

## **Construction noise and vibration Monthly Report – May 2020**

### **London Borough of Camden**

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# Non-technical summary

This Noise and Vibration Monitoring Report fulfils HS2 Limited's commitment detailed in the Environmental Minimum Requirements (EMRs), Annex 1, Code of Construction Practice, to present the results of noise and vibration monitoring carried out within the London Borough of Camden (LBC) during the month of May 2020.

A number of worksites were active during the reporting month in the LBC area. Noise monitoring was undertaken adjacent to the following worksites.

Works at on-network worksite C included vegetation removal to enable structural assessment of the Park Village East parapet wall, general surveying, installation trackside hoarding and ground investigation works.

Works at on-network worksites D, E and F included installation of site temporary services, installation of working platforms, installation of scaffolding, site setup, construction of drilling fluid slabs and test piling.

Works at on-network worksites G and H included cutline installation, demolition works, cable management system installation, high level cabling installation and lighting installation.

Materials processing and ancillary activities were undertaken at the DB Cargo and former Addison Lee worksite (ref. S001-WS01).

Materials storage and laydown were underway at the 132 and 140 Hampstead road and Petrol Station worksite (ref. S001-WS02).

Demolition and groundworks were undertaken at the Regent's Park Estate worksite (ref. S001-WS07).

At Wolfson House, Walkden House, 67-75 & 77-79 Euston Rd, worksite (ref. S003-WS03) work activities involved demolition and propping.

Processing of arisings was underway at the Ibis Hotel, 3 Cardington Street worksite (ref. S003-WS05).

Deliveries were made to the Former National Temperance Hospital, 110 Hampstead Road worksite (ref. S003-WS06).

Groundworks were underway at the 93-103 Drummond Street, 11-15 Melton Street, 54-64 Euston Street and 69 Cobourg Street worksite (ref. S003-WS07).

At the One Euston Square, 40 Melton Street, Grant Thornton House, 22 Melton Street worksite (ref. S003-WS09) demolition and scaffolding were undertaken.

Euston utilities diversions were underway on Stephenson Way, Gower Street, North Gower Street and Euston Street. Additional activities were undertaken within proximity to Euston Station which included signalling & telecoms maintenance, track maintenance, overhead line inspections, grinding, arc welding, points motor replacement, fixing and containment, tanking points, drilling of sleepers, crossing replacements and installation of demarcation posts.

Vibration monitoring was undertaken in the vicinity of Regent's Park Estate (worksite ref. S001-WS07), the Walkden House, 67-75 & 77-79 Euston Road worksite (ref. S003-WS03), the Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street worksite (ref. S003-WS05), the Ibis Hotel, Euston Square Gardens (west) worksite (ref. S003-WS08) and Cubitt Court on Park Village East (V043) (worksite ref. S001-WS07).

Further works were also undertaken as part of the Granby Terrace Bridge utilities diversion on Stanhope Street. Works involved excavations, works to grout the water main involving breaking out tarmac, excavating and cutting into main and filling with foamed concrete. Works at Cumberland Market involved temporary tarmac removal. Removal and replacement of faulty waterworks infrastructure covers were undertaken at Albany Street.

Guideline criteria for significant adverse effects were exceeded on two occasions due to HS2 works in the LBC area during May 2020. Six complaints were received during the monitoring period. Description of complaints, results of investigations and any actions taken are detailed in Table 8 of this report.



# Abbreviations and descriptions

The abbreviations, descriptions and project terminology used within this report can be found in Table 1.

Table 1: Table of abbreviations

Acronym/Term	Definition
$L_{Aeq,T}$	See equivalent continuous sound pressure level
Ambient sound	A description of the all-encompassing sound at a given location and time which will include sound from many sources near and far. Ambient sound can be quantified in terms of the equivalent continuous sound pressure level, $L_{pAeq,T}$
Decibel(s), or dB	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140dB.
Decibel(s) A-weighted, or dB(A)	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.
Equivalent continuous sound pressure level, or $L_{Aeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Exclusion of data	Measurement of noise levels can be affected by weather conditions such as prolonged periods of rain, winds speeds higher than 5m/s and snow/ice ground cover. Noise levels measured during these periods are considered not representative of normal noise conditions at the site and, for the purposes of this report, are excluded from the assessment of exceedances and calculation of typical noise levels and are also greyed out in charts. Identifiable incongruous noise and vibration events not attributable to HS2 construction noise are also excluded.
Façade	A facade noise level is the noise level 1m in front of a large reflecting surface. The effect of reflection, is to produce a slightly higher (typically +2.5 to +3 dB) sound level than it would be if the reflecting surface was not there.
Free-field	A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
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.
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 The nominated undertaker 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.

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 London Borough of Camden (LBC) for the period 1<sup>st</sup> to 31<sup>st</sup> May 2020.

1.1.2 Active construction sites in the local authority area during this period include:

- On-network HS2 preparatory works: worksite ref. C (see plan 2 in Appendix A)
  - Works included vegetation removal to enable structural assessment of the Park Village East parapet wall, general surveying, installation trackside hoarding and ground investigation works.
- On-network HS2 preparatory works: worksites ref. D, E and F (see plans 2 and 3 in Appendix A)
  - Works included installation of site temporary services, installation of working platforms, installation of scaffolding, site clearance including vegetation clearance and scrub, installation and adaptation of hoarding, construction of drilling fluid slabs and test piling.
- On-network HS2 preparatory works: worksites ref. G and H (see plan 3 in Appendix A)
  - Works included cutline installation, demolition works, cable management system installation, high level cabling installation and lighting installation.
- DB Cargo shed and adjacent land on Granby Terrace, worksite ref. S001-WS01 (see plan 2 in Appendix A)
  - Works included materials processing and ancillary activities.

- 132 and 140 Hampstead Road and Petrol Station, worksite ref. S001-WS02 (see plan 2 in Appendix A)
  - Works included material storage and laydown.
- Regent's Park Estate, worksite ref. S001-WS07 (see plan 2 and 3 in Appendix A)
  - Works activities included demolition and groundworks.
- Wolfson House, Walkden House, 67-75 & 77-79 Euston Rd, worksite ref. S003-WS03 (see plan 3 in Appendix A)
  - Works activities included demolition and propping.
- Ibis Hotel, 3 Cardington Street, worksite ref. S003-WS05 (see plan 3 in Appendix A)
  - Work activities included processing of arisings.
- Former National Temperance Hospital, 110 Hampstead Road, worksite ref. S003-WS06 (see plan 3 in Appendix A)
  - Site activities included deliveries.
- 93-103 Drummond Street, 11-15 Melton Street, 54-64 Euston Street, 69 Cobourg Street, worksite ref. S003-WS07 (see plan 3 in Appendix A)
  - Works activities included groundworks.
- One Euston Square, 40 Melton Street, Grant Thornton House, 22 Melton Street, worksite ref. S003-WS09 (see plan 3 in Appendix A)
  - Works activities included scaffolding and demolition.
- Vehicle Holding Area, worksite ref. VLH (see plan 1 in Appendix A)
  - Works activities included surveying, site clearance and installation of hoarding were undertaken.

Works to divert utilities were also undertaken at the London on Stanhope Street as part of the Granby Terrace Bridge utilities diversion (GTB Utilities). Utility works involved excavations, works to grout the water main, involving breaking out of tarmac, excavating and cutting into main and filling with foamed concrete. Works at Cumberland Market involved temporary tarmac removal. Faulty hydroguard covers were removed and replaced at Albany Street. Water mains and sewers diversion works were undertaken in Park Village East, Delancey Street, Stanhope Street, Mornington Terrace and Augustus Street.

- 1.1.3 The applicable standards, guidance, and monitoring methodology is outlined in the construction noise and vibration monitoring methodology report which can be found at the following location <https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2>. Noise and vibration monitoring reports for previous months can also be found at this location. Noise and vibration reports prior to 2018 can be found at the following location [www.gov.uk/government/publications/monitoring-noise-and-vibration-on-the-hs2-phase-one-route](http://www.gov.uk/government/publications/monitoring-noise-and-vibration-on-the-hs2-phase-one-route).

## 1.2 Measurement locations

1.2.1 Table 2 summarises the position of noise and vibration monitoring installations within the LBC area in May 2020.

1.2.2 Maps showing the position of noise and vibration monitoring installations are presented in Appendix B.

Table 2: Monitoring locations

Worksite Reference	Measurement Reference	Address
B	JC	Juniper Crescent
C	N046	Lamppost opposite to 49 Mornington Terrace
	N022	External to 34 Mornington Terrace
	N024	External to Park Village Studios, Park Village East
	N047	Park Village East/Mornington Street bridge, lamppost #13
D	N004	Mornington Terrace, lamppost #7 (junction of Mornington Terrace, Mornington Place and Clarkson Row)
E	N005	5A Granby Terrace
F	BS	Roof of Stockbeck House, Barnby Street
	N023	Lamppost #21 on Hampstead Road
G	HH	Euston Station Parcel Deck, Barnby Street
S001-WS01	N001	Park Village East, lamppost #1 (external to Cubitt Court, 100 Park Village East)
	N002	Park Village East, lamppost #2 (external to Richmond Court)
	N003	Park Village East, lamppost #9 (external to Silsoe House)
S001-WS02	N018	Outside replacement housing, Hampstead Road
	N019	Outside Cartmel, Hampstead Road
S001-WS07	N020	Mackworth Street, lamppost #1
	N021	Stanhope Street, lamppost #2
	N044	Regents Park Estate west, near Langdale
	N045	Regents Park Estate south, external to Coniston
	V039	Coniston, Regents Park Estate
	V043	Cubitt Court, Park Village East
S003-WS01	N016	Margaret Centre roof
S003-WS03	N006	Royal College of General Practitioners roof level
	N008	Stephenson's Way lamppost (external to RCGP)
	N010	Wesley Hotel
	N011	Euston Street, lamppost #4 (external to 82 Euston Street)

Worksite Reference	Measurement Reference	Address
	V002	Royal College of General Practitioners basement boiler room by Stephenson Way
	V037	Magic Circle, basement
	V038	Wesley Hotel, basement lightwell, Euston Street
S003-WS05	N014	Starcross Street lamppost (external to Exmouth Arms)
	V021	42-44 Cobourg Street
S003-WS06	N017	Hampstead Road, lamppost #48
S003-WS07	N012	Drummond Street, lamppost #14 (opposite to 92-94 Drummond Street)
S003-WS08	N007	Royal College of General Practitioners, Melton Street
	V003	Royal College of General Practitioners basement vaults under Melton St
Vehicle Holding Area (VHA)	N025	External to 3 Prince Albert Road
	N026	Thames Water Compound

## 2 Summary of results

### 2.1 Exceedances of SOAEL

- 2.1.1 The significant observed adverse effect levels (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."
- 2.1.2 Where construction noise levels exceed the SOAEL, relevant periods will be identified and summary statistics provided in order to evaluate ongoing qualification for noise insulation and temporary rehousing.
- 2.1.3 Table 3 presents a summary of recorded exceedances of the SOAEL due to HS2 related construction noise at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 3: Summary of exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
B	JC	Juniper Crescent	Weekday	08:00-18:00	1 <sup>(1)</sup>

Worksite Reference	Measurement Reference	Monitor Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
C	N046	Lamppost opposite to 49 Mornington Terrace	All days	All periods	No exceedance
	N022	External to 34 Mornington Terrace	All days	All periods	No exceedance
	N024	External to Park Village Studios, Park Village East	All days	All periods	No exceedance
	N047	Park Village East/Mornington Street bridge, lamppost #13	All days	All periods	No exceedance
D	N004	Mornington Terrace, lamppost #7	All days	All periods	No exceedance
E	N005	5A Granby Terrace	All days	All periods	No exceedance
F	BS	Barnby Street	All days	All periods	No exceedance
	N023	Amphill Estate, lamppost #21, Hampstead Road	All days	All periods	No exceedance
G	HH	Euston Station Parcel Deck, Barnby Street	All days	All periods	No exceedance
S001-WS01	N001	Park Village East Lamppost #1	All days	All periods	No exceedance
	N002	Park Village East Lamppost #2	Weekday	0800-1800	1 <sup>(2)</sup>
	N003	Park Village East Lamppost #9	All days	All periods	No exceedance
S001-WS02	N018	132 and 140 Hampstead Road and Petrol Station	All days	All periods	No exceedance
	N019	132 and 140 Hampstead Road and Petrol Station	All days	All periods	No exceedance
S001-WS07	N020	Mackworth Street, lamppost #1	All days	All periods	No exceedance
	N021	Stanhope Street, lamppost #2	All days	All periods	No exceedance
	N044	Regents Park Estate west, near Langdale	All days	All periods	No exceedance
	N045	Regents Park Estate south, external to Coniston	All days	All periods	No exceedance
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18	All days	All periods	No exceedance
	N047	Park Village East/Mornington Street bridge, lamppost #13	All days	All periods	No exceedance
S003-WS01	N016	Margarete Centre roof	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Monitor Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
S003-WS03	N006	Royal College of General Practitioners Roof level	All days	All periods	No exceedance
	N008	Walkden House, 67-75 & 77-79 Euston Rd	All days	All periods	No exceedance
	N010	Wesley Hotel	All days	All periods	No exceedance
	N011	Walkden House, 67-75 & 77-79 Euston Rd	Weekday	0800-1800	2
S003-WS05	N014	Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street	All days	All periods	No exceedance
S003-WS06	N017	Hampstead Road, lamppost #48	All days	All periods	No exceedance
S003-WS07	N012	93-103 Drummond Street, 11-15 Melton Street, 54-64 Euston Street, 69 Cobourg Street	All days	All periods	No exceedance
S003-WS08	N007	Euston Square Gardens (west)	All days	All periods	No exceedance
VHA	N025	External to 3 Prince Albert Road	All days	All periods	No exceedance
	N026	Thames Water Compound	All days	All periods	No exceedance

(1) SOAEL exceedance was caused by Network Rail maintenance works and is therefore discounted from further assessment.

(2) SOAEL exceedance was caused by roadworks unrelated to HS2 and is therefore discounted from further assessment.

2.1.4 Noise levels above the SOAEL during periods of works were measured at monitoring locations JC, N002 and N011. High noise levels measured at JC were found to be due to Network Rail maintenance works, and at N002 were found to be caused by roadworks; in both cases the works were not related to HS2 and are not considered further in this report. SOAEL exceedances at N011 were caused by utility diversion works and are attributable to HS2 construction noise, however works were in-line with best practicable means and relevant section 61 consents

2.1.5 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 4 and may be lower than the total sum of individual exceedances reported in Table 3 for each location.

Table 4: Summary of total exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
S003-WS03	N011	Walkden House, 67-75 & 77-79 Euston Rd	2

2.1.6 Monitoring of vibration peak particle velocity (PPV) was undertaken with the purpose of ensuring that construction generated vibration are not of such a magnitude to damage adjacent buildings, in accordance with Annex 1: Code of Construction Practice of the High Speed Rail (London-West Midlands) Environmental Minimum Requirements. No exceedances of the Code of Construction Practice criteria due to vibration caused by HS2 vibration were measured. There are no LOAEL and SOAEL criteria based on PPV applicable to HS2 construction vibration.

## 2.2 Summary of measured noise and vibration levels

2.2.1 Table 5 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.

2.2.2 Noise monitoring in the vicinity of worksites G, H, S001-WS01, S001-WS07, S003-WS03 and S003-WS09 is considered representative of HS2 works in LBC during periods of construction works. Other worksites were not considered to be giving rise to substantial levels of HS2 related construction noise, with the measured noise levels largely dominated by the underlying ambient noise, acknowledging that intermittent HS2 works may on occasion be taking place within the area.



Table 5: Summary of measured dB L<sub>Aeq</sub> data over the monitoring period

Worksite Reference	Measurement Reference	Monitor 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
B	JC	Juniper Crescent	Free-field	58.8 (61.7)	57.9 (76.4)	56.5 (59.4)	57.7 (65.3)	55.5 (61.4)	58.1 (61.1)	60.3 (71.8)	55.4 (56.3)	56.5 (60.9)	53.7 (61.3)	56.1 (59.0)	55.1 (59.6)
C	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18	Free field	61.5 (63.5)	61.2 (62.4)	60.6 (62.4)	60.9 (62.8)	57.1 (61.4)	60.9 (62.4)	61.6 (64.7)	60.3 (60.9)	61.3 (65.5)	55.3 (61.4)	60.1 (65.0)	57.2 (61.6)
	N022	52A Mornington Terrace	Free-field	57.6 (59.8)	58.3 (59.8)	57.4 (61.8)	57.3 (60.2)	53.2 (59.8)	57.0 (58.9)	57.6 (59.3)	56.7 (57.2)	57.6 (60.9)	51.6 (57.0)	56.4 (61.3)	53.2 (57.1)
	N024	External to Park Village Studios, Park Village East	Free-field	53.3 (59.0)	62.5 (73.1)	52.8 (56.7)	52.5 (57.8)	49.0 (57.9)	51.7 (56.7)	51.9 (53.6)	53.2 (54.4)	53.4 (57.1)	48.0 (56.2)	53.1 (60.8)	49.0 (53.1)
	N047	Park Village East/Mornington Street bridge, lamppost #13	Free field	56.4 (59.7)	60.1 (65.5)	57.7 (61.1)	57.1 (60.6)	52.6 (61.5)	54.7 (56.6)	57.2 (61.6)	56.2 (57.0)	57.7 (62.5)	52.7 (61.2)	56.7 (61.7)	52.7 (58.5)
D	N004	Mornington Terrace, lamppost #7	Free-field	64.9 (69.3)	65.0 (67.2)	61.7 (64.4)	63.4 (71.8)	61.1 (69.6)	65.4 (69.8)	64.4 (67.0)	61.7 (62.7)	64.7 (71.2)	62.1 (71.3)	63.8 (72.9)	61.3 (69.6)
E	N005	5A Granby Terrace	Free-field	65.6 (67.0)	66.0 (68.4)	63.8 (65.6)	64.2 (67.4)	61.7 (66.0)	64.2 (65.7)	64.0 (66.6)	62.9 (65.5)	64.0 (69.1)	60.9 (66.1)	62.5 (65.3)	61.4 (65.2)

Worksite Reference	Measurement Reference	Monitor 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
F	BS	Roof of Stockbeck House, Barnby Street	Free-field	60.7 (66.5)	60.2 (61.9)	58.7 (61.3)	60.6 (63.8)	56.0 (64.4)	59.9 (60.9)	59.4 (60.3)	58.4 (59.4)	59.0 (61.4)	56.1 (63.5)	58.5 (63.8)	56.2 (59.9)
	N023	Amphill Estate, Hampstead Road	Free-field	69.0 (70.9)	68.8 (69.9)	68.3 (70.2)	67.6 (71.1)	64.2 (70.2)	66.4 (67.2)	66.3 (67.3)	68.2 (71.0)	67.6 (71.5)	63.3 (67.6)	67.2 (73.5)	64.6 (69.5)
G	HH	Euston Station Parcel Deck, Barnby Street	Free-field	60.9 (63.1)	61.8 (63.6)	62.6 (68.4)	61.5 (67.6)	57.3 (67.9)	60.1 (62.8)	60.2 (60.9)	61.2 (65.5)	61.9 (66.9)	56.2 (60.3)	60.3 (65.1)	58.0 (65.1)
S001-WS01	N001	External to Cubitt Court, 100 Park Village East	Façade	60.1 (68.1)	65.6 (69.7)	58.2 (61.1)	59.1 (67.6)	52.9 (70.9)	54.5 (56.2)	58.8 (62.9)	56.0 (57.7)	57.5 (60.7)	50.6 (56.9)	57.2 (67.0)	52.9 (58.0)
	N002	Richmond Court, Park Village East	Free-field	57.3 (61.4)	64.3 (74.1)	58.4 (62.8)	58.2 (63.4)	52.3 (59.7)	54.6 (56.1)	58.4 (64.3)	56.1 (56.9)	57.9 (62.5)	51.6 (61.1)	56.8 (62.1)	53.0 (59.8)
	N003	Silsoe House, Park Village East	Free-field	56.6 (60.9)	60.5 (62.6)	58.4 (63.1)	57.9 (62.7)	52.3 (68.9)	54.7 (56.3)	57.9 (61.8)	56.4 (57.0)	57.8 (62.7)	51.8 (59.6)	56.5 (60.8)	52.4 (57.5)
S001-WS02	N018	Outside replacement housing, Hampstead Road	Free-field	69.8 (72.1)	70.9 (72.2)	71.1 (77.6)	70.5 (76.6)	66.7 (71.7)	68.3 (70.0)	68.9 (70.3)	70.7 (74.8)	70.2 (73.7)	66.4 (70.3)	69.5 (74.4)	67.4 (70.7)
	N019	Outside Cartmel, Hampstead Road	Free-field	68.5 (71.1)	69.6 (70.3)	69.9 (74.4)	69.0 (74.1)	65.5 (73.6)	67.2 (69.2)	67.7 (70.0)	69.5 (73.2)	68.9 (72.6)	65.0 (69.4)	68.1 (71.7)	66.1 (69.6)

Worksite Reference	Measurement Reference	Monitor 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
S001-WS07	N020	Mackworth Street	Free-field	51.7 (55.5)	58.3 (64.2)	51.7 (54.9)	52.1 (57.3)	47.6 (61.4)	49.2 (51.0)	49.9 (51.1)	51.4 (53.3)	51.6 (55.5)	46.6 (53.2)	51.3 (60.4)	47.6 (52.6)
	N021	Stanhope Street, lamppost #2	Free-field	58.1 (67.8)	64.5 (68.2)	57.0 (61.2)	56.7 (65.7)	51.4 (69.0)	52.6 (55.0)	55.6 (58.1)	54.7 (56.5)	56.4 (65.4)	49.7 (56.7)	56.4 (71.8)	51.6 (57.6)
	N044	Regents Park Estate west	Free field	54.4 (59.2)	64.8 (69.1)	52.1 (54.9)	52.2 (57.9)	47.9 (56.7)	49.9 (51.5)	52.8 (58.8)	50.9 (54.4)	51.6 (54.8)	45.9 (51.8)	50.0 (55.6)	45.7 (49.0)
	N045	Regents Park Estate south, external to Coniston	Free field	56.3 (59.1)	67.2 (72.7)	56.8 (60.1)	56.2 (58.9)	52.6 (58.3)	54.3 (54.9)	54.9 (56.0)	55.7 (57.2)	54.9 (57.4)	51.3 (57.4)	53.7 (56.4)	50.8 (54.8)
S003-WS03	N006	RCGP Roof level	Free-field	56.4 (62.2)	65.2 (76.4)	53.9 (55.7)	53.5 (55.6)	52.0 (58.7)	53.4 (54.1)	54.7 (56.6)	55.4 (57.1)	54.4 (59.0)	52.4 (53.8)	54.2 (58.4)	52.6 (54.5)
	N008	RCGP Stephenson Way	Façade	58.7 (64.0)	65.8 (71.0)	55.0 (63.9)	54.7 (64.5)	56.0 (66.0)	55.1 (58.5)	56.8 (64.1)	55.2 (56.9)	54.8 (62.4)	55.8 (65.1)	55.8 (65.1)	55.0 (61.7)
	N010	Wesley Hotel	Façade	59.0 (68.6)	69.4 (75.5)	56.8 (68.7)	59.4 (69.0)	55.1 (69.1)	51.2 (52.0)	60.6 (68.7)	59.6 (69.1)	62.2 (68.7)	51.5 (55.6)	60.2 (68.9)	55.4 (68.5)
	N011	Outside 82 Euston Street	Free-field	53.5 (62.4)	61.7 (75.9)	54.1 (62.8)	54.3 (67.6)	50.2 (61.8)	50.2 (52.7)	56.6 (65.5)	56.9 (72.5)	52.5 (60.7)	48.2 (52.5)	52.4 (60.2)	49.8 (56.1)
S003-WS05	N014	Starcross Street	Free-field	55.2 (60.8)	57.7 (62.2)	54.4 (57.3)	54.6 (68.5)	52.3 (65.6)	50.1 (55.1)	53.1 (55.1)	56.8 (62.1)	53.4 (57.0)	50.5 (60.5)	53.8 (62.6)	51.8 (60.2)
S003-WS01	N016	Margaret Centre roof	Free-field	55.0 (58.3)	57.6 (60.2)	54.5 (58.0)	54.3 (62.4)	52.8 (65.0)	52.9 (53.4)	54.3 (55.5)	56.1 (60.2)	54.7 (59.9)	51.1 (55.8)	54.8 (61.7)	52.5 (65.2)
S003-WS06	N017	Hampstead Road, lamppost #48	Free-field	69.5 (74.3)	70.7 (73.9)	69.7 (77.2)	69.8 (77.4)	65.9 (75.1)	67.5 (69.7)	67.9 (68.9)	69.6 (75.2)	69.2 (75.0)	65.5 (70.8)	68.2 (73.0)	66.3 (70.6)

Worksite Reference	Measurement Reference	Monitor 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
S003-WS07	N012	Opposite 92-94 Drummond Street	Free-field	54.0 (58.1)	58.8 (62.1)	55.7 (61.8)	54.3 (61.2)	50.9 (57.7)	53.5 (65.8)	57.4 (72.8)	55.8 (58.3)	54.1 (57.7)	50.5 (56.8)	53.9 (58.0)	51.3 (56.0)
S003-WS08	N007	RCGP, Melton Street	Free-field	63.3 (67.7)	67.3 (74.7)	62.8 (64.7)	62.2 (65.3)	60.2 (68.1)	61.2 (62.8)	61.2 (61.9)	61.6 (62.1)	62.7 (65.5)	59.2 (68.6)	61.7 (65.6)	58.7 (63.3)
VHA	N025	External to 3 Prince Albert Road	Free-field	66.4 (68.1)	65.9 (67.3)	64.8 (66.6)	63.7 (69.7)	61.4 (68.1)	62.7 (63.1)	63.8 (65.5)	64.1 (64.7)	64.4 (69.9)	60.7 (64.5)	64.1 (68.9)	62.0 (68.5)
	N026	Thames Water Compound	Free-field	56.0 (59.7)	56.6 (60.2)	54.5 (58.0)	53.5 (65.2)	50.1 (59.0)	53.7 (56.7)	52.8 (55.8)	54.2 (58.2)	54.4 (59.2)	49.5 (55.0)	54.7 (61.0)	51.1 (57.6)

2.2.3 Table 6 presents a summary of the measured vibration levels at monitoring locations over the reporting period. During the monitoring high values of PPV were measured at V043 and V002 which were due to local disturbance of the vibration monitors and are not representative of HS2 construction works. These have been greyed out in the charts alongside other periods of local disturbance of the monitor as shown in Appendix B, and have been excluded to calculate values in Table 6. The highest PPV measured during the monitoring along any axis is presented in the table.

Table 6: Summary of measured PPV data over the monitoring period

Worksite Reference	Measurement Reference	Monitor Address	Highest PPV measured in any axis, mm/s
S001-WS07	V039	Coniston, Regents Park Estate	2.82 (Y-axis)
	V043	Cubitt Court, Park Village East	1.36 (Y-axis)
S003-WS03	V002	RCGP. basement boiler room. 305 Euston Road	3.69 (Z-axis)
	V037	Magic Circle, basement	4.26 (Z-axis)
	V038	Wesley Hotel, basement lightwell, Euston Street	4.81 (Z-axis)
S003-WS05	V021	42-44 Cobourg Street (floor)	0.49 (Z-axis)
S003-WS09	V003	RCGP. basement vaults, 305 Euston Road	0.57 (Z-axis)

2.2.4 Construction vibration during the month was mainly due to demolition activities and may on occasion be perceptible at receptors nearby but was below levels that may cause structural damage to surrounding buildings.

2.2.5 Appendix C presents graphs of 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>.

## 2.3 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 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
-	-	-	-	-	-

2.3.2 There were no exceedances of trigger levels as defined in section Section 61 consents during the reporting period at any monitoring position.

## 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.

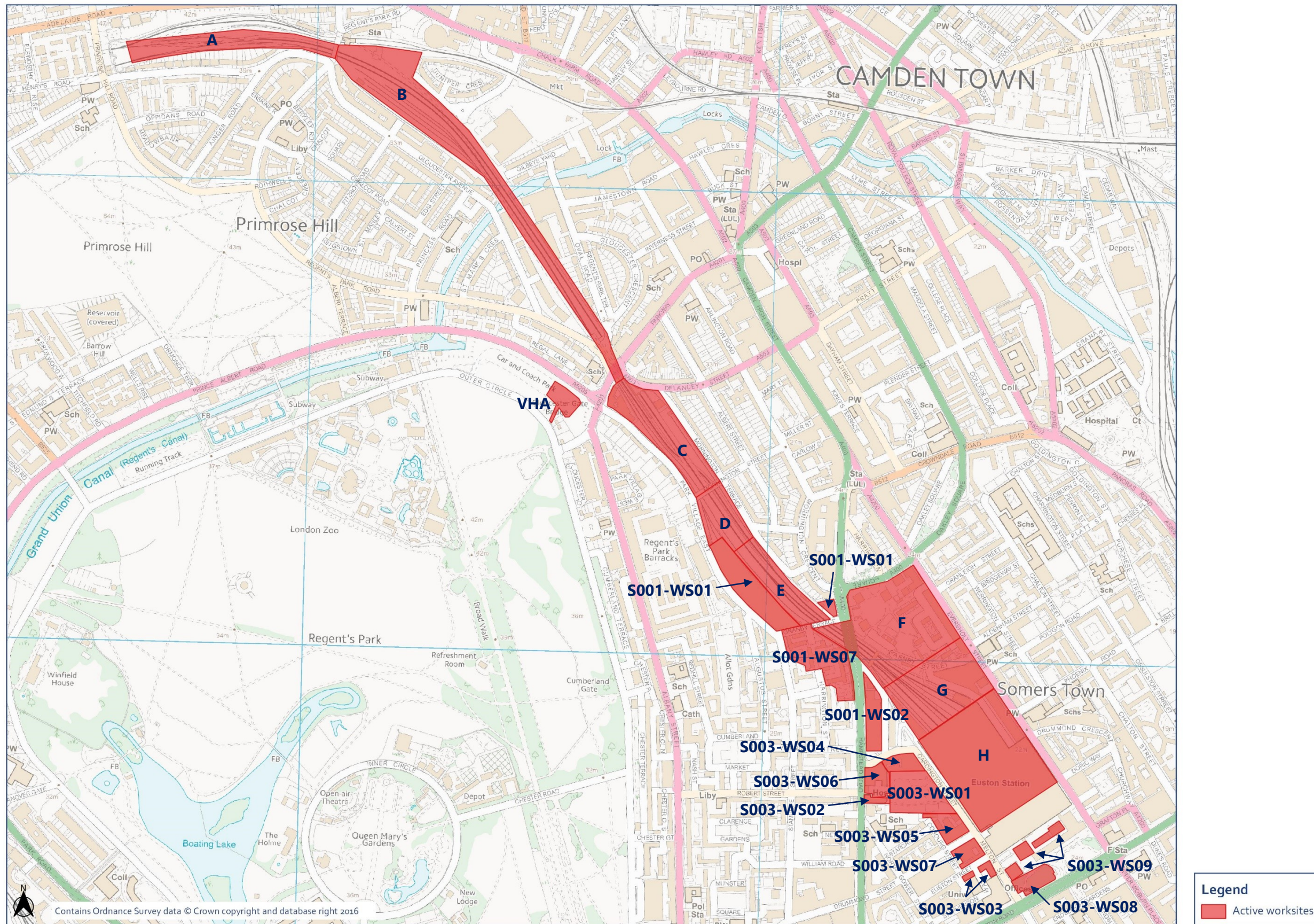
Table 8: Summary of complaints

Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
HS2-20-40033-C	F, D	Complaint from a resident regarding audible construction noise during the night-time.	The noise was due to Network Rail maintenance activities and therefore not associated with HS2.	Information provided to the complainant.
HS2-20-40053-C	S001-WS07	Complaint from a resident of Carmel due to cosmetic damage to dwelling.	Data at the nearest vibration monitor was analysed and noted to be below the level whereby cosmetic damage to buildings occurs.	Information provided to the complainant.
HS2-20-40037-C	F, D	Complaint from a resident regarding audible construction noise.	The noise was due to Network Rail maintenance activities and therefore not associated with HS2.	Information provided to the complainant.

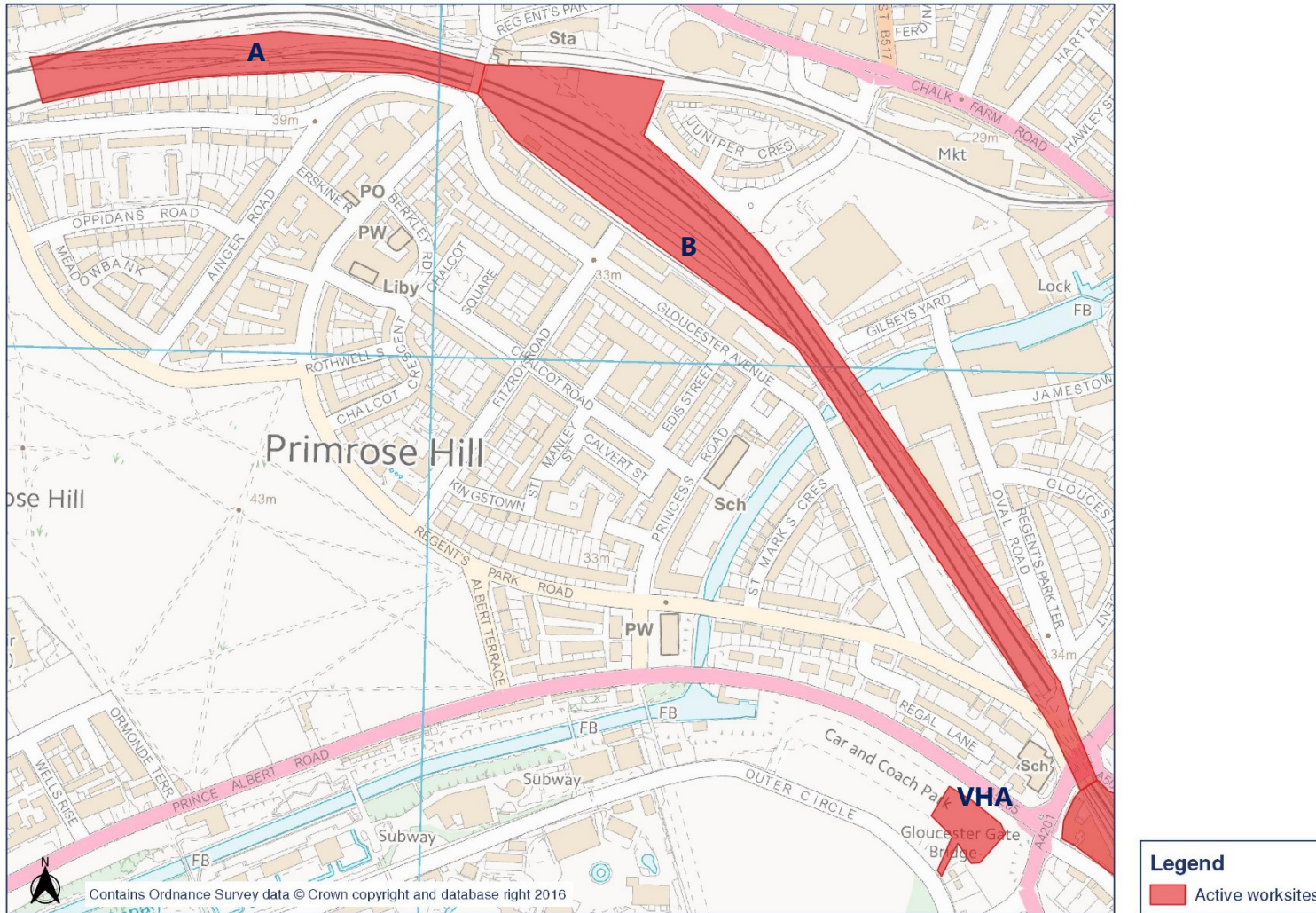
Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
HS2-20-40027-C, HS2-20-40339-E	S001-WS07	Complaint from a resident due to perceptible vibration events experienced within dwelling across a 4-minute period.	No significant construction activities taking place at the time of complaint and no elevated levels of vibration measured at site boundary. Resident at significant distance (circa 100m) from worksite and several intervening buildings. Not considered to be related to HS2 works.	Information provided to the complainant.
HS2-20-40076-C	A	Complaint from a resident regarding audible drilling noise during daytime and night-time periods.	Investigation is on-going.	Investigation is on-going.

