

Construction Noise and Vibration Monthly Report – March 2024

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 March 2024.

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

- Fir Tree Nursery Worksite (ref.:FTN) where topsoil stripping, stockpile management, site access road maintenance, haul road operation, drainage works, vegetation maintenance, water management and ditch maintenance was underway.
- Lower Boddington Worksite (ref.:LB) where topsoil stripping, stockpile management, site access road maintenance, haul road operation, drainage works, vegetation maintenance, viaduct 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, haul road and batching plant operation, general maintenance, stockpile and water management and material processing were underway.
- Blackgrounds worksite (ref.: BG) where topsoil stripping, stockpile management, site access road and vegetation maintenance, haul road operation, drainage works, water management and ditch maintenance were underway.
- Lower Thorpe worksite (ref.: LT) where site access road maintenance, haul road operation, drainage works, bulk earthworks, viaduct structure works, overbridge construction, drilling, culvert and tunnel works were underway.
- Greatworth worksite (ref.: GW) where site access road maintenance, haul road operation, drainage works, bulk earthworks, viaduct structure works, overbridge construction, drilling, culvert works, tunnel works, stockpile management, utility works and bulk excavation were underway.
- Radstone and Hall Farm worksites (ref.: RA and ref.: HF) where stockpile management, site access road maintenance, excavation and bulk excavation, site access and haul road operation, drainage and sheet piling were underway.

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

- A43 Compound where workshop building erection was underway.
- A43 Highway Diversion where de-vegetation and tree planting was underway.

- Helmdon Embankment where site access road construction 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.

One (1) complaint was received within the WNDC area during the monitoring period. A description of the complaint, the results of investigations and any actions 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 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 31st March 2024.

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:
 - Topsoil stripping.
 - Stockpile management.
 - Site access road maintenance.
 - Haul road operation.
 - Drainage works including temporary pond installation.
 - Vegetation maintenance.
 - Water management.
 - Ditch maintenance.
- 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.
- Haul road operation.
- Drainage works including temporary pond installation.
- Vegetation maintenance.
- Viaduct 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.
 - Bulk earthworks.
 - Site access road maintenance.
 - Haul road operation.
 - Batching plant operation.
 - General maintenance, including compound, vegetation, ditch and plant.
 - Stockpile management.
 - Water management.
 - Material processing.
- 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.
 - Haul road operation.
 - Drainage works including temporary pond installation.
 - Water management.
 - Ditch maintenance.

- Lower Thorpe worksite, ref.: LT (see Works Identification Plan 3 in Appendix A), where the following work activities were undertaken:
 - Site access road maintenance.
 - Haul road operation.
 - Drainage works including temporary pond installation.
 - Bulk earthworks.
 - Viaduct structure works.
 - Overbridge construction.
 - Drilling.
 - Culvert works.
 - Tunnel works.
- Greatworth, ref.: GW (see Works Identification Plan 4 in Appendix A) where the following work activities were undertaken:
 - Site access road maintenance.
 - Haul road operation.
 - Drainage works including temporary pond installation.
 - Bulk earthworks.
 - Viaduct structure works.
 - Overbridge construction.
 - Drilling.
 - Culvert works.
 - Tunnel works.
 - Stockpile management.
 - Utility works.
 - Bulk excavation.
- 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.
 - Site access road maintenance and operation.
 - Excavation including bulk excavation.
 - Site access road and haul road operation.
 - Drainage works.

- Sheet piling.

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

- A43 Compound where workshop building erection was underway.
- A43 Highway Diversion where de-vegetation and tree planting was underway.
- Helmdon Embankment where site access road construction was underway.

1.1.5 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 March in the WNDC area. Table 2 summarises the position of noise monitoring installations within the WNDC area in March 2024.

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	52.5 (61.5)	55.6 (58.9)	49.9 (58.6)	47.2 (61.9)	48.1 (56.9)	51.0 (54.7)	52.0 (56.4)	50.6 (57.6)	49.7 (55.8)	48.3 (55.6)	49.0 (55.1)	45.6 (54.0)
LB	LB-N1	Lower Boddington, West Northamptonshire	Free-field	51.9 (59.9)	57.0 (60.2)	49.8 (60.5)	48.0 (60.2)	47.6 (60.7)	50.2 (57.7)	51.7 (58.9)	50.0 (58.3)	49.1 (58.1)	47.6 (57.7)	48.8 (57.9)	46.5 (58.0)
CW	CW-N1	Chipping Warden, West Northamptonshire	Free field	52.6 (56.5)	52.6 (55.3)	51.5 (54.1)	48.3 (53.9)	46.9 (53.4)	49.3 (52.1)	51.0 (55.1)	51.4 (54.4)	50.3 (54.3)	46.5 (51.7)	50.2 (57.2)	47.3 (51.8)
BG	BG-N1	Blackground, Chipping Warden	Free field	44.4 (52.1)	49.5 (54.6)	44.7 (51.2)	40.8 (50.6)	41.0 (53.8)	46.8 (49.5)	43.9 (47.7)	45.2 (50.7)	44.0 (57.1)	40.3 (52.4)	42.5 (48.5)	35.4 (45.2)
LT	LT-N1	Thorpe Mandeville, Banbury	Free field	48.5 (58.9)	53.4 (60.1)	46.3 (54.7)	44.8 (53.7)	44.4 (54.9)	47.9 (50.9)	48.0 (53.4)	48.2 (56.6)	45.6 (49.8)	43.9 (47.3)	44.5 (47.6)	43.0 (47.4)
GW	GW-N1	Helmdon Road, Greatworth	Free field	48.6 (52.7)	51.7 (60.5)	47.5 (58.9)	46.3 (57.0)	45.7 (57.2)	49.8 (51.3)	49.1 (52.0)	46.6 (49.3)	47.0 (53.2)	45.6 (50.1)	49.8 (57.3)	41.7 (46.8)
	GW-N2	Greatworth Hall, Greatworth	Free field	48.3 (52.6)	52.3 (60.8)	48.4 (66.3)	43.9 (66.2)	45.7 (63.3)	49.5 (54.2)	51.4 (63.3)	49.2 (58.9)	50.8 (69.1)	46.4 (55.5)	49.3 (74.5)	45.7 (71.1)
RA	RA-N1	Radstone Road, Brackley	Free field	51.9 (58.4)	54.2 (58.1)	51.3 (60.0)	47.5 (60.1)	43.4 (56.0)	49.8 (53.4)	54.1 (57.6)	53.5 (55.1)	51.2 (55.4)	42.3 (49.3)	49.7 (55.0)	40.1 (48.9)

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	57.2 (74.0)	62.9 (73.8)	56.4 (69.3)	55.9 (71.9)	55.2 (75.0)	58.5 (71.3)	62.4 (73.6)	61.1 (70.0)	59.4 (69.0)	53.0 (69.1)	58.5 (69.0)	50.1 (73.4)

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	Saturday Saturday Sunday	1300-1400 1400-2200 0700-2200	1 5 9	No exceedances
CW	CW-N1	Chipping Warden and Edgcote, Banbury	Sunday	0700-2200	3	No exceedances
BG	BG-N1	Blackground, Chipping Warden	Saturday	1400-2200	1	No exceedances
LT	LT-N1	Thorpe Mandeville	All days	All periods	No exceedances	No exceedances
GW	GW-N1	Helmdon Road, Greatworth	Saturday Sunday	1400-2200 0700-2200	1 3	No exceedances
	GW-N2	Greatworth Hall, Greatworth	All days	All periods	No exceedances	No exceedances
RA	RA-N1	Radstone Road, Brackley	Weekday	1800-1900	1	No exceedances
HF	HF-N1	Hall Farm, Brackley	Weekdays	0800-1800	11	No exceedances
			Saturdays	0800-1300	2	

2.2.6 Exceedances of the LOAEL were recorded at six (6) monitoring locations during weekday daytime and evening, Saturday daytime, Saturday evening and Sunday periods in March 2024.

2.2.7 No exceedance of the SOAEL was recorded due to HS2 construction works during March 2024.

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
-	-	-	-	-	-

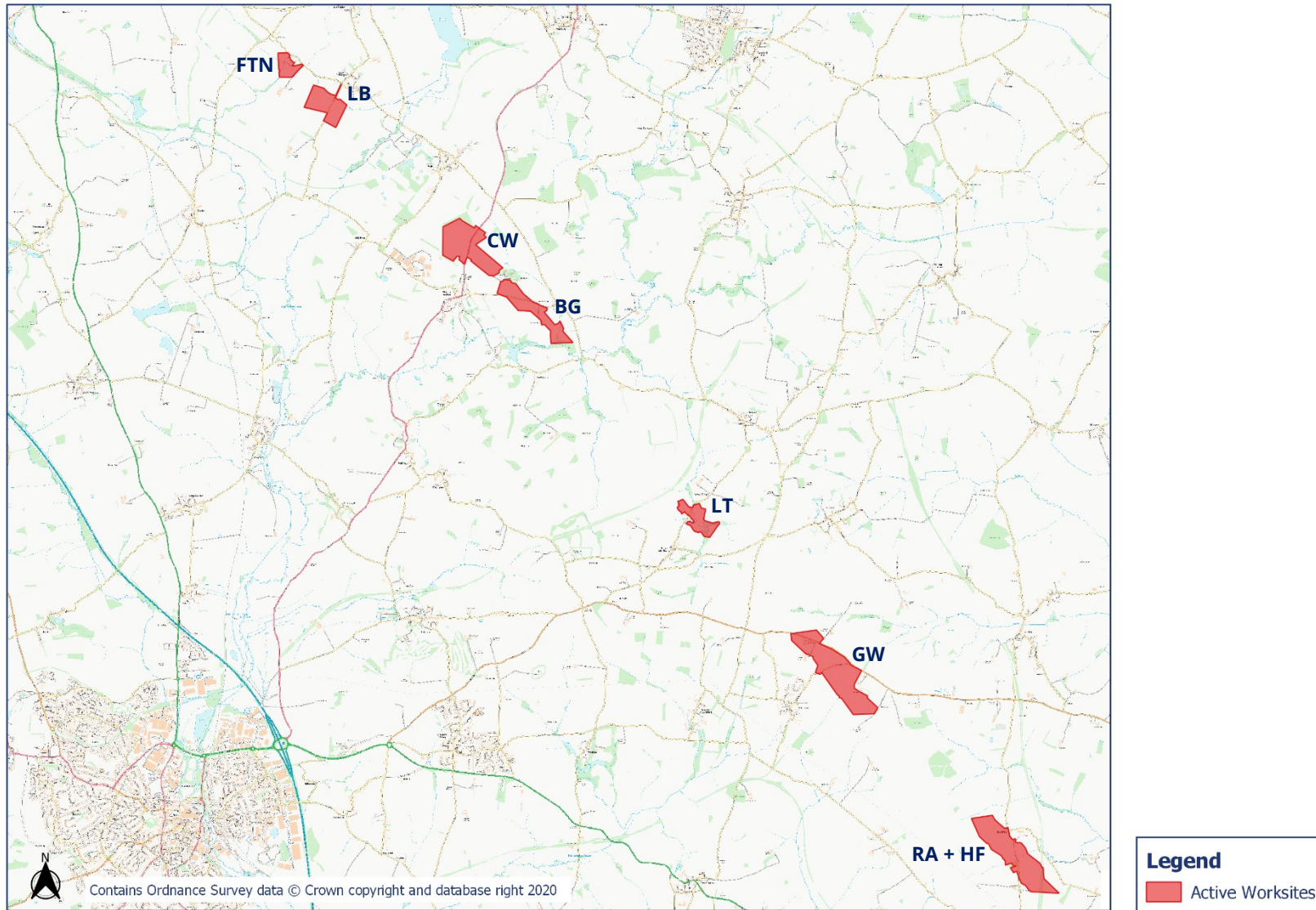
2.4 Complaints

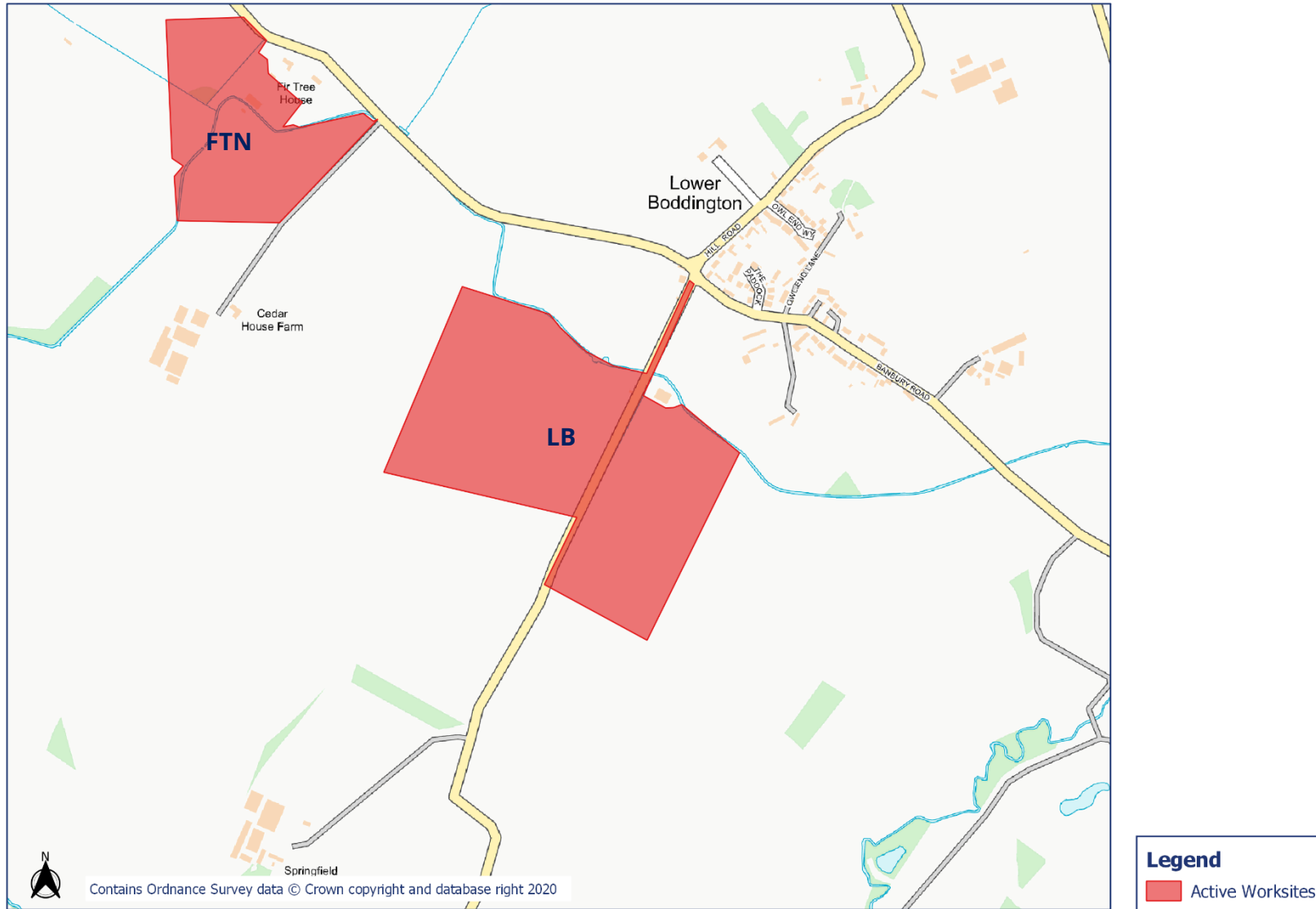
2.4.1 Table 6 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

