

Construction Noise and Vibration Monthly Report – November 2023

West Northamptonshire District Council

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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 West Northamptonshire District Council (WNDC) area during the month of November 2023.

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

- Fir Tree Nursery Worksite (ref.:FTN) where stockpile management, topsoil stripping, vegetation maintenance, site access road maintenance, drainage and temporary pond works, material movements, water management, ditch maintenance works, canal works and highway works were underway.
- Lower Boddington Worksite (ref.:LB) where topsoil stripping, stockpile management, site access road maintenance, material movements, drainage and temporary pond works, vegetation maintenance, viaduct and bridge works, excavation, water management, ditch maintenance, culvert works, highway works and landscape works were underway.
- Chipping Warden Worksite (ref.: CW) where tunnel construction and maintenance, earthworks, site access road maintenance, material movements, batching plant operation, general site and compound maintenance, water management, ditch maintenance, surface water sewer works, vegetation maintenance and stockpile management were underway.
- Backgrounds worksite (ref.: BG) where stockpile management, site access road maintenance, material movements, surface water sewer works, water management and ditch maintenance were underway.
- Lower Thorpe worksite (ref.: LT) where stockpile management, site access road maintenance, material movements, bulk earthworks, overbridge and viaduct works, drainage and temporary pond works, horizontal directional drilling works, culvert works and tunnel works were underway.
- Greatworth worksite (ref.: GW) where stockpile management, material movements, bulk earthworks, site access road maintenance, overbridge and viaduct works, horizontal directional drilling works, culvert works, tunnel works, utility diversion works, drainage and temporary pond works were underway.
- Radstone and Hall Farm worksites (ref.: RA and ref.: HF) where stockpile management, material movements, drainage works, sheet piling works, excavation, and maintenance and utilisation of site access road were underway.

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

- A43 compound where the erection of a workshop building for Finnings was underway.
- A43 highway diversion works where devegetation, tree planting, temporary road works, road layout change work and drainage works were underway.
- Helmdon Embankment where construction of site access road was underway.

The HS2 threshold levels for significant noise impacts, which are defined in Information Paper E23 (<https://www.gov.uk/government/publications/hs2-information-papers-environment>), were not exceeded during the reporting period.

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 within the WNDC area 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 +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 paramonator 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 West Northamptonshire District Council (WNDC) area for the period 1st to 30th November 2023.

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

- Fir Tree Nursery worksite, ref.: FTN (see Works Identification Plan 1 in Appendix A), where the following work activities were undertaken:
 - Stockpile management.
 - Topsoil stripping.
 - Vegetation maintenance.
 - Site access road maintenance.
 - Drainage works, including installation of temporary ponds.
 - Material movements.
 - Water management.
 - Ditch maintenance.
 - Canal works.
 - Highway works

- Lower Boddington worksite, ref.: LB (see Works Identification Plan 1 in Appendix A), where the following work activities were undertaken:
 - Topsoil stripping.
 - Stockpile management.
 - Site access road maintenance.
 - Material movements.
 - Drainage works, including installation of temporary ponds.
 - Vegetation maintenance.
 - Viaduct and bridge works.
 - Excavation.
 - Water management.
 - Ditch maintenance.
 - Culvert works.
 - Highway works.
 - Landscape works.

- Chipping Warden worksite, ref.: CW (see Works Identification Plan 2 in Appendix A), where the following work activities were undertaken:
 - Tunnel construction and maintenance, including erection of precast concrete sections and structural backfill.
 - Earthworks.
 - Site access road maintenance.
 - Material movements.
 - General site and compound maintenance.
 - Water management.
 - Ditch maintenance.
 - Plant maintenance.
 - Batching plant operation.
 - Surface water sewer works.
 - Vegetation maintenance.
 - Stockpile management.

- Blackgrounds worksite, ref.: BG (see Works Identification Plan 2 in Appendix A) where the following work activities were undertaken:
 - Stockpile management.
 - Site access road maintenance.
 - Material movements.
 - Surface water sewer works.
 - Water management.
 - Ditch maintenance works.

- Lower Thorpe worksite, ref.: LT (see Works Identification Plan 3 in Appendix A), where the following work activities were undertaken:
 - Stockpile management.
 - Site access road maintenance.
 - Material movements.
 - Drainage works, including installation of temporary ponds.
 - Bulk earthworks.
 - Overbridge and viaduct works.
 - Horizontal directional drilling works.
 - Culvert works.
 - Tunnel works.

- Greatworth, ref.: GW (see Works Identification Plan 4 in Appendix A) where the following work activities were undertaken:
 - Stockpile management.
 - Material movements.
 - Bulk earthworks.
 - Site access road maintenance.
 - Overbridge and viaduct works.
 - Horizontal directional drilling works.
 - Culvert works.
 - Green tunnel works.
 - Drainage works, including installation of temporary ponds.
 - Utility diversion works.

- Radstone and Hall Farm worksites, ref.: RA and ref.: HF (see Works Identification Plan 5 in Appendix A) where the following work activities were undertaken:
 - Stockpile management.
 - Material movements.
 - Drainage works.
 - Sheet piling works.
 - Excavation.
 - Maintenance and utilisation of site access road.

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

- A43 compound where the erection of a workshop building was underway.
- A43 highway diversion works where devegetation, tree planting, temporary road works, road layout change works and drainage works were underway.
- Helmdon Embankment where construction of site access road was underway.

The applicable standards, guidance, and monitoring methodology are 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 Nine (9) noise monitoring installations were active in November in the WNDC area. Table 2 summarises the position of noise monitoring installations within the WNDC area in November 2023.
- 1.2.2 Maps showing the position of noise monitoring installations are presented in Appendix B.

Table 2: Monitoring Locations

| Worksite Reference | Measurement Reference | Address |
|---------------------------|------------------------------|--|
| FTN | FTN-N1 | Fir Tree Nursery, Banbury Road, Lower Boddington |
| LB | LB-N1 | Lower Boddington, Daventry |
| CW | CW-N1 | Chipping Warden and Edgcote, Banbury |
| BG | BG-N1 | Blackground, Chipping Warden |
| LT | LT-N1 | Thorpe Mandeville, Banbury |
| GW | GW-N1 | Helmdon Road, Greatworth |
| | GW-N2 | Greatworth Hall, Greatworth |
| RA | RA-N1 | Radstone Road, Brackley |
| HF | HF-N1 | Hall Farm, Brackley |

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 | 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 |
| FTN | FTN-N1 | Fir Tree Nursery, Banbury Road | Free-field | 50.2 (60.9) | 57.4 (60.9) | 48.0 (59.4) | 47.0 (60.3) | 46.6 (56.7) | 48.6 (52.0) | 50.9 (54.1) | 48.8 (51.3) | 48.2 (53.8) | 47.0 (56.2) | 49.9 (55.9) | 47.1 (50.9) |
| LB | LB-N1 | Lower Boddington, West Northamptonshire | Free-field | 49.7 (52.6) | 58.7 (61.0) | 47.2 (55.6) | 46.3 (55.8) | 44.9 (52.7) | 43.7 (45.4) | 48.9 (54.4) | 49.5 (52.9) | 48.7 (59.7) | 45.6 (54.2) | 49.5 (55.3) | 44.0 (50.3) |
| CW | CW-N1 | Chipping Warden and Edgcote, Banbury | Free-field | 52.6 (55.1) | 54.8 (58.8) | 52.0 (56.9) | 48.3 (56.1) | 45.3 (56.2) | 48.2 (49.5) | 50.9 (51.2) | 50.7 (51.9) | 49.6 (51.9) | 45.1 (50.5) | 48.3 (55.4) | 44.7 (52.0) |
| BG | BG-N1 | Blackground, Chipping Warden | Free-field | 44.7 (49.2) | 52.8 (63.3) | 42.8 (56.7) | 40.8 (57.9) | 39.2 (56.3) | 44.9 (48.0) | 47.4 (51.1) | 45.5 (49.3) | 42.7 (47.6) | 39.7 (47.9) | 43.4 (50.9) | 40.6 (50.2) |
| LT | LT-N1 | Thorpe Mandeville, Banbury | Free-field | 48.0 (52.8) | 54.6 (70.3) | 44.2 (52.4) | 43.3 (54.4) | 42.6 (53.5) | 45.6 (47.7) | 47.8 (49.6) | 47.3 (49.7) | 45.1 (52.2) | 42.9 (46.3) | 47.3 (53.6) | 44.5 (54.0) |
| GW | GW-N1 | Helmdon Road, Greatworth | Free-field | 46.2 (51.6) | 49.1 (56.0) | 45.5 (55.3) | 44.6 (53.8) | 44.2 (54.3) | 46.0 (48.6) | 48.2 (51.9) | 46.9 (50.0) | 45.2 (50.7) | 44.0 (50.7) | 46.8 (53.9) | 44.4 (50.4) |
| | GW-N2 | Greatworth Hall, Greatworth | Free-field | 47.3 (58.5) | 51.9 (59.2) | 45.5 (57.7) | 43.2 (58.9) | 41.5 (55.9) | 45.8 (53.6) | 49.1 (49.9) | 49.3 (55.0) | 48.6 (67.0) | 40.4 (51.4) | 47.3 (55.1) | 39.6 (44.4) |
| RA | RA-N1 | Radstone Road, Brackley | Free-field | 51.5 (54.4) | 54.2 (58.8) | 51.9 (58.2) | 48.7 (58.1) | 43.2 (52.1) | 47.6 (53.8) | 53.5 (57.7) | 53.0 (58.0) | 52.1 (58.0) | 44.1 (50.7) | 52.0 (62.4) | 43.6 (49.5) |

| Worksite Reference | Measurement Reference | Site 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 |
| HF | HF-N1 | Hall Farm, Brackley | Free-field | 54.1 (58.2) | 57.8 (60.1) | 54.3 (58.5) | 51.2 (58.1) | 46.4 (54.9) | 50.1 (54.8) | 55.2 (57.7) | 55.4 (58.0) | 53.8 (58.3) | 46.3 (52.1) | 53.0 (58.7) | 45.3 (50.2) |

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 reported 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 (Week Siteday, Saturday, Sunday, Night) | Time period | Number of exceedances of LOAEL | Number of exceedances of SOAEL |
|--------------------|-----------------------|--------------------------------------|---|-------------|--------------------------------|--------------------------------|
| FTN | FTN-N1 | Fir Tree Nursery, Banbury Road | All days | All periods | No exceedances | No exceedances |
| LB | LB-N1 | Lower Boddington | All days | All periods | No exceedances | No exceedances |
| CW | CW-N1 | Chipping Warden and Edgcote, Banbury | All days | All periods | No exceedances | No exceedances |
| BG | BG-N1 | Blackground, Chipping Warden | Weekday | 0800-1800 | 1 | No exceedances |
| LT | LT-N1 | Thorpe Mandeville | Weekday | 0800-1800 | 1 | No exceedances |
| GW | GW-N1 | Helmdon Road, Greatworth | All days | All periods | No exceedances | No exceedances |
| | GW-N2 | Greatworth Hall, Greatworth | All days | All periods | No exceedances | No exceedances |
| RA | RA-N1 | Radstone Road, Brackley | All days | All periods | No exceedances | No exceedances |
| HF | HF-N1 | Hall Farm, Brackley | All days | All periods | No exceedances | No exceedances |

2.2.6 Exceedances of the LOAEL were recorded at two (2) monitoring locations during weekday daytime periods in November 2023.

2.2.7 No exceedances of the SOAEL were recorded due to HS2 construction works during November 2023.

2.3 Exceedances of Trigger Level

2.3.1 Table 5 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 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 |
|--|--------------------|----------------------|-------------------|---|---------------|
| - | - | - | - | - | - |

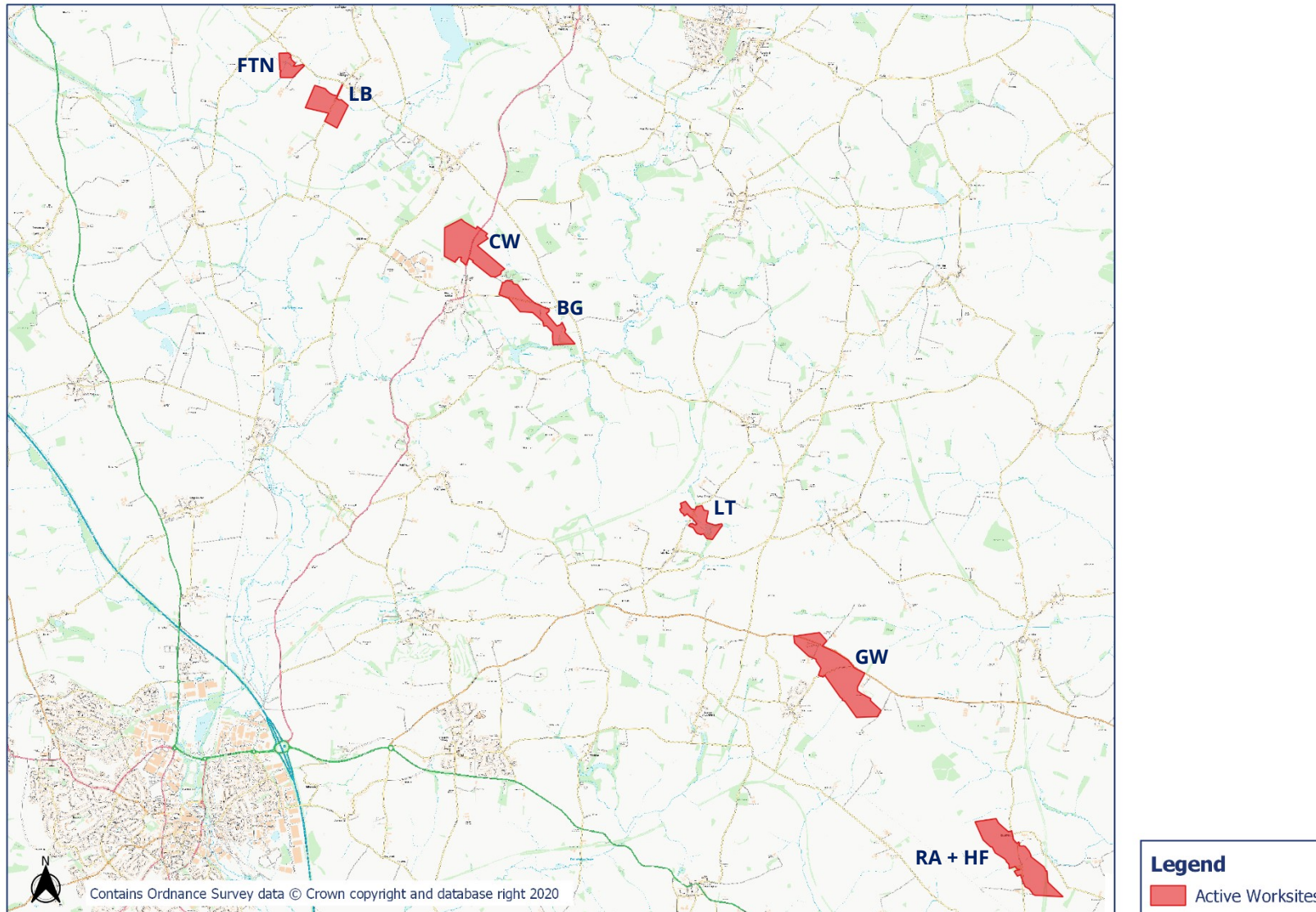
2.4 Complaints

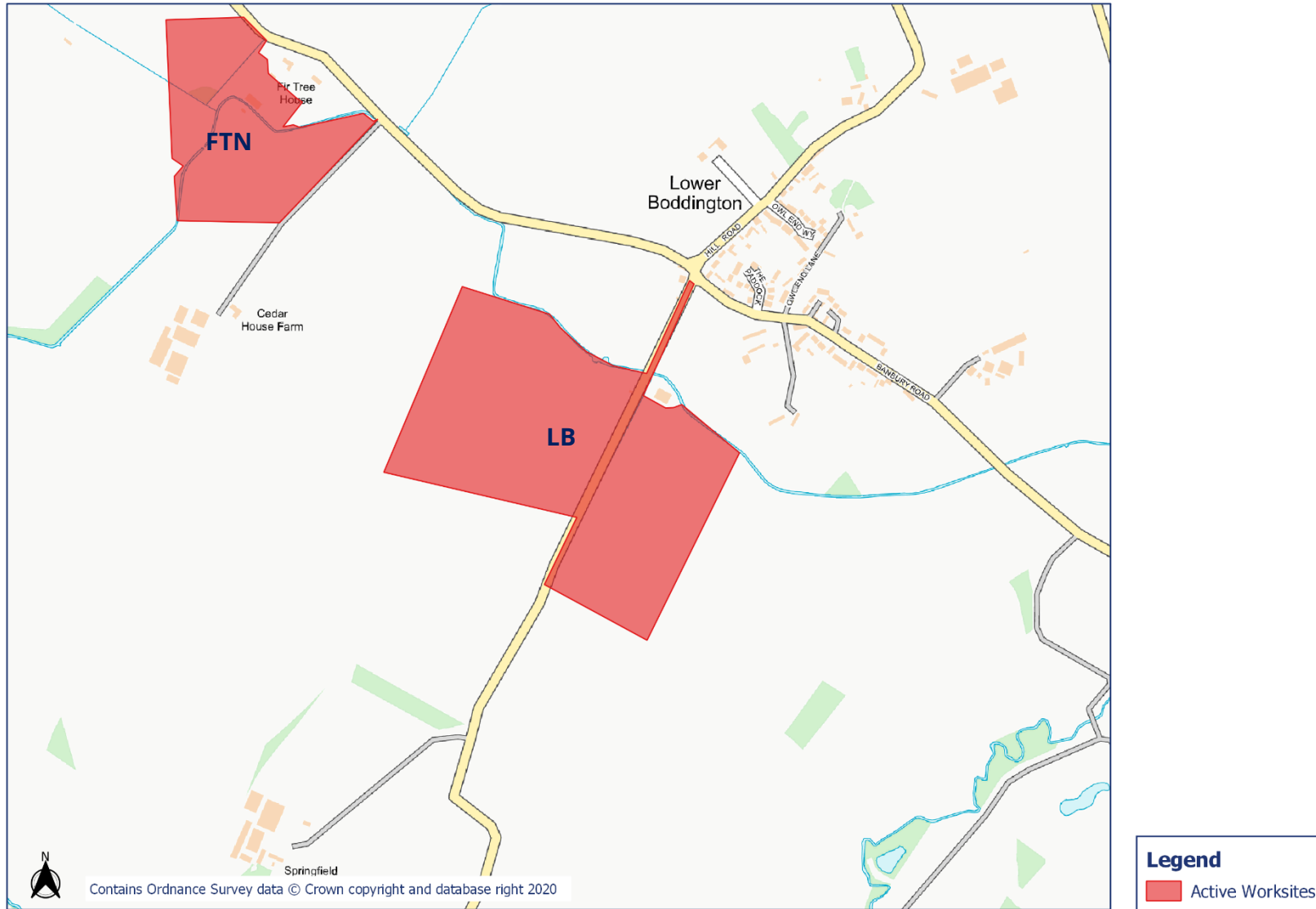
2.4.1 Table 6 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

