

## **Construction Noise and Vibration Monthly Report – July 2022**

**Buckinghamshire**

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# Non-Technical Summary

This Noise and Vibration Monitoring Report fulfils HS2 Limited's commitment detailed in the Environmental Minimum Requirements (EMRs), Annex 1, Code of Construction Practice, to present the results of noise monitoring carried out within Buckinghamshire (BS) during the month of July 2022.

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken in the vicinity of the A422 Turweston North Worksite (ref.: A422 TN) where construction of the access road, topsoil stripping, compound maintenance works, drainage works, excavations, stockpiling and construction of slab crossing were undertaken.
- Noise monitoring was undertaken in the vicinity of School End worksite (ref.: SE), Rosehill Farm worksite (ref.: RF), and Hermitage Chetwode worksite (ref.: HC) where compound development works, bulk excavation, topsoil stripping, drainage works, instrumentation and monitoring works and stockpiling were undertaken.
- Noise monitoring was undertaken in the vicinity of West Street Overbridge worksite (ref.: WSO) where excavation, stone laying and compaction, cutting of ditches, surfacing, access road maintenance, topsoil stripping works were undertaken.
- Noise monitoring was undertaken in the vicinity of Addison Road worksite (ref.: AR) where concrete pours, rebar fixing works and formworks installations were underway.
- Noise monitoring was undertaken in the vicinity of School Hill Compound worksite (ref.: SHC) where no works were undertaken during the reporting period.
- Noise monitoring was undertaken in the vicinity of the School Hill UTX worksite (ref.: SHU) where excavation, backfilling, fencing works, surface works, and demobilisation works were undertaken during the reporting period.
- Noise monitoring was undertaken in the vicinity of the Quainton worksite (ref.: QAR) where construction of the under track crossing shaft, tunnelling works trenching and duct laying works were underway.
- Noise monitoring was undertaken in the vicinity of the FCC Sidings worksite reference (ref: FCC) where no work activities were undertaken during the reporting period.

- Noise monitoring was undertaken in the vicinity of Meadoway and Glebe House, Aylesbury worksite (ref: MW&GH) where access road construction, utility works and earthworks were undertaken.
- Noise monitoring was undertaken in the vicinity of Oat Close Worksite (ref: OC) where earthworks, stockpiling works, excavation works, utility works piling works, diversion works, and rail deliveries were underway.
- Noise monitoring was undertaken in the vicinity of Nash Lee Lane Worksite (ref.: NLL) where subsoil stripping, compound extension works, plant crossing works and earth works were underway.
- Noise monitoring was undertaken in the vicinity of Ellesborough Road Worksite (ref.: ER) where demolition, vegetation clearance, excavation of drainage pond and pit construction works were underway.
- Noise monitoring was undertaken in the vicinity of Rocky Lane Embankment worksite (ref: RLE) where tarmacking, pond construction, topsoiling, digging, demolition works, backfilling, vegetation clearance, earthworks, piling platform construction, piling, access road construction works were underway.
- Noise monitoring was undertaken in the vicinity of Leather Lane worksite (ref: LL) where archaeological works, site haul road works and earthworks were underway.
- Noise monitoring was undertaken in the vicinity of South Heath Cutting worksite (ref: SHCW) where earthworks and culvert installation works were undertaken.
- Noise monitoring was undertaken in the vicinity of North Portal Worksite (ref: NP) where site mobilisation, including site set up and fencing works, temporary and permanent access road construction, piling platform construction, drainage works, temporary utility works, compound construction, operation and maintenance works were undertaken.
- Noise monitoring was undertaken in the vicinity of Chesham Road Worksite (ref: CR) where site maintenance and operations and shaft construction works were undertaken.
- Noise monitoring was undertaken in the vicinity of Little Missenden Vent Shaft worksite (ref.: LM) where site operation, dewatering, piling works, shaft base slab and collar construction were undertaken.
- Noise monitoring was undertaken in the vicinity of Amersham Vent Shaft worksite (ref.: AM), where maintenance, waterproofing works, piling works, collar construction, and earthworks were undertaken.

- Noise monitoring was undertaken in the vicinity of Chalfont St Giles Vent Shaft worksite (ref.: CSG) where maintenance, piling works, road maintenance works, secondary lining to the concrete, earthworks, tunnelling and construction of basement works were undertaken.
- Noise monitoring was undertaken in the vicinity of Chalfont St Peter Vent Shaft worksite (ref.: CSP), where general plant operations, piling works, road maintenance works, concrete reinforcement and basement construction works and tunnelling works were underway.
- Noise monitoring was undertaken in the vicinity of Load Test Pile 1 worksite (ref.: LTP #1), where piling works, construction of a cofferdam, compound operations, ground investigation works, compound operation, River Colne re-alignment and crossing works, pier construction, duct installation works, pumping water management, maintenance of haul roads, maintenance of generators, fencing works, utility diversions, environmental maintenance, Bentonite Farms maintenance, fibre crossing works, pier construction, gas crossing emergency dismantling works were underway.

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

- East West Rail (EWR) Overbridge and Charndon Lodge Underbridge where rebar fixing, formwork lifting and concrete works were underway.
- Perry Hill Overbridge where piling works and concrete works were underway.
- Addison Road where concrete works were underway.
- EWR Calvert where installation of culvert units, waterproofing works, backfilling and shuttering works were undertaken.
- Greendon Underwood Overbridge where piling works were underway.
- Infrastructure maintenance depo where landscape filling works were underway.
- Hills Farm where stockpiling and material deliveries were underway.
- Calvert section of Marylebone to Claydon Junction Line where removal of existing ballast embankment, drainage works and removal of existing culvert were underway.
- Edgcott Road overbridge where excavation of piling platform was underway.
- Doddershall Culvert where excavation work were underway.
- Creighton Road where concrete works were underway.

- Quainton temporary utility diversion works including concrete works, micro tunnelling, boring works, field trenching and road trenching were 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 five (5) times 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.

Five (5) complaints were received within the Buckinghamshire area during the monitoring period. A description of complaints, the results of investigations and any action 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 +3 dB) sound level than it would be if the reflecting surface was not there.
Free-field	A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
Peak particle velocity, or PPV	Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position. The PPV is a simple indicator of perceptibility and risk of damage to structures due to vibration. It is usually measured in mm/s.
SOAEL	Significant Observed Adverse Effect Level - the level above which significant adverse effects on health and quality of life occur.
Sound pressure level	The parameter by which sound levels are measured in air. It is measured in decibels. The threshold of hearing has been set at 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB at a distance of 1 metre and a change of 3dB in a time varying sound signal is commonly regarded as being just detectable. A change of 10dB is subjectively twice, or half, as loud.
Vibration dose value, or VDV	An index used to evaluate human exposure to vibration in buildings. While the PPV provides information regarding the magnitude of single vibration events, the VDV provides a measure of the total vibration experienced over a specified period of time (typically 16h daytime and 8h night-time). It takes into account the magnitude, the number and the duration of vibration events and can be used to quantify exposure to continuous, impulsive, occasional and intermittent vibration. The vibration dose value is measured in $m/s^{1.75}$ .

# 1 Introduction

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

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

1.1.2 Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the Buckinghamshire (BS) Local Authority area for the period 1<sup>st</sup> to 31<sup>st</sup> July 2022.

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

- A422 Turweston North worksite, reference A422 TN (see Plan 1 in Appendix A), where works activities included:
  - access road construction;
  - topsoil stripping;
  - compound maintenance works;
  - drainage works and installation of ponds;
  - excavations;
  - stockpiling; and
  - construction of slab crossing.
- School End worksite reference SE (see Plan 2 in Appendix A), Rosehill Farm worksite reference RF (see Plan 2 in Appendix A), and Hermitage Chetwode



Worksite reference – HC (see plan 2 in Appendix A), where works activities included:

- compound setup;
  - bulk excavation;
  - topsoil stripping;
  - drainage works, including pond maintenance works;
  - instrumentation and monitoring installations; and
  - stockpiling.
- West Street Overbridge worksite reference WSO (see Plan 2 in Appendix A), where works activities included:
- excavation;
  - stone laying and compaction;
  - cutting of drain ditches;
  - surfacing and tarmacking;
  - temporary diversion works;
  - access road maintenance; and
  - topsoil stripping.
- Addison Road worksite reference AR (see Plan 3 in Appendix A), where works activities included:
- concrete pours;
  - rebar fixing works; and
  - formwork installations.
- School Hill Compound worksite reference SHC (see Plan 3 in Appendix A), where no works activities were undertaken during the reporting period.
- School Hill UTX worksite reference - SHU (see Plan 3 in Appendix A), where works activities included:
- demobilisation works;
  - excavation works;
  - backfilling; and
  - surface works.

- Quainton worksite, reference – QAR (see Plan 4 in Appendix A) where works activities included:
  - construction of the under track crossing shaft;
  - tunnelling works;
  - trenching works; and
  - duct laying.
- FCC Sidings worksite, reference – FCC (see Plan 3 in Appendix A) where no works activities were undertaken during the reporting period.
- Meadoway and Glebe House, Aylesbury Worksite, reference – MW&GH (see Plan 5 in Appendix A), where works activities included:
  - utility works;
  - construction of access roads; and
  - earthworks, including stockpiling.
- Oat Close Worksite, reference – OC (see Plan 5 in Appendix A), where works activities included:
  - earthworks, including stockpiling management;
  - excavation works;
  - Stockpile construction; and
  - utility works.
- Nash Lee Lane Worksite, reference – NLL (see Plan 6 in Appendix A), where works activities included:
  - subsoil stripping;
  - compound extension works;
  - plant crossing works; and
  - excavation.
- Ellesborough Road Worksite, reference – ER (see Plan 6 in Appendix A), where works activities included:
  - archaeology work;
  - tarmacking;
  - pond construction including excavation;

- topsoiling;
  - earthworks;
  - demolition works;
  - backfilling;
  - demolition works; and
  - vegetation clearance.
- Rocky Lane Embankment Worksite, reference – RLE (see Plan 7 in Appendix A), where works activities included:
    - piling platforms;
    - tarmacking;
    - haul road construction;
    - sheet piling;
    - installation of access roads; and
    - earthworks.
- Leather Lane Worksite, reference – LL (see Plan 8 in Appendix A), where works activities included:
    - archaeological works;
    - site haul road works; and
    - earthworks, including stockpiling.
- South Heath Cutting Worksite, reference – SHCW (see Plan 8 in Appendix A), where works activities included:
    - earthworks; and
    - culvert installation.
- North Portal Worksite, reference – NP (see Plan 8 in Appendix A), where works activities included:
    - site mobilisation, including site set up and fencing works;
    - temporary and permanent access road construction, including hardstanding, kerbing, drainage works, asphaltting and installation of signage;
    - piling platform construction, including stabilisation, hardstanding, ducting, drainage and scrape formation works;

- temporary utility works;
  - supporting compound plant works; and
  - operation and maintenance works.
- Chesham Road Worksite reference – CR (see Plan 8 in Appendix A), where works activities included:
    - site maintenance and operations; and
    - shaft construction, which included concrete pours, grouting, reinforced concrete works, backfilling and sheet pile demolition.
  - Little Missenden Vent Shaft worksite reference LM (see Plan 9 in Appendix A), where works activities included:
    - general plant operations;
    - dewatering;
    - basement secant piling works;
    - shaft base slab construction; and
    - collar construction.
  - Amersham Vent Shaft Worksite, reference – AM (see Plan 10 in Appendix A), where works activities included:
    - maintenance;
    - waterproofing works;
    - basement secant piling;
    - collar construction;
    - small basement construction; and
    - secondary lining works.
  - Chalfont St Giles Vent Shaft Worksite, reference - CSG (see Plan 11 in Appendix A), where works activities included:
    - general plant operations;
    - secant piling works;
    - road maintenance works;
    - secondary lining to the concrete;
    - construction of reinforced concrete structures; and

- construction of basement.
- Chalfont St Peter Vent Shaft Worksite, reference – CSP (see Plan 12 in Appendix A), where works activities included:
  - general plant operations;
  - basement secant piling works;
  - road maintenance works;
  - concrete reinforcement;
  - tunnelling works; and
  - basement construction works.
- Colne Valley Viaduct - Load Test Pile 1 Worksite, reference – CVV-LTP #1 (see Plan 13 in Appendix A), where works activities included:
  - piling works, including bored piling, de-sanding, installation of reinforcement cage and concrete piling, break-out of bored pile, grout curtain construction around viaduct maintenance plant and clean up around piles;
  - construction of a cofferdam, including piling, excavation, dewatering and operation of support plant;
  - compound operations;
  - ground investigation works;
  - DWSC compound operation;
  - River Colne re-alignment and crossing works;
  - pier construction, including yard supporting activities and tower crane mobilisation and demobilisation;
  - duct installation works, including earthworks;
  - pumping water management;
  - maintenance of haul roads;
  - satellite welfares;
  - maintenance of generators;
  - fencing works;
  - utility diversions;
  - environmental maintenance;

- Bentonite Farms demolition and base slab construction works;
- fibre crossing works;
- pier construction;
- gas crossing emergency dismantling; and
- deck works.

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

- East West Rail (EWR) Overbridge and Charndon Lodge Underbridge where rebar fixing, formwork lifting, and concrete works were underway.
- Perry Hill Overbridge where piling works, and concrete works were underway.
- EWR Calvert where installation of culvert units, waterproofing works, backfilling and shuttering works were undertaken.
- Greendon Underwood Overbridge where piling works were underway.
- Infrastructure maintenance depot where landscape filling works were underway.
- Hills Farm were stockpiling, and material deliveries were underway.
- Calvert section of Marylebone to Claydon Junction Line where removal of existing ballast embankment, drainage works, and removal of existing culvert were underway.
- Edgcott Road overbridge where excavation of piling platform was underway.
- Doddershall Culvert where excavation work were underway.
- Addison Road temporary diversion works including removal of existing embankment.
- Creighton Road where concrete works were underway.
- Quainton temporary utility diversion works including concrete works, tunnelling, boring works, field trenching, and road trenching were underway.
- Various locations along the route where vegetation clearance, construction of access roads, compound development and maintenance, demolition works, topsoil stripping and ponds maintenance works were 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

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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 Forty-three (43) noise and two (2) vibration monitoring installations were active in July in the BS area. Table 2 summarises the positions of noise and vibration monitoring installations within the BS area in July 2022.
- 1.2.2 Noise monitor position (ref.:MF-NMP1) was temporarily retrieved for the entire month of July due to failure of the monitoring station microphone.
- 1.2.3 Noise monitor position (ref.:SHU-NMP1) was permanently removed on the 28<sup>th</sup> July.
- 1.2.4 Vibration monitor was position (ref.: ER-Vib1) was added for the month of July.
- 1.2.5 Vibration monitor position (ref.: SE-Vib1) was temporarily retrieved for the month of July due to possible water ingress in monitor connections and is currently being repaired.
- 1.2.6 Maps showing the positions of noise and vibration monitoring installations are presented in Appendix B.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
A422 TN	TN-NMP1	Turweston, Brackley
SE	SE-NMP1	School End, Chetwode
RF	RF-NMP1	Old Stable Cottage, Rosehill Farm, Chetwode
	RF-Vib1	Old Stable Cottage, Rosehill Farm, Chetwode
HC	HC-NMP1	Hermitage, Chetwode
WSO	WSO-NMP1	West Street, Twyford
	WSO-NMP2	Cross Bucks Way, Twyford
AR	AR-NMP1	Addison Road, Rosehill Farm
SHC	SHC-NMP1	School Hill Compound, Calvert
SHU	SHU-NMP1	70 Cotswold Way, Calvert
QAR	QAR-NMP2	Station Rd, Quainton
FCC	FCC-NMP1	Calvert South
MW&GH	GH-NMP1	Glebe House, A418, Aylesbury

Worksite Reference	Measurement Reference	Address
	MW-NMP1	Aylesbury, Buckinghamshire
OC	OC-NMP1	Oat Close, Bishopstone, Aylesbury
	WES-NMP1	Westfield, Stoke Mandeville, Aylesbury
NLL	NLL-NMP1	Nash Lee Lane, Nash Lee
	NLL-NMP2	Nash Lee Lane, Nash Lee
ER	ER-NMP1	Ellesborough Rd, Wendover
	ER-Vib1	Ellesborough Rd, Wendover
	BL-NMP1	Bacombe Lane, Wendover
	WT-NMP1	A413, Wendover
RLE	SDVC-NMP1	Rocky Lane, Wendover
	NCAS6-NMP1	Chesham Lane, The Lee, Wendover
	NCAS5-NMP1	Chesham Lane, The Lee, Wendover
LL	HG-NMP1	Hunts Green, Leather Lane, The Lee, South Heath
	GD-NMP1	Grimms Ditch, The Lee, South Heath
SHCW	PR-NMP1	Potters Row, South Heath
	SH-NMP1	Bury Farm, South Heath
NP	ORC-NMP1	Orchard Cottage, Ballinger Road, South Heath
	BLH-NMP1	Bayleys Hatch, South Heat, Great Missinden
CR	MDL-NMP1	Meadow Leigh Cottage, Firth Hill, South Heath
AM	AM-NMP1	Amersham Vent Shaft Worksite, Whielden Lane, Amersham
LM	LM-NMP1	Little Missenden, A413, Amersham
	PWC-NMP1	Patricia Holmes, Little Missenden Vent Shaft Worksite, Amersham
CSG	CSG-NMP1	Chalfont St Giles Vent Shaft Worksite, Bottom House Farm Lane
	CSG-NMP2	Chalfont St Giles Vent Shaft Worksite, Bottom House Farm Lane
	PIC-NMP1	Bottom House Farm Lane, Chalfont St Giles
CSP	CSP-NMP1	Chalfont St Peter Vent Shaft Worksite, Chesham Lane, Chalfont St. Peter
	CSP-NMP2	Chalfont St Peter Vent Shaft Worksite, Chesham Lane, Chalfont St. Peter
	CSP-NMP3	Chalfont St Peter Vent Shaft Worksite, Chesham Lane, Chalfont St. Peter



Worksite Reference	Measurement Reference	Address
CVV-LTP #1	CVV-LTP #1-NMP1	Northern boundary, Load Test Pile 1 Worksite, Denham Water Ski Club
	CVV-WYC-NMP1	Wyatt's Covert, Tilehouse Lane, Denham, Denham Garden Village
	CVV-DFS-NMP1	Denham Film Studio, Uxbridge
CVV-MR*	CVV-SVF-NMP1	Savay Farm, Denham Garden Village, Denham, Buckinghamshire

\* This worksite is within the London Borough of Hillingdon, for more details on the works taking place please refer to the London Borough of Hillingdon Noise and Vibration Report available at:

<https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2>

## 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<sub>Aeq</sub> Data over the Monitoring Period

Worksite Reference	Measurement Reference	Site Address	Free-Field or Façade Measurement	Weekday 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
A422 TN	TN-NMP1	Turweston, Brackley	Free-field	47.3 (51.3)	51.3 (56.6)	46.8 (58.3)	45.8 (48.6)	45.4 (51.5)	46.0 (47.1)	49.7 (54.8)	48.9 (52.0)	48.0 (55.5)	45.2 (48.1)	48.4 (57.1)	45.8 (50.0)
SE	SE-NMP1	School End, Chetwode	Free-field	49.0 (56.9)	59.3 (64.3)	45.1 (61.0)	41.4 (47.5)	41.0 (46.9)	47.0 (53.8)	54.8 (62.0)	52.1 (60.8)	44.8 (48.5)	41.6 (46.5)	47.4 (56.0)	40.6 (47.6)
RF	RF-NMP1	Old Stable Cottage, Rosehill Farm, Chetwode	Free-field	46.9 (52.2)	52.2 (59.9)	47.1 (52.2)	46.3 (51.5)	45.1 (54.5)	46.5 (47.9)	49.0 (53.1)	47.5 (51.0)	47.3 (53.0)	45.0 (52.2)	48.6 (58.1)	44.5 (55.2)
HC	HC-NMP1	Hermitage, Chetwode	Free-field	47.9 (52.4)	60.5 (74.5)	45.9 (55.2)	42.3 (49.8)	40.9 (53.3)	45.1 (49.0)	56.7 (72.6)	53.8 (64.8)	47.0 (51.7)	41.6 (50.8)	49.6 (57.4)	40.6 (48.9)
WSO	WSO-NMP1	West Street, Twyford	Free-field	48.9 (58.3)	51.5 (58.3)	44.5 (50.3)	41.8 (50.2)	40.5 (48.8)	46.5 (49.1)	49.1 (52.3)	46.5 (49.2)	44.0 (51.1)	39.9 (46.4)	47.5 (53.0)	39.8 (46.8)
	WSO-NMP2	Twyford	Free-field	47.6 (52.4)	51.4 (61.0)	45.6 (48.6)	44.2 (50.8)	43.7 (57.3)	46.6 (48.7)	51.0 (53.2)	49.9 (52.6)	47.8 (53.1)	43.4 (48.5)	49.8 (54.6)	43.3 (46.3)
AR	AR-NMP1	Addison Road, Rosehill Farm	Free-field	50.7 (55.7)	53.9 (73.9)	48.3 (57.7)	38.9 (46.6)	37.8 (50.6)	46.7 (49.7)	52.2 (55.2)	49.3 (51.3)	44.4 (49.3)	37.4 (45.0)	47.9 (54.1)	36.3 (43.7)
SHC	SHC-NMP1	School Hill Compound, Calvert	Free-field	49.2 (52.7)	52.0 (59.0)	47.0 (51.9)	42.8 (47.5)	39.8 (48.6)	44.1 (49.9)	50.1 (54.0)	48.9 (58.1)	45.7 (58.6)	39.2 (46.9)	45.4 (53.5)	39.9 (46.9)

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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
SHU	SHU-NMP1	70 Cotswold Way, Calvert	Free-field	49.7 (54.8)	51.7 (58.7)	47.4 (52.1)	44.2 (49.3)	41.6 (49.9)	46.3 (48.0)	48.7 (50.6)	46.8 (49.2)	49.0 (60.3)	40.2 (46.4)	51.1 (70.1)	41.6 (48.3)
QAR	QAR-NMP2	Station Rd, Quainton	Free-field	50.6 (61.5)	52.5 (62.6)	48.5 (54.8)	46.0 (57.0)	41.8 (56.1)	48.0 (56.9)	54.0 (61.0)	54.7 (62.1)	54.0 (64.8)	45.6 (57.9)	54.6 (70.0)	44.7 (59.8)
FCC	FCC-NMP1	Calvert South	Free-field	54.5 (60.7)	55.4 (58.8)	47.1 (56.6)	45.1 (60.2)	43.0 (55.1)	50.2 (53.2)	47.4 (50.7)	45.6 (48.9)	43.7 (48.5)	39.2 (46.2)	46.4 (54.2)	43.4 (53.7)
MW&GH	GH-NMP1	Glebe House, A418, Aylesbury	Free-field	53.2 (54.6)	54.7 (75.0)	52.9 (54.8)	51.4 (54.4)	47.4 (54.1)	51.2 (51.4)	53.2 (53.8)	52.5 (53.0)	52.1 (54.8)	46.9 (50.0)	52.1 (55.7)	48.0 (53.0)
	MW-NMP1	Aylesbury, Buckinghamshire	Free-field	61.9 (62.6)	61.4 (70.8)	60.9 (62.5)	58.9 (61.6)	55.2 (61.6)	59.3 (60.1)	61.1 (61.5)	60.8 (61.4)	60.0 (62.7)	54.0 (58.5)	59.6 (62.6)	55.1 (61.6)
OC	OC-NMP1	Oat Close, Bishopstone, Aylesbury	Free-field	47.8 (61.5)	57.1 (75.6)	52.5 (64.7)	43.5 (53.4)	42.4 (54.3)	44.8 (53.7)	45.9 (50.5)	45.2 (47.5)	45.3 (51.0)	44.7 (54.3)	49.0 (65.2)	43.2 (54.7)
	WES-NMP1	Westfield, Stoke Mandeville, Aylesbury	Free-field	43.0 (47.1)	51.4 (67.2)	42.9 (49.1)	42.1 (51.3)	41.2 (55.1)	41.9 (52.7)	49.8 (61.8)	44.4 (50.0)	43.1 (49.9)	40.0 (48.6)	45.5 (55.5)	43.1 (50.9)
NLL	NLL-NMP1	Nash Lee Lane, Nash Lee	Free-field	53.3 (53.8)	56.5 (57.7)	52.0 (54.0)	48.8 (52.5)	48.9 (58.9)	53.5 (53.5)	56.5 (56.5)	56.2 (56.2)	52.1 (54.9)	44.1 (46.5)	49.1 (50.3)	44.4 (50.5)
	NLL-NMP2	Nash Lee Lane, Nash Lee	Free-field	54.0 (57.8)	53.8 (57.1)	52.7 (56.4)	50.7 (54.1)	47.9 (56.5)	51.1 (54.0)	53.1 (56.5)	52.5 (57.0)	51.7 (55.6)	48.3 (53.2)	52.2 (58.7)	48.0 (54.5)

OFFICIAL

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
ER	ER-NMP1	Ellesborough Rd, Wendover	Free-field	54.4 (57.2)	58.4 (76.7)	53.5 (55.2)	51.7 (55.5)	48.5 (56.4)	51.1 (52.8)	52.3 (54.3)	52.3 (54.3)	52.2 (55.7)	47.5 (53.0)	51.4 (56.0)	47.9 (53.7)
	BL-NMP1	Bacombe Lane, Wendover	Free-field	47.7 (50.1)	48.0 (52.7)	46.8 (49.6)	46.3 (50.2)	45.3 (50.1)	46.5 (47.5)	47.7 (48.9)	46.3 (48.0)	46.5 (52.1)	45.0 (48.7)	47.1 (52.4)	45.1 (51.1)
	WT-NMP1	A413, Wendover	Free-field	66.2 (67.1)	65.0 (67.2)	64.9 (66.6)	61.9 (65.8)	58.7 (66.0)	61.9 (62.5)	63.4 (63.7)	63.4 (64.2)	62.6 (65.1)	57.4 (64.9)	62.5 (68.4)	58.5 (65.2)
RLE	SDVC-NMP1	Rocky Lane, Wendover	Free-field	62.9 (64.1)	65.7 (72.5)	62.1 (64.8)	59.6 (62.7)	56.6 (63.8)	60.5 (61.1)	61.8 (63.2)	61.4 (63.4)	60.5 (62.9)	55.8 (60.2)	60.2 (62.2)	56.4 (63.0)
	NCAS6-NMP1	Chesham Lane, The Lee, Wendover	Free-field	53.7 (70.3)	62.8 (67.3)	61.1 (70.6)	44.1 (50.5)	41.9 (55.4)	44.2 (46.3)	46.9 (51.5)	45.8 (49.3)	47.7 (58.1)	43.8 (56.9)	47.7 (54.1)	44.7 (63.9)
	NCAS5-NMP1	Chesham Lane, The Lee, Wendover	Free-field	55.4 (58.4)	56.4 (58.1)	55.0 (59.5)	52.1 (58.3)	48.5 (56.3)	52.3 (54.6)	54.6 (57.3)	53.8 (56.7)	53.5 (56.8)	48.5 (52.4)	53.9 (57.9)	49.0 (56.4)
LL	HG-NMP1	Hunts Green, Leather Lane, The Lee	Free-field	45.4 (53.4)	50.9 (55.6)	46.7 (57.8)	44.9 (63.6)	40.5 (58.5)	43.0 (49.2)	50.1 (52.9)	45.2 (47.3)	48.5 (66.6)	39.7 (49.5)	51.3 (72.0)	39.7 (48.9)
	GD-NMP1	Grimms Ditch, The Lee, South Heath	Free-field	47.3 (54.2)	55.2 (65.6)	49.9 (62.3)	46.3 (62.6)	46.2 (69.2)	47.2 (58.2)	50.7 (60.4)	50.0 (57.7)	50.2 (66.2)	46.9 (56.3)	53.0 (67.4)	44.3 (49.1)
SHCW	PR-NMP1	Potters Row, South Heath	Free-field	48.4 (52.0)	50.1 (53.5)	47.6 (59.5)	43.8 (51.7)	42.4 (56.4)	46.4 (50.3)	49.3 (53.6)	46.1 (48.3)	46.7 (51.6)	43.4 (49.7)	48.3 (55.8)	43.2 (48.5)

OFFICIAL

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
	SH-NMP1	Bury Farm, South Heath	Free-field	49.9 (56.6)	54.3 (73.0)	47.8 (51.3)	46.4 (51.8)	42.0 (50.6)	47.5 (51.6)	50.2 (54.3)	46.9 (48.0)	46.2 (51.5)	42.4 (47.0)	47.5 (53.3)	42.1 (46.9)
NP	ORC-NMP1	Orchard Cottage, Ballinger Road, South Heath	Free-field	55.8 (59.0)	57.0 (58.9)	53.5 (56.3)	52.3 (57.2)	44.0 (55.5)	53.5 (55.5)	54.5 (57.1)	50.0 (52.6)	49.7 (56.1)	45.3 (51.5)	50.8 (58.2)	44.0 (49.6)
	BLH-NMP1	Bayleys Hatch, South Heat, Great Missinden	Free-field	48.7 (52.7)	51.0 (55.1)	48.1 (57.6)	46.7 (56.0)	39.4 (51.9)	46.0 (48.9)	50.8 (55.9)	49.5 (61.7)	47.2 (52.6)	39.6 (44.6)	47.8 (57.5)	40.6 (52.4)
CR	MDL-NMP1	Meadow Leigh Cottage, Firth Hill, South Heath	Free-field	55.1 (61.1)	55.0 (58.9)	54.7 (66.0)	52.2 (59.7)	47.0 (60.0)	50.5 (51.6)	55.6 (58.2)	53.1 (55.0)	55.8 (66.1)	48.2 (55.3)	56.6 (64.3)	47.1 (59.9)
AM	AM-NMP1	Whielden Lane, Amersham	Free-field	61.1 (62.5)	65.6 (72.1)	60.0 (67.9)	57.1 (59.0)	53.8 (59.2)	58.9 (60.5)	61.3 (64.6)	59.9 (61.6)	58.7 (61.9)	53.9 (58.3)	58.1 (61.1)	53.4 (59.4)
LM	LM-NMP1	Little Missenden, A413, Amersham	Free-field	58.3 (59.5)	59.6 (68.1)	58.0 (59.6)	55.4 (64.5)	50.8 (57.7)	54.4 (56.3)	56.8 (58.1)	57.4 (58.1)	56.6 (60.4)	49.9 (54.6)	56.0 (58.7)	50.4 (57.0)
	PWC-NMP1	Patricia Holmes, Little Missenden Vent Shaft Worksite, Amersham	Free-field	57.9 (59.2)	57.5 (64.2)	57.3 (59.3)	54.6 (57.7)	50.3 (57.4)	53.8 (55.7)	57.1 (59.4)	56.7 (58.2)	55.9 (58.9)	49.7 (53.9)	55.5 (58.7)	50.0 (56.2)
CSG	CSG-NMP1	Chalfont St Giles Vent Shaft Worksite, Bottom House Farm Lane	Free-field	50.8 (59.3)	54.4 (68.4)	44.2 (48.2)	44.5 (62.0)	41.6 (54.1)	44.3 (47.5)	47.2 (48.0)	46.8 (51.2)	47.2 (55.6)	42.3 (52.9)	46.6 (51.5)	42.9 (53.4)
	CSG-NMP2	Chalfont St Giles Vent Shaft Worksite, Bottom House Farm Lane	Free-field	51.4 (56.7)	58.6 (65.3)	48.2 (55.9)	45.1 (54.4)	43.0 (53.8)	45.1 (49.7)	48.4 (50.1)	47.8 (51.5)	47.3 (53.8)	41.8 (49.0)	47.2 (52.1)	41.7 (50.2)

OFFICIAL

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
	PIC-NMP1	Bottom House Farm Lane, Chalfont St Giles, Buckinghamshire	Free-field	52.6 (54.7)	52.9 (54.6)	52.2 (57.9)	50.3 (58.0)	46.5 (54.4)	50.3 (52.4)	52.5 (54.9)	52.5 (58.8)	50.5 (53.7)	44.9 (49.1)	50.7 (58.1)	45.7 (51.8)
CSP	CSP-NMP1	Chalfont St Peter Vent Shaft Worksite	Free-field	57.5 (59.2)	57.3 (60.8)	55.9 (58.7)	52.7 (60.6)	47.5 (54.4)	52.6 (53.7)	55.4 (56.7)	55.8 (57.8)	53.8 (57.3)	46.8 (52.5)	53.7 (57.0)	46.9 (52.8)
	CSP-NMP2	Chalfont St Peter Vent Shaft Worksite	Free-field	47.6 (51.8)	50.5 (52.4)	45.6 (49.5)	44.2 (53.9)	41.5 (57.4)	48.0 (55.4)	51.0 (52.2)	50.9 (52.5)	46.6 (51.8)	40.1 (47.7)	49.2 (55.2)	39.7 (47.5)
	CSP-NMP3	Chalfont St Peter Vent Shaft Worksite	Free-field	55.5 (57.1)	55.4 (57.5)	54.3 (56.0)	52.7 (55.2)	48.6 (54.6)	53.1 (54.3)	55.6 (56.2)	56.0 (56.7)	54.5 (57.1)	49.0 (57.6)	54.6 (58.5)	48.5 (54.3)
CVV-LTP #1	CVV-LTP #1-NMP1	Northern boundary, Load Test Pile 1 Worksite	Free-field	61.2 (62.2)	61.1 (62.2)	60.1 (62.1)	57.5 (61.8)	55.5 (62.0)	57.9 (58.8)	60.4 (61.1)	60.5 (61.7)	58.6 (64.1)	54.2 (67.2)	58.1 (63.1)	55.1 (61.7)
	CVV-WYC-NMP1	Wyatt's Covert, Tilehouse Lane, Denham	Free-field	56.8 (58.5)	57.6 (62.1)	55.7 (58.9)	52.8 (56.6)	50.7 (58.6)	53.0 (55.3)	56.6 (58.1)	57.2 (58.1)	54.2 (59.8)	50.3 (68.3)	54.7 (60.1)	49.5 (56.5)
	CVV-DFS-NMP1	Denham Film Studio, Uxbridge	Free-field	46.3 (50.0)	48.0 (50.5)	47.4 (51.8)	47.1 (54.9)	42.6 (58.2)	45.1 (48.9)	47.1 (48.0)	47.1 (50.1)	46.3 (53.5)	41.8 (46.7)	46.6 (53.2)	41.6 (47.4)
CVV-MR	CVV-SVF-NMP1	Savay Farm, Denham Garden Village, Denham, Buckinghamshire	Free-field	46.9 (52.8)	49.5 (55.3)	46.3 (51.6)	45.0 (50.5)	41.8 (53.4)	43.8 (47.2)	45.3 (46.6)	43.8 (45.9)	43.4 (49.6)	40.6 (45.9)	44.3 (50.2)	41.5 (51.1)

2.1.2 Table 4 presents a summary of the measured vibration levels at the monitoring location over the reporting period. The highest PPV measured during the monitoring 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
ER	ER-Vib 1	46, Ellesborough Rd, Wendover	2.16 (Z-axis)
RF	RF-Vib 1	Old Stable Cottage, Rosehill Farm, Chetwode	1.87 (X-axis)

2.1.3 Appendix C presents graphs of the noise and vibration 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). Vibration data presented consist of hourly PPV values. 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 at nearby receptors, 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 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	Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
A422 TN	TN-NMP1	Turweston, Brackley	All days	All periods	No exceedance	No exceedance
SE	SE-NMP1	School End, Chetwode	Weekdays Saturdays	0800-1800 0800-1300	2 1	No exceedance
RF	RF-NMP1	Old Stable Cottage, Rosehill Farm, Chetwode	All days	All periods	No exceedance	No exceedance
HC	HC-NMP1	Hermitage, Chetwode	Weekdays Saturdays	0800-1800 0800-1300	6 1	1 1
WSO	WSO-NMP1	West Street, Twyford	All days	All periods	No exceedance	No exceedance
	WSO-NMP2	Twyford	All days	All periods	No exceedance	No exceedance
AR	AR-NMP1	Addison Road, Rosehill Farm	All days	0800-1800	1	1
SHC	SHC-NMP1*	School Hill Compound, Calvert	All days	All periods	No exceedance	No exceedance
SHU	SHU-NMP1	70 Cotswold Way, Calvert	All days	All periods	No exceedance	No exceedance
QAR	QAR-NMP2	Station Rd, Quainton	Weekdays	0800-1800	1	No exceedance
FCC	FCC-NMP1	Calvert South	All days	All periods	No exceedance	No exceedance
MW&GH	GH-NMP1	Glebe House, A418, Aylesbury	All days	All periods	No exceedance	No exceedance
	MW-NMP1	Aylesbury, Buckinghamshire	Weekdays	0800-1800	1	No exceedance

Worksite Reference	Measurement Reference	Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOEL	Number of exceedances of SOAEL
OC	OC-NMP1	Oat Close, Bishopstone, Aylesbury	Weekdays	0800-1800	5	No exceedance
	WES-NMP1	Westfield, Stoke Mandeville, Aylesbury	Weekdays	0800-1800	3	No exceedance
NLL	NLL-NMP1	Nash Lee Lane, Nash Lee	All days	All periods	No exceedance	No exceedance
	NLL-NMP2	Nash Lee Lane, Nash Lee	All days	All periods	No exceedance	No exceedance
ER	ER-NMP1	Ellesborough Rd, Wendover	All days	0800-1800	3	1
	BL-NMP1	Bacombe Lane, Wendover	All days	All periods	No exceedance	No exceedance
	WT-NMP1	A413, Wendover	Weekdays Saturdays	0800-1800 0800-1300	21 5	No exceedance
RLE	SDVC-NMP1	Rocky Lane, Wendover	Weekdays Saturdays	0800-1800 0800-1300	19 1	No exceedance
	NCAS6-NMP1	Chesham Lane, The Lee, Wendover	Weekdays	0800-1800	16	No exceedance
	NCAS5-NMP1	Chesham Lane, The Lee, Wendover	All days	All periods	No exceedance	No exceedance
LL	HG-NMP1	Hunts Green, Leather Lane, The Lee, South Heath	All days	All periods	No exceedance	No exceedance
	GD-NMP1	Grimms Ditch, The Lee, South Heath	Weekdays	0800-1800	4	No exceedance
SHCW	PR-NMP1	Potters Row, South Heath	All days	All periods	No exceedance	No exceedance
	SH-NMP1	Bury Farm, South Heath	Weekdays	0800-1800	4	1

Worksite Reference	Measurement Reference	Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
NP	ORC-NMP1	Orchard Cottage, Ballinger Road, South Heath	All days	All periods	No exceedance	No exceedance
	BLH-NMP1	Bayleys Hatch, South Heat, Great Missinden	Weekdays Saturdays	1800-2200 1300-1400	2 1	No exceedance No exceedance
CR	MDL-NMP1	Meadow Leigh Cottage, Firth Hill, South Heath	Weekdays Saturdays	1900-2200 1400-2200	6 3	No exceedance No exceedance
AM	AM-NMP1*	Whielden Lane, Amersham	All days	All periods	No exceedance	No exceedance
LM	LM-NMP1*	Little Missenden Vent Shaft Worksite	All days	All periods	No exceedance	No exceedance
	PWC-NMP1	Patricia Holmes, Little Missenden Vent Shaft Worksite, Amersham	Weekdays Saturdays	0800-1800 1900-2200 1400-2200	1 6 13	No exceedance No exceedance No exceedance
CSG	CSG-NMP1*	Chalfont St Giles Vent Shaft	Weekdays Saturdays	1900-2200 1400-2200	2 3	No exceedance
	CSG-NMP2*	Chalfont St Giles Vent Shaft	All days	All periods	No exceedance	No exceedance
	PIC-NMP1	Bottom House Farm Lane, Chalfont St Giles	Weekdays Saturdays	1900-2200 1300-1400	1 1	No exceedance
CSP	CSP-NMP1*	Chalfont St Peter Vent Shaft Worksite	All days	All periods	No exceedance	No exceedance
	CSP-NMP2*	Chalfont St Peter Vent Shaft Worksite	All days	All periods	No exceedance	No exceedance
	CSP-NMP3*	Chalfont St Peter Vent Shaft Worksite	Night	2200-0700	1	No exceedance
CVV-LTP #1	CVV-LTP #1-NMP1*	Northern boundary, Load Test Pile 1 Worksite	All days	All periods	No exceedance	No exceedance
	CVV-WYC-NMP1**	Wyatt's Covert, Tilehouse Lane, Denham	Weekdays Saturdays	1800-2200 1400-2200	8 10	No exceedance No exceedance

Worksite Reference	Measurement Reference	Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
	CVV-DFS-NMP1**	Denham Film Studio, Uxbridge	Weekdays Saturdays	1800-2200 1400-2200	4 1	No exceedance No exceedance
CVV-MR	CVV-SVF-NMP1*	Savay Farm, Denham Garden Village, Denham, Buckinghamshire	All days	All periods	No exceedance	No exceedance

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

\*\* The ambient noise level is close to the LOAEL and measured LOAEL exceedances are considered to be due to ambient noise levels exceeding the LOAEL and not due to HS2 construction noise.

2.2.6 Exceedances of the LOAEL were recorded at twenty-one (21) monitoring locations during the month of July 2022. LOAEL exceedances were recorded during weekdays, nights and Saturdays working hours.

2.2.7 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
HC	HC-NMP1	Hermitage, Chetwode	2
AR	AR-NMP1	Addison Road, Rosehill Farm	1
ER	ER-NMP1	Ellesborough Rd, Wendover	1
SHCW	SH-NMP1	Bury Farm, South Heath	1

2.2.8 Five (5) SOAEL exceedances were recorded due to HS2 construction works during July 2022. The exceedance occurred at monitoring locations HC-NMP1, AR-NMP1, ER-NMP1 and SH-NMP1 during weekdays and Saturdays working hours.

## 2.3 Exceedances of Trigger Level

2.3.1 Table 7 provides a summary of exceedances of the S61 trigger noise levels determined to be due to HS2 related construction noise measured during the reporting period, along with the findings of any investigation.

Table 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

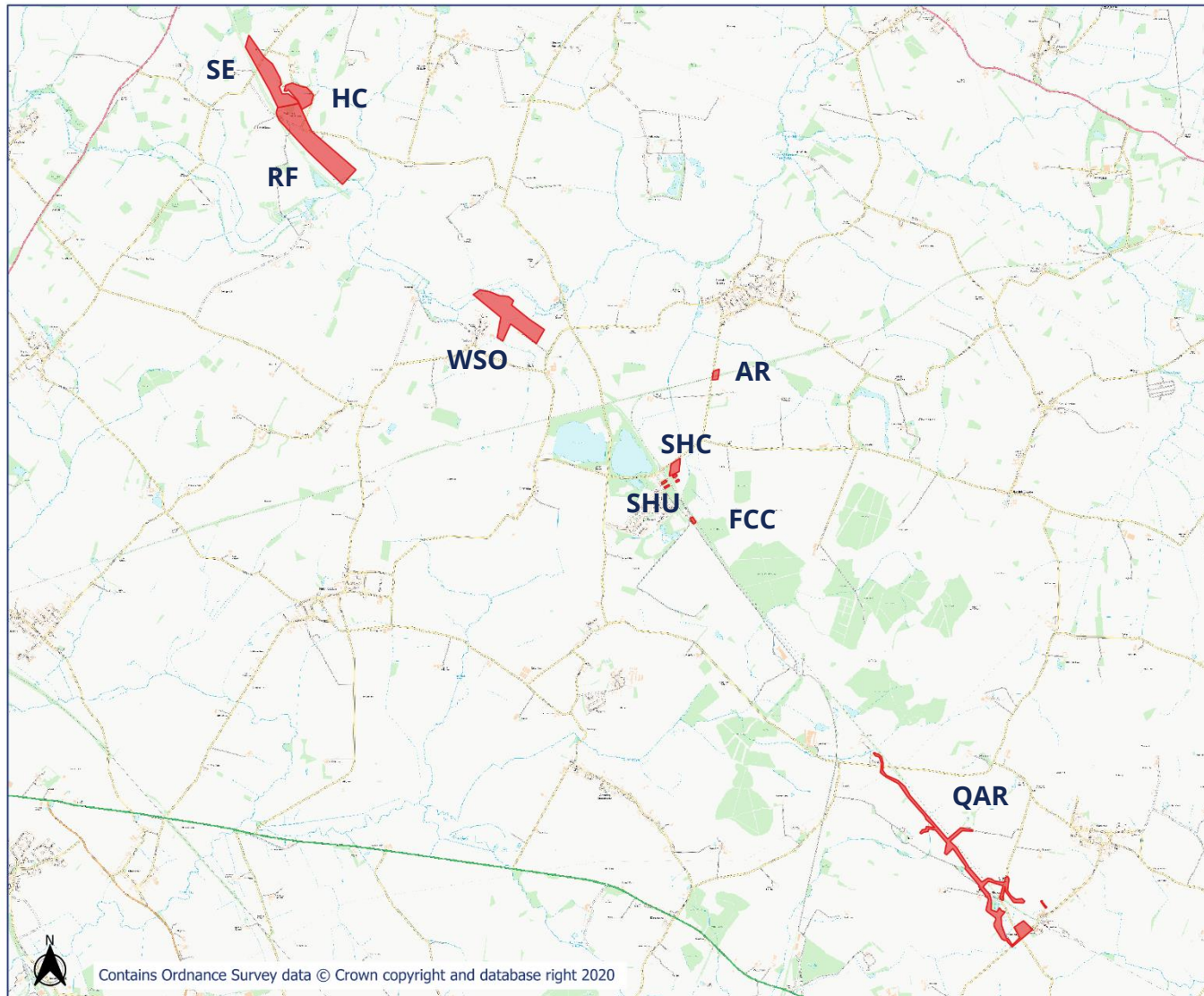
2.4.1 Table 8 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 8: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-22-43781-C	QAR	Complaint due to noise disturbance from construction noise prior to 8am.	Longer working hours were agreed to be extended as part of Section 61 Consent.	Increased noise monitoring will be undertaken to ensure no exceedances occur. Stakeholder has been contacted regarding the results of the investigation.
HS2-22-43807-C	RF	Complaint due to disturbance from construction vehicle use before consented hours.	Investigations show construction vehicles were working outside the standard working hours.	Apology provided and site staff re-briefed about use of vehicles and working before core hours. Stakeholder has been contacted regarding the results of the investigation.
HS2-22-43808-C	RLE	Noise from security on site in evening.	Investigation shows noise generated by security staff in hours of the evening.	Site staff have been re-briefed regarding formal quiet hours to ensure disturbance does not occur again. Stakeholder has been contacted and

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
				information about the results of the investigation has been provided.
HS2-22-43820-C	OC	Noise from rail deliveries during night.	Investigation shows overnight rail deliveries are only possible when no commuter services are operating. Noise bunds are in place to minimise the noise and no exceedances were recorded at the noise monitor installed on the estate.	Acoustic barriers are nearing completing. Stakeholder has been contacted and information about the results of investigations have been provided.

# Appendix A Site Locations

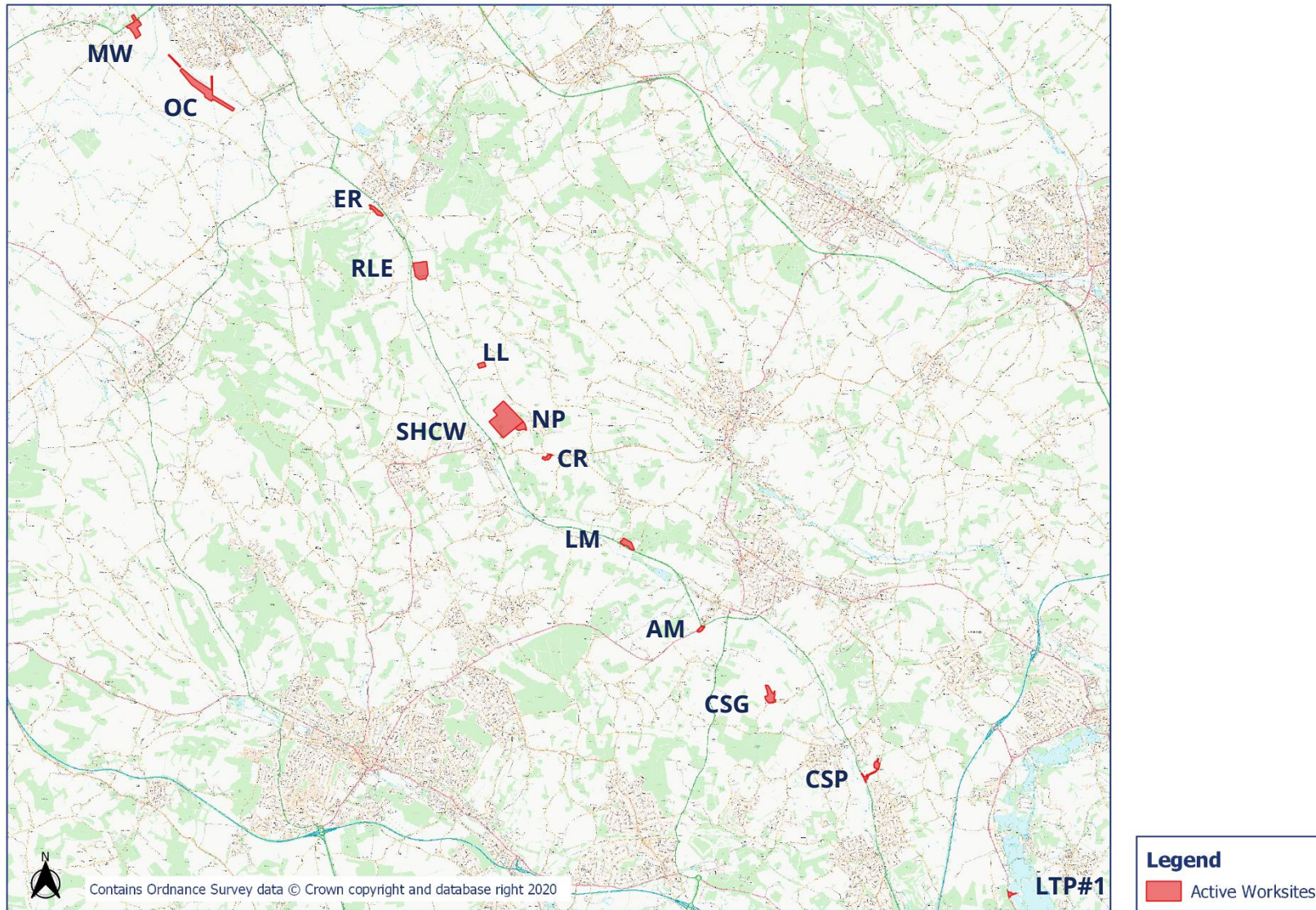


**Legend**

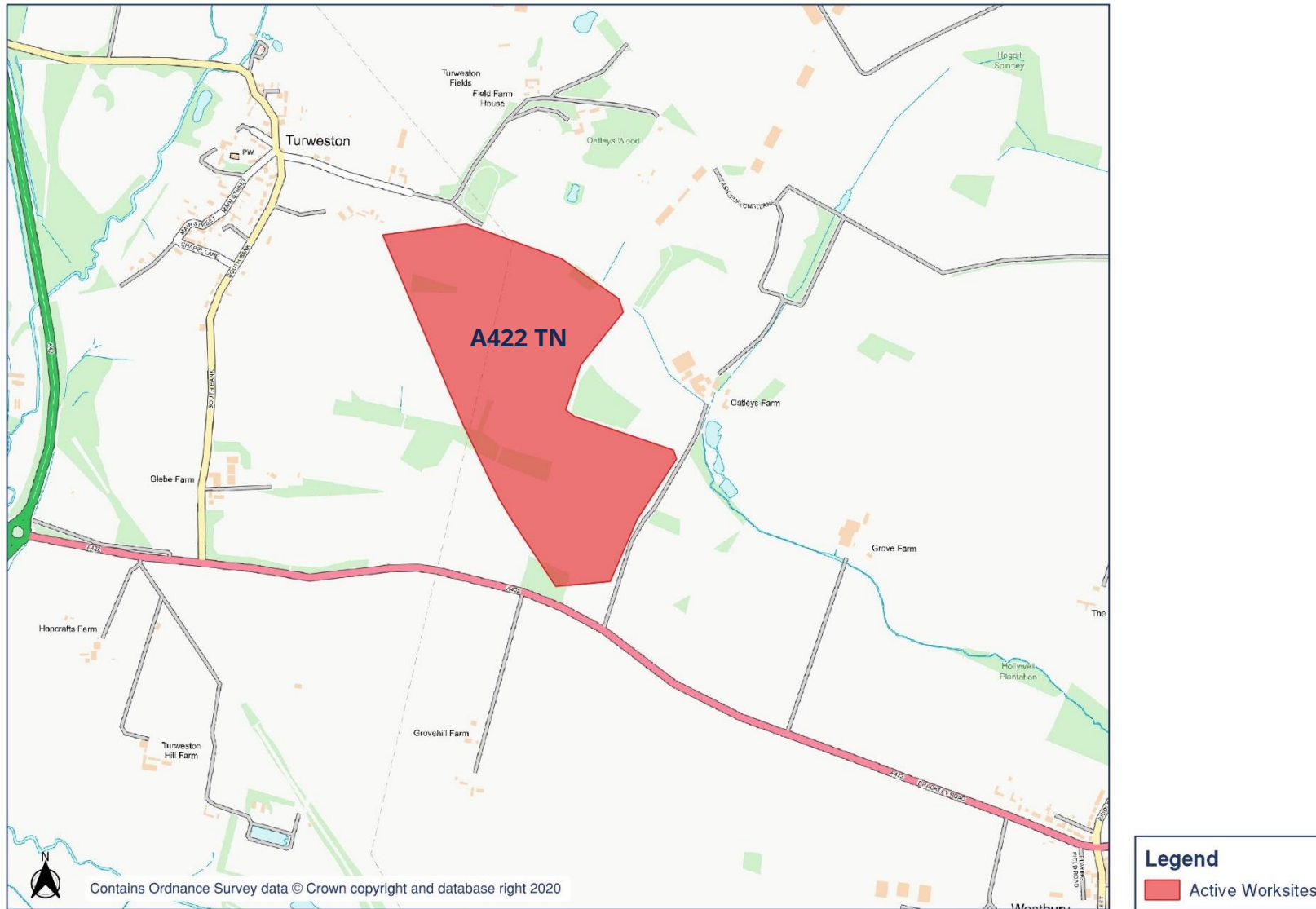
Active Worksites

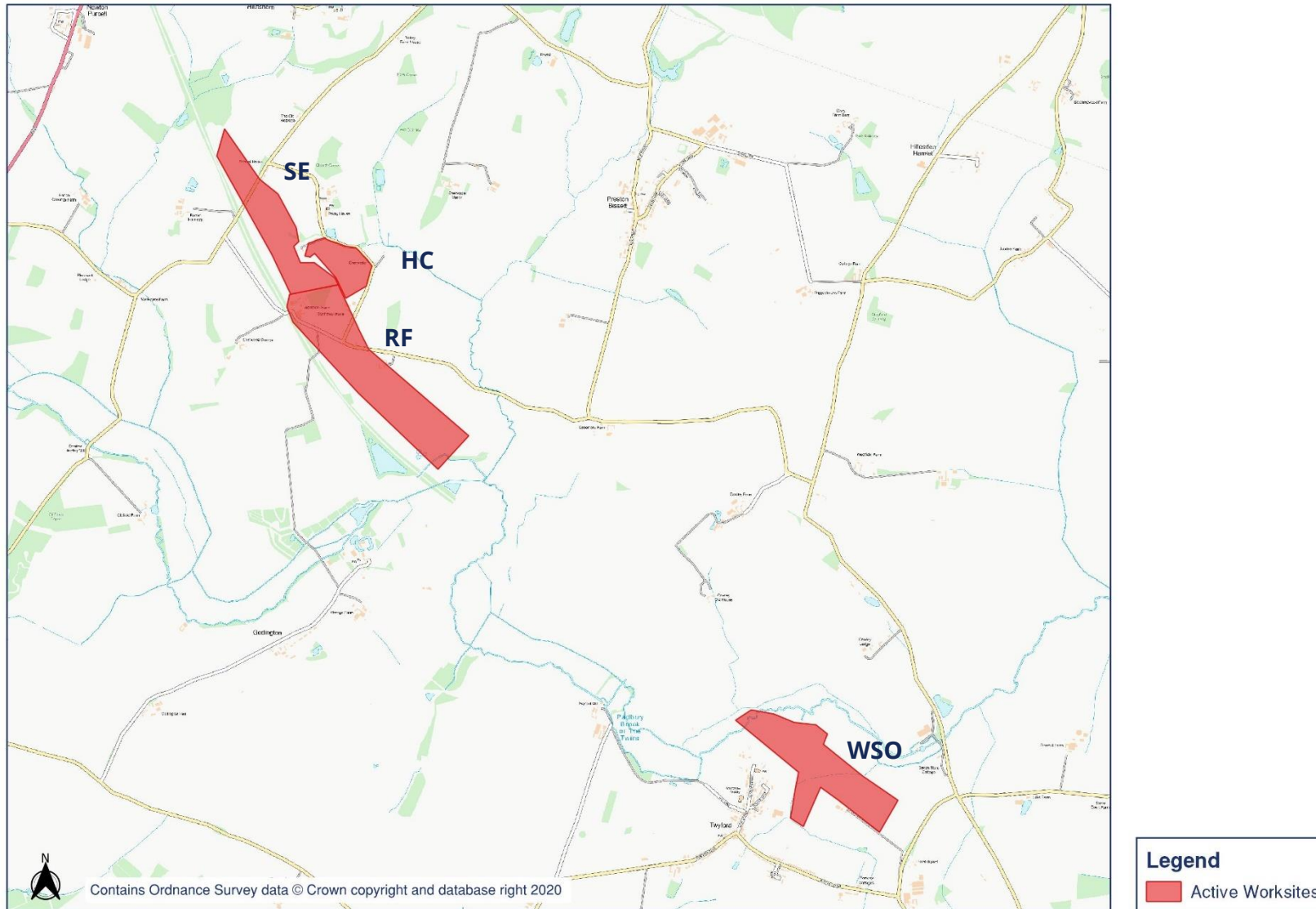


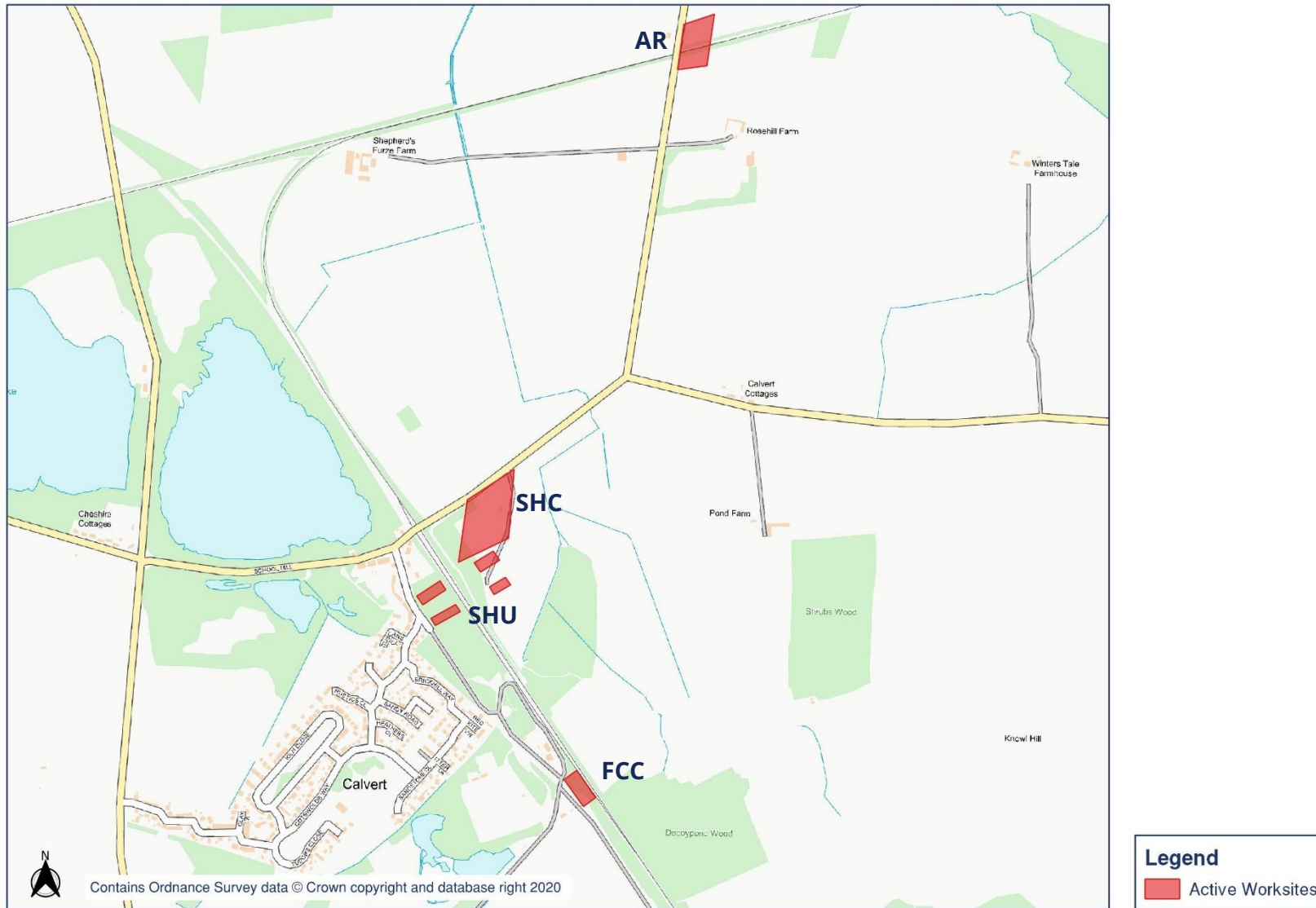
# HS2 Worksite Identification Plan - Overview 2