# Appendix A Site Locations

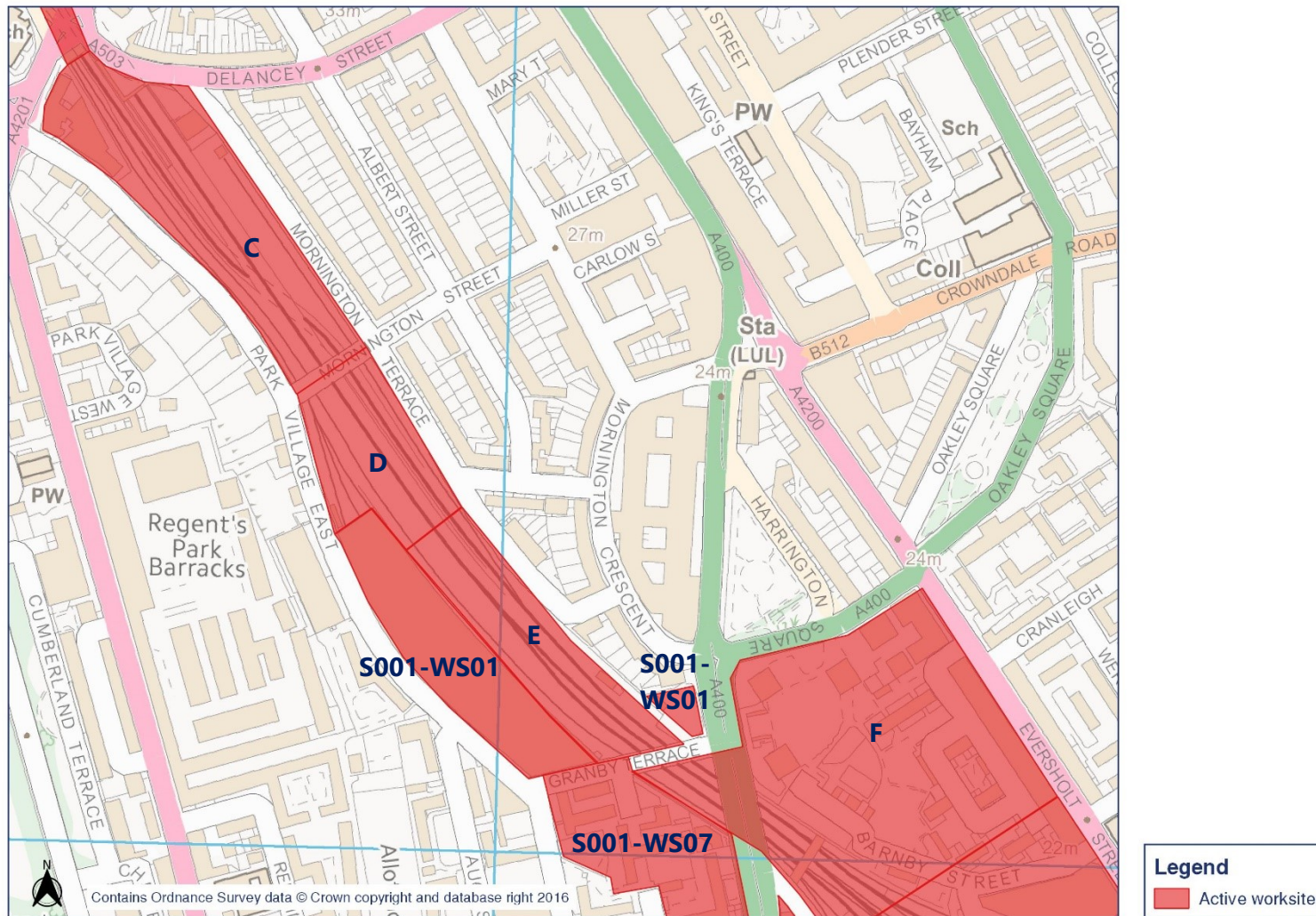


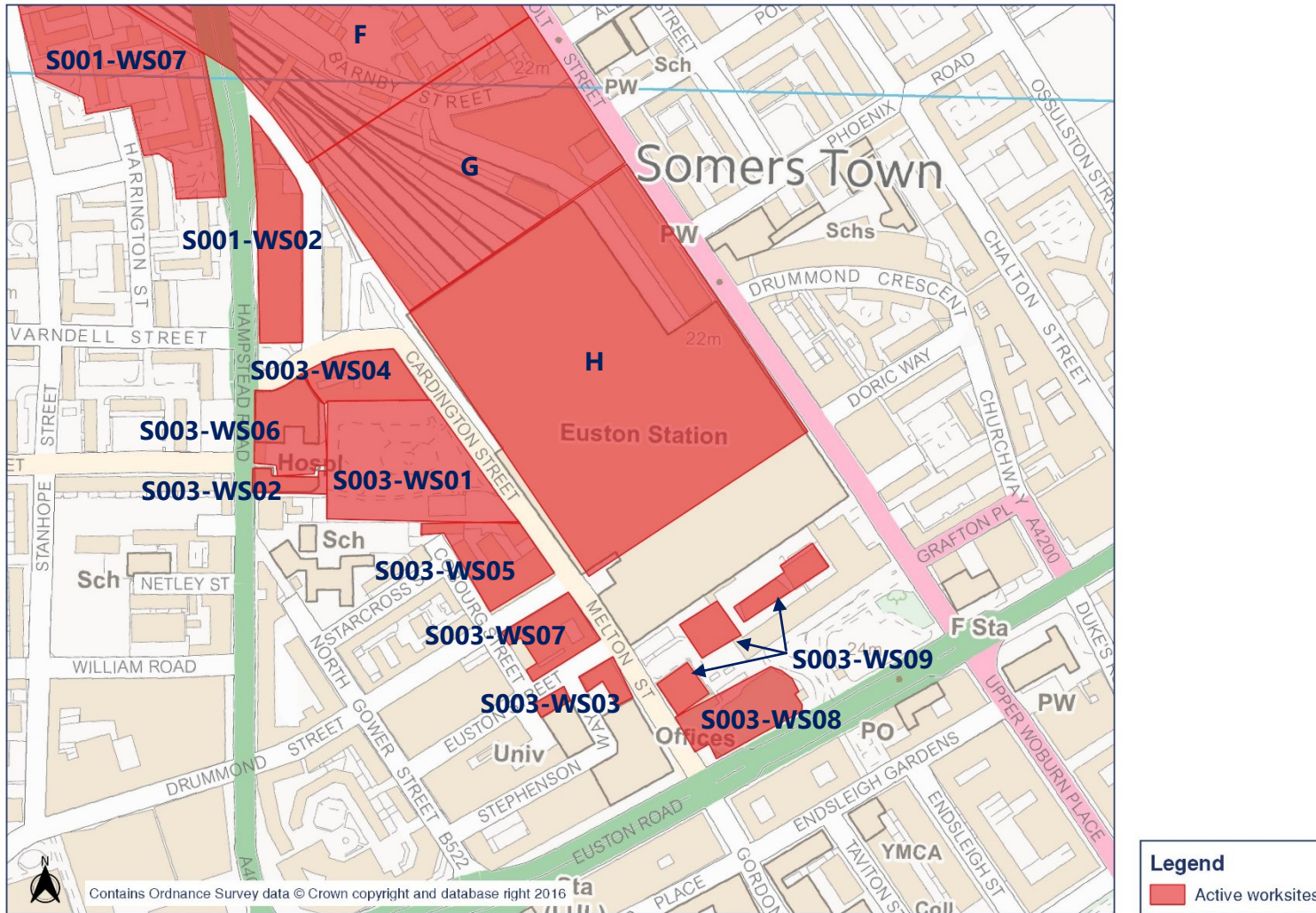






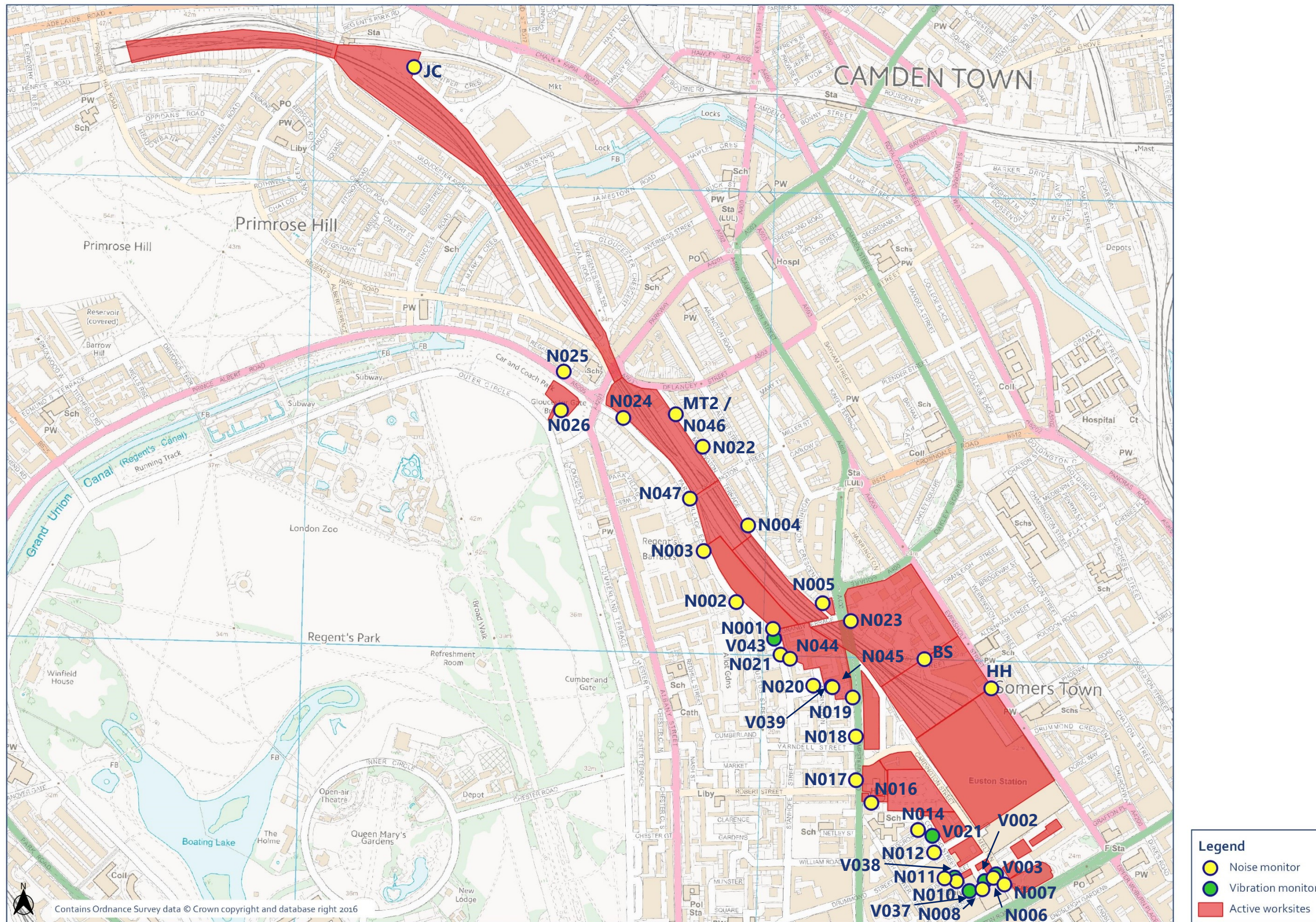




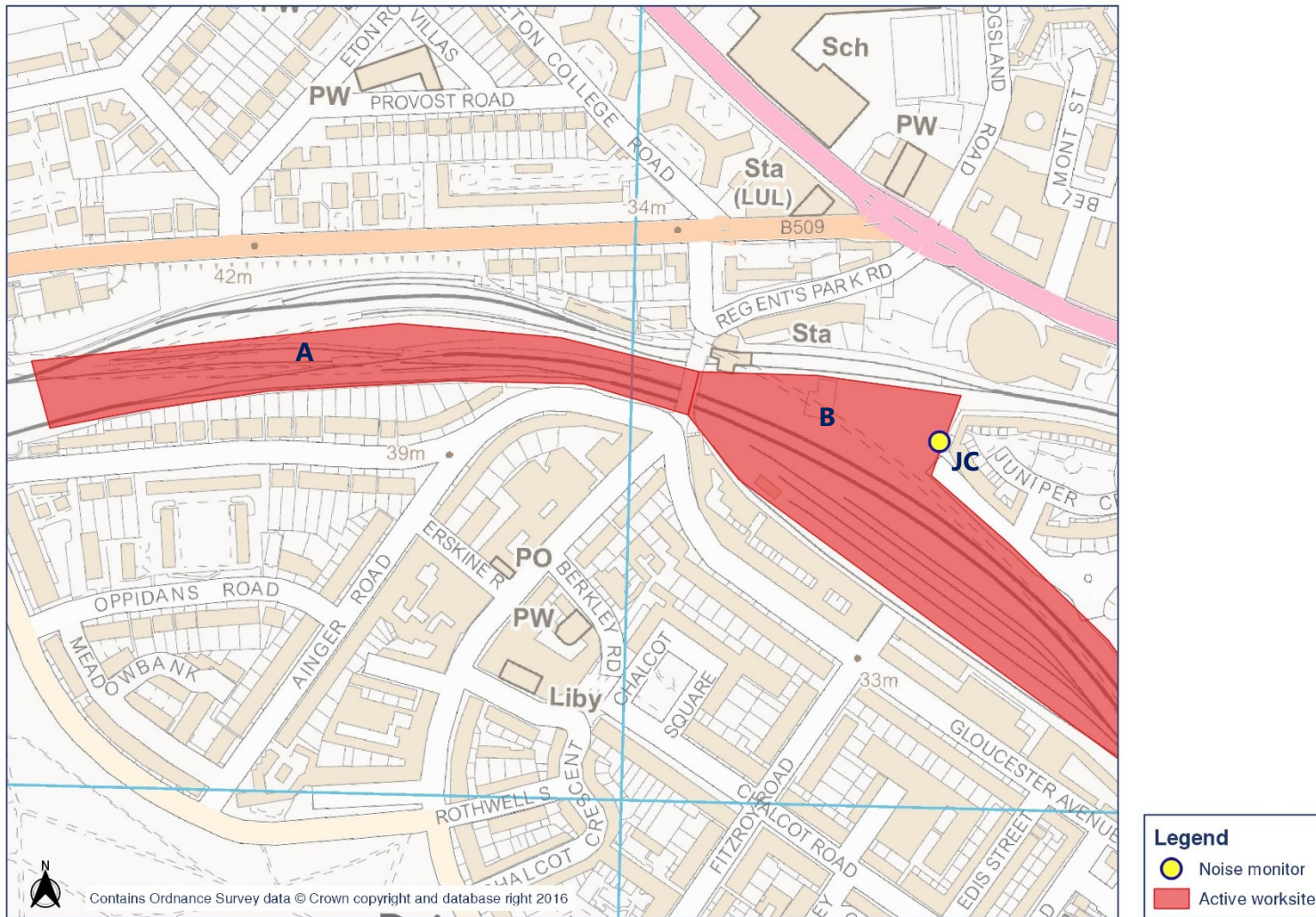


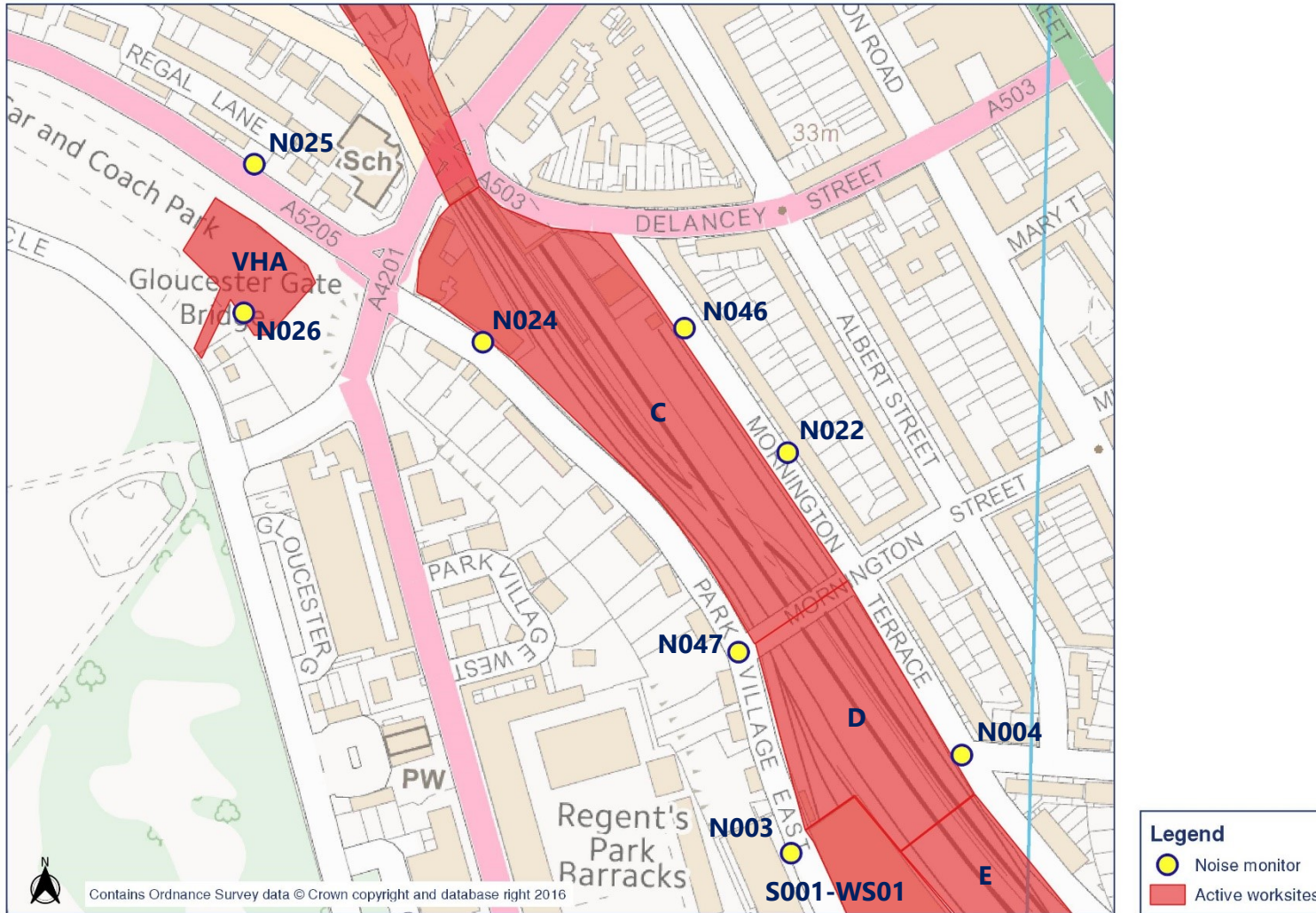
# Appendix B Monitoring Locations



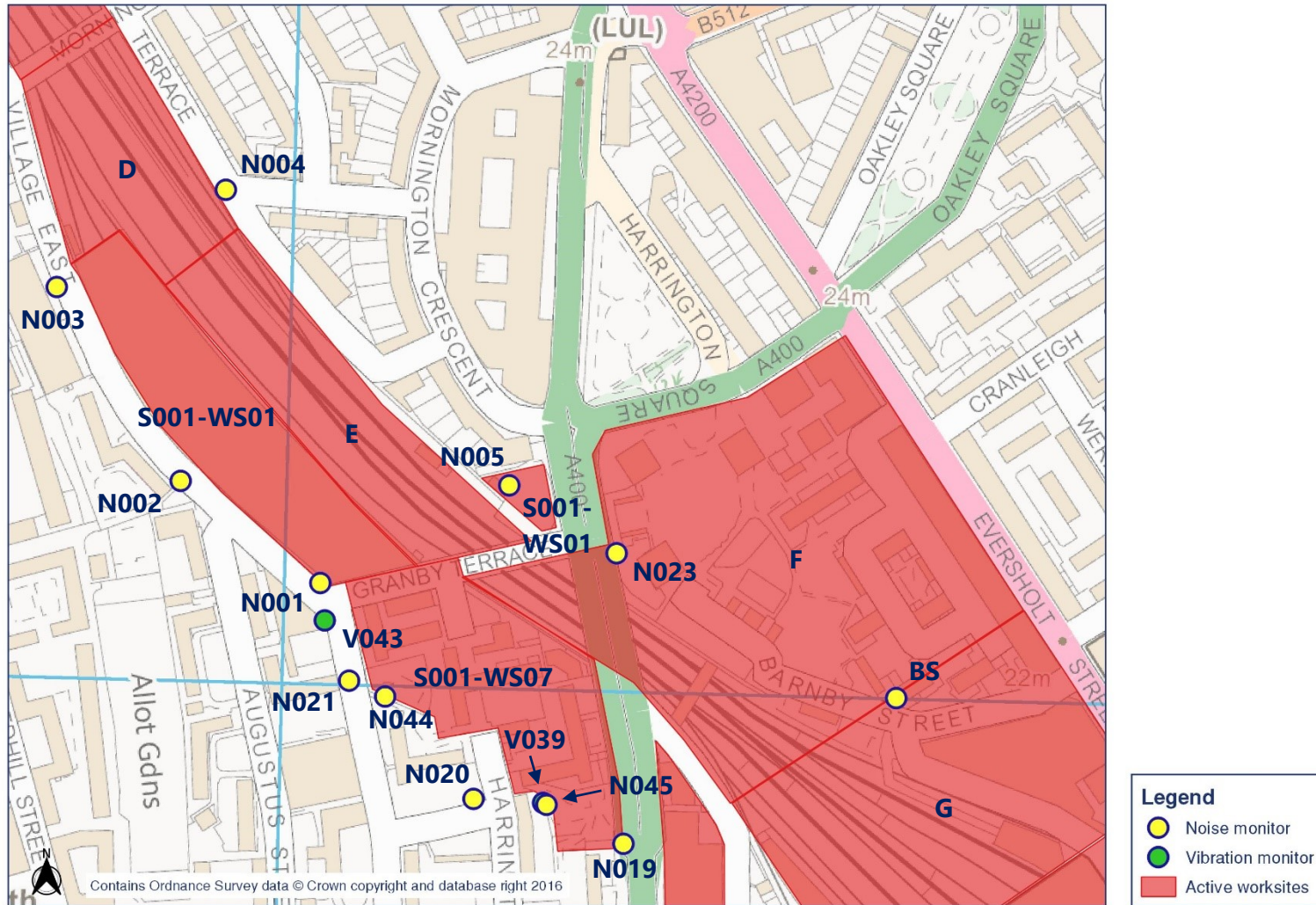


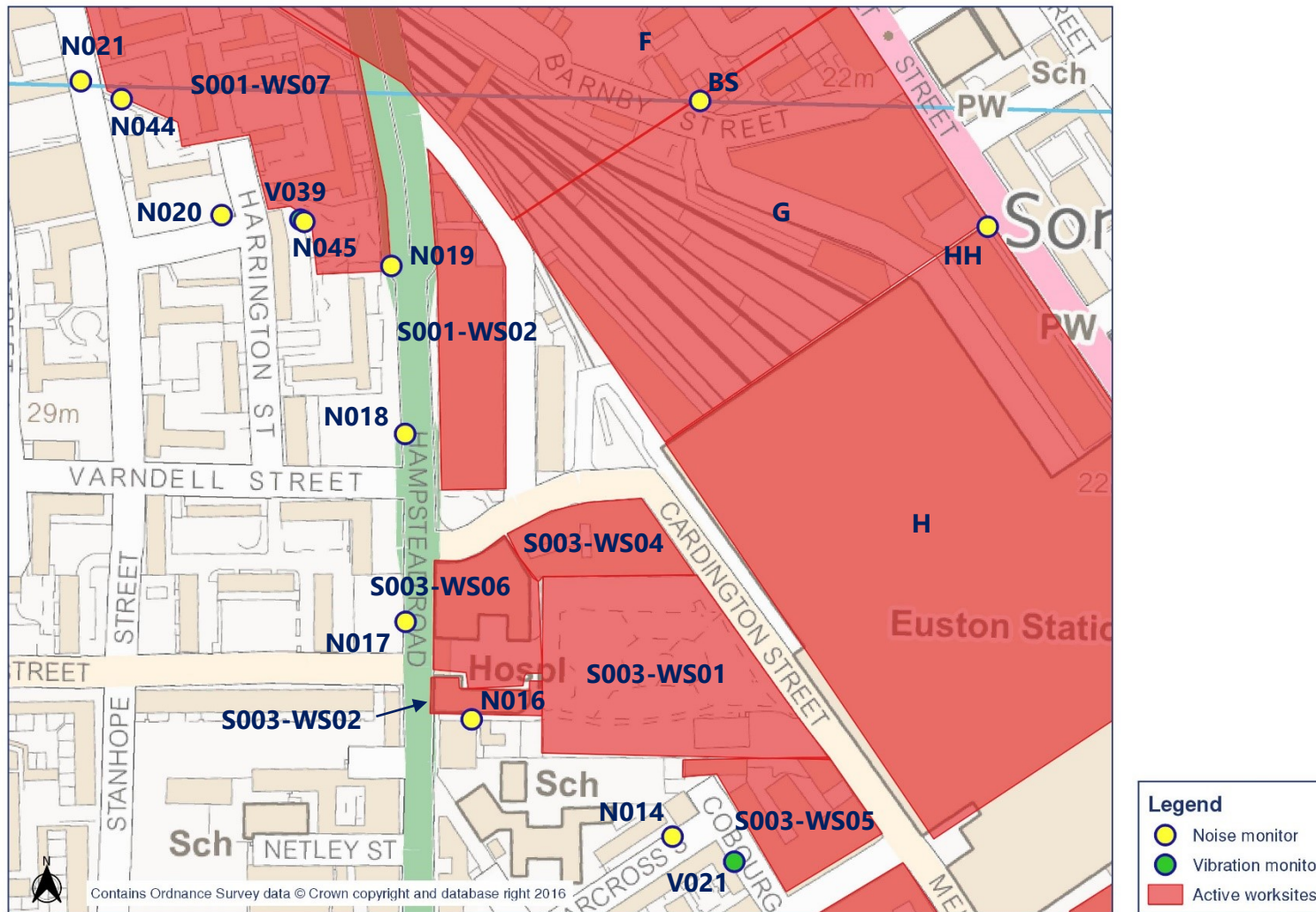




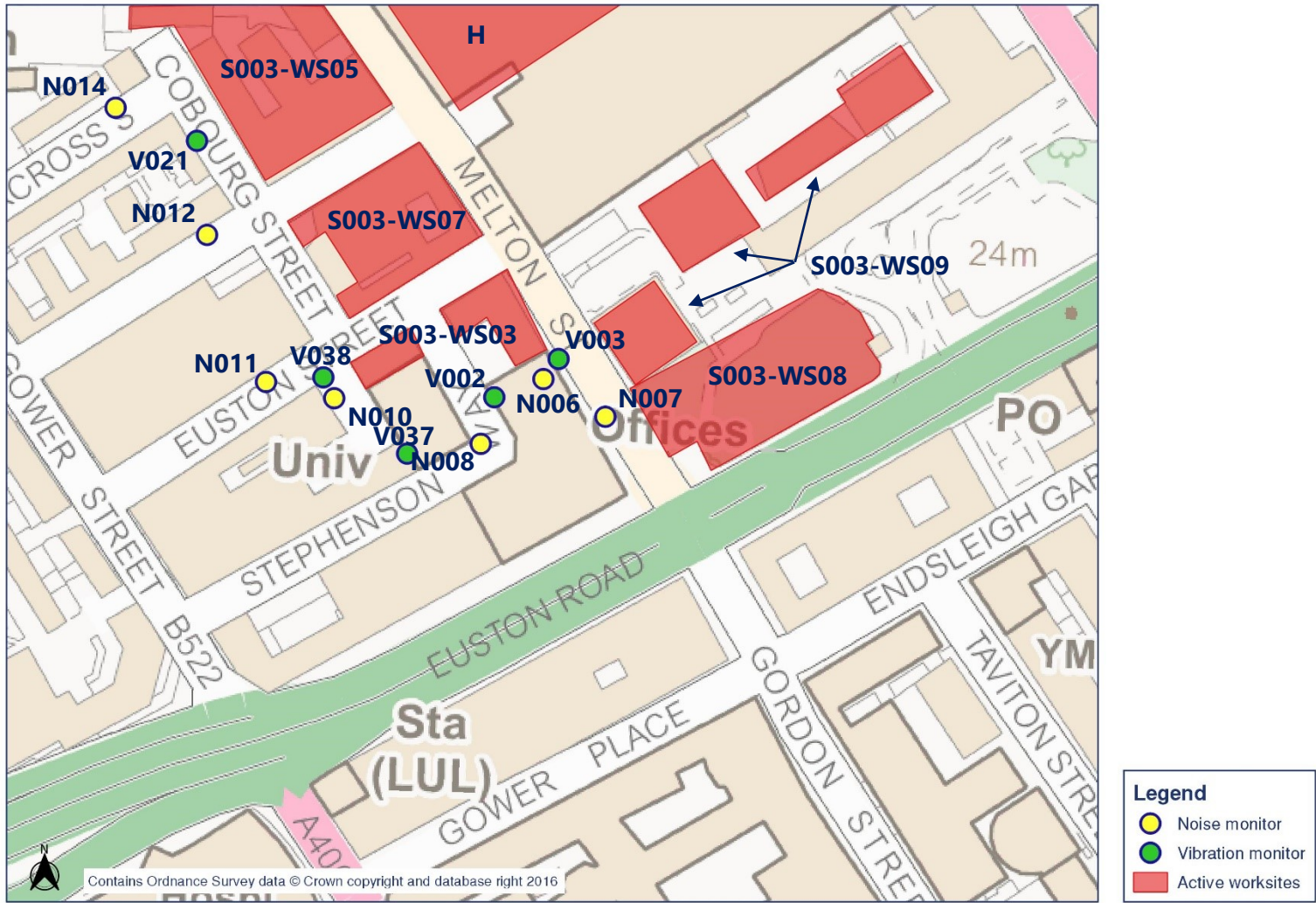










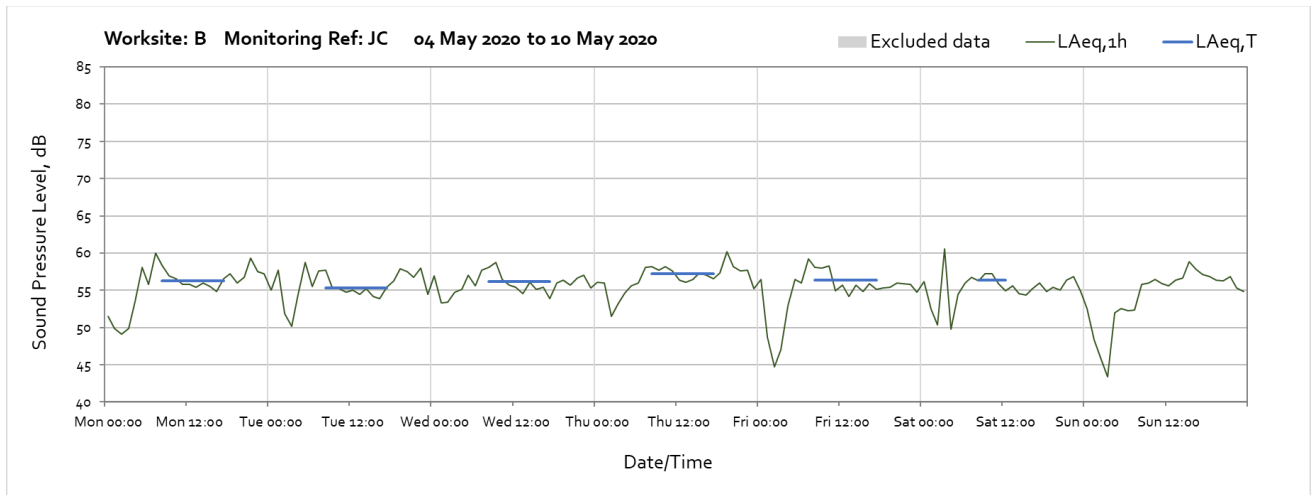
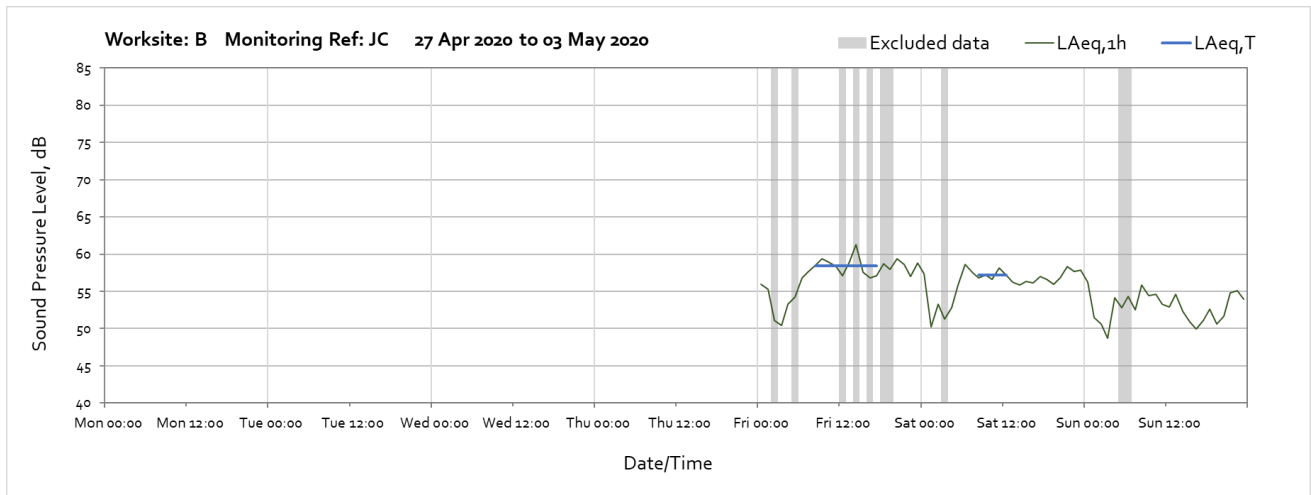


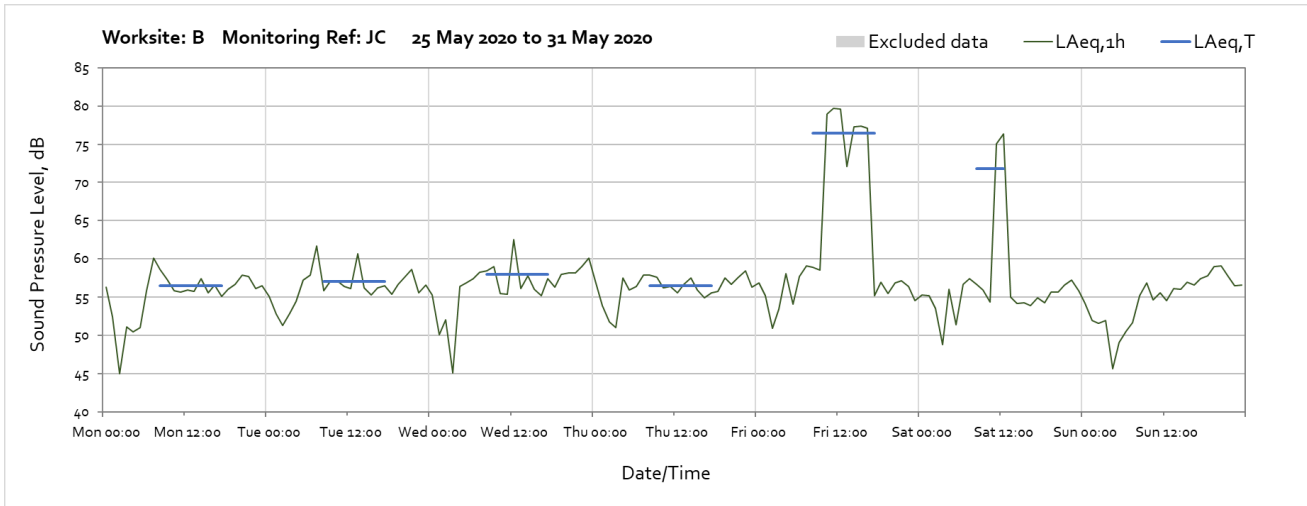
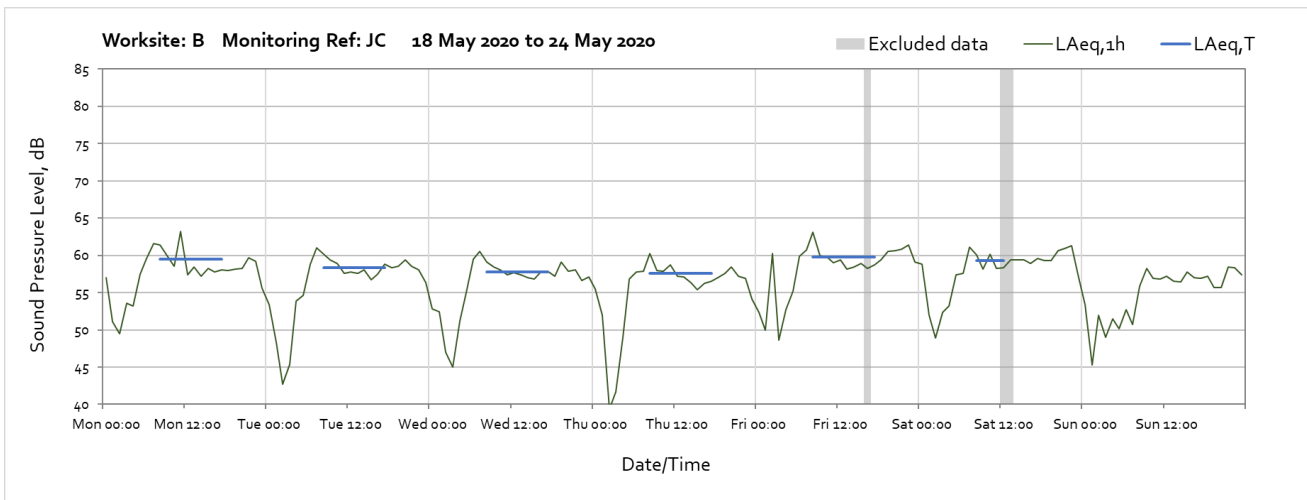
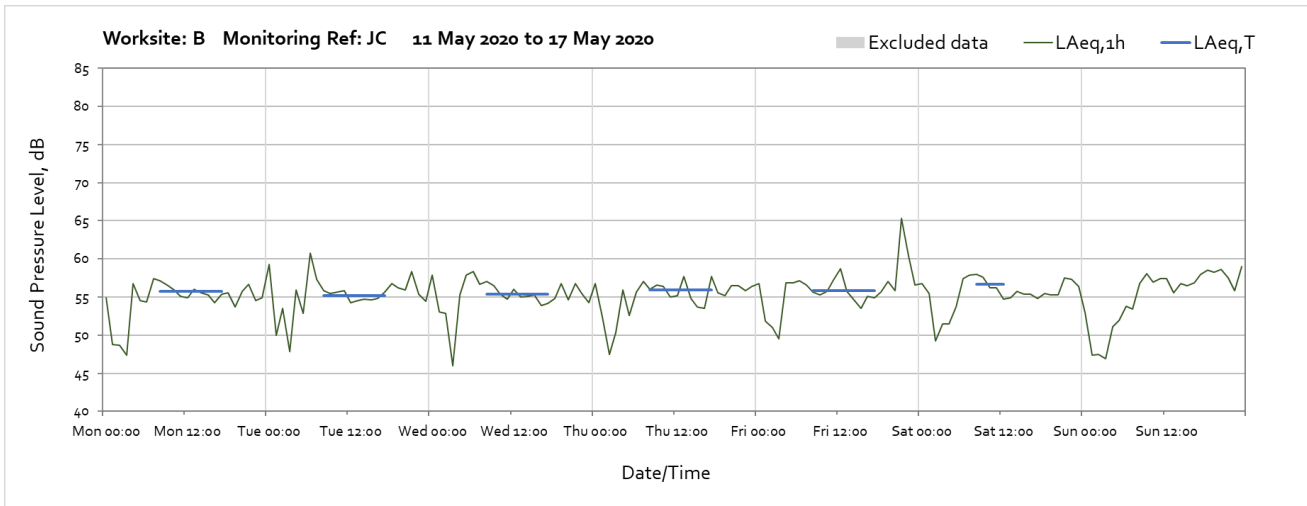
# Appendix C Data

## Noise

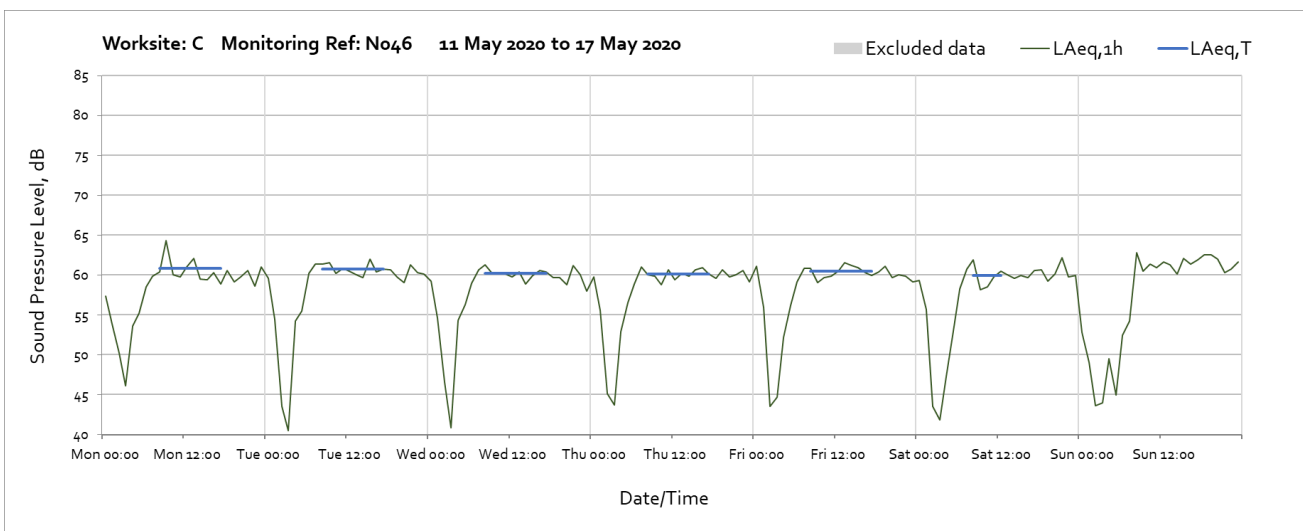
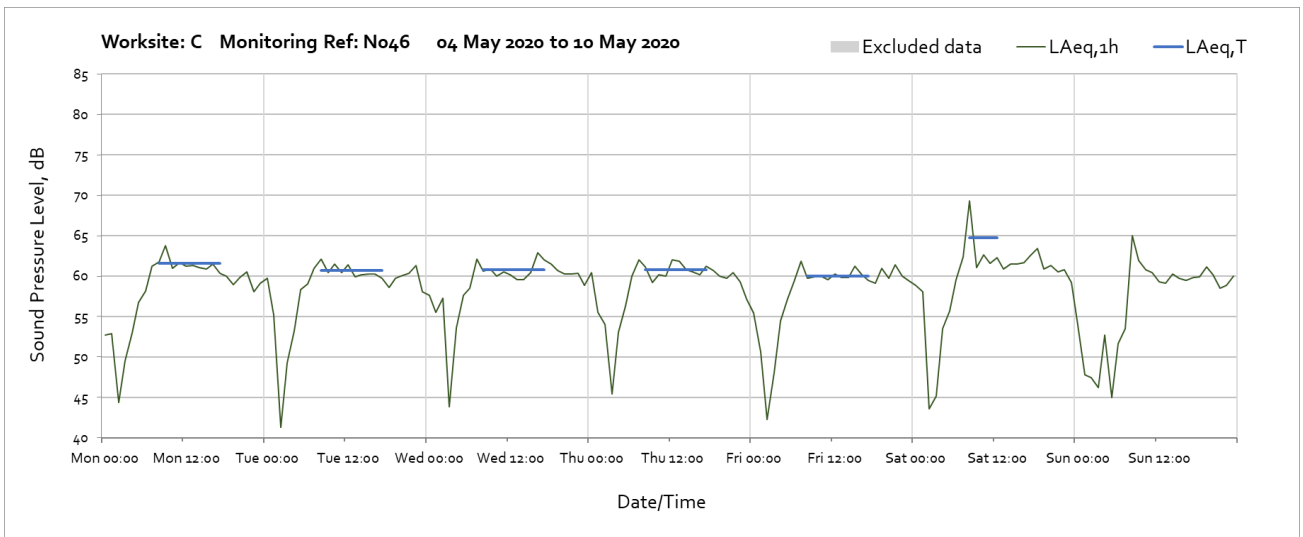
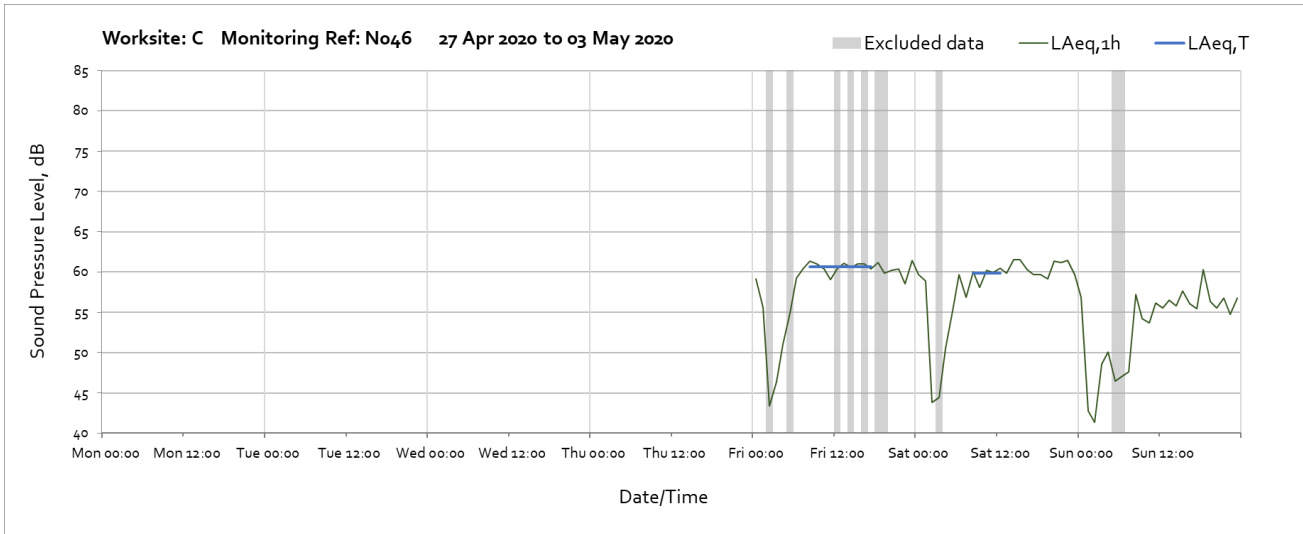
The following graphs show the hourly measured ambient noise level  $L_{Aeq,1h}$  and, where relevant, the averaged noise level  $L_{Aeq,T}$  values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have been excluded from the calculation of the  $L_{Aeq,T}$  values in Table 5.

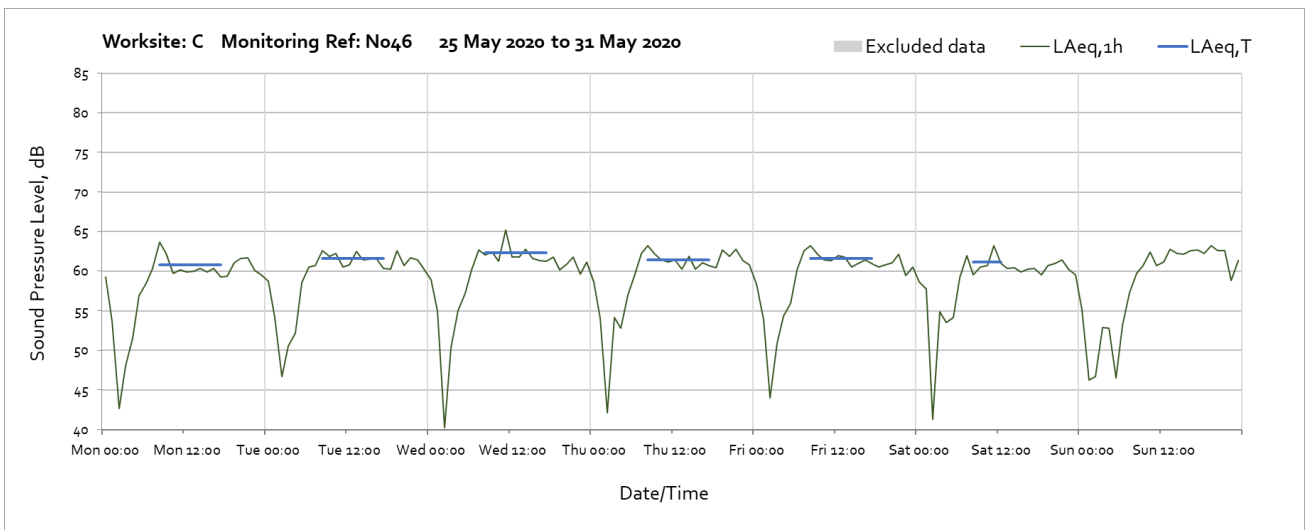
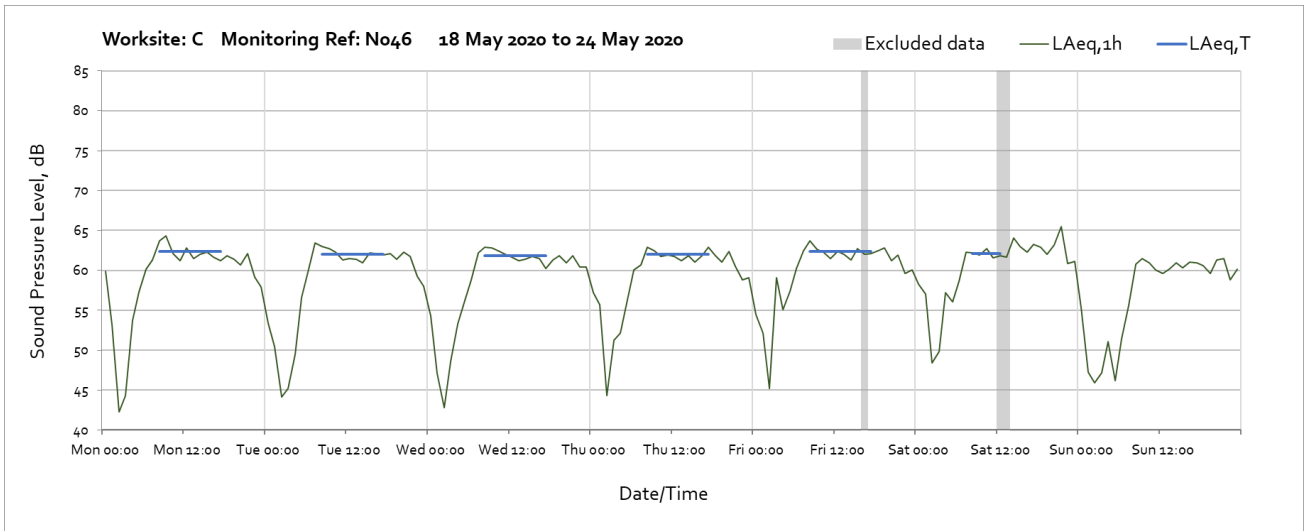
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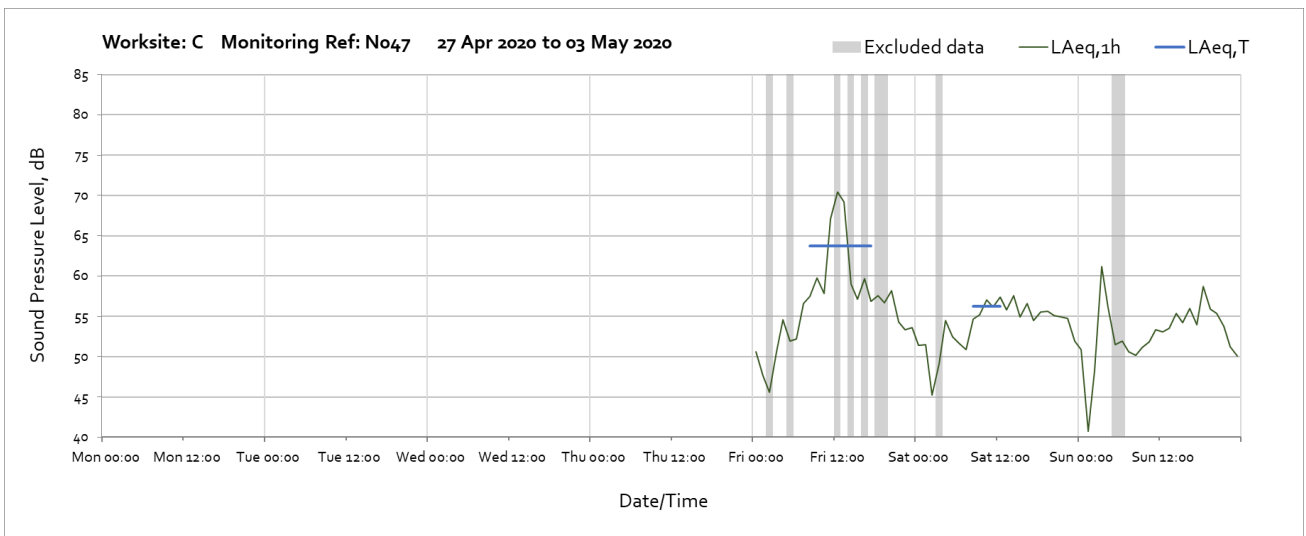


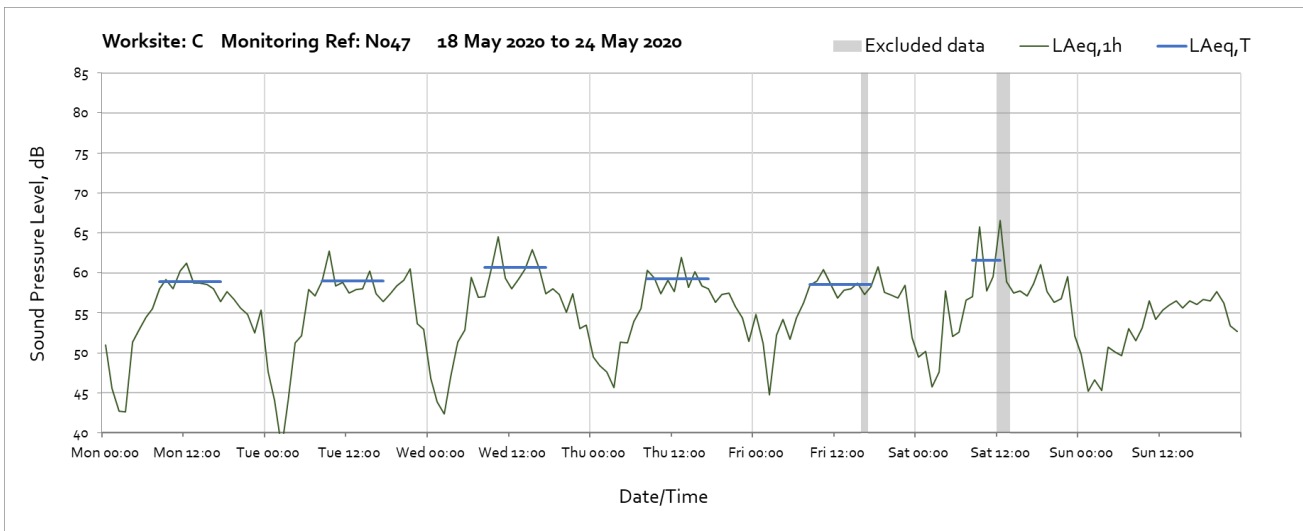
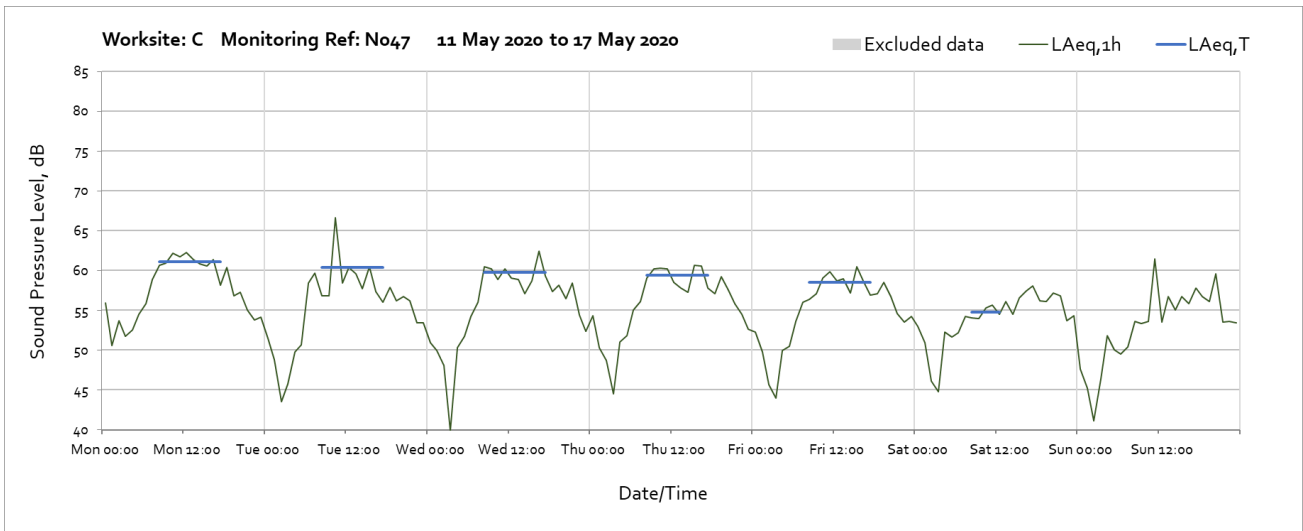
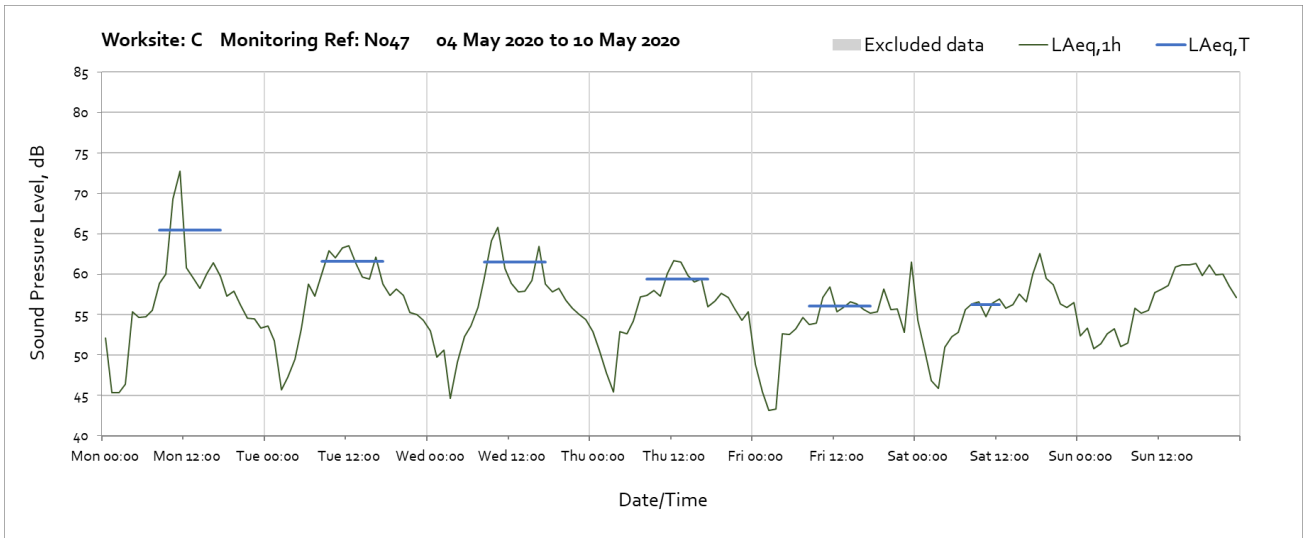
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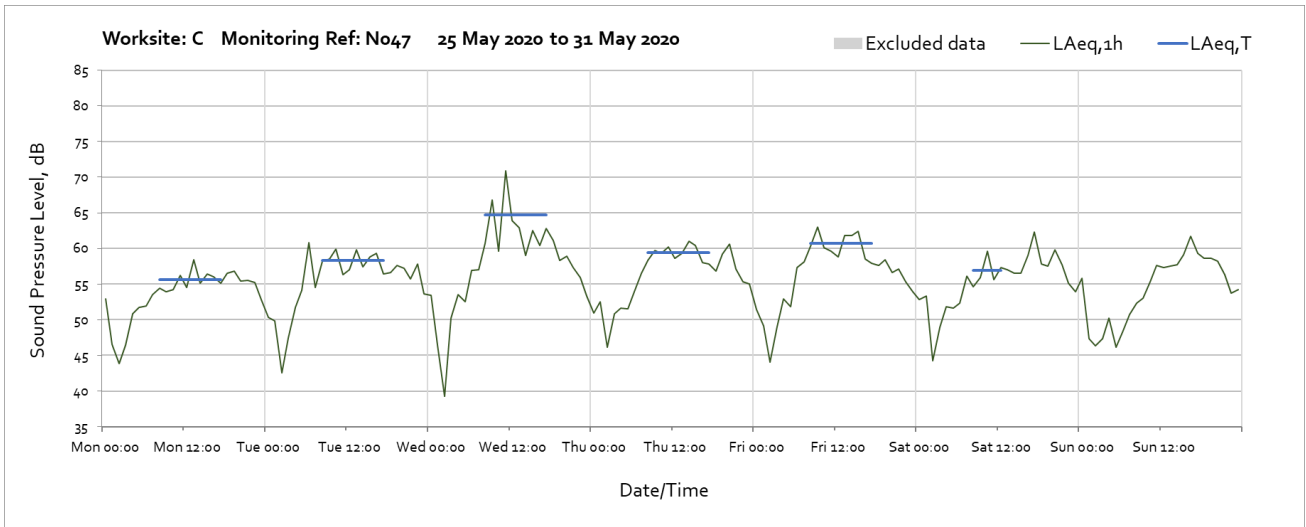


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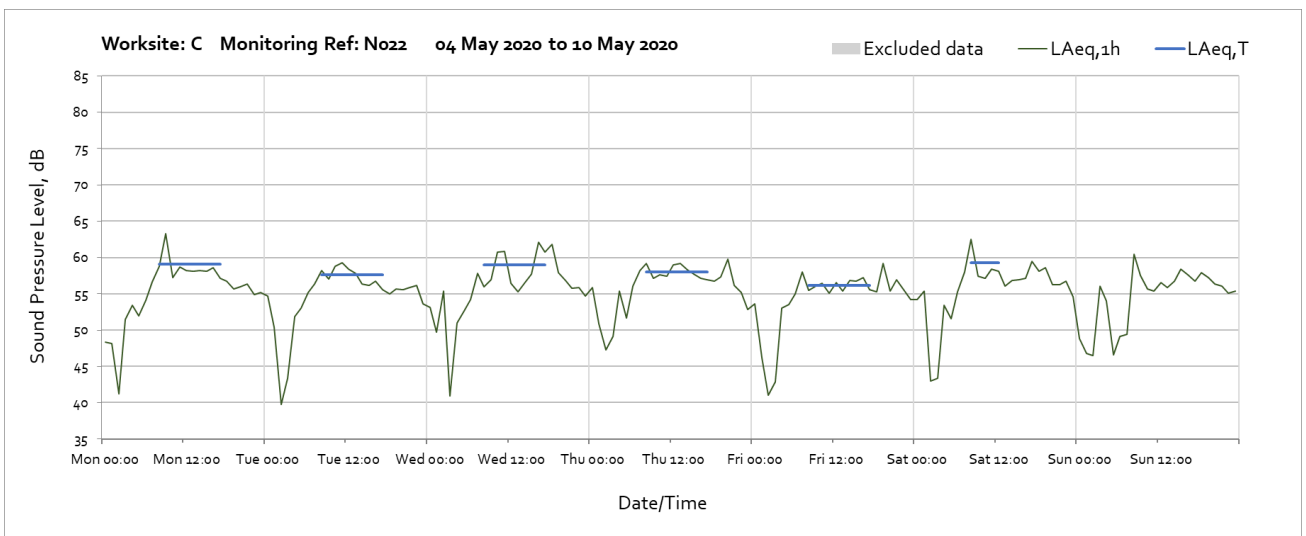
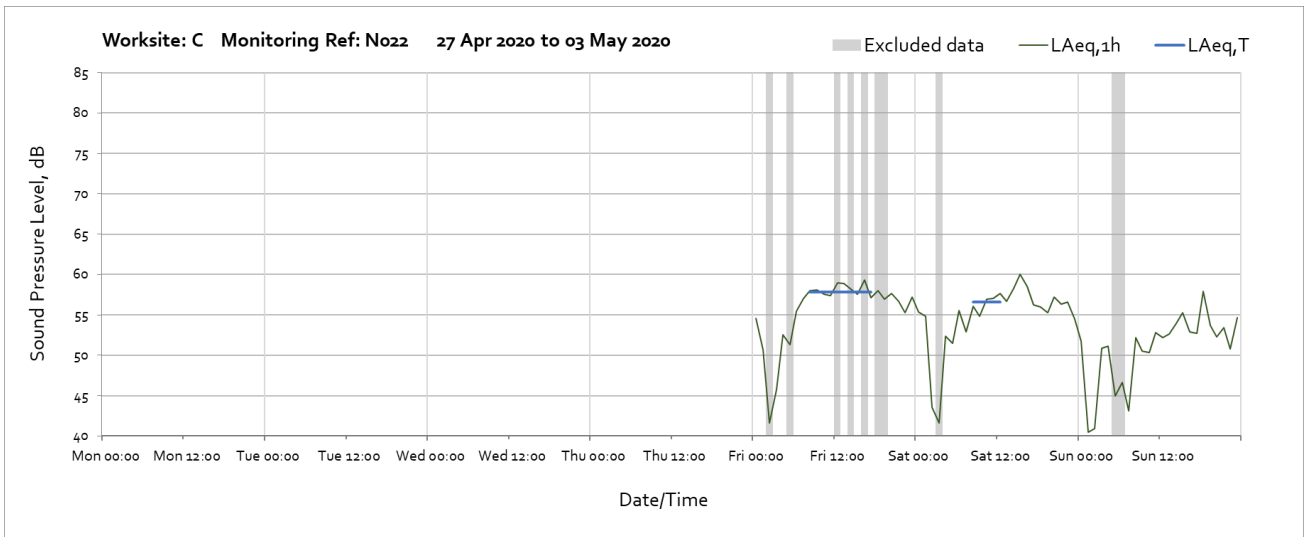


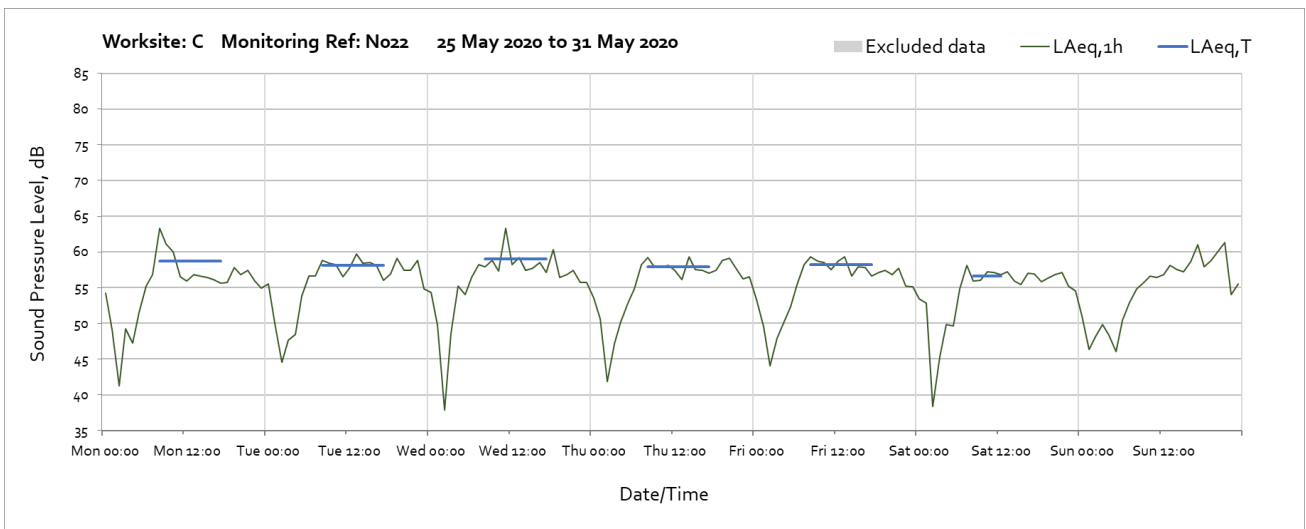
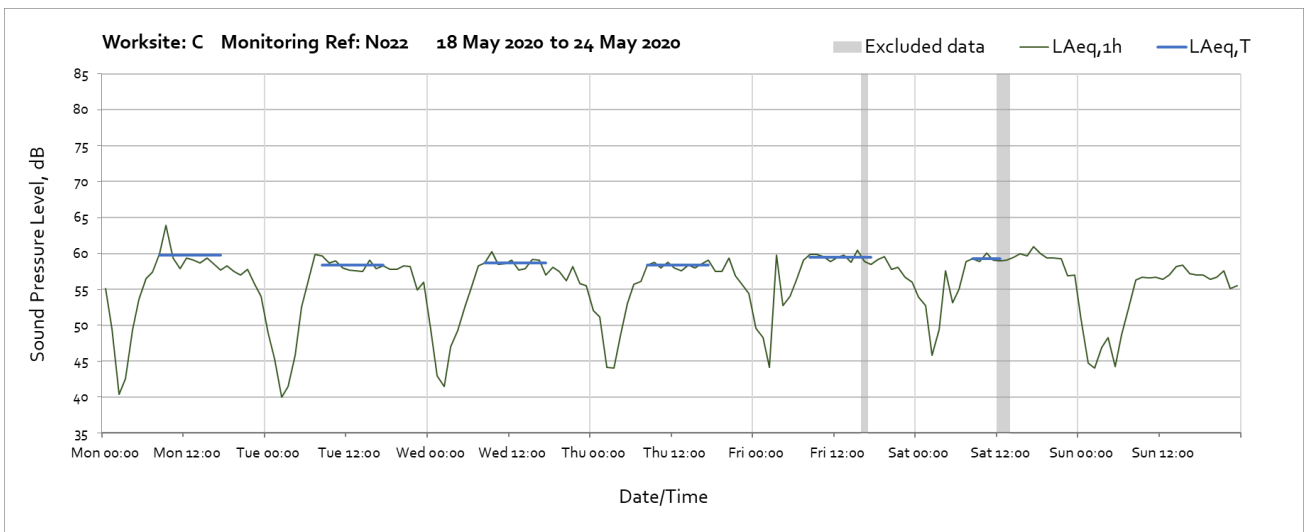
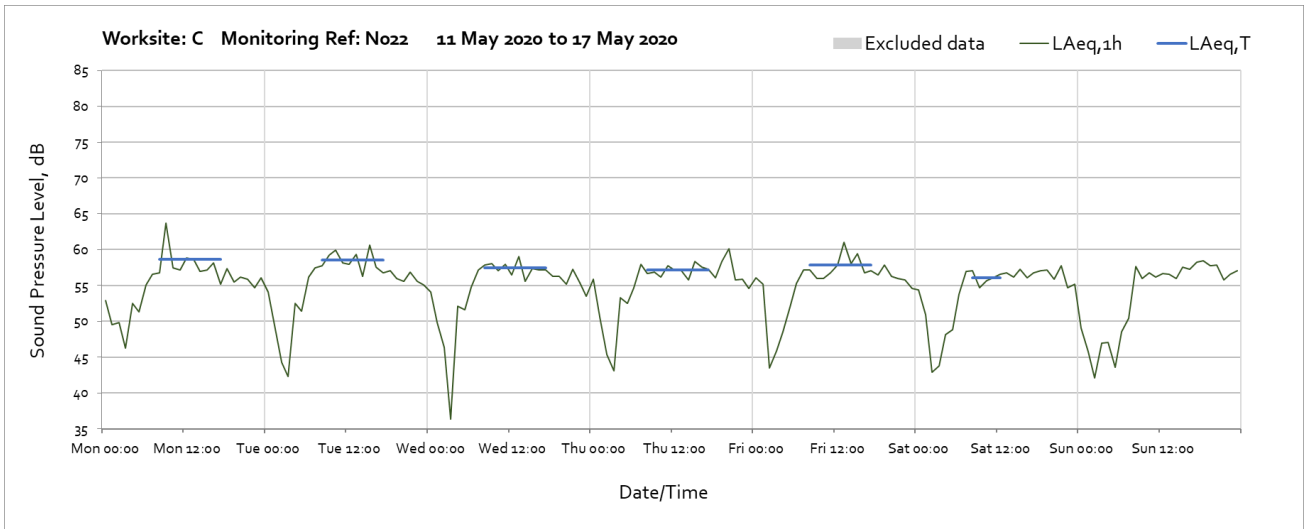




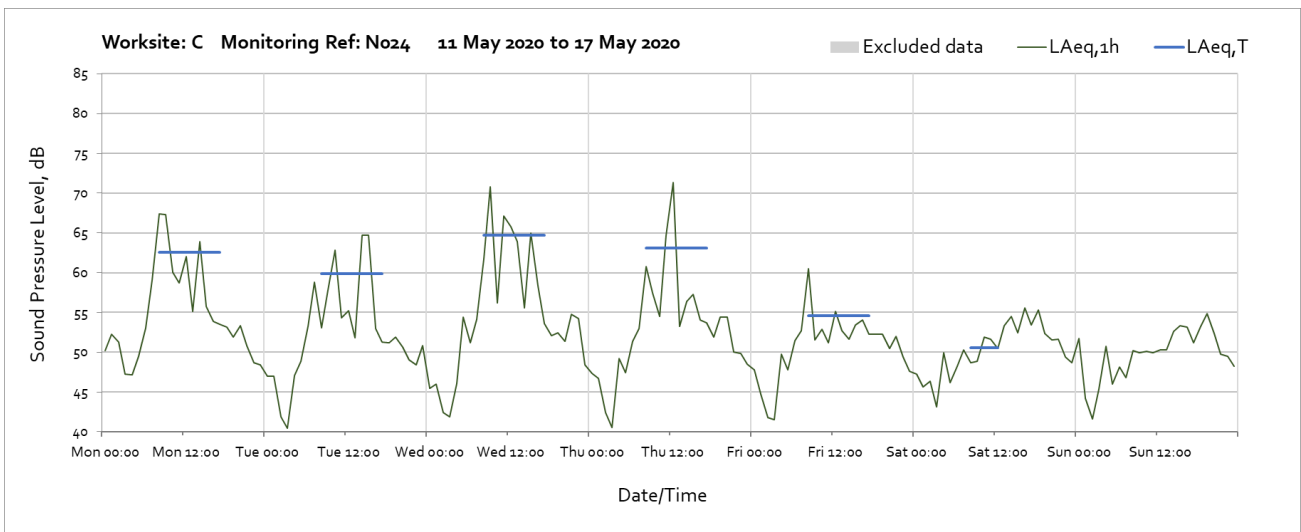
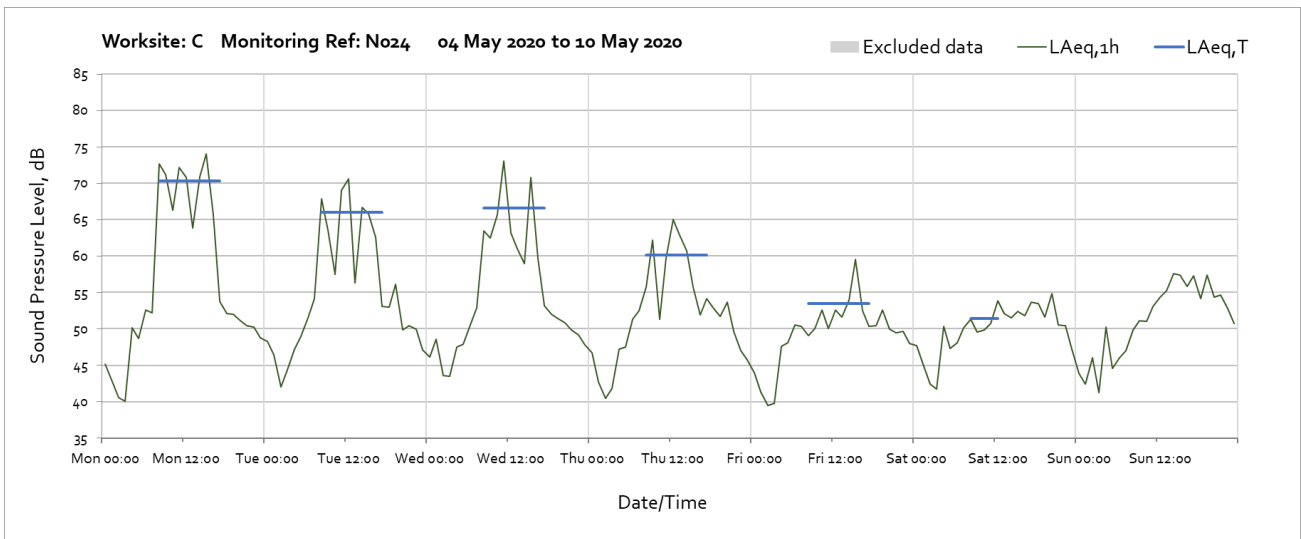
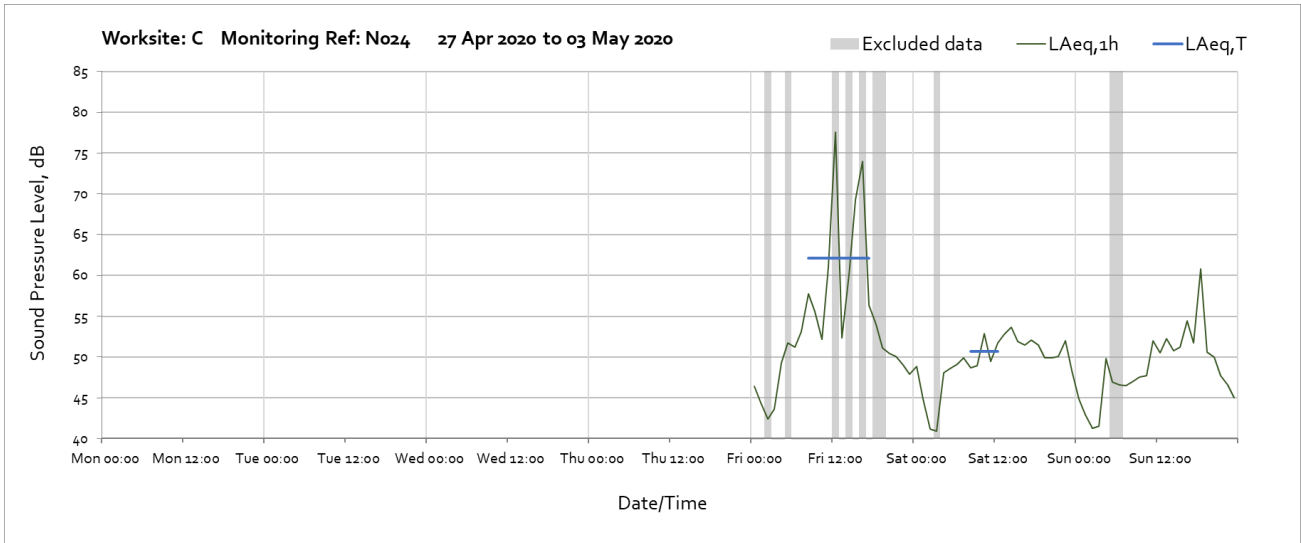


