

Construction noise and vibration Monthly Report – September 2020

Buckinghamshire

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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 monitoring carried out within Buckinghamshire (BS) during the month of September 2020.

Within this period noise monitoring was undertaken in the vicinity of the following worksites:

- Bottom House Farm Lane worksite (ref.: BHFL), where drainage, earthworks, roadworks and site management activities were underway.
- Chalfont St Peter Vent Shaft worksite (ref.: CSP), where excavation works, structural concrete wall installation and concreting works were in progress.
- Load Test Pile 1 worksite (ref.: LTP #1), where reinstatement of pile mat and pile cropping works were underway.
- Amersham Vent Shaft worksite (ref.: AM), where installation of service and earthworks activities were underway.
- Quainton Access Road (ref: QAR), where earthworks and roadworks were underway.

Further works, where monitoring did not take place, were also undertaken at the following locations:

- Ground investigation works to inform design and site mobilisation at various locations within the local authority area.
- Northmoor, Chalfont St. Giles and Amersham as part of water pipeline works.
- Frith Hill, Wendover, Aylesbury, Quainton, Mixbury, Calvert and Turweston as part of electricity diversion works.
- Aylesbury, Quainton and Perry Hill as part of gas pipeline works.

There were no exceedances of the HS2 threshold levels for significant noise impacts during the reporting period at any monitoring position.

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

No complaints were received during the 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 $L_{Aeq,T}$ | 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. |
| LOAEL | Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected. |
| 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. |
| SOAEL | Significant Observed Adverse Effect Level - the level above which significant adverse effects on health and quality of life occur. |
| 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 HS2 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.

1.1.2 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 Buckinghamshire (BS) Local Authority area for the period 1st to 30th September 2020.

1.1.3 Active construction sites in the local authority area where monitoring was undertaken during this period include:

- Bottom House Farm Lane - BHFL (see plan 2 in Appendix A), where work activities included: drainage activities (excavating trenches, levelling, backfilling trenches and compacting); earthworks activities (topsoil and subsoil stripping, cut and fill operations, compaction, installation of geogrid and stockpile management); roadworks activities; utility diversion works and site management activities.
- Chalfont St Peter Vent Shaft - CSP (see plan 3 in Appendix A), where works activities included: structural wall installation works, deliveries and removal of materials from site and compound activities including installation of services and drainage works.
- Load Test Pile 1 worksite - LTP #1 (see plan 4 in Appendix A), where reinstatement of pile mat and pile cropping works were underway.
- Amersham Vent Shaft worksite – AM (see plan 5 in Appendix A), where installation of service (telecom ducts and drainage) and earthworks activities including formation of site accommodation platform, soil stripping, stockpiling and surfacing works were underway.

- Quainton Access Road – QAR (see plan 6 in Appendix A) where work activities included: earthworks activities involving excavation, soil stripping, compaction and soil testing and roadworks activities including installation of geogrid and access track works.

1.1.4 Further works, where monitoring did not take place, were also undertaken at:

- Ground investigation works to inform design and site mobilisation at various locations within the local authority area.
- Northmoor, Chalfont St. Giles and Amersham as part of water pipeline works.
- Frith Hill, Wendover, Aylesbury, Quainton, Mixbury, Calvert and Turweston as part of electricity diversion works.
- Aylesbury, Quainton and Perry Hill as part of gas pipeline works.

1.1.5 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 Seven noise monitoring installations were active in September in the BS area. Table 2 summarises the position of noise monitoring installations within the BS area in September 2020.

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

1.2.3 A new noise monitor was installed near the recently established Quainton Access Road worksite in late August.

Table 2: Monitoring Locations

| Worksite Reference | Measurement Reference | Address |
|--------------------|-----------------------|--|
| CSP | CSP-NMP1 | Chesham Lane, Chalfont St. Peter |
| | CSP-NMP2 | Chesham Lane, Chalfont St. Peter |
| | CSP-NMP3 | Chesham Lane, Chalfont St. Peter |
| LTP #1 | LTP #1-NMP1 | Along worksite northern boundary |
| BHFL | BHFL-NMP1 | Elm Tree Cottage, Bottom House Farm Lane |
| AM | AM-NMP1 | Whielden Lane, Amersham |
| QAR | QAR-NMP1 | 1 Woodlands Farm Cottages |

1.2.4 During a site maintenance visit, monitor LTP #1-NMP1 was found to be lying on its side. The monitor is believed to have fallen over at the end of August, and for this reason the September data can not be verified as being robust and are not presented in this report. Currently the monitor has been reinstalled and secured to prevent similar incidents in the future.

2 Summary of Results

2.1 Summary of Measured Noise Levels

2.1.1 Table 3 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.

Table 3: 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 |
| CSP | CSP-NMP1 | Chesham Lane, Chalfont St. Peter | Free-field | 62.6 (66.0) | 64.8 (69.3) | 62.1 (74.1) | 59.2 (62.9) | 58.3 (62.3) | 59.1 (59.8) | 62.0 (62.9) | 60.6 (61.3) | 59.5 (62.1) | 58.1 (59.3) | 59.0 (61.3) | 58.1 (60.5) |
| | CSP-NMP2 | Chesham Lane, Chalfont St. Peter | Free-field | 44.9 (54.8) | 48.3 (60.7) | 43.5 (48.3) | 42.0 (53.8) | 37.4 (47.5) | 42.2 (44.0) | 47.6 (49.1) | 48.7 (49.6) | 45.8 (50.6) | 38.1 (46.1) | 46.3 (52.2) | 36.3 (43.6) |
| | CSP-NMP3 | Chesham Lane, Chalfont St. Peter | Free-field | 56.9 (58.4) | 56.3 (59.6) | 56.1 (58.8) | 53.3 (57.6) | 49.6 (65.2) | 54.0 (55.3) | 56.8 (58.0) | 57.0 (57.8) | 55.1 (57.6) | 48.2 (52.7) | 54.8 (57.4) | 48.2 (55.6) |
| LTP #1* | LTP #1-NMP1 | Along worksite northern boundary | Free-field | 55.6 (57.7) | 55.1 (56.5) | 54.0 (55.9) | 51.9 (57.8) | 50.0 (57.3) | 52.2 (53.2) | 54.2 (55.2) | 54.3 (56.0) | 53.0 (56.8) | 48.6 (51.0) | 52.9 (59.0) | 49.5 (55.8) |
| BHFL | BHFL-NMP1 | Elm Tree Cottage, Bottom House Farm Lane | Free-field | 55.5 (59.6) | 61.9 (65.9) | 53.0 (54.9) | 50.4 (70.6) | 47.2 (66.6) | 53.0 (55.8) | 54.4 (57.0) | 55.8 (62.5) | 52.3 (56.9) | 46.1 (51.6) | 51.5 (54.2) | 46.8 (54.7) |
| AM | AM-NMP1 | Whielden Lane, Amersham | Free-field | 70.5 (71.8) | 70.9 (74.9) | 70.0 (71.3) | 67.0 (73.2) | 61.9 (71.3) | 66.6 (66.9) | 69.6 (70.0) | 70.3 (70.6) | 68.9 (71.7) | 60.7 (67.6) | 68.8 (73.1) | 61.7 (68.9) |
| QAR | QAR-NMP1 | 1 Woodlands Farm Cottages | Free-field | 54.1 (56.8) | 54.1 (59.0) | 51.5 (55.2) | 48.9 (55.4) | 44.2 (52.9) | 48.9 (49.7) | 51.3 (51.7) | 52.2 (55.7) | 50.1 (54.5) | 42.7 (48.6) | 52.7 (66.1) | 42.3 (52.1) |

* Following a routine inspection the monitor was found on its side therefore the dataset from monitor LTP#1-NMP1 is not considered accurate during September 2020.

2.1.2 Appendix C presents graphs of the noise monitoring data over the month for each of the measurement locations. Noise data presented consists of 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 Exceedances of the LOAEL and SOAEL

2.2.1 The lowest observed adverse effect level (LOAEL) is defined in the Planning Practice Guidance – Noise (PPG) 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".

2.2.2 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."

2.2.3 HS2 Phase One Information Paper E23: Control of Construction Noise and Vibration sets out the LOAELs and SOAELs for construction noise.

2.2.4 Where construction noise levels exceed the LOAEL and SOAEL relevant periods will be identified. Summary statistics to evaluate ongoing qualification for noise insulation and temporary rehousing are also presented where relevant.

2.2.5 Table 4 presents a summary of recorded exceedances of the LOAEL and SOAEL at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 4: 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 |
|--------------------|-----------------------|--|--|-------------|--------------------------------|--------------------------------|
| CSP | CSP-NMP1 | Chesham Lane, Chalfont St. Peter | Weekday | 0800-1800 | 18 | No exceedance |
| | CSP-NMP2 | Chesham Lane, Chalfont St. Peter | All days | All periods | No exceedance | No exceedance |
| | CSP-NMP3 | Chesham Lane, Chalfont St. Peter | All days | All periods | No exceedance | No exceedance |
| LTP #1* | LTP #1-NMP1 | Along worksite northern boundary | - | - | - | - |
| BHFL | BHFL-NMP1 | Elm Tree Cottage, Bottom House Farm Lane | Weekday | 0800-1800 | 6 | No exceedance |
| AM | AM-NMP1 | Whielden Lane, Amersham | Weekday | 0800-1800 | 22 | 2** No exceedance |
| | | | Saturday | 0800-1300 | 4 | |
| QAR | QAR-NMP1 | 1 Woodlands Farm Cottages | All days | All periods | No exceedance | No exceedance |

* Following a routine inspection the monitor was found on its side therefore the dataset from monitor LTP#1-NMP1 is not considered accurate during September 2020.

** Exceedances of the SOAEL at monitoring position AM-NMP1 are not considered as representative of HS2 works at nearby receptors in consideration of the large separation distance (approximately 70m) between the monitor and nearby receptors with noise levels at the nearby receptor estimated / calculated to be below SOAEL.

2.2.6 No exceedances of the SOAEL were recorded due to HS2 construction works during September 2020. A number of exceedances of the LOAEL were recorded at monitoring positions CSP-NMP1, BHFL-NMP1 and AM-NMP1 in September 2020 during weekday and Saturday core working hours.

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 |
|--|--------------------|----------------------|-------------------|---|---------------|
| - | - | - | - | - | - |