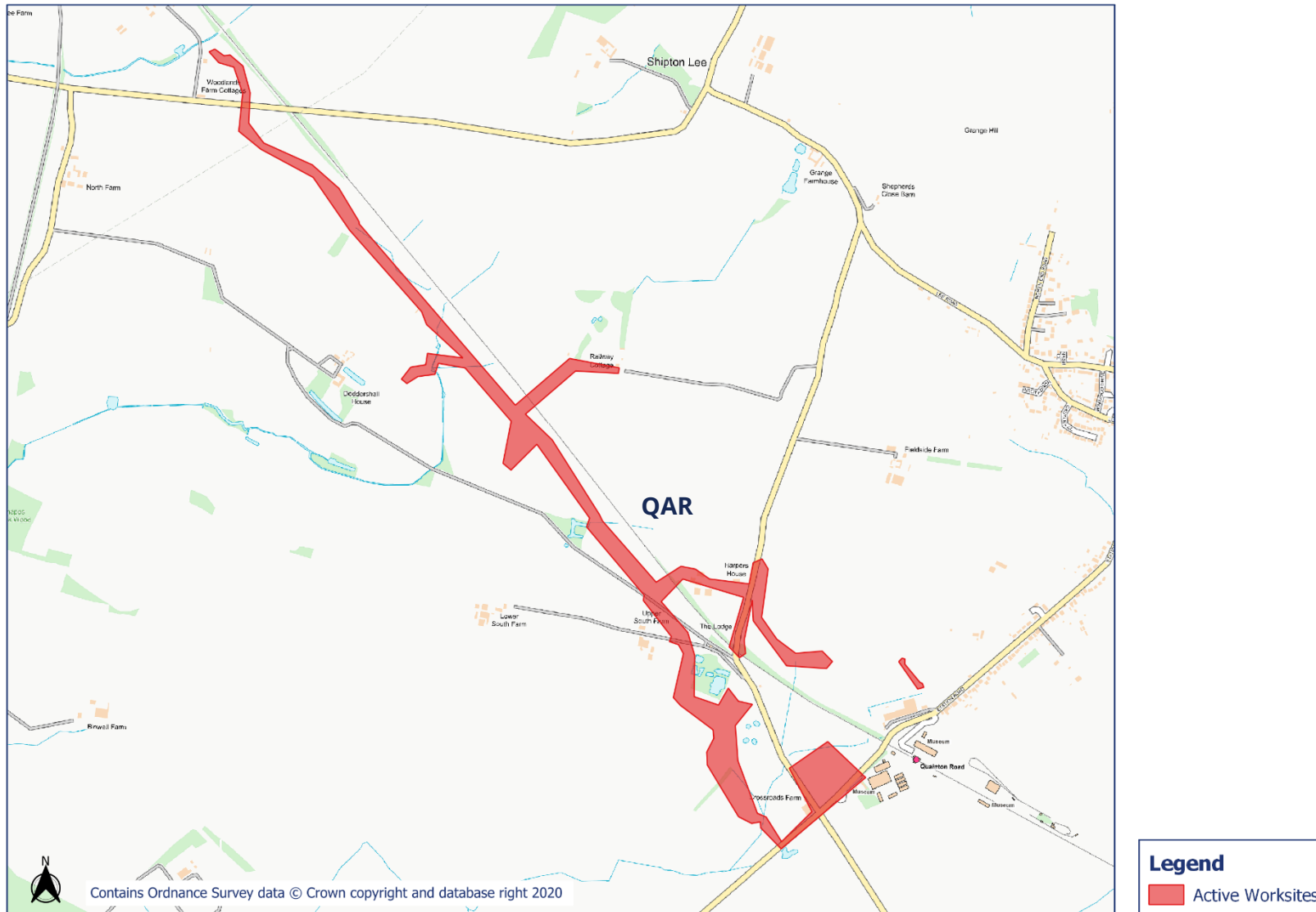


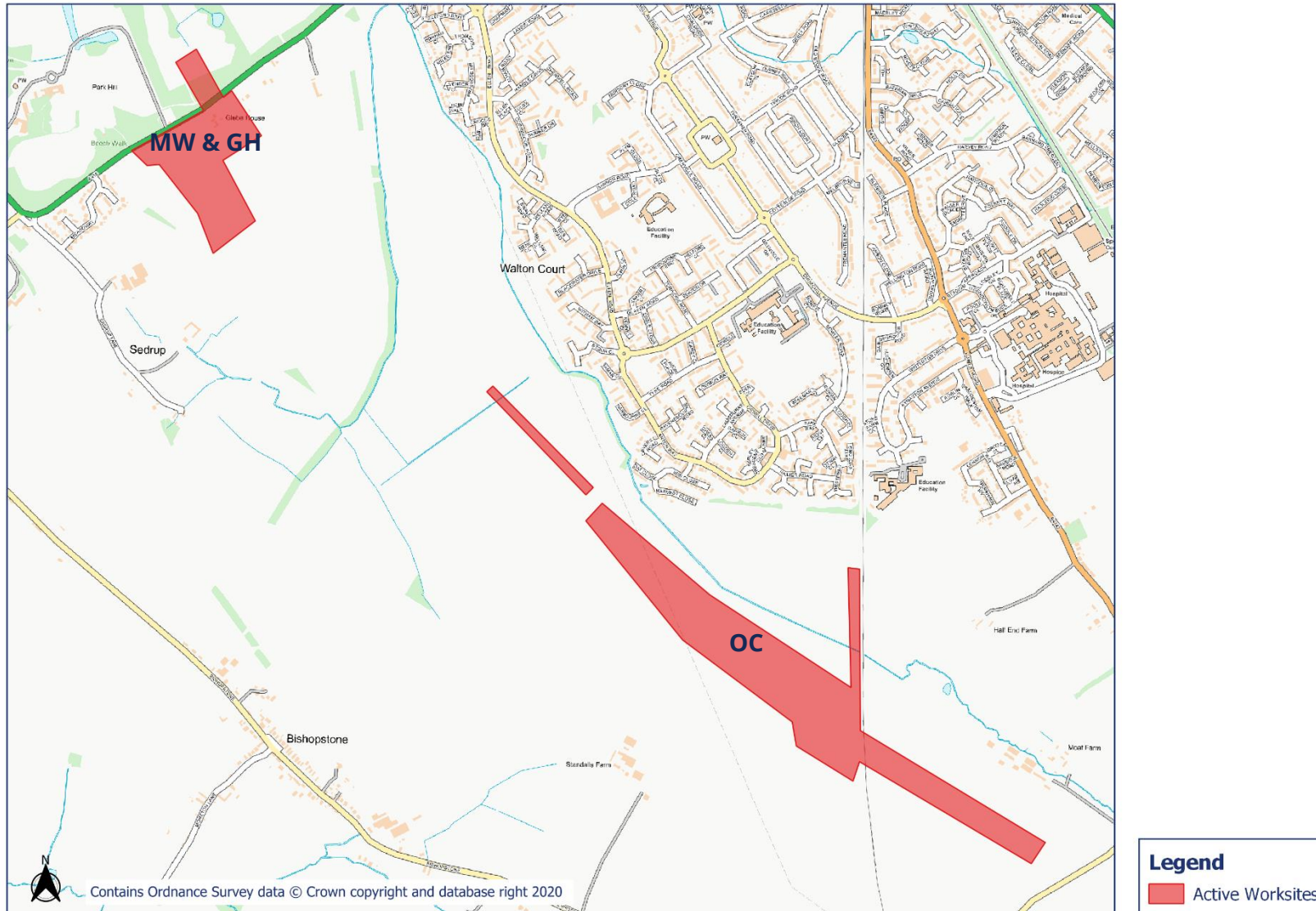
OFFICIAL

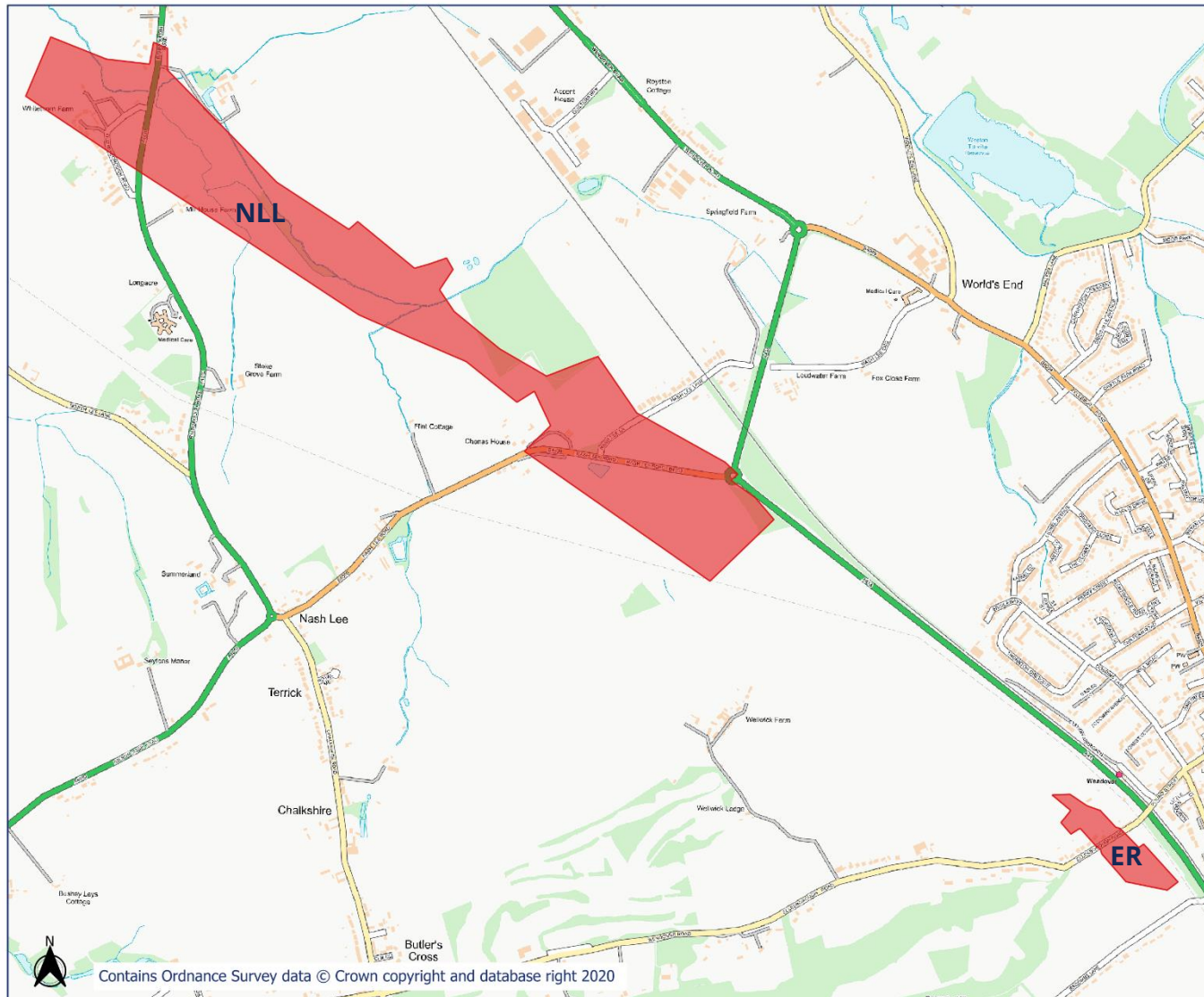




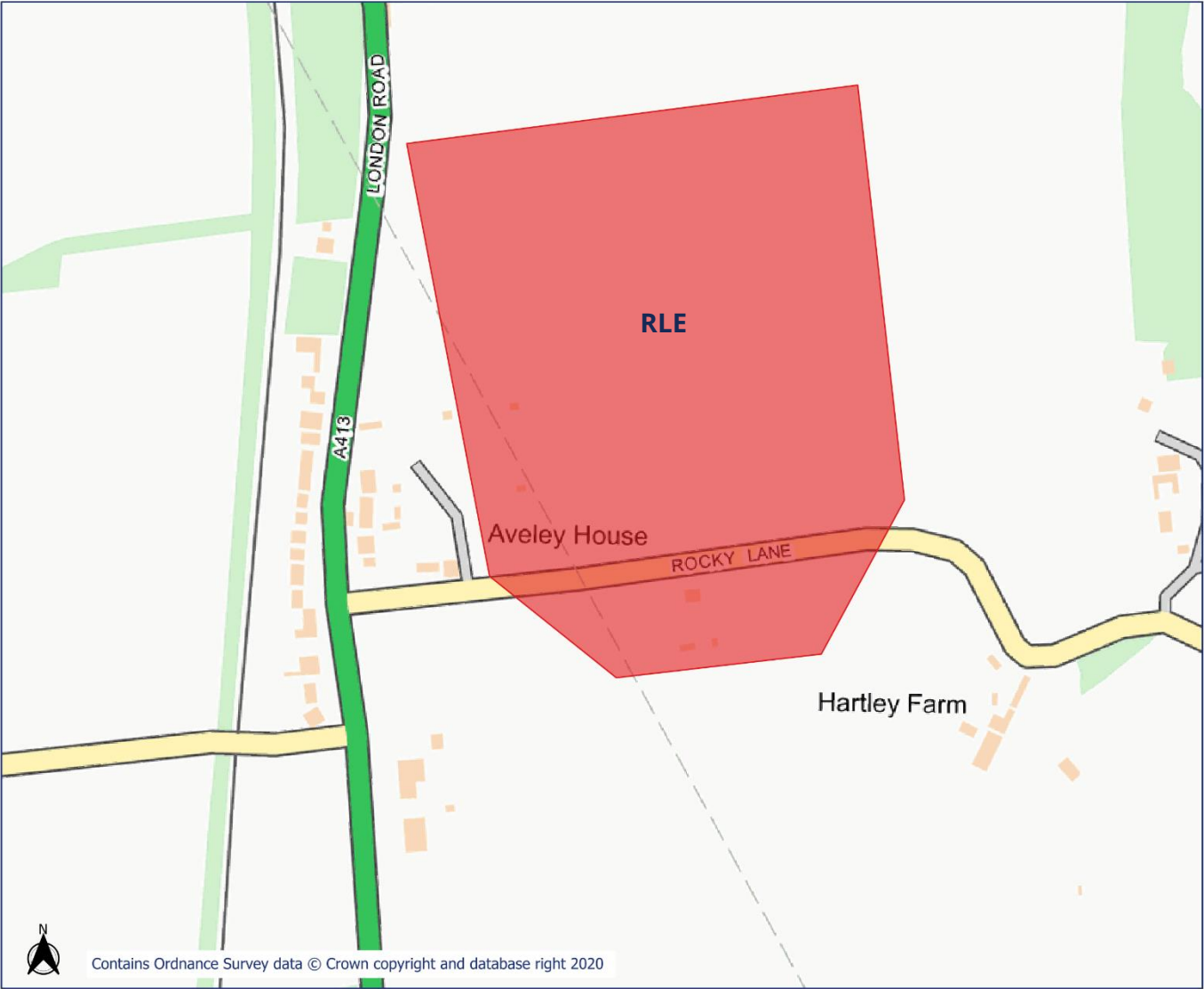




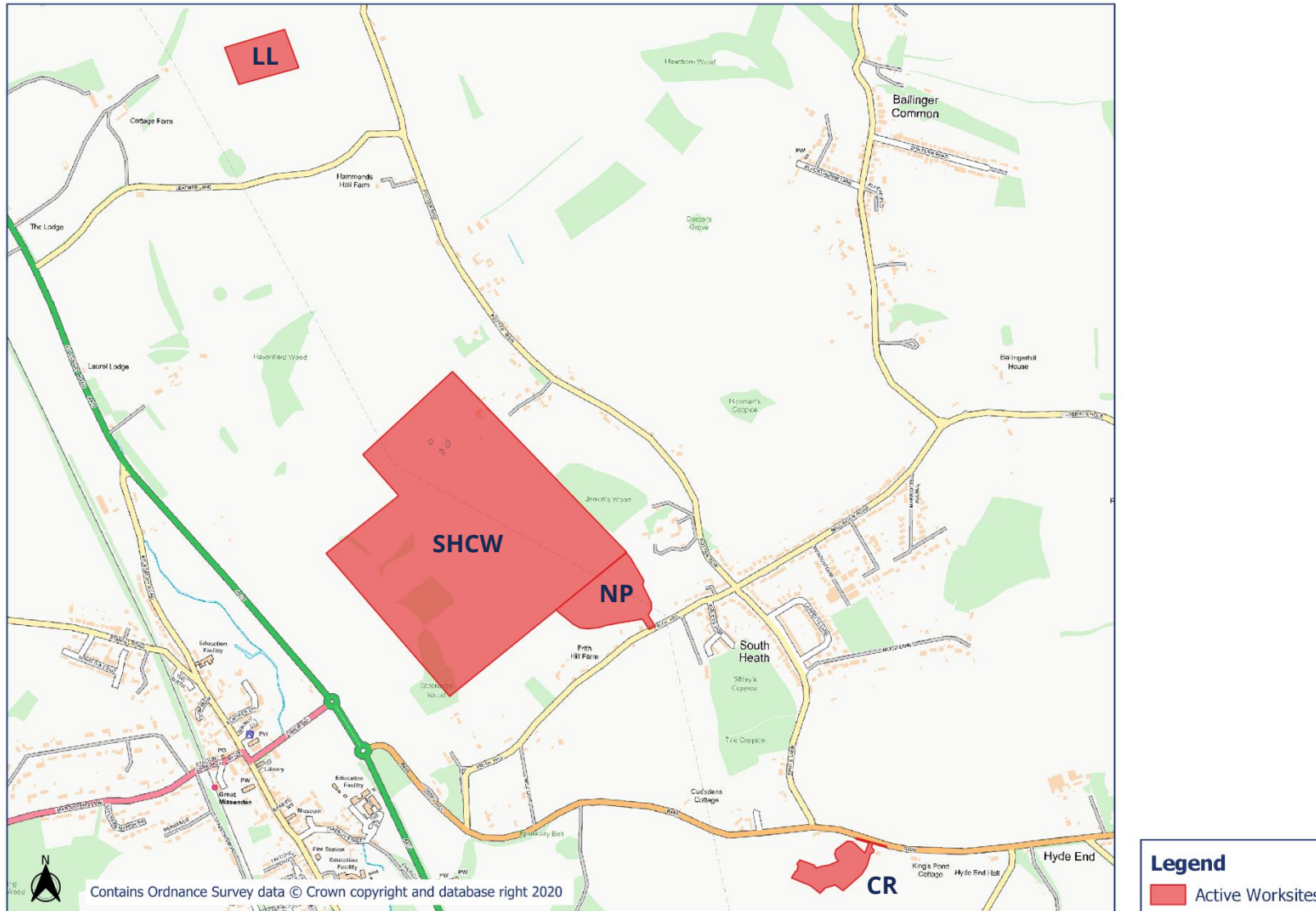




**Legend**  
Active Worksites





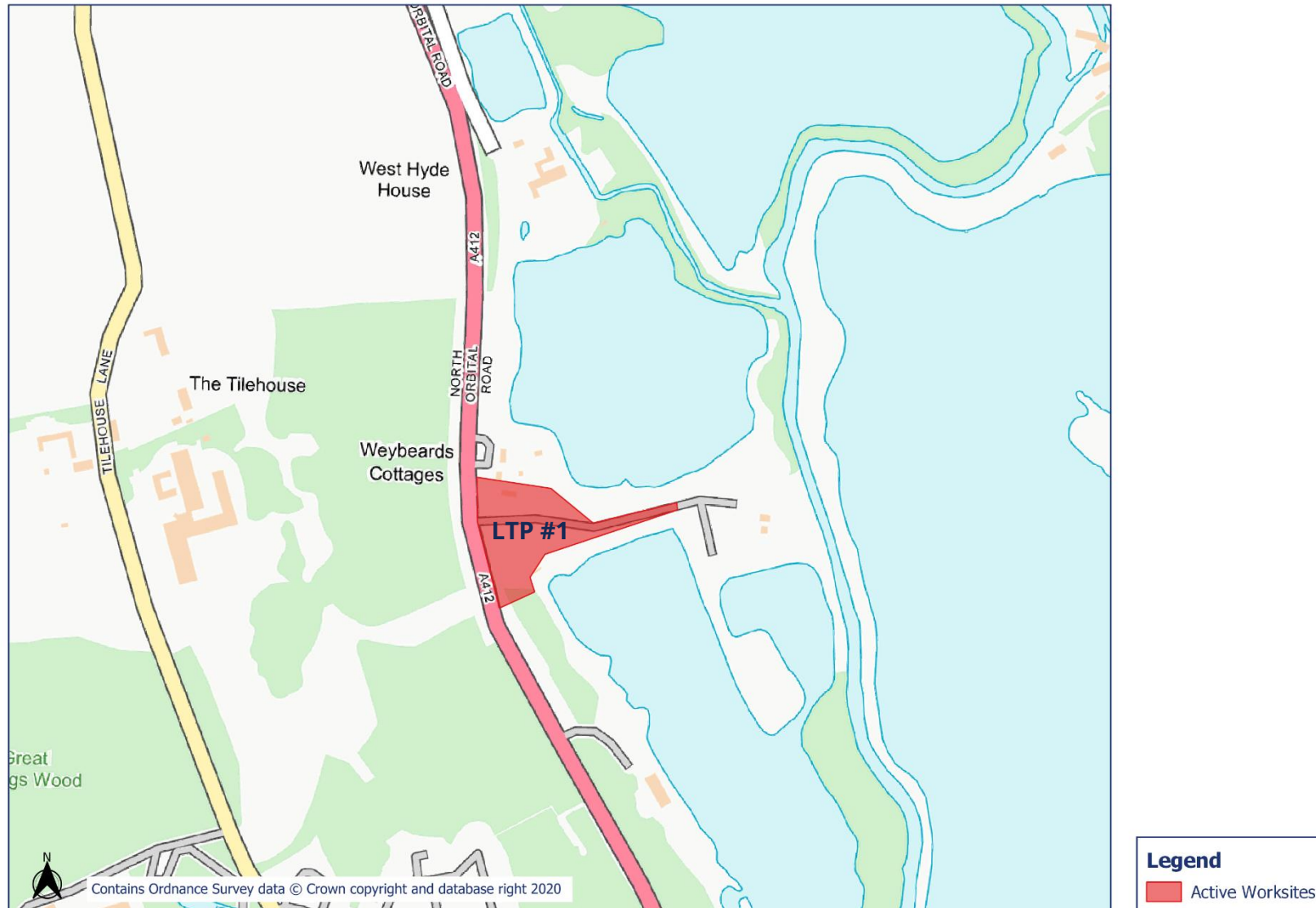




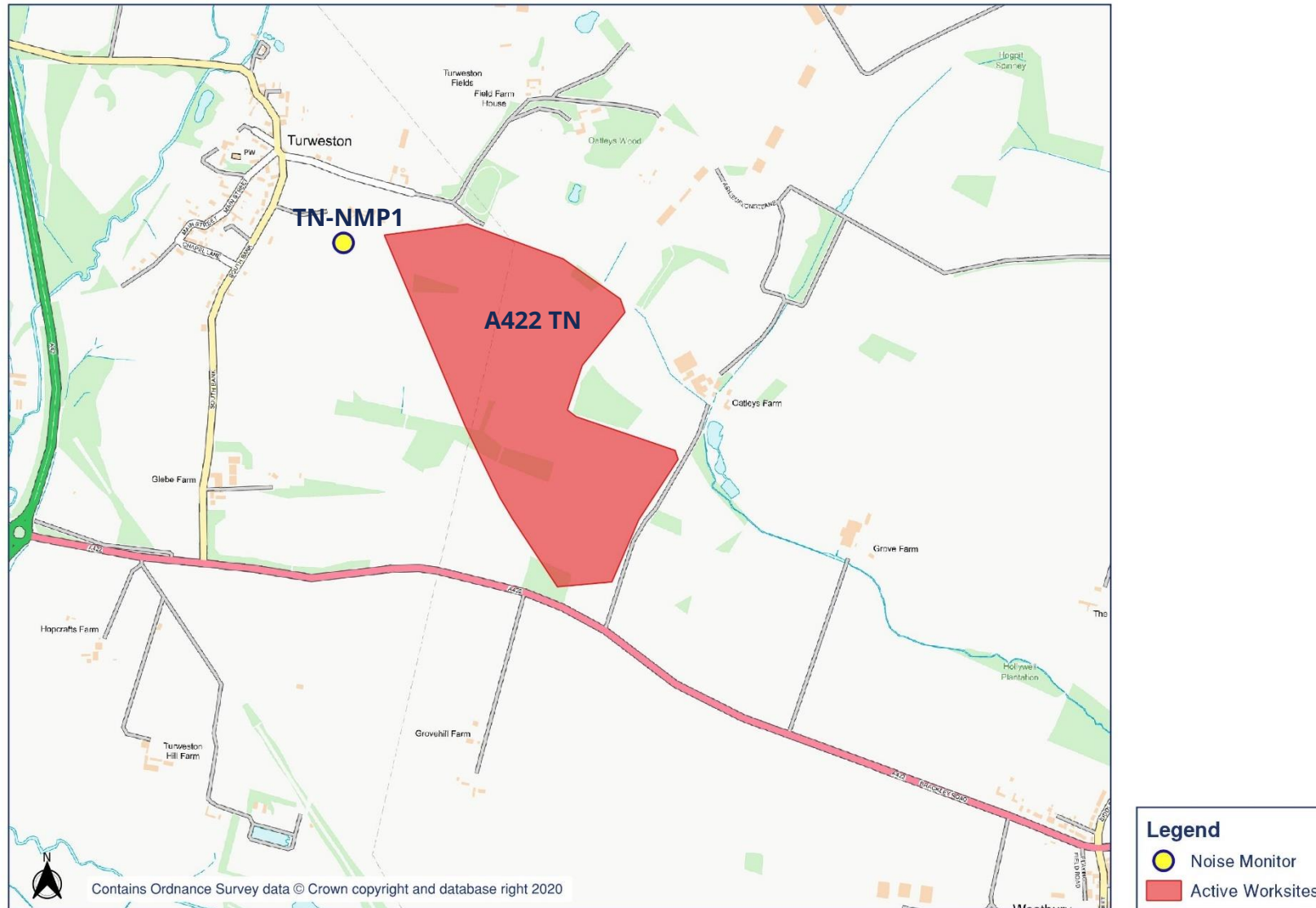








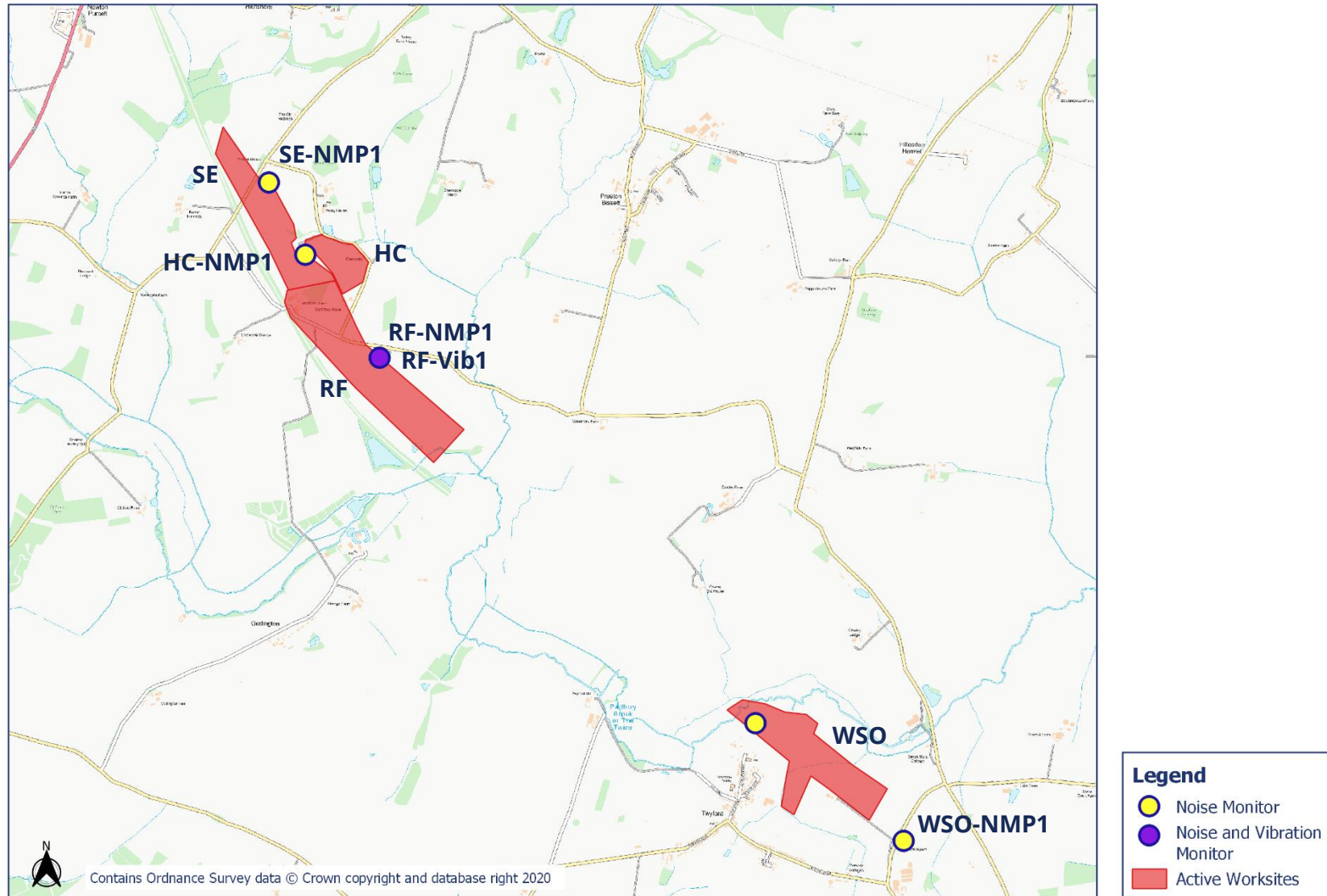
# Appendix B Monitoring Locations

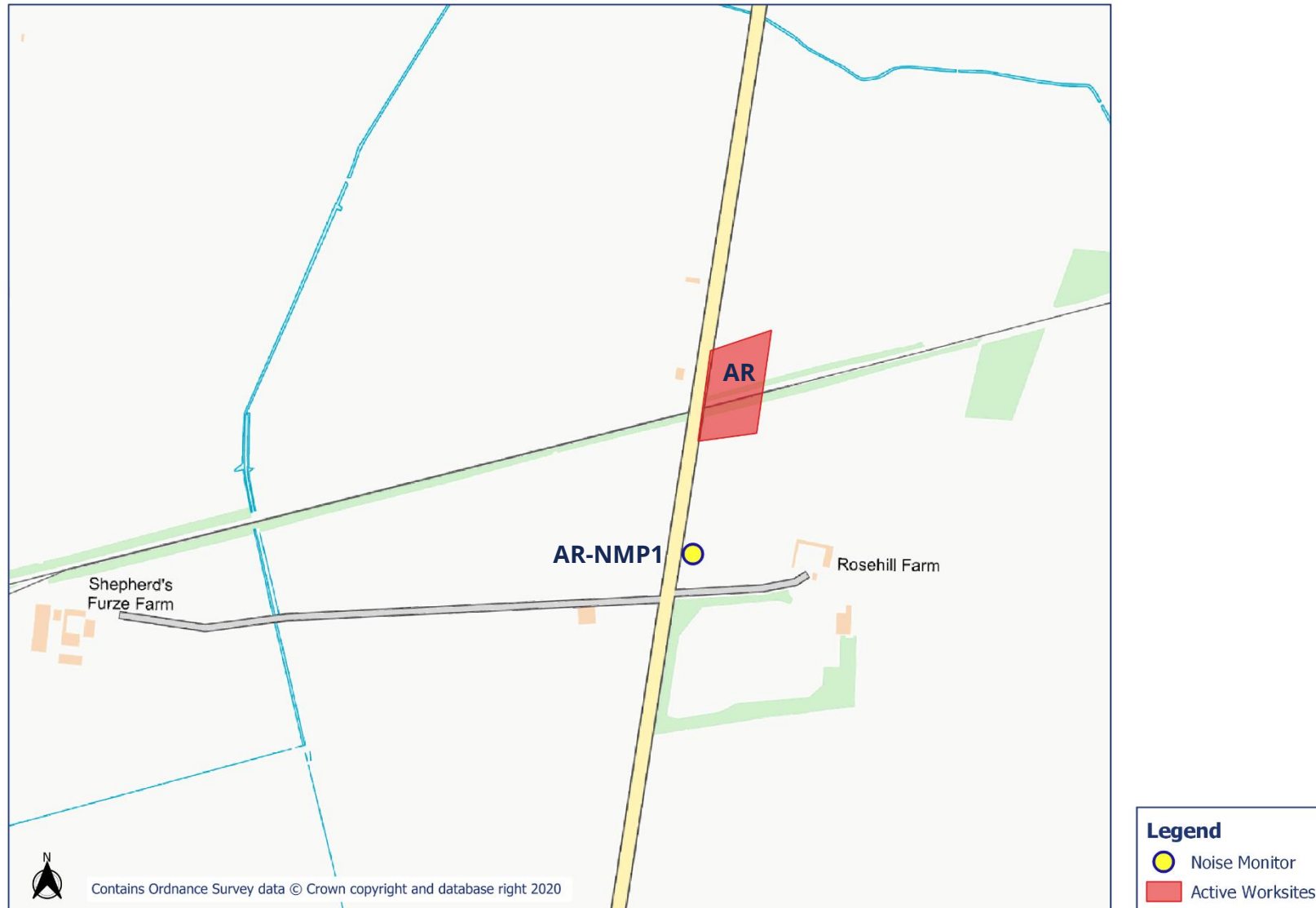


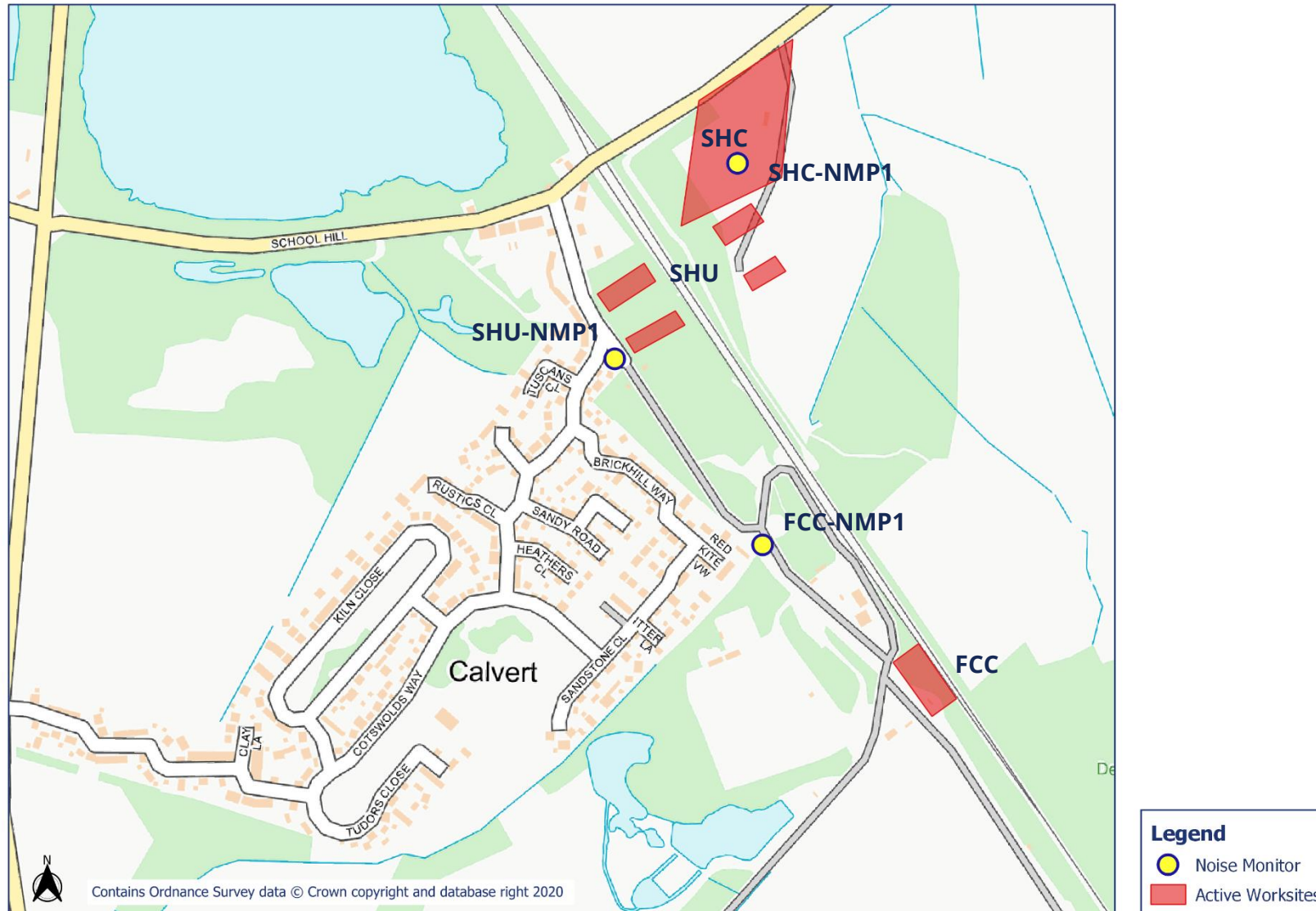


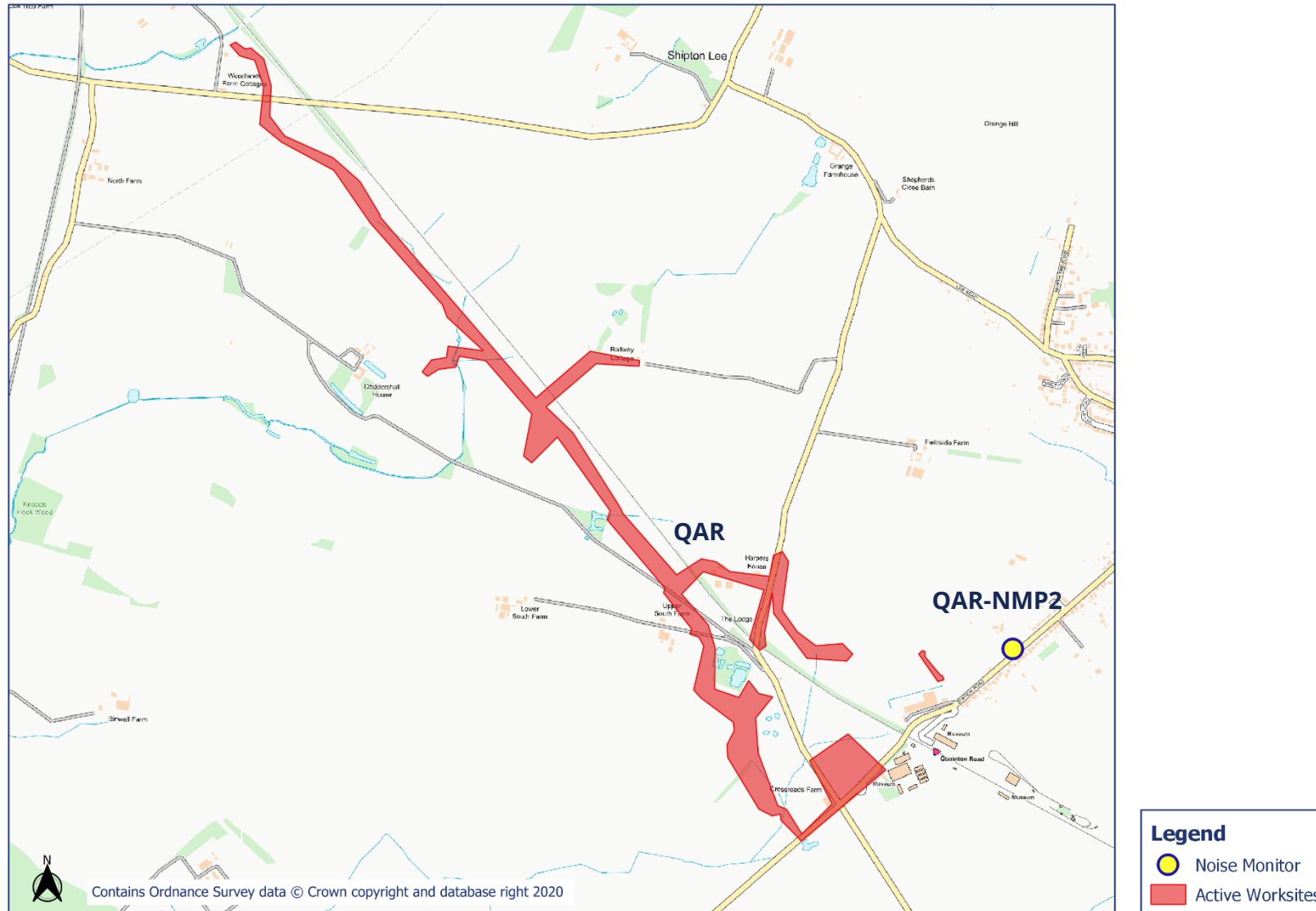
# HS2

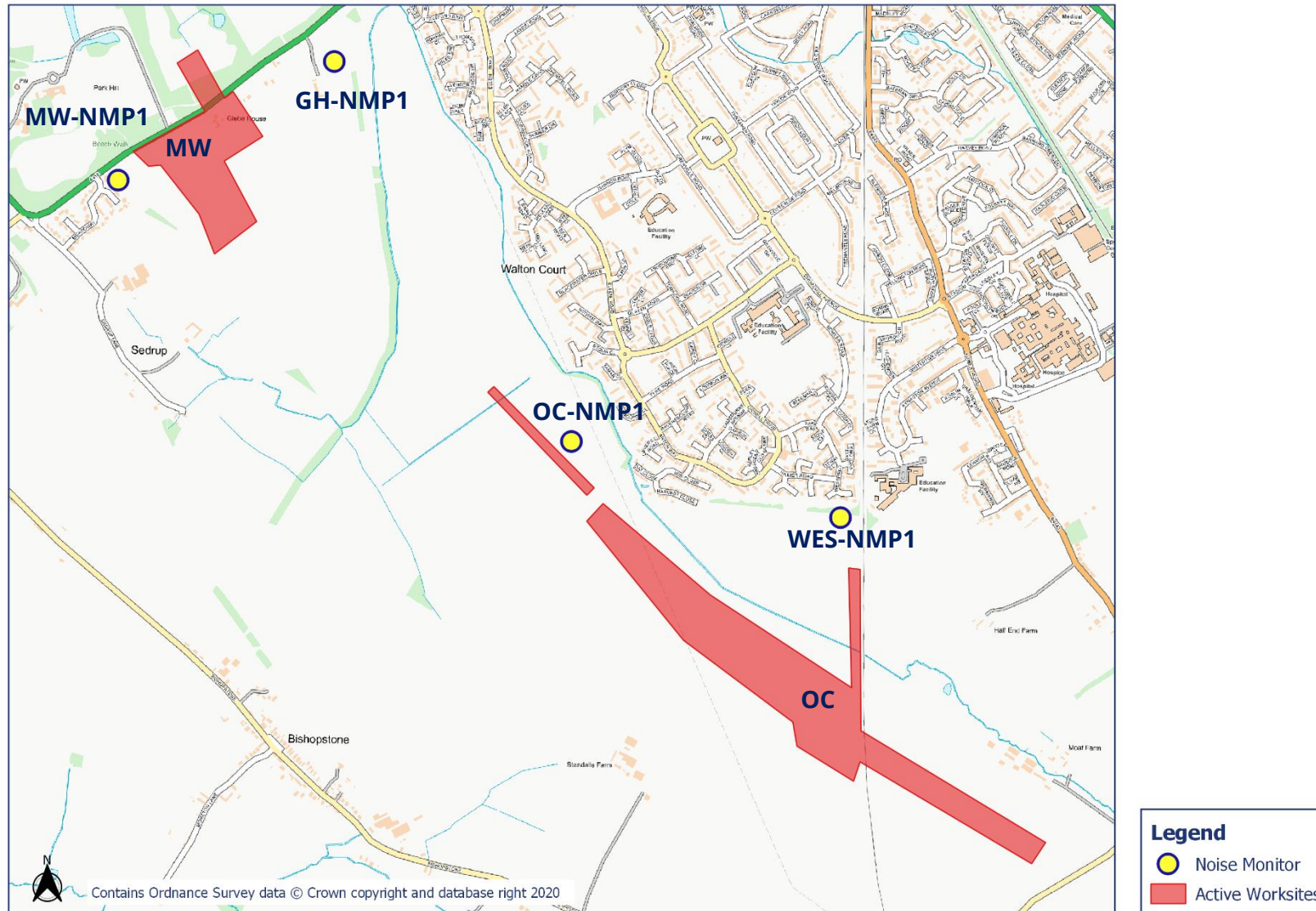
## Noise and Vibration Monitoring Plan - 2

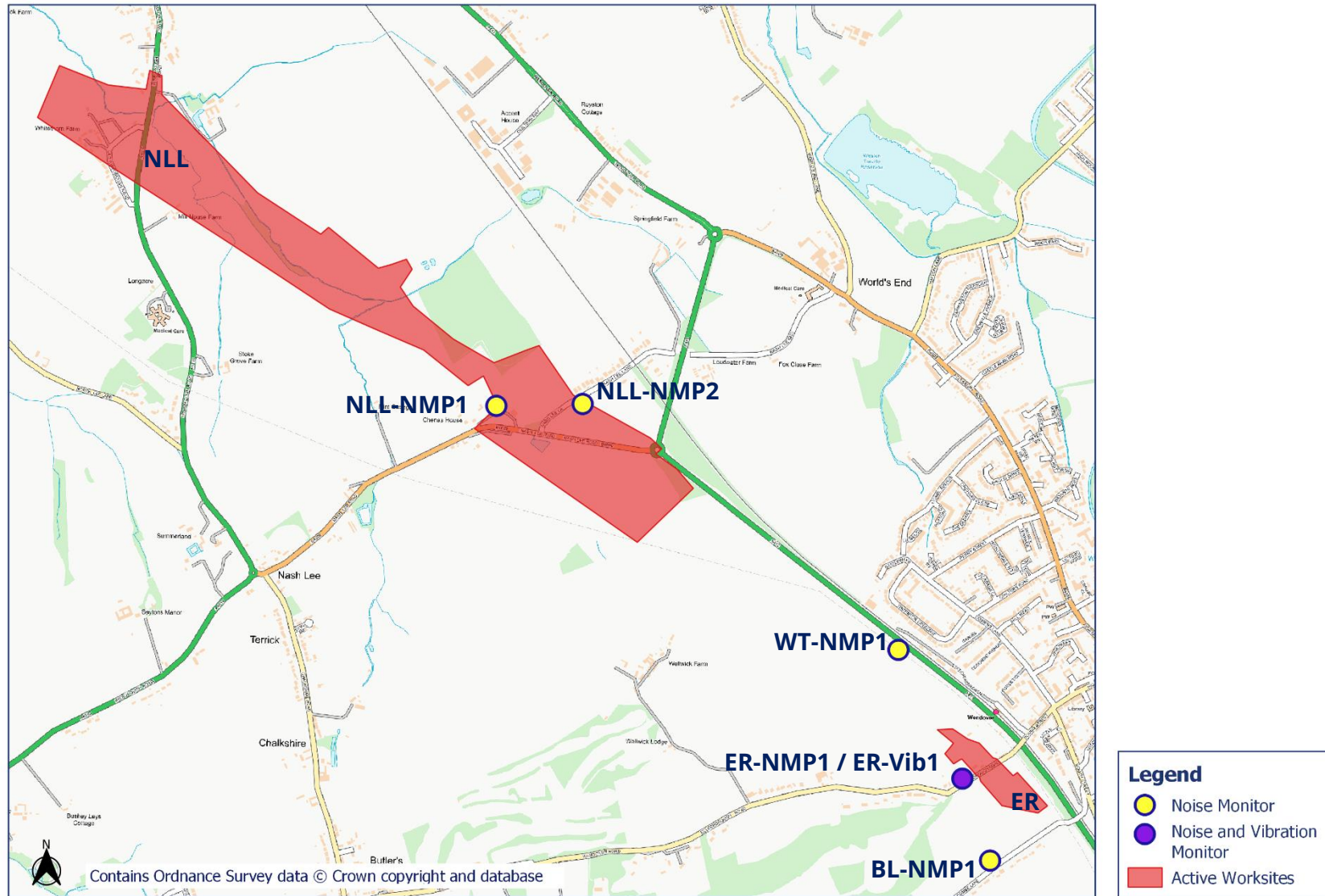


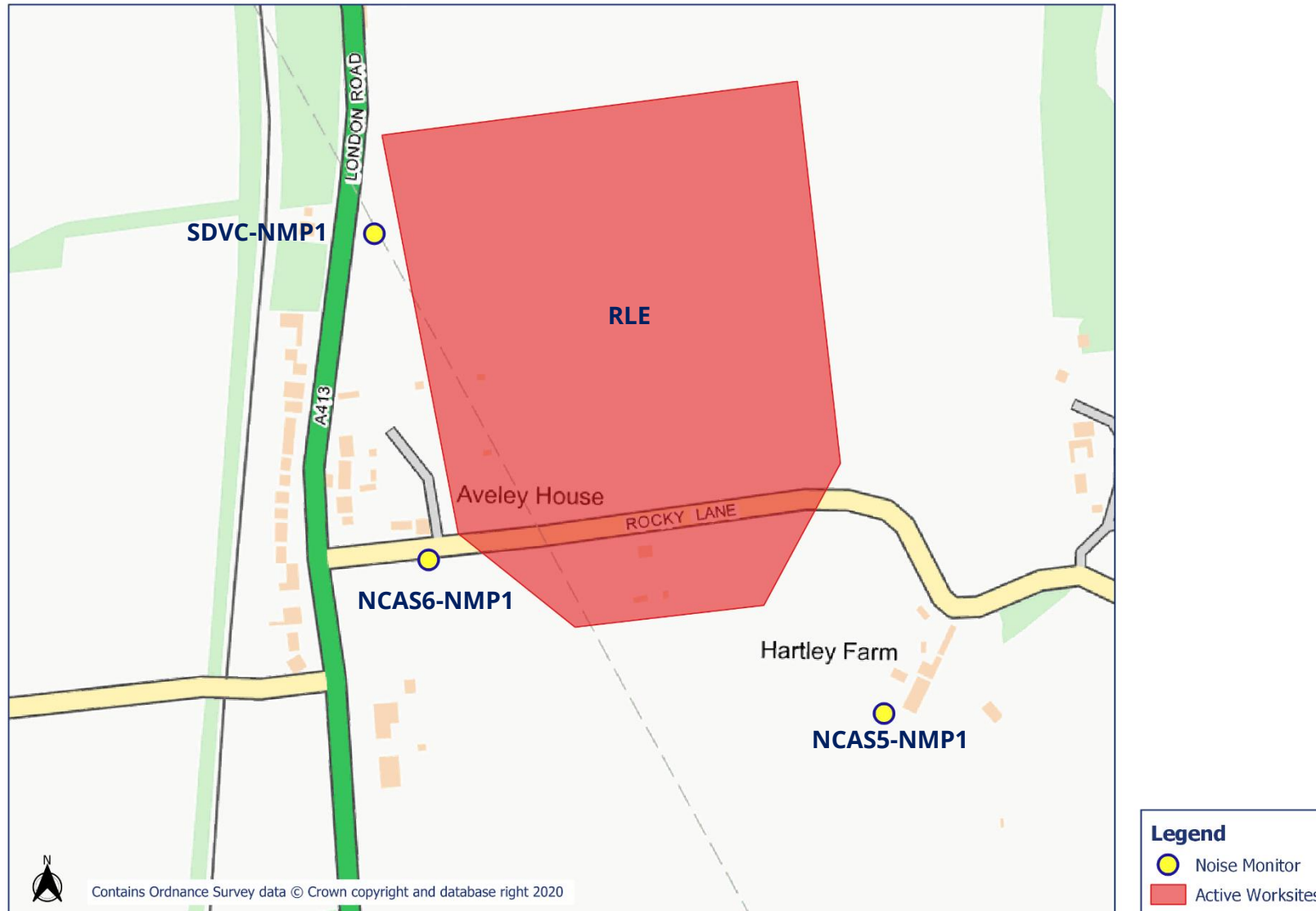


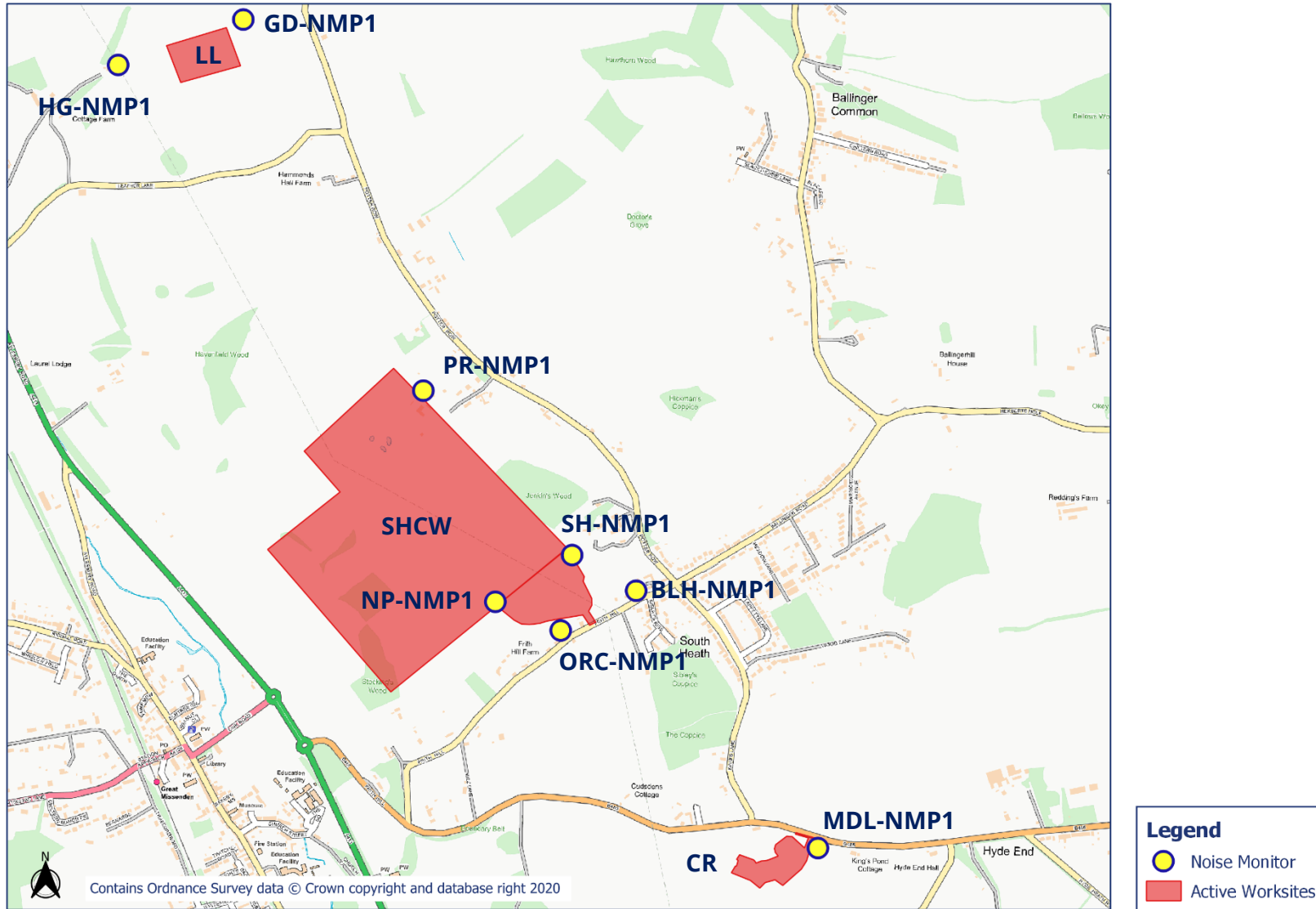






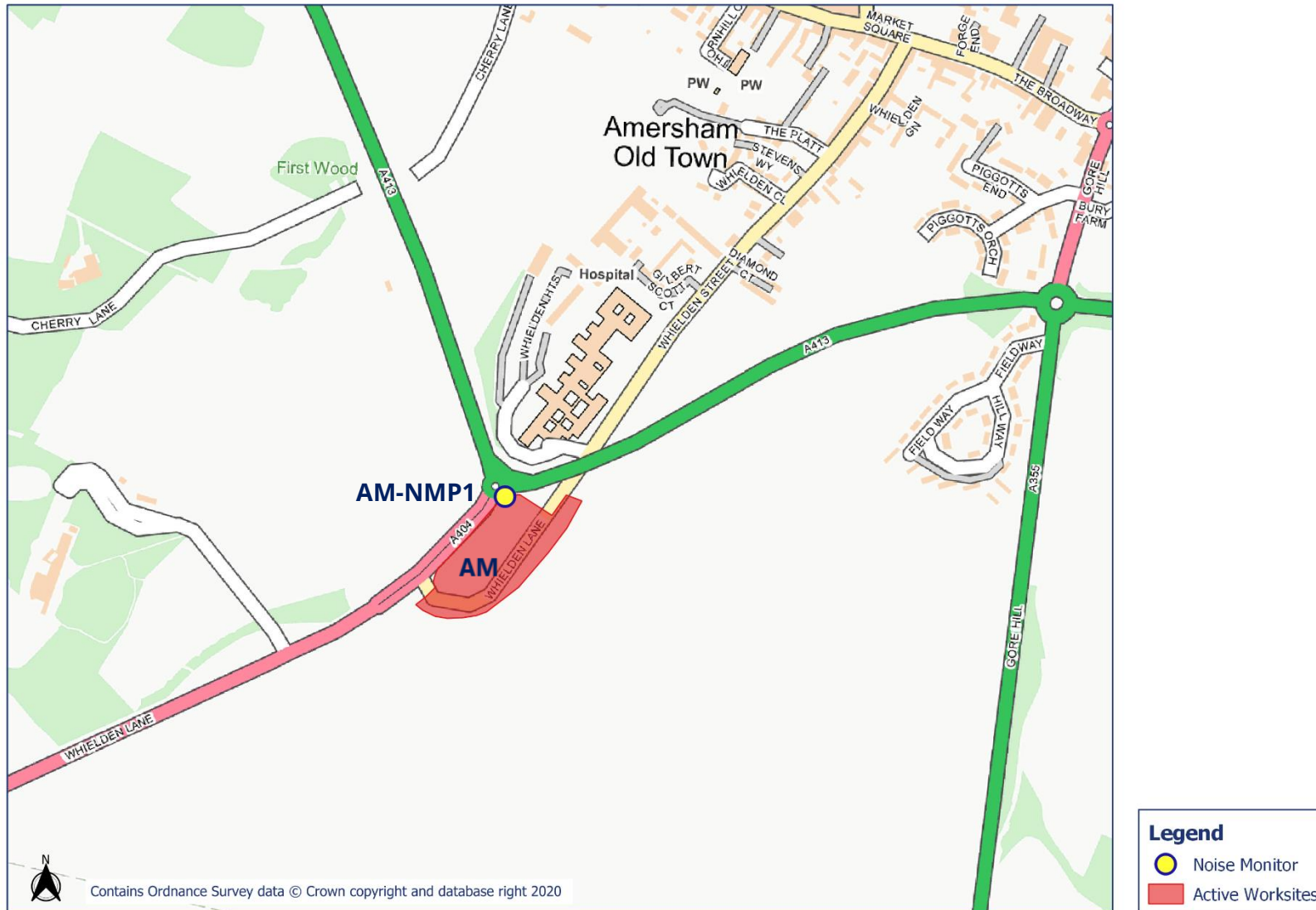


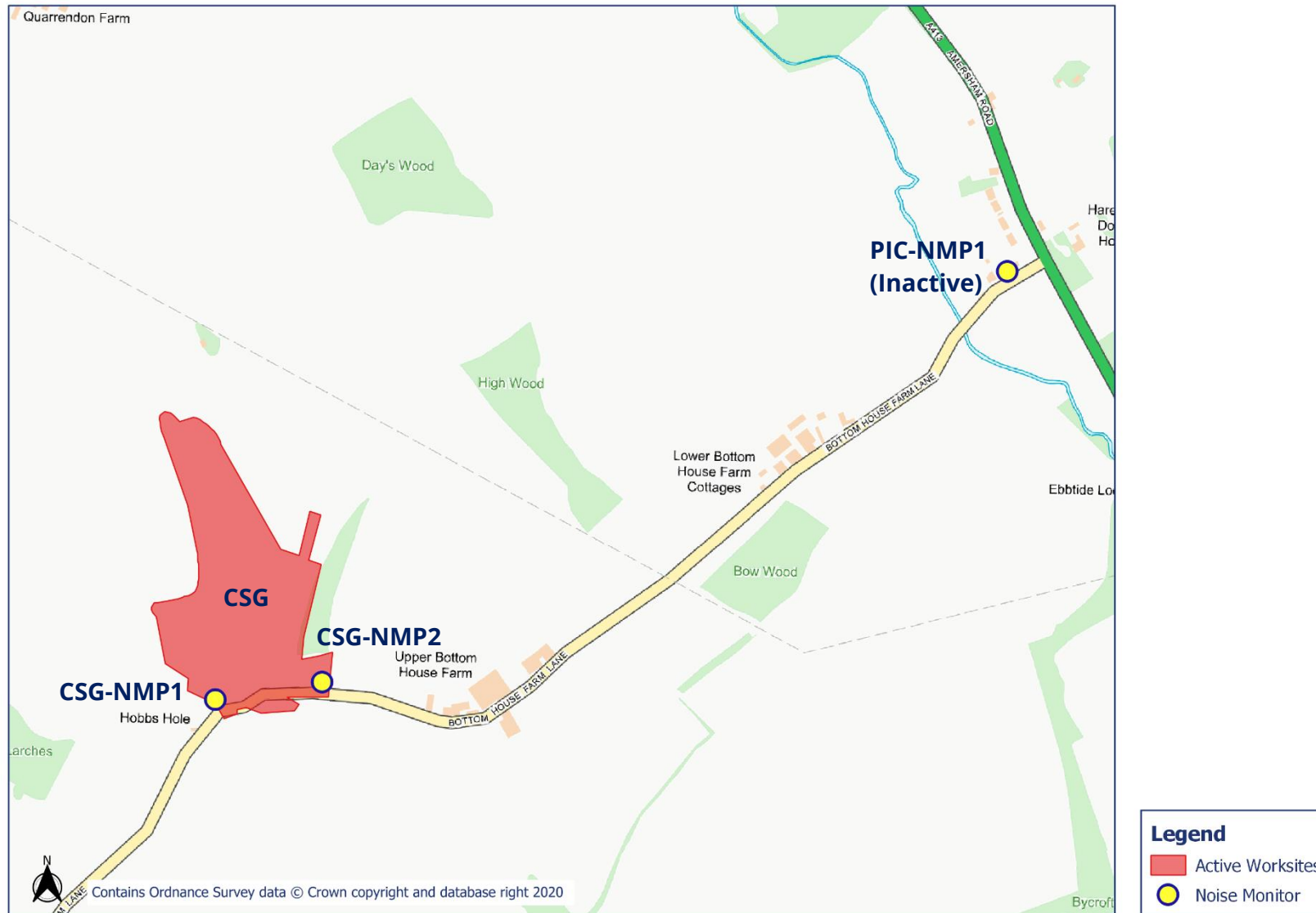




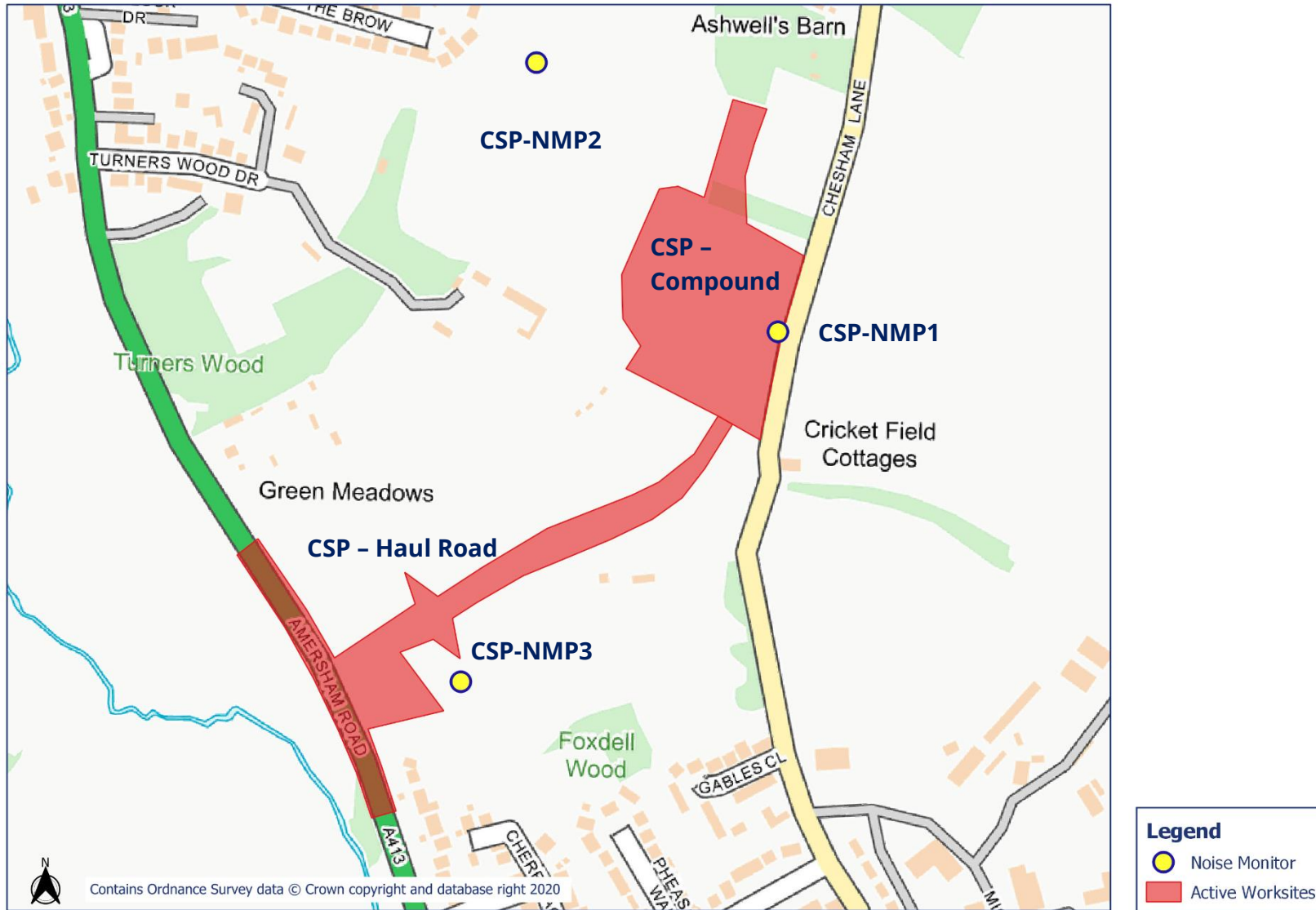


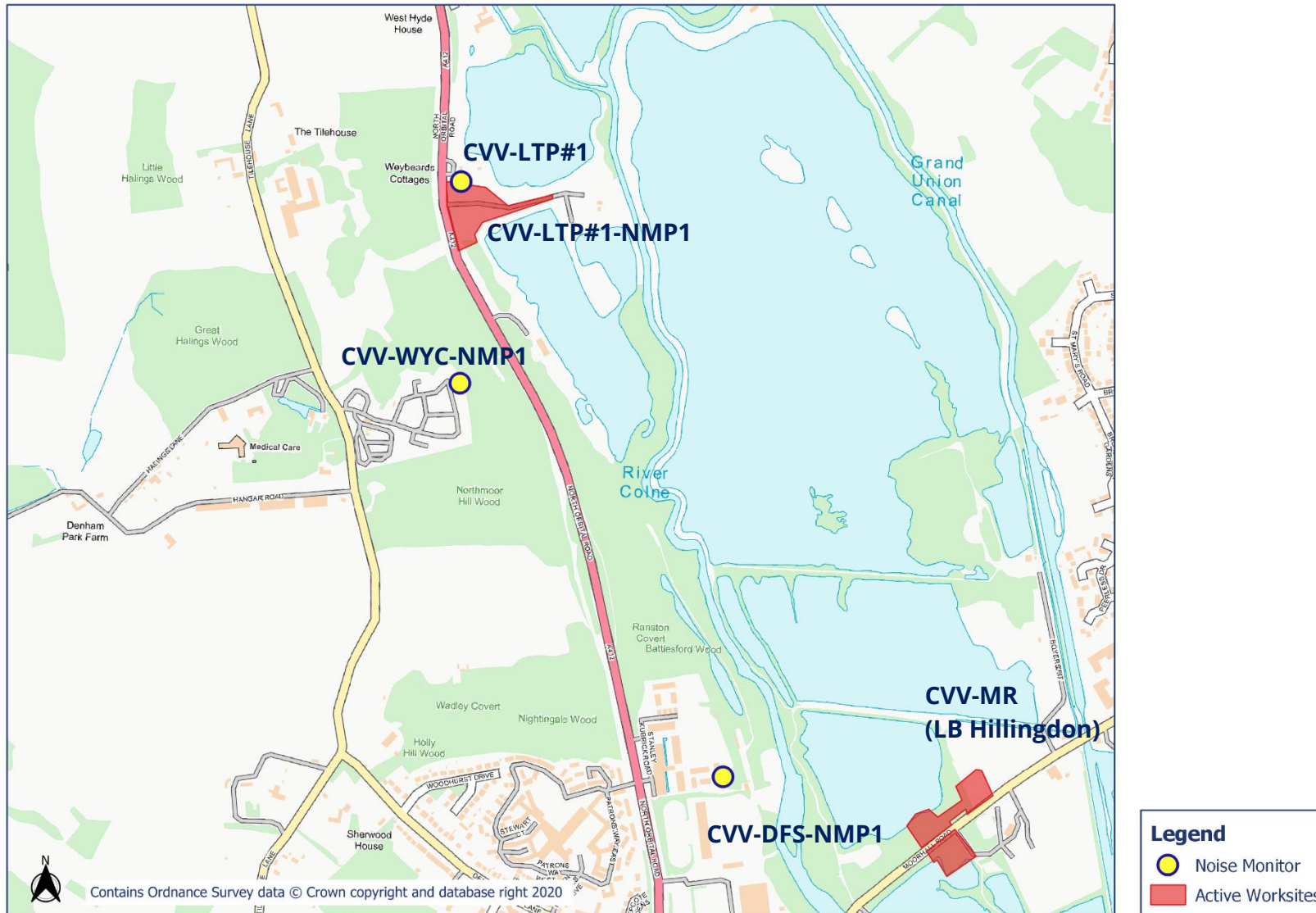


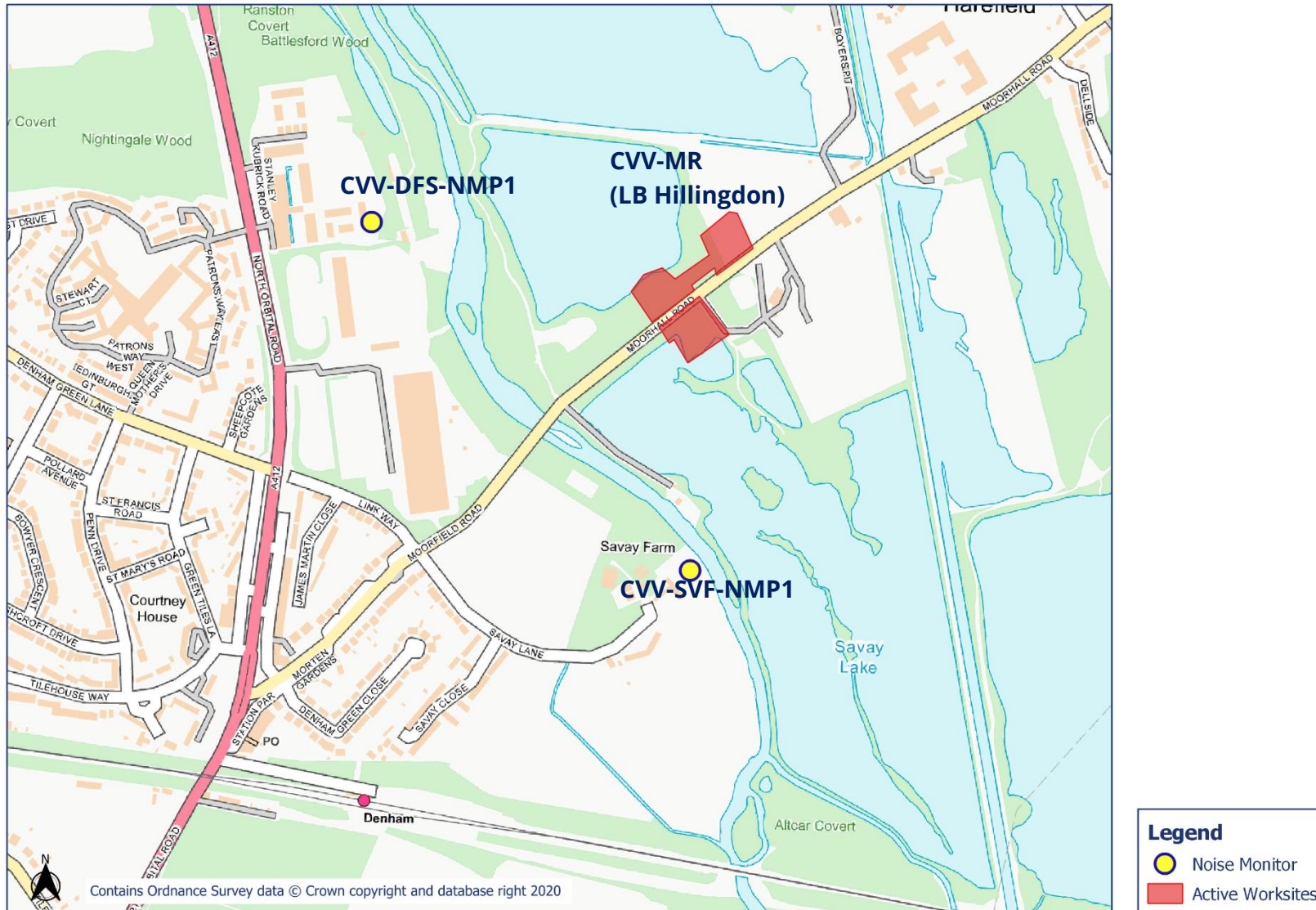




# HS2 Noise and Vibration Monitoring Plan - 13





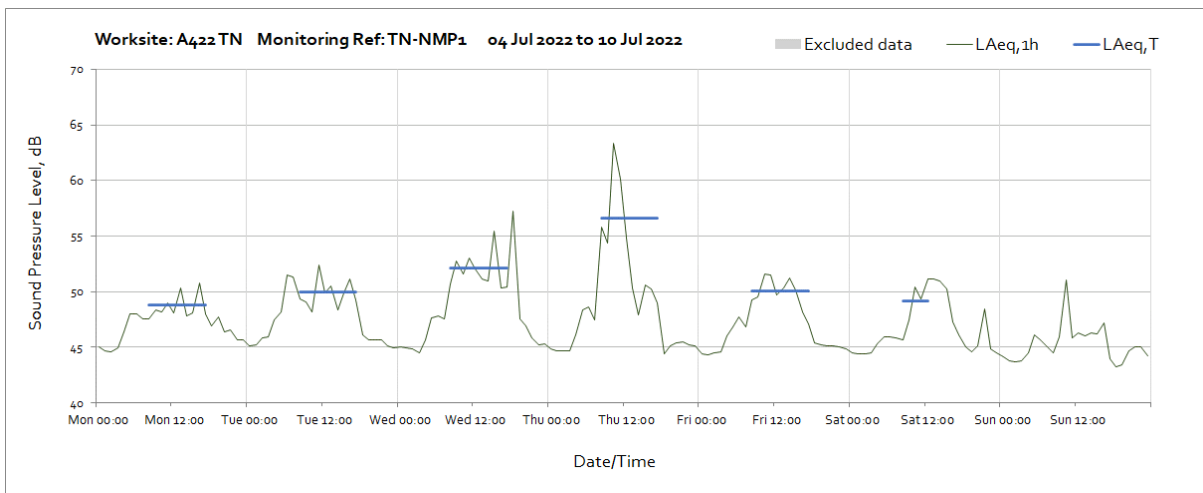
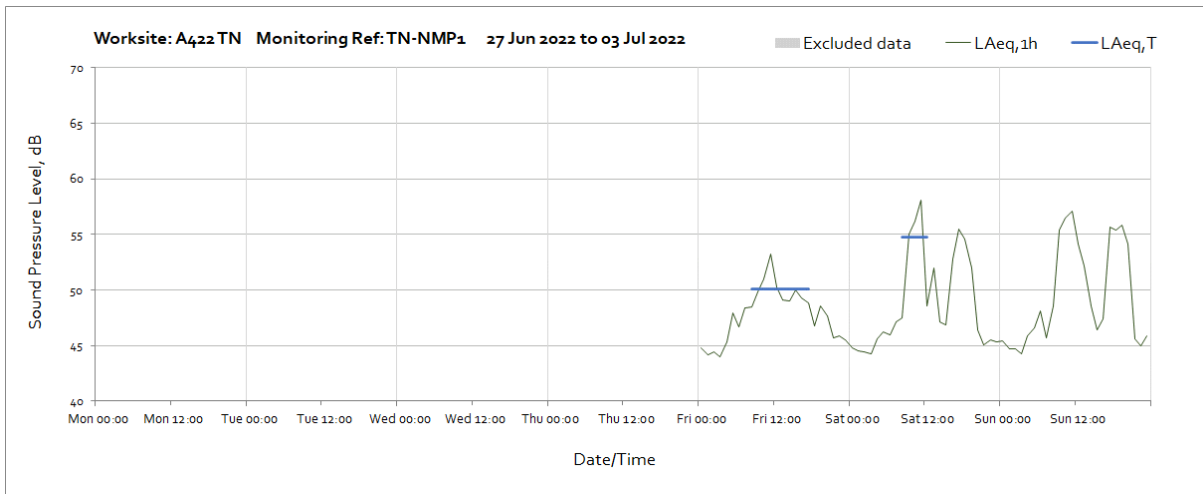