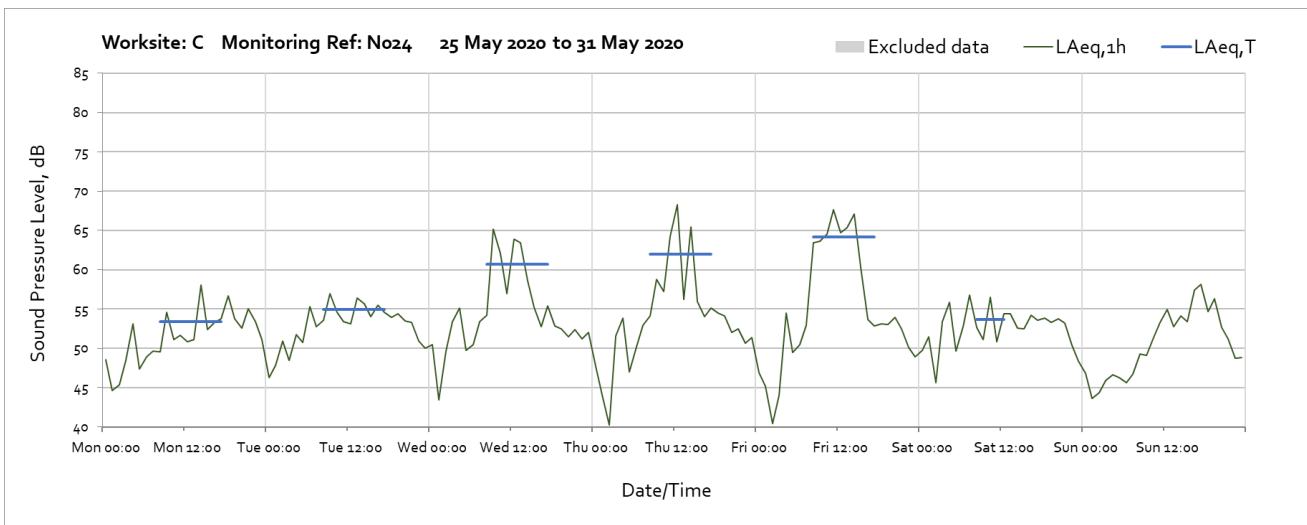
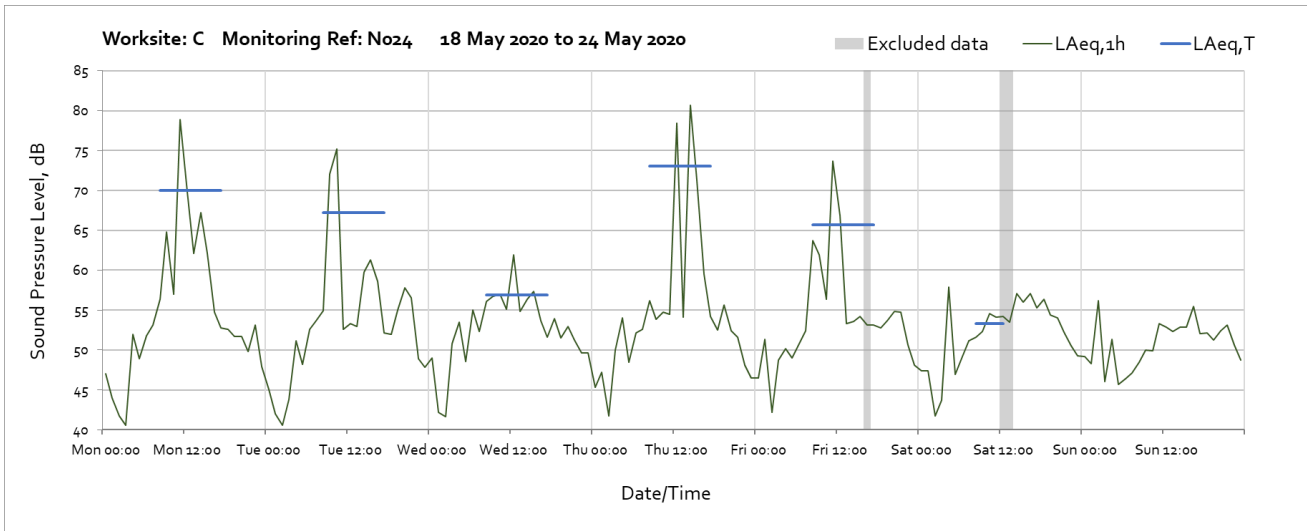
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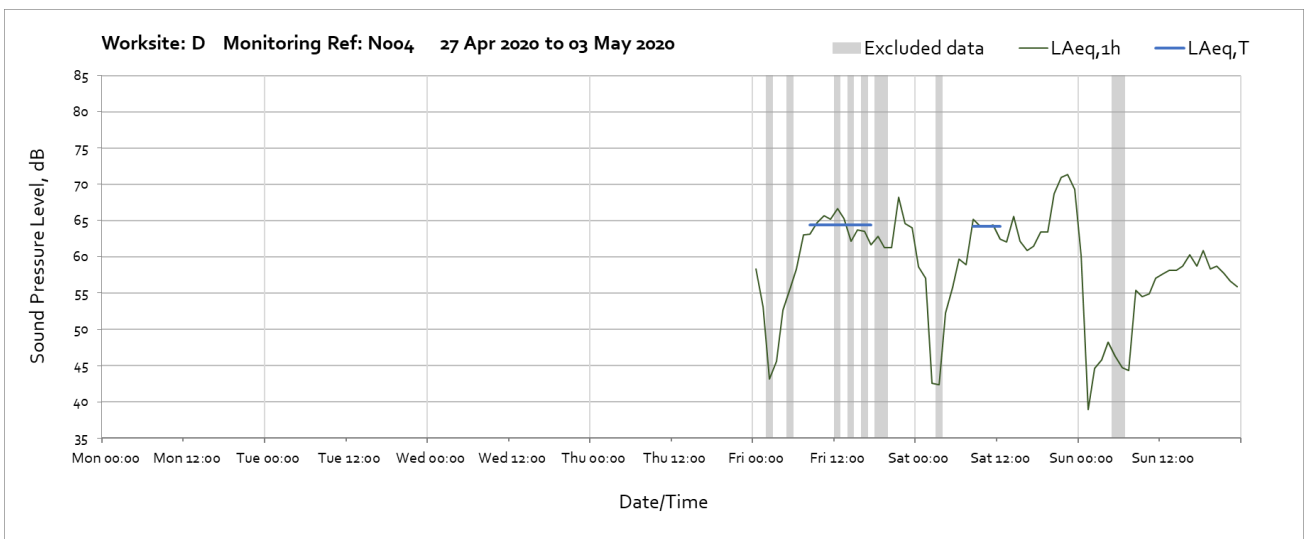


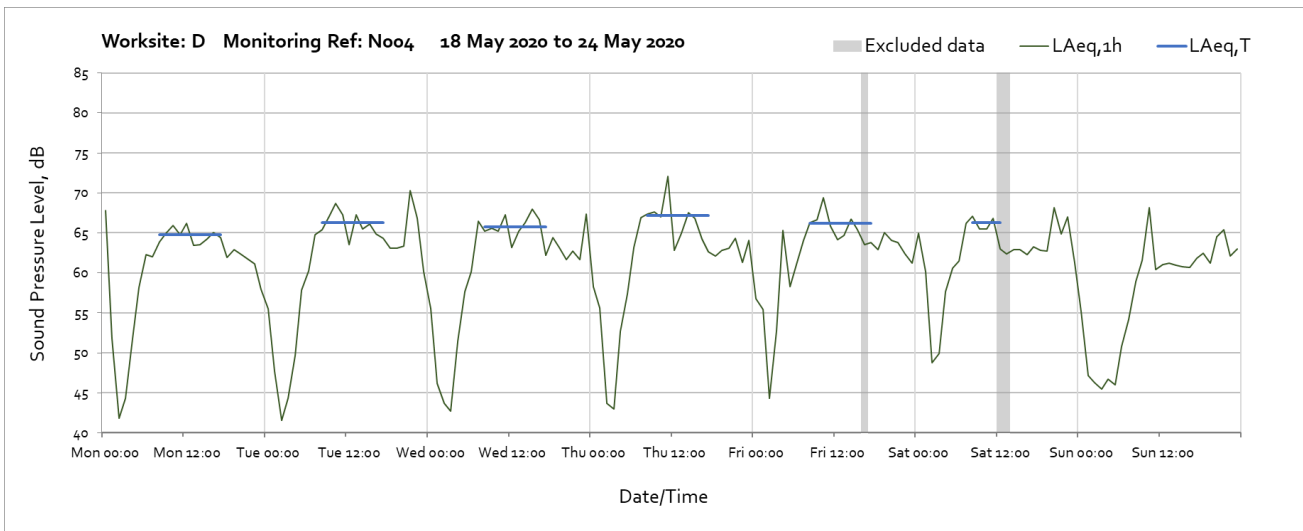
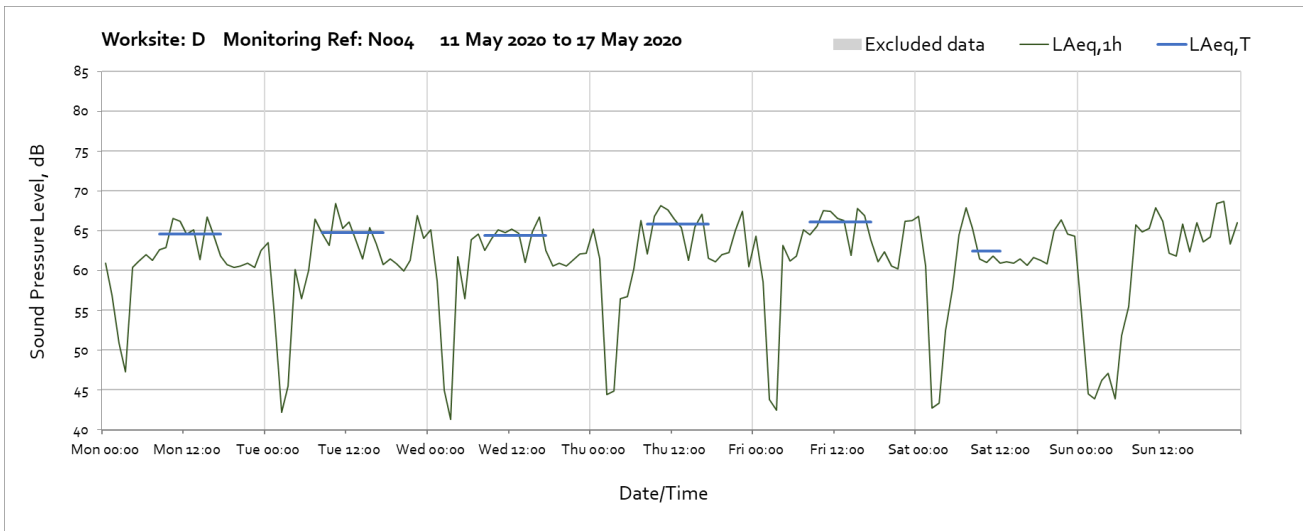
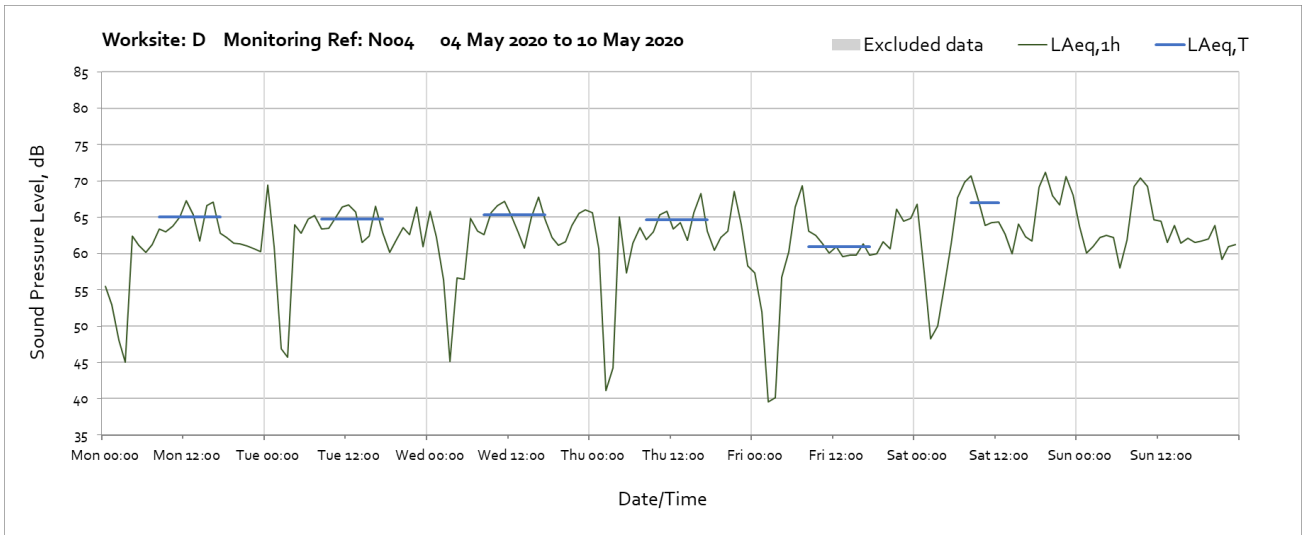
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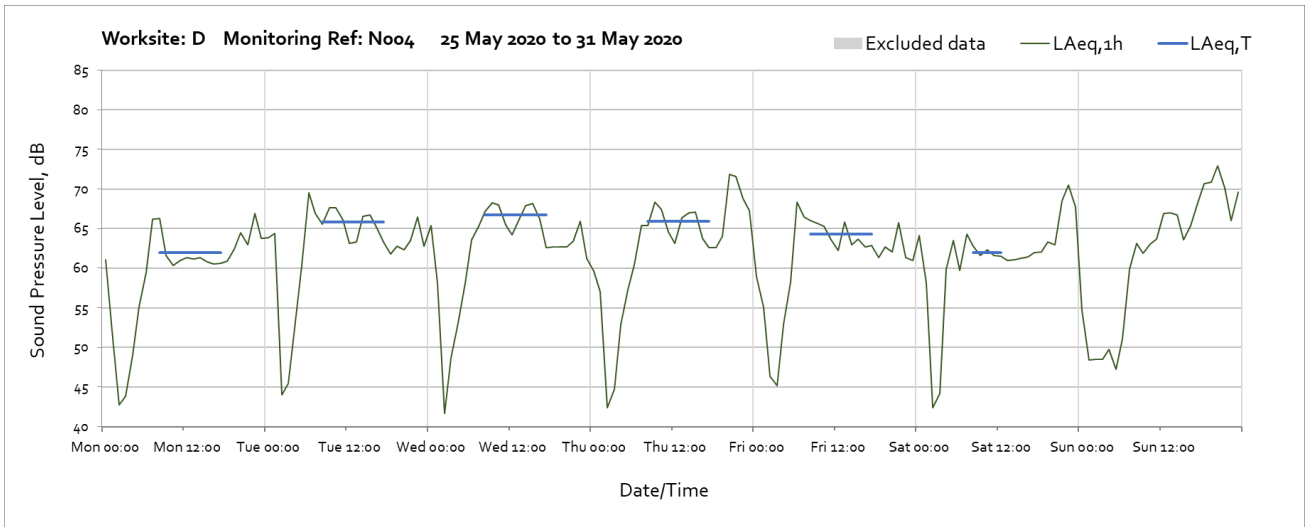




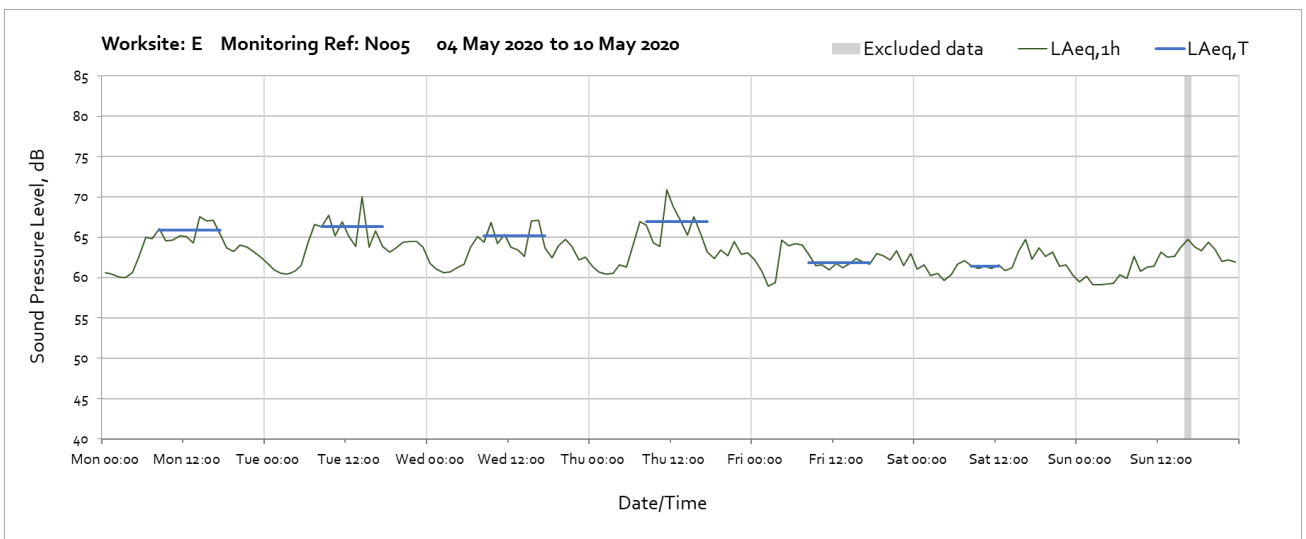
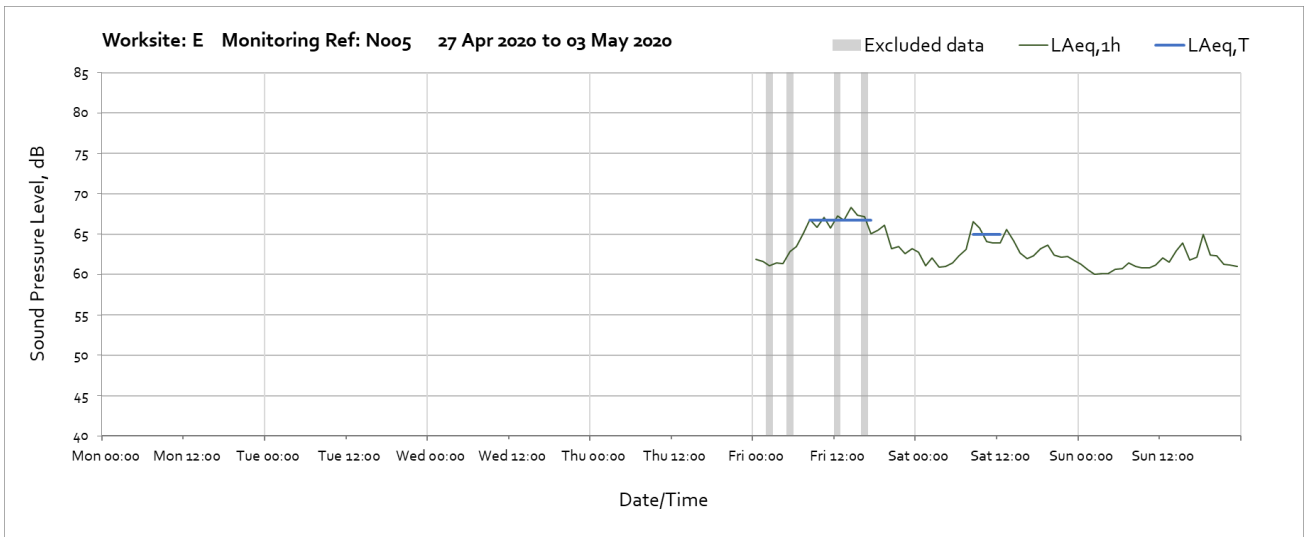
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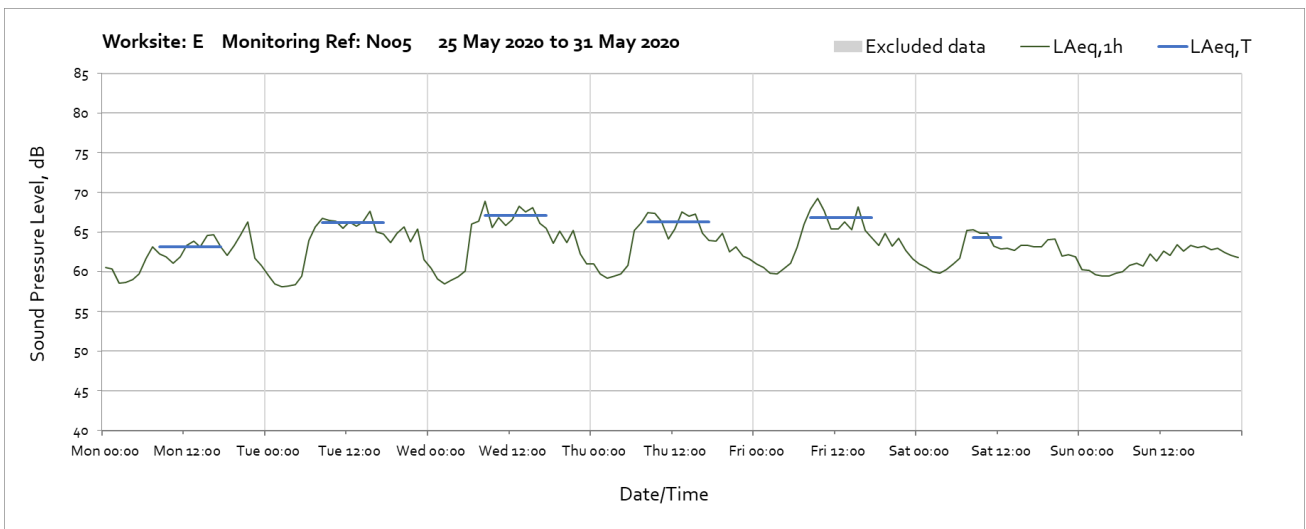
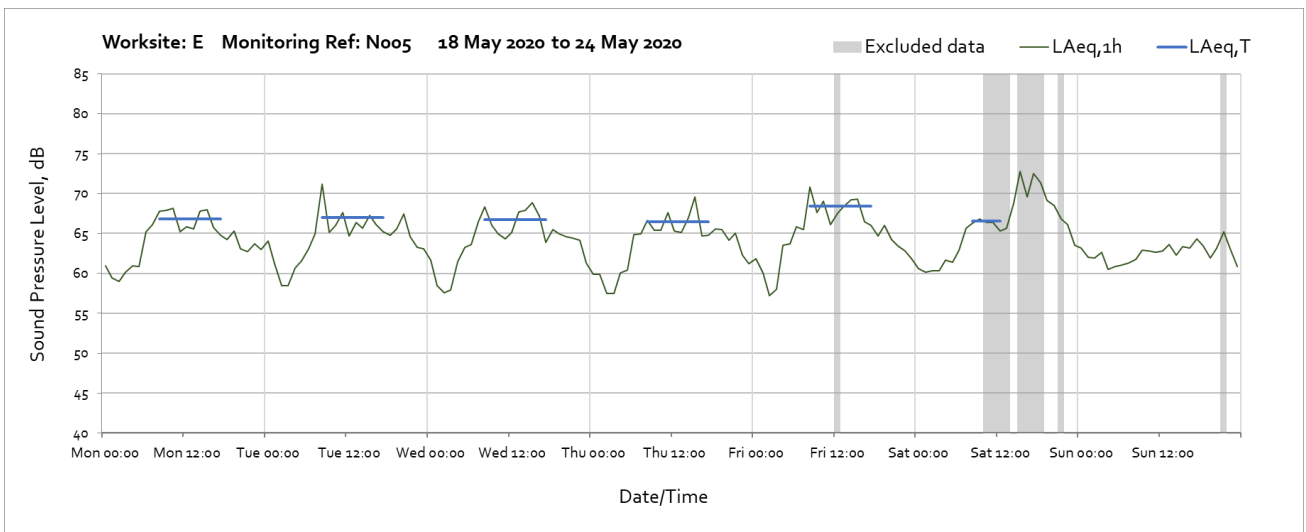
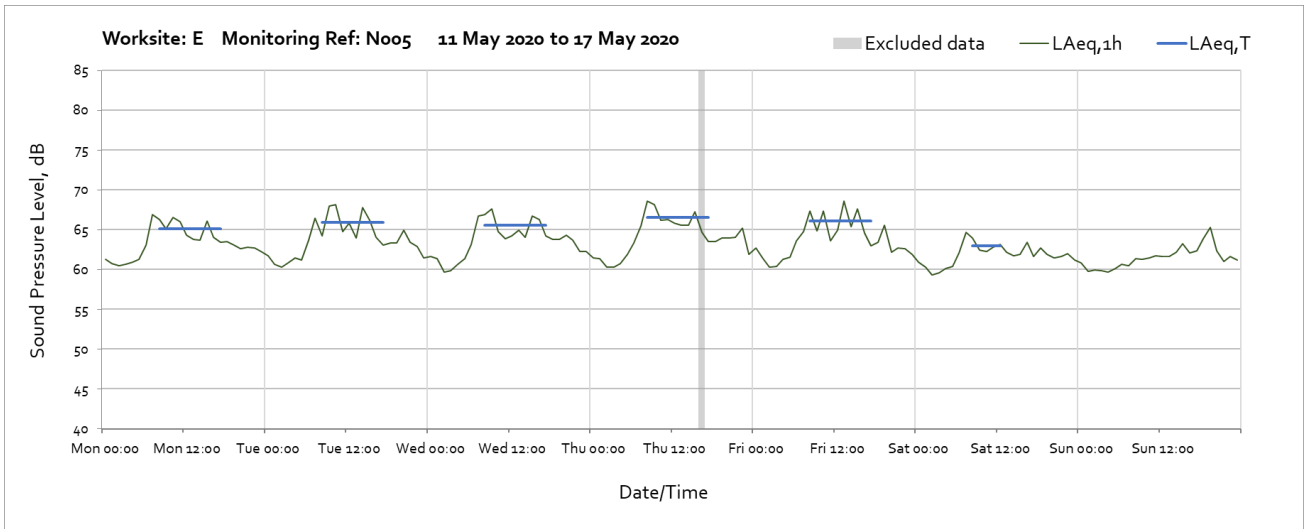




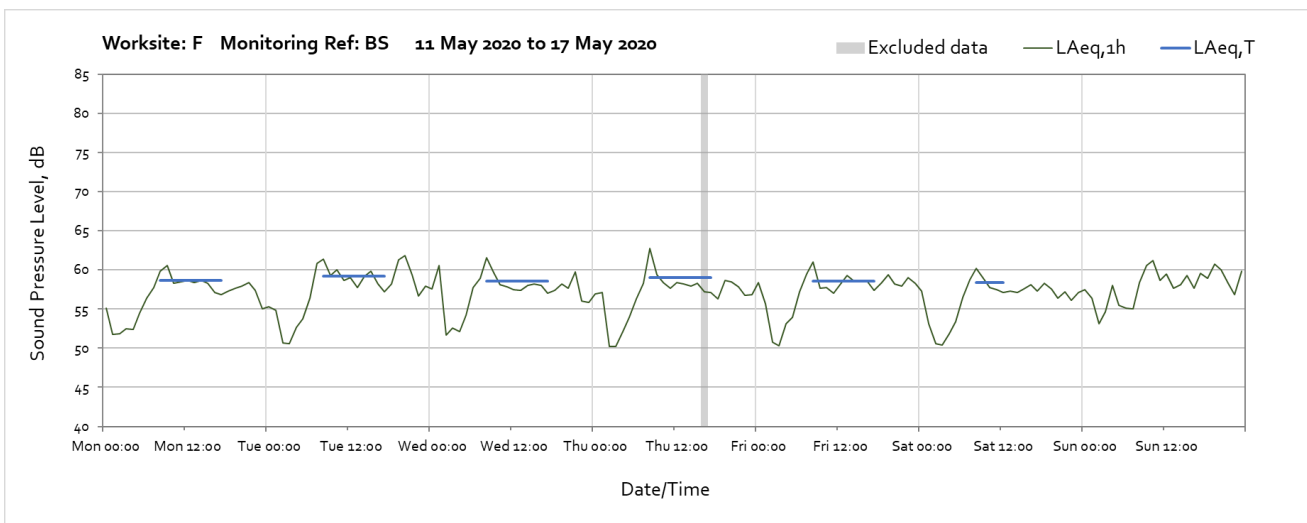
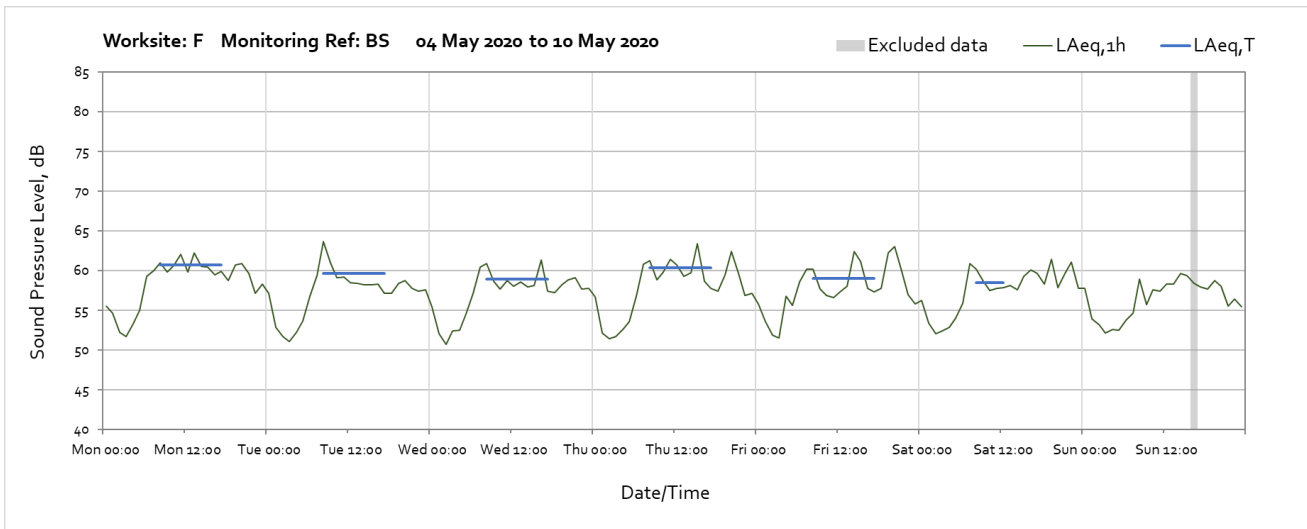
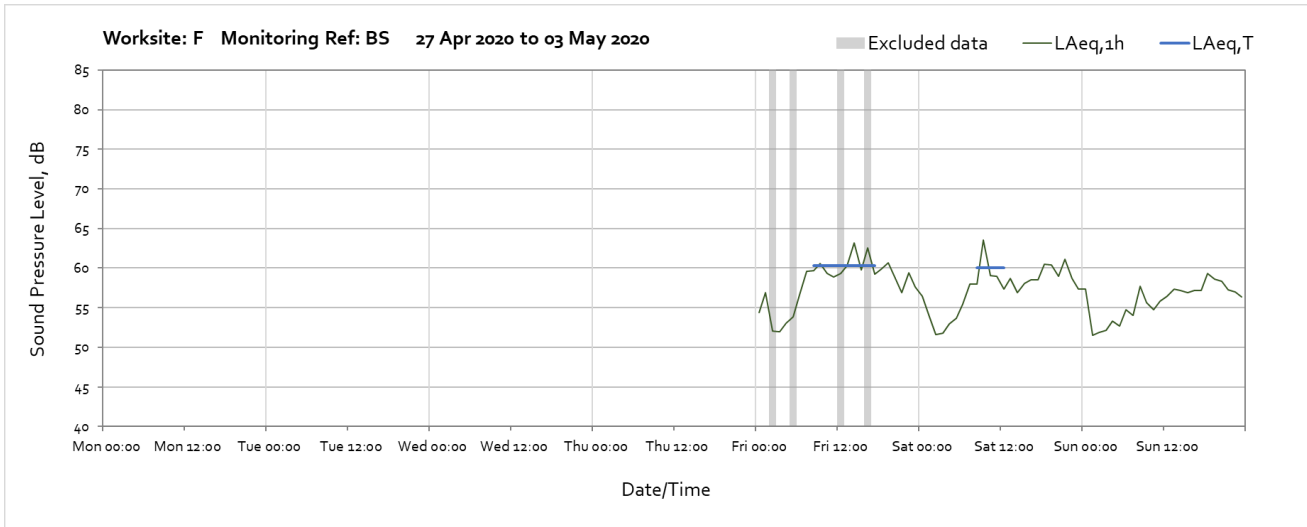


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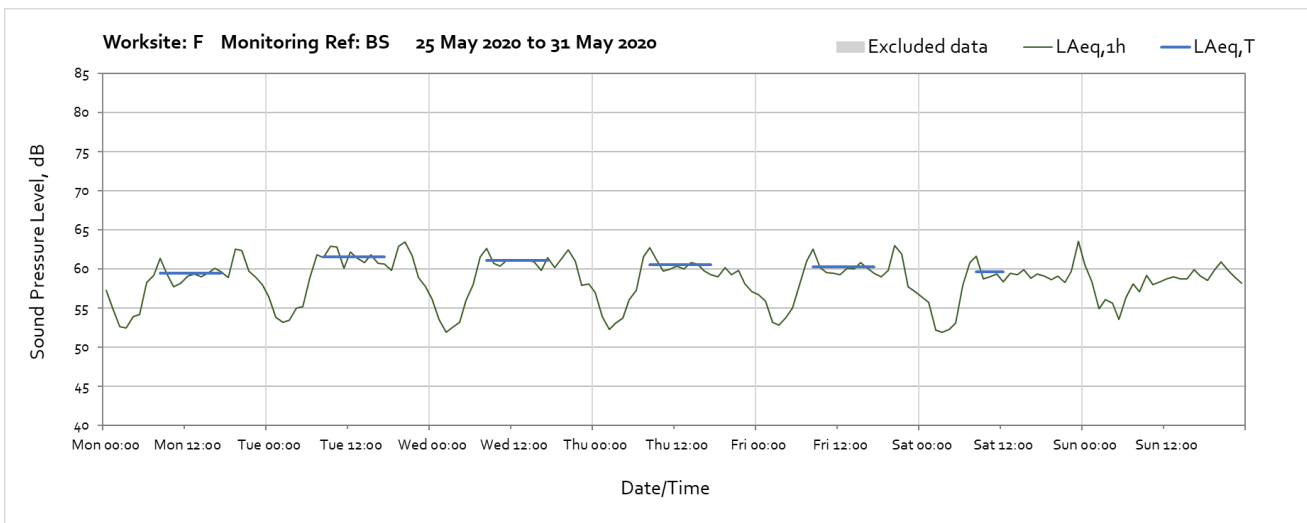
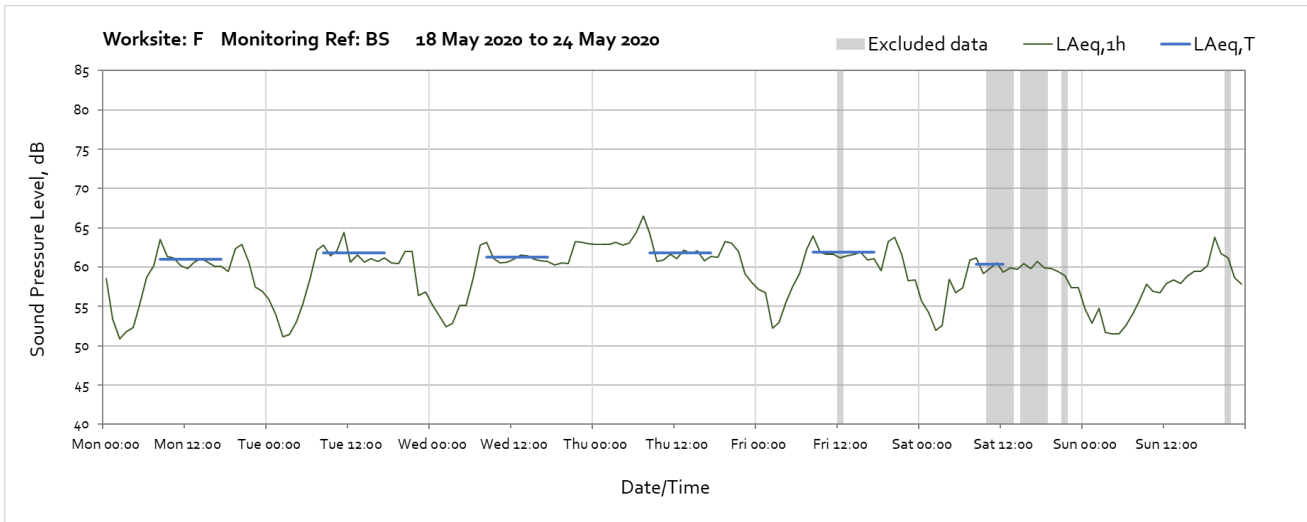




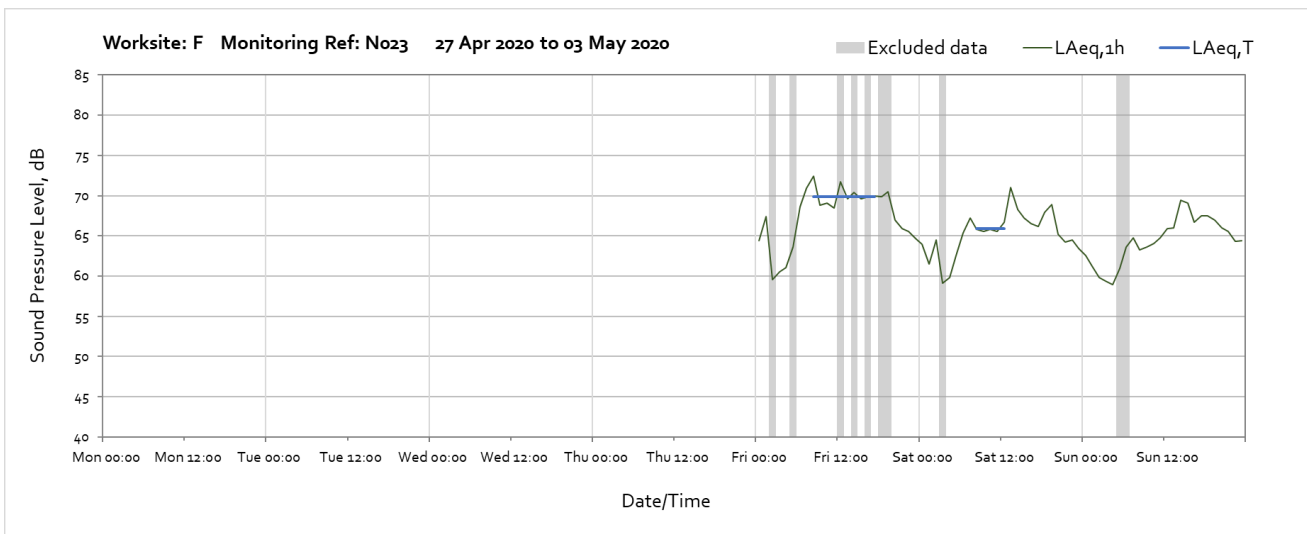
# Worksite: F – Monitoring Ref: BS

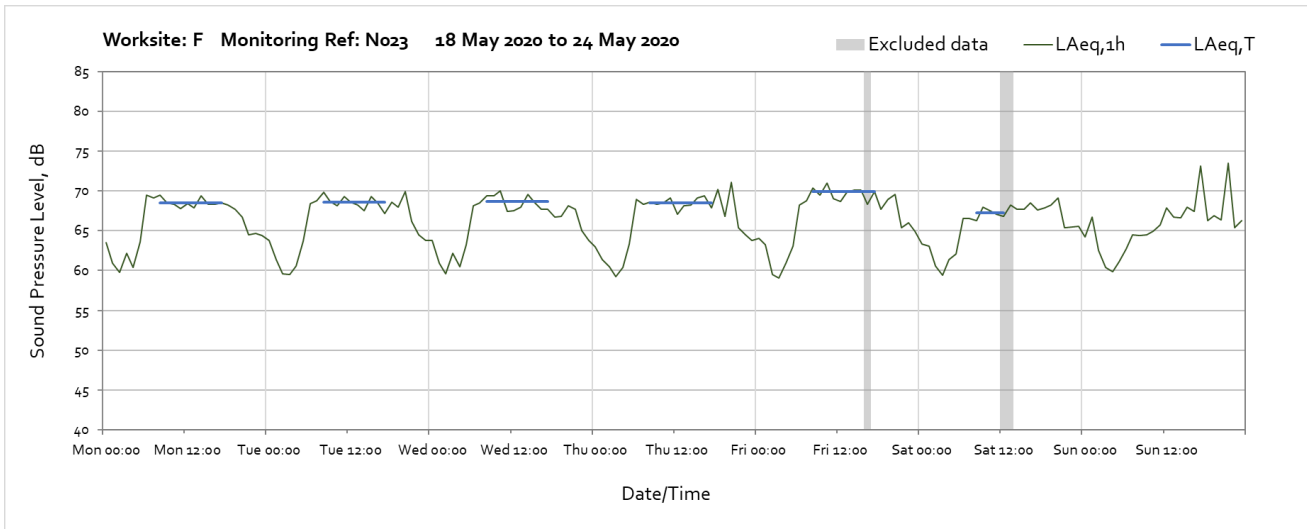
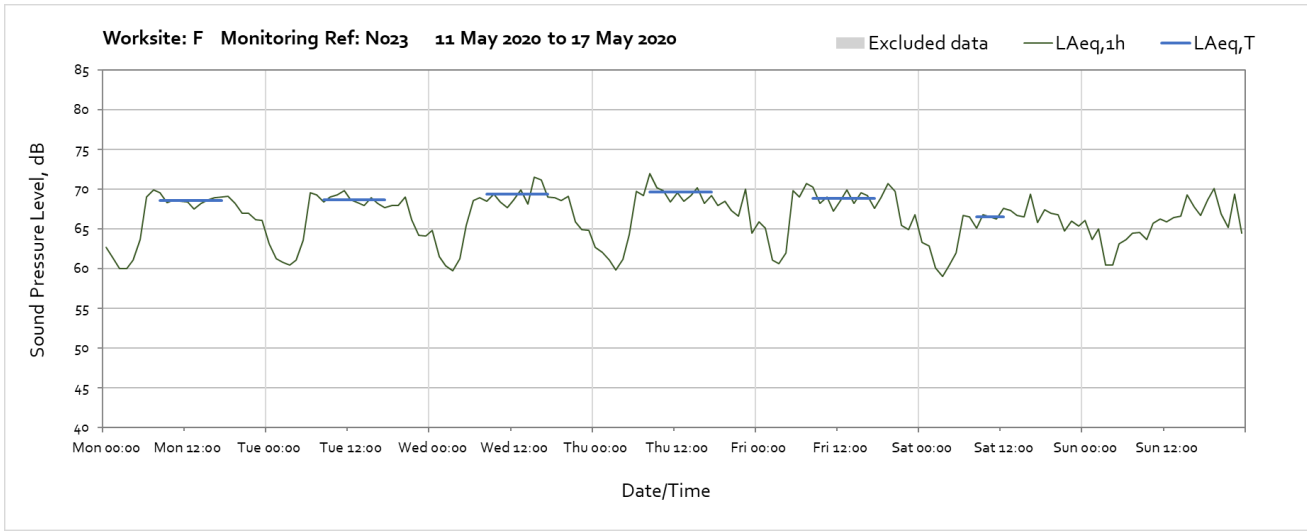
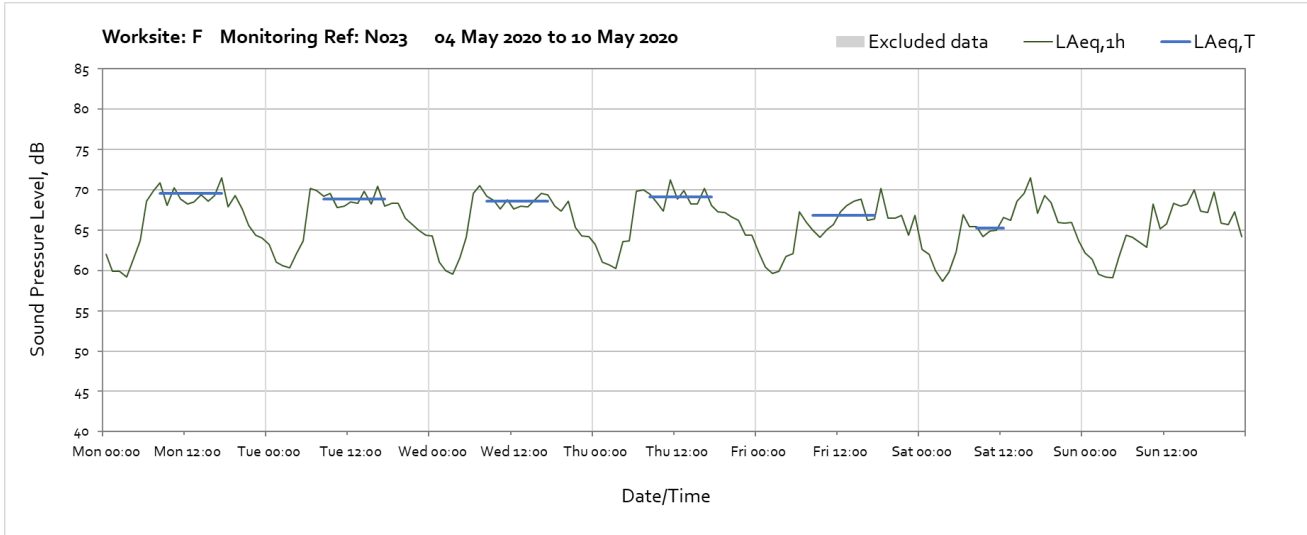


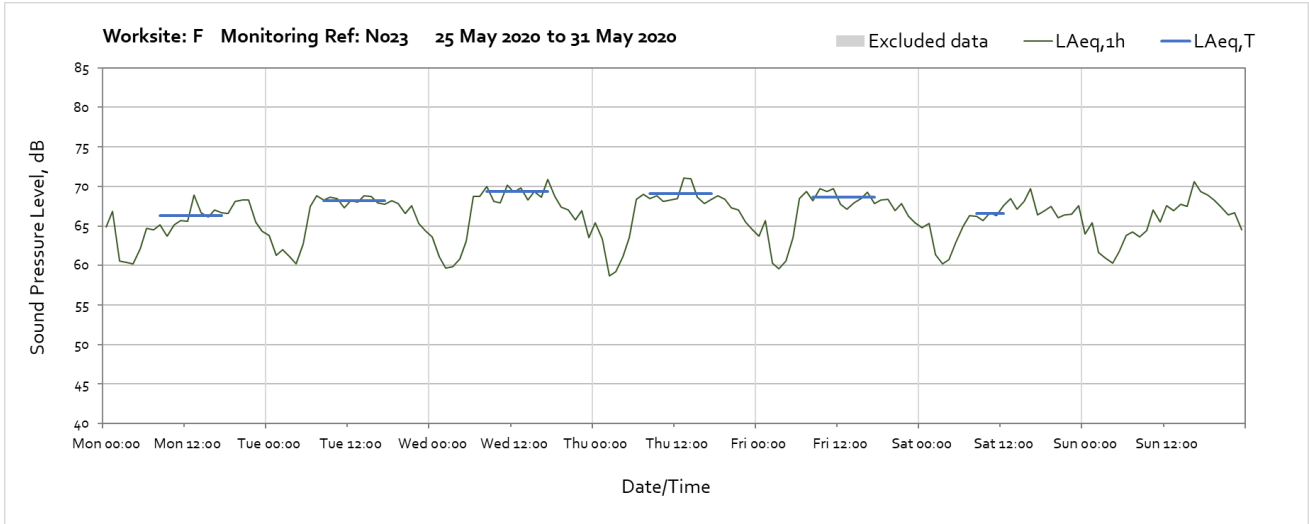




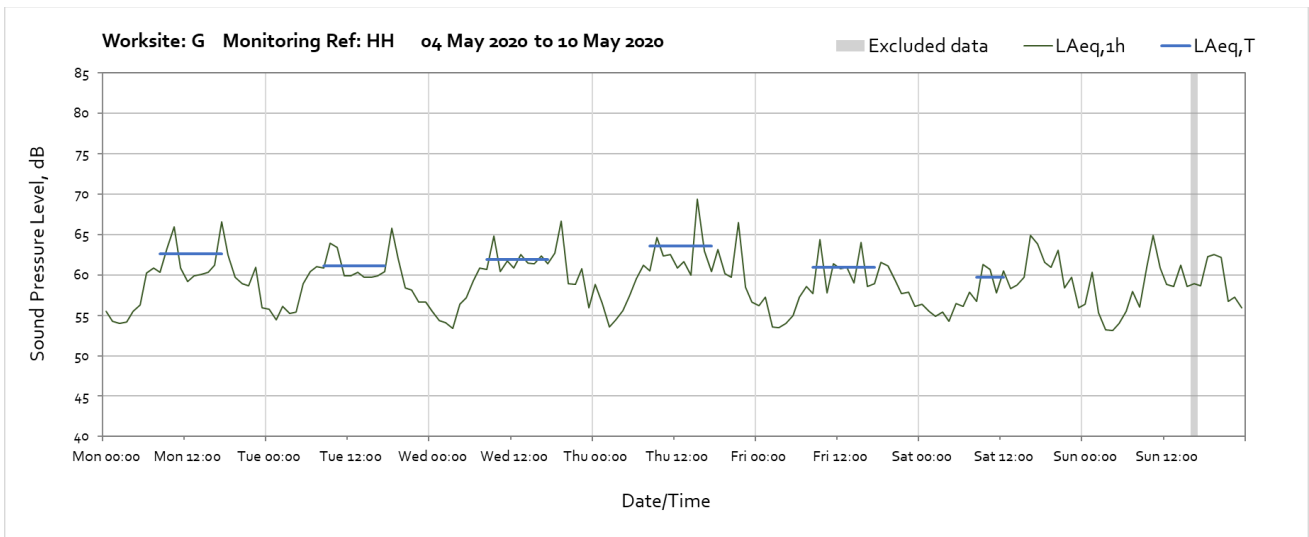
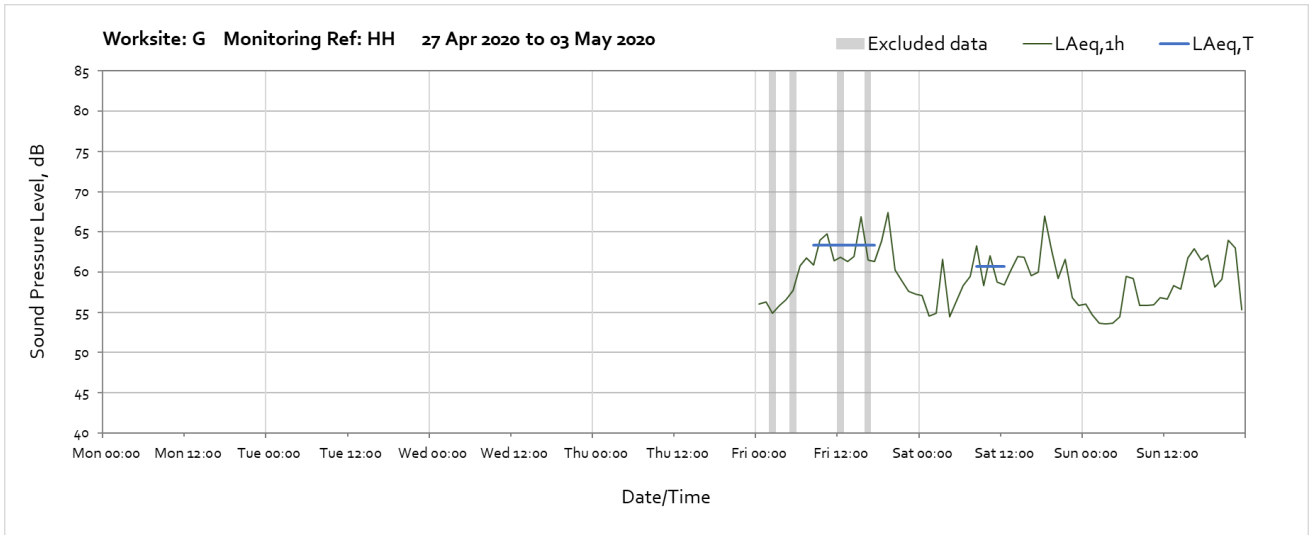
## Worksite: F – Monitoring Ref: N023

