HS2

July 2020

Construction noise and vibration Monthly Report – May 2020

Solihull Metropolitan District

gov.uk/hs2

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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 May 2020.

This report presents data from two noise monitoring installations near the Park Lane worksite and two noise monitoring installations near the Work Package 62 (WP62) worksite. Works at the Park Lane worksite included installation of ducting and drainage along Park Lane and utilities diversion on A452. Works at the WP62 worksite included earthworks and construction of an attenuation pond, excavation of utility trench and construction of a compound extension.

The measured noise levels in May exceeded guideline criteria for significant adverse effects on one occasion during night-time works to remove traffic management measures along the A452. No exceedance of Section 61 noise levels was measured and no complaints were reported to HS2 for the SMD region during the May monitoring period.

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 $L_{pAeq,T}$	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 Solihull Metropolitan District (SMD) area for the period 1st to 31st May 2020.

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

- Park Lane worksite (see plan 1 and 2 in Appendix A)
  - Site activities including installation of ducting and drainage along Park lane and utility diversion works on the A452. Removal of traffic management along the A452 was undertaken during the night of 5th of May. All other site activities in May were undertaken during core working hours between 08:00-18:00 on weekdays.

- Work Package 62 (WP62) worksite (see plan 1 and 3 in Appendix A)
  - Site activities including excavation and construction of an attenuation pond to the immediate east of the B4438 roundabout, excavation of utility trench parallel to the B4438 and around the Fujitsu factory and construction of a new compound extension at Quartz Point. Site activities in May were mainly undertaken during core working hours (between 08:00-18:00 on weekdays and 08:00-13:00 on Saturdays), except for occasional night works during week commencing 18th of May requiring road closures.

Further utility works were also undertaken in Kenilworth Road, Balsall Common (gas line between Austey and Barston); and East Car Park Road, NEC Birmingham (works at overhead power lines).

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 presents the position of the noise monitoring installation within the SMD area in May 2020.

1.2.2 To avoid confusion, noise monitors in proximity to worksite WP62 and referred to as Loc 1 and Loc 2 in previous reports will be referred to as Loc 3 and Loc 4 in this and future reports.

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
Park Lane	Loc 1	Willow Cottage
	Loc 2	Final Home
WP62	Loc 3	Birmingham Business Park, Solihull Parkway, Solihull, B37 7YU
	Loc 4	Holiday Inn Express, Bickenhill Parkway, Solihull, B40 1QA

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 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
Park Lane	Loc 1	Willow Cottage	Night	2200-0700	2	2
	Loc 2	Final Home	Weekday	0800-1800	2	No exceedance
WP62	Loc 3	Birmingham Business Park	Night	2200-0700	29	No exceedance
	Loc 4	Holiday Inn Express	Weekday	0800-1800	2	No exceedance
			Night	2200-0700	29	No exceedance

2.1.5 HS2 construction activities were mainly undertaken between 08:00 and 18:00 on weekdays at the Park Lane worksite, and between 08:00 and 18:00 on weekdays and between 08:00 and13:00 on Saturdays at the WP62 worksite.

2.1.6 Night-time works were undertaken during the night of 5th May to remove traffic management measures along the A452. During this period noise levels above the SOAEL were measured for two hours. There were also occasional night-time works at the WP62 worksite during week commencing 18th of May requiring road closures, no exceedances of the SOAEL were recorded during these times. All works were undertaken in accordance with the approved Section 61.

2.1.7 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	Monitor Address	Total of SOAEL exceedances in the month
Park Lane	Loc 1	Willow Cottage	1

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.

Table 5: 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
Park Lane	Loc 1	Willow Cottage	Free-field	54.7 (58.0)	55.3 (62.6)	52.2 (55.8)	52.1 (65.4)	49.9 (66.6)	51.3 (54.1)	53.3 (56.7)	54.0 (57.4)	51.9 (56.5)	45.3 (51.1)	52.0 (58.6)	47.8 (57.3)
	Loc 2	Final Home	Free-field	54.0 (65.8)	54.7 (65.4)	45.1 (58.6)	43.8 (51.2)	44.4 (57.4)	46.2 (57.4)	47.6 (59.8)	48.6 (60.0)	45.8 (58.8)	42.8 (52.4)	46.6 (51.1)	45.1 (67.7)
WP62	Loc 3	Birmingham Business Park	Free-field	63.5 (67.6)	61.4 (66.0)	58.9 (63.2)	58.5 (62.7)	57.8 (63.9)	56.8 (58.0)	56.5 (58.9)	56.7 (59.3)	57.1 (61.5)	53.2 (60.2)	57.7 (64.6)	56.1 (64.4)
	Loc 4	Holiday Inn Express	Free-field	61.9 (68.2)	62.2 (65.6)	59.6 (64.7)	59.5 (69.6)	59.6 (69.9)	57.6 (58.4)	58.4 (59.2)	58.8 (60.7)	56.6 (61.3)	58.7 (78.7)	58.3 (64.1)	58.6 (77.7)

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.

