

## **Construction noise and vibration Monthly Report – September 2019**

**Warwick 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 Warwick District (WD) during the month of September 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 and utilities pipeline diversions. Details of works undertaken are presented in the report.

Given the offset distance between the monitors and the location of works and the nature of works currently being undertaken the measured noise levels during working periods are largely dominated by the underlying ambient noise levels, rather than being attributable to HS2 construction noise. However, it is acknowledged that HS2 works have been taking place within the area and the measured noise levels may on occasion be affected by construction noise. Following completion of works the noise monitors were removed on the 27<sup>th</sup> of September.

No exceedances of the SOAEL and no exceedances of S61 trigger levels due to HS2 related works were measured during the monitoring period. No complaints were reported to HS2 for the WD region during the September 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 Warwick District (WD) Area for the period 1<sup>st</sup> to 30<sup>th</sup> September 2019.

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

- Burton Green Pipeline Diversion (BGPLD) (see plan 1 in Appendix A)
  - Works activities include site mobilisation and site establishment, preparation of working areas, pipe stringing, welding and coating, trench excavation, lowering and laying of pipes in the trench, backfilling the trench, horizontal drilling under the future HS2 track and testing, survey and commissioning of pipeline and reinstatement of site.

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 position of noise monitoring installations within the WD area in September 2019.

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

Table 2: Monitoring locations

Worksite Reference	Measurement Reference	Address
Burton Green Pipeline Diversion (BYPD)	Noise 1	Red lane, Burton Green, north-west of worksite
	Noise 2	Red lane, Burton Green, south-east of worksite

1.2.3 Following completion of works the noise monitors were removed on the 27<sup>th</sup> of September.

## 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
BYPD	Noise 1	Red lane, Burton Green, north-west of worksite	All days	All periods	No exceedance
	Noise 2	Red lane, Burton Green, north-west of worksite	All days	All periods	No exceedance

2.1.4 HS2 main construction activities were undertaken during core working hours and in accordance with S61.

## 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 Given the nature of works currently being undertaken in the WD area the measured noise levels during working periods are largely dominated by underlying ambient noise levels, rather than being attributable to HS2 construction noise. However, it is acknowledged that HS2 works have been taking place within the area and the measured noise levels may on occasion be affected by construction noise.

Table 4: Summary of measured dB L<sub>Aeq</sub> data over the monitoring period.

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )					Saturday Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )					Sunday / Public Holiday Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
BGPD	Noise 1	Red lane, Burton Green, north-west of worksite	Free-field	56.2 (59.2)	58.2 (65.1)	53.5 (56.2)	50.2 (54.1)	45.6 (57.0)	51.6 (52.3)	55.0 (56.3)	52.6 (54.7)	52.7 (57.3)	43.7 (49.8)	51.0 (56.4)	44.5 (52.1)
	Noise 2	Red lane, Burton Green, south-east of worksite	Free-field	54.7 (67.5)	53.4 (59.4)	45.2 (49.9)	42.3 (46.8)	42.7 (52.2)	47.2 (48.6)	46.3 (47.7)	46.7 (49.8)	44.3 (51.4)	39.4 (47.8)	44.4 (47.8)	41.3 (48.7)