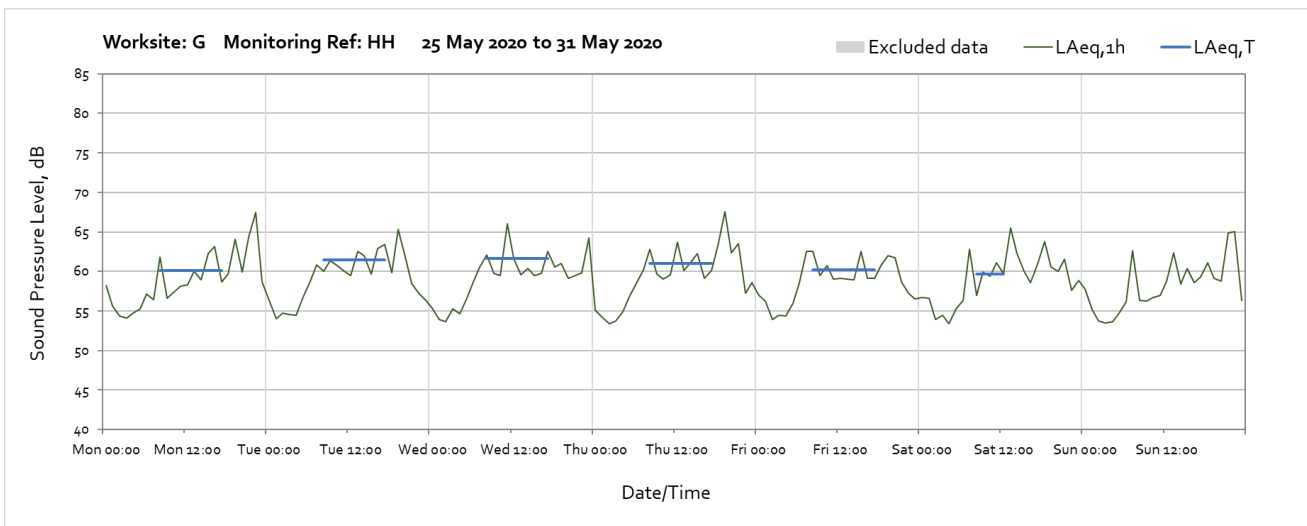
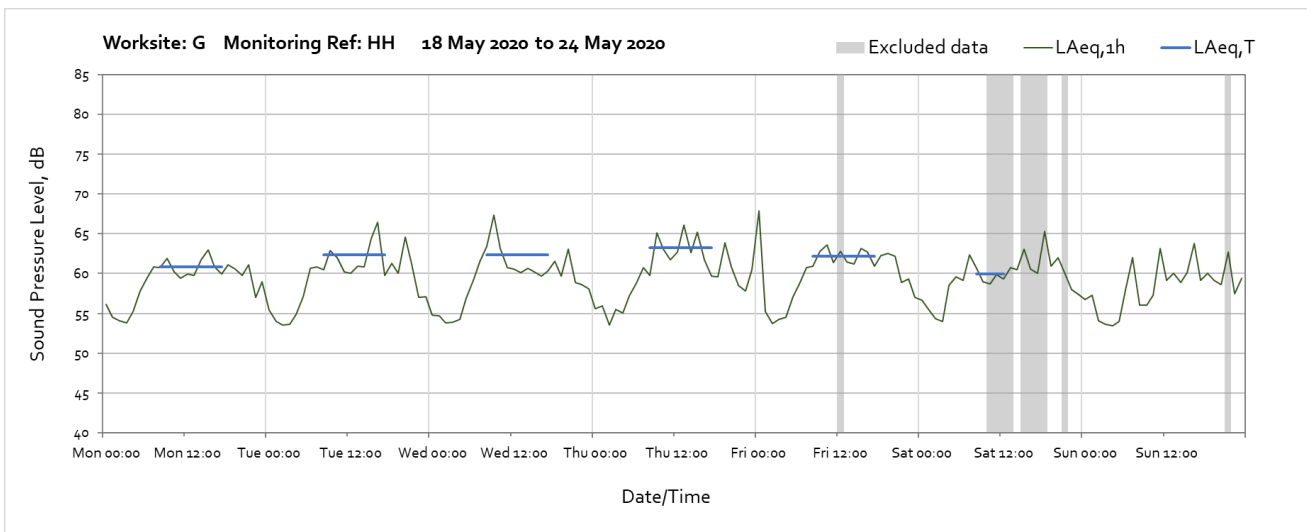
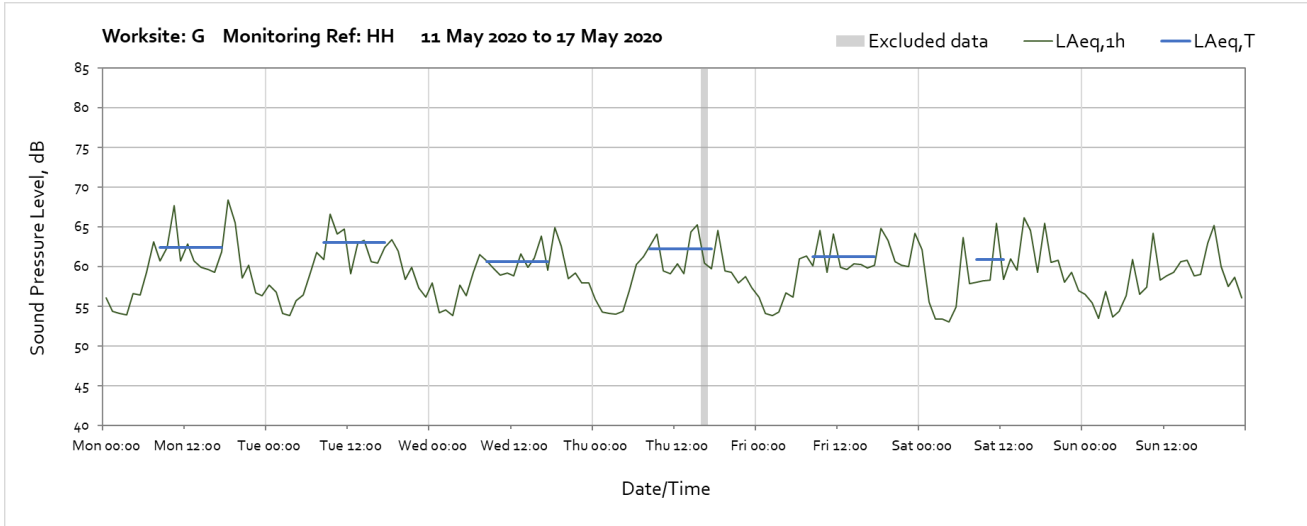




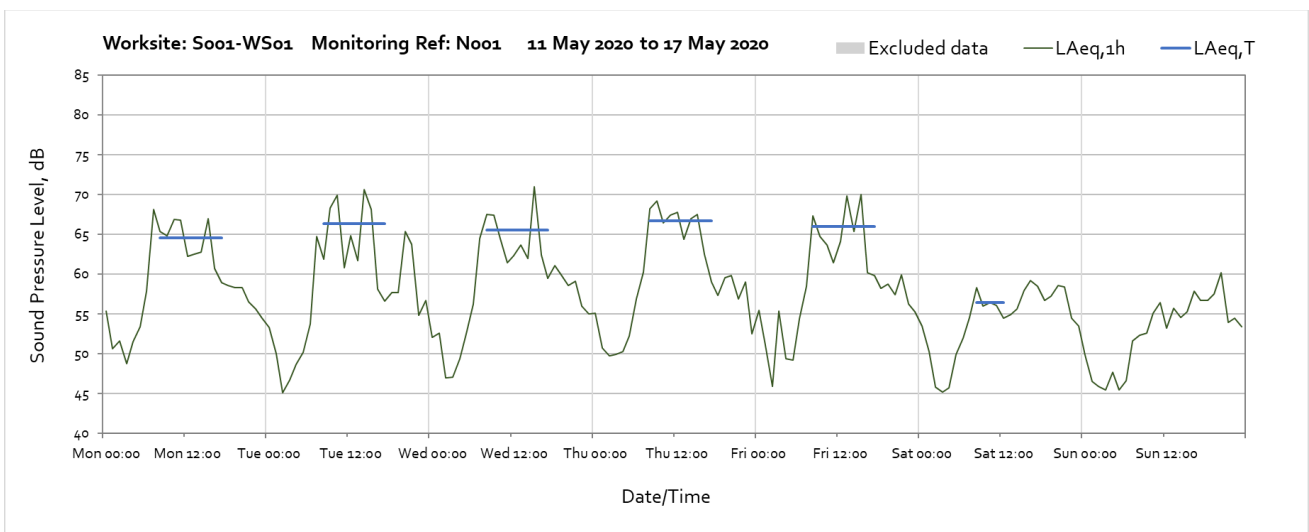
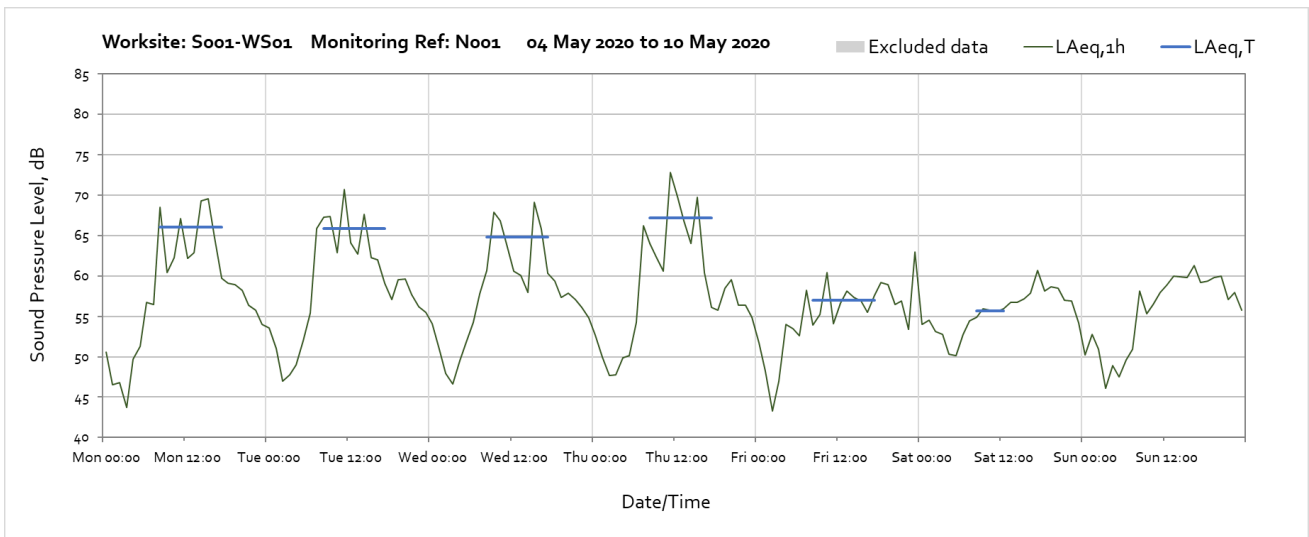
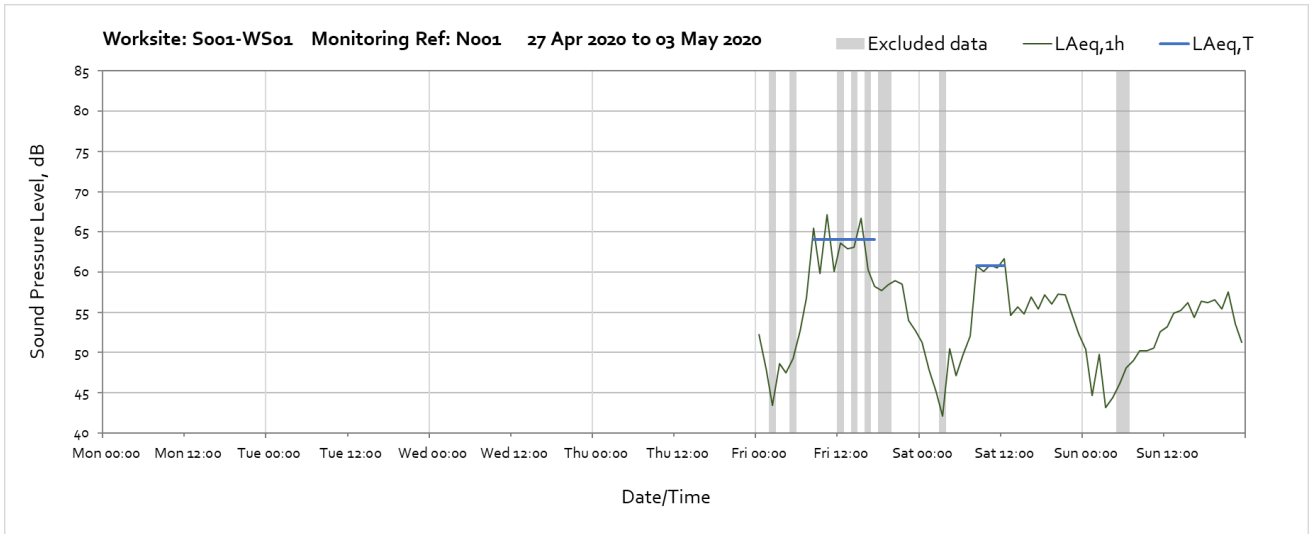


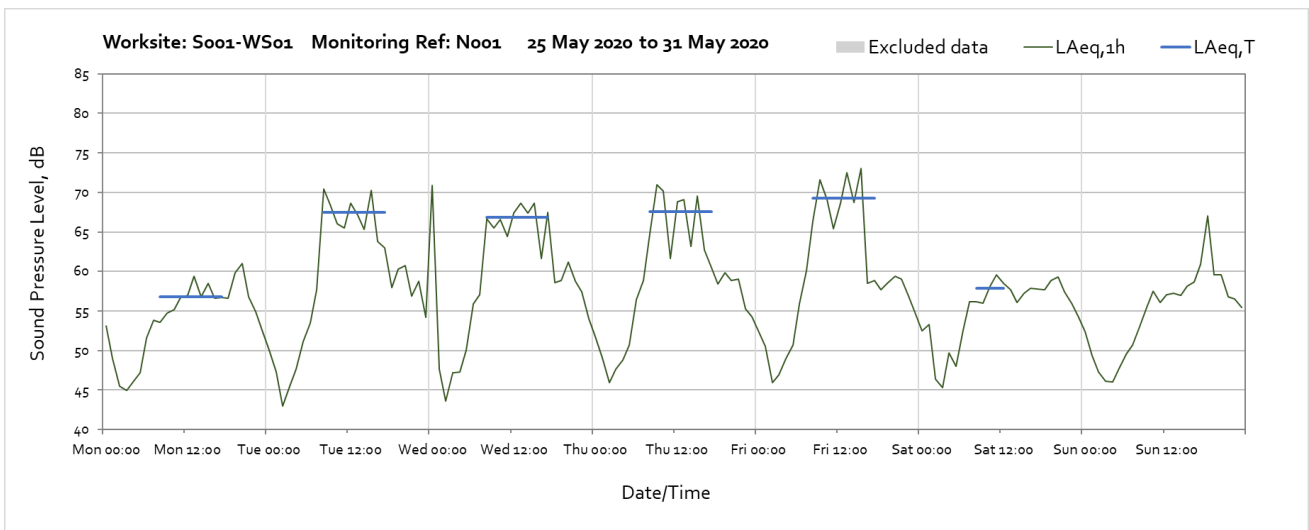
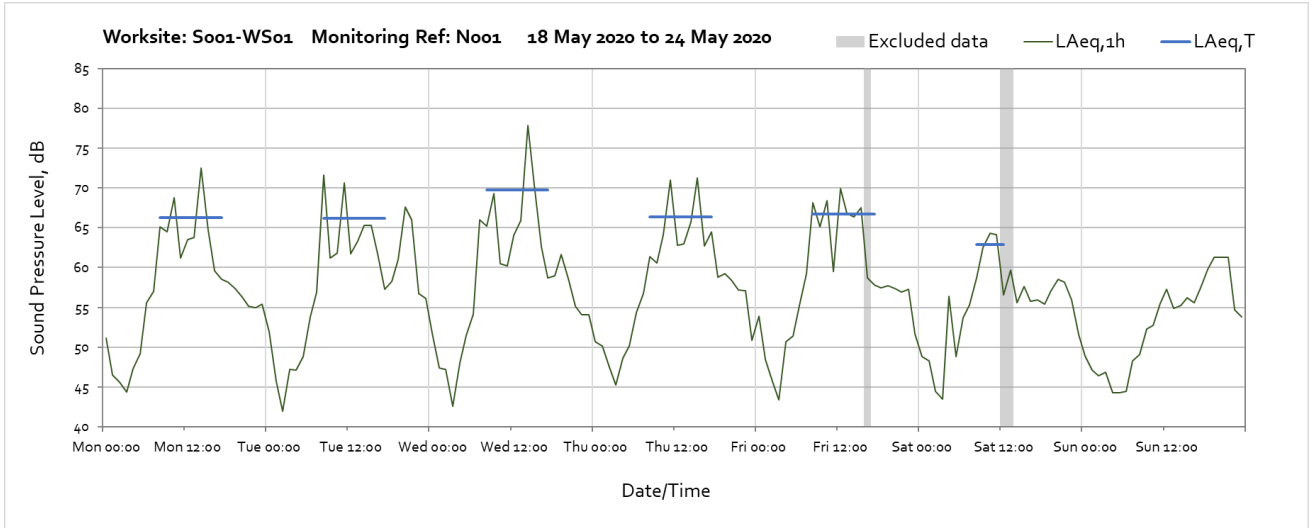
## Worksite: G – Monitoring Ref: HH



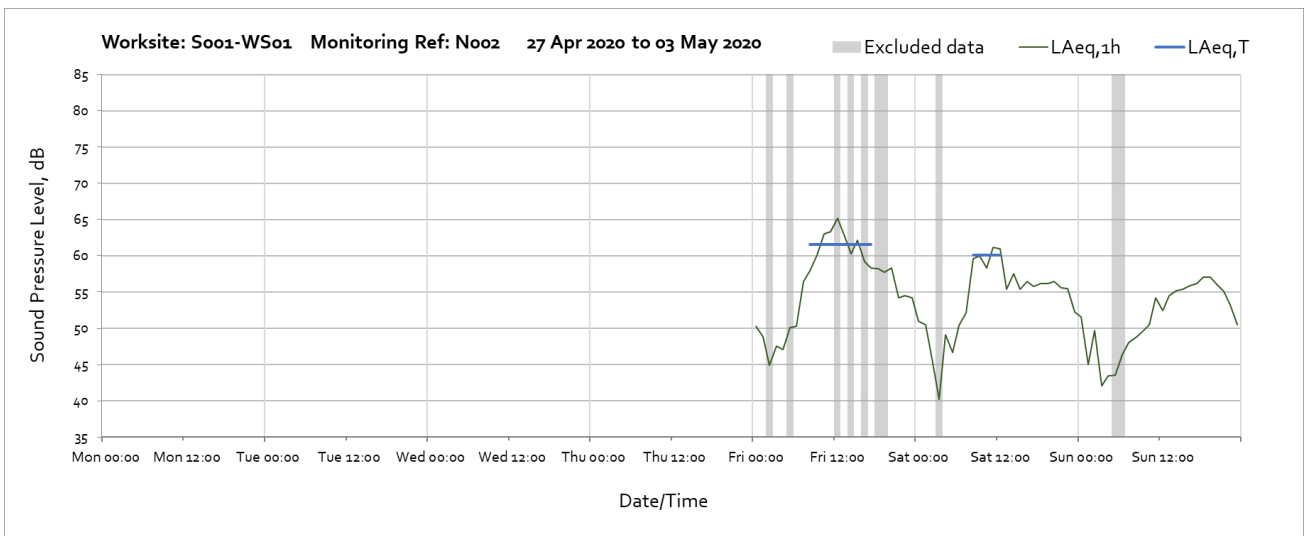


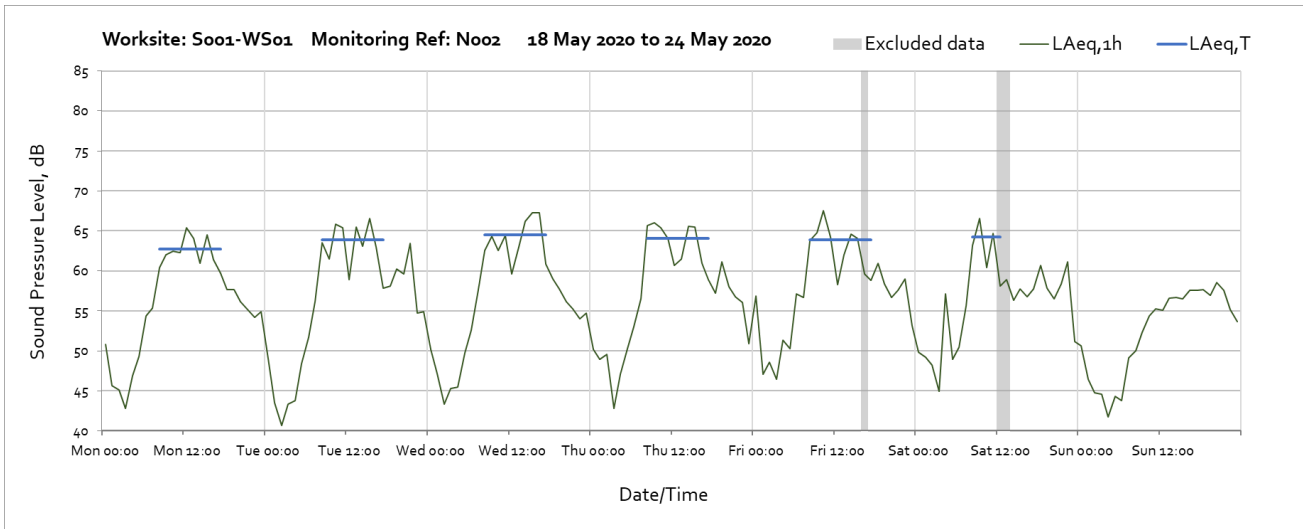
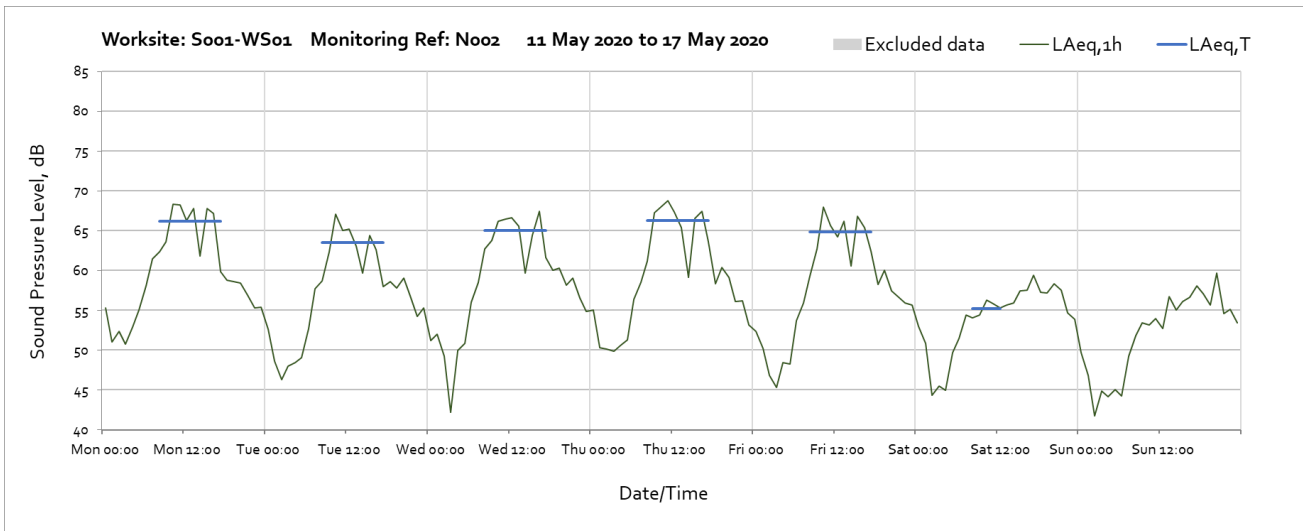
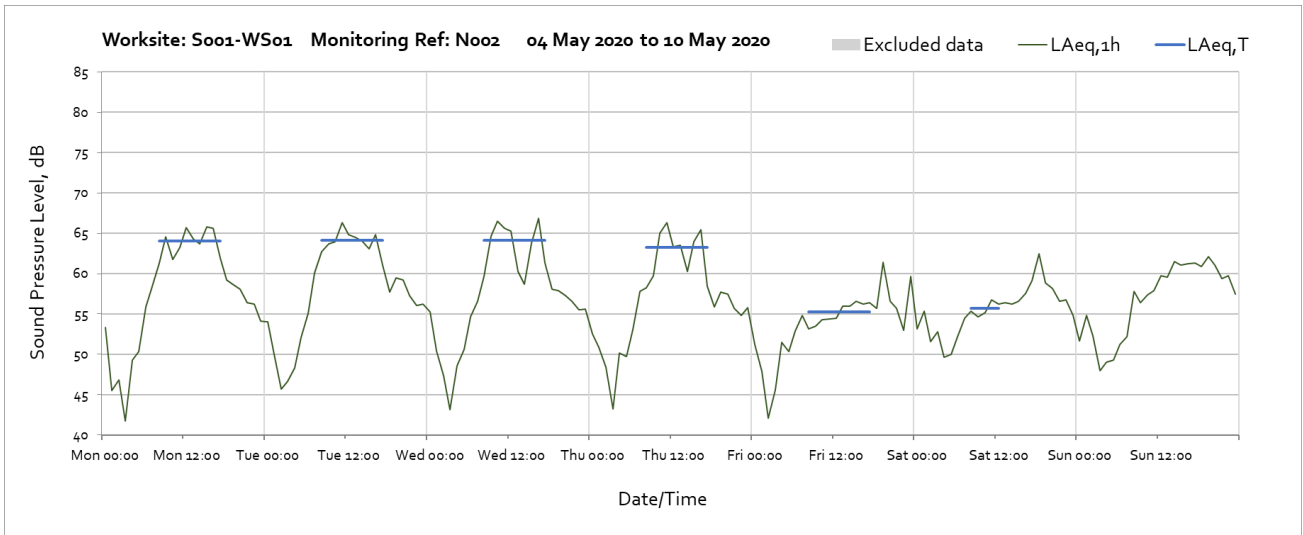
# Worksite: S001-WS01 – Monitoring Ref: N001

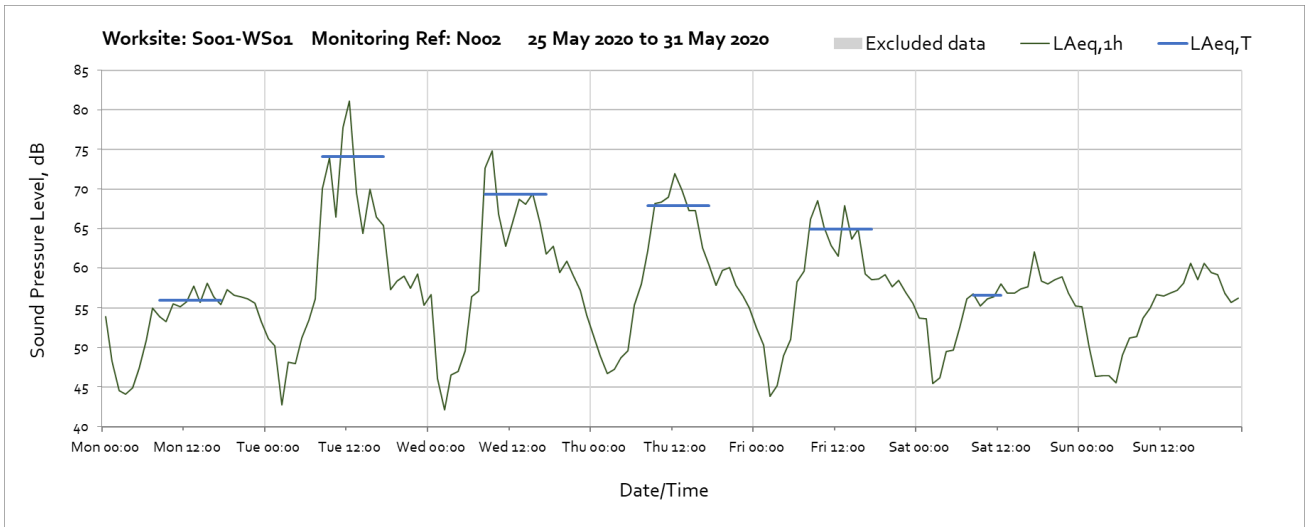




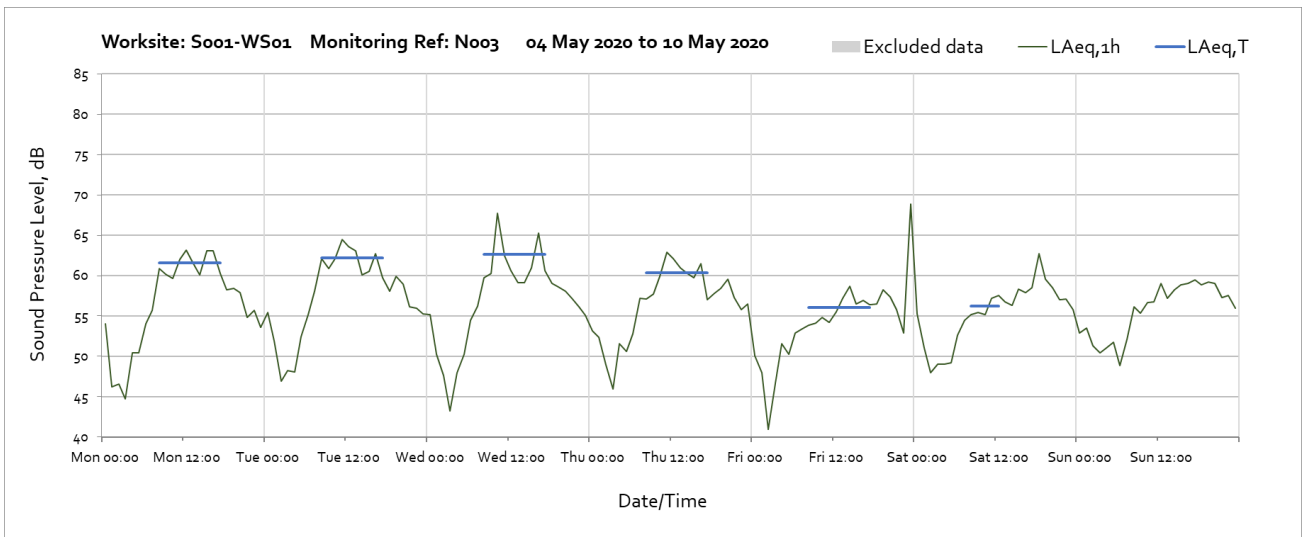
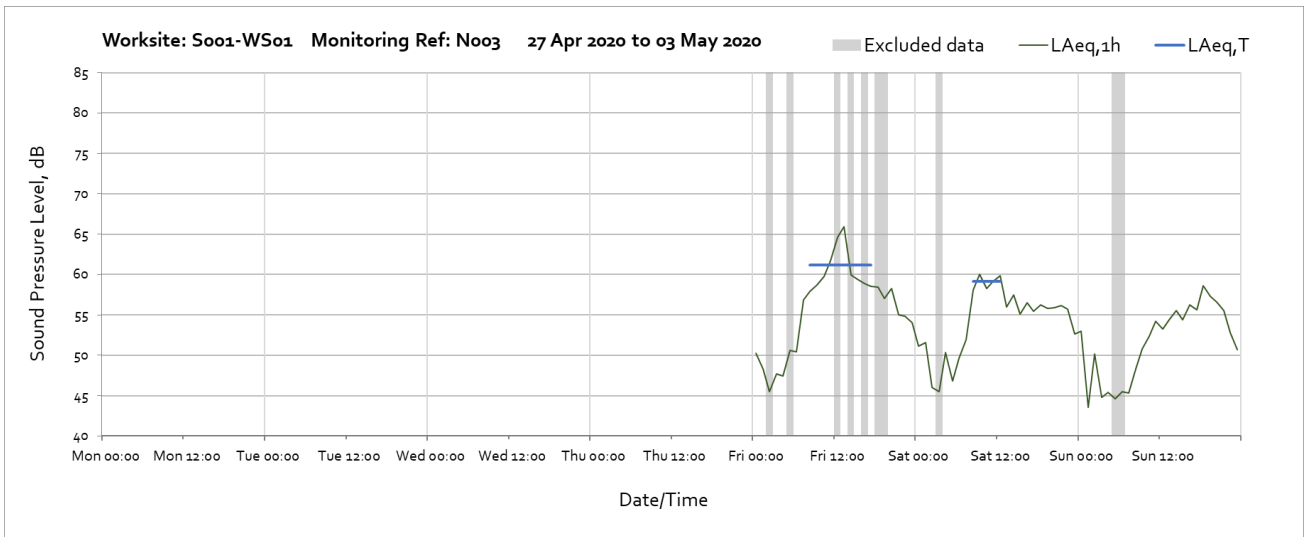
## Worksite: S001-WS01 – Monitoring Ref: N002



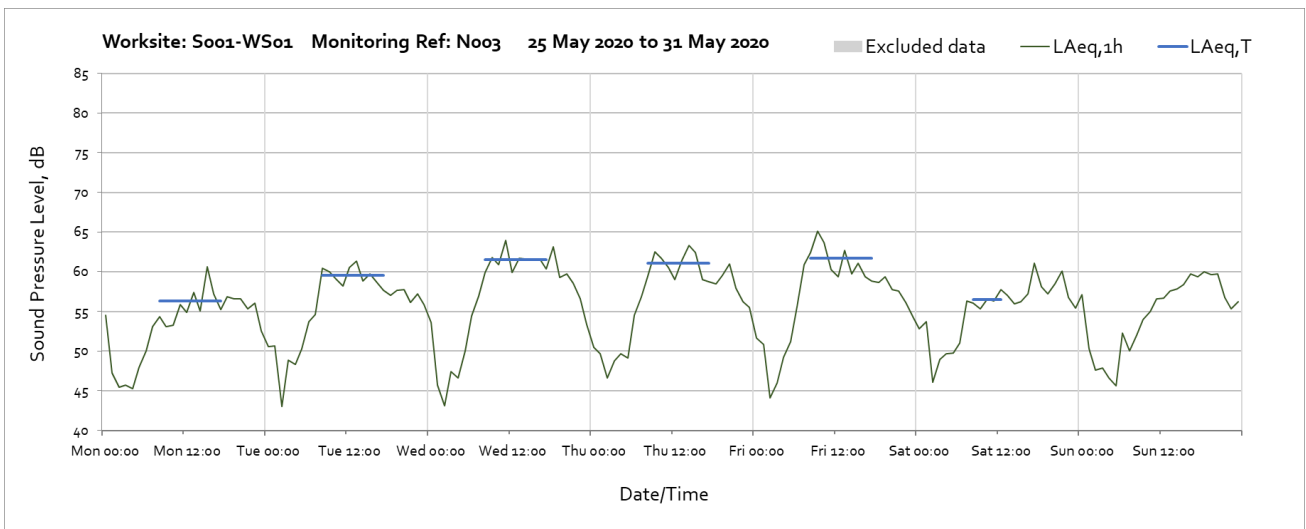
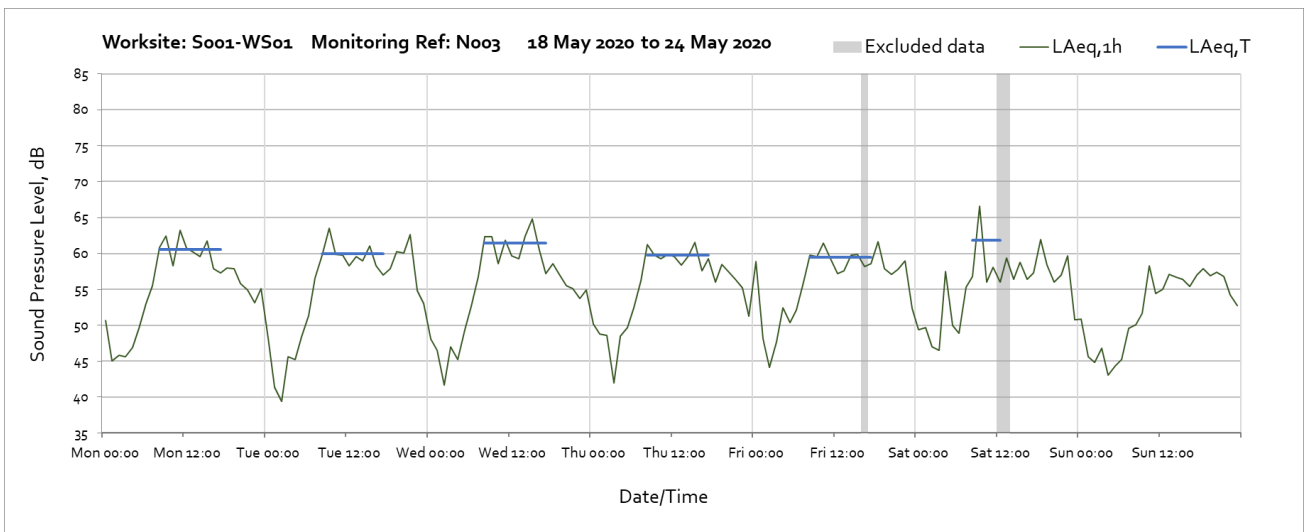
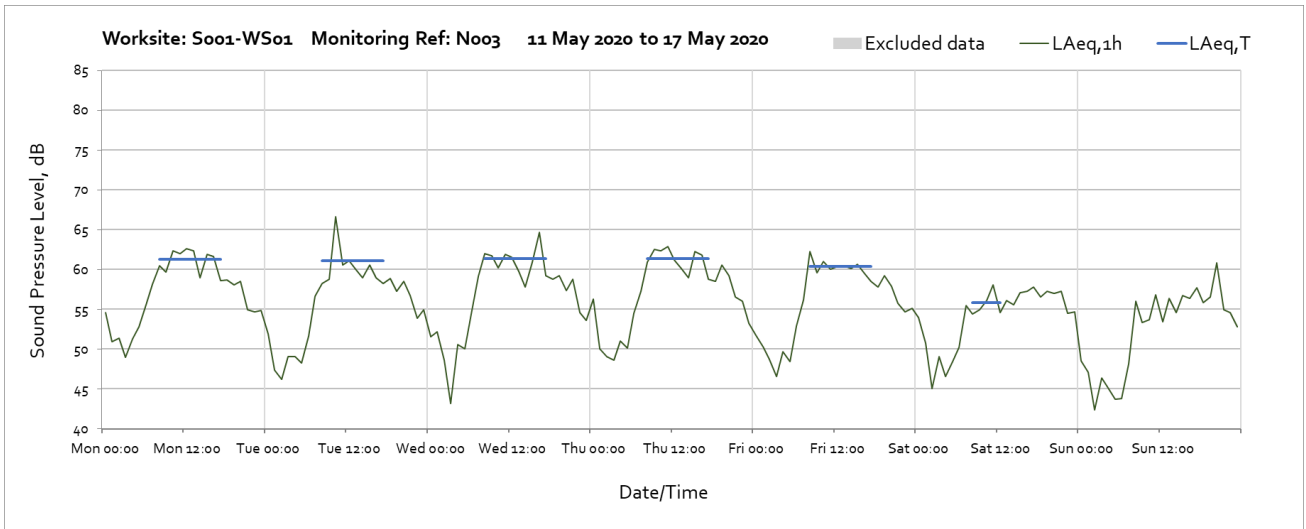




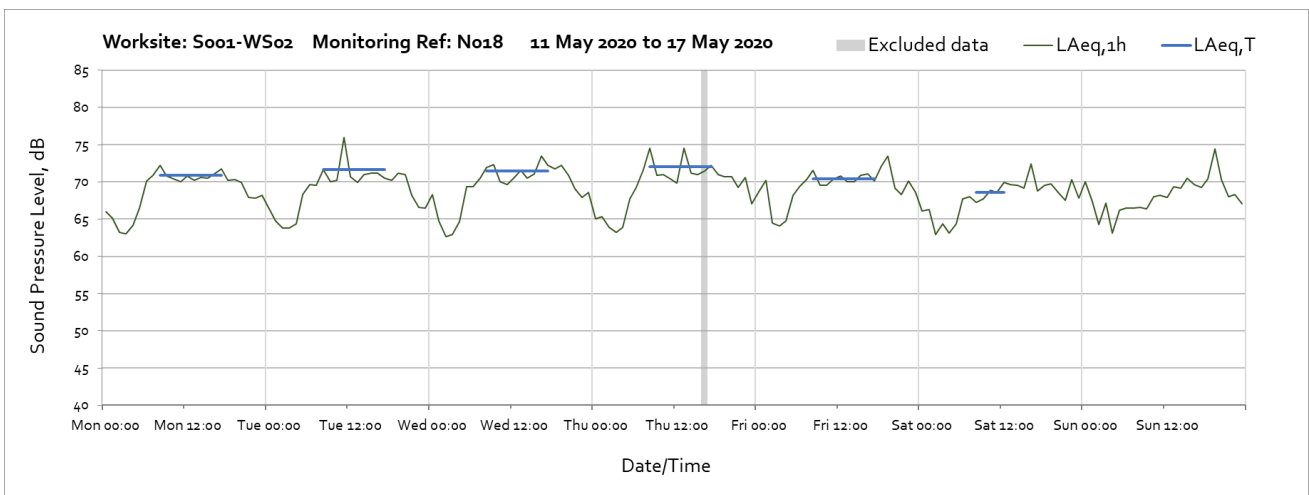
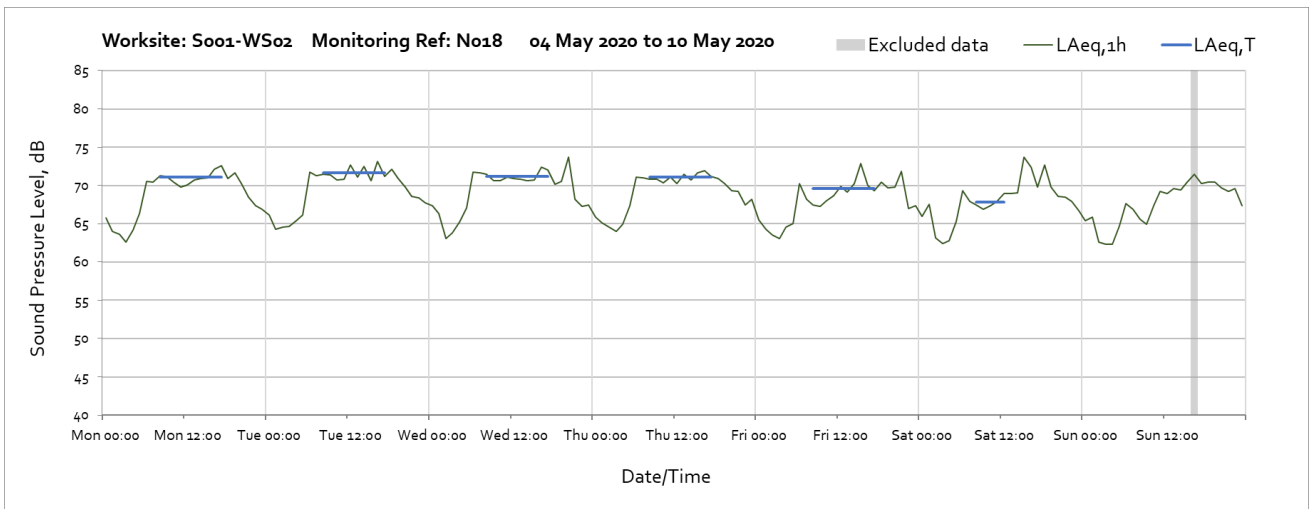
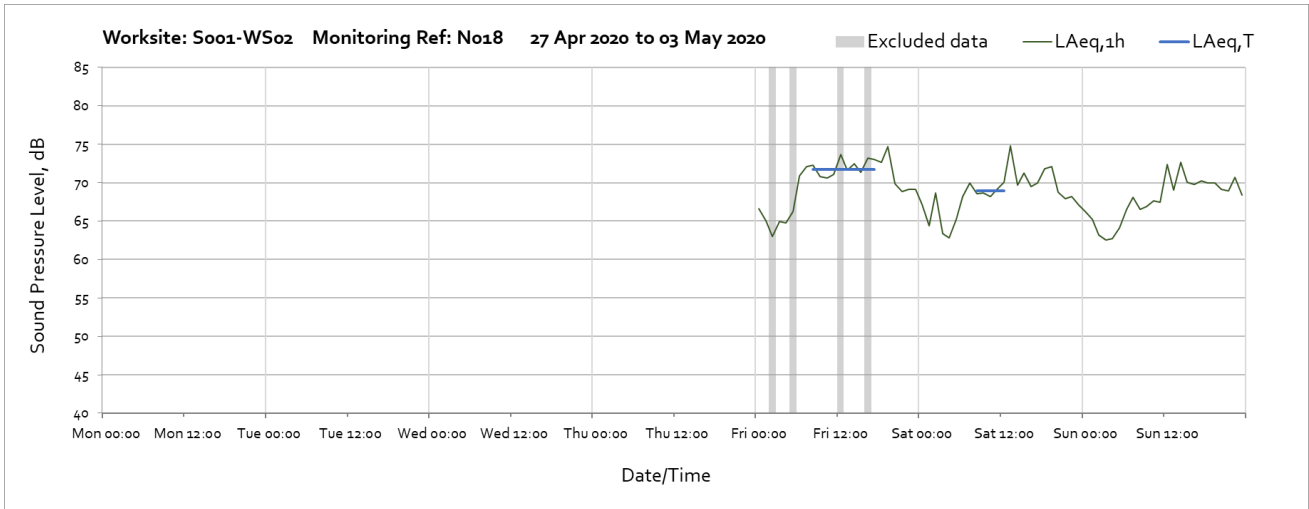
## Worksite: S001-WS01 – Monitoring Ref: N003

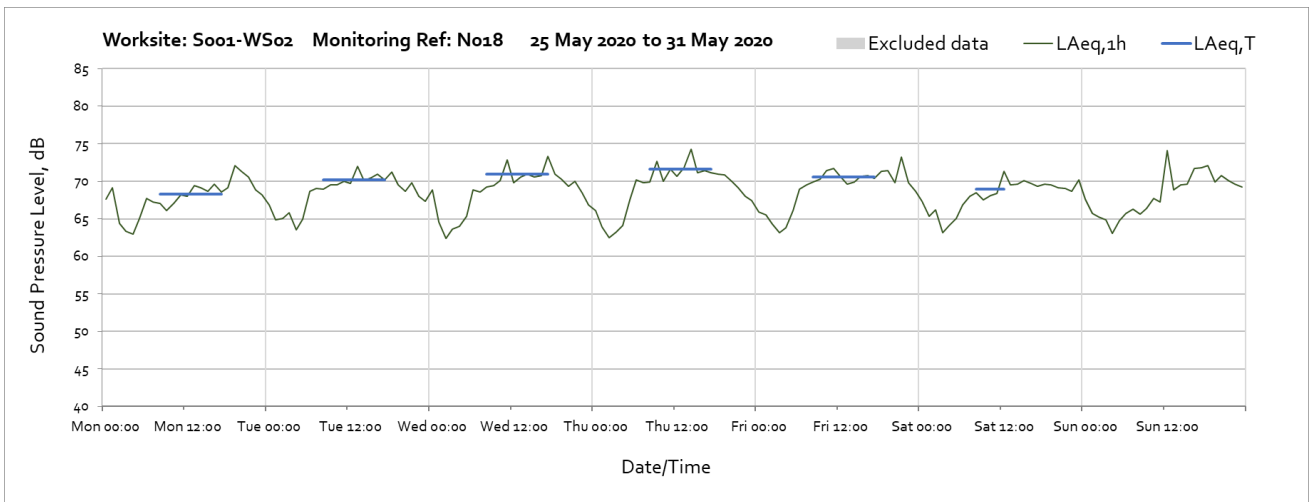
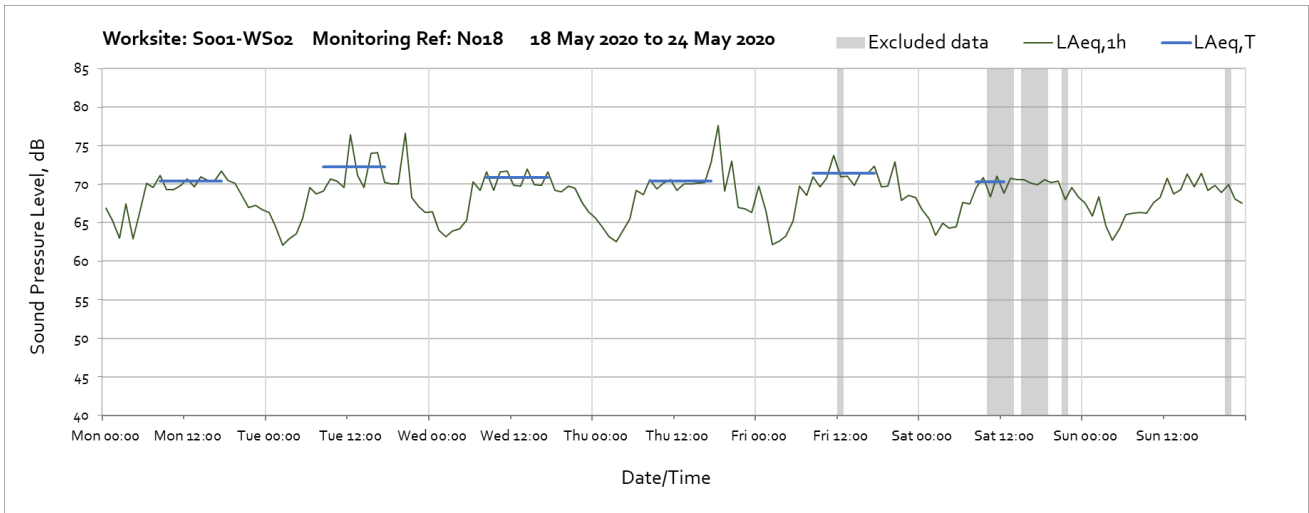




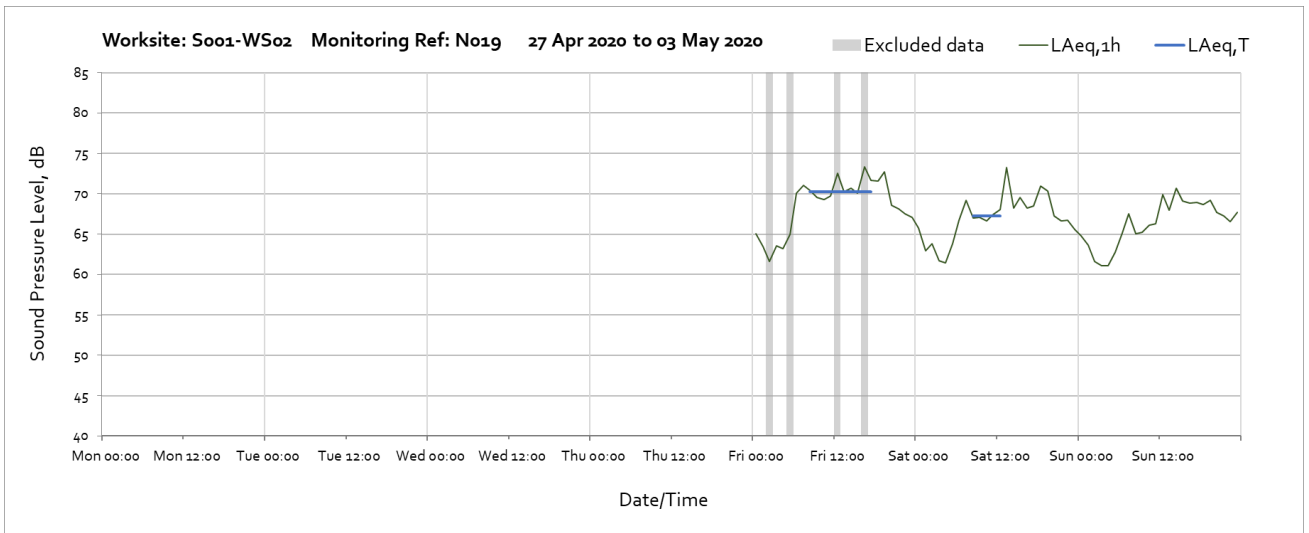


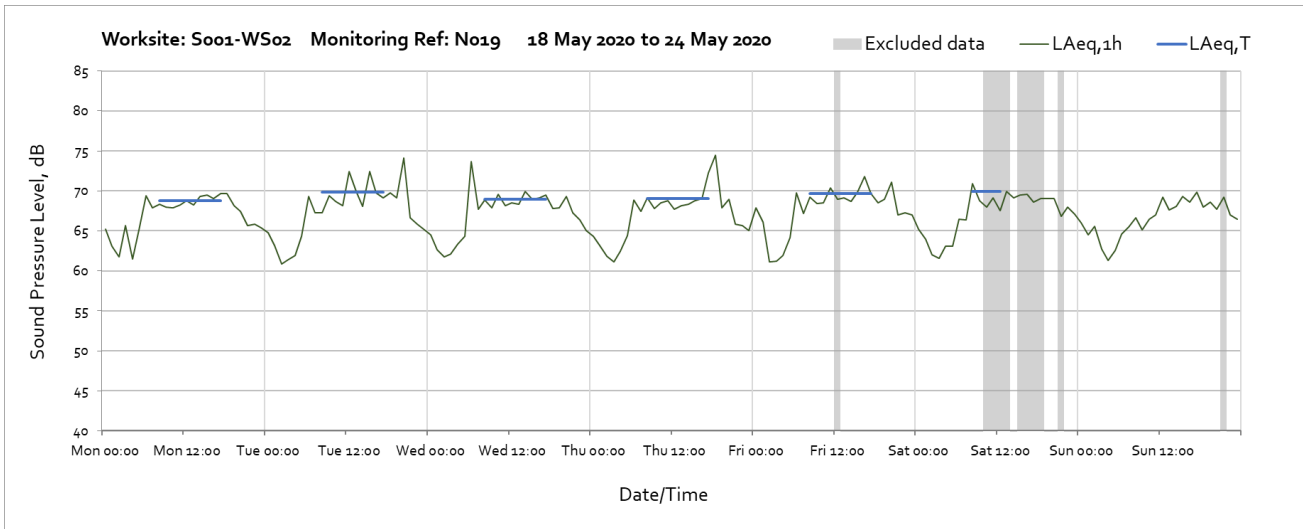
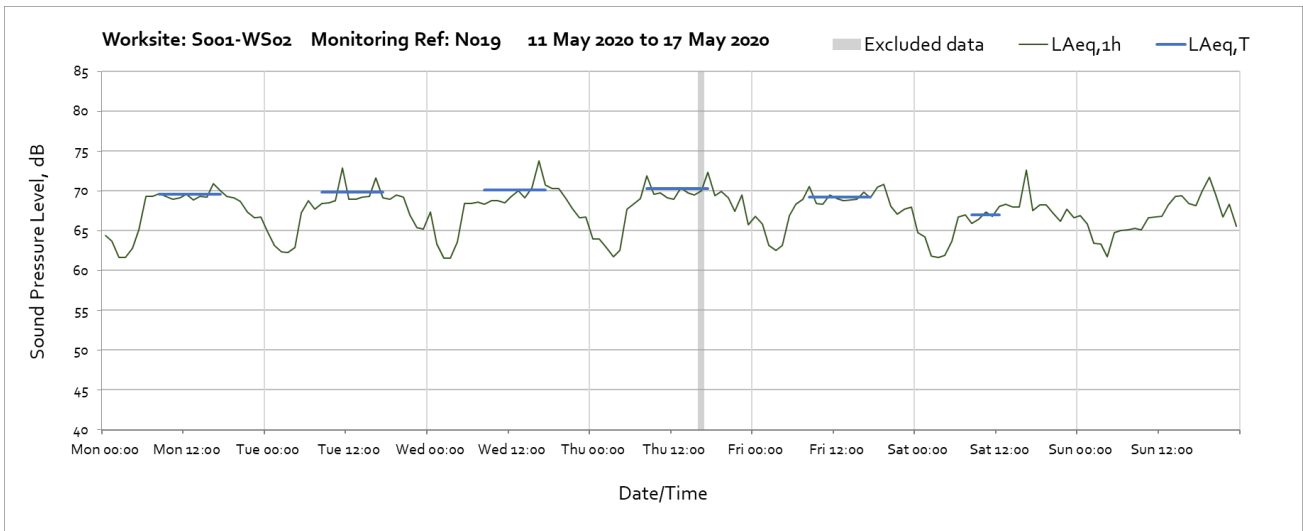
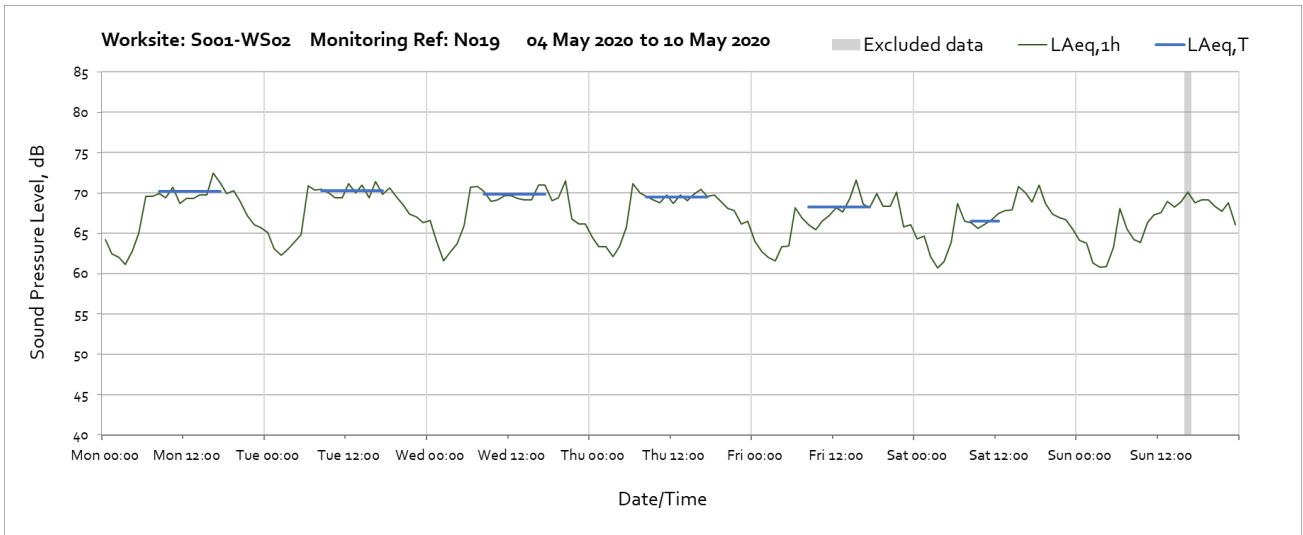
# Worksite: S001-WS02 – Monitoring Ref: N018

