

Construction noise and vibration Monthly Report – March 2020

Three Rivers District

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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 Three Rivers District (TRD) during the month of March 2020.

This report presents data measured from two noise monitoring stations installed on the site boundary of the Chiltern Tunnel South Portal Compound. Site activities during the monitoring period included cutting and filling of main platforms, grout blocking, West Hyde Embankment earthworks, stockpiling fill and subsoil, excavation of cuttings and capping layers/hardstandings on logistics platform and new compound.

Given the nature and location of works currently being undertaken and the high ambient noise in many locations, the measured noise levels are largely dominated by the underlying ambient noise levels, rather than being attributable to construction noise.

The measured noise levels in March did not exceed guideline criteria for significant adverse effects due to HS2 related works. No exceedances of Section 61 trigger levels were measured due to HS2 related works during the monitoring period. There were also no complaints reported to HS2 during the monitoring period.

Abbreviations and descriptions

The abbreviations, descriptions and project terminology used within this report can be found in the Project Dictionary (HS2-HS2-PM-GDE-000-000002).

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)'. 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 Three Rivers District (TRD) area for the period 1st to 31st March 2020.

1.1.2 Active construction sites in the local authority area during this period include:

- Southern Portal worksite, ref. 1MC05-ALJV (see plan 1 in Appendix A), where the following activities were undertaken:
 - Earthworks: cutting and filling of South Portal, West Hyde embankment foundation, tunnel precast yard, Chalfont Lane bund, and extension of induction centre platform; stockpiling general fill and subsoil; detailed excavation of South Portal cutting; and capping layers/hardstanding for logistic platform and new compound.
 - South Cutting: Grout blocking works which includes drilling and grouting; soil nailing works which includes drilling, grouting and associated earthworks; and compaction grouting at West Hyde Embankment.

1.1.3 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 TRD area in March 2020.
- 1.2.2 Two noise monitors were active in the TRD area at the Southern Portal worksite, Main Compound northern boundary (SP-NMP1) and eastern boundary (SP-NMP2).
- 1.2.3 A map showing the position of the noise monitoring installations is presented in Appendix B.

Table 2: Monitoring locations

Worksite Reference	Measurement Reference	Address
1MC05-ALJV	SP-NMP1	ALIGN JV Site, Chalfont Lane, WD3 9XN (northern site boundary)
	SP-NMP2	ALIGN JV Site, Chalfont Lane, WD3 9XN (eastern site boundary)

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. Ambient noise levels in the surround area of Southern Portal are dominated by road traffic by the local road A412 (east of site) and the

M25 (west of site) as well as from local air traffic using Denham Aerodrome that fly close or over site.

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.

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
1MC05-ALJV	SP-NMP1	ALIGN JV Site (northern site boundary)	Weekday	08:00-18:00	2	No exceedance
			Saturday	08:00-13:00	1	1*
	SP-NMP2	ALIGN JV Site (eastern site boundary)	Weekday	08:00-18:00	11	No exceedance
			Saturday	08:00-13:00	2	No exceedance

* Due to the larger distance of the construction activities to the nearest receptor noise levels at this location were calculated to be below the SOAEL.

2.1.5 HS2 main construction activities were undertaken between 08:00 and 18:00 on weekdays. Noise levels above the SOAEL were measured outside of working periods and were likely due to local road traffic noise. One occurrence of noise levels above the SOAEL was measured during working hours at location NMP1. This was associated with the movement of an earth bund in close proximity to the monitoring station, however the nearest receptor is located 25m away from the microphone and due to the larger separation distance from the area of works noise levels at this location were calculated to be 70 dBA, which is below the SOAEL threshold level.

2.1.6 Noise levels above the LOAEL were measured at both monitoring locations both within and outside working hours and are mostly attributable to local road traffic.

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>.

- 2.2.3 Ambient noise levels in the surrounding area of the Southern Portal are dominated by road traffic by the local road A412 (east of site) and road traffic from the M25, as well as local air traffic using Denham Aerodrome that fly close or over site.

Table 4: Summary of measured dB L_{Aeq} data over the monitoring period

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday 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
1MC05-ALJV	SP-NMP1	ALIGN JV Site (northern site boundary)	Free-field	56.6 (59.1)	58.8 (72.1)	54.5 (58.2)	52.6 (59.2)	51.9 (58.1)	58.9 (74.3)	61.1 (75.0)	55.8 (57.9)	54.9 (60.1)	52.3 (57.6)	54.6 (59.8)	51.6 (58.2)
	SP-NMP2	ALIGN JV Site (eastern site boundary)	Free-field	64.5 (67.9)	62.5 (65.3)	62.0 (66.6)	58.7 (66.5)	57.8 (66.9)	59.6 (62.4)	62.0 (63.3)	62.8 (63.1)	60.5 (63.2)	53.8 (59.9)	58.7 (63.5)	56.9 (66.8)

