

Construction noise and vibration Monthly Report – June 2019

London Borough of Camden

Non-technical summary	1
Abbreviations and descriptions	3
1 Introduction	4
1.2 Measurement locations	6
2 Summary of results	8
2.1 Exceedances of SOAEL	8
2.2 Summary of measured noise and vibration levels	10
2.3 Exceedances of trigger level	15
2.4 Complaints	16
Appendix A Site Locations	22
Appendix B Monitoring Locations	27
Appendix C Data	34

List of tables

Table 1: Table of abbreviations	3
Table 2: Monitoring locations.	6
Table 3: Summary of exceedances of LOAEL and SOAEL.	8
Table 4: Summary of total exceedances of SOAEL.	10
Table 5: Summary of measured dB L_{Aeq} data over the monitoring period.	11
Table 6: Summary of measured PPV data over the monitoring period.	15
Table 7: Summary of exceedances of trigger levels.	16
Table 8: Summary of complaints.	16

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 June 2019.

A number of worksites were active during the reporting month in the LBC area. Camera removal and cabling works were underway at Network Rail worksite B. Works at Network Rail worksites C, D and E mainly included cabling works, works at platforms, works on all lines and around Granby Terrace. Activities at Network Rail worksite F mainly included works at the substation building and inspection for defects. Drainage and reinforced concrete works were carried out at Network Rail worksite G. Ancillary activities were undertaken at the DB Cargo and former Addison Lee worksite (ref. S001-WS01). Demolition was underway at 132 and 140 Hampstead Road and Petrol Station worksite (ref. S001-WS02), at the Regent's Park Estate worksite (ref. S001-WS07), at the Wolfson House, Walkden House, 67-75 & 77-79 Euston Rd, worksite (ref. S003-WS03), at the Thistle Hotel worksite (ref. S003-WS04), at the Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street worksite (ref. S003-WS05) and at 93-103 Drummond Street, 11-15 Melton Street, 54-64 Euston Street, 69 Cobourg Street worksite (ref. S003-WS07). Archaeological excavations and construction of screening structures were underway at St James's Garden worksite (ref. S003-WS01). Deliveries were carried out at the former National Temperance Hospital, 110-122 Hampstead Road worksite (ref. S003-WS06). Removal of fixtures and fittings and scaffolding were carried out at One Euston Square, 40 Melton Street, Grant Thornton House, 22 Melton Street worksite (ref. S003-WS09). Utilities diversions were also undertaken Stanhope Street and Hampstead Road. Works to install main pipes were undertaken along Albany Street, Redhill Street, Robert Street and Varndell Street. Works for the construction of drive and reception shaft for tunnelling works were also undertaken at the London Zoo Car Park and at Park Village East. Site mobilisation for UKPN utility diversion works were completed at the Euston Station taxi rank.

Noise monitoring was undertaken in the vicinity of Network Rail worksites B, C, D, E, F and G, the DB Cargo worksite (ref. S001-WS01), 132 and 140 Hampstead Road and Petrol Station worksite (ref. S001-WS02), Regent's Park Estate worksite (ref. S001-WS07), St James's Gardens worksite (ref. S003-WS01), Wolfson House, Walkden House, 67-75 & 77-79 Euston Rd worksite (ref. S003-WS03), the Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street worksite (ref. S003-WS05), former National Temperance Hospital, 110-122 Hampstead Road worksite (ref. S003-WS06), Drummond Street / Euston Street worksites (ref. S003-WS07), Ibis Hotel, Euston Square Gardens (west) worksite (ref. S003-WS08) and the Thistle Hotel (ref. S003-WS04). Further noise monitoring was also undertaken at Regents Park Estate and in the vicinity of Regents Park Lorry Holding Area.

Vibration monitoring was undertaken in the vicinity 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 305 Euston Road (ref. S003-WS09). Two new vibration monitors (V037 and V038) were installed in June at locations surrounding worksite S003-WS03: monitor V037 installed on the 10th of June in the basement of the Magic Circle and monitor V038 installed on the 12th of June in the basement of the Wesley Hotel.

Two exceedances of the SOAEL were measured at one location. Twenty five complaints were received during the monitoring period. Description of exceedances, complaints, results of investigations and any actions taken are detailed in the report.

Abbreviations and descriptions

The abbreviations, descriptions and project terminology used within this report can be found in the Project Dictionary (HS2-HS2-PM-GDE-000-000002).

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.
Equivalent continuous sound pressure level, or $L_{pAeq,T}$	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.
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 1st to 30th June 2019.

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

- Network Rail on-networks HS2 preparatory works: worksite ref. B (see plan 1 in Appendix A)
 - Works activities include removal of camera in Camden Carriage Sidings and installation of 11kv Camden route.
- Network Rail on-networks HS2 preparatory works: worksite ref. C, D and E (see plan 2 in Appendix A)
 - Works activities include surveys, movements of material and vehicles, cabling works (including cable recoveries and installations, cable running and cable pulling) works at platforms (including installation of site boundary, overhead line equipment works and in-line cabling works), works on all lines (including installation of new line drop vertical, and cable management system (CMS) device), temporary works on Granby embankment, coring of retaining wall, works at Granby Terrace (including installation of handrail, installation of troughing and window sampling), removal of tonne bags, functional supply point bonding preparation and verification, adjustments to gantries on platforms, installation of signs for under track crossings, tamping at platforms, glass reinforced plastic structure installation, provision and remove of worksite isolation and lighting.

- Network Rail on-networks HS2 preparatory works: worksite ref. F (see plan 2 in Appendix A)
 - Works activities include installation of lighting protection, CMS for external lamp posts, inspection for defects, fence repair works, breaking out and foundation works and paving reinstatement.
- Network Rail on-networks HS2 preparatory works: worksite ref. G (see plan 3 in Appendix A)
 - Works activities include drainage and reinforced concrete works.
- DB Cargo shed and adjacent land on Granby Terrace, worksite ref. S001-WS01 (see plan 2 in Appendix A)
 - Ancillary activities at the former Addison Lee site.
- 132 and 140 Hampstead Road and Petrol Station, worksite ref. S001-WS02 (see plan 3 in Appendix A)
 - Works activities include substructure demolition and processing of arisings.
- Regent's Park Estate, worksite ref. S001-WS07 (see plan 2 and 3 in Appendix A)
 - Works activities include removal of fixture and fittings and demolition.
- St James's Gardens, worksite ref. S003-WS01 (see plan 2 in Appendix A)
 - Works activities include archaeological excavations and construction of screening structures.
- Wolfson House, Walkden House, 67-75 & 77-79 Euston Rd, worksite ref. S003-WS03 (see plan 3 in Appendix A)
 - Works activities include removal of fixture and fittings, scaffolding and demolition.
- Thistle Hotel, Cardington Street, worksite ref. S003-WS04 (see plan 3 in Appendix A)
 - Works activities include scaffolding and demolition.
- Ibis Hotel, 3 Cardington Street, worksite ref. S003-WS05 (see plan 3 in Appendix A)
 - Substructure demolition and processing of arisings
- Former National Temperance Hospital, 110 Hampstead Road, worksite ref. S003-WS06 (see plan 3 in Appendix A)
 - Site activities include 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 include demolition and construction.

- Euston Square Gardens (west), worksite ref. S003-WS08 (see plan 3 in Appendix A)
 - Works activities include site mobilisation for UK Power Network works.
- One Euston Square, 40 Melton Street, Grant Thornton House, 22 Melton Street, worksite ref. S003-WS09 (see plan 3 in Appendix A)
 - Works activities include removal of fixture and fittings and scaffolding.

Further works were also undertaken as part of the Granby Terrace Bridge utilities diversion (GTB Utilities) on Stanhope Street and Hampstead Road. Pipe laying was undertaken along Albany Street, Redhill Street and Robert Street. Removal of a listed wall was undertaken within the London Zoo Car Park for the construction of a drive shaft to facilitate tunnelling works to Park Village East, where works for the reception shaft commenced. Additional UK Power Network works were undertaken on Varndell Street, which included excavations, laying of ducts and re-instatement.

1.1.3 Please refer to Appendix A for plan identifying active worksites within the London Borough of Camden.

1.1.4 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.

1.2 Measurement locations

1.2.1 Table 2 summarises the position of noise and vibration monitoring installations within the LBC area in June 2019.

1.2.2 Additional vibration monitors V037 and V038 were installed at worksites S003-WS03 on Monday 10th June and Wednesday 12th June respectively.

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	CC	Whittlebury Mews West
	JC	Juniper Crescent
C	MT2	Lampost opposite to 49 Mornington Terrace

Worksite Reference	Measurement Reference	Address
	N022	External to 34 Mornington Terrace
	N024	External to Park Village Studios, Park Village East
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
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)
	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
Not near worksite	N025	External to 3 Prince Albert Road
Not near worksite	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 LOAEL and SOAEL.

Worksite Reference	Measurement Reference	Monitor Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
B	CC	Whittlebury Mews West	All days	All periods	No exceedance
	JC	Juniper Crescent	All days	All periods	No exceedance
C	MT2	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
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	DB Cargo shed and adjacent land on Granby Terrace	Weekday	08:00-18:00	2

Worksite Reference	Measurement Reference	Monitor Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
	N002	DB Cargo shed and adjacent land on Granby Terrace	All days	All periods	No exceedance
	N003	DB Cargo shed and adjacent land on Granby Terrace	All days	All periods	No exceedance
	N005	5A Granby Terrace	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
S003-WS01	N016	Margarete Centre roof	All days	All periods	No exceedance
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	All days	All periods	No exceedance
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
Not near worksite	N025	External to 3 Prince Albert Road	All days	All periods	No exceedance
Not near worksite	N026	Thames Water Compound	All days	All periods	No exceedance

2.1.4 Over the reporting period the SOAEL was exceeded at a measurement location in the vicinity of worksite S001-WS01. These were due to utility works undertaken in footpath and road near the monitor.

2.1.5 Construction and demolition works taking place at worksites B, C, D, E, F, G, S001-WS02, S003-WS03, S003-WS04 and S003-WS05 along with utility diversion works for Granby Terrace were ongoing for the majority of the period and are likely to have given rise to noise which would have been audible beyond the site boundary and, at times, in excess of the LOAEL at sensitive receptors.

2.1.6 Activities taking place at other worksites were either intermittent or not considered to give rise to substantial levels of HS2 related construction noise during this period, 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.

2.1.7 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 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
S001-WS01	N001	DB Cargo shed and adjacent land on Granby Terrace	2

2.1.8 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. 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 B, C, D, E, F, G, S001-WS02, S003-WS03, S003-WS04, S003-WS05 and around Granby Terrace Bridge is considered representative of HS2 Area South works 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_{Aeq} data over the monitoring period.

Worksite Reference	Measurement Reference	Monitor 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
B	CC	Whittlebury Mews West	Free-field	63.1 (64.7)	62.0 (64.2)	65.2 (68.7)	64.2 (66.4)	57.7 (63.7)	62.0 (62.3)	60.4 (61.6)	60.2 (62.3)	62.2 (64.3)	54.3 (64.1)	60.4 (64.1)	58.0 (64.3)
	JC	Juniper Crescent	Free-field	60.2 (62.6)	60.7 (63.1)	61.3 (64.4)	61.2 (66.5)	56.4 (62.1)	59.7 (61.3)	59.4 (62.2)	59.8 (62.6)	59.9 (63.2)	54.1 (60.1)	59.3 (63.4)	56.2 (62.6)
C	MT2	Lamppost opposite to 49 Mornington Terrace	Free field	63.4 (64.4)	63.8 (64.8)	64.1 (64.8)	63.1 (64.7)	58.4 (64.5)	61.9 (62.7)	62.4 (63.8)	63.0 (64.2)	63.0 (64.4)	57.0 (63.4)	62.1 (64.6)	58.4 (62.5)
	N022	52A Mornington Terrace	Free-field	59.4 (60.6)	60.6 (61.8)	60.5 (61.9)	59.2 (61.0)	54.9 (61.1)	57.8 (58.4)	58.9 (60.9)	59.1 (60.5)	58.9 (61.3)	53.8 (58.6)	58.1 (61.3)	54.4 (58.6)
	N024	External to Park Village Studios, Park Village East	Free-field	56.9 (68.3)	62.3 (71.7)	57.7 (70.4)	55.3 (67.4)	51.3 (60.3)	53.7 (59.7)	53.5 (55.6)	53.5 (55.5)	54.6 (62.9)	50.8 (55.3)	52.9 (57.1)	50.4 (58.9)
D	N004	Mornington Terrace, lamppost #7	Free-field	64.3 (67.2)	65.4 (67.8)	65.4 (66.8)	64.7 (69.7)	60.3 (68.8)	64.2 (66.1)	64.5 (68.6)	64.0 (64.8)	65.2 (70.8)	59.4 (71.2)	64.2 (71.5)	62.5 (72.3)
E	N005	5A Granby Terrace	Free-field	66.0 (67.1)	66.7 (67.3)	67.3 (69.1)	66.0 (68.2)	63.2 (67.8)	64.3 (65.2)	65.3 (65.9)	65.3 (68.0)	65.6 (68.4)	63.0 (66.3)	65.2 (69.0)	63.2 (67.0)

Worksite Reference	Measurement Reference	Monitor 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
F	BS	Roof of Stockbeck House, Barnby Street	Free-field	62.8 (64.9)	64.1 (67.9)	62.7 (65.3)	61.8 (64.2)	58.6 (64.8)	61.9 (63.6)	62.8 (64.9)	62.0 (63.0)	61.7 (63.8)	58.2 (62.8)	61.6 (65.5)	59.2 (63.0)
	N023	Amphill Estate, Hampstead Road	Free-field	71.2 (72.5)	70.6 (72.4)	70.9 (72.5)	69.8 (72.3)	68.4 (72.6)	69.0 (69.4)	69.6 (70.3)	69.6 (70.3)	70.5 (74.3)	68.6 (72.6)	69.3 (72.8)	68.1 (71.8)
G	HH	Euston Station Parcel Deck, Barnby Street	Free-field	62.4 (67.7)	66.0 (69.6)	62.4 (65.8)	61.9 (66.9)	59.2 (66.2)	60.3 (66.7)	63.6 (68.4)	63.4 (67.7)	61.6 (65.0)	57.9 (64.0)	61.8 (69.9)	58.1 (63.7)
S001-WS01	N001	External to Cubitt Court, 100 Park Village East	Façade	57.1 (61.5)	66.5 (80.8)	58.5 (62.9)	57.8 (61.2)	52.5 (65.1)	55.2 (57.9)	64.5 (82.5)	58.2 (62.3)	57.2 (66.4)	52.3 (58.3)	55.8 (61.6)	52.9 (63.8)
	N002	Richmond Court, Park Village East	Free-field	58.7 (60.7)	61.0 (62.9)	60.5 (63.5)	59.0 (61.3)	54.1 (59.0)	55.6 (56.6)	57.8 (59.1)	58.4 (59.8)	58.5 (63.8)	53.6 (59.3)	57.2 (60.4)	53.6 (56.5)
	N003	Silsoe House, Park Village East	Free-field	58.8 (61.0)	60.7 (63.0)	60.4 (61.7)	59.0 (61.6)	54.1 (58.8)	56.0 (57.6)	57.8 (59.1)	58.2 (59.0)	59.2 (67.2)	54.3 (60.3)	57.4 (61.5)	54.0 (56.6)
S001-WS02	N018	Outside replacement housing, Hampstead Road	Free-field	71.6 (73.7)	73.7 (78.6)	73.0 (76.6)	72.0 (74.9)	70.5 (74.8)	71.0 (72.4)	71.8 (72.1)	71.3 (72.5)	72.2 (74.1)	71.2 (76.0)	71.3 (75.6)	70.3 (73.1)
	N019	Outside Cartmel, Hampstead Road	Free-field	70.4 (73.4)	71.8 (73.9)	71.7 (74.1)	70.8 (72.4)	69.6 (75.6)	69.3 (69.8)	70.1 (70.4)	69.5 (70.8)	70.6 (74.3)	69.5 (72.6)	69.7 (73.0)	68.9 (72.5)
S001-WS07	N020	Mackworth Street	Free-field	52.3 (55.4)	63.7 (70.4)	53.9 (64.9)	51.8 (59.2)	51.2 (71.5)	57.7 (65.4)	60.5 (64.1)	55.0 (57.5)	53.2 (60.6)	54.3 (71.5)	52.4 (60.3)	49.4 (55.1)
	N021	Stanhope Street, lamppost #2	Free-field	54.2 (59.4)	67.0 (71.2)	54.9 (57.8)	53.9 (58.9)	50.1 (62.7)	53.8 (56.4)	65.4 (72.5)	58.6 (68.4)	55.3 (62.1)	49.6 (55.6)	53.7 (62.0)	49.5 (55.0)

Worksite Reference	Measurement Reference	Monitor 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
S003-WS03	N006	RCGP Roof level	Free-field	52.7 (54.8)	66.2 (73.6)	51.9 (56.6)	53.4 (59.3)	51.2 (61.9)	51.9 (53.9)	66.1 (71.4)	54.4 (58.4)	53.9 (57.4)	51.3 (59.9)	52.4 (61.4)	50.0 (53.1)
	N008	RCGP Stephenson Way	Façade	65.4 (69.1)	69.3 (83.1)	57.8 (63.3)	56.1 (65.5)	59.5 (74.8)	58.9 (59.3)	67.5 (72.5)	56.5 (58.6)	56.0 (67.4)	54.5 (58.9)	55.4 (61.6)	58.9 (74.4)
	N010	Wesley Hotel	Façade	66.6 (67.0)	69.3 (71.7)	66.1 (67.4)	66.0 (67.0)	61.7 (68.4)	66.3 (66.4)	68.8 (73.0)	65.8 (66.2)	65.7 (67.5)	61.1 (67.9)	65.6 (66.7)	59.7 (66.5)
	N011	Outside 82 Euston Street	Free-field	59.2 (61.4)	62.5 (65.5)	57.7 (61.5)	56.6 (61.2)	55.5 (66.5)	57.0 (67.0)	62.2 (64.9)	58.5 (61.9)	56.4 (62.5)	52.5 (59.0)	56.2 (62.0)	54.0 (61.7)
S003-WS05	N014	Starcross Street	Free-field	56.0 (61.3)	61.5 (64.0)	60.9 (70.7)	61.8 (71.9)	54.5 (65.3)	51.4 (53.2)	60.2 (60.8)	55.4 (56.8)	55.8 (60.3)	52.1 (60.6)	54.9 (60.9)	51.6 (59.7)
S003-WS01	N016	Margaret Centre roof	Free-field	55.6 (57.3)	61.8 (64.9)	55.8 (57.4)	55.4 (60.2)	54.2 (63.2)	54.3 (54.8)	61.2 (66.7)	56.4 (60.2)	55.8 (61.9)	53.9 (58.0)	54.9 (62.1)	53.5 (59.2)
S003-WS06	N017	Hampstead Road, lamppost #48	Free-field	71.2 (73.8)	72.1 (73.1)	72.1 (75.0)	71.2 (73.9)	70.0 (77.3)	69.9 (70.7)	70.7 (71.2)	70.6 (71.7)	71.7 (76.1)	70.2 (74.1)	70.5 (74.7)	69.5 (73.0)
S003-WS07	N012	Opposite 92-94 Drummond Street	Free-field	58.8 (63.9)	63.1 (65.2)	59.3 (61.2)	59.8 (62.5)	57.1 (63.9)	55.8 (57.8)	62.4 (64.2)	59.9 (63.7)	59.9 (70.4)	56.0 (60.5)	58.7 (63.4)	55.6 (59.2)
S003-WS08	N007	RCGP, Melton Street	Free-field	66.8 (69.5)	66.9 (67.6)	65.7 (67.5)	66.4 (69.3)	65.2 (69.7)	64.3 (64.8)	65.7 (66.5)	65.8 (68.5)	64.9 (67.3)	63.3 (66.6)	64.4 (67.4)	63.2 (66.3)

Worksite Reference	Measurement Reference	Monitor 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
Not near worksite	N025	External to 3 Prince Albert Road	Free-field	69.1 (75.7)	68.6 (69.2)	68.3 (72.7)	67.1 (69.7)	65.6 (71.0)	66.5 (66.7)	66.5 (67.1)	66.2 (67.5)	67.3 (76.3)	65.1 (68.2)	66.5 (72.4)	64.6 (71.4)
Not near worksite	N026	Thames Water Compound	Free-field	58.6 (64.9)	63.3 (70.3)	57.3 (59.8)	56.5 (59.6)	52.7 (59.7)	54.5 (55.4)	56.8 (60.1)	57.9 (59.6)	56.4 (60.3)	52.6 (57.6)	56.4 (66.4)	51.5 (54.4)

2.2.3 Table 6 presents a summary of the measured vibration levels at monitoring locations V002, V003, V021, V037 and V038 over the reporting period. During the monitoring high values of PPV were measured at V021 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
S003-WS03	V002	RCGP. basement boiler room. 305 Euston Road	3.42 (X-axis)
S003-WS03	V037	Magic Circle, basement	3.33 (X-axis)
S003-WS03	V038	Wesley Hotel, basement lightwell, Euston Street	1.64 (Y-axis)
S003-WS05	V021	42-44 Cobourg Street (floor)	2.95 (Y-axis)
S003-WS09	V003	RCGP. basement vaults, 305 Euston Road	0.41 (Z-axis)

2.2.4 Appendix C presents graphs of noise and vibration monitoring data over the month for each of the measurement locations. Noise data presented consist 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 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
N/A	GTB Utilities	Complaint from resident of Stanhope Street regarding noise, including comments regarding noise at night.	Utilities diversion works taking place in Stanhope Street including saw cutting and breaking out of the road surface (single day only). Works methodology including use of acoustic barriers in accordance with BPM and S61 consent. No works taking place outside of core working hours.	No additional measures practicable. Saw cutting, breaking out complete. Residents contacted and informed of findings.
N/A	S001-WS02	Complaint from resident of Harrington Street regarding demolition	Demolition of basement slab. Works methodology, mitigation and noise levels from demolition works compliant with S61 and no exceedance of SOAEL.	Ongoing monitoring Residents contacted and informed of findings.

Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
HS2-19-03910-C	N/A	Complaint from resident of Drummond St area regarding night time noise, drilling and fixing scaffolding	Some night shift works, including scaffolding and hoarding, taking place at Euston towers. Site investigations suggest transient noise events occasionally audible around the station area but no clear evidence from monitoring data. Uncertain if these works responsible for complaint.	Site operatives re-briefed on sensitivities and BPM.
HS2-19-03749-C	S003-WS03	Complaint from Euston Square regarding loud noise from demolition and drilling activities.	Demolition works were ongoing at worksite S003-WS03, however construction methodology was according to S61 consent and ongoing monitoring of noise shows no exceedance of SOAEL or trigger levels.	Resident contacted and explanation provided.
HS2-19-03751-C	S001-WS02	General complaint from resident of Hawkshead due to construction noise and request for compensation.	Construction methodology was according to S61 consent and ongoing monitoring of noise levels shows no exceedance of SOAEL.	Resident contacted and informed of the works that were going on.
HS2-19-03912-C	S001-WS02	Complaint from resident on Regents Park Estate due to noise and vibration within dwelling. Resident is unable to sleep during the day due to construction noise and vibration.	Construction methodology was according to S61 consent and ongoing monitoring of noise and vibration show no exceedance of SOAEL or trigger levels.	Complainant contacted to provide information and update on works.
HS2-19-03914-C	S001-WS07	Complaint from a resident Stanhope Street due to noise within dwelling.	Complainant did not provide contact details or sufficient information to investigate.	Information provided was insufficient to contact the complainant and to take any further action.

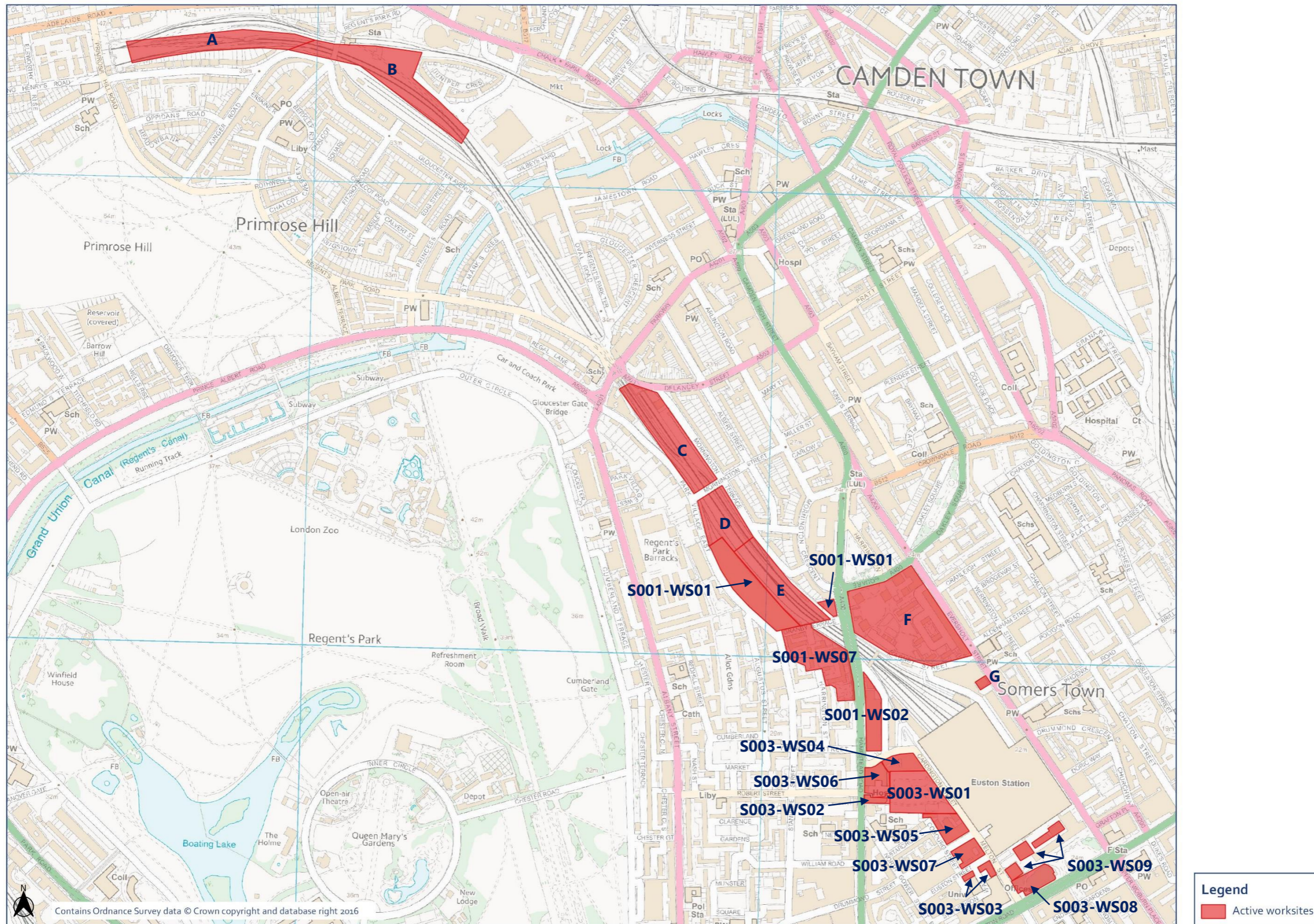
Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
HS2-19-03918-C	S001-WS07	Complaint from resident on Stanhope Street due to construction noise and vibration.	Construction methodology was according to S61 consent and ongoing monitoring of noise and vibration show no exceedance of SOAEL or trigger levels.	Site meeting was held with the complainant to provide information on works and noise and vibration issues.
HS2-19-03920-C	S003-WS03	A non-residential complainant on Melton street / Euston Road regarding increased levels of construction noise during office hours.	The contractor had received an amber alert shortly before the complaint, which alerts the contractor that they were approaching the trigger level so that they can take action to avoid exceeding this. The noise increase was caused by tile breaking during the scaffold erection process and was completed in the morning.	Explanation provided to the complainant. Following the call the complainant should not have experienced much disruption.
HS2-19-04011-C	S003-WS03	Complaint from resident on Regents Park Estate due to construction noise within dwelling.	Noise disturbance is likely caused by an echo from the UCL demolition site whereby breaking of the slab was being undertaken until 15 th June. Construction methodology was according to S61 consent and ongoing monitoring of noise shows no exceedance of SOAEL or trigger levels.	Resident contacted and explanation provided.
HS2-19-04389-C	S001-WS07	Complaint from a resident on Gloucester Gate due to construction noise within dwelling.	Thames Water, were carrying out works on behalf of HS2. Contractors had been breaking the road surface on Langdale to install utilities ducting. Construction methodology was according to S61 consent and ongoing monitoring of noise shows no exceedance of SOAEL or trigger levels.	Explanation provided to complainant.

Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
HS2-19-04220-C	C/D/E	Complaint from a resident on Mornington Terrace disturbed by construction noise at night.	Works were being carried out by Network Rail at the time	Complainant contacted to provide information on works.
HS2-19-04317-C	S001-WS07	Complaint from resident of Regents Park Estate with regards to construction noise.	Work methodology was according to S61 consent and ongoing monitoring of noise shows no exceedance of SOAEL or trigger levels.	Complainant informed about measures taken to minimise noise and vibration, and about steps that will be taken if there is a breach on site in the future.
HS2-19-04333-C	C/D/E	Complaint from a resident on Mornington Terrace disturbed by construction noise.	Works were being carried out by Network Rail at the time.	The resident was visited by the complaint team to discuss their concerns and to provide further information on the works.
HS2-19-04439-C	S001-WS07	Complaint from a resident of Regents Park Estate due to construction noise within dwelling.	Construction methodology was according to S61 consent and ongoing monitoring of noise shows no exceedance of SOAEL or trigger levels.	The resident was visited to discuss works and mitigation.
HS2-19-04442-C	S001-WS07	Complaint from a resident on Regents Park Estate due to construction noise within dwelling.	Construction methodology was according to S61 consent and ongoing monitoring of noise shows no exceedance of SOAEL or trigger levels.	Resident was visited and provided information on the sound insulation measures offered.
HS2-19-04444-C	S001-WS07	Complaint from a resident on Regents Park Estate due to construction noise and vibration within dwelling.	Construction methodology was according to S61 consent and ongoing monitoring of noise and vibration show no exceedance of SOAEL or trigger levels.	Explanation provided to the complainant
HS2-19-04648-C	N/A	Complaint from a resident on Eversholt Street due to construction noise at night.	Thames Water were carrying out works on Eversholt Street at the time of the complaint to repair a burst water main. This is not connected to HS2 and late night on-network works.	Not considered to be due to HS2 works.

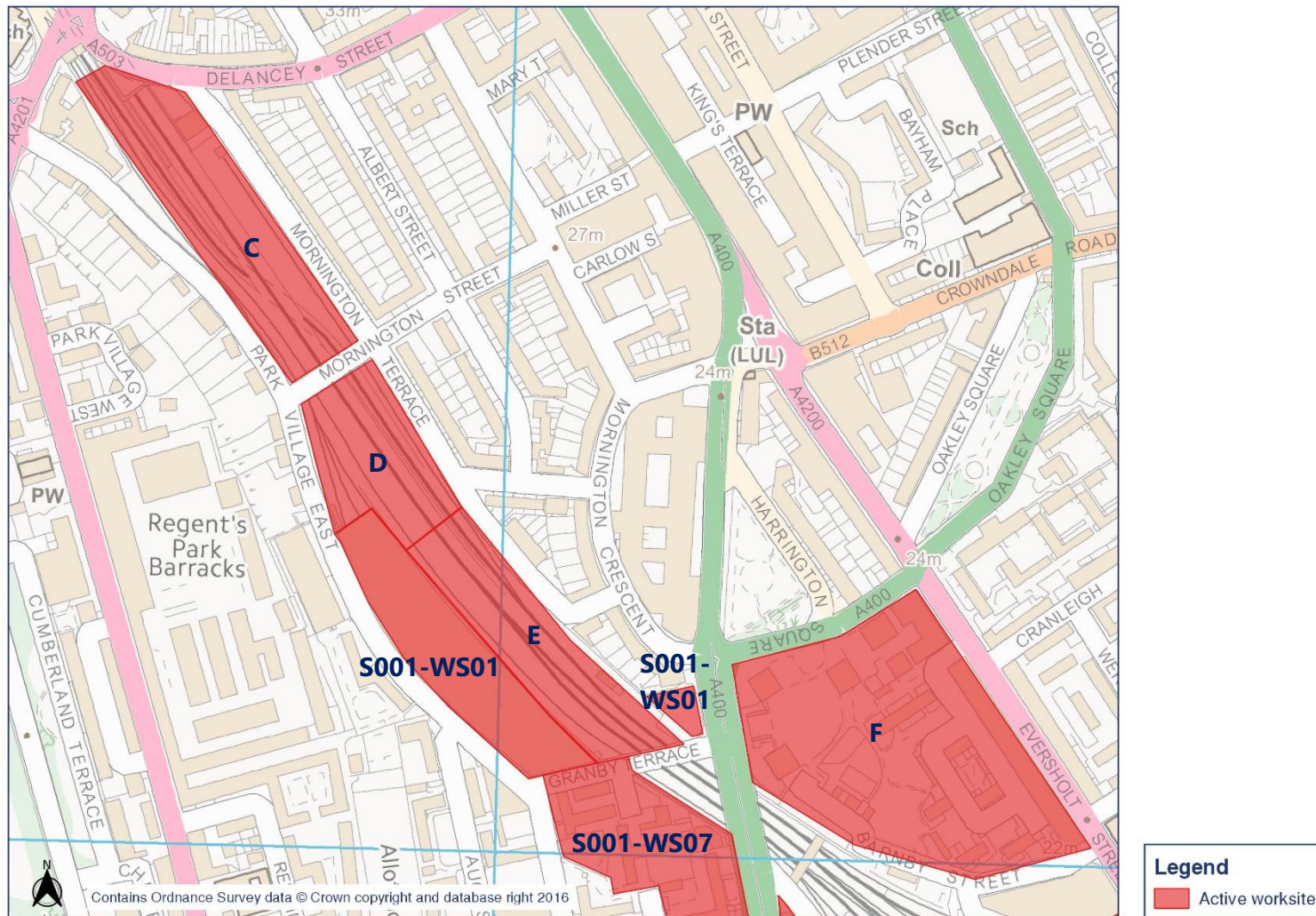
Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
HS2-19-04825-C	N/A	Complaint from a resident on North Gower Street due to construction noise at night from works at Euston Station.	Anonymous complaint to help desk activated the on call team. Network Rail out of hours team was also contacted, however complainant did not provide contact details or sufficient information to investigate.	Information provided was insufficient to contact the complainant and to take any further action.
HS2-19-04801-C	S003-WS09	Complaint from resident due to construction noise from works in the Euston area.	Investigation confirmed that noise was due to HS2 works undertaken at Grant Thornton House building and the associated contractor was informed of the complaint.	Visited resident and explained works in the area.
HS2-19-04835-C	S001-WS07	Complaint from a resident on Regents Park Estate due to construction noise within dwelling.	Construction methodology was according to S61 consent and ongoing monitoring of noise shows no exceedance of SOAEL or trigger levels.	Explanation provided to the complainant along with further information on works and mitigation measures.
HS2-19-04823-C	S001-WS07	Complaint from a resident on Regents Park Estate due to construction noise within dwelling.	Construction methodology was according to S61 consent and ongoing monitoring of noise shows no exceedance of SOAEL or trigger levels.	Explanation provided to the complainant about works and demolition techniques and mitigation measures.
HS2-19-04841-C	S001-WS07	Complaint from a resident on Stanhope Street due to construction noise within dwelling.	Construction methodology was according to S61 consent and ongoing monitoring of noise shows no exceedance of SOAEL or trigger levels.	Explanation provided to the complainant about works and demolition techniques and mitigation measures.
HS2-19-04842-C	S003-WS03	Complaint from a resident on Euston Square due to vibration within office block.	Construction methodology was according to S61 consent and ongoing monitoring of vibration shows no exceedance of SOAEL or trigger levels.	Explanation provided to complainant about nature of works and confirmation that levels were within permitted limits.

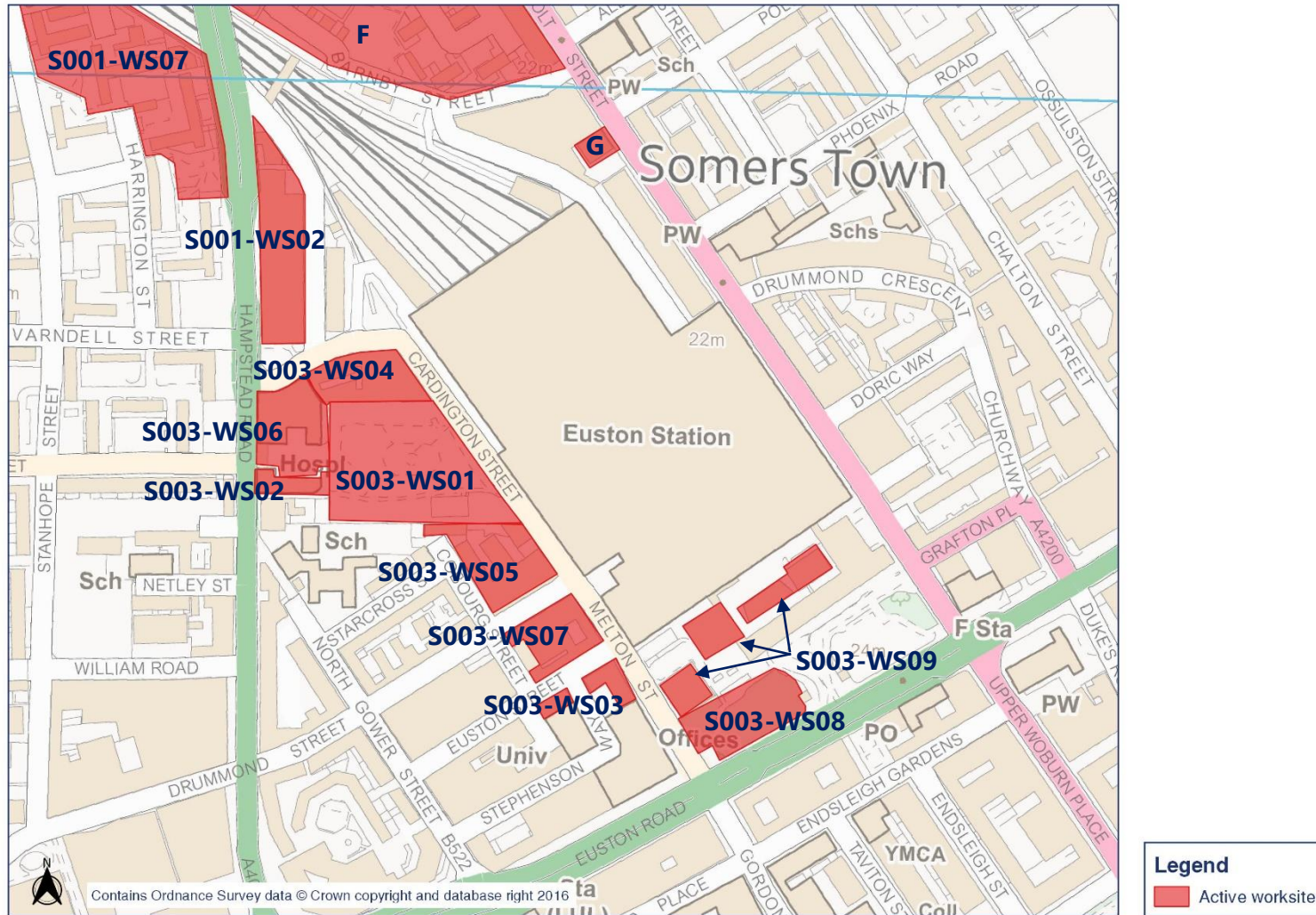
Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
HS2-19-05350-C	C/D/E	Complaint from a resident on Mornington Terrace disturbed by noise at night.	Network Rail is investigating the issue	The resident was contacted about their concerns.

