

Construction noise and vibration Monthly Report – September 2019

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 September 2019.

A number of worksites were active during the reporting month in the LBC area. Works at Network Rail worksites G and H mainly included works at platforms, including excavations, cabling works, installation and removal of high-level walkway, movement of materials and plant and installation of throughing. Ancillary activities were undertaken at the DB Cargo and former Addison Lee worksite (ref. S001-WS01). Removal of fixtures and fittings and demolition were underway at the Regent's Park Estate worksite (ref. S001-WS07). Archaeological excavations and earthworks were underway at St James's Garden worksite (ref. S003-WS01). Demolition was undertaken at the Wolfson House, Walkden House, 67-75 & 77-79 Euston Rd, worksite (ref. S003-WS03), at the Thistle Hotel worksite (ref. S003-WS04) and at One Euston Square, 40 Melton Street, Grant Thornton House, 22 Melton Street worksite (ref. S003-WS09). Demolition and construction were undertaken at 93-103 Drummond Street, 11-15 Melton Street, 54-64 Euston Street, 69 Cobourg Street worksite (ref. S003-WS07). Processing of arisings was carried out at the Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street worksite (ref. S003-WS05). Deliveries were carried out at the former National Temperance Hospital, 110-122 Hampstead Road worksite (ref. S003-WS06). Cable diversion works and installation of substation units were carried out at Drummond Street, Coburg Street, and Euston Road; fitting out of launch and reception shafts and installation of water mains were carried out at Park Village East / London Zoo Car Park and open cut of road way, excavations and installation of pipework were carried out at Albany Street, Robert Street, Red Hill Street and Osnaburgh Street.

Noise monitoring was undertaken in the vicinity of Network Rail worksites B, C, D, E, F and G; in the vicinity of 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 in the vicinity of Regents Park Lorry Holding Area.

Vibration monitoring was undertaken in the vicinity of the 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) and the Ibis Hotel, Euston Square Gardens (west) worksite (ref. S003-WS08).

No exceedances of the SOAEL were measured due to HS2 construction during September 2019. Five complaints were received during the monitoring period. Description of complaints, results of investigations and any actions taken are detailed in this report in Section 2.4.

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 September 2019.

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

- Network Rail on-networks HS2 preparatory works: worksites ref. G and H (see plans 1 to 3 in Appendix A)
 - Work activities included excavation of switches and crossings footprint and associated plain line, cabling works (including in-line cabling, cable installation, cable recoveries and cable pulling), TFM preparatory works, high level walkway installation and removal, hollow bearer repair and checks, movement of materials and plant and installation of troughing.
- DB Cargo shed and adjacent land on Granby Terrace, worksite ref. S001-WS01 (see plan 2 in Appendix A)
 - Work activities included ancillary activities at the former Addison Lee site.
- Regent's Park Estate, worksite ref. S001-WS07 (see plan 2 and 3 in Appendix A)
 - Works activities included removal of fixtures and fittings and demolition.
- St James's Gardens, worksite ref. S003-WS01 (see plan 2 in Appendix A)
 - Works activities included archaeological excavations and earthworks.
- Wolfson House, Walkden House, 67-75 & 77-79 Euston Rd, worksite ref. S003-WS03 (see plan 3 in Appendix A)
 - Works activities included demolition.

- Thistle Hotel, Cardington Street, worksite ref. S003-WS04 (see plan 3 in Appendix A)
 - Works activities included demolition.
- 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 demolition and construction.
- 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 demolition.

Further works were also undertaken as part of the Granby Terrace Bridge utilities diversion (GTB Utilities) on Stanhope Street. Cable diversion works and installation of substation units were carried out at Drummond Street, Coburg Street, and Euston Road, fitting out of launch and reception shafts and installation of water mains were carried out at Park Village East / London Zoo Car Park and open cut of road way, excavations and installation of pipework were carried out at Albany Street, Robert Street, Red Hill Street and Osnaburgh Street.

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 September 2019.

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	CC	Whittlebury Mews West
	JC	Juniper Crescent
C	MT2	Lamppost opposite to 49 Mornington Terrace
	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
	N044	Regents Park Estate west, near Langdale
	N045	Regents Park Estate south, external to Coniston
	V039	Coniston, Regents Park Estate
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)

Worksite Reference	Measurement Reference	Address
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

Worksite Reference	Measurement Reference	Monitor Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
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	All days	All periods	No exceedance
	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
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
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

Worksite Reference	Measurement Reference	Monitor Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
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 not exceeded during periods of works.

2.1.5 Construction and demolition works taking place at worksites S001-WS07, S003-WS01, S003-WS04, S003-WS03, S003-WS07 and S003-WS09, 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 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 4 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 C, D, E, S001-WS02, S001-WS07, S003-WS03, S003-WS04, S003-WS05, S003-WS07 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 4: 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	62.7 (64.6)	60.0 (62.1)	64.5 (67.3)	63.7 (71.0)	57.0 (63.4)	62.4 (63.3)	62.9 (63.2)	62.2 (63.4)	63.3 (66.8)	53.6 (63.0)	61.4 (65.6)	56.9 (63.5)
	JC	Juniper Crescent	Free-field	60.1 (62.1)	61.1 (66.8)	61.2 (63.1)	60.6 (63.6)	57.1 (71.8)	60.3 (62.6)	60.6 (63.3)	59.2 (63.5)	59.6 (66.9)	52.4 (58.5)	58.8 (67.7)	55.1 (60.1)
C	MT2	Lamppost opposite to 49 Mornington Terrace	Free field	63.6 (64.2)	63.6 (64.4)	64.5 (65.4)	63.0 (64.8)	58.7 (64.3)	62.5 (63.3)	63.8 (66.5)	62.5 (63.2)	62.5 (65.4)	55.6 (62.0)	61.6 (64.6)	57.7 (62.3)
	N022	52A Mornington Terrace	Free-field	60.4 (61.9)	61.1 (64.1)	61.3 (62.6)	59.6 (62.9)	55.0 (61.4)	58.8 (59.2)	60.0 (60.8)	59.4 (60.6)	59.0 (61.2)	52.3 (58.4)	58.4 (61.5)	53.8 (59.1)
	N024	External to Park Village Studios, Park Village East	Free-field	56.2 (64.1)	60.3 (64.1)	58.2 (69.3)	54.9 (66.2)	50.6 (59.6)	52.9 (53.5)	54.7 (55.2)	55.0 (57.5)	54.3 (57.4)	49.9 (54.7)	53.5 (59.5)	50.1 (54.6)
D	N004	Mornington Terrace, lamppost #7	Free-field	64.1 (65.7)	64.9 (66.6)	65.5 (67.1)	64.2 (67.5)	59.8 (67.5)	63.7 (64.7)	63.8 (63.9)	63.5 (65.5)	63.1 (65.5)	55.5 (62.1)	62.8 (68.7)	59.6 (68.2)
E	N005	5A Granby Terrace	Free-field	65.9 (68.6)	66.4 (67.2)	67.0 (67.9)	65.3 (67.0)	62.7 (67.1)	65.0 (65.7)	65.2 (66.0)	65.3 (66.4)	65.6 (68.4)	62.5 (65.5)	64.6 (66.5)	62.8 (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
F	BS	Roof of Stockbeck House, Barnby Street	Free-field	62.2 (63.4)	63.5 (66.8)	63.0 (65.5)	61.2 (62.7)	58.3 (63.6)	61.9 (62.7)	61.7 (62.2)	61.4 (63.0)	61.4 (63.6)	56.8 (62.3)	60.5 (63.5)	57.9 (63.8)
	N023	Amphill Estate, Hampstead Road	Free-field	72.1 (74.5)	70.5 (71.4)	70.7 (72.7)	69.9 (72.5)	67.9 (72.1)	69.9 (71.0)	69.7 (70.2)	70.7 (72.6)	70.6 (79.3)	67.8 (71.1)	69.6 (72.5)	67.4 (71.8)
G	HH	Euston Station Parcel Deck, Barnby Street	Free-field	62.2 (65.8)	67.2 (70.5)	63.2 (65.3)	62.9 (69.2)	59.8 (69.9)	61.7 (65.0)	64.6 (67.9)	64.8 (66.9)	63.3 (66.6)	60.9 (67.3)	63.6 (70.6)	59.4 (65.4)
S001-WS01	N001	External to Cubitt Court, 100 Park Village East	Façade	56.9 (59.6)	65.4 (69.6)	58.6 (61.3)	57.1 (65.5)	52.3 (62.3)	55.7 (56.8)	60.9 (64.2)	56.8 (58.6)	57.5 (60.1)	51.7 (56.2)	56.0 (60.4)	51.0 (55.5)
	N002	Richmond Court, Park Village East	Free-field	57.7 (59.0)	60.5 (64.8)	60.1 (62.6)	58.5 (62.6)	53.2 (62.1)	56.1 (57.2)	58.4 (58.8)	58.7 (59.6)	58.6 (62.3)	52.4 (58.3)	57.4 (66.5)	51.8 (55.7)
	N003	Silsoe House, Park Village East	Free-field	57.8 (59.5)	61.0 (68.0)	59.7 (61.7)	58.5 (62.5)	53.6 (61.9)	56.0 (57.2)	58.3 (58.9)	58.4 (59.0)	58.5 (64.4)	52.4 (58.0)	57.4 (66.0)	52.6 (61.4)
S001-WS02	N018	Outside replacement housing, Hampstead Road	Free-field	72.2 (74.6)	72.9 (74.2)	73.2 (74.7)	72.5 (74.9)	70.9 (75.2)	72.1 (75.6)	72.0 (72.1)	72.5 (73.2)	72.8 (76.8)	71.2 (74.0)	72.0 (74.7)	70.4 (73.1)
	N019	Outside Cartmel, Hampstead Road	Free-field	70.9 (73.1)	71.1 (72.3)	71.6 (73.4)	71.0 (75.3)	69.4 (76.3)	70.5 (72.7)	70.3 (70.7)	70.5 (70.8)	71.6 (76.0)	69.5 (71.8)	70.3 (74.3)	69.4 (75.1)

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
S001-WS07	N020	Mackworth Street	Free-field	53.6 (60.9)	62.3 (67.0)	52.3 (54.0)	52.5 (60.8)	49.2 (59.0)	51.3 (52.7)	57.6 (60.7)	52.5 (55.2)	53.7 (59.5)	49.0 (53.1)	51.5 (59.3)	47.9 (52.3)
	N021	Stanhope Street, lamppost #2	Free-field	54.2 (63.8)	64.5 (68.2)	55.1 (60.4)	54.3 (67.0)	50.1 (66.2)	51.9 (53.6)	60.4 (62.4)	53.9 (55.1)	54.4 (57.9)	49.8 (54.3)	52.7 (57.9)	48.5 (55.2)
	N044	Regents Park Estate west	Free field	51.3 (56.6)	64.3 (70.1)	51.2 (54.3)	50.5 (62.2)	47.9 (58.6)	50.3 (51.1)	58.6 (66.1)	50.7 (52.1)	51.1 (55.4)	47.9 (51.2)	50.2 (58.2)	47.3 (50.8)
	N045	Regents Park Estate south, external to Coniston	Free field	56.4 (59.3)	66.3 (71.0)	56.7 (58.8)	55.8 (60.7)	53.7 (58.7)	56.0 (57.2)	60.5 (74.0)	55.8 (56.4)	56.3 (60.0)	53.8 (56.9)	55.1 (59.8)	53.1 (56.6)
S003-WS03	N006	RCGP Roof level	Free-field	55.6 (57.2)	64.5 (68.1)	53.8 (54.9)	53.2 (54.8)	53.1 (58.2)	54.8 (55.8)	60.3 (65.5)	54.2 (54.8)	53.8 (56.3)	52.6 (53.6)	53.6 (60.5)	52.5 (54.4)
	N008	RCGP Stephenson Way	Façade	64.3 (71.1)	67.3 (74.3)	58.0 (69.0)	57.5 (71.2)	59.4 (73.3)	57.7 (58.9)	60.1 (63.4)	54.7 (55.7)	56.3 (62.1)	56.9 (65.9)	55.2 (60.7)	59.0 (70.9)
	N010	Wesley Hotel	Façade	67.1 (67.6)	69.1 (71.2)	66.4 (67.5)	66.4 (67.0)	61.0 (67.2)	66.9 (67.2)	66.8 (66.9)	66.2 (66.3)	66.3 (66.8)	60.0 (66.8)	66.6 (67.2)	59.6 (67.1)
	N011	Outside 82 Euston Street	Free-field	60.1 (65.3)	63.1 (65.5)	57.4 (65.3)	55.8 (61.4)	54.3 (60.4)	54.7 (55.0)	58.9 (59.9)	56.2 (58.4)	57.8 (64.2)	52.0 (55.6)	56.2 (62.8)	53.2 (58.1)
S003-WS05	N014	Starcross Street	Free-field	55.7 (62.1)	61.2 (63.6)	60.7 (67.4)	60.7 (78.8)	53.1 (74.6)	55.9 (58.1)	58.2 (58.9)	54.7 (56.6)	55.6 (61.6)	49.8 (57.1)	54.5 (60.7)	50.4 (55.6)
S003-WS01	N016	Margaret Centre roof	Free-field	56.2 (59.1)	61.7 (63.9)	54.8 (56.0)	53.9 (55.9)	52.6 (56.3)	55.6 (57.5)	61.0 (64.3)	54.0 (55.0)	54.5 (57.8)	52.7 (54.9)	54.1 (60.4)	52.1 (55.7)

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-WS06	N017	Hampstead Road, lamppost #48	Free-field	71.5 (74.4)	72.3 (74.6)	72.0 (74.1)	71.4 (75.4)	69.6 (74.8)	71.5 (74.7)	71.7 (74.0)	71.5 (72.2)	71.7 (77.8)	69.8 (73.5)	70.7 (76.6)	69.1 (72.3)
S003-WS07	N012	Opposite 92-94 Drummond Street	Free-field	59.8 (63.1)	63.5 (66.7)	60.0 (66.3)	60.0 (64.8)	57.0 (60.8)	57.7 (58.4)	61.5 (62.0)	58.8 (59.2)	59.2 (60.9)	56.5 (59.1)	58.6 (62.0)	56.6 (62.3)
S003-WS08	N007	RCGP, Melton Street	Free-field	67.1 (69.5)	69.3 (70.9)	65.2 (66.2)	65.4 (68.4)	63.8 (67.8)	66.8 (68.4)	67.6 (68.1)	65.9 (66.6)	64.8 (67.9)	63.5 (69.6)	64.4 (66.9)	63.2 (66.8)
Not near worksite	N025	External to 3 Prince Albert Road	Free-field	69.3 (72.6)	69.1 (74.7)	67.8 (71.0)	66.7 (70.6)	64.9 (70.1)	66.4 (66.6)	66.7 (67.7)	66.4 (66.9)	67.4 (71.8)	65.0 (68.6)	66.7 (71.1)	63.8 (68.4)
Not near worksite	N026	Thames Water Compound	Free-field	57.3 (58.5)	60.0 (63.9)	56.5 (57.7)	55.3 (59.7)	52.0 (57.7)	54.1 (55.6)	55.5 (56.2)	55.8 (57.1)	55.8 (58.5)	51.3 (54.8)	55.2 (58.9)	51.2 (55.3)

2.2.3 Table 5 presents a summary of the measured vibration levels at monitoring locations V002, V003, V021, V037, V038 and V039 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 5. The highest PPV measured during the monitoring along any axis is presented in the table.

Table 5: 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	3.47 (Y-axis)
S003-WS03	V002	RCGP. basement boiler room. 305 Euston Road	2.08 (Y-axis)
	V037	Magic Circle, basement	2.01 (Z-axis)
	V038	Wesley Hotel, basement lightwell, Euston Street	3.20 (Y-axis)
S003-WS05	V021	42-44 Cobourg Street (floor)	0.92 (Y-axis)
S003-WS09	V003	RCGP. basement vaults, 305 Euston Road	1.05 (Y-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 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 6 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 6: 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

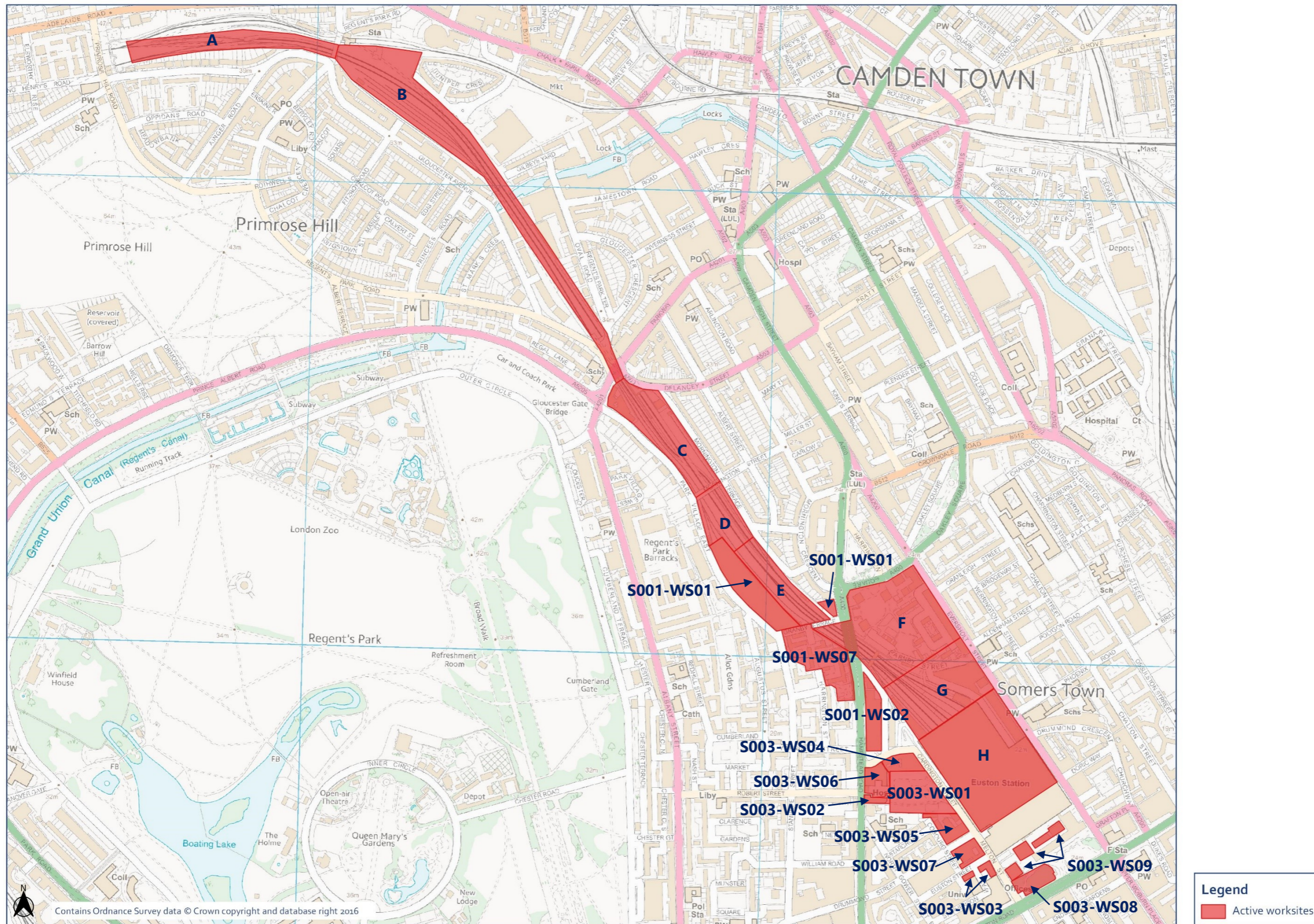
2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

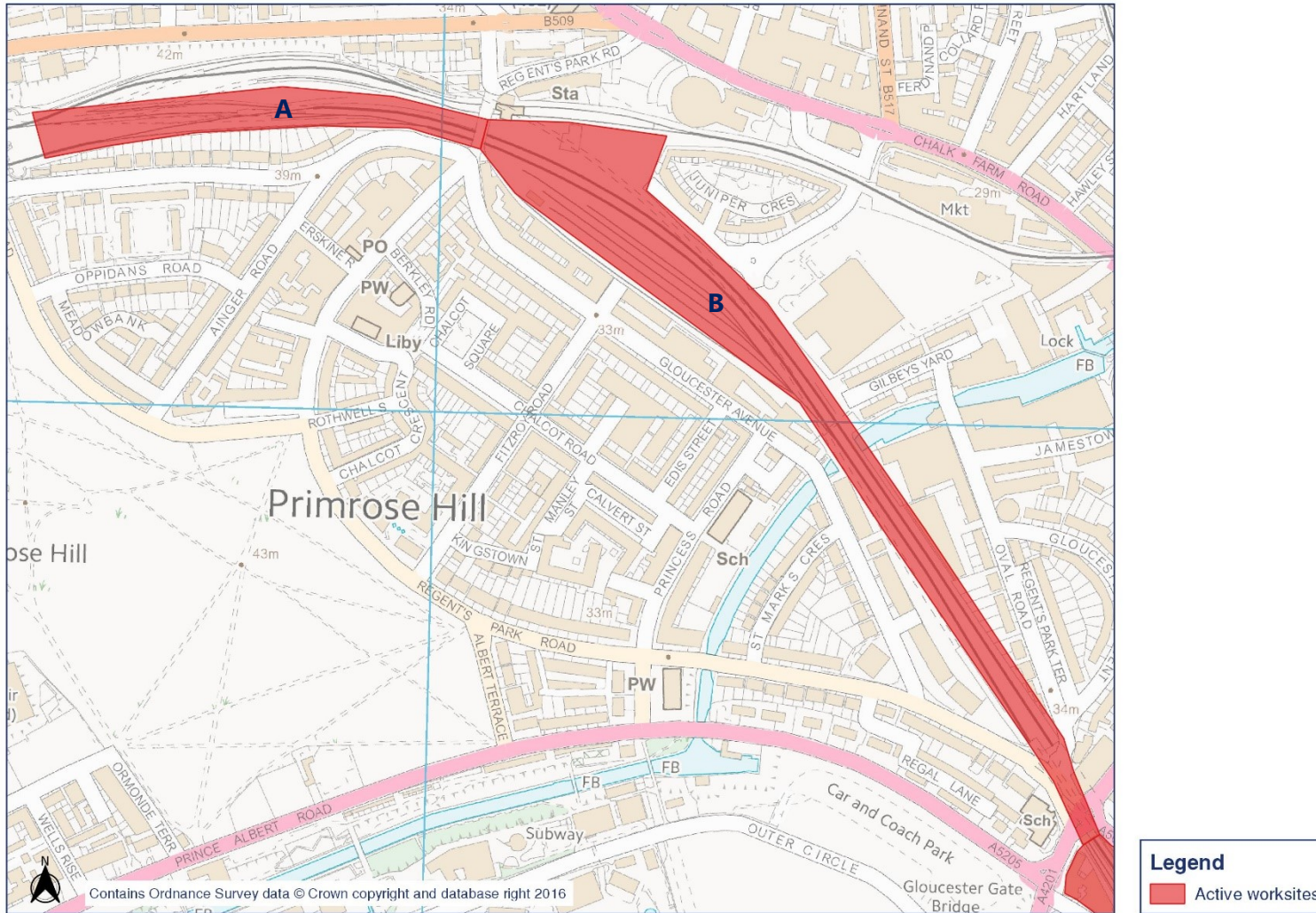
Table 7: Summary of complaints.

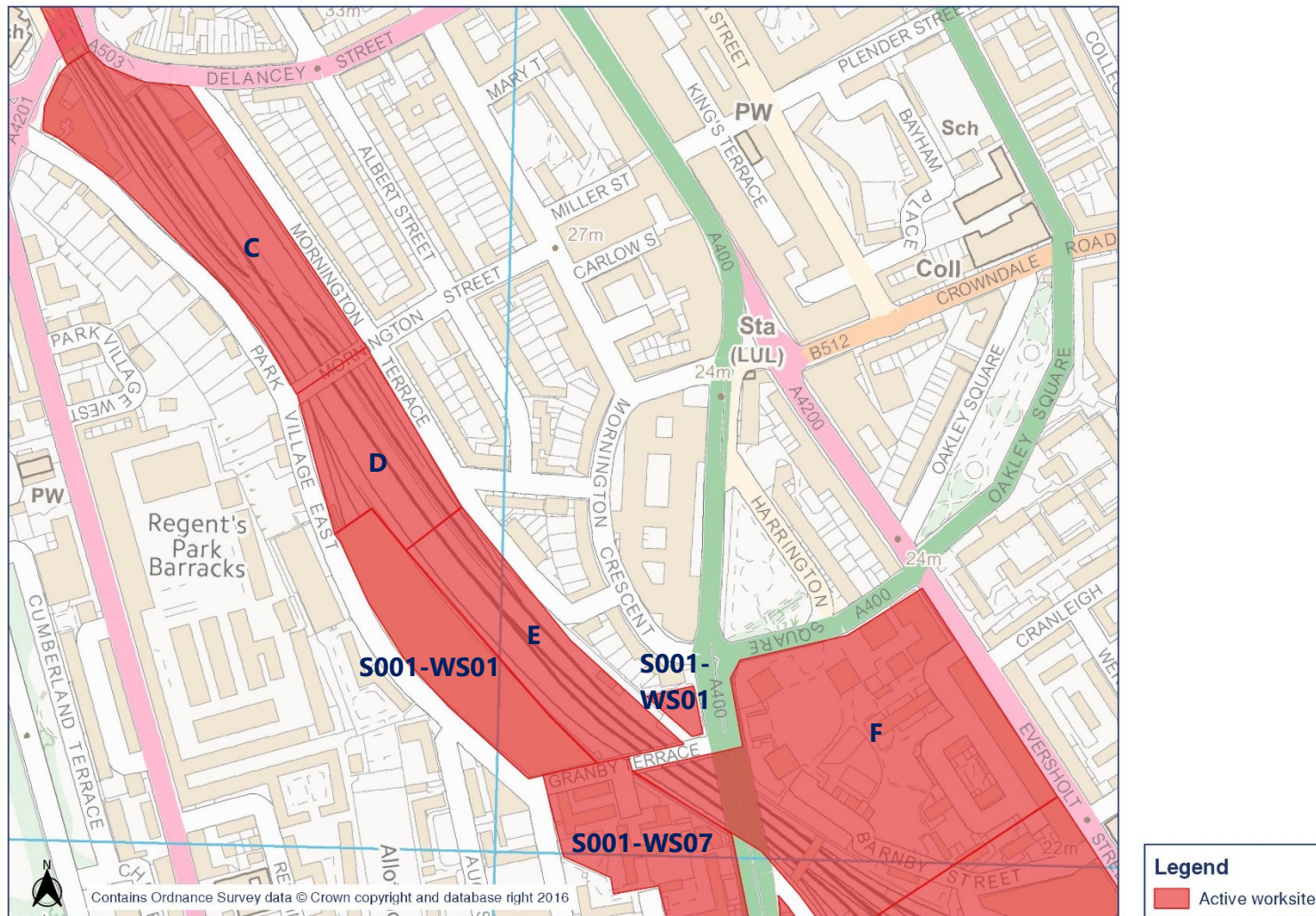
Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
HS2-19-08346-C	S001-WS07	Complaint from a resident of Regents Park Estate due to reversing alarm noise from lorries.	Reversing alarms were identified as not being related to HS2 contractor’s vehicles.	Discussions were held between the site team and resident concluding that the reversing alarms were not related to HS2 contractor vehicles.
HS2-19-08571-C	S003-WS03	Complaint from Stephenson Way due to construction noise.	Noise was due to HS2 breaking works on Stephenson Way.	Complainant was contacted to advise on the programme of works and was also informed that noise levels were s61 levels.
HS2-19-08960-C	N/A	Complaint from a resident on Clarence Gardens disturbed by noise at night.	No HS2 related construction works were undertaken at that time.	Complainant was contacted to inform of findings.

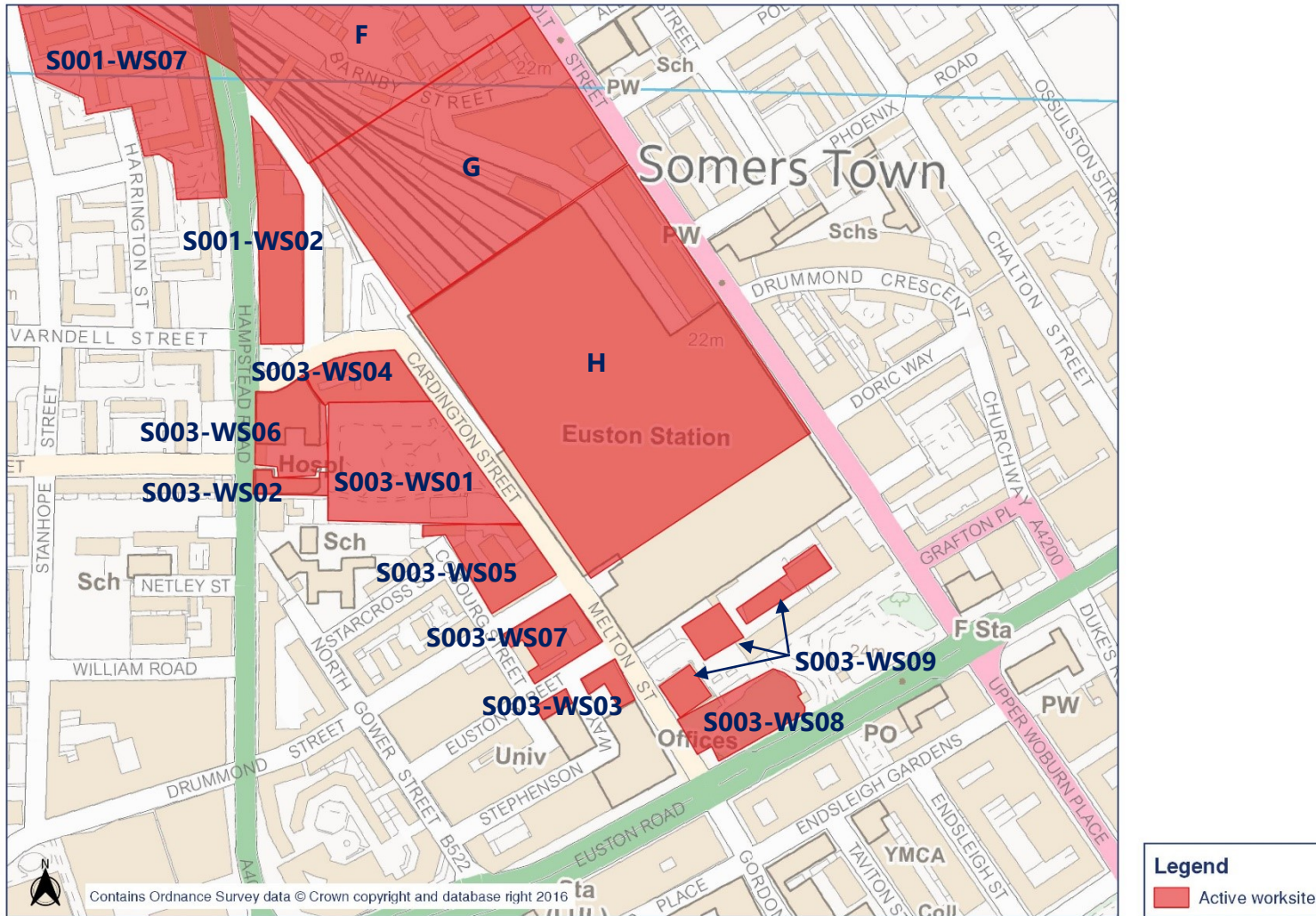
Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
HS2-19-08965-C HS2-19-08967-C	S003-WS03	Complaint from a non-residential property due to noise and vibration caused by pneumatic drilling at Wolfson House	Drilling of Wolfson House perimeter beams and central core structures giving rise to elevated noise levels. Monitoring data demonstrates compliance with TAP and s61 levels.	Acoustic screening of building was in place. The methodology was reviewed, and operatives briefed to reduce impact of drilling when removing concrete encasement of steelwork as far as reasonably practicable. On-site operatives also provided with live noise monitoring feed to allow ongoing evaluation of works.
HS2-19-09262-C	C	Complaint from a resident on Albany Street due to noise and vibration caused by drilling undertaken by HS2 contractors.	Investigation of the complaint is ongoing.	Contractors have visited the resident and informed them of the works. Investigation is ongoing.

Appendix A Site Locations

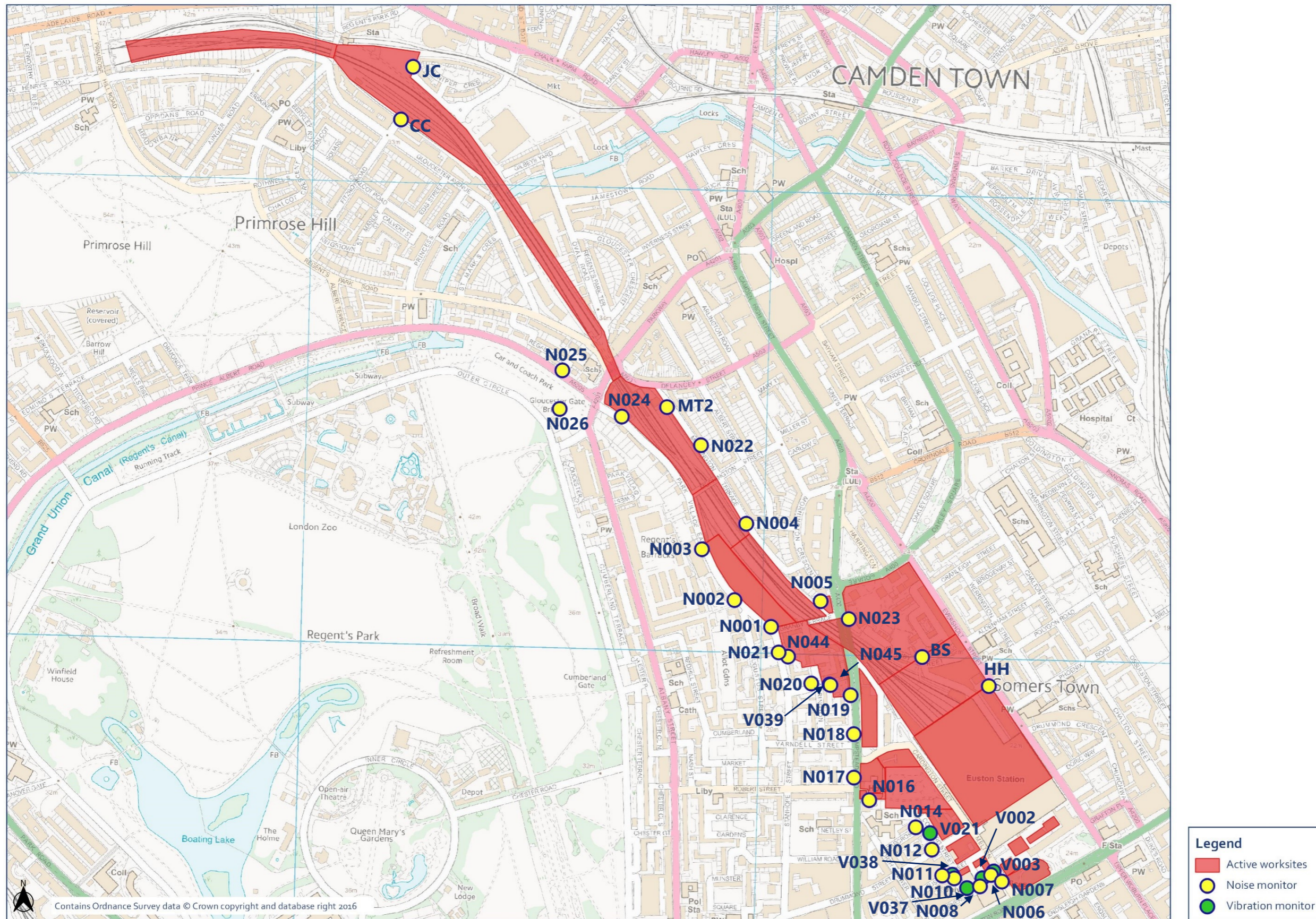


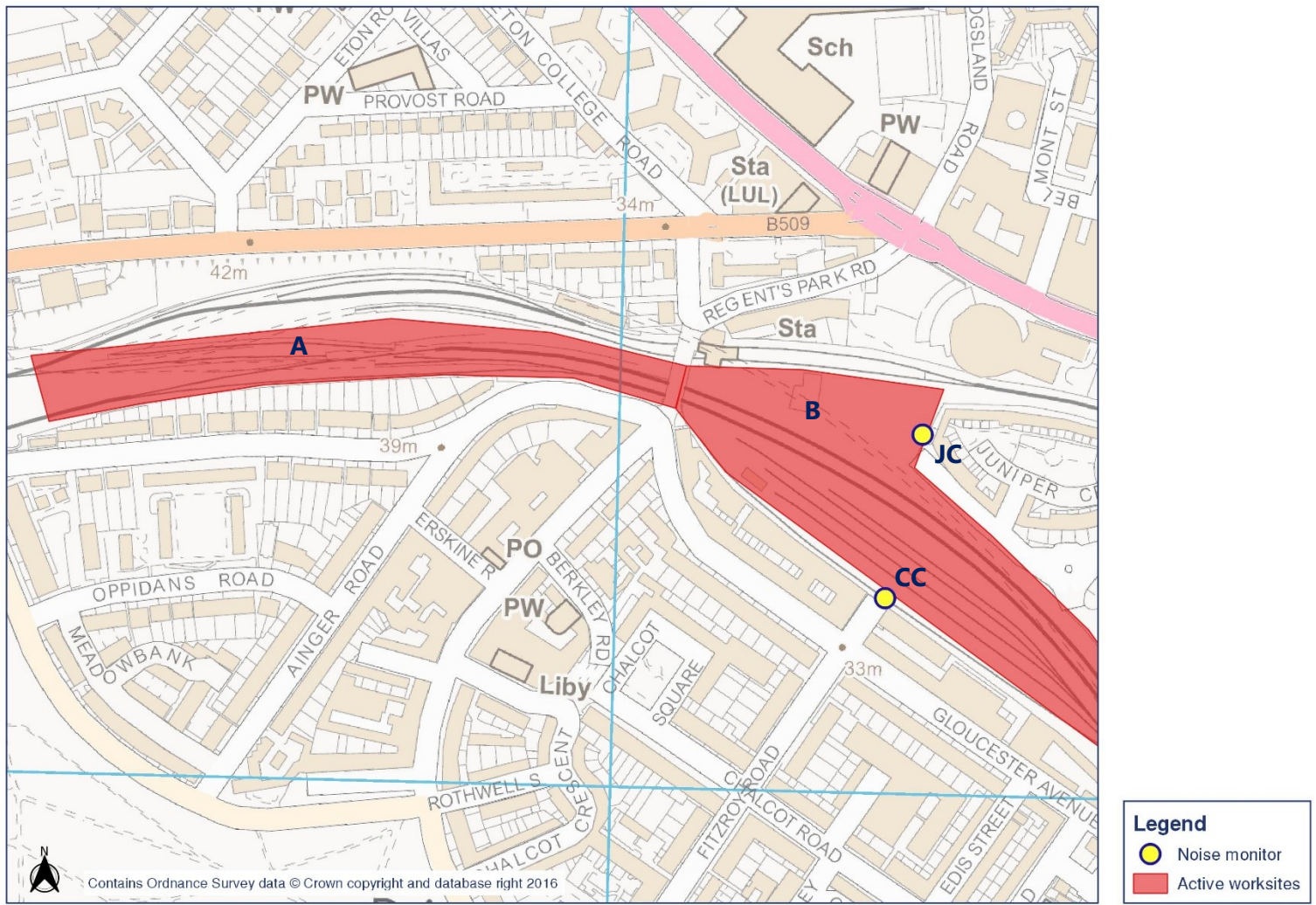


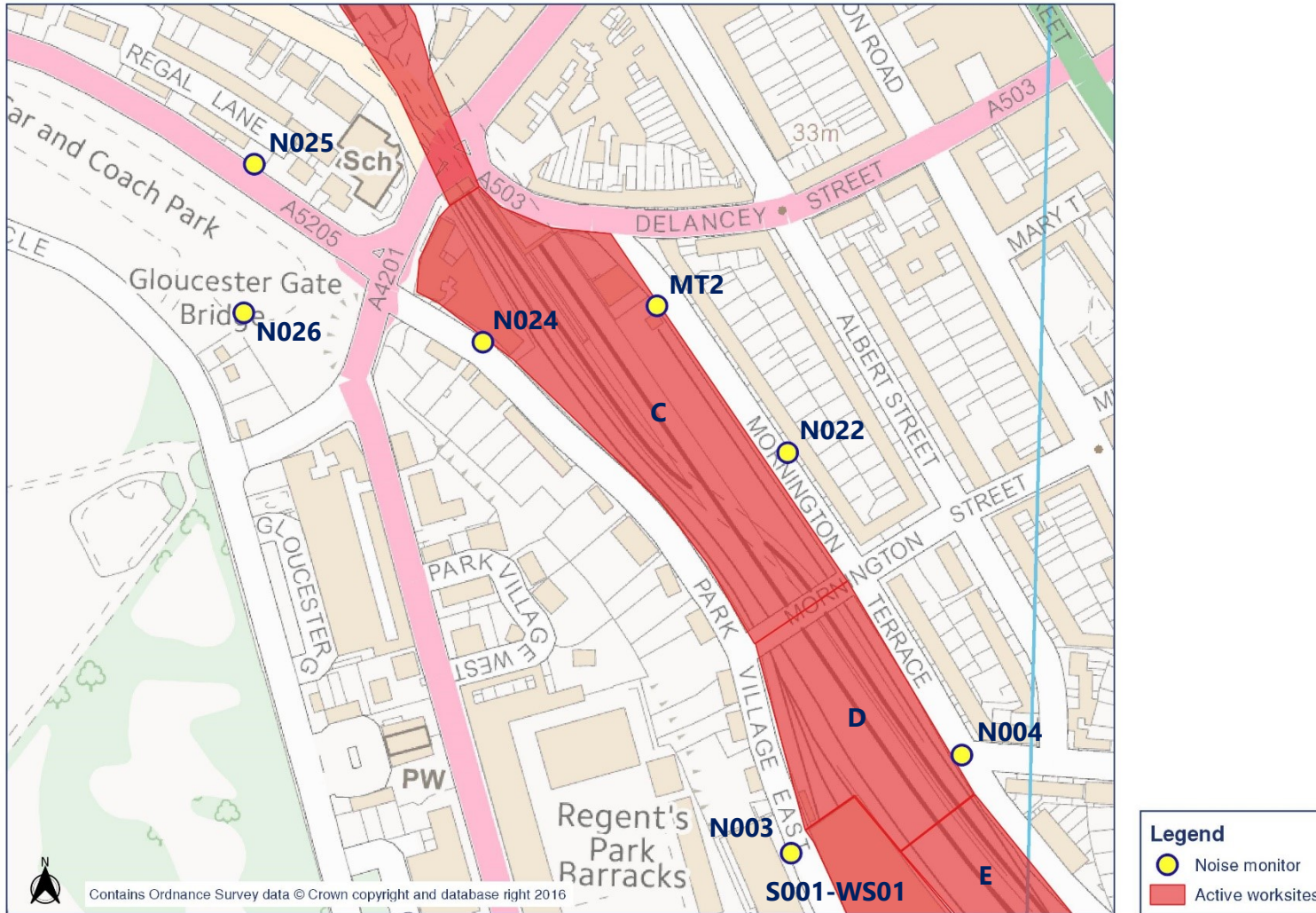


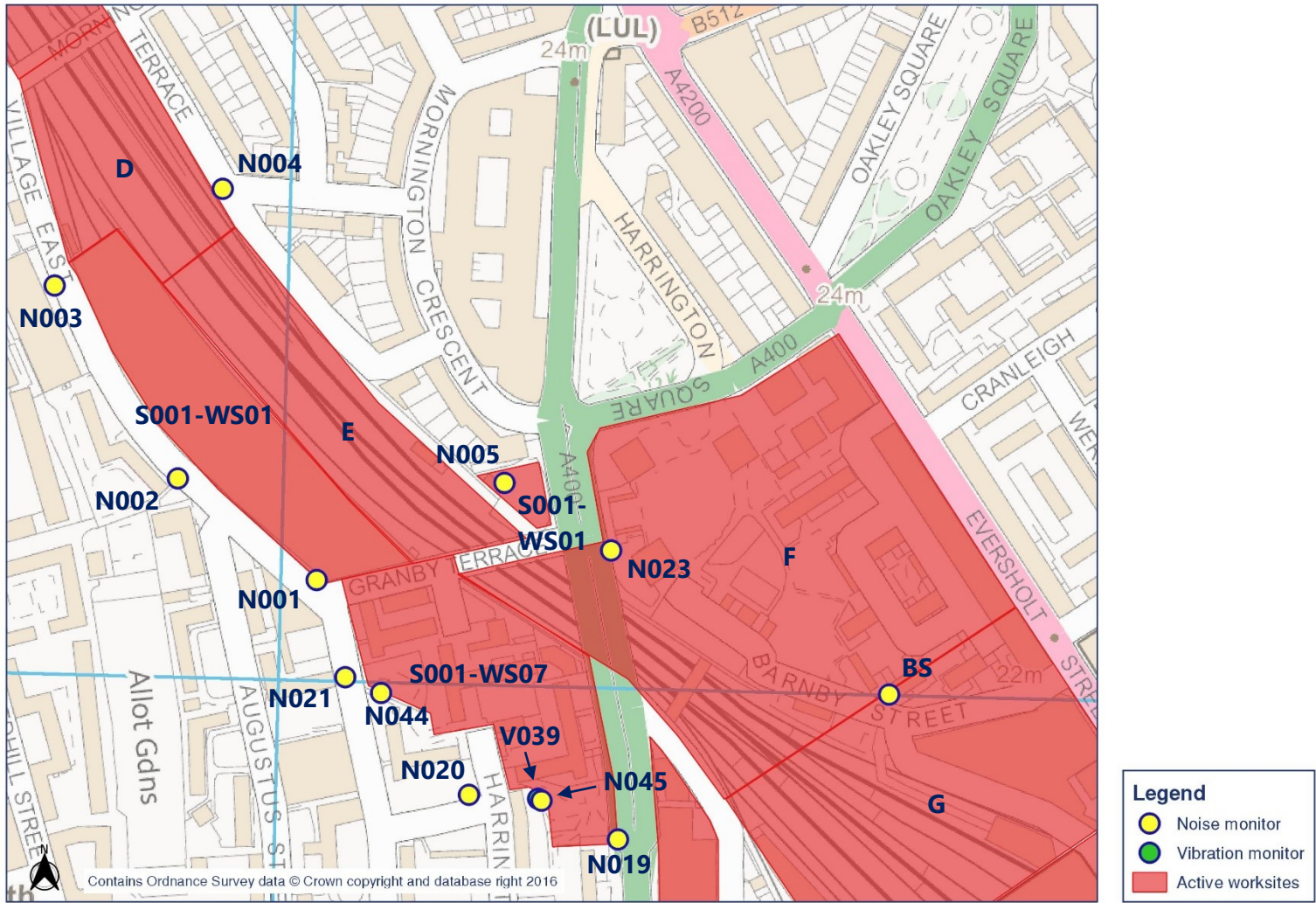


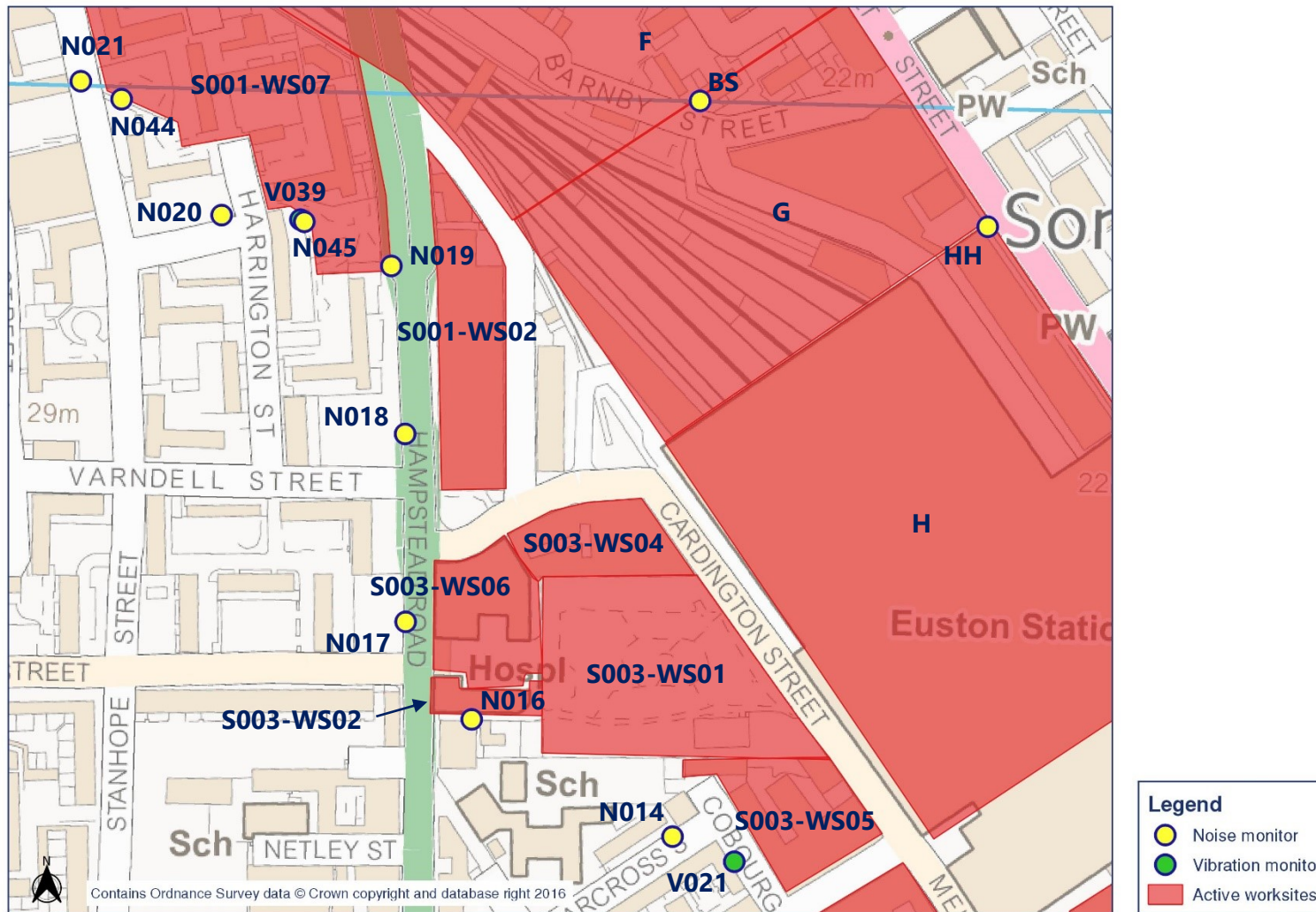
Appendix B Monitoring Locations

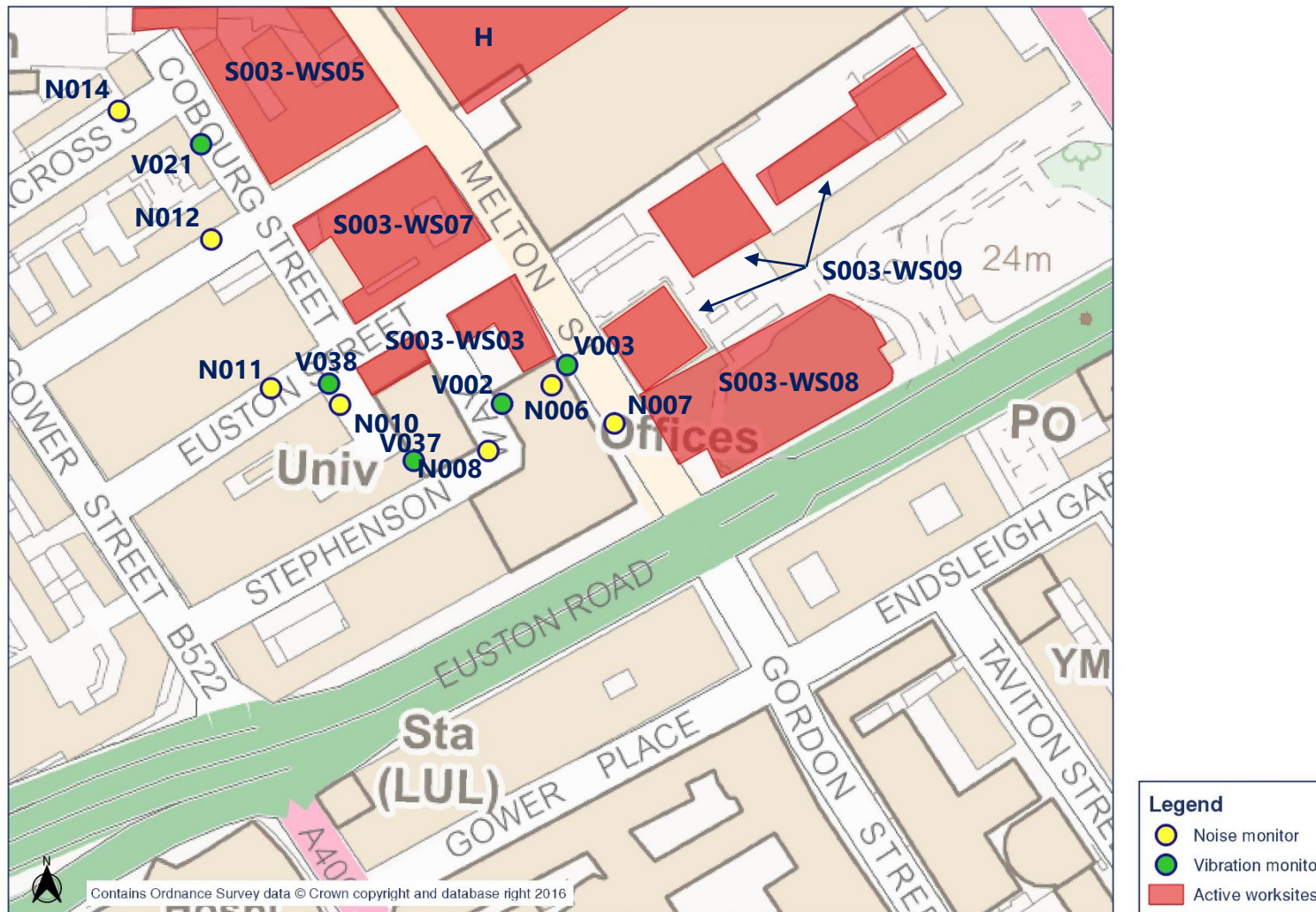










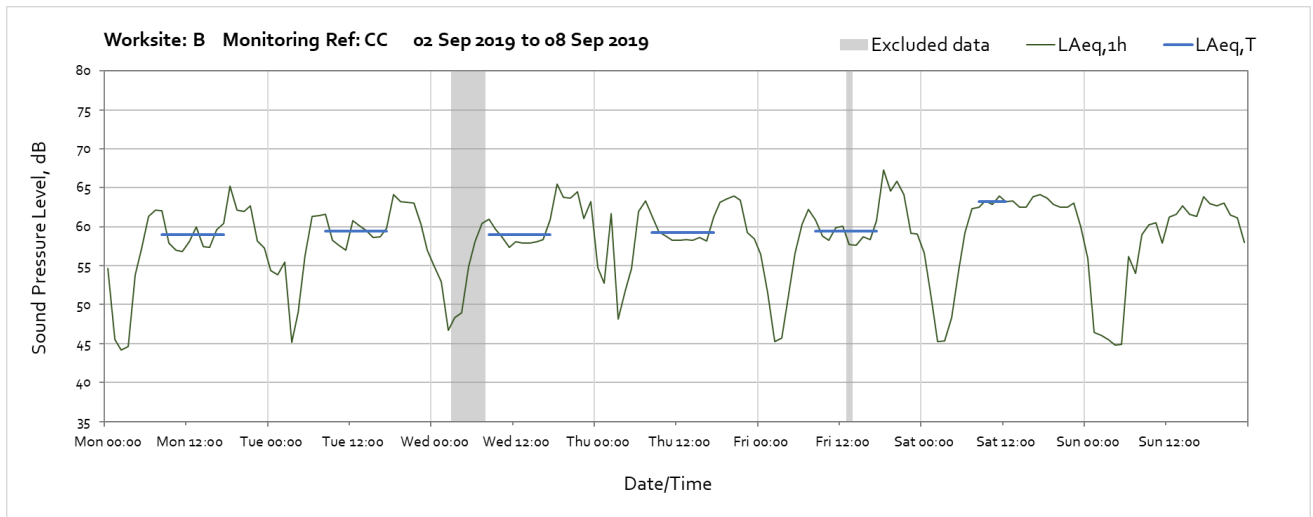
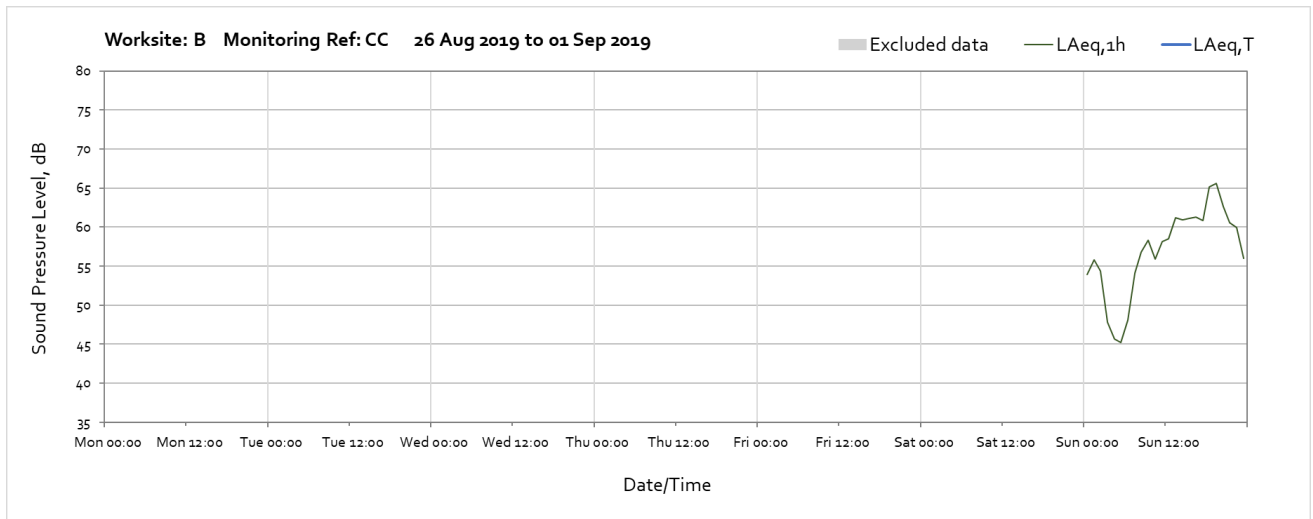


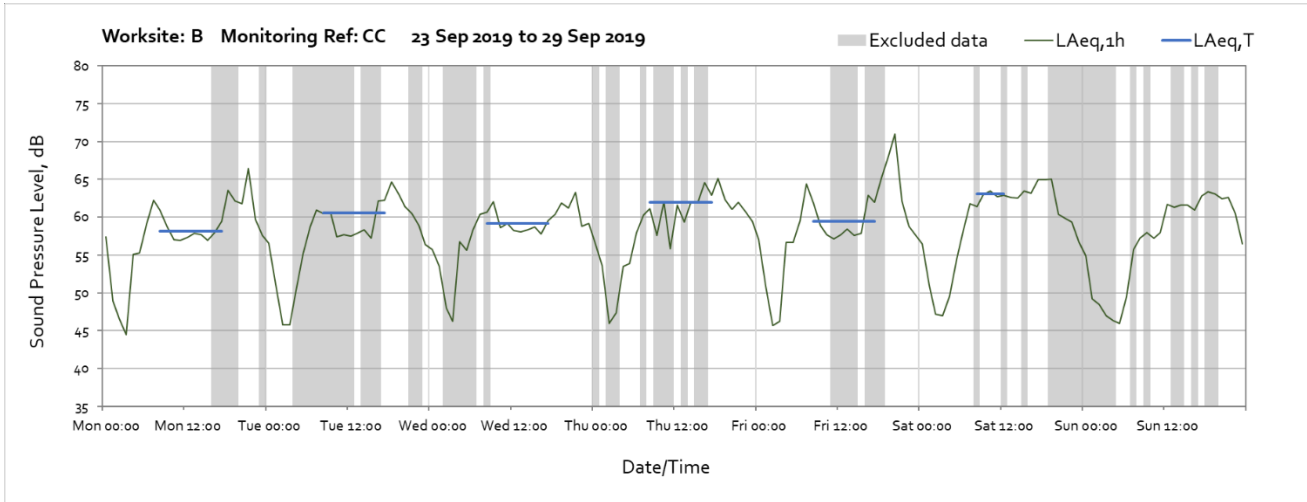
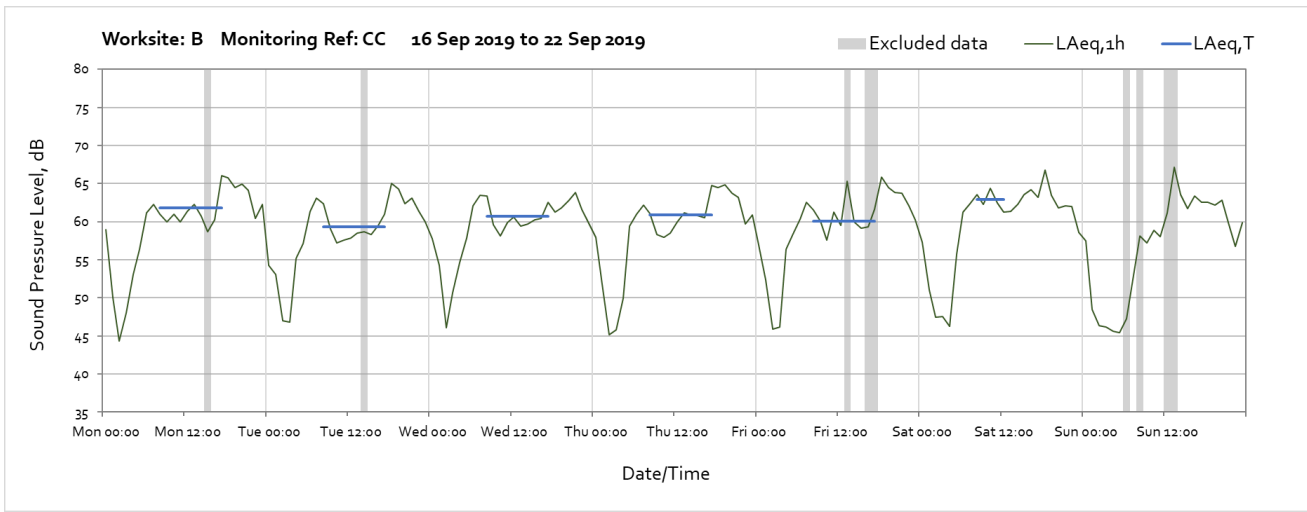
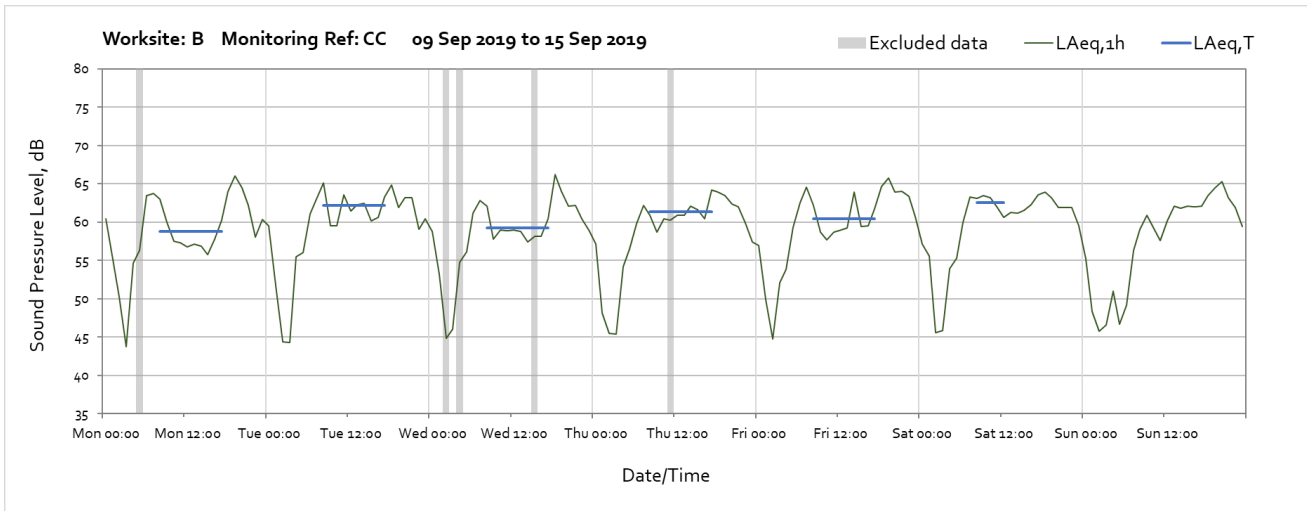
Appendix C Data

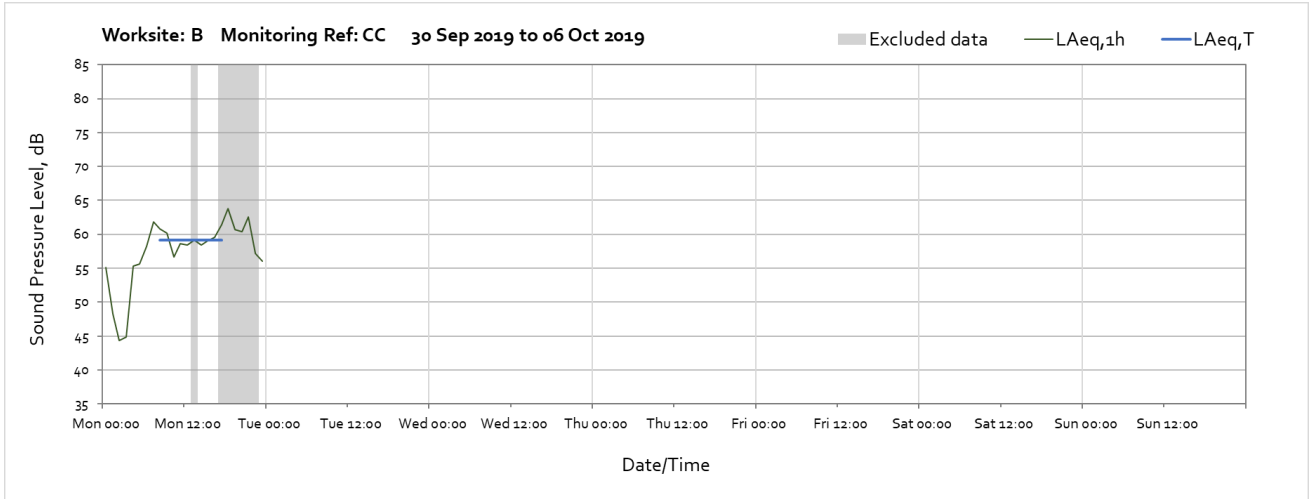
Noise

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 4.