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
-	-	-	-	-	-

2.3.2 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

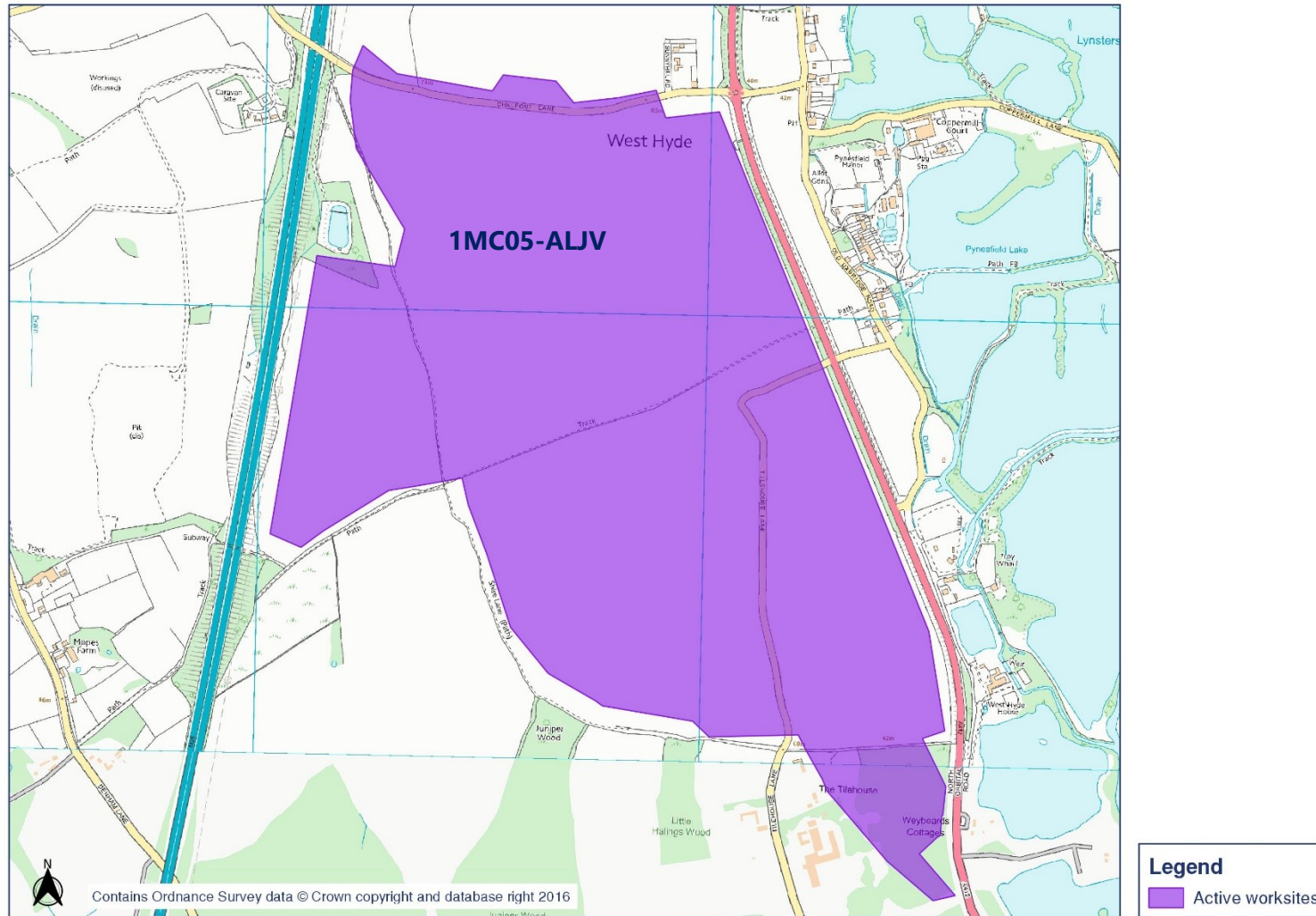
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
-	-	-	-	-