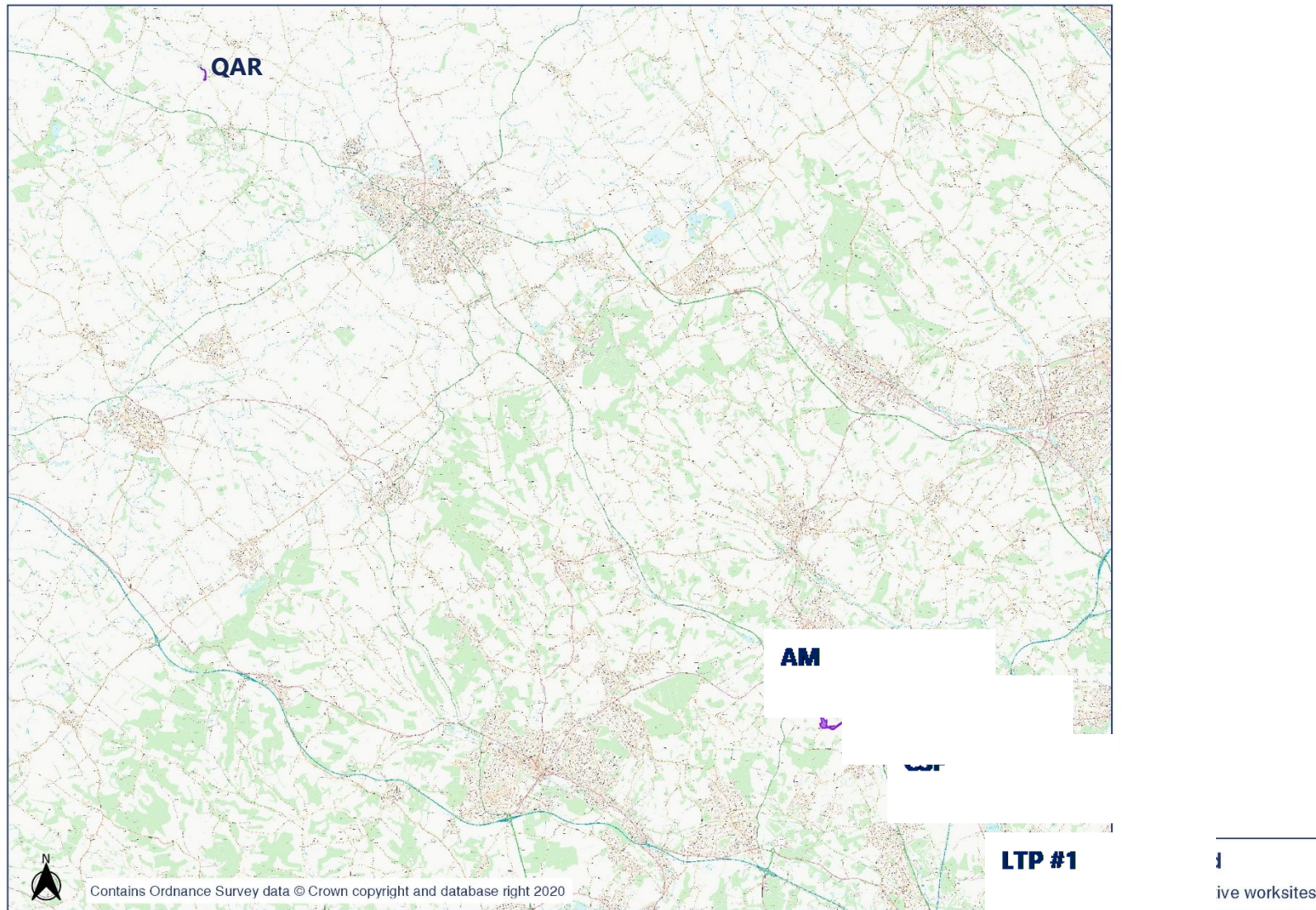
2.4 Complaints

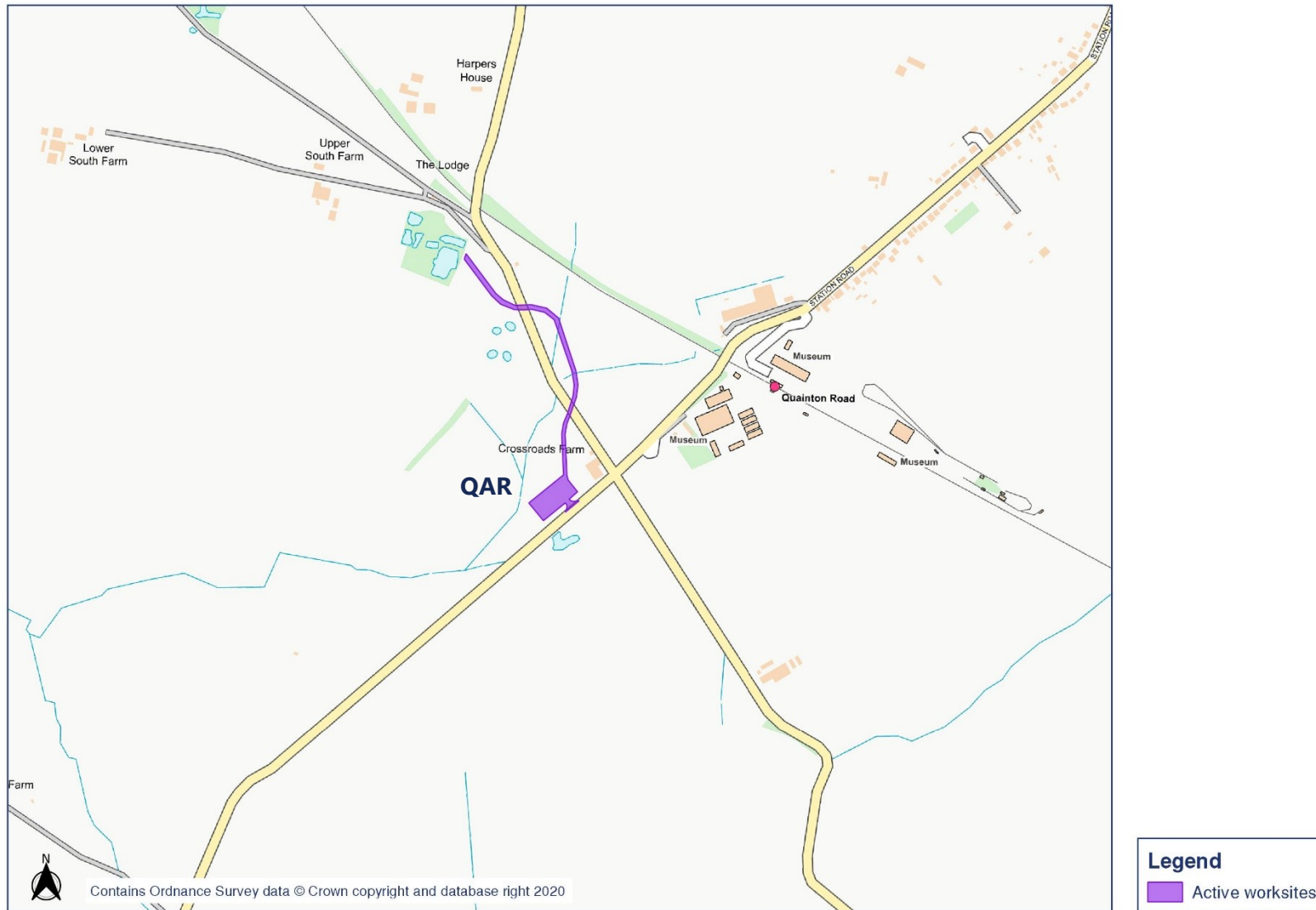
2.4.1 Table 6 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

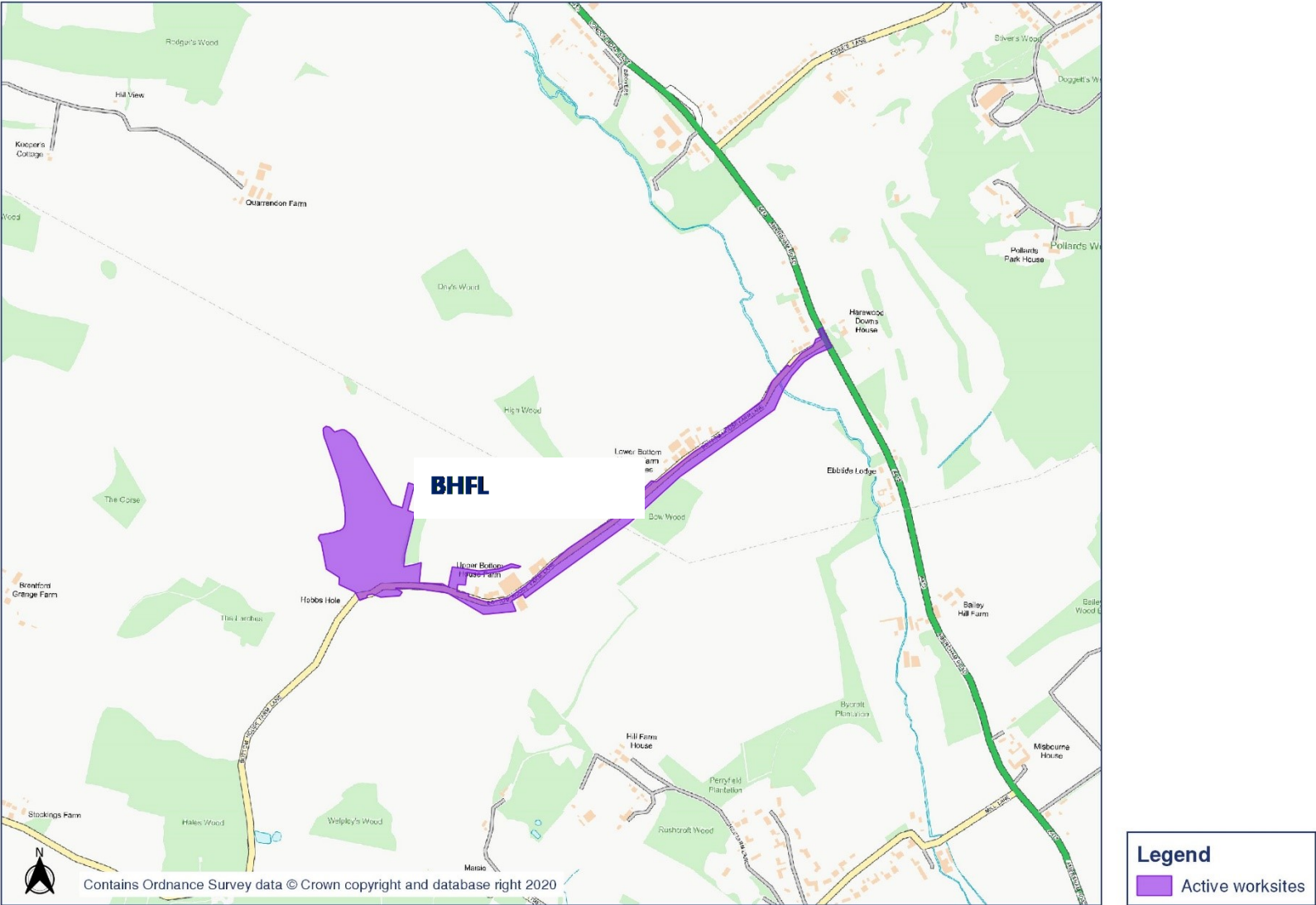
Table 6: Summary of Complaints

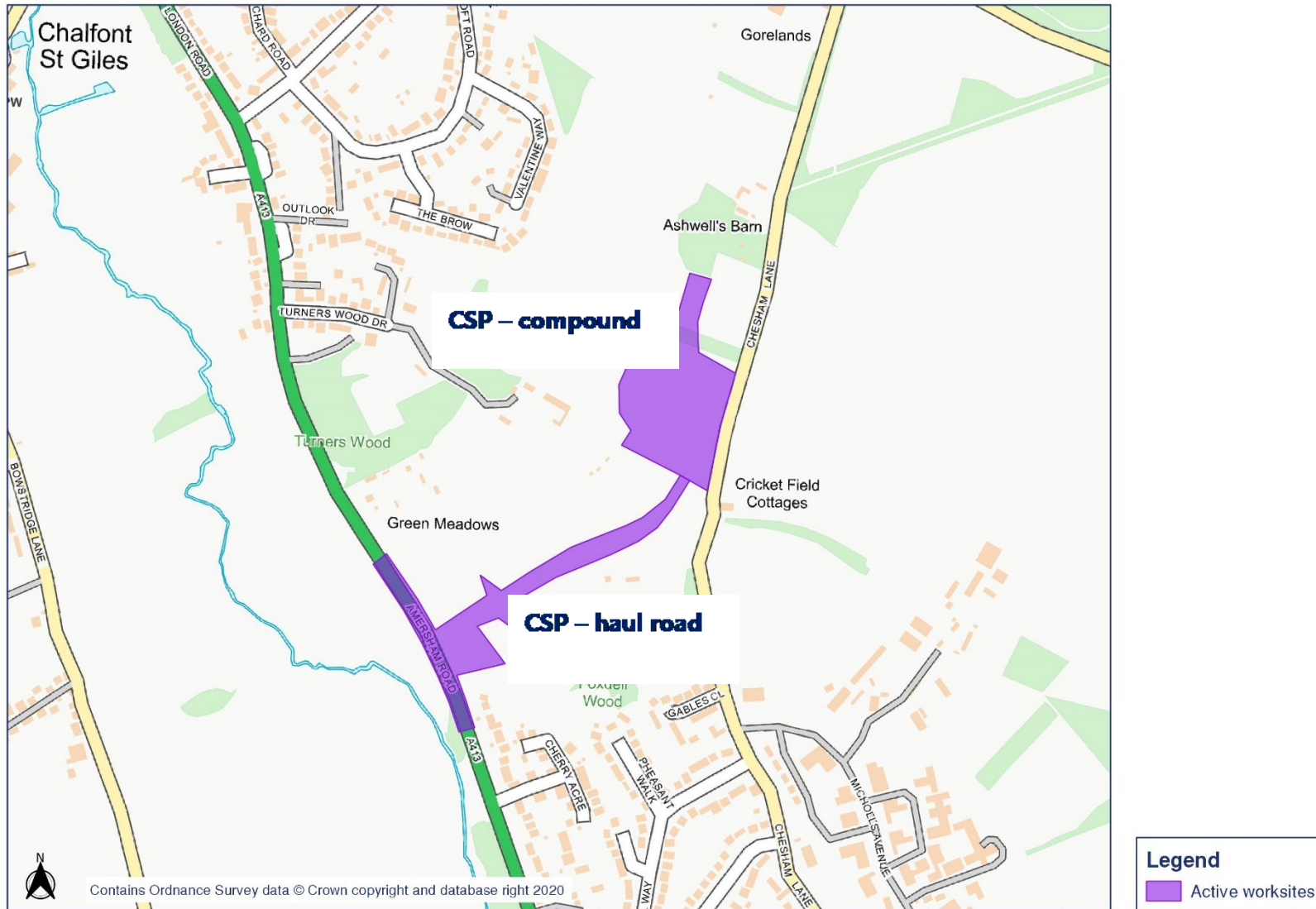
| Complaint Reference Number | Worksite Reference | Description of Complaint | Results of Investigation | Actions Taken |
|----------------------------|--------------------|--------------------------|--------------------------|---------------|
| - | - | - | - | - |

