

Construction noise and vibration Monthly Report – April 2020

London Borough of Hillingdon

Non-technical summary	1
Abbreviations and descriptions	2
1 Introduction	3
1.2 Measurement Locations	4
2 Summary of results	4
2.1 Exceedances LOAEL of SOAEL	4
2.2 Summary of measured noise levels	6
2.3 Exceedances of trigger level	8
2.4 Complaints	8
Appendix A Site Locations	10
Appendix B Monitoring Locations	14
Appendix C Data	17

List of tables

Table 1: Table of abbreviations	2
Table 2: Monitoring locations	4
Table 3: Summary of exceedances of LOAEL and SOAEL	5
Table 4: Summary of total exceedances of SOAEL	6
Table 5: Summary of measured dB L_{Aeq} data over the monitoring period	7
Table 6: Summary of exceedances of trigger levels	8
Table 7: Summary of complaints	8

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 London Borough of Hillingdon (LBH) during the month of April 2020.

This report presents data from noise monitor installations at, and in the vicinity of, the Load Test Pile LTP #2 worksite located south of Dews Farm, the West Ruislip Portal worksite and the West Ruislip Northolt Corridor worksite. During the monitoring period works at the LTP #2 worksite recommenced on 27th April with earthworks being undertaken. No data was captured at the NMP1 noise monitoring position between 3rd April and 30th April due to power loss at the monitor and Covid-19 access restrictions to the site for monitor maintenance. Works concluded at the West Ruislip Northolt Corridor worksite on 5th April, activities undertaken in April included tamping and boxing in ballast between sleepers, materials removal, installation of new troughing and profiling ballast up to the new troughing. Noise monitors NMP3 and NMP4 were removed from site during the final overnight shift on 5th April. Works at the adjacent West Ruislip Portal worksite included hoarding and fencing installation, site security, and aggregate deliveries via freight train.

Noise levels measured near the West Ruislip Northolt Corridor worksite were above guideline criteria for significant adverse effects due to construction activities on two occasions in April due to night-time HS2 related works. One complaint was reported to HS2 for the LBH area during the April 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 London Borough of Hillingdon (LBH) for the period 1st to 30th April 2020.

1.1.2 Active construction sites potentially contributing to noise in the local authority area during this period include:

- Load Test Pile LPT #2 worksite, where earthworks at the worksite recommenced on 27th April. Works were paused between 1st April and 26th April due to Covid-19, with only security and welfare maintenance activities taking place during this period.
- West Ruislip Northolt Corridor worksite, where works were undertaken during an overnight shift on 1st April, including tamping on the West Ruislip up siding along with boxing in ballast between sleepers; during normal working hours on 2nd April, including stop block and site checks following tamping; during an overnight shift on 5th April, including the removal of materials from site via train, installation of new troughing and profiling of ballast up to the new troughing. Works at the adjacent West Ruislip Portal worksite included hoarding and fencing installation, site security, and aggregate deliveries via freight train activities. Hoarding installation along the Network Rail boundary fence was carried out in possession / engineering hours.

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 Noise monitoring was undertaken adjacent to the Load Test Pile (LTP #2) worksite, at the boundary to the worksite (ref: NMP2) and at the Hillingdon Outdoor Activities Centre (ref: NMP1), and at two locations adjacent to the West Ruislip Northolt Corridor worksite located on the opposite side of the tracks, installed on a concrete post approximately 80m northwest of Ickenham Road (ref: NMP3) and installed at a buffer stop approximately 370m northwest of Ickenham Road (ref: NMP4).

1.2.2 Table 2 presents the position of the noise monitoring installation within the LBH area in April 2020. A map showing the position of the noise monitoring installation is presented in Appendix B.

Table 2: Monitoring locations

Worksite Reference	Measurement Reference	Address
LTP #2	NMP1	Hillingdon Outdoor Activity Centre, Dews Lane, Harefield, Uxbridge
	NMP2	LTP #2 Worksite, Harvil Road, Harefield, Uxbridge
West Ruislip Portal/Northolt Corridor	NMP3	Down sidings, opposite worksite. Concrete post
	NMP4	Down sidings, opposite worksite. Buffer stop

1.2.3 Noise monitors NMP3 and NMP4 were removed from site at 05:00 on Sunday 5th April following completion of works at the West Ruislip Northolt Corridor worksite.

2 Summary of results

2.1 Exceedances LOAEL of 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 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
LTP #2	NMP1	Hillingdon Outdoor Activity Centre, Dews Lane, Harefield, Uxbridge	All days	All periods	No exceedance	No exceedance
	NMP2	LTP #2 Worksite, Harvil Road, Harefield, Uxbridge	Weekday	08:00-18:00	4	No exceedance
West Ruislip Portal/Northolt Corridor	NMP3	Down sidings, opposite worksite. Concrete post	Night	2200-0700	2	2
	NMP4	Down sidings, opposite worksite. Buffer stop	Night	2200-0700	1	1

2.1.4 Exceedances of SOAEL occurred during two overnight shifts, with a tamping machine being used overnight on 1st April, and a road rail vehicle and engineering train being used overnight on 5th April. Associated works were tamping on the West Ruislip up siding and removal of materials. The LOAEL was exceeded on a number of occasions during periods of works at monitoring locations near the West Ruislip/Northolt Corridor worksite. However, the monitoring locations are exposed to noise from the operational railway, engineering trains and railway maintenance operations, and only a small number of LOAEL exceedances are believed to be attributable to HS2 construction works.