2.4.2 No complaints were received during the reporting period.

Appendix A Site Locations

HS2

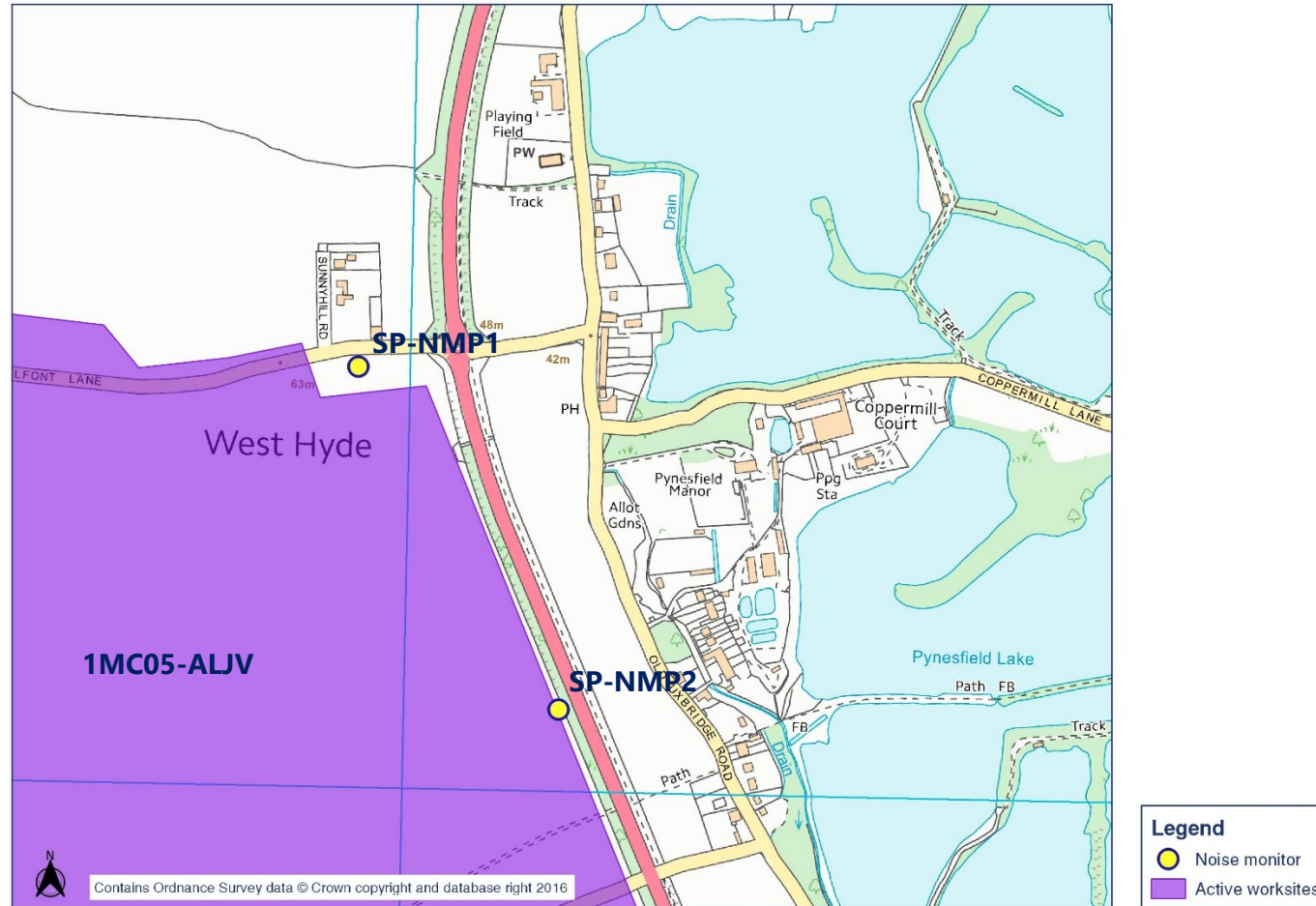
Worksite identification plan - 1