Appendix A Site Locations





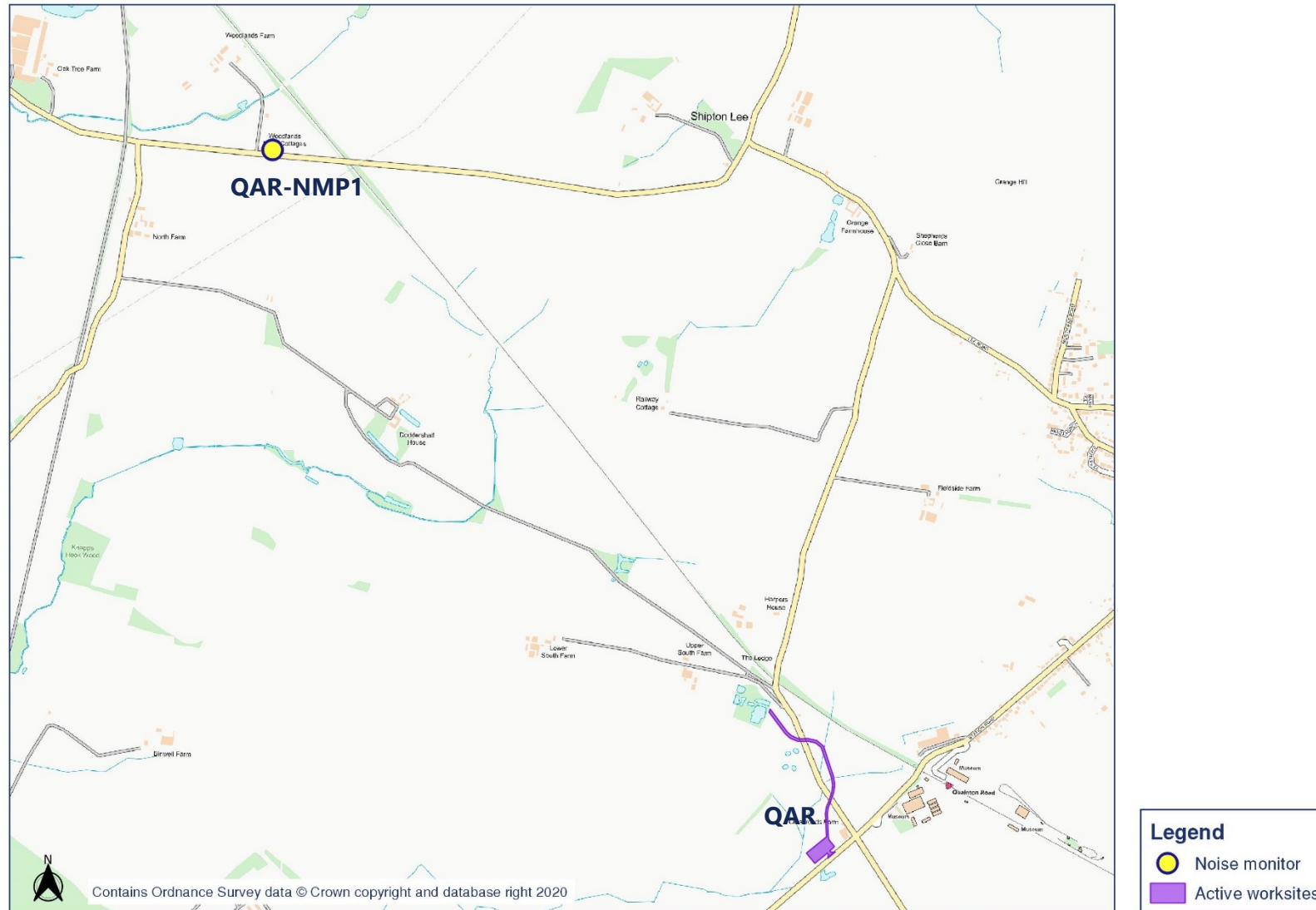


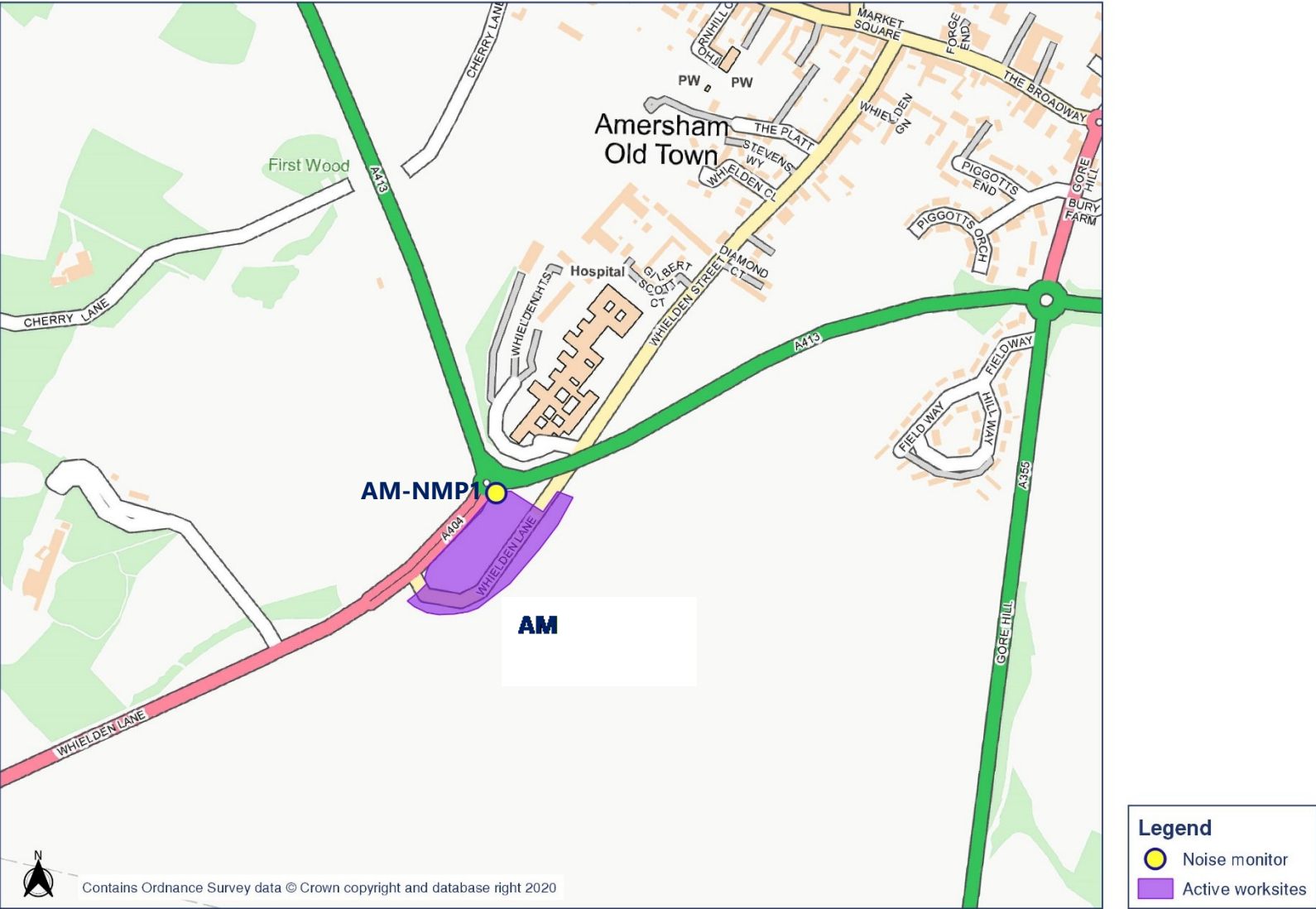


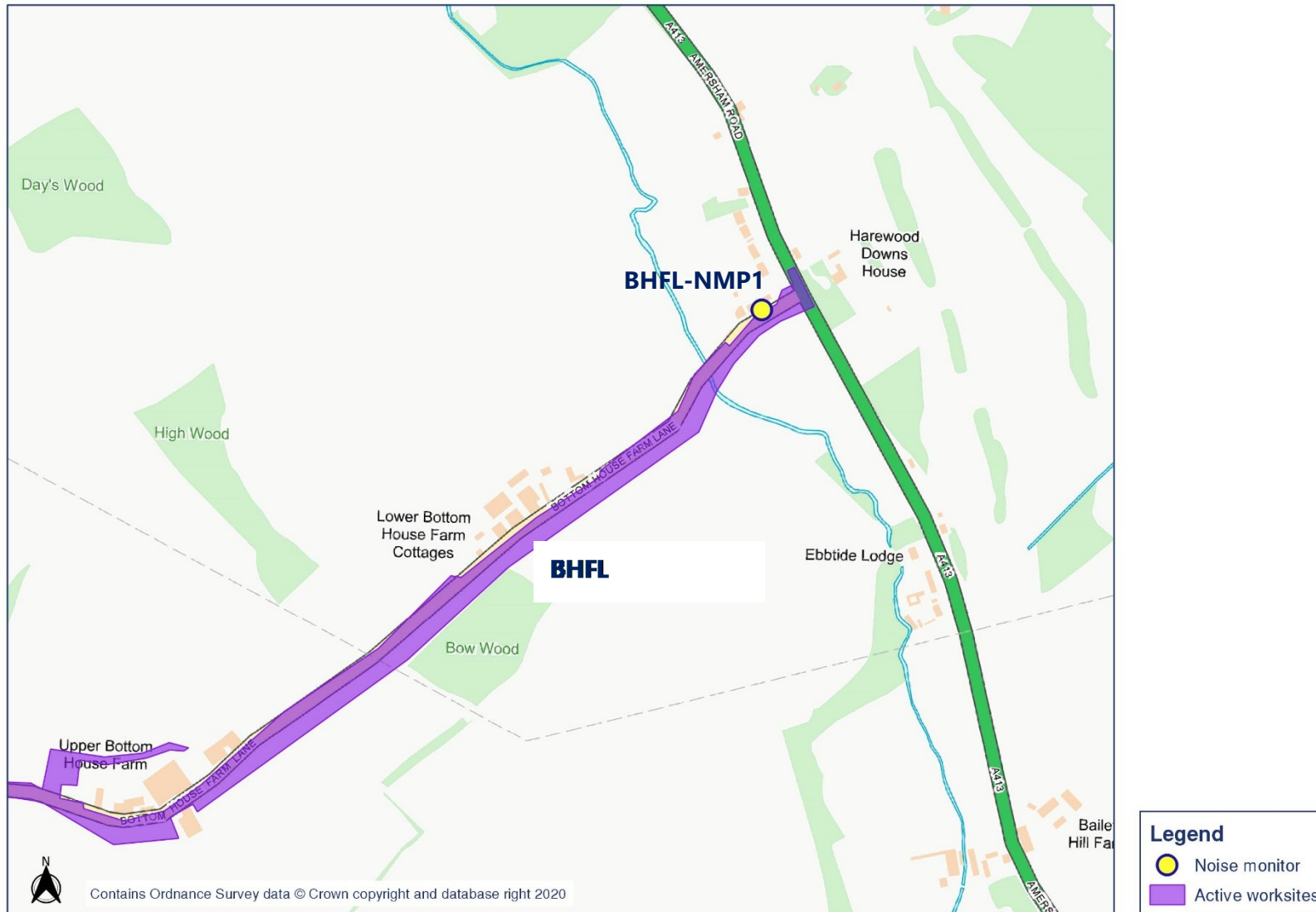


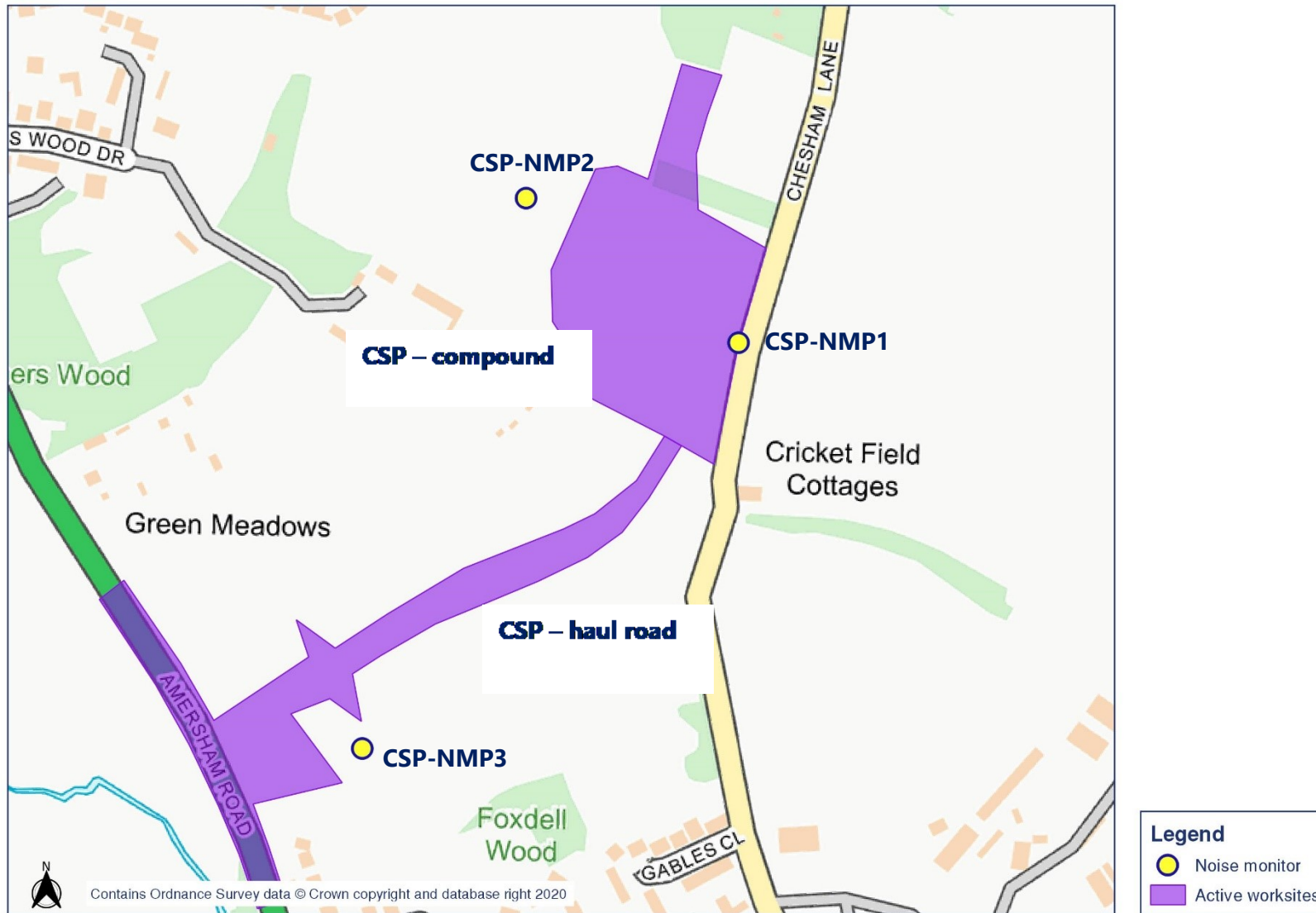


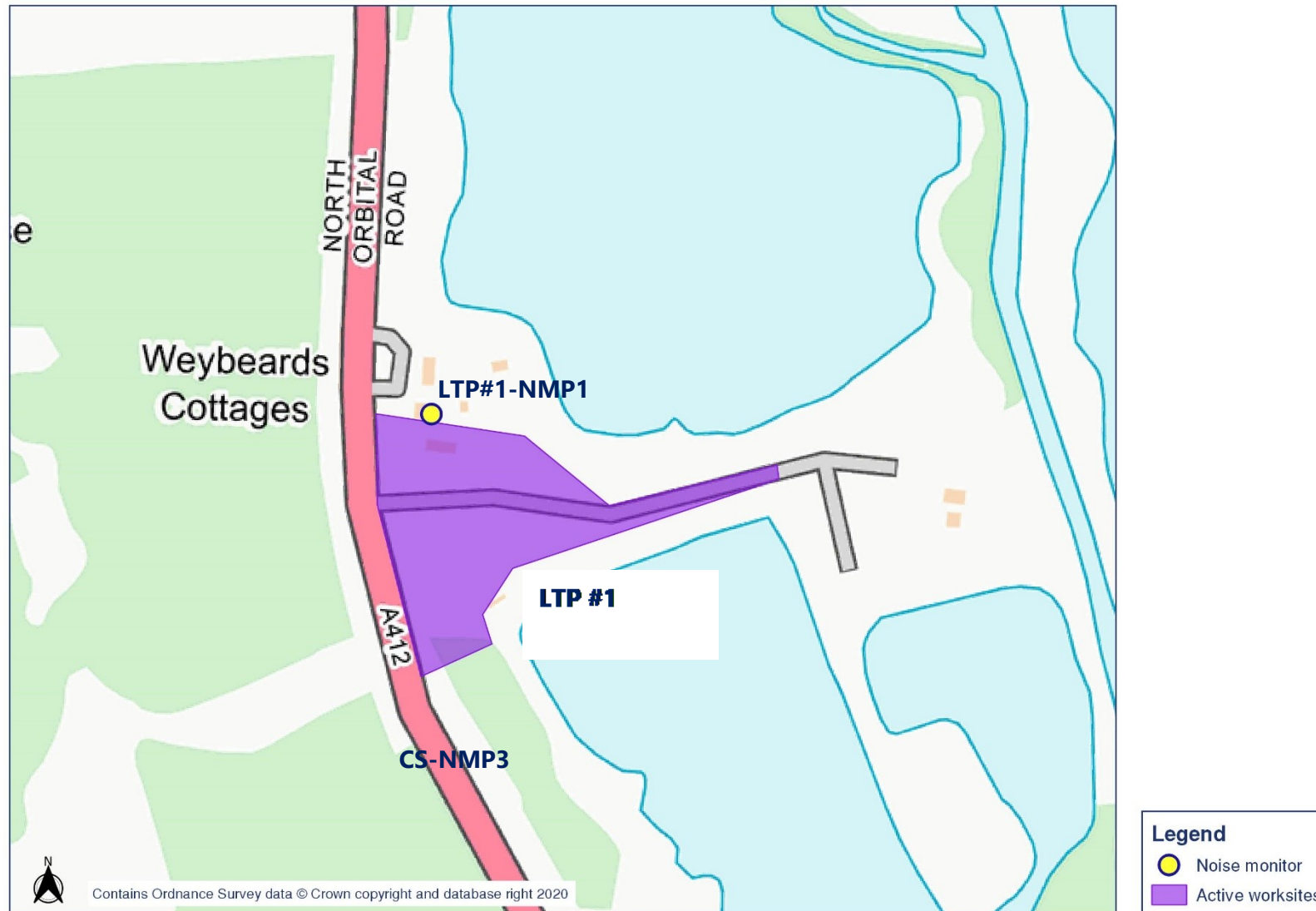
