

Construction noise and vibration Monthly Report – June 2019

Solihull Metropolitan 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 Solihull Metropolitan District (SMD) during the month of June 2019.

The report presents data from a noise monitoring installation in the vicinity of a utilities pipeline diversion worksite. Works included site establishment, preparation of working areas, tunnelling and utilities pipeline diversions. Details of works undertaken are presented in the report.

Due to the monitor being located on-site in close proximity to the location of works the measured noise levels are representative of construction noise near the source. Construction noise levels at the nearest noise sensitive receptors would be significantly lower than the measured noise levels (it is estimated approximately 5dB reduction) due to distance attenuation.

A number of exceedances of the SOAEL were measured during periods of works at the monitoring location. However, construction noise levels at the nearest receptors would be significantly lower and measured exceedances are not considered representative of SOAEL exceedances at receptor locations.

Measured noise levels were lower than levels predicted in the relevant S61 application and no S61 trigger levels exceedance was measured due to HS2 related works during the monitoring period.

No complaints were reported to HS2 for the SMD region during the June 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)'.
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.
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.
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 Solihull Metropolitan District (SMD) area for the period 1st to 30th June 2019.

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

- BPA Beechwood Embankment, Balsall Common, Pipeline Diversion (see plan 1 in Appendix A)
 - Works activities include mobilising the site and site establishment, preparation of working areas, pipe stringing, welding and coating, excavation of trenches, lowering and laying of pipes in the trench, backfilling of the trench, hand shield excavation and testing, survey and commissioning of pipeline.

1.1.3 Most site activities were undertaken during core working hours (between 08:00-18:00 on weekdays and 08:00-13:00 on Saturdays). However, tunnelling was undertaken continuously, including during night-time and weekend periods.

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 position of noise monitoring installations within the SMD area in June 2019.
- 1.2.2 A noise monitor was installed at the along the site perimeter at the end of June to acquire baseline noise information. A map showing the position of the noise monitoring installation is presented in Appendix B.

Table 2: Monitoring locations

Worksite Reference	Measurement Reference	Address
BPA Beechwood Embankment	Noise 1	Truggist Lane, Berkswell, CV7 7BW

2 Summary of results

2.1 Exceedances of SOAEL

- 2.1.1 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."
- 2.1.2 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.
- 2.1.3 Table 3 presents a summary of recorded exceedances of the SOAEL due to HS2 related construction noise at each measurement location over the reporting period, including the number of exceedances during each time period. For this monitoring period no exceedances of the SOAEL were recorded.

Table 3: Summary of exceedances of SOAEL.

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
BPA Beechwood Embankment	Noise 1 ⁽¹⁾	Truggist Lane	Weekday	1900-2200	11
			Saturday	1300-1400	2
			Sunday	0700-2200	1
			Night	2200-0700	19

⁽¹⁾ This monitor is located within the worksite and the measured noise levels and exceedances of the SOAEL at the measurement location are not representative of noise levels at the surrounding residential properties.

2.1.4 For the purpose of assessing eligibility for noise insulation or temporary rehousing, multiple exceedances of the SOAEL in a 24-hour period would be counted as a single exceedance during that day. Over the reporting period, the overall number of SOAEL exceedances at each measurement location is shown in Table 4 and may be lower than the total sum of individual exceedances reported in Table 3 for each location.

Table 4: Summary of total exceedances of SOAEL.

Worksite Reference	Measurement Reference	Site Address	Total of SOAEL exceedances in the month
BPA Beechwood Embankment	Noise 1 ⁽¹⁾	Truggist Lane	18

⁽¹⁾ This monitor is located within the worksite and the measured noise levels and exceedances of the SOAEL at the measurement location are not representative of noise levels at the surrounding residential properties.

2.1.5 A number of exceedances of the SOAEL were measured during periods of works at the monitoring location. However, construction noise levels at the nearest noise sensitive receptors would be significantly lower than the measured noise levels (it is estimated approximately 5dB reduction) due to distance attenuation. Therefore, the measured exceedances are not considered representative of SOAEL exceedances at receptor locations.

2.1.6 HS2 main construction activities were undertaken during core working hours and in accordance with S61. However, tunnelling was undertaken continuously, including during night-time and weekend periods.

2.2 Summary of measured noise levels

2.2.1 Table 5 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 The worksite is surrounded by agricultural fields and is predominantly rural in nature. The main source of environmental noise in the vicinity of the worksite is the Coventry-Birmingham railway line. Due to the monitor being located on-site in close proximity to the location of works the measured noise levels are representative of construction noise near the source. Construction noise levels at the nearest noise sensitive receptors would be significantly lower than the measured noise levels (it is estimated approximately 5 dB reduction).

