

Construction Noise and Vibration Monthly Report – September 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 September 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, highways works and a utility diversion 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 overbridge works, bulk excavation, water management and ditch maintenance were underway.
- Chipping Warden Worksite (ref.: CW) where tunnel construction and maintenance, bulk earthworks, site access road maintenance, material movements and processing, batching plant operation, general site and compound maintenance, water management, ditch maintenance, vegetation maintenance, stockpile management, and plant maintenance were underway.
- Blackgrounds worksite (ref.: BG) where topsoil stripping, stockpile management, site access road maintenance, vegetation maintenance, material movements, drainage and temporary pond works, water management and ditch maintenance were underway.
- Lower Thorpe worksite (ref.: LT) where topsoil stripping, stockpile management, site access road maintenance, material movements, bulk earthworks, piling works, drainage and temporary pond works and general maintenance were underway.
- Greatworth worksite (ref.: GW) where stockpile management, material movements, bulk earthworks, soil stripping, site access road maintenance, drainage and temporary pond works, utility diversion, piling works and general maintenance were underway.
- Radstone and Hall Farm worksites (ref.: RA and ref.: HF) where stockpile management, material movements, drainage works, piling works, bulk excavation, and maintenance 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 de-vegetation 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 exceeded once 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.

One complaint was received within the WNDC area during the monitoring period. A description of complaints, the results of investigations and any action taken are detailed in Table 6 of this report.

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 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 West Northamptonshire District Council (WNDC) area for the period 1st to 30th September 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 works.
 - Utility diversion.
 - Highways 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.
 - Bulk excavation.
 - Water management.
 - Ditch maintenance.
- 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, structural backfill and waterproofing.
 - Bulk earthworks.
 - Site access road maintenance.
 - Material movements.
 - Batching plant operation.
 - General site and compound maintenance.
 - Water management.
 - Ditch maintenance.
 - Plant maintenance.
 - Material processing.
 - Vegetation maintenance.
 - Stockpile management
- Blackgrounds worksite, ref.: BG (see Works Identification Plan 2 in Appendix A) where the following work activities were undertaken:
 - Topsoil stripping.
 - Stockpile management.
 - Site access road maintenance.
 - Vegetation maintenance.

- Material movements.
- Drainage works, including installation of temporary ponds.
- 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:
 - Topsoil stripping
 - Stockpile management.
 - Site access road maintenance.
 - Material movements.
 - Drainage works, including installation of temporary ponds.
 - Bulk earthworks.
 - Piling works
 - General maintenance.
- Greatworth, ref.: GW (see Works Identification Plan 4 in Appendix A) where the following work activities were undertaken:
 - Stockpile management.
 - Material movements.
 - Bulk earthworks.
 - Soil stripping.
 - Site access road maintenance.
 - Drainage works, including installation of temporary ponds.
 - Utility diversion works.
 - Piling works.
 - General maintenance.
- 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.
 - Piling works.
 - Bulk excavation.

- Maintenance and utilisation of site access road.

1.1.4 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 de-vegetation 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 September in the WNDC area. Table 2 summarises the position of noise monitoring installations within the WNDC area in September 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 LAeq Data over the Monitoring Period

Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday Average LAeq,T (Highest Day LAeq,T)					Saturday Average LAeq,T (Highest Day LAeq,T)					Sunday / Public Holiday Average LAeq,T (Highest Day LAeq,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	49.9 (60.8)	57.3 (64.1)	50.5 (58.5)	46.2 (60.9)	46.1 (61.5)	48.7 (49.8)	50.7 (56.9)	49.6 (58.7)	46.8 (55.2)	47.4 (53.9)	48.5 (57.8)	47.9 (55.8)
LB	LB-N1	Lower Boddington, West Northamptonshire	Free-field	51.3 (57.0)	57.1 (61.0)	50.8 (55.9)	48.4 (58.4)	48.0 (55.9)	50.3 (54.0)	51.3 (57.2)	51.2 (60.4)	49.4 (53.2)	49.1 (51.2)	49.7 (55.9)	47.3 (50.5)
CW	CW-N1	Chipping Warden and Edgcote, Banbury	Free-field	50.8 (56.7)	52.9 (72.5)	50.0 (52.5)	47.1 (56.2)	44.2 (57.7)	46.8 (48.7)	47.8 (49.7)	47.4 (50.6)	48.3 (56.4)	43.9 (46.4)	48.9 (62.7)	44.4 (51.1)
BG	BG-N1	Blackground, Chipping Warden	Free-field	45.0 (54.9)	57.1 (76.2)	44.7 (50.4)	41.2 (51.0)	38.2 (57.3)	41.9 (42.1)	43.1 (45.6)	44.7 (45.9)	43.4 (51.1)	43.2 (47.6)	44.6 (52.2)	43.3 (49.7)
LT	LT-N1	Thorpe Mandeville, Banbury	Free-field	47.2 (52.0)	57.5 (63.6)	49.5 (53.5)	41.5 (53.0)	38.5 (44.3)	45.1 (45.1)	55.1 (55.1)	54.3 (54.3)	49.0 (54.4)	39.9 (41.5)	47.4 (52.7)	36.6 (42.3)
GW	GW-N1	Helmdon Road, Greatworth	Free-field	47.6 (55.2)	49.7 (55.1)	47.4 (59.7)	44.8 (54.3)	43.3 (57.4)	45.1 (45.9)	46.8 (48.1)	46.8 (49.3)	46.6 (51.0)	45.7 (51.2)	47.2 (52.3)	43.4 (49.8)
	GW-N2	Greatworth Hall, Greatworth	Free-field	48.1 (57.5)	51.7 (63.7)	47.7 (54.4)	45.9 (56.8)	45.0 (59.8)	48.3 (53.0)	48.2 (51.2)	47.6 (51.0)	47.2 (55.8)	44.8 (47.7)	47.4 (54.4)	44.8 (50.2)
RA	RA-N1	Radstone Road, Brackley	Free-field	49.2 (55.6)	53.4 (58.5)	50.8 (56.6)	47.7 (54.9)	42.7 (56.7)	45.0 (46.3)	50.8 (52.9)	51.2 (52.5)	48.9 (60.0)	40.0 (44.0)	47.7 (53.5)	41.3 (48.1)
HF	HF-N1	Hall Farm, Brackley	Free-field	54.2 (55.7)	57.6 (60.2)	54.9 (57.9)	51.5 (54.7)	48.1 (54.9)	50.6 (51.6)	53.9 (56.2)	53.5 (54.2)	52.0 (56.9)	47.2 (49.9)	51.2 (54.6)	47.1 (51.5)

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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	Weekday	0800-1800	1	No exceedances
LB	LB-N1	Lower Boddington	Sunday	0800-1800	1	No exceedances
CW	CW-N1	Chipping Warden and Edgcote, Banbury	Weekday	0800-1800	1	No exceedances
BG	BG-N1	Blackground, Chipping Warden	Weekday	0800-1800	3	1
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	Weekday	0800-1800	1	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 six (6) monitoring locations during weekday and Sunday daytime periods in September 2023.

2.2.7 Exceedances of the SOAEL were recorded at one (1) noise monitor. The SOAEL exceedances were recorded during weekday daytime working.

2.2.8 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 5 and may be lower than the total sum of individual exceedances reported in Table 4 for each location.

Table 5: Summary of Total Exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
BG	BG-N1	Blackground, Chipping Warden	1

2.2.9 One exceedance of the SOAEL was recorded due to HS2 construction works during September 2023.

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
-	-	-	-	-	-

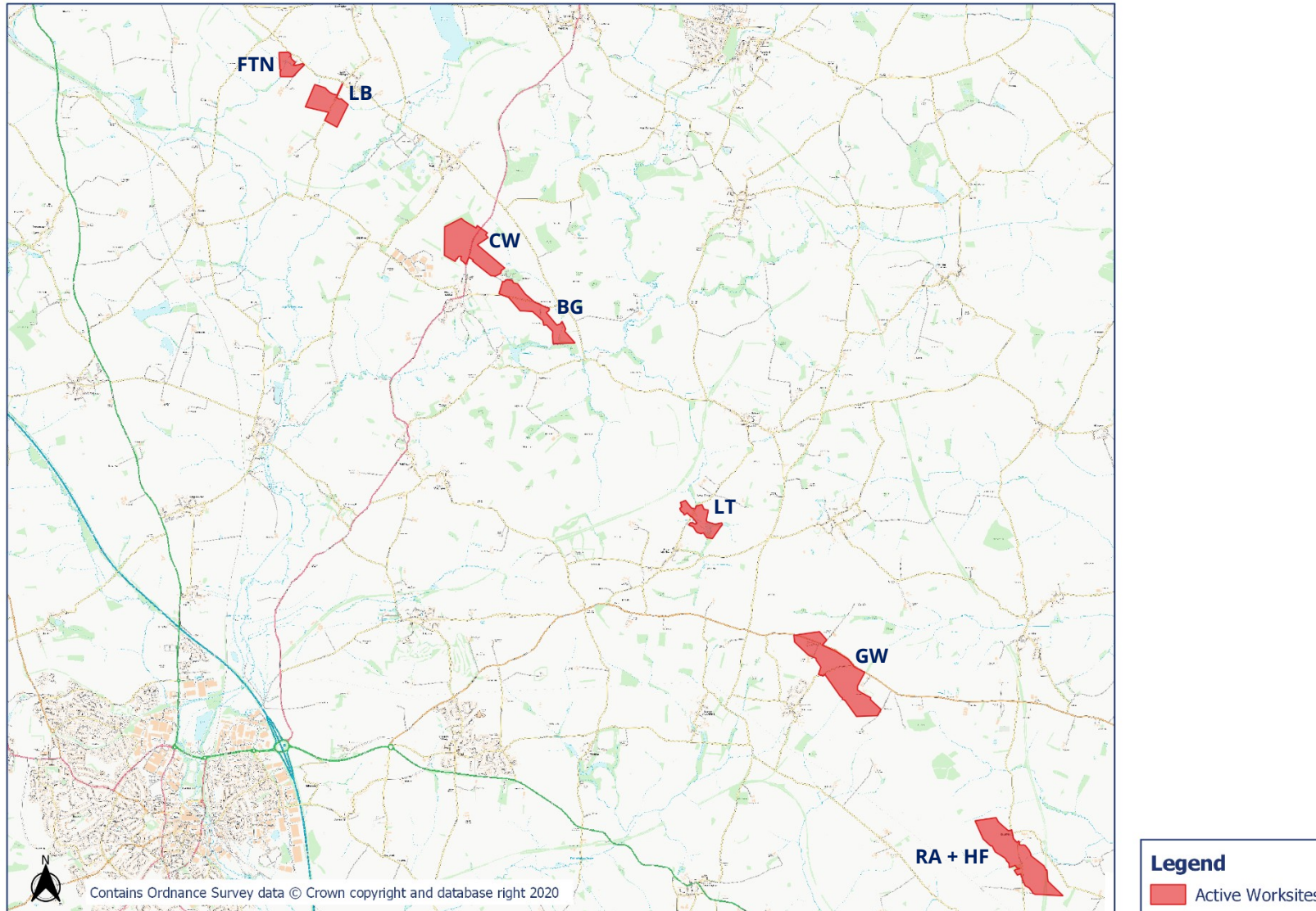
2.4 Complaints

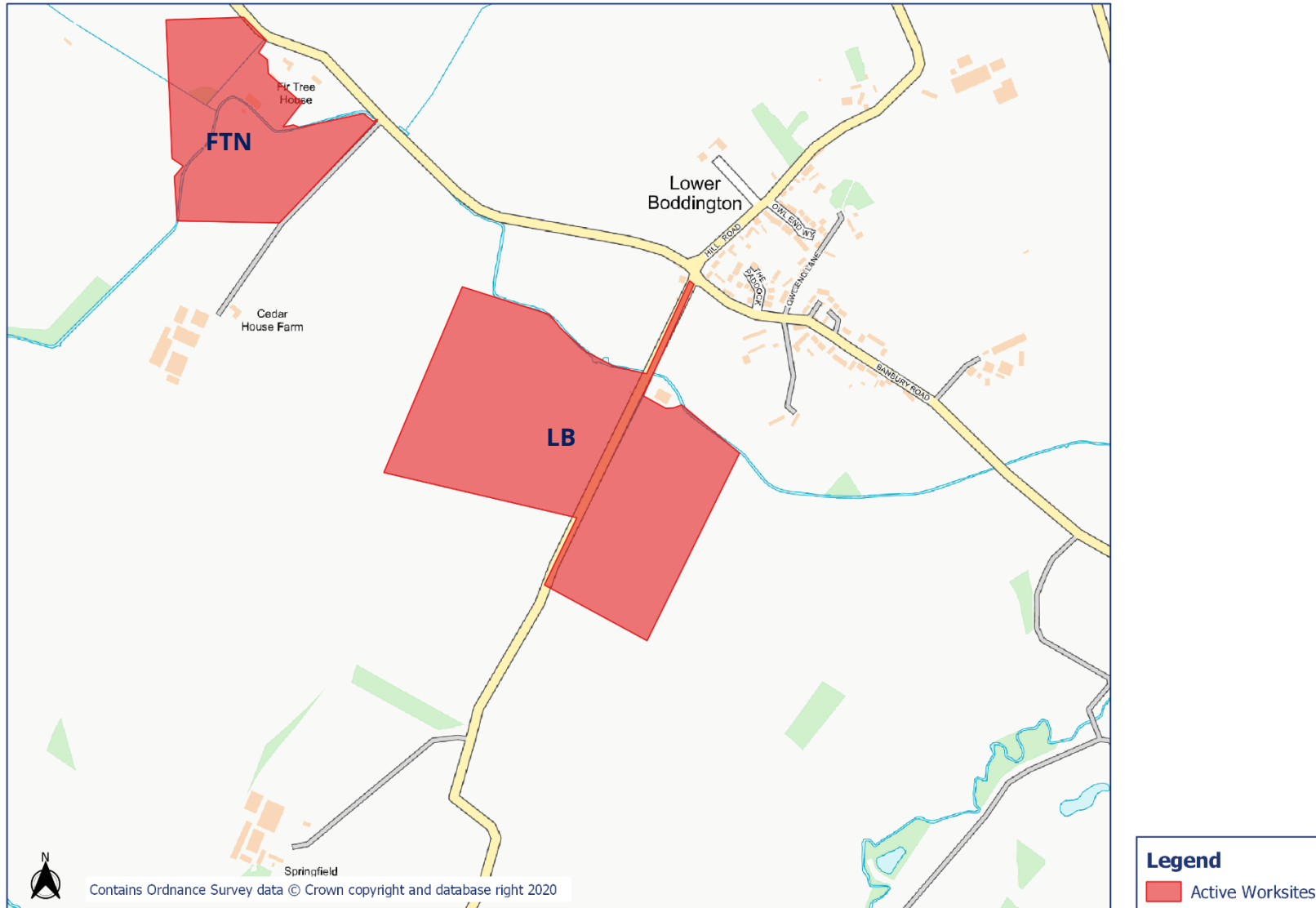
2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

