

Construction noise and vibration Monthly Report – April 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 April 2021.

Within this period monitoring was undertaken at the following worksites:

- 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 preparation for concrete works 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 slab were underway.
- Noise monitoring was undertaken in the vicinity of Hall Farm, Bicester Road worksite (ref: HF) where installation of binder and concrete coring works were underway.
- Noise monitoring was undertaken in the vicinity of Little Missenden Vent Shaft worksite (ref.: LM) where construction of site access, roads and car park, installation of site facilities, construction of piling platform, installation of piling mat and hardstanding, removal of satellite compound facilities and stockpiling management were underway.
- Noise monitoring was undertaken in the vicinity of Amersham Vent Shaft worksite (ref.: AM), where site setup; grouting and drilling, erection of hoarding and excavation works were underway.
- Noise and vibration monitoring were undertaken in the vicinity of Bottom House Farm Lane worksite (ref.: BHFL), where general site maintenance, relocation of fencing and footpaths, installation of drainage, earthworks, landscaping, construction of fences and erecting 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, structural wall installation works were in progress.
- Noise monitoring was undertaken in the vicinity of Chalfont St Peter Vent Shaft worksite (ref.: CSP), where stockpile management, shaft dewatering and excavation, post-treatment injection works and emergency site surface stabilisation 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 works along the A412 were underway.

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

- Amersham as part of water pipeline and pumping station works;
- Chalfont St Giles as part of water pipeline and pumping station works;
- Aylesbury as part of gas works;
- Aylesbury and Quainton where trial pitting, repair of trial pit and localised concrete breaking and coring works were underway;
- Chetwode where de-vegetation, fencing, trial trenching and bore holes were underway;
- north of Calvert where electricity diversion works; compounds set up works; roadworks, piling, temporary drainage, top soil stripping, earthworks, utility works, material deliveries by train and stockpile extension were underway;
- south of Calvert where break from highways and protection slab construction were underway;
- Wendover where early work for batching plant construction were underway;
- Turweston where electricity diversion works and groundworks for bat house construction were underway;
- A41/Bicester Road where construction of compound area and roundabout connection between A41 and Bicester Road were underway;
- A418 Oxford Road where temporary compound enabling works were underway;
- Great Missenden where compound setup, expansion of permanent pond, construction of temporary chalk embankment archaeological works, site clearance, installation of fencing, tree planting and clearance of ancient woodland were underway;
- Small Dean and Leather Lane vegetation clearance, soil stripping and backfilling works were underway;
- Twyford where compound access road creation, soil stripping and culvert installation works were underway;
- Hartwell where trial archaeological works, boundary fencing and ecological mitigation works were underway;
- between Waddesdon and Quainton, where trial holes and boreholes were underway;

- Aylesbury Golf Course where borehole surveys, archaeological works, boundary fencing, ecology mitigation and tree planting were underway;
- Great Moore where construction of new access road, container base and slipway construction works were underway; and
- Fleet Marston where vegetation clearance and archaeological mitigation works were underway.

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 30th April 2021.

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

- School Hill UTX worksite reference - SHU (see plan 1 in Appendix A), where works activities included:
 - site setup (including vacuum excavation and road cutting).
- Calvert South Worksite, near Calvert, reference - CALS (see plan 1 in Appendix A), where works activities included:
 - preparation for concrete works.
- Quainton 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;
 - construction of hardstanding;
 - 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:
 - installation of binder; and
 - concrete coring works.
- Little Missenden Vent Shaft worksite reference - LM (see plan 4 in Appendix A), where works activities included:
 - construction of site access bell mouth, site road formation and car parking;
 - installation of office and other site facilities;
 - construction of piling platform;
 - installation of piling mat and other hardstanding;
 - removal of satellite compound offices, welfare facilities and stores; and
 - stockpile management.
- Amersham Vent Shaft Worksite, reference - AM (see plan 5 in Appendix A), where works activities included:
 - site setup;
 - grouting and drilling;
 - erection of hoarding;
 - installation of storage, reinforcement, 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:
 - general site maintenance and relocation of fencing and footpaths;
 - installing drainage (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);
 - landscaping works;
 - construction of fences and erecting gates; and
 - utility works (relocation of telegraph poles).
- Chalfont St Giles Vent Shaft Worksite, reference - 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).
- Chalfont St Peter Vent Shaft Worksite, reference - 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, trim structural wall, construct capping beam and excavation);
 - grouting; and
 - emergency site surface stabilisation works.
- Load Test Pile 1 Worksite, reference - LTP #1 (see plan 8 in Appendix A), where works activities included:
 - utility works;
 - construction of compound access roads including drainage and pavement;
 - Denham Water Ski Club and North Embankment compound operation and desanding;
 - civil works, earthworks, drainage and finishing works on haul road;
 - ground investigation works;
 - piling works (Cofferdam sheet piling and permanent main piling works);
 - River Colne to the Grand Union Canal devegetation works;
 - realignment of River Colne and New Years Green Bourne; and
 - Tarmac, finishing works and fencing along the A412.

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

- Amersham as part of water pipeline and pumping station works;
- Chalfont St Giles as part of water pipeline and pumping station works;
- Aylesbury as part of gas works;
- Aylesbury and Quainton where trial pitting, repair of trial pit on topside of structure and localised concrete breaking and coring works were underway.

- Chetwode where de-vegetation, fencing, trial trenching and bore holes were underway.
- north of Calvert, where work activities included:
 - compound set up activities (including cabins fitout, electrical and potable water networks, utility connection, drainage, erection of batching plant);
 - roadworks for site access;
 - piling;
 - temporary drainage;
 - top soil stripping;
 - earthworks;
 - utility works; and
 - delivery of aggregates and stockpile extension.
- south of Calvert, where work activities included:
 - break from highways and protection slab construction.
- Wendover where early work for batching plant construction were underway.
- Turweston where electricity diversion works and groundworks for bat house construction were underway.
- A41/Bicester Road where work activities included:
 - construction of compound; and
 - construction of roundabout connection between A41 and Bicester Road.
- A418 Oxford Road where temporary compound enabling works were underway.
- Great Missenden, where work activities included:
 - compound setup;
 - expansion of permanent pond;
 - construction of temporary chalk embankment;
 - archaeological works;
 - site clearance;
 - installation of fencing;
 - tree planting; and

- clearance of ancient woodland - trees and soils.
- Small Dean and Leather Lane where vegetation clearance, soil stripping and backfilling works were underway.
- Twyford where compound construction activities included:
 - construction of access road;
 - soil stripping; and
 - culvert installation.
- Hartwell where trial archaeological works, boundary fencing and ecological mitigation works were underway.
- Between Waddesdon and Quainton, where trial holes and boreholes for under track crossings works were underway.
- Aylesbury Golf Course where borehole surveys, archaeological works, boundary fencing, Ecology mitigation and planting underway.
- Great Moore where construction of new access road, container base and slipway construction works were underway.
- Fleet Marston where vegetation clearance and archaeological mitigation 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 Fourteen noise and one vibration monitoring installations were active in April in the BS area. Table 2 summarises the position of noise monitoring installations within the BS area in April 2021.

1.2.2 Maps showing the position of noise monitoring installations are presented in Appendix B.

1.2.3 The noise monitor WYC-NMP1 was installed in proximity to the Load Test Pile 1 worksite, ref.: LTP #1, on the 13th of April.

1.2.4 The noise monitor CALS-NMP1 was installed in proximity to the Calvert South worksite, ref.: CALS, on the 23th of April.

1.2.5 The noise monitor SHUTX-NMP1 was installed at School Hill UTX worksite, ref.: SHU, on the 19th of April.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
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
AM	AM-NMP1	Amersham Vent Shaft Worksite, Whielden Lane, Amersham
LM	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
CSG	CSG-NMP1	Chalfont St Giles Vent Shaft Worksite, Bottom House Farm Lane
	CSG-NMP2	Chalfont St Giles Vent Shaft Worksite, Bottom House Farm Lane
CSP	CSP-NMP1	Chalfont St Peter Vent Shaft Worksite, Chesham Lane, Chalfont St. Peter
	CSP-NMP2	Chalfont St Peter Vent Shaft Worksite, Chesham Lane, Chalfont St. Peter
	CSP-NMP3	Chalfont St Peter Vent Shaft Worksite, Chesham Lane, Chalfont St. Peter
LTP #1	LTP #1-NMP1	Northern boundary, Load Test Pile 1 Worksite, Denham Water Ski Club
	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
SHU	SHU-NMP1	70 Cotswold Way, Calvert	Free-field	54.4 (57.9)	56.3 (65.8)	51.8 (57.2)	50.6 (55.9)	50.3 (59.3)	50.3 (50.3)	50.7 (50.7)	51.0 (51.0)	56.2 (63.5)	51.3 (58.8)	50.3 (52.3)	52.5 (59.1)
CALS	CALS-NMP1	Site boundary adjacent to Red Kite View, Calvert	Free-field	59.5 (61.8)	57.9 (58.6)	46.6 (48.9)	43.6 (48.3)	44.0 (59.3)	46.6 (46.6)	45.7 (45.7)	50.2 (50.2)	44.9 (49.2)	40.1 (46.5)	46.1 (51.3)	41.4 (47.7)
QAR	QAR-NMP1	1 Woodlands Farm Cottages, Quainton	Free-field	52.4 (54.2)	54.3 (62.6)	49.7 (54.7)	46.5 (51.7)	45.4 (67.2)	50.7 (52.0)	56.3 (64.3)	54.4 (62.5)	51.0 (59.6)	43.8 (51.8)	52.1 (67.6)	44.1 (52.1)
HF	HF-NMP1	Hall Farm, Bicester Road, Waddesdon	Free-field	66.3 (67.8)	65.8 (67.8)	66.1 (69.3)	63.5 (67.7)	59.5 (65.3)	63.0 (63.6)	65.2 (66.1)	66.1 (66.8)	64.9 (66.6)	57.8 (62.3)	63.2 (67.6)	59.0 (65.2)
AM	AM-NMP1	Whielden Lane, Amersham	Free-field	70.2 (73.0)	70.6 (72.3)	69.9 (73.8)	67.2 (73.7)	61.9 (69.3)	67.9 (70.5)	70.0 (71.4)	69.2 (69.9)	68.6 (71.7)	61.1 (68.1)	68.4 (72.0)	61.2 (68.3)
LM	LM-NMP1	Little Missenden Vent Shaft Worksite	Free-field	66.3 (67.8)	66.1 (71.9)	65.9 (67.8)	62.6 (66.1)	58.3 (65.6)	62.8 (63.5)	64.9 (65.2)	65.3 (65.9)	64.0 (65.5)	56.8 (60.2)	63.7 (65.5)	57.6 (65.1)
BHFL	BHFL-NMP1	Elm Tree Cottage, Bottom House Farm Lane	Free-field	55.5 (63.4)	54.3 (56.7)	52.4 (56.4)	50.5 (54.4)	49.0 (58.5)	52.9 (55.4)	52.7 (52.7)	51.9 (52.1)	53.9 (63.6)	47.4 (55.3)	51.4 (56.2)	48.6 (55.5)
CSG	CSG-NMP1	Chalfont St Giles Vent Shaft Worksite, Bottom House Farm Lane	Free-field	53.2 (63.1)	56.4 (59.6)	49.4 (55.2)	47.2 (62.6)	46.0 (55.6)	46.3 (49.3)	48.3 (51.7)	49.5 (55.6)	46.2 (54.7)	40.4 (46.8)	49.3 (61.8)	44.7 (55.1)
	CSG-NMP2	Chalfont St Giles Vent Shaft Worksite, Bottom House Farm Lane	Free-field	52.9 (55.3)	57.8 (64.8)	50.7 (56.0)	49.7 (60.6)	48.6 (57.5)	50.2 (51.6)	53.7 (64.6)	51.4 (56.9)	49.3 (55.2)	46.5 (50.1)	48.5 (56.0)	46.4 (54.0)

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
CSP	CSP-NMP1	Chalfont St Peter Vent Shaft Worksite	Free-field	67.3 (72.0)	70.1 (77.2)	65.7 (69.6)	59.5 (70.0)	54.5 (66.4)	64.9 (73.2)	67.4 (77.4)	62.9 (63.7)	60.4 (63.5)	51.1 (55.8)	60.0 (63.5)	51.8 (59.6)
	CSP-NMP2	Chalfont St Peter Vent Shaft Worksite	Free-field	52.5 (73.5)	52.0 (56.7)	48.1 (54.8)	44.0 (51.5)	43.7 (56.0)	48.1 (48.5)	47.9 (50.0)	47.0 (51.5)	44.2 (48.4)	42.3 (50.7)	47.7 (54.6)	45.4 (56.7)
	CSP-NMP3	Chalfont St Peter Vent Shaft Worksite	Free-field	56.6 (58.0)	56.1 (58.1)	55.4 (58.1)	53.3 (56.0)	51.5 (65.9)	53.3 (55.1)	55.2 (55.5)	55.3 (56.6)	54.0 (55.5)	49.5 (60.7)	54.4 (56.8)	52.2 (63.7)
LTP #1	LTP #1-NMP1	Northern boundary, Load Test Pile 1 Worksite	Free-field	61.6 (63.8)	62.1 (64.0)	61.8 (64.2)	59.3 (63.9)	56.1 (63.8)	59.0 (60.1)	60.7 (61.4)	60.9 (61.4)	60.4 (70.5)	53.5 (59.3)	59.5 (64.8)	54.9 (62.5)
	WYC-NMP1	Wyatt's Covert, Tilehouse Lane, Denham	Free-field	56.7 (58.0)	59.1 (60.9)	55.9 (57.9)	52.4 (59.2)	51.7 (63.0)	54.3 (55.6)	59.0 (59.2)	56.5 (56.6)	55.7 (59.6)	51.0 (58.5)	57.0 (61.5)	51.3 (59.0)

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	0.18 (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
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
AM	AM-NMP1*	Whielden Lane, Amersham	All days	All periods	No exceedance	No exceedance
LM	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	No exceedance	No exceedance
CSG	CSG-NMP1*	Chalfont St Giles Vent Shaft	All days	All periods	No exceedance	No exceedance
	CSG-NMP2*	Chalfont St Giles Vent Shaft	Night	2200-0700	1	No exceedance
CSP	CSP-NMP1*	Chalfont St Peter Vent Shaft Worksite	All days	All periods	No exceedance	No exceedance
	CSP-NMP2*	Chalfont St Peter Vent Shaft Worksite	All days	All periods	No exceedance	No exceedance
	CSP-NMP3*	Chalfont St Peter Vent Shaft Worksite	All days	All periods	No exceedance	No exceedance

Worksite Reference	Measurement Reference	Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
LTP #1	LTP #1-NMP1	Northern boundary, Load Test Pile 1 Worksite	All days	All periods	No exceedance	No exceedance
	WYC-NMP1	Wyatt's Covert, Tilehouse Lane, Denham	Saturday Sunday Night	1400-2200 0700-2200 2200-0700	8 18 24	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 April 2021. Exceedances of the LOAEL were recorded at CSG-NMP2 during a period of night-time works and at WYC-NMP1 outside of core working hours.

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

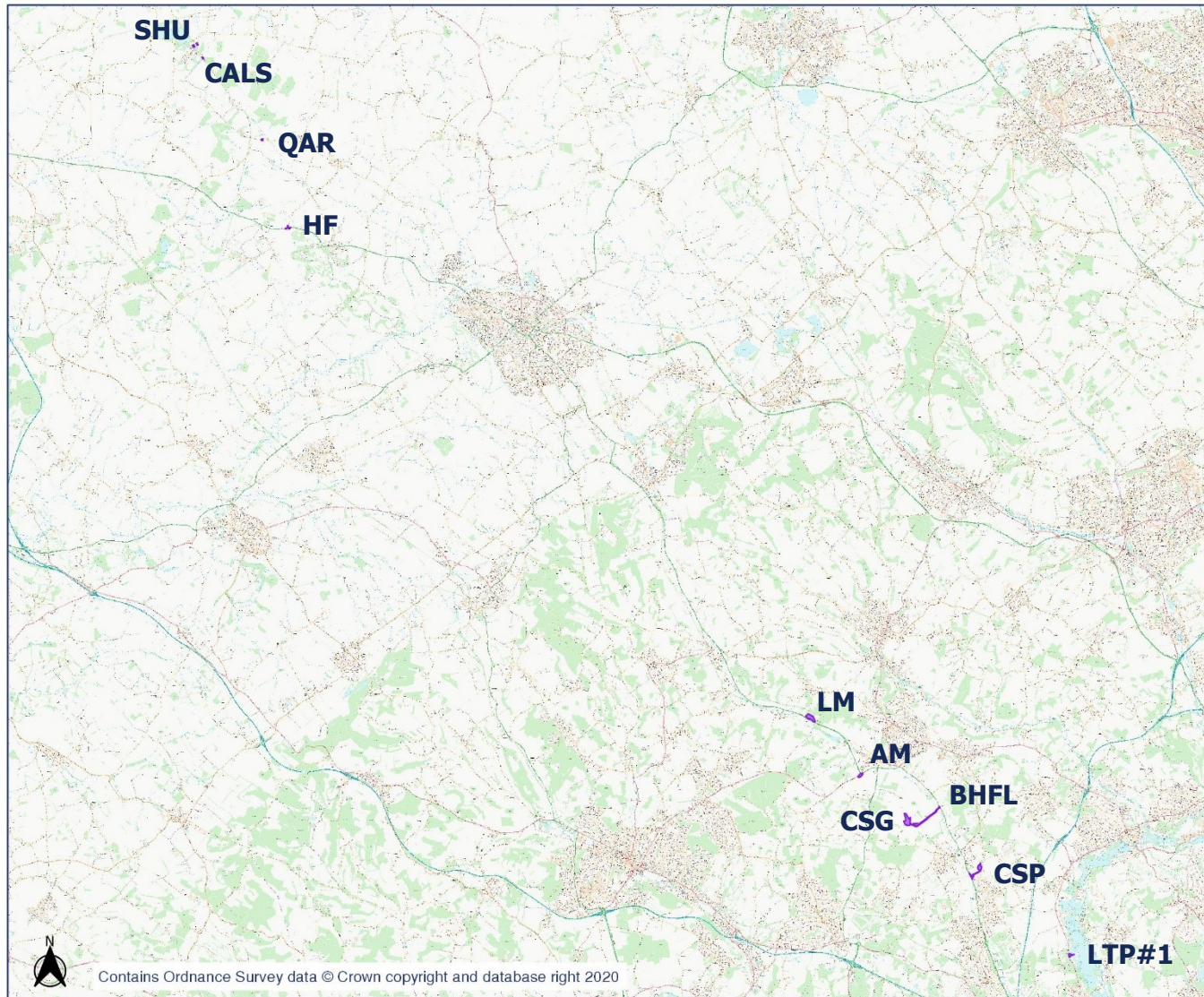
2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 7: Summary of Complaints

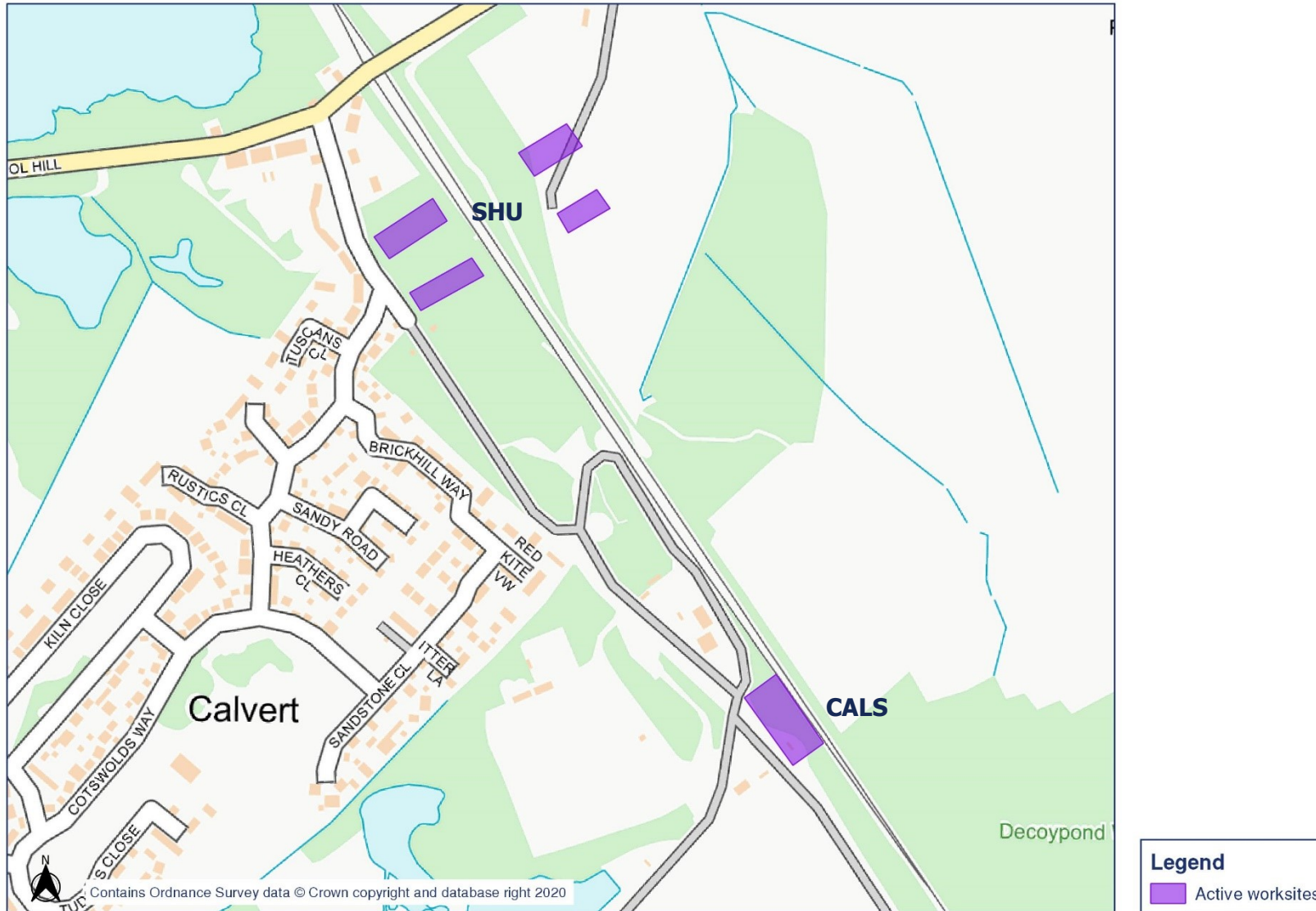
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-41718-C HS2-21-41761-C HS2-21-41781-C HS2-21-41860-C	SHU, Calvert North railhead	Noise from construction site.	Noise due to aggregate unloading, being delivered by rail. Activity was carried out in compliance with S61 consent and Best Practicable Means (BPM) were used.	Confirmed to stakeholder, along with confirmation that these materials are being delivered by rail to reduce the volume of HGVs in the area, and confirmation of rough times each day when the activity is carried out.

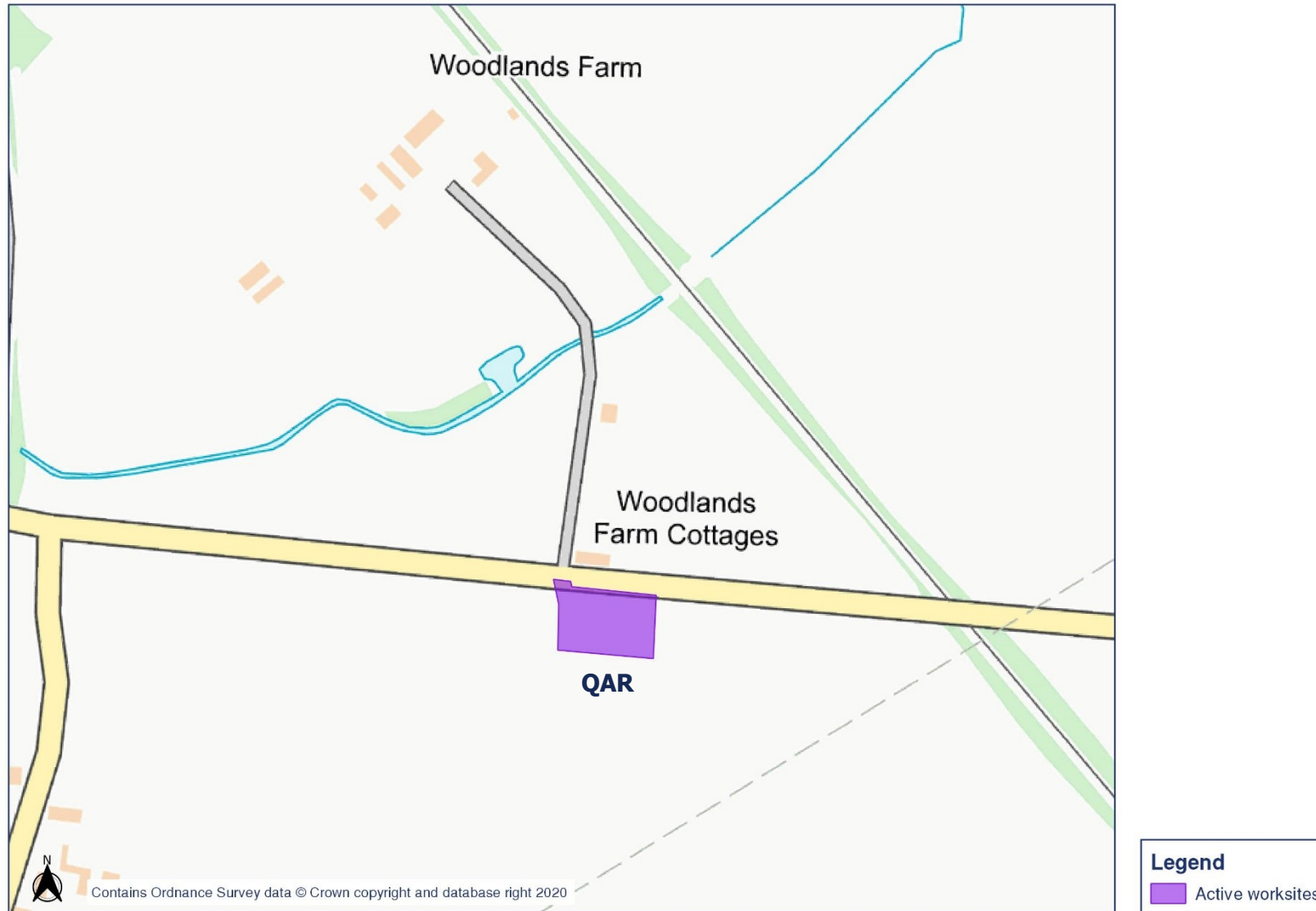
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-41739-C	Works near Wendover	Generator noise at night.	Noise associated with a generator installed to provide power for site security at the batching plant compound. For health and safety reasons the generator operates 24/7.	Contractor is in ongoing liaison with the stakeholder to discuss their concerns and agree potential mitigation.
HS2-21-41854-C	CALS	Noise from removal of trees early in the morning.	Devegetation activities were not related to HS2, however the complaint was found to also be associated with unloading of aggregate at the Calvert South railhead. Activity was carried out in compliance with S61 consent and BPM were used.	Confirmed to stakeholder, along with confirmation that these materials are being delivered by rail to reduce the volume of HGVs in the area, and confirmation of rough times each day when the activity is carried out.