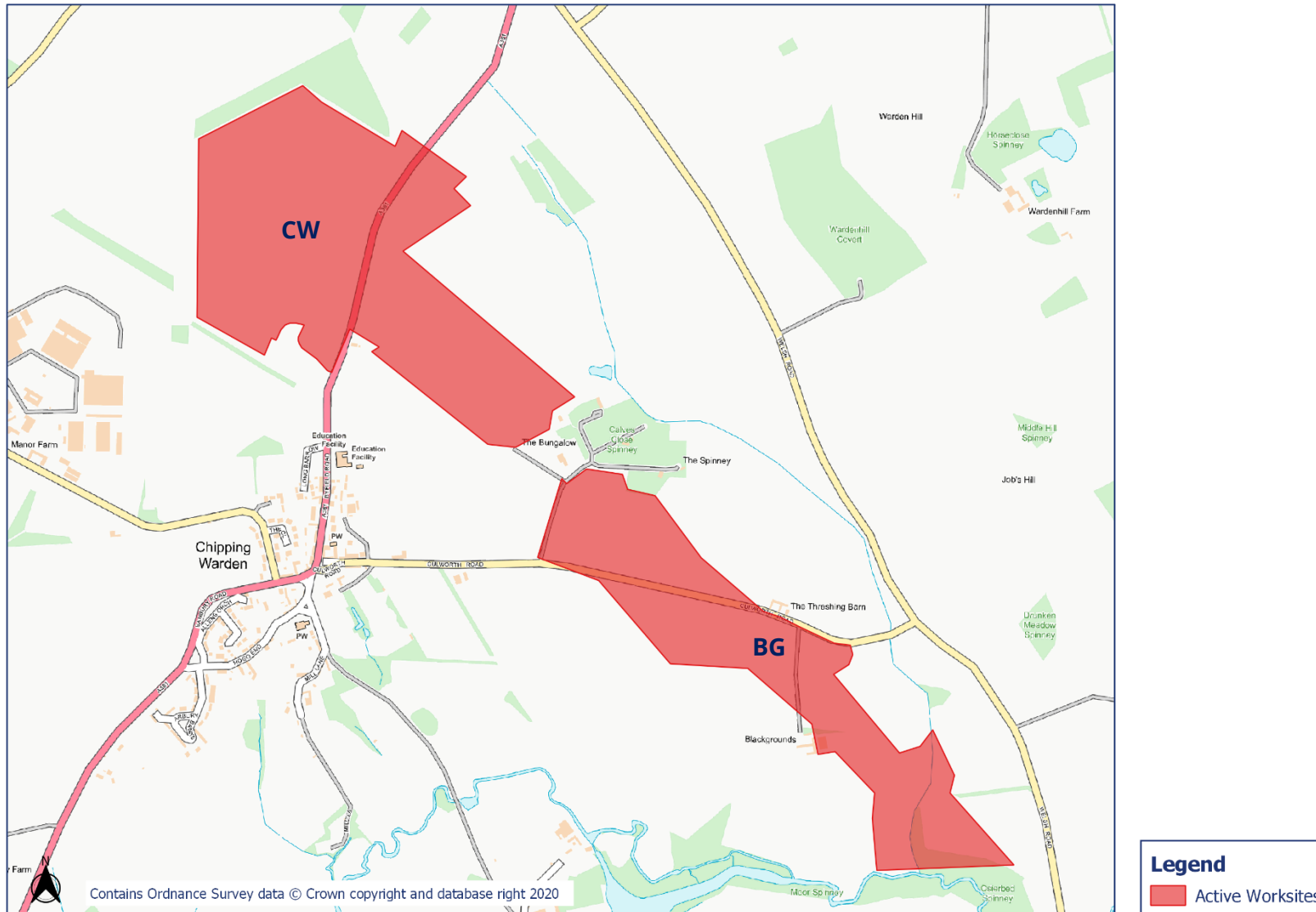
Table 6: Summary of Complaints

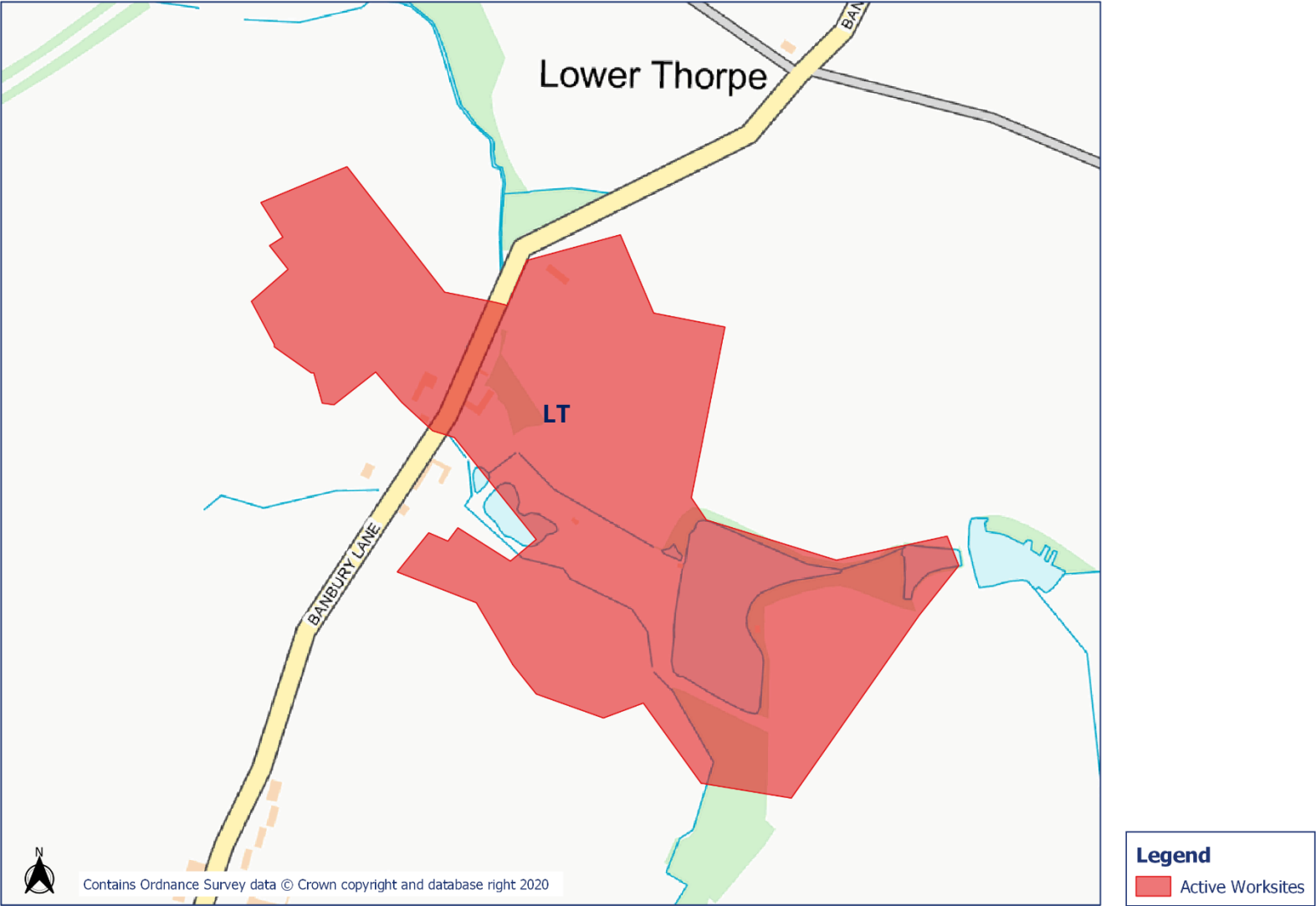
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-24-45279-C	LB	Complaint due to ongoing disturbance from generator noise.	Generator noise due to pumps needed to reduce rainfall surface water. A reduced noise pump has since been ordered to replace the existing pump.	The results of the investigation have been relayed to the resident.