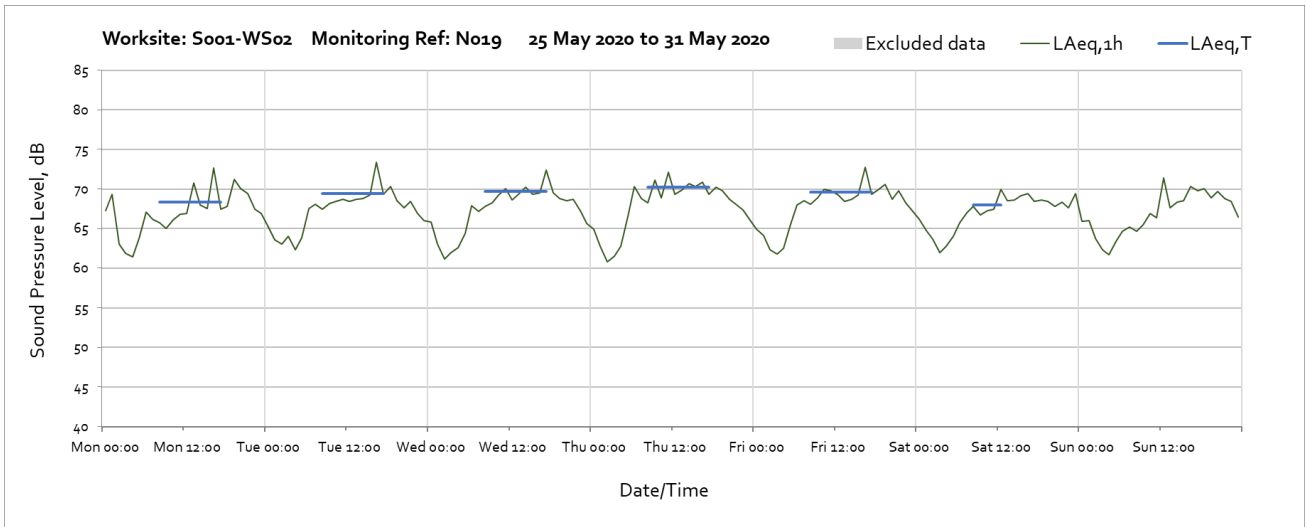




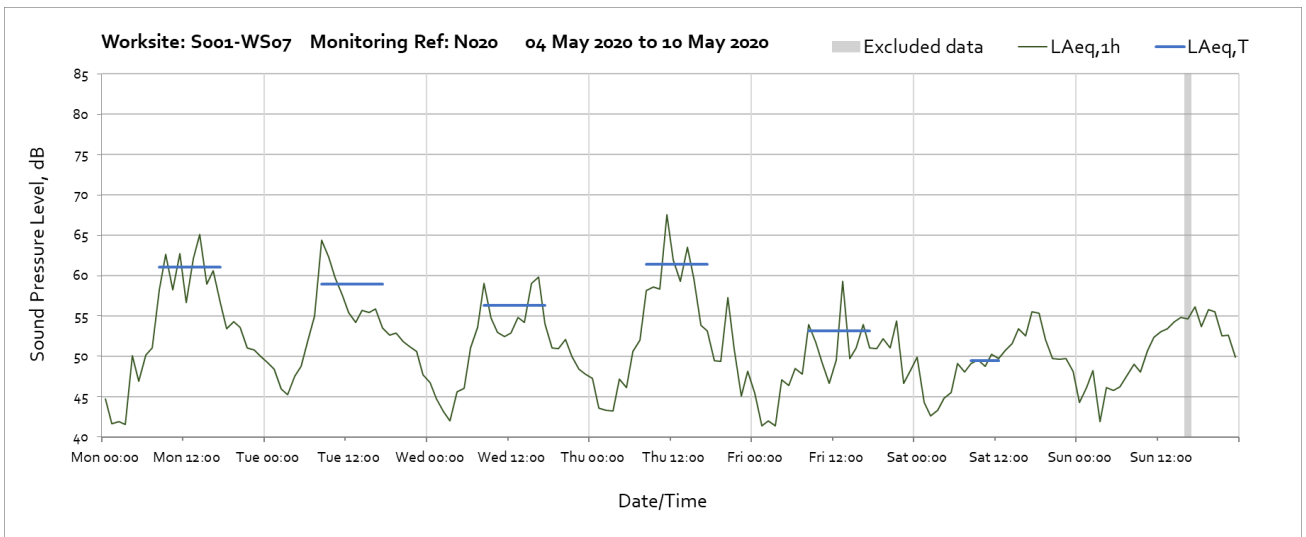
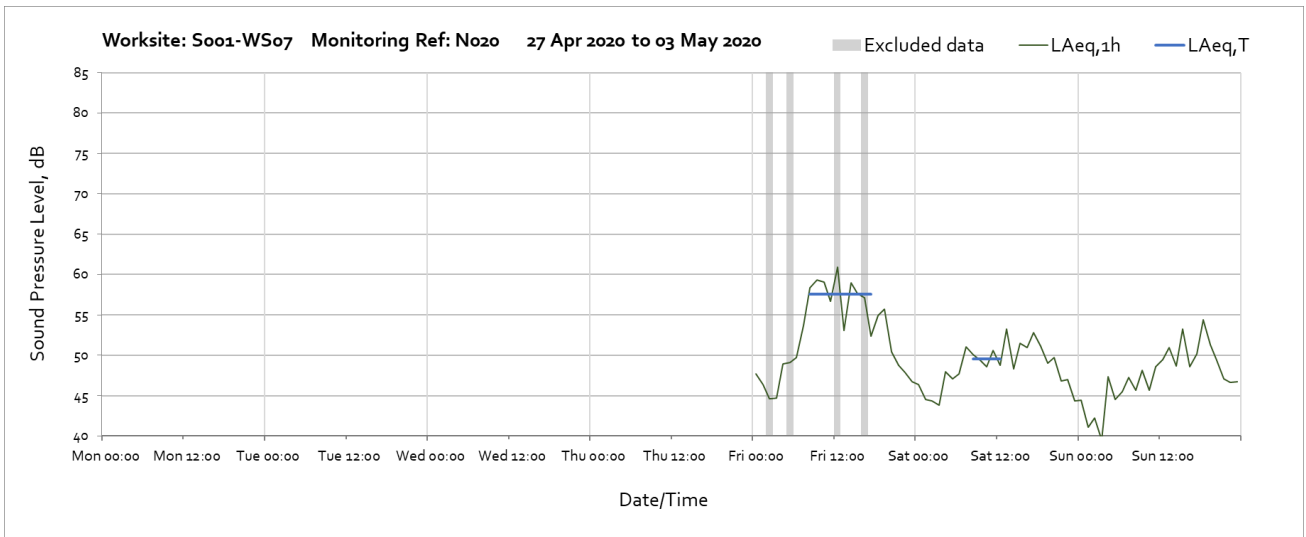
## Worksite: S001-WS02 – Monitoring Ref: N019

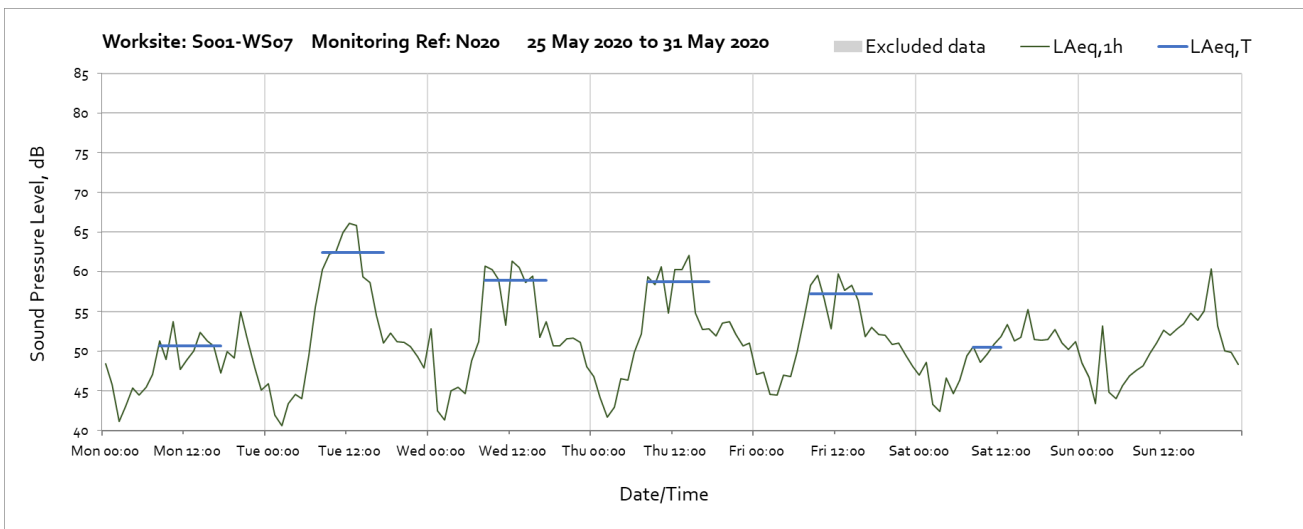
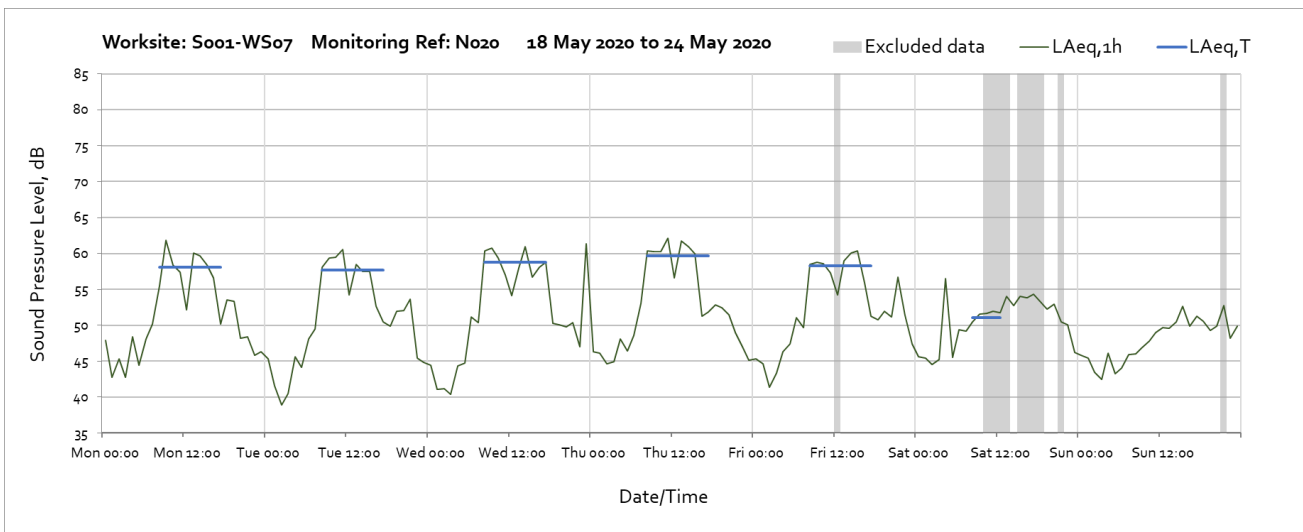
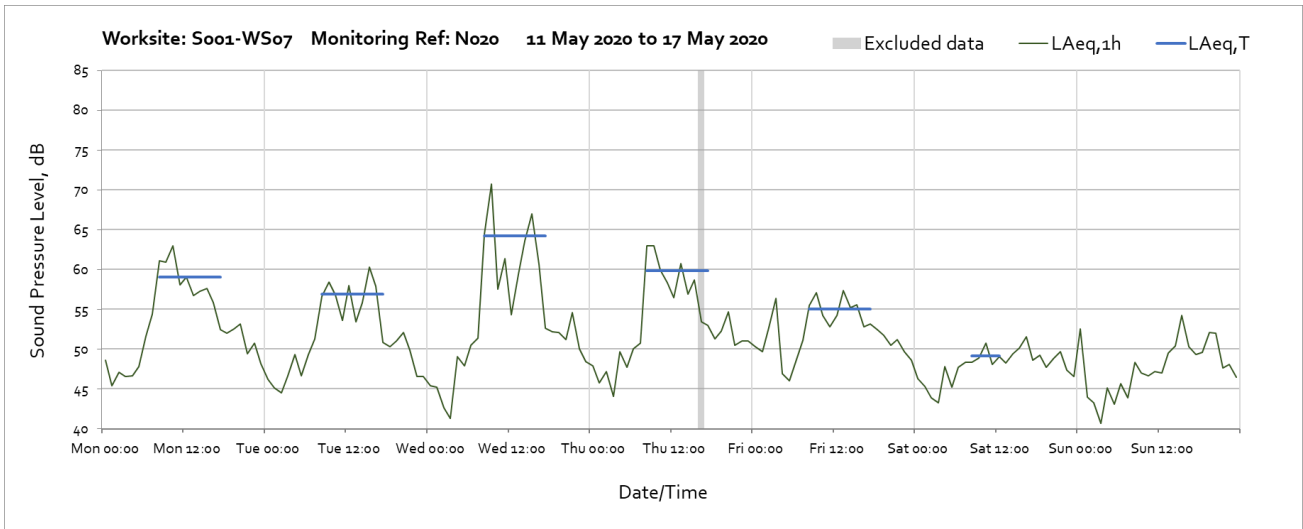




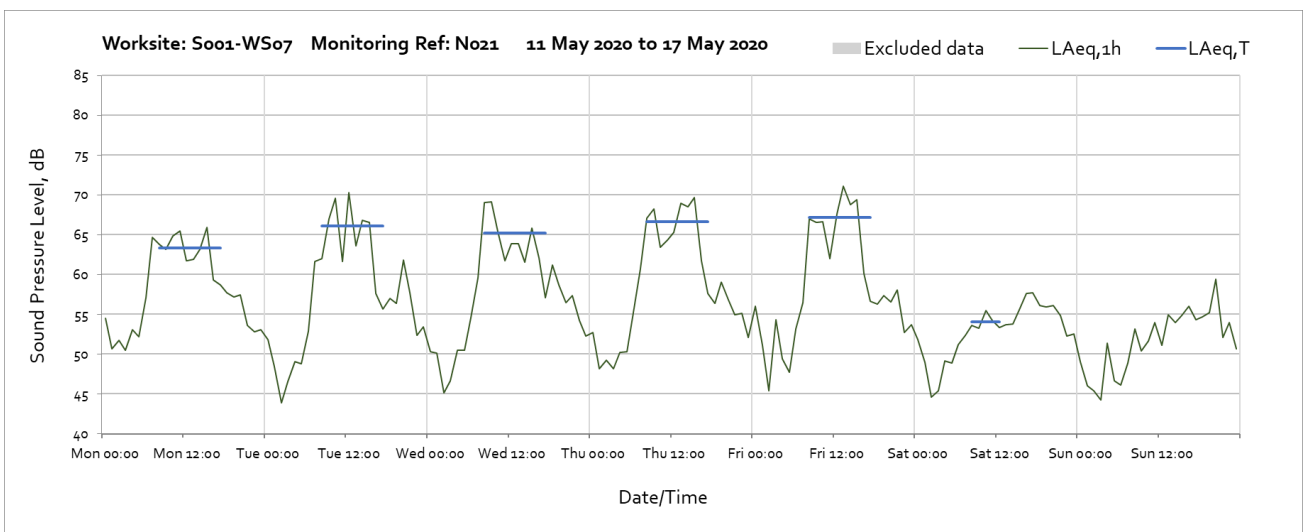
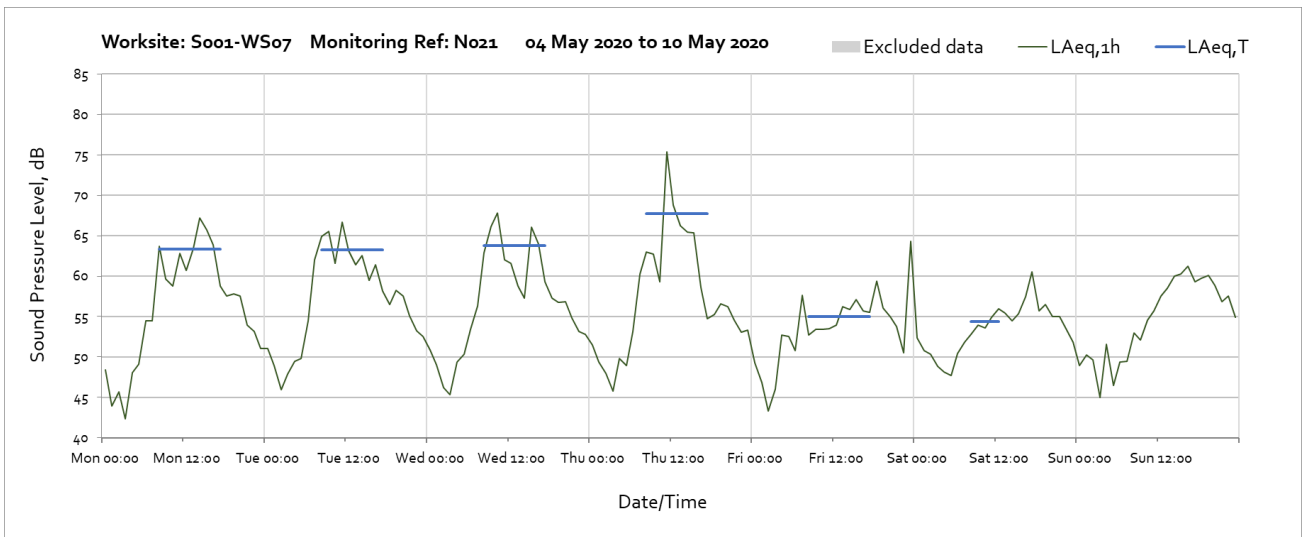
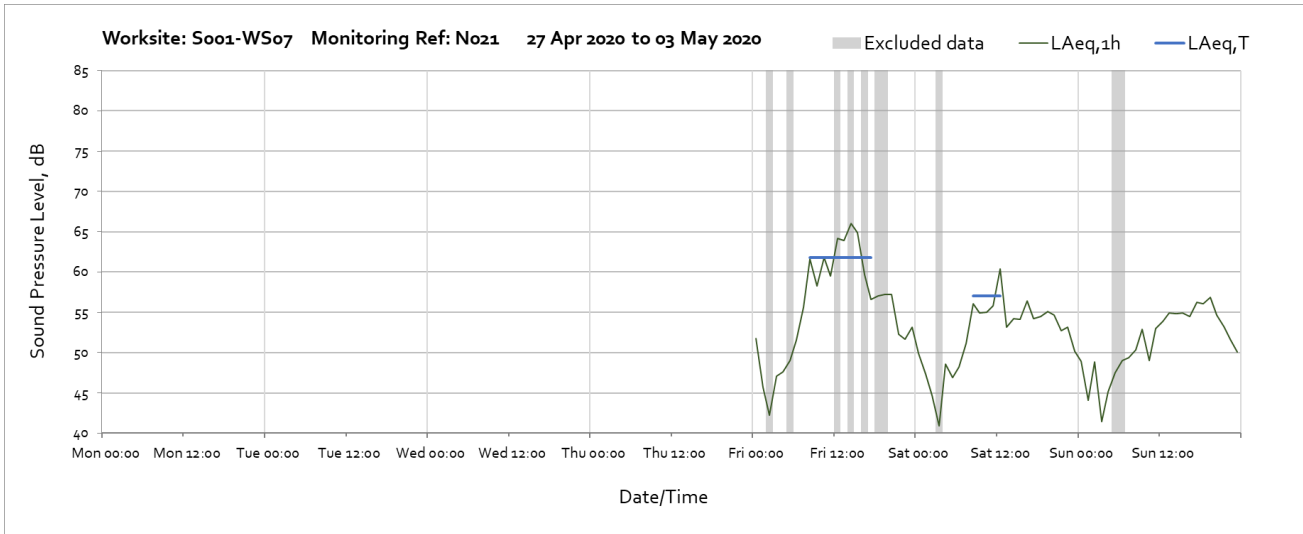


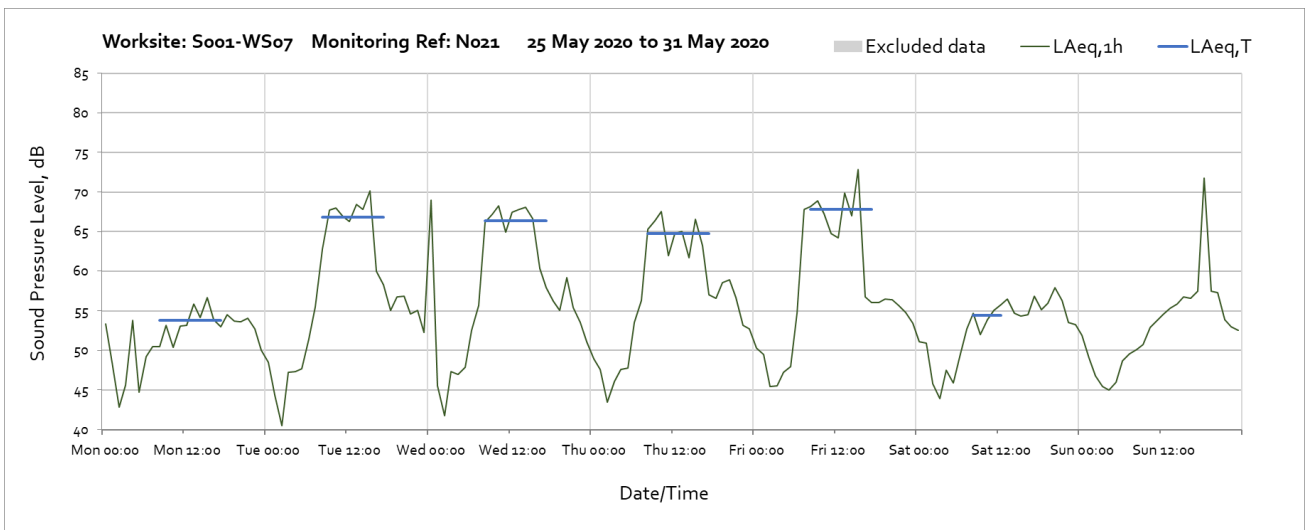
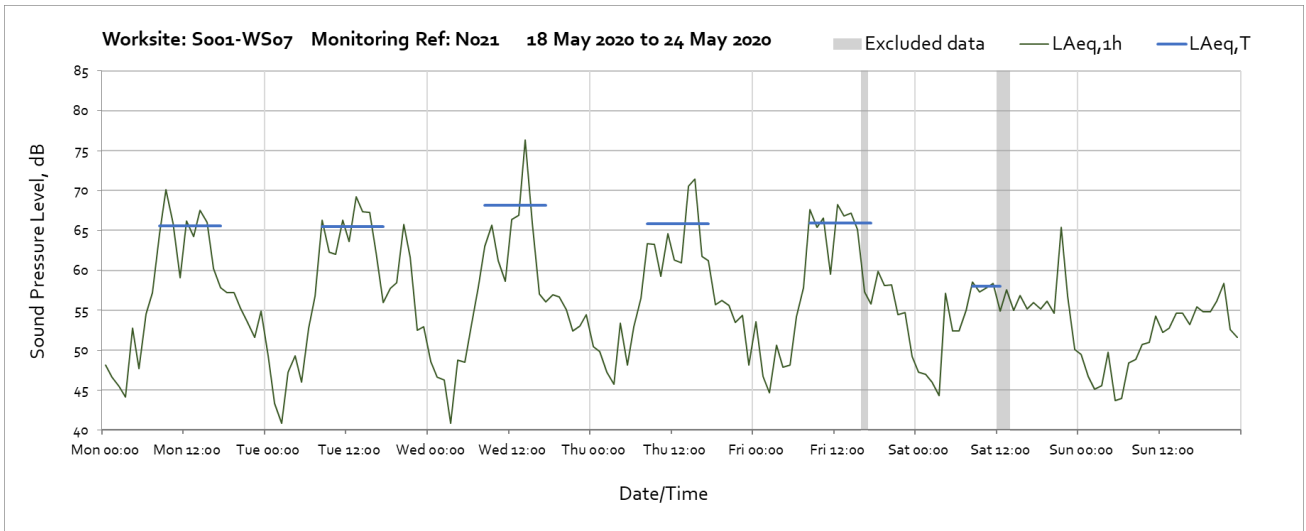
## Worksite: S001-WS07 – Monitoring Ref: N020



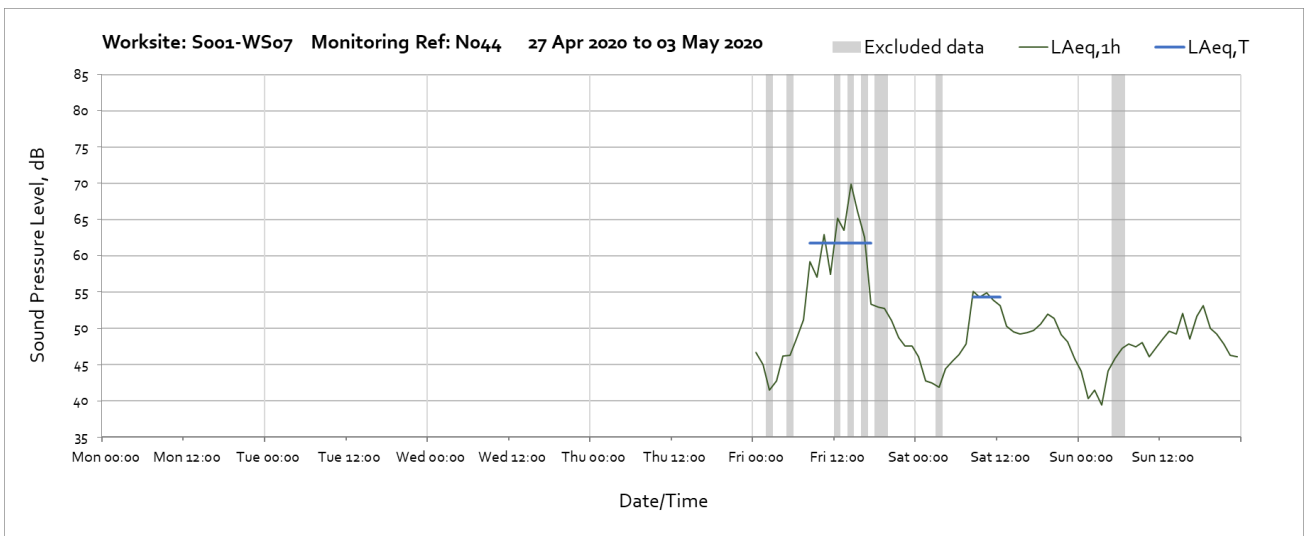


# Worksite: S001-WS07 – Monitoring Ref: N021

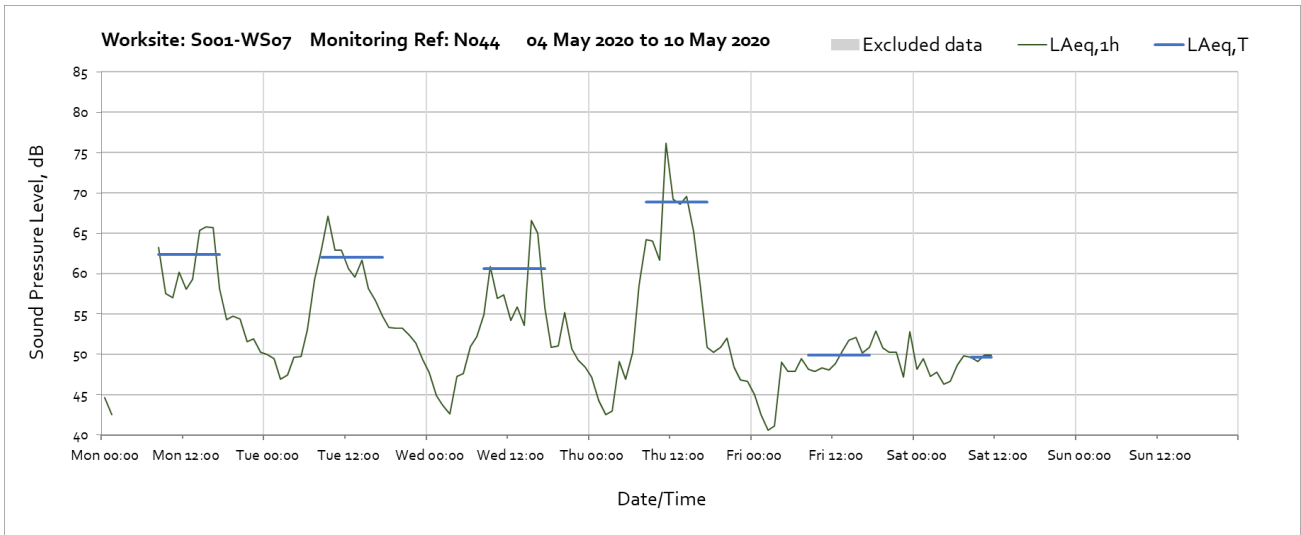




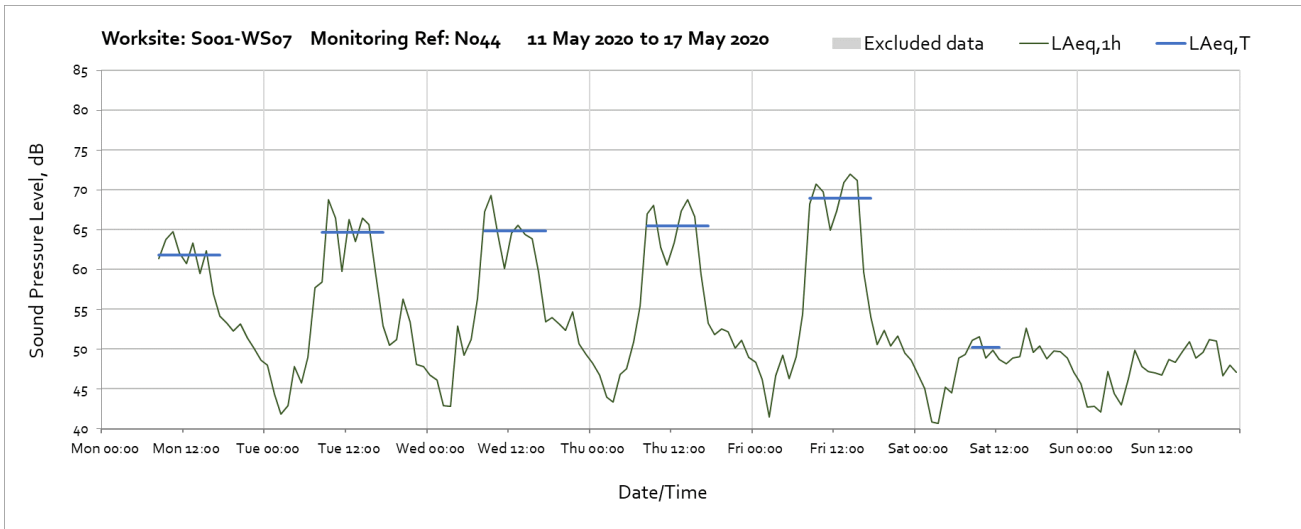
## Worksite: S001-WS07 – Monitoring Ref: N044



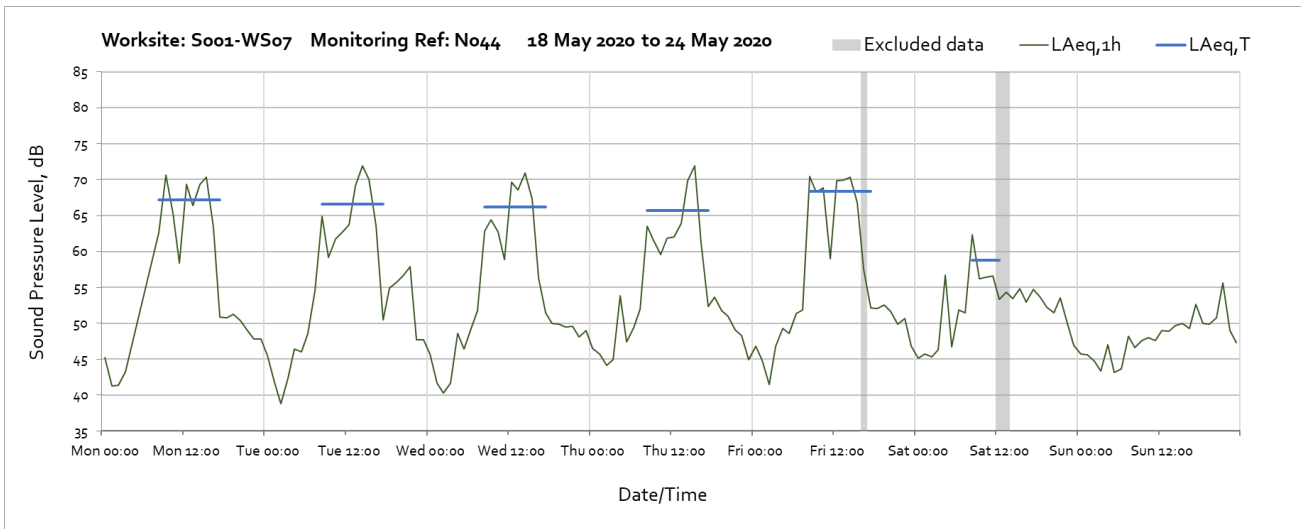


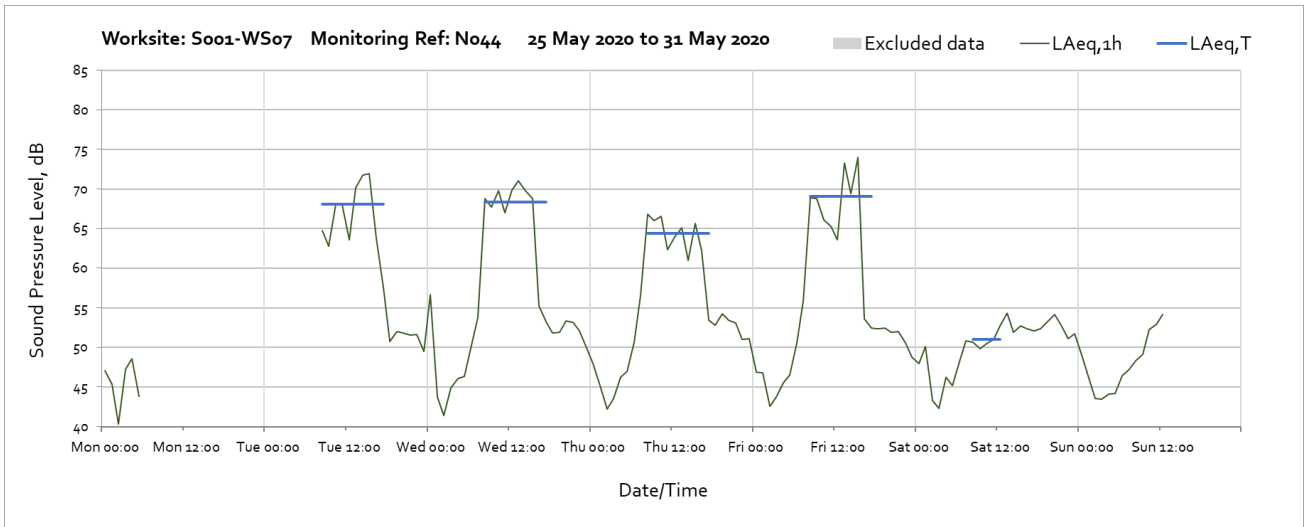


Note: Missing data between 02:00 and 08:00 on Monday 4<sup>th</sup> May and between 12:00 on Saturday 9<sup>th</sup> and 00:00 on Sunday 10<sup>th</sup> May was due to loss of power at the monitor.



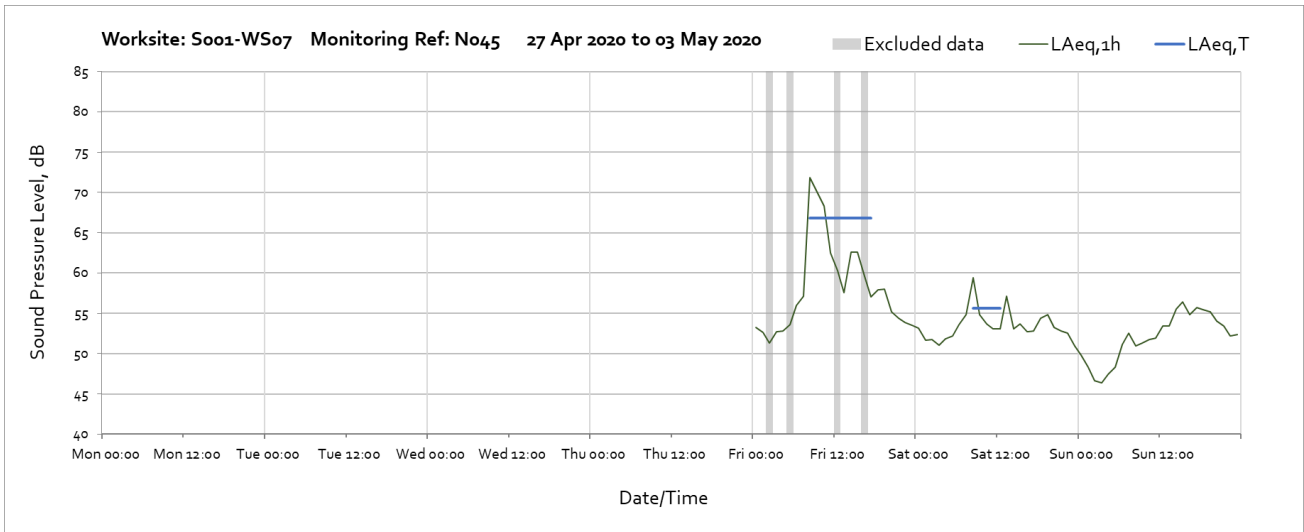
Note: Missing data between 00:00 and 08:00 on Monday 11<sup>th</sup> May was due to loss of power at the monitor.

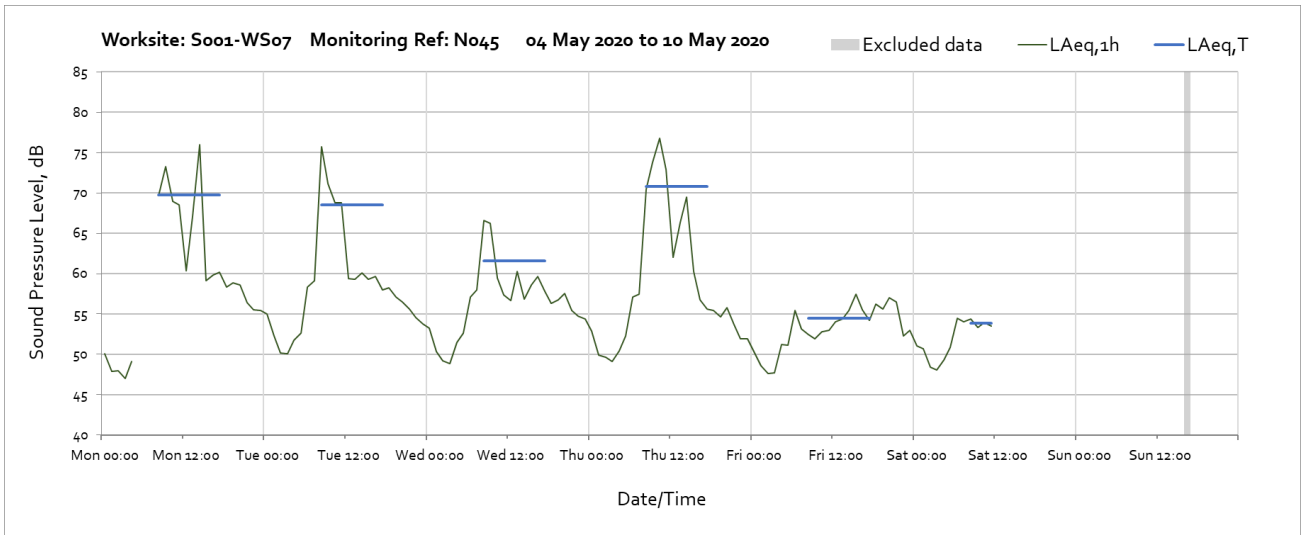




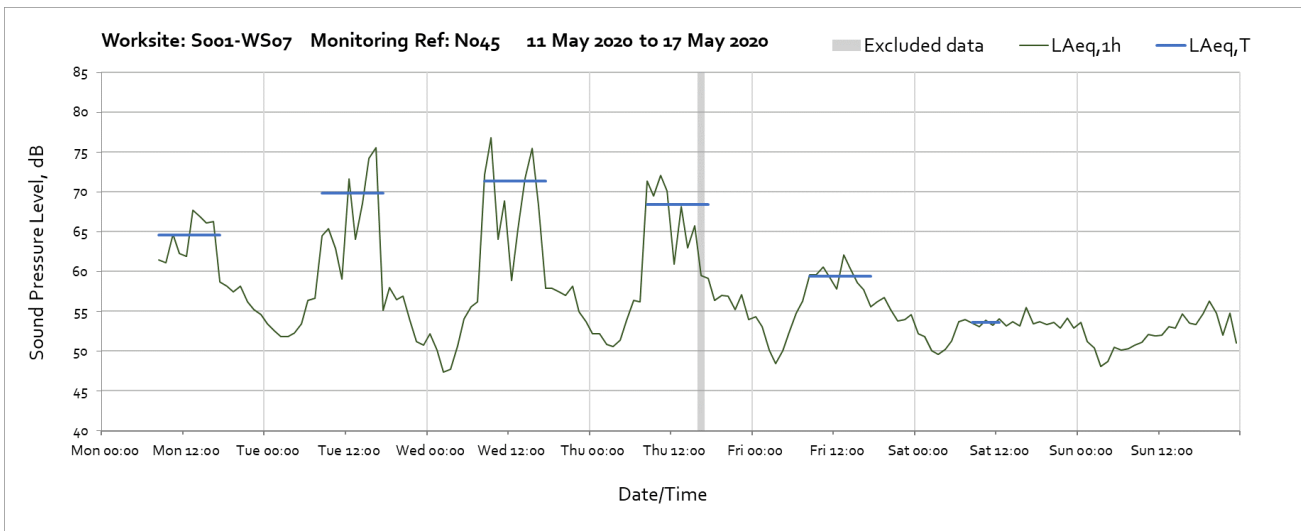
Note: Missing data between 04:00 and 08:00 on Monday 25<sup>th</sup> May and between 13:00 and 24:00 on Sunday 31<sup>st</sup> May was due to loss of power at the monitor.

## Worksite: S001-WS07 – Monitoring Ref: N045

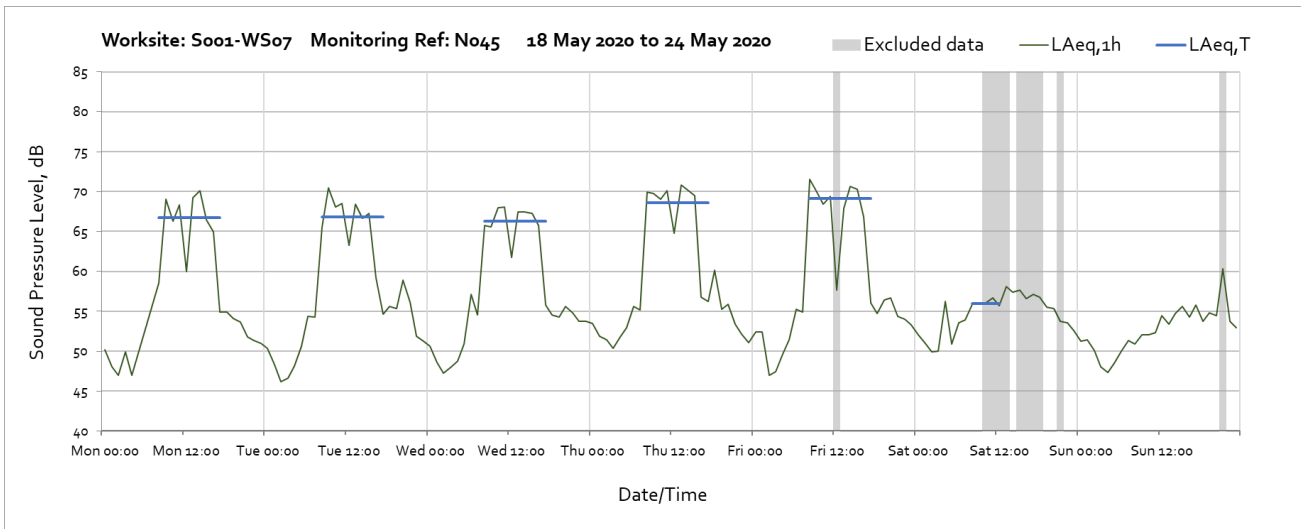


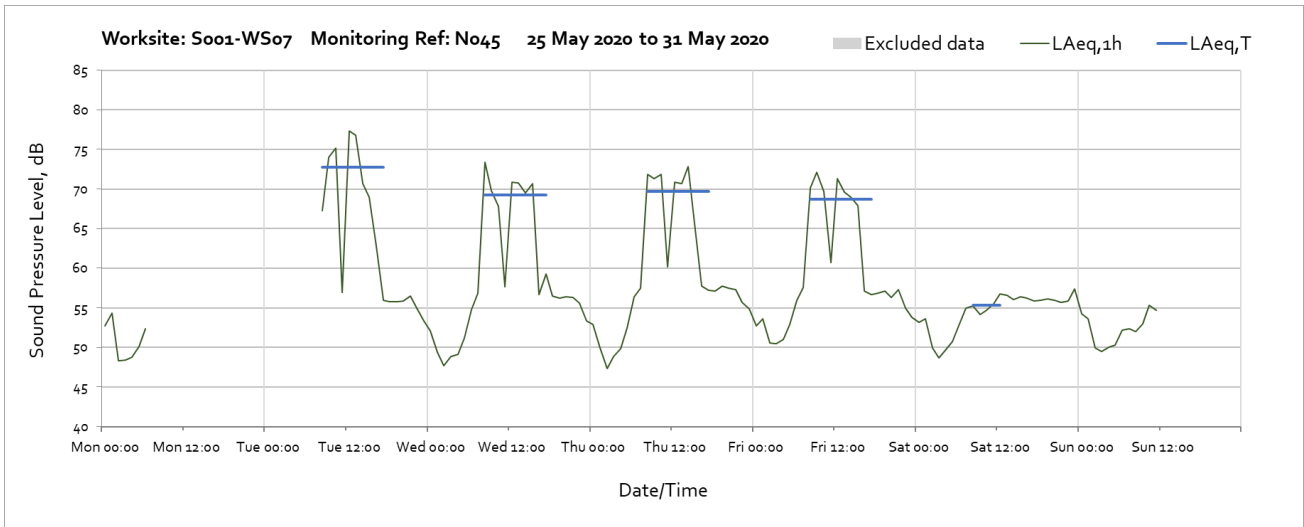


Note: Missing data between 05:00 and 08:00 on Monday 4<sup>th</sup> May and between 12:00 and 24:00 on Sunday 10<sup>th</sup> May was due to loss of power at the monitor.



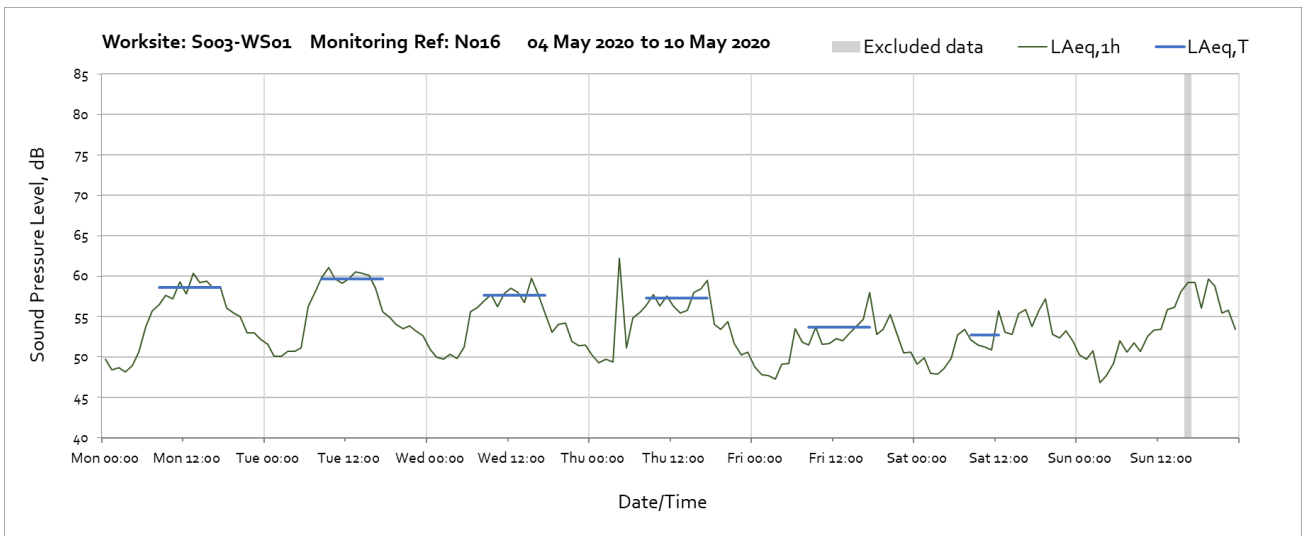
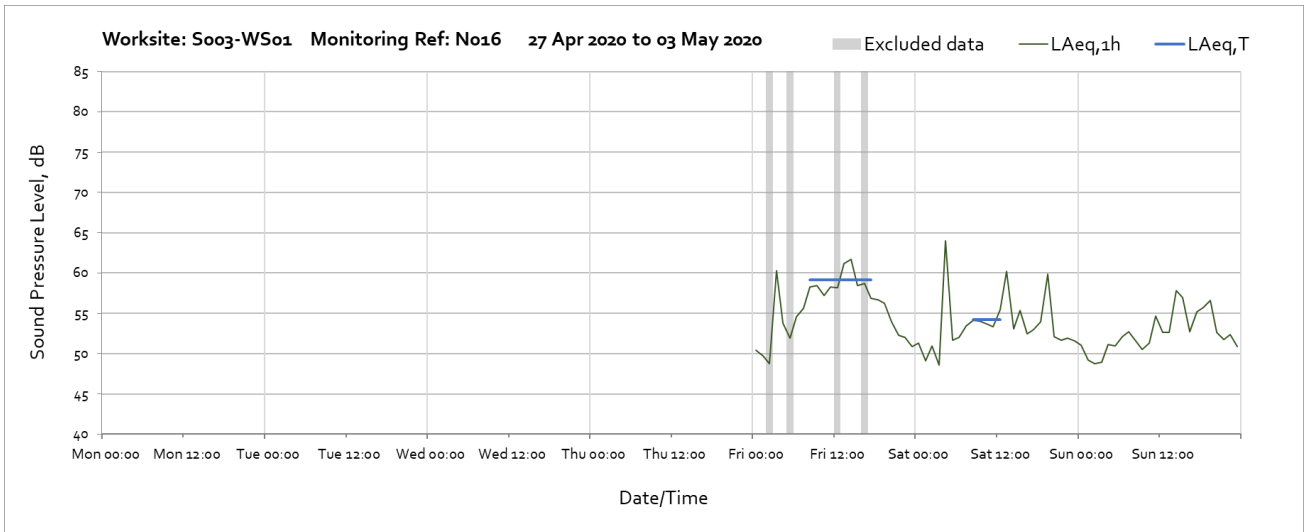
Note: Missing data from 00:00 and 08:00 on Monday 11<sup>th</sup> May was due to loss of power at the monitor.