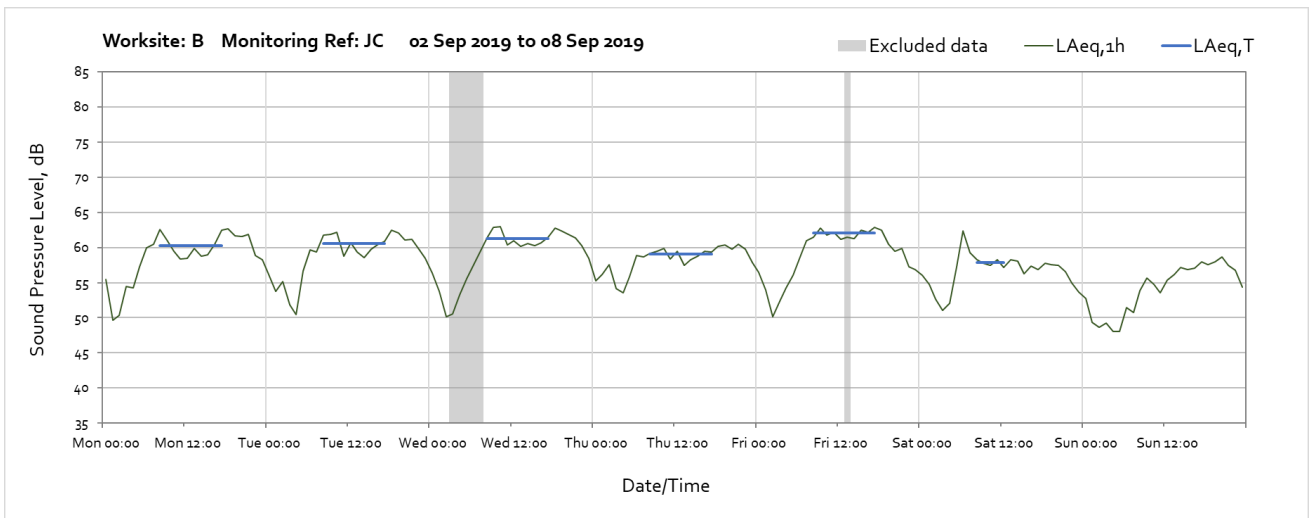
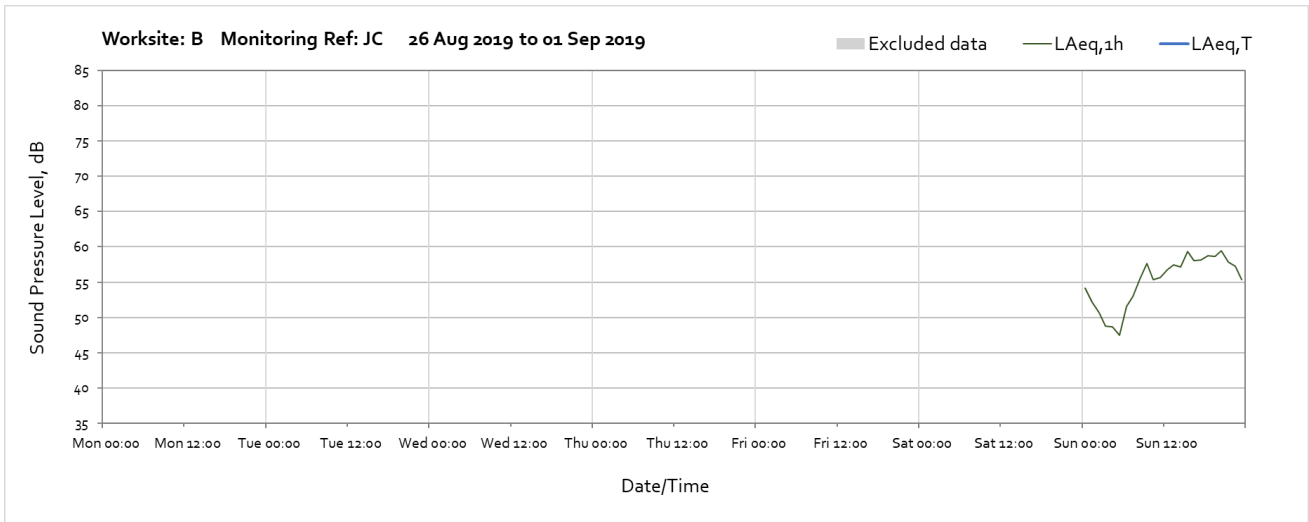
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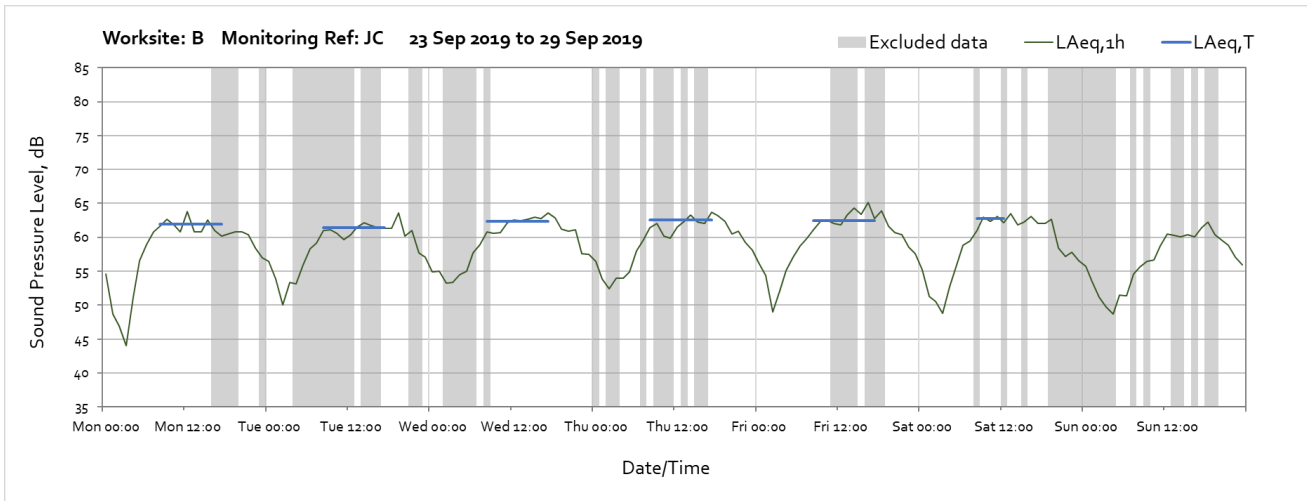
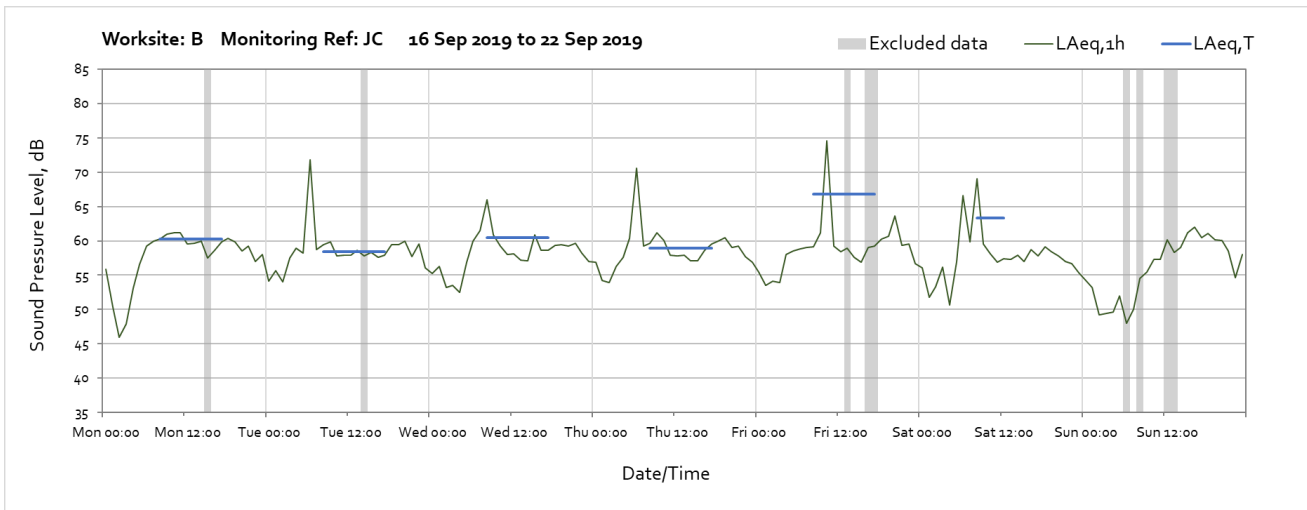
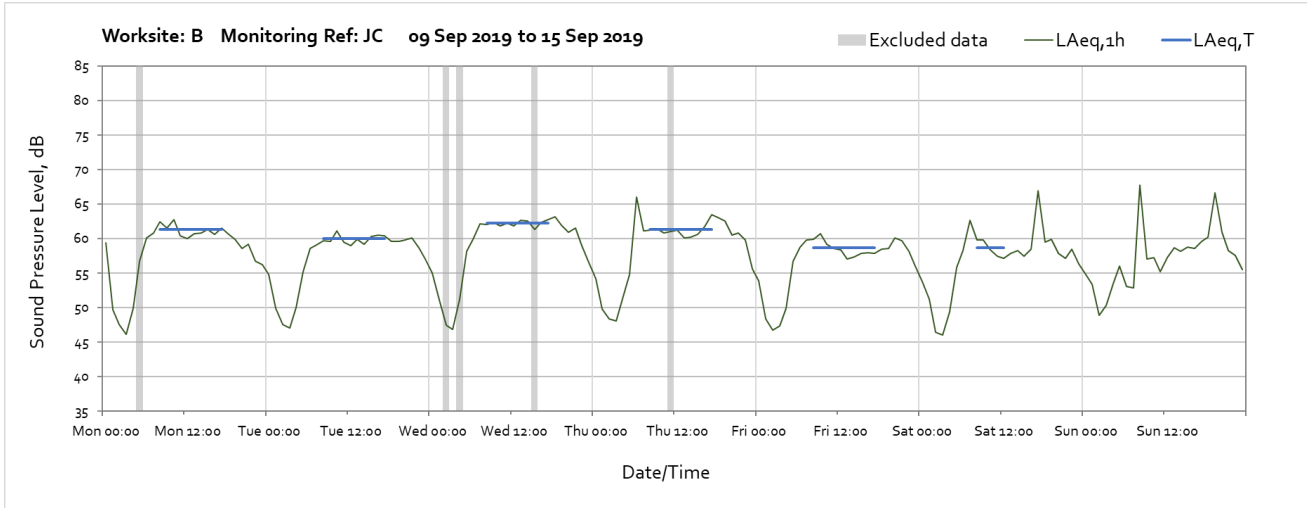


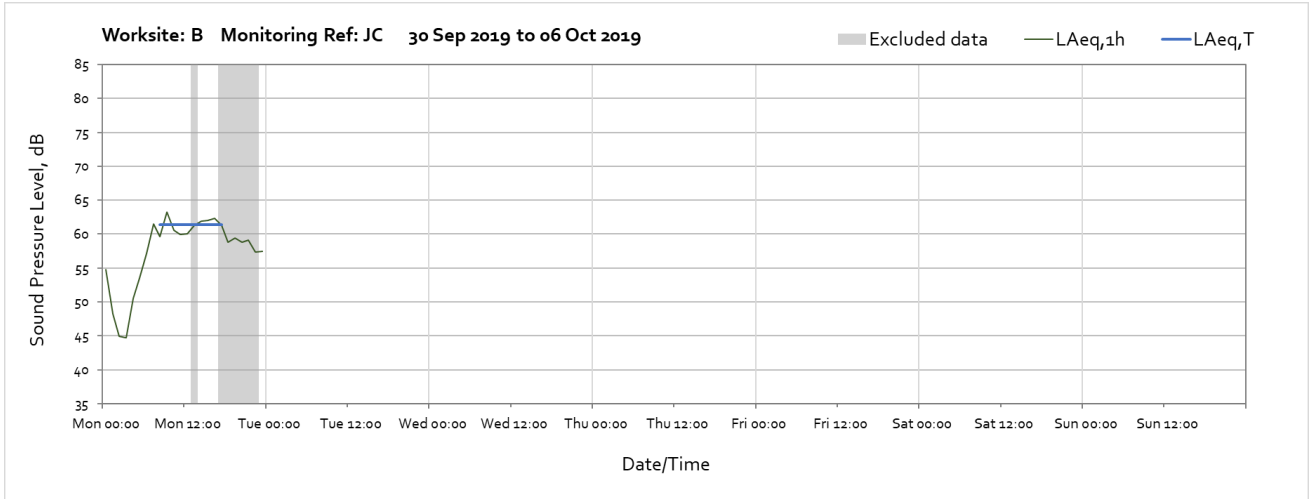




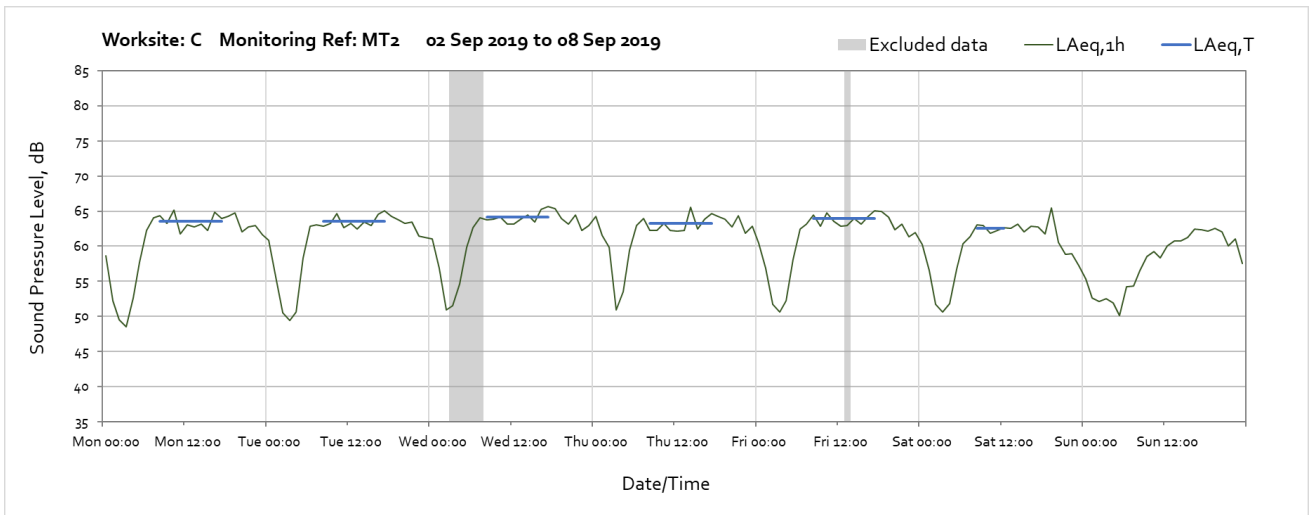
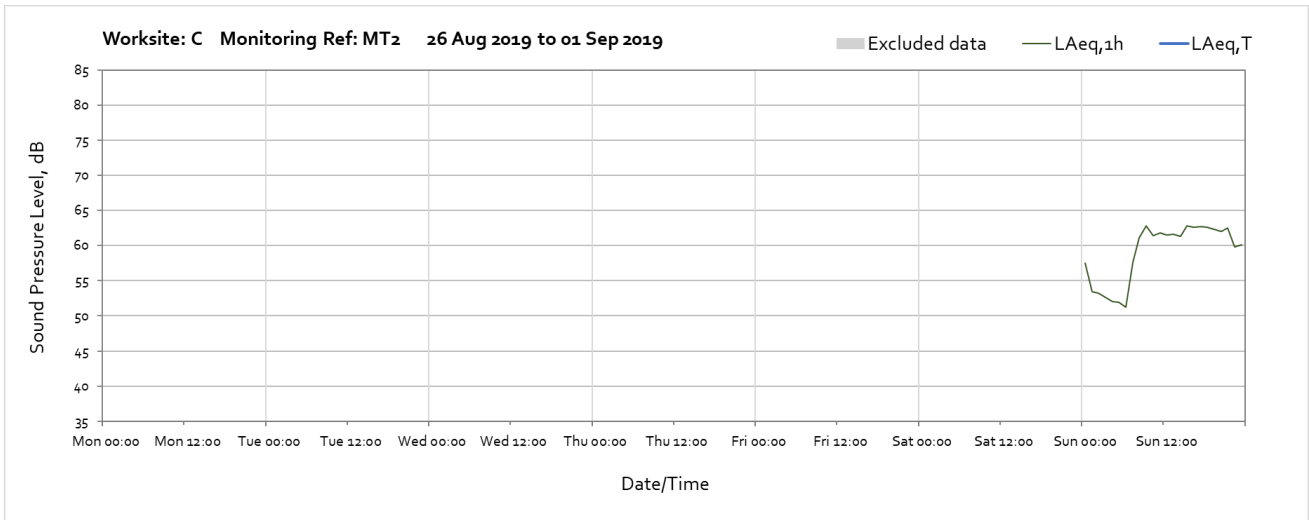
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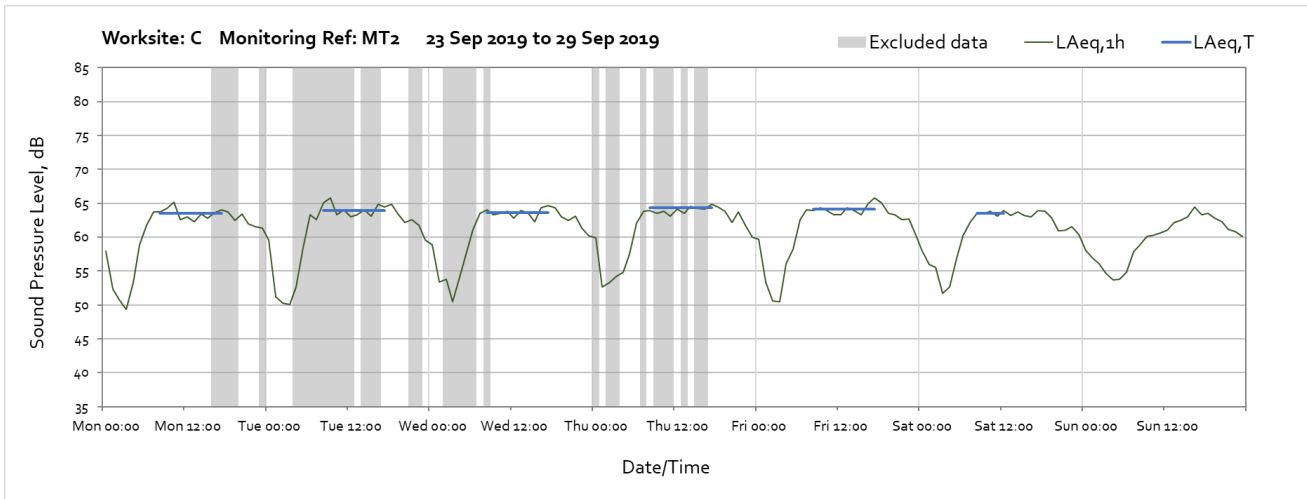
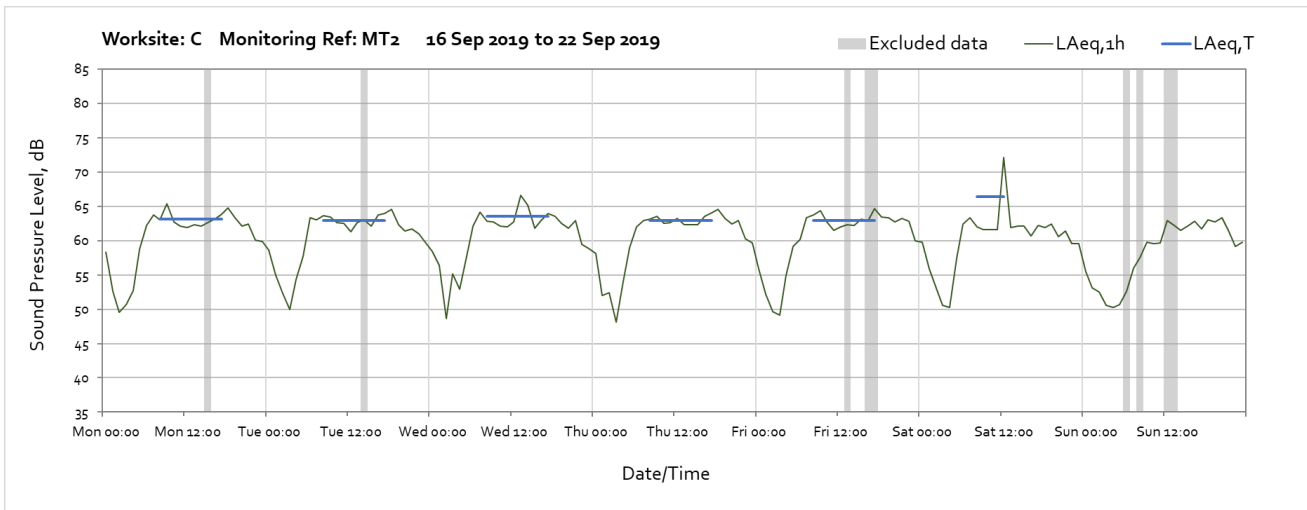
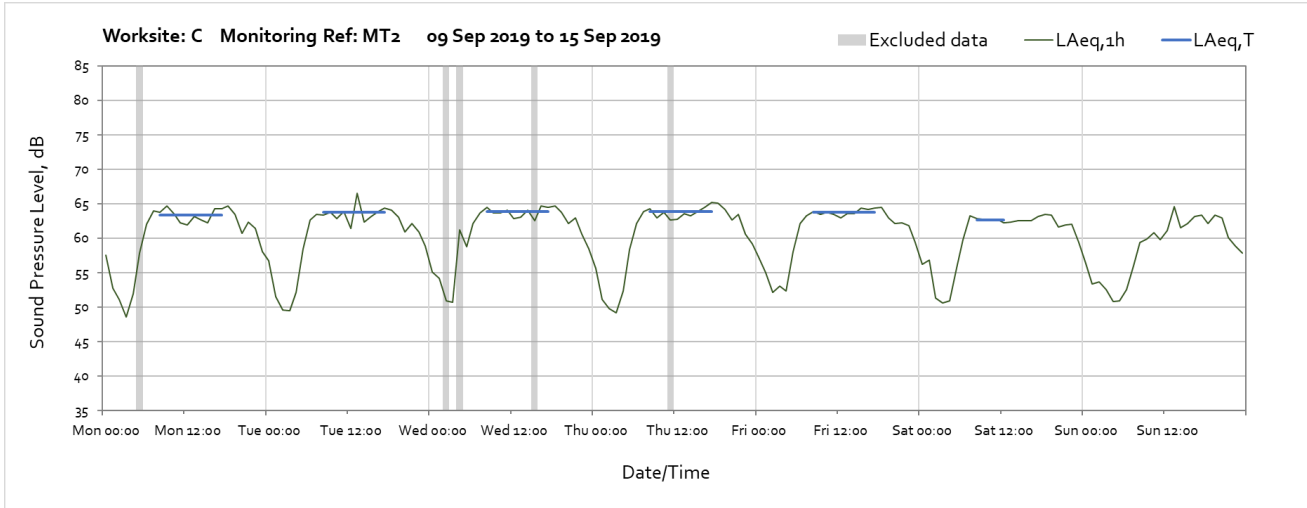


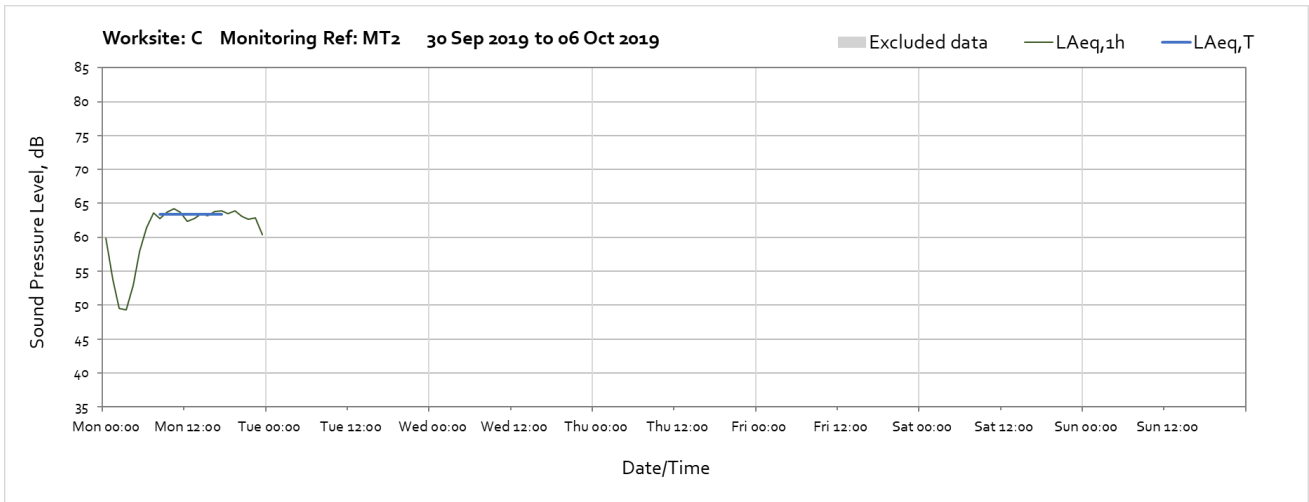




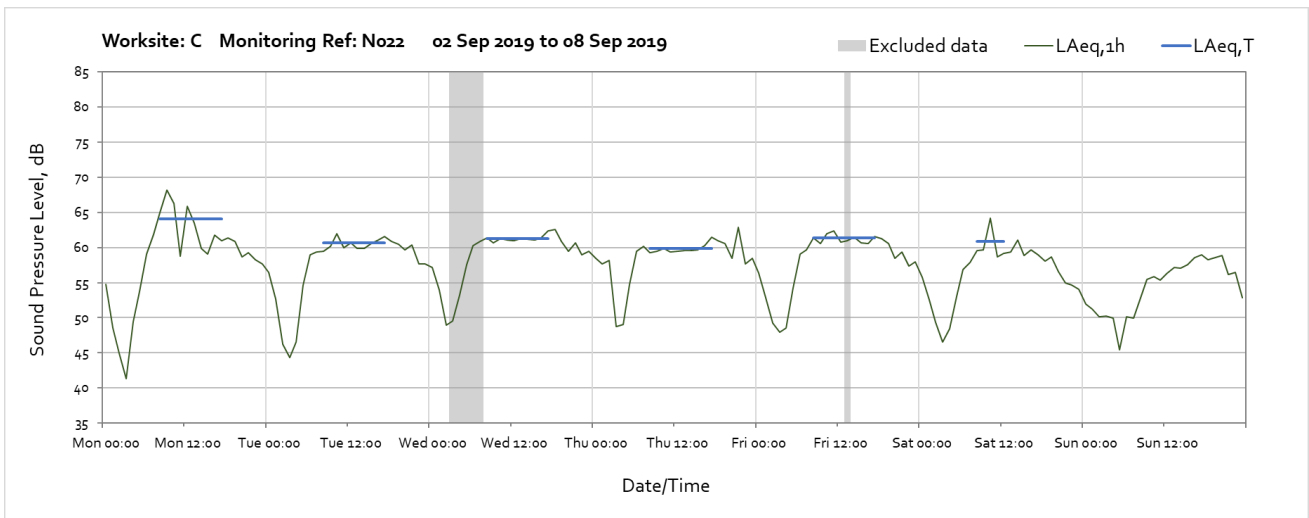
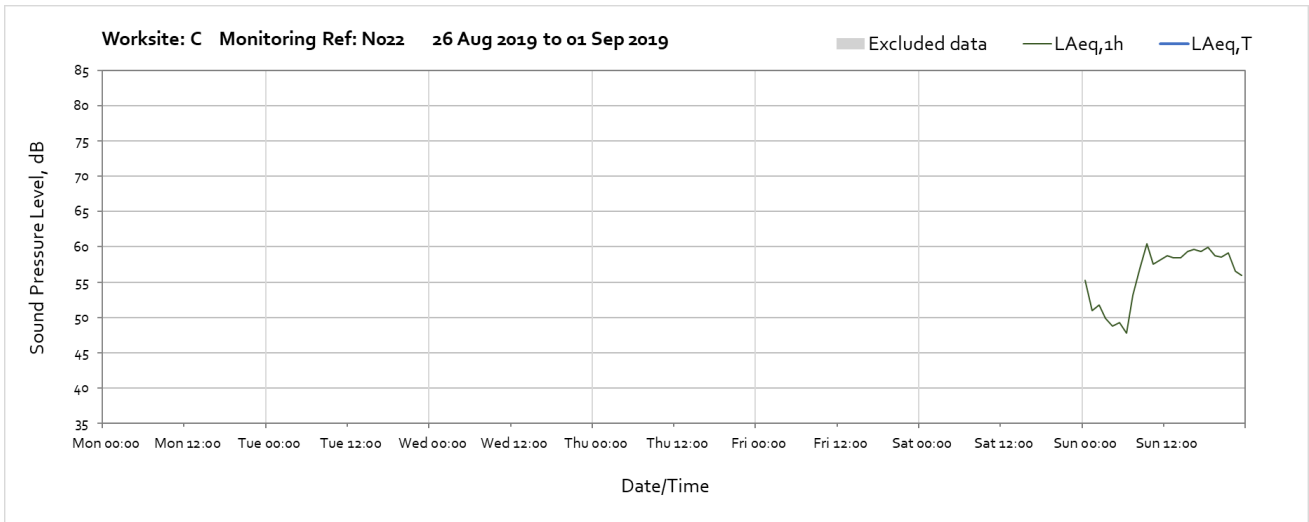
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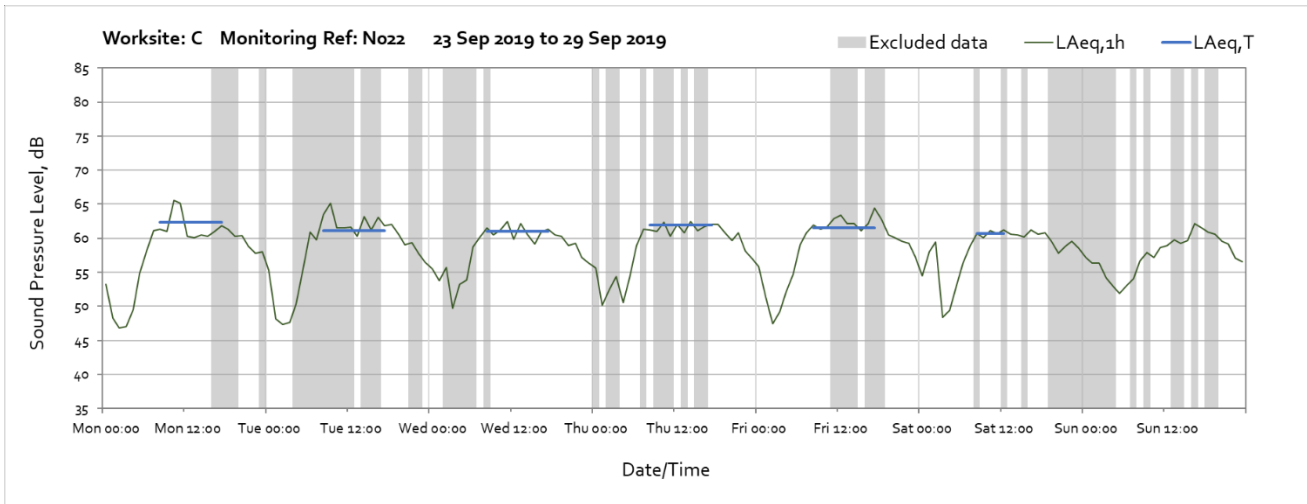
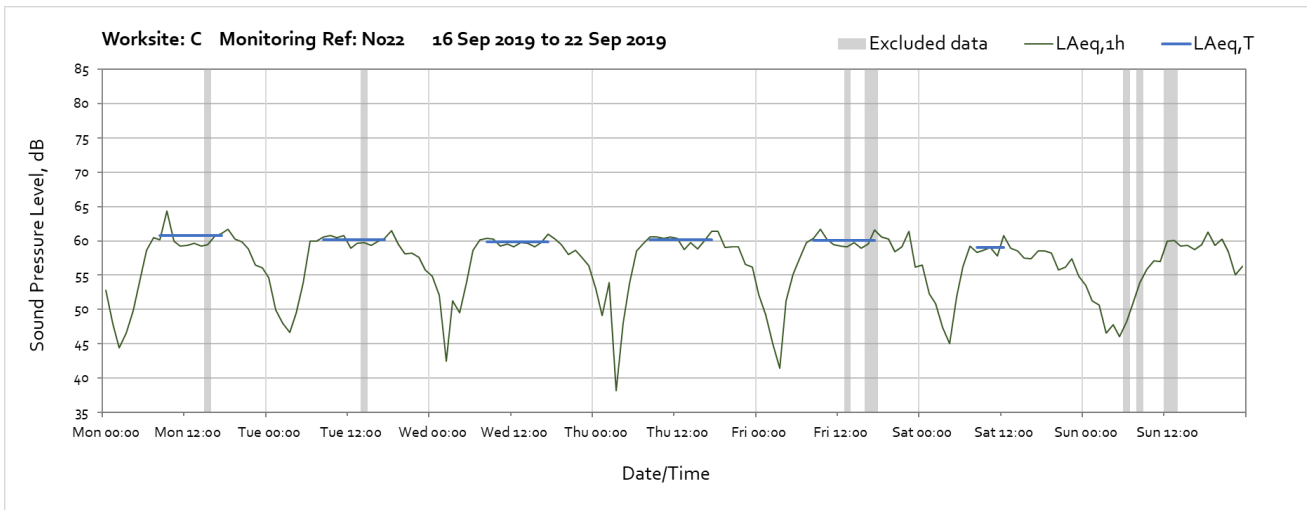
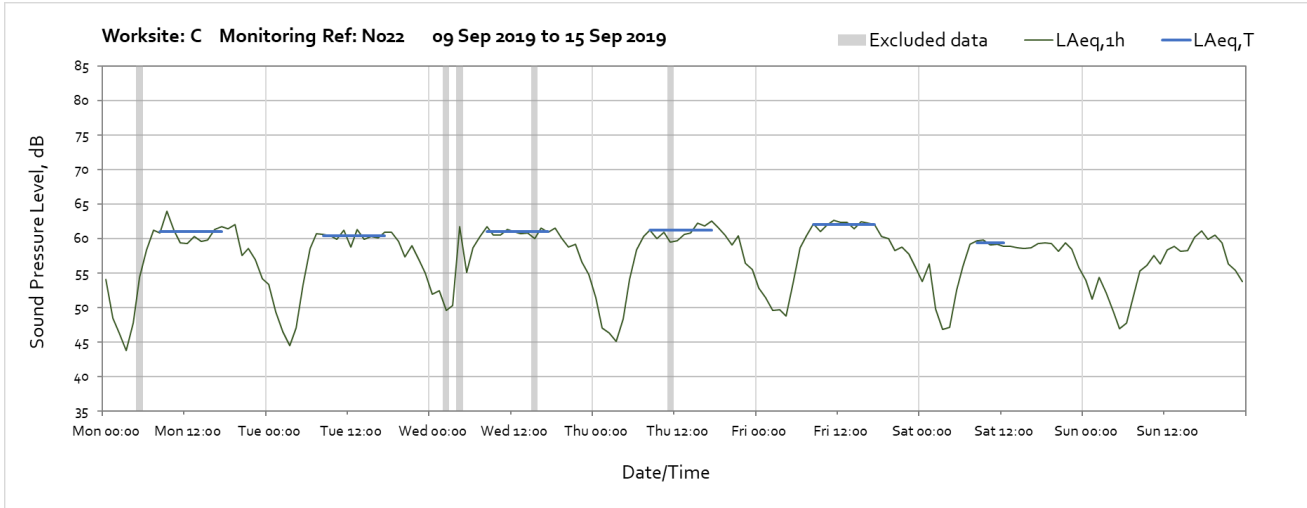


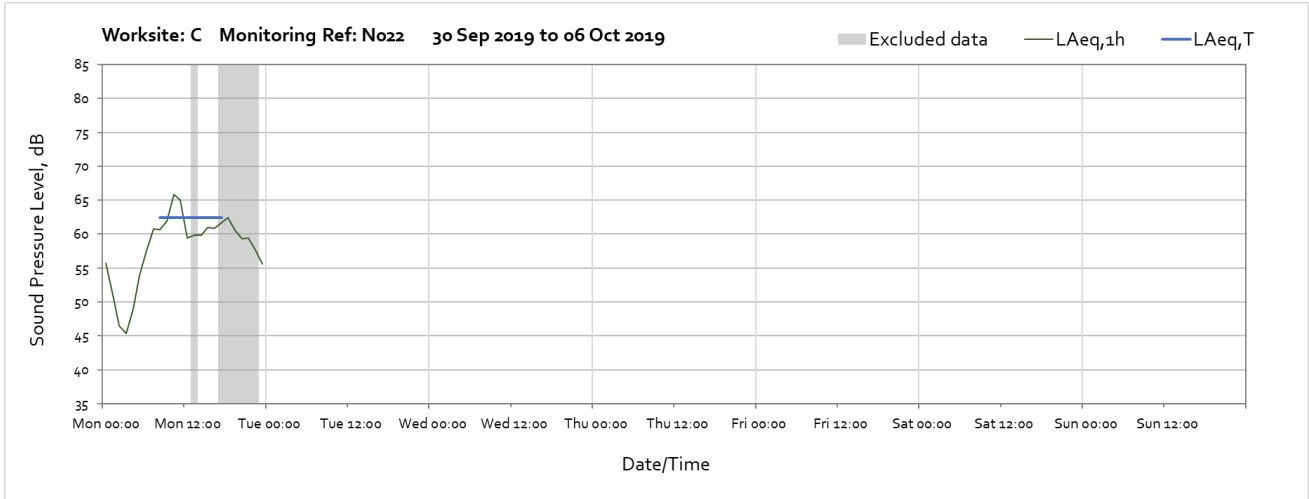




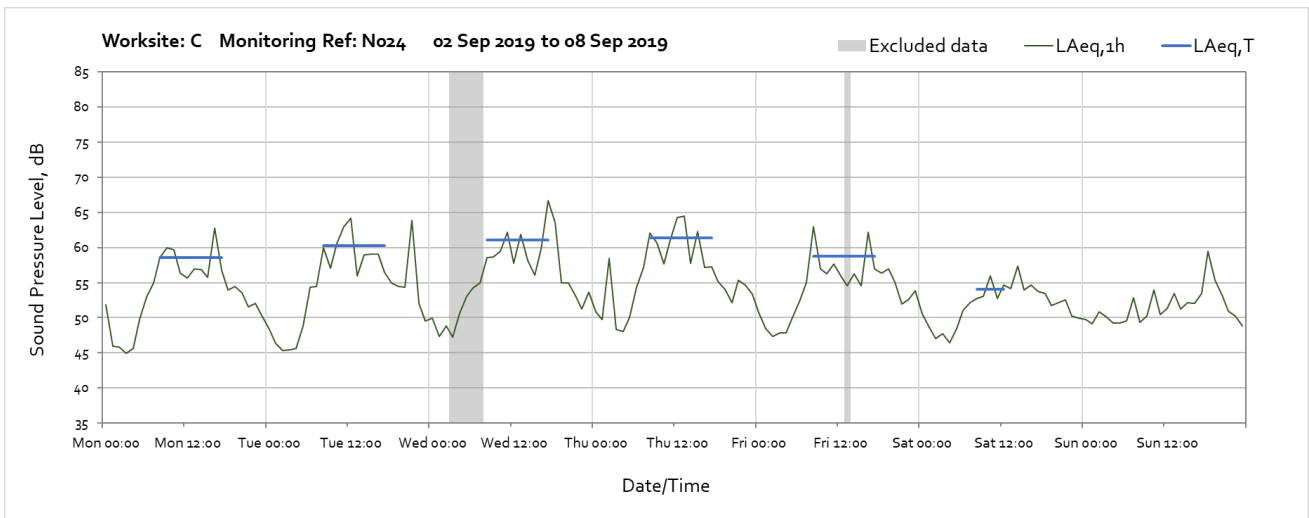
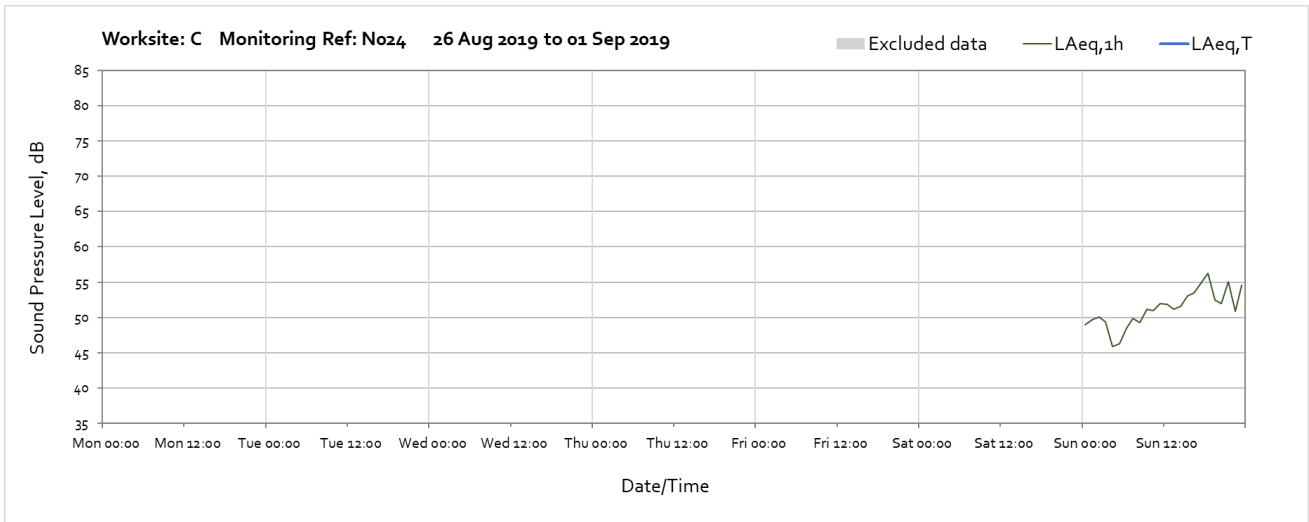
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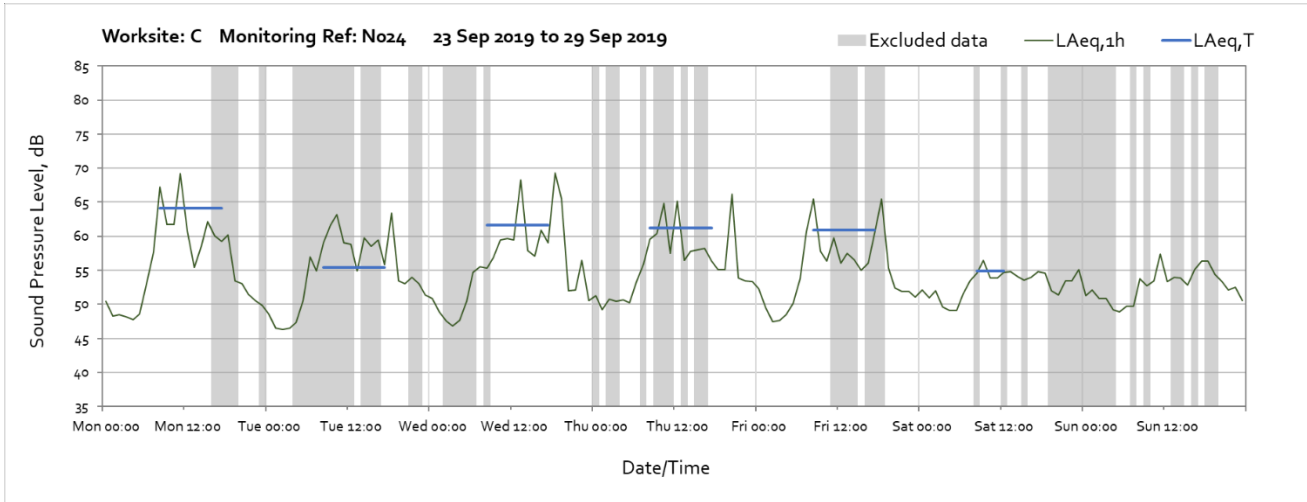
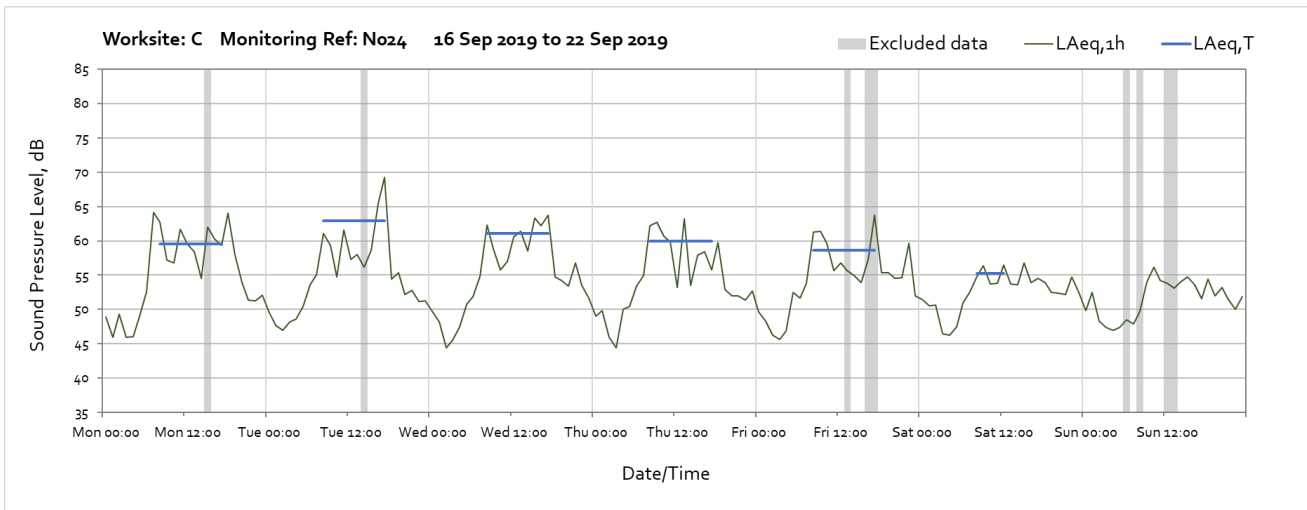
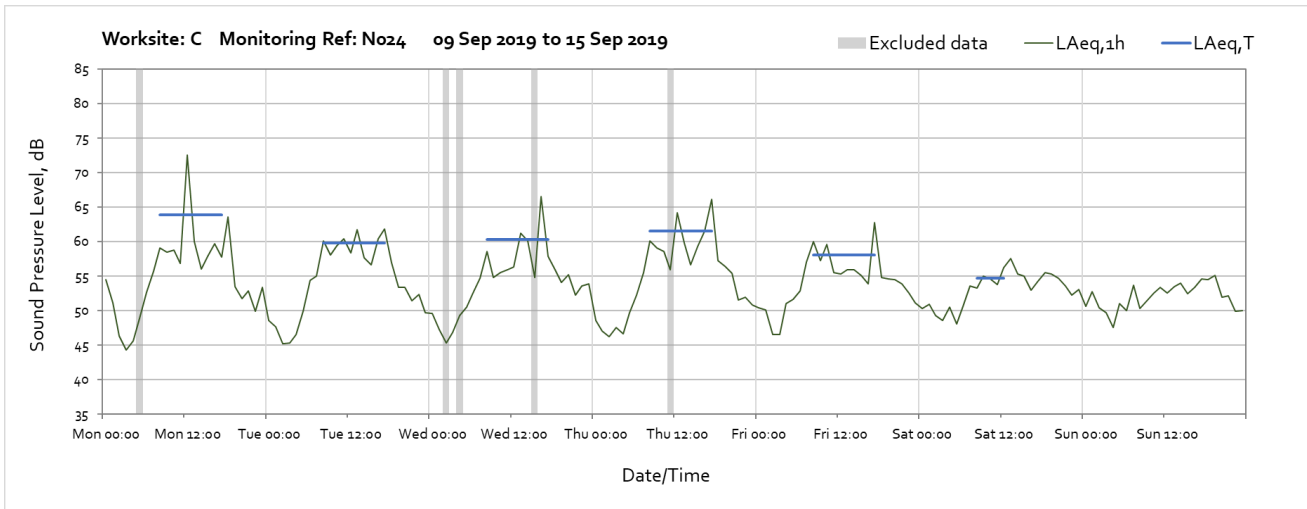