Appendix B Monitoring Locations

HS2

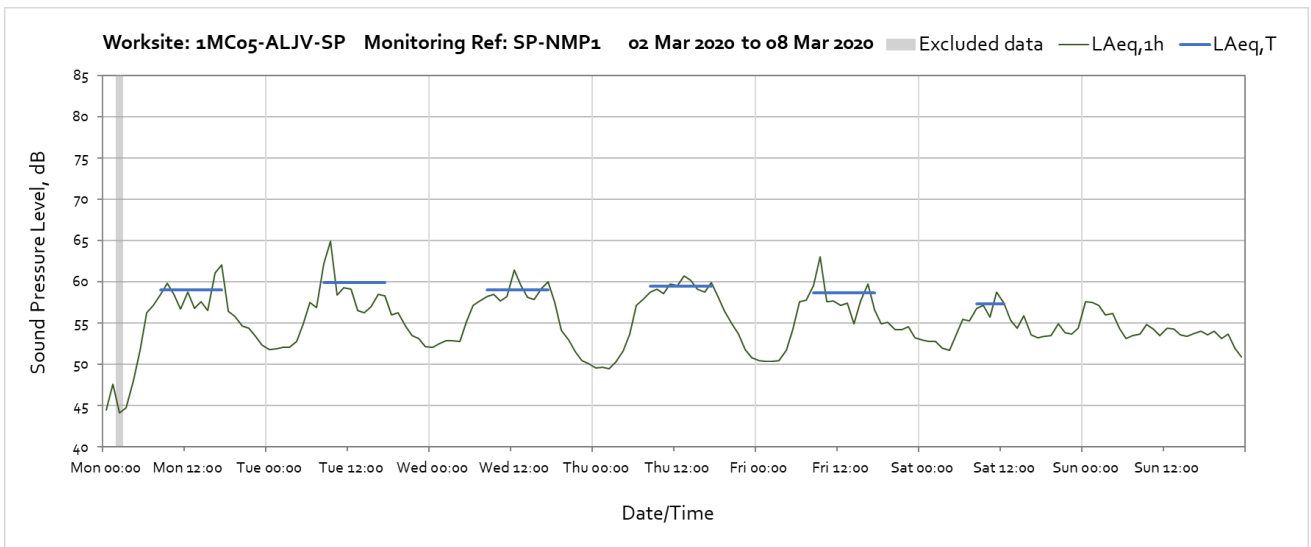
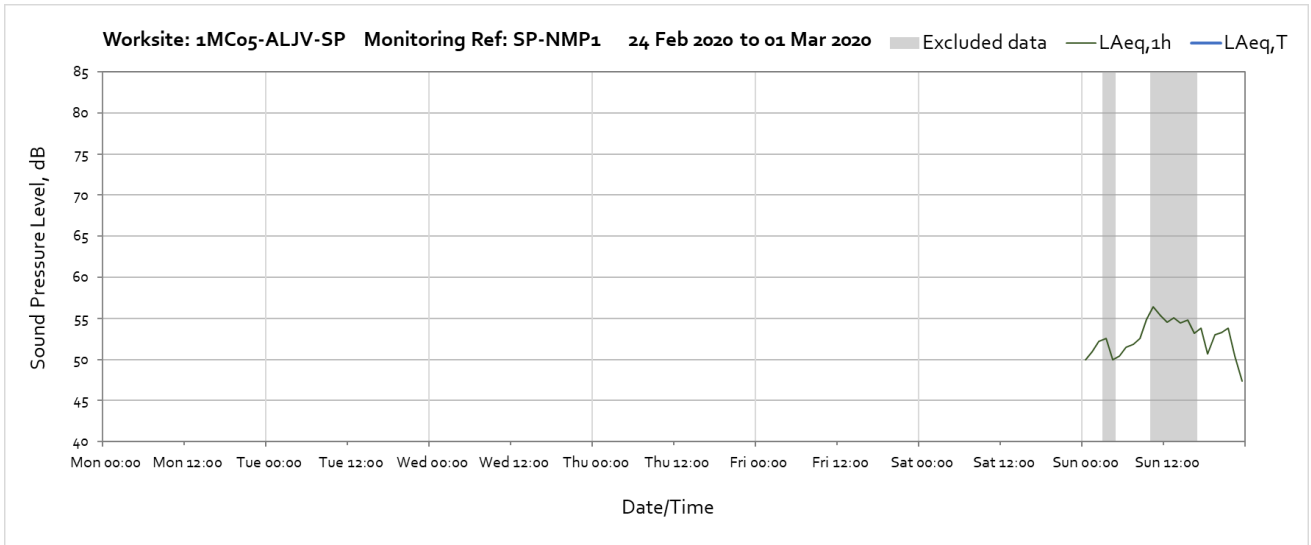
Noise monitoring plan - 1

