

## **Construction noise and vibration Monthly Report – July 2021**

**Warwick 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 Warwick District Council (WDC) area during the month of July 2021.

Within this period monitoring was undertaken at the following worksites:

- Noise and vibration monitoring were undertaken at the Burton Green Tunnel worksite (ref.: BGT), where work activities included demolition work at 404, 305 and 303 Cromwell Lane, and excavation works.
- Noise monitoring was undertaken at Bockenden Cutting (ref.: BC), where work activities included topsoil stripping, temporary drainage works, and stockpiling.
- Noise monitoring was undertaken at the A429 Kenilworth Road Overbridge (ref.: A429KRO), where work activities included topsoil stripping, temporary drainage works, stockpiling, haul road construction and earthworks.
- Noise monitoring was undertaken at the Cubbington (ref.: CR), where work activities included soil stripping, stockpiling, and deliveries.
- Noise monitoring was undertaken at Fosseyway Diversion (ref.: WP80), where work activities included the construction of the Southern Roundabout, and installation of the gas diversion along Welsh Road.
- Noise monitoring was undertaken at Offchurch Cutting ref.: OC (formerly Welsh Road Underbridge worksite ref: WRU) where work activities included compound extension, construction of road crossing and widening, subsoil stockpile, earthworks, compound construction at Hummingham Road, haul road and plant crossing construction at Hummingham Road and Offchurch Greenway, and construction of attenuation pond.

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

- Rugby to Hanbury, Offchurch & Cubbington, Burton Green and Lavender Hall Farm, as part of water utility works.
- Burton Green, as part of power utility works.
- Dalehouse Lane, as part of sewage diversion works.

There were no exceedances of 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>), 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 during the monitoring period. A description of the complaints, the results of investigations and any actions taken are detailed in Table 8 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 +2.5 to +3 dB) sound level than it would be if the reflecting surface was not there.
Free-field	A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
Peak particle velocity, or PPV	Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position. The PPV is a simple indicator of perceptibility and risk of damage to structures due to vibration. It is usually measured in mm/s.
SOAEL	Significant Observed Adverse Effect Level - the level above which significant adverse effects on health and quality of life occur.
Sound pressure level	The parameter by which sound levels are measured in air. It is measured in decibels. The threshold of hearing has been set at 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB at a distance of 1 metre and a change of 3dB in a time varying sound signal is commonly regarded as being just detectable. A change of 10dB is subjectively twice, or half, as loud.
Vibration dose value, or VDV	An index used to evaluate human exposure to vibration in buildings. While the PPV provides information regarding the magnitude of single vibration events, the VDV provides a measure of the total vibration experienced over a specified period of time (typically 16h daytime and 8h night-time). It takes into account the magnitude, the number and the duration of vibration events and can be used to quantify exposure to continuous, impulsive, occasional and intermittent vibration. The vibration dose value is measured in $m/s^{1.75}$ .

# 1 Introduction

1.1.1 HS2 is required to undertake noise (and vibration) monitoring as necessary to comply with the requirements of the High Speed Rail (London-West Midlands) Environmental Minimum Requirements, including specifically Annex 1: Code of Construction Practice, in addition to any monitoring requirements arising from conditions imposed through consents under Section 61 of the Control of Pollution Act, 1974 or through Undertakings & Assurances given to third parties. Such monitoring may be undertaken for the following purposes:

- monitoring the impact of construction works;
- to investigate complaints, incidents and exceedance of trigger levels; or
- monitoring the effectiveness of noise and vibration control measures.

1.1.2 Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the Warwick District Council (WDC) area for the period 1<sup>st</sup> to 31<sup>st</sup> July 2021.

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

- Burton Green Tunnel worksite ref.: BGT (see plan 1 in Appendix A), where work activities included:
  - demolition work at 404, 305 and 303 Cromwell Lane; and
  - excavation works for the formation level of the South Portal base slab.
- Bockenden Cutting ref.: BC (see plan 1 in Appendix A), where work activities included:
  - topsoil stripping;
  - temporary drainage works; and
  - stockpiling at Bockenden.
- A429 Kenilworth Road Overbridge ref.: A429KRO (see plan 2 in Appendix A), where work activities included:
  - topsoil stripping;

- stockpiling at Crackley;
- temporary drainage works at Kenilworth and Crackley;
- haul road construction; and
- cutting phase 1 earthworks at Kenilworth.
- Cubbington ref.: CR (see plan 2 in Appendix A), where work activities included:
  - soil stripping;
  - stockpiling; and
  - deliveries.
- Fosseyway Diversion ref.: FD (see plan 3 in Appendix A), where work activities included:
  - construction of the Southern Roundabout; and
  - installation of the gas diversion along Welsh Road.
- Offchurch Cutting worksite ref.: OC (see plan 3 in Appendix A), (formerly Welsh Road Underbridge worksite ref: WRU), where work activities included:
  - compound extension;
  - construction of road crossing and widening;
  - subsoil stockpile;
  - earthworks;
  - compound construction at Hummingham Road;
  - haul road and plant crossing construction at Hummingham Road and Offchurch Greenway; and
  - construction of attenuation pond.

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

- Rugby to Hanbury, Offchurch & Cubbington, Burton Green and Lavender Hall Farm, as part of water utility works.
- Burton Green, as part of power utility works.
- Dalehouse Lane, as part of sewage diversion works.

1.1.5 The applicable standards, guidance, and monitoring methodology is outlined in the construction noise and vibration monitoring methodology report which can be

found at the following location

<https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2>. Noise and vibration monitoring reports for previous months can also be found at this location.

## 1.2 Measurement Locations

- 1.2.1 Thirteen noise monitoring installations and two vibration monitoring installation were active in July in the WDC area. Table 2 summarises the position of the noise monitoring installations within the WDC area in July 2021.
- 1.2.2 One additional noise monitor (ref.: CR-N1) was installed south-west of Wychwood, Cubbington Road, Lillington, Leamington Spa, worksite ref. CR, on the 23<sup>rd</sup> of July.
- 1.2.3 One additional noise monitor (ref.: OC-N2) was installed north-east of Valley Fields, Hunningham Road, Offchurch, Leamington Spa, worksite ref. OCVF, on the 5<sup>th</sup> of July.
- 1.2.4 Maps showing the position of the noise monitoring installations are presented in Appendix B.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
Burton Green Tunnel (BGT)	BGT-N1	301 Cromwell Lane, Burton Green, Warwick, Warwickshire
	BGT-N2	Broadwell Woods Caravan Park, Red Lane, Burton Green, Warwick, Warwickshire
	BGT-N3	404 Cromwell Lane, Burton Green, Warwick, Warwickshire
	BGT-N4	307 Cromwell Lane, Burton Green, Warwick, Warwickshire
	BGT-V1	404 Cromwell Lane, Burton Green, Warwick, Warwickshire
	BGT-V2	307 Cromwell Lane, Burton Green, Warwick, Warwickshire
Bockenden Cutting (BC)	BC-N1	Thistle Estate, Red Lane, Burton Green, Warwick, Warwickshire
A429 Kenilworth Road Overbridge (A429KRO)	A429KRO-N1	Millburn Grange, Coventry Road, Kenilworth
	A429KRO-N2	Brookview, Milburn Grange, Coventry Road, Kenilworth
	A429KRO-N3	16 Kenilworth Road, Kenilworth
Cubbington(CR)	CR-N1	Wychwood, Cubbington Road, Leamington Spa
Offchurch Cutting Valley Field (OCVF)	OC-N2	Valley Fields, Offchurch, Leamington Spa
Fosseway Diversion (FD)	FD-N1	Burnt Heath Cottages Long Itchington Rd, Offchurch, Leamington Spa
	FD-N2	Spring Hill Cottages Fosse Way, Offchurch, Leamington Spa



Worksite Reference	Measurement Reference	Address
Offchurch Cutting (OC)	OC-N1	Welsh Road, Offchurch, Leamington

## 2 Summary of Results

### 2.1 Summary of Measured Noise and Vibration 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<sub>Aeq</sub> Data over the Monitoring Period

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average L <sub>Aeq,T</sub> (highest Day L <sub>Aeq,T</sub> )					Saturday Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )					Sunday / Public Holiday Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
BGT	BGT-N1	301 Cromwell Lane, Burton Green, Warwick, Warwickshire	Free-field	46.1 (56.9)	54.9 (64.7)	42.1 (47.9)	41.2 (52.8)	42.0 (58.7)	45.2 (55.7)	49.0 (64.8)	41.4 (42.7)	41.5 (51.2)	39.7 (55.5)	42.7 (53.8)	42.0 (55.3)
	BGT-N2	Broadwell Woods Caravan Park, Red Lane, Burton Green, Warwick, Warwickshire	Free-field	44.4 (50.7)	52.8 (60.5)	42.5 (47.6)	40.9 (48.4)	39.0 (54.8)	42.3 (45.5)	45.9 (55.2)	41.0 (44.3)	42.1 (48.8)	37.5 (49.0)	43.2 (51.2)	37.1 (45.9)
	BGT-N3	Cromwell Lane, Burton Green, Warwick, Warwickshire	Free-field	54.6 (73.5)	58.7 (77.6)	50.9 (53.3)	48.4 (51.6)	43.9 (52.0)	48.7 (51.0)	51.0 (51.7)	50.6 (51.7)	50.2 (54.0)	42.4 (47.1)	49.6 (54.3)	43.5 (51.2)
	BGT-N4	307 Cromwell Lane, Burton Green, Warwick, Warwickshire	Free-field	54.8 (69.1)	59.3 (76.2)	50.8 (56.1)	48.2 (53.8)	44.2 (53.1)	48.3 (50.9)	51.7 (53.4)	50.6 (54.5)	51.7 (59.9)	42.9 (49.1)	52.9 (66.1)	43.0 (50.3)
BC	BC-N1	Thistle Estate, Red Lane, Burton Green, Warwick, Warwickshire	Free-field	46.3 (55.1)	55.4 (70.7)	41.4 (57.7)	40.9 (67.7)	42.7 (65.7)	43.4 (48.1)	47.1 (57.9)	40.1 (44.2)	40.4 (50.7)	38.0 (56.2)	42.7 (60.3)	42.3 (57.5)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average $L_{Aeq,T}$ (highest Day $L_{Aeq,T}$ )					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
A429KRO	A429KRO -N1	Millburn Grange, Coventry Road, Kenilworth	Free-field	52.0 (57.7)	58.0 (76.4)	52.8 (68.8)	52.6 (58.7)	49.7 (57.9)	50.9 (51.6)	51.9 (52.8)	51.1 (53.5)	55.3 (81.9)	42.3 (48.0)	50.6 (54.0)	45.9 (54.5)
	A429KRO -N2	Brookview, Milburn Grange, Coventry Road, Kenilworth	Free-field	49.0 (53.6)	54.9 (62.9)	49.6 (57.3)	50.2 (61.1)	46.5 (56.0)	47.1 (48.8)	49.8 (51.6)	47.9 (51.6)	49.3 (59.2)	41.1 (46.0)	48.2 (53.3)	44.8 (57.2)
	A429KRO -N3	16 Kenilworth Road, Kenilworth	Free-field	55.1 (57.3)	57.1 (61.2)	54.6 (55.9)	53.5 (57.7)	50.0 (63.3)	52.3 (54.1)	55.2 (55.8)	55.4 (56.4)	54.0 (58.1)	49.8 (61.3)	53.8 (59.6)	49.6 (60.0)
CR	CR-N1	Wychwood, Cubbington Road, Lillington, Leamington Spa	Free field	52.1 (53.9)	53.3 (55.1)	53.2 (54.9)	50.5 (54.7)	43.6 (49.3)	48.0 (48.6)	52.9 (53.2)	53.2 (54.2)	52.0 (55.2)	44.5 (46.4)	50.5 (54.4)	42.6 (48.9)
OCVF	OC-N2	Valley Fields, Hunningham Road, Offchurch, Leamington Spa	Free field	44.7 (57.2)	57.5 (68.5)	47.2 (54.3)	47.5 (60.9)	40.0 (52.0)	44.0 (46.8)	46.7 (49.7)	45.8 (48.5)	44.7 (52.8)	38.3 (43.9)	48.4 (61.6)	39.9 (48.5)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average $L_{Aeq,T}$ (highest Day $L_{Aeq,T}$ )					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$ )	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
FD	FD-N1	Burnt Heath Cottages Long Itchington Rd, Offchurch, Leamington Spa	Free-field	57.0 (59.7)	57.3 (62.4)	57.6 (62.6)	55.1 (63.2)	48.6 (57.4)	53.0 (53.6)	56.3 (57.2)	57.1 (60.3)	55.9 (62.2)	47.8 (53.6)	54.8 (58.5)	48.0 (55.9)
	FD-N1	Spring Hill Cottages Fosse Way, Offchurch, Leamington Spa	Free-field	66.1 (67.2)	65.6 (67.6)	64.7 (66.6)	62.3 (67.1)	57.3 (65.3)	61.7 (62.5)	64.8 (65.5)	64.7 (66.8)	63.1 (66.4)	55.4 (60.2)	63.3 (69.9)	57.4 (65.0)
OC	OC-N1	Welsh Road, Offchurch, Leamington	Free-field	52.5 (55.0)	56.3 (60.9)	48.9 (53.4)	46.3 (53.0)	41.8 (57.5)	50.0 (56.5)	55.2 (60.9)	50.2 (56.5)	47.7 (53.2)	39.7 (47.0)	46.4 (52.0)	41.0 (49.8)

2.1.2 Table 4 presents a summary of the measured vibration levels at each monitoring location over the reporting period. The highest component PPV measured during periods of work along any axis is presented in the table.

Table 4: Summary of Measured PPV Data over the Monitoring Period

Worksite Reference	Measurement Reference	Monitor Address	Highest PPV measured in any axis, mm/s
BGT	BGT-V1	Cromwell Lane, Burton Green, Warwick, Warwickshire, CV8 1PG	4.67 (X-axis)
	BGT-V2	307 Cromwell Lane, Burton Green, Warwick, Warwickshire, CV8 1PG	6.44 (Z-axis)

2.1.3 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 5 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 5: Summary of Exceedances of LOAEL and SOAEL

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
BGT	BGT-N1*	301 Cromwell Lane, Burton Green, Warwick, Warwickshire	All days	All periods	No exceedances	No exceedances
	BGT-N2*	Broadwell Woods Caravan Park, Red Lane, Burton Green, Warwick, Warwickshire	All days	All periods	No exceedances	No exceedances
	BGT-N3*	Cromwell Lane, Burton Green, Warwick, Warwickshire	Weekday	0800-1800	3	1
	BGT-N4	307 Cromwell Lane, Burton Green, Warwick, Warwickshire	Weekday	0800-1800	6	2
BC	BC-N1*	Thistle Estate, Red Lane, Burton Green, Warwick, Warwickshire	All days	All periods	No exceedances	No exceedances
A429KRO	A429KRO-N1*	Millburn Grange, Coventry Road, Kenilworth	All days	All periods	No exceedances	No exceedances
	A429KRO-N2*	Brookview, Millburn Grange,	All days	All periods	No exceedances	No exceedances

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
		Coventry Road, Kenilworth				
	A429KRO-N3*	16 Kenilworth Road, Kenilworth	All days	All periods	No exceedances	No exceedances
CR	CR-N1	Wychwood, Cubbington Road, Lillington, Leamington Spa	All days	All periods	No exceedances	No exceedances
OCVF	OC-N2*	Valley Fields, Hunningham Road, Offchurch, Leamington Spa	Weekday	0800-1800	2	No exceedances
FD	FD-N1	Burnt Heath Cottages Long Itchington Rd, Offchurch, Leamington Spa	All days	All periods	No exceedances	No exceedances
	FD-N2	Spring Hill Cottages Fosse Way, Offchurch, Leamington Spa	All days	All periods	No exceedances	No exceedances
OC	OC-N1*	Welsh Road, Offchurch, Leamington,	All days	All periods	No exceedances	No exceedances

\* A distance correction has been applied when calculating exceedances of the LOAEL and SOAEL.

2.2.6 For the purpose of assessing eligibility for noise insulation or temporary rehousing, multiple exceedances of the SOAEL in a 24-hour period would be counted as a single exceedance during that day. Over the reporting period, the overall number of SOAEL exceedances at each measurement location is shown in Table 6 and may be lower than the total sum of individual exceedances reported in Table 5 for each location.



Table 6: Summary of Total Exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
BGT	BGT-N3	Cromwell Lane, Burton Green, Warwick, Warwickshire	1
	BGT-N4	307 Cromwell Lane, Burton Green, Warwick, Warwickshire	2

2.2.7 3 no. exceedances of the SOAEL were recorded due to demolition works near the Burton Green Tunnel worksite during weekday working periods, July 2021. 9 no. exceedances of the LOAEL were recorded near the Burton Green Tunnel worksite during weekday working periods. 2 no. exceedance of the LOAEL was recorded near the Offchurch Cutting worksite during weekday working periods.

## 2.3 Exceedances of Trigger Level

2.3.1 Table 7 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 7: 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

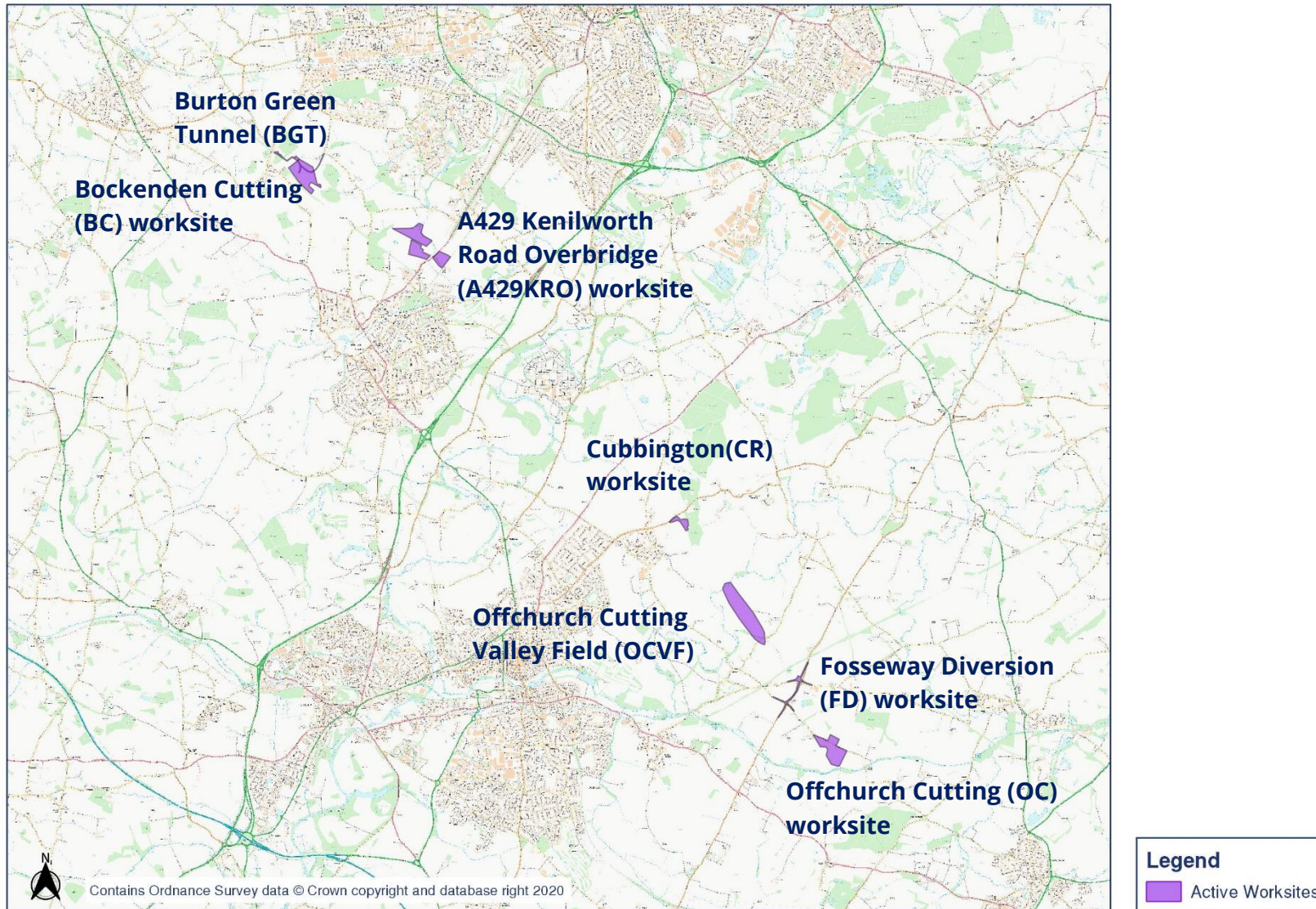
2.4.1 Table 8 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

