

Construction noise and vibration Monthly Report – June 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 and vibration monitoring carried out within the Buckinghamshire (BS) Local Authority area during the month of June 2020.

This report presents data from monitoring installations near the following active worksites:

- Bottom House Farm Lane worksite (ref. BHFL), where works on the temporary access road took place, along with other site works including stockpiling materials, tree stump removal and fencing.
- Chalfont St Peter Vent Shaft worksite (ref. CSP), where activities included works on site roads, stockpiling, blockwork, drainage works and excavations.
- Load Test Pile 1 worksite (ref. LTP #1), where activities included demolition on the bentonite slab.

No works were undertaken at the Great Missenden Link Road worksite (ref. WS01) due to Covid-19 and no noise monitoring took place during June at this worksite.

The measured noise levels in June did not exceed guideline criteria for significant adverse effects due to HS2 related works. There were no exceedances of Section 61 trigger noise levels. Four complaints were reported to HS2 for this period. Description of complaints, results of investigations and any actions taken are detailed in Table 6 of this report.

Abbreviations and descriptions

The abbreviations, descriptions and project terminology used within this report are shown 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 $L_{pAeq,T}$	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.
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.
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.
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.
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 The nominated undertaker 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 (BS) Local Authority area for the period 1st to 30th June 2020.

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

- Bottom House Farm Lane (ref. BHFL) worksite (see plan 2 in Appendix A), where activities included works on the temporary access road (including topsoil removal, soil compaction and trial holes), along with other site works; stockpiling materials, tree stump and track mat removal and fencing.
- Chalfont St Peter Vent Shaft (ref. CSP) worksite (see plan 3 in Appendix A), where activities included works on site roads, stockpiling bulk materials, block work, drainage installation, excavation, and deliveries for the pumping station.
- Load Test Pile 1 (ref. LTP #1) worksite (see plan 4 in Appendix A), where activities included demolition on the bentonite slab.

Activities at the Great Missenden Link Road (ref. WS01) worksite were suspended in May and no works were undertaken in June. Activities are planned to resume in July.

1.1.3 Further utility works were also undertaken:

- in North Orbital Road, Denham (Northmoor Pumping Station);
- in Mill Lane, Chalfont St. Giles (water main from Chalfont to Amersham);
- in London Road West, Amersham (works at pumping station);
- in the South Heath, Wendover, Aylesbury and Turweston areas (works at overhead power lines);

- in the Quainton, Aylesbury and Calvert areas (gas works);
- in Calvert (Substation works);
- in Church Lane, Mixbury (power diversion works); and
- in Station Road, Quainton (ground reinstatement following 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 Table 2 summarises the positions of noise monitoring installations within the BS area in June 2020.

1.2.2 Three noise monitoring positions are installed in the BS region. A map showing the position of the noise monitoring installations is presented in Appendix B.

1.2.3 A noise monitor previously installed near the Great Missenden Link Road worksite (ref. WS01) was decommissioned on the 15th of May following suspension of the works. No works were undertaken in June at this worksite, and further works will not require continuous noise monitoring, in compliance with Section 61 requirements.

Table 2: Monitoring locations

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

2 Summary of results

2.1 Exceedances of LOAEL and SOAEL

2.1.1 The lowest observed adverse effect level (LOAEL) is defined in the 'Planning Practice Guidance – Noise' 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".

- 2.1.2 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."
- 2.1.3 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.
- 2.1.4 Table 3 presents a summary of recorded exceedances of the LOAEL and SOAEL due to HS2 related construction noise at each measurement location over the reporting period, including the number of exceedances during each time period. No noise monitoring was undertaken at monitoring position Noise 1 during suspended works at worksite ref. WS01.

Table 3: 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	22	No exceedance
			Saturday	0800-1300	3	No exceedance
LTP #1	NMP2	Along worksite northern boundary	Weekday	0800-1800	1	No exceedance
			Saturday	0800-1300	No exceedance	No exceedance
BHFL	NMP3	Elm Tree Cottage, Bottom House Farm Lane	Weekday	0800-1800	1	No exceedance
			Saturday	0800-1300	No exceedance	No exceedance

- 2.1.5 HS2 construction activities were undertaken between 08:00 and 18:00 on weekdays, and between 08:00 and 13:00 on Saturdays.
- 2.1.6 The LOAEL was exceeded on a number of occasions during periods of works at monitoring location NMP1, on one occasion at NMP2 and on one occasion at NMP3.

2.2 Summary of measured noise levels

2.2.1 Table 4 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.

2.2.2 Appendix C presents graphs of the noise monitoring data over the month for the measurement location. Data presented includes 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>.

Table 4: Summary of measured dB LAeq data over the monitoring period

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday Average LAeq,T (highest day LAeq,T)					Saturday Average LAeq,T (highest day LAeq,T)					Sunday / Public Holiday Average LAeq,T (highest day LAeq,T)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
CSP	NMP1	Chalfont St. Peter	Free-field	61.1 (63.0)	66.2 (72.3)	59.7 (63.7)	57.3 (63.0)	52.4 (69.9)	57.8 (59.3)	66.0 (69.4)	60.8 (61.8)	59.2 (62.1)	53.2 (65.7)	58.5 (65.3)	58.5 (74.4)
LTP #1	NMP2	Along worksite northern boundary	Free-field	62.4 (63.5)	62.1 (68.9)	60.7 (62.1)	58.2 (60.7)	55.7 (63.1)	59.0 (59.7)	61.2 (61.5)	61.5 (61.9)	60.7 (62.5)	53.4 (57.7)	59.7 (62.1)	56.2 (63.6)
BHFL	NMP3	Elm Tree Cottage, Bottom House Farm Lane	Free-field	56.0 (59.1)	56.9 (66.3)	54.7 (59.2)	53.3 (61.2)	51.2 (65.7)	53.1 (53.4)	54.5 (55.1)	54.7 (55.1)	54.1 (60.5)	49.3 (59.3)	53.8 (59.5)	52.7 (59.6)

2.3 Exceedances of trigger level

2.3.1 Table 5 provides a summary of exceedances of the Section 61 trigger noise levels determined to be due to HS2 related construction noise measured during the reporting period, along with the findings of any investigation.