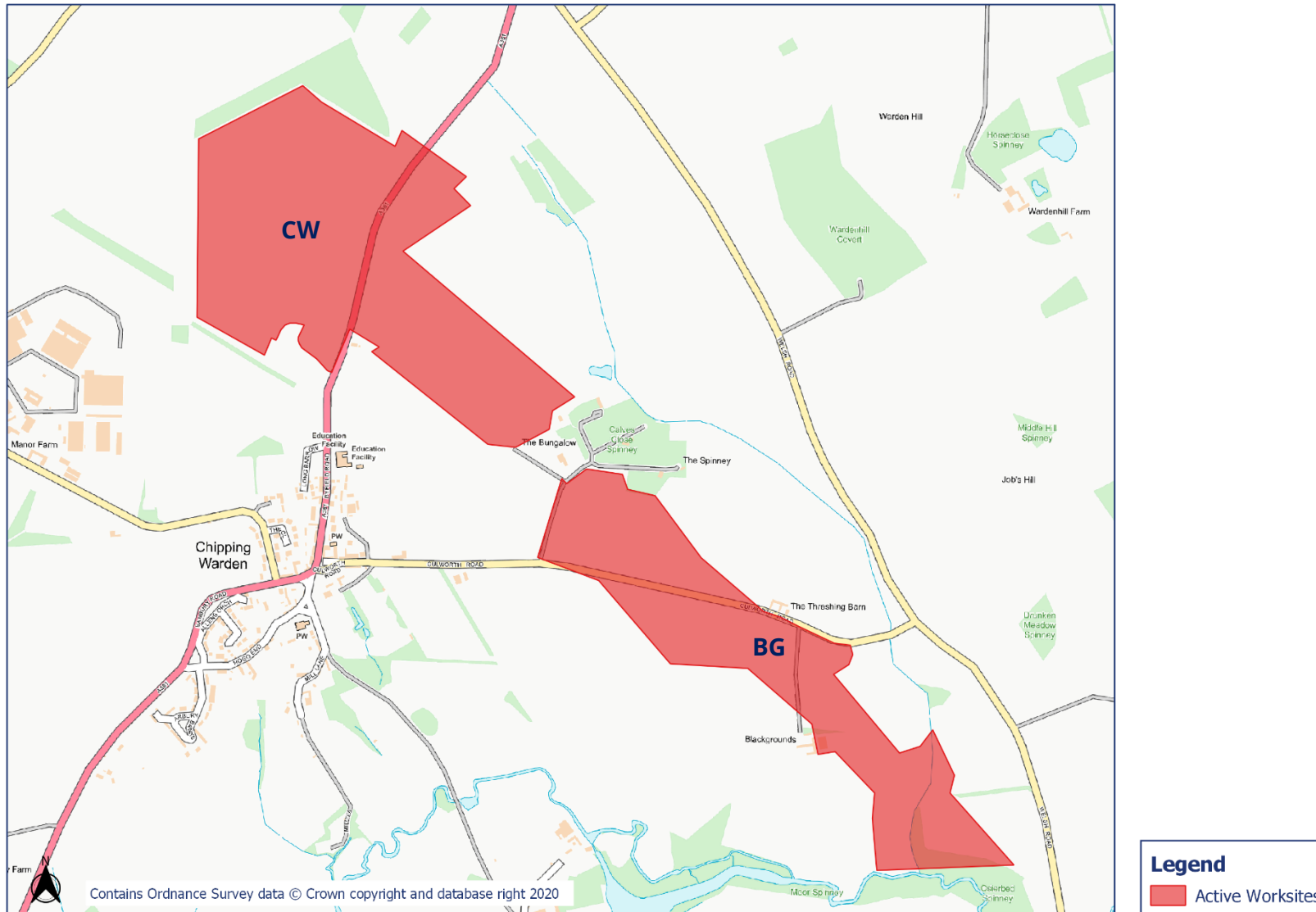
Table 6: Summary of Complaints

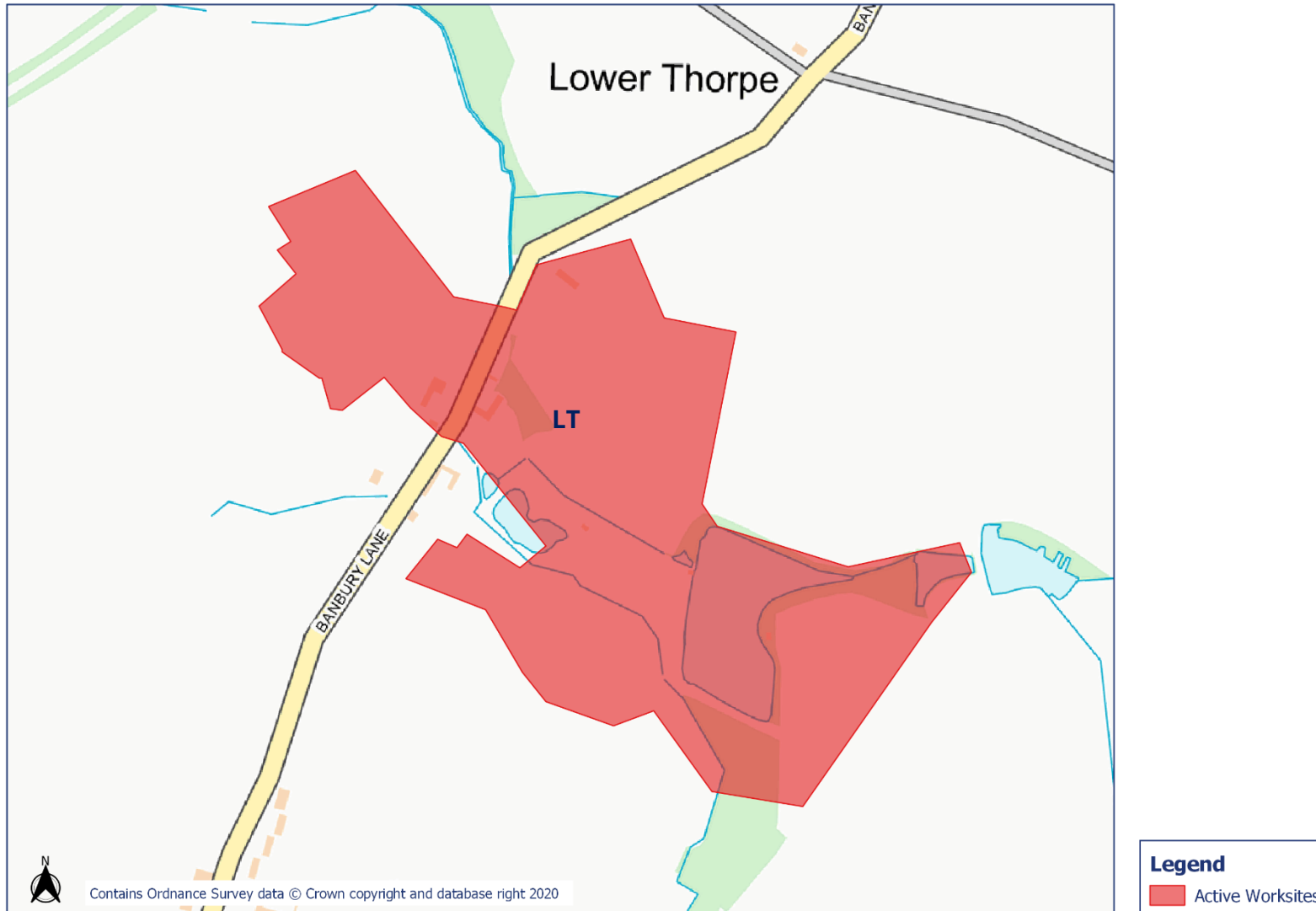
| Complaint Reference Number | Worksite Reference | Description of Complaint | Results of Investigation | Actions Taken |
|----------------------------|--------------------|--------------------------|--------------------------|---------------|
| | | | | |