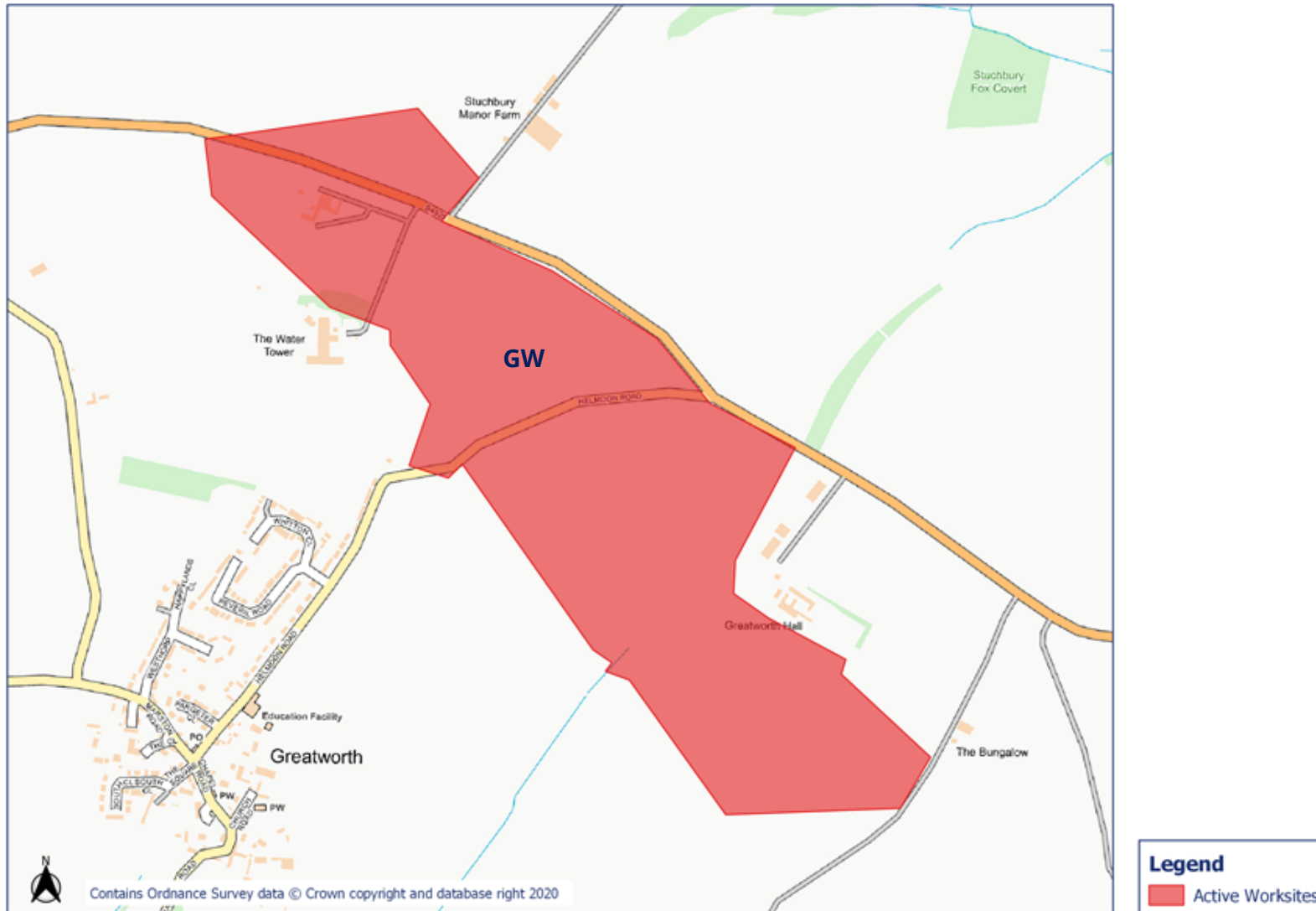
Appendix A Site Location

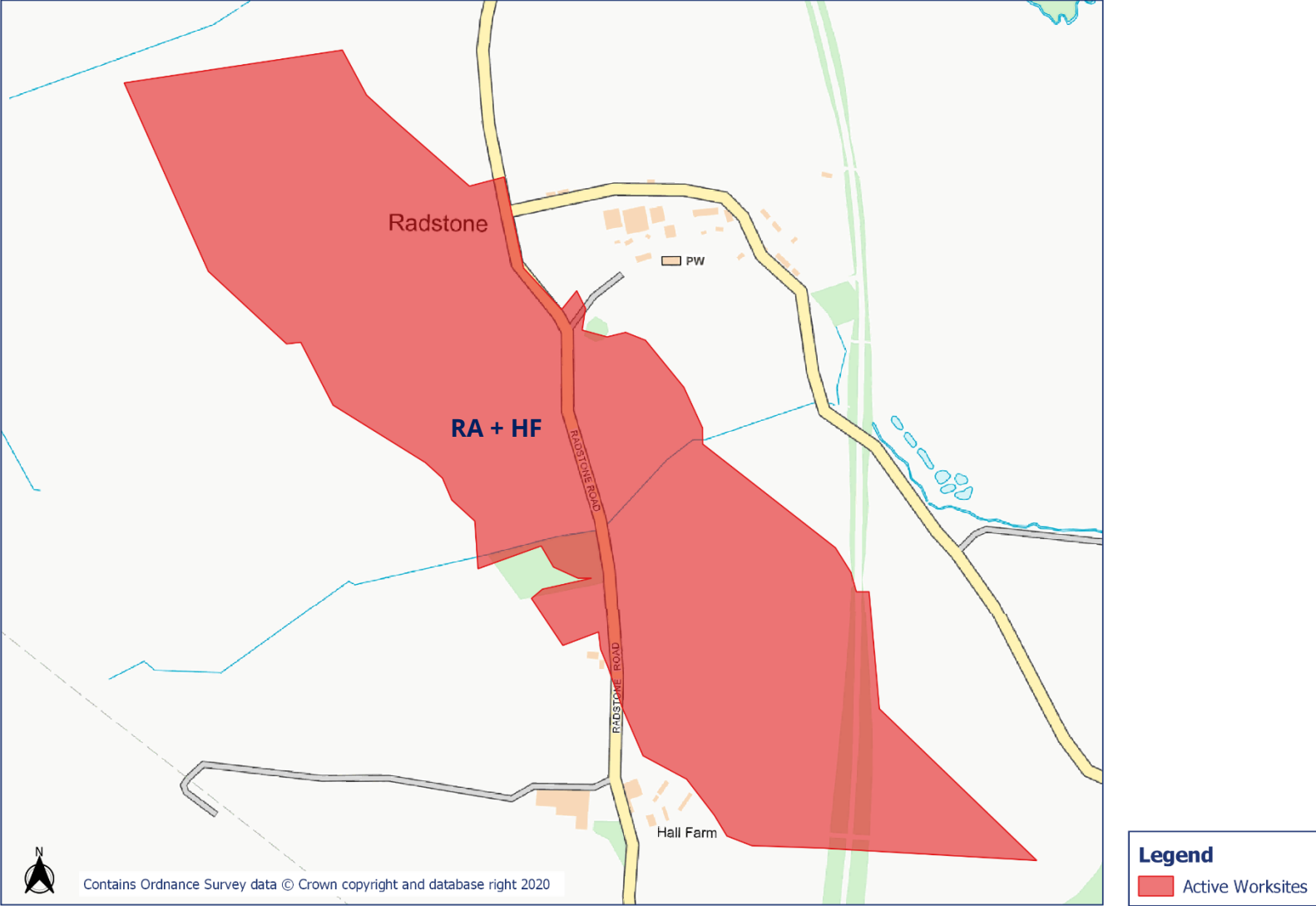




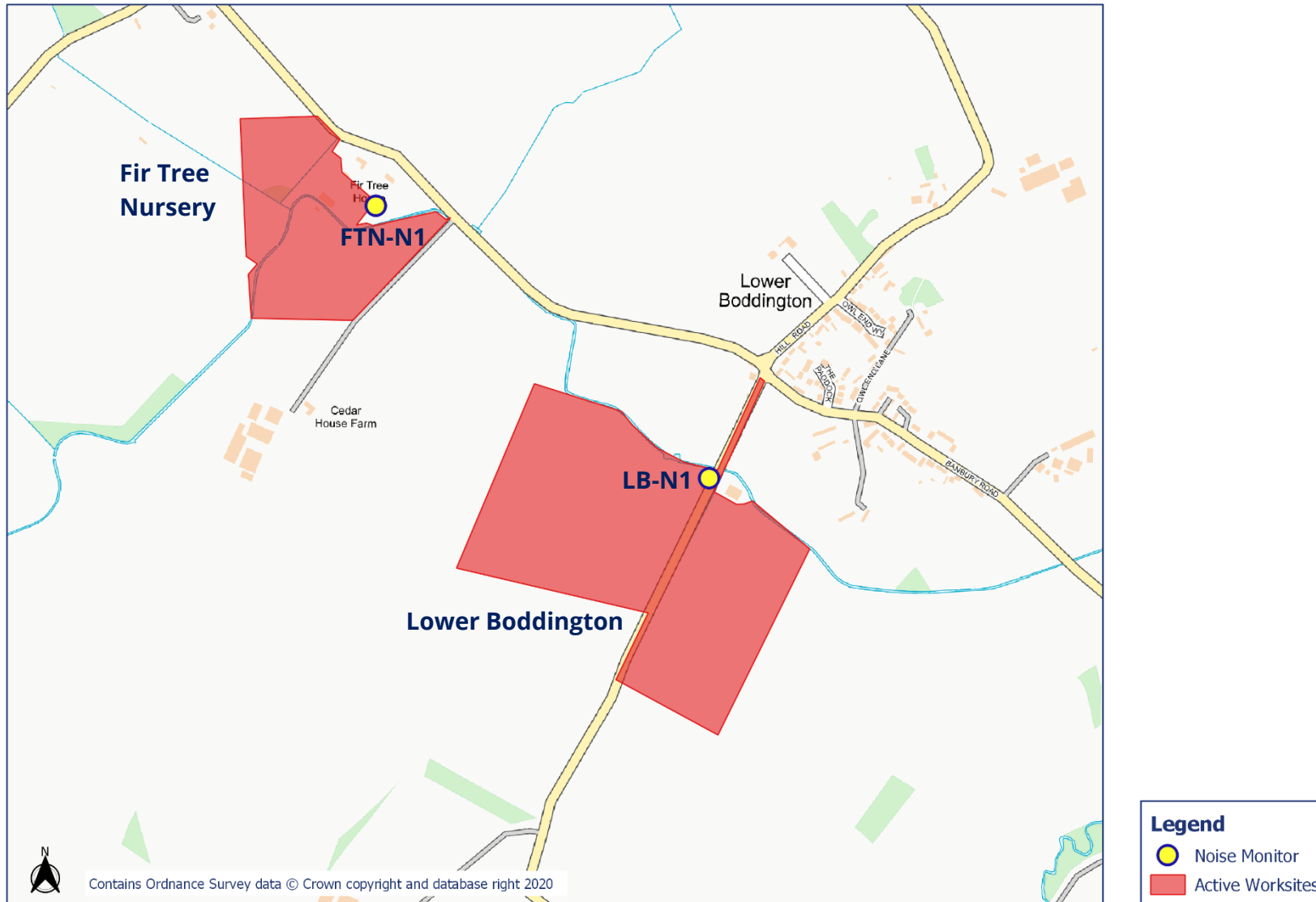


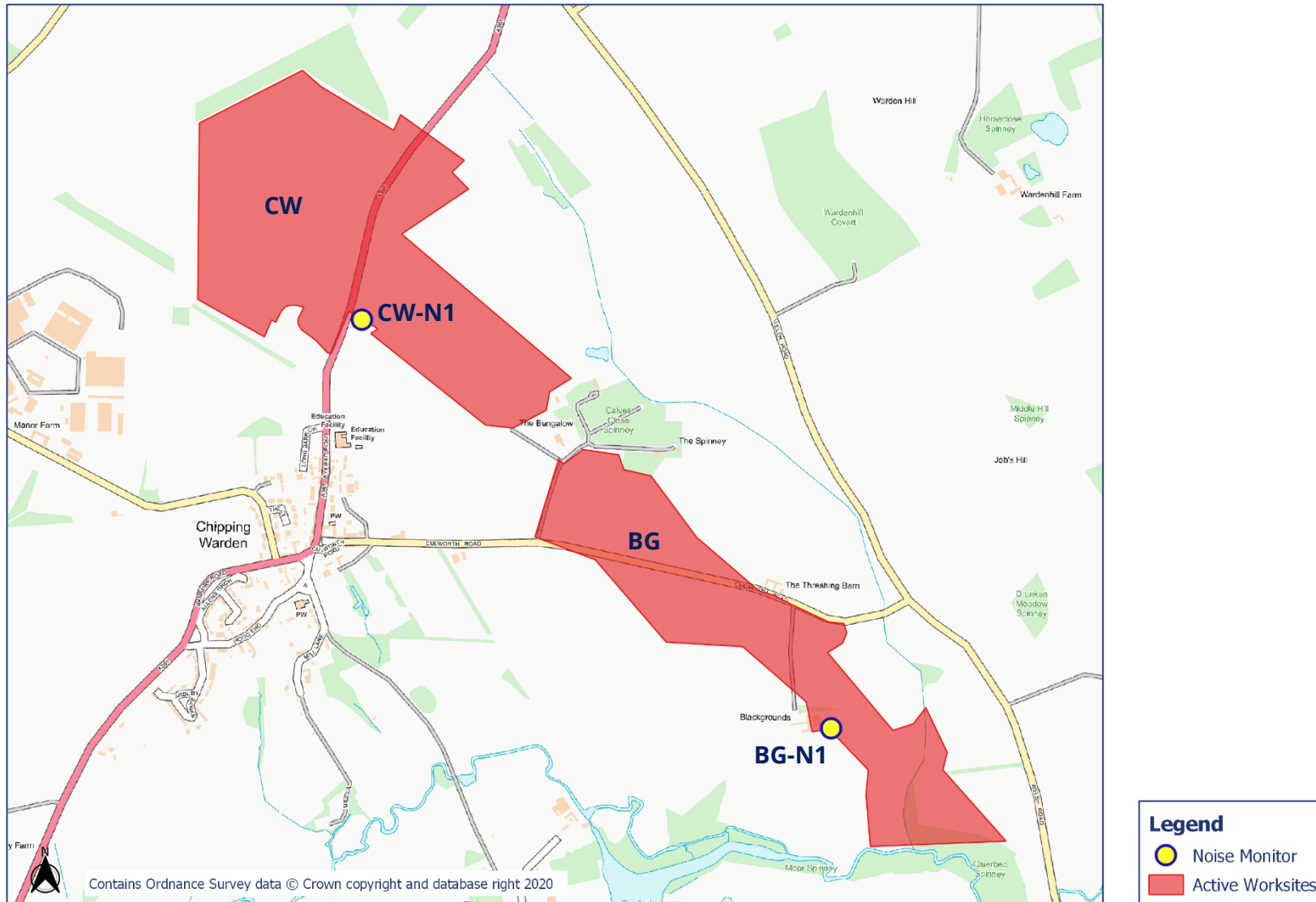


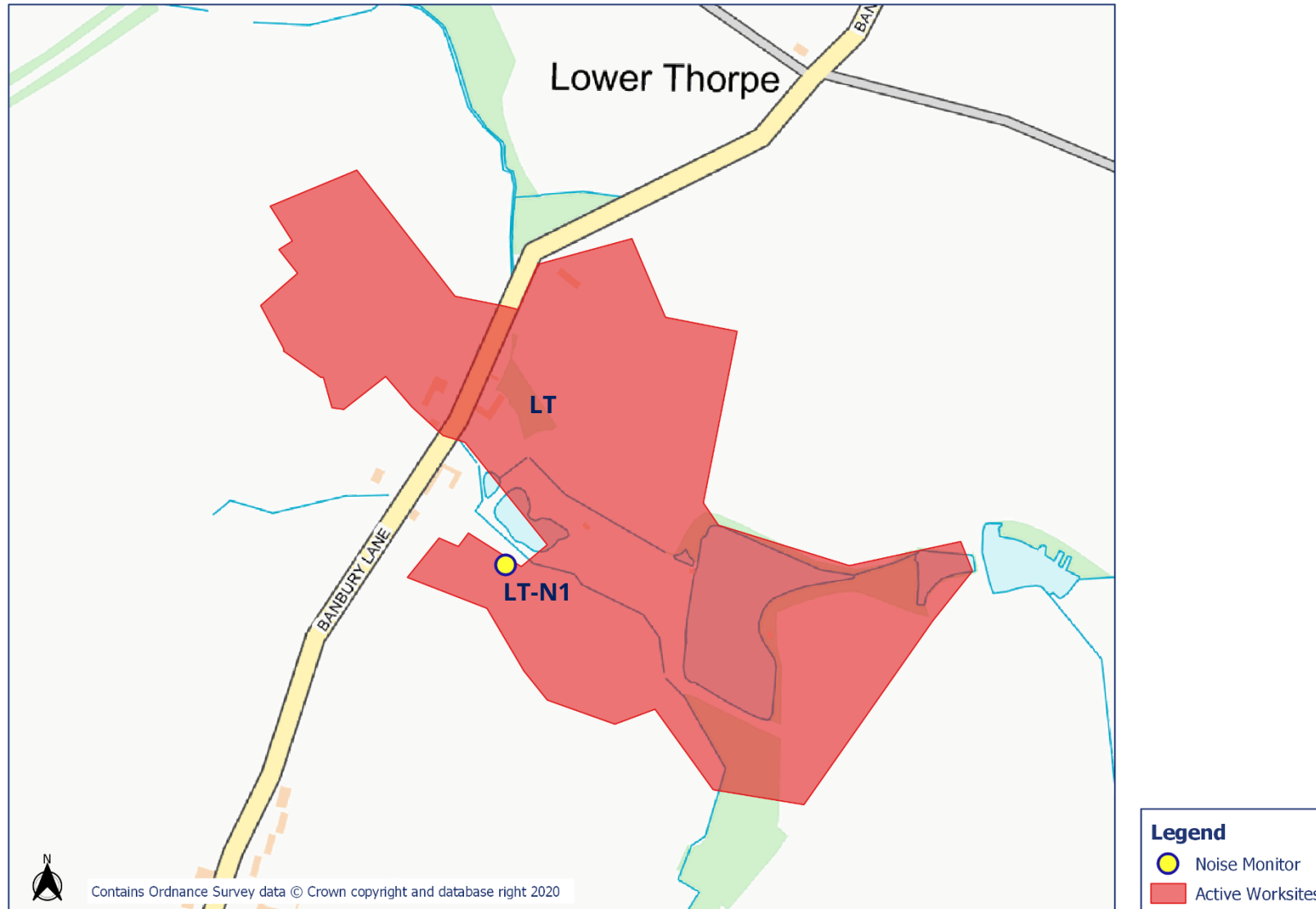


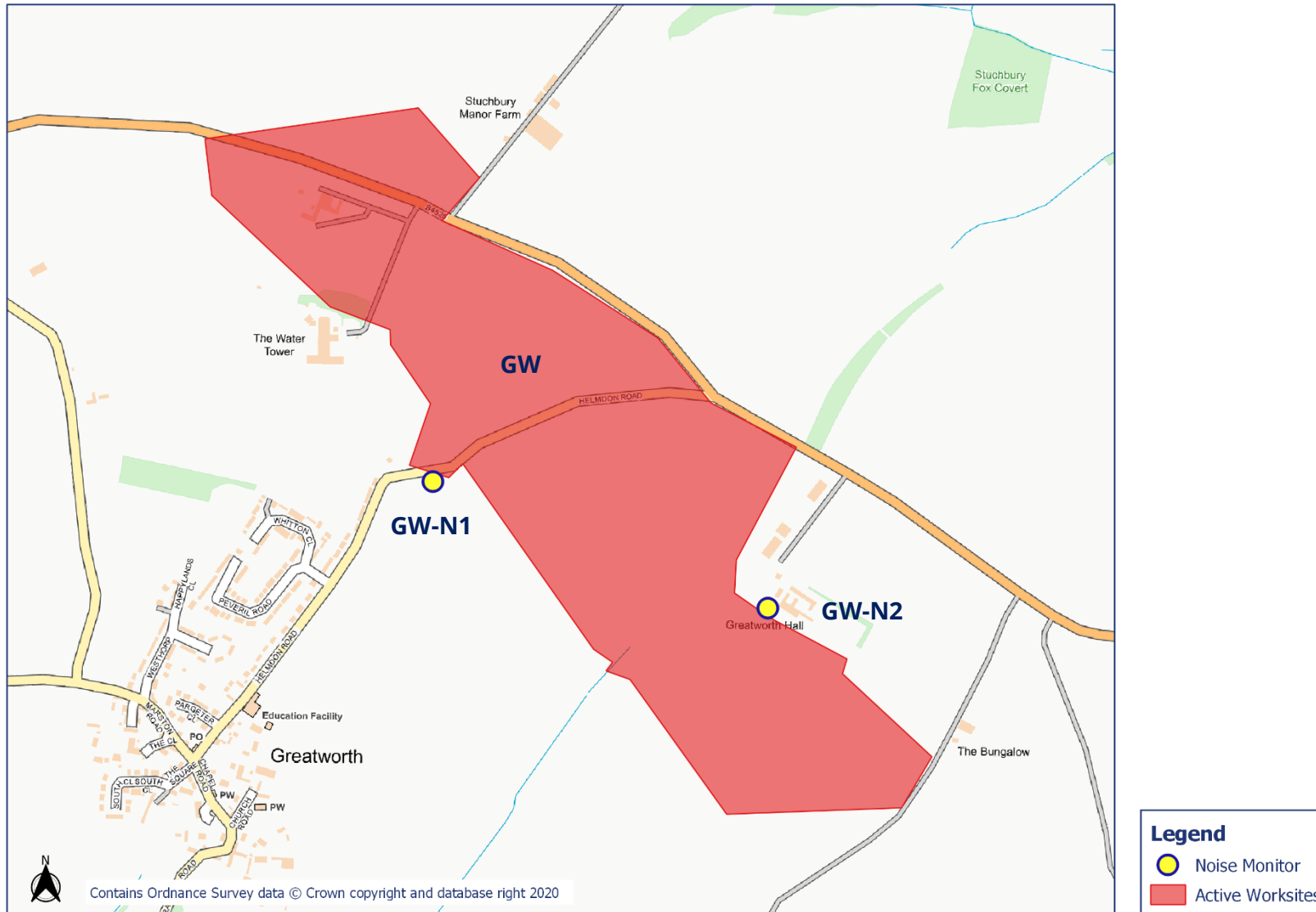


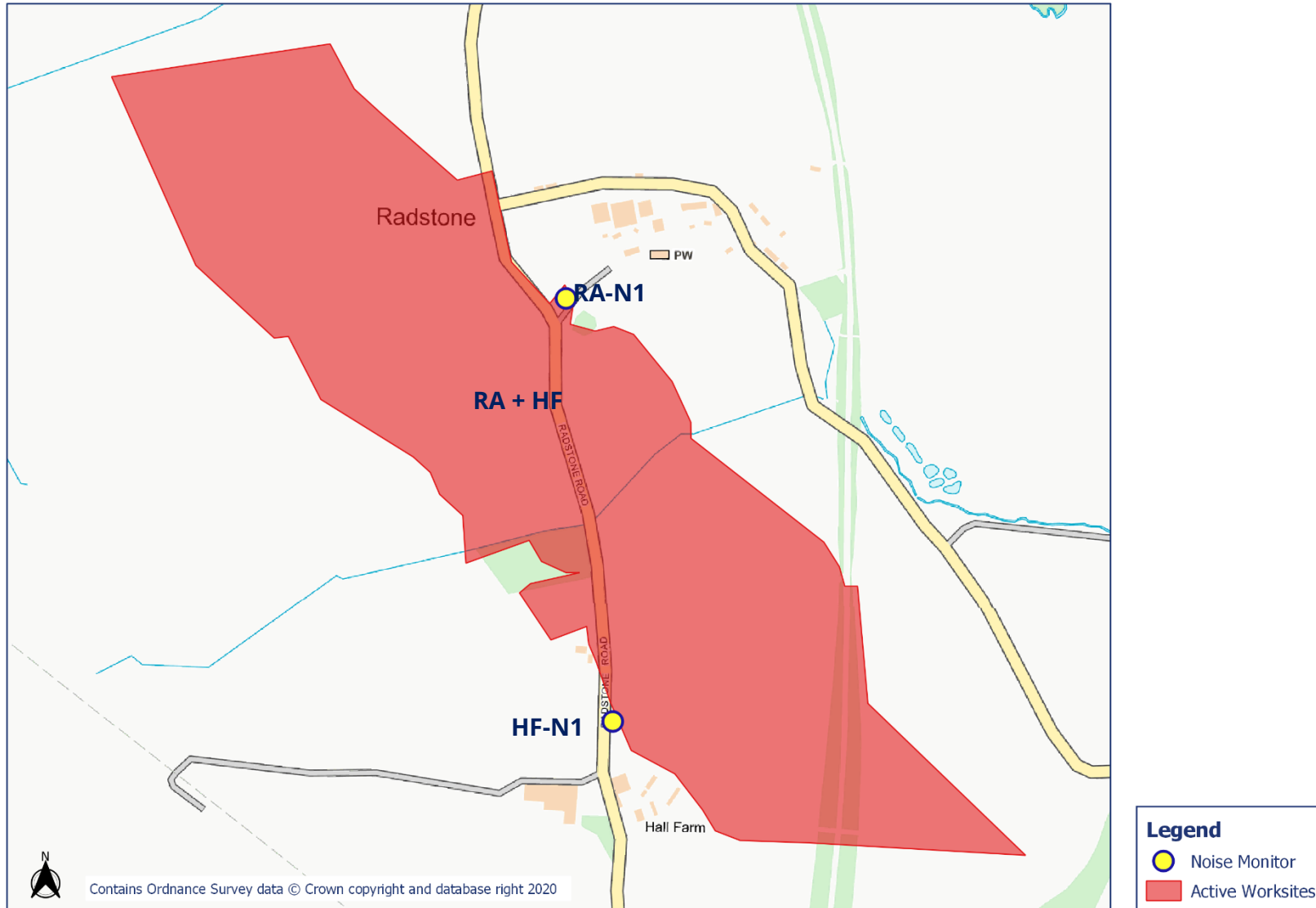
Appendix B Monitoring Locations









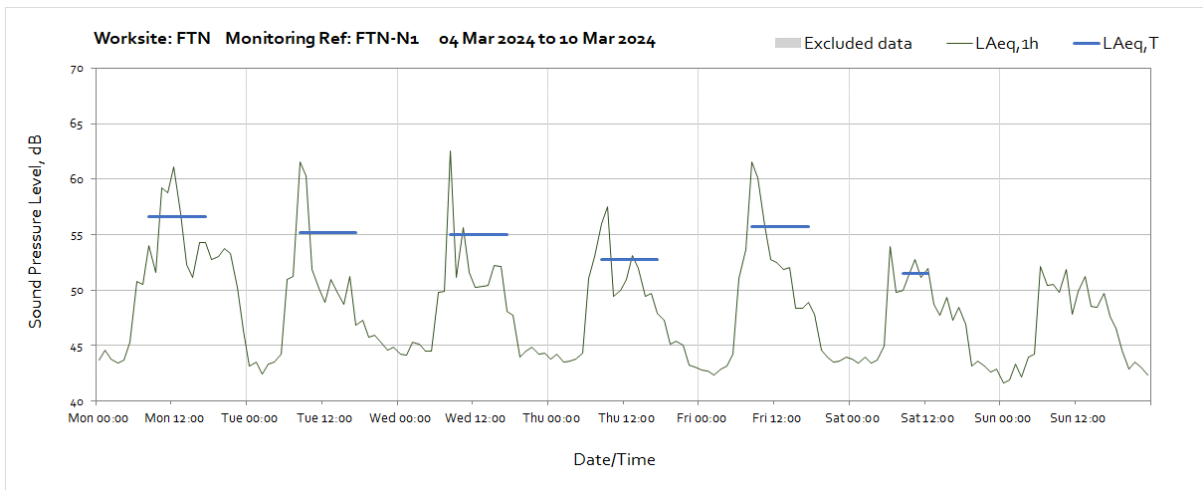
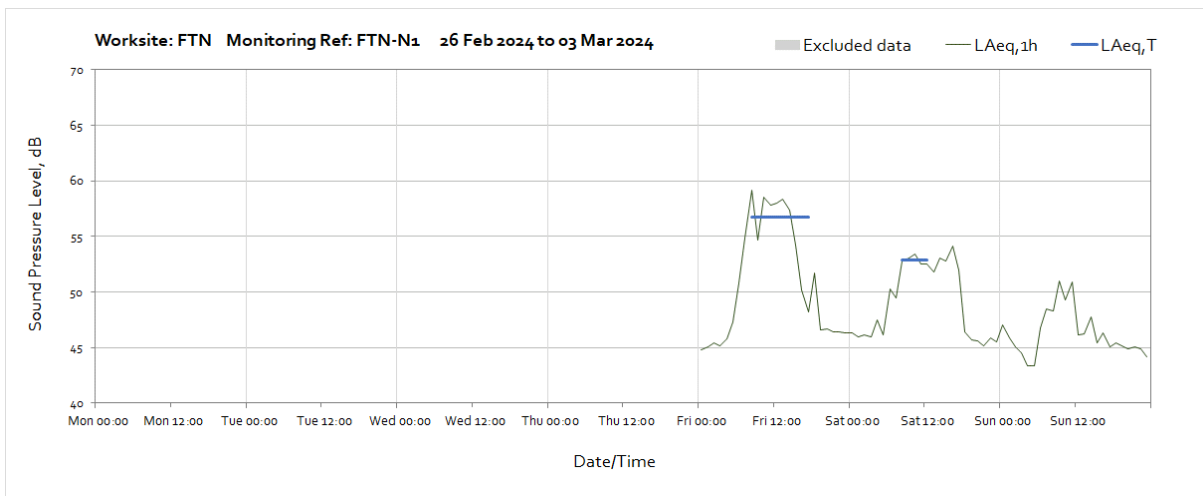


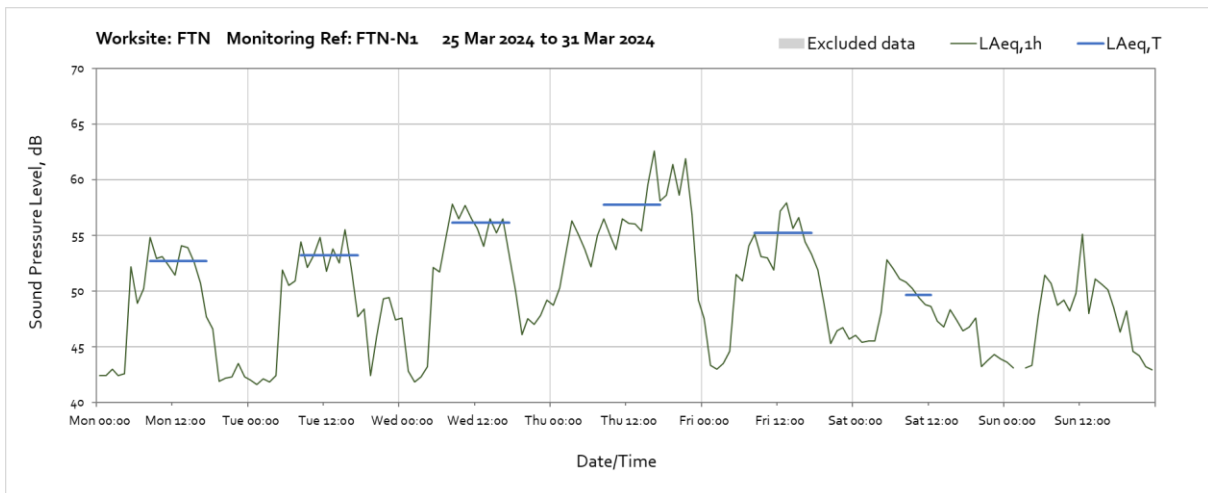
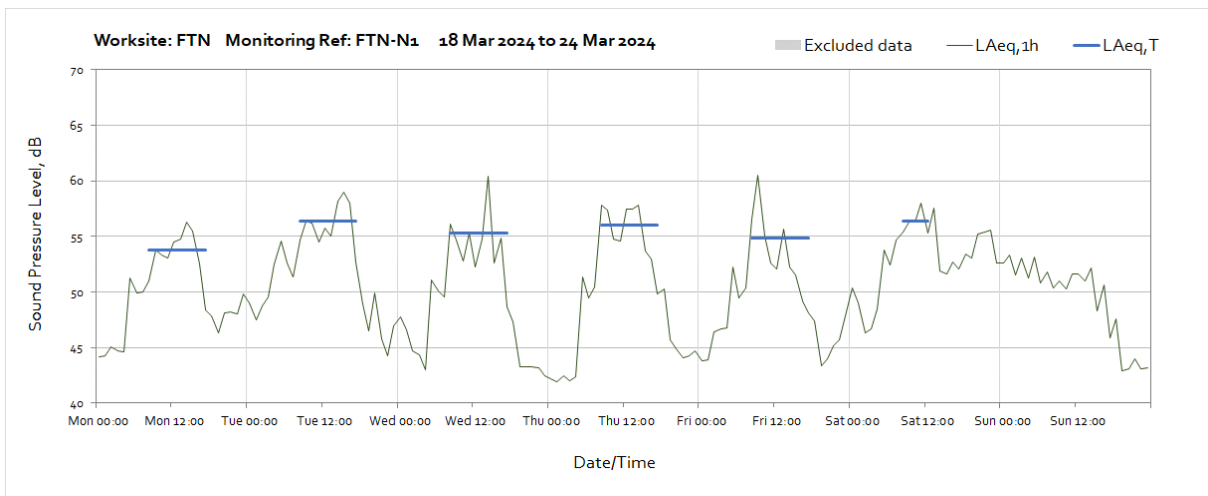