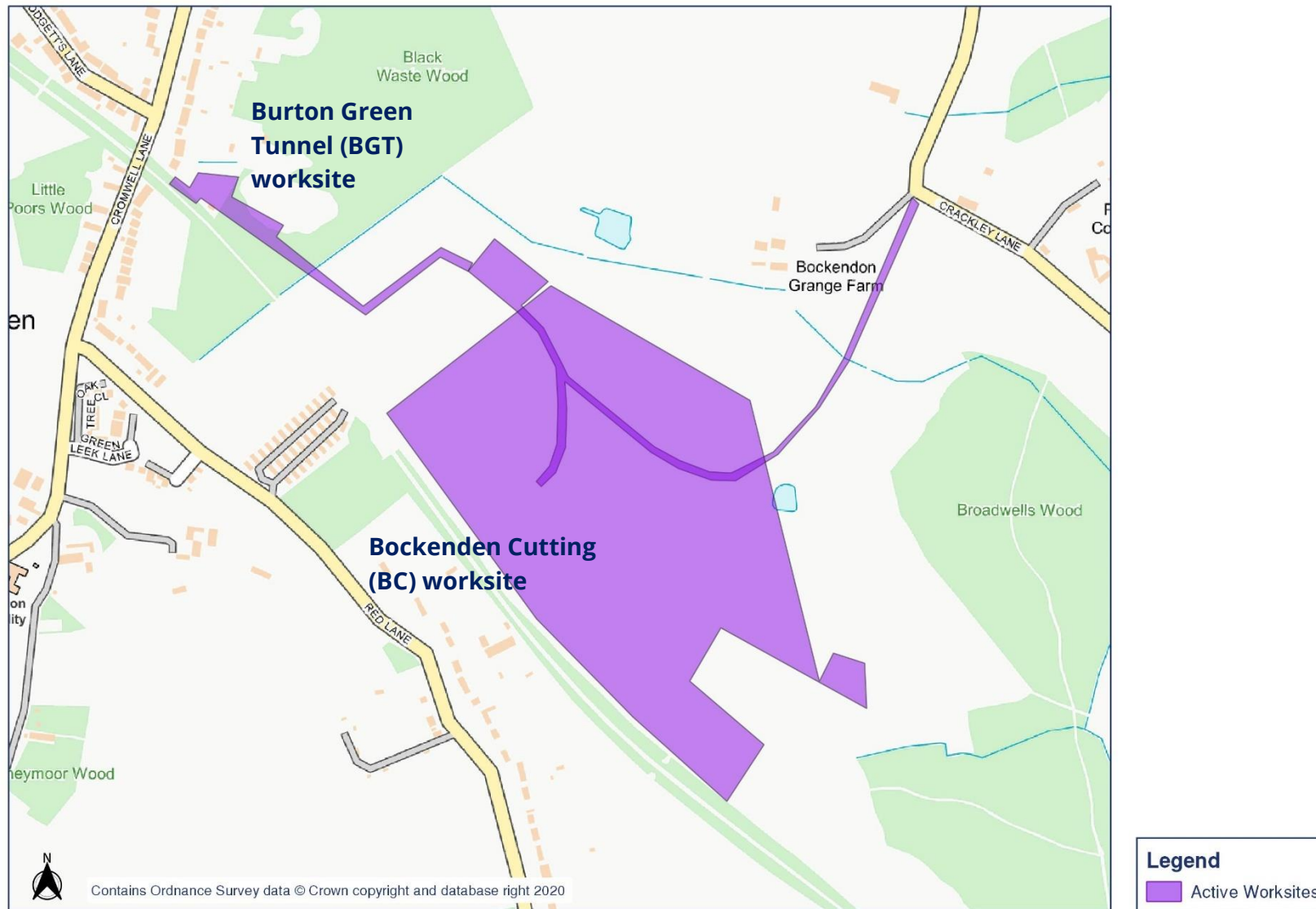
Table 8: Summary of Complaints

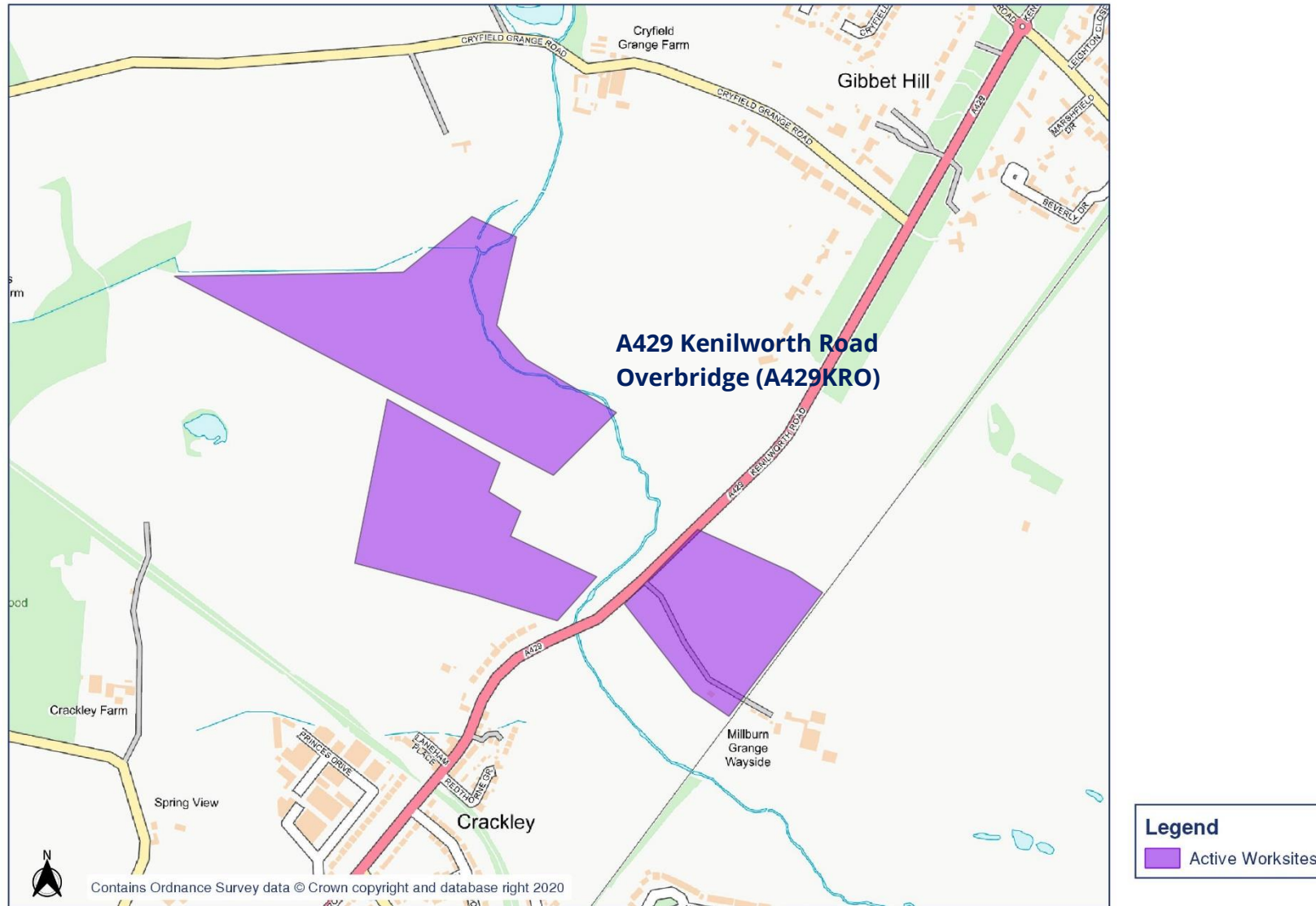
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-42243-C	BC/BGT	Complaint due to noise from construction vehicles beep.	The noise was confirmed to be from ongoing HS2 related construction works.	Information was provided to the stakeholder confirming the beeping of noise for safety purposes and the team on site reminded to keep mindful of the local community and to only do this when it is necessary.
HS2-21-42320-C	A429KRO	Complaint due to construction noise occurring outside of construction hours.	The noise was confirmed to be from ongoing HS2 related construction works.	Information was provided to the stakeholder confirming the delivery of an abnormal load and urgent last-minute delivery causing disruption.
HS2-21-42322-C	A429KRO	Complaint due to construction noise occurring outside of construction hours.	The noise was confirmed to be from ongoing HS2 related construction works.	Information was provided to the stakeholder confirming the delivery of an

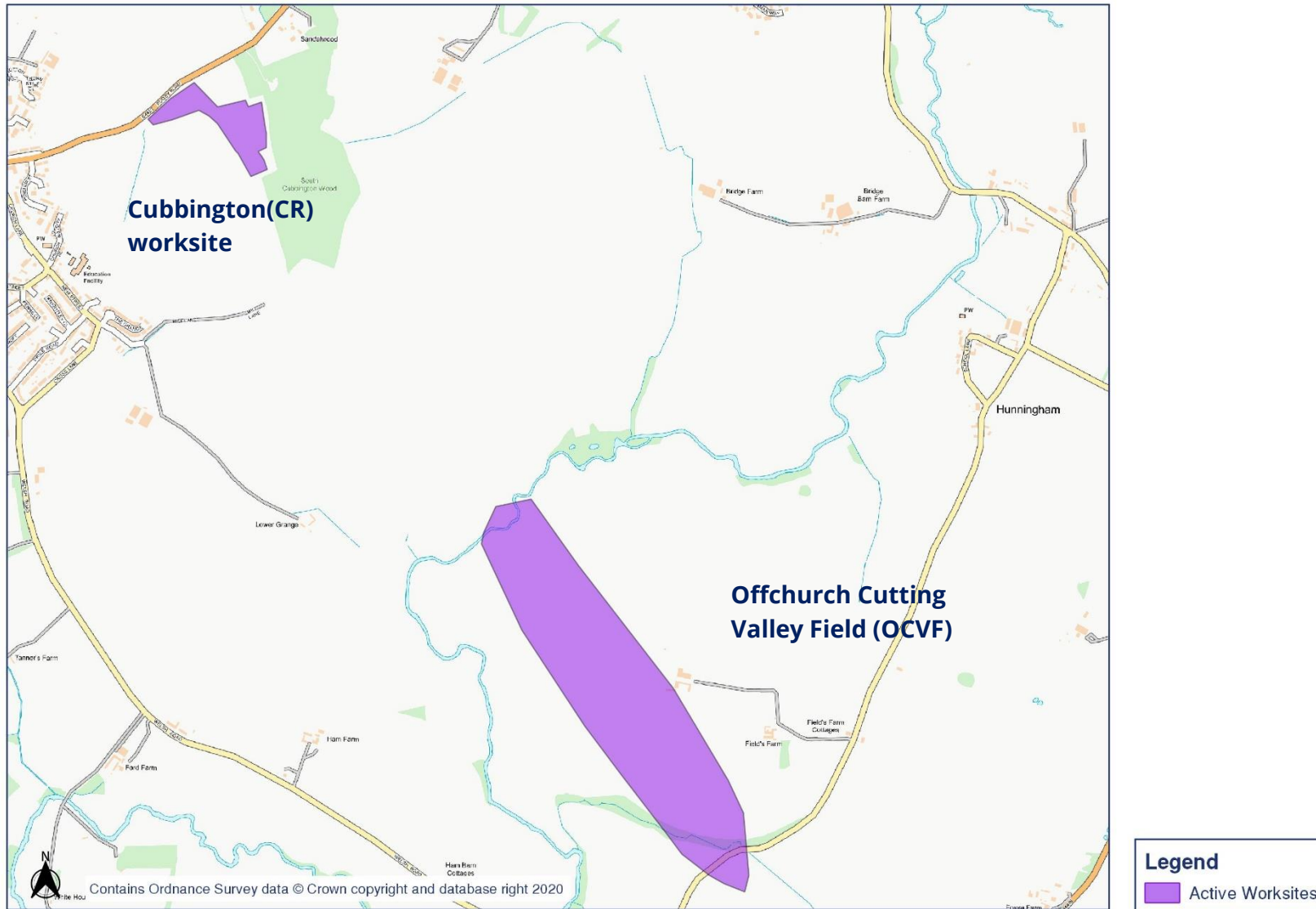
				abnormal load and urgent last-minute delivery causing disruption.
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# Appendix A Site Locations