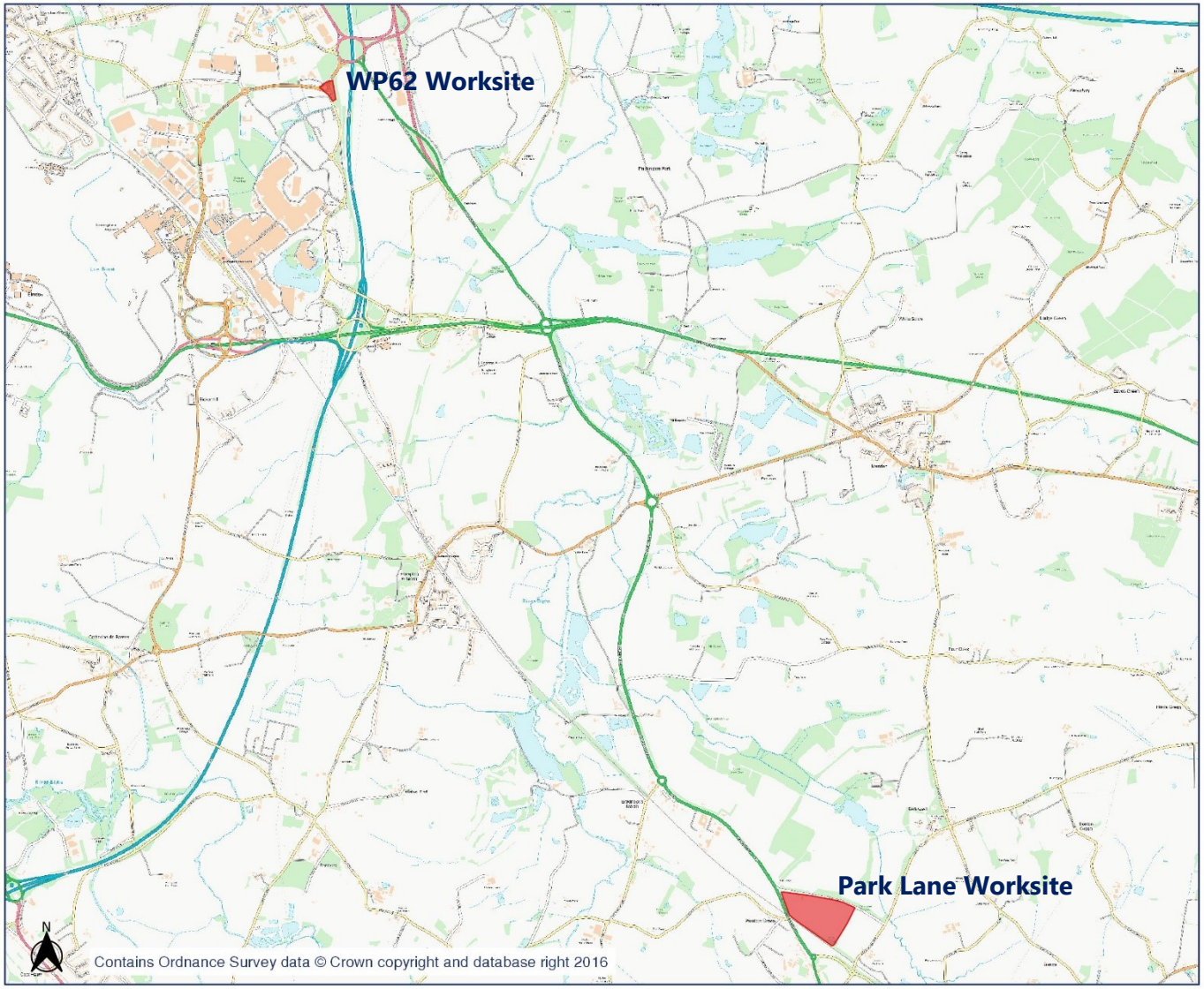
Table 7: Summary of complaints

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

2.4.2 No complaints were received during the reporting period.

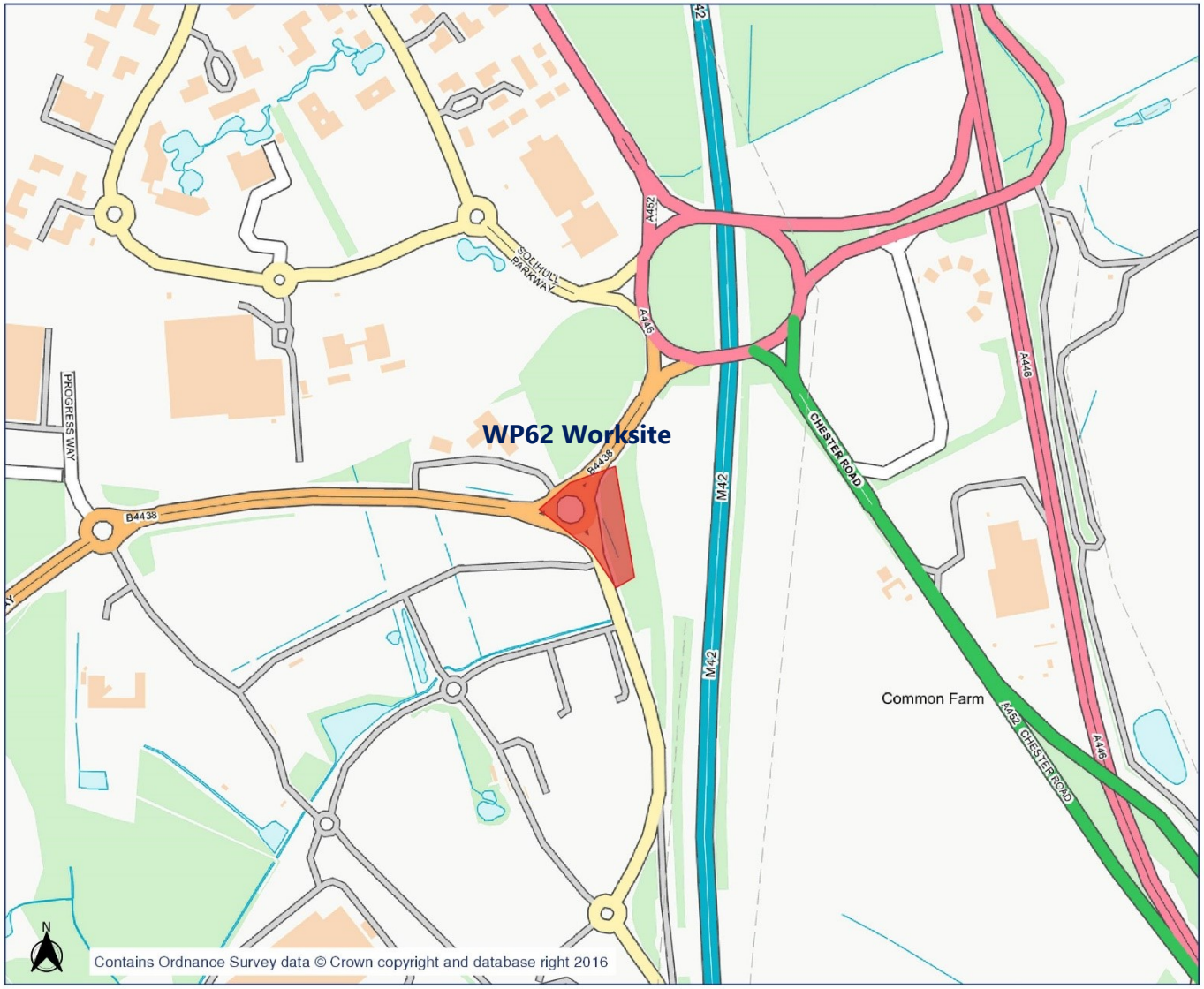
Appendix A Site Locations

