

Construction noise and vibration Monthly Report – August 2020

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 August 2020.

Within this period noise monitoring was undertaken in the vicinity of the following worksites:

- Bottom House Farm Lane worksite (ref.: BHFL), where drainage, earthworks, roadworks and site management activities were underway.
- Chalfont St Peter Vent Shaft worksite (ref.: CSP) where site set up, drilling trials and grout injection, erection of site hoarding, excavation works, and electrical and lighting activities were underway.
- Load Test Pile 1 worksite (ref.: LTP #1) where fence installation works and installing new welfare units were underway.
- Amersham Vent Shaft worksite (ref.: AM) where installation of drainage and service ducts, installation of sheet piled retaining wall and earthworks activities were underway.

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

- Northmoor, Chalfont St. Giles and Amersham as part of water pipeline works.
- Frith Hill, Wendover, Aylesbury, Quainton, Mixbury, Calvert and Turweston as part of electricity diversion works.
- Aylesbury, Quainton and Perry Hill as part of gas pipeline works.

There were no exceedances of the HS2 threshold levels for significant noise impacts 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.

No complaints were received during the monitoring period.

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.

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 Local Authority area for the period 1st to 31st August 2020.

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

- Bottom House Farm Lane - BHFL (see plan 2 in Appendix A), where work activities included: Drainage activities including excavating trenches and levelling, laying geomembrane, installing attenuation crates, backfilling trenches and compacting; earthworks activities including excavating temporary access road to formation, stockpiling, topsoil stripping, installation of aggregate material, compaction, breakout of stables slab and commencement of bridge embankment; roadworks activities including laying, sampling and testing and site management activities including cleaning trackway, vegetation clearance, dust suppression, testing of formation, installation of fencing and relocation of IT utilities.
- Chalfont St Peter Vent Shaft - CSP (see plan 3 in Appendix A), where work activities included: Site set up (installation of de-sander, centrifuge, de-silter and bentonite pool), drilling trials and grout injection, excavation, erection of site hoarding, electrical and lighting works and installation of wheel wash.
- Load Test Pile 1 - LTP #1 (see plan 4 in Appendix A), where work activities included: Fence installation and lifting new welfare units into place.

- Amersham Vent Shaft - AM (see plan 5 in Appendix A), where work activities included: Installation of service ducts, drainage installation, earthworks including formation of site office platform and ground level formation for infiltration area and attenuation tanks and installation of sheet piled retraining wall adjacent to A404.

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

- Northmoor, Chalfont St. Giles and Amersham as part of water pipeline works.
- Frith Hill, Wendover, Aylesbury, Quanton, Mixbury, Calvert and Turweston as part of electricity diversion works.
- Aylesbury, Quanton and Perry Hill as part of gas pipeline works.

1.1.4 The applicable standards, guidance, and monitoring methodology is 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 Six noise monitoring installations were active in August in the BS area. Table 2 summarises the position of noise monitoring installations within the BS area in August 2020.

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

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
CSP	NMP1	Chesham Lane, Chalfont St. Peter
	NMP4	Chesham Lane, Chalfont St. Peter
	NMP5	Chesham Lane, Chalfont St. Peter
LTP #1	NMP2	Along worksite northern boundary
BHFL	NMP3	Elm Tree Cottage, Bottom House Farm Lane
AM	NMP6	Whielden Lane, Amersham

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
CSP	NMP1	Chesham Lane, Chalfont St. Peter	Free-field	60.9 (62.3)	66.5 (75.1)	60.2 (61.6)	57.8 (60.6)	55.7 (59.5)	58.7 (59.8)	61.9 (62.6)	60.1 (61.1)	59.0 (61.5)	56.1 (58.6)	58.6 (62.9)	56.0 (58.2)
	NMP4	Chesham Lane, Chalfont St. Peter	Free-field	42.9 (47.7)	47.4 (50.4)	44.4 (60.0)	42.7 (57.8)	37.8 (49.4)	41.7 (45.4)	46.7 (48.9)	44.3 (50.6)	45.9 (58.4)	39.0 (53.0)	46.1 (55.6)	39.8 (63.4)
	NMP5	Chesham Lane, Chalfont St. Peter	Free-field	53.5 (56.0)	55.8 (78.5)	53.8 (57.1)	51.8 (55.7)	47.4 (54.6)	52.3 (54.7)	54.9 (57.1)	54.7 (56.9)	53.8 (57.4)	47.1 (53.0)	53.3 (56.6)	47.1 (53.2)
LTP #1	NMP2	Along worksite northern boundary	Free-field	59.6 (62.8)	59.3 (63.6)	58.9 (64.5)	56.2 (61.1)	53.2 (63.5)	55.5 (57.1)	57.3 (59.3)	57.4 (59.7)	56.1 (59.8)	50.4 (54.7)	56.0 (59.4)	52.1 (60.7)
BHFL	NMP3	Elm Tree Cottage, Bottom House Farm Lane	Free-field	55.5 (58.4)	59.5 (64.2)	53.6 (58.5)	51.1 (55.1)	47.7 (56.4)	52.6 (53.2)	56.9 (64.2)	53.4 (54.5)	51.9 (54.7)	45.7 (50.8)	51.6 (57.7)	46.3 (53.0)
AM	NMP6	Whielden Lane, Amersham	Free-field	70.0 (72.6)	71.5 (76.3)	69.6 (72.7)	66.9 (70.4)	62.2 (70.7)	66.8 (68.3)	69.9 (71.6)	70.3 (71.6)	68.8 (76.6)	60.8 (66.3)	67.8 (72.4)	62.2 (71.0)

- 2.1.2 Appendix C presents graphs of the noise 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). 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 construction noise levels exceed the SOAEL, relevant periods will be identified, and summary statistics provided in order to evaluate ongoing qualification for noise insulation and temporary rehousing.
- 2.2.5 Table 4 presents a summary of recorded exceedances of the LOAEL and SOAEL at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 4: Summary of Exceedances of LOAEL and SOAEL

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
CSP	NMP1	Chesham Lane, Chalfont St. Peter	Weekday	0800-1800	15	No exceedance
	NMP4	Chesham Lane, Chalfont St. Peter	All days	All periods	No exceedance	No exceedance
	NMP5	Chesham Lane, Chalfont St. Peter	Weekday	0800-1800	1	No exceedance
LTP #1	NMP2	Along worksite northern boundary	All days	All periods	No exceedance	No exceedance
BHFL	NMP3	Elm Tree Cottage, Bottom House Farm Lane	Weekday Saturday	0800-1800 0800-1300	3 1	No exceedance No exceedance
AM	NMP6	Whielden Lane, Amersham	Weekday Saturdays	0800-1800 0800-1300	18 5	No exceedance No exceedance

- 2.2.1 No exceedances of the SOAEL were recorded due to HS2 construction works during August 2020. A number of exceedances of the LOAEL were recorded at monitoring positions NM1, NM5, NMP3 and NM6 in August 2020 during weekday and Saturday core working hours.

2.3 Exceedances of Trigger Level

- 2.3.1 Table 5 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 5: 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
-	-	-	-	-	-