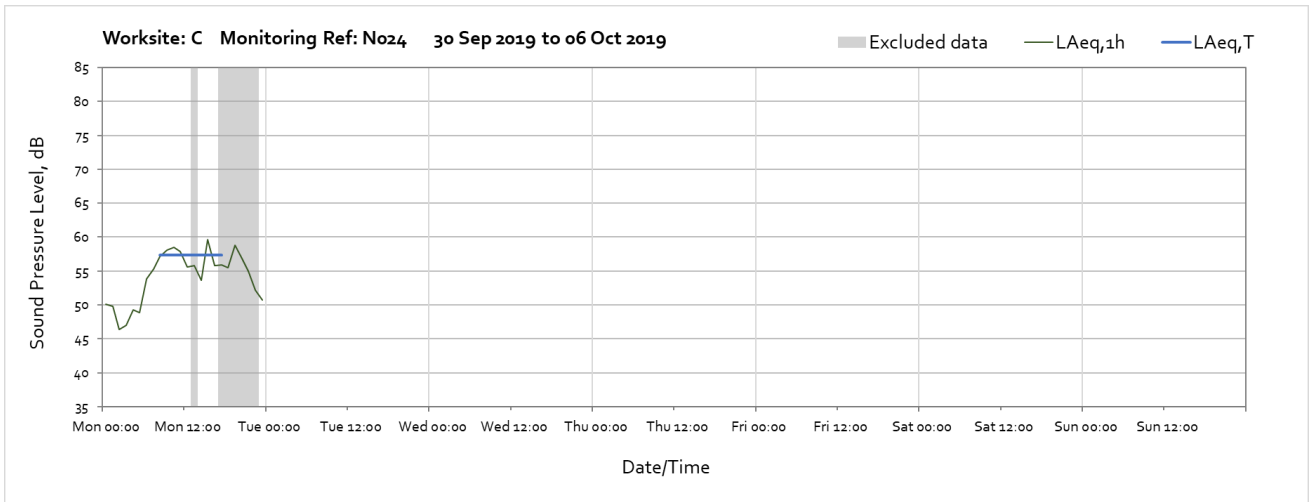




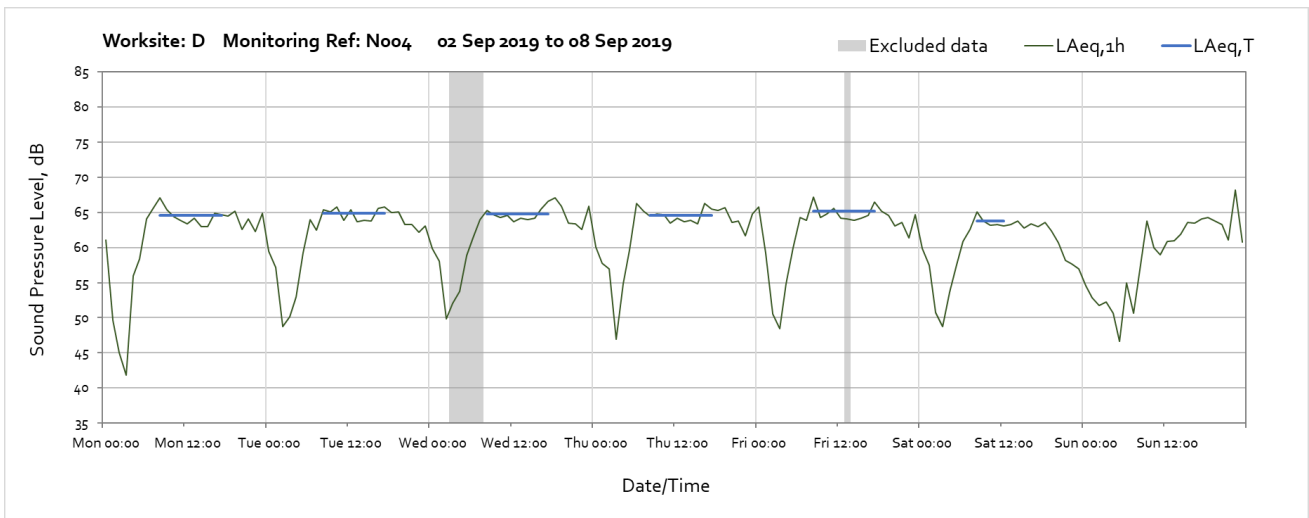
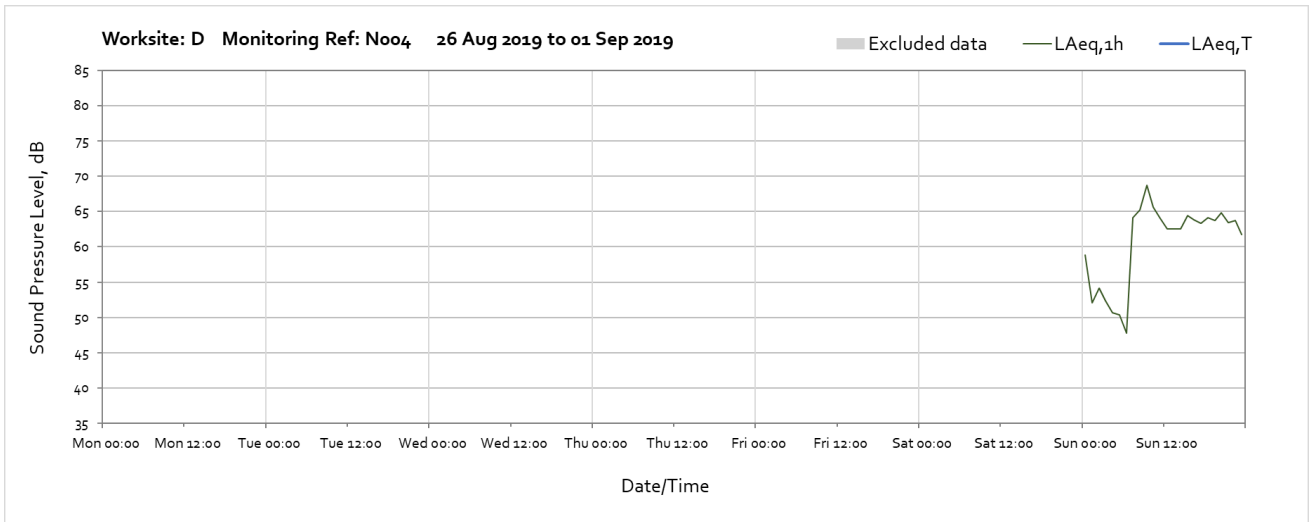
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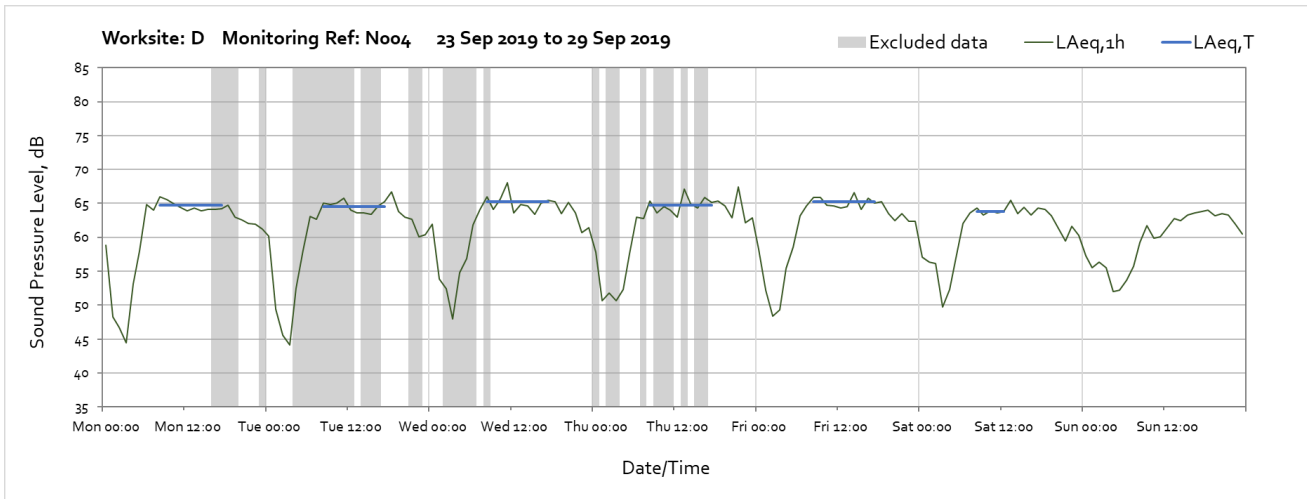
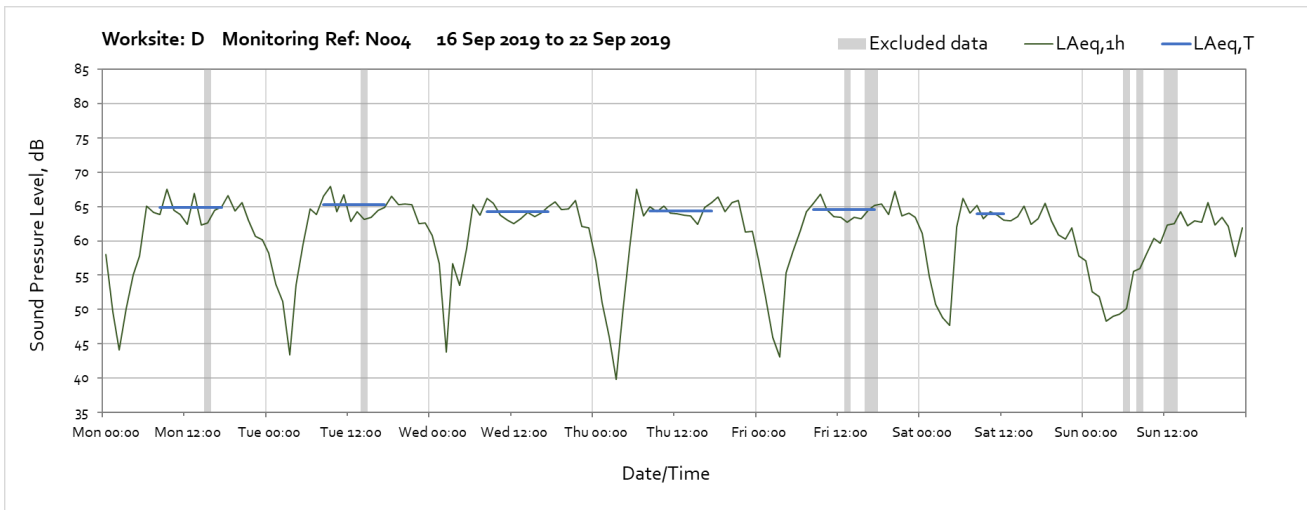
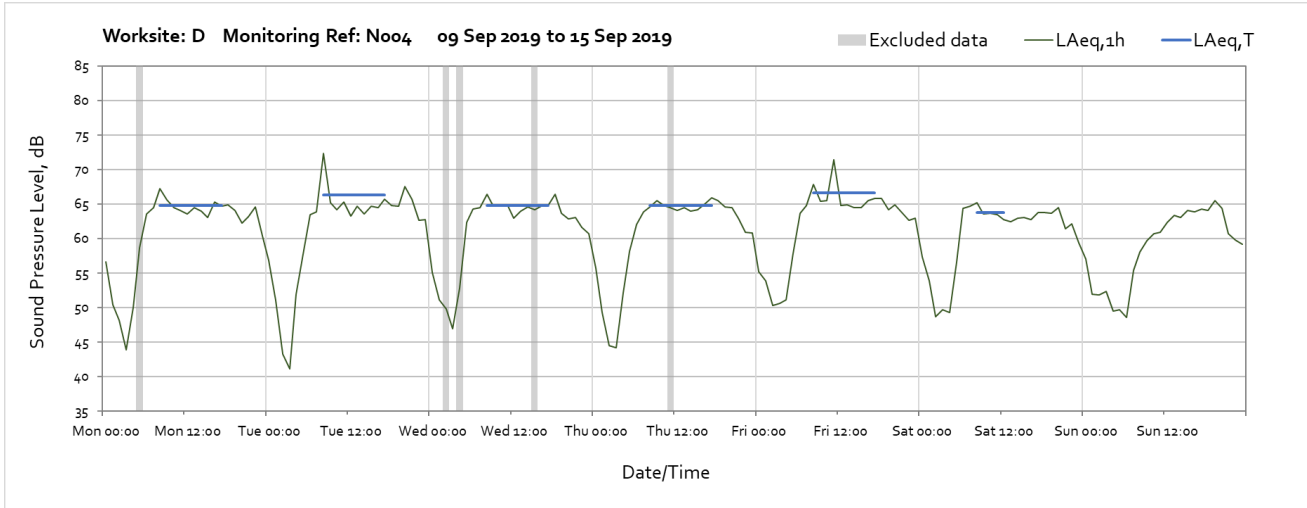


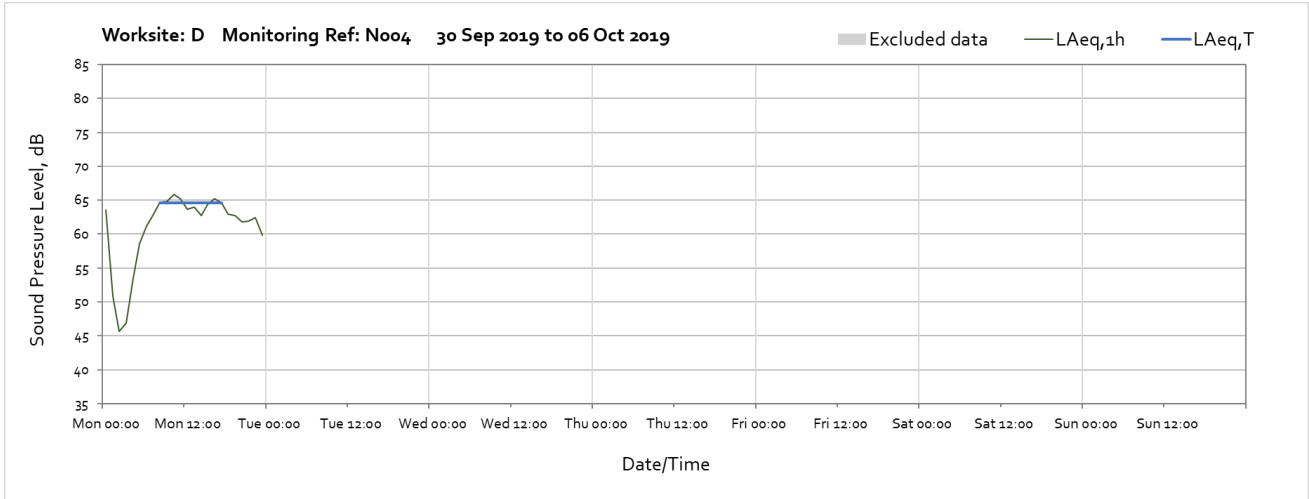




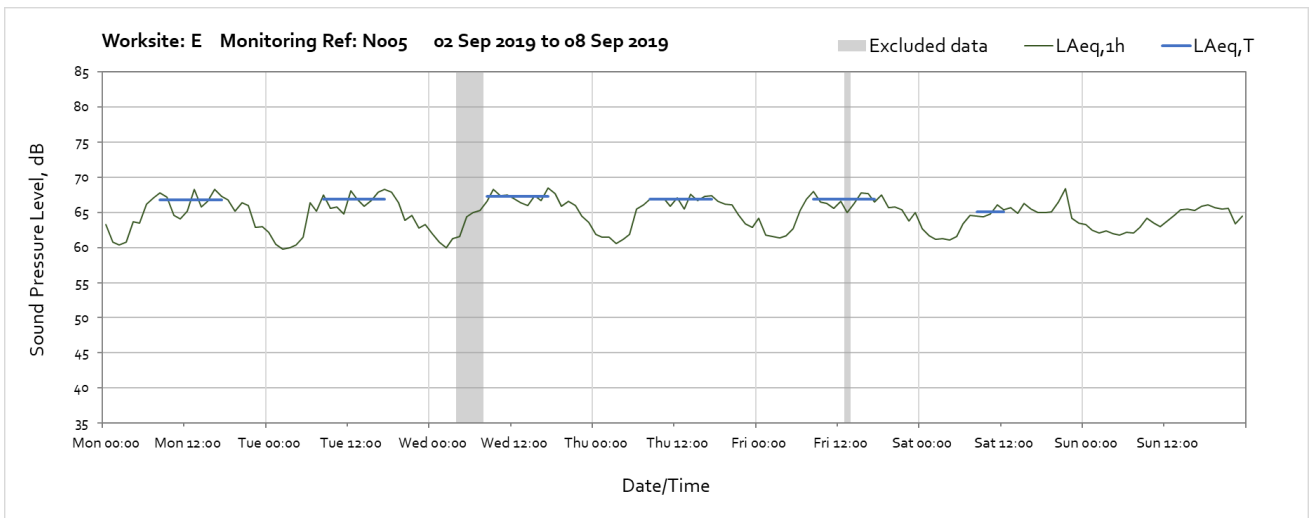
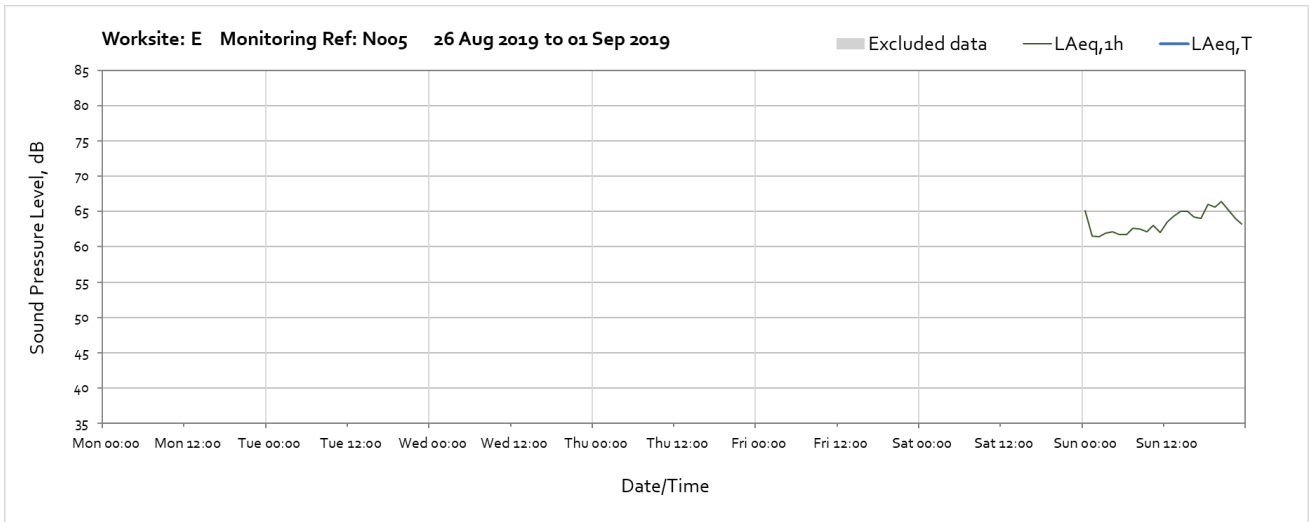
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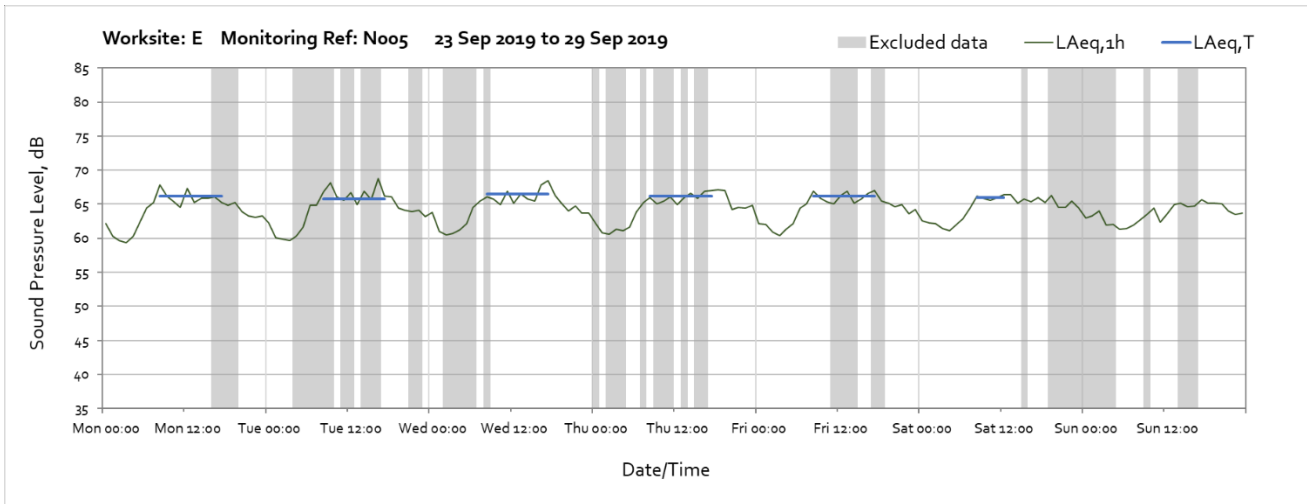
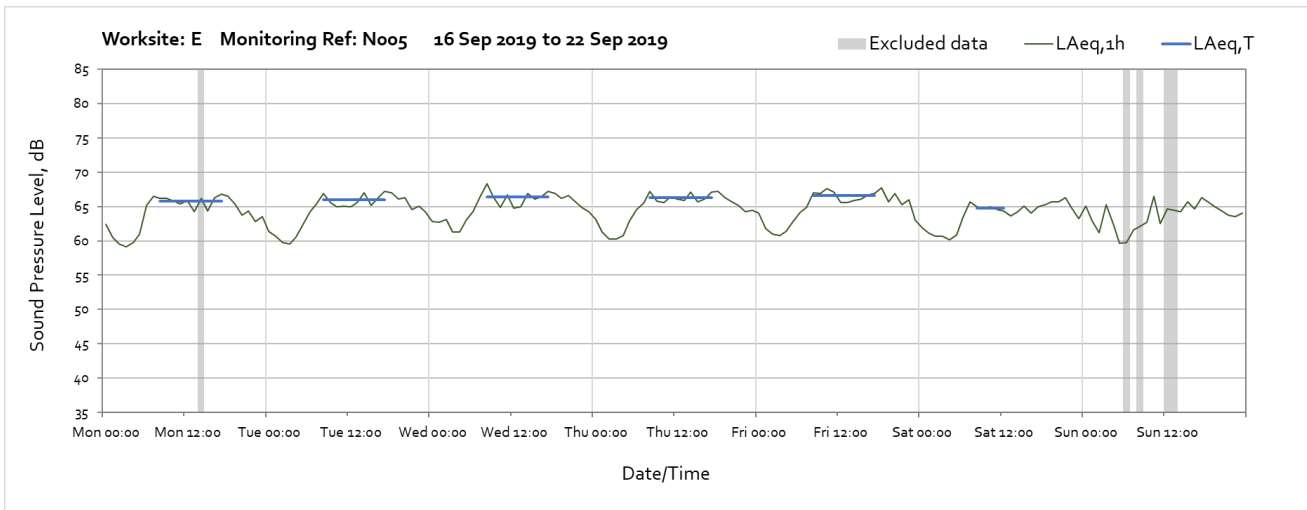
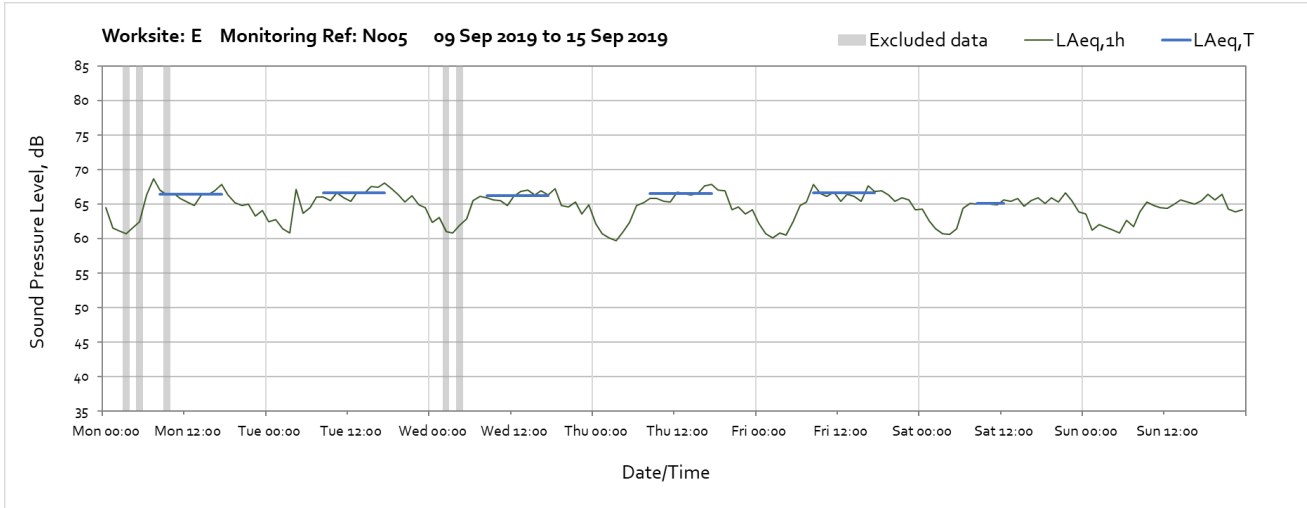


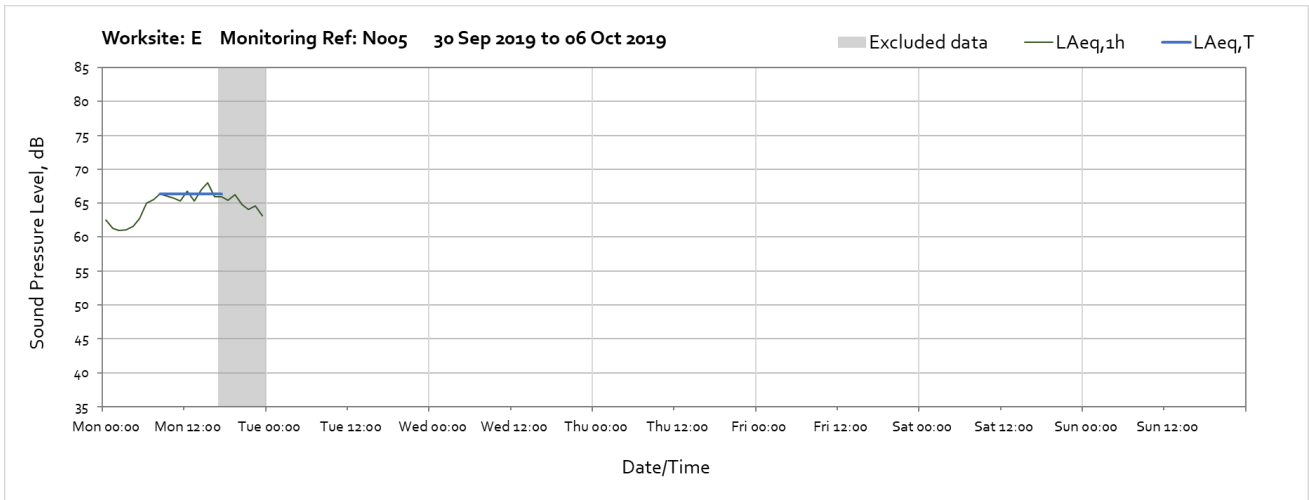




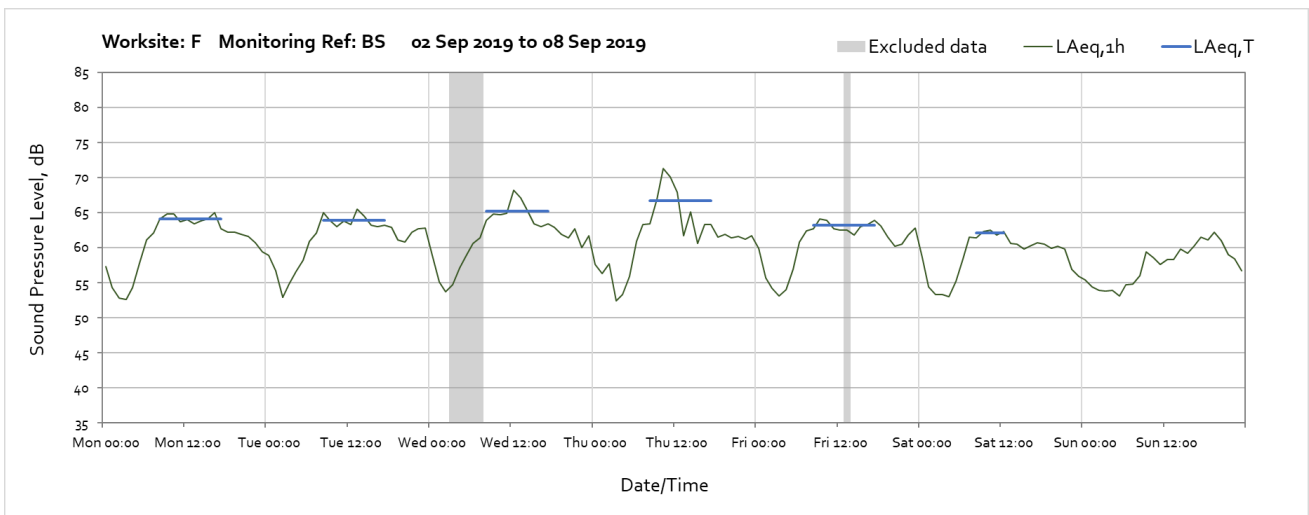
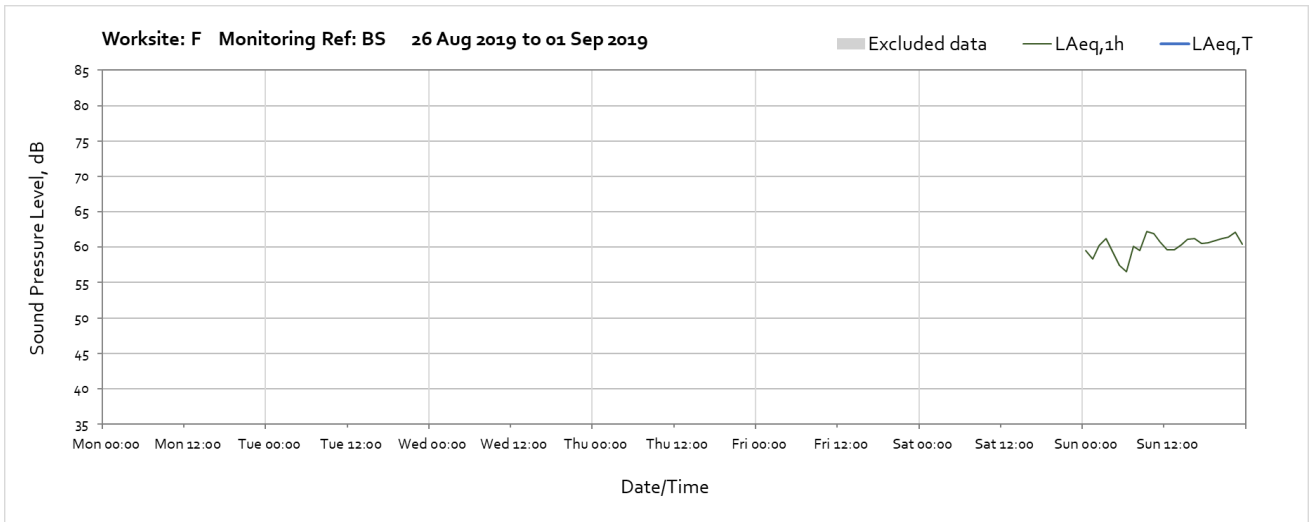
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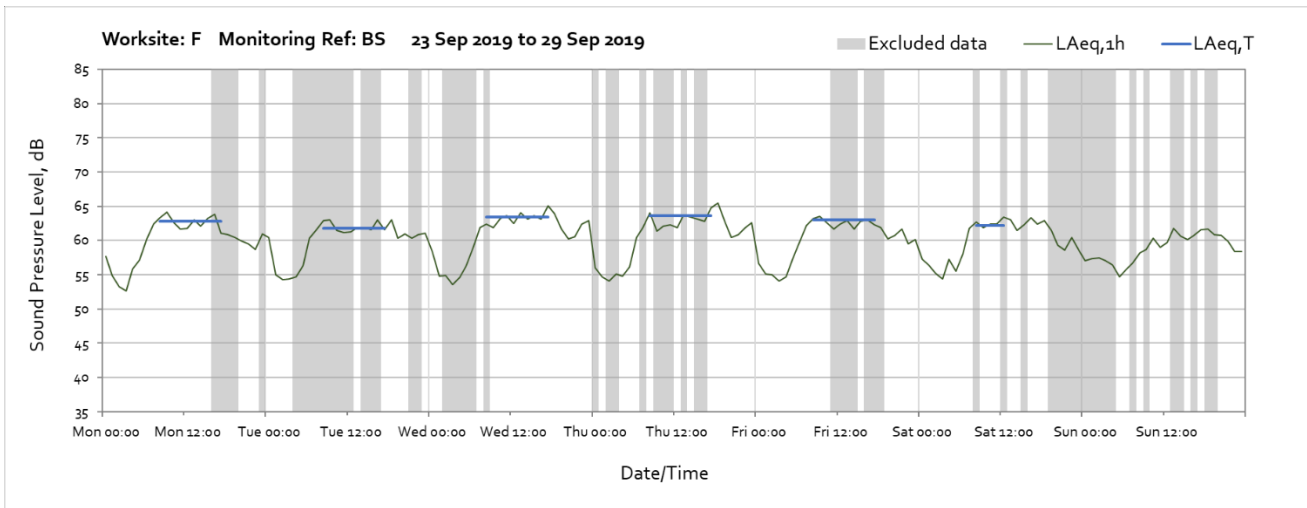
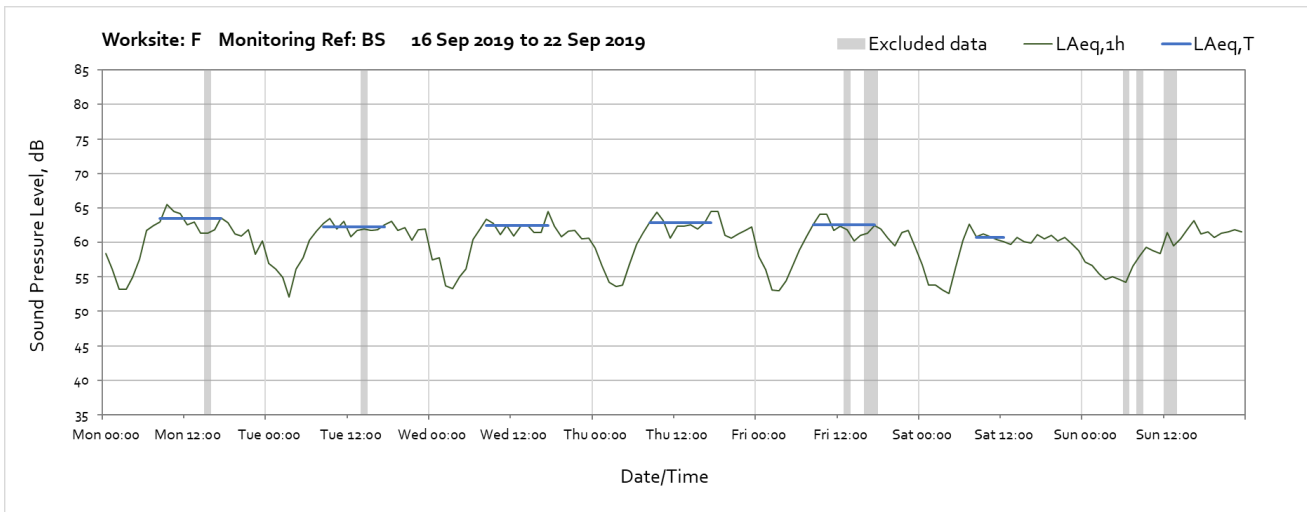
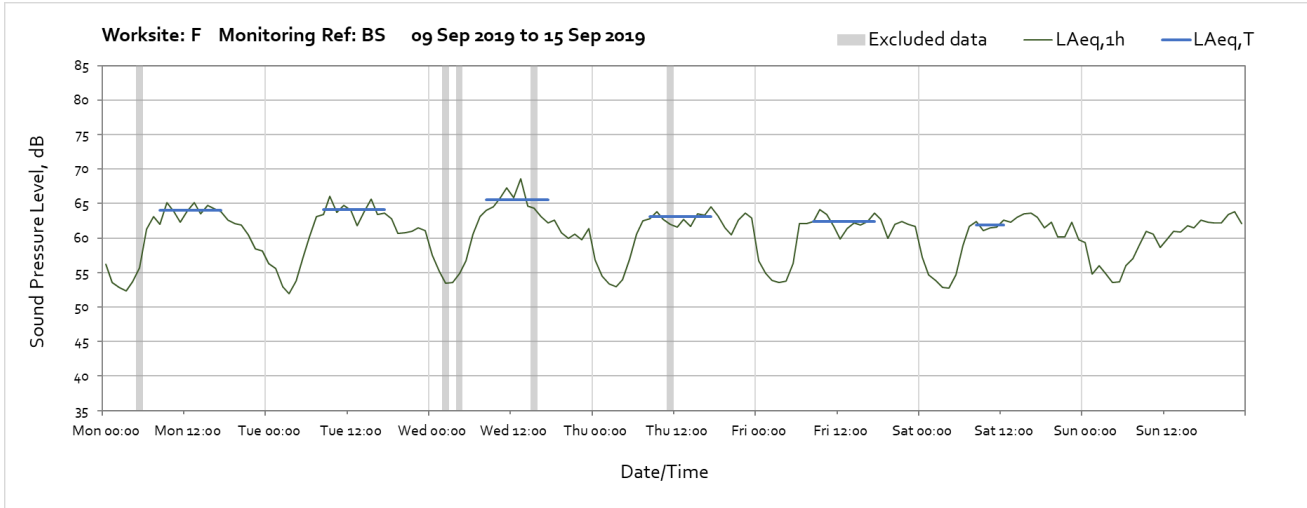


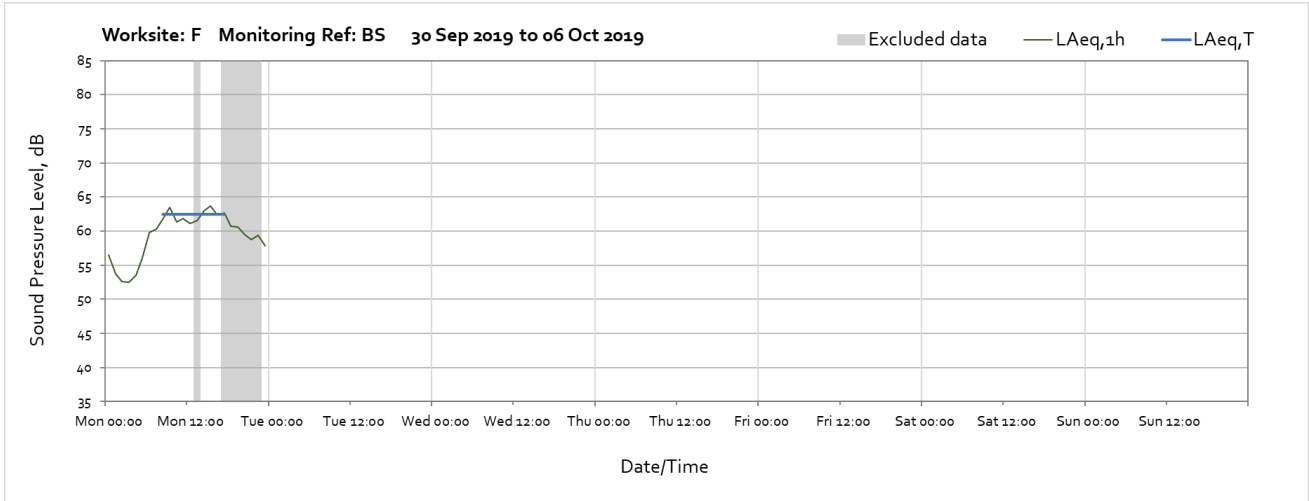




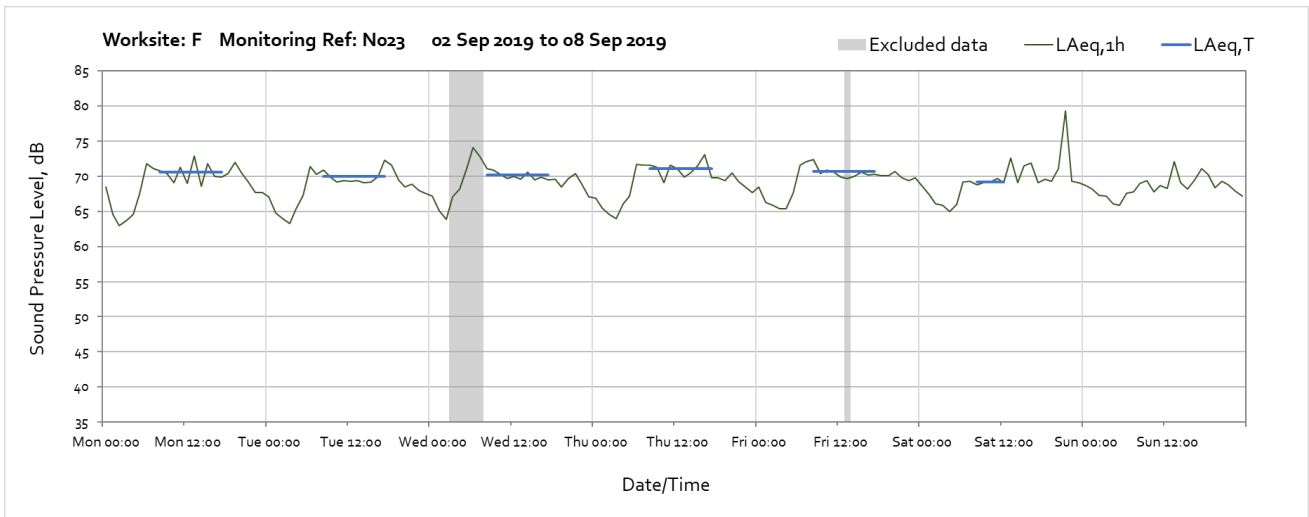
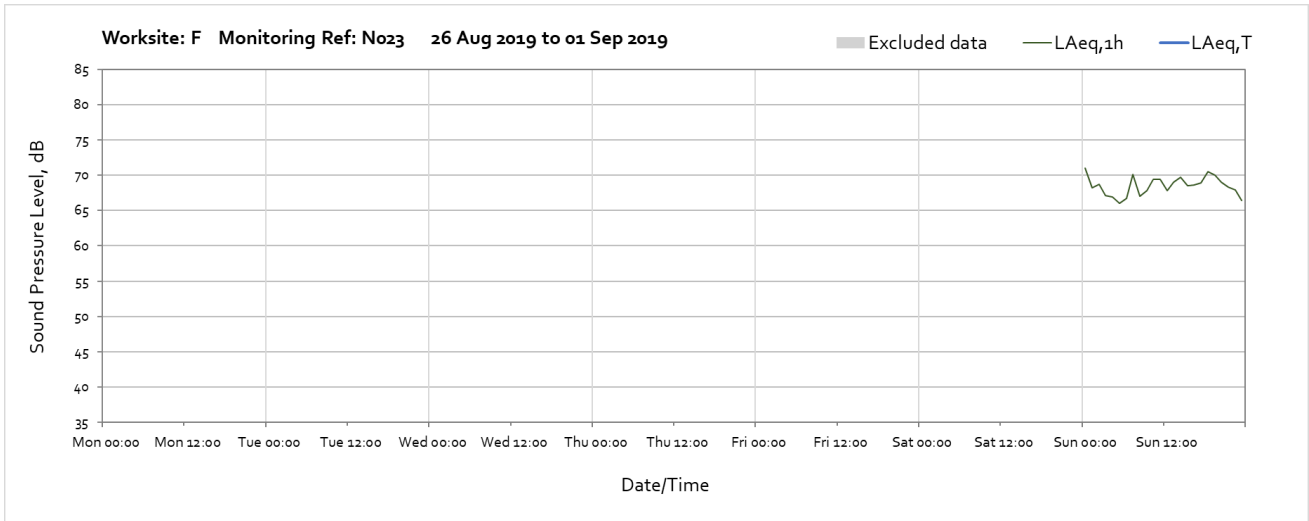
Worksite: F – Monitoring Ref: BS

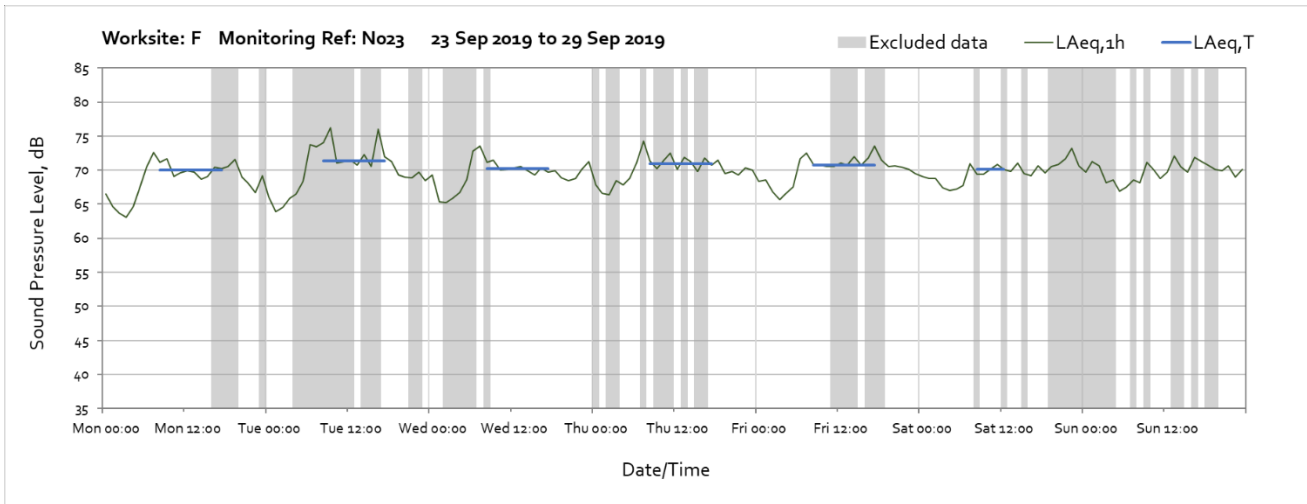
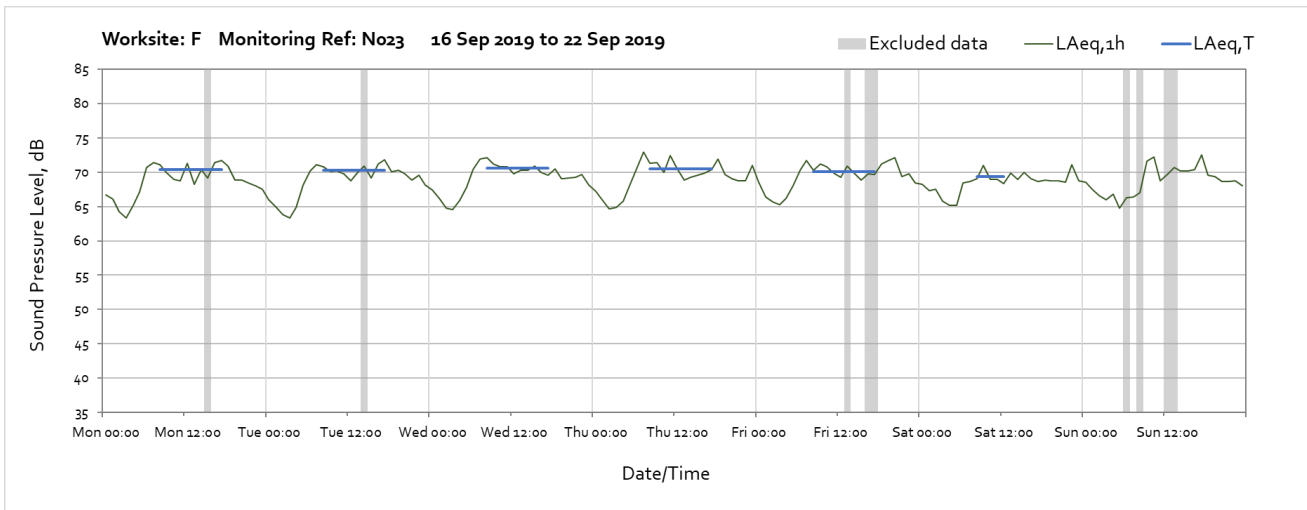
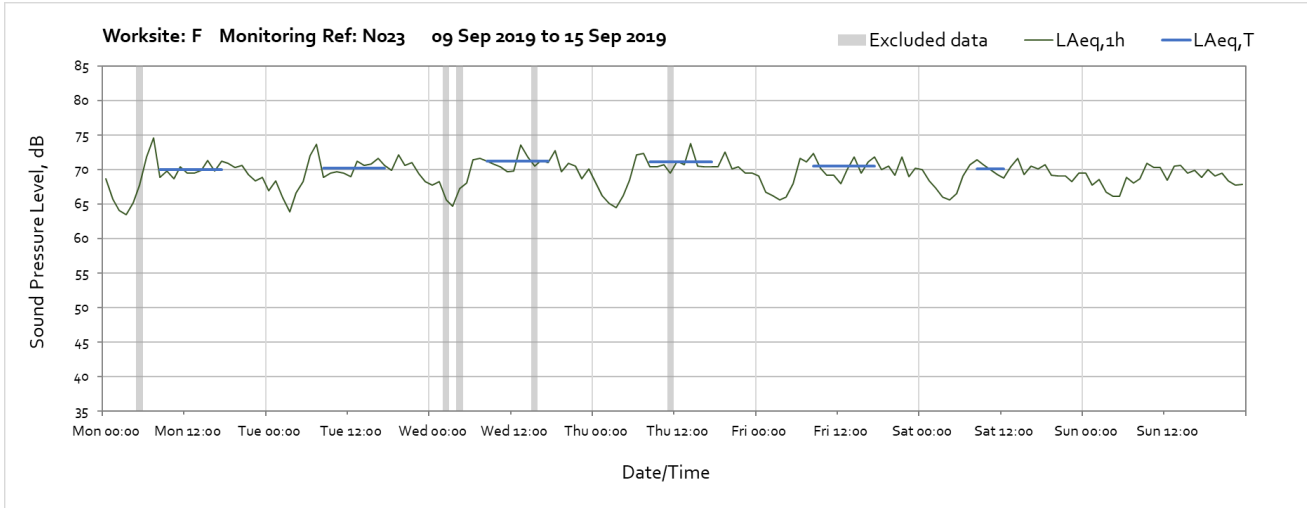


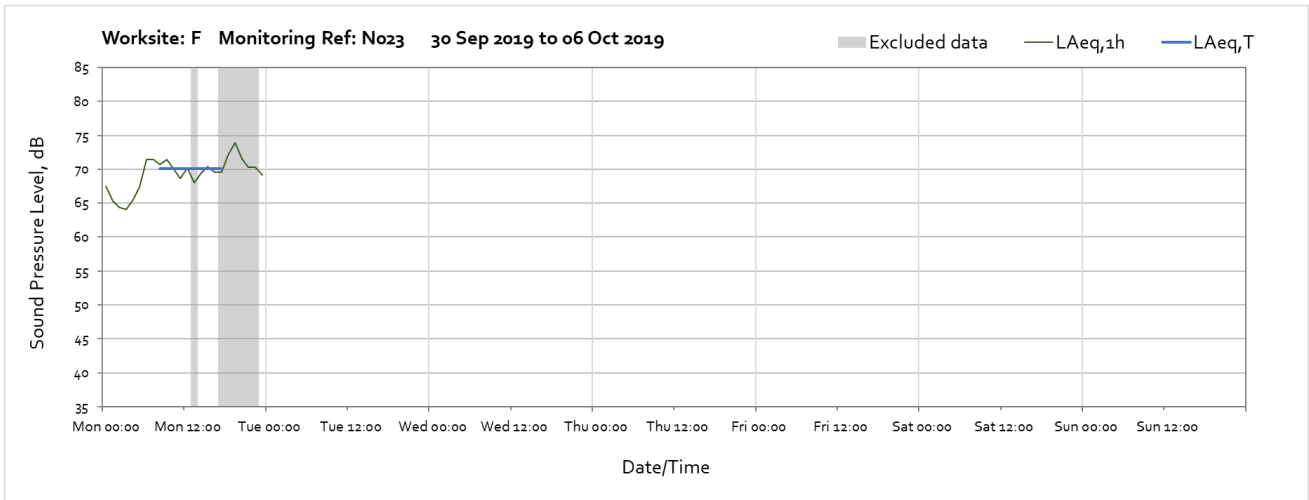




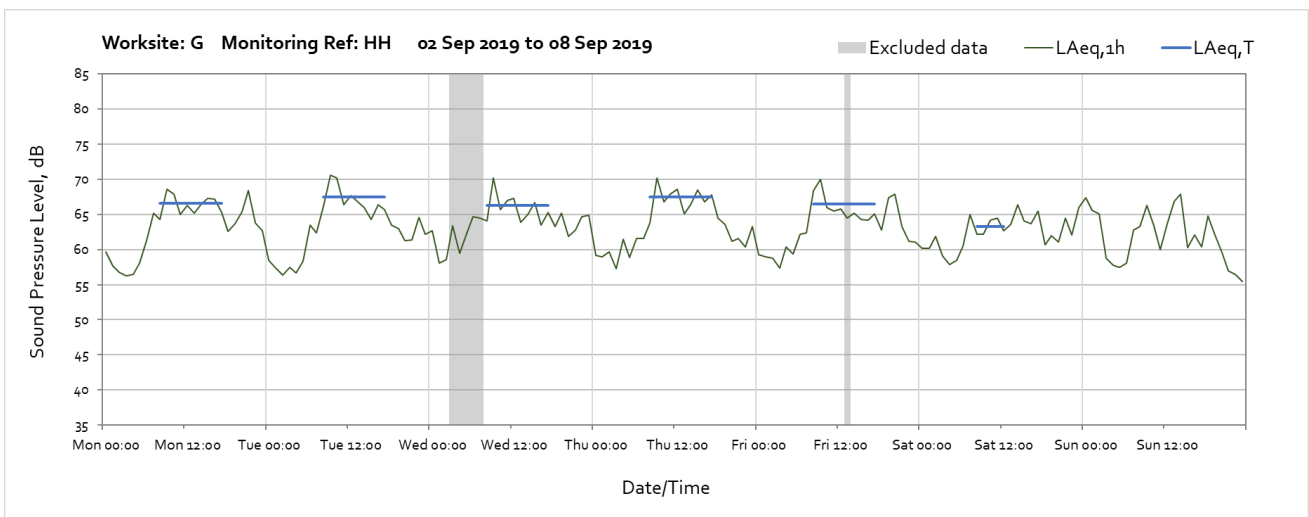
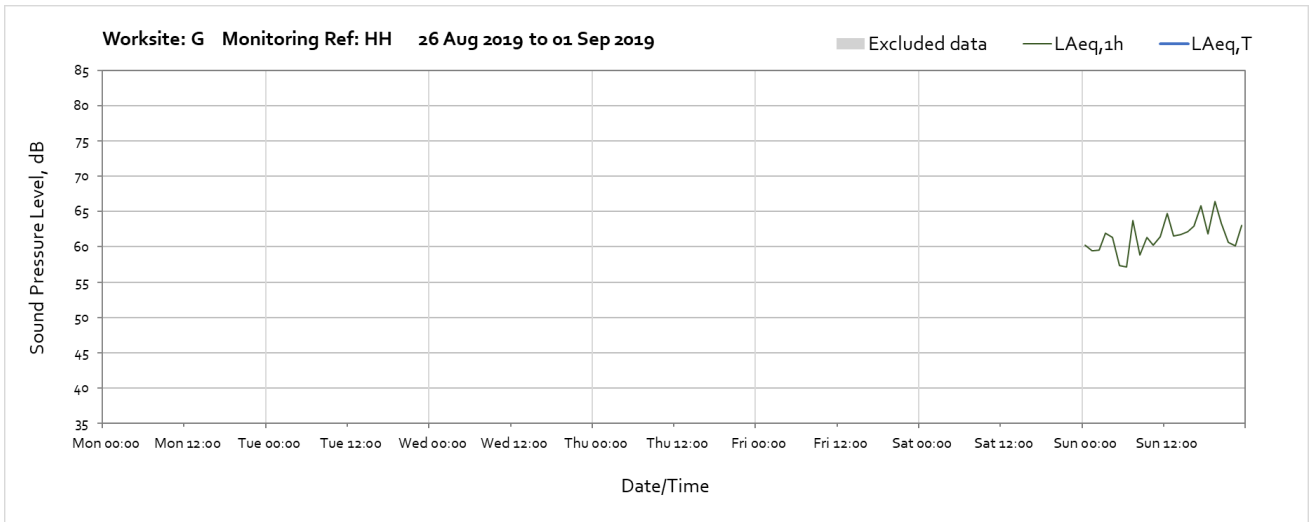
Worksite: F – Monitoring Ref: N023

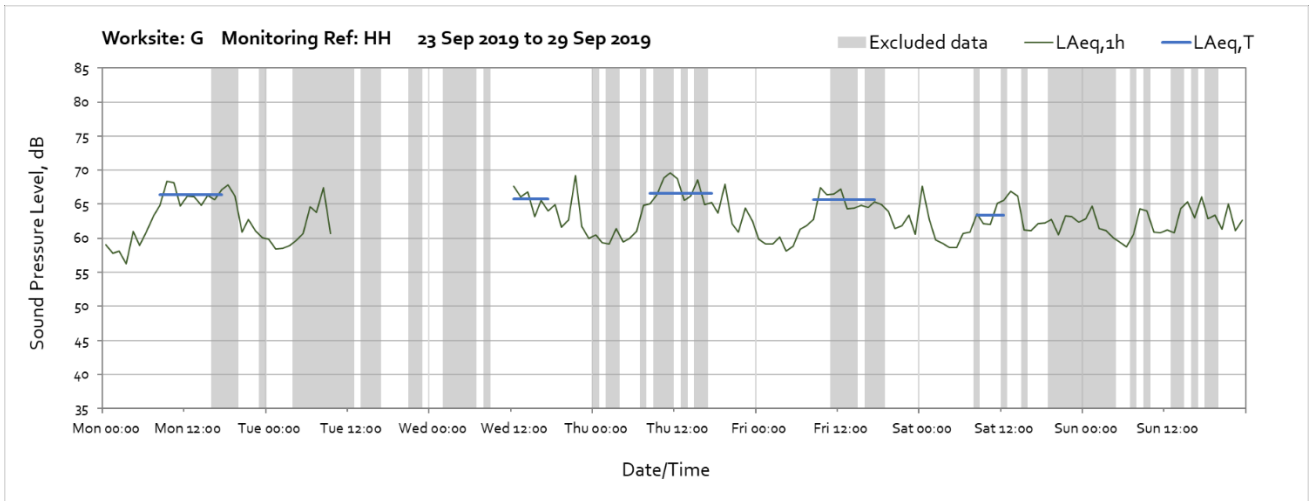
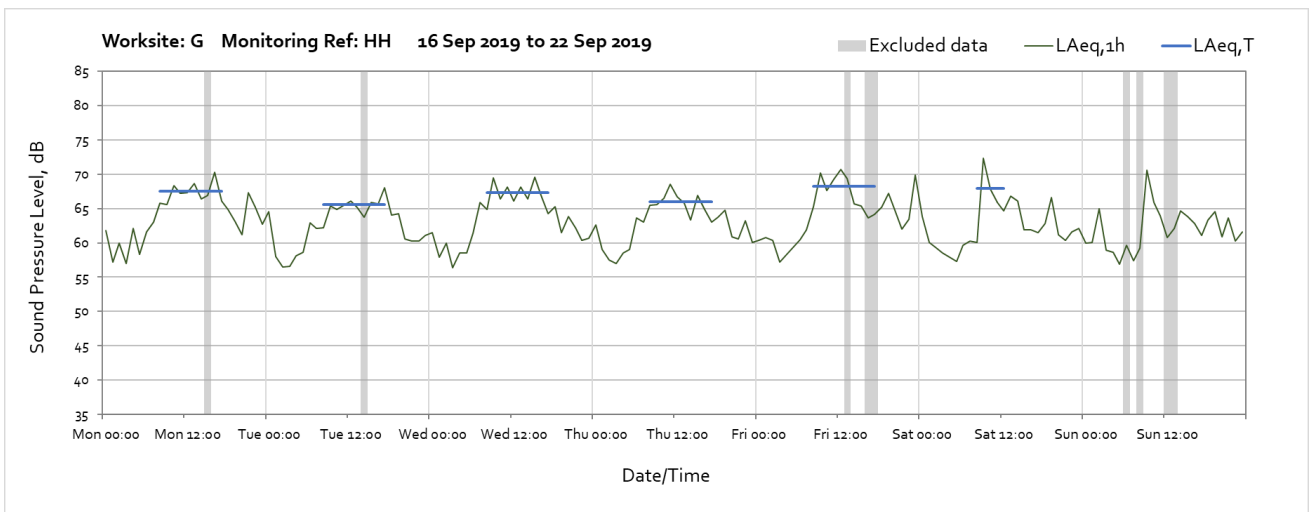
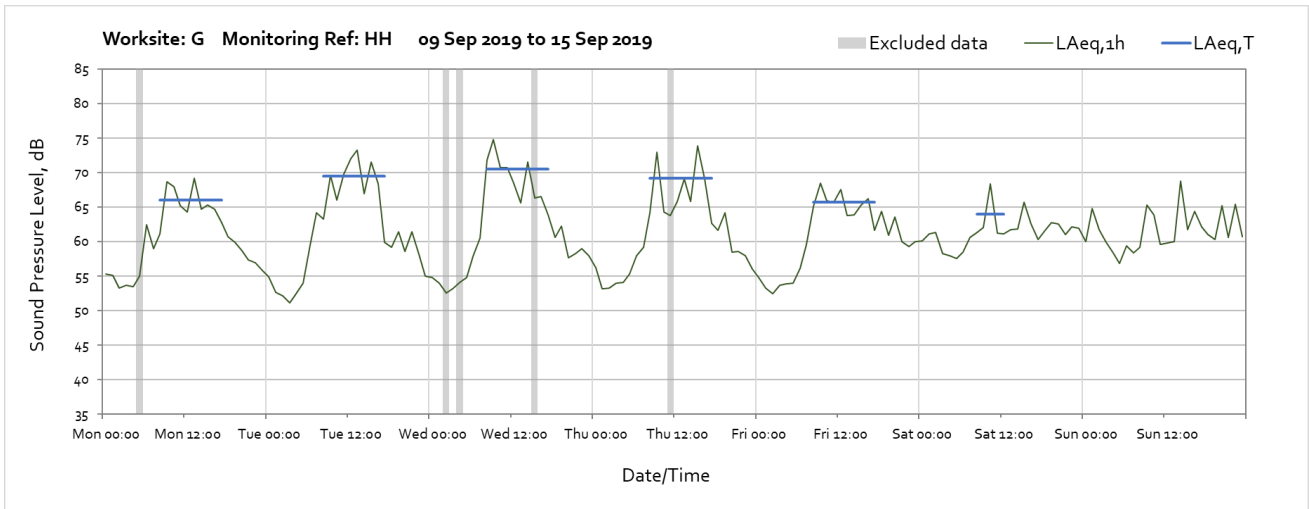




