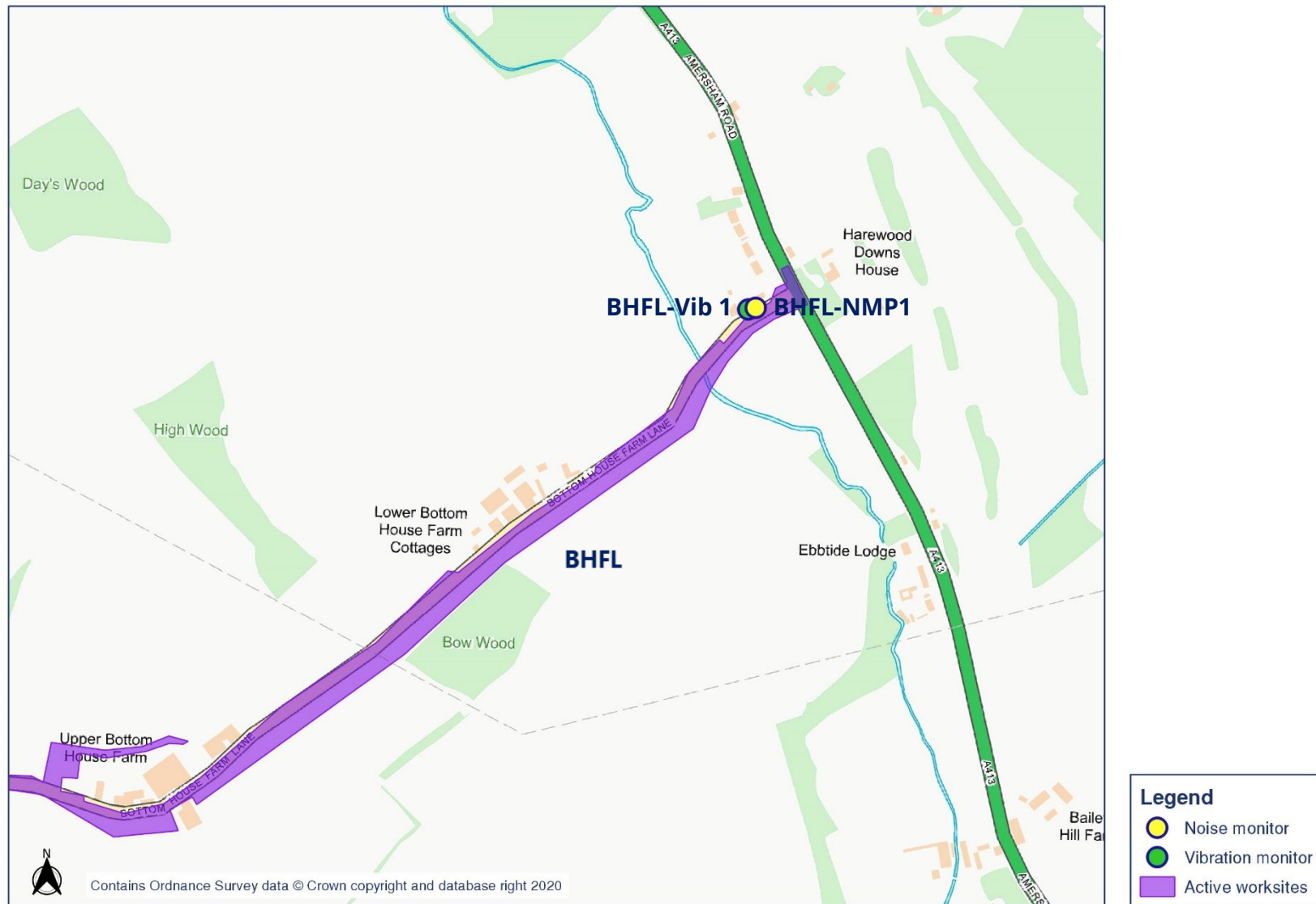


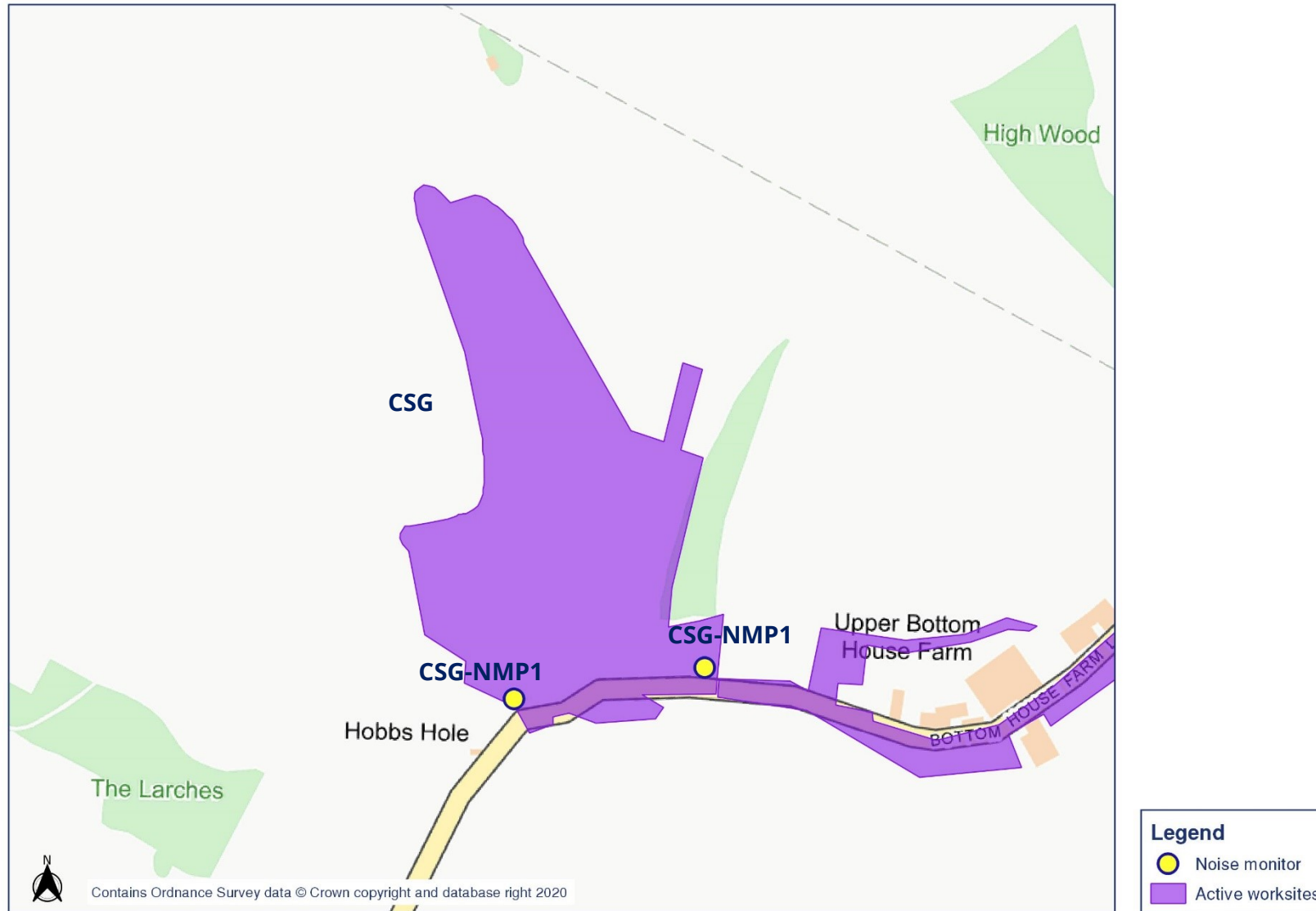


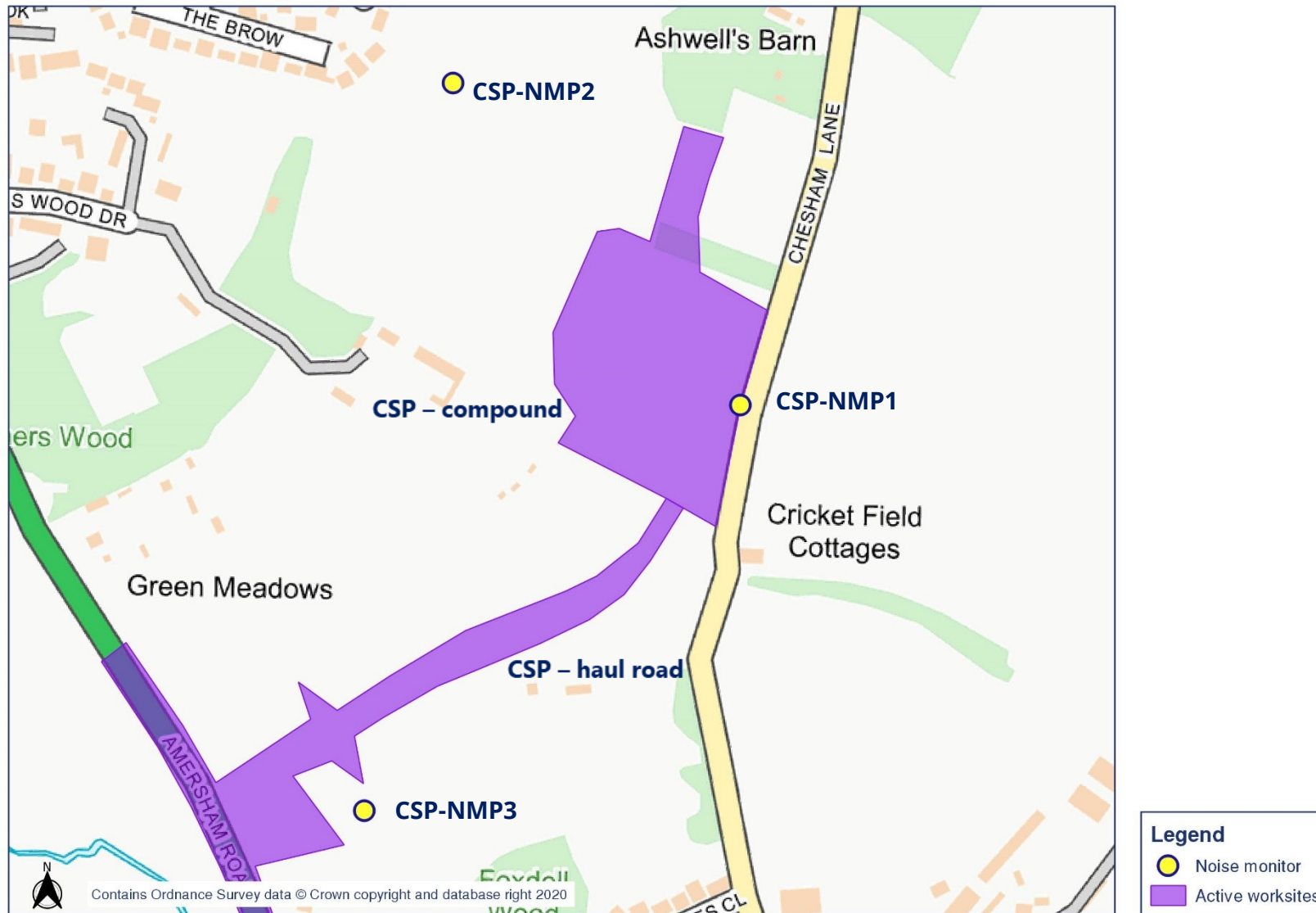












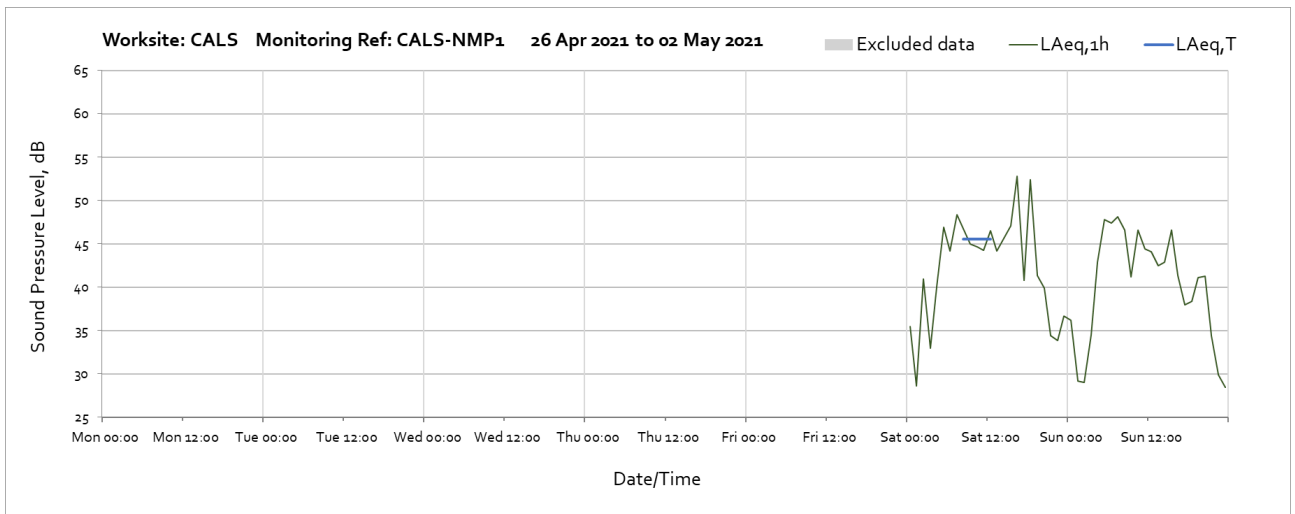


Appendix C Data

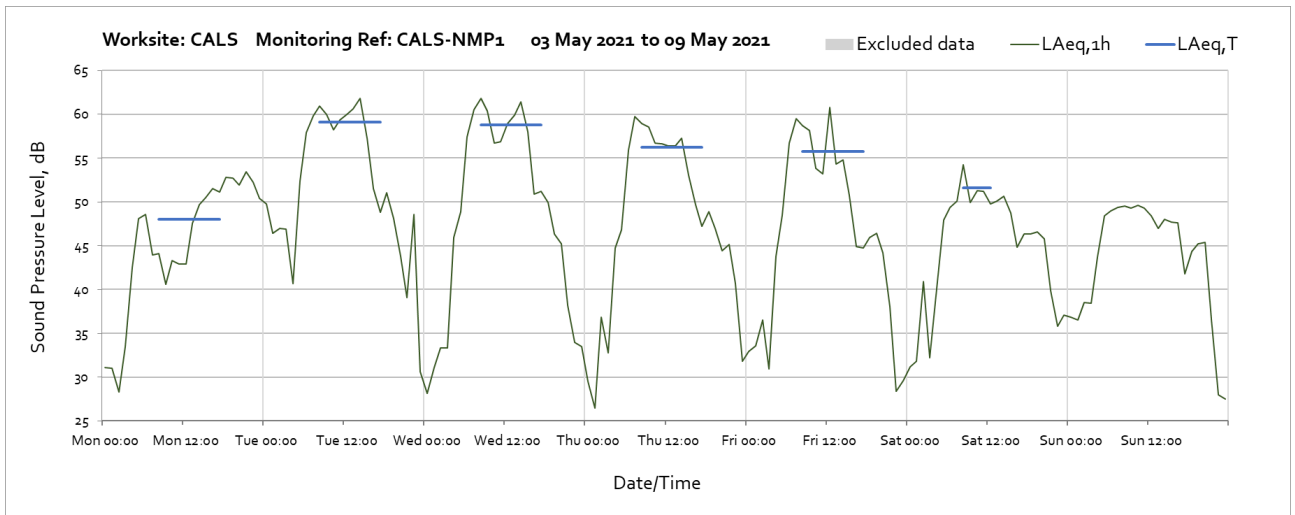
Noise

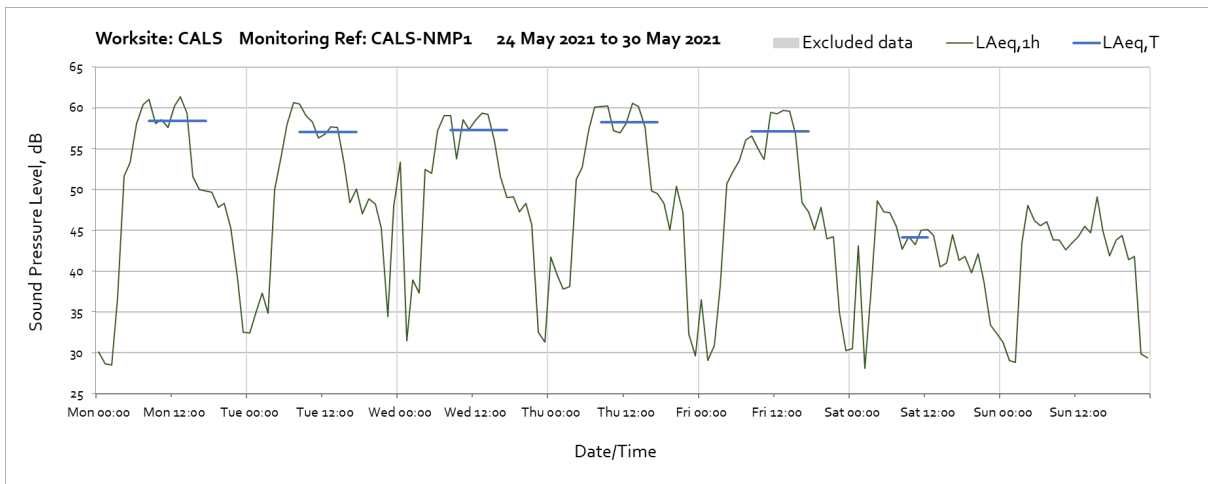
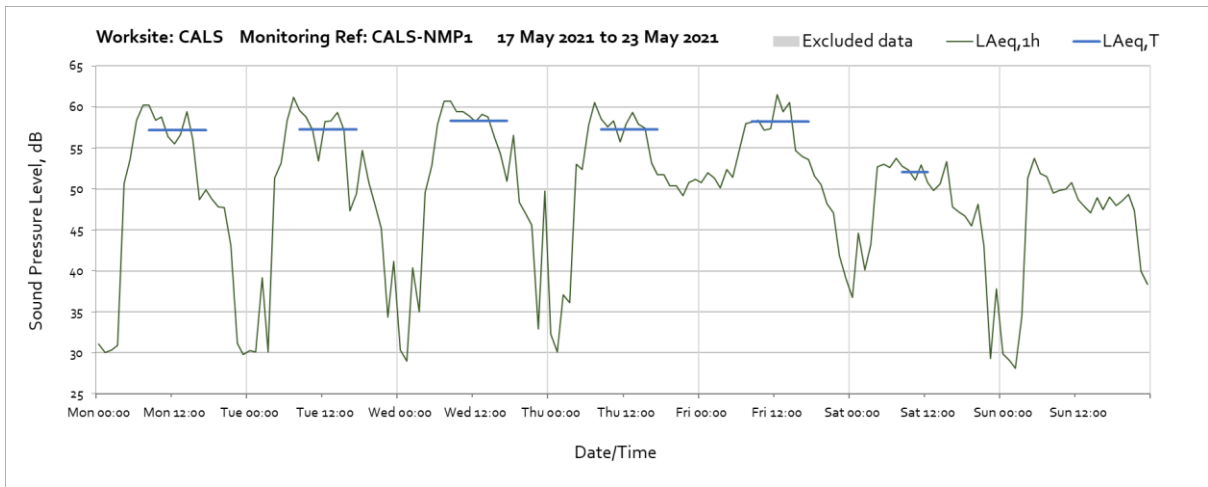
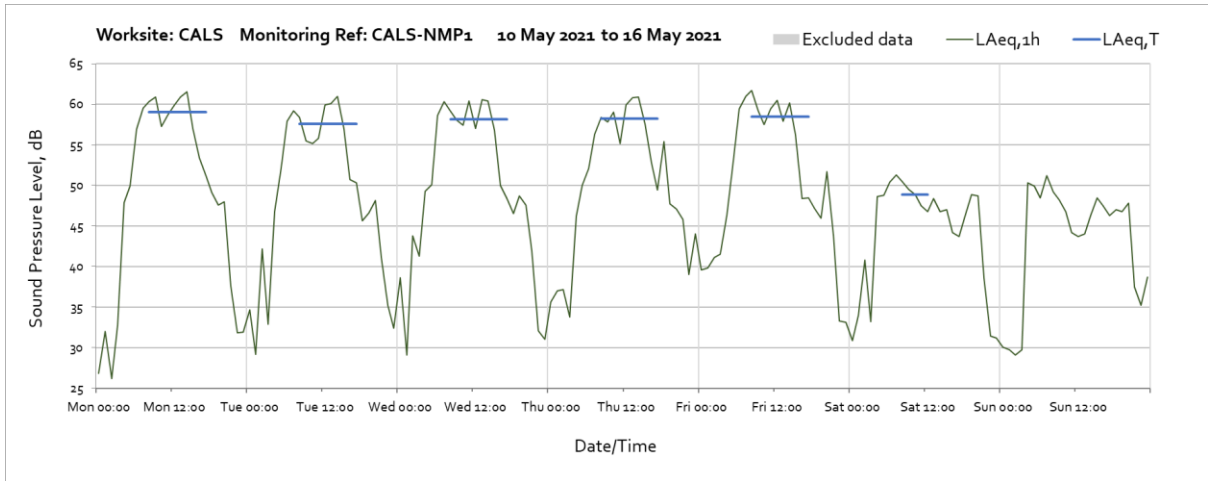
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have been excluded from the calculation of the $L_{Aeq,T}$ values in **Error! Reference source not found.** of the main report.

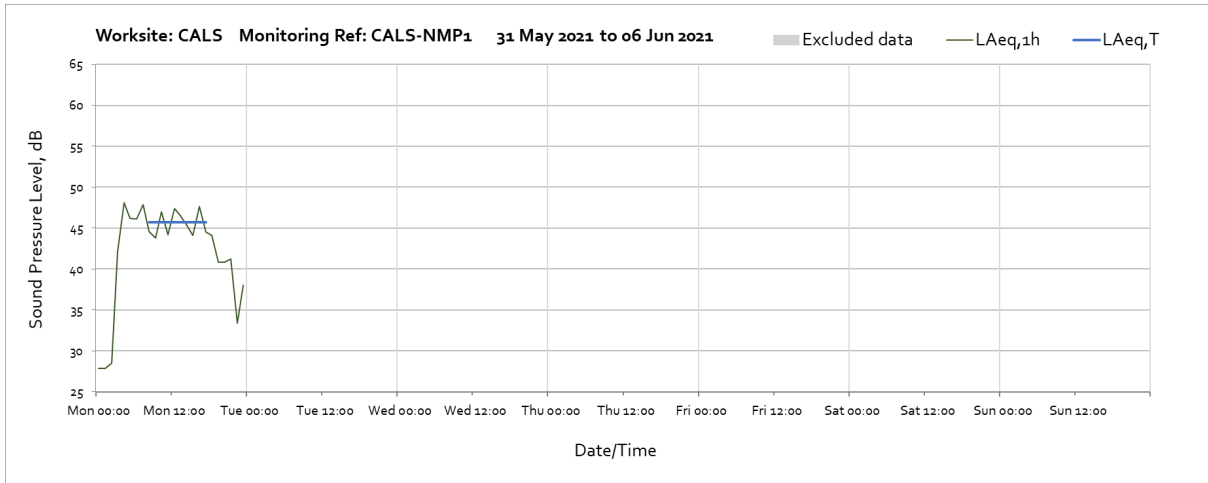
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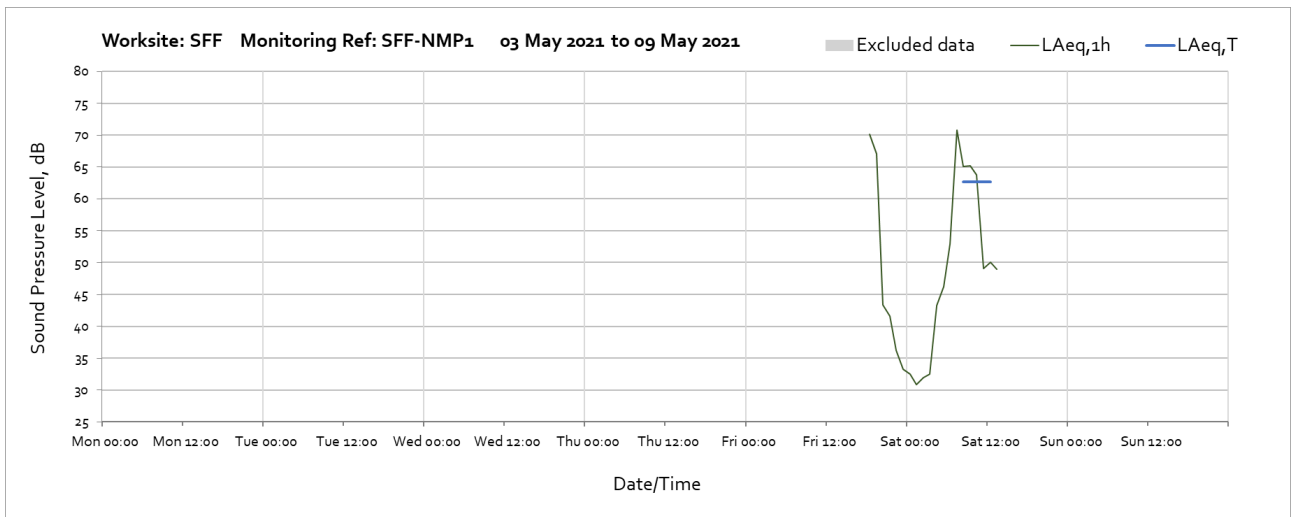
Note: The noise monitor was installed at 11:00 on Friday 7th May 2021.



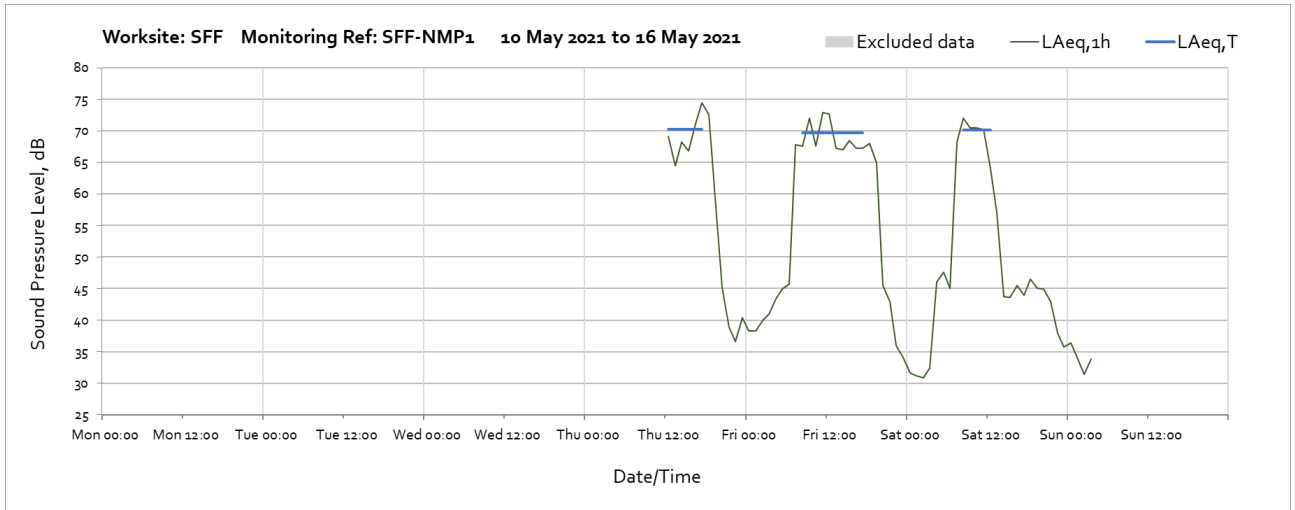




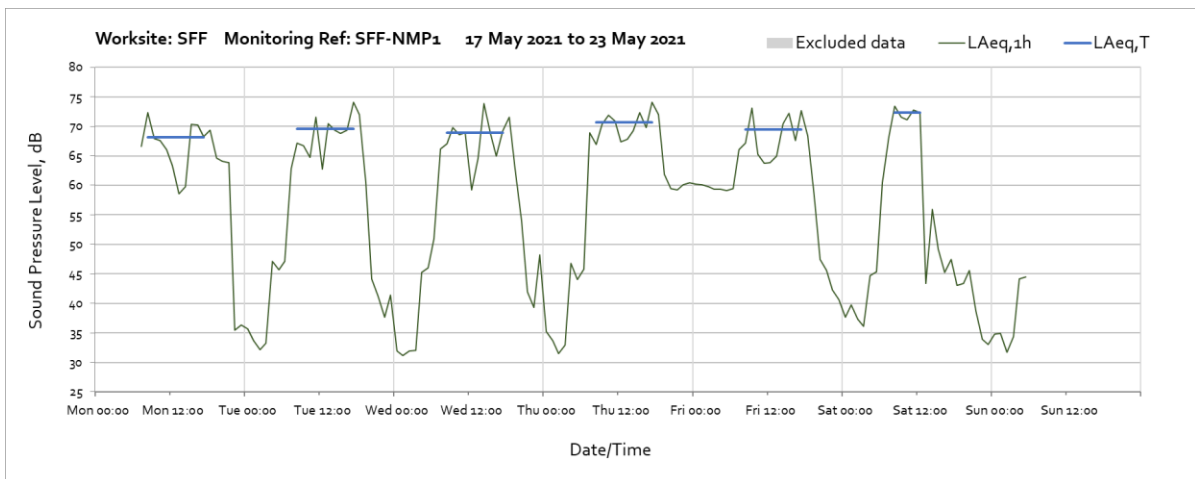
Worksite: SHC – Monitoring Ref: SHC-NMP1



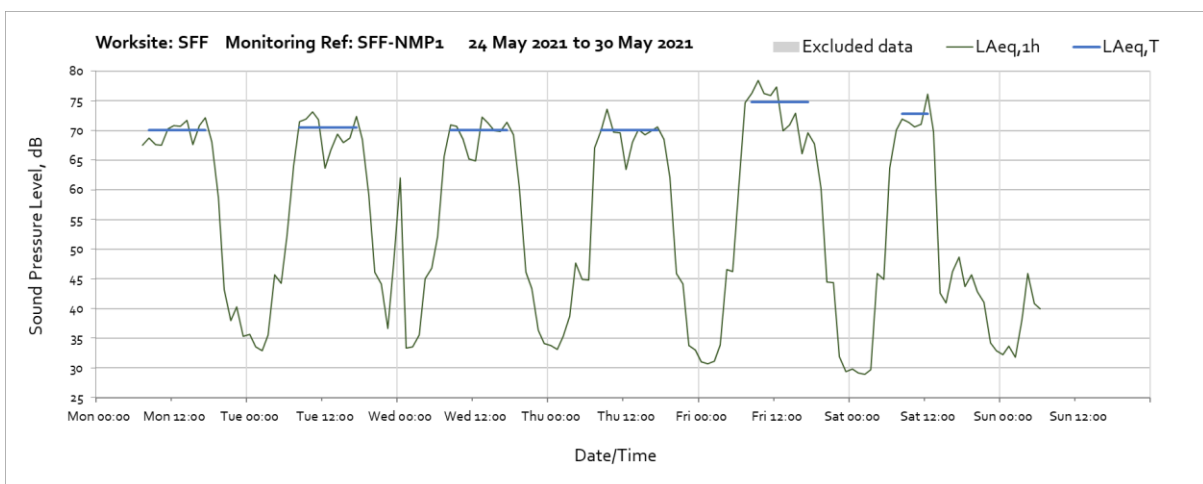
Note: The noise monitor was installed at 18:00 on Friday 7th May 2021. Missing data between 14:00 on Saturday 8th of May and 00:00 on Monday 10th May was due to malfunctioning of the equipment. The cause of the malfunction is under investigation by the equipment supplier. In order to prevent future loss of data, the noise monitor was replaced.