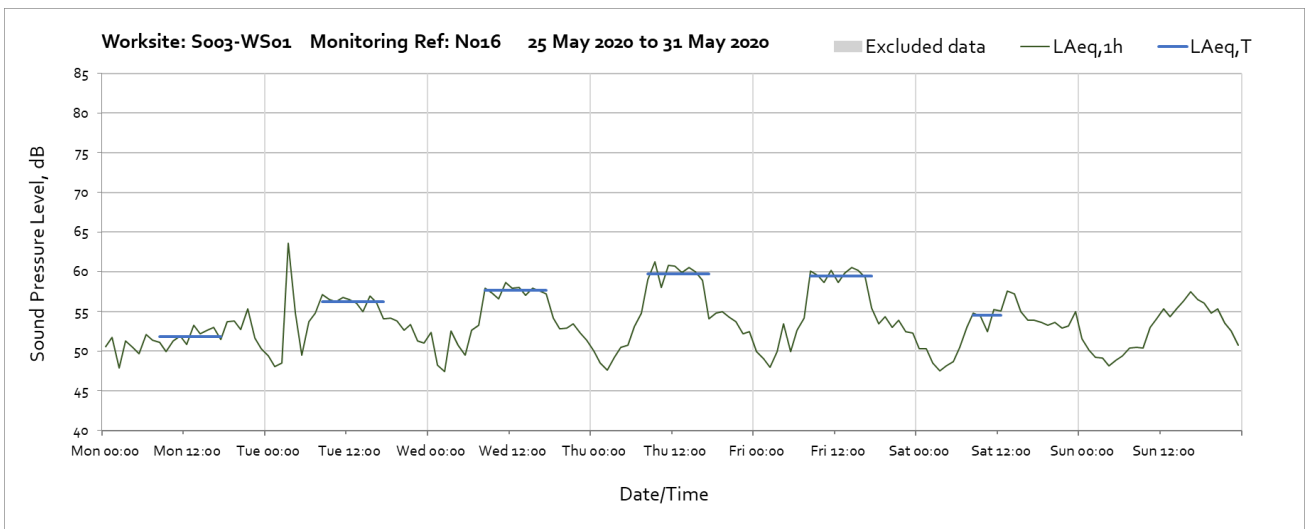
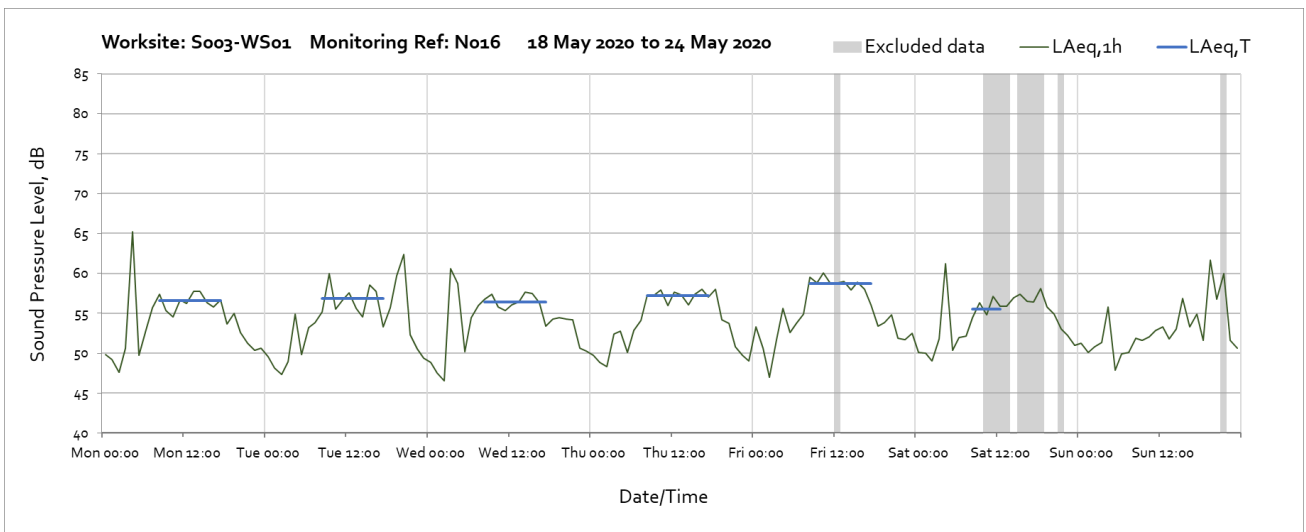
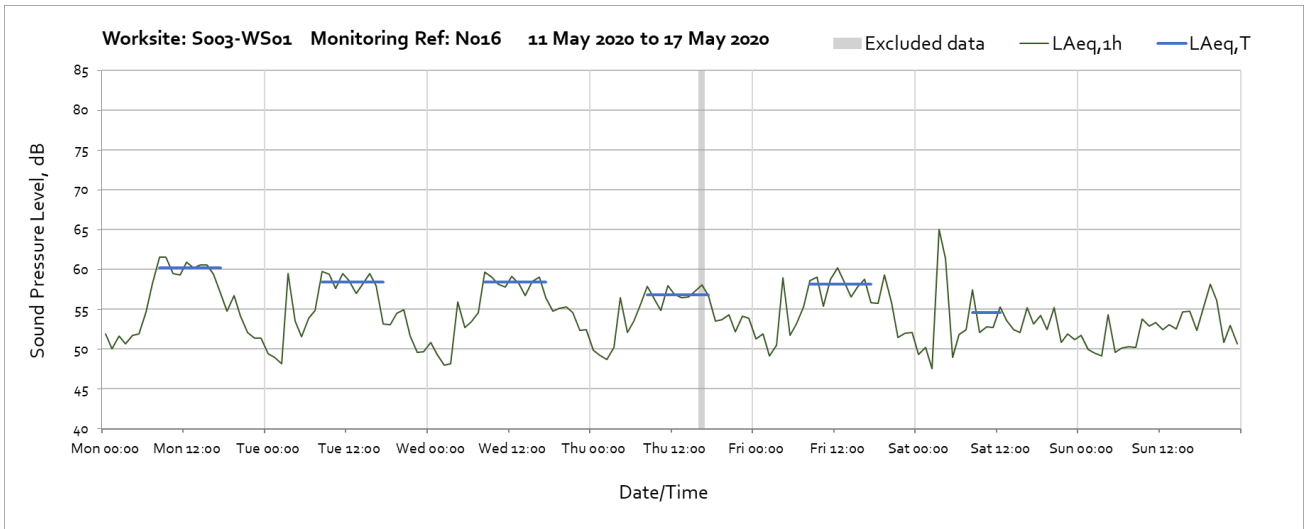




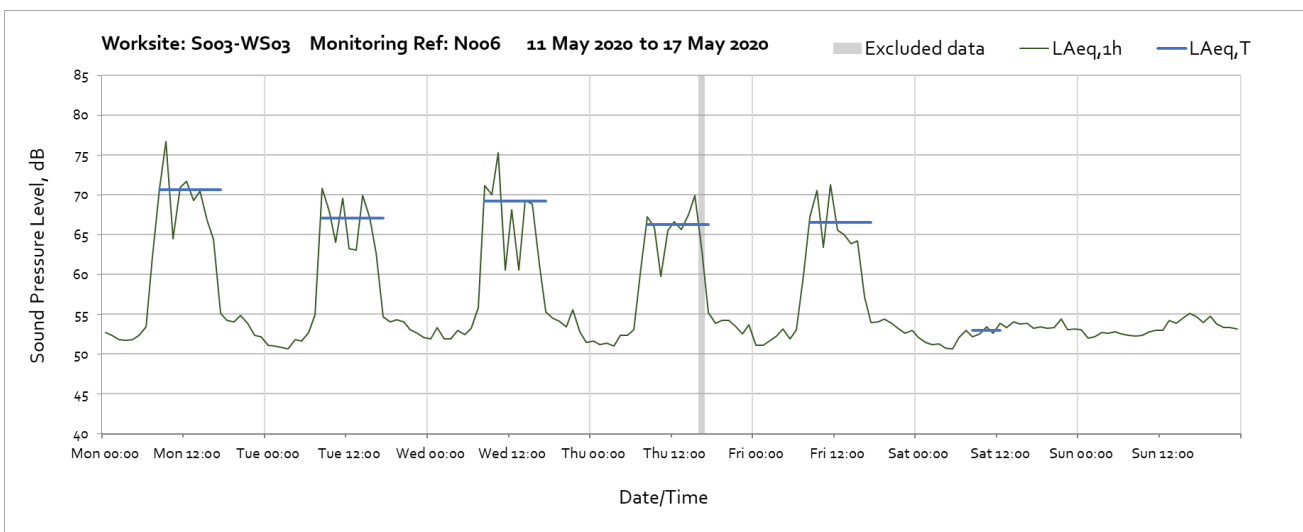
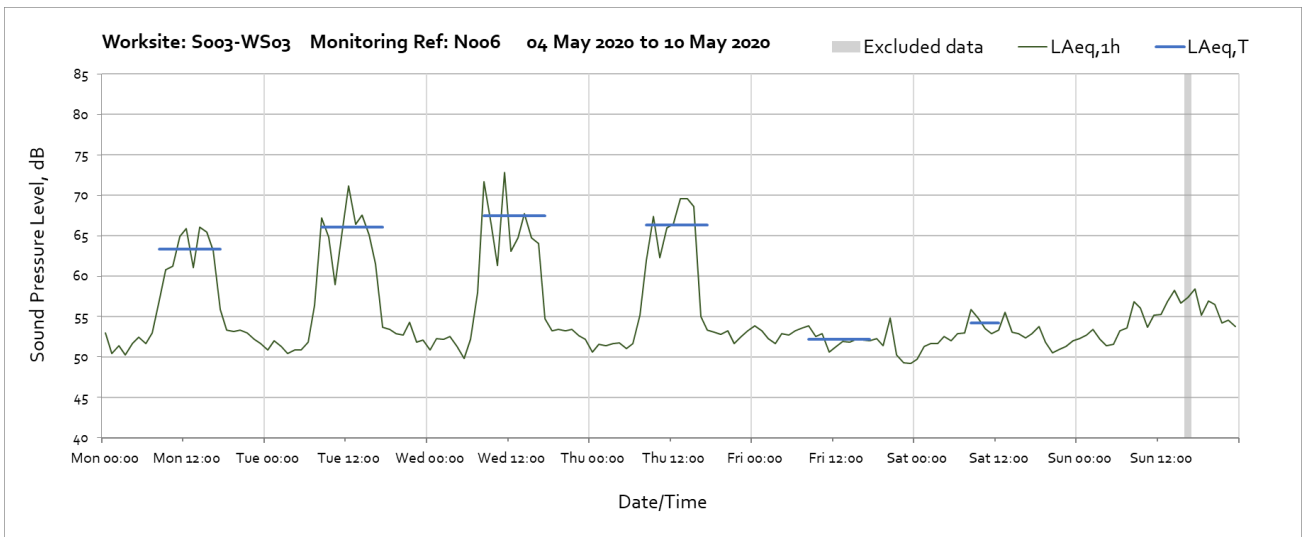
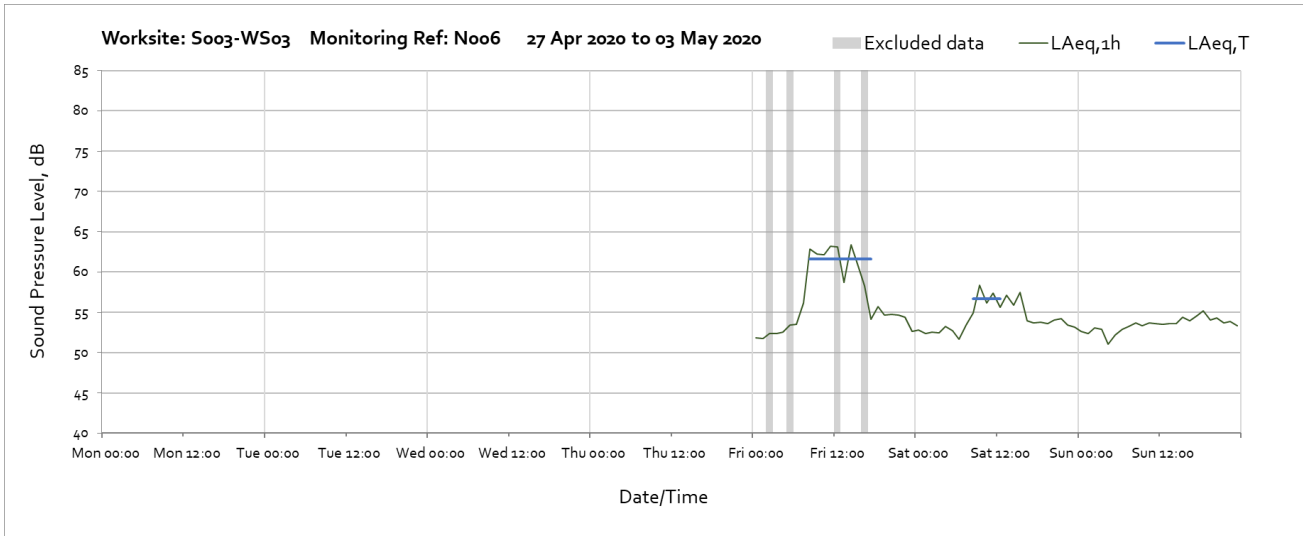
Note: Missing data from 07:00 on Monday 18<sup>th</sup> until 08:00 on Tuesday 19<sup>th</sup> May and between 12:00 and 24:00 on Sunday 31<sup>st</sup> May was due to loss of power at the monitor.

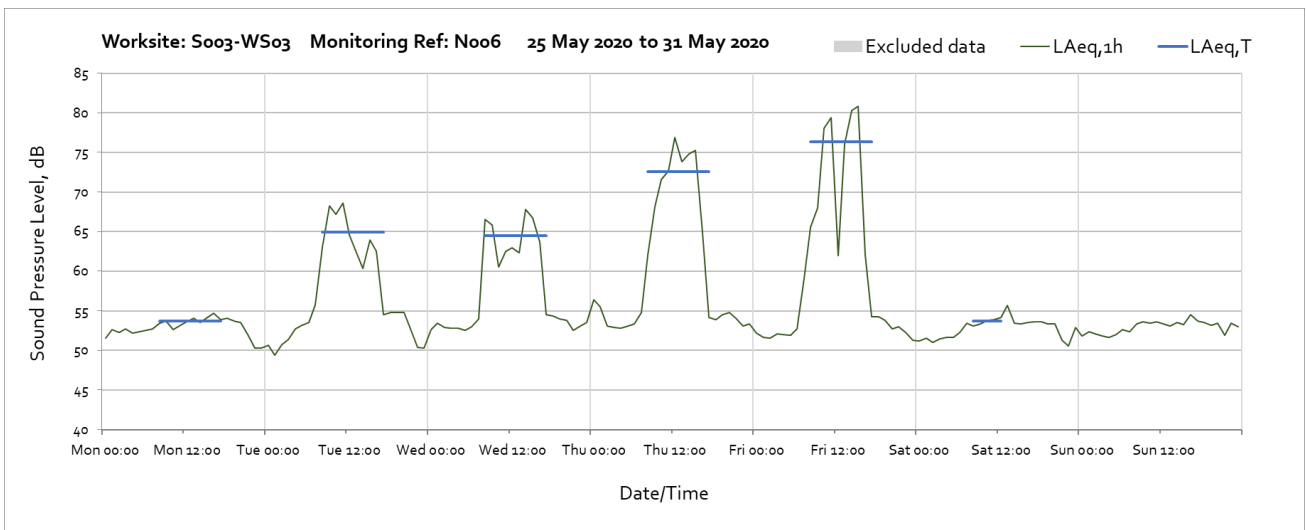
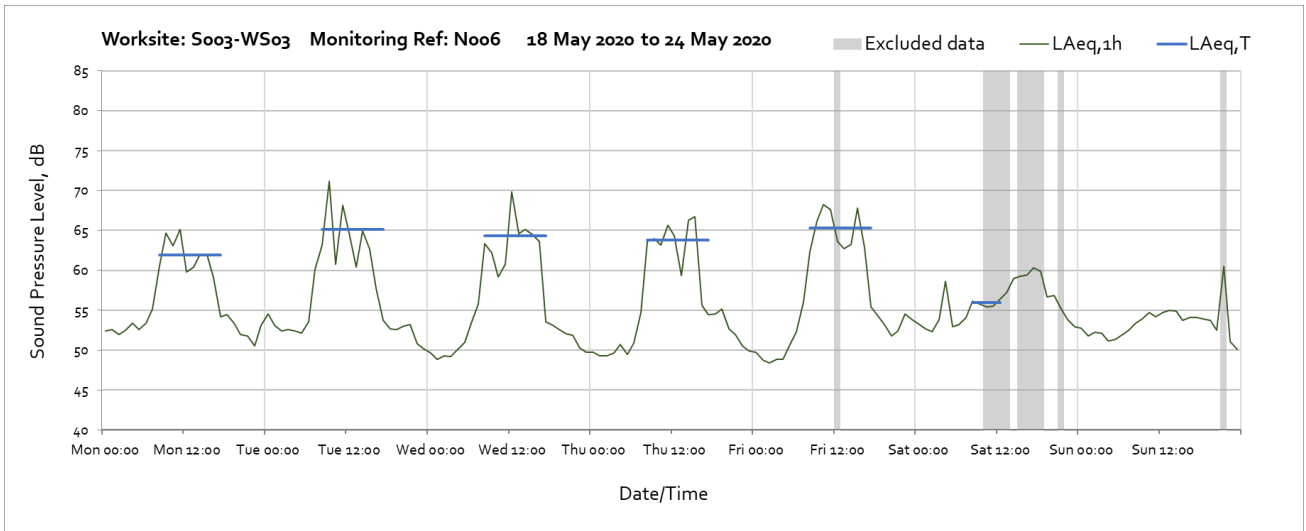
## Worksite: S003-WS01 – Monitoring Ref: N016



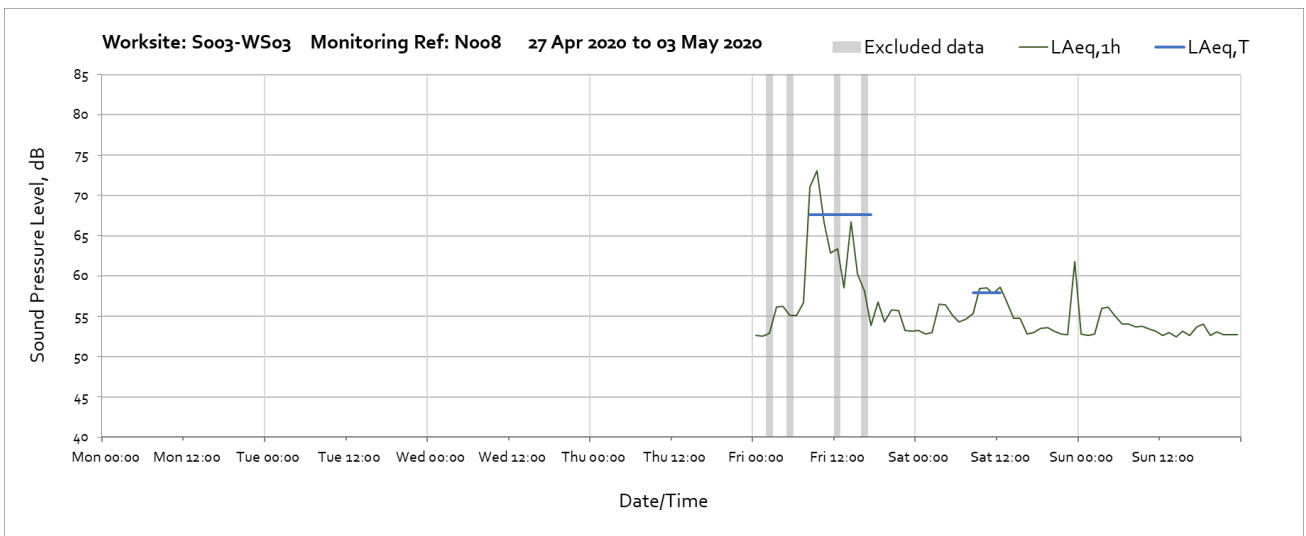


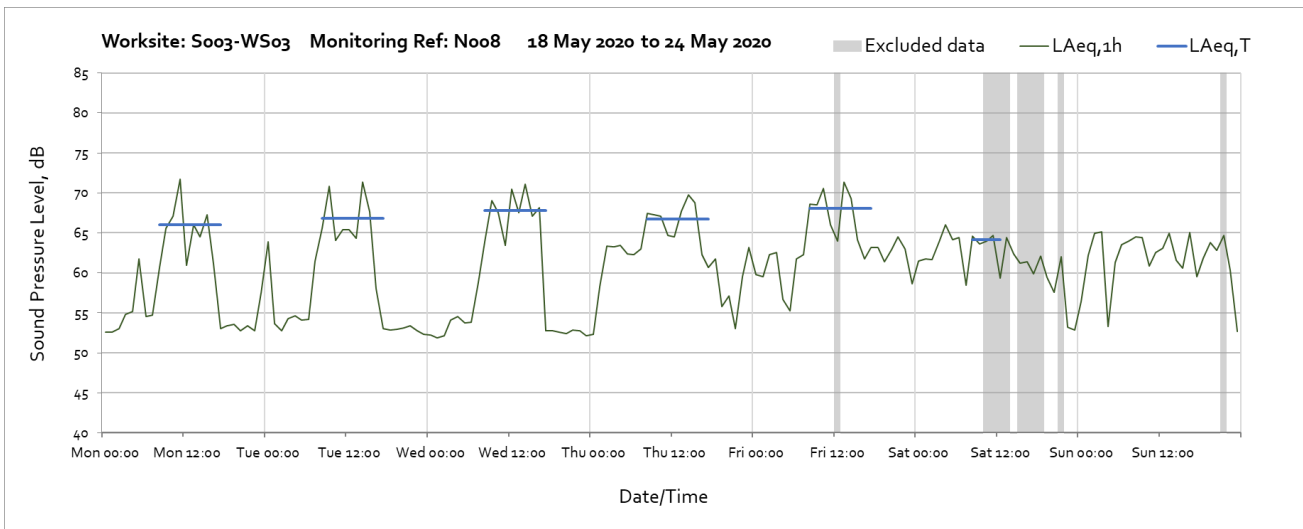
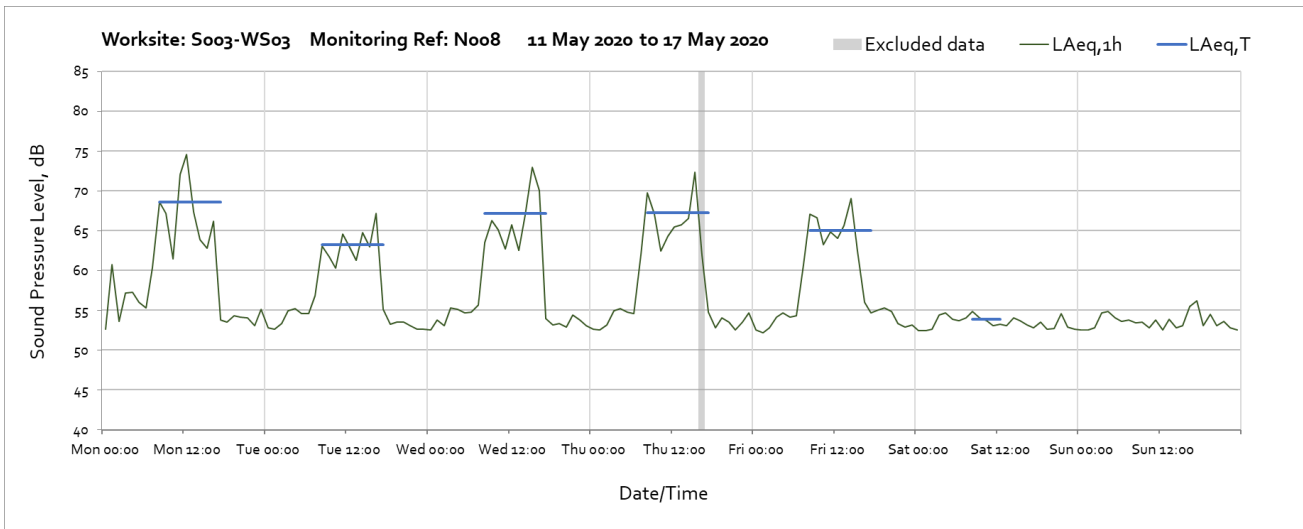
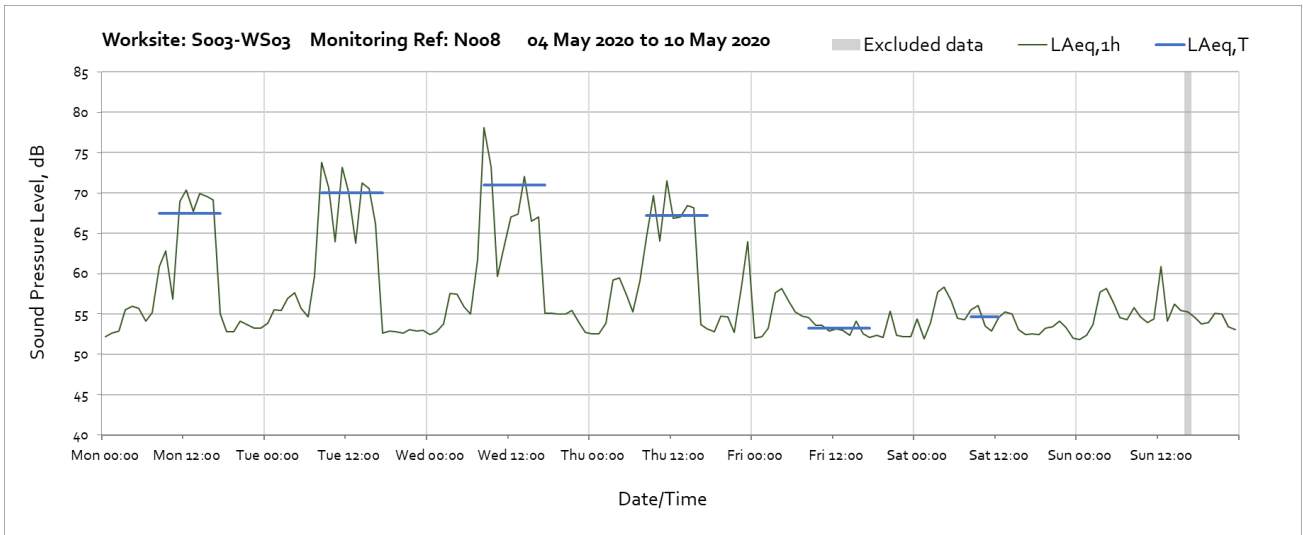
# Worksite: S003-WS03 – Monitoring Ref: N006



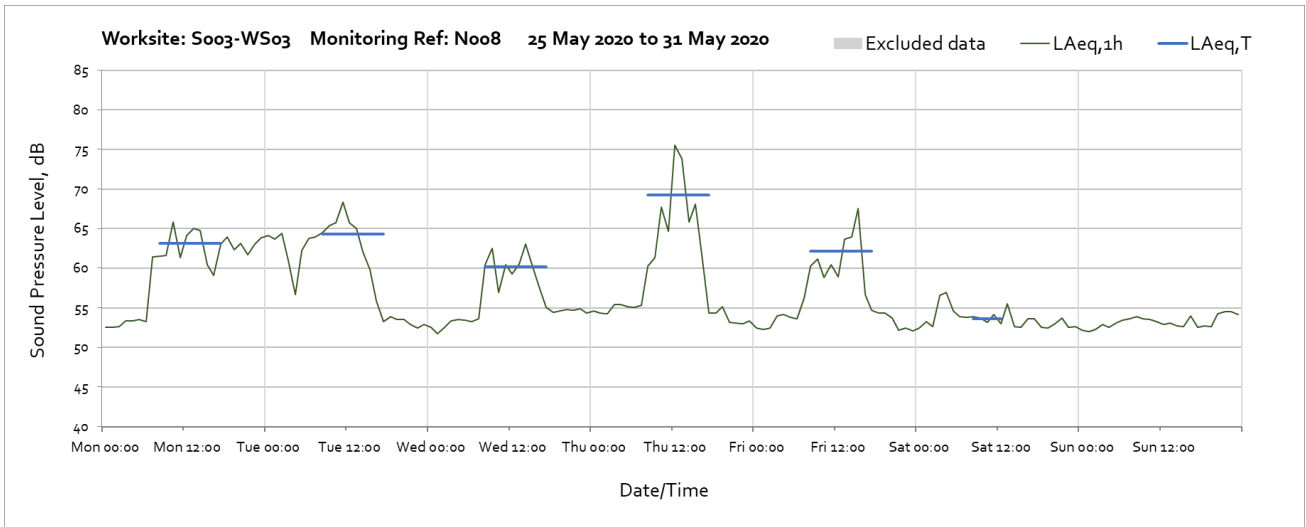


## Worksite: S003-WS03 – Monitoring Ref: N008

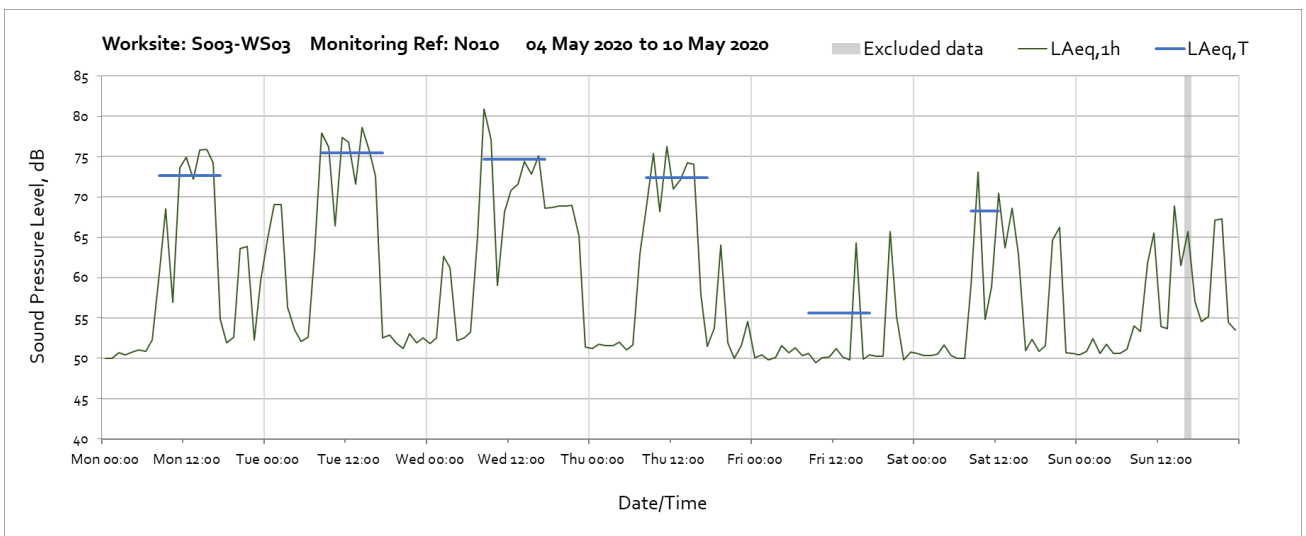
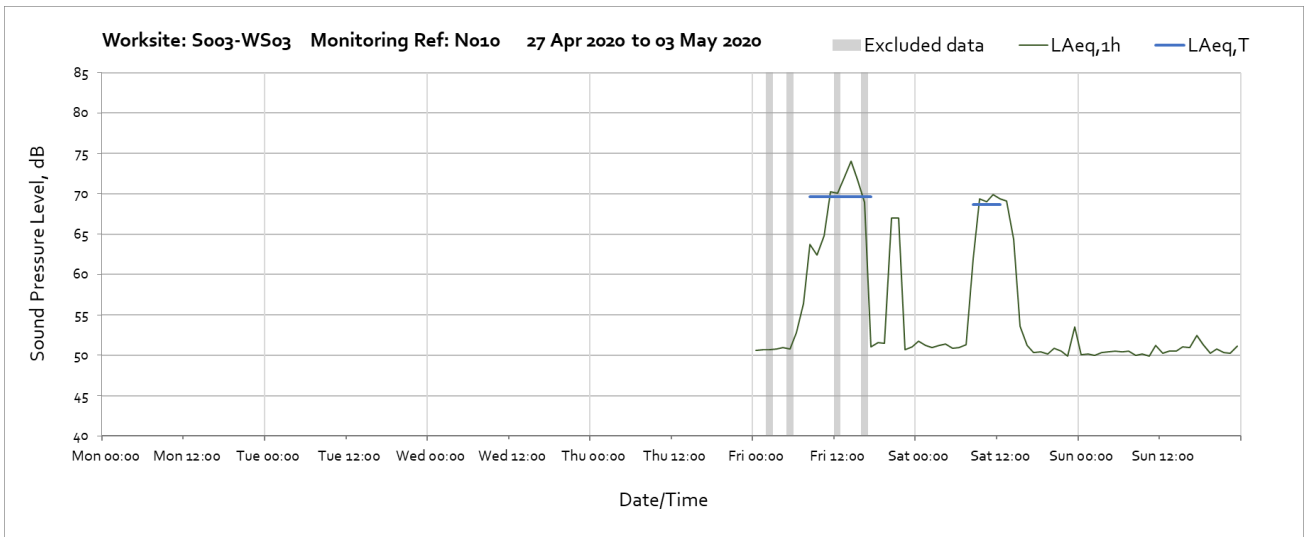


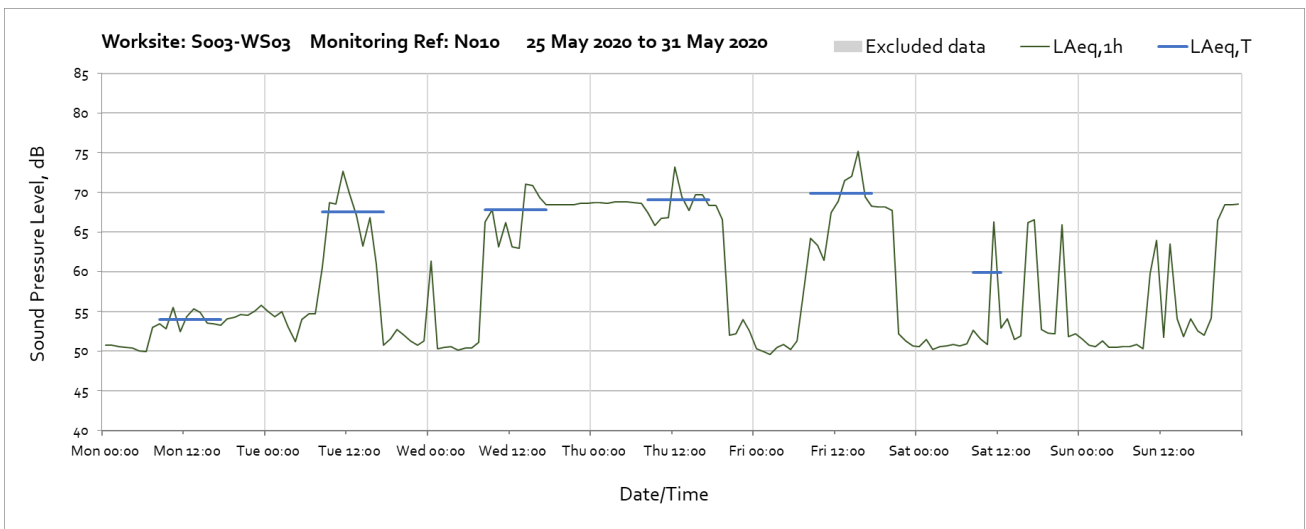
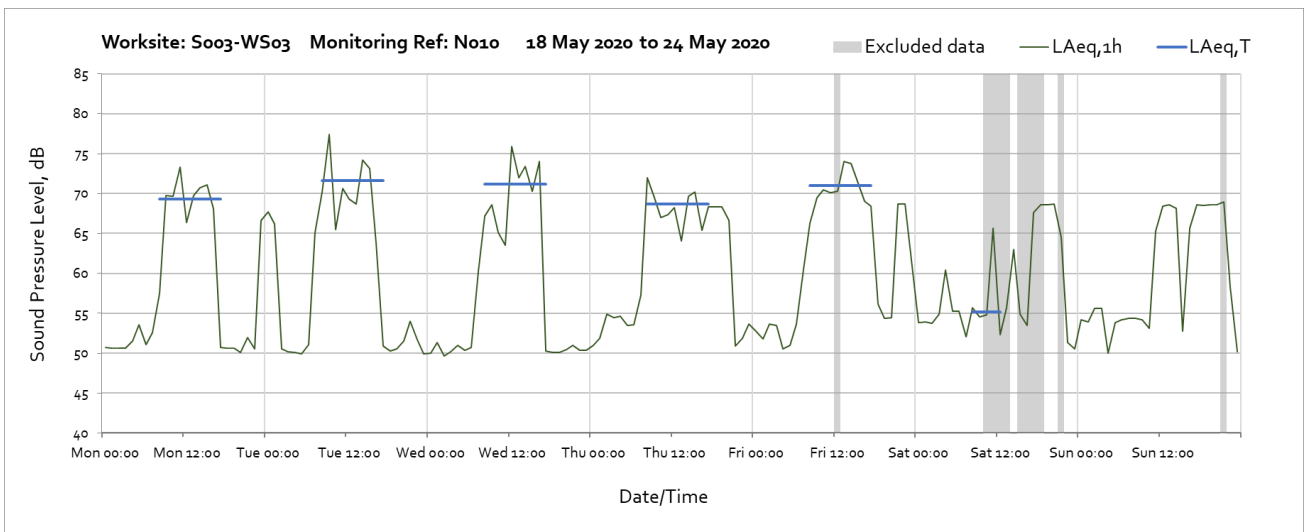
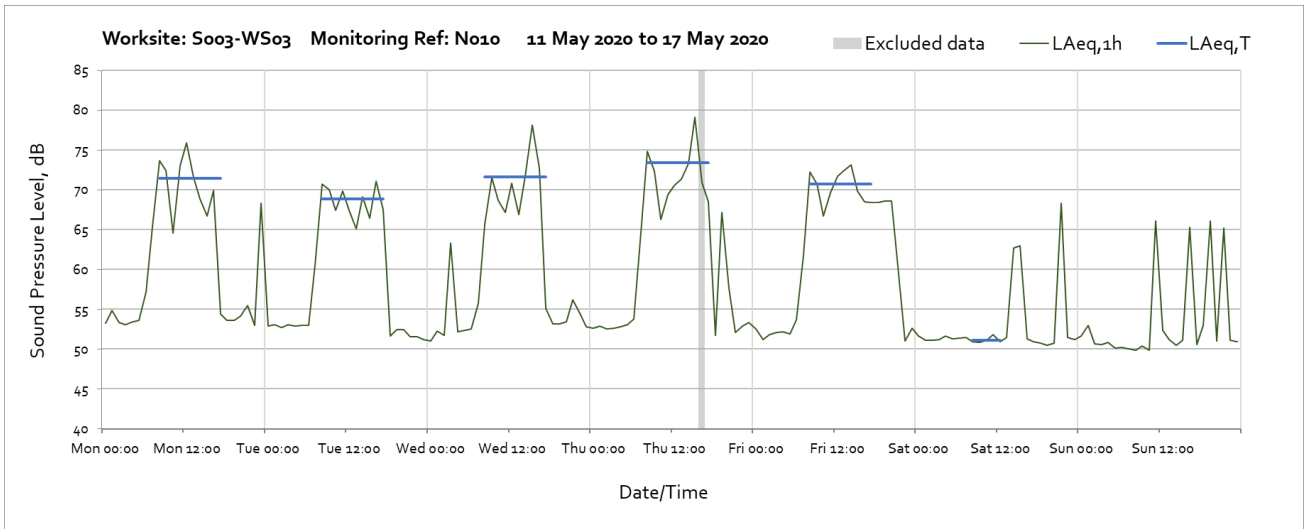




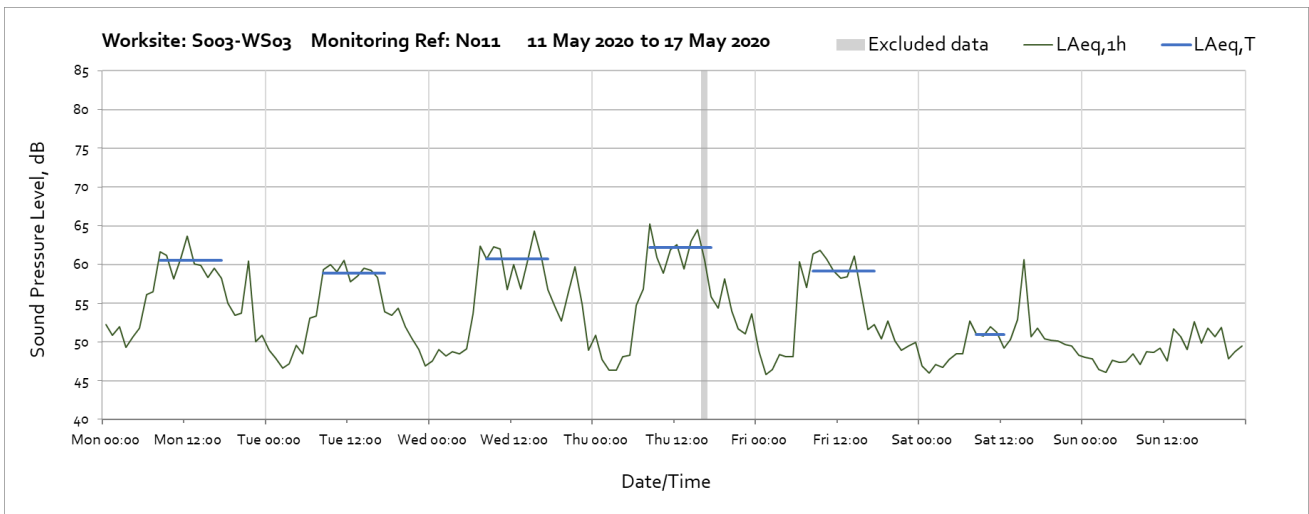
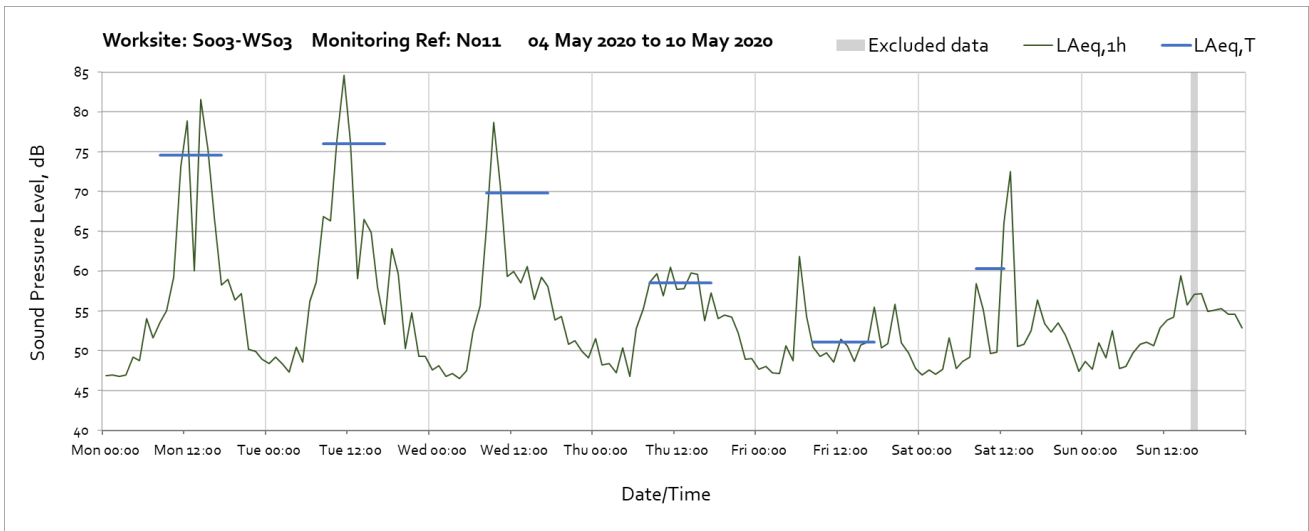
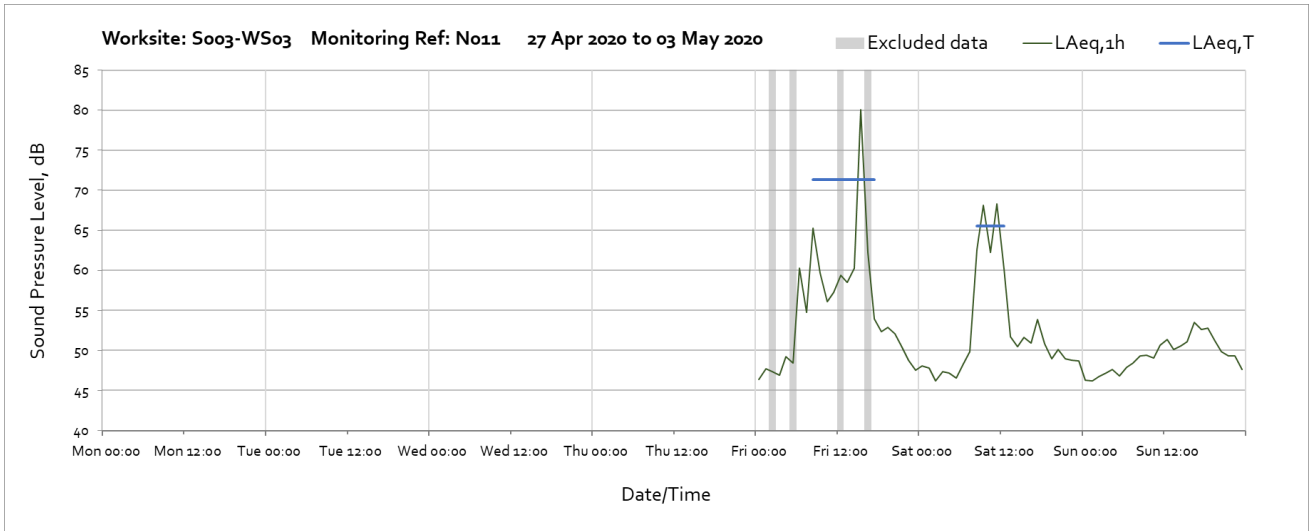


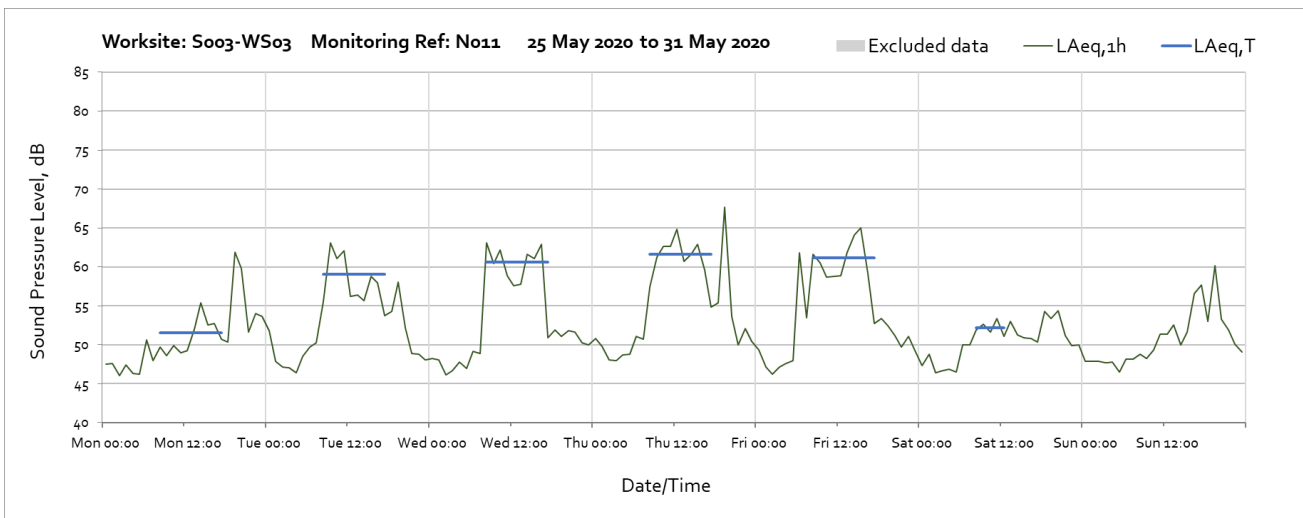
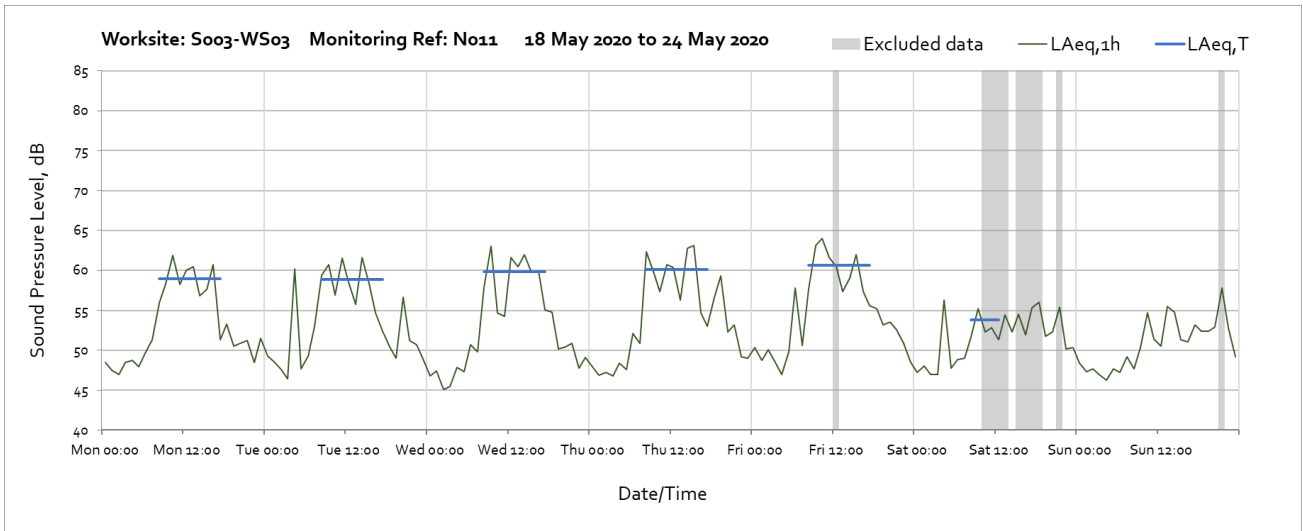
## Worksite: S003-WS03 – Monitoring Ref: N010



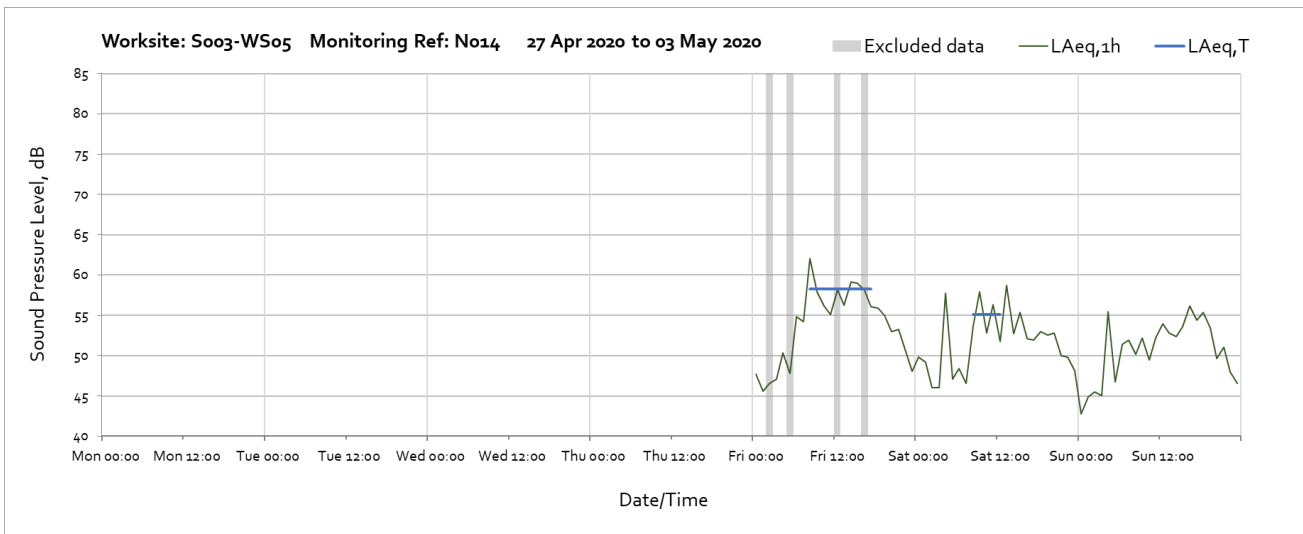


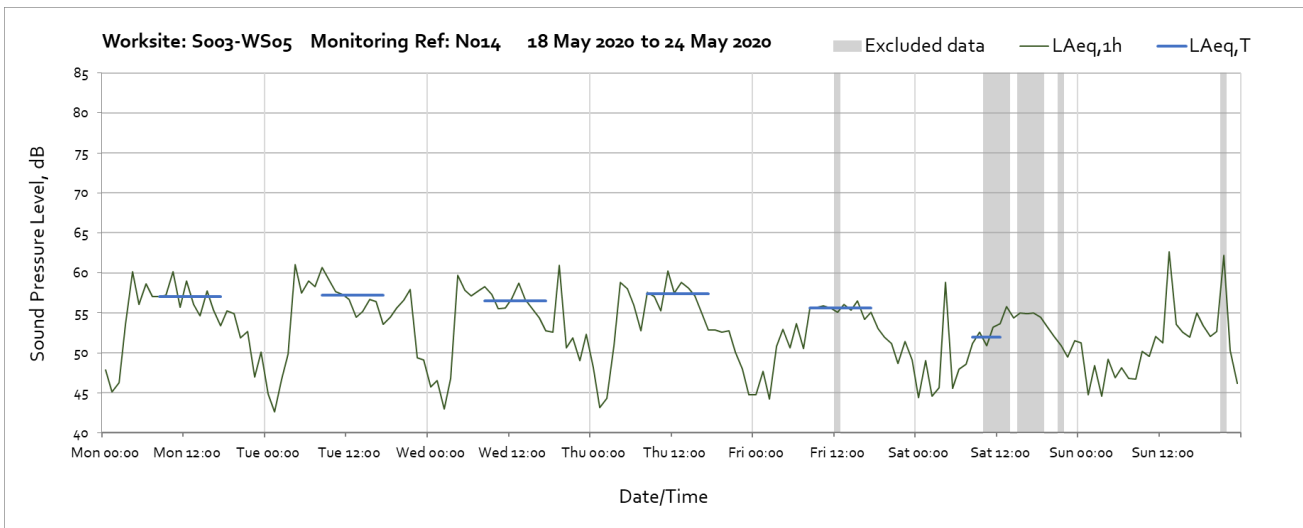
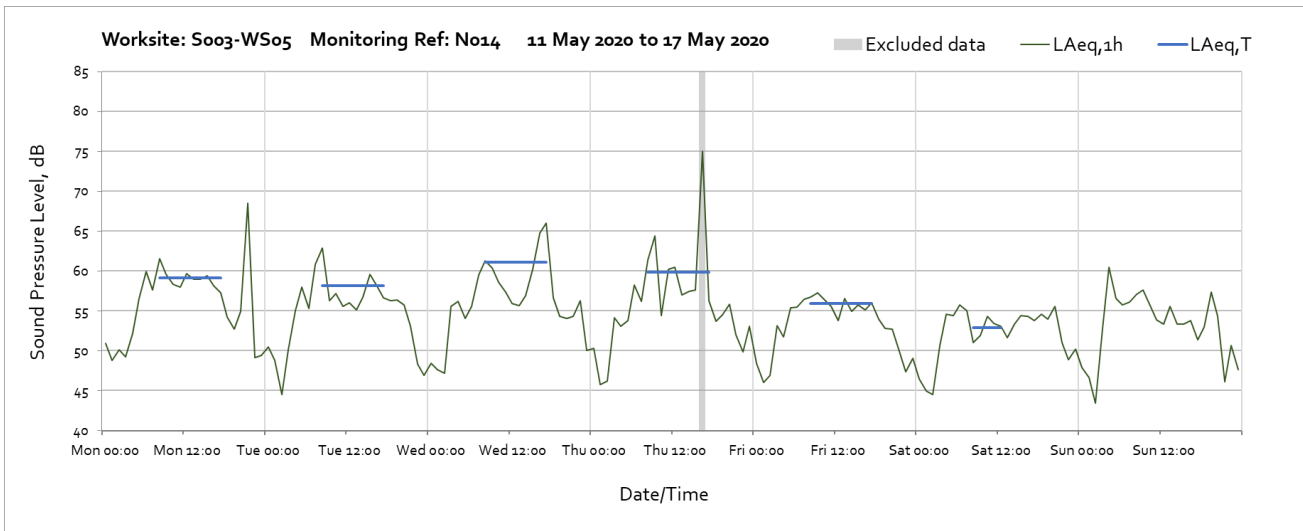
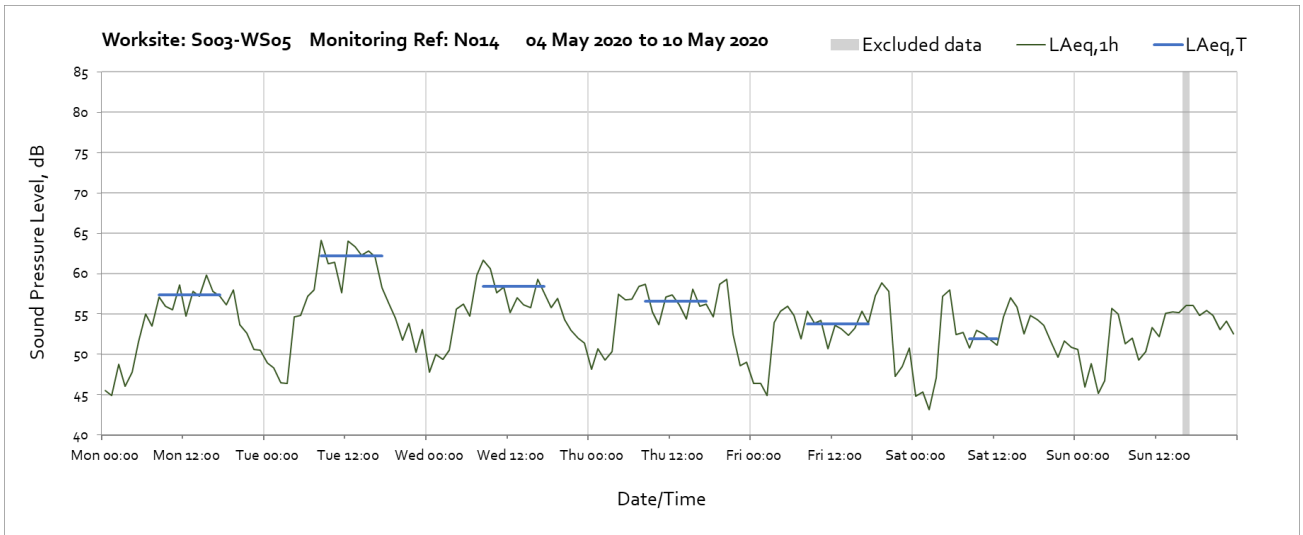
# Worksite: S003-WS03 – Monitoring Ref: N011

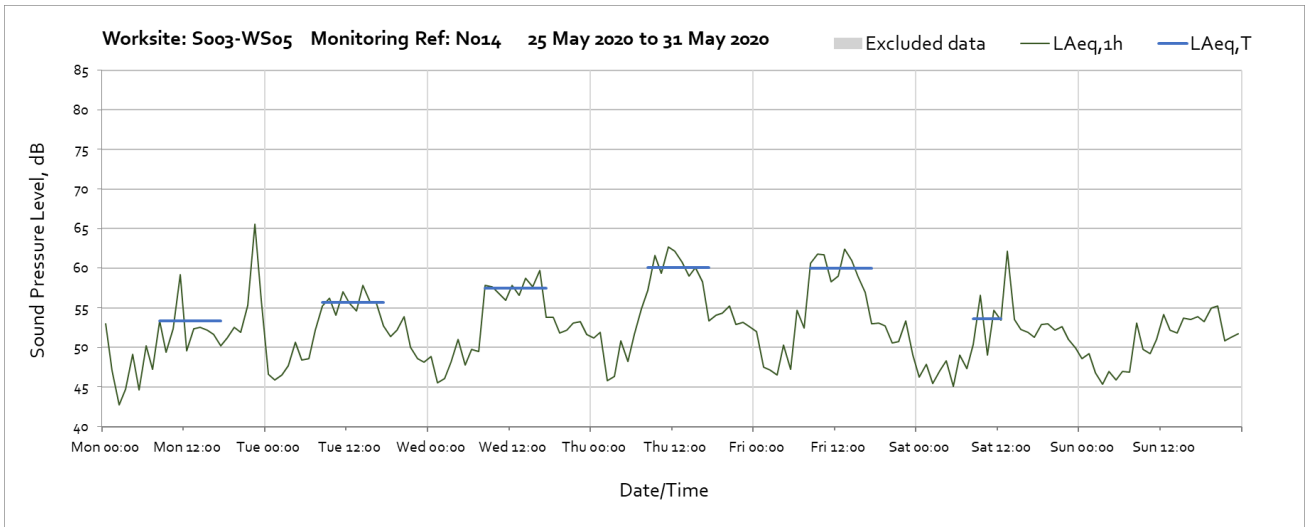




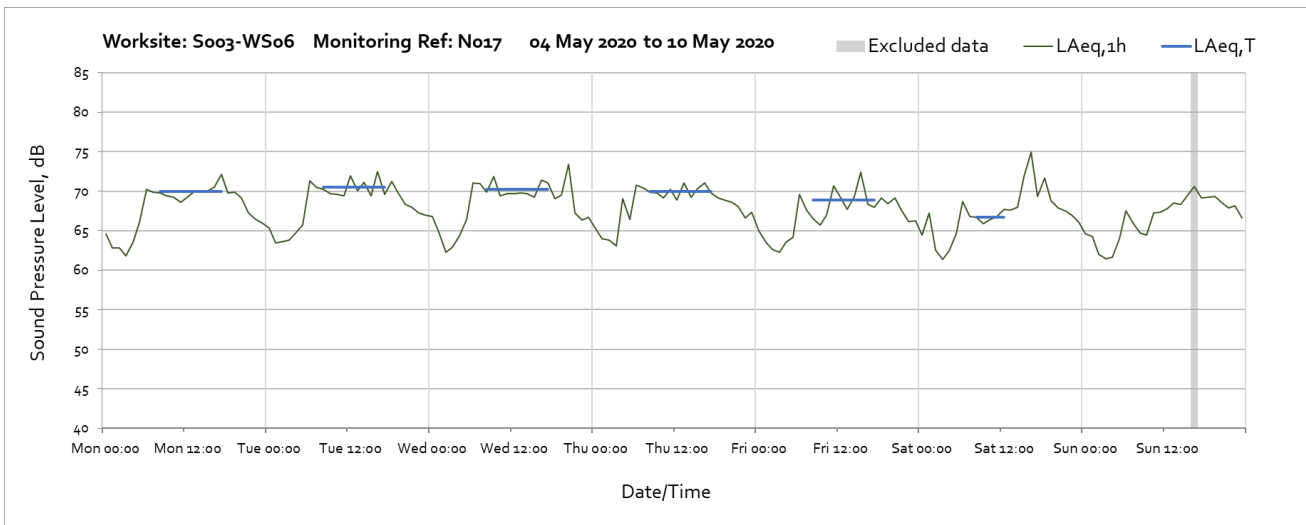
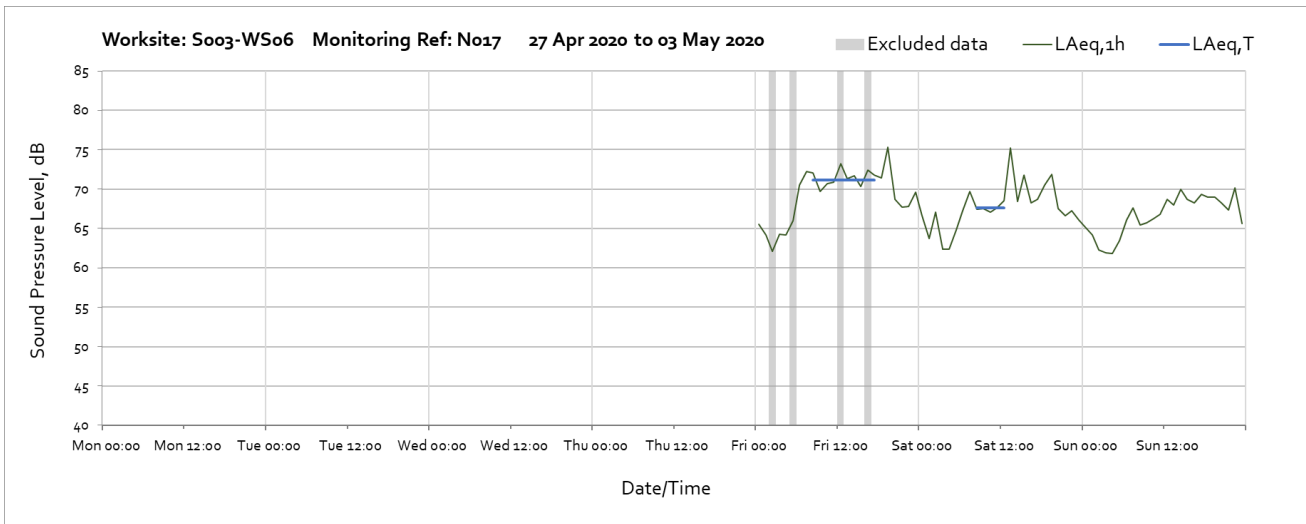
## Worksite: S003-WS05 – Monitoring Ref: N014