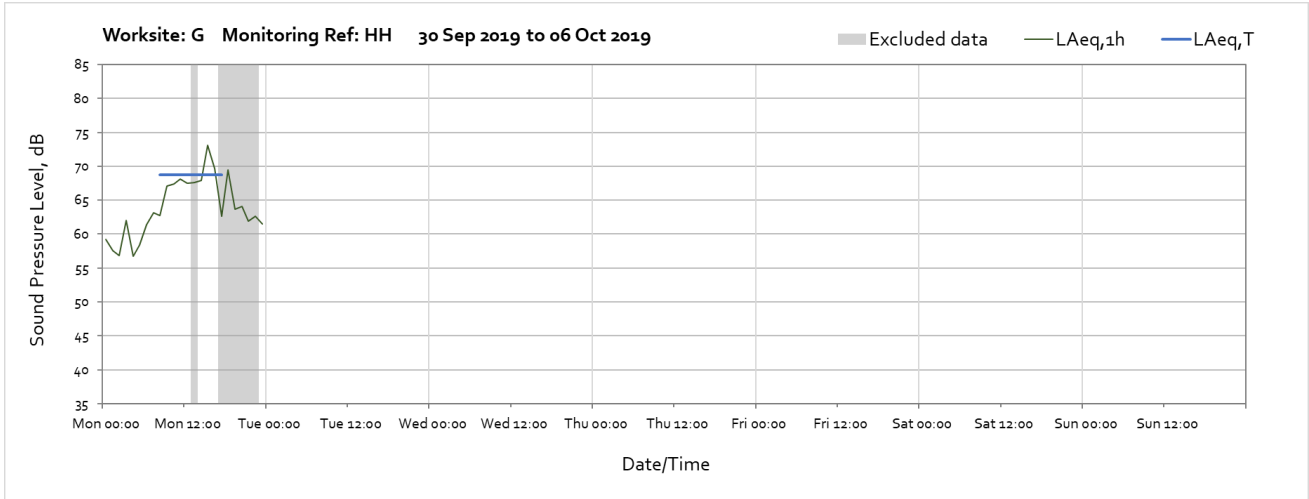


Worksite: G – Monitoring Ref: HH

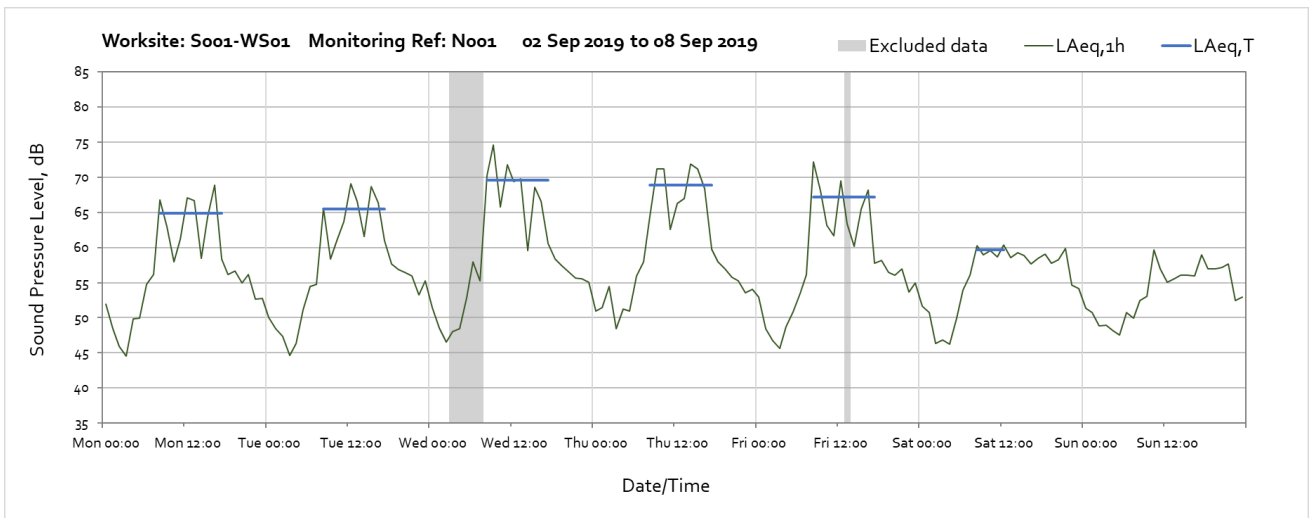
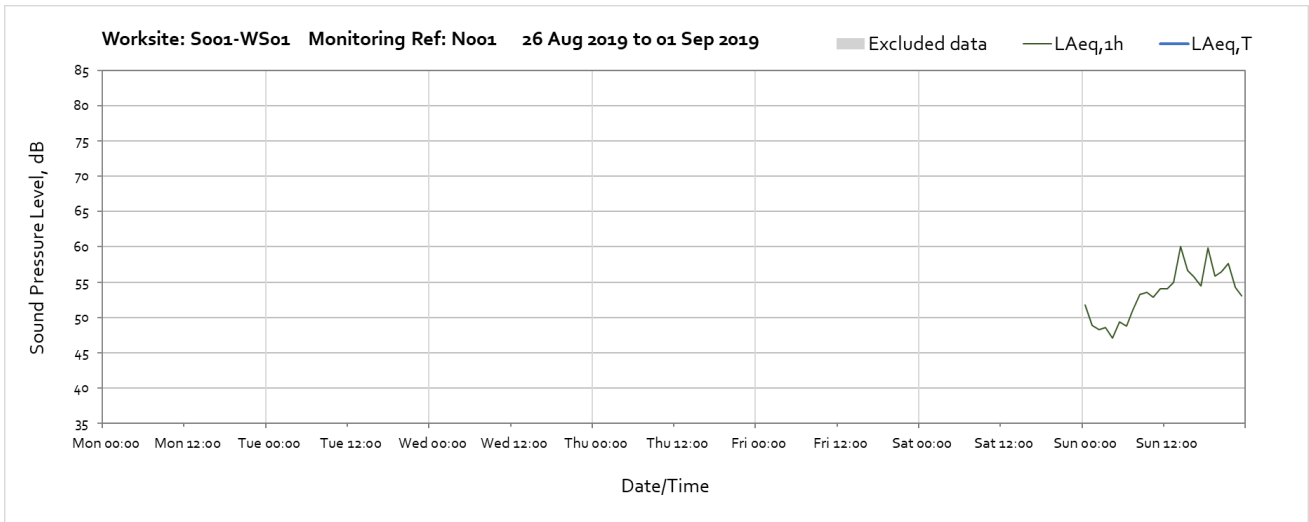


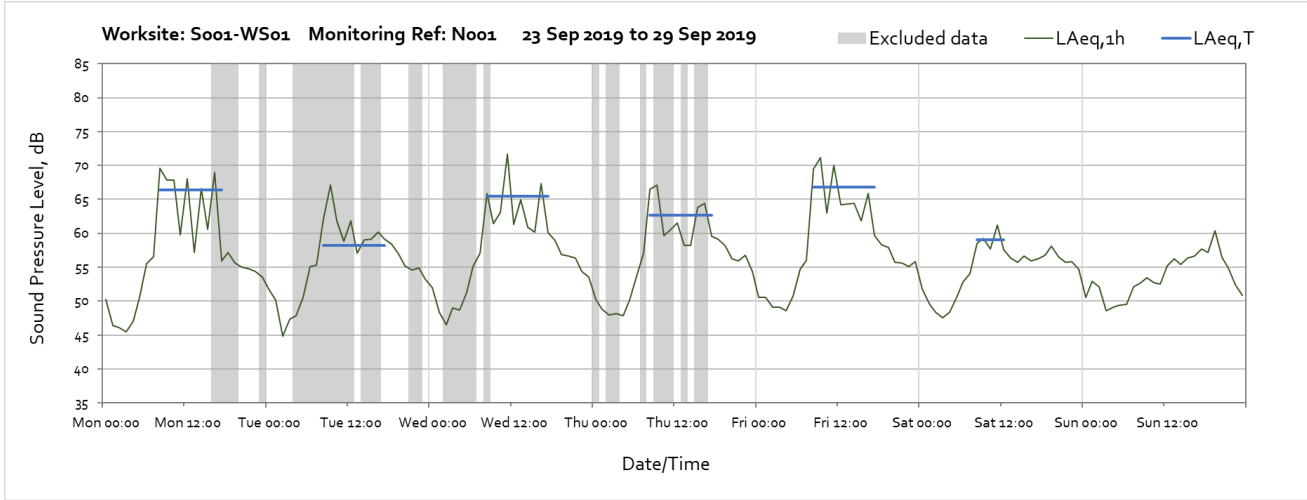
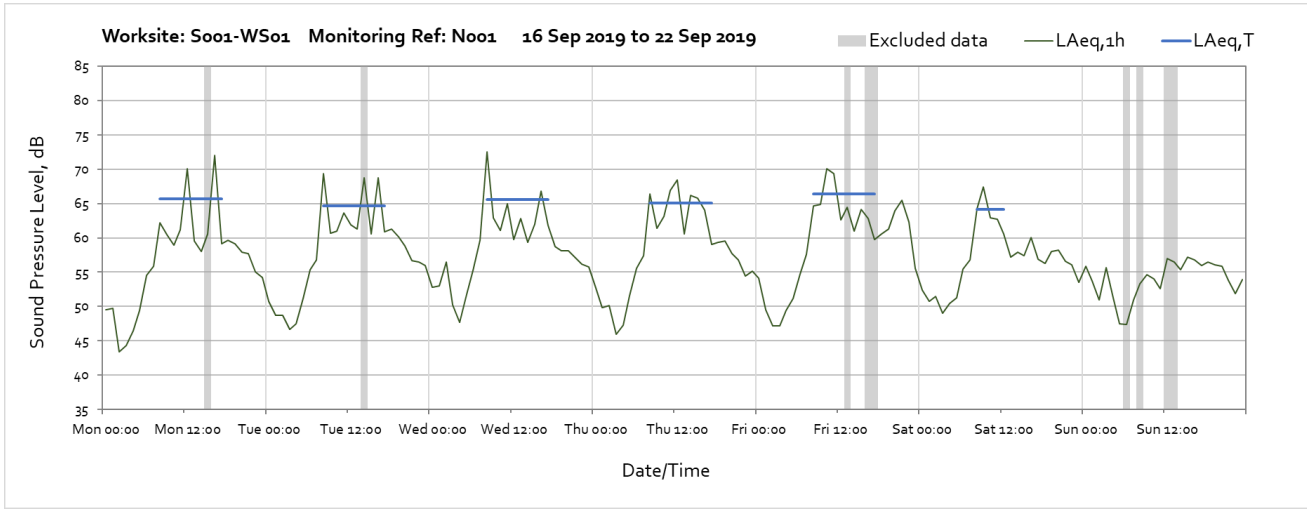
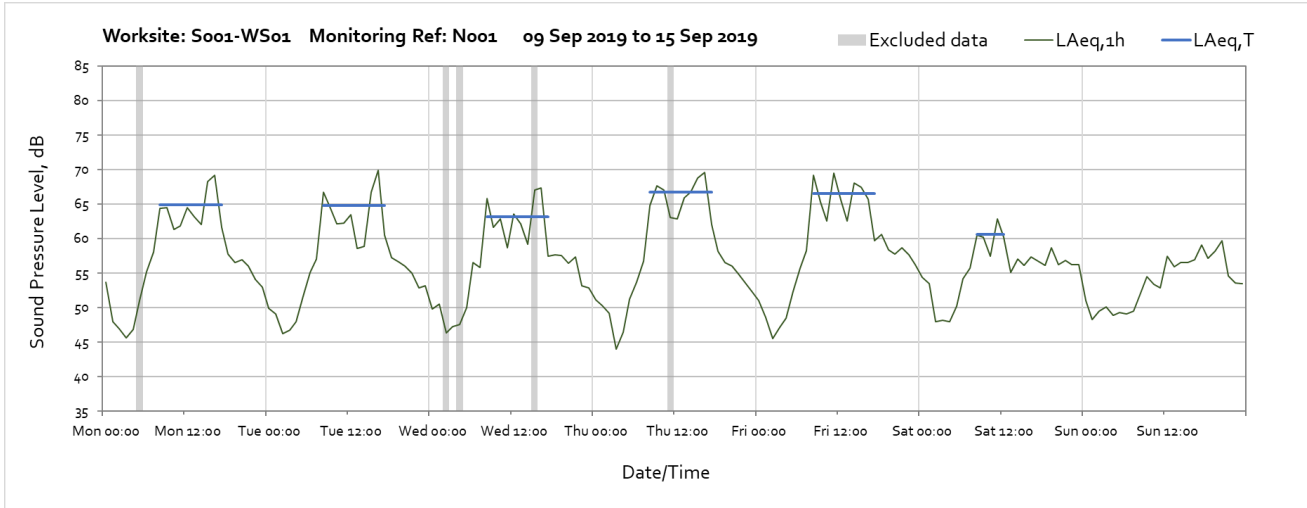


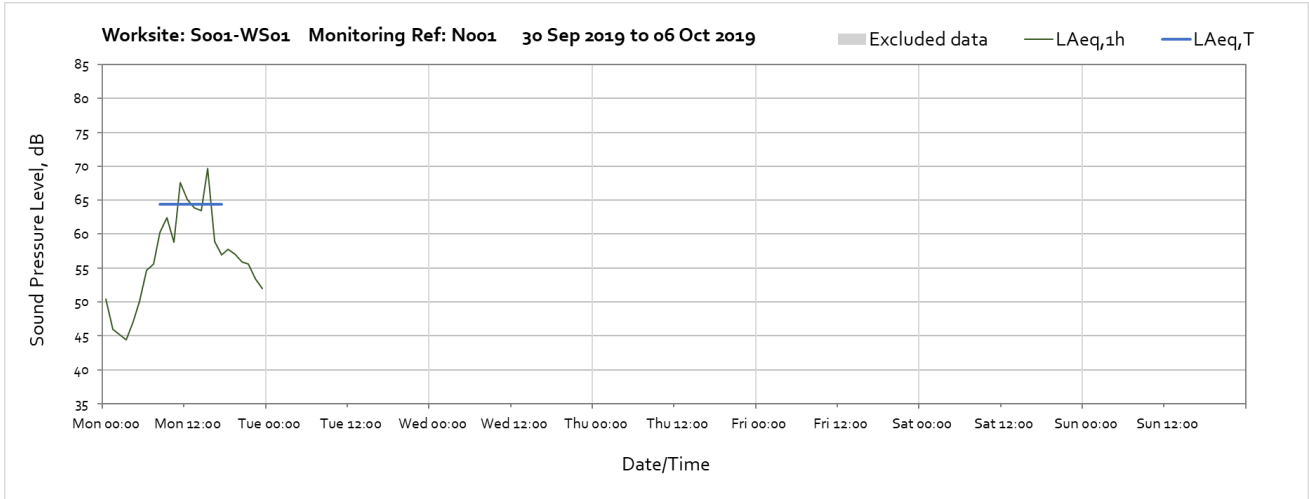
Note: Missing data between 10:00 on Tuesday 24th and 12:00 on Wednesday 25th of September was due to a loss of power at the monitoring station.



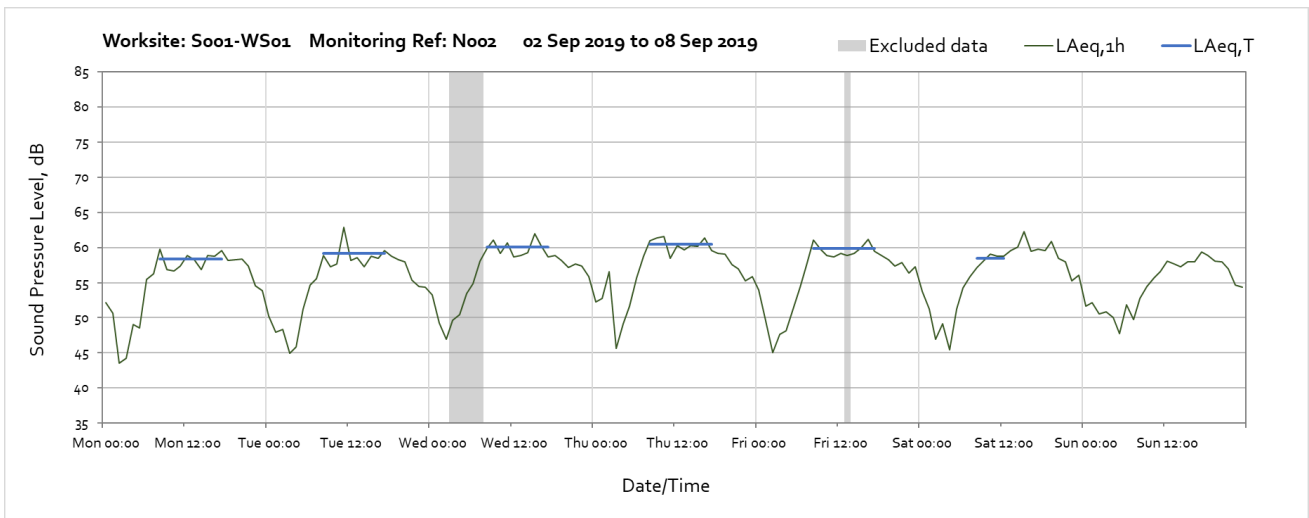
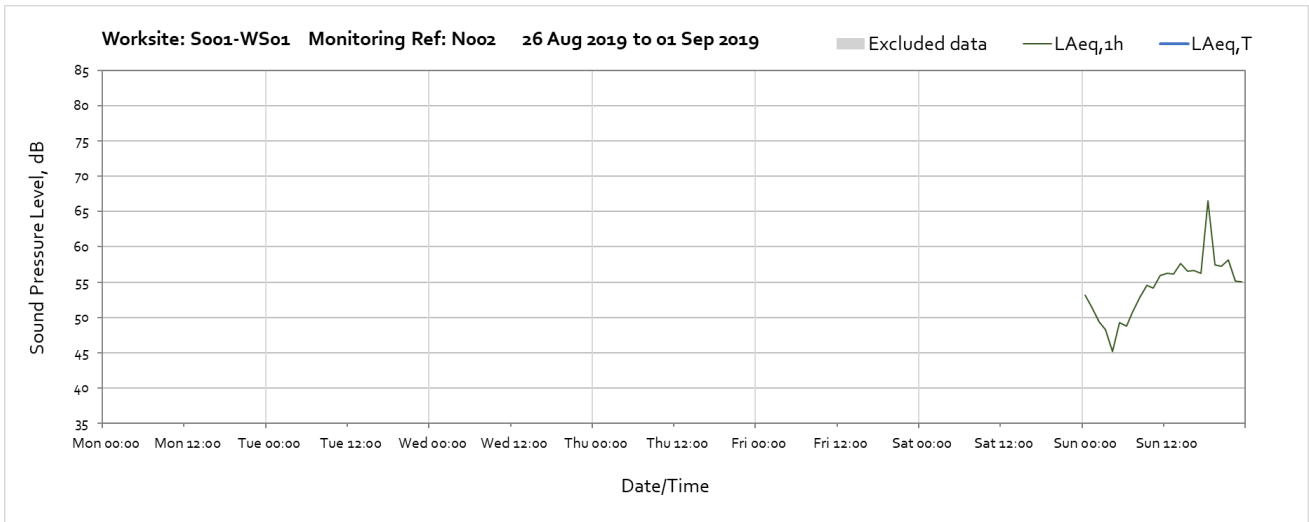
Worksite: S001-WS01 – Monitoring Ref: N001

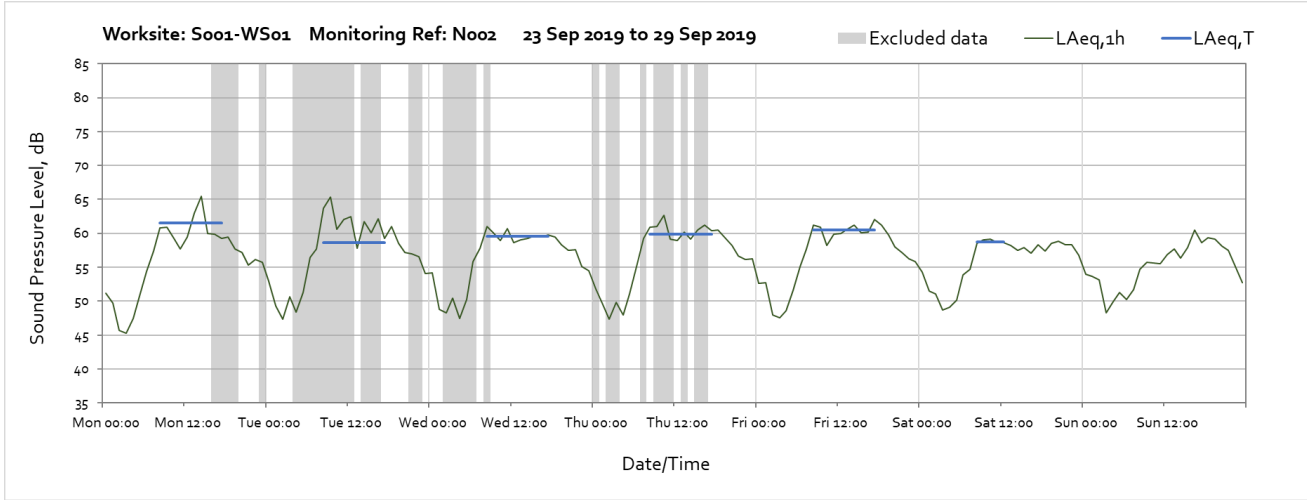
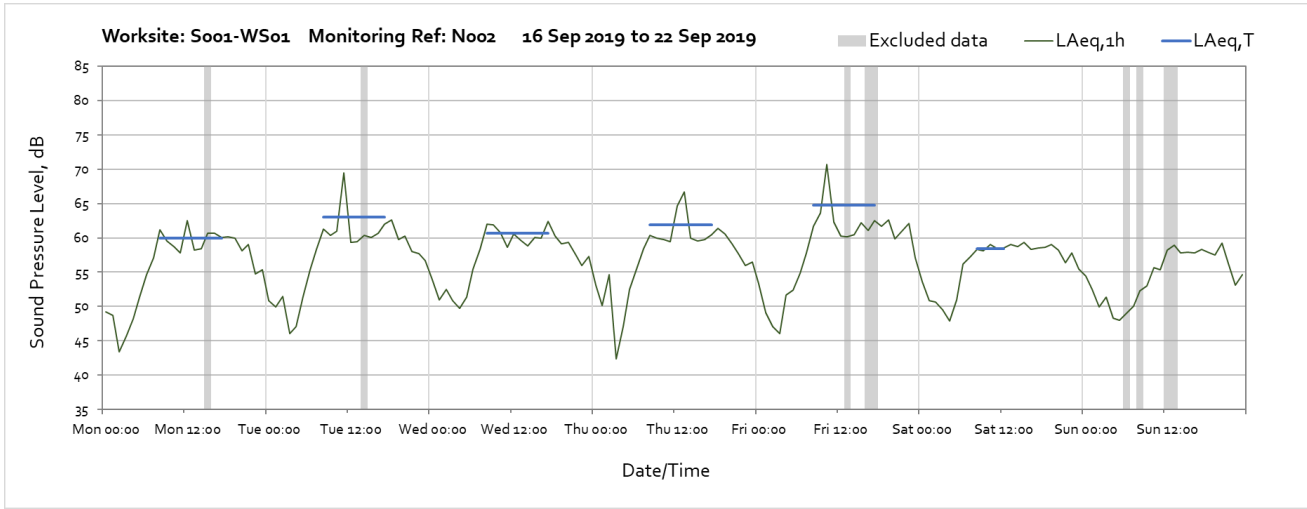
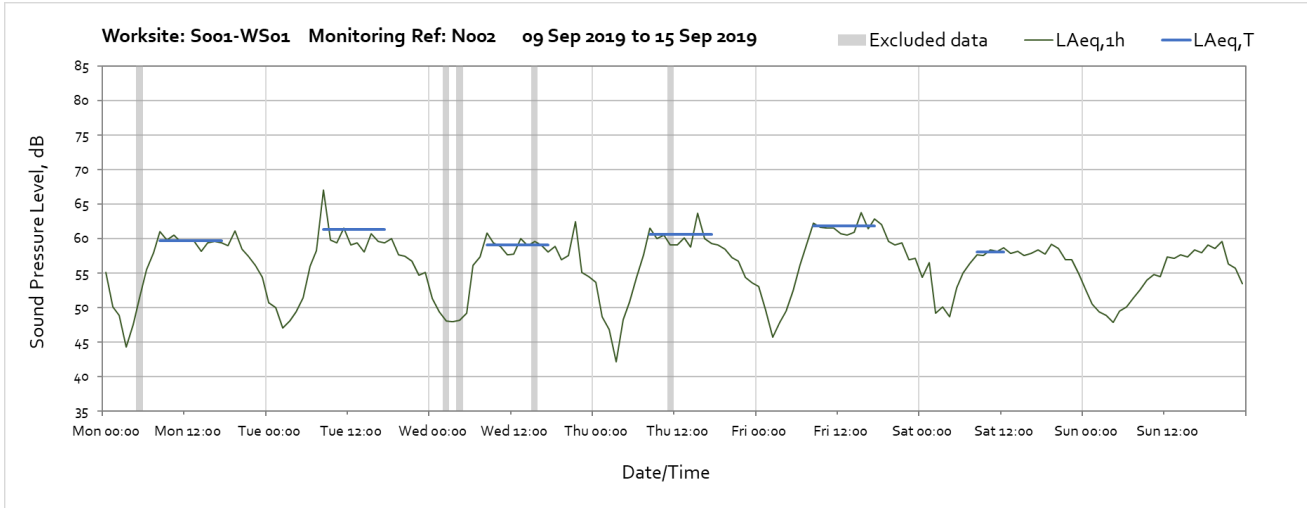


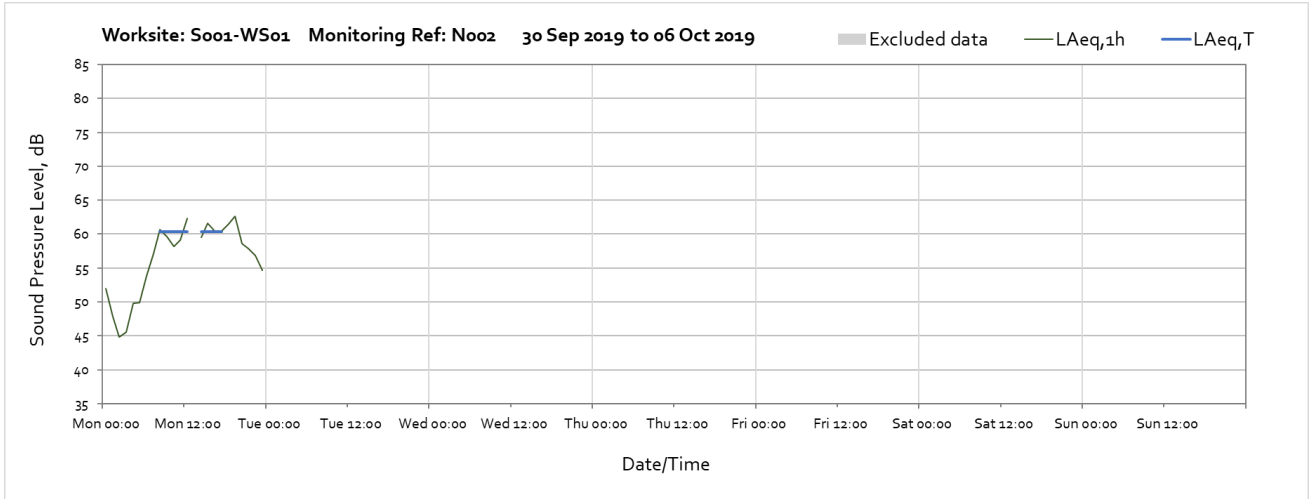




Worksite: S001-WS01 – Monitoring Ref: N002

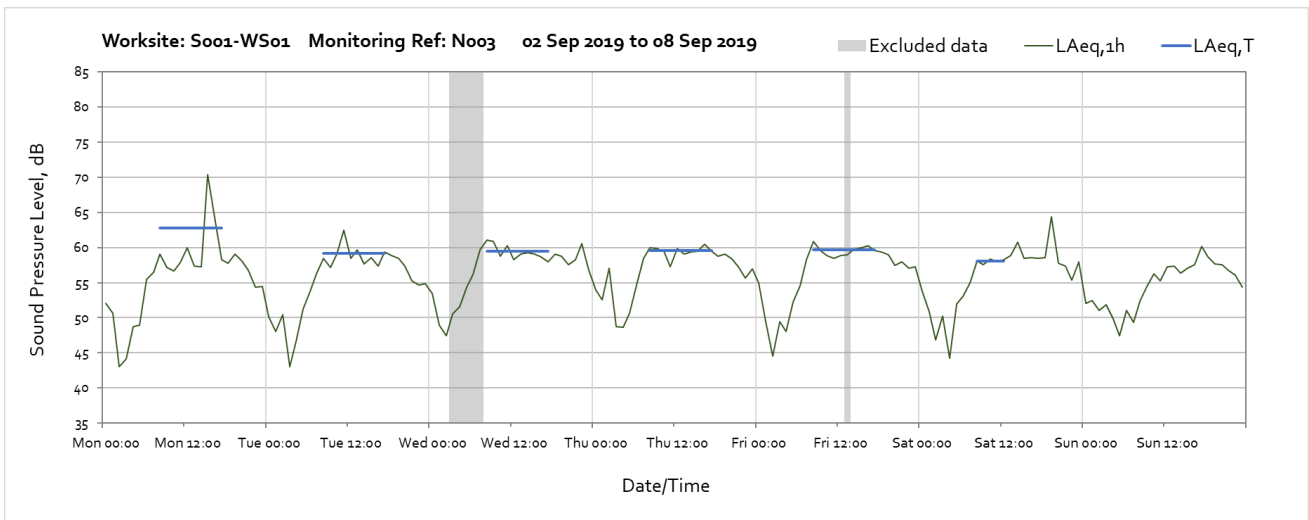
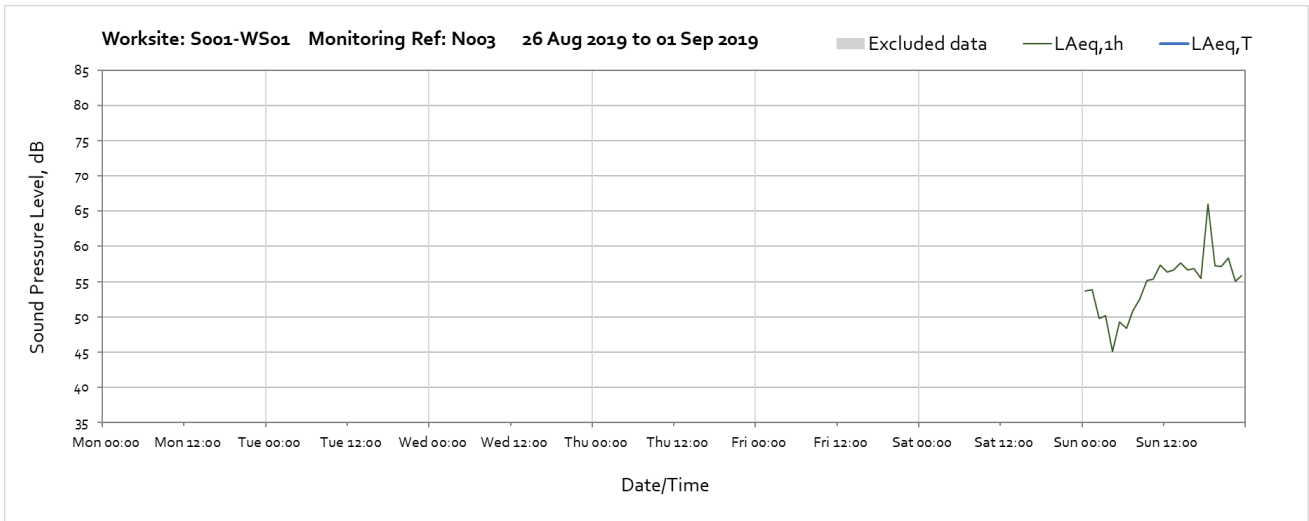


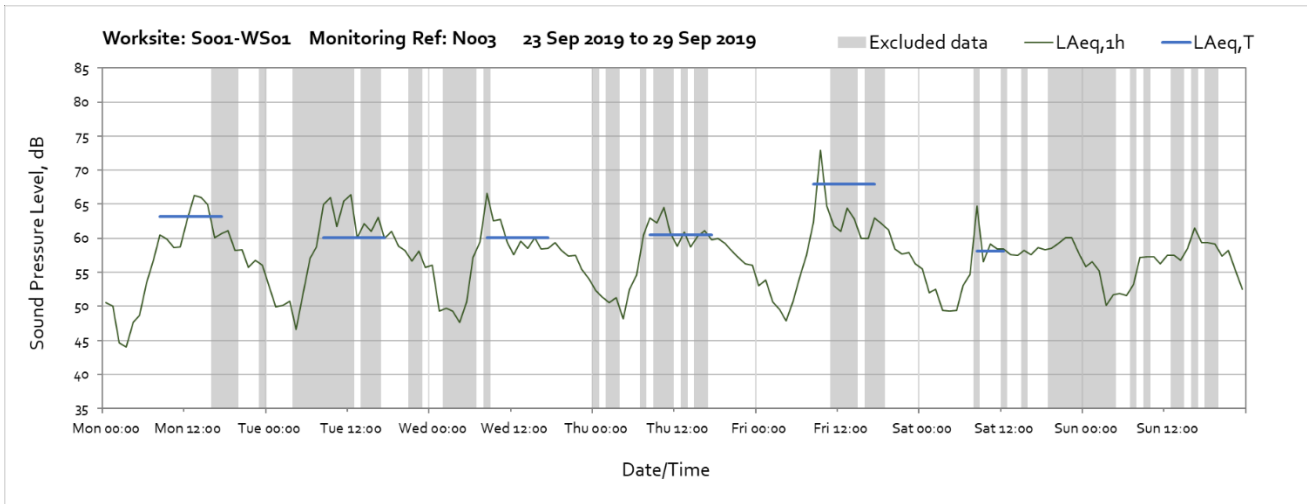
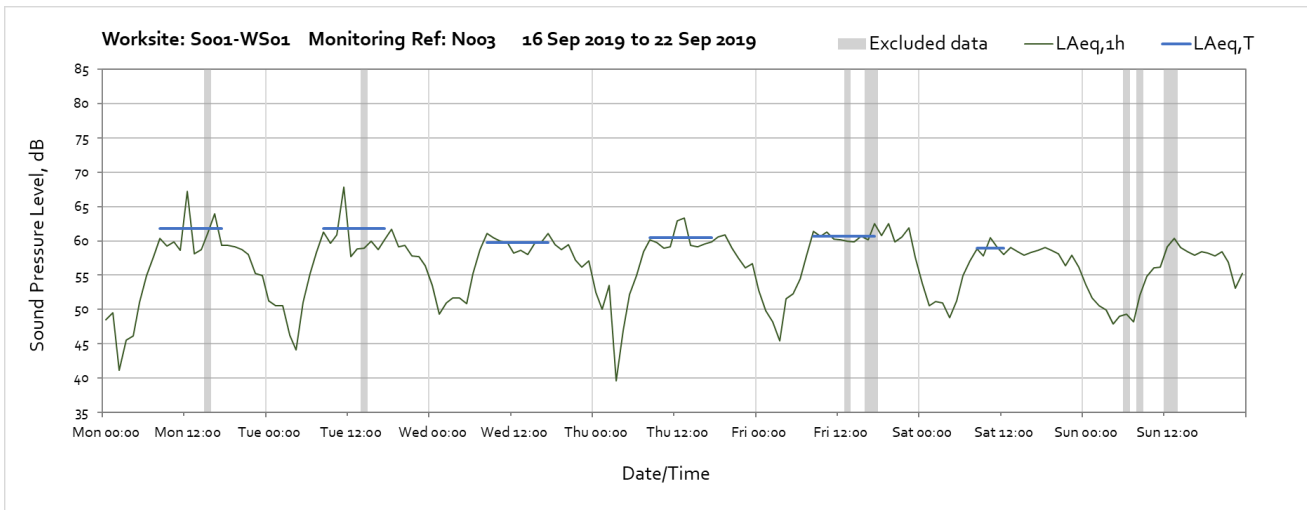
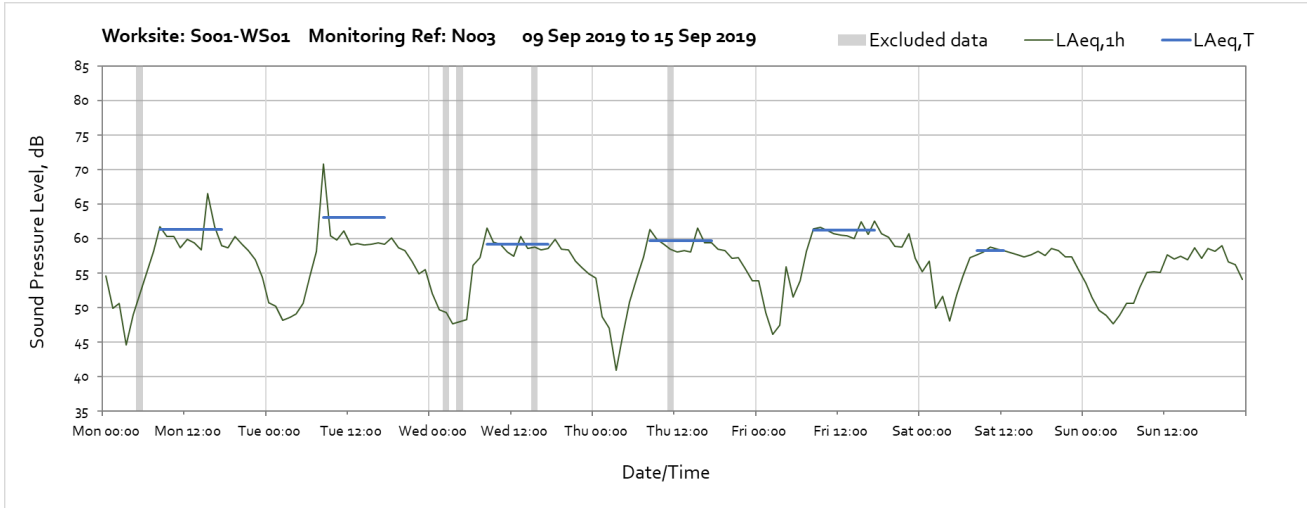


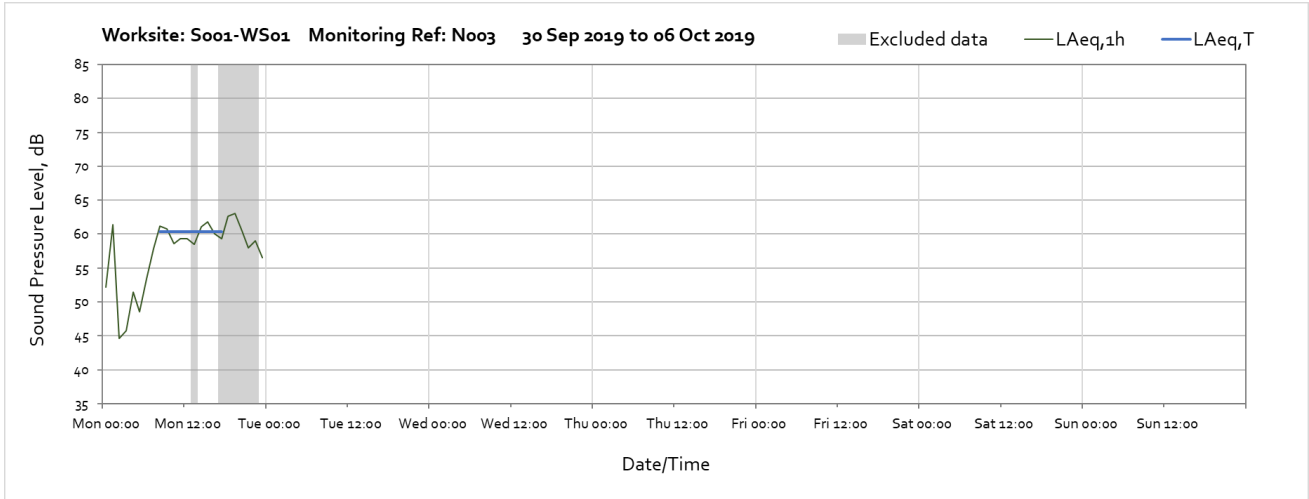


Note: missing data between 13:00 and 14:00 on Monday 30th of September was during mainenance operations.

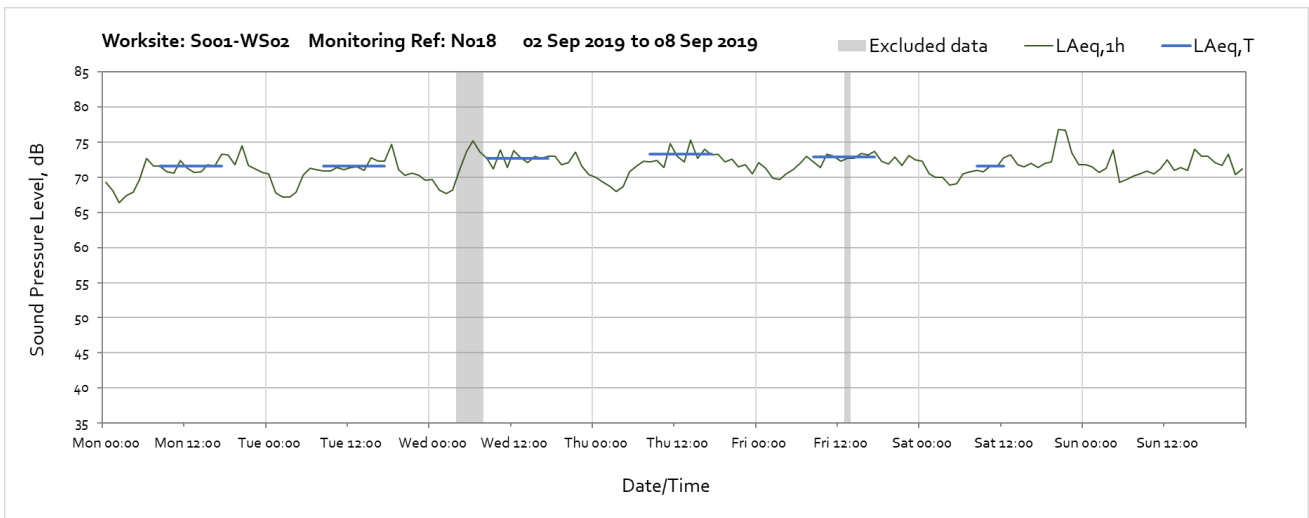
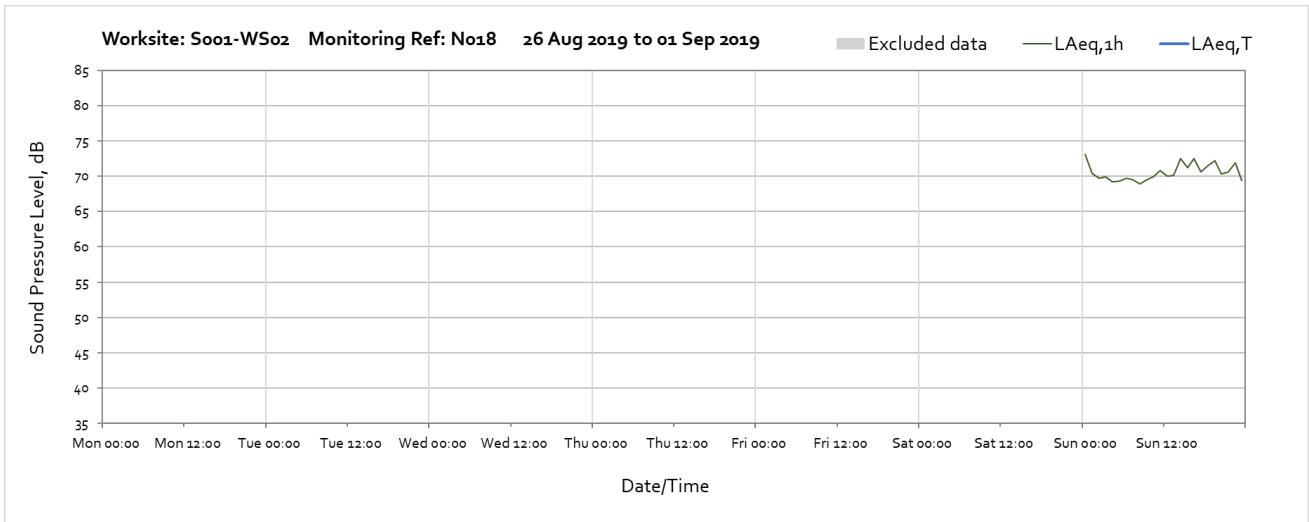
Worksite: S001-WS01 – Monitoring Ref: N003

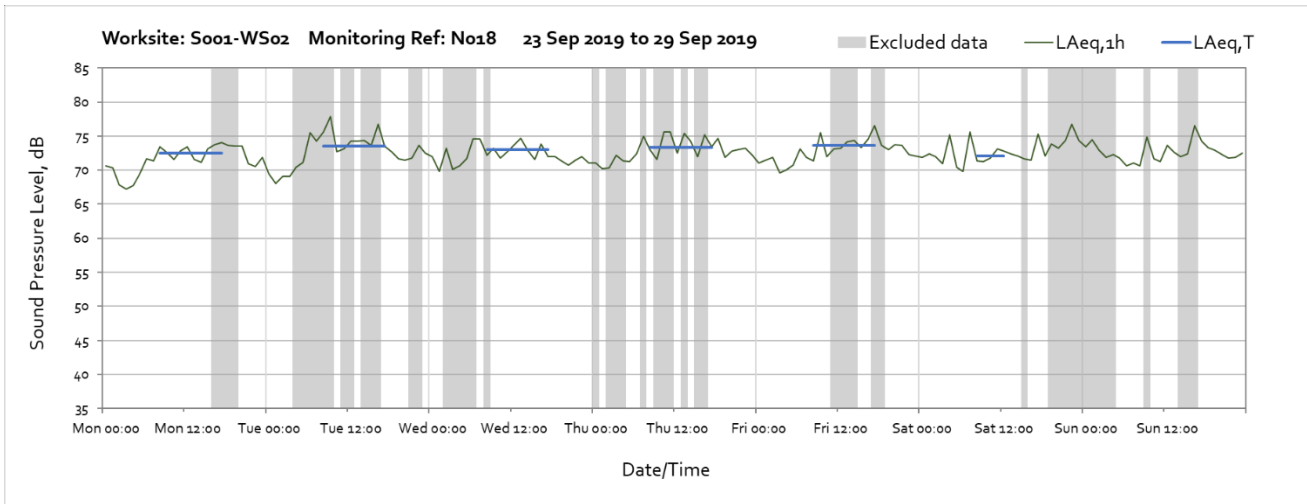
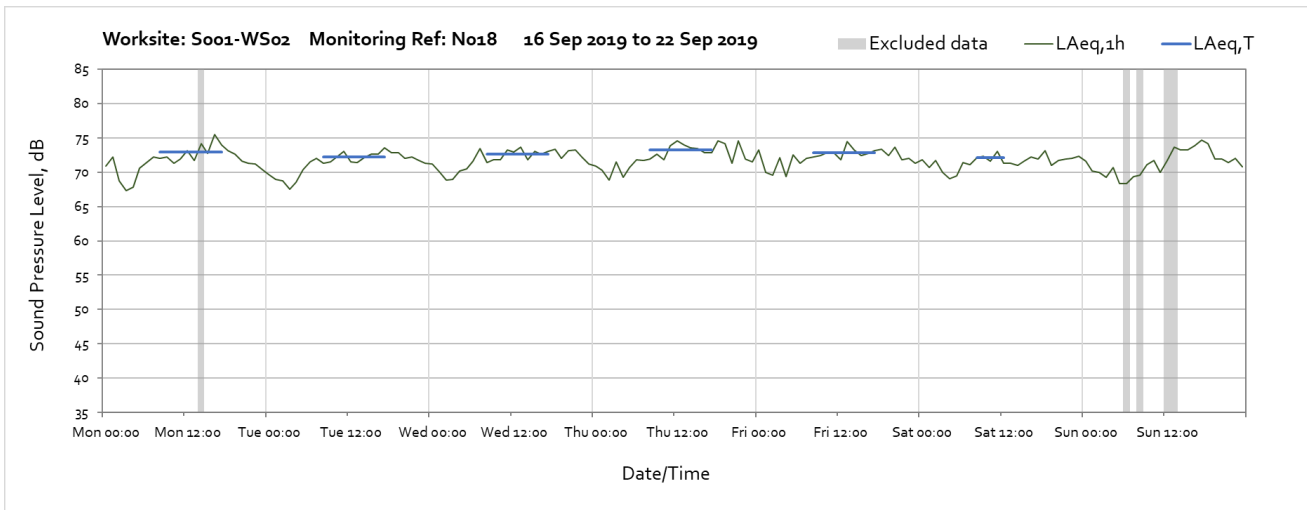
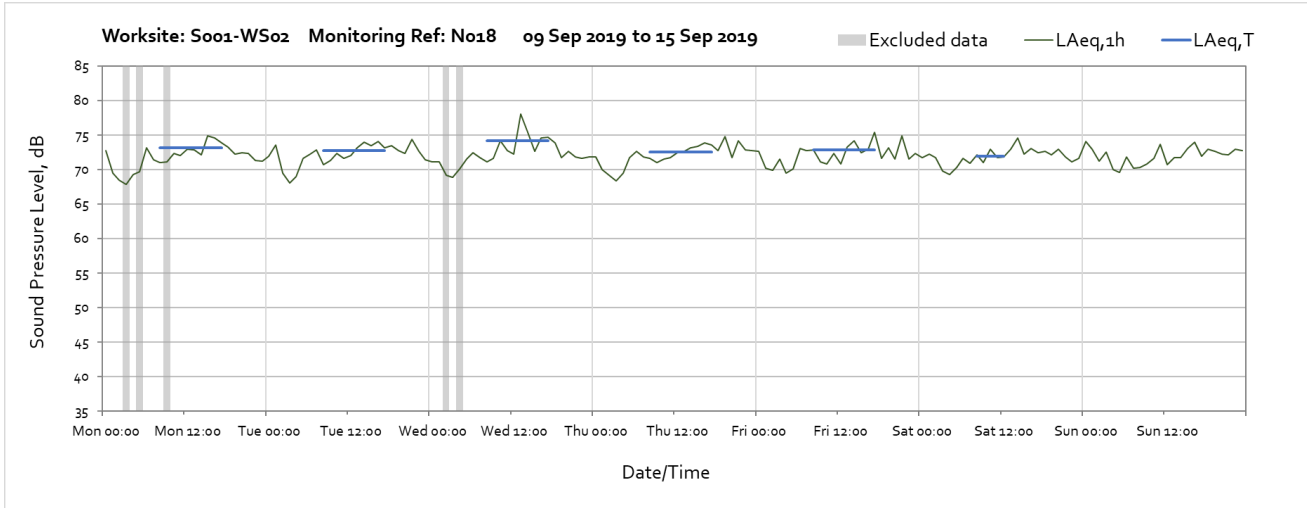


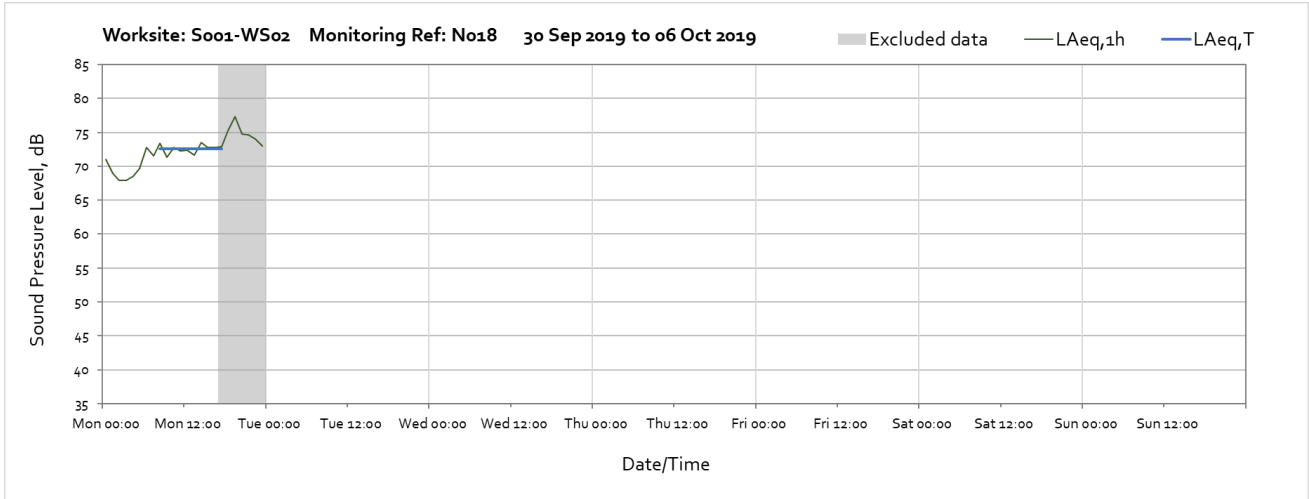




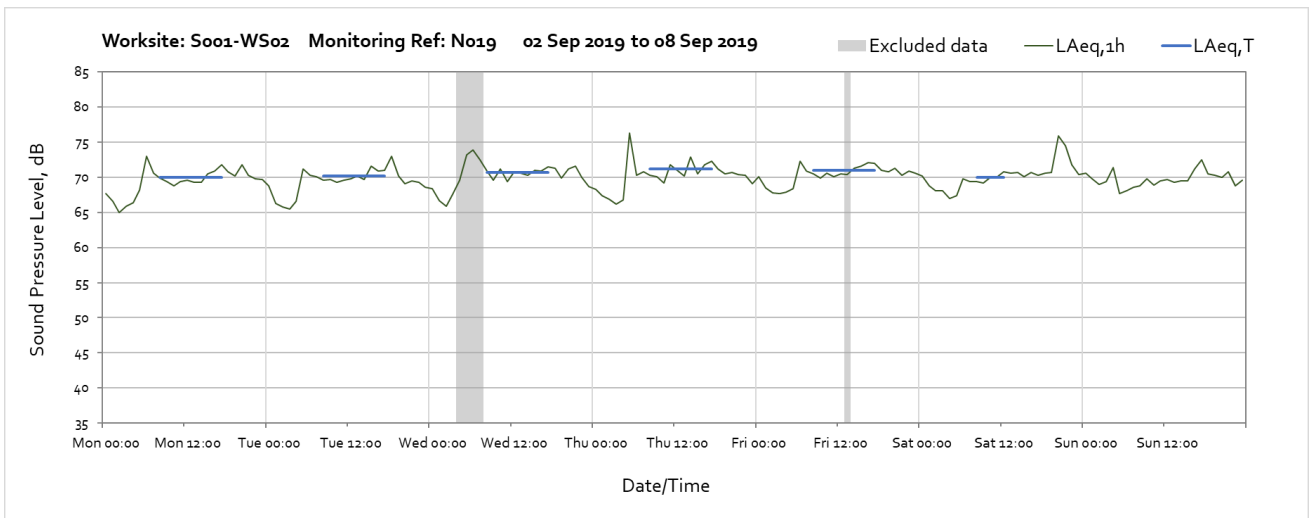
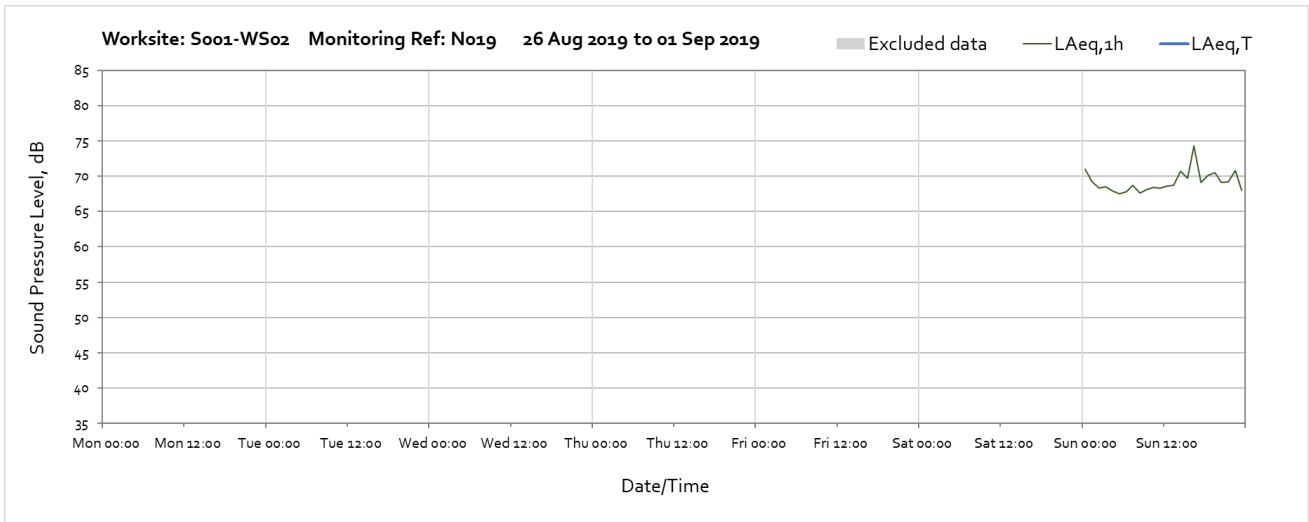
Worksite: S001-WS02 – Monitoring Ref: N018