Worksite identification plan - 1



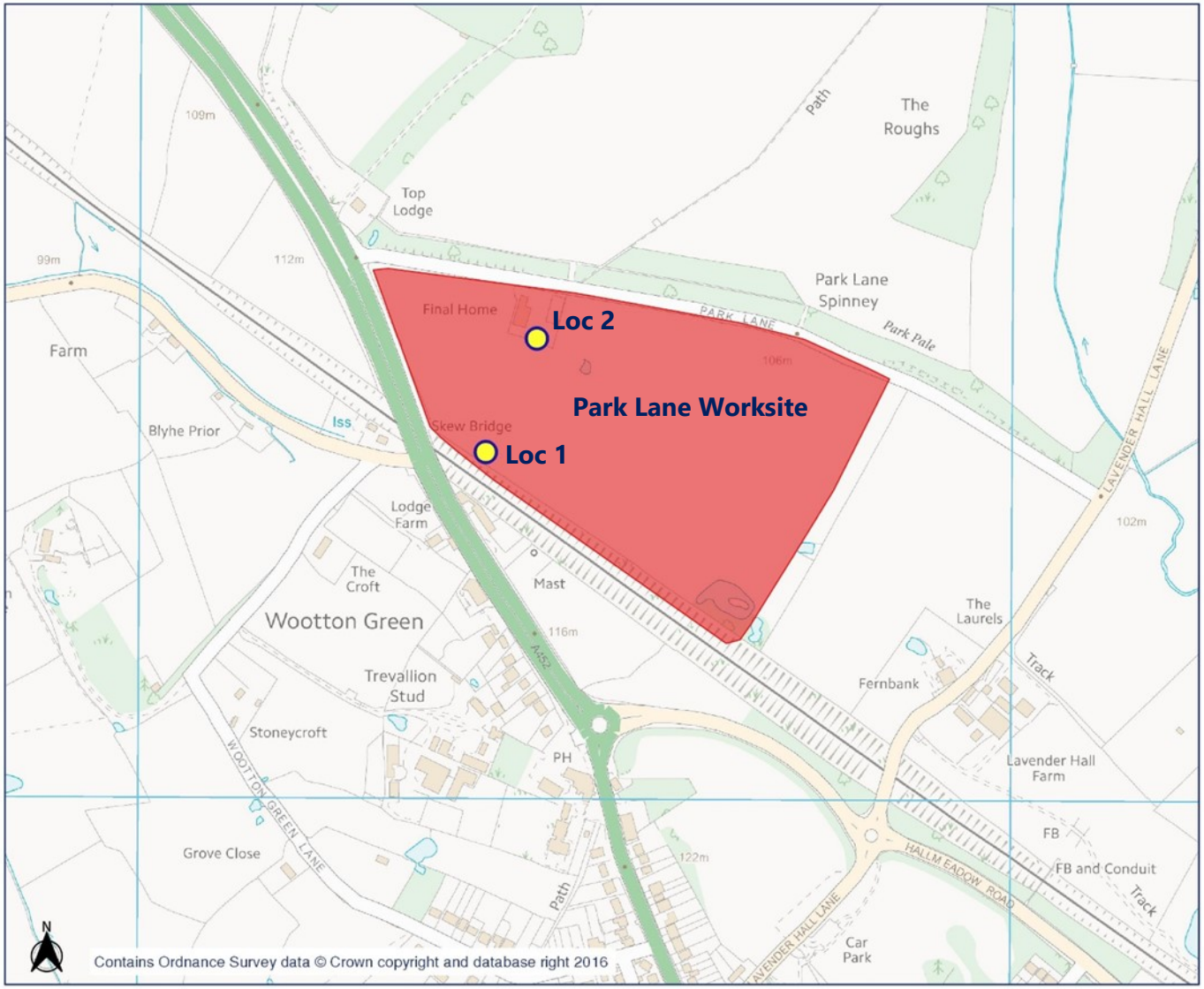
Worksite identification plan - 2

Worksite identification plan - 3

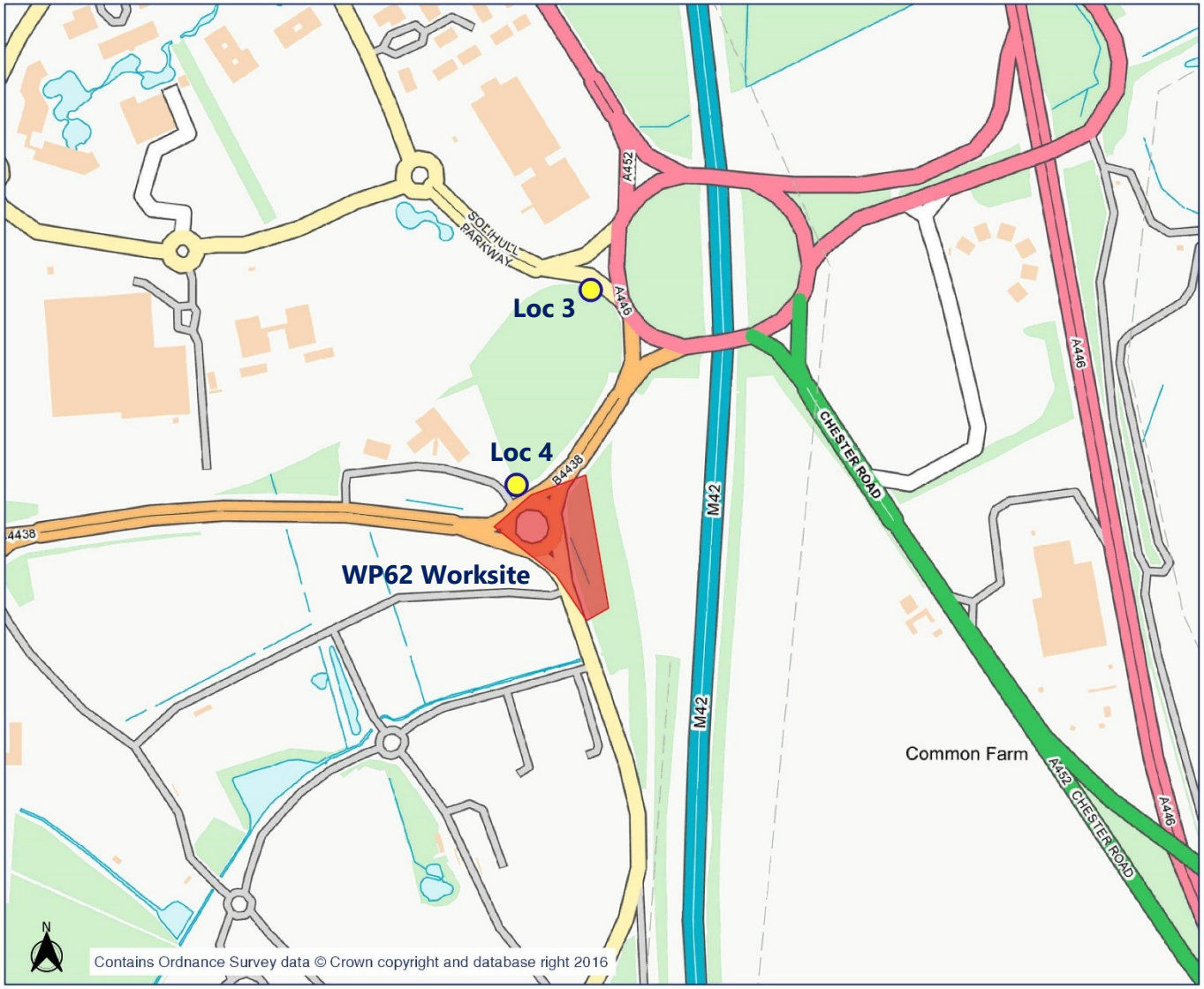


Appendix B Monitoring Locations

Noise monitoring plan - 1



