HS2

January 2021

Construction noise and vibration Monthly Report – November 2020

Buckinghamshire

gov.uk/hs2

List of tables

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 November 2020.

Within this period monitoring was undertaken at the following worksites:

- Noise and vibration monitoring were undertaken in the vicinity of Bottom House Farm Lane worksite (ref.: BHFL), where earthworks, roadworks and site management activities were underway.
- Noise monitoring was undertaken in the vicinity of Chalfont St Peter Vent Shaft worksite (ref.: CSP), where excavation works, structural concrete wall installation and concreting works were in progress.
- Noise monitoring was undertaken in the vicinity of Load Test Pile 1 worksite (ref.: LTP #1), where ground investigation works, earthworks, utility works and roadworks were underway.
- Noise monitoring was undertaken in the vicinity of Amersham Vent Shaft worksite (ref.: AM), where site management activities, utility works and earthworks were underway.
- Noise monitoring was undertaken in the vicinity of Quainton Access Road (ref: QAR), where ground investigation works, earthworks, roadworks and utility works were underway.

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

- Amersham as part of water pipeline works;
- Calvert and Turweston as part of electricity diversion works.
- Aylesbury, Quainton and Calvert as part of gas works.
- North of Great Missenden, Calvert and along A41 road where compound set up, ground investigations, earthworks, roadworks and vegetation clearance works were underway.

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.

One complaint was received during the monitoring period. A description of the complaint, the results of investigations and any actions taken are detailed in Table 7 of this report.

Abbreviations and Descriptions

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

Table 1: Table of Abbreviations

Acronym/Term	Definition
$L_{Aeq,T}$	See equivalent continuous sound pressure level
Ambient sound	A description of the all-encompassing sound at a given location and time which will include sound from many sources near and far. Ambient sound can be quantified in terms of the equivalent continuous sound pressure level, $L_{pAeq,T}$
Decibel(s), or dB	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140dB.
Decibel(s) A-weighted, or dB(A)	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.
Equivalent continuous sound pressure level, or $L_{Aeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Exclusion of data	Measurement of noise levels can be affected by weather conditions such as prolonged periods of rain, winds speeds higher than 5m/s and snow/ice ground cover. Noise levels measured during these periods are considered not representative of normal noise conditions at the site and, for the purposes of this report, are excluded from the assessment of exceedances and calculation of typical noise levels and are also greyed out in charts. Identifiable incongruous noise and vibration events not attributable to HS2 construction noise are also excluded.
Façade	A facade noise level is the noise level 1m in front of a large reflecting surface. The effect of reflection, is to produce a slightly higher (typically +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 November 2020.

1.1.3 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:
  - earthworks;
  - trial holes;
  - laying and compaction of subbase material;
  - utility works including drainage and duct installation;
  - removing and relocating track mat and cleaning;
  - dust suppression;
  - tree stump removal;
  - roadworks activities involving tarmac removal from Bottom House Farm Lane.

- Chalfont St Peter Vent Shaft - CSP (see plan 3 in Appendix A), where works activities included:
  - structural wall installation works including diaphragm wall excavation, rebar and concreting and operation of vacuum truck and centrifuge;
  - earthworks activities including borehole drilling, grout injection and stockpile management.

- Load Test Pile 1 worksite - LTP #1 (see plan 4 in Appendix A), where works activities included:
  - ground investigation and overwater investigation works;
  - earthworks and drainage works;
  - construction of access roads and hardstanding;
  - lay of track matt, temporary fencing and signage.

- Amersham Vent Shaft worksite - AM (see plan 5 in Appendix A), where works activities included:
  - site management activities including installation of offices and the construction of a new footpath, internal site roads and car parks;
  - utility and drainage works;
  - structural wall installation works involving the anchoring of a sheet pile wall.

- Quainton Access Road - QAR (see plan 6 in Appendix A), where works activities included:
  - ground and overwater investigation works;
  - utility and drainage works;
  - earthworks activities involving the creation of the compound hardstanding;
  - construction of access roads and installation of geogrid;
  - installation of protection slab for telecommunication utilities.

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

- Amersham as part of water pipeline works;
- Turweston as part of electricity diversion works;
- Aylesbury and Quainton as part of gas pipeline and pressure reduction system works;
- Along A41 road where vegetation clearance works were underway;
- North of Great Missenden, where work activities included:
  - compound construction;
  - vegetation clearance works;
  - cabin installation and compound set-up for chalk embankment trial;
  - expansion of permanent pond;
  - construction of temporary chalk embankment.
- Calvert, where work activities included:
  - electricity diversion works;
  - gas pipeline works;
  - vegetation clearance works at Calvert section Station Road Quaiton;
  - soil striping, surfacing and construction of access road at West Street Compound to Railhead;
  - test piling at Edgcott Road.

1.1.5 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 Seven noise and one vibration monitoring installations were active in November in the BS area. Table 2 summarises the position of noise monitoring installations within the BS area in November 2020.

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

1.2.3 Vibration monitor BHFL-Vib 1 was installed at Pine Cottage, Bottom House Farm Lane, worksite ref.: BHFL, on the 1st of November.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
CSP	CSP-NMP1	Chesham Lane, Chalfont St. Peter
	CSP-NMP2	Chesham Lane, Chalfont St. Peter
	CSP-NMP3	Chesham Lane, Chalfont St. Peter
LTP #1	LTP #1-NMP1	Along worksite northern boundary
BHFL	BHFL-NMP1	Elm Tree Cottage, Bottom House Farm Lane
	BHFL-Vib 1	Pine Cottage, Bottom House Farm Lane
AM	AM-NMP1	Whielden Lane, Amersham
QAR	QAR-NMP1	1 Woodlands Farm Cottages

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	CSP-NMP1	Chesham Lane, Chalfont St. Peter	Free-field	64.7 (69.8)	65.7 (69.2)	63.6 (68.0)	63.0 (70.4)	60.1 (65.4)	62.5 (64.0)	67.7 (73.1)	61.3 (61.8)	59.9 (61.6)	58.0 (59.4)	59.1 (61.8)	55.7 (59.6)
	CSP-NMP2	Chesham Lane, Chalfont St. Peter	Free-field	47.0 (49.2)	50.5 (52.9)	46.9 (50.0)	45.7 (49.3)	41.0 (49.7)	46.2 (46.3)	51.9 (53.3)	49.3 (49.7)	47.2 (54.3)	37.0 (45.3)	47.9 (54.1)	38.0 (44.9)
	CSP-NMP3	Chesham Lane, Chalfont St. Peter	Free-field	56.9 (59.7)	57.2 (59.4)	55.9 (58.6)	53.5 (56.6)	49.0 (57.4)	54.0 (55.1)	56.6 (58.5)	57.3 (58.5)	56.5 (66.8)	46.2 (51.3)	55.6 (58.8)	49.3 (57.0)
LTP #1	LTP #1-NMP1	Along worksite northern boundary	Free-field	61.2 (62.7)	61.1 (61.8)	58.7 (61.1)	56.0 (60.1)	54.3 (62.0)	56.4 (58.3)	58.6 (61.3)	57.5 (59.9)	56.5 (61.2)	51.0 (54.9)	56.7 (61.0)	53.9 (61.0)
BHFL	BHFL-NMP1	Elm Tree Cottage, Bottom House Farm Lane	Free-field	55.5 (58.2)	62.4 (65.0)	54.1 (57.5)	49.3 (56.5)	47.8 (58.2)	52.9 (54.2)	61.0 (65.5)	55.5 (58.7)	51.0 (55.8)	44.0 (51.9)	50.5 (54.9)	47.3 (53.0)
AM	AM-NMP1	Whielden Lane, Amersham	Free-field	72.0 (74.2)	72.3 (78.8)	70.1 (71.6)	67.0 (70.4)	62.9 (70.3)	69.1 (69.9)	71.5 (72.8)	71.7 (72.8)	69.3 (73.3)	60.6 (65.9)	69.4 (73.8)	63.9 (70.8)
QAR	QAR-NMP1	1 Woodlands Farm Cottages	Free-field	53.7 (57.8)	53.7 (62.5)	48.8 (51.4)	44.3 (52.4)	43.4 (54.2)	49.9 (51.0)	51.7 (52.5)	51.4 (52.5)	47.7 (53.8)	41.0 (52.1)	49.6 (56.2)	43.1 (53.3)

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	1.59 (Y-axis)

2.1.3 Appendix C presents graphs of the noise and vibration monitoring data over the month for each of the measurement locations. Noise data presented consists of the hourly L_{Aeq} values and, where relevant, the $L_{Aeq,T}$ values (where the time period T has been taken to be the averaging period as specified in Table 1 of HS2 Information Paper E23). Vibration data presented consist of hourly PPV values. The full data set for the monitoring equipment can be found at the following location: https://data.gov.uk/dataset/24542ae7-dd44-444f-b259-871c4cc43b5e/environmental-monitoring-data.

2.2 Exceedances of the LOAEL and SOAEL

2.2.1 The lowest observed adverse effect level (LOAEL) is defined in the Planning Practice Guidance – Noise (PPG) as the level above which "noise starts to cause small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life".

2.2.2 The significant observed adverse effect level (SOAEL) is defined in the 'Planning Practice Guidance – Noise' as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

2.2.3 HS2 Phase One Information Paper E23: Control of Construction Noise and Vibration sets out the LOAELs and SOAELs for construction noise.

2.2.4 Where reported construction noise levels exceed the LOAEL and SOAEL, relevant periods will be identified. Summary statistics to evaluate ongoing qualification for noise insulation and temporary rehousing are also presented where relevant.

2.2.5 Table 5 presents a summary of recorded exceedances of the LOAEL and SOAEL at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 5: Summary of Exceedances of LOAEL and SOAEL

Worksite Reference	Measurement Reference	Site Address	Day (Weekday , Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
CSP	CSP-NMP1	Chesham Lane, Chalfont St. Peter	All days	0700-2200 2200-0700	Continuous Continuous	No exceedance Continuous*
	CSP-NMP2	Chesham Lane, Chalfont St. Peter	All days	All periods	No exceedance	No exceedance
	CSP-NMP3	Chesham Lane, Chalfont St. Peter	All days	All periods	No exceedance	No exceedance
LTP #1	LTP #1-NMP1	Along worksite northern boundary	All days	All periods	No exceedance	No exceedance
BHFL	BHFL-NMP1	Elm Tree Cottage, Bottom House Farm Lane	Weekday Saturdays	0800-1800 0800-1300	7 1	No exceedance No exceedance
AM	AM-NMP1	Whielden Lane, Amersham	Weekday Saturdays	0800-1800 0800-1300	15 3	2** No exceedance
QAR	QAR-NMP1	1 Woodlands Farm Cottages	All days	All periods	No exceedance	No exceedance

* Exceedances of the SOAEL at monitoring position CSP-NMP1 were due to a generator installed 5m from the monitor. Therefore, in consideration of the large separation distance between the monitor and nearby receptors (approximately 70m), noise levels at receptor locations are calculated to be below the SOAEL.

** Exceedances of the SOAEL at monitoring position AM-NMP1 were due to construction activities being undertaken in close proximity to the monitor. In consideration of the large separation distance between the monitor and nearby receptors (approximately 70m), noise levels at receptor locations are calculated to be below the SOAEL.

2.2.6 A number of exceedances of the LOAEL were recorded at monitoring positions CSP-NMP1, BHFL-NMP1 and AM-NMP1 in November 2020. No exceedances of the SOAEL at sensitive receptors were recorded due to HS2 construction works during November 2020.

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

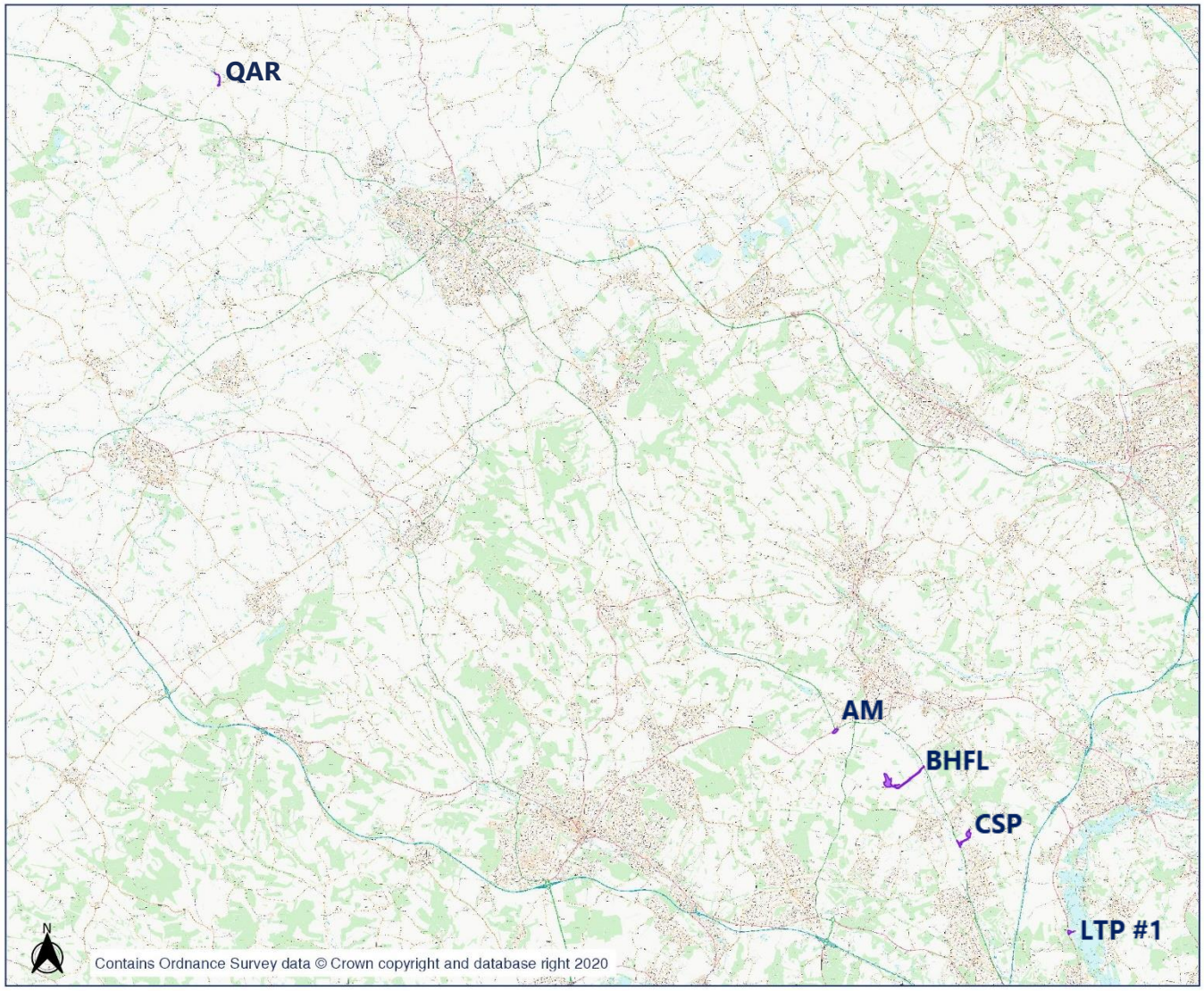
2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 7: Summary of Complaints