## 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

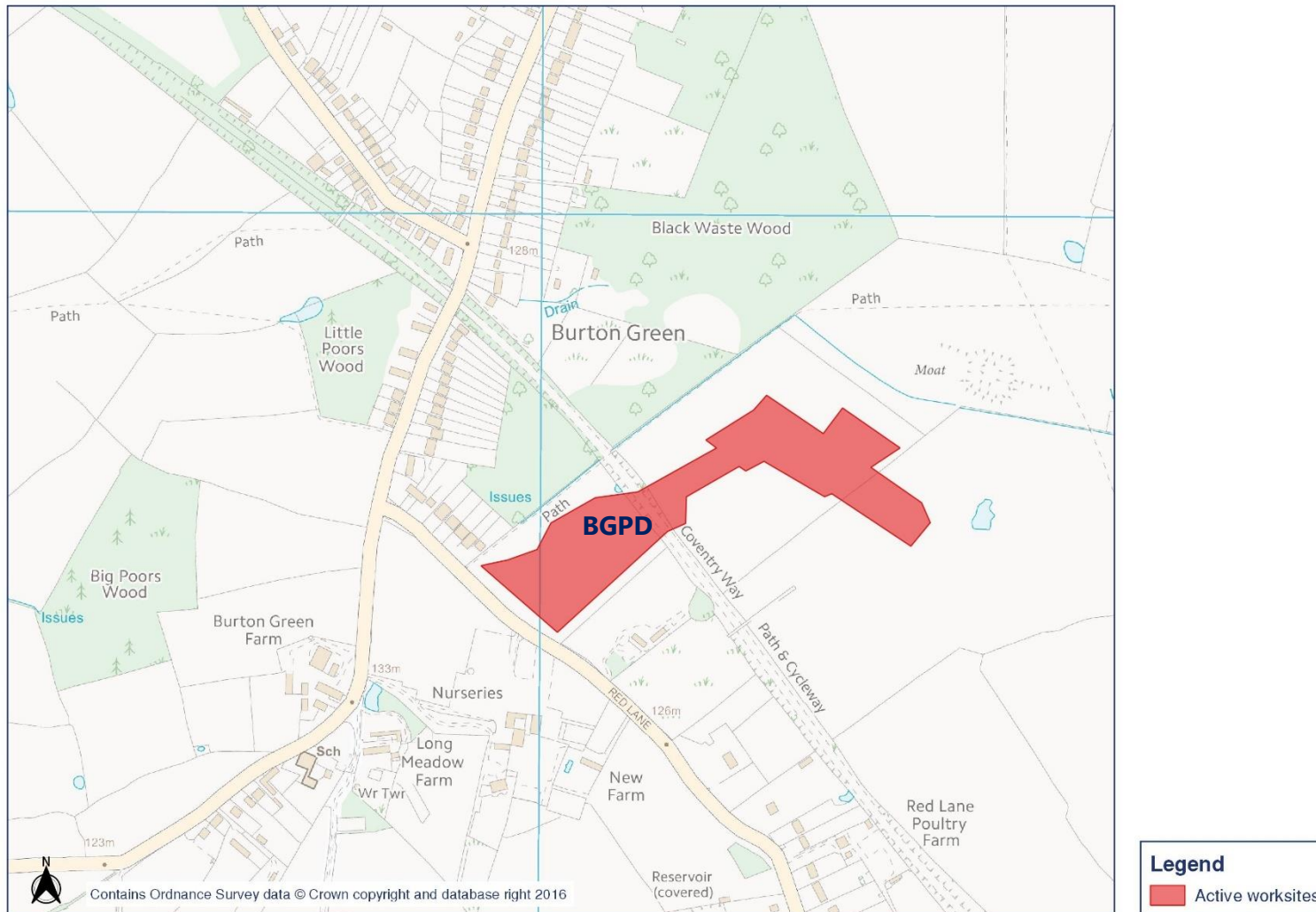
2.4.1 Table 6 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 6: Summary of complaints.