Appendix A Site Locations

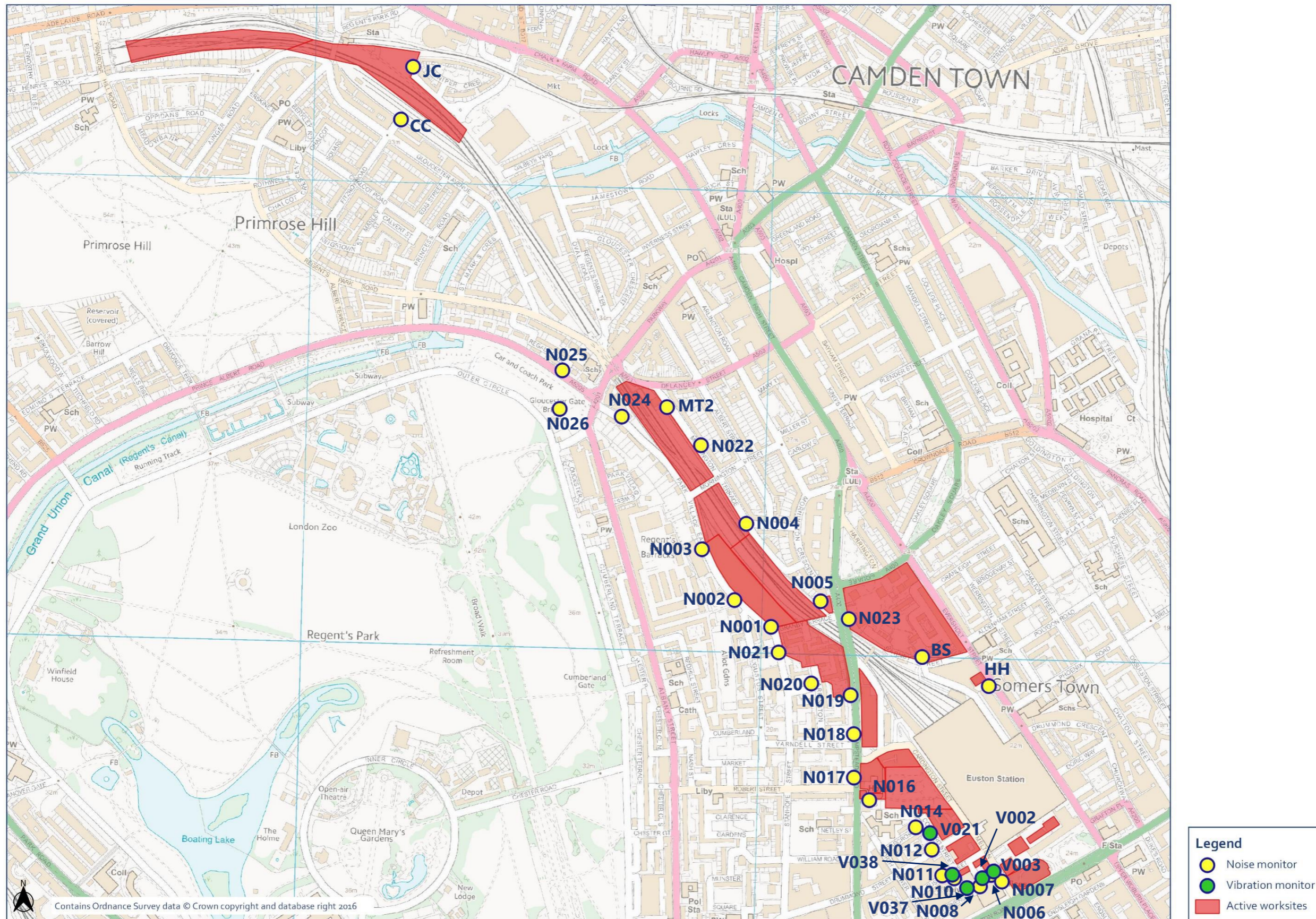


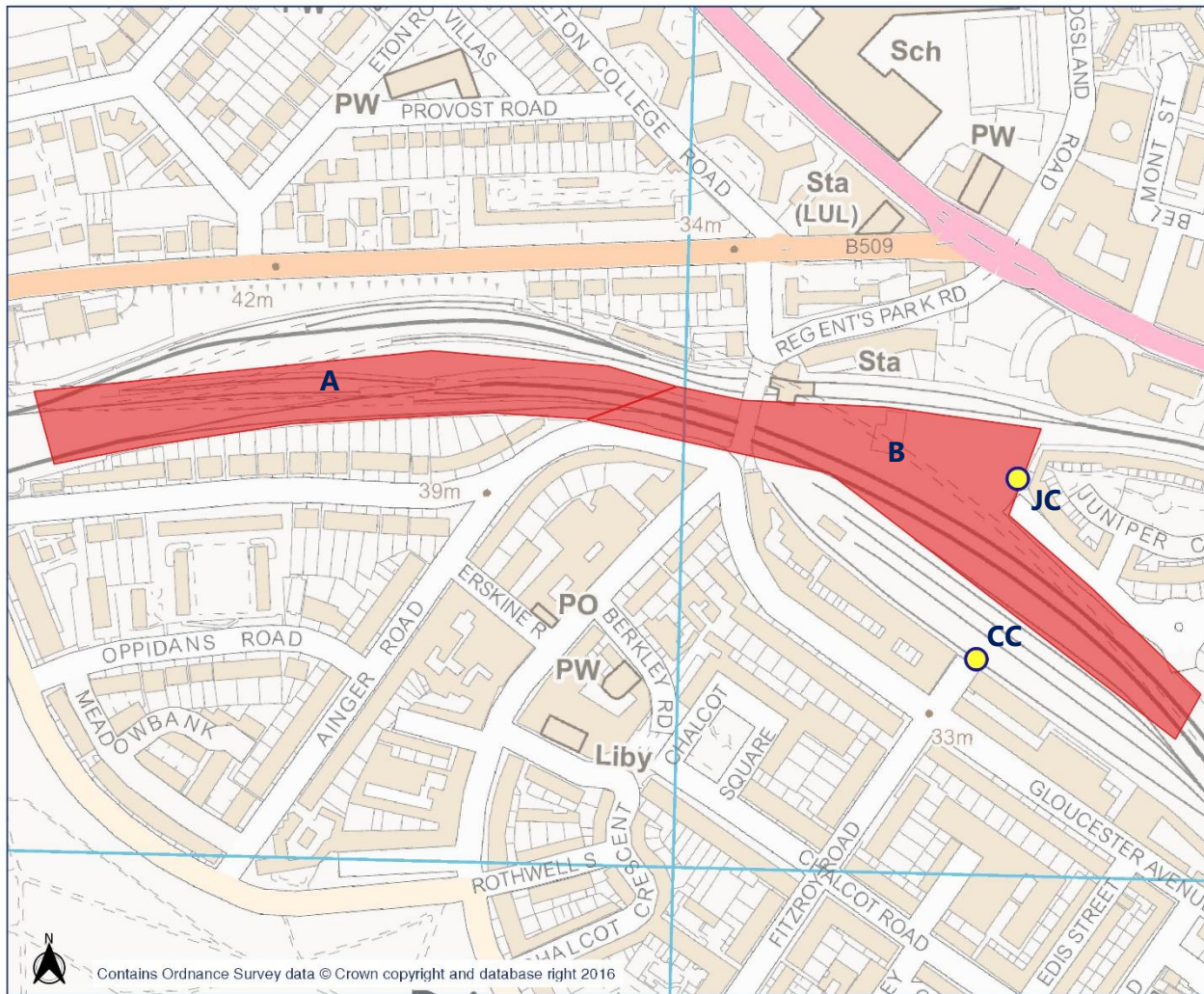


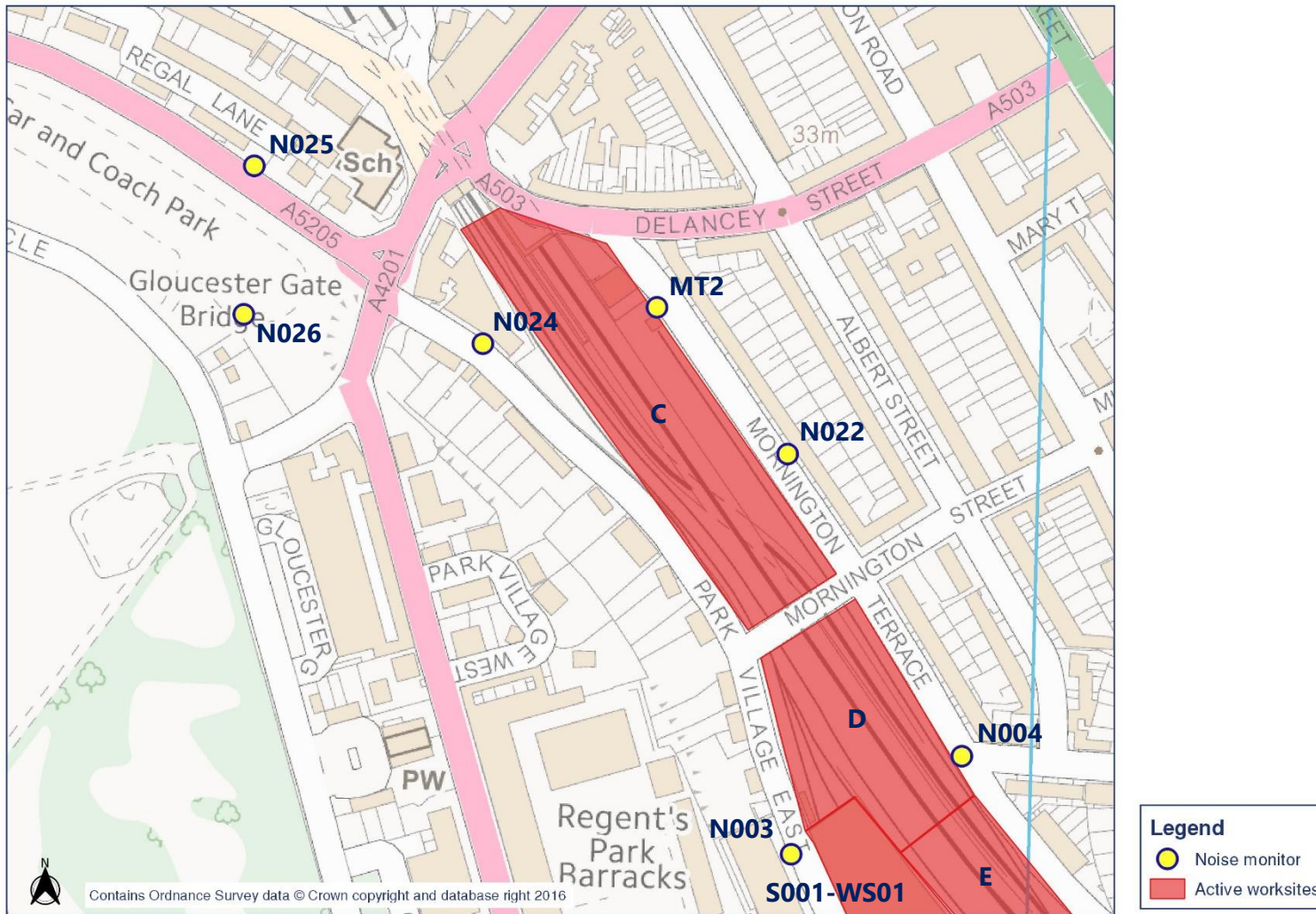


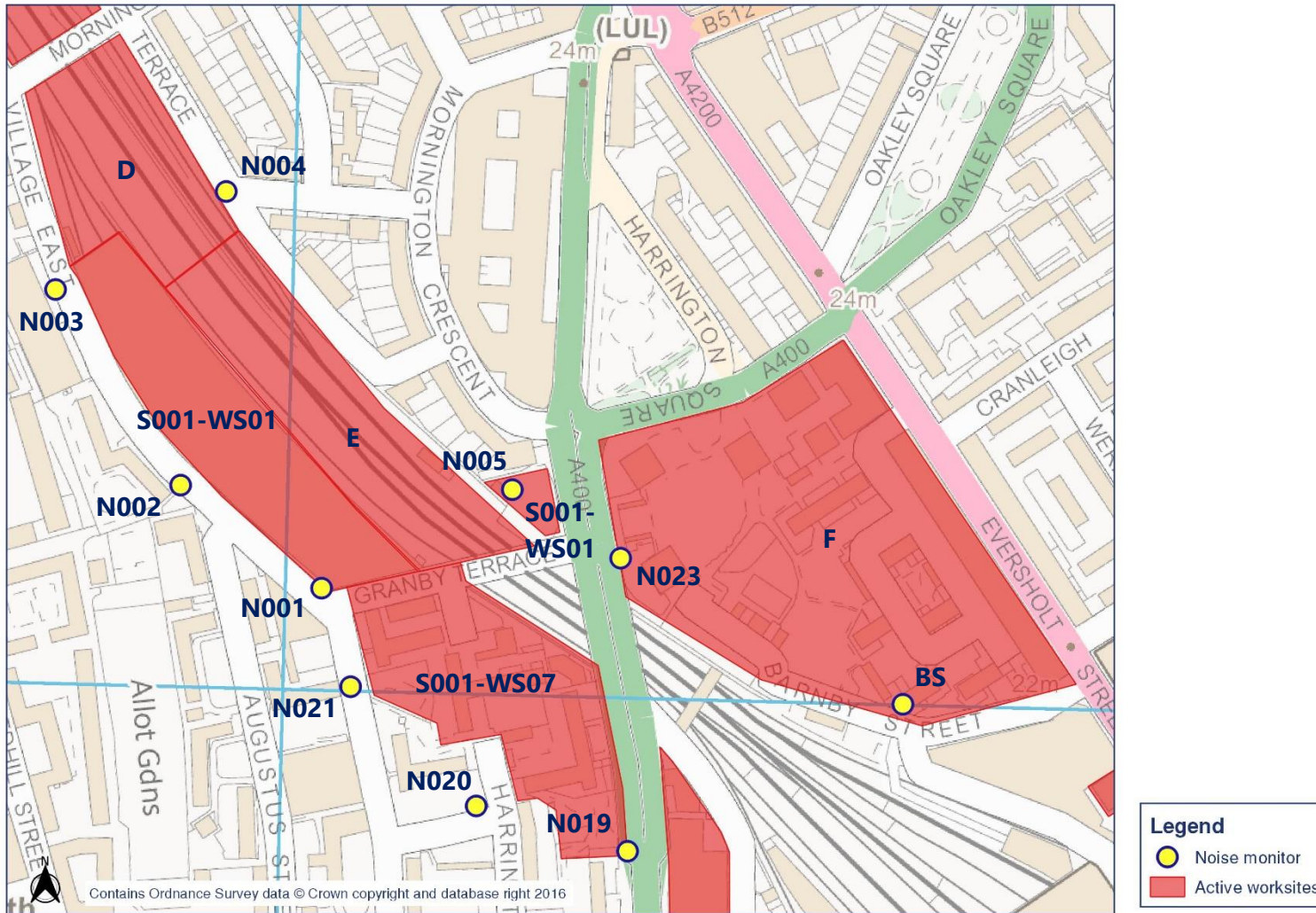


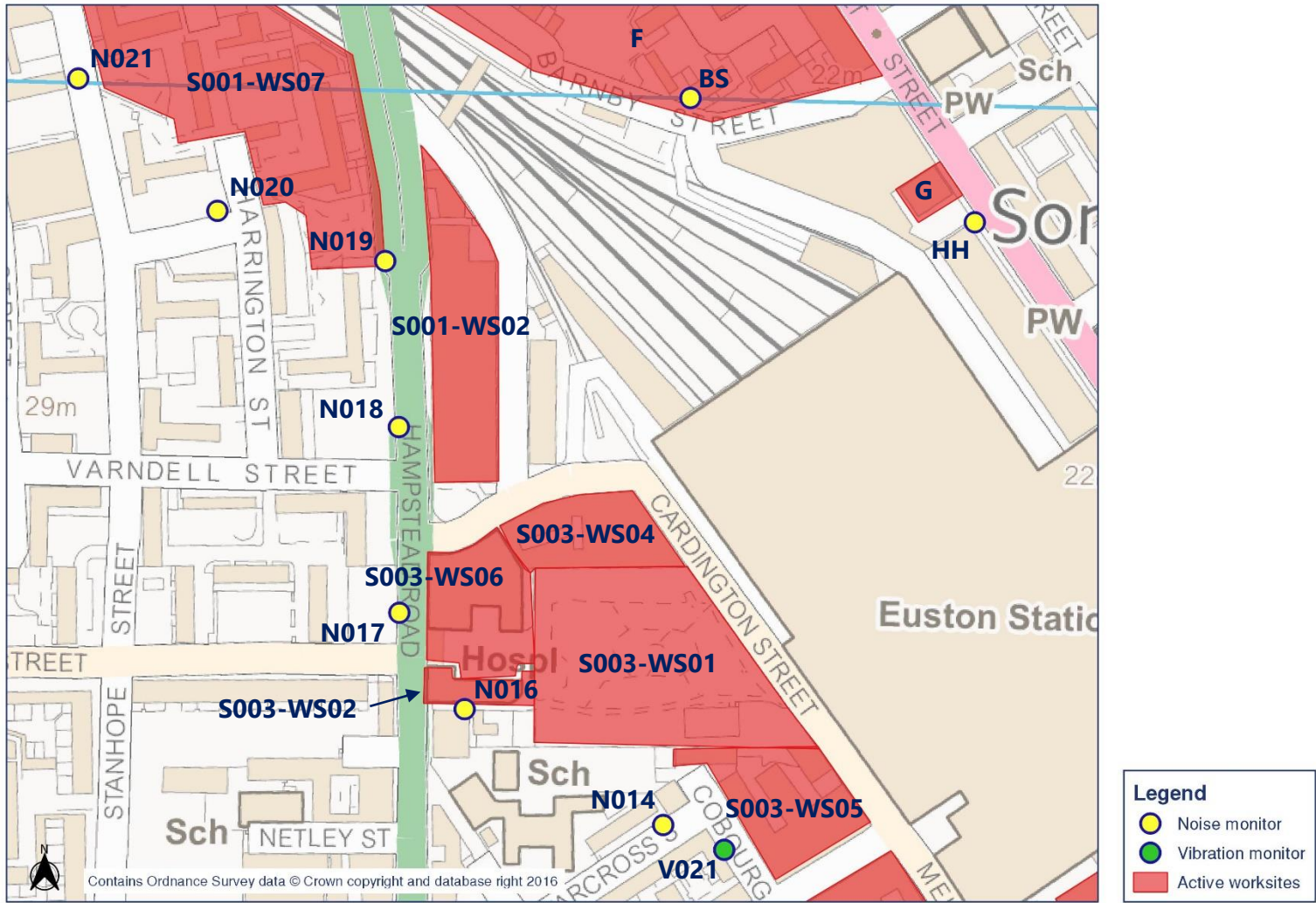
Appendix B Monitoring Locations

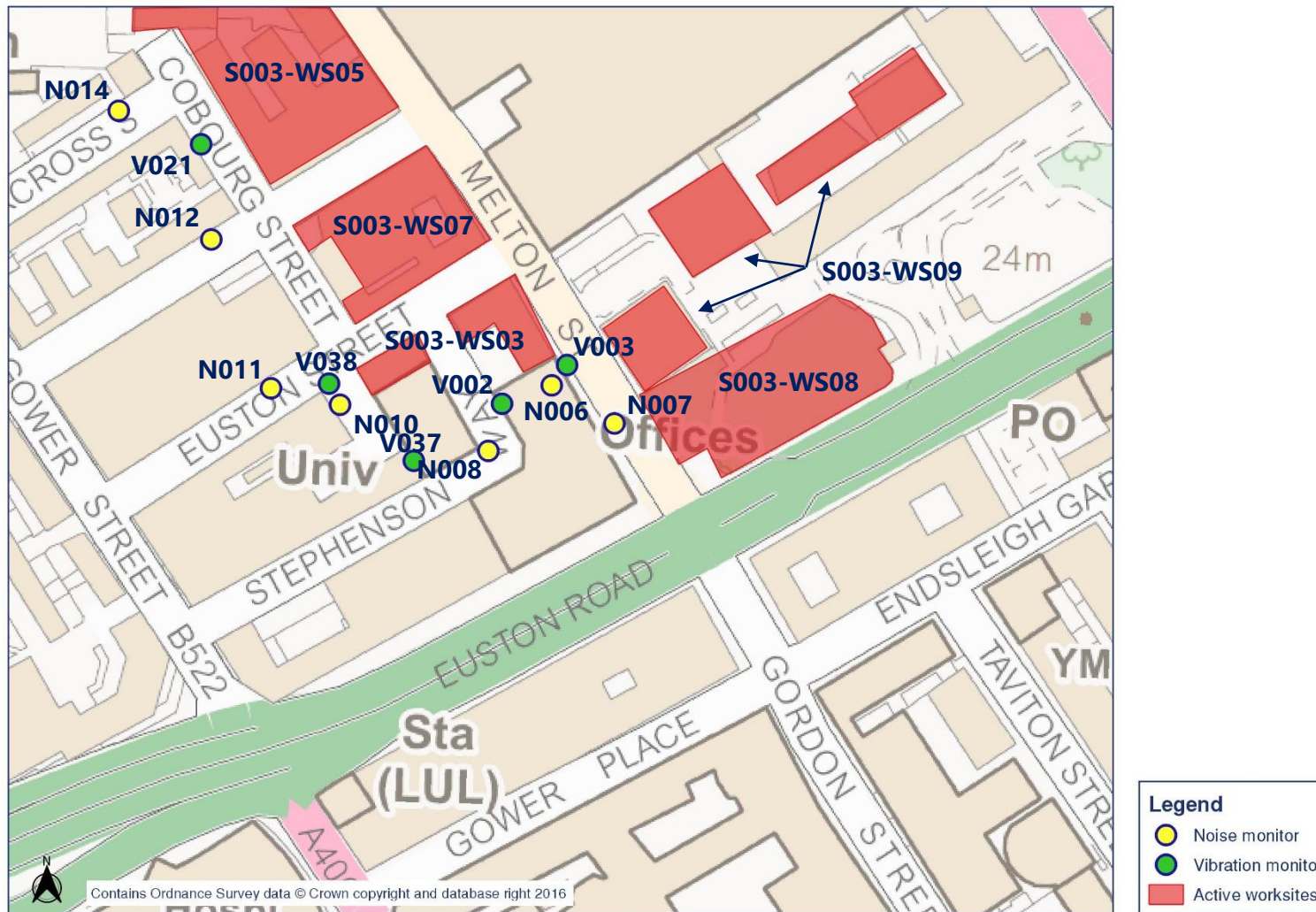










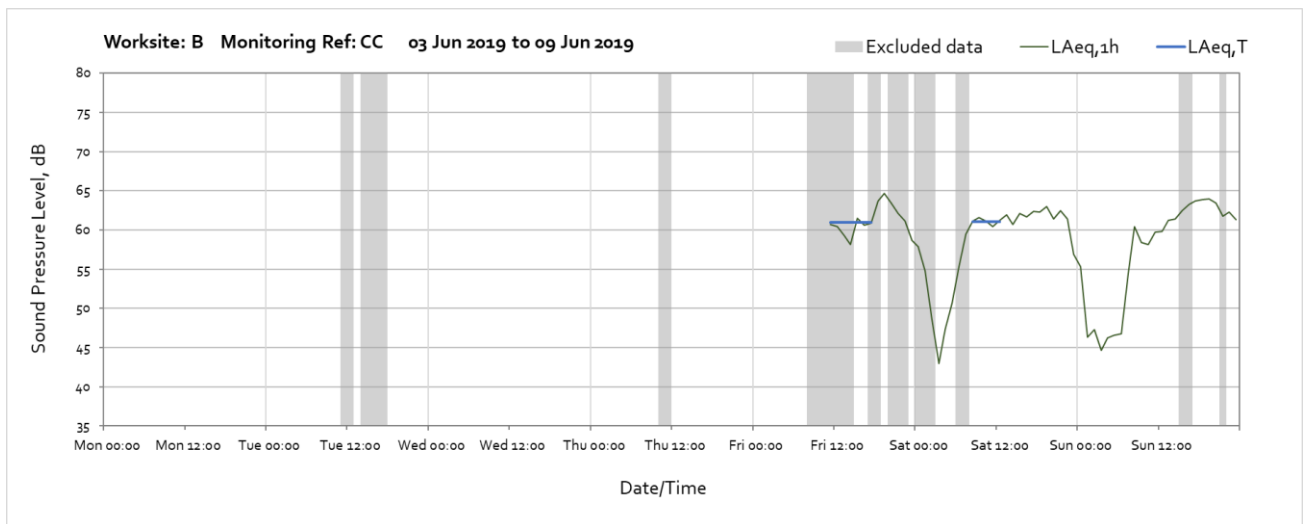


Appendix C Data

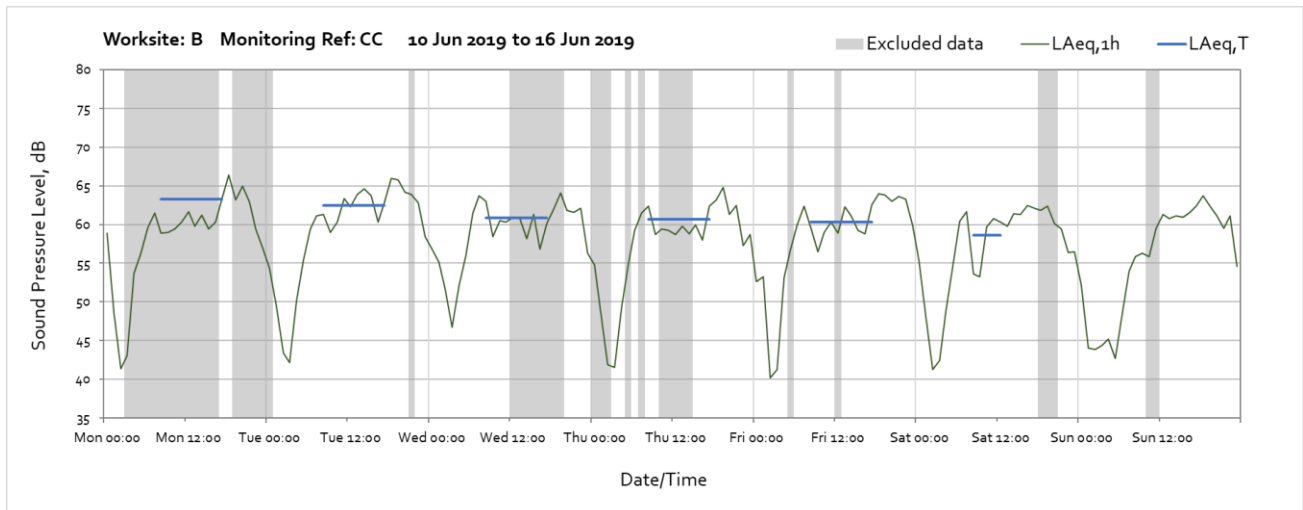
Noise

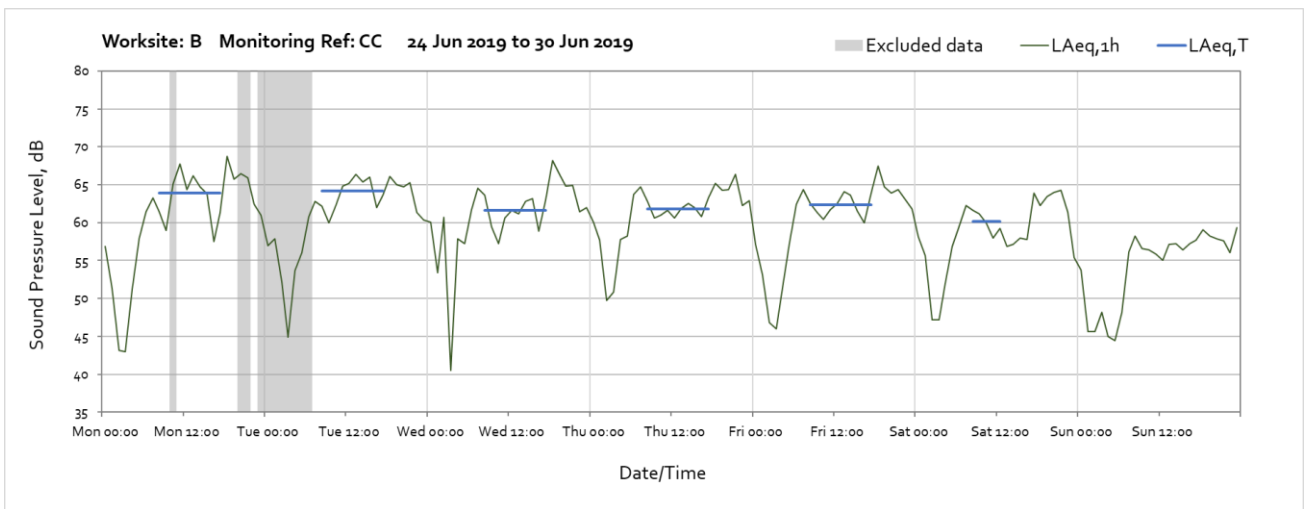
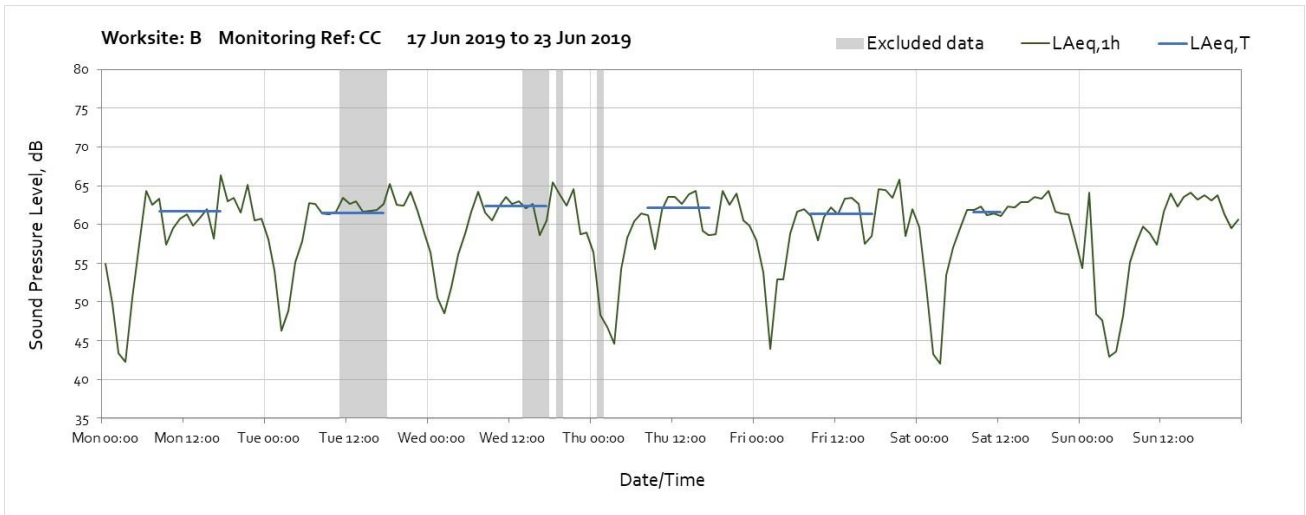
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

Worksite: B – Monitoring Ref: CC

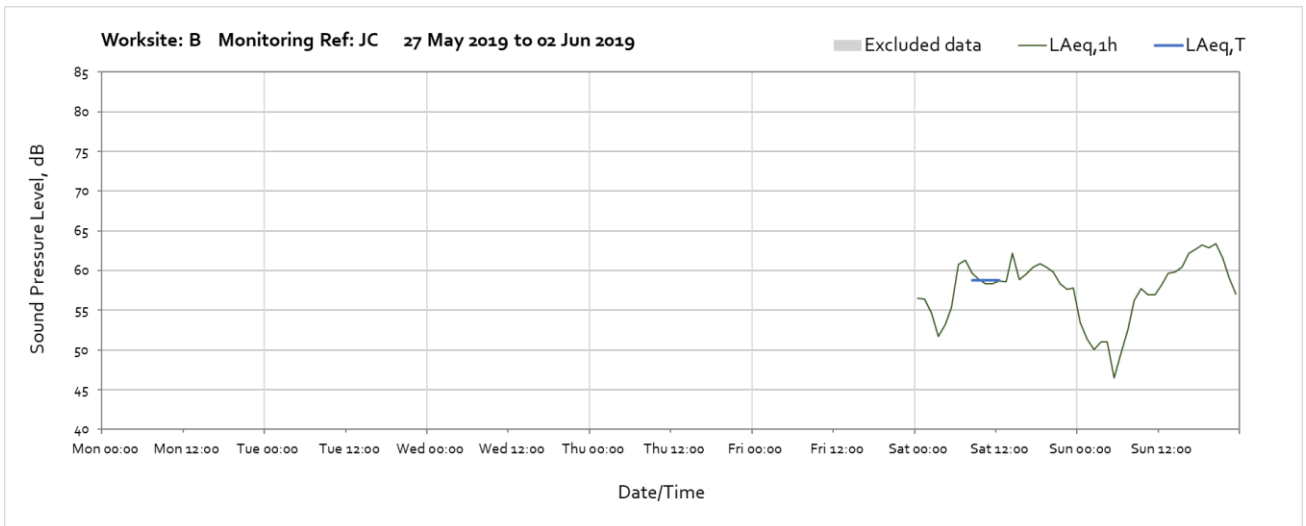


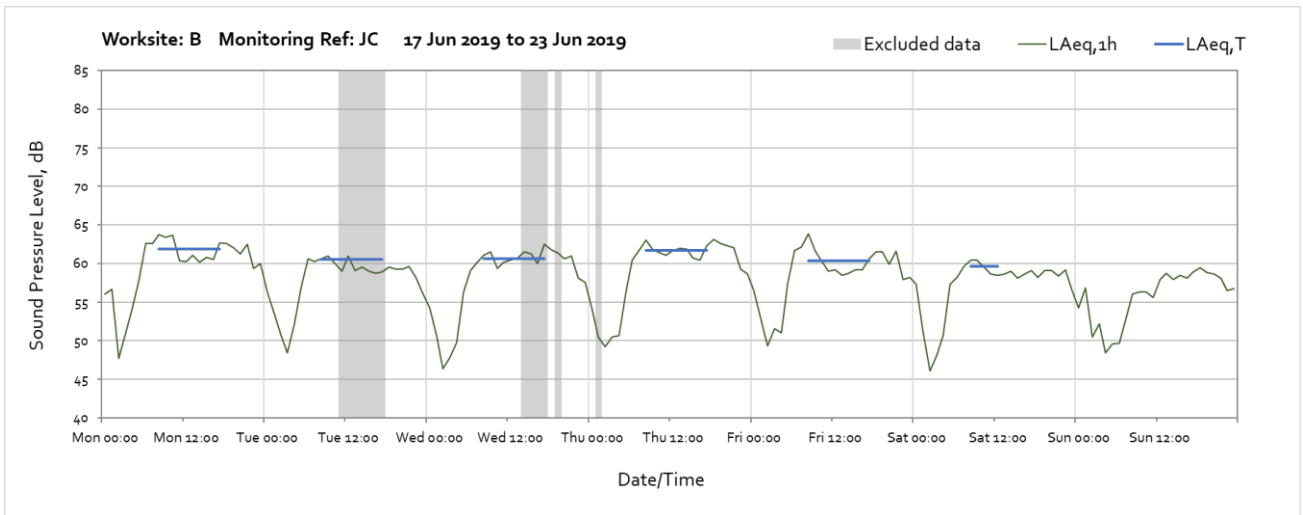
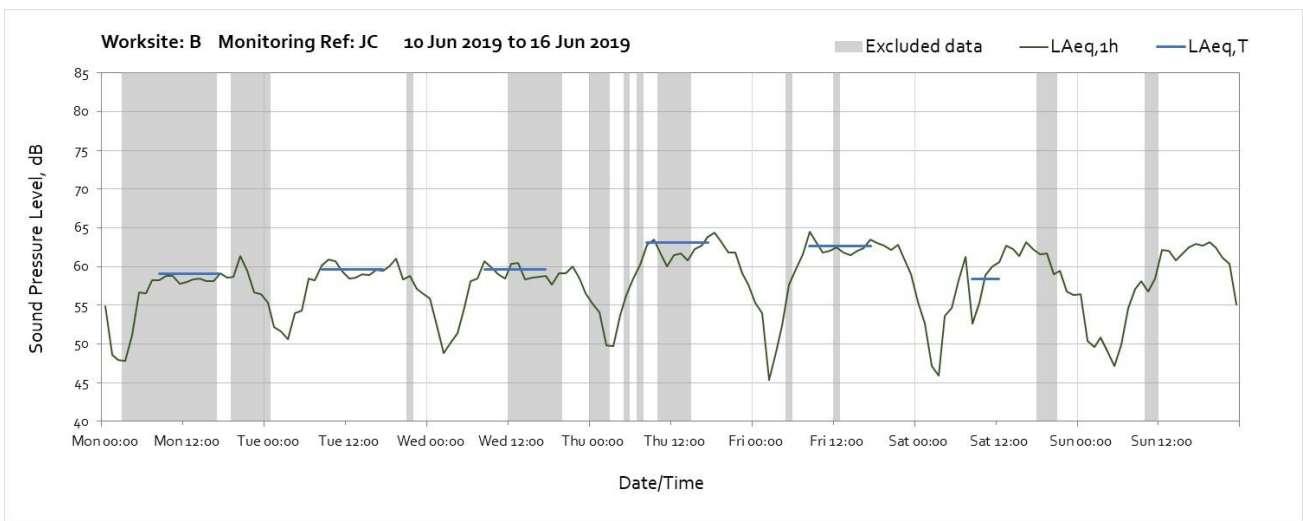
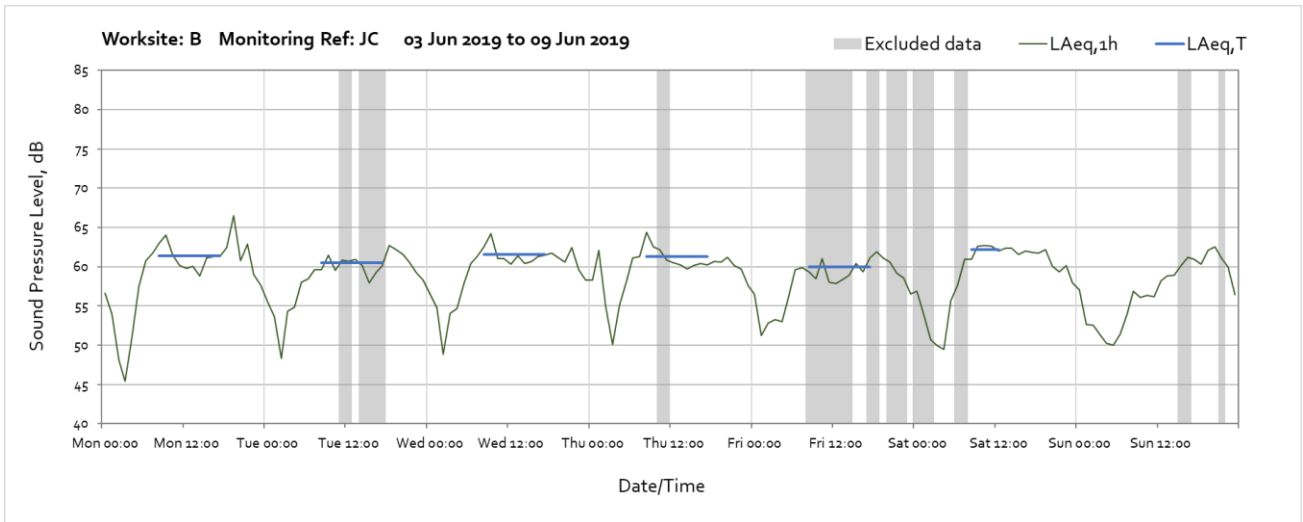
Note: Missing data between the beginning of the month and 11:00 on Friday 7th June was due to a power cut affecting the site.

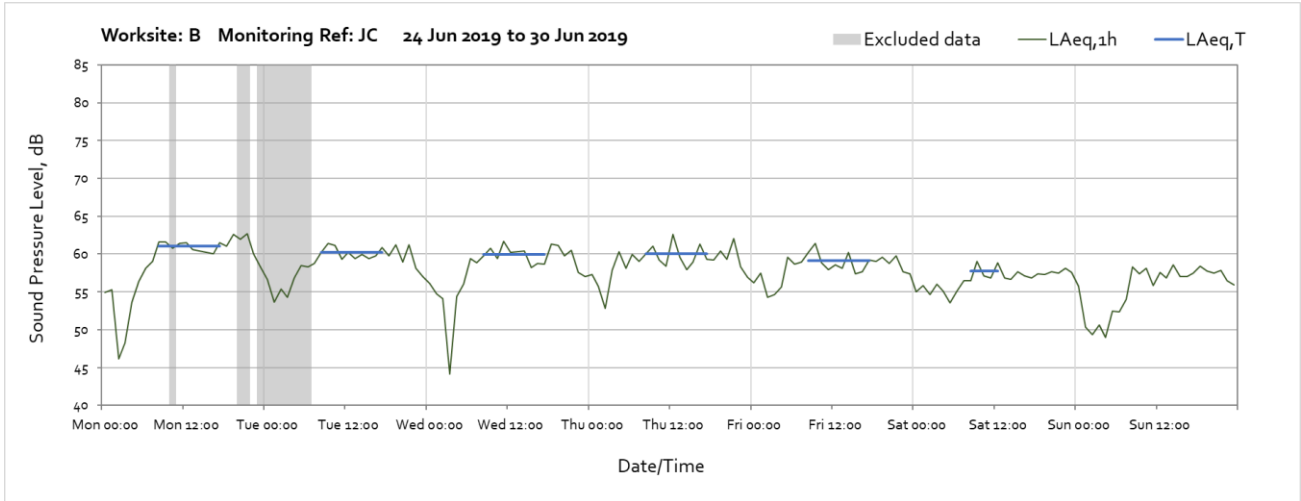




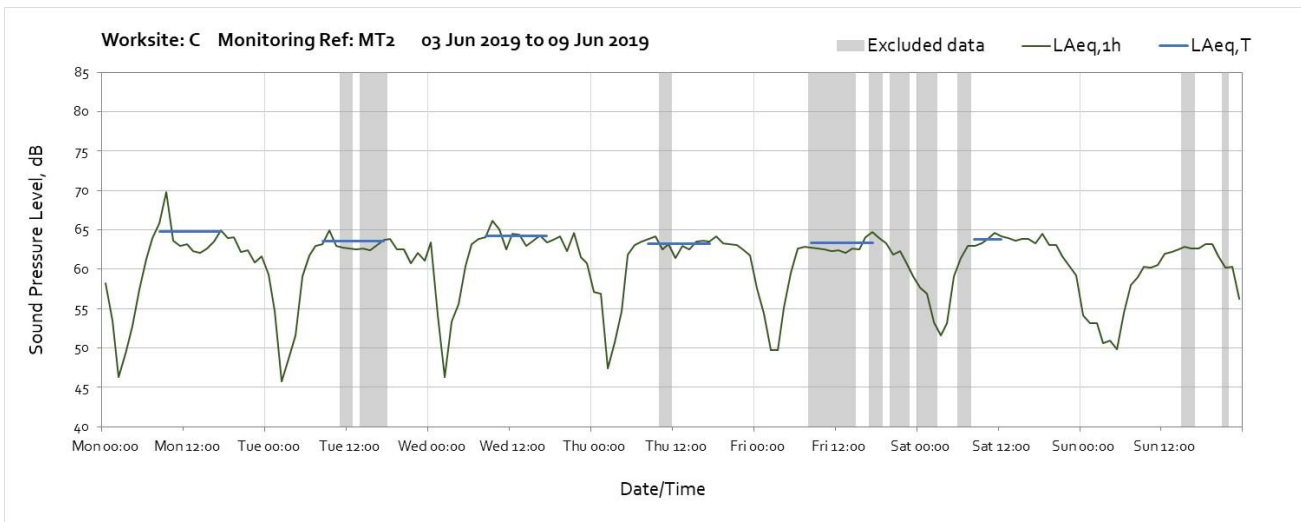
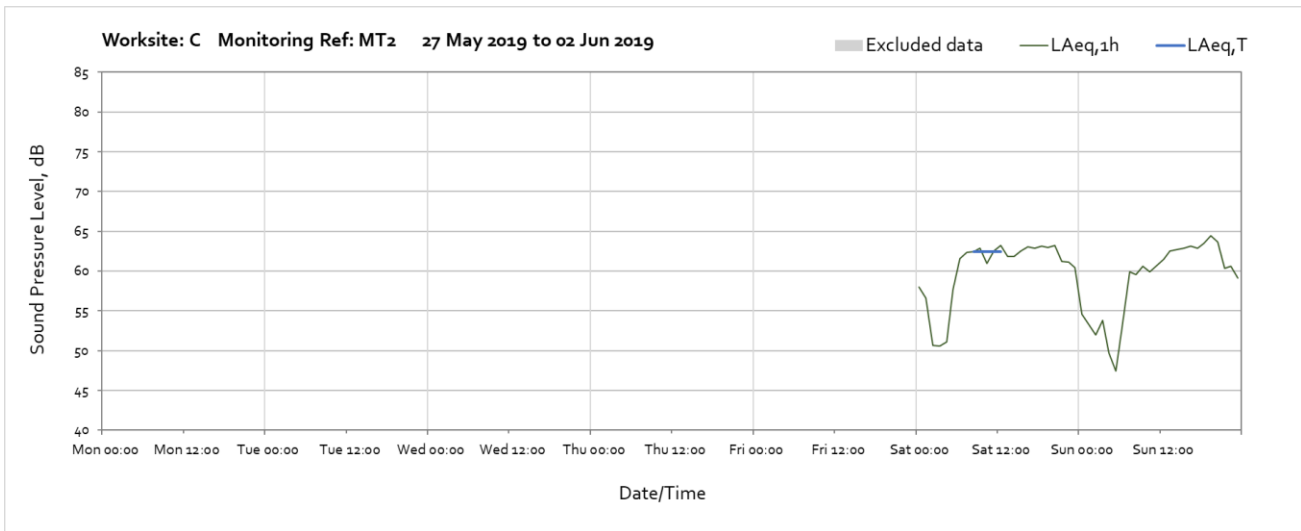
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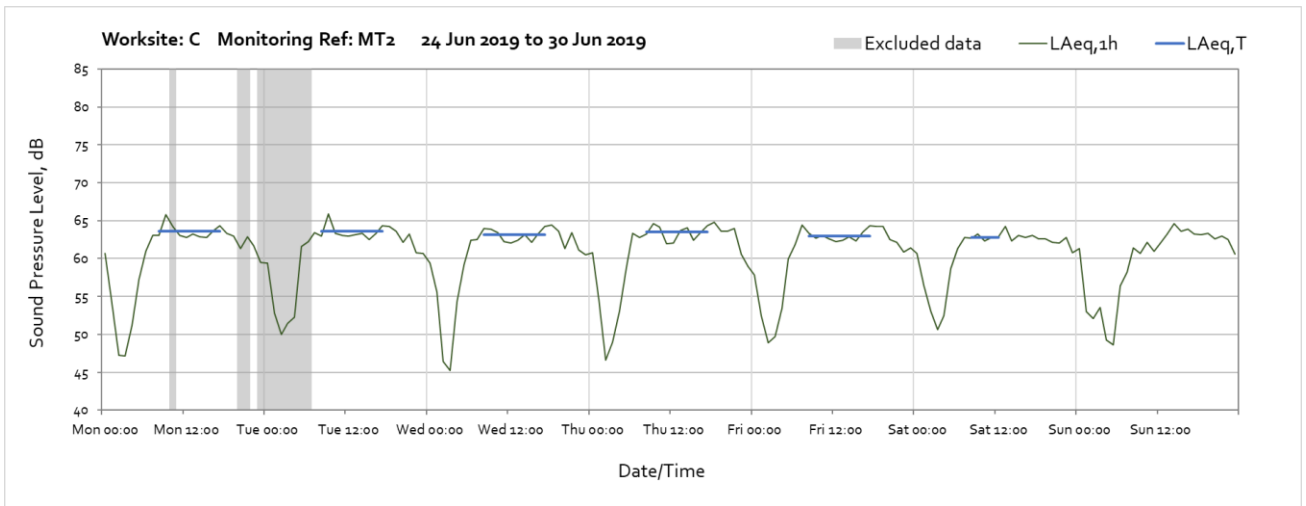
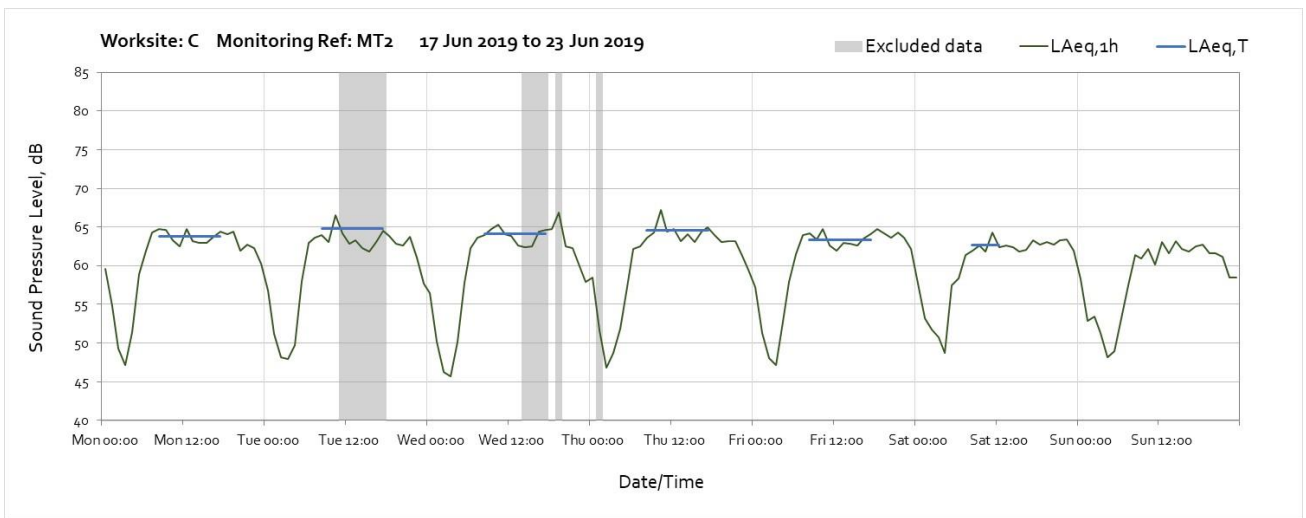
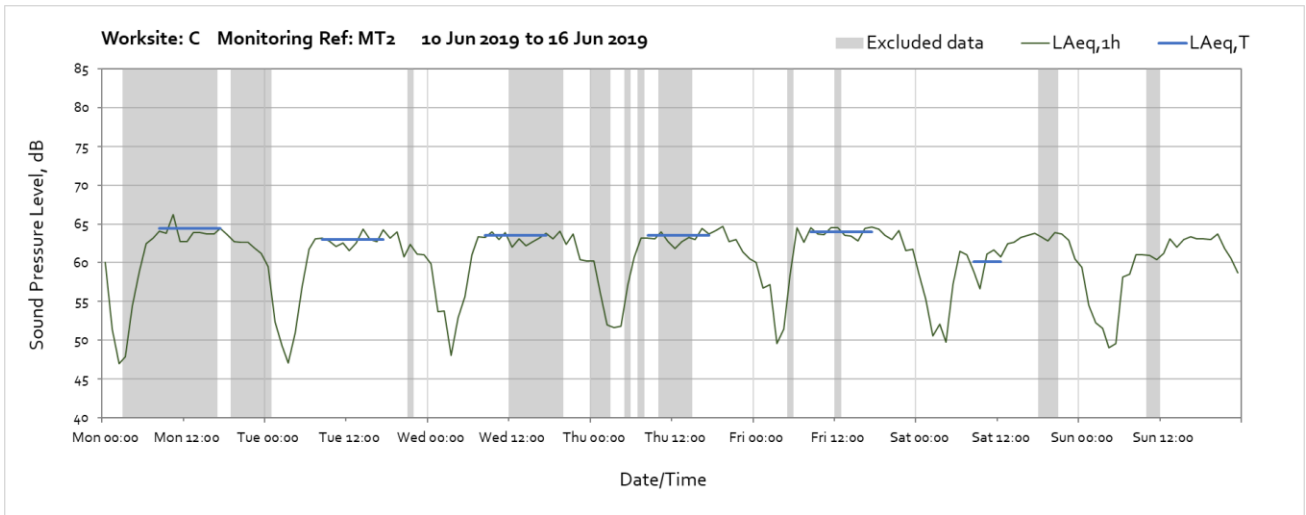




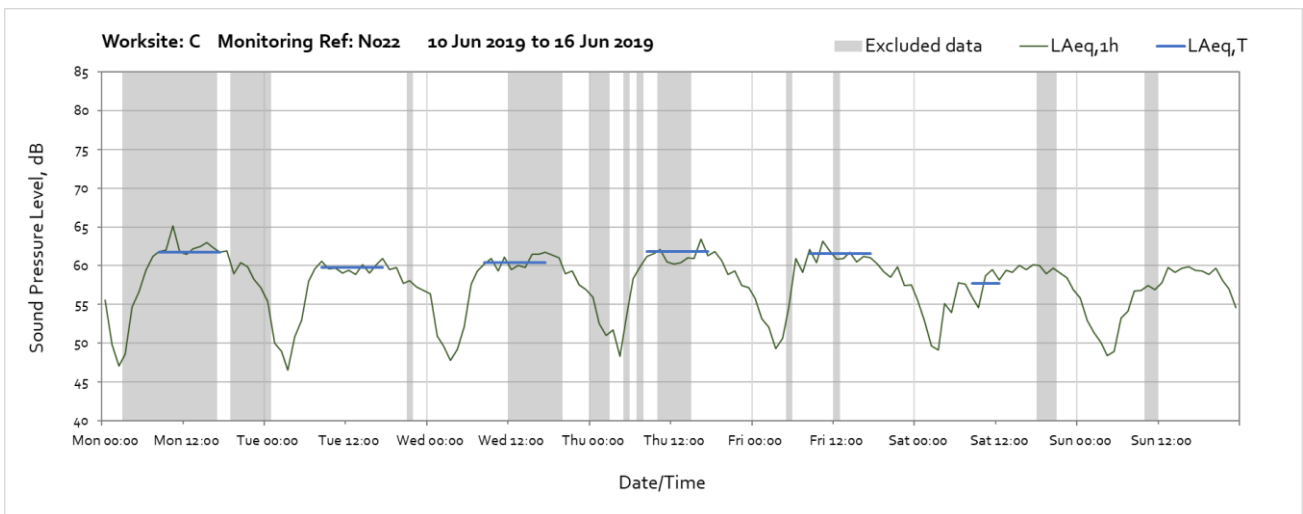
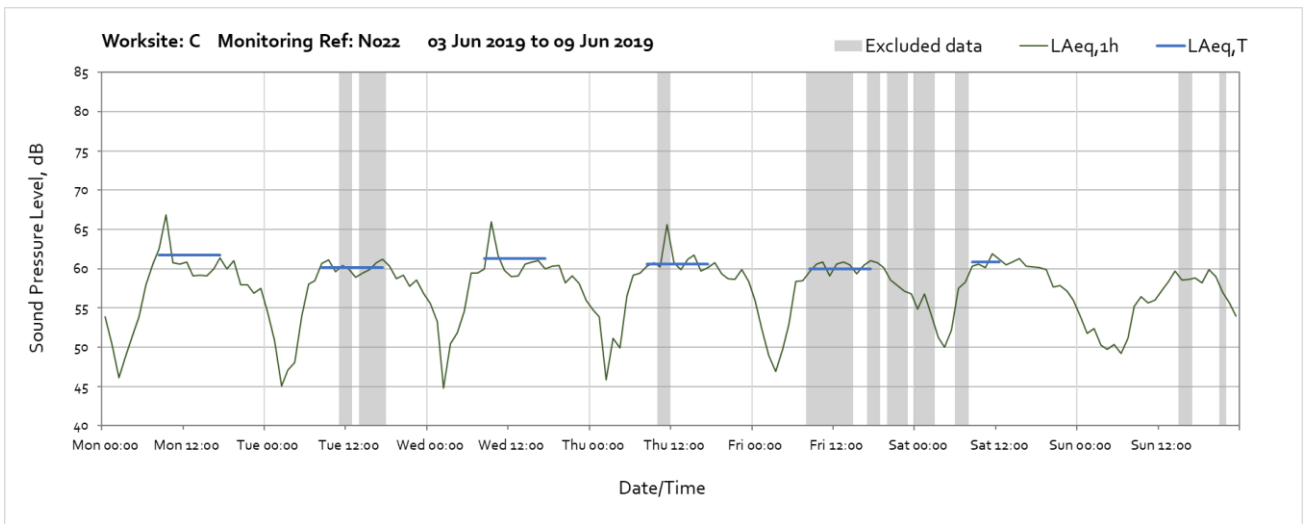
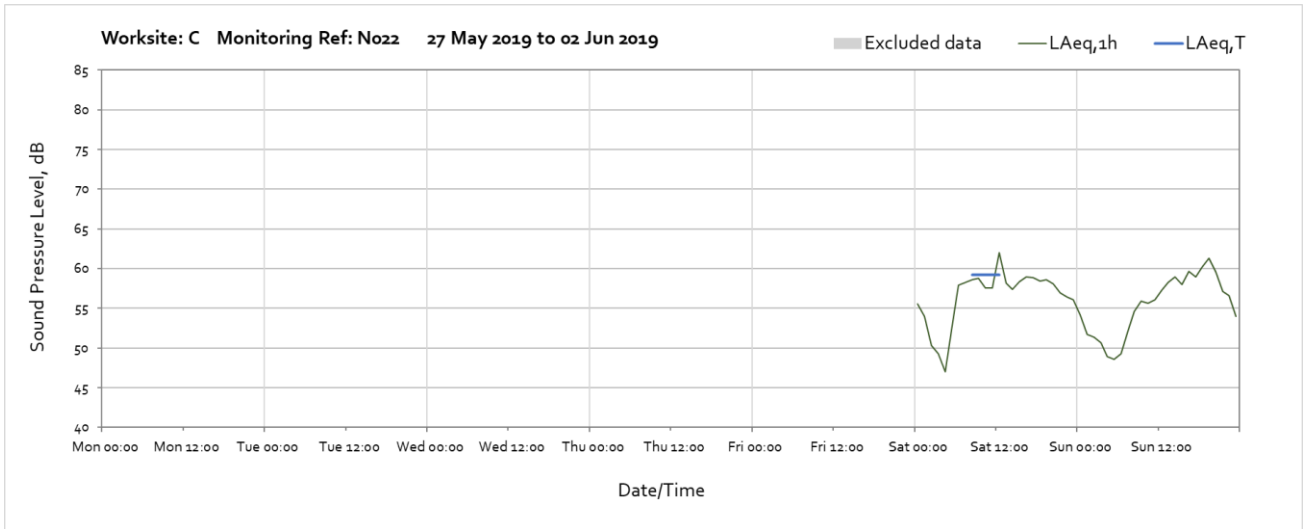