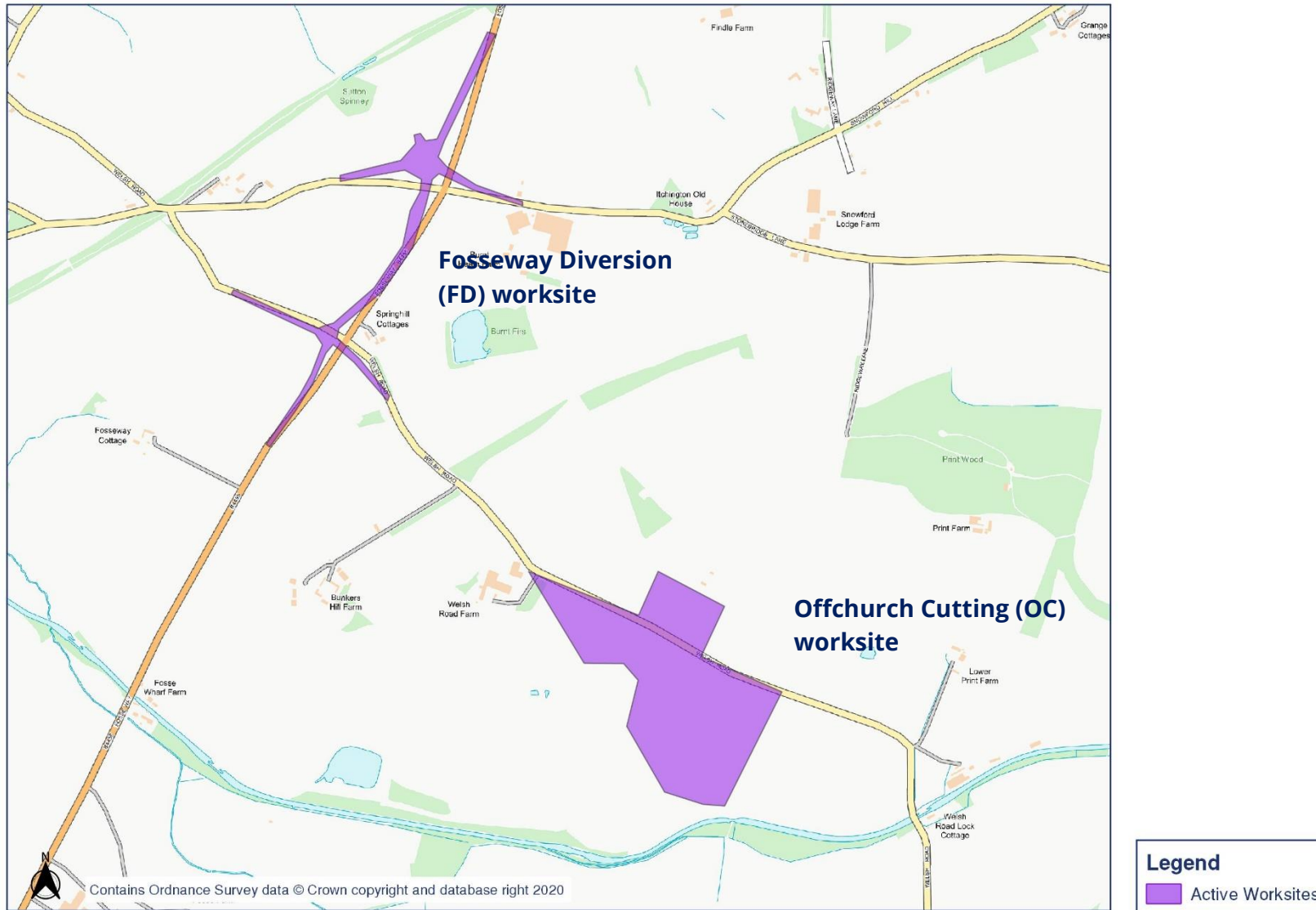




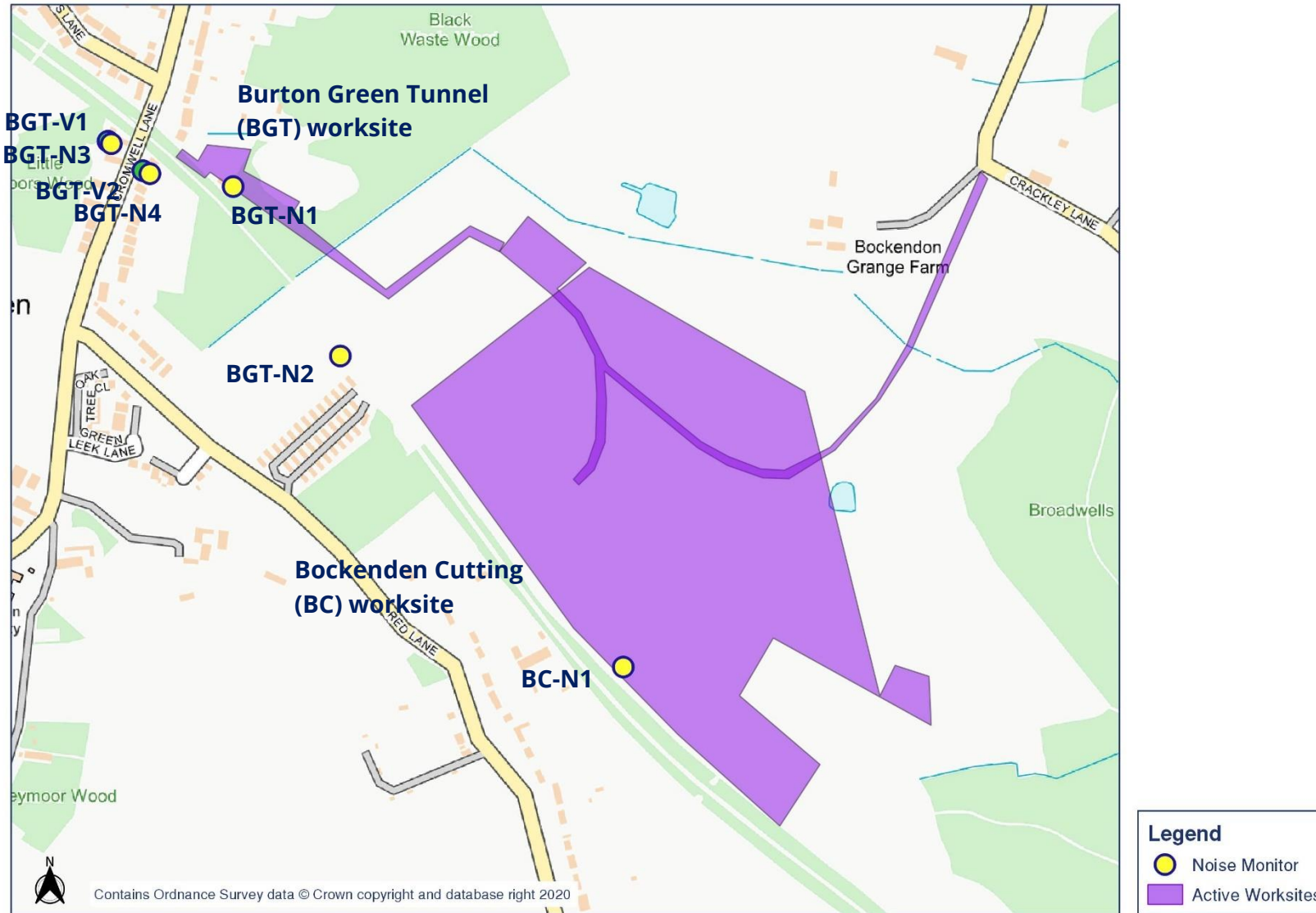


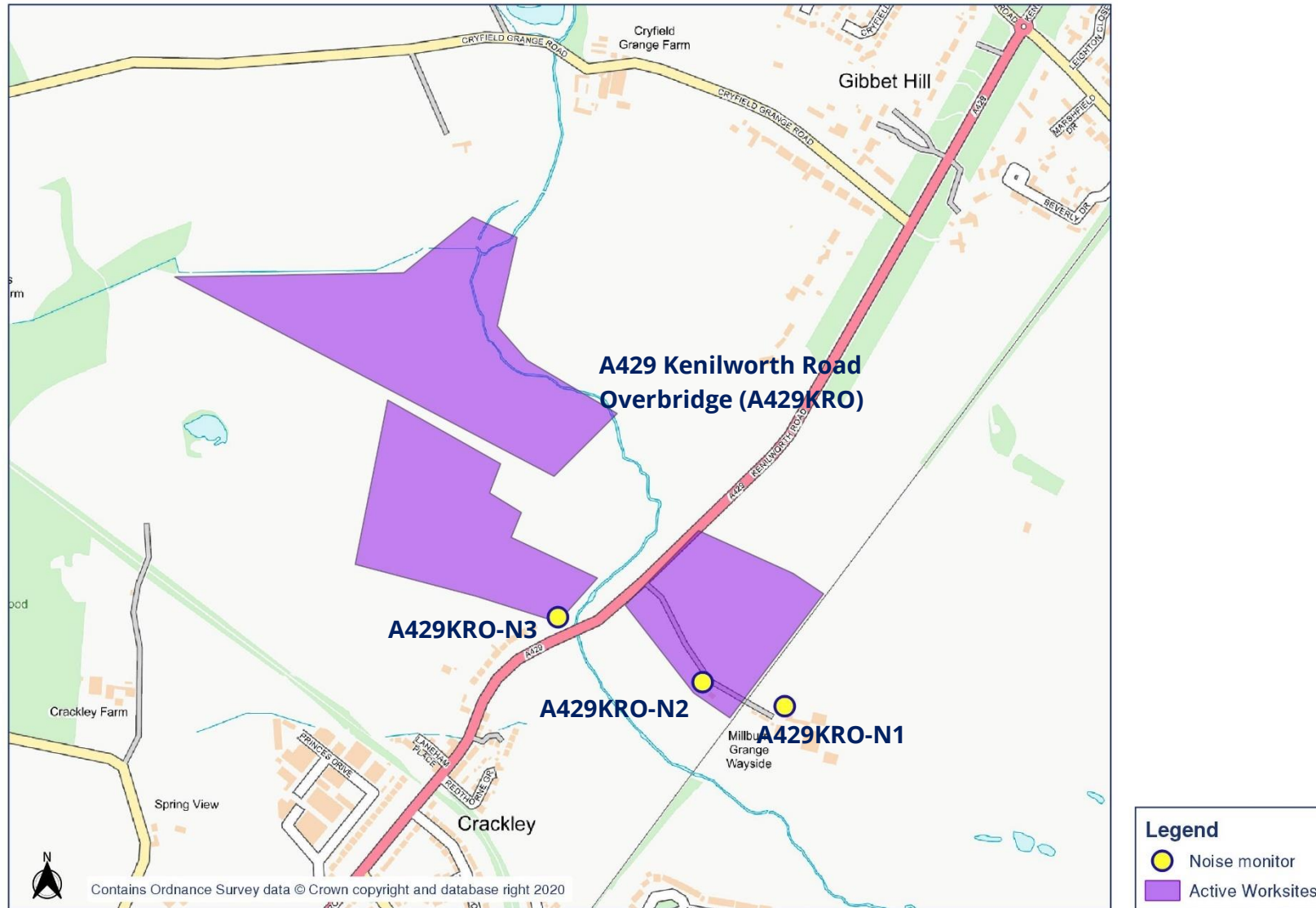


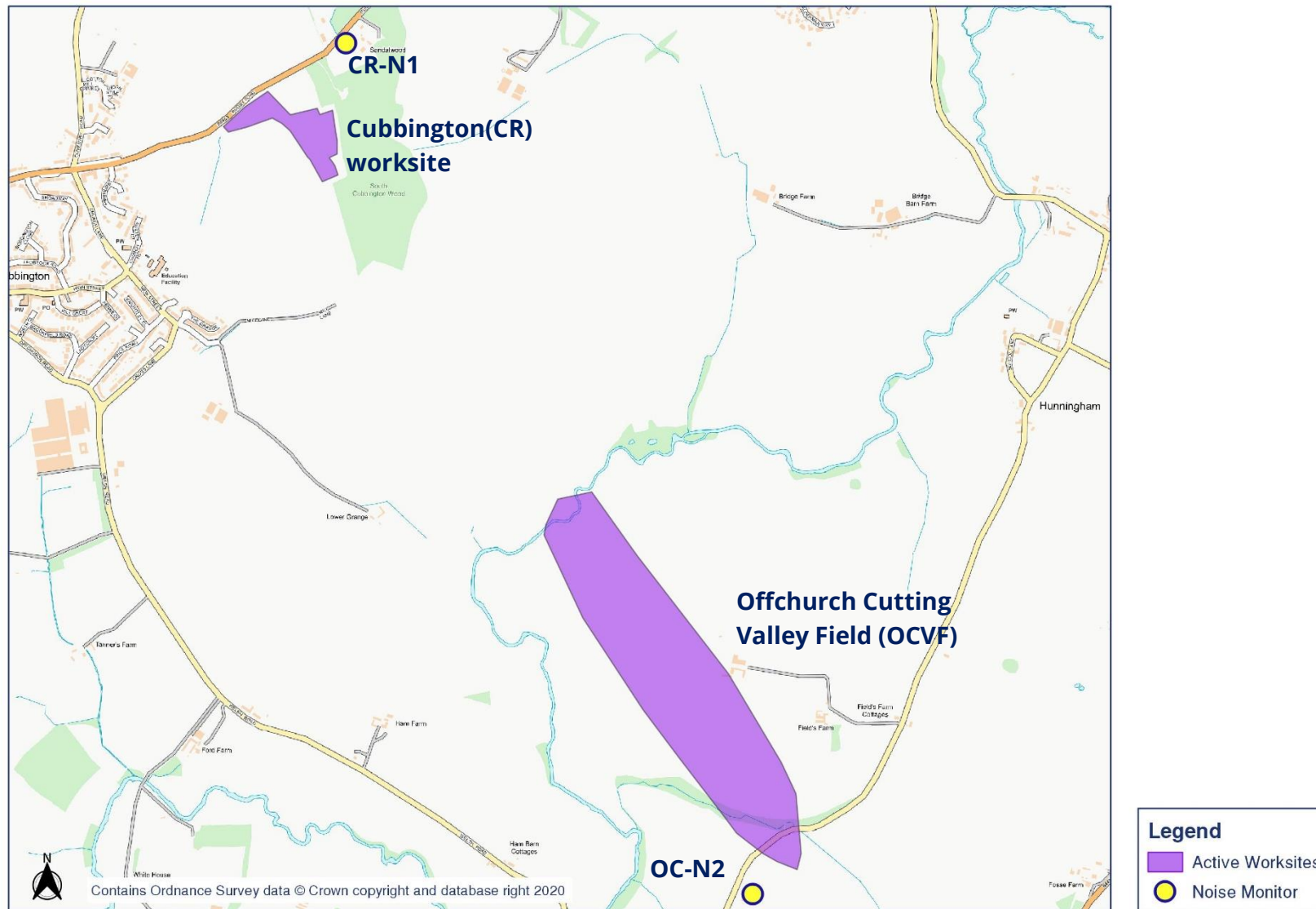


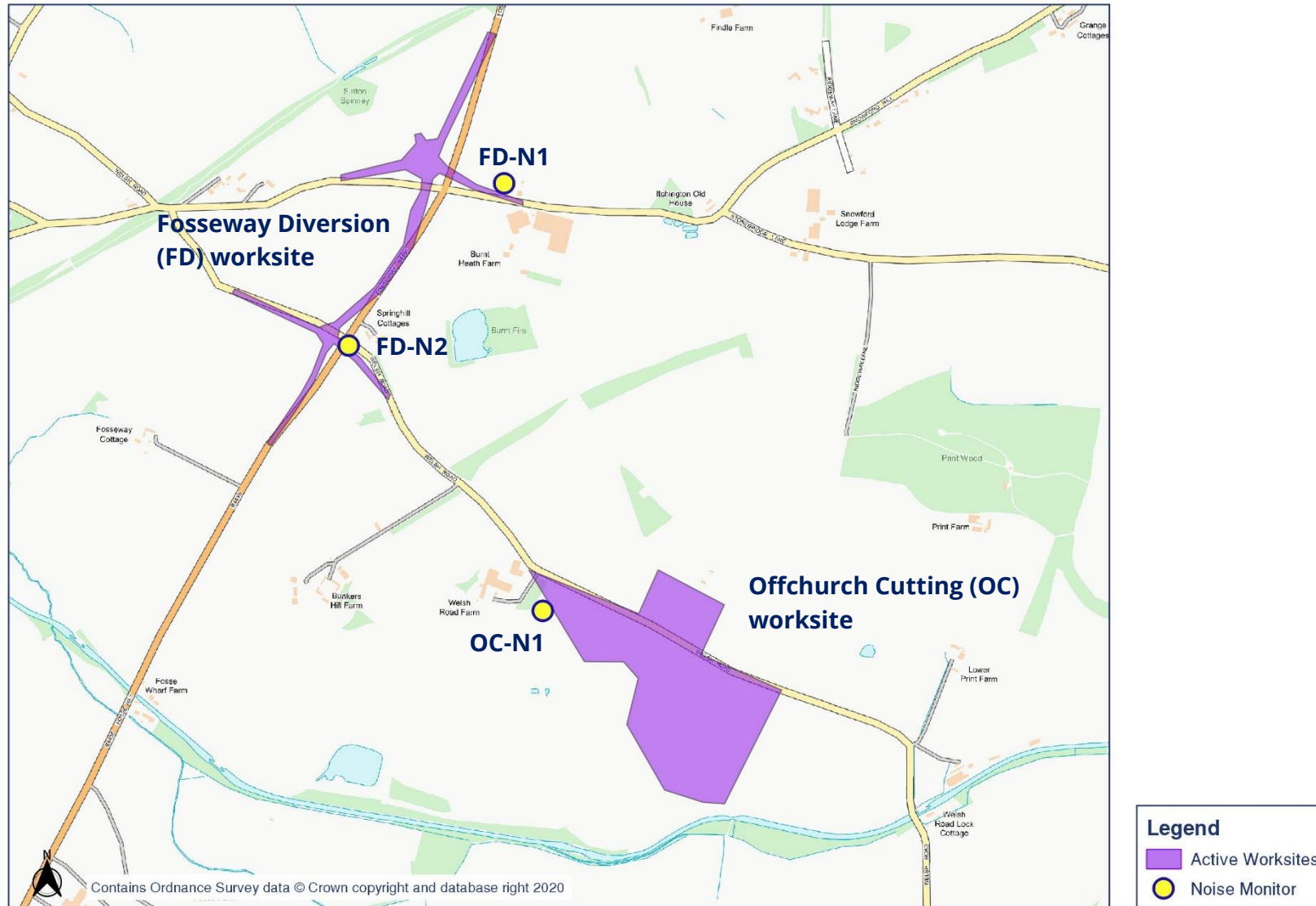


# Appendix B Monitoring Locations







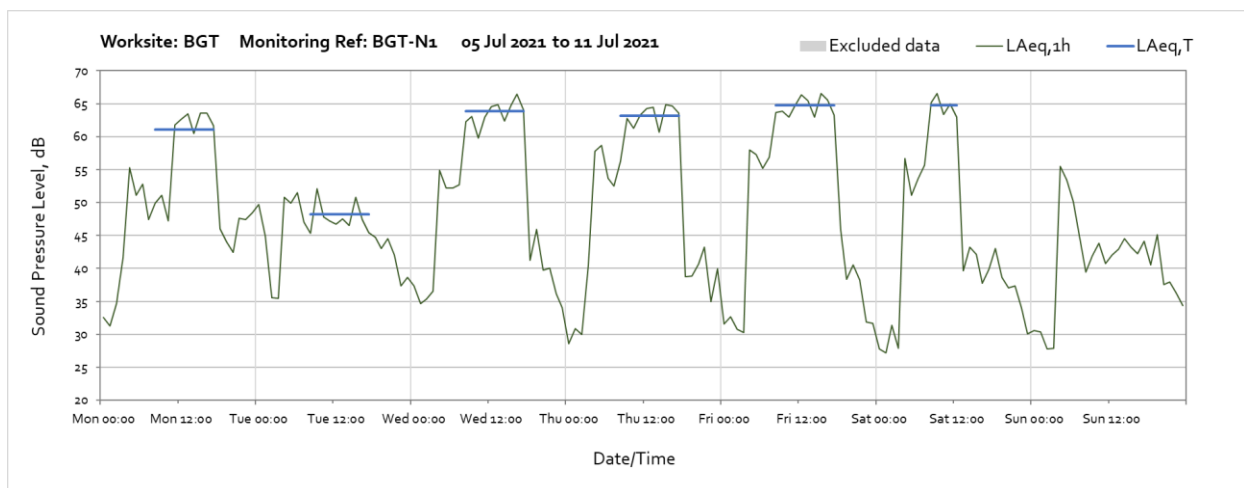
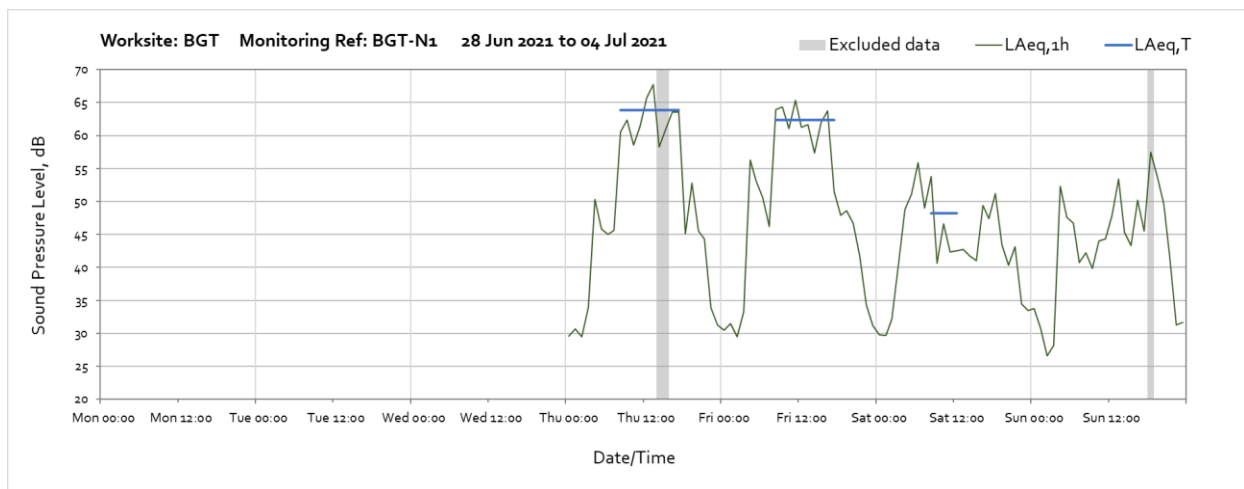


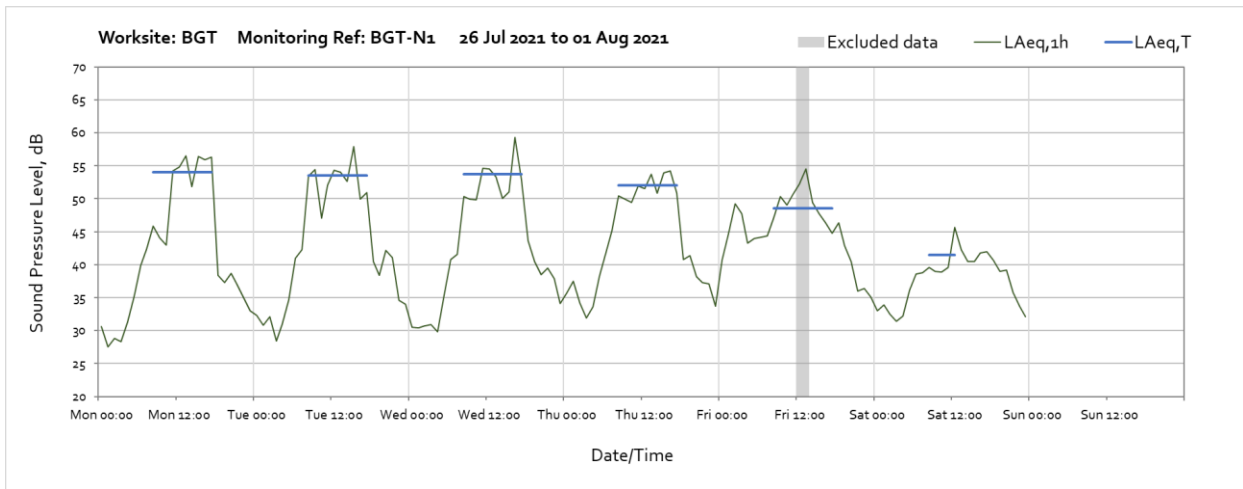
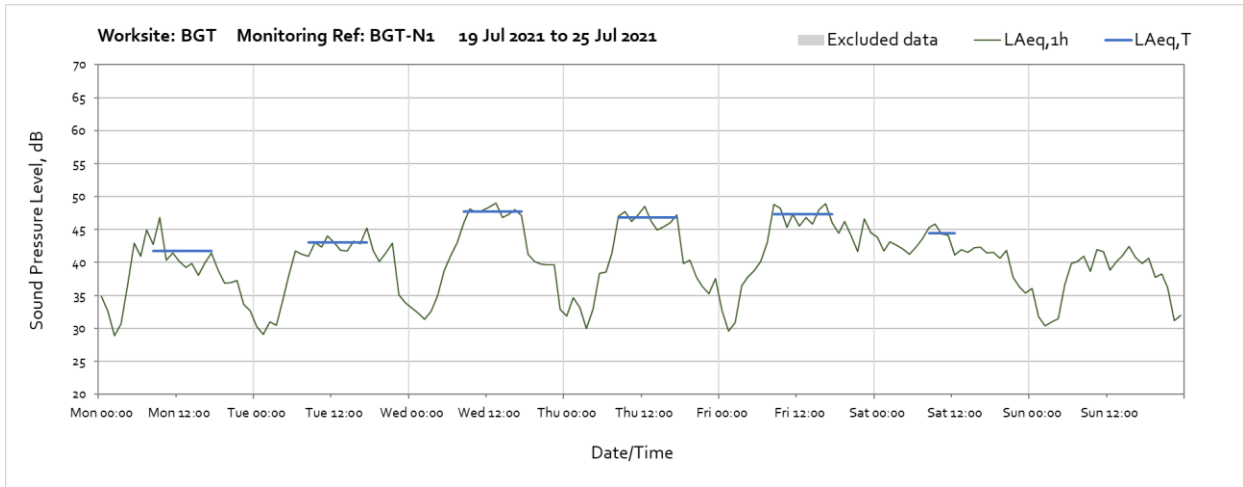
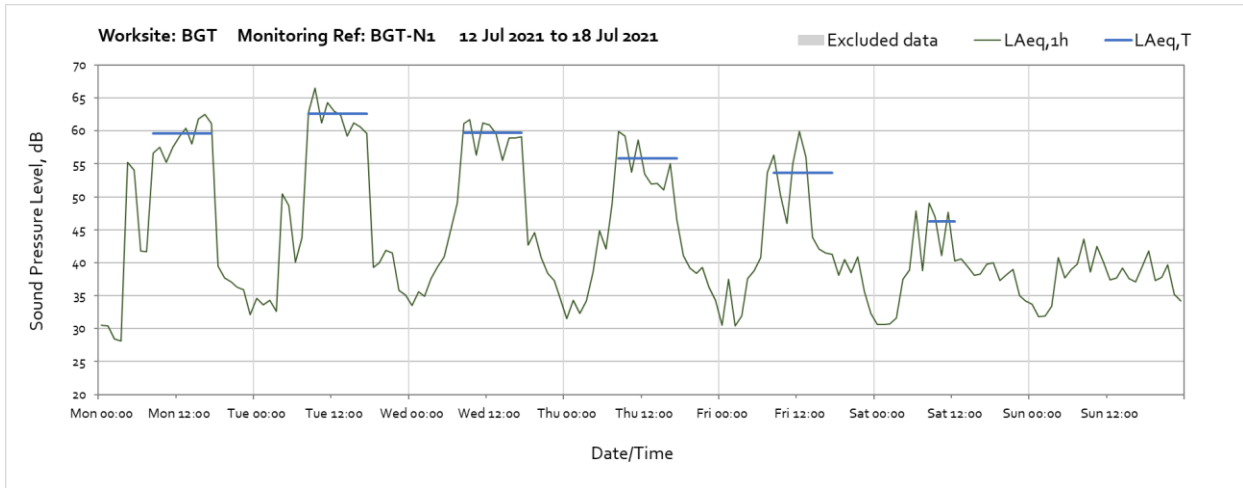
# Appendix C Data

## 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 with adversely weather affected noise levels are greyed out and have been excluded from the calculation of the  $L_{Aeq,T}$  values in Table 3 of the main report.

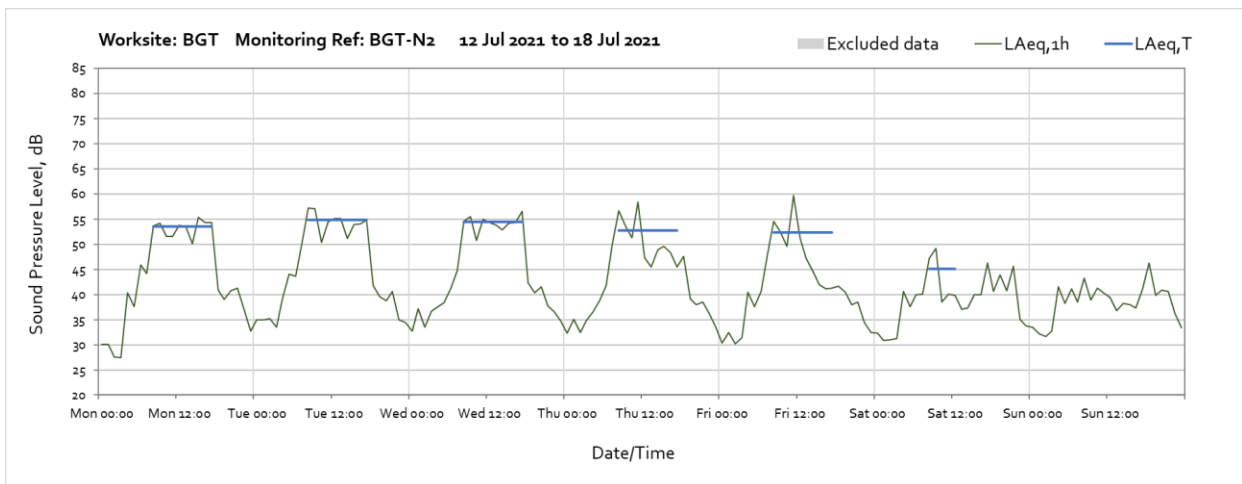
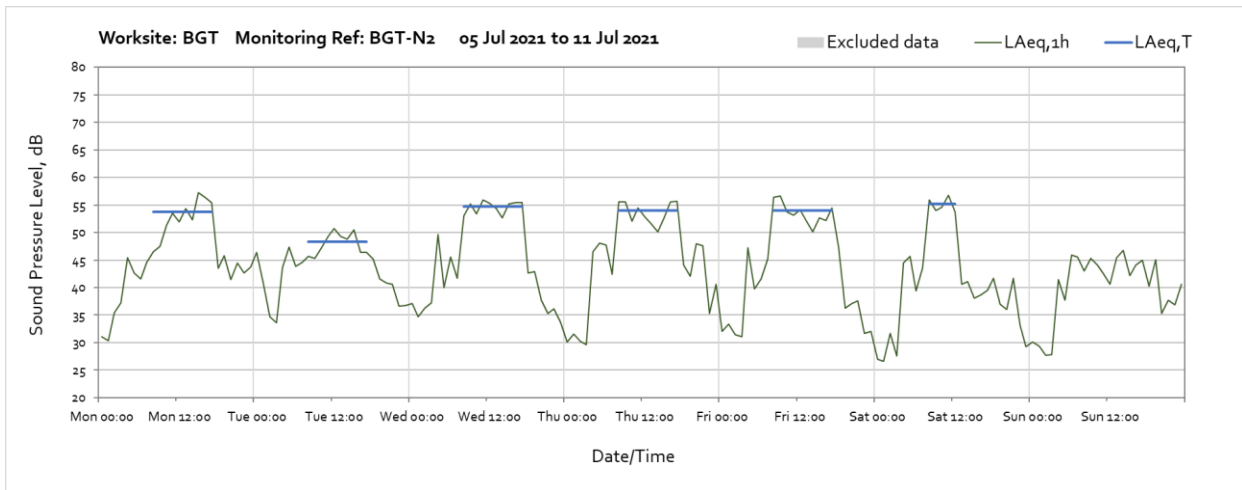
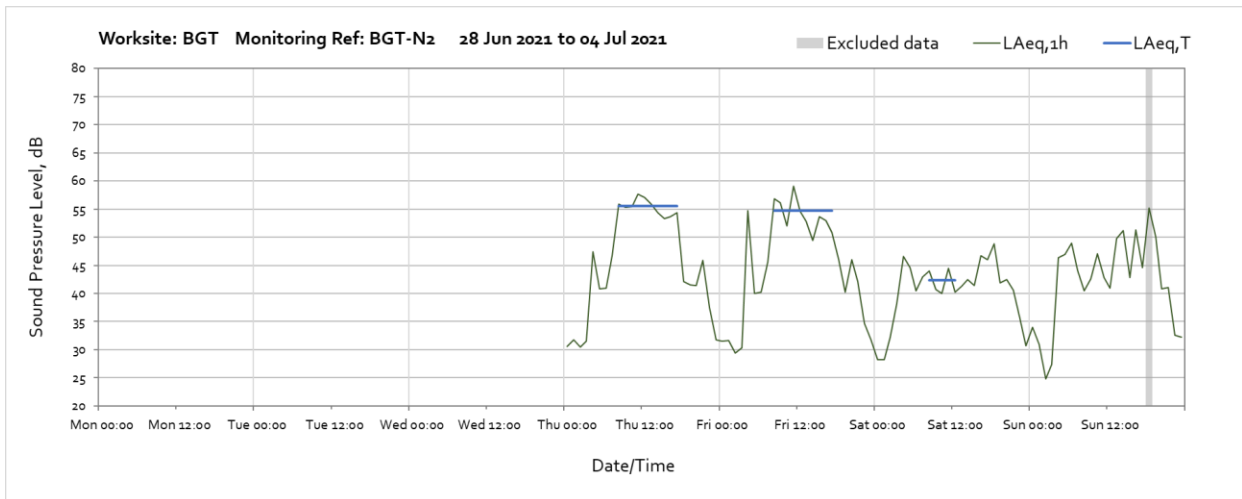
### Worksite: BGT - Monitoring Ref: BGT-N1

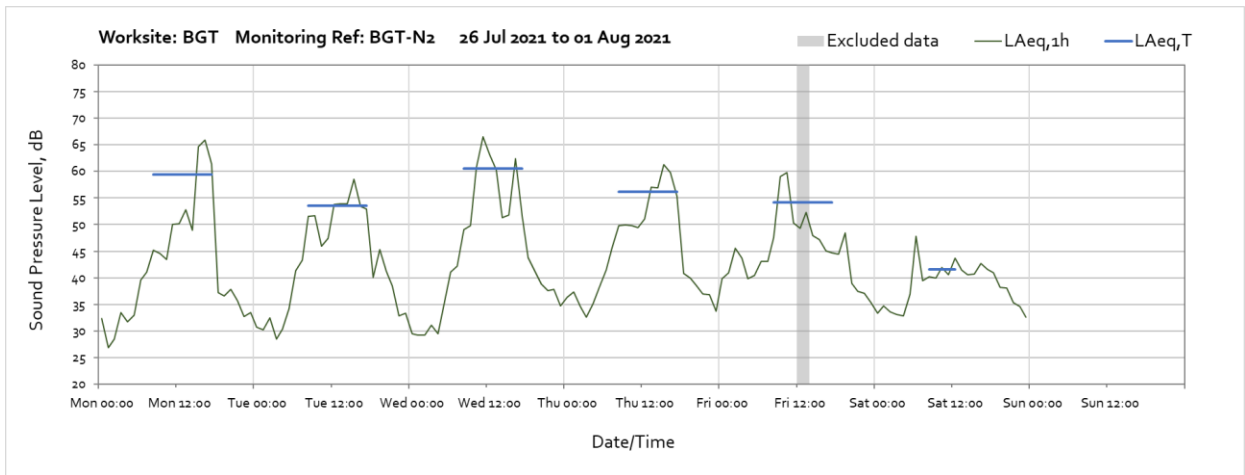
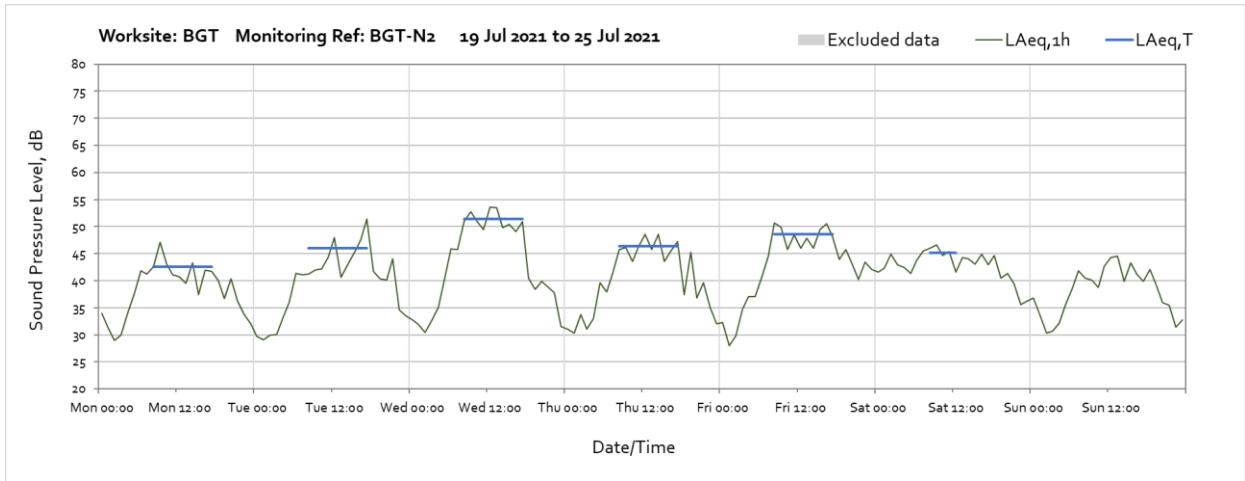