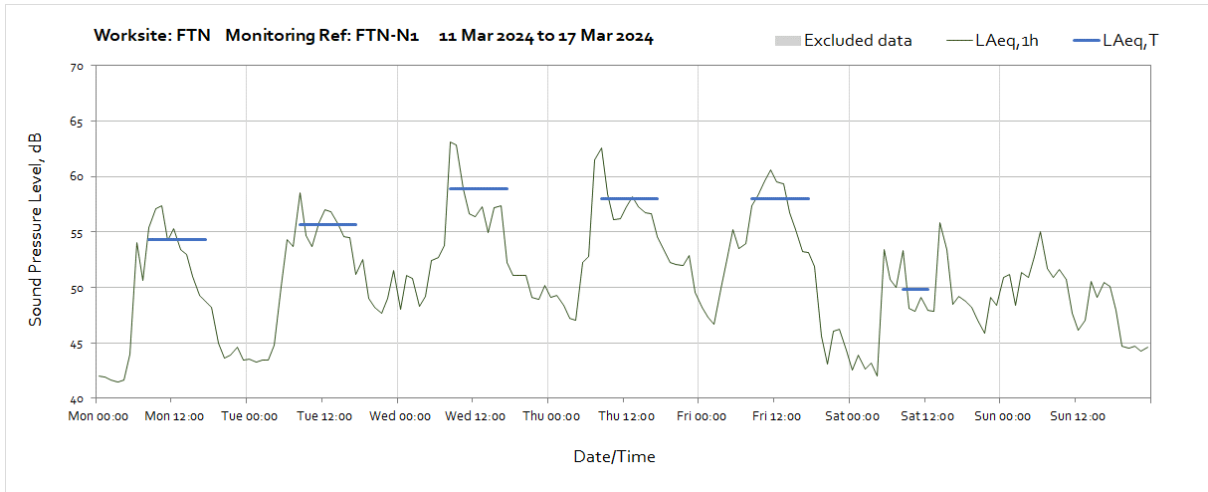
Appendix C Data

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 Table 3 of the main report.

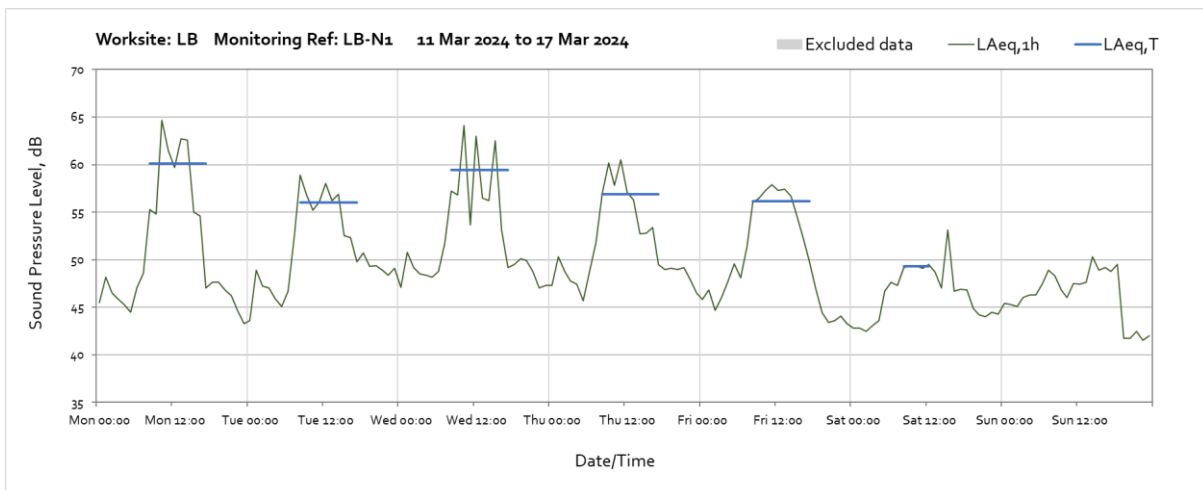
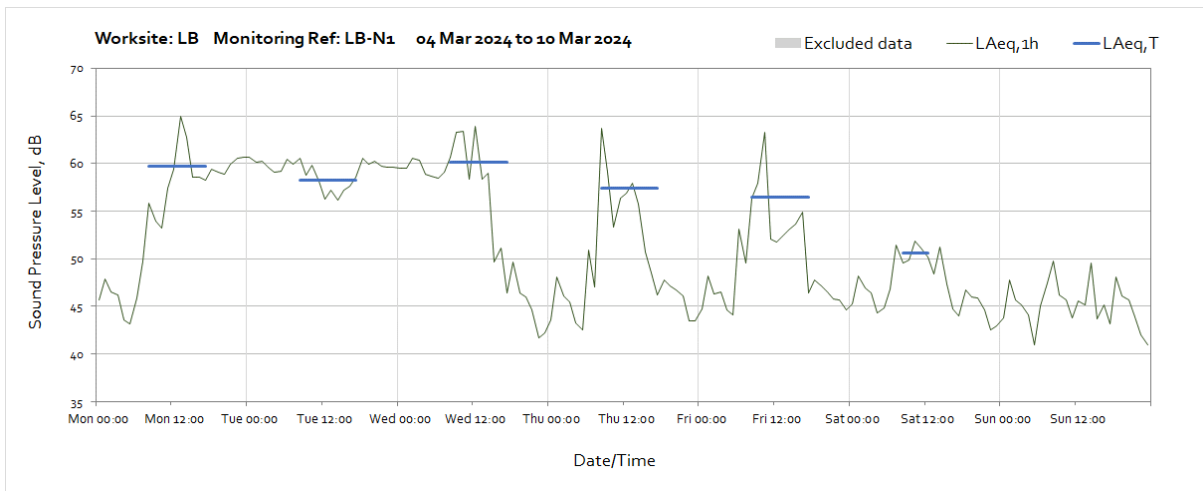
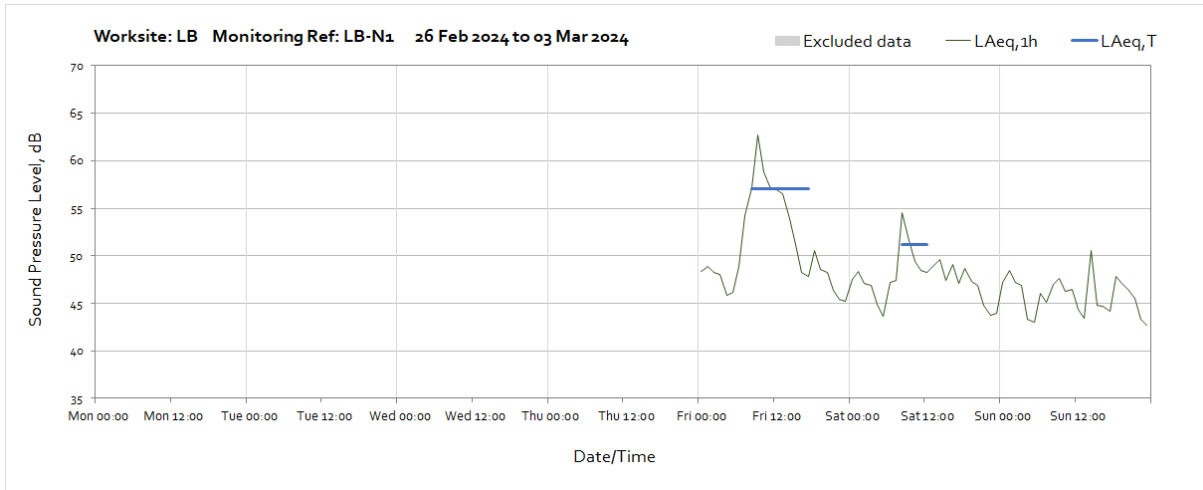
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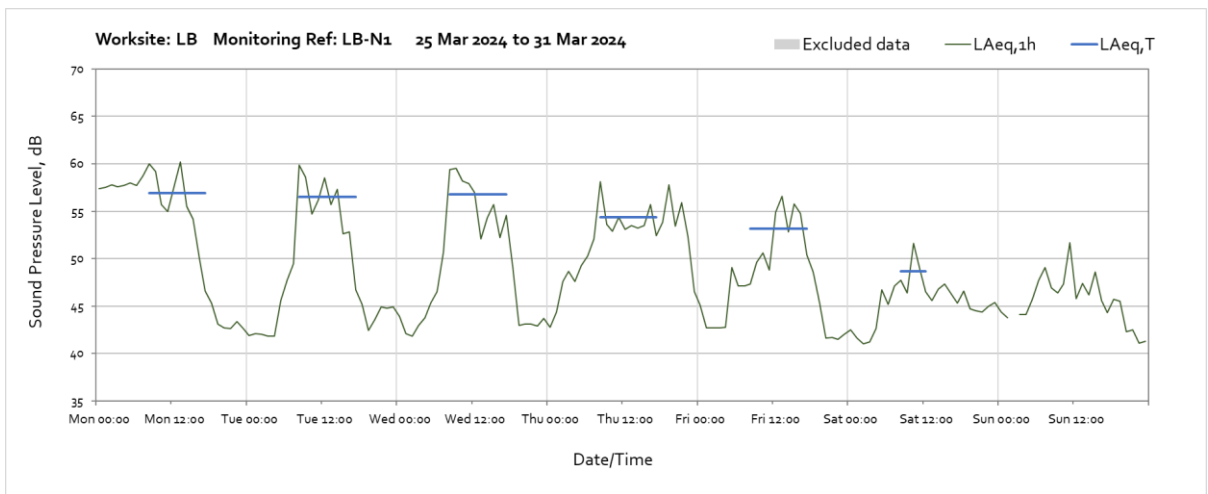
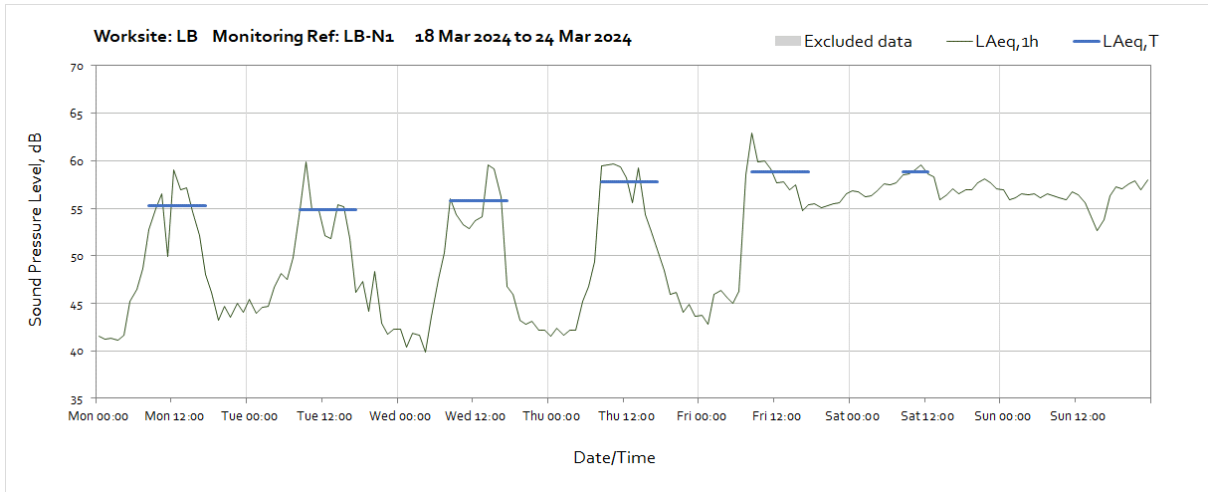




Note: Missing data between 02:00 and 03:00 on Sunday 31st March is due to a monitor time adjustment at the start of British Summer Time.