Note: Missing data between 00:00 on Monday 10th May and 12:00 on Thursday 13th May was due to malfunctioning of the equipment. Missing data between 04:00 on Sunday 16th of May and 00:00 on Monday 17th May was due to removal of power to the equipment.



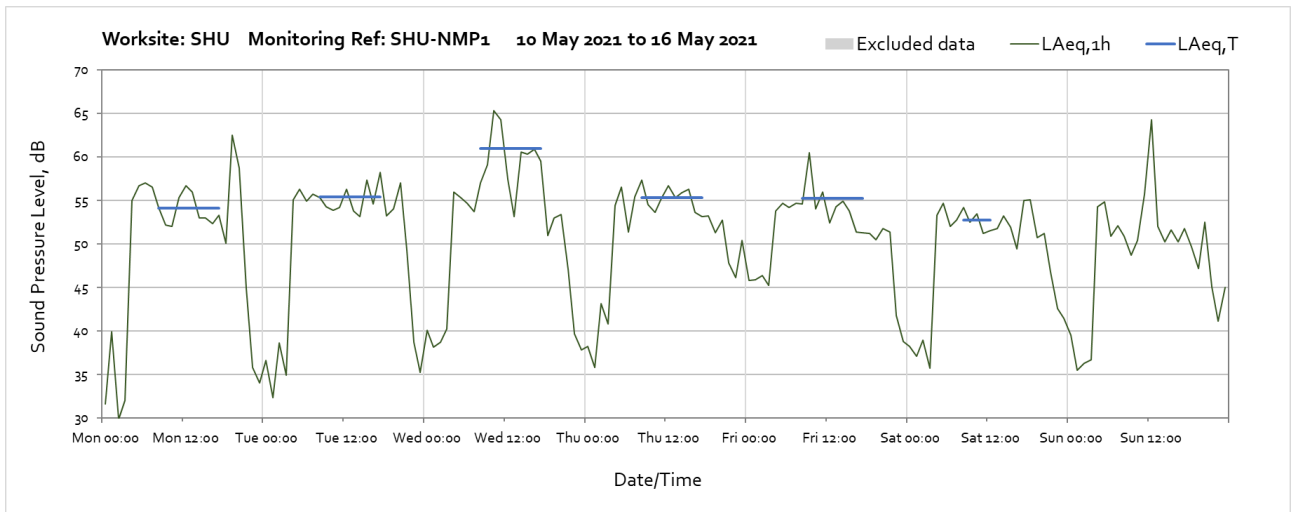
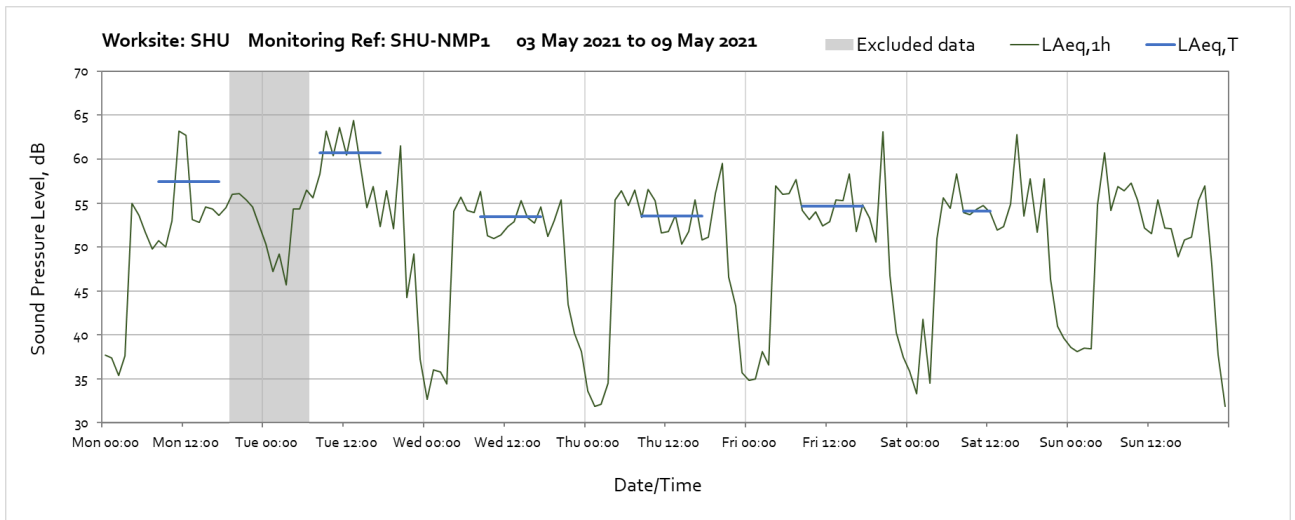
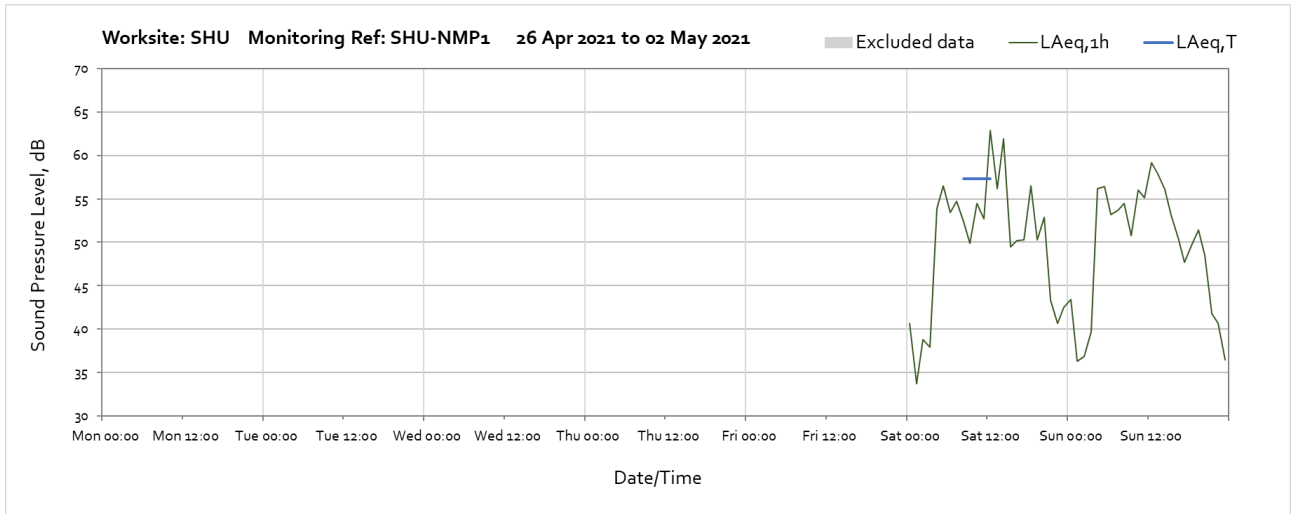
Note: Missing data between 00:00 and 07:00 on Monday 17th May and between 06:00 on Sunday 23rd May and 00:00 on Monday 24th May was due to removal of power to the equipment.

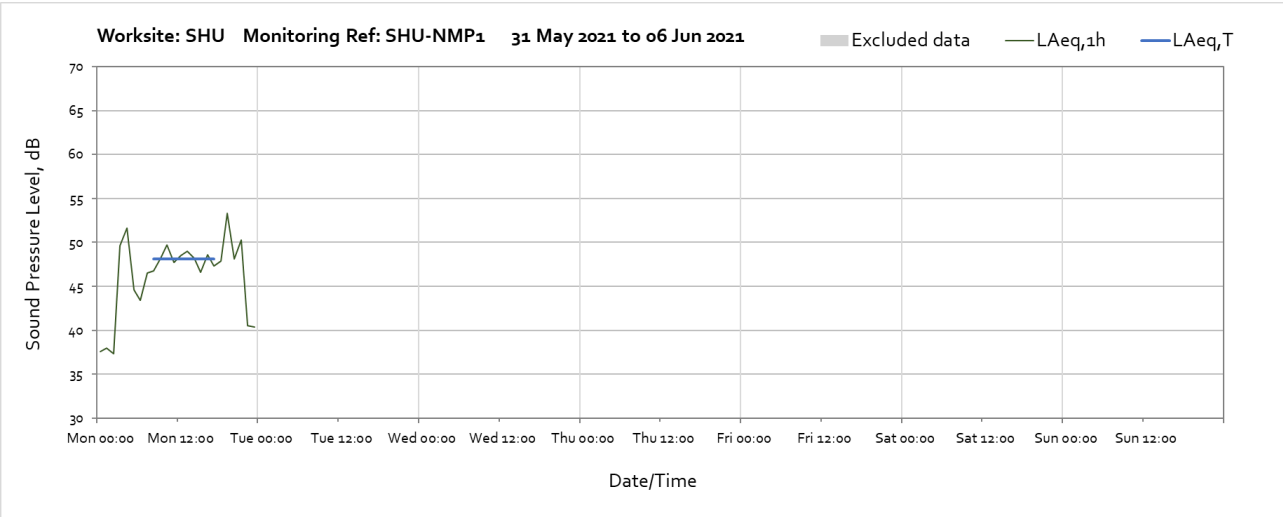
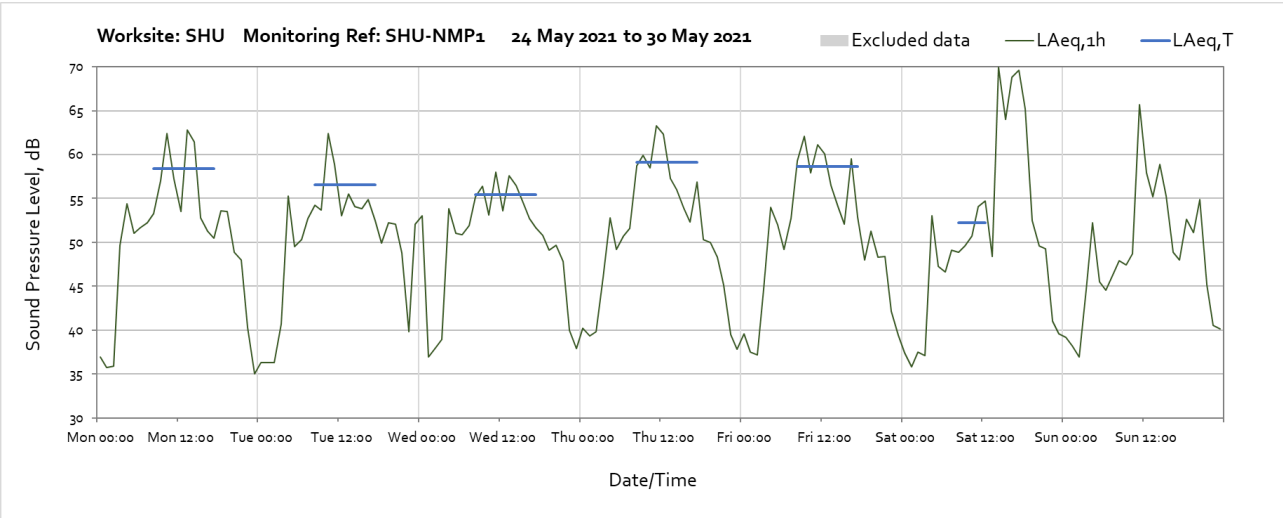
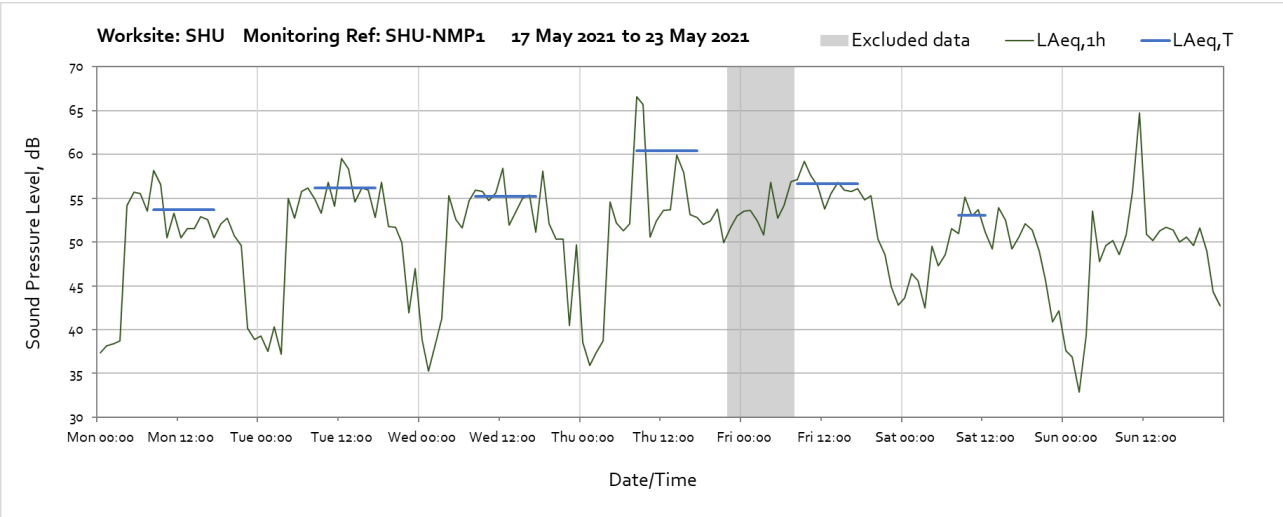


Note: Missing data between 00:00 and 07:00 on Monday 24th May and from 07:00 on Sunday 30th May till the end of the month was due to removal of power to the equipment.

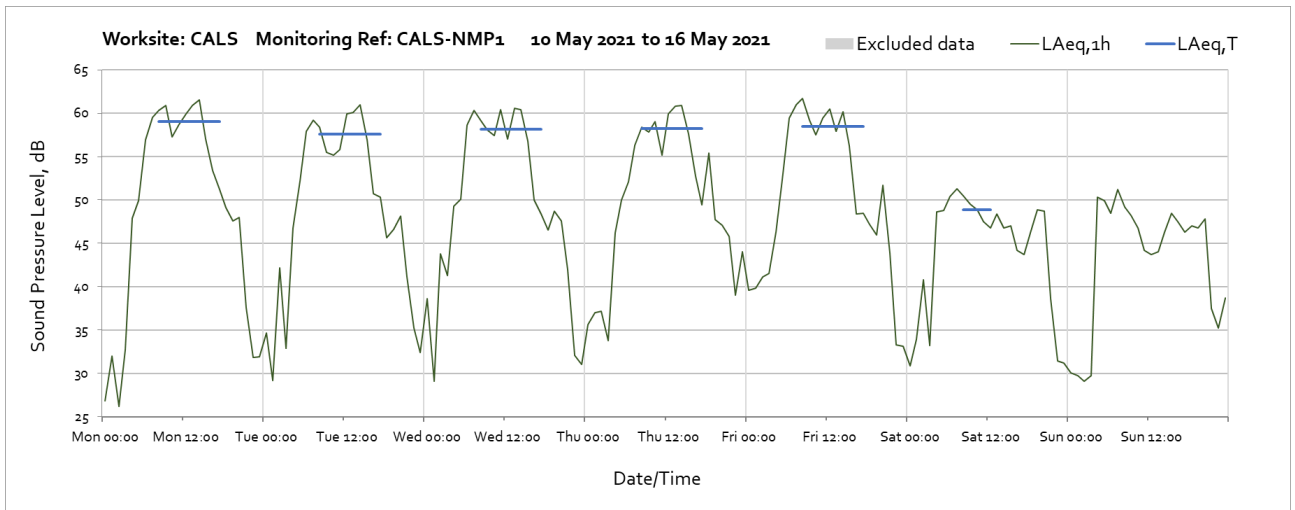
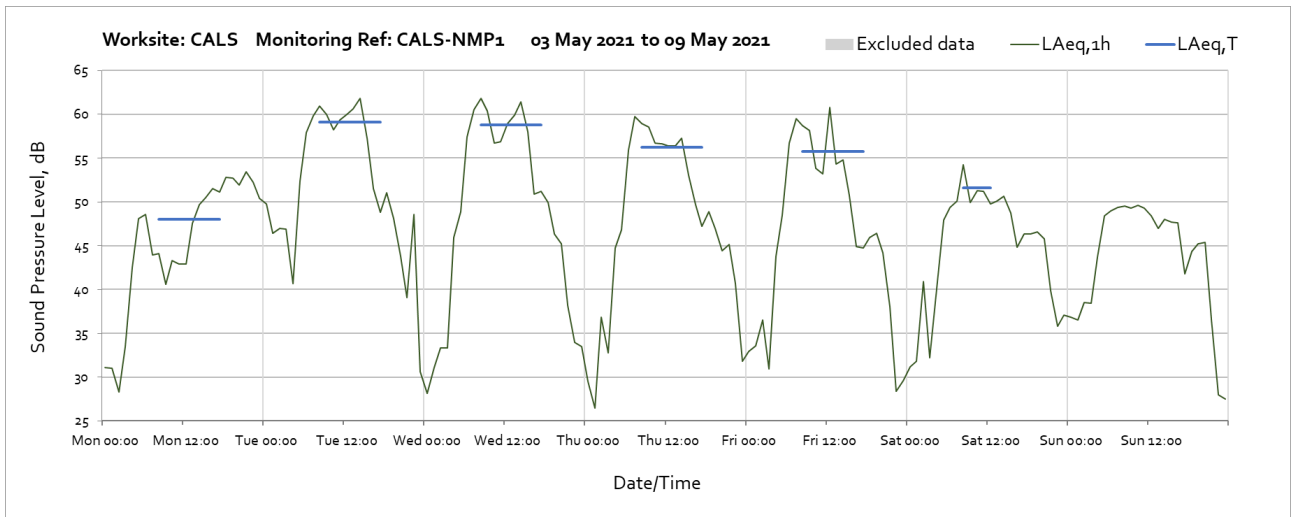
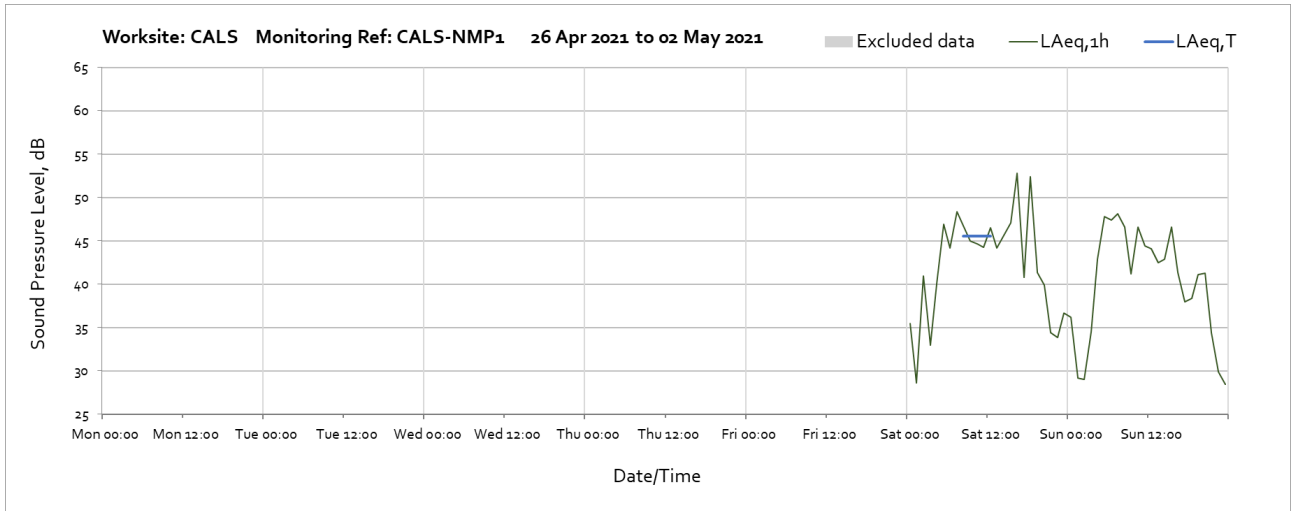
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Worksite: SHU – Monitoring Ref: SHU-NMP1

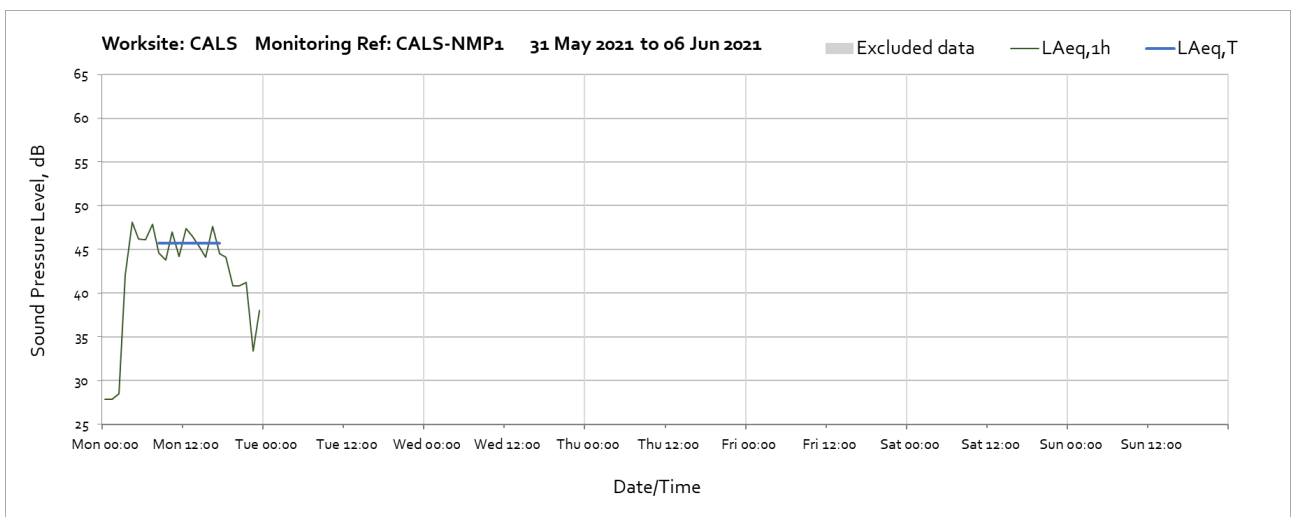
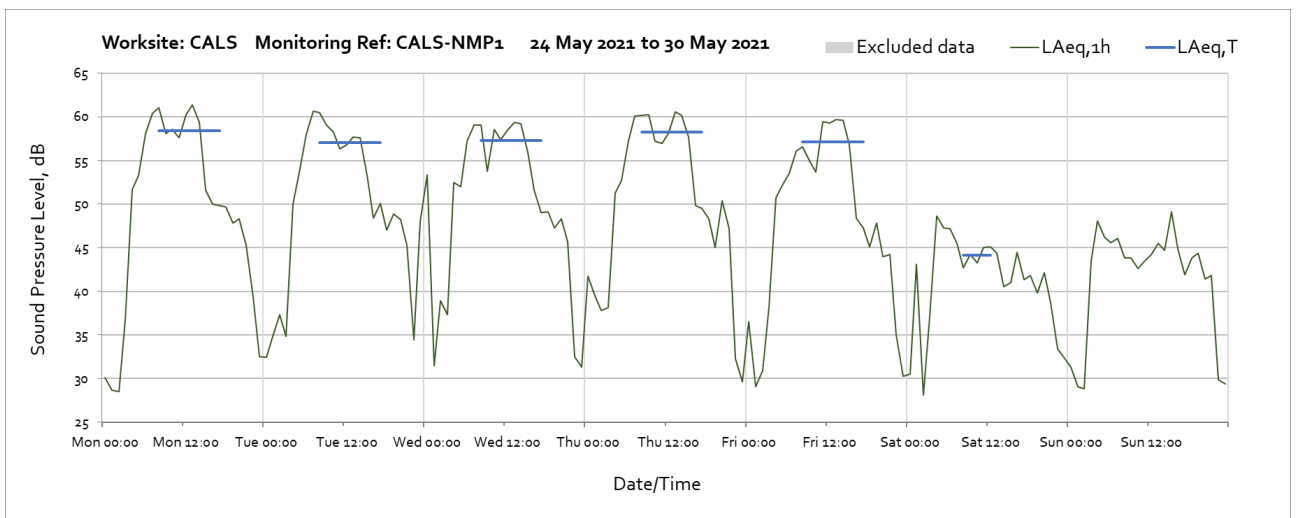
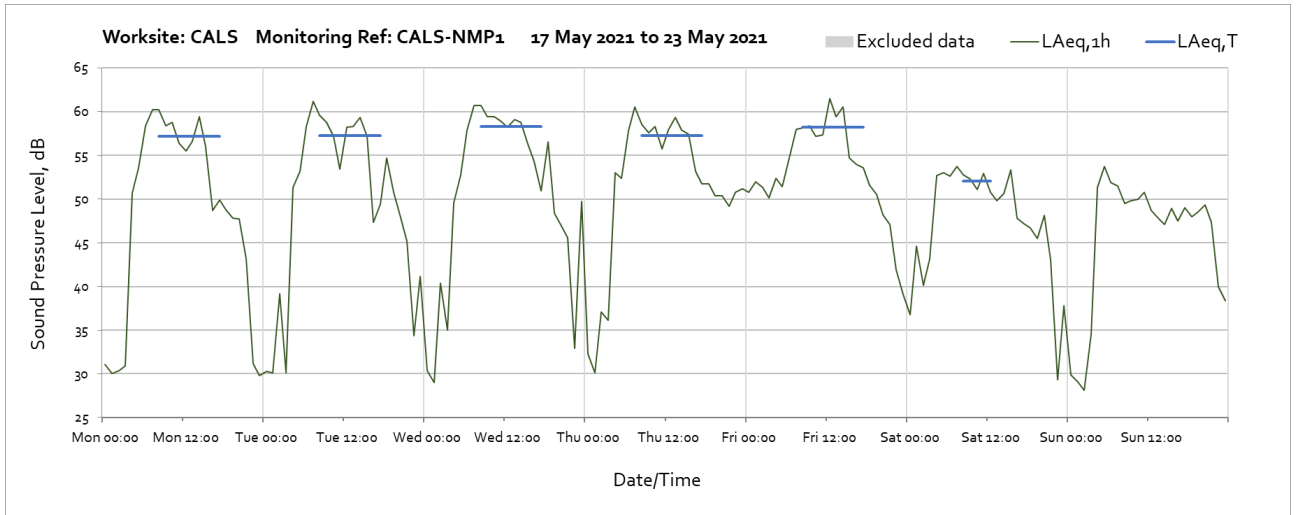