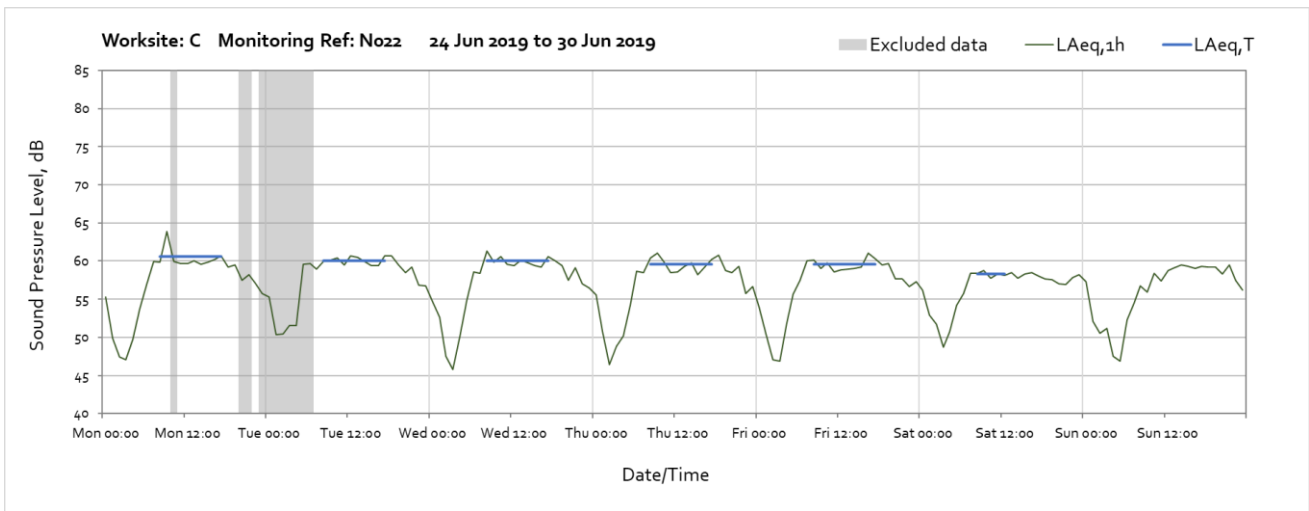
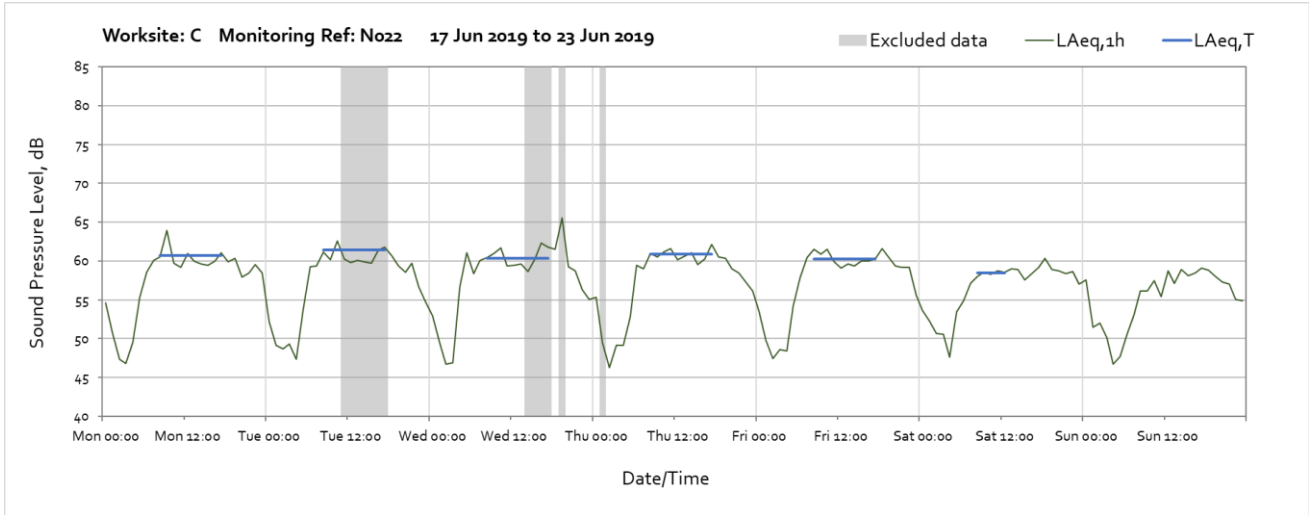
Worksite: C – Monitoring Ref: MT2



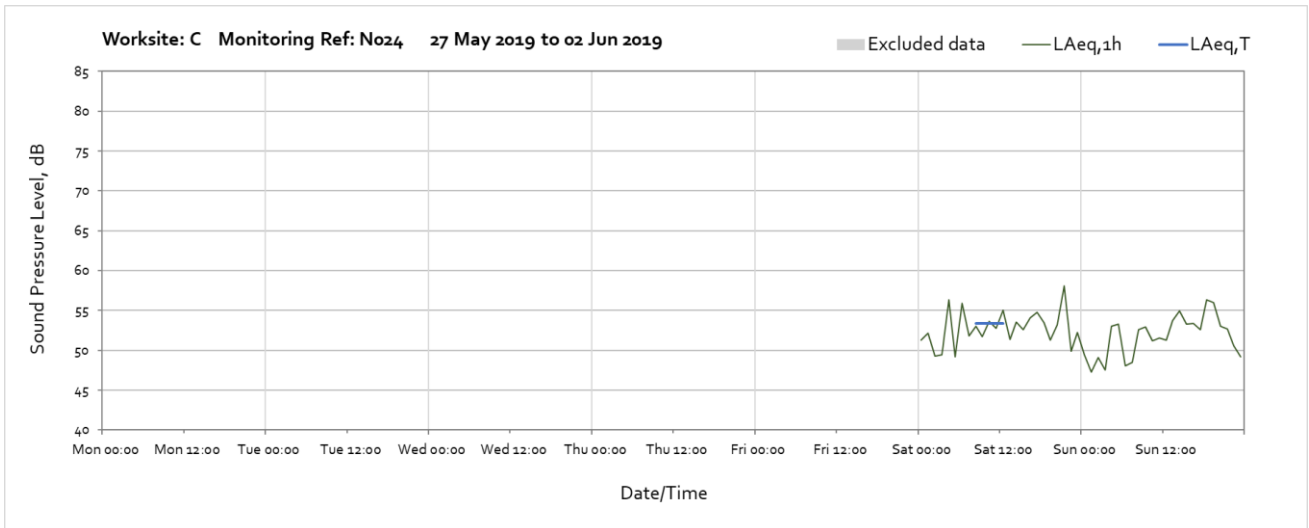


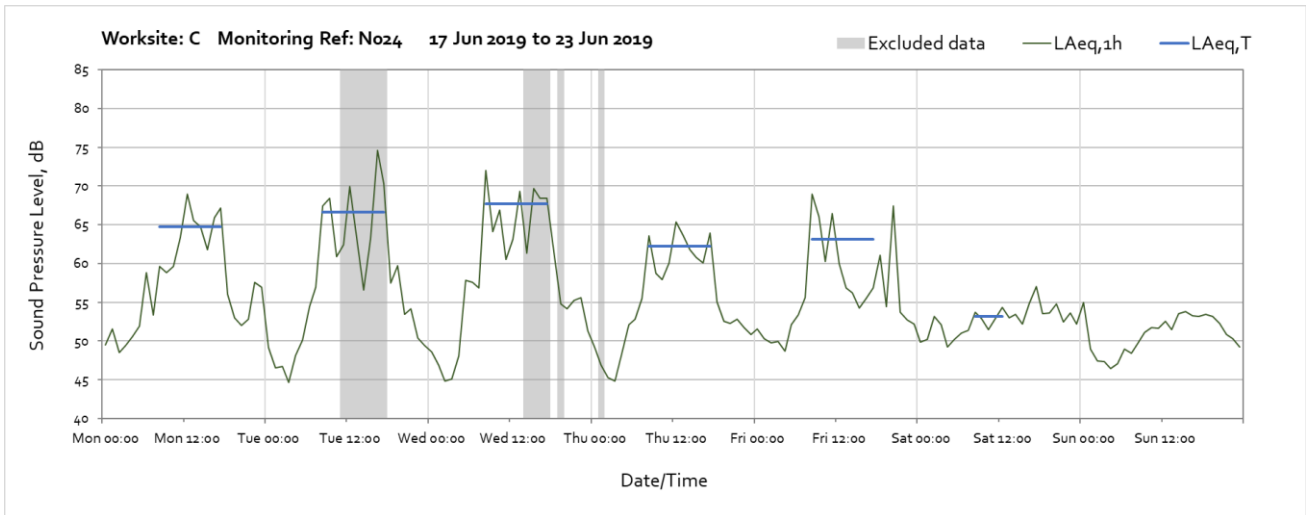
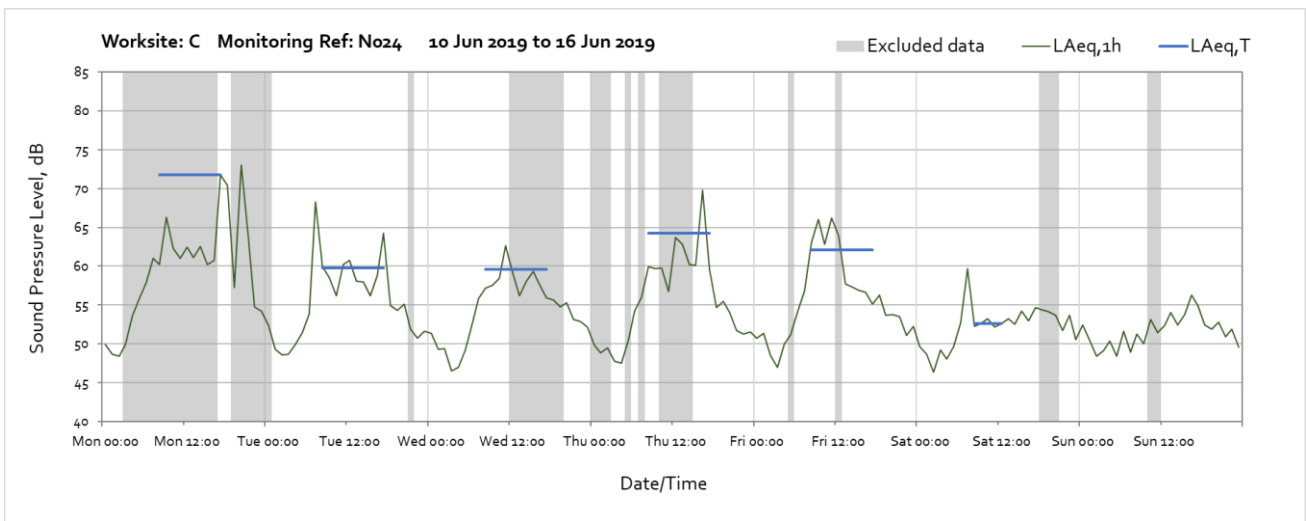
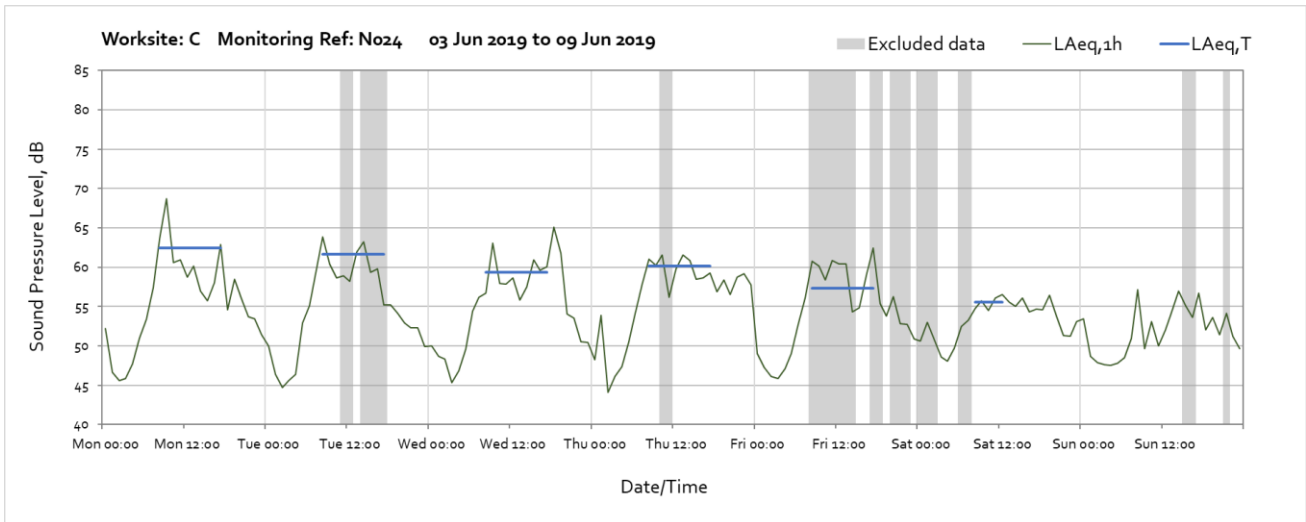
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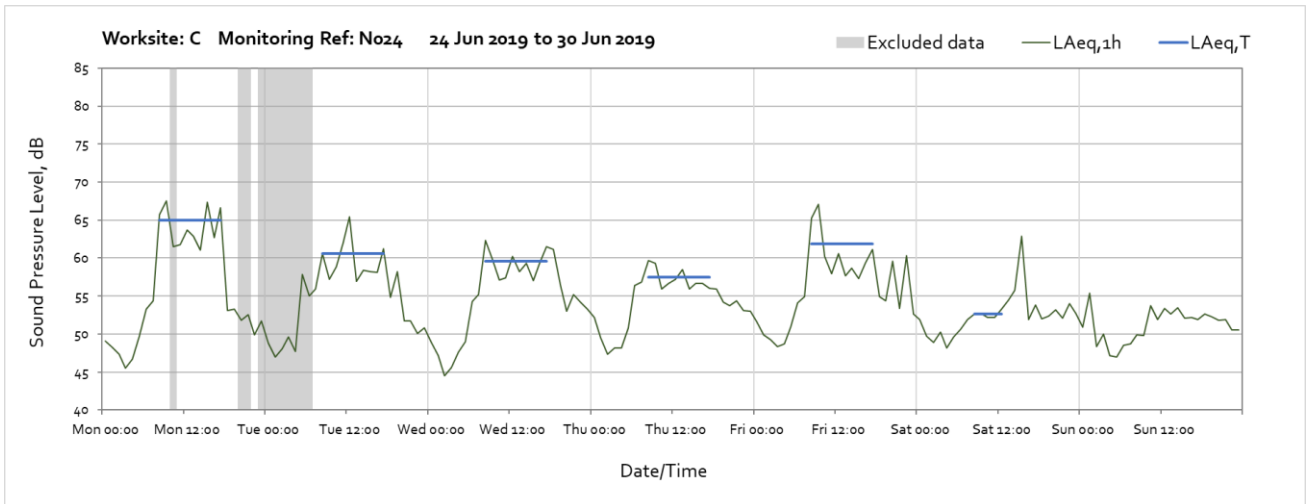




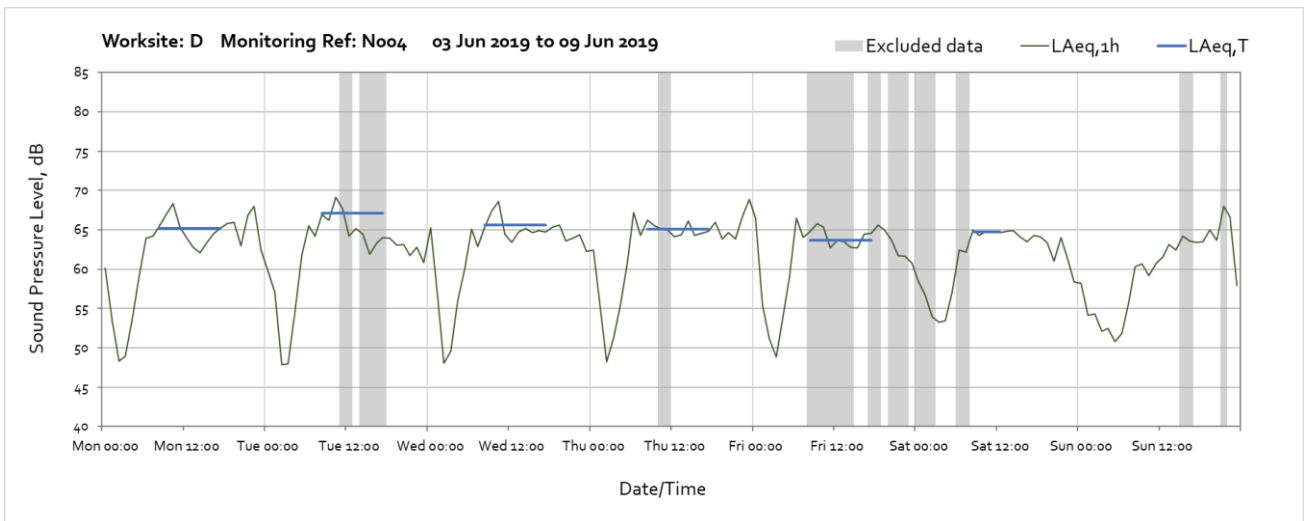
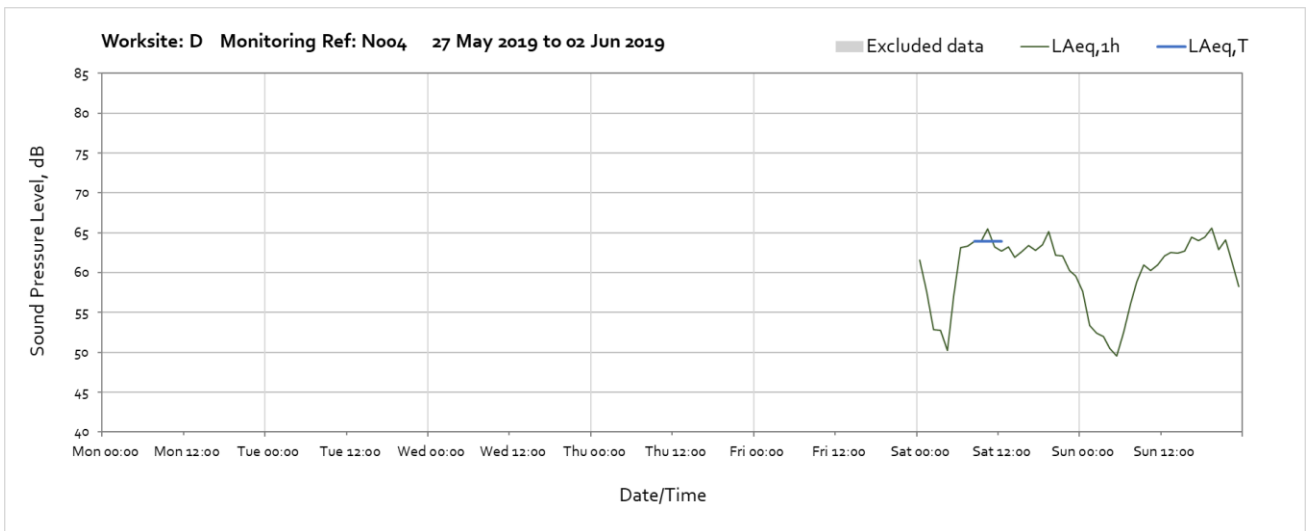
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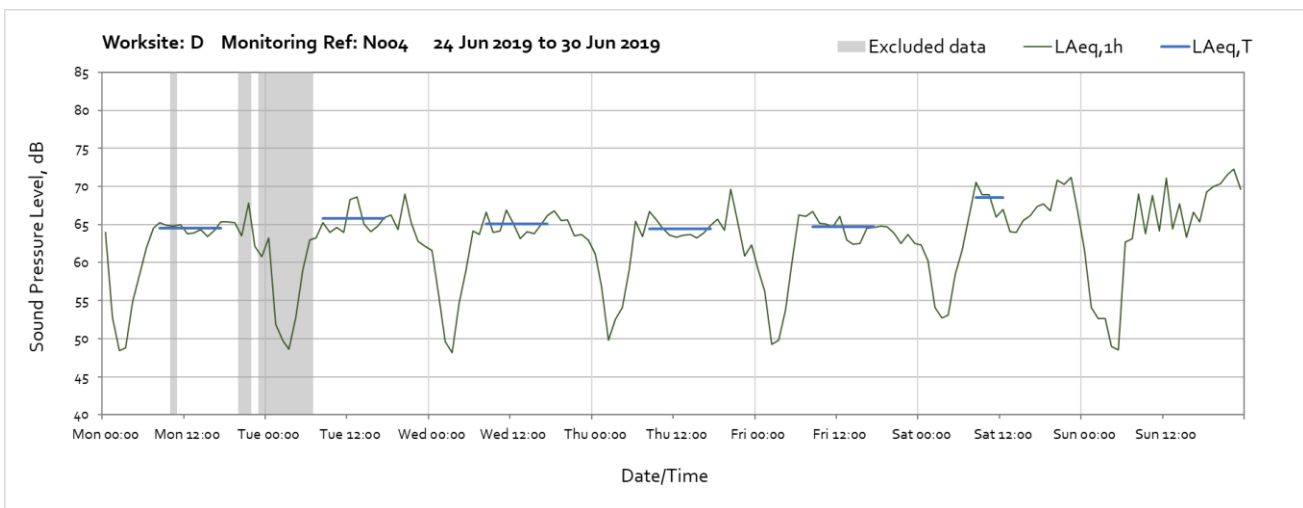
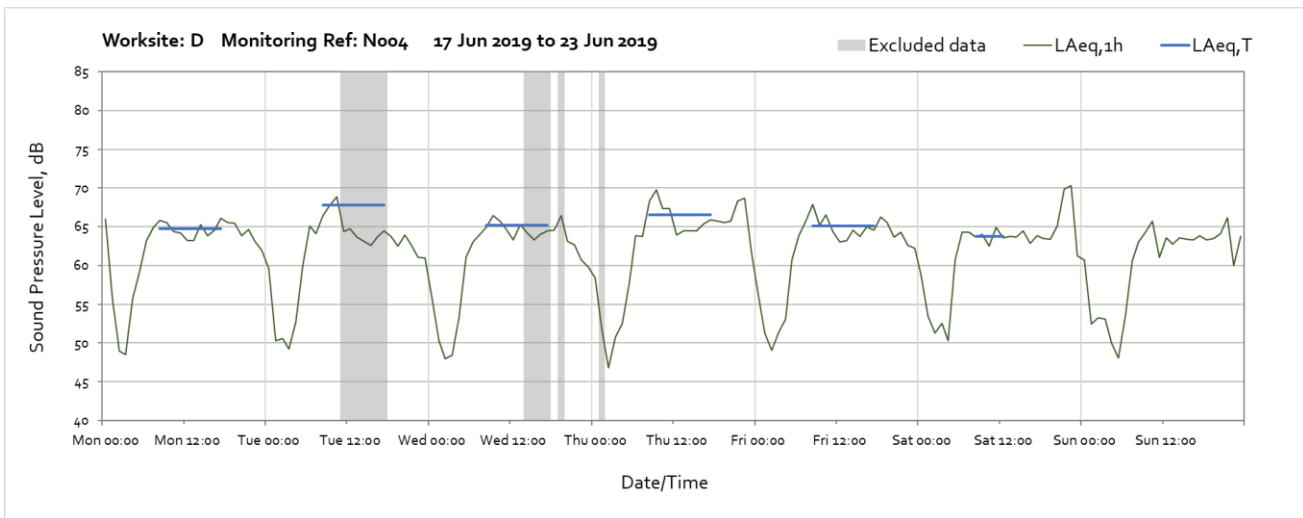
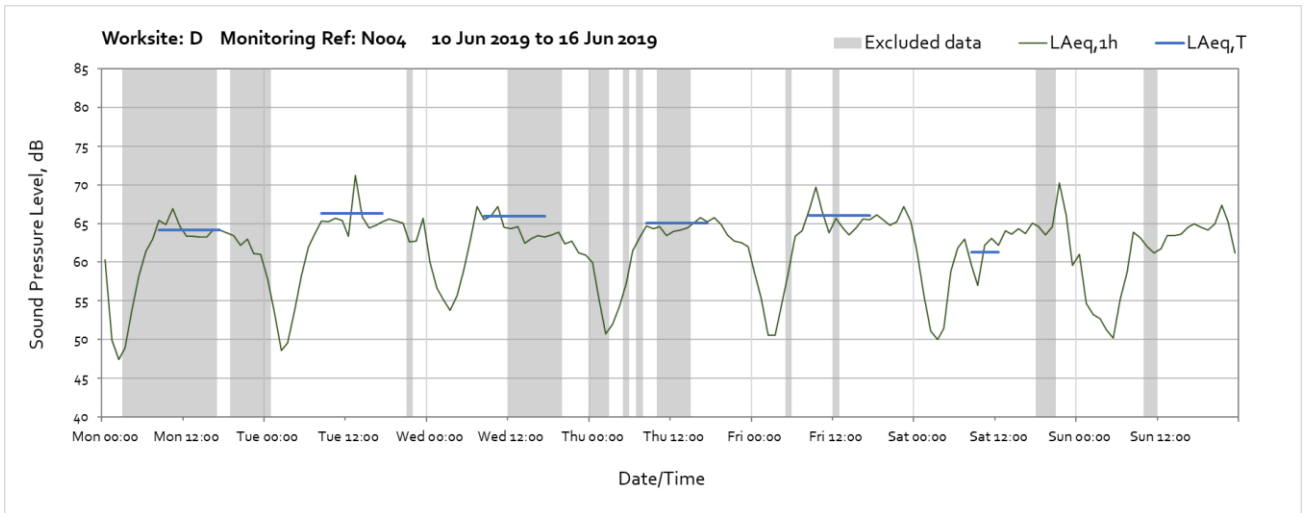




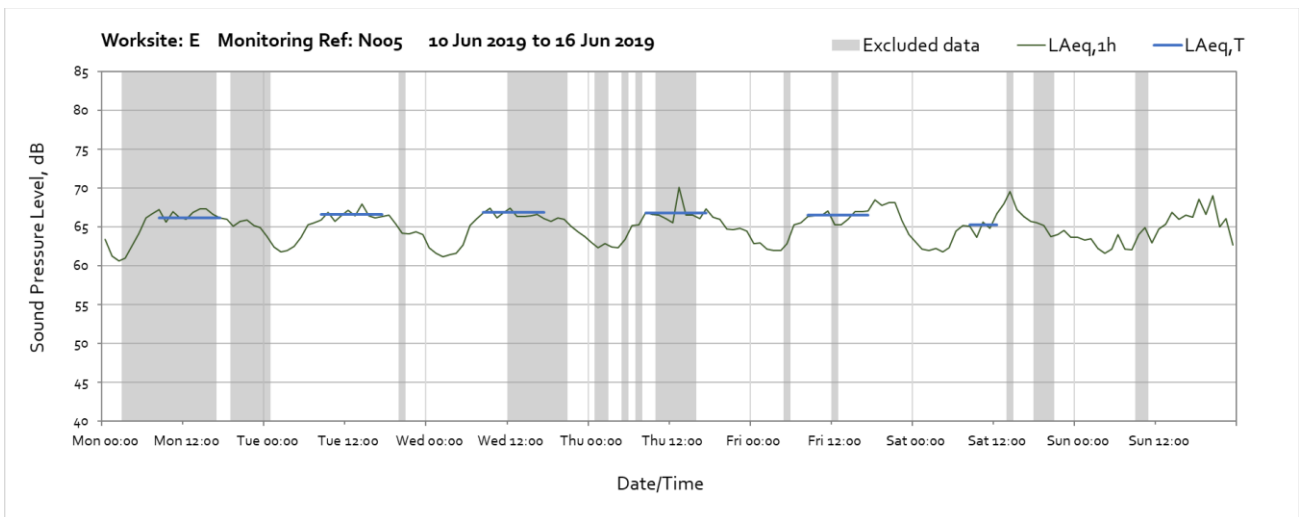
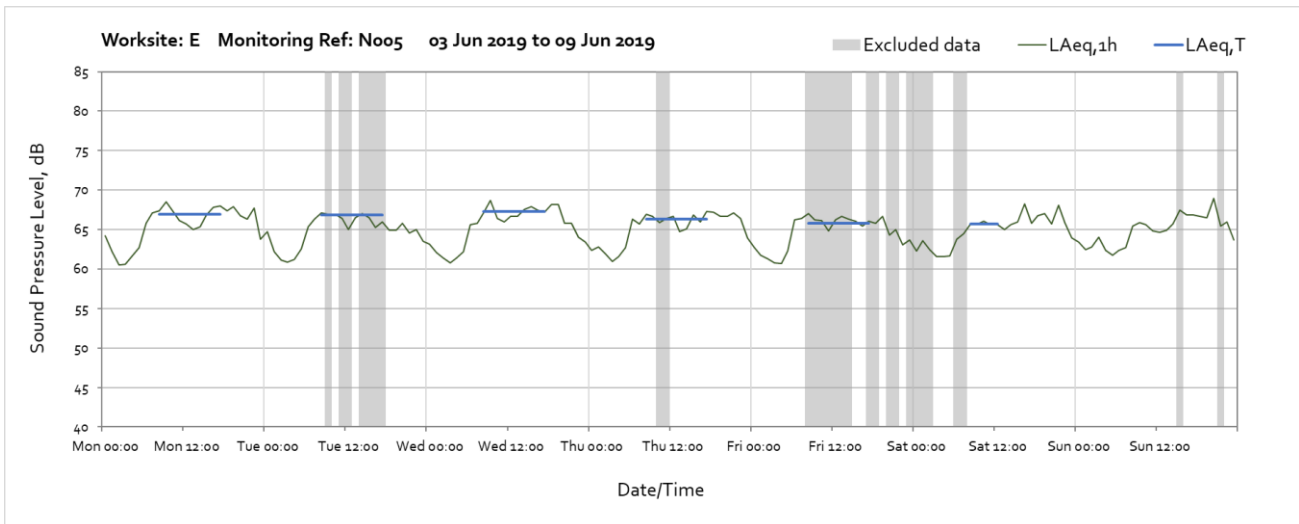
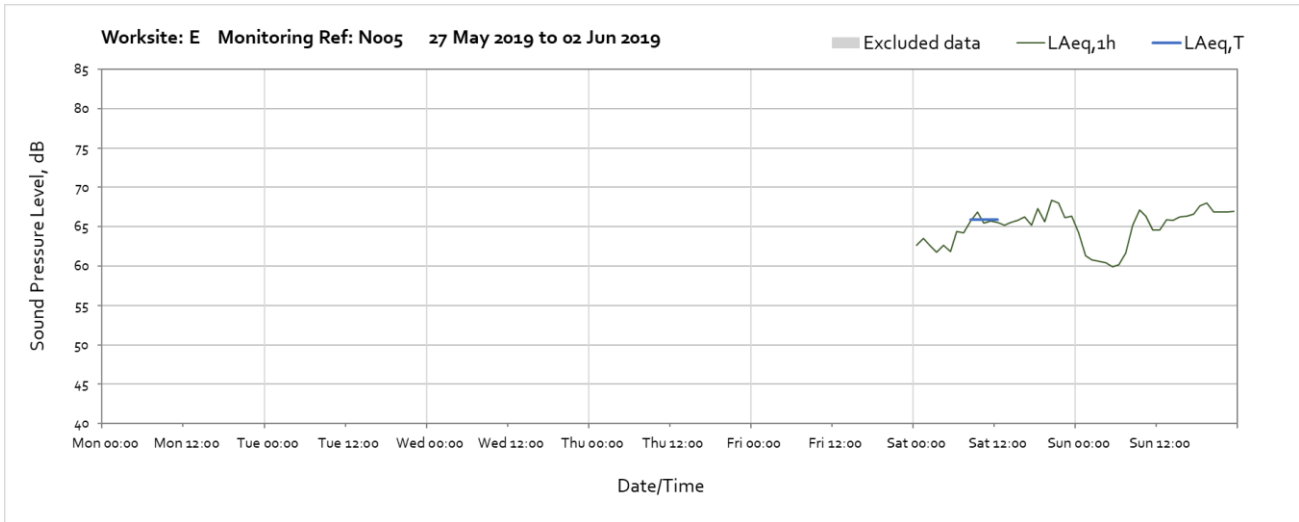


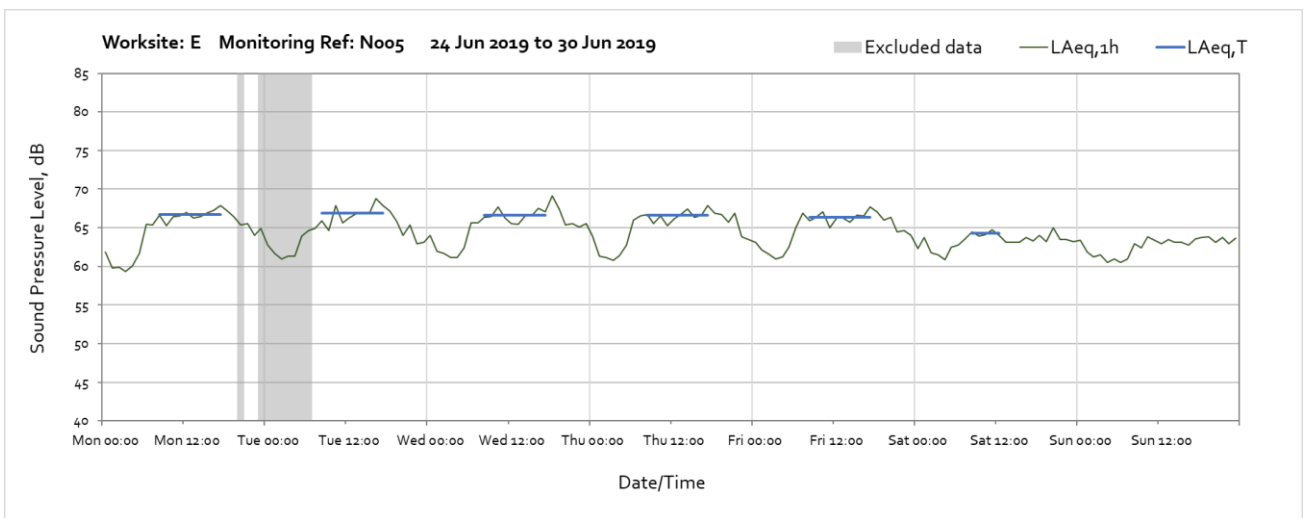
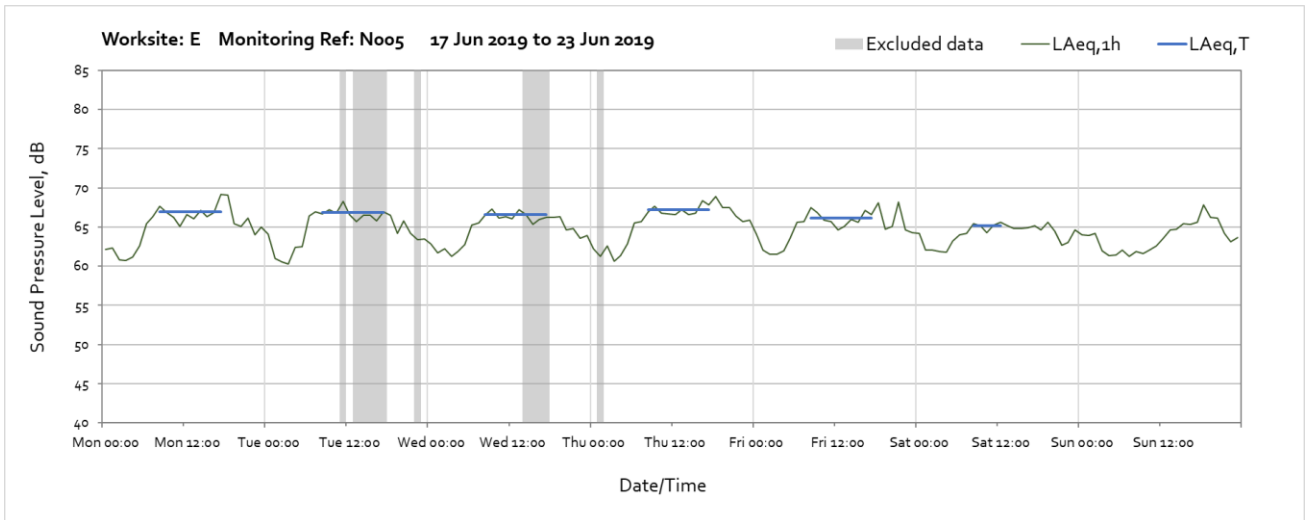
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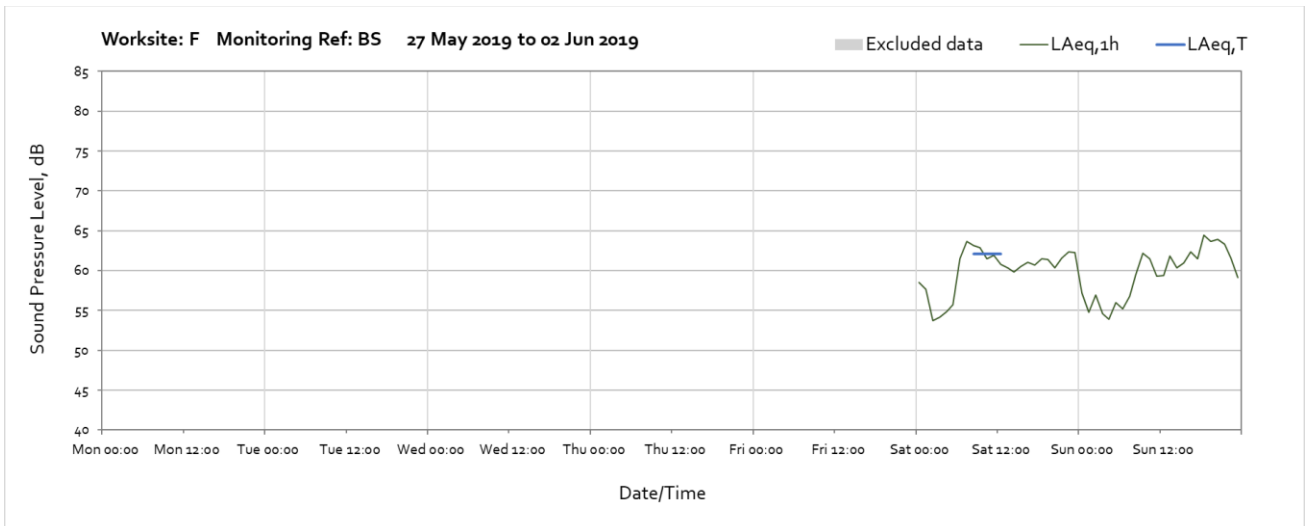


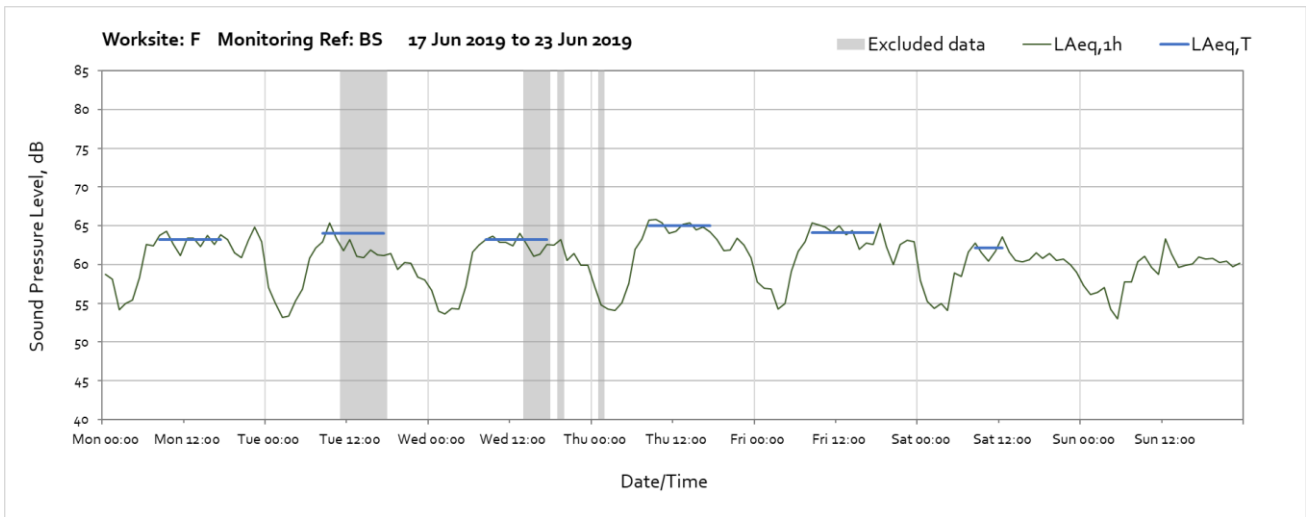
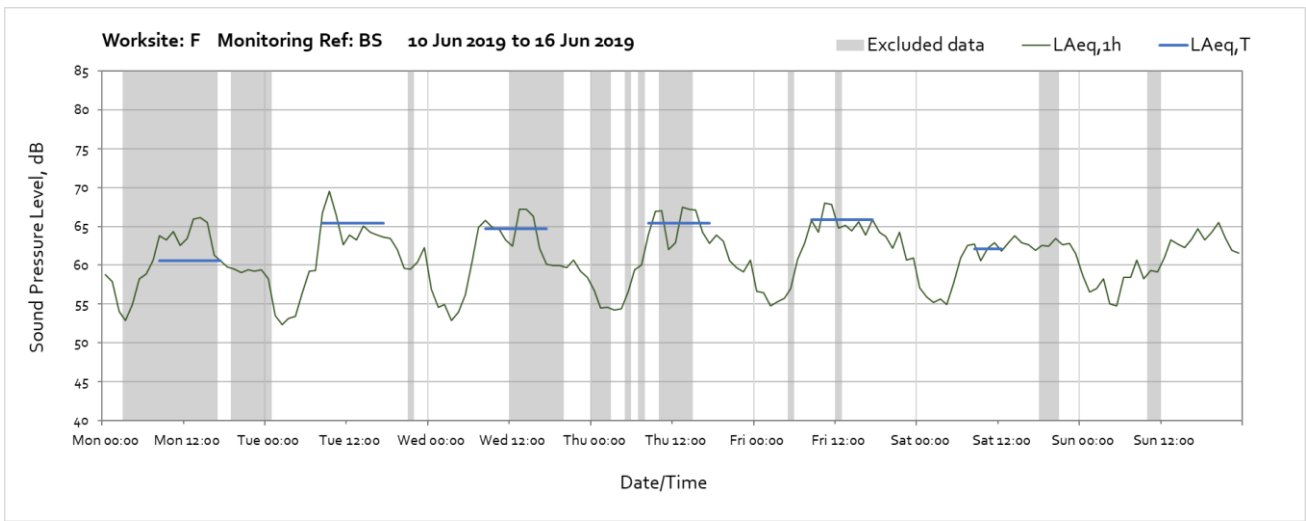
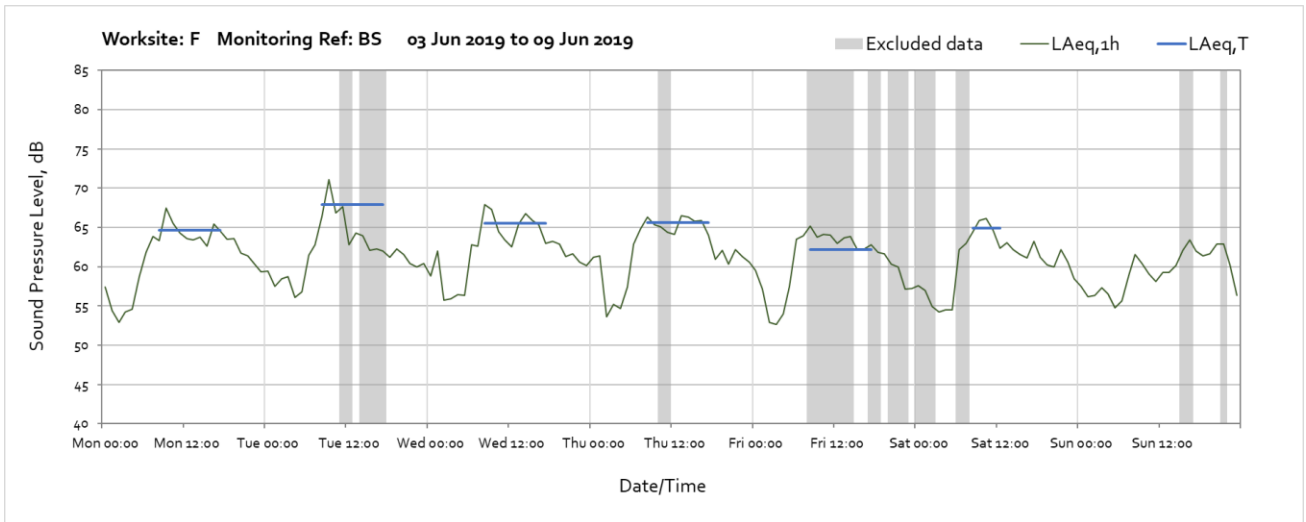
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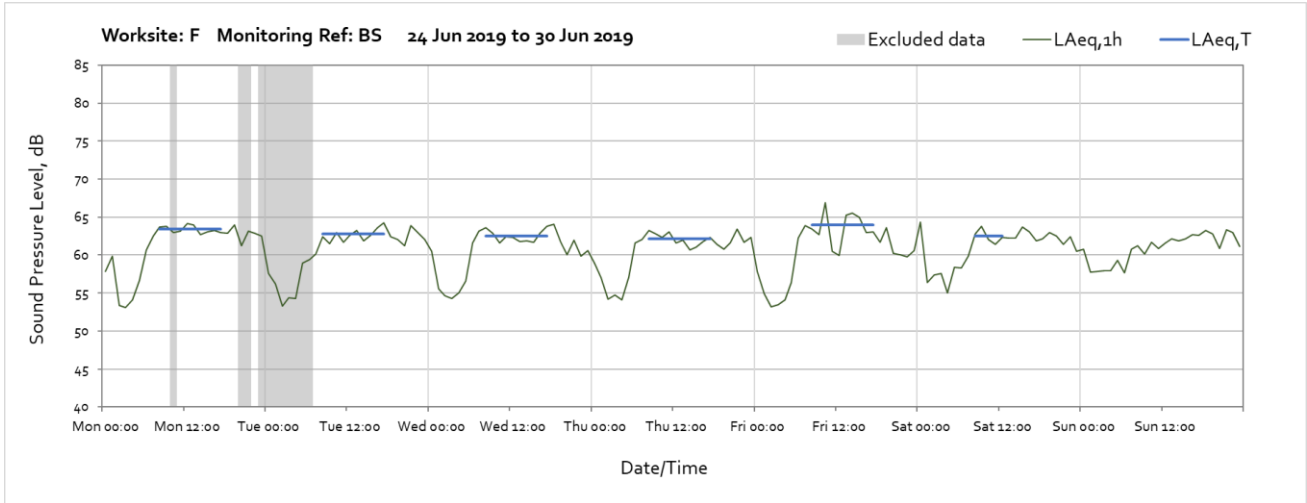