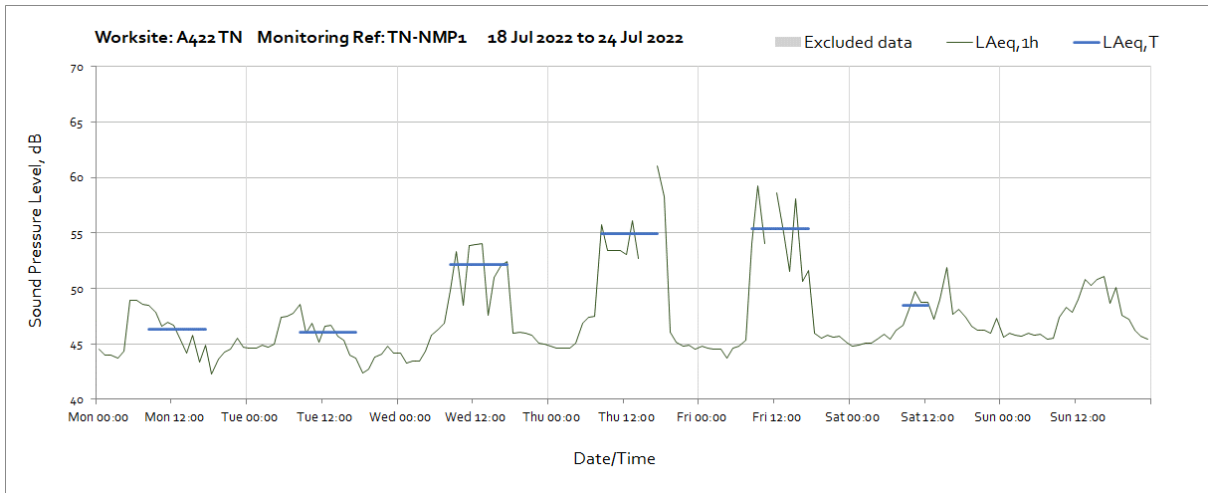
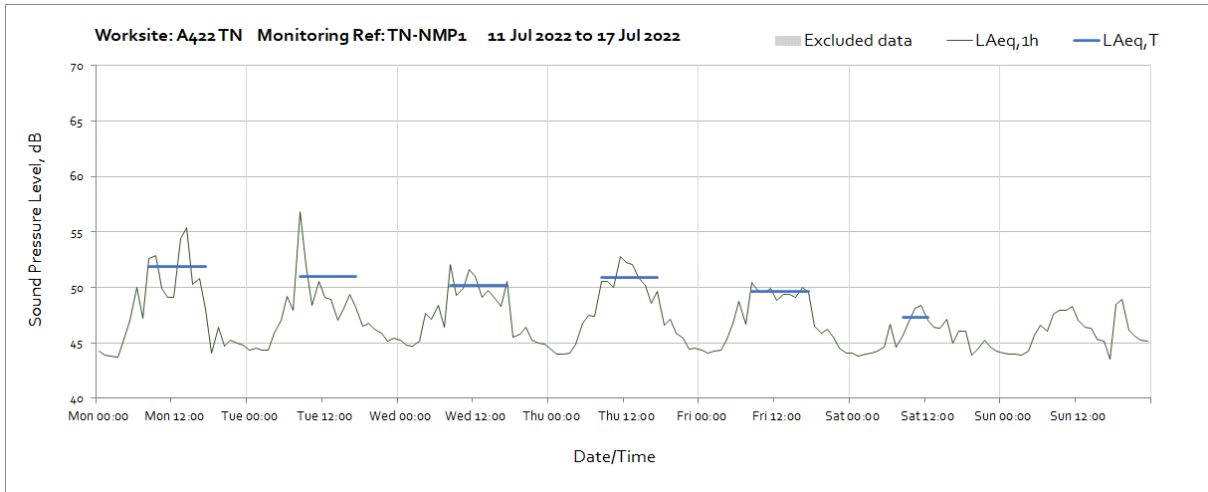
# Appendix C Data

## Noise

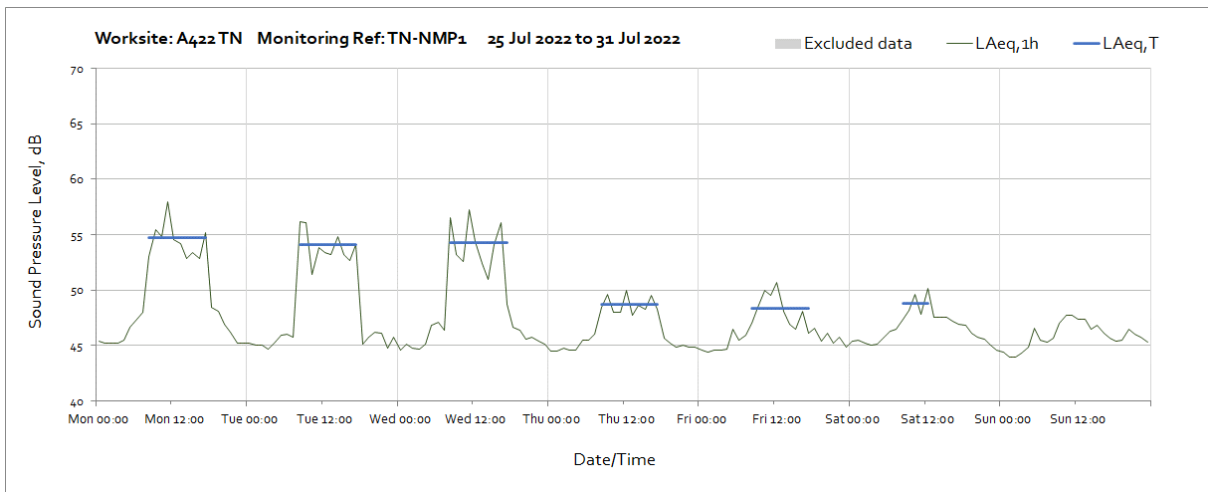
The following graphs show the hourly measured ambient noise level  $L_{Aeq,1h}$  and, where relevant, the averaged noise level  $L_{Aeq,T}$  values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and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

### Worksite: A422 TN – Monitoring Ref: TN-NMP1



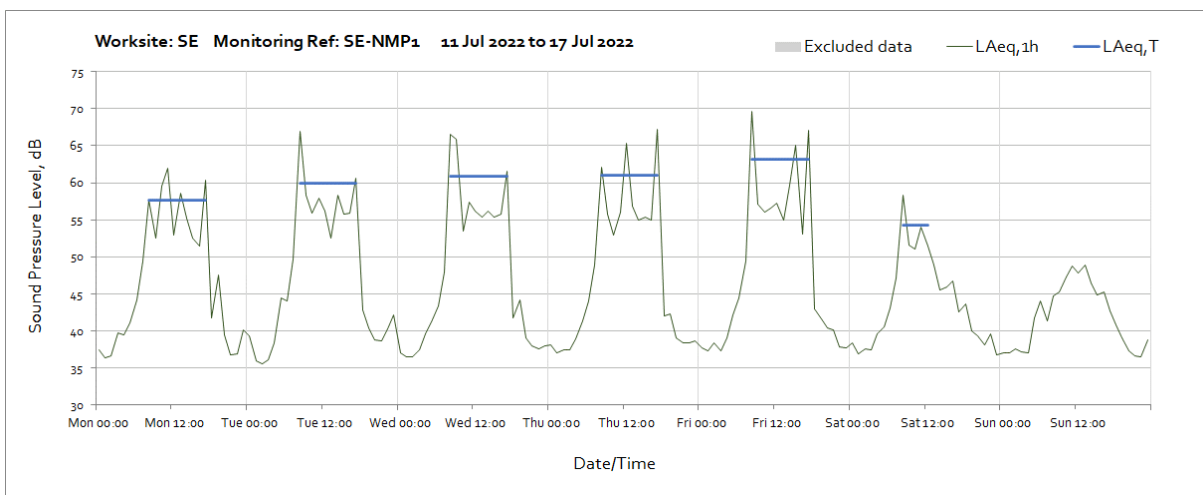
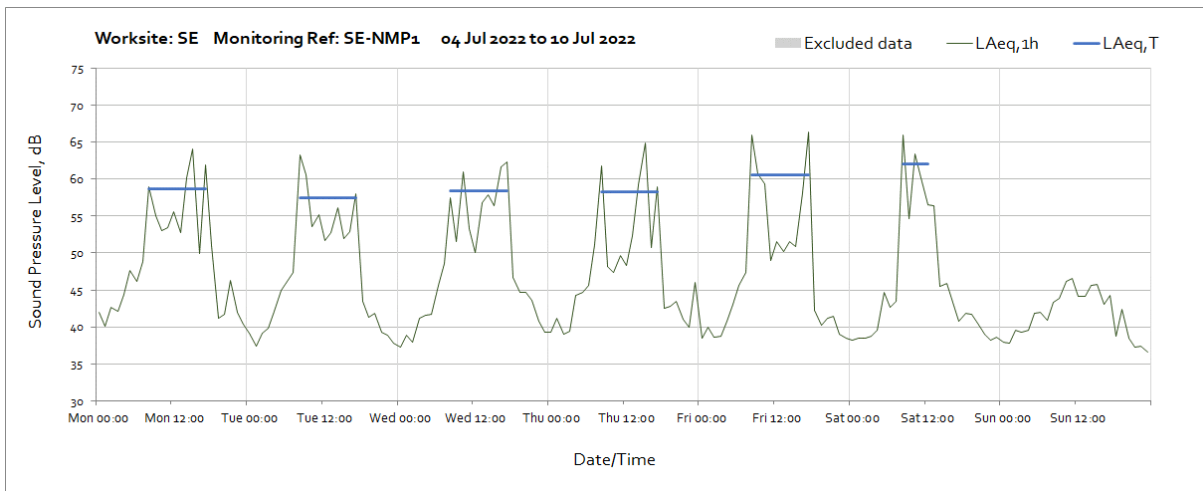
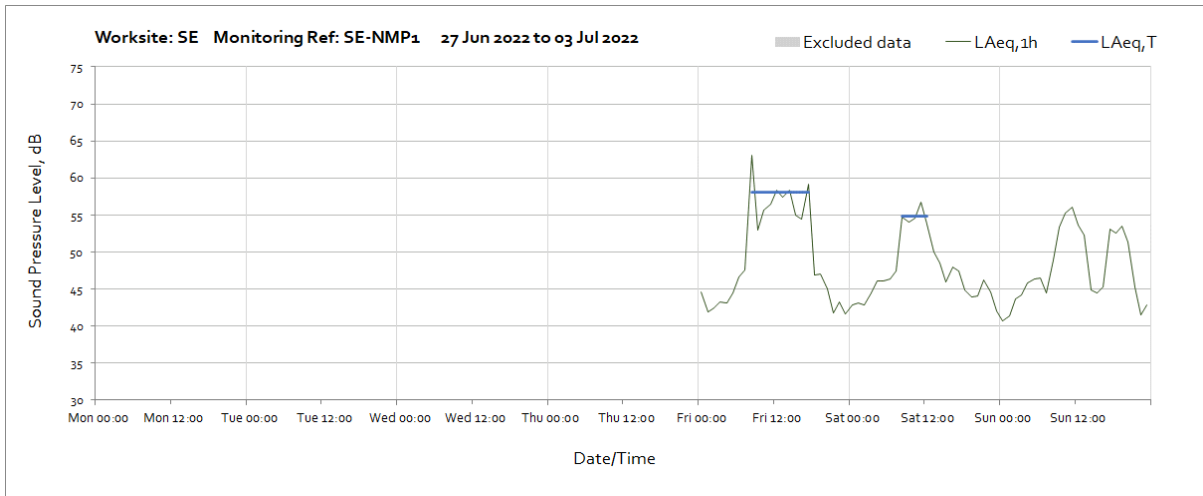


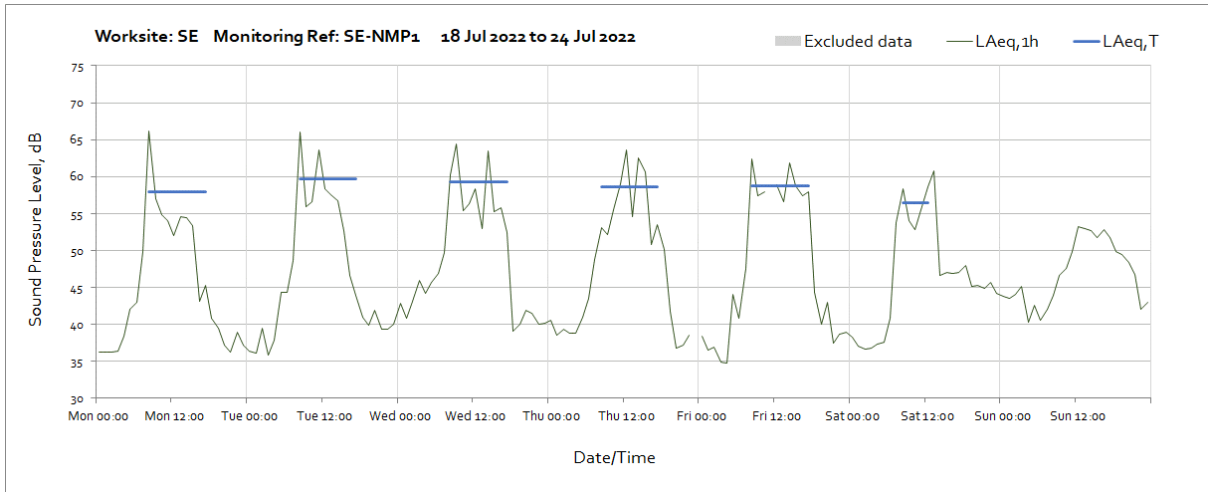
Note: Missing data between 15:00 and 17:00 on the 21<sup>st</sup> July and 11:00 and 12:00 on the 22<sup>nd</sup> July was due to monitor maintenance.



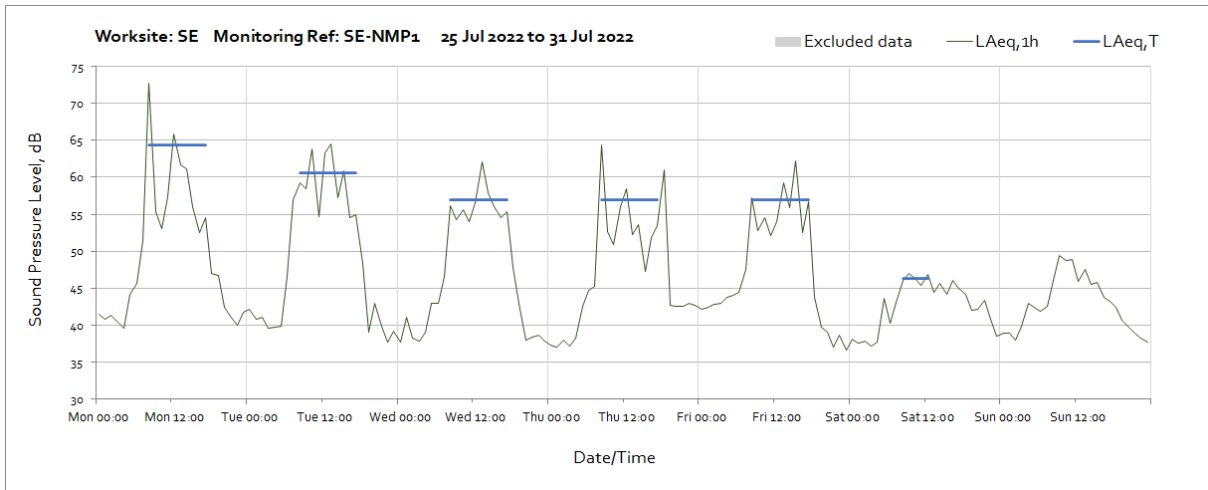


## Worksite: SE – Monitoring Ref: SE-NMP1

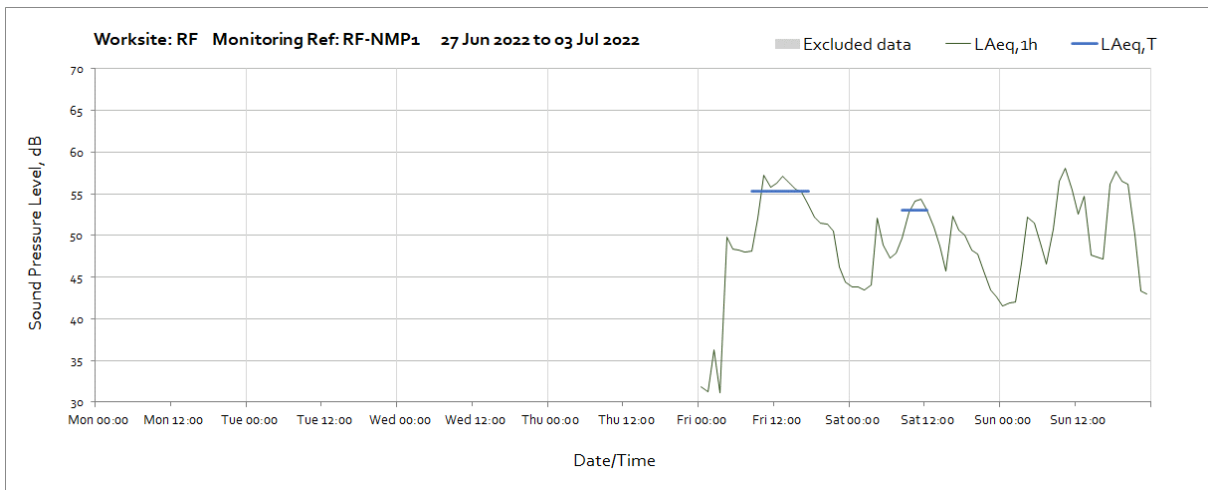


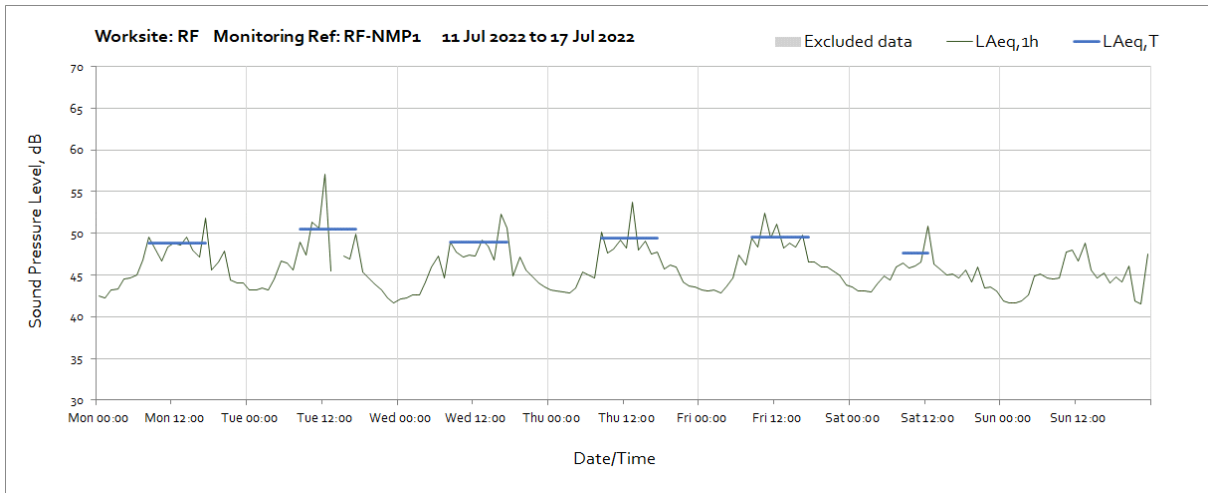
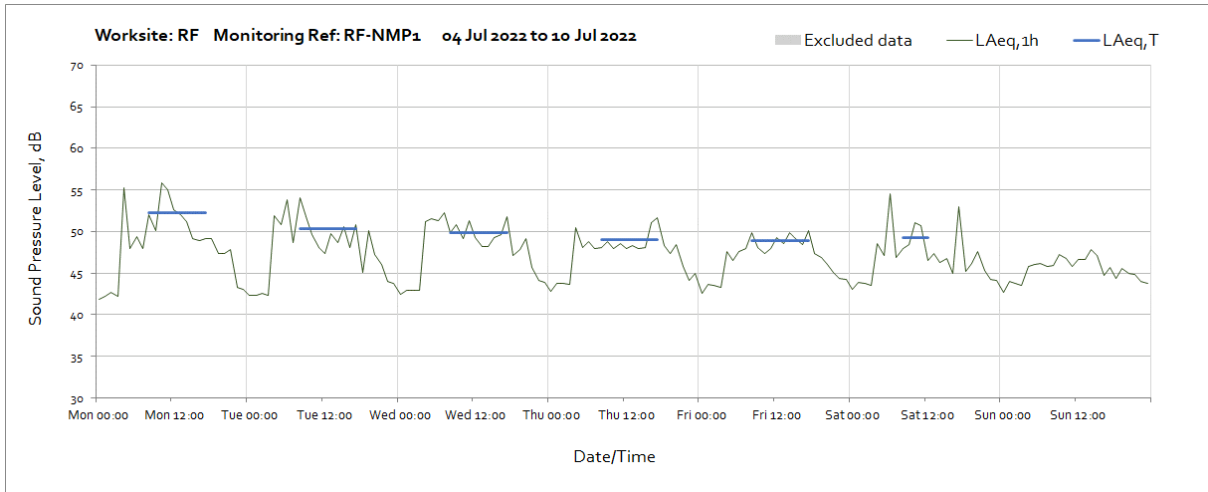


Note: Missing data between 23:00 and 00:00 on the 21<sup>st</sup> July and 11:00 and 12:00 on the 22<sup>nd</sup> July was due to monitor maintenance.

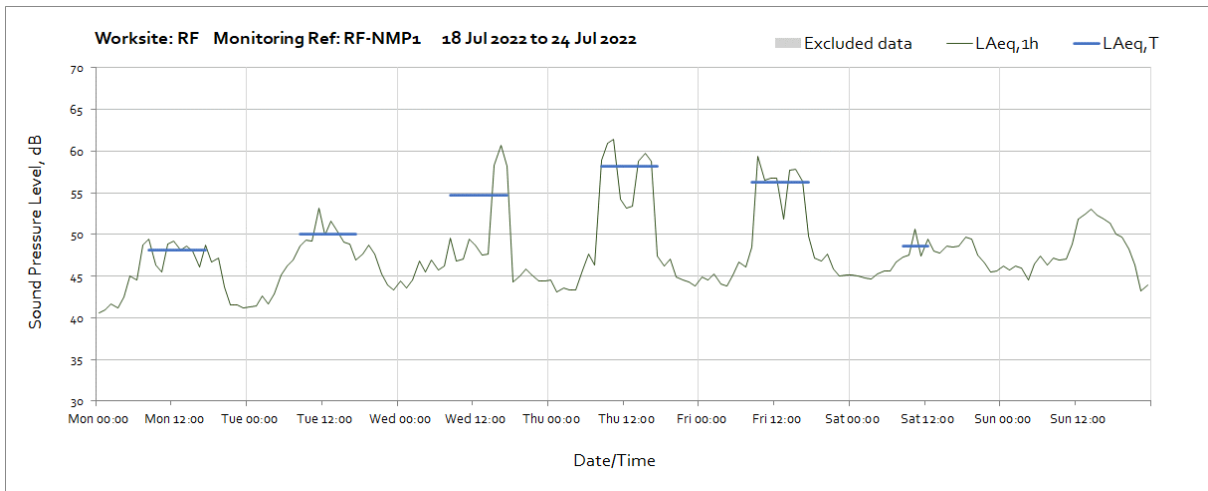


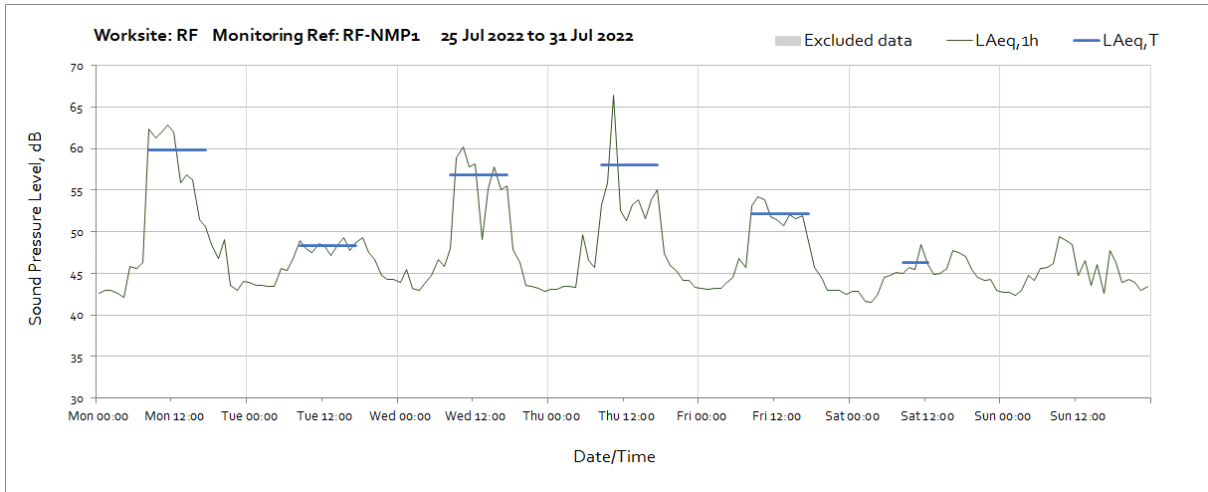
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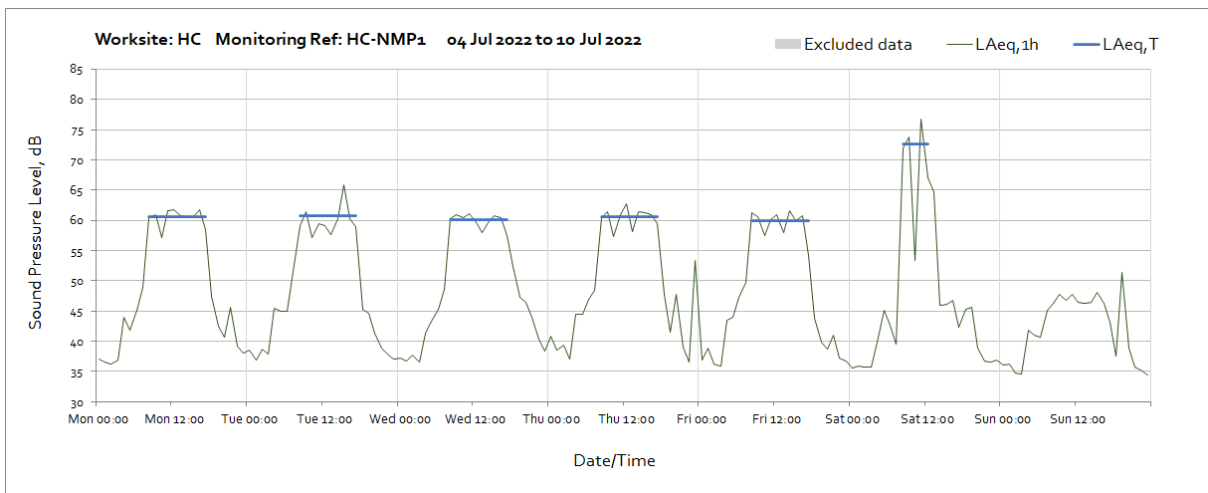
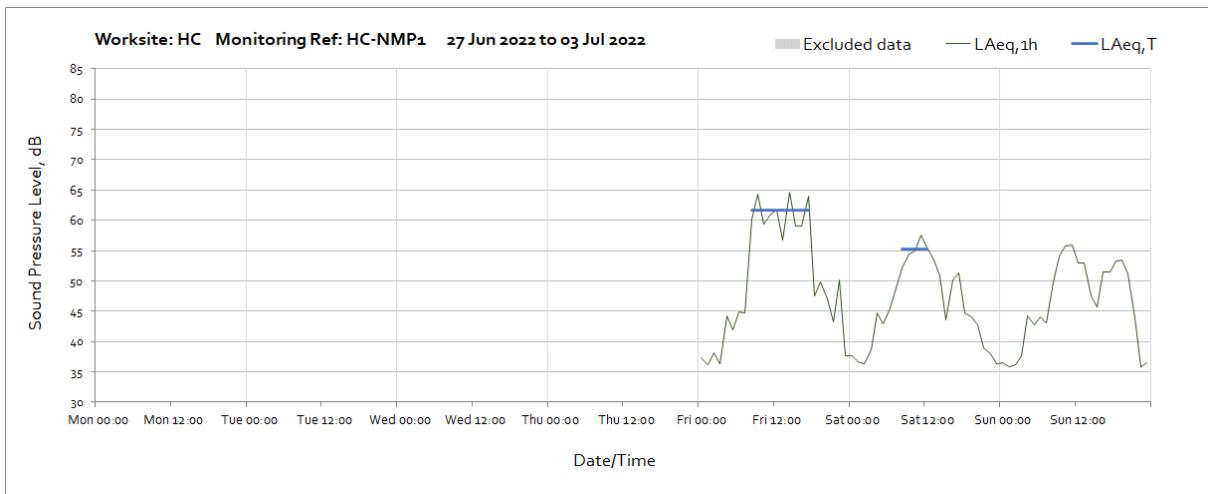


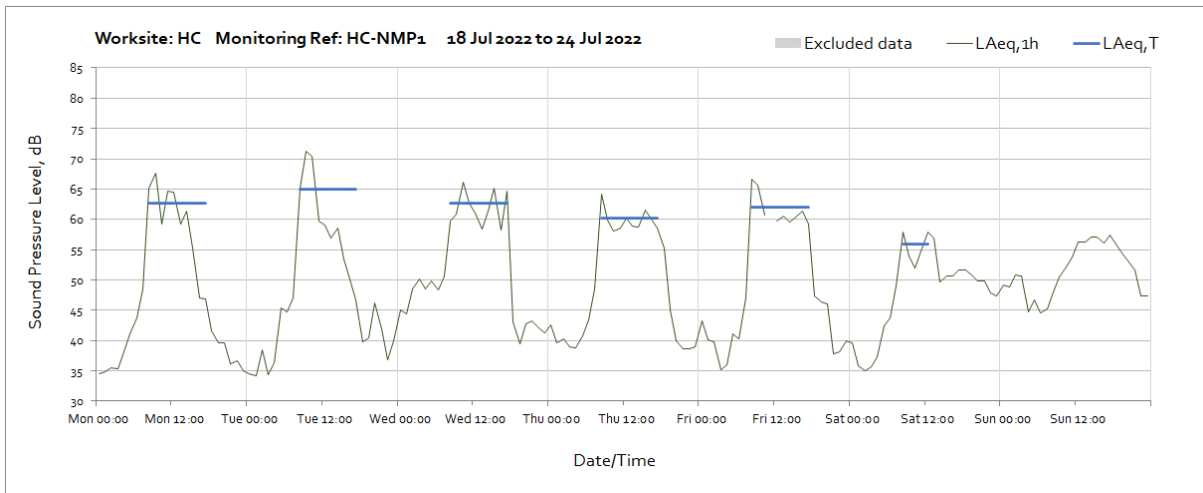
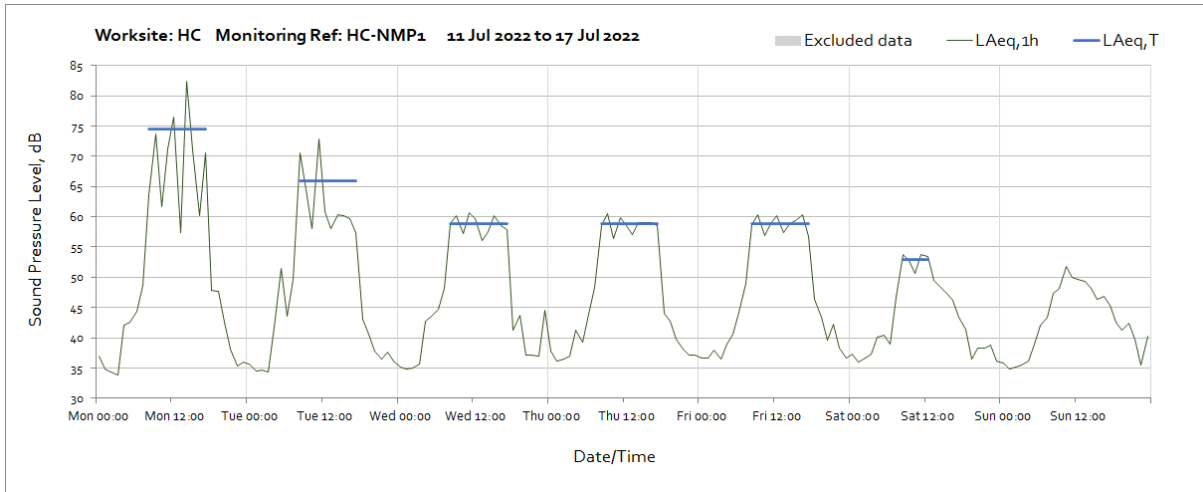
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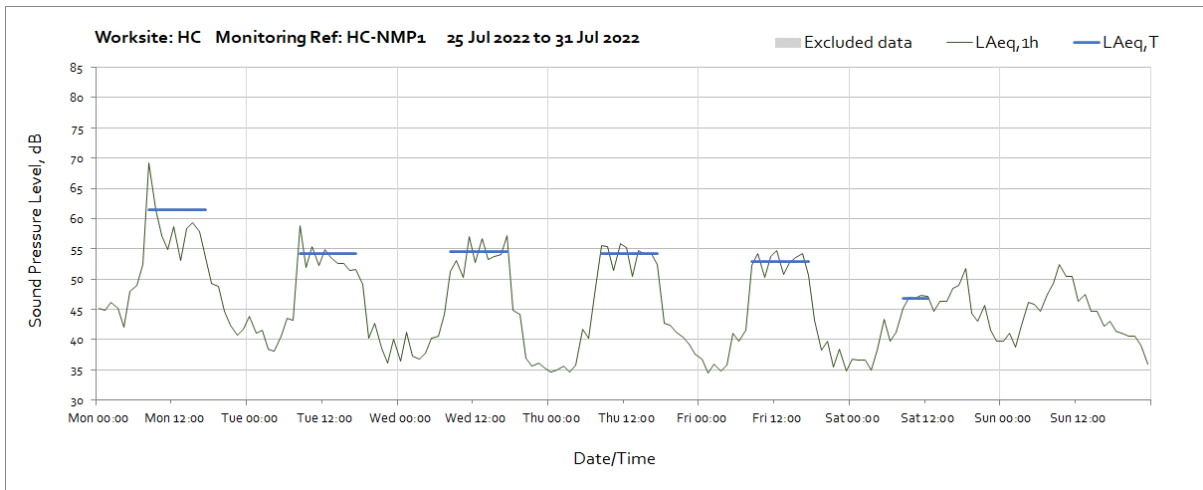


**Worksite: HC – Monitoring Ref: HC-NMP1**

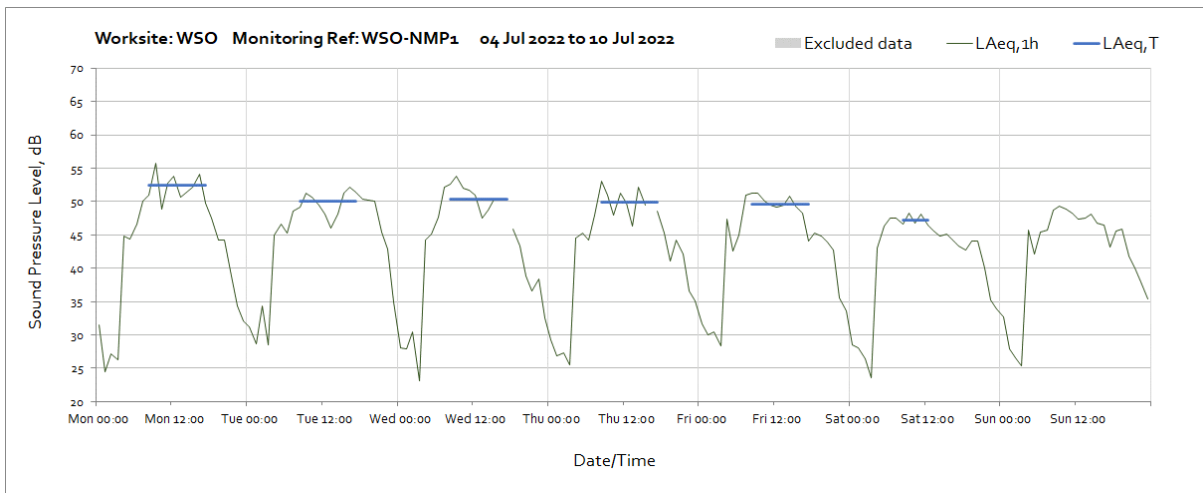
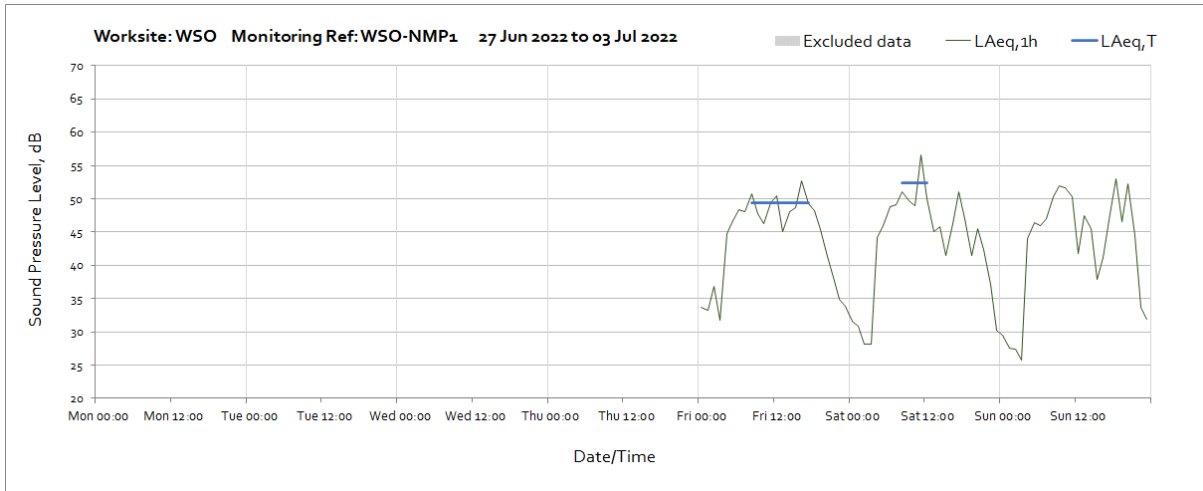




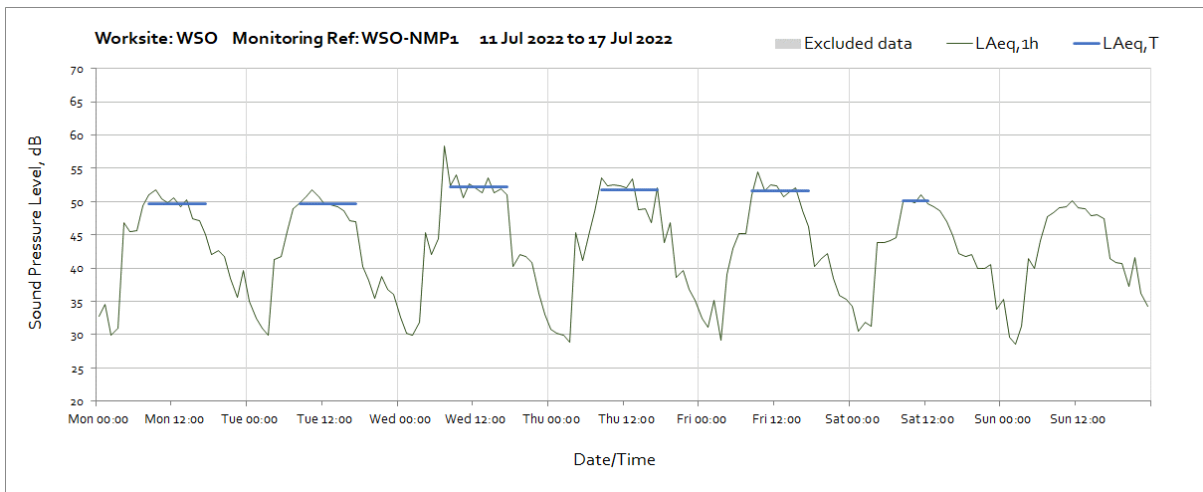
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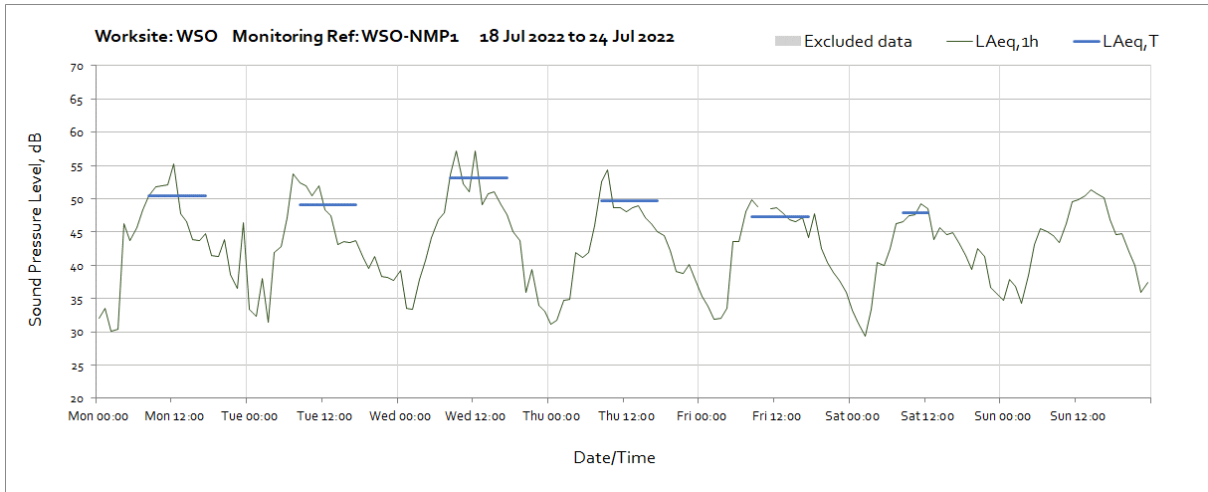


## Worksite: WSO – Monitoring Ref: WSO-NMP1

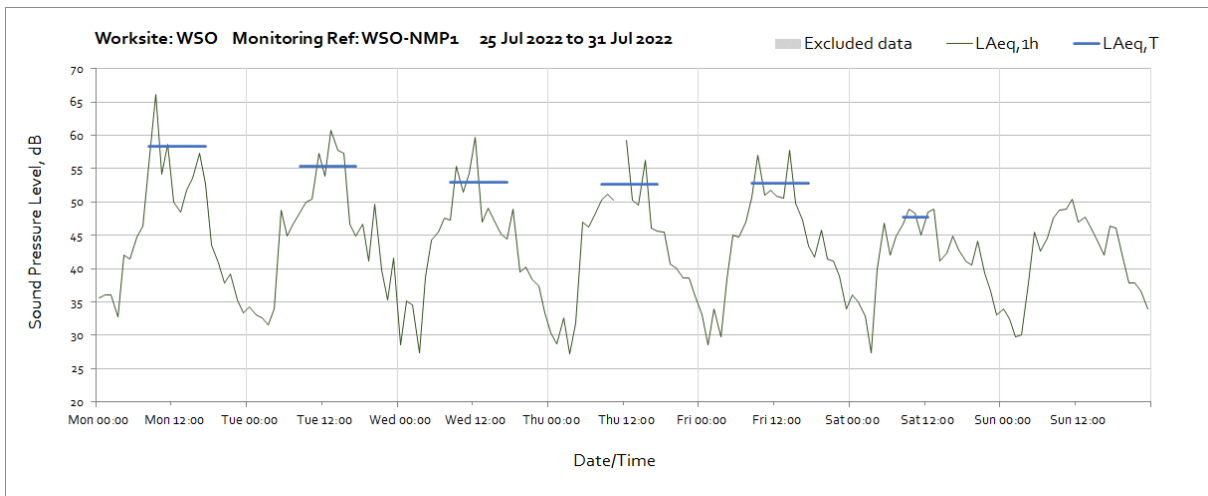


Note: Missing data between 16:00 and 18:00 on the 6<sup>th</sup> July and 16:00 and 17:00 on the 7<sup>th</sup> July was due to monitor maintenance.



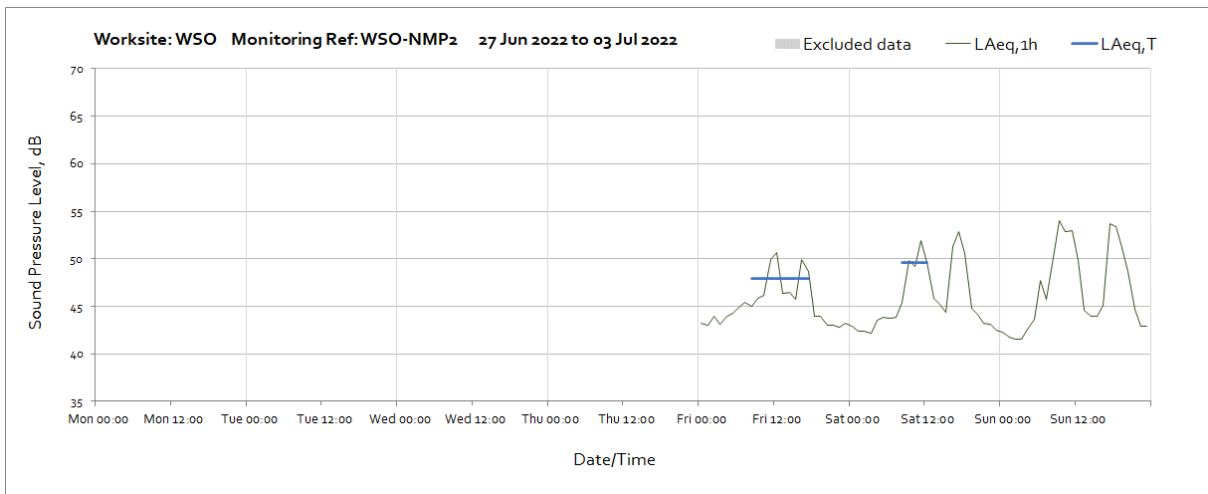


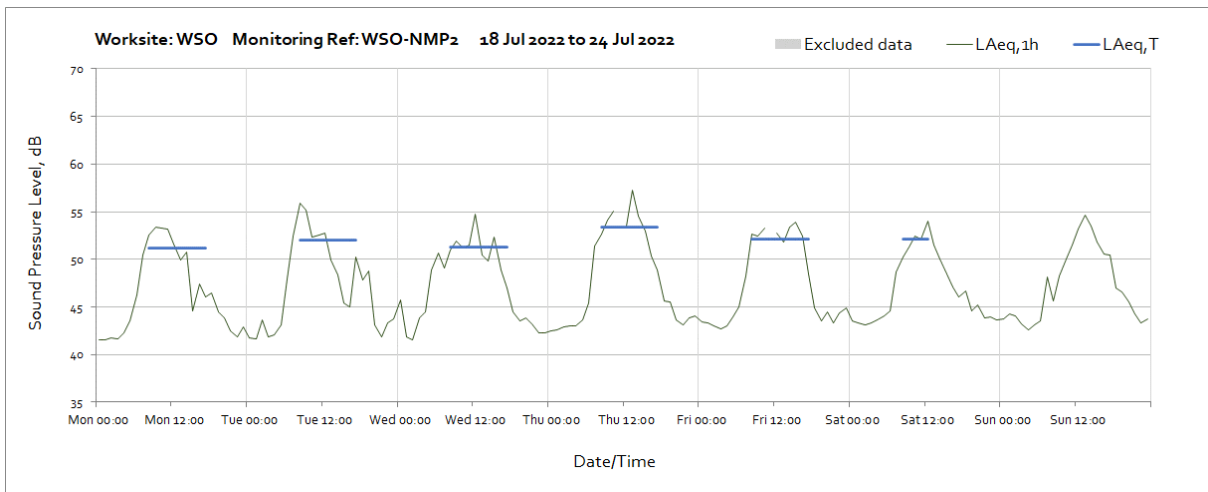
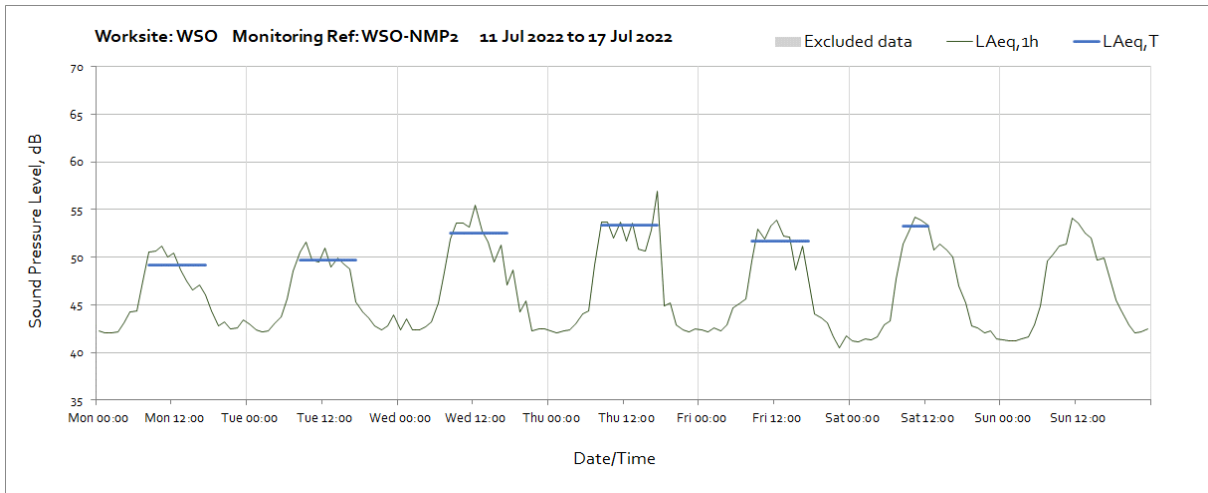
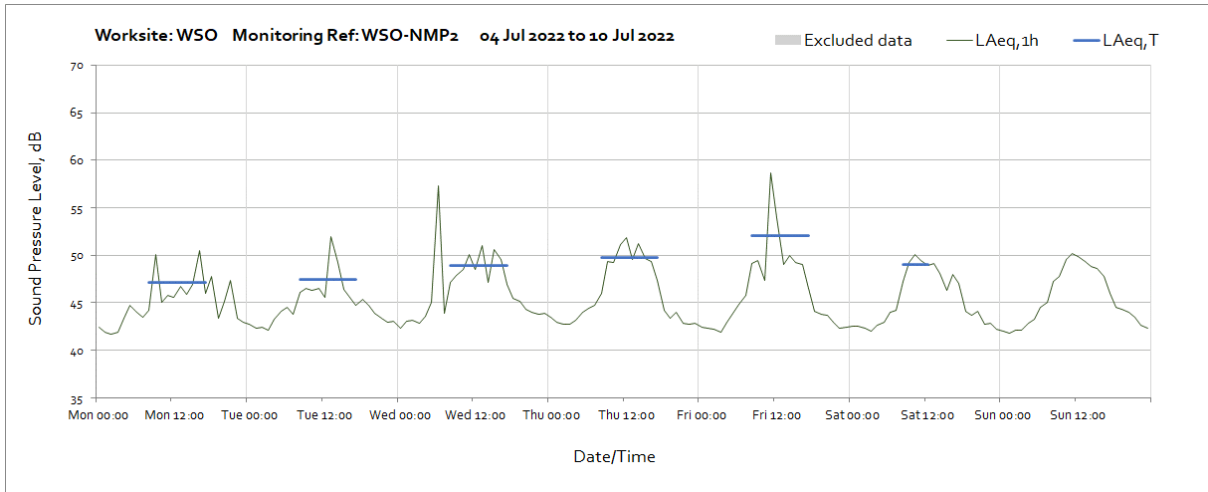
Note: Missing data between 10:00 and 11:00 on the 22<sup>nd</sup> July was due to monitor maintenance.



Note: Missing data between 11:00 and 12:00 on the 28<sup>th</sup> July was due to monitor maintenance.

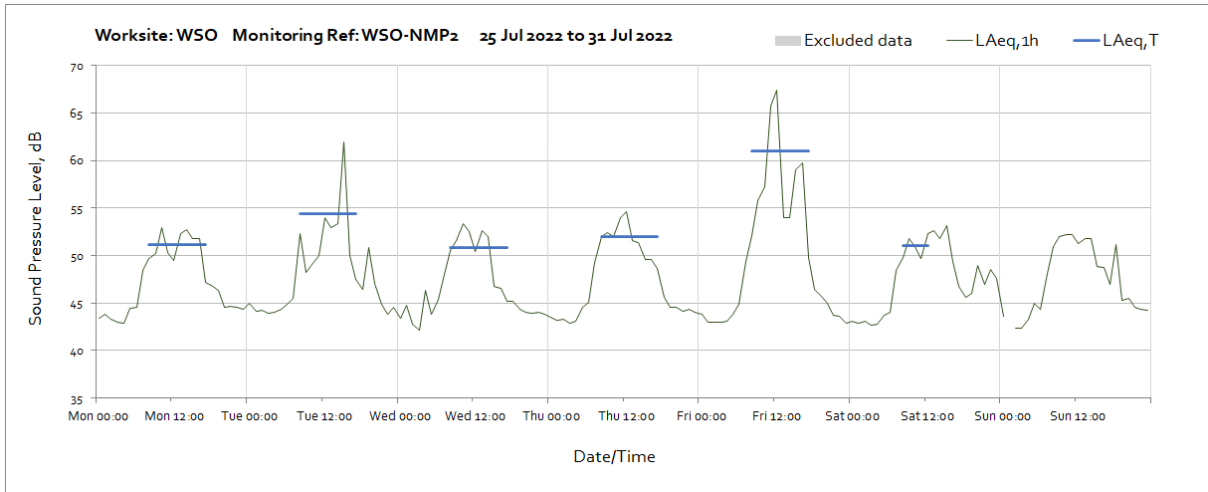
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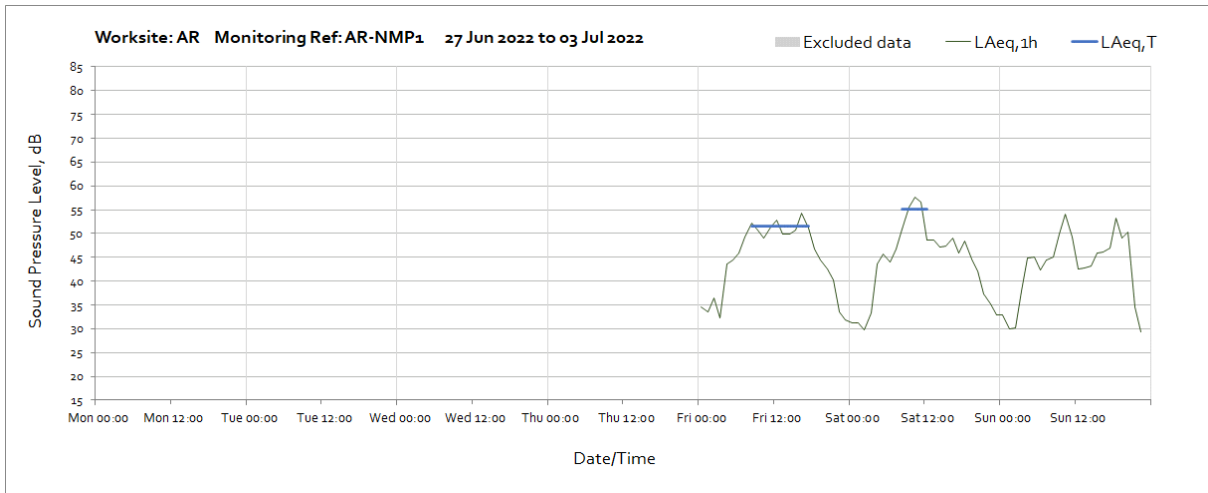
Note: Missing data between 11:00 and 12:00 on the 21<sup>st</sup> July and 11:00 and 12:00 on the 22<sup>nd</sup> July was due to monitor maintenance.



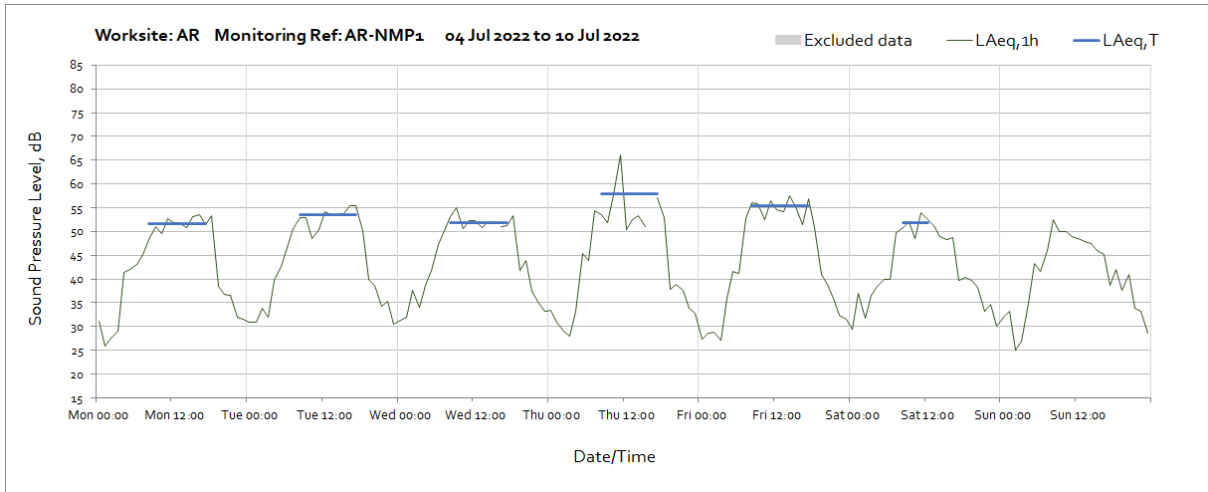


Note: Missing data between 01:00 and 02:00 on the 31<sup>st</sup> July was due to monitor automatic system check.

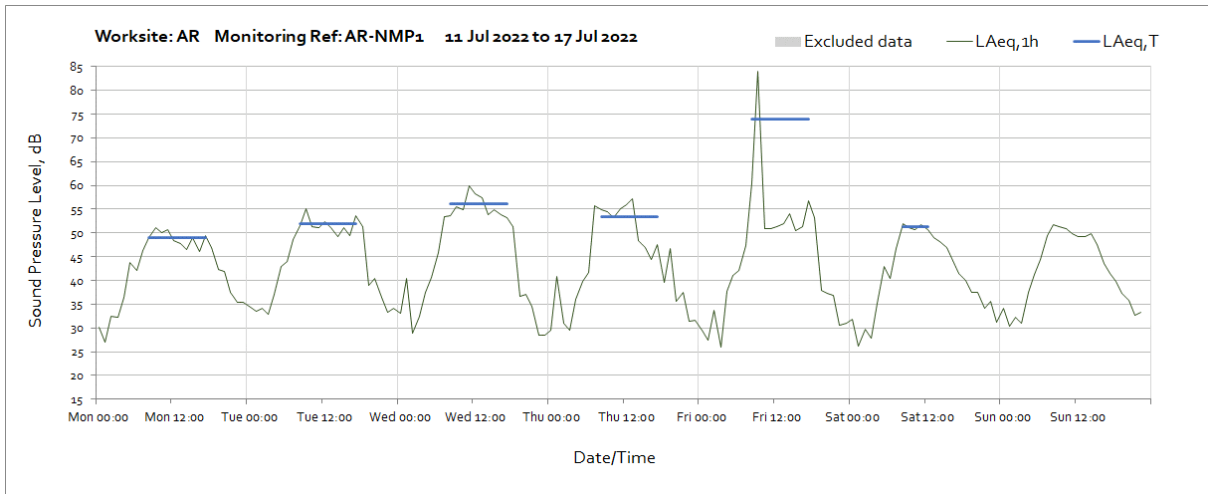
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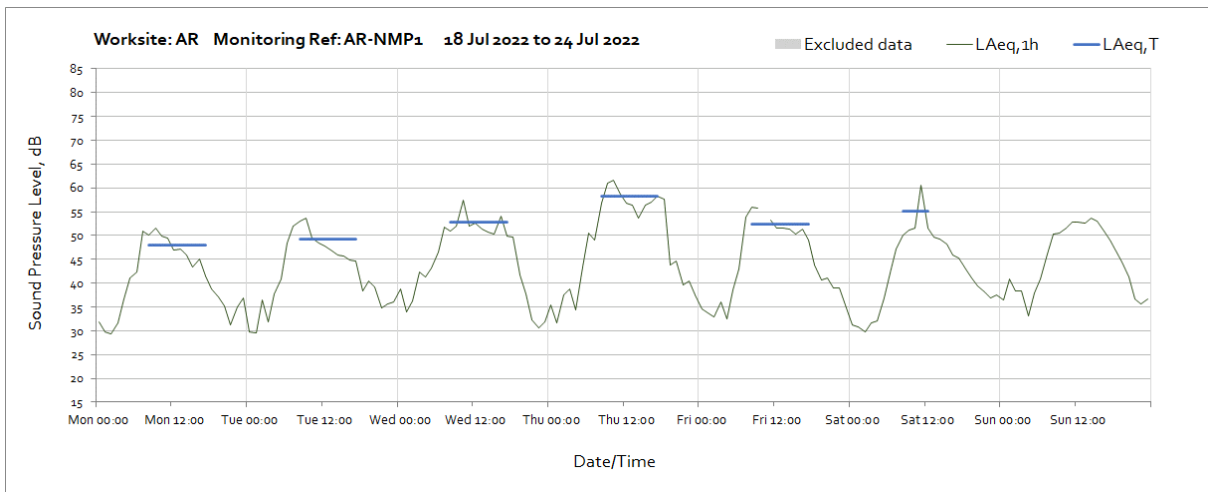
Note: Missing data between 23:00 and 0:00 on the 3<sup>rd</sup> July was due to monitor rounding cut off.



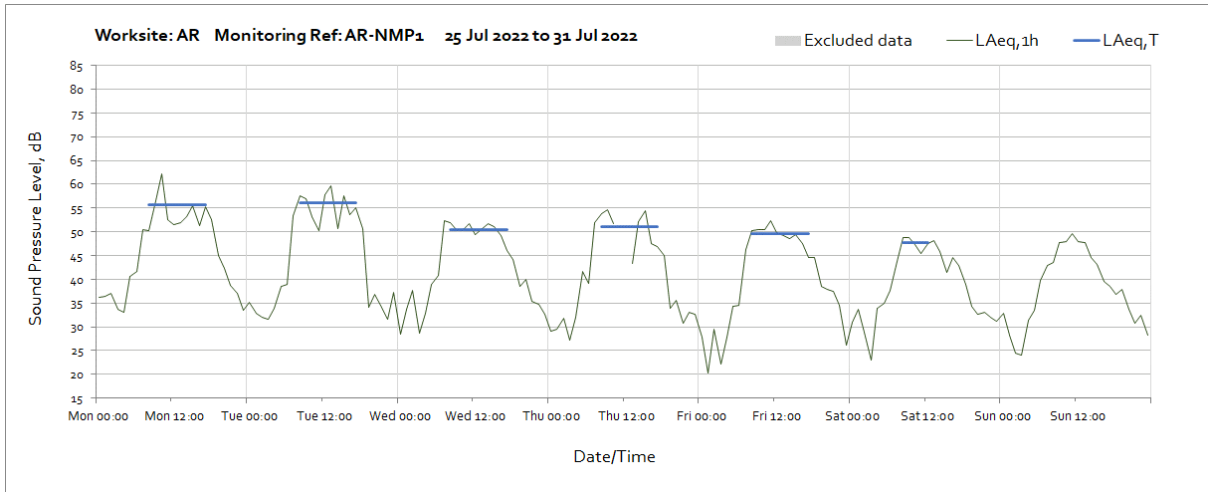
Note: Missing data between 15:00 and 16:00 on the 6<sup>th</sup> July and 16:00 and 17:00 on the 7<sup>th</sup> July was due to monitor maintenance.



Note: Missing data between 23:00 and 0:00 on the 17<sup>th</sup> July was due data rounding period after system check.

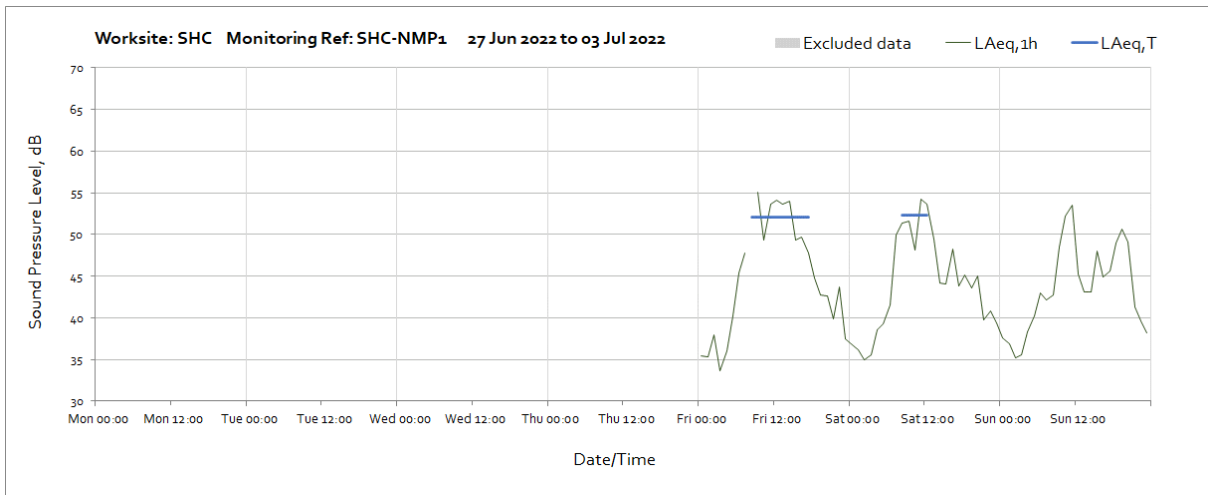


Note: Missing data between 10:00 and 11:00 on the 22<sup>nd</sup> July was due to loss of power to the monitor.