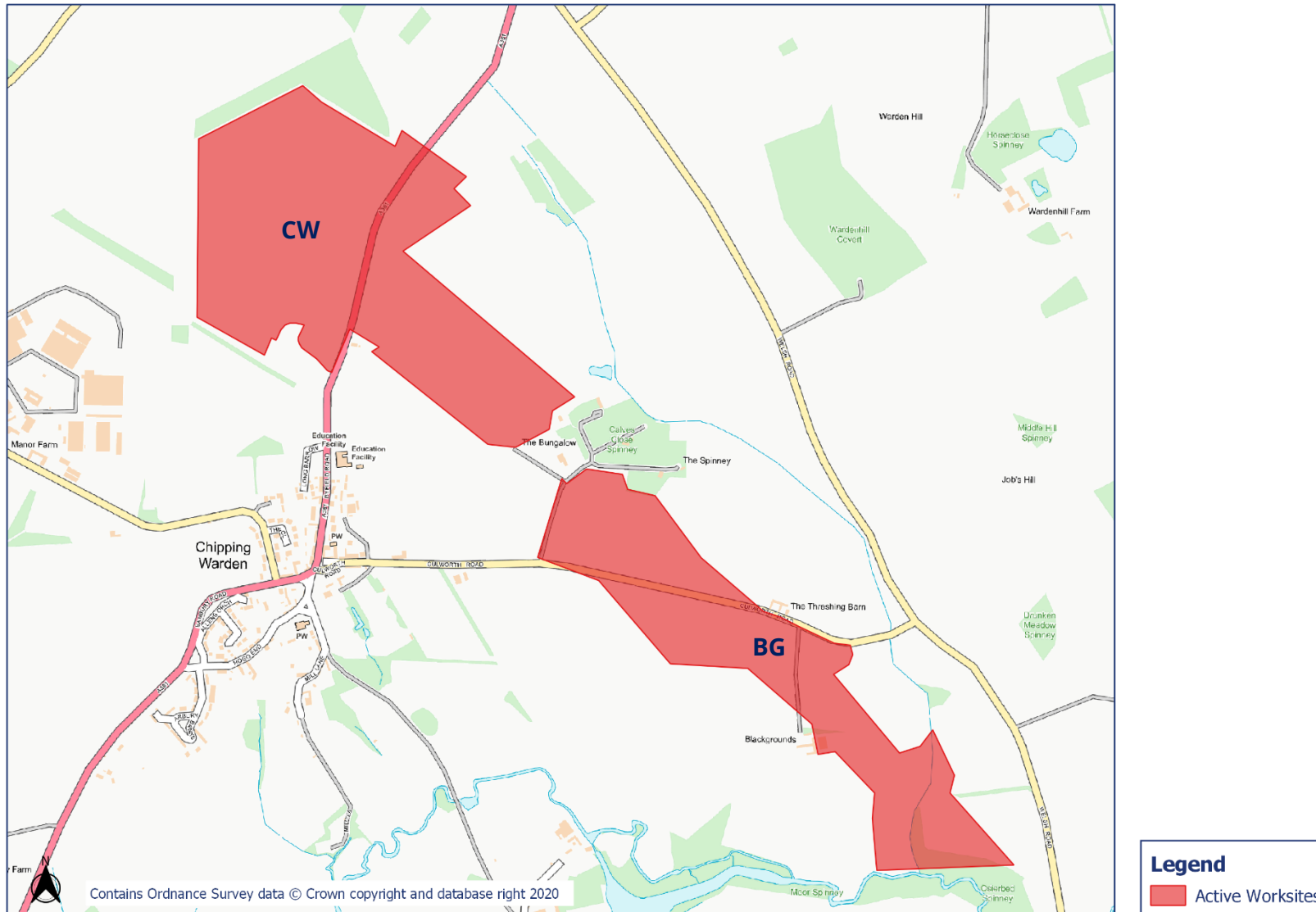
Table 7: Summary of Complaints

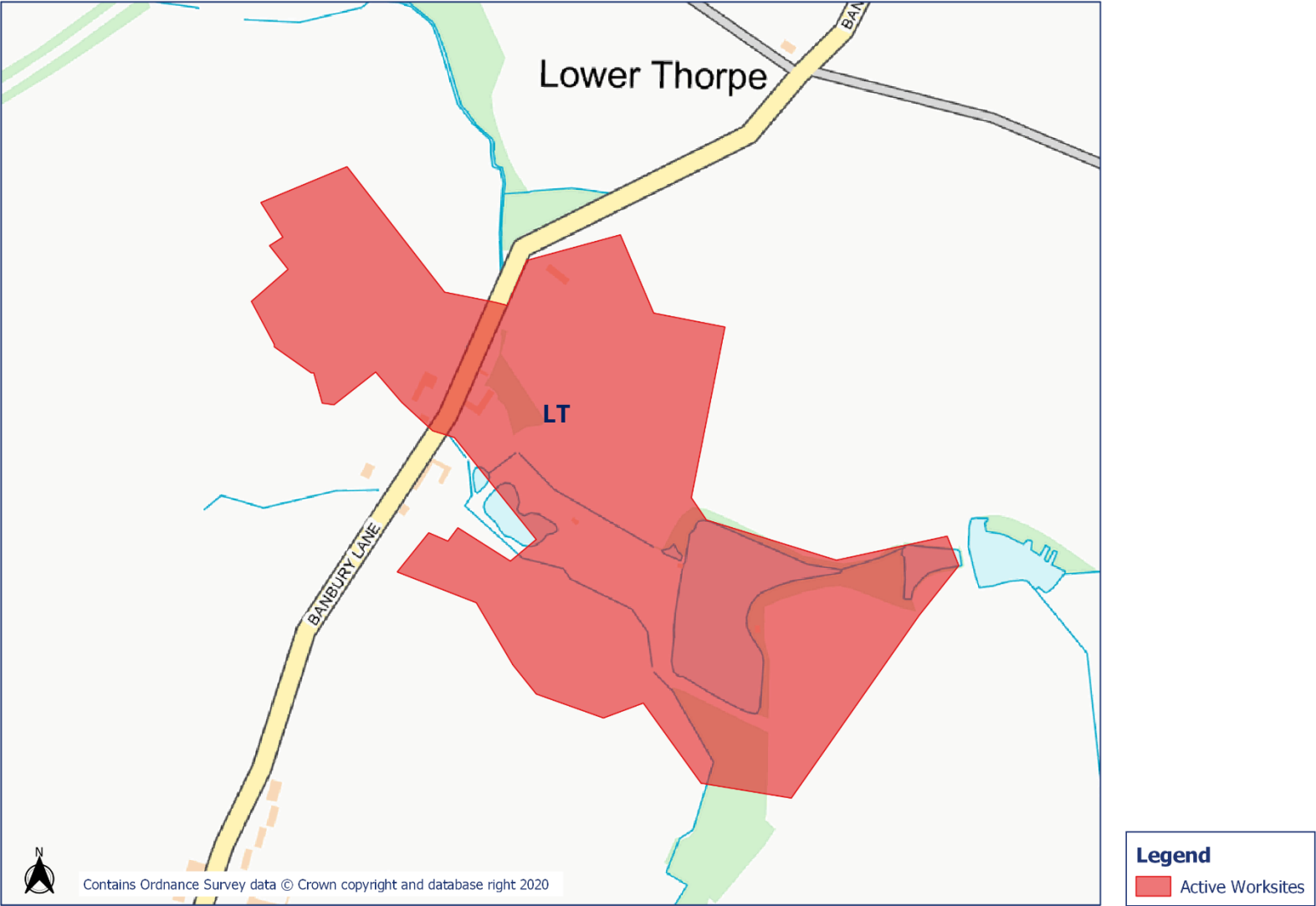
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-23-44977-C	RA	Ongoing noise and vibration at night.	It was found that the noise was due to construction of over bridge	Explanation and works notice provided to the resident.