Table 5: 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
BPA Beechwood Embankment	Noise 1 ⁽¹⁾	Truggist Lane	Free-field	57.2 (60.6)	58.7 (60.9)	57.1 (59.1)	60.0 (62.5)	56.6 (60.8)	52.8 (54.8)	55.6 (60.3)	53.9 (59.0)	55.4 (61.0)	52.4 (60.8)	54.6 (61.3)	50.3 (60.1)

⁽¹⁾ This monitor is located within the worksite and the measured noise levels and exceedances of the SOAEL at the measurement location are not representative of noise levels at the surrounding residential properties.

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
-	-	-	-	-	-

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

2.4 Complaints

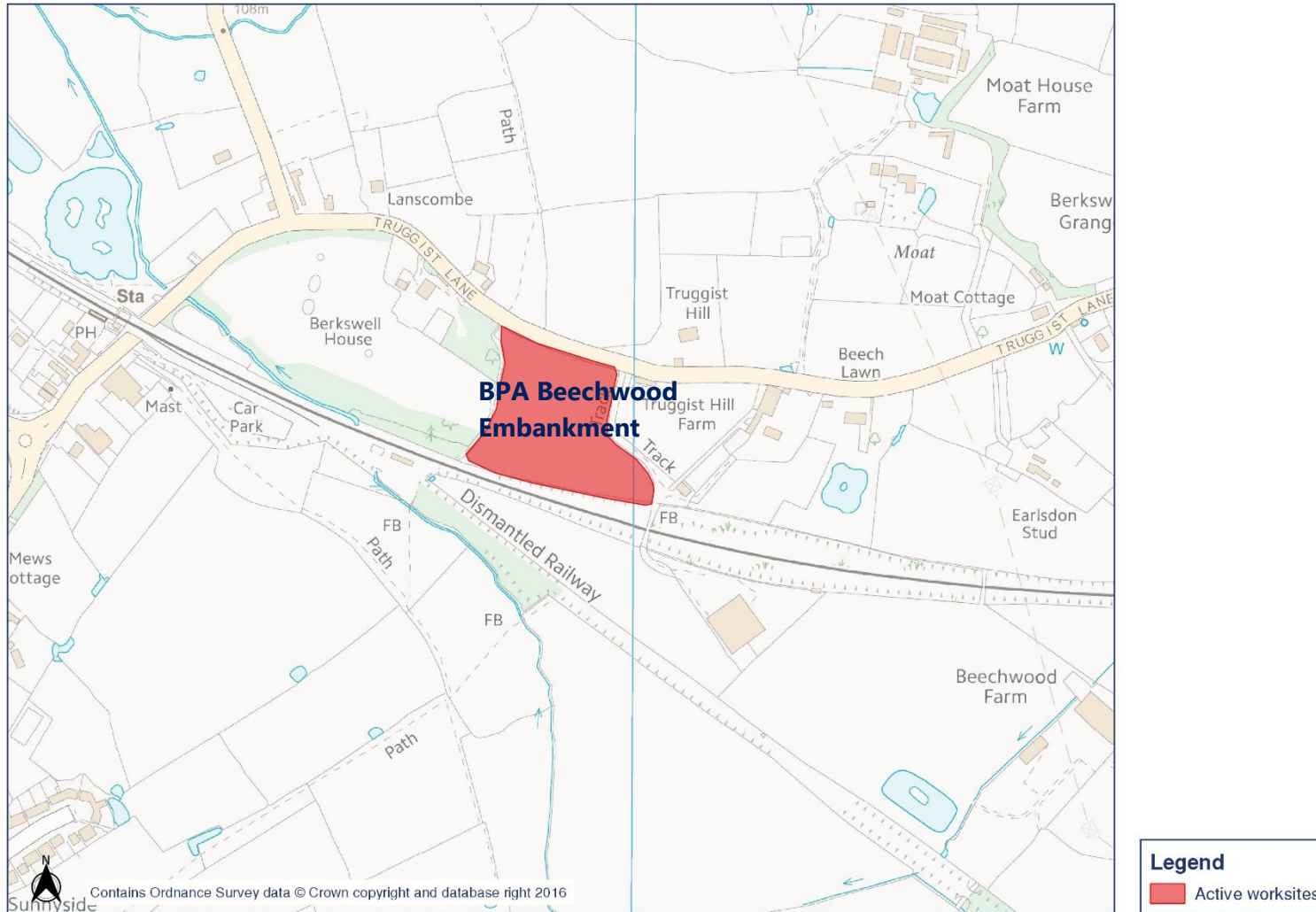
2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 7: Summary of complaints.