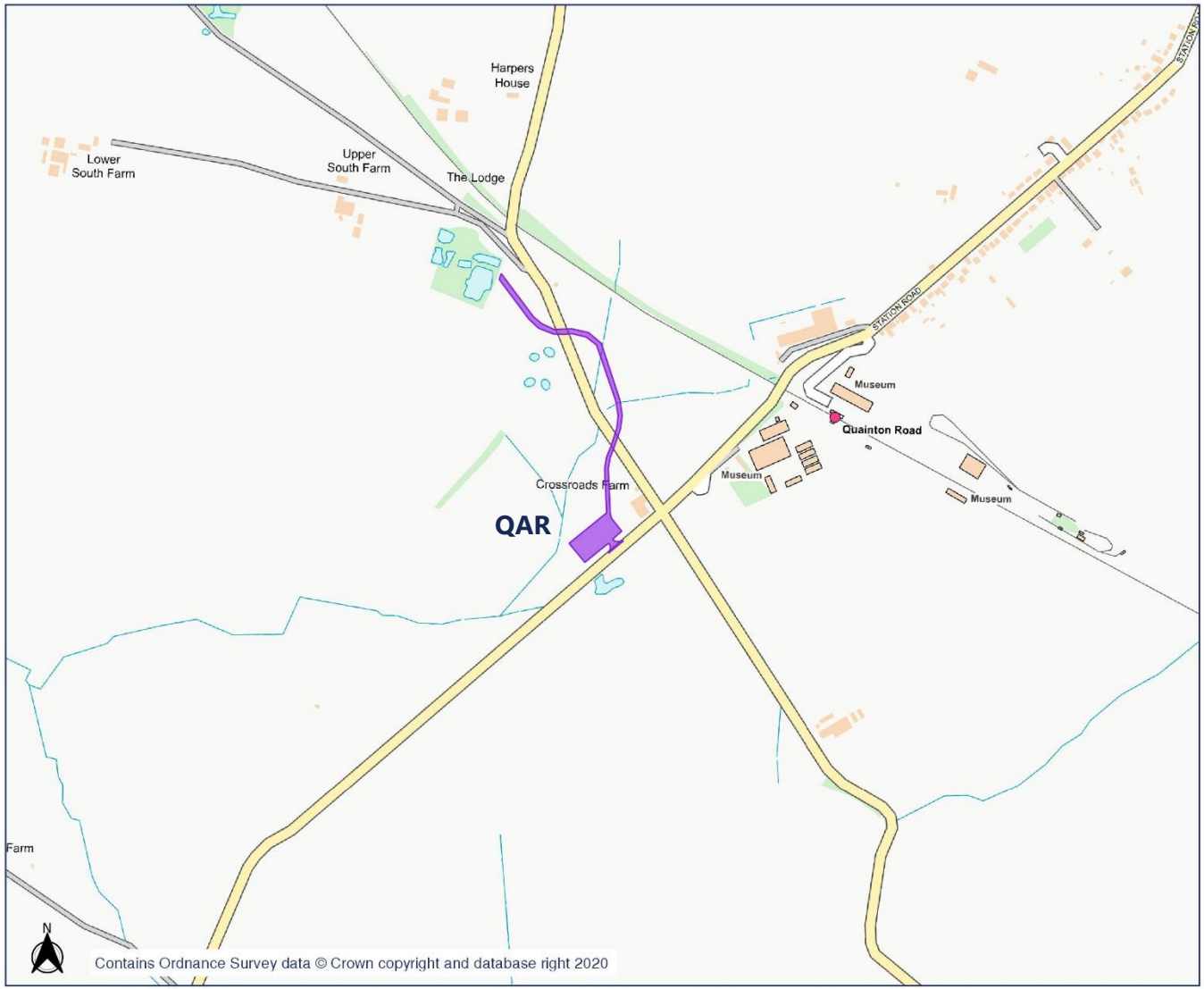
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-20-40866-C	-	Noisy HS2 night works now meaning noise 24-hours a day (across field adjoining Gore Hill, Amersham), causing disturbance to sleep, and distress	Equipment was chosen to minimise effects of works. Construction methodology was according to S61 consent and ongoing monitoring of noise shows no exceedance of SOAEL or trigger levels. It has also been noted that there are other construction projects in progress in the area.	Results of the investigation was communicated to the complainant. Information on the next phase of work is due to be published shortly. A series of webinars have been planned to provide more information about upcoming works in the area, where those attending can ask questions to the project team. Details of the webinars and how to register are advertised on www.hs2inbucksandox.co.uk.

Appendix A Site Locations

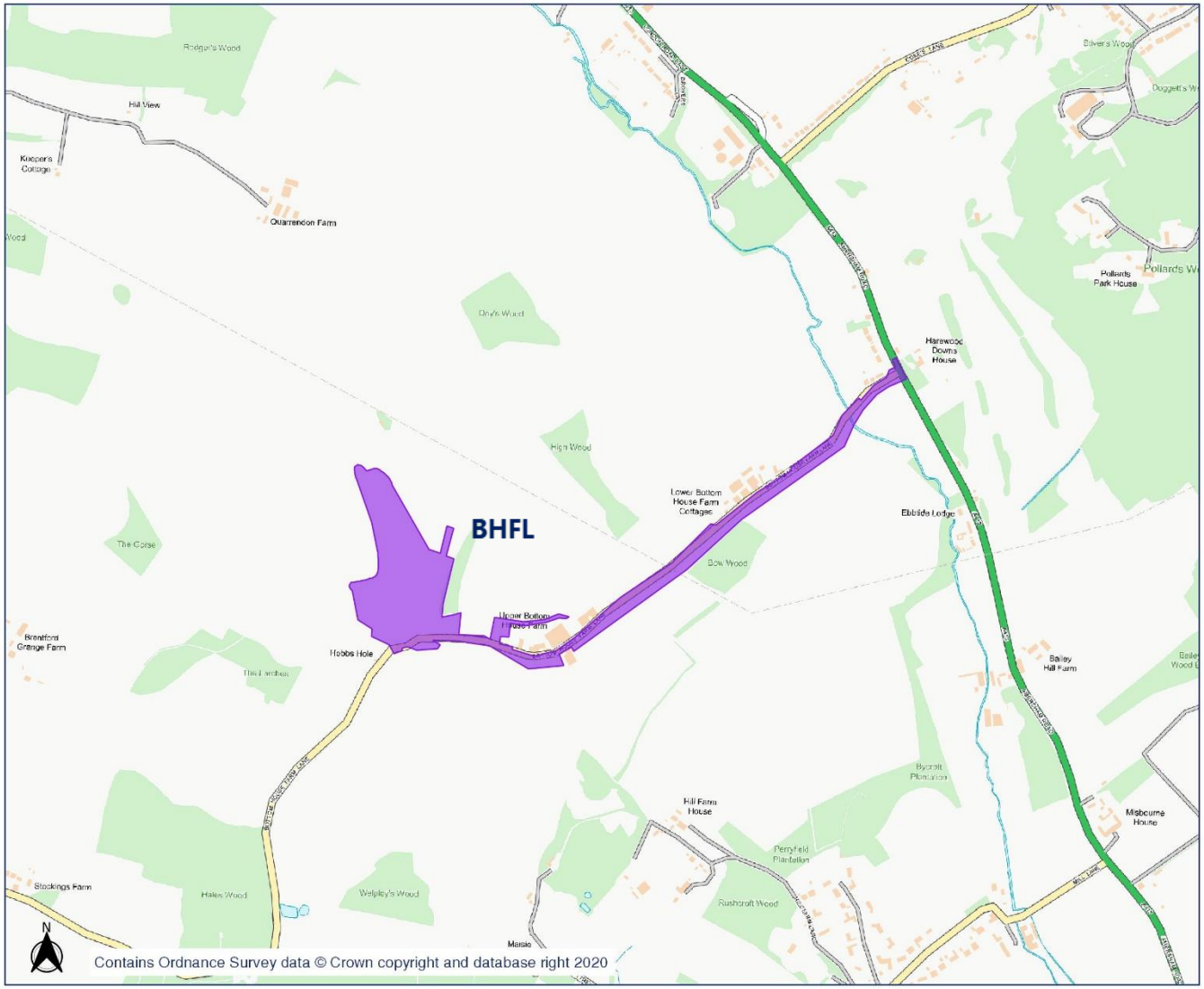
Worksite identification plan - 1



Worksite identification plan - 2



Worksite identification plan - 3



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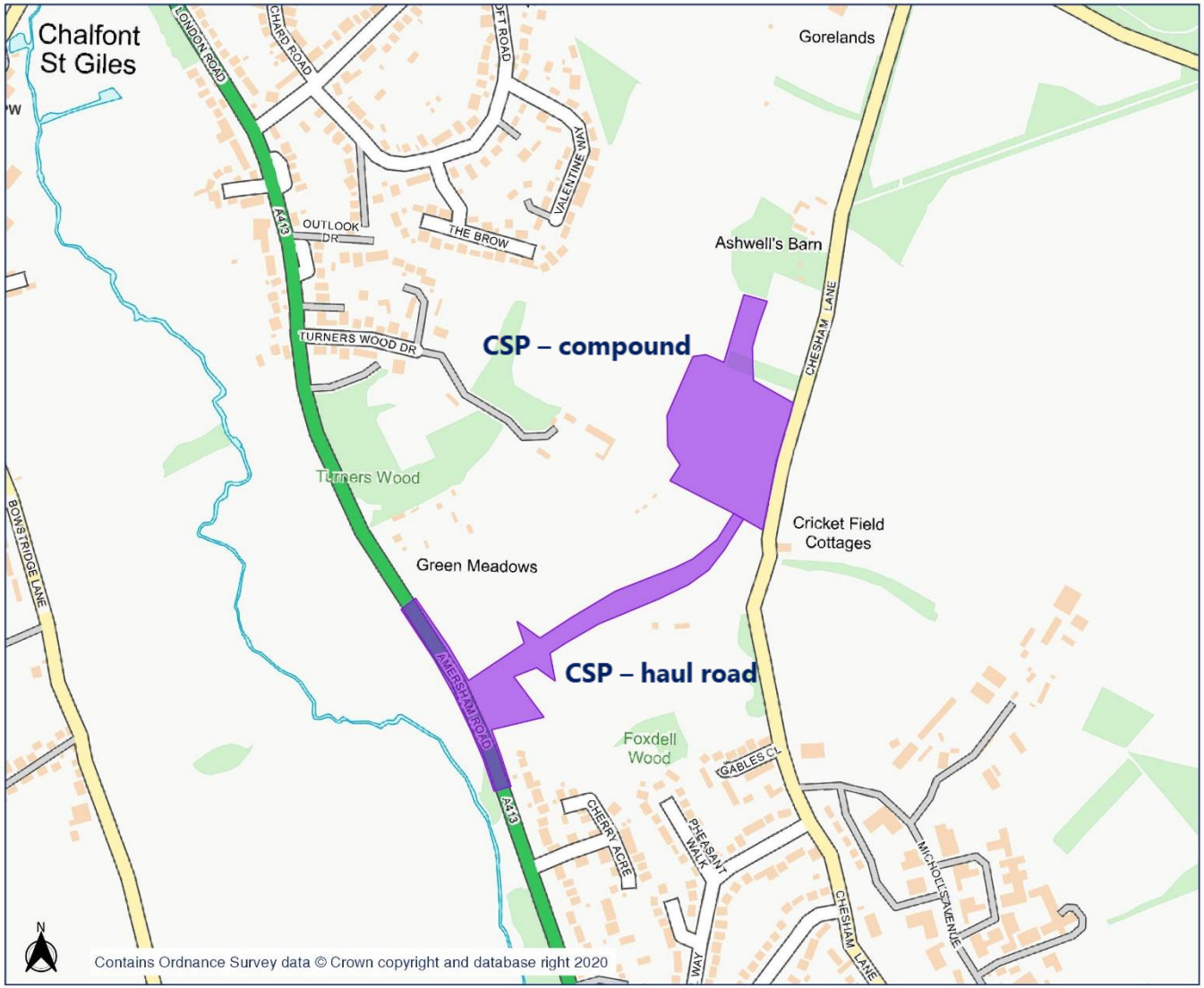
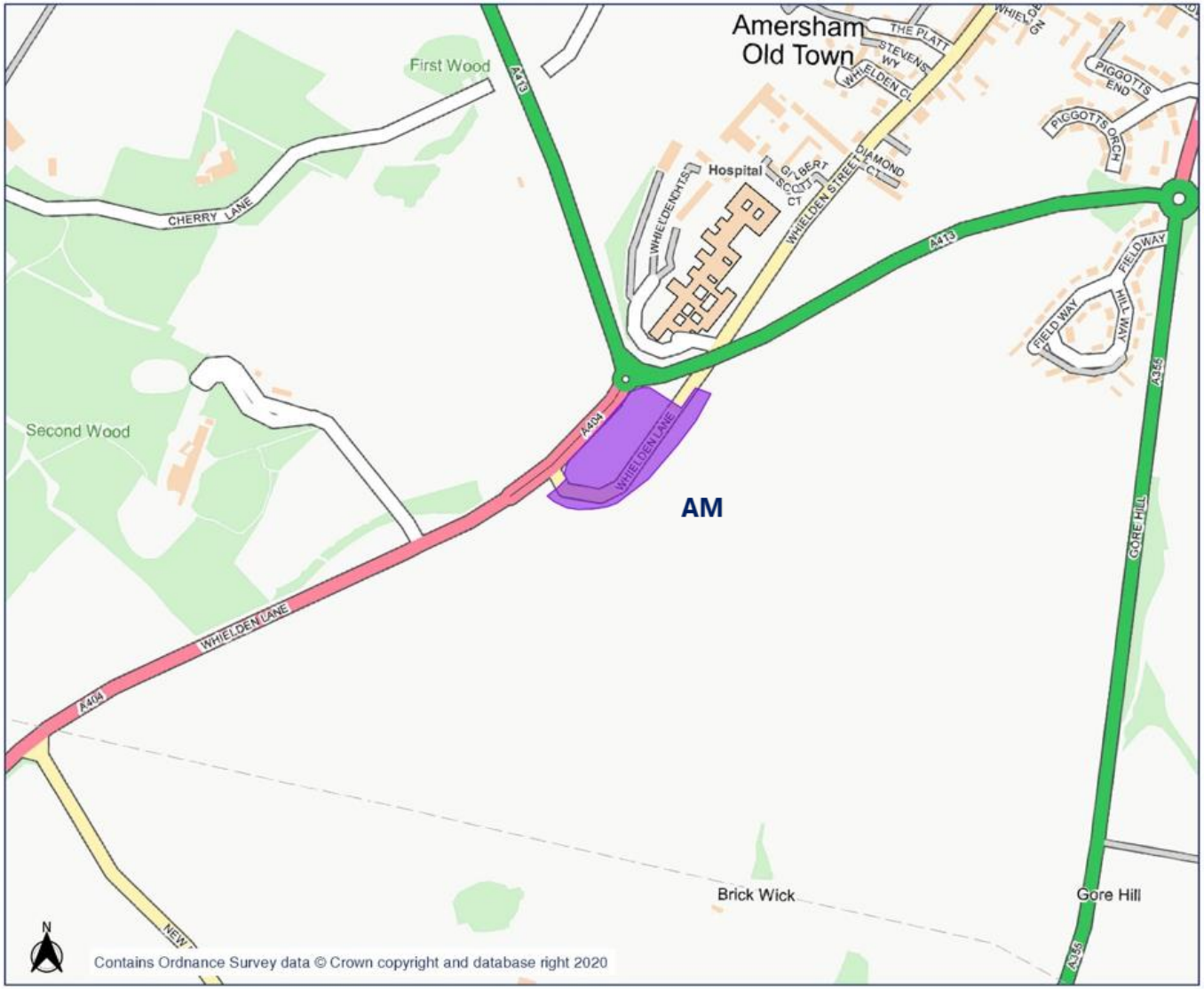