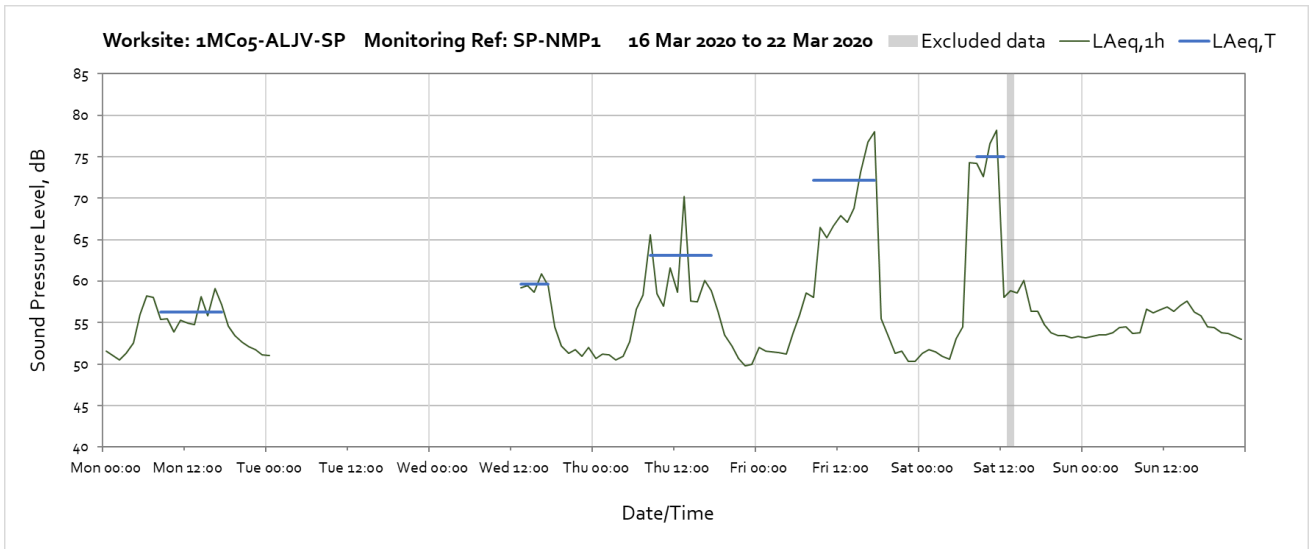
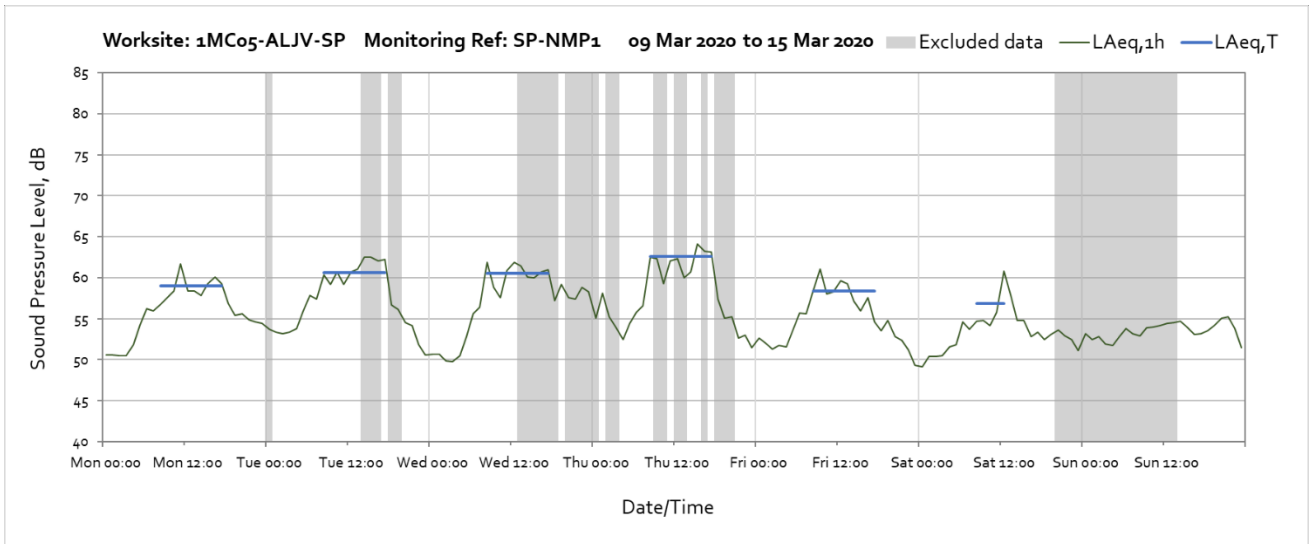


Appendix C Data

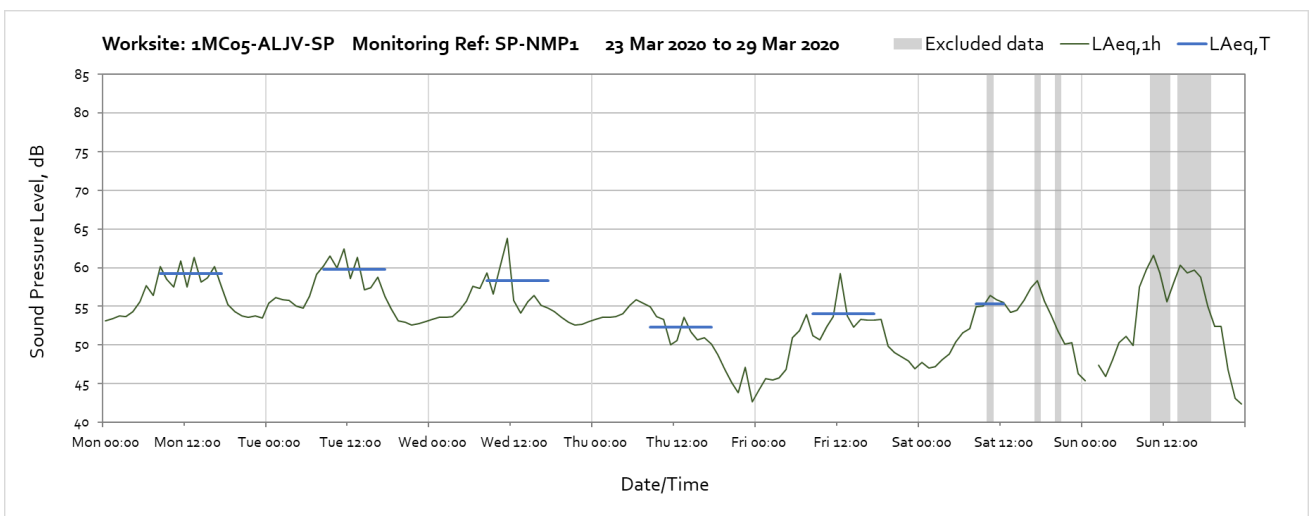
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