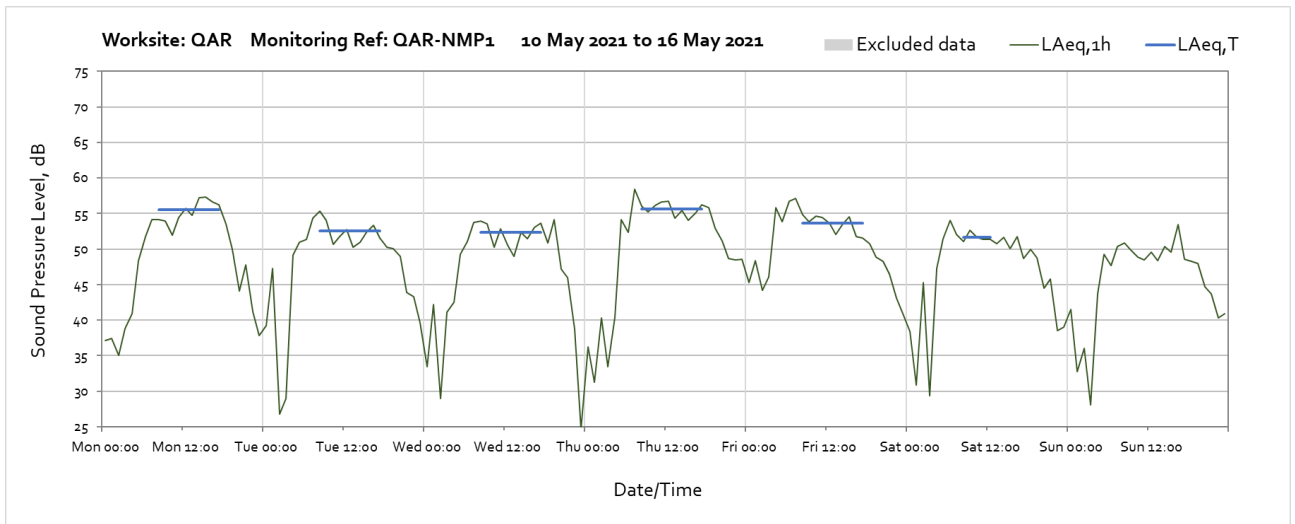
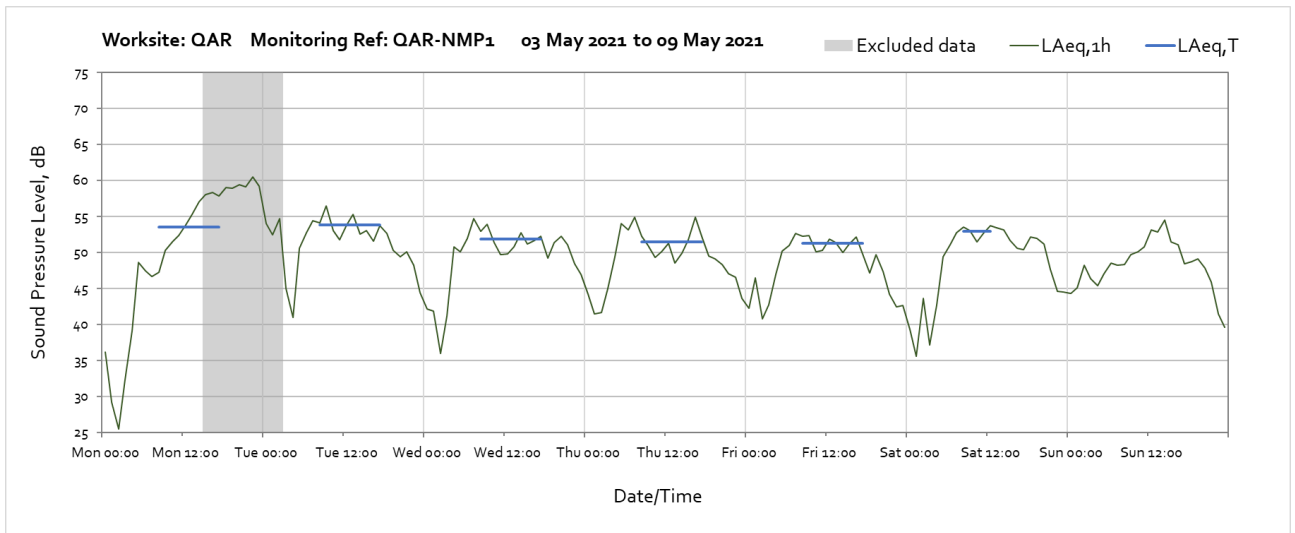
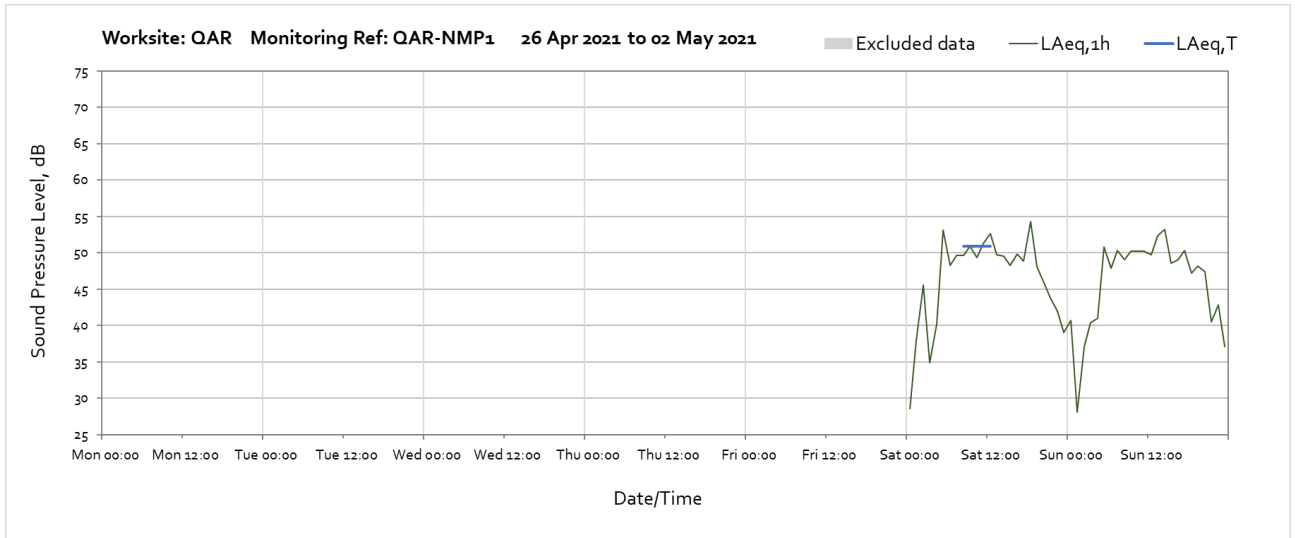
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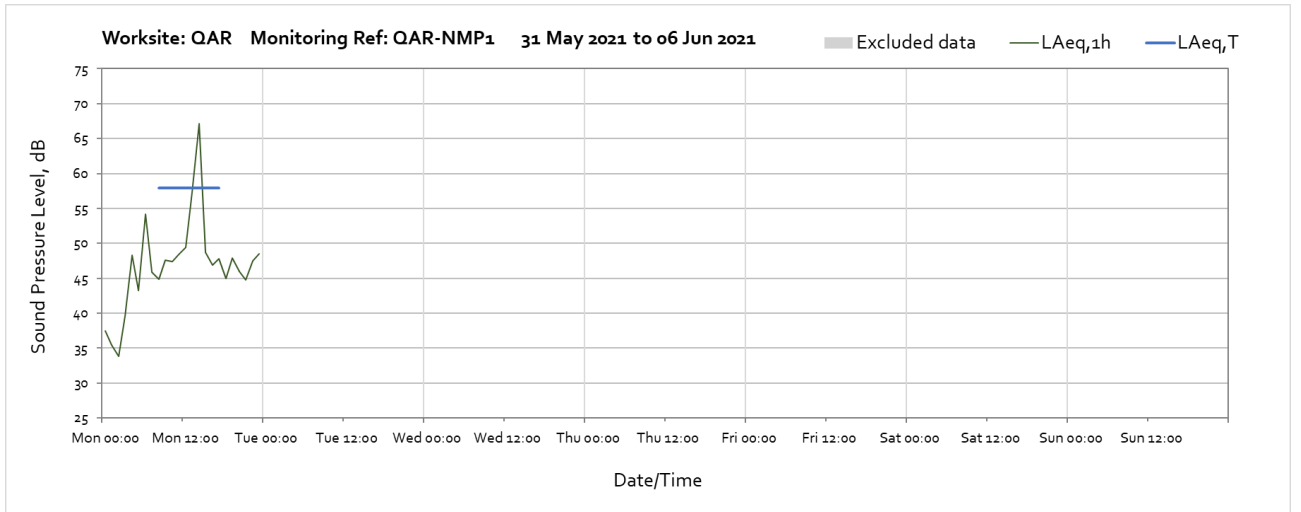
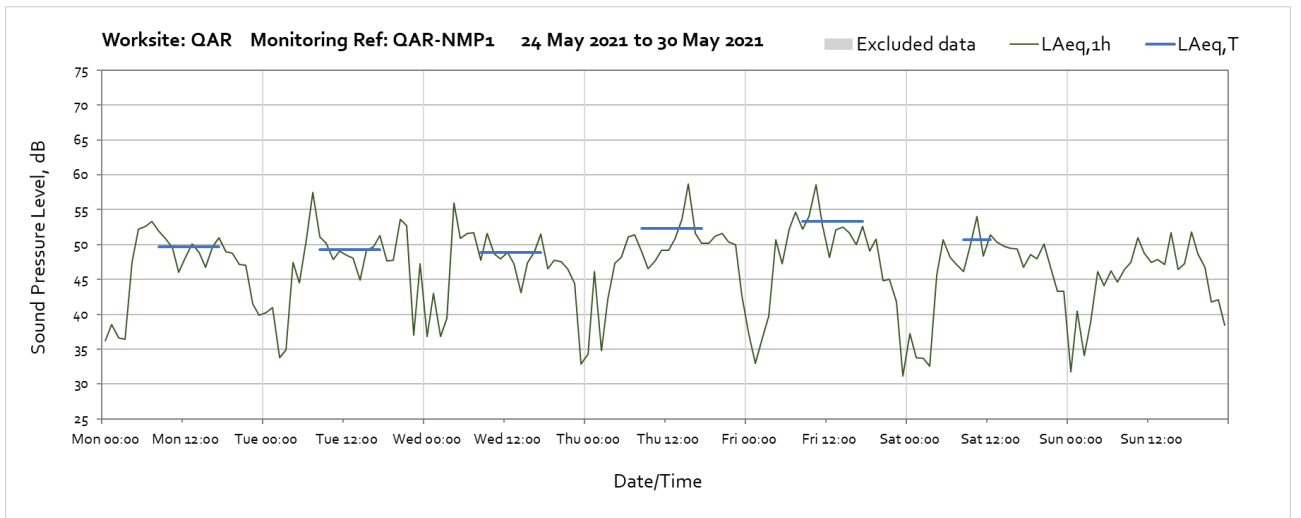
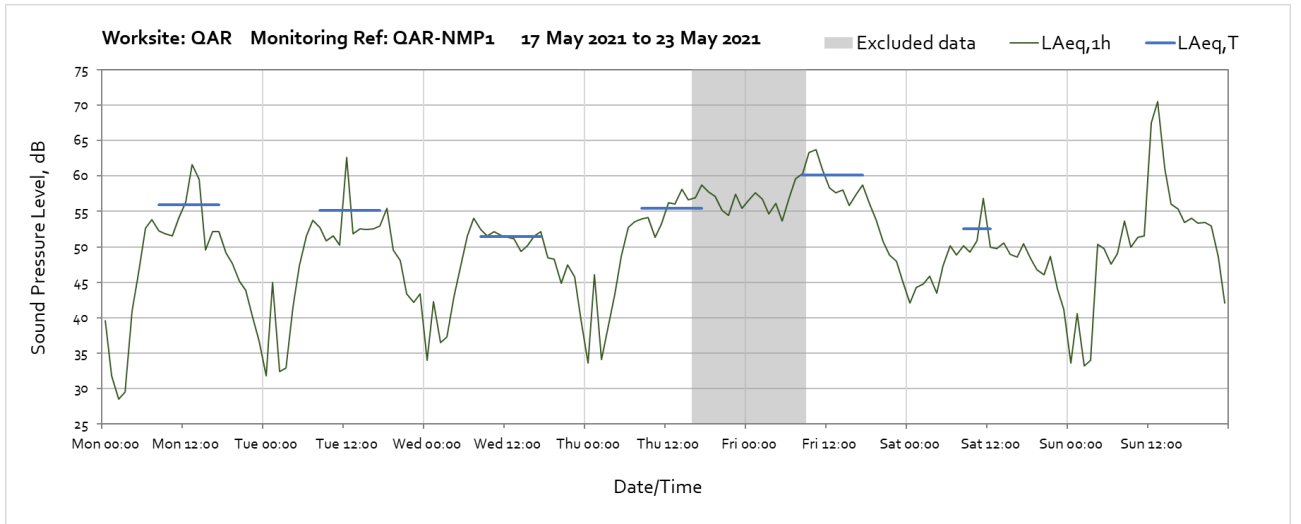


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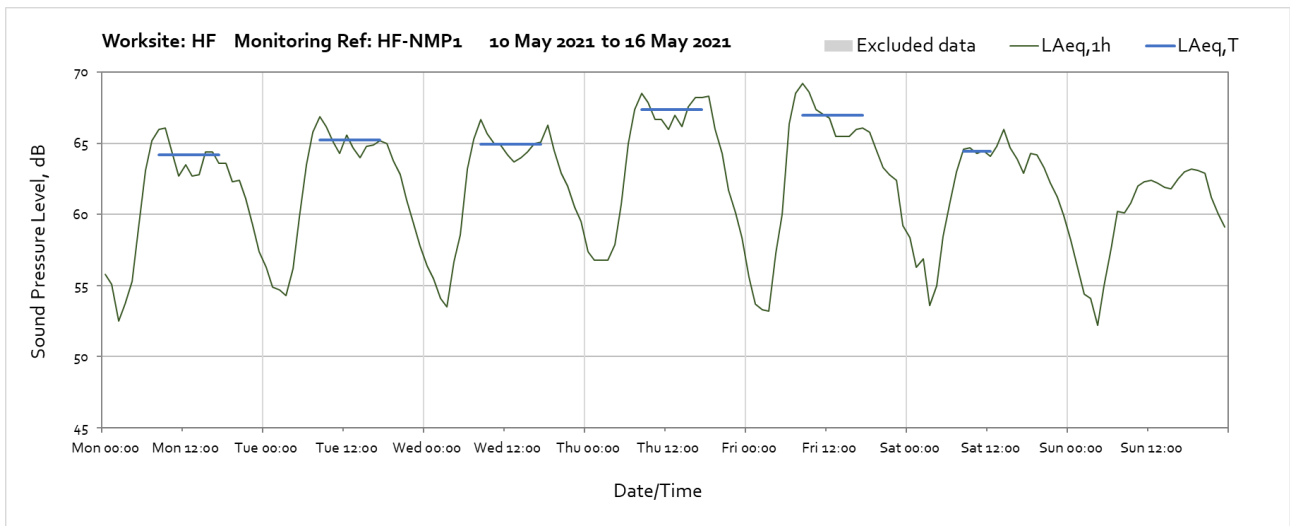
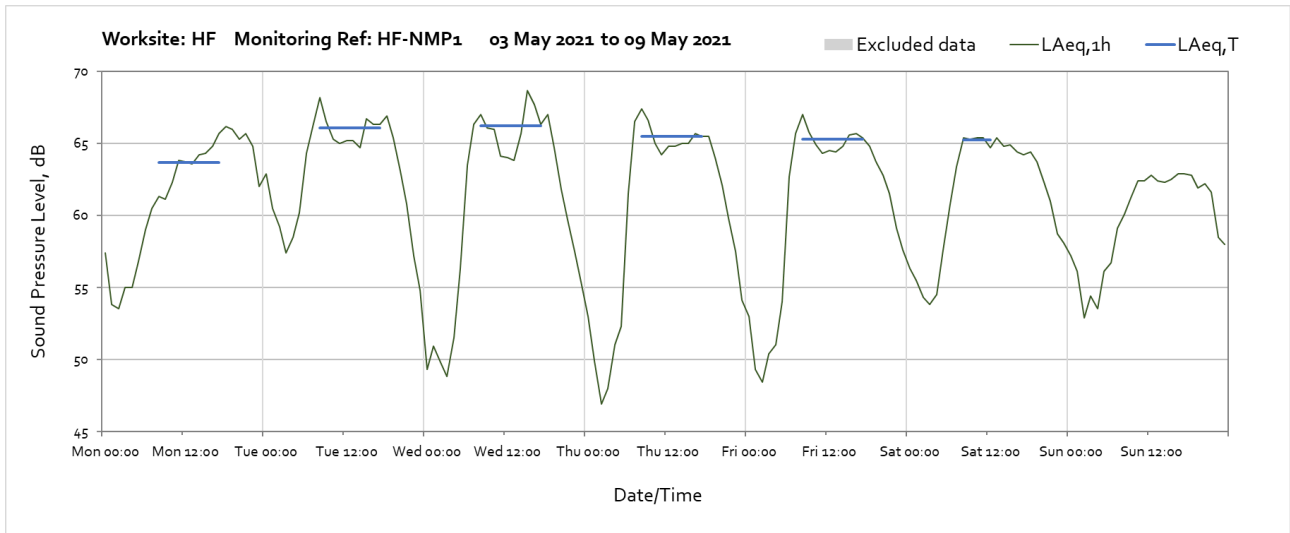
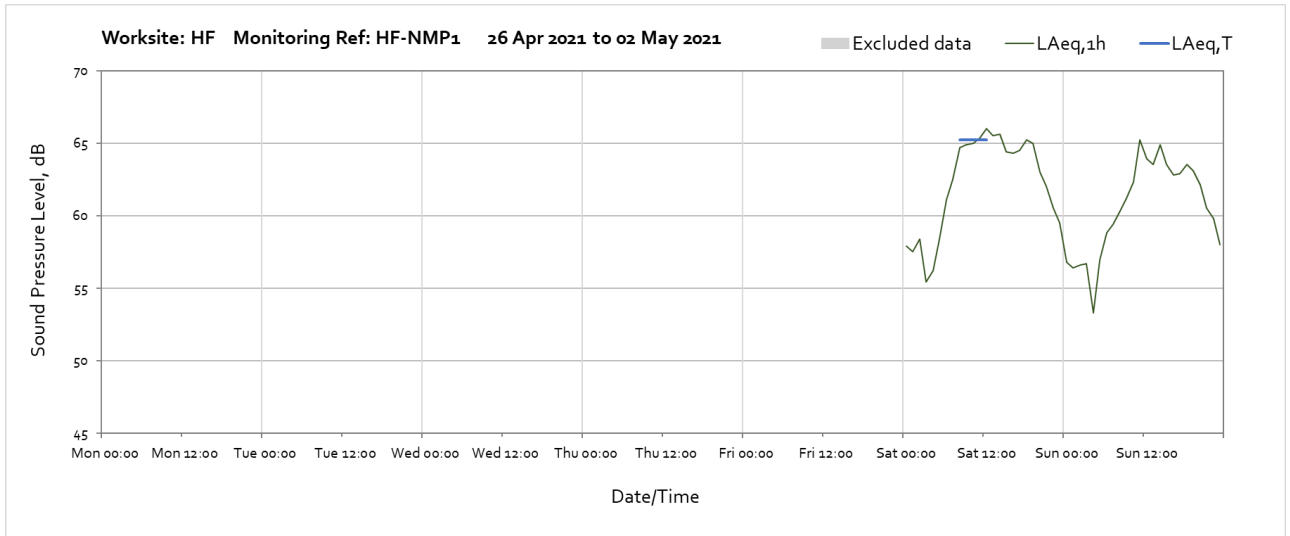


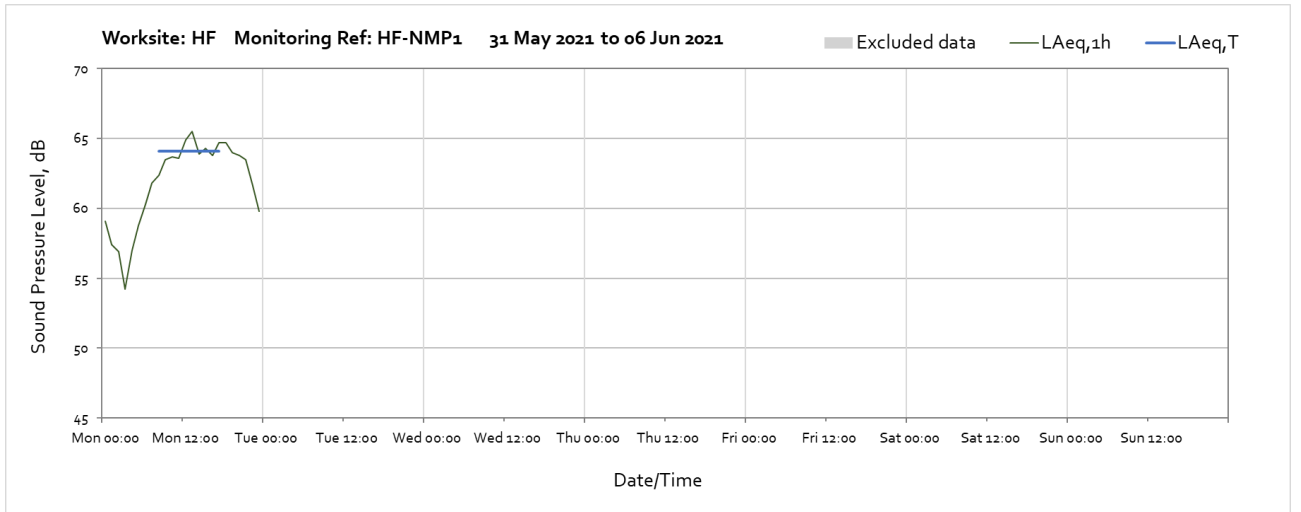
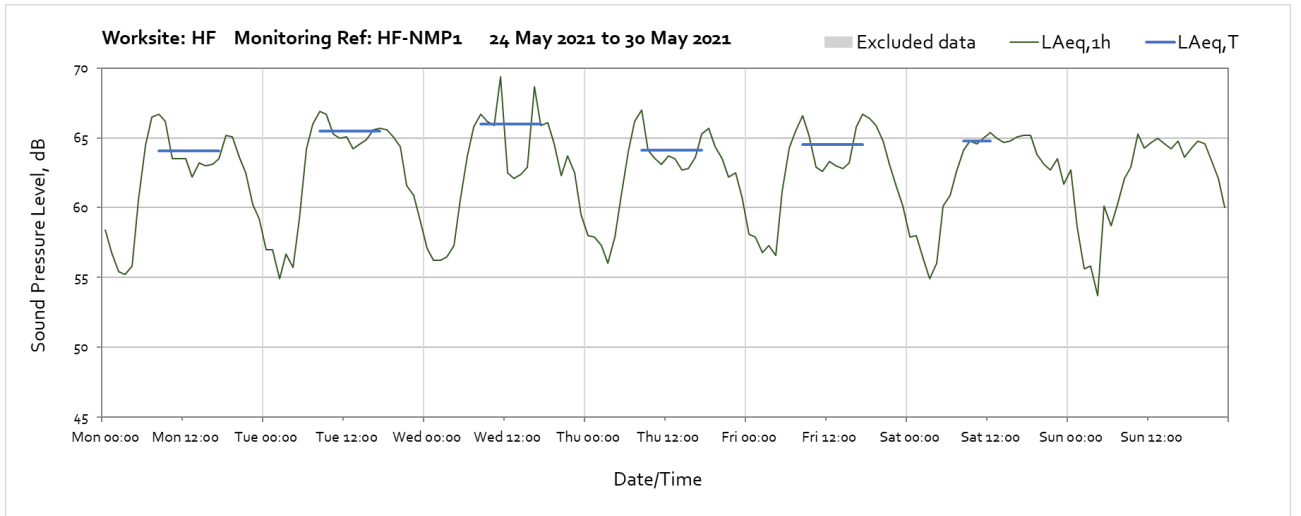
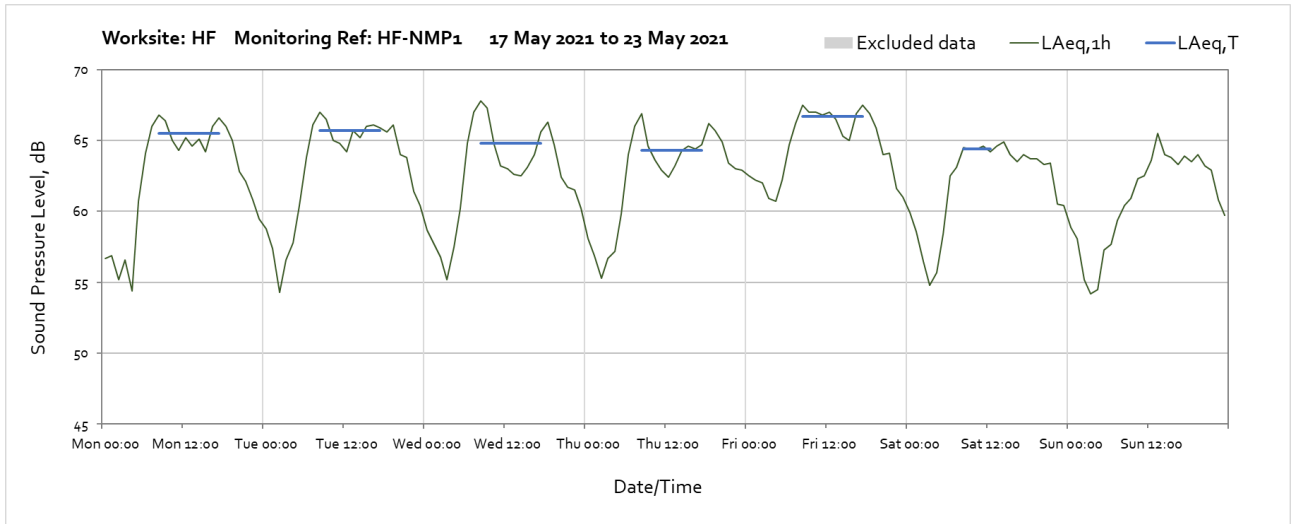
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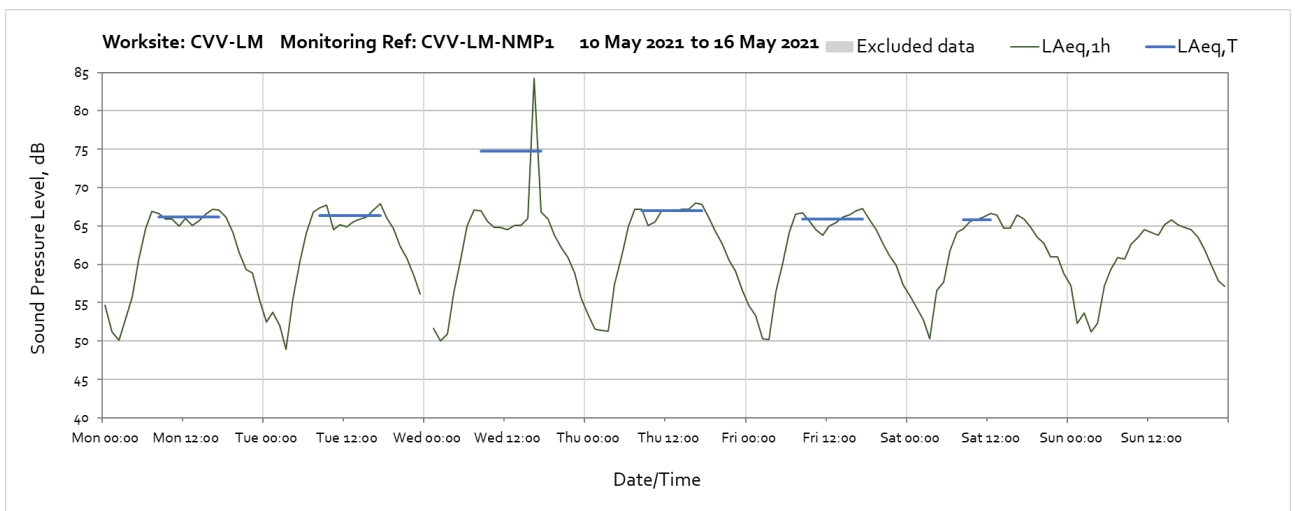
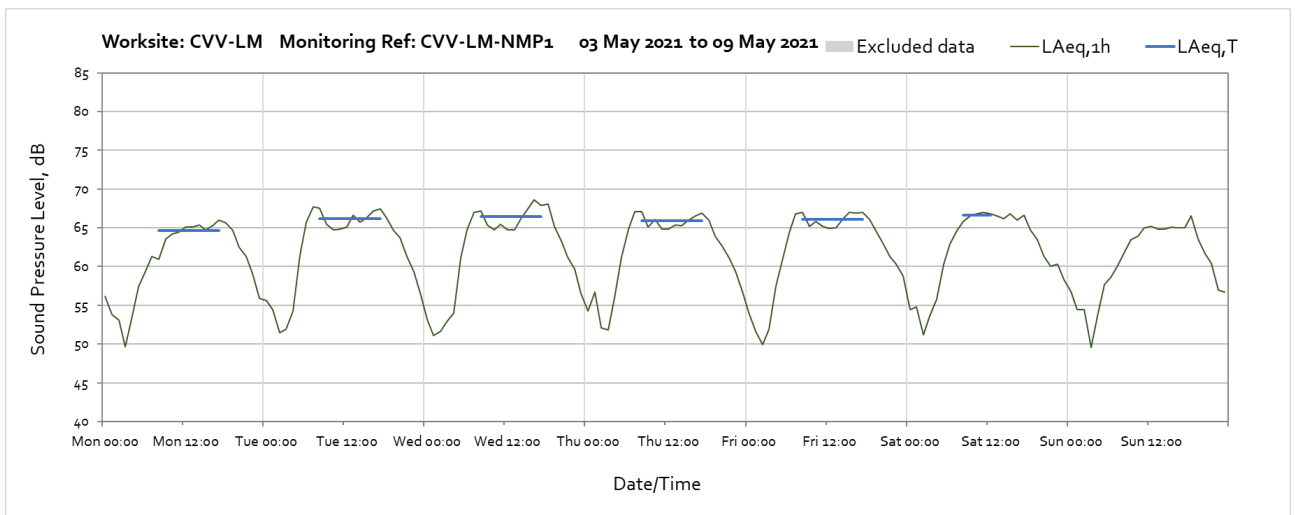
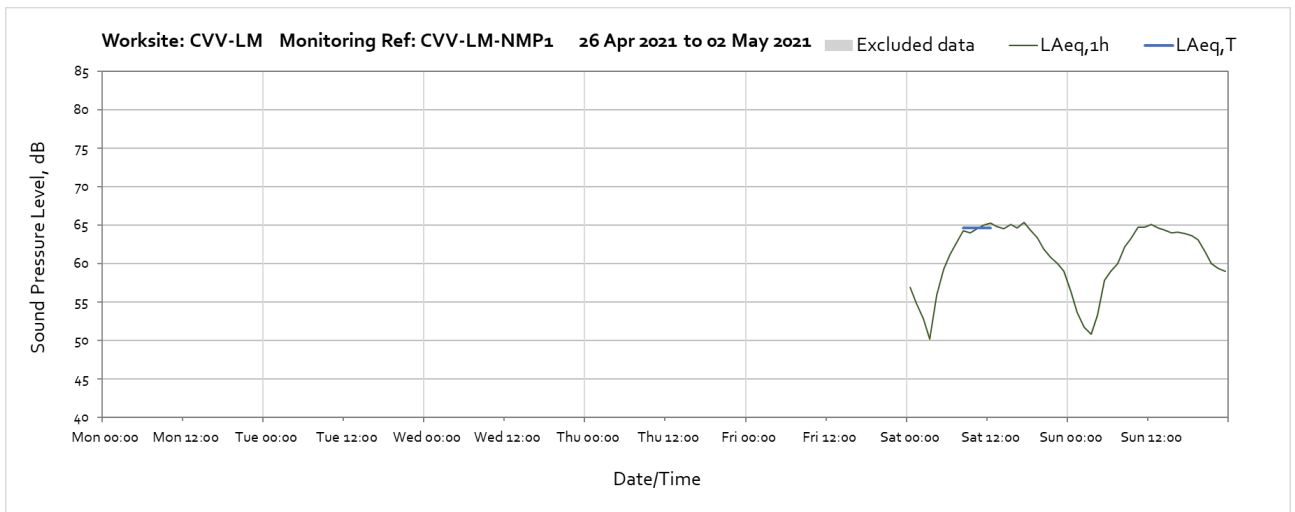