Table 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
-	-	-	-	-	-

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

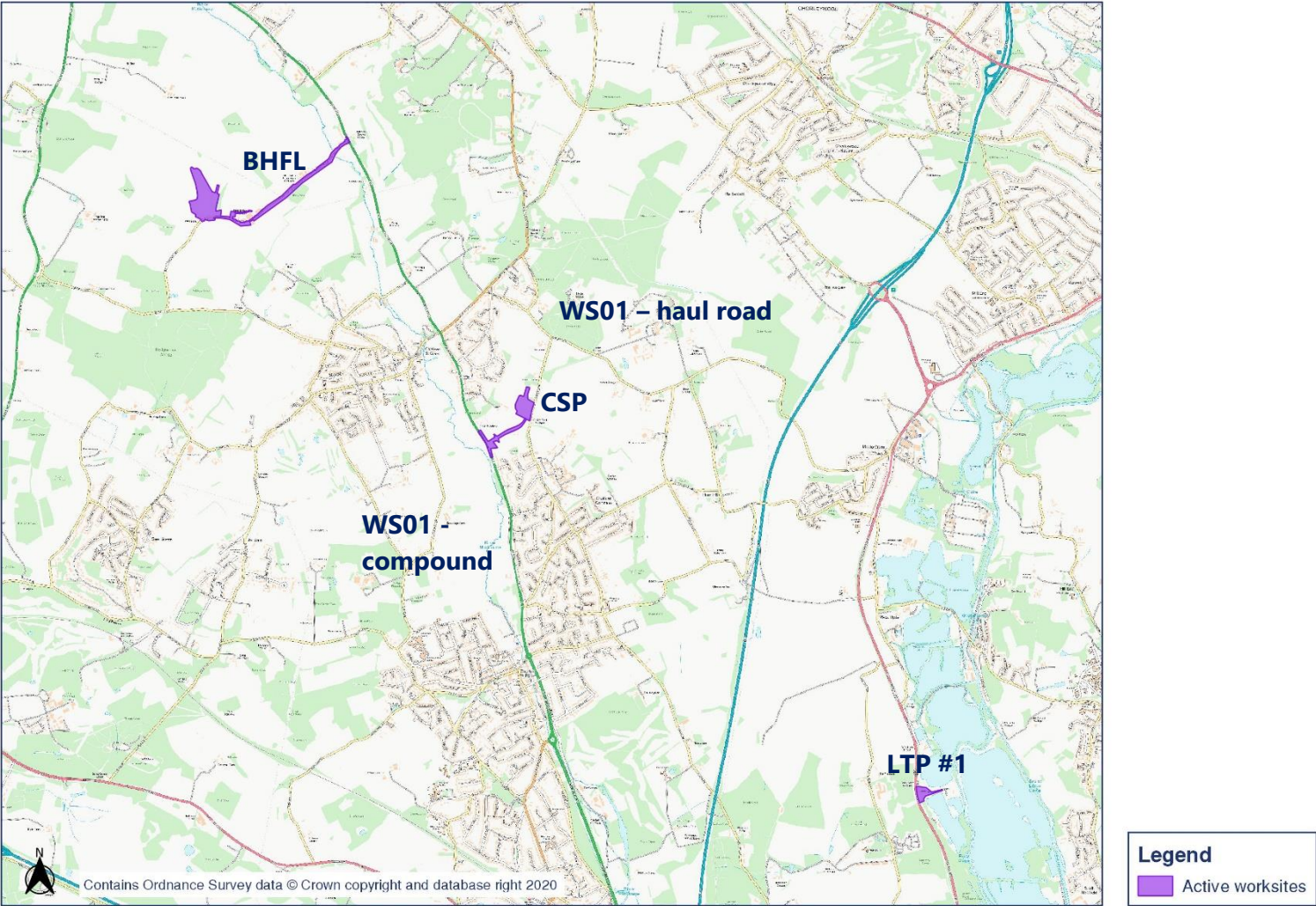
2.4 Complaints

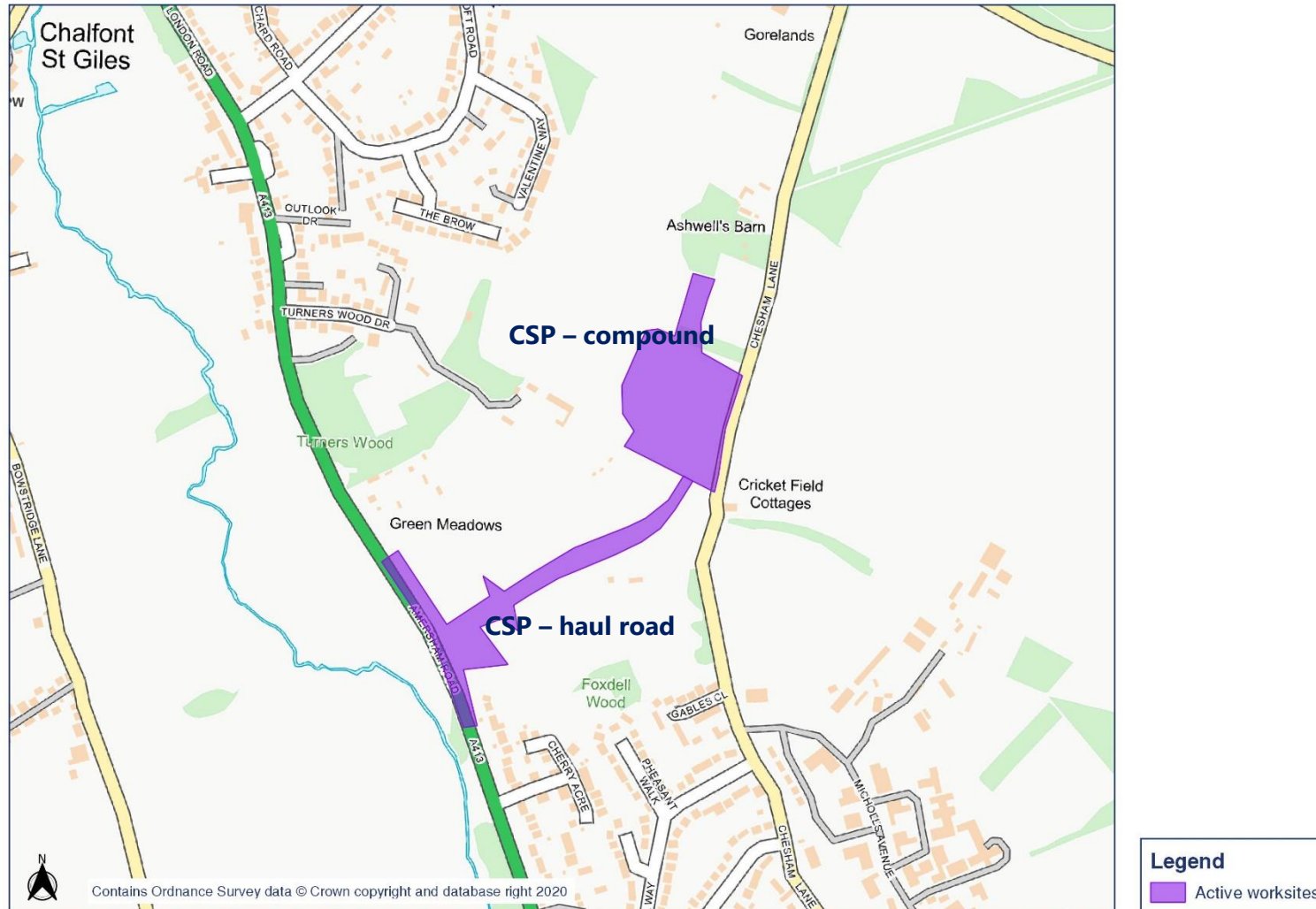
2.4.1 Table 6 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 6: Summary of complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-20-40187-C	BHFL	Complaint regarding construction noise near residential property.	Removal of topsoil in preparation for construction of the embankment was being undertaken at the time. However, noise generated by digger and trucks removing the topsoil and water spraying machine were within Section 61 predictions.	Information was provided to the resident.
HS2-20-40126-C	Utility diversions	Complaint from a resident in Amersham regarding effect of vibrations on hearing.	Investigation was conducted however the cause of the problem was not established.	Results of investigation discussed with resident. Contact details provided in case of recurrence so that investigation can take place.
HS2-20-41317-E	Utility diversions	Complaint from residents in Fieldway, the road opposite to the site, regarding effect of vibrations on hearing.	Fieldway is approximately 400m from site. Investigations shown that activities on site were topsoil clearance and soil treatment.	No further action was taken.
HS2-20-40164-C	Utility diversions	Complaint from a resident near Wendover regarding generator noise heard after 8pm.	A generator is used for short periods at night to provide power for 24h security within the compound.	Site operatives informed of complaint and re-briefed to minimise noise during night-time periods, including use of generator.