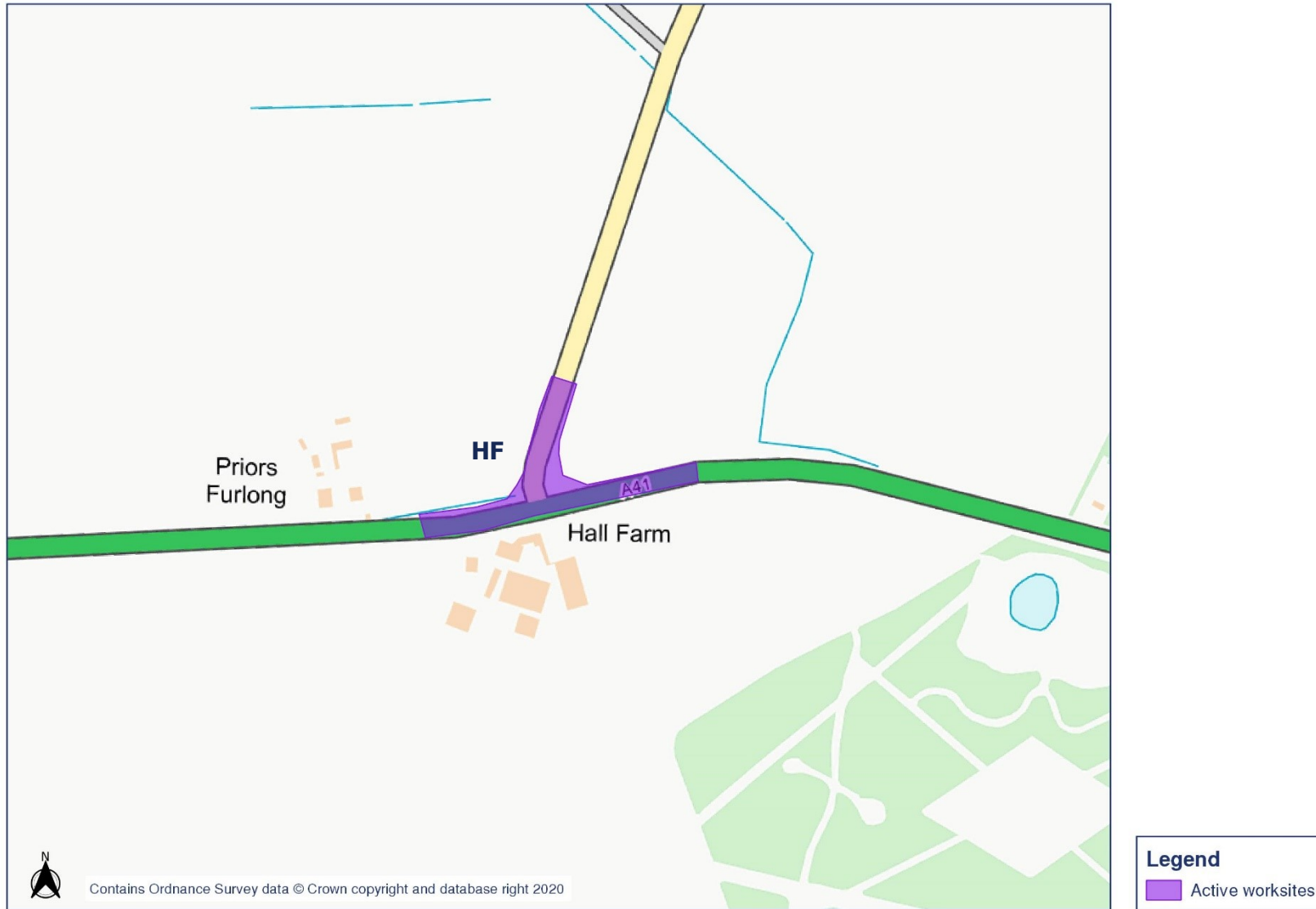
Appendix A Site Locations



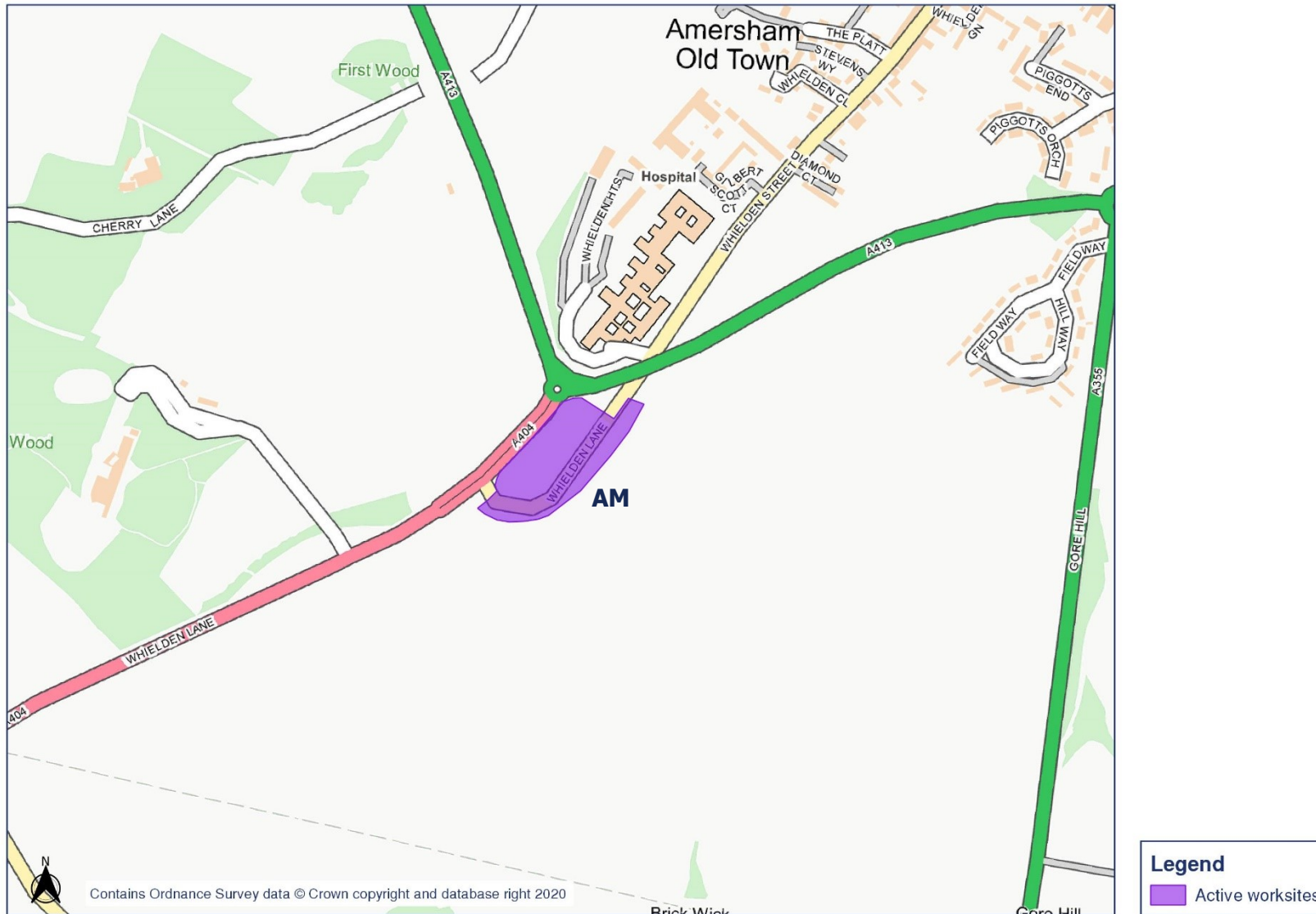
Legend
Active worksites

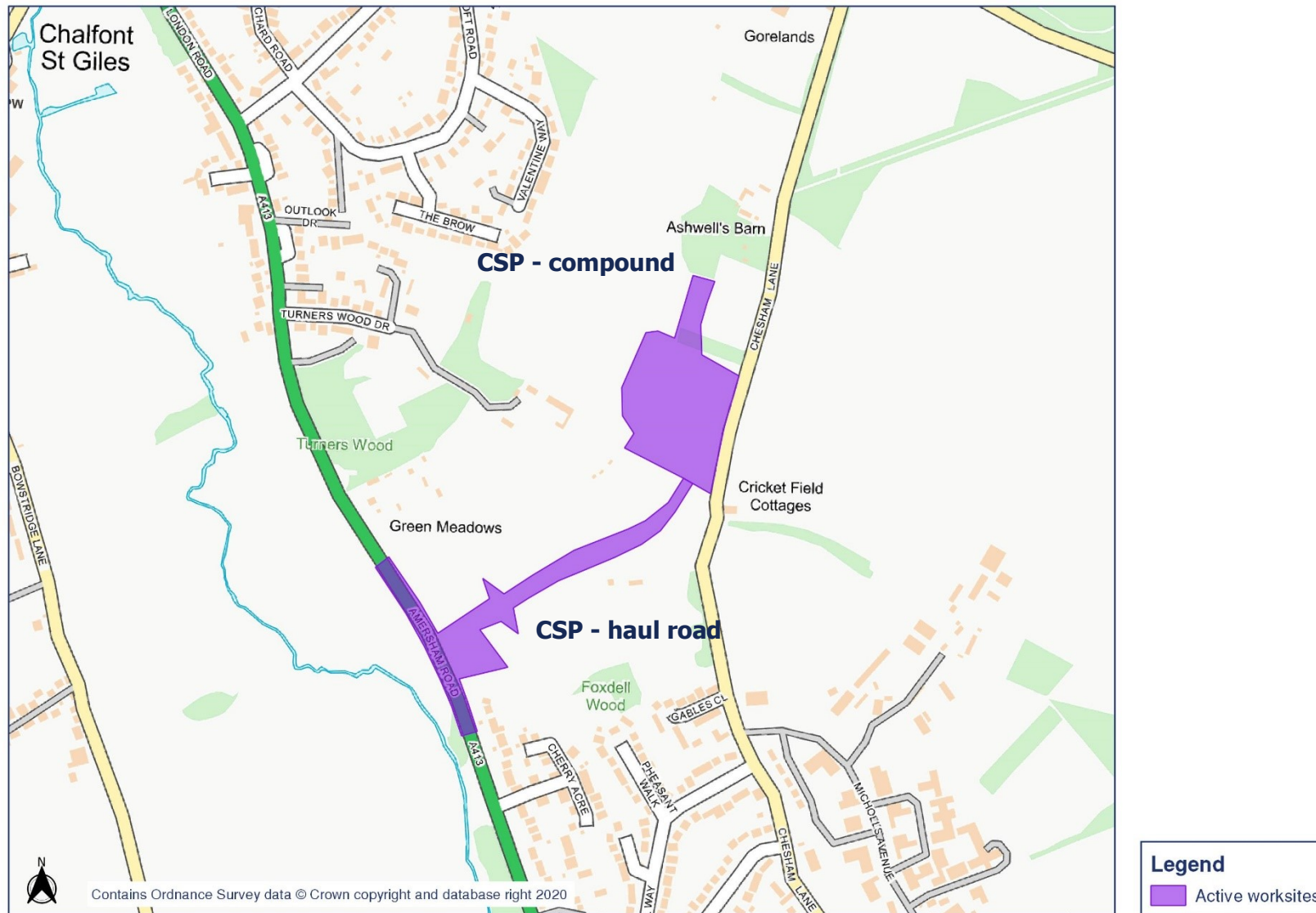






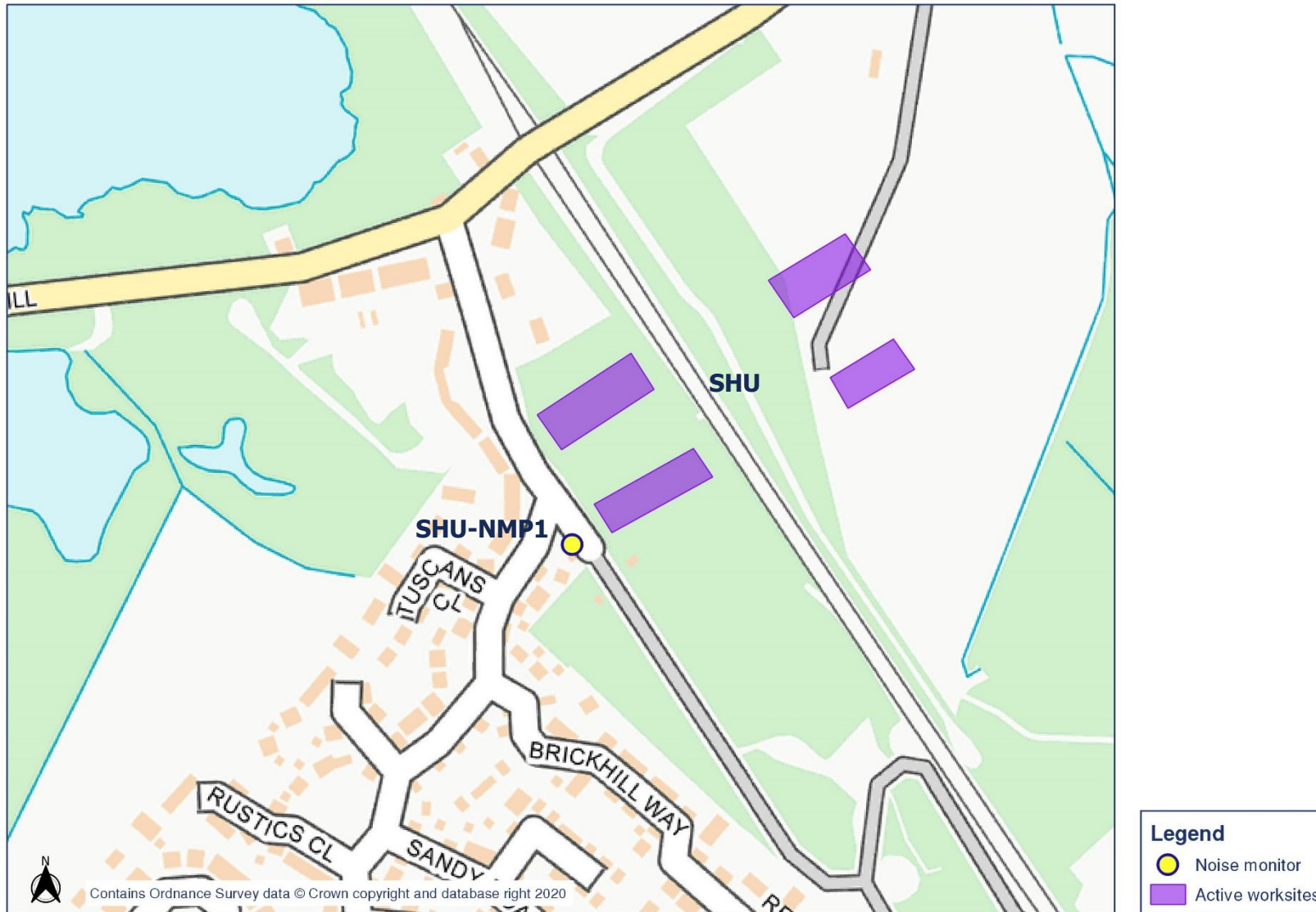


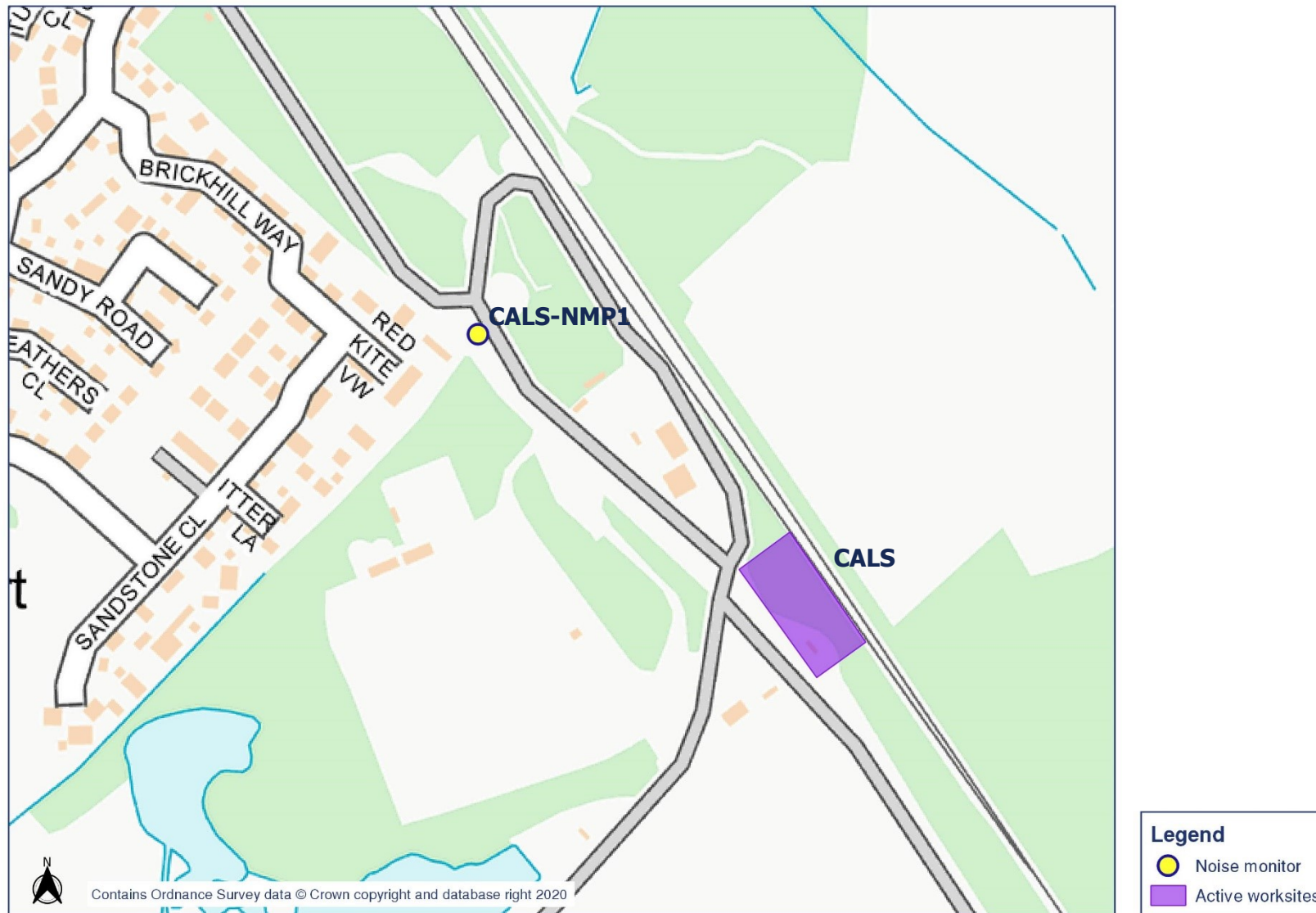






Appendix B Monitoring Locations

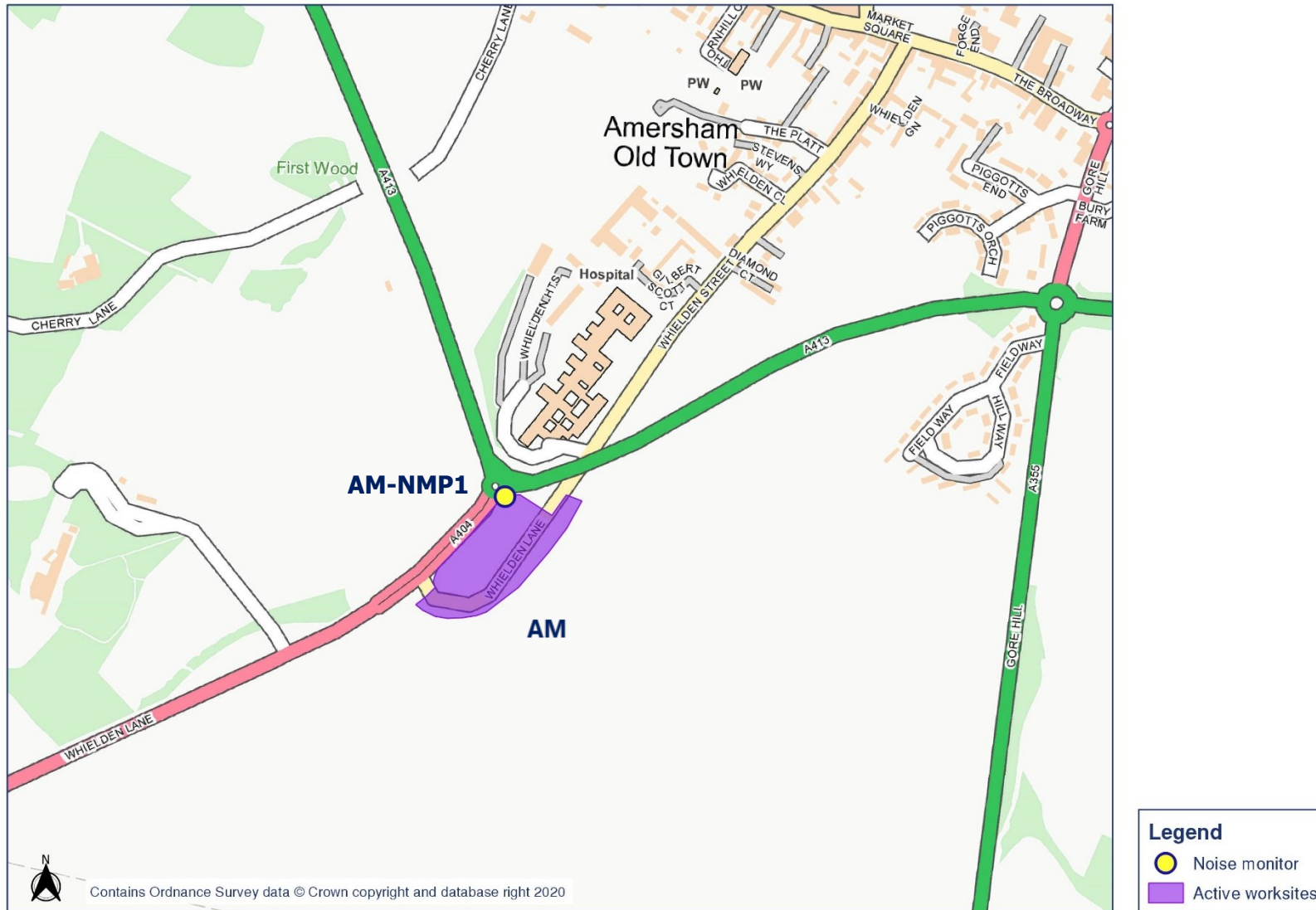


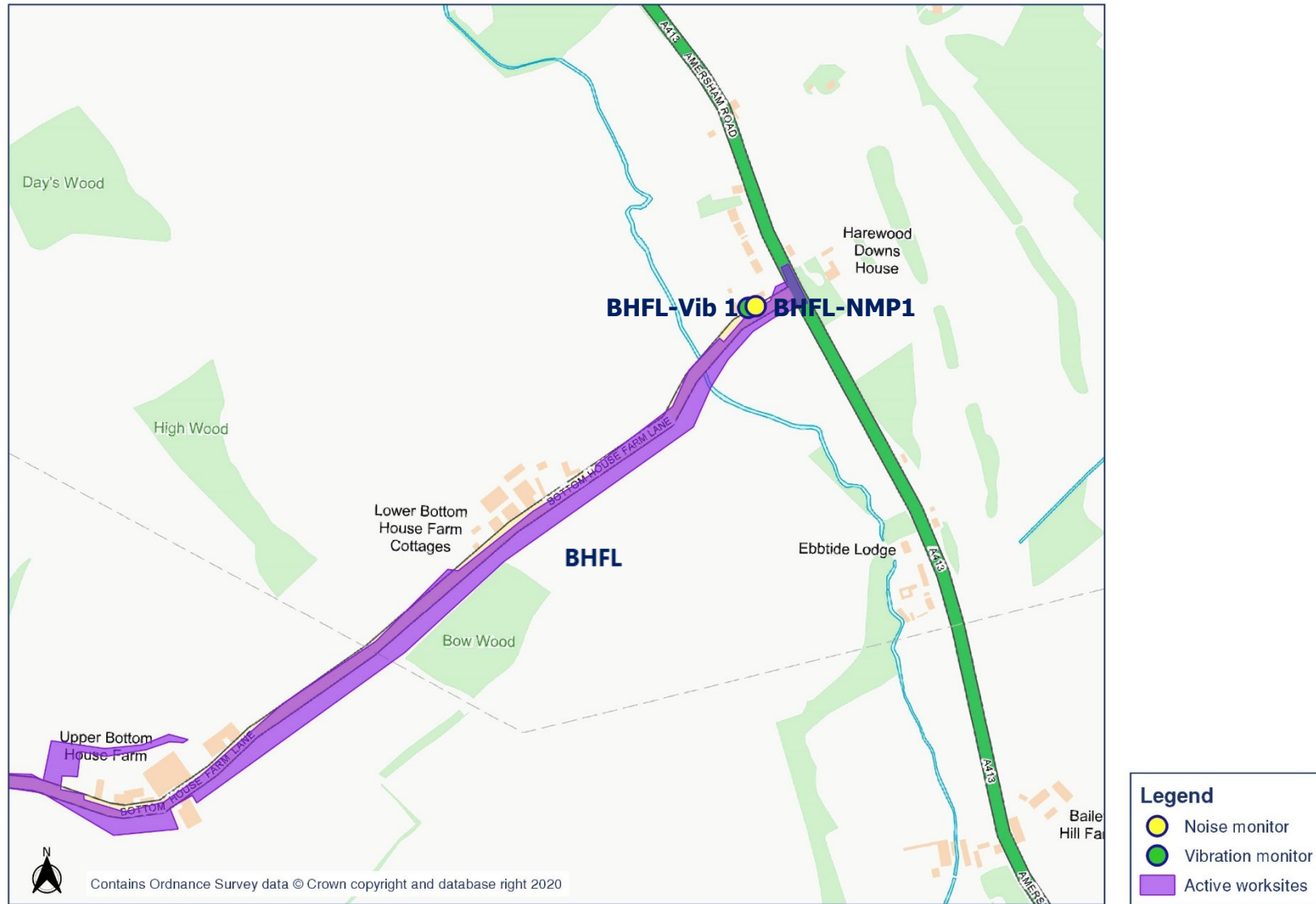


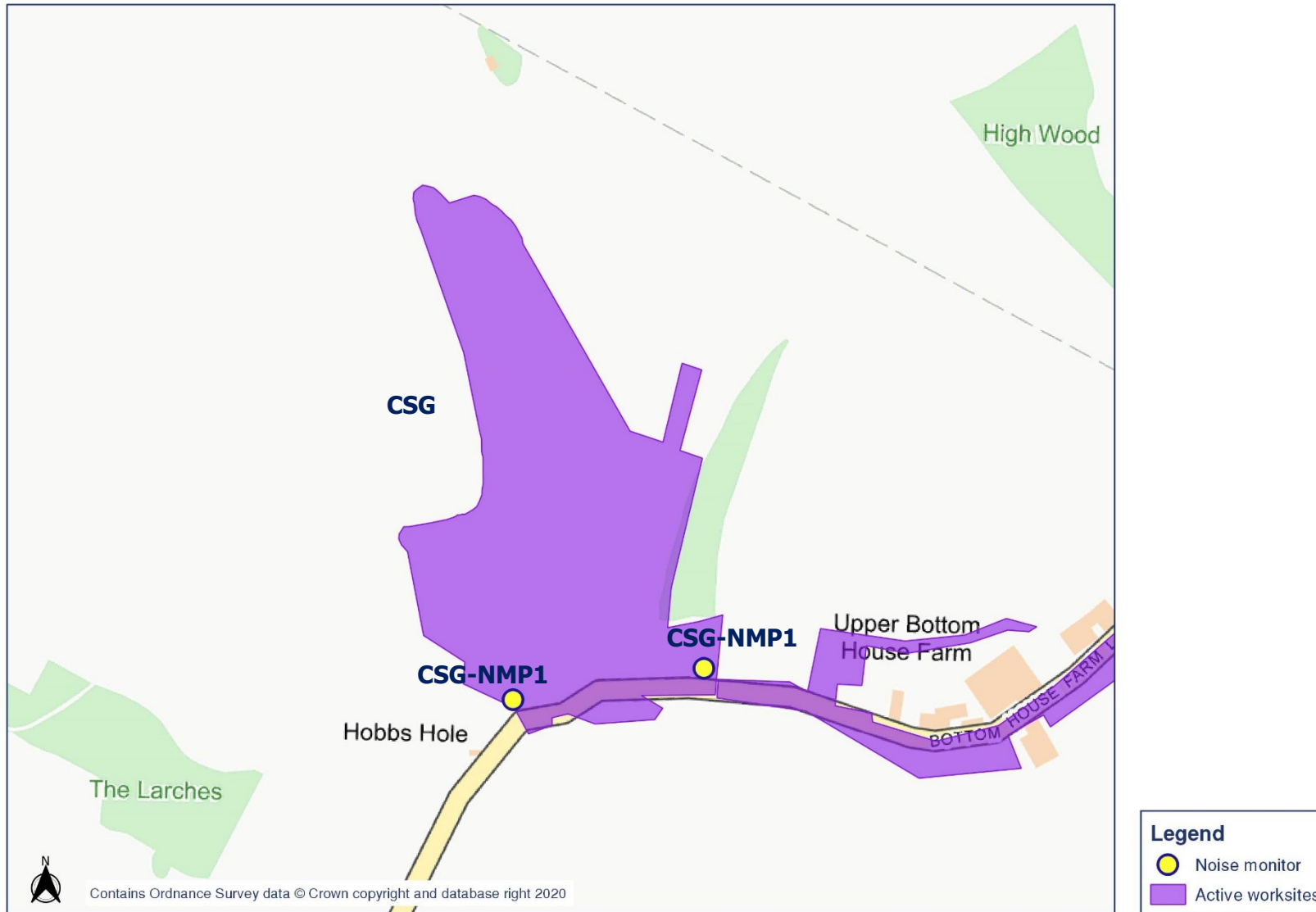


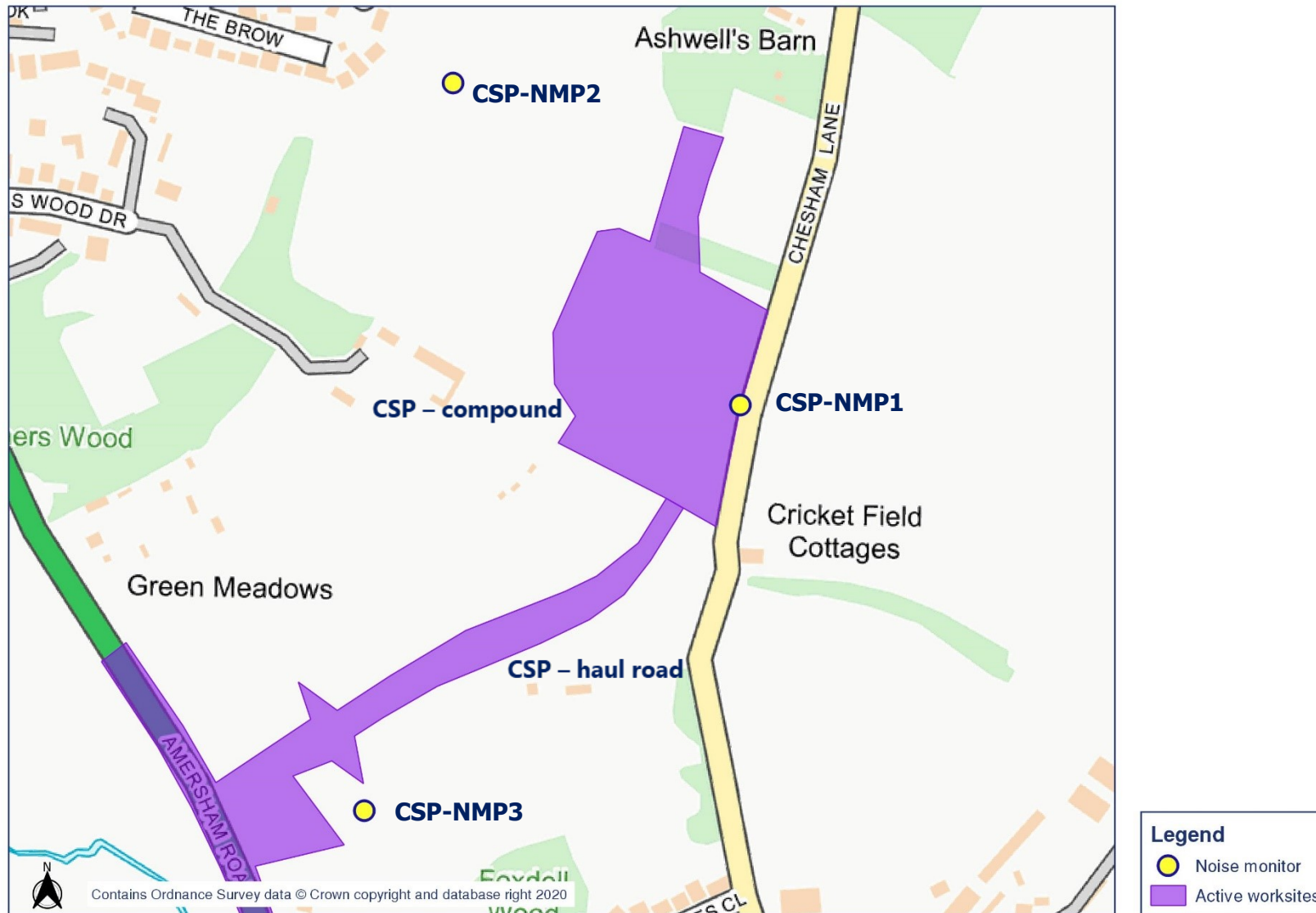












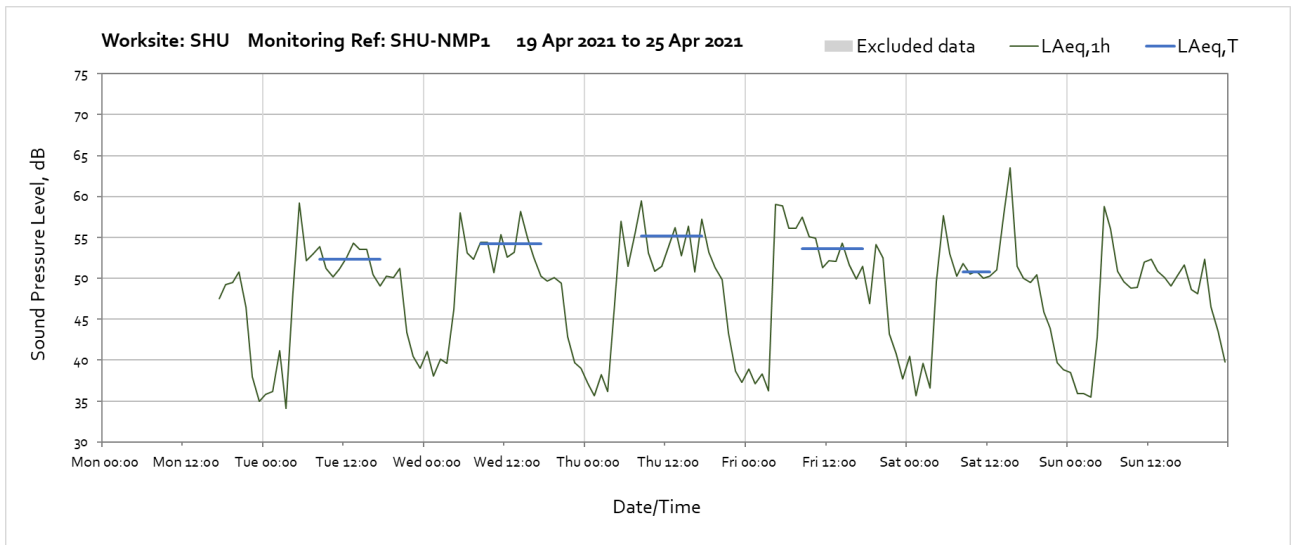


Appendix C Data