Appendix B Monitoring Locations







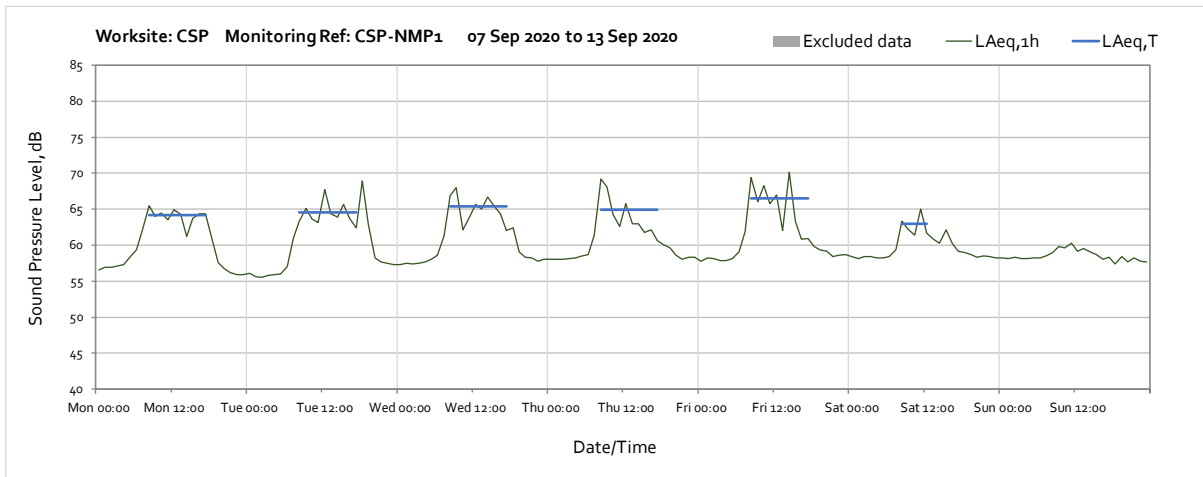
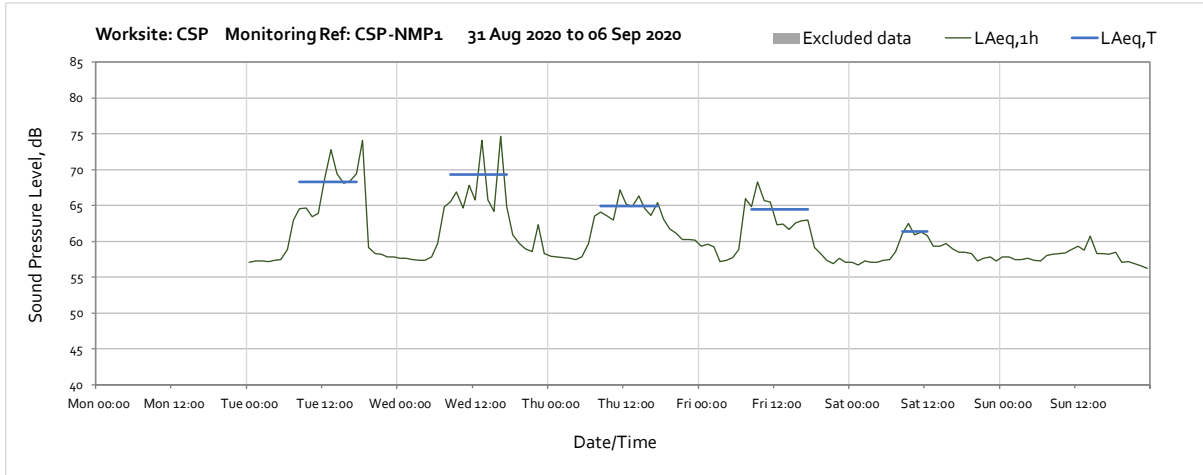


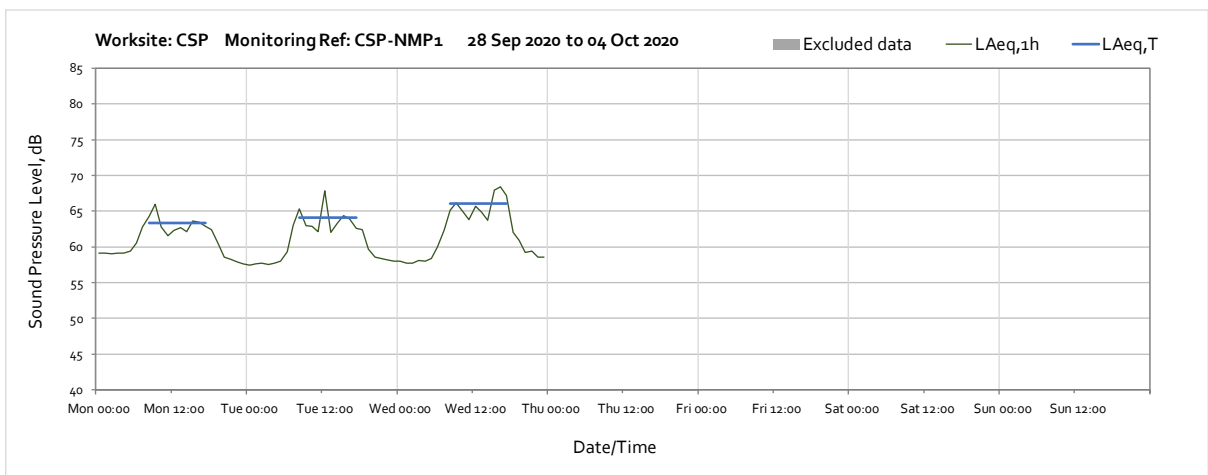
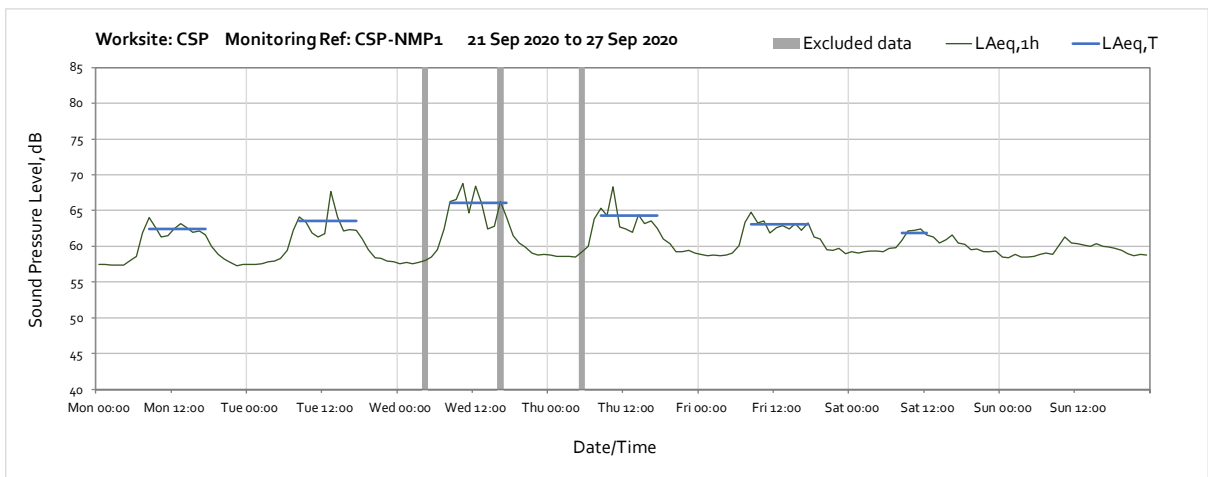
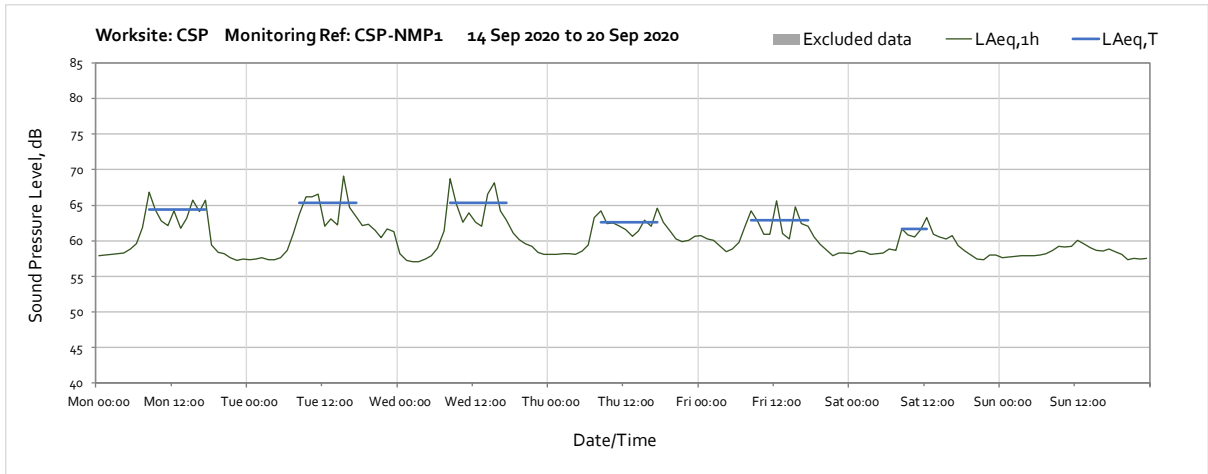