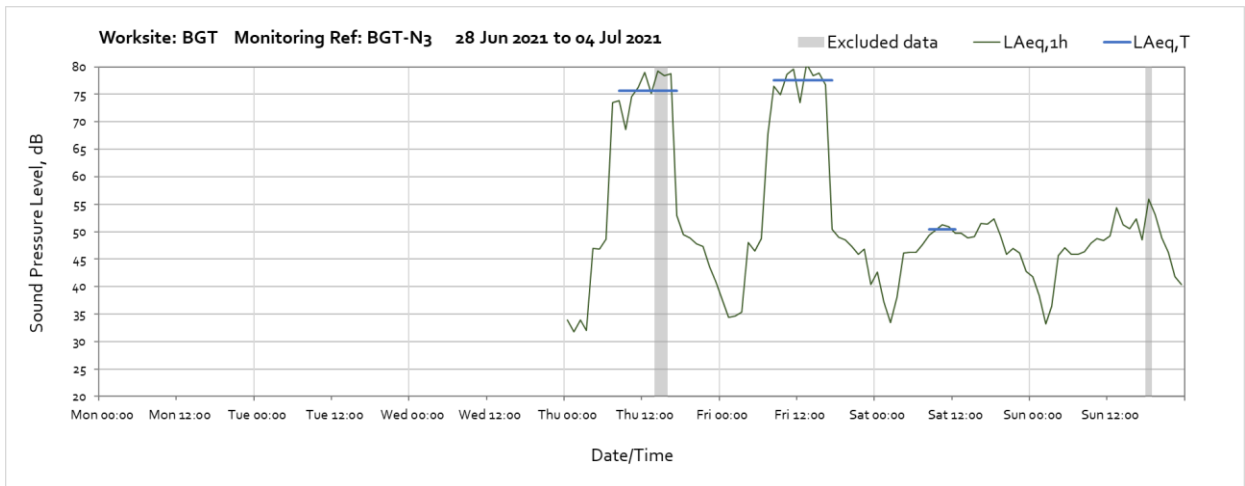


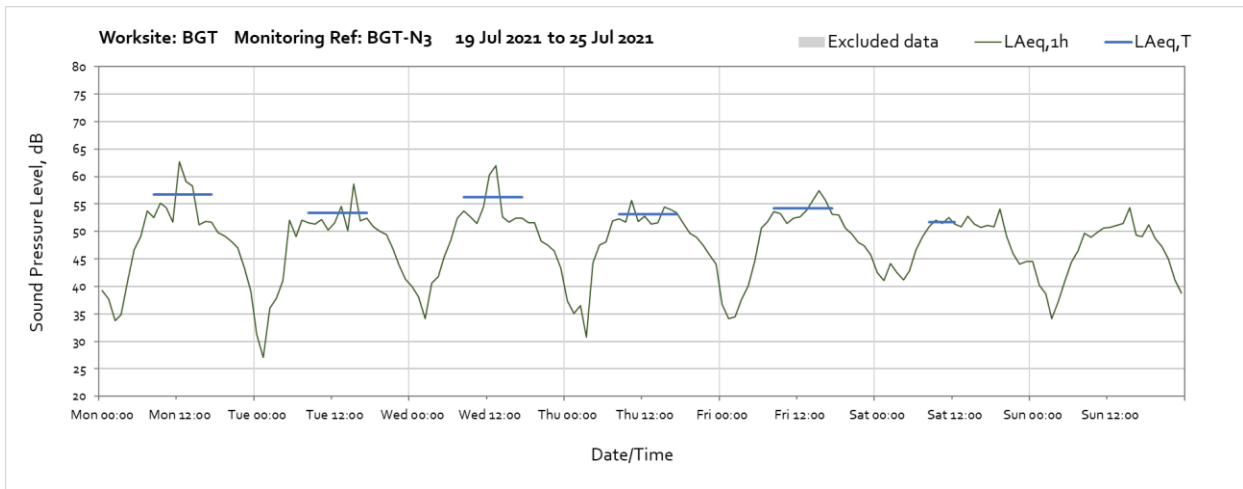
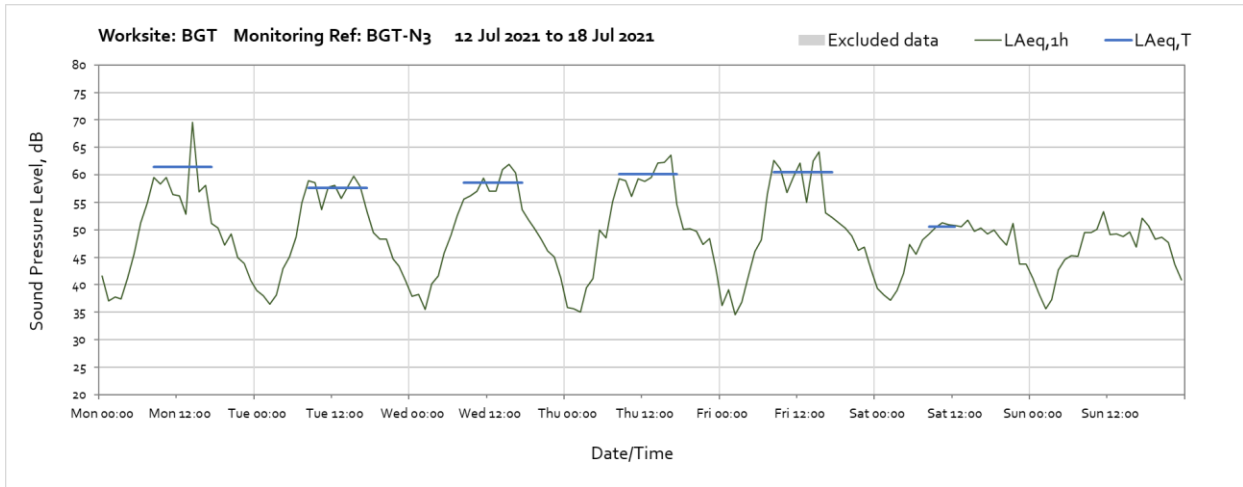
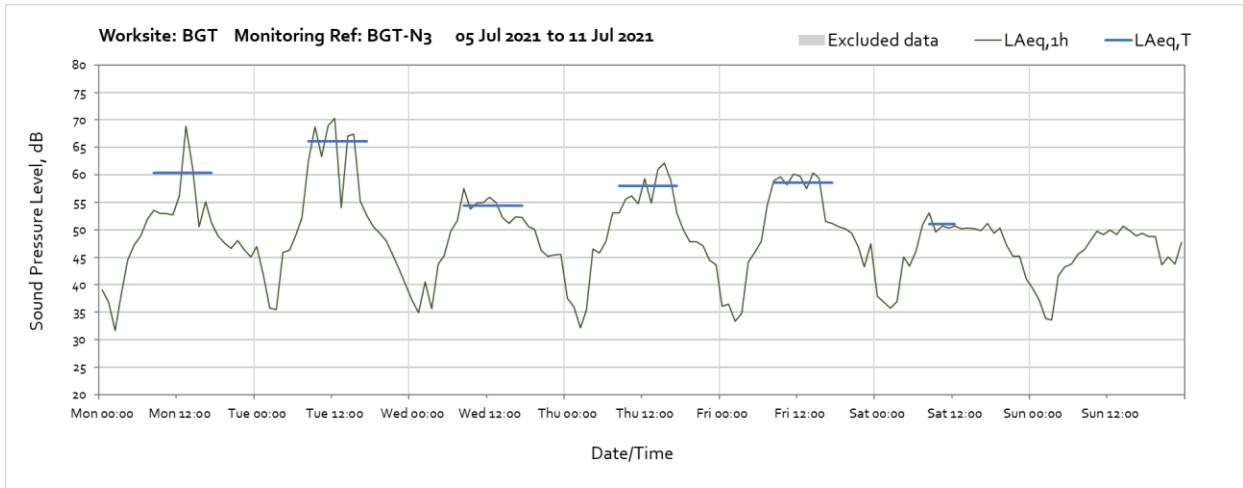
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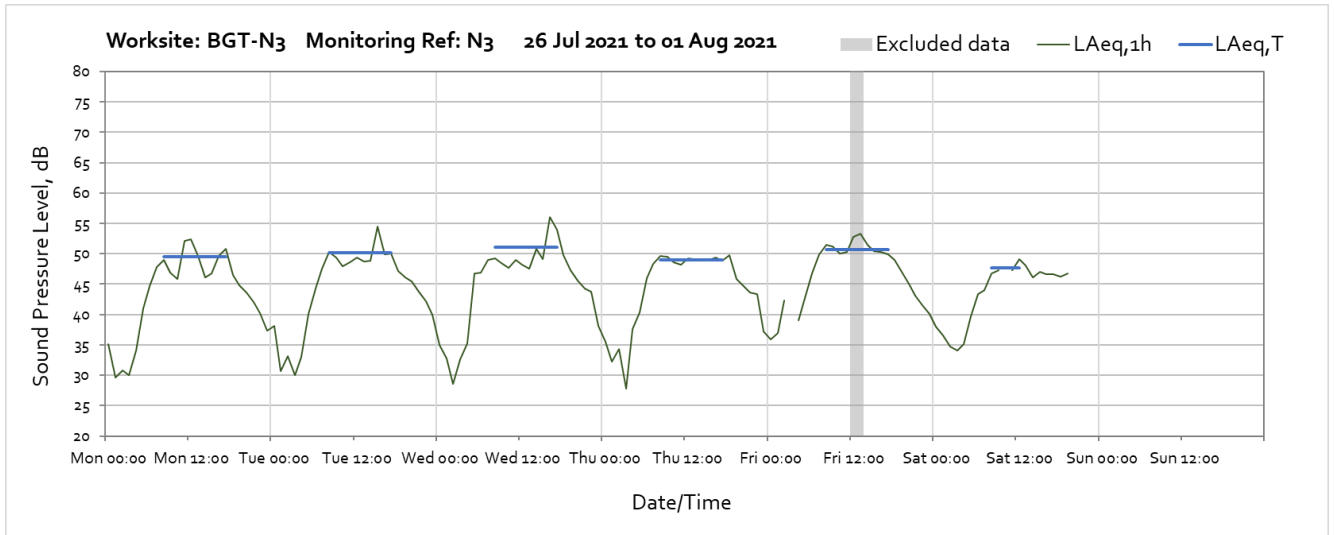




**Worksite: BGT - Monitoring Ref: BGT-N3**

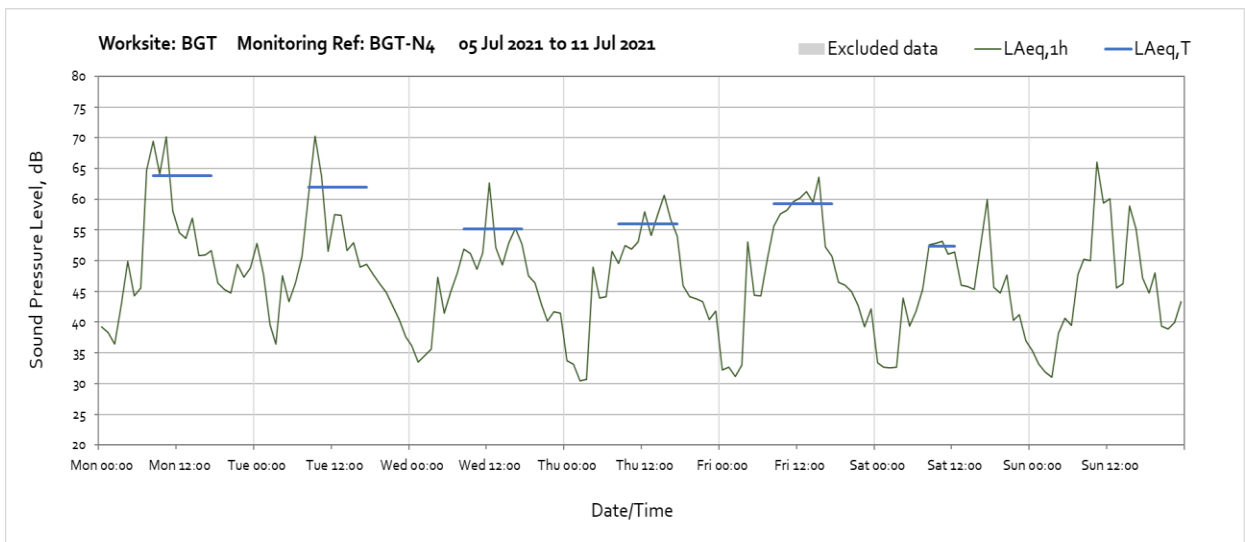
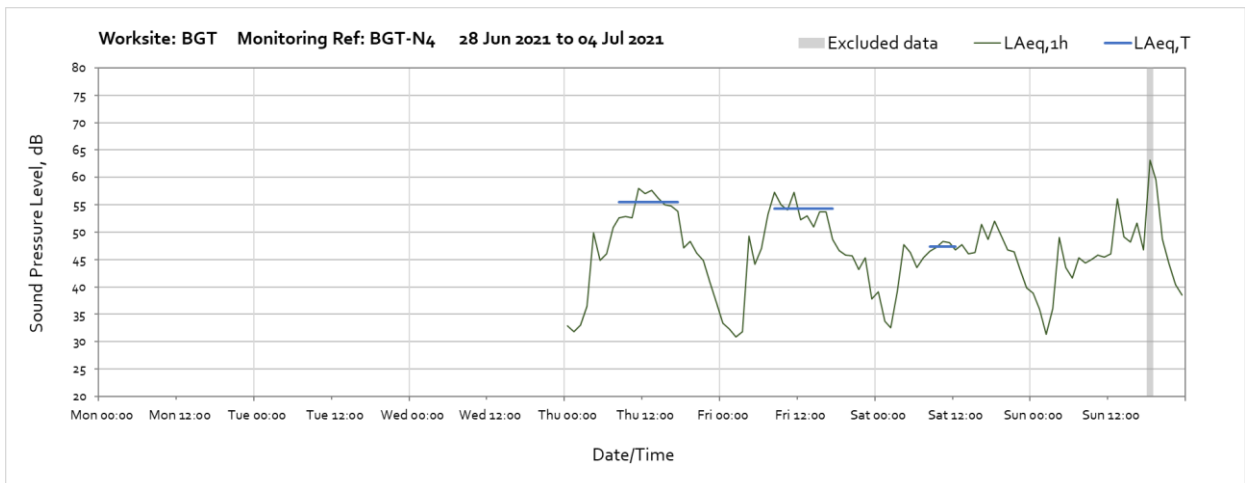


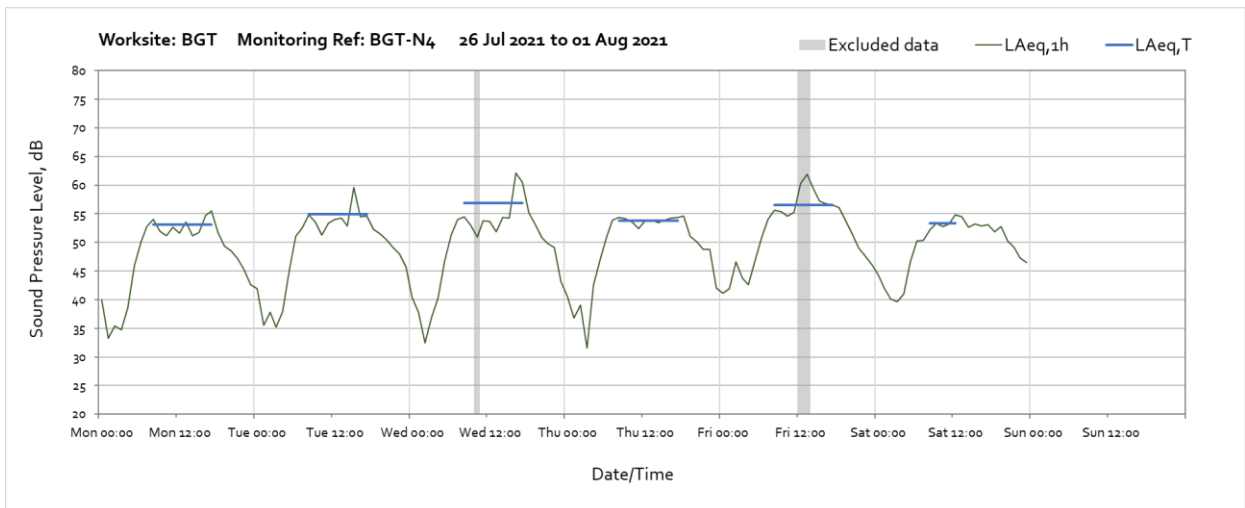
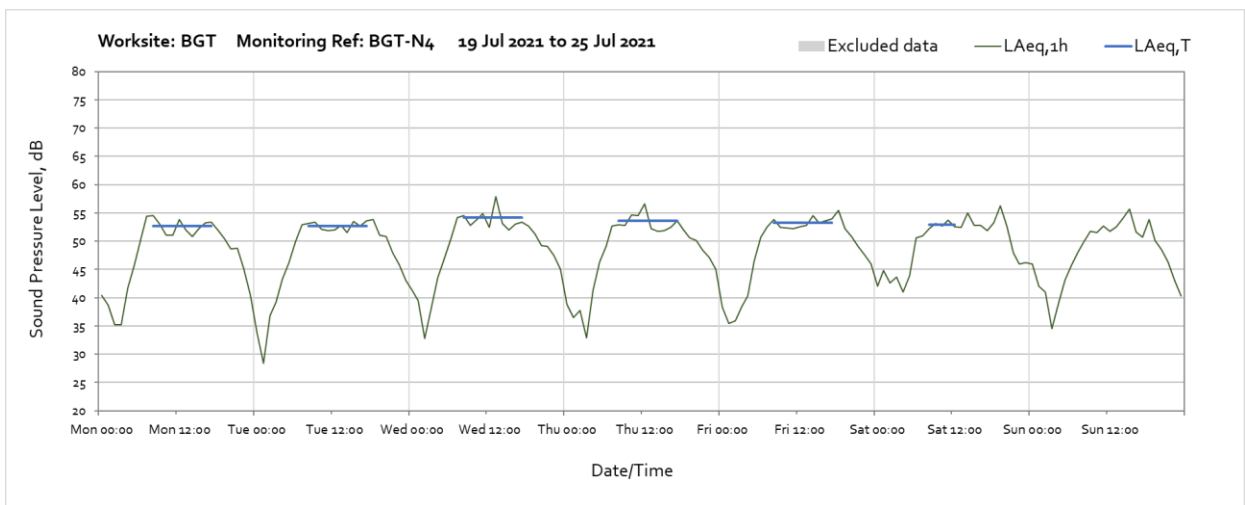
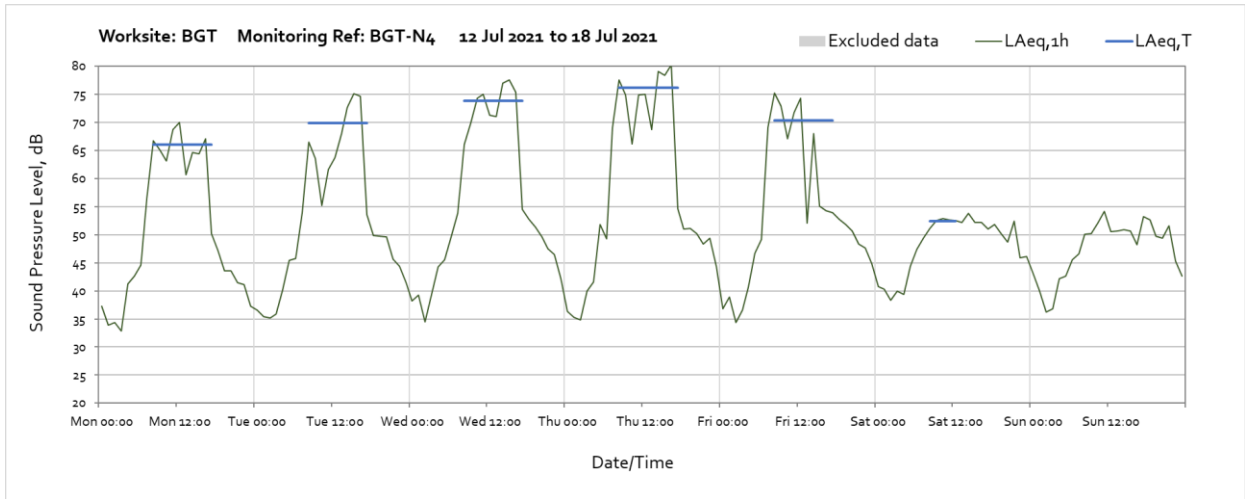




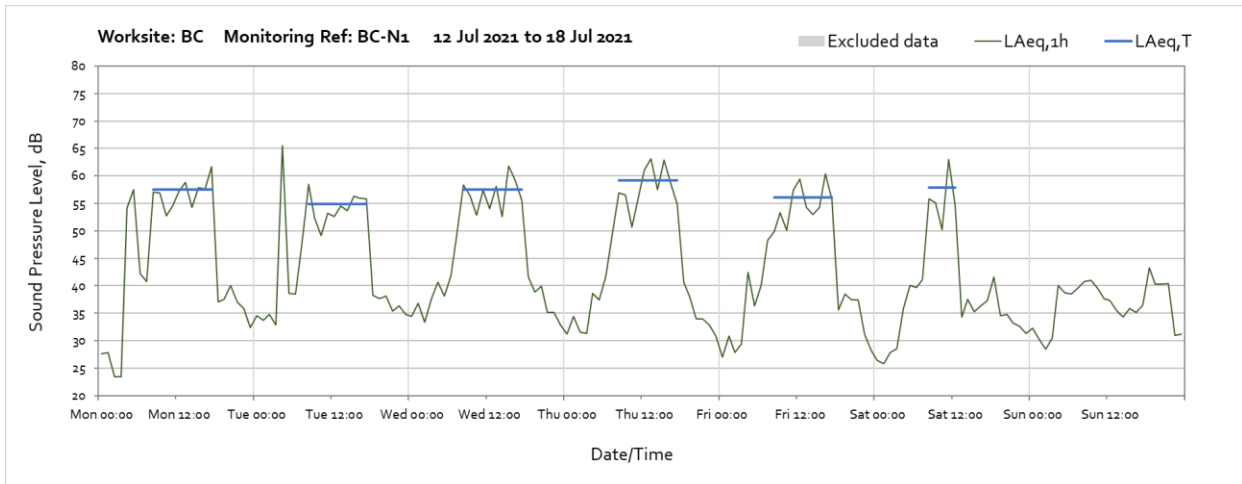
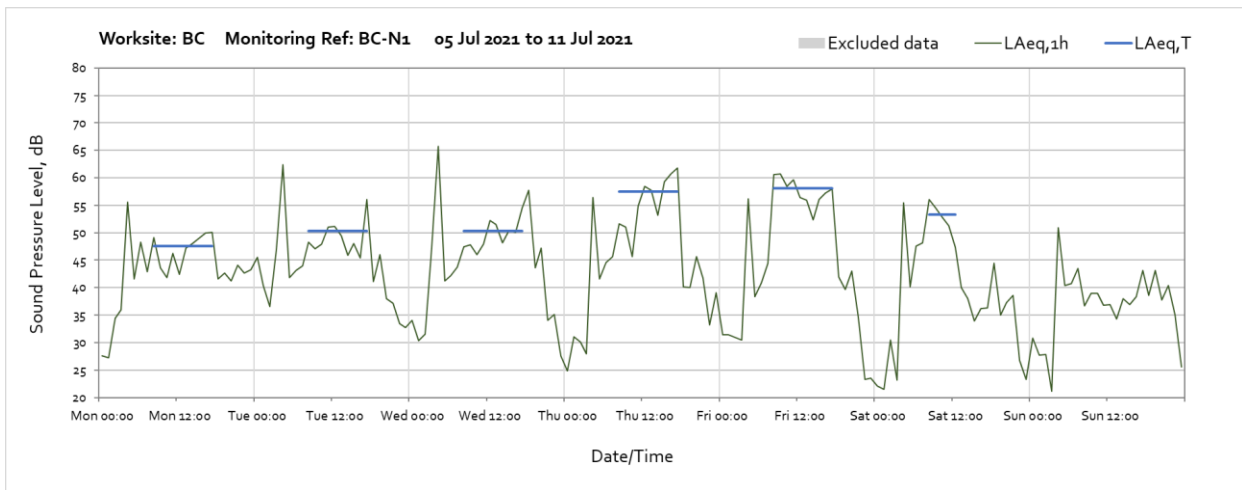
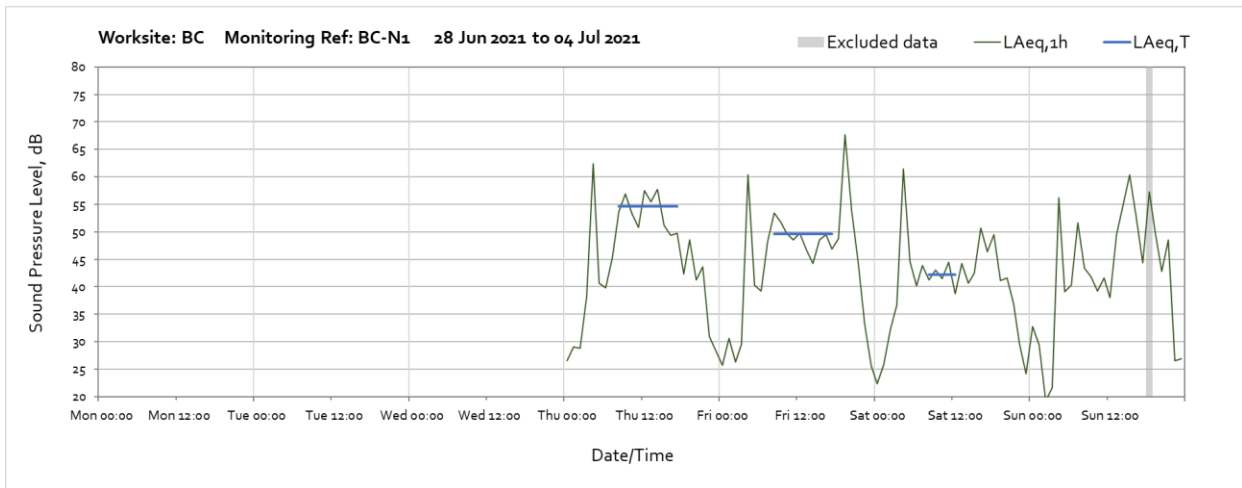
Note: Missing data at 03:00 on Friday 30<sup>th</sup> July and at 10:00 on Saturday 31<sup>st</sup> July 2021 was due internal issue of the noise station. Missing data at 20:00 to 23:00 on Saturday 31<sup>st</sup> July 2021 was due to power issue (battery not being switched).