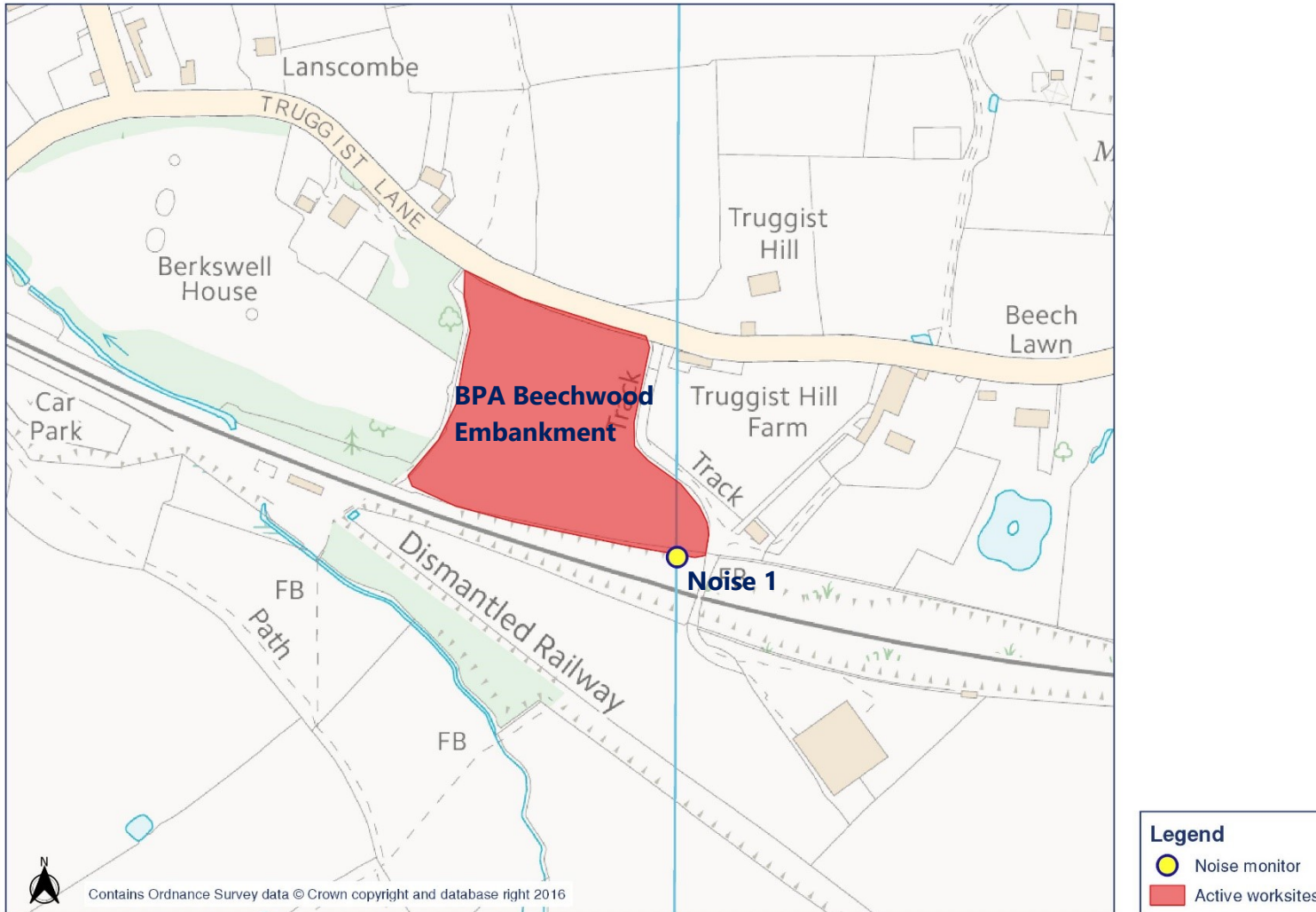
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
-	-	-	-	-

