HS2

April 2020

# Construction noise and vibration Monthly Report – February 2020

## Chiltern 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 Chiltern District (CD) during the month of February 2020.

This report presents data from two noise monitoring installations in proximity to the Great Missenden Haul Road, Link Road and Frith Hill Works worksite (ref. WS01), where drainage, road works and fencing works were undertaken; and in the vicinity of the Chalfont St Peter vent shaft worksite (ref. CSP) where soil stripping, hardstanding formation, installation of fencing and drainage were underway. Additional utility works were undertaken in Amersham.

During night time works at the Link Road roundabout the measured construction noise levels were occasionally above guideline criteria for significant adverse effects. Noise levels were in line with Section 61 predictions and no further exceedance of Section 61 trigger levels were measured due to HS2 related works during the monitoring period. There were 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)'. |
| 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. |
| 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. |
| 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. |
| 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. |
| 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 Chiltern District (CD) for the period 1st to 29th February 2020.

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

- Great Missenden Haul Road, Link Road and Frith Hill Works, worksite reference WS01 (see plan 1 in Appendix A)
  - Haul road opening: works activities include traffic management setup and removal, drainage and installation of sub-base, resurfacing, white-lining and fencing.
  - Frith Hill: works activities include traffic management setup and removal, drainage and installation of sub-base, resurfacing, and white-lining.
- Chalfont St. Peter, Chesham Lane, worksite reference CSP (see plan 1 in Appendix A)
  - Works activities include stripping of topsoil and subsoil, removal of bulk material and delivery of filling material, formation of area required for site offices, parking and roads, installation of site offices, permanent perimeter fencing and drainage, and minor vegetation clearance works.

Further utility works were undertaken in Amersham.

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 Two noise monitoring installations were active in February in the CD area, monitor near to Great Missenden (WS01) and the monitor in the vicinity of Chalfont St. Peter (CSP).

1.2.2 Table 2 details the address of the noise monitoring installations within the CD area in February 2020. A map showing the positions of noise monitoring is also presented in Appendix B.

Table 2: Monitoring locations

| Worksite Reference | Measurement Reference | Address |
|---|---|---|
| WS01 | Noise 1 | Link Road, Great Missenden |
| CSP | NMP1 | Chesham Lane, Chalfont St. Peter |

# 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 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 |
|---|---|---|---|---|---|---|
| WS01 | Noise 1 | Link Road, Great Missenden | Weekday | 0700-0800 | 3 | No exceedance |
| | | | Weekday | 0800-1800 | 12 | No exceedance |
| | | | Weekday | 1800-1900 | 2 | 1 |
| | | | Weekday | 1900-2200 | 17 | 13 |
| | | | Night | 2200-0700 | 65 | 42 |
| CSP | NMP1 | Chesham Lane, Chalfont St. Peter | All days | All periods | 19 | 1* |

* Exceedance of the SOAEL was due to a plant (excavator) associated with the installation of drainage operating in close proximity to the noise monitor. In consideration of the larger separation distance noise levels at the nearest receptor would be lower and below the SOAEL.

2.1.5 SOAEL exceedances were measured during night time works undertaken on the adjacent link road roundabout. Noise levels above the LOAEL were measured during periods of works and outside working hours, likely due to road traffic noise from the A413.

2.1.6 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 |
|---|---|---|---|
| WS01 | Noise 1 | Link Road, Great Missenden | 9 |
| CSP | NMP1 | Chesham Lane, Chalfont St. Peter | 1* |

* Exceedance of the SOAEL was due to a plant (excavator) associated with the installation of drainage operating in close proximity to the noise monitor. In consideration of the larger separation distance noise levels at the nearest receptor are estimated to be lower and below the SOAEL.

## 2.2 Summary of measured noise levels

2.2.1 Table 5 presents a summary of the measured noise levels at the 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 and vibration monitoring data over the month for each of the measurement locations. Noise 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 limited nature of works undertaken in the CD region, the measured noise levels are largely attributable to underlying, ambient noise (road traffic) rather than being attributable to construction activities.

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 |
| WS01 | Noise 1 | Link Road, Great Missenden | Free-field | 61.9 | 64.8 | 62.5 | 62.4 | 59.5 | 58.5 | 62.4 | 62.7 | 61.2 | 57.3 | 62.1 | 57.4 |
| | | | | (66.9) | (69.0) | (75.3) | (74.1) | (78.1) | (61.7) | (65.0) | (67.9) | (69.2) | (64.9) | (71.7) | (64.8) |
| CSP | NMP1 | Chesham Lane, Chalfont St. Peter | Free-field | 65.3 | 67.5 | 61.5 | 56.8 | 51.8 | 56.0 | 59.2 | 57.5 | 56.2 | 51.3 | 55.4 | 52.8 |
| | | | | (69.1) | (77.8) | (63.7) | (59.9) | (60.8) | (58.5) | (62.3) | (62.7) | (63.3) | (54.9) | (61.1) | (60.0) |