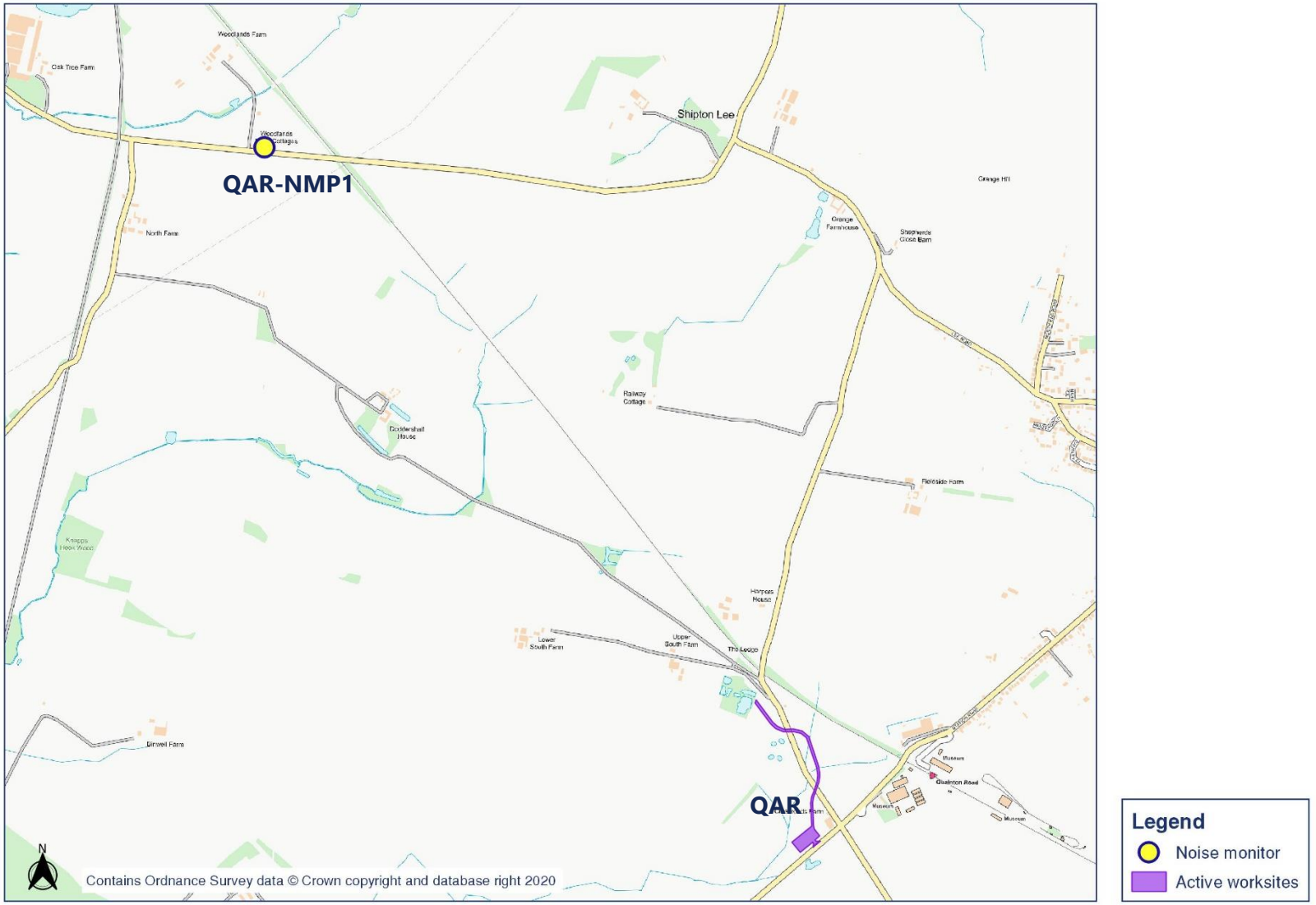
Worksite identification plan - 5

HS2 Worksite identification plan - 6

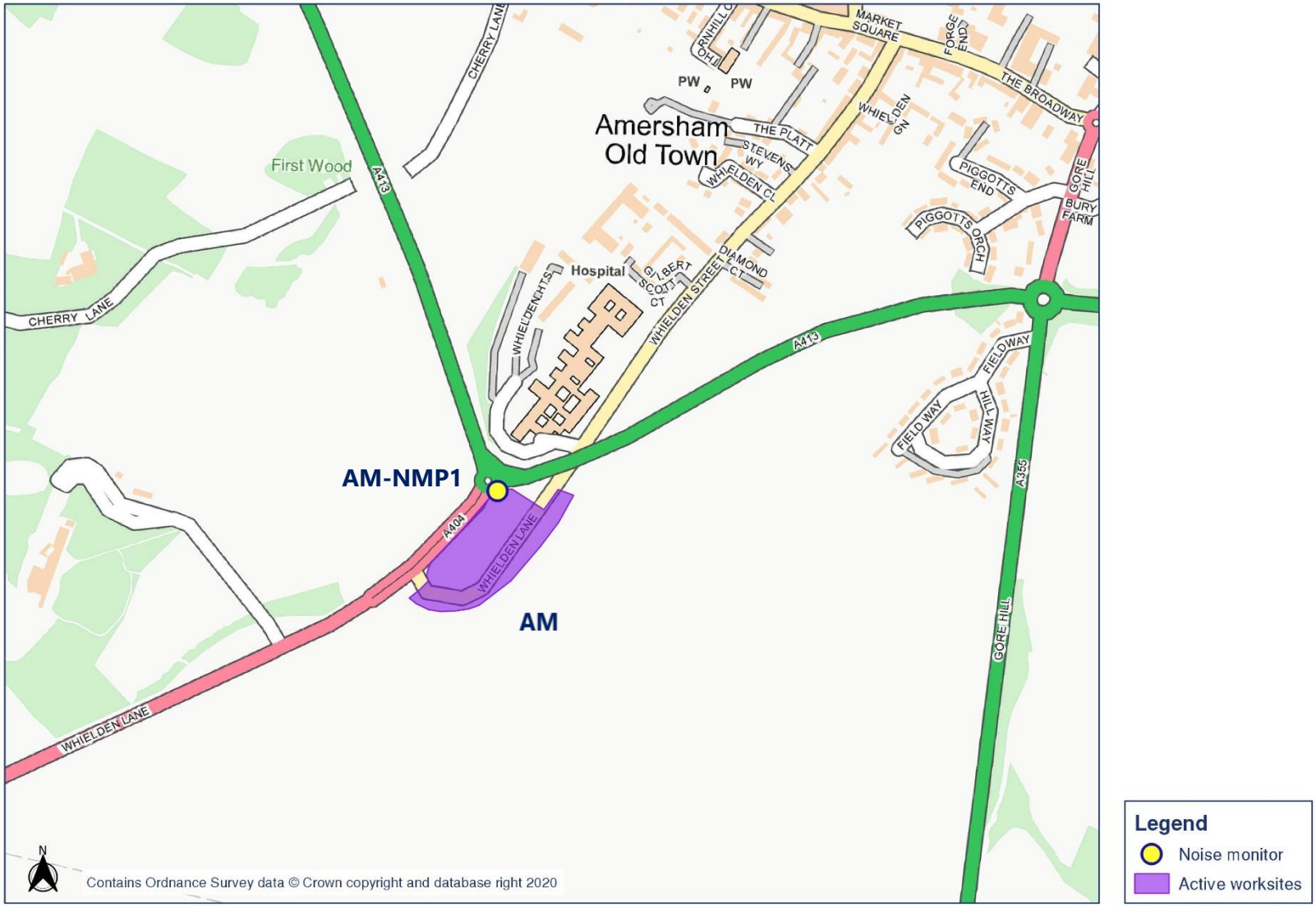


Appendix B Monitoring Locations

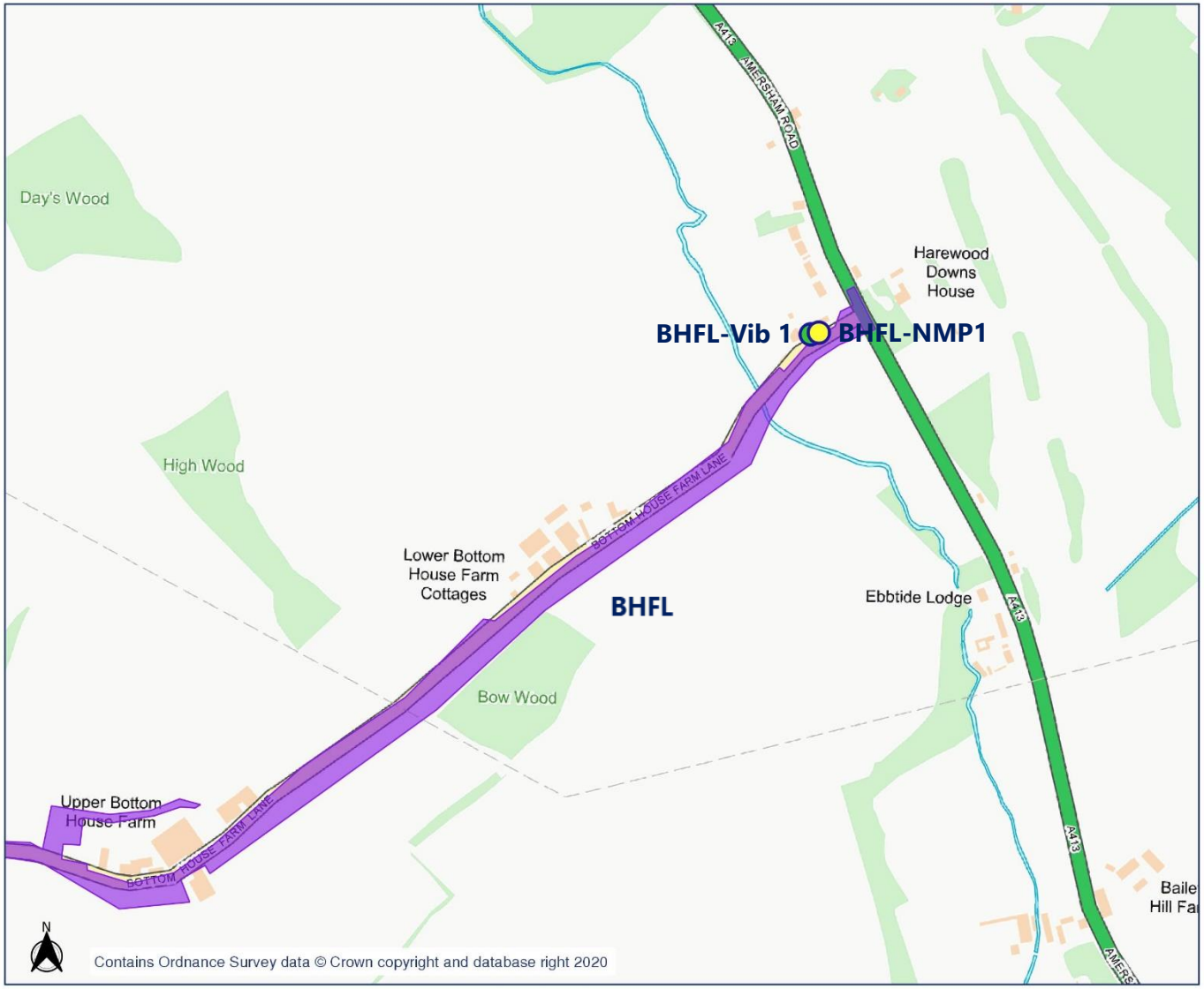
Noise monitoring plan - 1



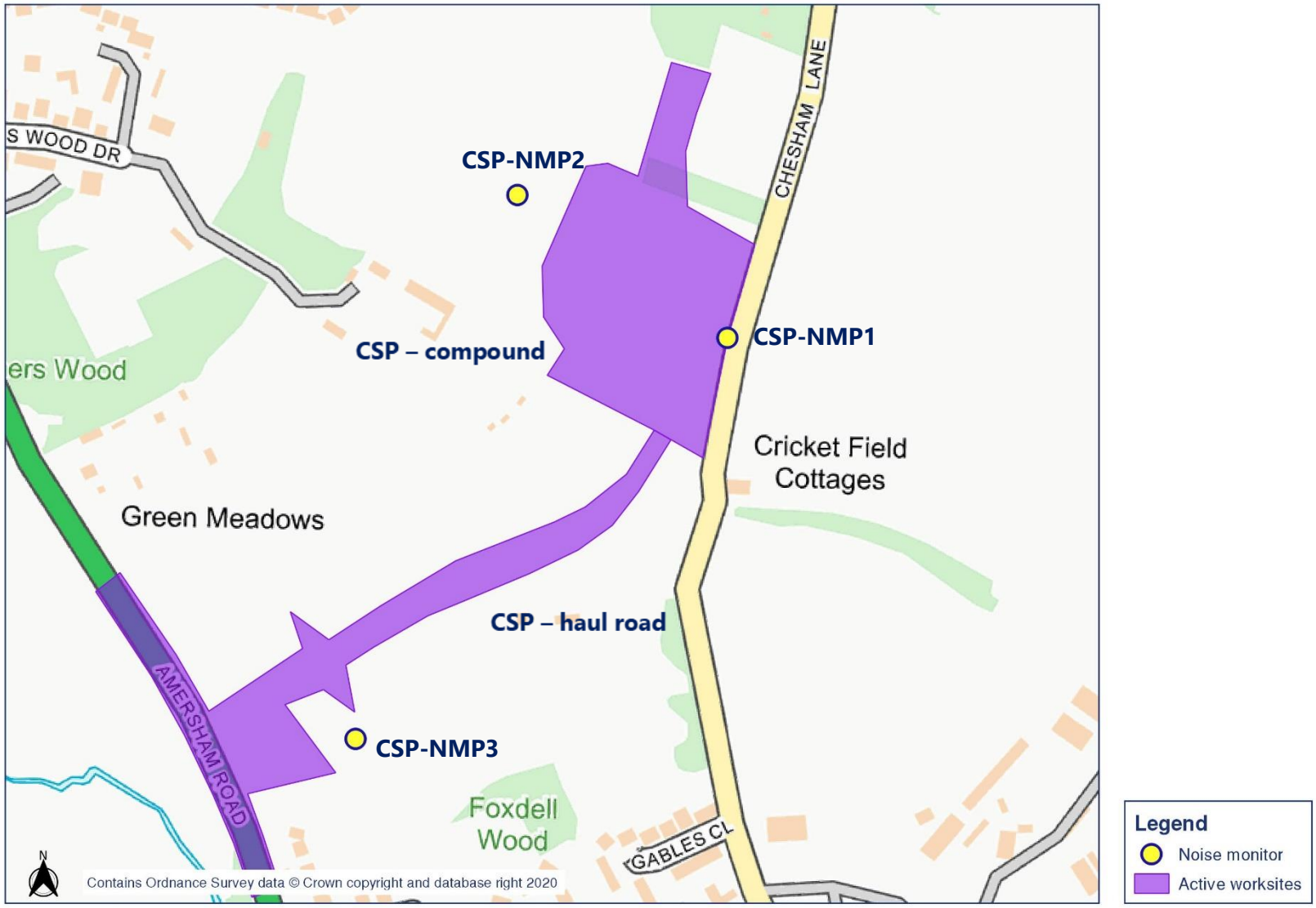
Noise monitoring plan - 2



Noise monitoring plan - 3



Noise monitoring plan - 4



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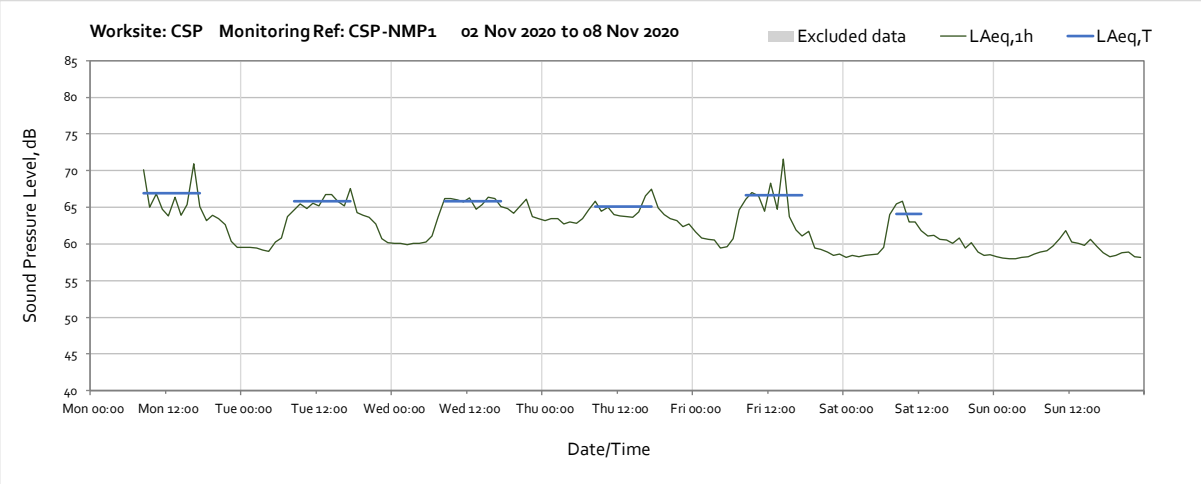
Noise monitoring plan - 5