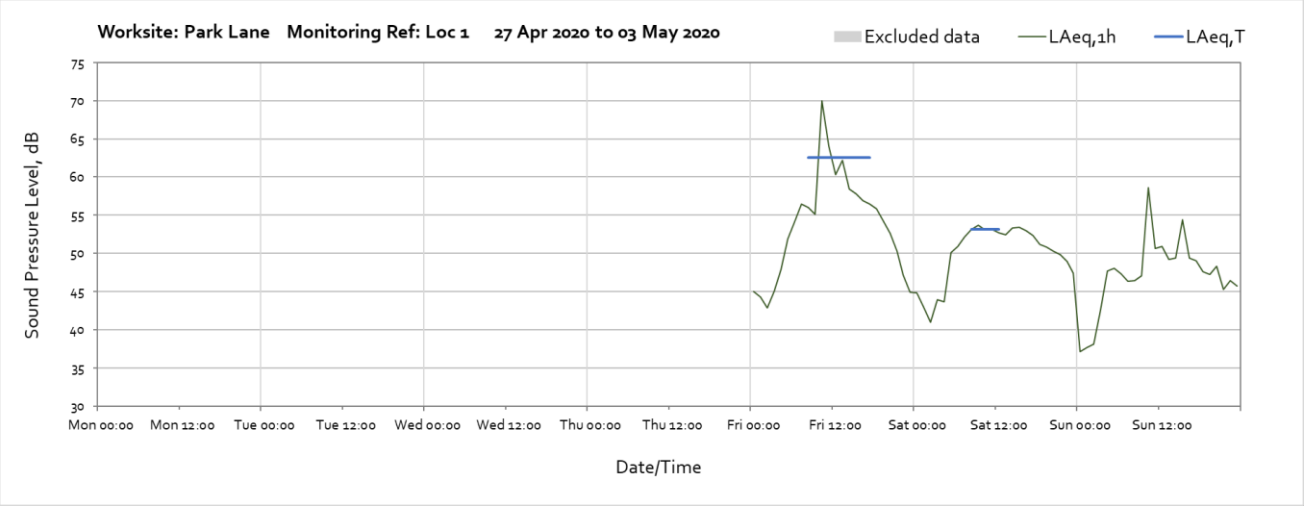
Noise monitoring plan - 2

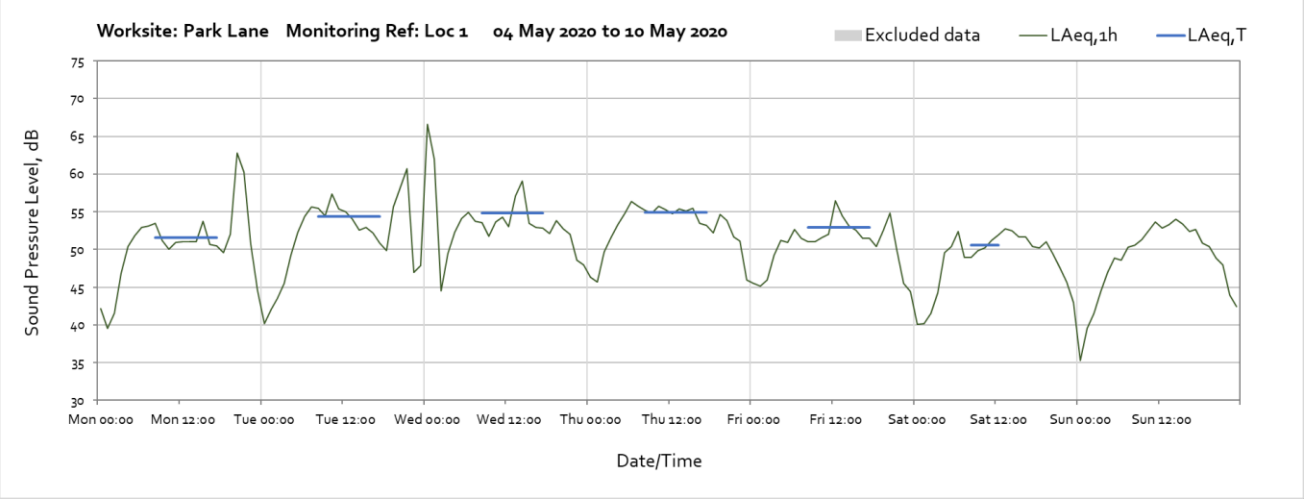


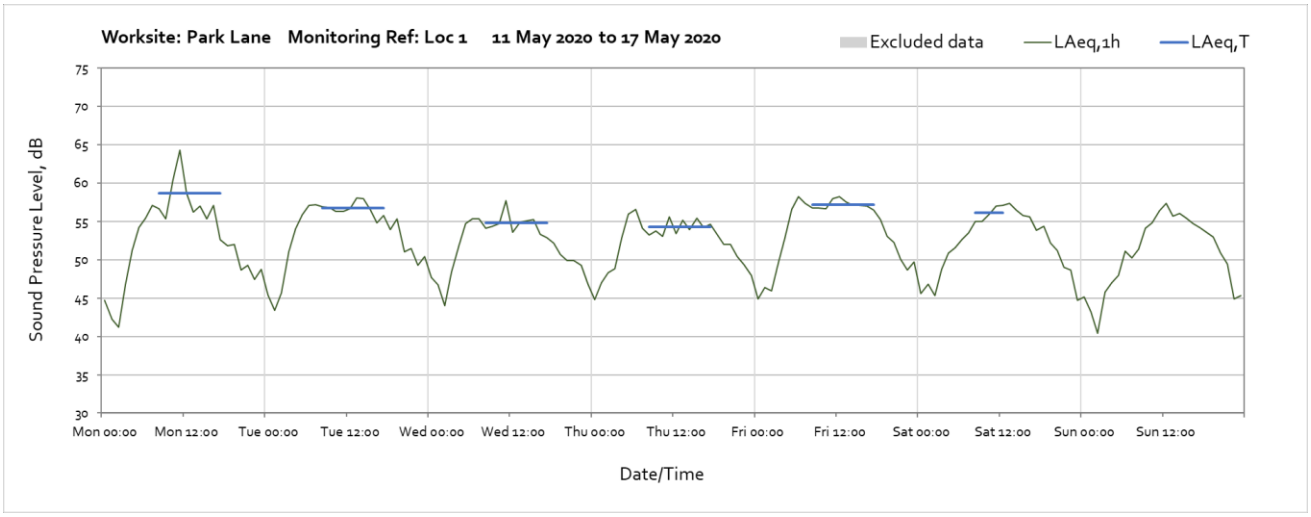
Appendix C Data

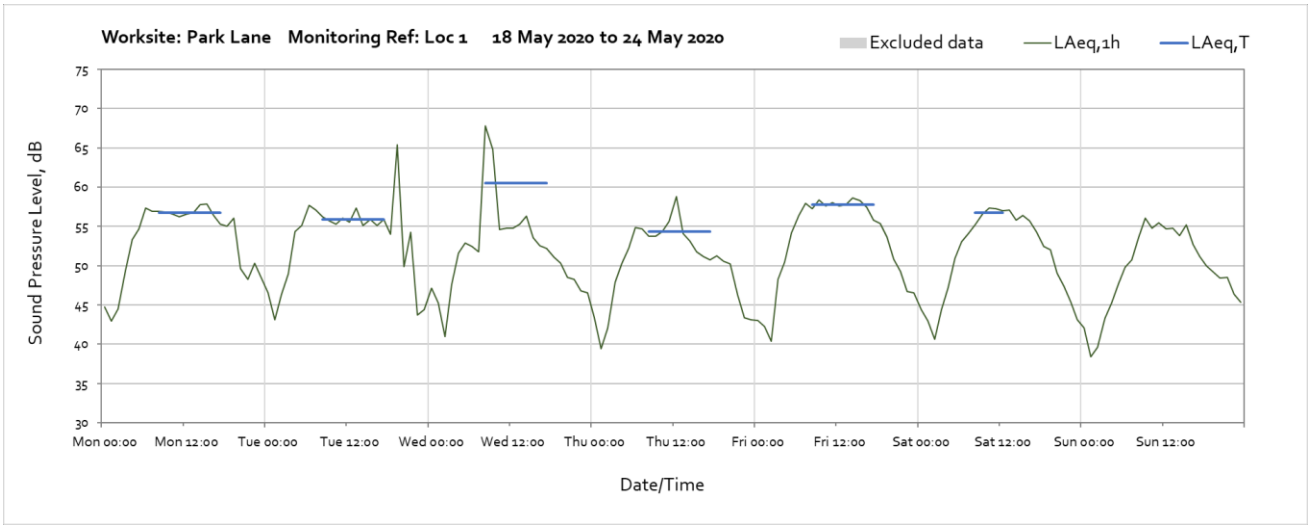
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