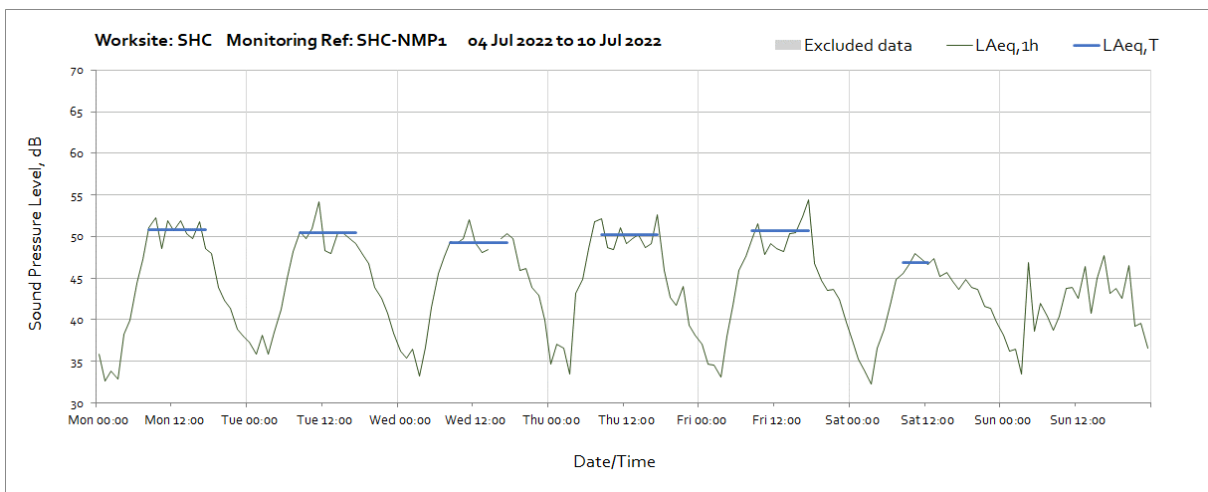


Note: Missing data between 11:00 and 13:00 on the 28<sup>th</sup> July was due to loss of power to the monitor.

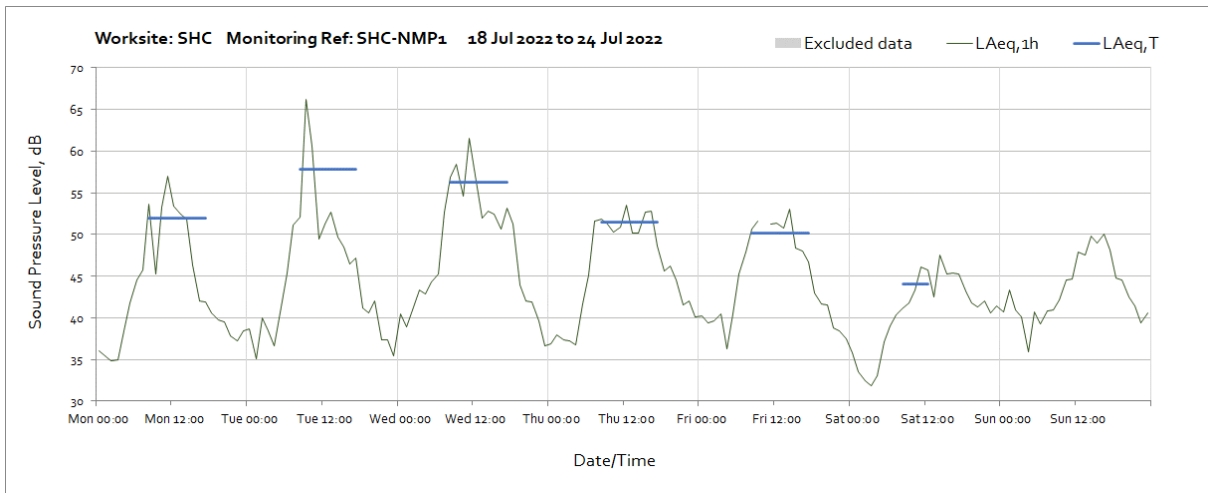
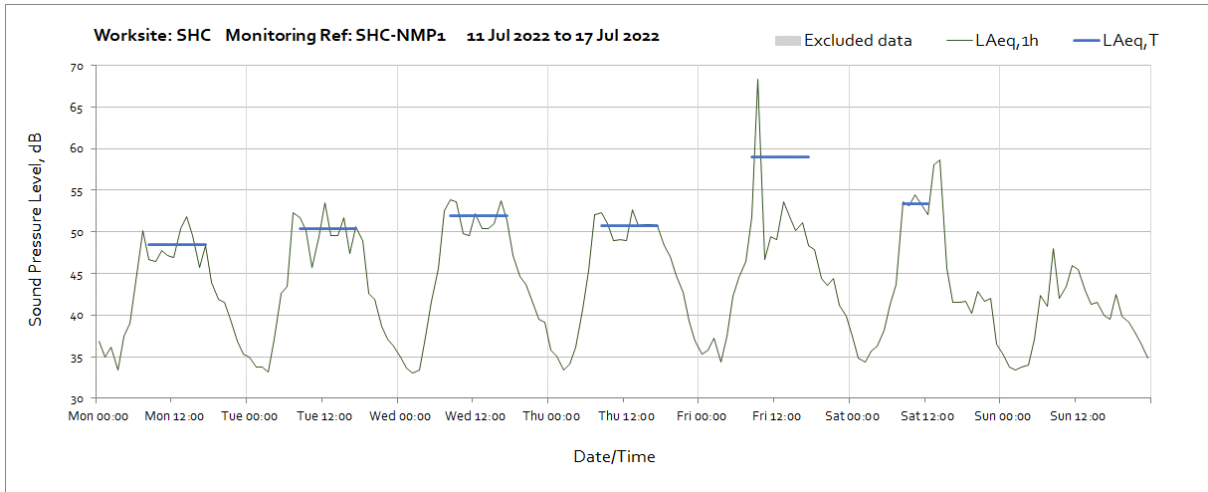
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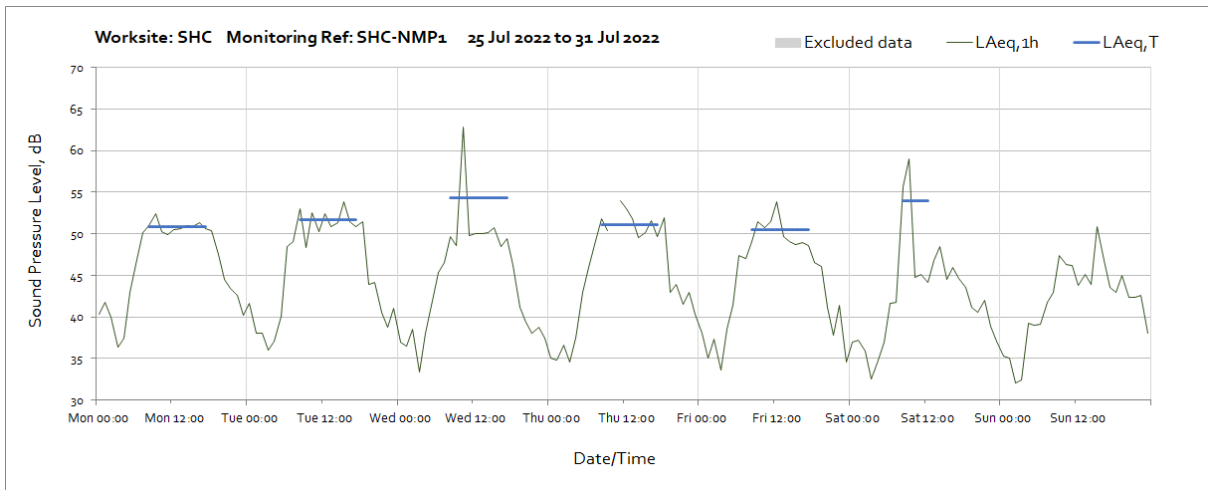
Note: Missing data between 8:00 and 9:00 on the 1<sup>st</sup> July was due to loss of power to the monitor.



Note: Missing data between 15:00 and 16:00 on the 6<sup>th</sup> July was due to monitor maintenance.

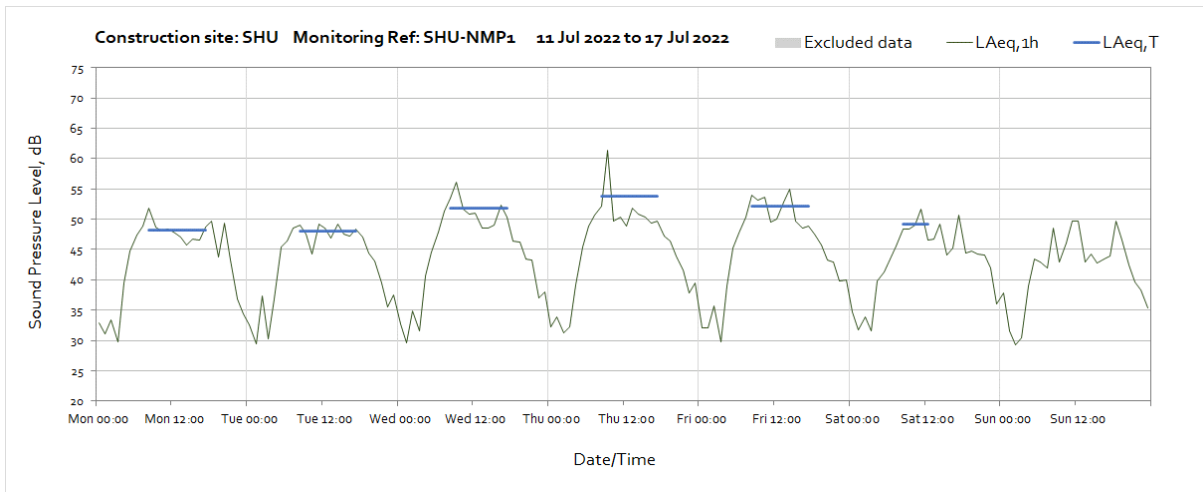
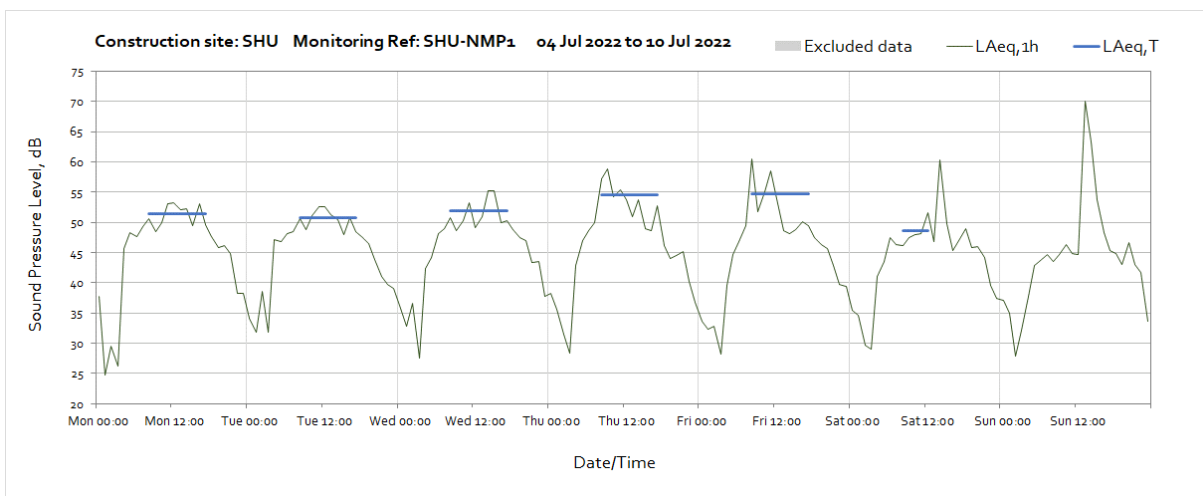
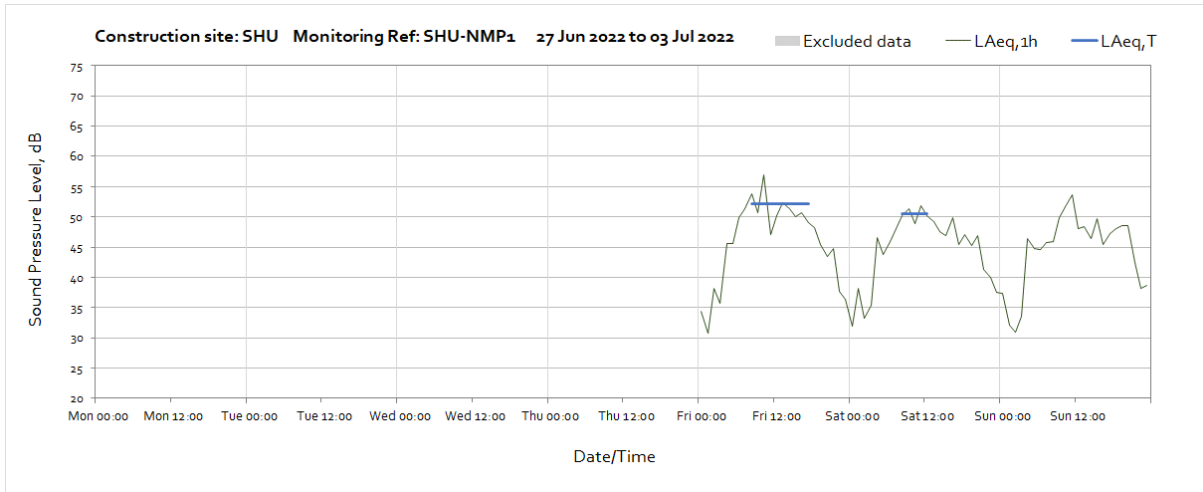


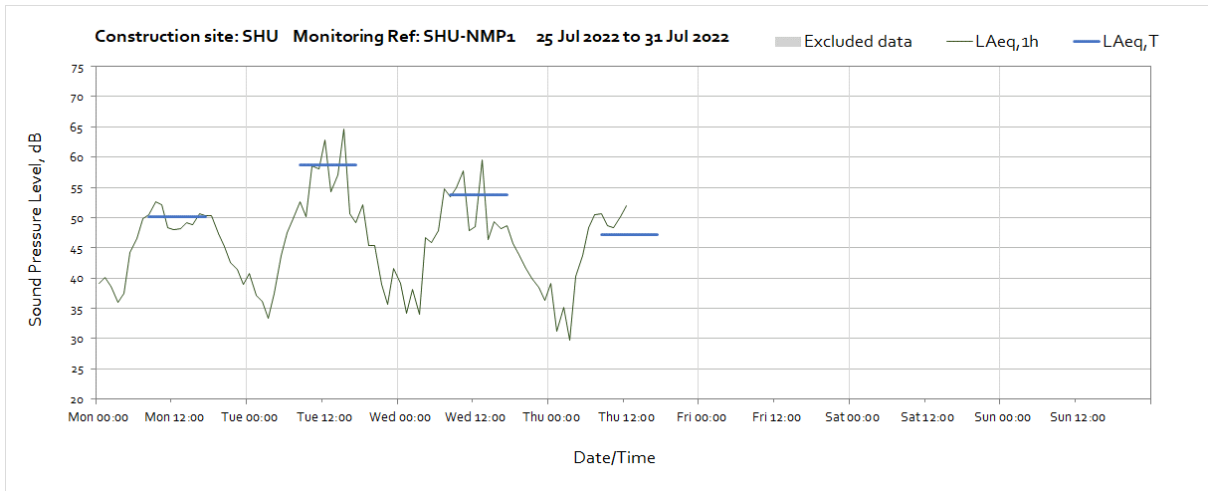
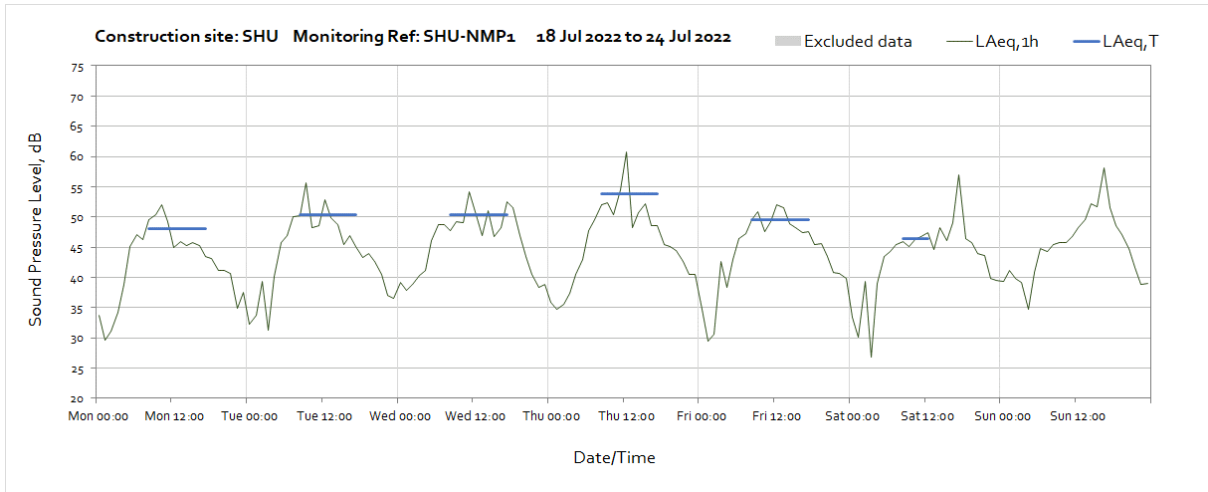
Note: Missing data between 10:00 and 11:00 on the 22<sup>nd</sup> July was due to loss of power to the monitor.



Note: Missing data between 10:00 and 11:00 on the 28<sup>th</sup> July was due to loss of power to the monitor.

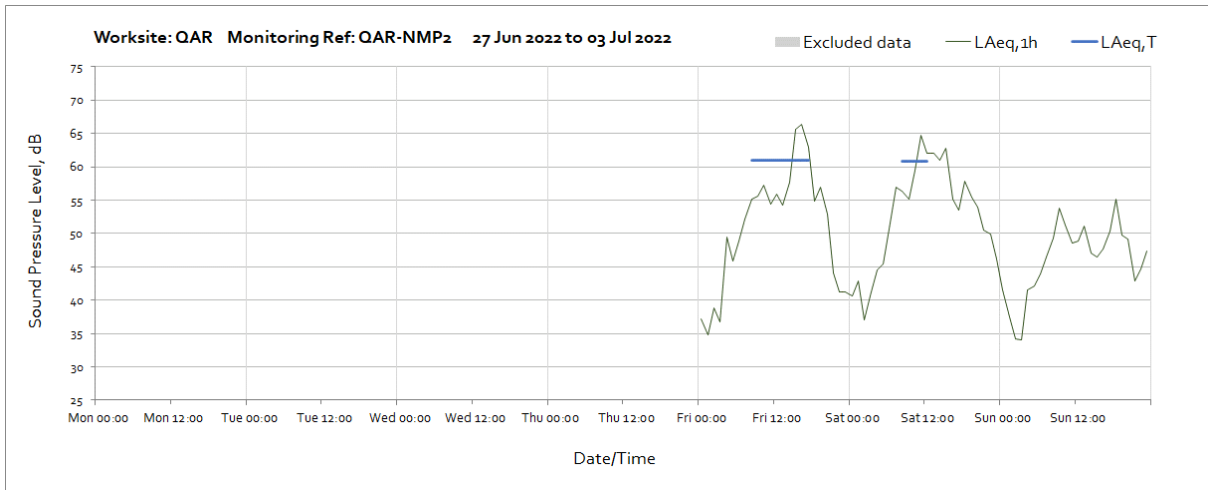
## Worksite: SHU – Monitoring Ref: SHU-NMP1

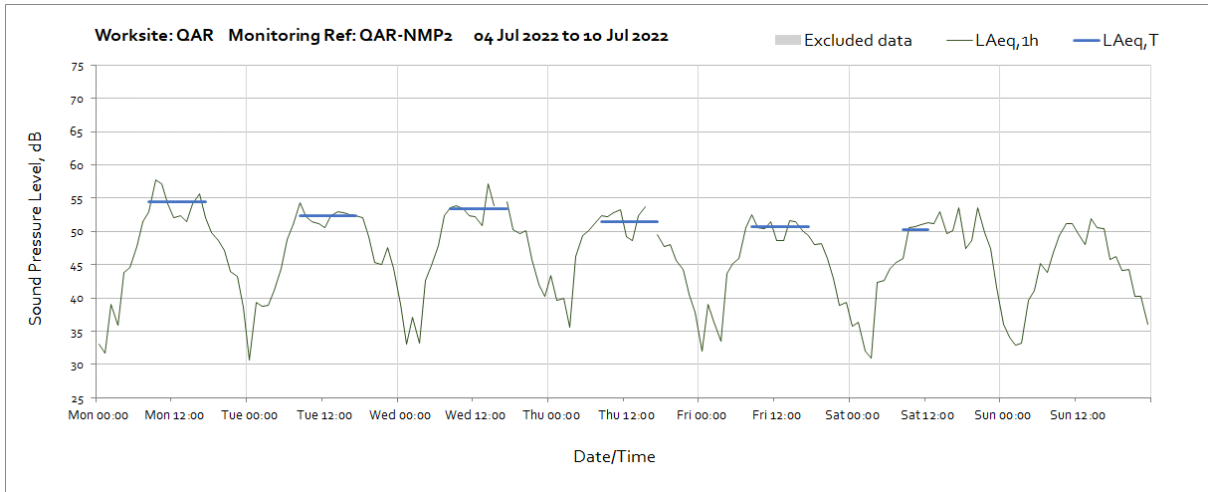




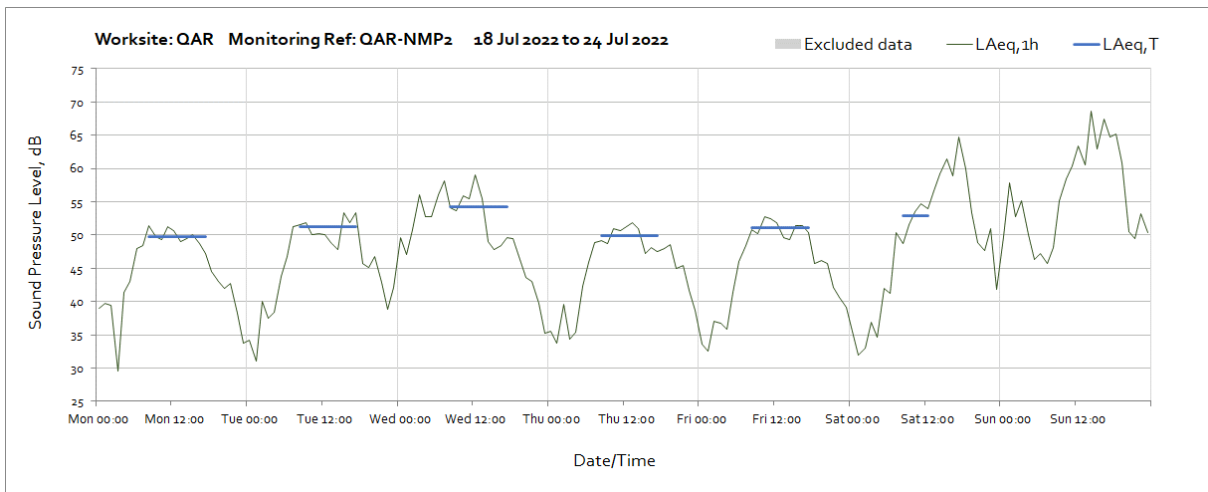
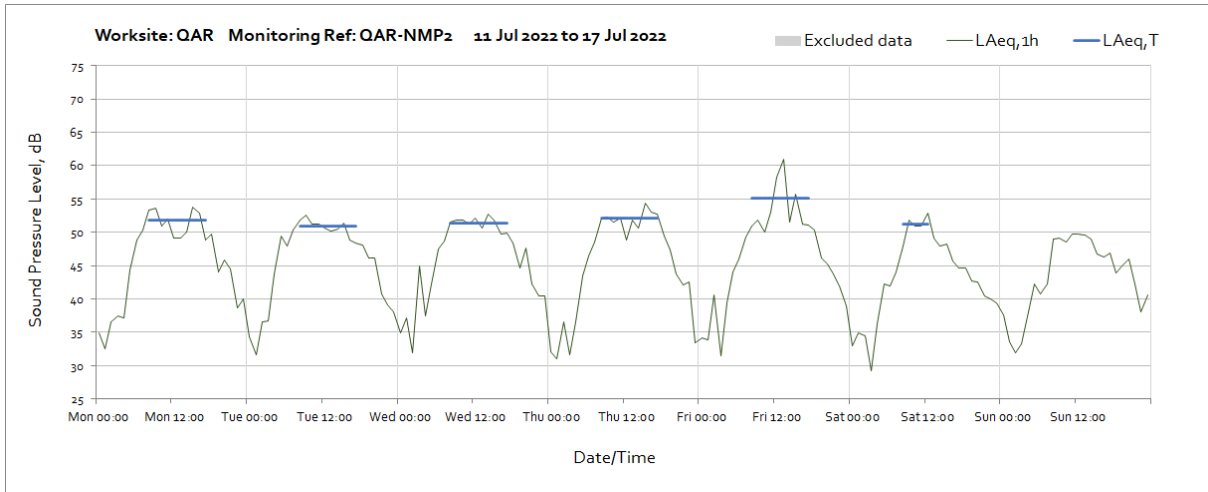
Note: Missing data from 13:00 on the 28<sup>th</sup> July was due to the monitor being permanently retrieved.

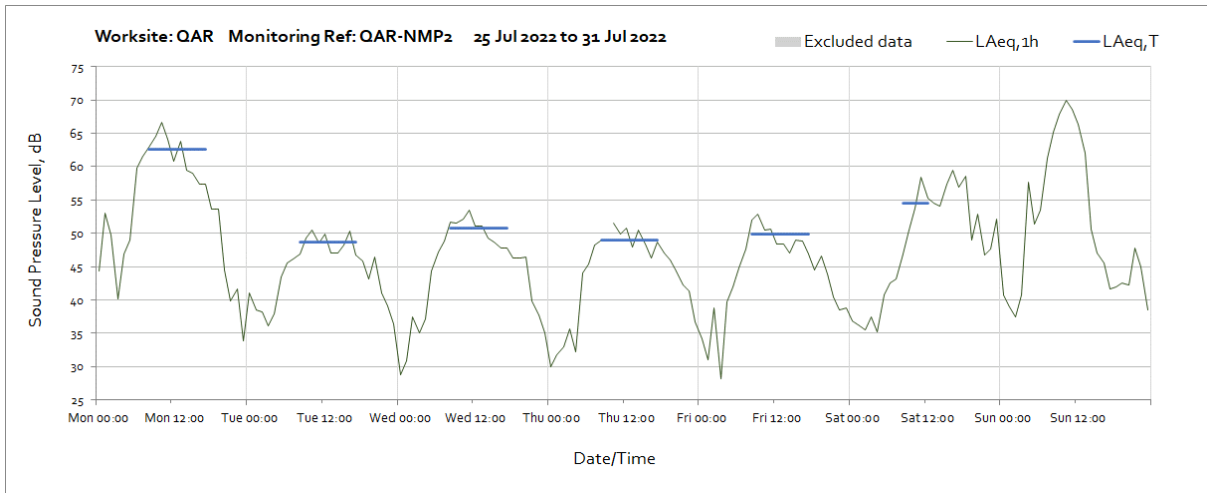
### Worksite: QAR - Monitoring Ref: QAR-NMP2





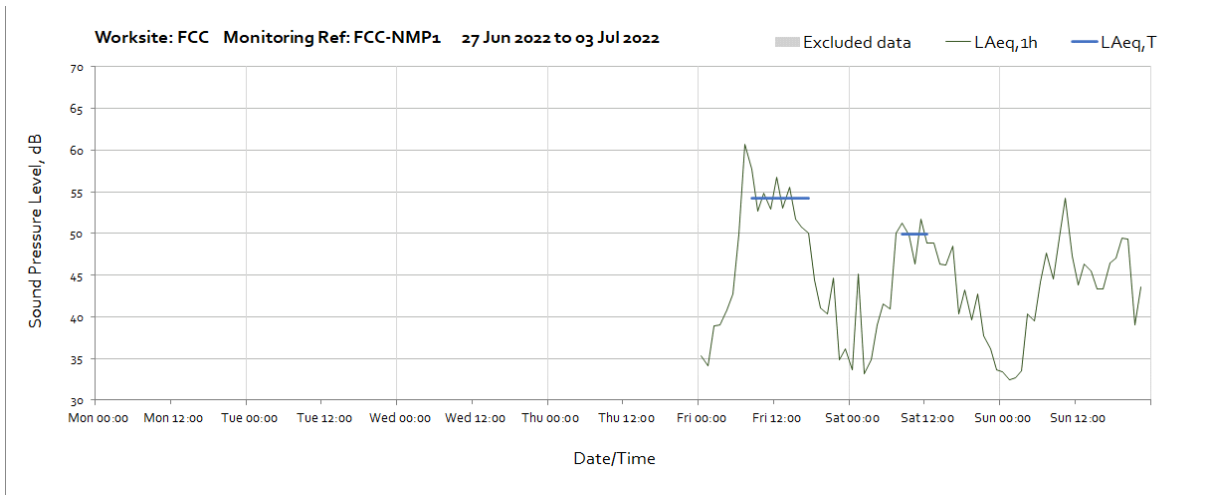
Note: Missing data between 16:00 and 17:00 on the 6<sup>th</sup> July and 16:00 and 15:00 on the 7<sup>th</sup> July was due to monitor maintenance.



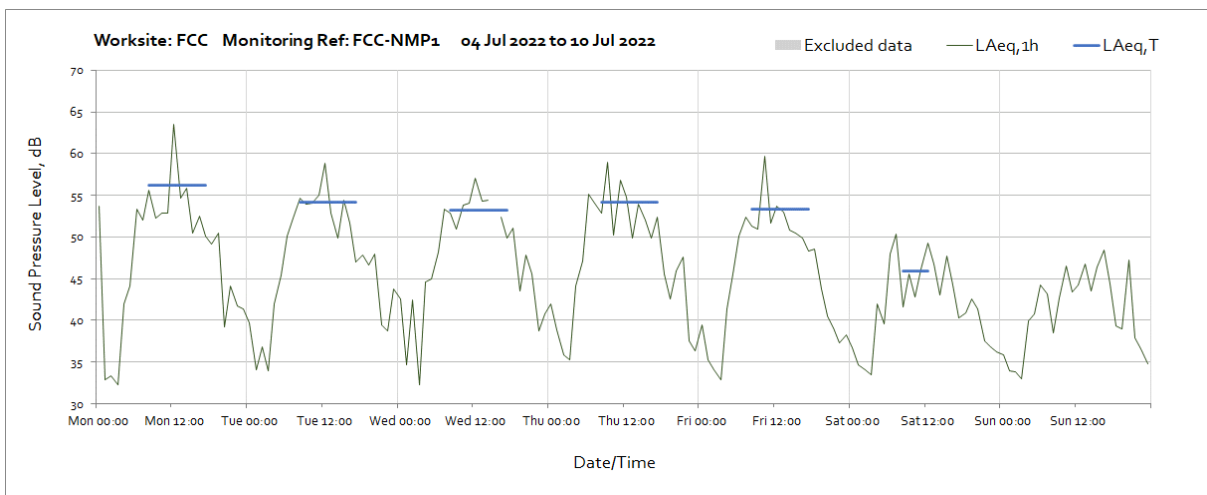


Note: Missing data between 09:00 and 10:00 on the 28<sup>th</sup> July was due to monitor maintenance.

**Worksite: FCC – Monitoring Ref: FCC-NMP1**

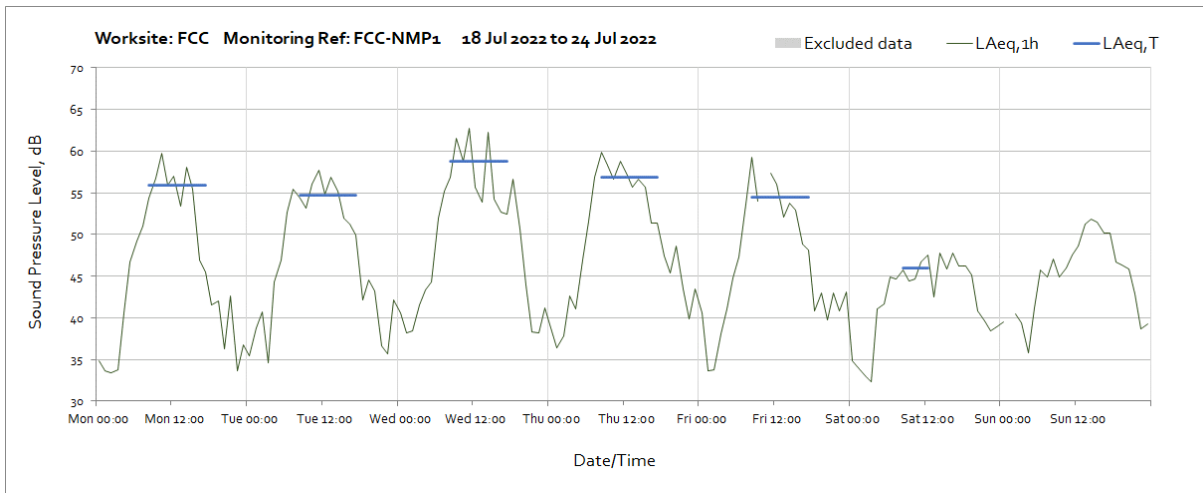
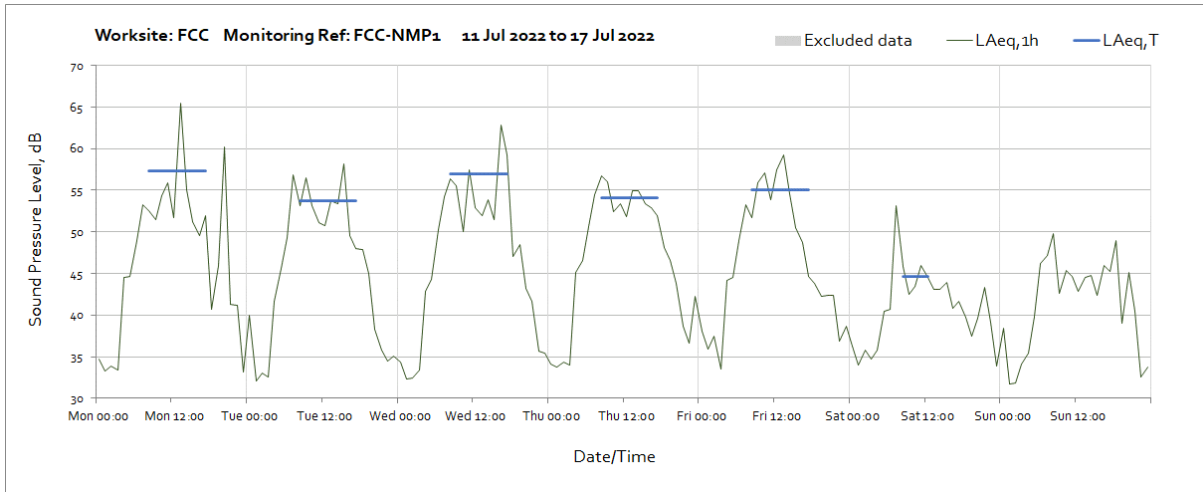


Note: Missing data between 23:00 and 0:00 on the 3<sup>rd</sup> July was due to data rounding after system check.

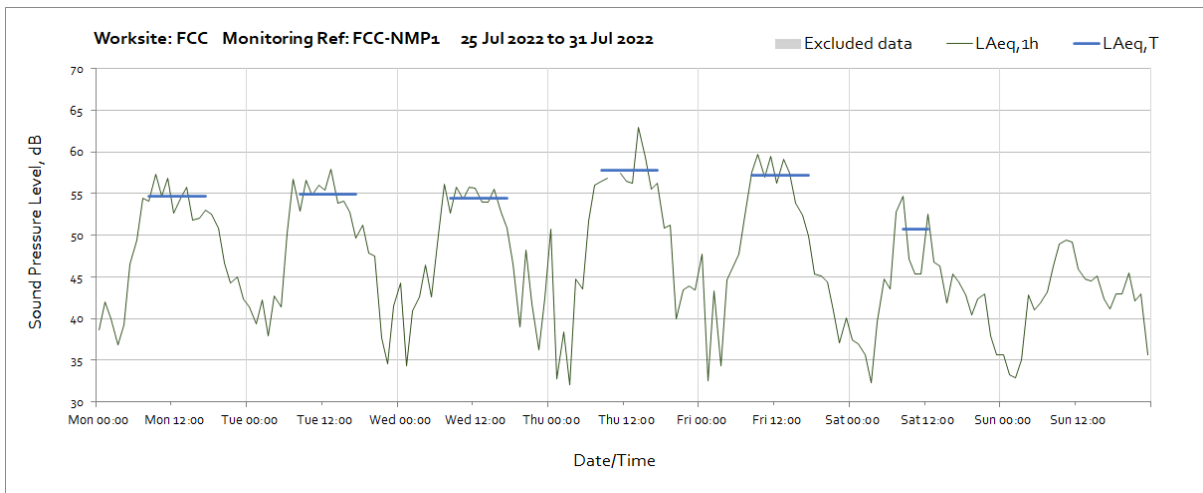


Note: Missing data between 15:00 and 16:00 on the 6<sup>th</sup> July was due to monitor maintenance.



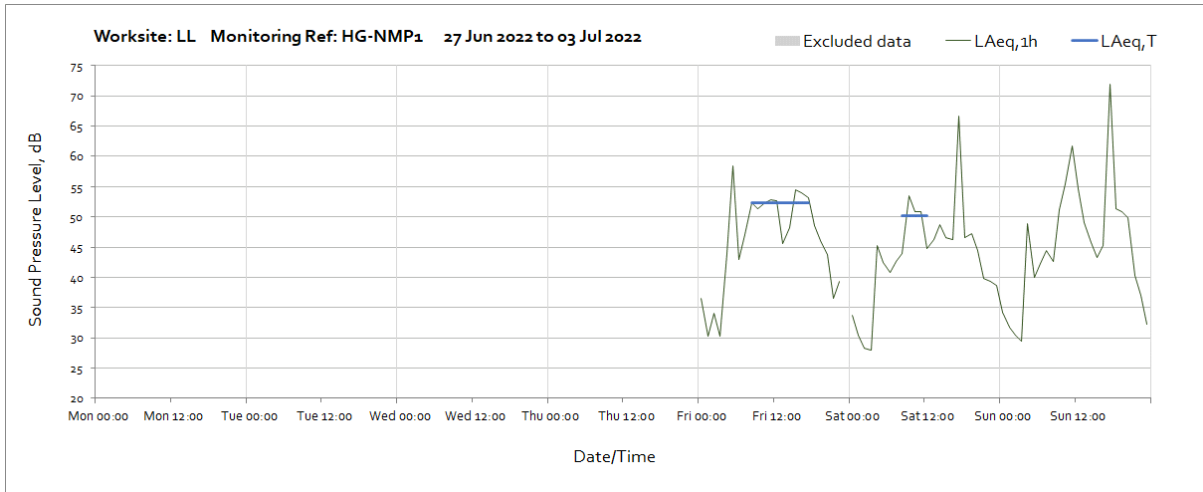


Note: Missing data between 10:00 and 11:00 on the 22<sup>nd</sup> July was due to monitor maintenance and 01:00 and 02:00 on the 24<sup>th</sup> July was due to automatic system check.

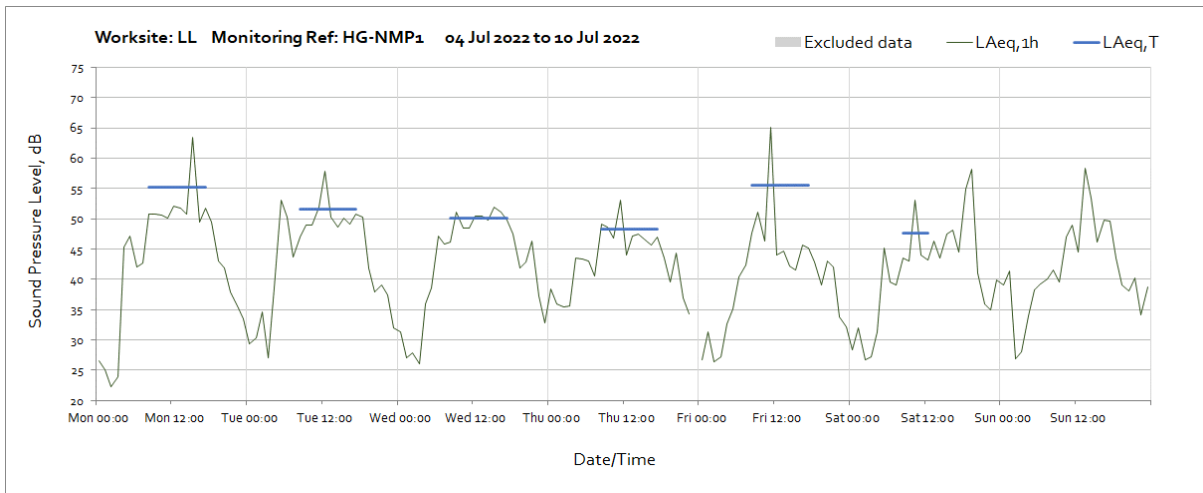


Note: Missing data between 10:00 and 11:00 on the 28<sup>th</sup> July was due to monitor maintenance.

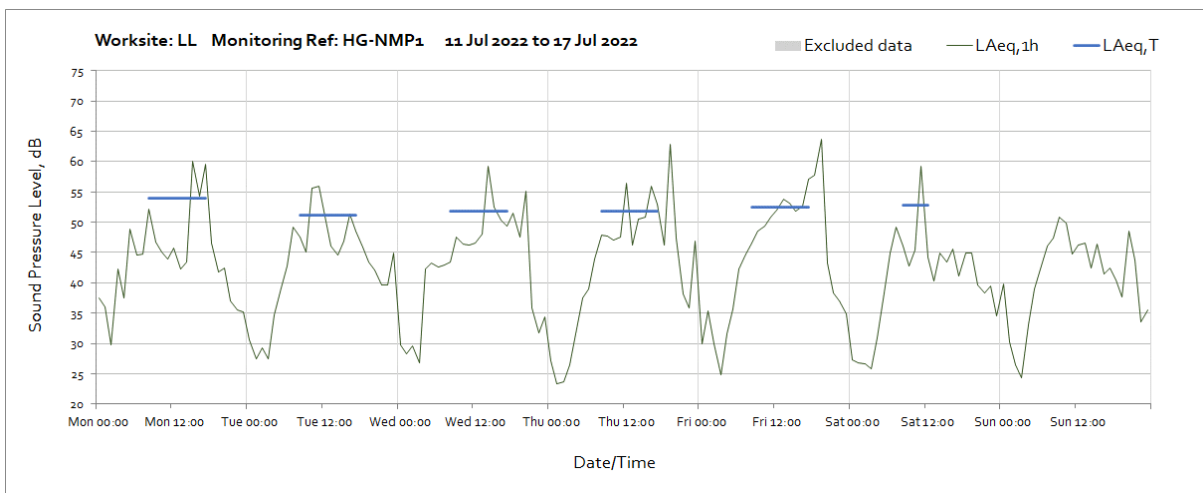
## Worksite: LL – Monitoring Ref: HG-NMP1

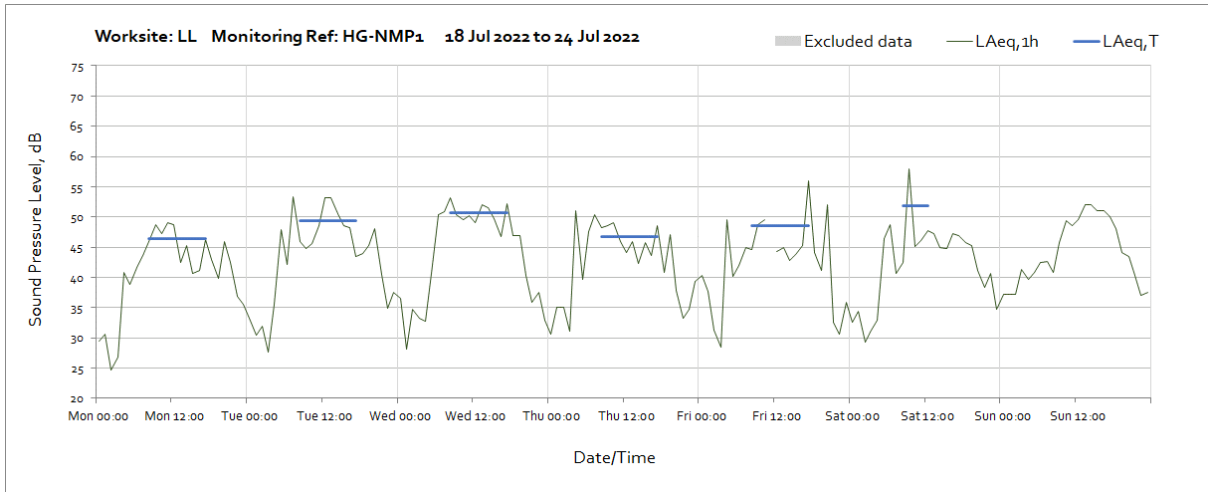


Note: Missing data between 23:00 and 00:00 on the 1<sup>st</sup> July was due loss of power to the monitor.

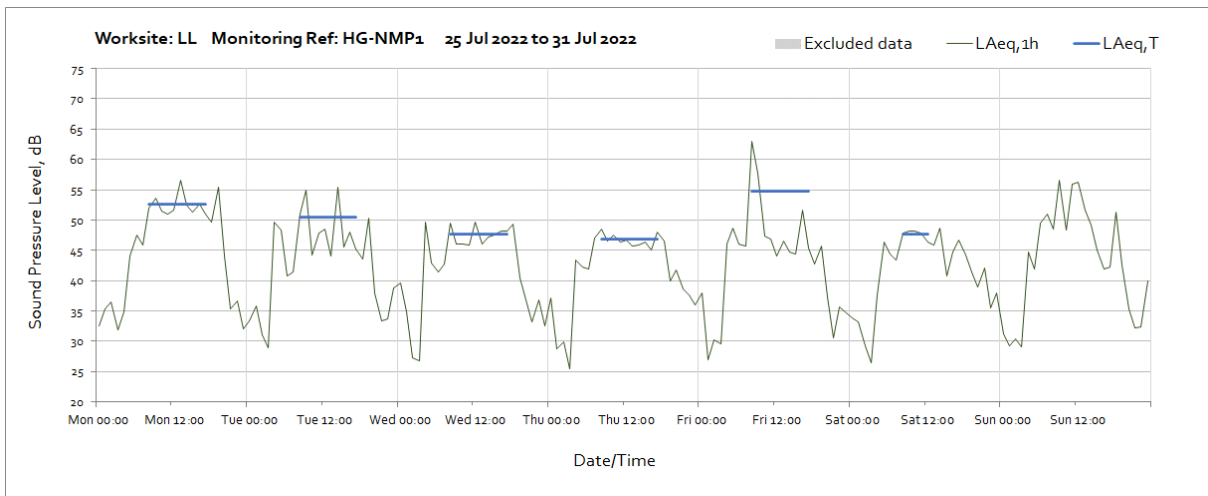


Note: Missing data between 23:00 and 00:00 on the 7<sup>th</sup> July was due to loss of power to the monitor.

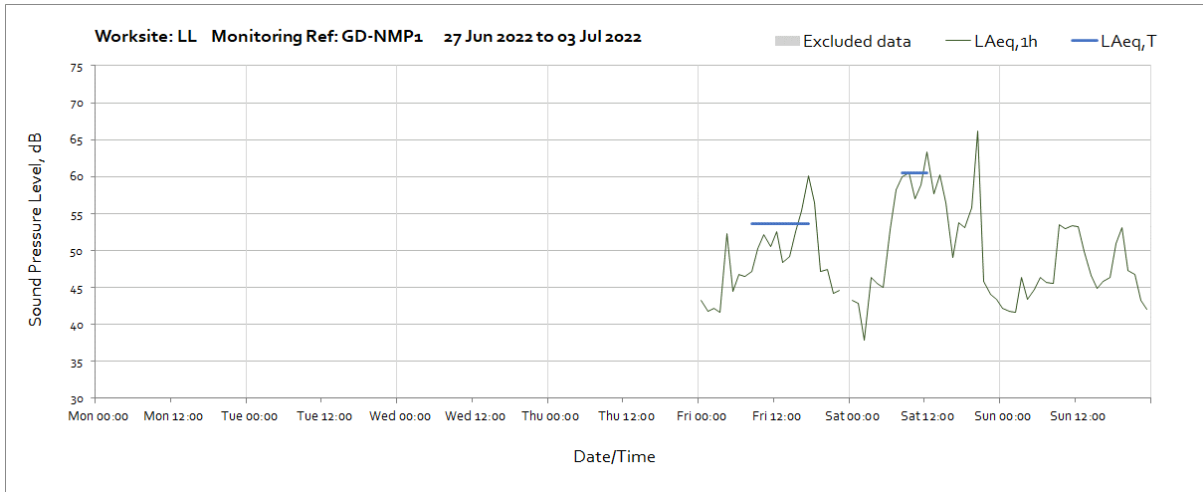




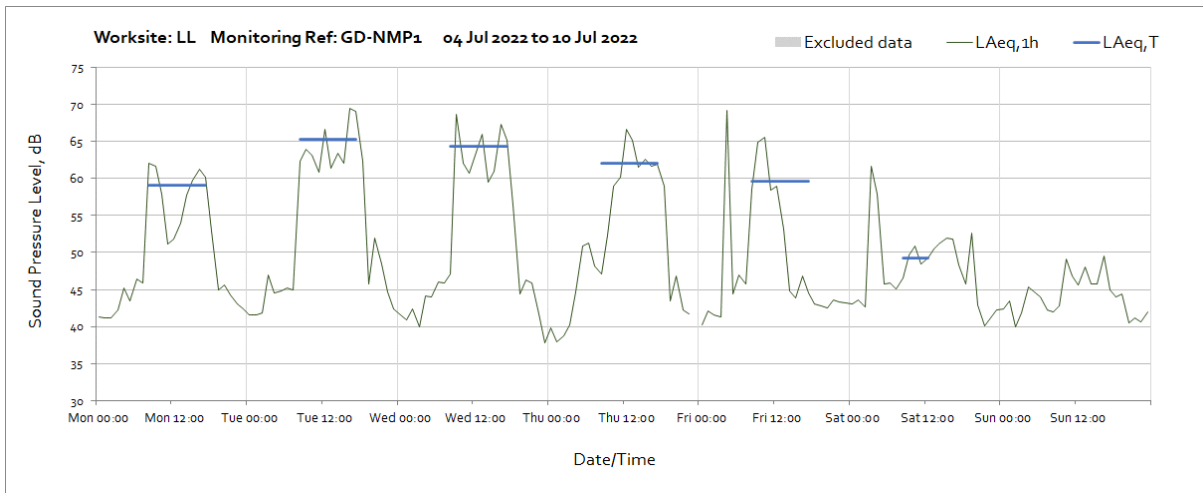
Note: Missing data between 11:00 and 12:00 on the 22<sup>nd</sup> July was due to monitor maintenance.



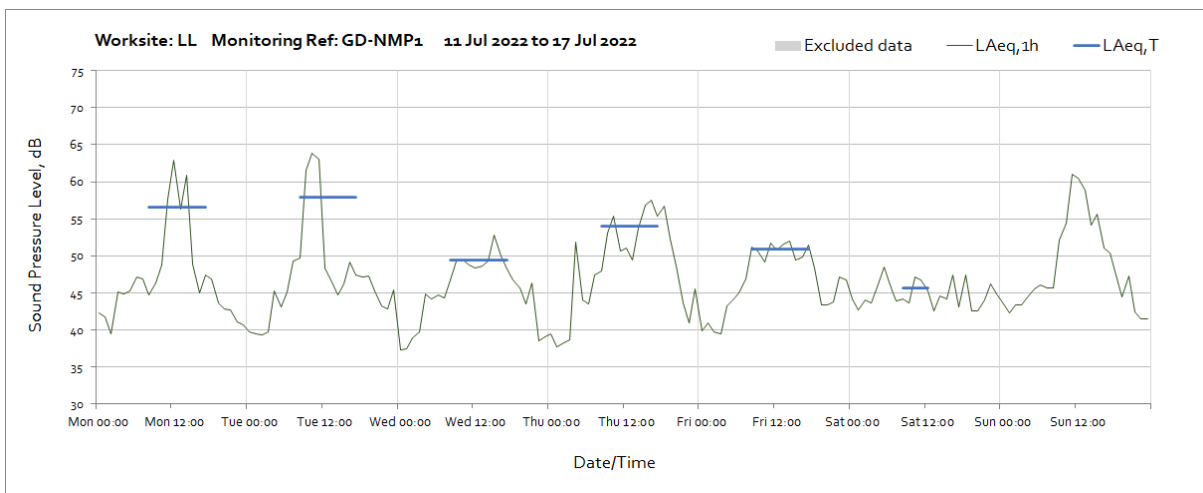
## Worksite: LL - Monitoring Ref: GD-NMP1

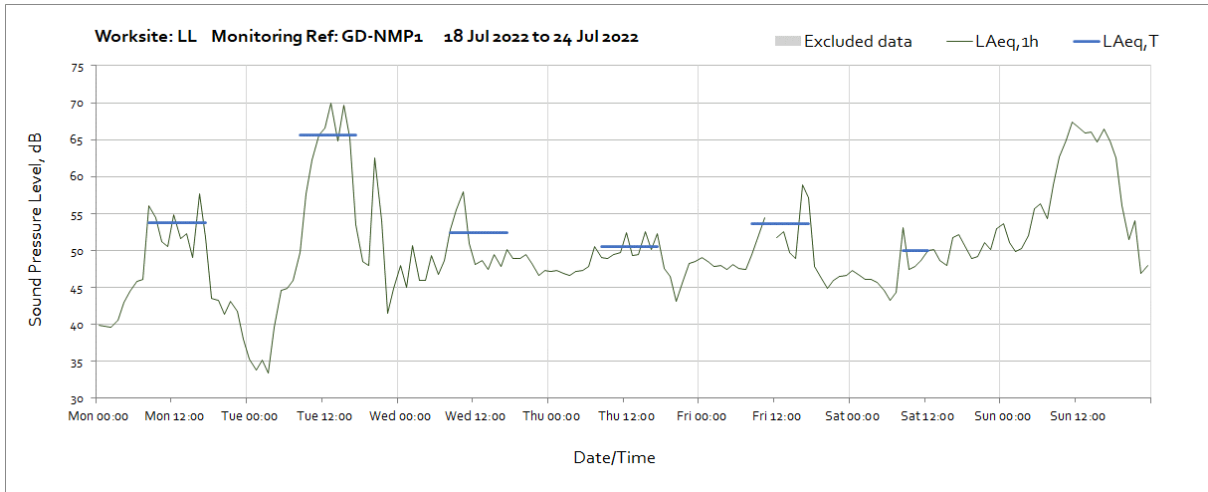


Note: Missing data between 23:00 and 00:00 on the 1<sup>st</sup> July was due to loss of power to the monitor.

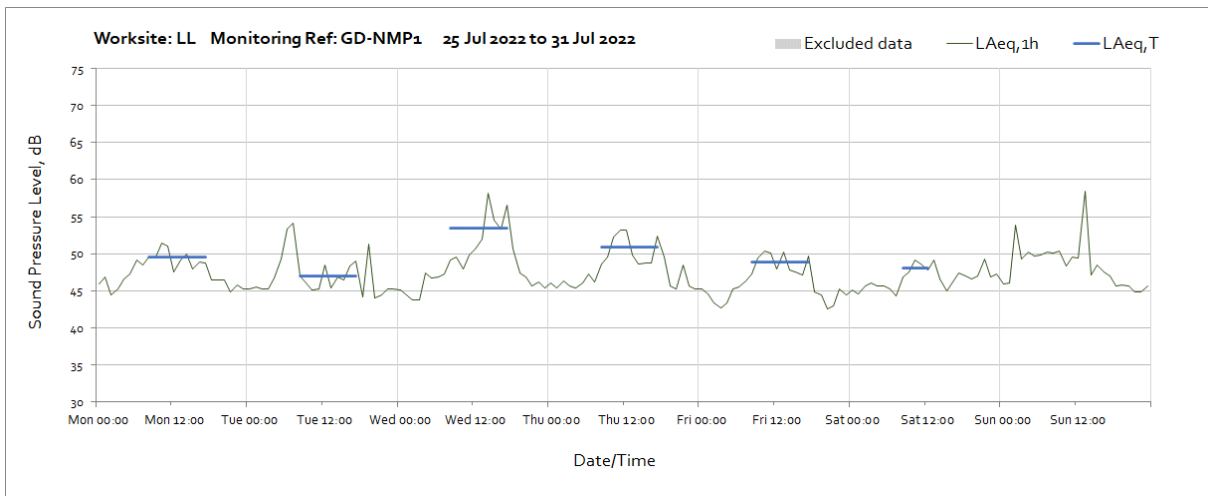


Note: Missing data between 23:00 and 00:00 on the 7<sup>th</sup> July was due to loss of power to the monitor.

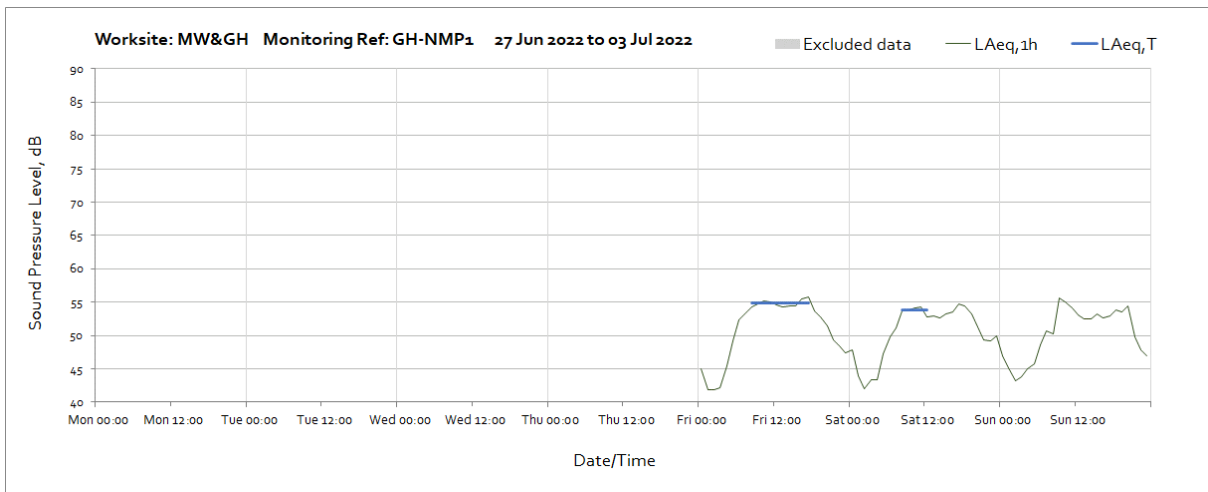


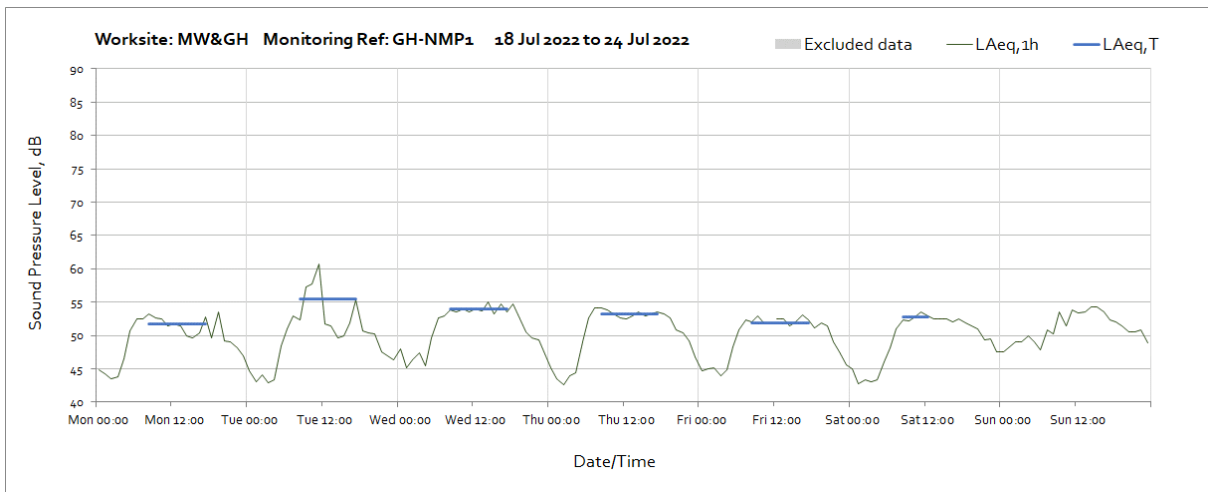
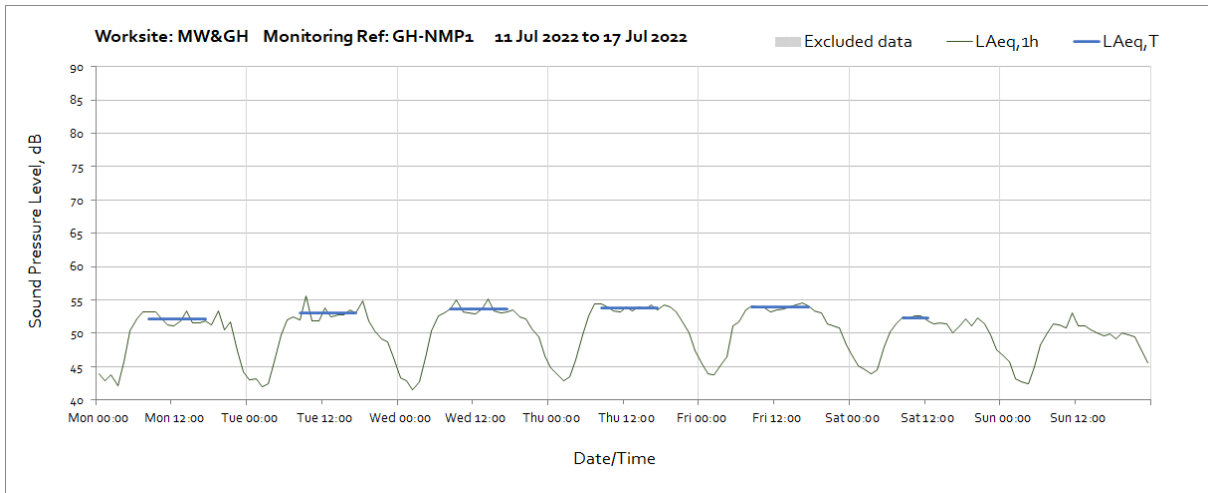
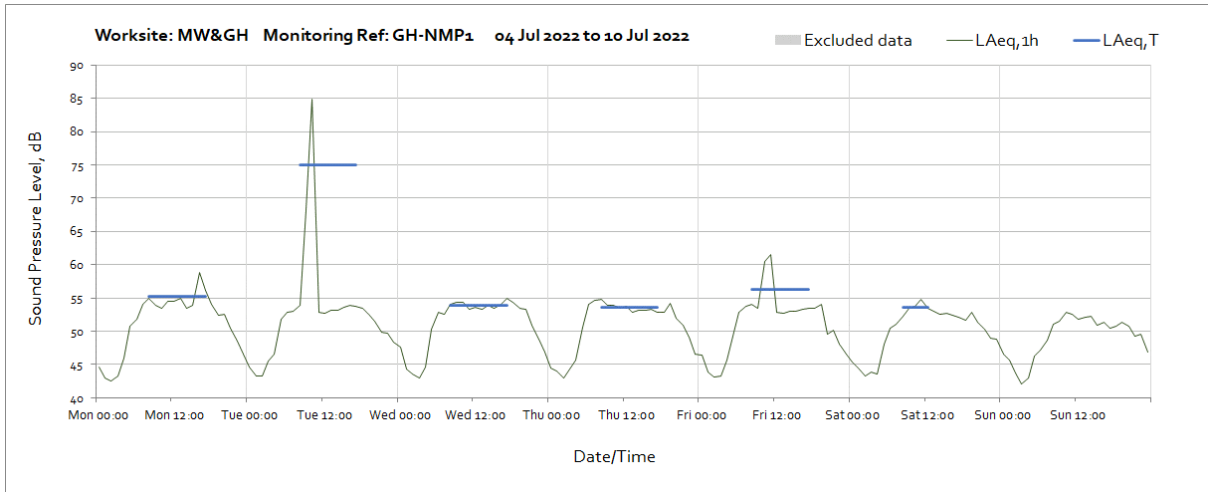


Note: Missing data between 11:00 and 12:00 on the 22<sup>nd</sup> July was due to loss of power to the monitor.

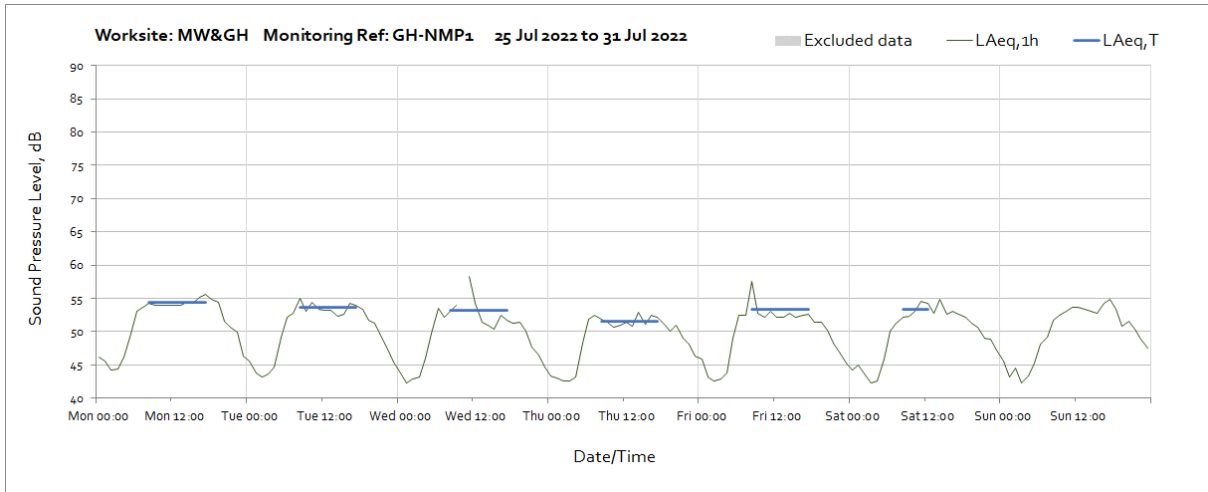


### Worksite: MW&GH - Monitoring Ref: GH-NMP1



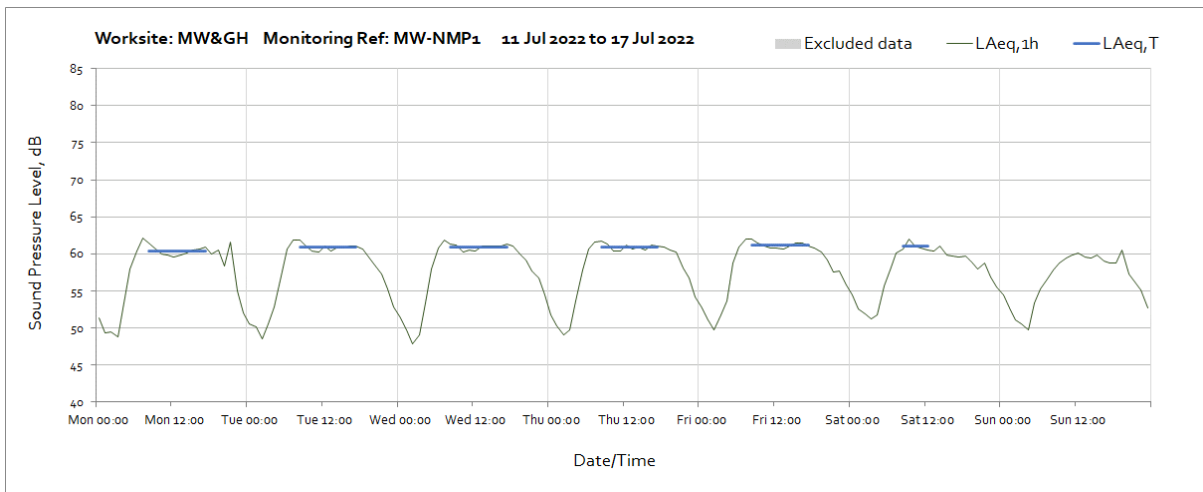
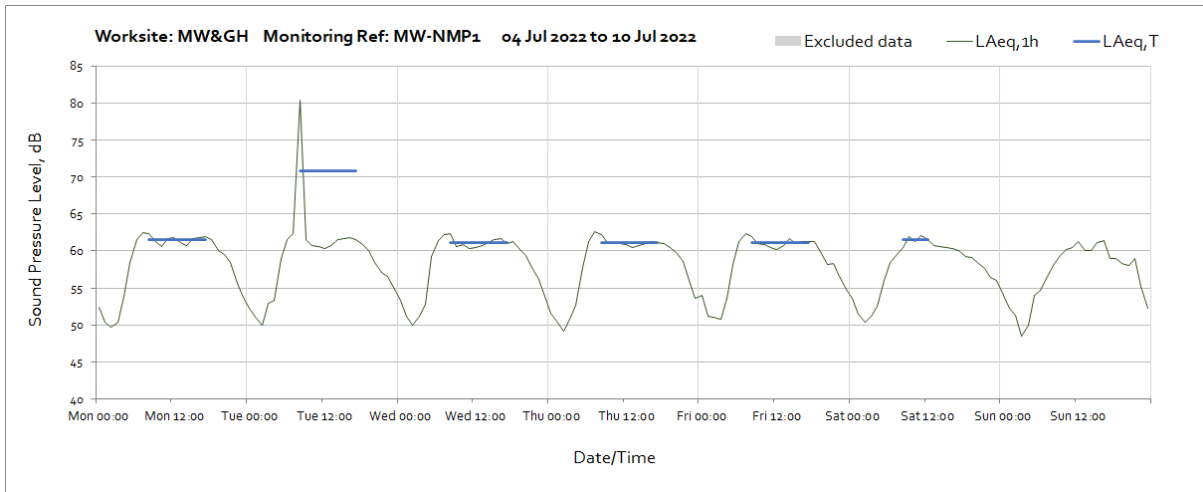
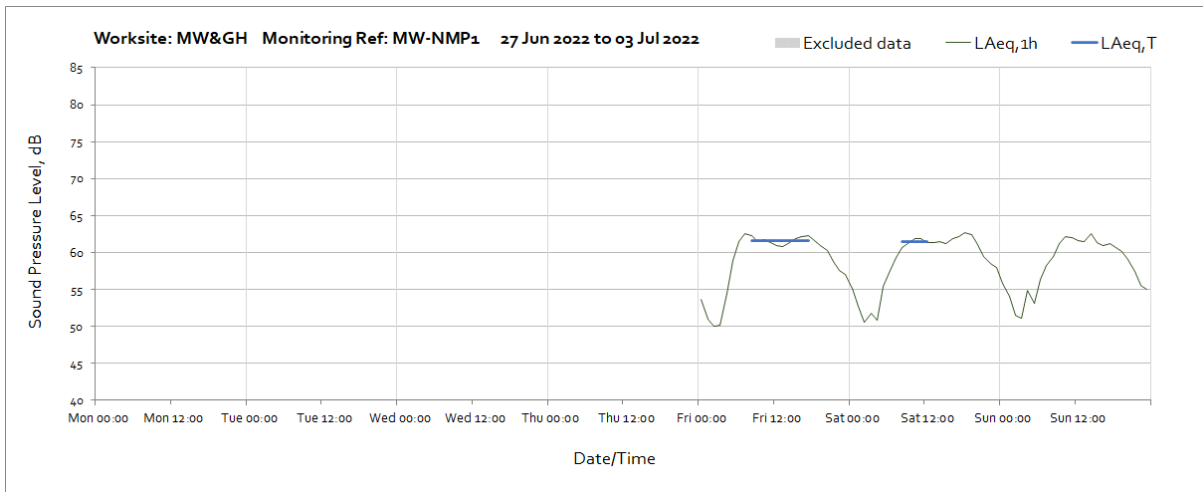


Note: Missing data between 11:00 and 12:00 on the 22<sup>nd</sup> July was due to monitor maintenance.