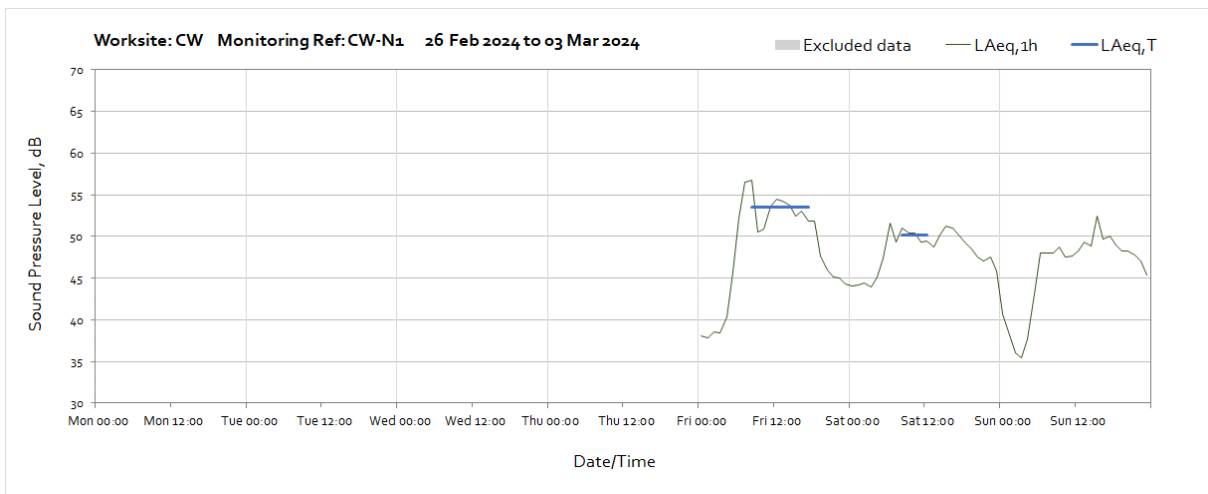
Worksite: LB – Monitoring Ref: LB-N1

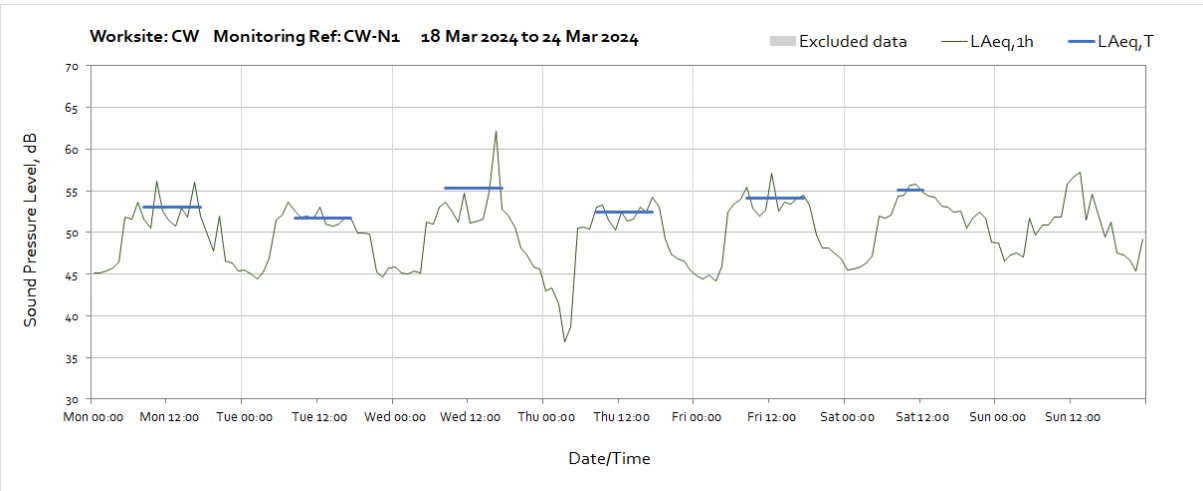
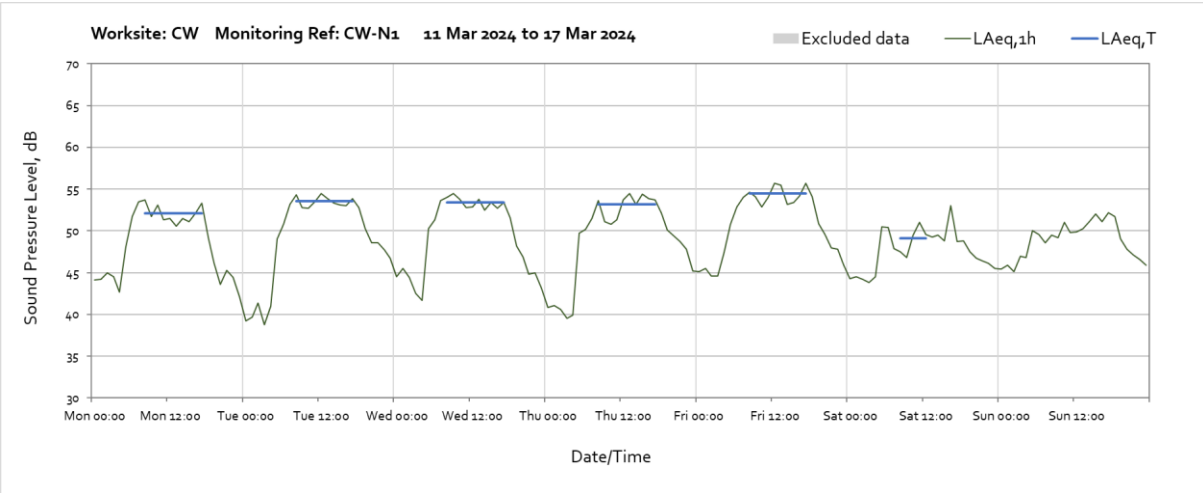
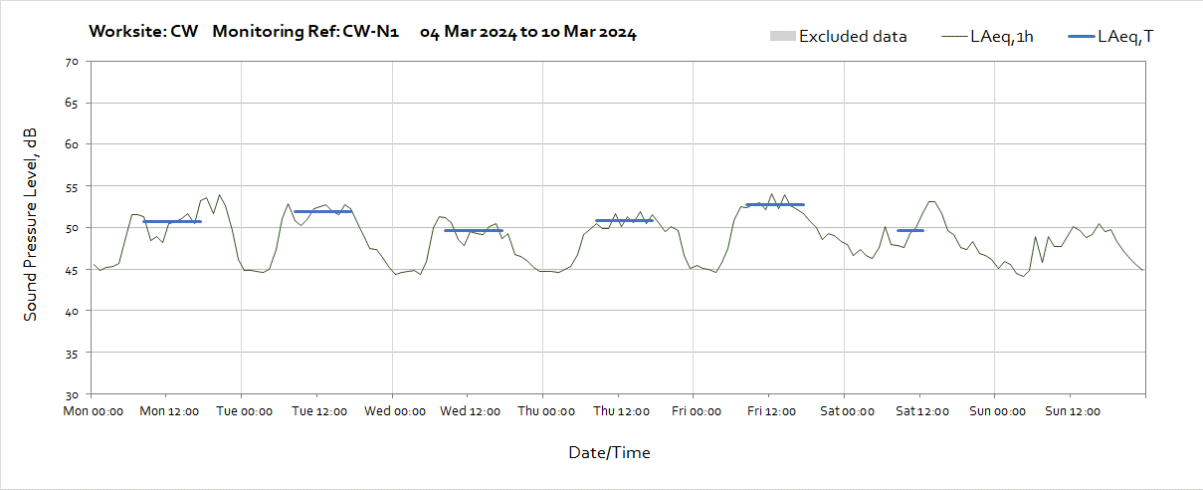


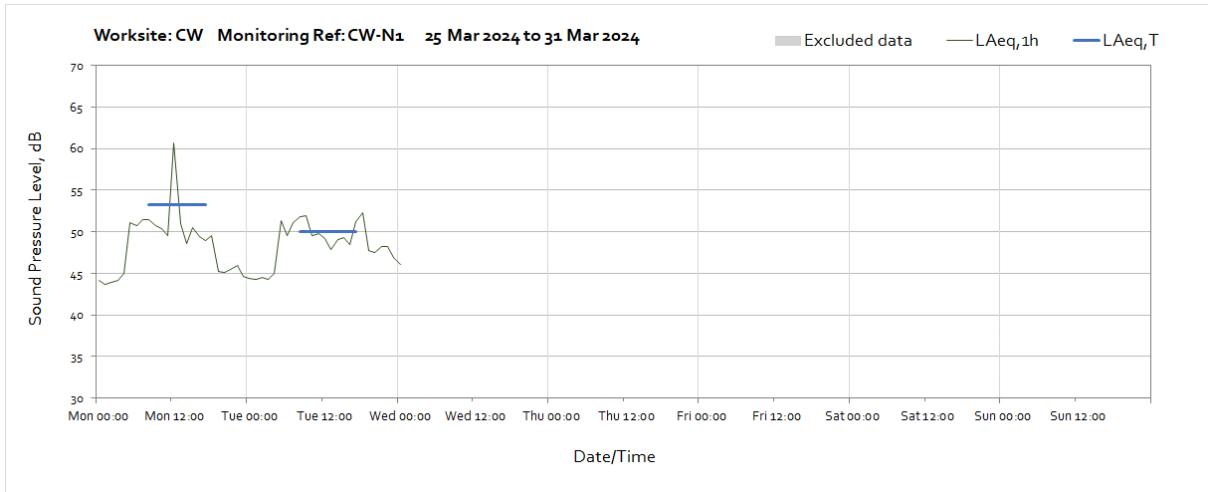


Note: Missing data between 02:00 and 03:00 on Sunday 31st March is due to a monitor time adjustment at the start of British Summer Time.

Worksite: CW – Monitoring Ref: CW-N1

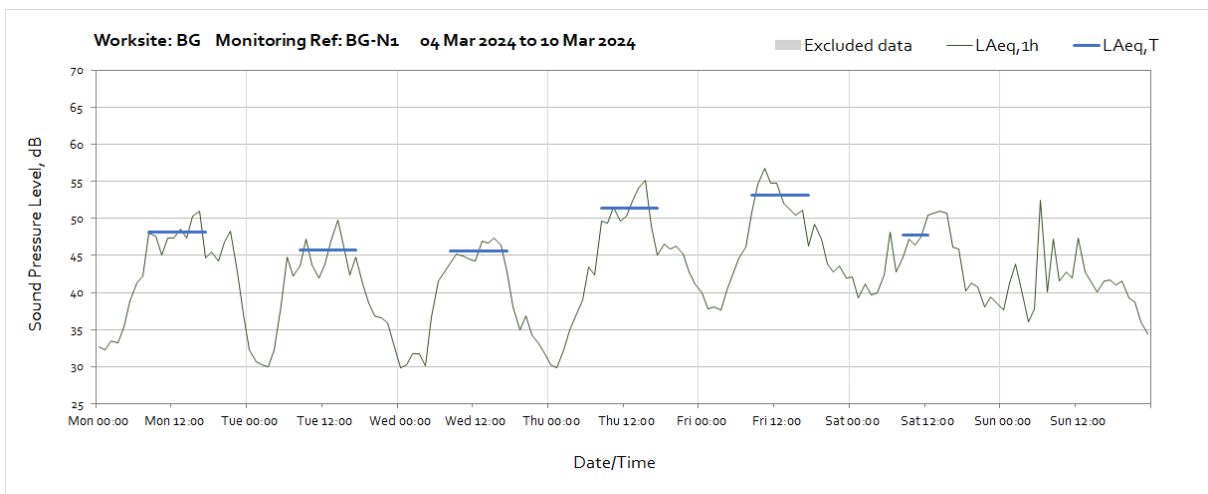
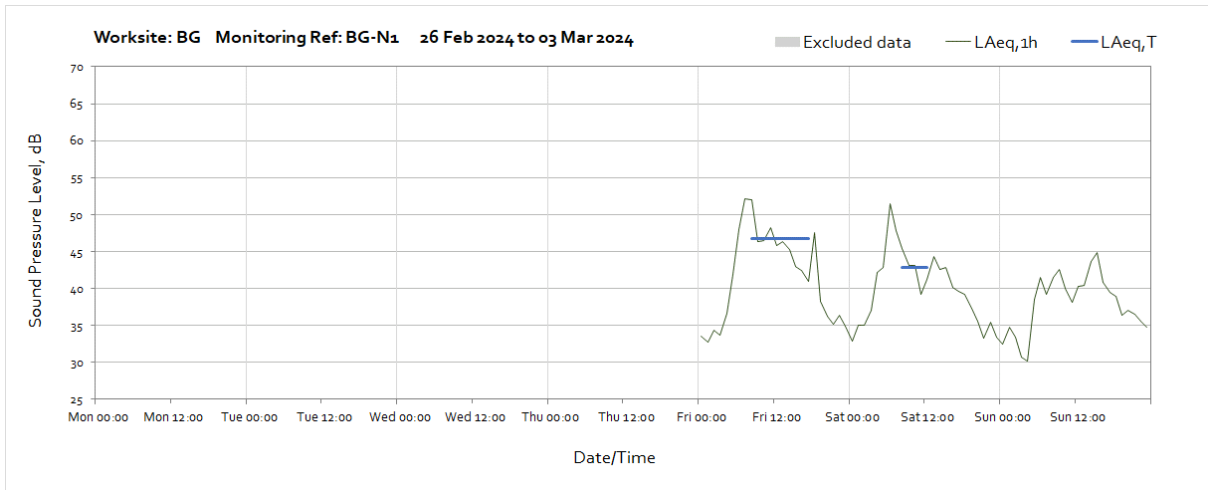