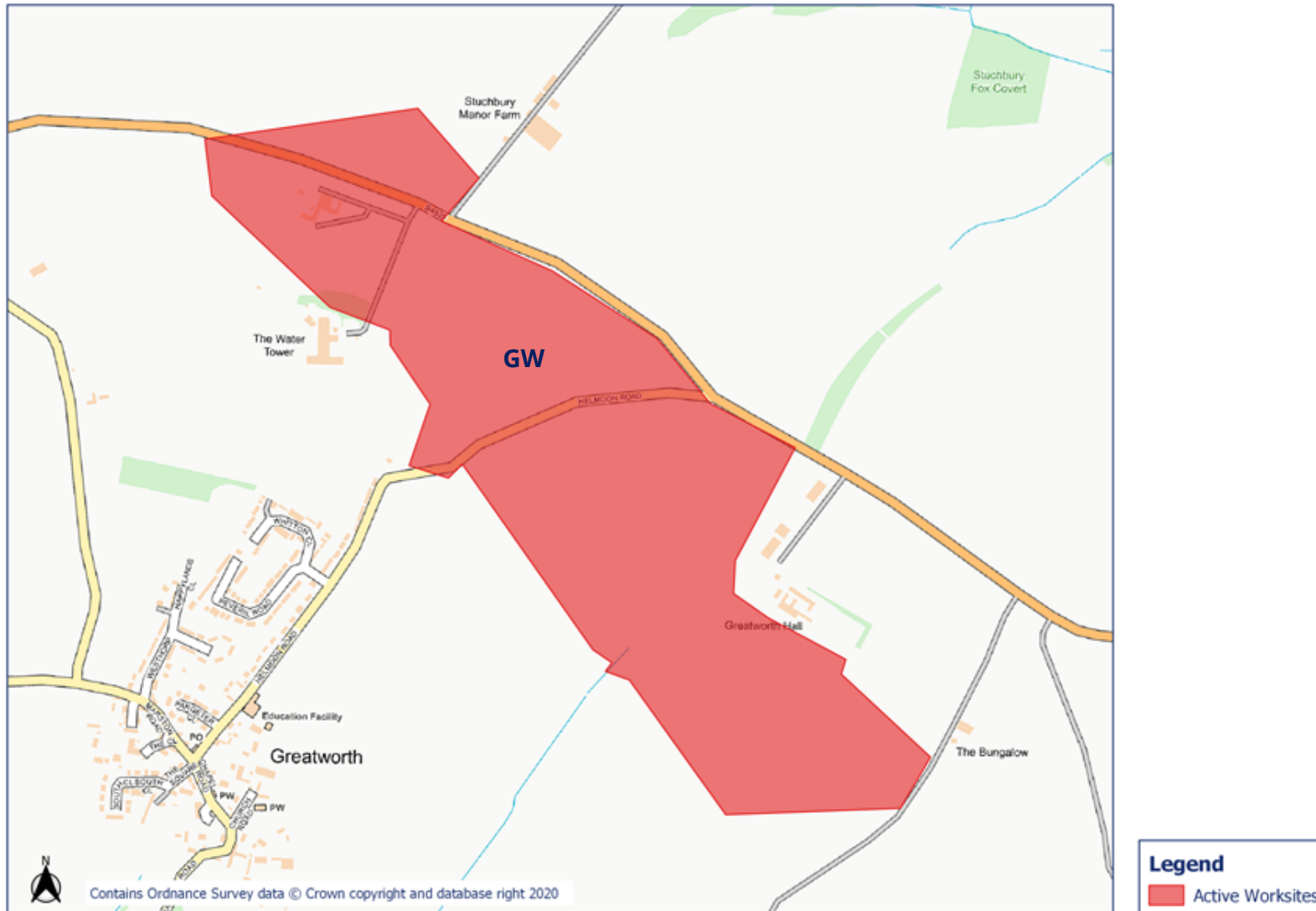
Appendix A Site Location

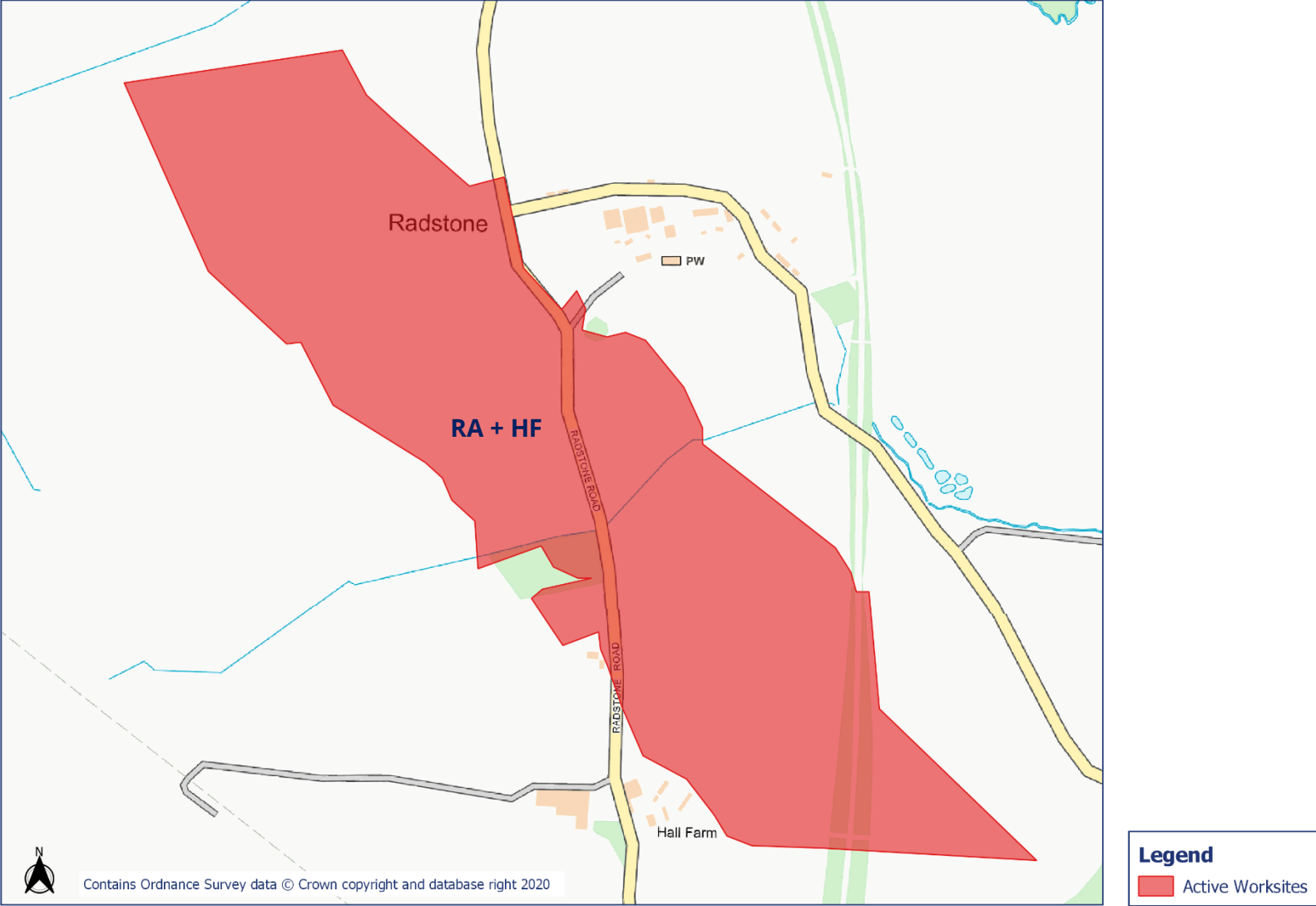




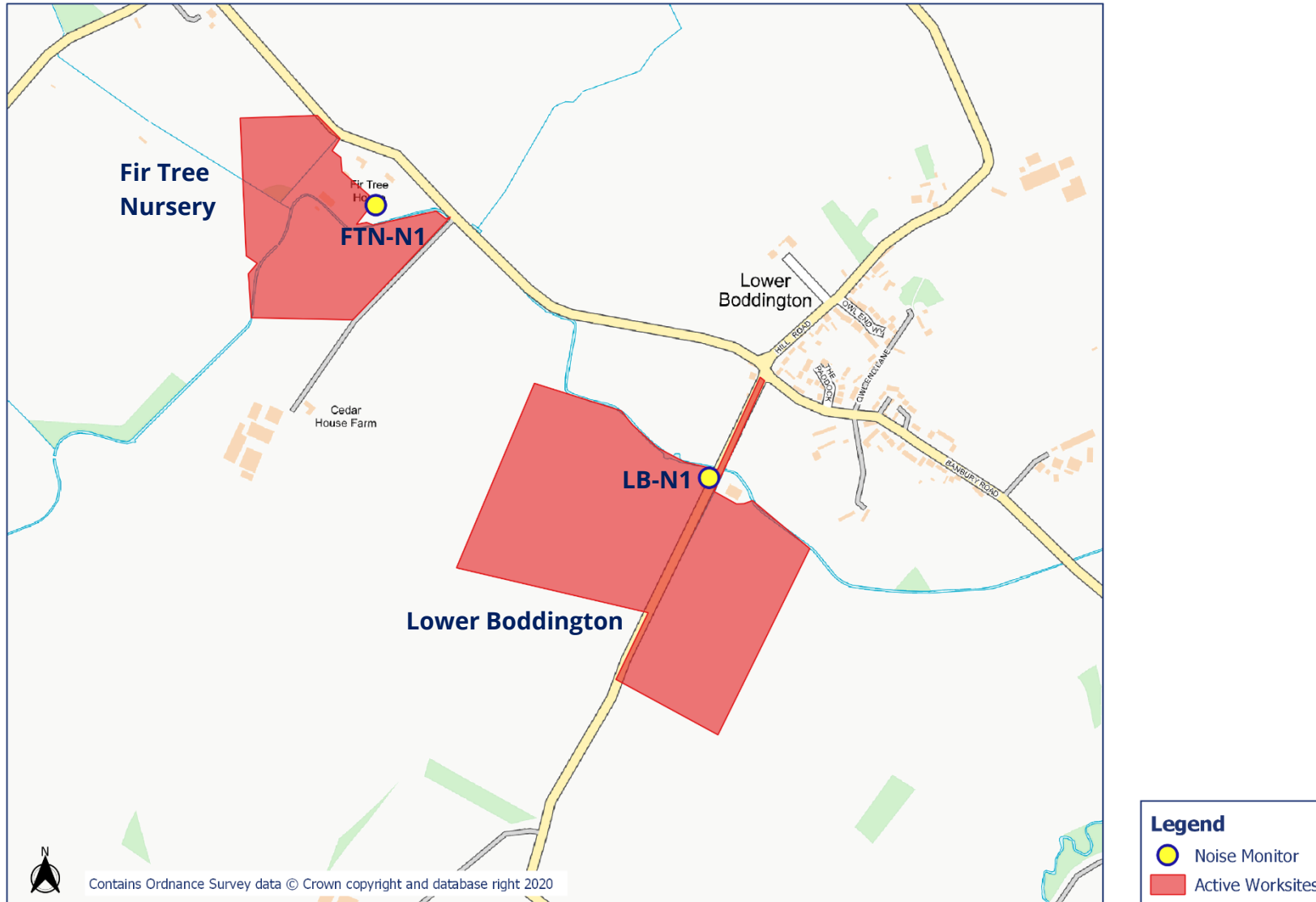


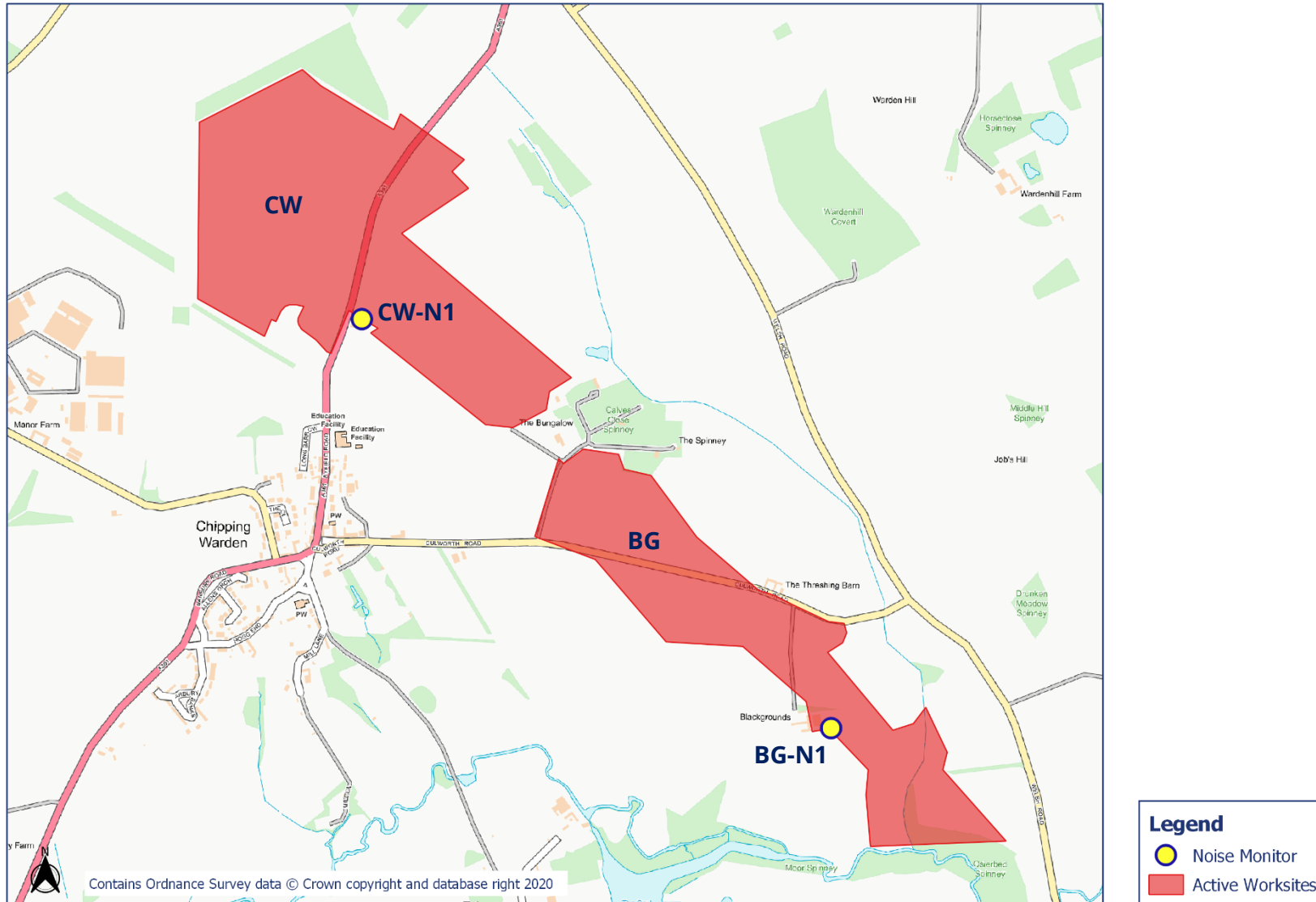


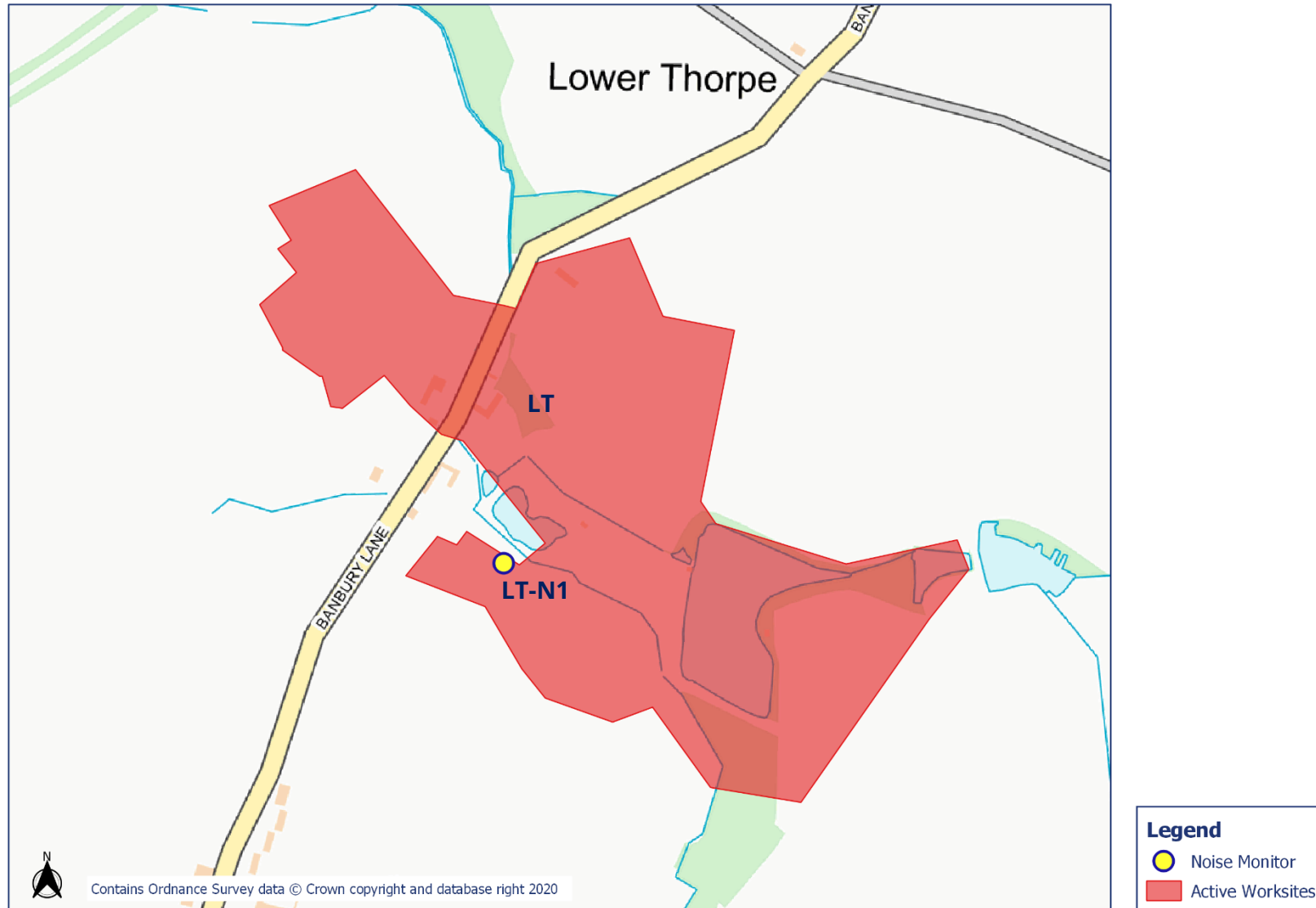


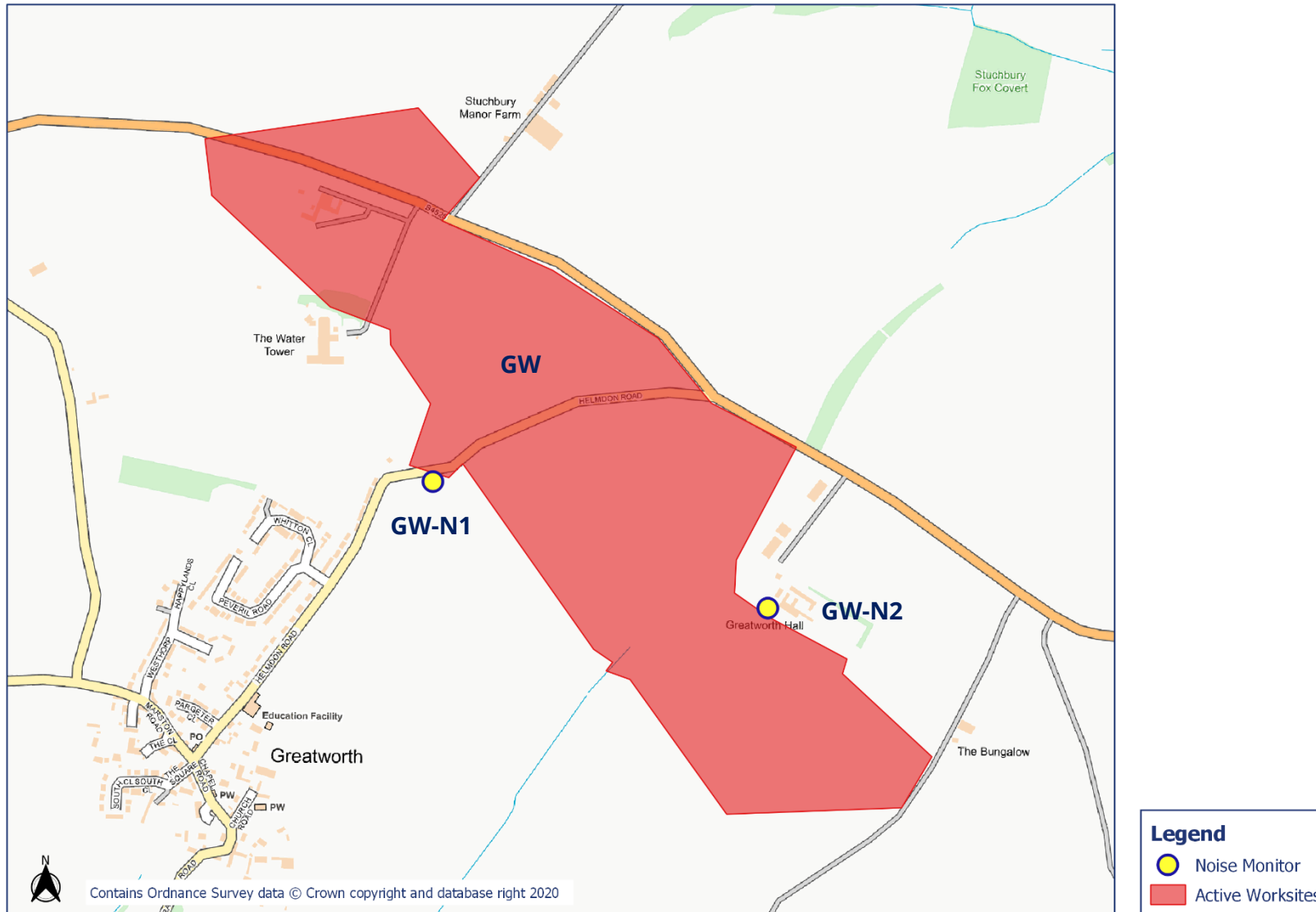


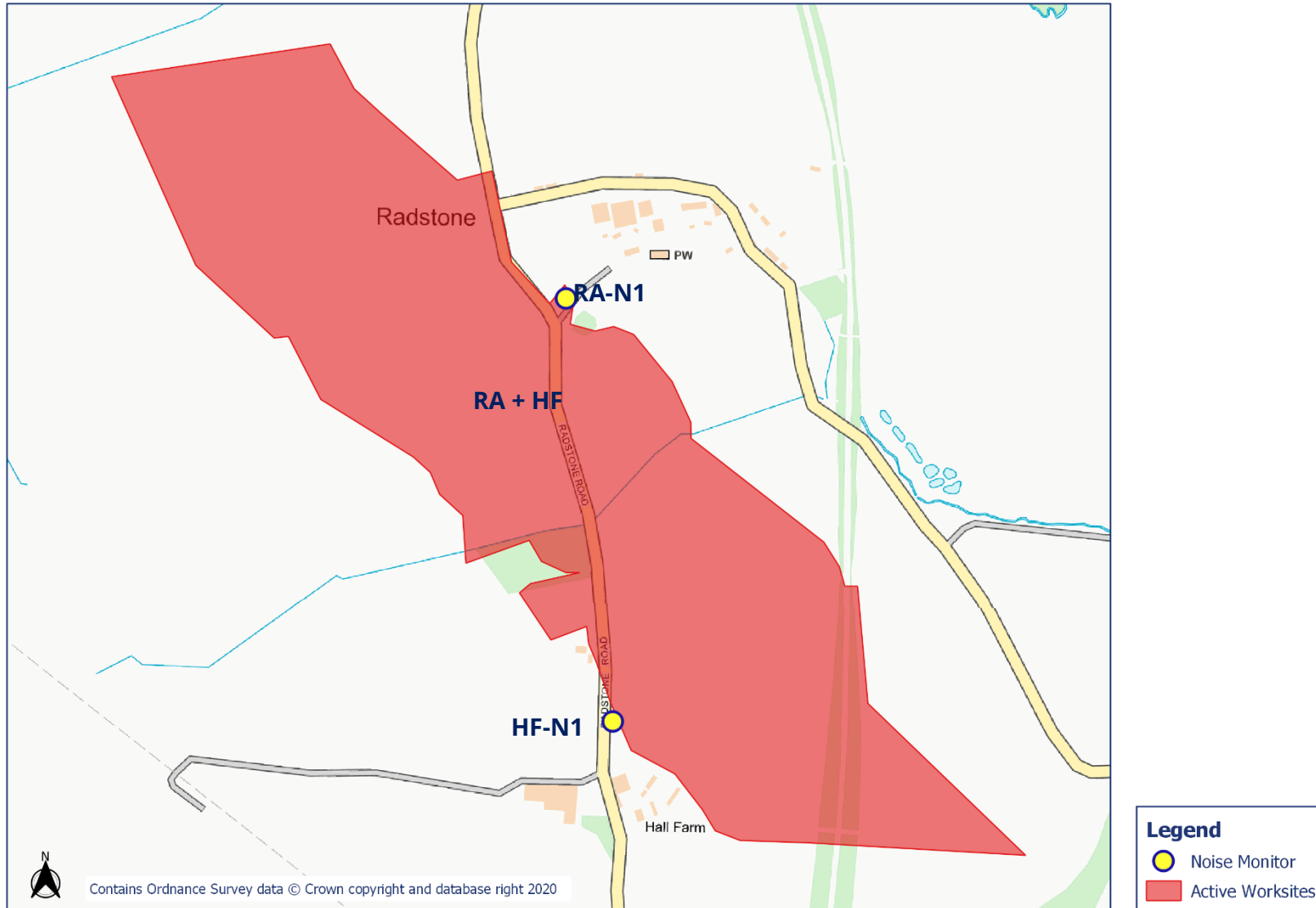
Appendix B Monitoring Locations









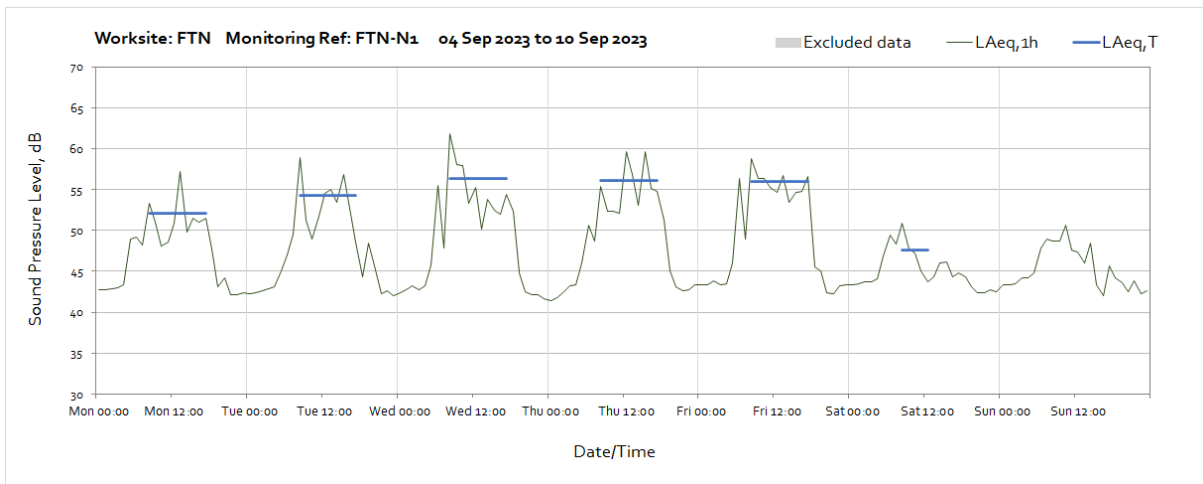
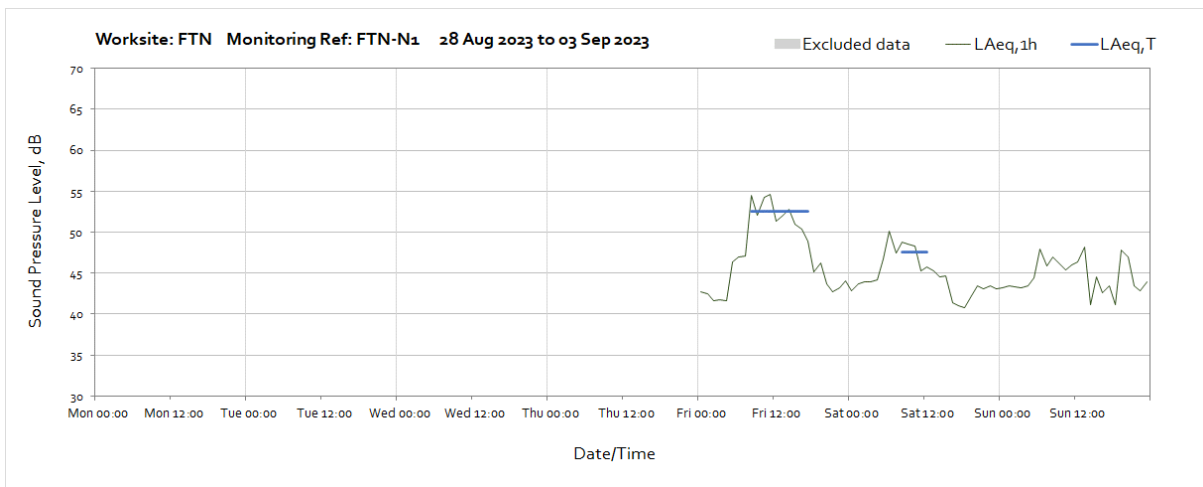


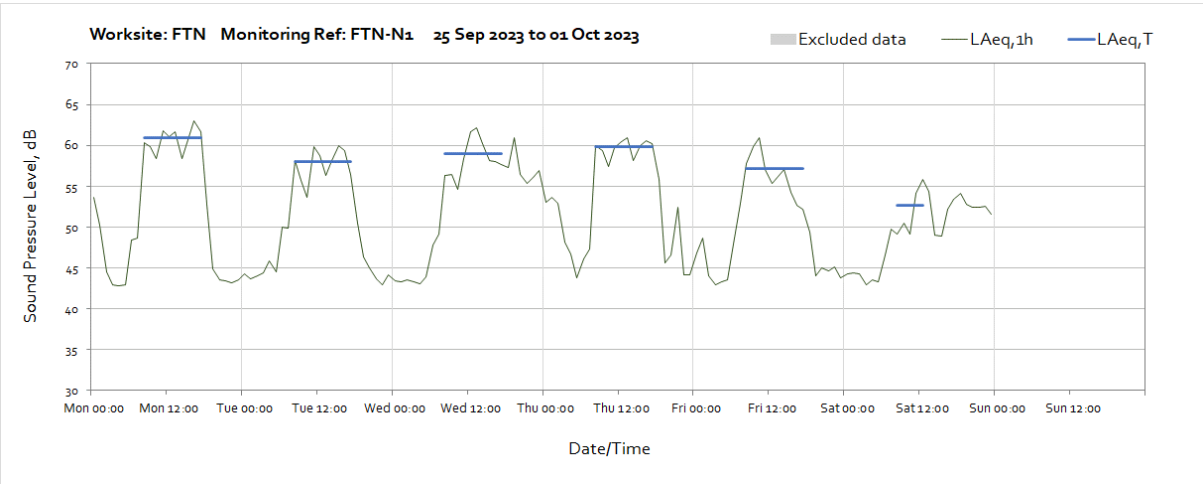