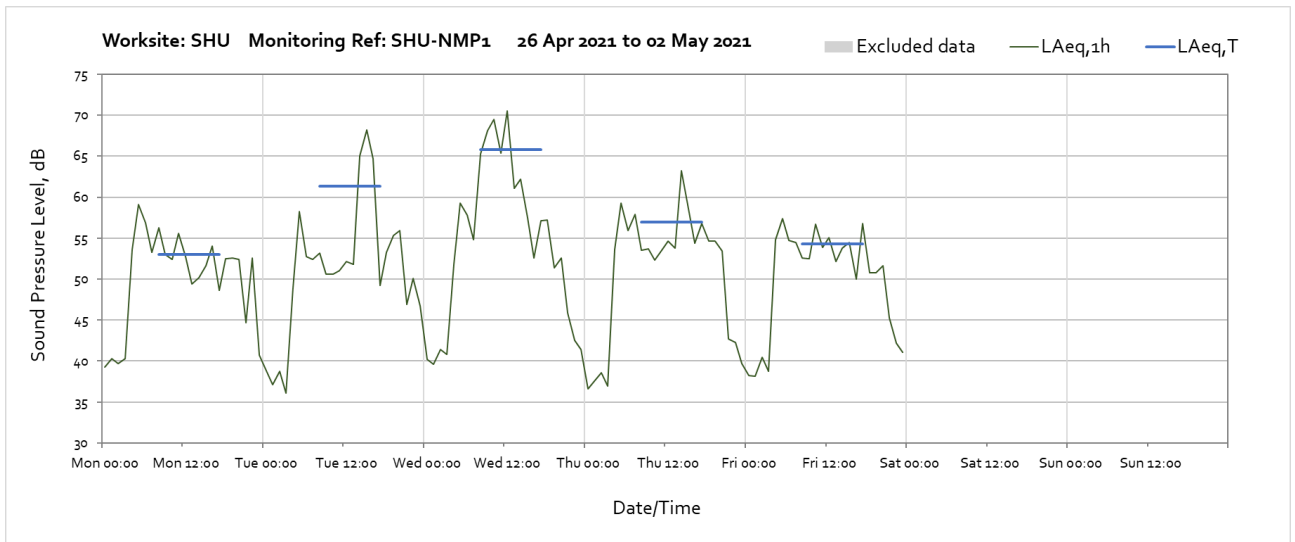
Noise

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.

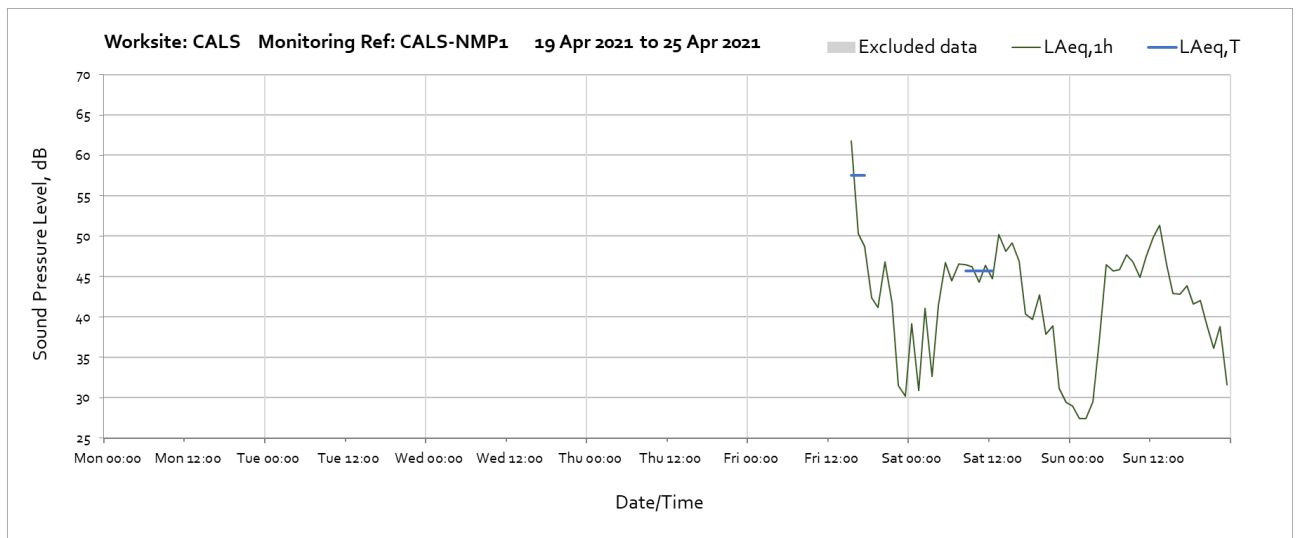
Worksite: SHU – Monitoring Ref: SHU-NMP1



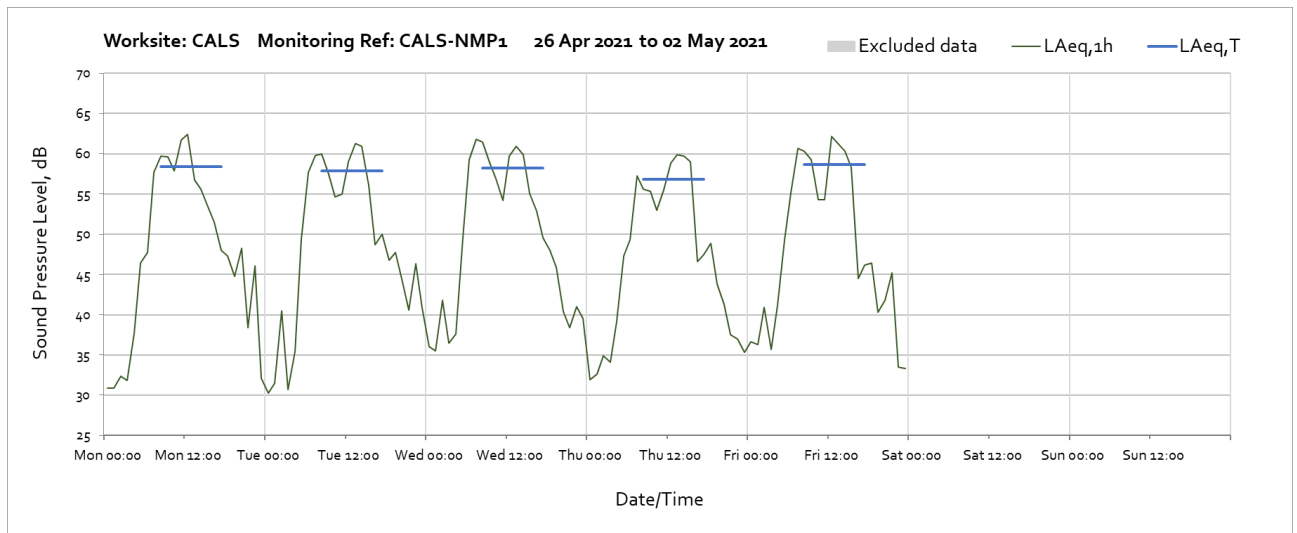
Note: The monitor was installed at 17:00 on Monday 19th April.



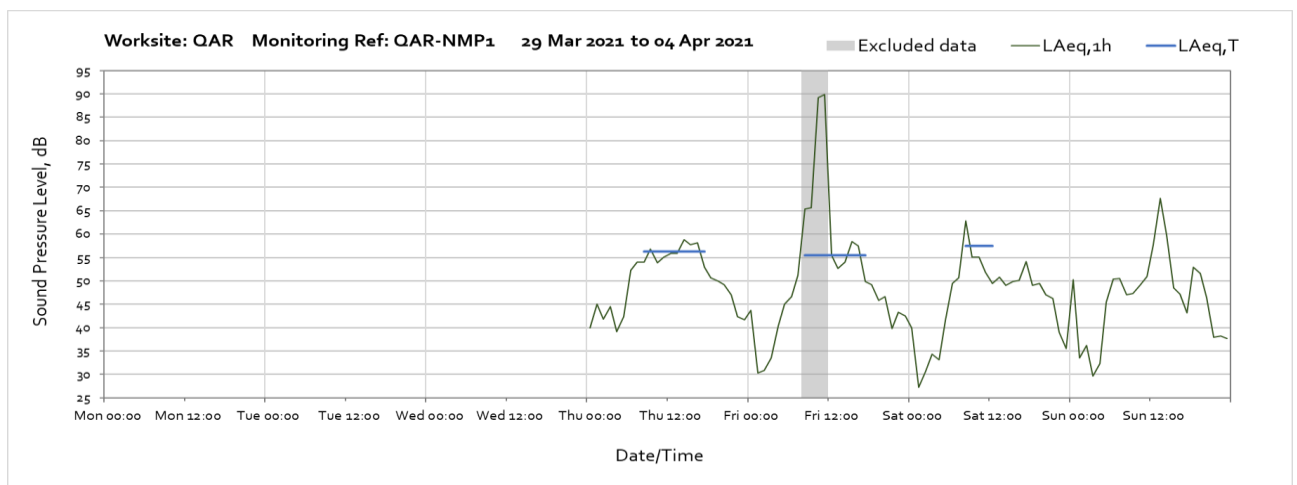
Worksite: CALS – Monitoring Ref: CALS-NMP1



Note: The monitor was installed at 15:00 on Friday 23th April.

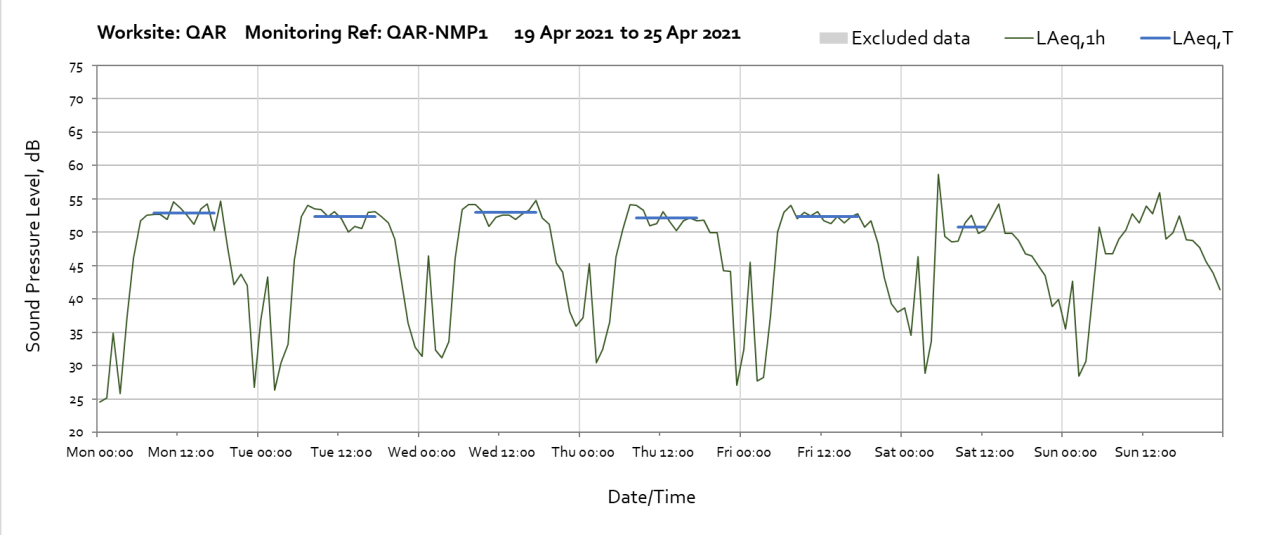
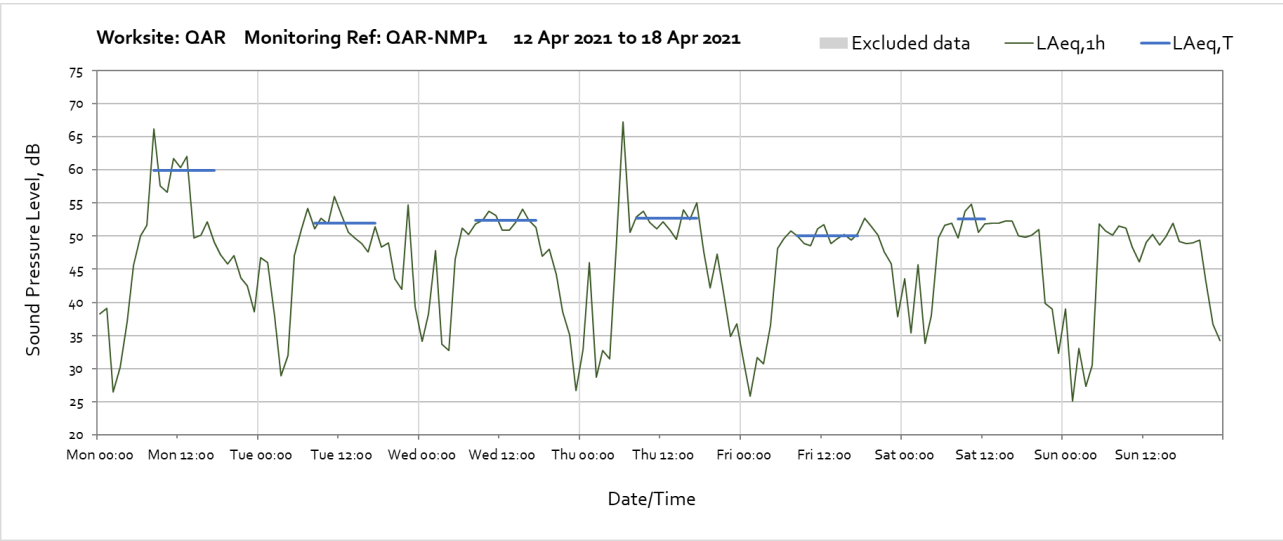
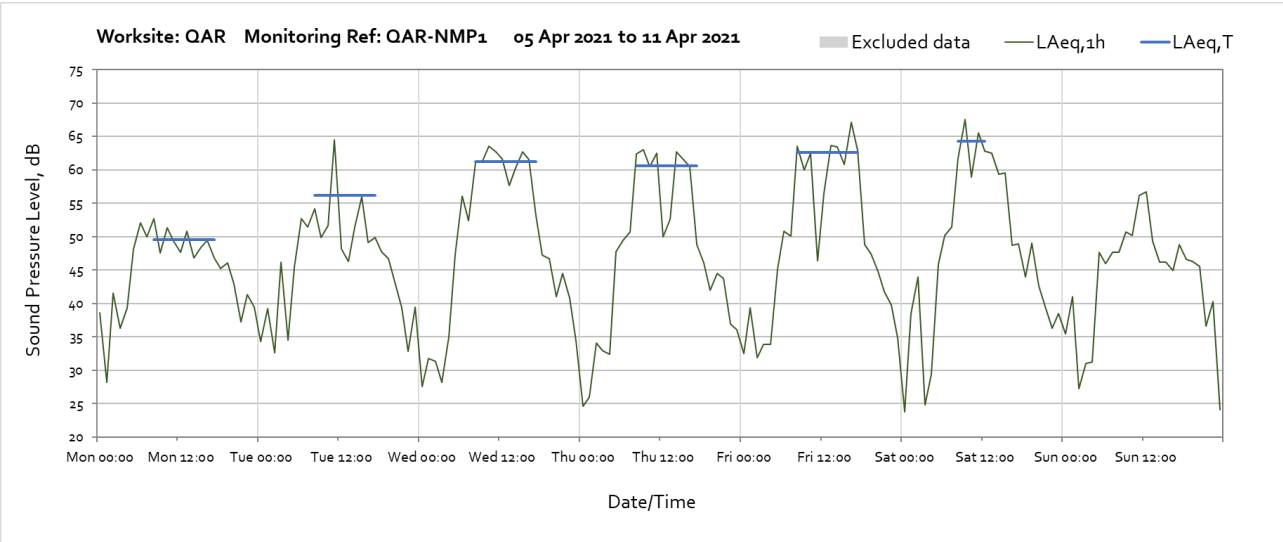