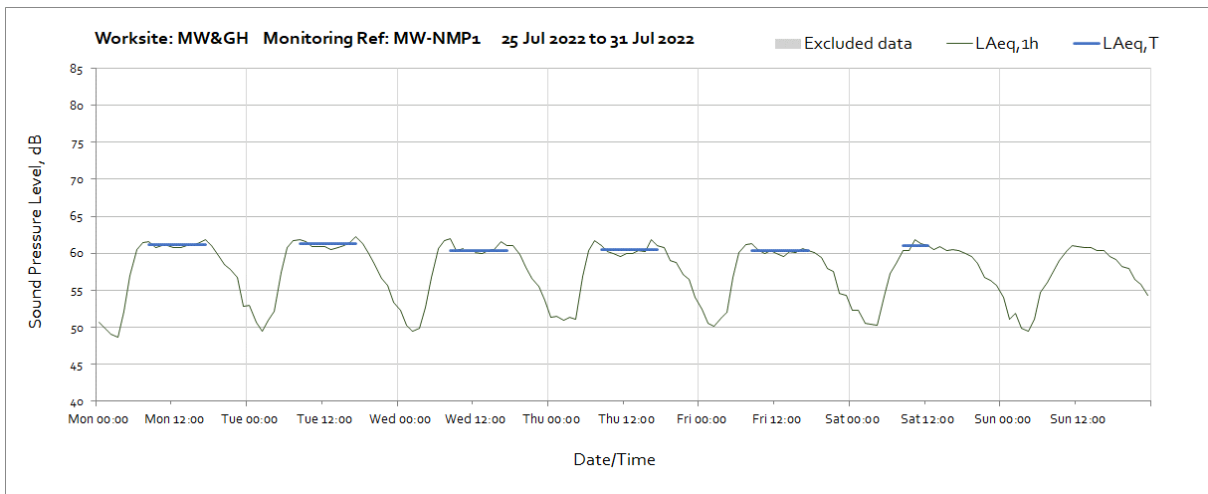
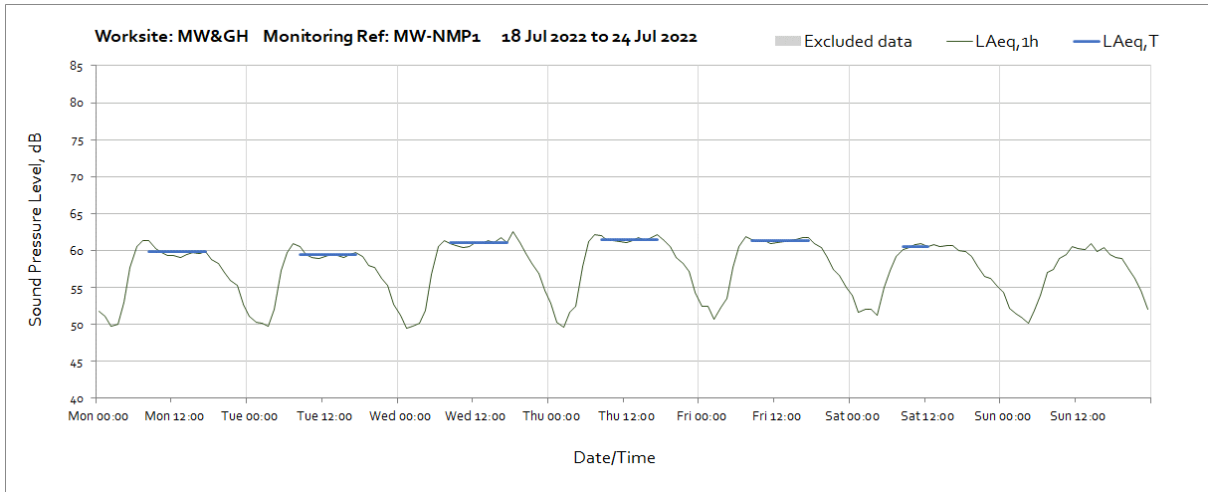


Note: Missing data between 10:00 and 11:00 on the 27<sup>th</sup> July was due to monitor maintenance.

## Worksite: MW&GH – Monitoring Ref: MW-NMP1

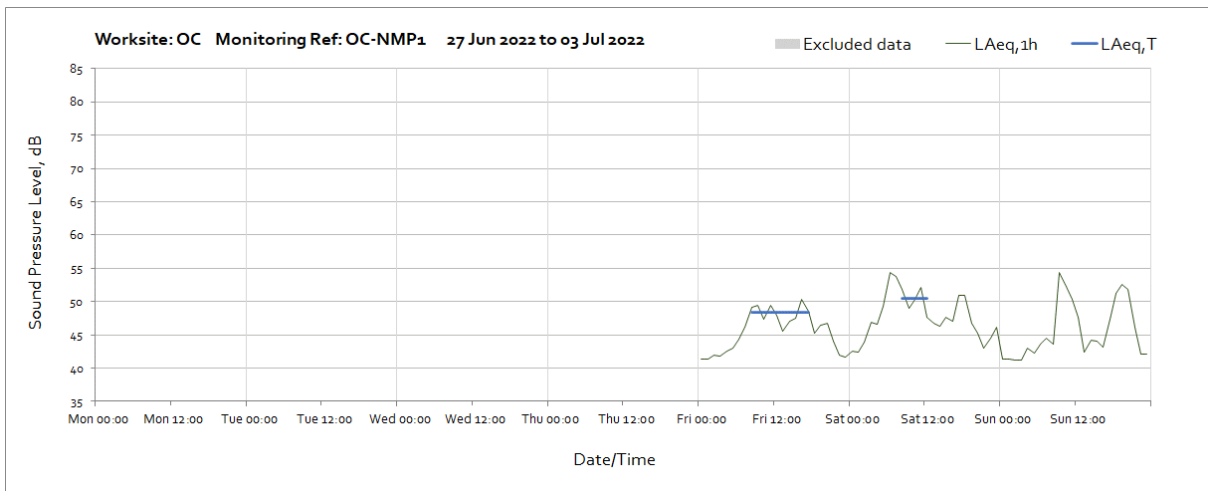


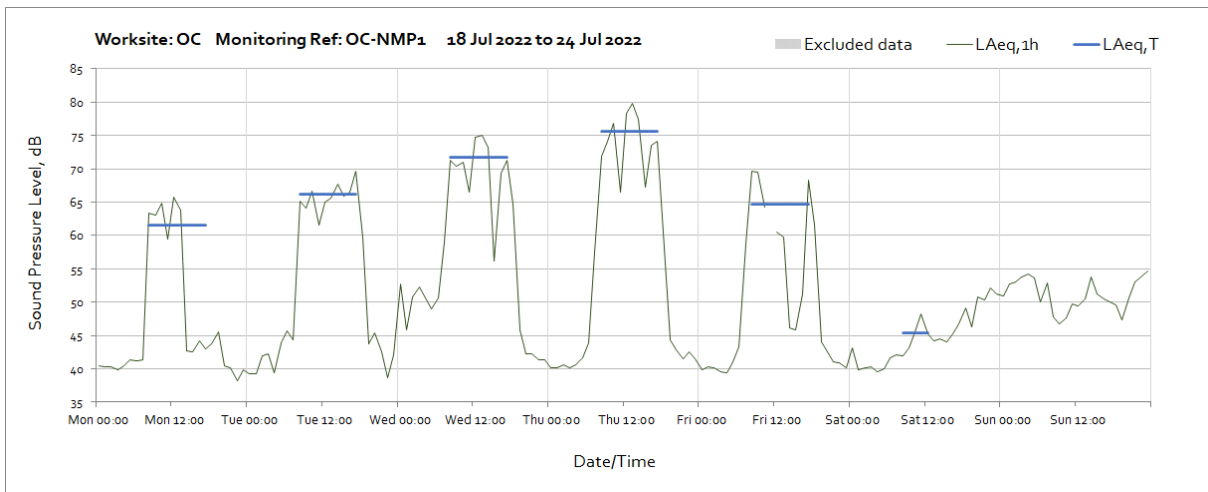
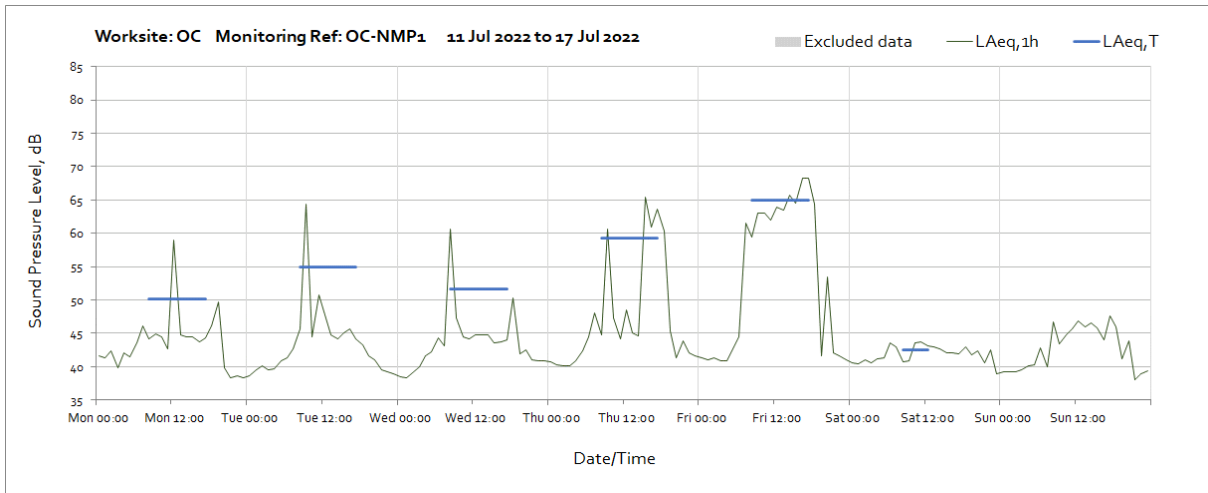
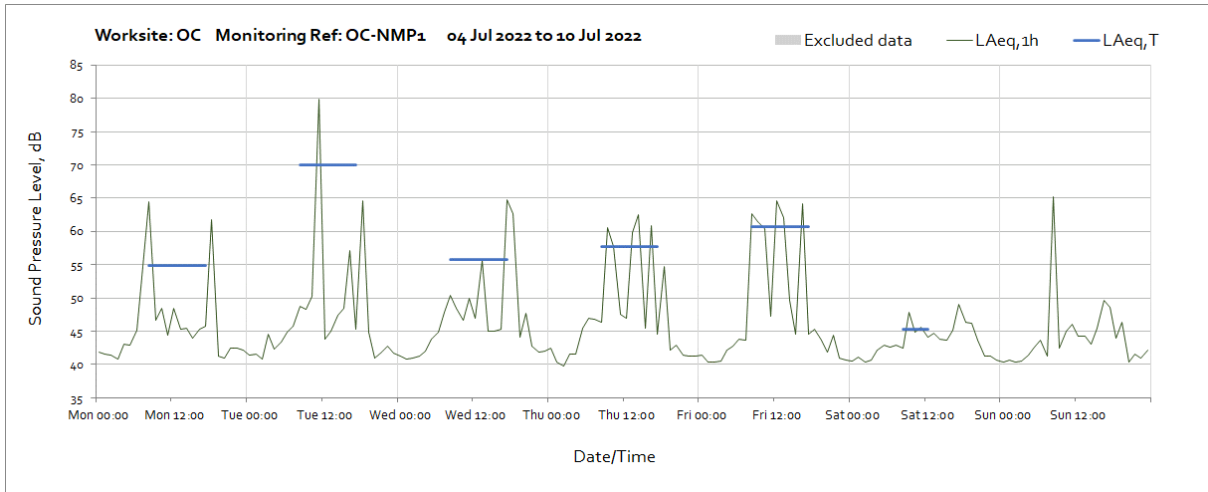




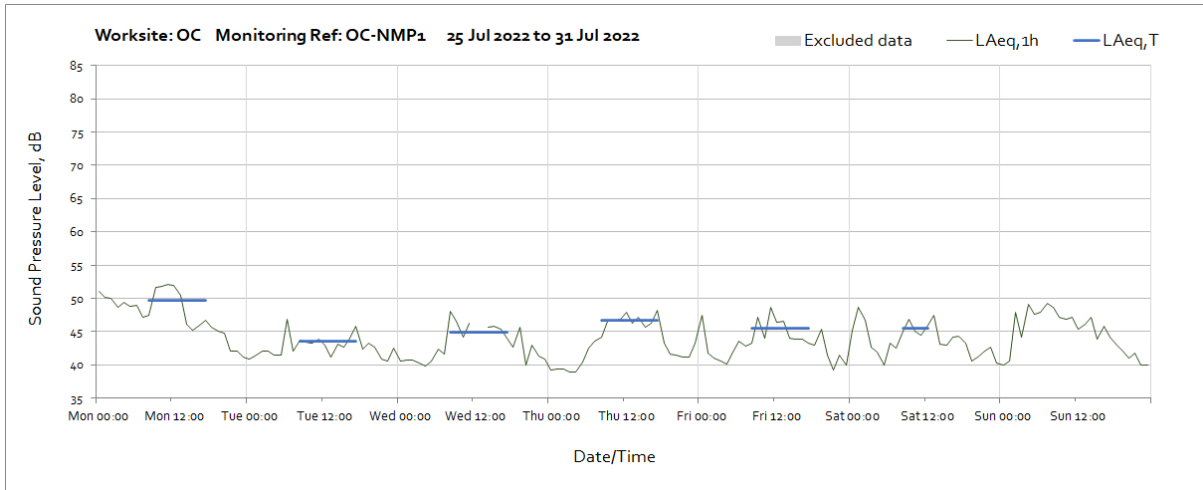
Note: Missing data between 11:00 and 12:00 on the 27<sup>th</sup> July was due to monitor maintenance.

**Worksite: OC – Monitoring Ref: OC-NMP1**



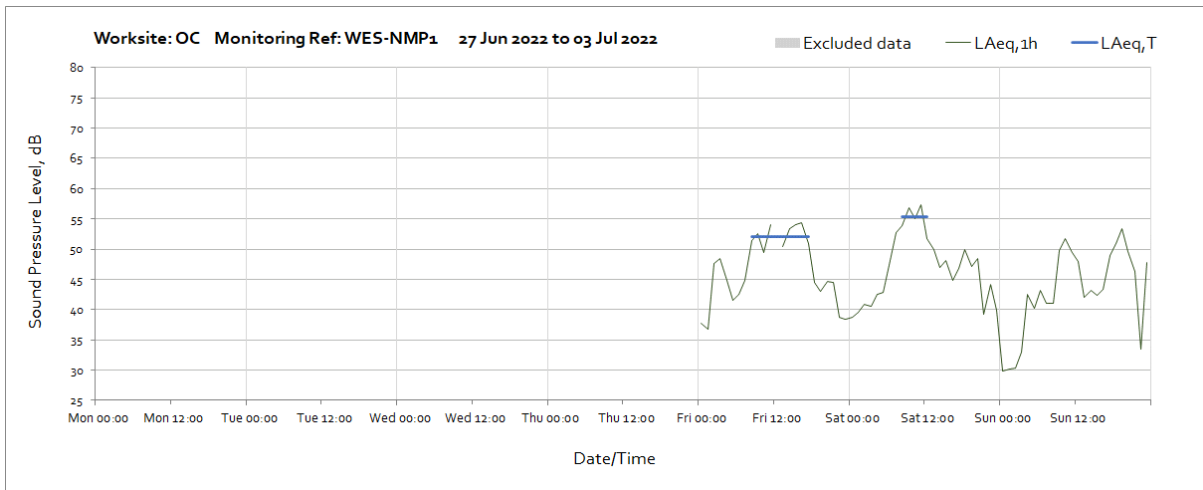


Note: Missing data between 11:00 and 12:00 on the 22<sup>nd</sup> July was due to monitor maintenance.

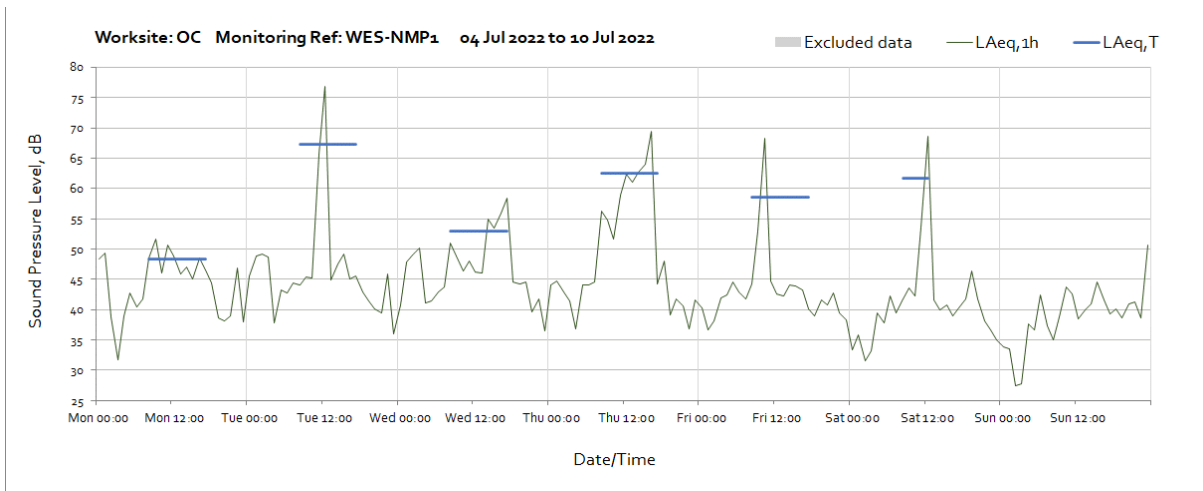


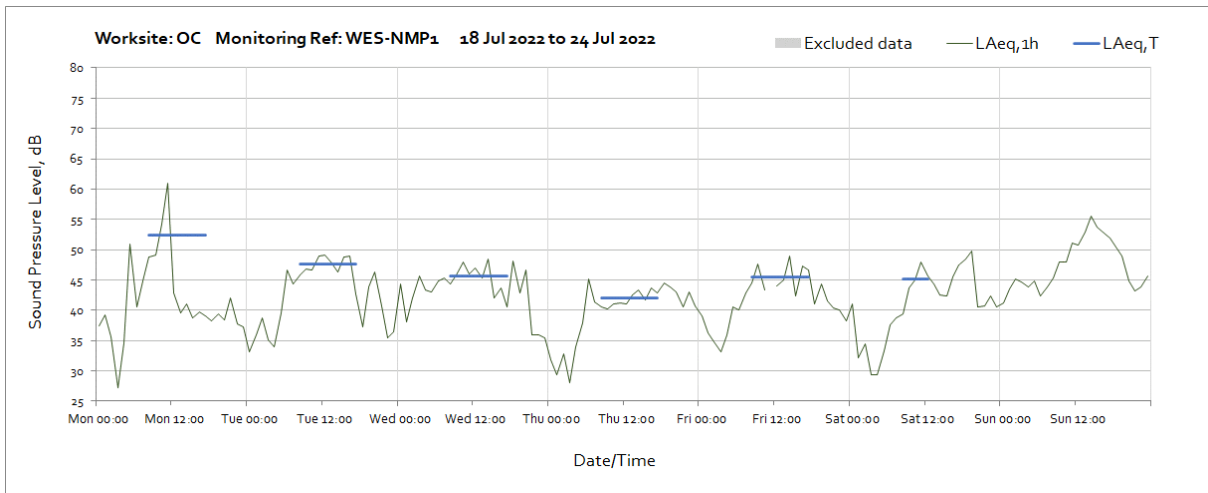
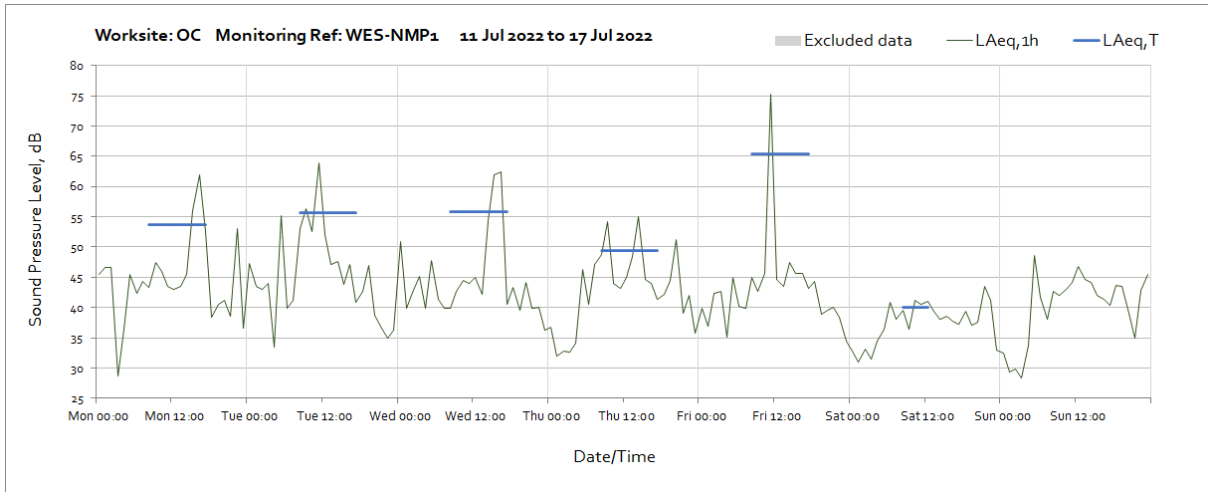
Note: Missing data between 12:00 and 14:00 on the 27<sup>th</sup> July was due to monitor maintenance.

**Worksite: OC – Monitoring Ref: WES-NMP1**

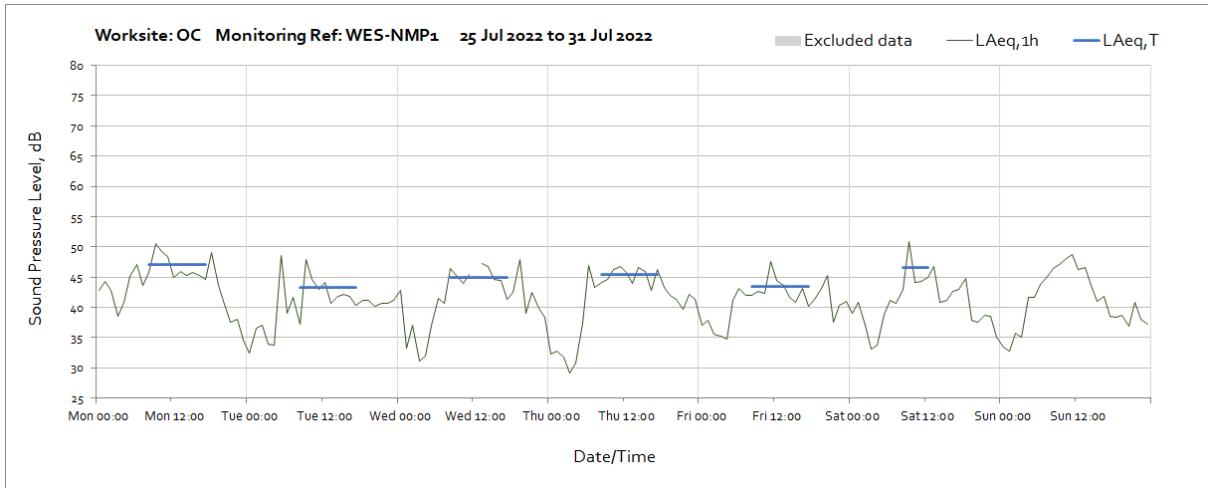


Note: Missing data between 12:00 and 13:00 on the 1<sup>st</sup> July was due to loss of power to the monitor.



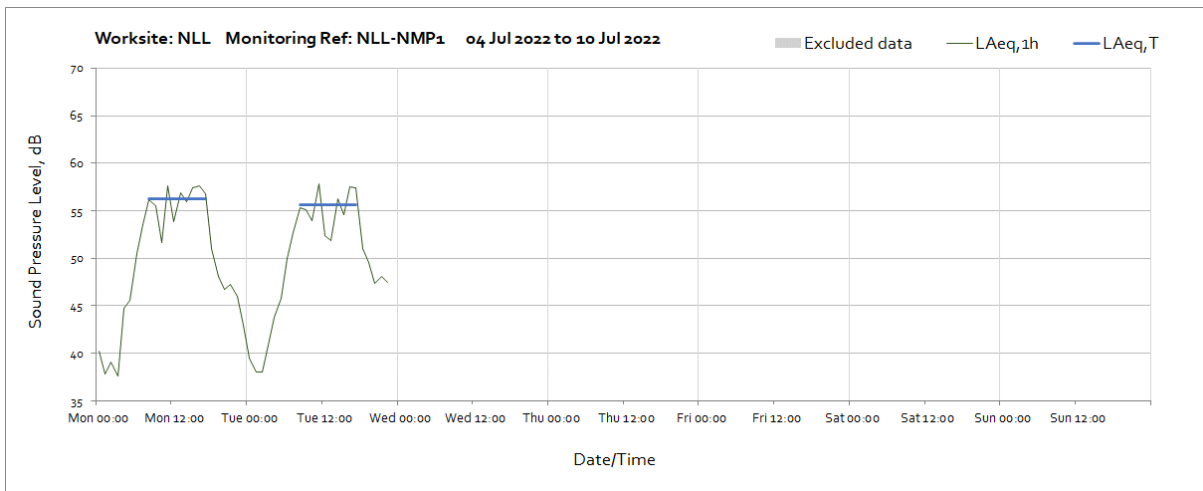
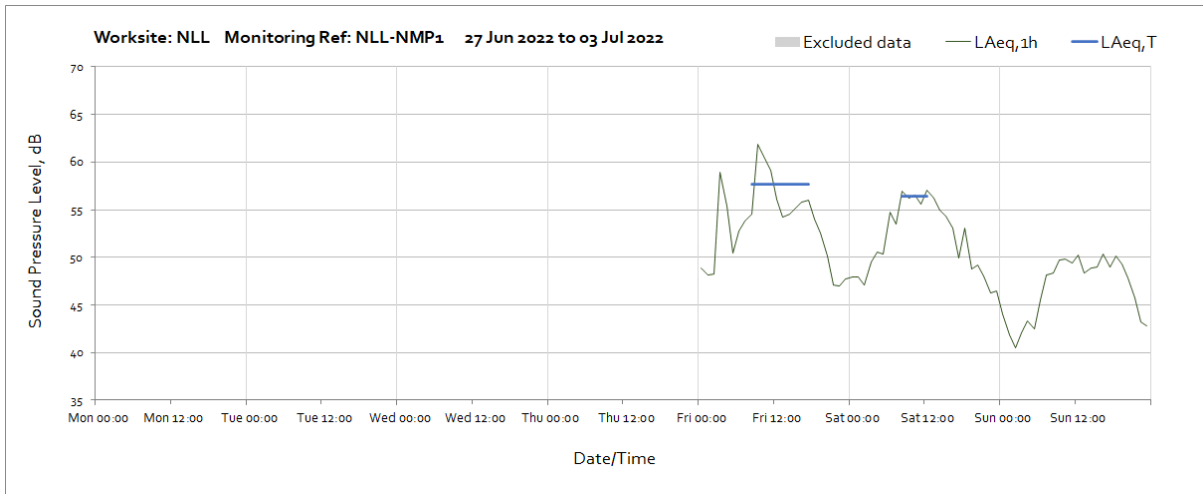


Note: Missing data between 11:00 and 12:00 on the 22<sup>nd</sup> July was due to monitor maintenance.



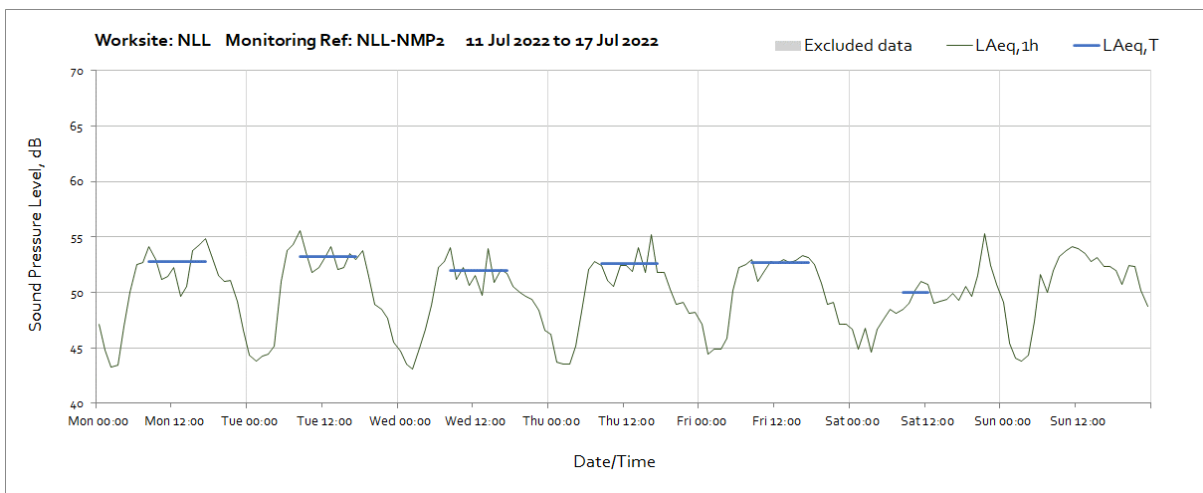
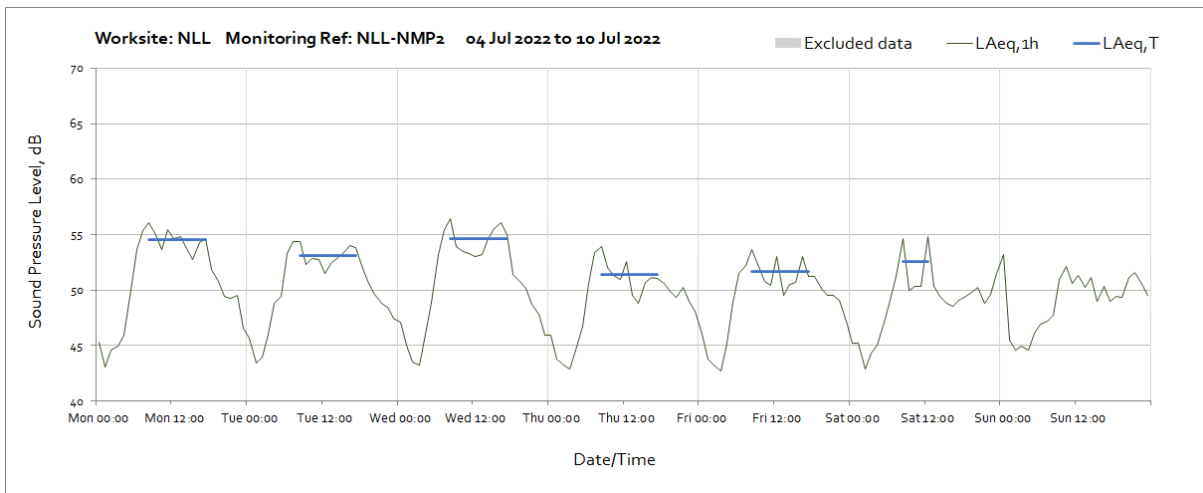
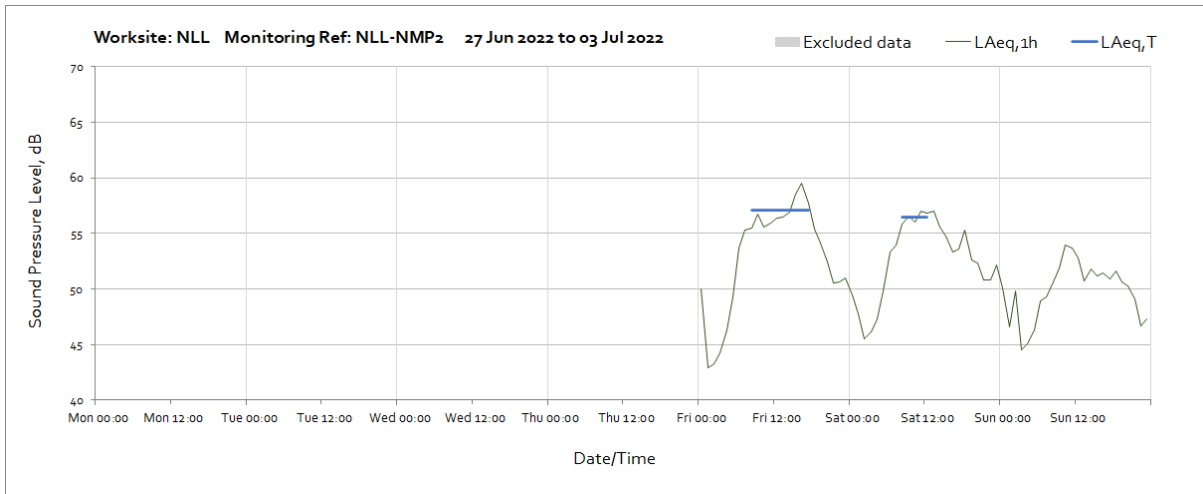
Note: Missing data between 12:00 and 13:00 on the 27<sup>th</sup> July was due to monitor maintenance.

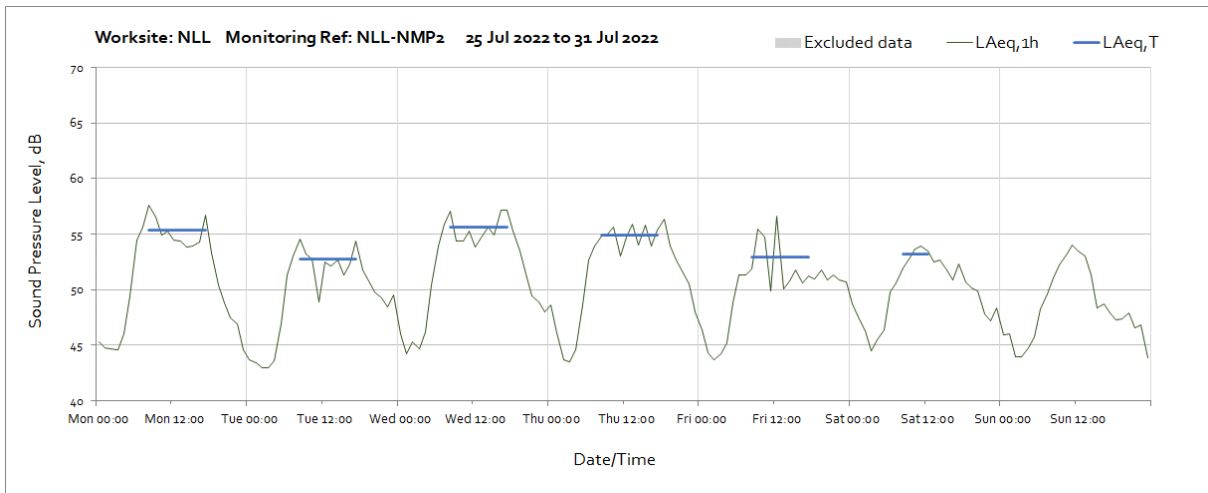
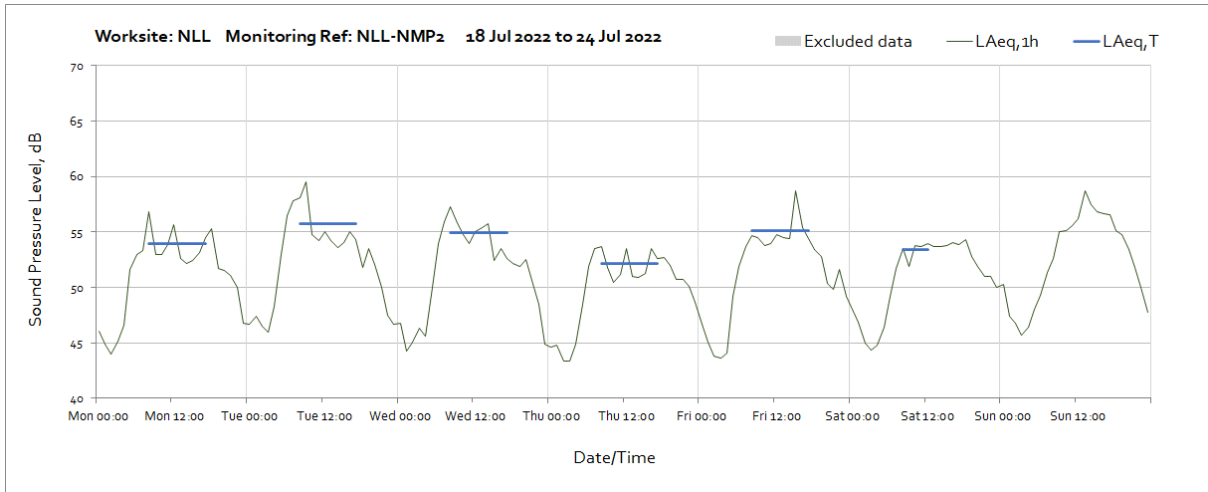
## Worksite: NLL – Monitoring Ref: NLL-NMP1



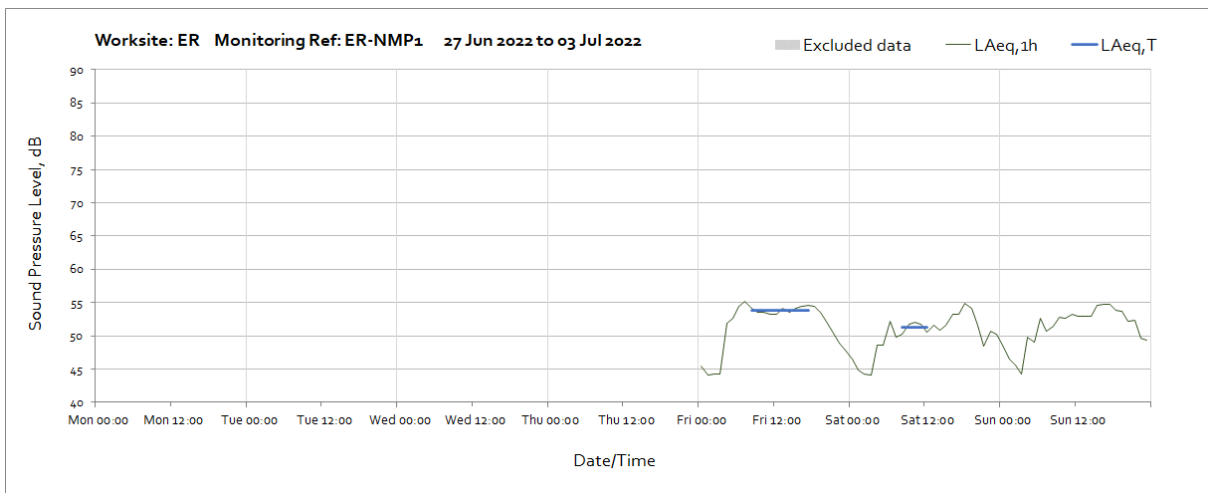
Note: Missing data from 23:00 on the 5<sup>th</sup> July due to severed solar panel cable, the supplier is sending a replacement.

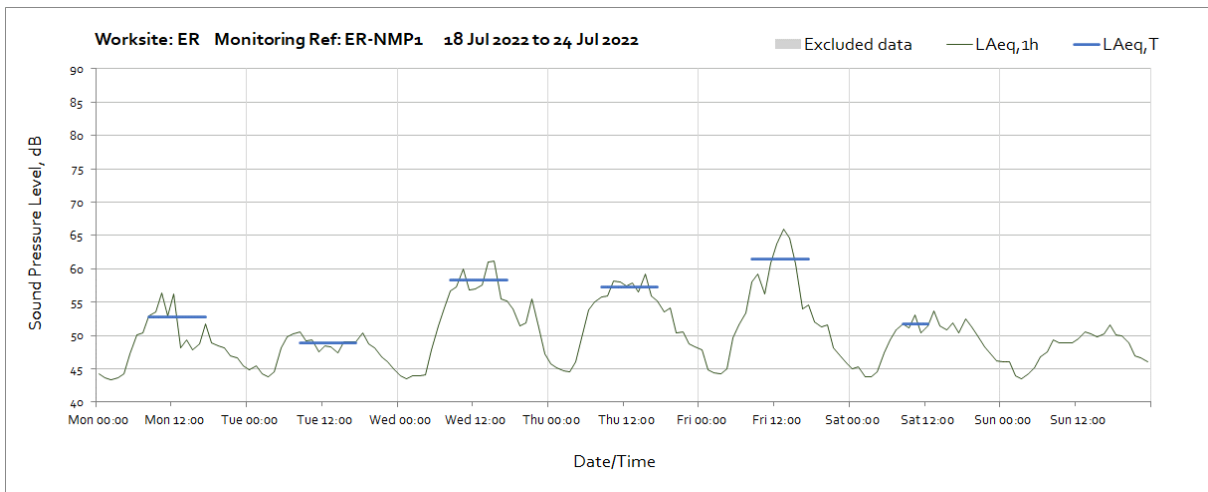
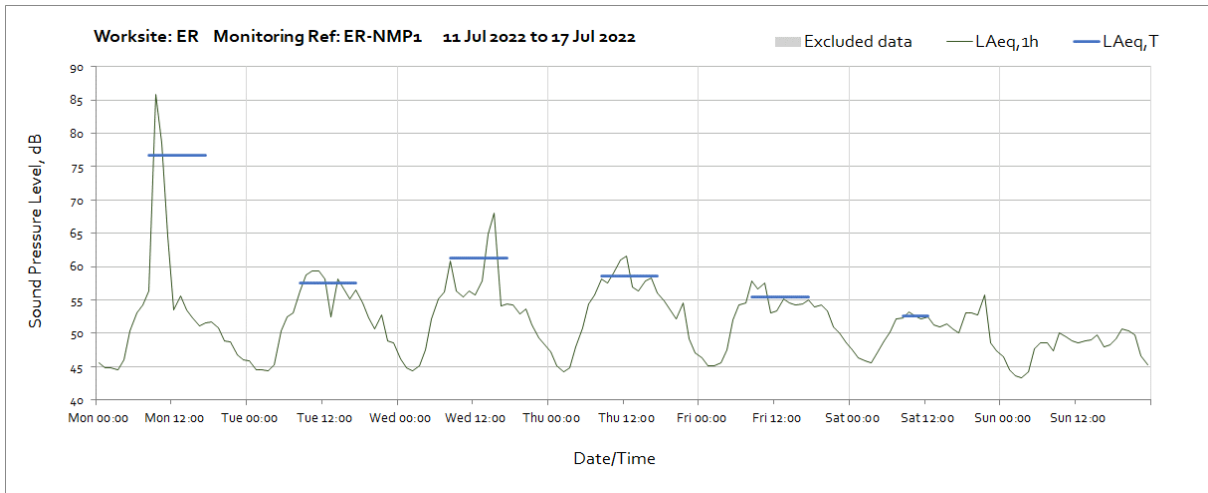
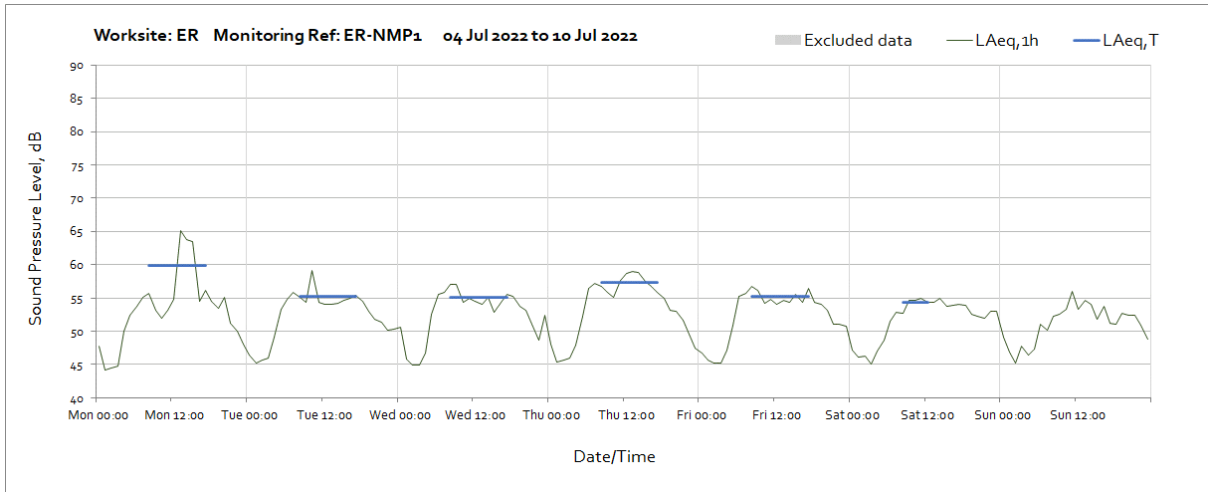
## Worksite: NLL – Monitoring Ref: NLL-NMP2



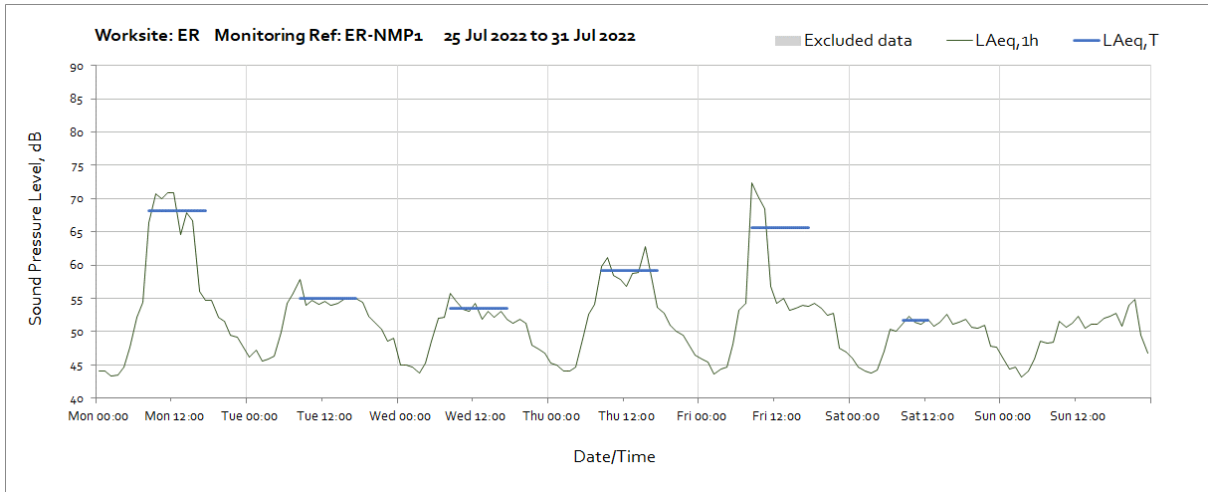


**Worksite: ER - Monitoring Ref: ER-NMP1**

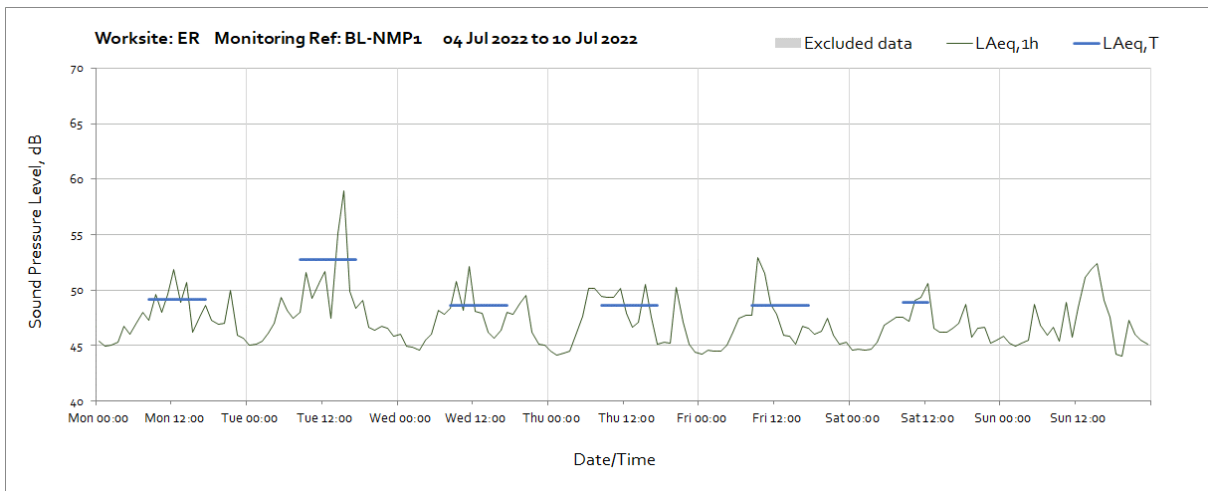
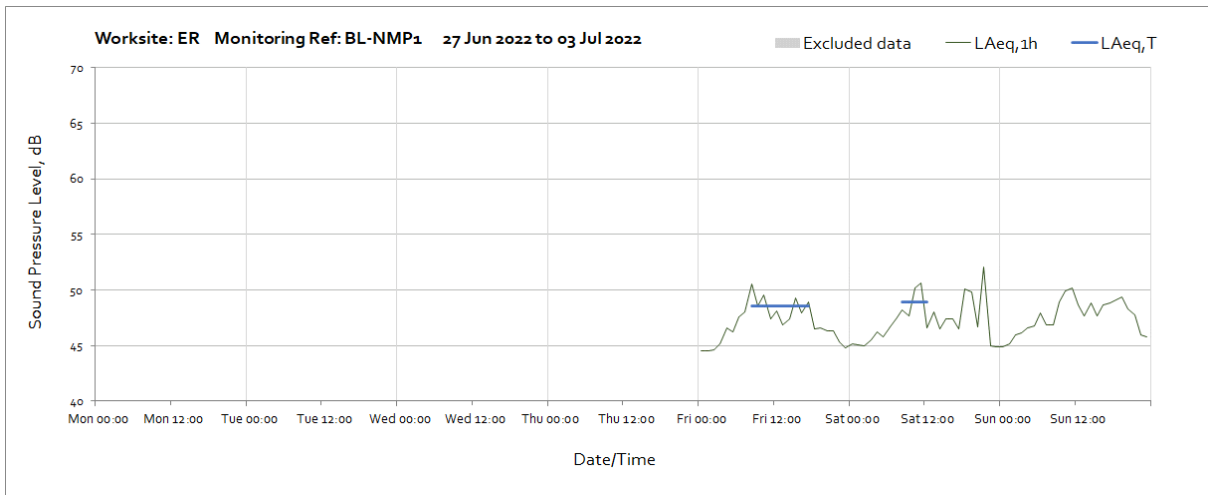


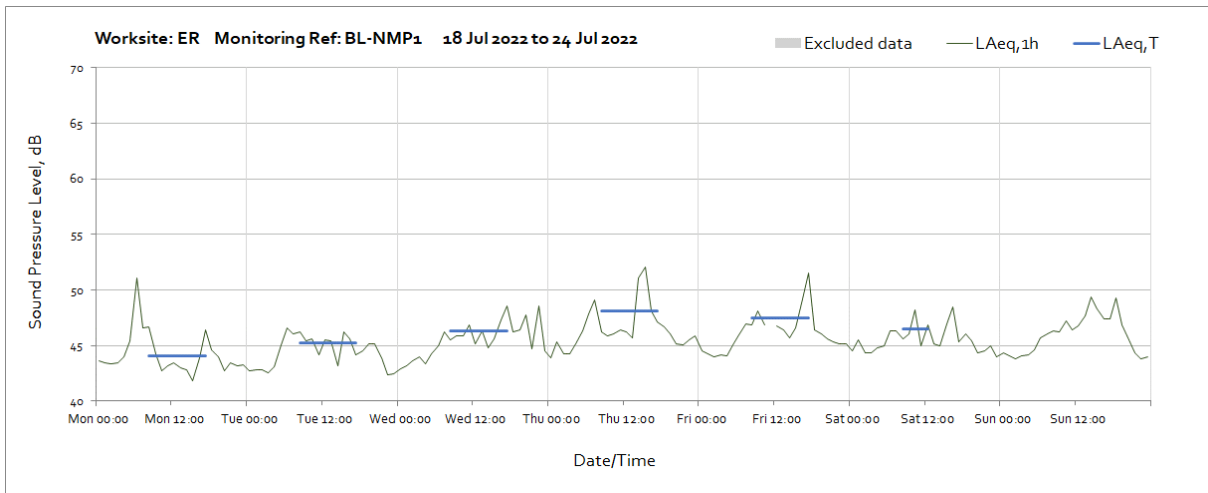
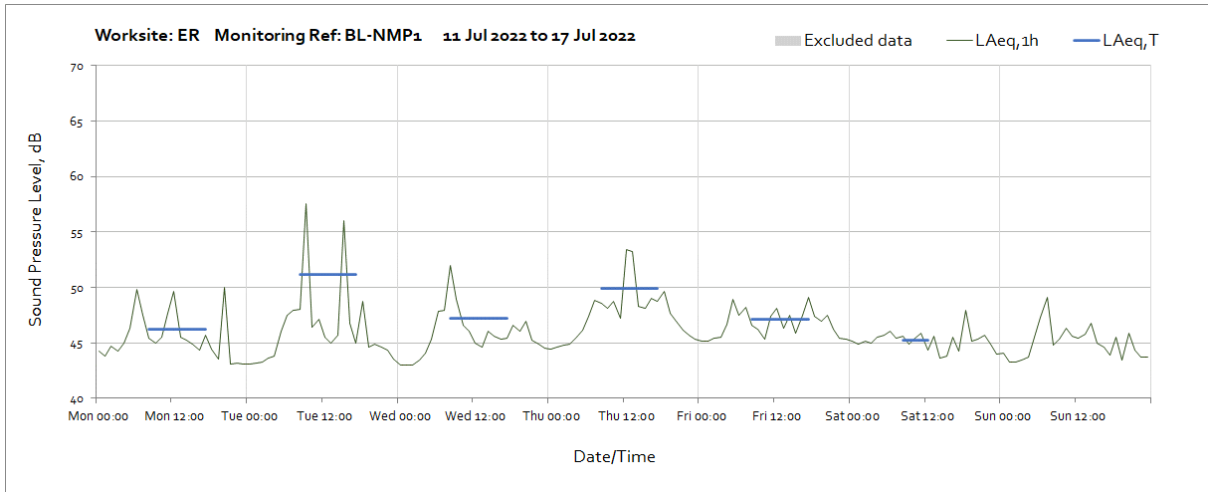




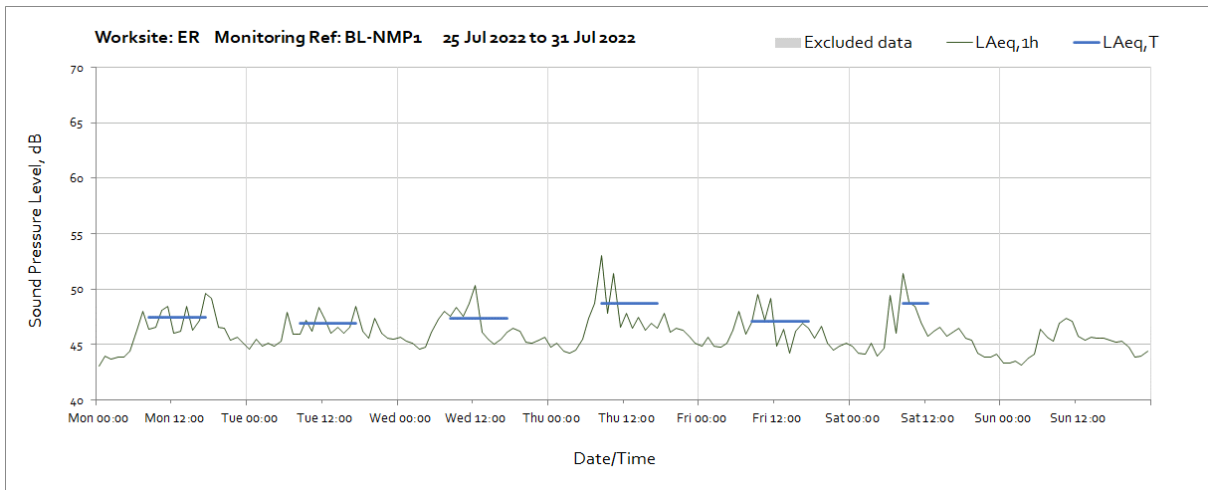


**Worksite: ER – Monitoring Ref: BL-NMP1**

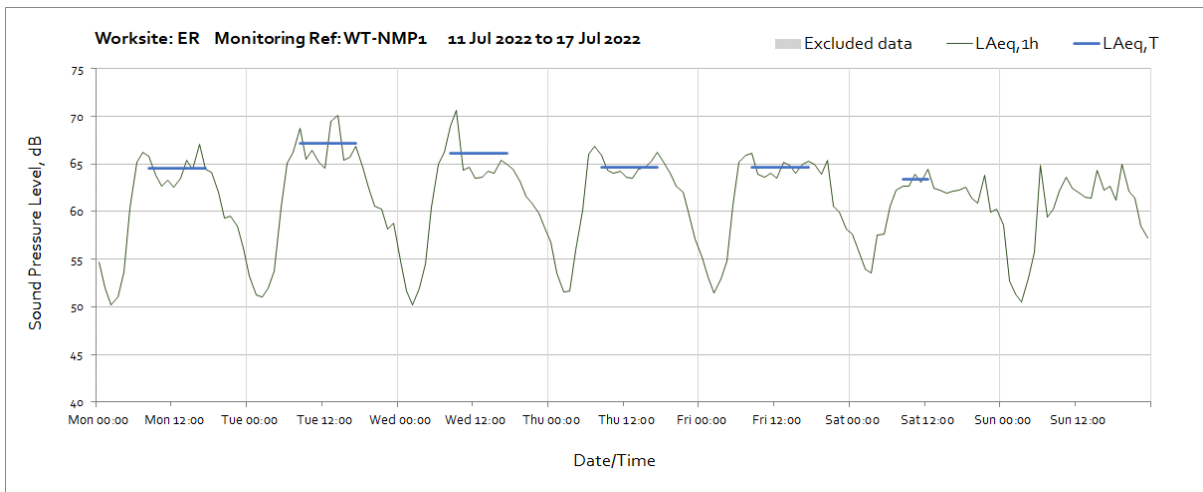
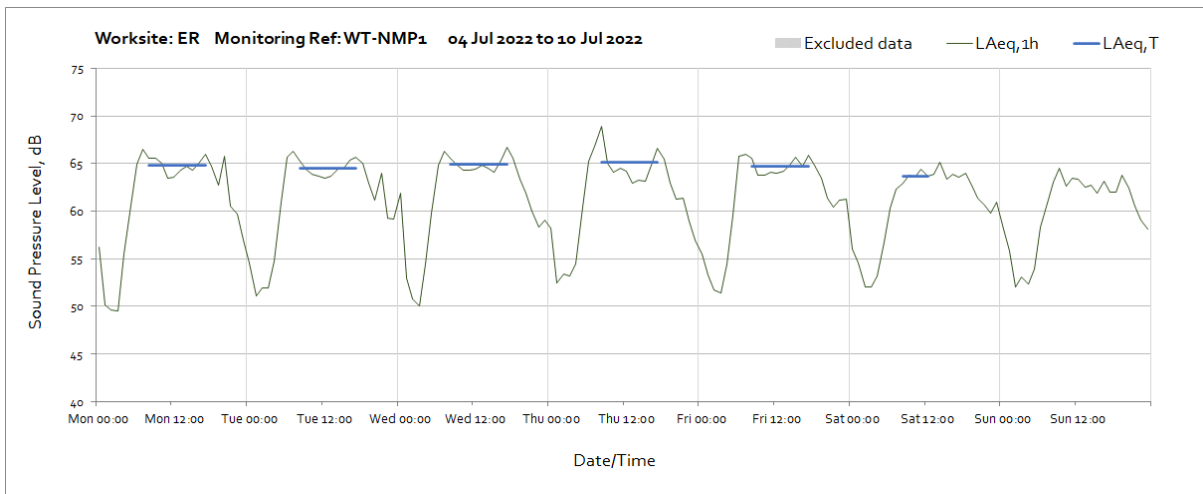
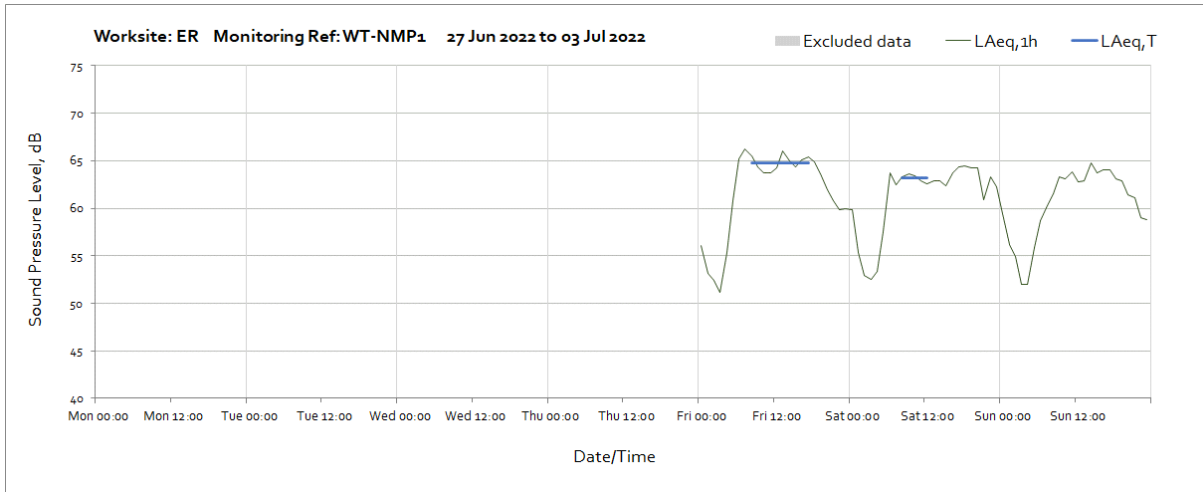




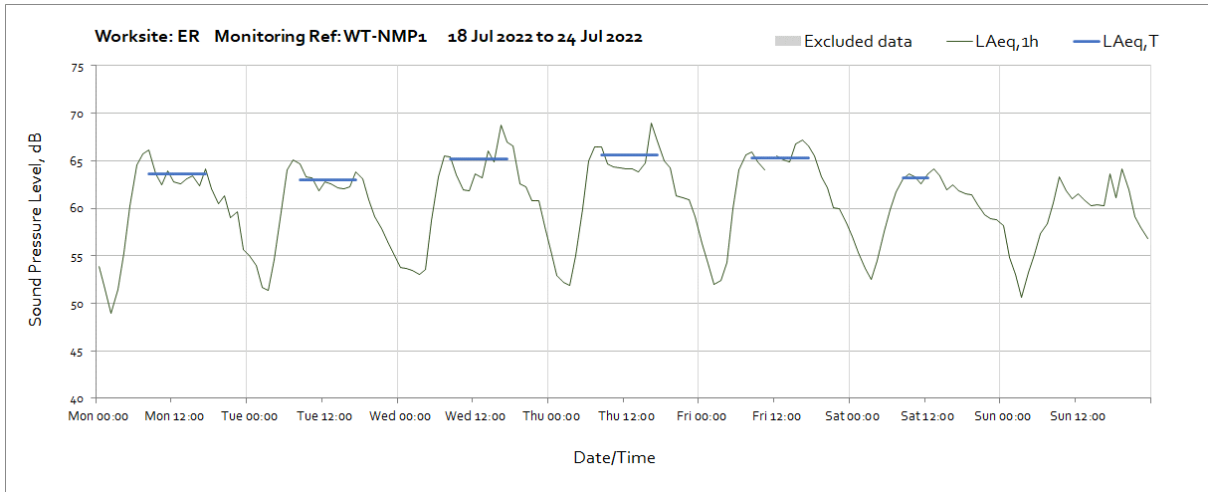
Note: Missing data between 11:00 and 12:00 on the 22<sup>nd</sup> July was due to monitor maintenance.