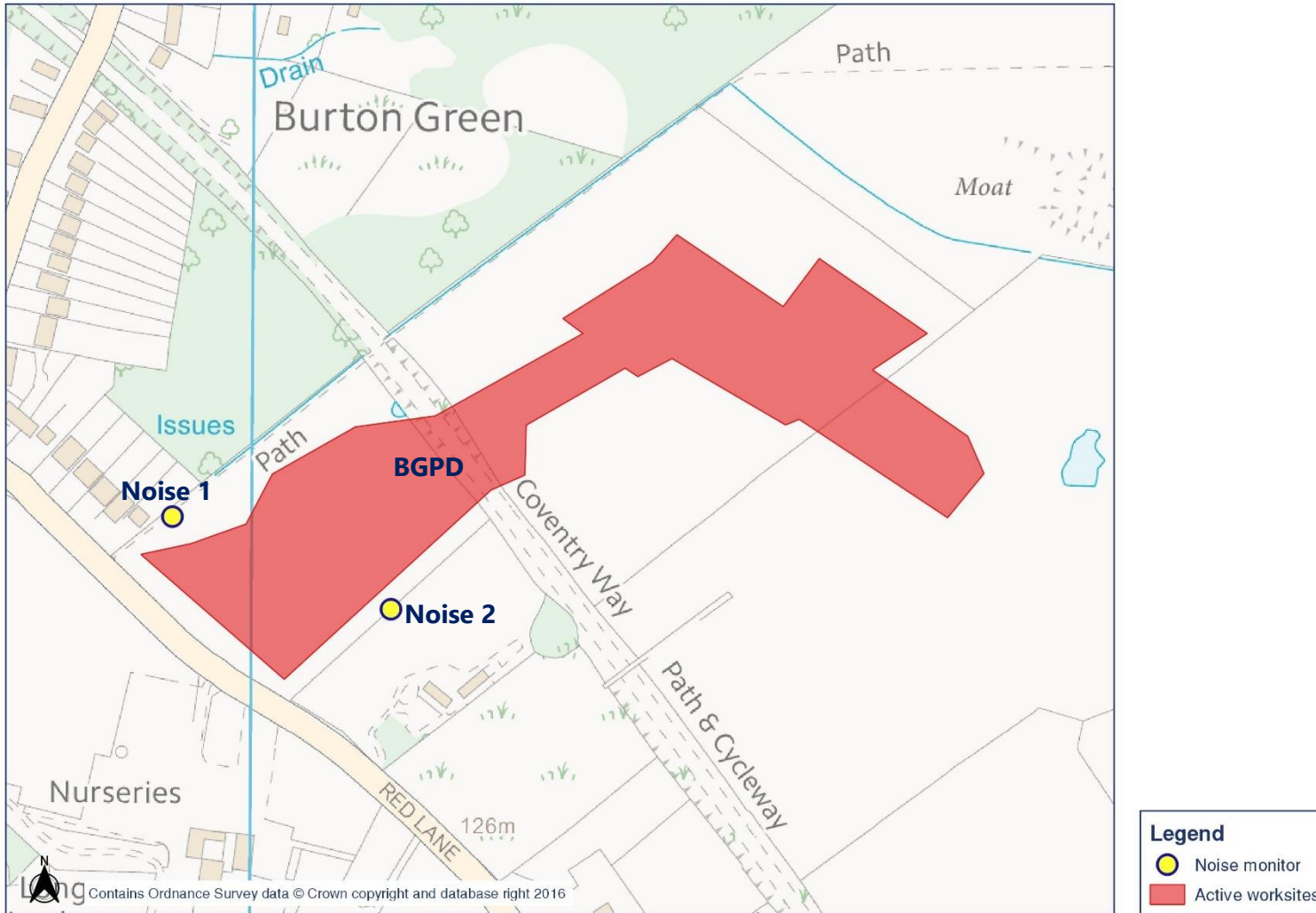
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
-	-	-	-	-