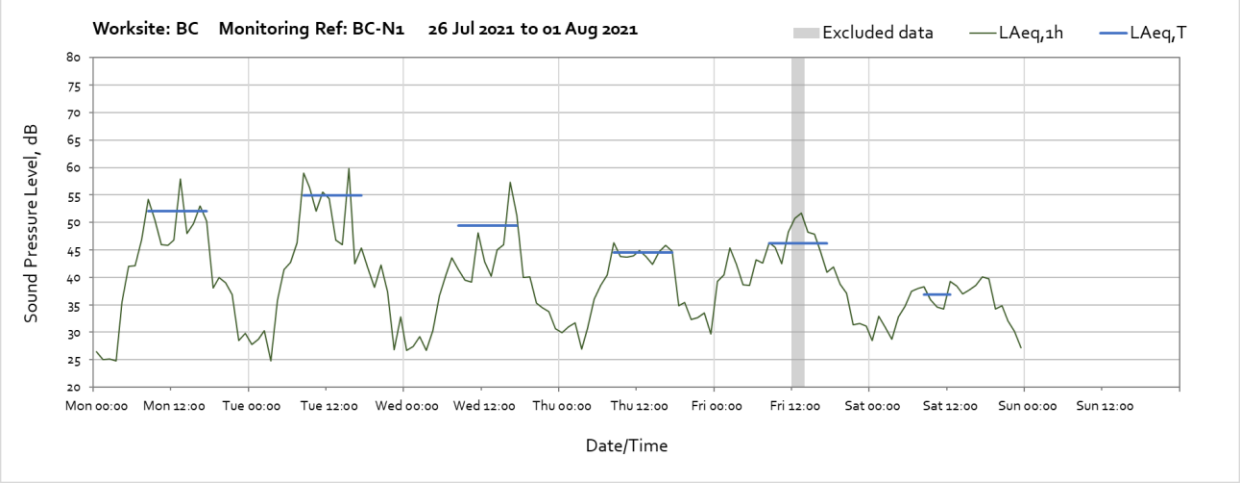
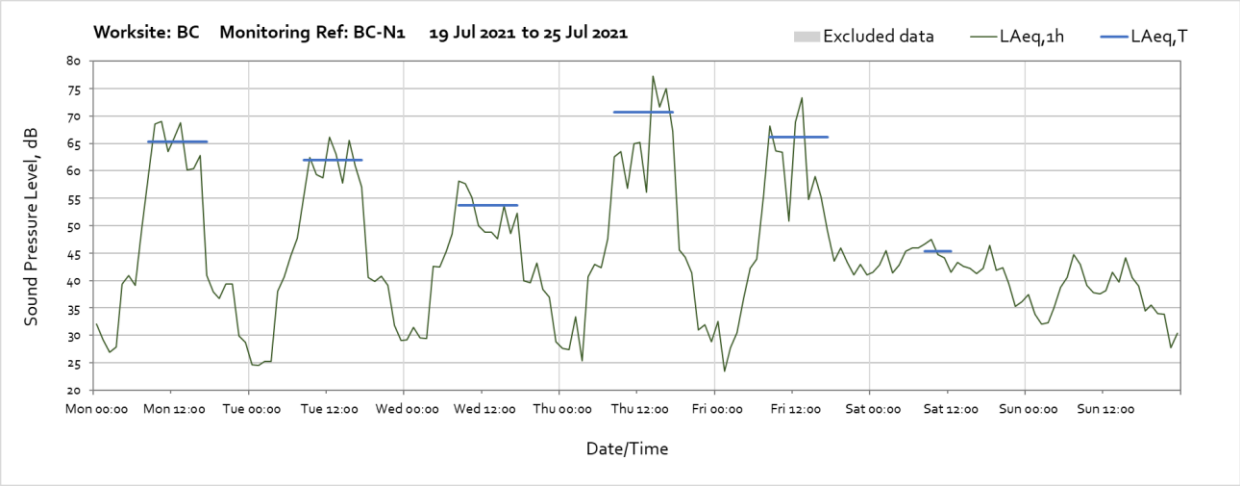
### Worksite: BGT - Monitoring Ref: BGT-N4



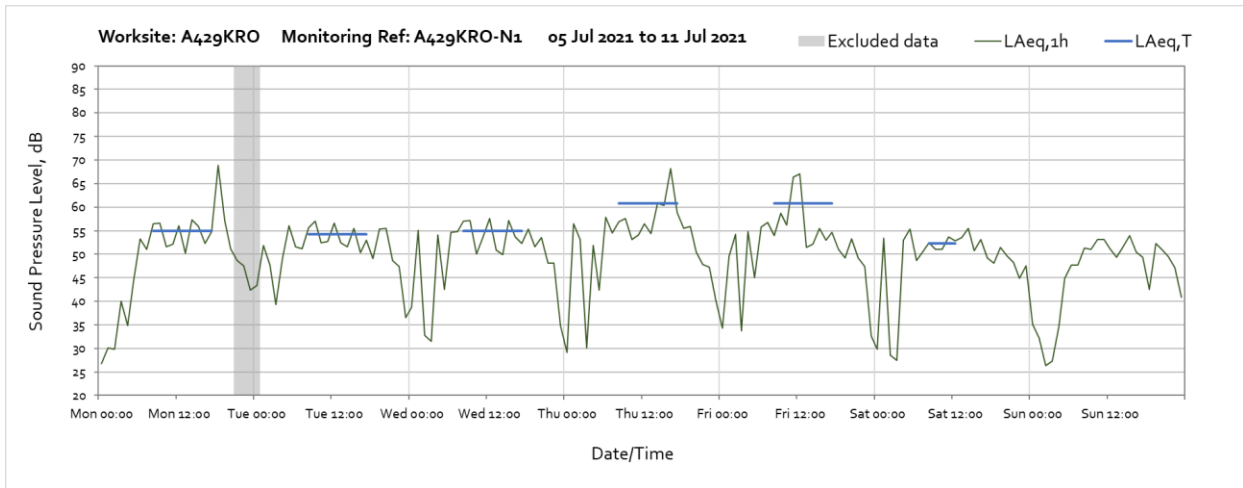
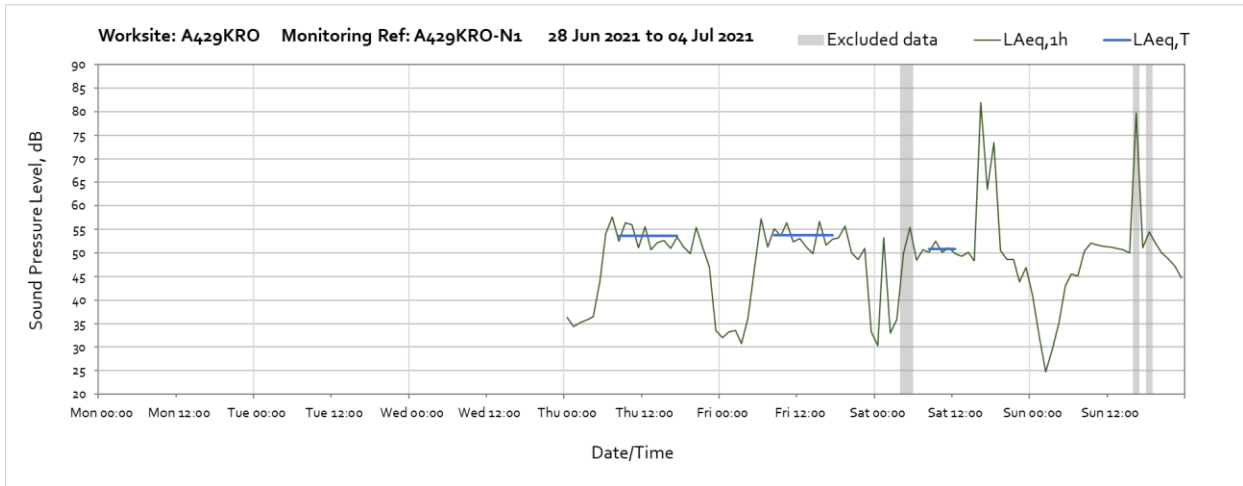


## Worksite: BC – Monitoring Ref: BC-N1

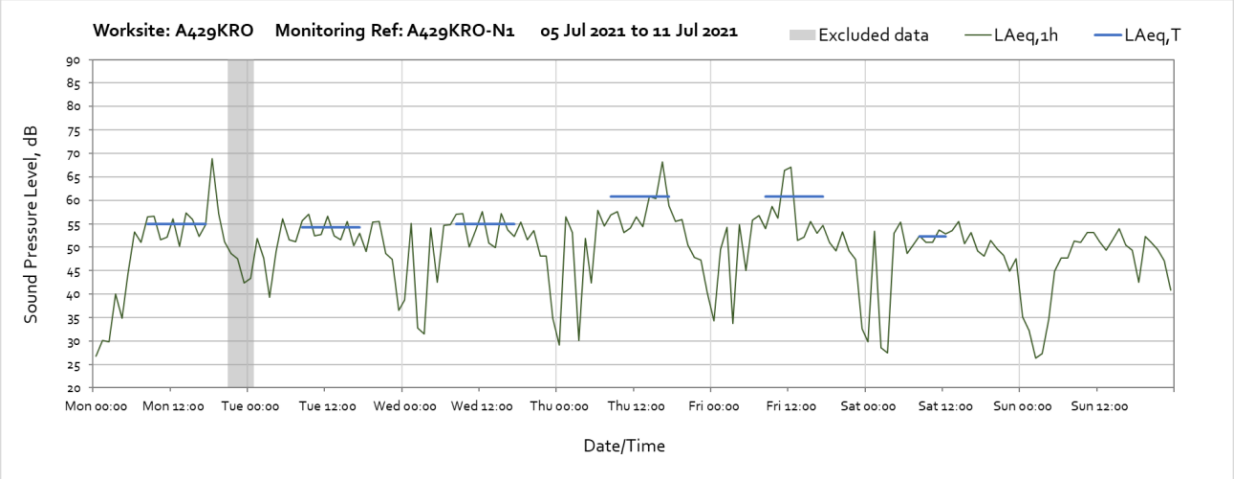
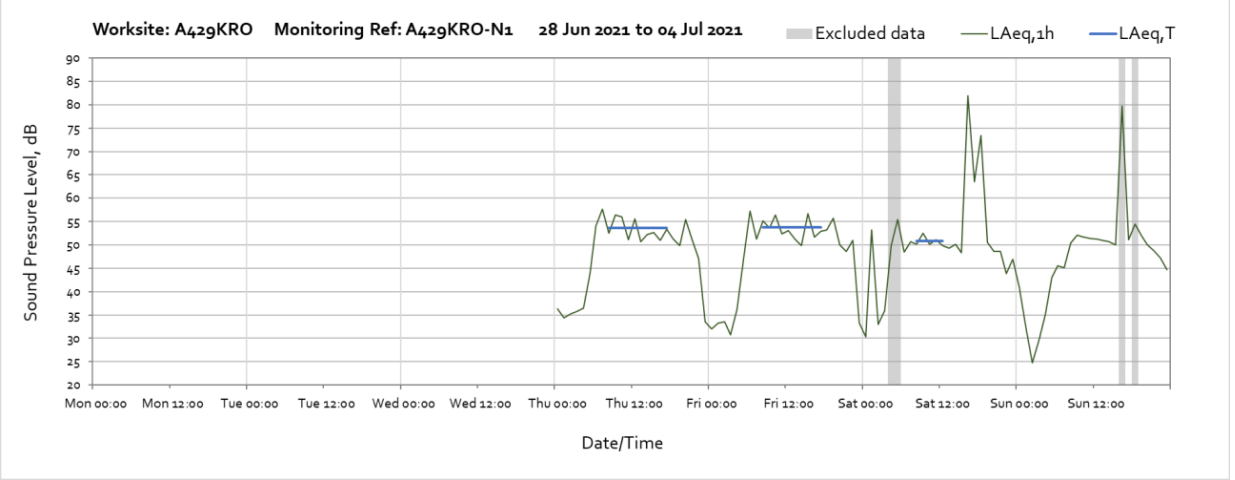
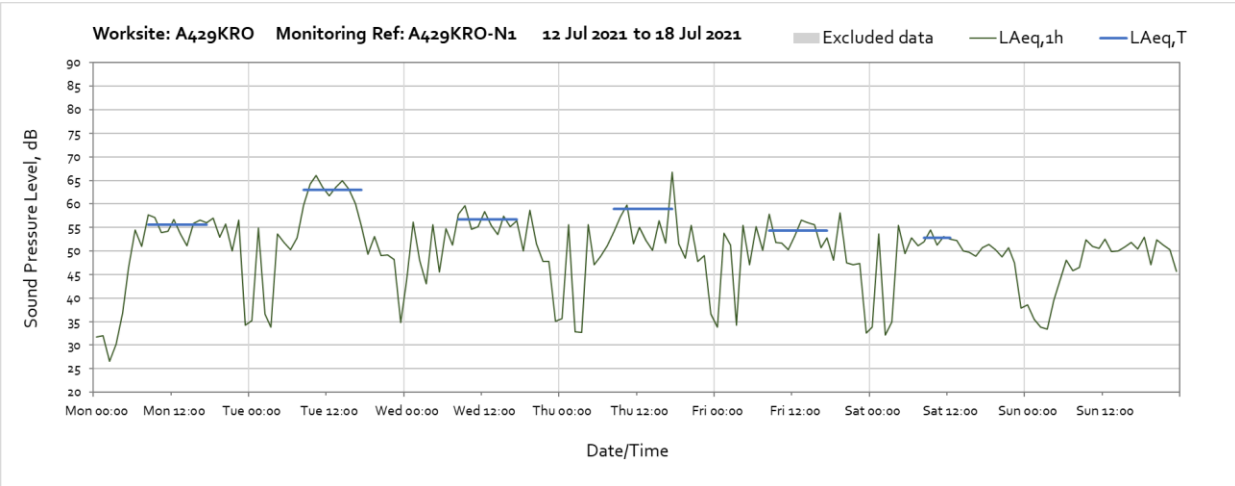


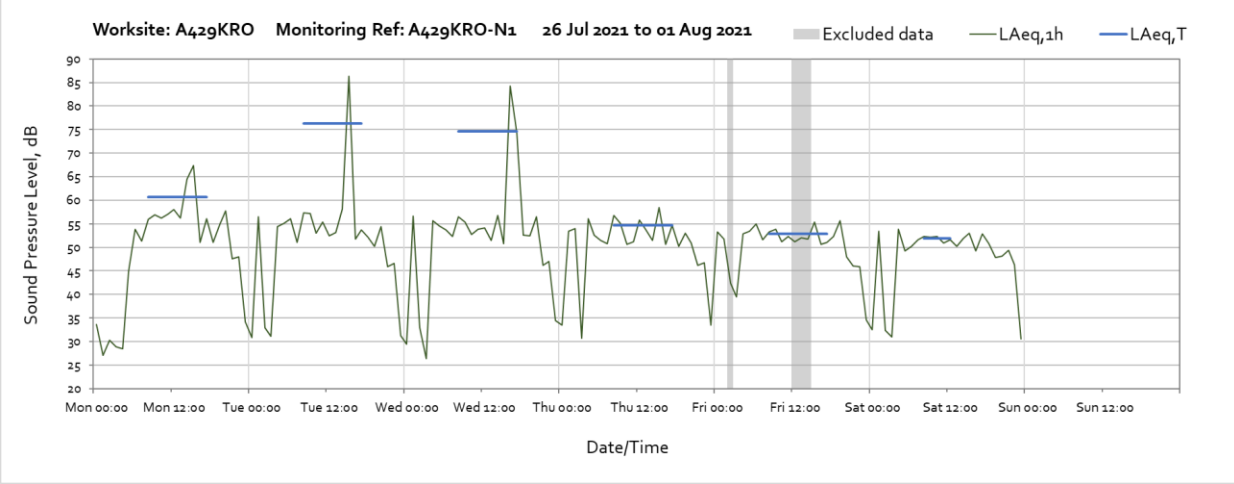
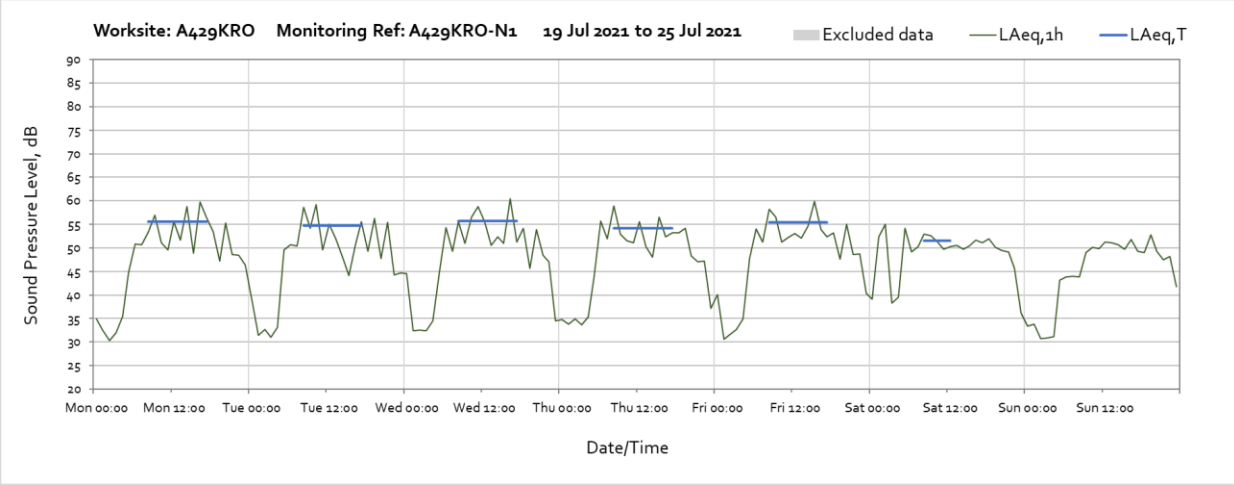
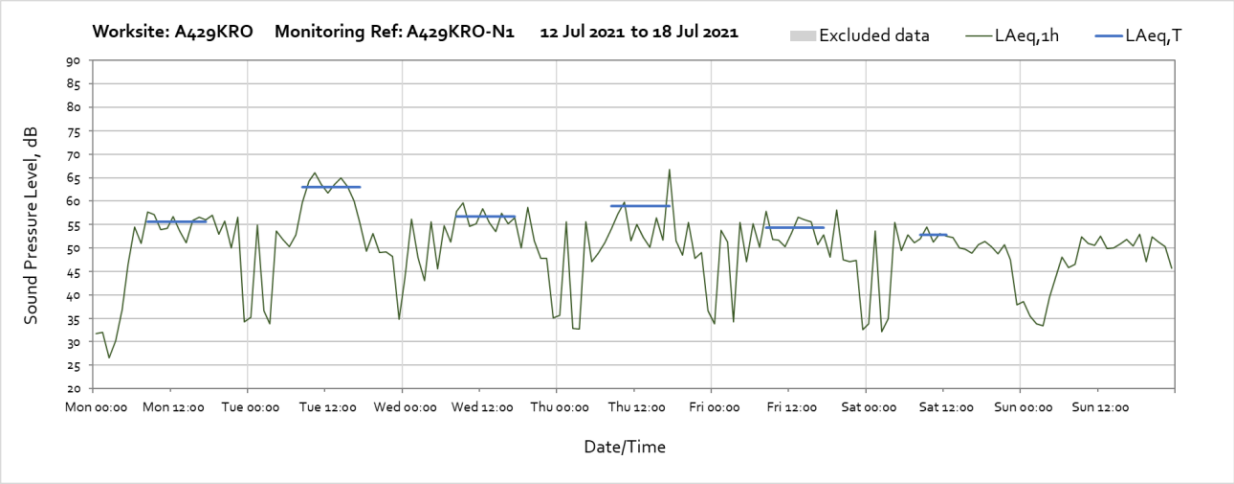