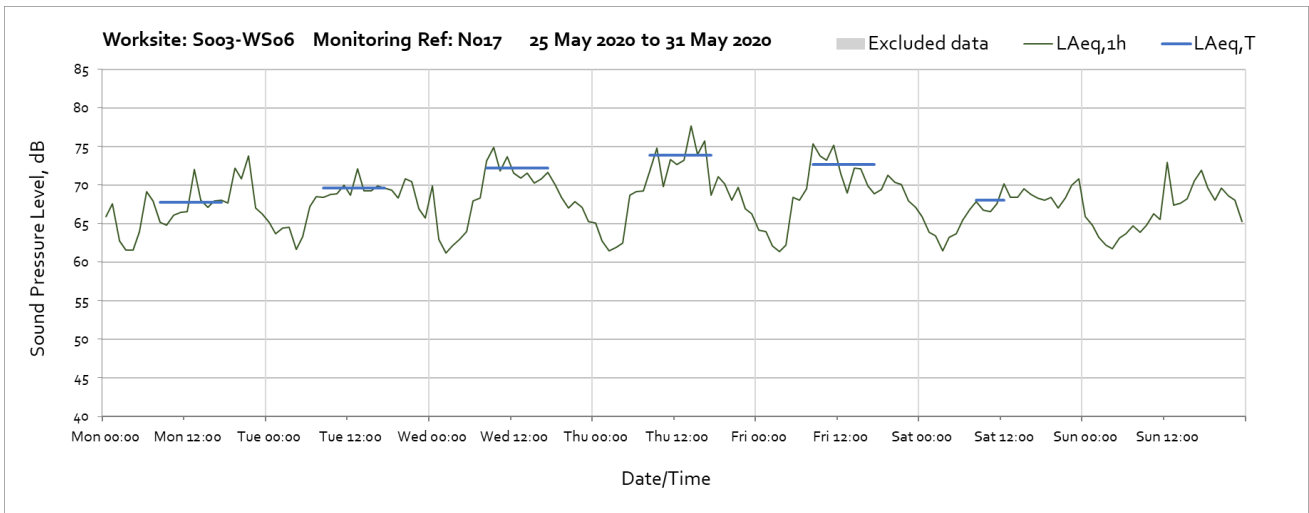
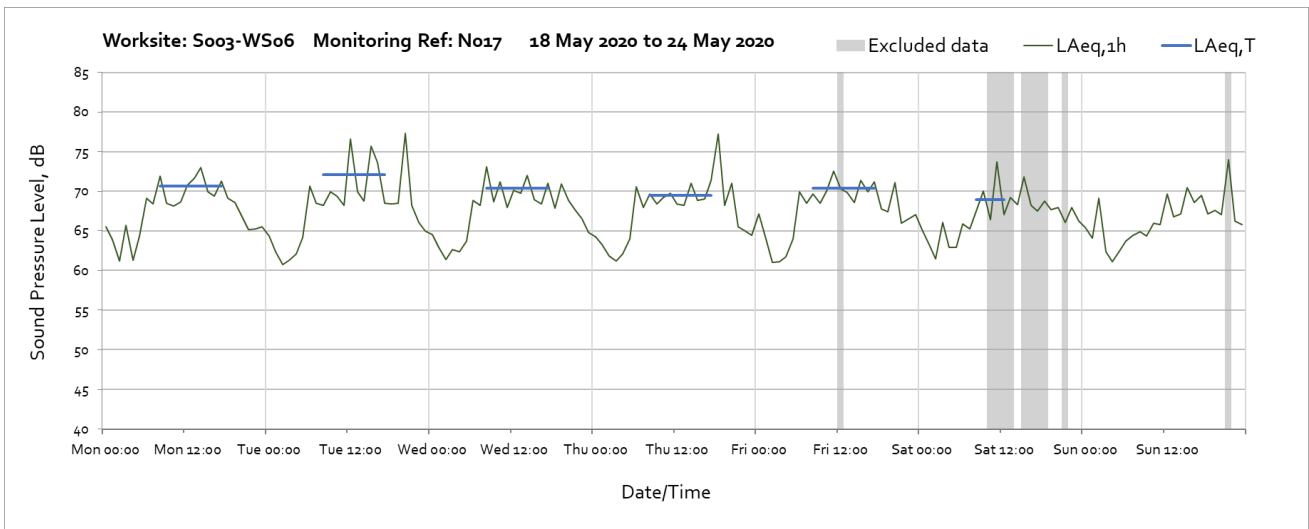
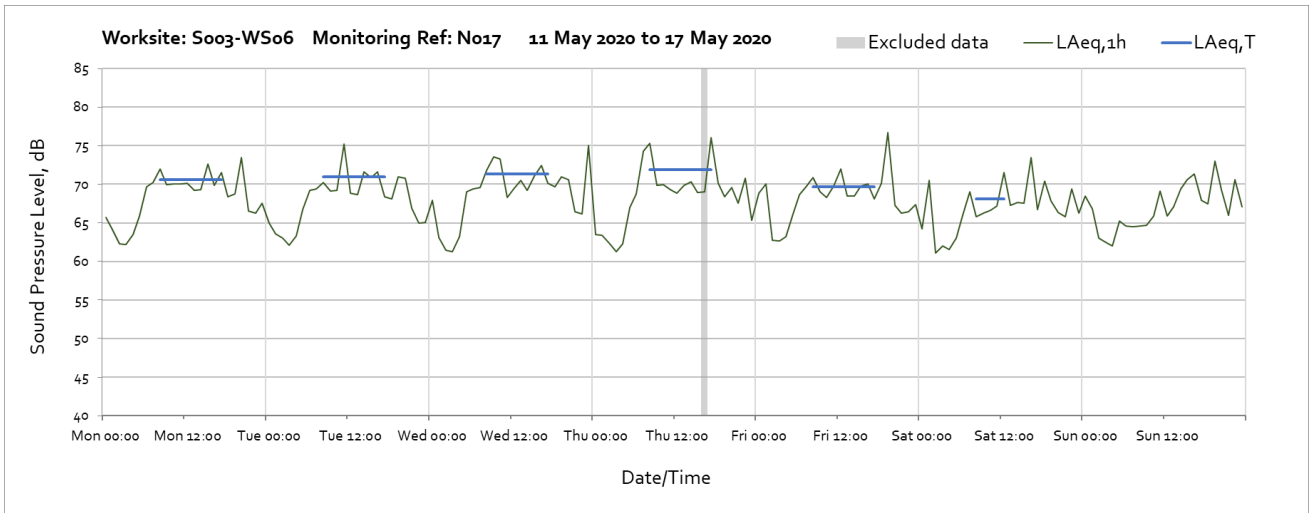




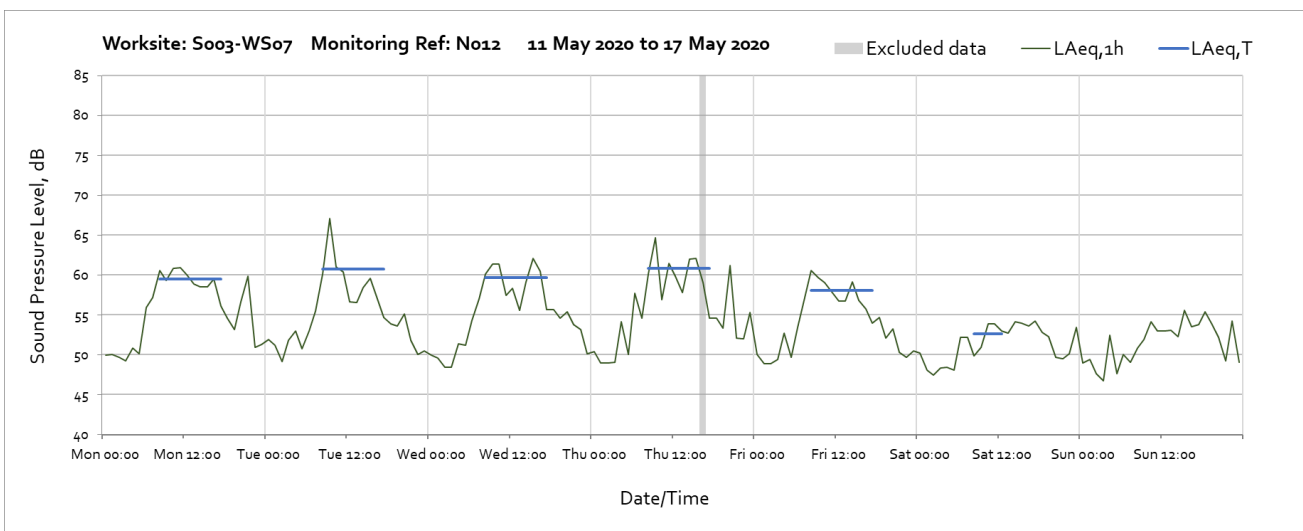
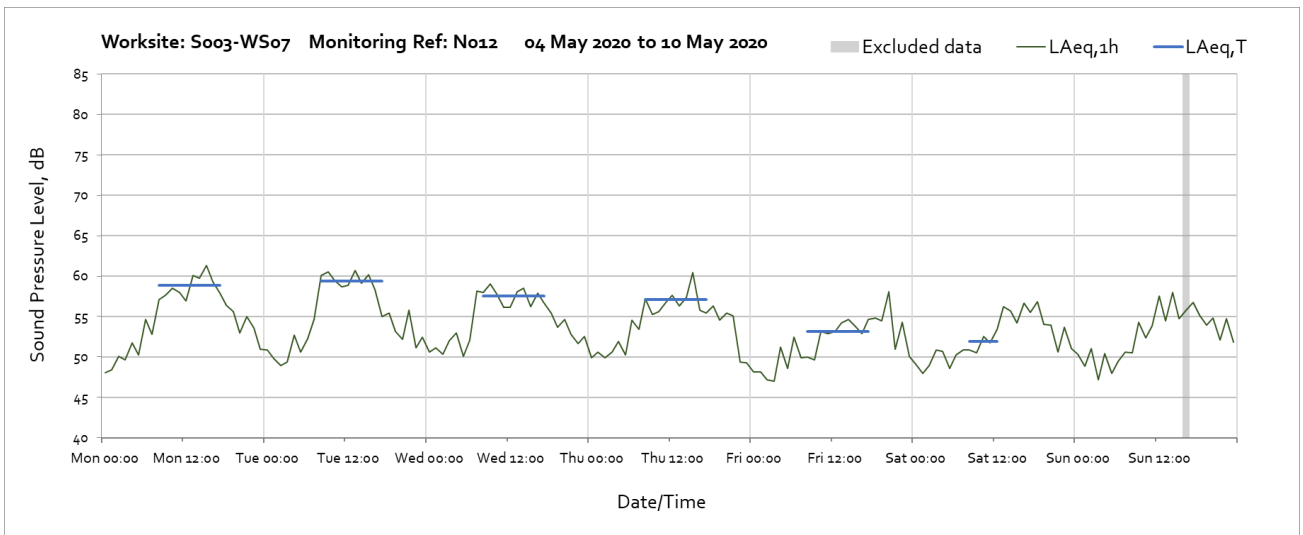
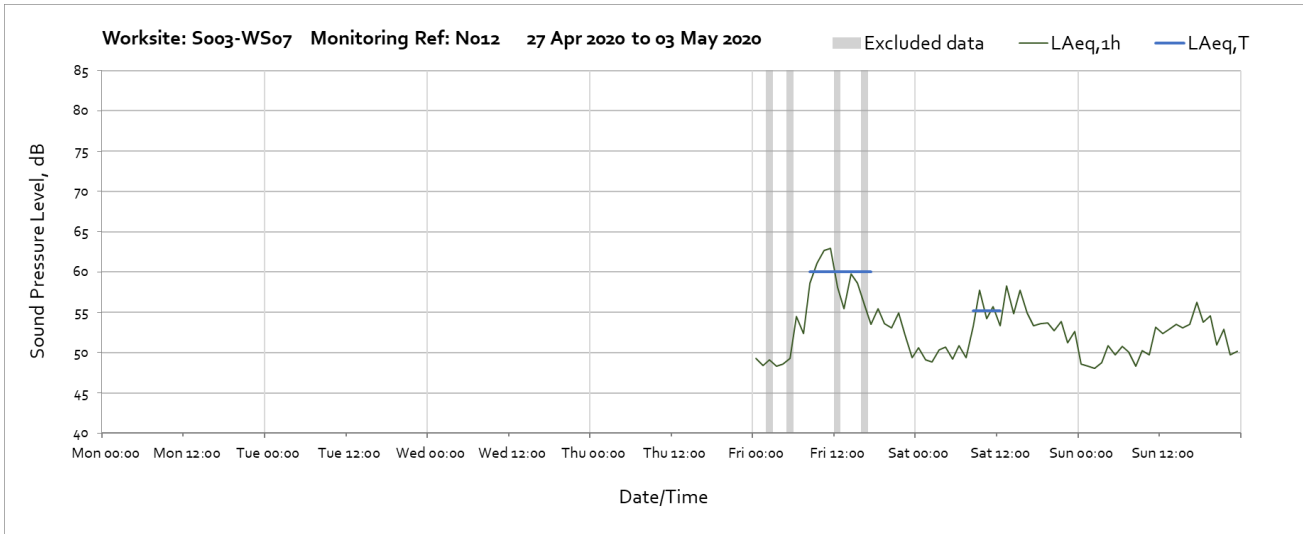


## Worksite: S003-WS06 – Monitoring Ref: N017

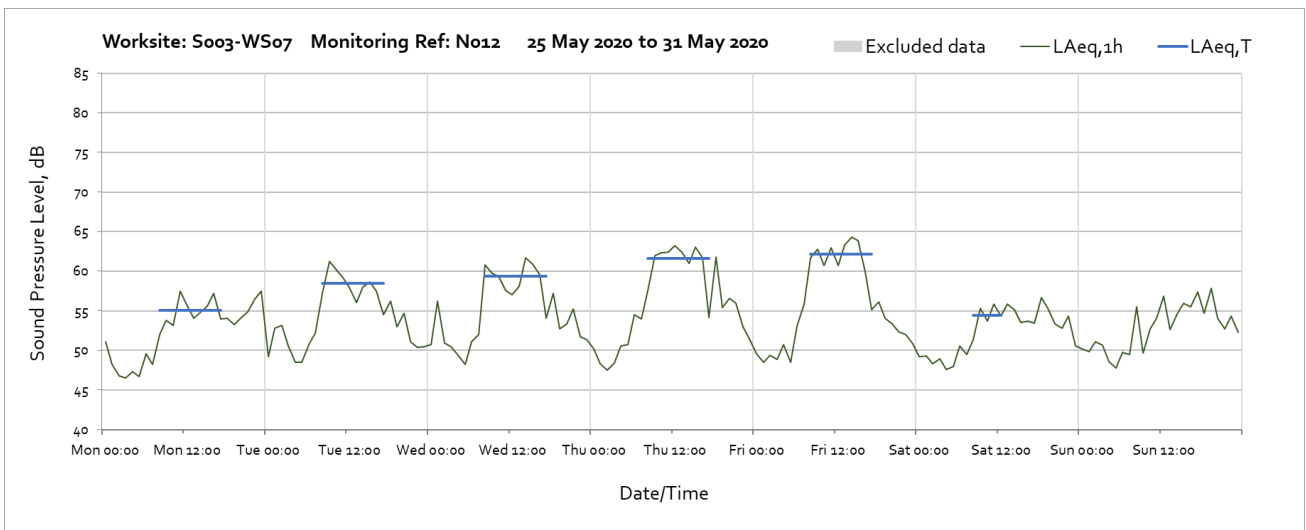
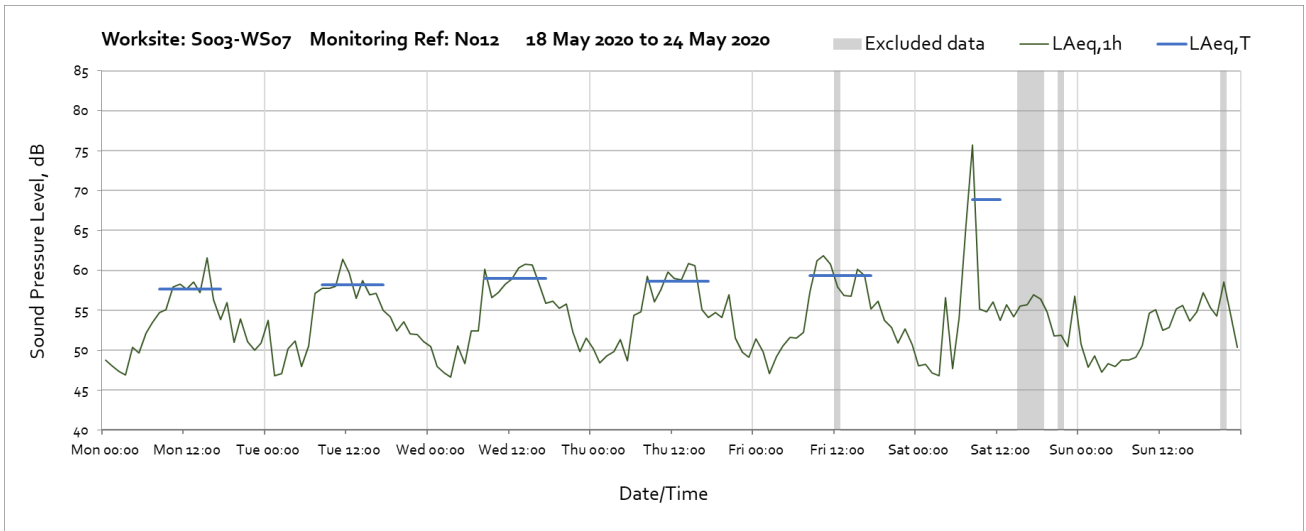




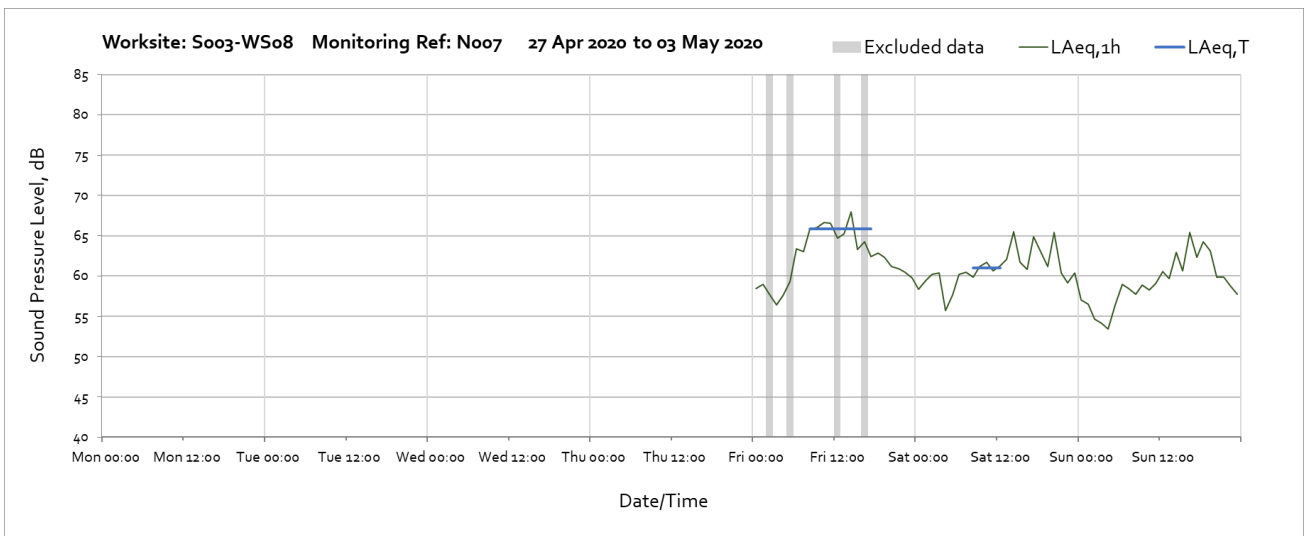
# Worksite: S003-WS07 – Monitoring Ref: N012

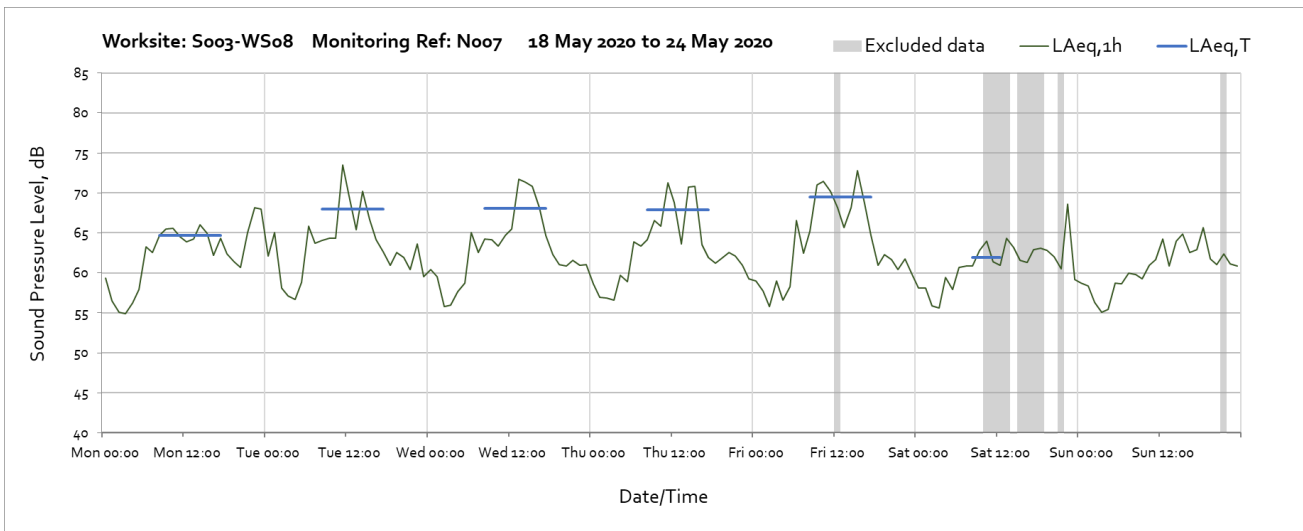
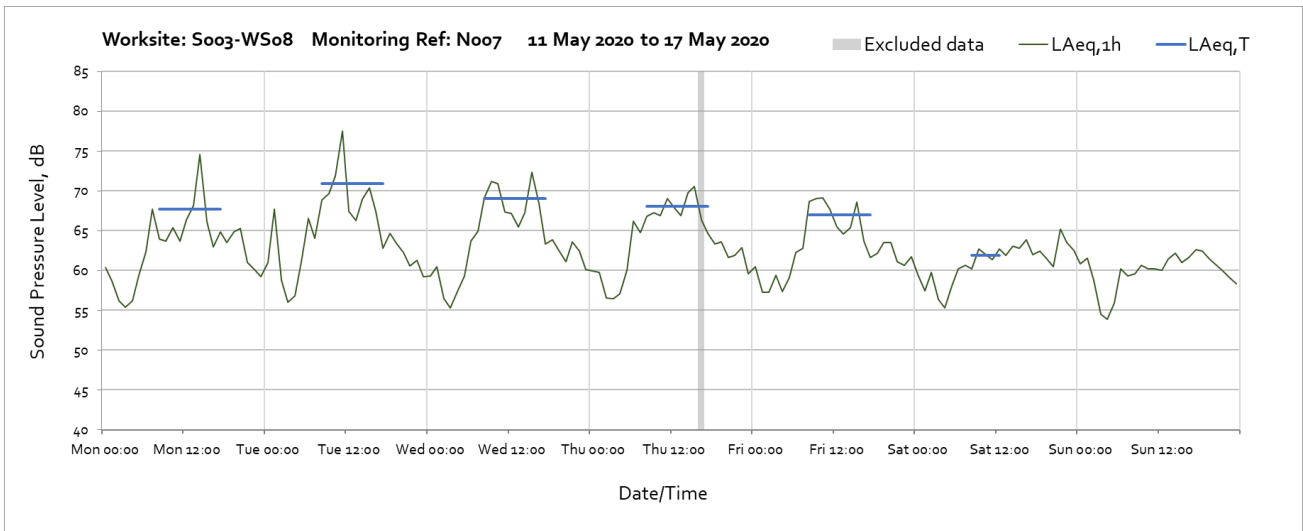
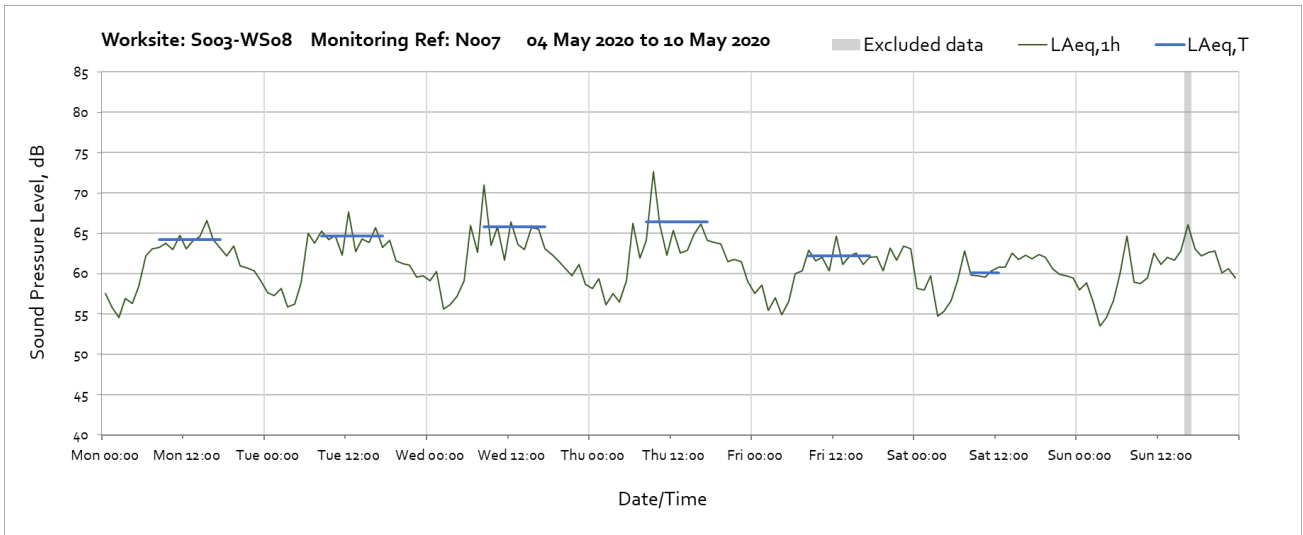


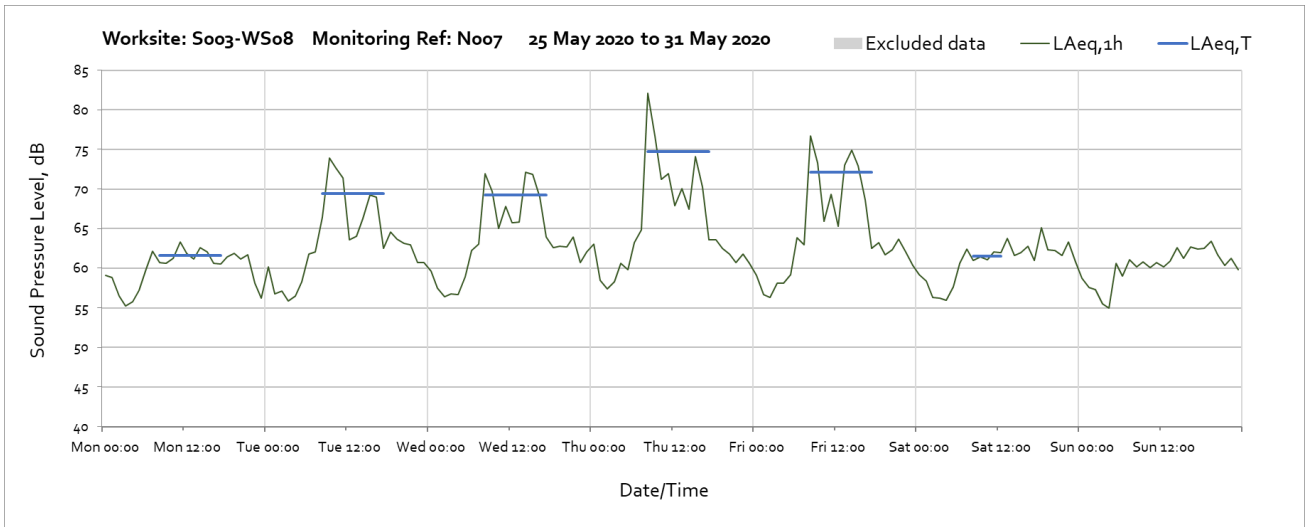




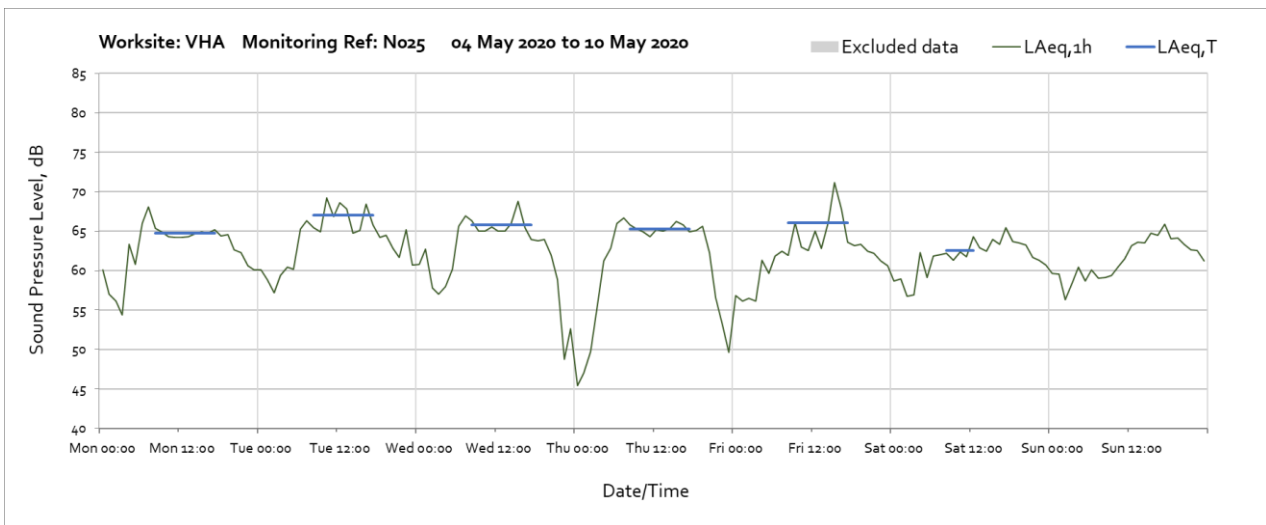
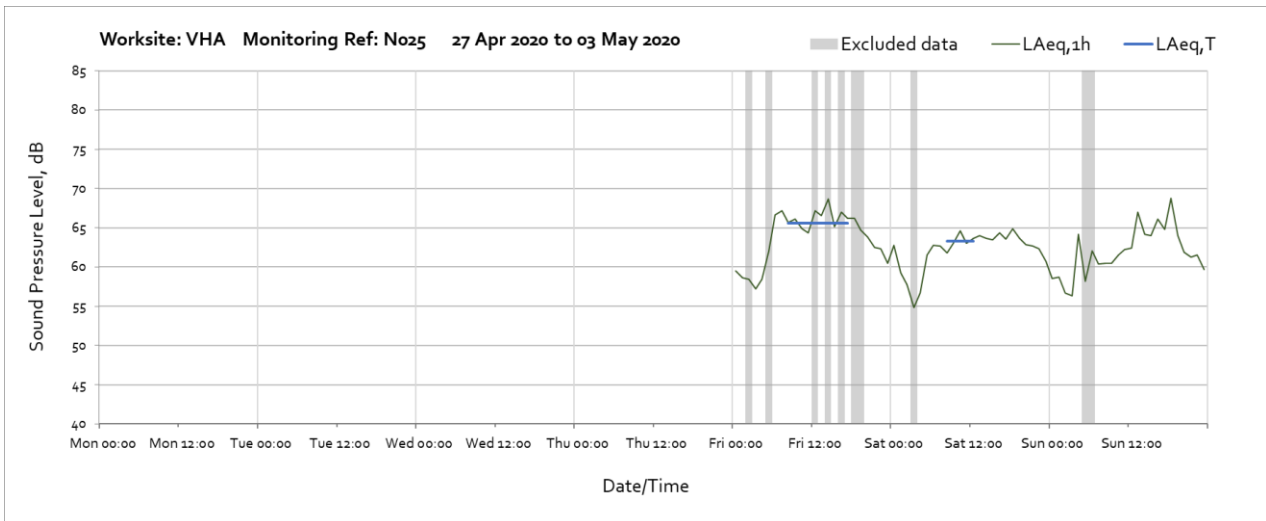
## Worksite: S003-WS08 – Monitoring Ref: N007

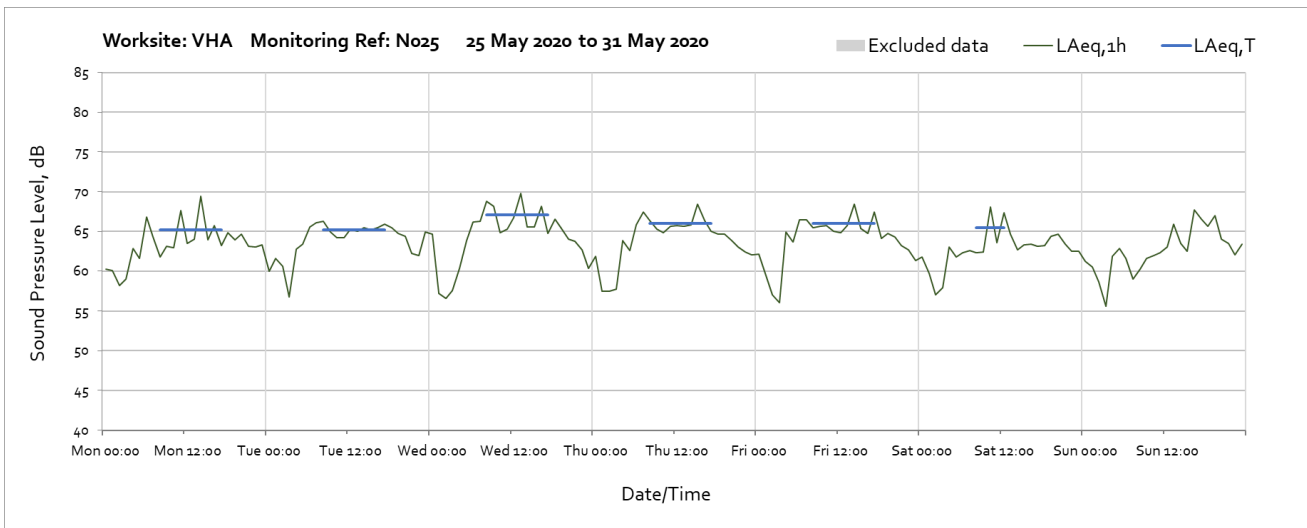
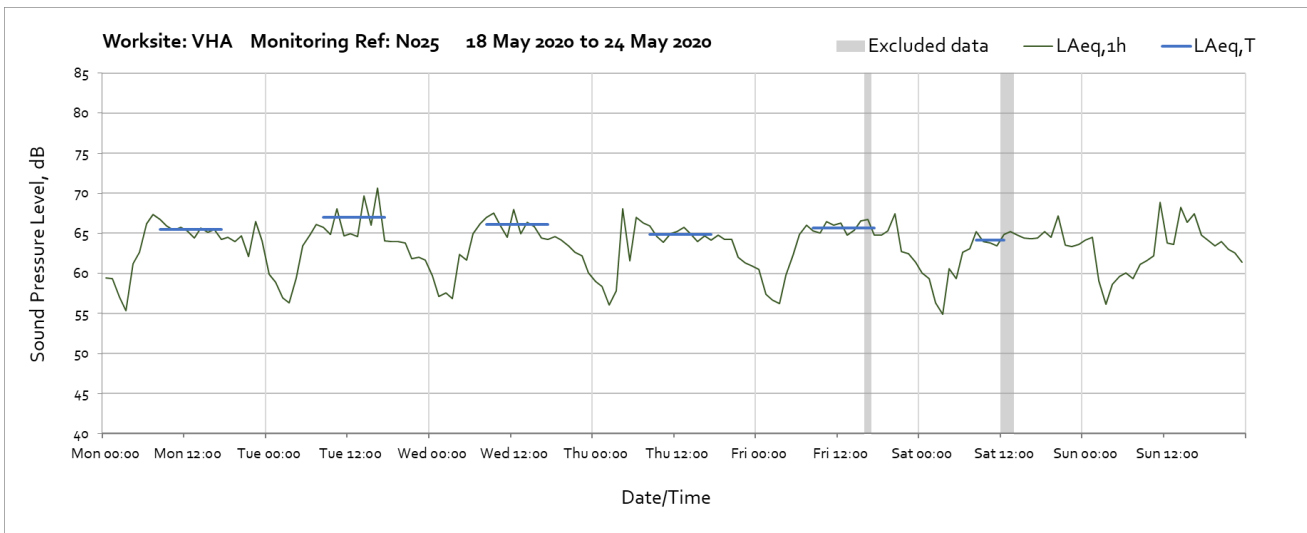
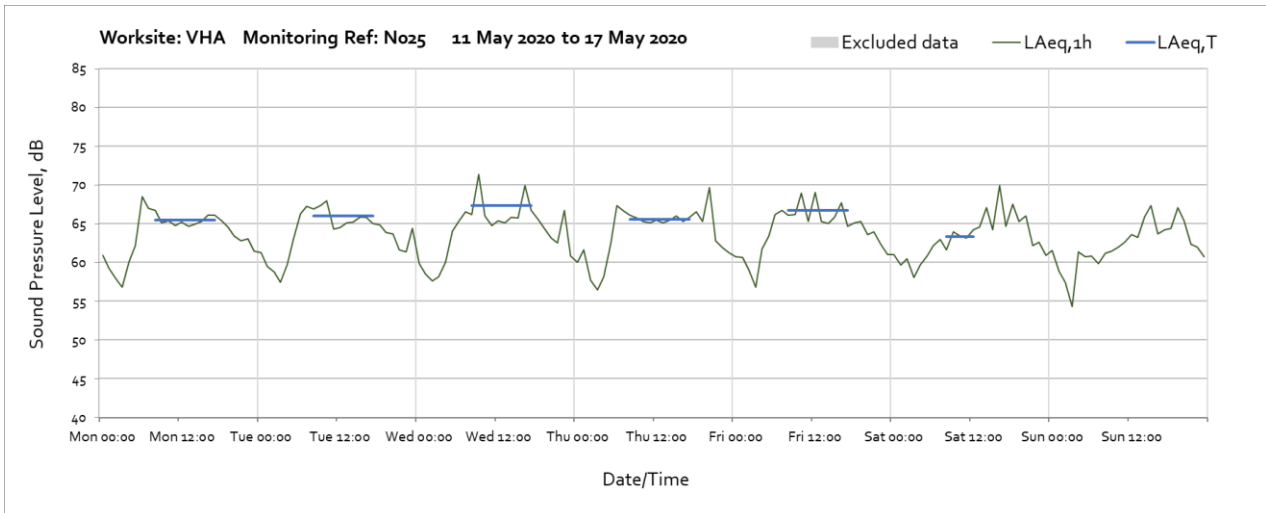




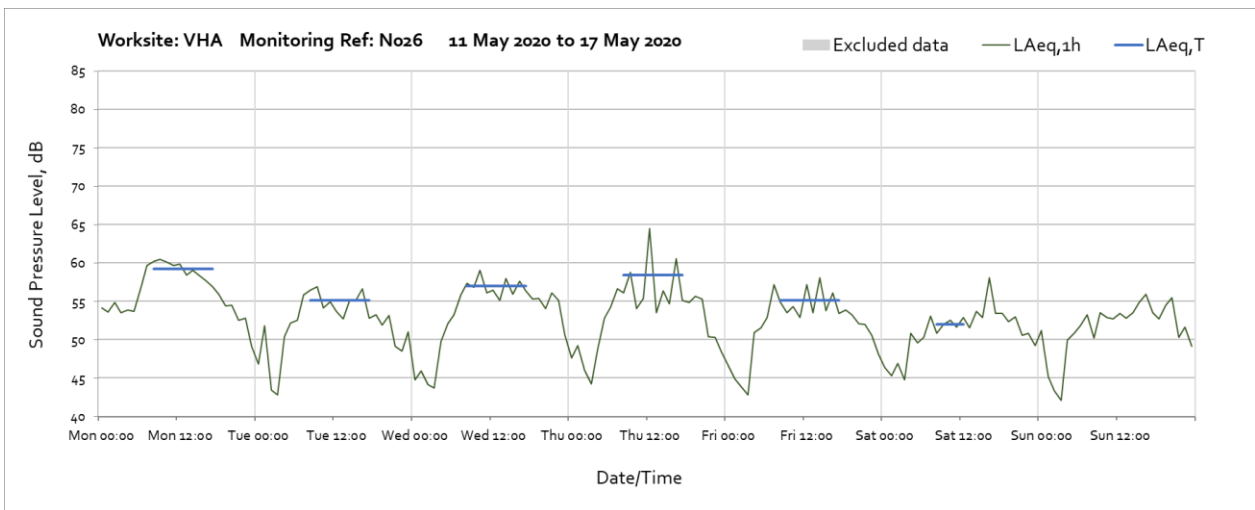
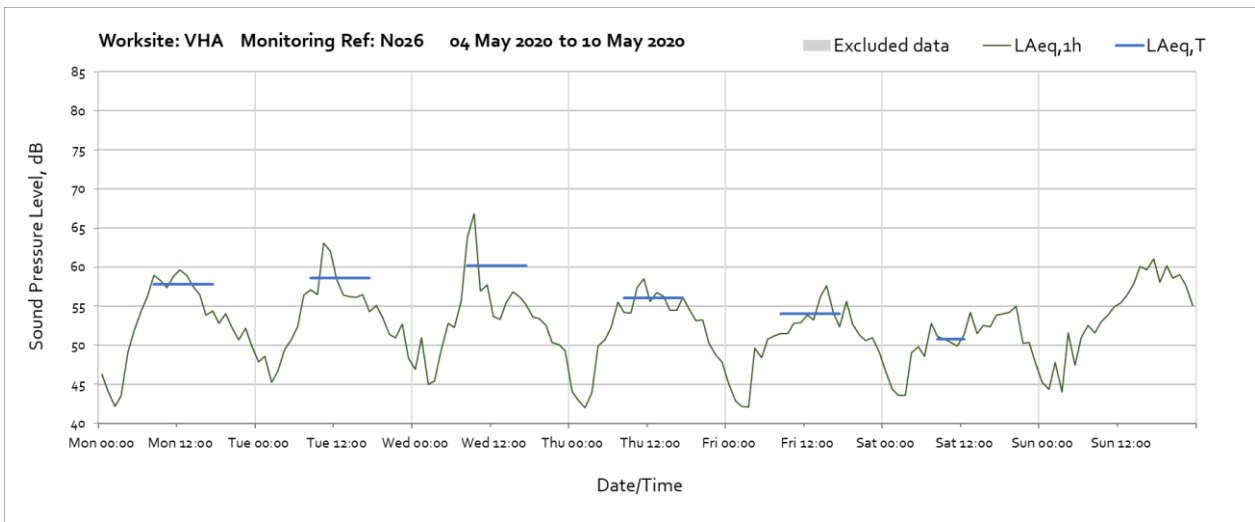
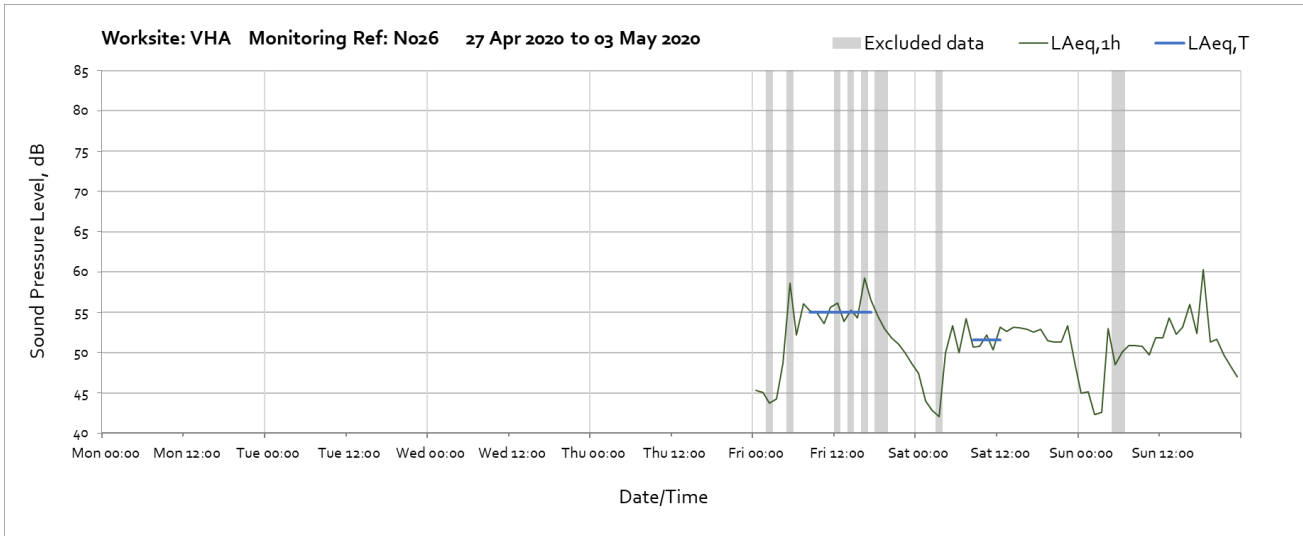


## Vehicle Holding Area (VHA) – Monitoring Ref: N025

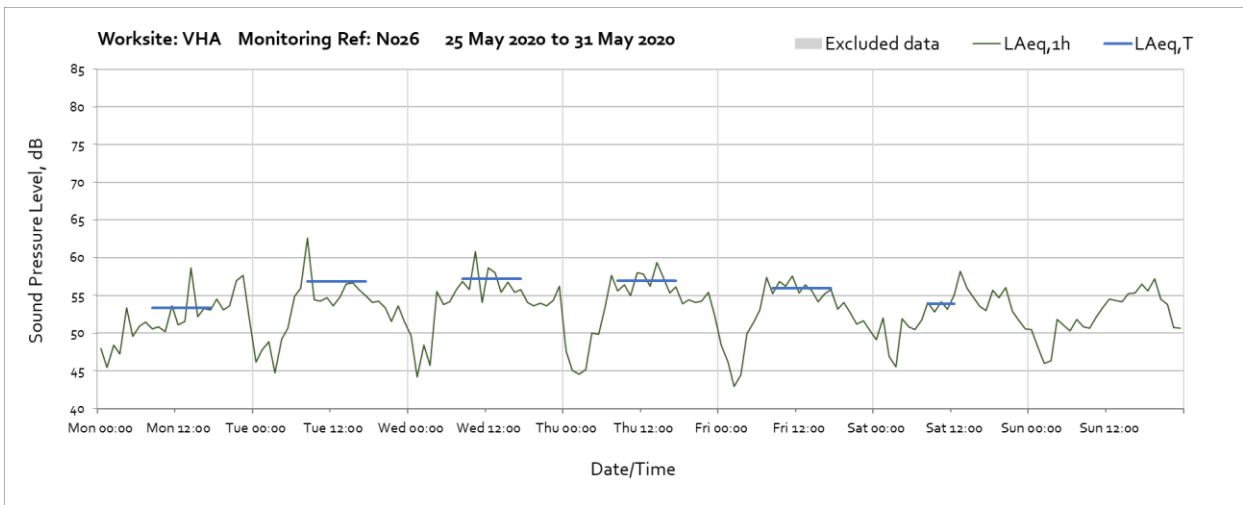
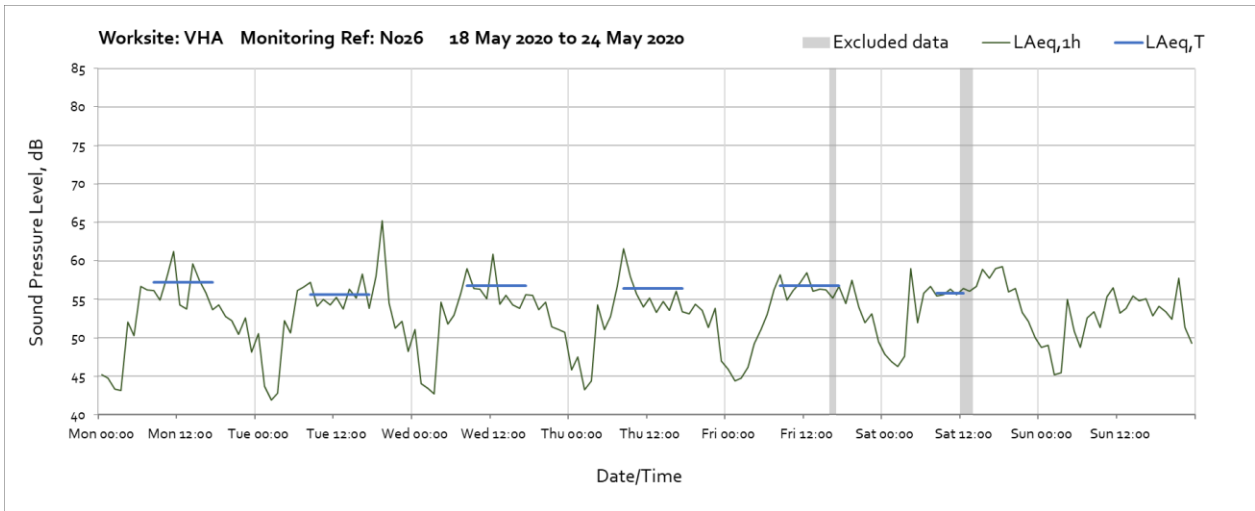




# Vehicle Holding Area (VHA) – Monitoring Ref: N026



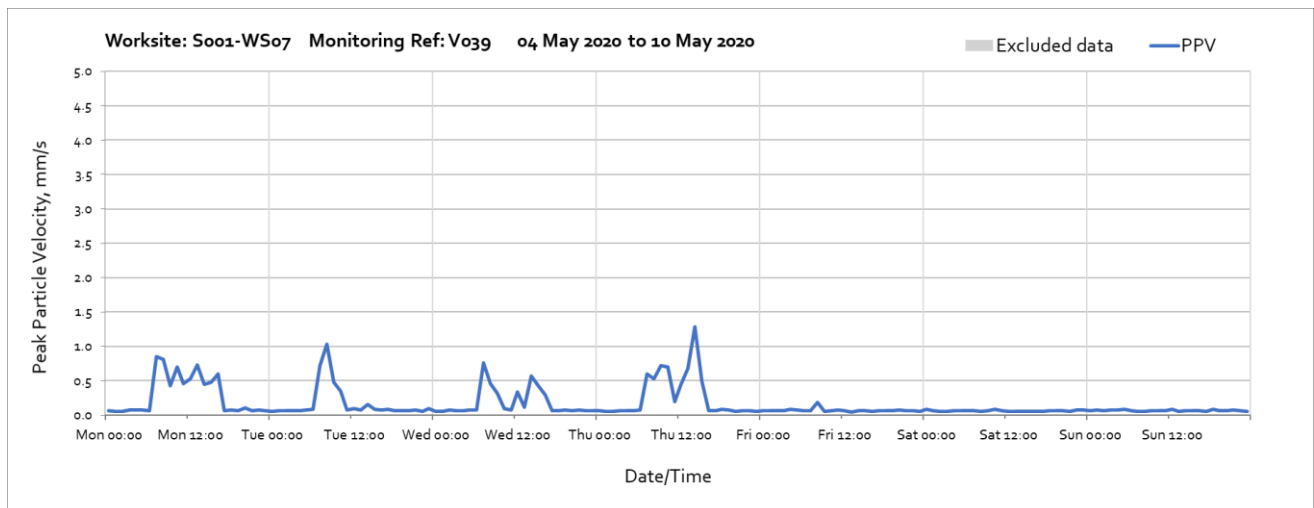
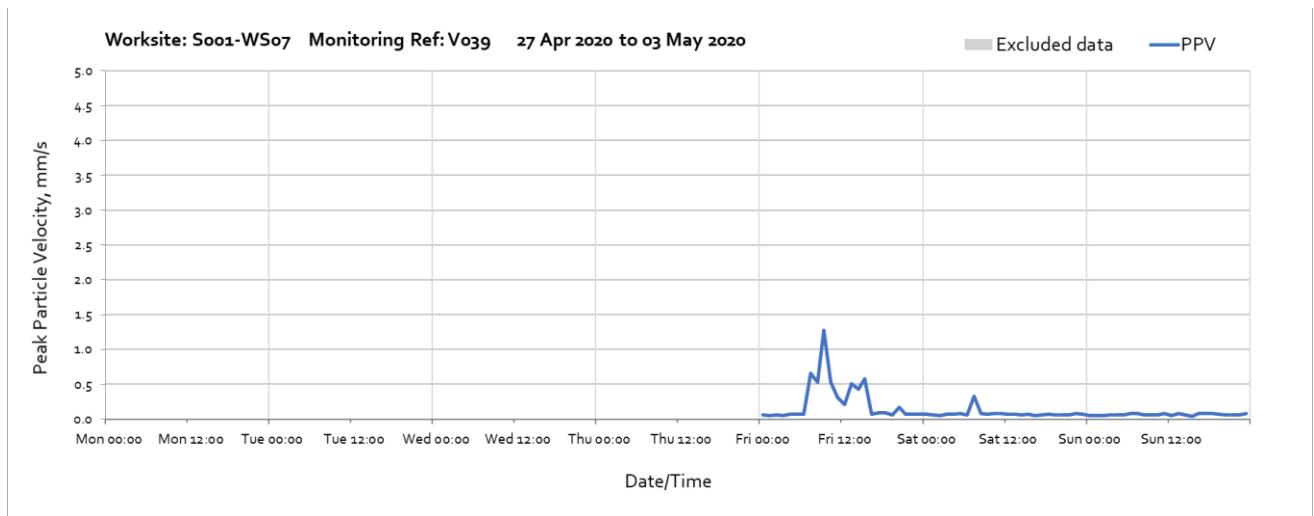