2.4.2 No complaints were received during the reporting period.

# Appendix A Site Locations



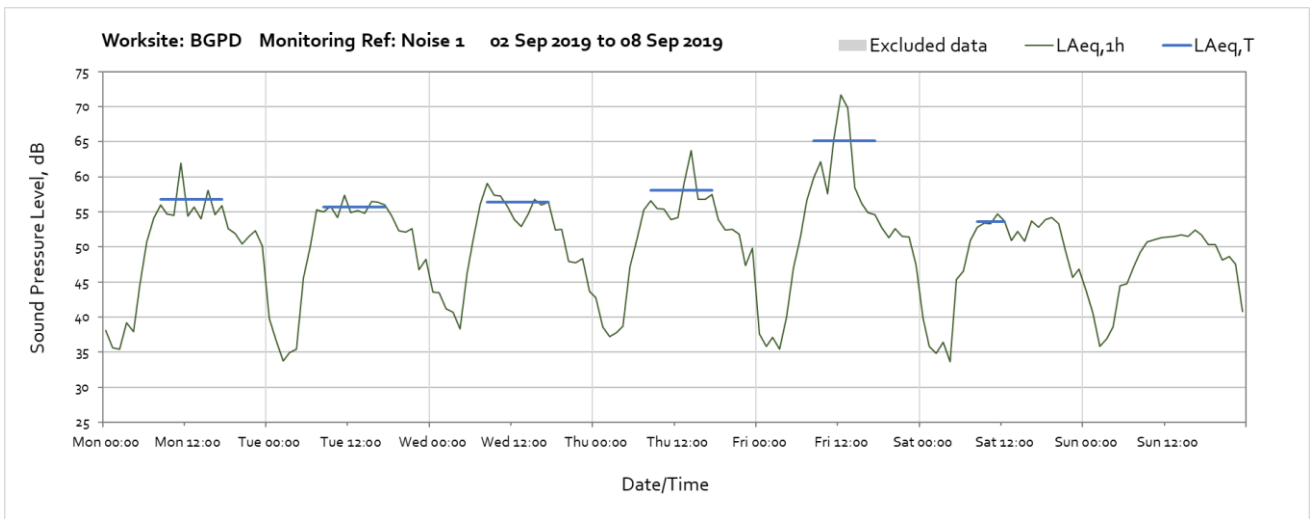
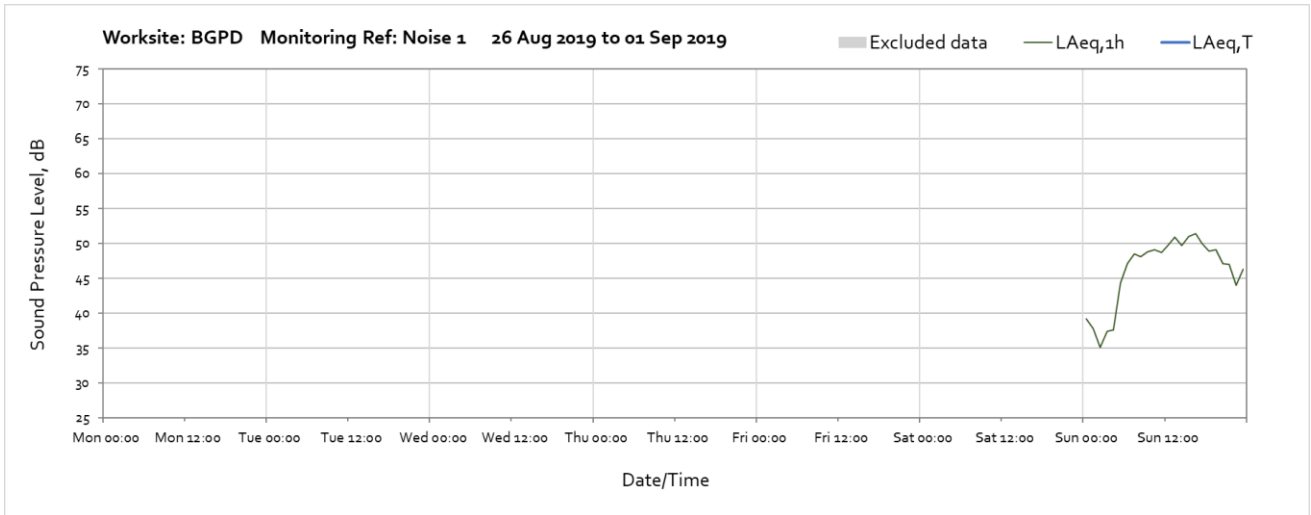
# Appendix B Monitoring Locations