2.1.5 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
West Ruislip Portal/Northolt Corridor	NMP3	Down sidings, opposite worksite. Concrete post	2
	NMP4	Down sidings, opposite worksite. Buffer stop	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 Ambient noise levels for monitoring location NMP1 in the locality of Hillingdon Outdoor Activity Centre are dominated by noise emanating from the activity centre and the use of the car park. Ambient noise levels for monitoring location NMP2 in the locality of LTP #2 are dominated by noise emanating from local road traffic on Harvil Road to the east.
- 2.2.3 Ambient noise levels for monitoring locations NMP3 and NMP4 adjacent to West Ruislip Northolt Corridor are dominated by road traffic from Ickenham Road bridge, there are also contribution from trains pass-bys and London Underground trains departing the nearby West Ruislip Station into the early hours.

Table 5: Summary of measured dB L_{Aeq} data over the monitoring period

Worksite Reference	Measurement Reference	Monitor 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
LTP #2	NMP1	Hillingdon Outdoor Activity Centre	Free-field	55.5 (58.4)	61.9 (62.2)	50.5 (51.8)	45.2 (48.6)	50.2 (62.5)	- (1) - (1)	- (1) - (1)	- (1) - (1)	- (1) - (1)	- (1) - (1)	- (1) - (1)	- (1) - (1)
	NMP2	LTP #2 Worksite	Free-field	50.6 (60.7)	52.9 (71.6)	46.7 (51.7)	46.8 (53.4)	45.2 (52.9)	49.0 (51.3)	47.7 (48.6)	46.4 (49.7)	45.8 (49.9)	43.8 (49.0)	46.4 (55.9)	45.1 (51.5)
West Ruislip Portal/Northolt Corridor	NMP3	Down sidings, opposite worksite. Concrete post	Free-field	65.7 (65.9)	66.8 (67.0)	66.6 (67.2)	66.5 (67.5)	63.6 (76.8)	64.6 (64.6)	63.2 (63.2)	64.8 (64.8)	63.2 (64.4)	69.4 (76.4)	- (2) - (2)	- (2) - (2)
	NMP4	Down sidings, opposite worksite. Buffer stop	Free-field	66.4 (66.5)	68.5 (68.8)	67.9 (69.2)	67.6 (69.5)	64.6 (75.2)	65.1 (65.1)	66.8 (66.8)	66.1 (66.1)	65.1 (67.9)	73.2 (79.0)	- (2) - (2)	- (2) - (2)

(1) No data was recorded at monitor NMP1 during Saturday and Sunday periods due to loss of power at the noise monitor.

(2) No data was recorded at monitor NMP3 and NMP4 during Sunday periods due to removal of noise monitors on the 5th of April.

2.2.4 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>.

2.3 Exceedances of trigger level

2.3.1 Table 6 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 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