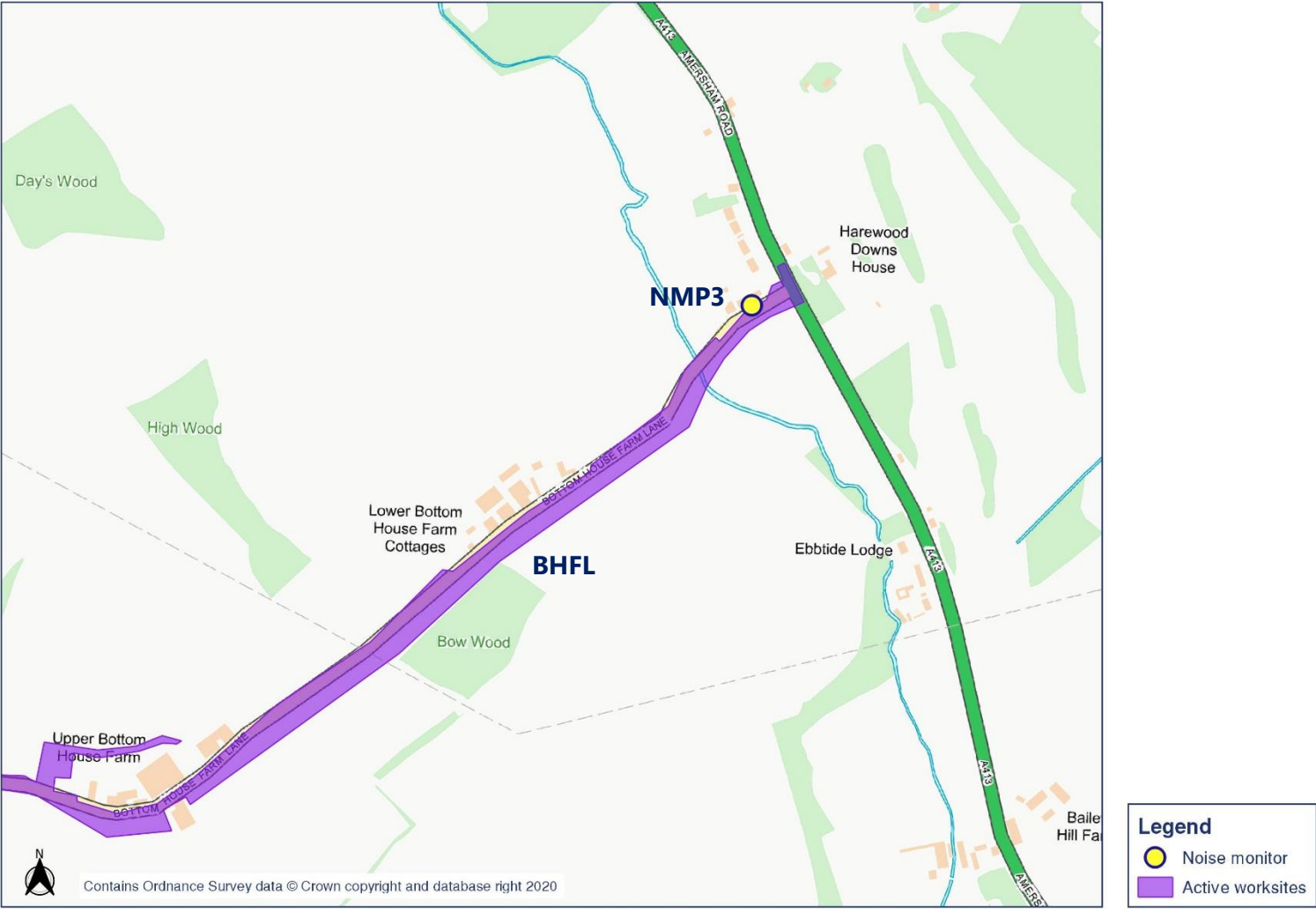
Appendix A Site Locations

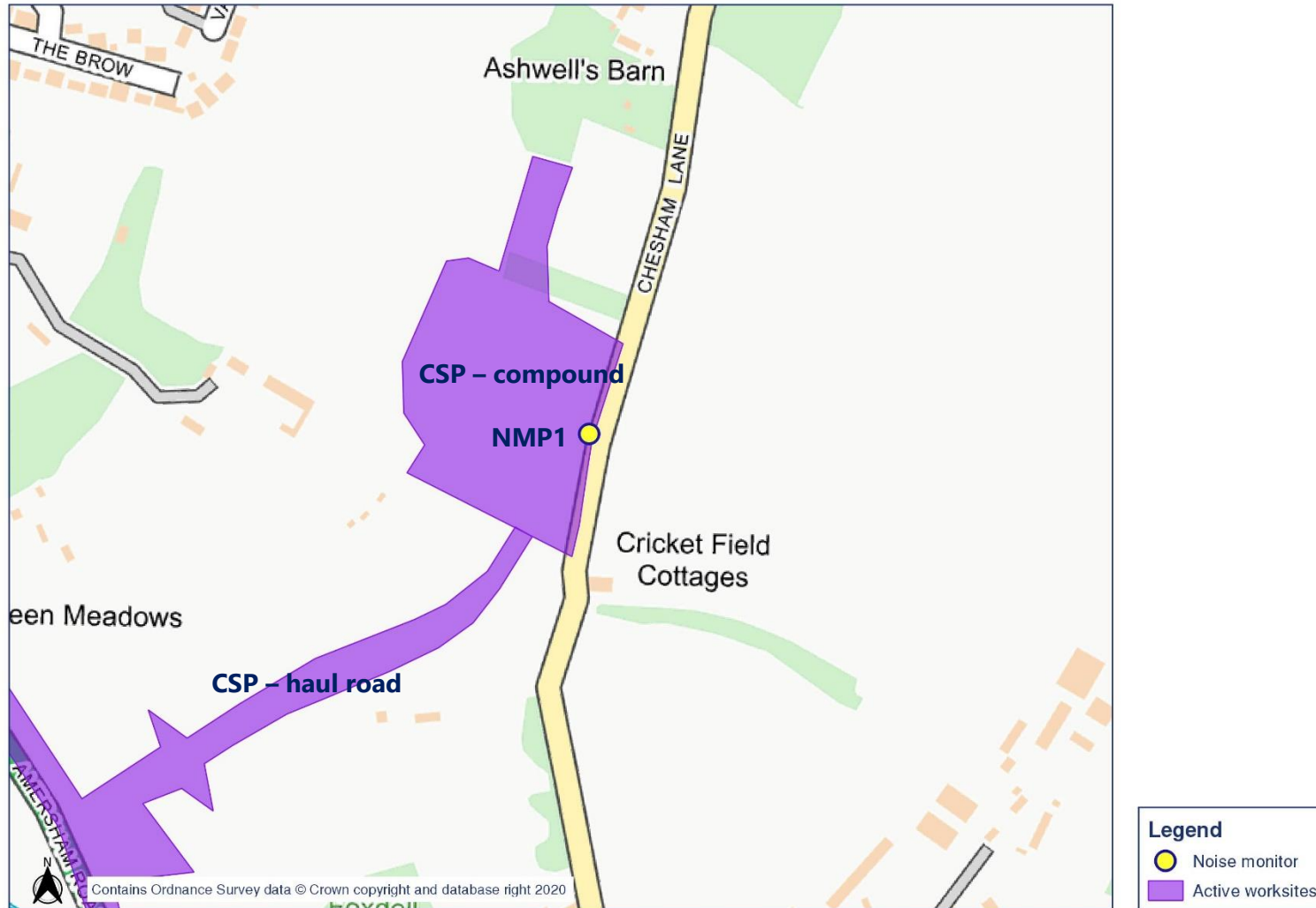