## 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.

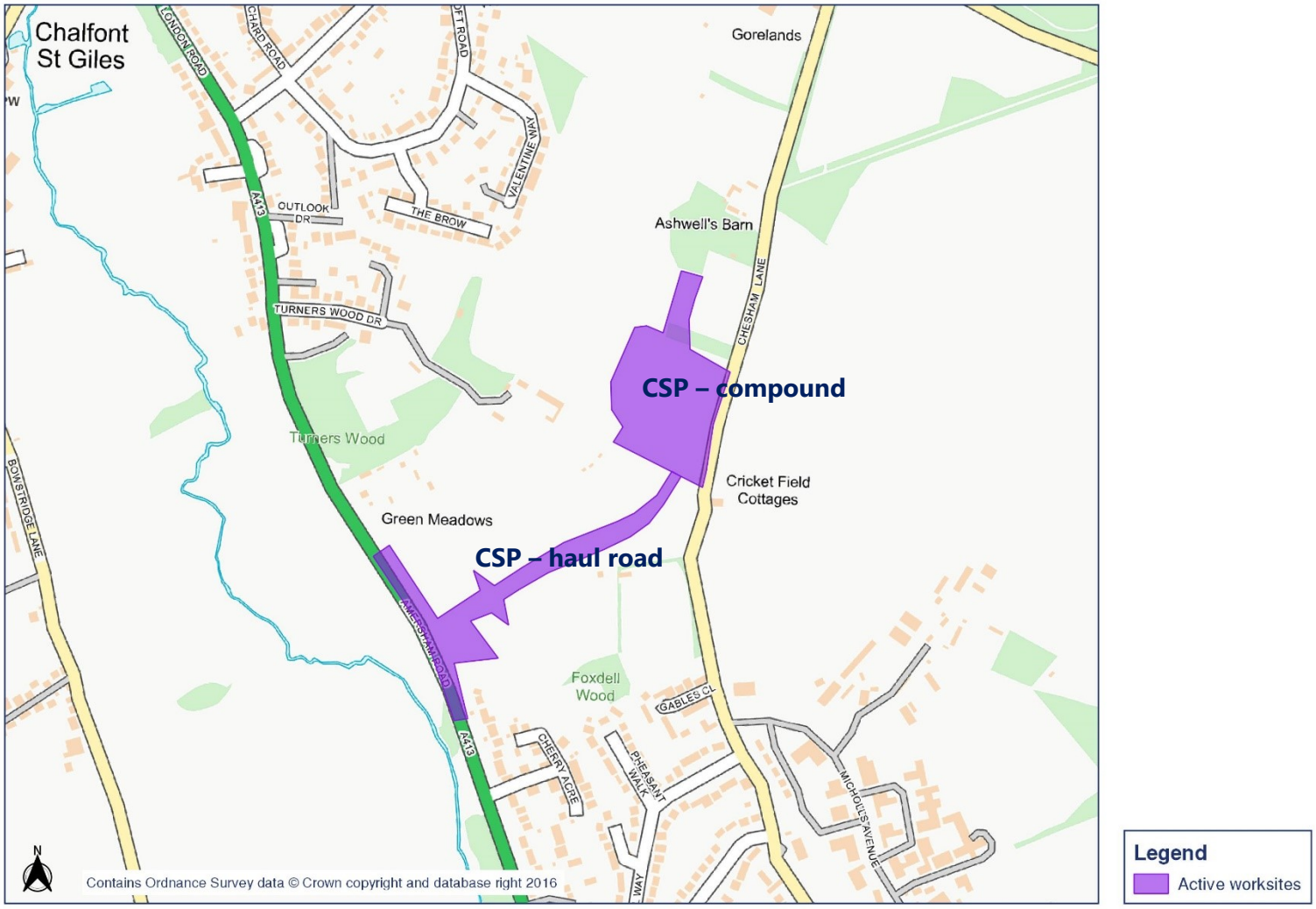
Table 7: Summary of complaints

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