Appendix C Data

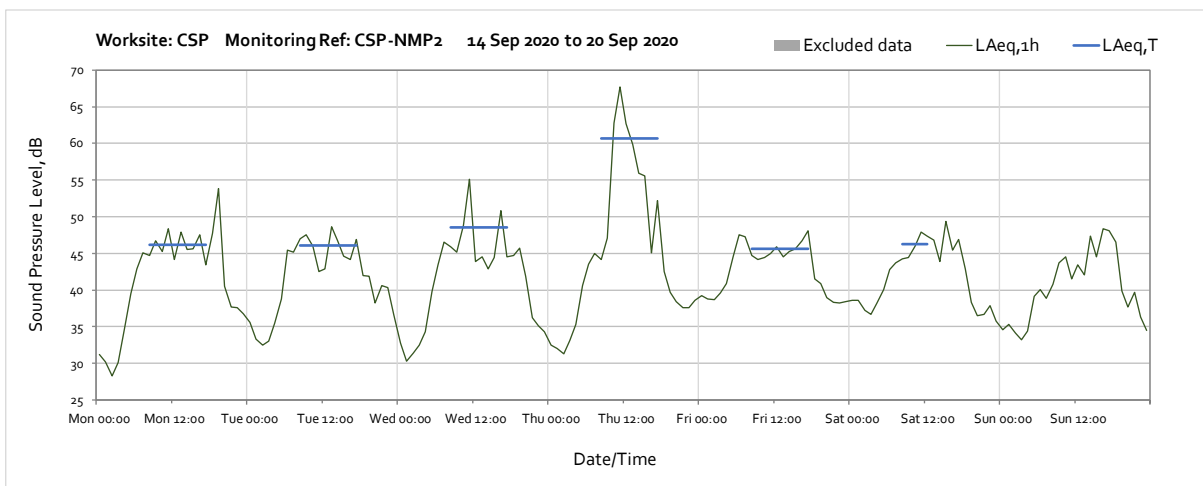
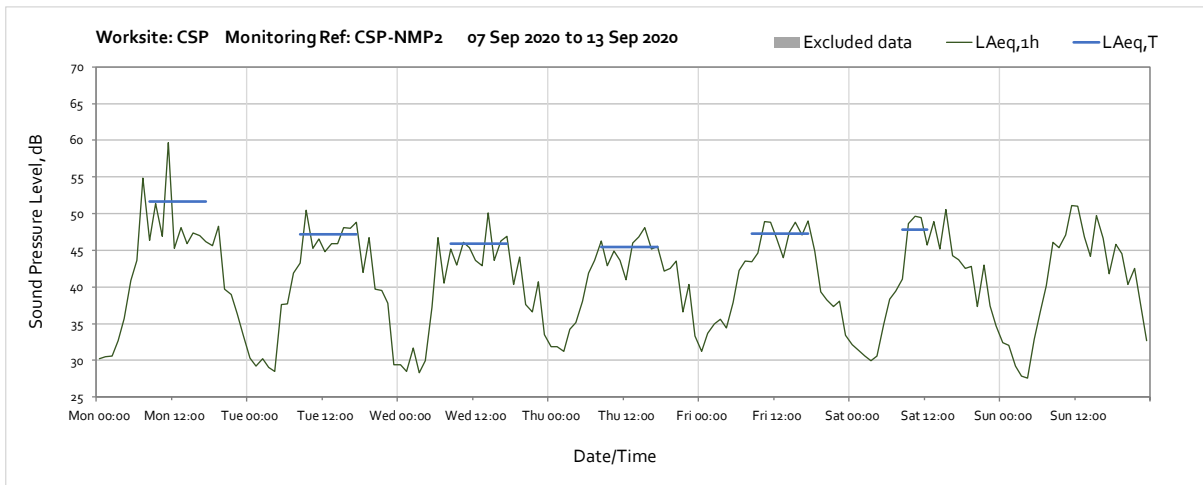
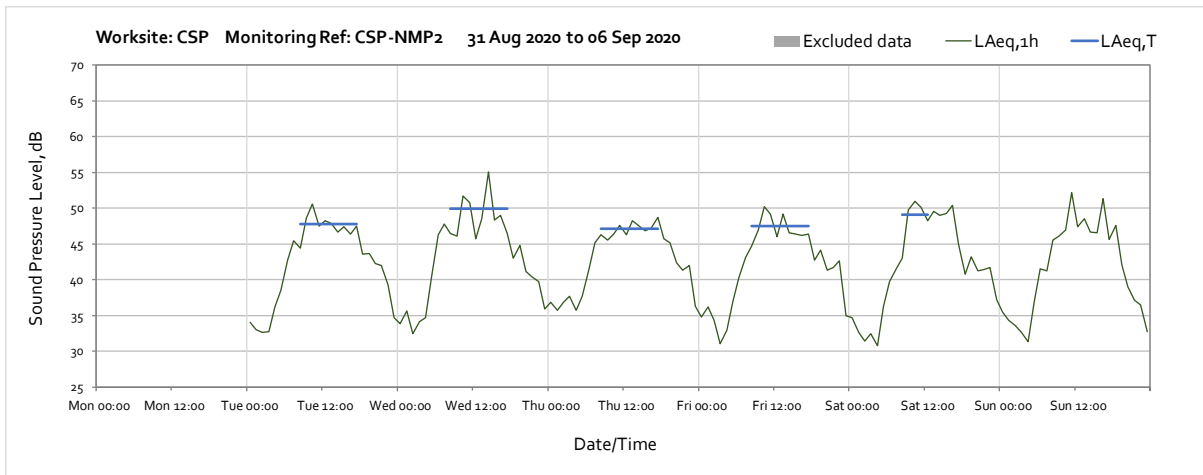
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have been excluded from the calculation of the $L_{Aeq,T}$ values in Table 3 of the main report.

Worksite: CSP – Monitoring Ref: CSP-NMP1

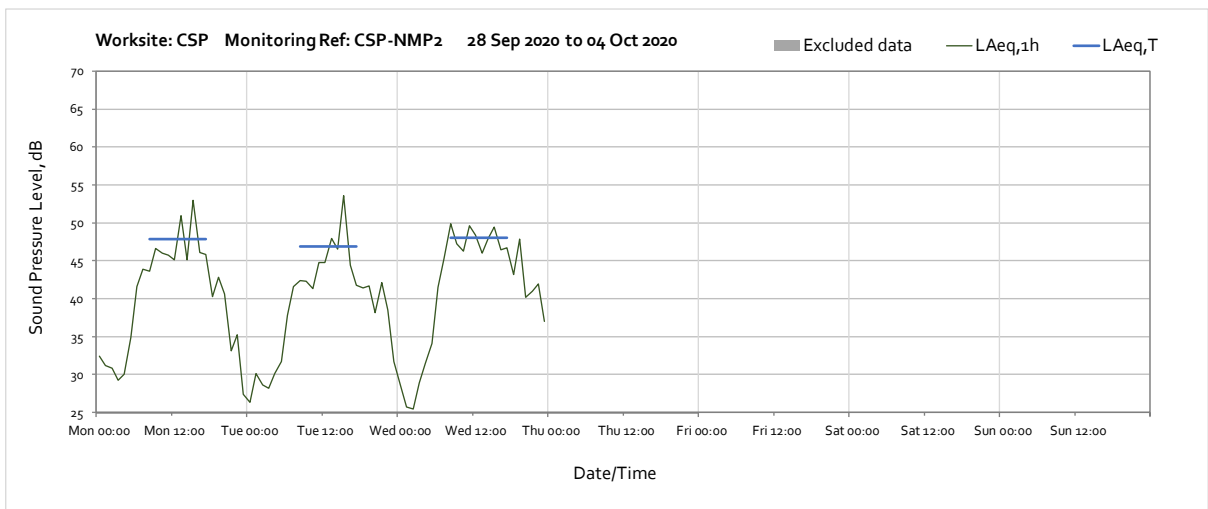
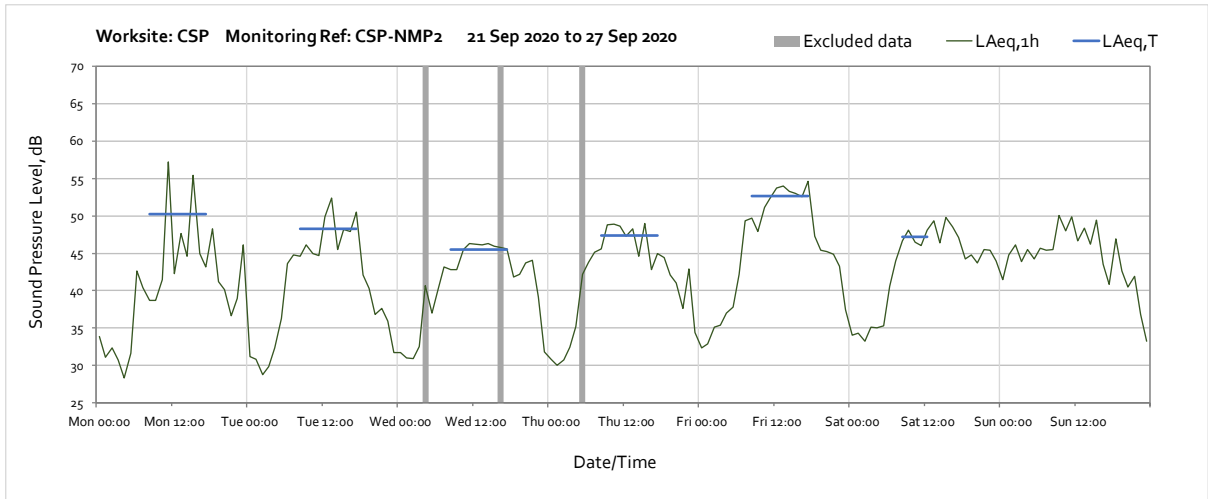