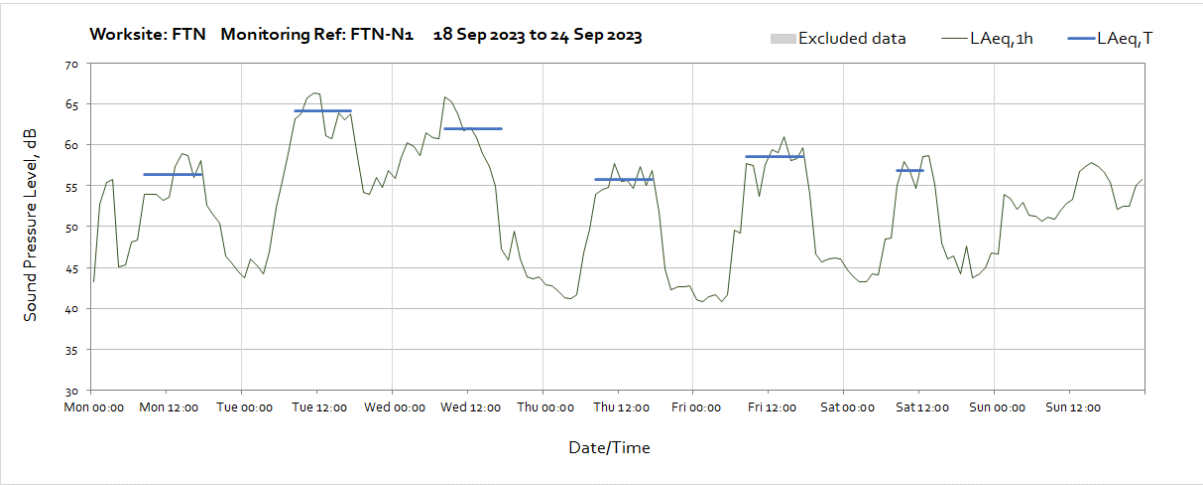
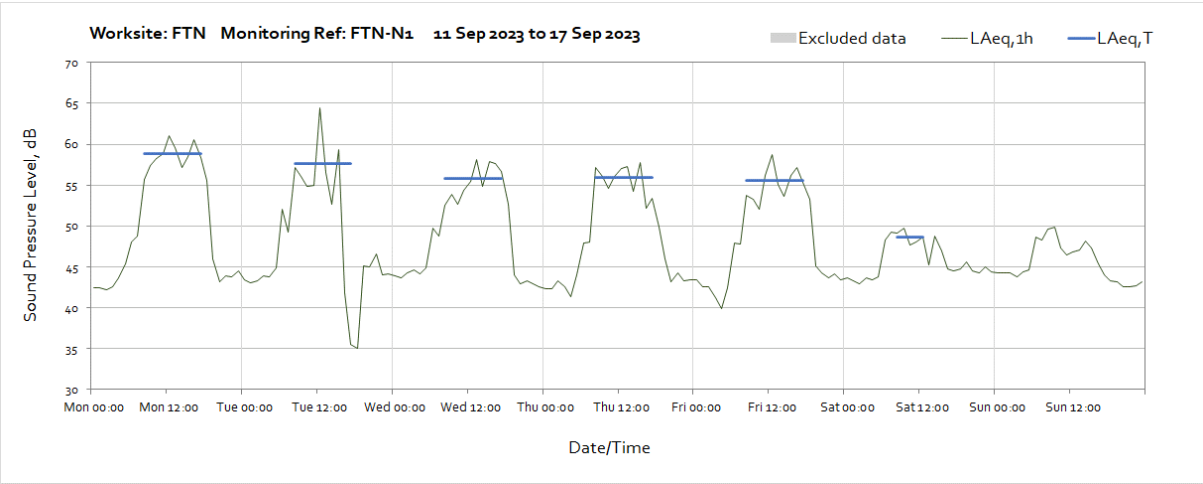
Appendix C Data

Noise

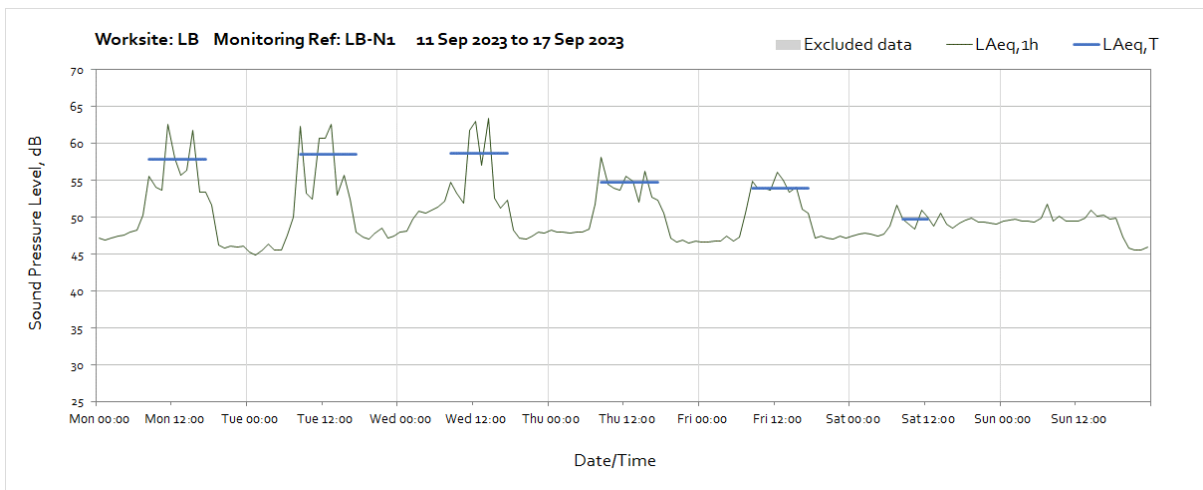
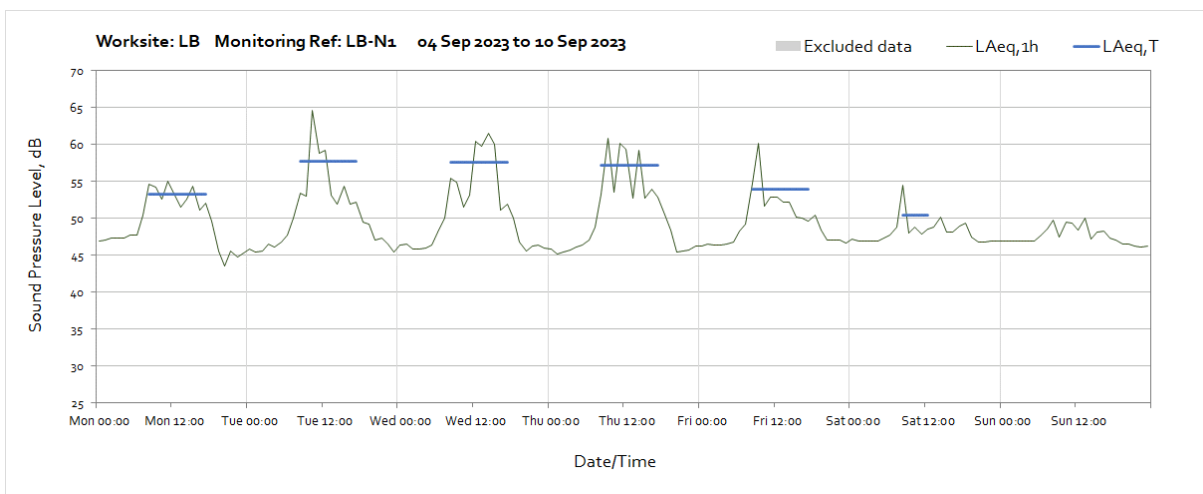
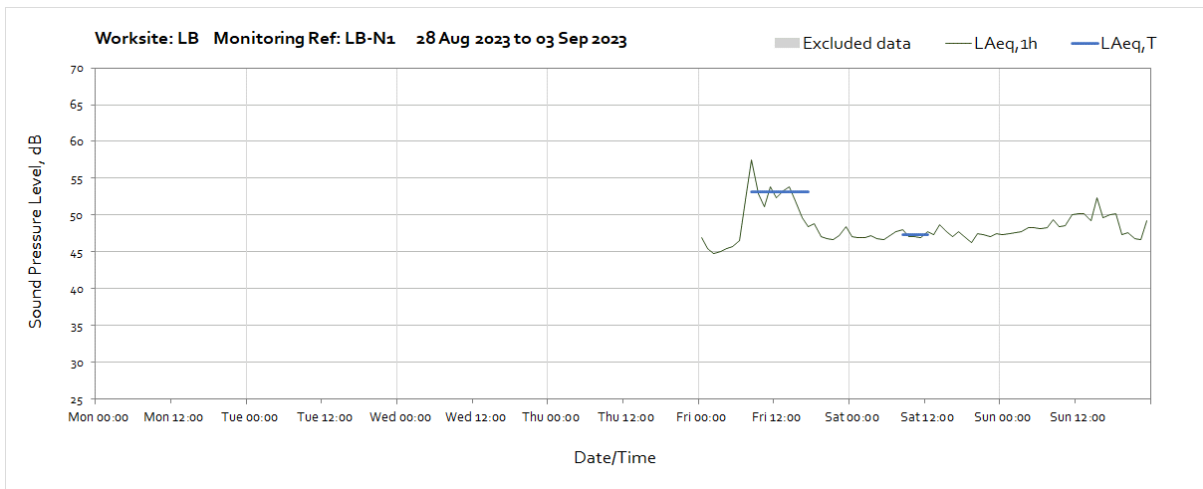
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods where noise levels are adversely affected by weather or only measured 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 **Error! Reference source not found.** of the main report.