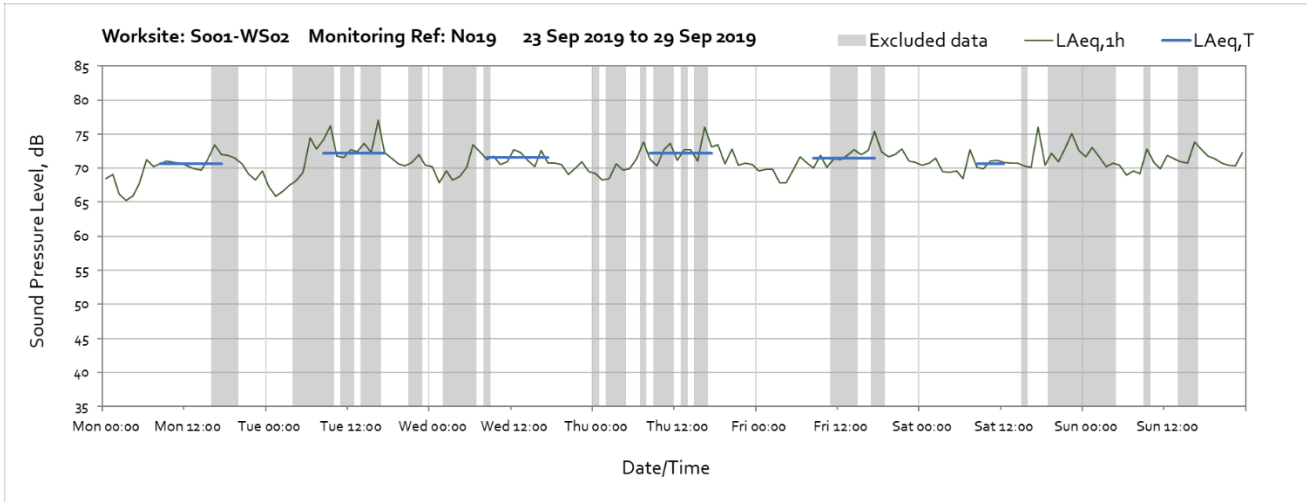
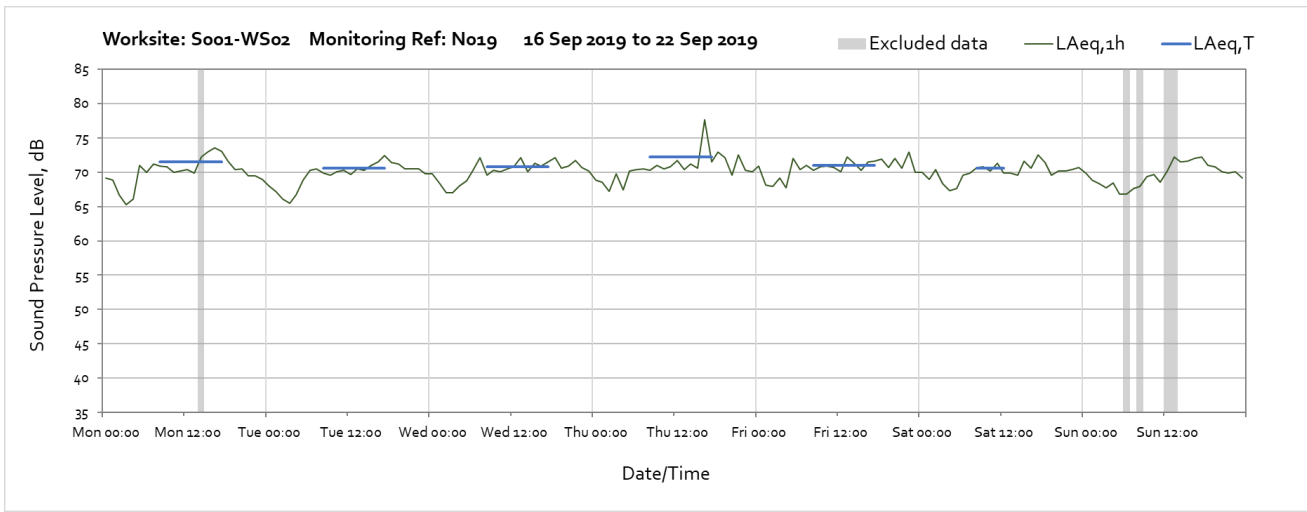
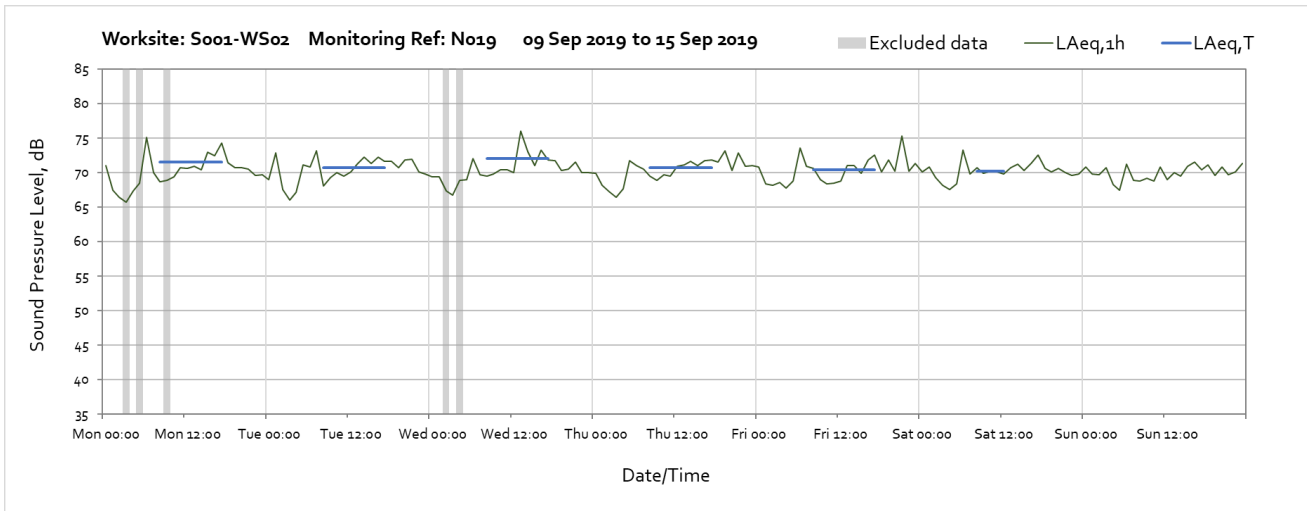


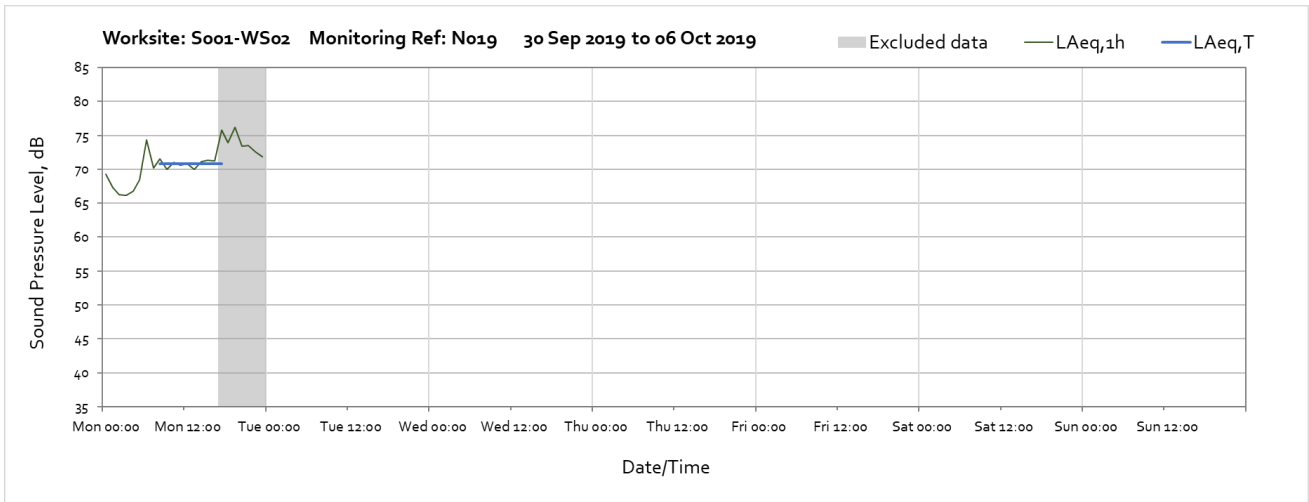




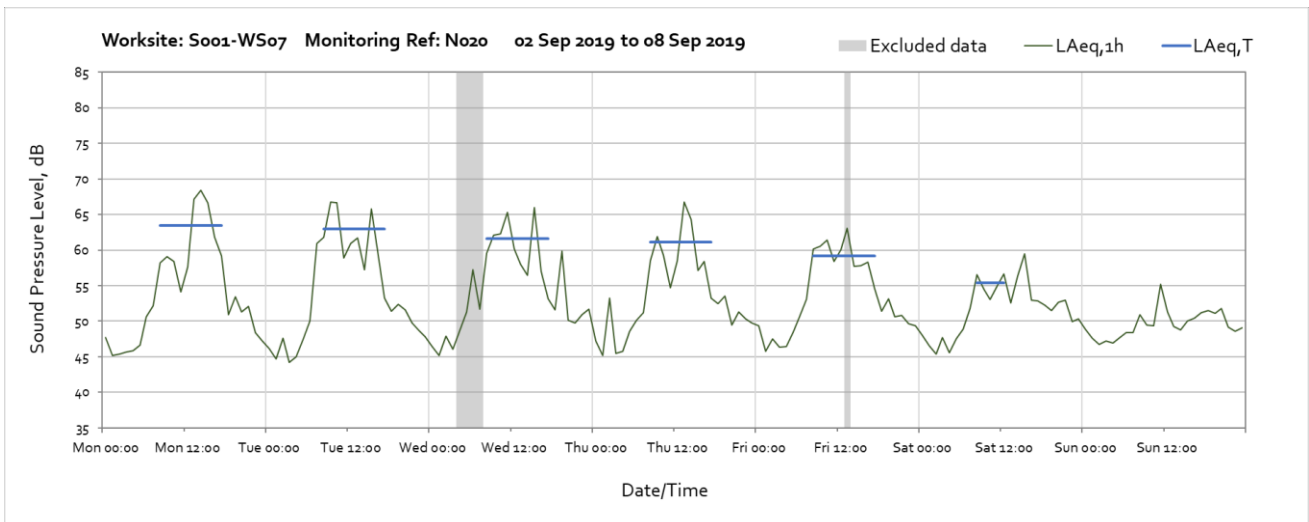
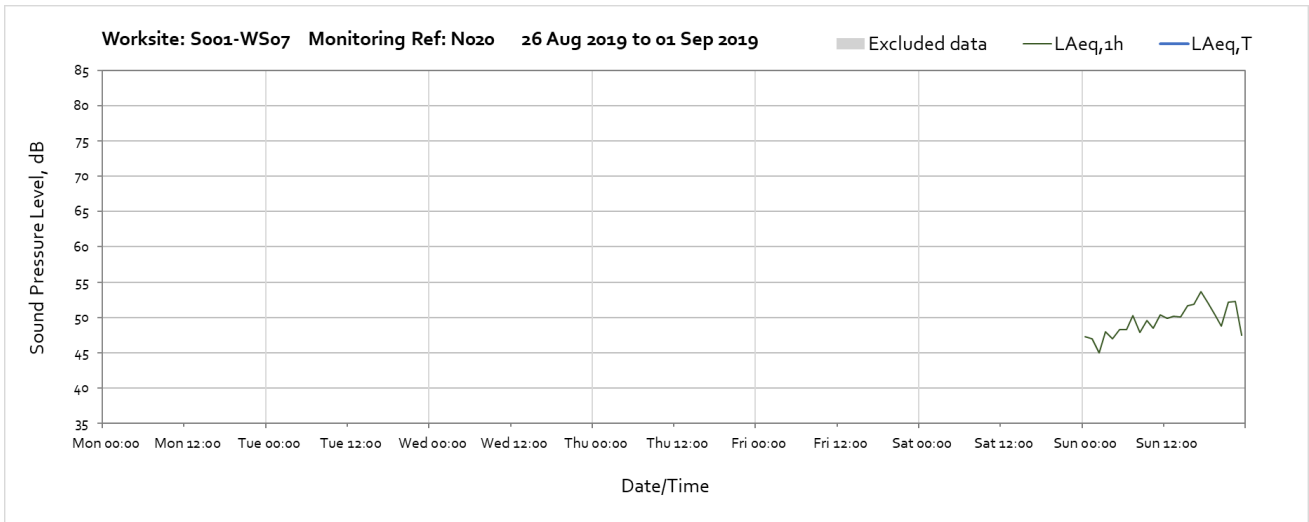
Worksite: S001-WS02 – Monitoring Ref: N019

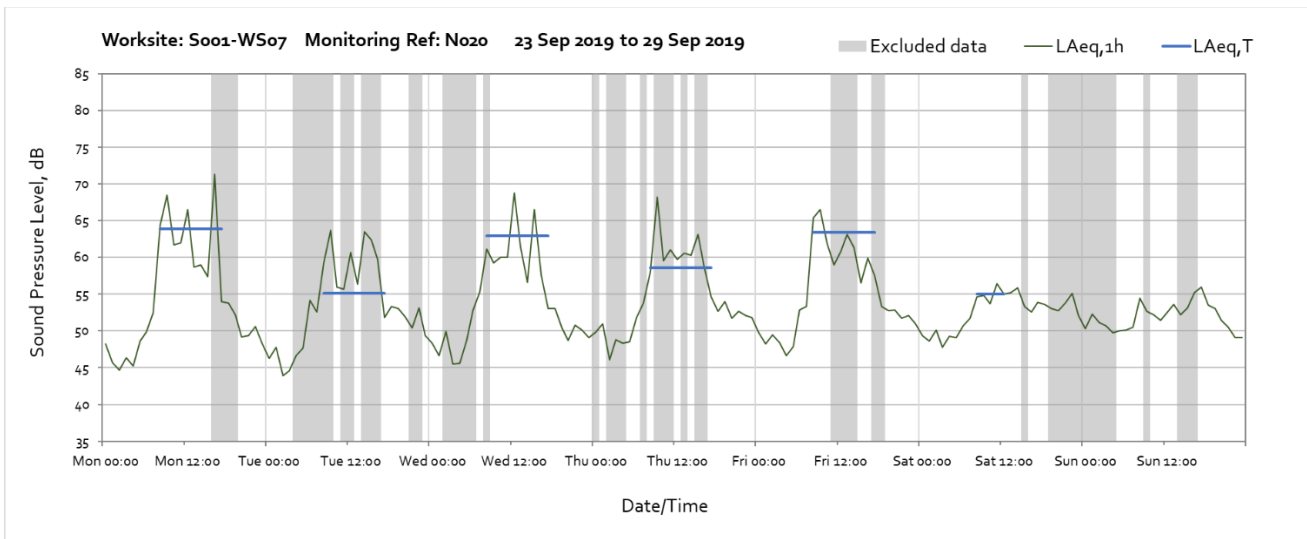
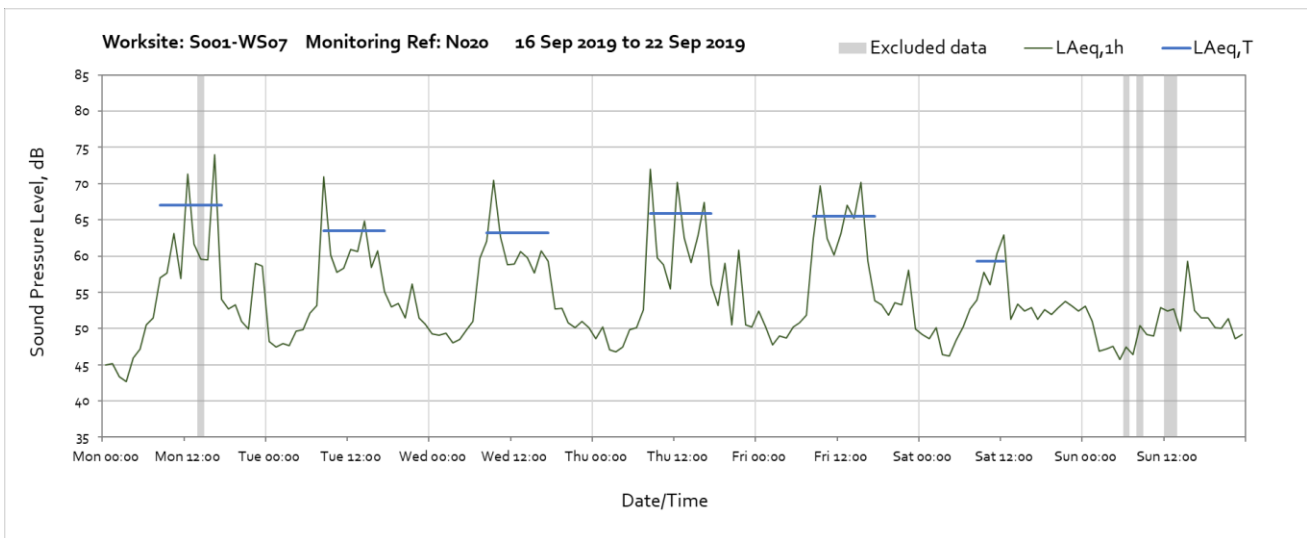
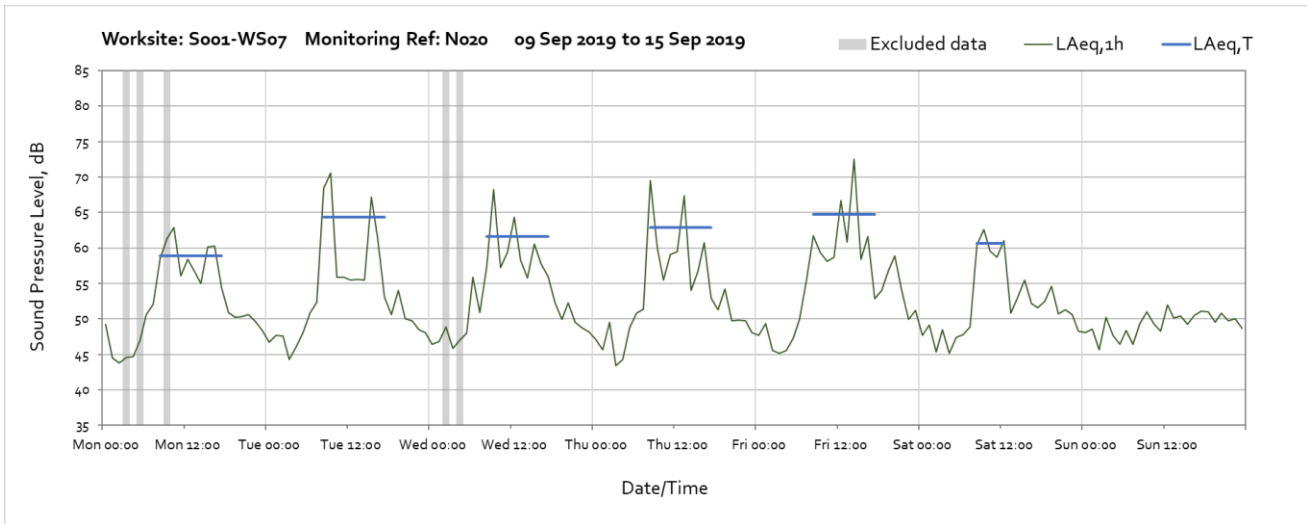


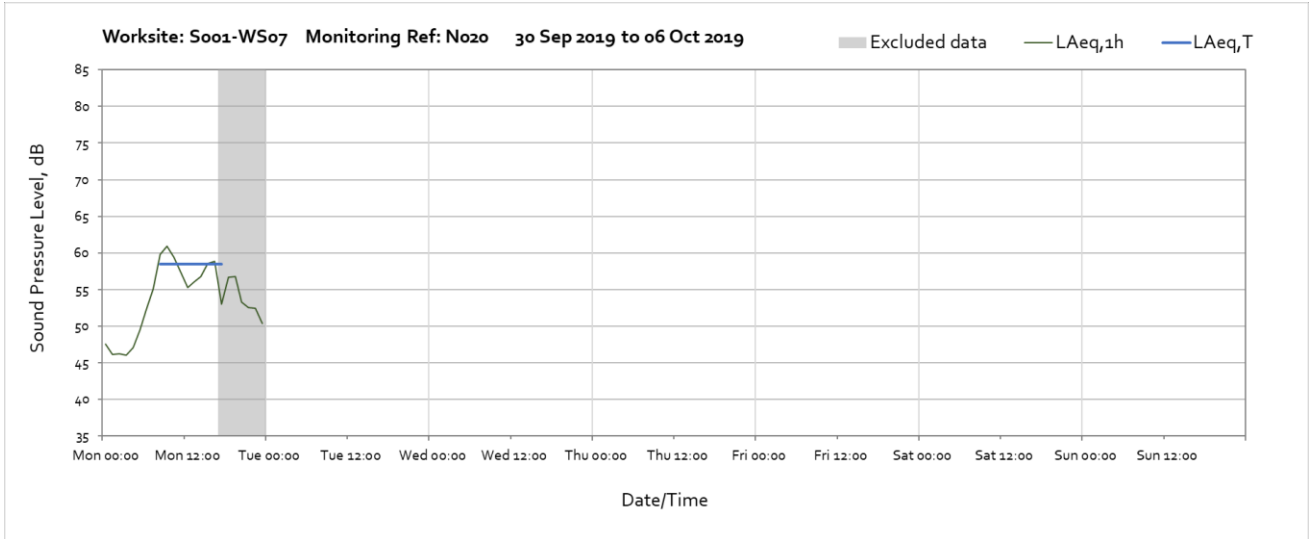




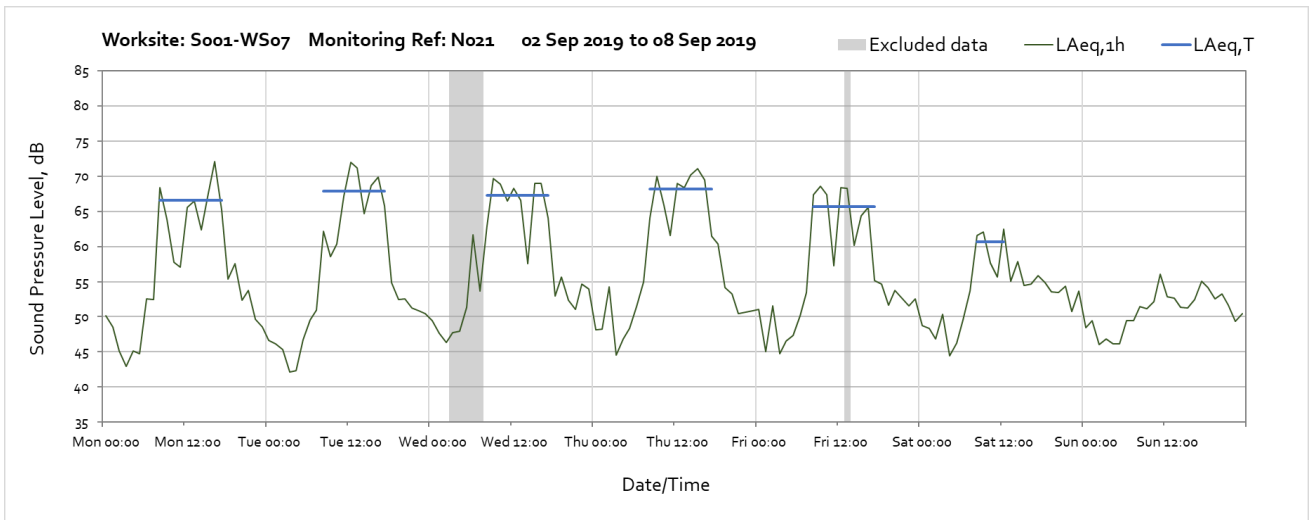
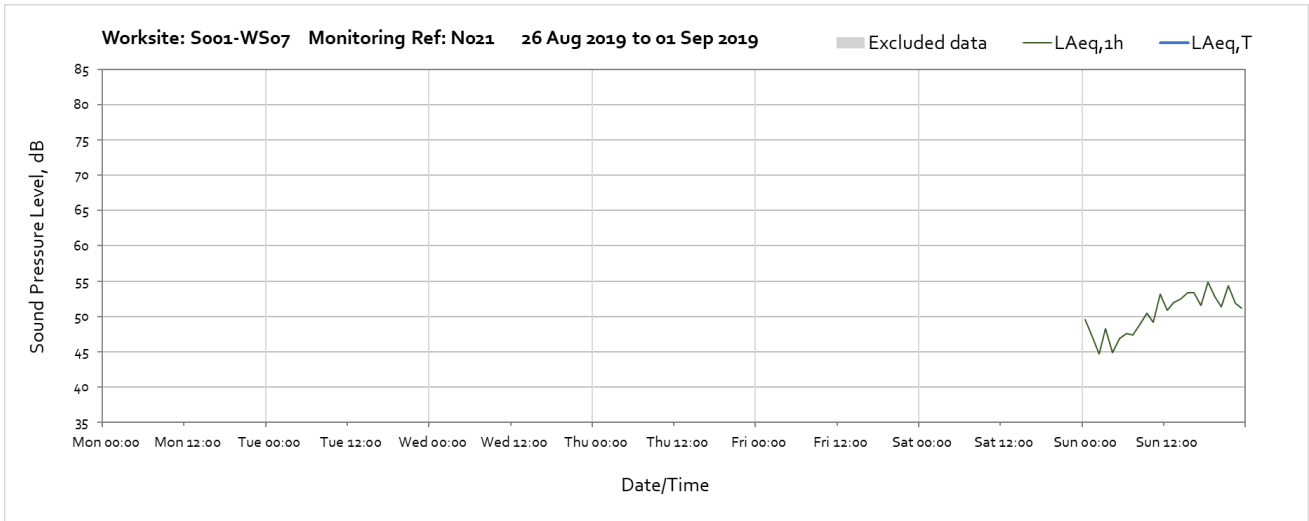
Worksite: S001-WS07 – Monitoring Ref: N020

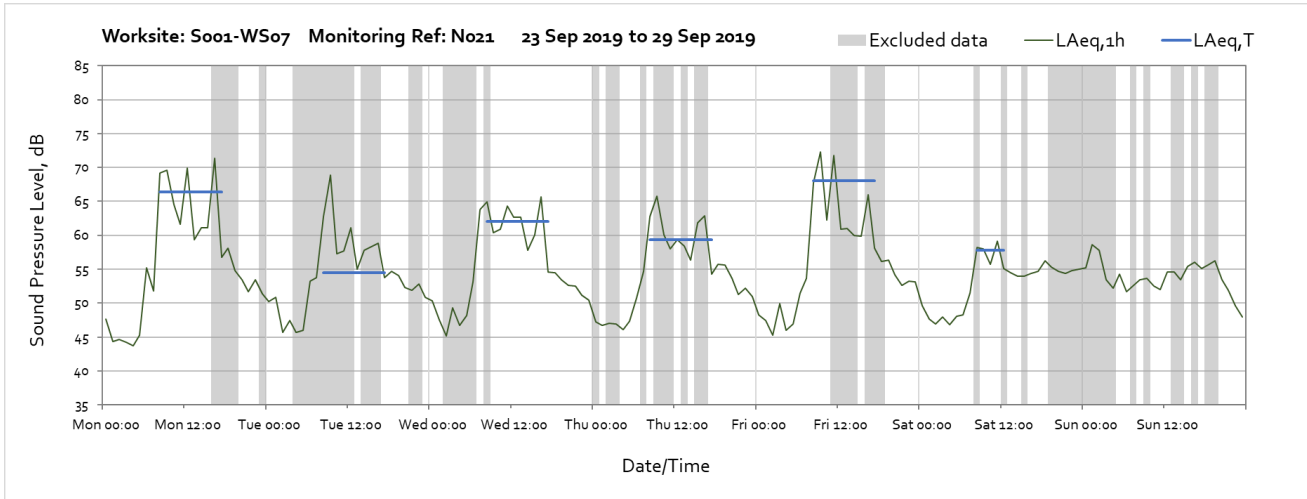
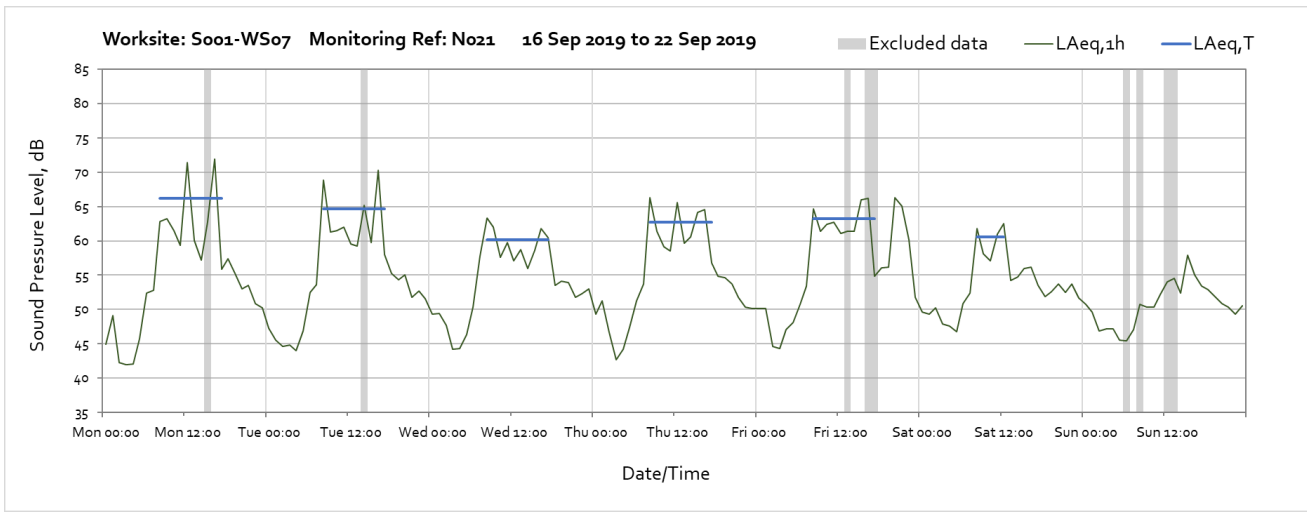
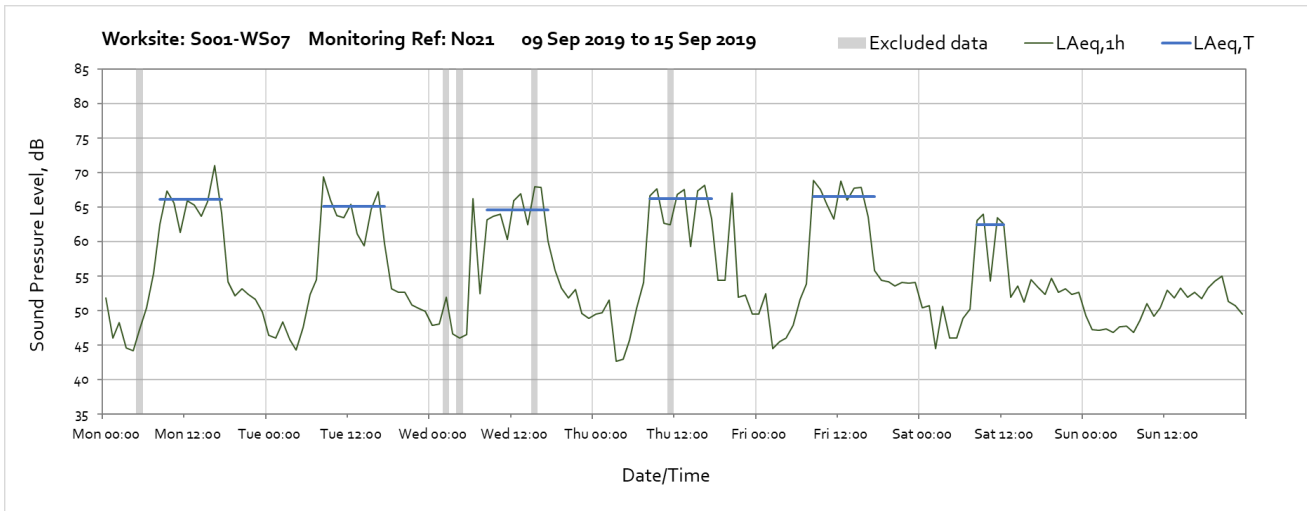


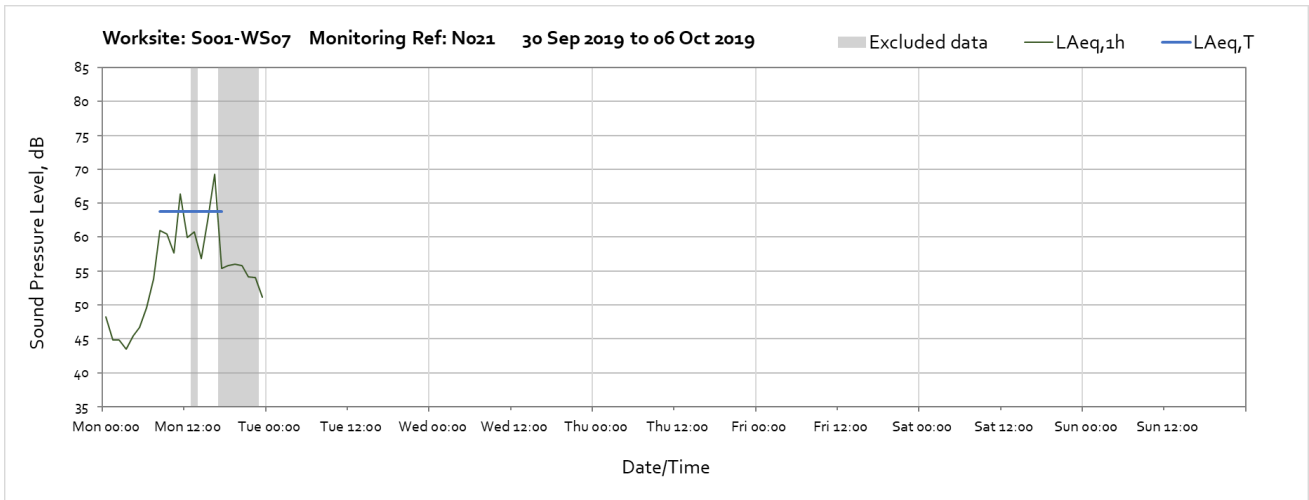




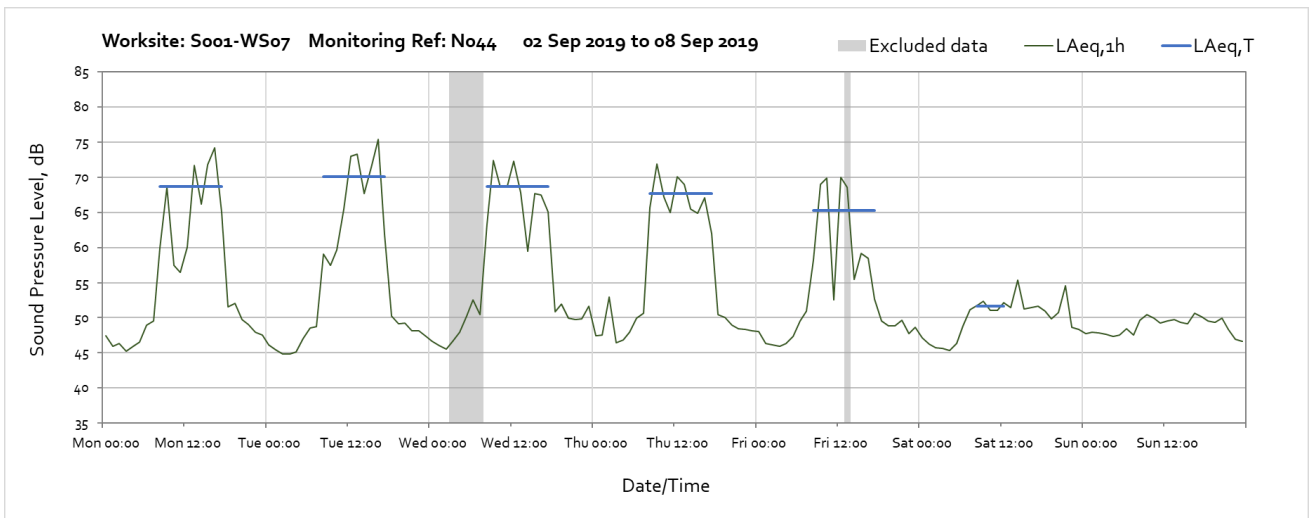
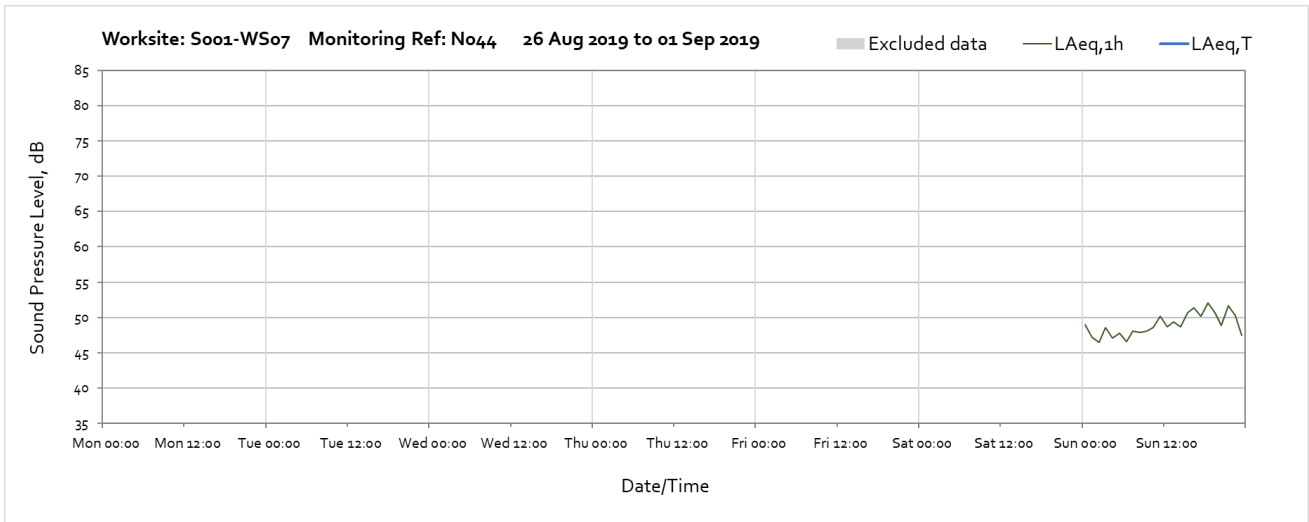
Worksite: S001-WS07 – Monitoring Ref: N021

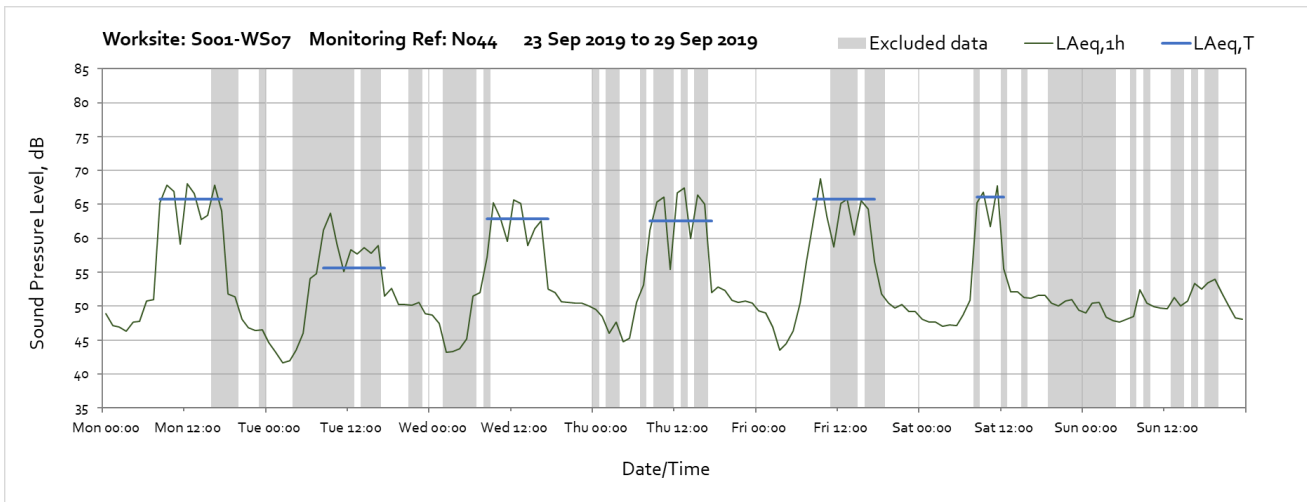
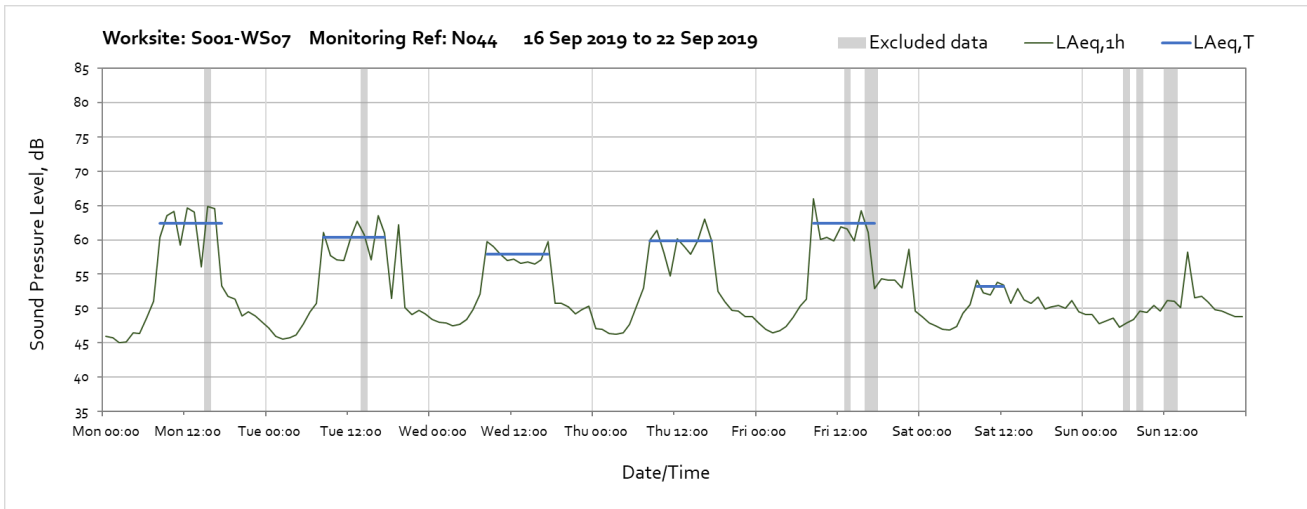
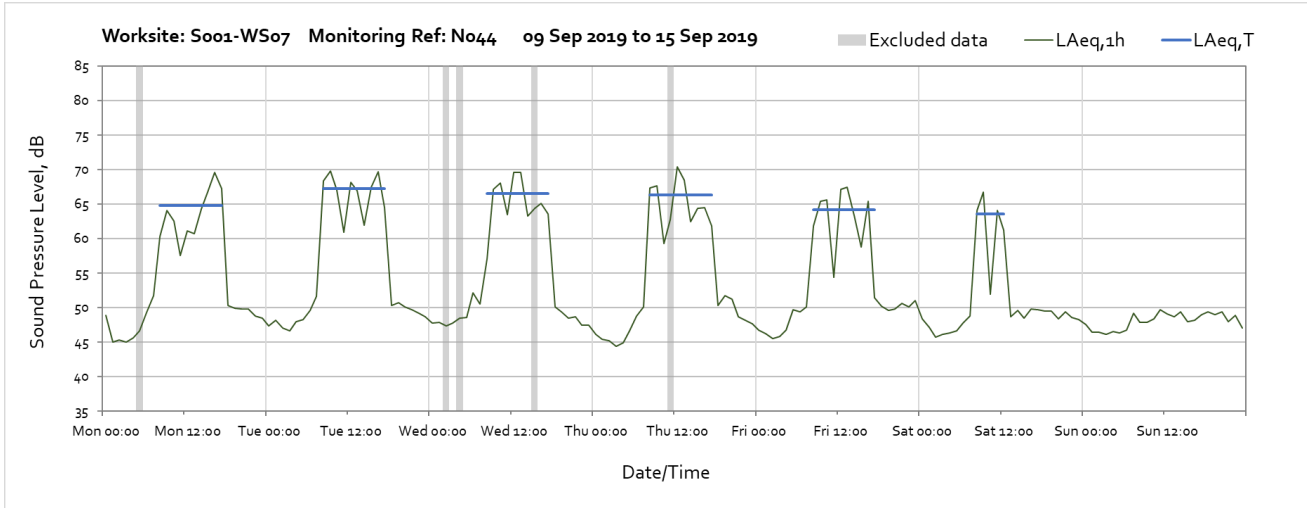


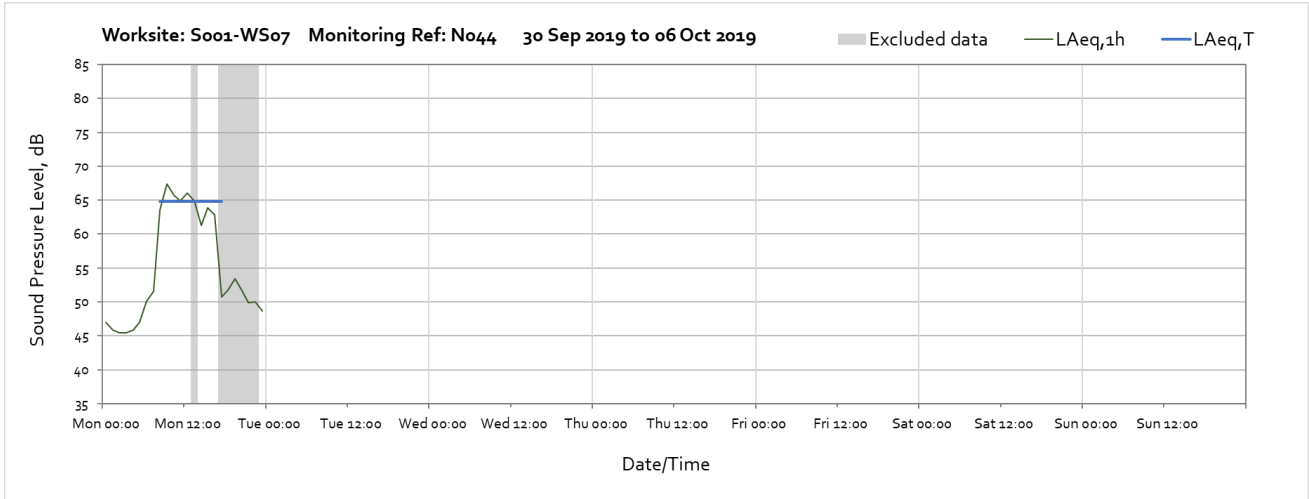




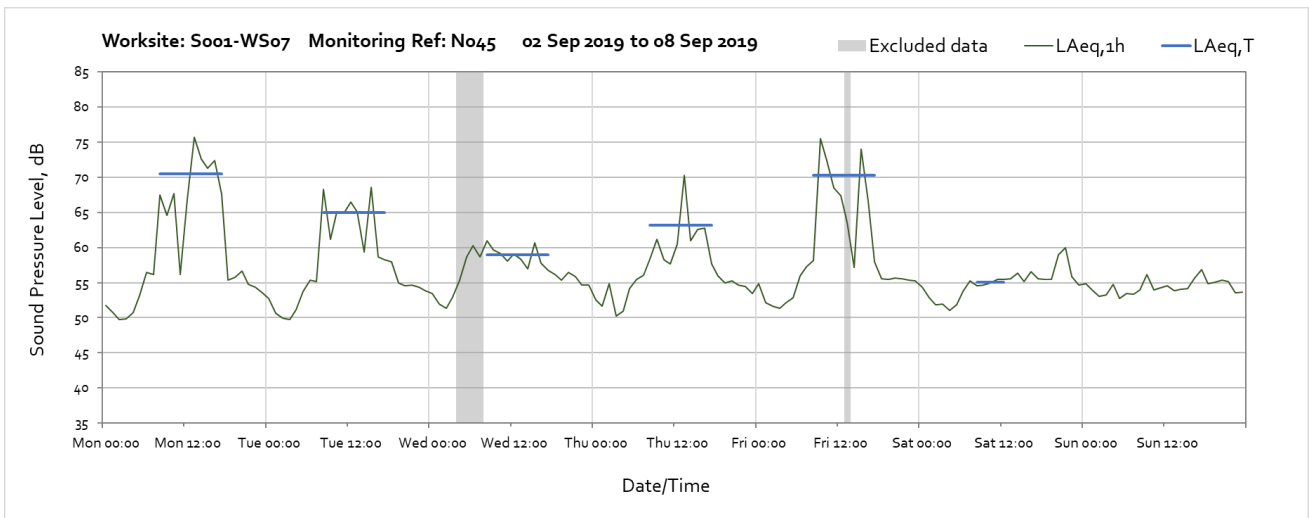
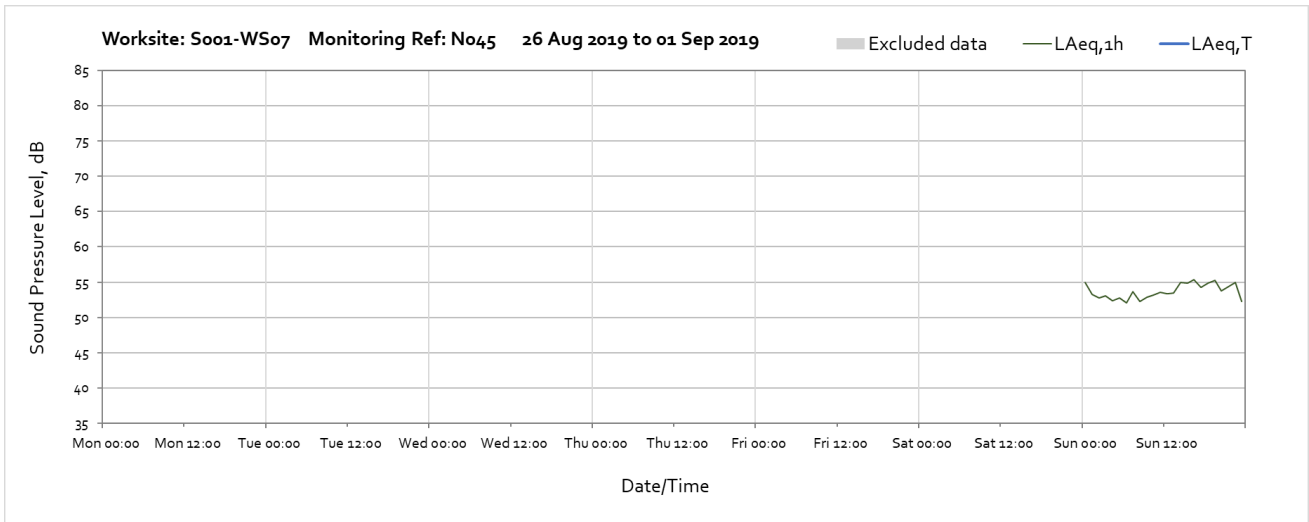
Worksite: S001-WS07 – Monitoring Ref: N044

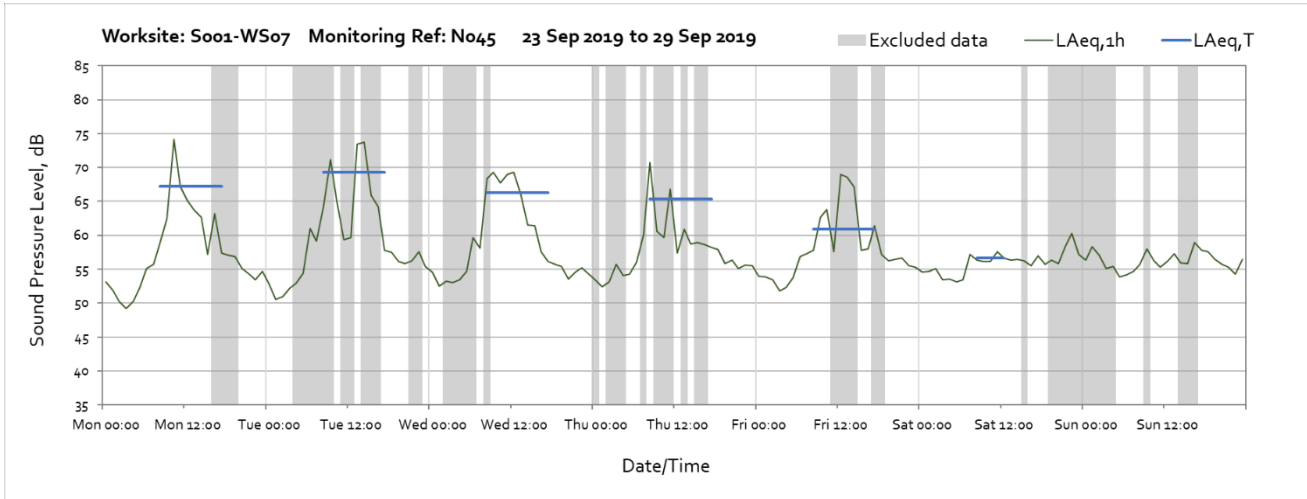
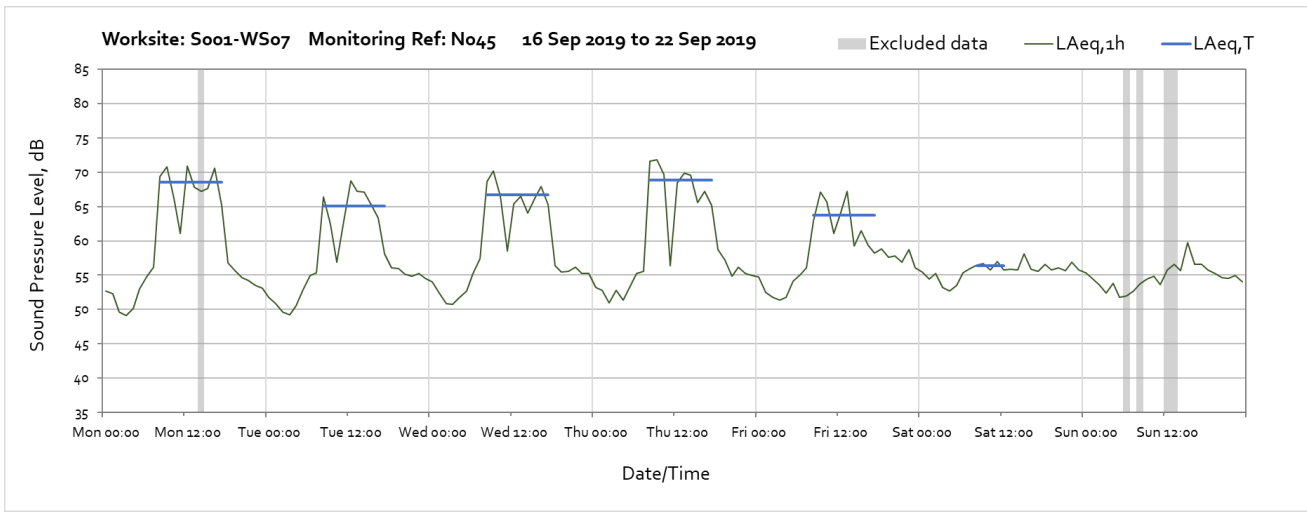
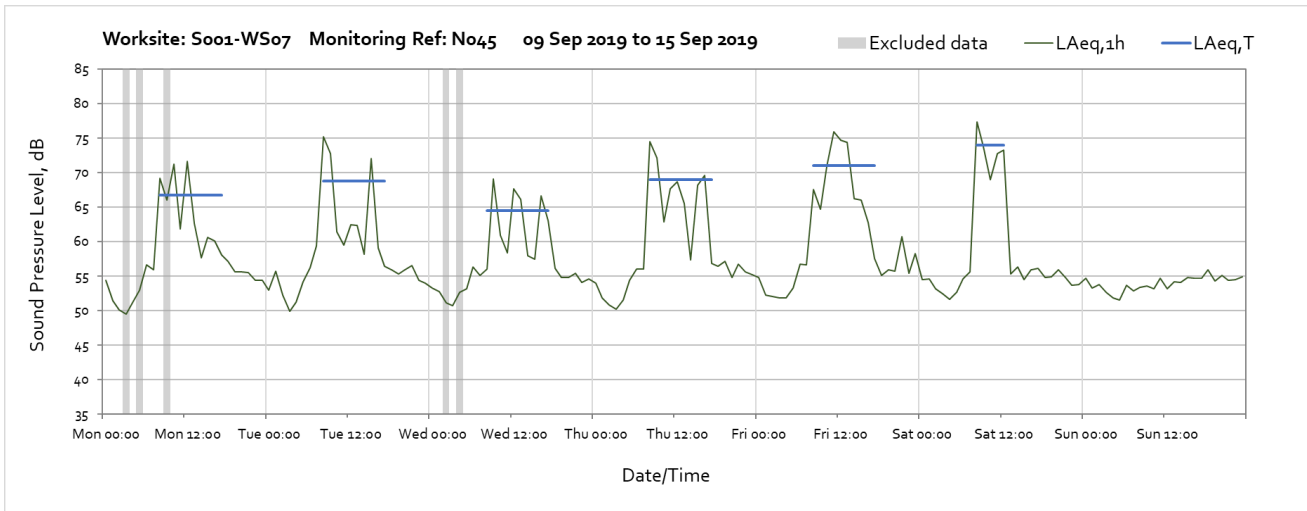