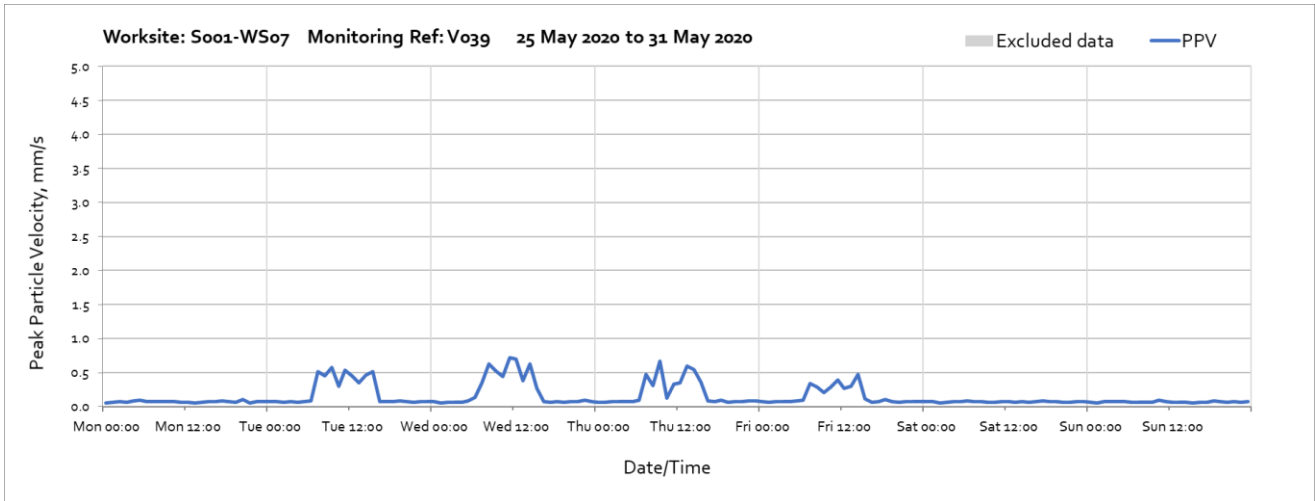
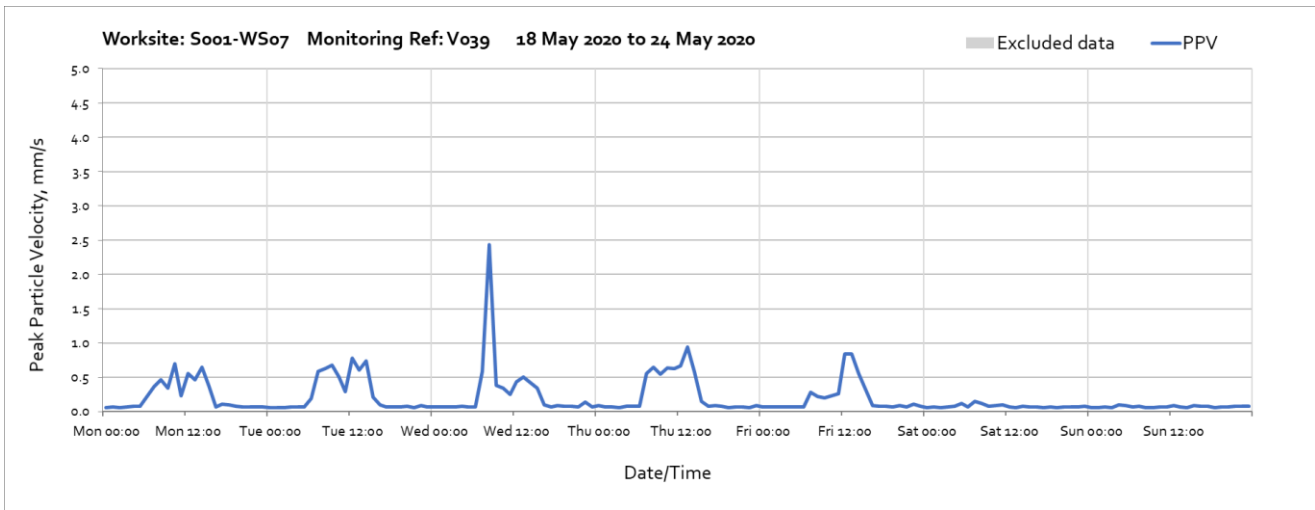
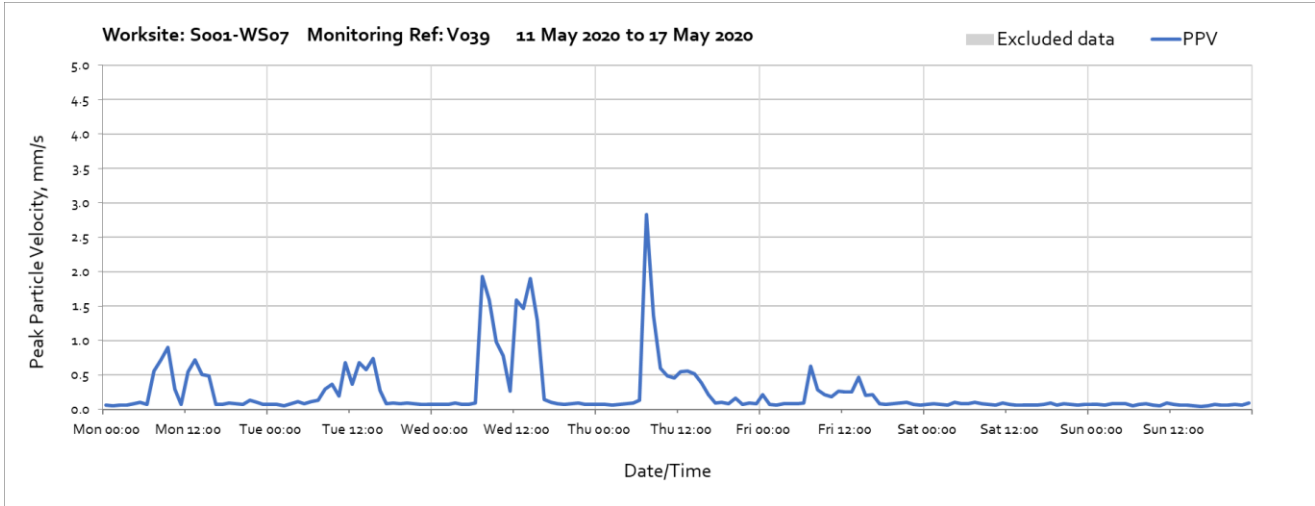


## Vibration

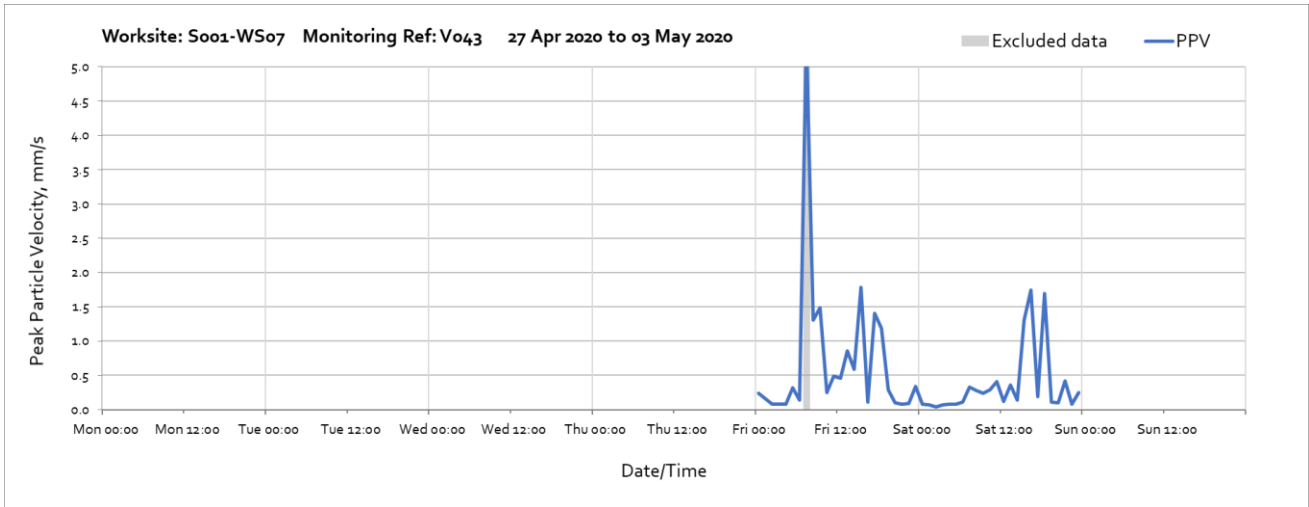
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axis x, y and z. High values of PPV were measured on occasions at V043 and V002. These were due to local interference with the vibration monitor and are not representative of HS2 construction works. These data entries have been greyed out in the following charts and have been excluded to calculate values in Table 6.

### Worksite: S001-WS07 – Monitoring Ref: V039



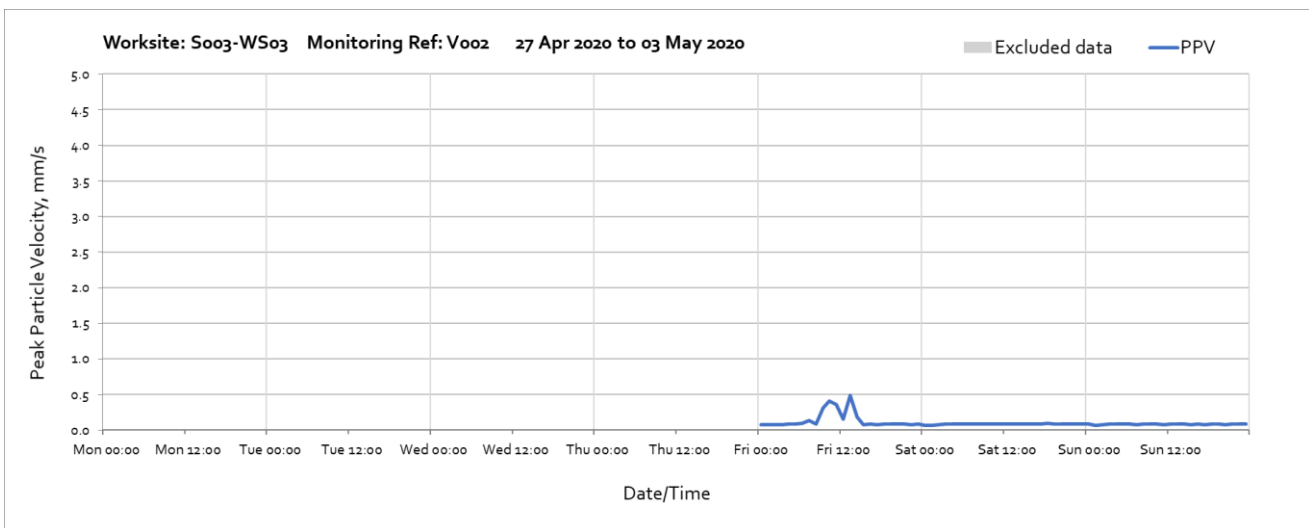


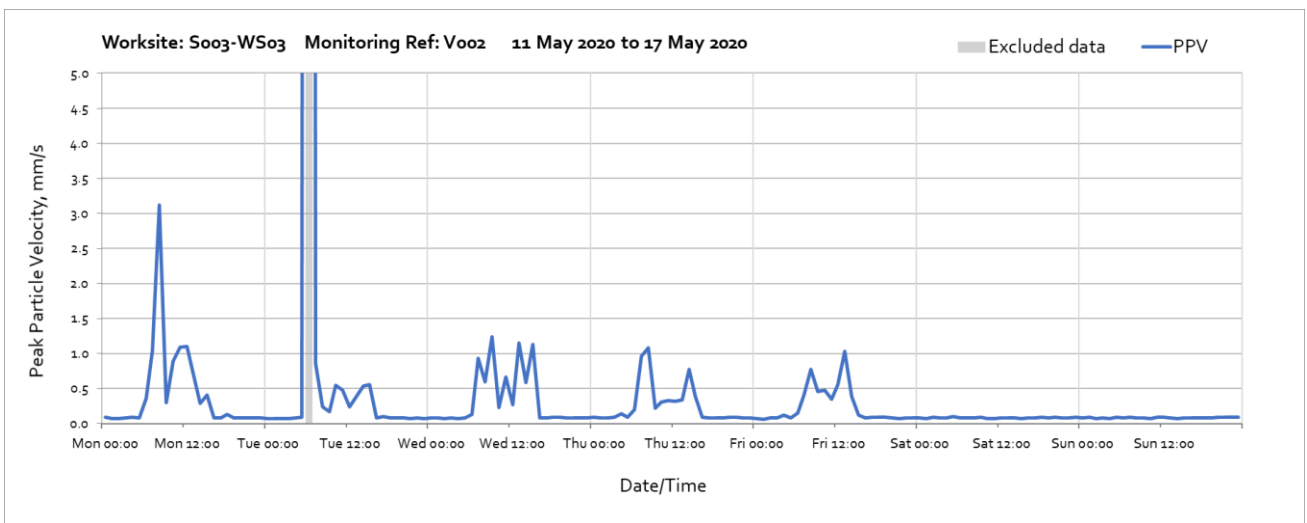
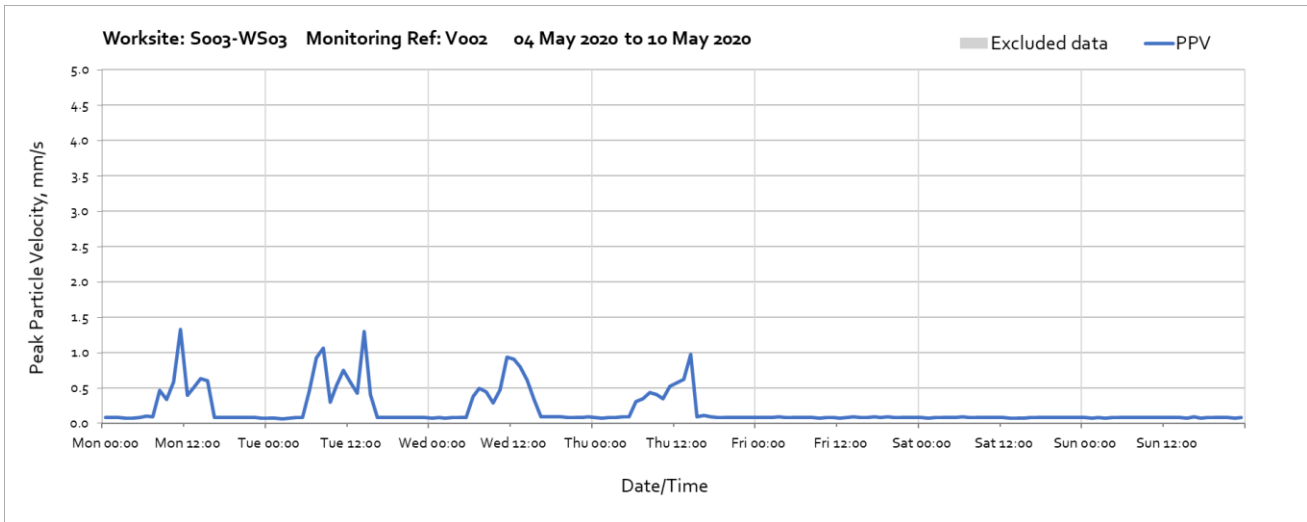
## Worksite: S001-WS07 – Monitoring Ref: V043



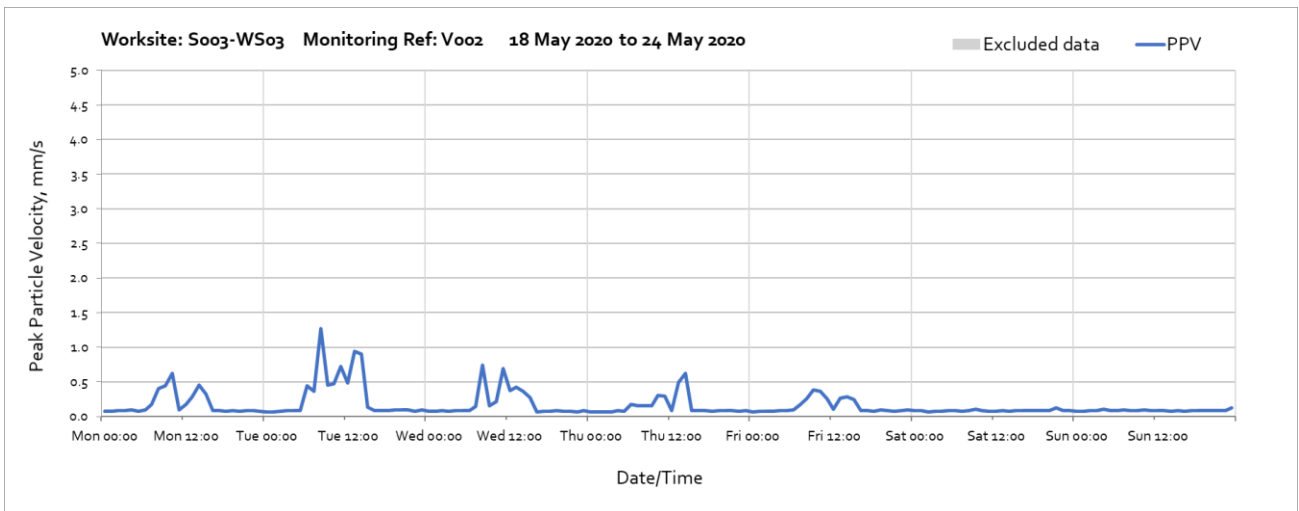
Note: High vibration levels measured at 07:00 on Friday 1<sup>st</sup> May were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels. Missing data from Sunday 3<sup>rd</sup> May until the end of the month was due to depletion of the monitoring station battery; access to the monitor for battery replacement was not available due to site restrictions related to Covid-19.

## Worksite: S003-WS03 – Monitoring Ref: V002

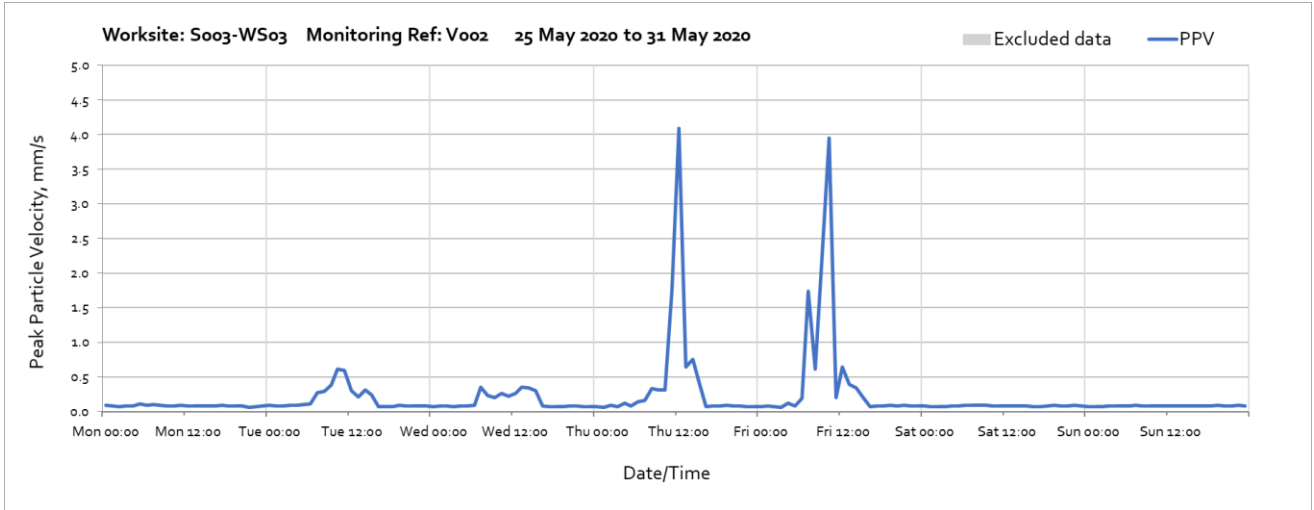




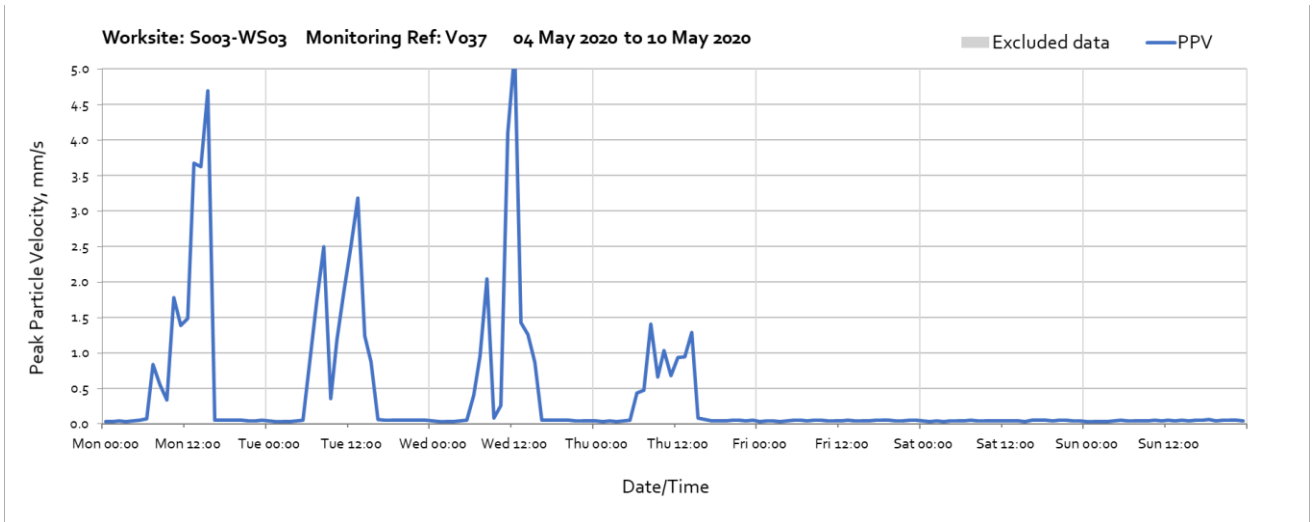
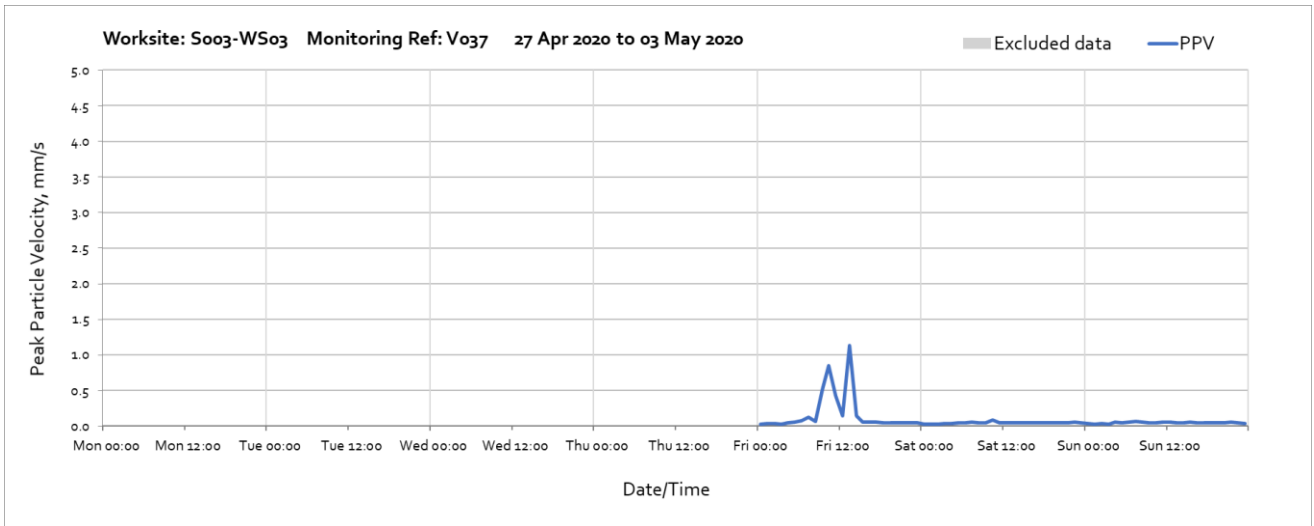
Note: High vibration levels measured at 06:00 on Tuesday 12<sup>th</sup> May were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

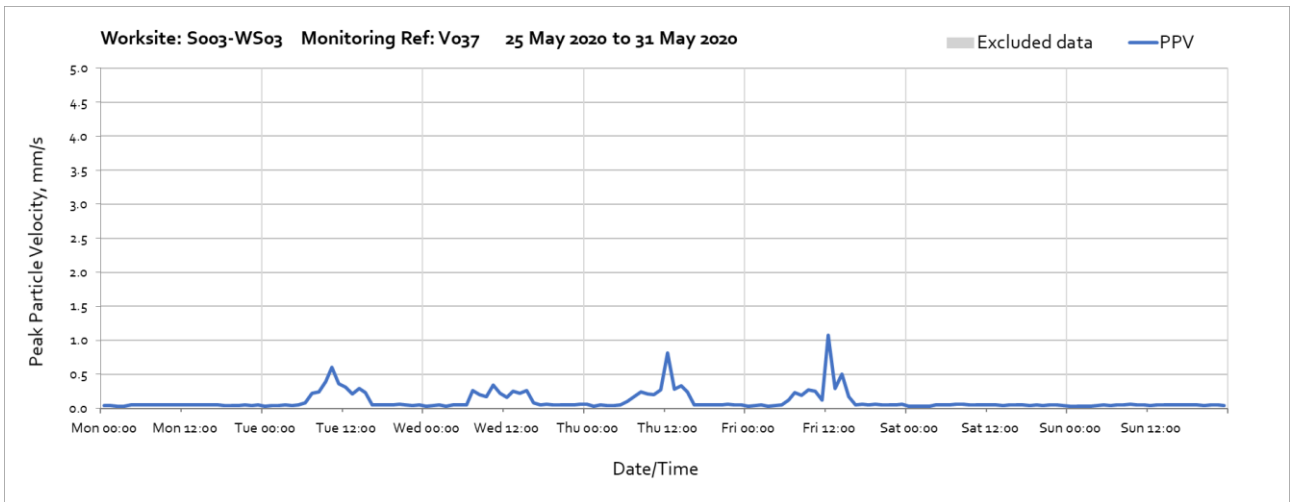
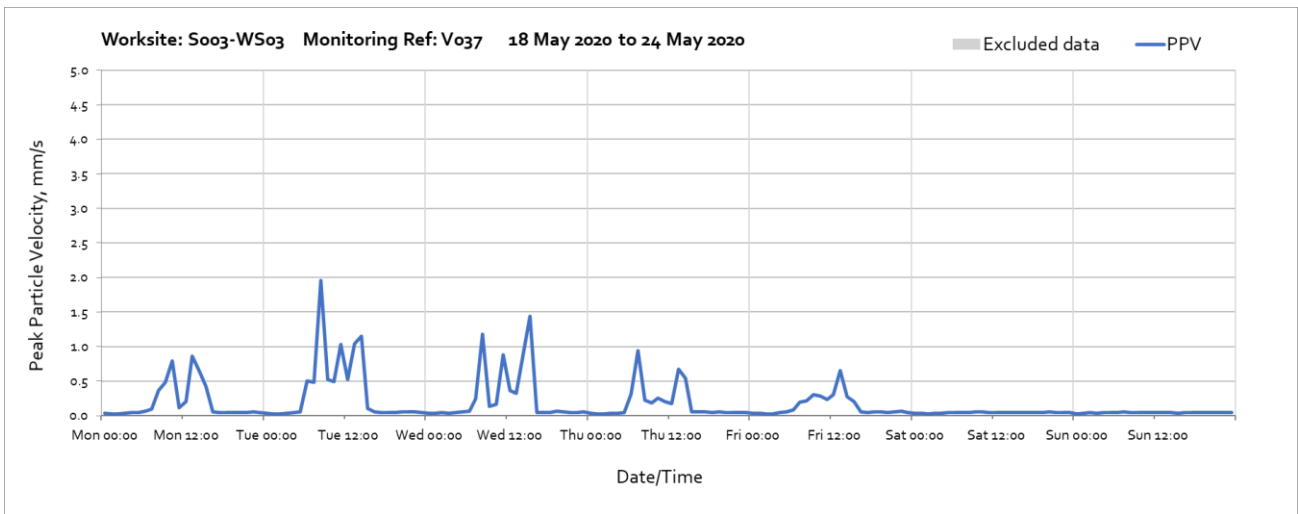
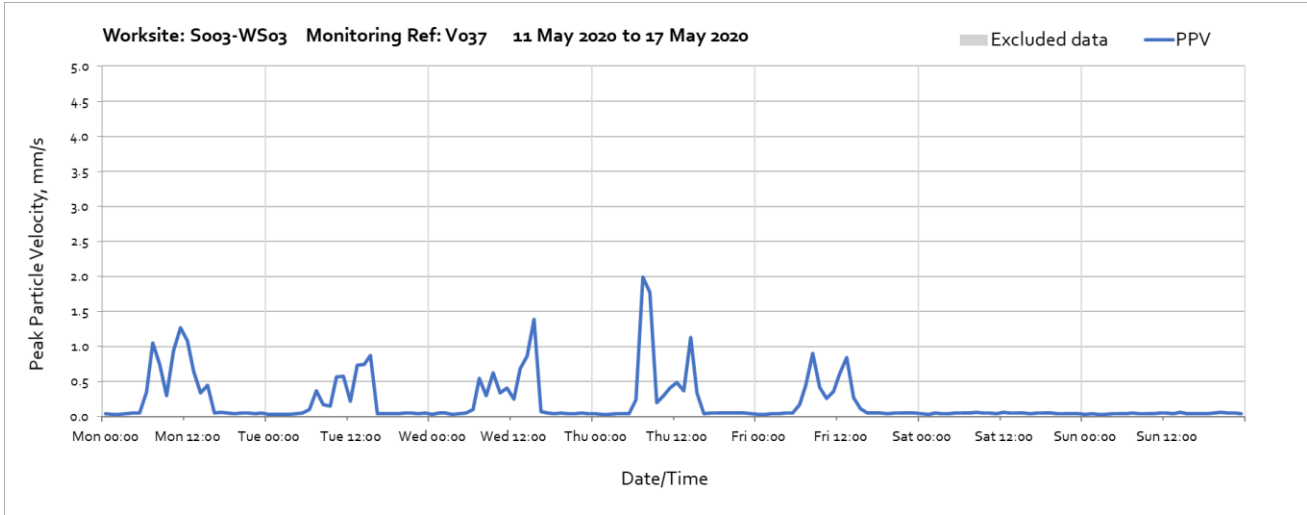




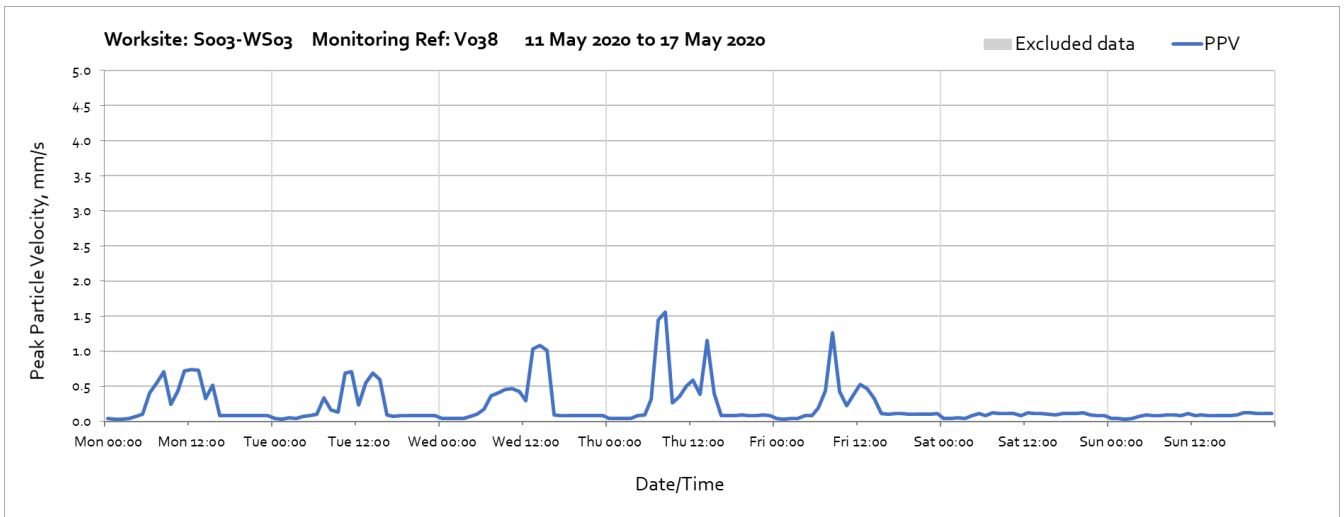
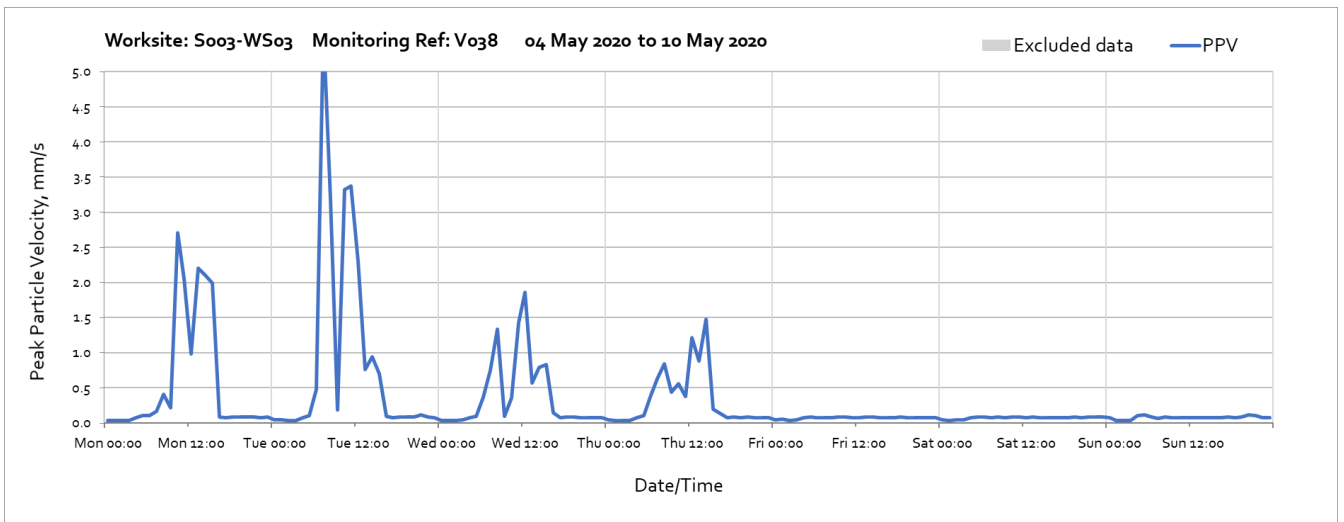
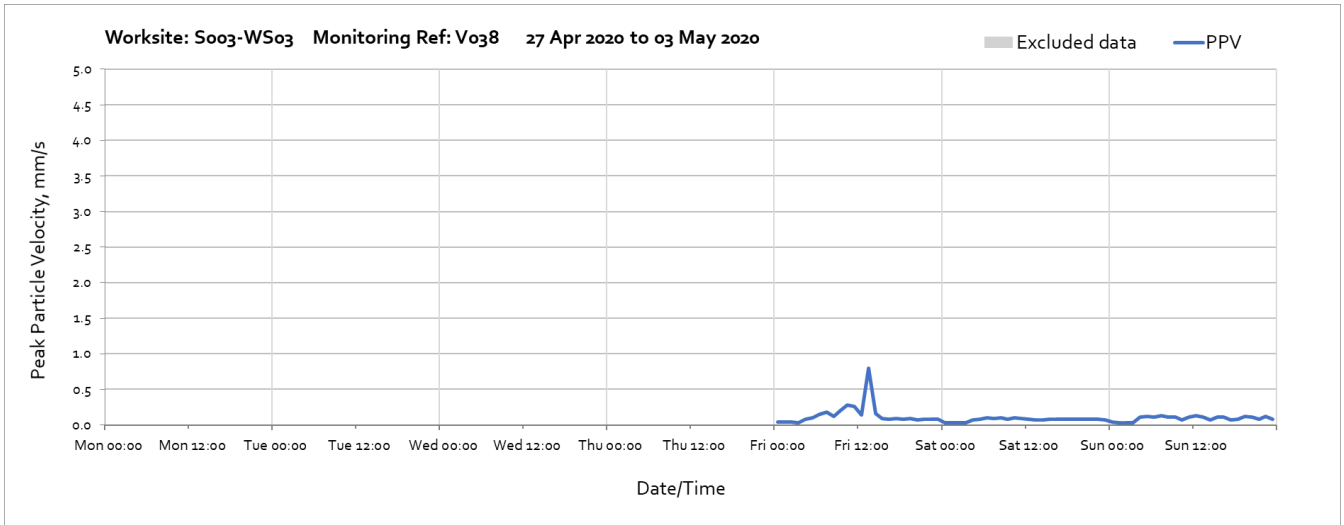


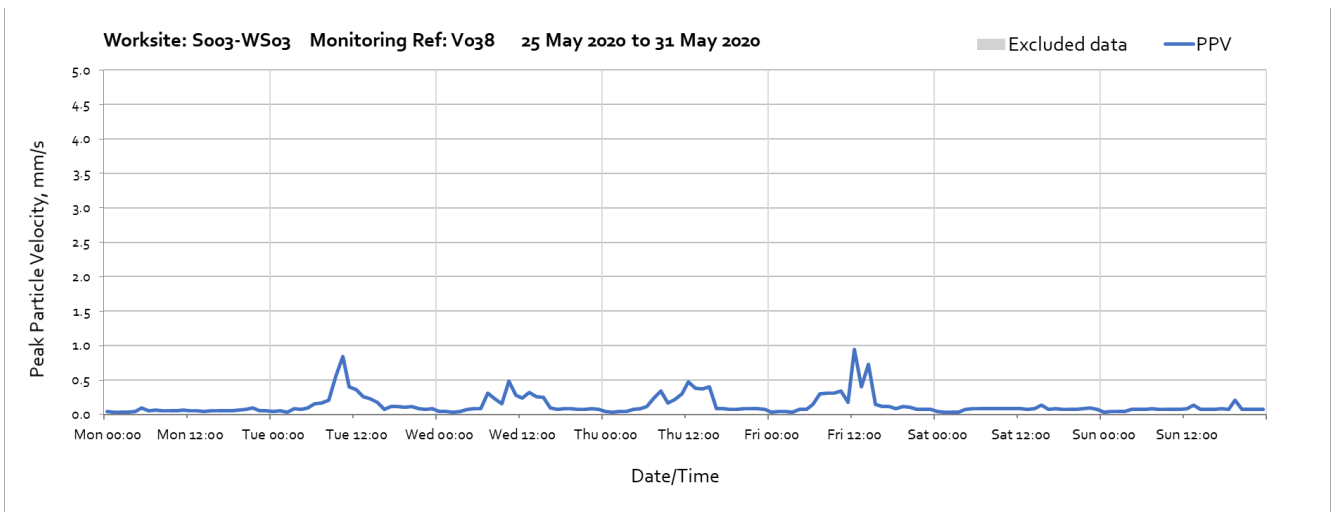
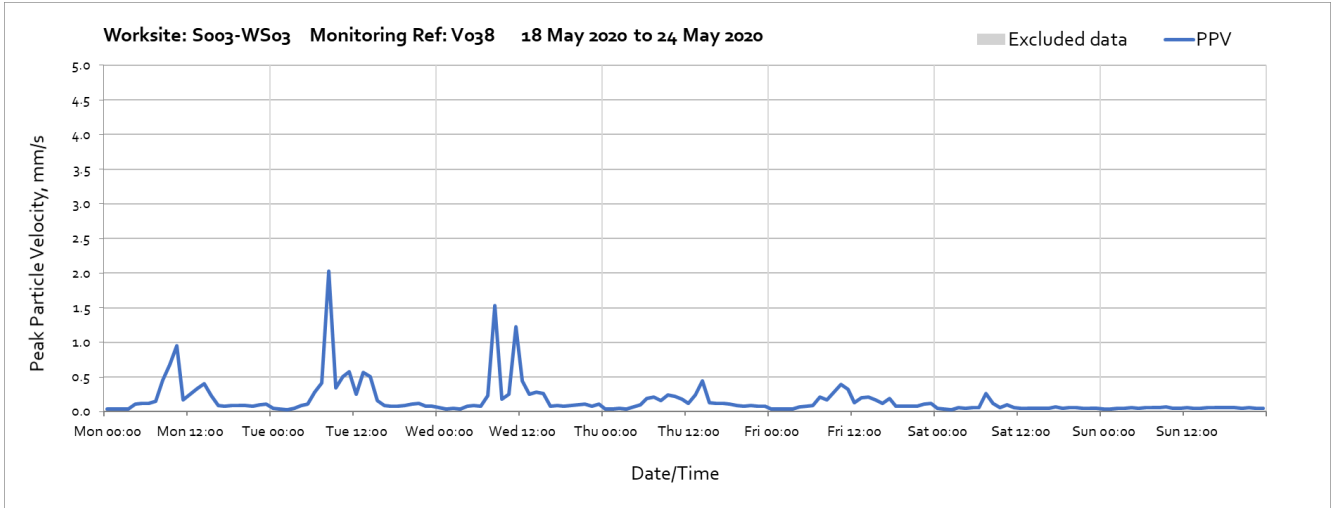
## Worksite: S003-WS03 – Monitoring Ref: V037



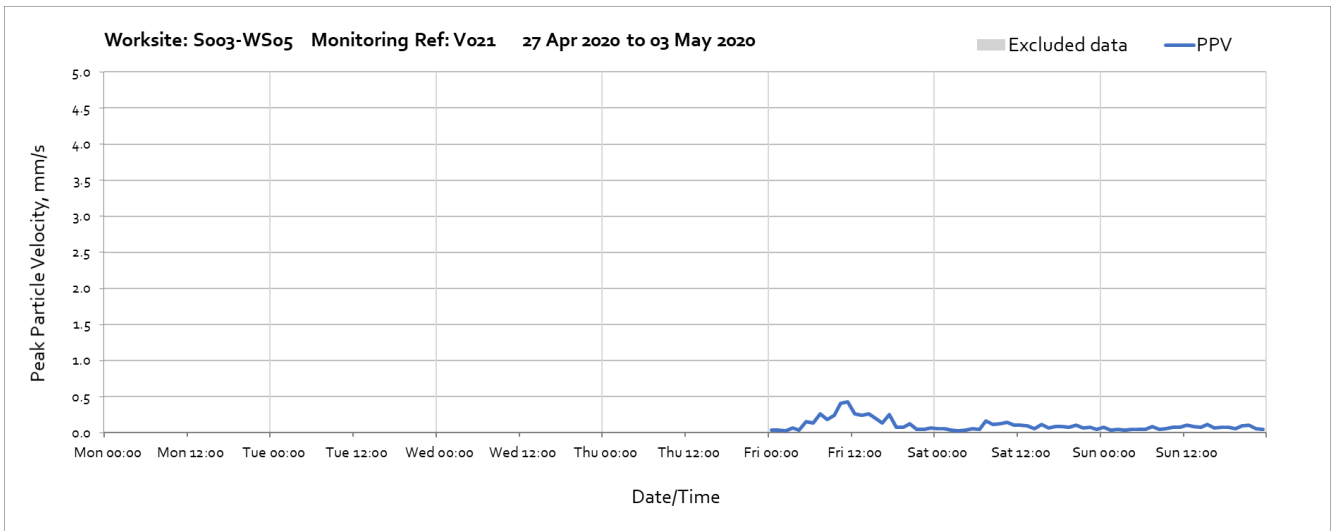


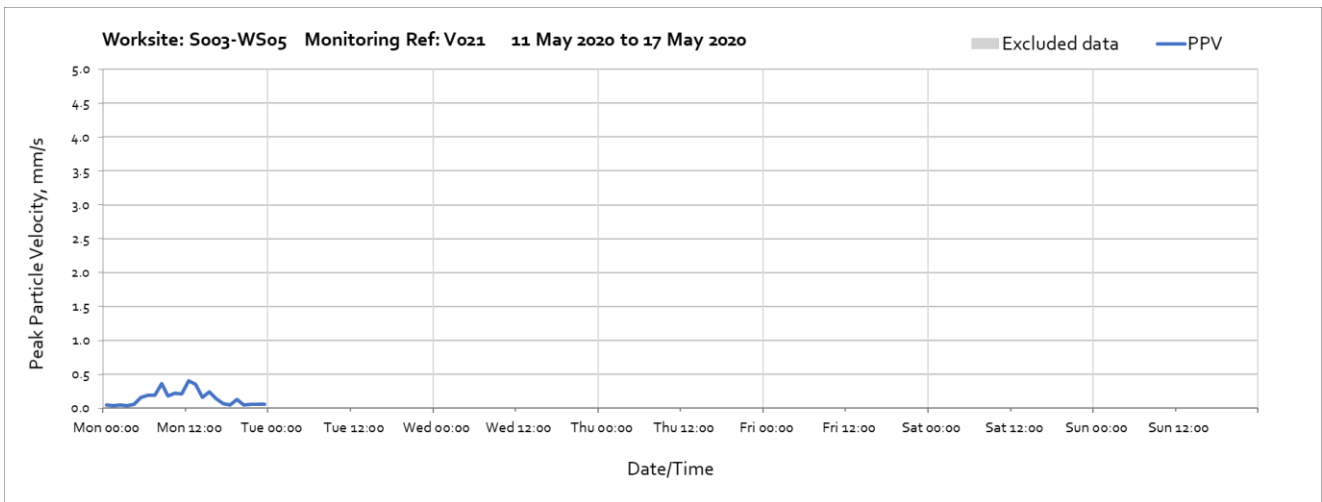
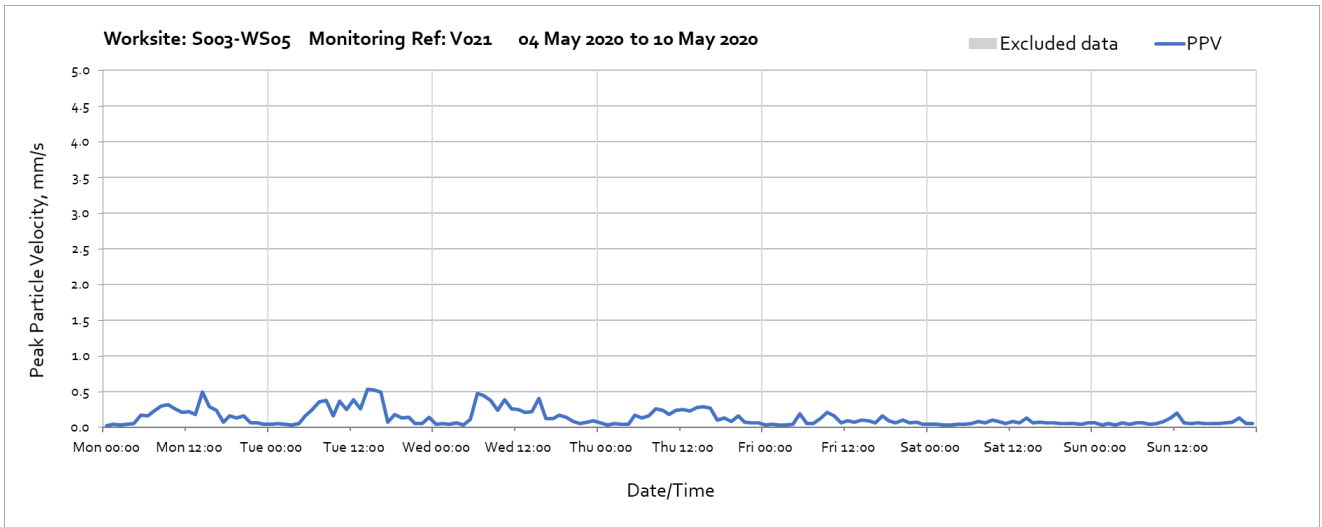
# Worksite: S003-WS03 – Monitoring Ref: V038





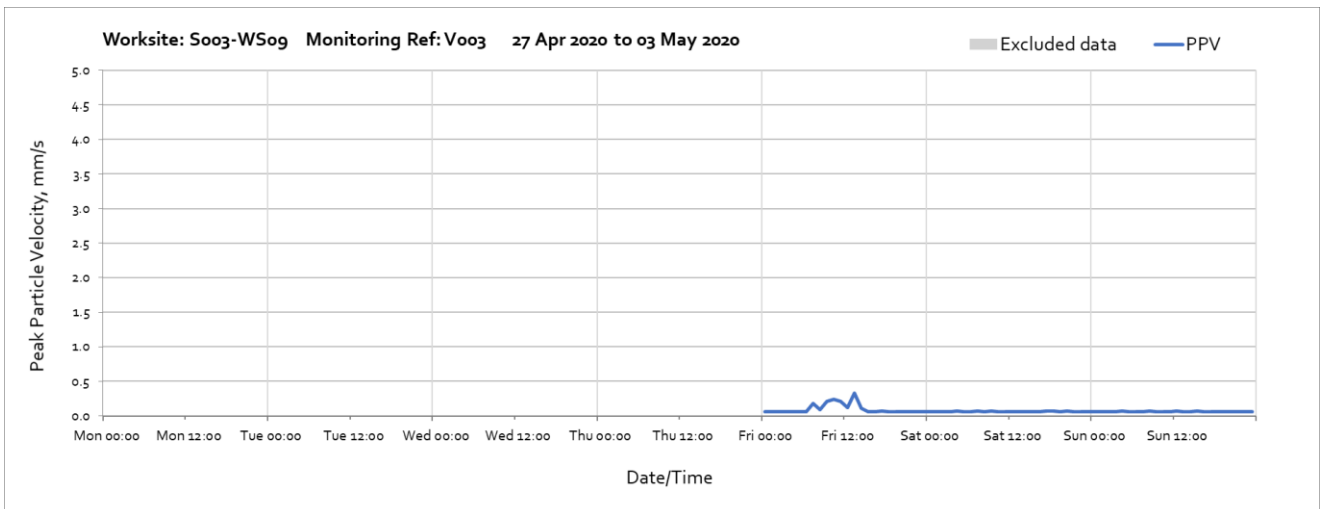
## Worksite: S003-WS05 – Monitoring Ref: V021

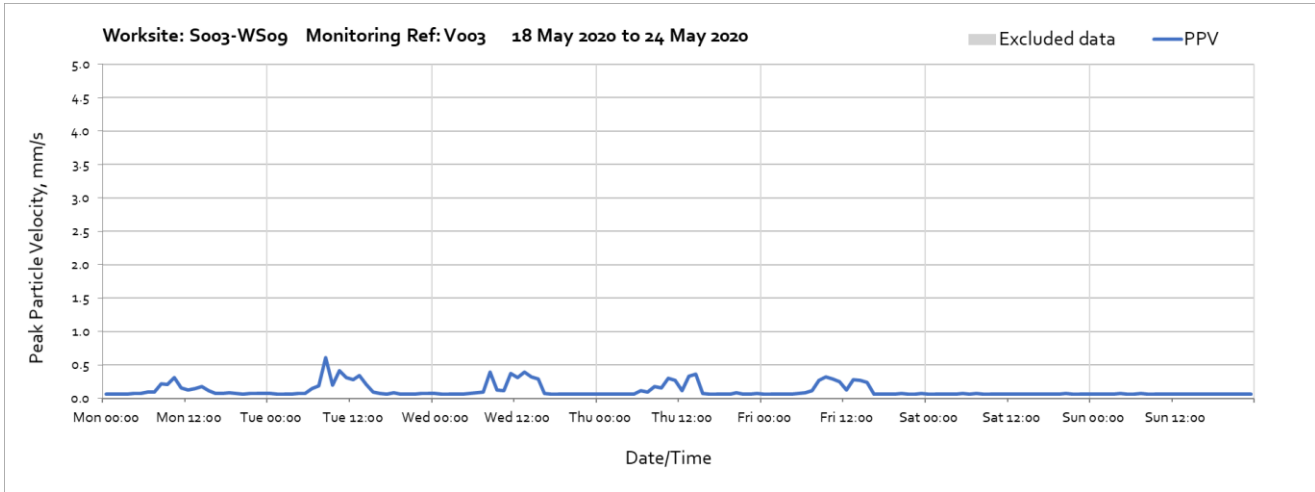
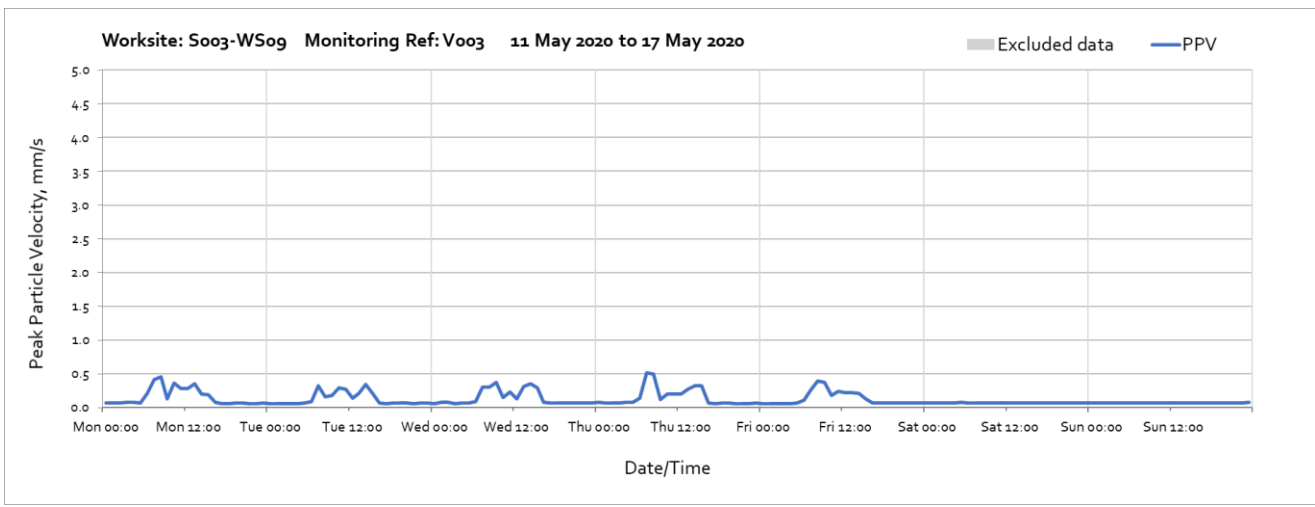
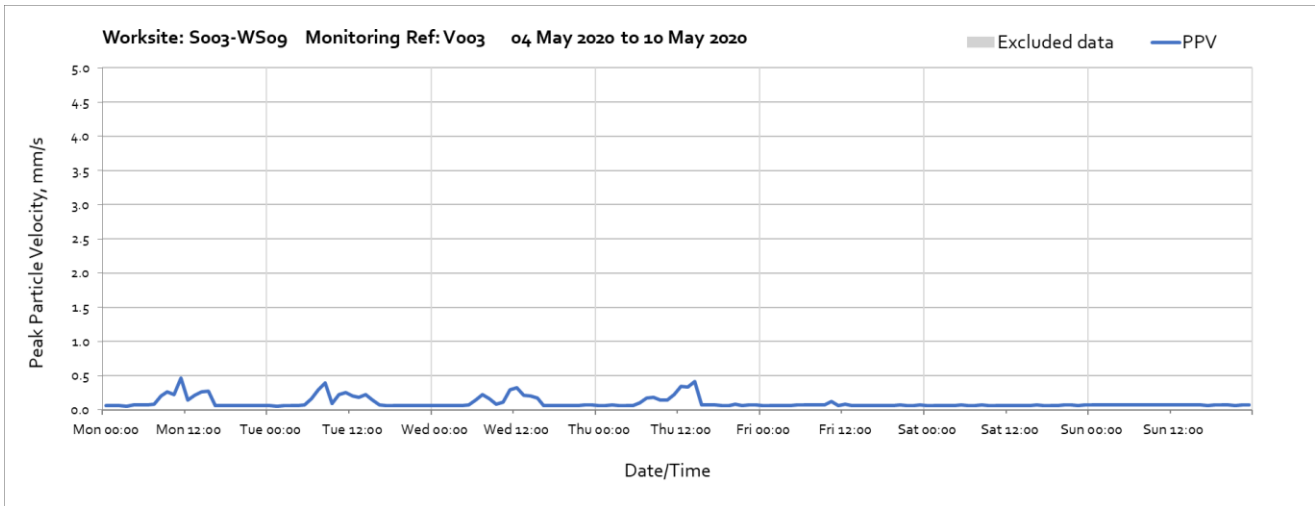




Note: Missing data from Tuesday 12<sup>th</sup> May until the end of the month were due to depletion of the monitoring station battery; access to the monitor for battery replacement was not available due to site restrictions related to Covid-19.

### Worksite: S003-WS09 – Monitoring Ref: V003







Worksite: So03-WS0g Monitoring Ref: V003 25 May 2020 to 31 May 2020

Excluded data PPV