Appendix C Data

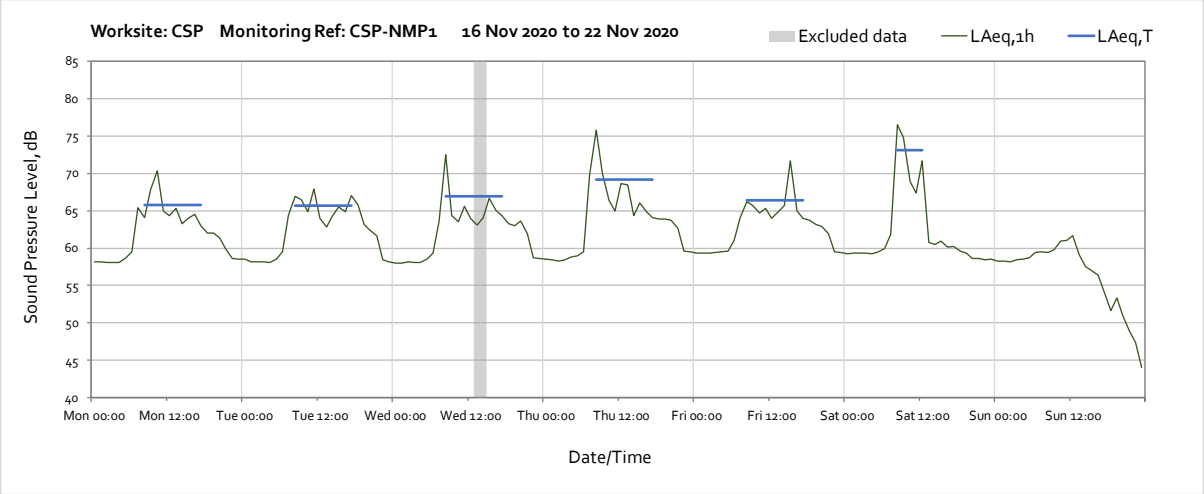
Noise

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

Worksite: CSP – Monitoring Ref: CSP-NMP1



Note: Missing data from 00:00 on Sunday 1st November until 08:00 on Monday 2nd November was due to loss of site power.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Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: CSP Monitoring Ref: CSP-NMP1 23 Nov 2020 to 29 Nov 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
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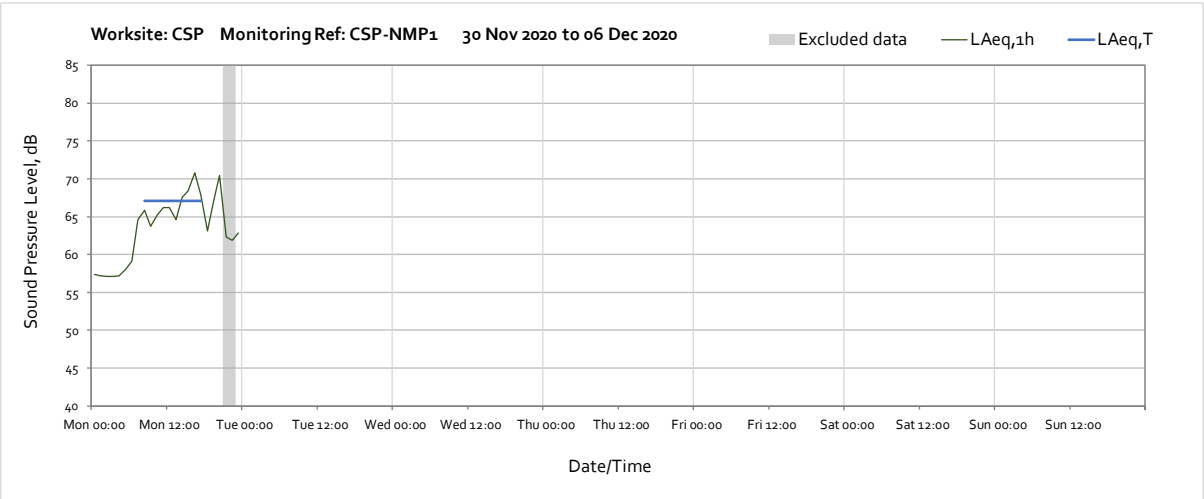
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time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LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
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Date/Time

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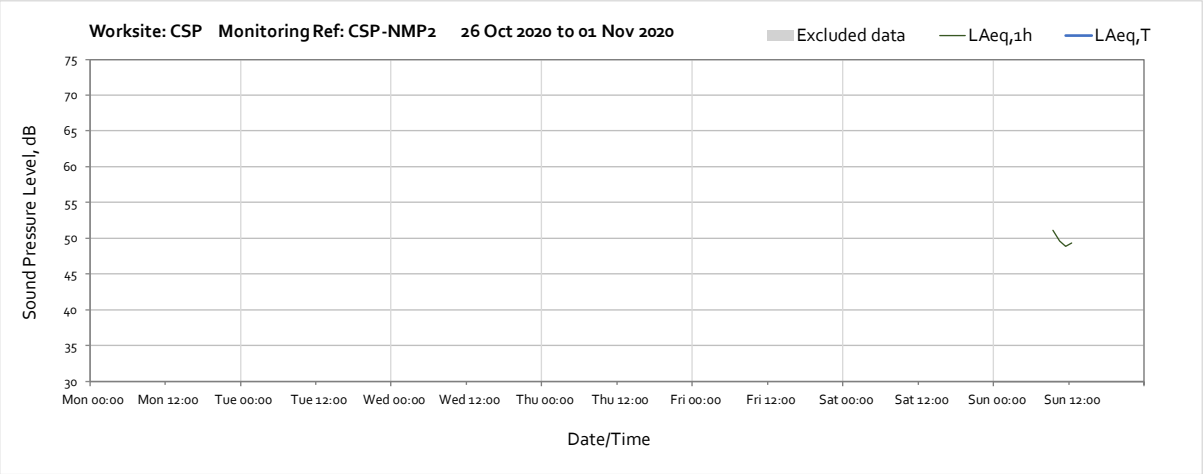
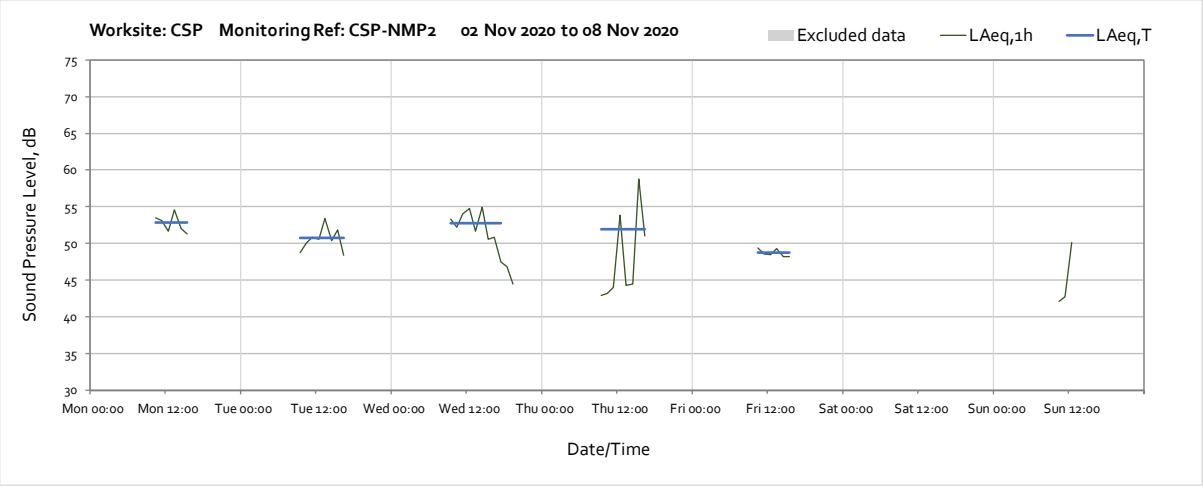
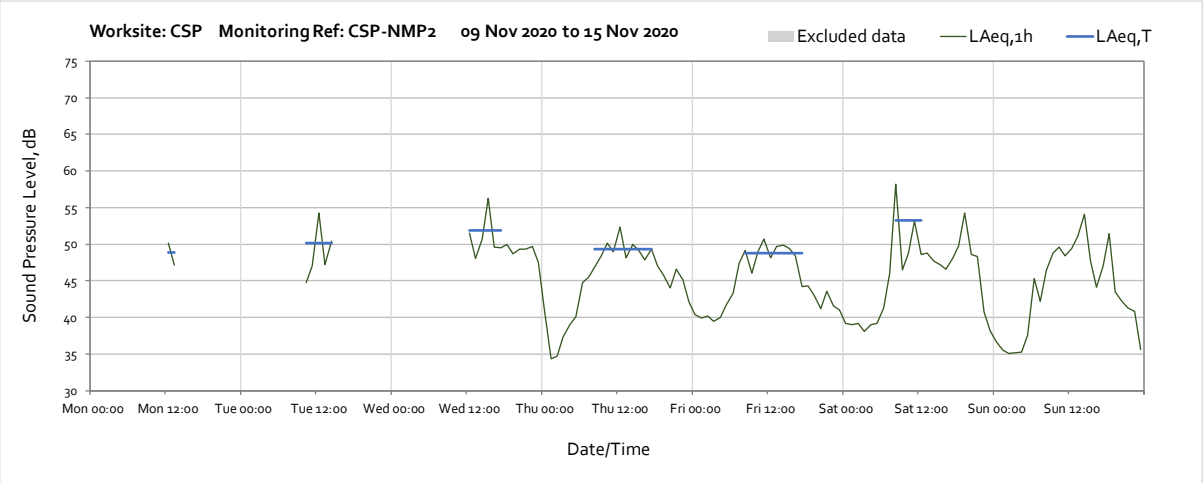


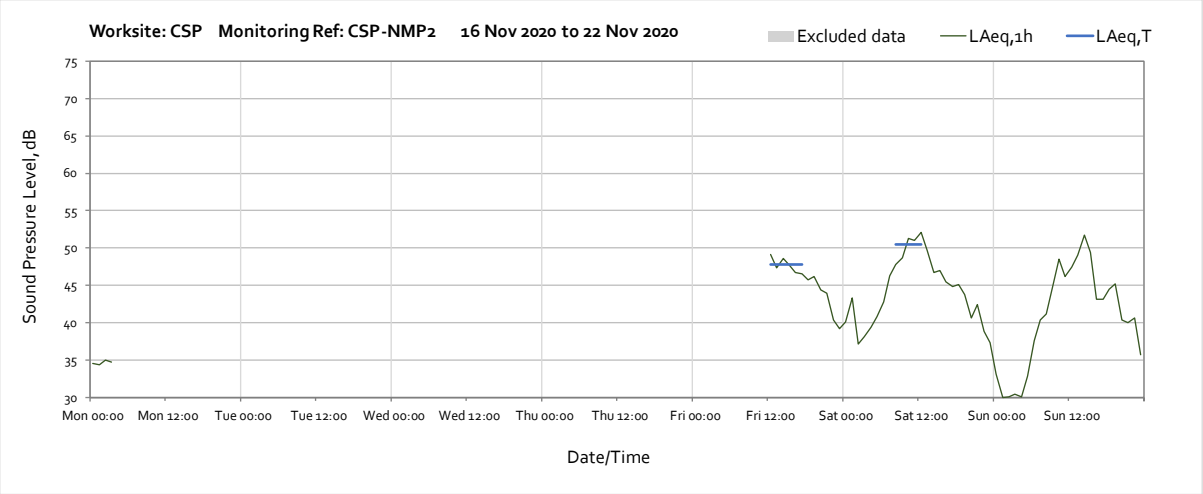
Note: Missing data throughout the week was due to loss of solar power caused by a lack of sunlight.



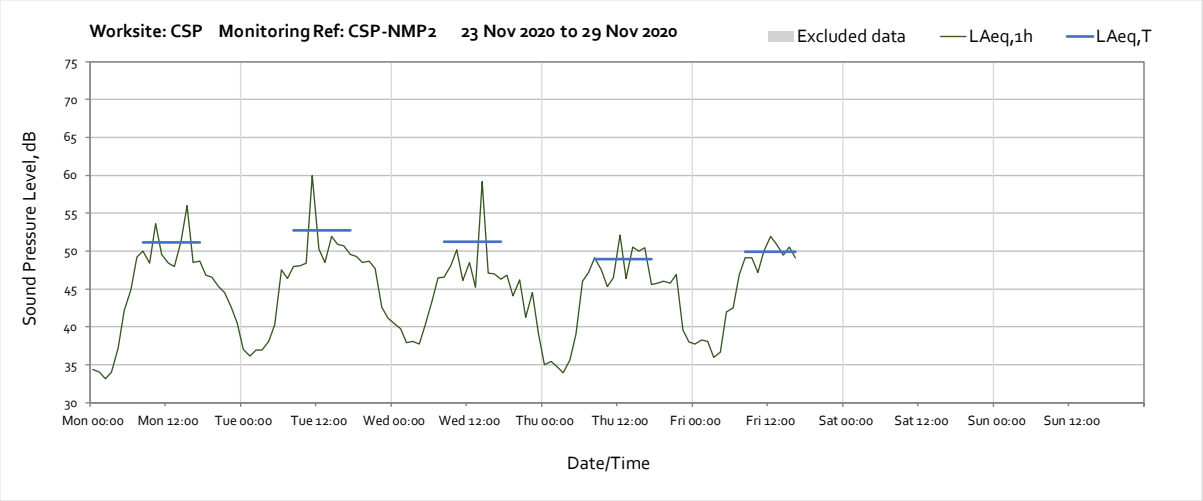
Note: Missing data throughout the week was due to loss of solar power caused by a lack of sunlight.



Note: Missing data throughout the week was due to loss of solar power caused by a lack of sunlight.

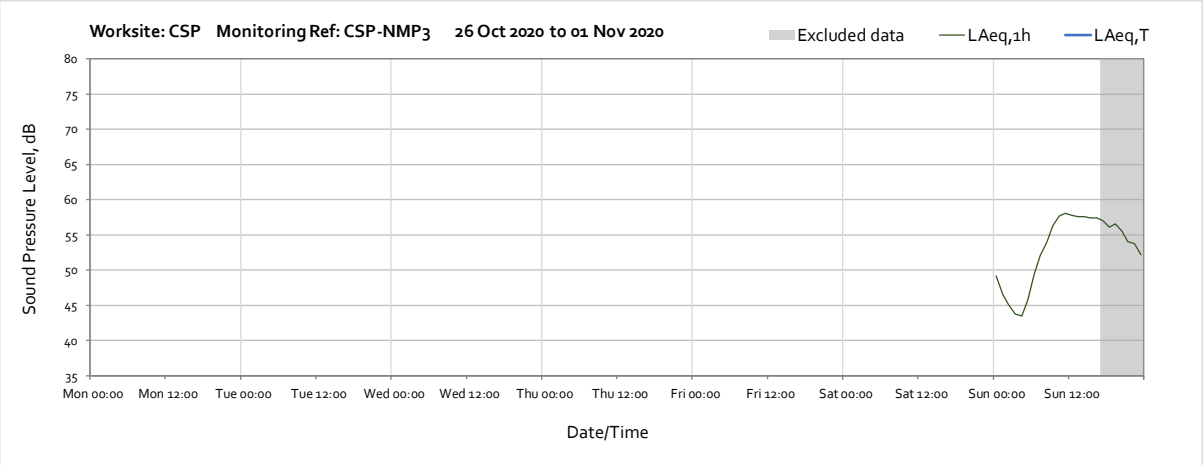


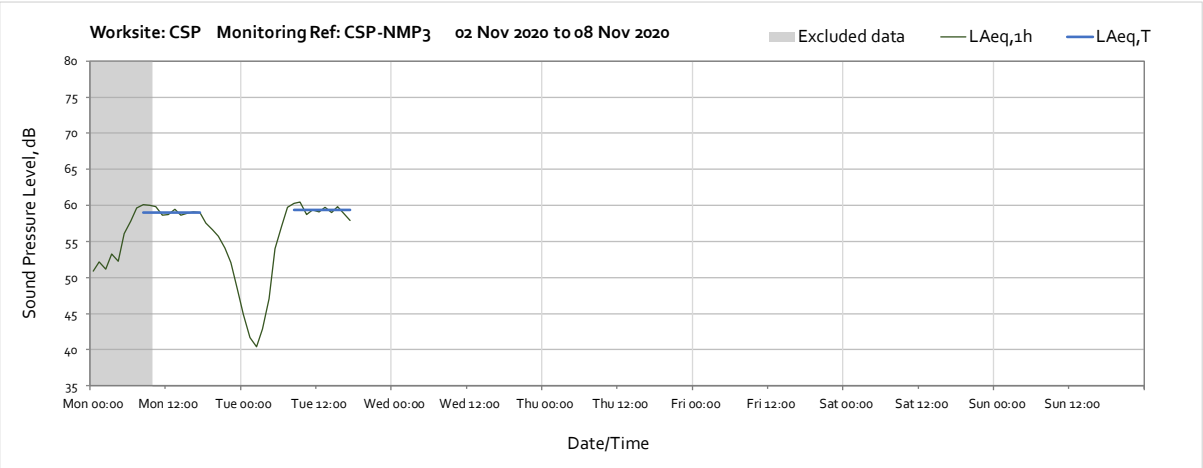
Note: Missing data throughout the week was due to loss of solar power caused by a lack of sunlight.