Appendix B Monitoring Locations



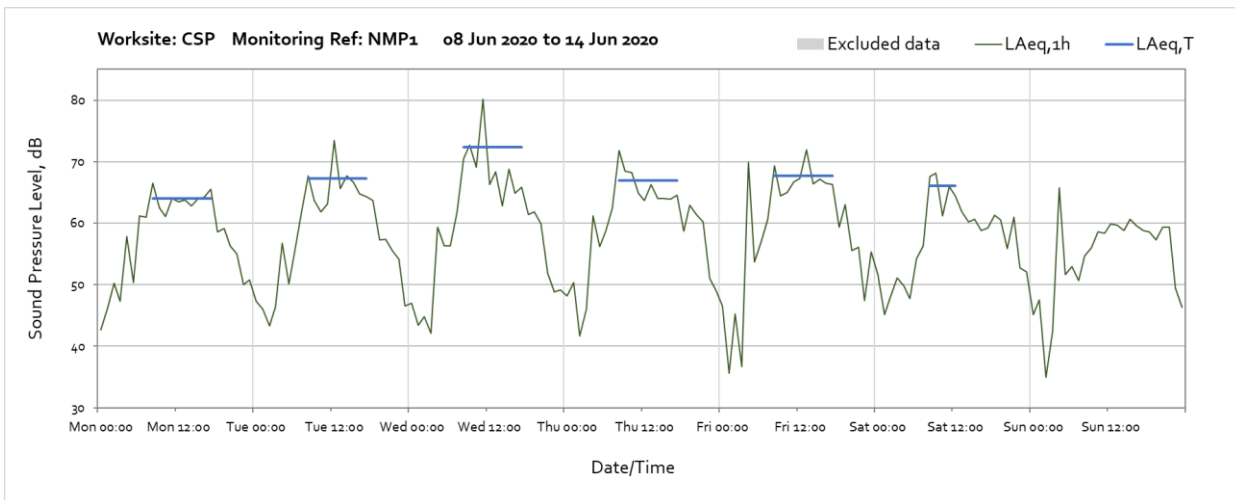
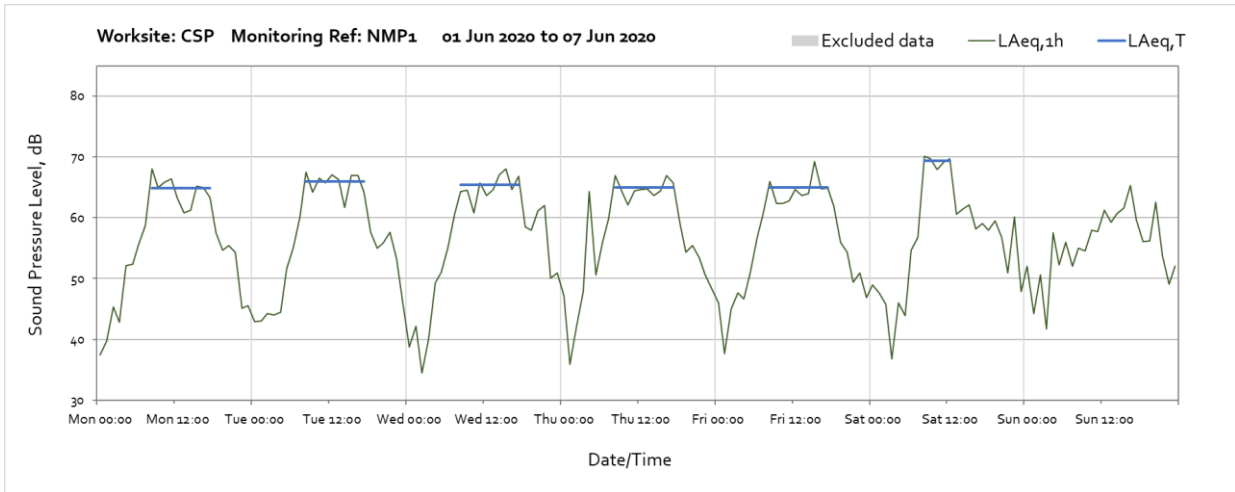