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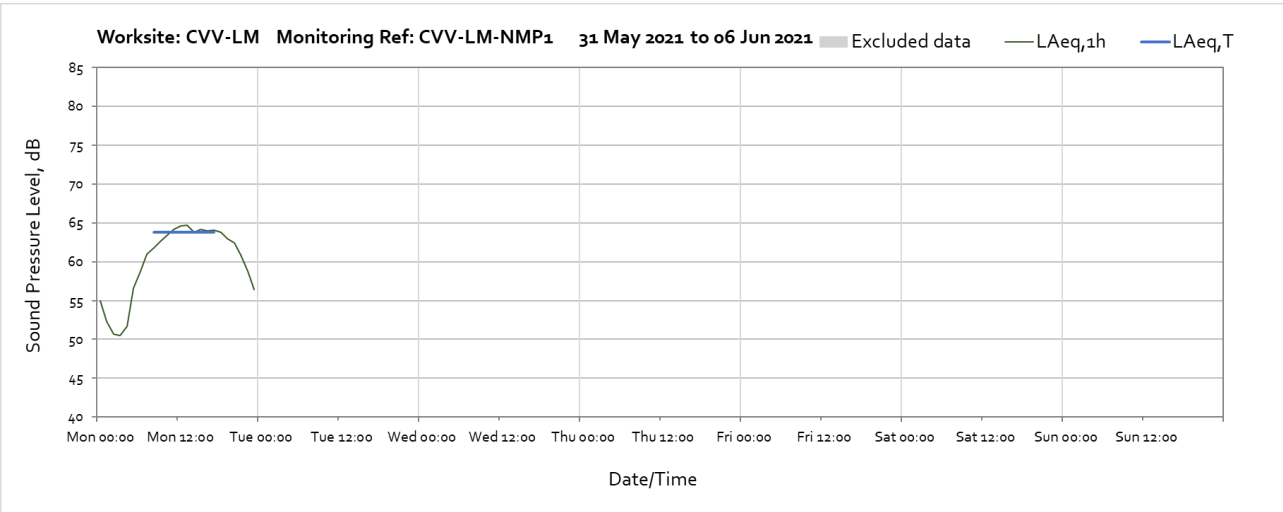
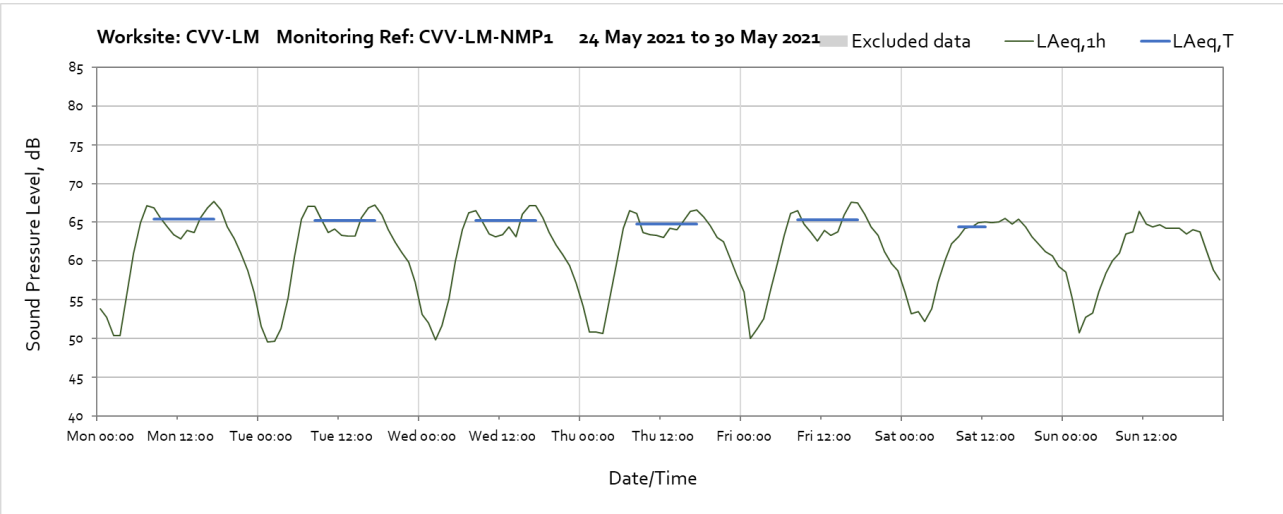
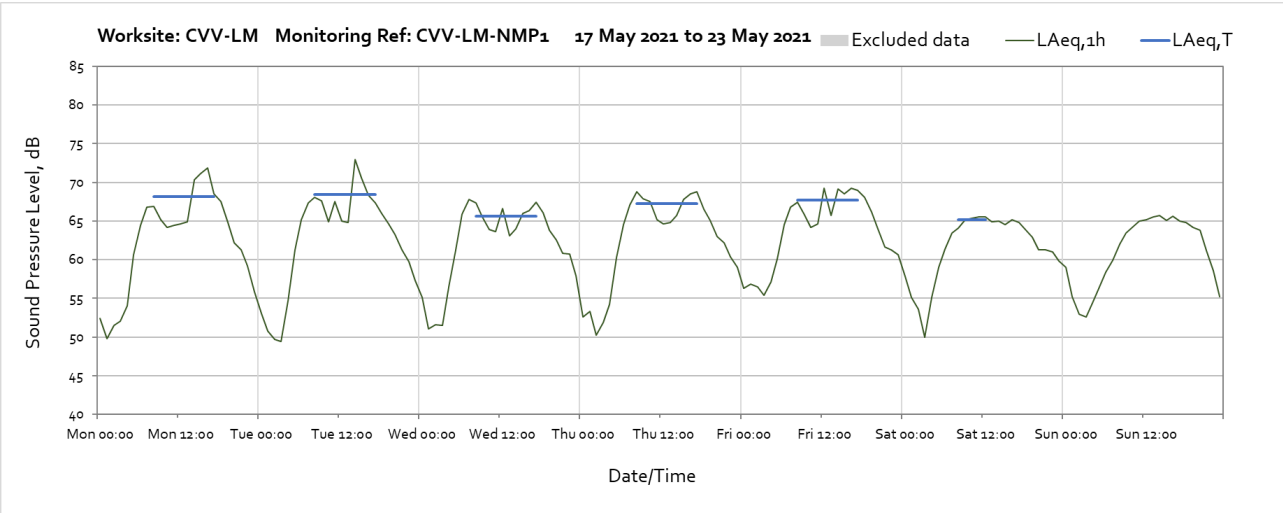


Worksite: CVV-LM – Monitoring Ref: CVV-LM-NMP1

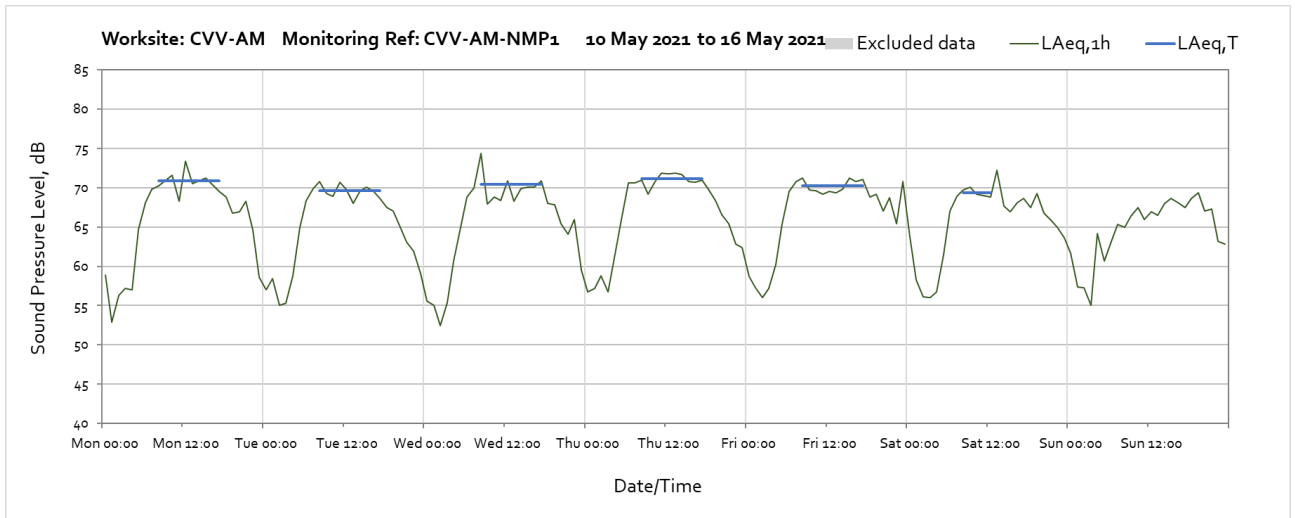
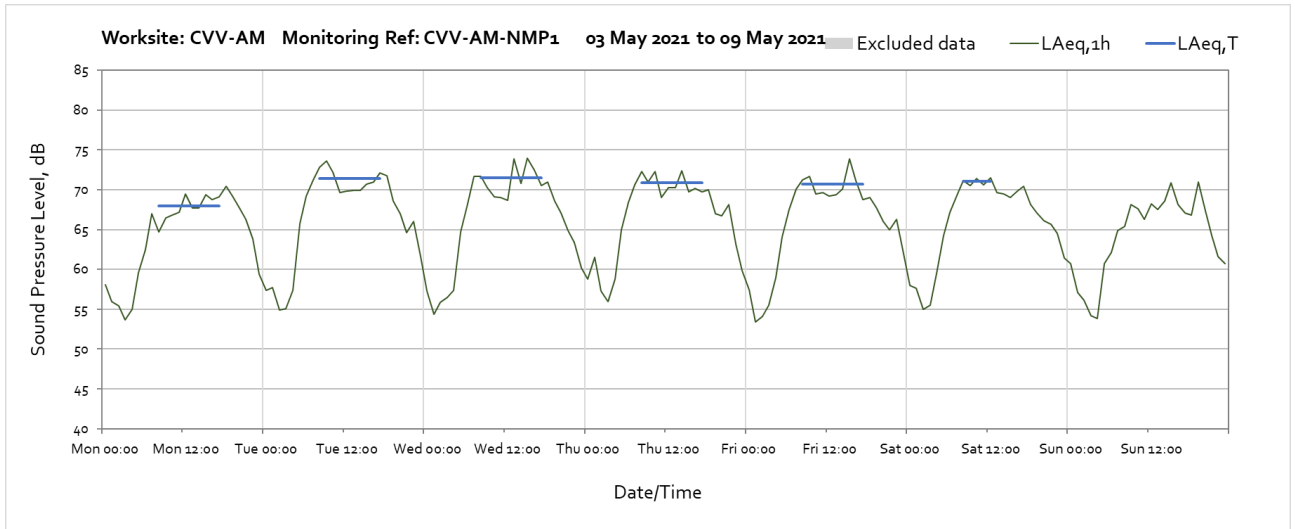
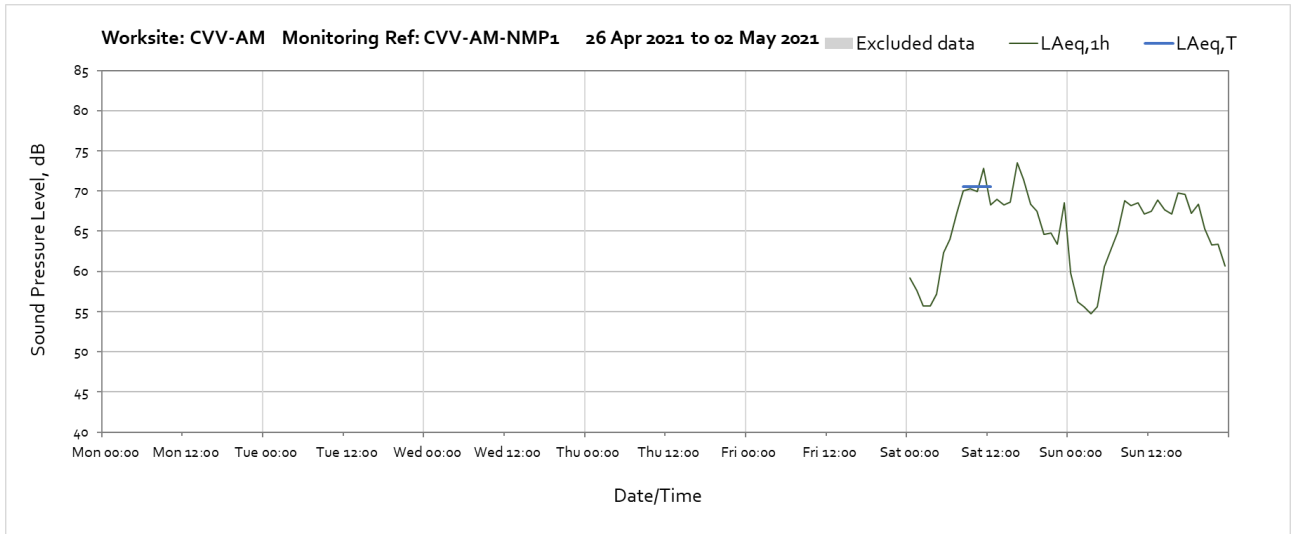


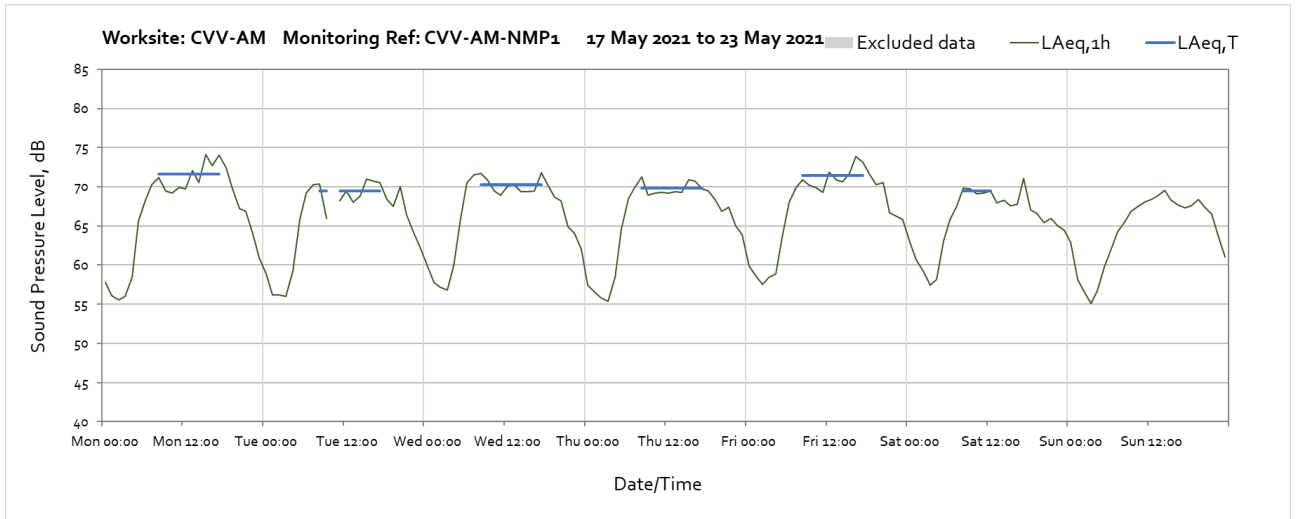
Note: Missing data between 10:00 and 11:00 on Wednesday 12th May was due to the monitoring being paused during maintenance operations and setting adjustments.

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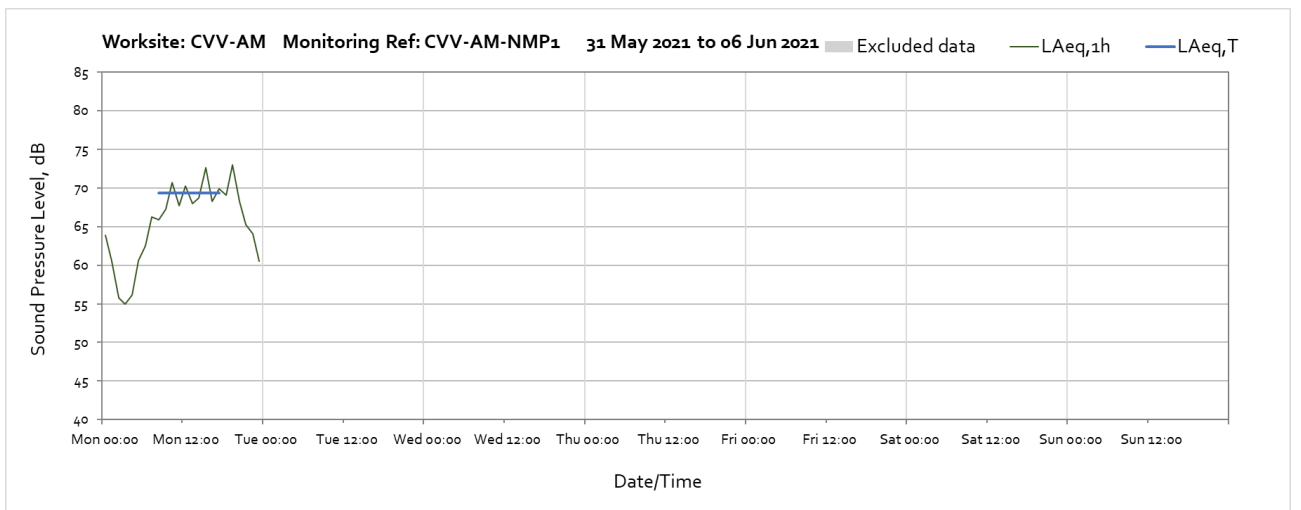
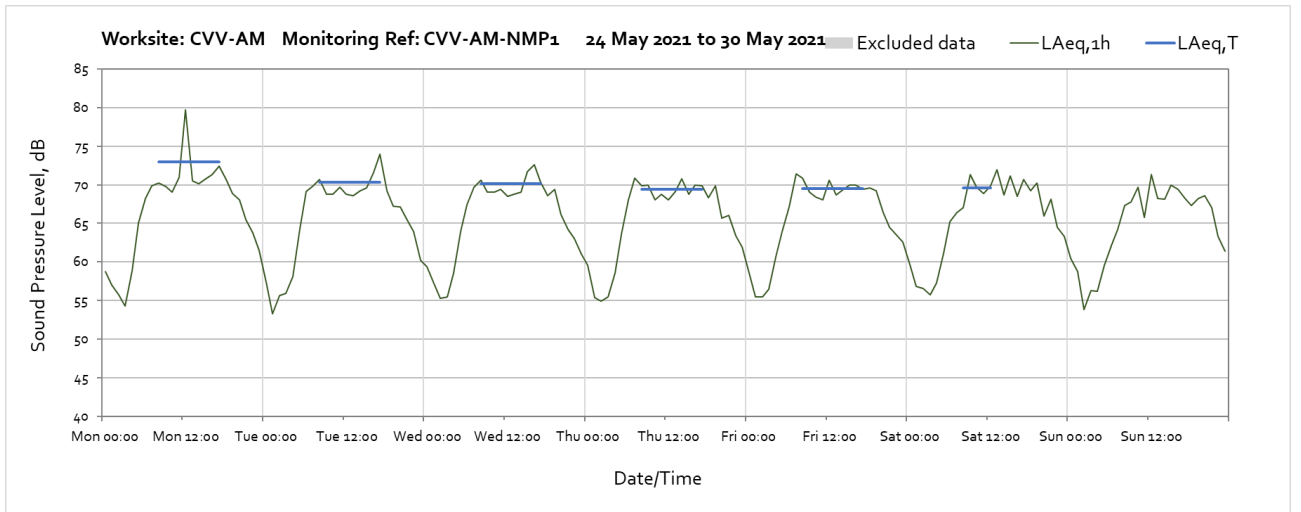


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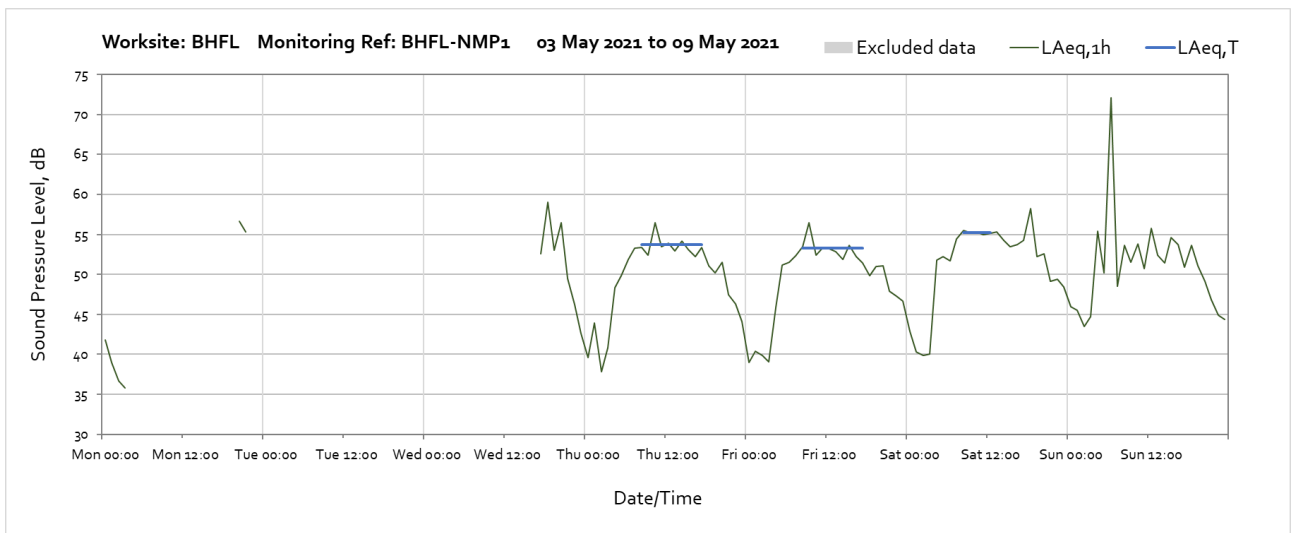
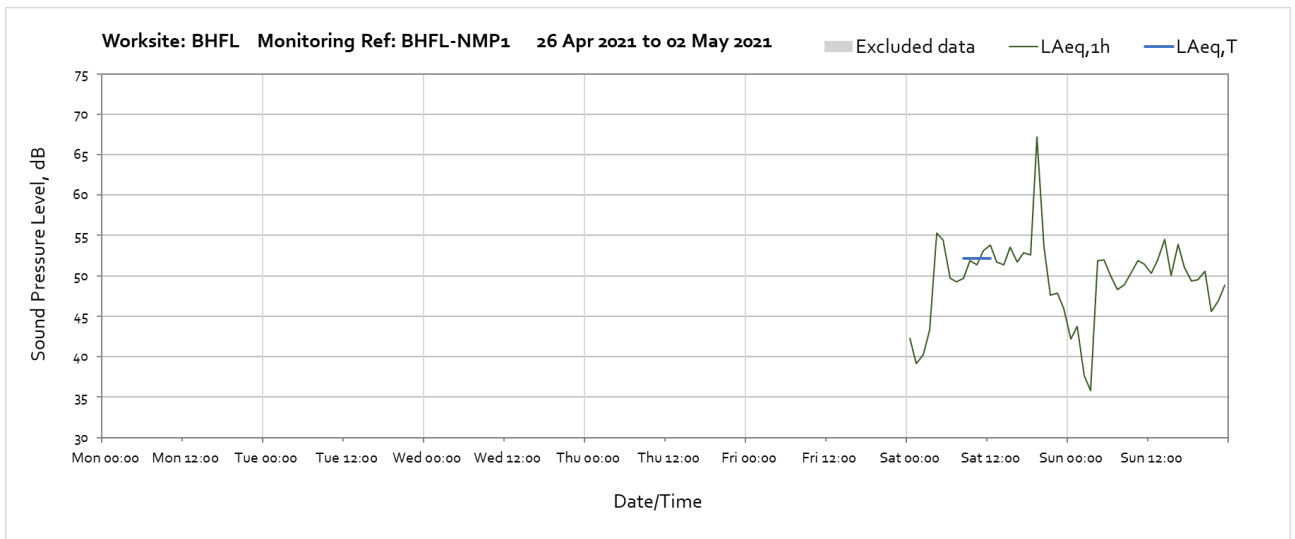




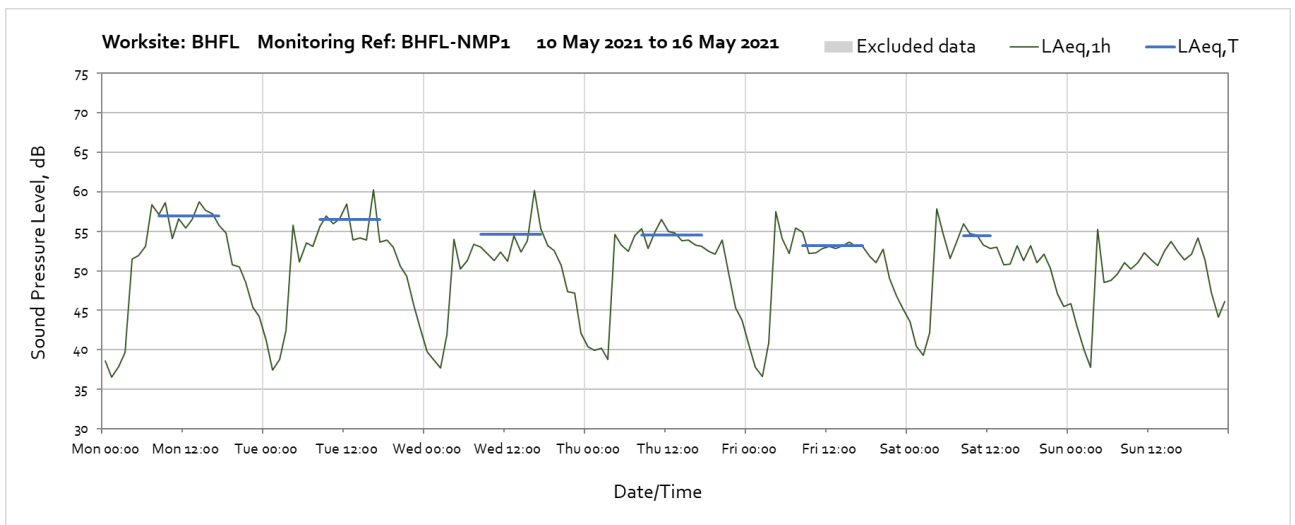
Note: Missing data between 10:00 and 11:00 on Tuesday 18th May due to the monitoring being paused for field calibration.