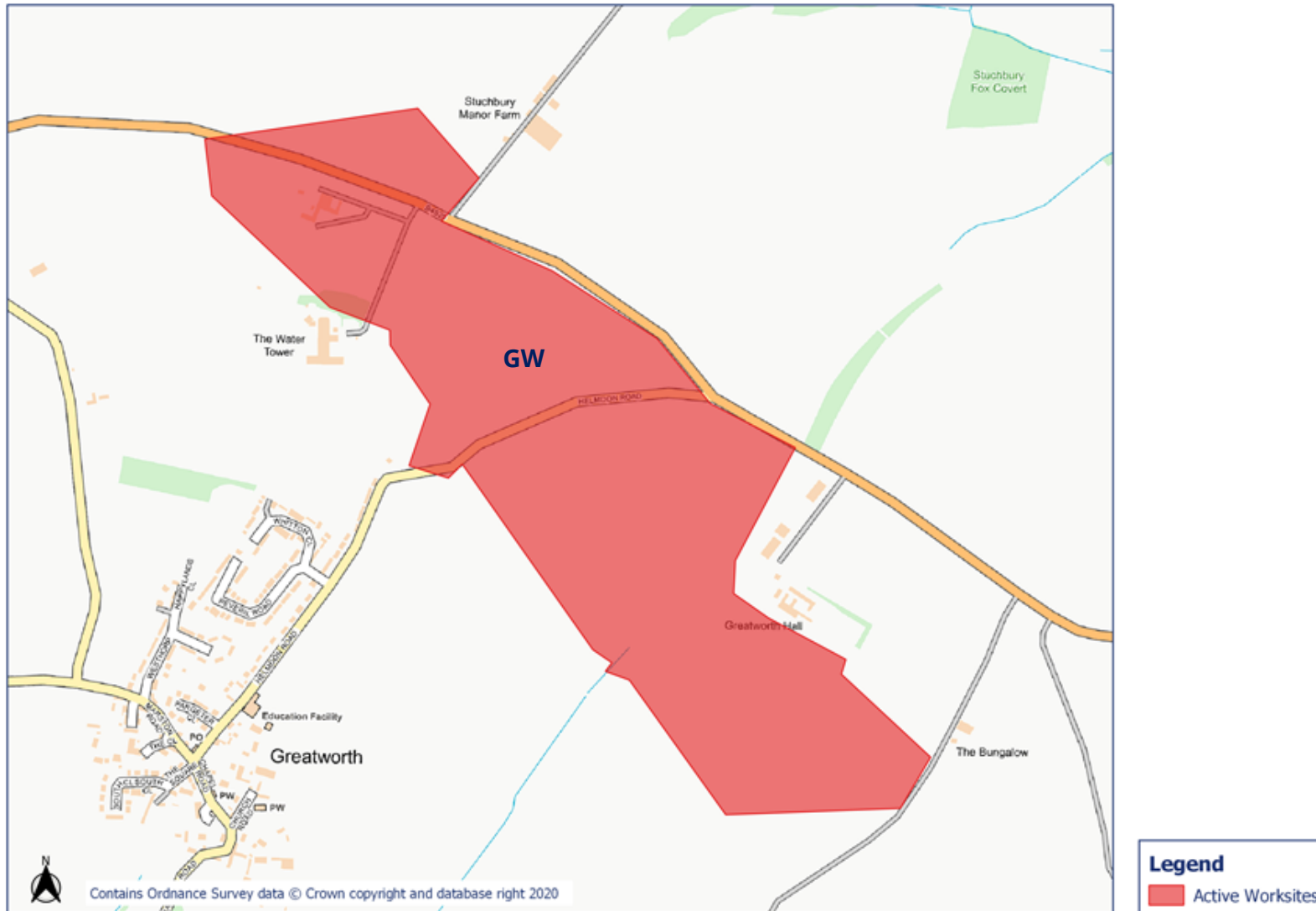
Appendix A Site Location

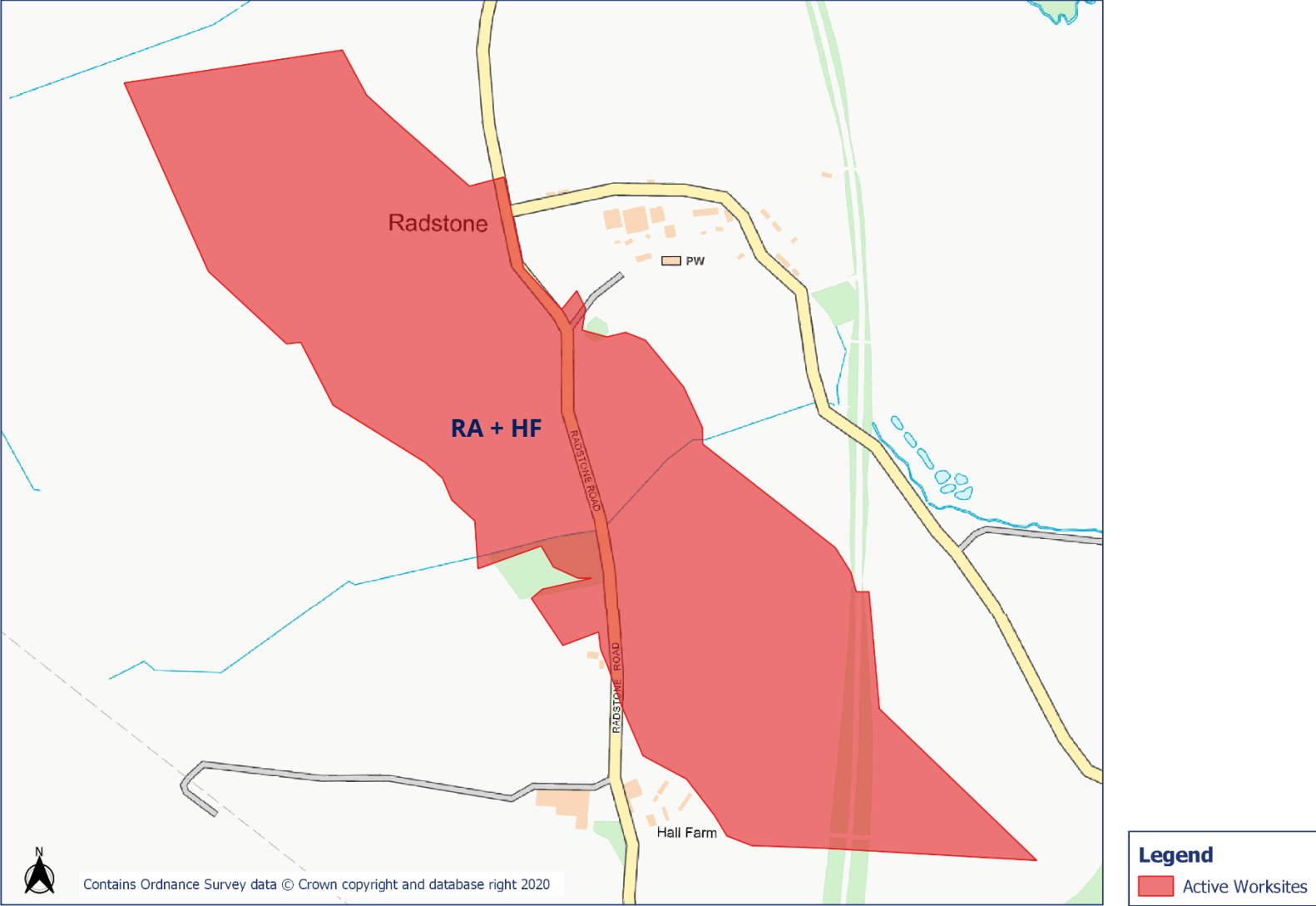




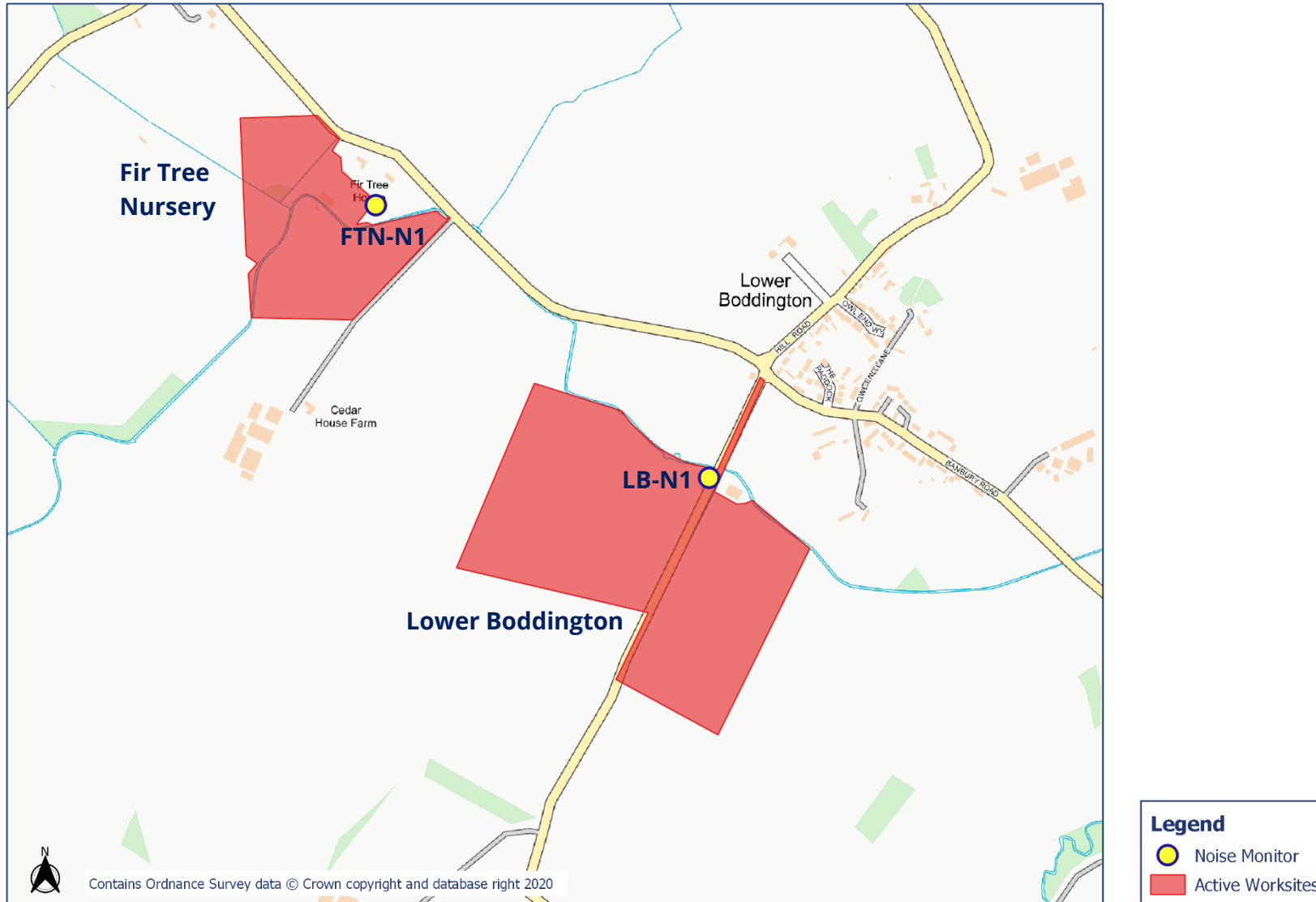


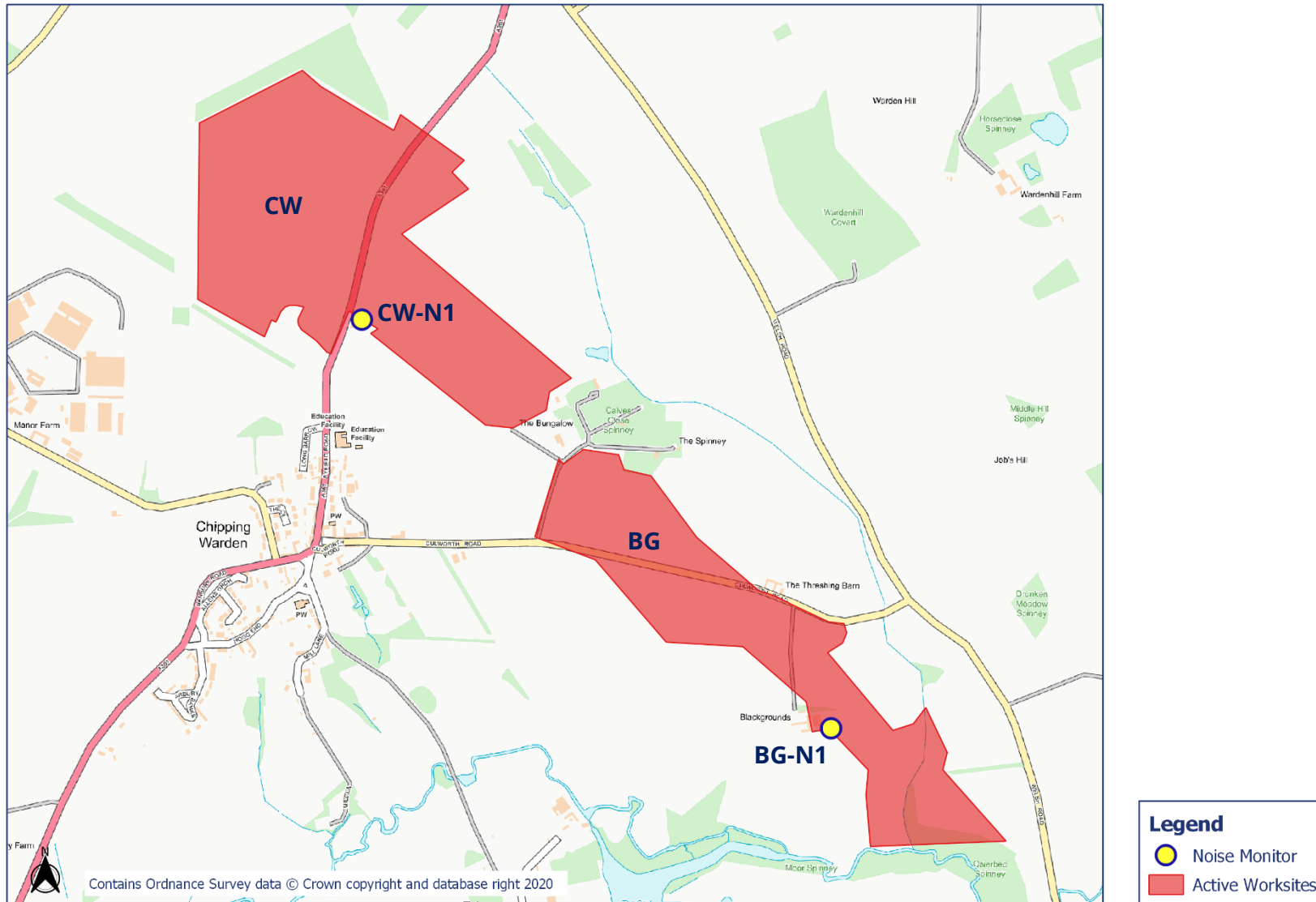


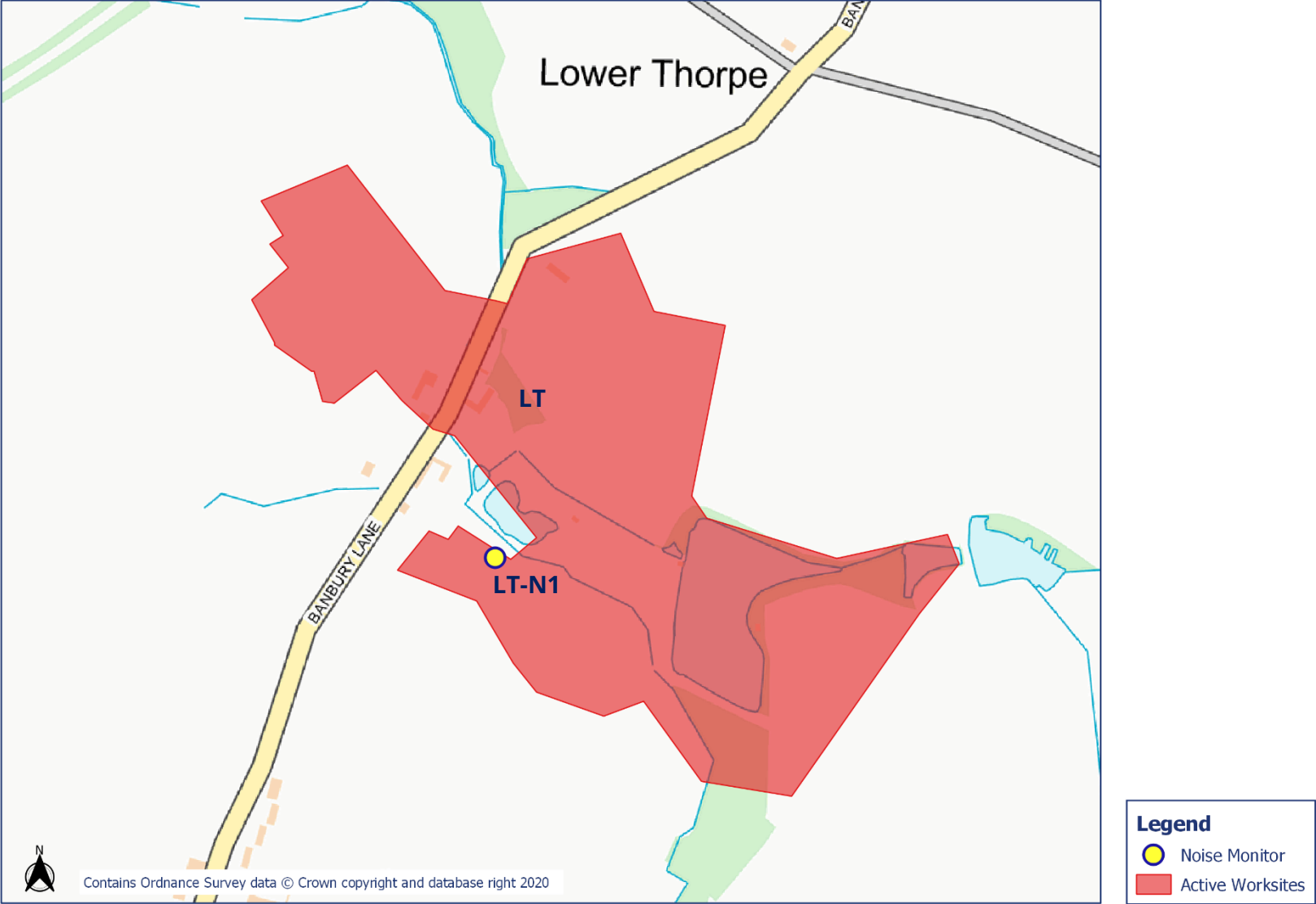


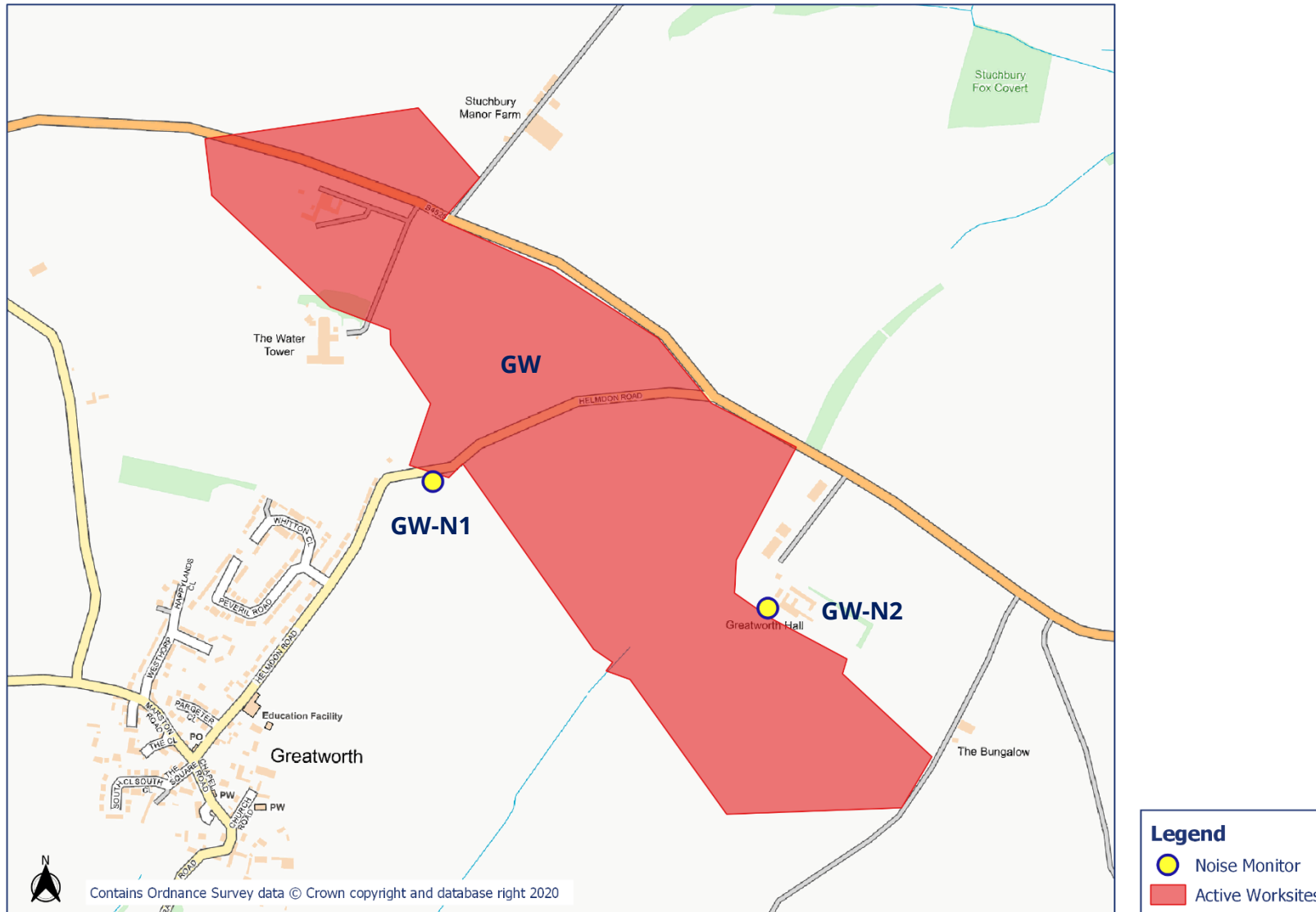


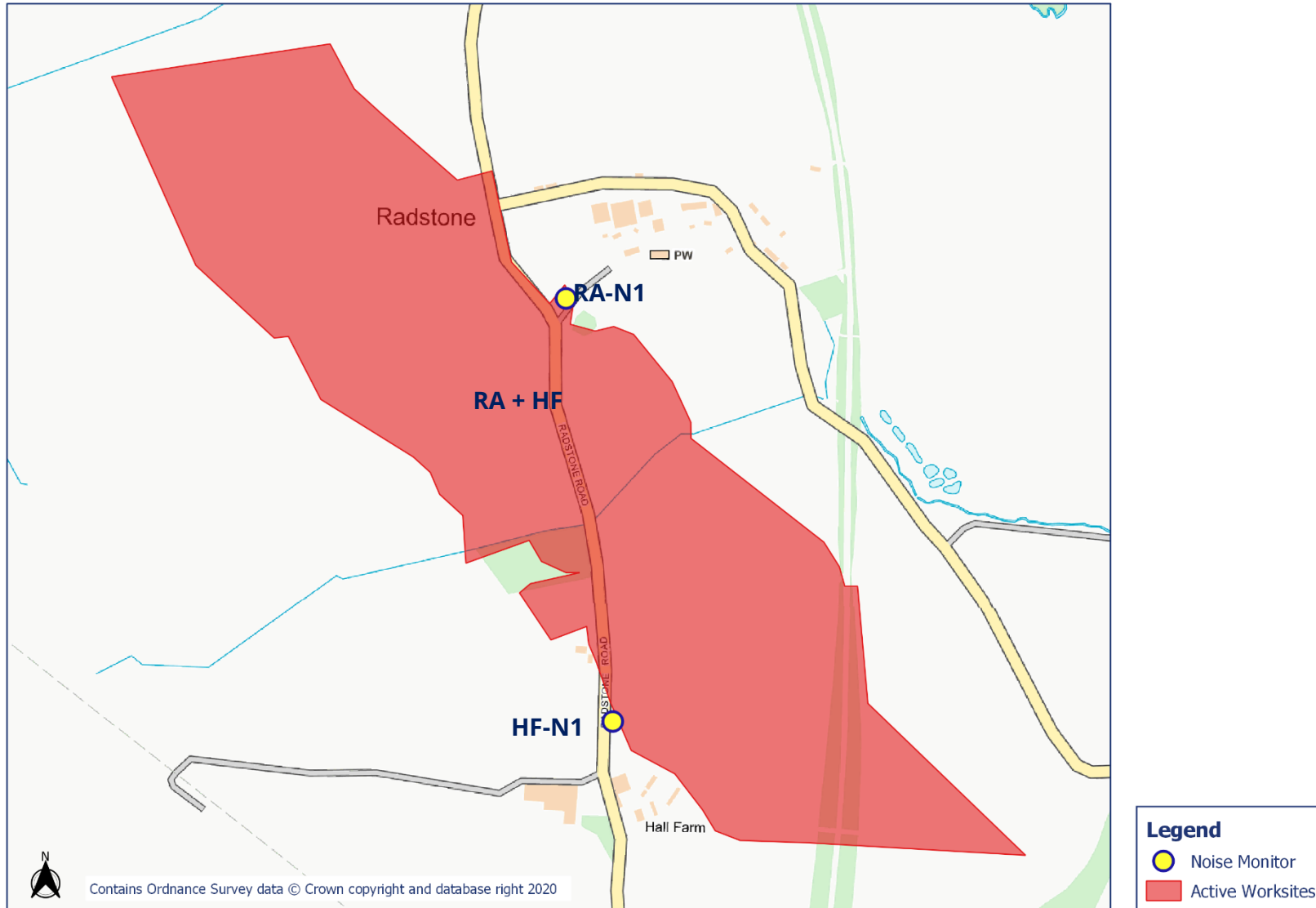
Appendix B Monitoring Locations









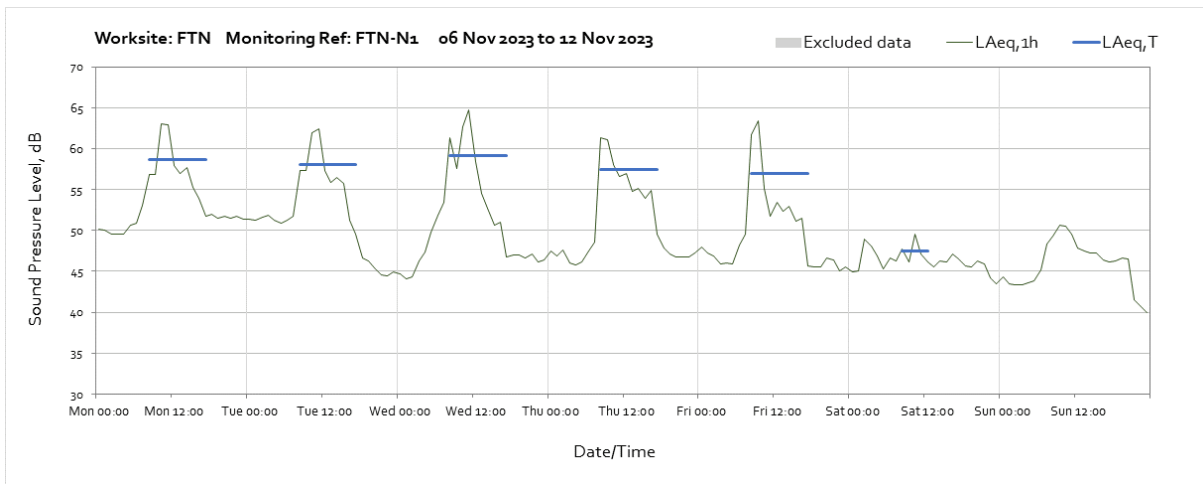
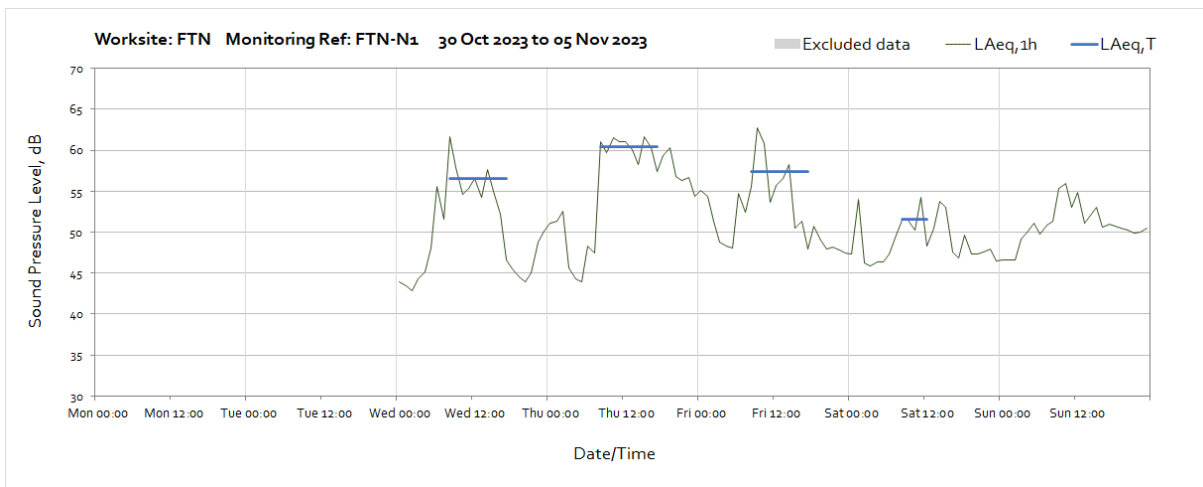


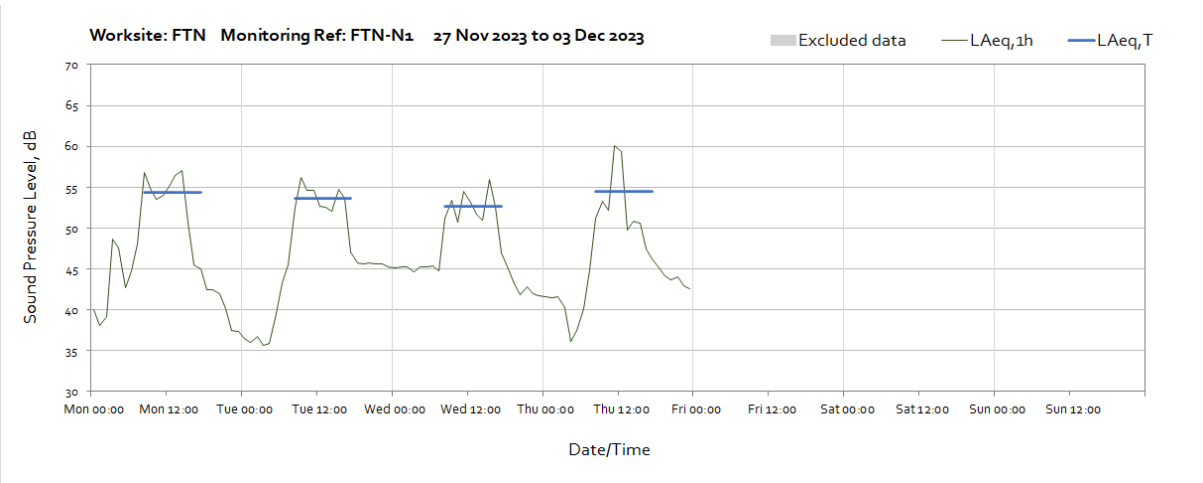
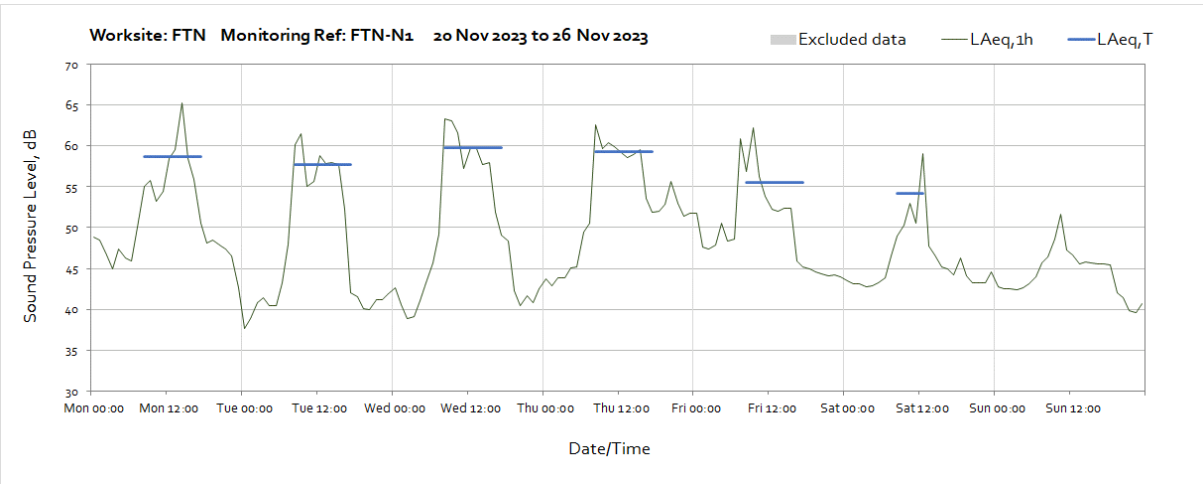