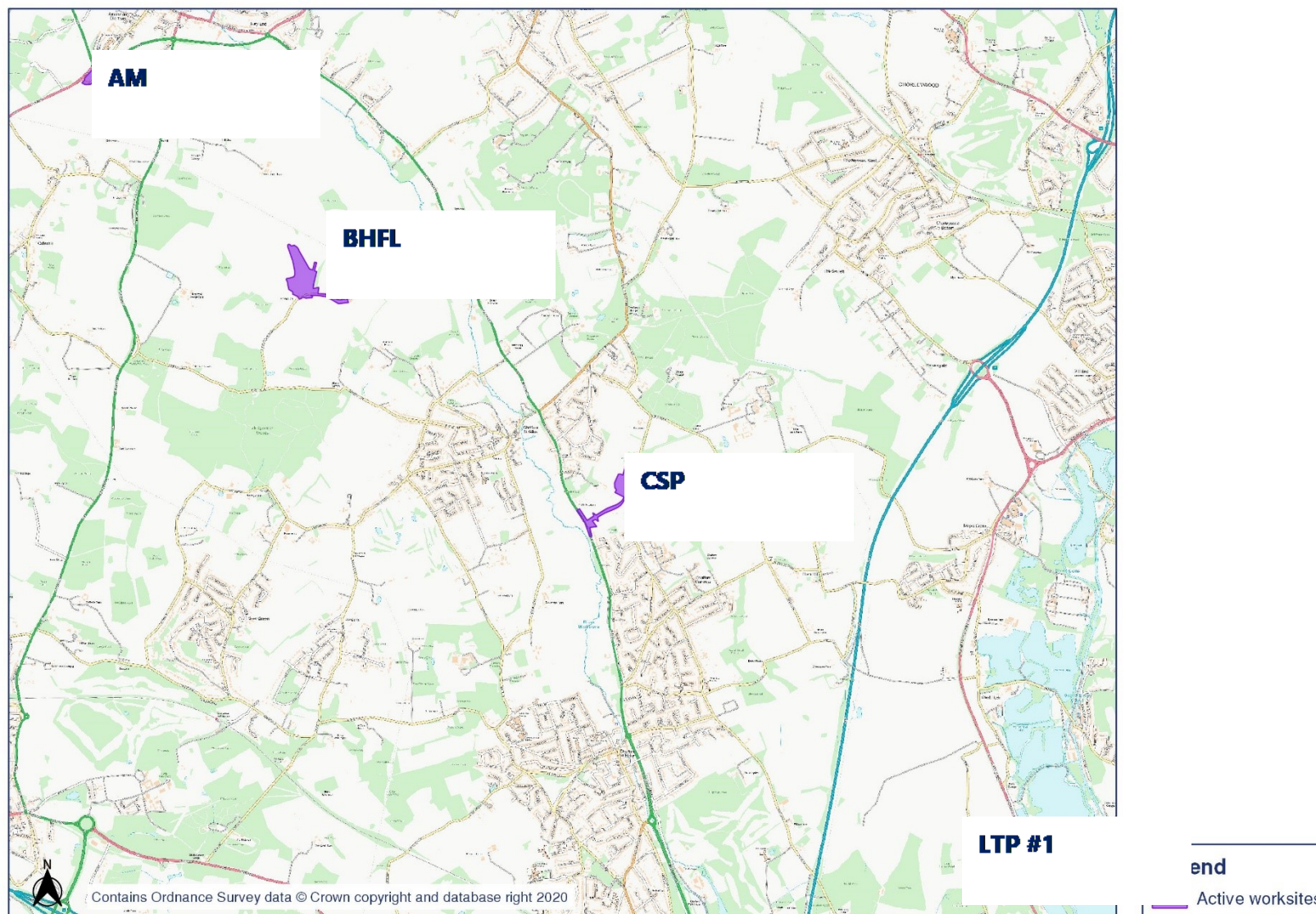
2.4 Complaints

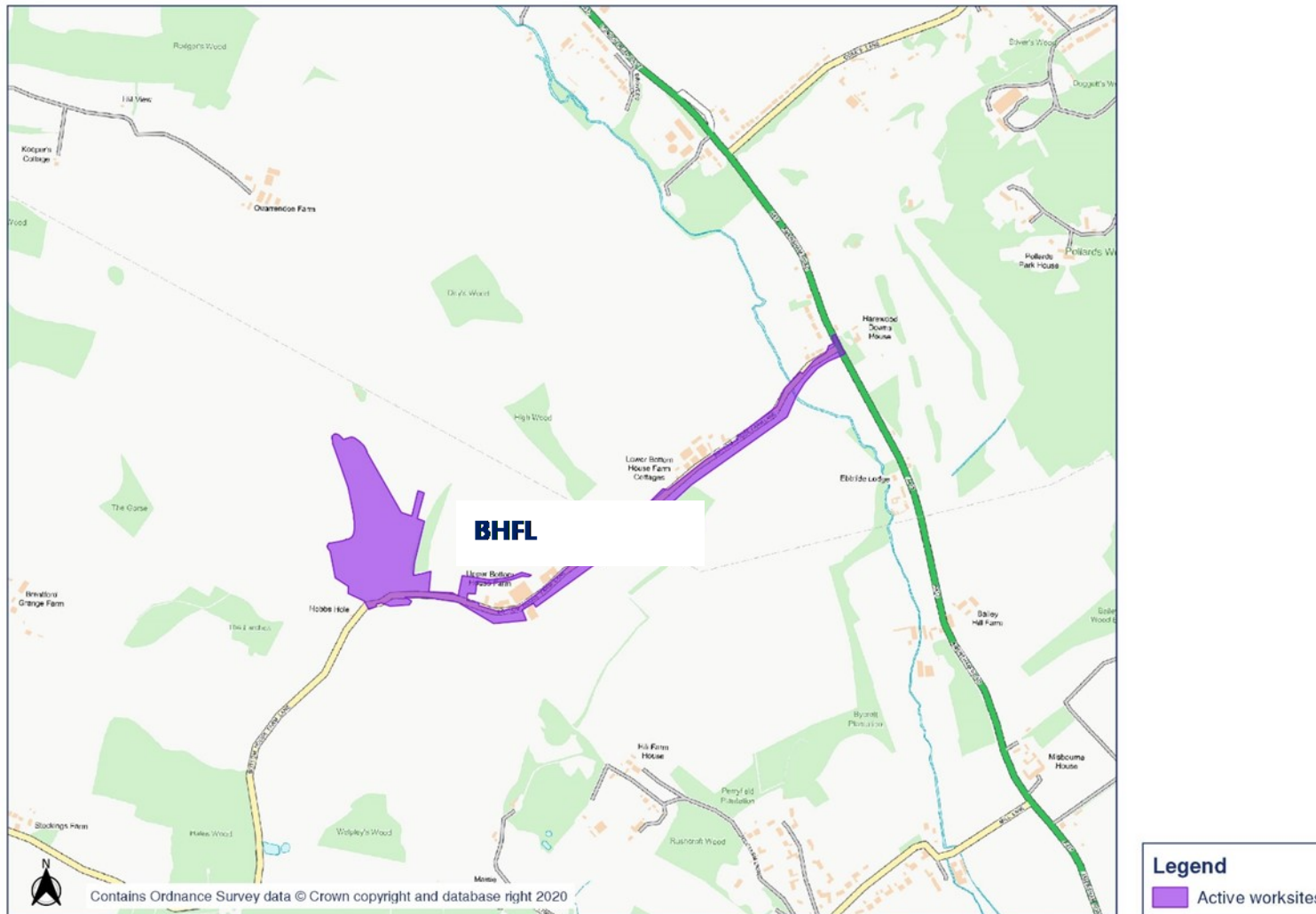
2.4.1 Table 6 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

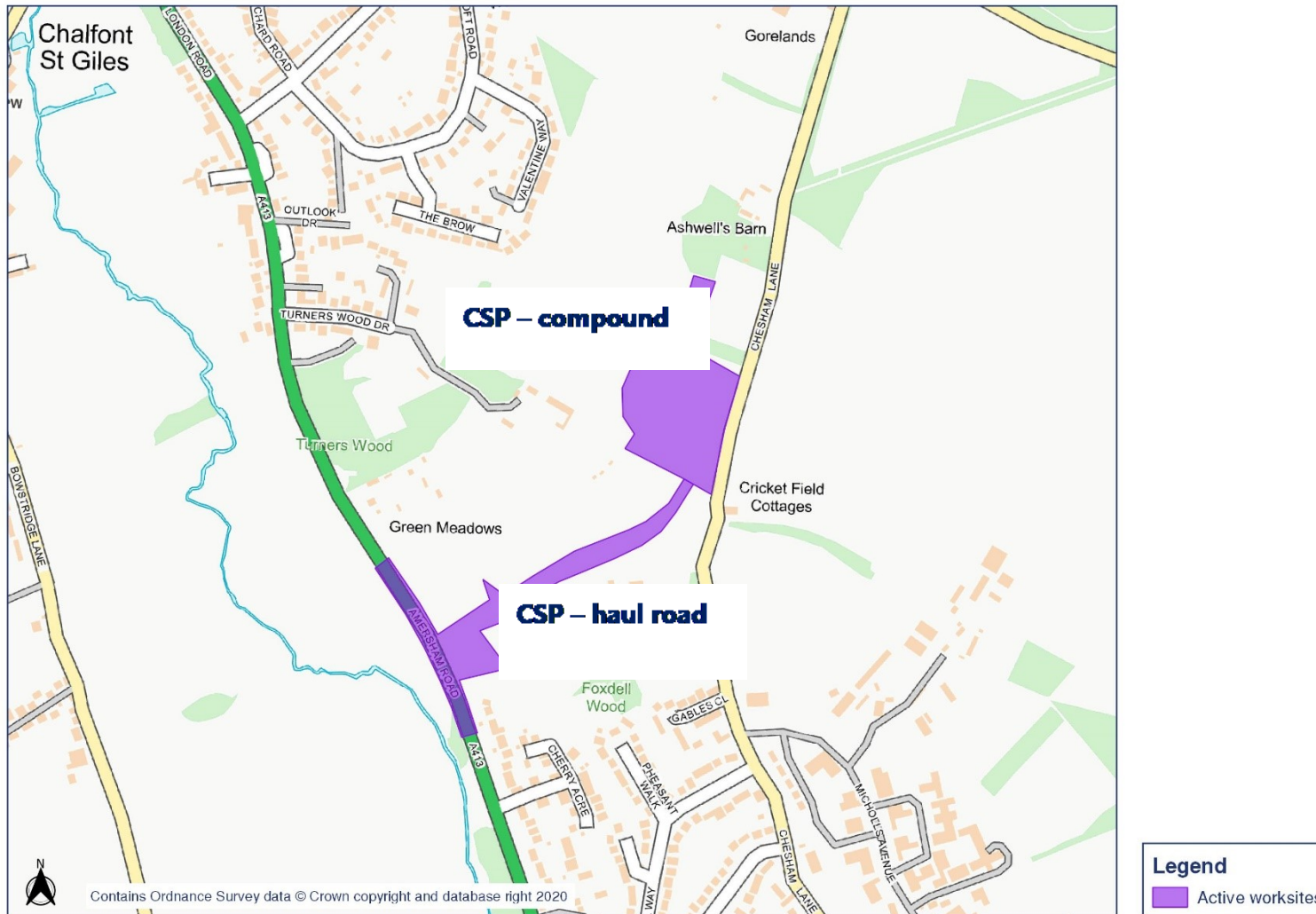
Table 6: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
-	-	-	-	-