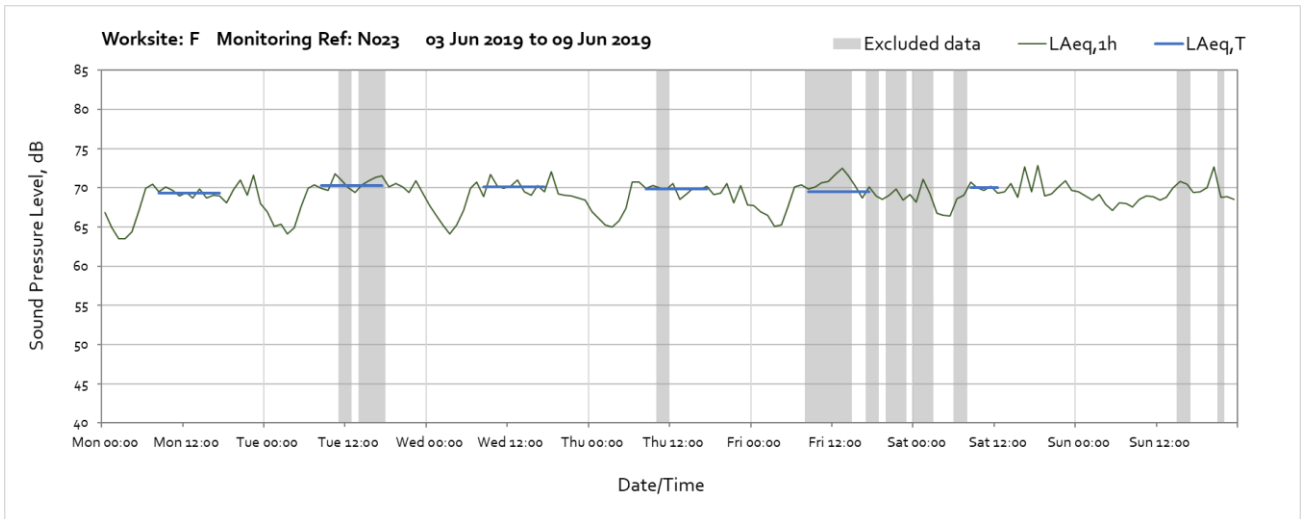
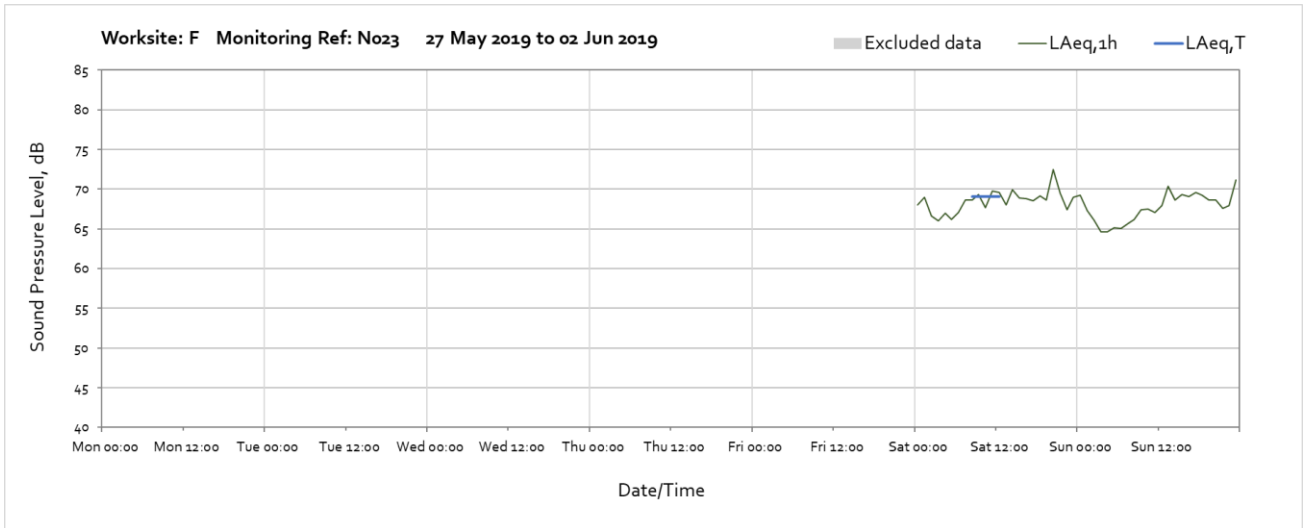
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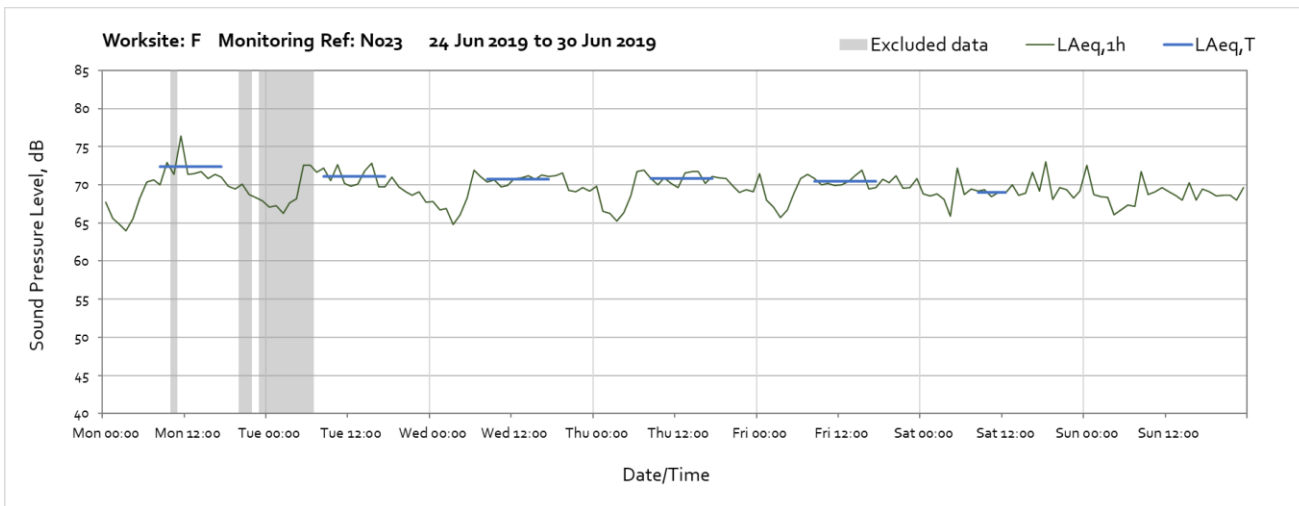
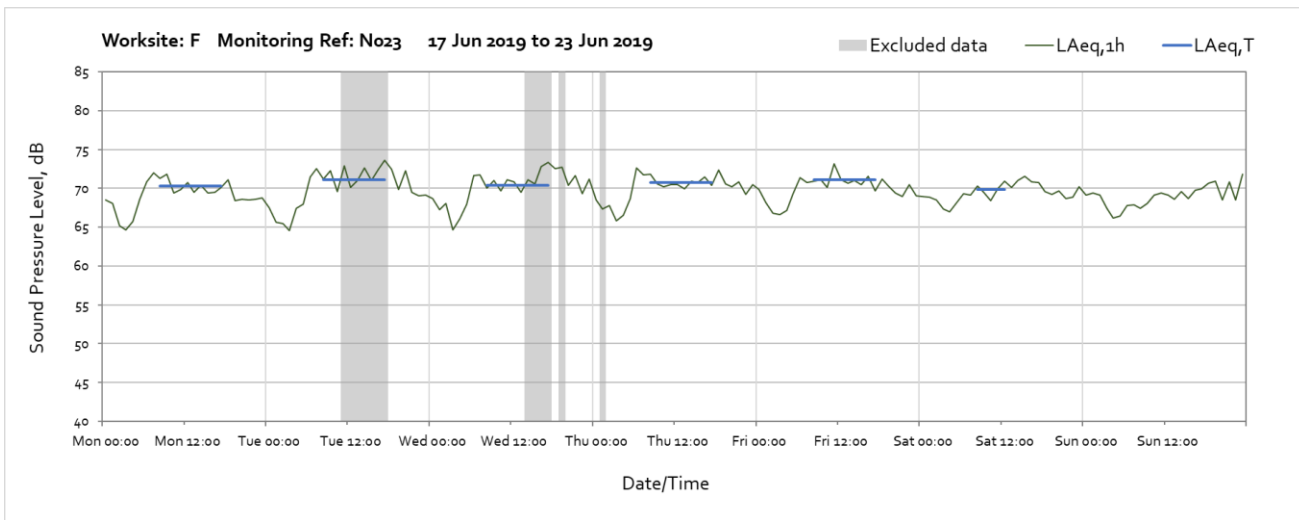
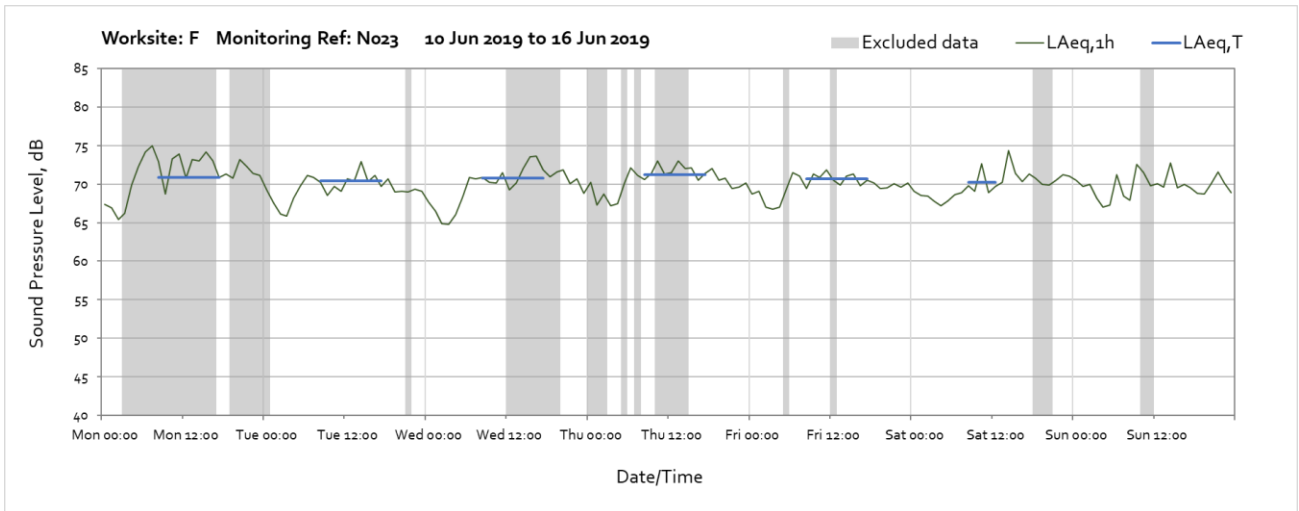




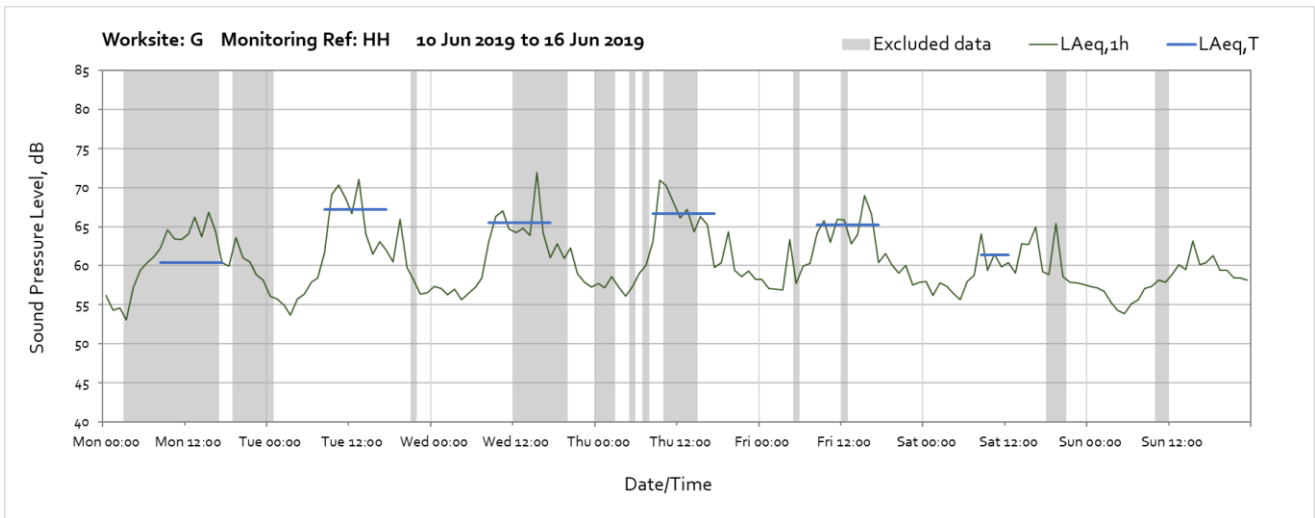
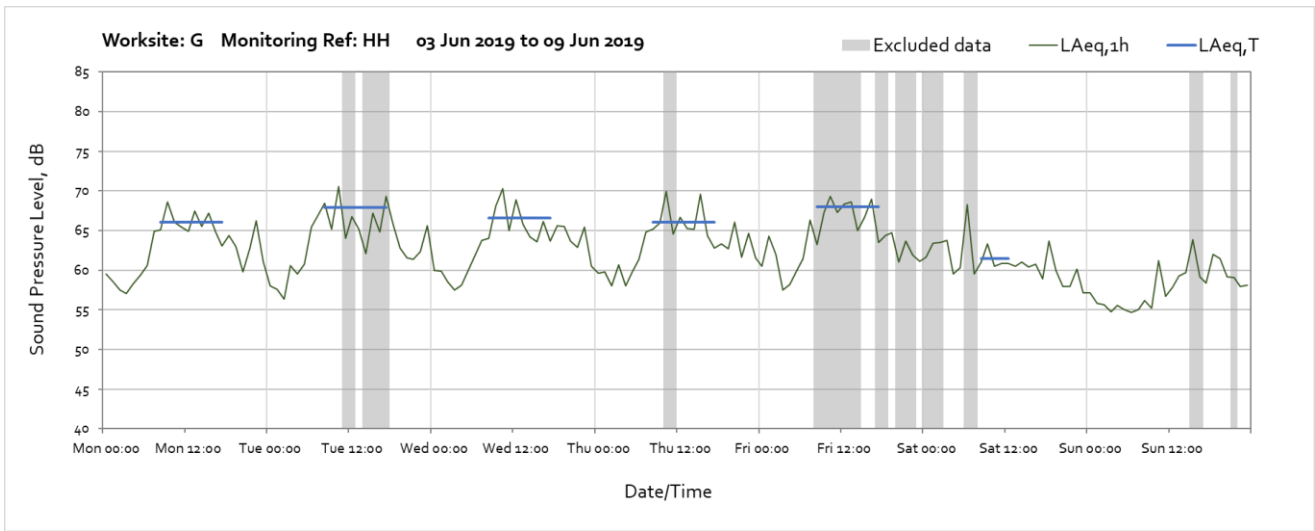
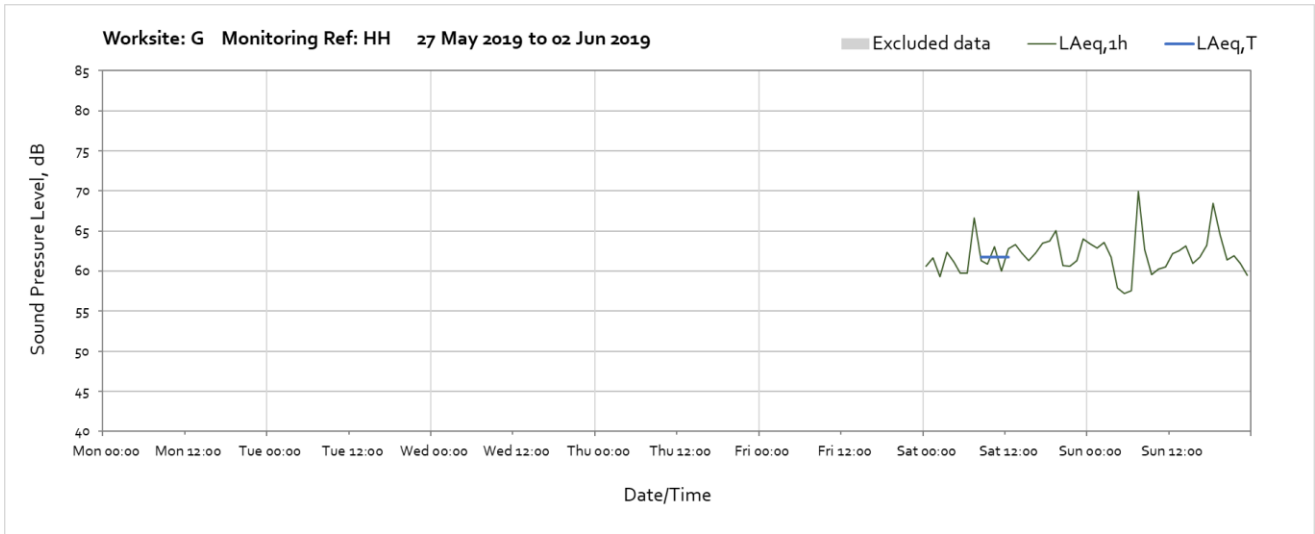


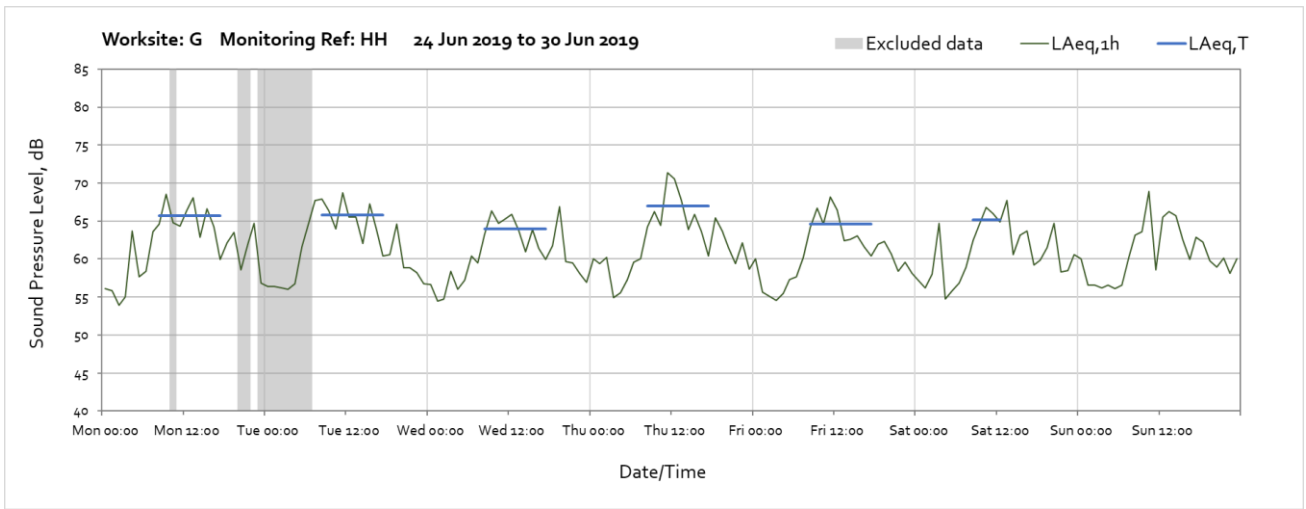
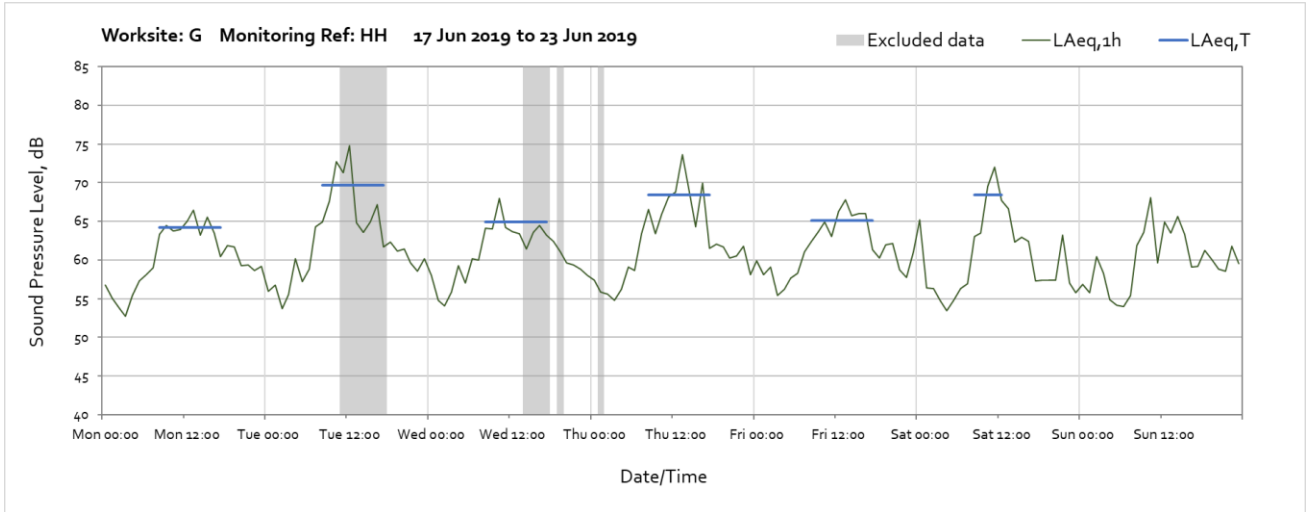
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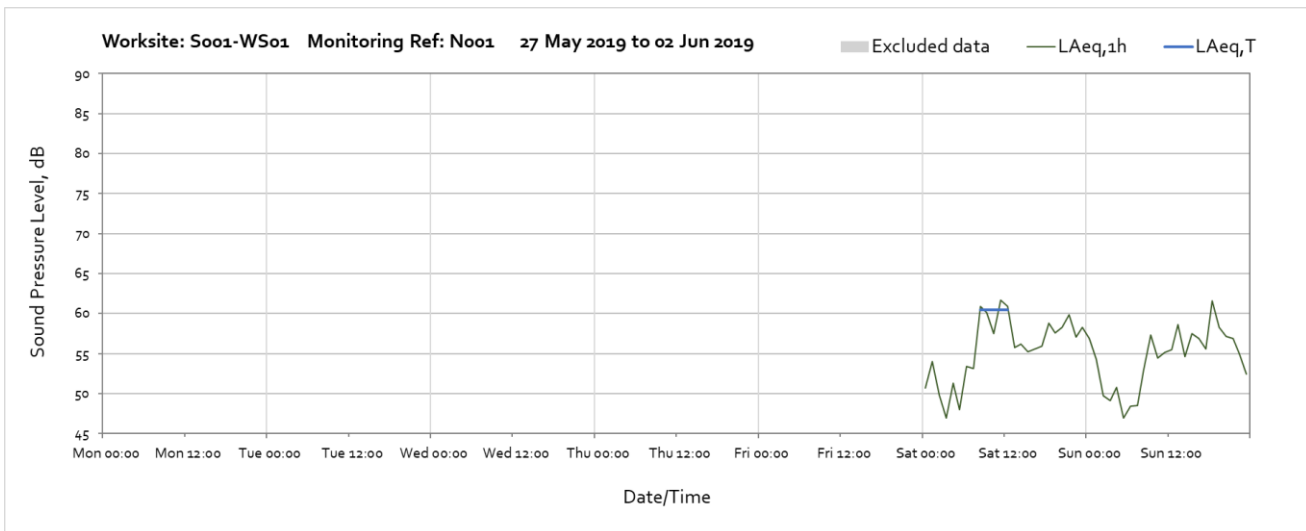


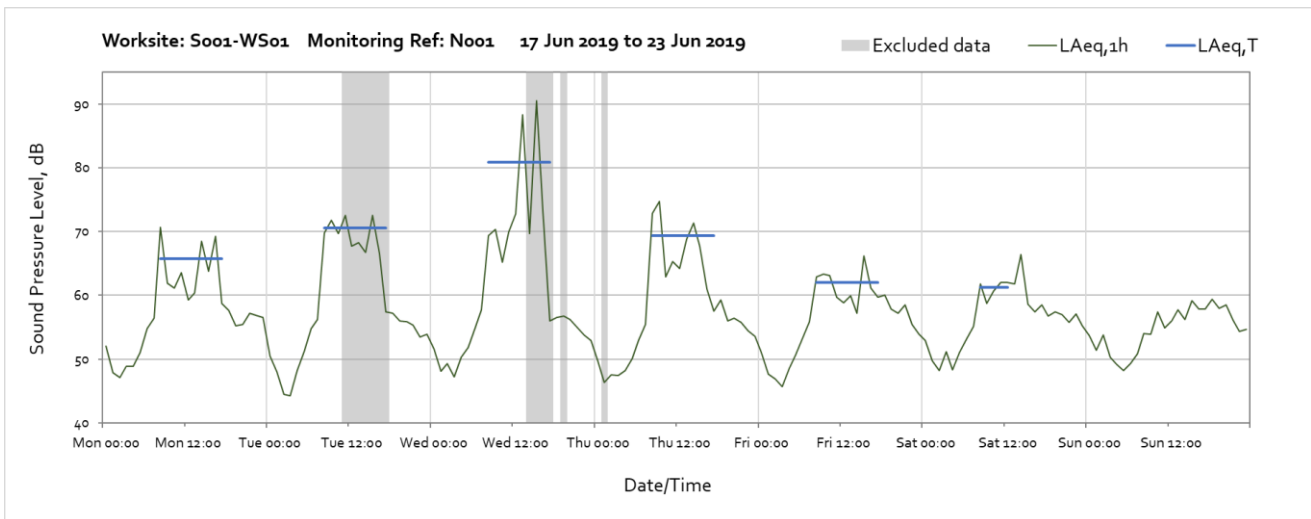
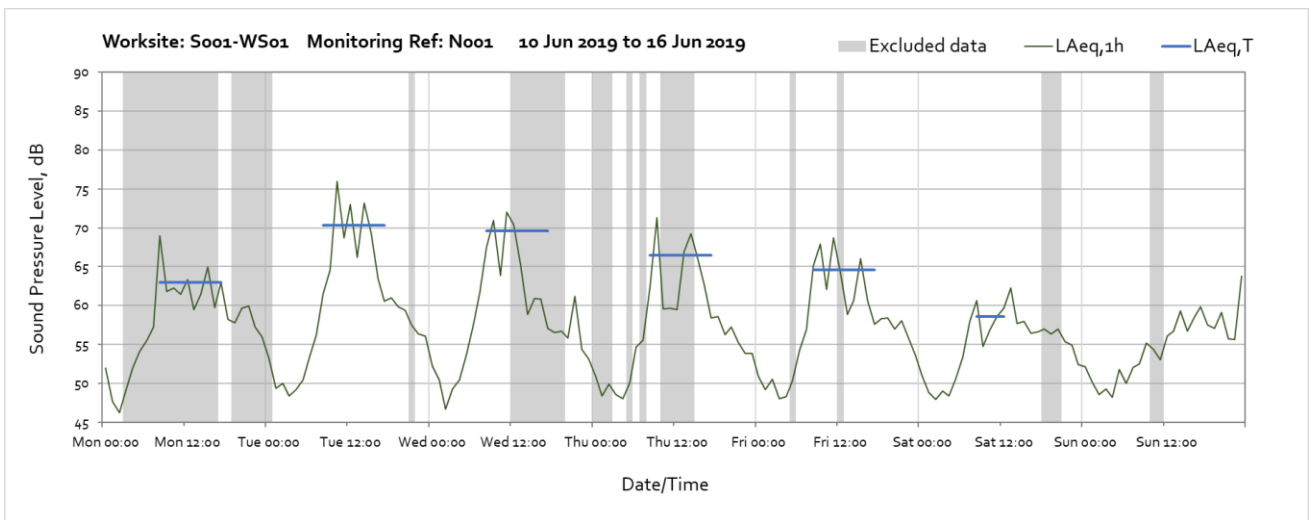
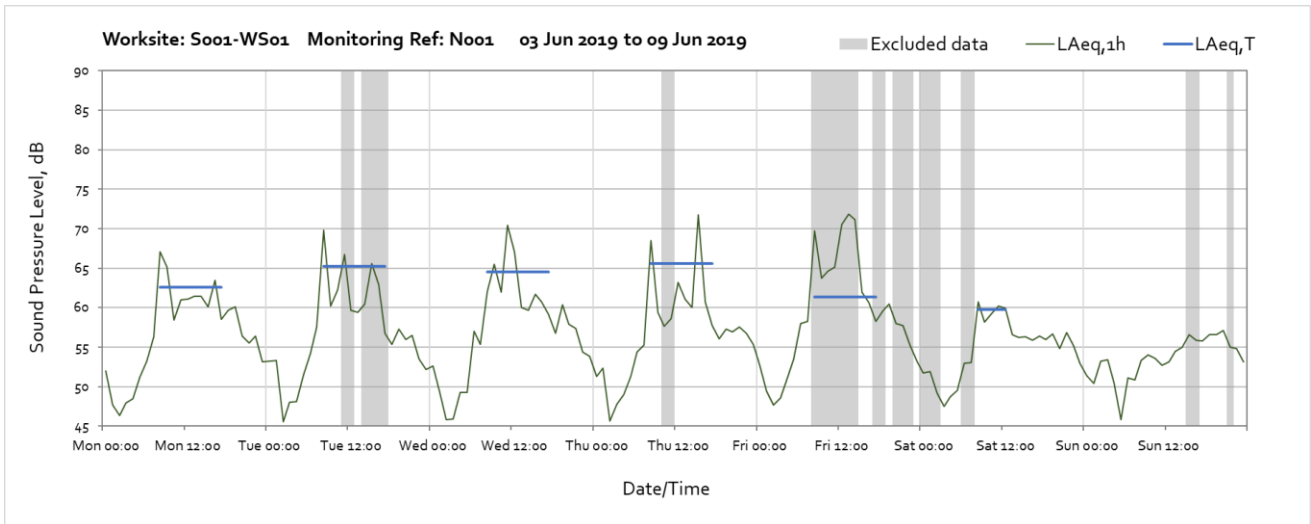
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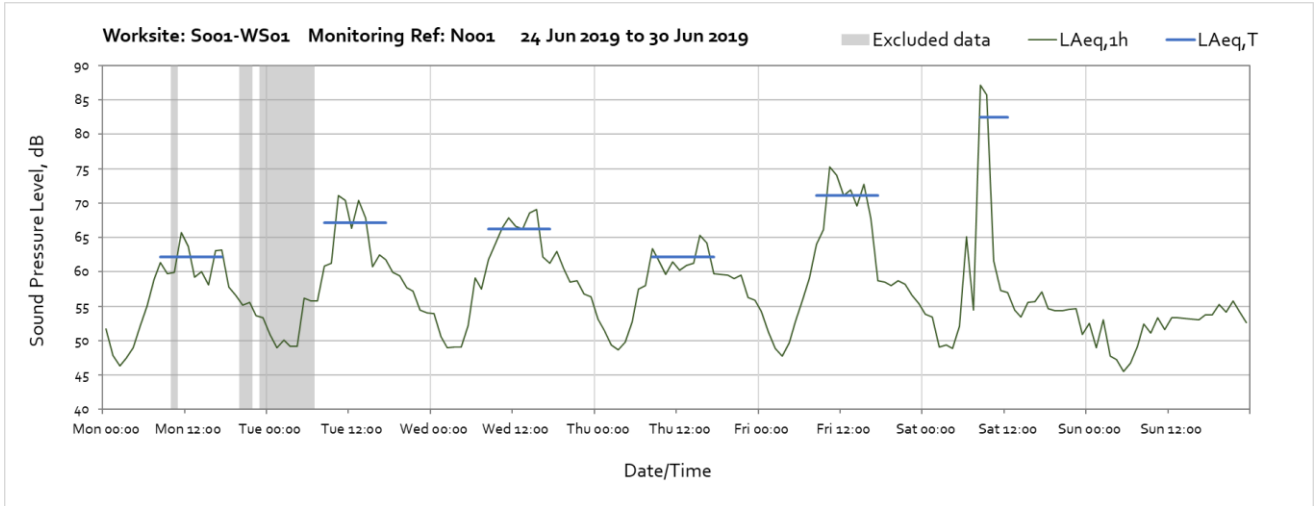




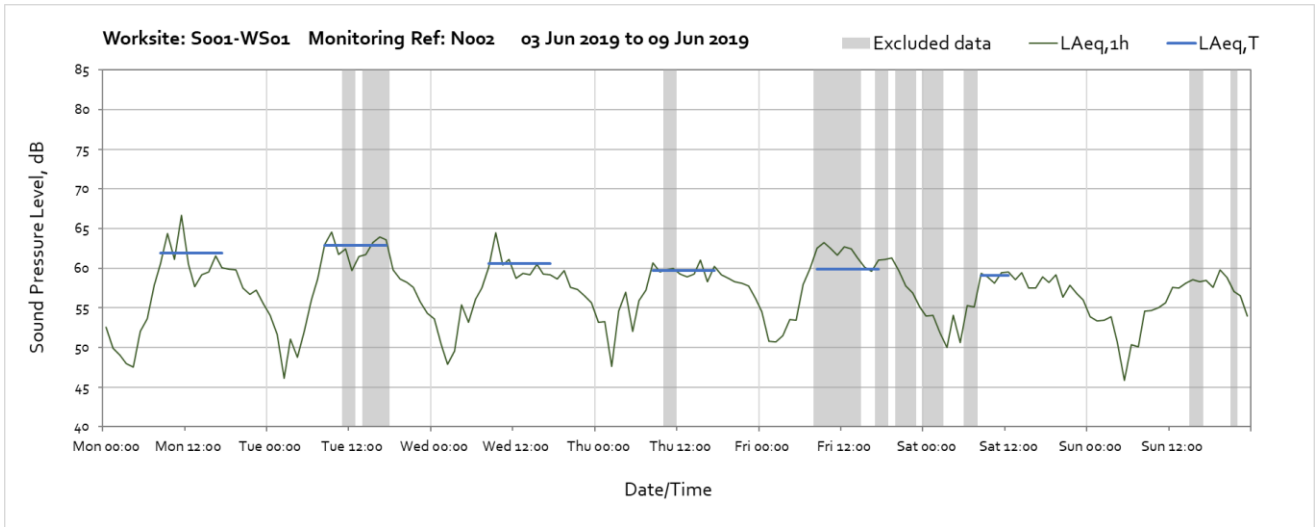
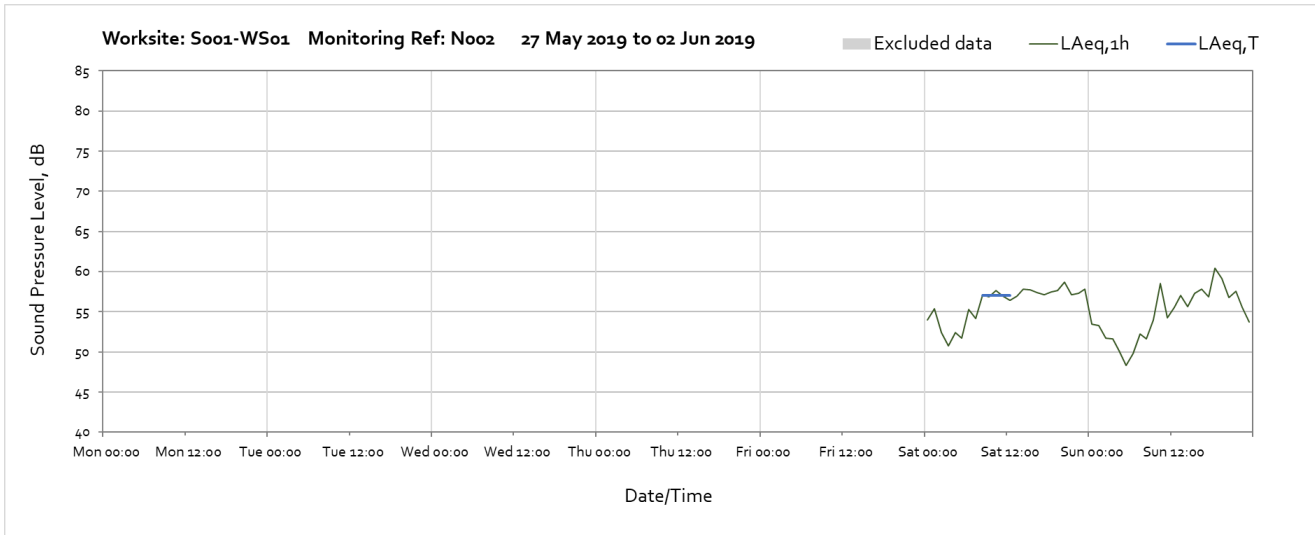
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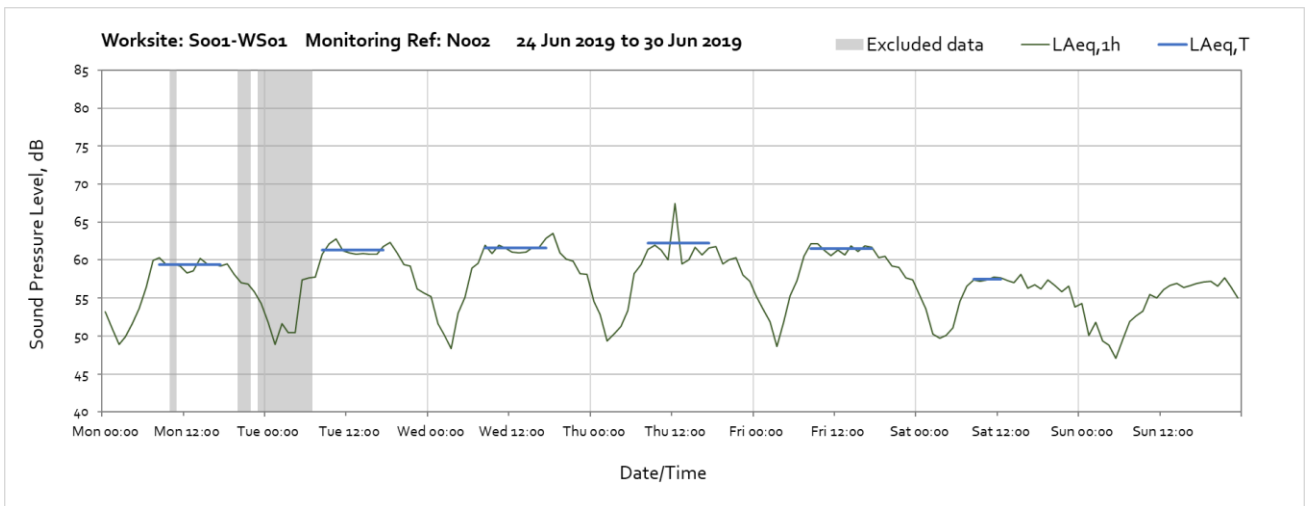
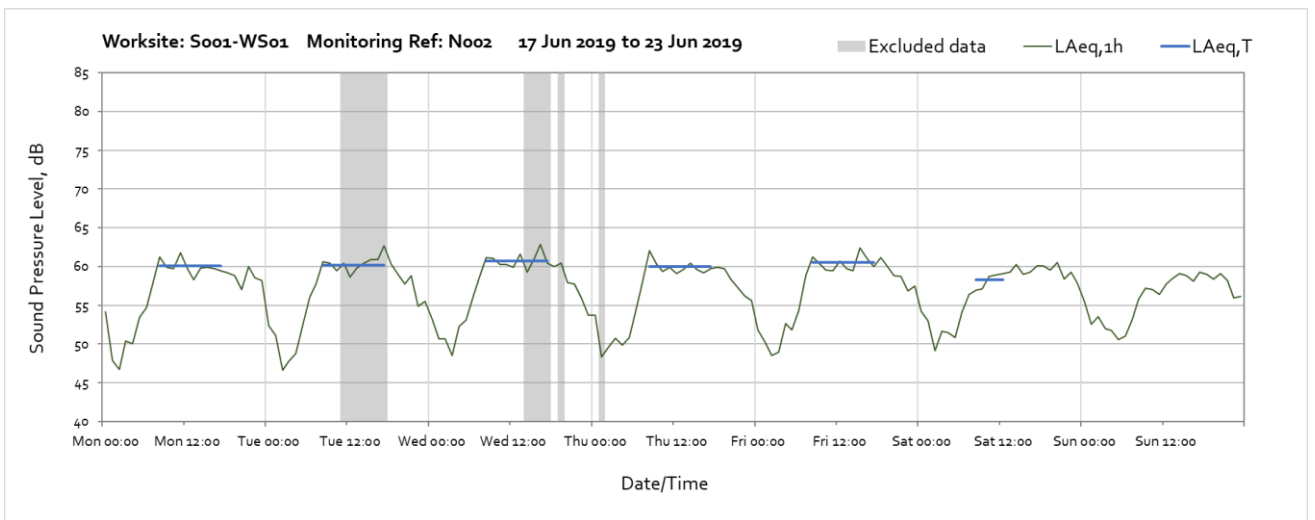
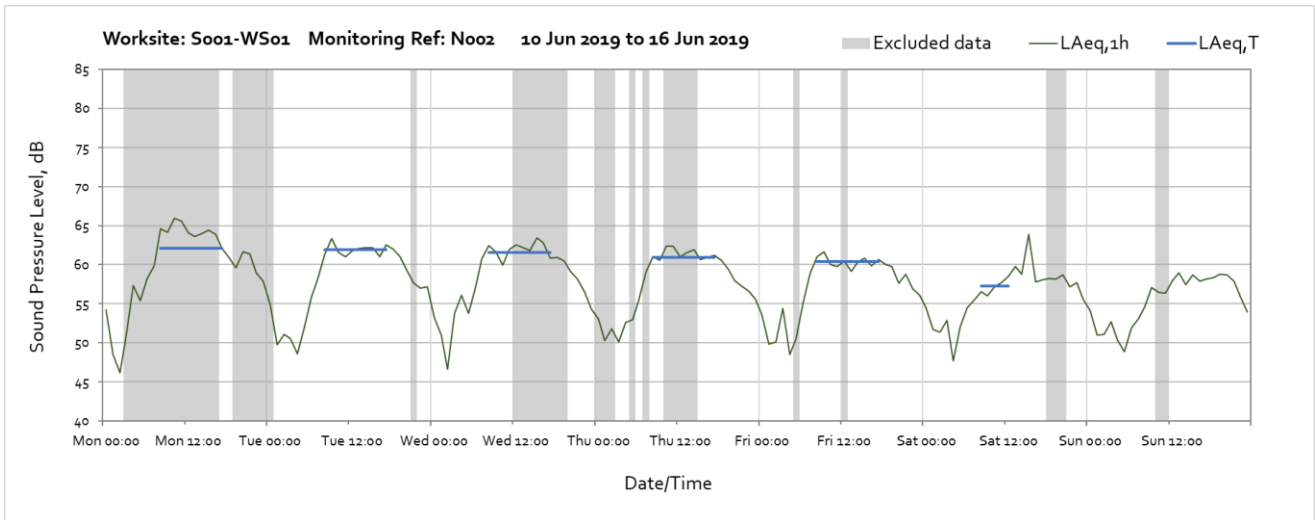




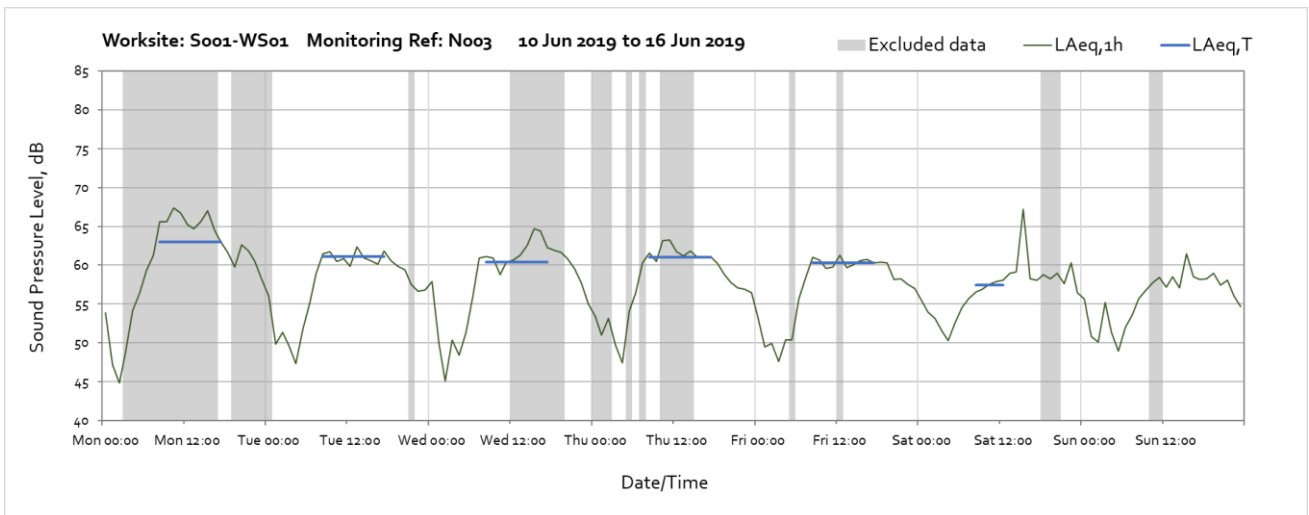
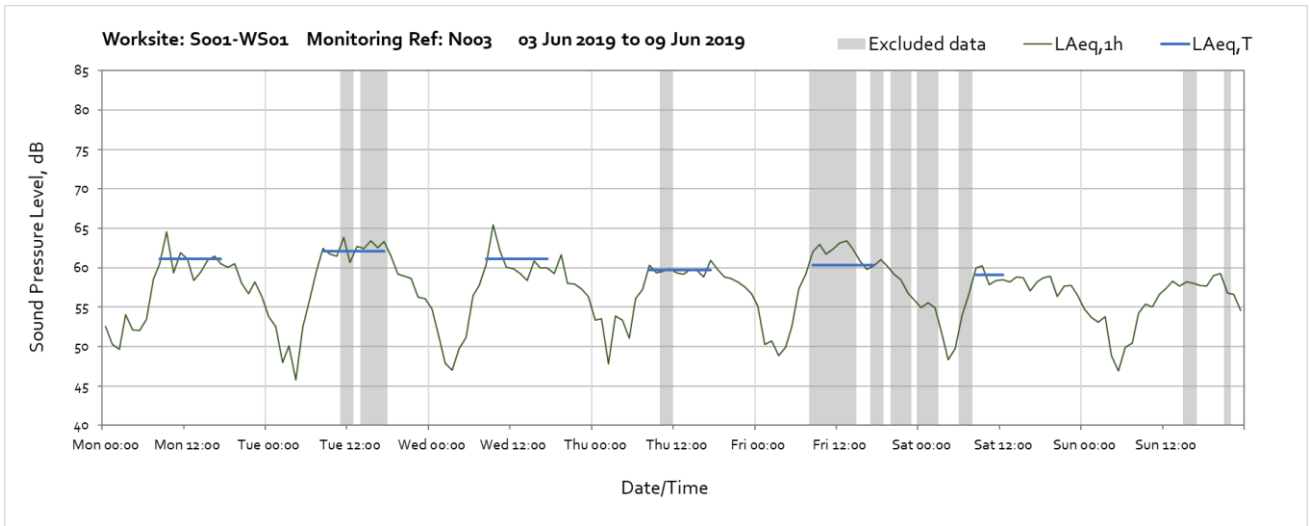
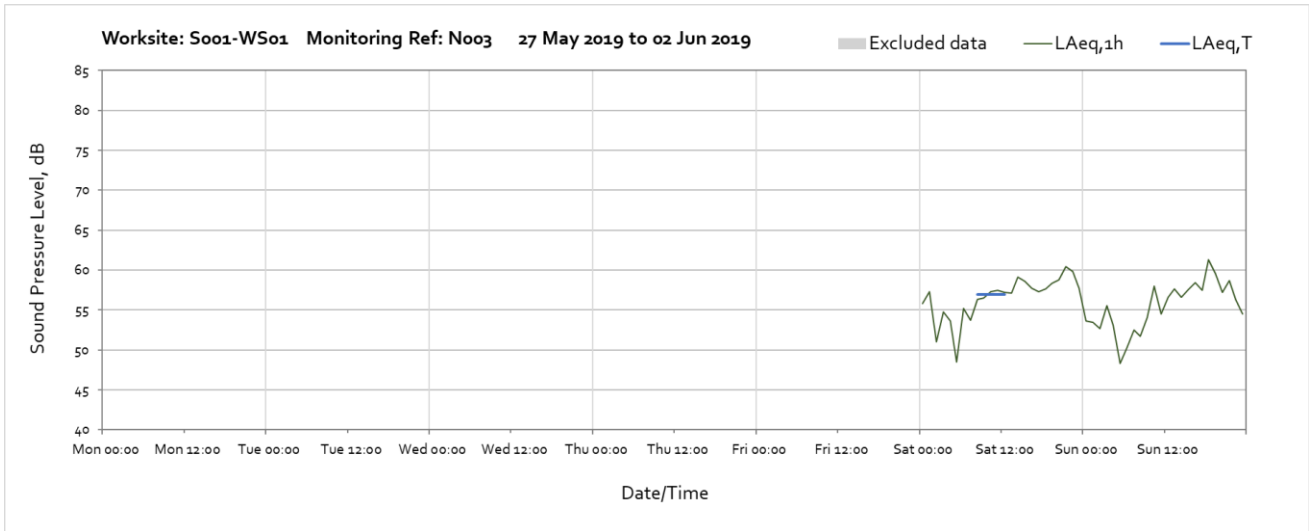


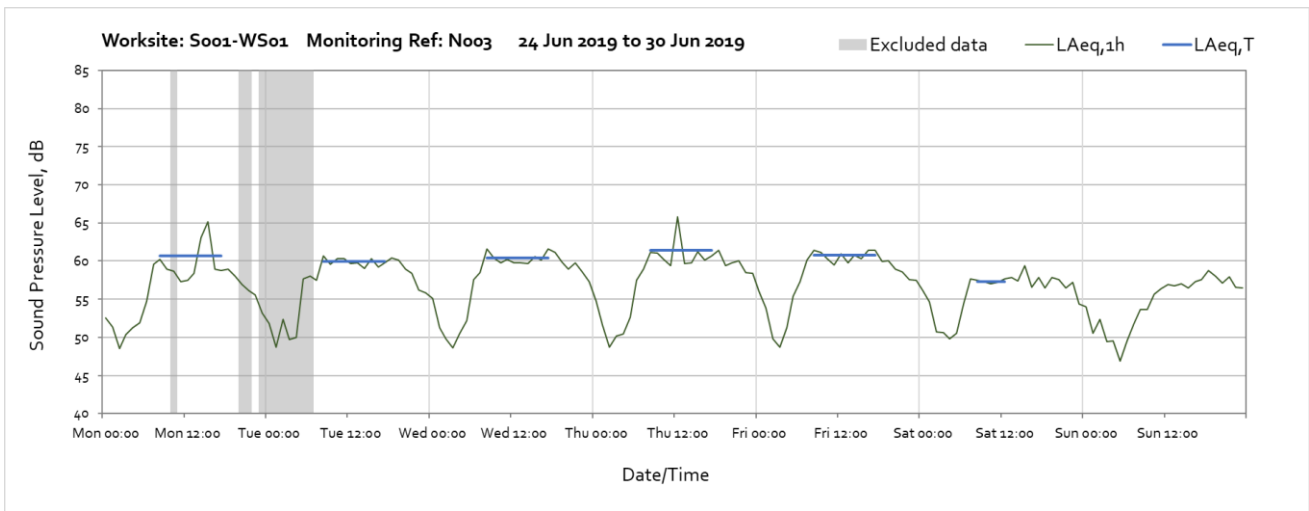
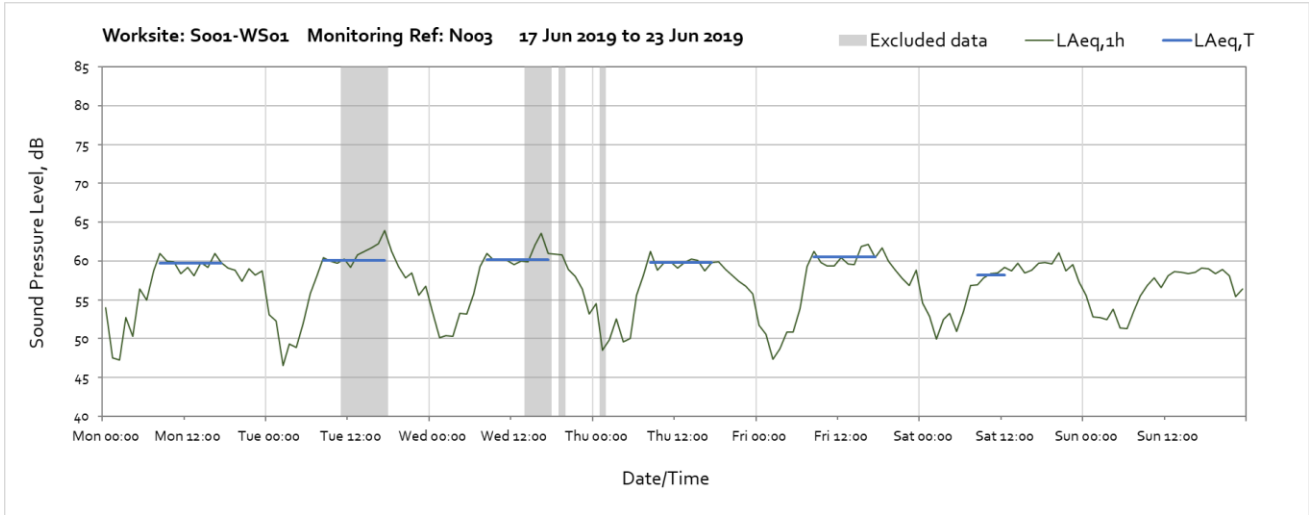
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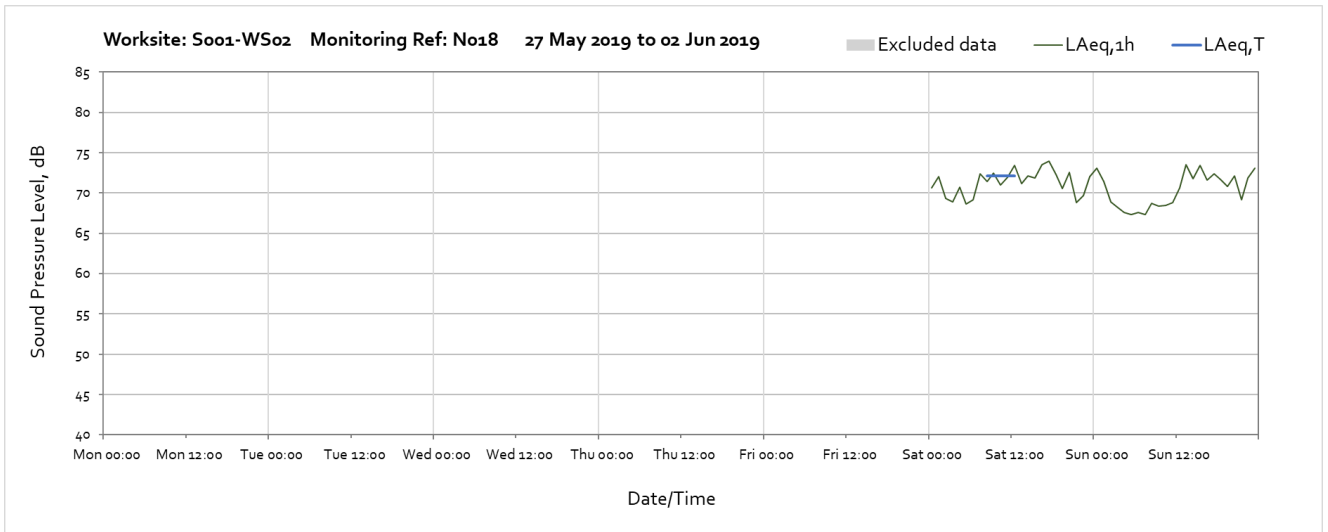