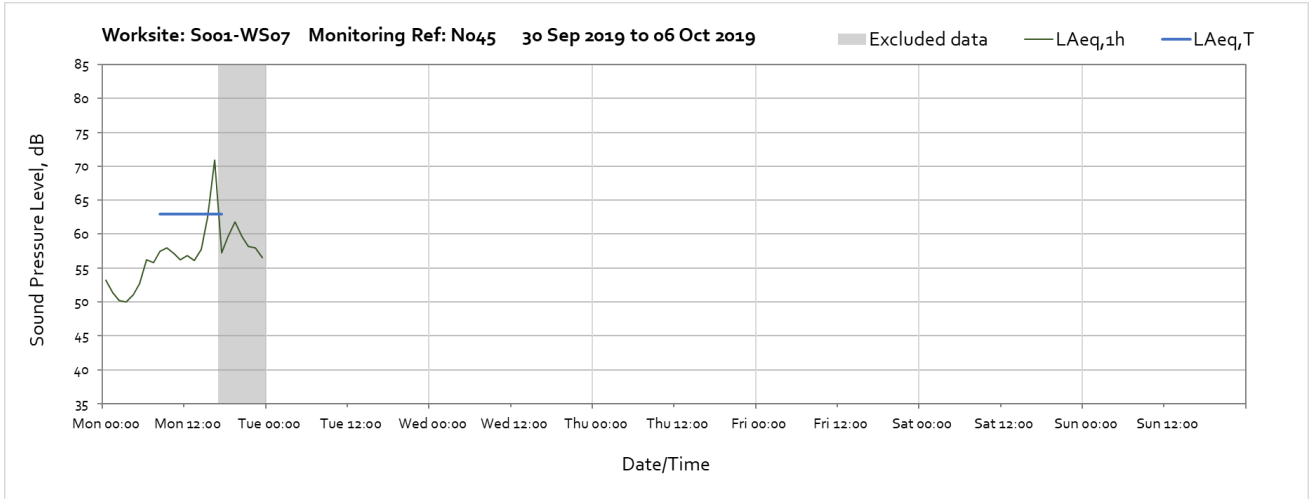




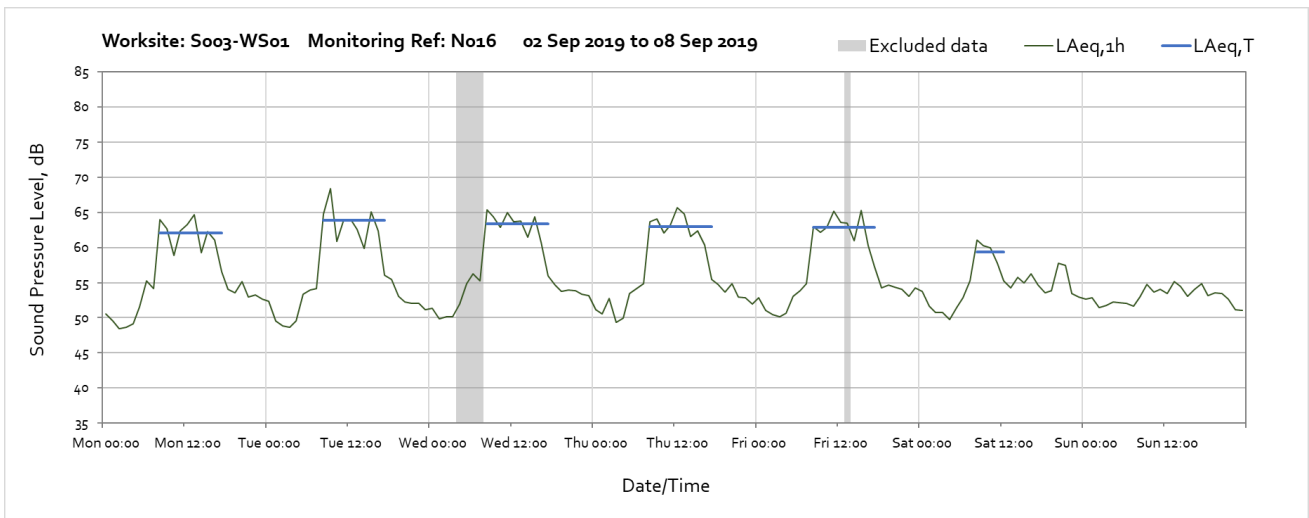
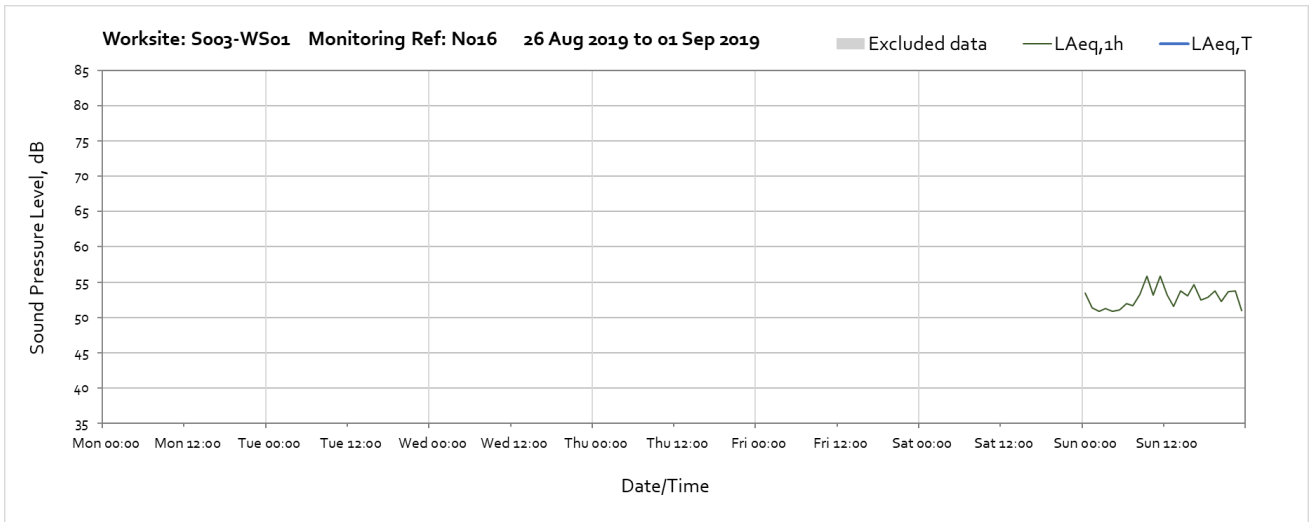
Worksite: S001-WS07 – Monitoring Ref: N045

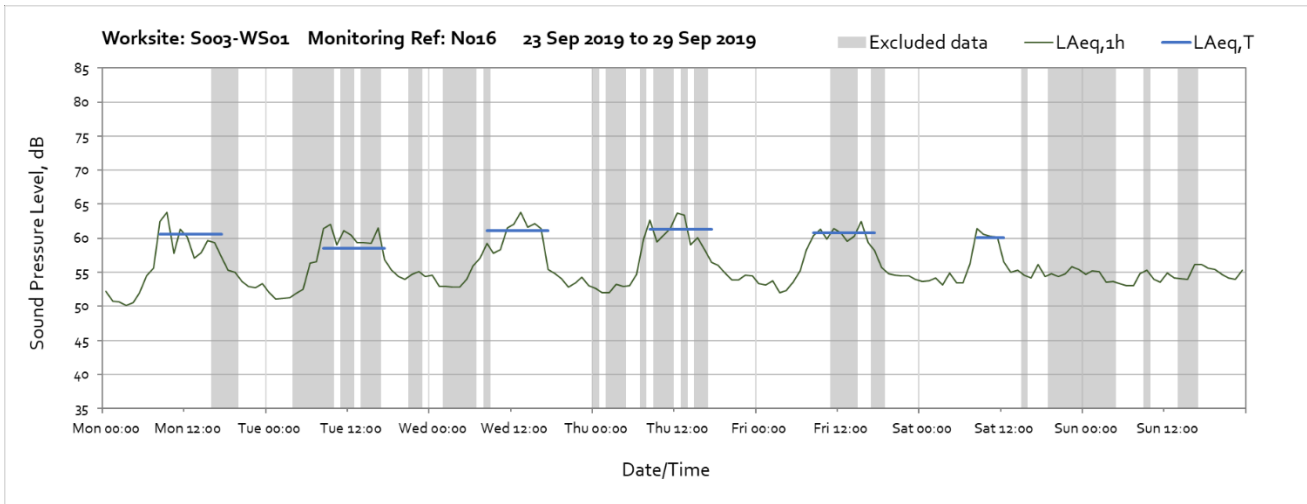
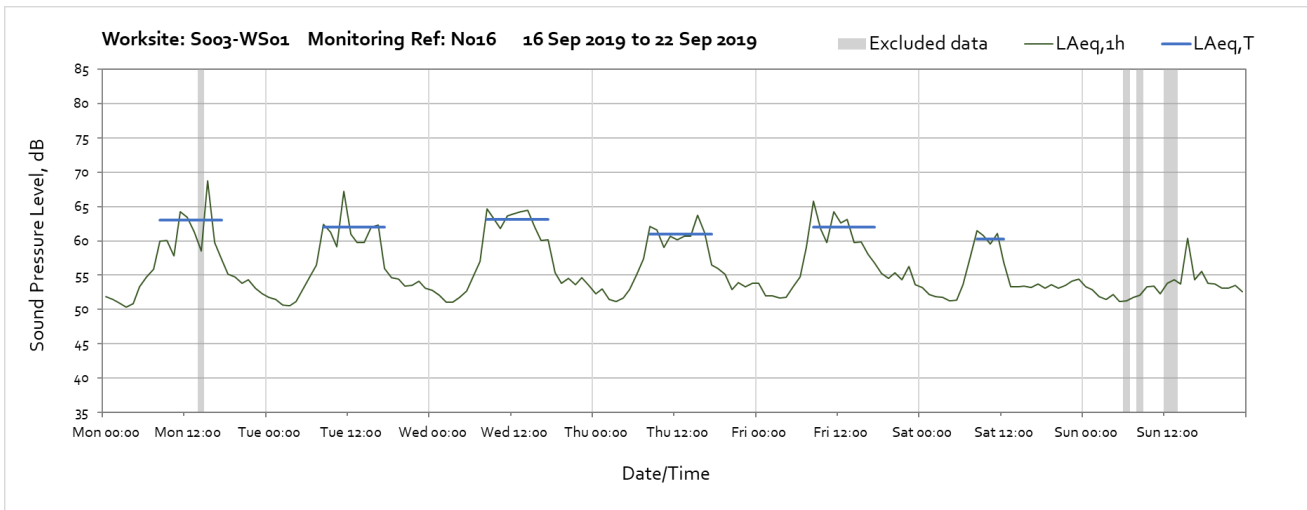
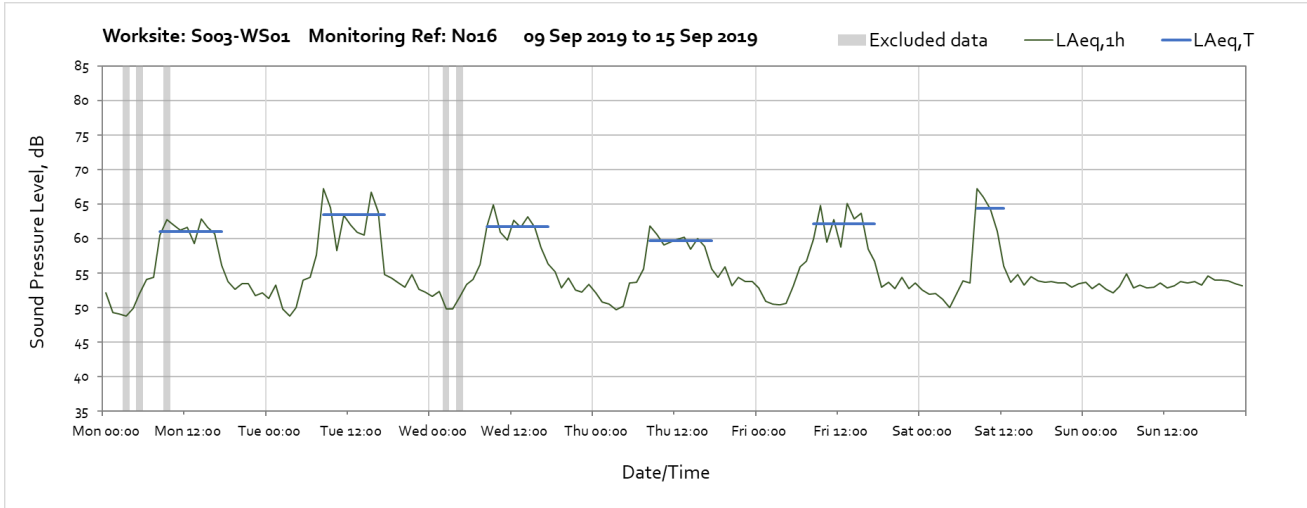


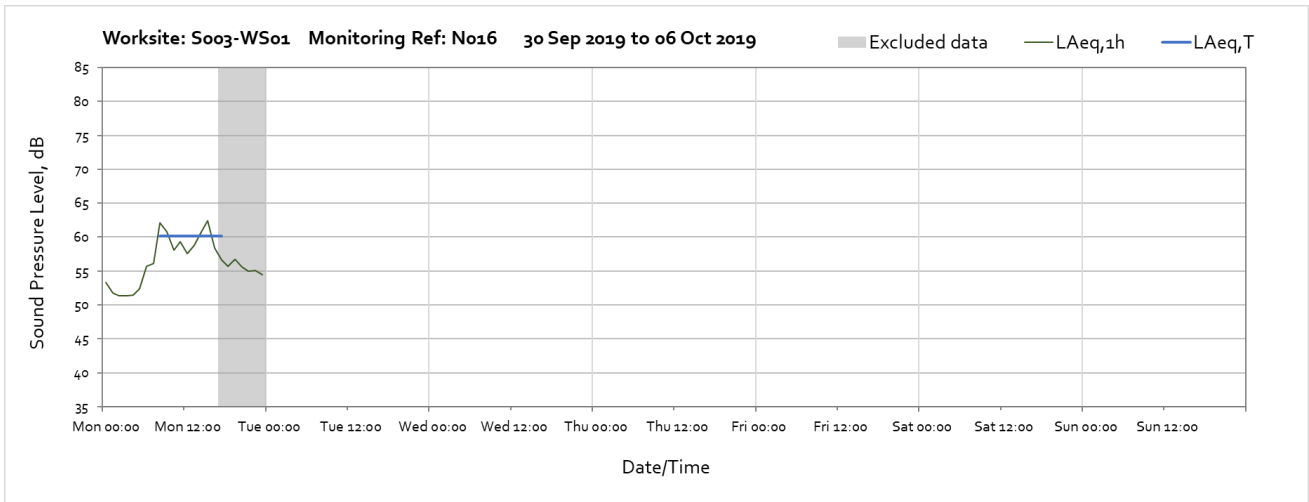




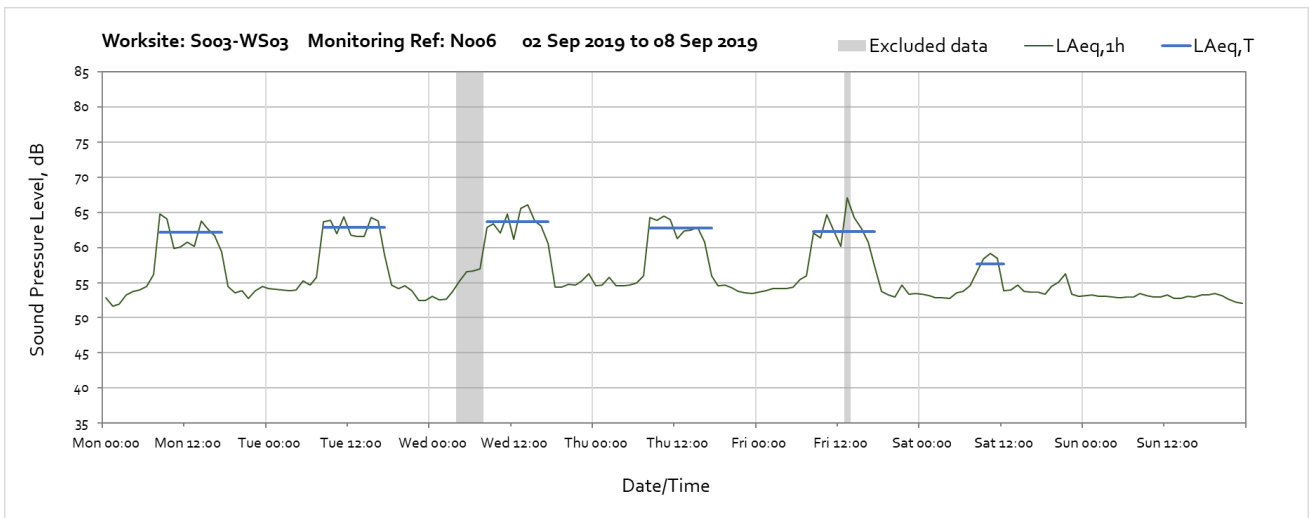
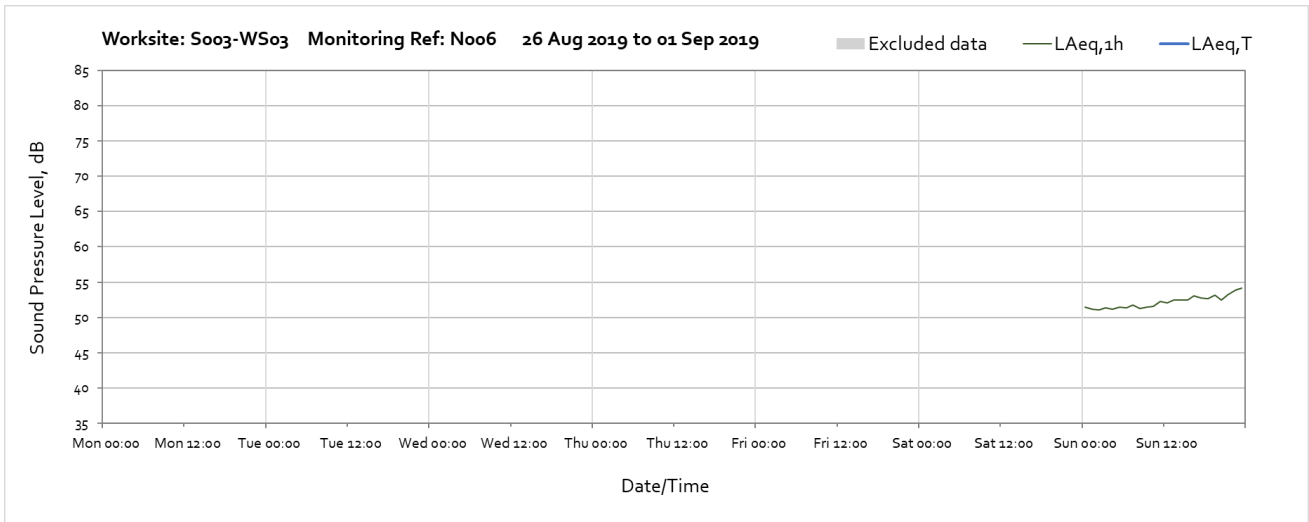
Worksite: S003-WS01 – Monitoring Ref: N016

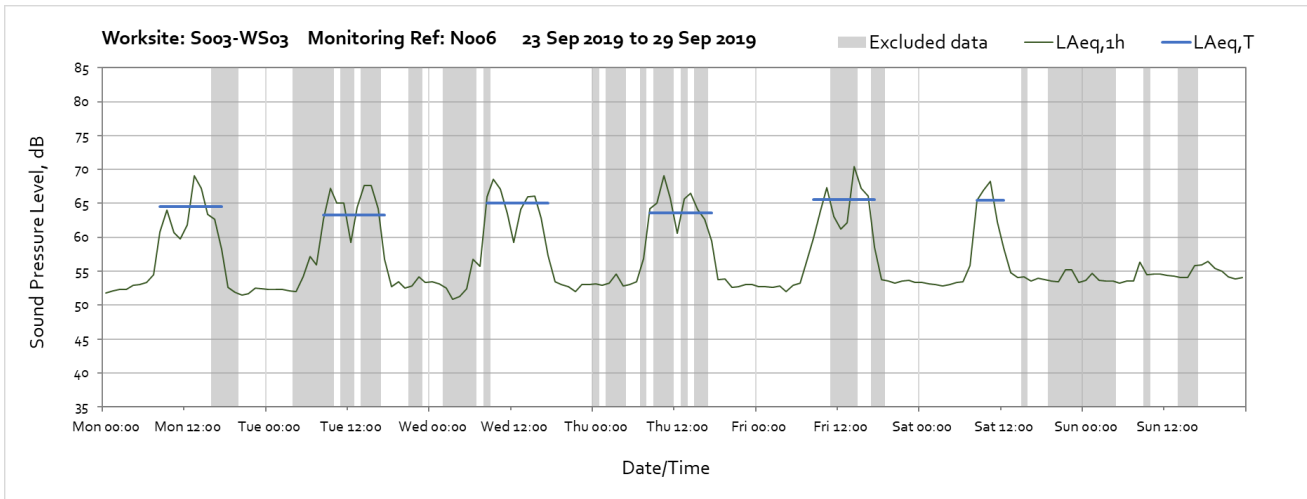
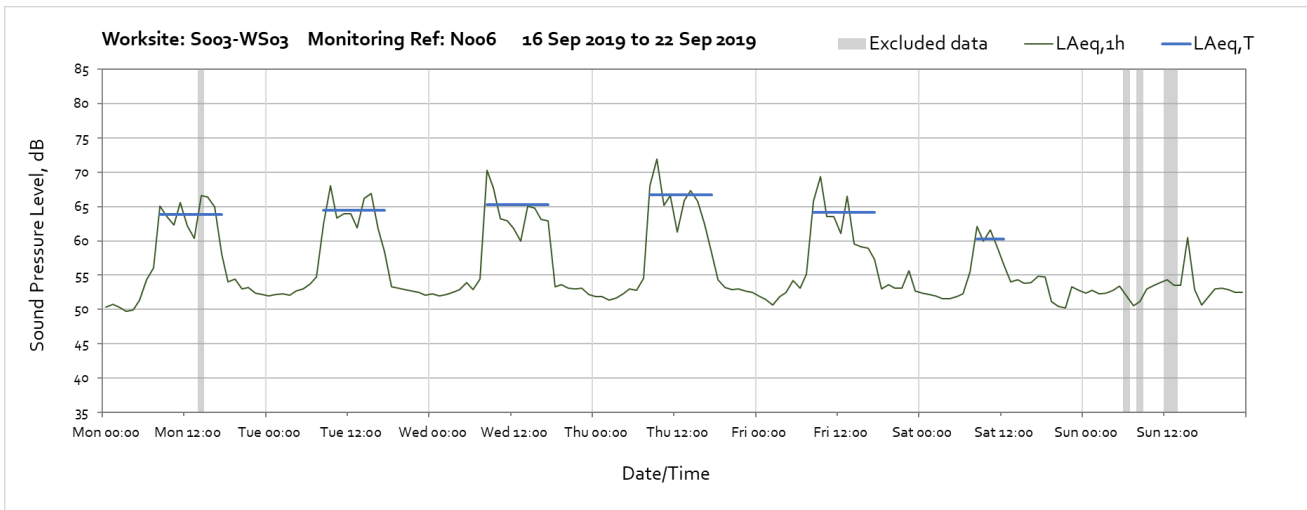
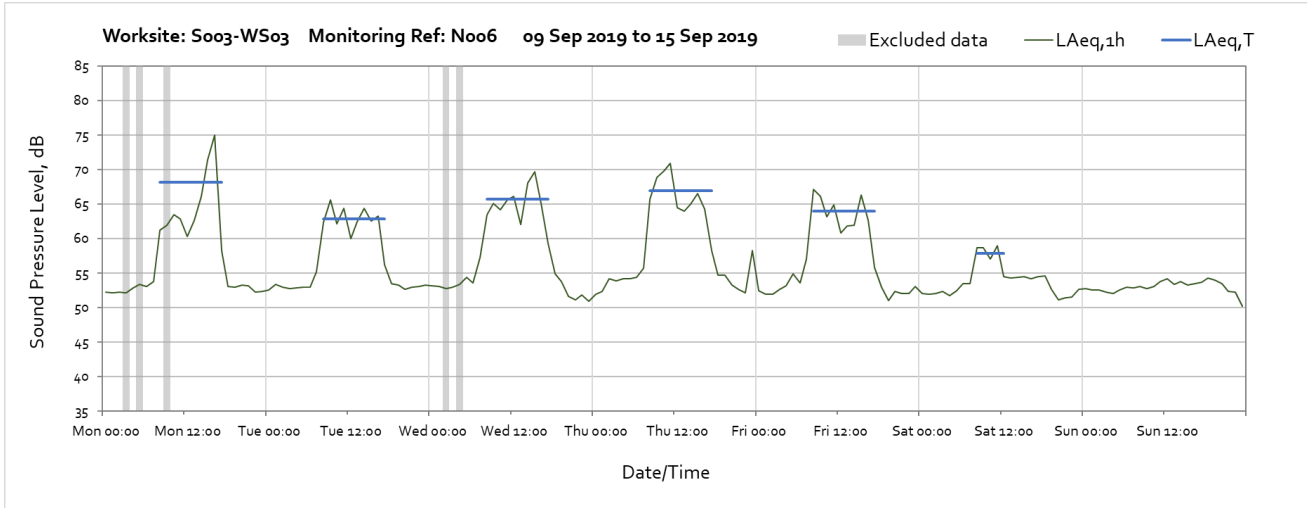


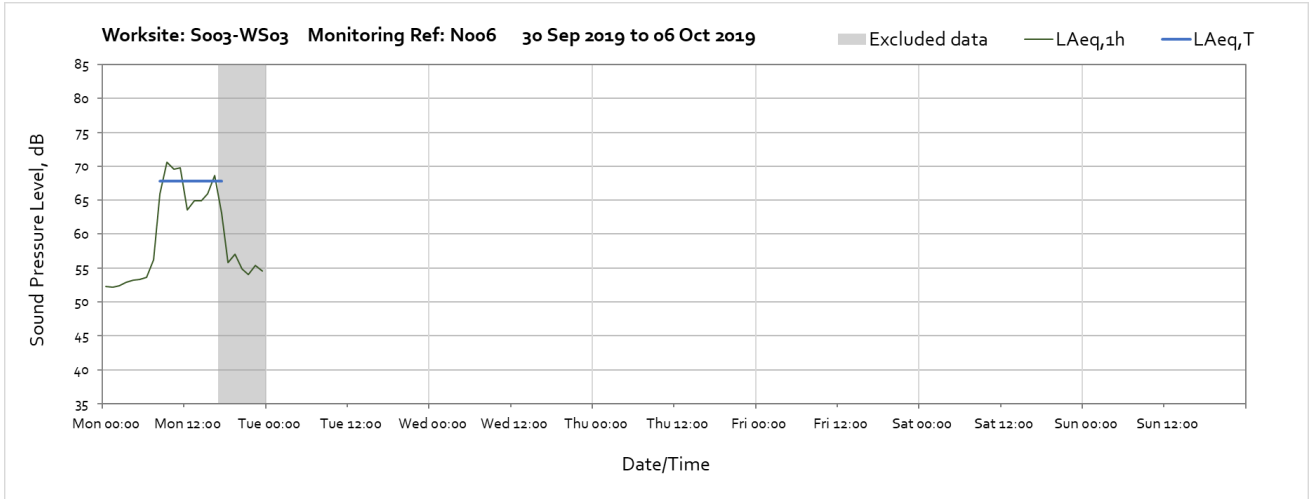




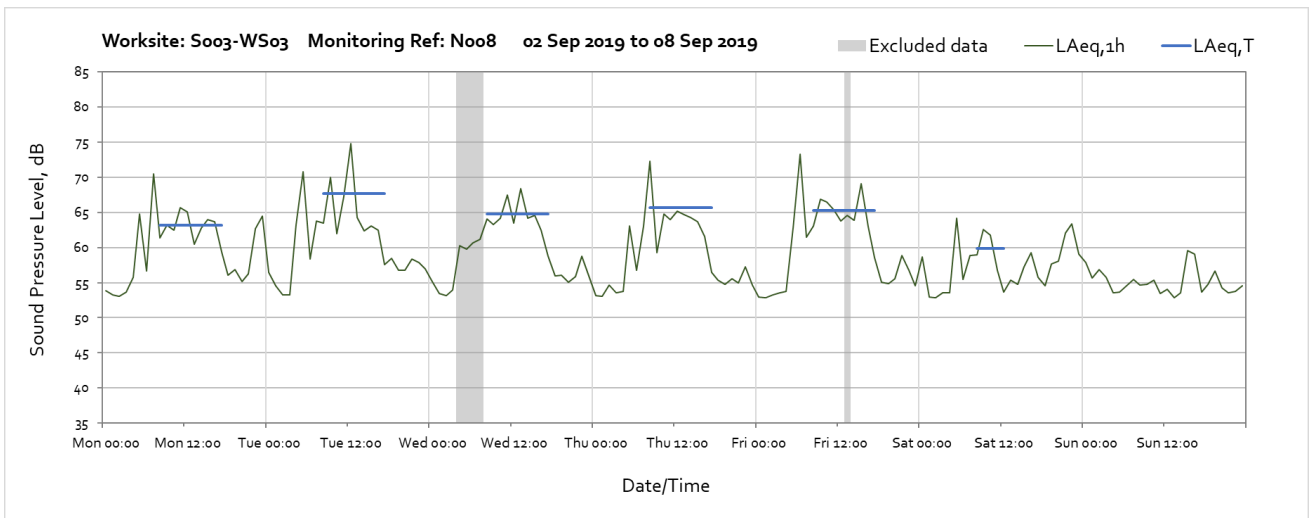
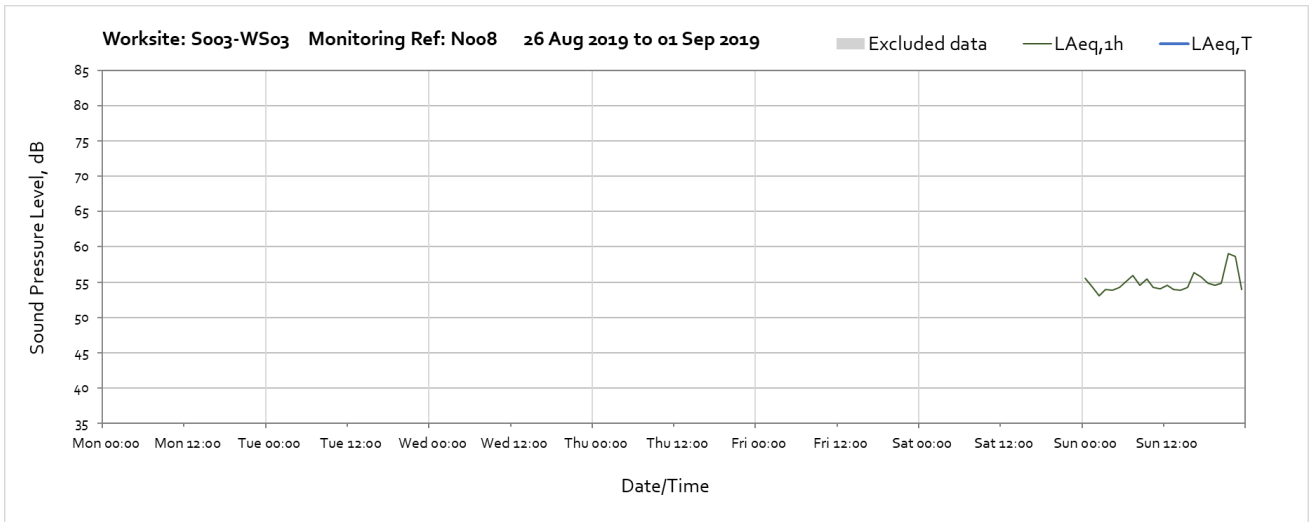
Worksite: S003-WS03 – Monitoring Ref: N006

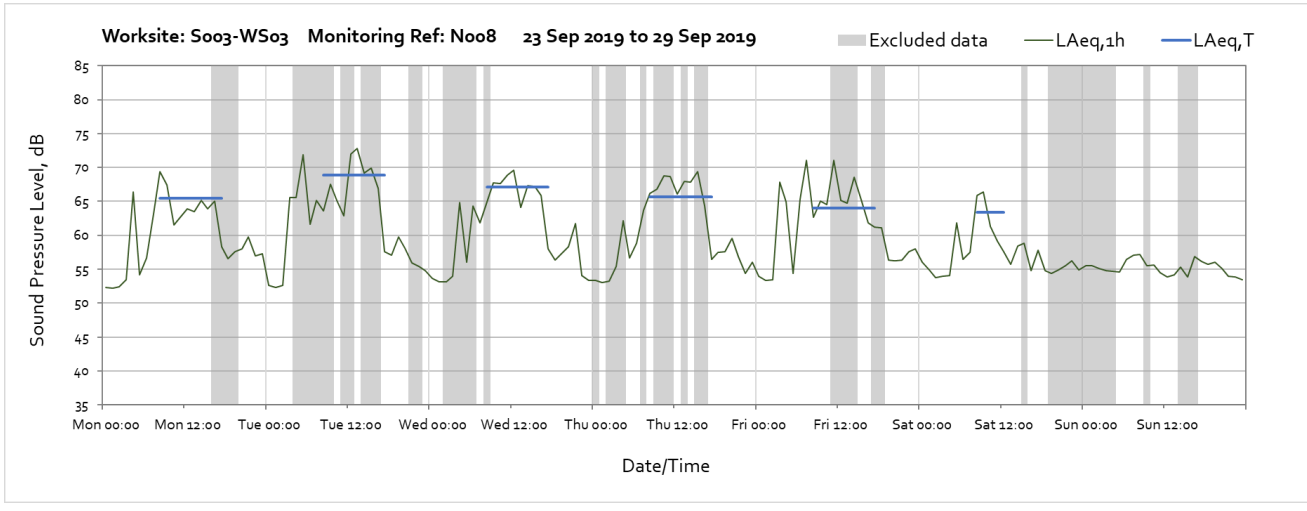
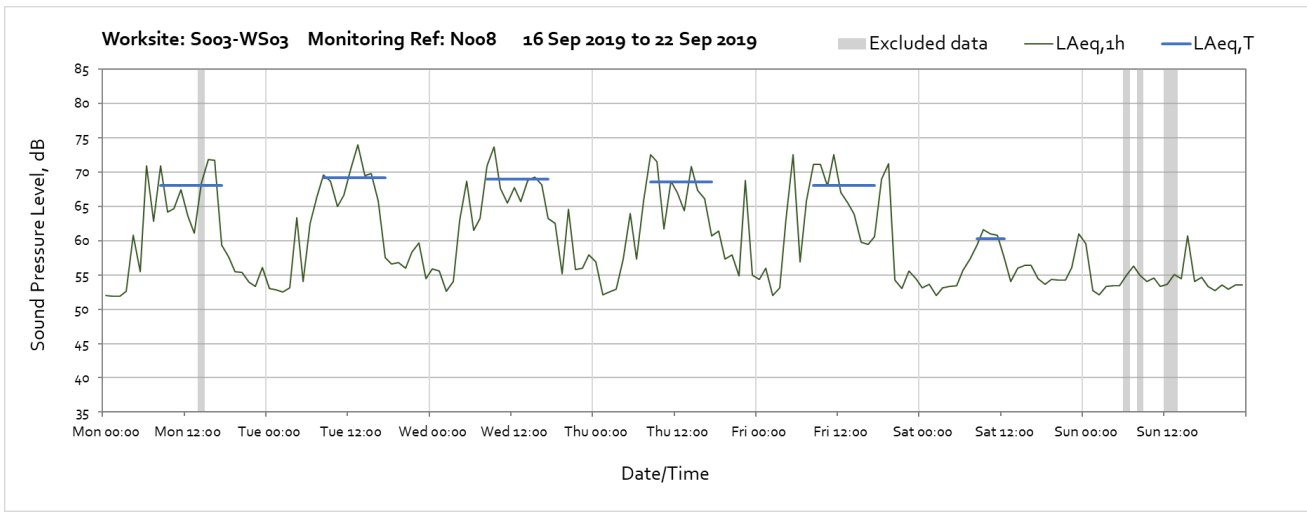
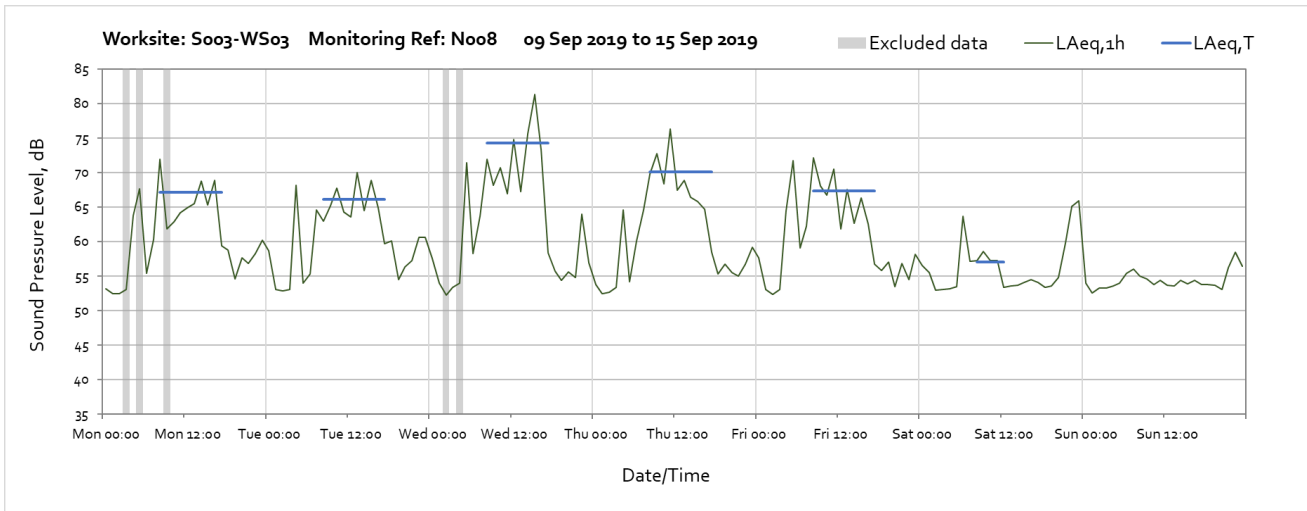


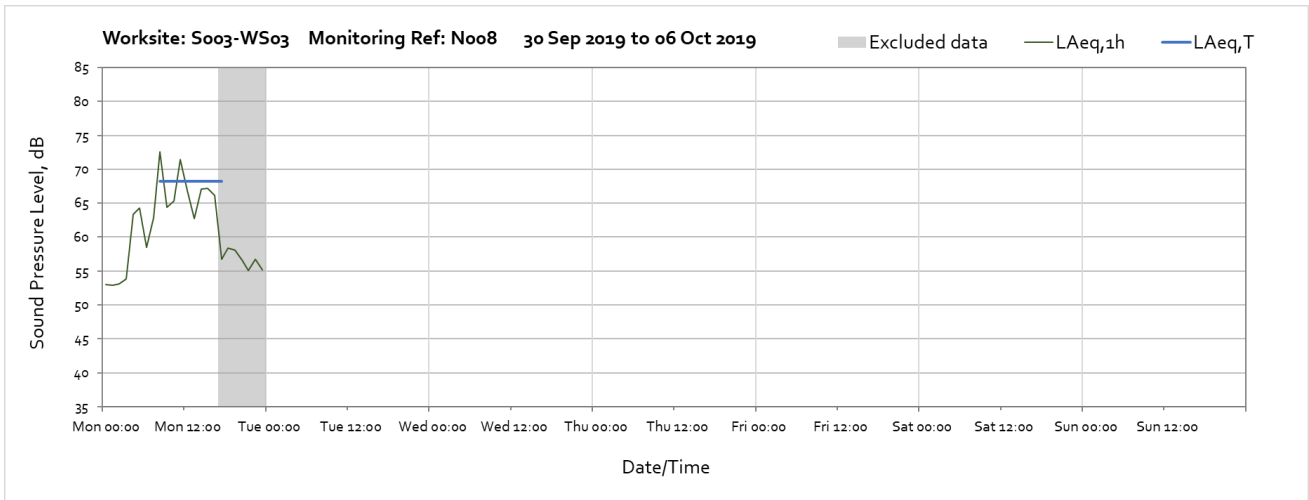




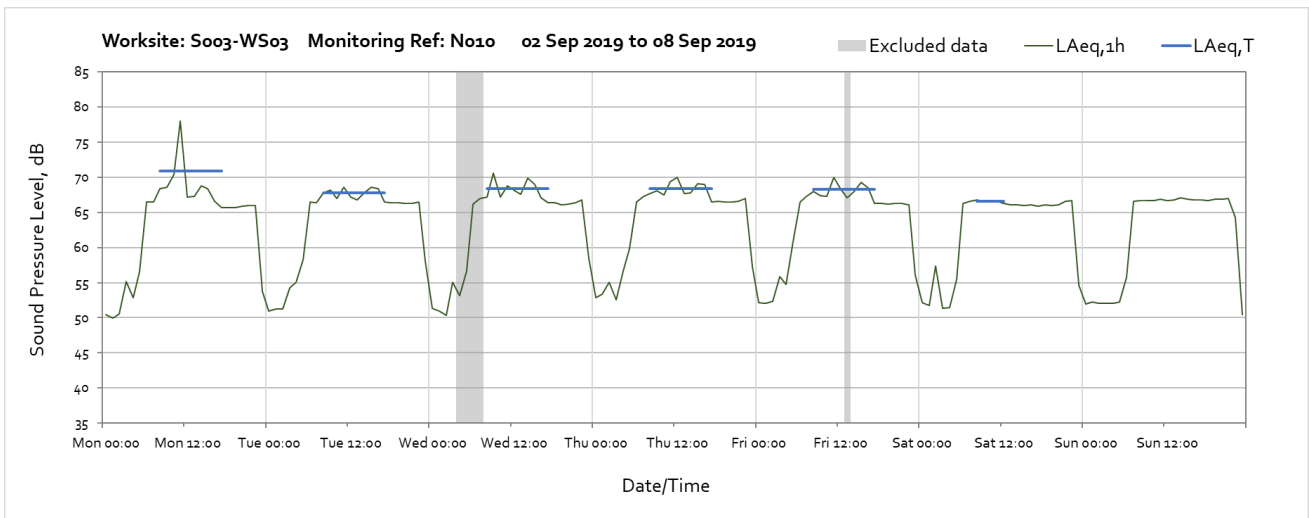
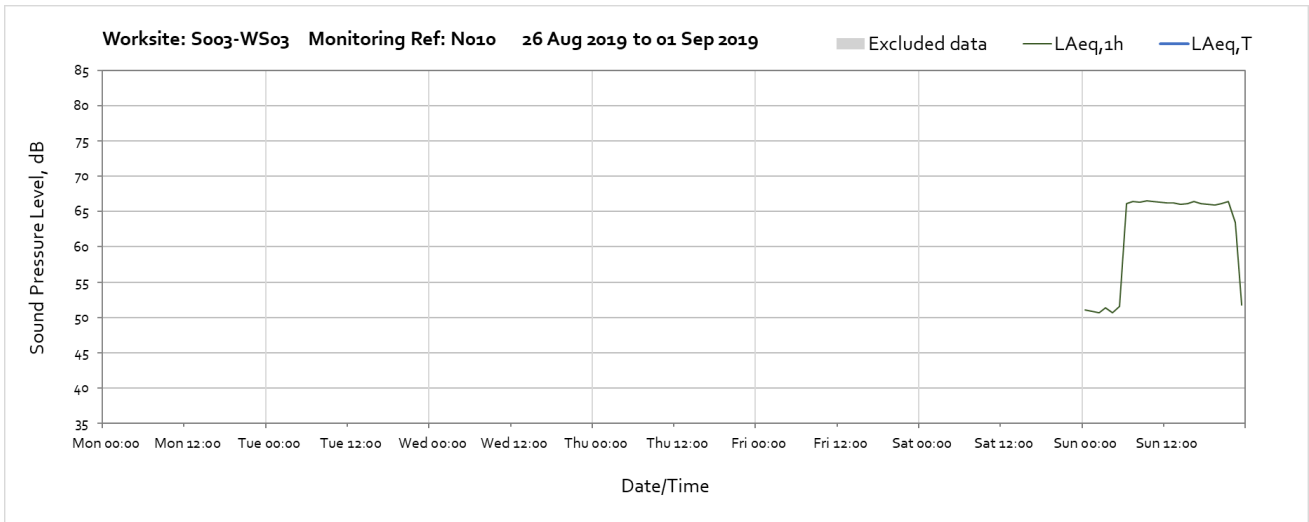
Worksite: S003-WS03 – Monitoring Ref: N008

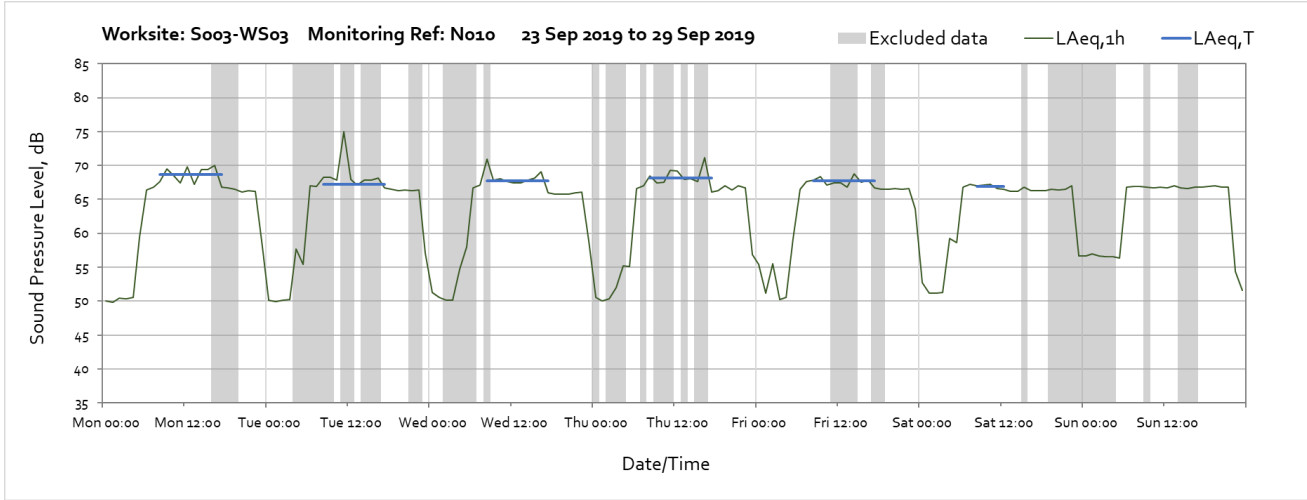
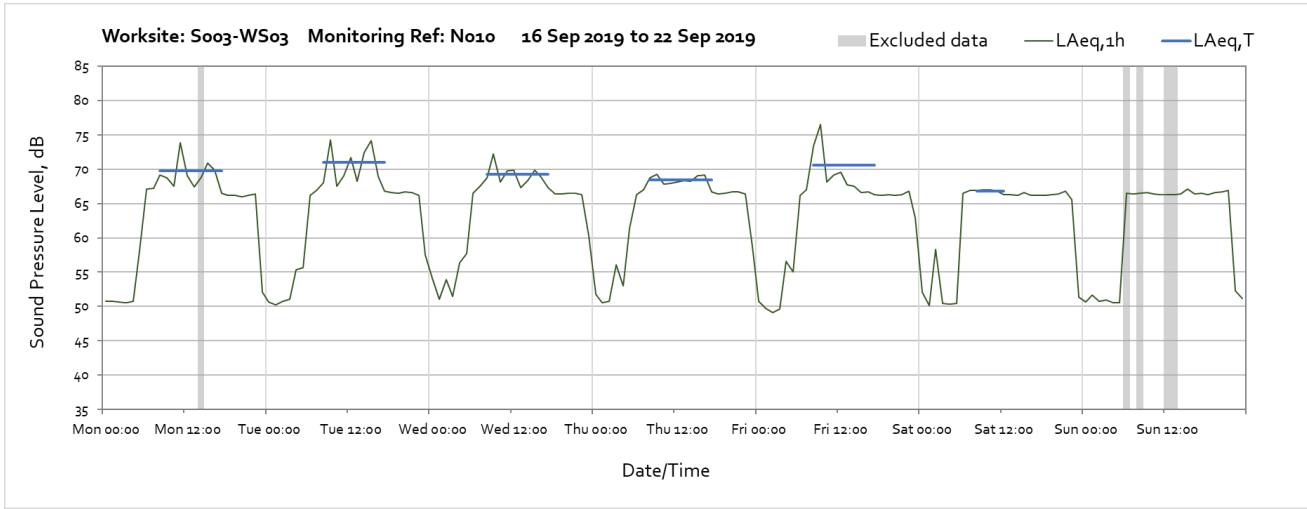
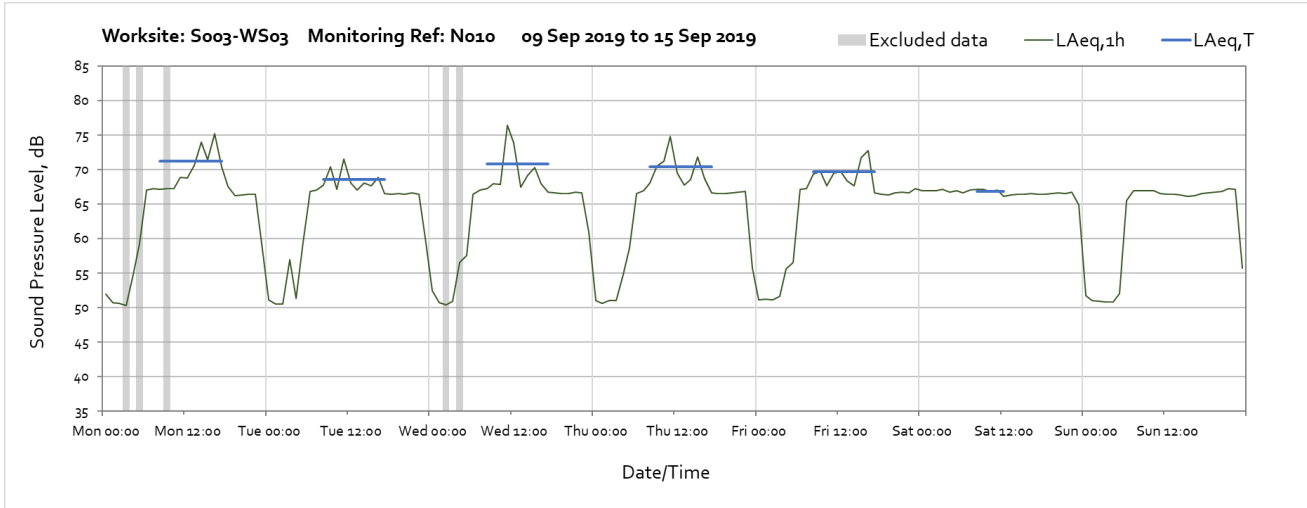


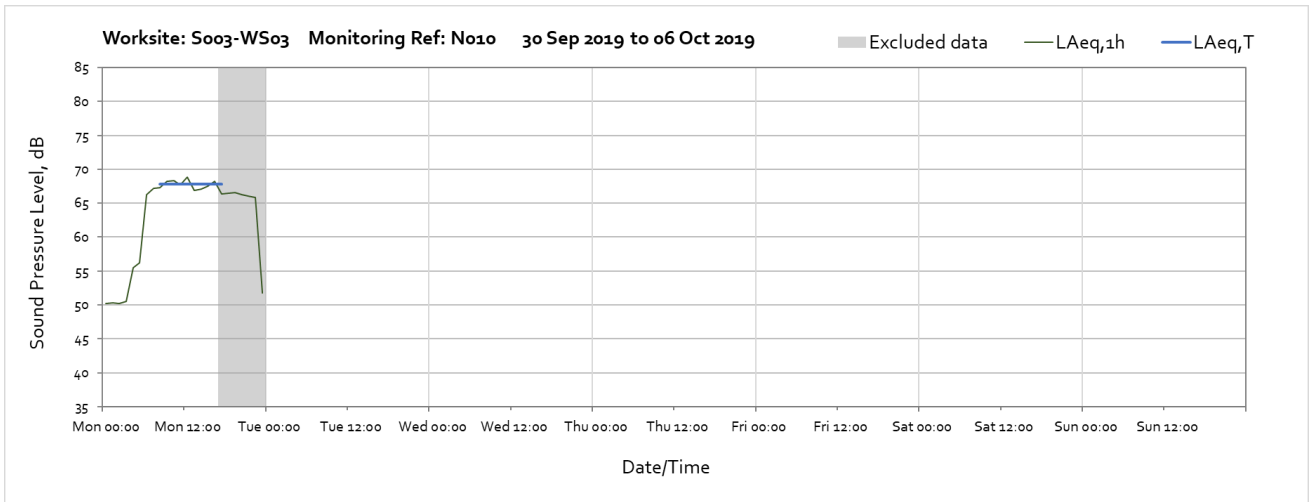




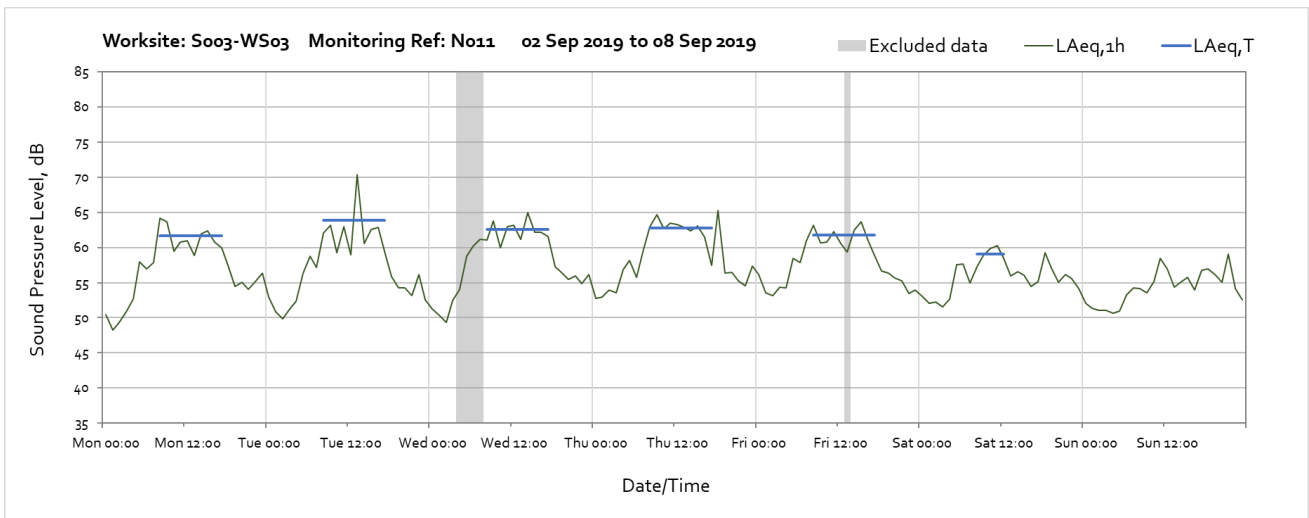
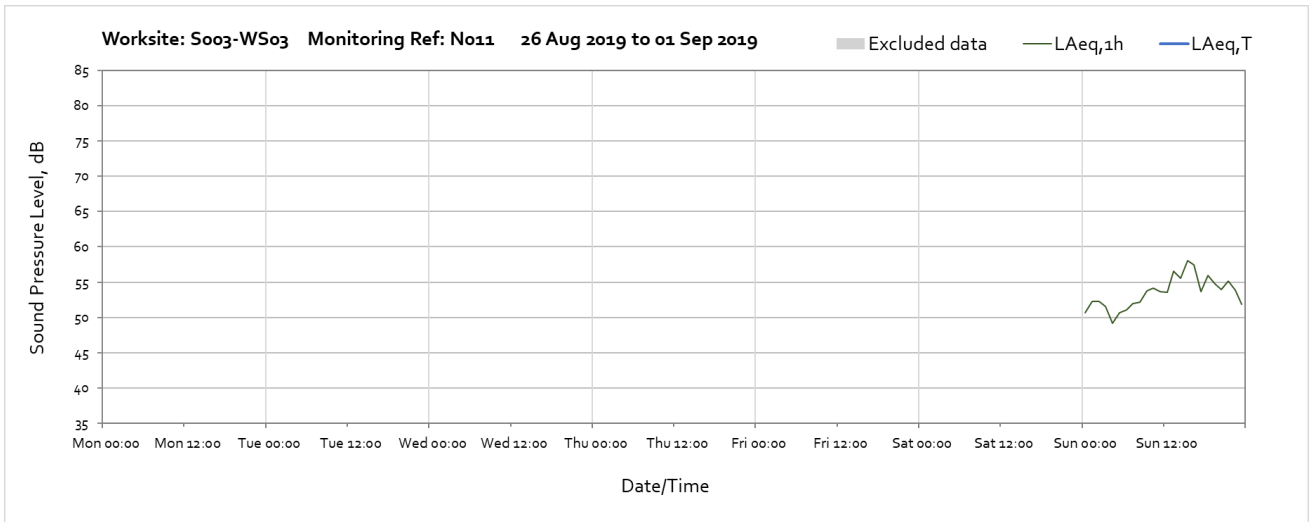
Worksite: S003-WS03 – Monitoring Ref: N010

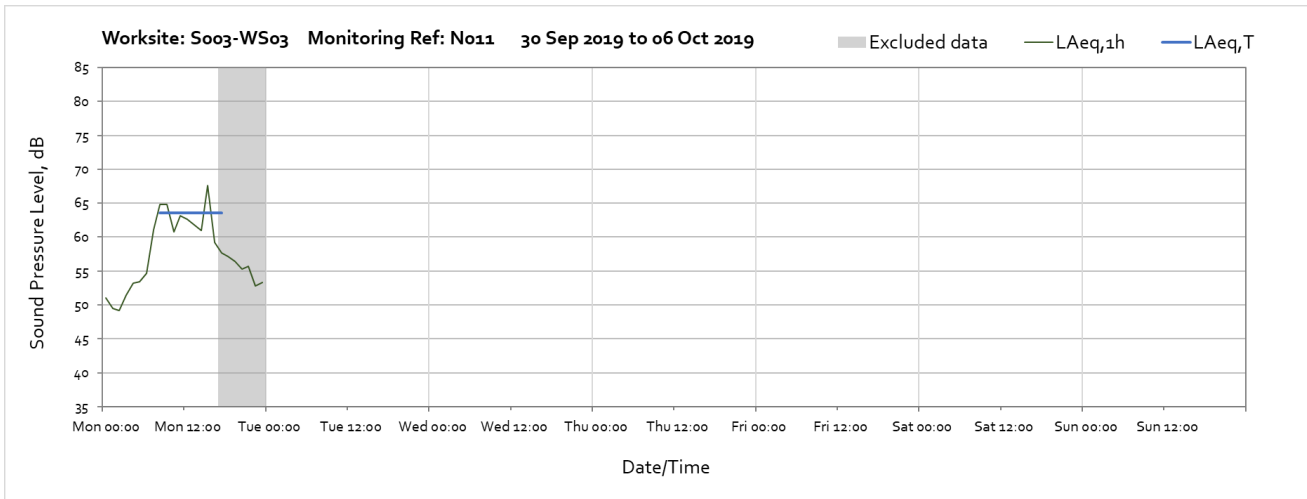
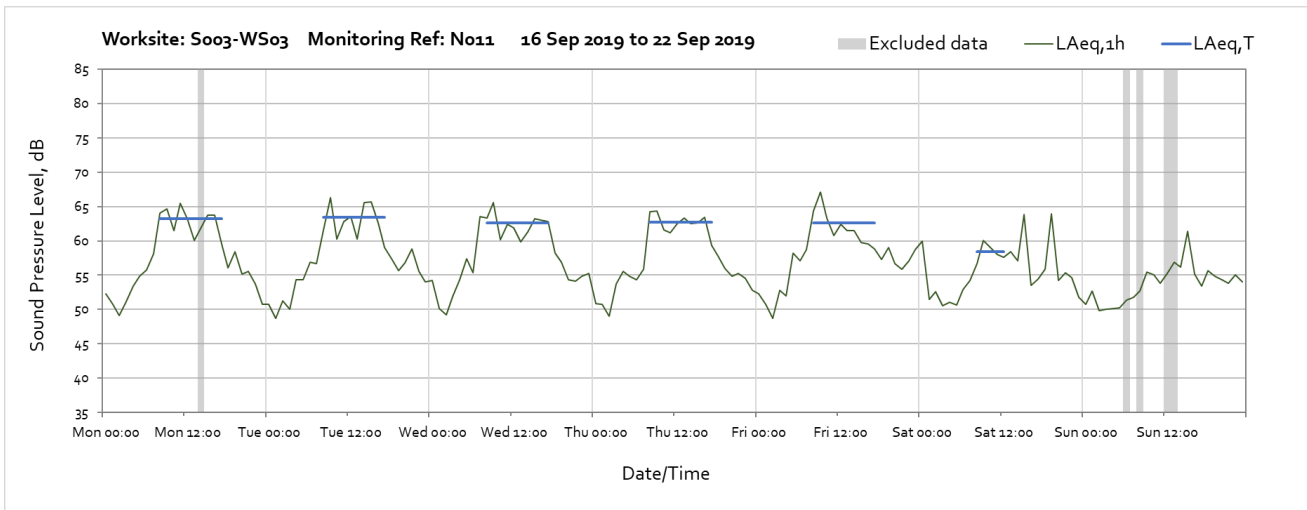
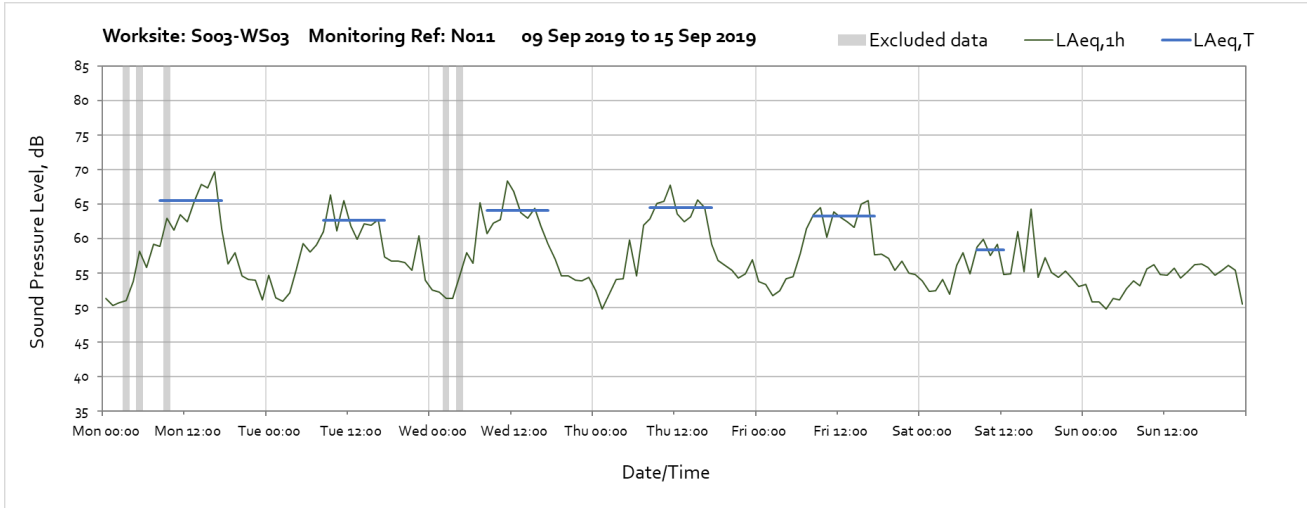