2.4.2 No complaints were received during the reporting period.

Appendix A Site Locations



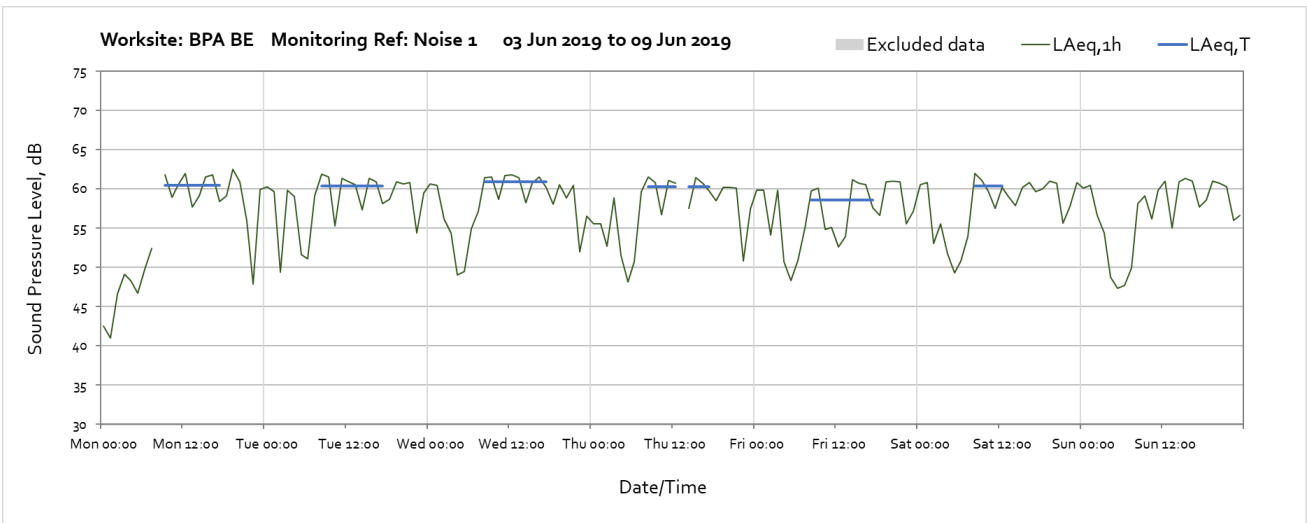
Appendix B Monitoring Locations



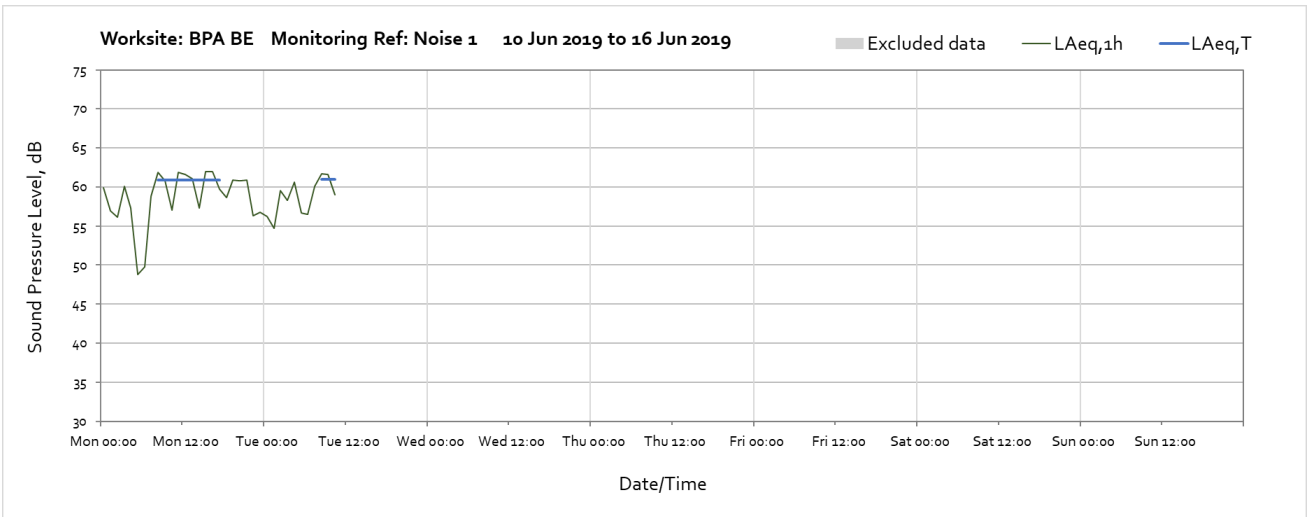
Appendix C Data

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.