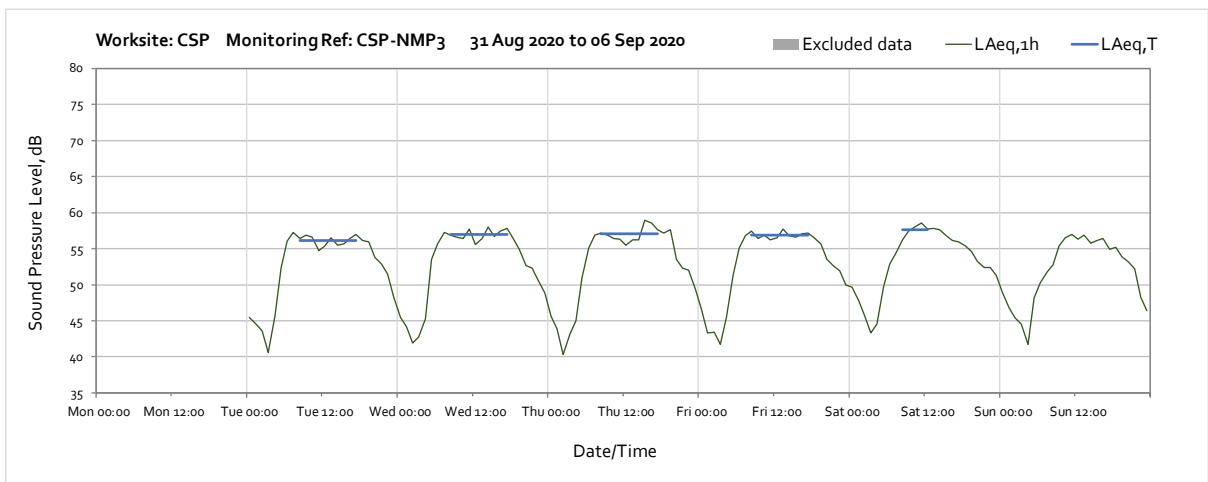
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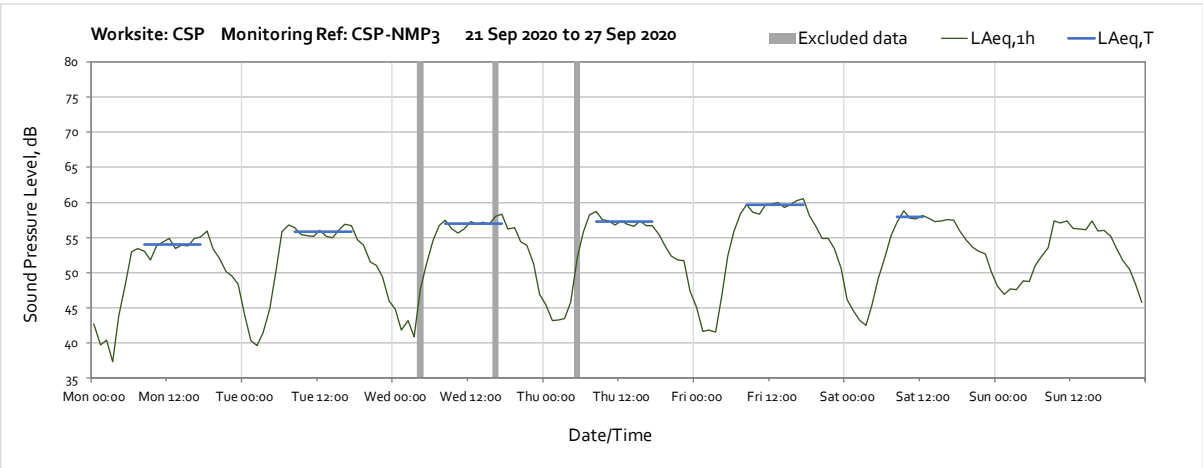
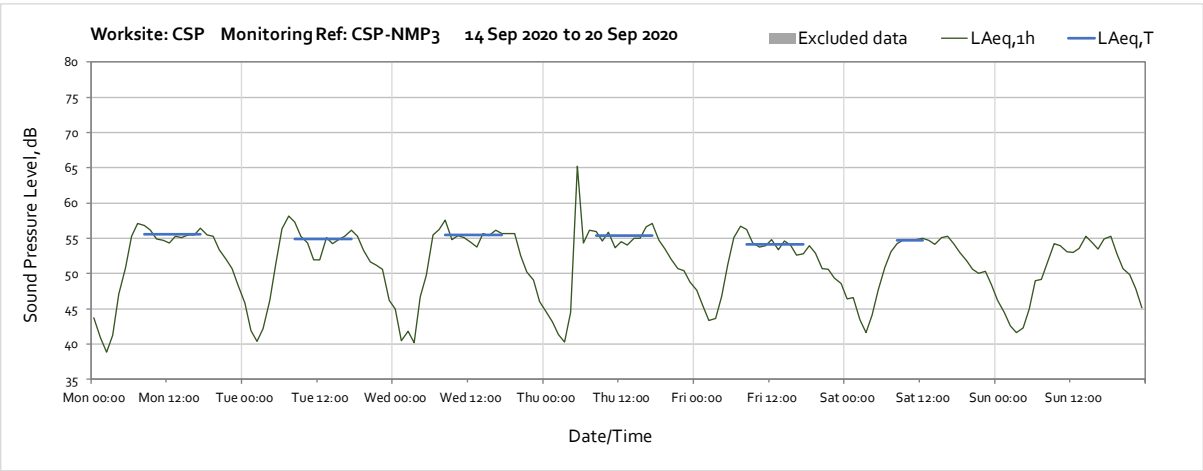
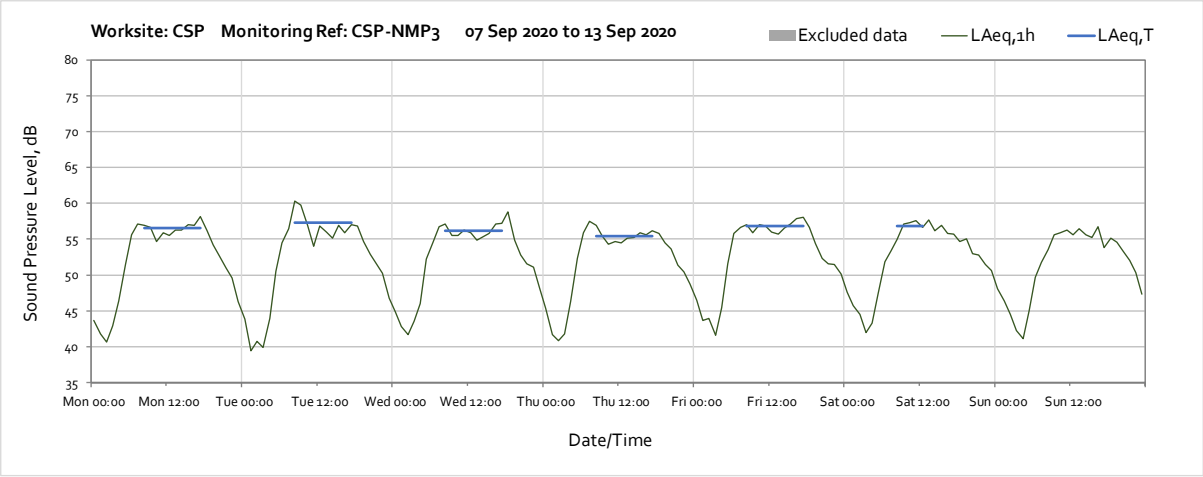


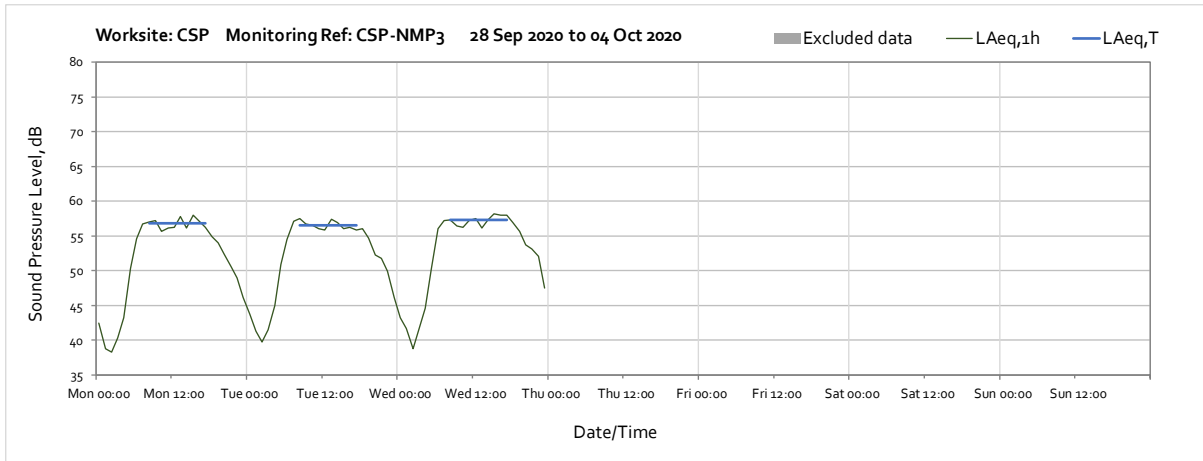
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Worksite: CSP – Monitoring Ref: CSP-NMP3

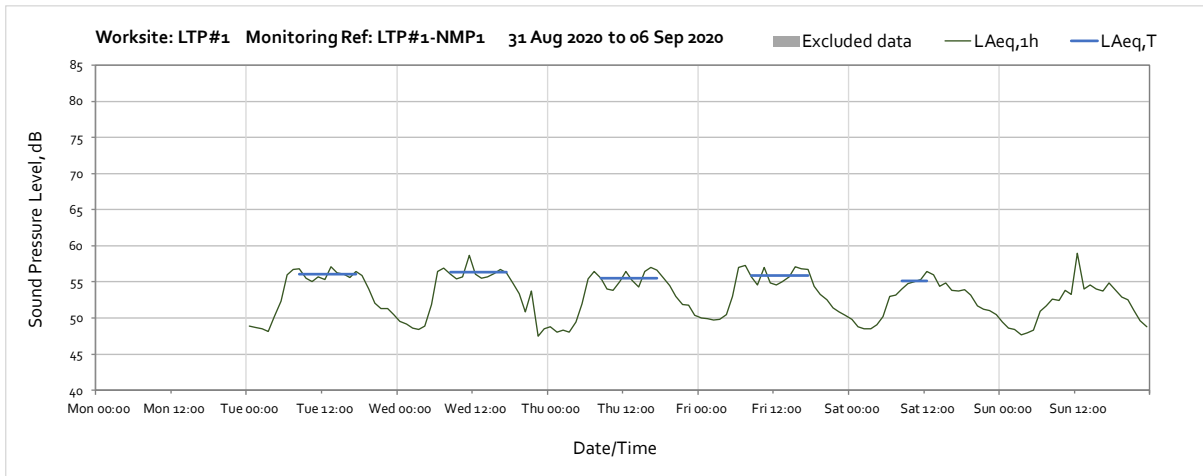




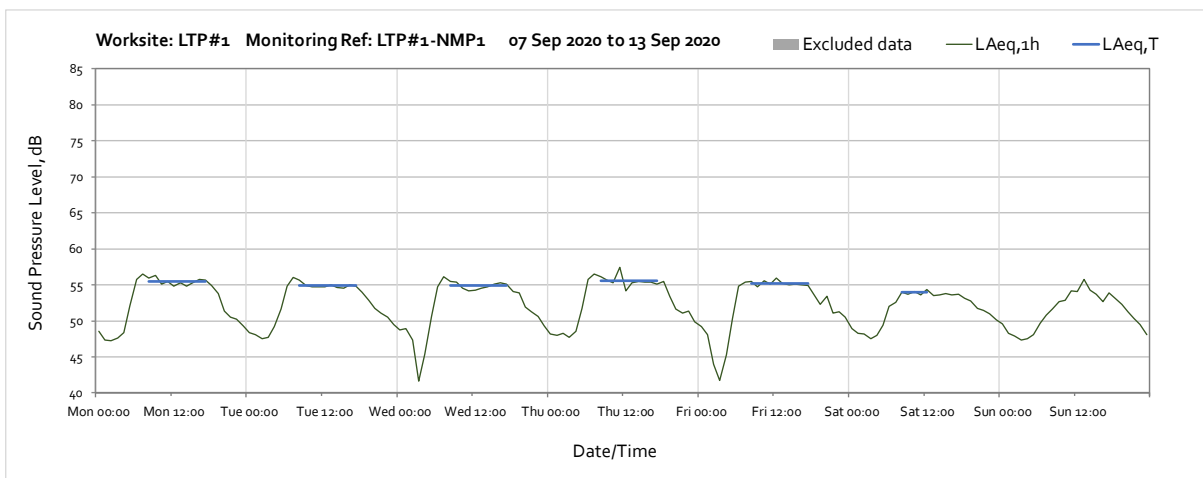


Worksite: LPT#1 – Monitoring Ref: LPT#1-NMP1

Following a routine inspection, the monitor was found on its side therefore the dataset from monitor LPT#1-NMP1 is not considered accurate during September 2020.