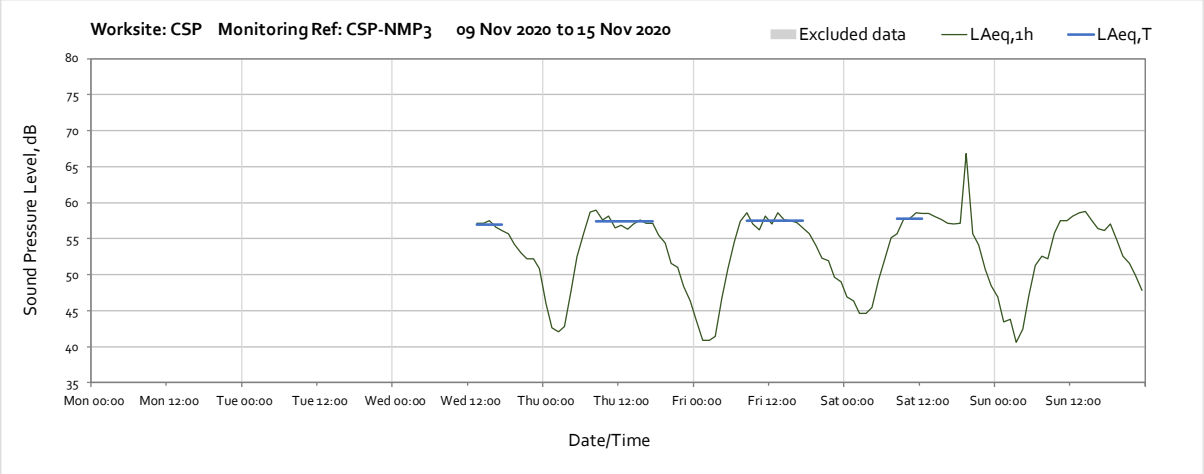
Note: Missing data from 17:00 on Friday 21st November until 23:00 on Monday 30th November was due to loss of solar power caused by a lack of sunlight.

Worksite: CSP – Monitoring Ref: CSP-NMP3

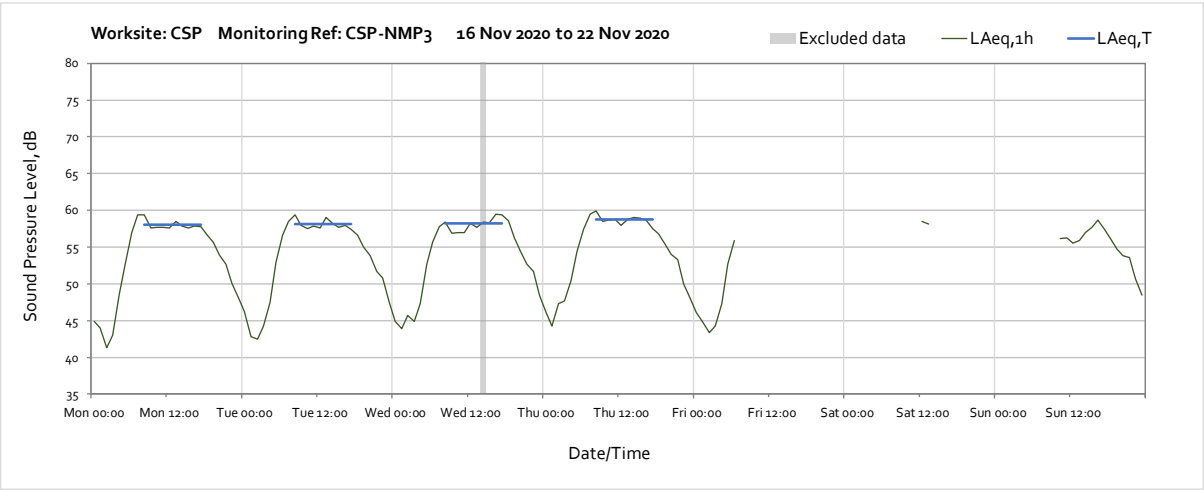




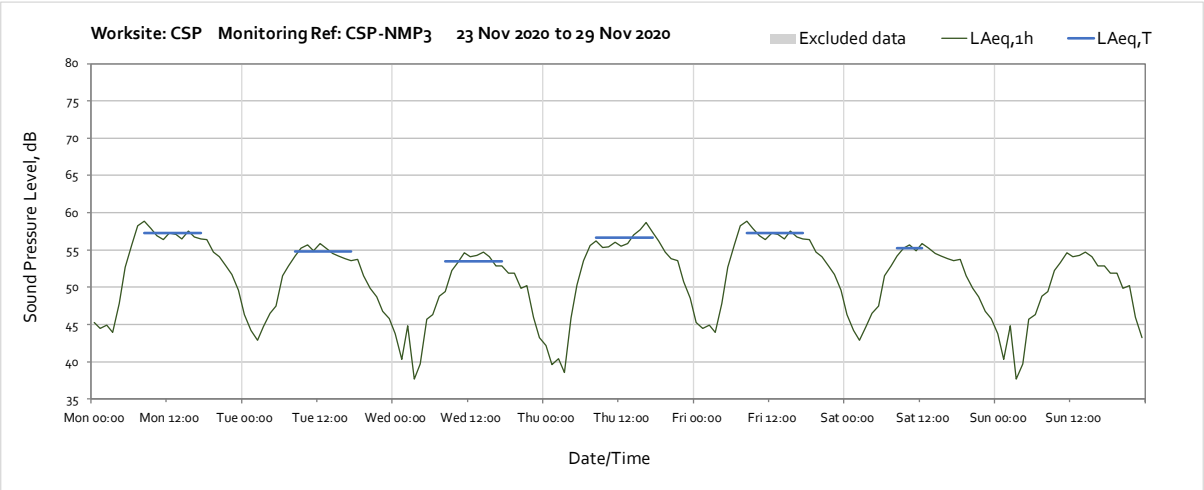
Note: Missing data from 18:00 on Tuesday 3rd November until 13:00 on Wednesday 11th November was due to loss of solar power caused by a lack of sunlight.

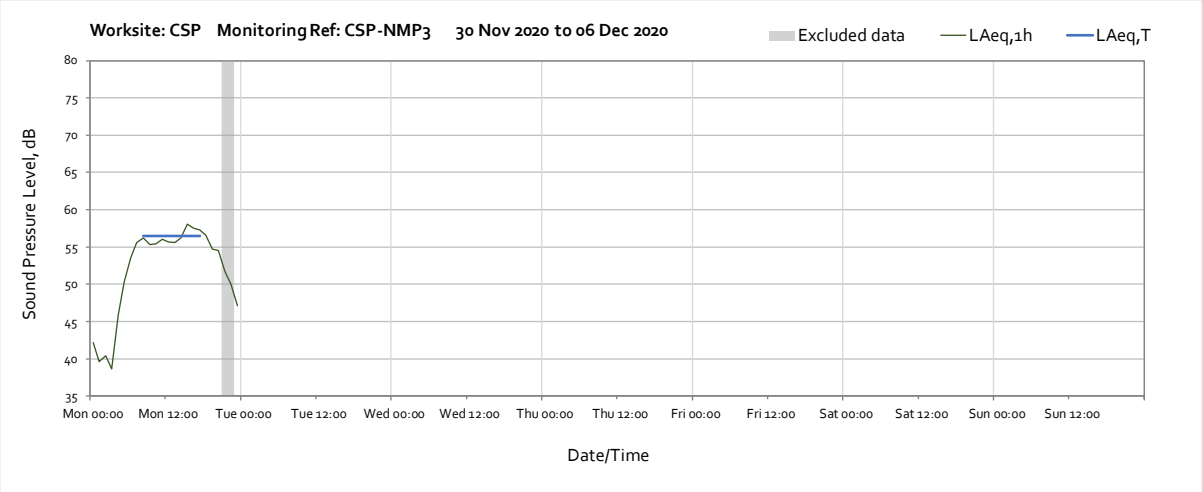


Note: Missing data from 18:00 on Tuesday 3rd November until 13:00 on Wednesday 11th November was due to loss of solar power caused by a lack of sunlight.

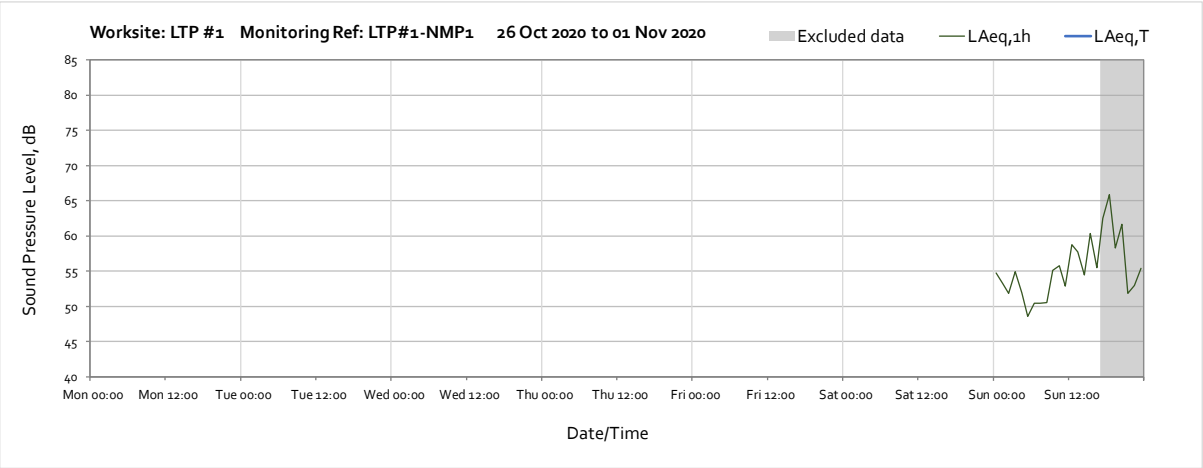


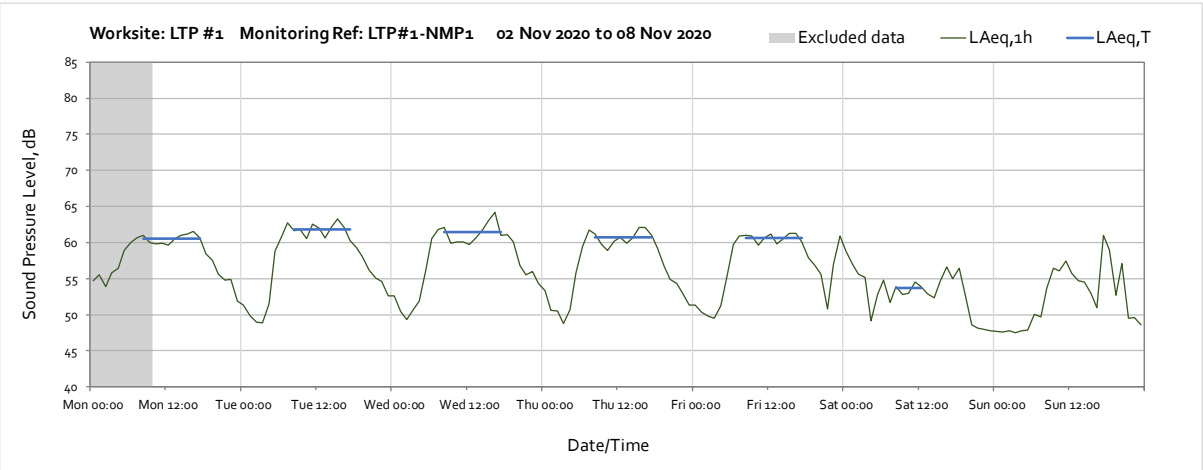
Note: Missing data throughout the week was due to loss of solar power caused by a lack of sunlight.

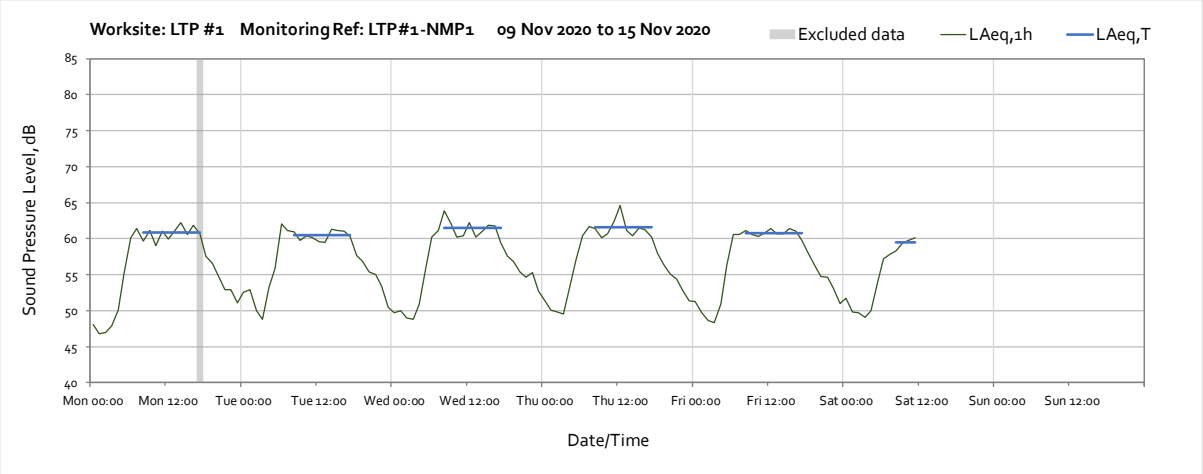




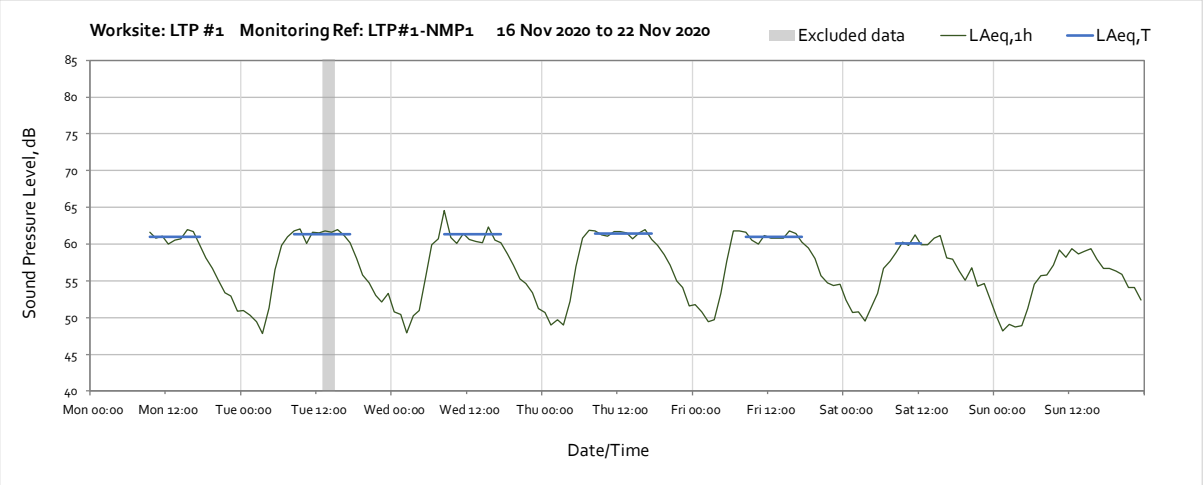
Worksite: LPT#1 – Monitoring Ref: LPT#1-NMP1