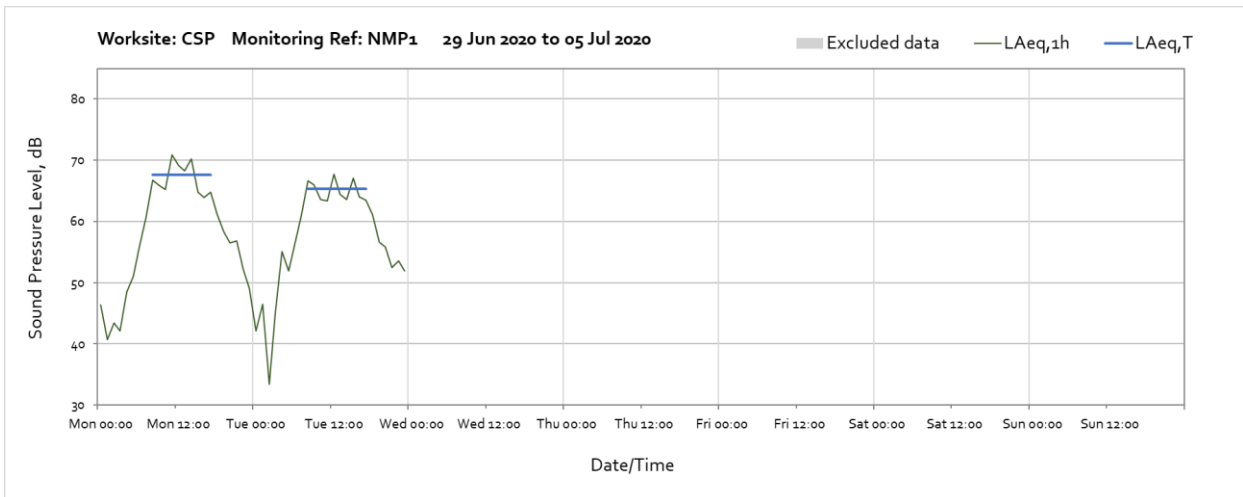
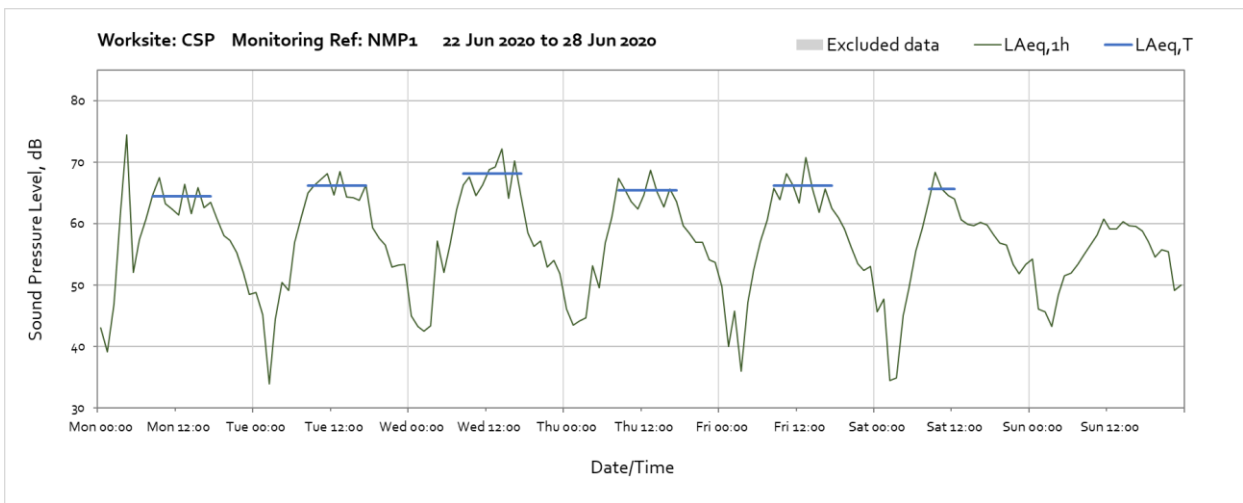
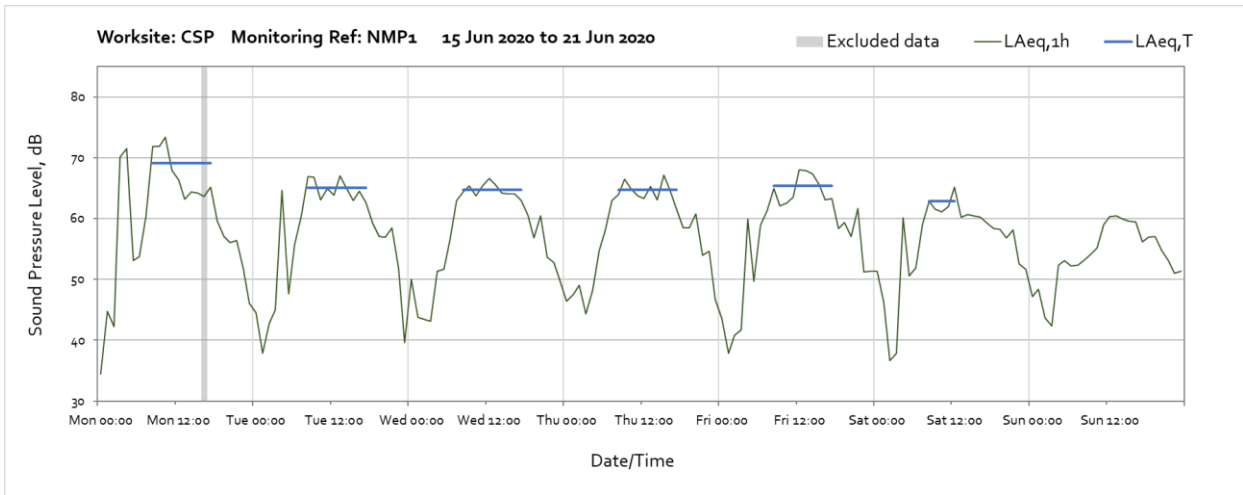


Appendix C Data

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.