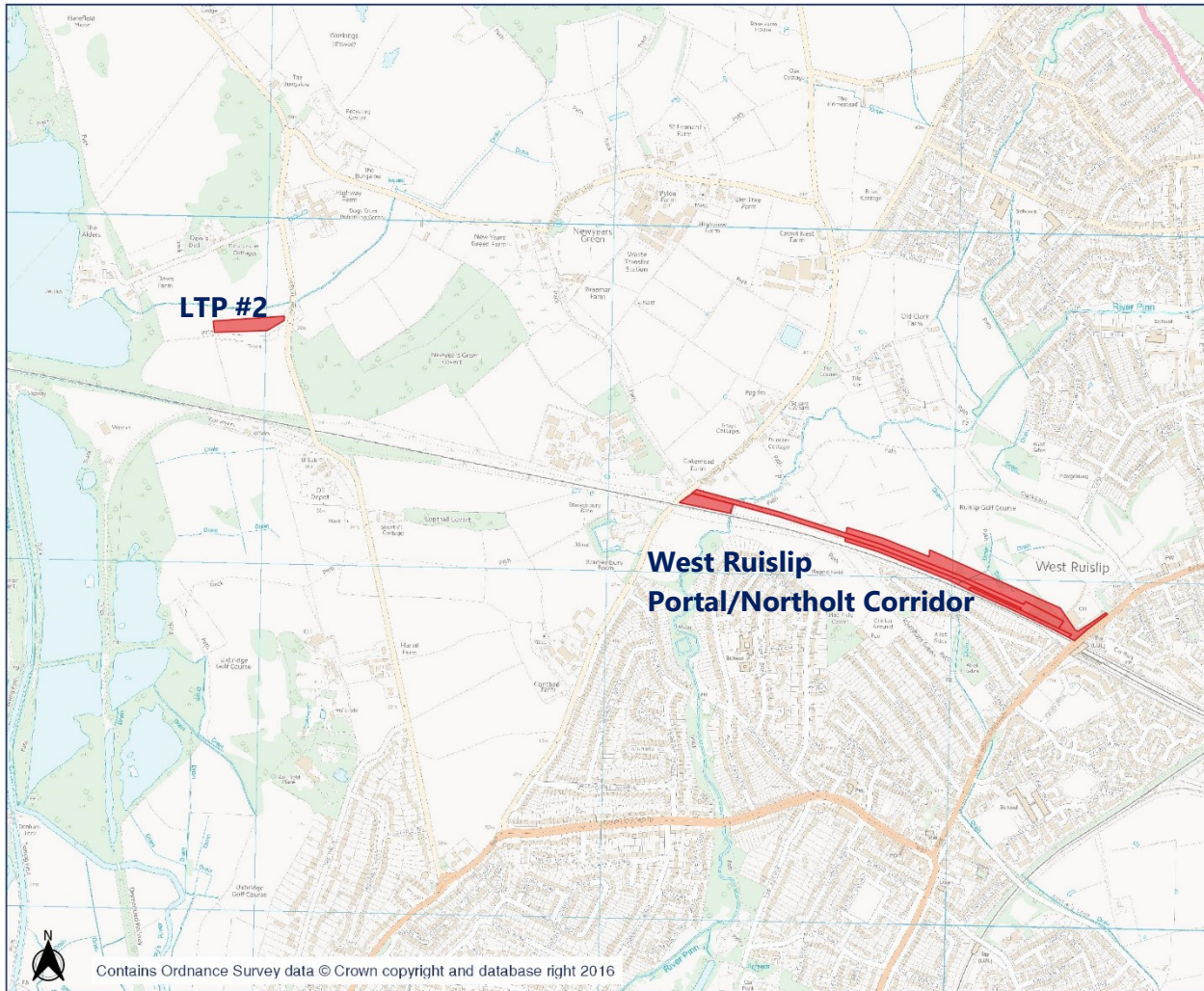
2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation. One complaint was reported to HS2 for the LBH region during the April monitoring period.

Table 7: Summary of complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-20-40151	West Ruislip Portal/Northolt Corridor	Noise complaint received following overnight works undertaken between 31/03/20 - 01/04/20.	Complaint was the result of tamping works undertaken during overnight possession on the 1st April.	Best practicable means noise mitigation was in place and had been carefully managed where possible. A response was submitted by the contractor to the complainant to advise of the works being undertaken and the noisy

				nature of tamping. The complainant was also advised of the remaining activities within the programme that had the potential to increase overnight noise levels.
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Appendix A Site Locations