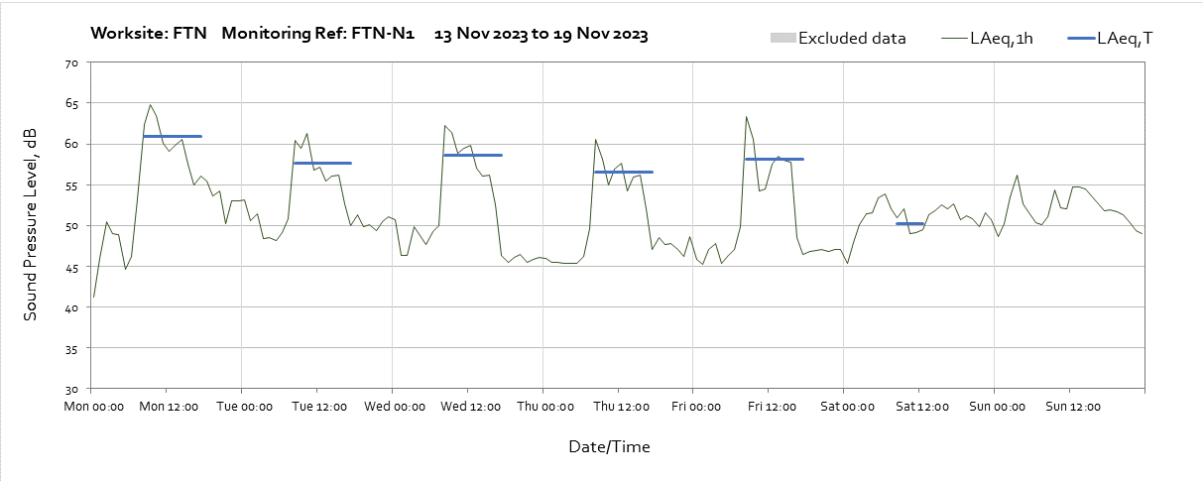
Appendix C Data

Noise

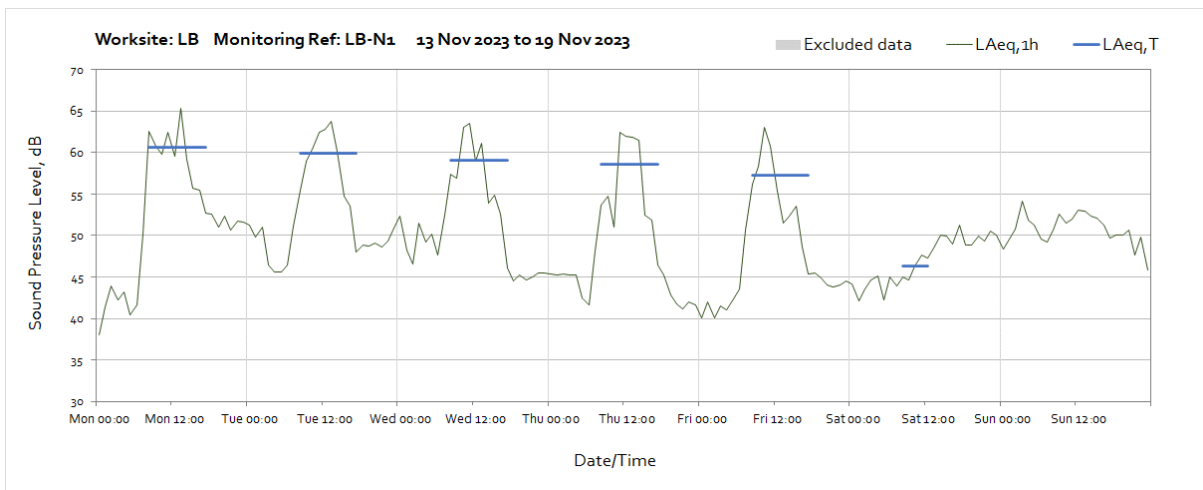
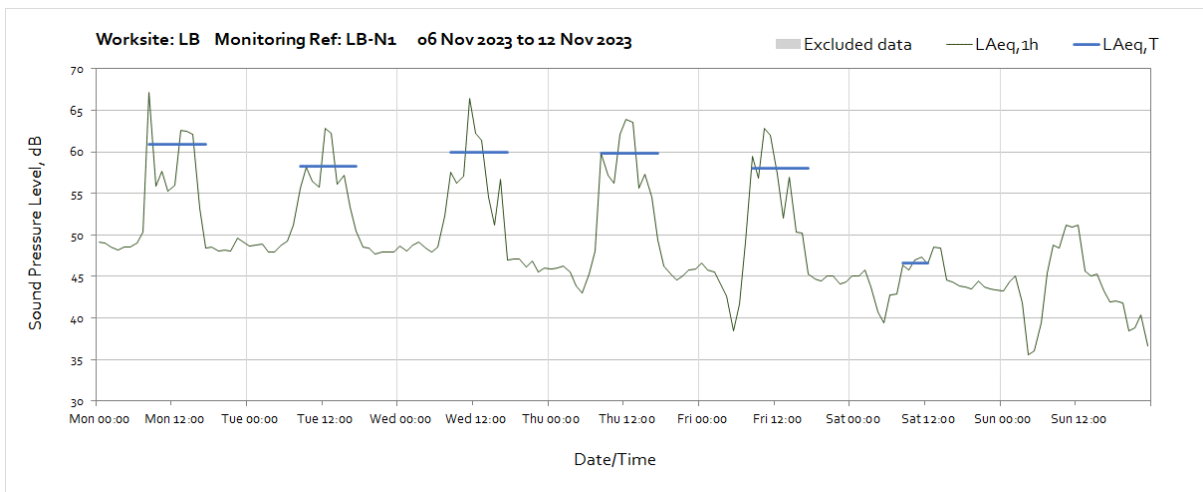
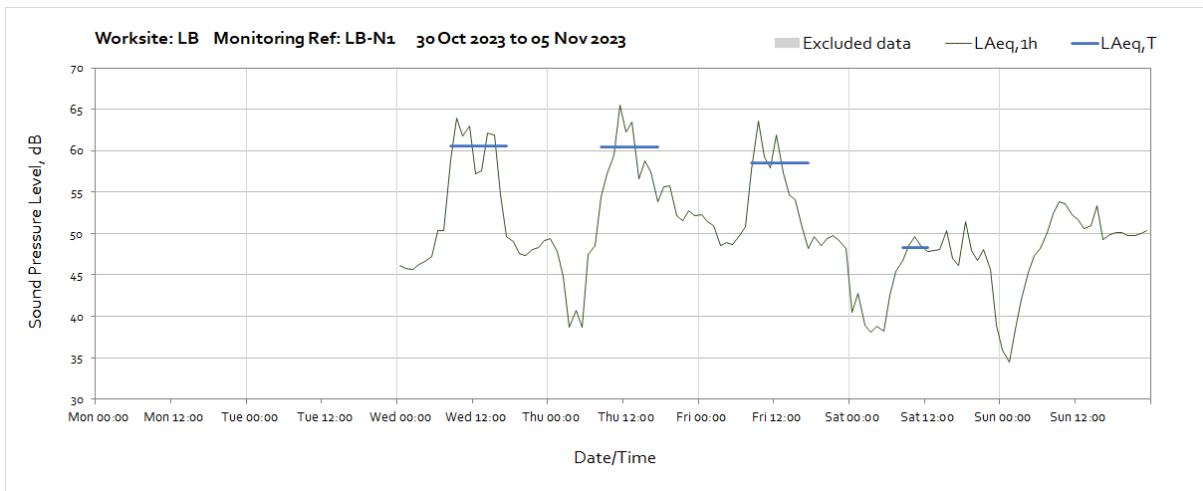
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods where noise levels are adversely affected by weather or only measured for part of the period, which are not representative of HS2 construction works, have been greyed out and excluded from the calculation of the $L_{Aeq,T}$ values in in Table 3 of the main report.