Worksite: CSP – Monitoring Ref: NMP1

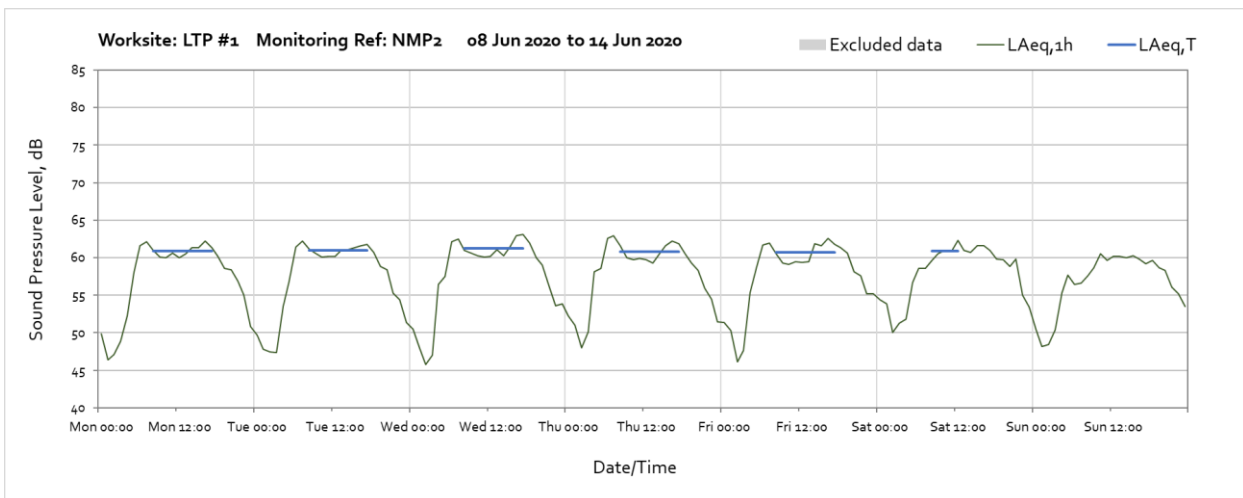
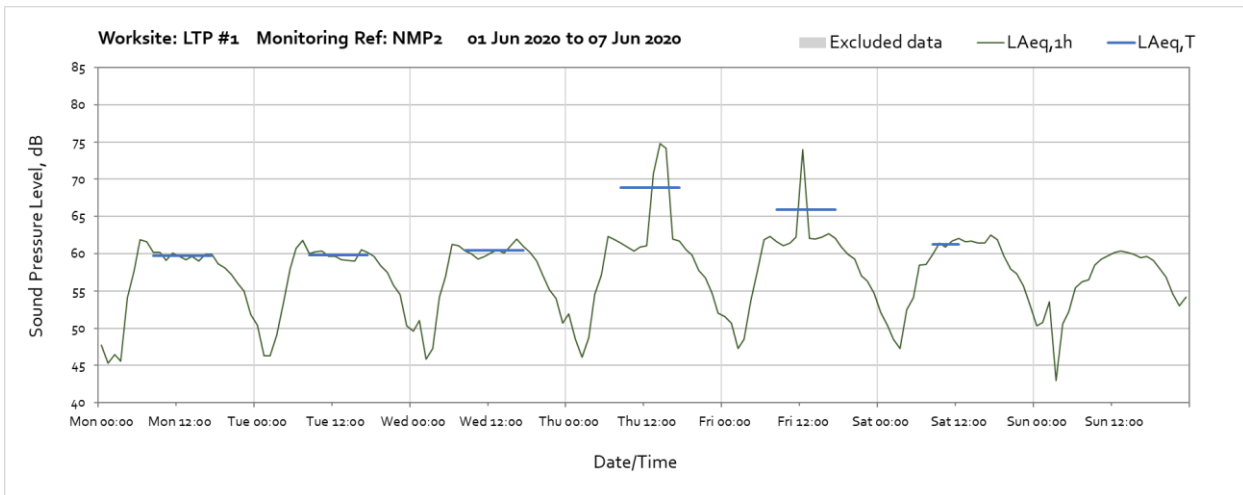