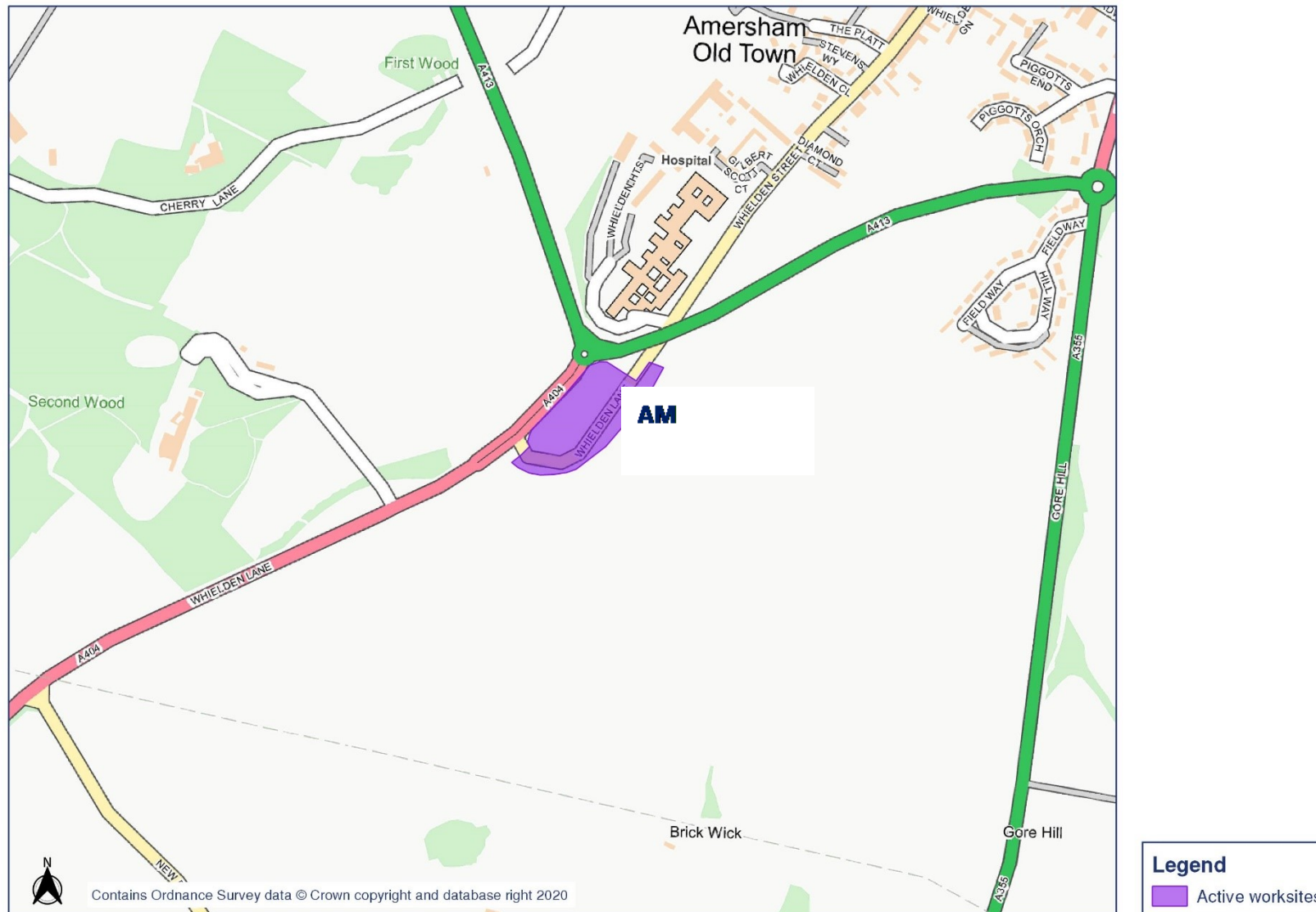
Appendix A Site Locations



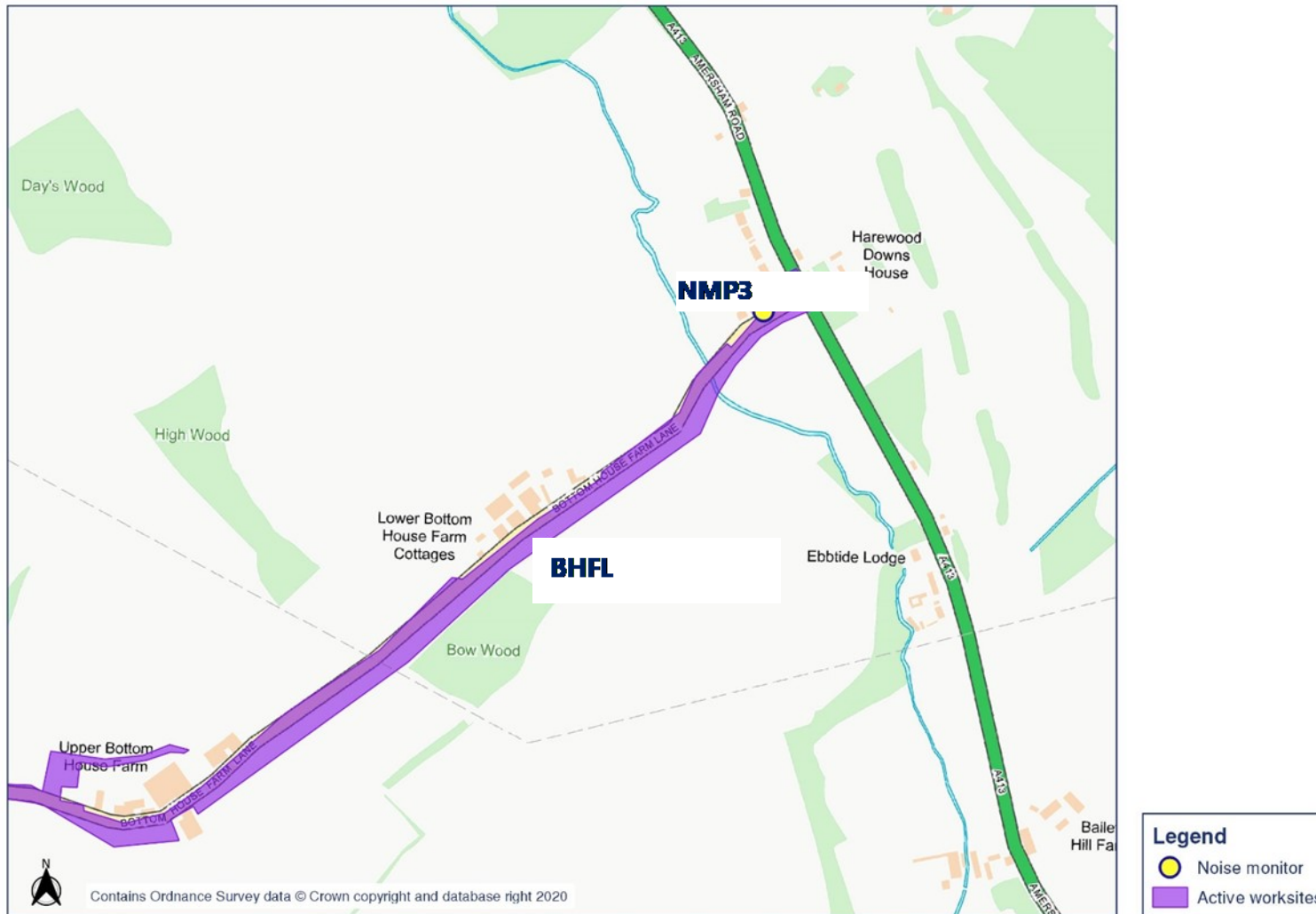


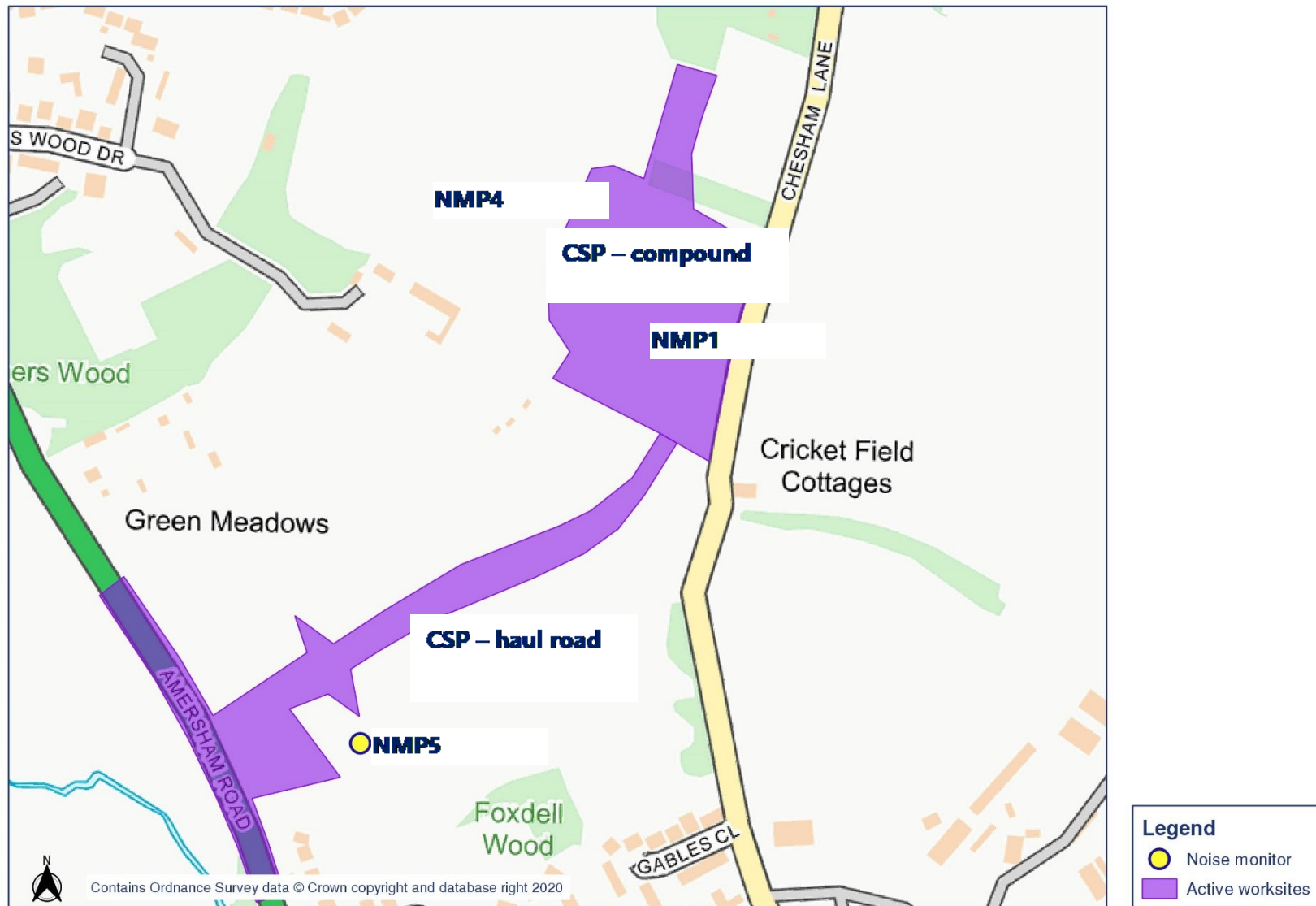




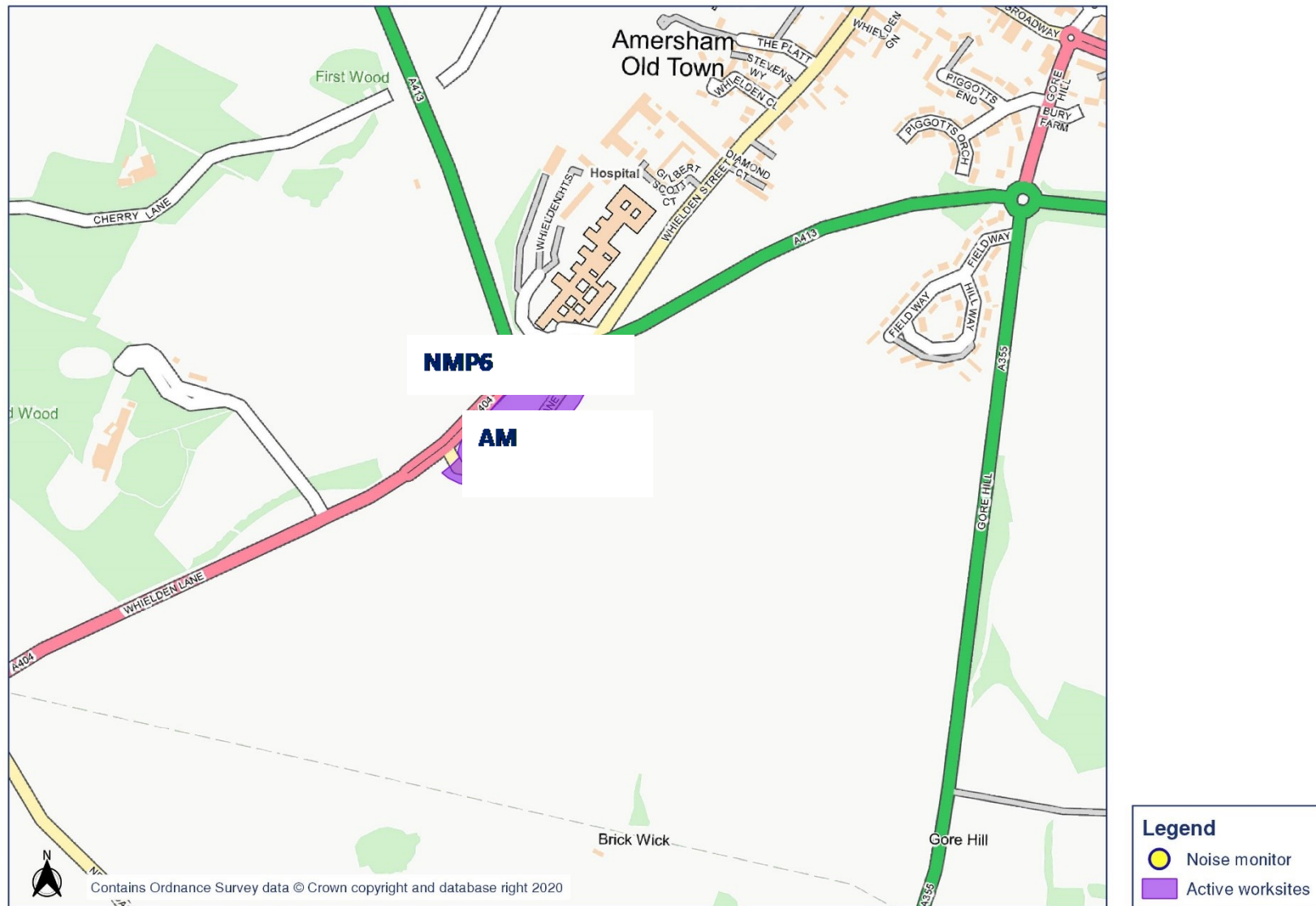


Appendix B Monitoring Locations





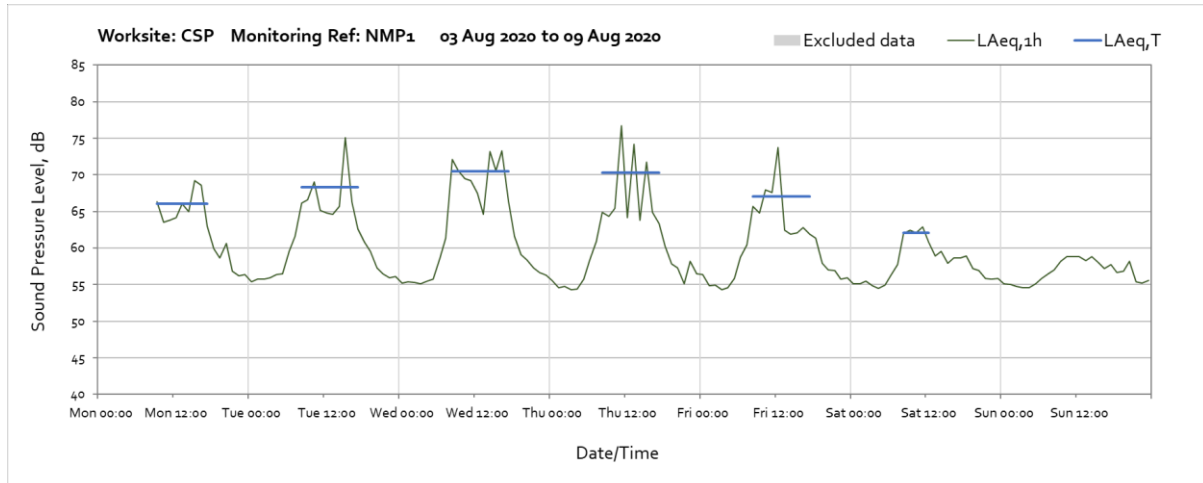




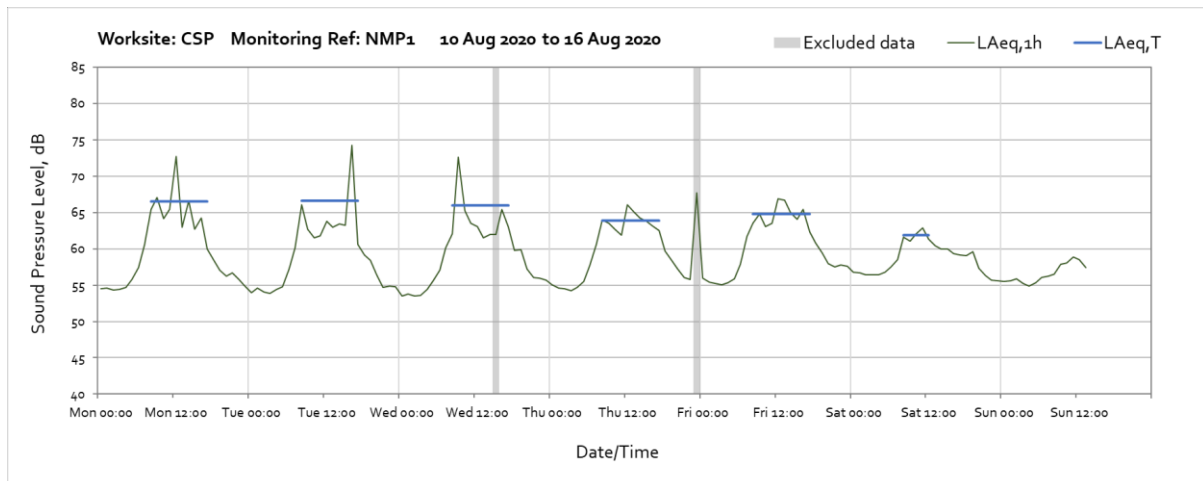
Appendix C Data

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

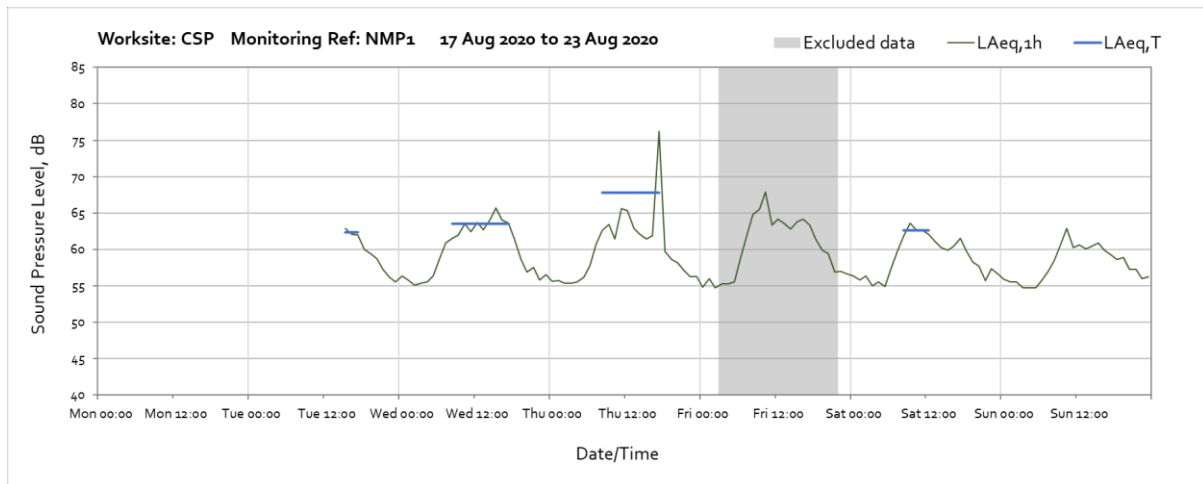