Worksite: 1MC05-ALJV – Monitoring Ref: SP-NMP1

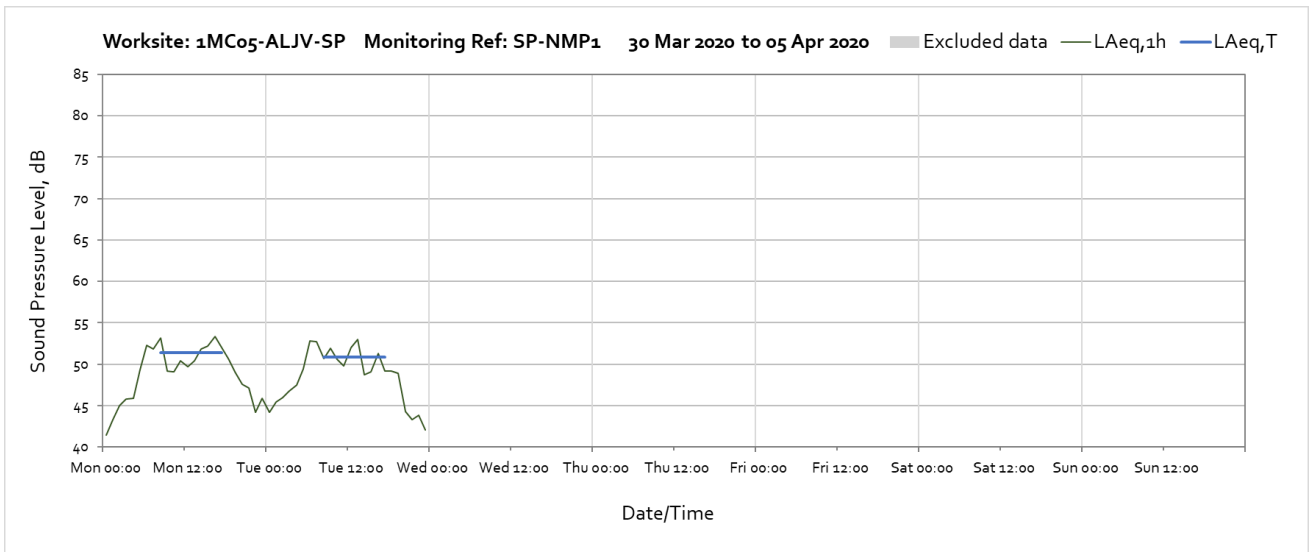




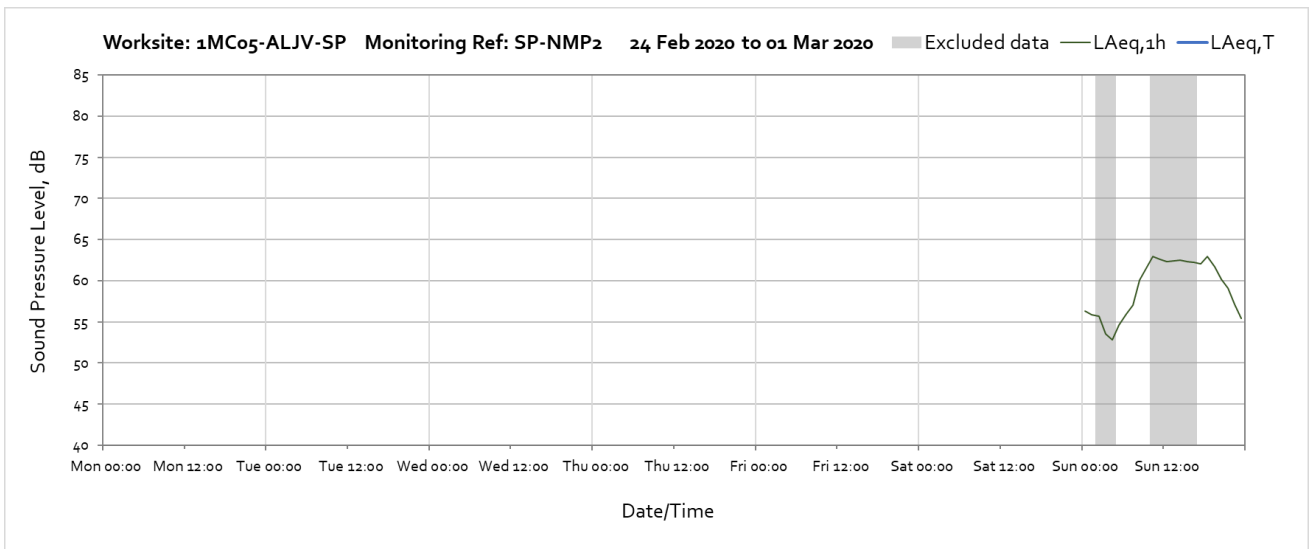
Note: Missing data between 01:00 on Tuesday 17th and 13:00 on Wednesday 18th were due to a loss of power at the monitoring station.