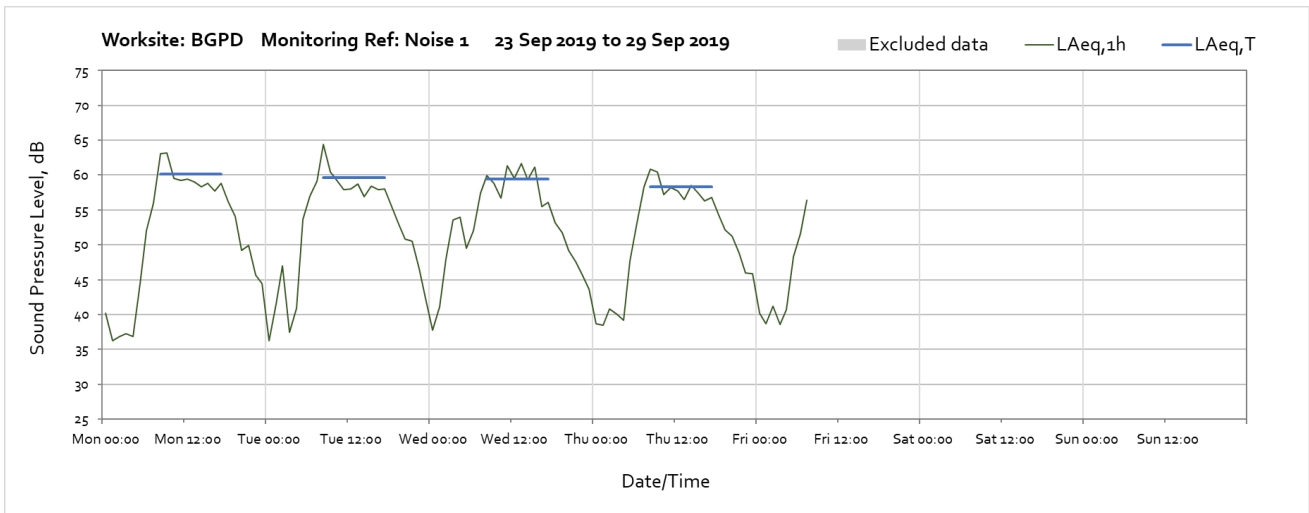
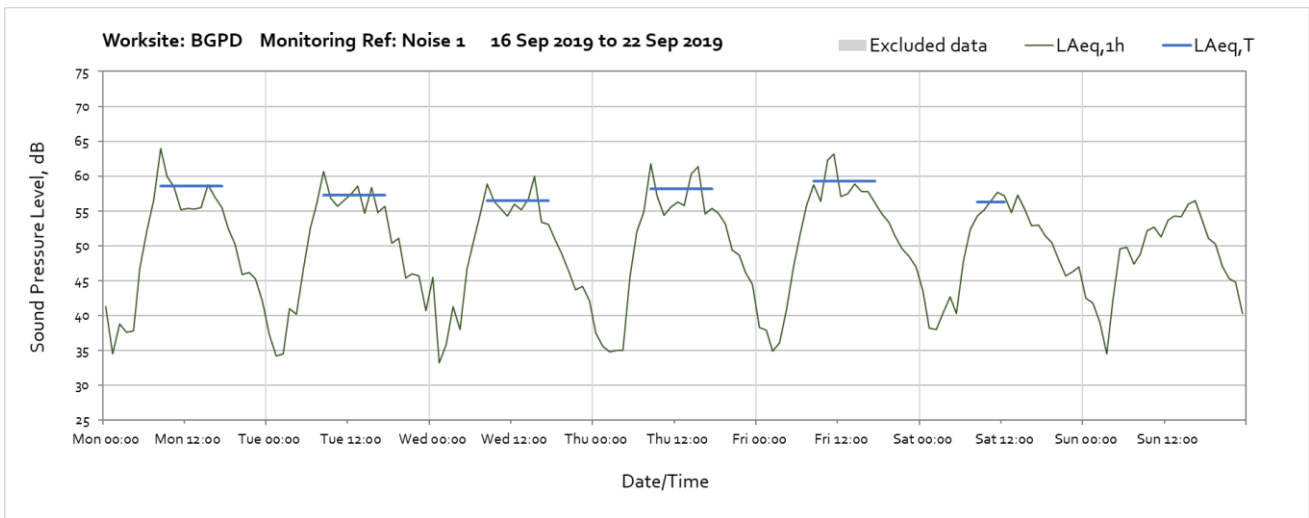
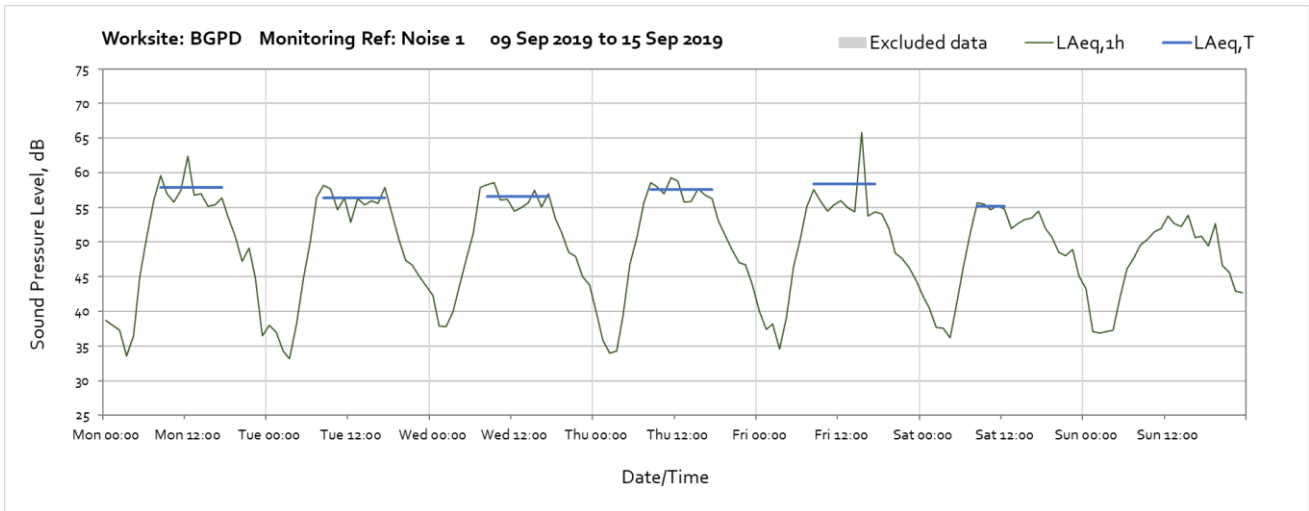