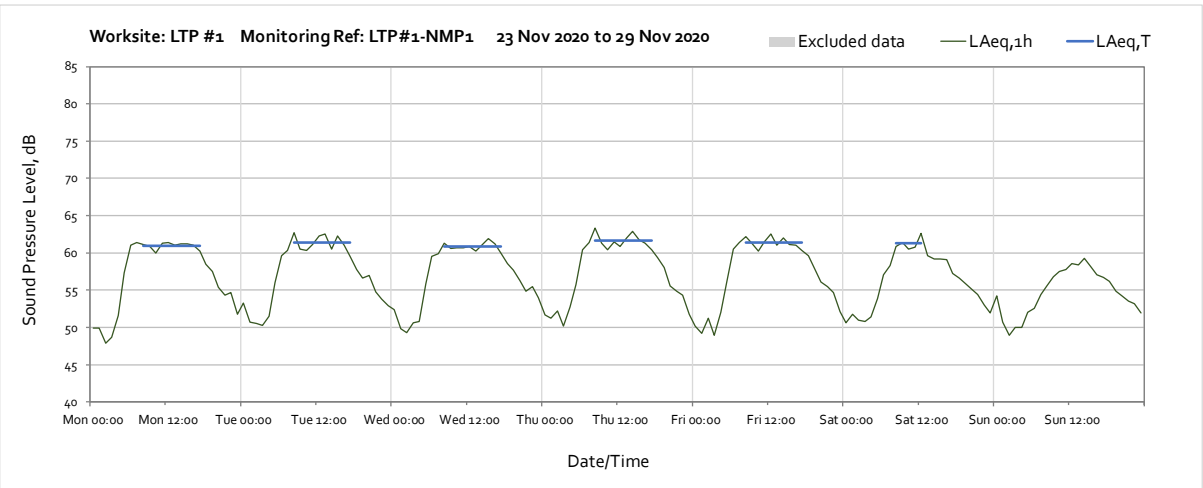


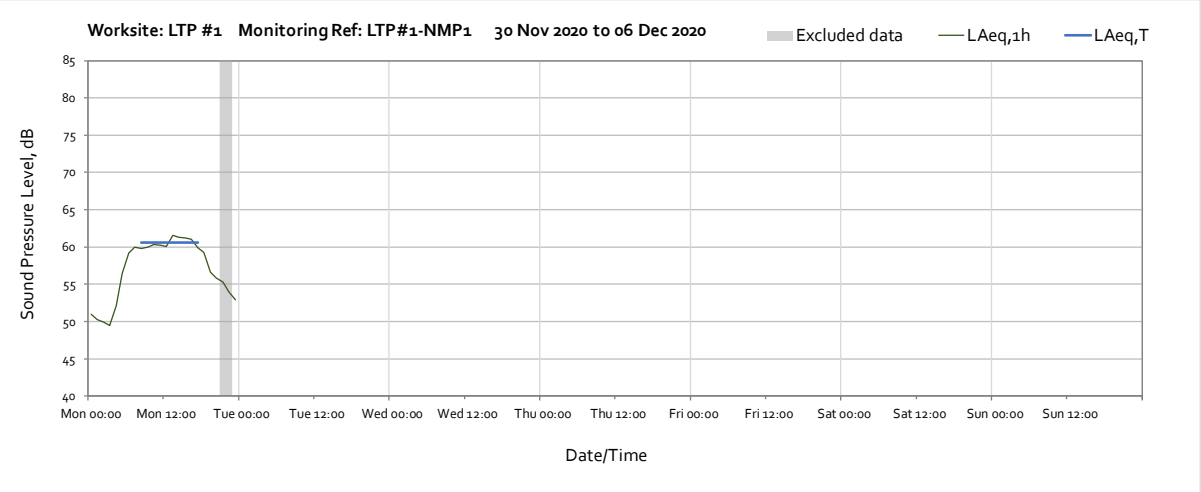


Note: Missing data from 12:00 on Saturday 14th November until 08:00 on Monday 16th November was due to the continuous site power being disconnected.

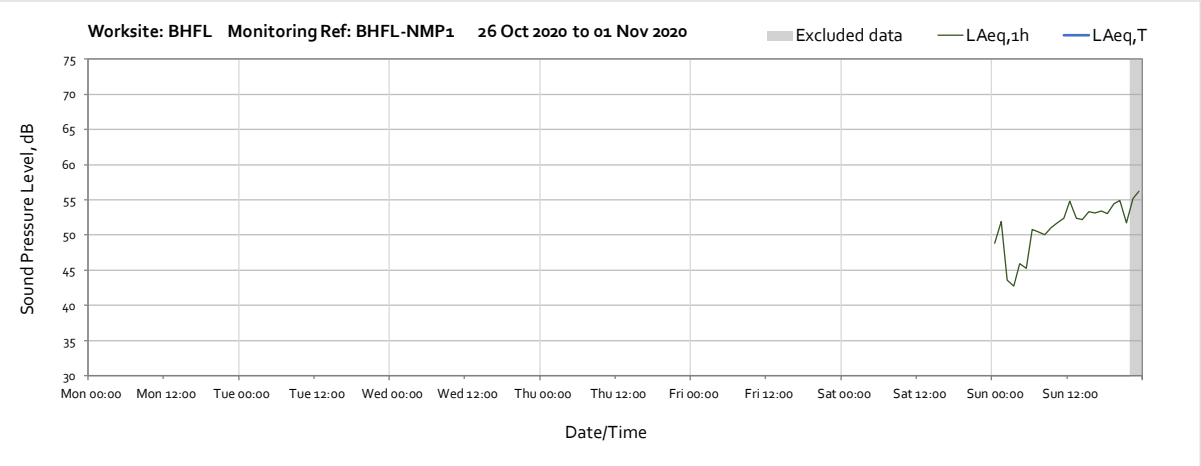


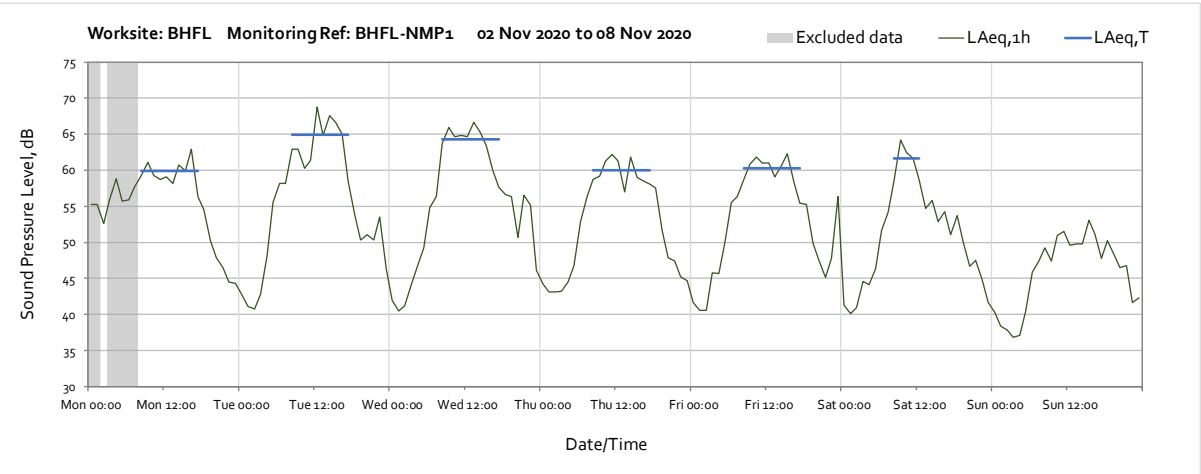
Note: Missing data from 12:00 on Saturday 14th November until 09:00 on Monday 16th November was due to the continuous site power being disconnected.

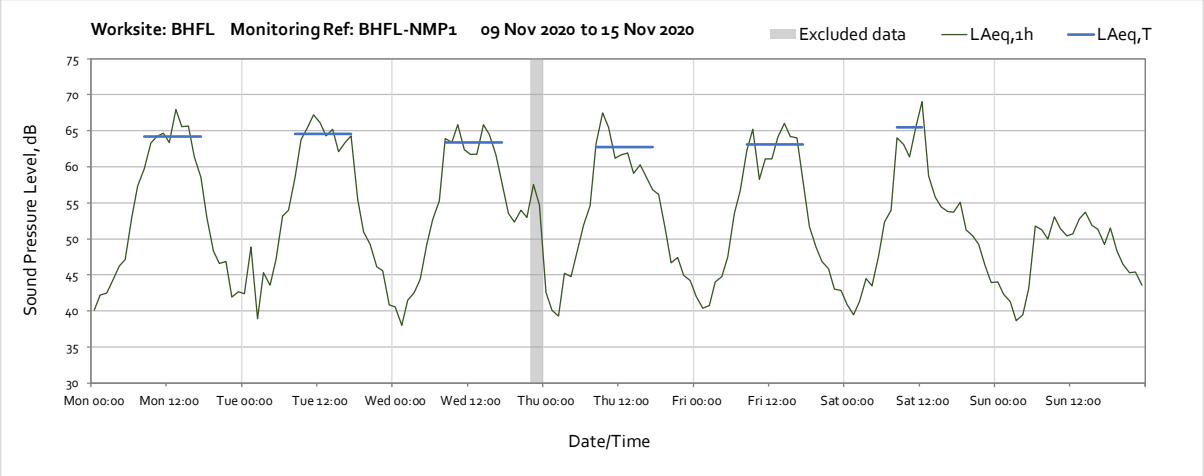


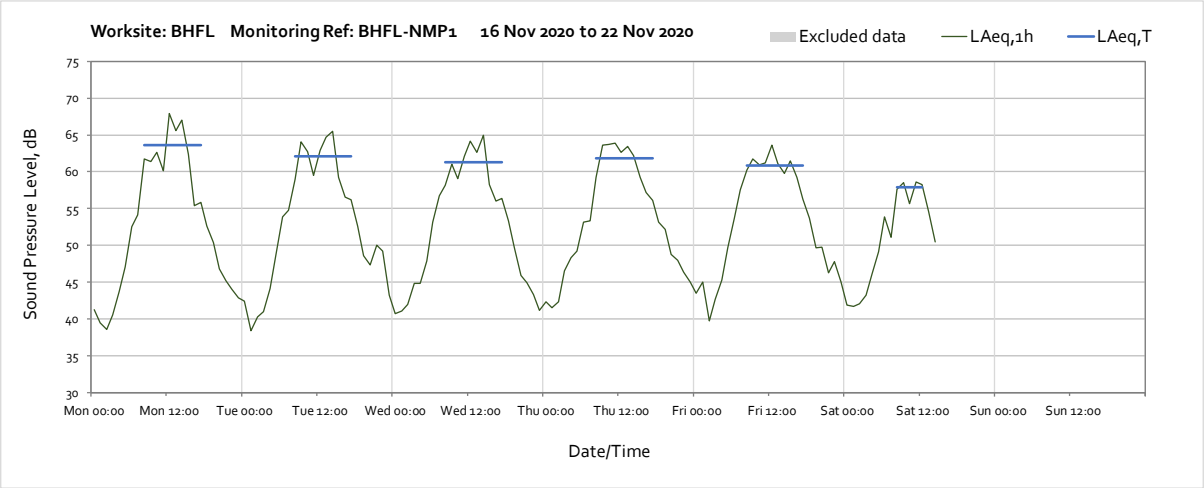


Worksite: BHFL – Monitoring Ref: BHFL-NMP1

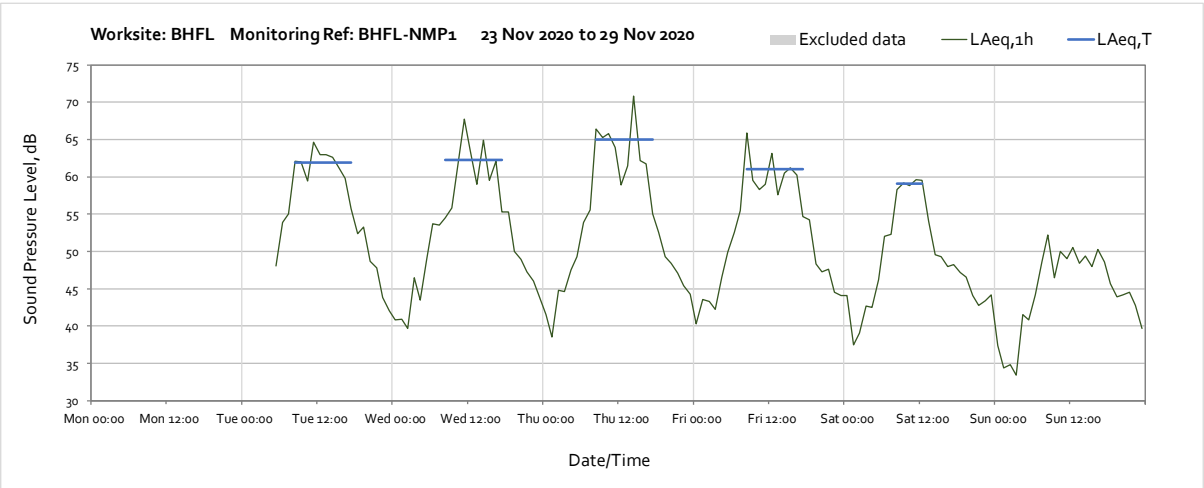




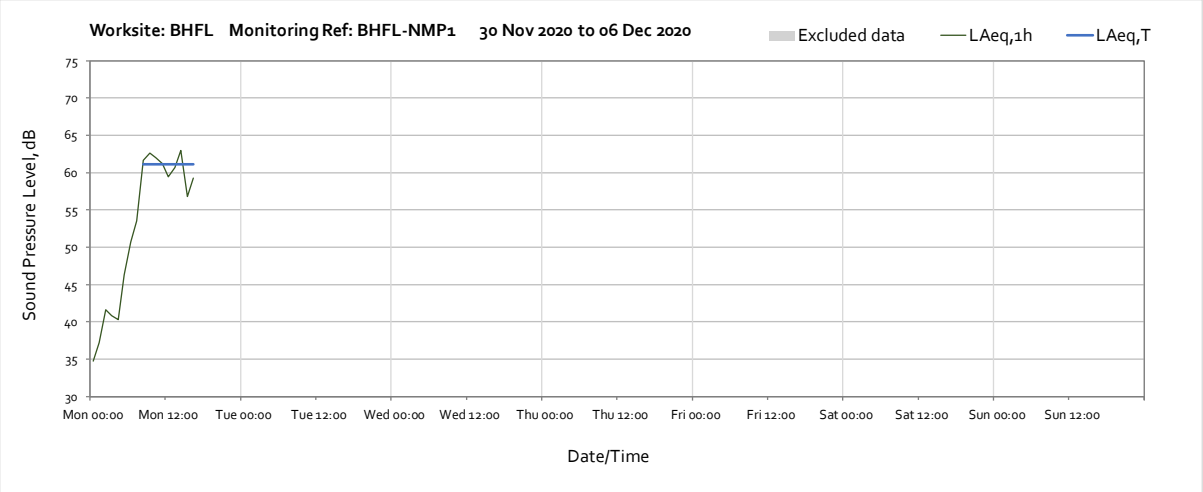




Note: Missing data from 15:00 on Saturday 21st November until 05:00 on Tuesday 24th November was due to equipment malfunction.

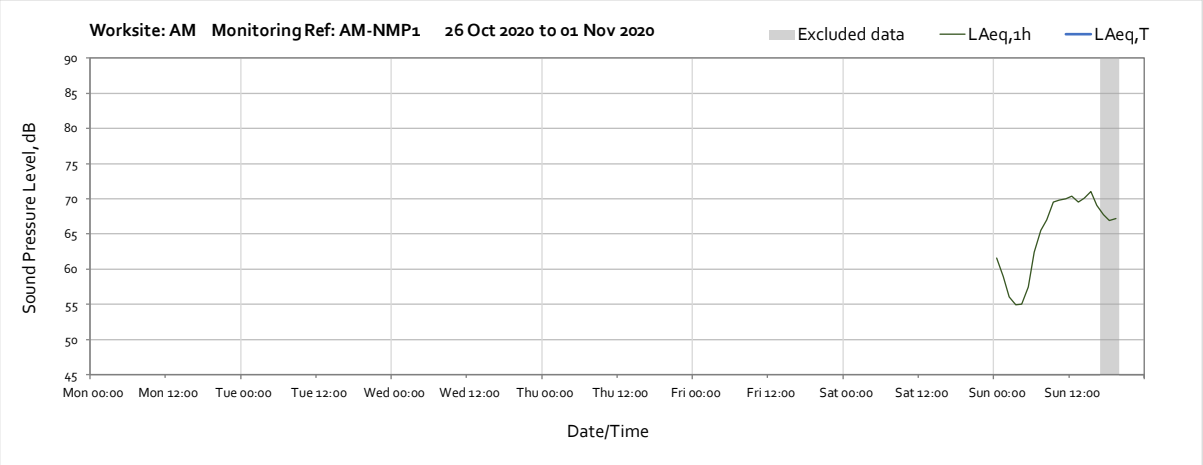


Note: Missing data from 15:00 on Saturday 21st November until 05:00 on Tuesday 24th November was due to equipment malfunction.