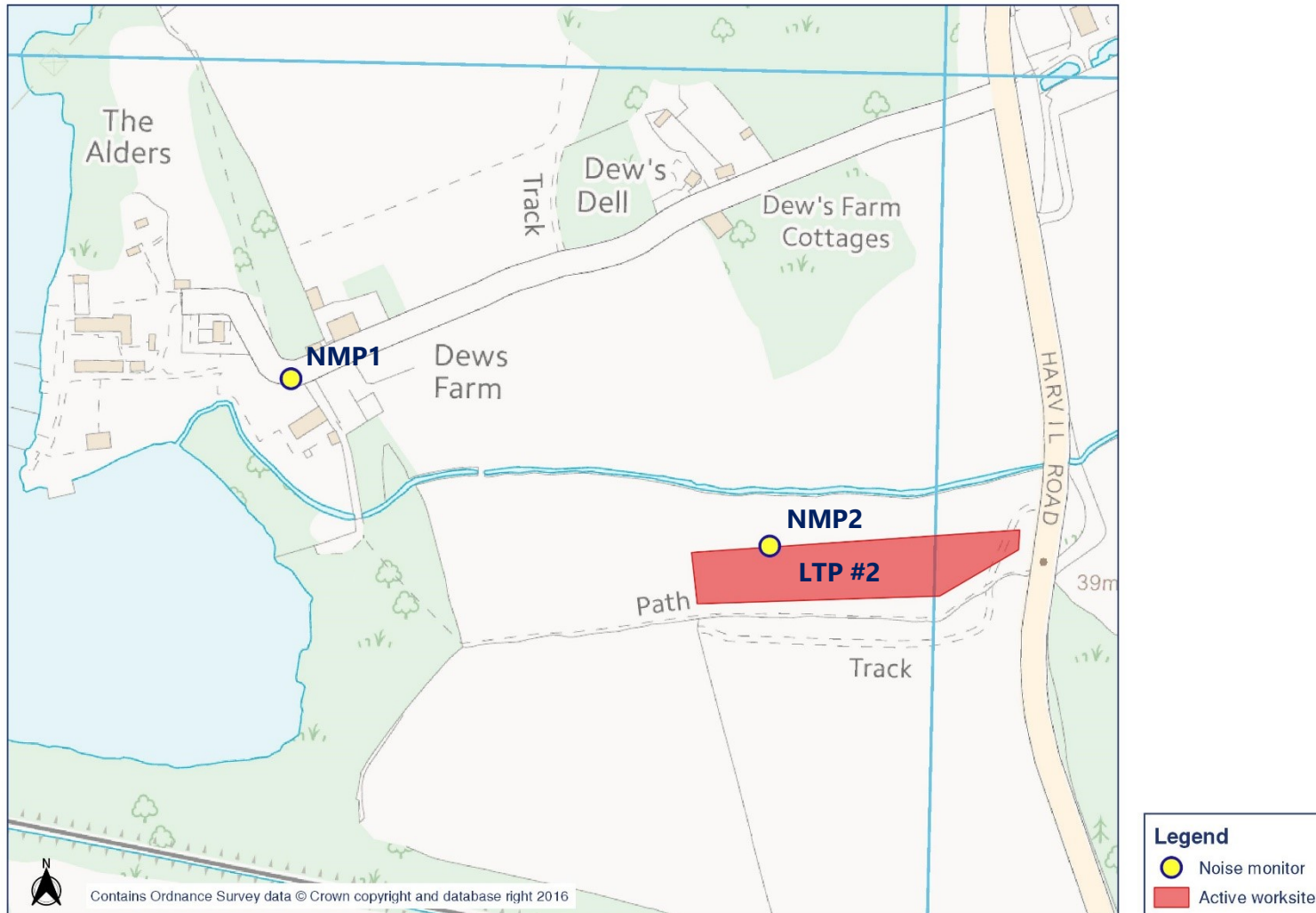


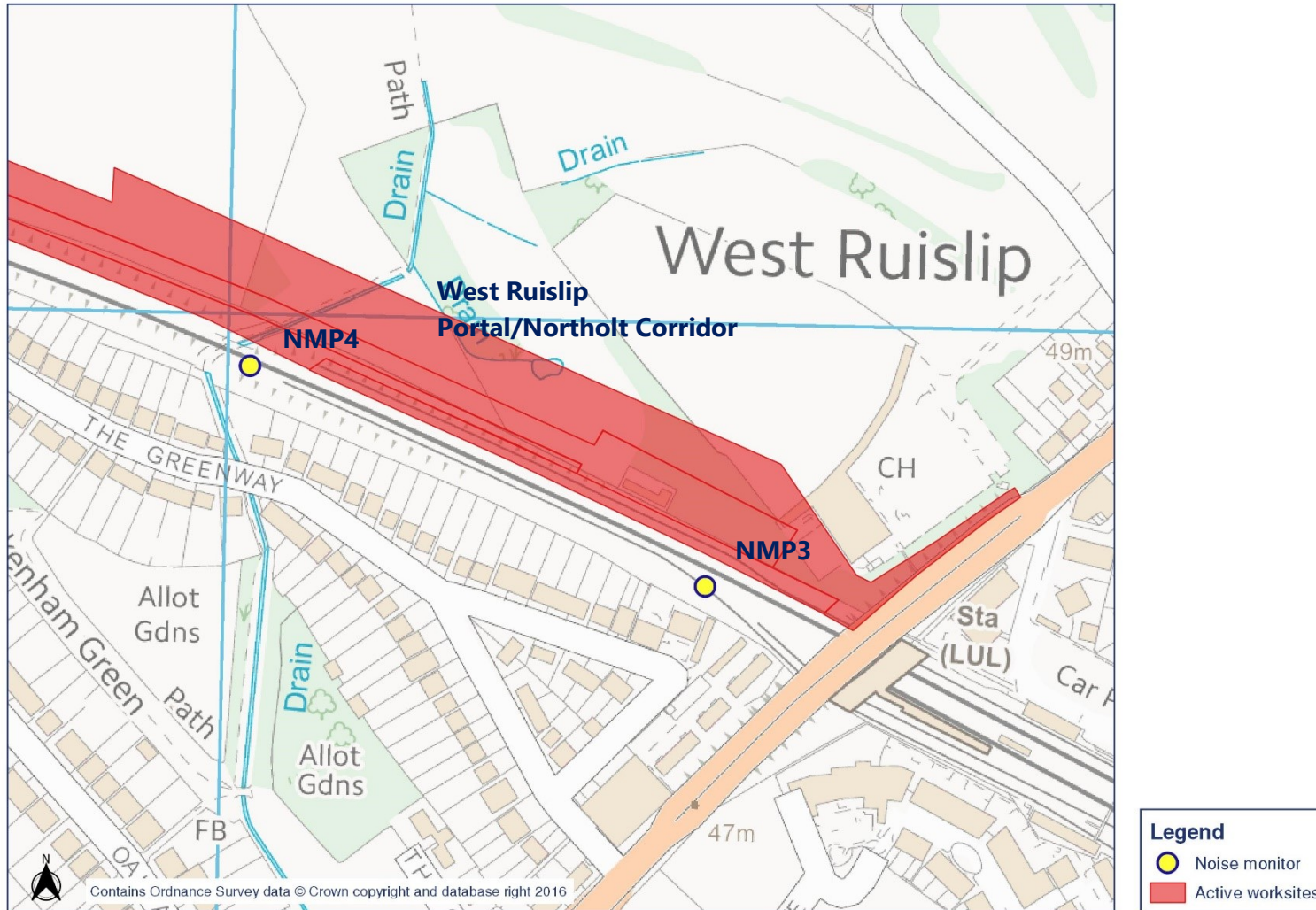


Appendix B Monitoring Locations

HS2

Noise monitoring plan - 1