# Appendix C Data

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.

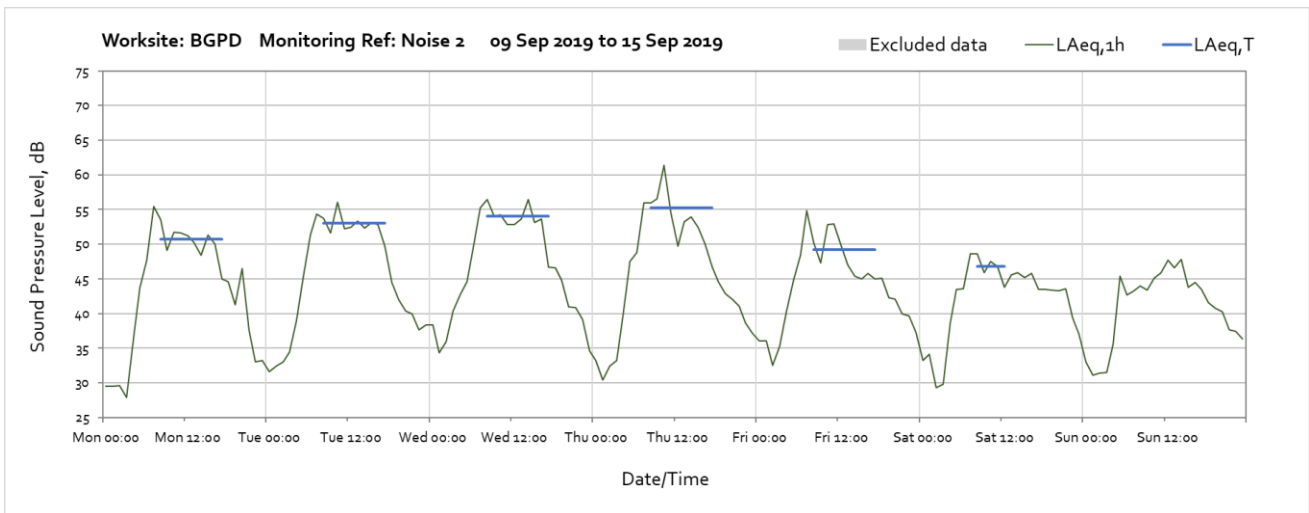