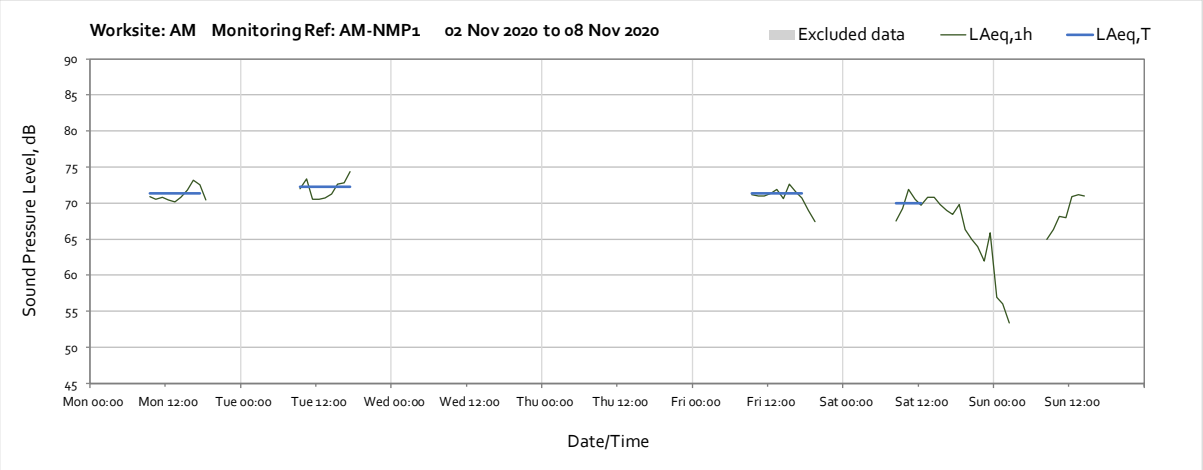


Note: Missing data from 16:00 on Monday 30th November was due to equipment malfunction.

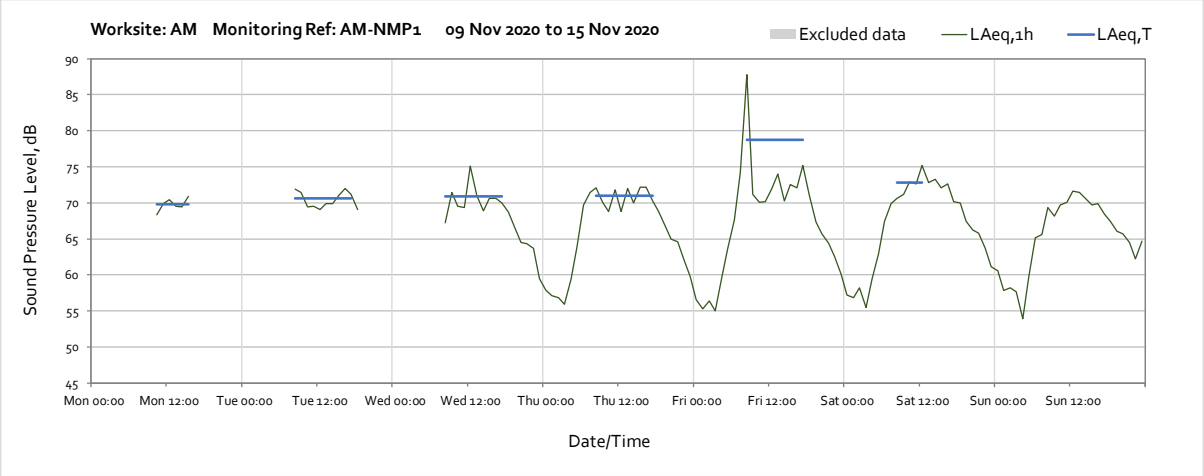
Worksite: AM – Monitoring Ref: AM-NMP1



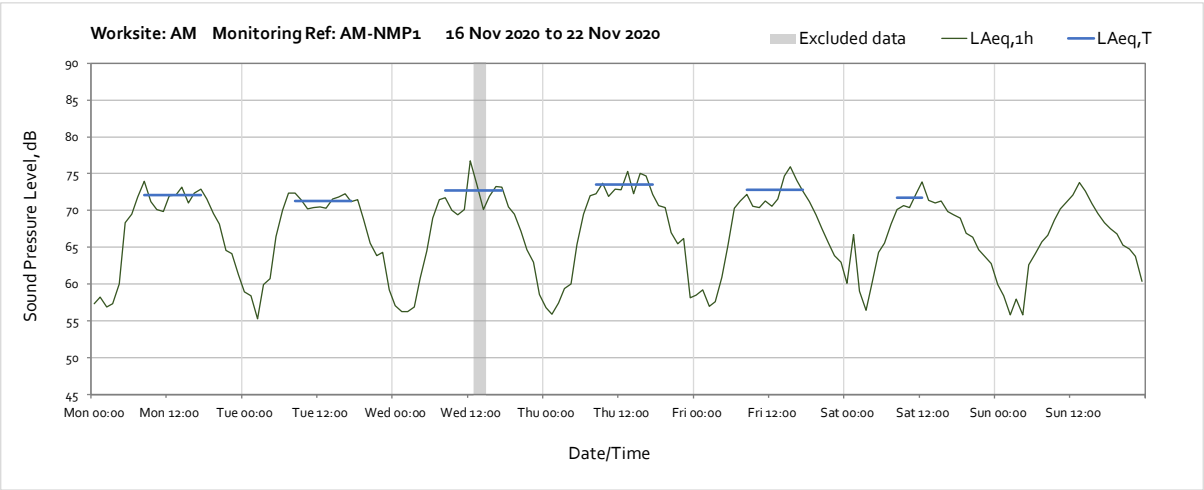
Note: Missing data from 20:00 on Sunday 1st November until 09:00 on Monday 2nd November was due to loss of solar power caused by a lack of sunlight.

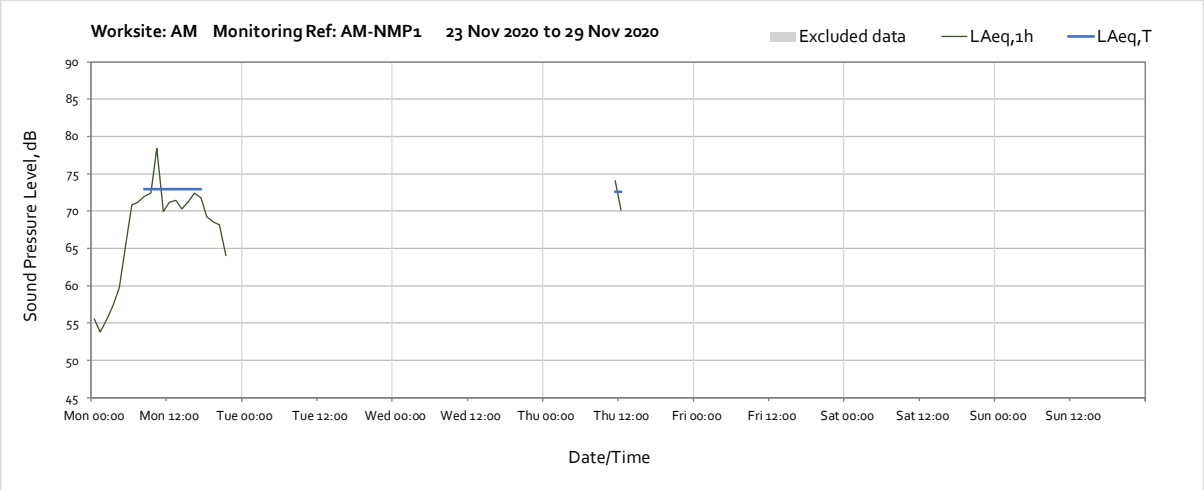


Note: Missing data throughout the week was due to loss of solar power caused by a lack of sunlight.



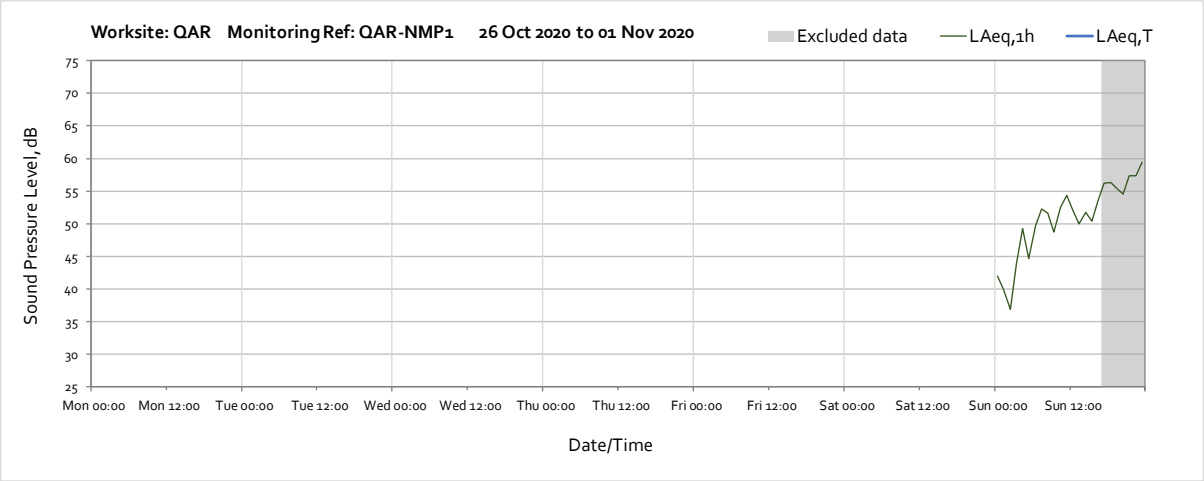
Note: Missing data throughout the week was due to loss of solar power caused by a lack of sunlight.

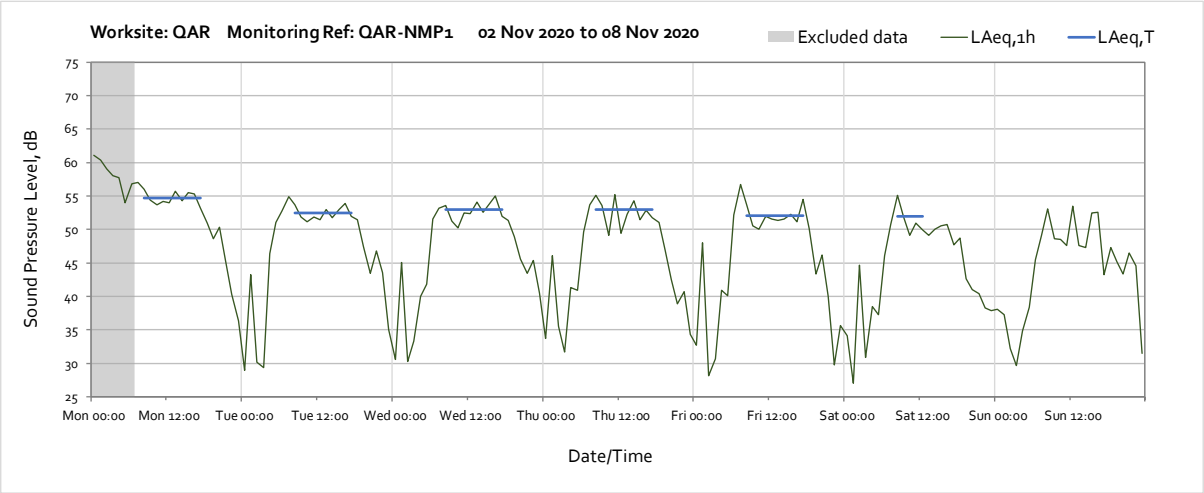


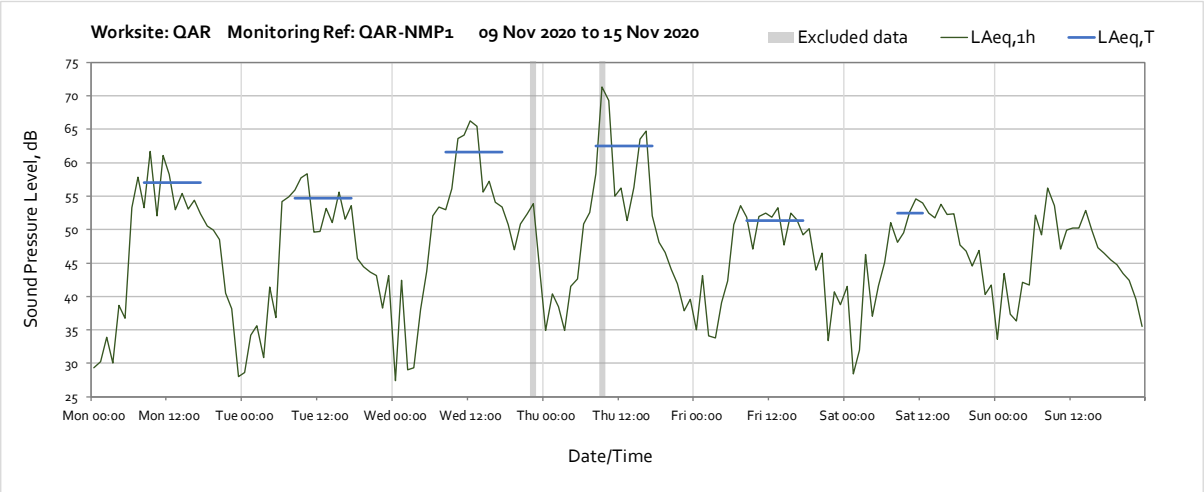


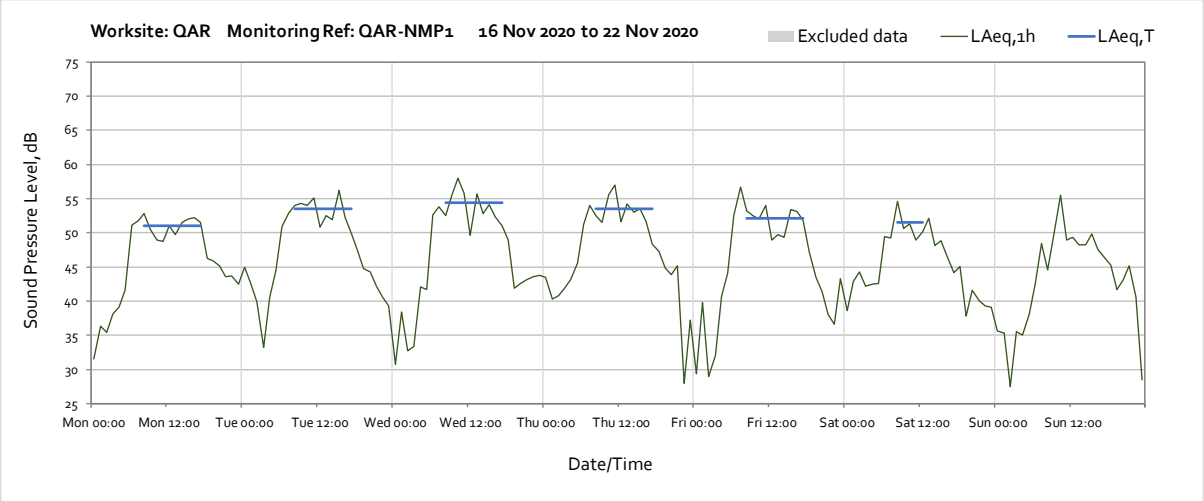
Note: throughout the week was due to loss of solar power caused by a lack of sunlight.