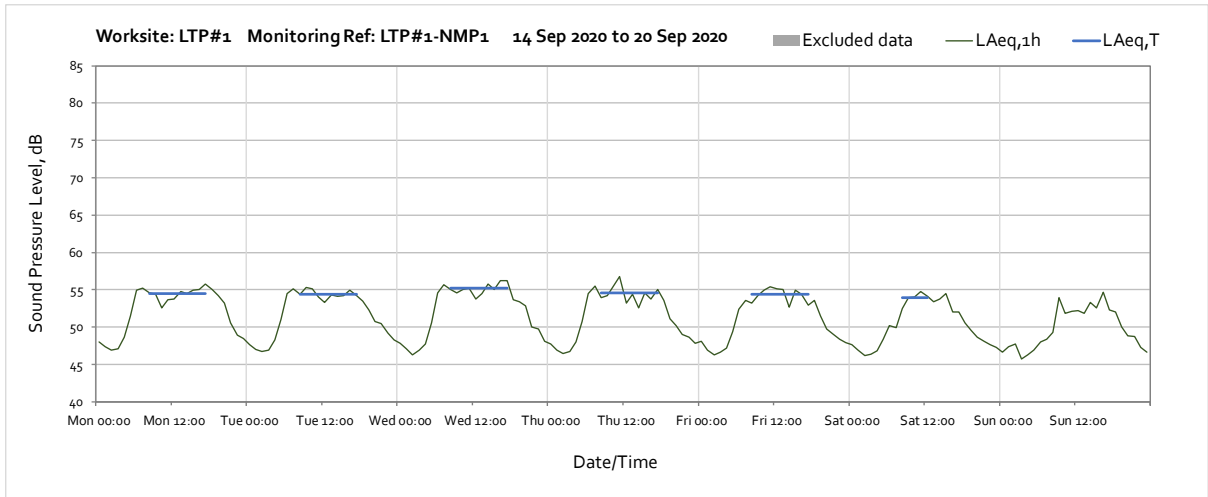


Note: Data from monitor LPT#1-NMP1 is not considered accurate during September 2020.

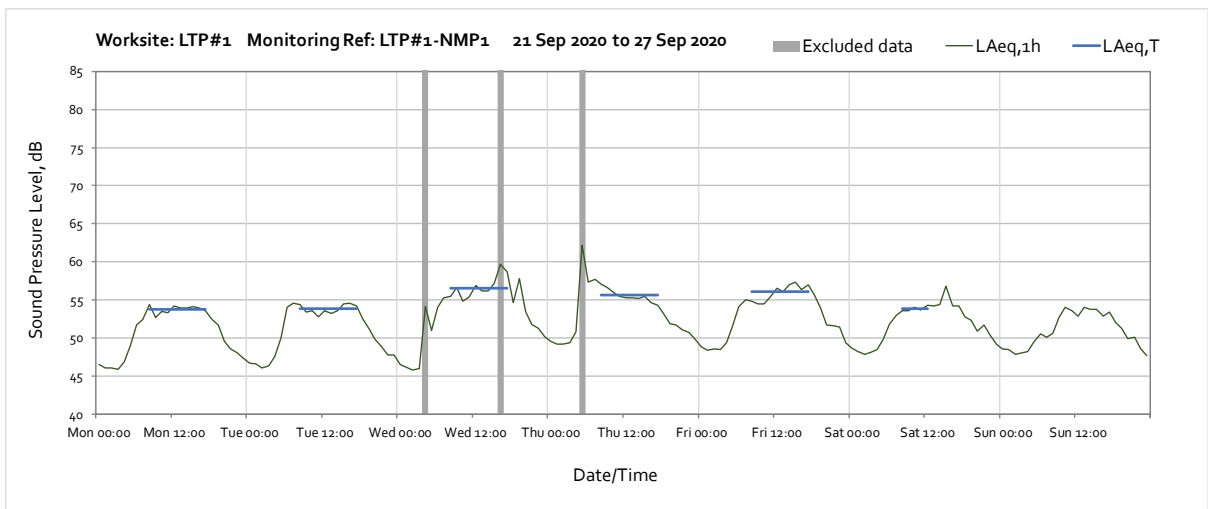


Note: Data from monitor LPT#1-NMP1 is not considered accurate during September 2020.

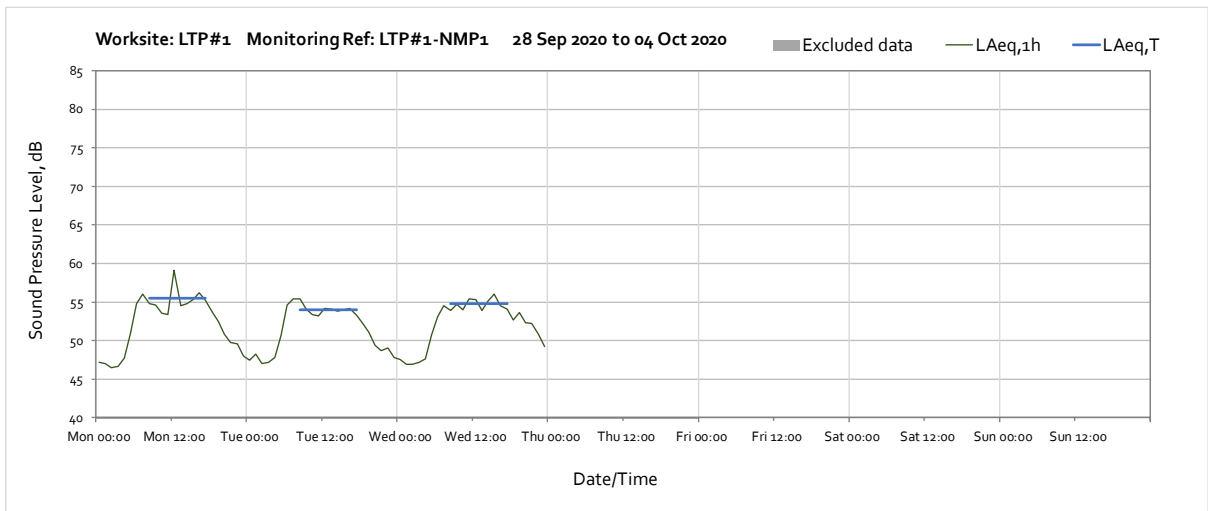
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Note: Data from monitor LTP#1-NMP1 is not considered accurate during September 2020.

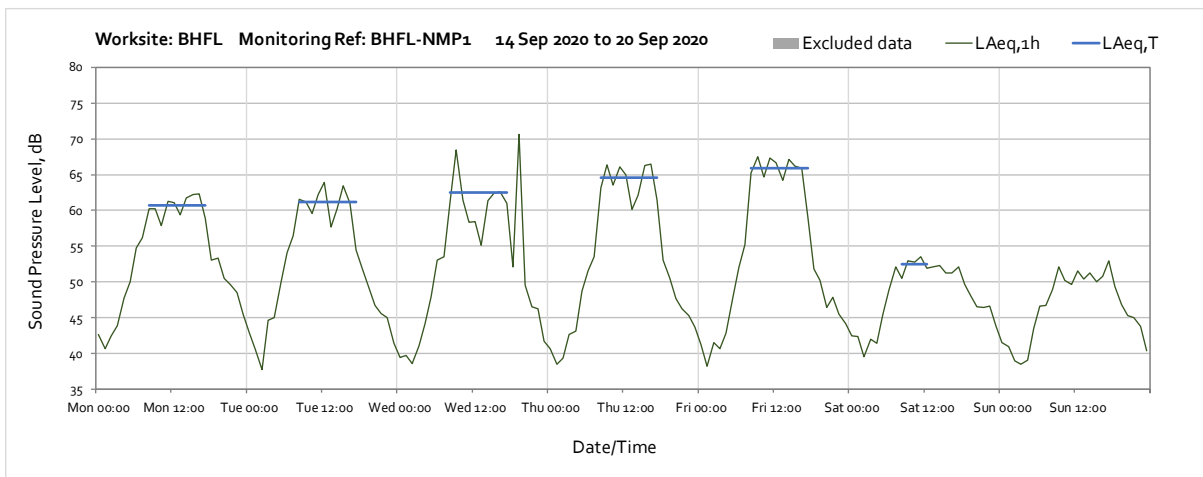
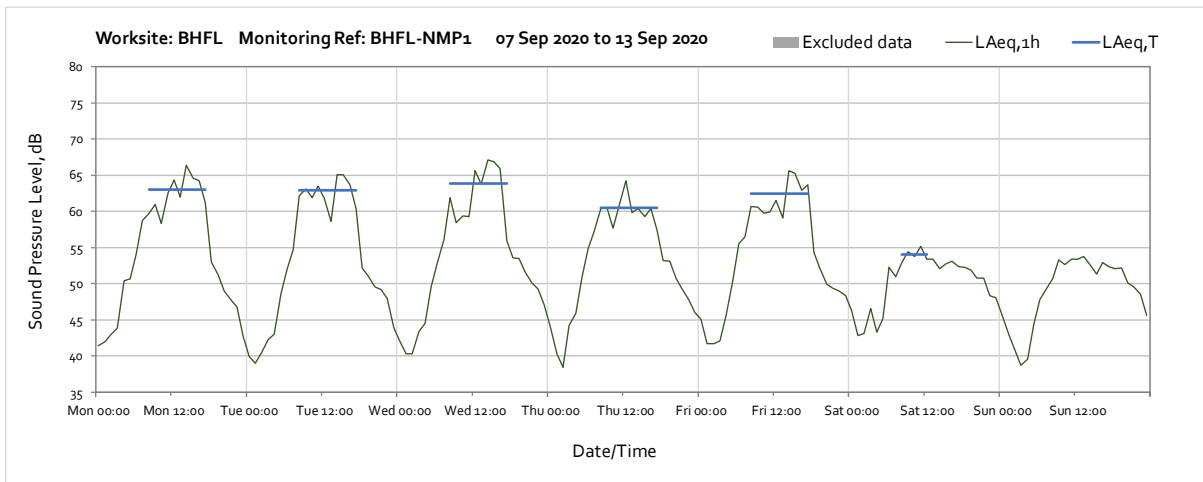
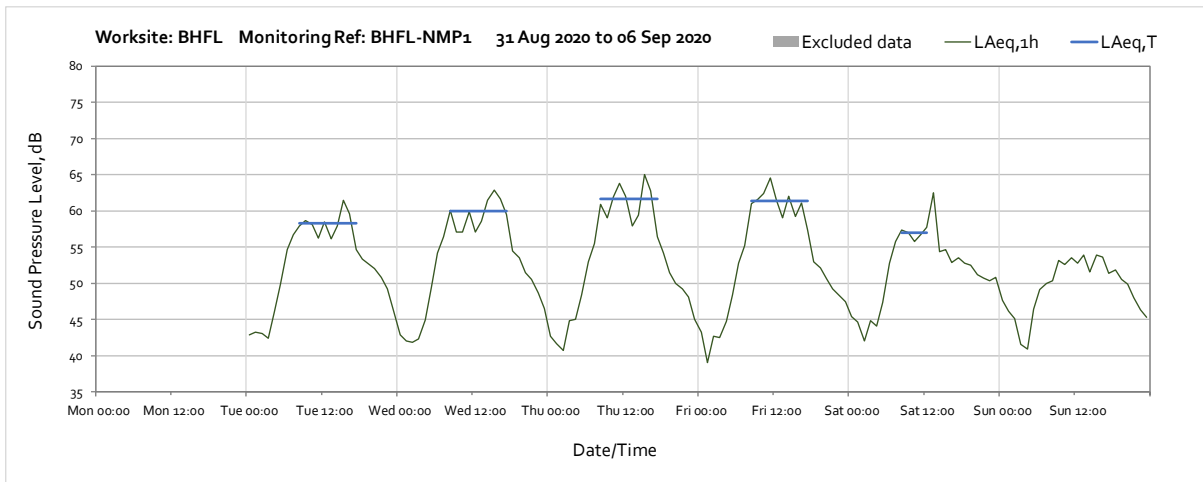


Note: Data from monitor LTP#1-NMP1 is not considered accurate during September 2020.