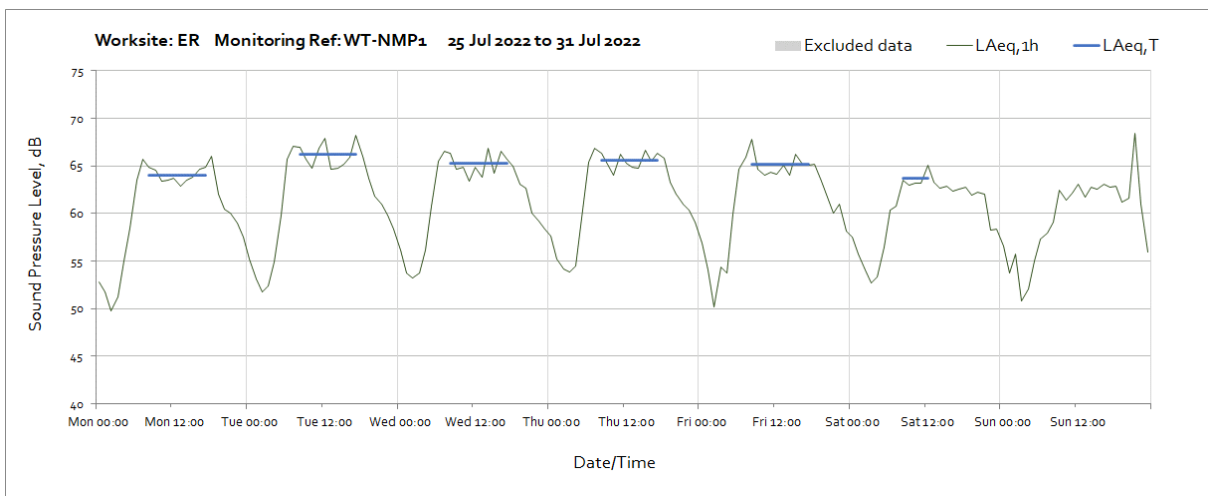
## Worksite: ER – Monitoring Ref: WT-NMP1



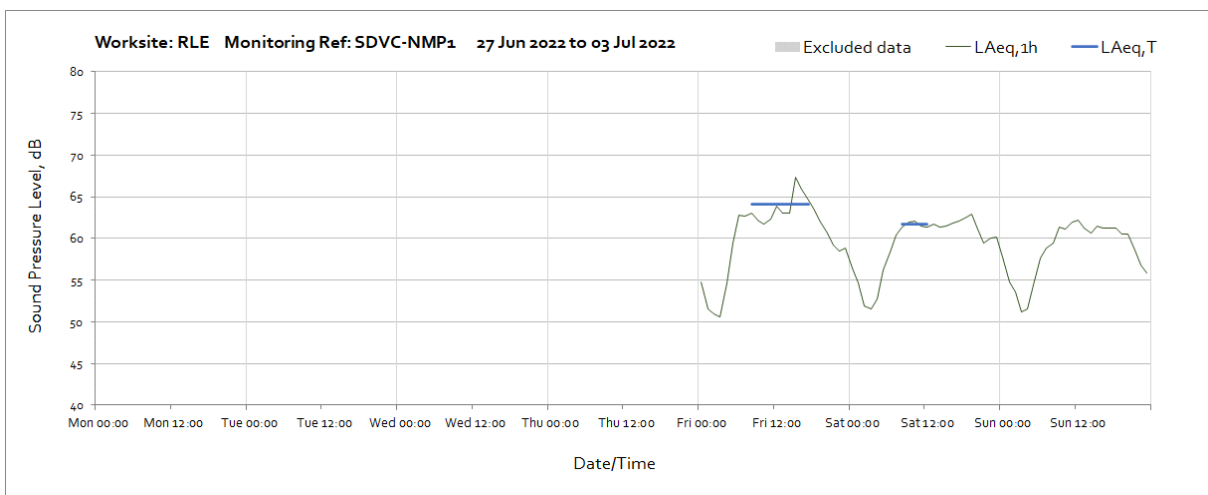
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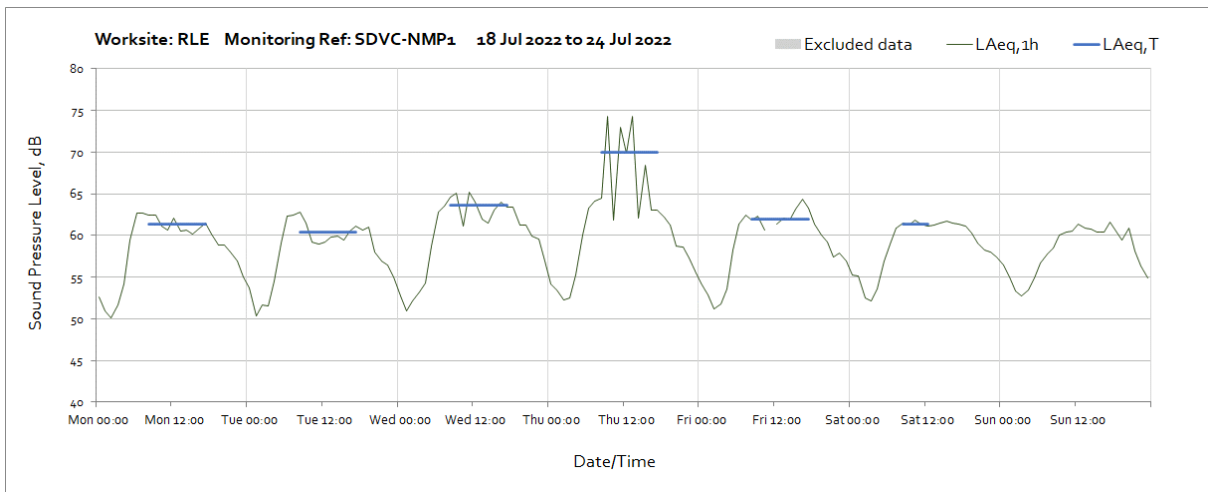
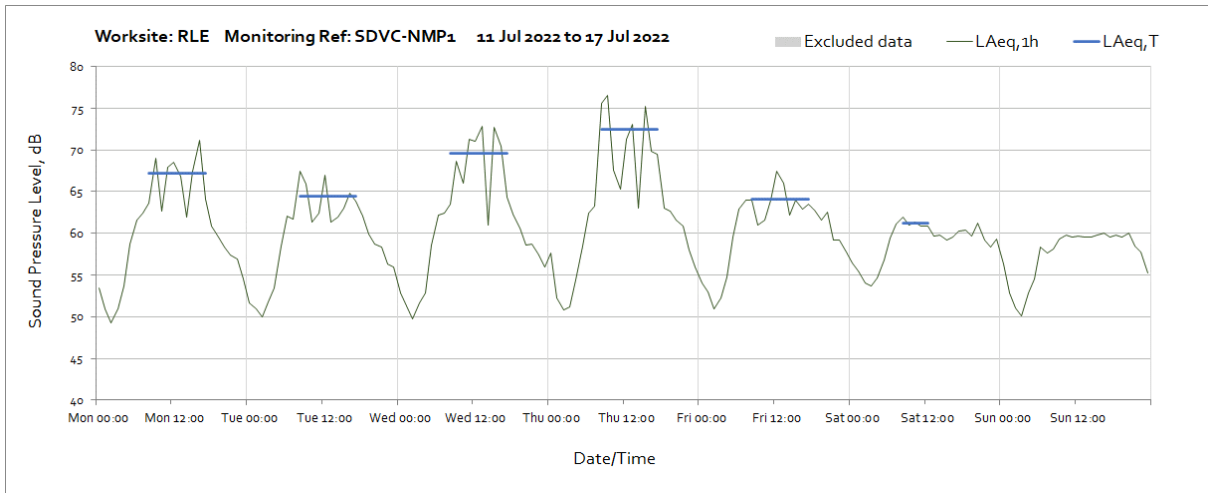
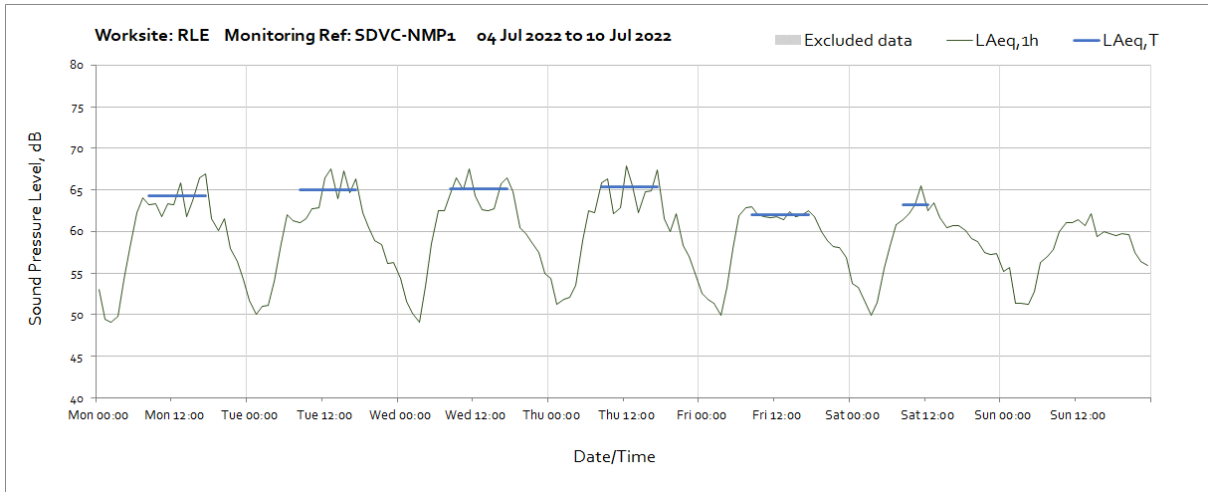


Note: Missing data between 11:00 and 12:00 on the 22<sup>nd</sup> July was due to monitor maintenance.

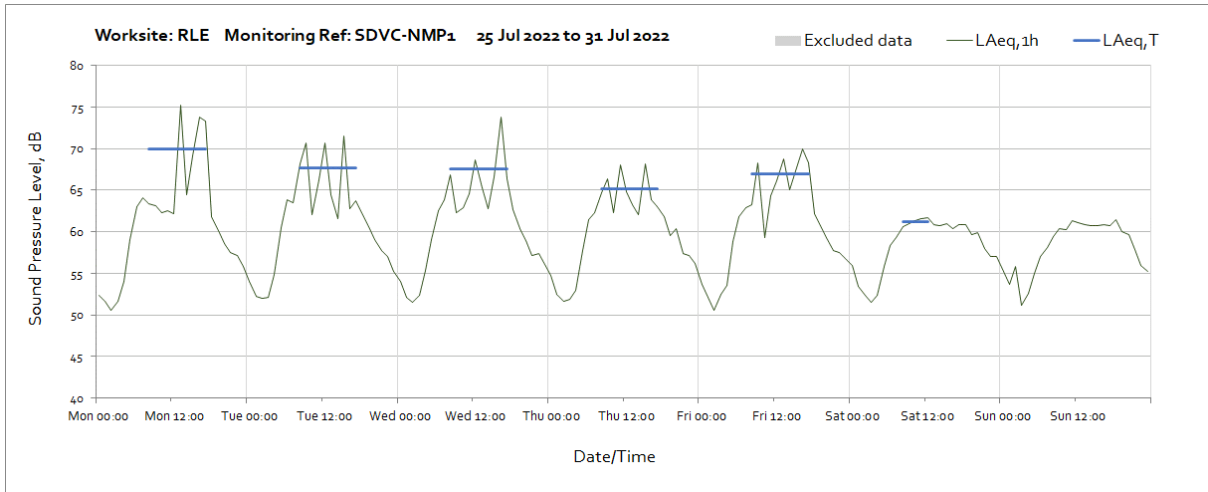


**Worksite: RLE - Monitoring Ref: SDVC-NMP1**

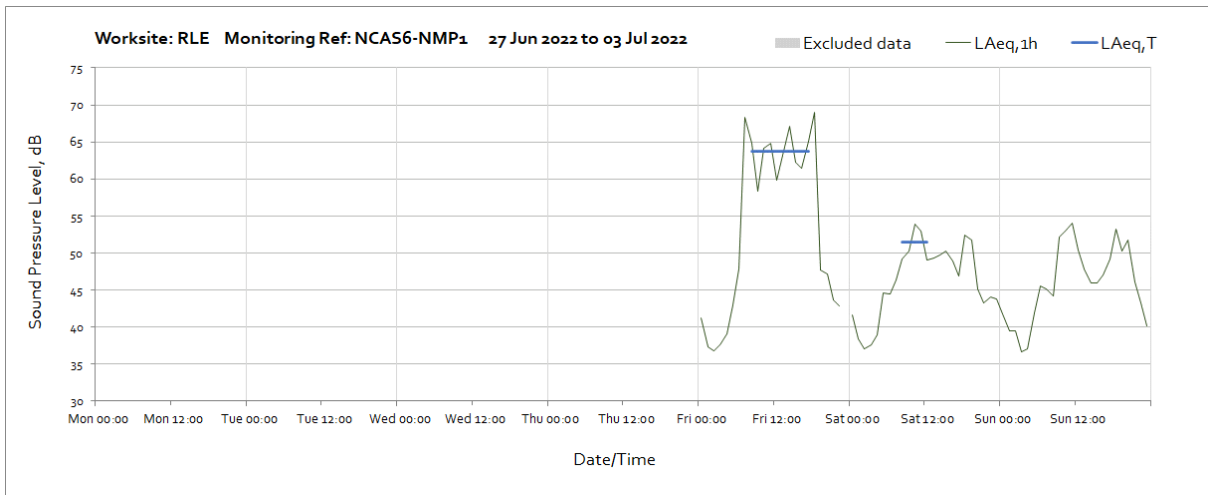




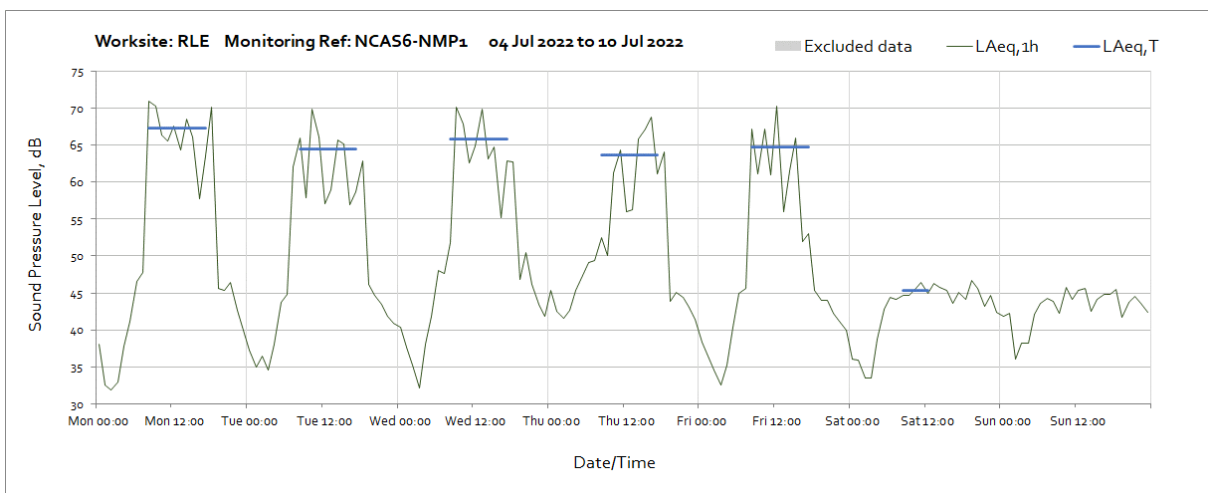
Note: Missing data between 11:00 and 12:00 on the 22<sup>nd</sup> July was due to monitor maintenance.

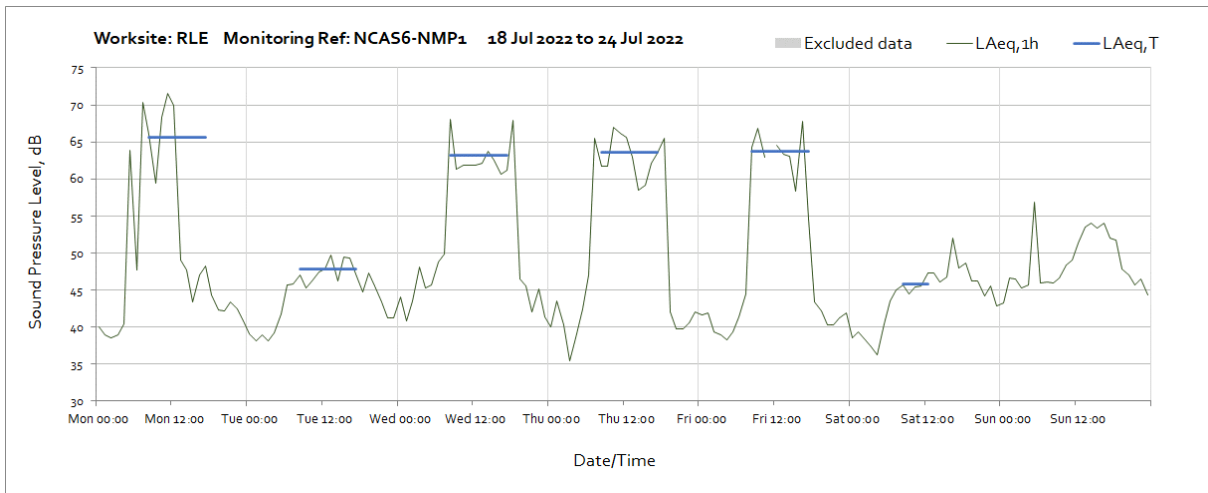
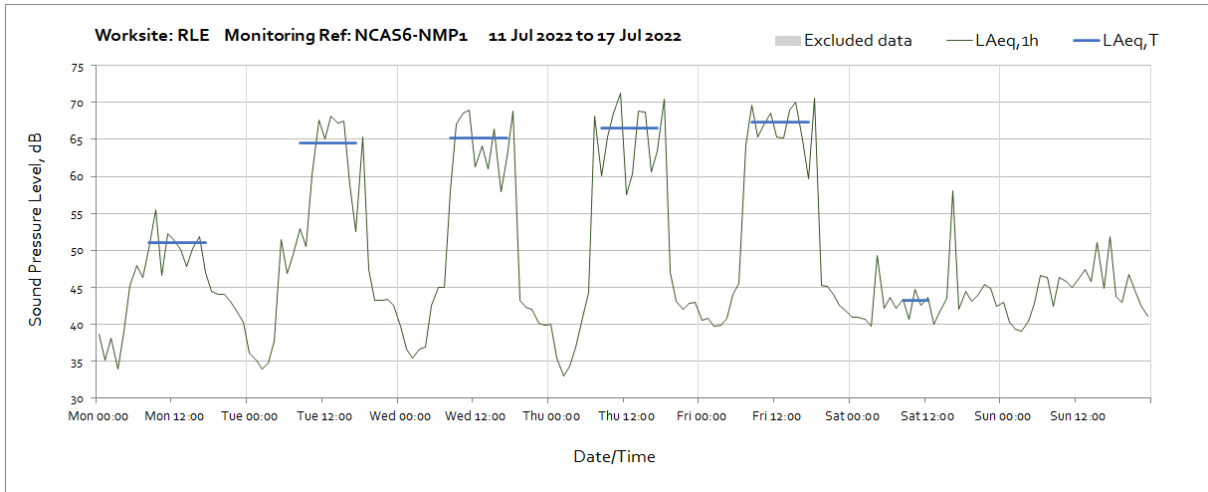


**Worksite: RLE – Monitoring Ref: NCAS6-NMP1**

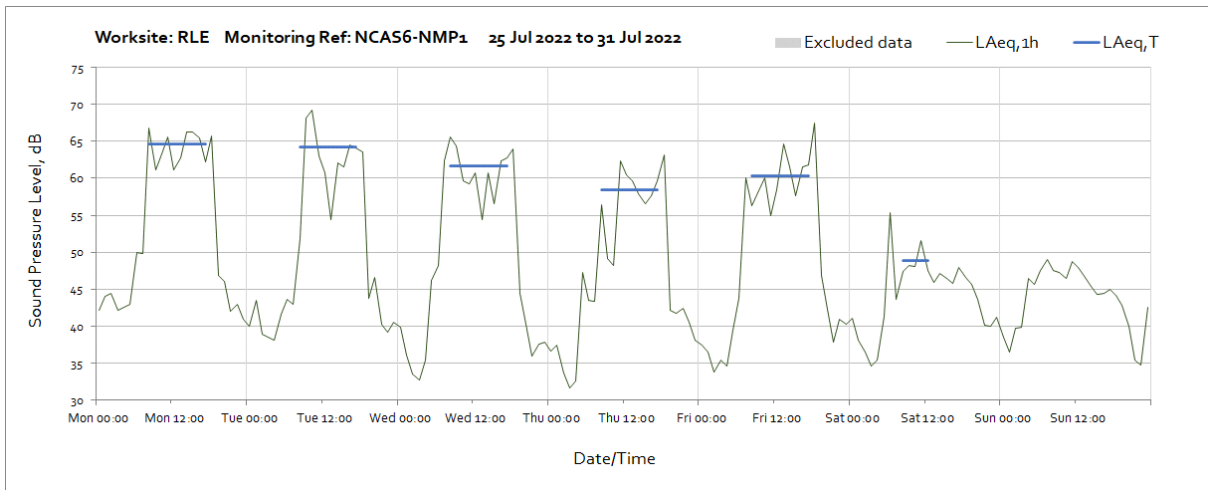


Note: Missing data between 23:00 and 00:00 on the 1<sup>st</sup> July was due to monitor maintenance.

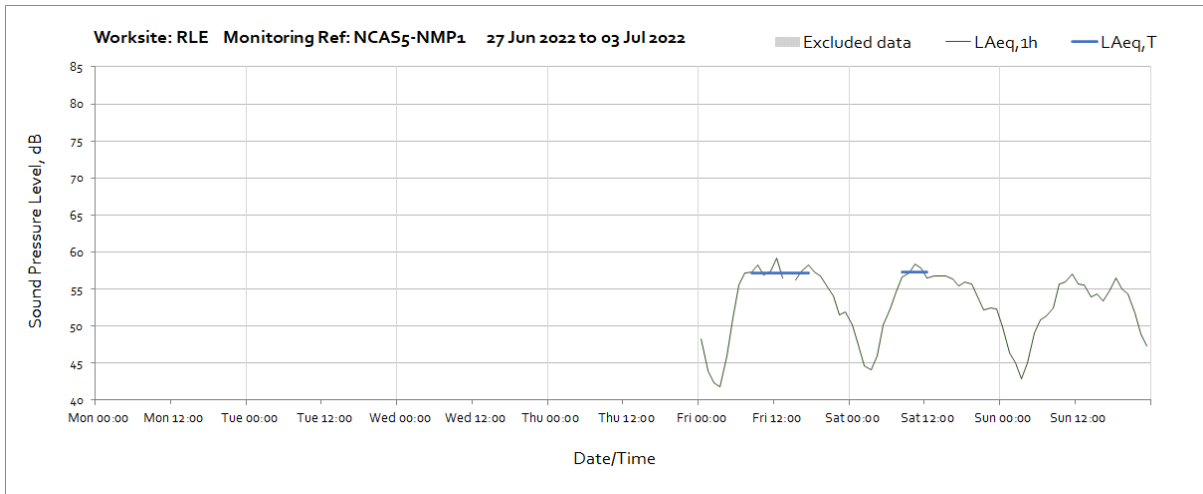




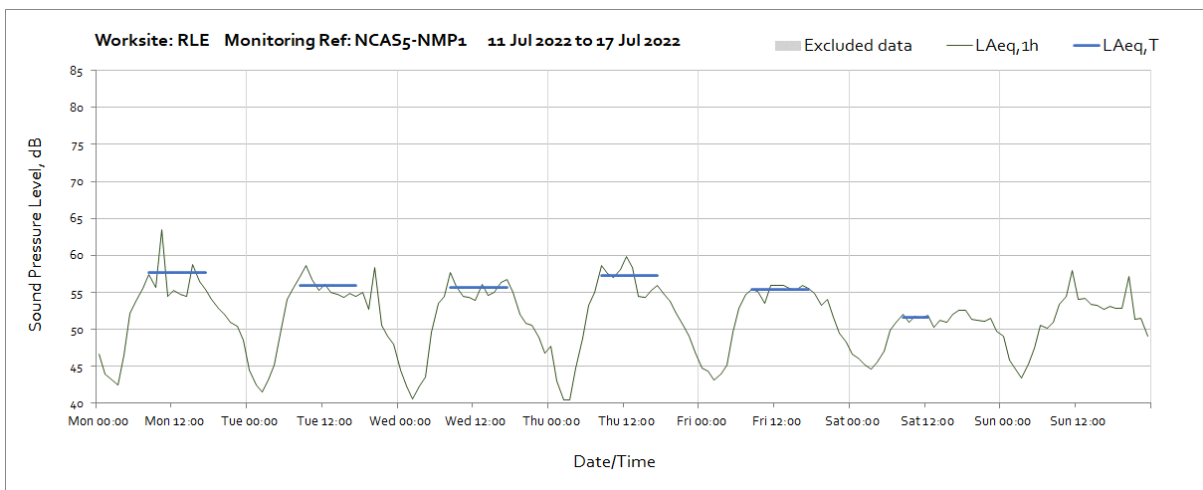
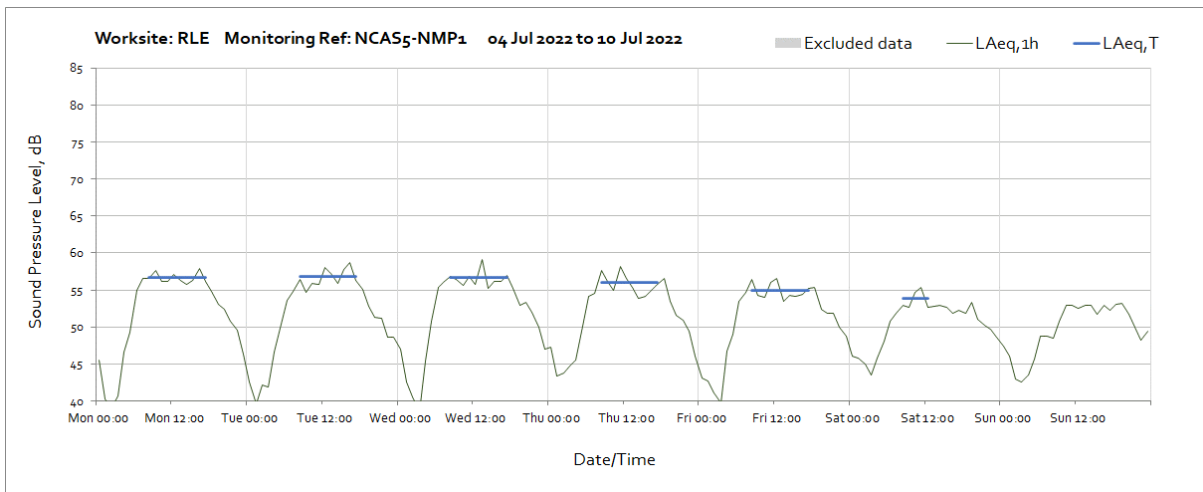
Note: Missing data between 11:00 and 12:00 on the 22<sup>nd</sup> July was due to monitor maintenance.



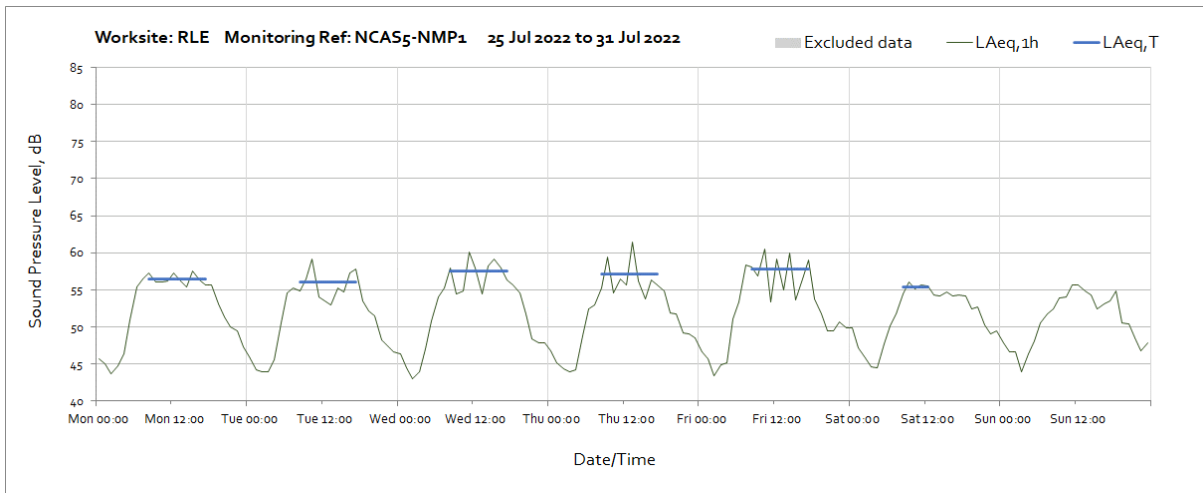
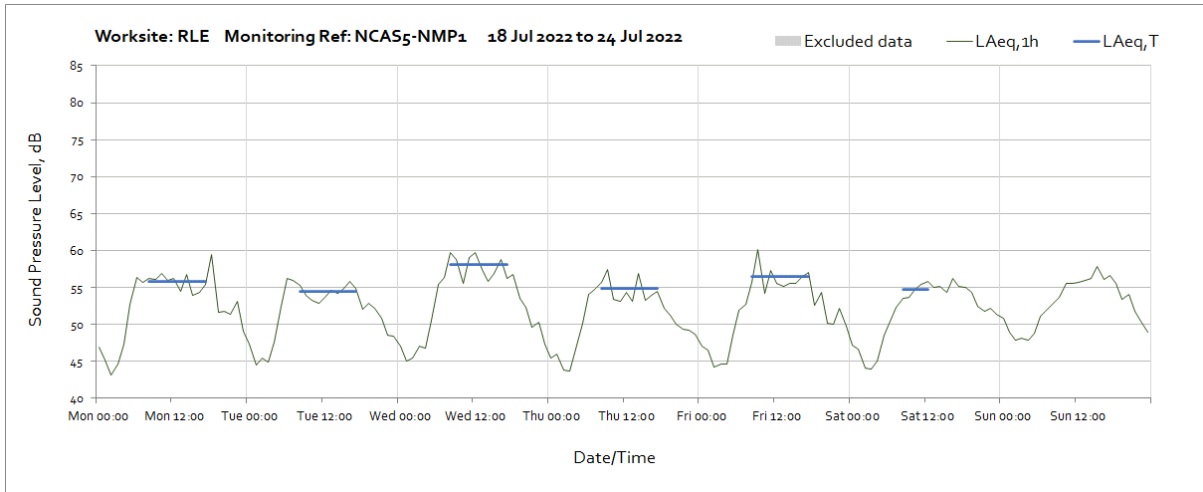
## Worksite: RLE – Monitoring Ref: NCAS5-NMP1



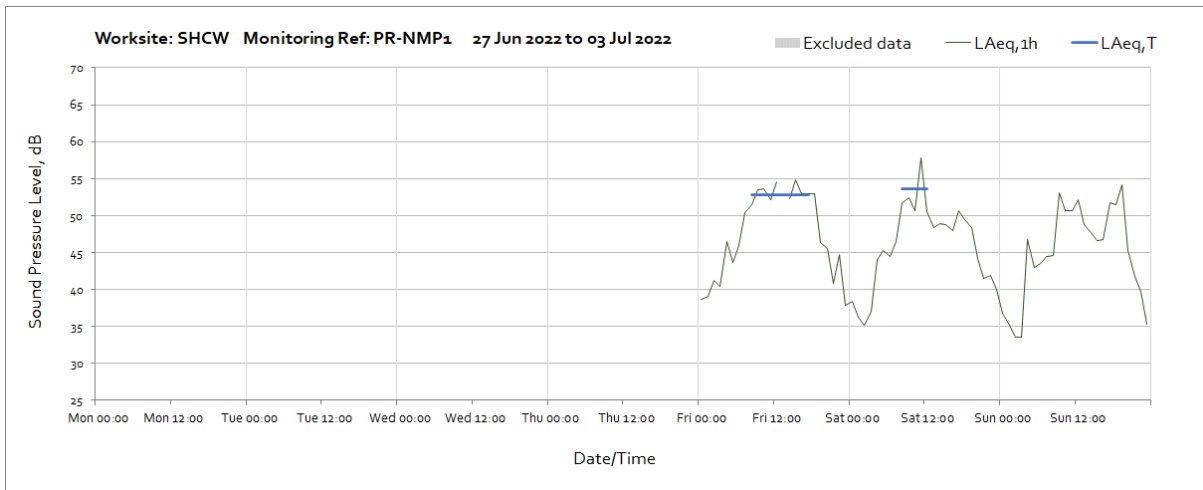
Note: Missing data between 14:00 and 15:00 on the 1<sup>st</sup> July was due to monitor maintenance.



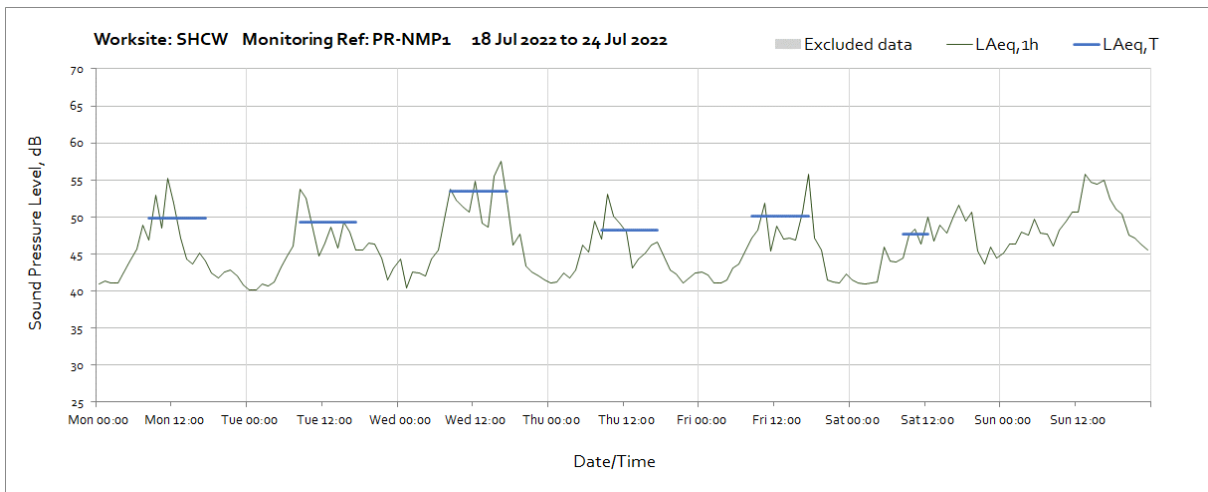
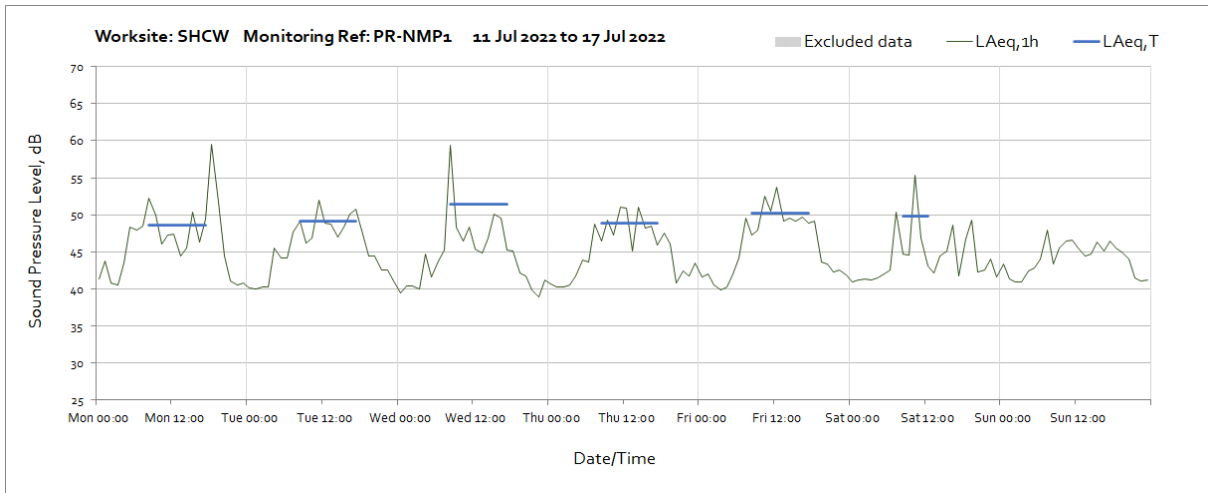
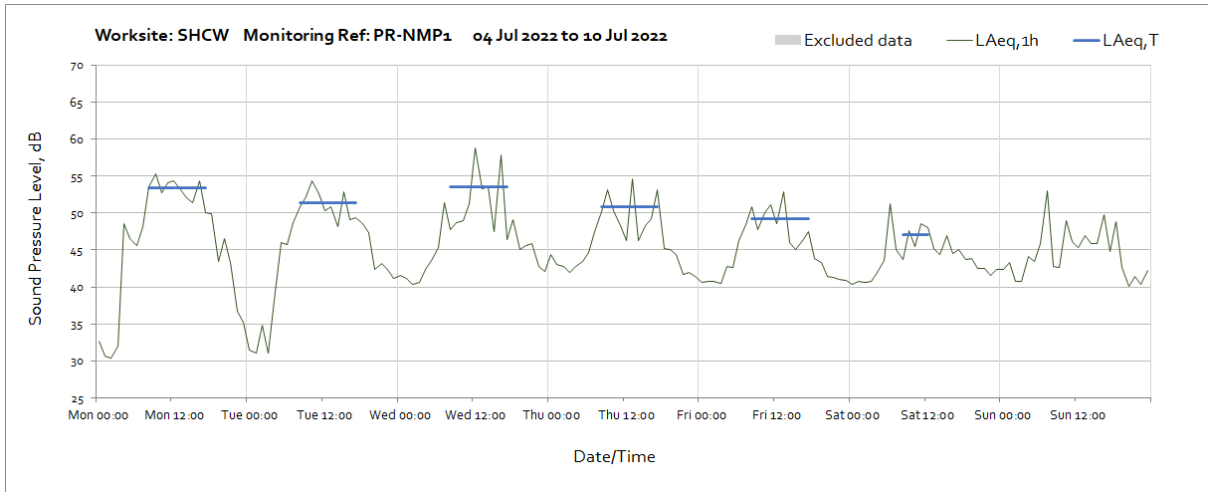


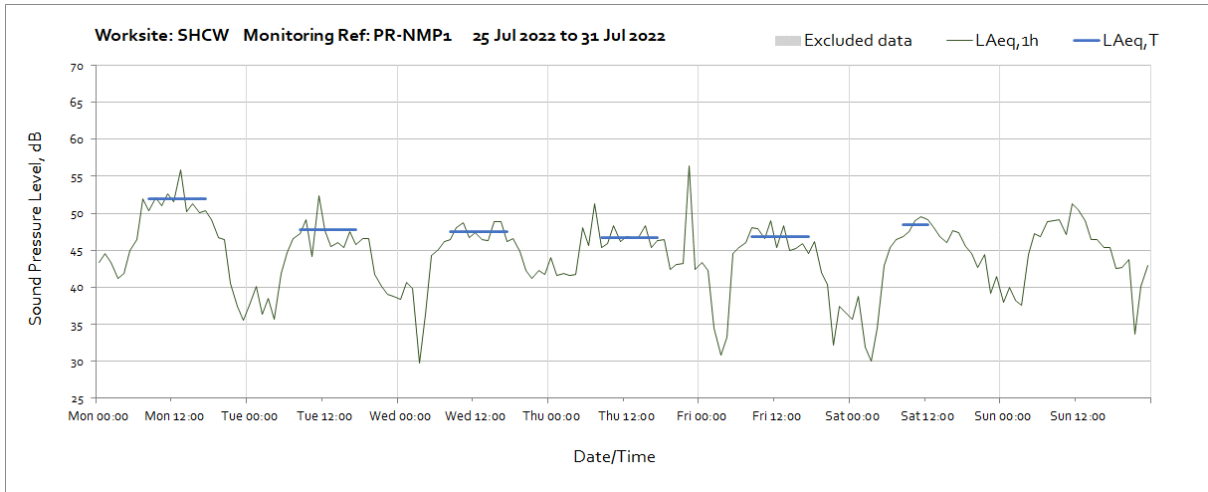


**Worksite: SHCW - Monitoring Ref: PR-NMP1**

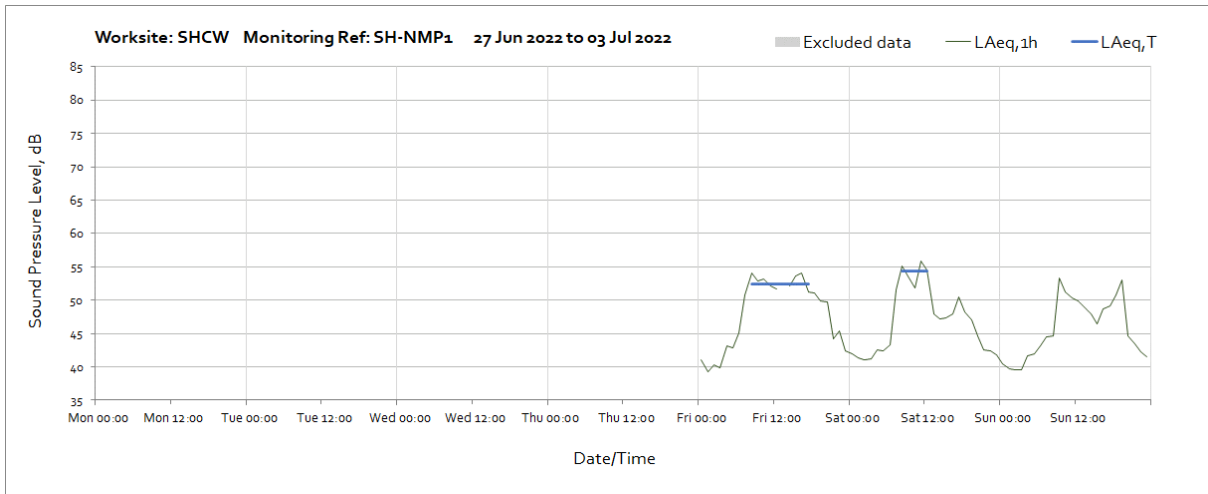


Note: Missing data between 13:00 and 14:00 on the 1<sup>st</sup> July was due to monitor maintenance.

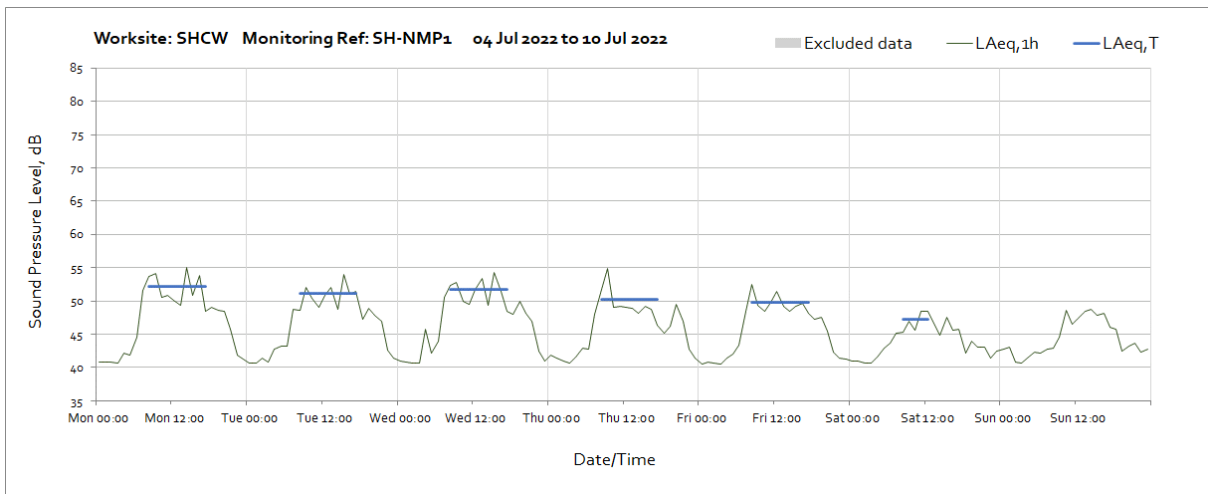


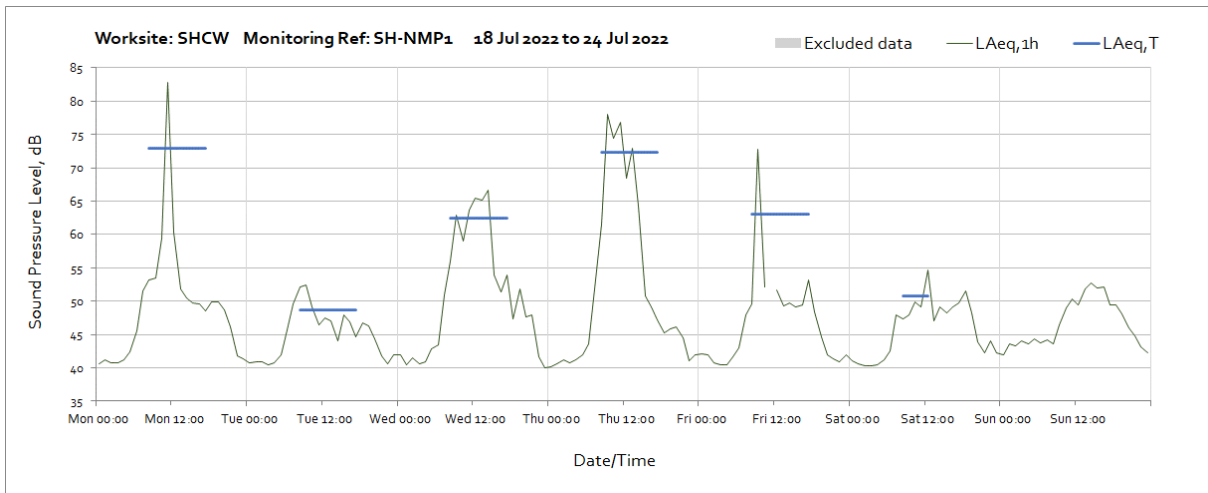
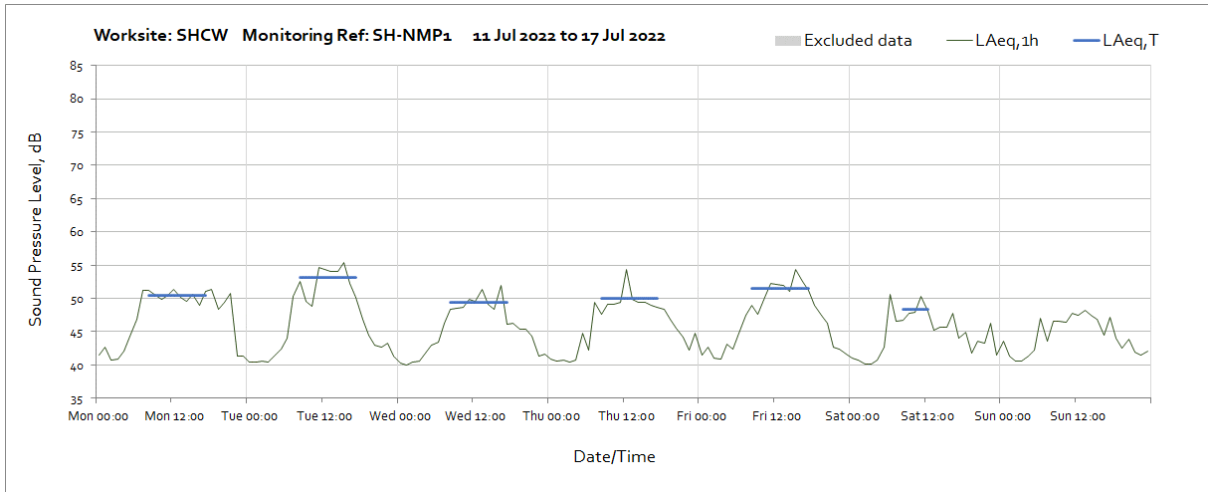


**Worksite: SHCW – Monitoring Ref: SH-NMP1**

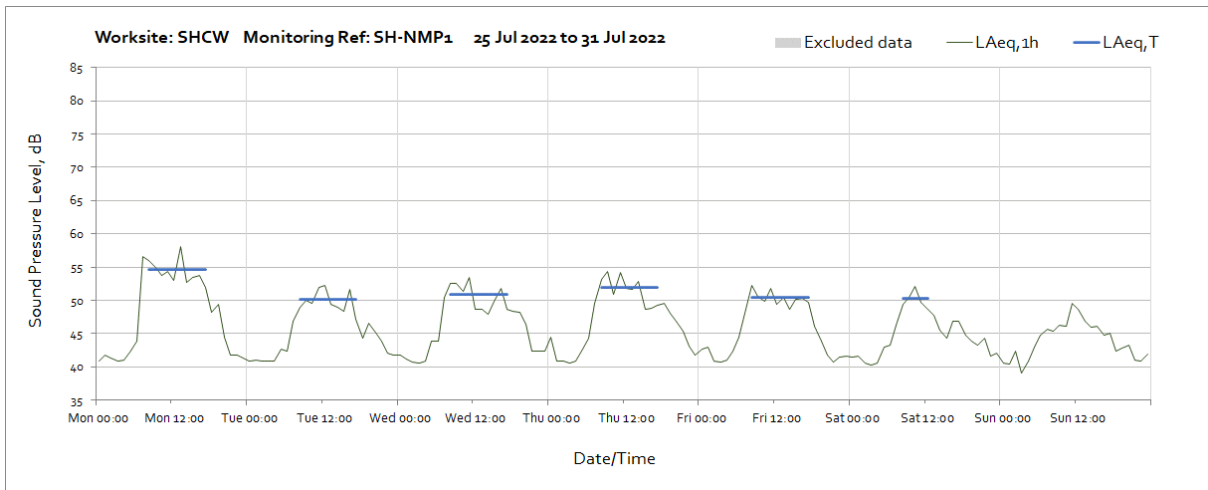


Note: Missing data between 13:00 and 14:00 on the 1<sup>st</sup> July was due to monitor maintenance.

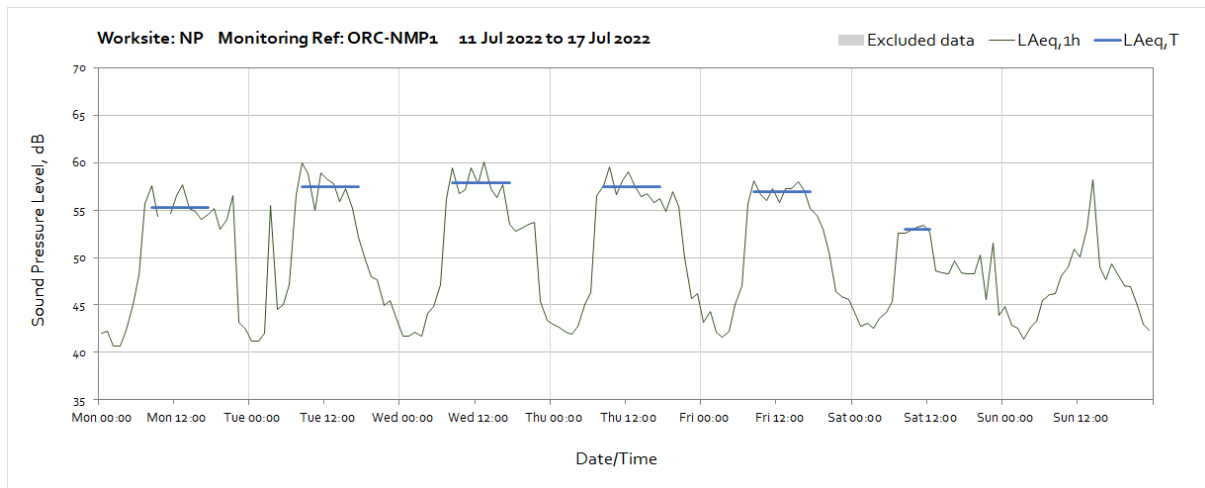
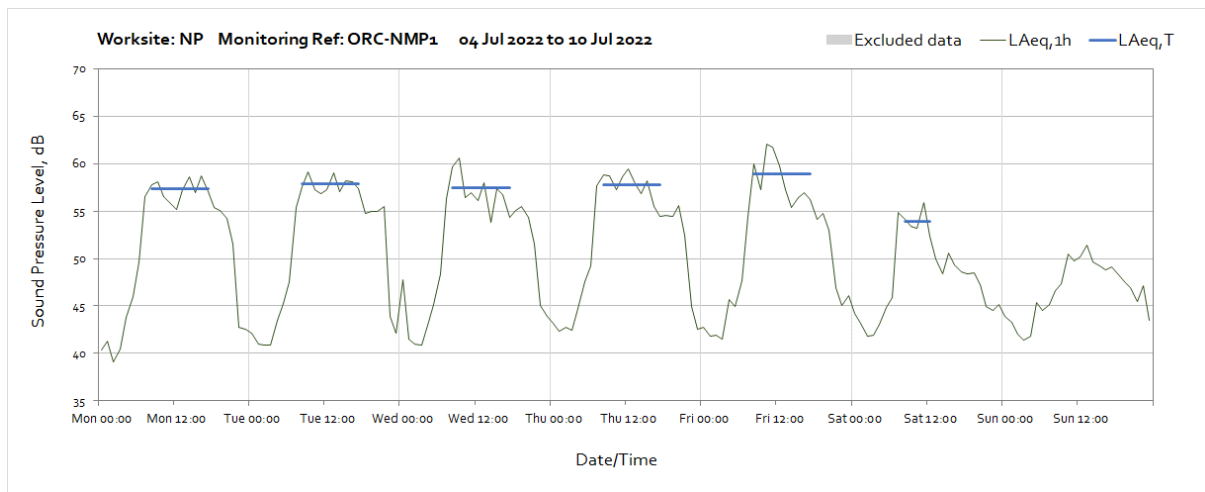
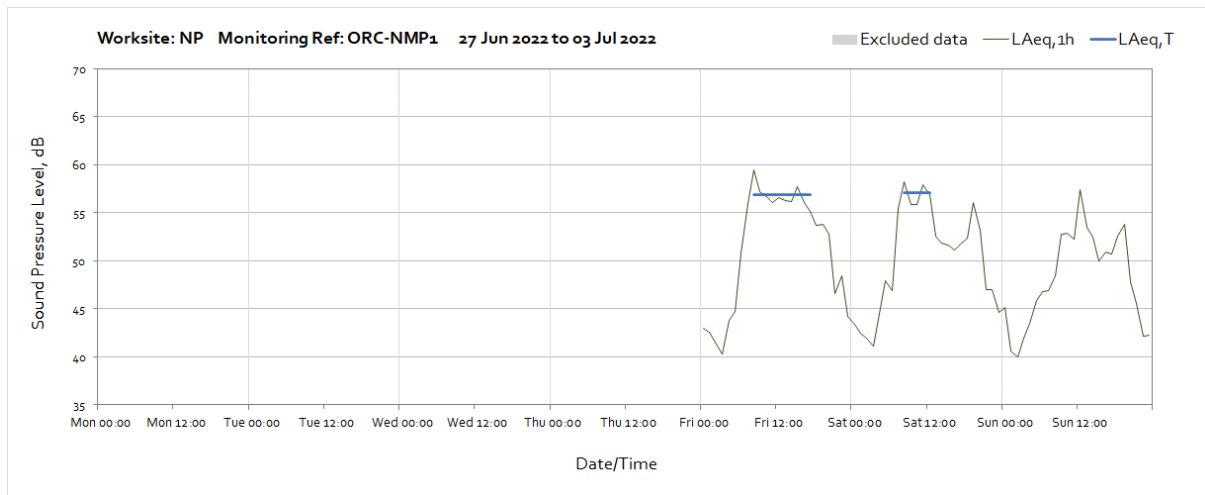




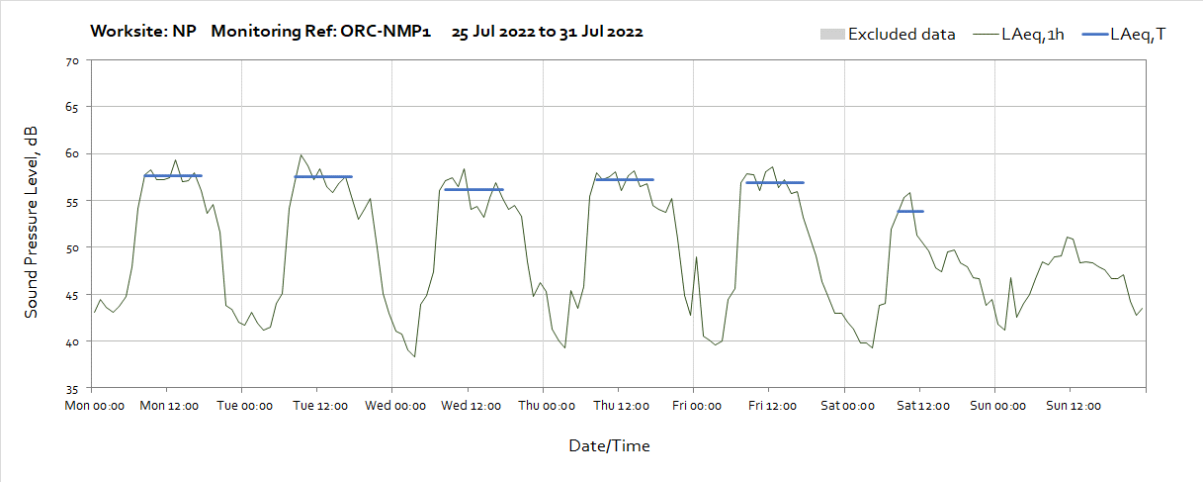
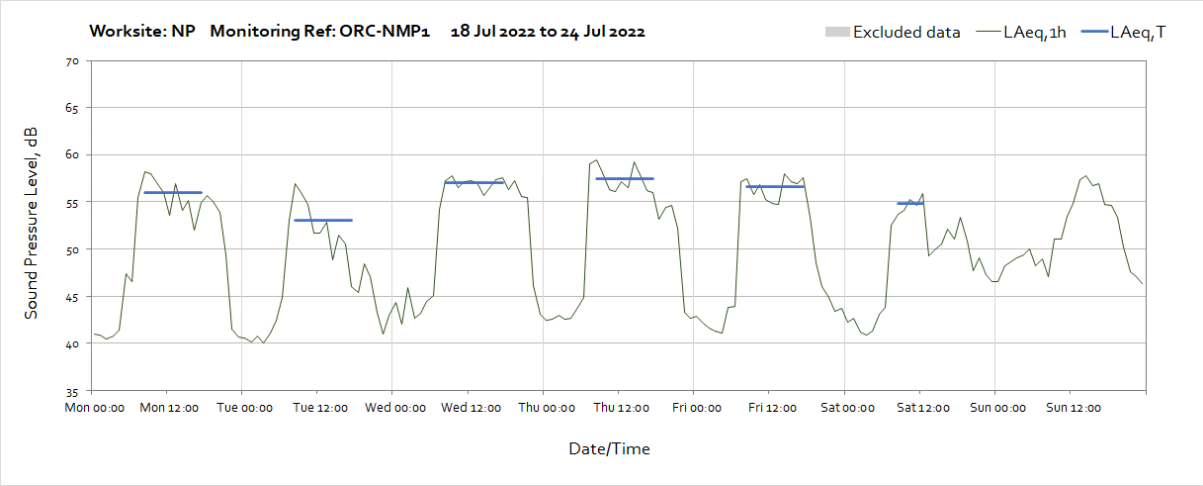
Note: Missing data between 11:00 and 12:00 on the 22<sup>nd</sup> July was due to monitor maintenance.



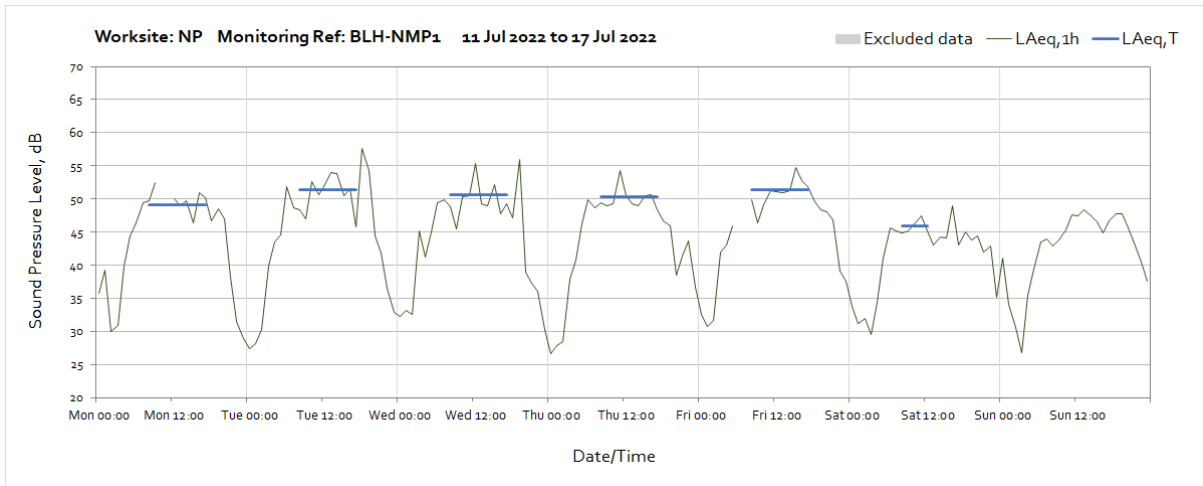
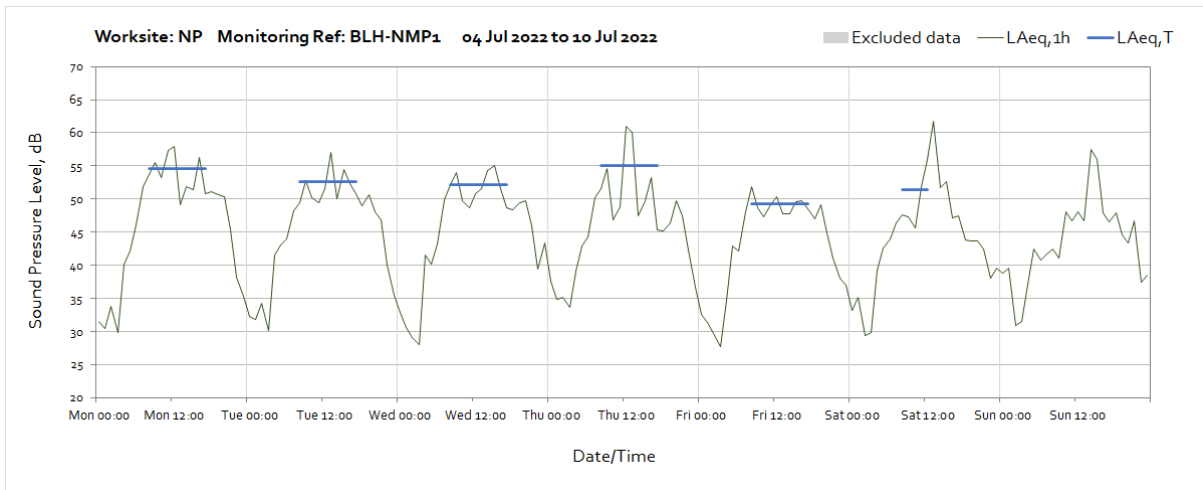
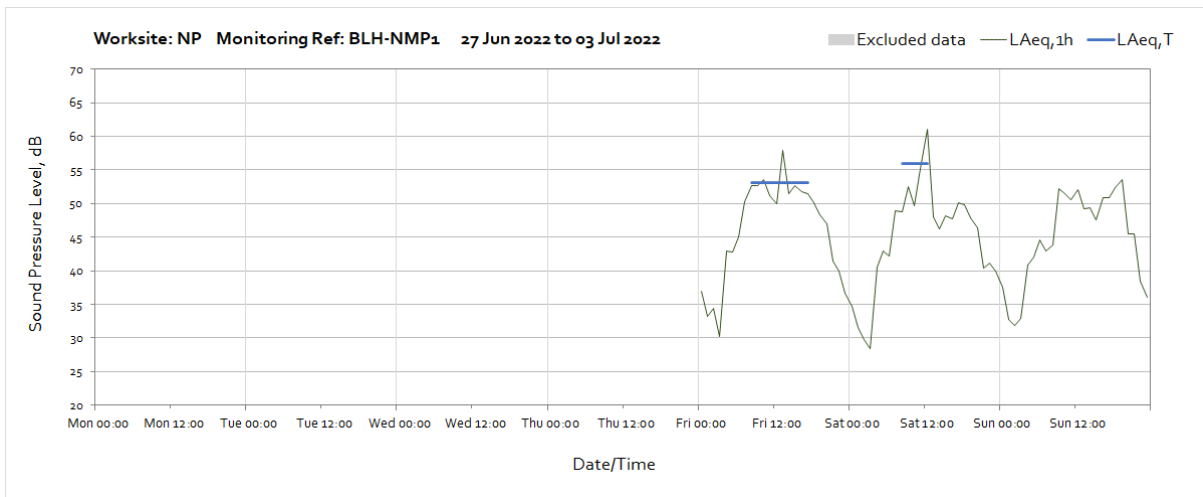
## Worksite: NP – Monitoring Ref: ORC-NMP1



Note: Missing data between 10:00 and 11:00 on the 11<sup>th</sup> July was due to monitor field calibration.

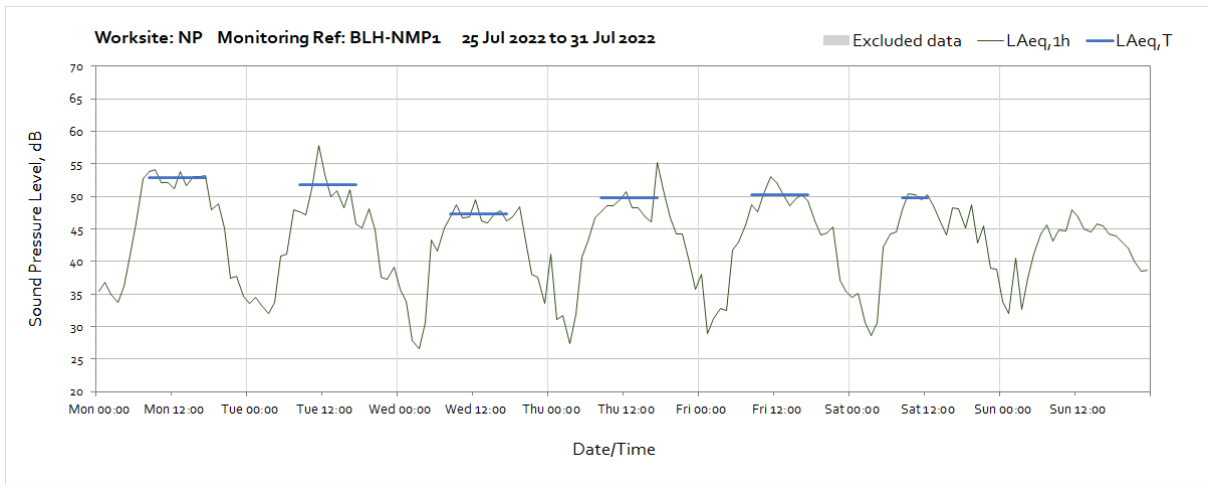
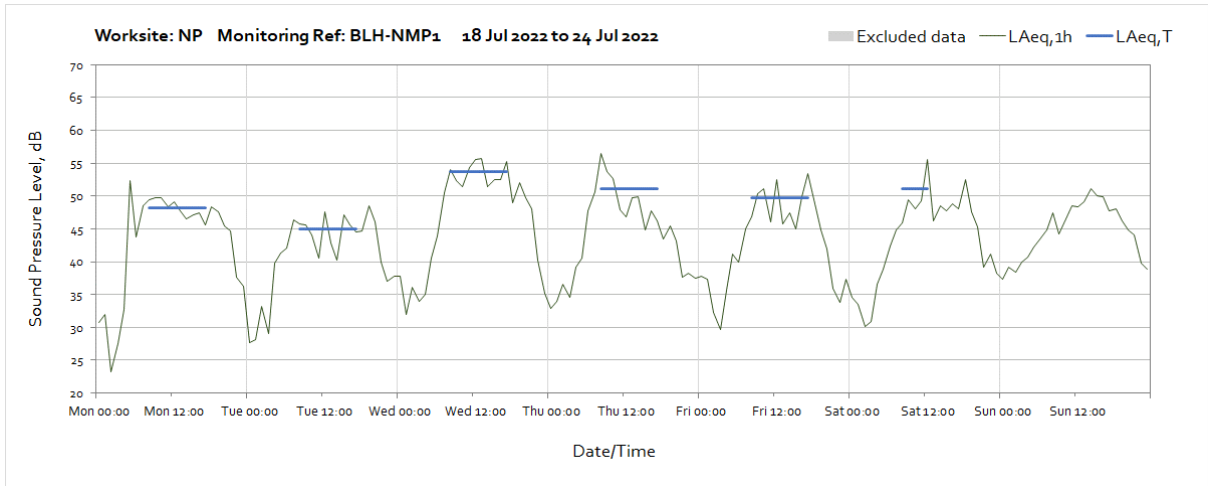


## Worksite: NP – Monitoring Ref: BLH-NMP1

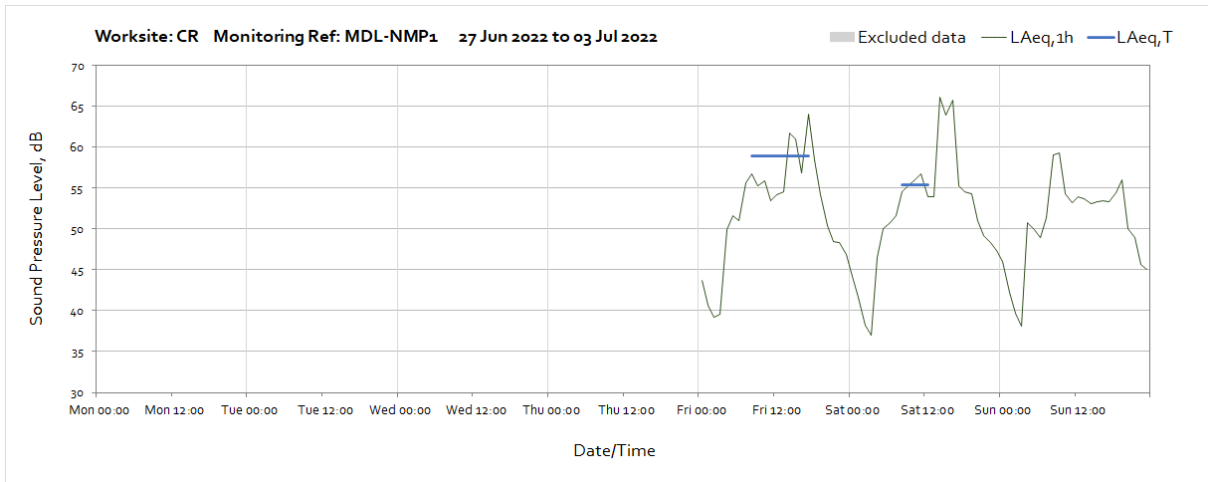


Note: Missing data between 10:00 and 12:00 on the 11<sup>th</sup> July was due to monitor field calibration. Missing data between 06:00 and 08:00 on the 15<sup>th</sup> July was due to temporary power issue.