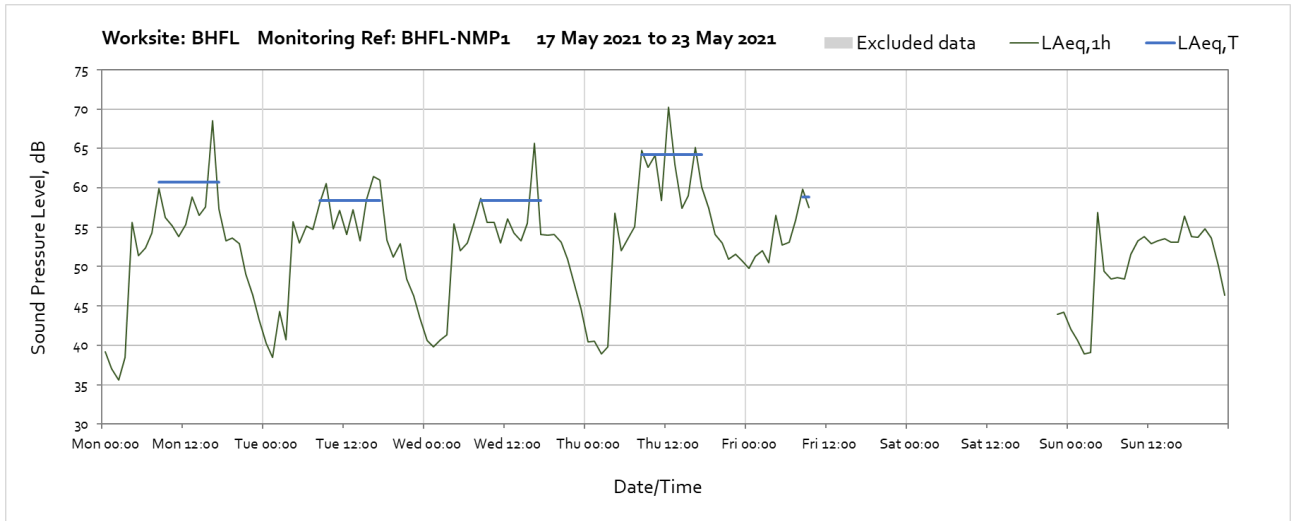
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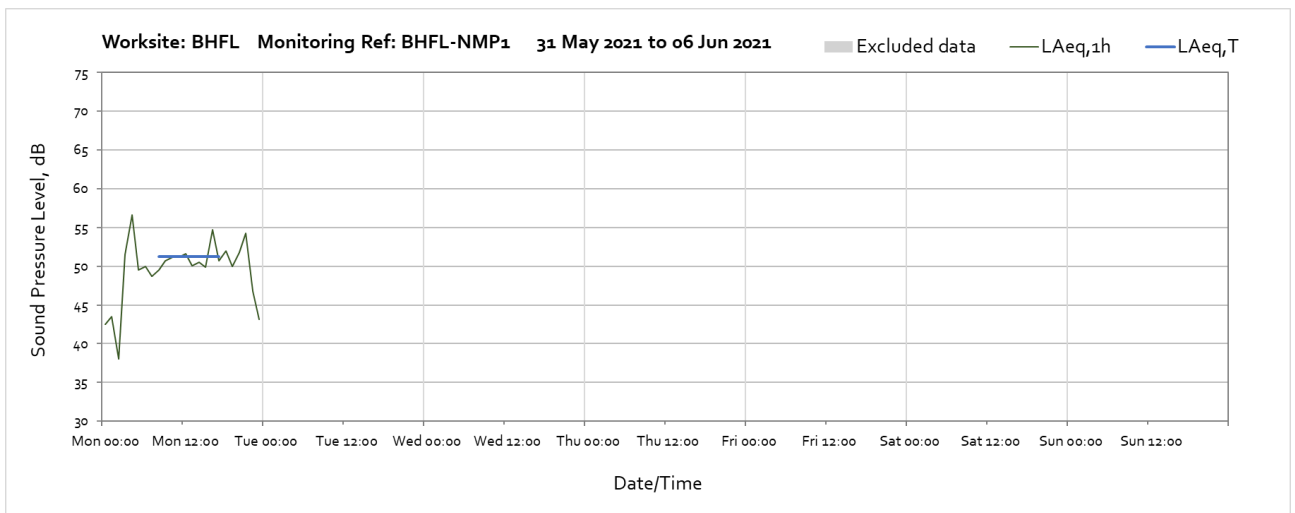
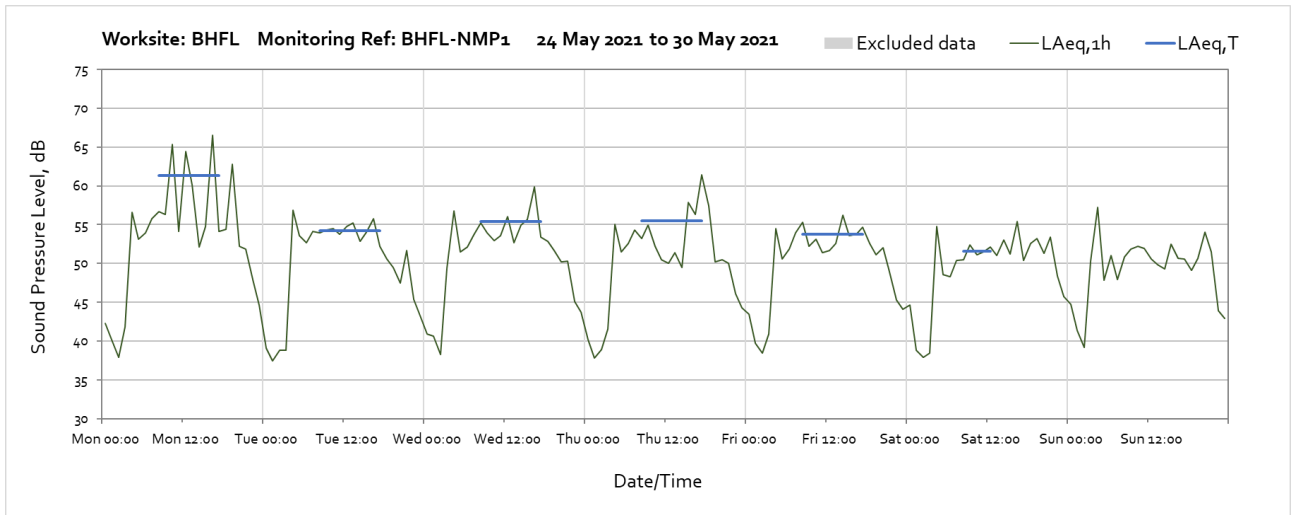
Note: Missing data between 04:00 on Monday 3rd May and 17:00 on Wednesday 5th May was due to loss of power to the monitoring station. The damaged external backup battery has been replaced to avoid loss of power to the monitoring station.



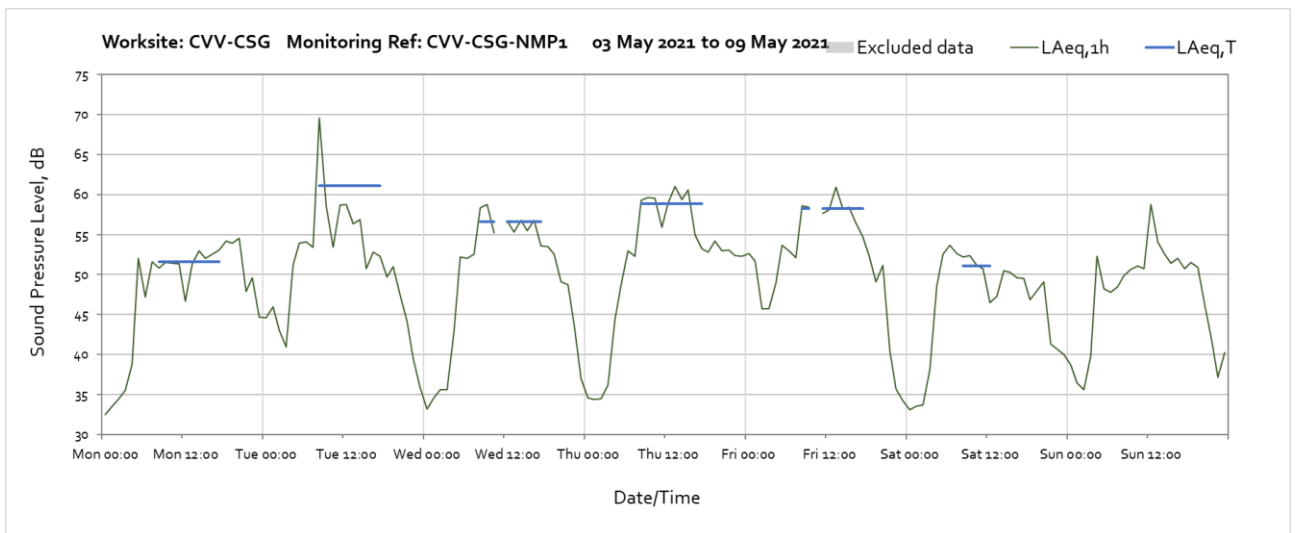
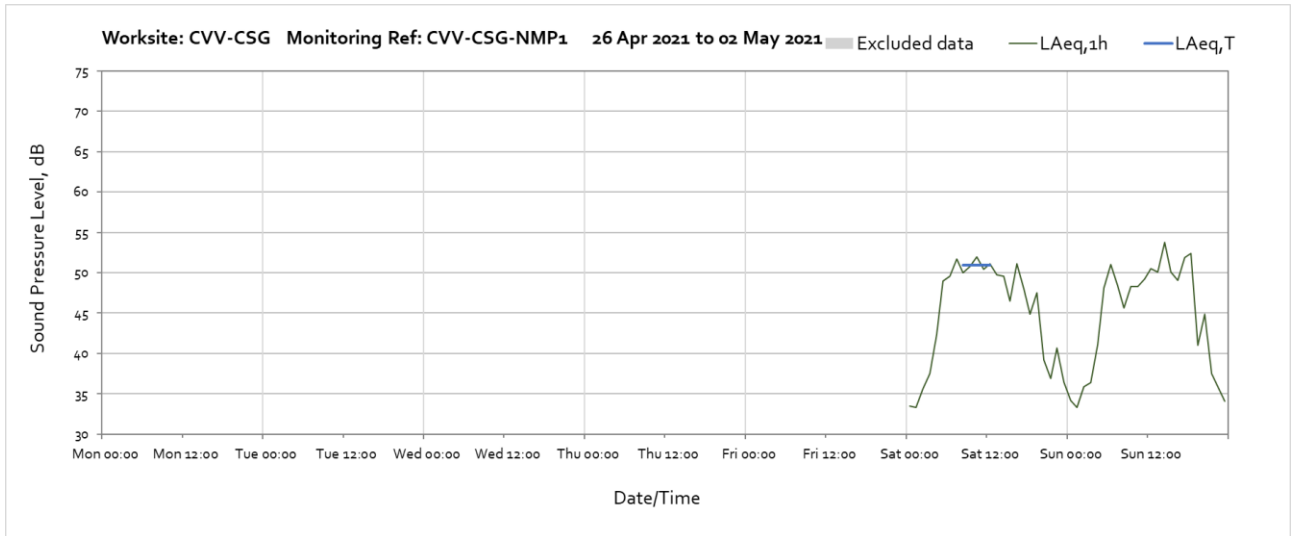
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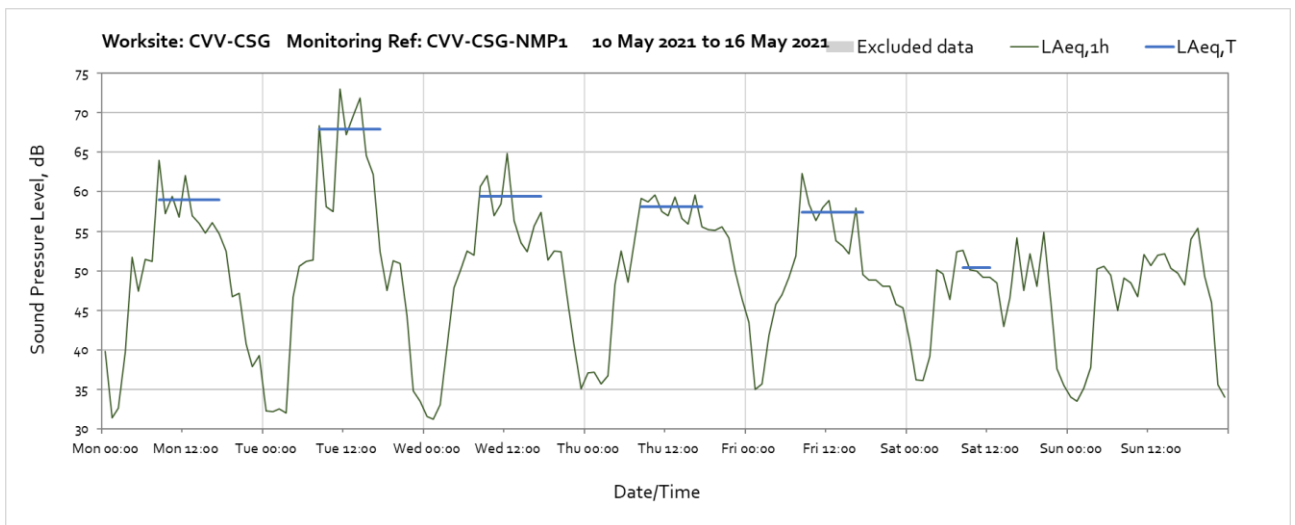
Note: Missing data between 10:00 on Friday 21st May and 21:00 on Saturday 22nd May was due to equipment malfunction.



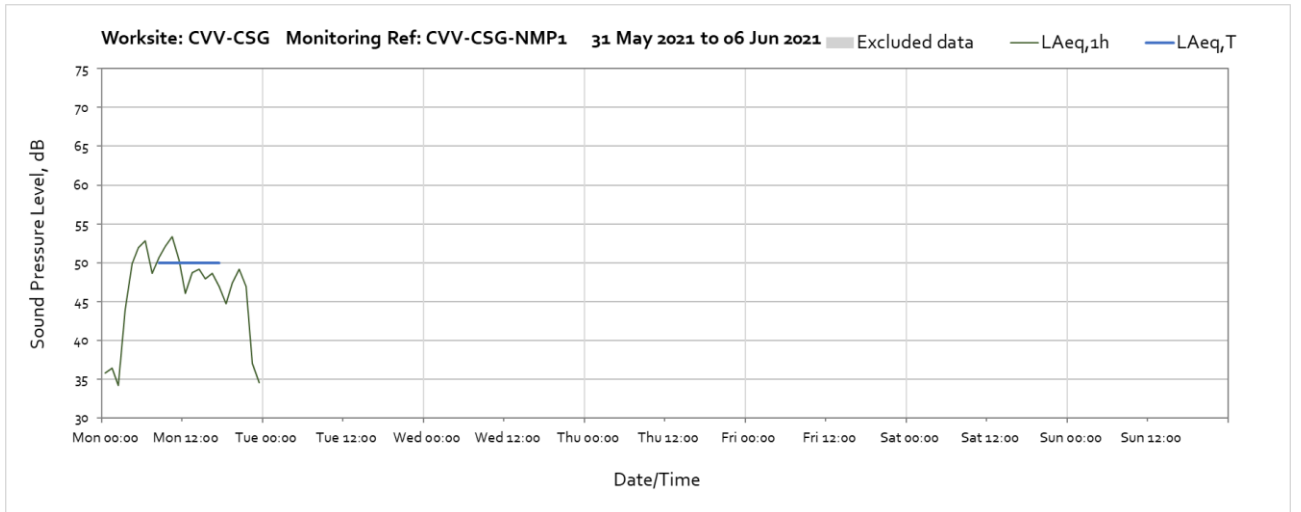
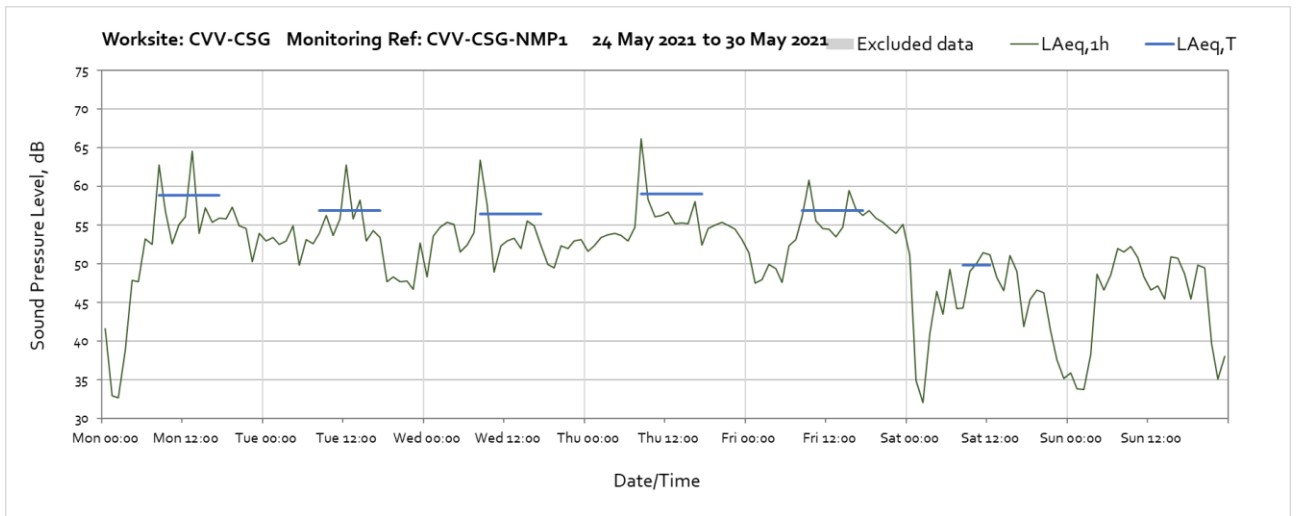
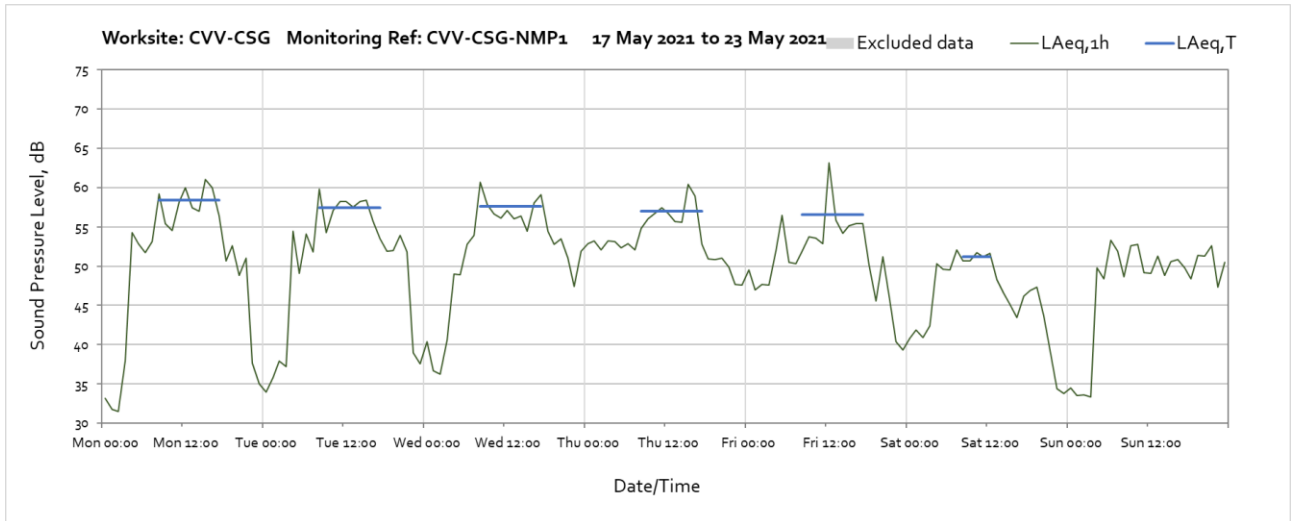
Worksite: CSG – Monitoring Ref: CSG-NMP1



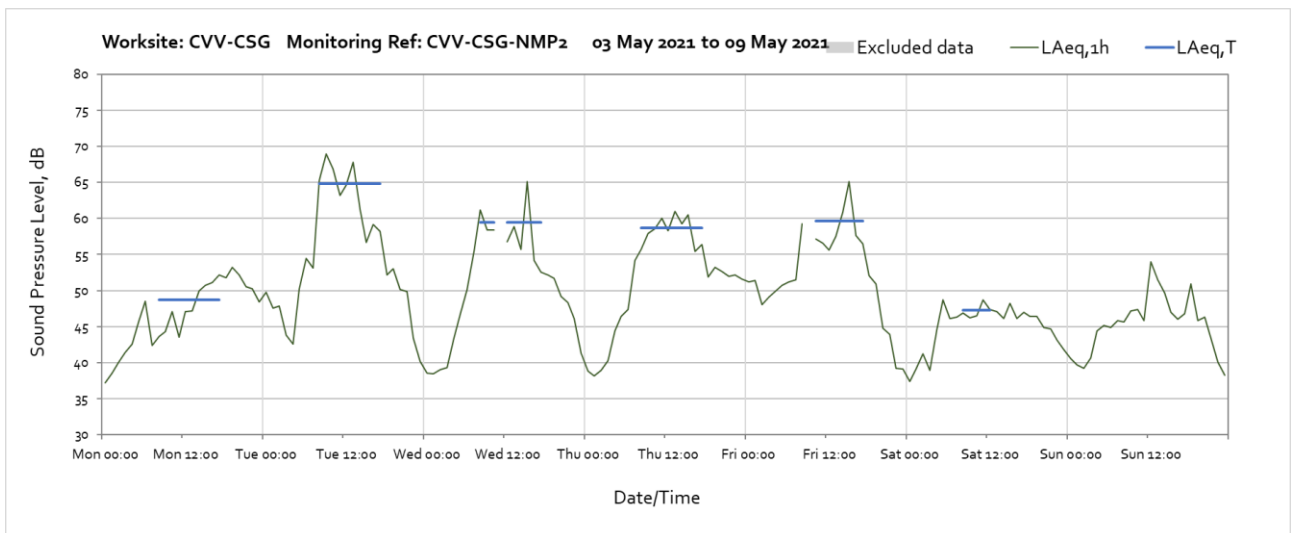
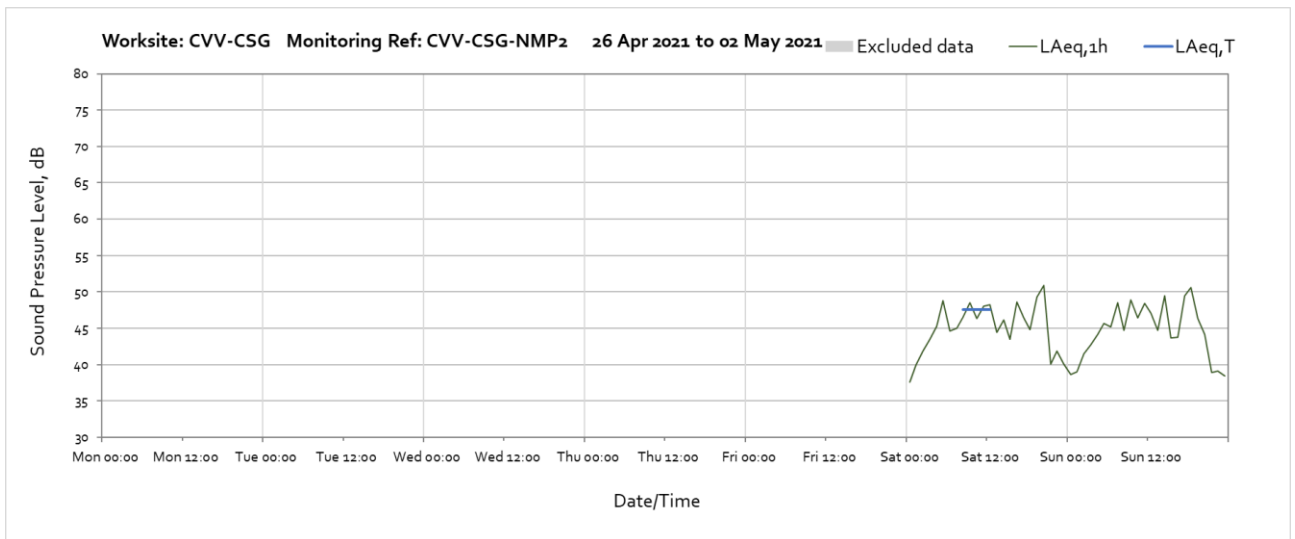
Note: Missing data between 11:00 and 12:00 on Wednesday 5th May was due to maintenance being undertaken to the monitor to setup audio alarm. Missing data between 10:00 and 11:00 on Friday 7th May was due to equipment being paused for field calibration.