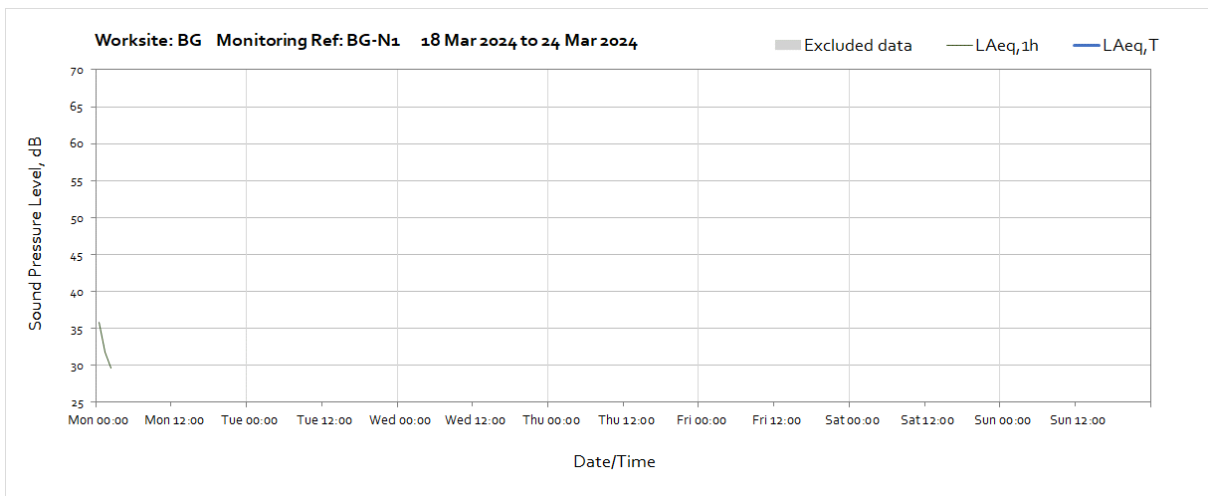
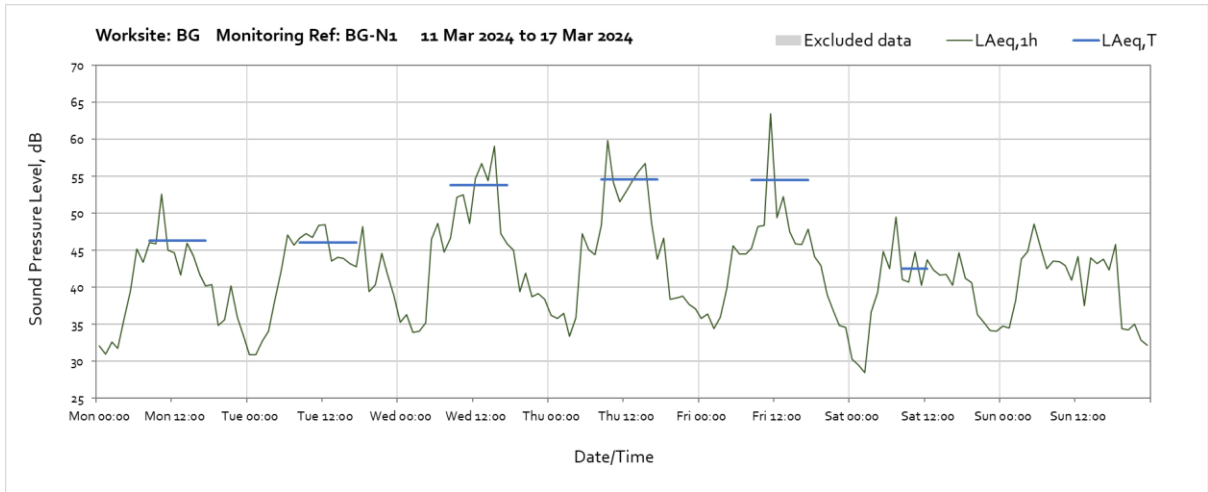




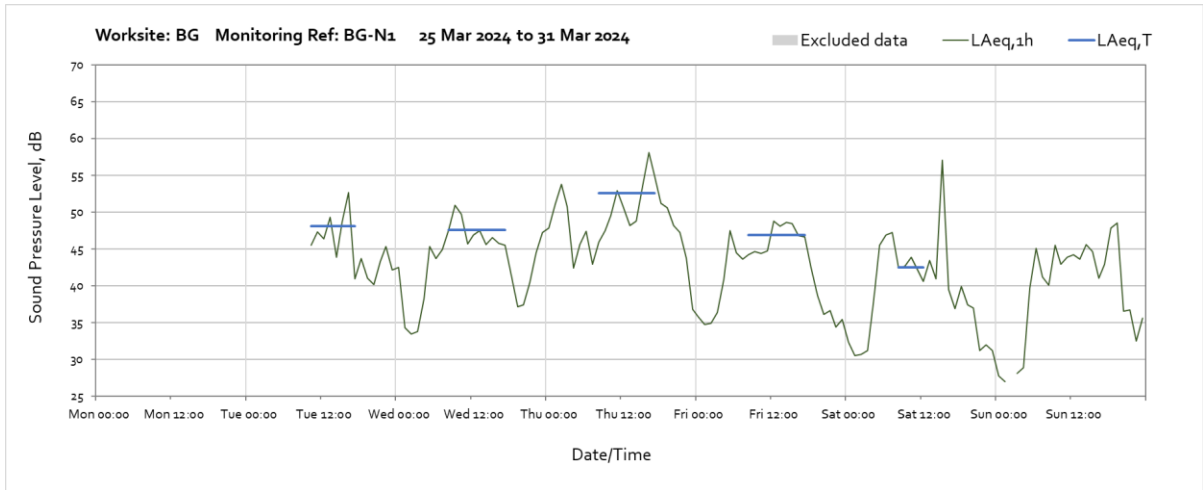
Note: Missing data from 01:00 on Wednesday 27th March to the end of the month was due to a communication error between the monitoring station and server.

Worksite: BG – Monitoring Ref: BG-N1



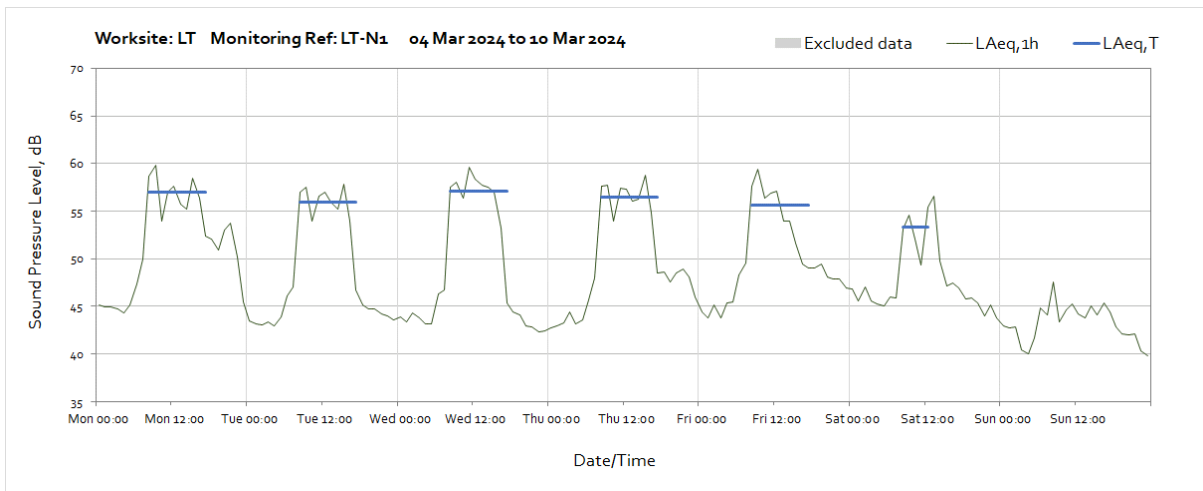
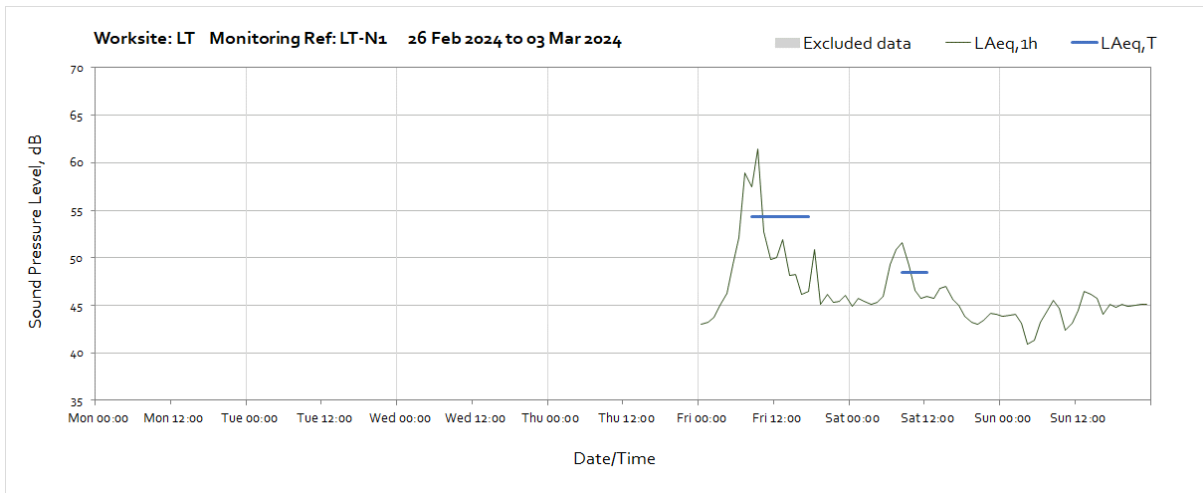


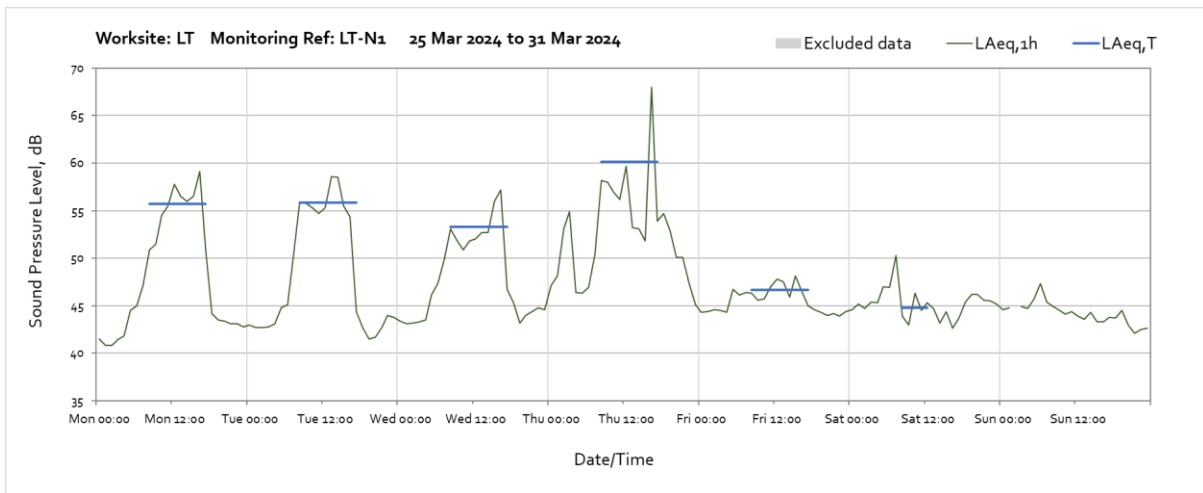
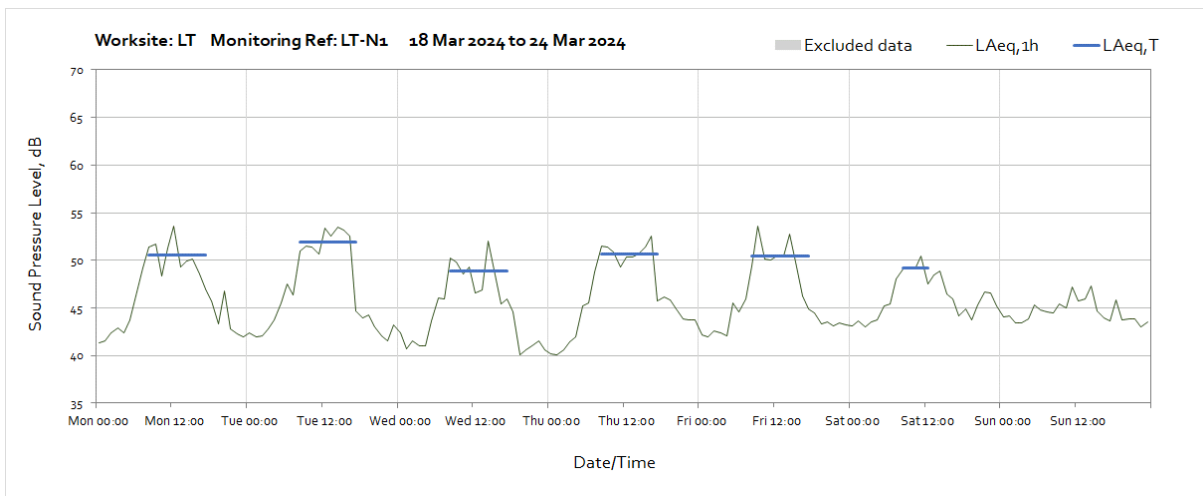
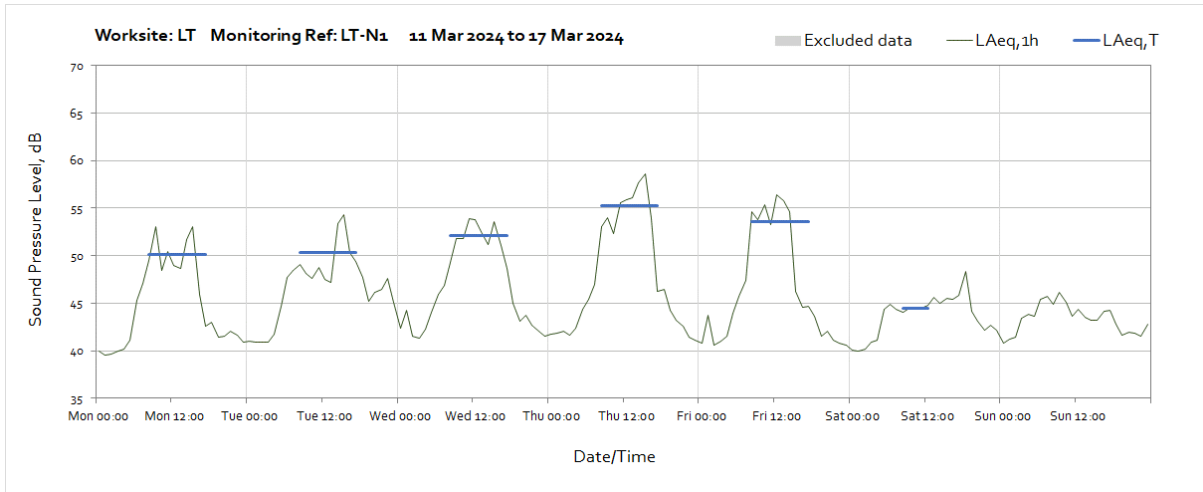
Note: Missing data between 03:00 on Monday 18th until 10:00 on Tuesday 26th March was due to depleted batteries at the monitoring station.



Note: Missing data between 03:00 on Monday 18th to 10:00 on Tuesday 26th March was due to depleted batteries at the monitoring station. Missing data between 02:00 and 03:00 on Sunday 31st March is due to a monitor time adjustment at the start of British Summer Time.