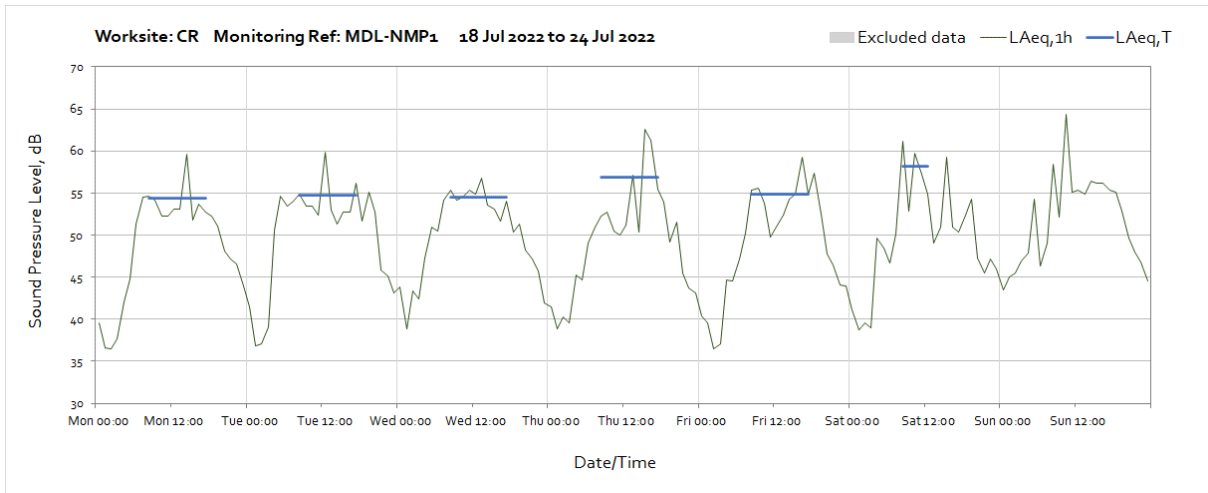
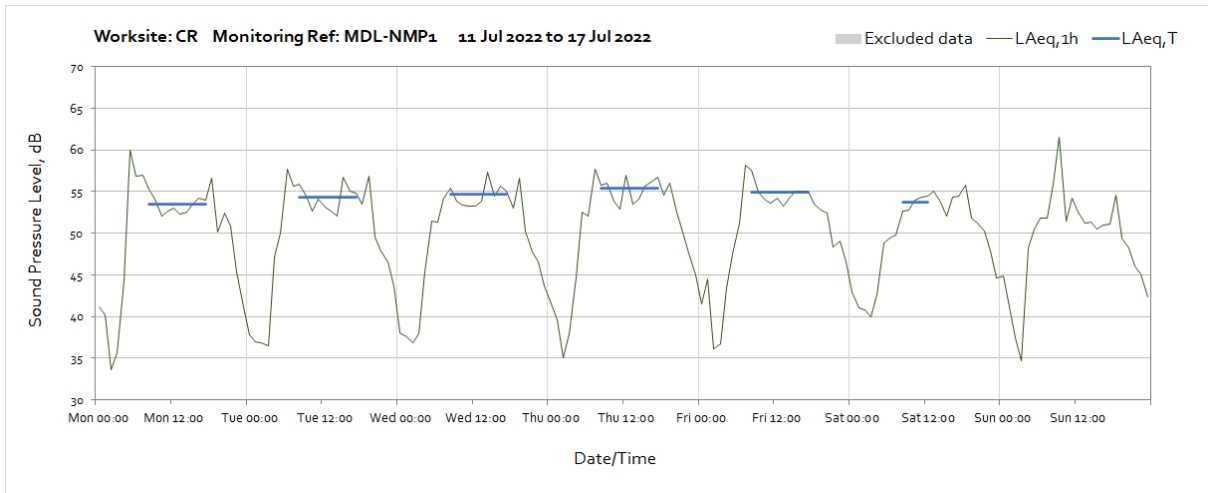
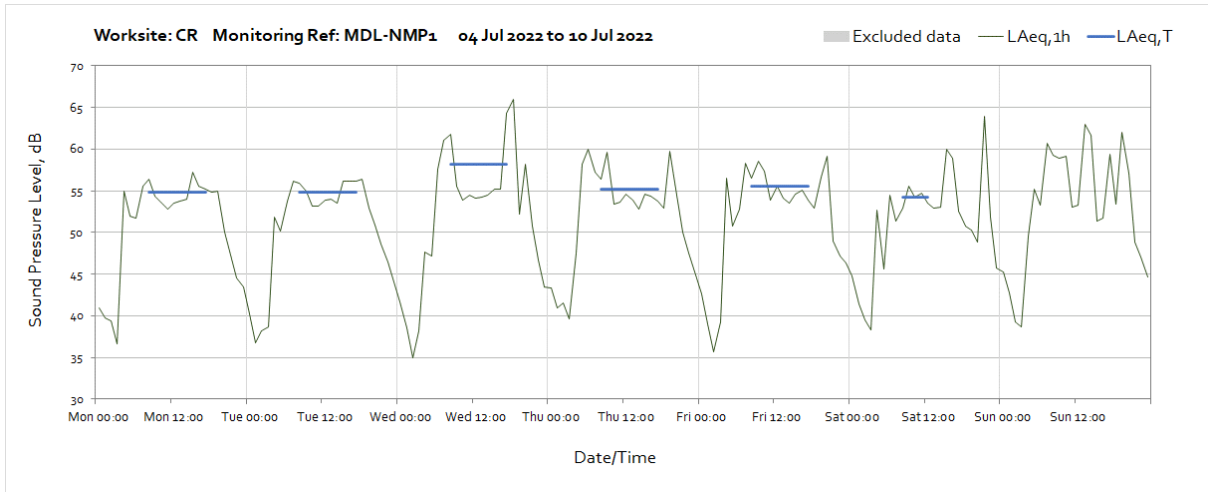
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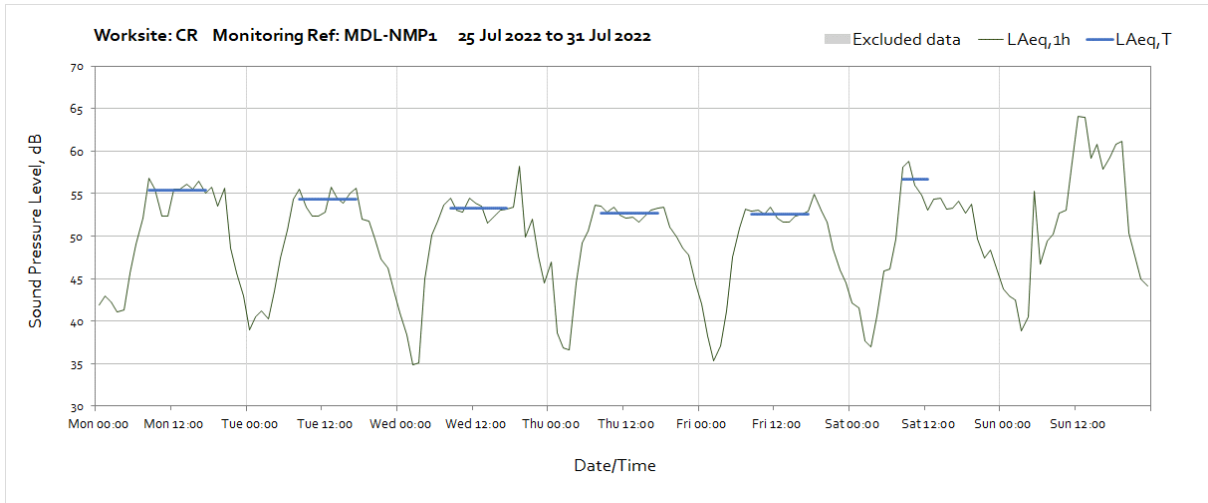


**Worksite: CR – Monitoring Ref: MDL-NMP1**

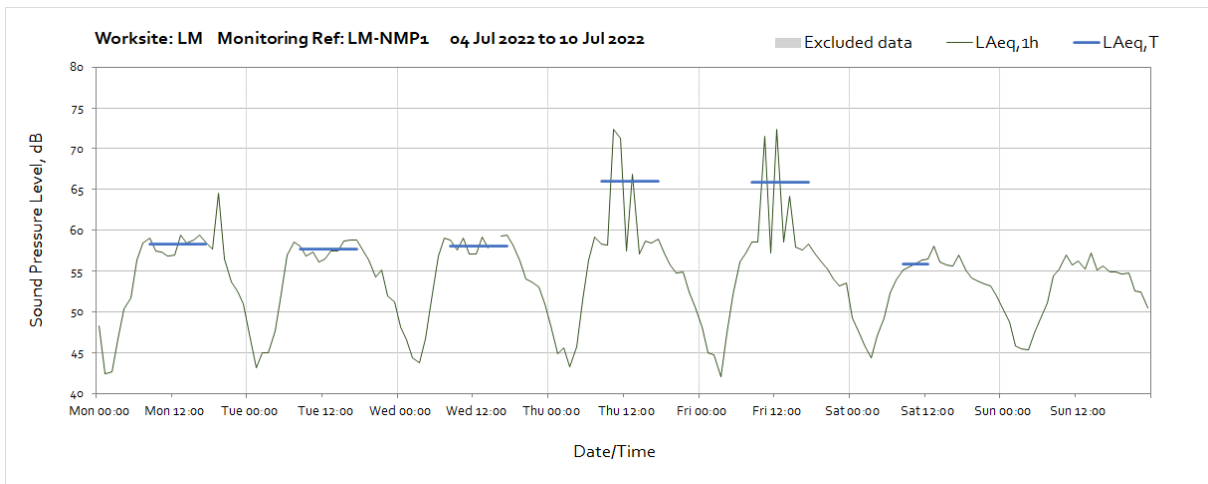
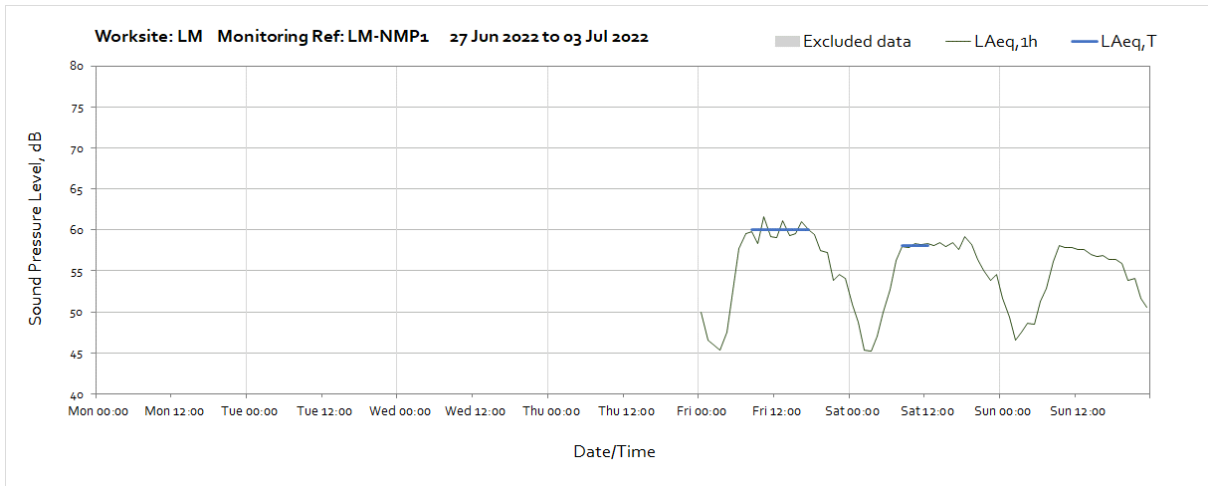




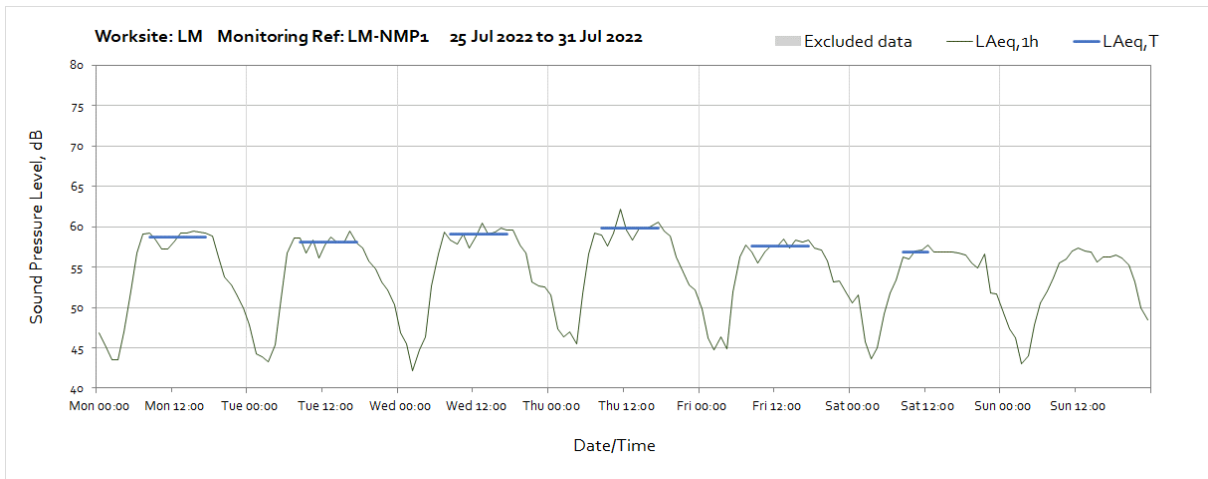
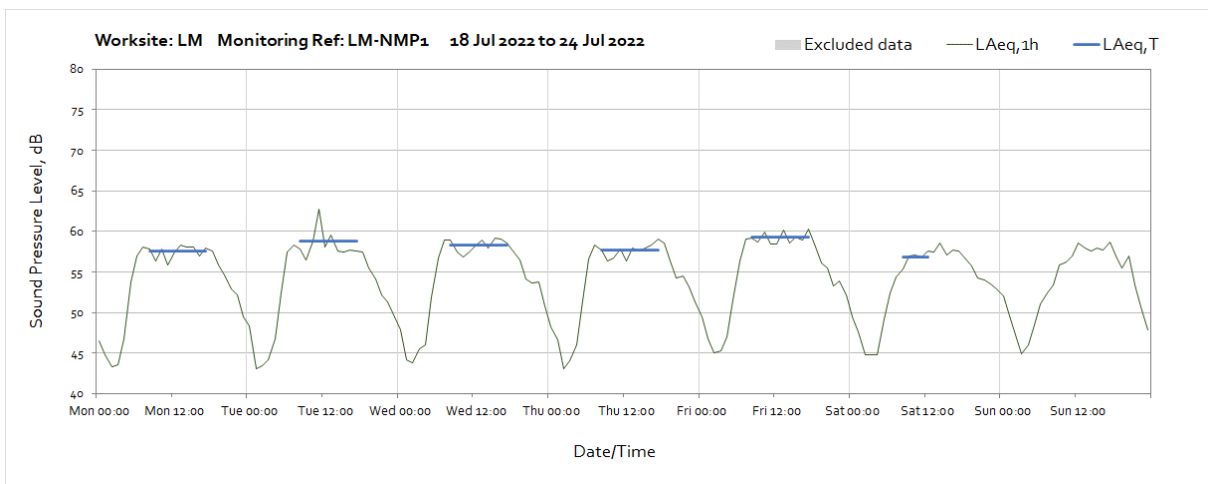
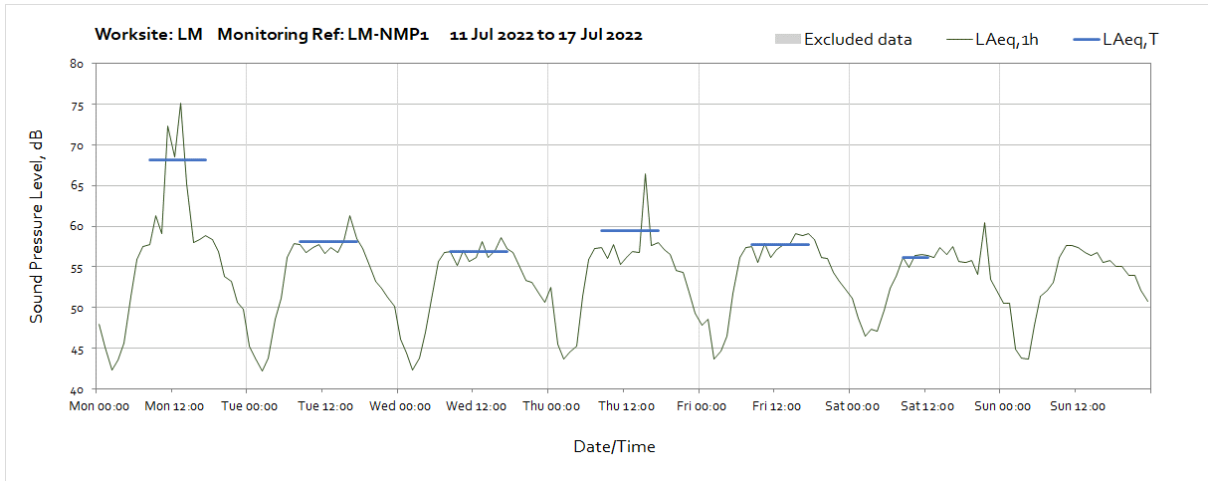




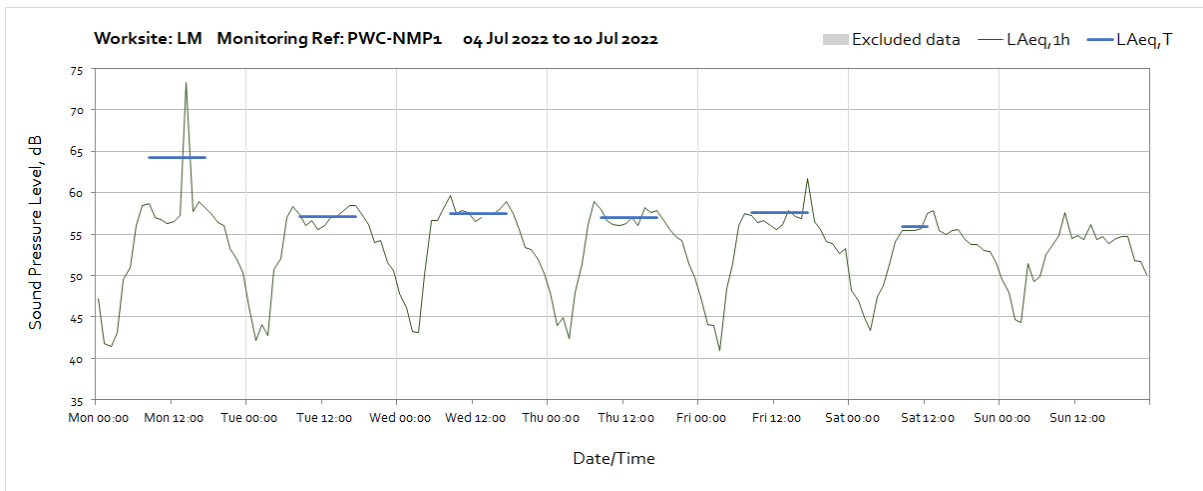
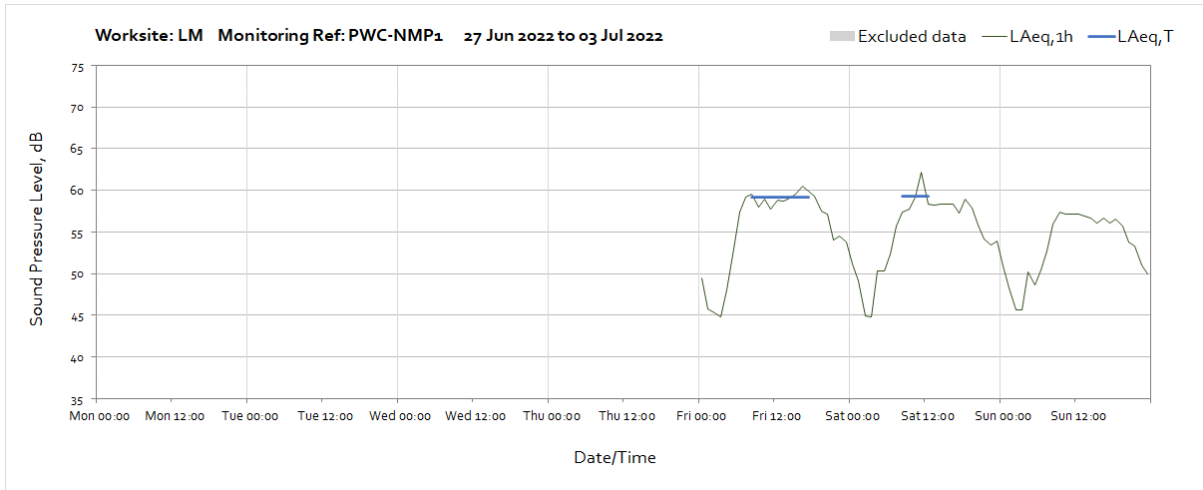
**Worksite: LM – Monitoring Ref: LM-NMP1**



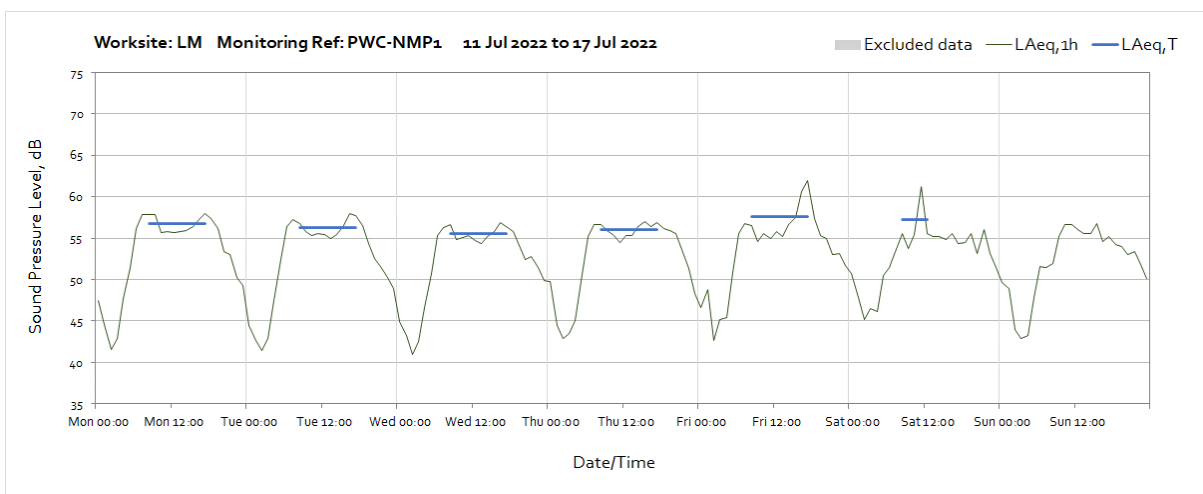
Note: Missing data between 15:00 and 16:00 on the 6<sup>th</sup> July was due to monitor field calibration.

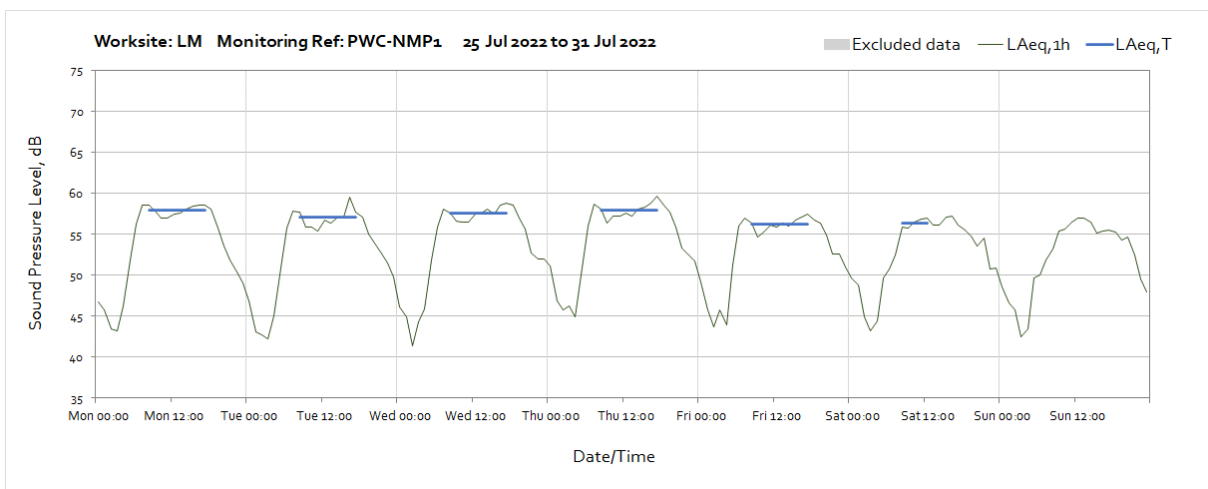
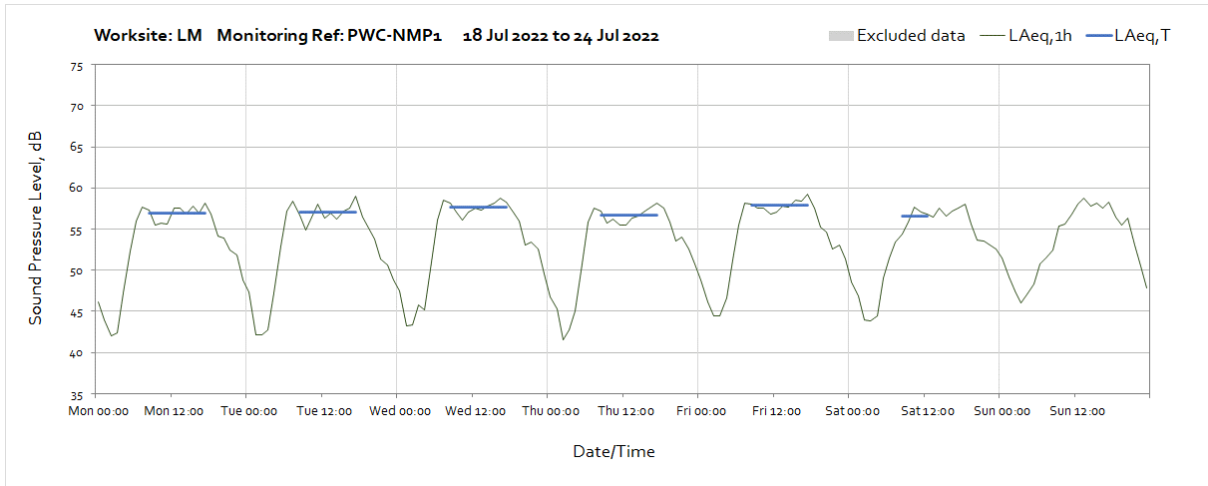


## Worksite: LM – Monitoring Ref: PWC-NMP1

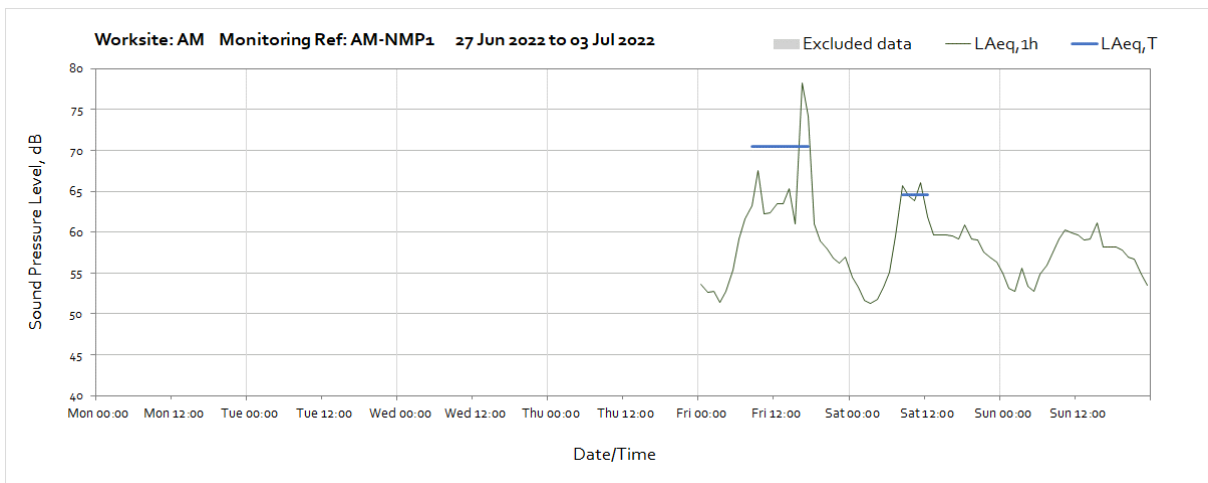


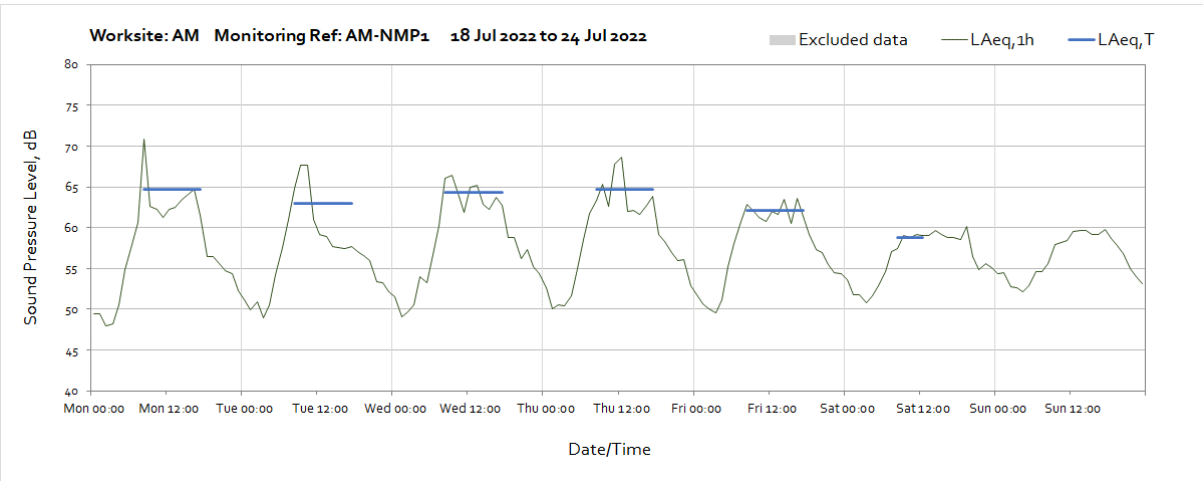
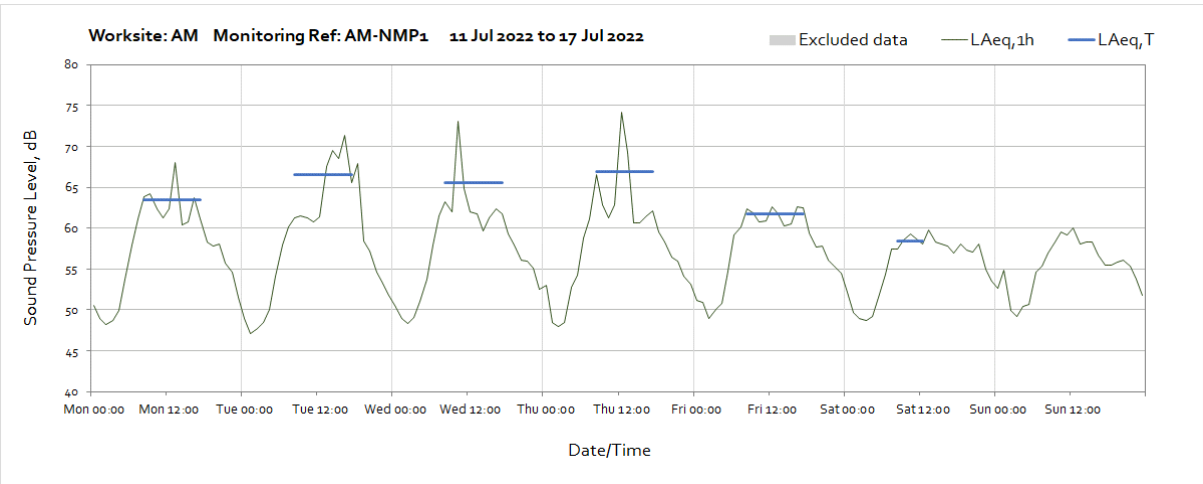
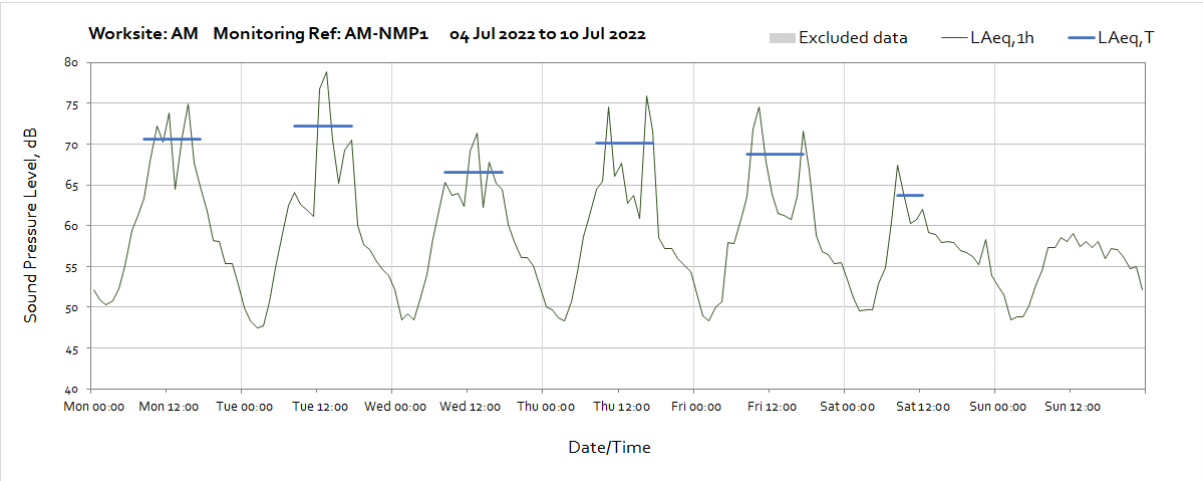
Note: Missing data between 14:00 and 15:00 on the 6<sup>th</sup> July was due to monitor field calibration.

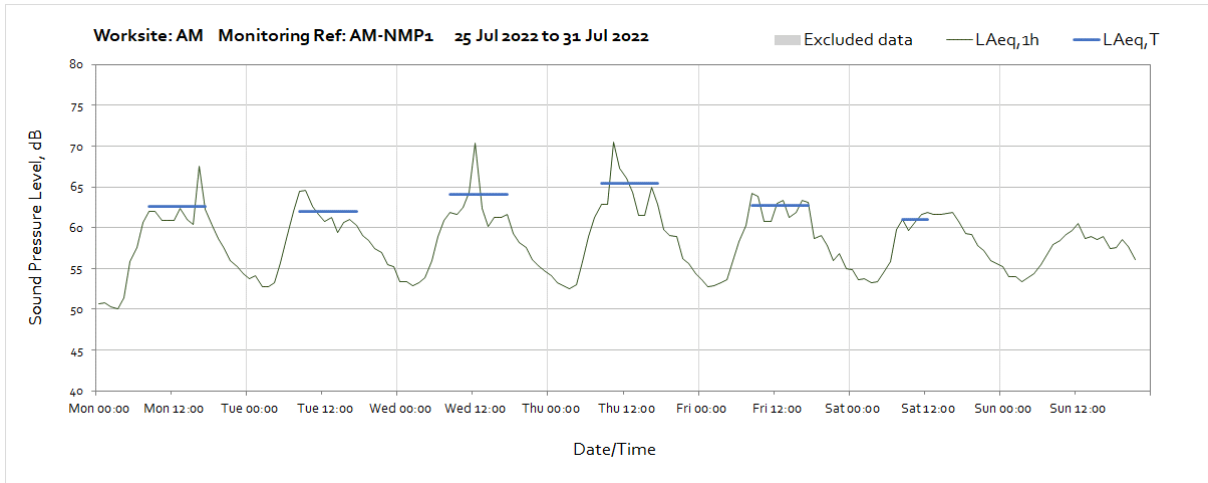




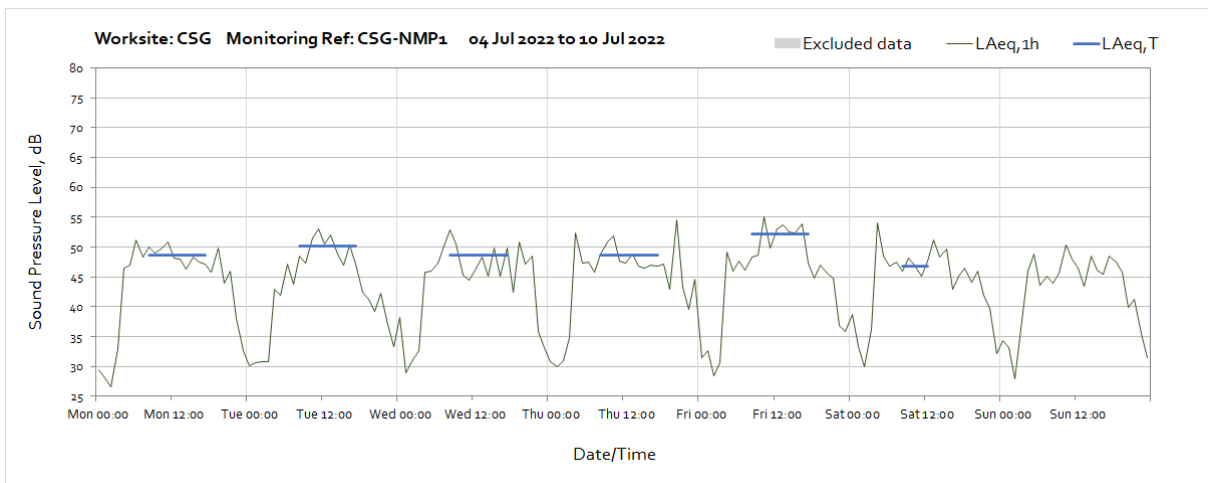
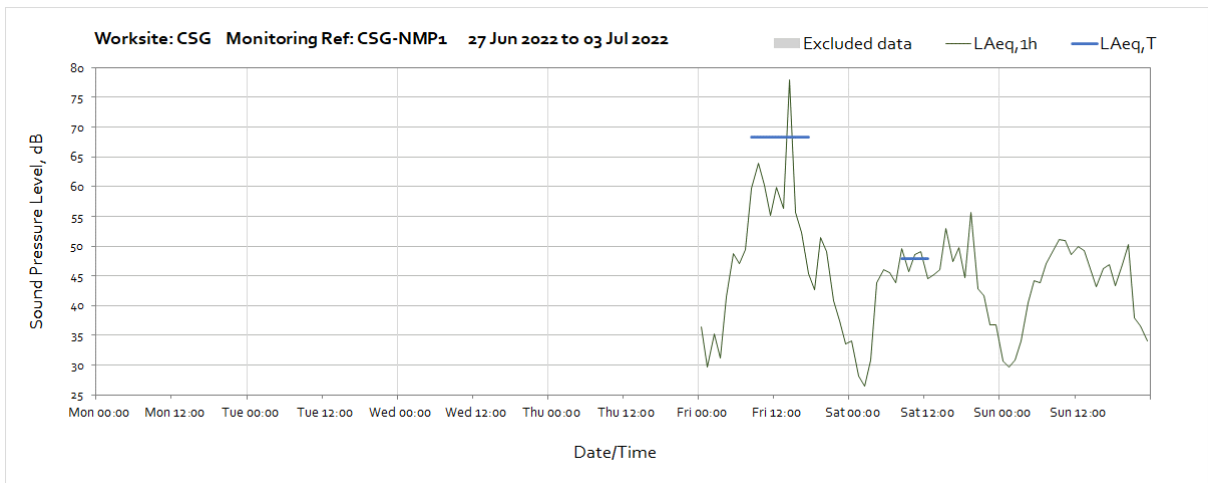
**Worksite: AM - Monitoring Ref: AM-NMP1**

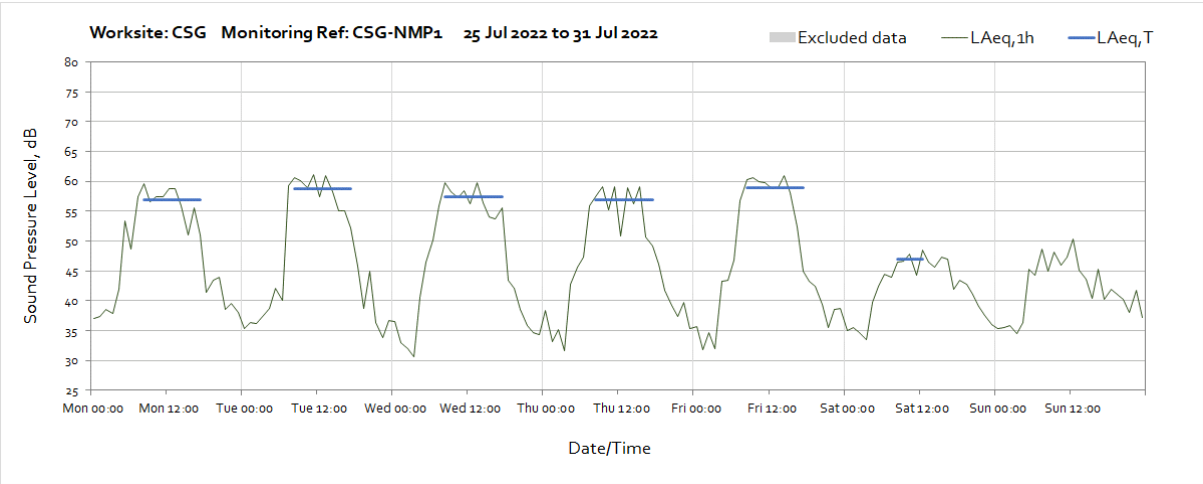
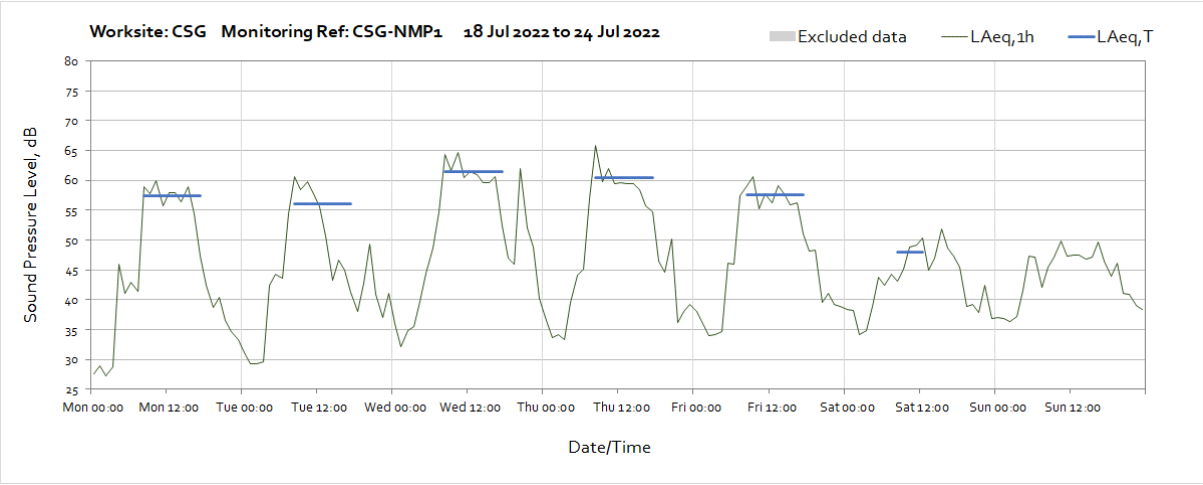
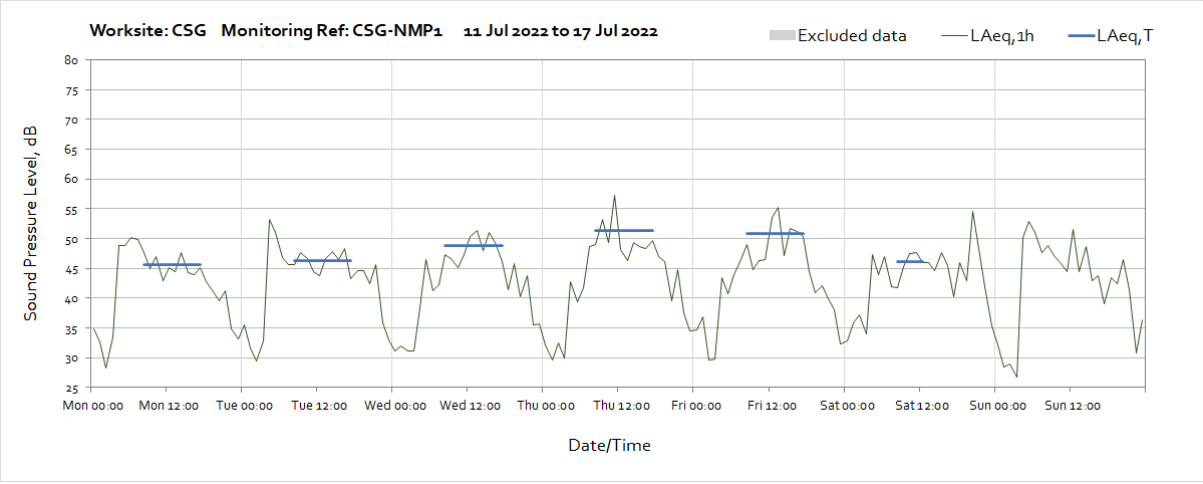






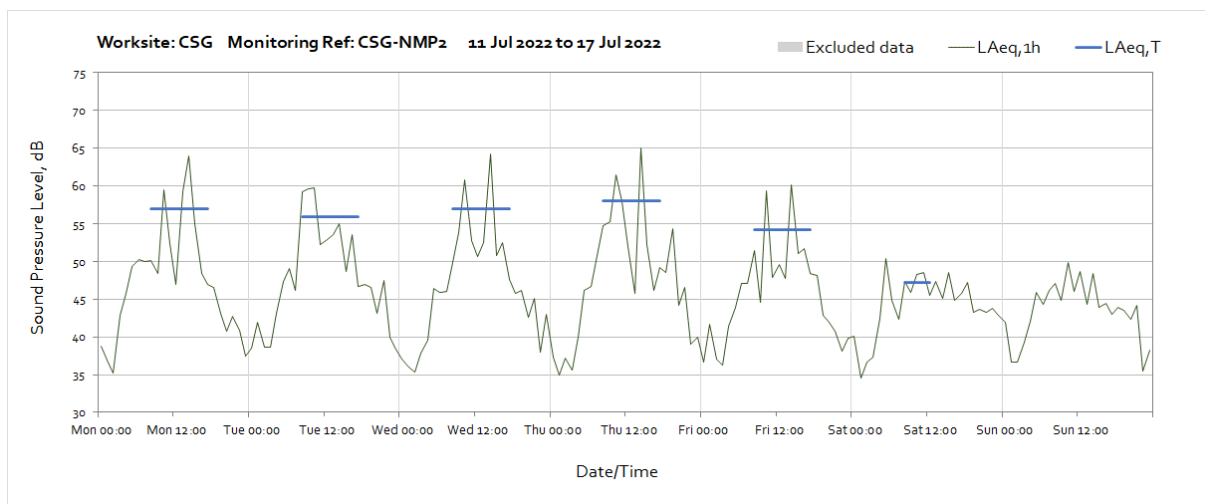
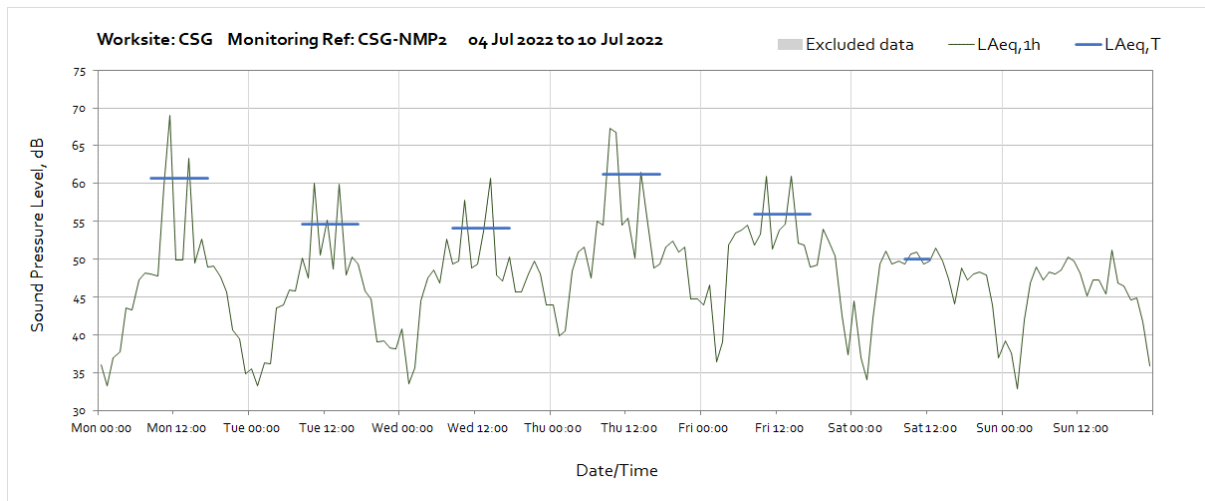
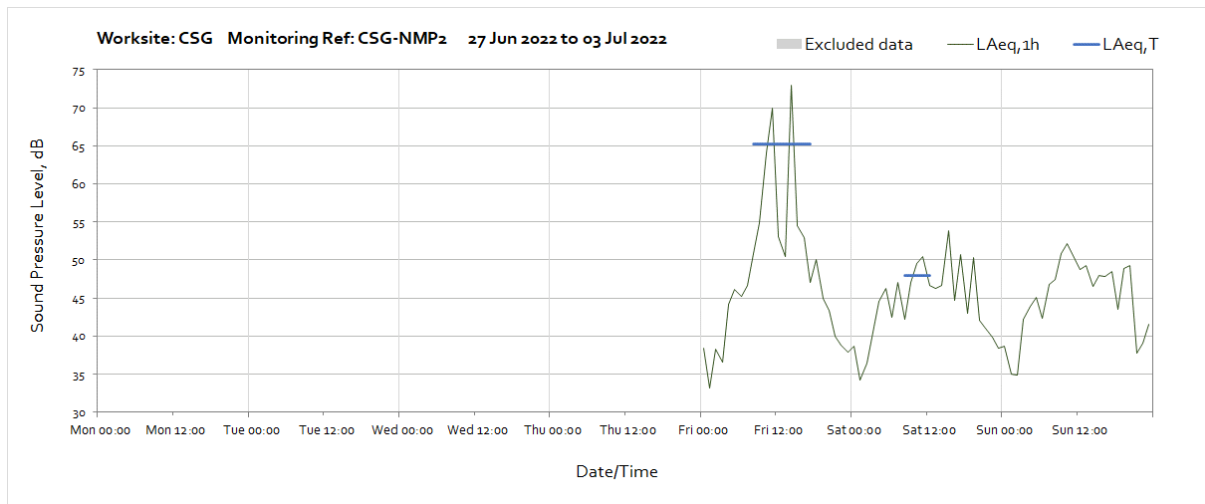
**Worksite: CSG – Monitoring Ref: CSG-NMP1**

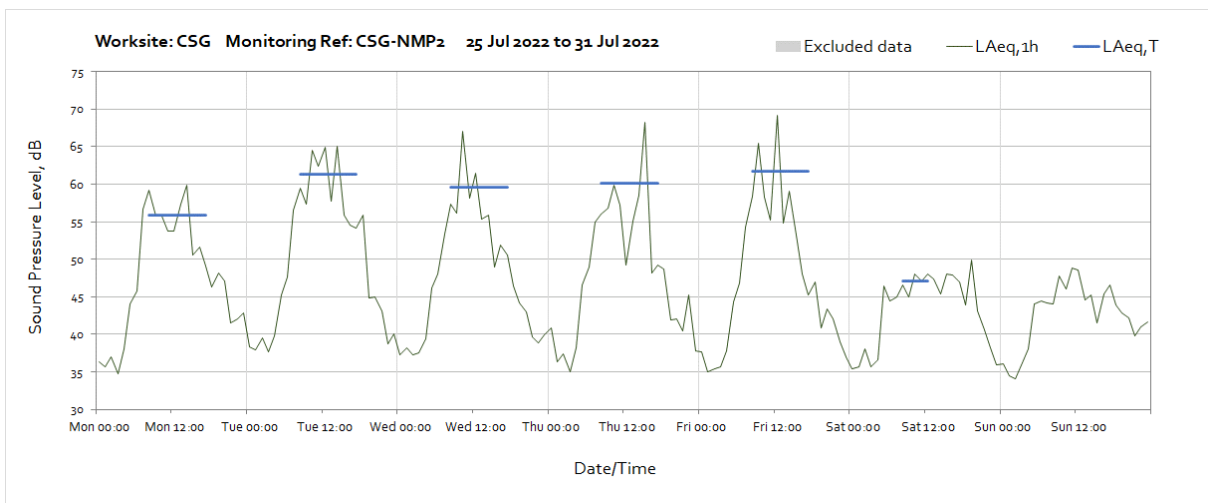
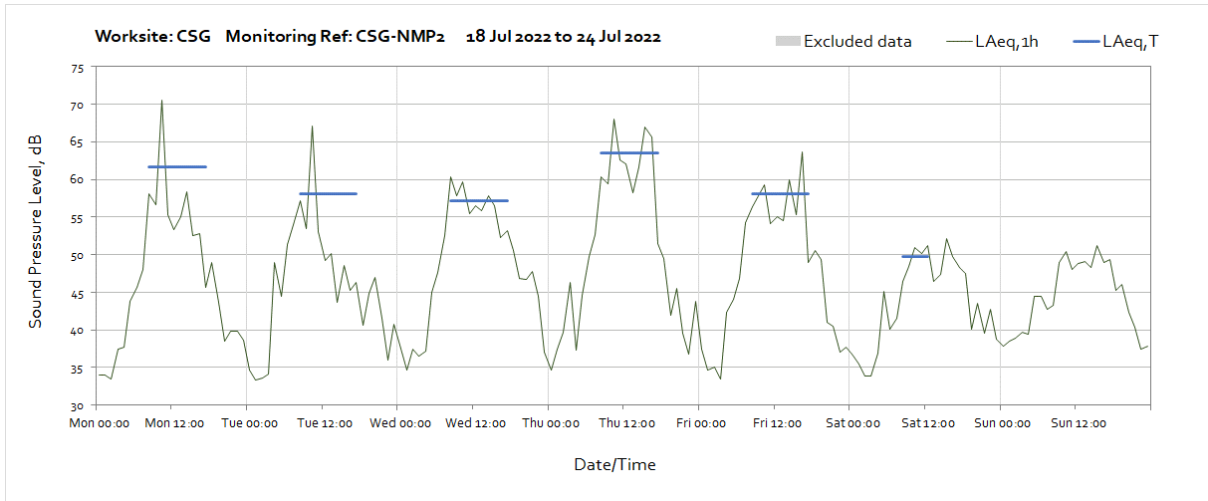




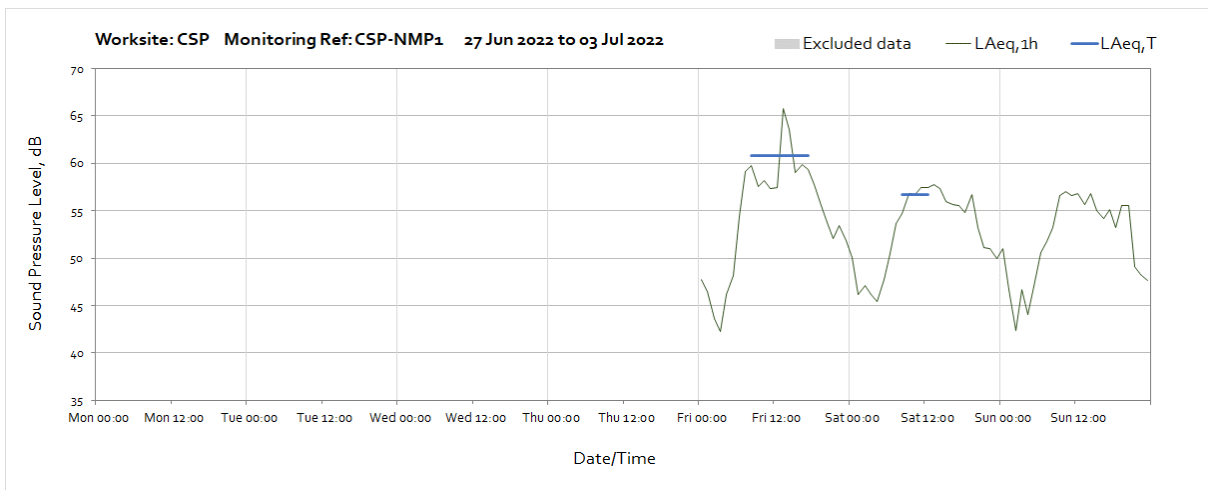


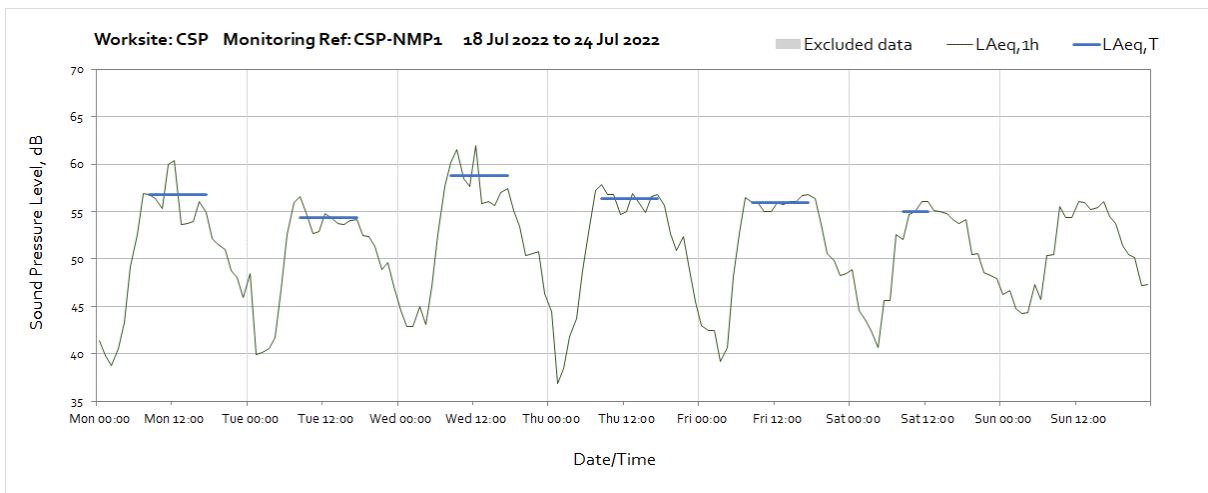
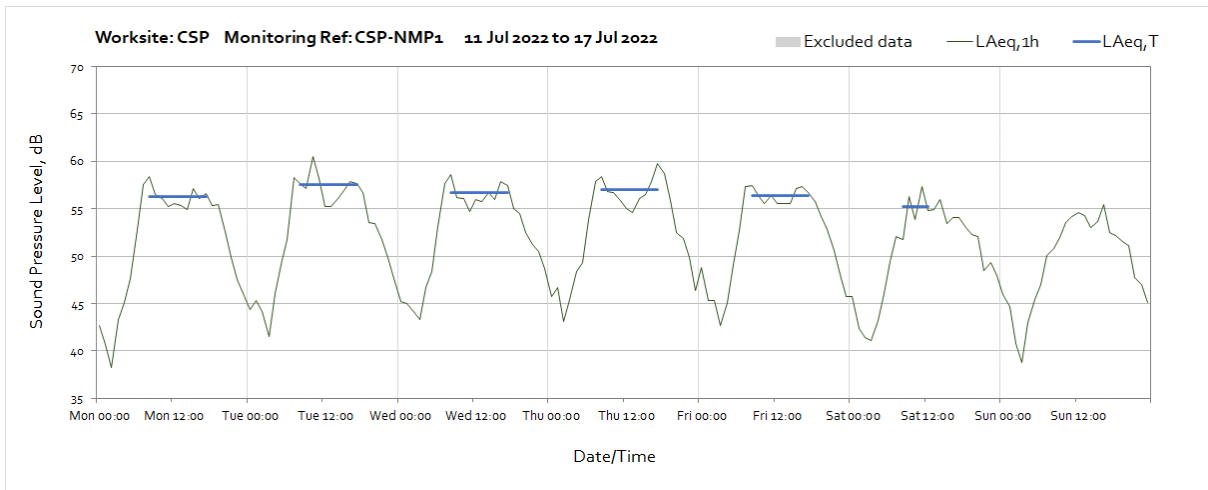
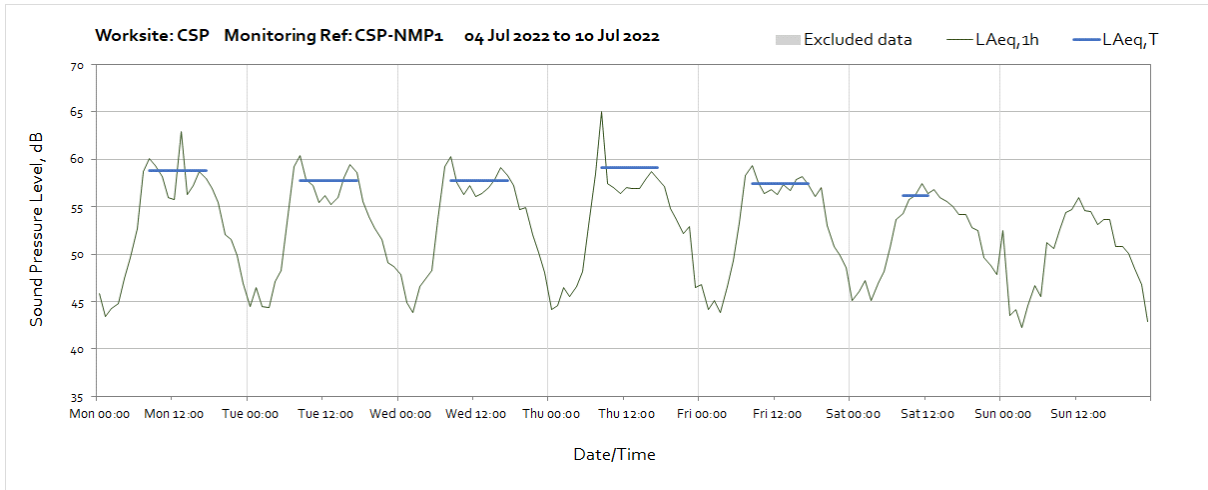
## Worksite: CSG – Monitoring Ref: CSG-NMP2

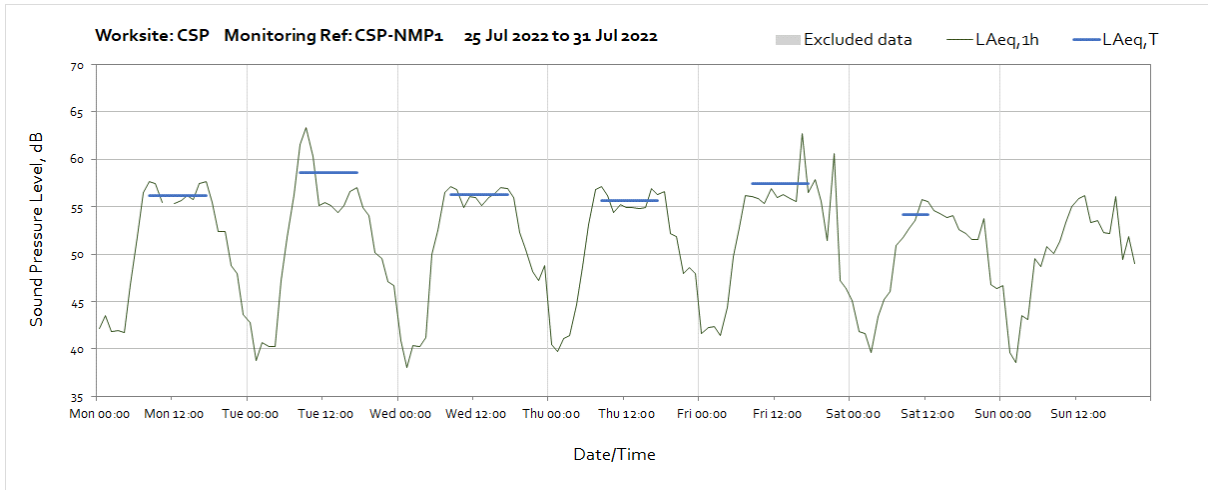




**Worksite: CSP – Monitoring Ref: CSP-NMP1**

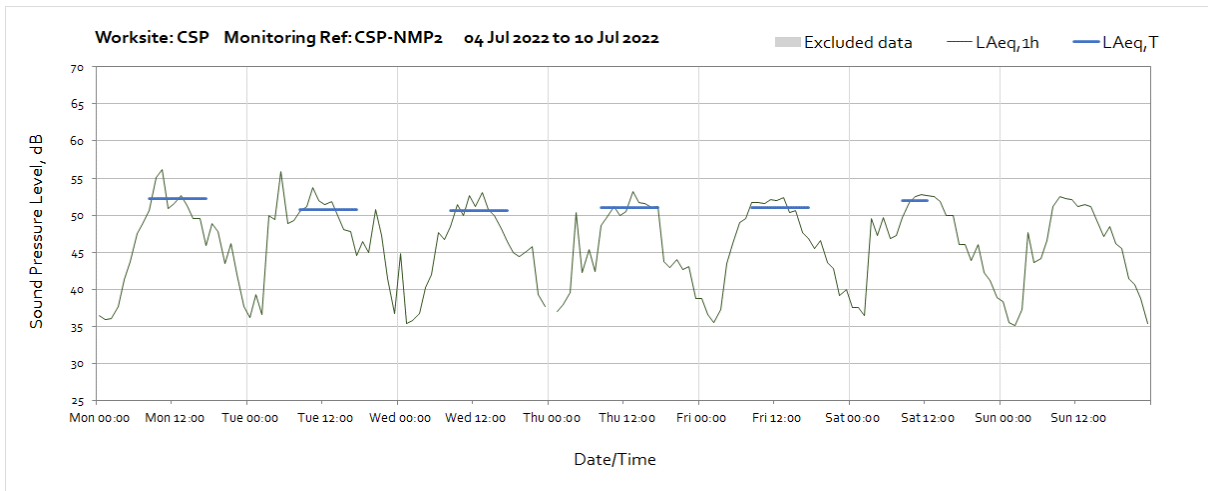
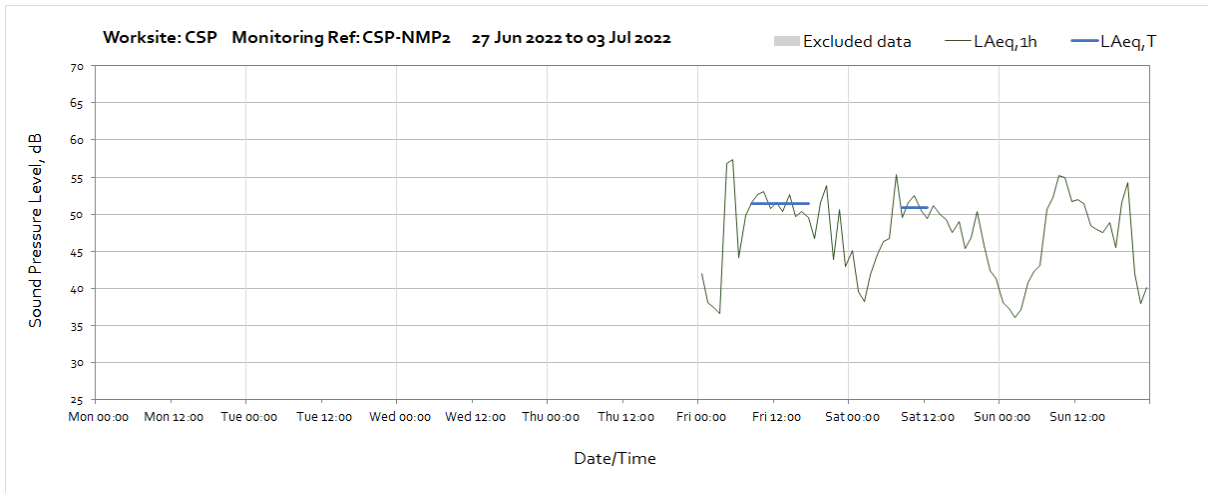




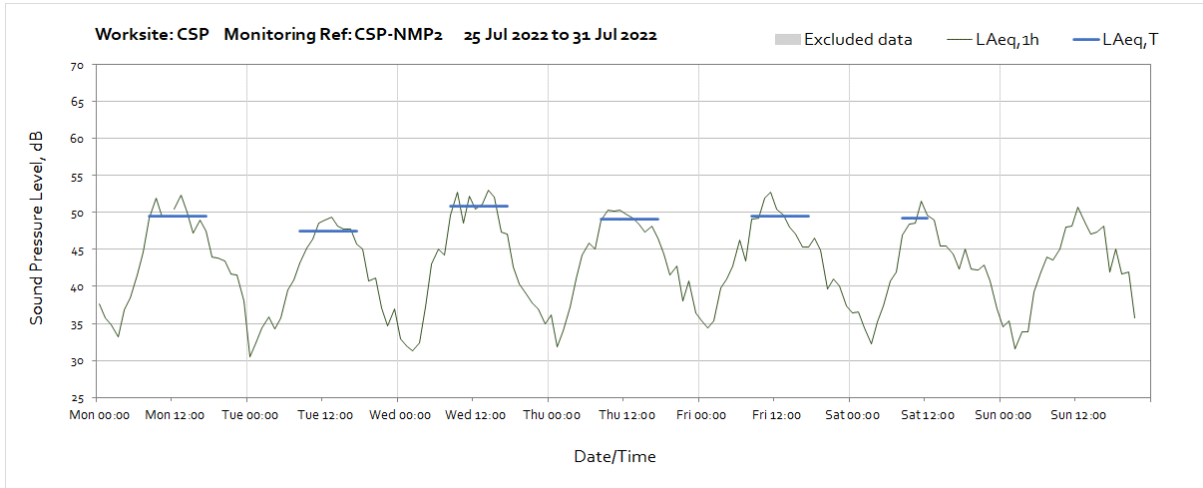
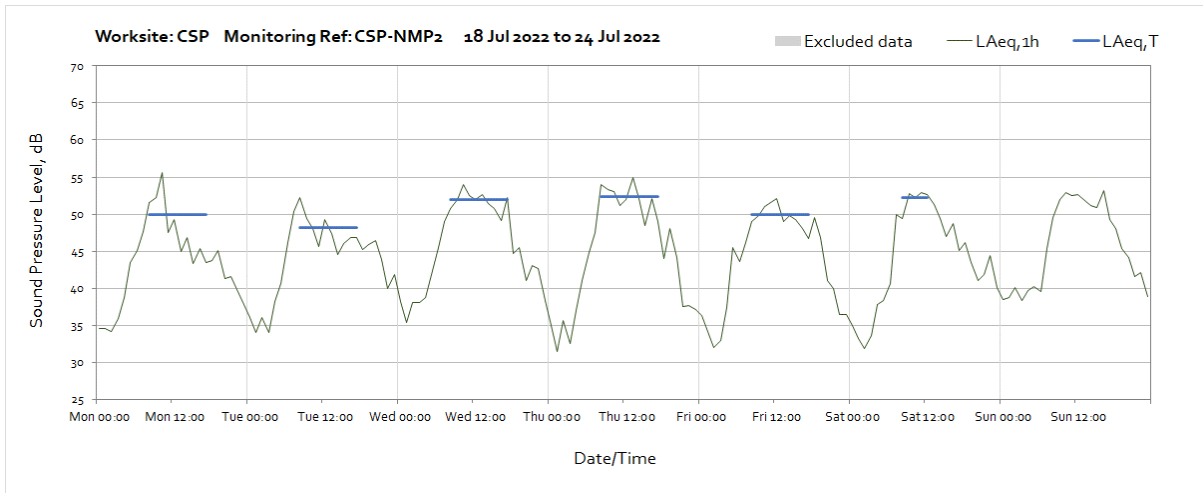
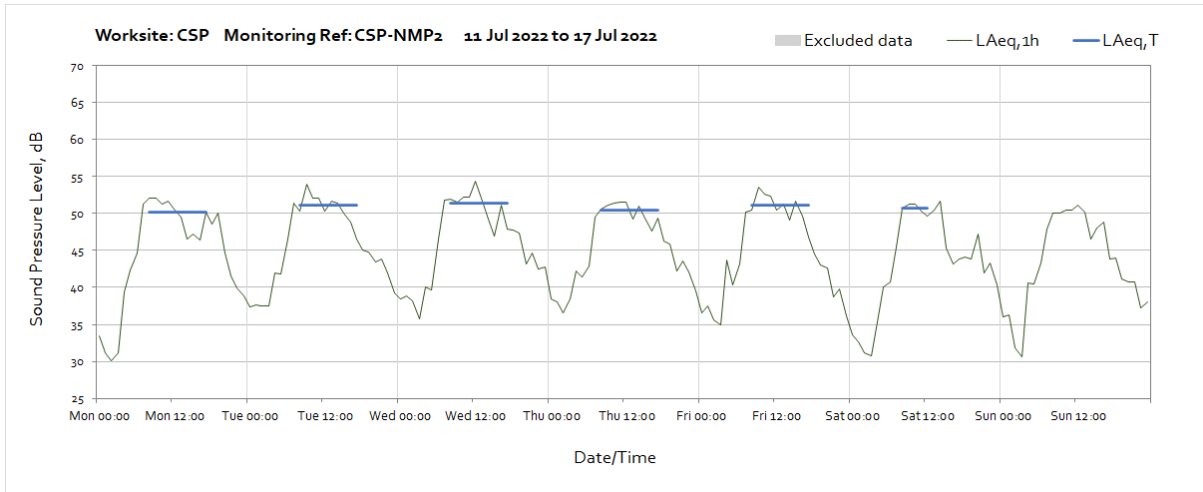


Note: Missing data between 11:00 and 12:00 on the 25<sup>th</sup> July was due to monitor field calibration.