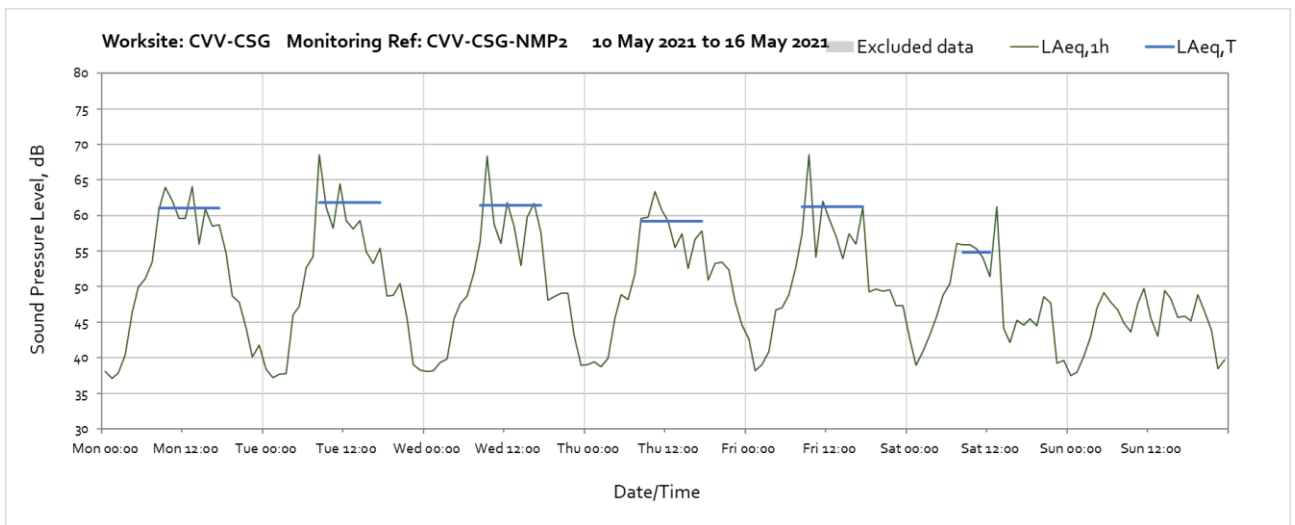
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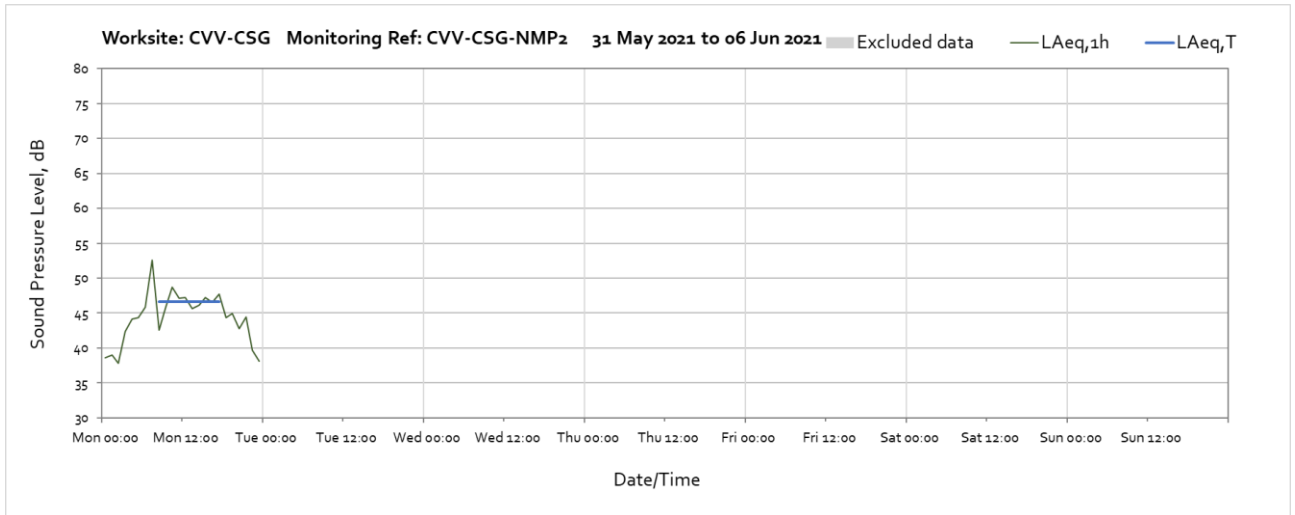
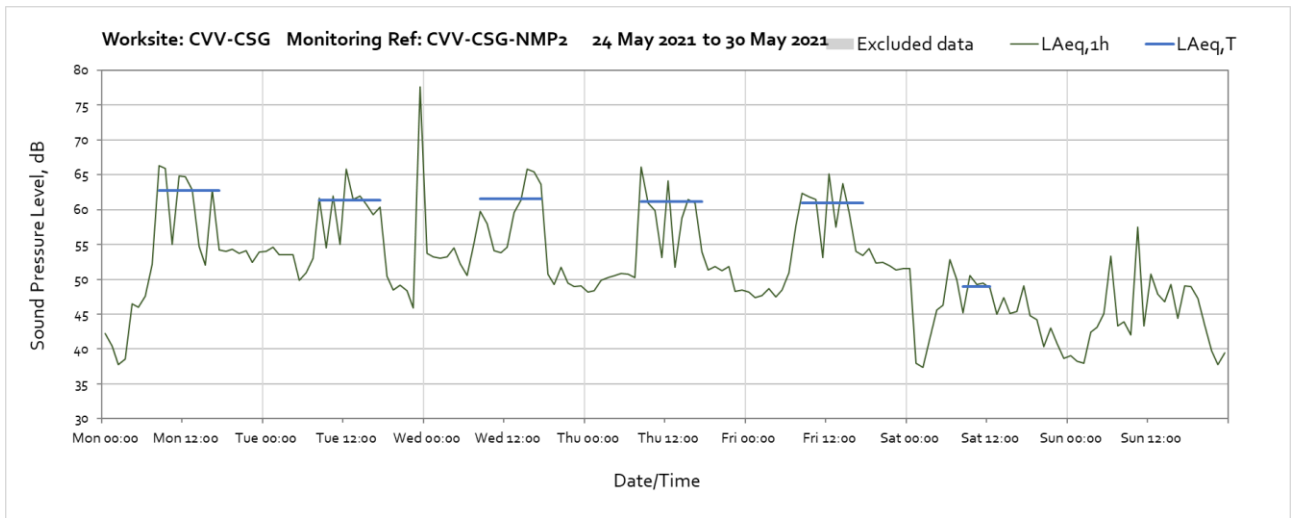
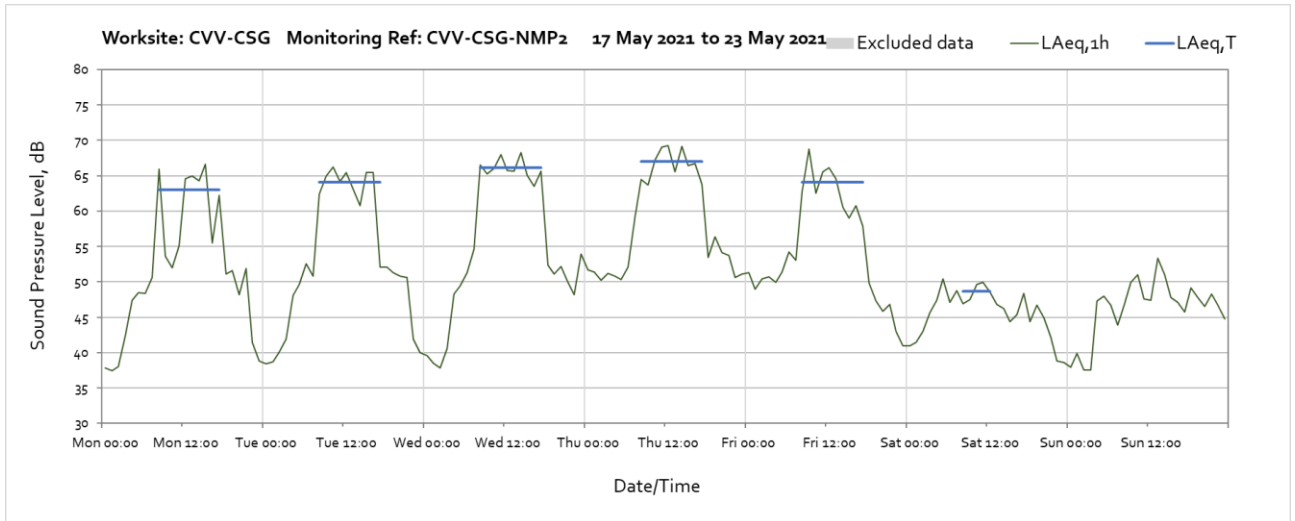
Worksite: CSG – Monitoring Ref: CSG-NMP2



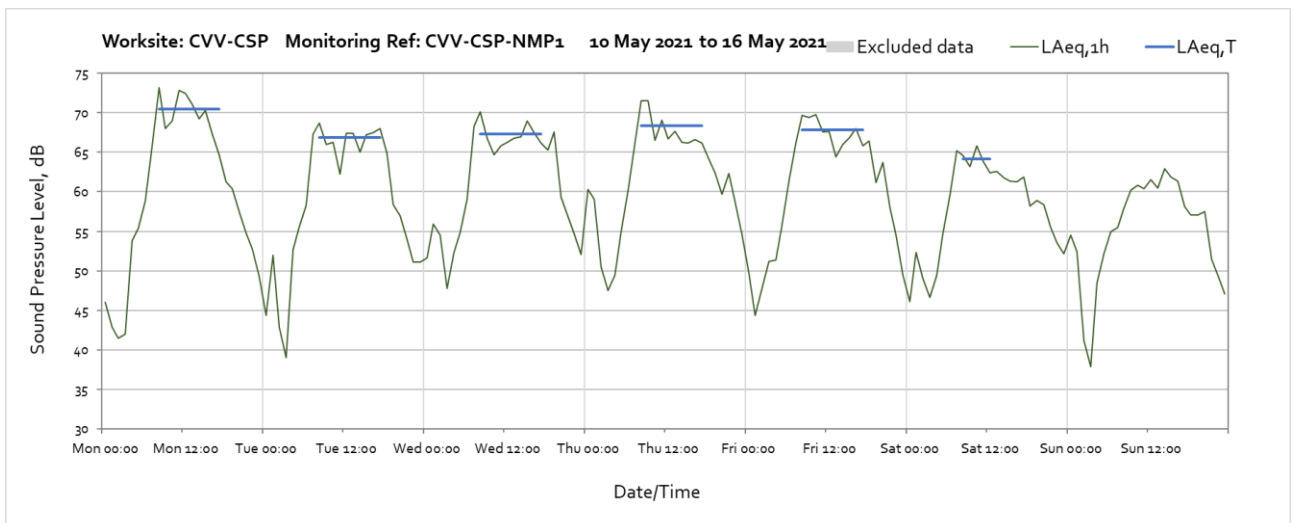
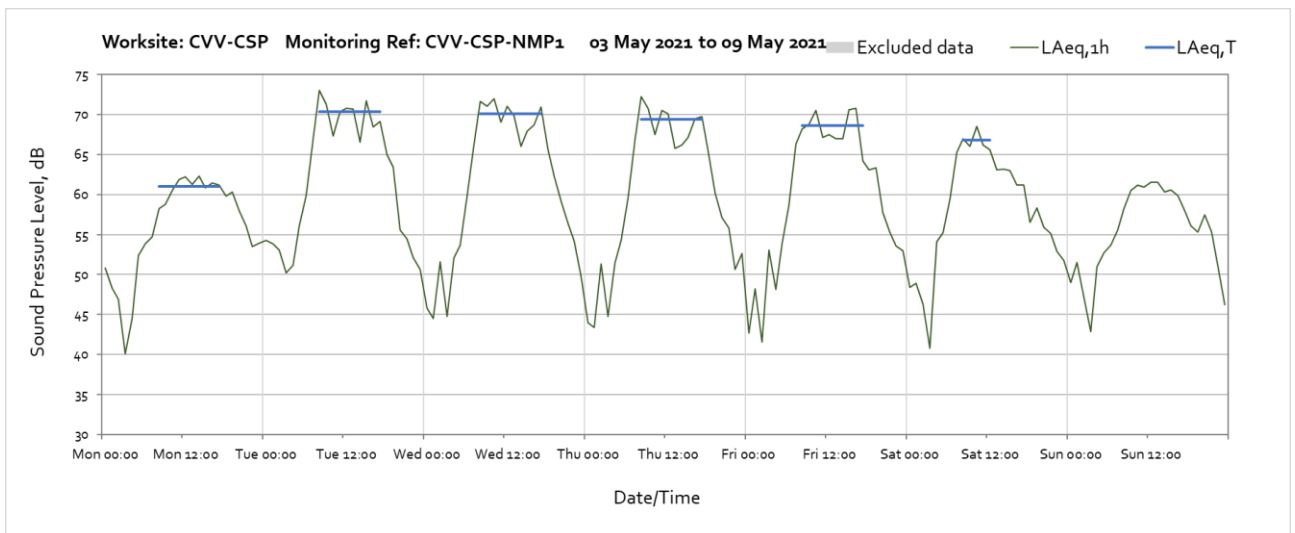
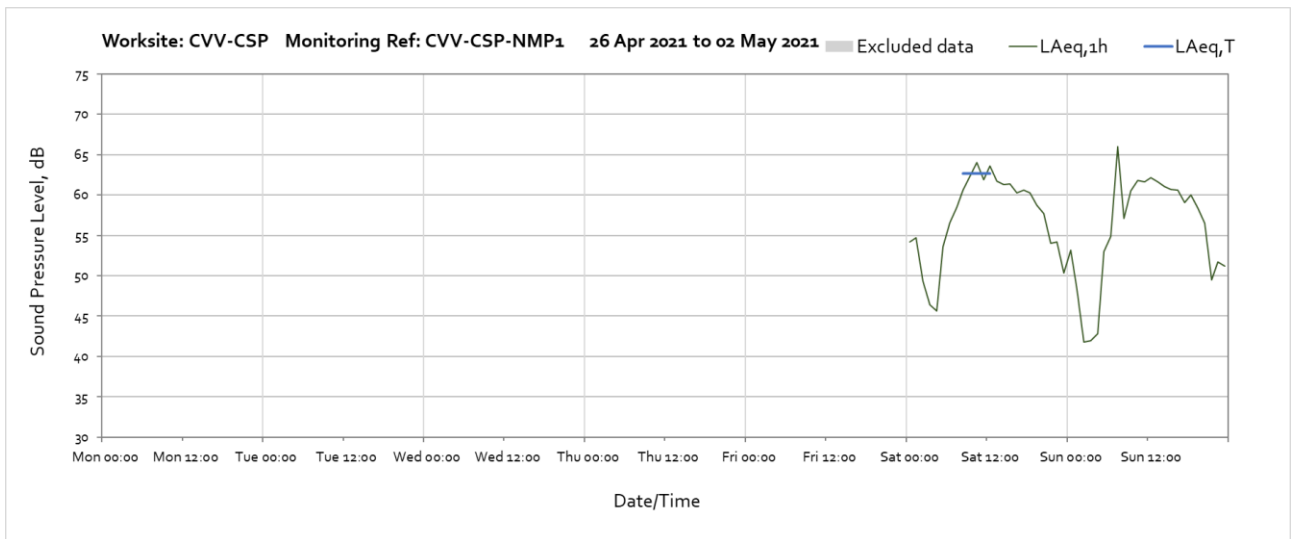
Note: Missing data between 11:00 and 12:00 on Wednesday 5th May was due to maintenance being undertaken to the monitor to setup audio alarm. Missing data between 09:00 and 10:00 on Friday 7th May was due to equipment being paused for field calibration.

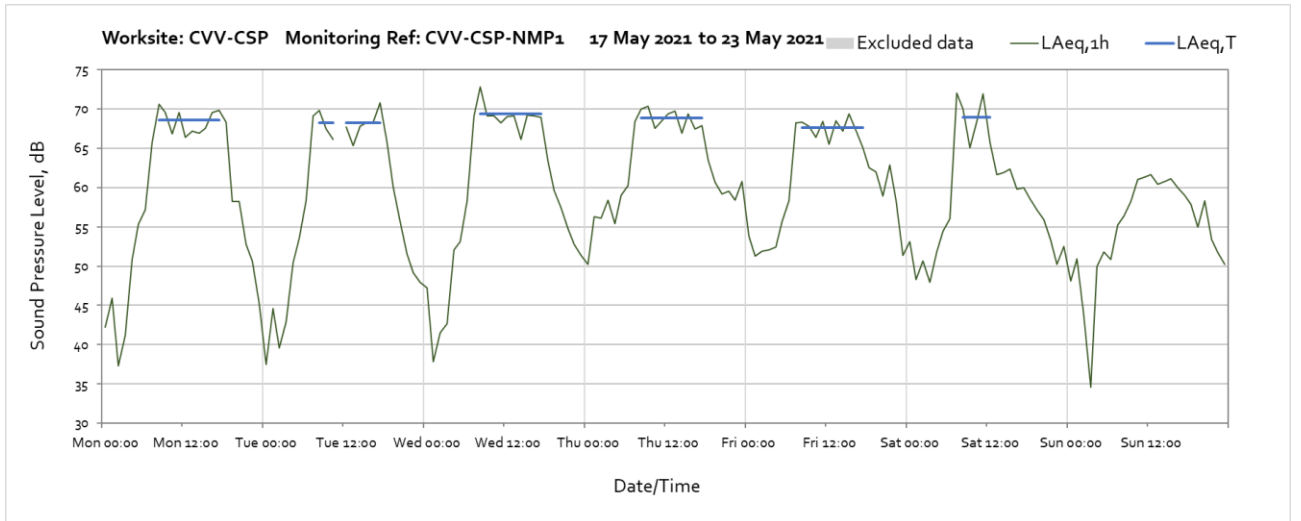


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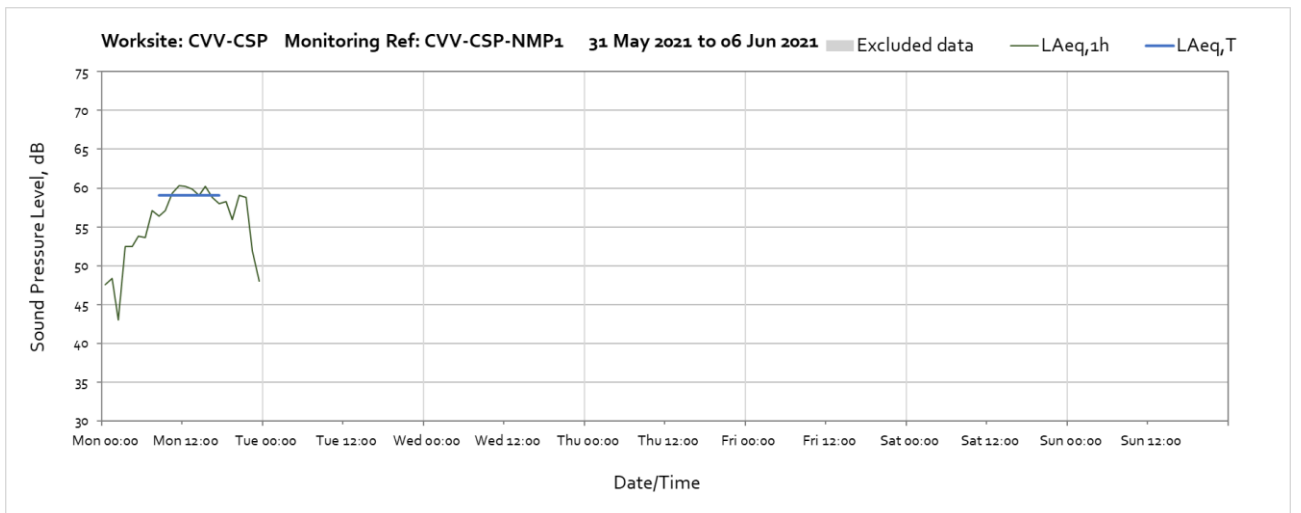
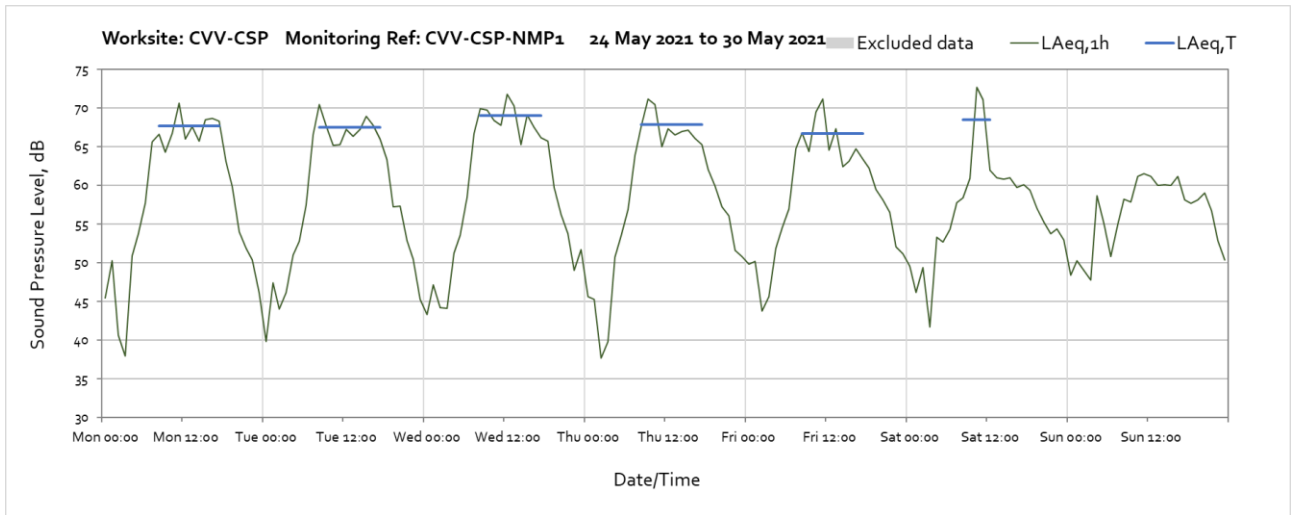


Worksite: CVV-CSP – Monitoring Ref: CVV-CSP-NMP1

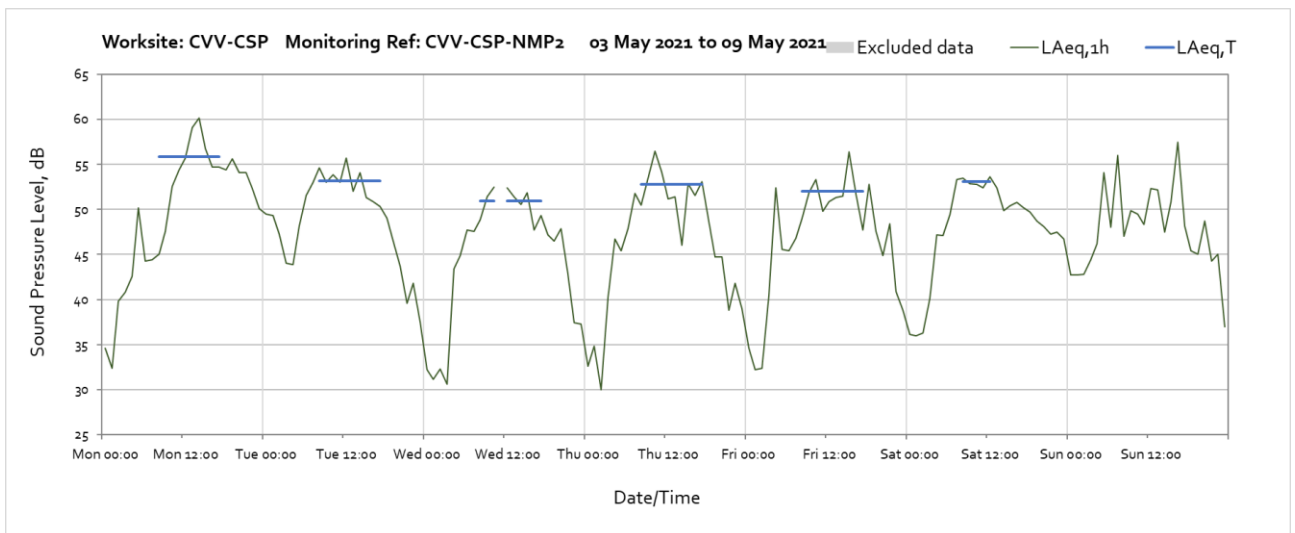
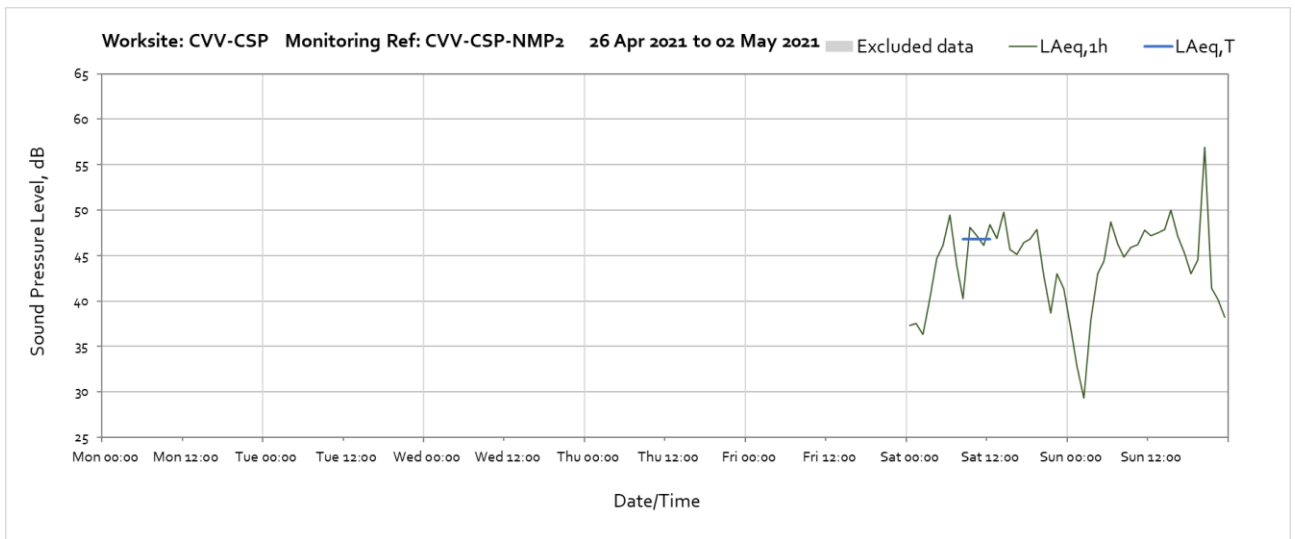




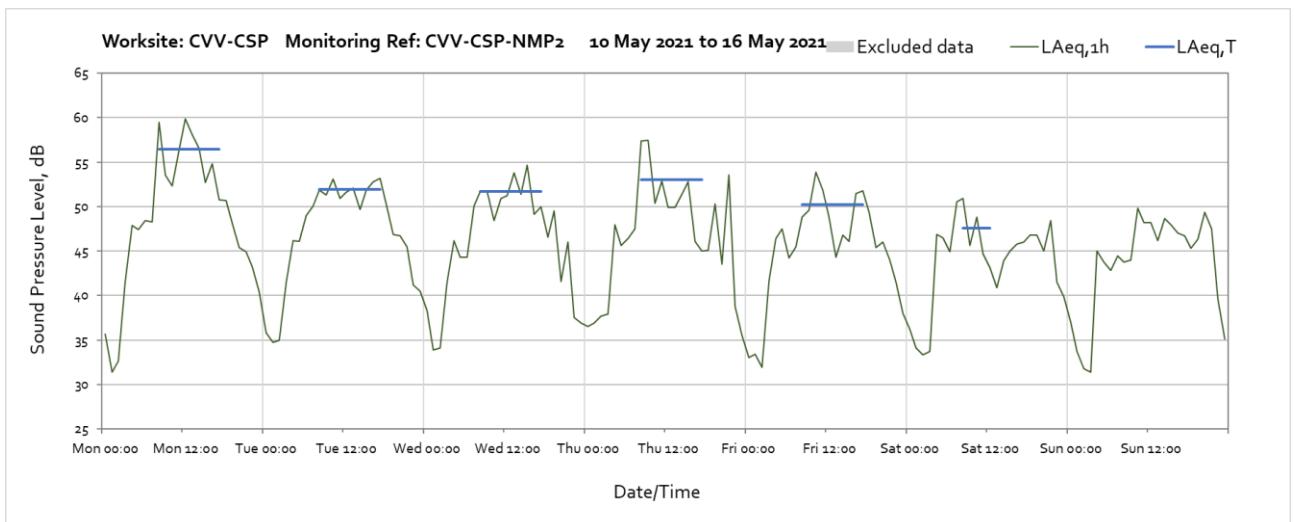
Note: Missing data between 11:00 and 12:00 on Tuesday 18th May was due to monitor being paused for field calibration.