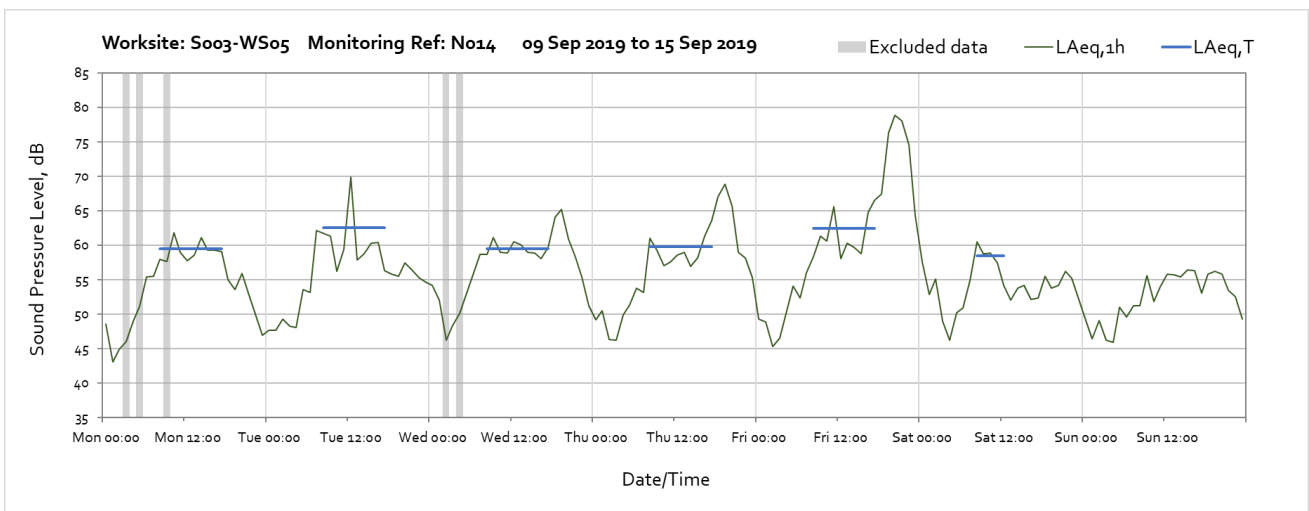
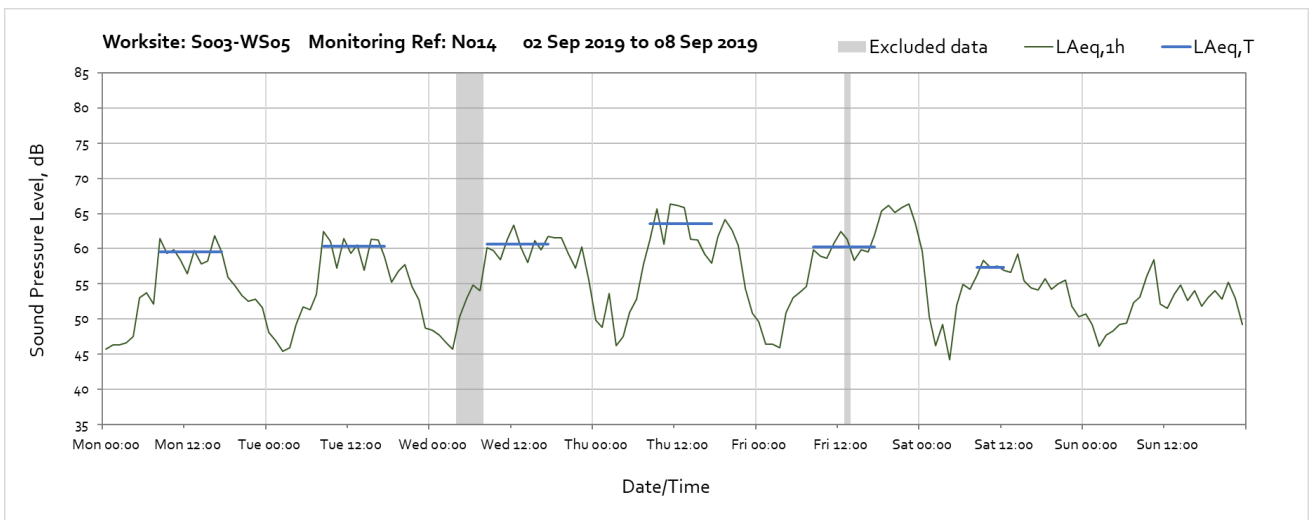
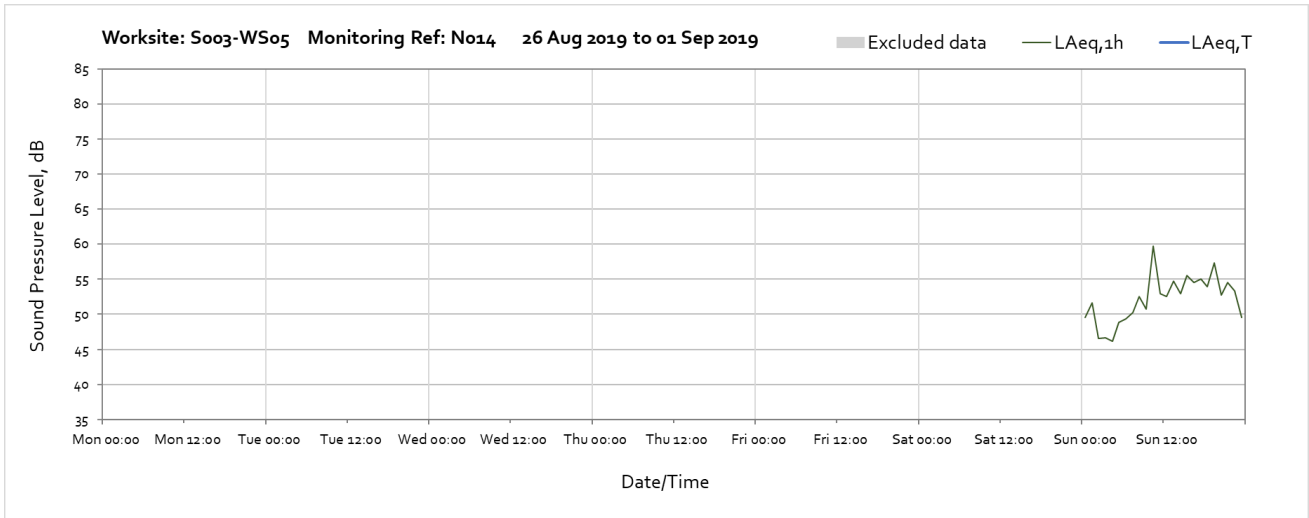


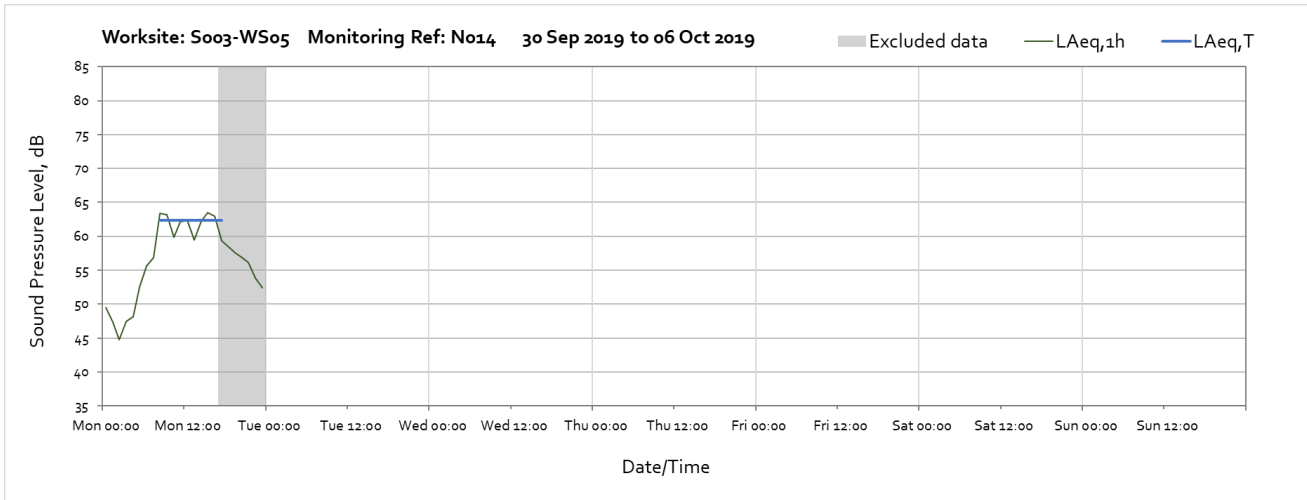
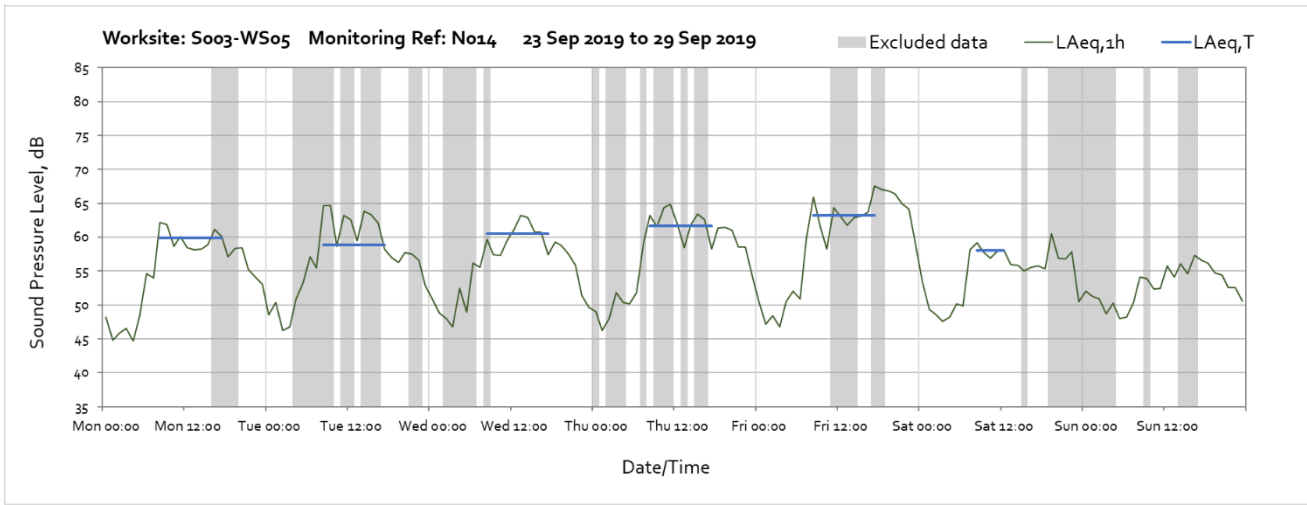
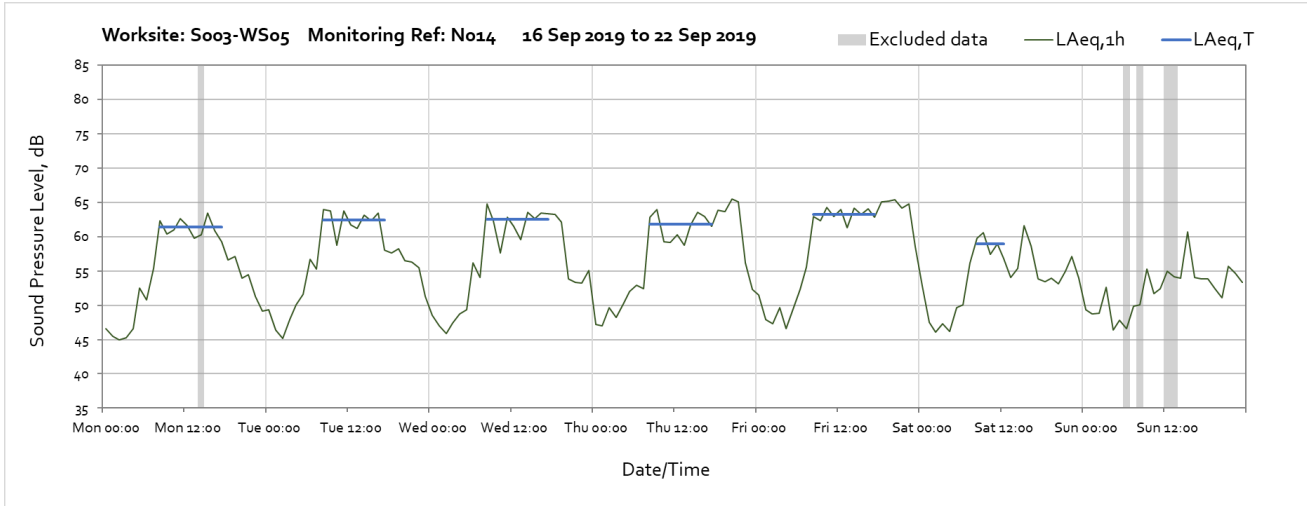
Worksite: S003-WS03 – Monitoring Ref: N011



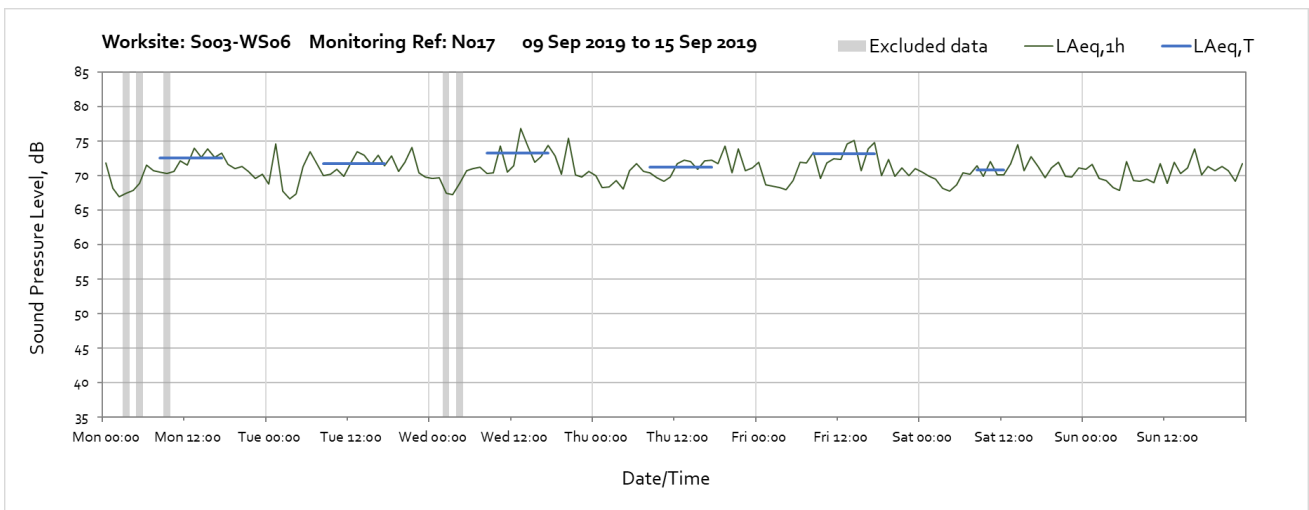
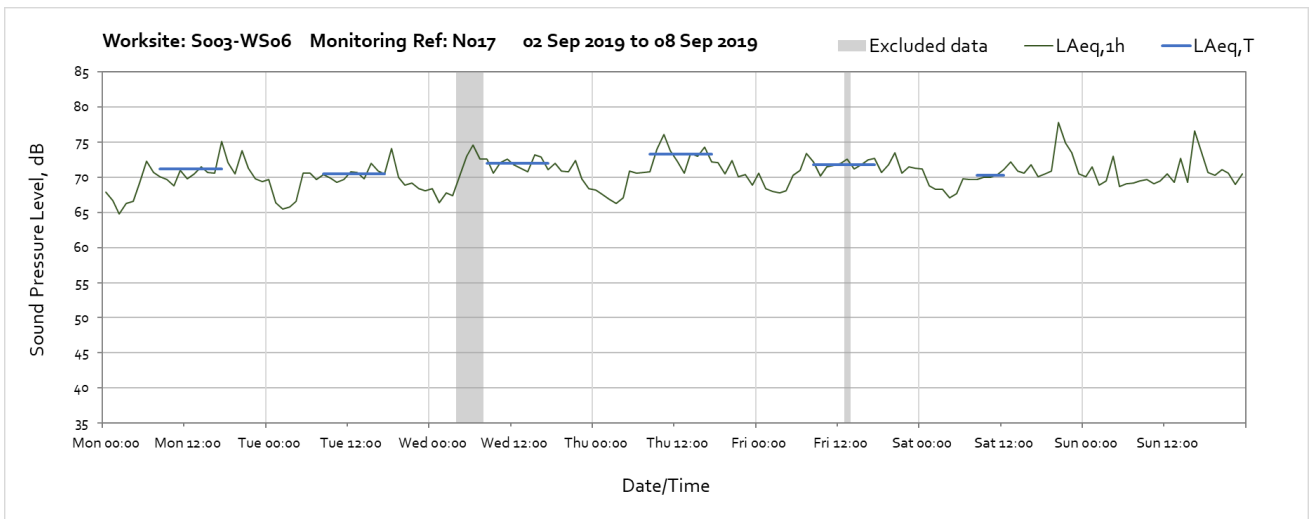
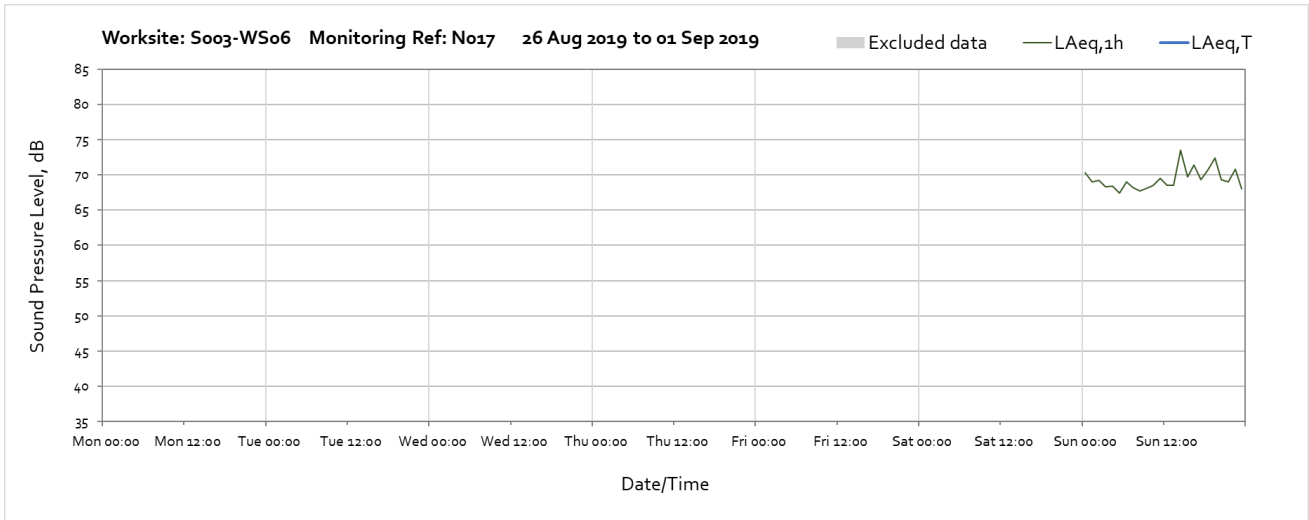


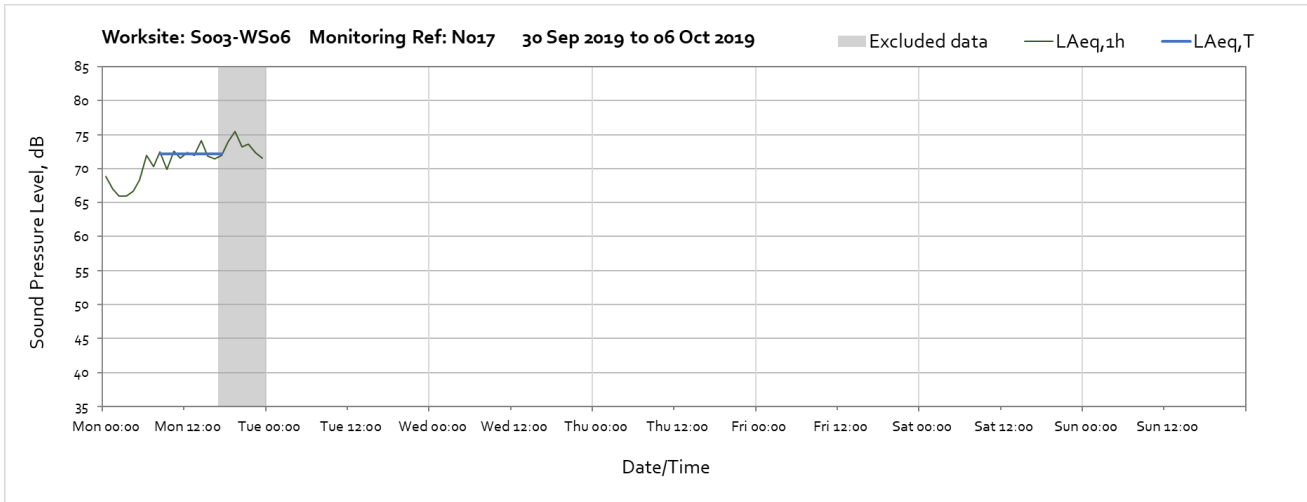
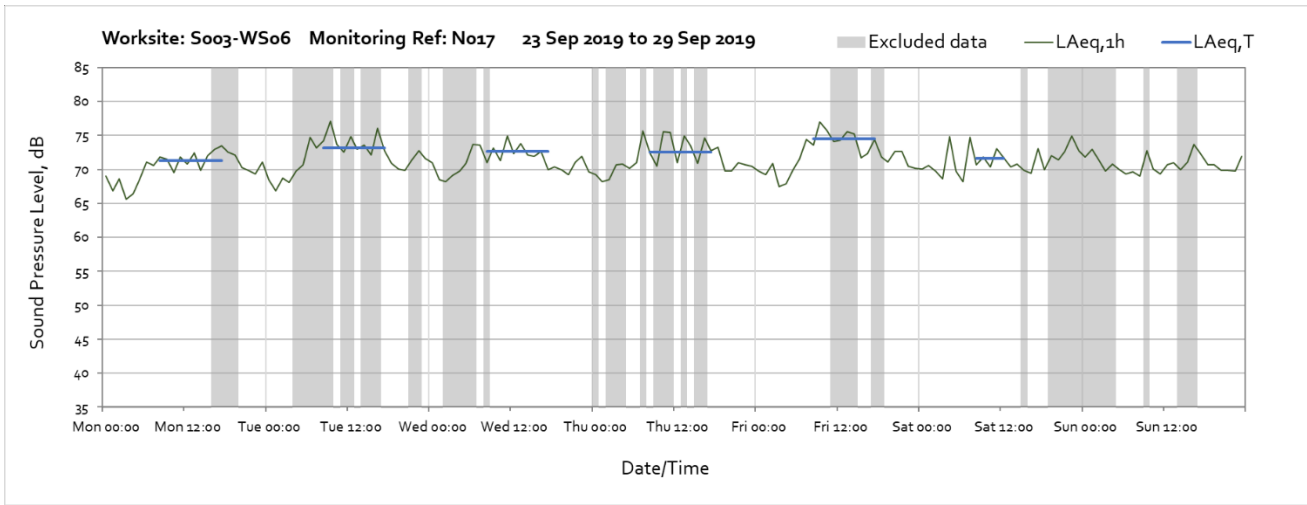
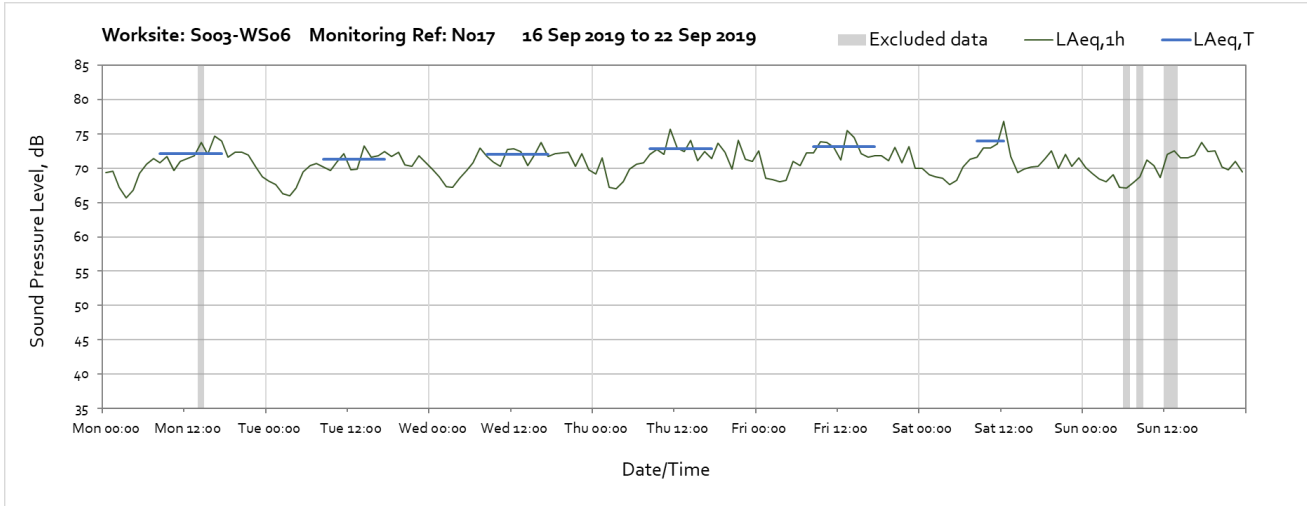
Worksite: S003-WS05 – Monitoring Ref: N014



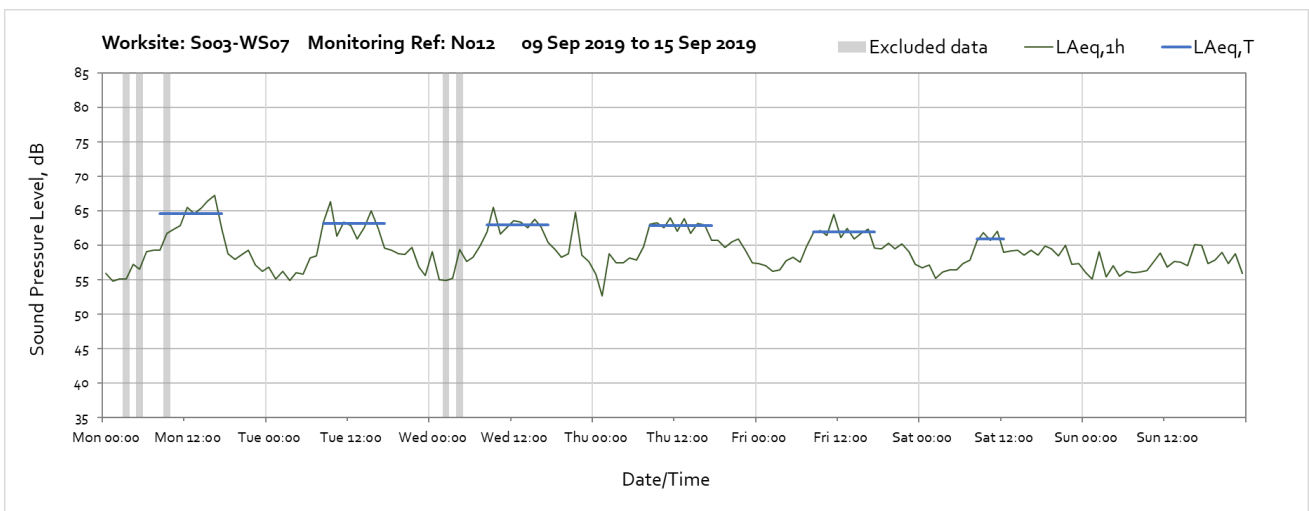
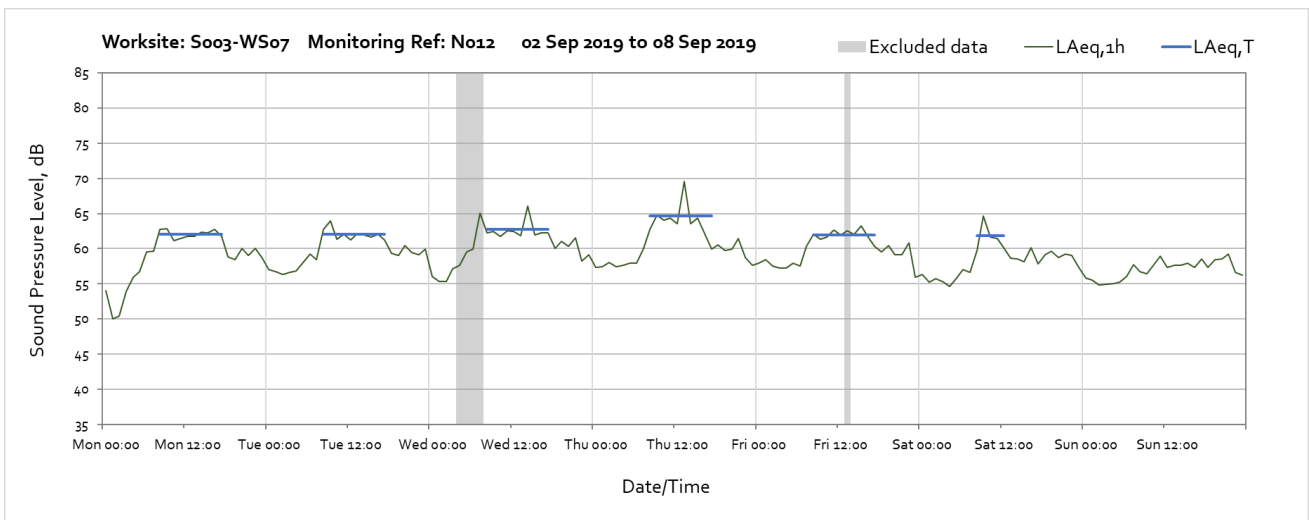
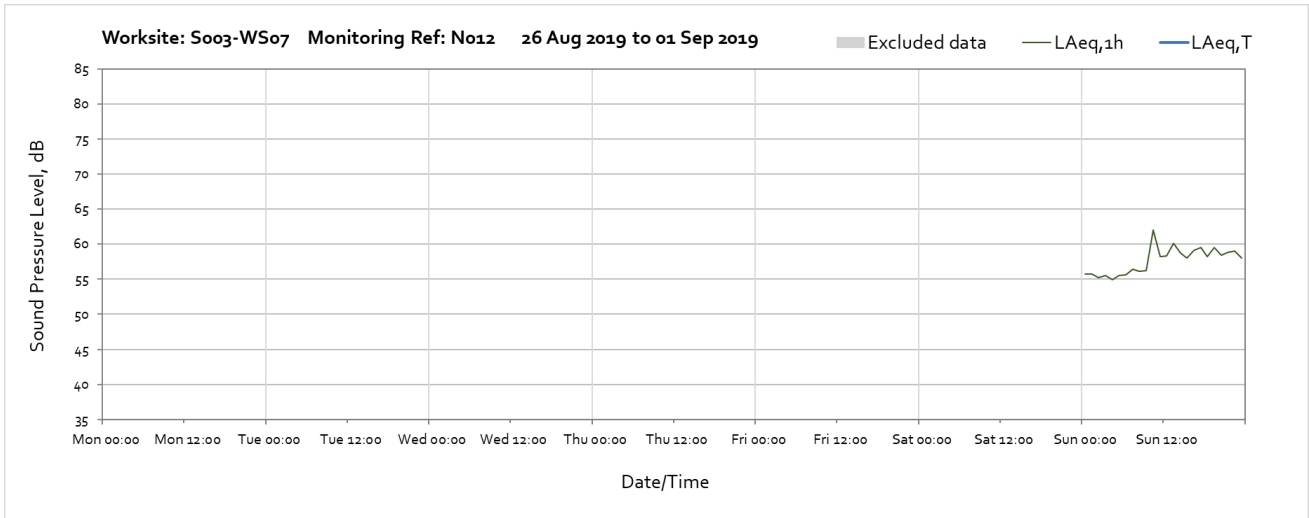


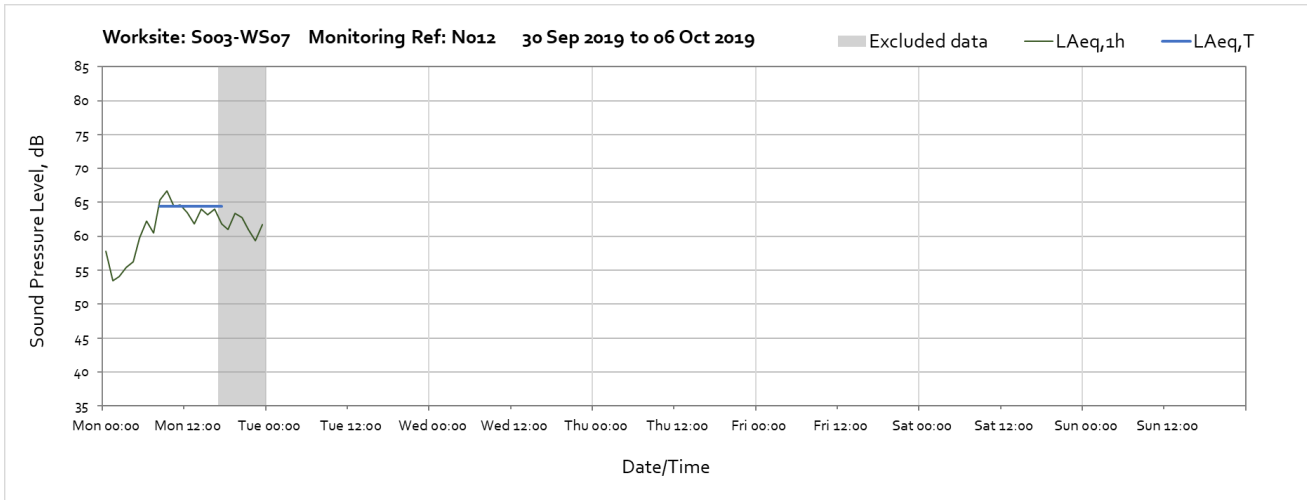
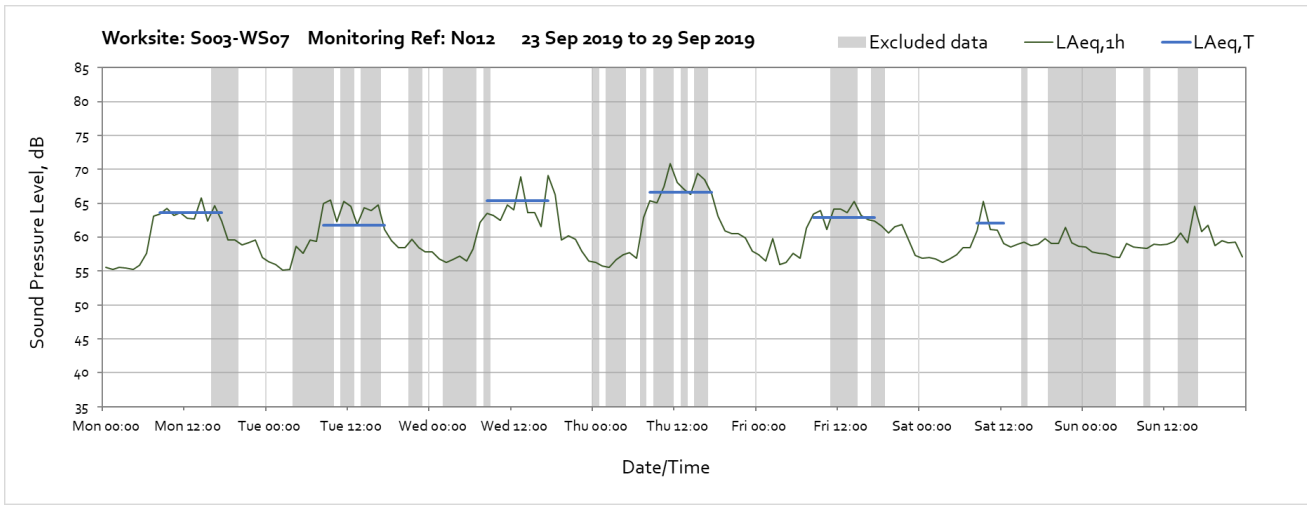
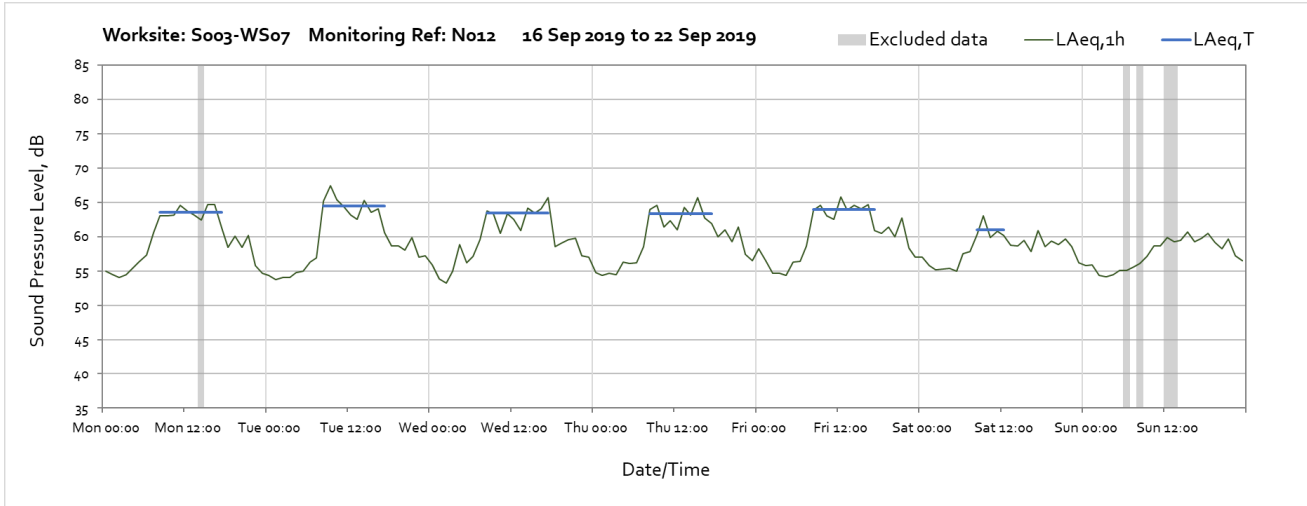
Worksite: S003-WS06 – Monitoring Ref: N017



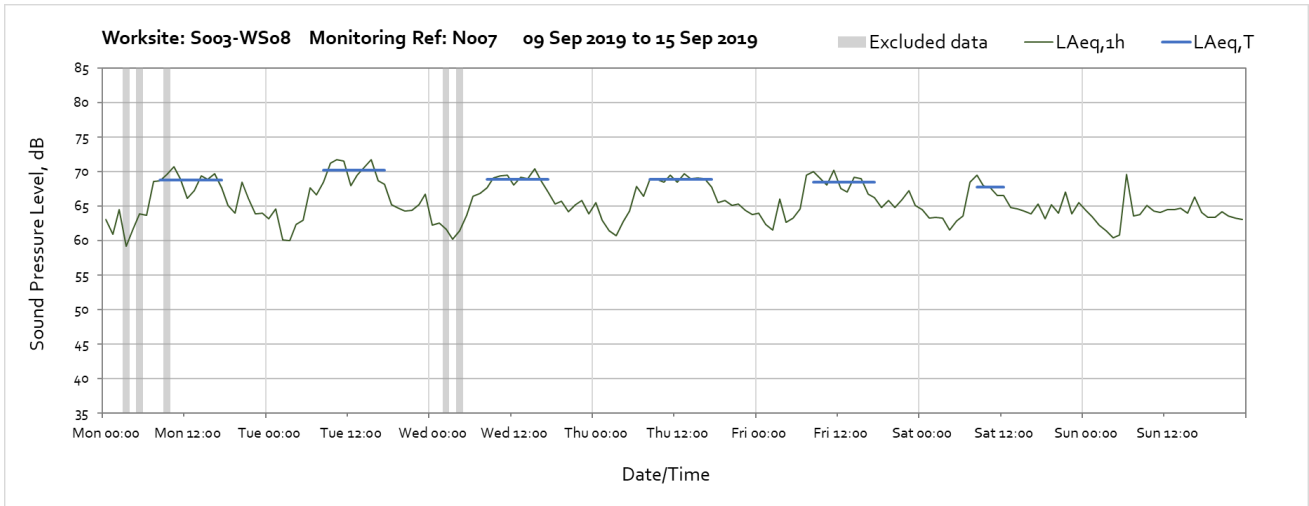
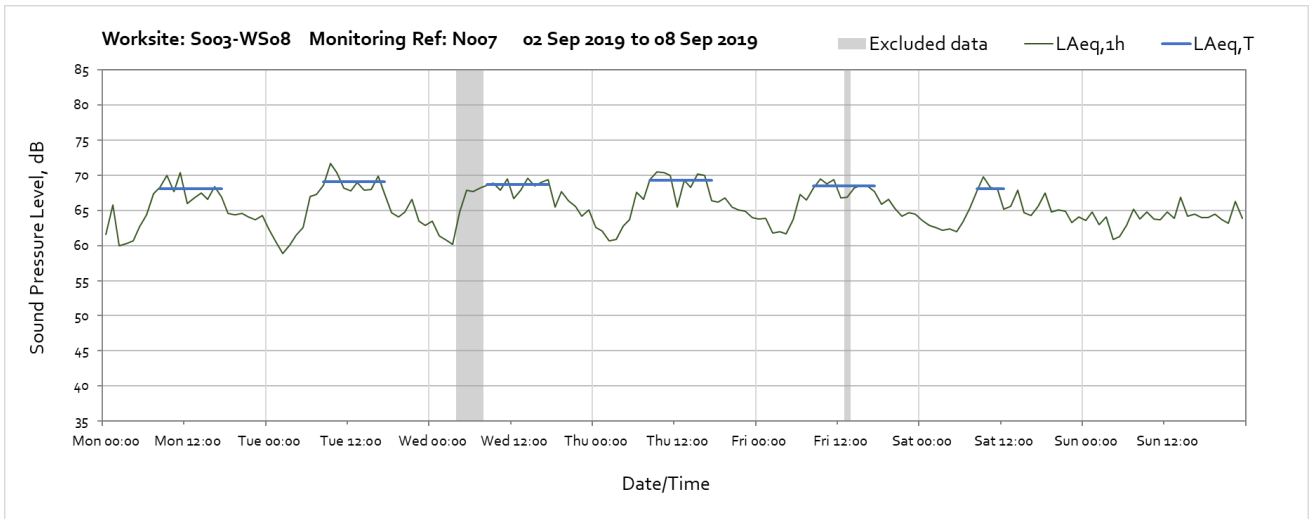
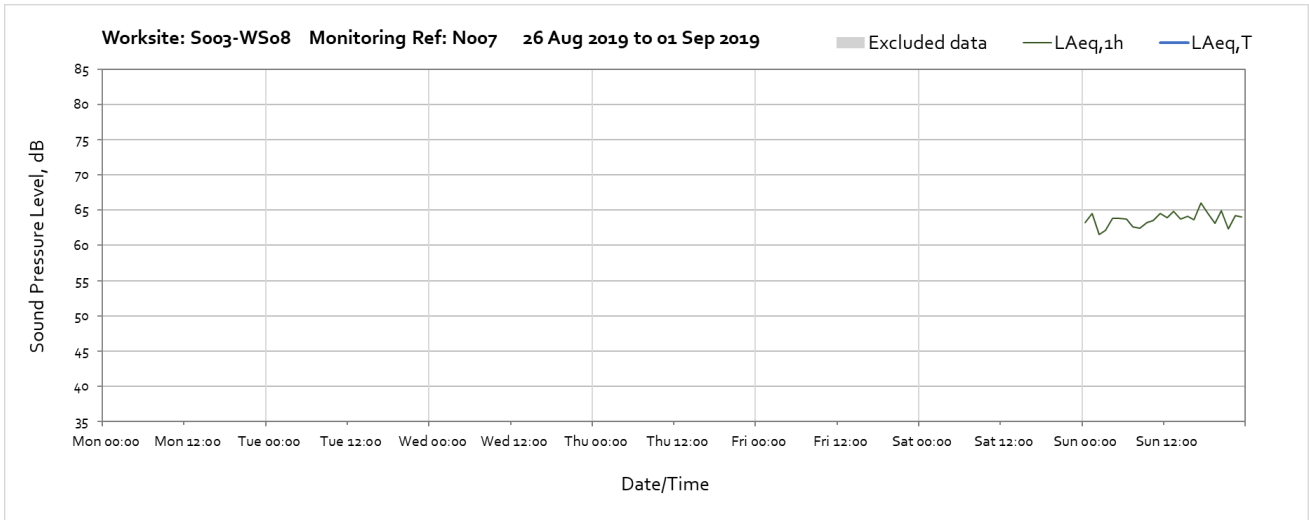


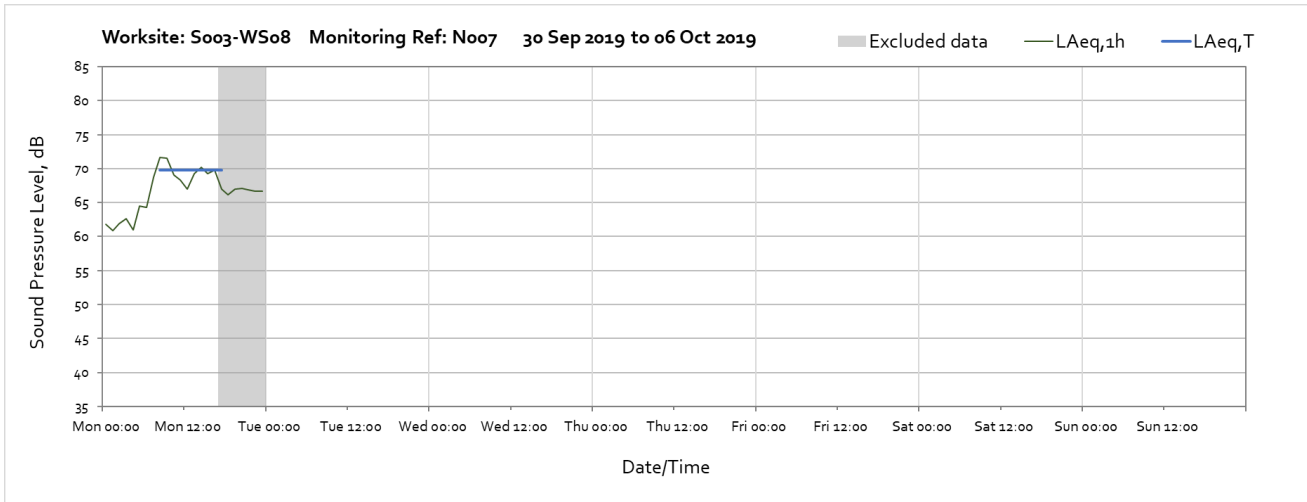
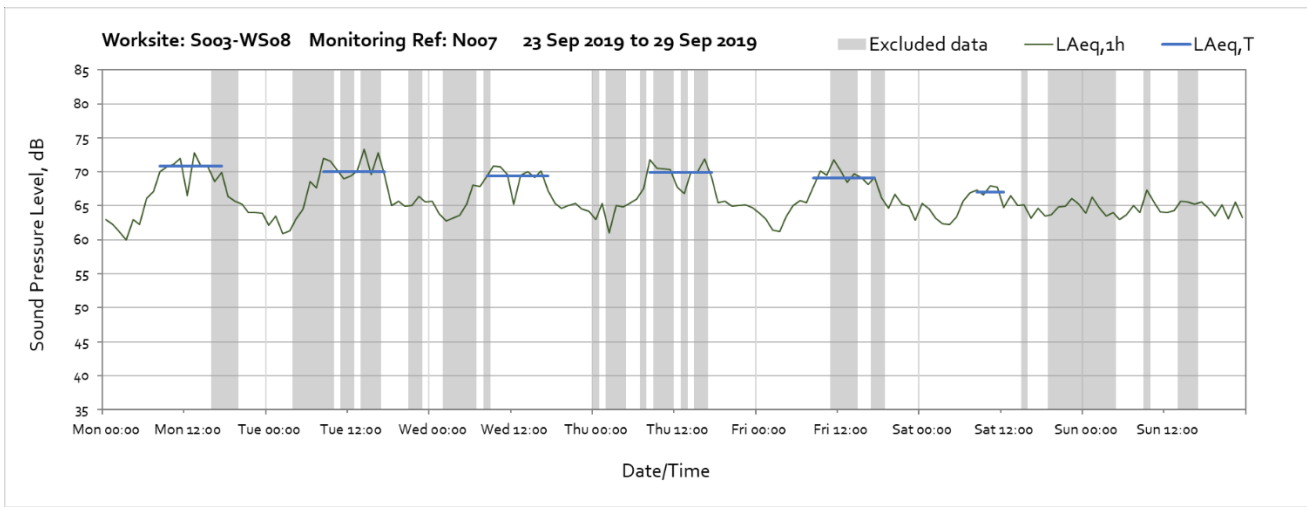
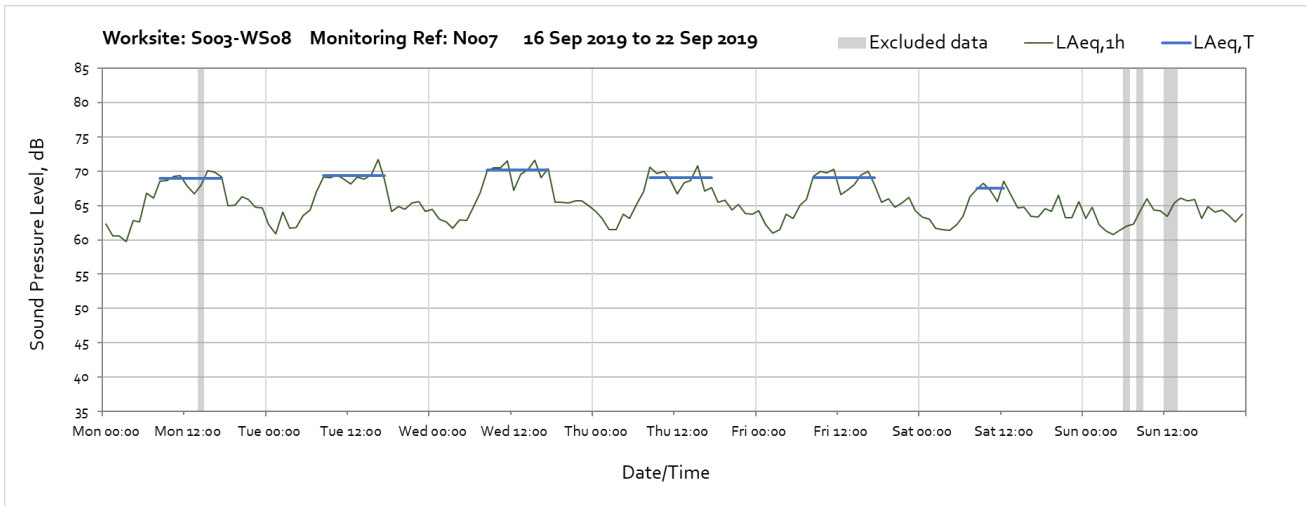
Worksite: S003-WS07 – Monitoring Ref: N012



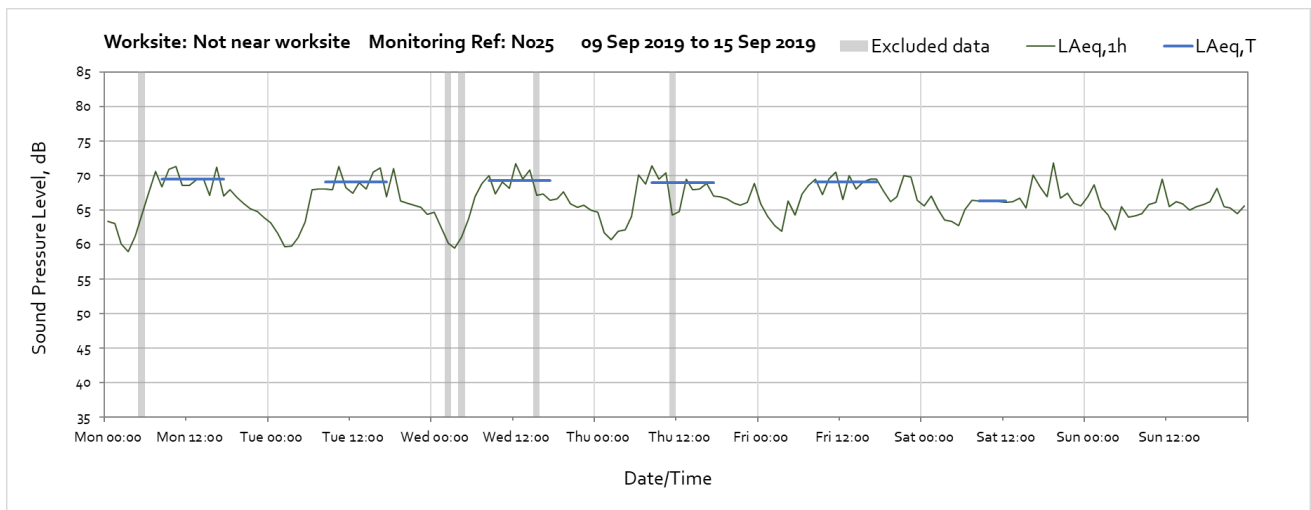
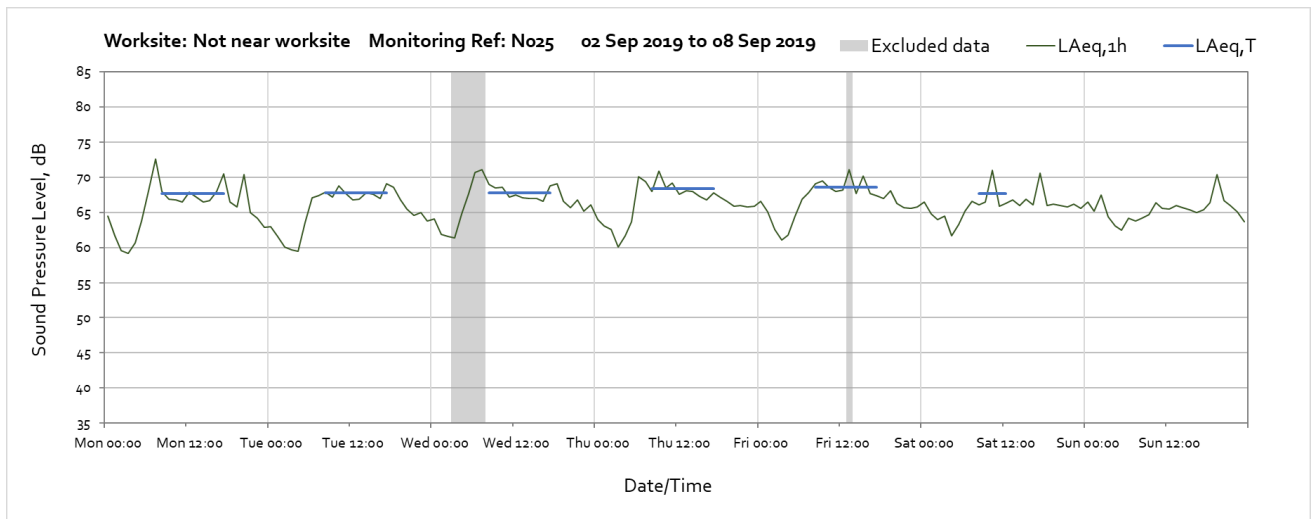
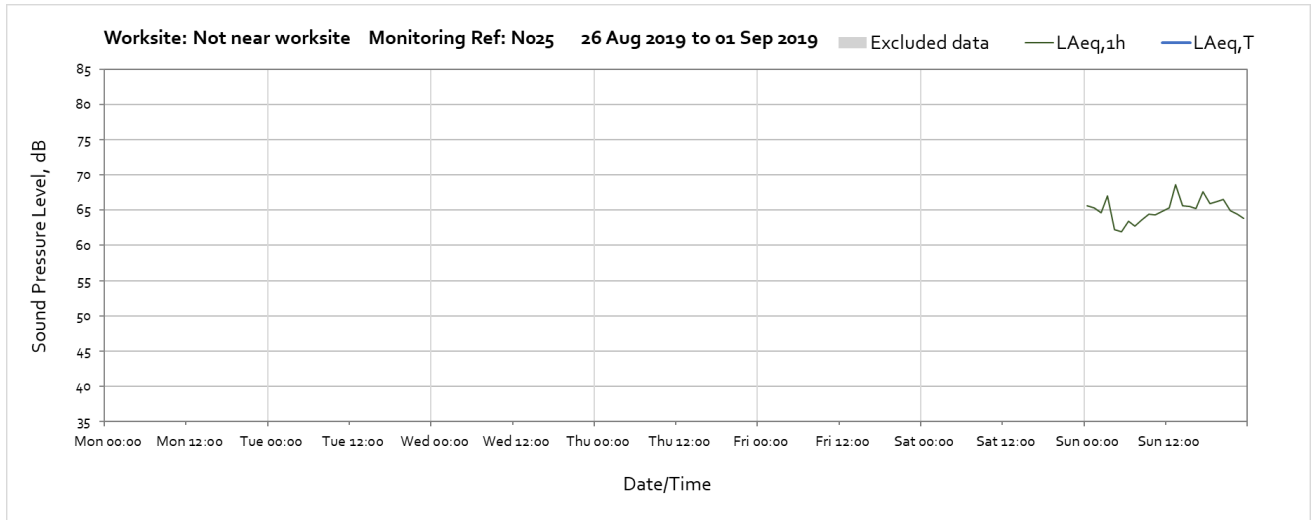