Worksite: CSP – Monitoring Ref: NMP1



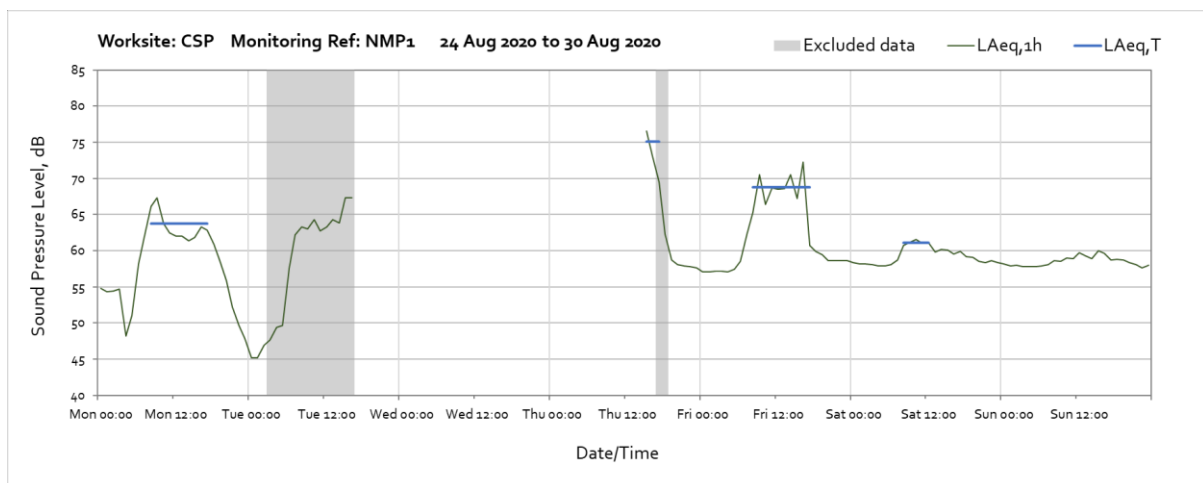
Note: Missing data between 00:00 on Saturday 1st August and 09:00 on Monday 3rd August was due to loss of continuous battery power at the monitoring station.



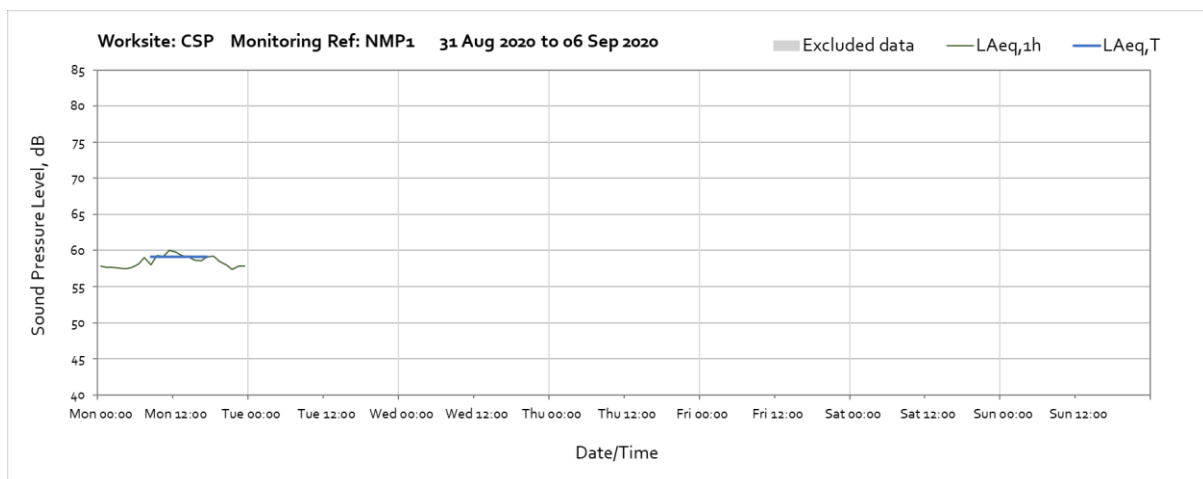
Note: Missing data between 14:00 on Sunday 16th August and 15:00 on Tuesday 18th August was due to loss of continuous site power.