Worksite: Park Lane – Monitoring Ref: Loc 1






Worksite: Park Lane Monitoring Ref: Loc 1 11 May 2020 to 17 May 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
35
30
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: Park Lane Monitoring Ref: Loc 1 18 May 2020 to 24 May 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
35
30
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
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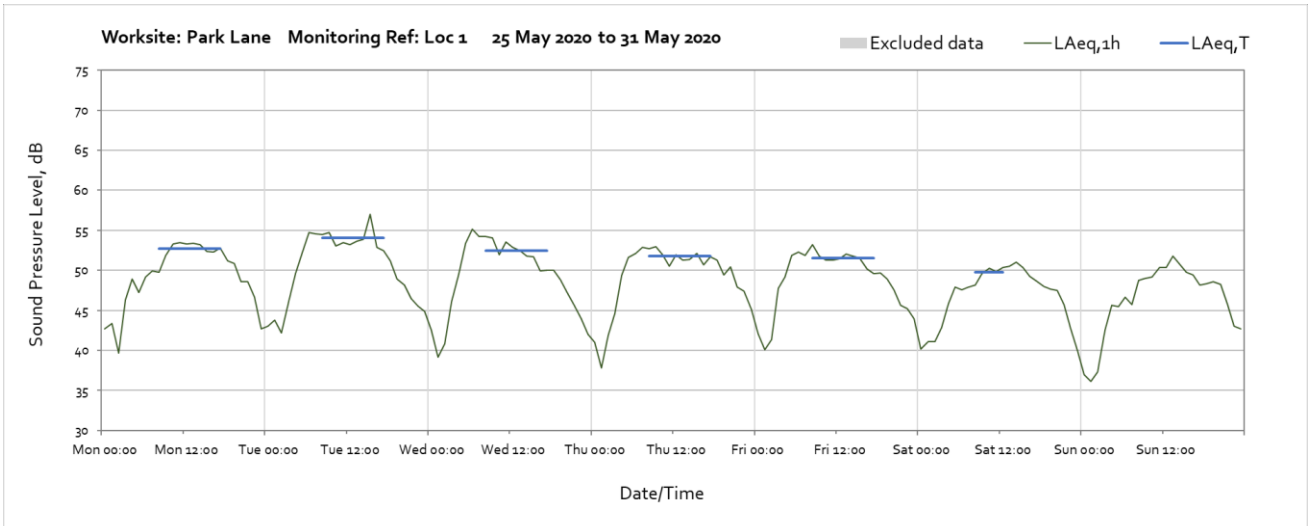
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: Park Lane Monitoring Ref: Loc 1 25 May 2020 to 31 May 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
75
70
65
60
55
50
45
40
35
30
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
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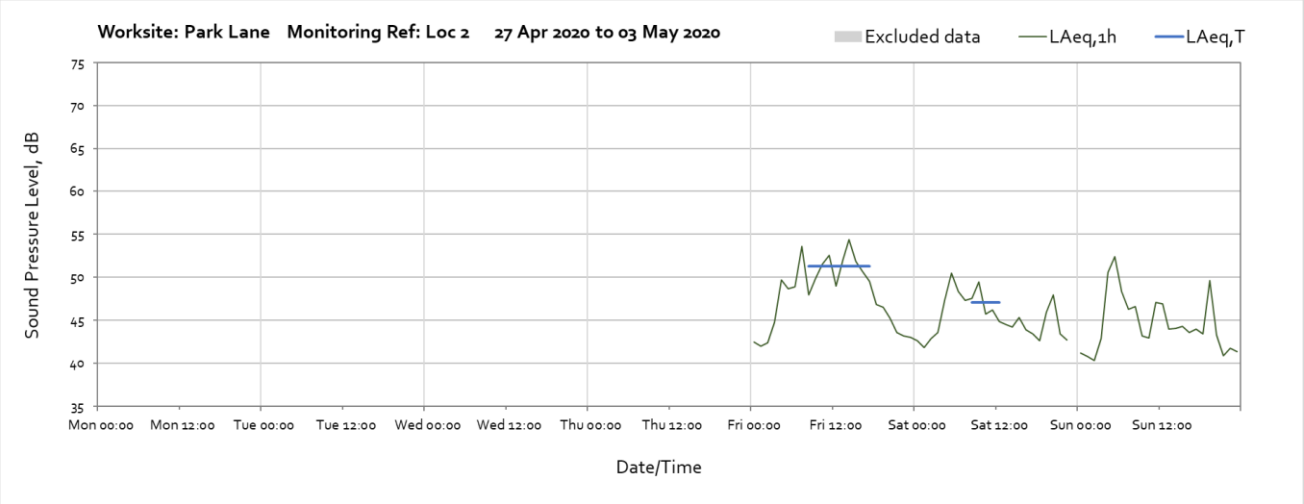
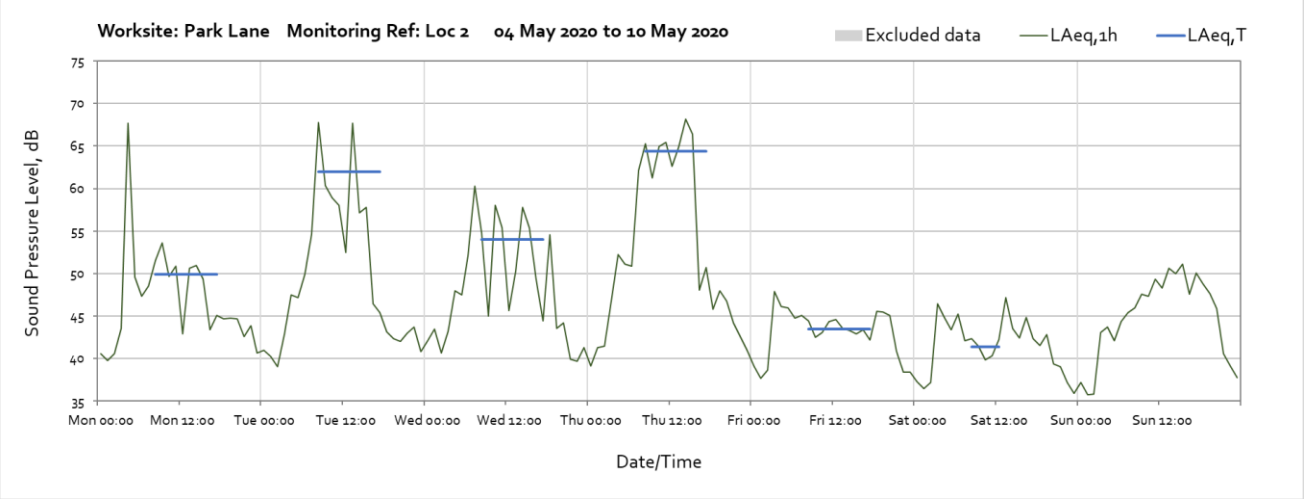
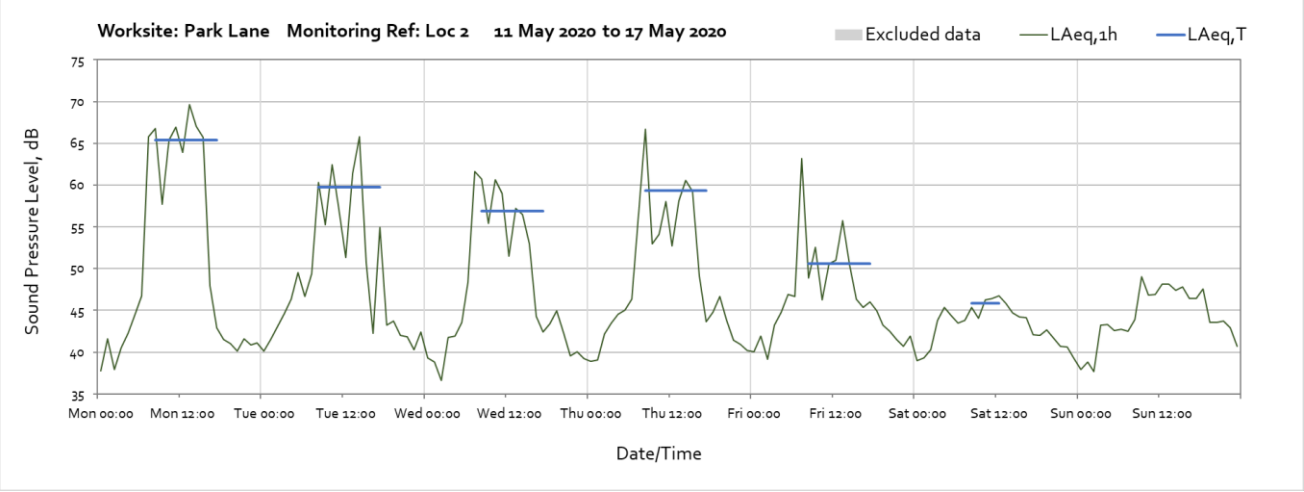
Sun 00:00
Sun 12:00
Date/Time