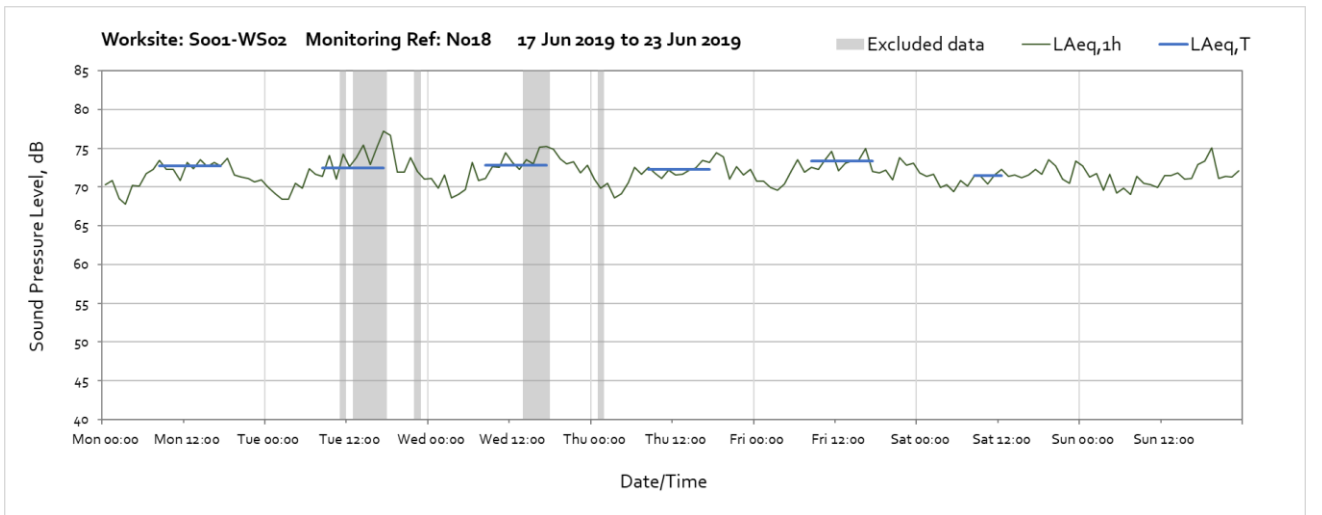
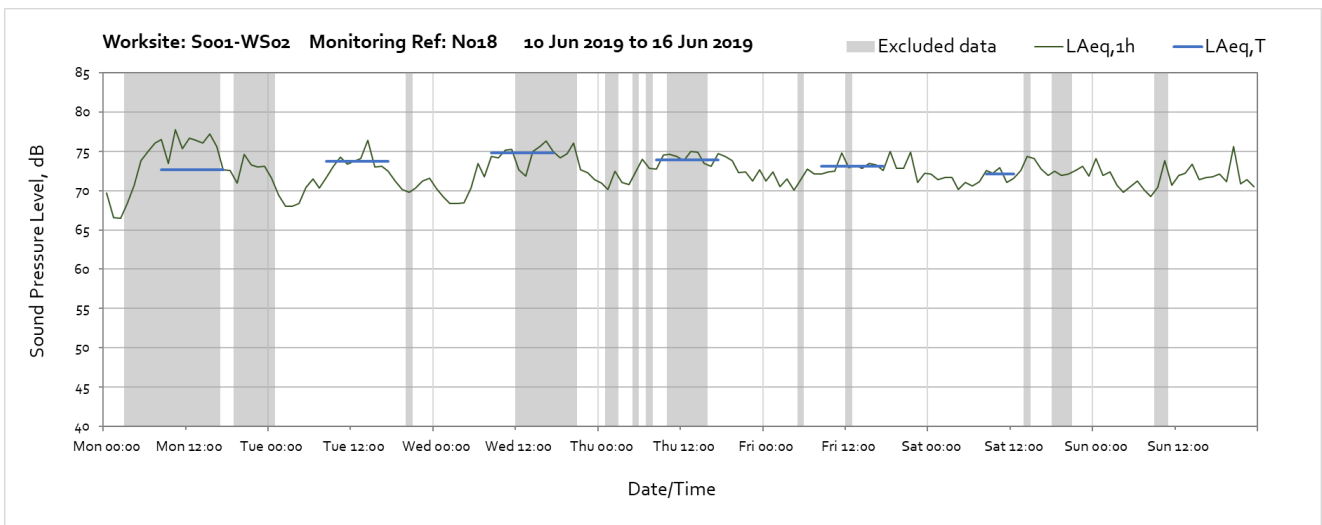
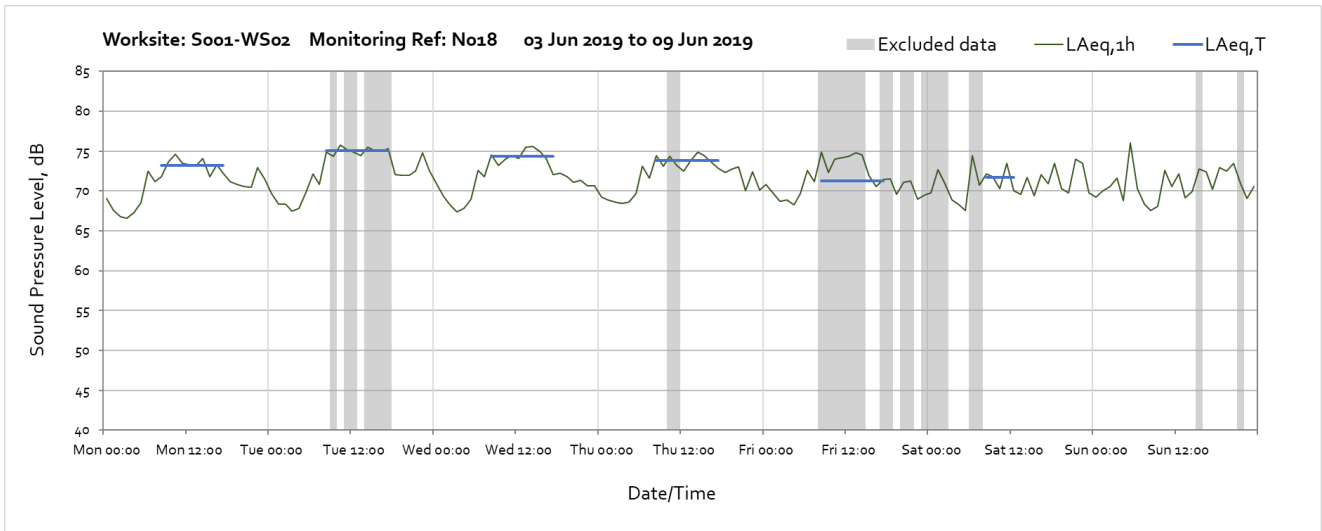
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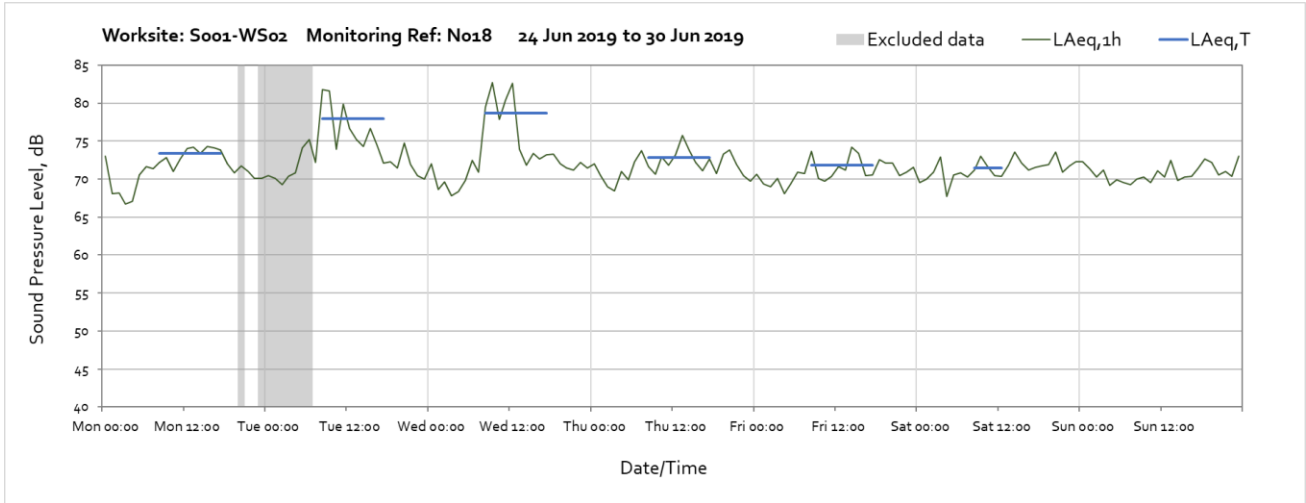




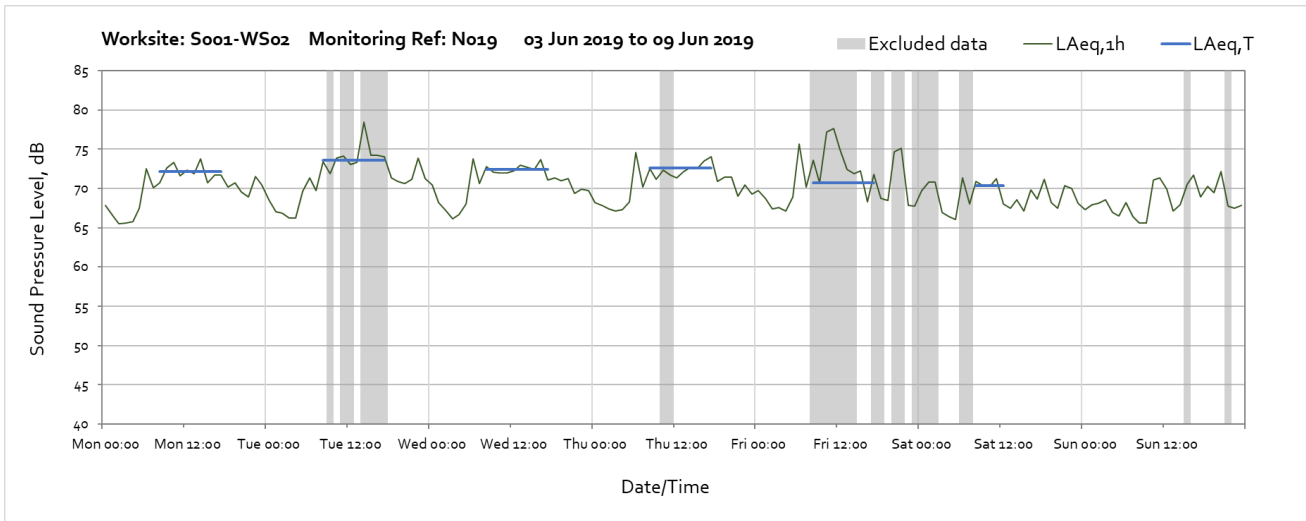
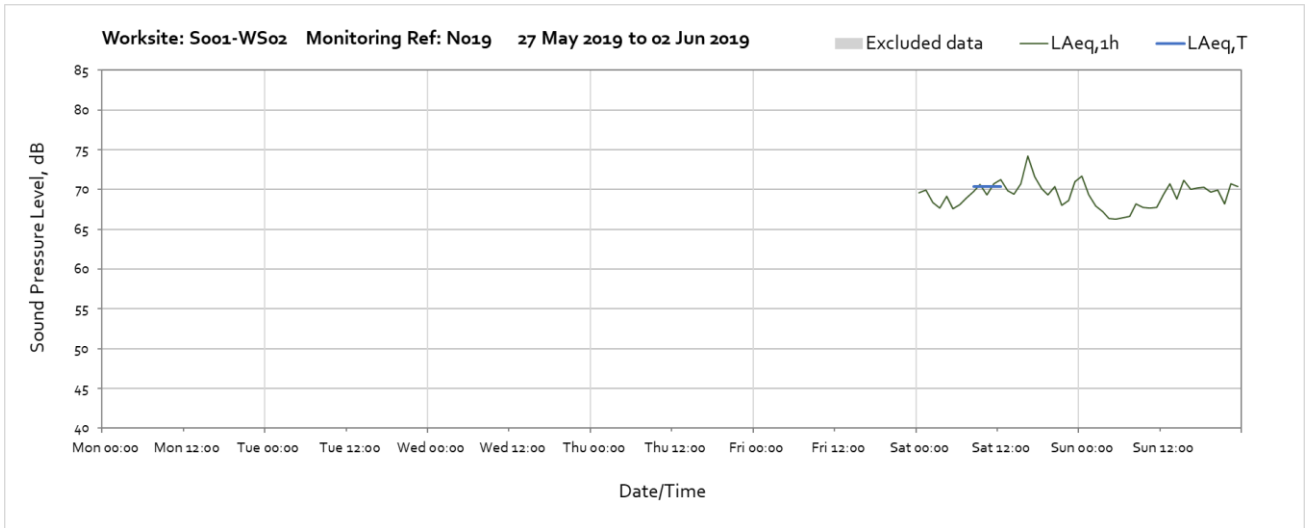
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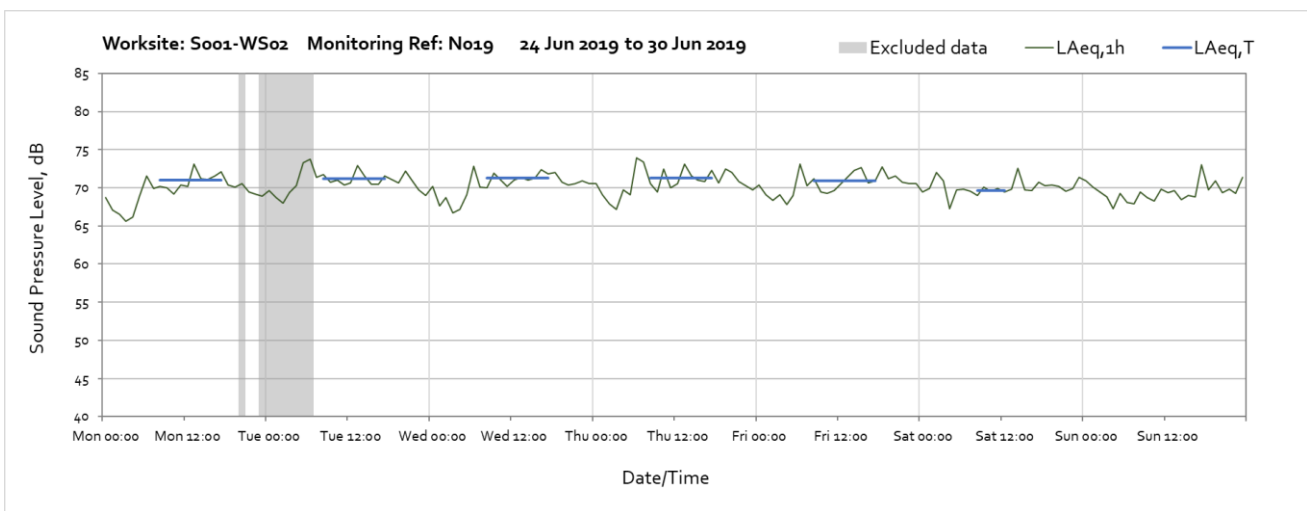
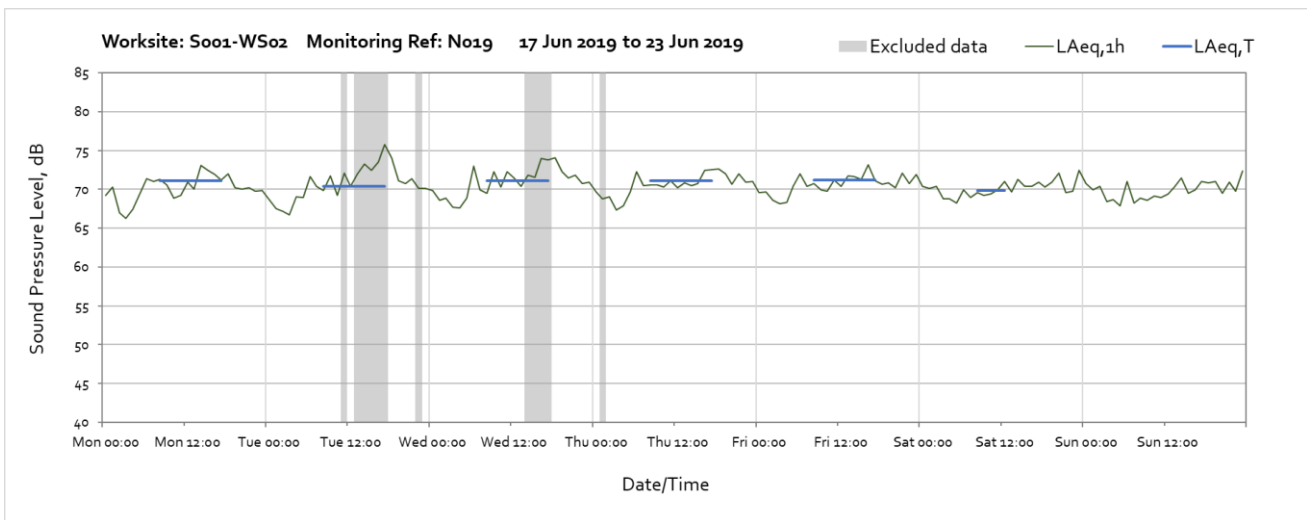
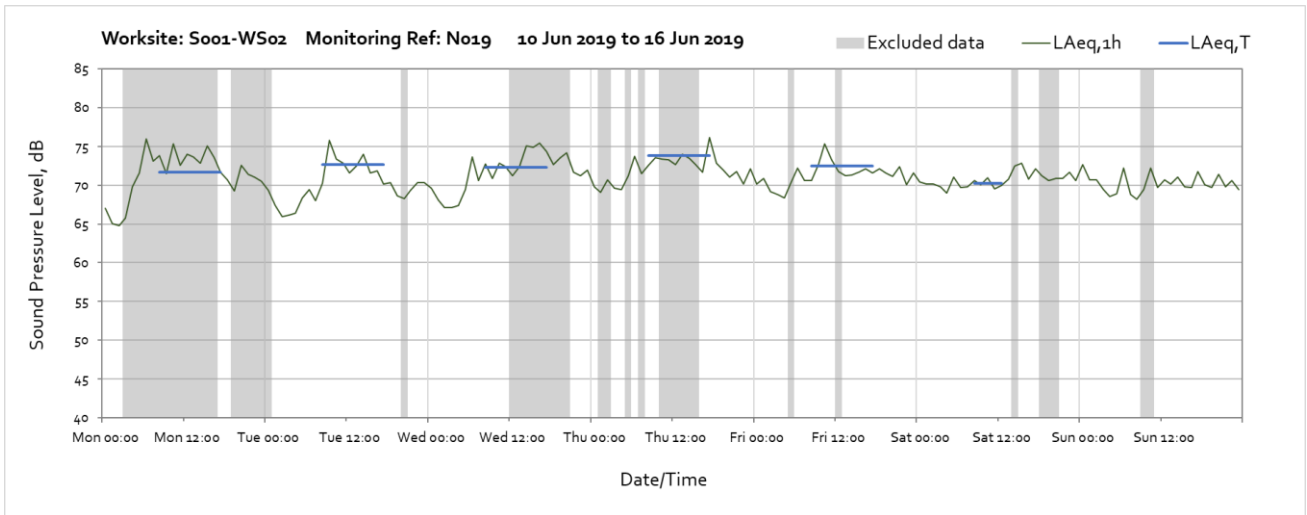




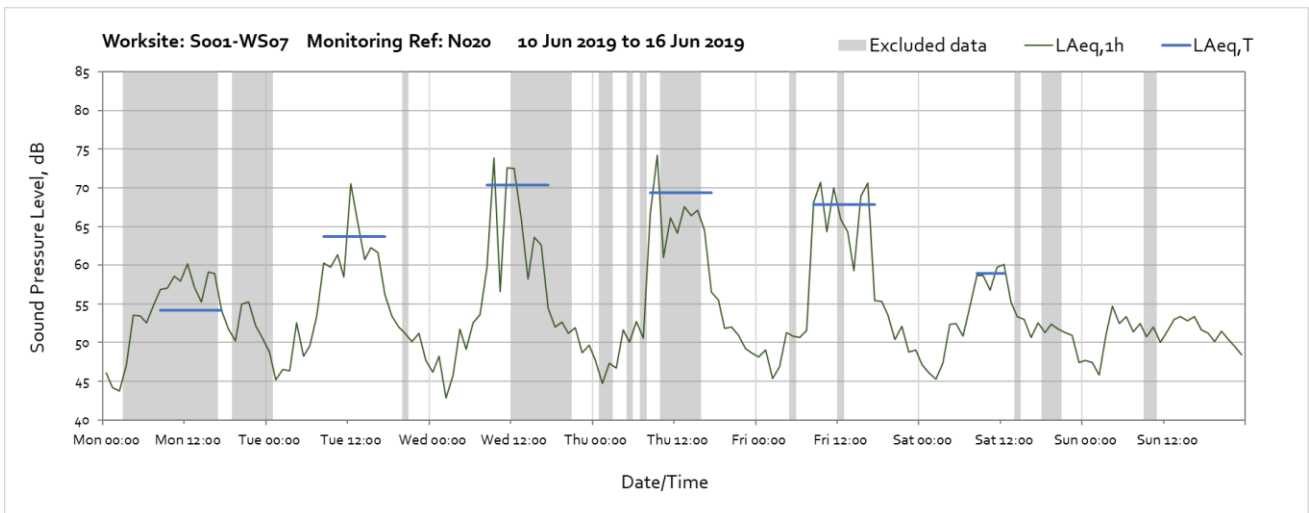
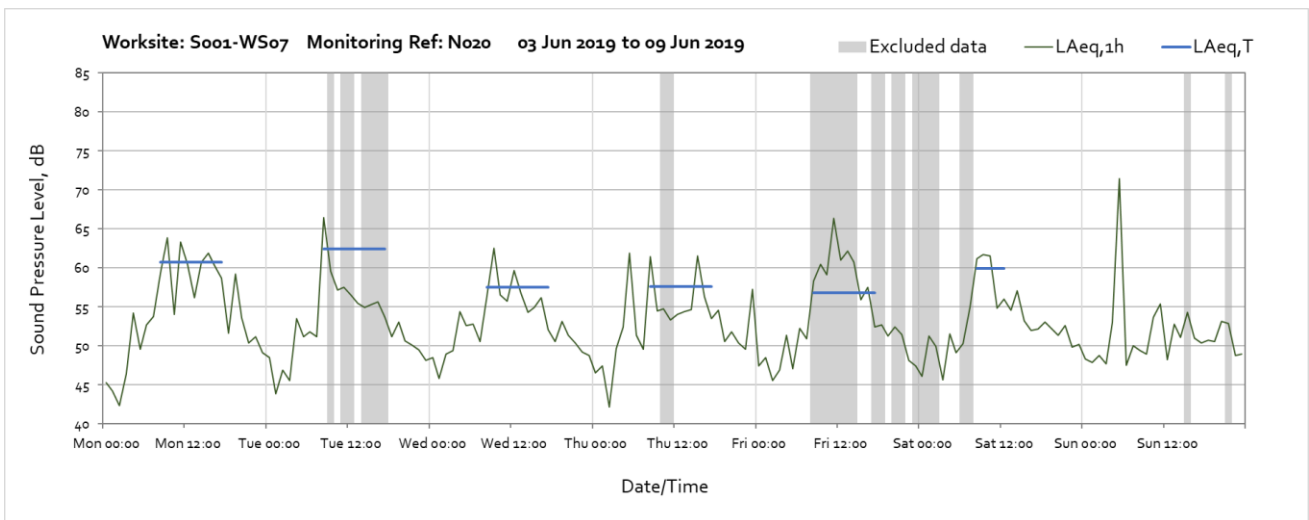
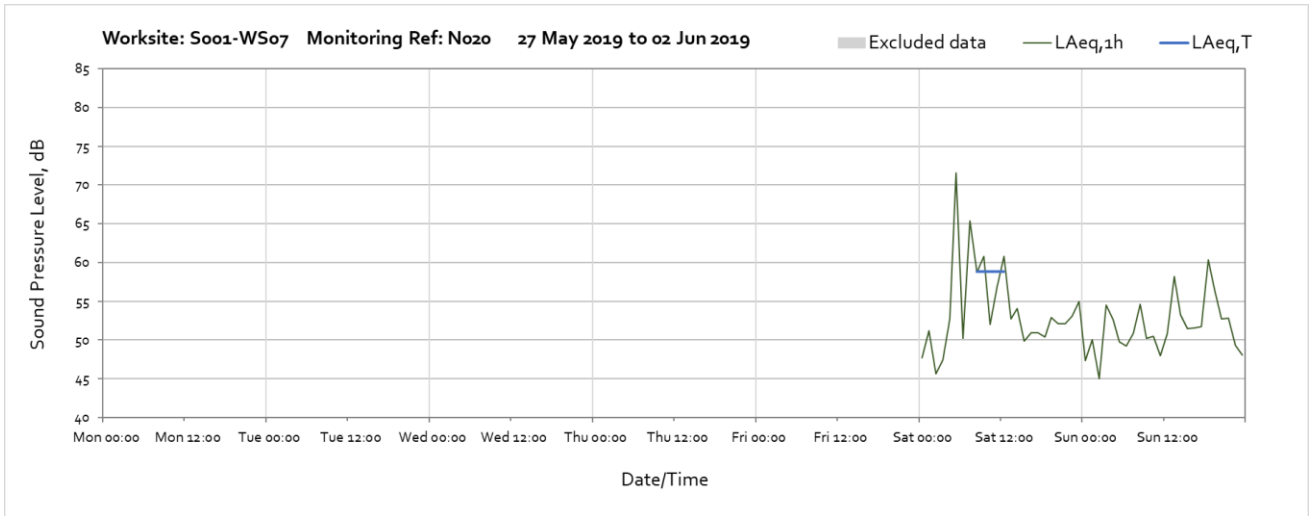


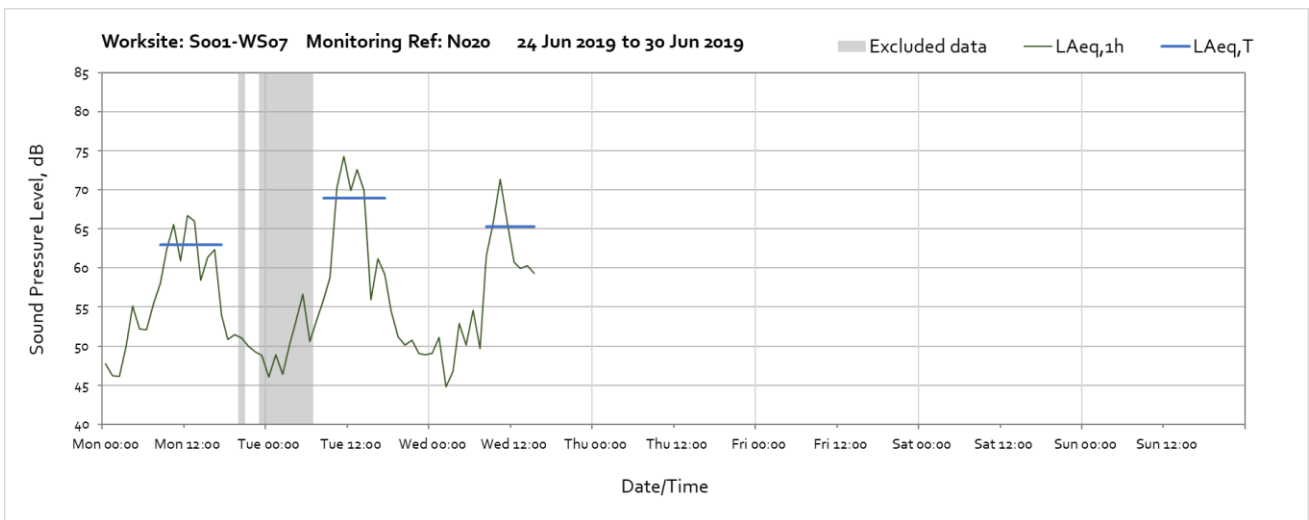
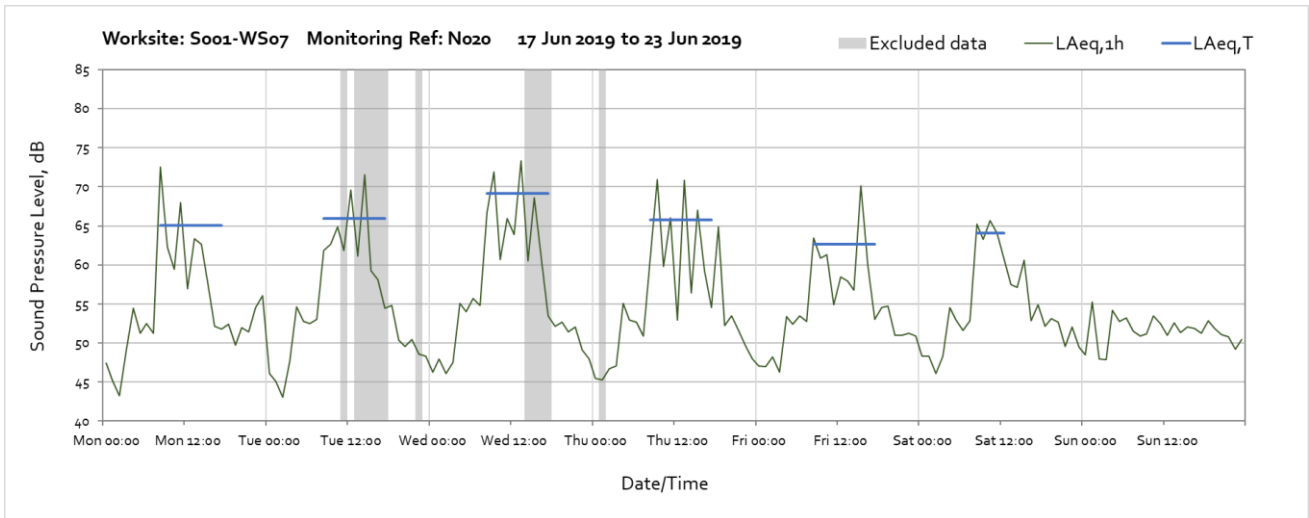
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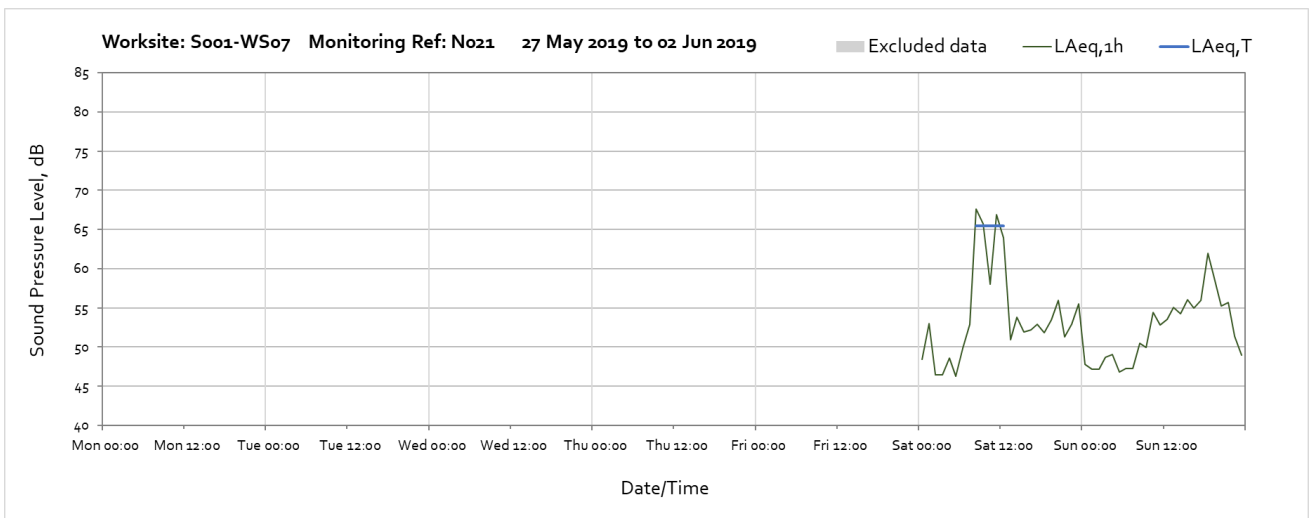
Worksite: S001-WS02 – Monitoring Ref: N020

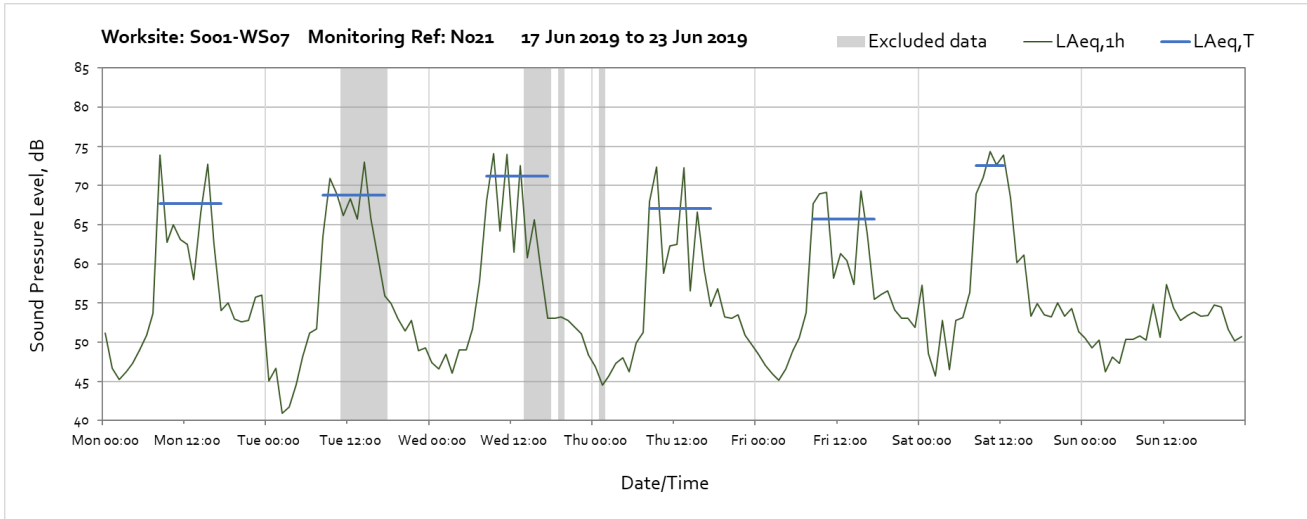
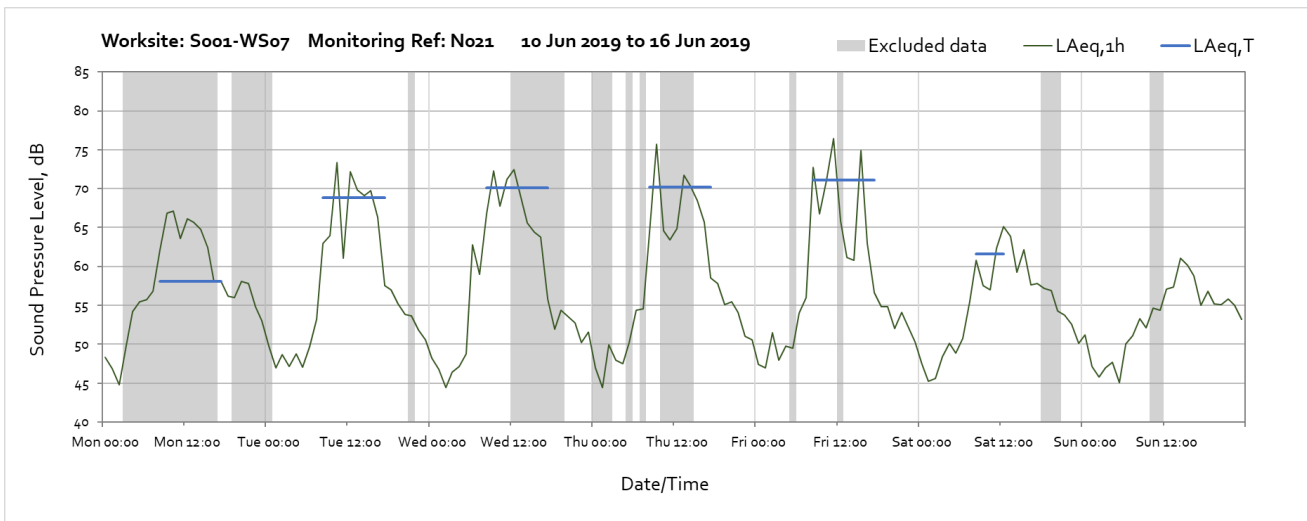
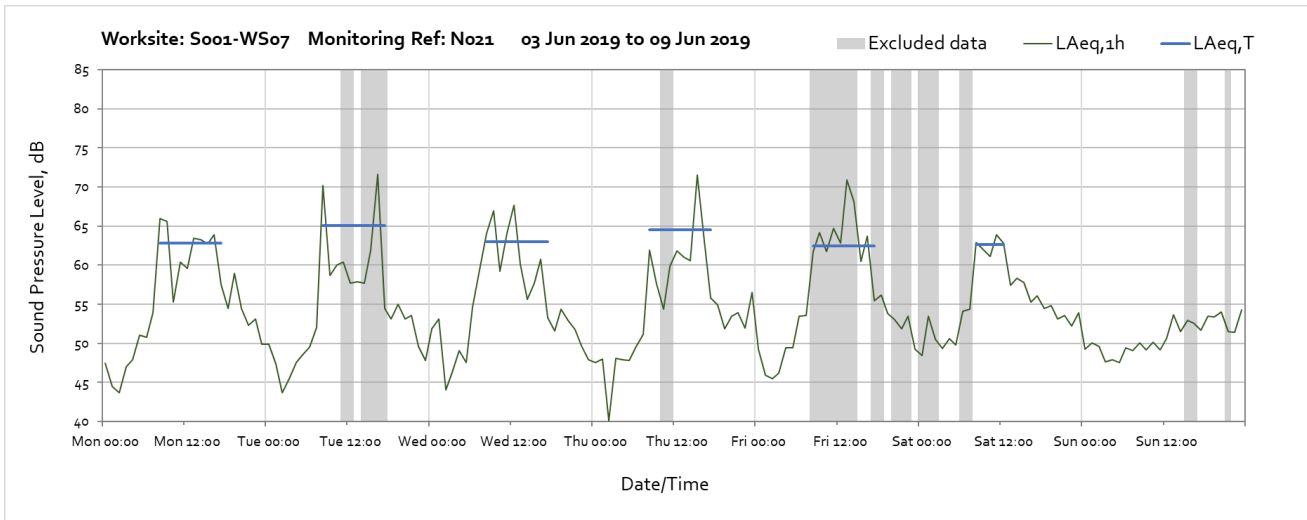


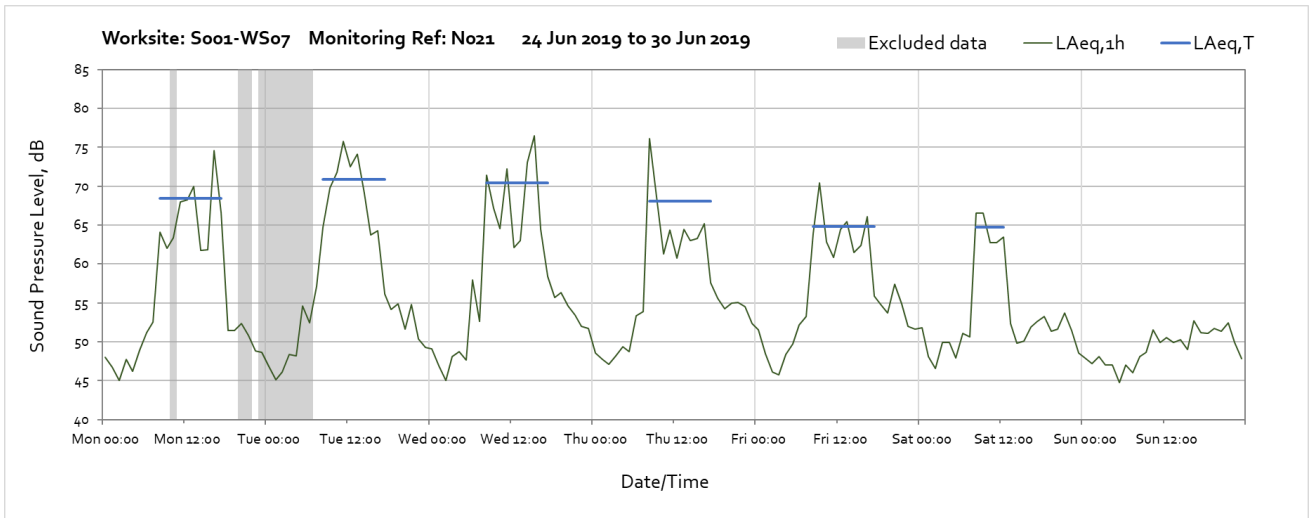


Note: Missing data between 16:00 on Wednesday 26th and the end of month were due to the measurement being stopped and mistakenly not restarted during a site visit.