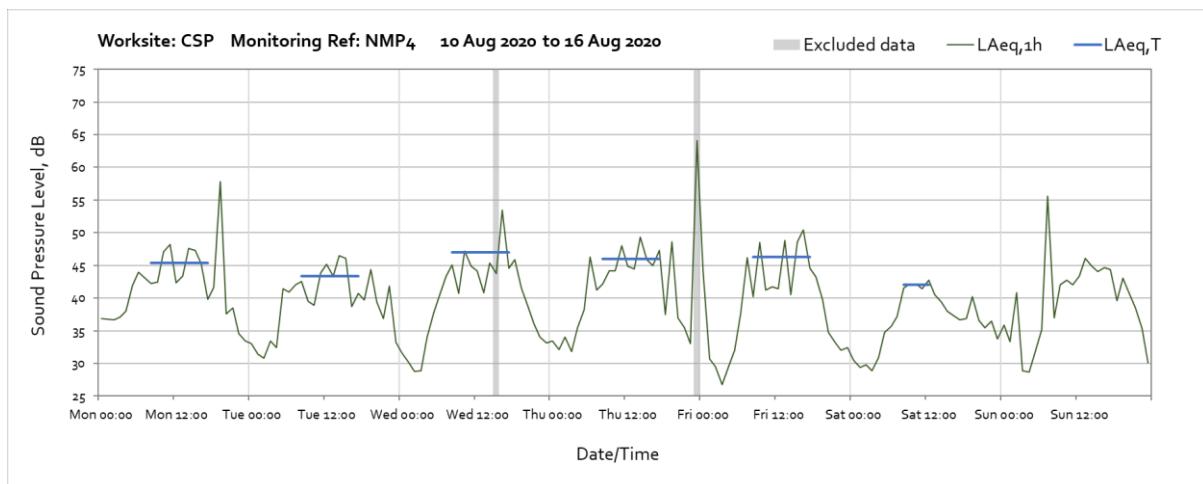
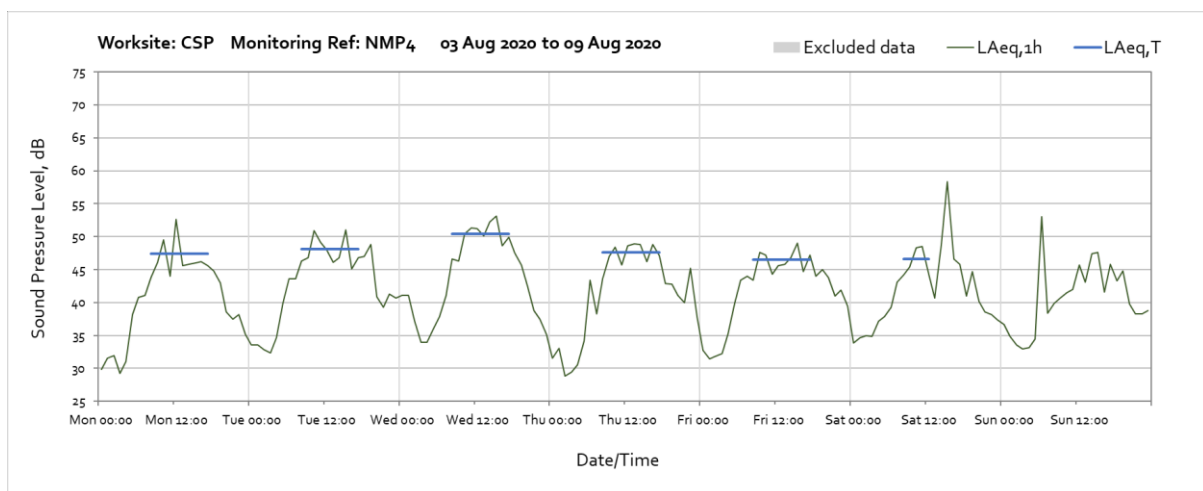
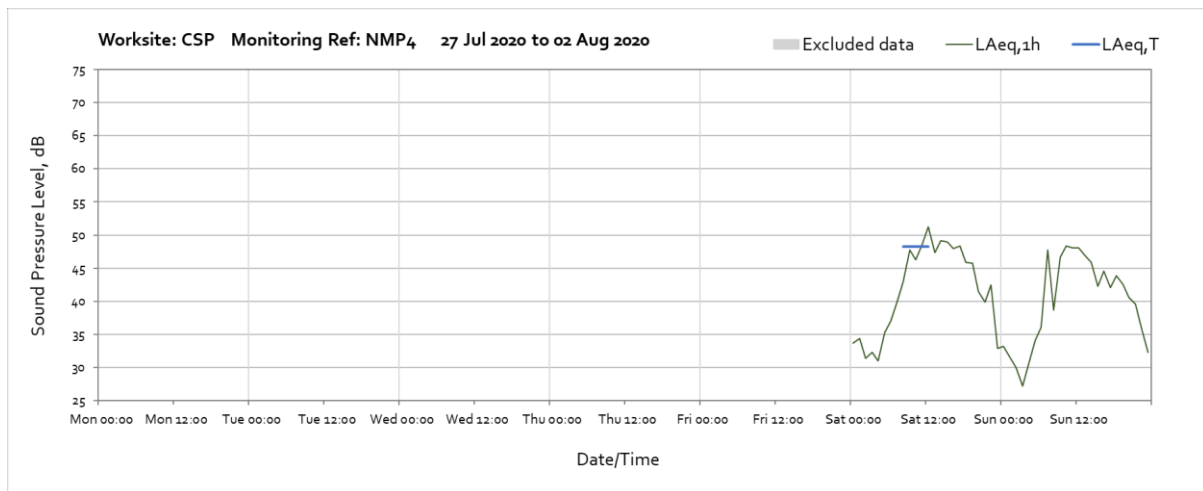
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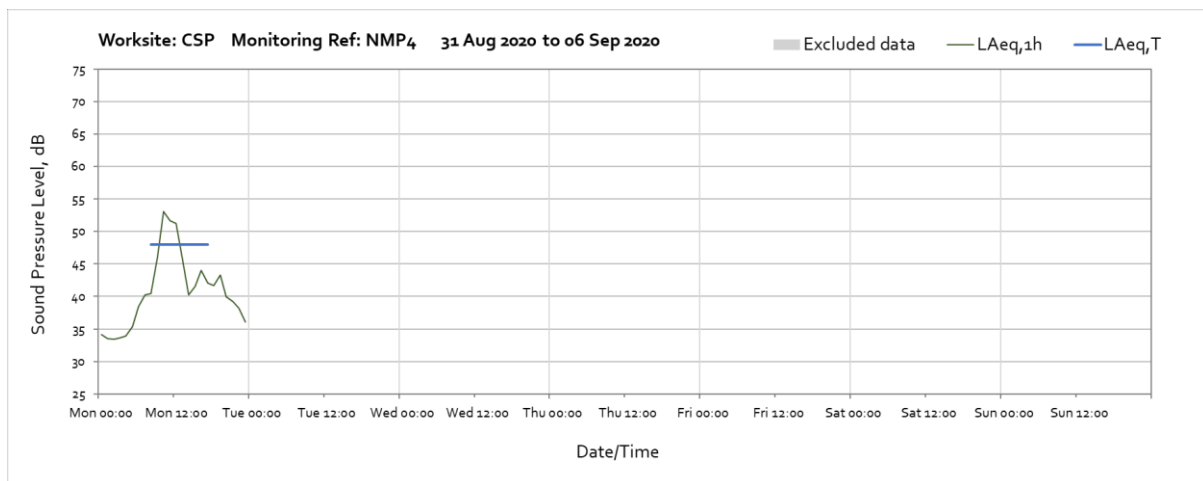
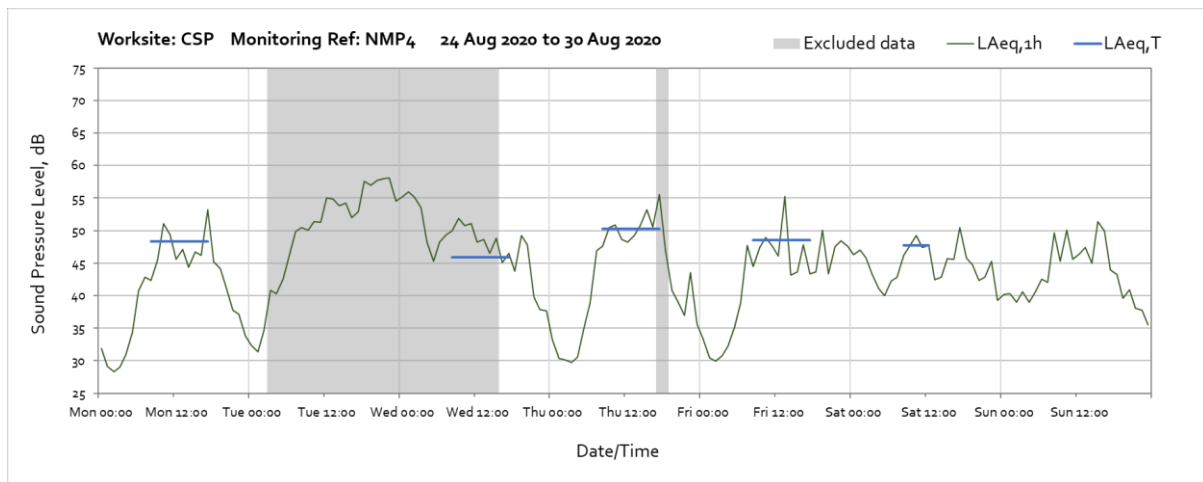
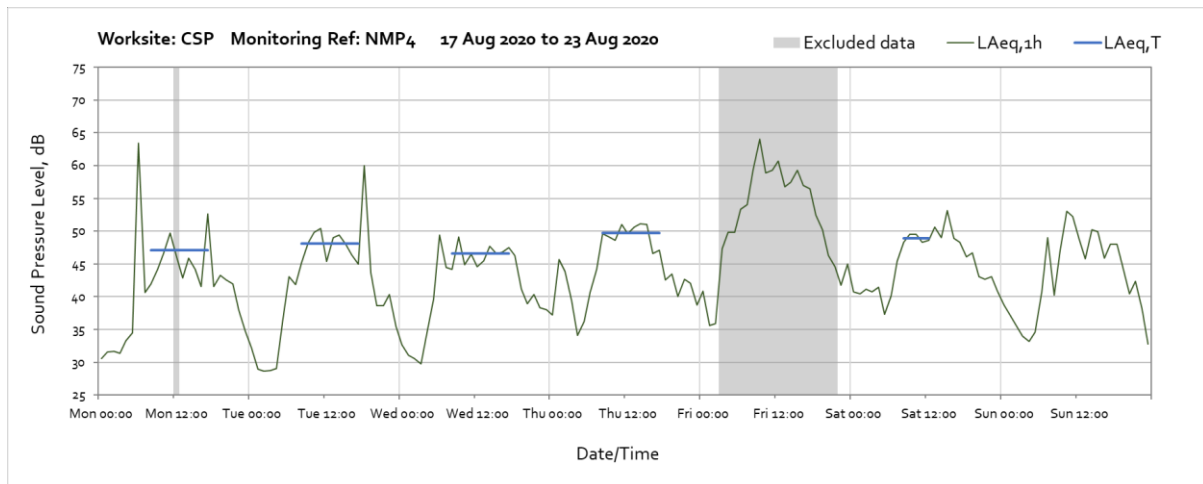


Note: Missing data between 17:00 on Tuesday 25th August and 15:00 on Thursday 27th August was due to loss of continuous site power and relocation of noise unit.