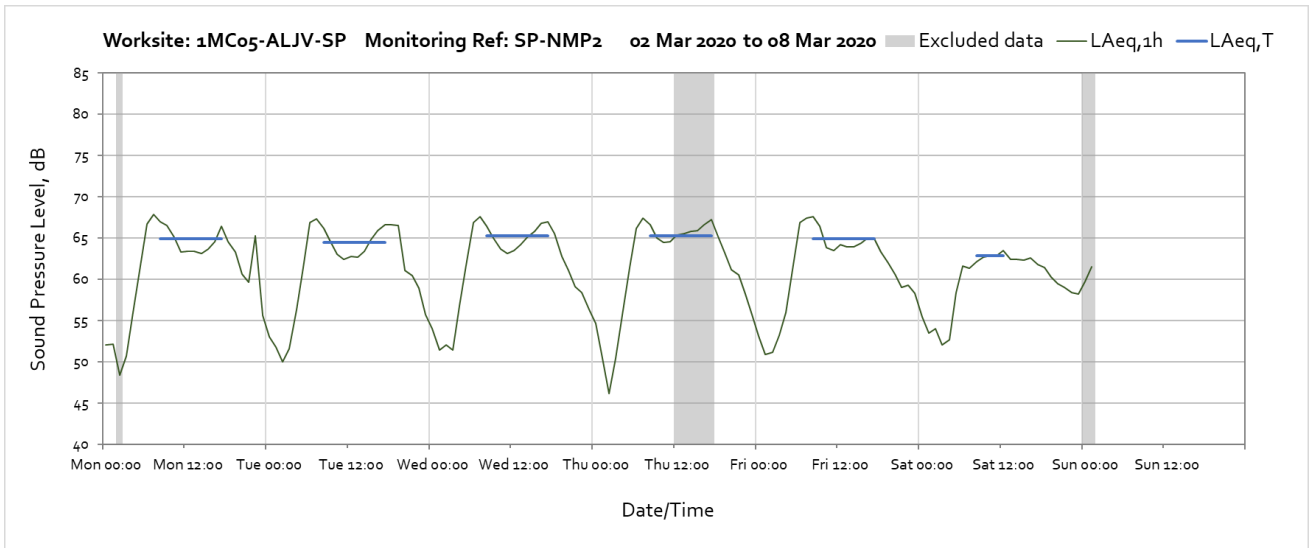


Note: Missing data at 01:00 on Sunday 29th March was due to the clocks going forward at the start of British Summertime.