# Appendix A Site Locations

# Worksite identification plan - 1

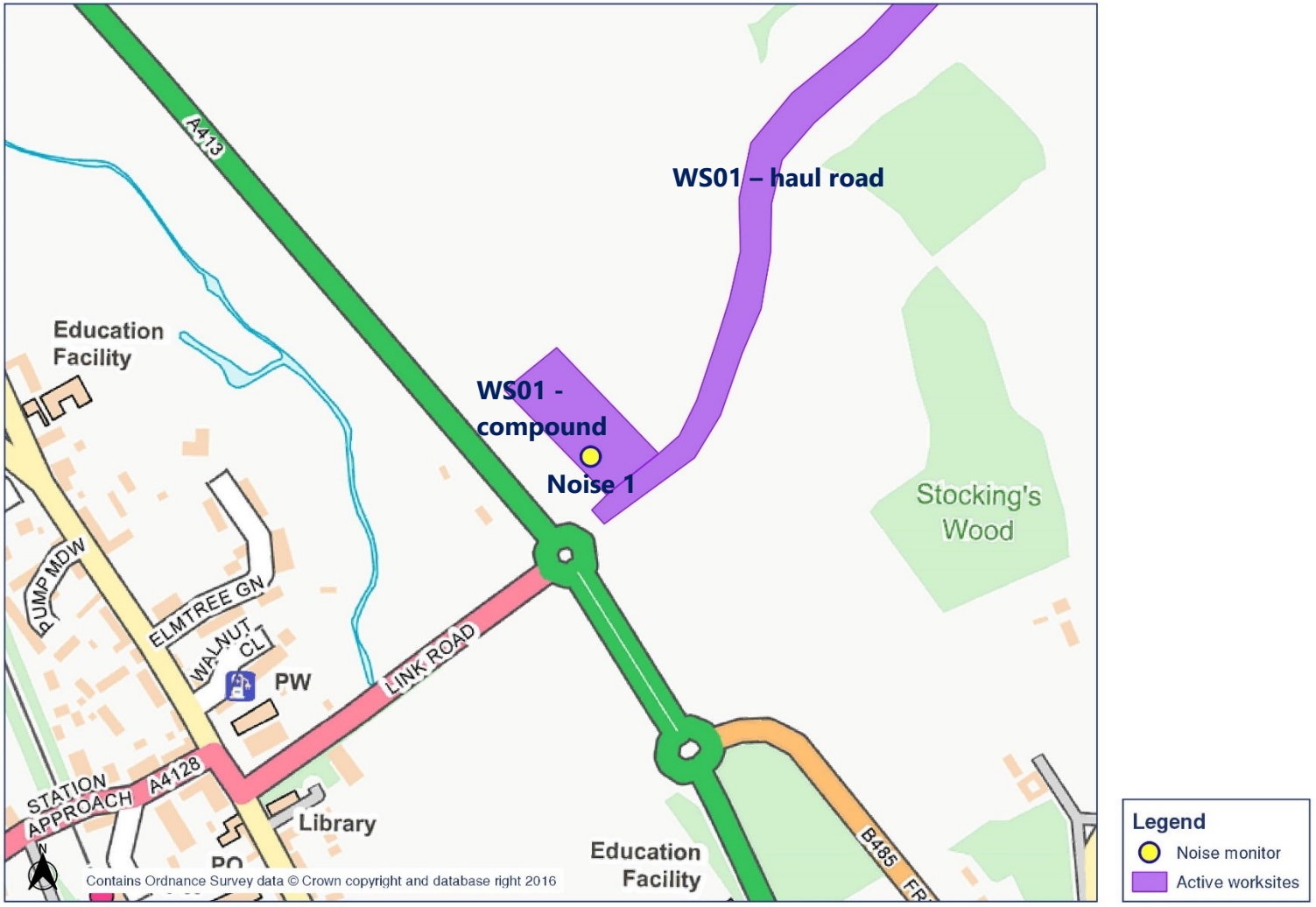
# Worksite identification plan - 2



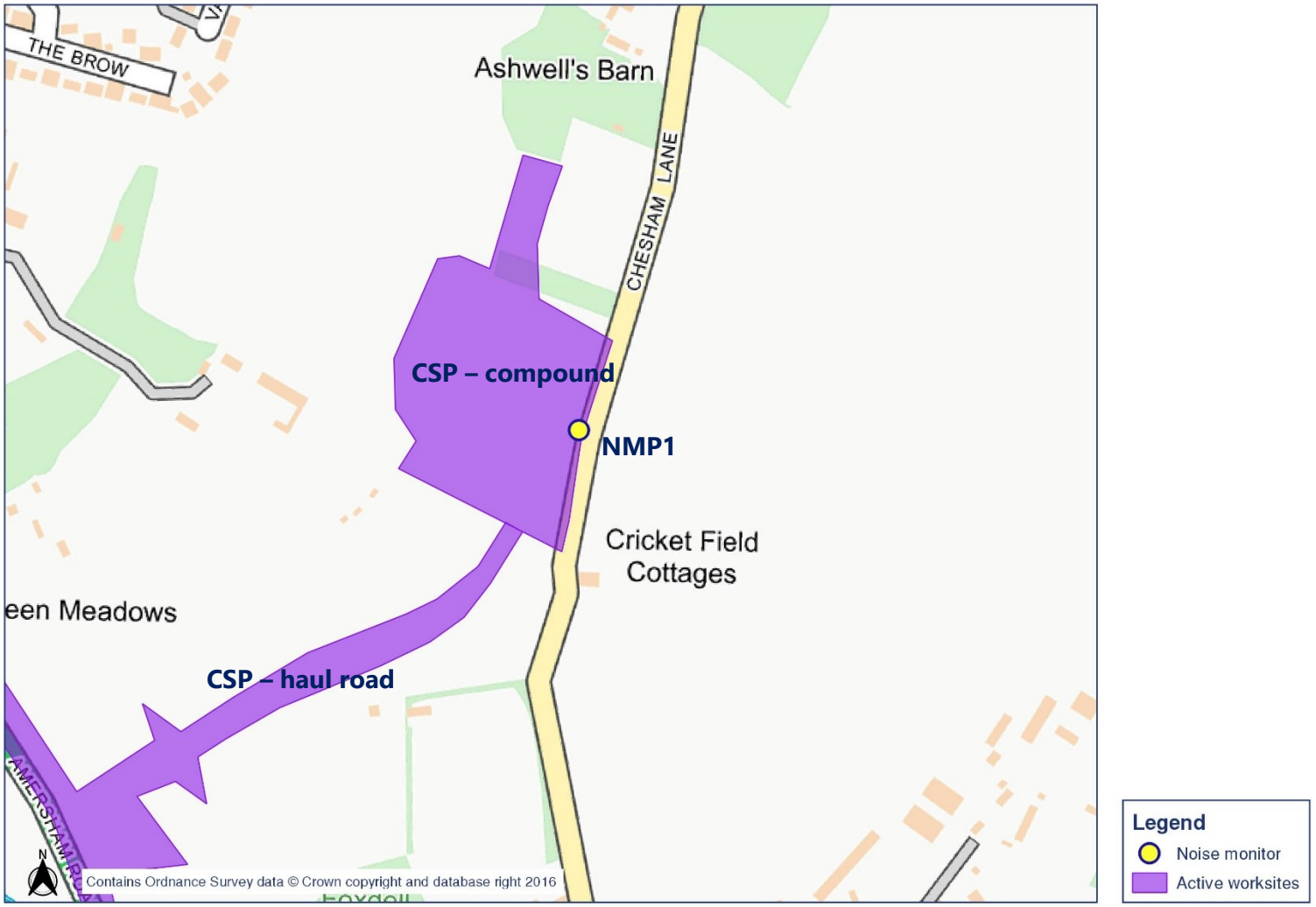