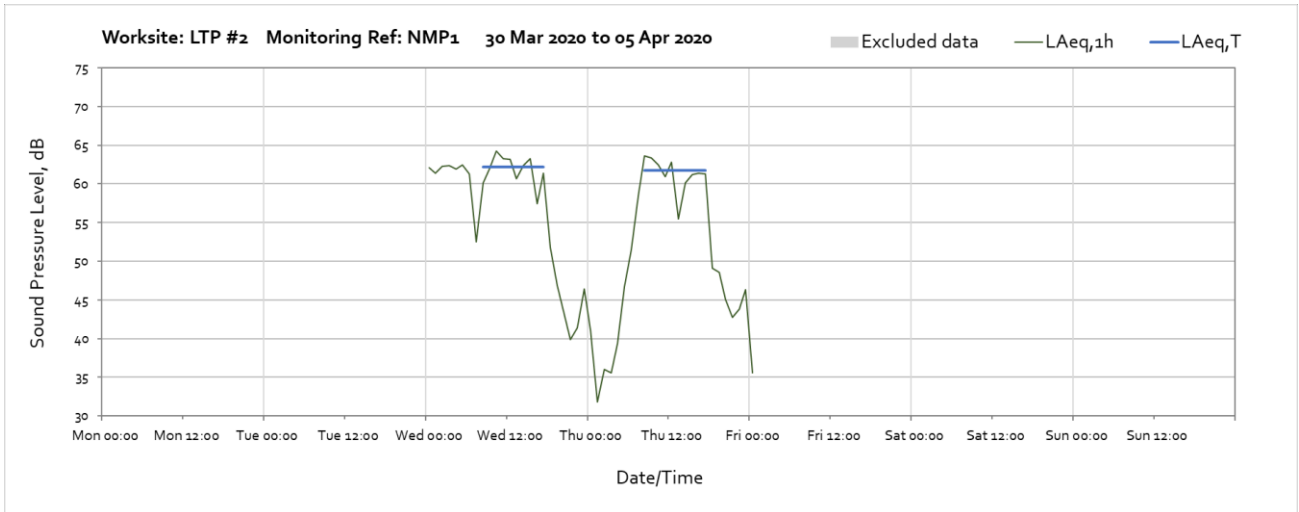




Appendix C Data

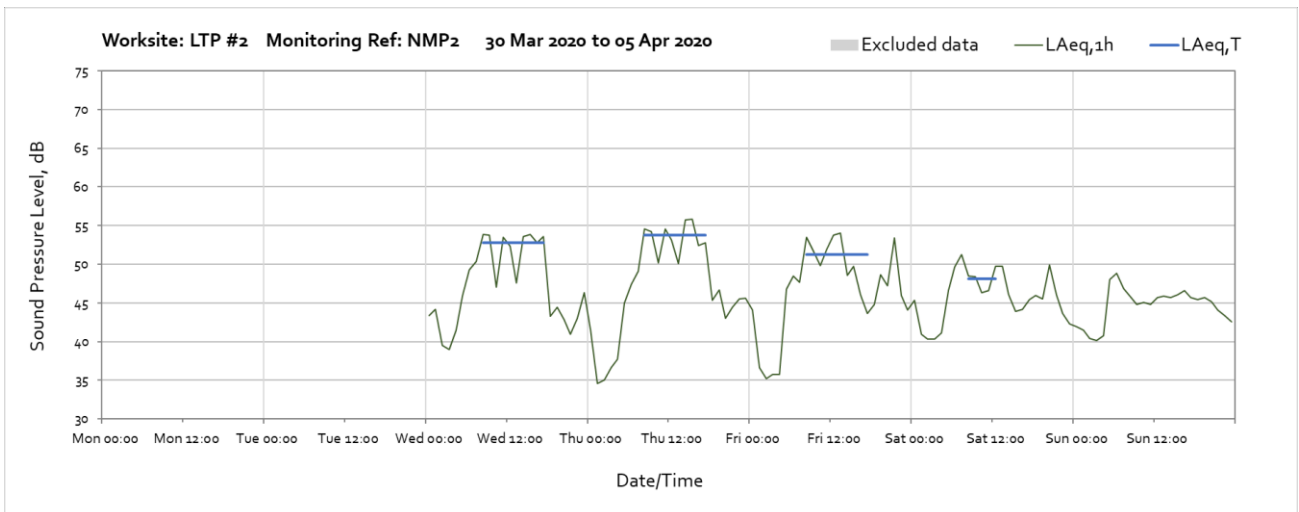
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