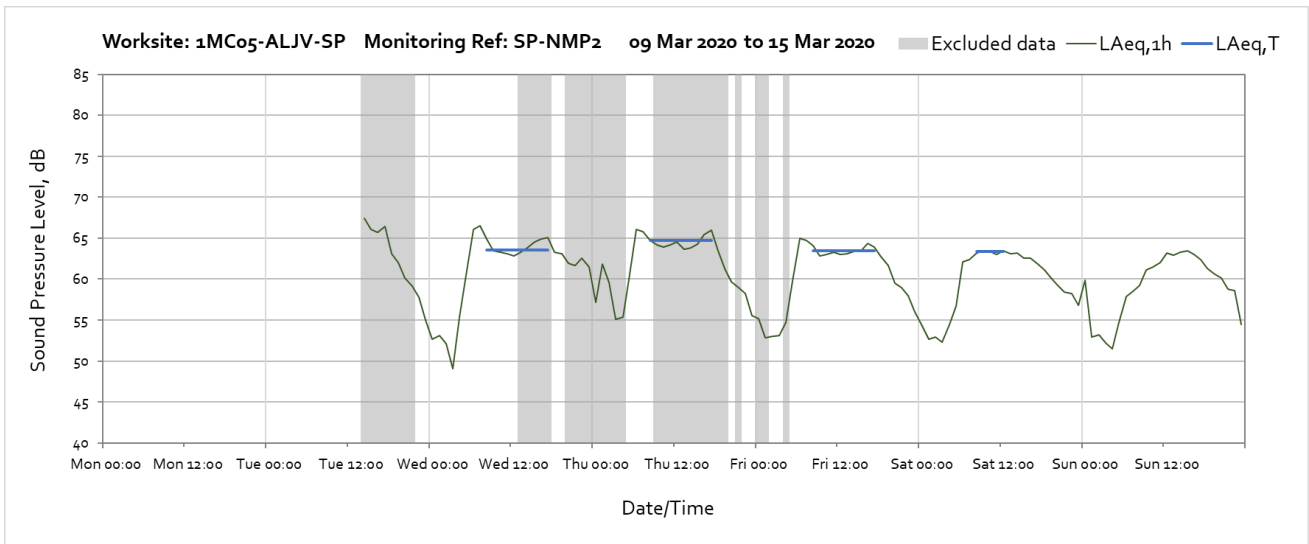


Worksite:1MC05-ALJV – Monitoring Ref: SP-NMP2

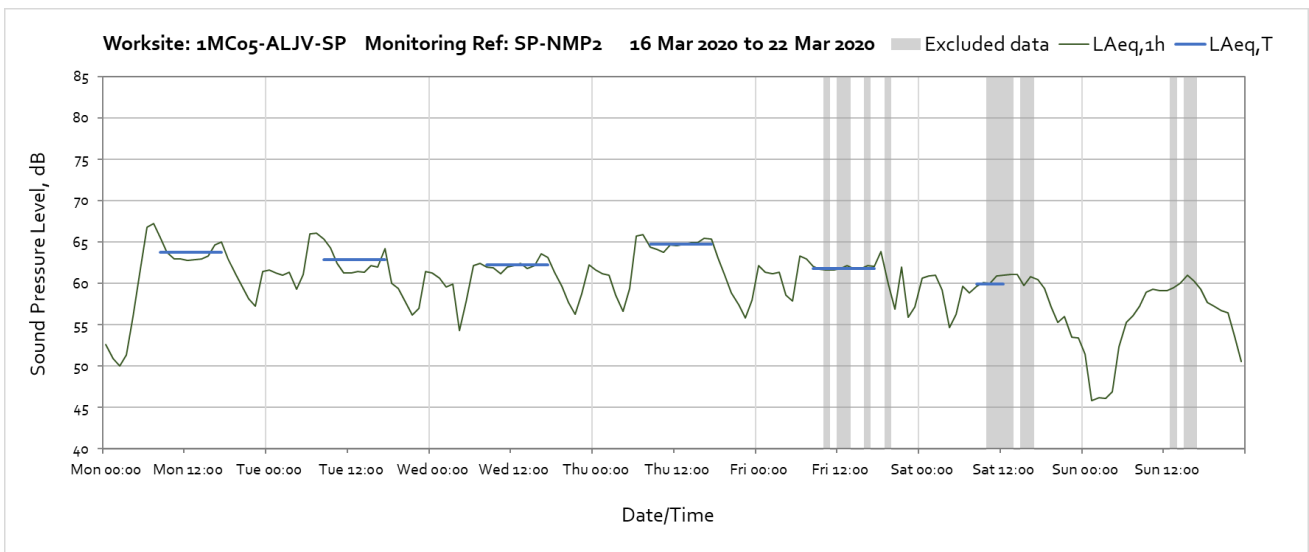


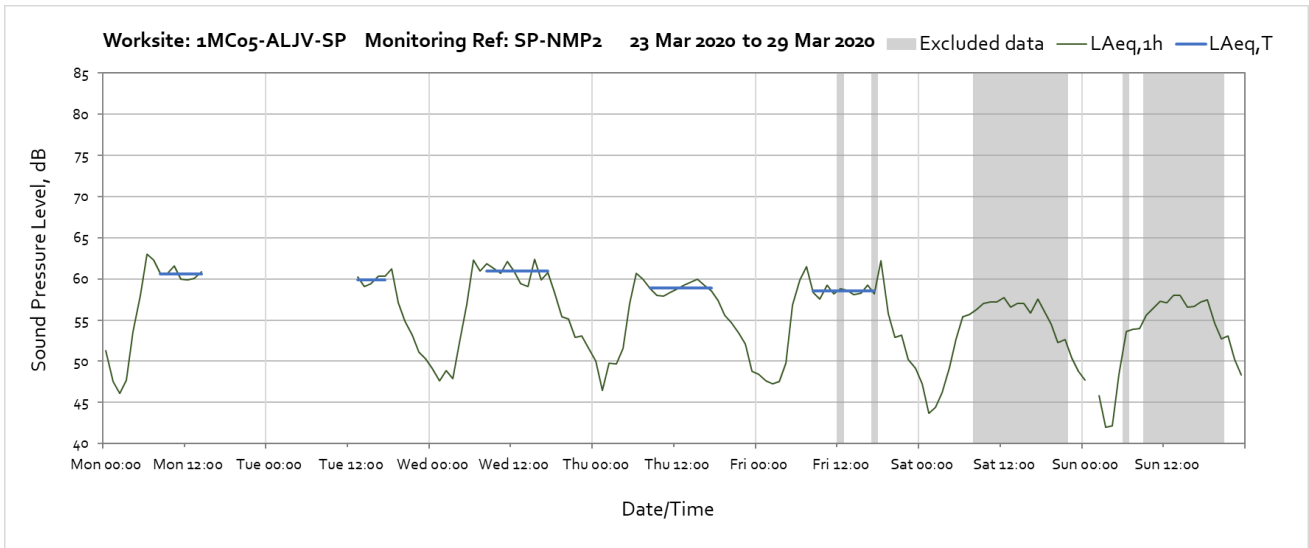


Note: Missing data between 02:00 on Sunday 7th and 13:00 on Tuesday 17th were due to a loss of power at the monitoring station.



Note: Missing data between 02:00 on Sunday 7th and 13:00 on Tuesday 17th were due to a loss of power at the monitoring station.





Note: Missing data between 15:00 on Monday 23rd and 13:00 on Tuesday 24th were due to a loss of power at the monitoring station. Missing data at 01:00 on Sunday 29th March was due to the clocks going forward at the start of British Summertime.