# Appendix B Monitoring Locations

HS2

# Noise monitoring plan - 1



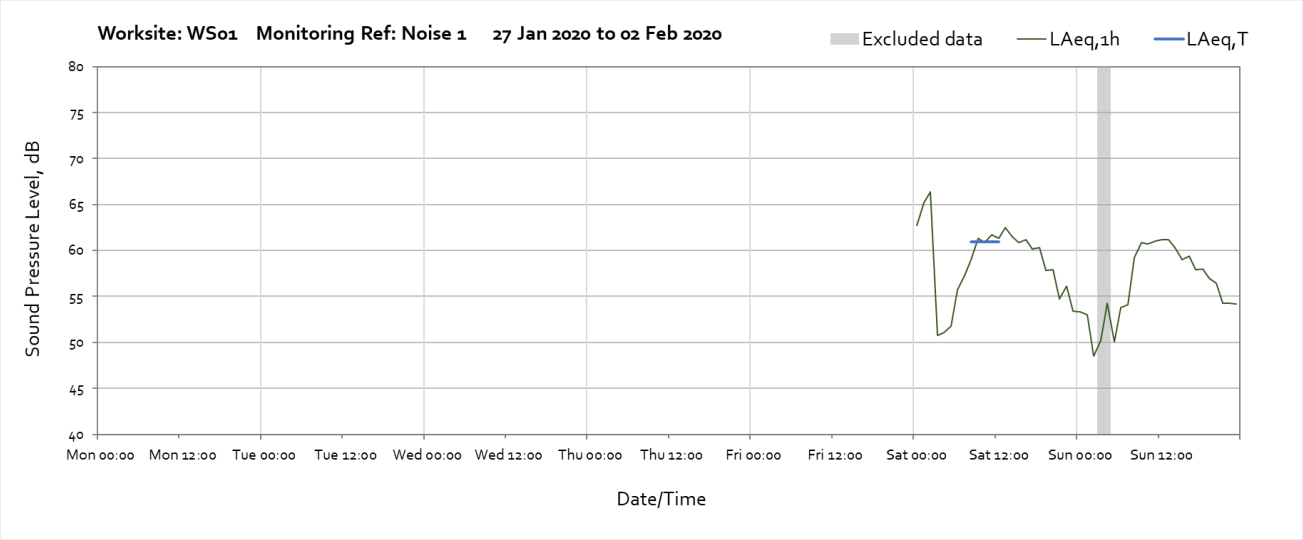
# Noise monitoring plan - 2

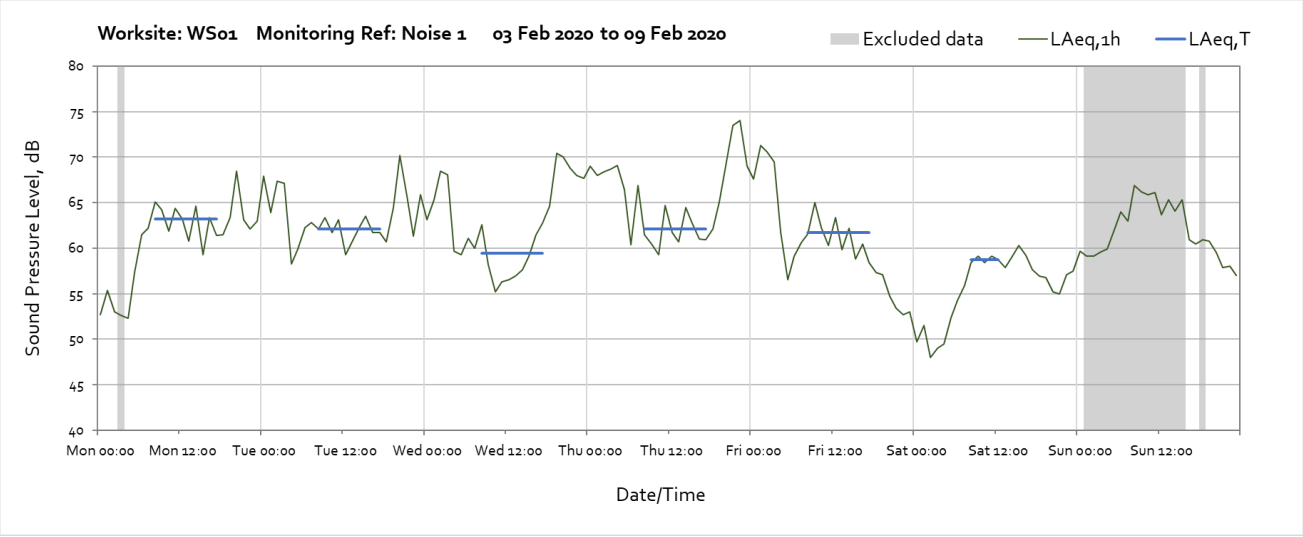