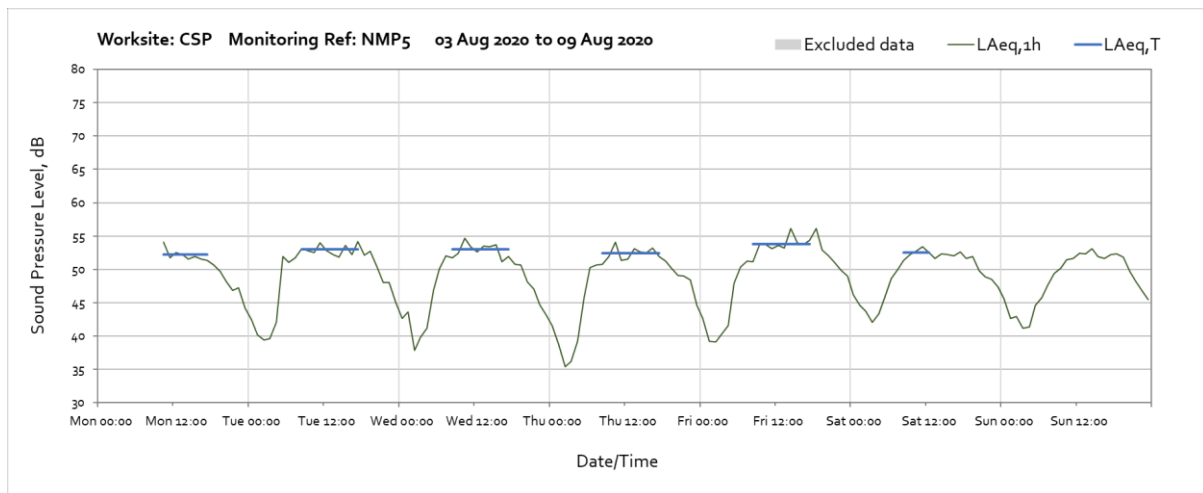


Worksite: CSP – Monitoring Ref: NMP4

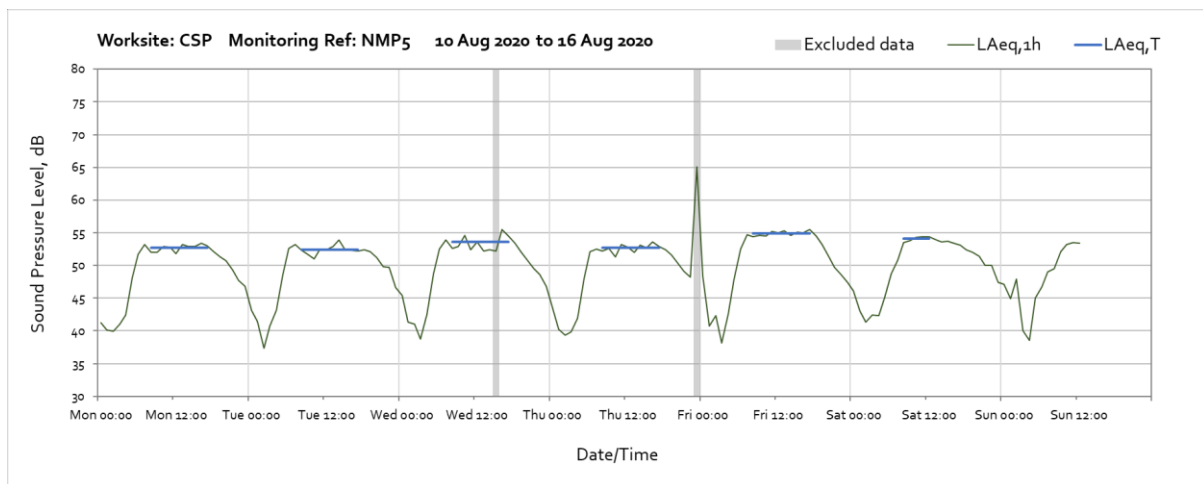




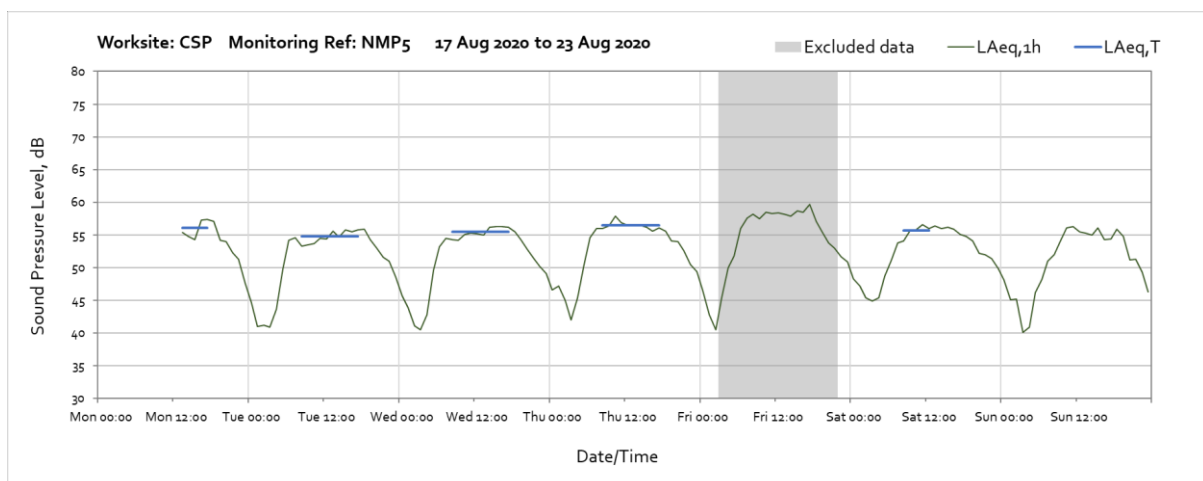
Worksite: CSP – Monitoring Ref: NMP5



Note: Missing data between 00:00 on Saturday 1st August and 10:00 on Monday 3rd August was due to loss of continuous solar and battery power at the monitoring station.

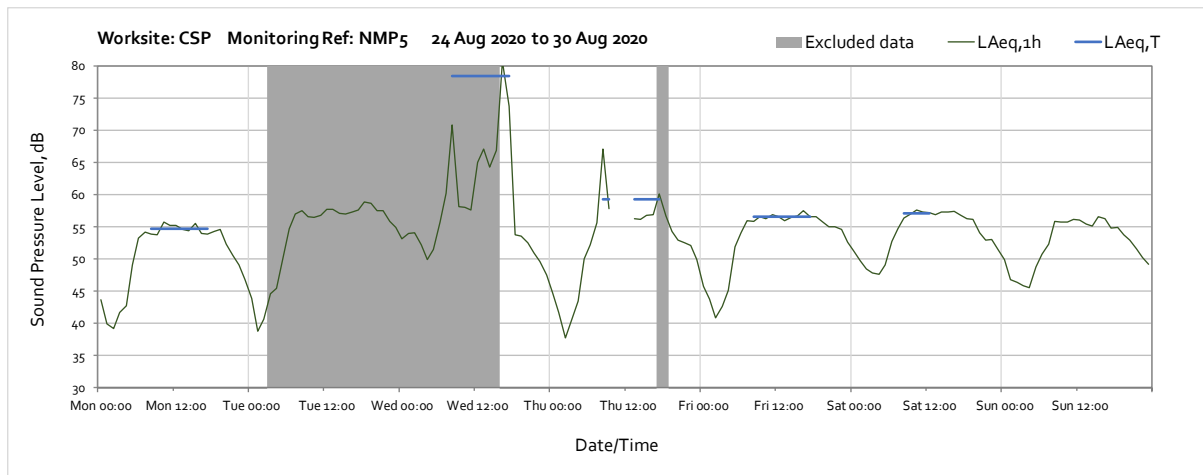


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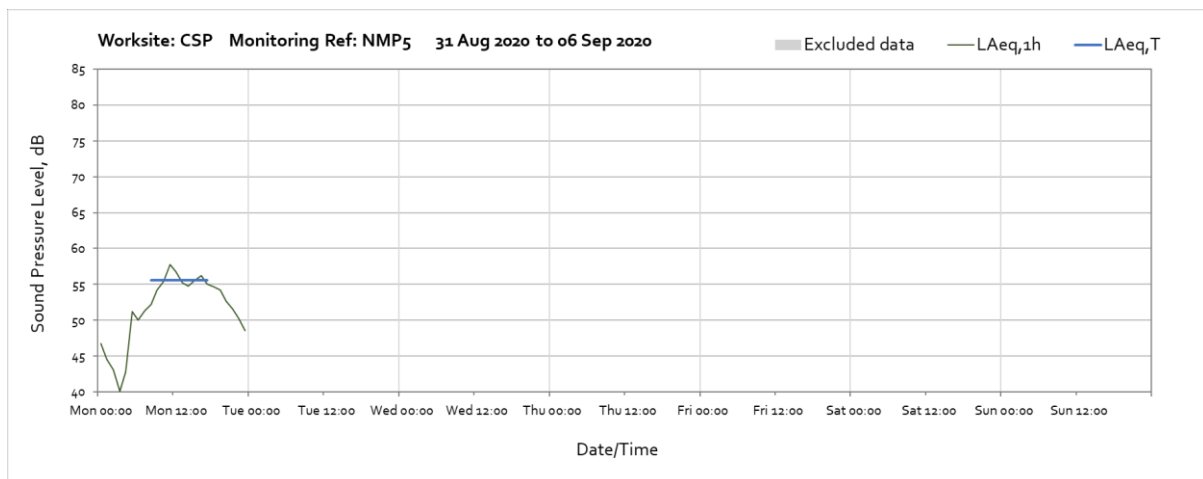


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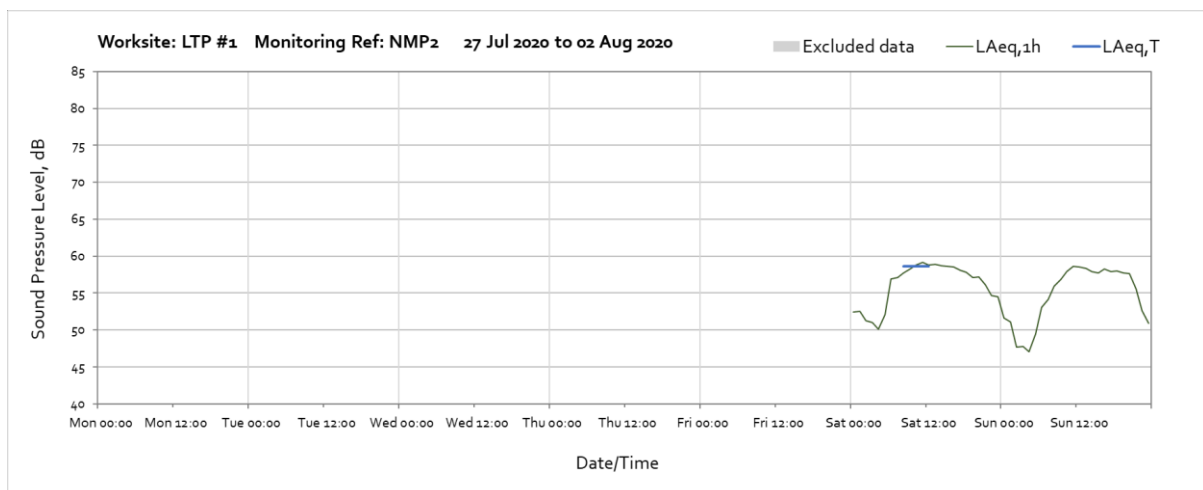
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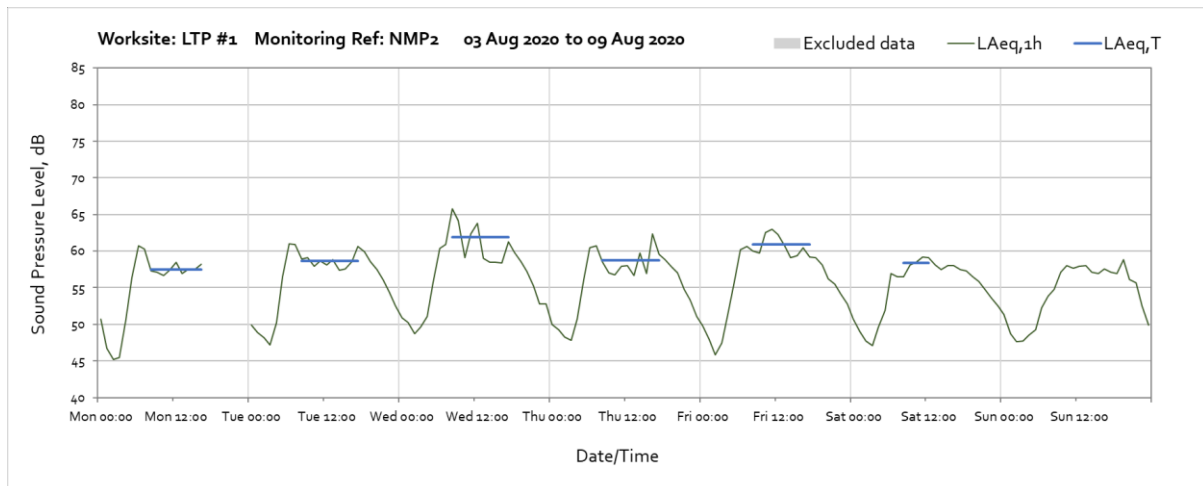


Note: Missing data between 10:00 and 13:00 on Thursday 27th August was due to failure of remote connection of the noise monitor.