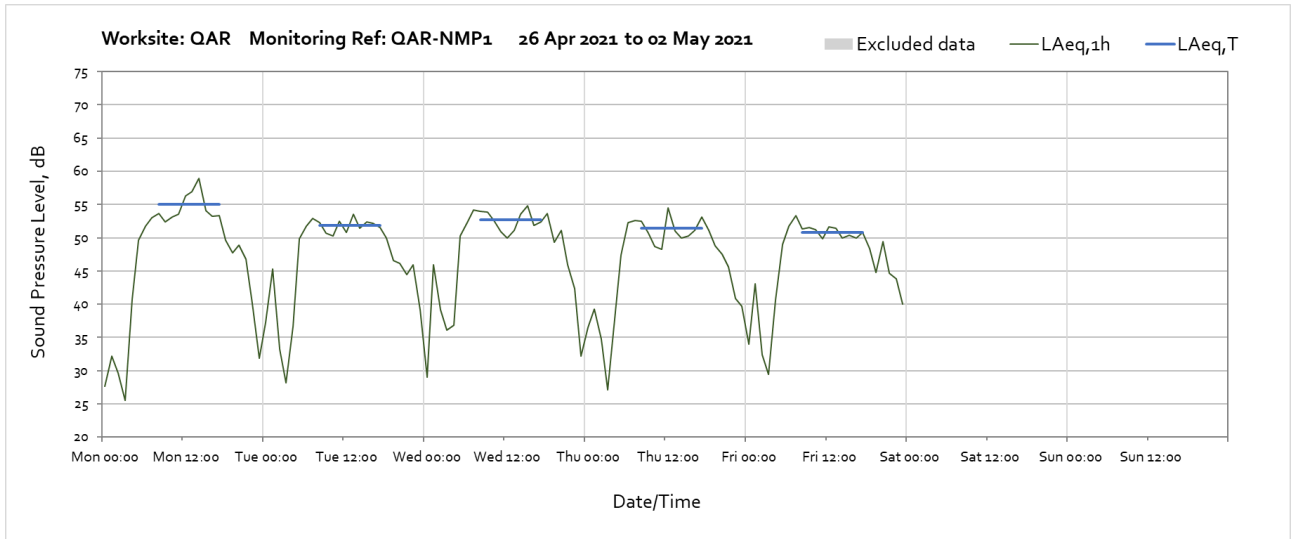
Worksite: QAR – Monitoring Ref: QAR-NMP1



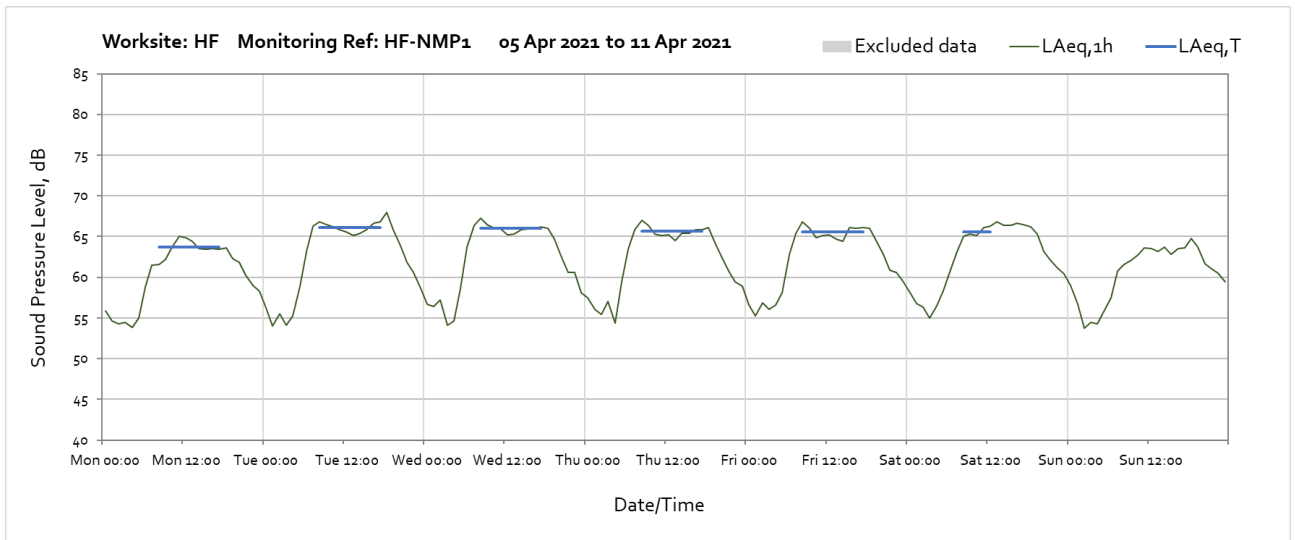
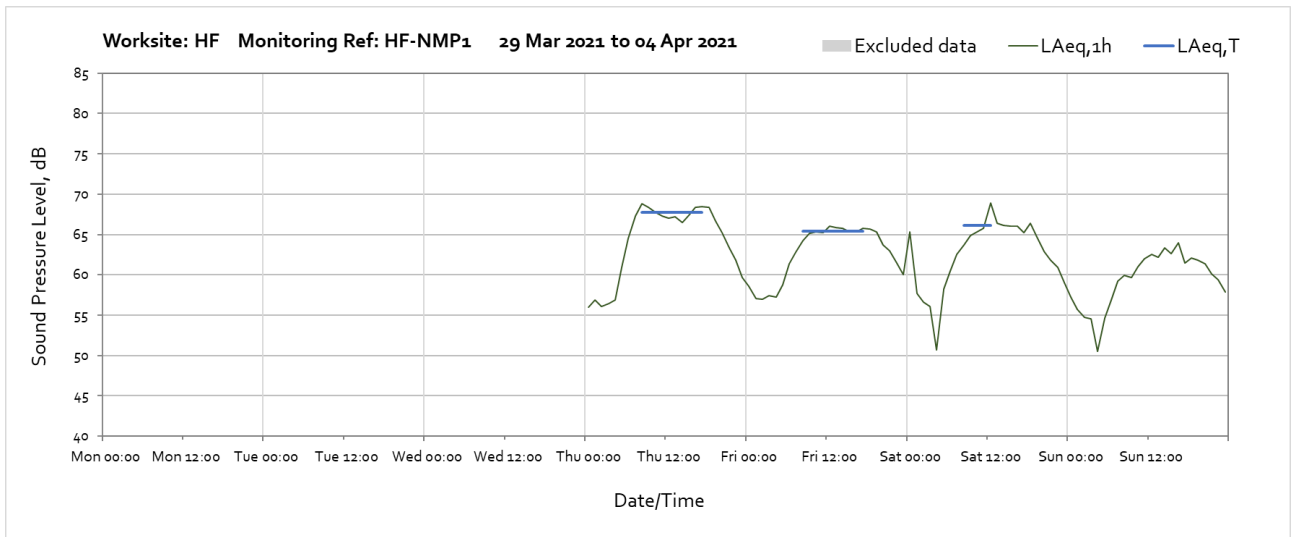
Note: High noise levels between 08:00 and 12:00 on Friday 2nd April 2021 were due to renovation works at the resident's property and are not representative of HS2 construction noise levels.

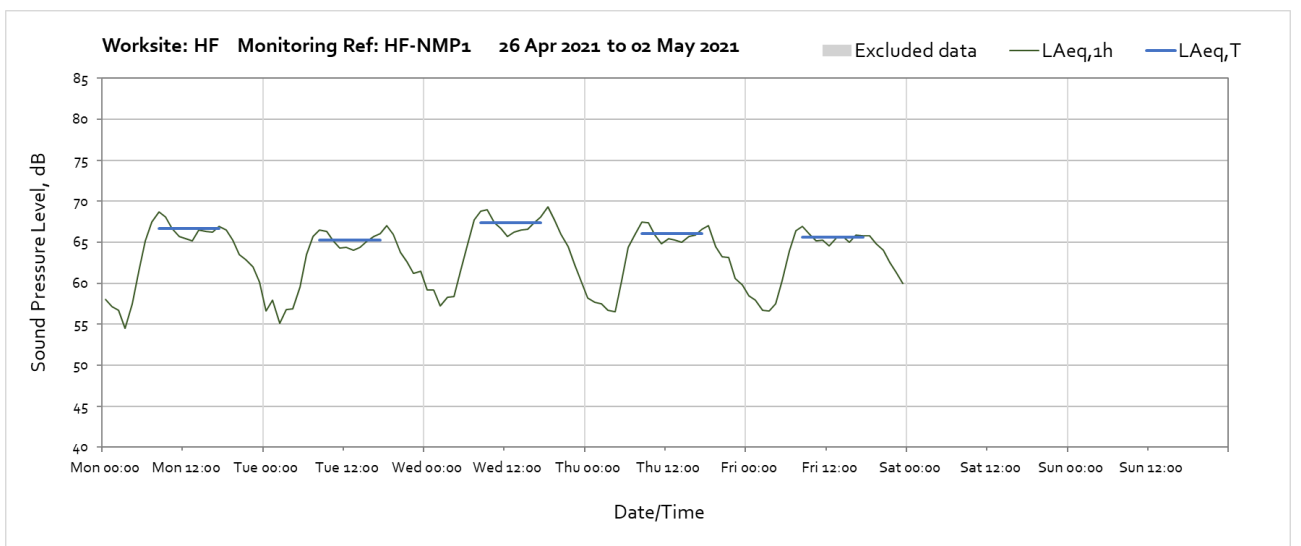
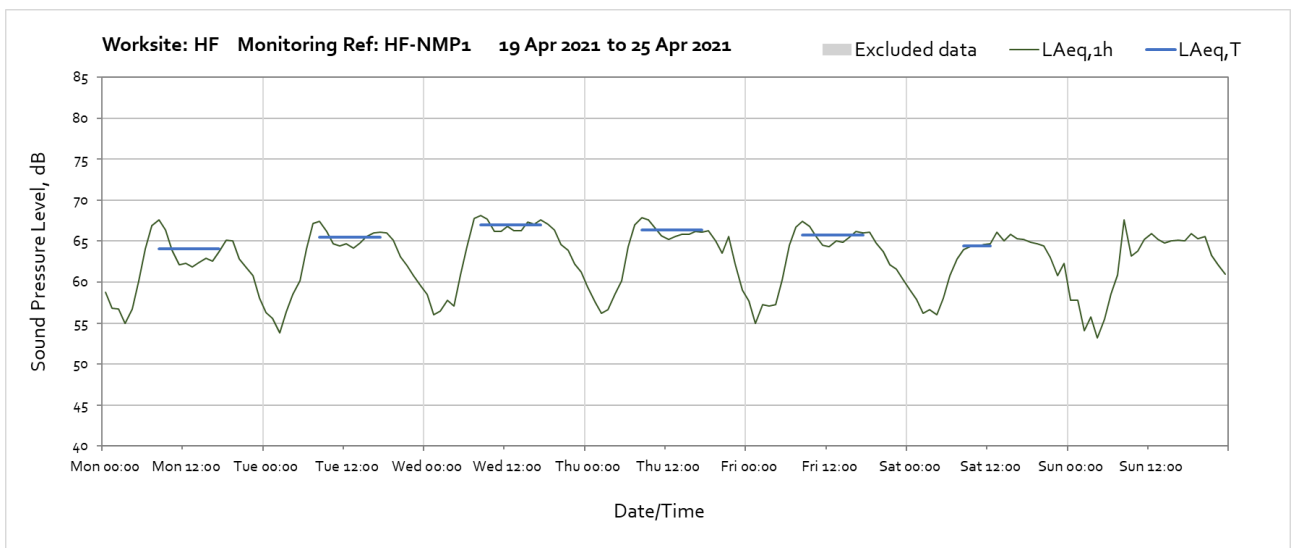
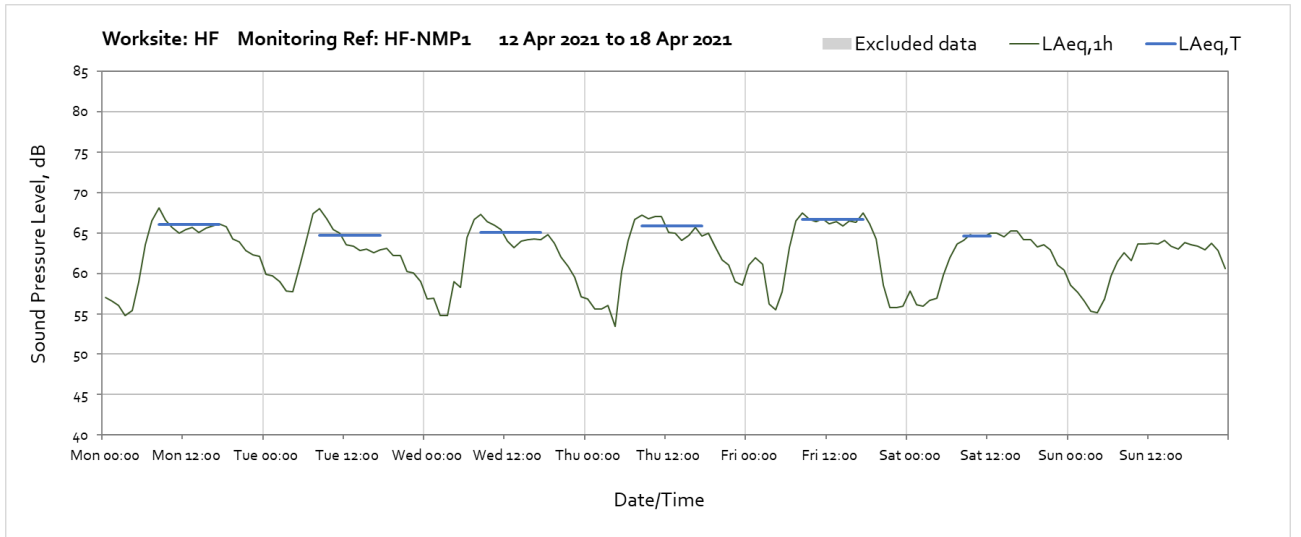
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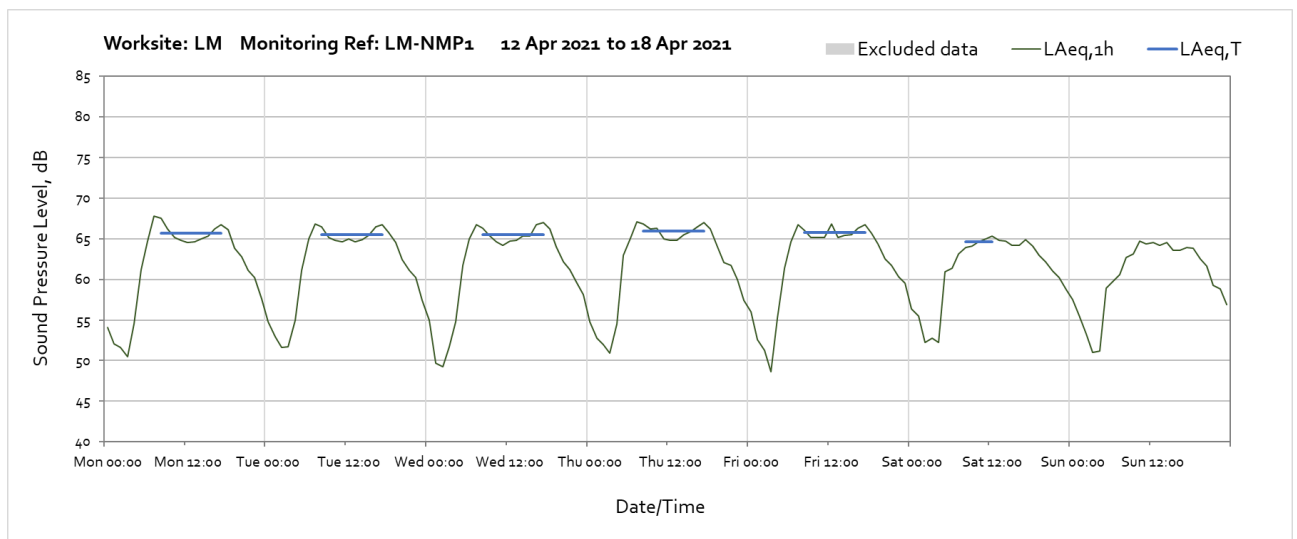
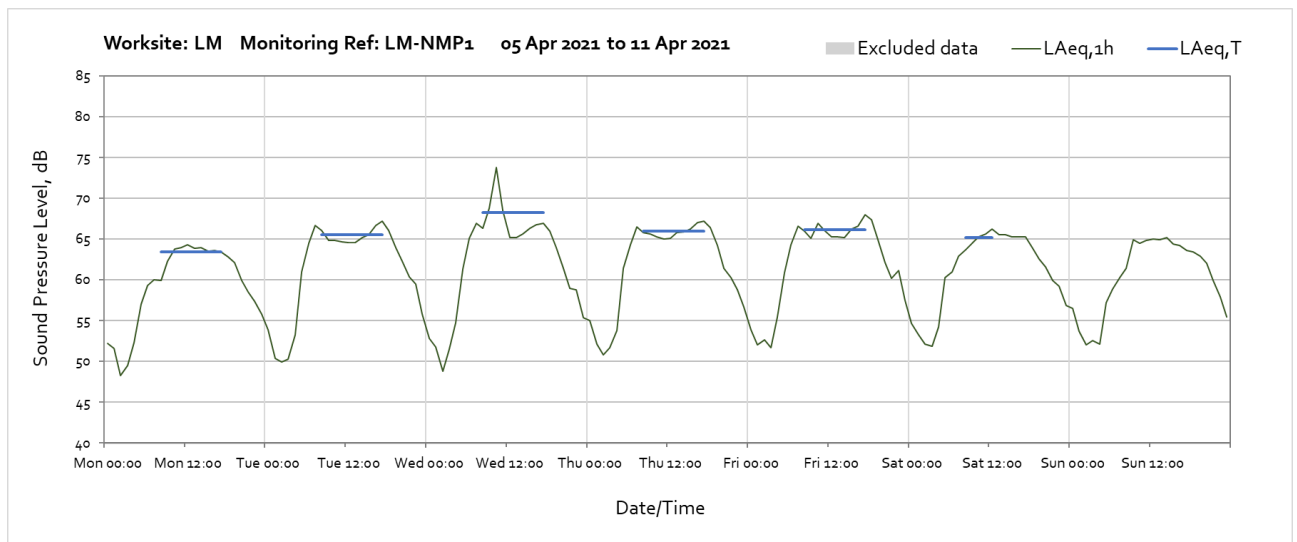
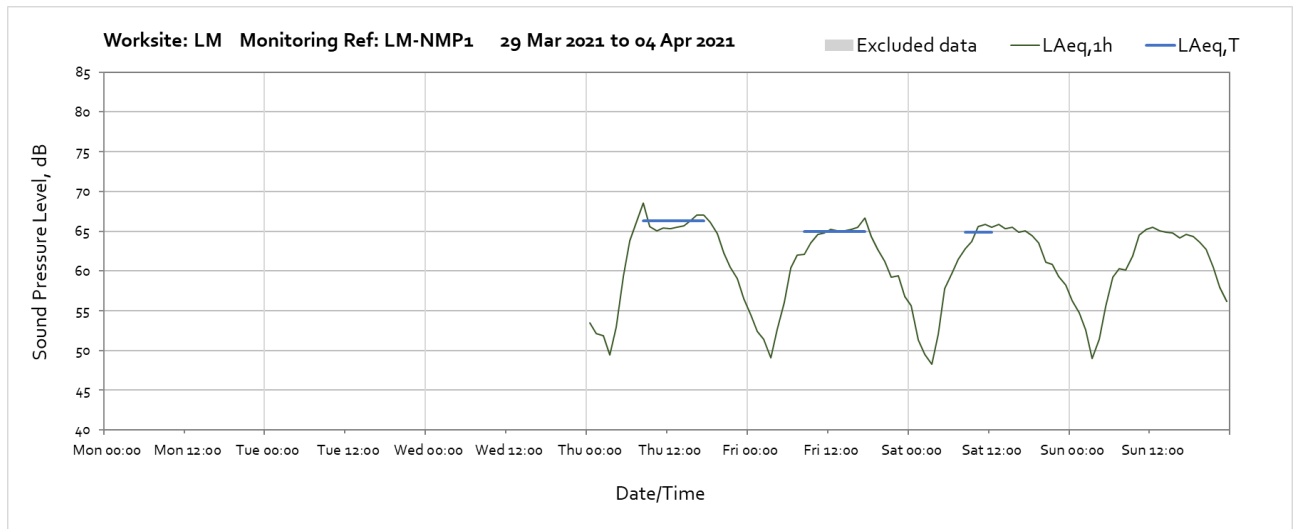


Worksite: HF – Monitoring Ref: HF-NMP1

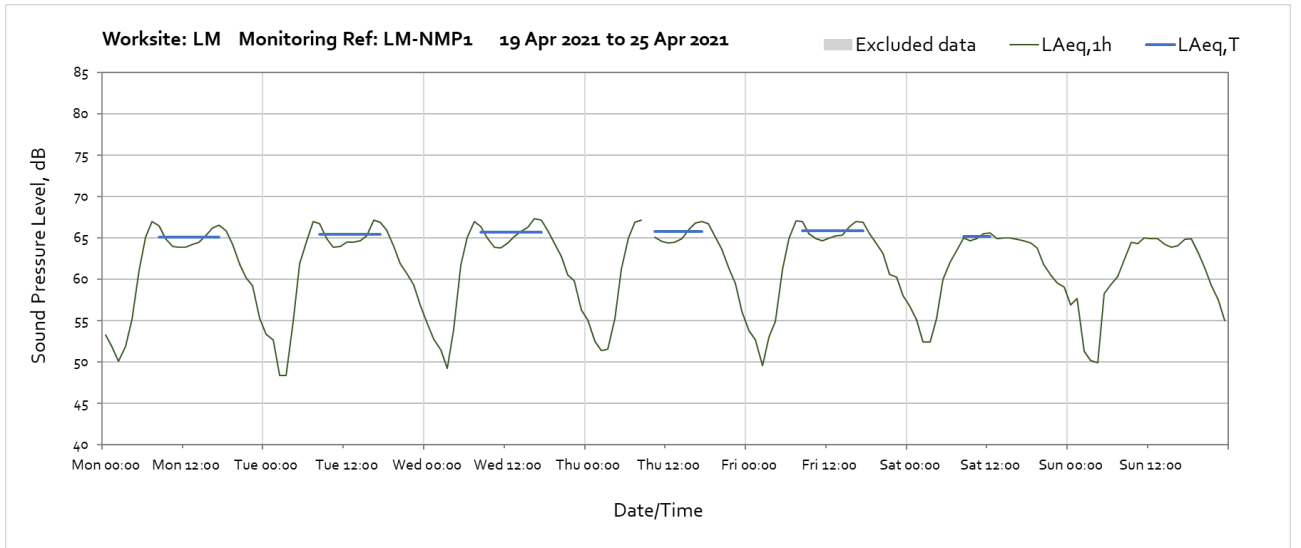




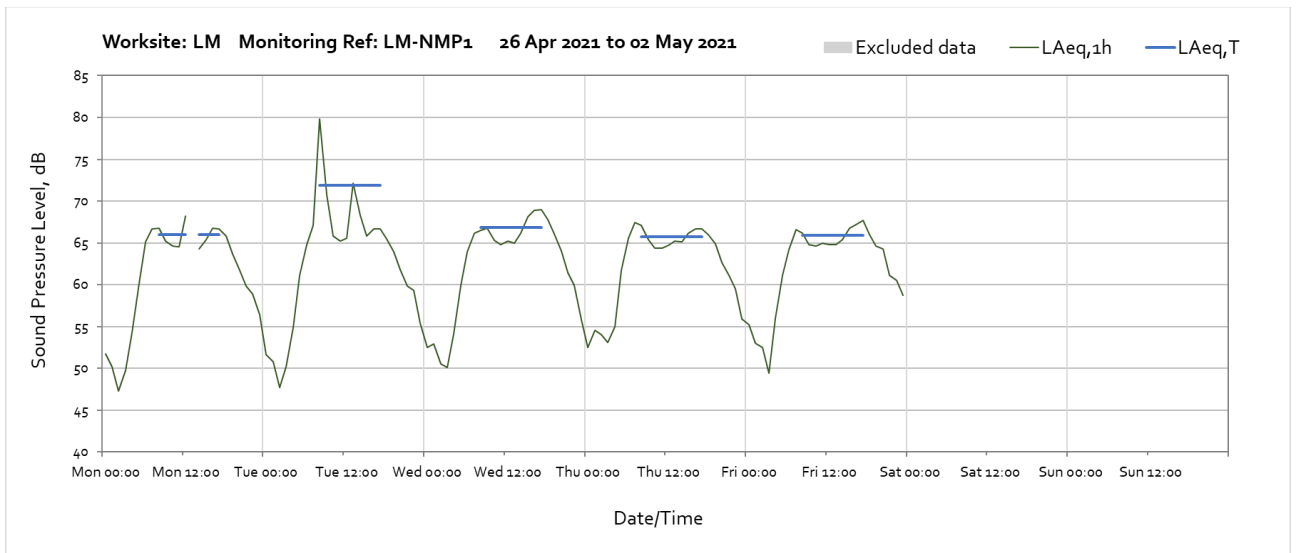
Worksite: LM – Monitoring Ref: LM-NMP1



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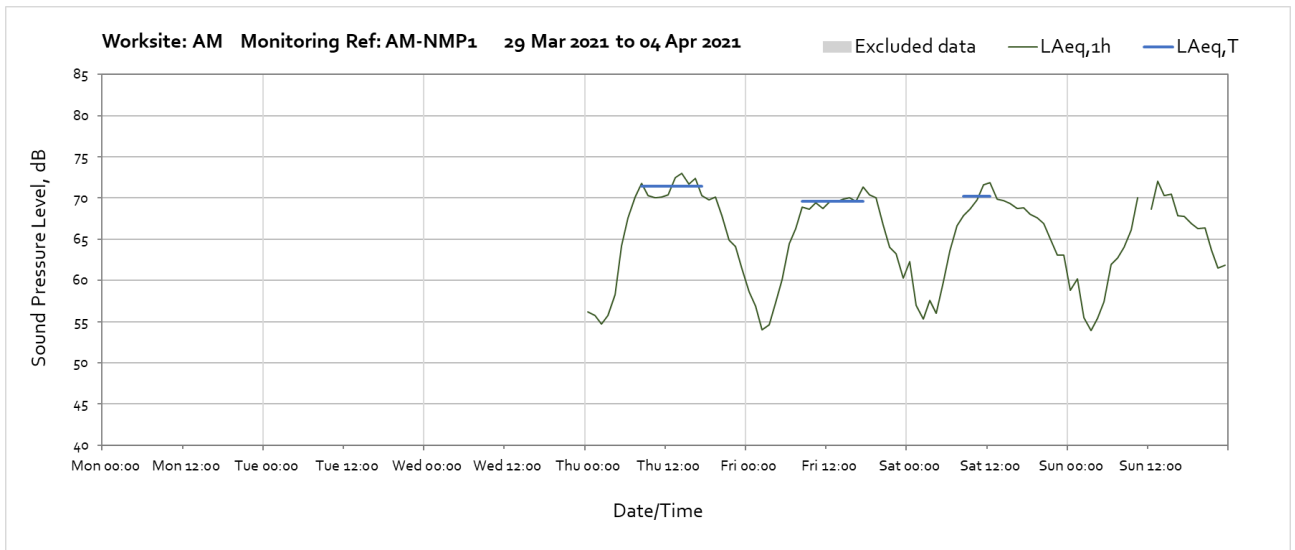


Note: Missing data between 09:00 and 10:00 on Thursday 22nd April was due to maintenance being undertaken to check calibration of the monitor.