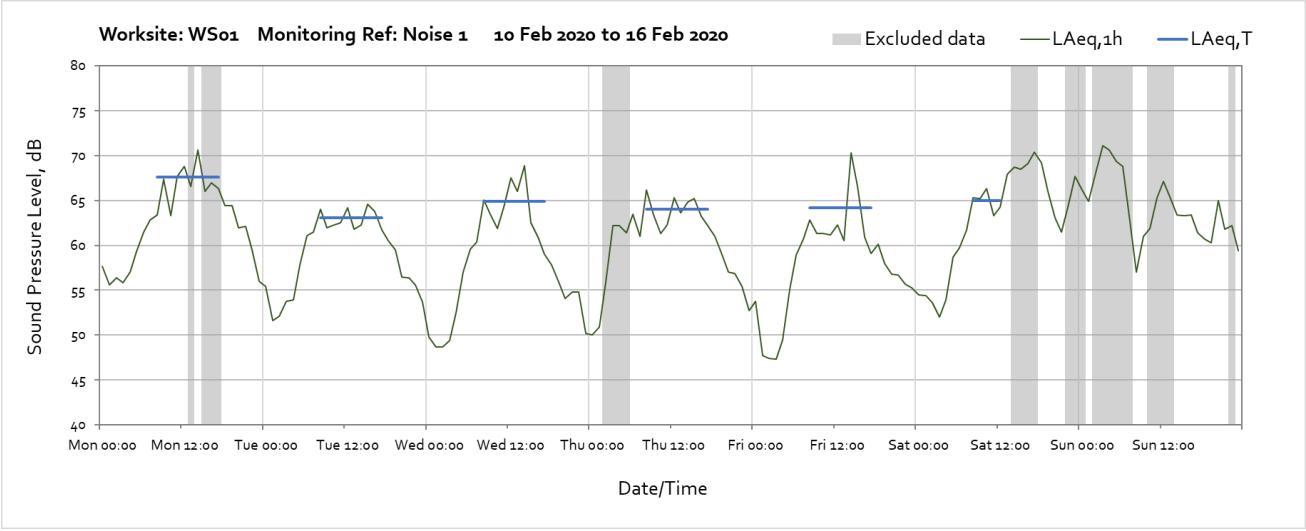
# Appendix C Data

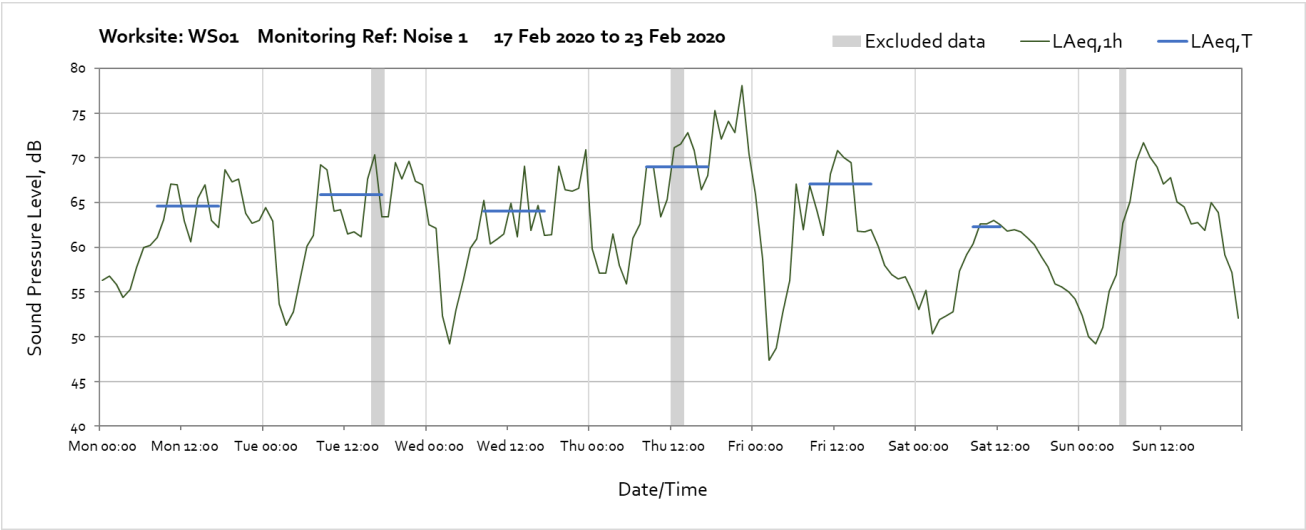
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