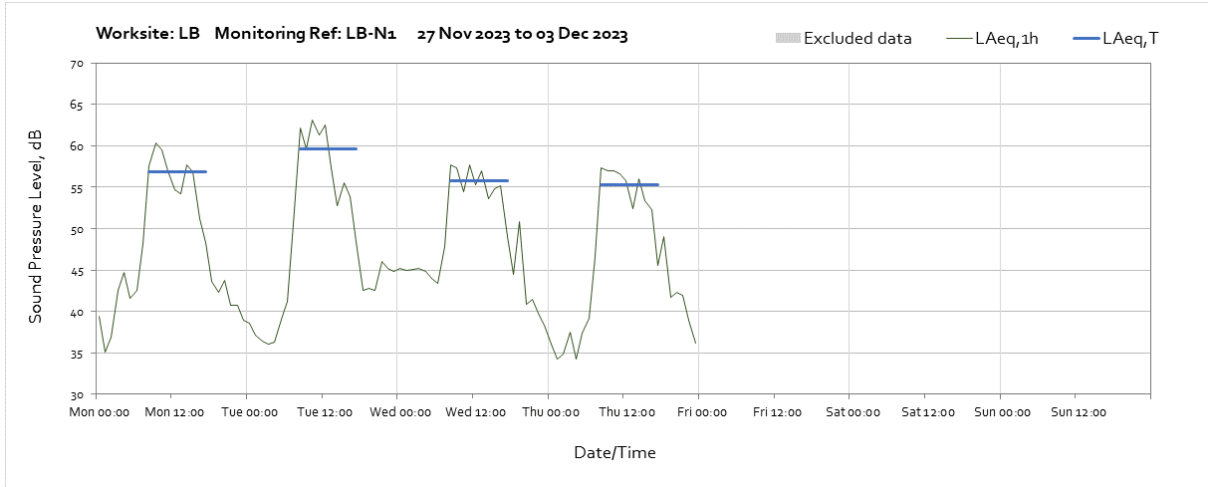
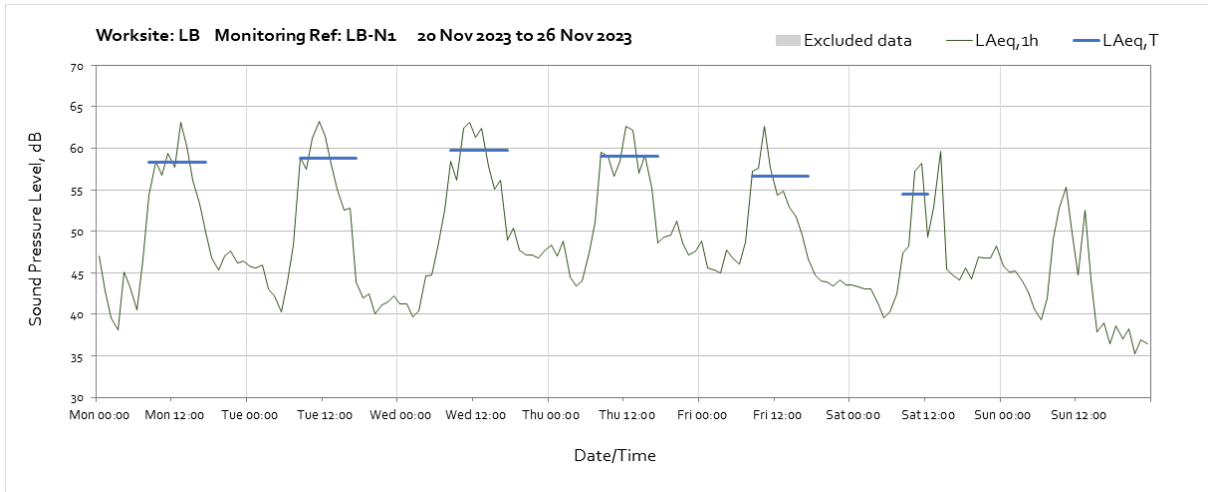
Worksite: FTN - Monitoring Ref: FTN-N1



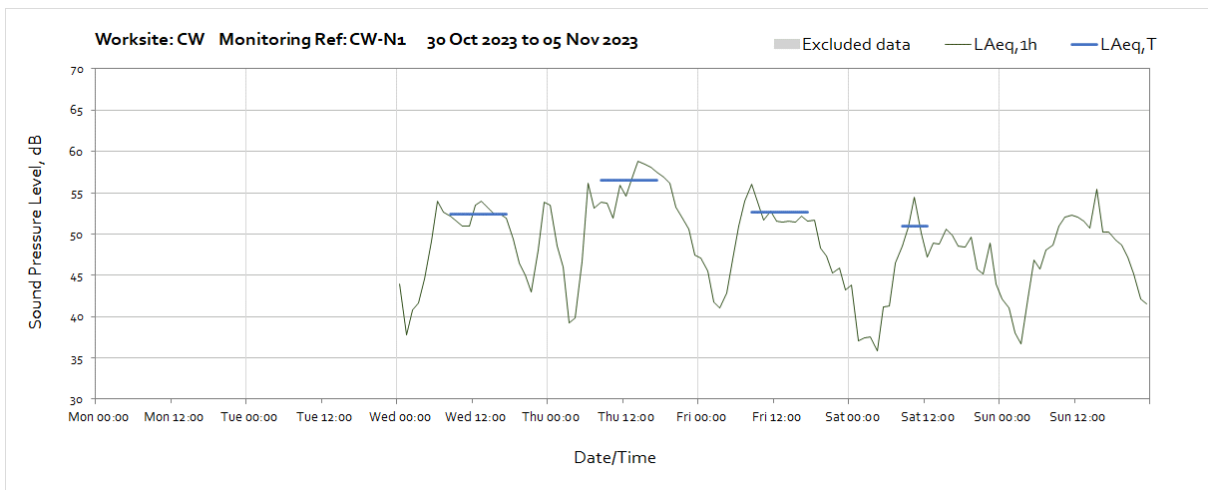


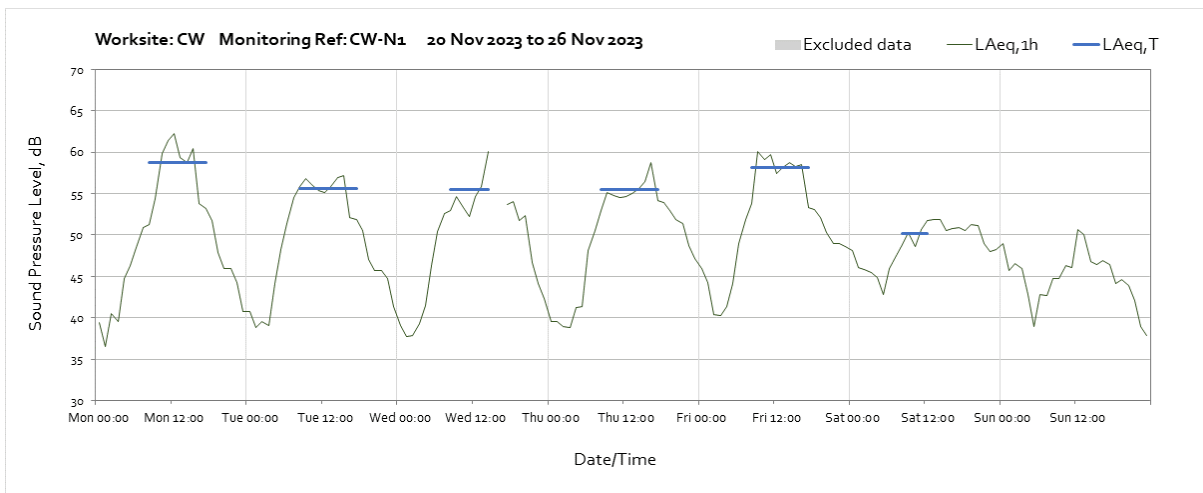
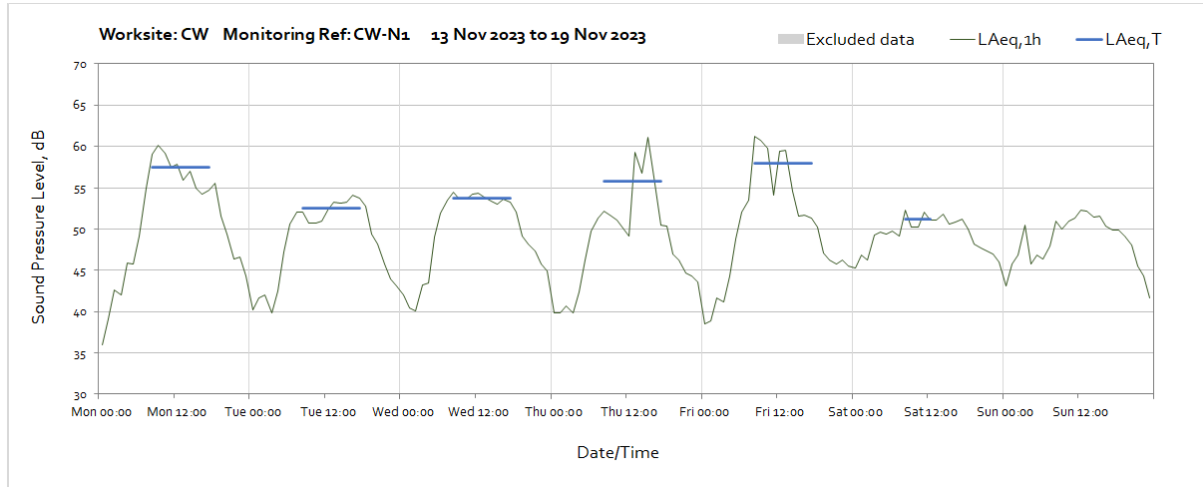
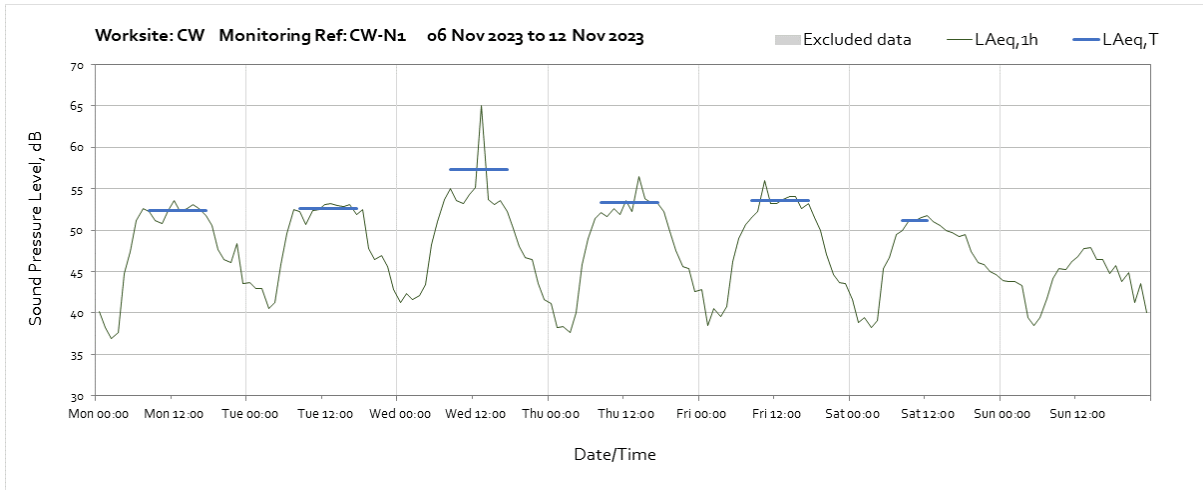
Worksite: LB – Monitoring Ref: LB-N1



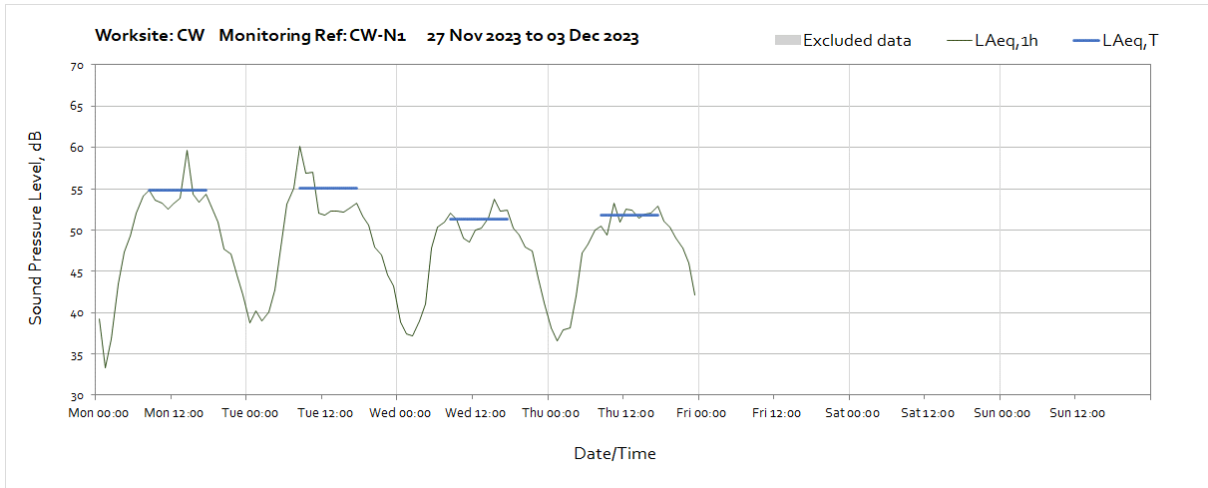


Worksite: CW – Monitoring Ref: CW-N1

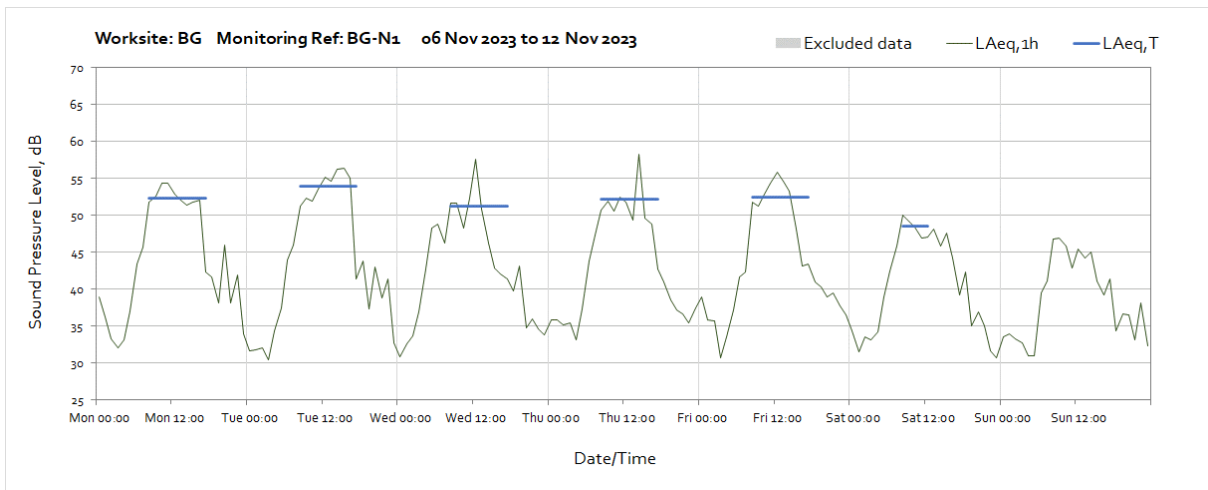
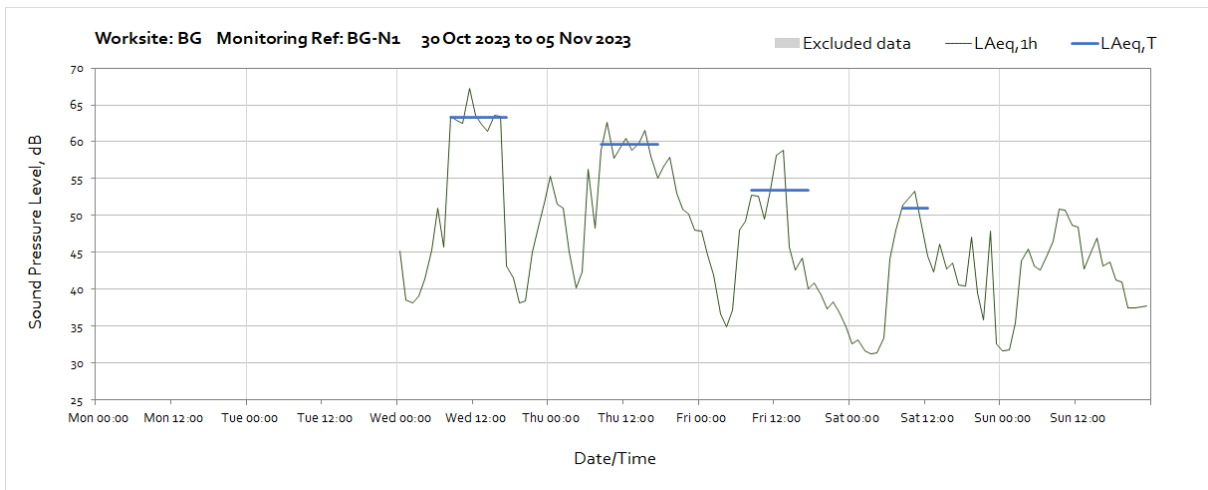