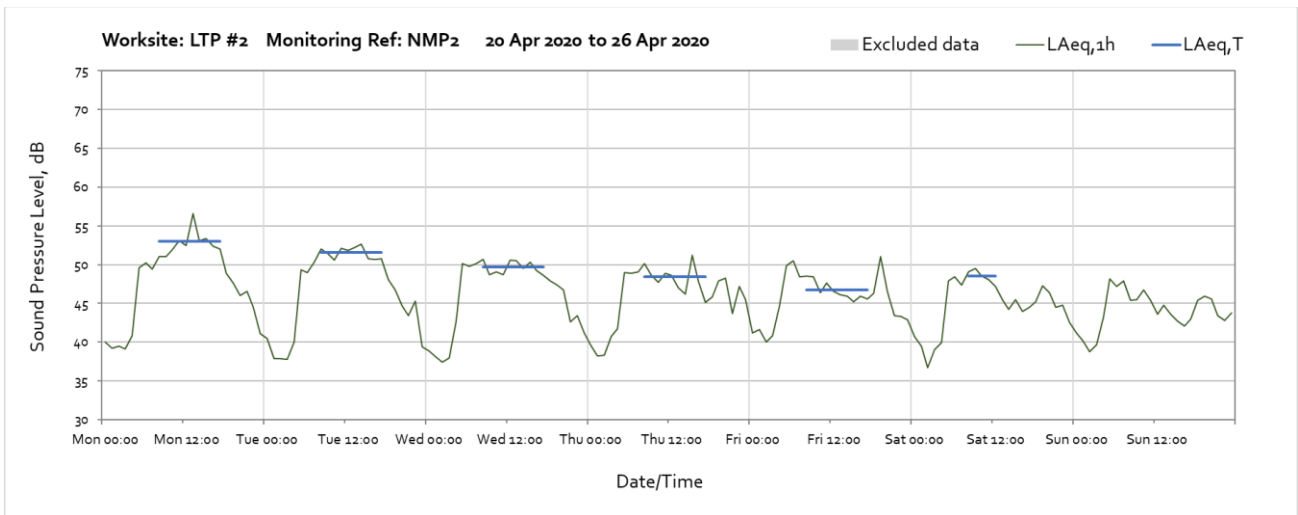
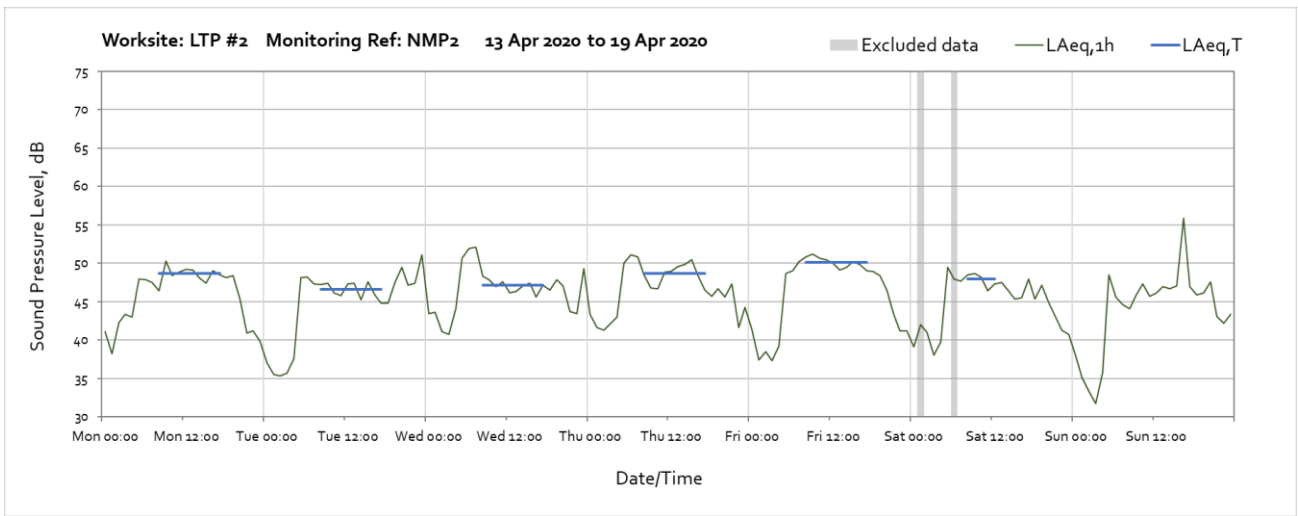
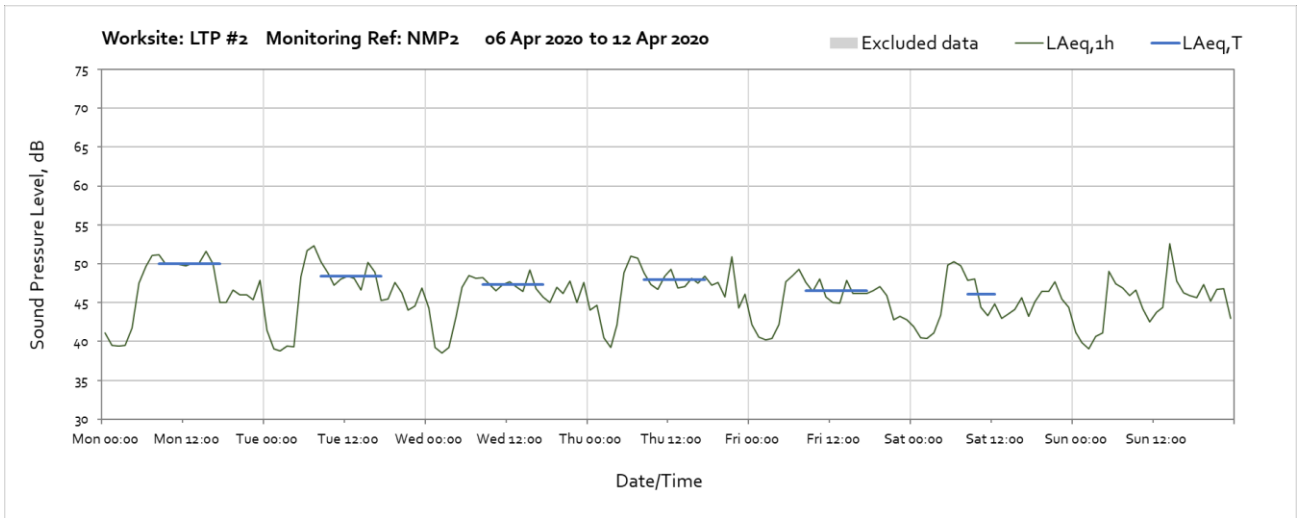
Worksite: LTP #2 – Monitoring Ref: NMP1