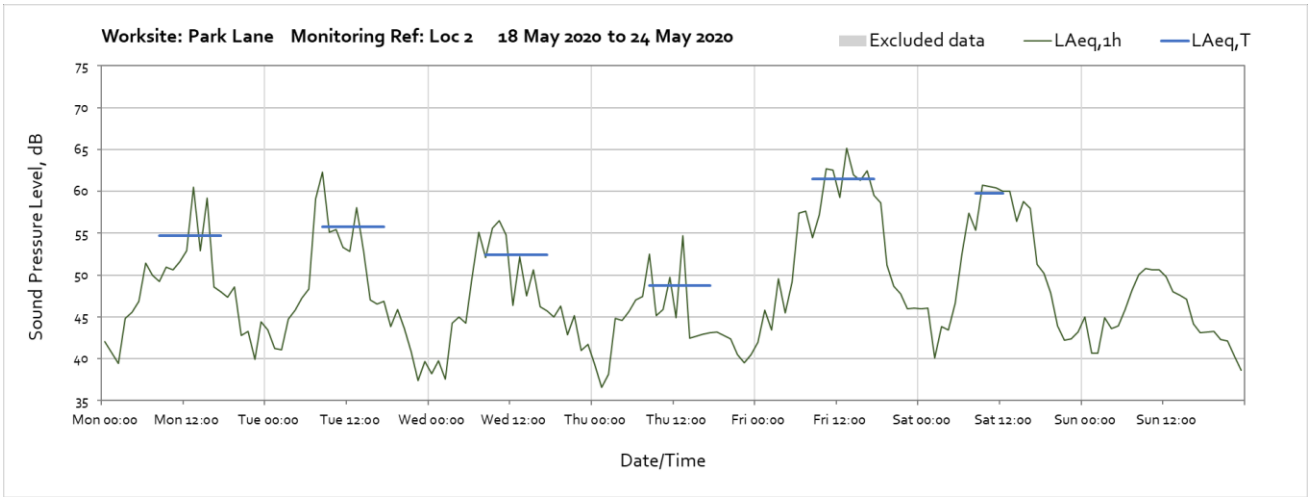
Worksite: Park Lane – Monitoring Ref: Loc 2

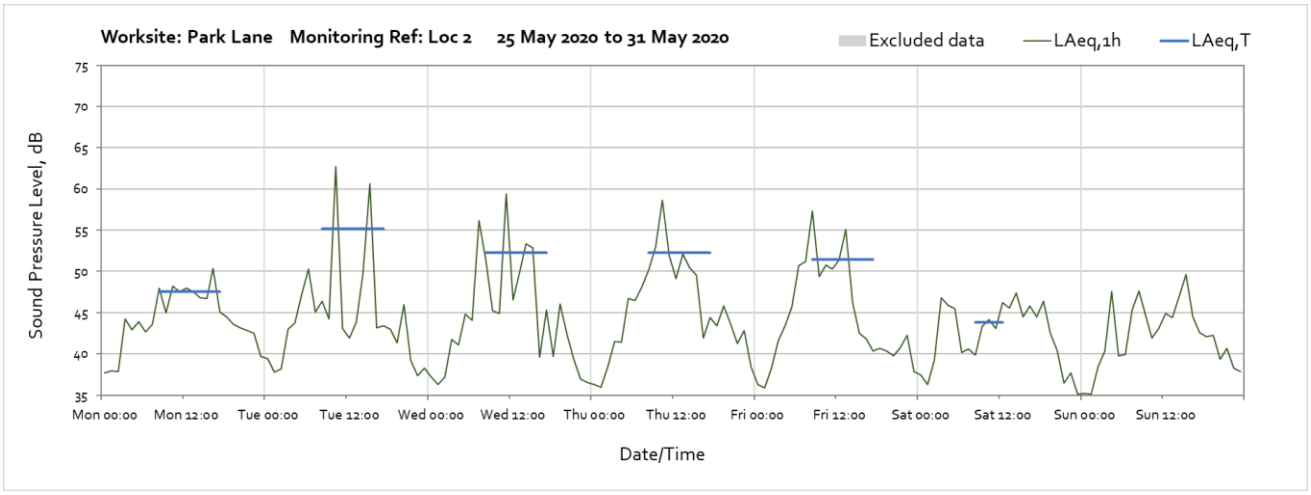


Note: Missing data at 23:00 on Saturday 2nd May were due to software updates of the monitor.