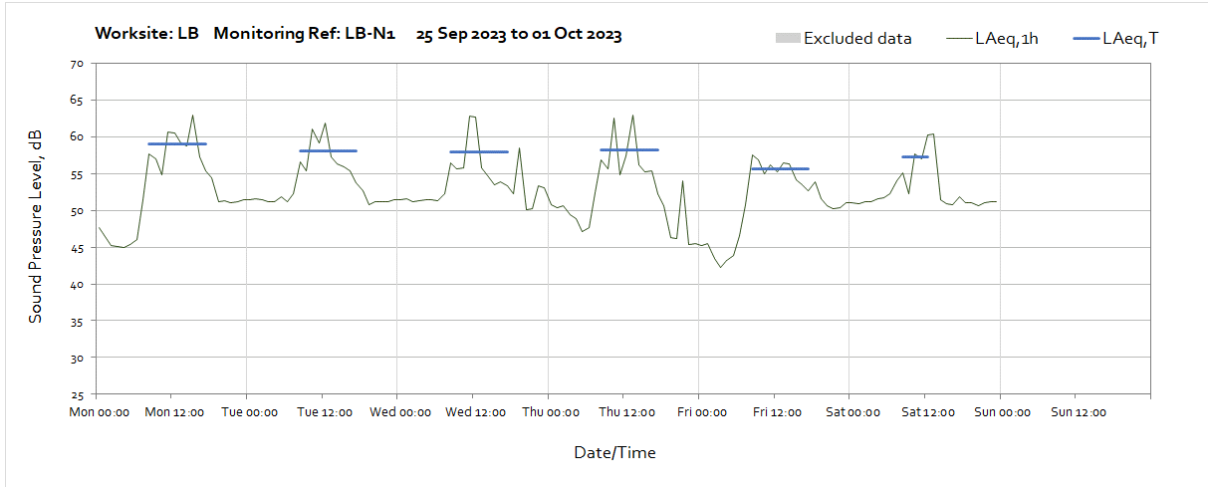
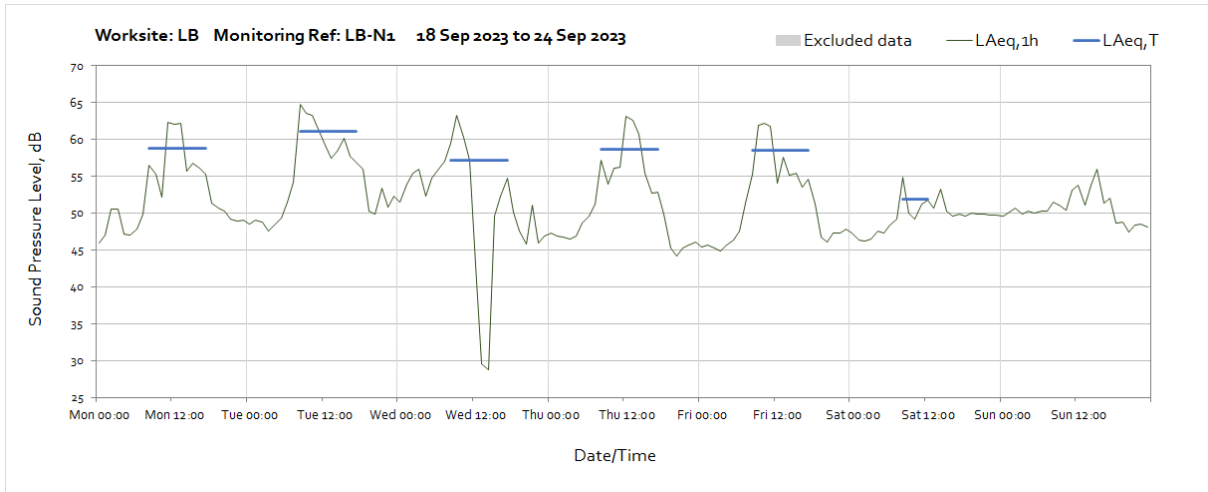
Worksite: FTN – Monitoring Ref: FTN-N1



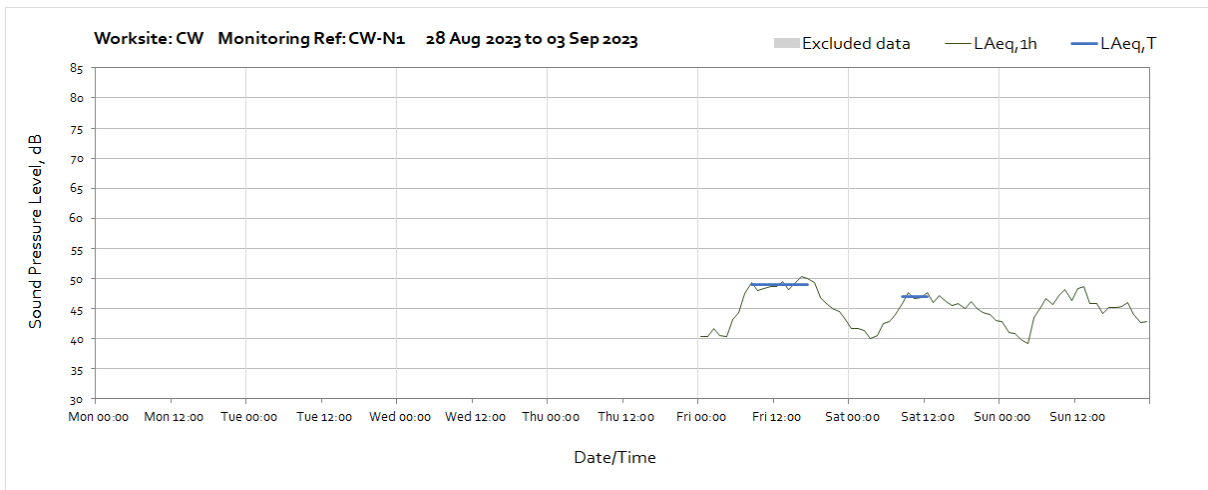


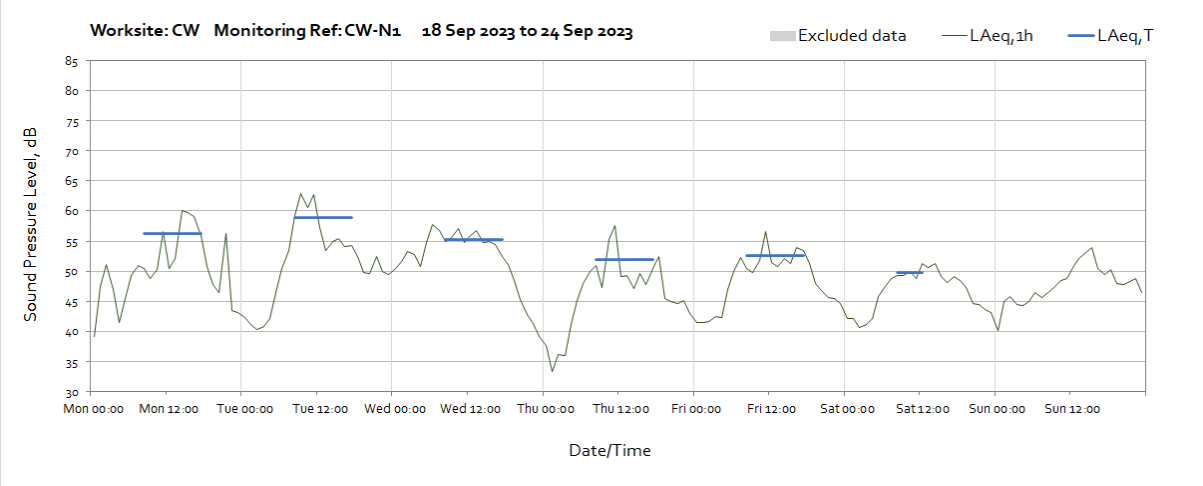
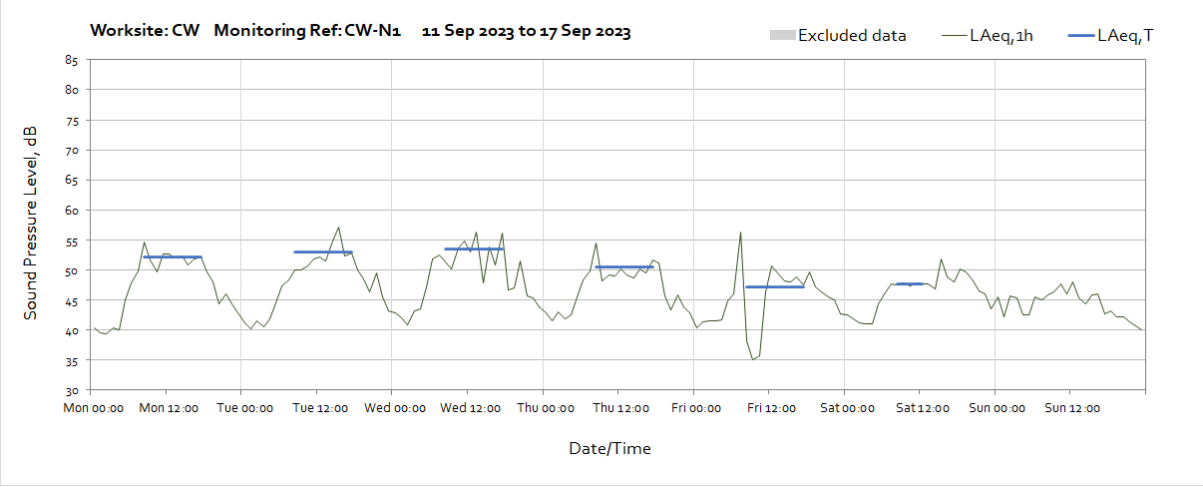
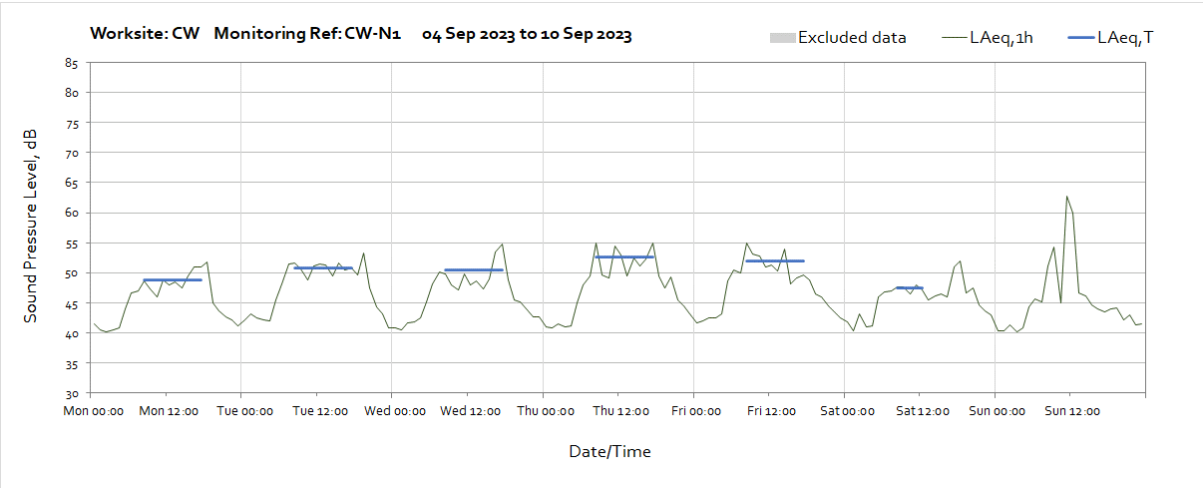
Worksite: LB – Monitoring Ref: LB-N1