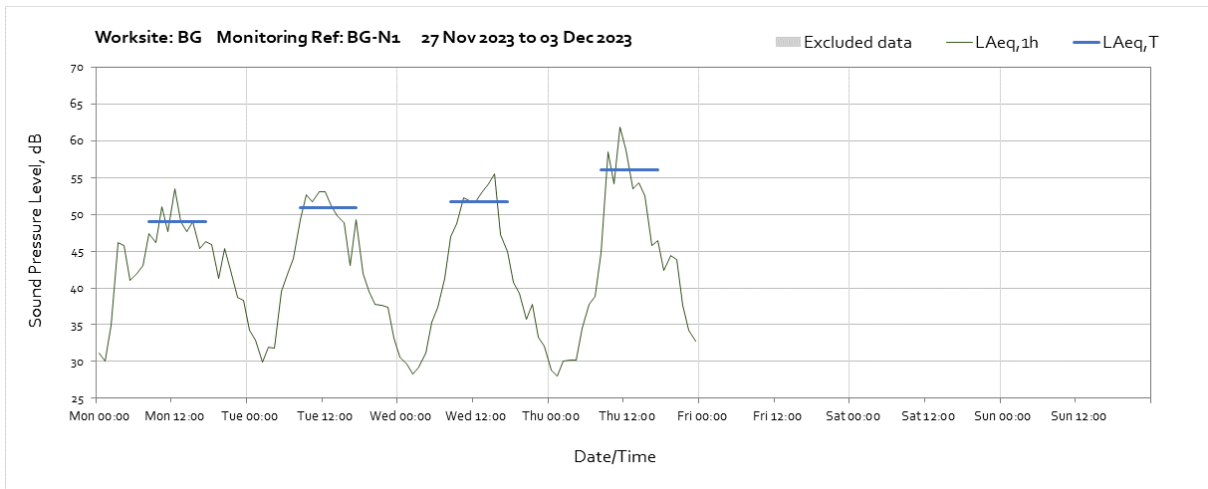
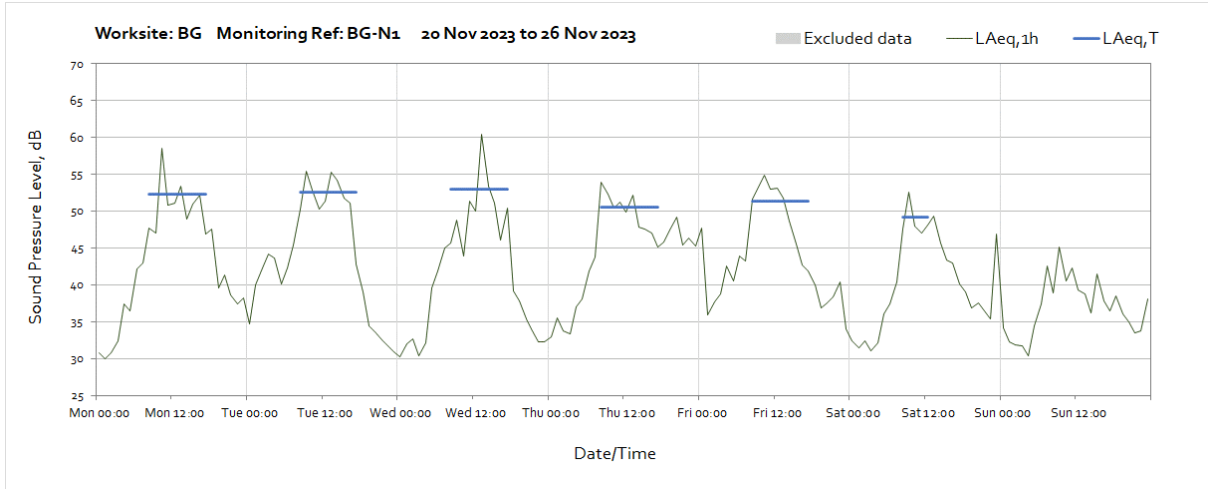
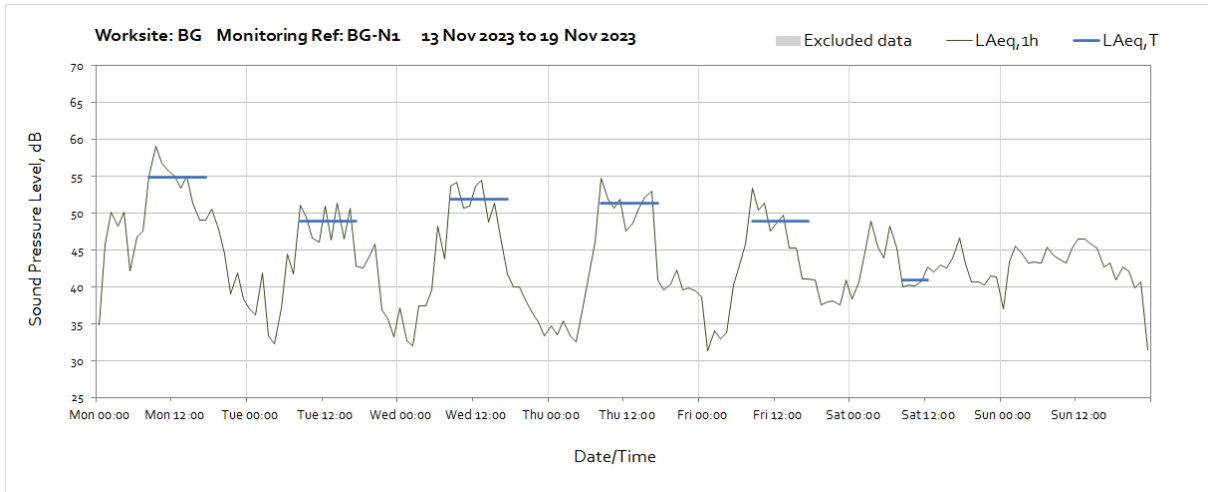


Note: Missing data between 15:00 and 17:00 on 22nd November was due to maintenance and calibration of the monitor.

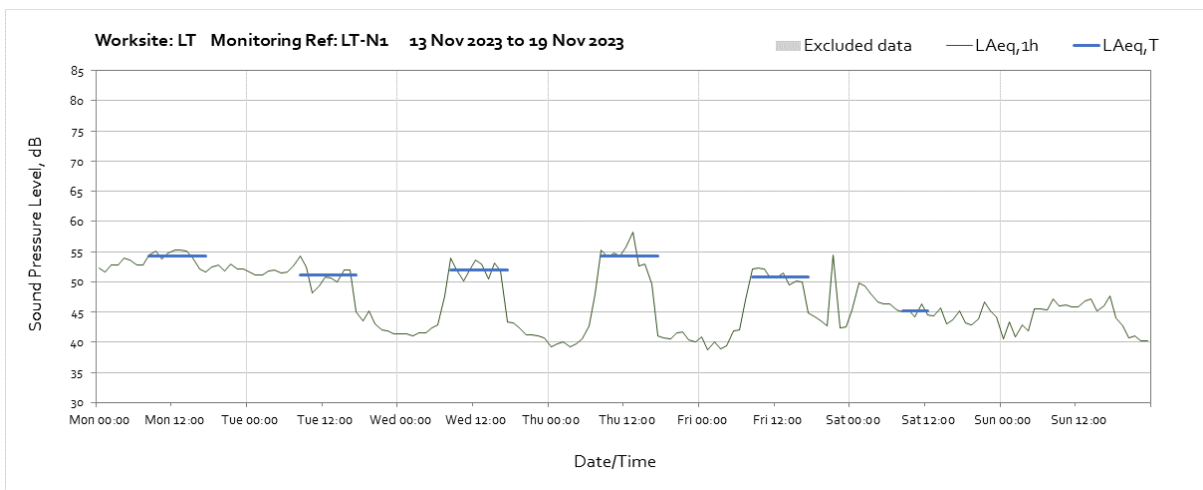
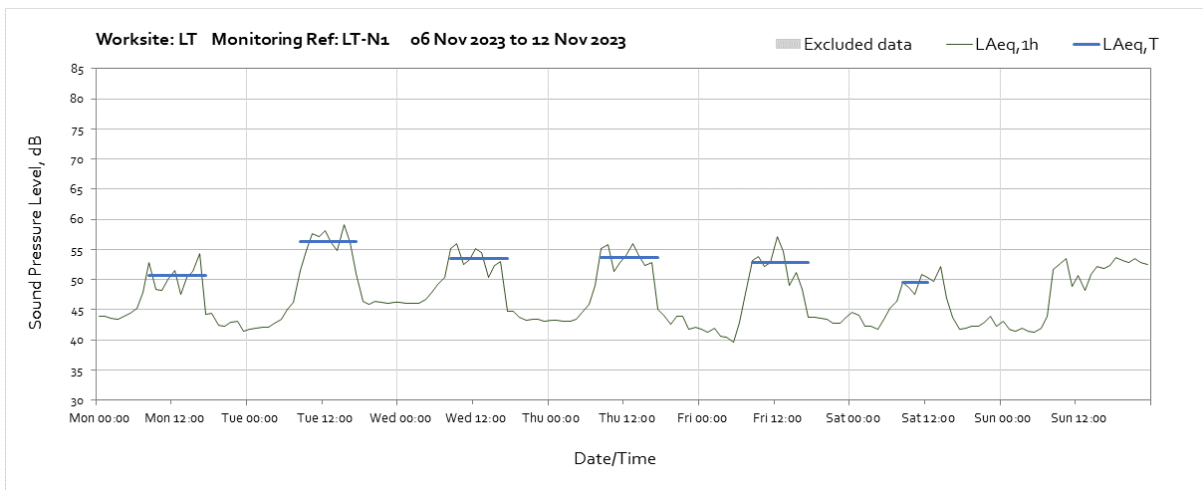
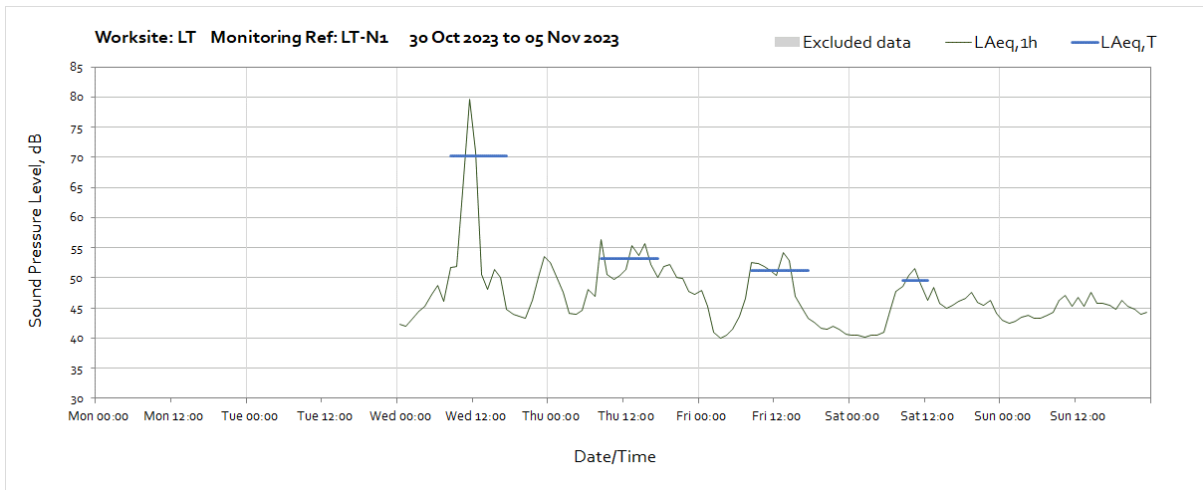


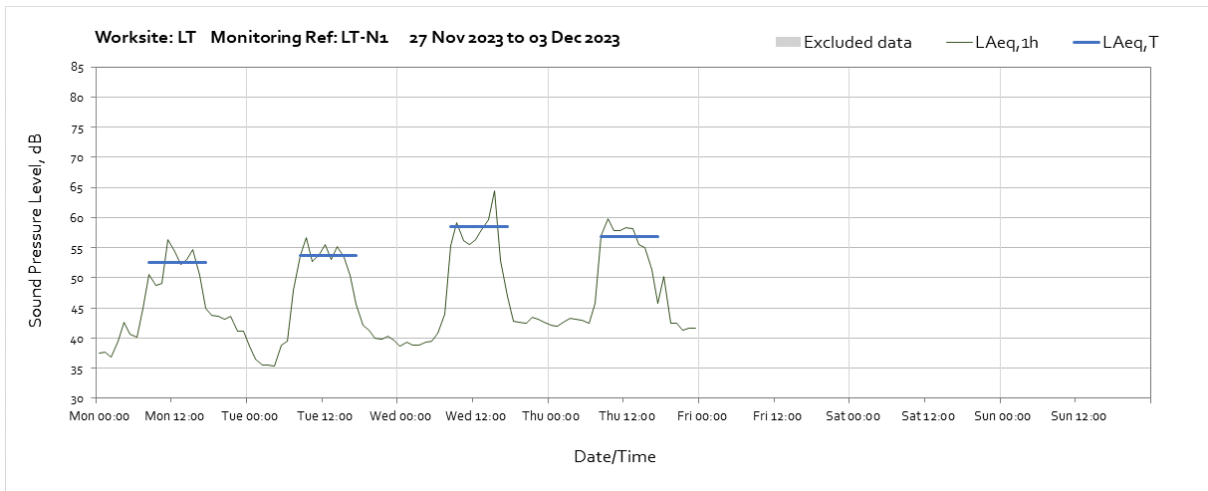
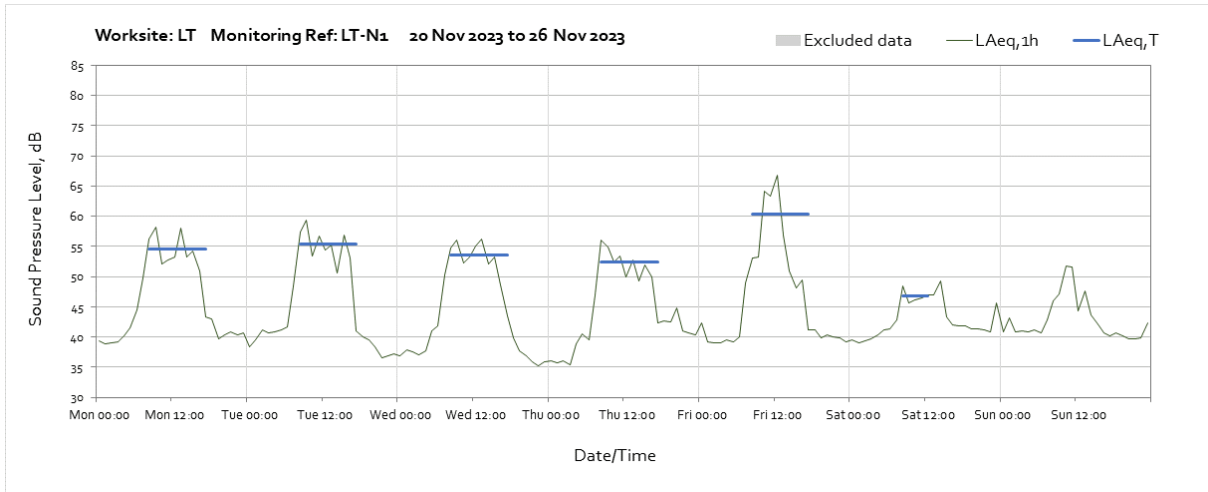
Worksite: BG – Monitoring Ref: BG-N1