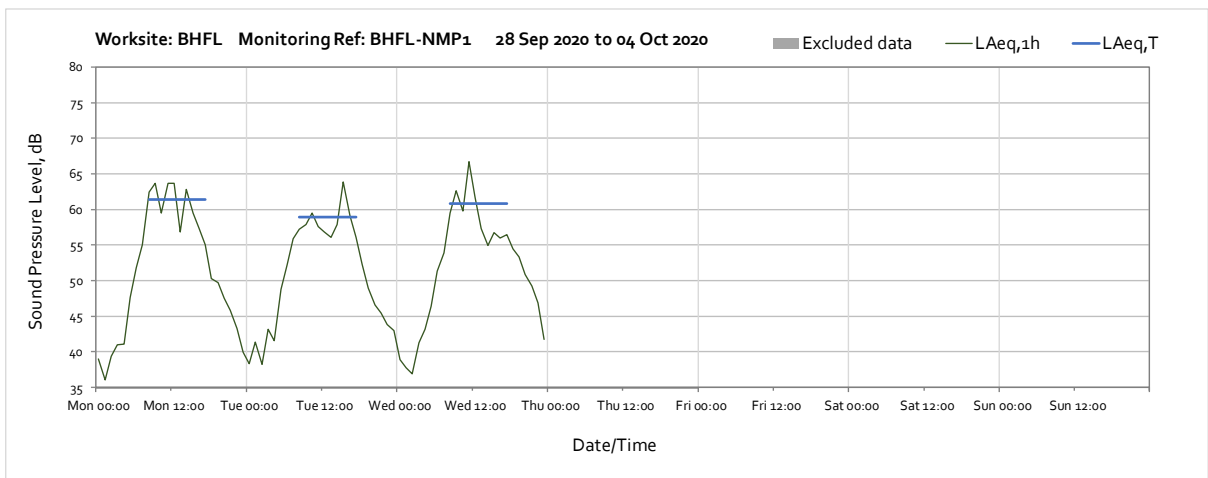
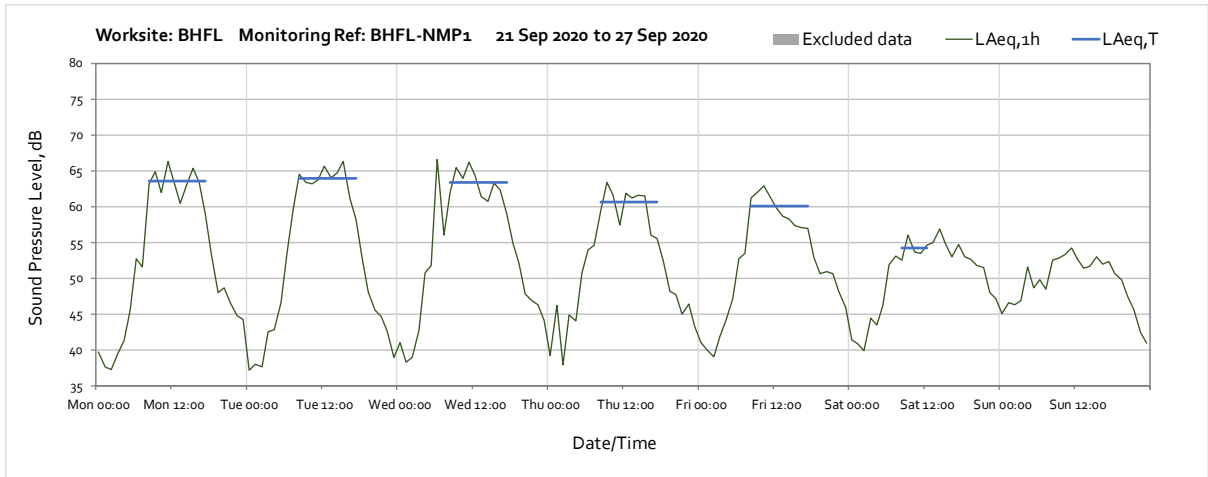


Note: Data from monitor LTP#1-NMP1 is not considered accurate during September 2020.

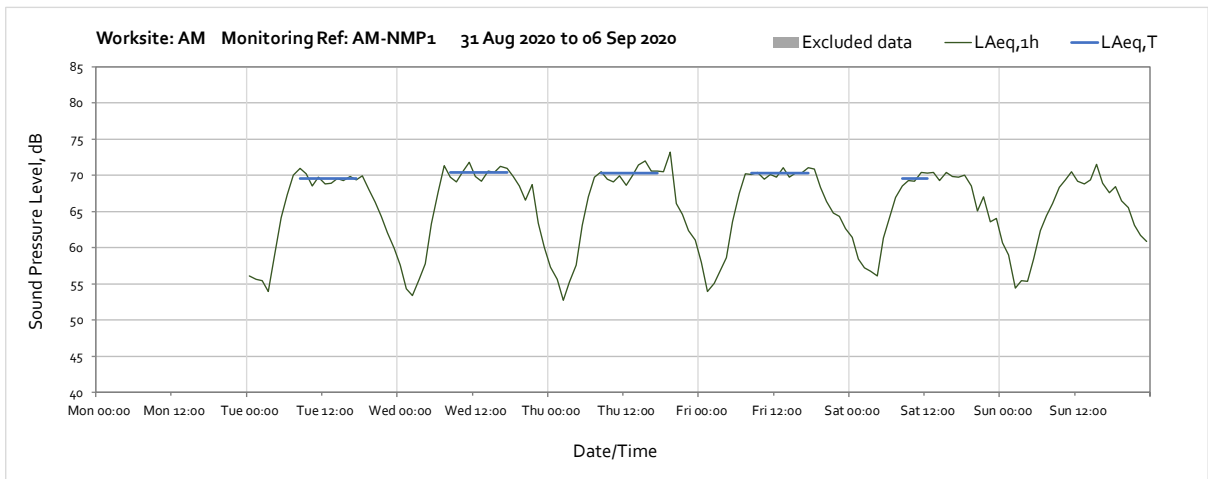
Worksite: BHFL – Monitoring Ref: BHFL-NMP1

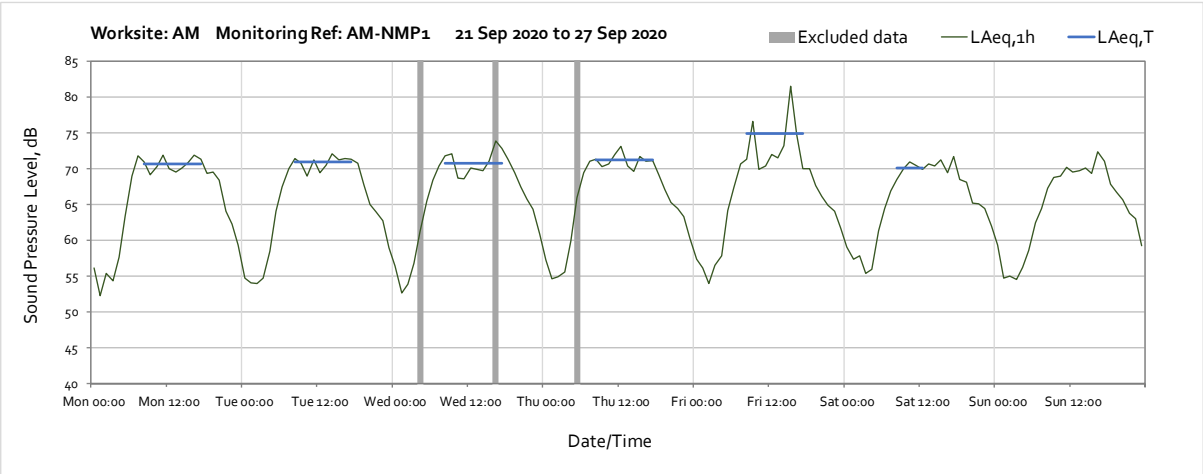
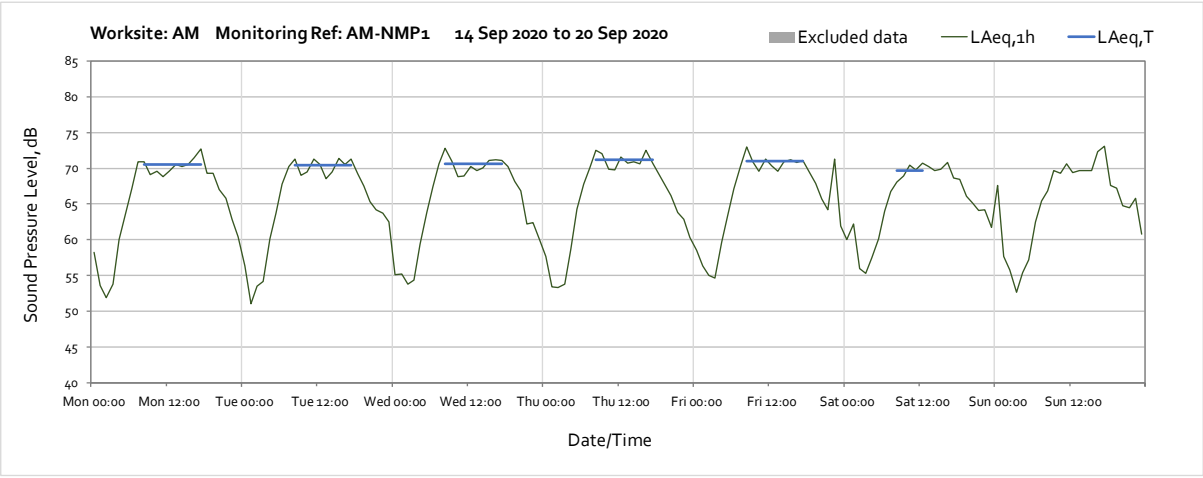
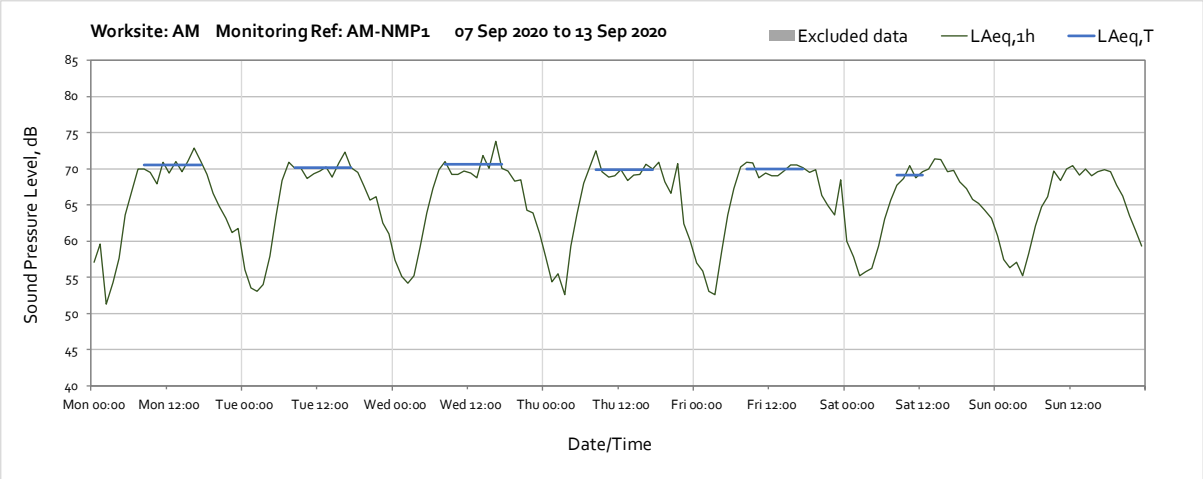


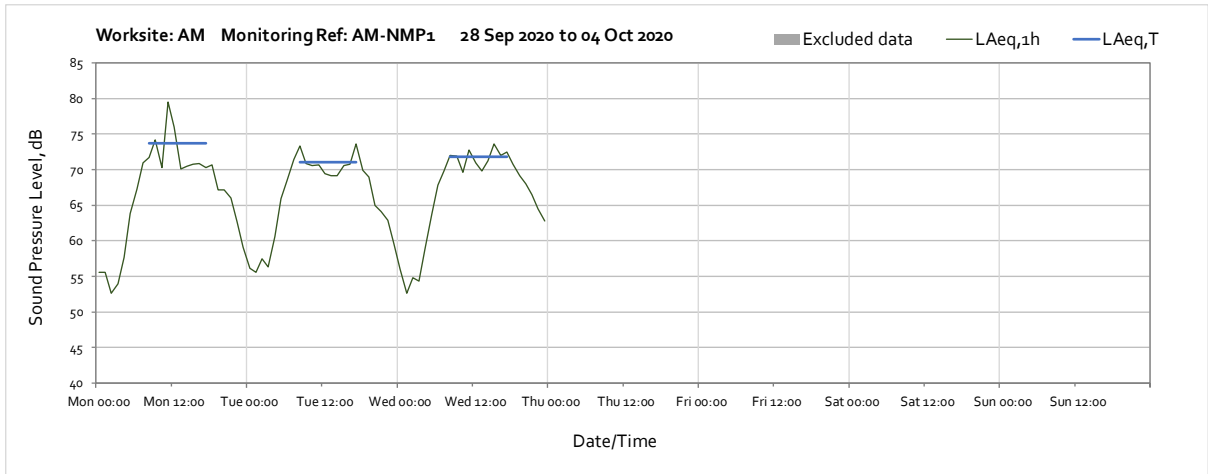
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Worksite: AM – Monitoring Ref: AM-NMP1







Worksite: QAR – Monitoring Ref: QAR-NMP1