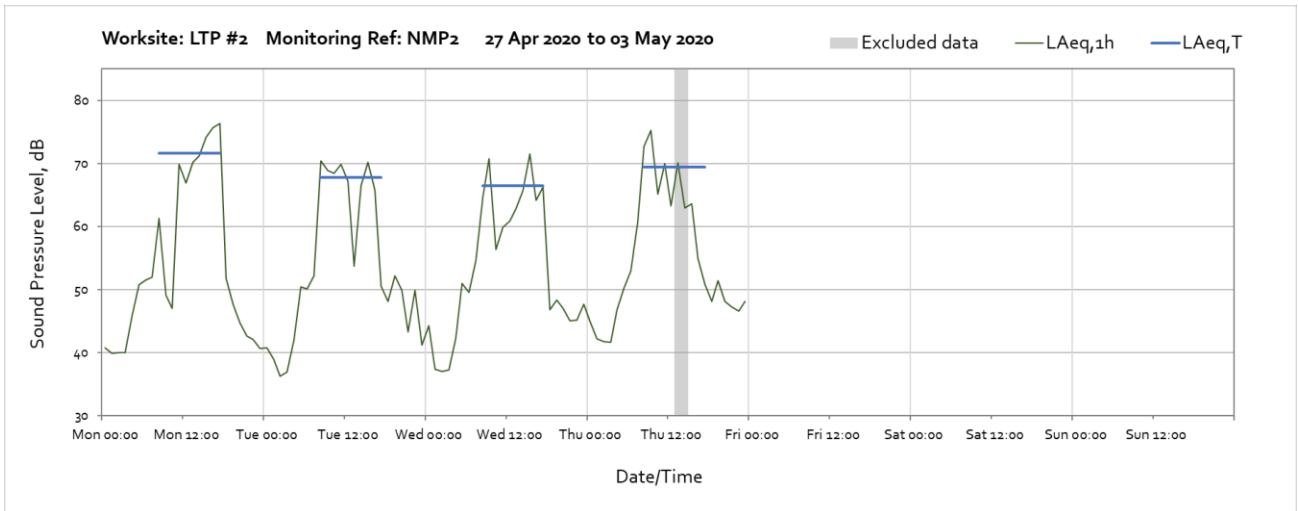


Note: Missing data from 01:00 on Friday 3rd to 23:00 on Thursday 30th April due to a loss of power to the noise monitor. During this period works were only undertaken between 27th and 30th of April, with access to the noise monitor for maintenance being restricted due to Covid-19 safety measures.