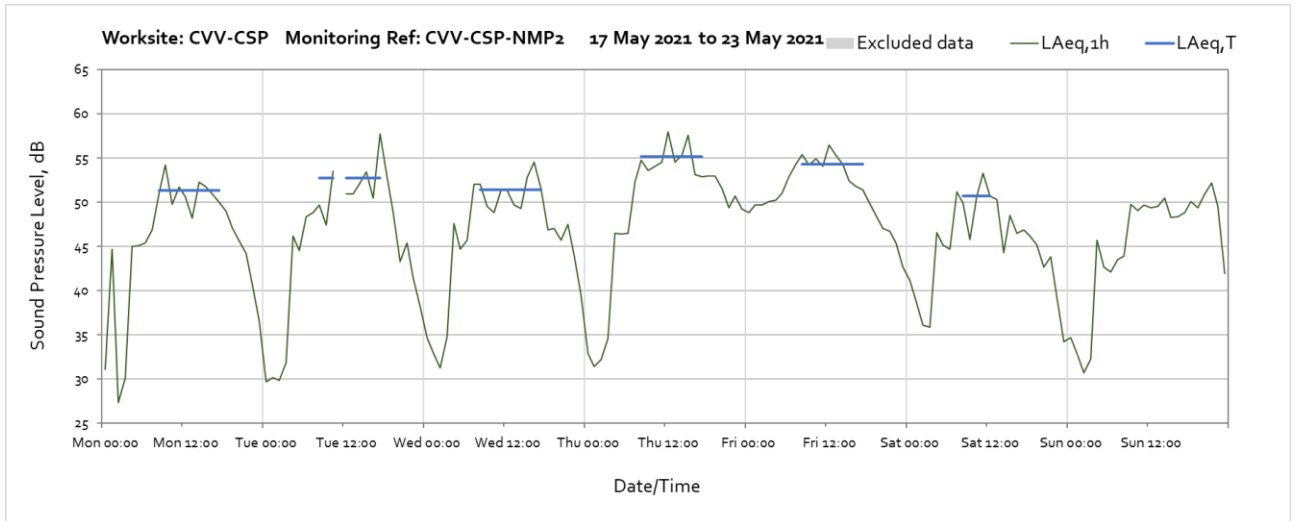
Worksite: CVV-CSP – Monitoring Ref: CVV-CSP-NMP2



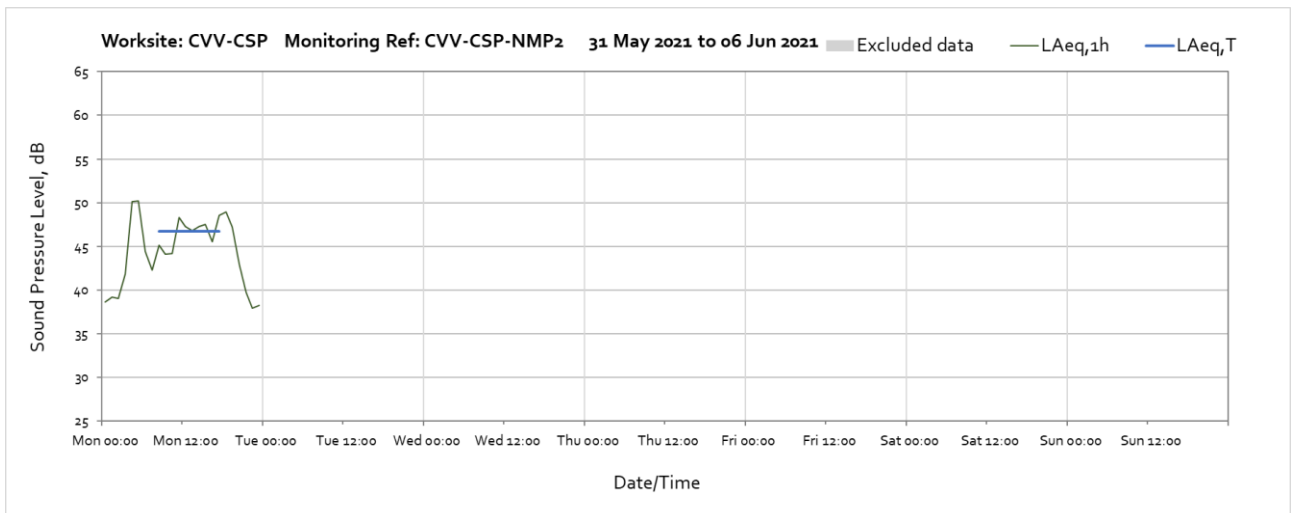
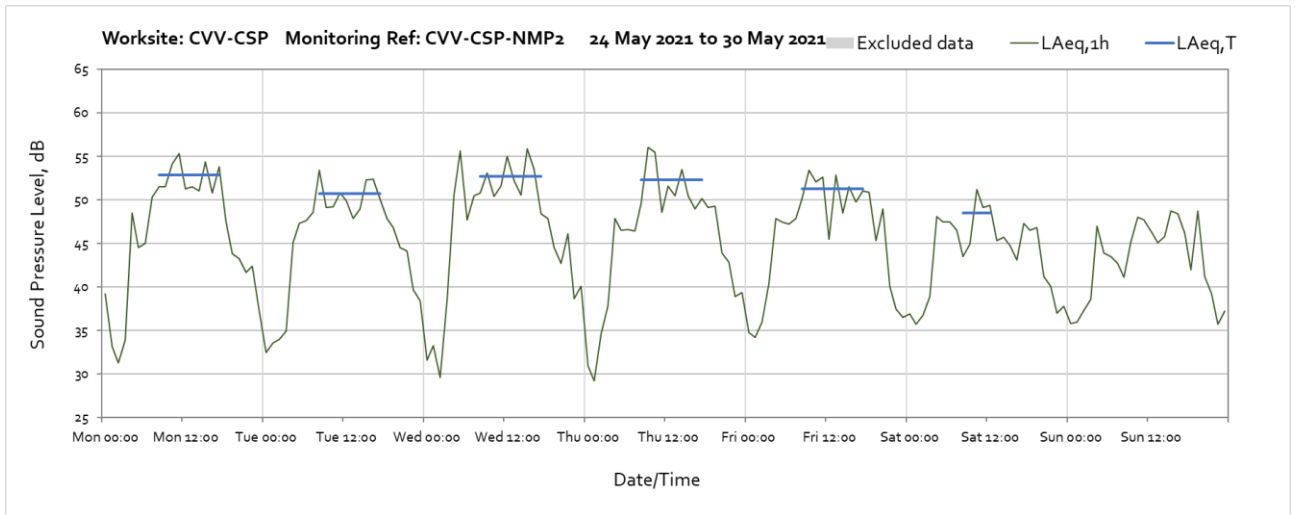
Note: Missing data between 11:00 and 12:00 on Wednesday 5th May was due to maintenance being undertaken to the monitor to setup audio alarm.



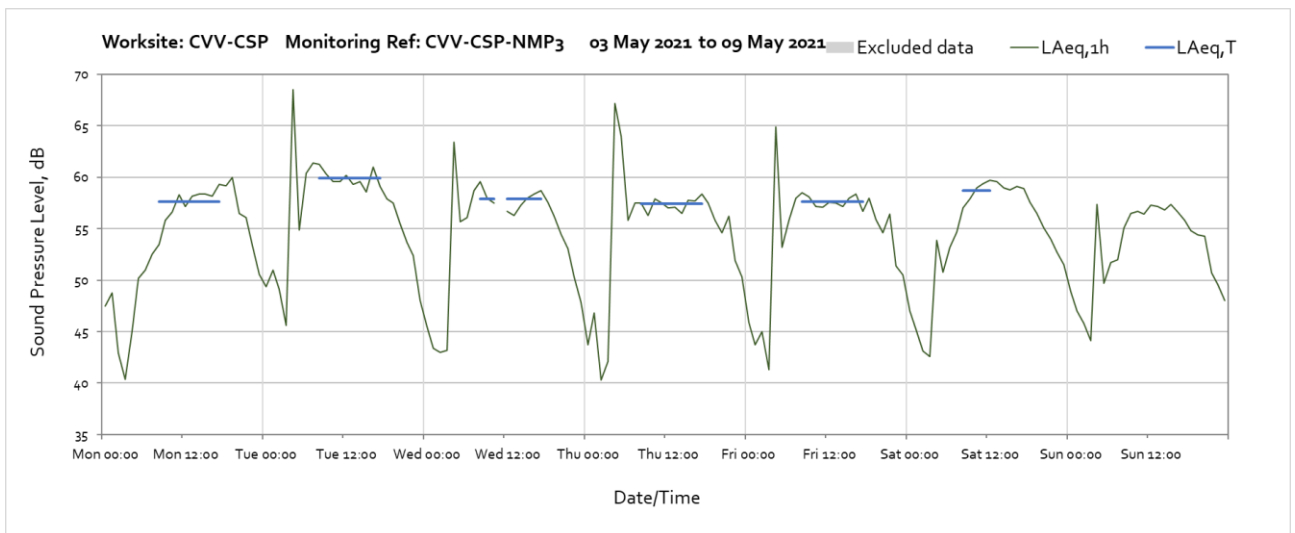
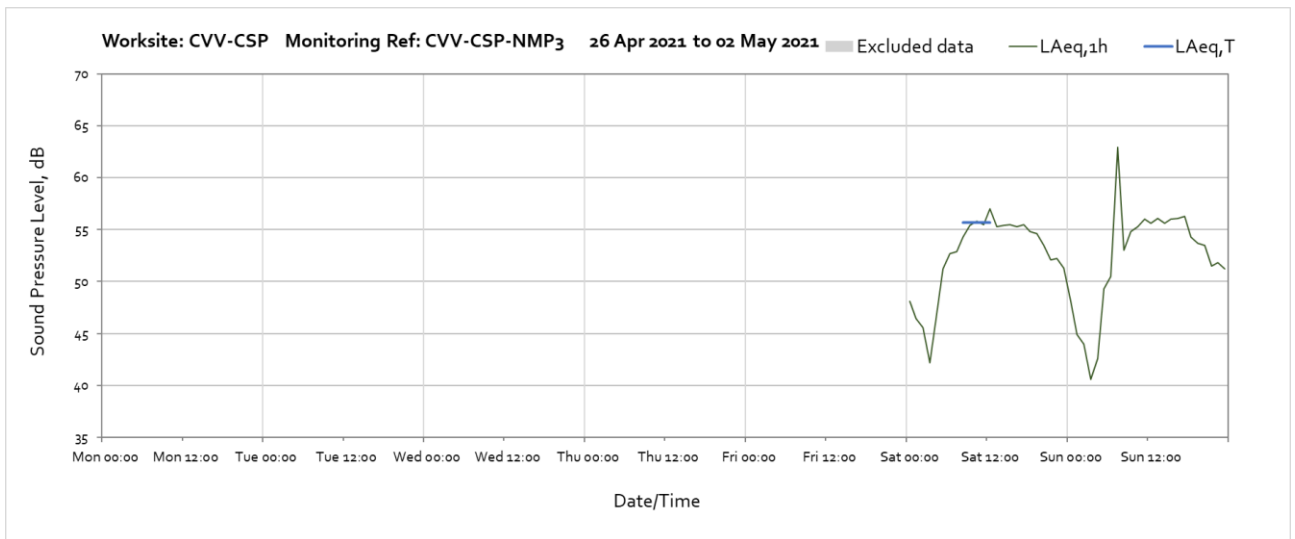
OFFICIAL



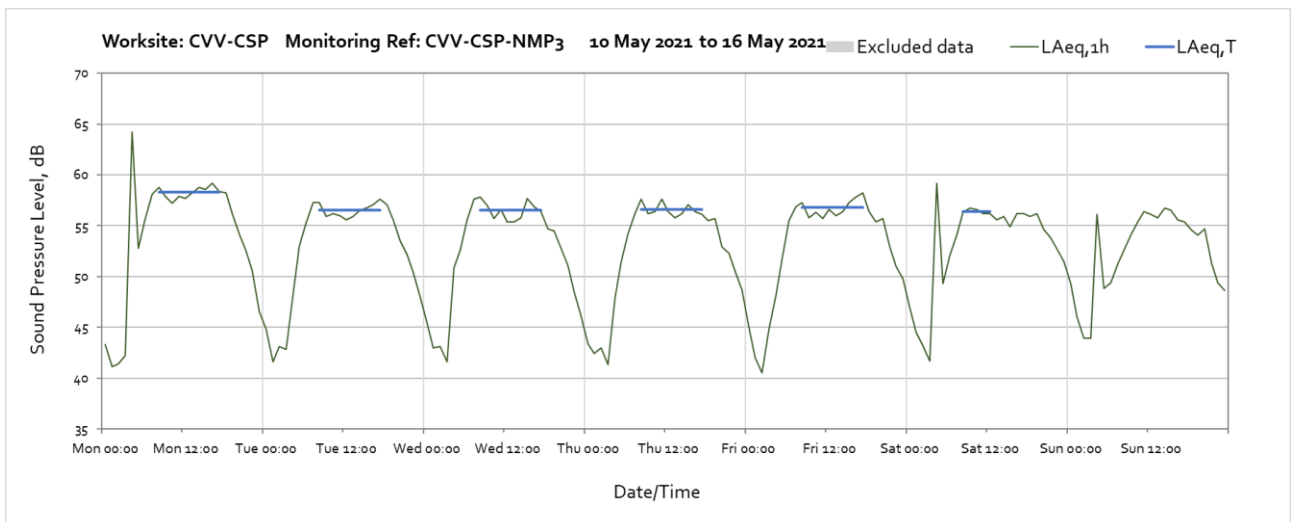
Note: Missing data between 11:00 and 12:00 on Tuesday 18th May was due to monitor being paused for field calibration.



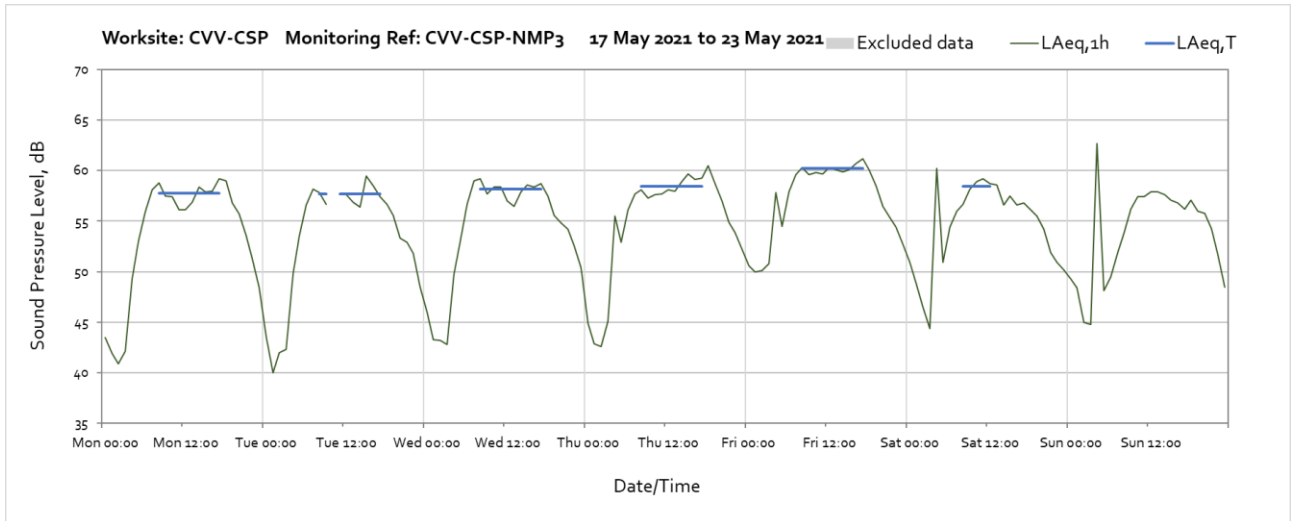
Worksite: CVV-CSP – Monitoring Ref: CVV-CSP-NMP3



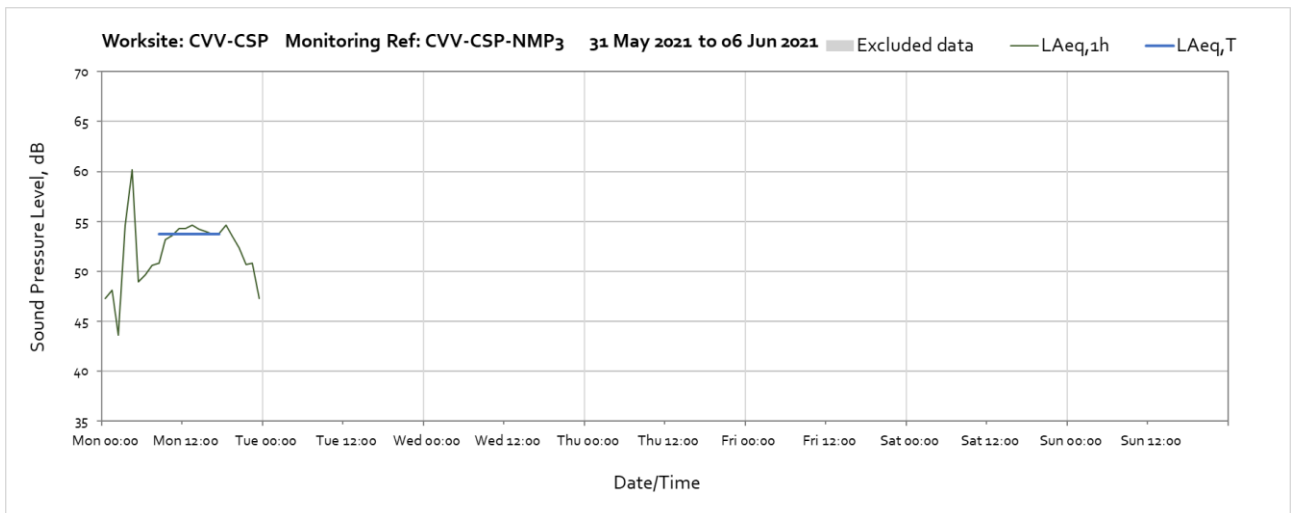
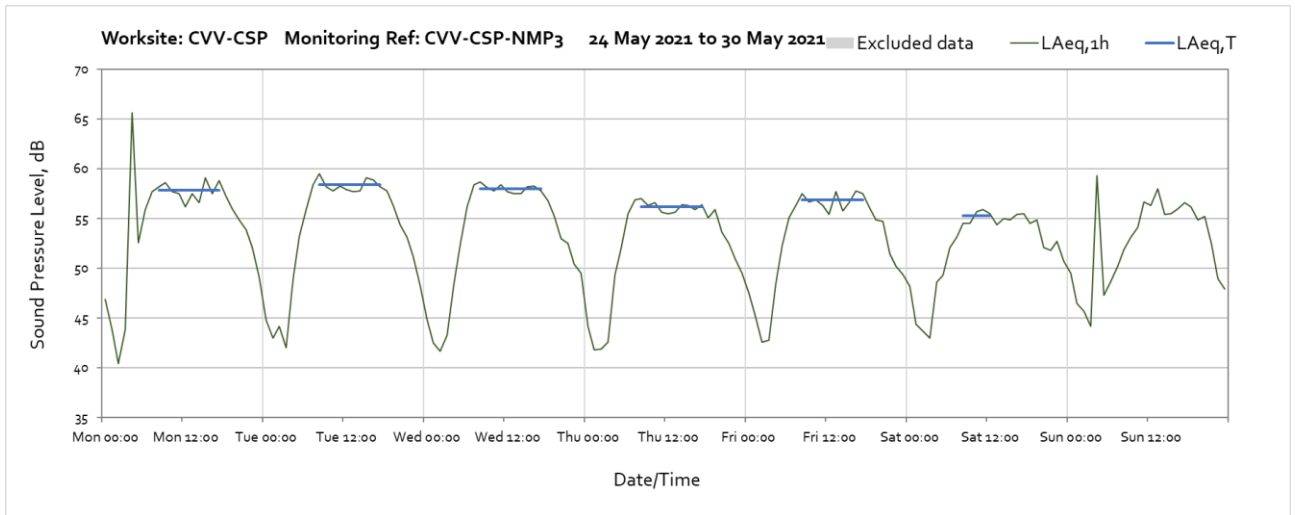
Note: Missing data between 11:00 and 12:00 on Wednesday 5th May was due to maintenance being undertaken to the monitor to setup audio alarm.



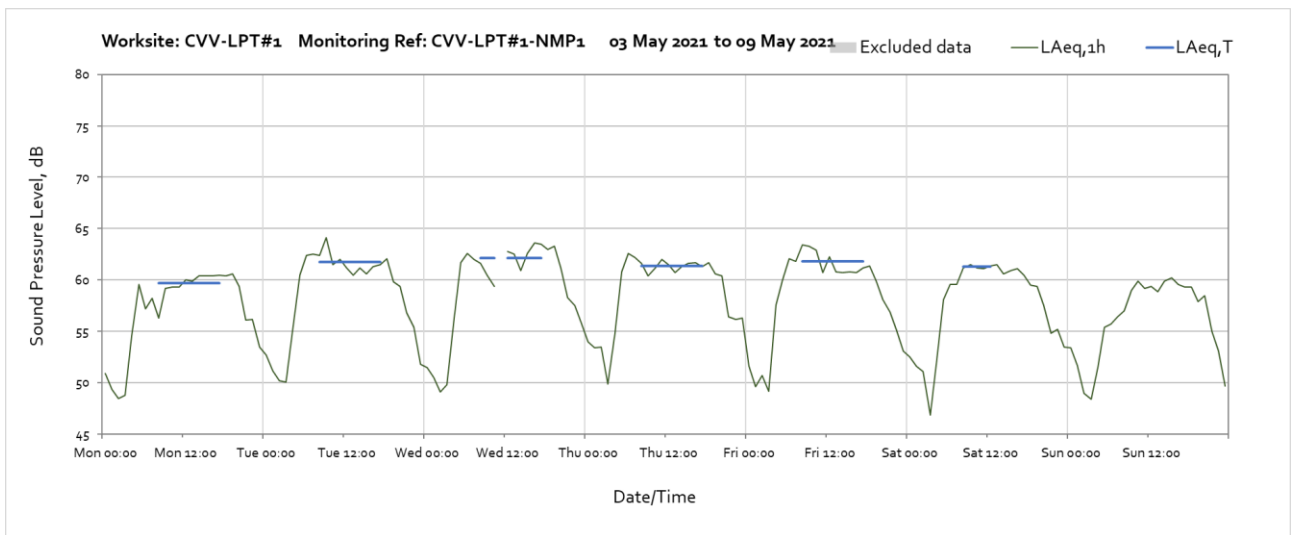
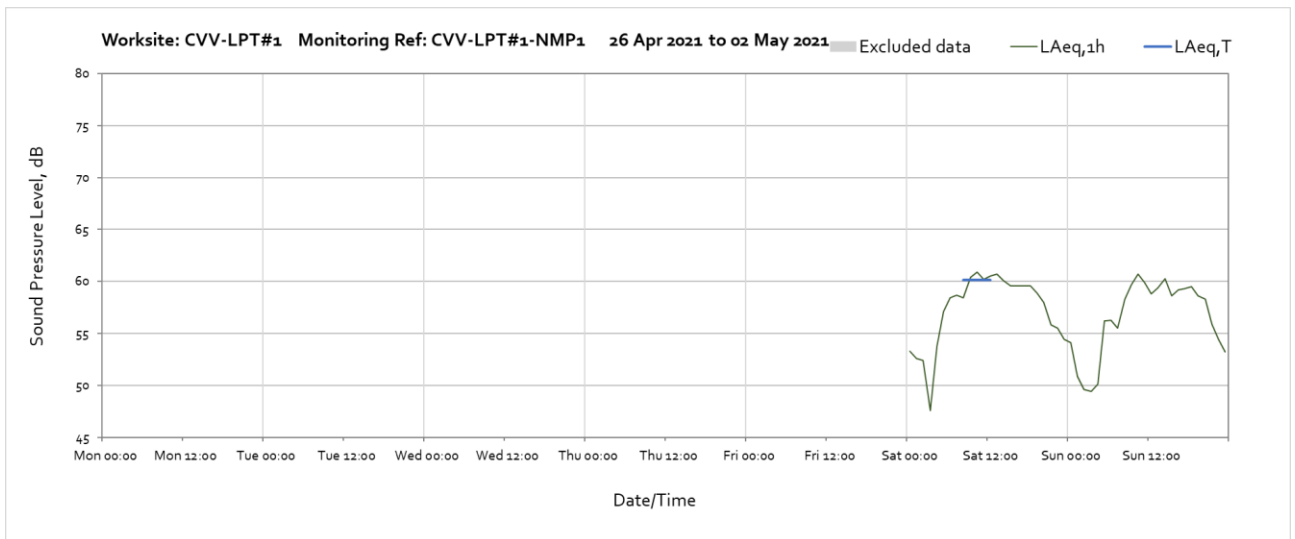
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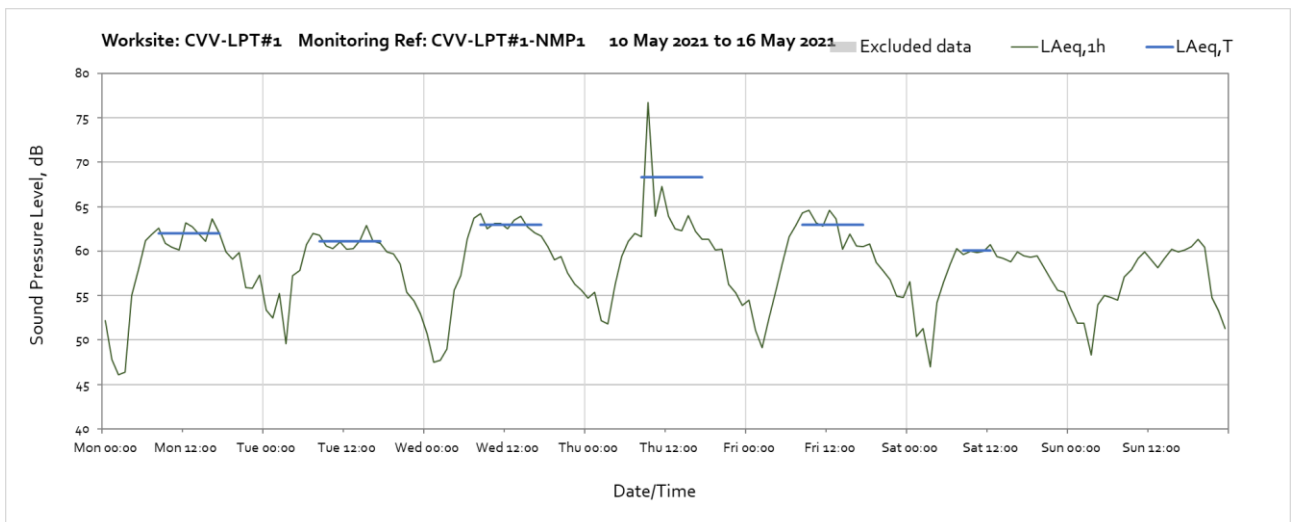
Note: Missing data between 10:00 and 11:00 on Tuesday 18th May was due to monitor being paused for field calibration.



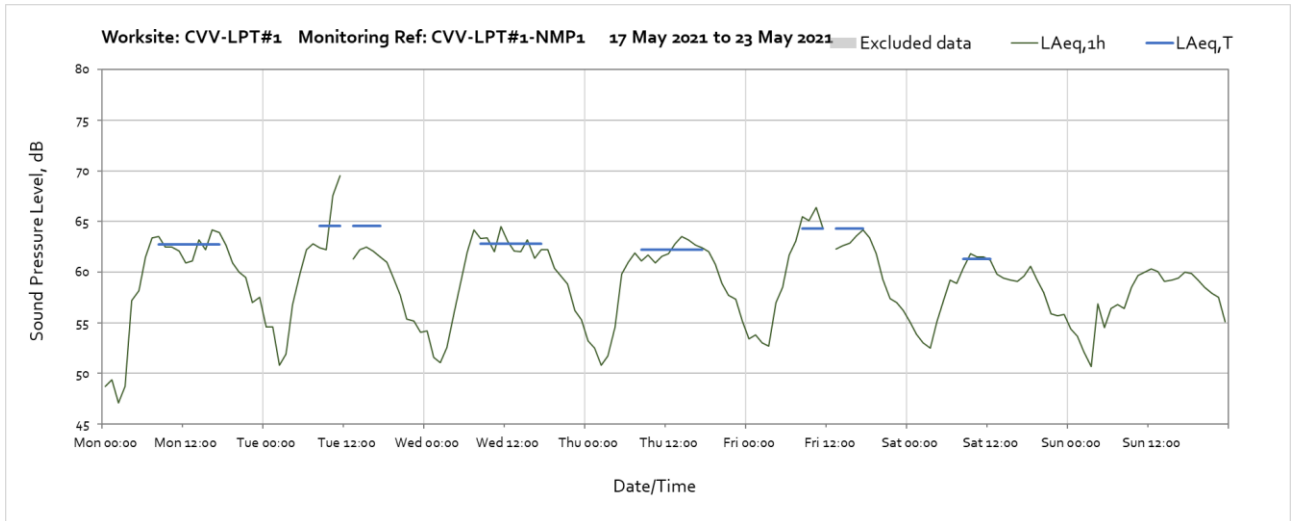
Worksite: LPT#1 – Monitoring Ref: LPT#1-NMP1



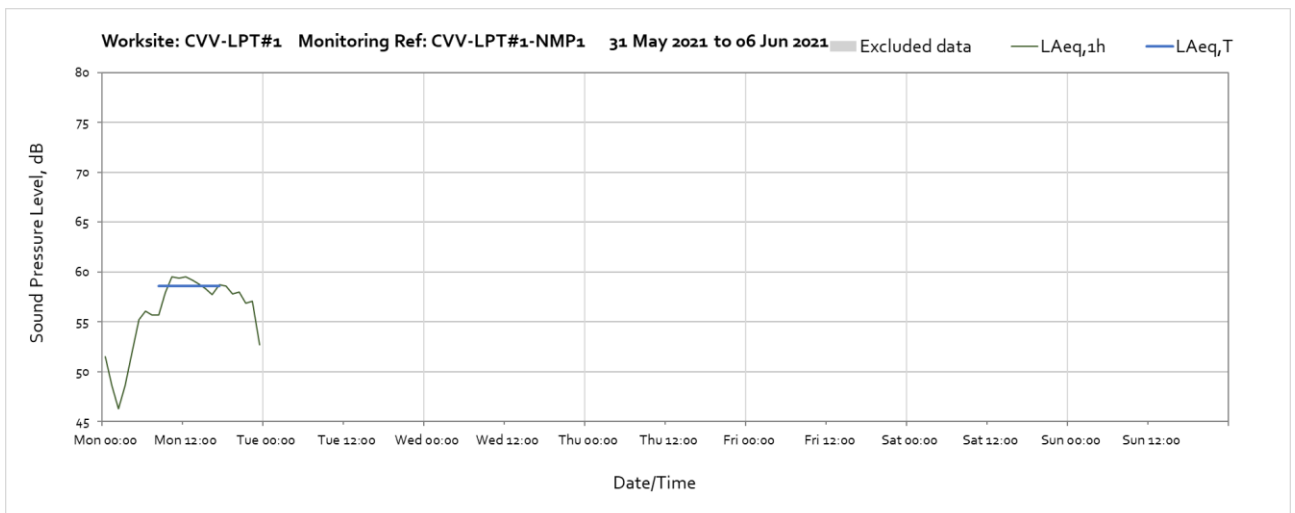
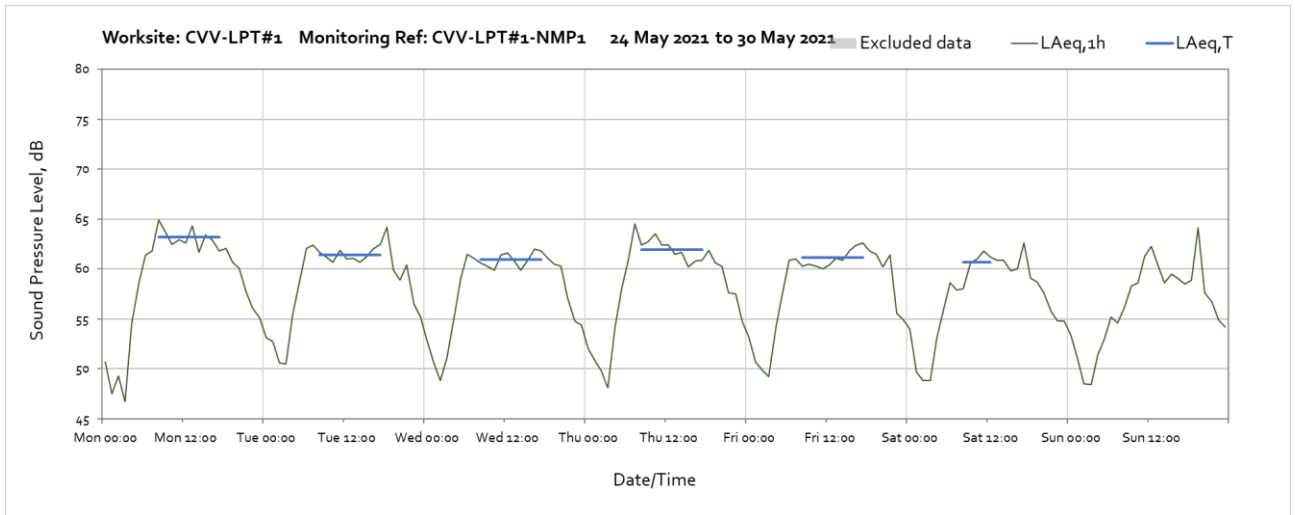
Note: Missing data between 11:00 and 12:00 on Wednesday 5th May was due to maintenance being undertaken to the monitor to setup audio alarm.