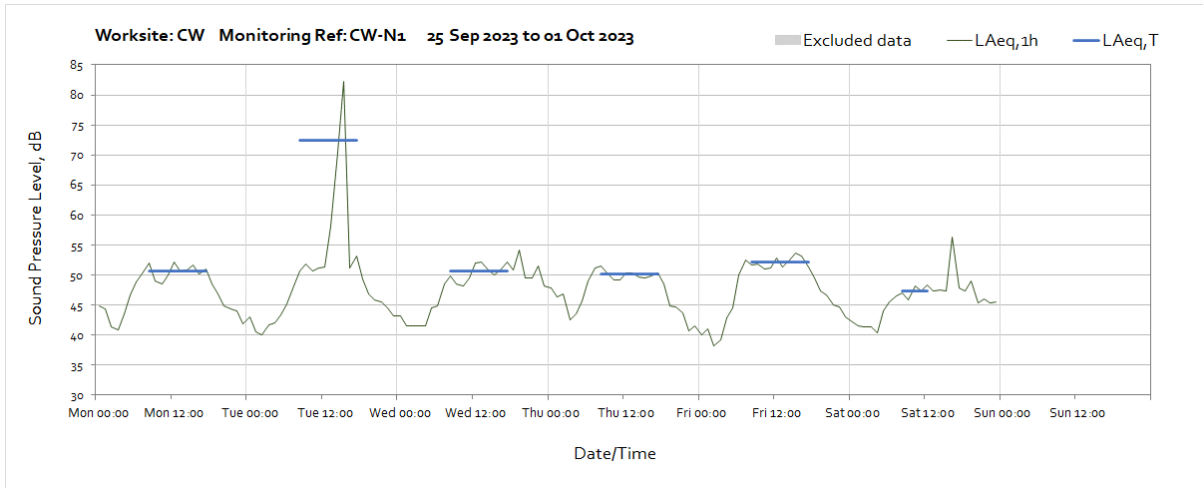




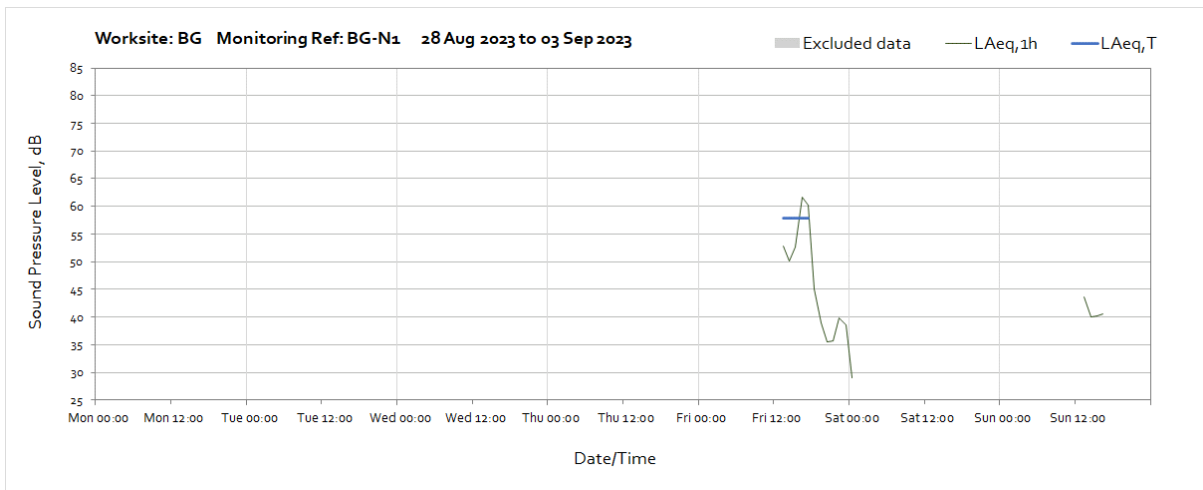
Worksite: CW - Monitoring Ref: CW-N1



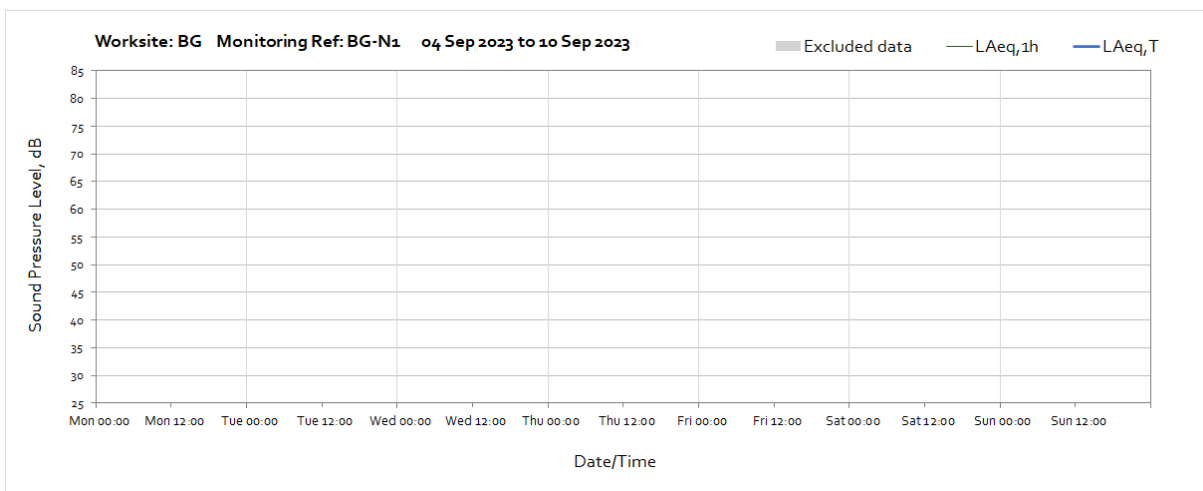




Worksite: BG – Monitoring Ref: BG-N1

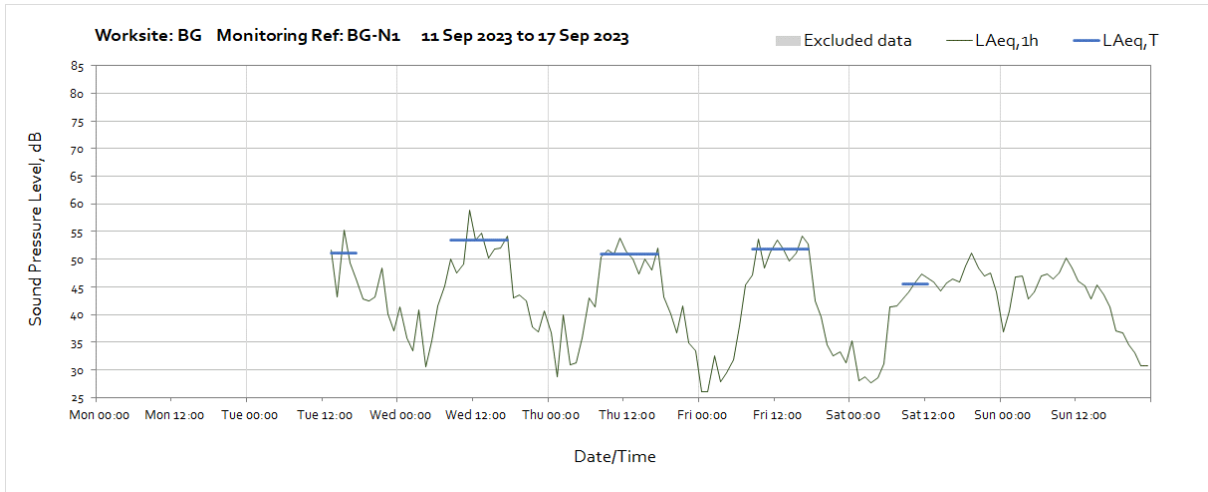


Note: Missing and intermittent data from the beginning of the month until 13:00 on Tuesday 12th September is due to power supply problems. A different solar controller is being obtained.

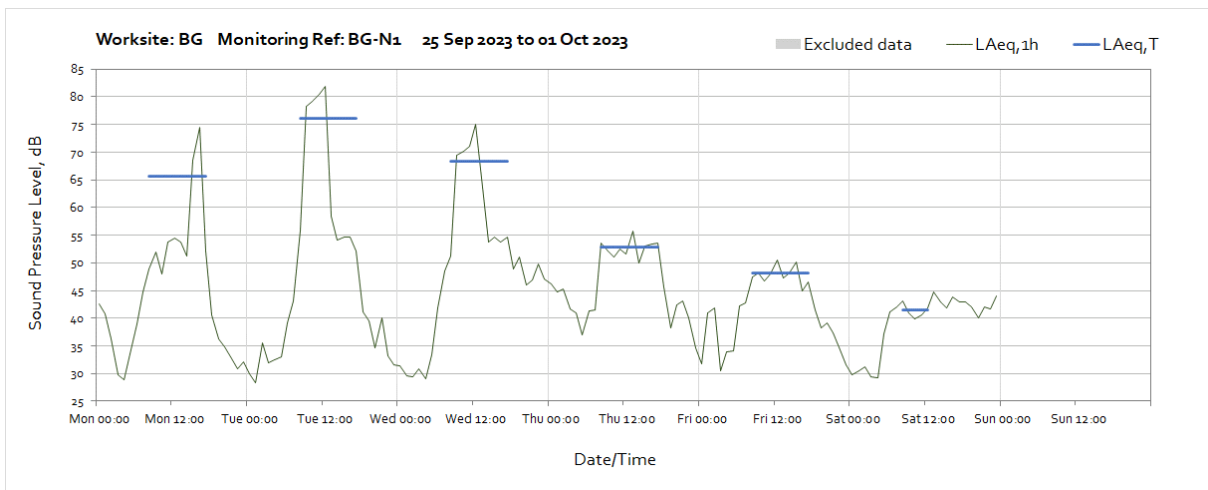
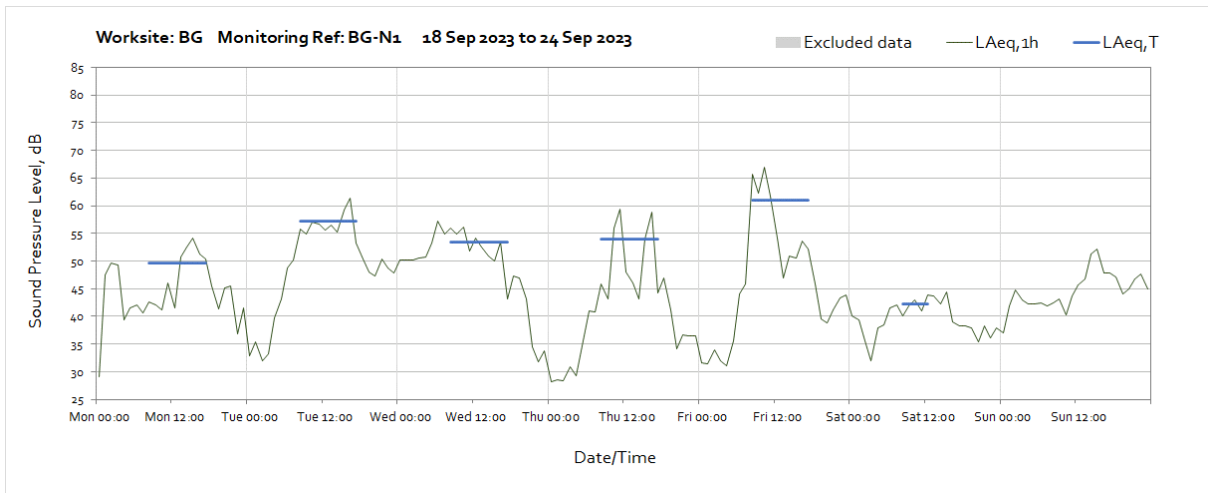


Note: Missing and intermittent data from the beginning of the month until 13:00 on Tuesday 12th September is due to power supply problems.

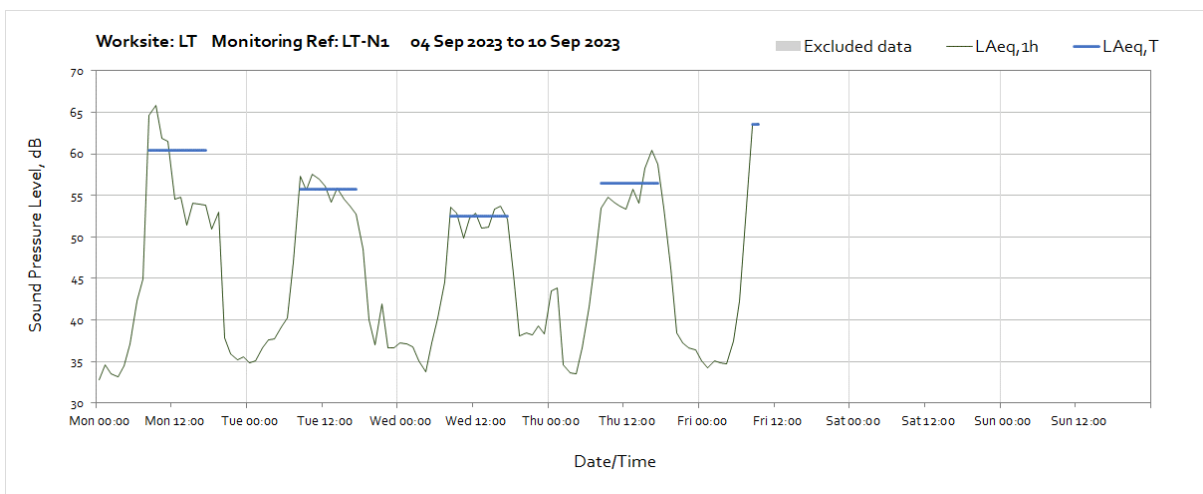
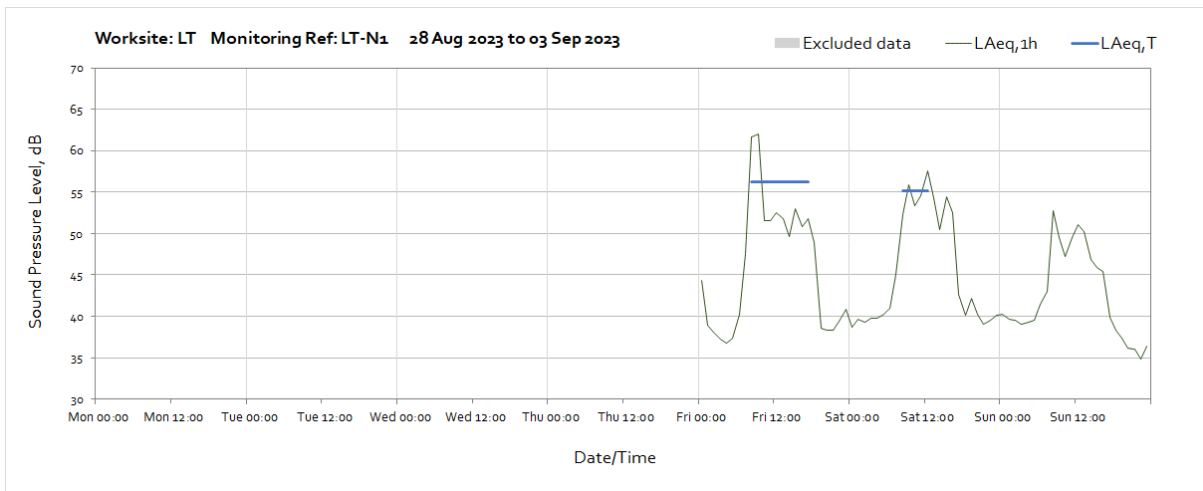
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Note: Missing and intermittent data from the beginning of the month until 13:00 on Tuesday 12th September is being investigated.

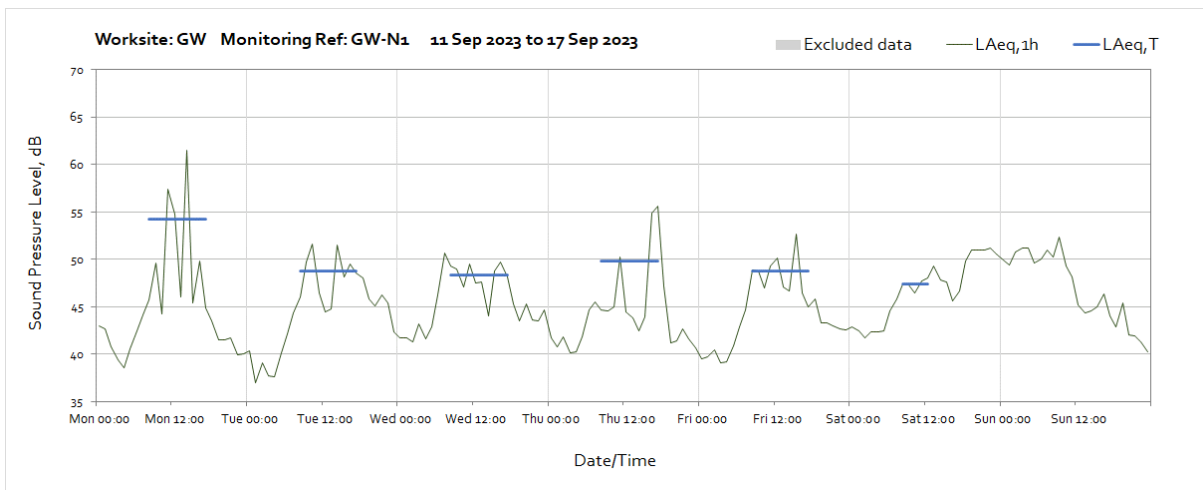
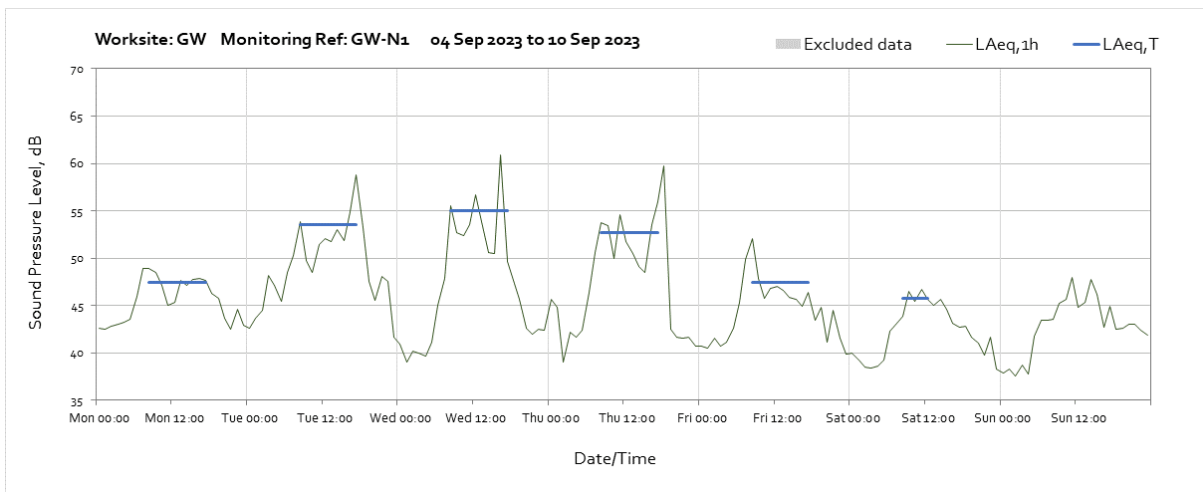
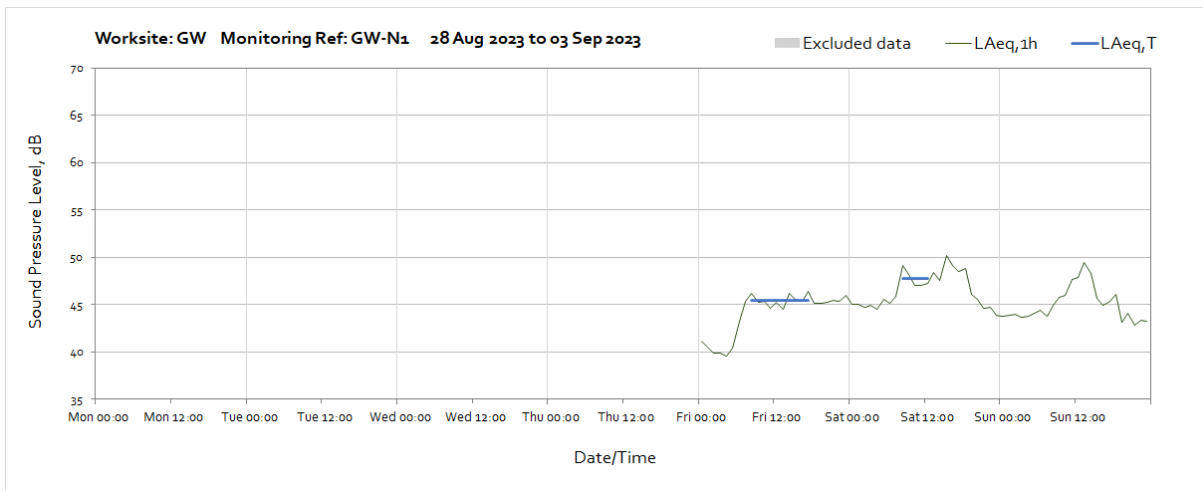