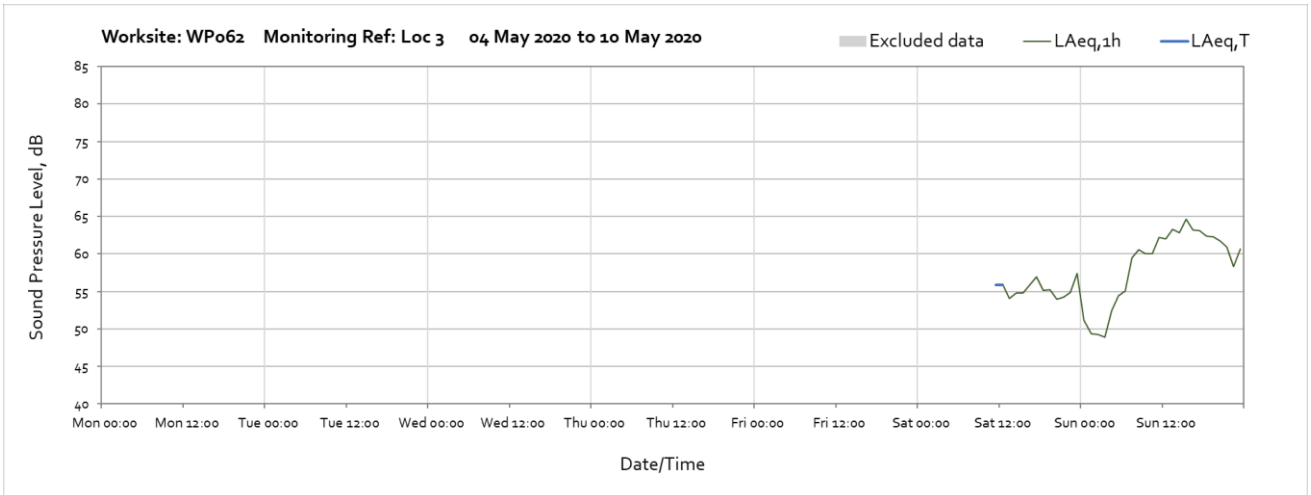




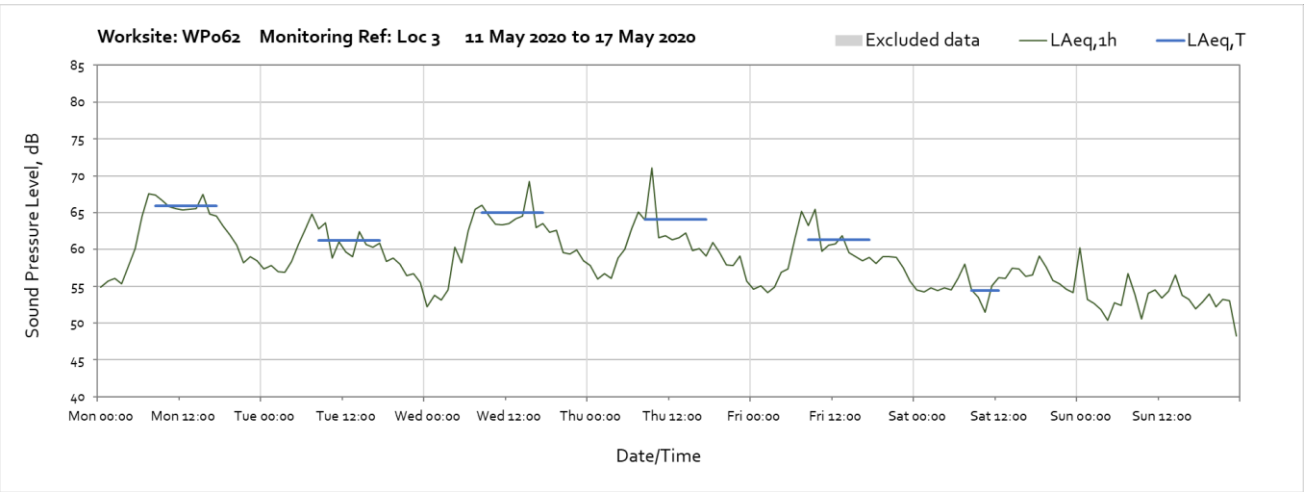


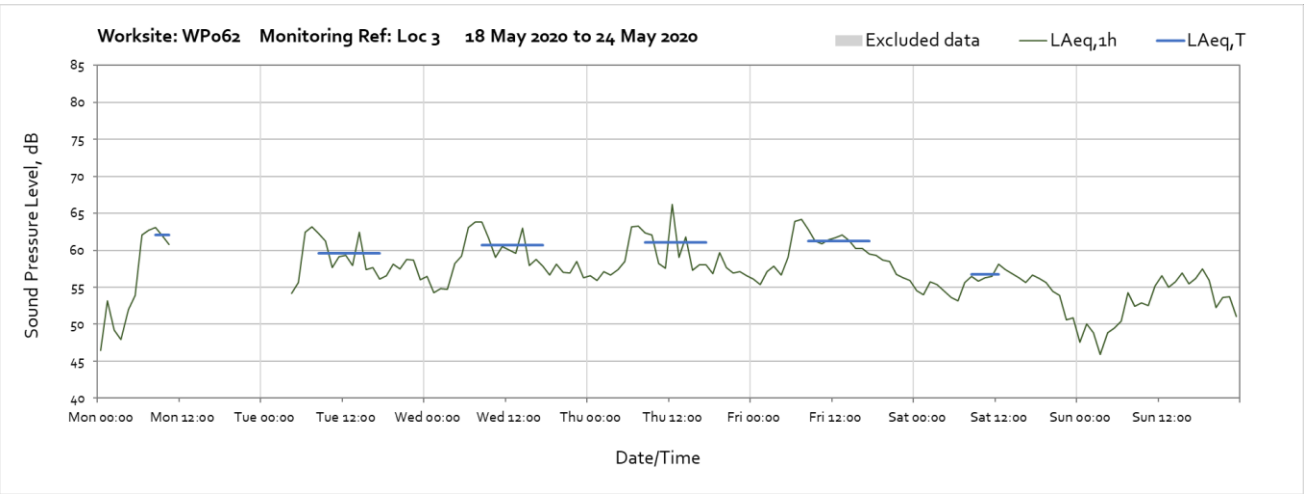


Worksite: WP62 – Monitoring Ref: Loc 3

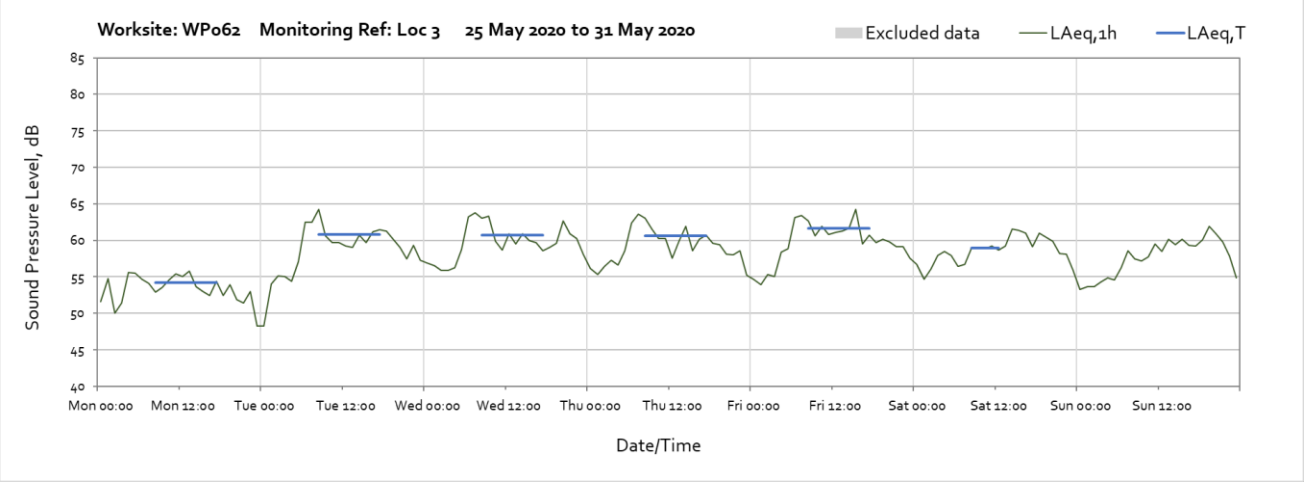


Note: Missing data from the beginning of the month until 11:00 on Saturday 9th May were due to failure of the solar panel powering the monitor.





Note: Missing data between 11:00 on Monday 18th and 04:00 on Tuesday 19th May were due to failure of the equipment supplier's server causing no data to be saved during this period.



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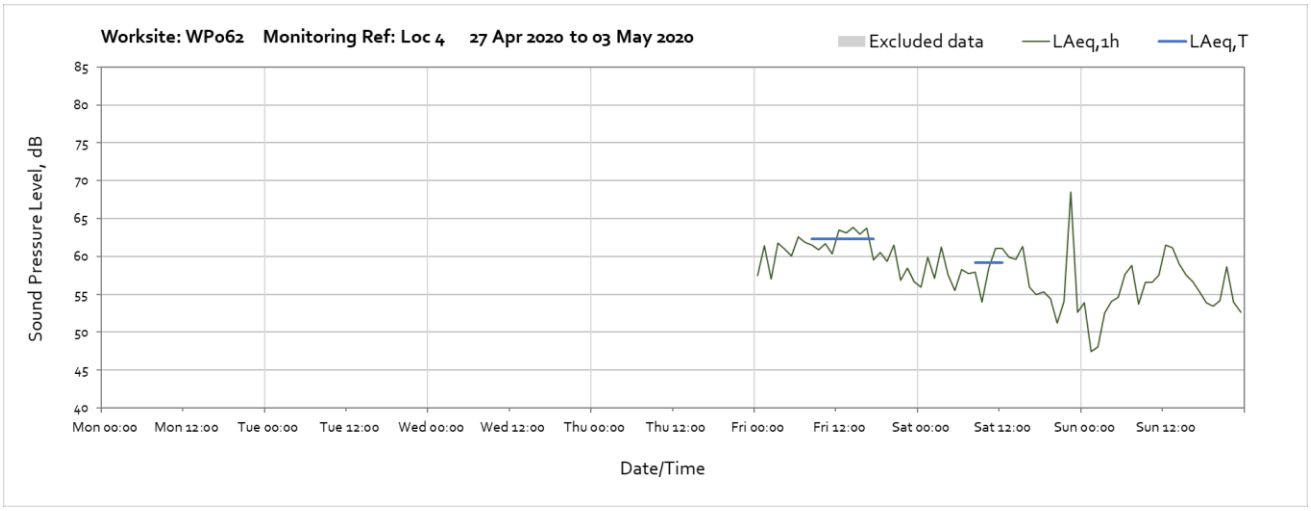