# Worksite: A429KRO – Monitoring Ref: A429KRO-N1

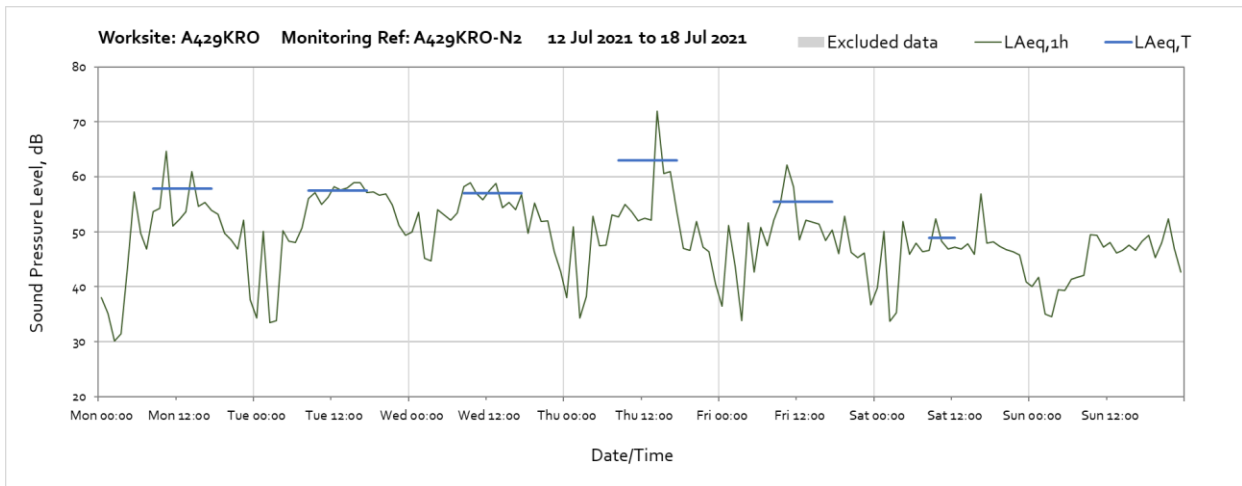
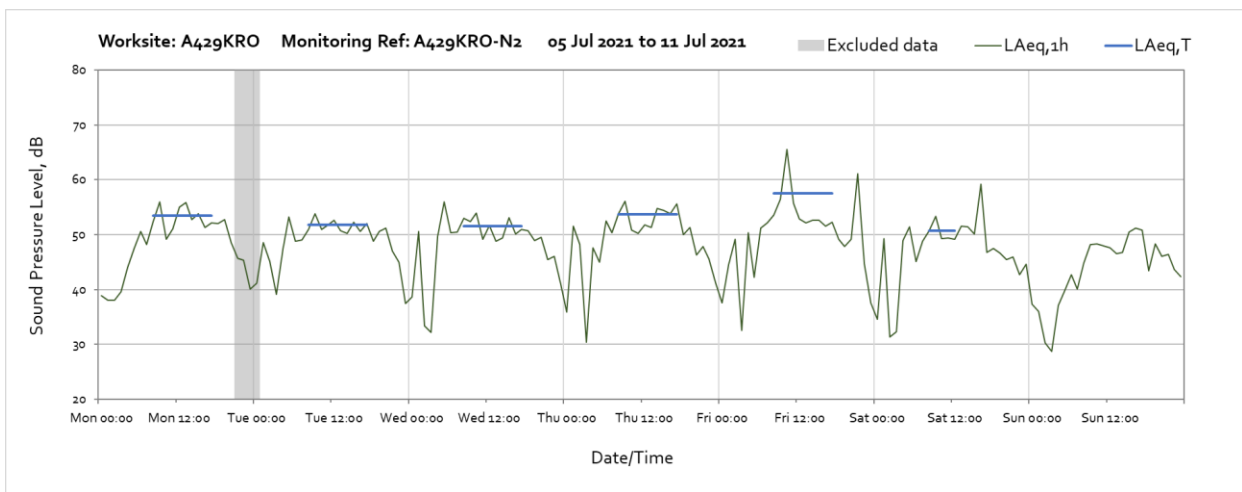
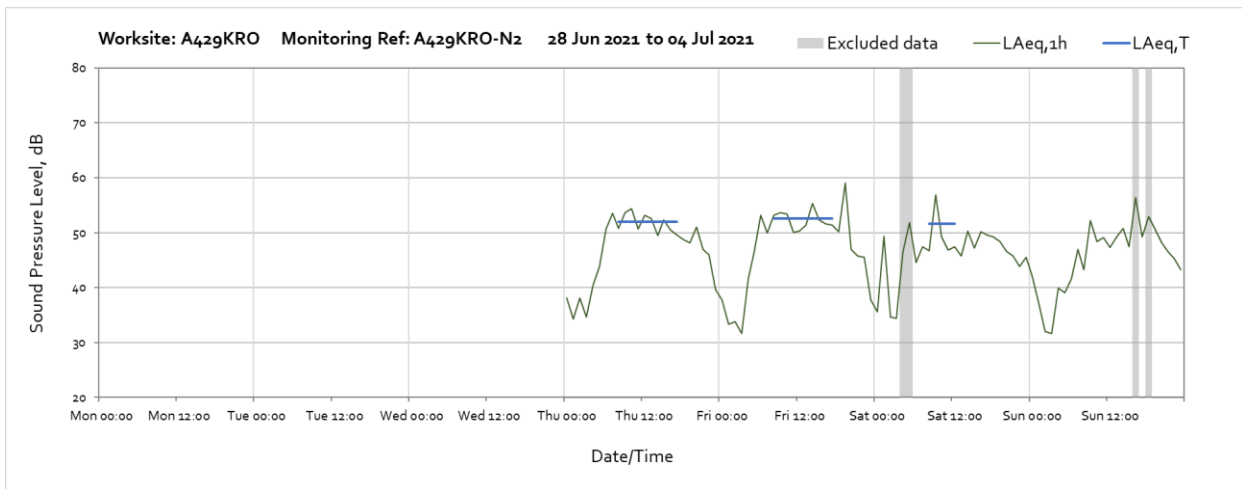




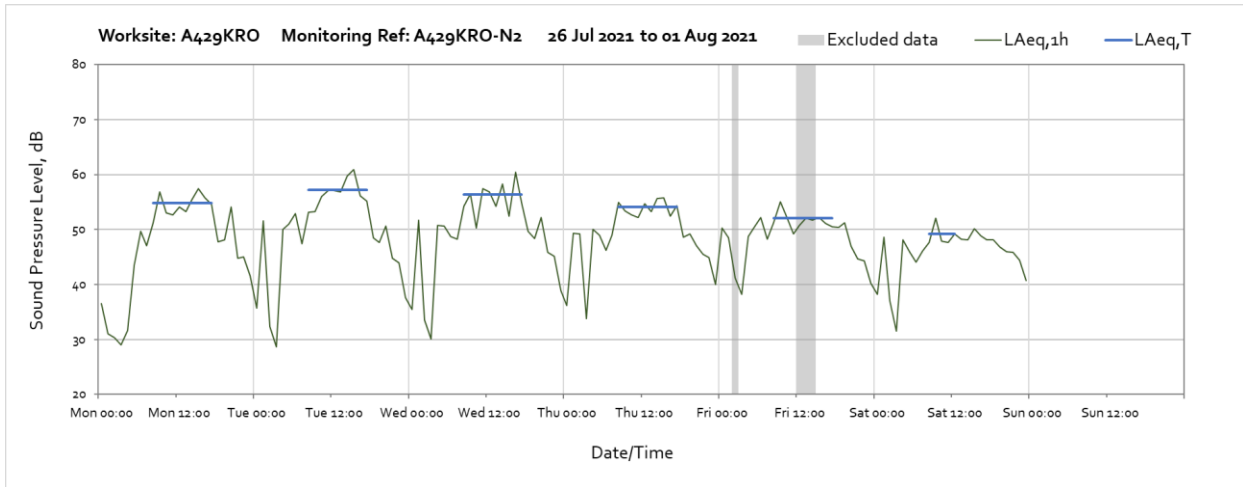
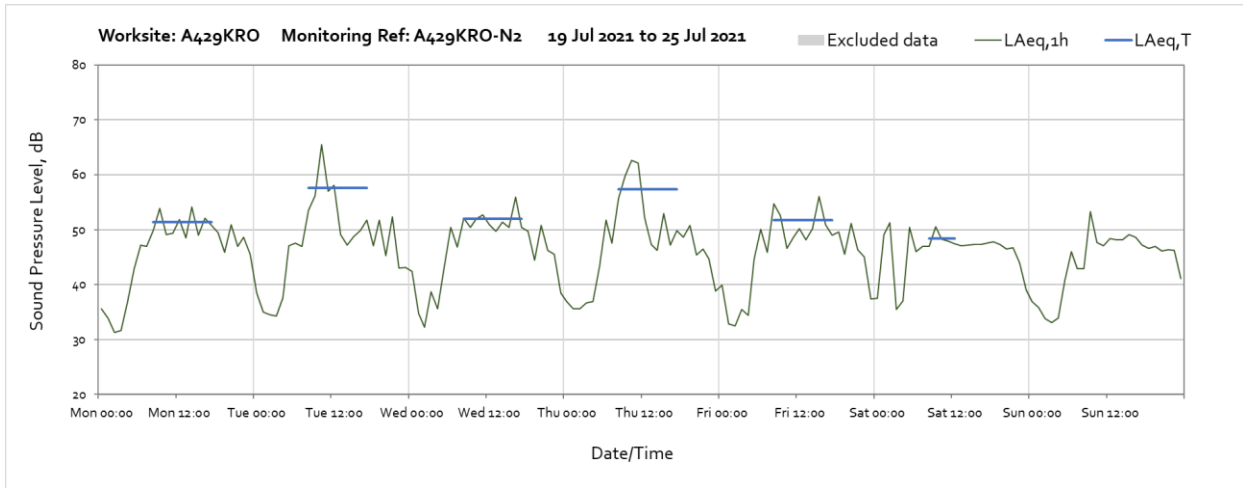




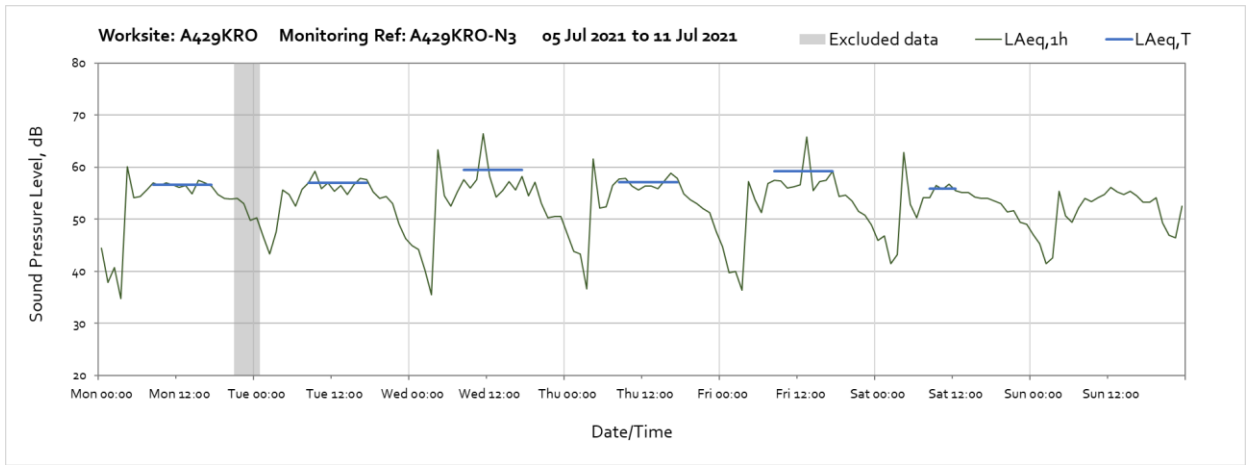
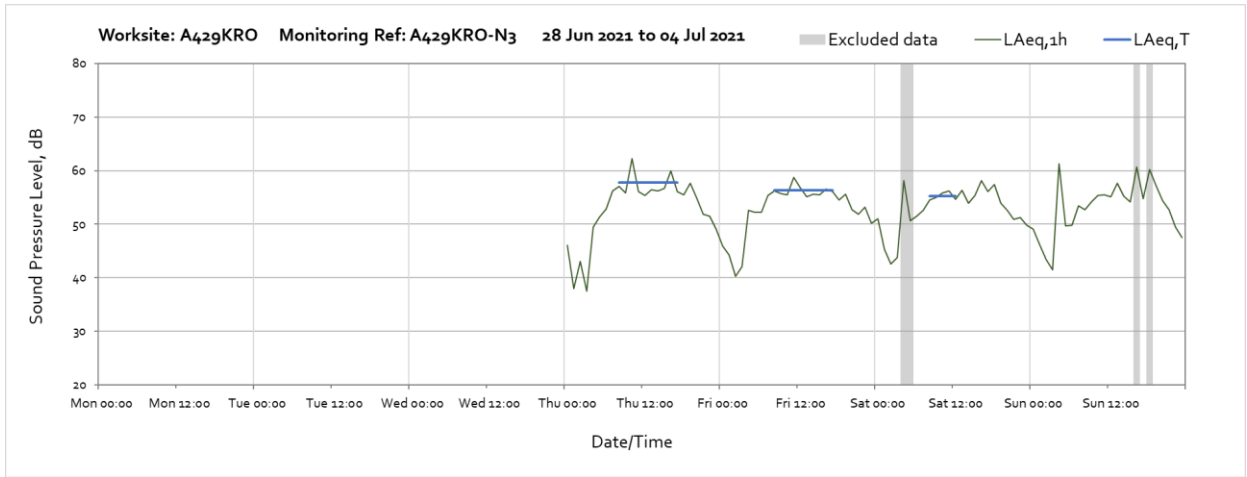
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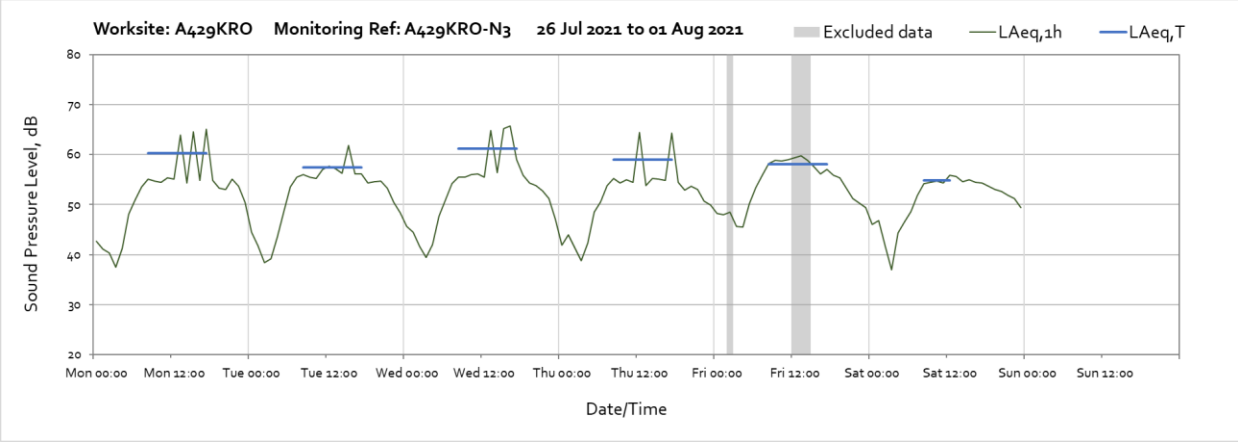
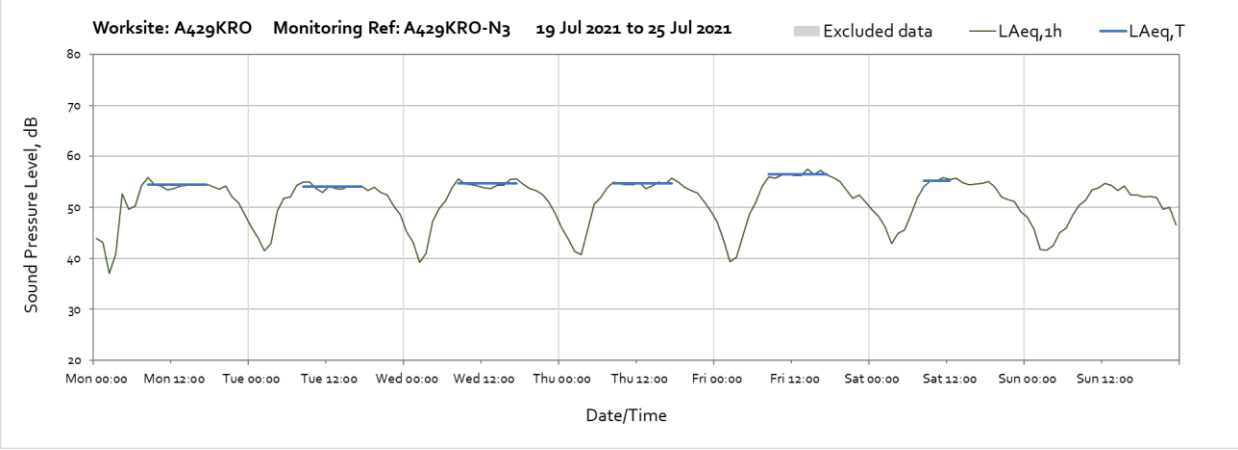
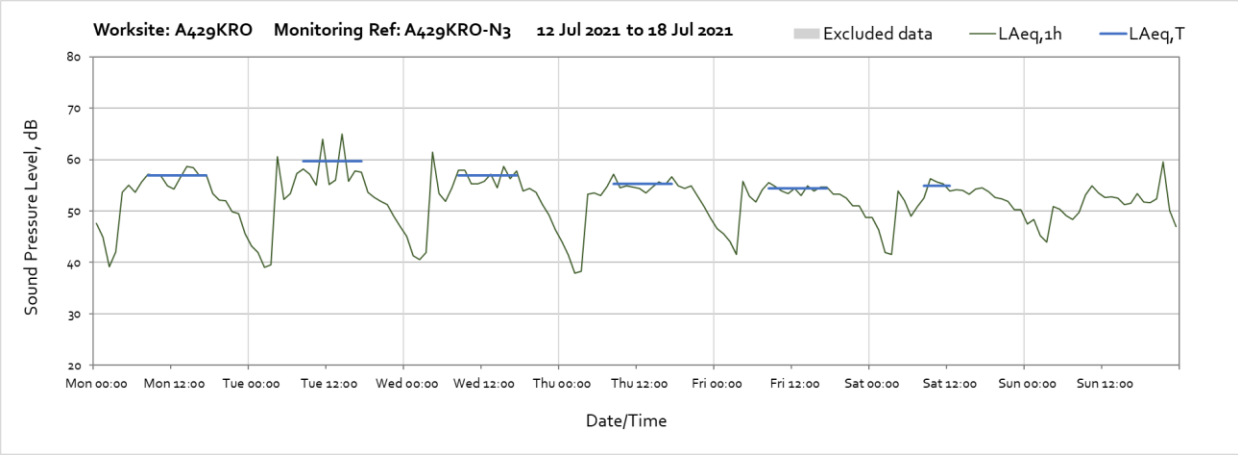


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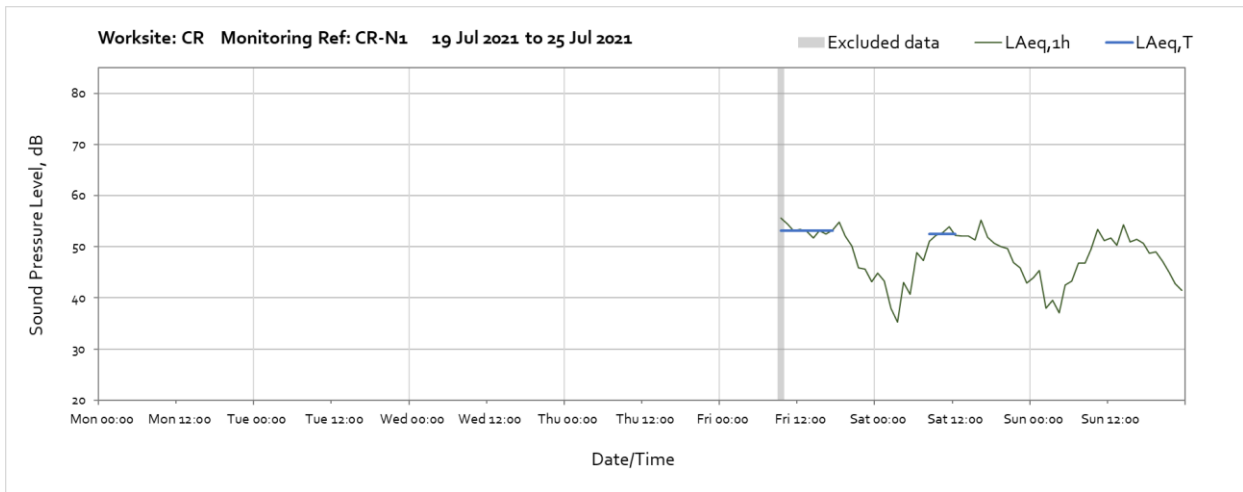


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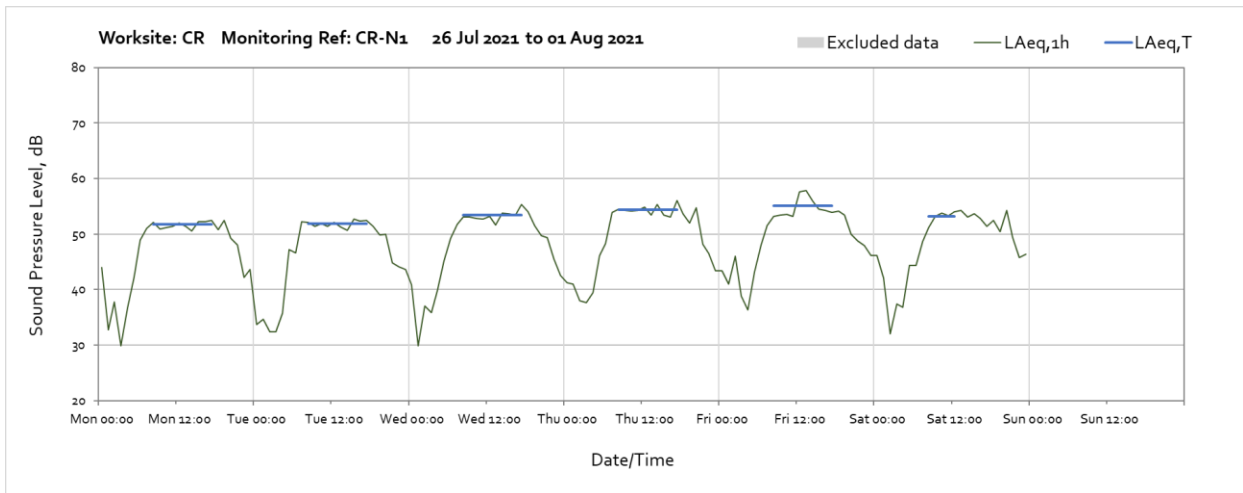