## Worksite: WS01 – Monitoring Ref: Noise 1




Worksite: WS01 Monitoring Ref: Noise 1 10 Feb 2020 to 16 Feb 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
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: WS01 Monitoring Ref: Noise 1 17 Feb 2020 to 23 Feb 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
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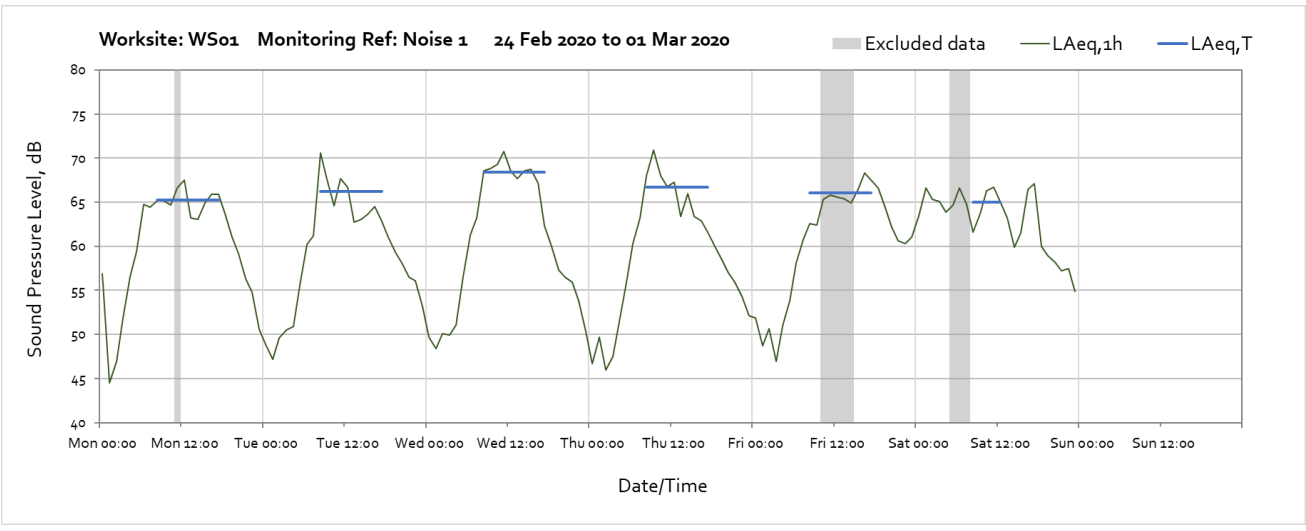
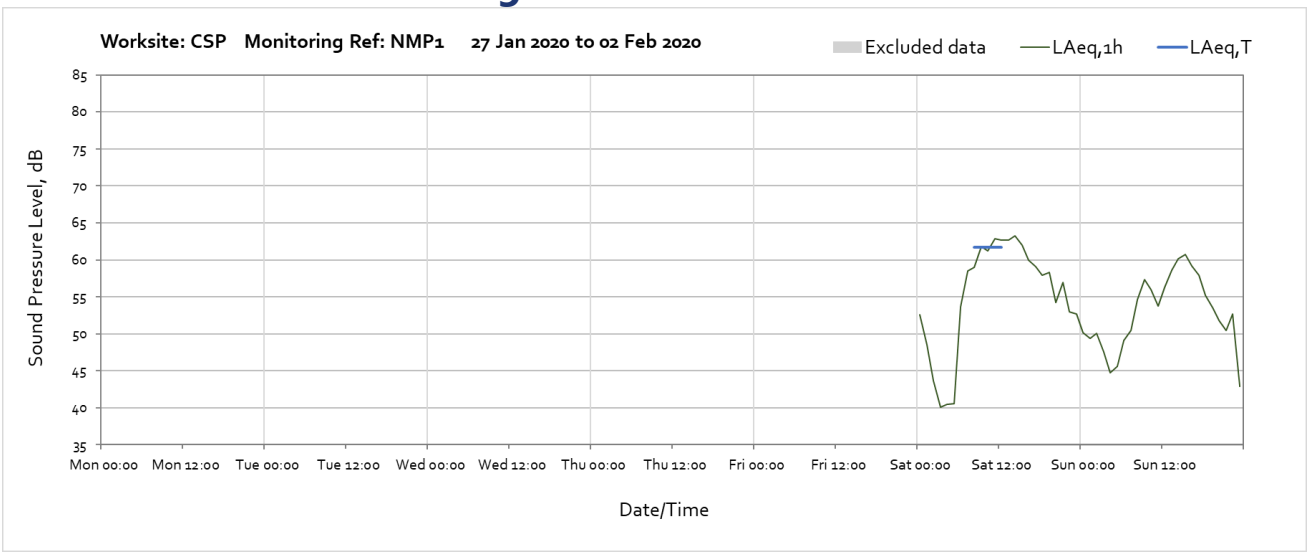
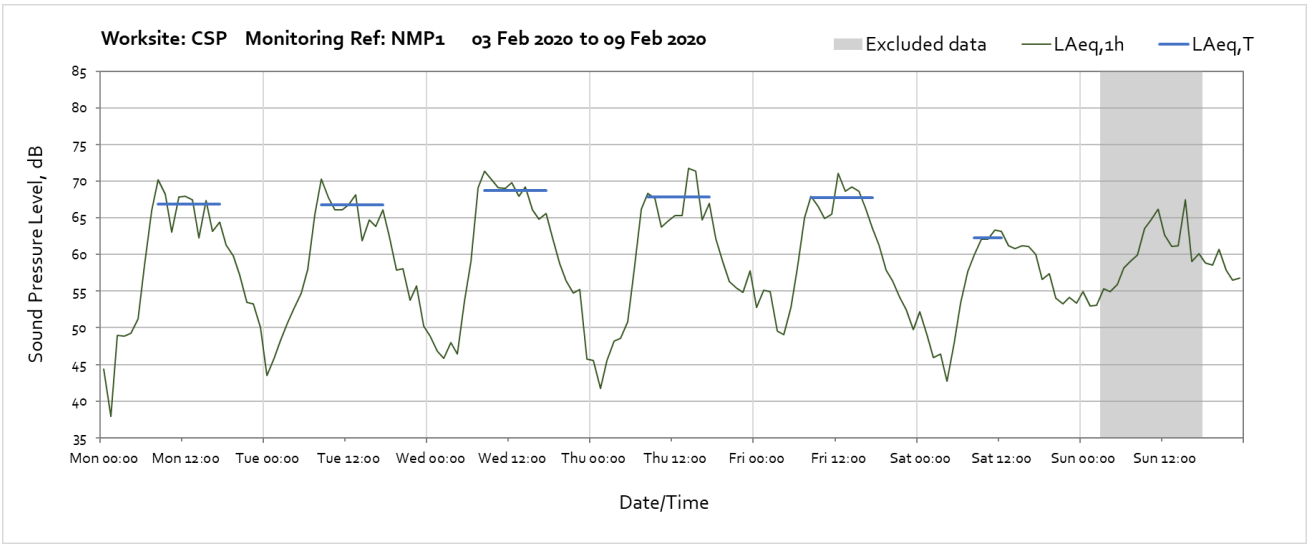
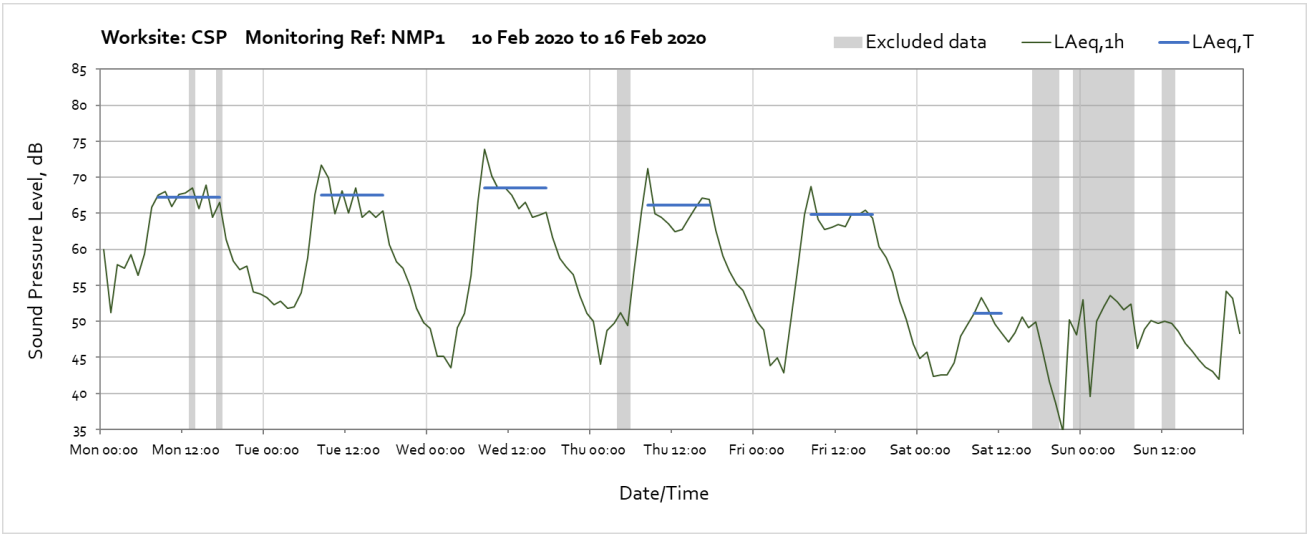
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