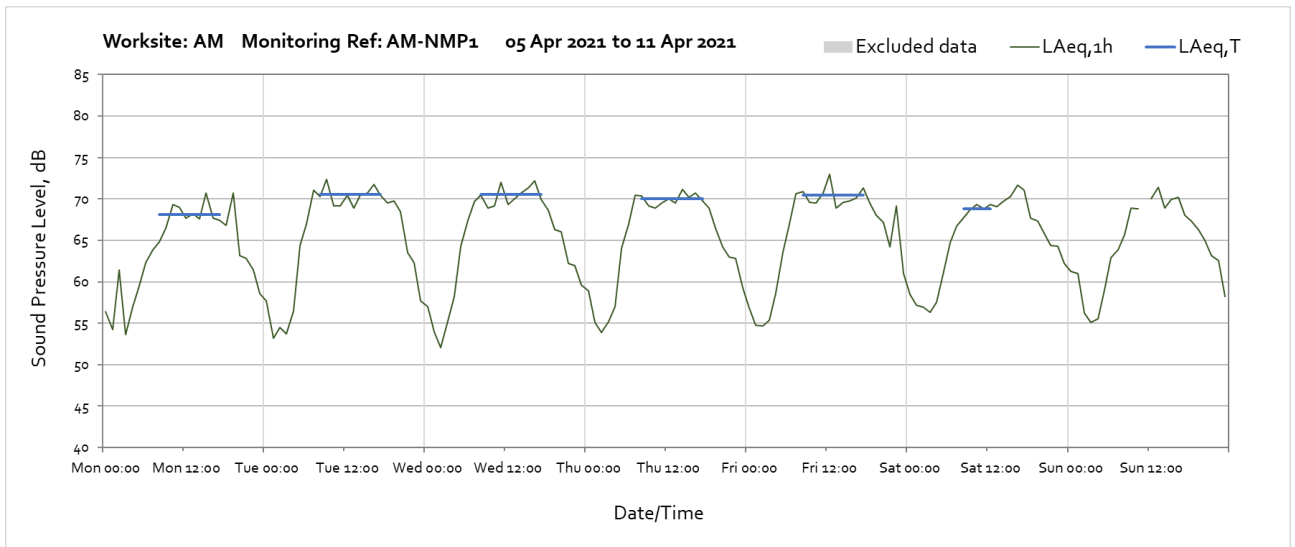


Note: Missing data between 13:00 and 14:00 on Monday 26th April was due to maintenance being undertaken to the monitor to setup audio alarm.

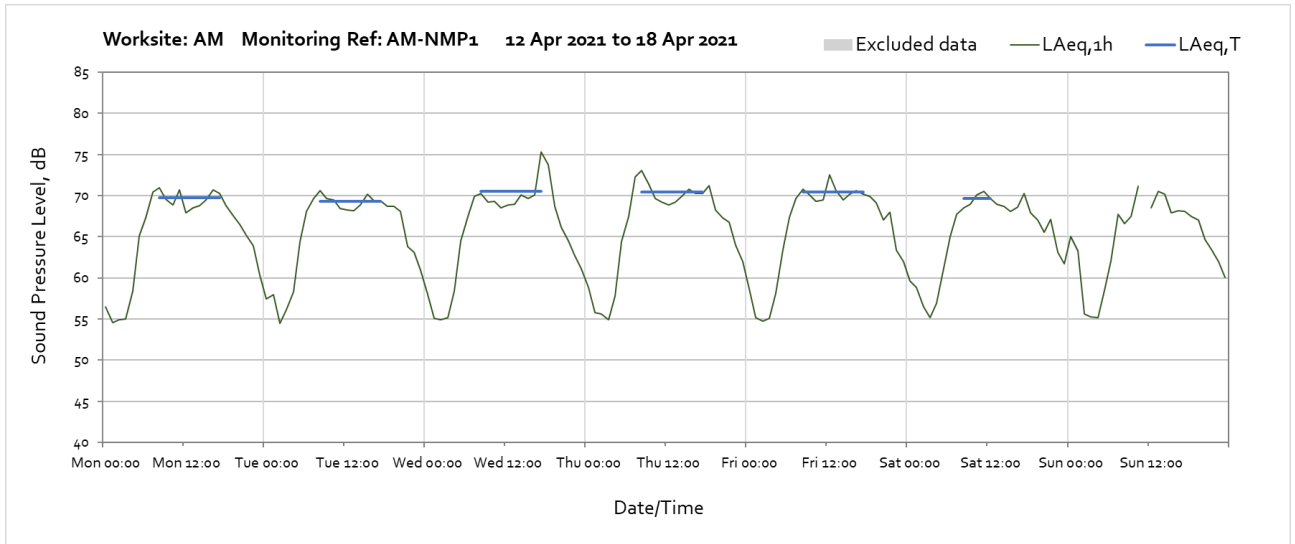
Worksite: AM – Monitoring Ref: AM-NMP1



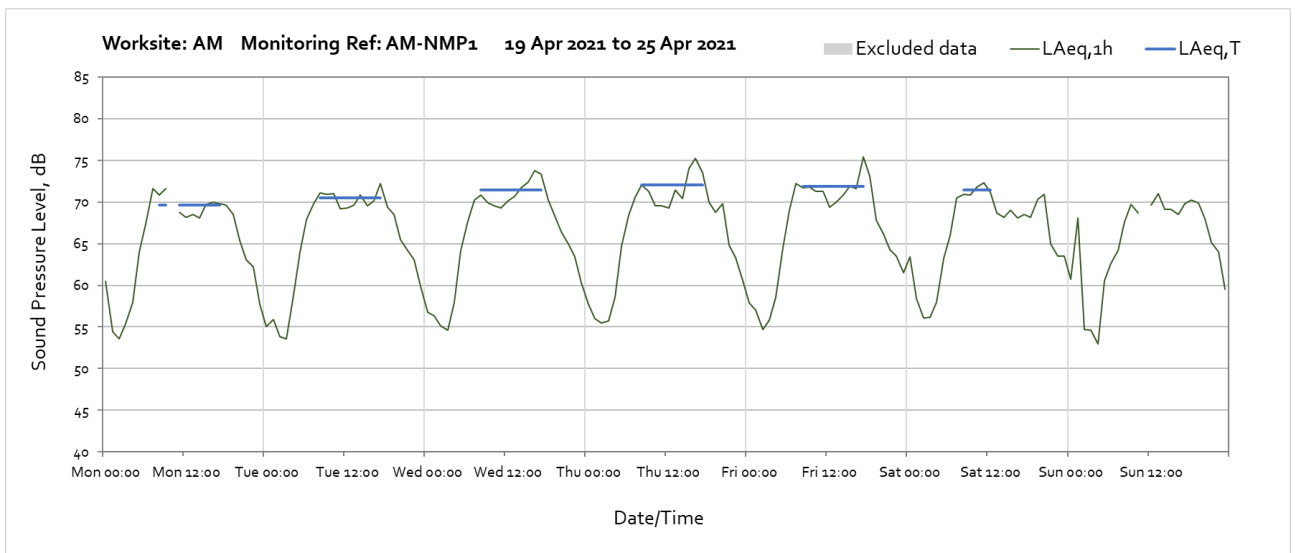
Note: Missing data sporadically throughout April was due to the monitoring being paused during maintenance operations and setting adjustments.



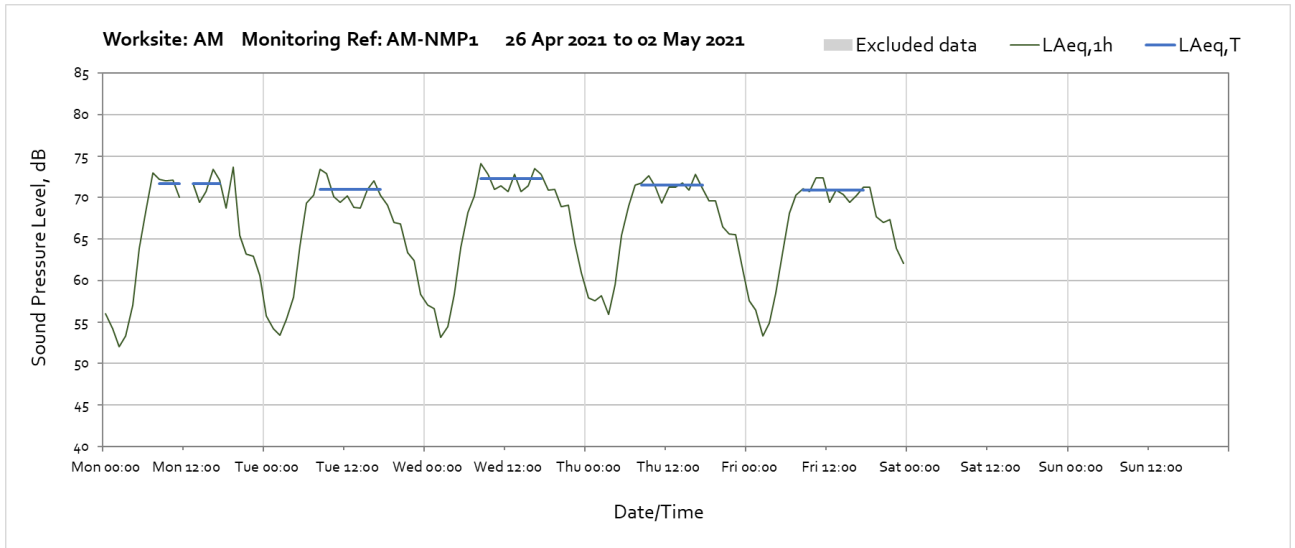
Note: Missing data sporadically throughout April was due to the monitoring being paused during maintenance operations and setting adjustments.



Note: Missing data sporadically throughout April was due to the monitoring being paused during maintenance operations and setting adjustments.

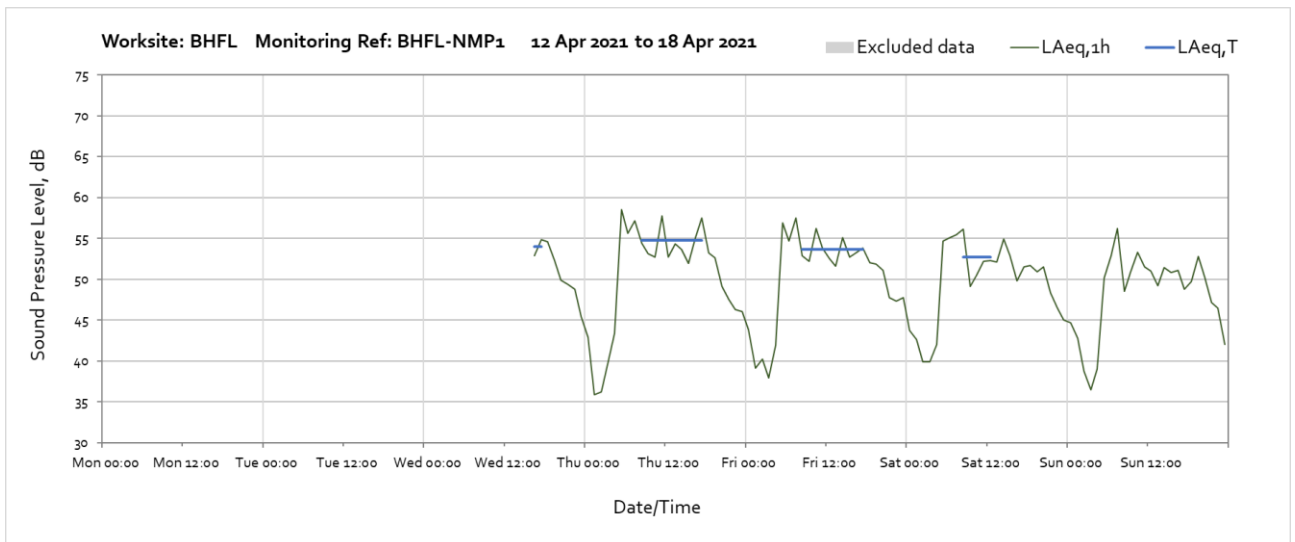


Note: Missing data sporadically throughout April was due to the monitoring being paused during maintenance operations and setting adjustments.

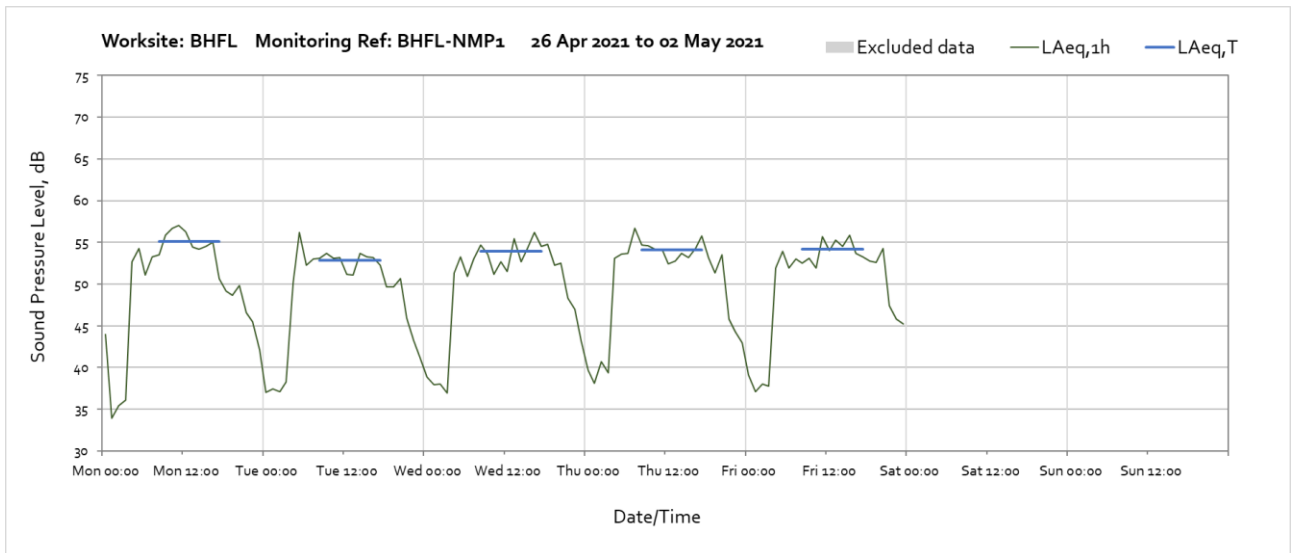
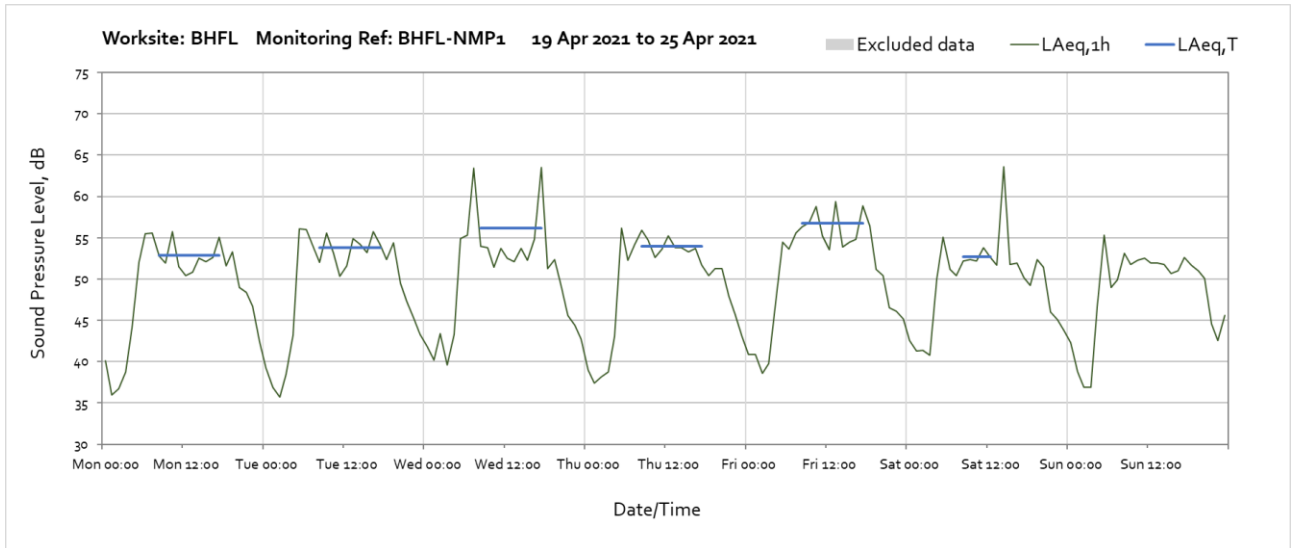


Note: Missing data sporadically throughout April was due to the monitoring being paused during maintenance operations and setting adjustments.

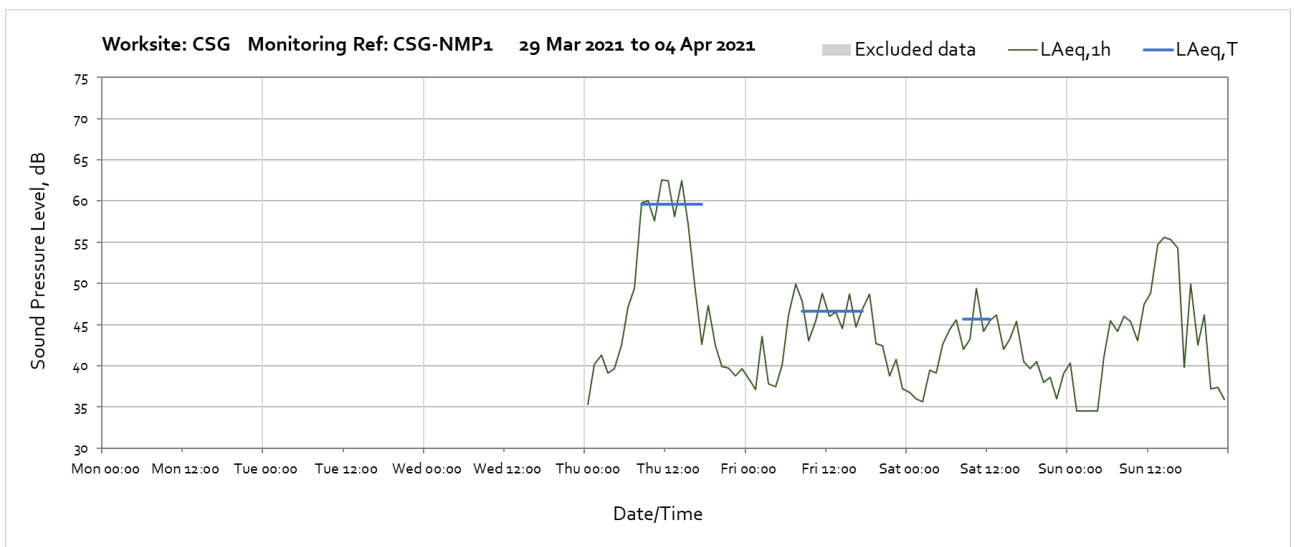
Worksite: BHFL – Monitoring Ref: BHFL-NMP1

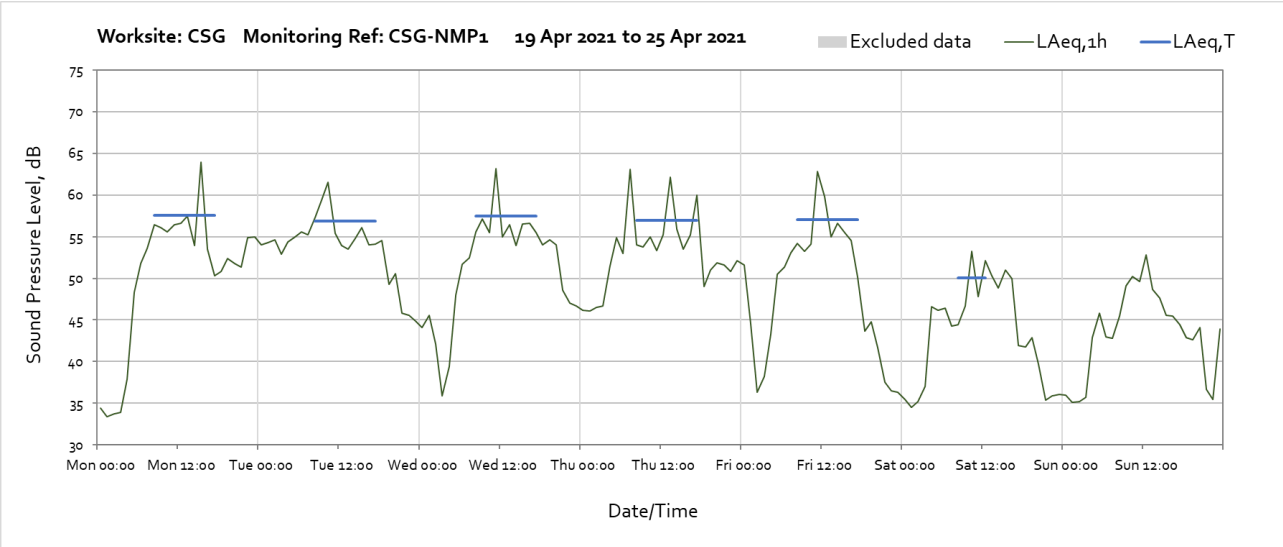
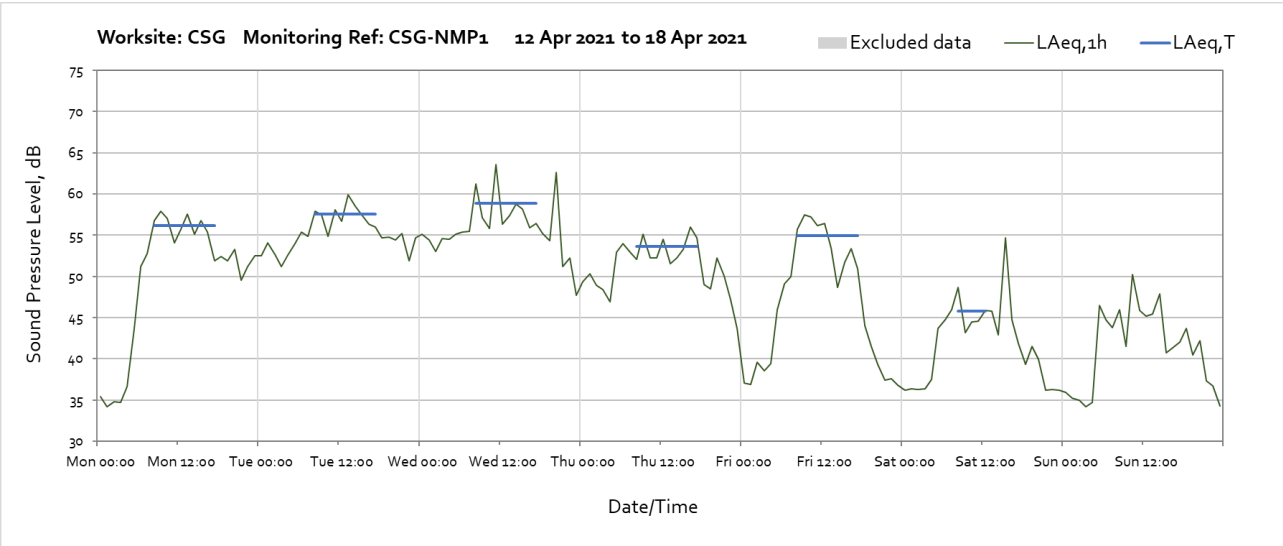
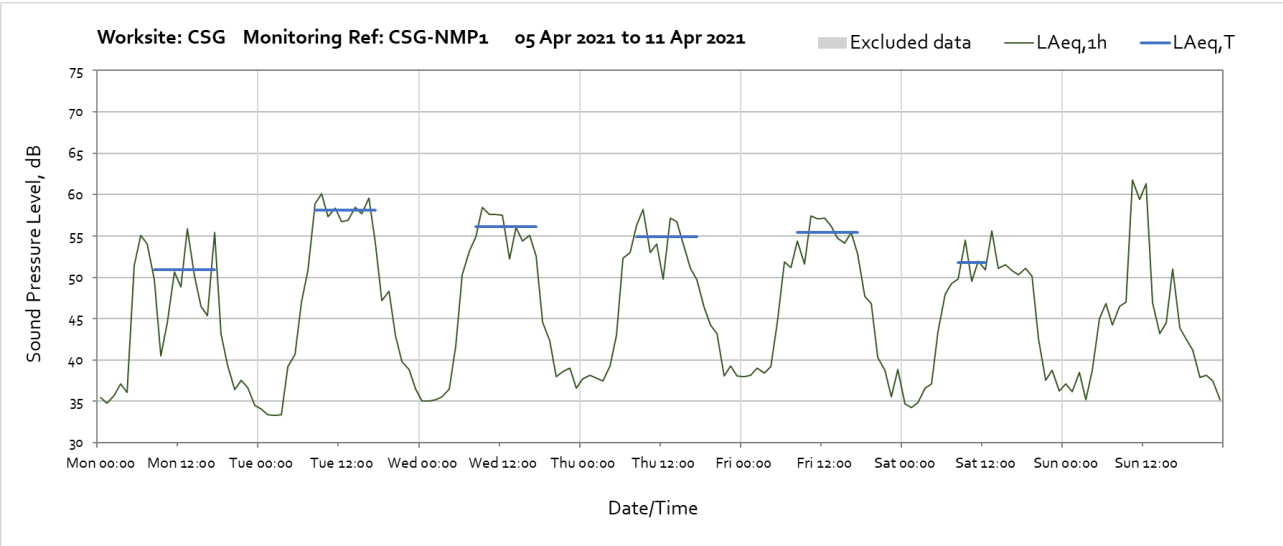