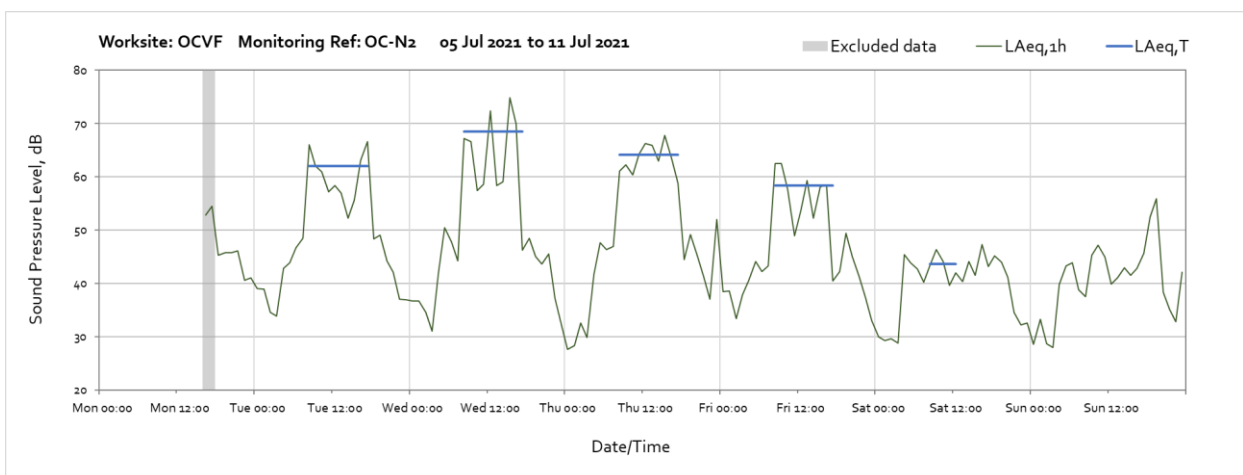
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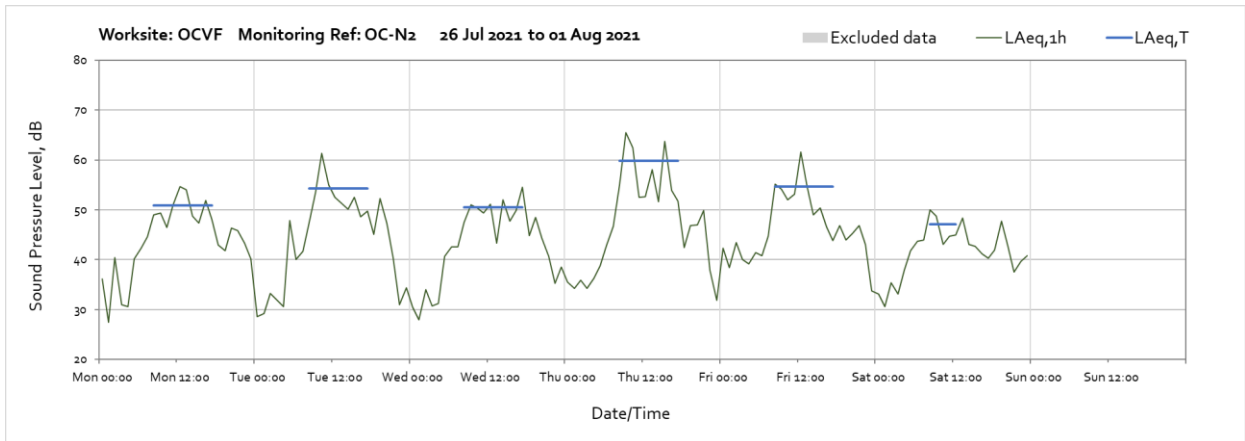
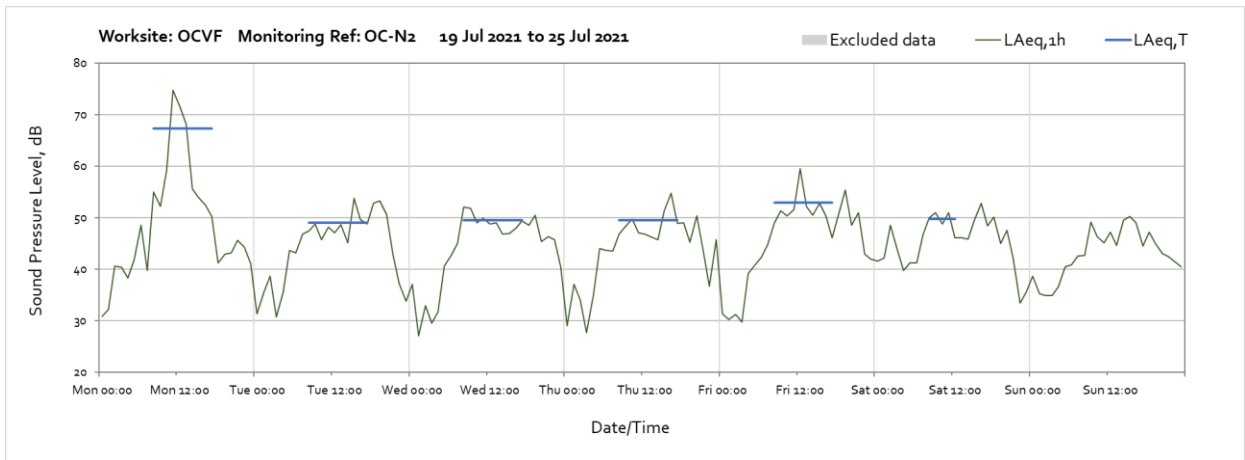
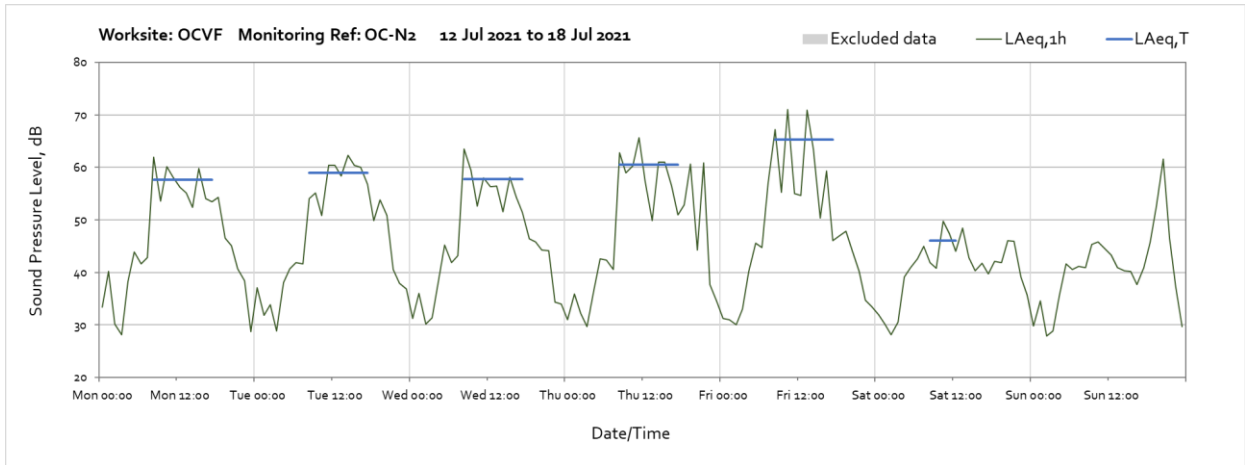
Note: The noise monitor was installed on 23<sup>rd</sup> July 2021.



## Worksite: OCVF – Monitoring Ref: OC-N2

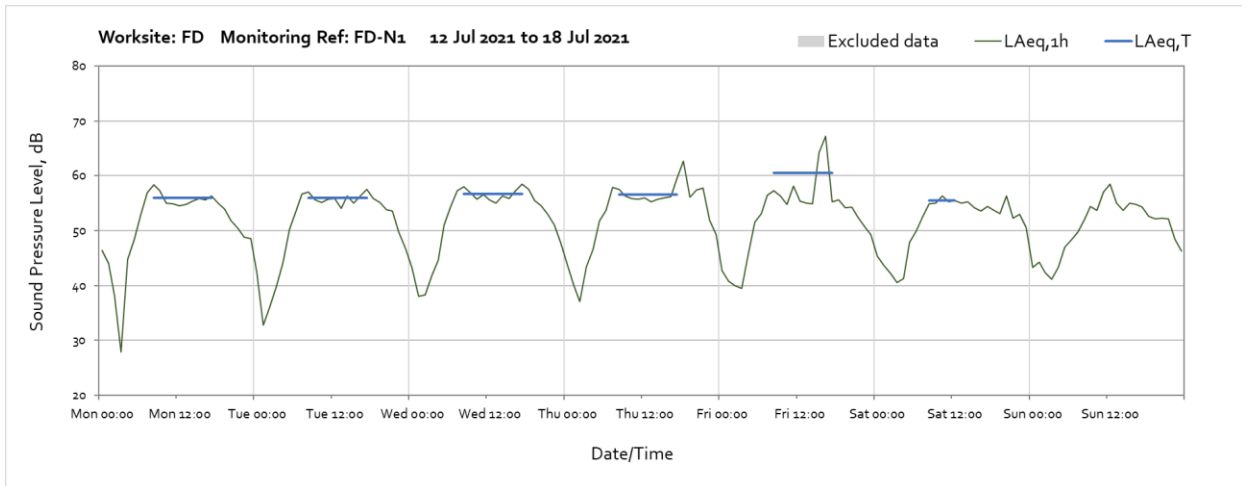
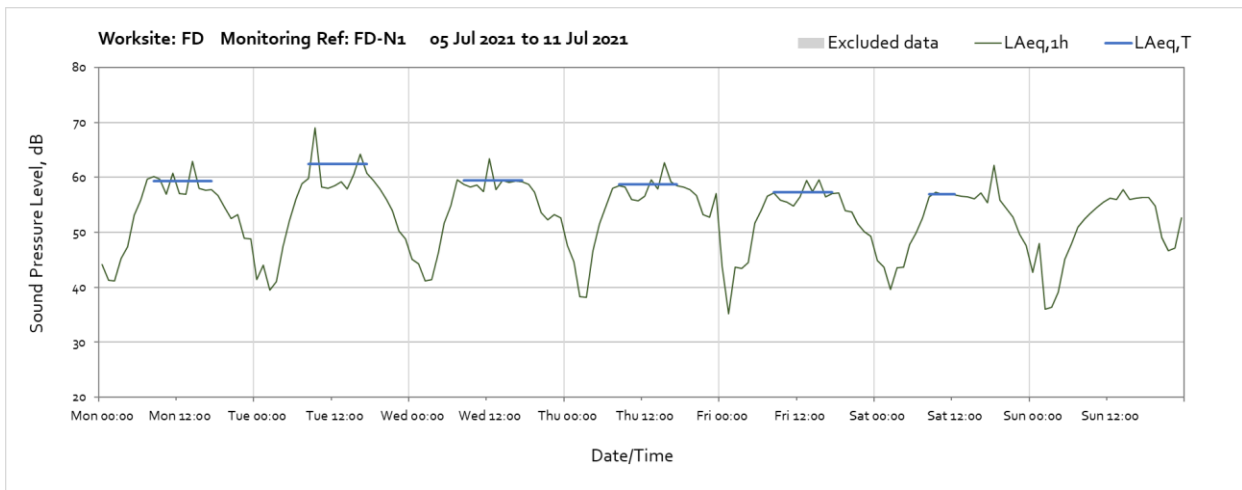
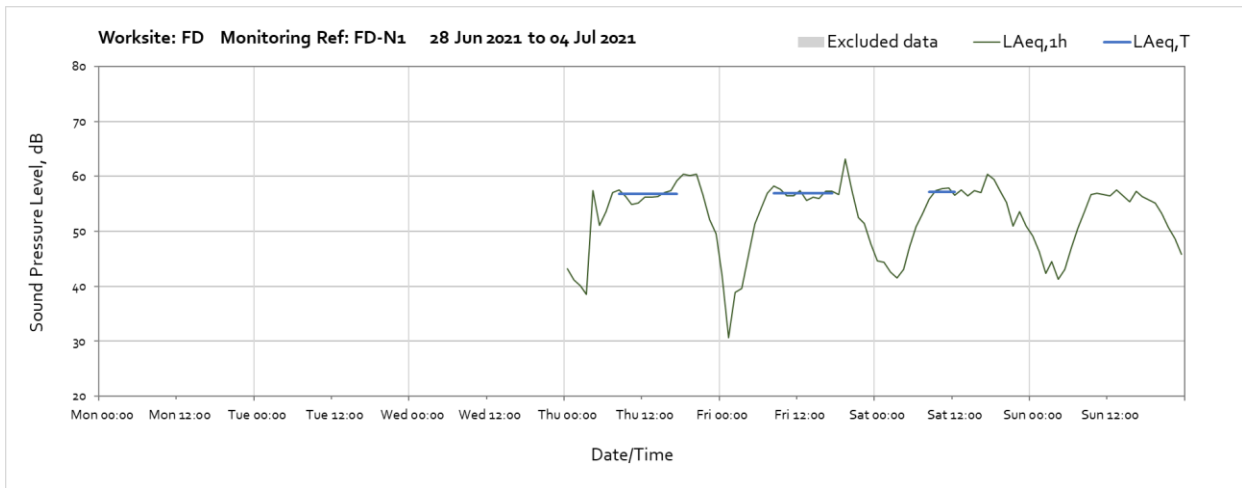


Note: The noise monitor was installed on 5<sup>th</sup> July 2021

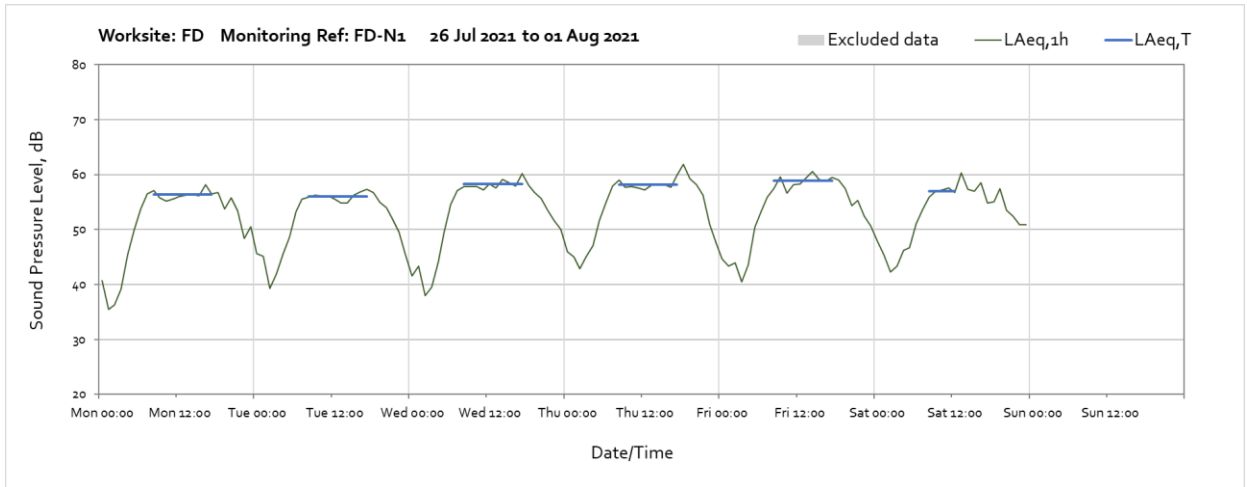
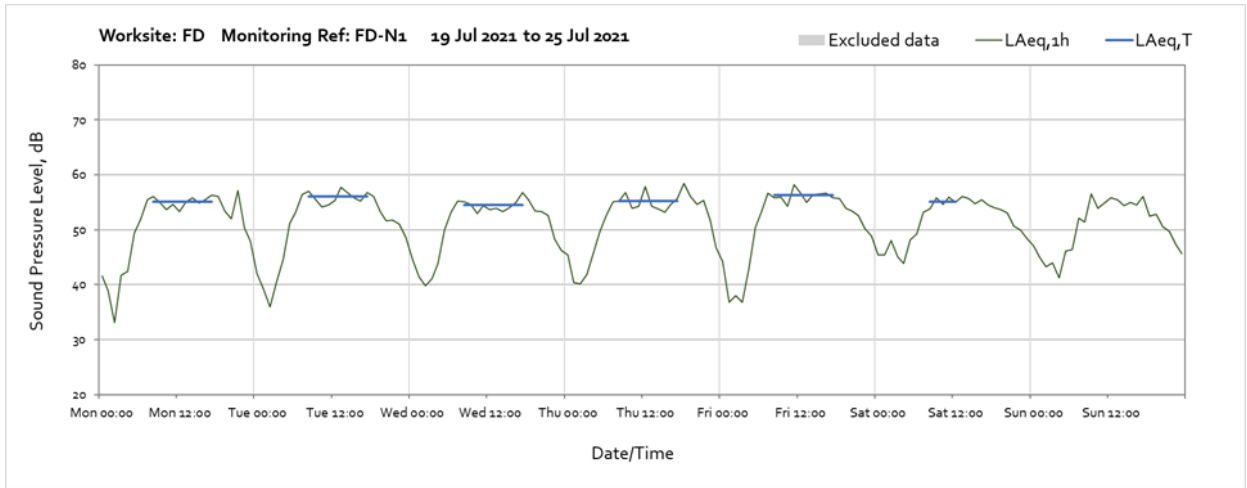




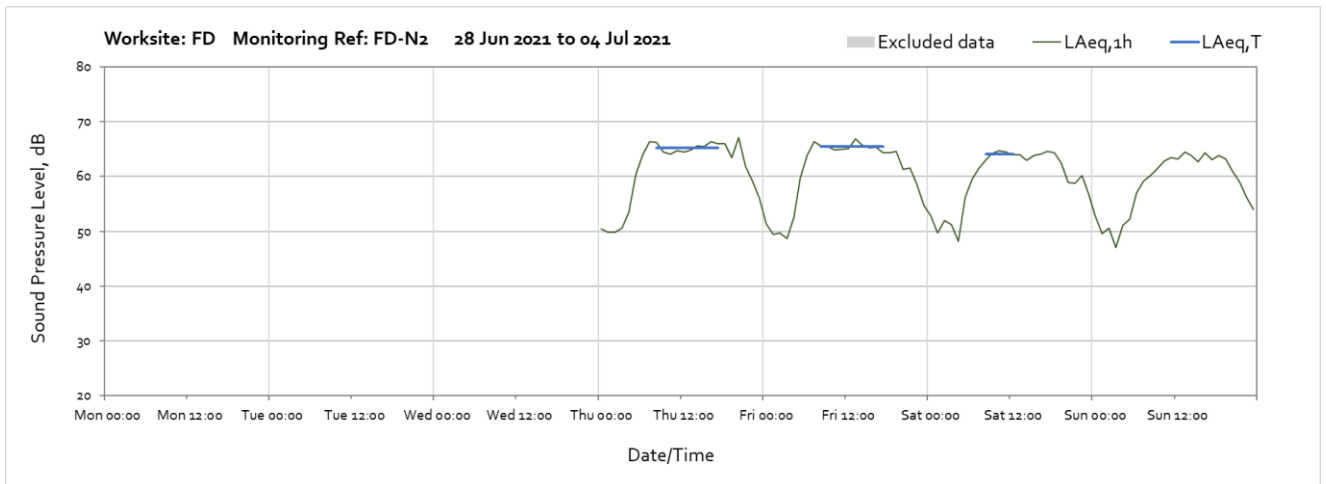
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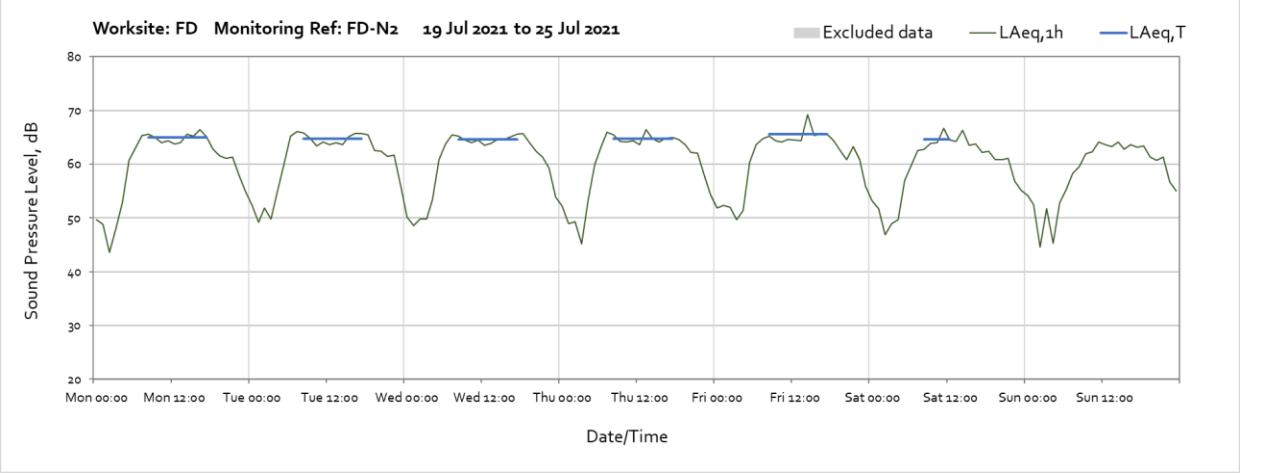
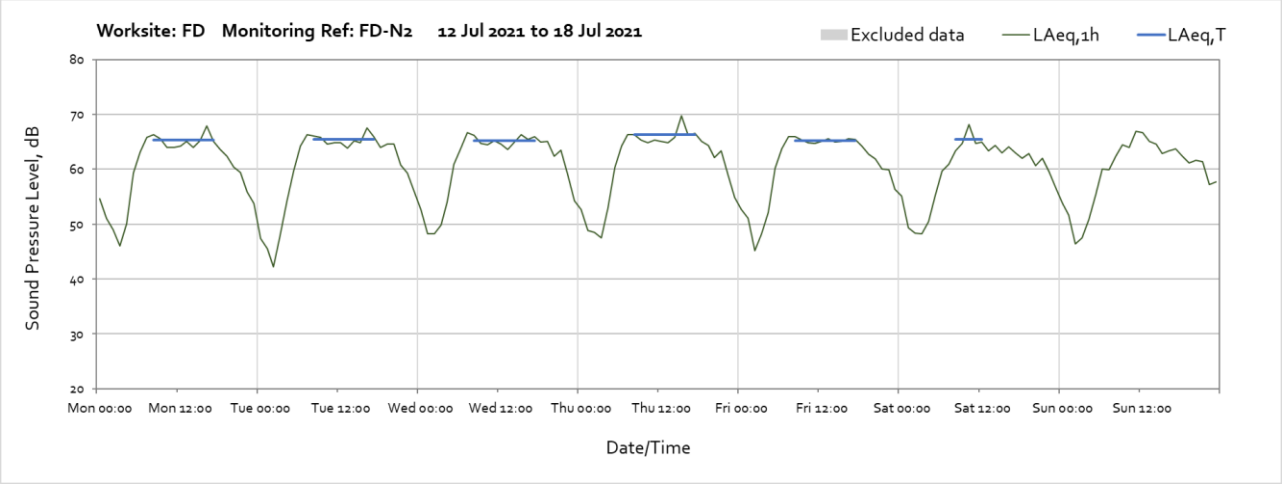
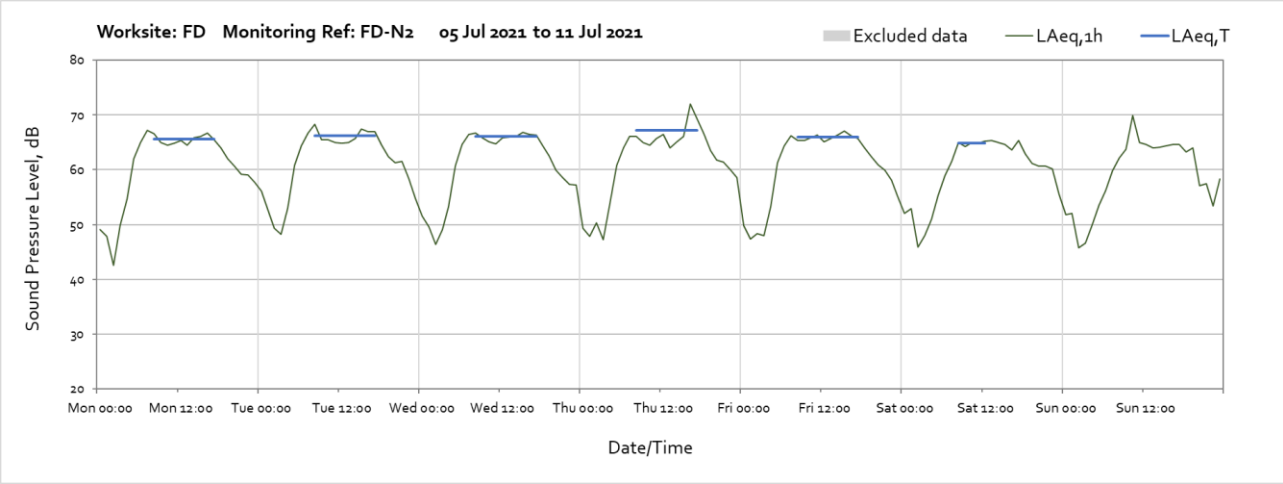