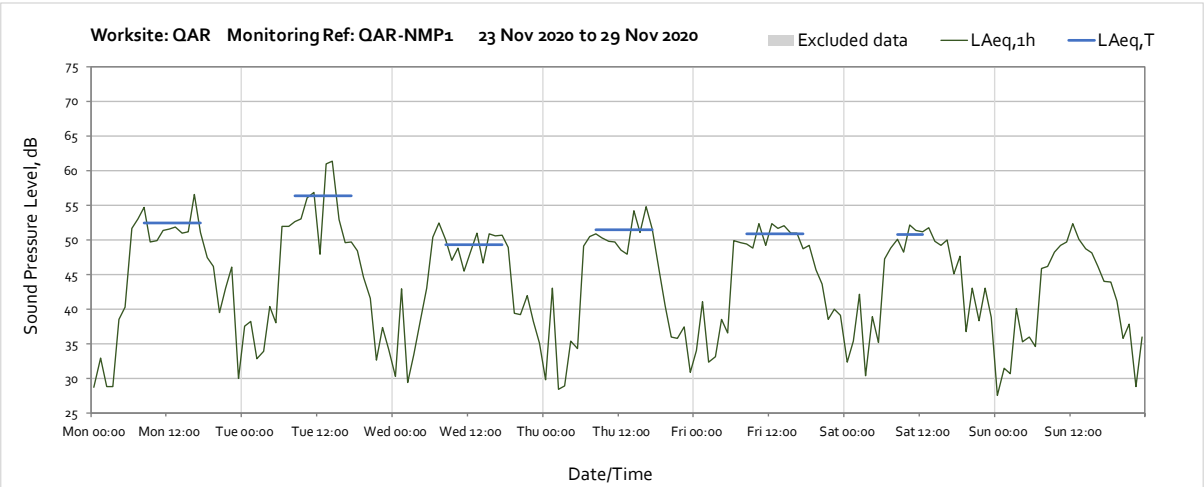
Worksite: QAR – Monitoring Ref: QAR-NMP1

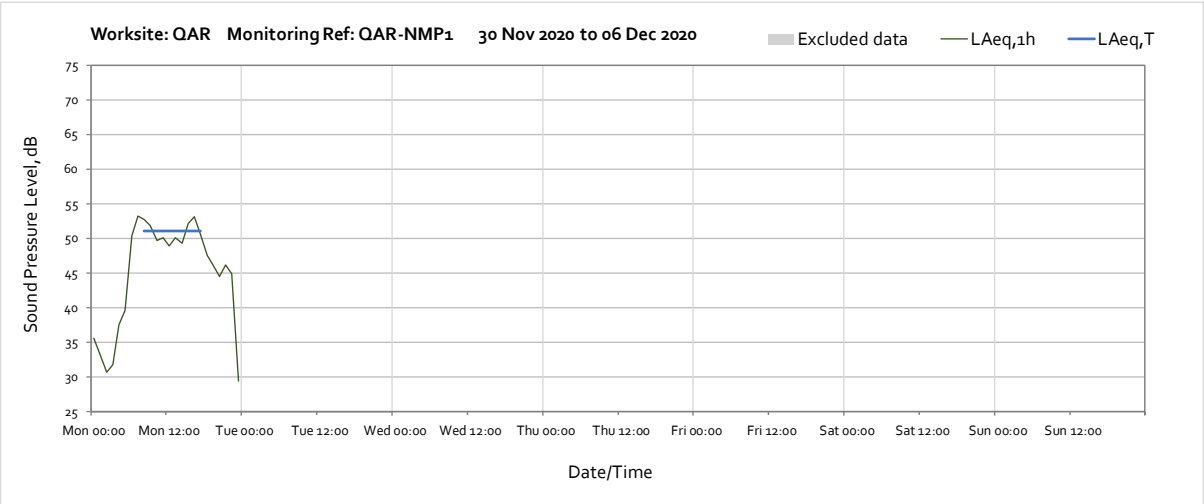







Worksite: QAR Monitoring Ref: QAR-NMP1 16 Nov 2020 to 22 Nov 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
35
30
25
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

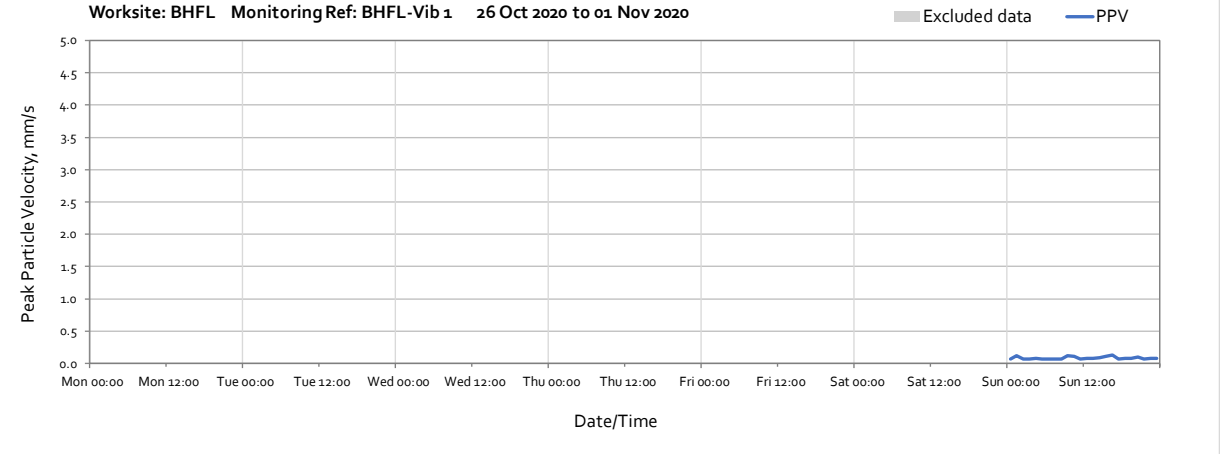

Worksite: QAR Monitoring Ref: QAR-NMP1 23 Nov 2020 to 29 Nov 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
35
30
25
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

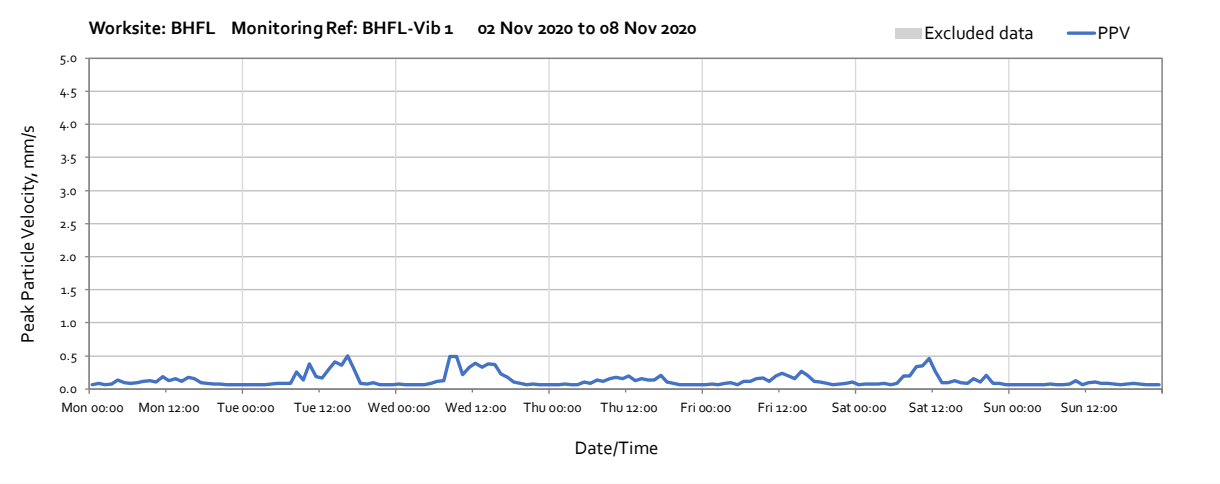

Worksite: QAR Monitoring Ref: QAR-NMP1 30 Nov 2020 to 06 Dec 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
35
30
25
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

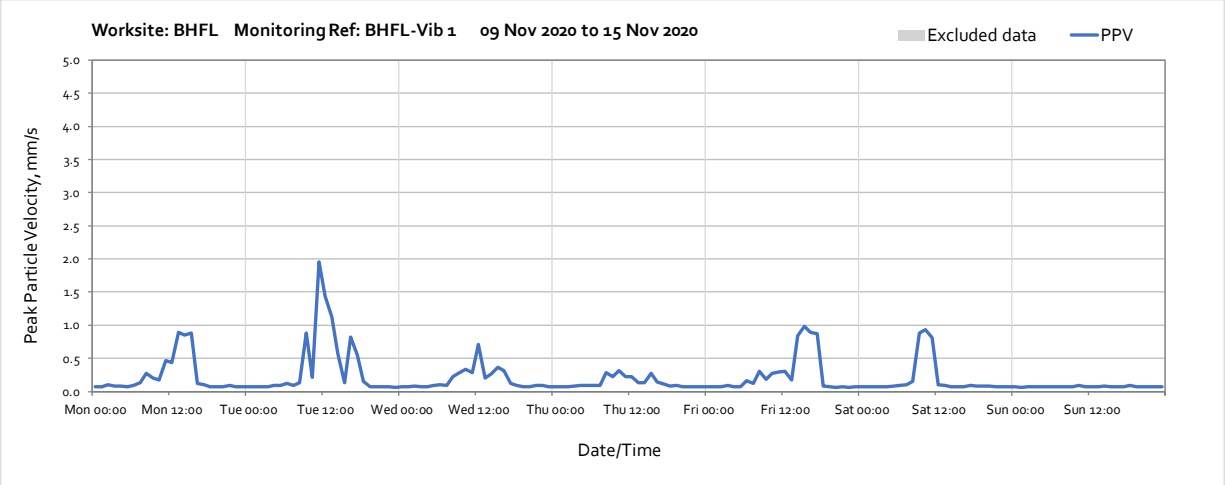
Vibration

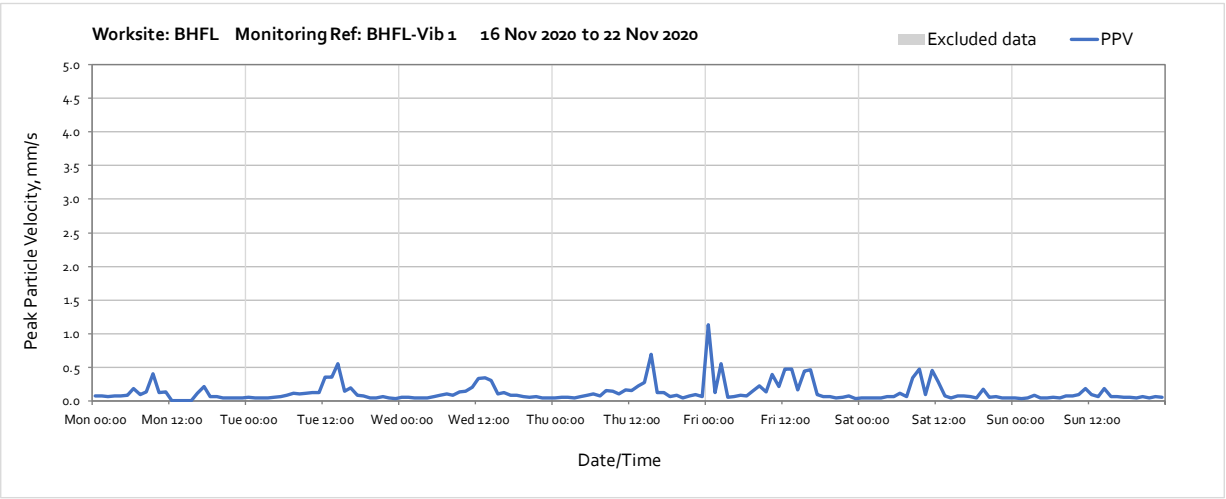
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which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

Worksite: BHFL – Monitoring Ref: BHFL-Vib 1

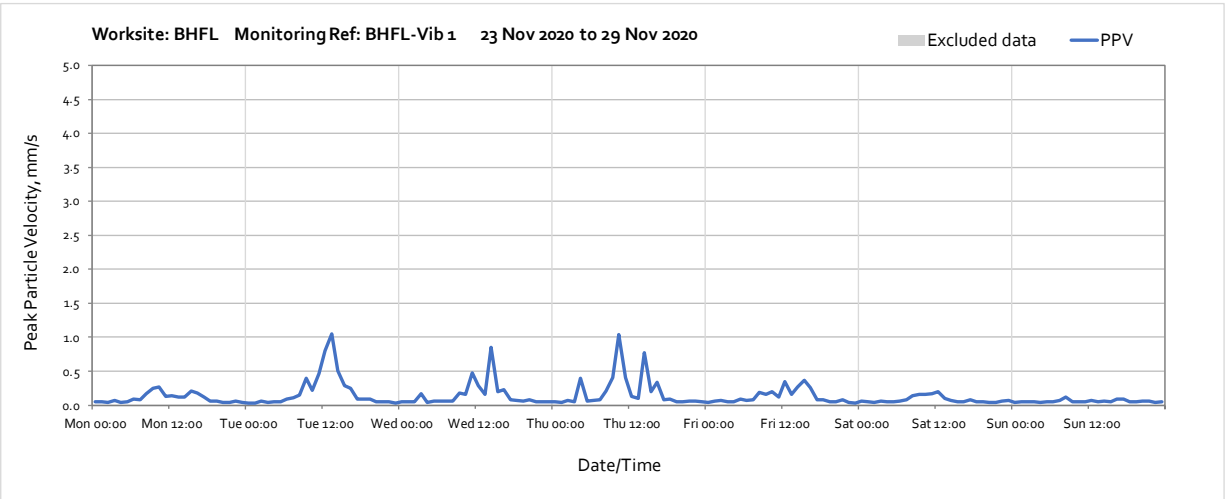


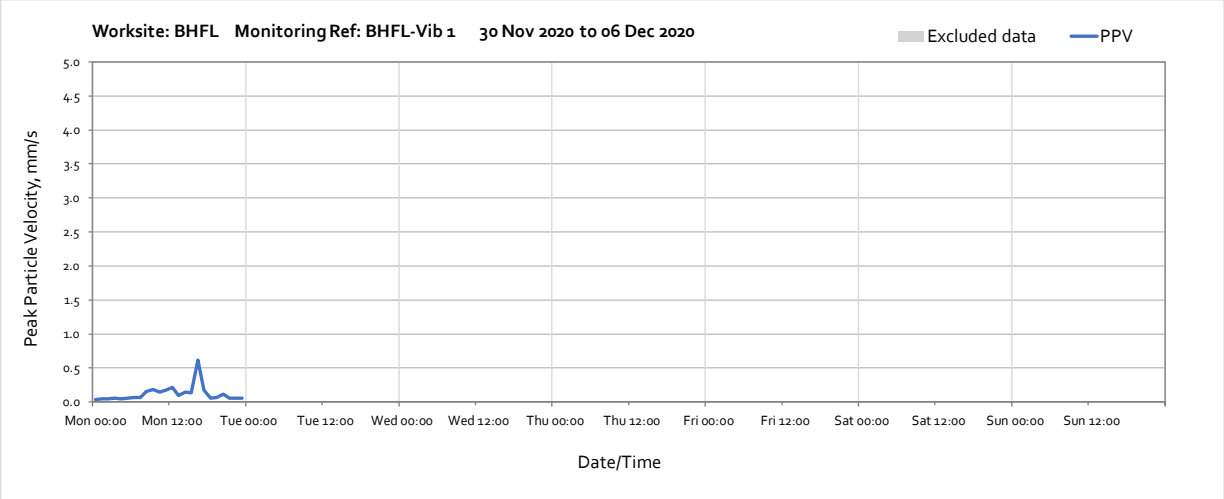






Note: Missing data from 12:00 until 16:00 on Monday 16th November was due to equipment change over.




Worksite: BHFL Monitoring Ref: BHFL-Vib 1 30 Nov 2020 to 06 Dec 2020
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time