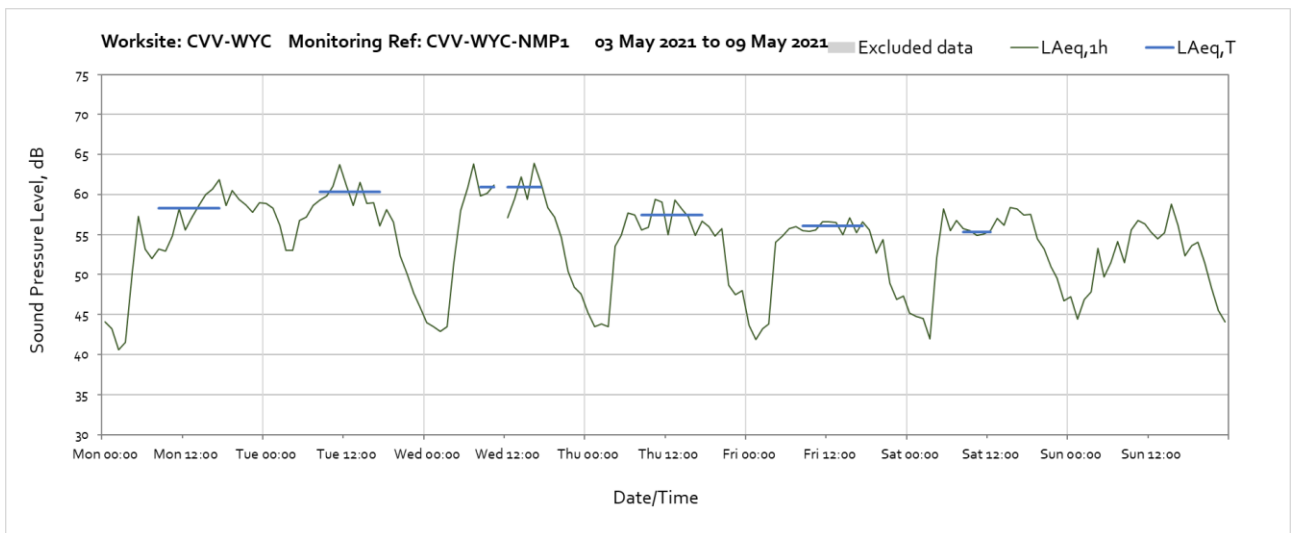
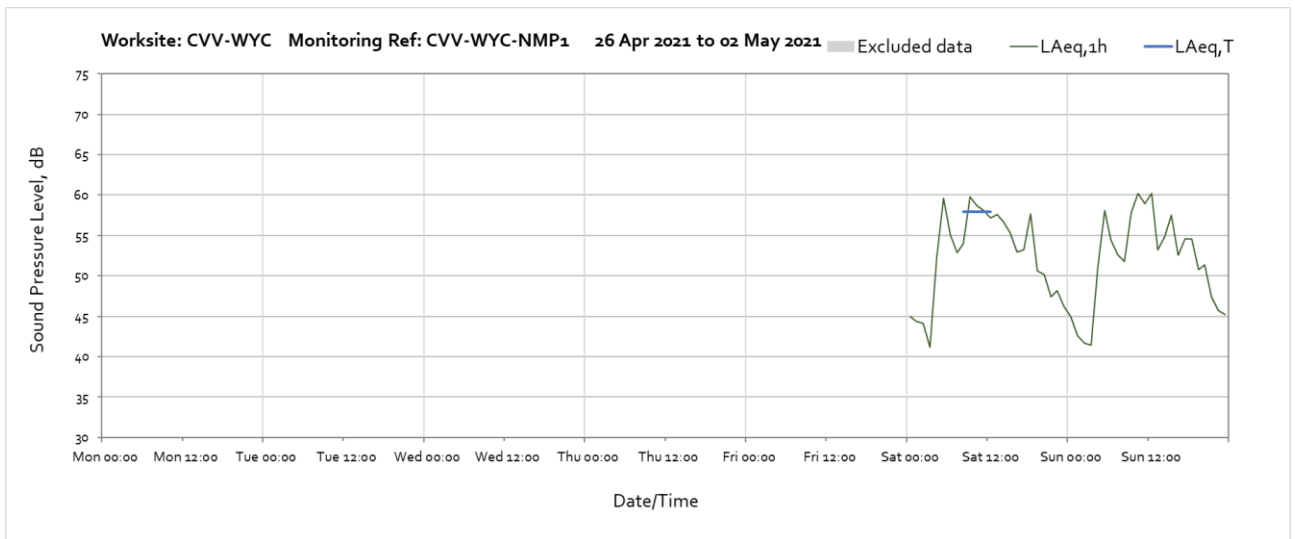
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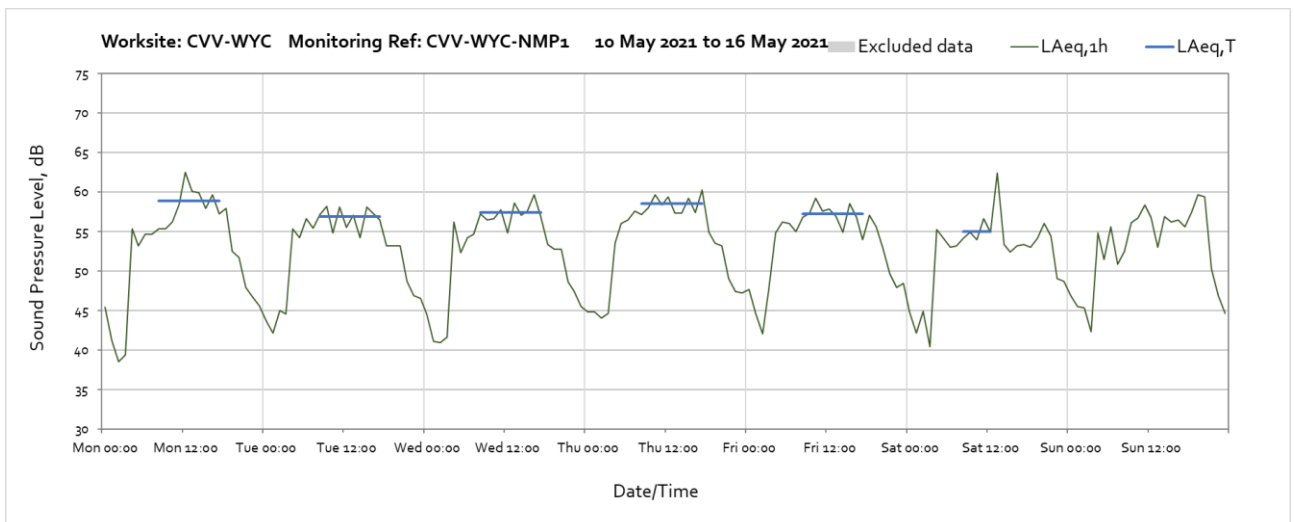
Note: Missing data between 12:00 and 13:00 on Tuesday 18th May was due to monitor being paused for field calibration.



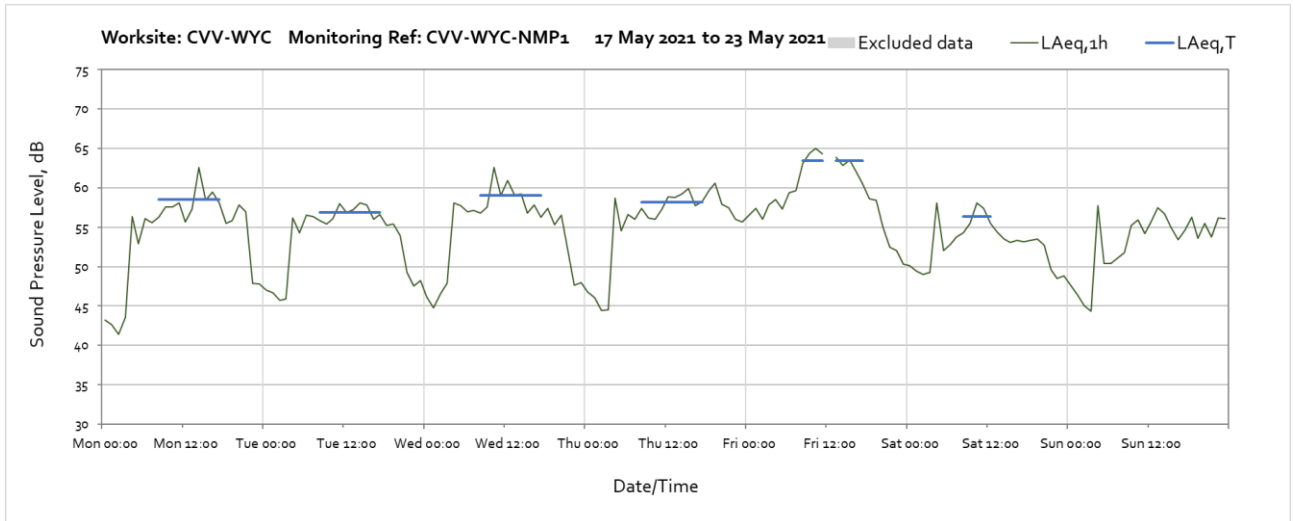
Worksite: LPT#1 – Monitoring Ref: WYC-NMP1



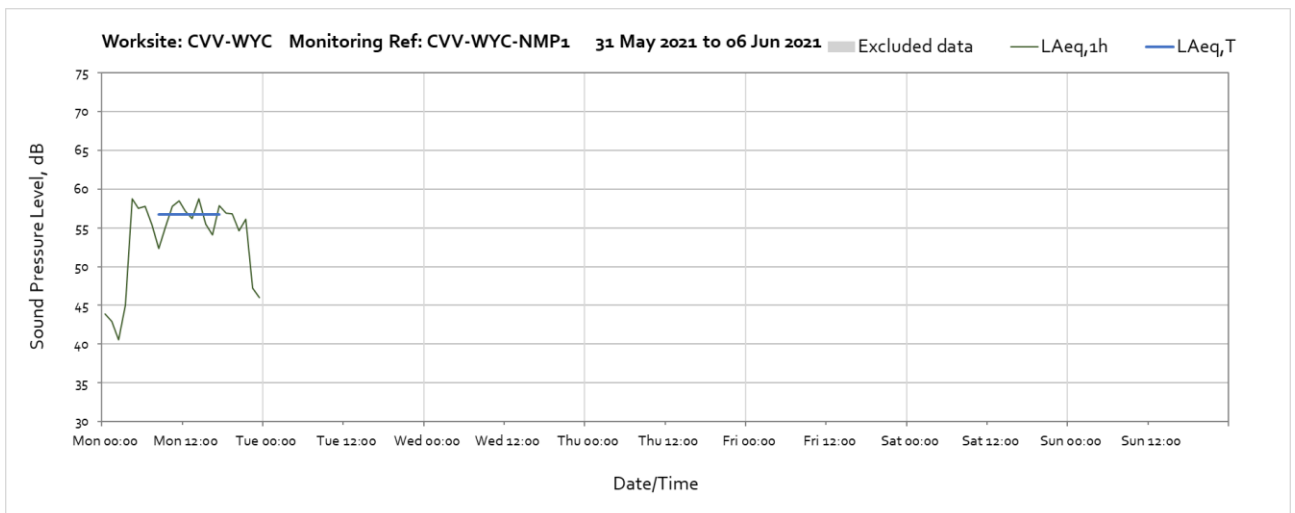
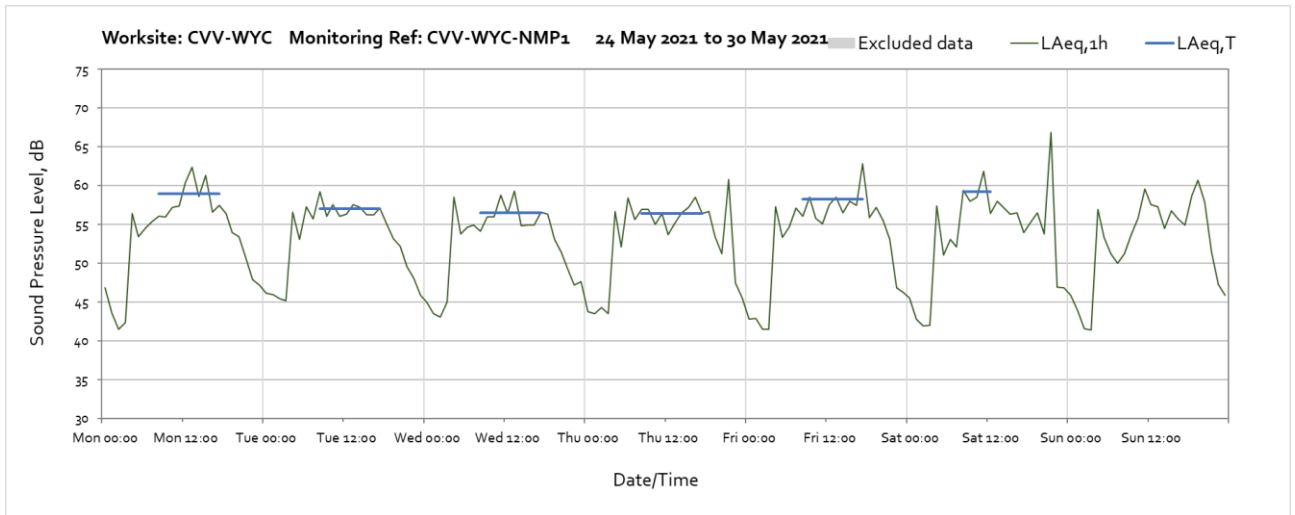
Note: Missing data between 11:00 and 12:00 on Wednesday 5th May was due to maintenance being undertaken to the monitor to setup audio alarm.



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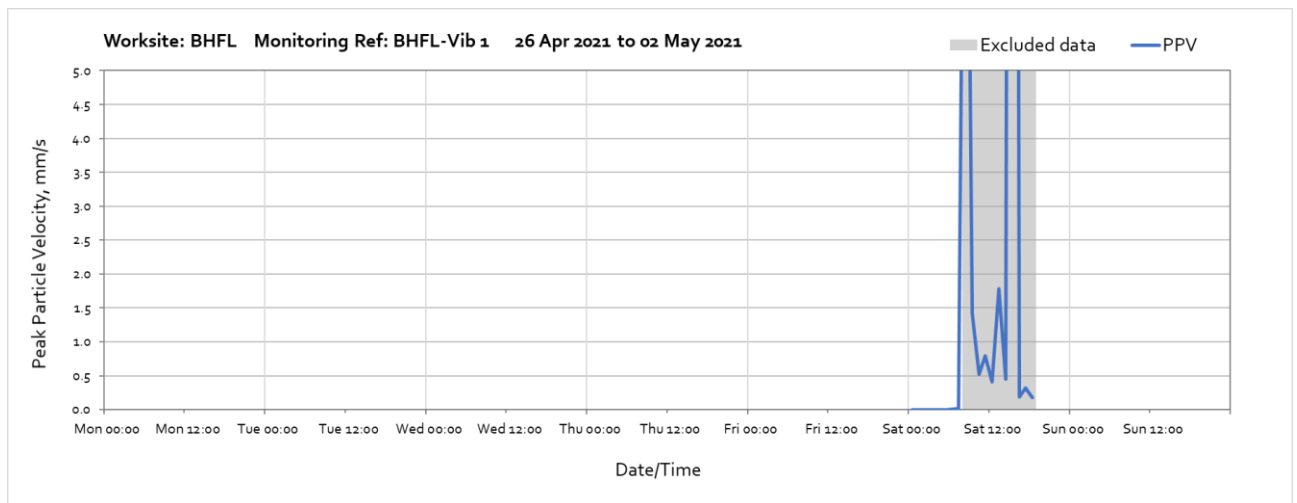
Note: Missing data between 12:00 and 13:00 on Tuesday 18th May was due to monitor being paused for field calibration.



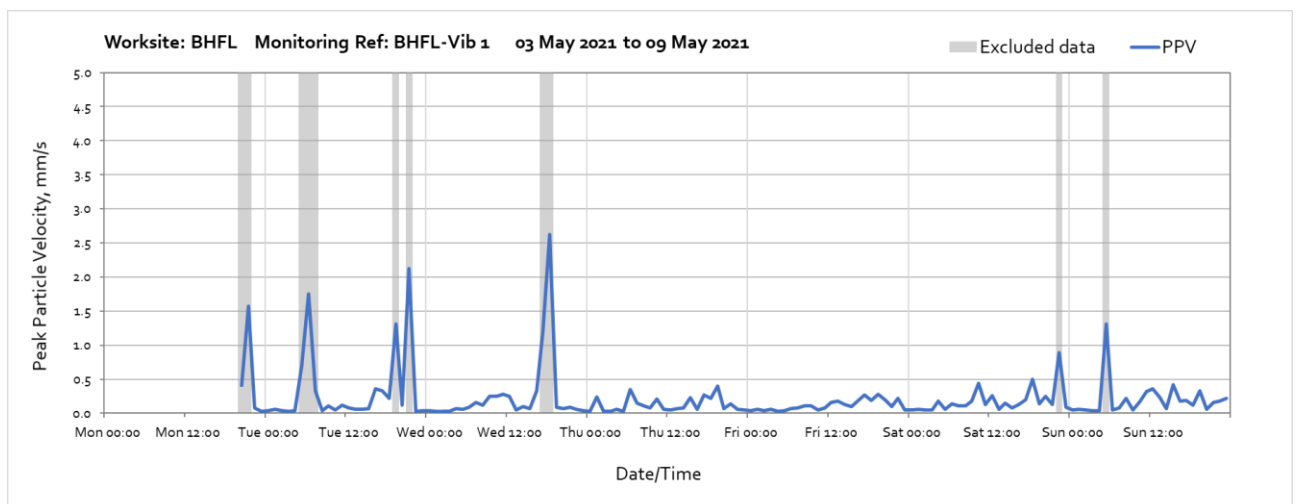
Vibration

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 axes 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.

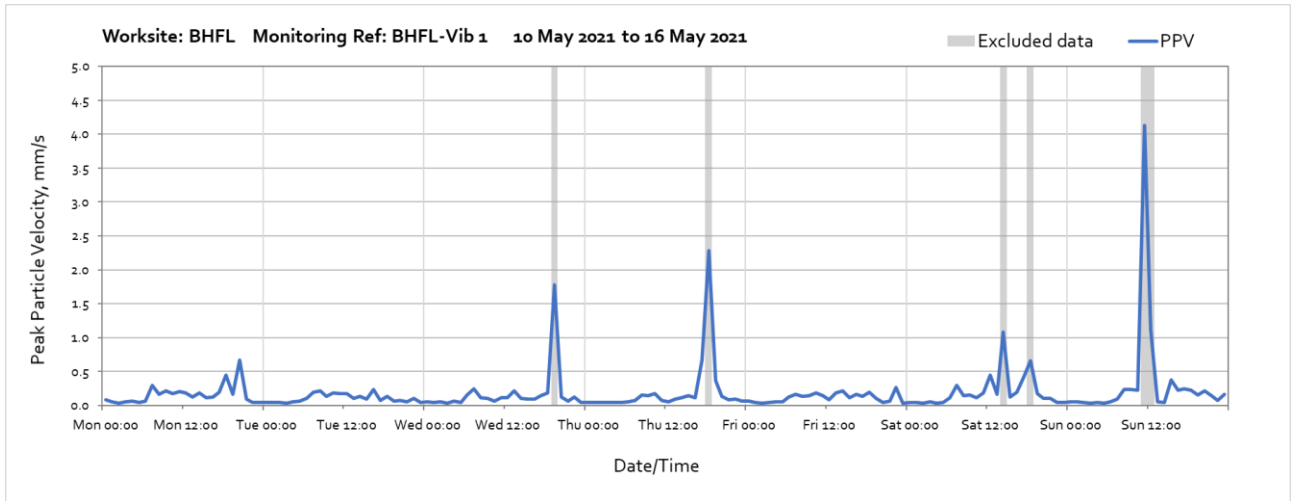
Worksite: BHFL – Monitoring Ref: BHFL-Vib 1



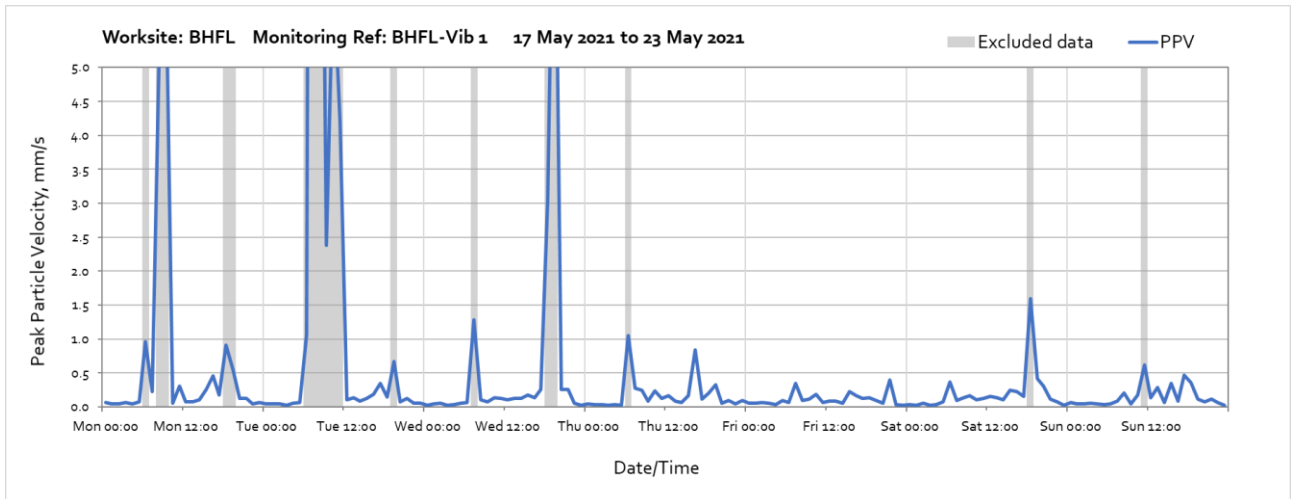
Note: Missing data between 19:00 on Saturday 1st May and 00:00 on Monday 3rd May was due to loss of power to the monitoring station. High levels of vibration measured between 08:00 and 19:00 on 1st of May were due to local disturbance of the monitor and are not representative of HS2 construction vibration levels.



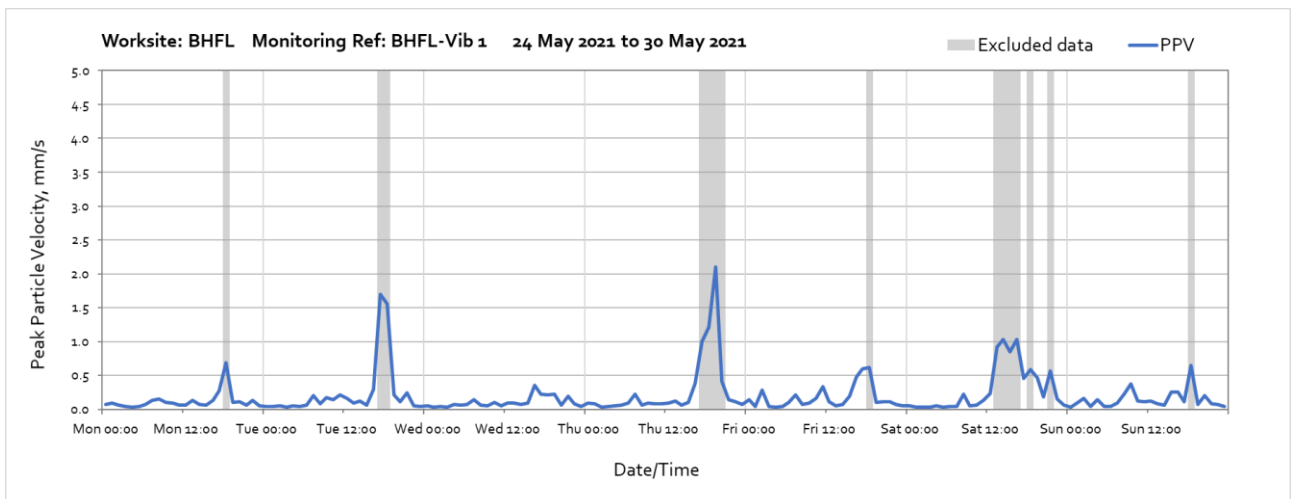
Note: Missing data between 00:00 and 20:00 on Monday 3rd May was due to loss of power to the monitoring station. High levels of vibration measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 construction vibration levels.



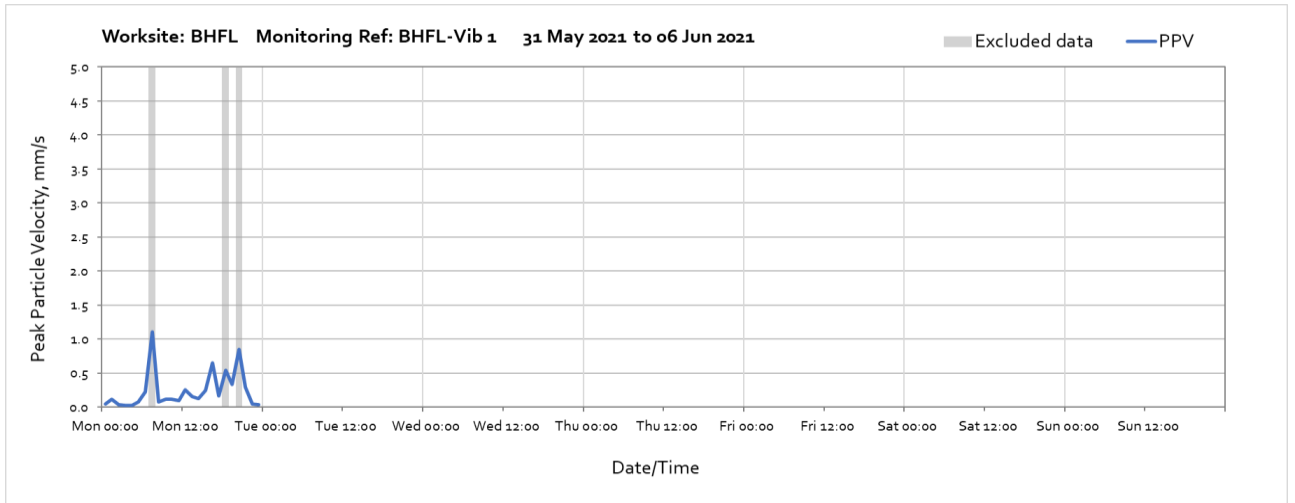
Note: High levels of vibration measured throughout the week were due to local disturbance of the monitor and are not representative of HS2 construction vibration levels.



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