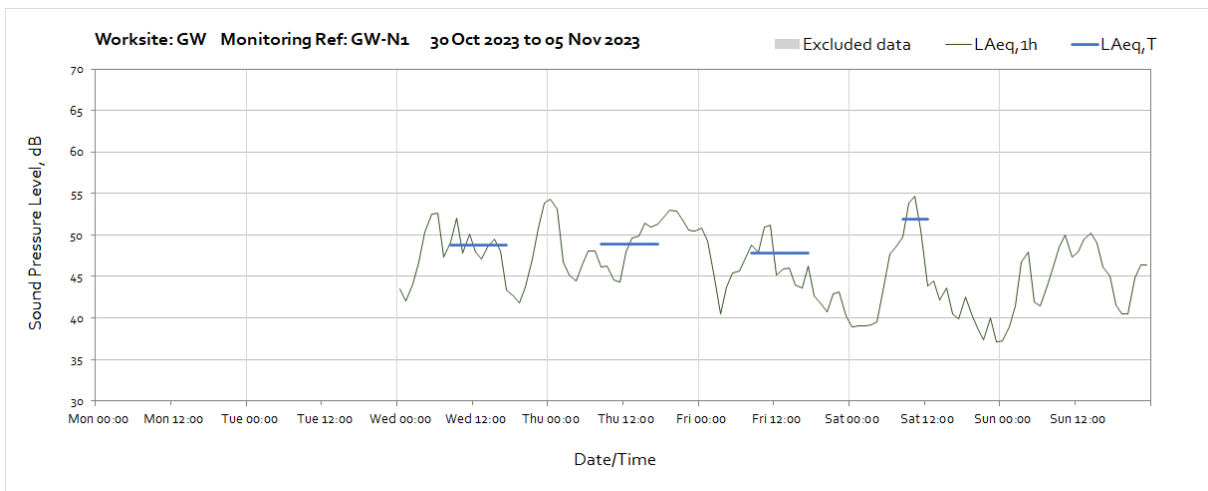


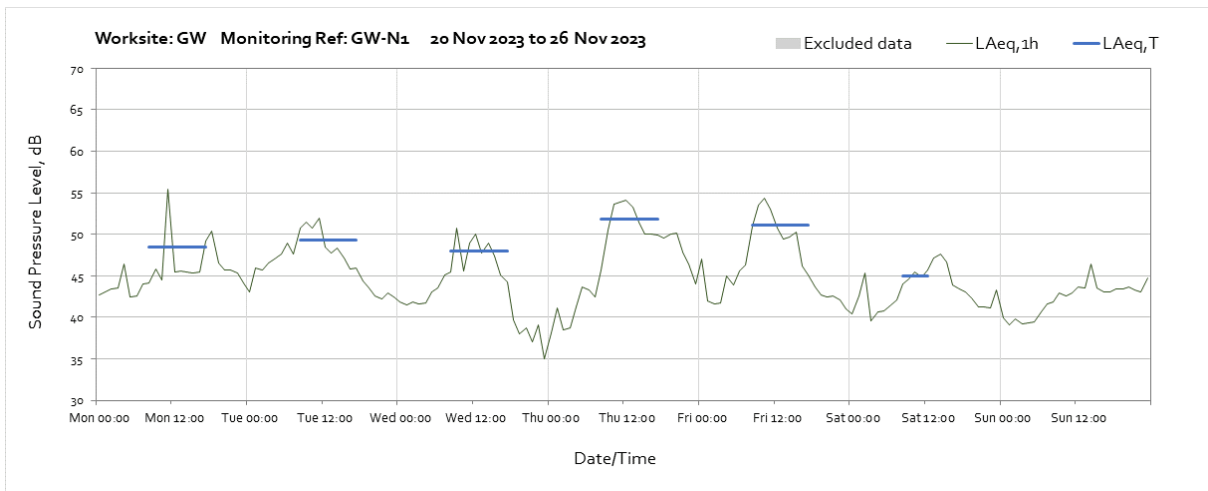
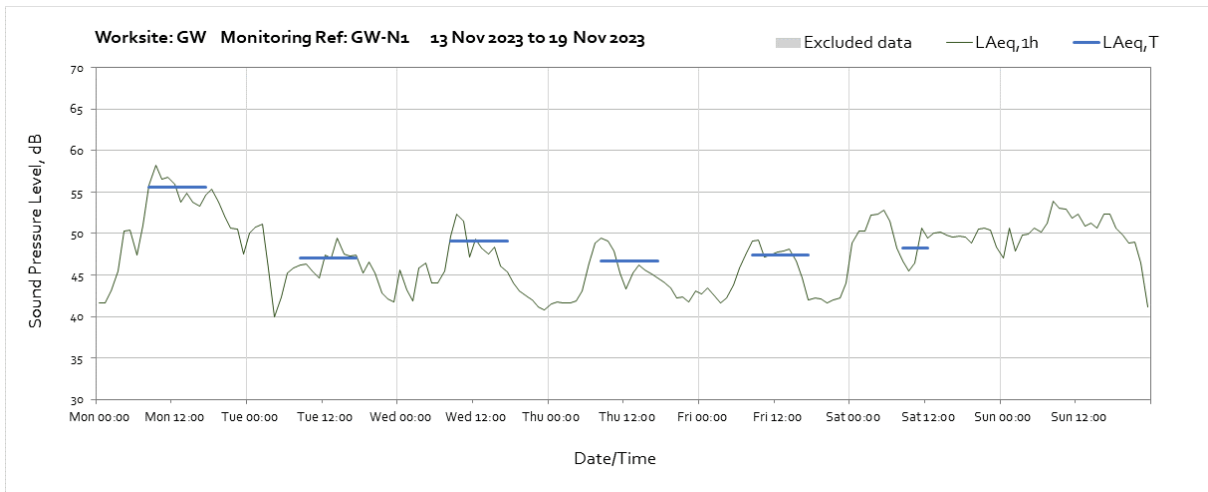
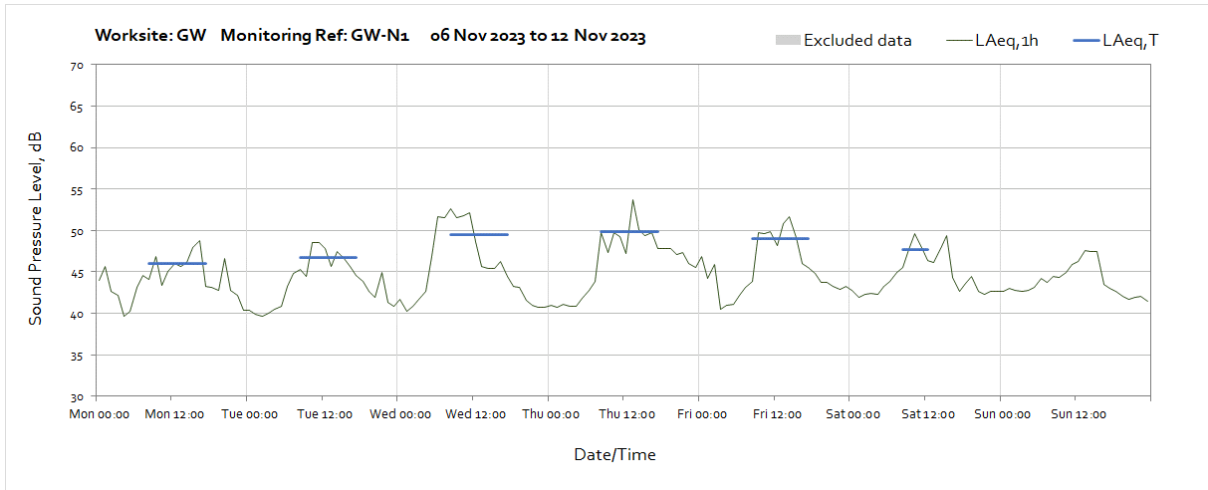
Worksite: LT – Monitoring Ref: LT-N1

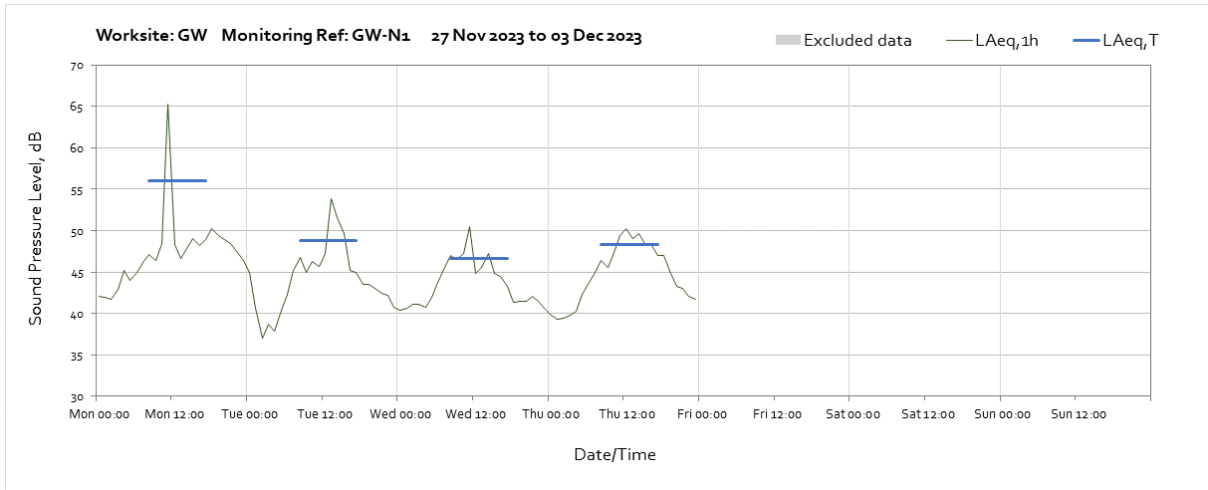




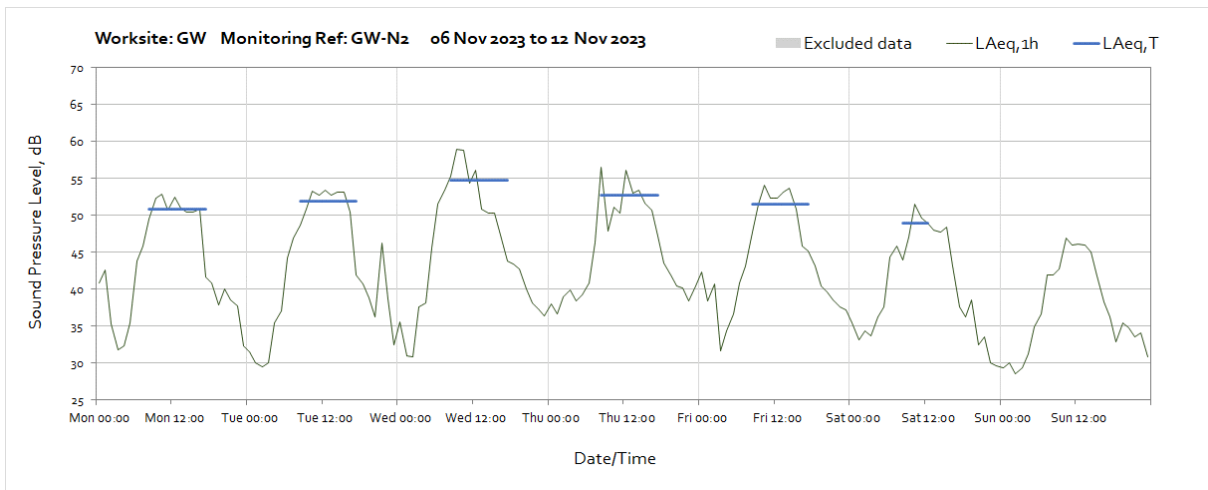
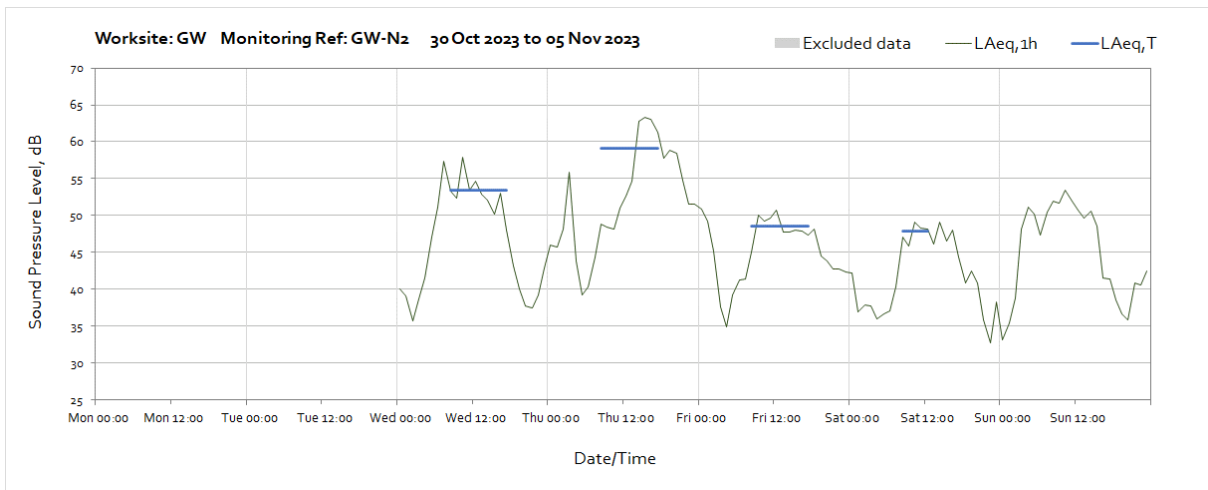
Worksite: GW – Monitoring Ref: GW-N1

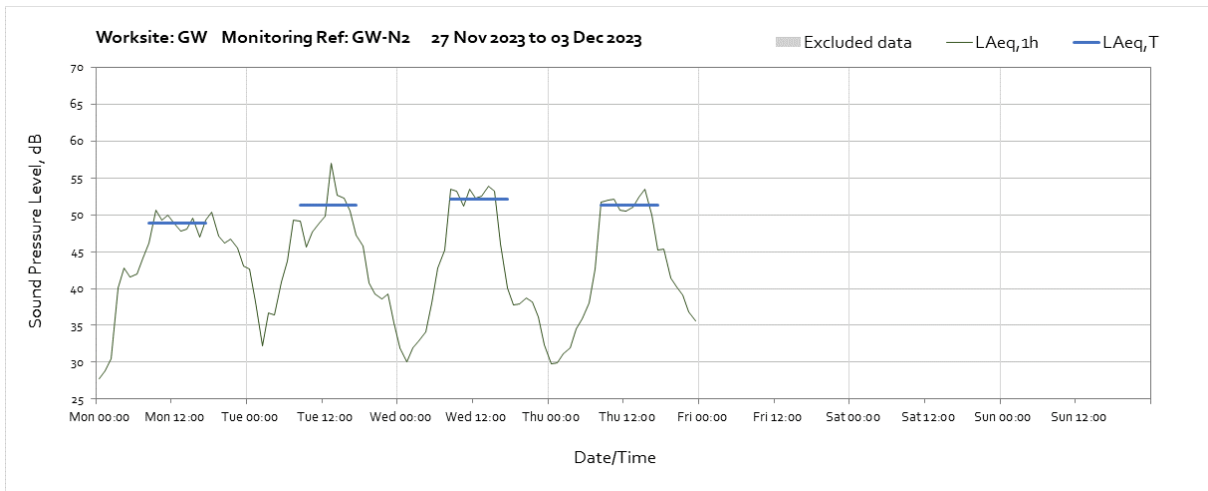
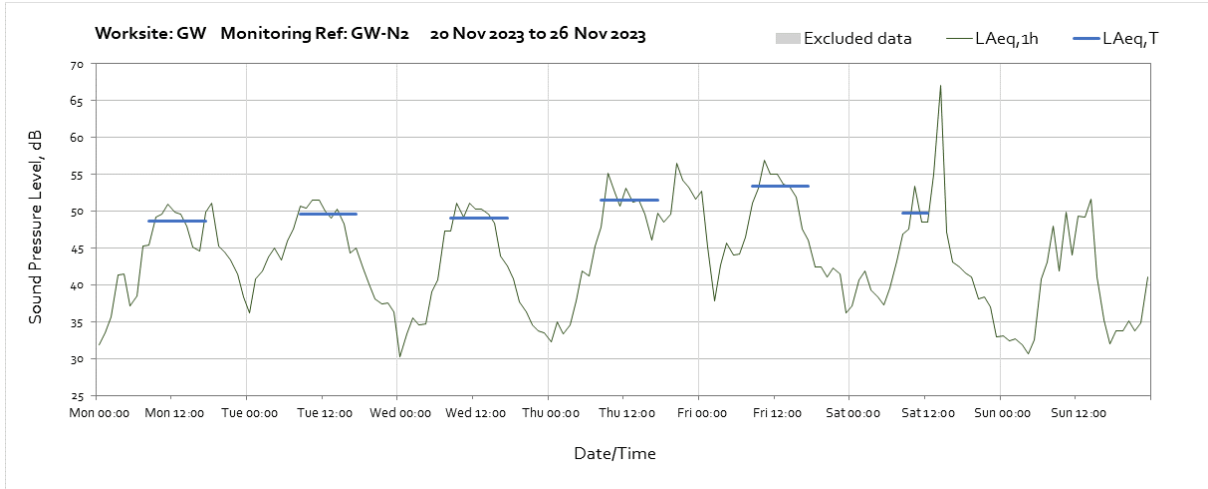
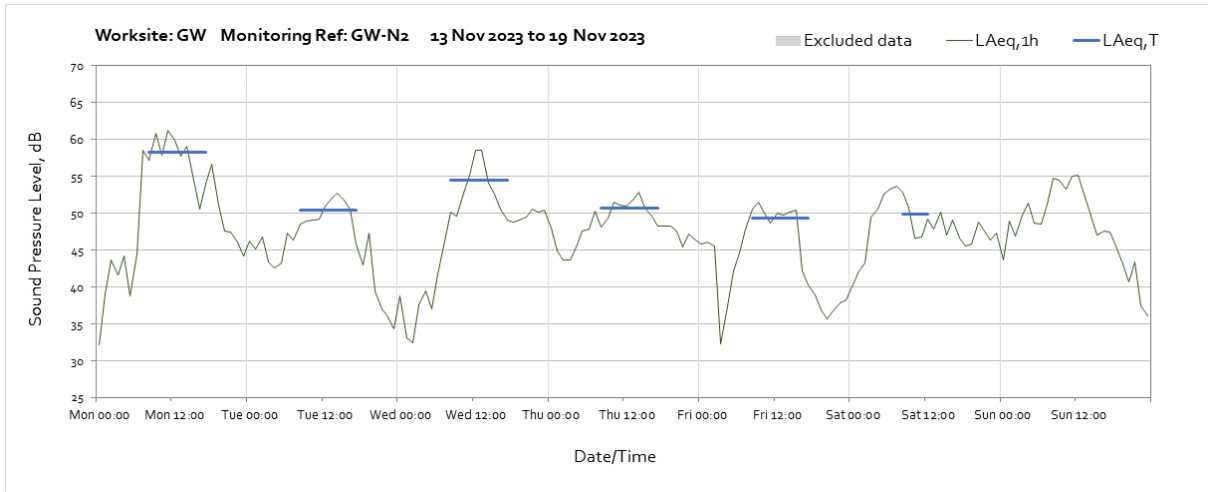