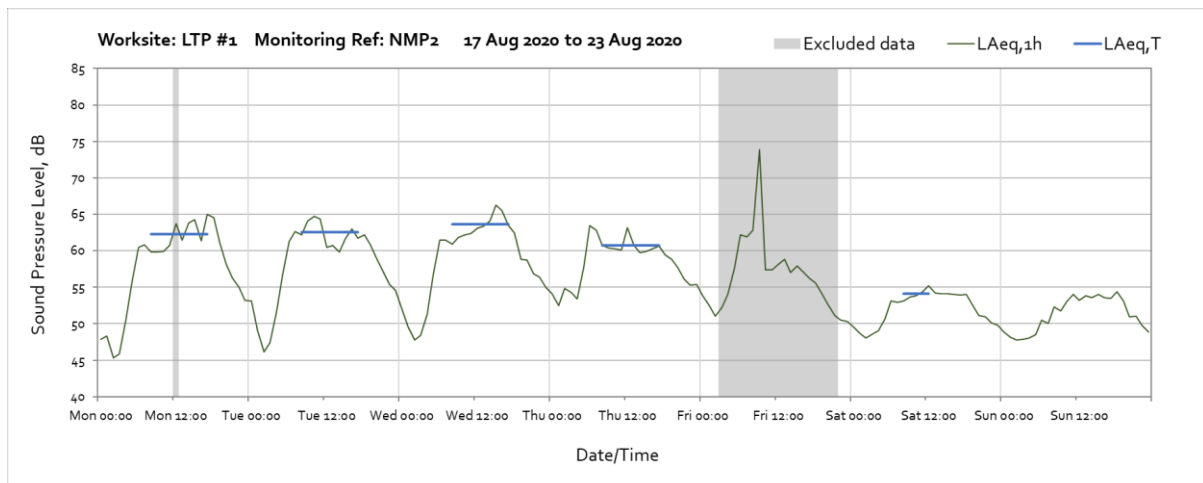
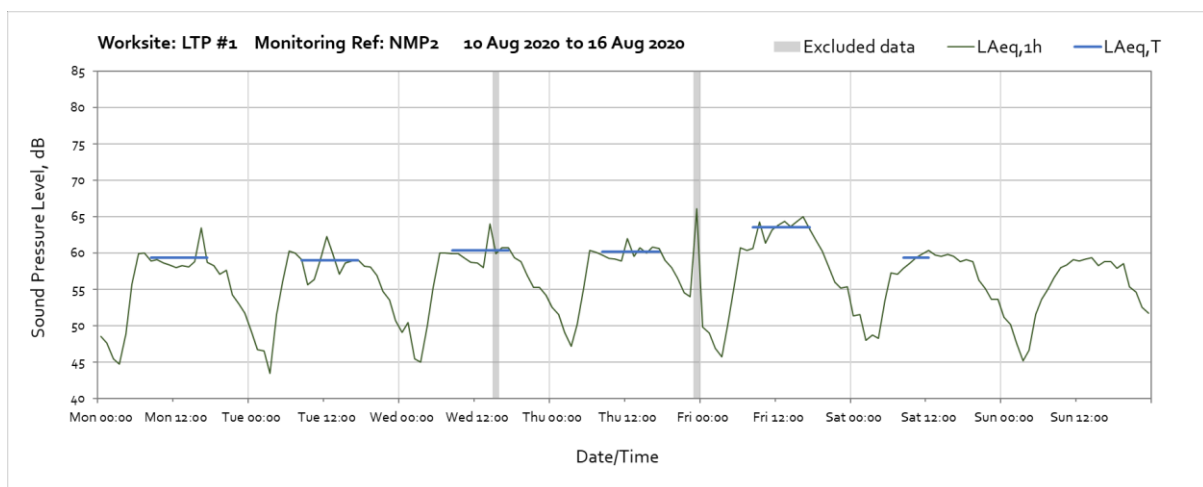


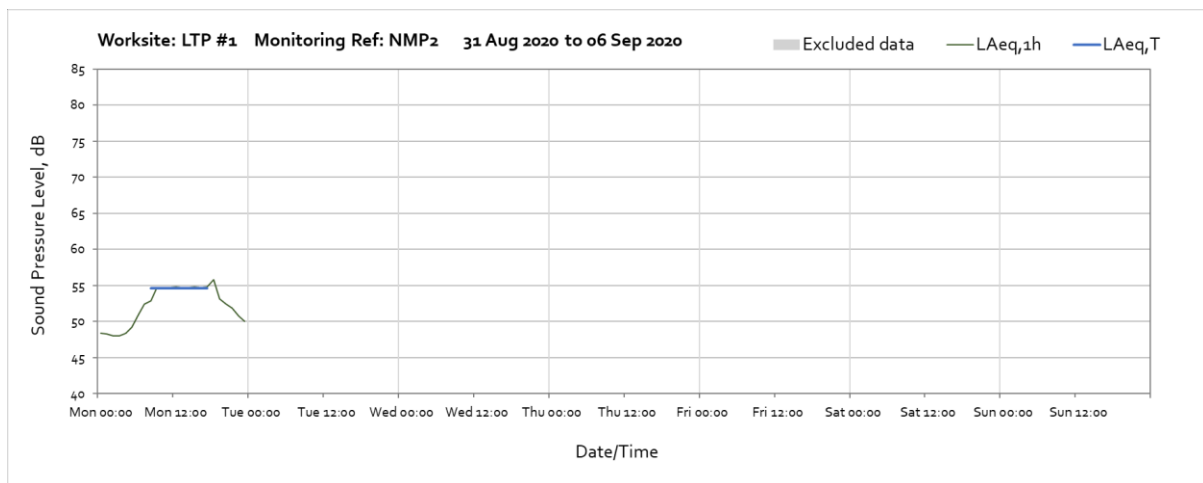
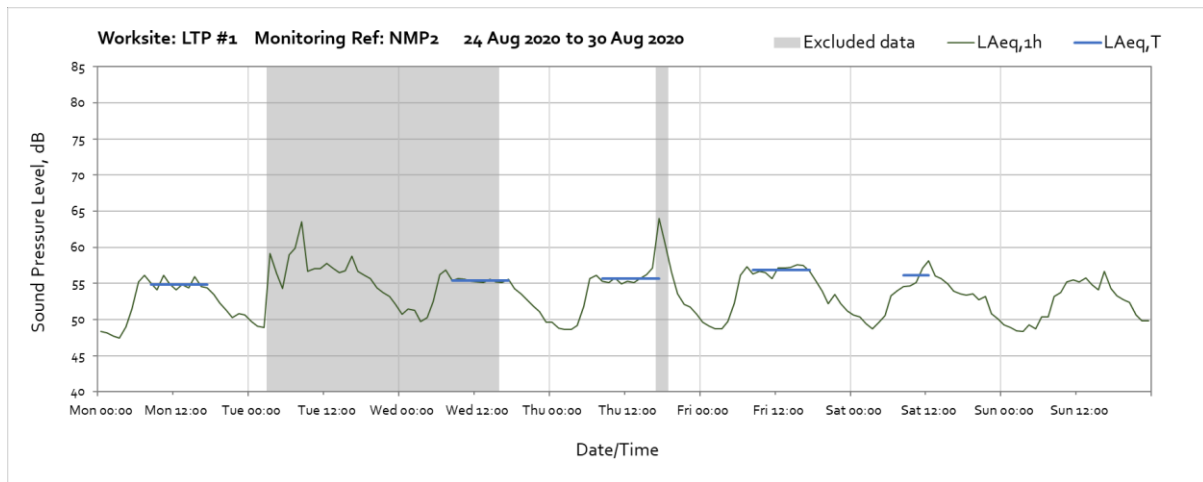
Worksite: LPT #1 – Monitoring Ref: NMP2