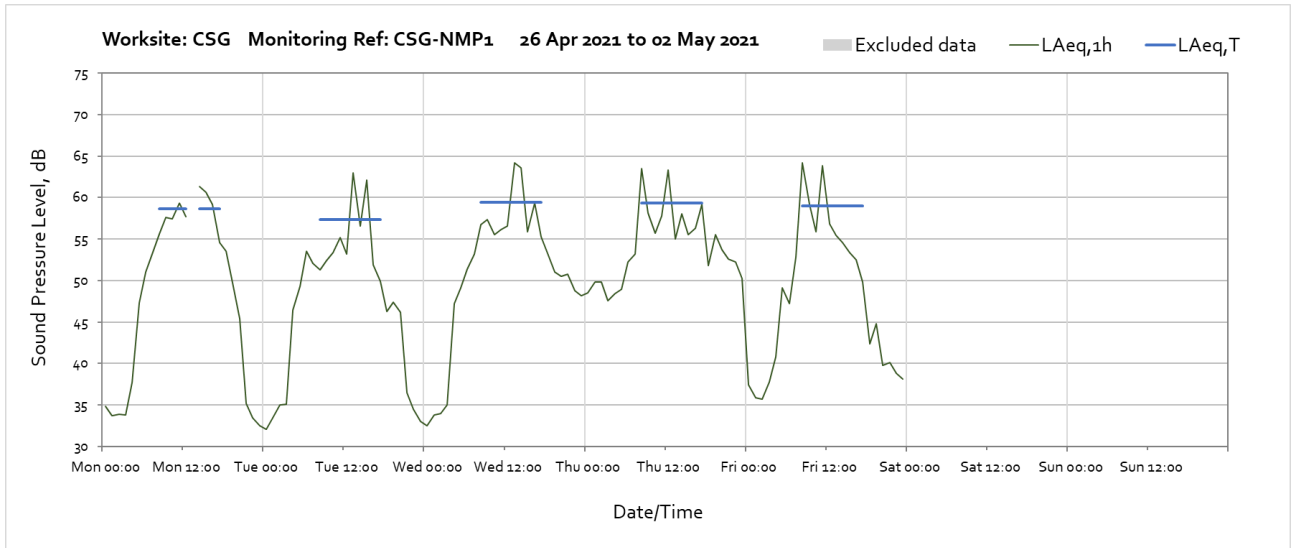
Note: Missing data until 16:00 on Wednesday 14th April was due to interruption of main power supply to the monitor.



Worksite: CSG – Monitoring Ref: CSG-NMP1

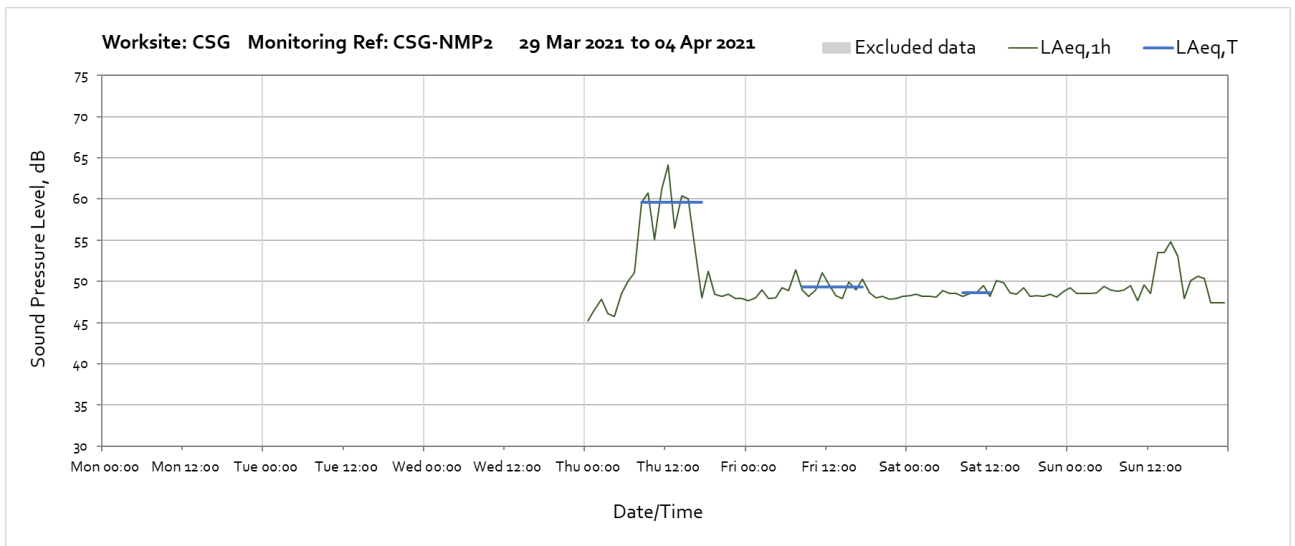


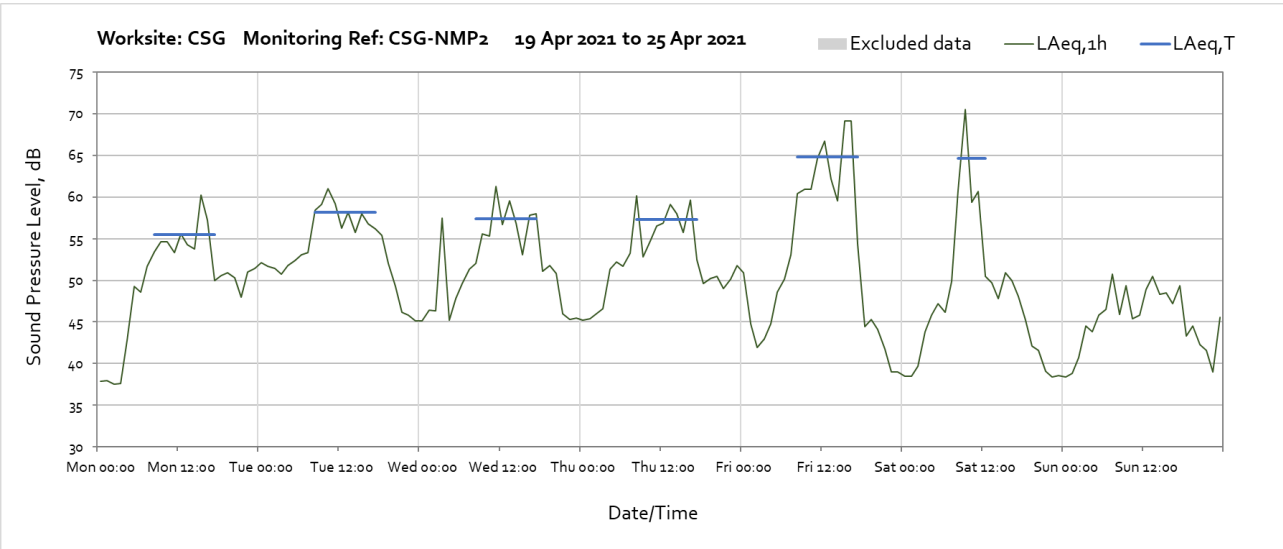
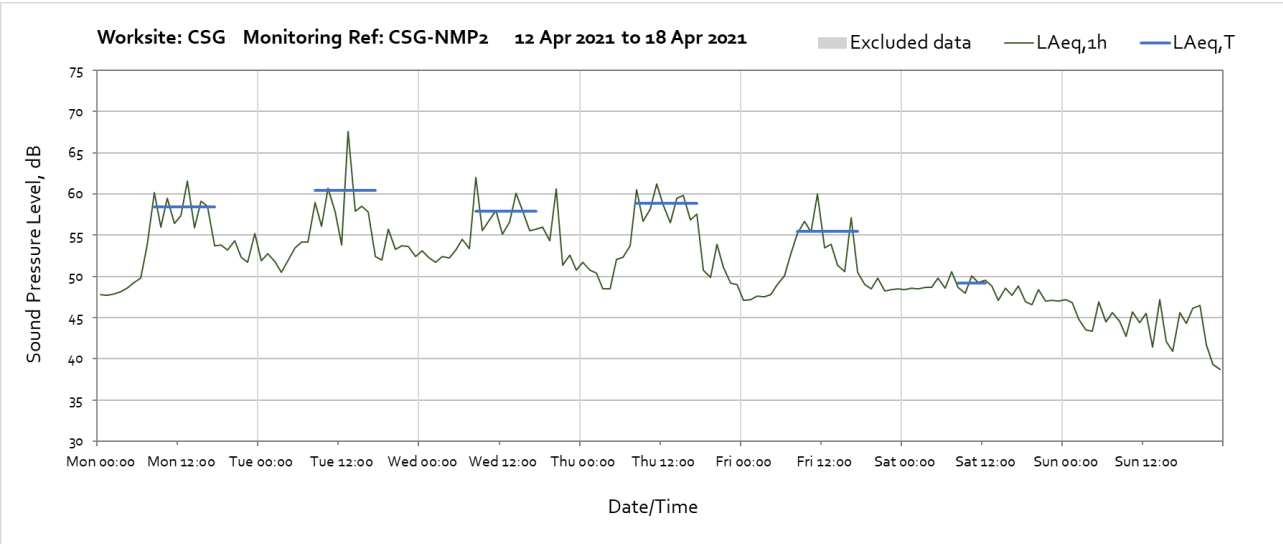
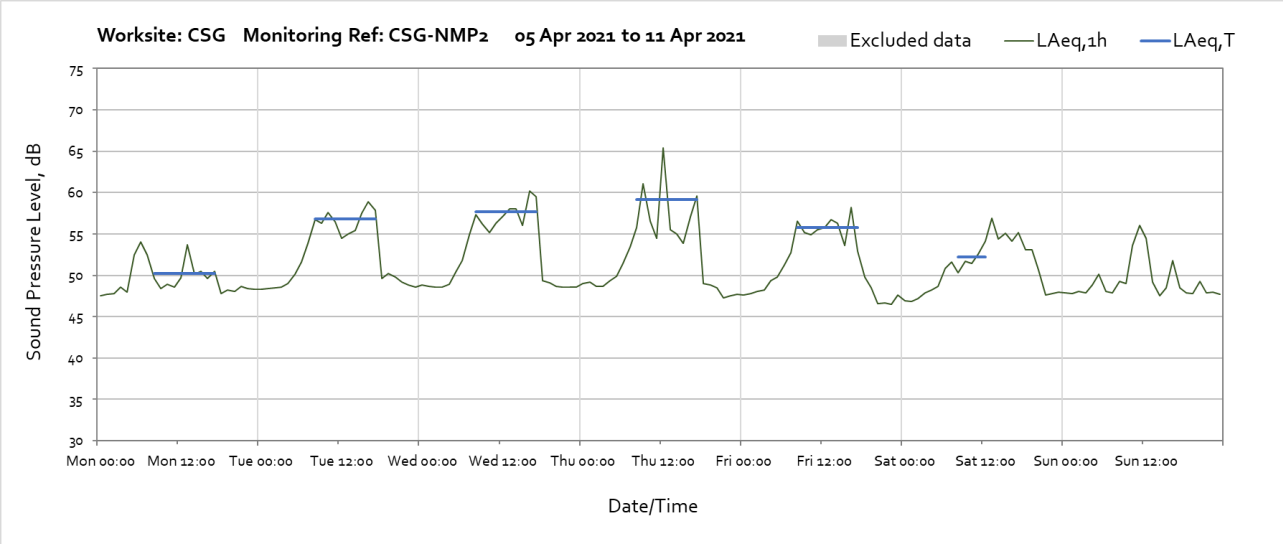


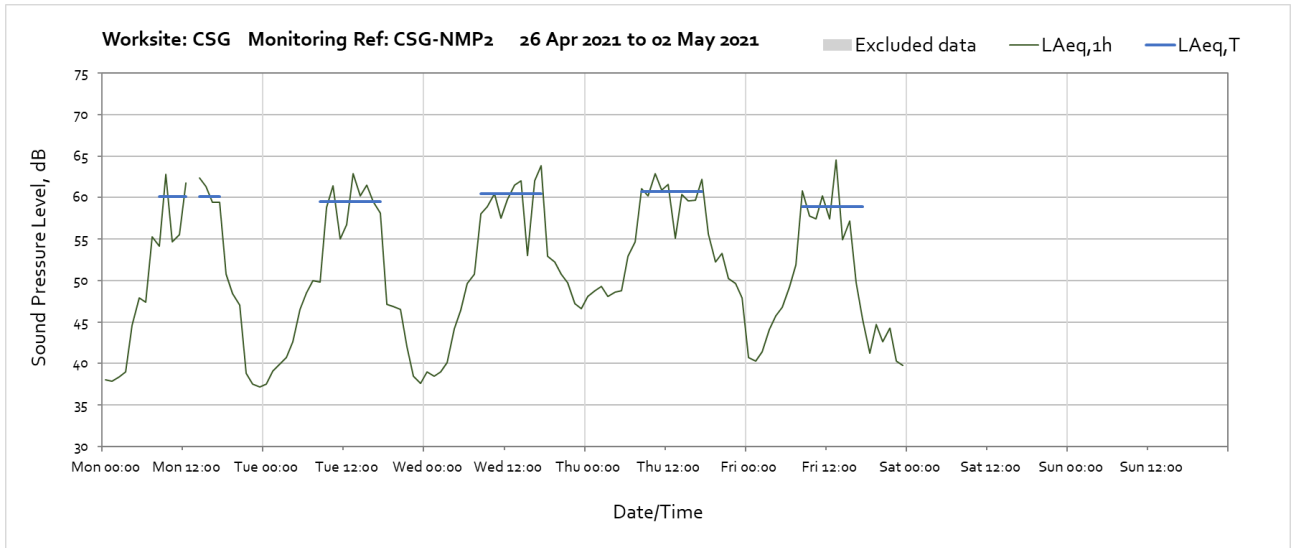


Note: Missing data between 13:00 and 14:00 on Monday 26th April was due to maintenance being undertaken to the monitor to setup audio alarm.

Worksite: CSG – Monitoring Ref: CSG-NMP2

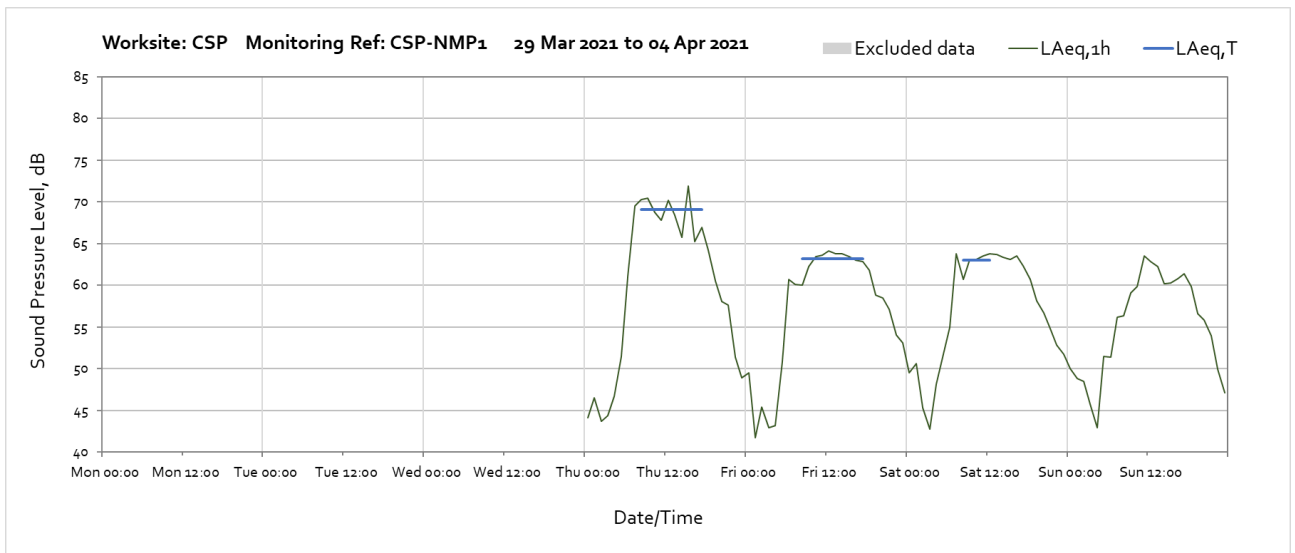


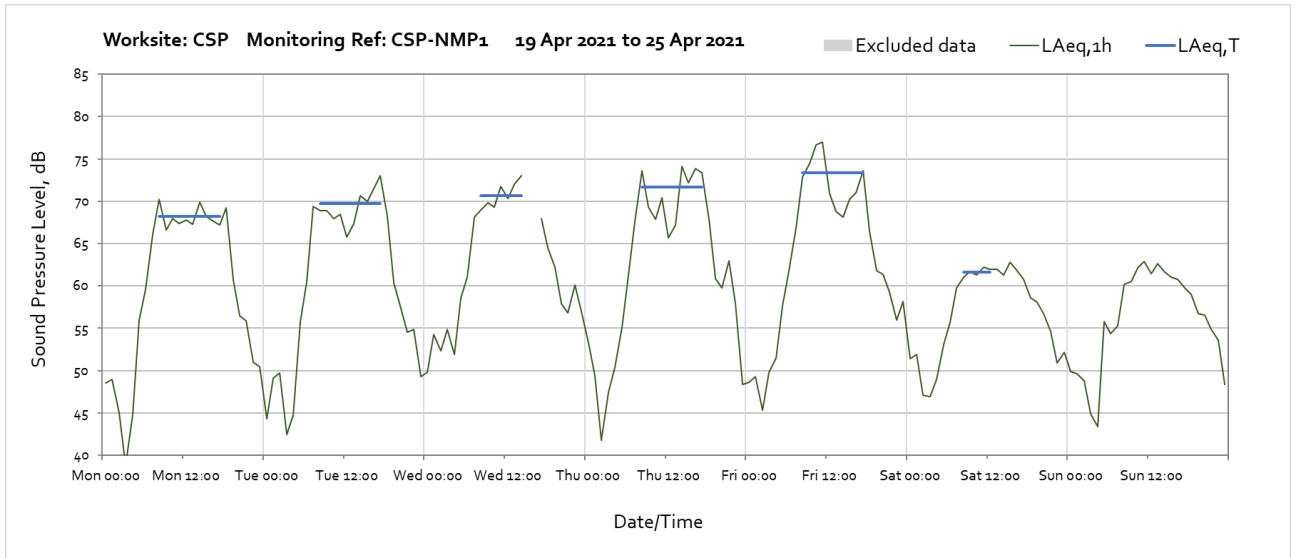
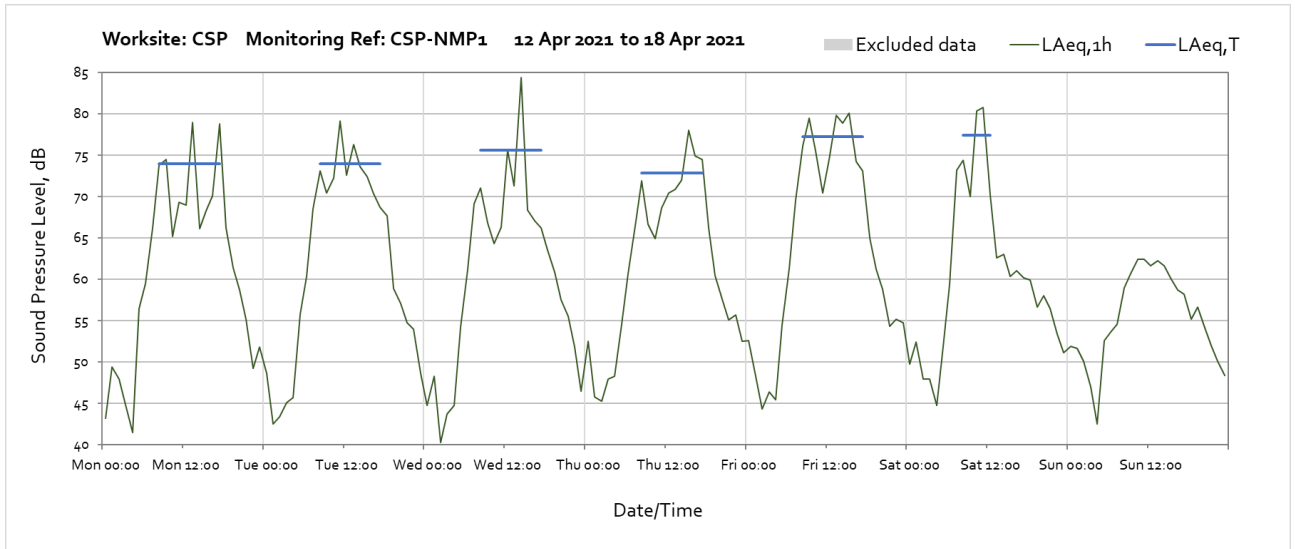
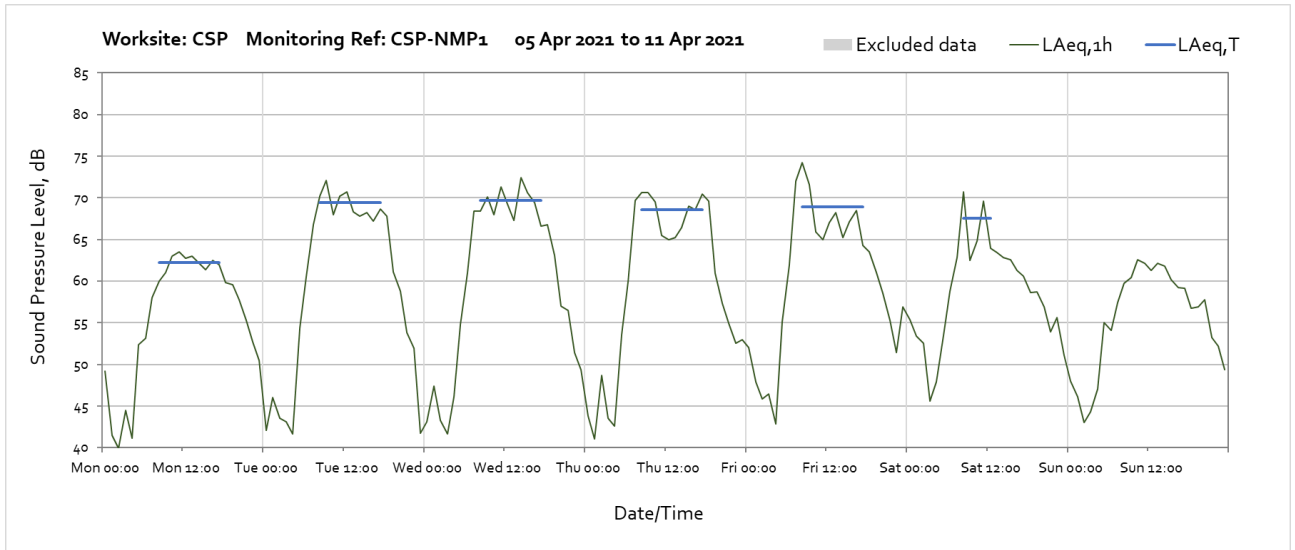




Note: Missing data between 13:00 and 14:00 on Monday 26th April was due to maintenance being undertaken to the monitor to setup audio alarm.