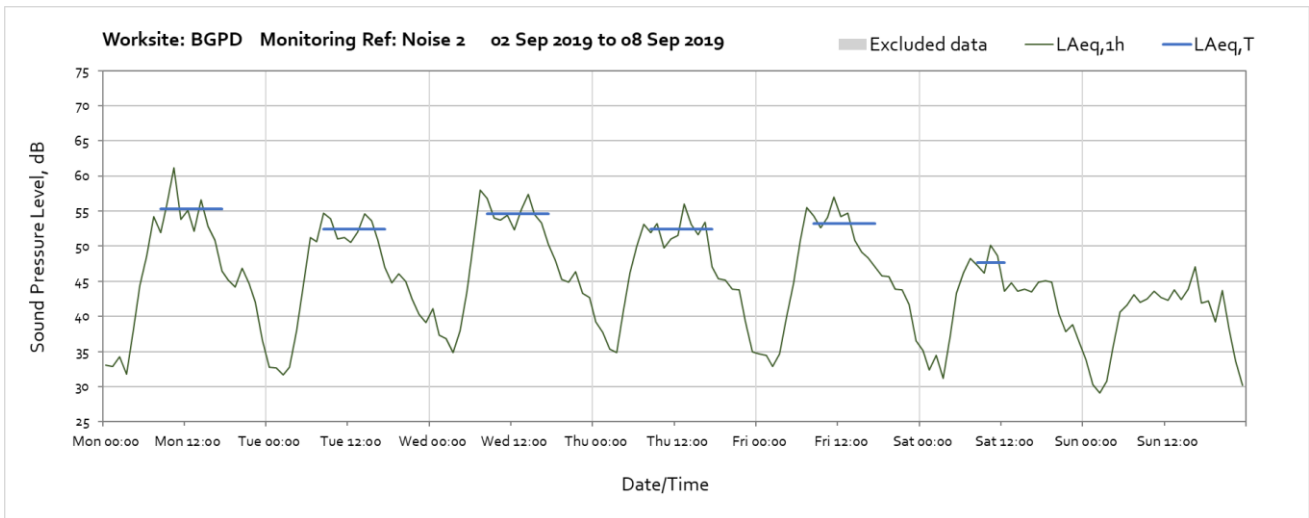
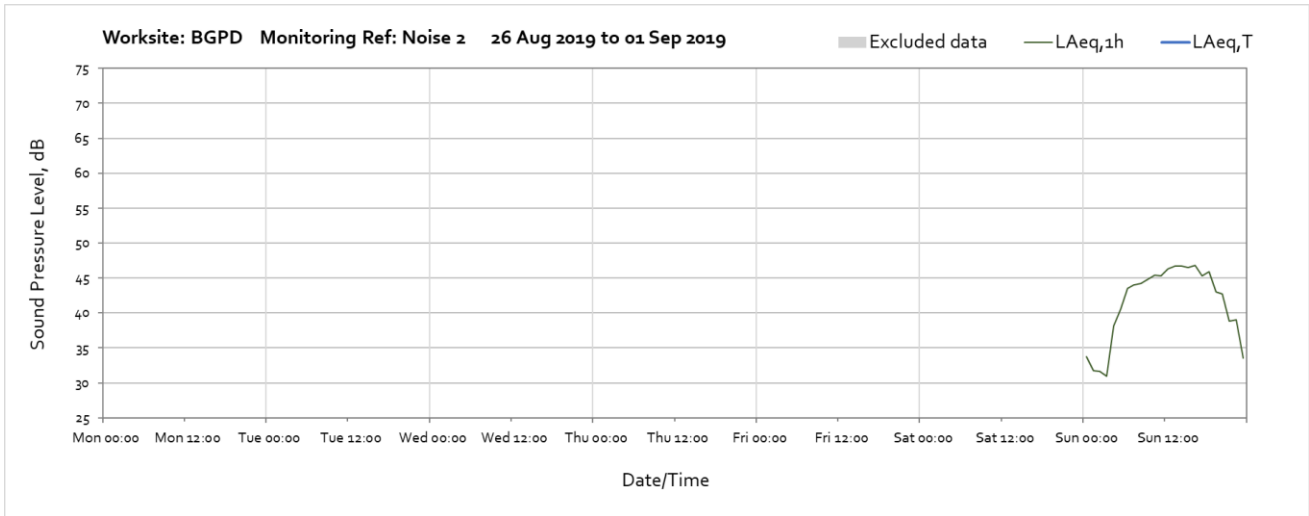
## Worksite: BGPD – Monitoring Ref: Noise 1