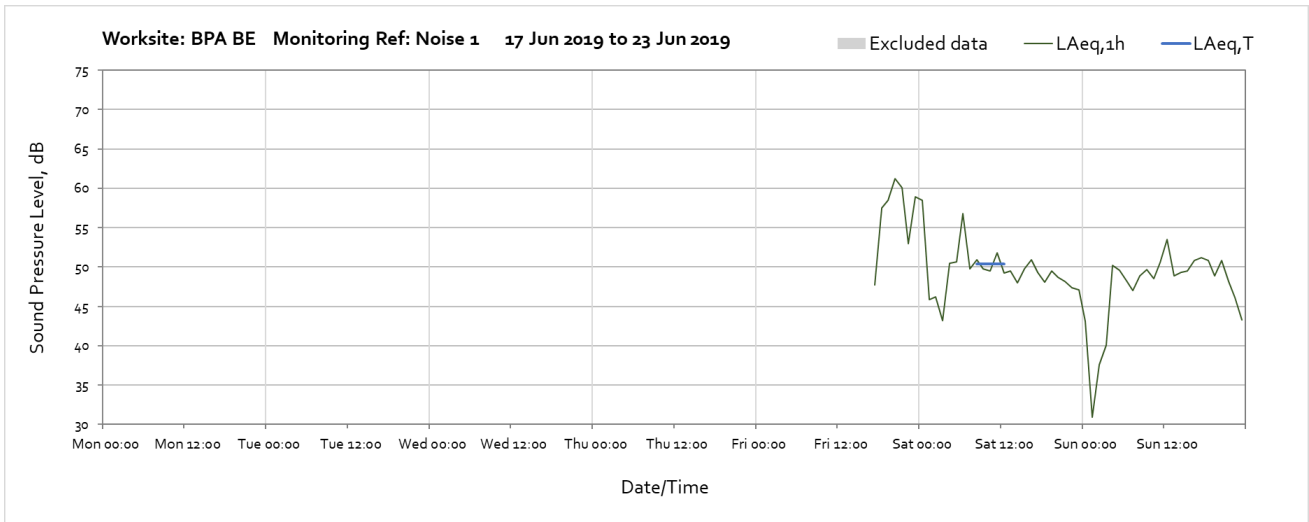
Worksite: BPA Beechwood Embankment (BPA BE) – Monitoring Ref: Noise 1



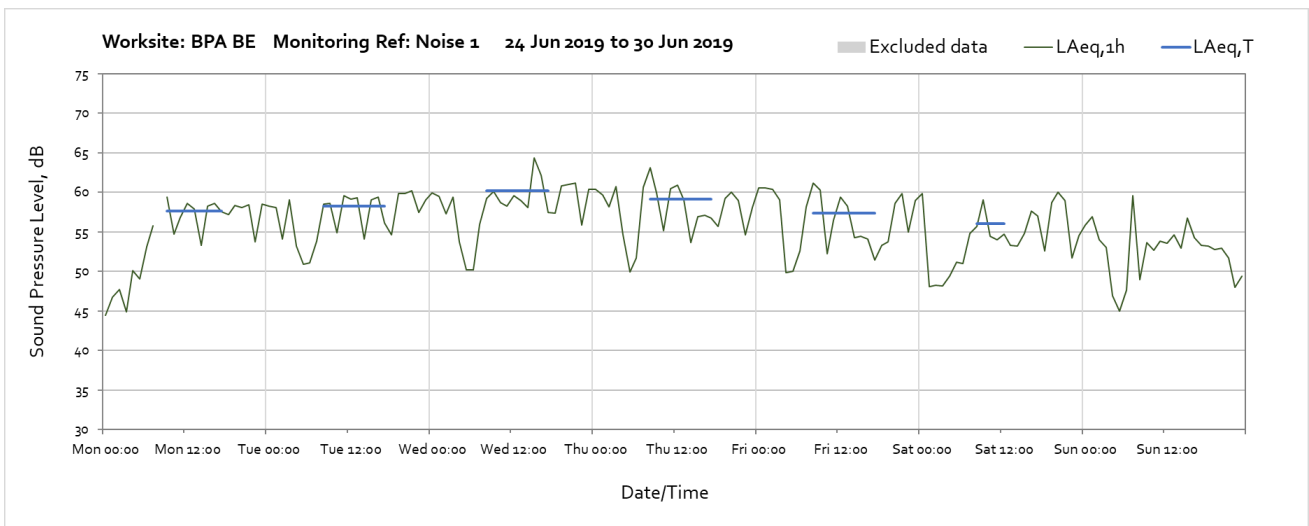
Note: Missing data at 08:00 on Monday 3rd June and 13:00 on Thursday 6th of June was due to monitor replacement.



Note: Missing data between 11:00 Tuesday 11th of June to 17:00 on Friday 21st of June was due to loss of power at the monitoring station.



Note: Missing data between 11:00 Tuesday 11th of June to 17:00 on Friday 21st of June was due to loss of power at the monitoring station.



Note: Missing data on 08:00 on Monday 24th of June was due to monitor replacement.