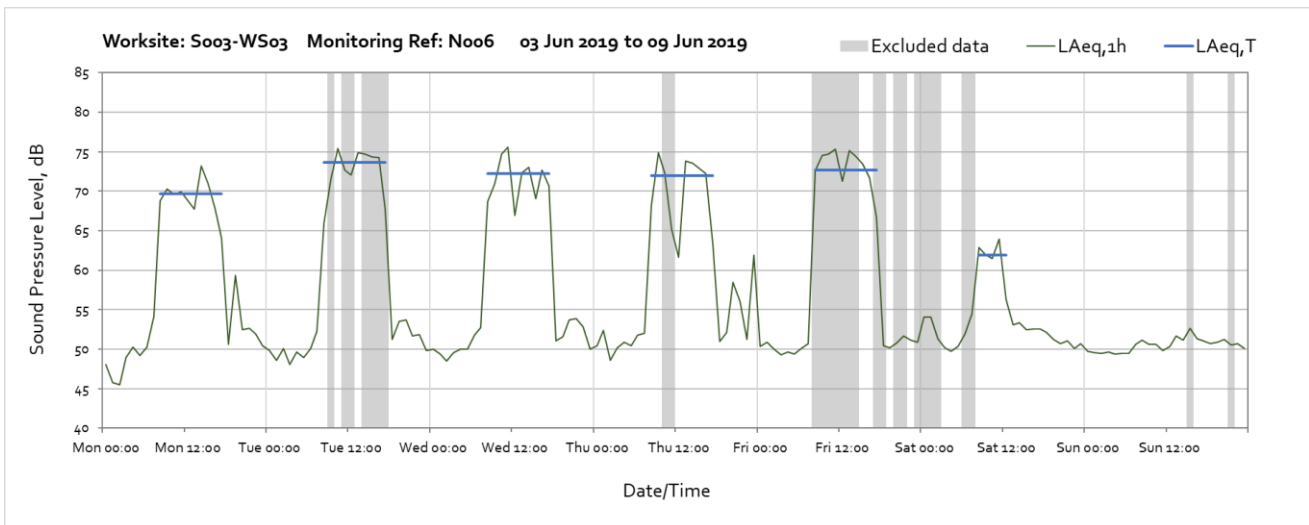
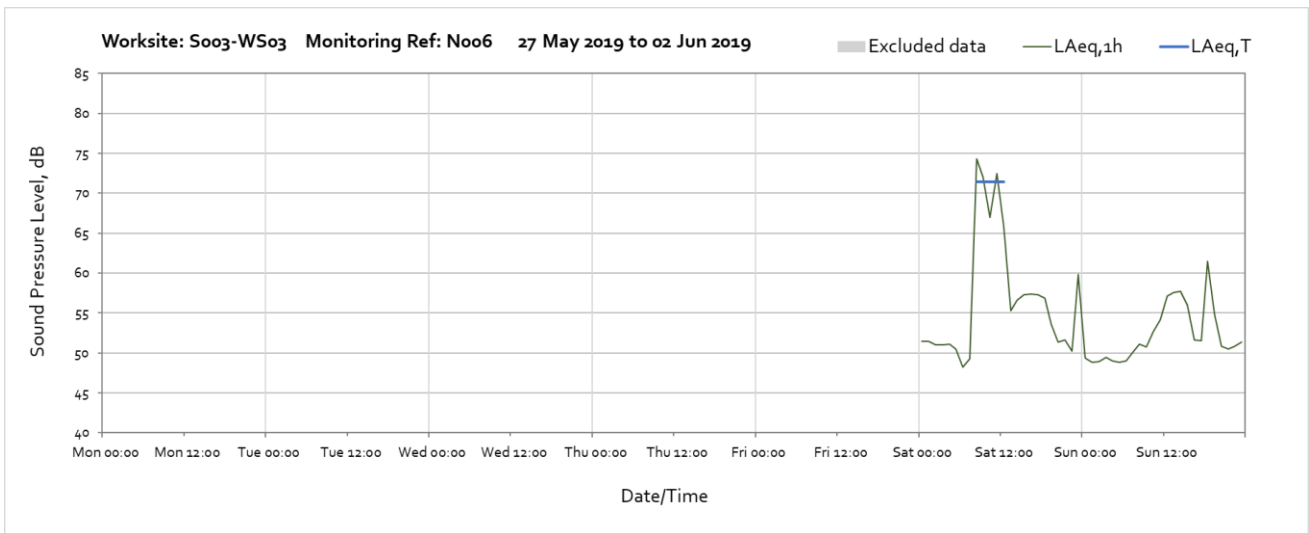
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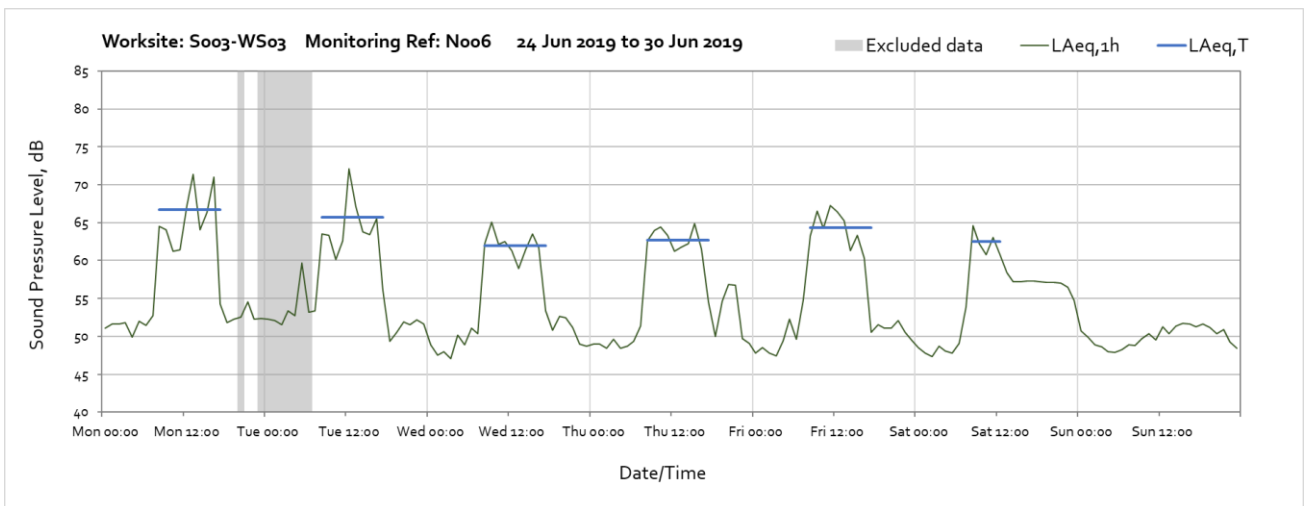
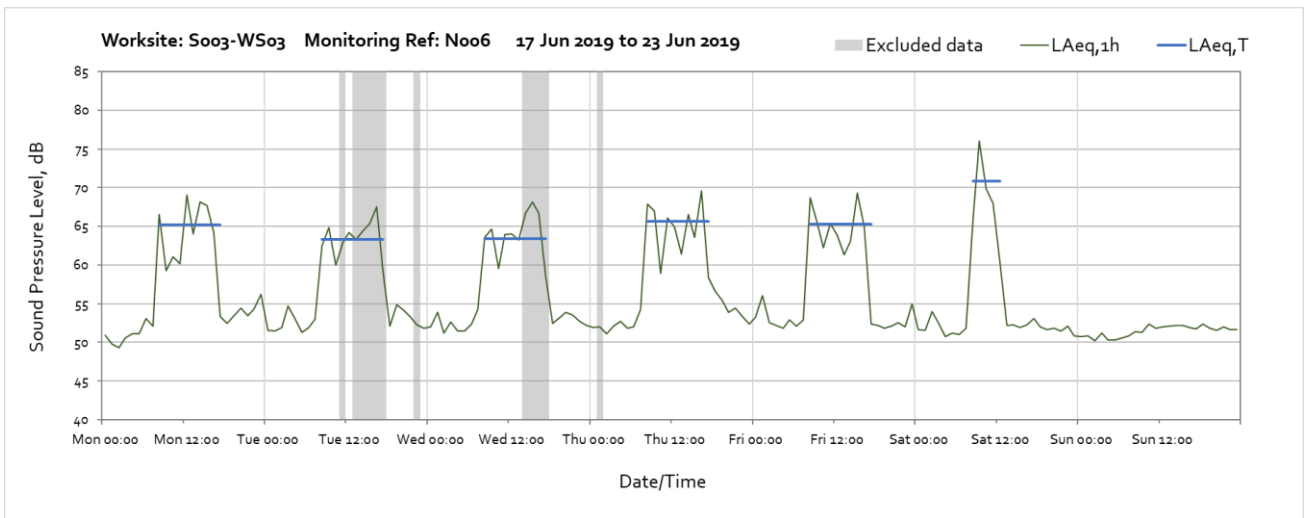
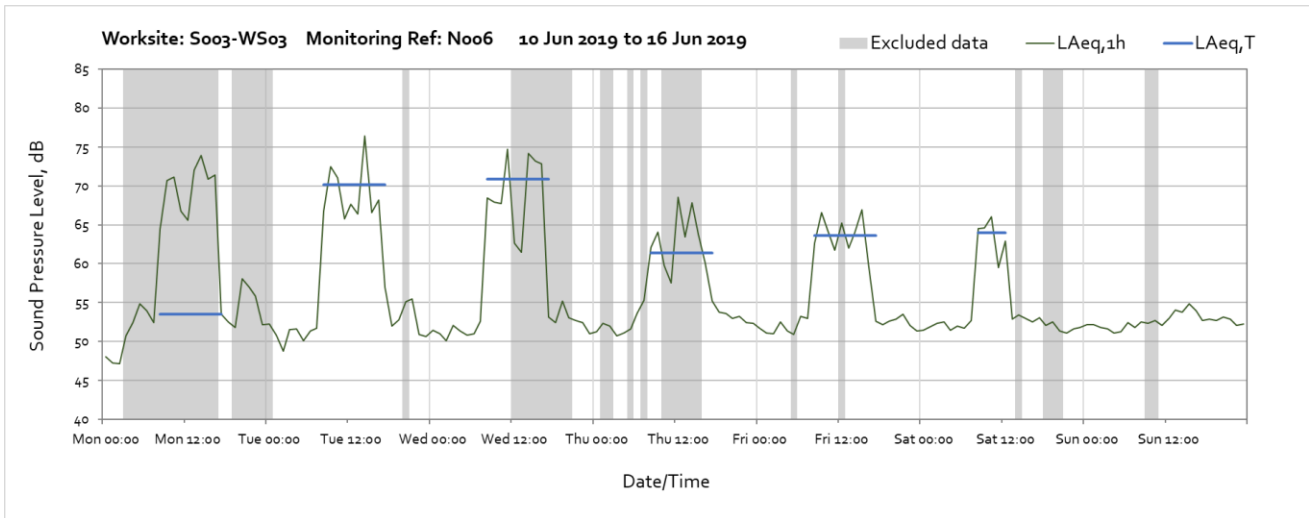




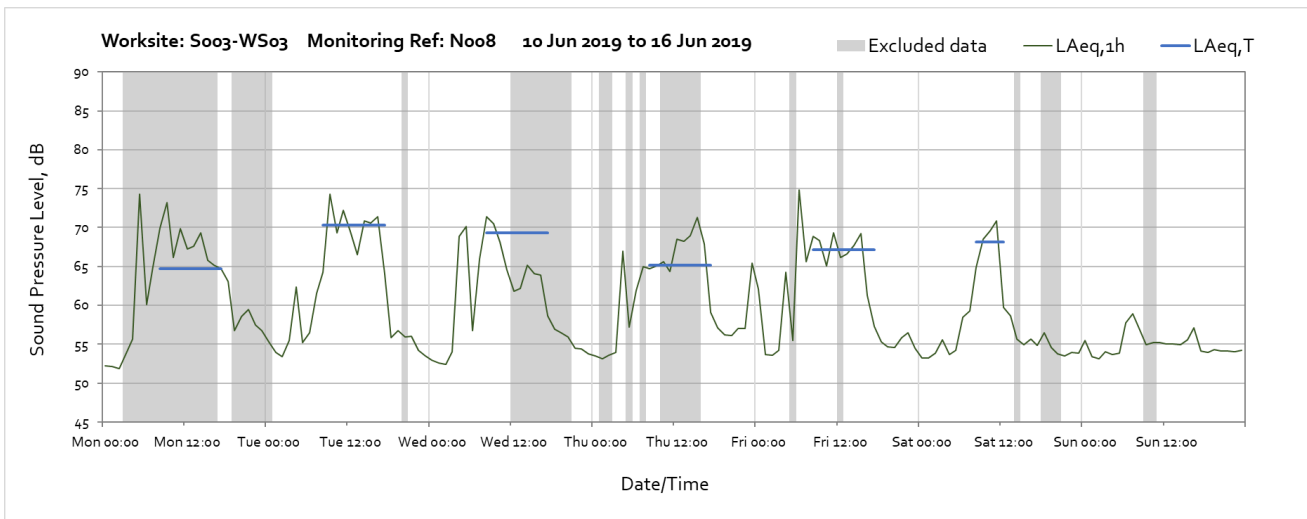
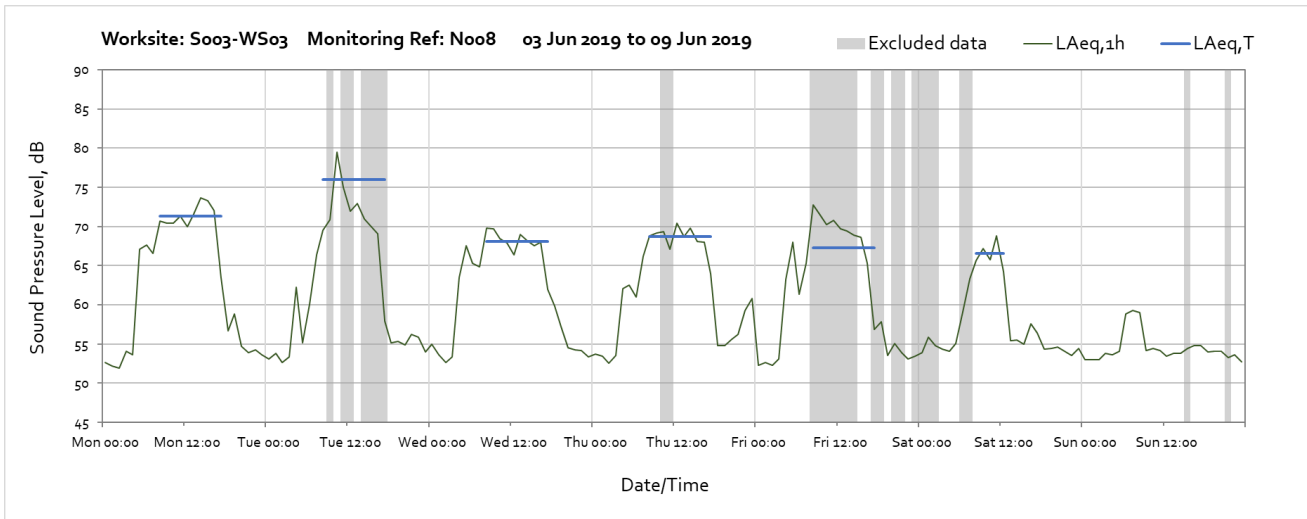
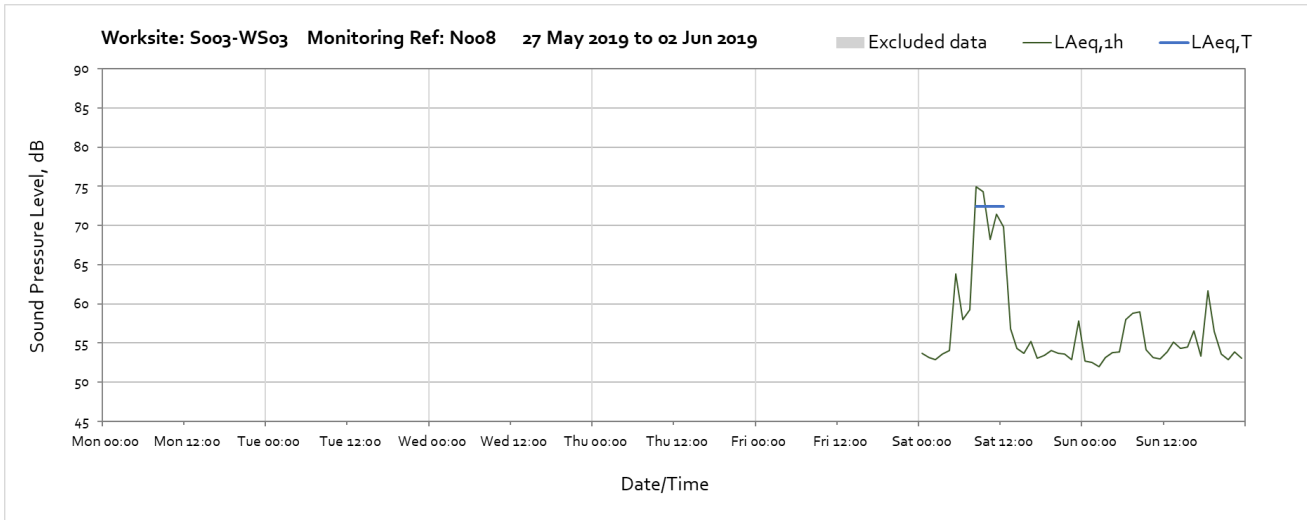


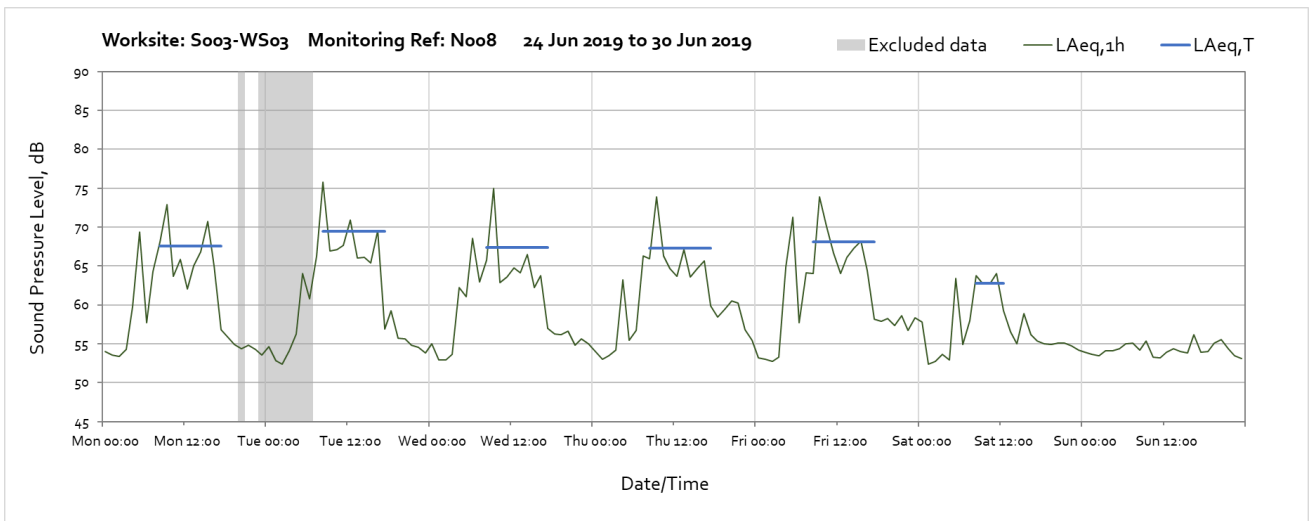
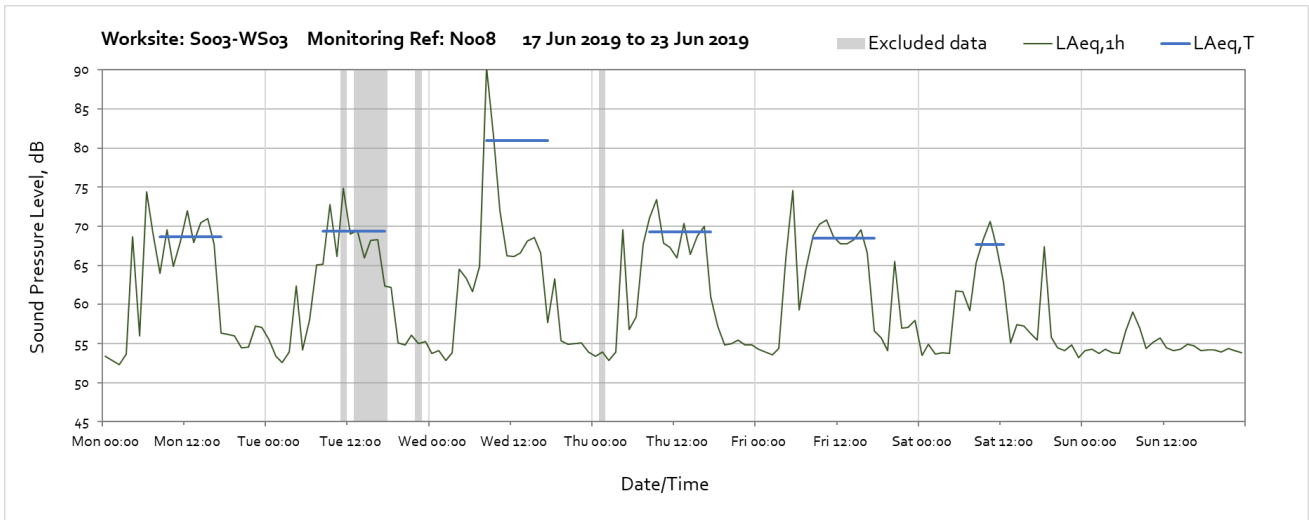
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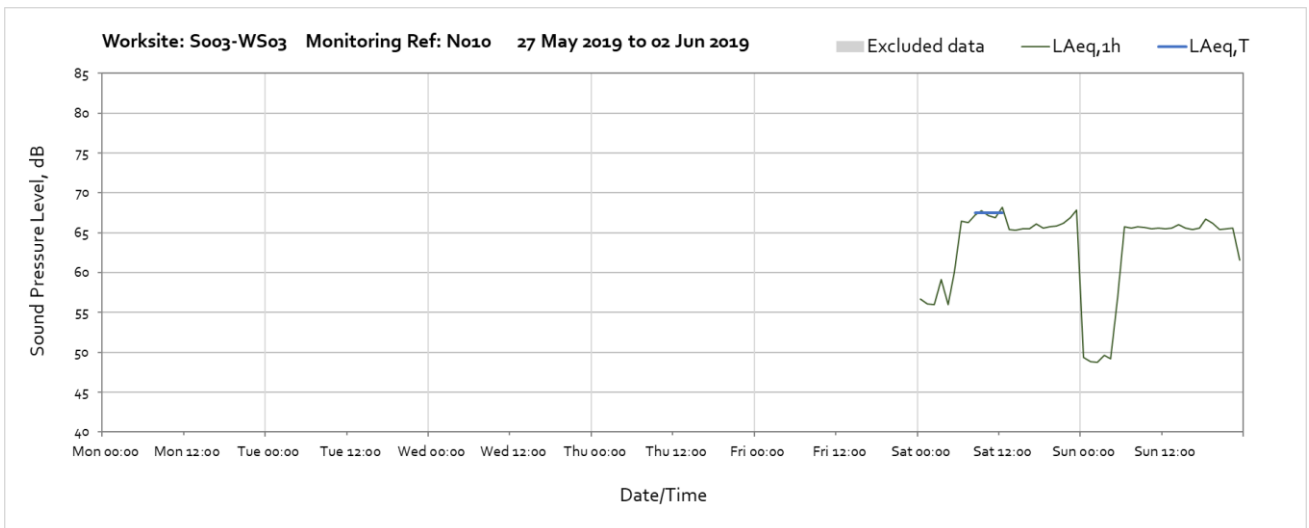


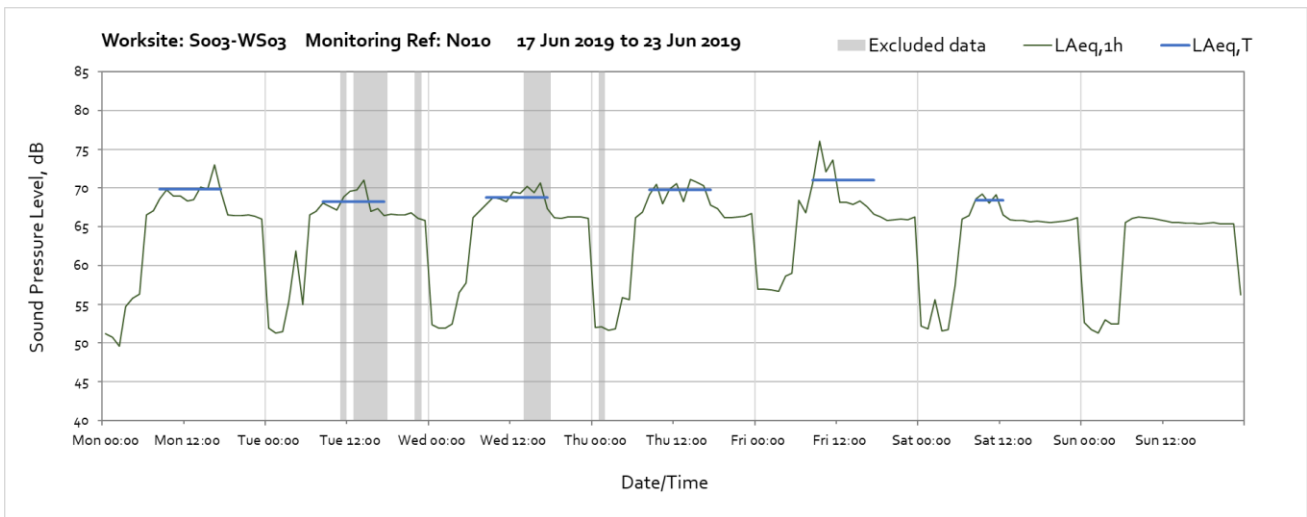
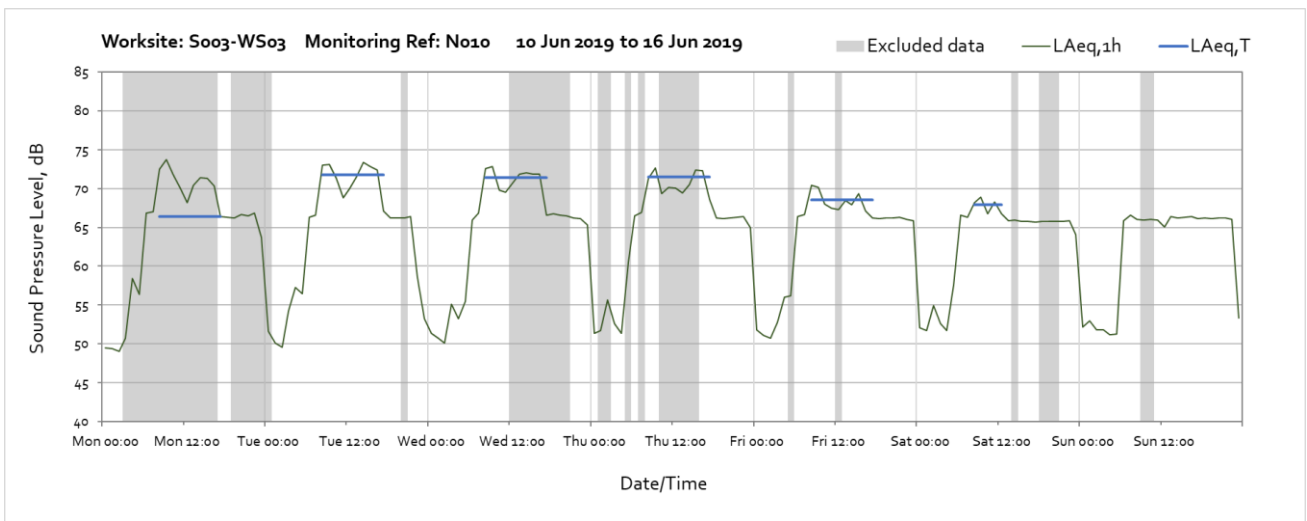
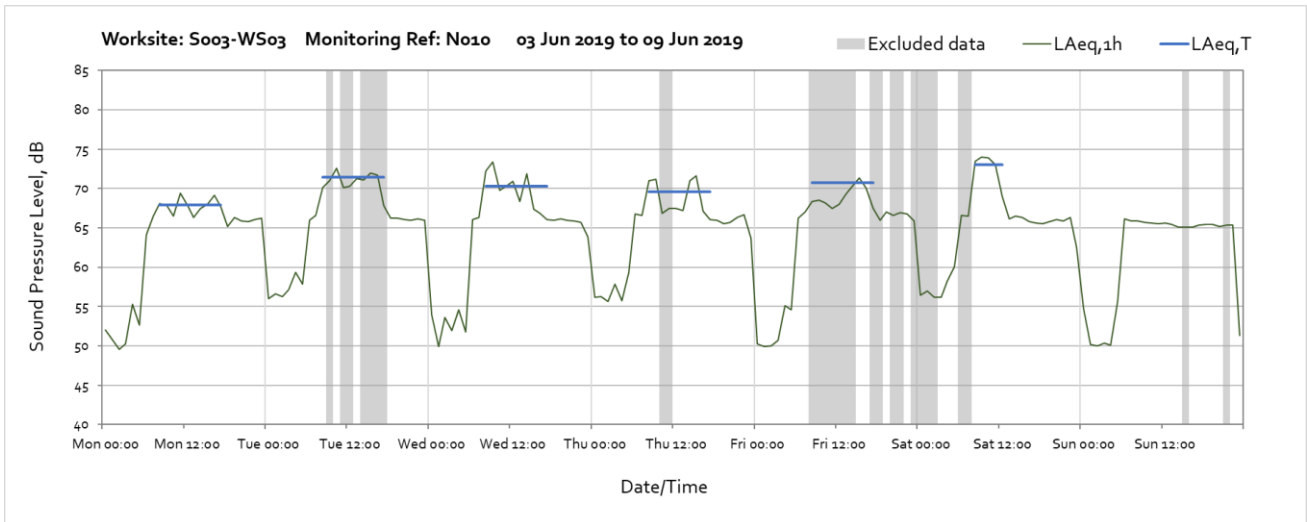
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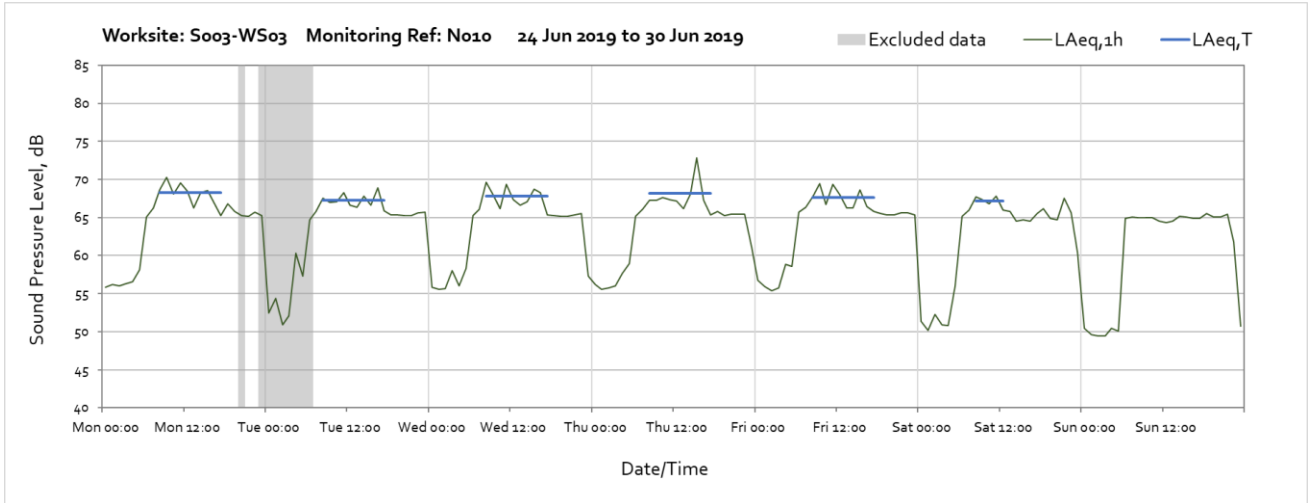




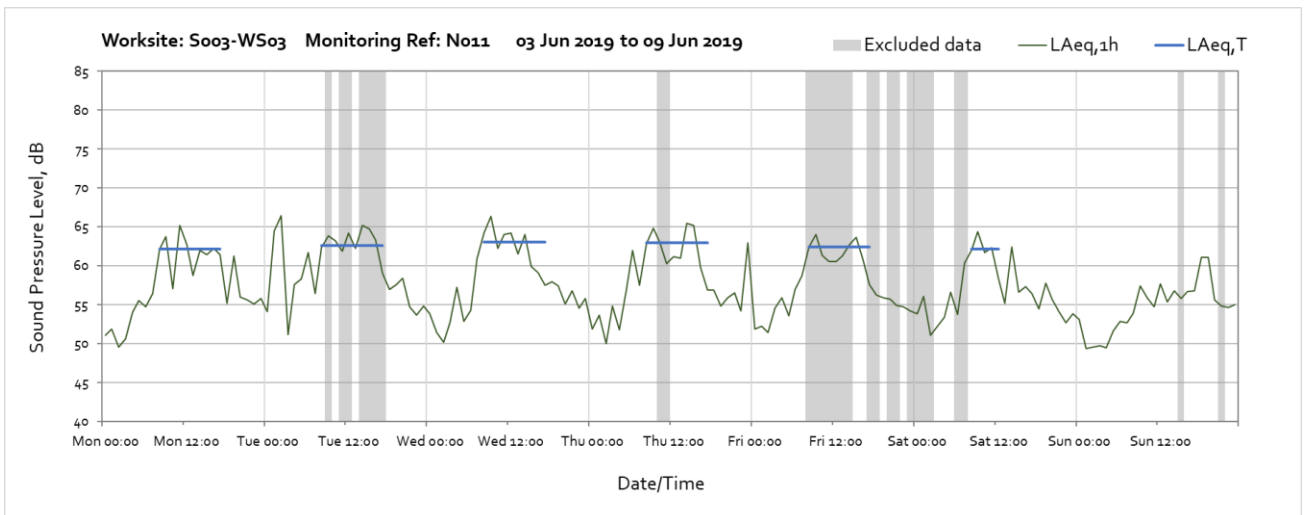
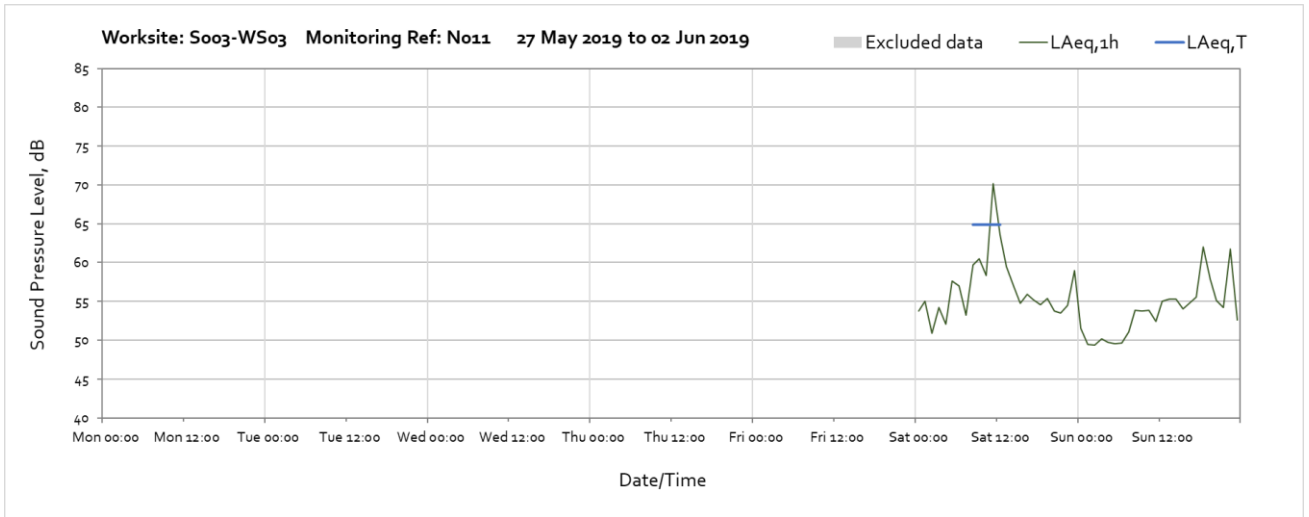
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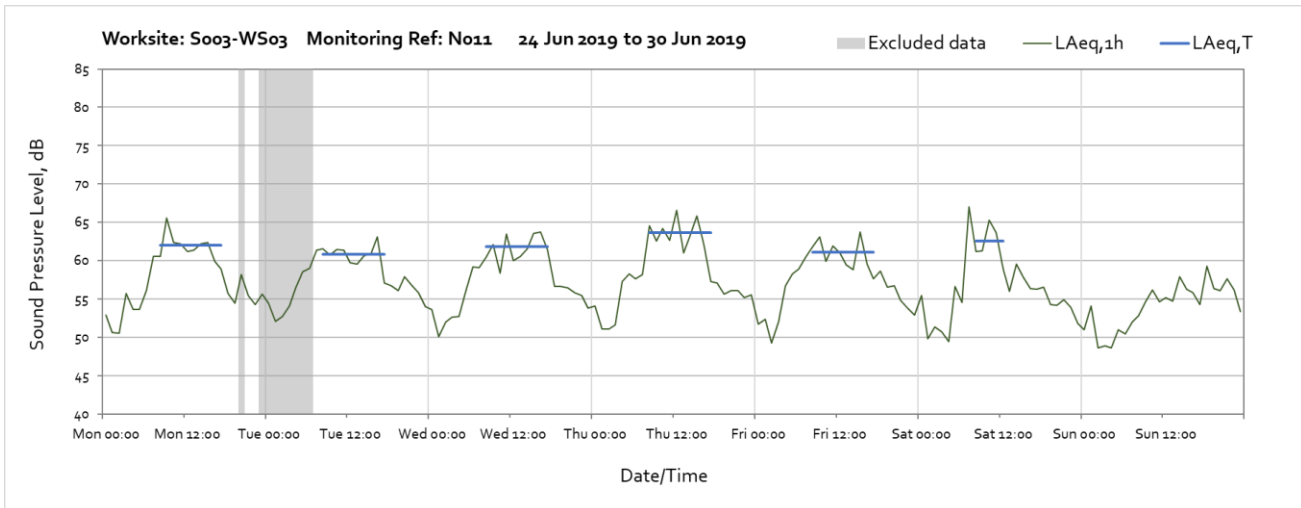
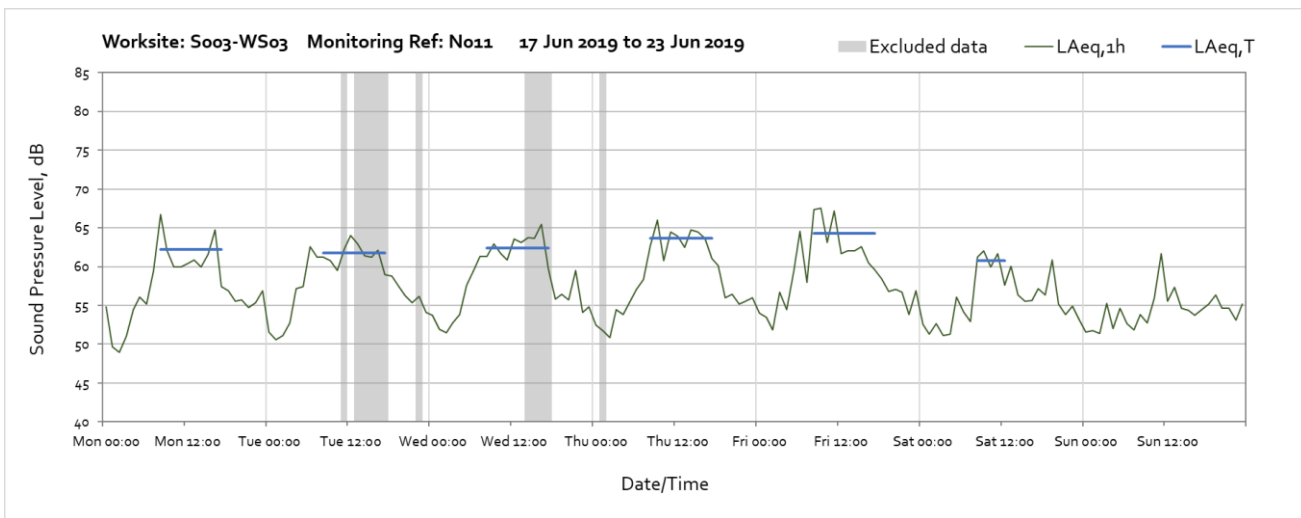
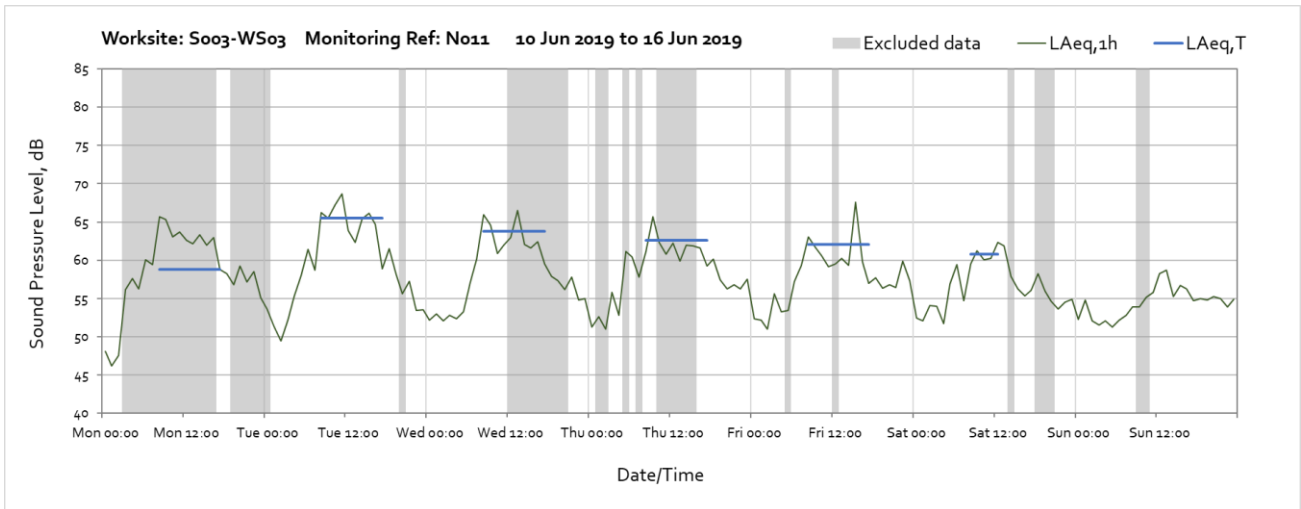




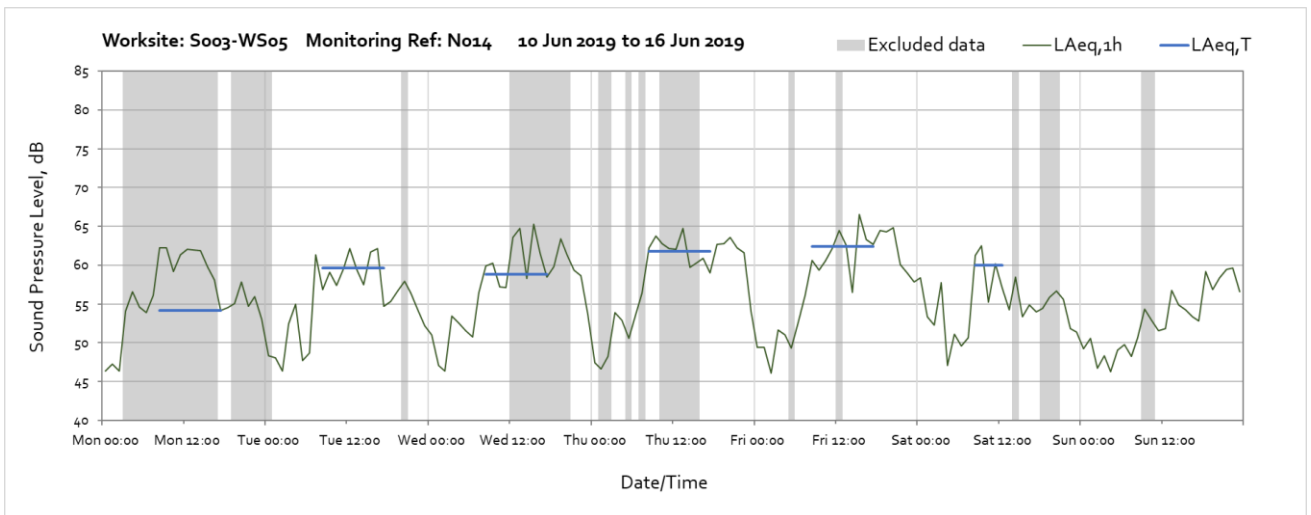
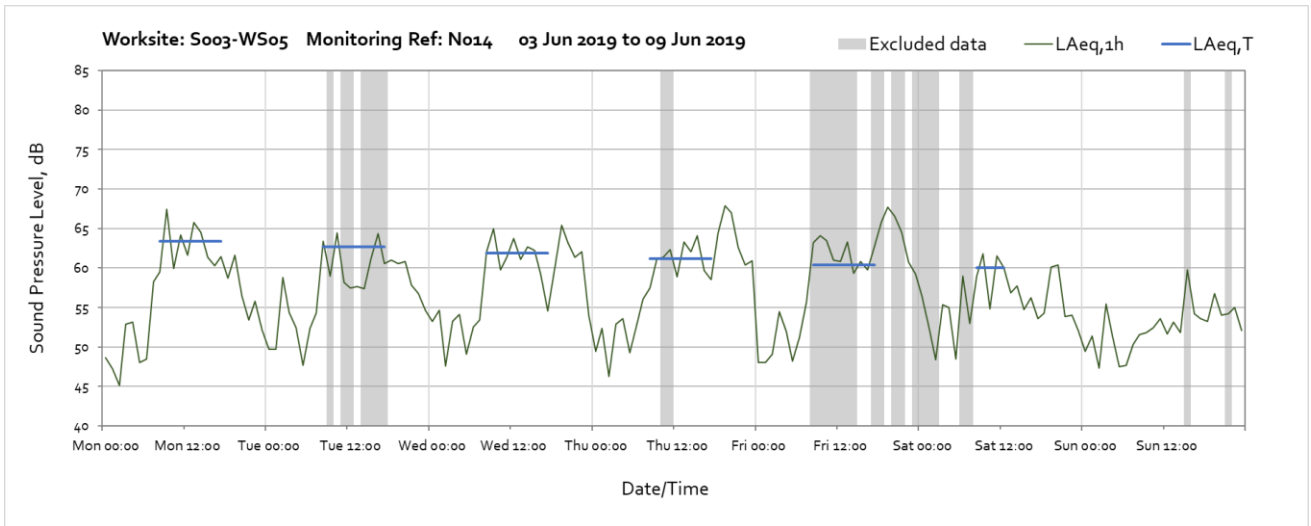
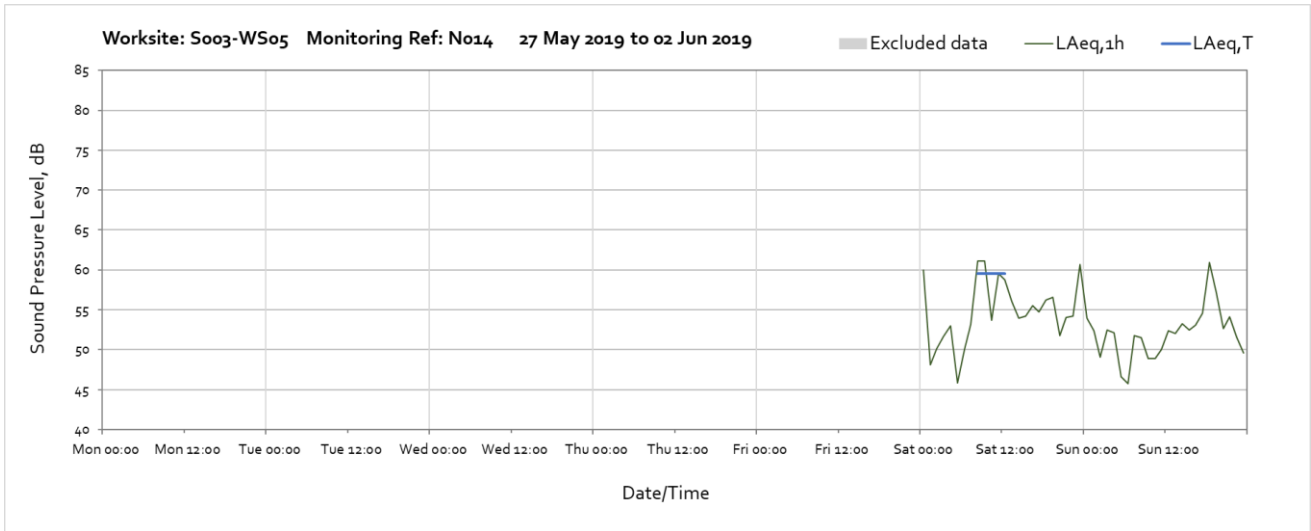


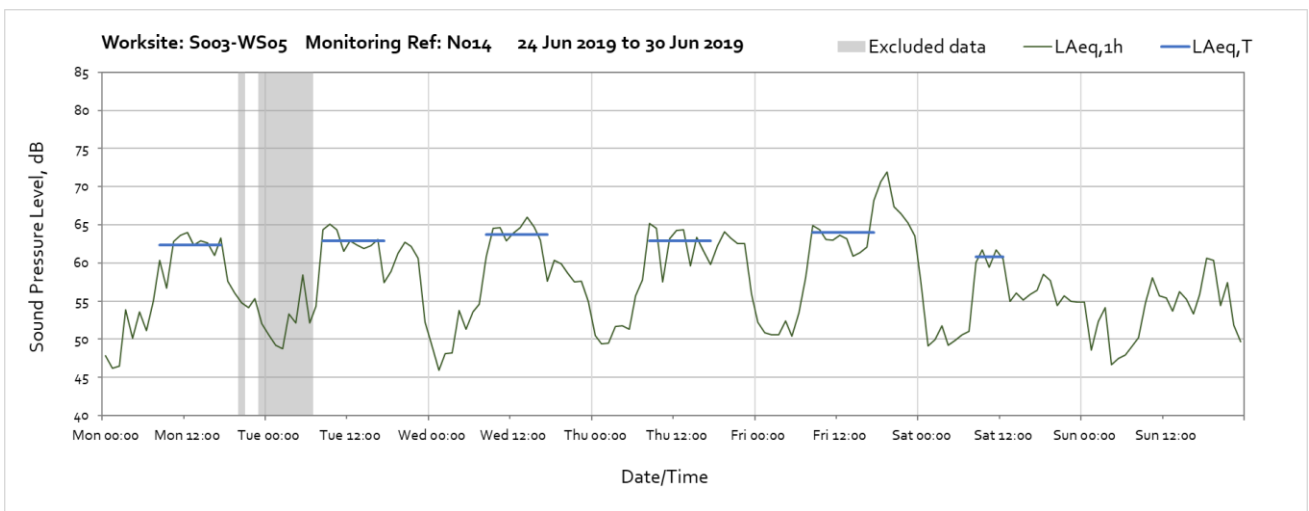
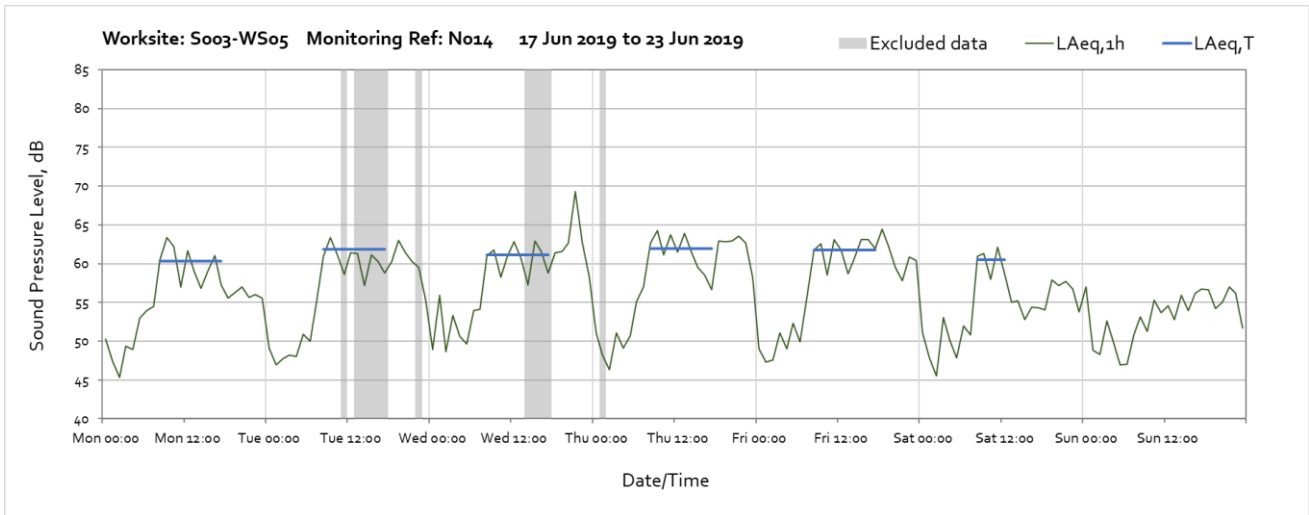
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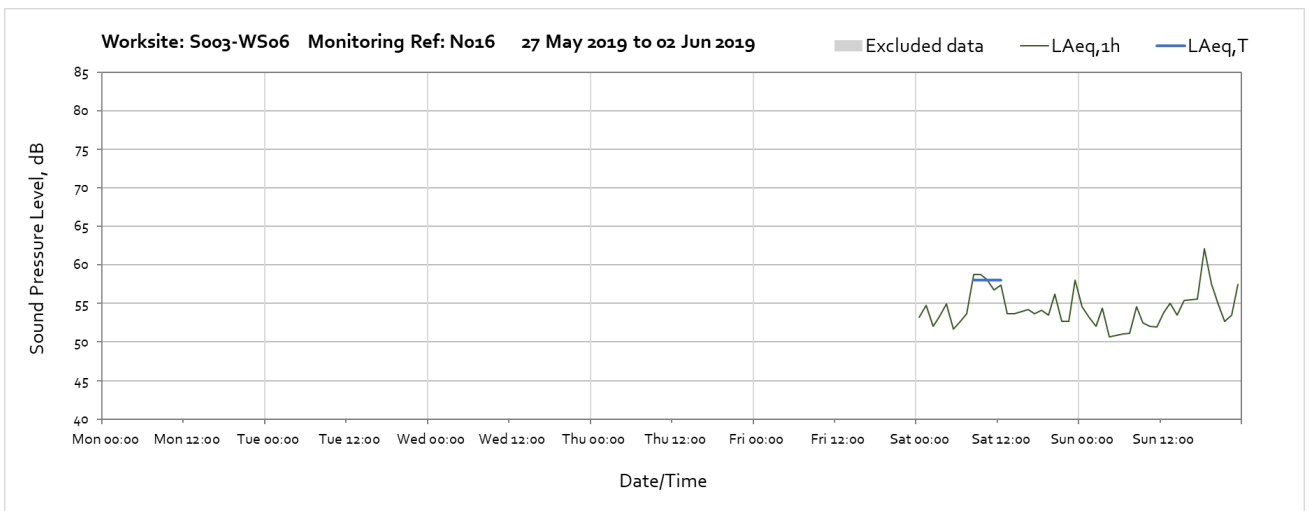