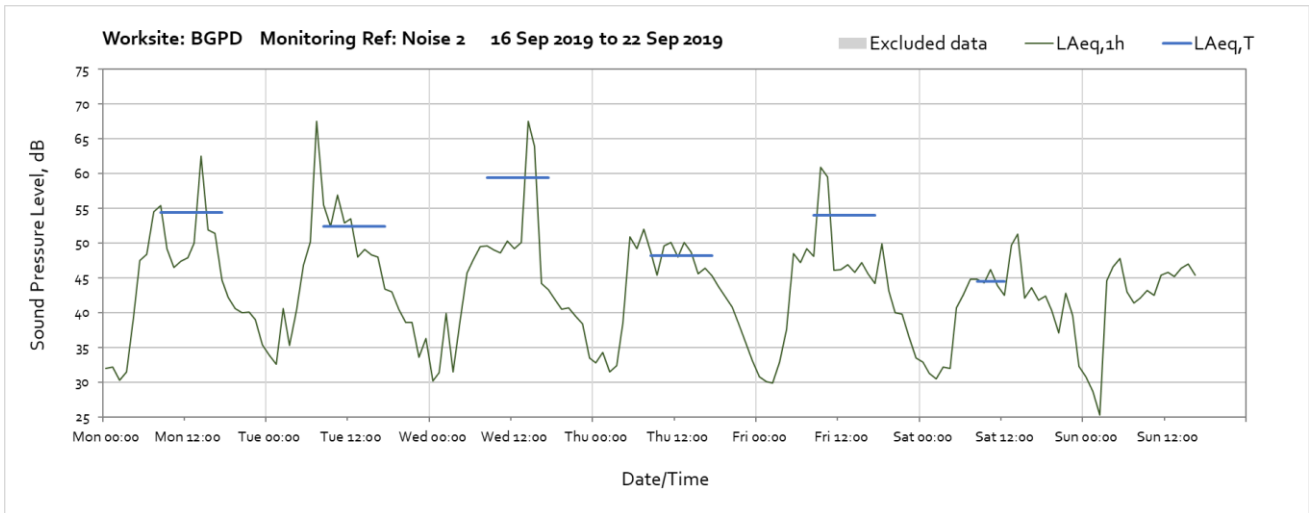


Note: Following completion of the works the monitor was removed at 07:00 on Friday 27<sup>th</sup>.

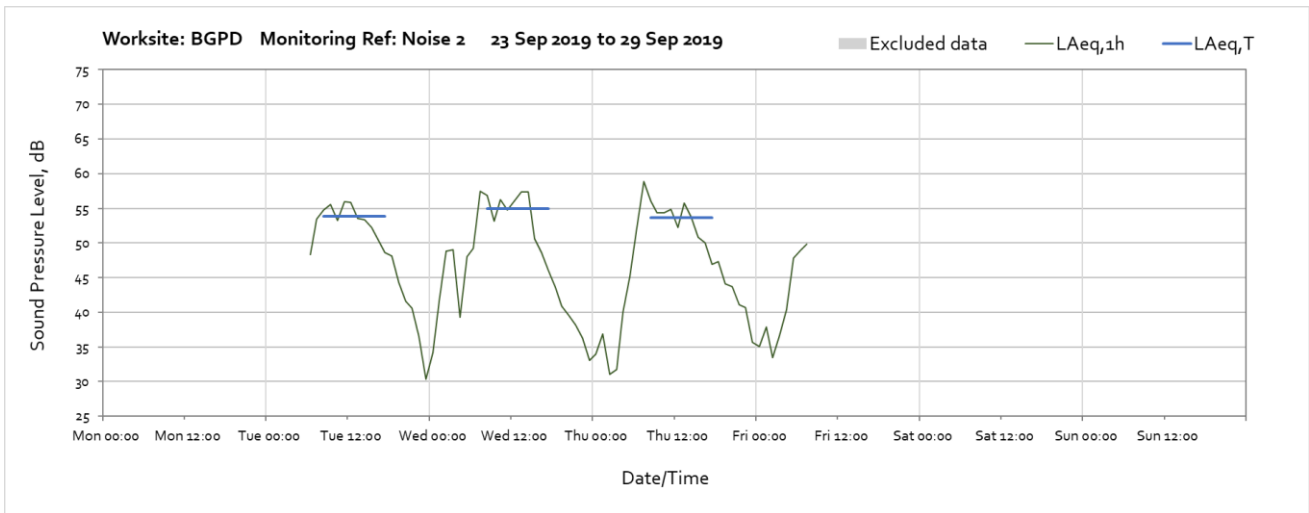
# Worksite: BGPD – Monitoring Ref: Noise 2







Note: Missing data between 17:00 on Sunday 22<sup>nd</sup> and 05:00 on Tuesday 24<sup>th</sup> of September was due to a technical fault with the monitoring station.



Note: Missing data between 17:00 on Sunday 22<sup>nd</sup> and 05:00 on Tuesday 24<sup>th</sup> of September was due to a technical fault with the monitoring station. Following completion of the works the monitor was removed at 08:00 on Friday 27<sup>th</sup>.