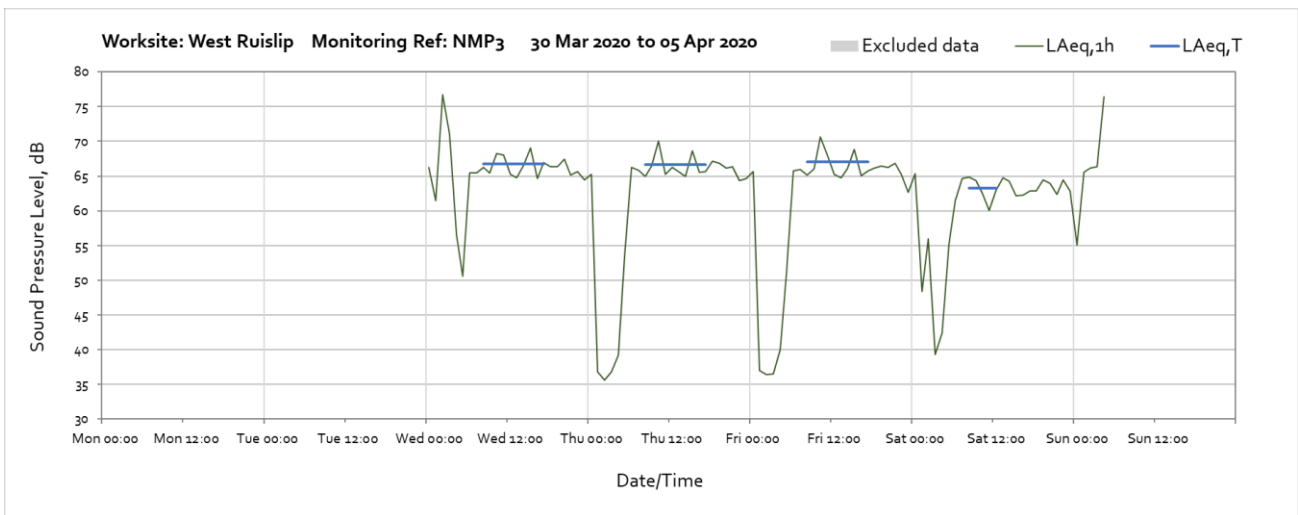
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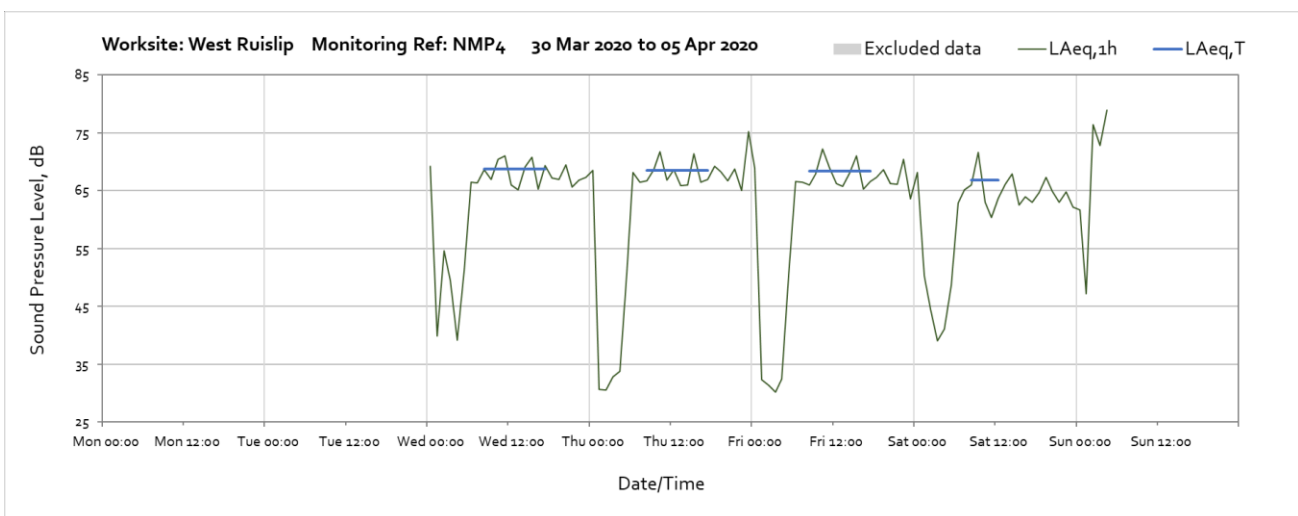


Worksite: West Ruislip – Monitoring Ref: NMP3



Note: The noise monitor was removed from site at 05:00 on Sunday 5th April following completion of the works at the West Ruislip Northolt Corridor worksite.

Worksite: West Ruislip – Monitoring Ref: NMP4



Note: The noise monitor was removed from site at 05:00 on Sunday 5th April following completion of the works at the West Ruislip Northolt Corridor worksite.