### Worksite: CSP - Monitoring Ref: CSP-NMP2

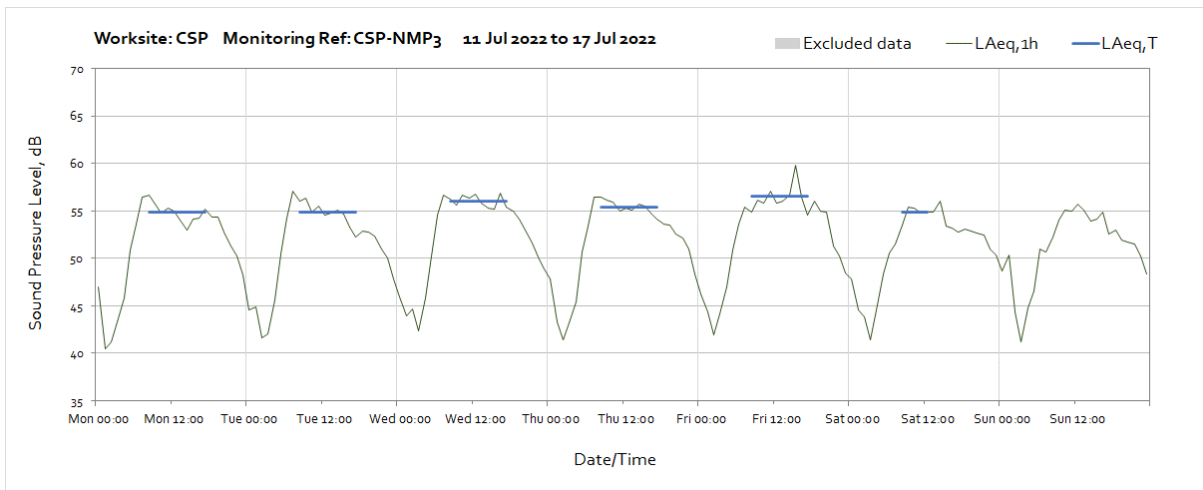
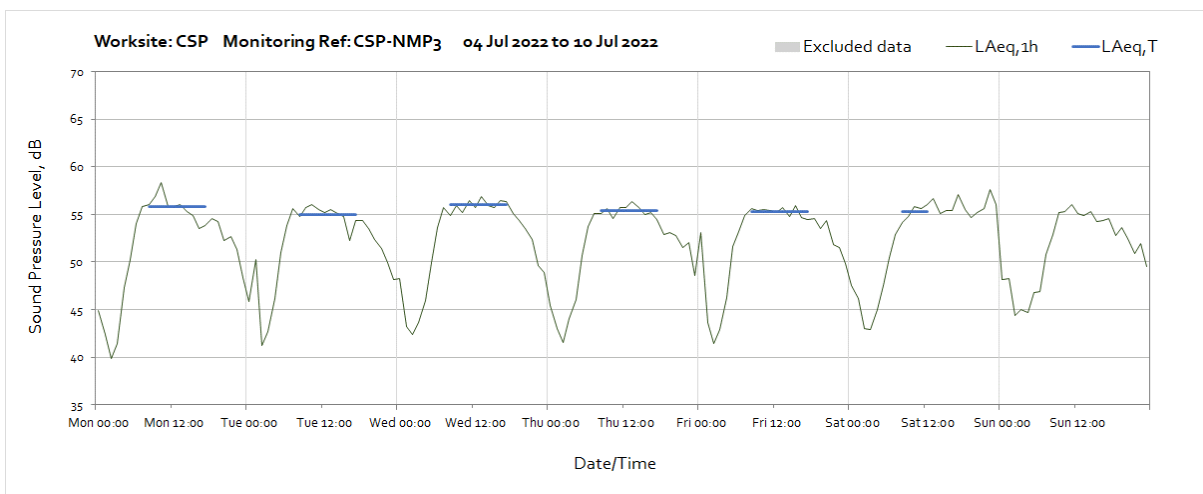
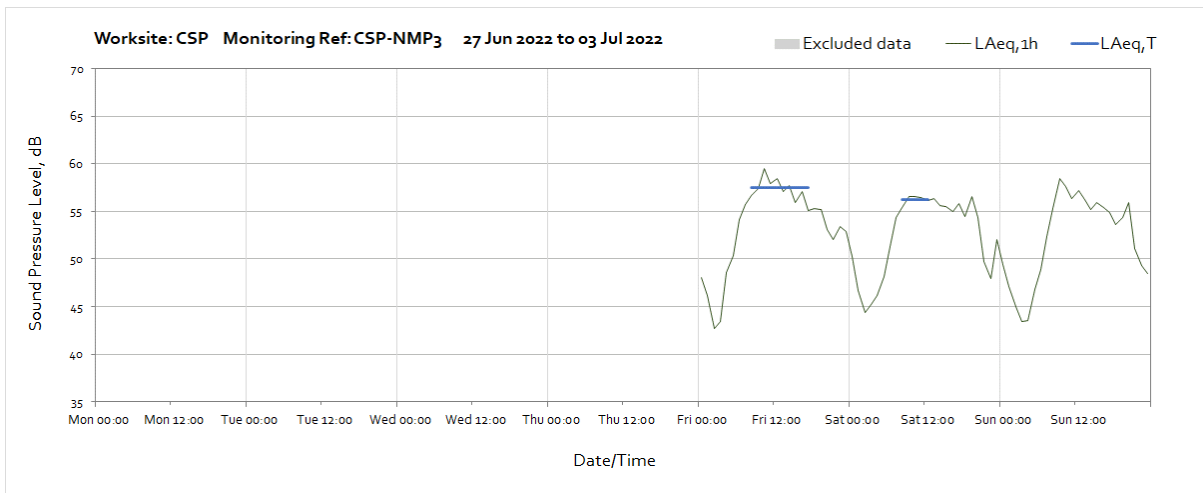


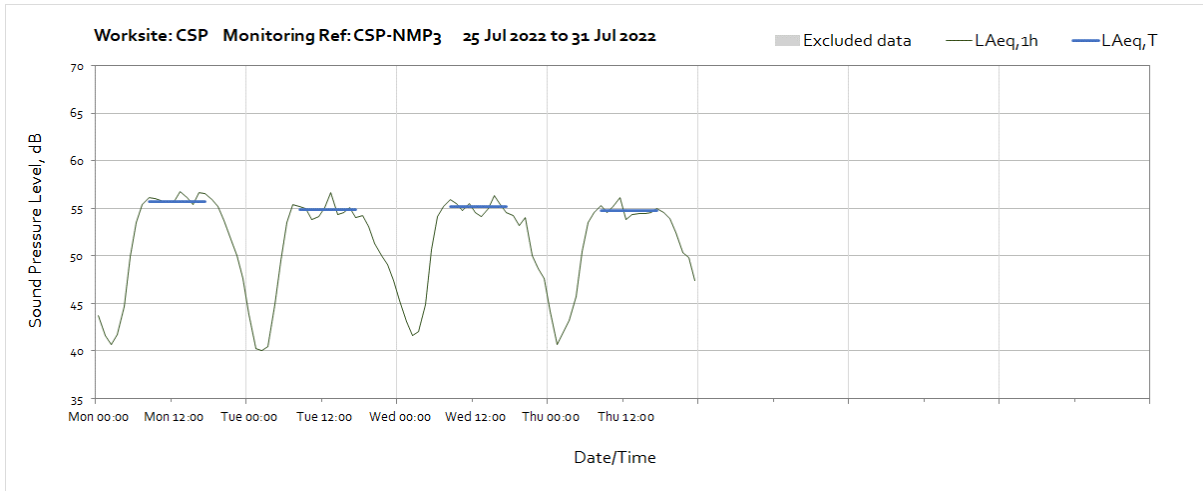
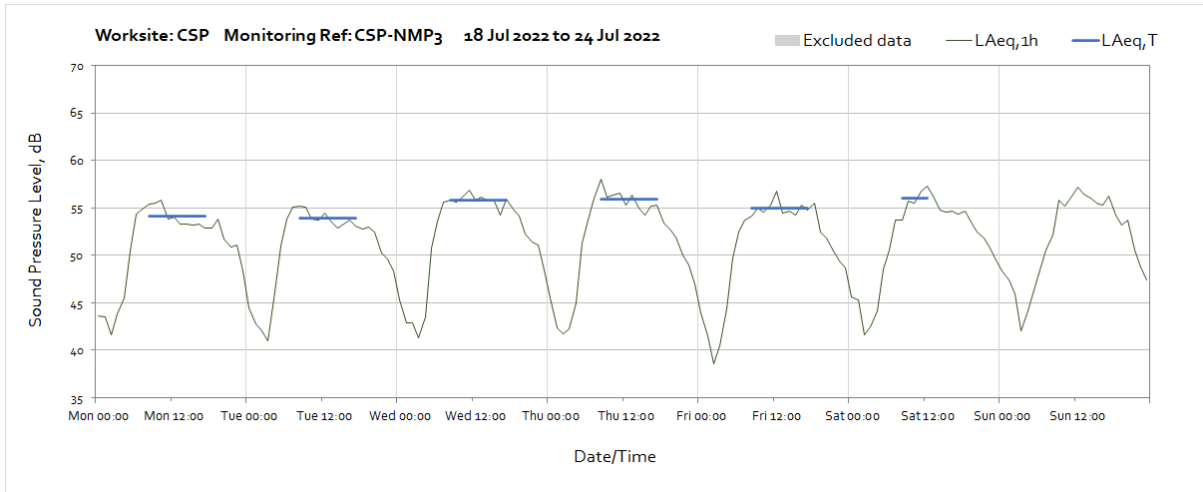
Note: Missing data between 00:00 and 01:00 on the 7<sup>th</sup> July was due to monitor settings update.



Note: Missing data between 11:00 and 12:00 on the 25<sup>th</sup> July was due to monitor field calibration.

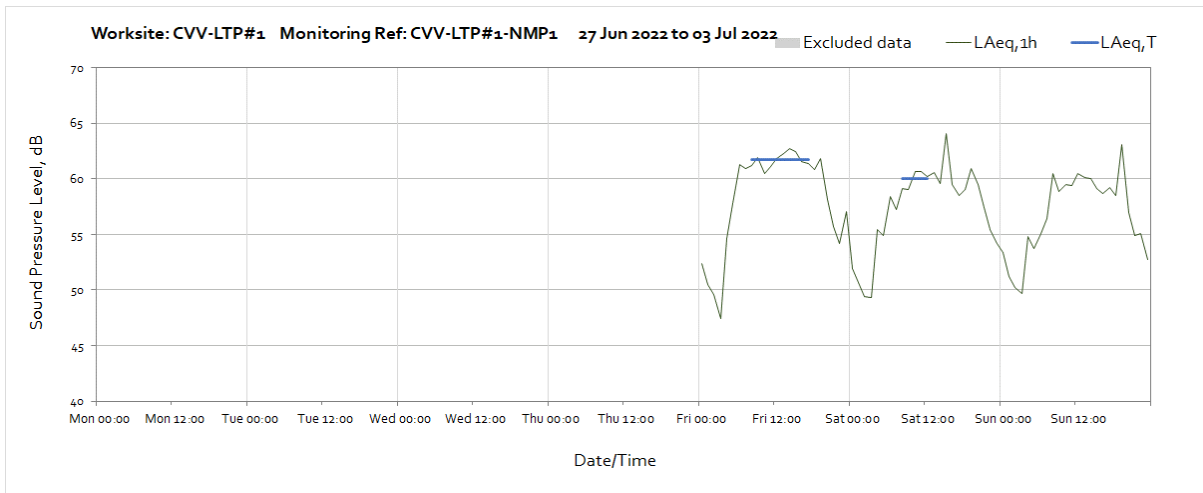
## Worksite: CSP – Monitoring Ref: CSP-NMP3

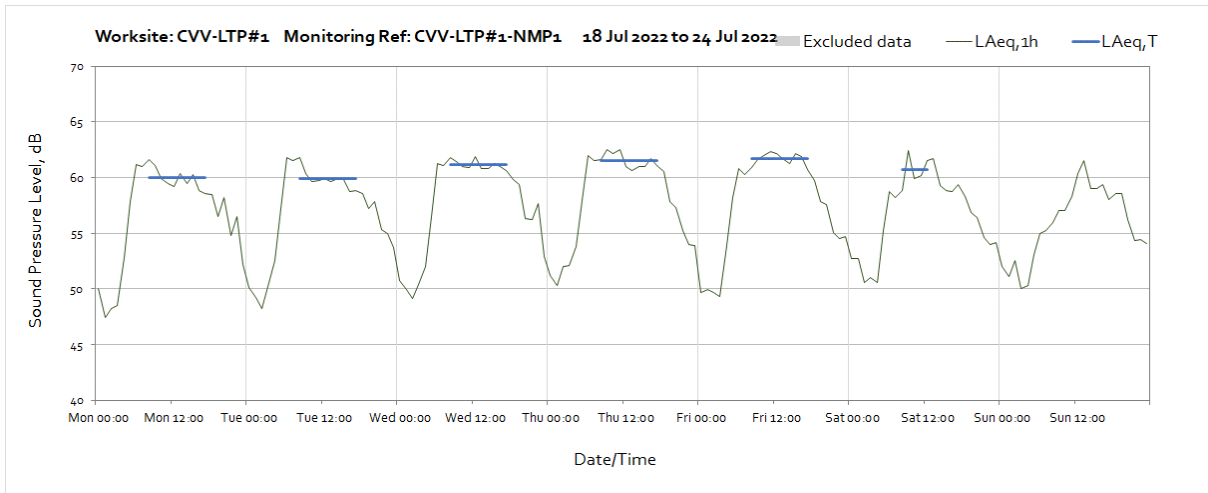
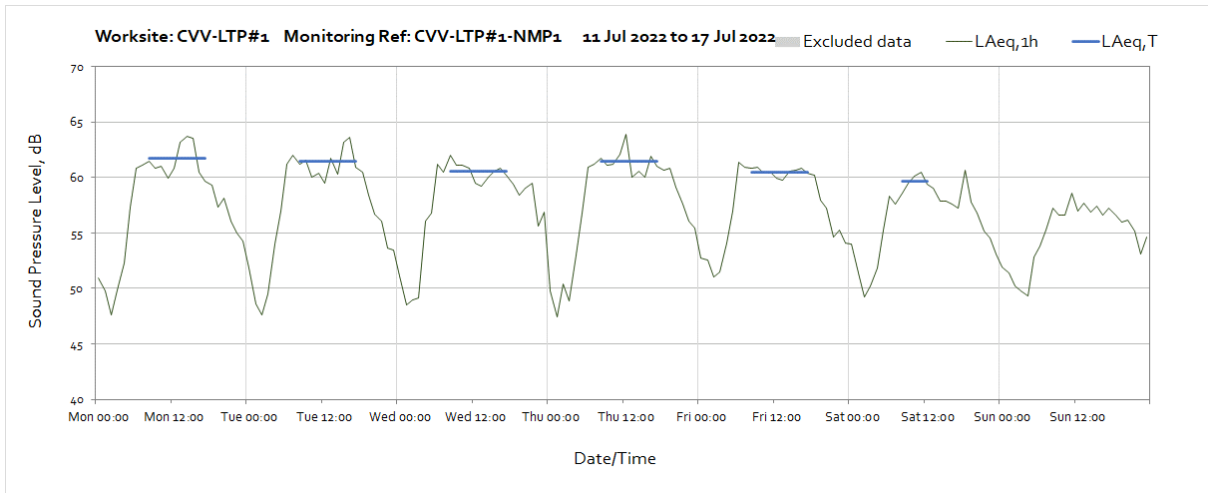
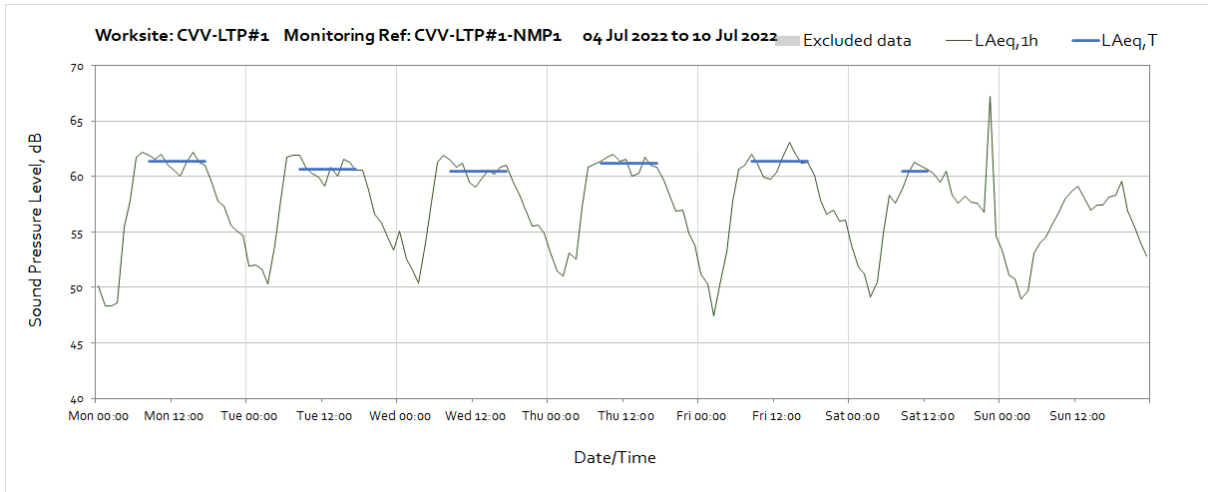




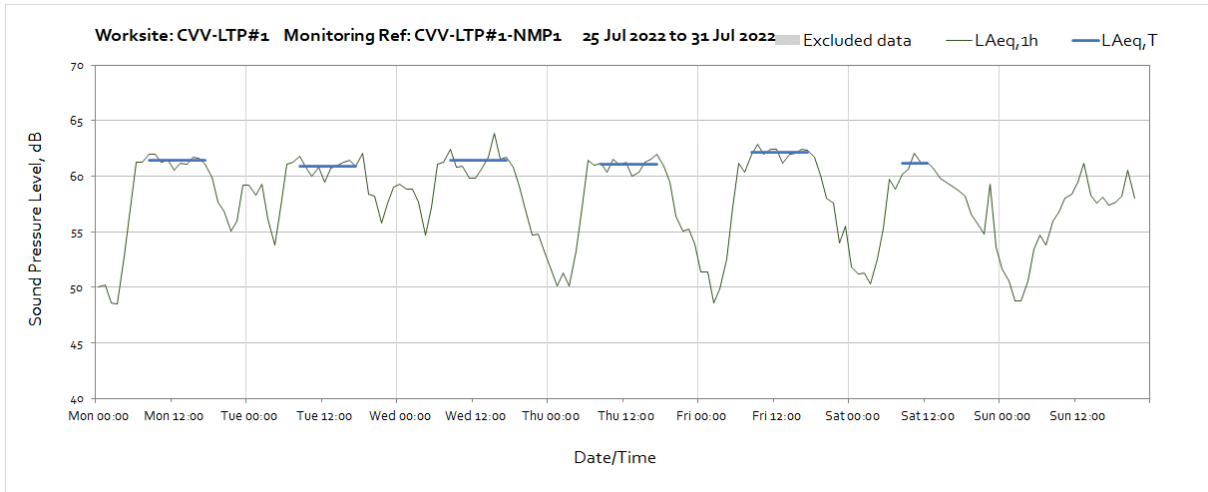
Note: Missing data between 11:00 and 12:00 on the 25<sup>th</sup> July was due to monitor field calibration.

**Worksite: CVV-LPT#1 - Monitoring Ref: CVV-LPT#1-NMP1**

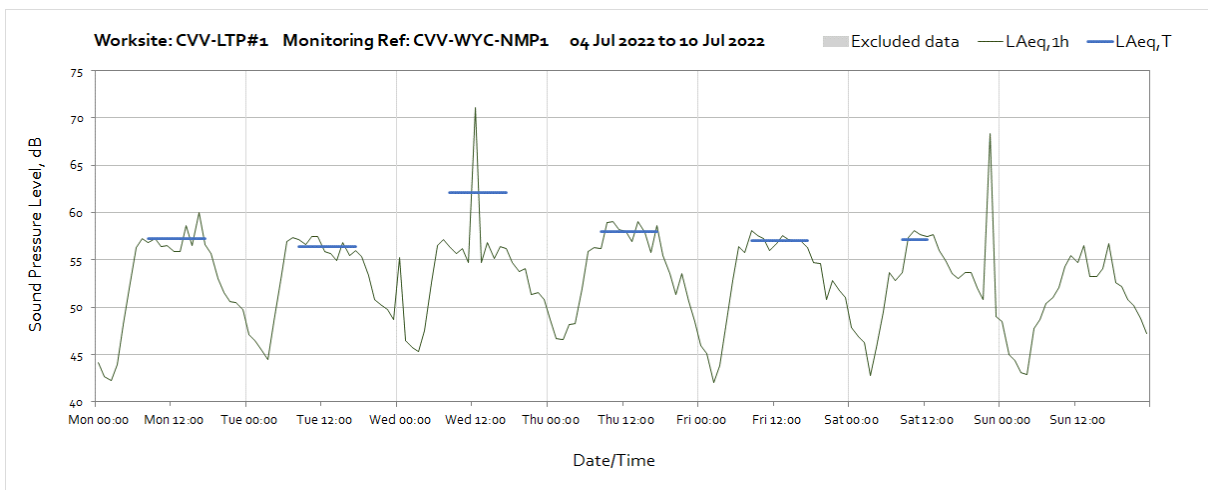
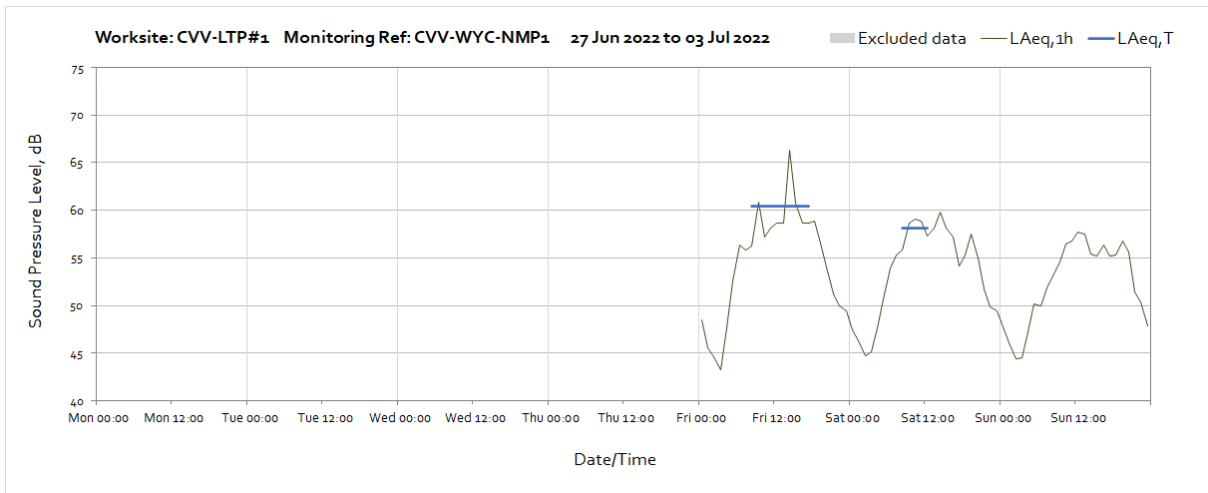


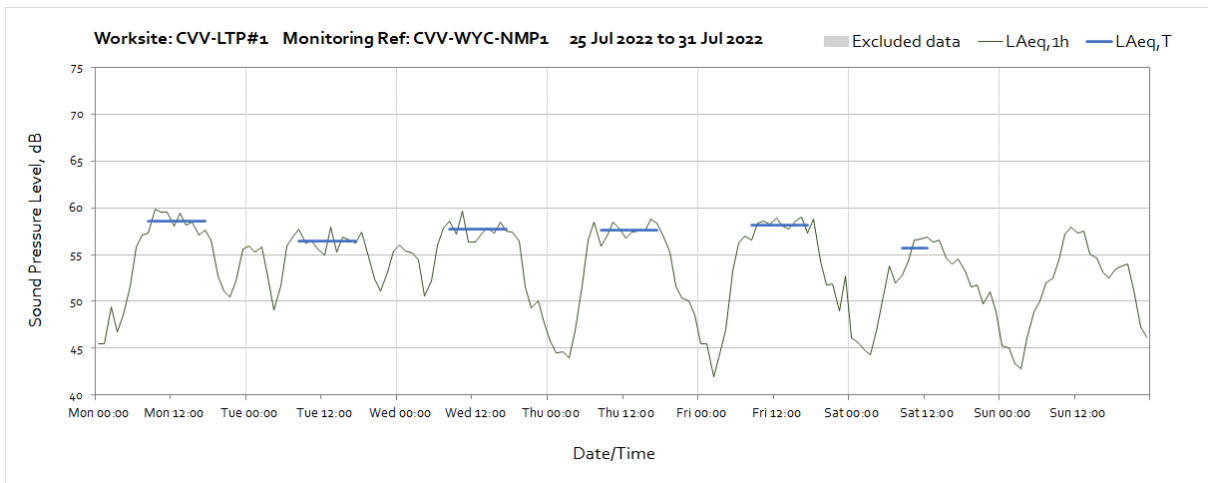
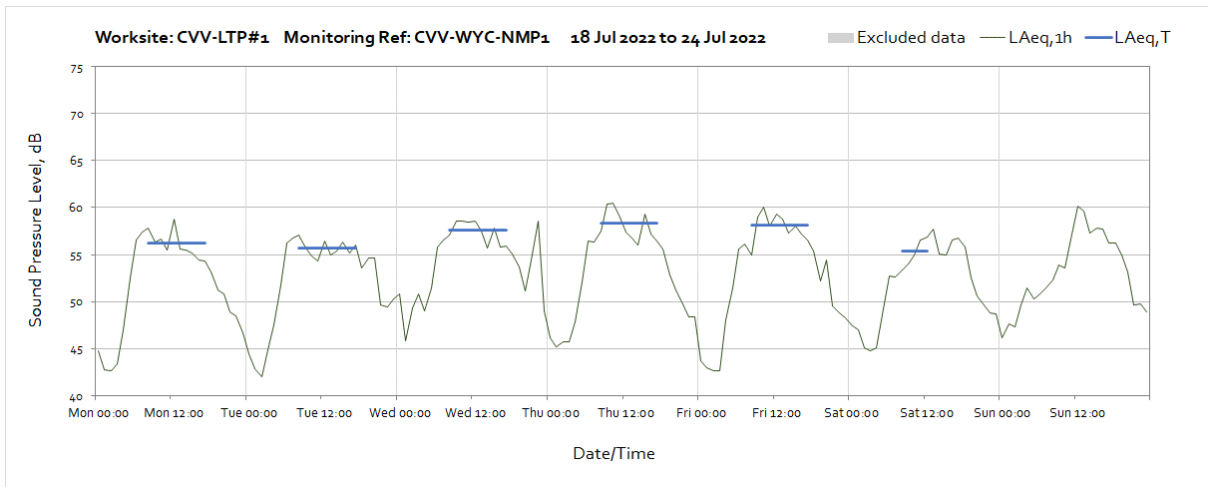
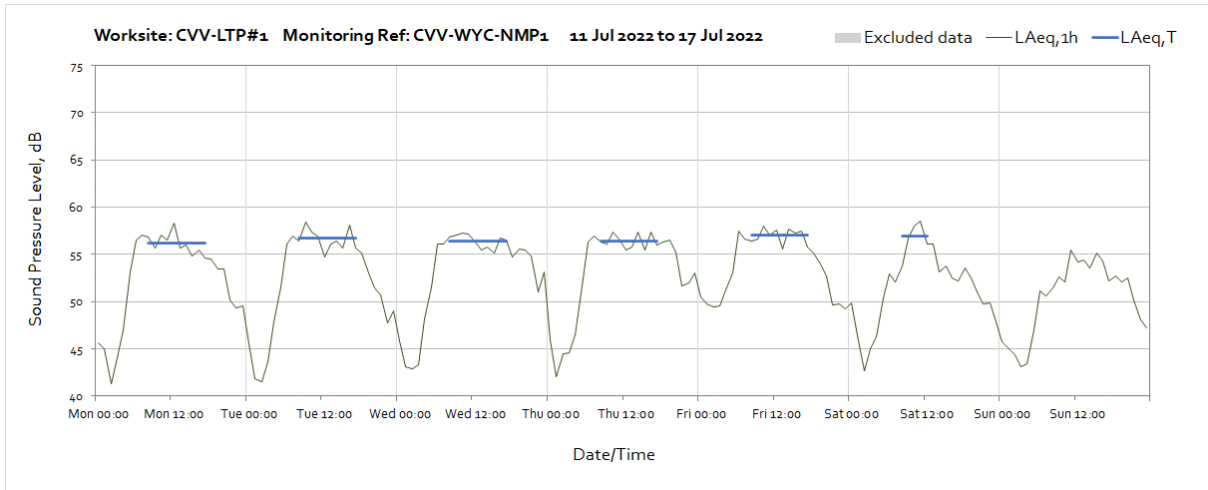




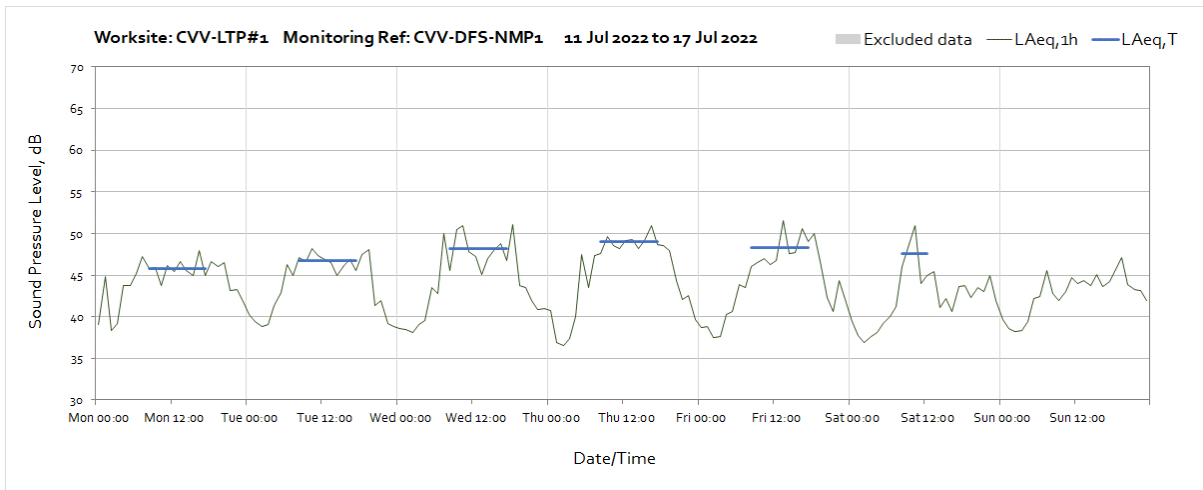
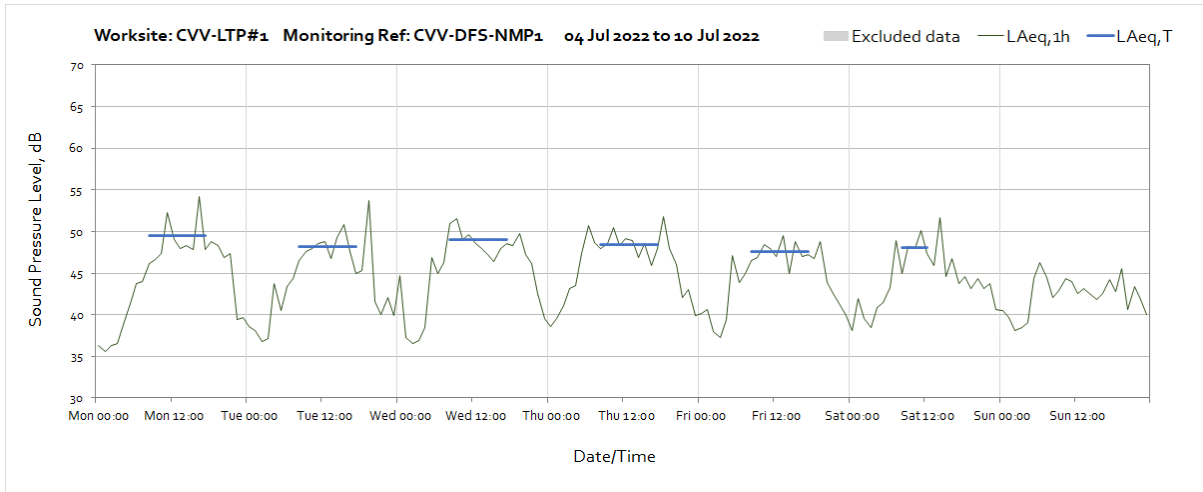
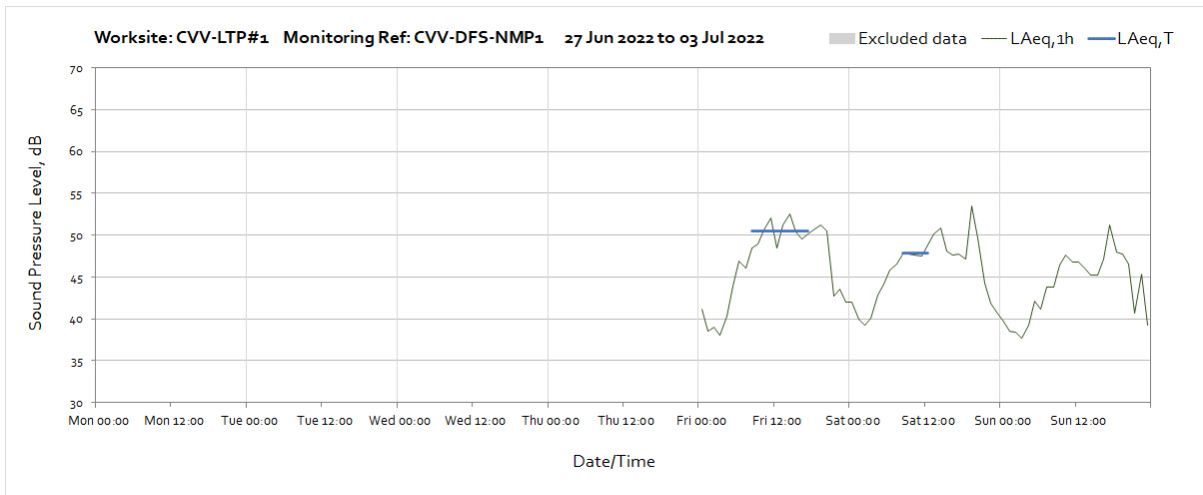


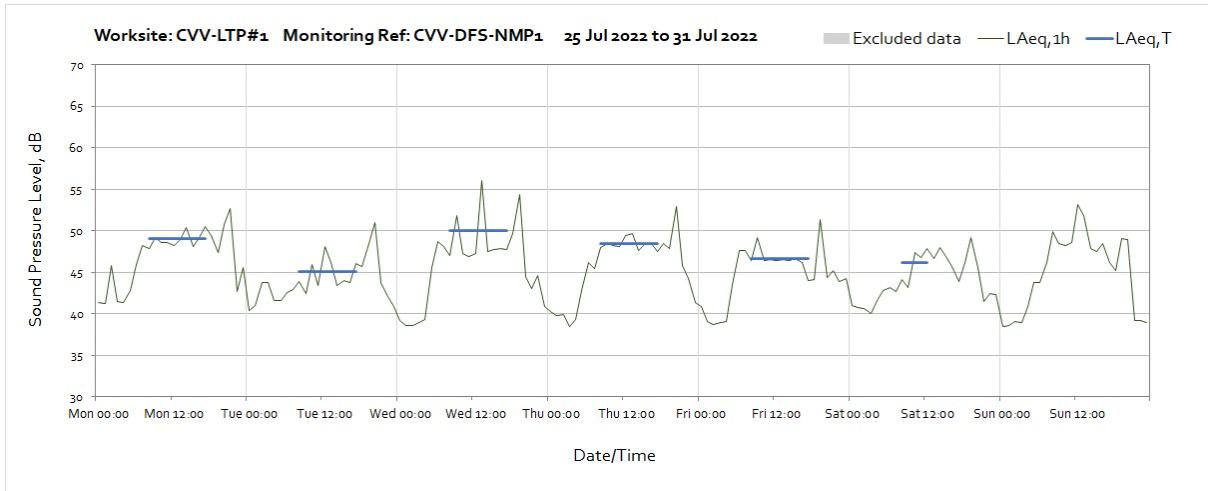
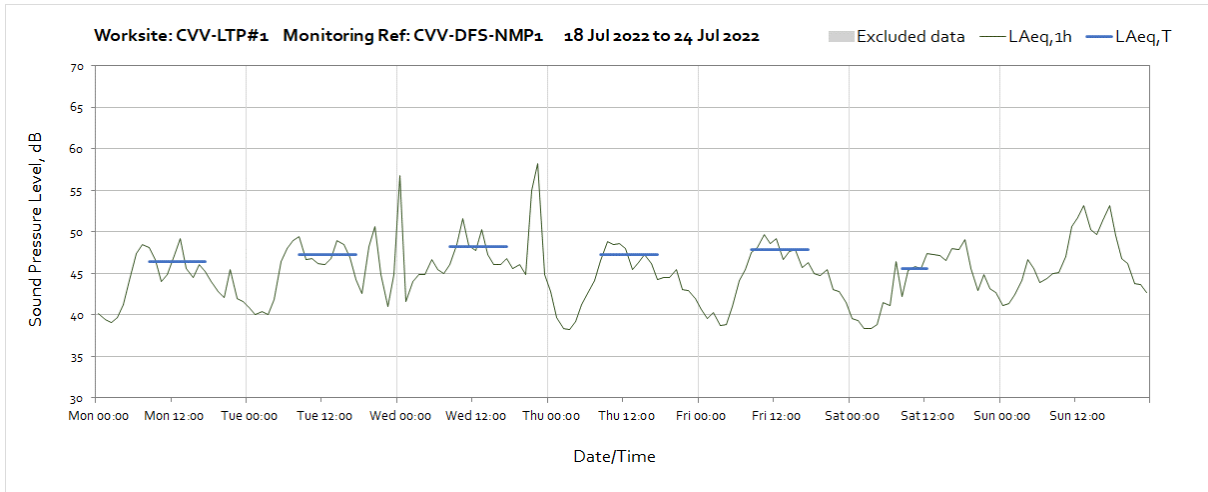
### Worksite: CVV-LPT#1 – Monitoring Ref: CVV-WYC-NMP1



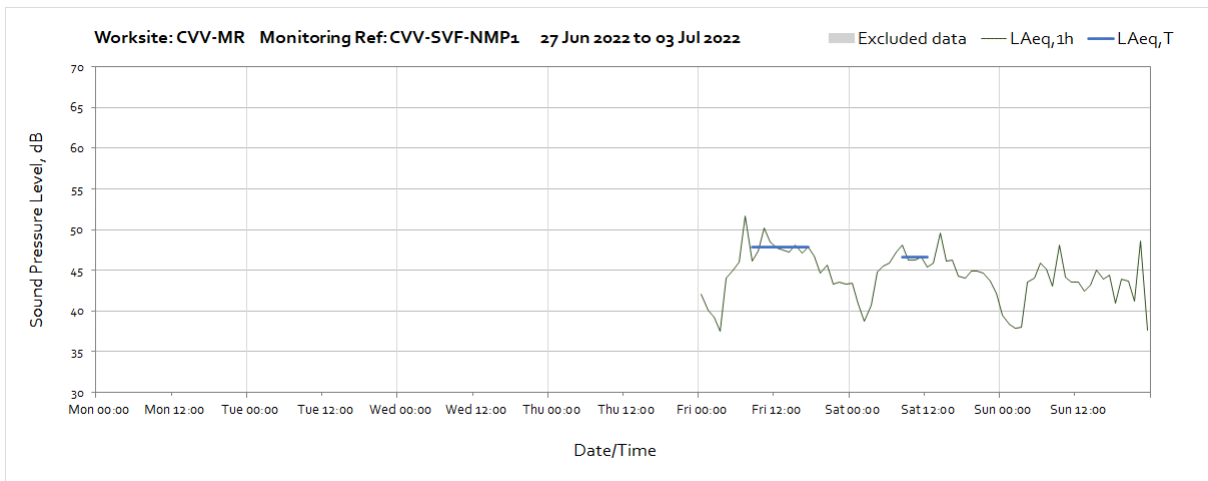


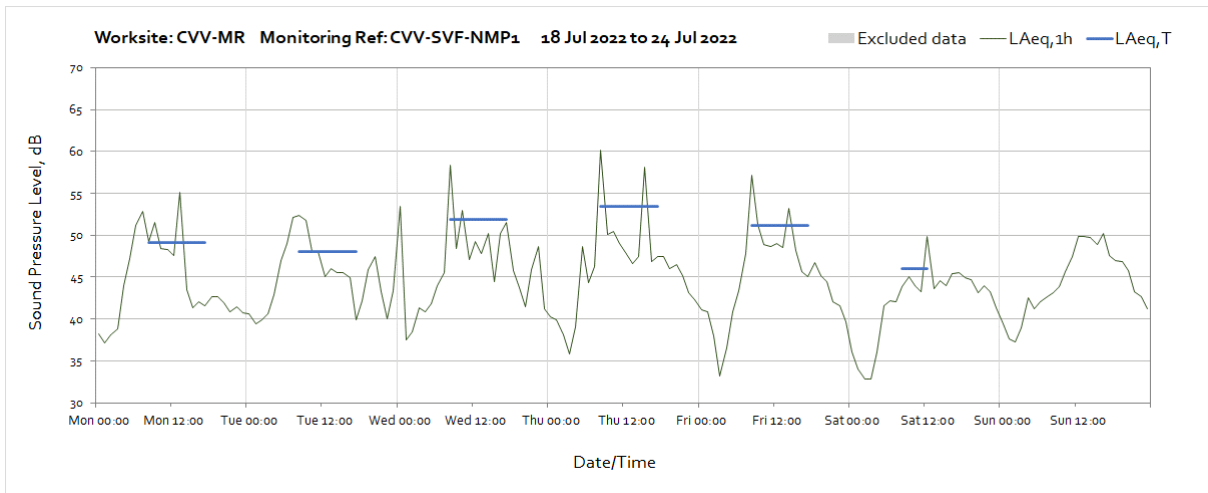
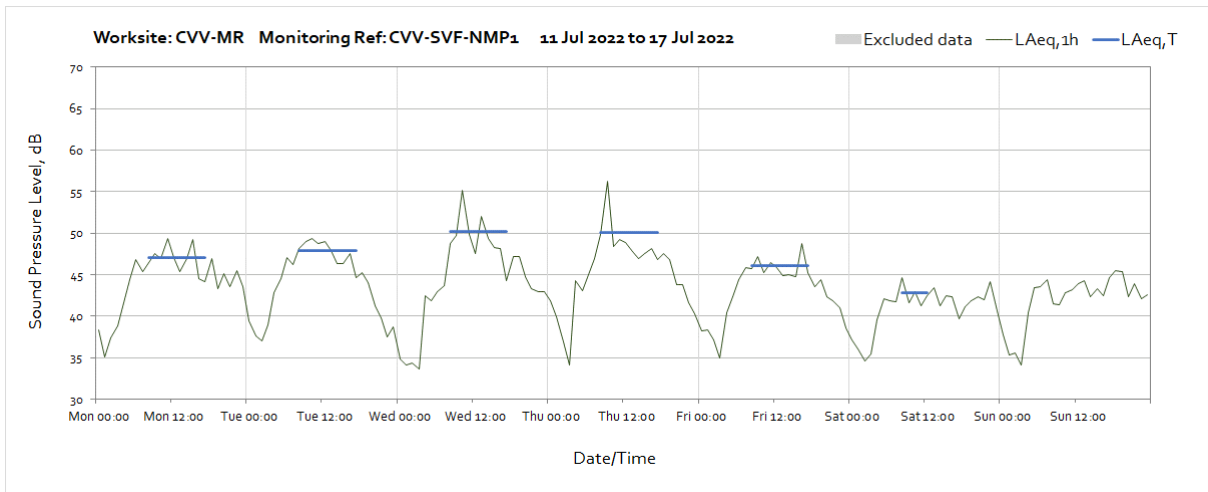
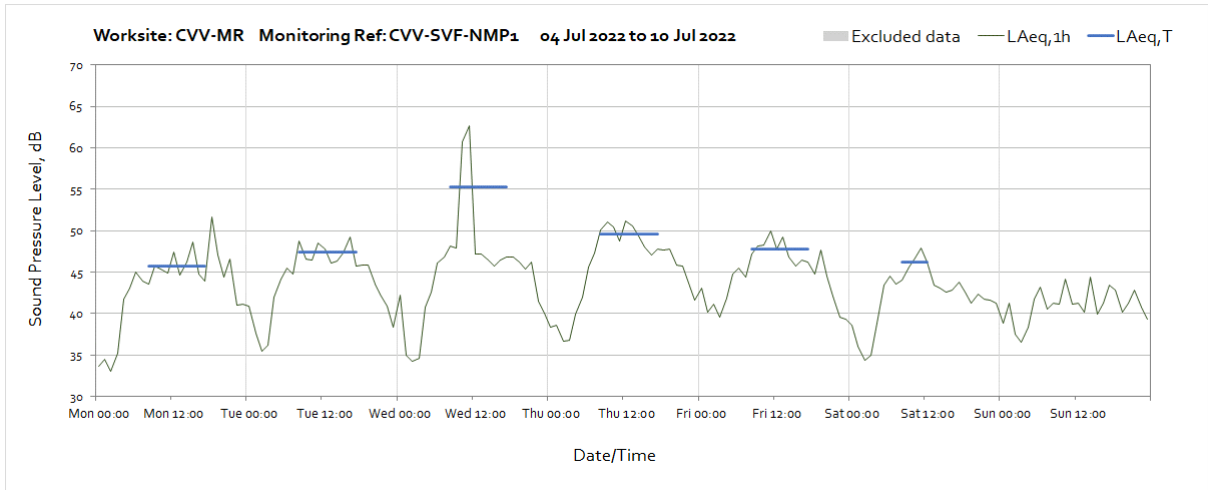
## Worksite: CVV-LTP#1 – Monitoring Ref: CVV-DFS-NMP1

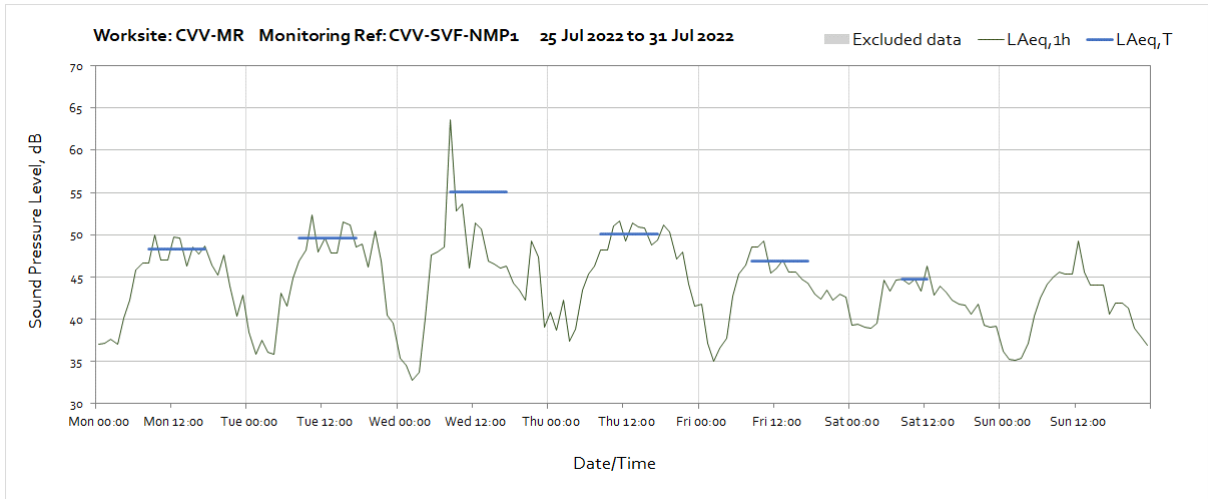




**Worksite: CVV-MR - Monitoring Ref: CVV-SVF-NMP1**



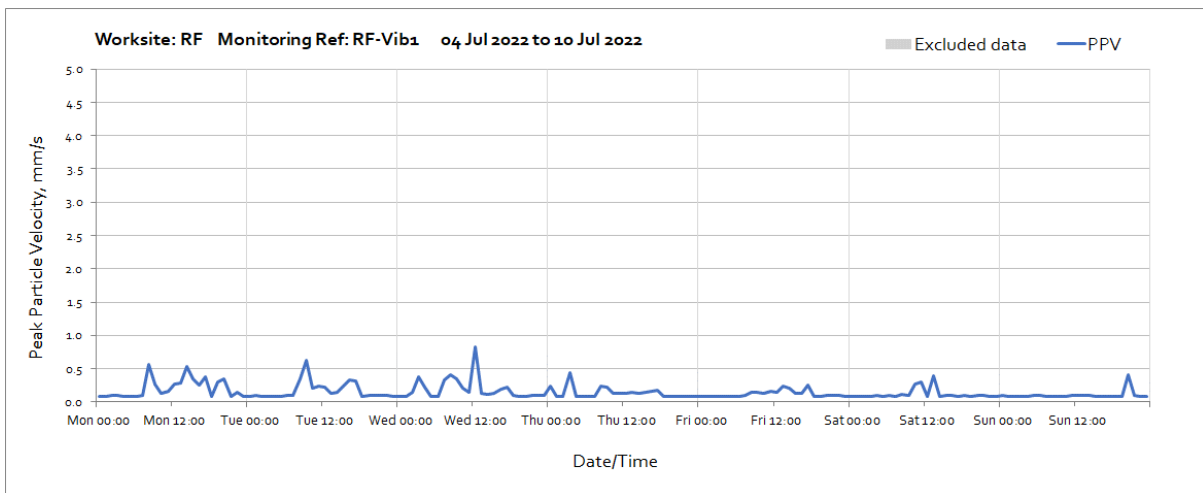
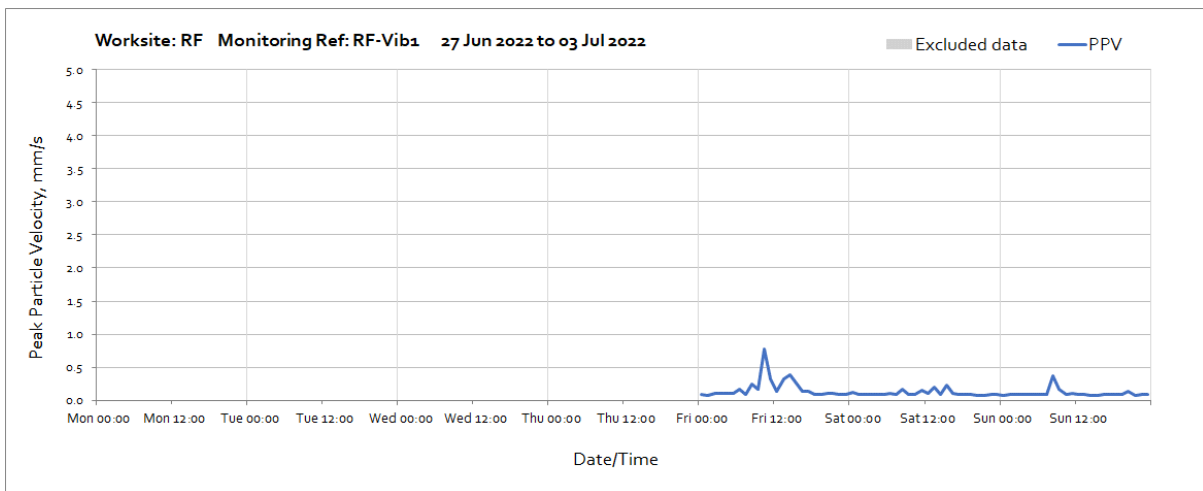


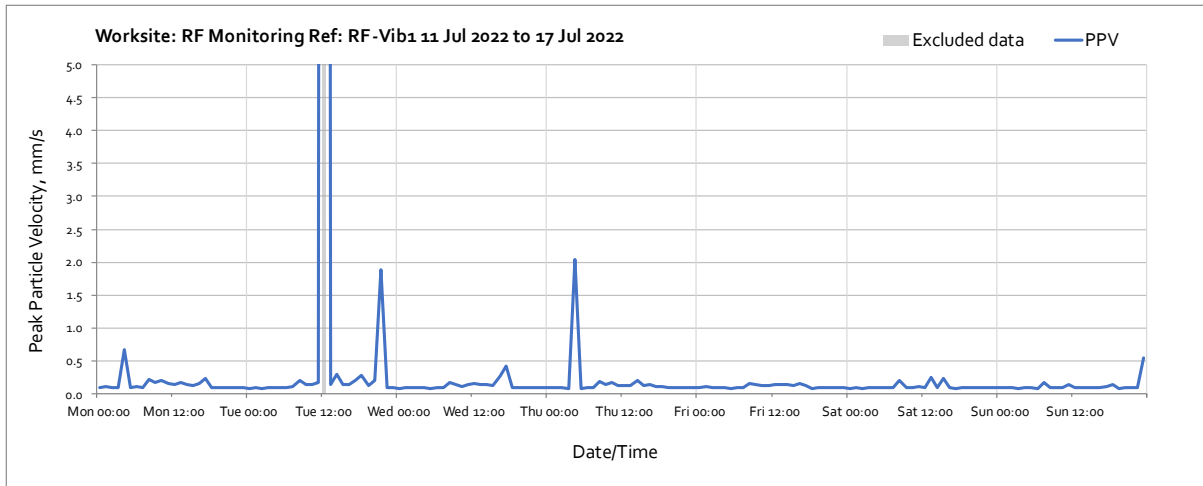


# Vibration

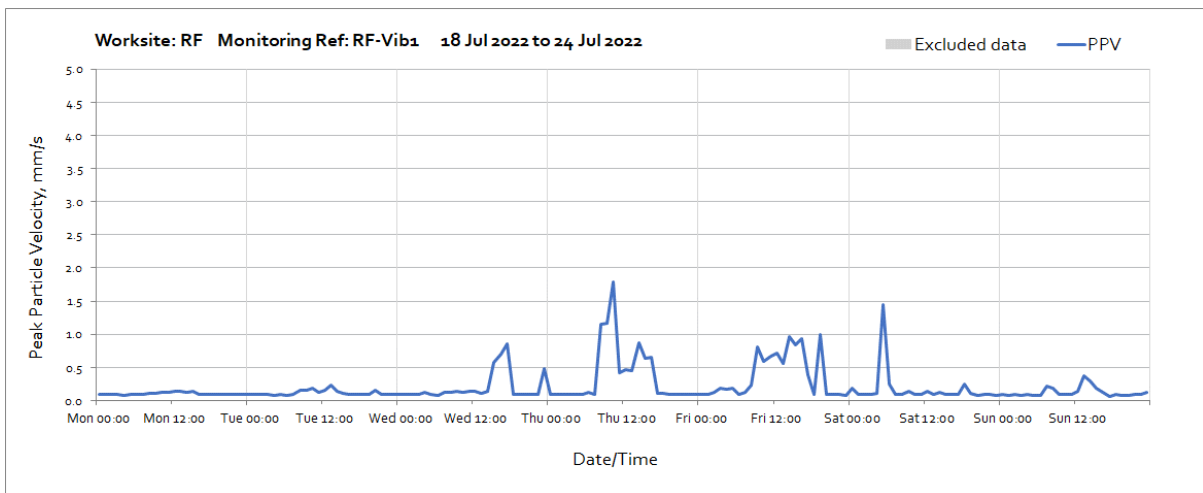
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the highest PPV of the three orthogonal axes x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative 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: RF – Monitoring Ref: RF-Vib 1

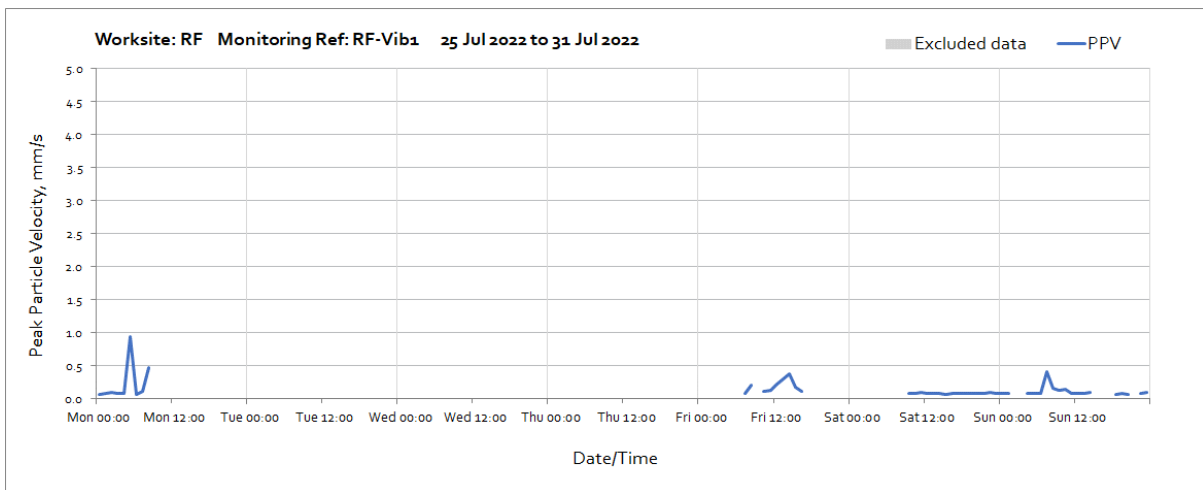




Note: High data peak between 12:00 and 13:00 on the 12<sup>th</sup> July was due to monitor maintenance.



Note: Missing data between 16:00 and 17:00 on the 24<sup>th</sup> July was due to monitor communication issue.

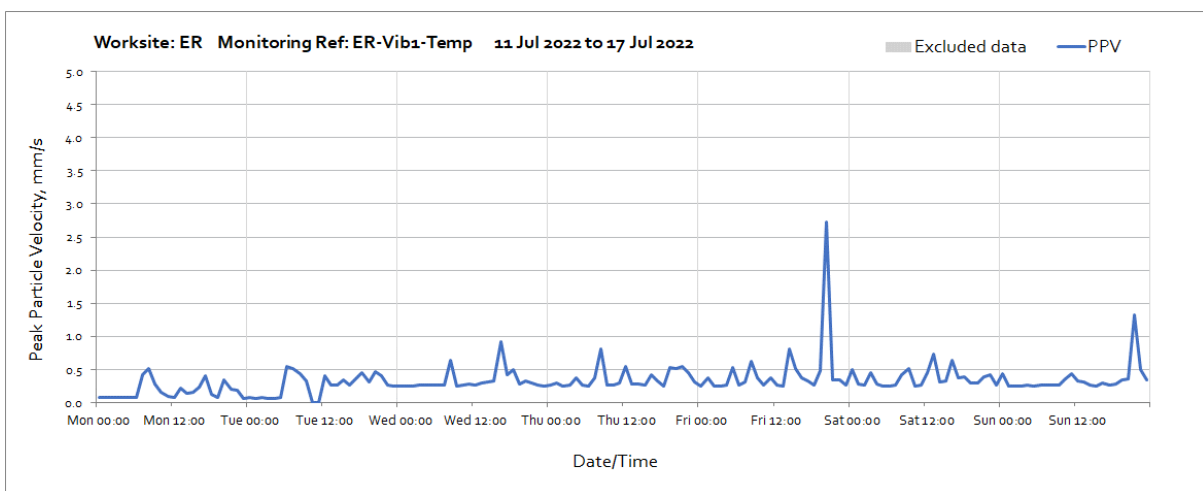
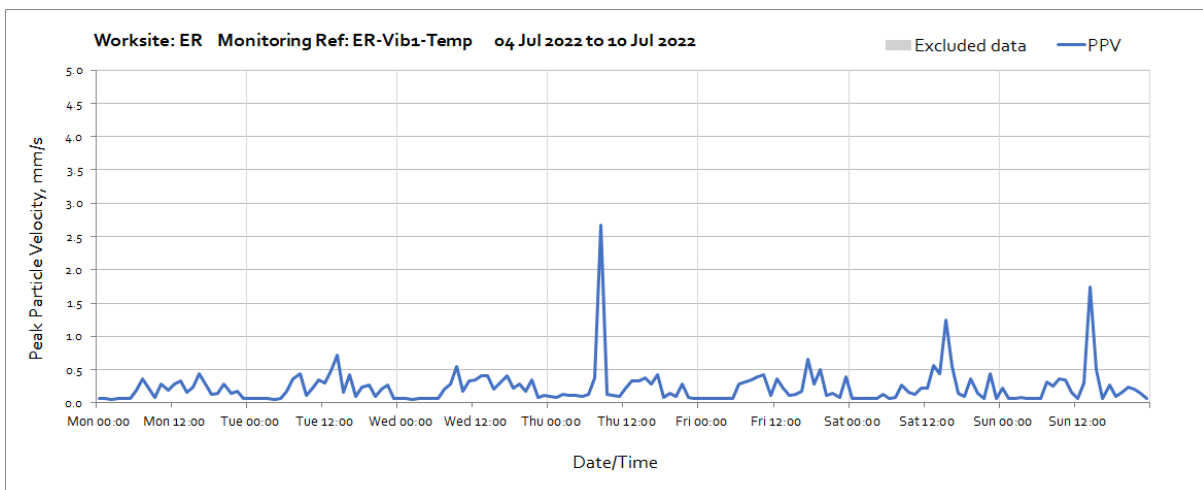
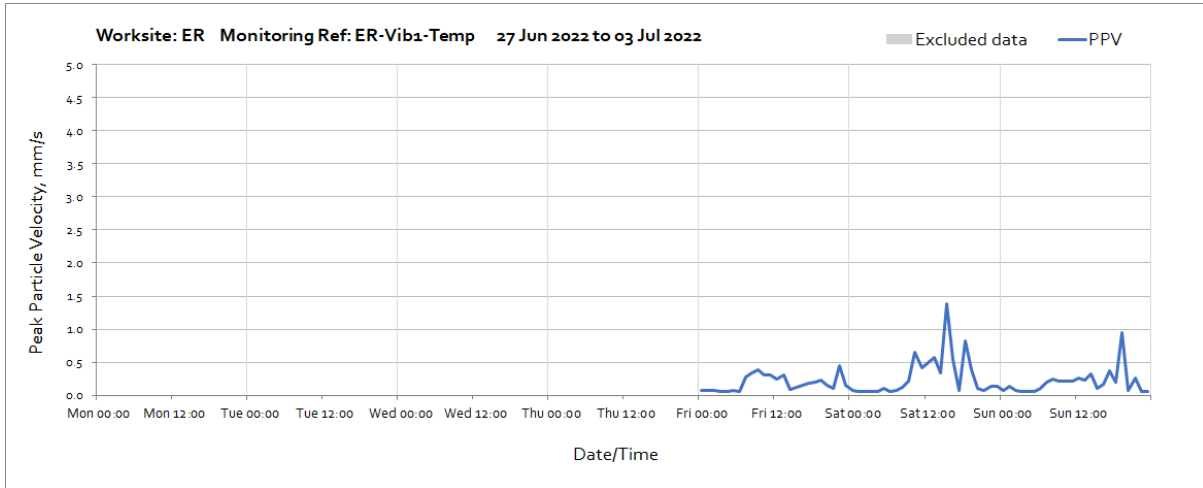


Note: Missing data between 09:00 on the 25<sup>th</sup> July and 07:00 on the 29<sup>th</sup> July, 09:00 and 10:00 on the 29<sup>th</sup> July, 17:00 on the 29<sup>th</sup> July and 09:00 on the 30<sup>th</sup> July, 02:00 and 04:00 on the 31<sup>st</sup> July, 15:00 and 18:00 on the 31<sup>st</sup> July and 21:00 and 22:00 on the 31<sup>st</sup> July was due to monitor communication issue.

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