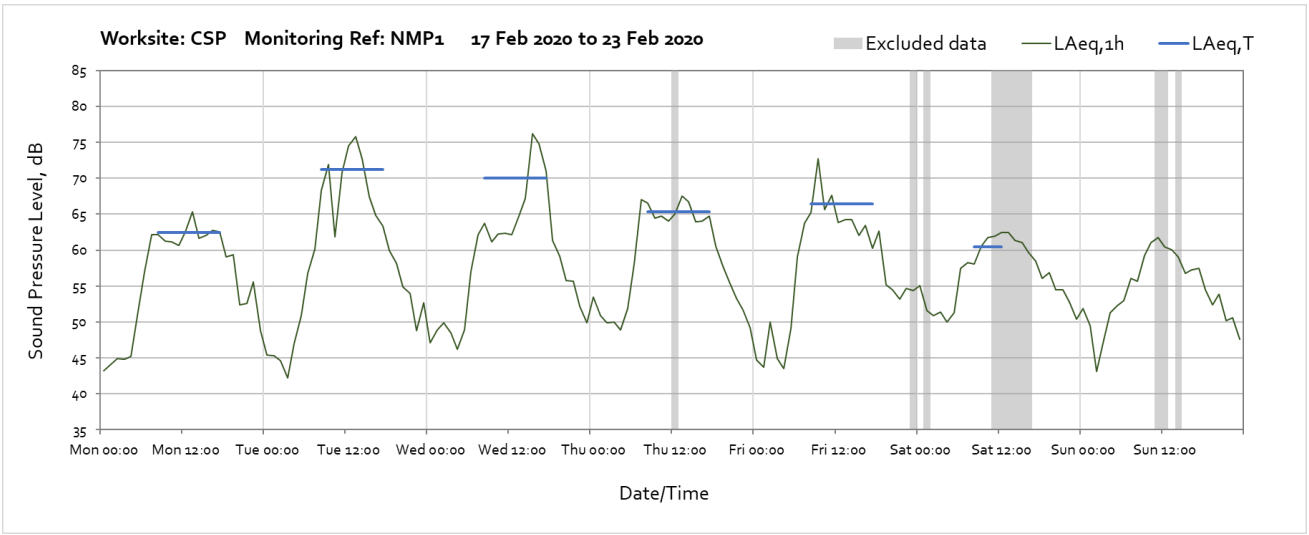

Worksite: WS01 Monitoring Ref: Noise 1 24 Feb 2020 to 01 Mar 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

# Worksite: CSP – Monitoring Ref: NMP1




Worksite: CSP Monitoring Ref: NMP1 17 Feb 2020 to 23 Feb 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
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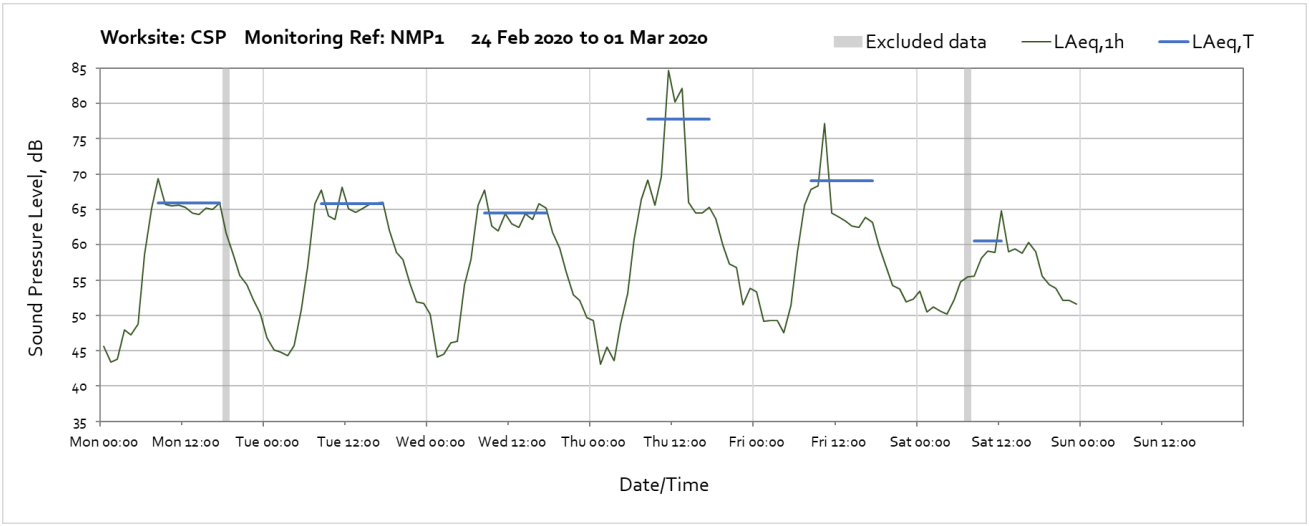
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time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Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
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Sun 12:00
Date/Time