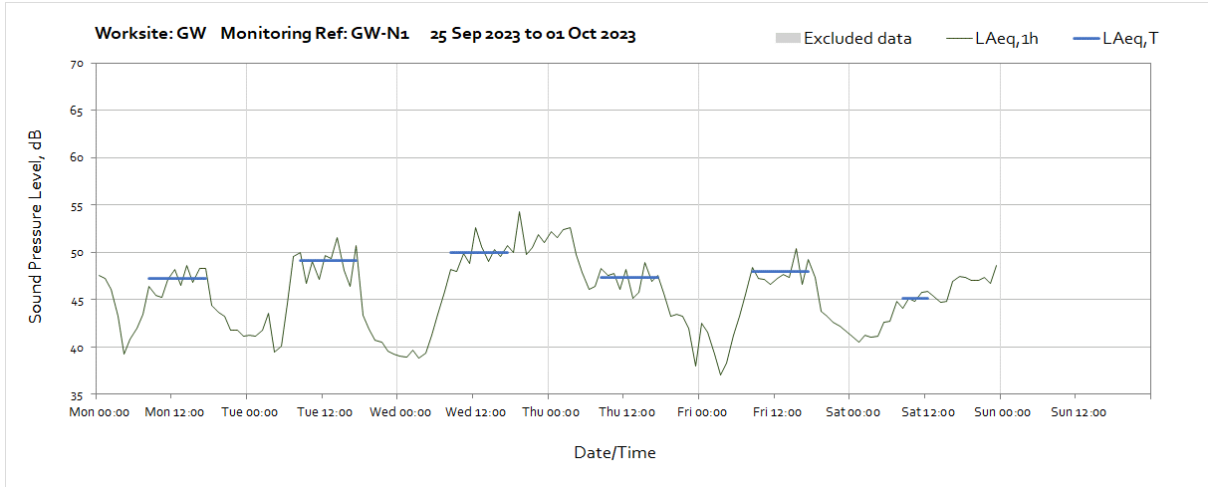
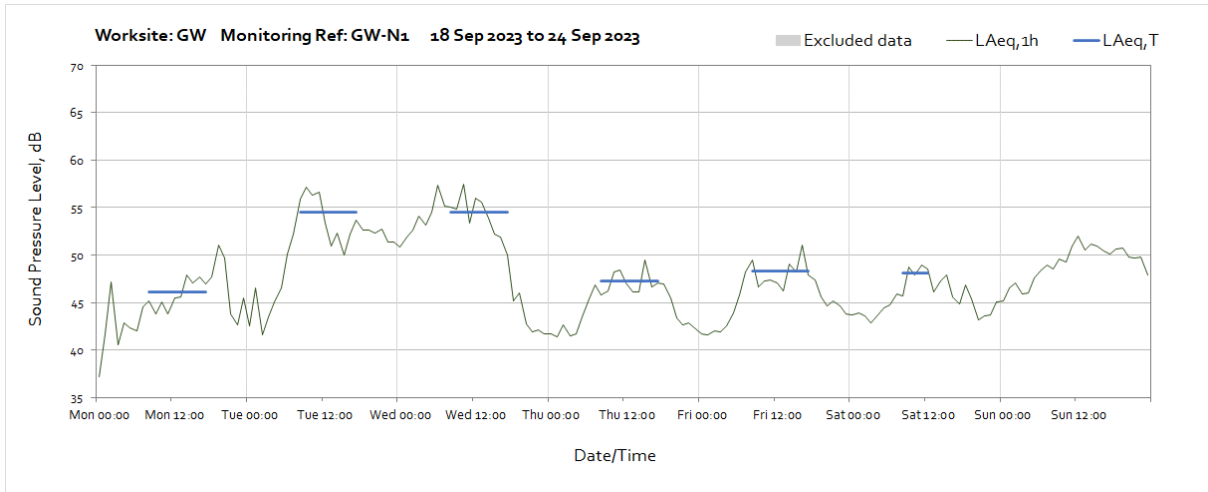
Worksite: LT - Monitoring Ref: LT-N1



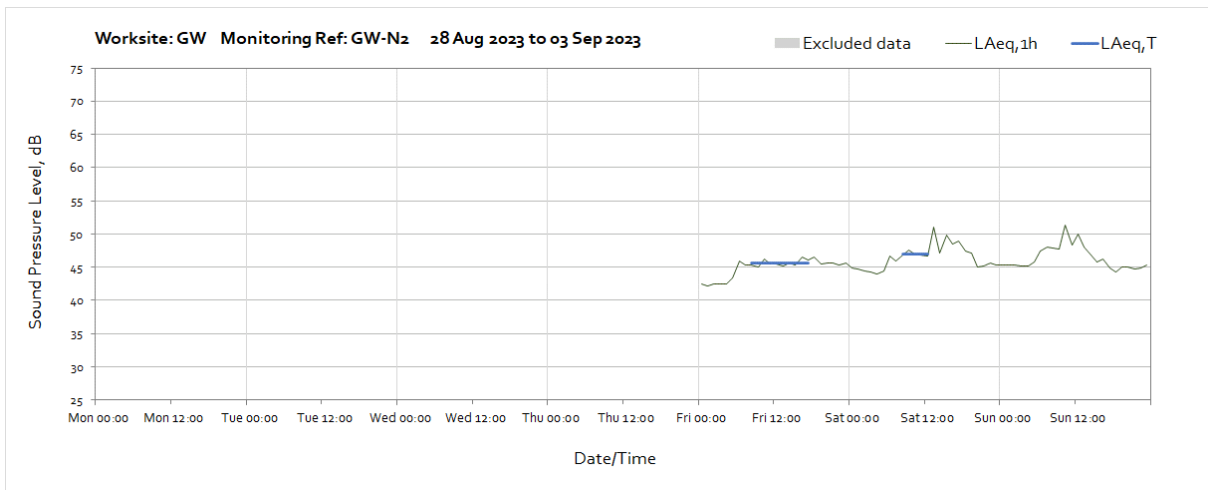
Note: Missing data from 10:00 on Friday 8th September onwards was due to problems with the monitor power supply. This problem is being addressed.

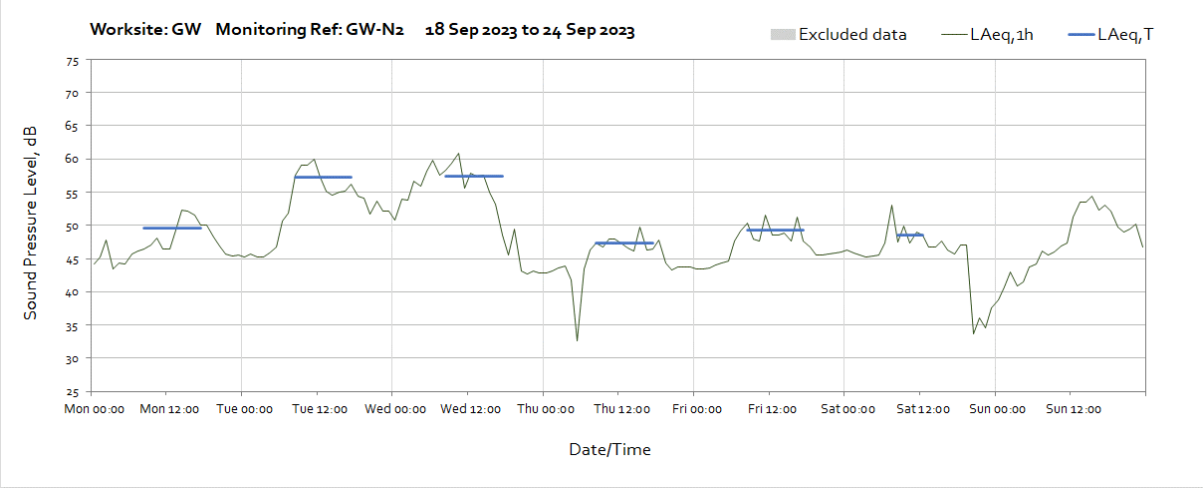
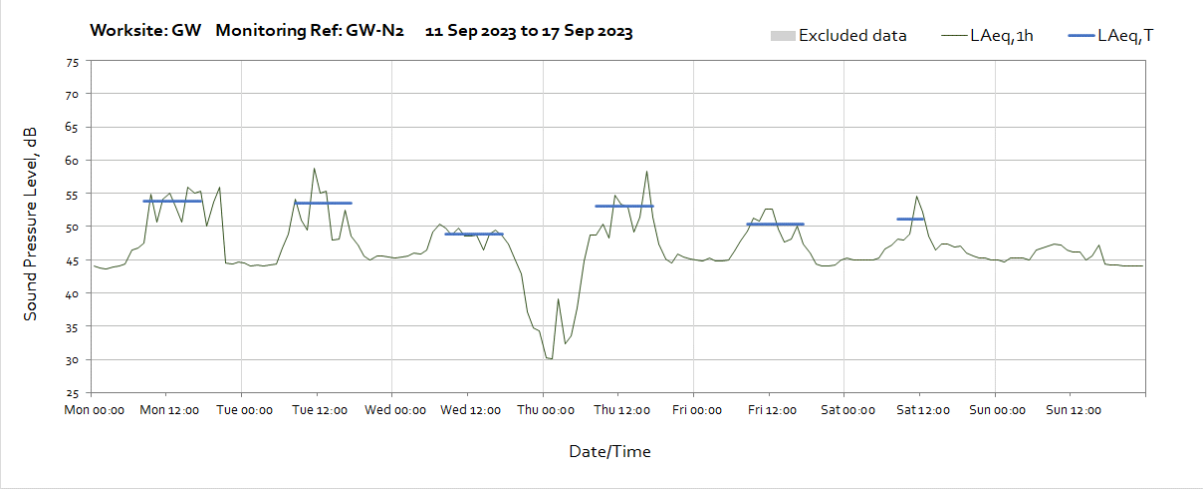
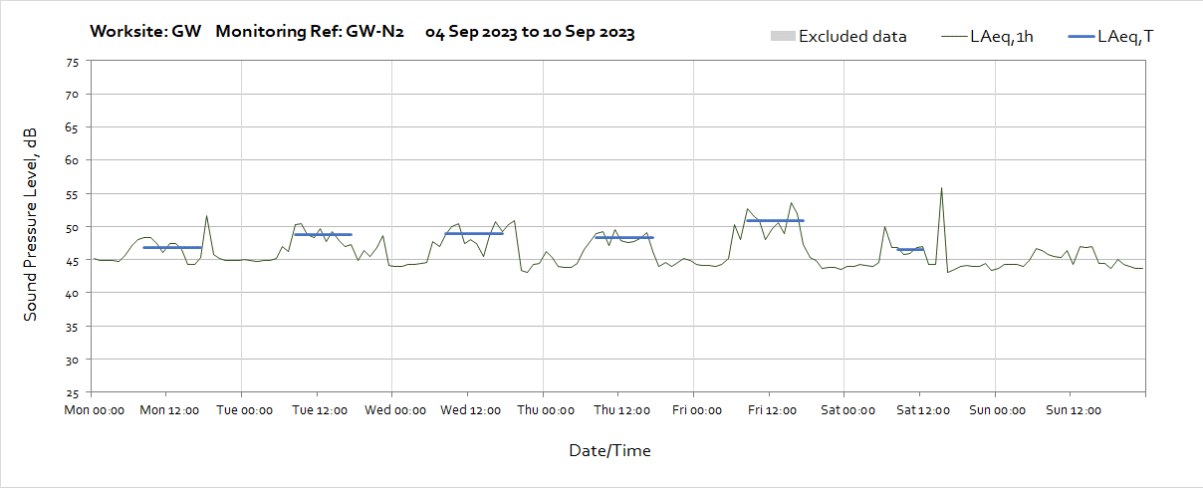
Worksite: GW – Monitoring Ref: GW-N1