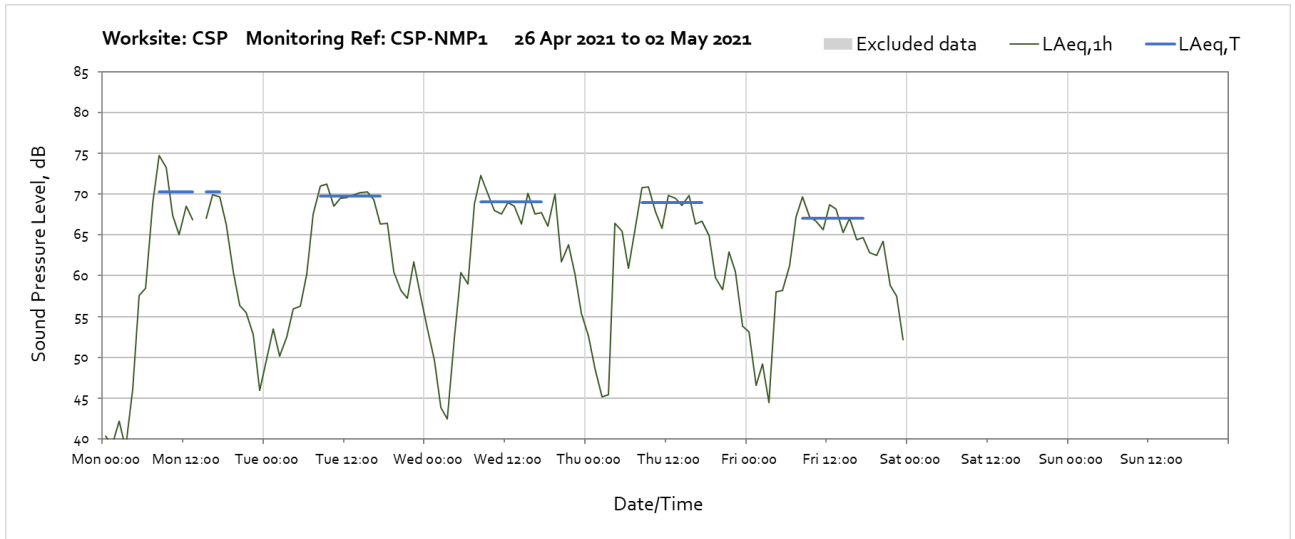
Worksite: CSP – Monitoring Ref: CSP-NMP1





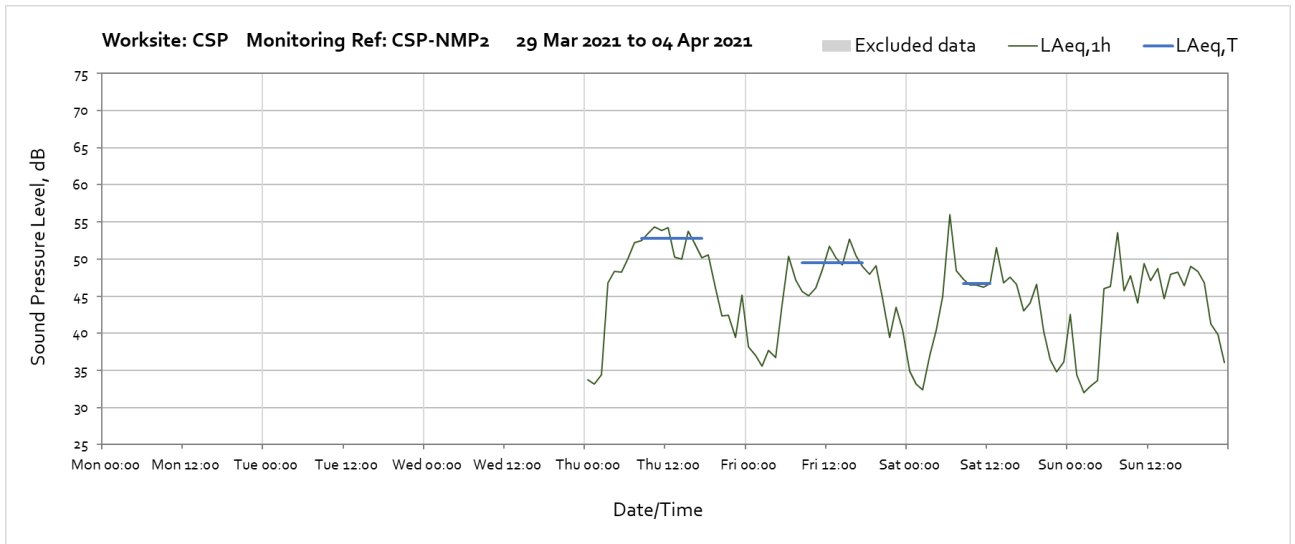
Note: Missing data between 15:00 and 17:00 on Wednesday 21st April was due to maintenance being undertaken to the monitor to setup audio alarm.

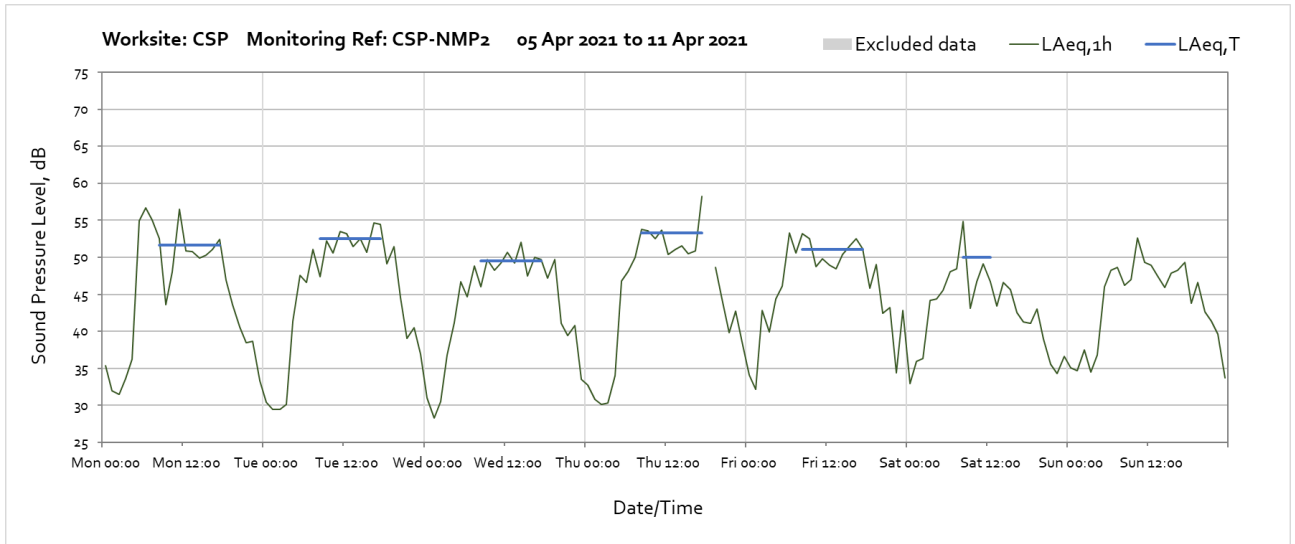
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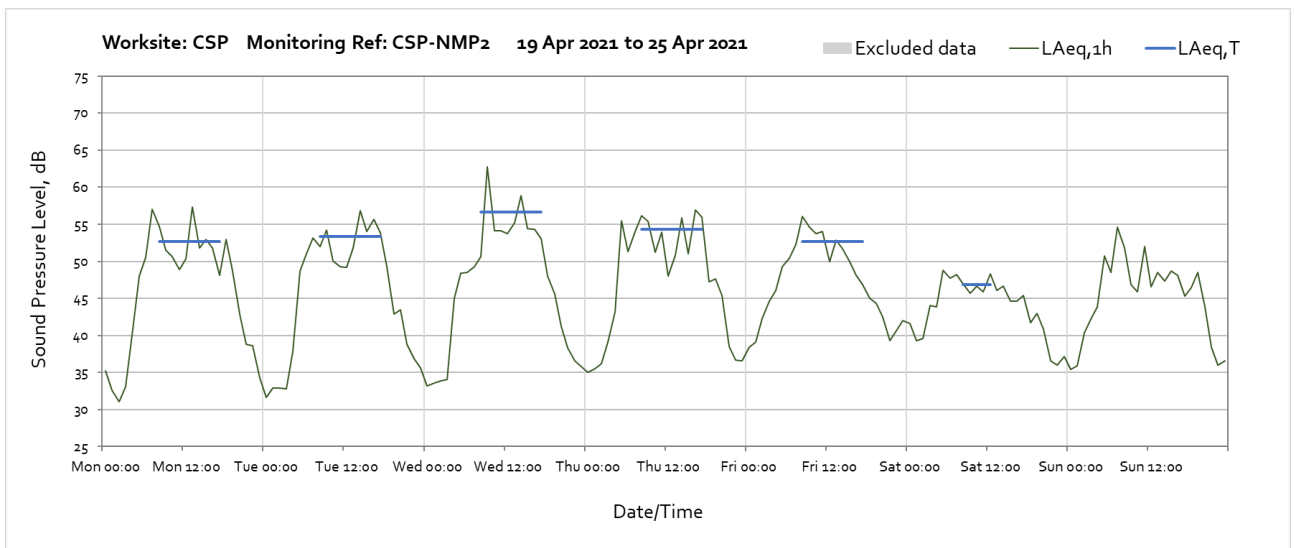
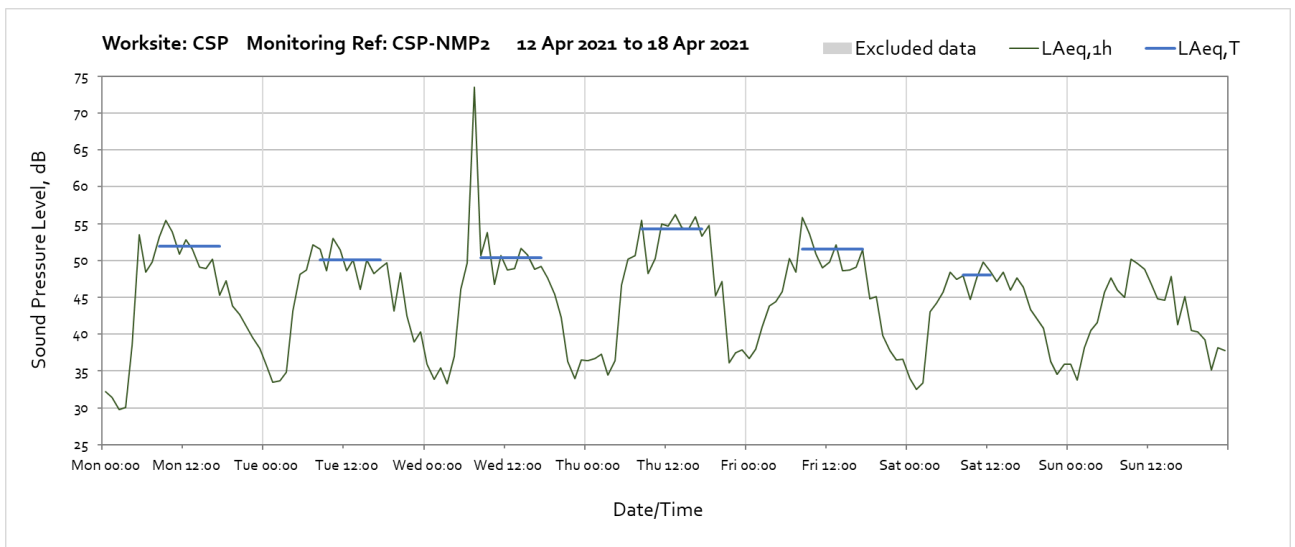
Note: Missing data between 14:00 and 15:00 on Monday 26th April was due to maintenance being undertaken to the monitor to setup audio alarm.

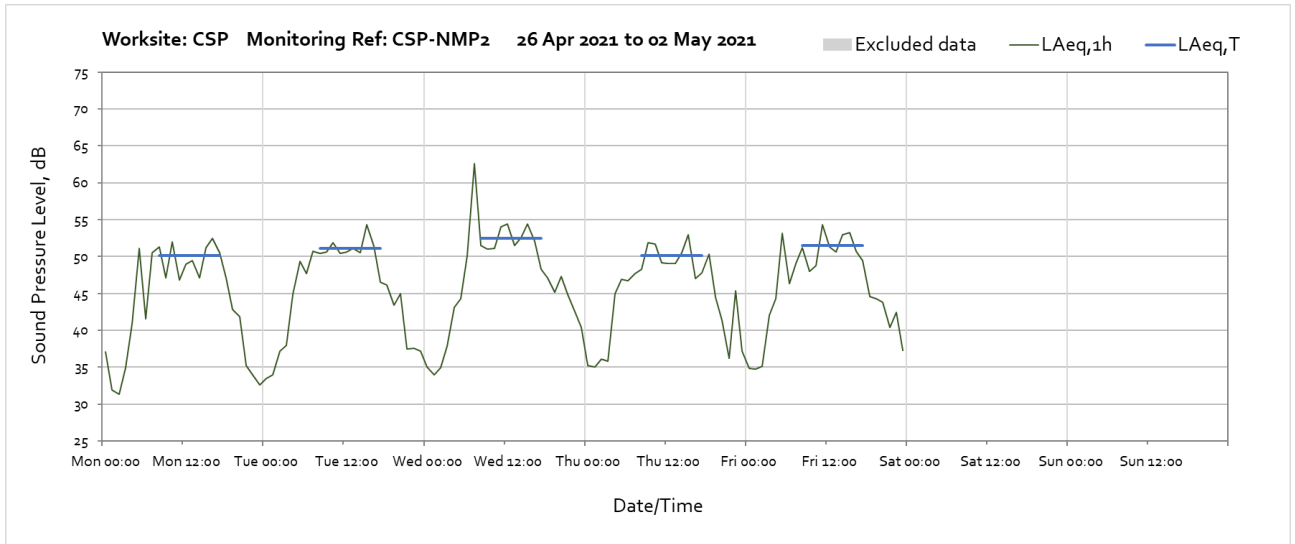
Worksite: CSP – Monitoring Ref: CSP-NMP2



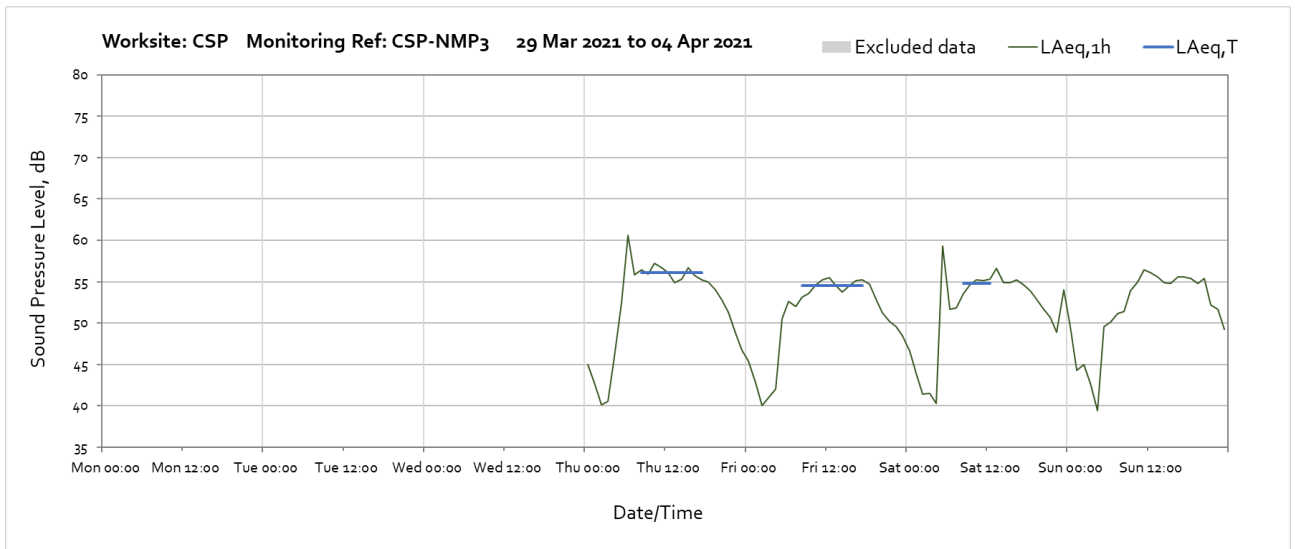


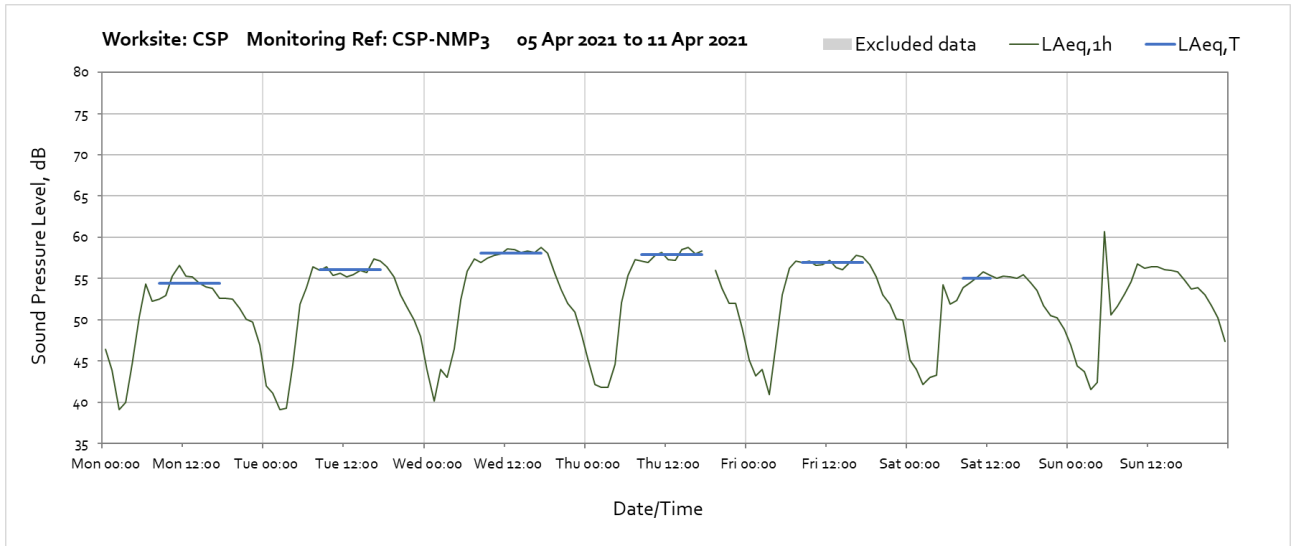
Note: Missing data between 18:00 and 9:00 on Thursday 8th April was due to maintenance being undertaken to the monitor to setup audio alarm.



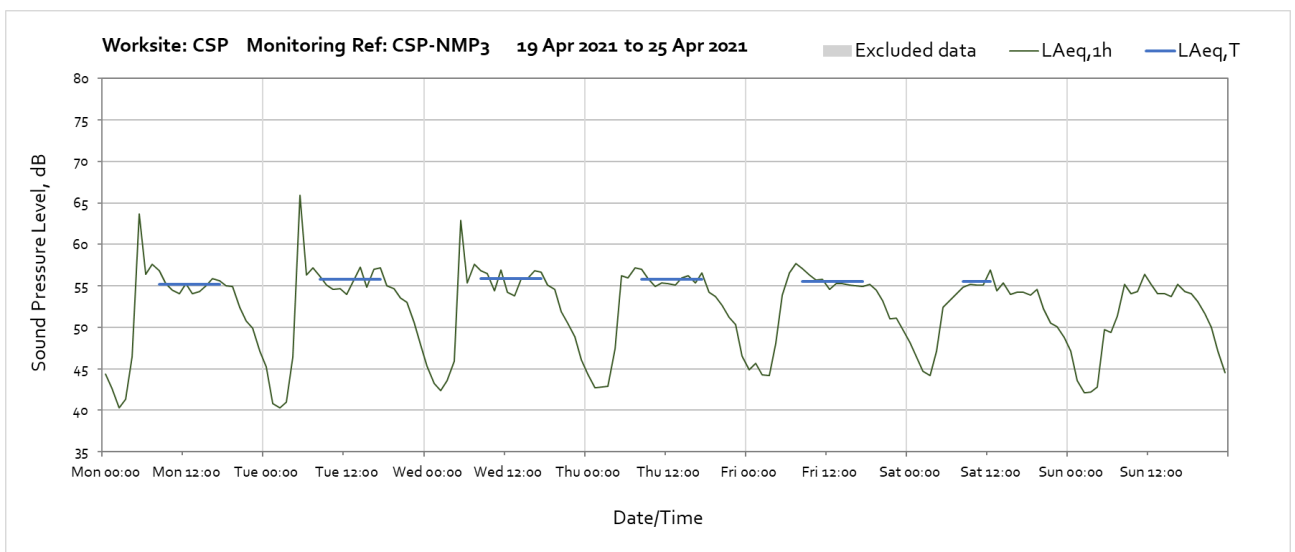
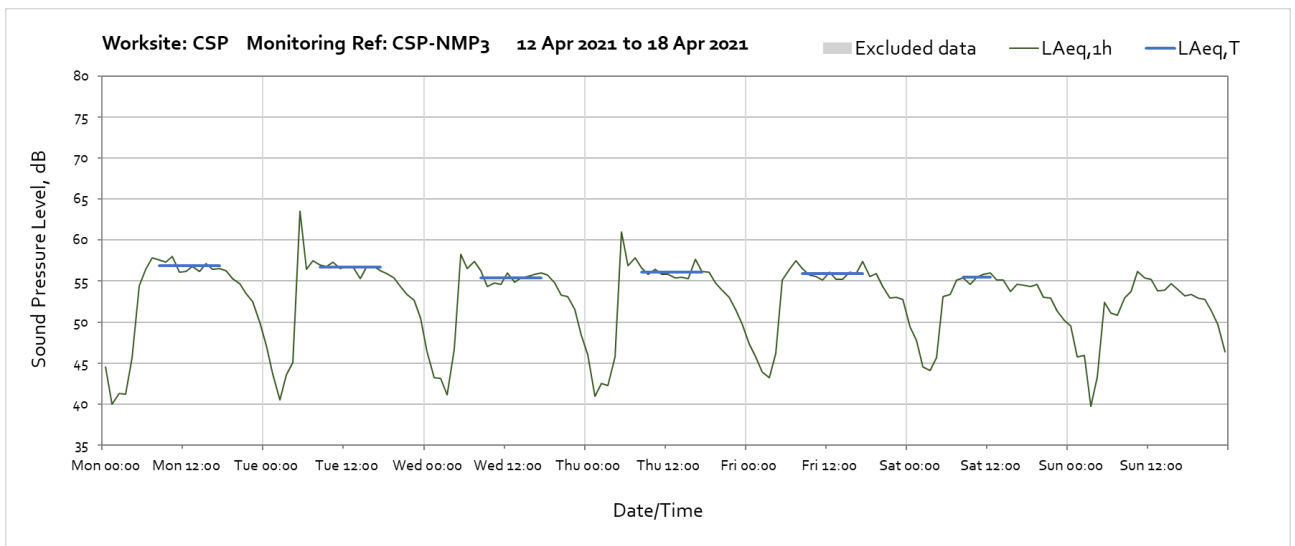


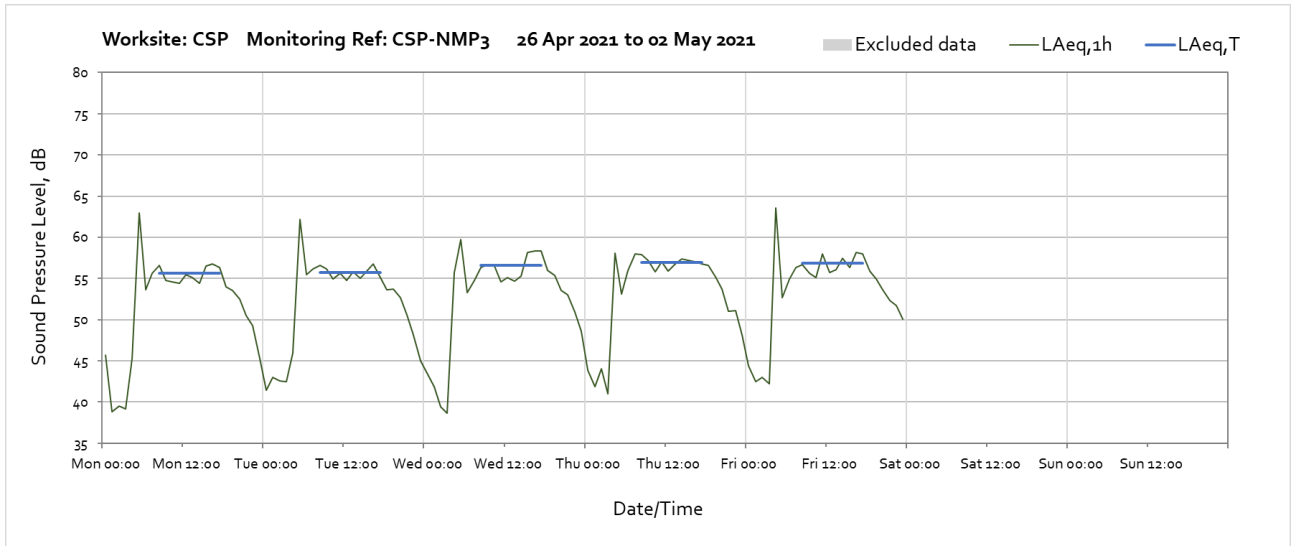
Worksite: CSP – Monitoring Ref: CSP-NMP3



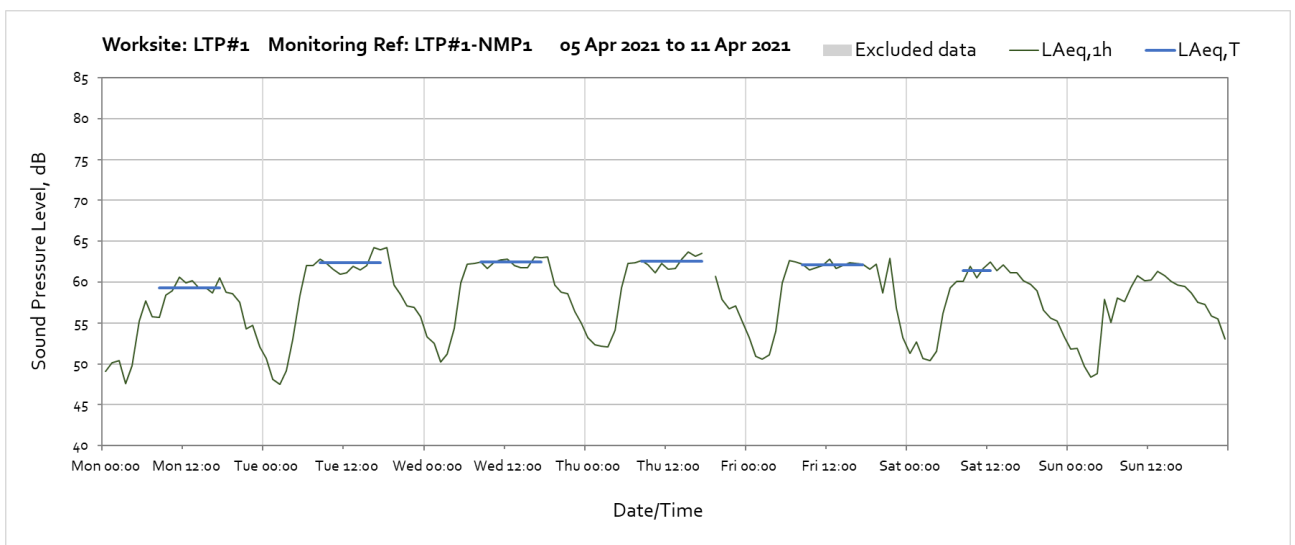
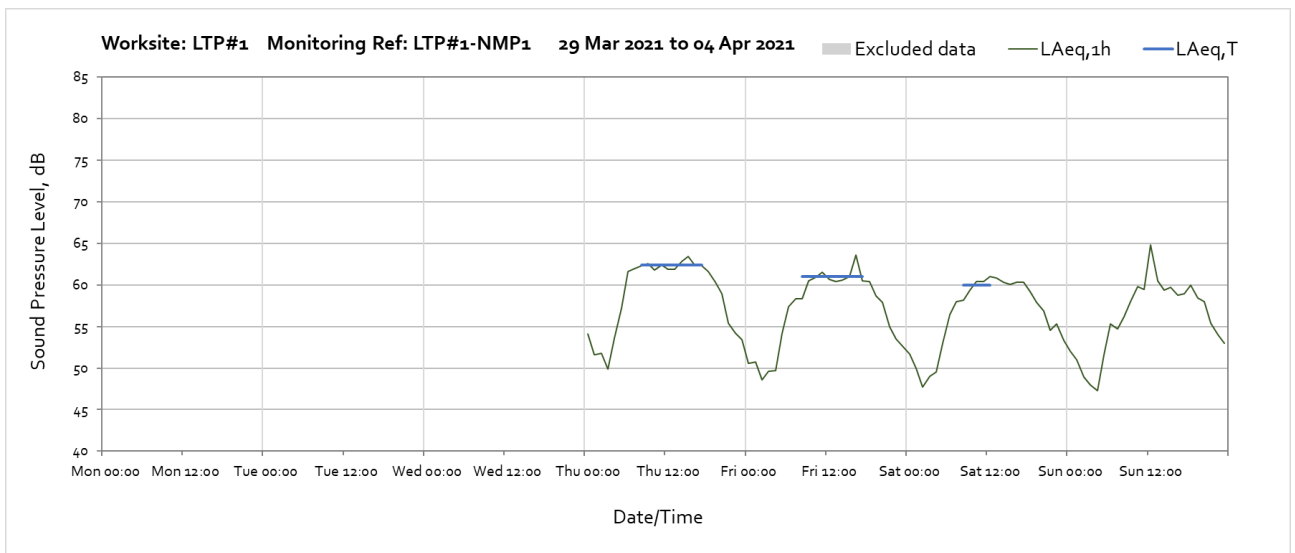


Note: Missing data between 18:00 and 21:00 on Thursday 8th April was due to maintenance being undertaken to the monitor to setup audio alarm.