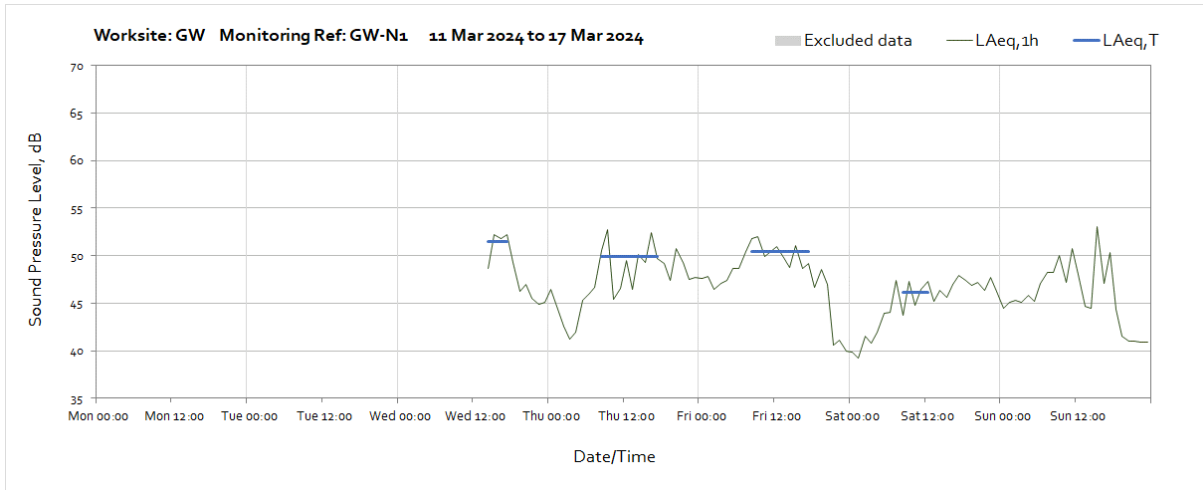
Worksite: LT - Monitoring Ref: LT-N1



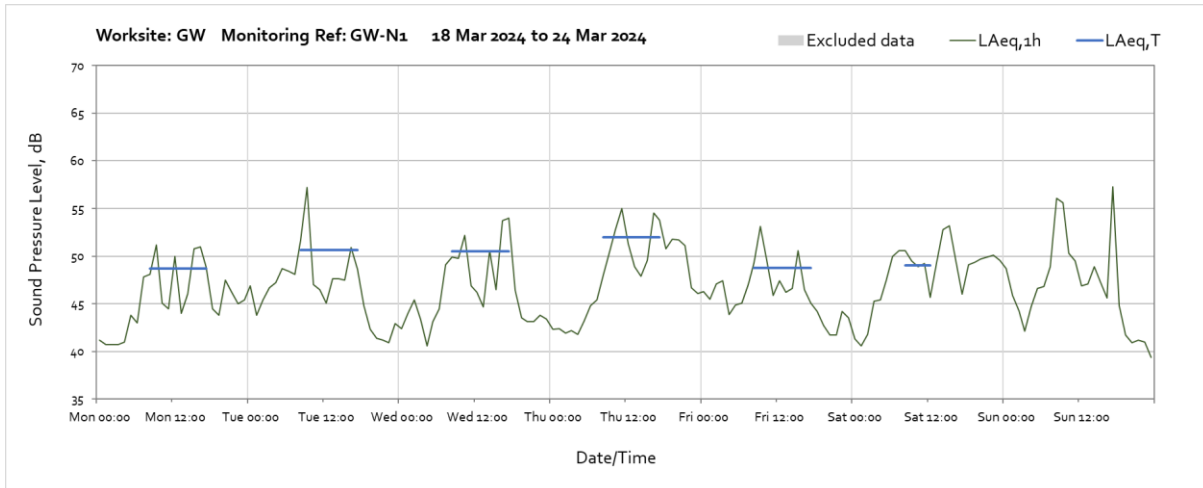


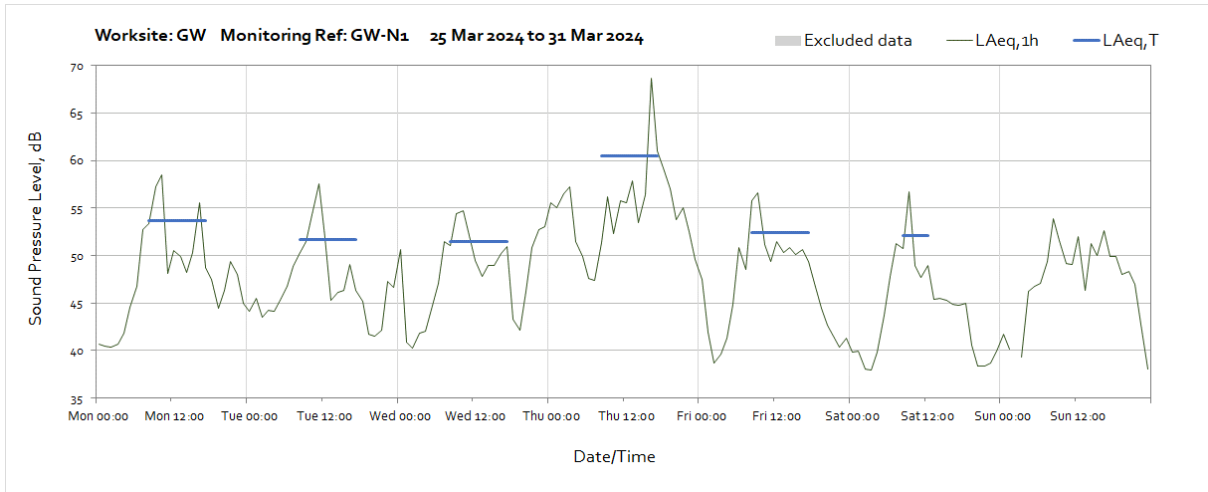
Note: Missing data between 02:00 and 03:00 on Sunday 31st March is due to a monitor time adjustment at the start of British Summer Time.

Worksite: GW – Monitoring Ref: GW-N1



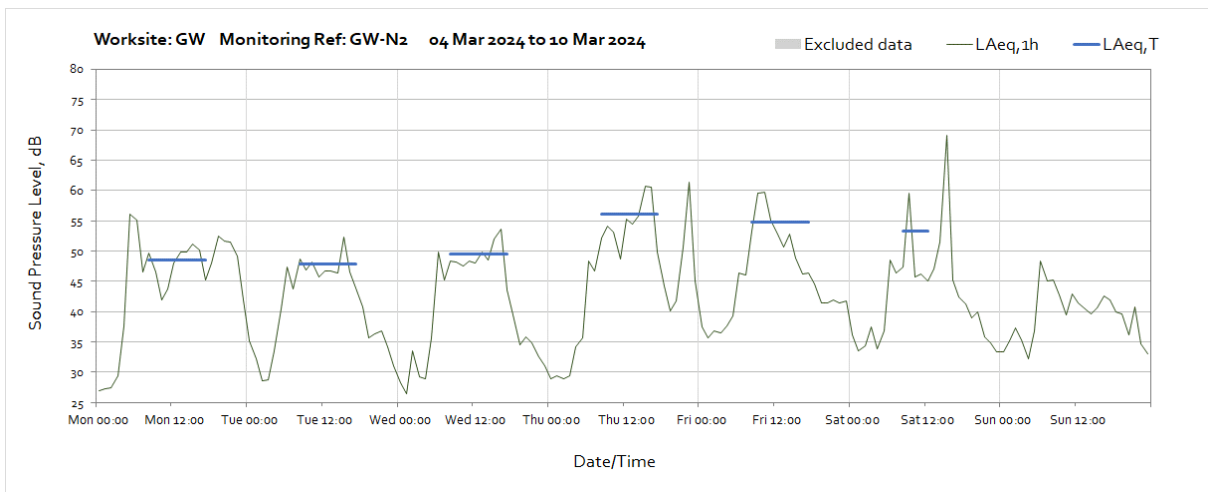
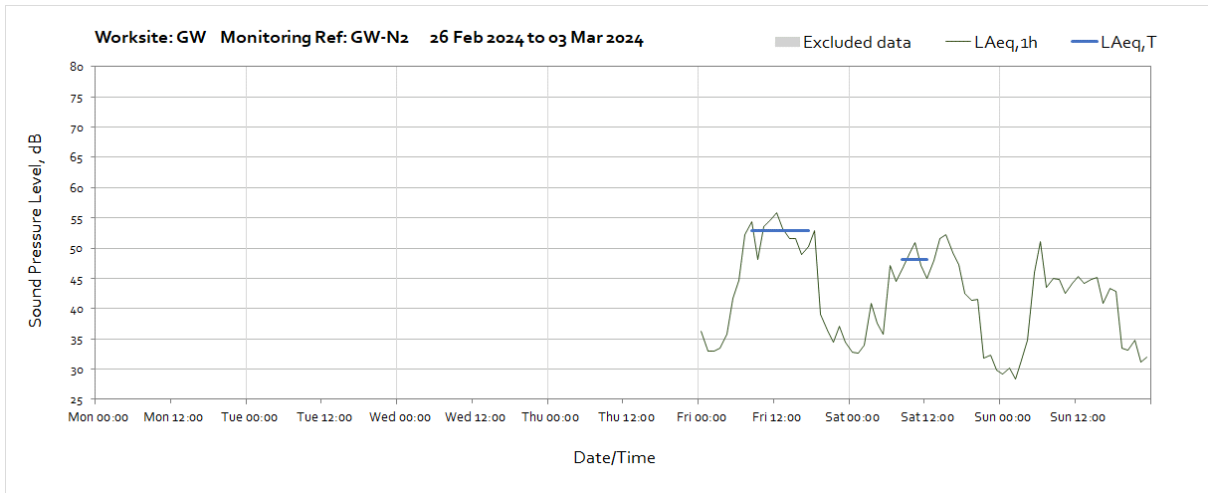
Note: Missing data from the beginning of the month until 14:00 on Wednesday 13th March was due to water ingress into the noise monitor.

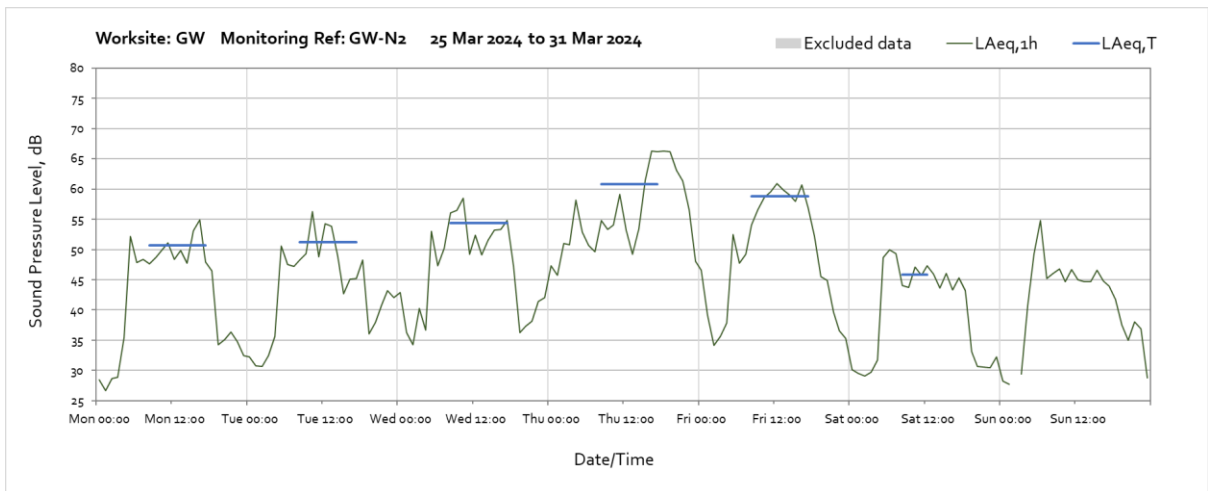
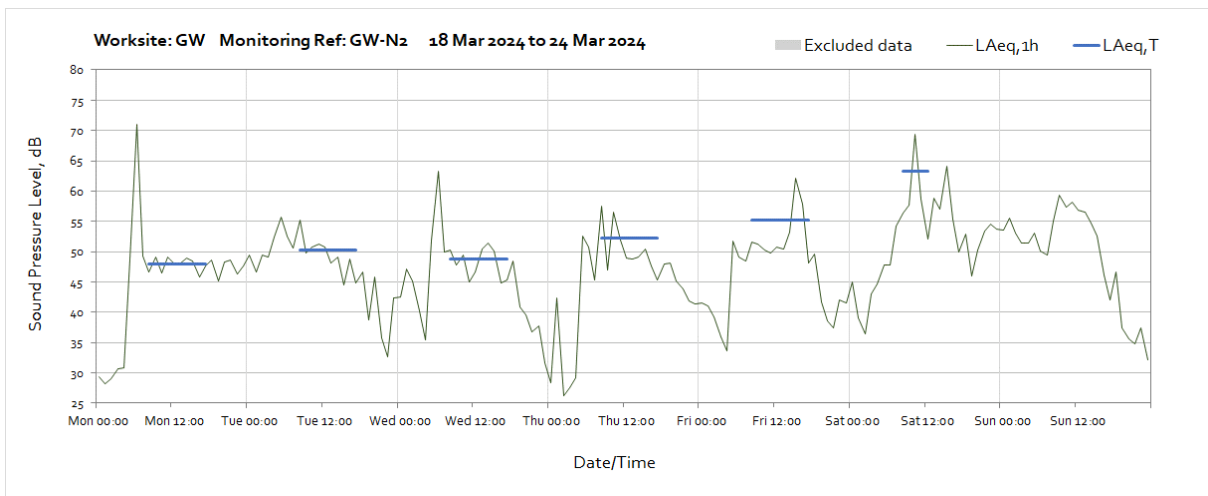
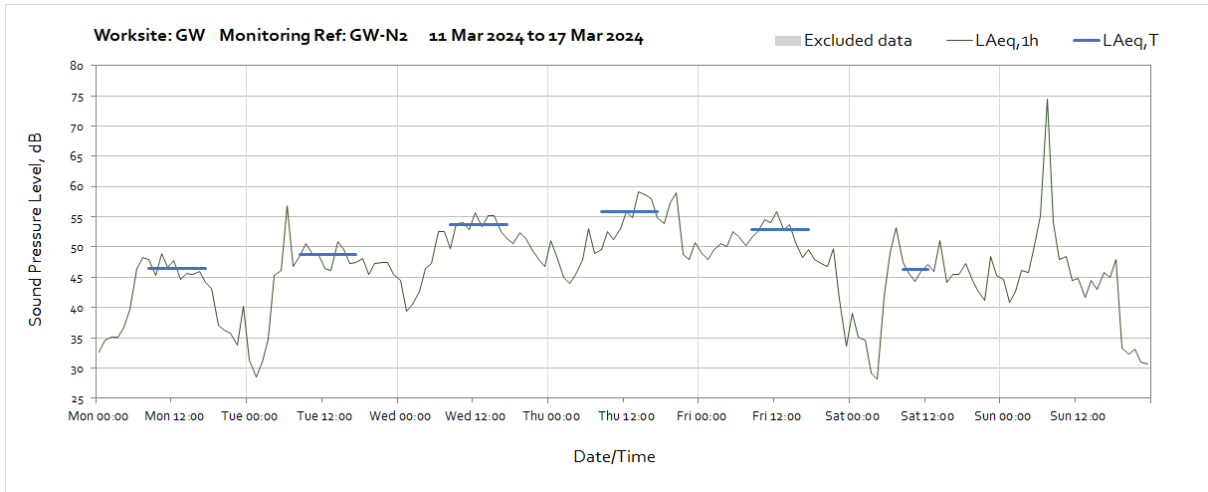




Note: Missing data between 02:00 and 03:00 on Sunday 31st March is due to a monitor time adjustment at the start of British Summer Time.

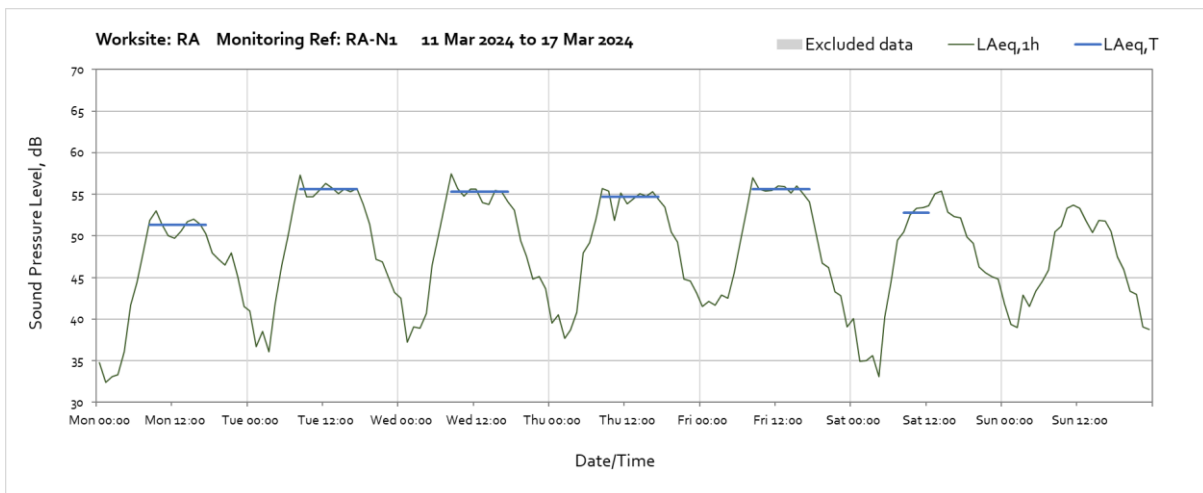
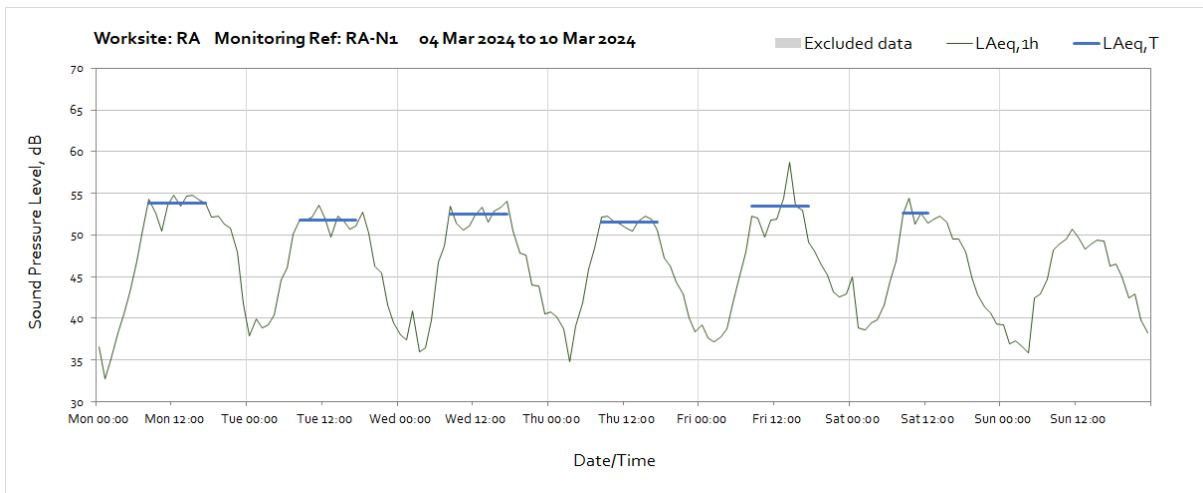
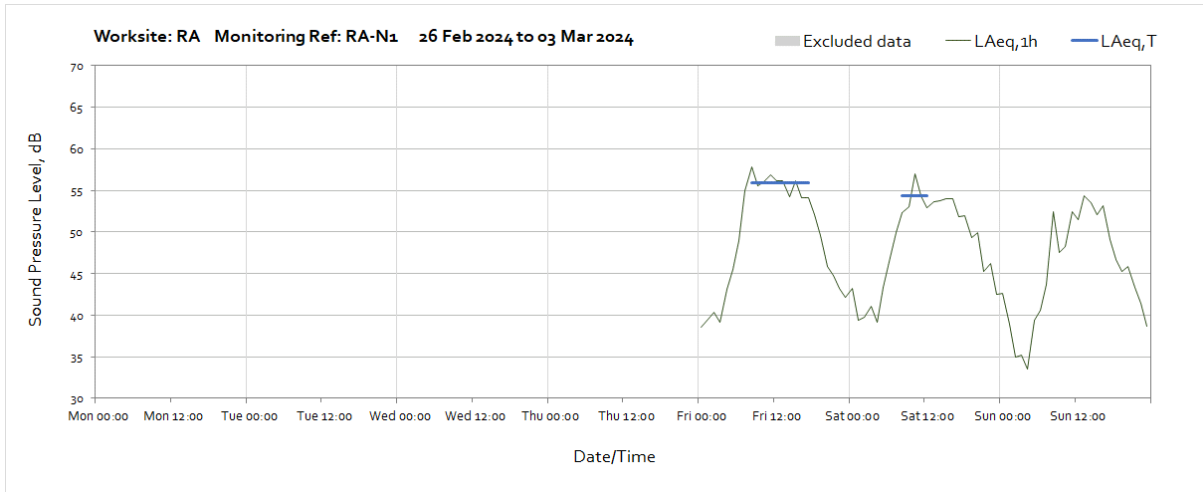
Worksite: GW – Monitoring Ref: GW-N2