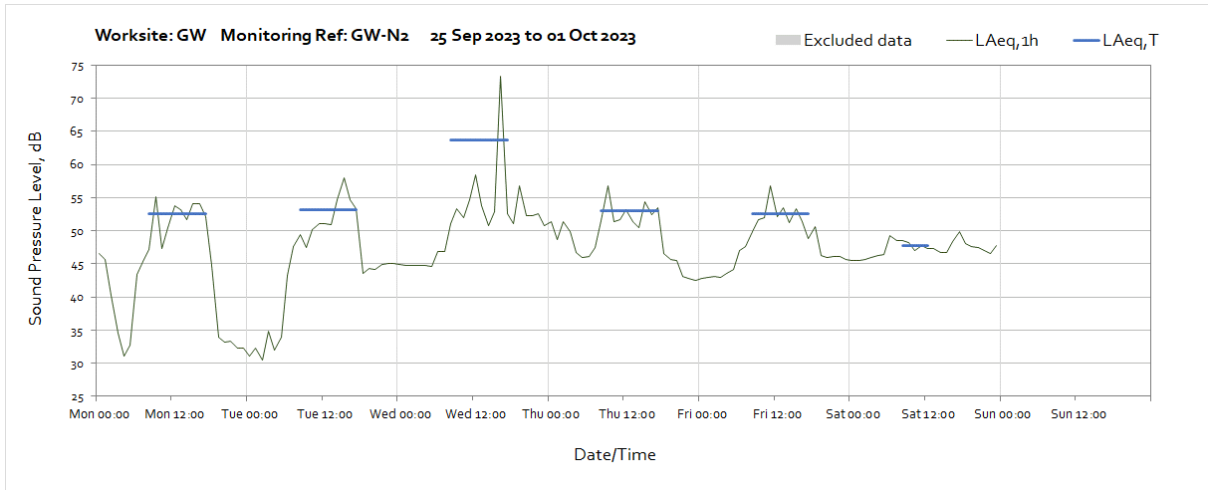




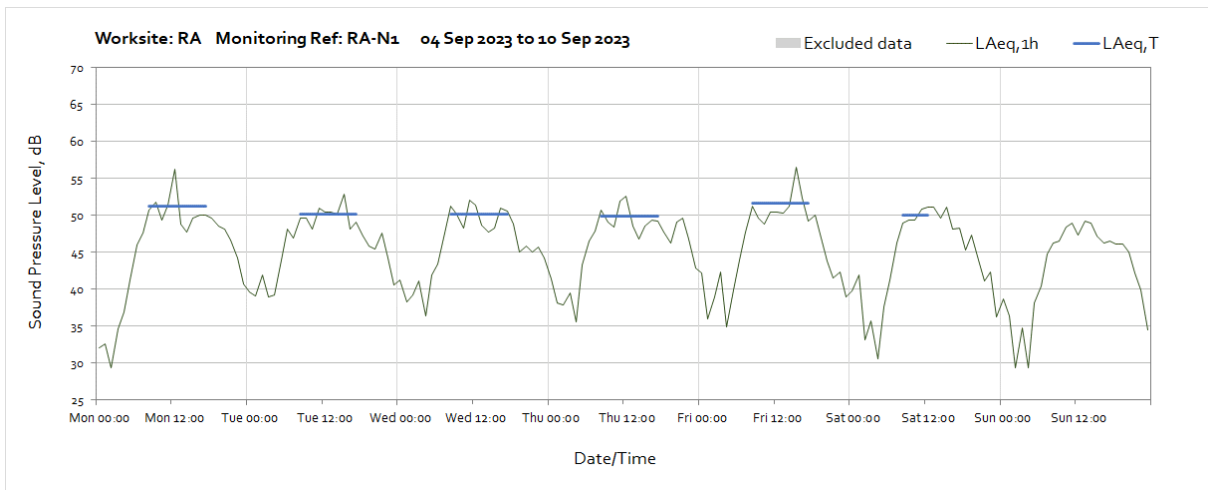
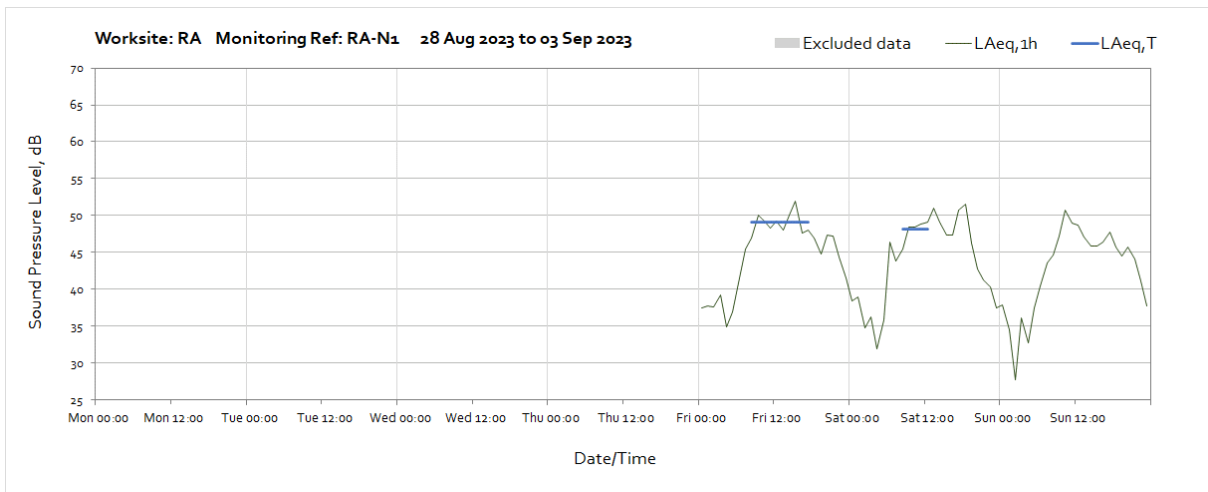
Worksite: GW - Monitoring Ref: GW-N2

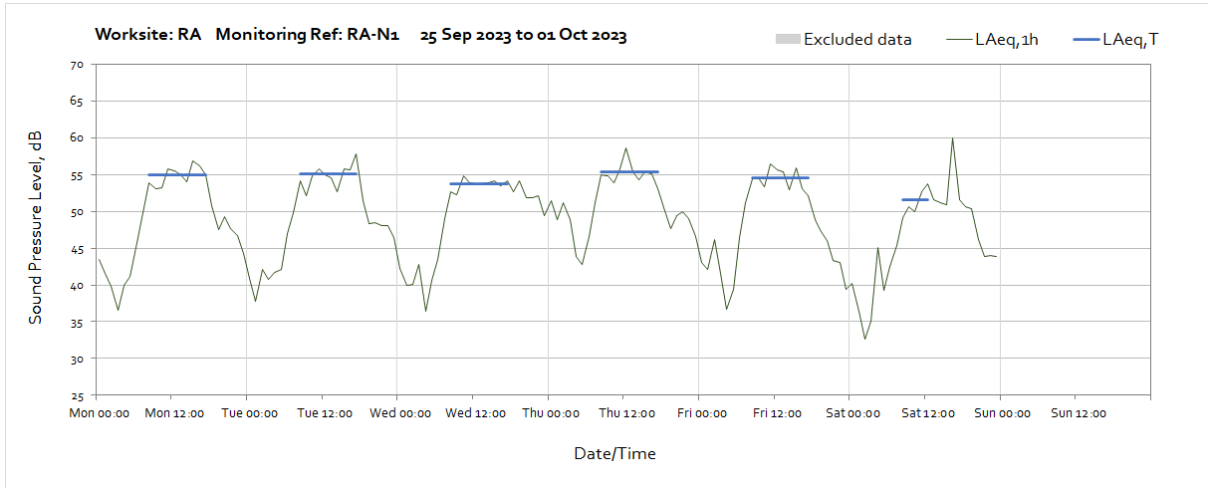
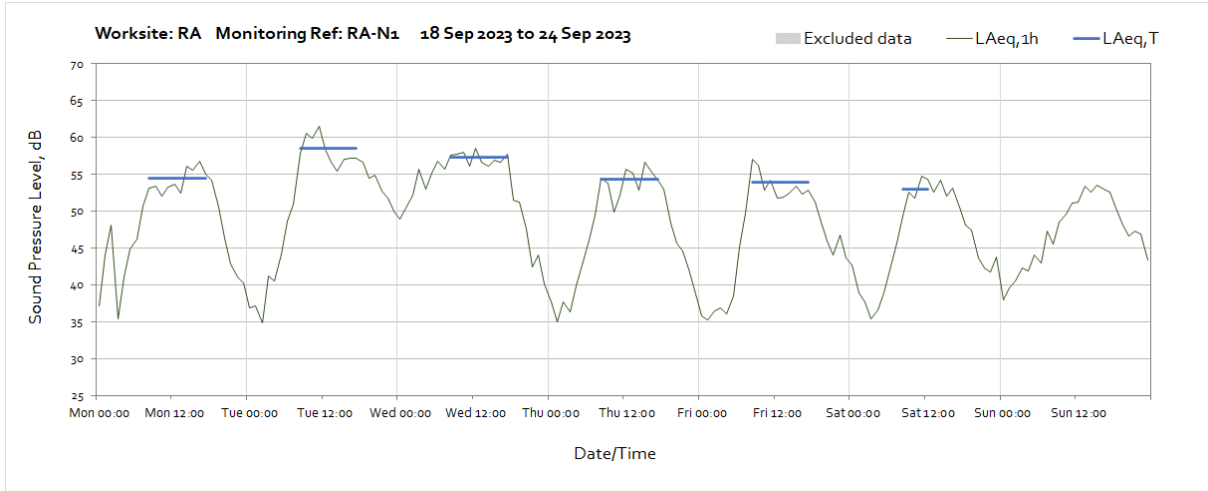
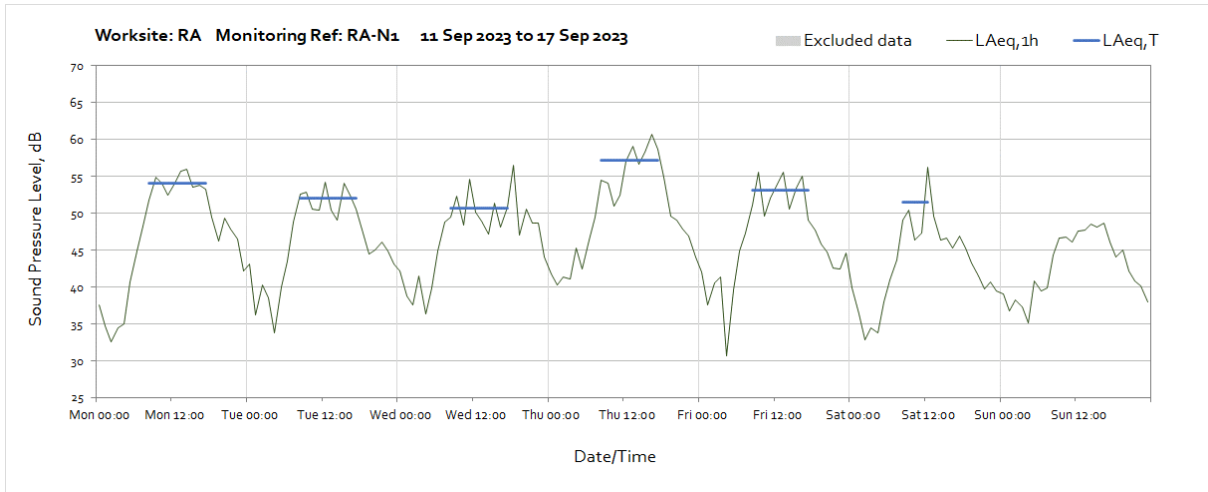




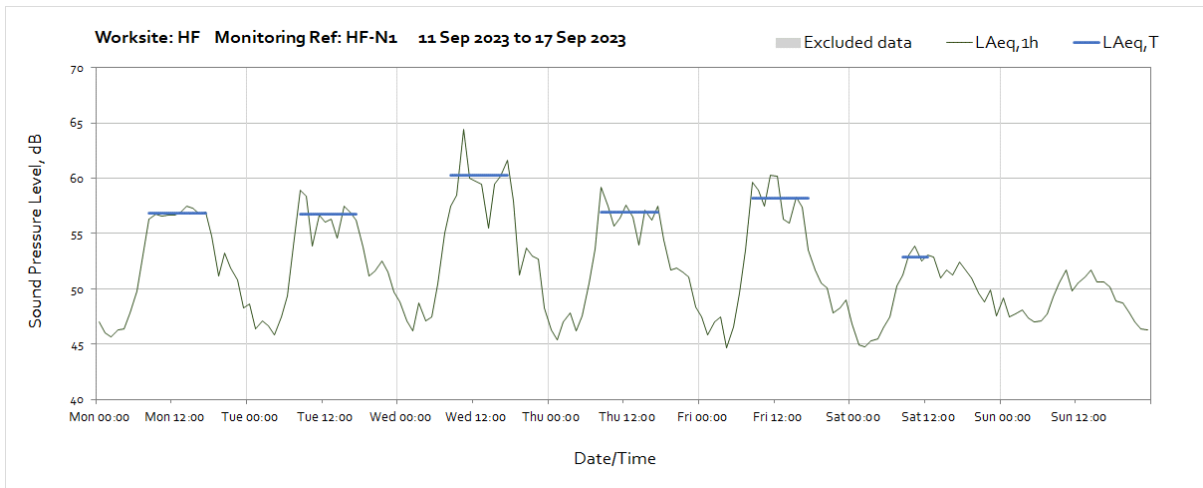
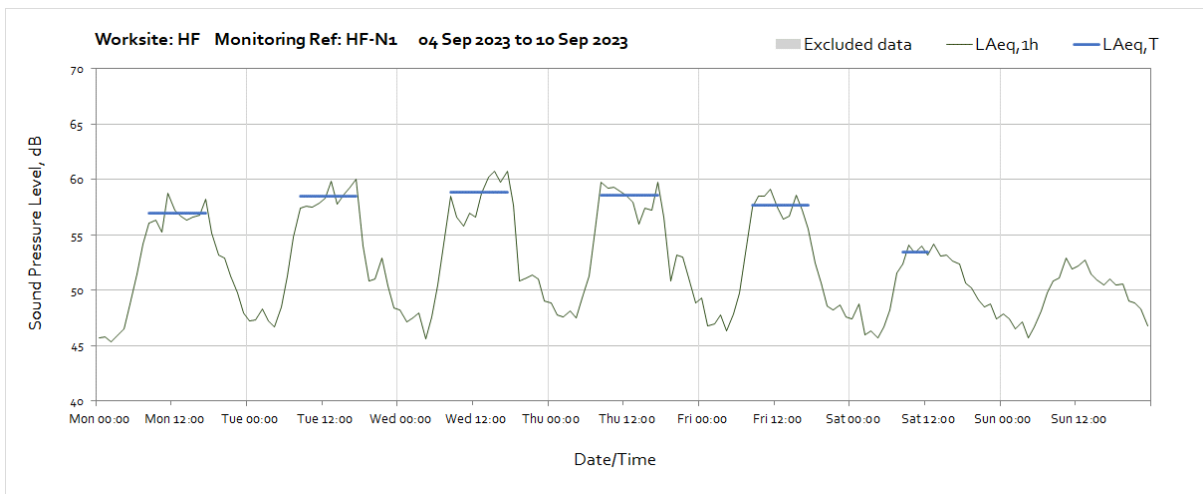
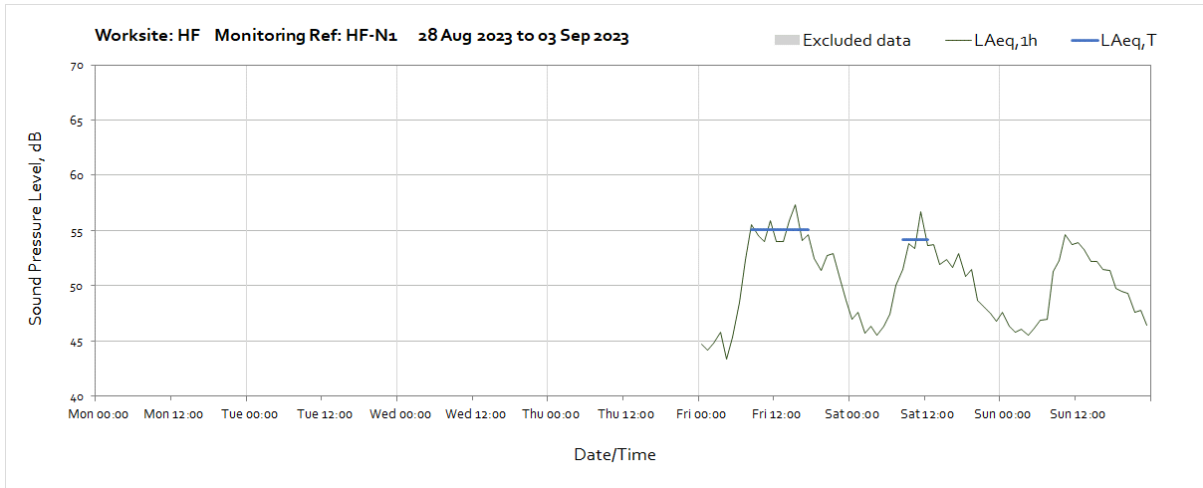


Worksite: RA – Monitoring Ref: RA-N1





Worksite: HF – Monitoring Ref: HF-N1



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