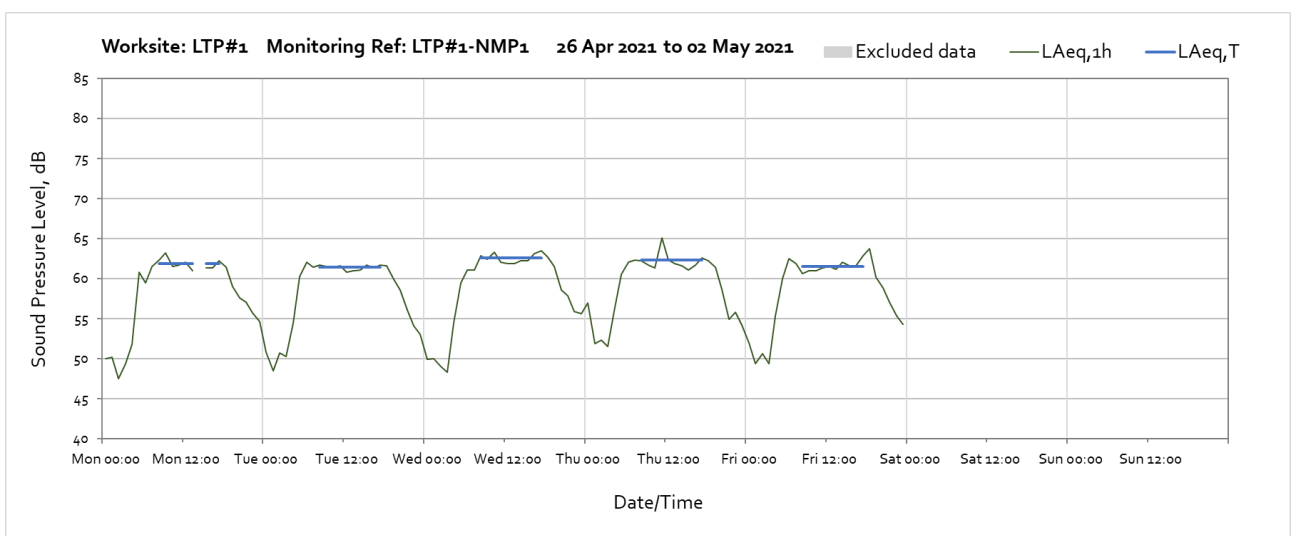
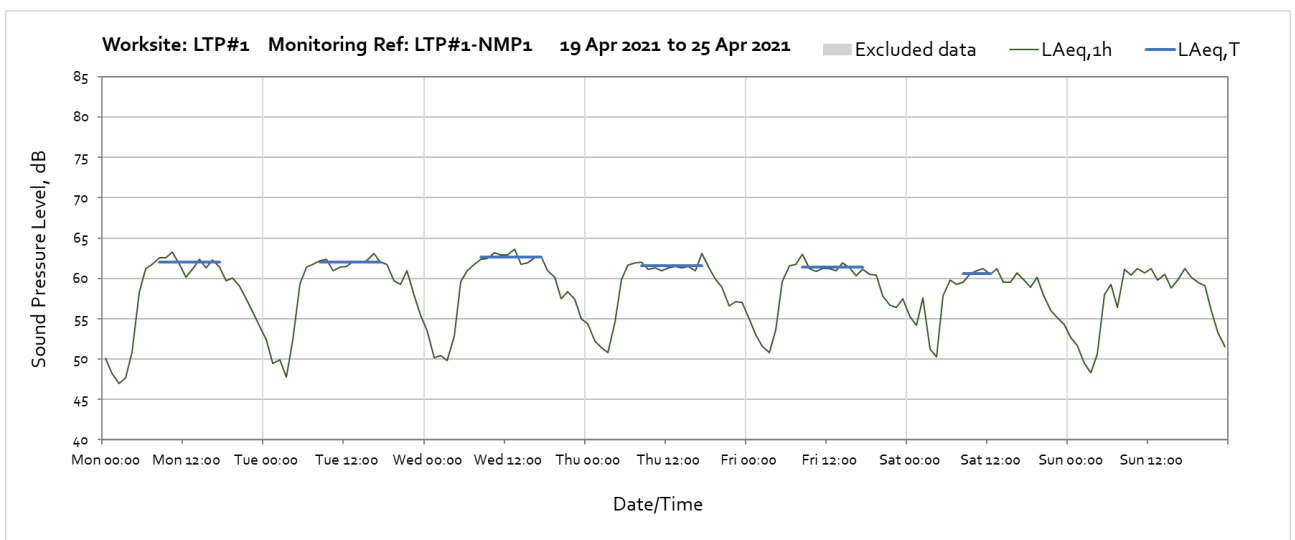
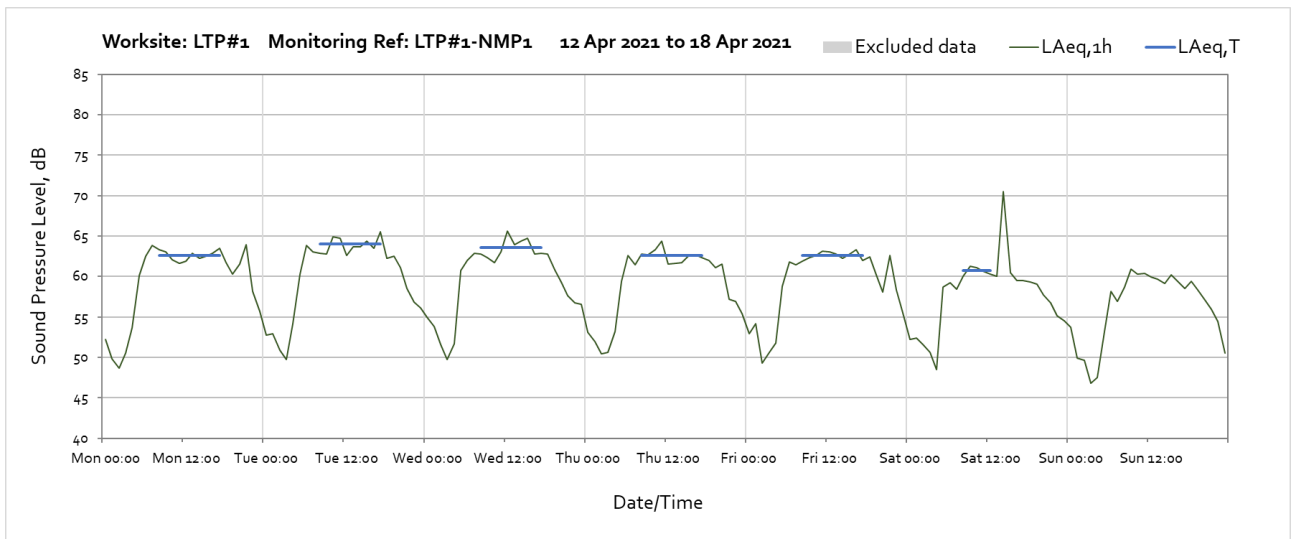




Worksite: LPT#1 – Monitoring Ref: LPT#1-NMP1



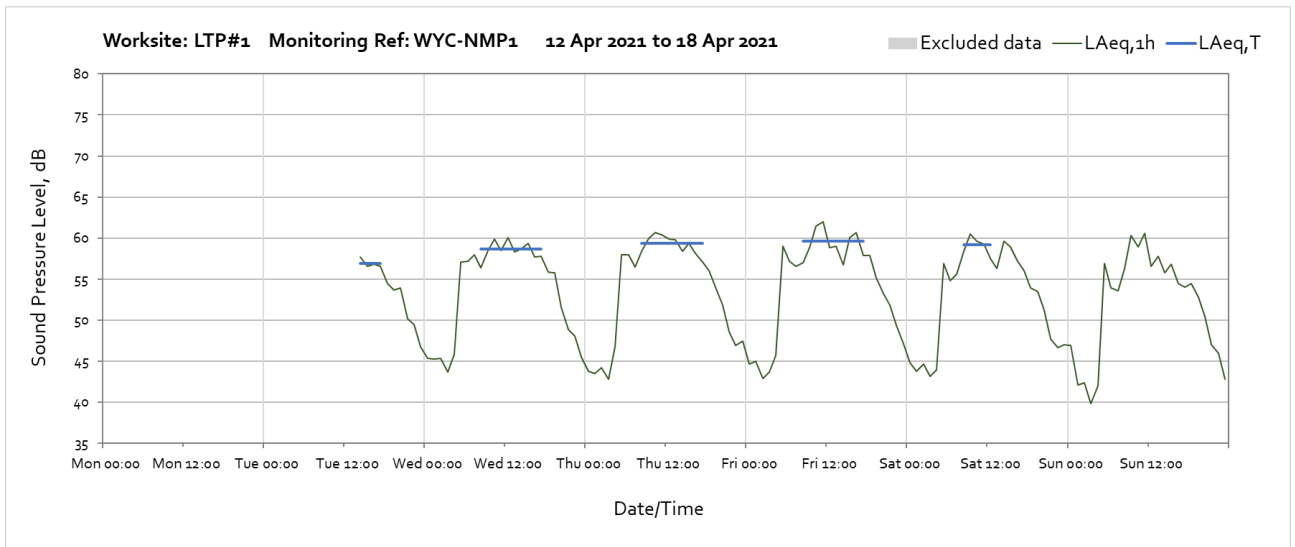
Note: Missing data between 18:00 and 9:00 on Thursday 8th April was due to maintenance being undertaken to the monitor to setup audio alarm.



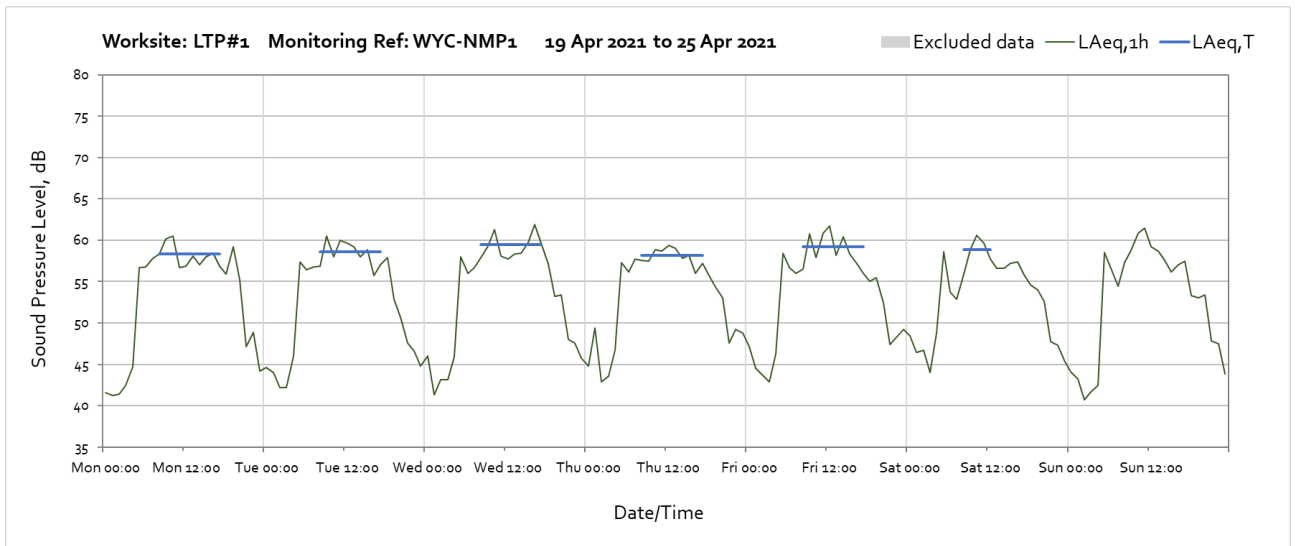
Note: Missing data between 14:00 and 15:00 on Monday 26th April was due to maintenance being undertaken to the monitor to setup audio alarm.

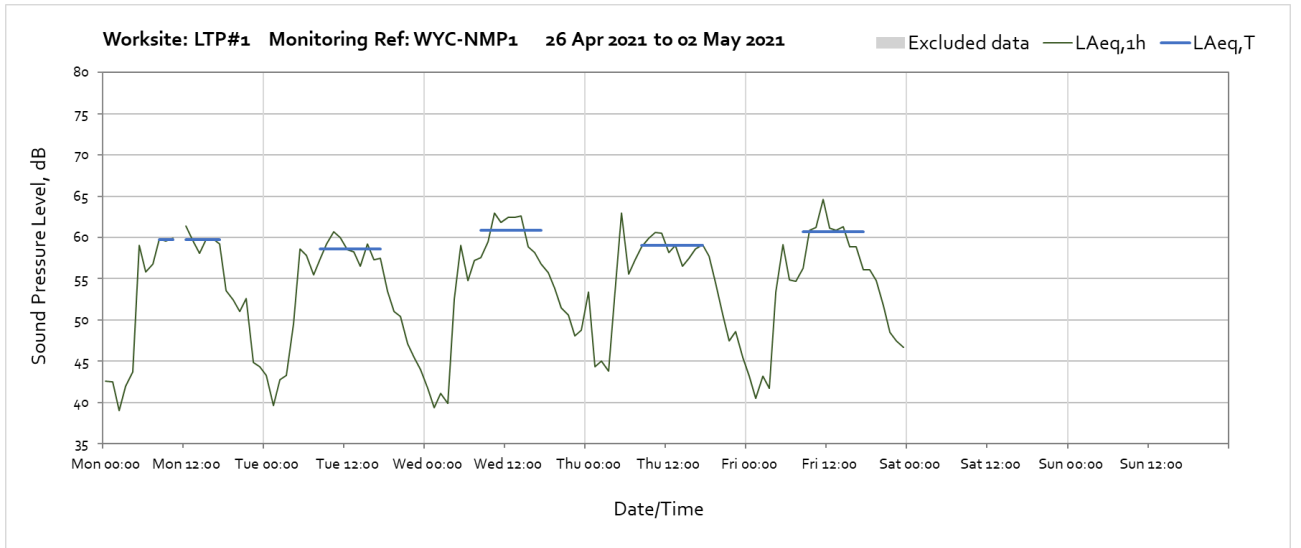
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Worksite: LPT#1 – Monitoring Ref: WYC-NMP1



Note: The noise monitor was installed at 12:00 on Tuesday 13th April 2021.



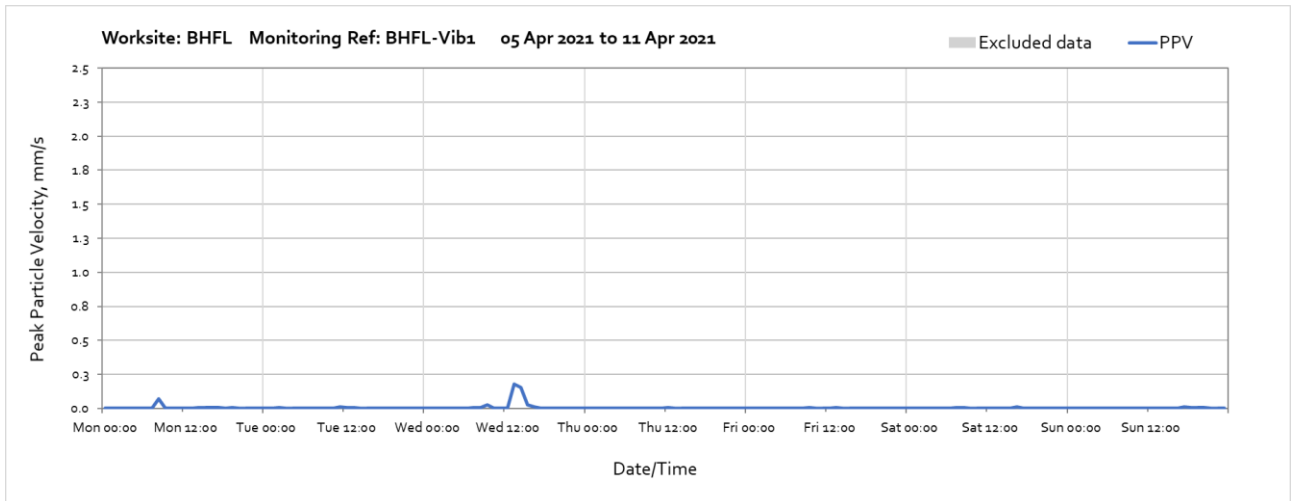
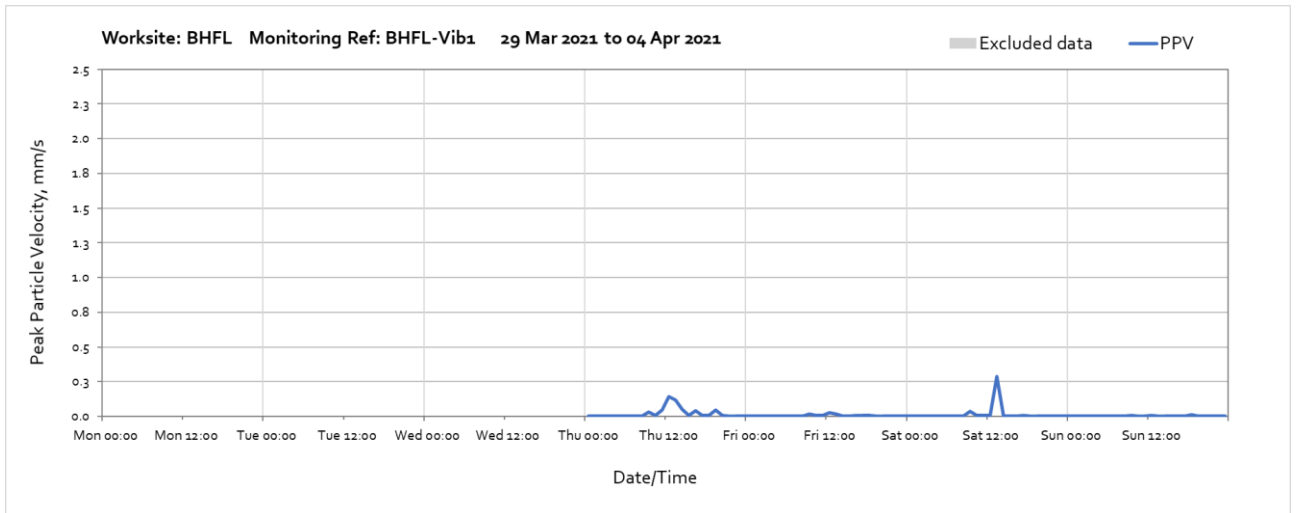


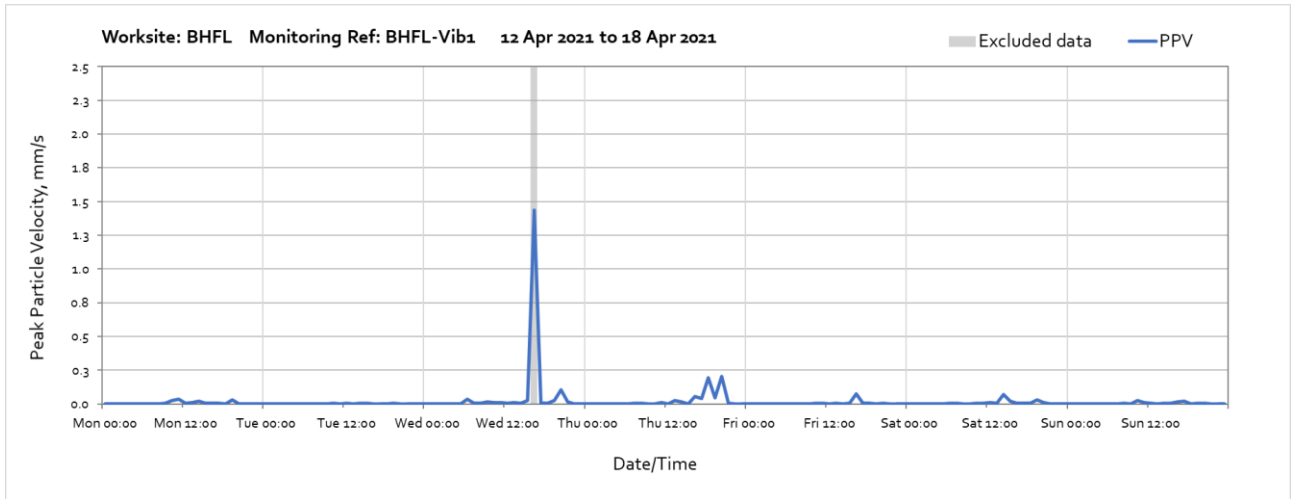
Note: Missing data between 11:00 and 12:00 on Monday 26th April was due to maintenance being undertaken to the monitor to setup audio alarm.

Vibration

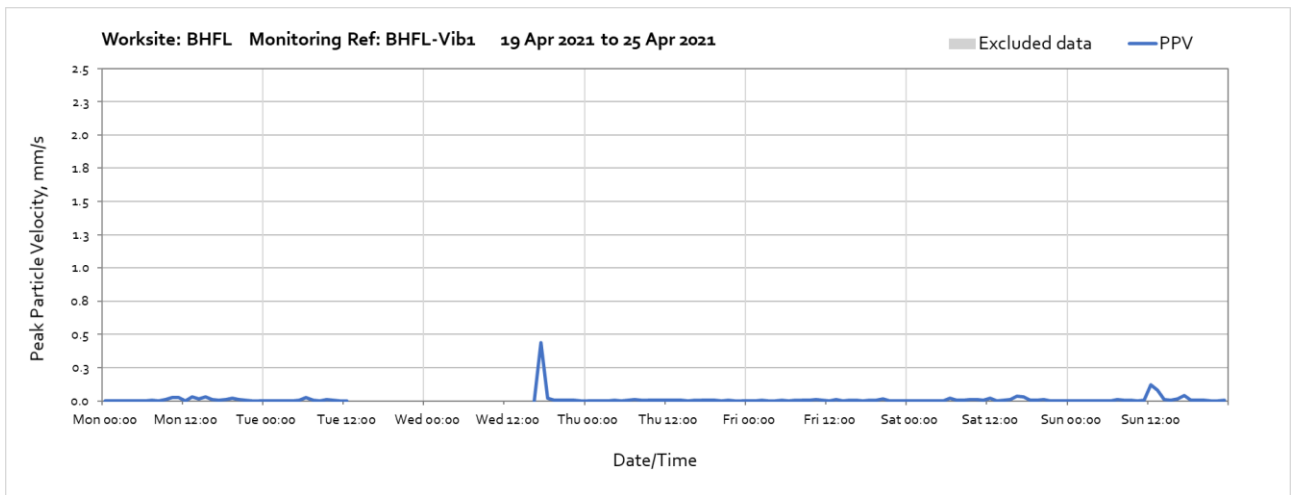
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axes x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative 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: High vibration levels measured at 16:00 on Wednesday 14th April 2021 were due to local disturbance of the monitor during maintenance operations and are not representative of HS2 construction vibration.



Note: Missing data between 13:00 on Tuesday 20th April and 16:00 on Wednesday 21st April was due to interruption of power to the monitor.