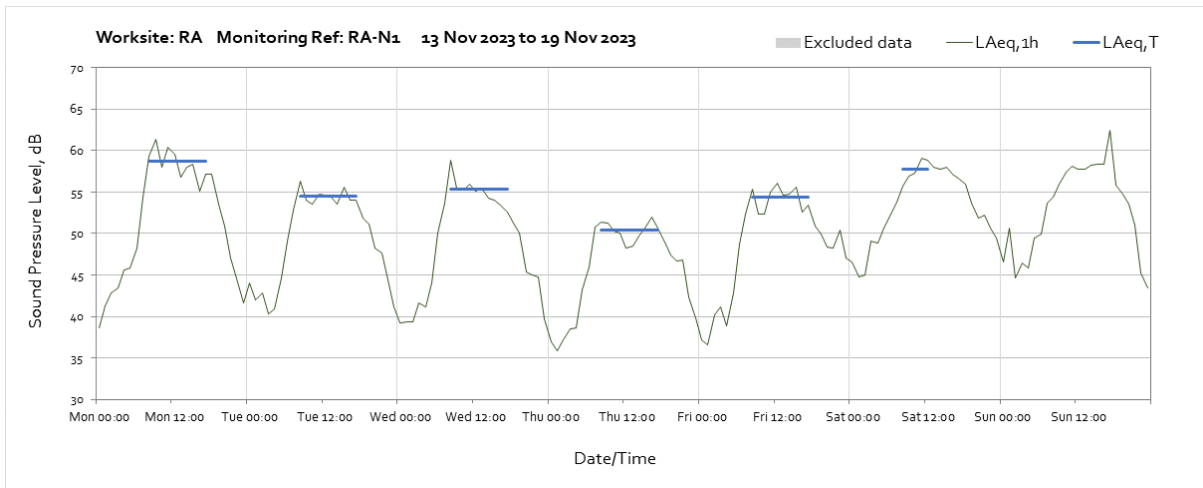
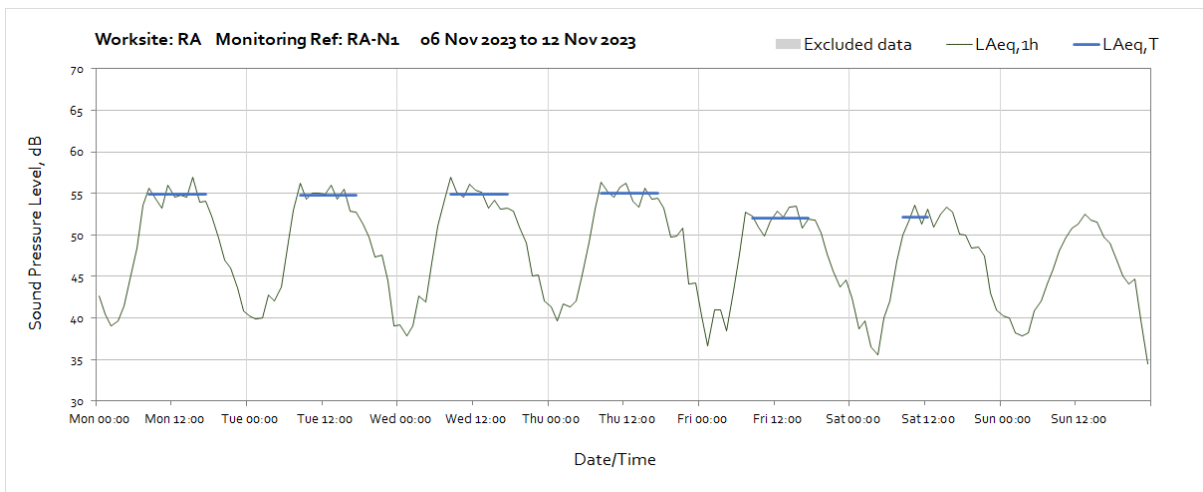
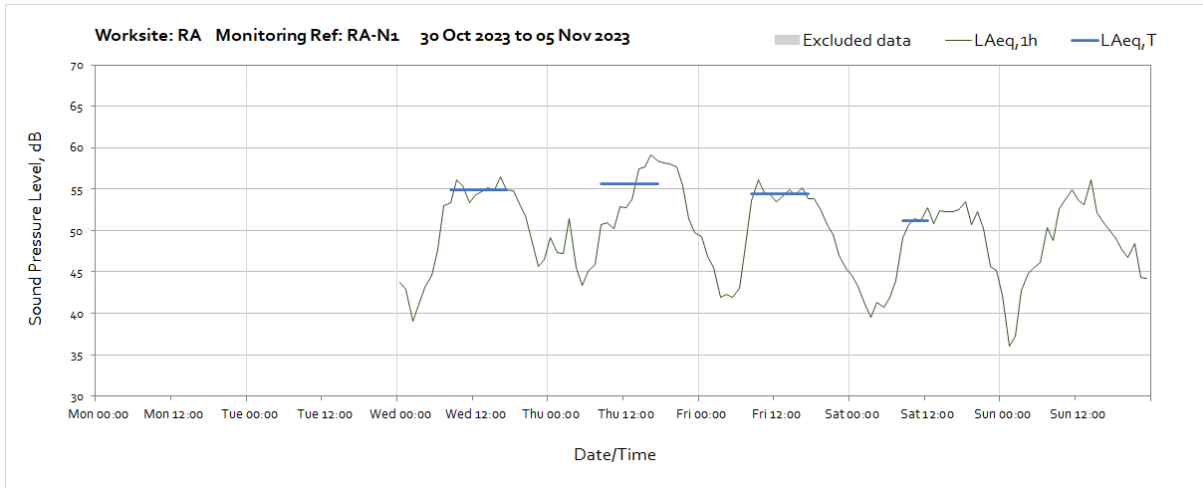


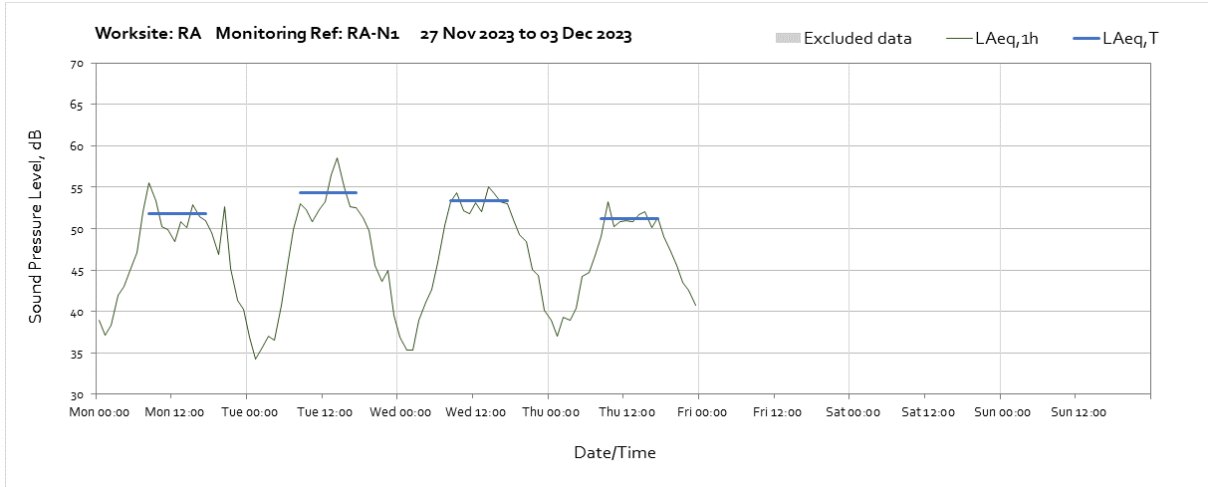
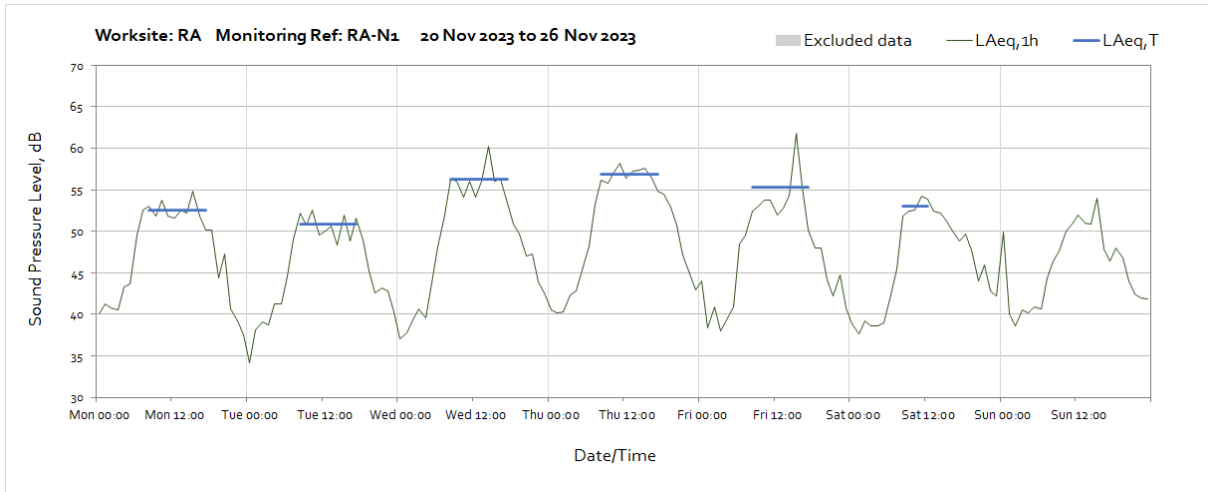
Worksite: GW - Monitoring Ref: GW-N2



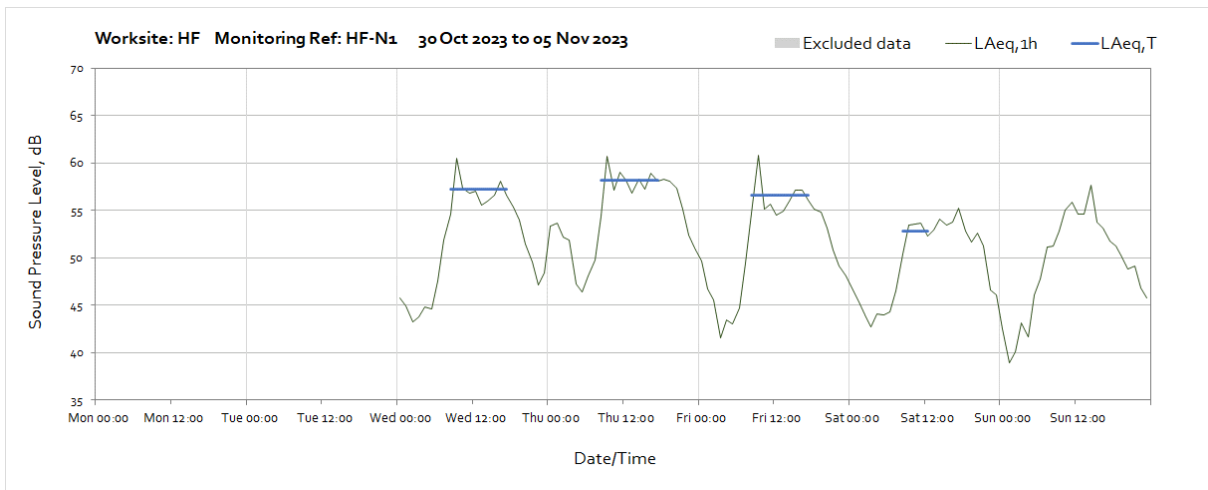


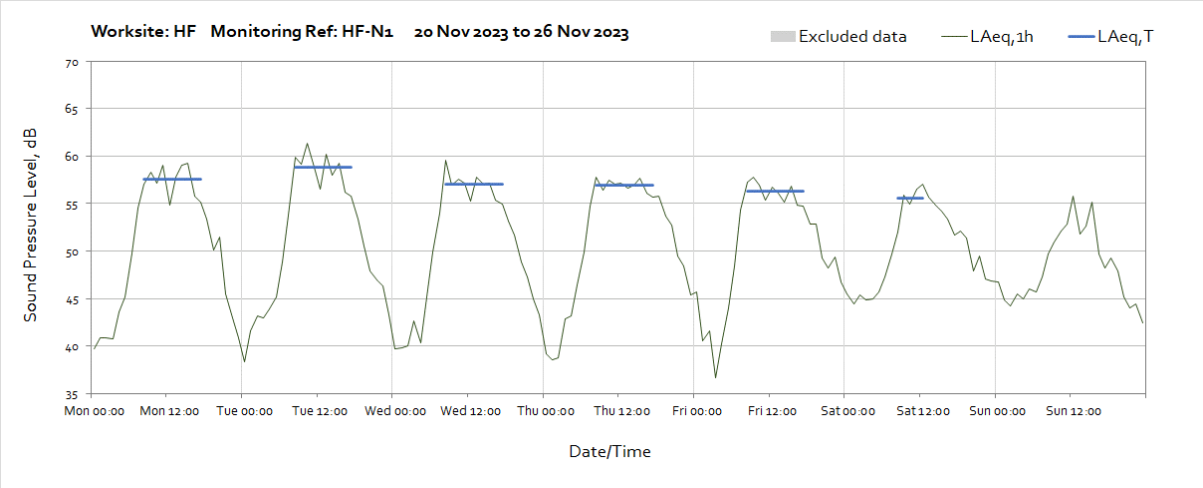
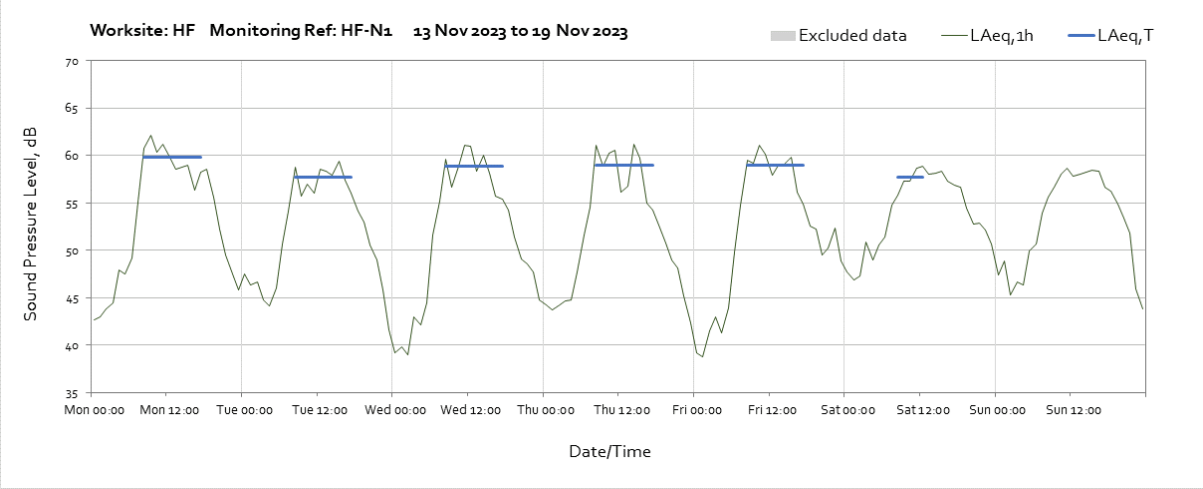
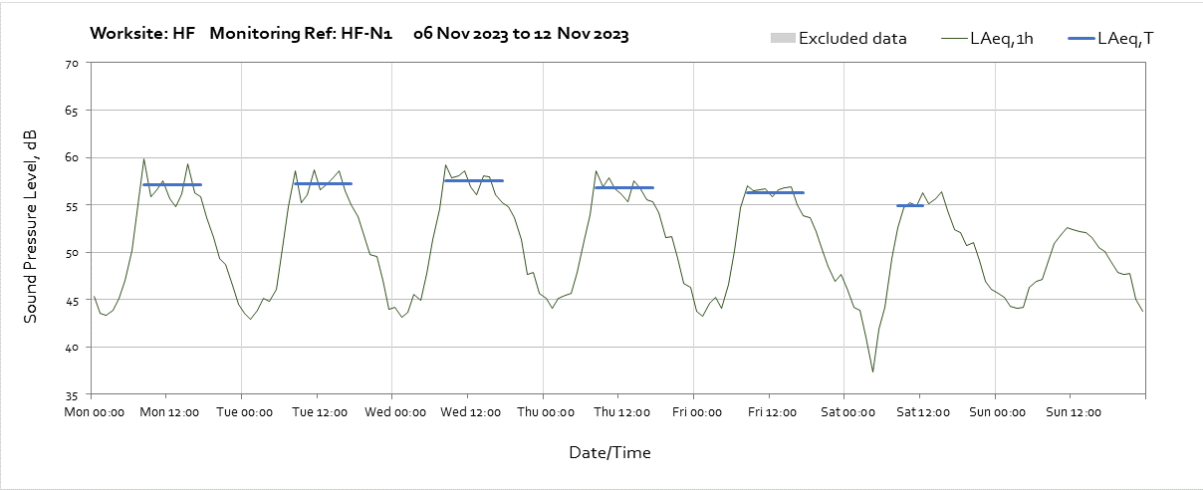
Worksite: RA – Monitoring Ref: RA-N1

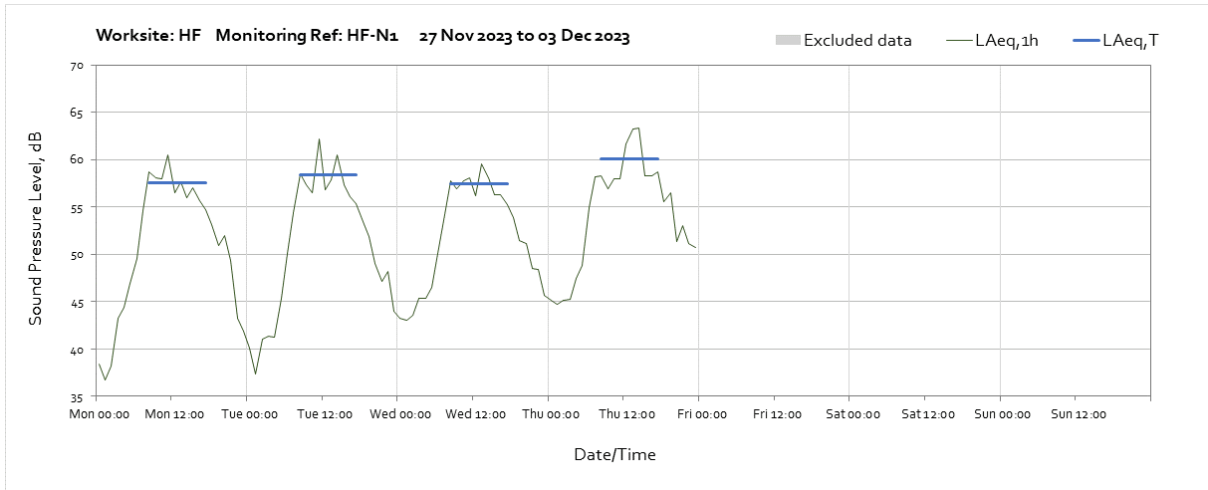




Worksite: HF – Monitoring Ref: HF-N1







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