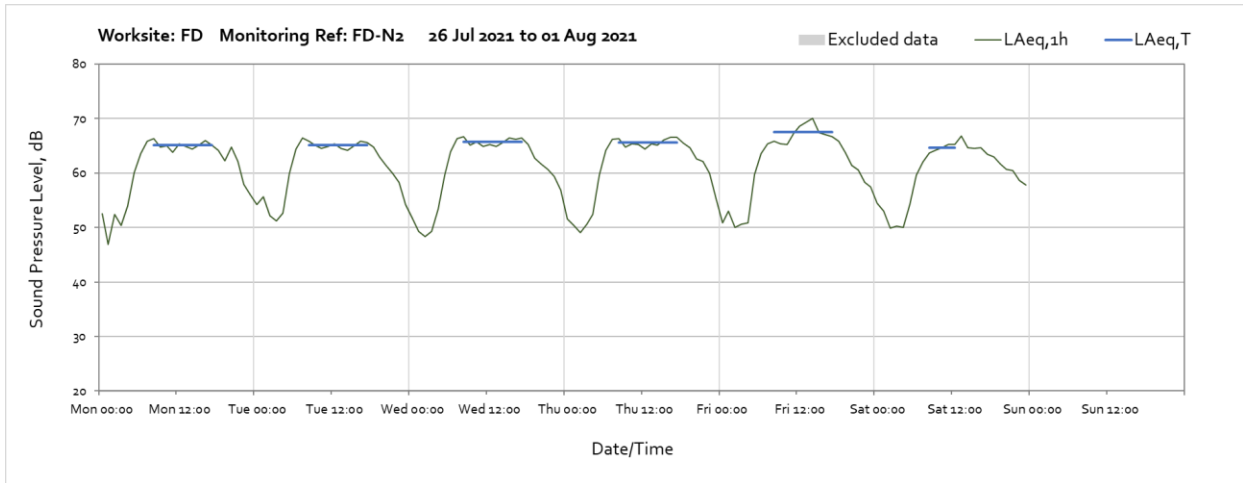
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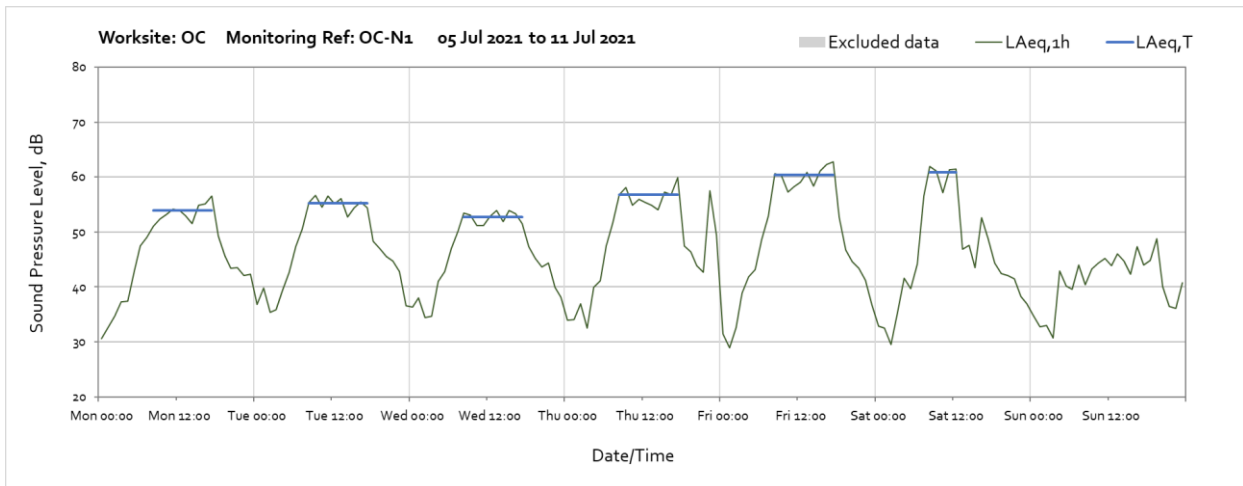
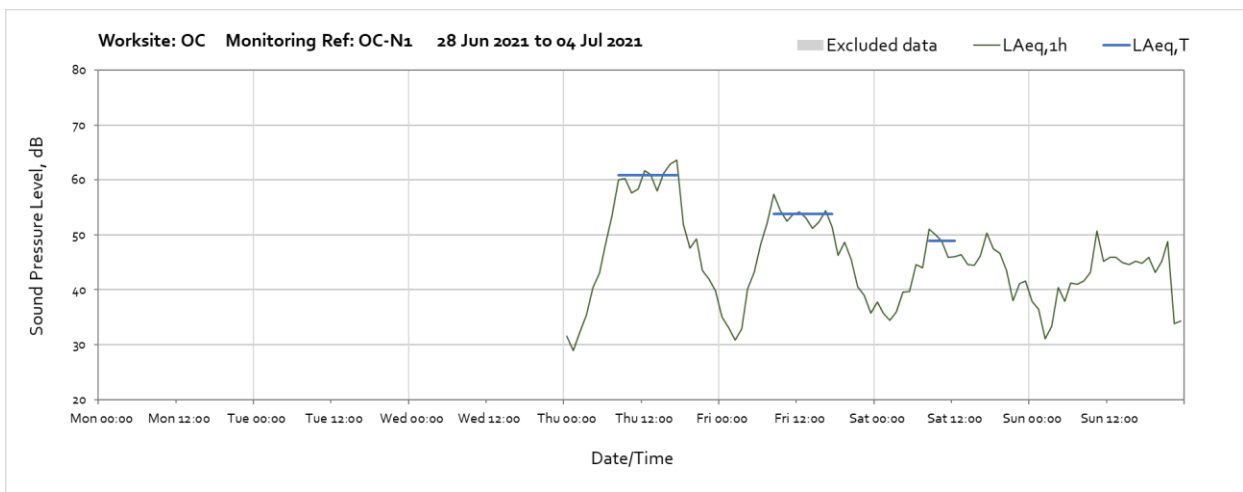
**Worksite: FD – Monitoring Ref: FD-N2**

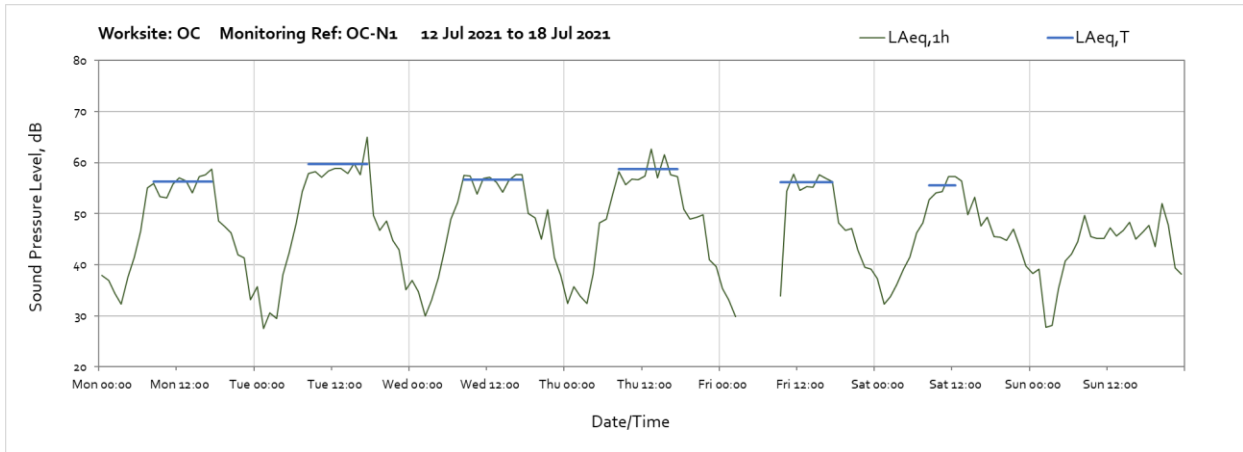




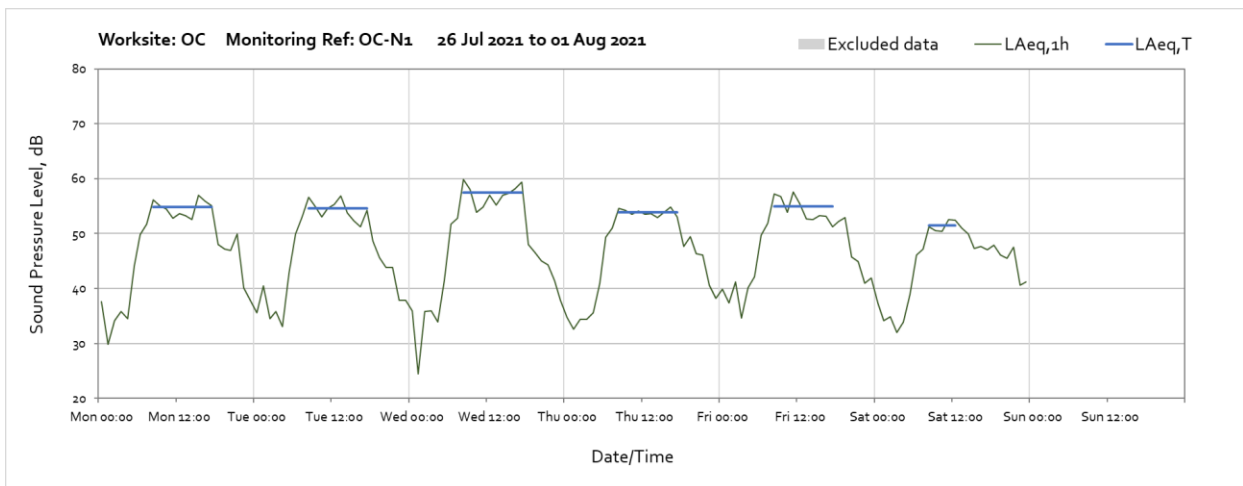
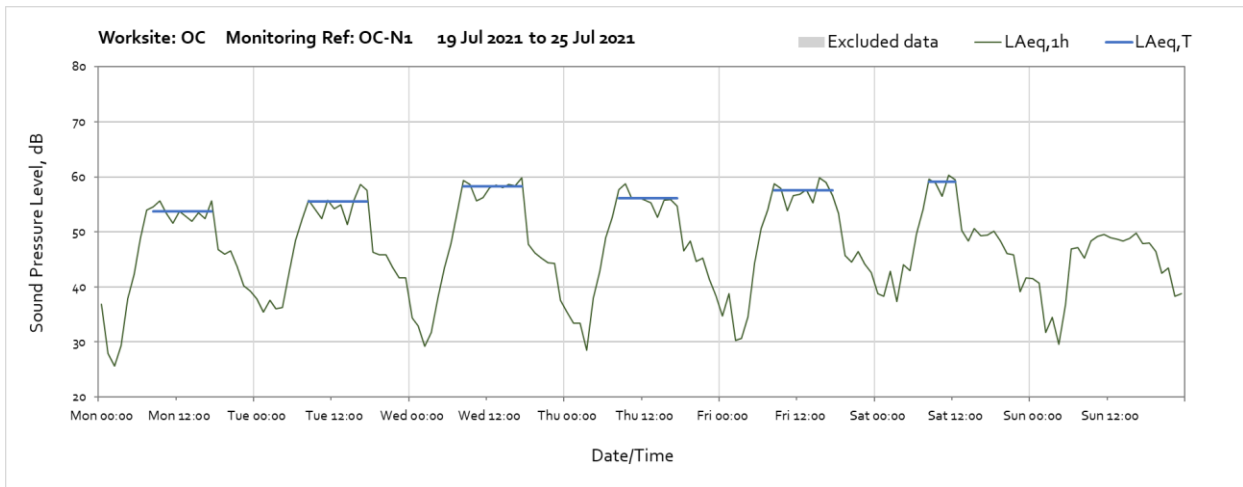


**Worksite: OC - Monitoring Ref: OC-N1**





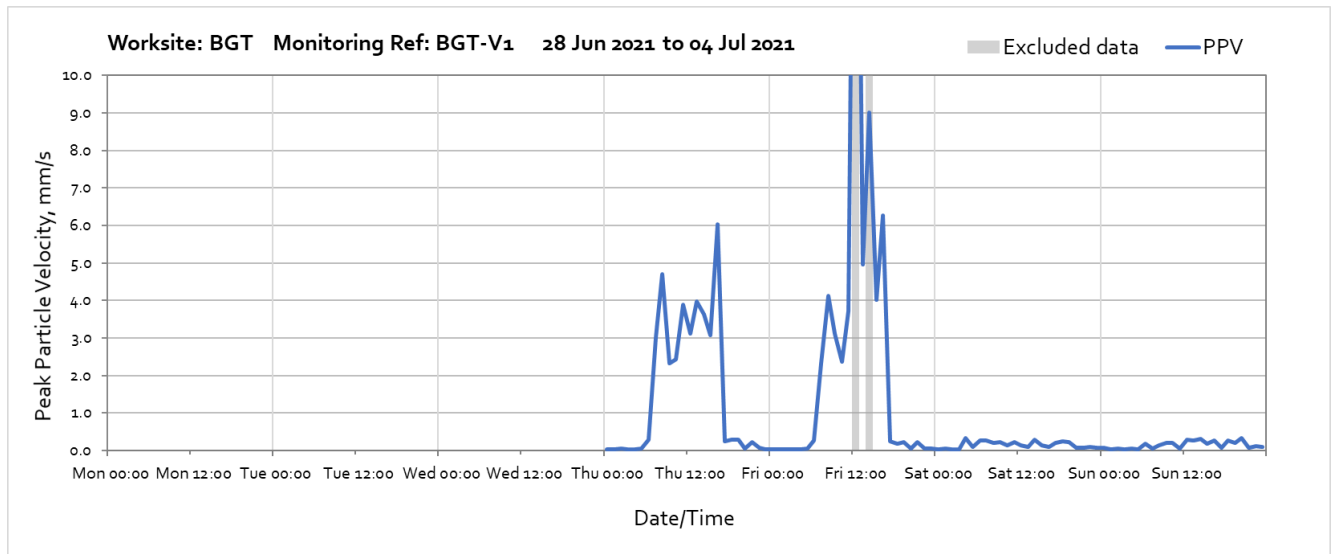
Note: Missing data at 03:00 to 08:00 on Friday 17<sup>th</sup> July 2021 was due to the system rebooting.



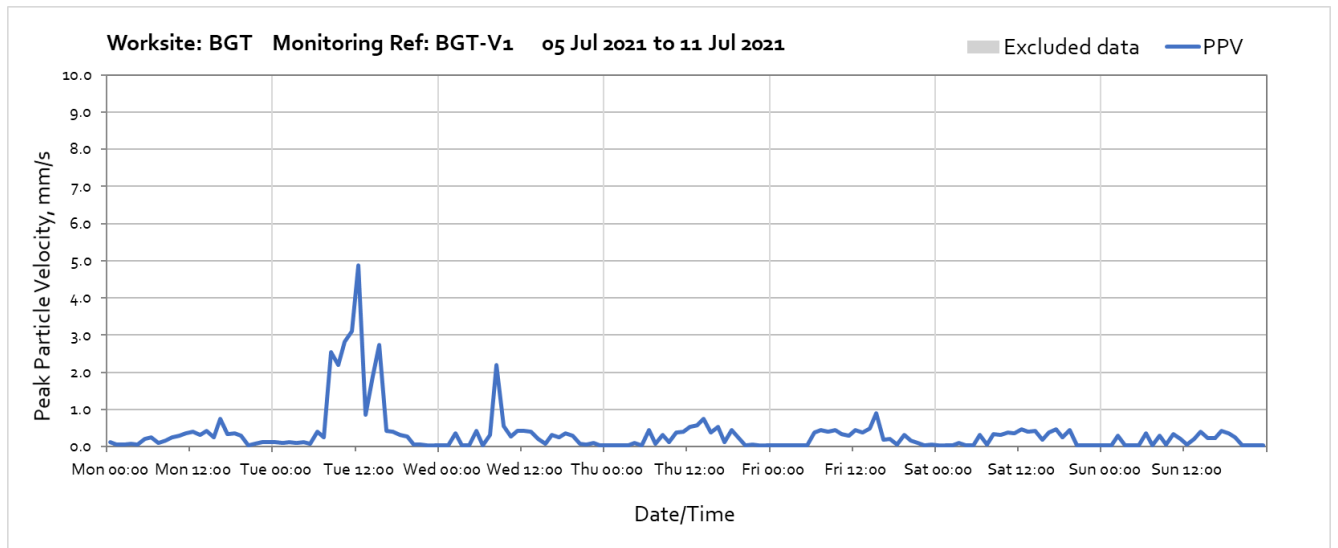
## Vibration

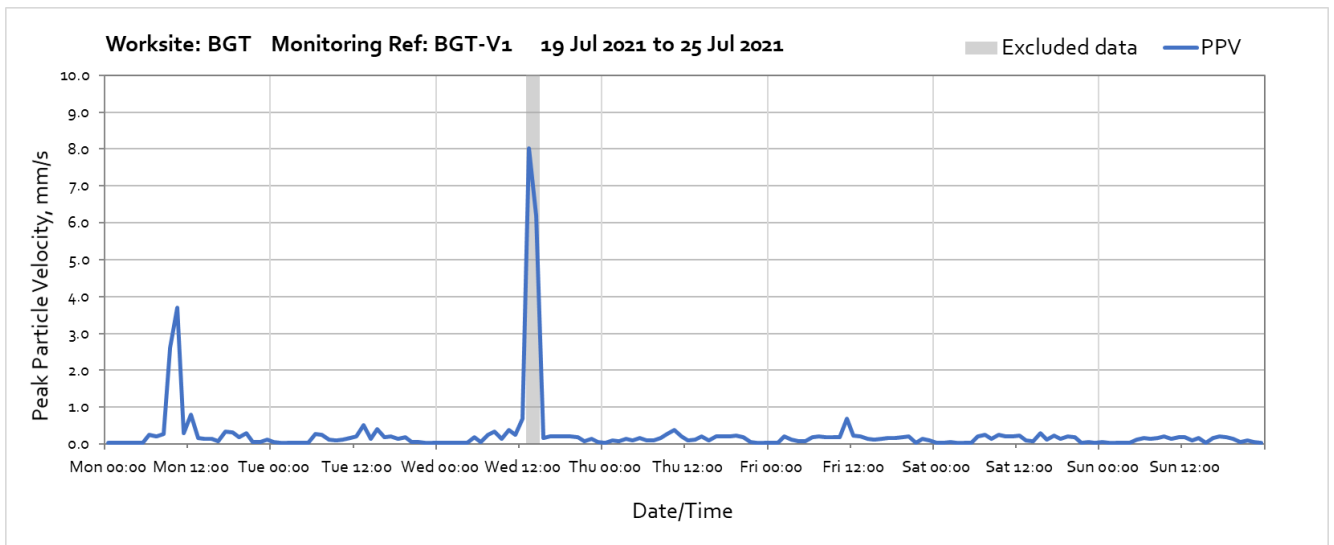
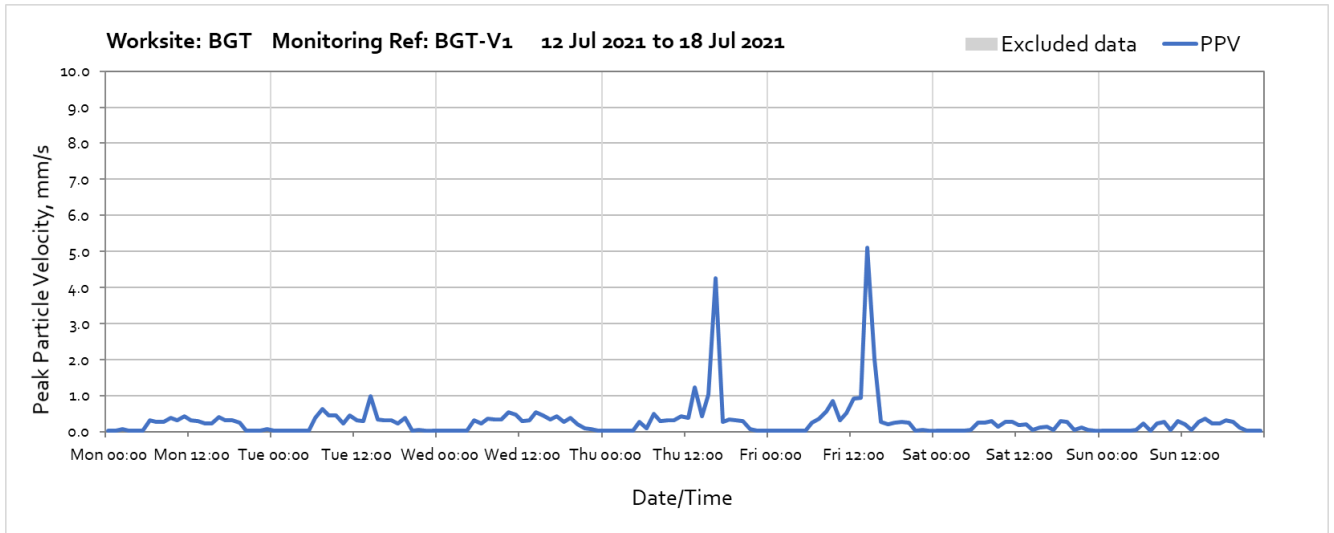
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative of HS2 construction works, these values have been greyed out in the following charts and have been excluded to calculate values in Table 4 of the main report.

### Worksite: BGT - Monitoring Ref: BGT-V1

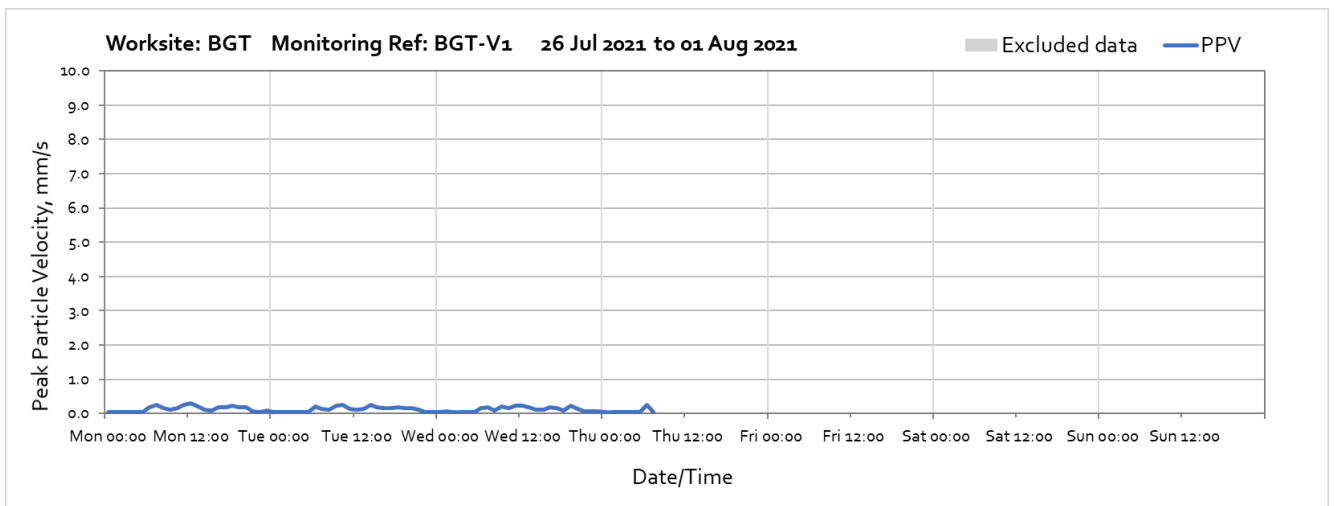


Note: High vibration levels measured at 12:00 on Friday 2<sup>nd</sup> July 2021 were due to local disturbance at the monitor station and not representative of HS2 vibration levels.





Note: High vibration levels measured between 13:00 and 14:00 on Wednesday 21<sup>st</sup> July 2021 were not related to HS2 vibration levels as site was not operational as that time.



Note: Missing data at between 08:00 on Thursday 29<sup>th</sup> July 2021 to 23:00 on Saturday 31<sup>st</sup> July 2021 was due to power issue (battery not being switched).

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## Worksite: BGT - Monitoring Ref: BGT-V2