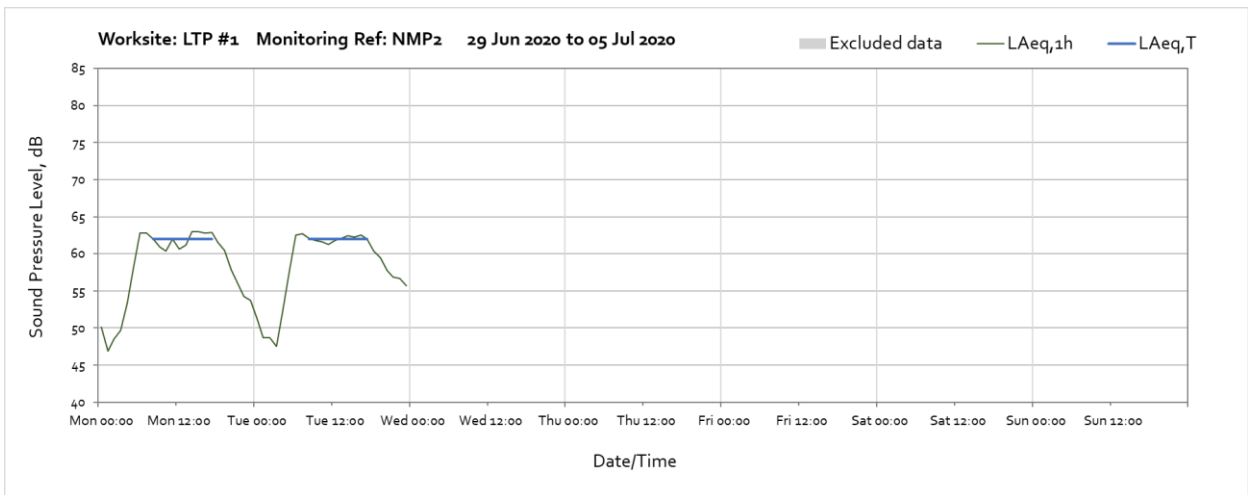
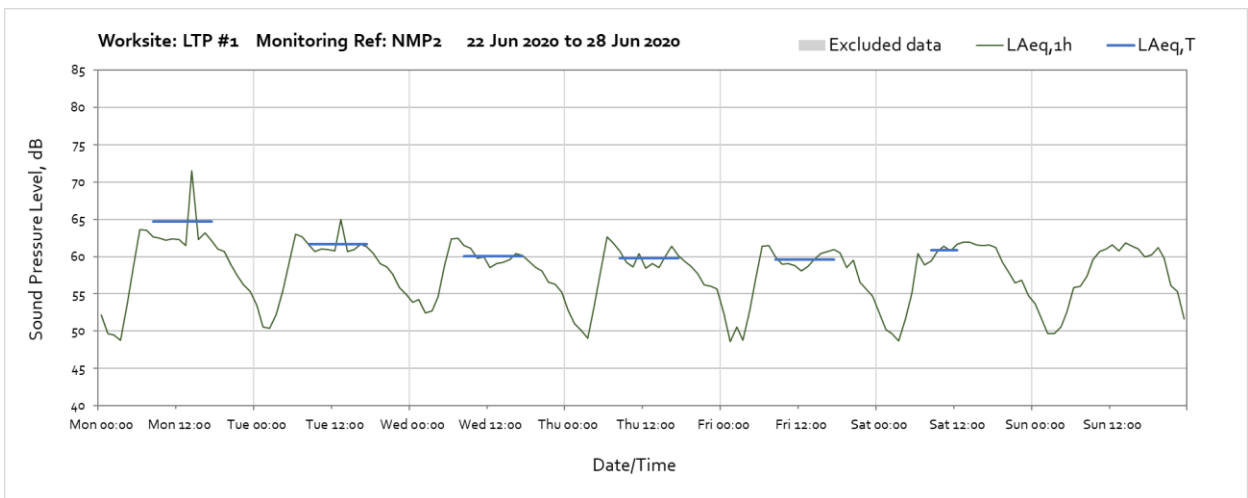
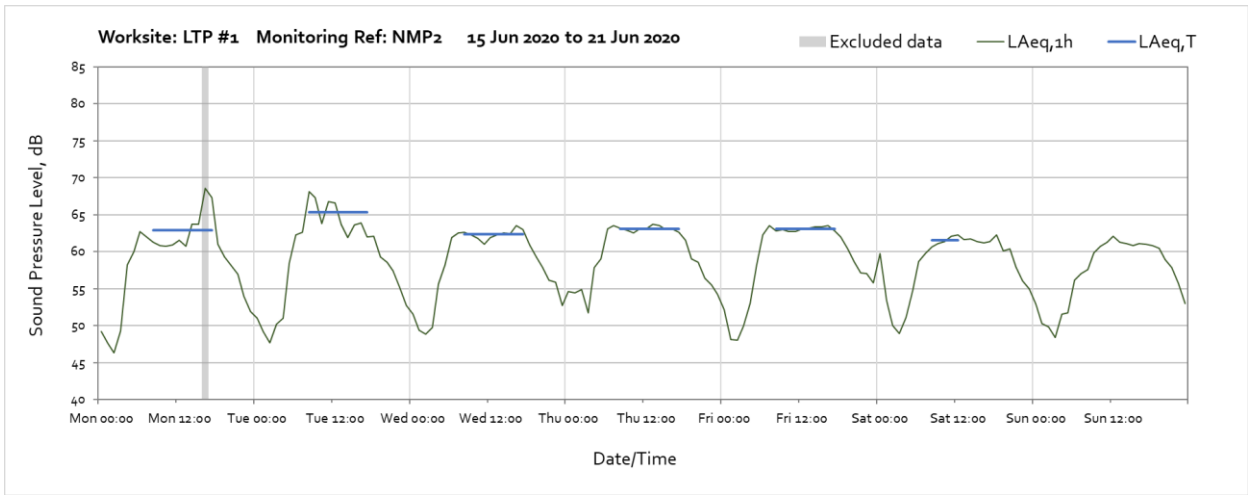


Worksite: WS01 – Monitoring Ref: Noise 1

No noise monitoring was undertaken at monitoring position Noise 1 during suspended works at worksite ref. WS01

Worksite: LTP #1 – Monitoring Ref: NMP2





Worksite: BHFL – Monitoring Ref: NMP3