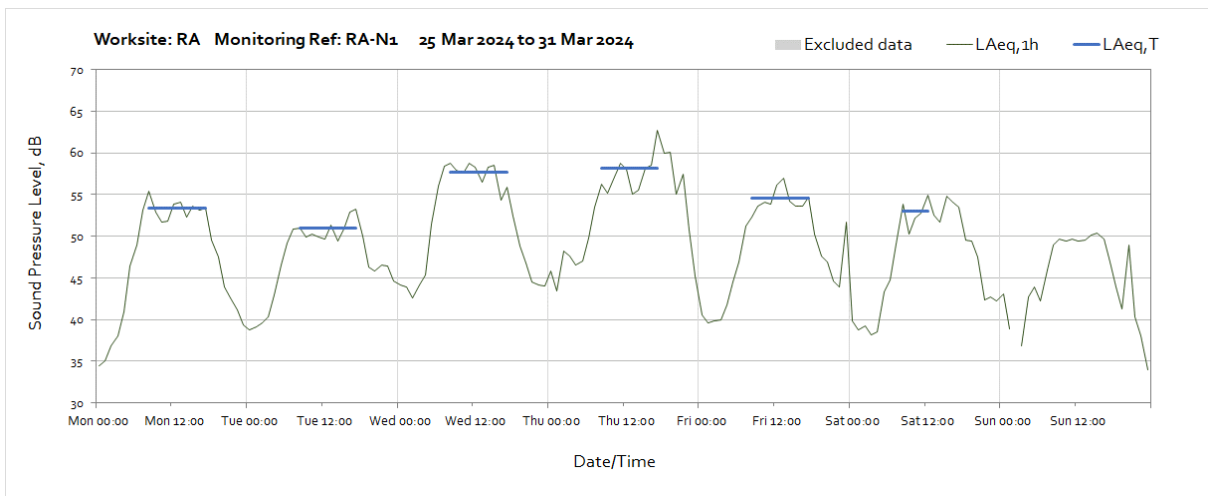
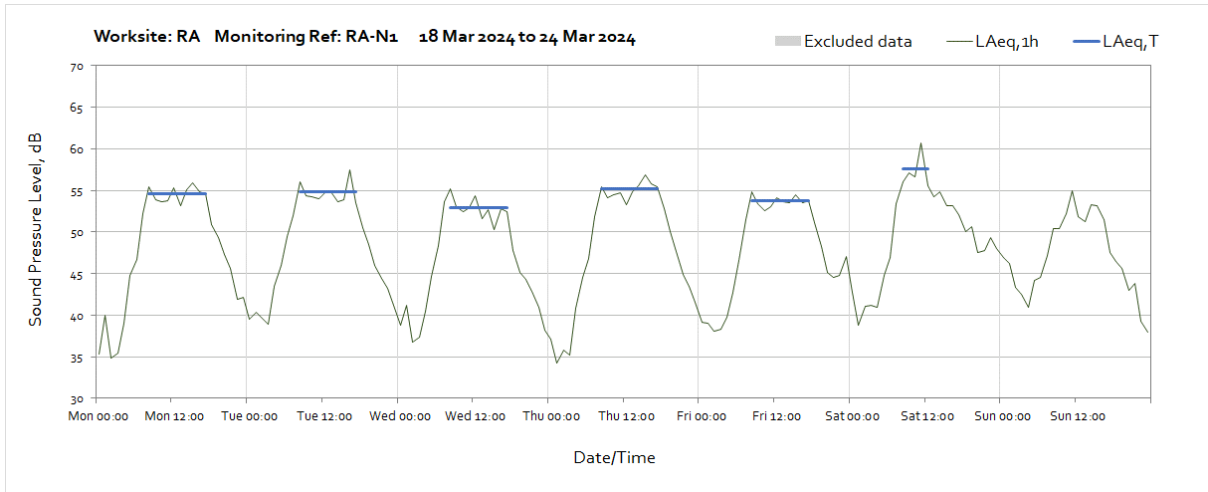




Note: Missing data between 02:00 and 03:00 on Sunday 31st March is due to a monitor time adjustment at the start of British Summer Time.

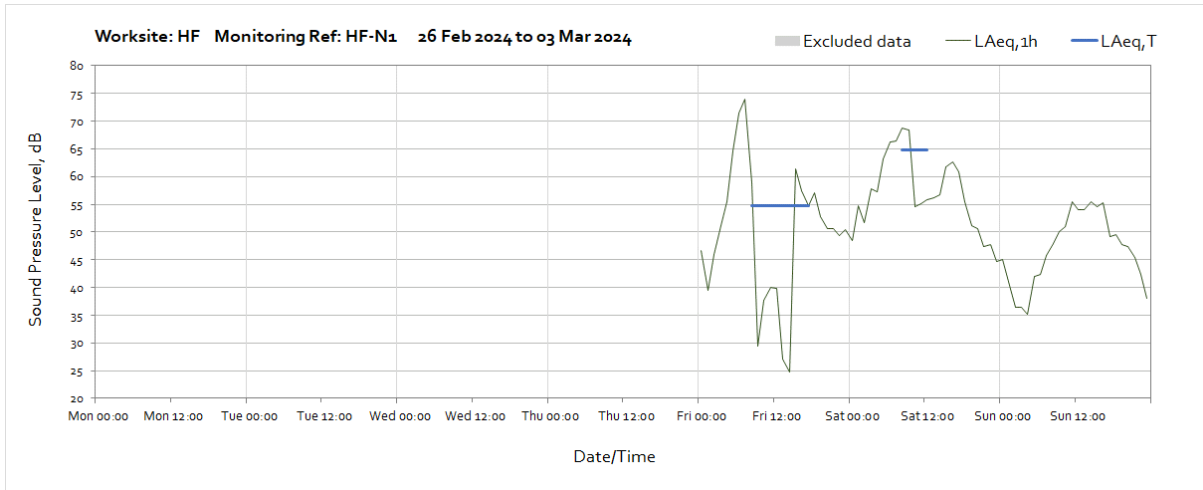
Worksite: RA – Monitoring Ref: RA-N1



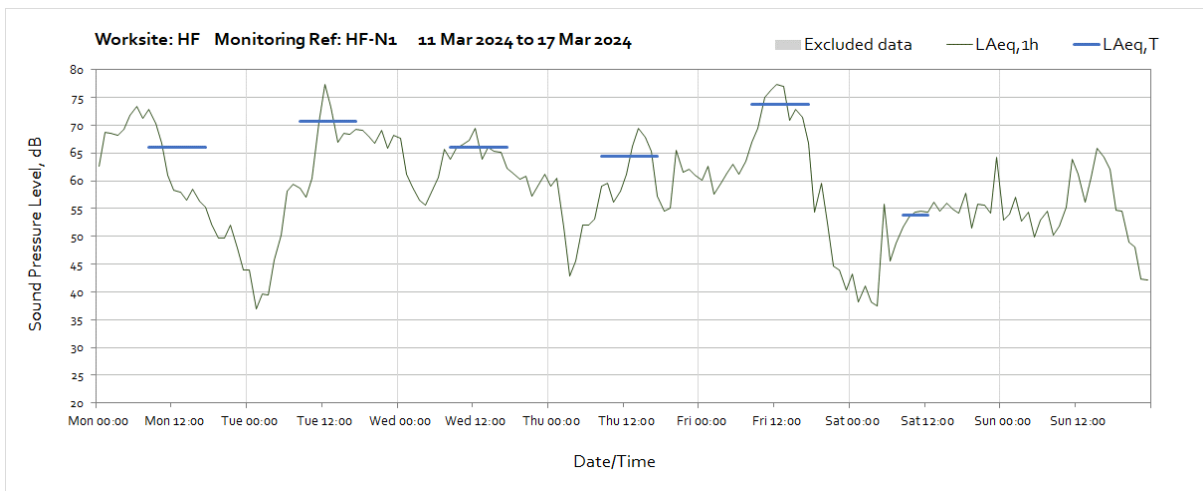
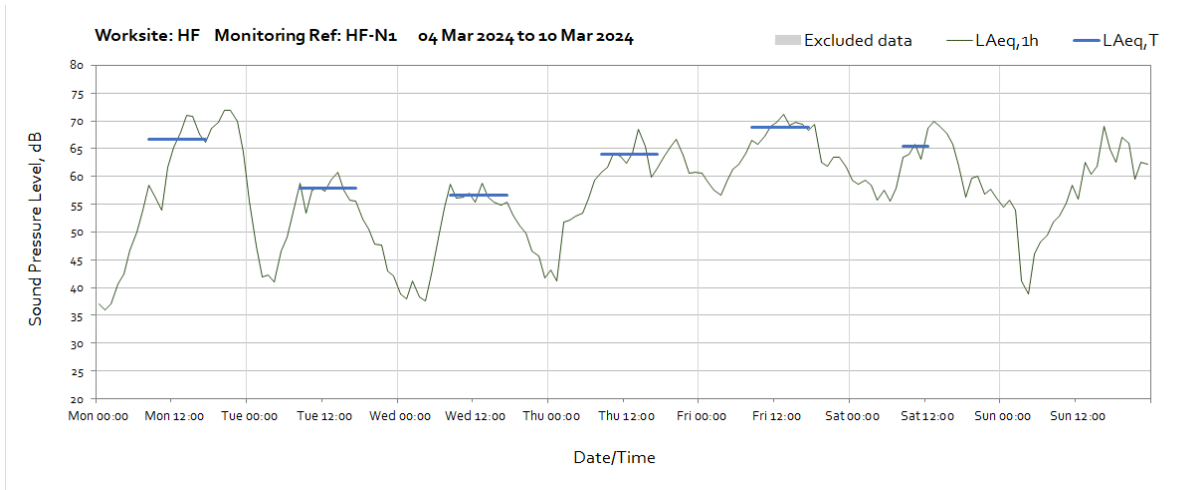


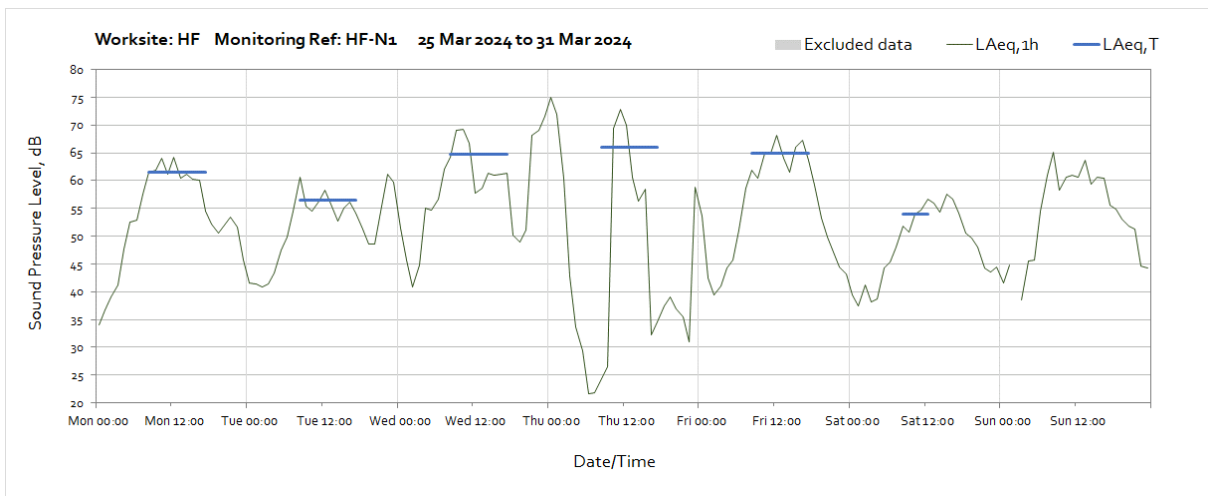
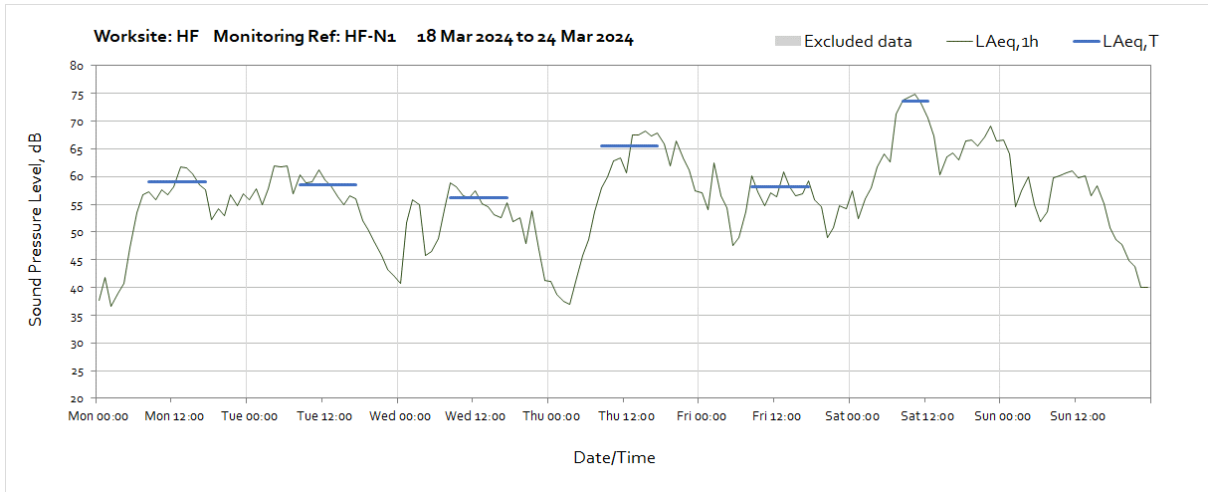
Note: Missing data between 02:00 and 03:00 on Sunday 31st March is due to a monitor time adjustment at the start of British Summer Time.

Worksite: HF – Monitoring Ref: HF-N1



Note: Unusual fluctuations in noise levels throughout the month have been noted and are currently subject to further investigation.





Note: Unusual fluctuations in noise levels throughout the month have been noted and are currently subject to further investigation. Missing data between 02:00 and 03:00 on Sunday 31st March is due to a monitor time adjustment at the start of British Summer Time.