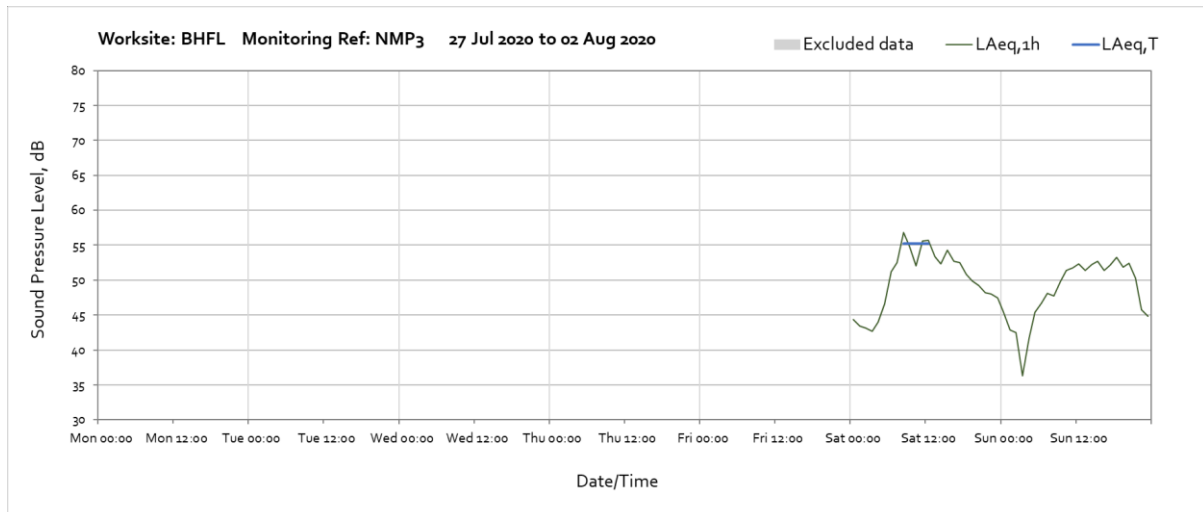


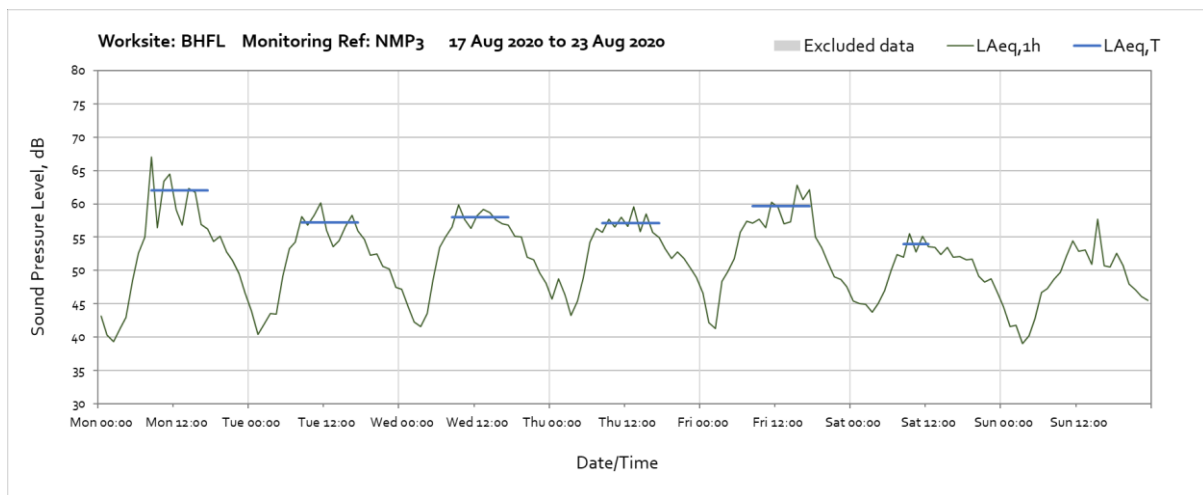
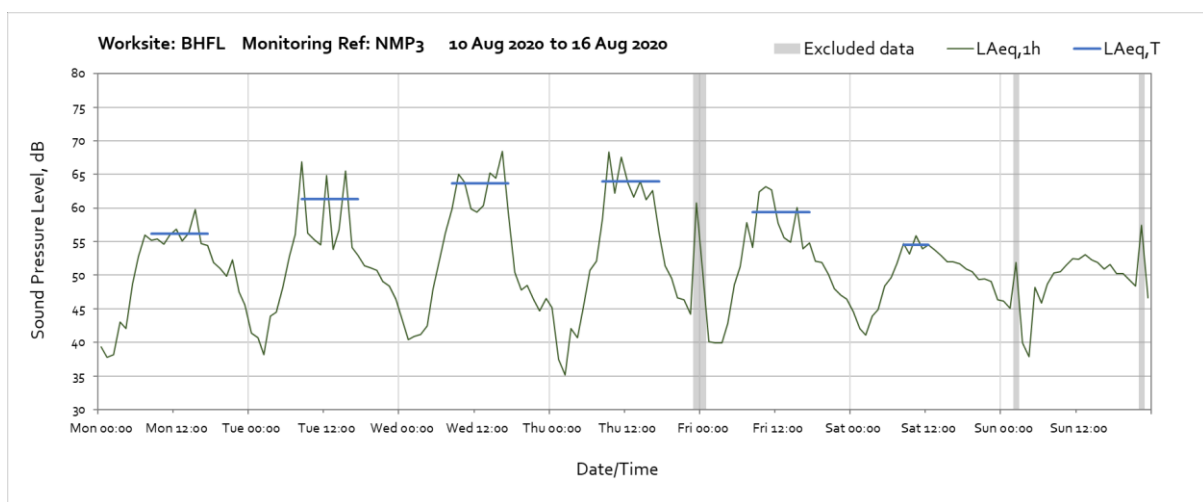
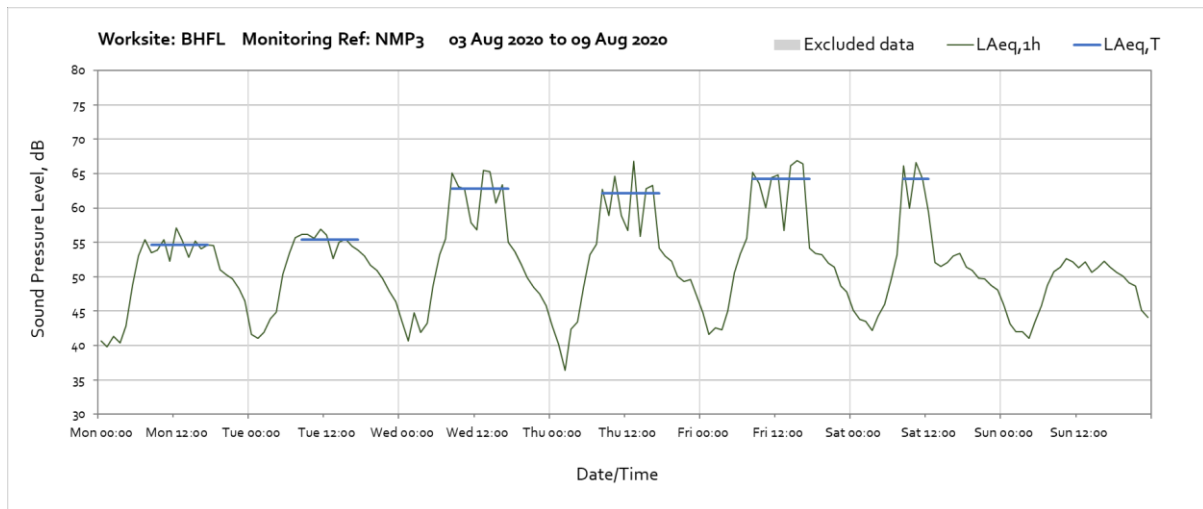
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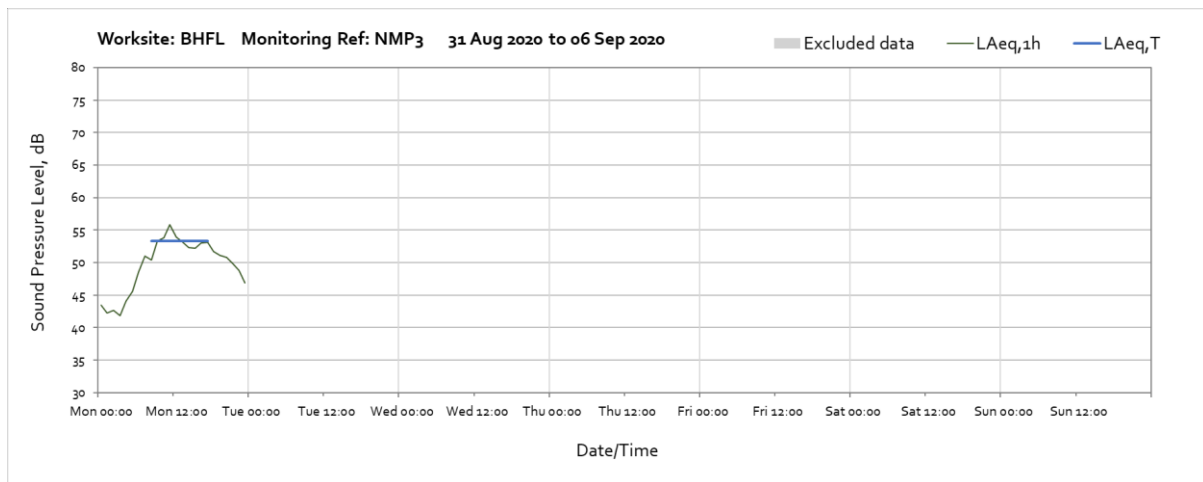
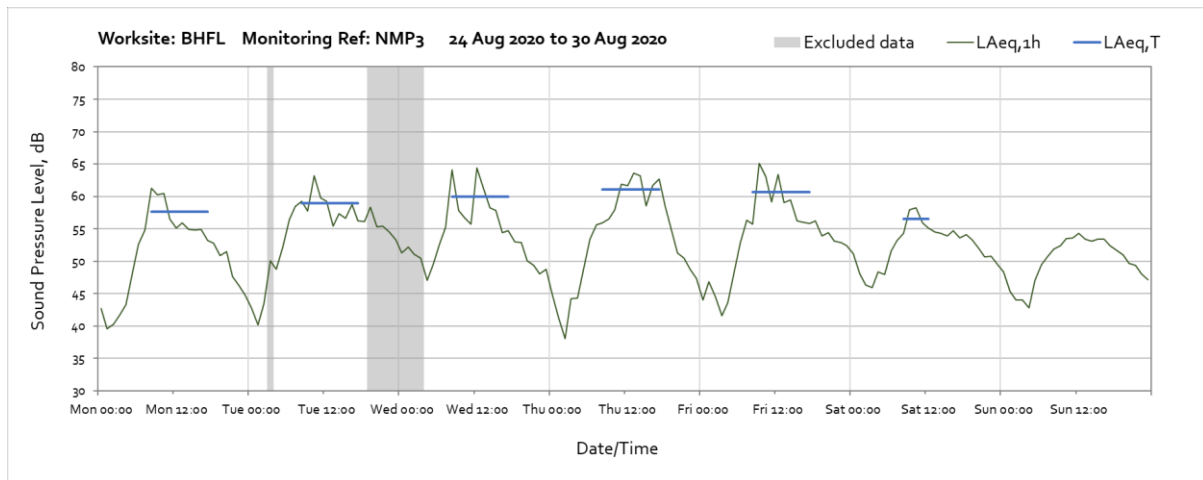




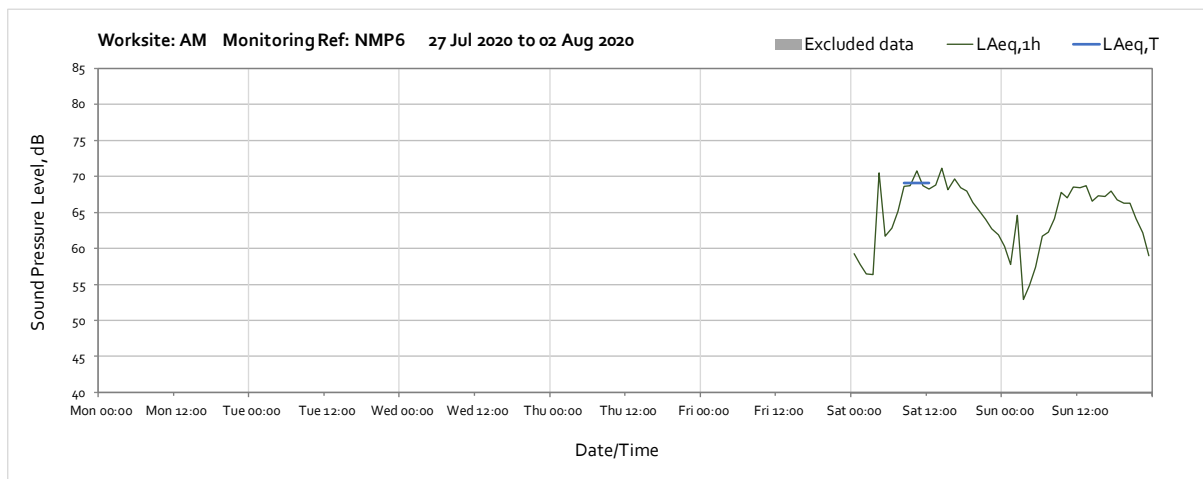
Worksite: BHFL – Monitoring Ref: NMP3

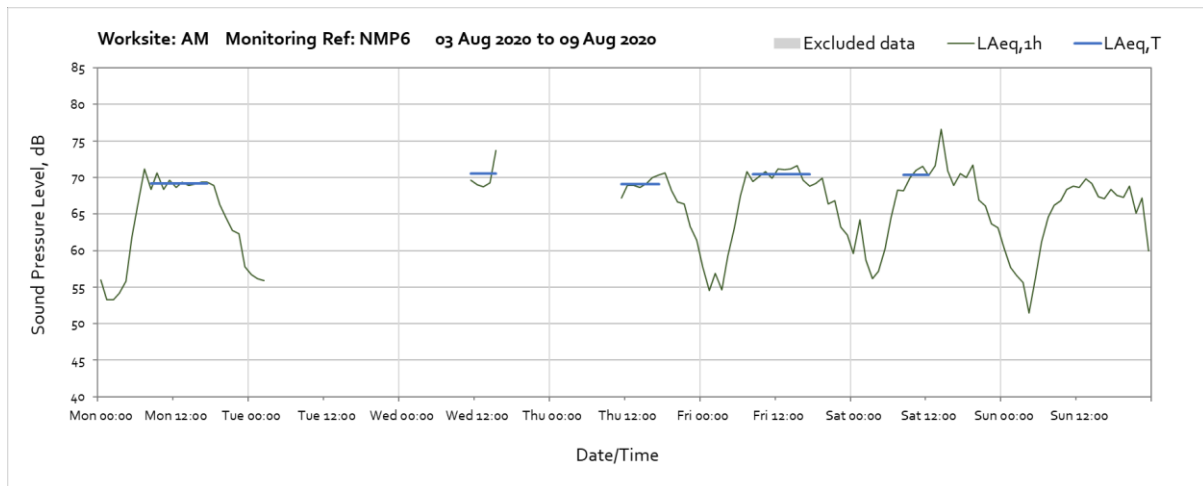






Worksite: AM – Monitoring Ref: NMP6





Note: Missing data between 03:00 on Tuesday 4th August and 11:00 on Wednesday 5th August and between 16:00 on Wednesday 5th August and 11:00 on Thursday 6th August was due to battery failure at the noise monitor.