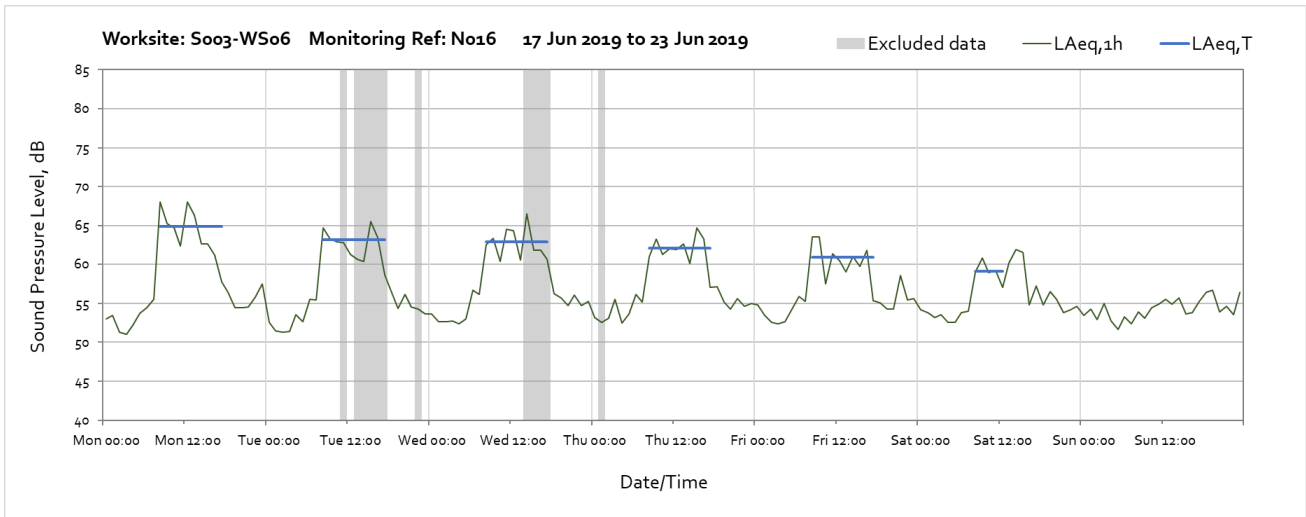
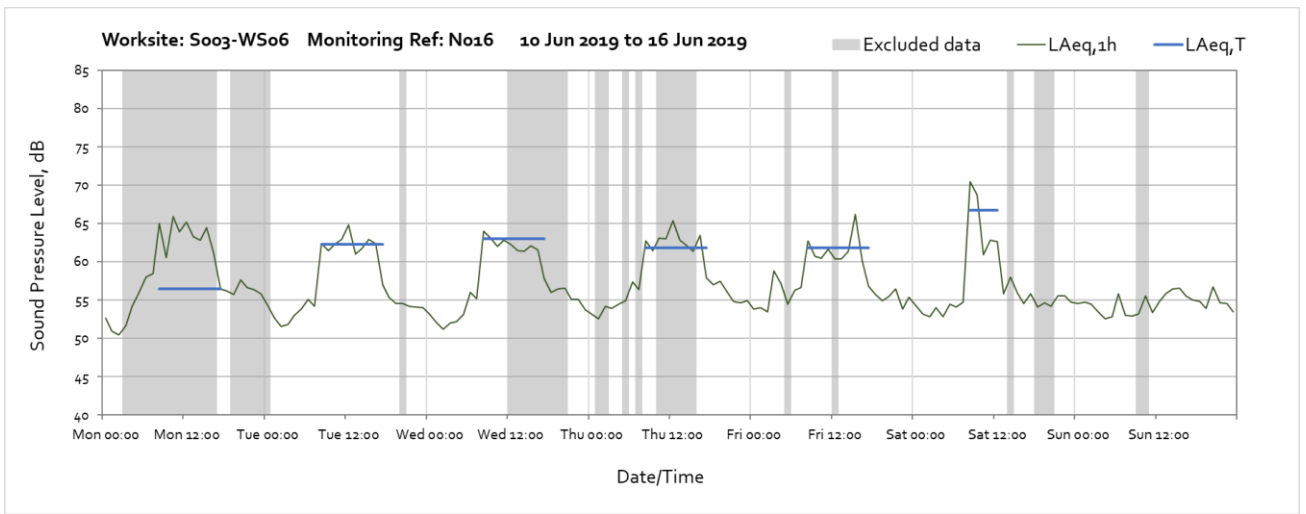
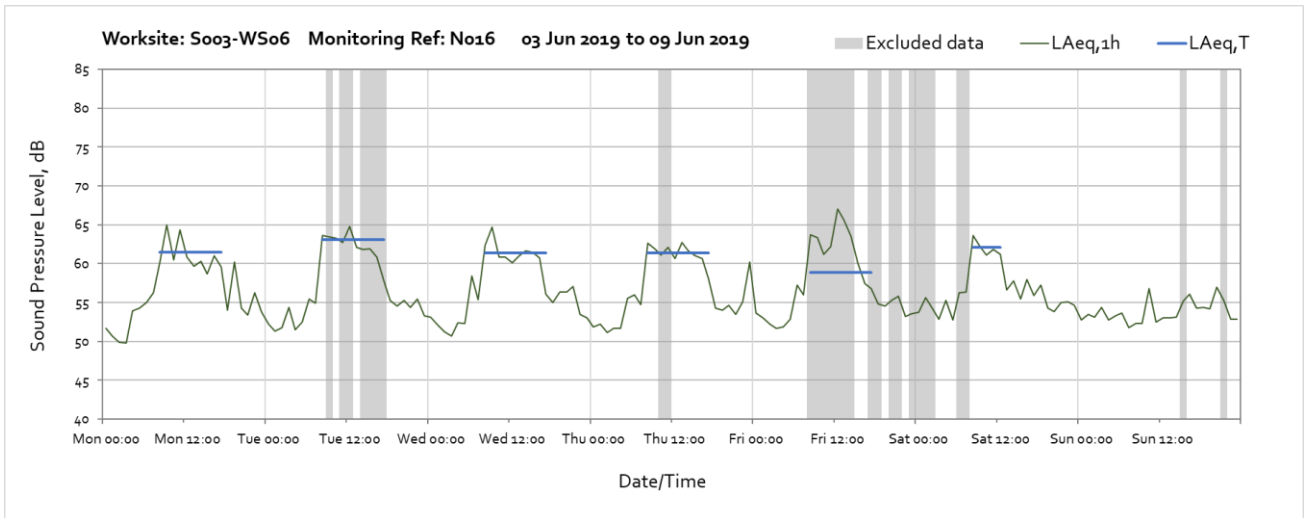
Worksite: S003-WS05 – Monitoring Ref: N014

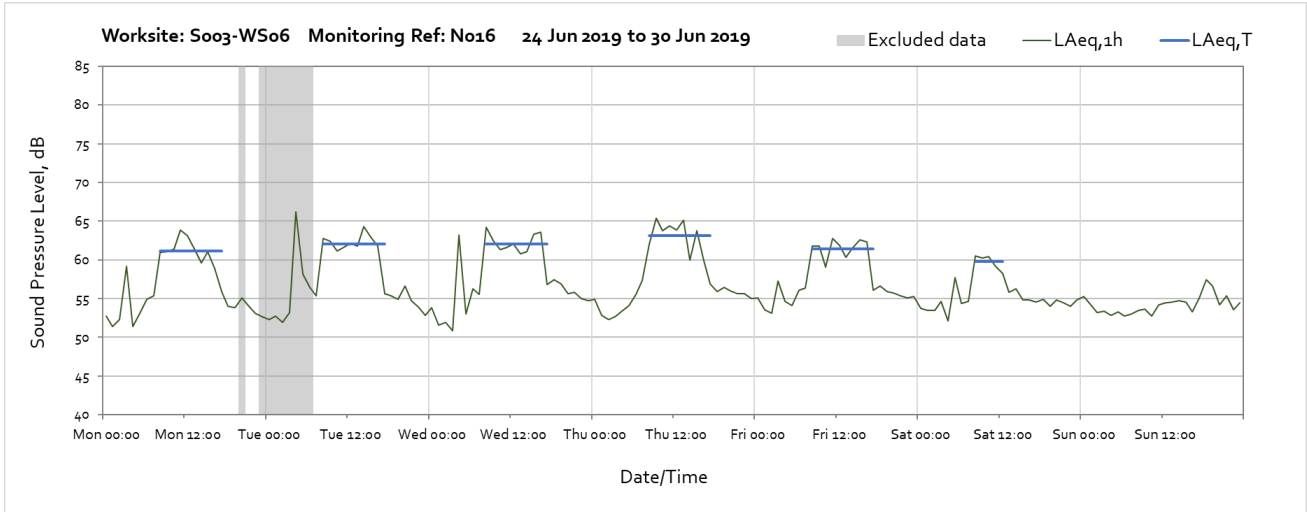




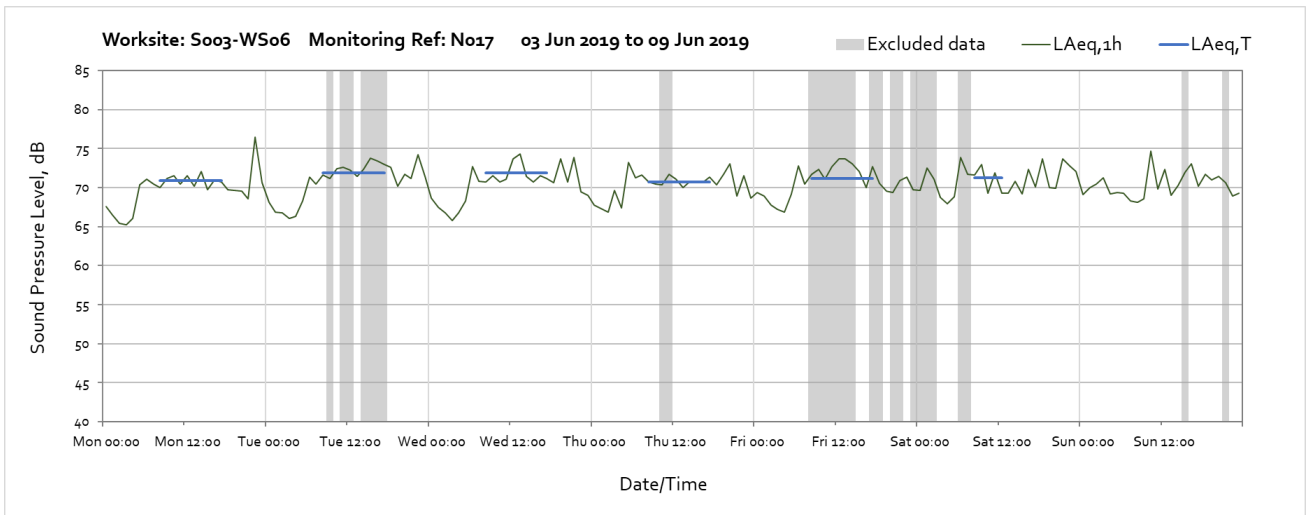
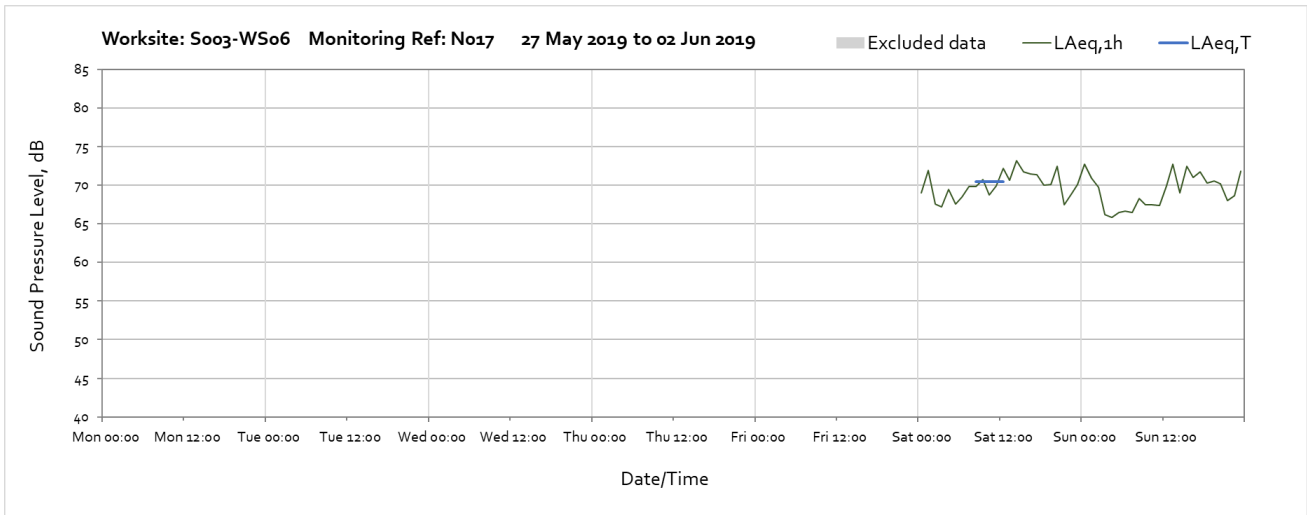
Worksite: S003-WS06 – Monitoring Ref: N016

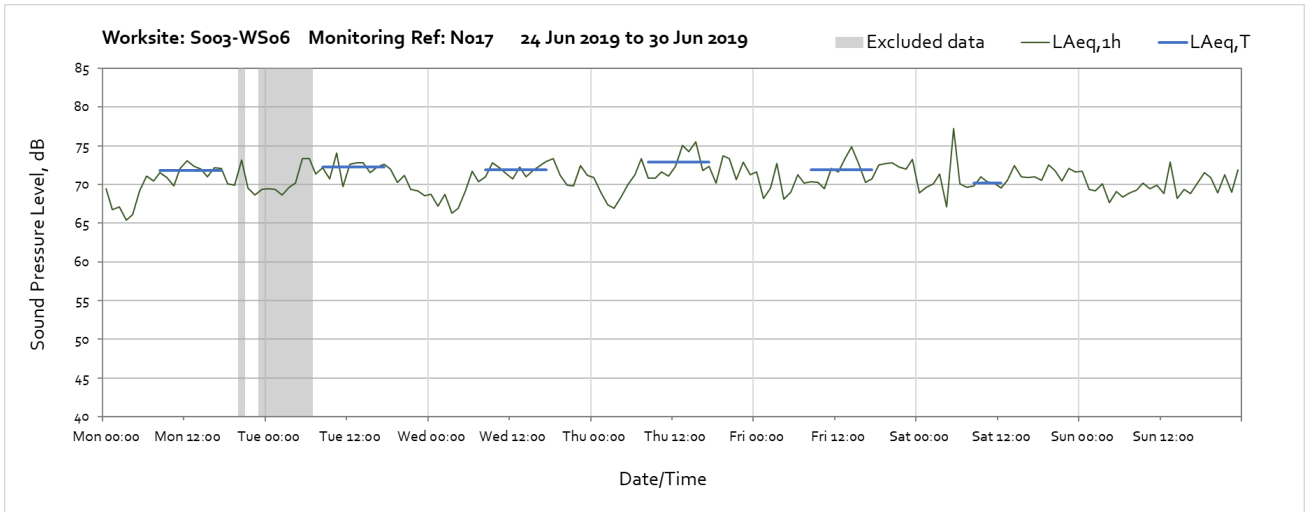
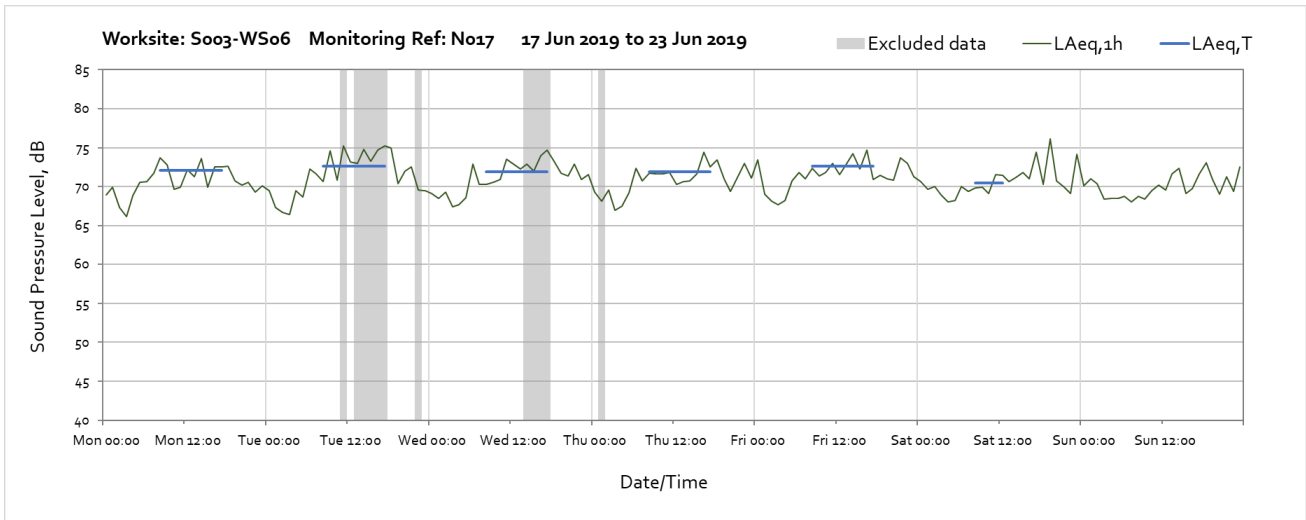
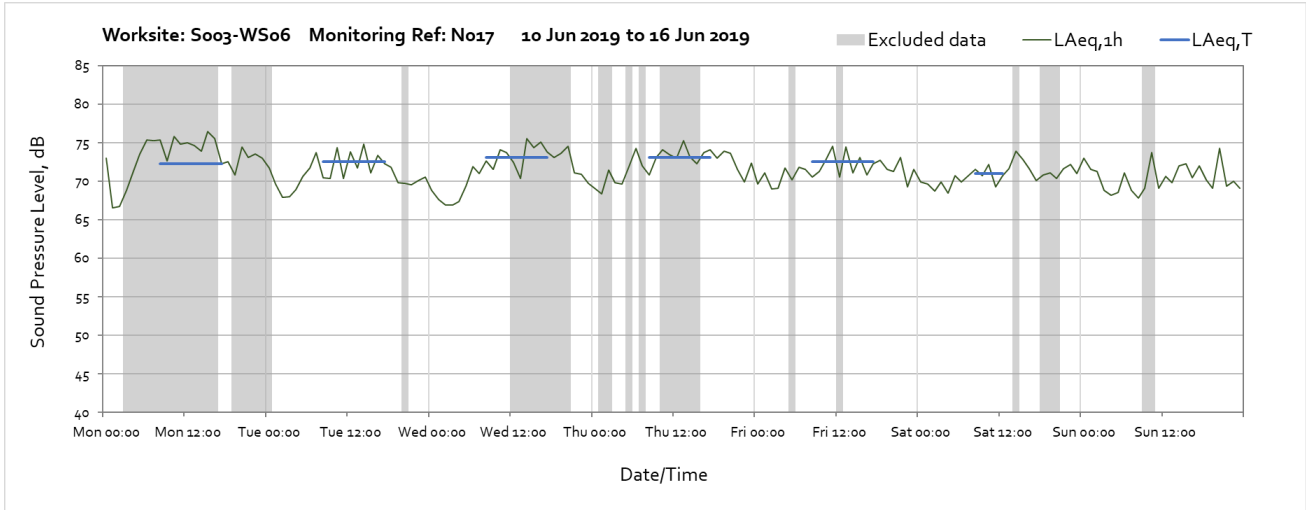




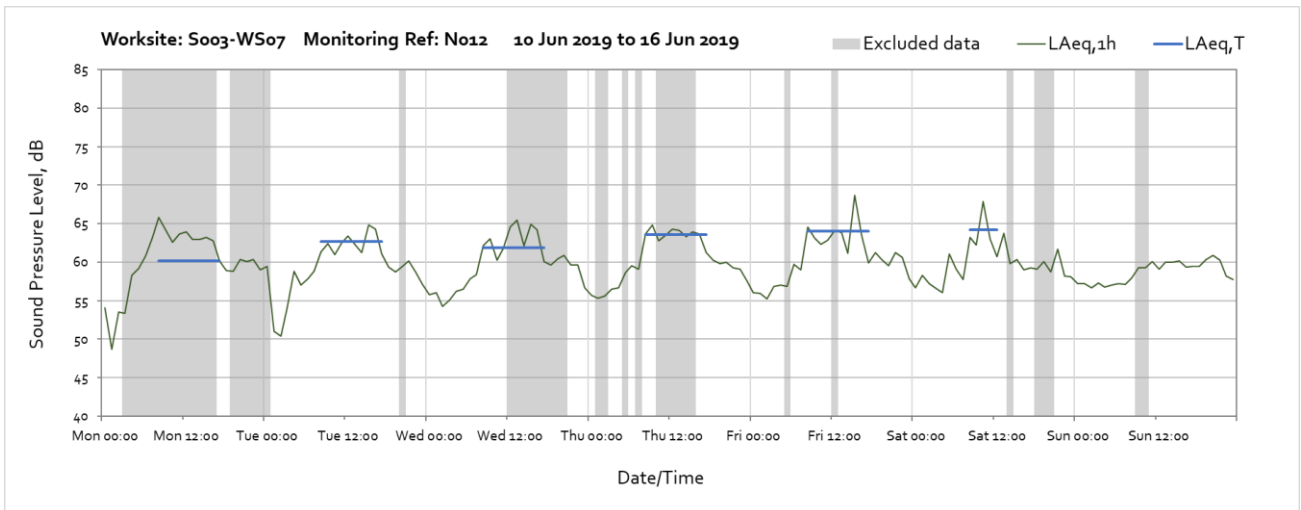
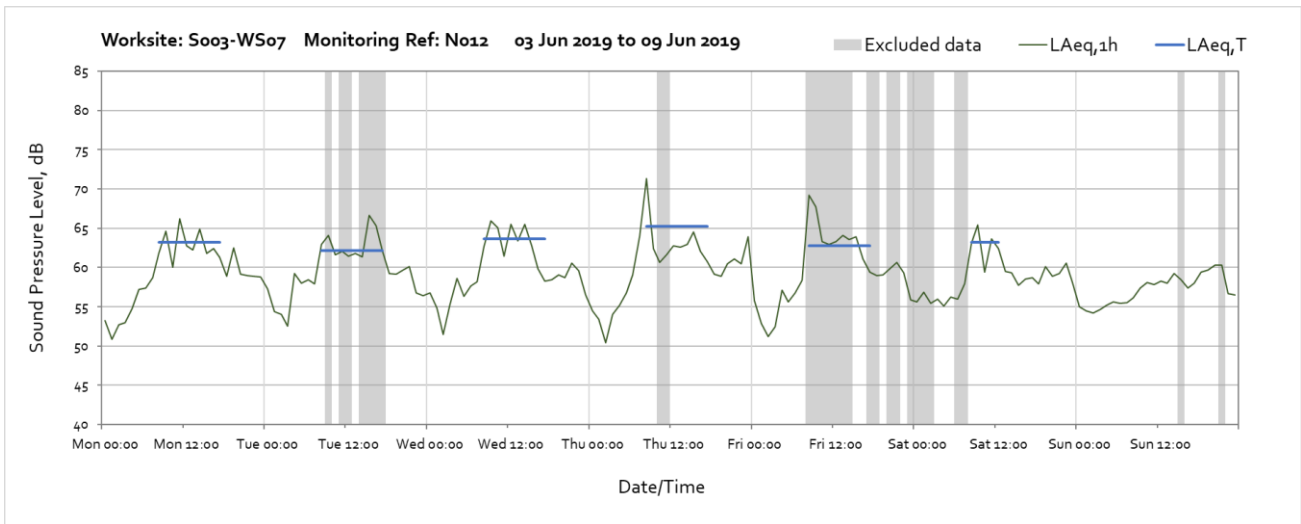
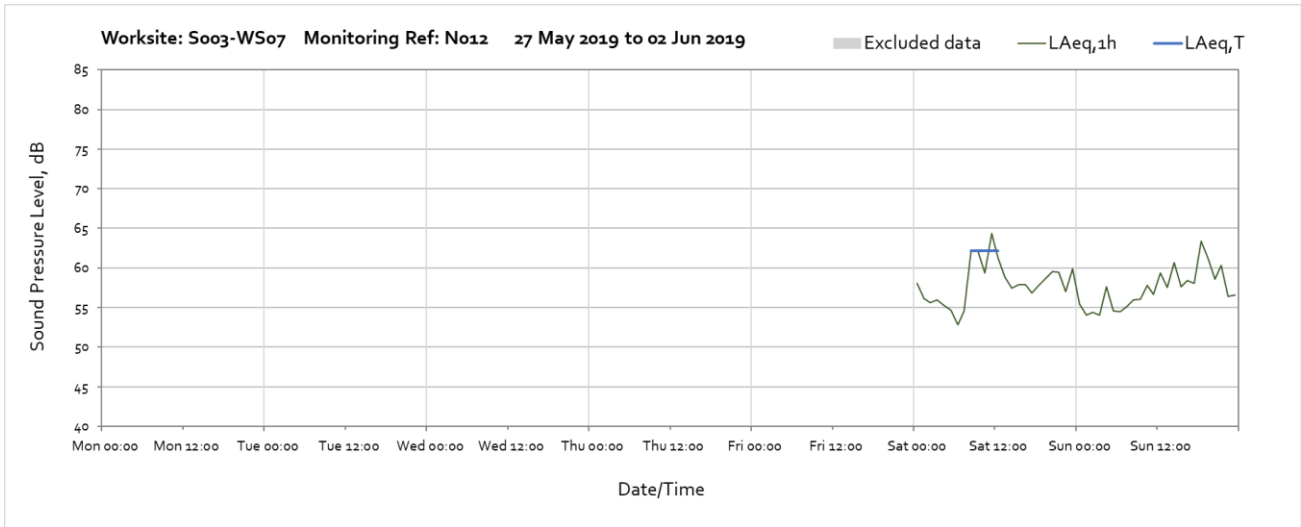


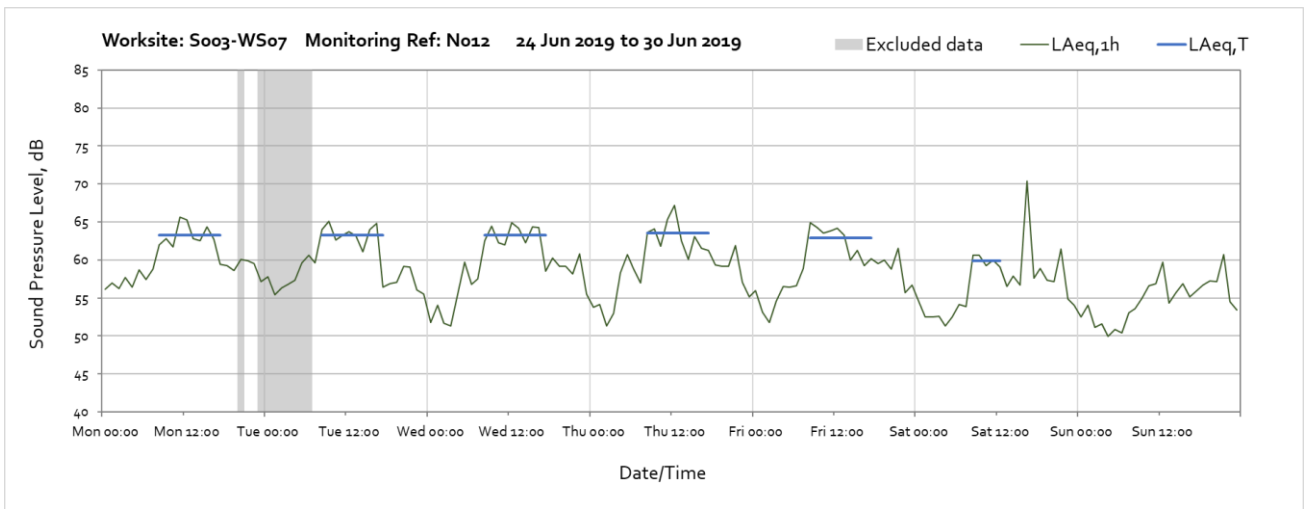
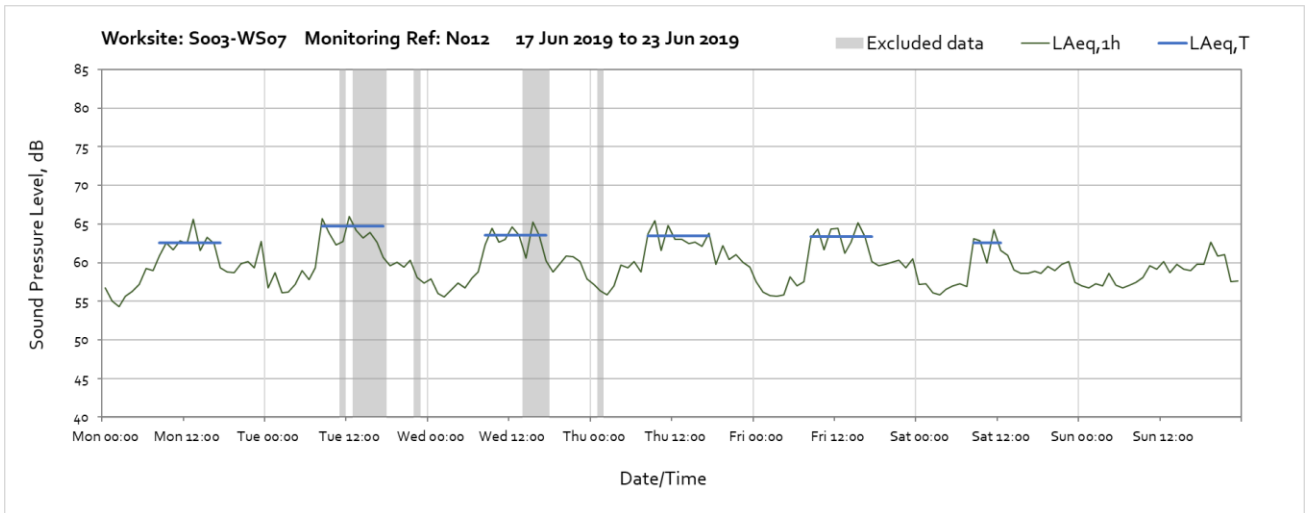
Worksite: S003-WS06 – Monitoring Ref: N017



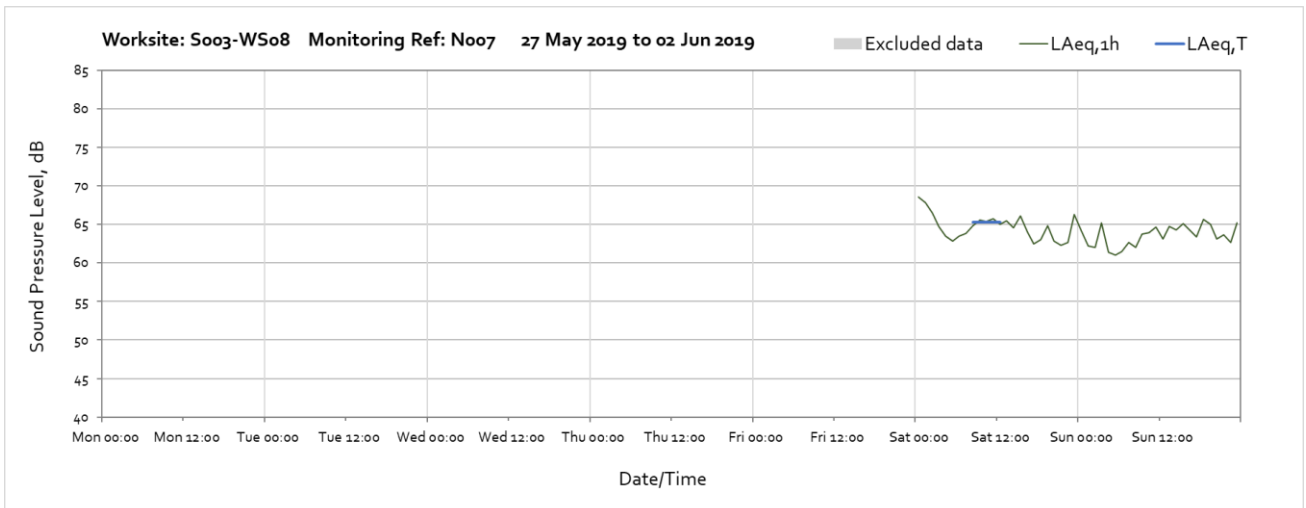


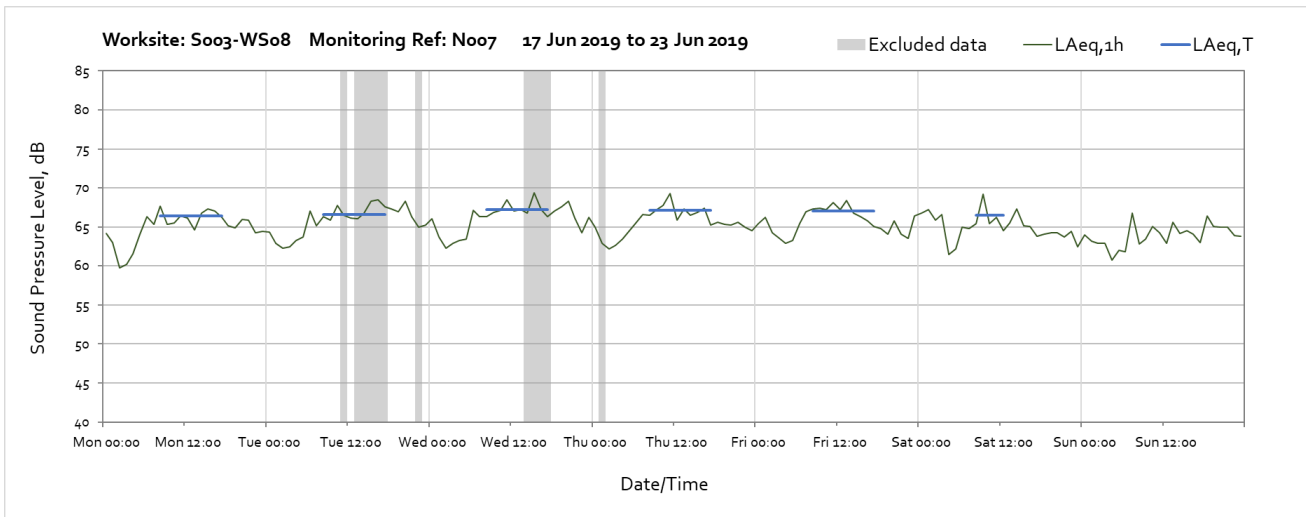
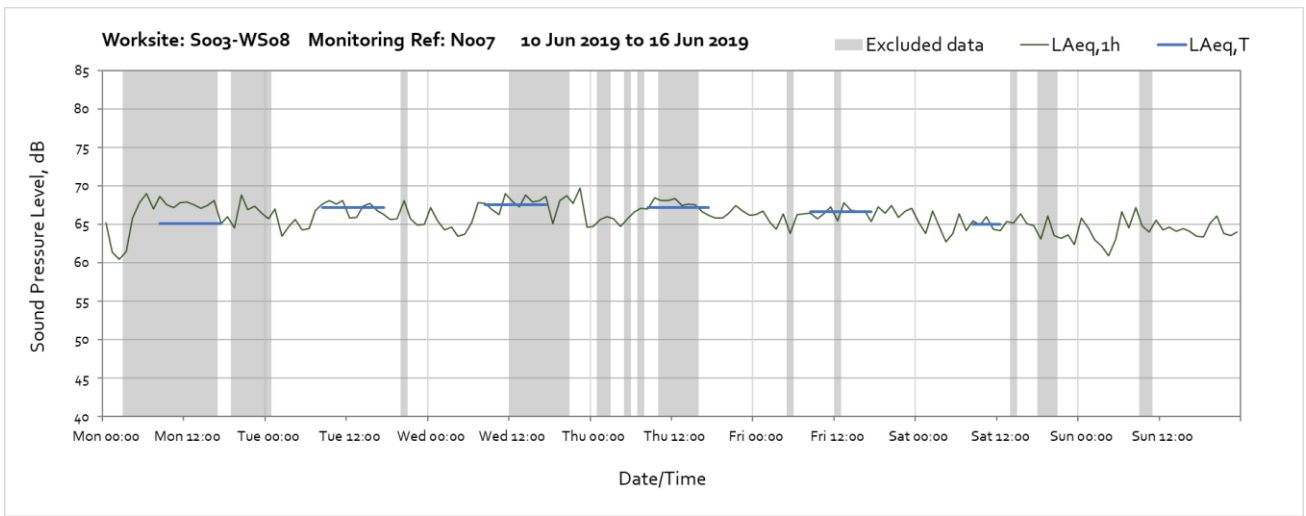
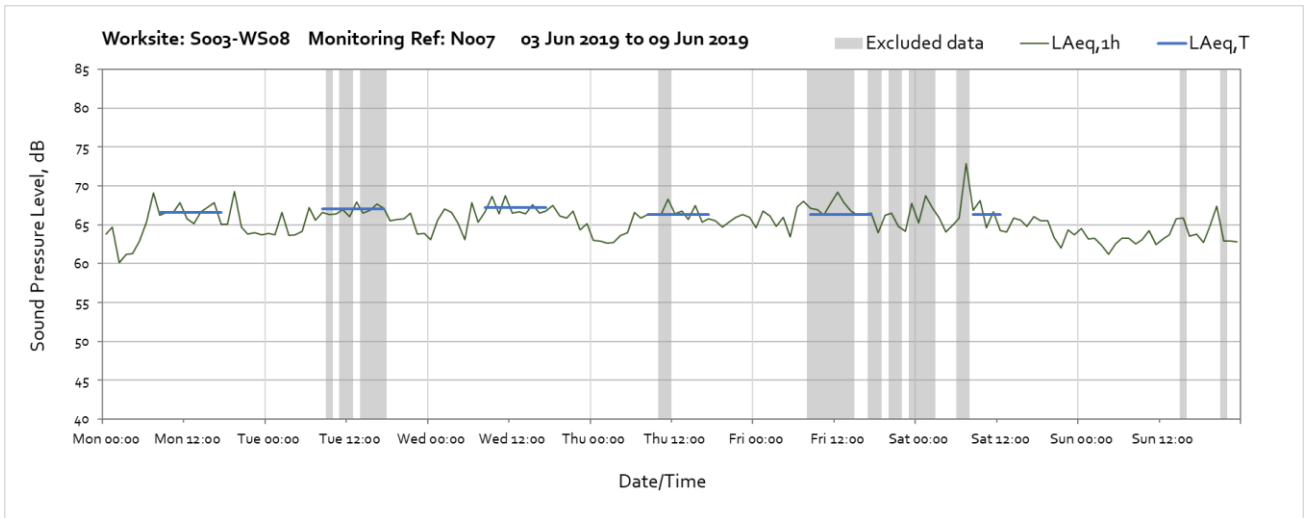
Worksite: S003-WS07 – Monitoring Ref: N012

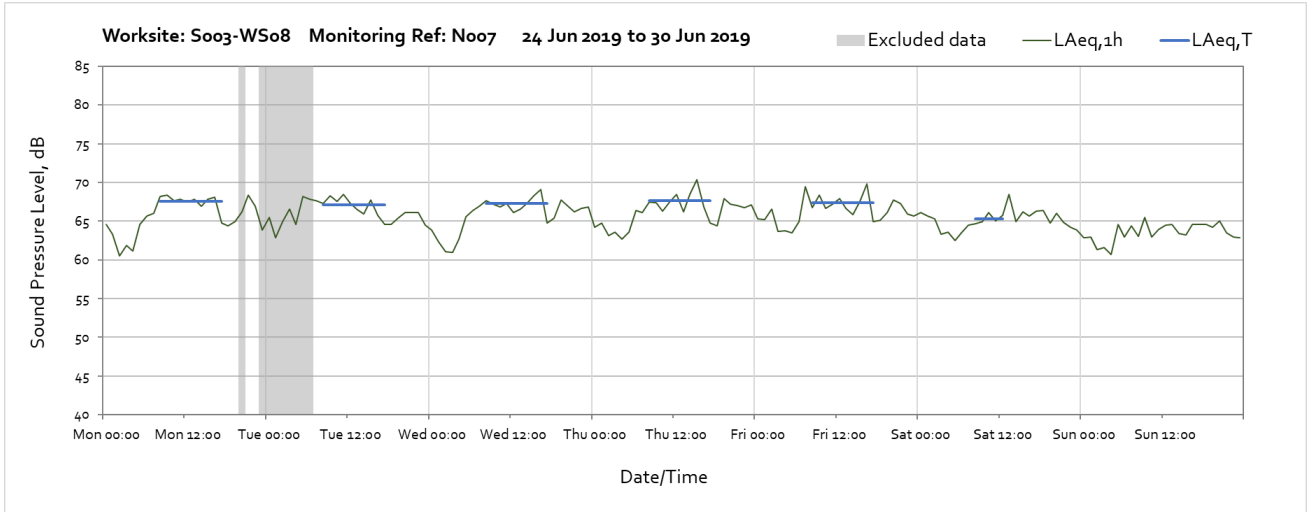




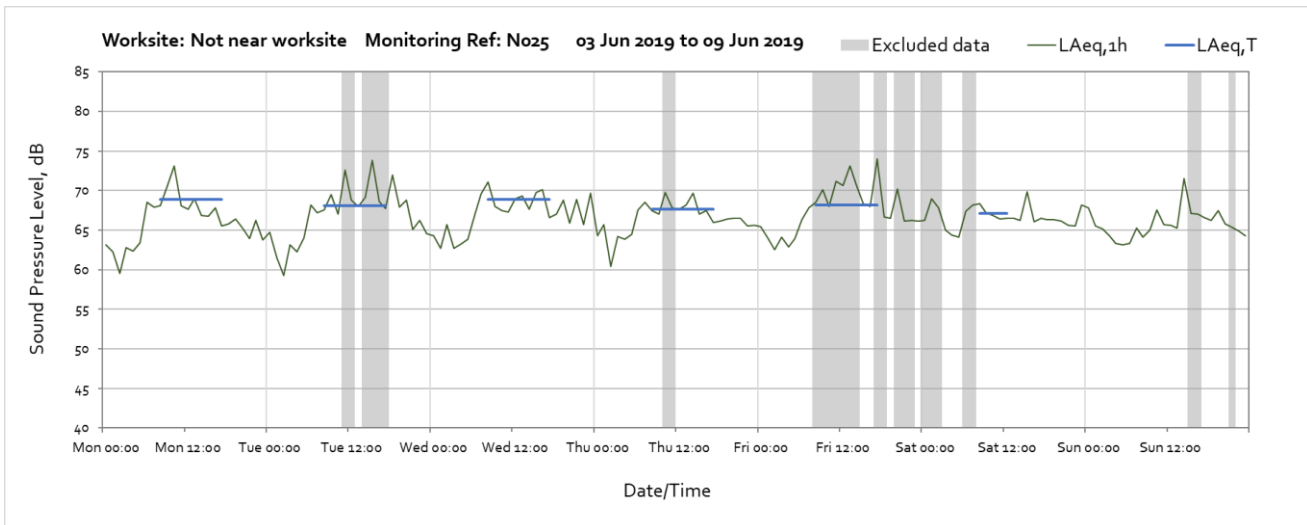
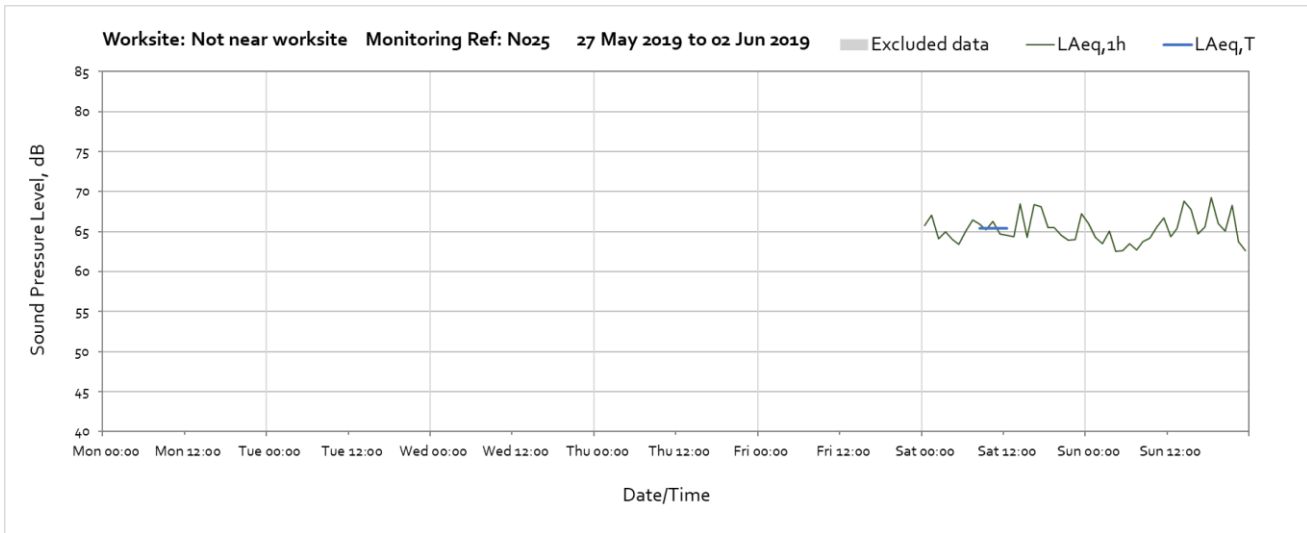
Worksite: S003-WS08 – Monitoring Ref: N007

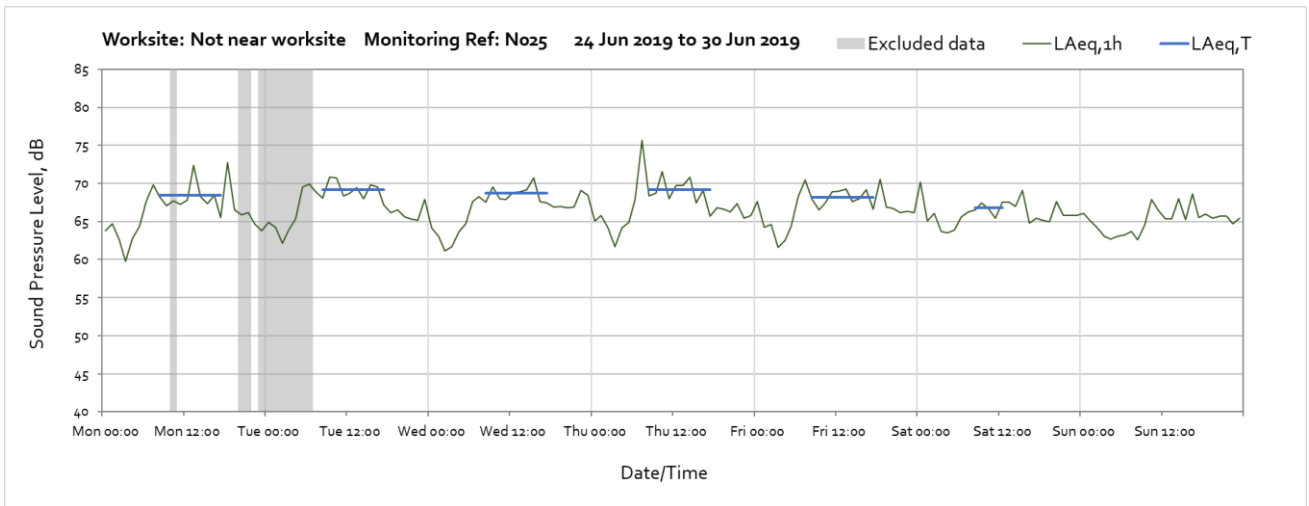
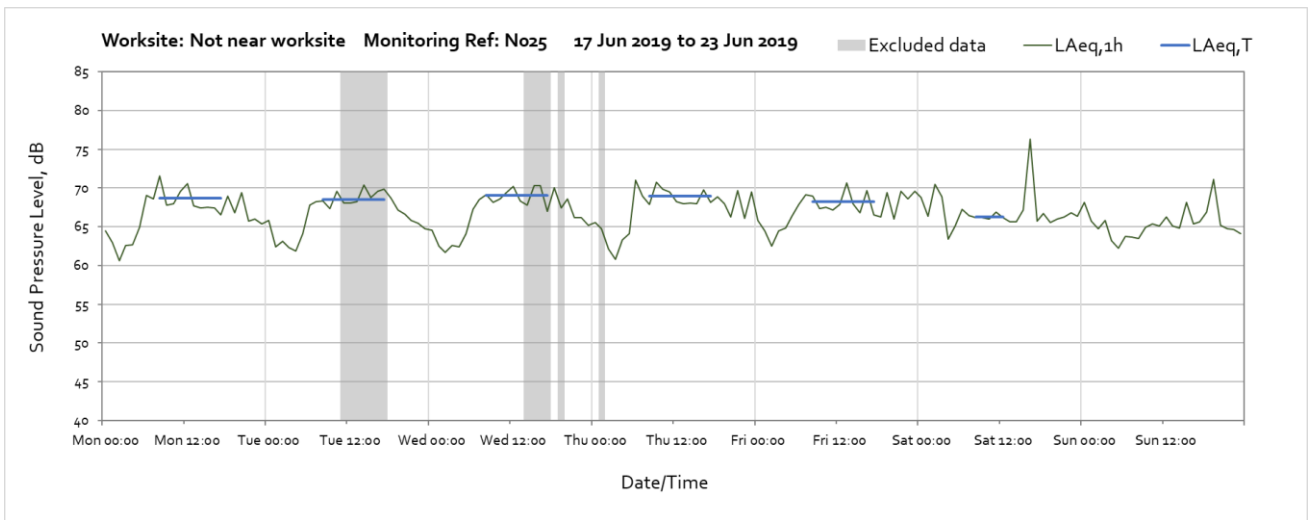
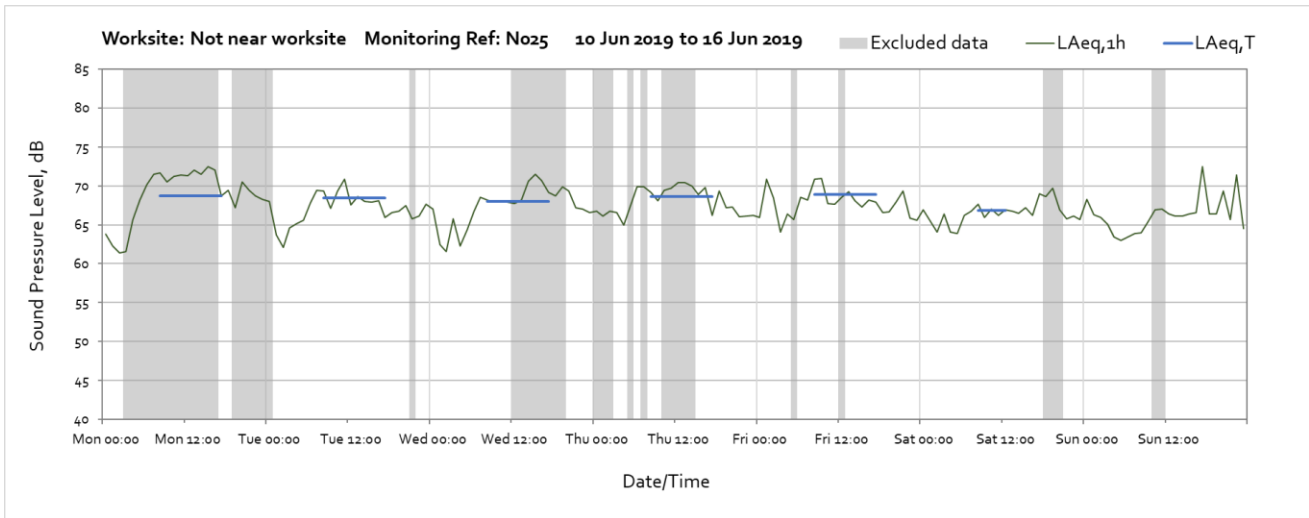