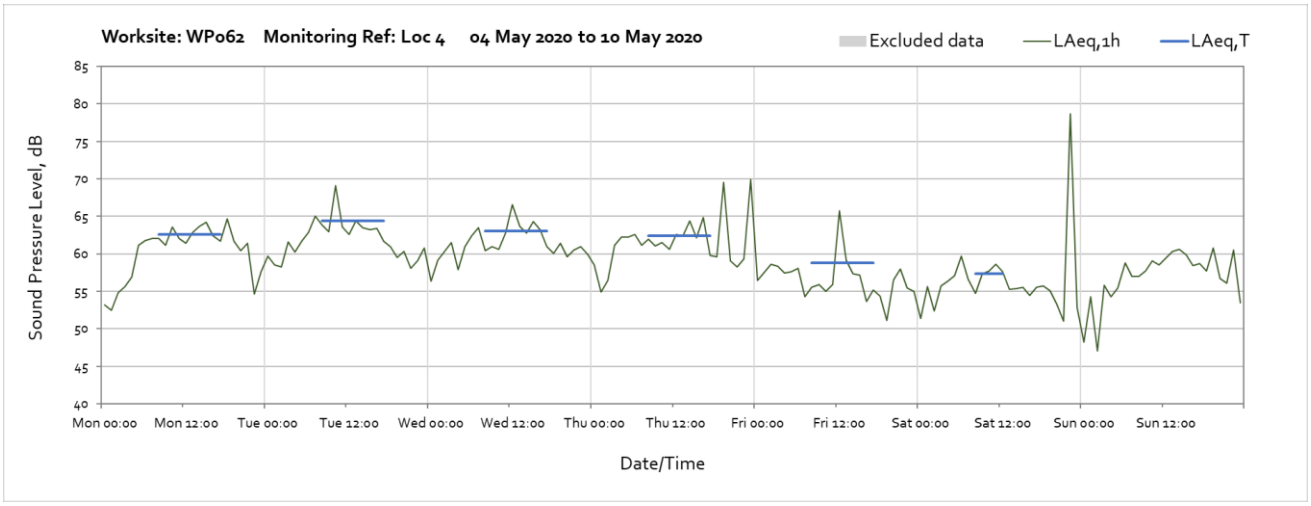

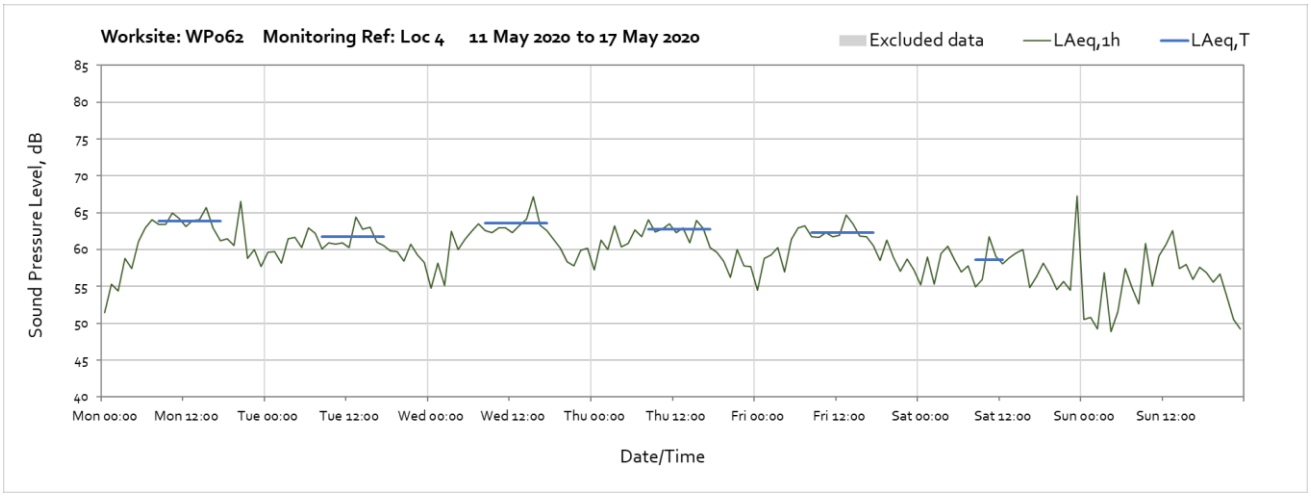

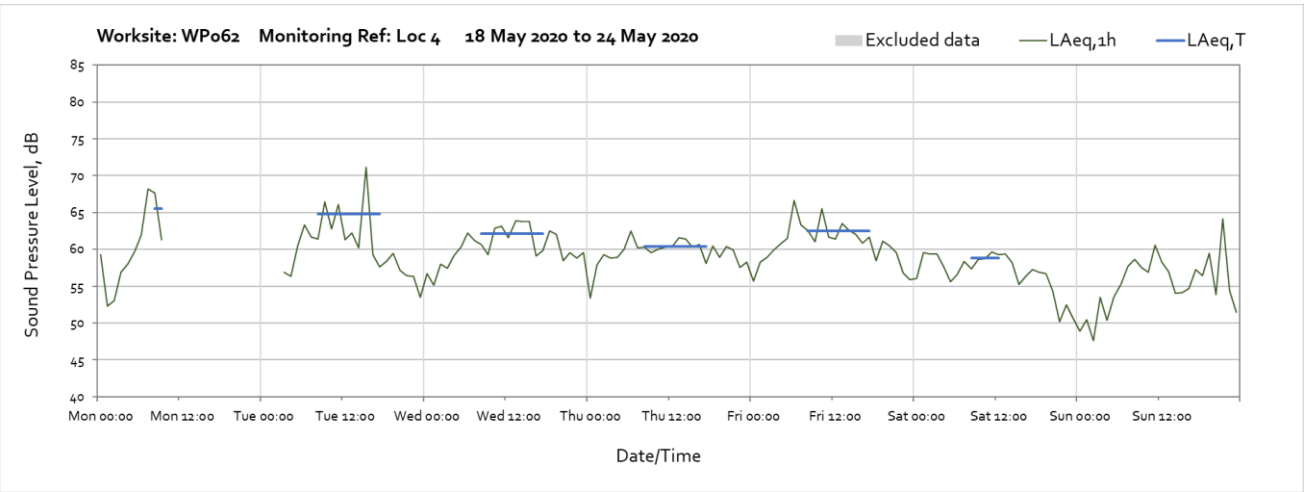

Note: Missing data between 10:00 on Monday 18th and 03:00 on Tuesday 19th May were due to failure of the equipment supplier's server causing no data to be saved during this period.