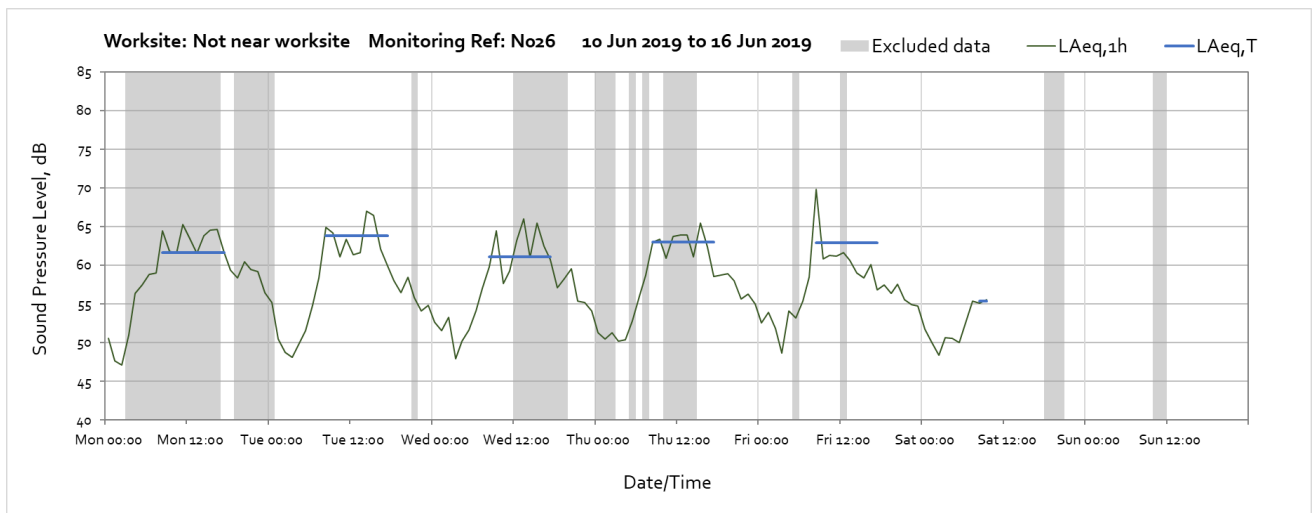
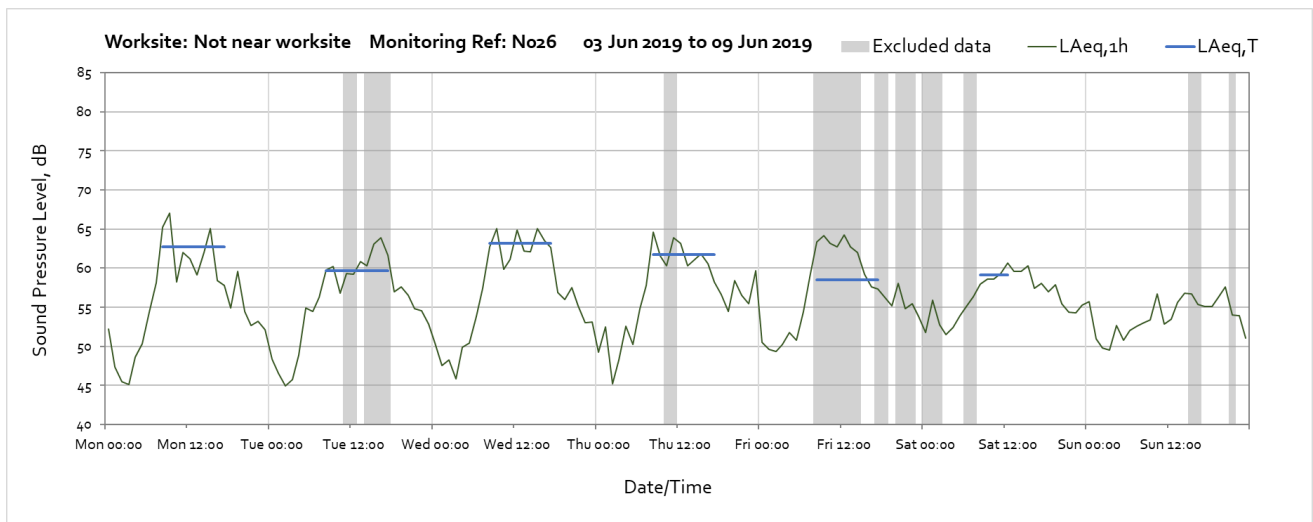
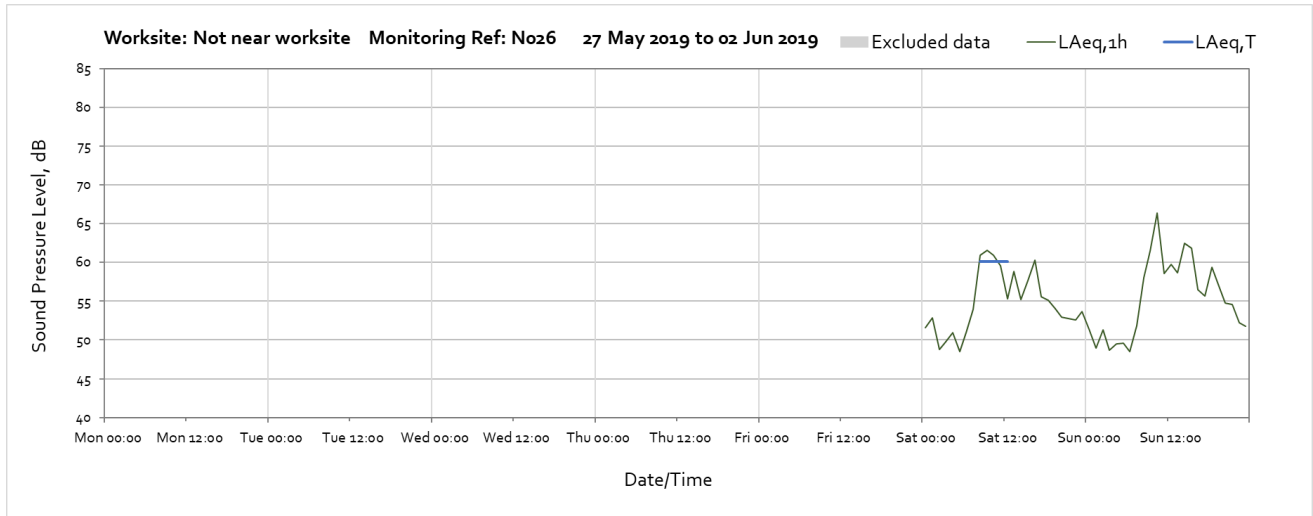


Monitoring Ref: N025

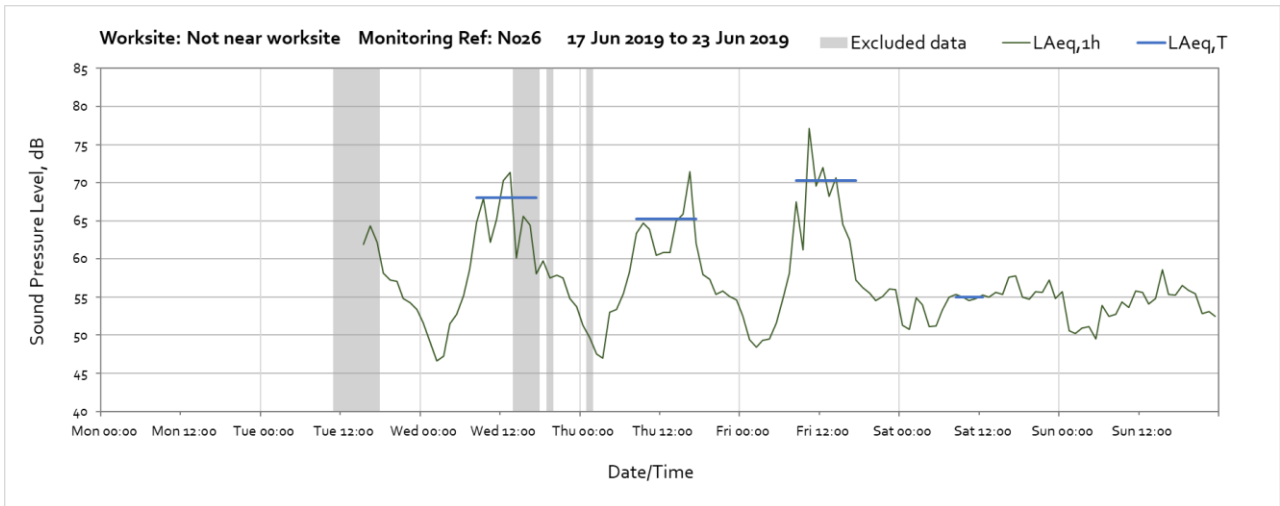




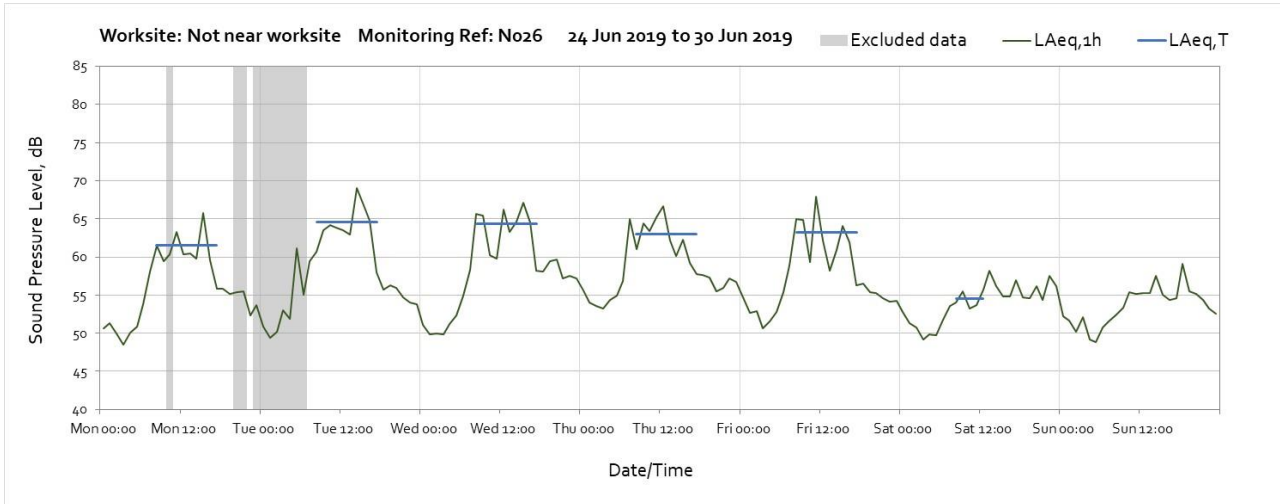
Monitoring Ref: N026



Note: Missing data between 10:00 on Saturday 15th and 15:00 on Tuesday 18th was due to a power disconnection during .



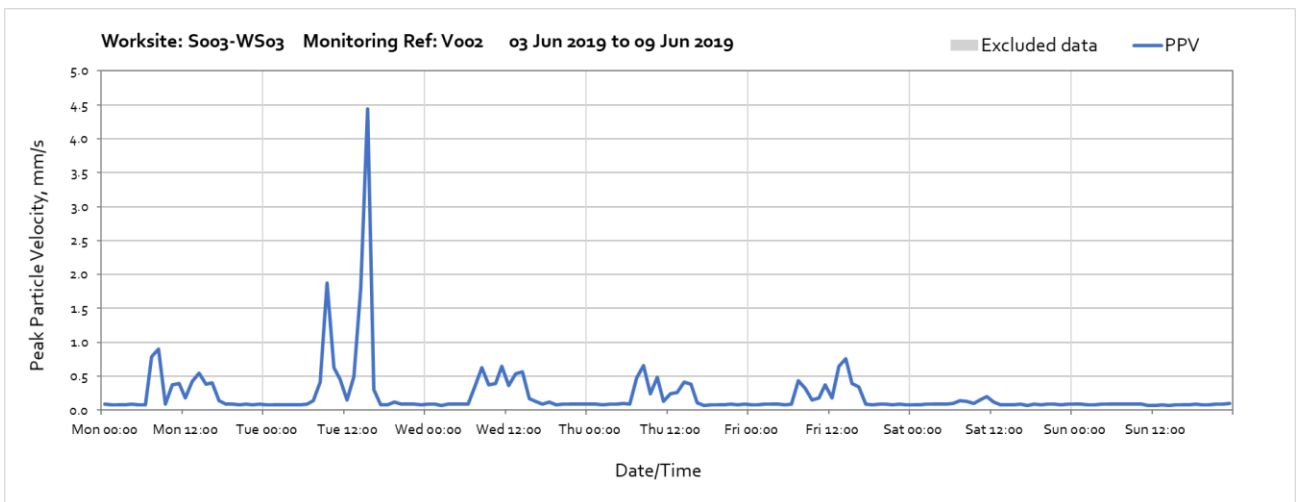
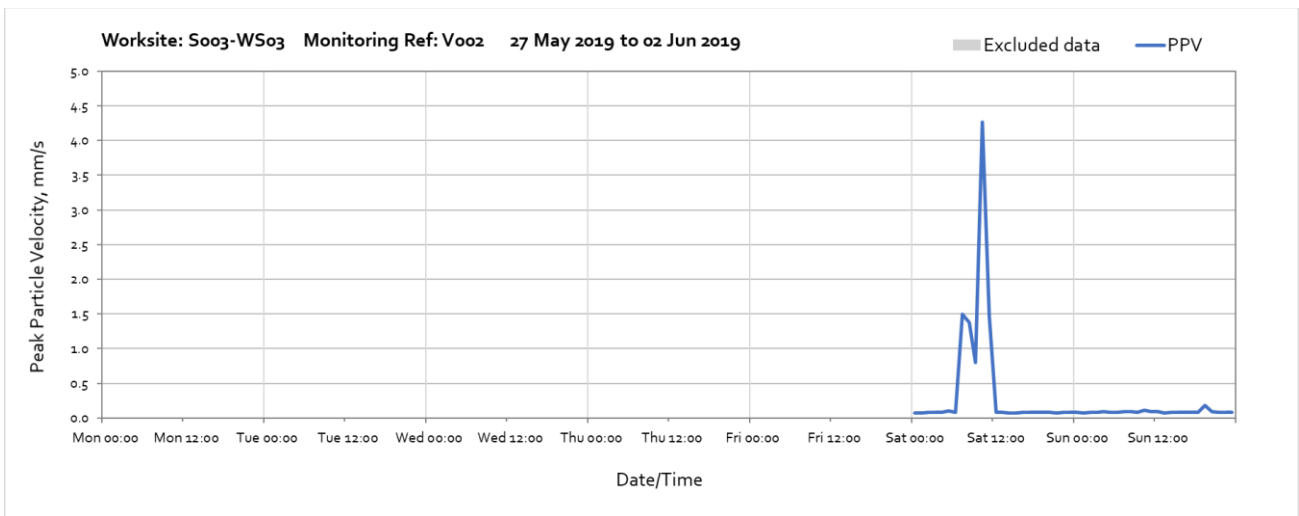
Note: Missing data between 10:00 on Saturday 15th and 15:00 on Tuesday 18th was due to a power disconnection during .

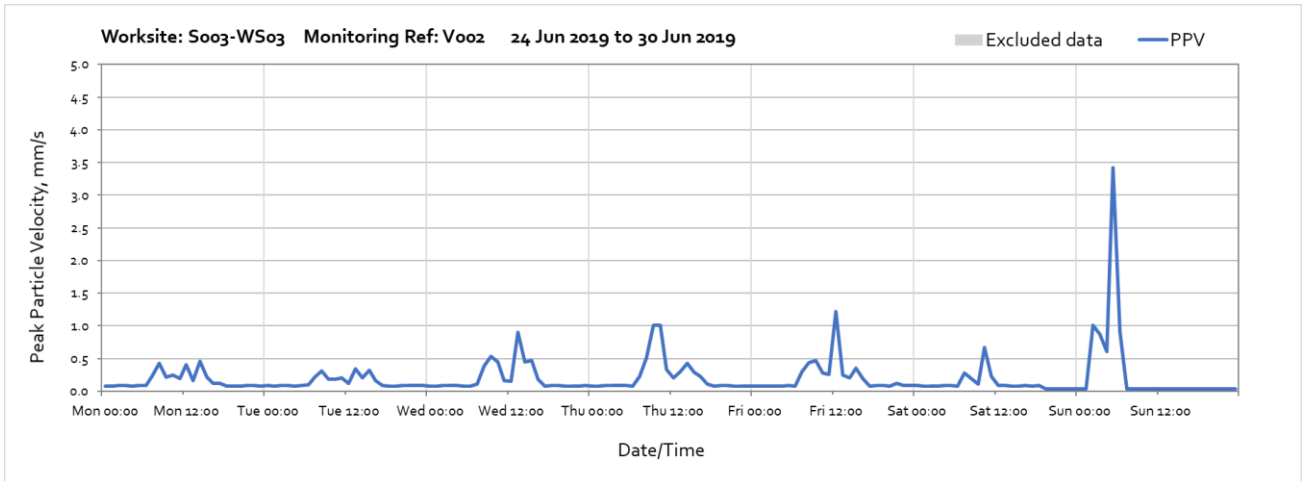
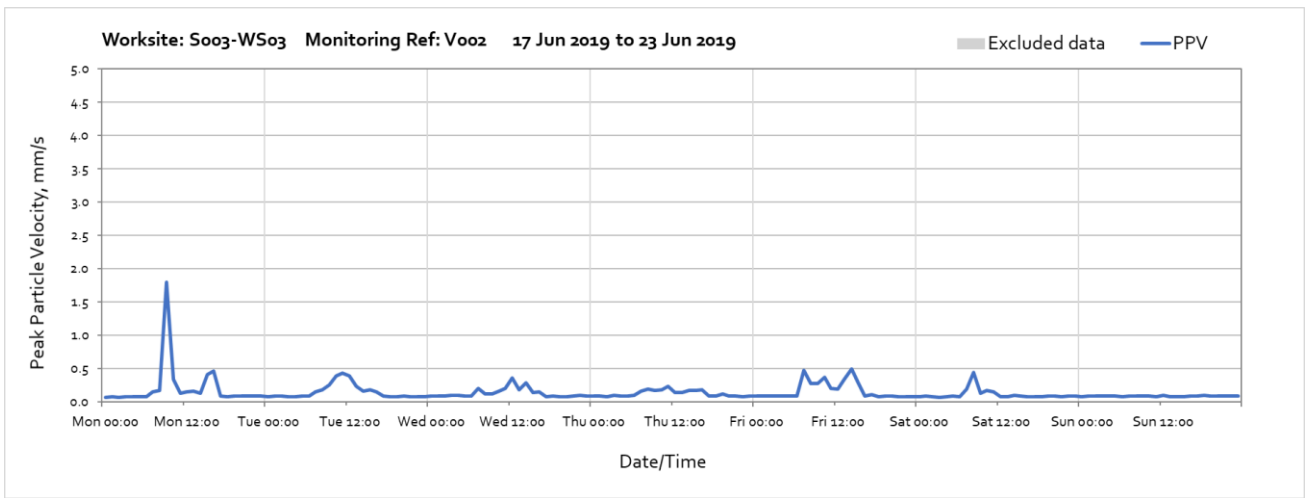
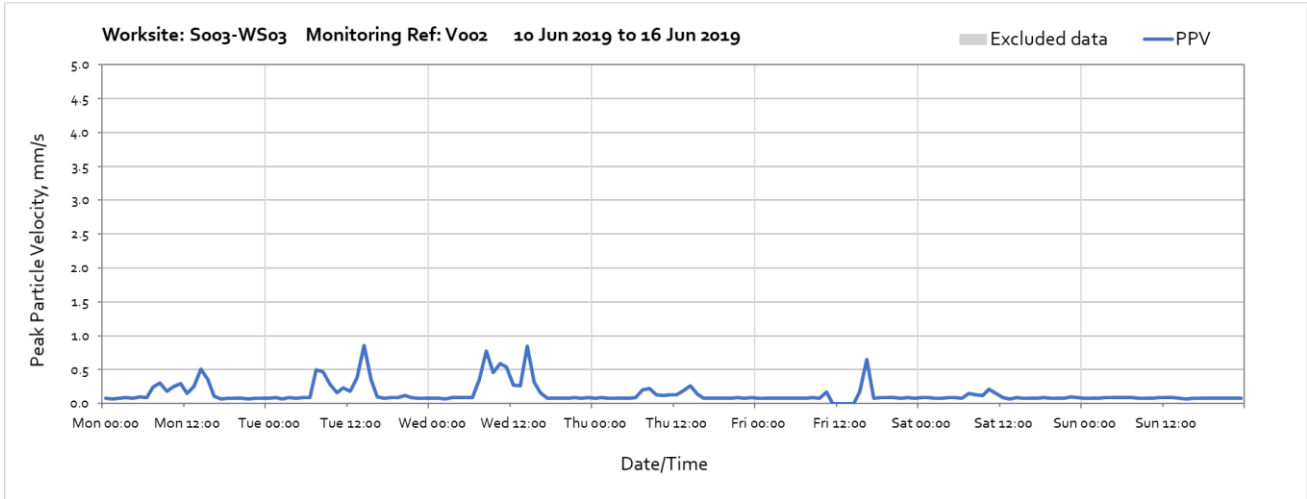


Vibration

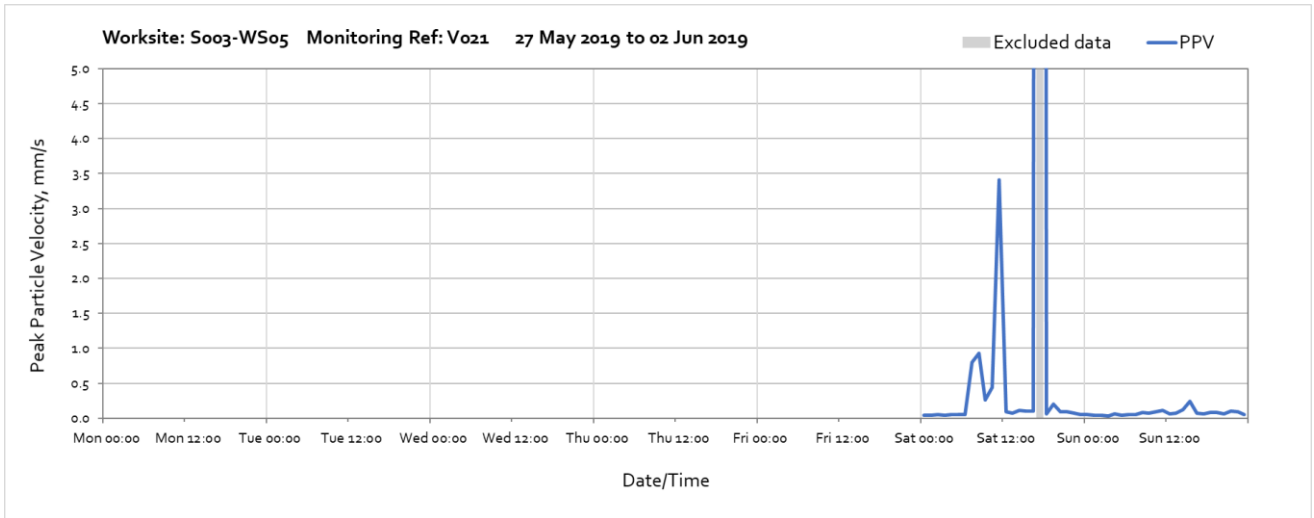
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axis x, y and z. High values of PPV were measured on occasions at V021. These were due to local interference 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: S003-WS03 – Monitoring Ref: V002

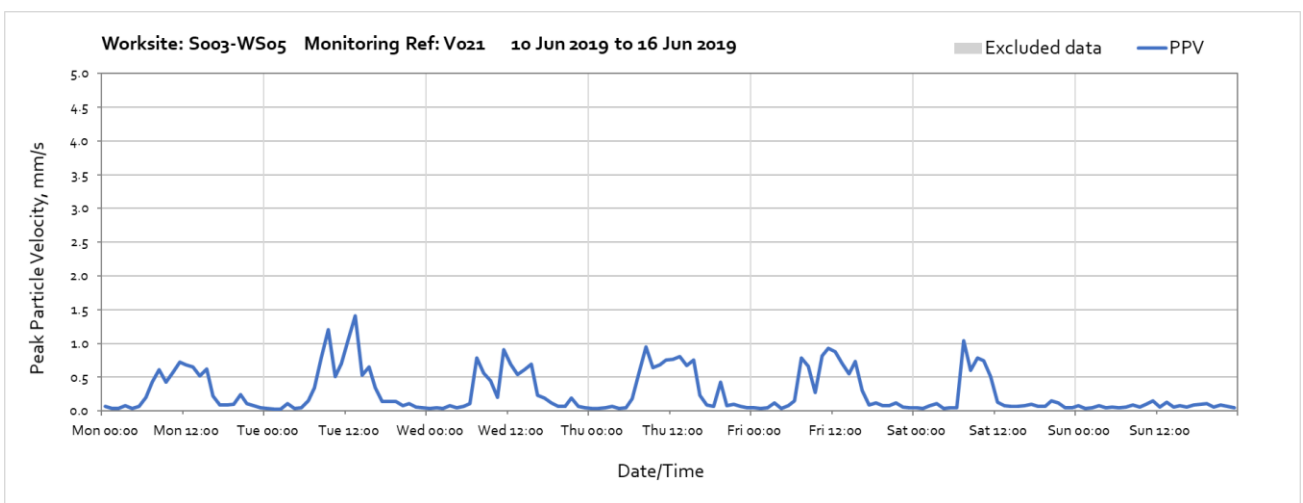
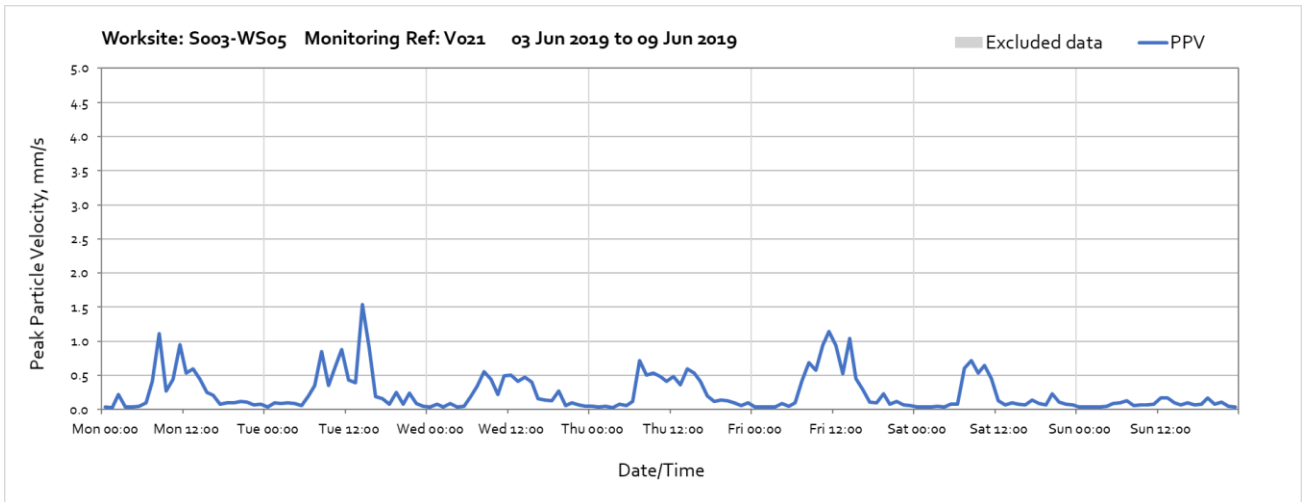


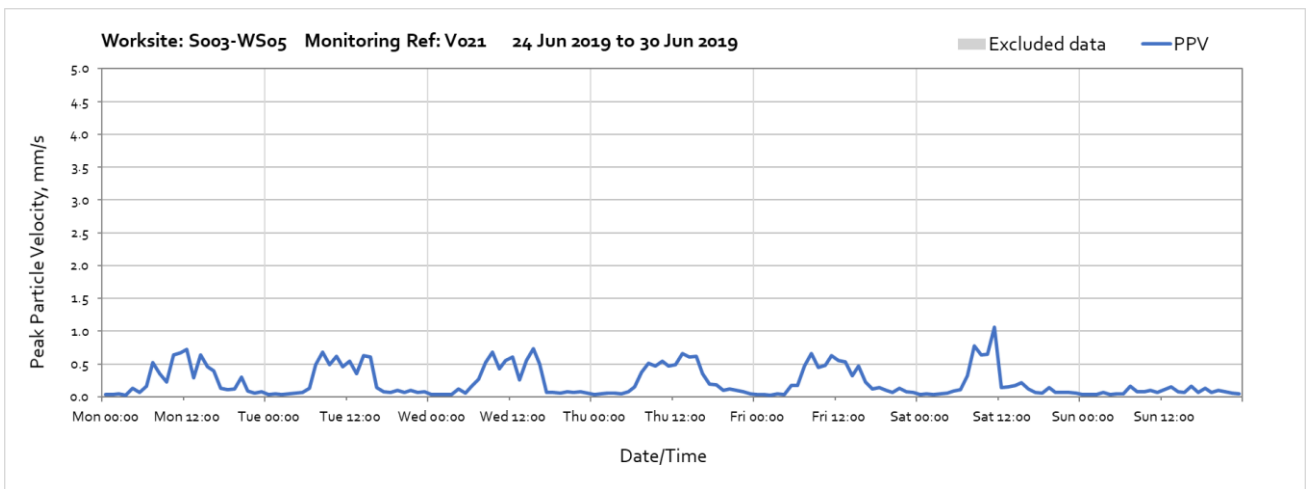
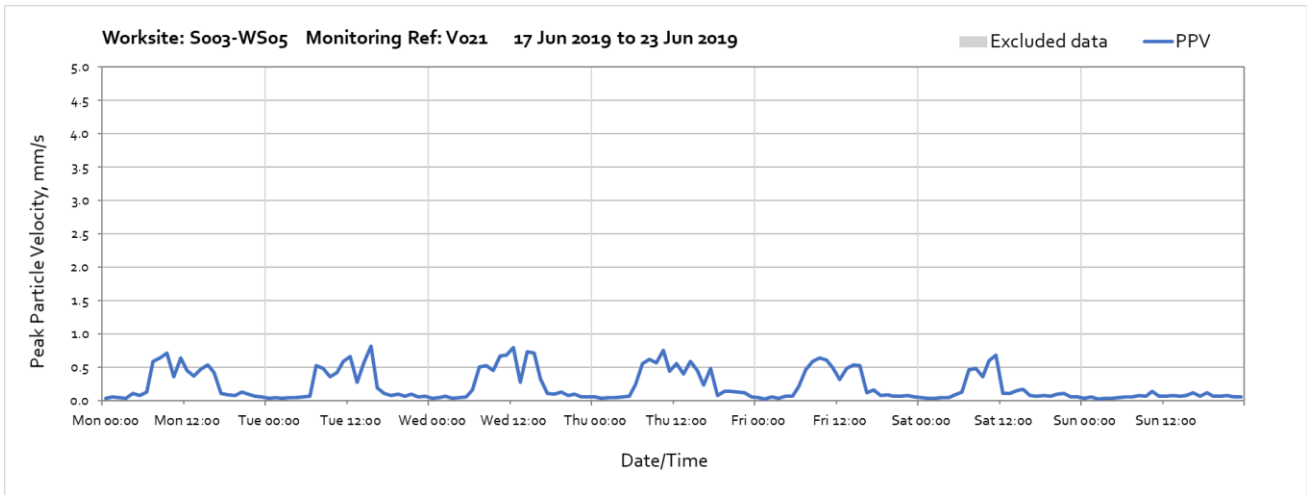


Worksite: S003-WS05 – Monitoring Ref: V021

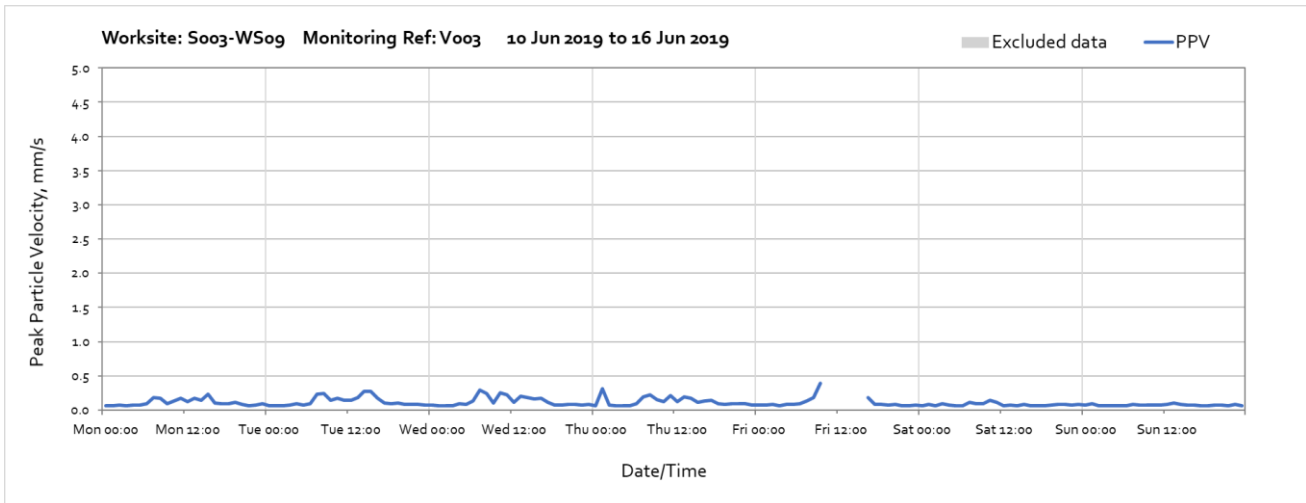
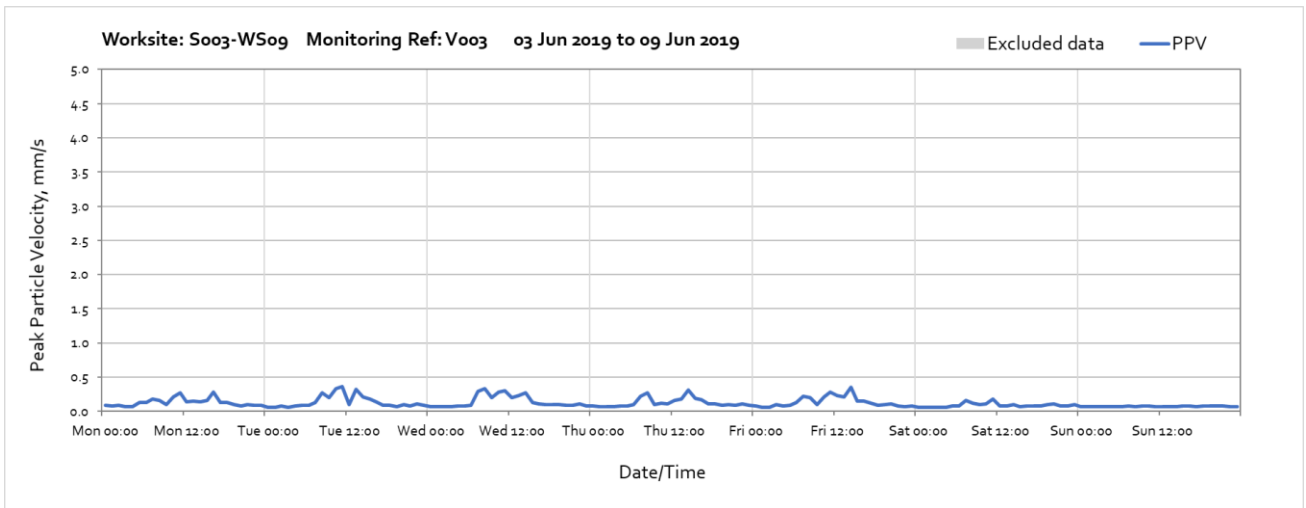
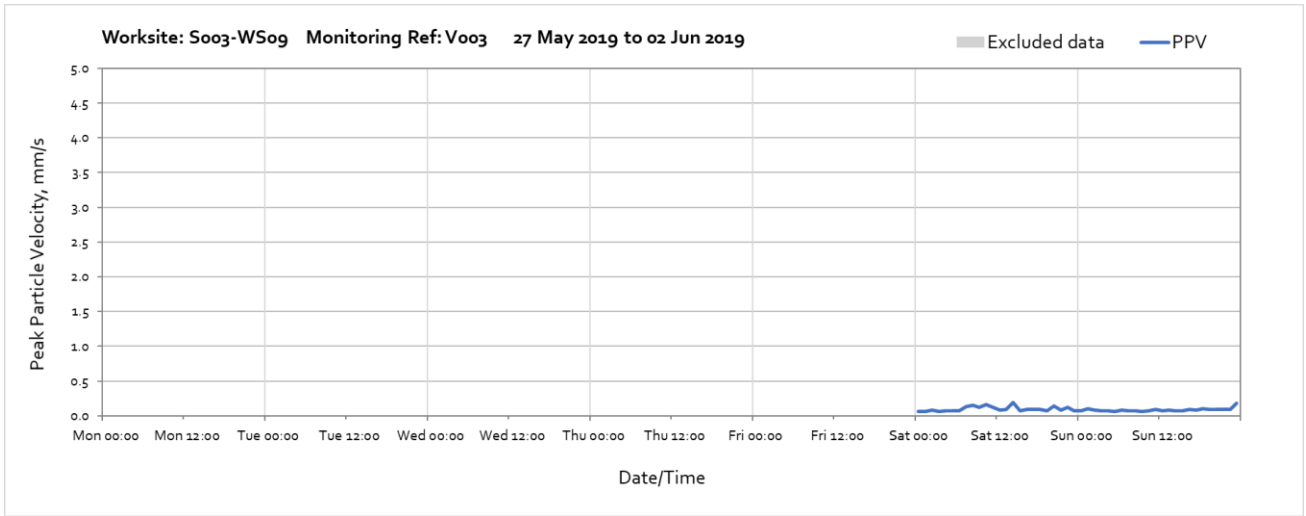


Note: High vibration levels at 17:00 on Saturday 1st June were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

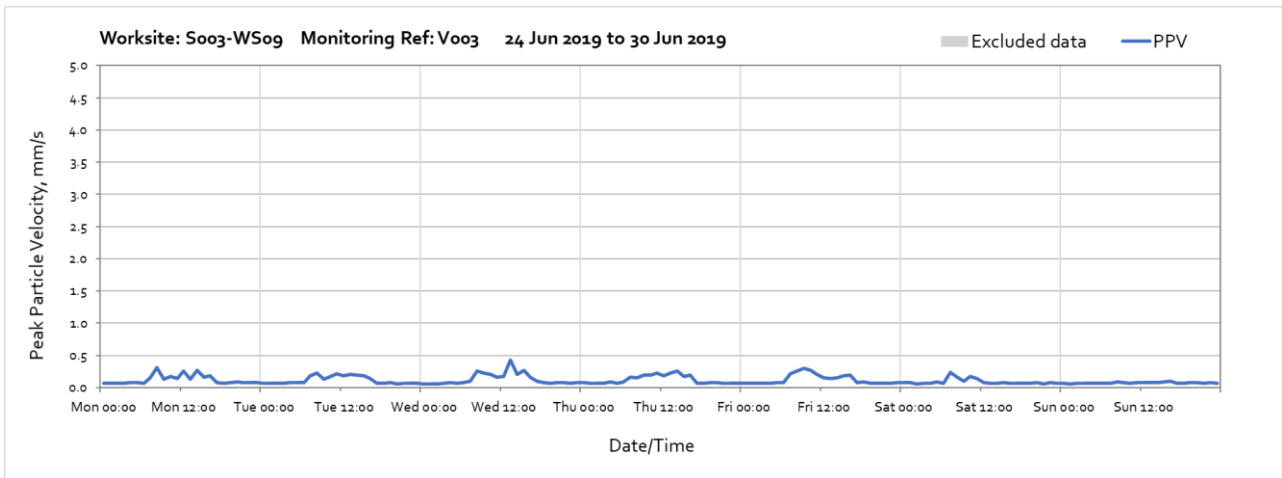
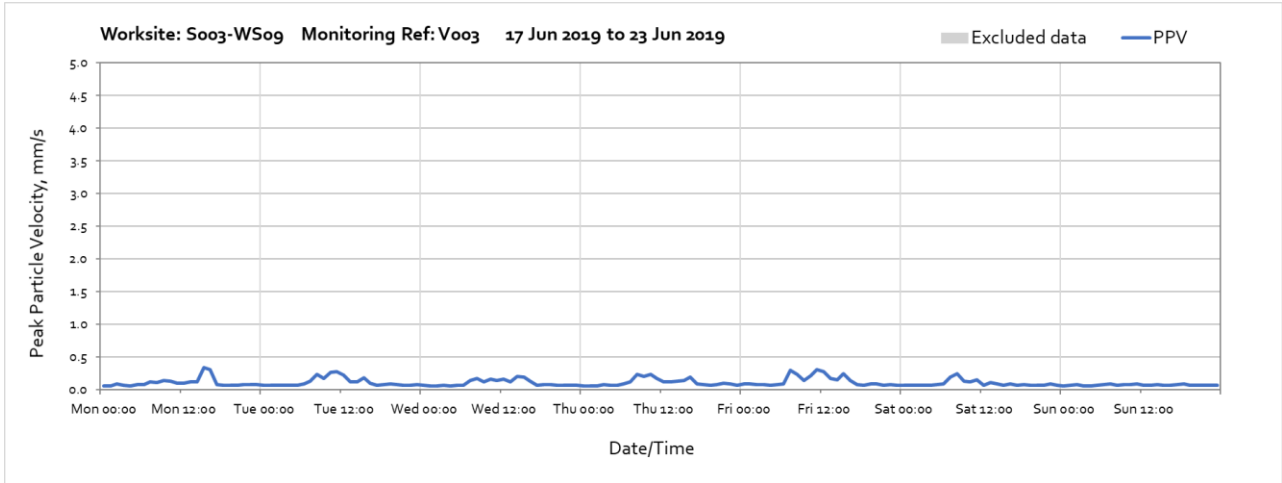




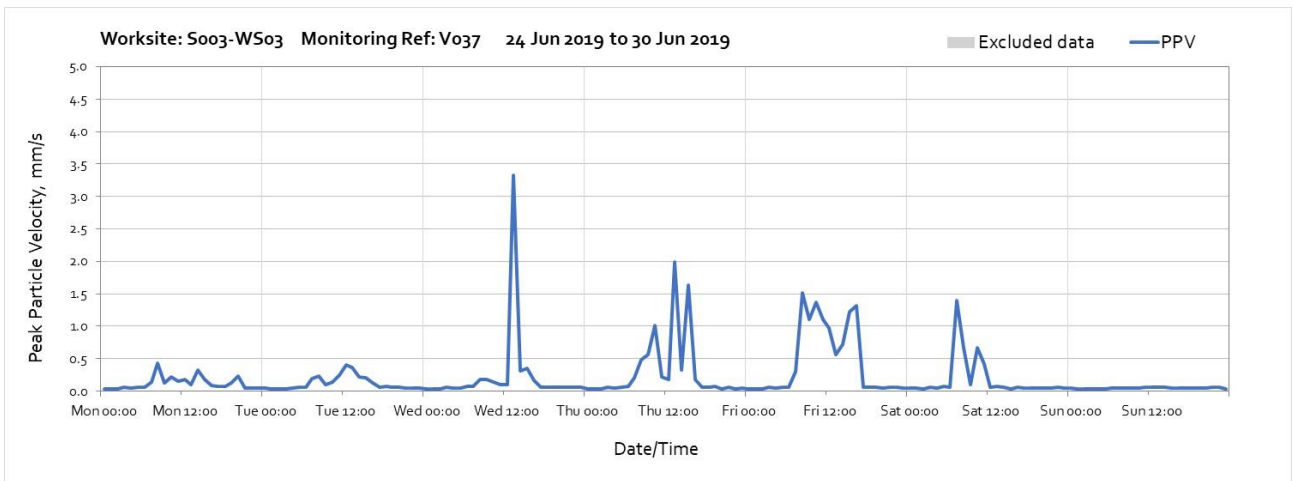
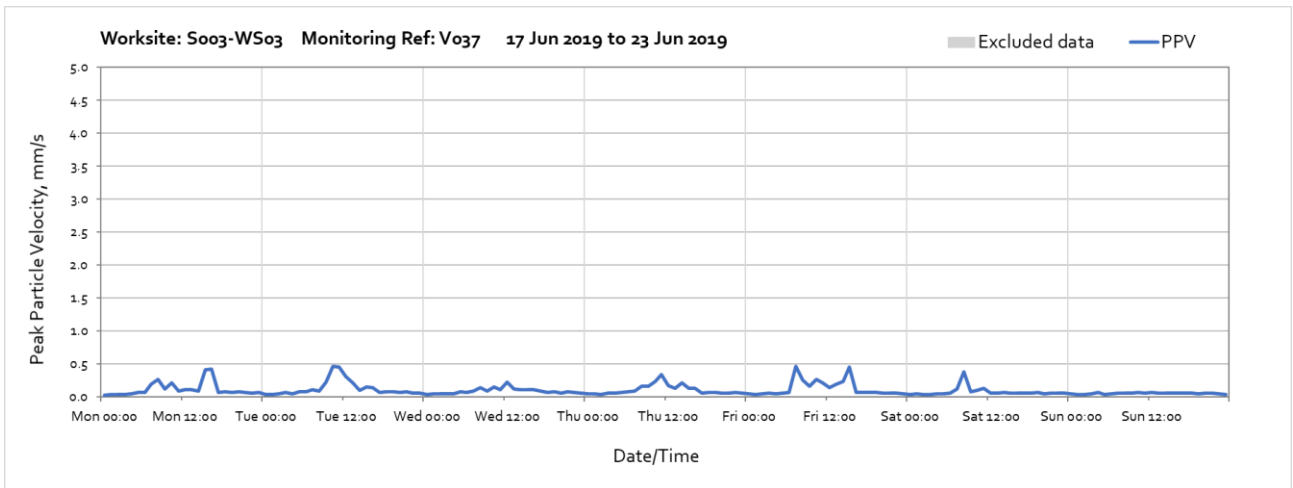
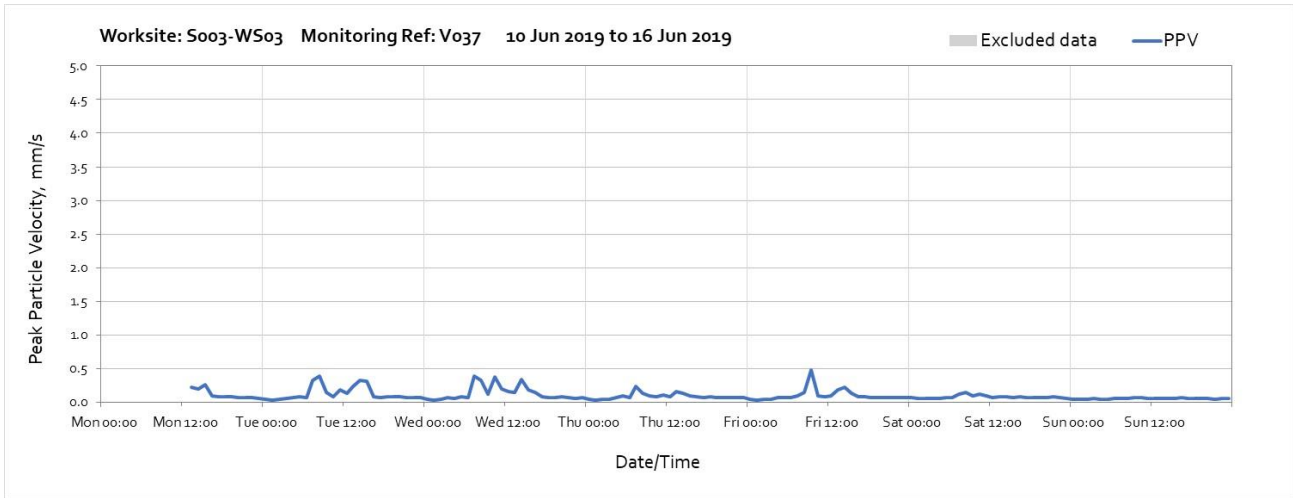
Worksite: S003-WS09 – Monitoring Ref: V003



Note: Missing data between 10:00 and 16:00 on Friday 14th were during a temporary shut down of the monitor for battery replacement.



Worksite: S003-WS03 – Monitoring Ref: V037



Worksite: S003-WS03 – Monitoring Ref: V038