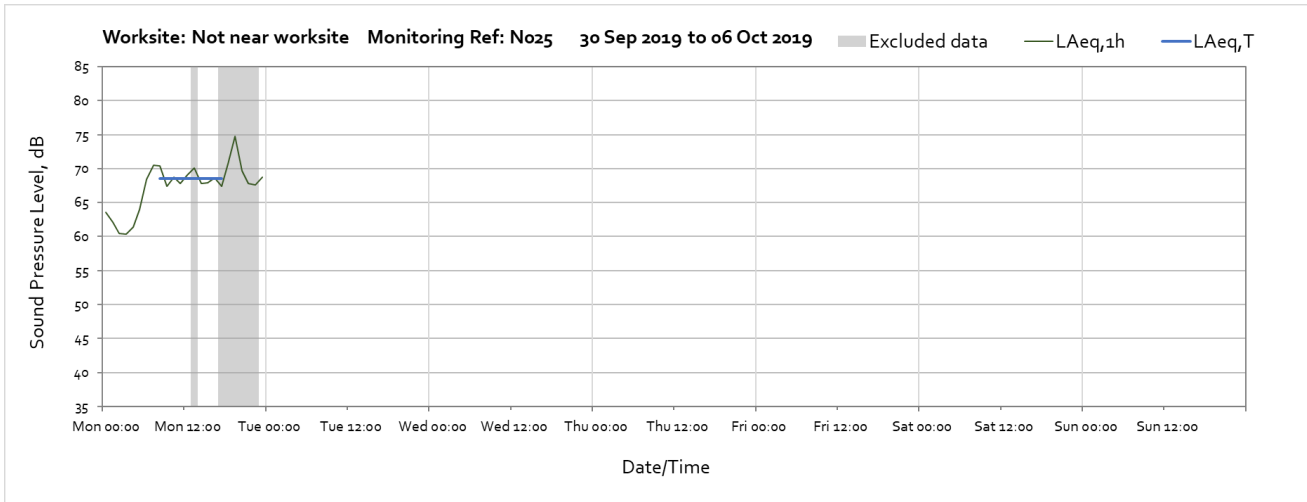
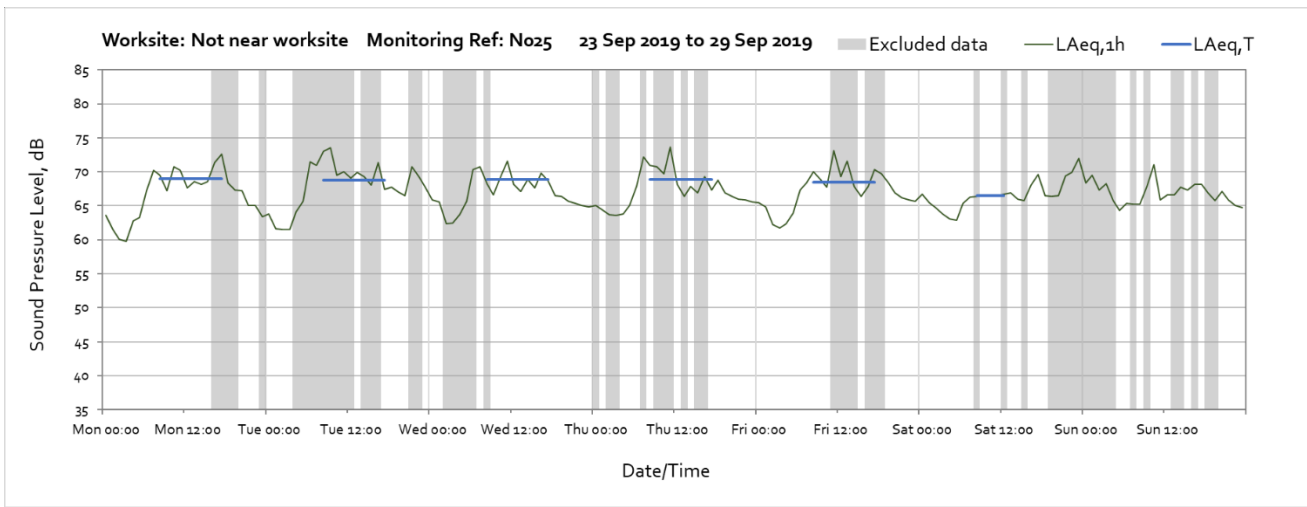
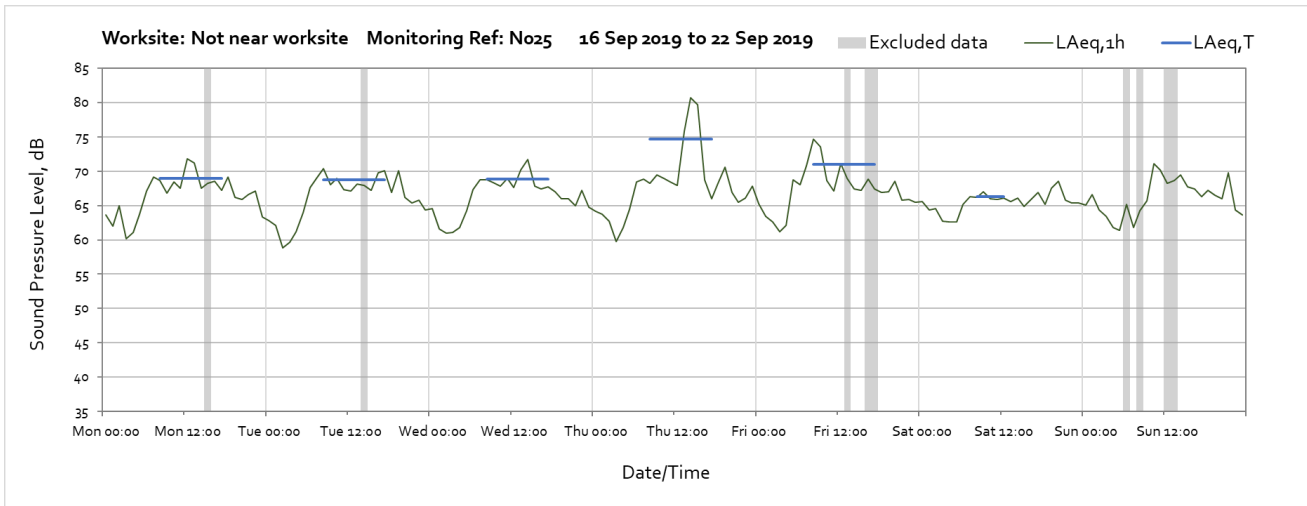
Worksite: S003-WS08 – Monitoring Ref: N007



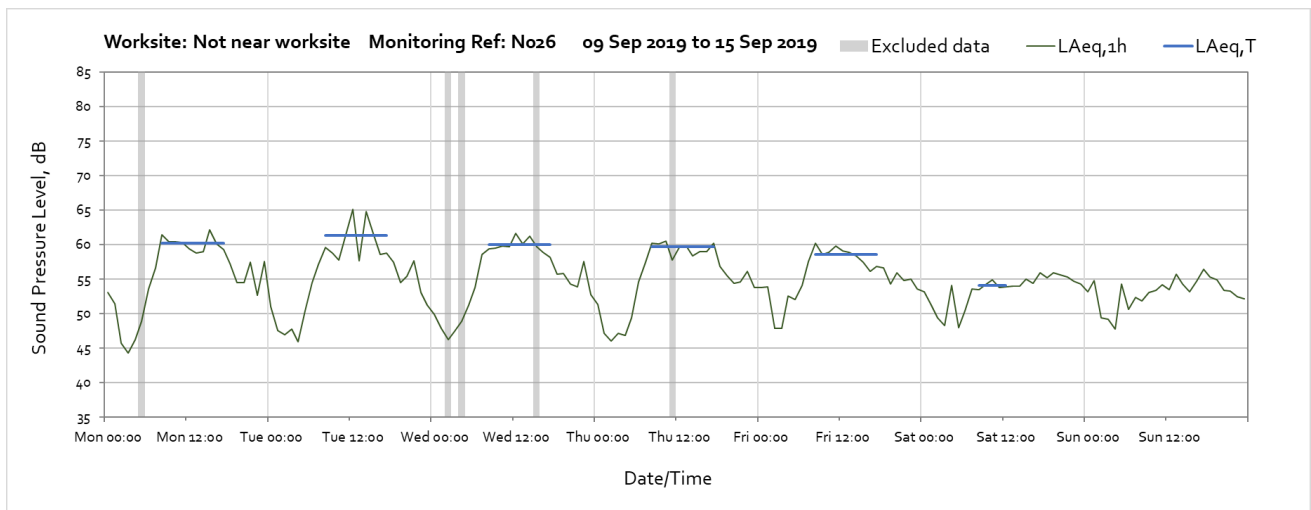
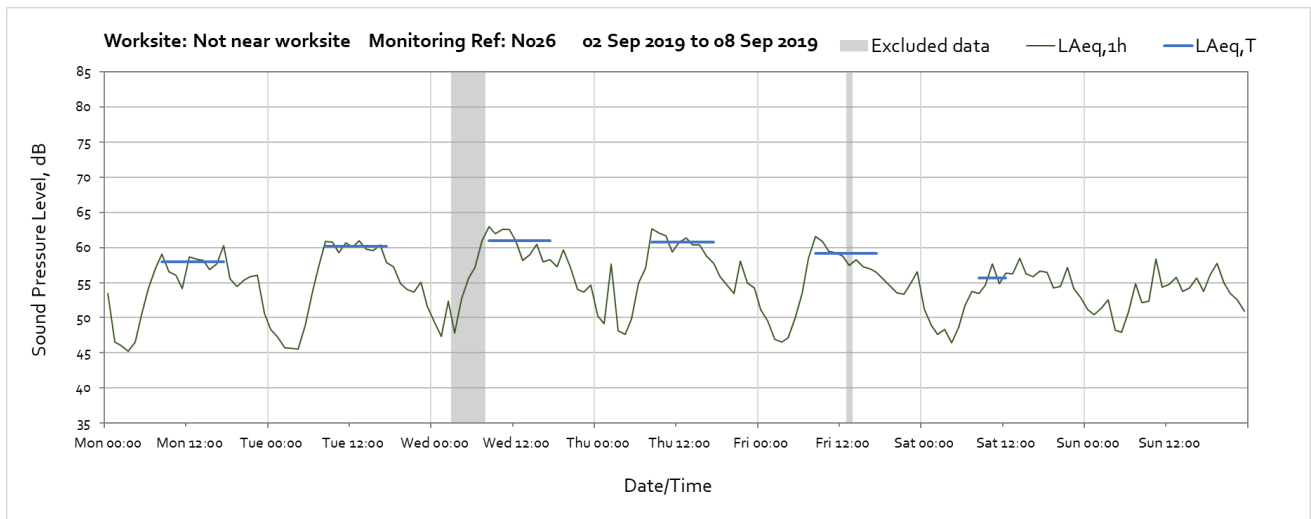
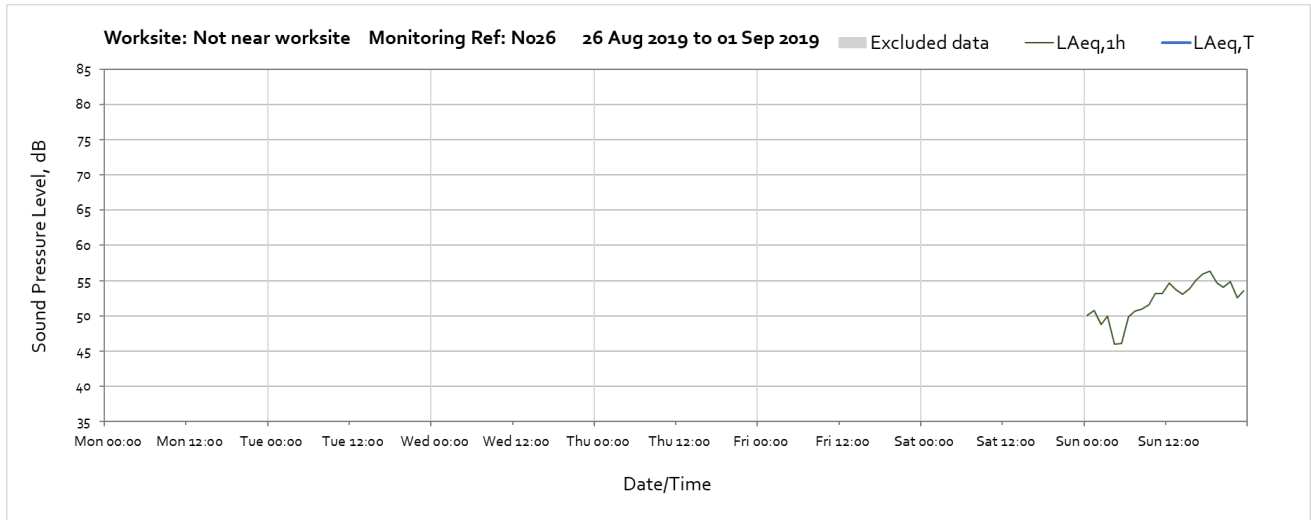


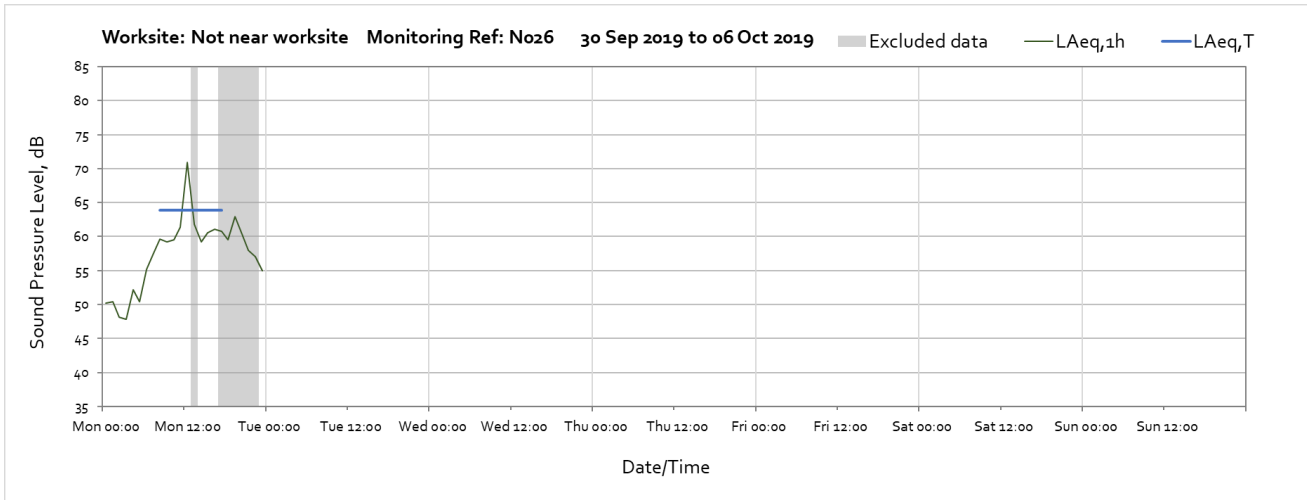
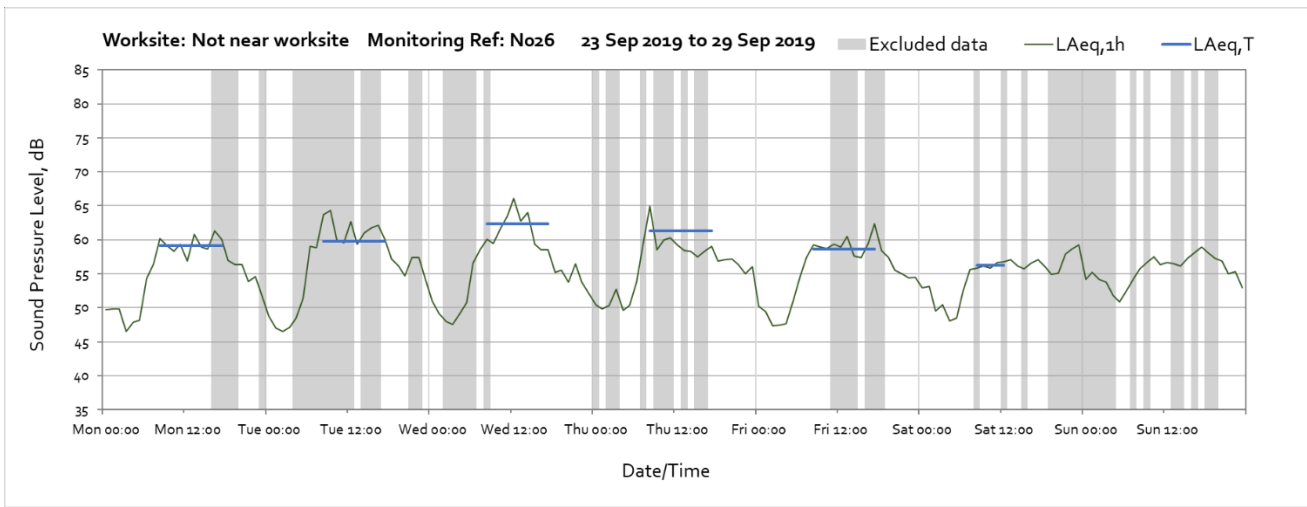
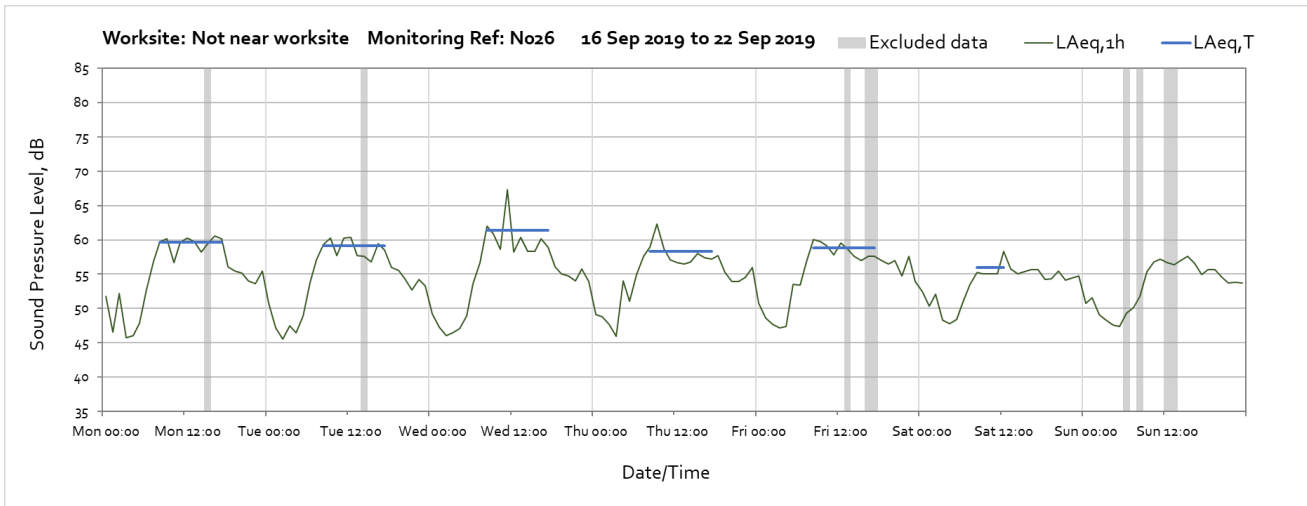
Monitoring Ref: N025





Monitoring Ref: N026

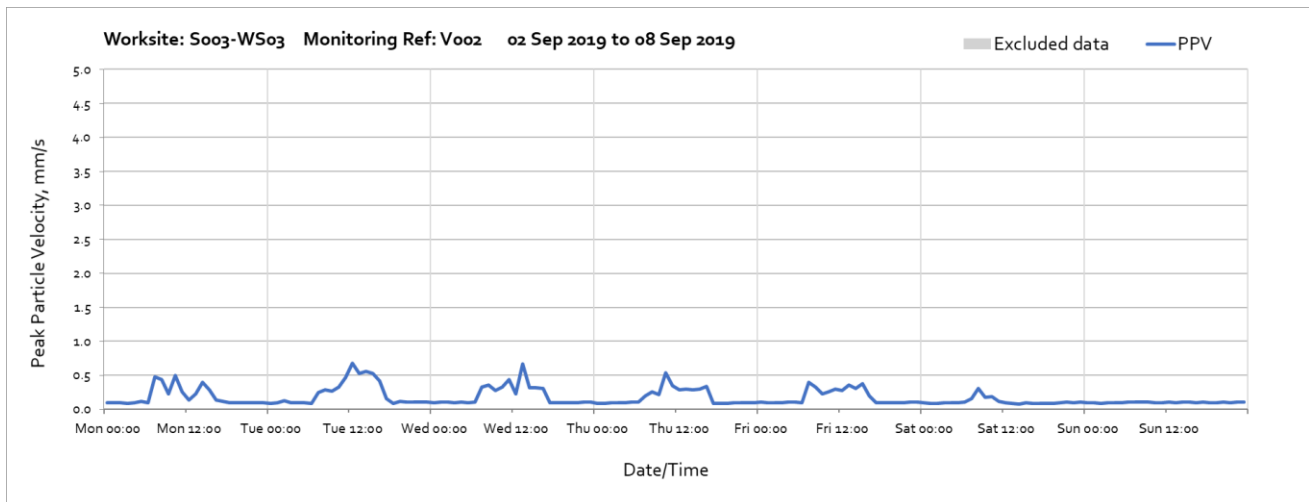
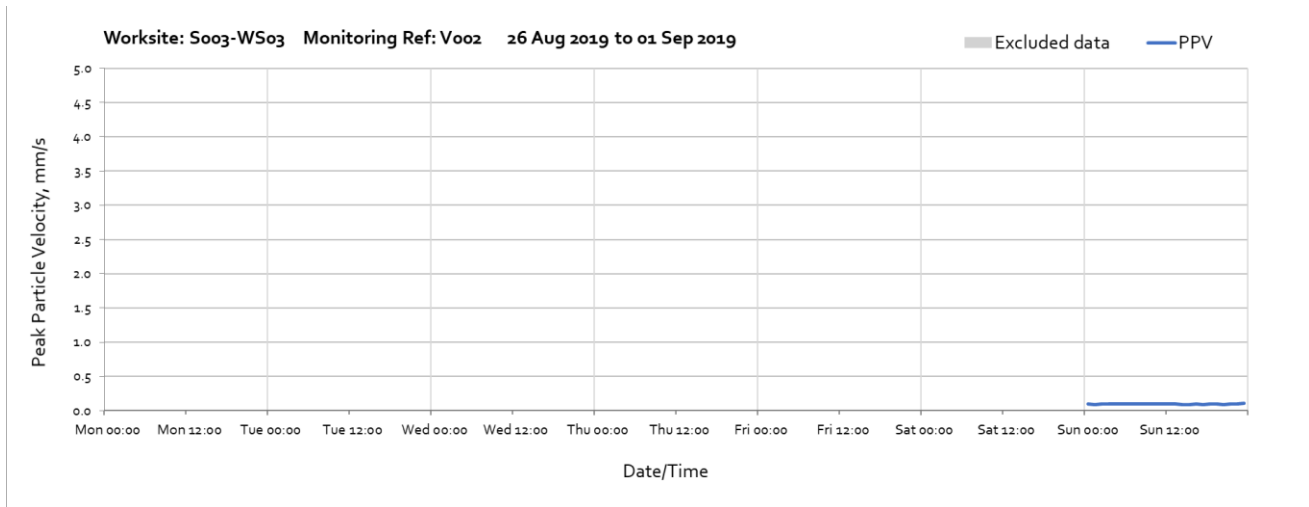


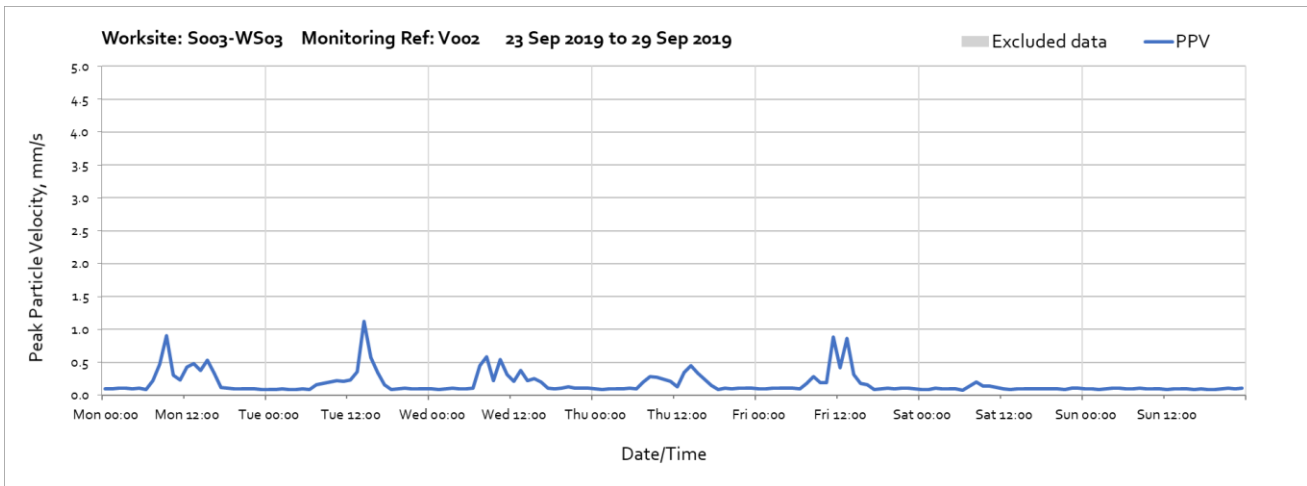
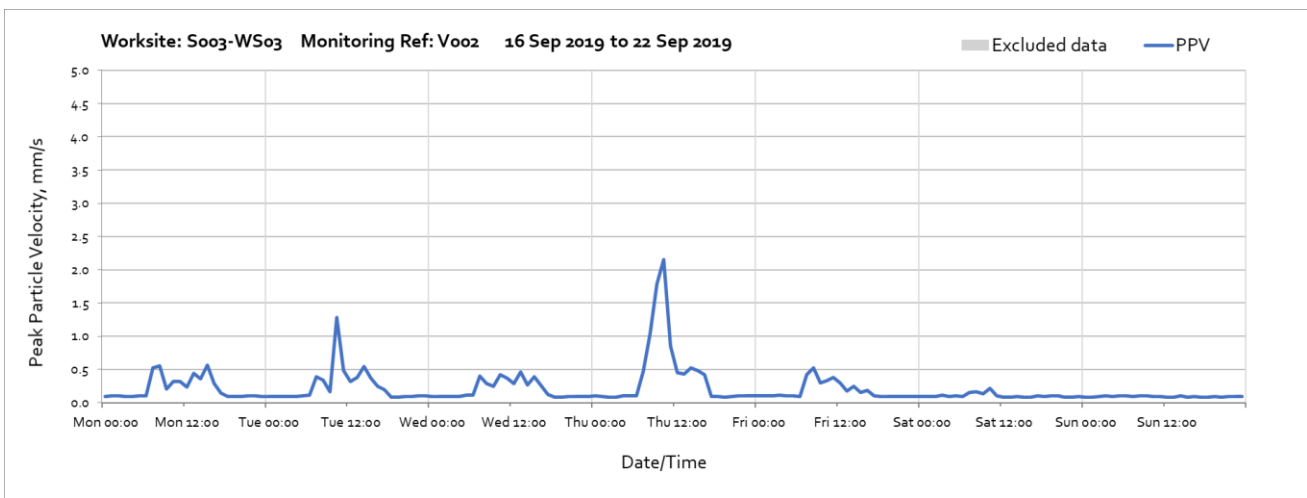
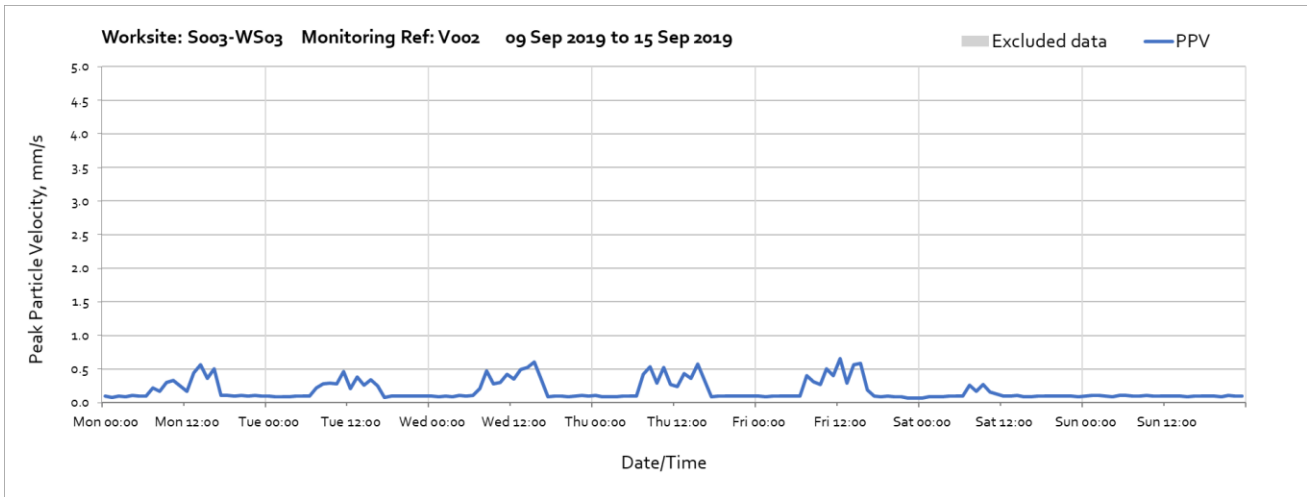


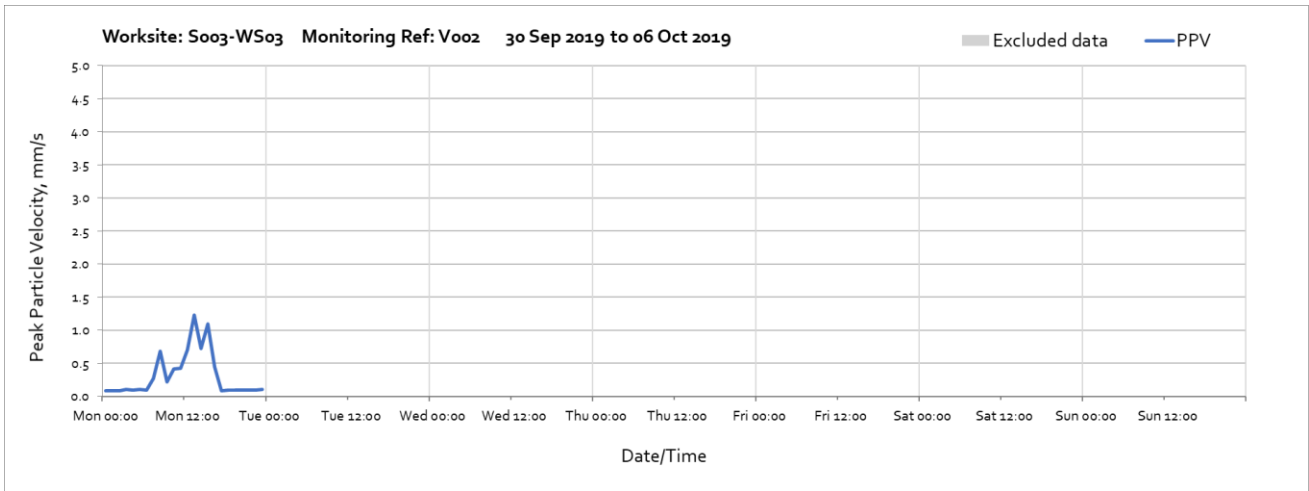
Vibration

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 locations V021 and V038. 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 5.

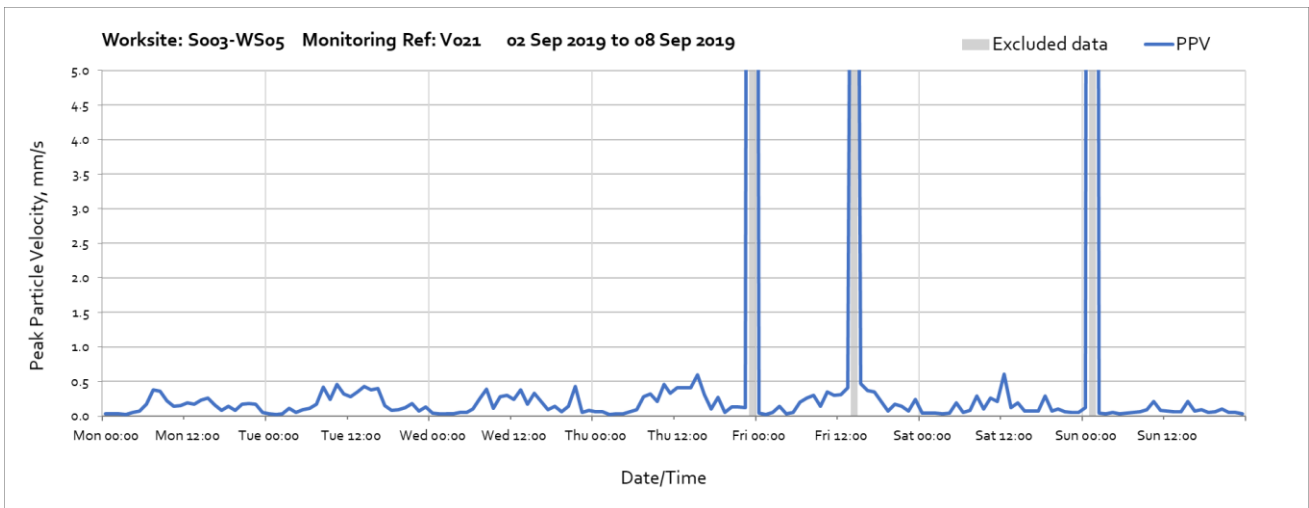
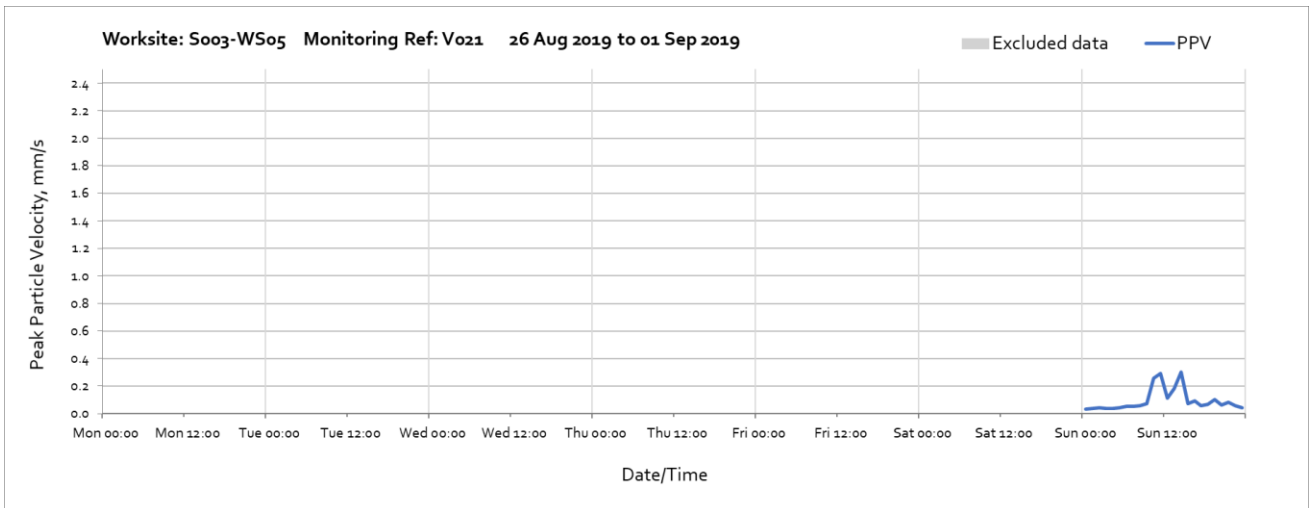
Worksite: S003-WS03 – Monitoring Ref: V002



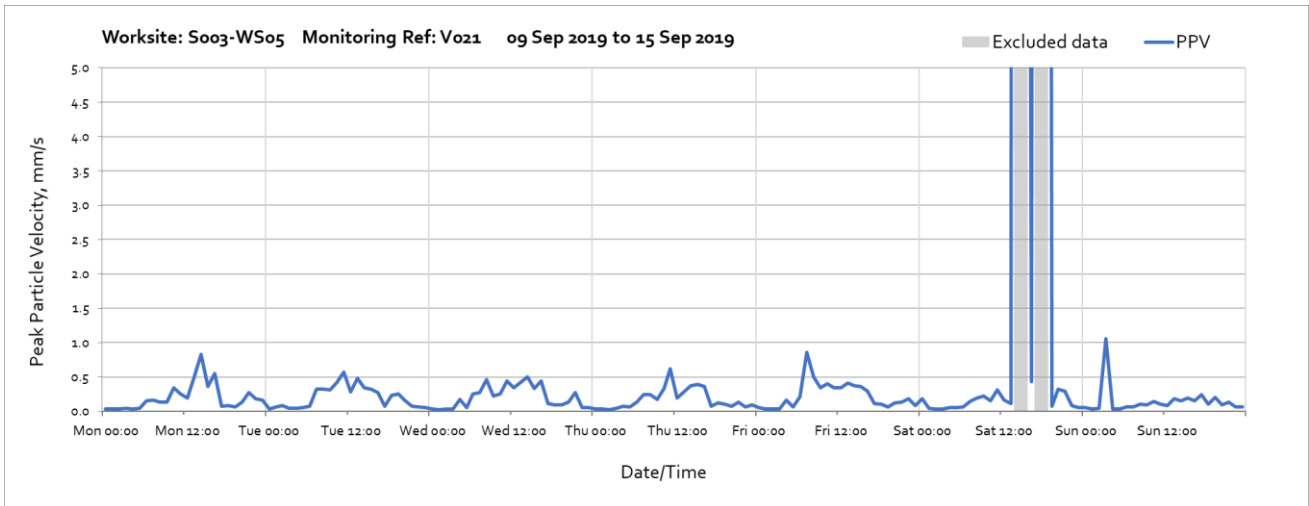




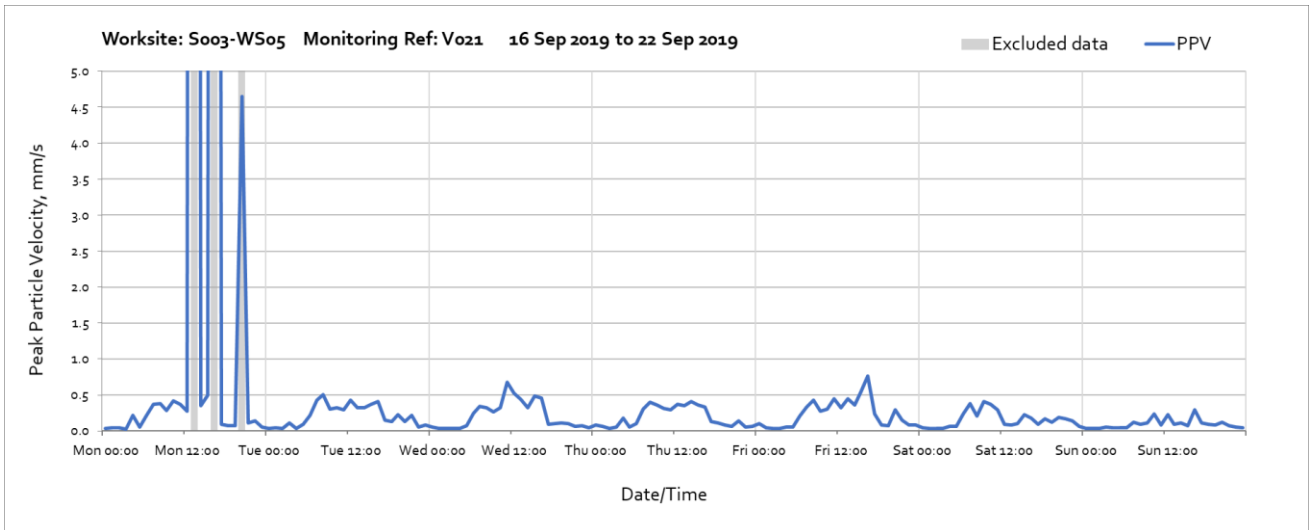
Worksite: S003-WS05 – Monitoring Ref: V021



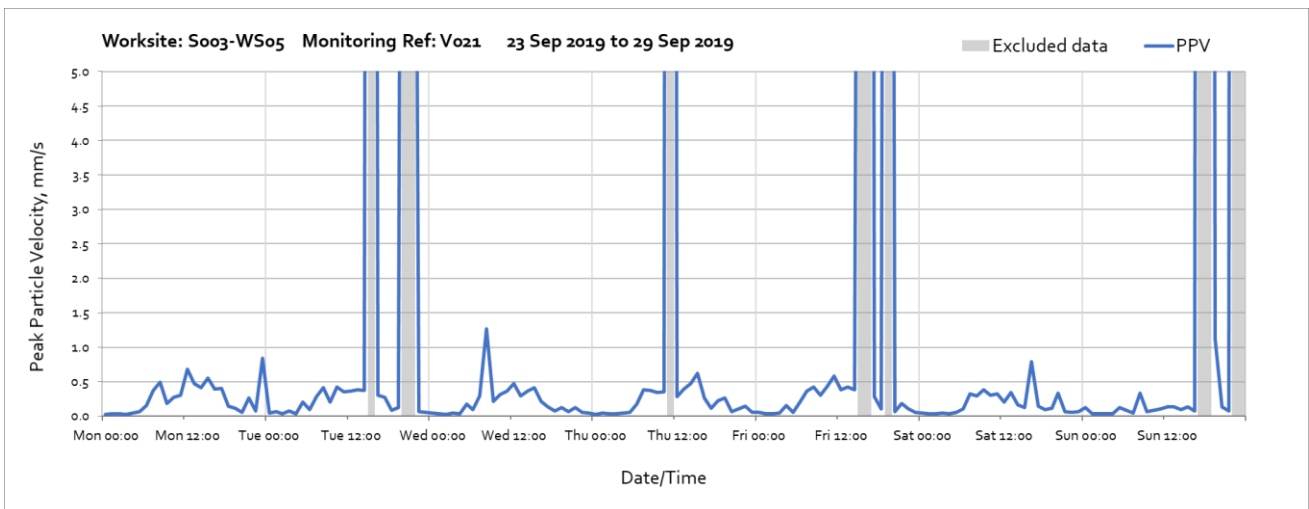
Note: High vibration levels at 23:00 on Wednesday 5th, at 14:00 on Thursday 6th and at 01:00 on Sunday 8th of September were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.



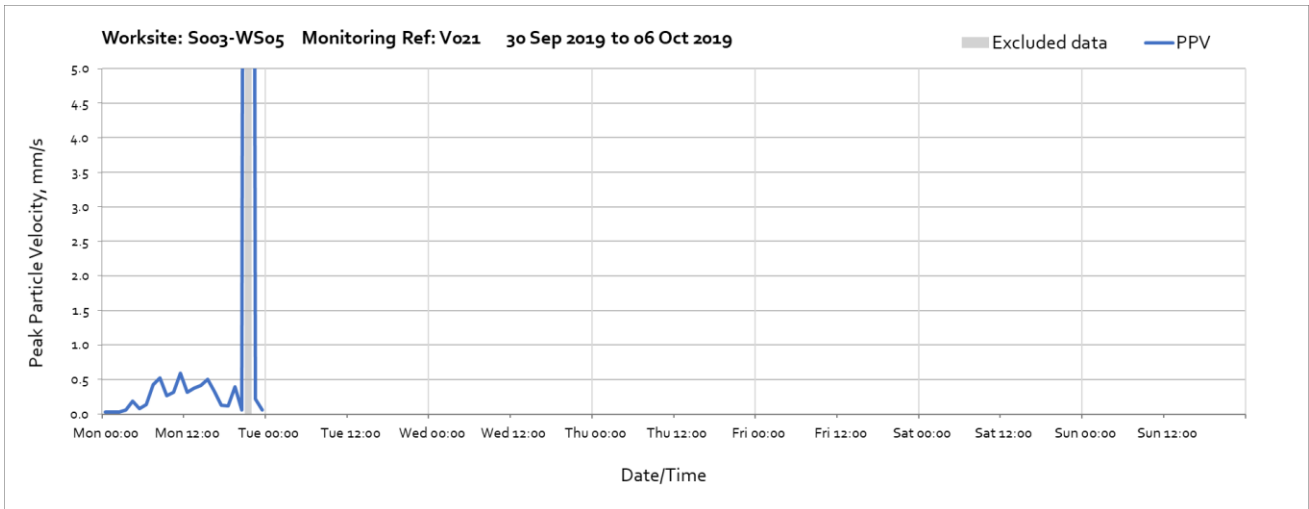
Note: High vibration levels between 14:00 and 16:00 and between 17:00 and 19:00 on Saturday 14th of September were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.



Note: High vibration levels at 13:00, 16:00 and 20:00 on Monday 16th of September were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

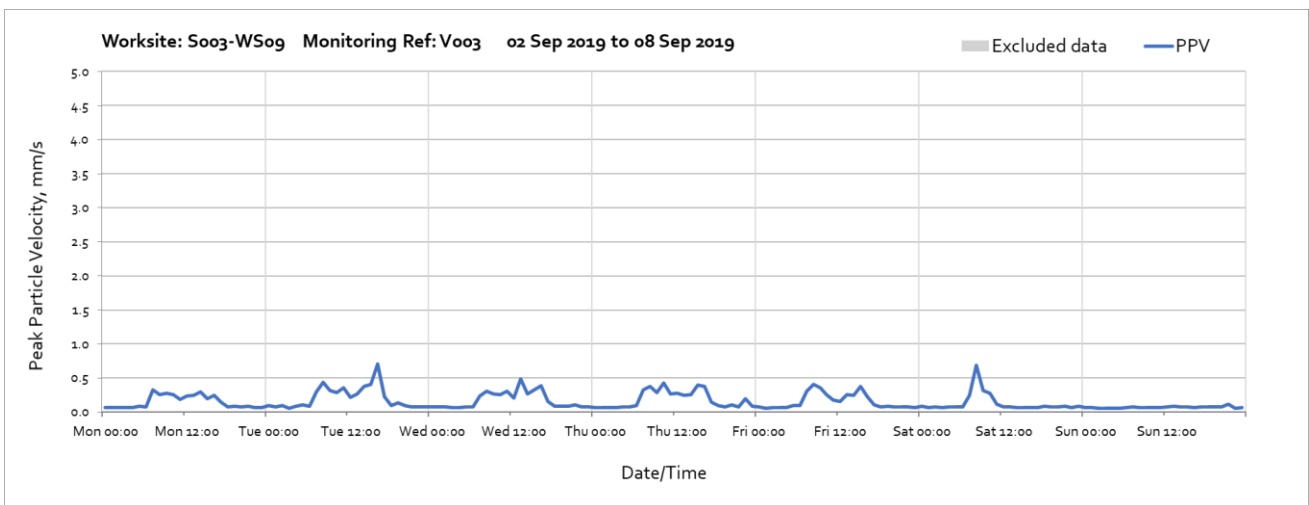
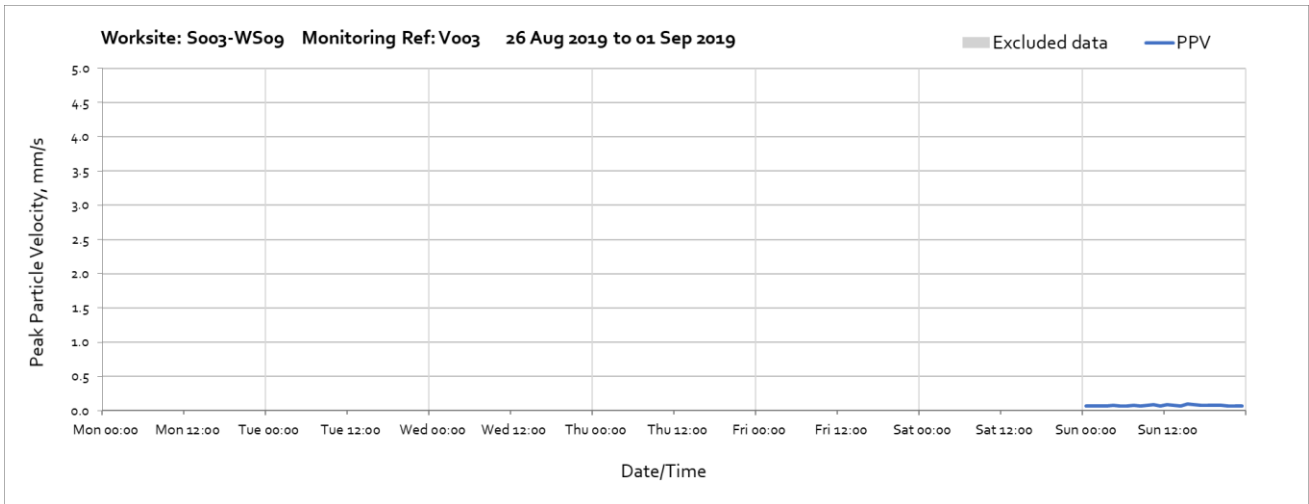


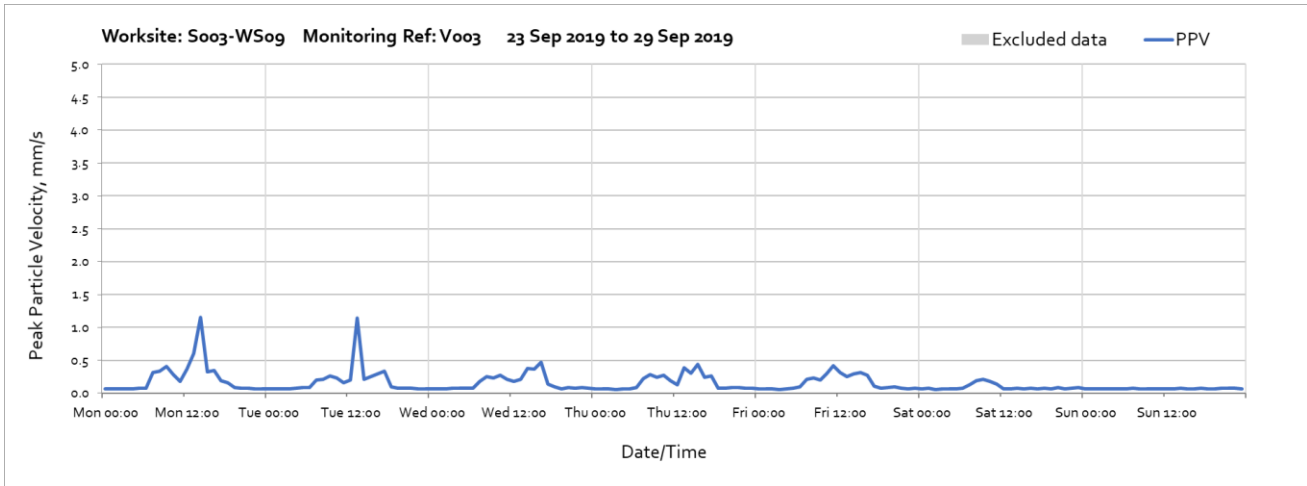
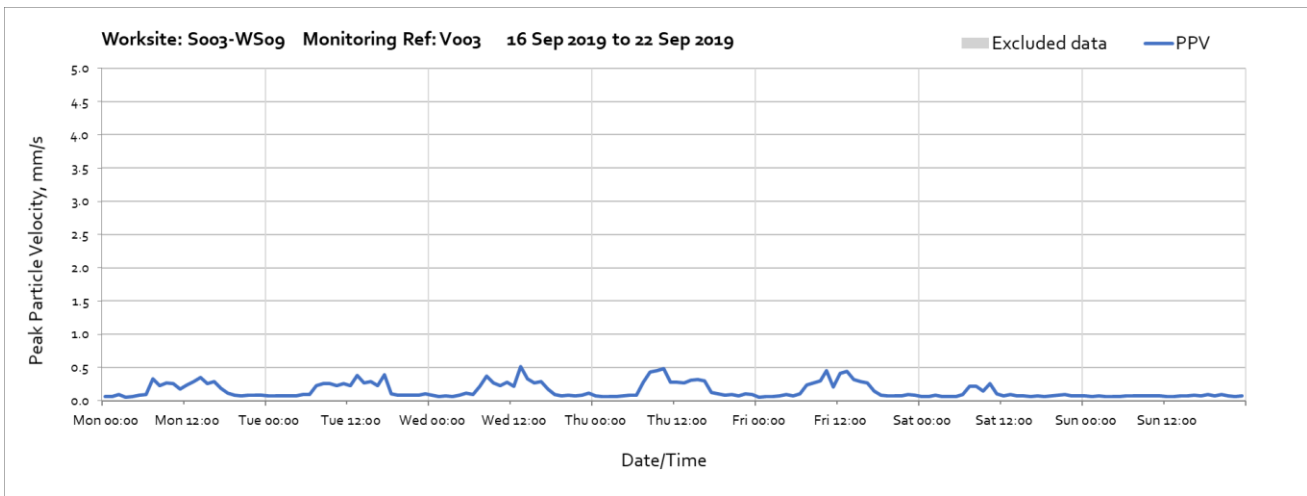
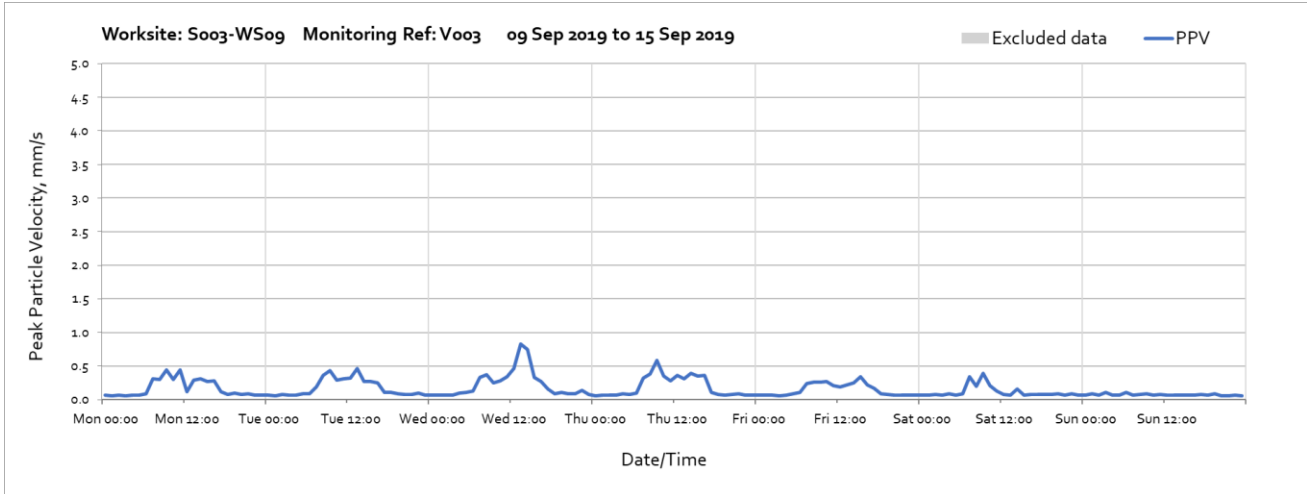
Note: High vibration levels at 15:00 and between 20:00 and 22:00 on Tuesday 24th, at 11:00 on Thursday 26th, between 15:00 and 17:00 and at 19:00 on Friday 27th and between 17:00 and 19:00, and 21:00 and 23:00 on Sunday 29th of September were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

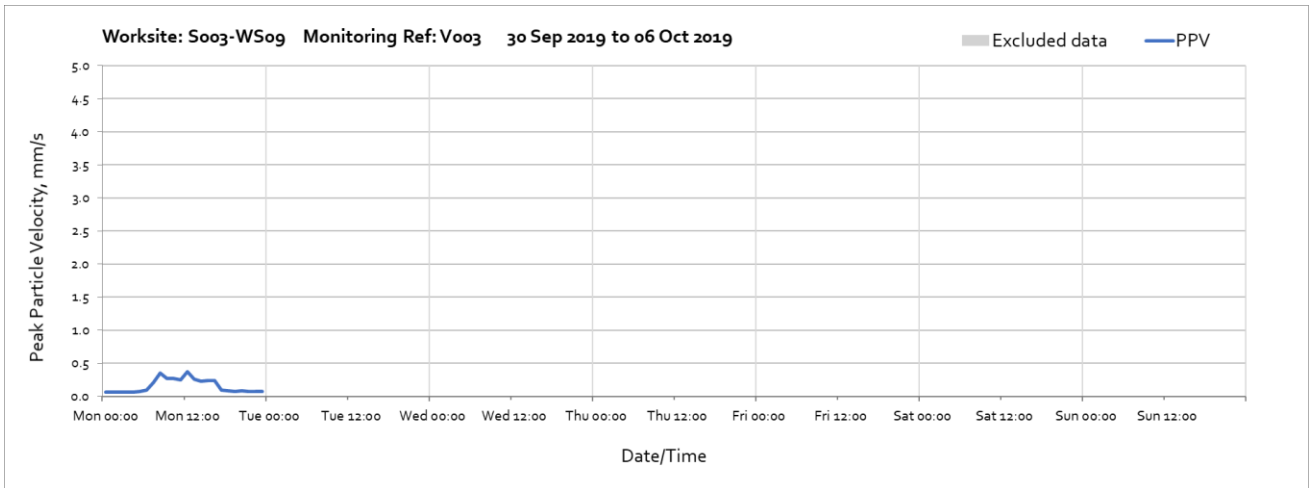


Note: High vibration levels at 21:00 on Monday 30th of September were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

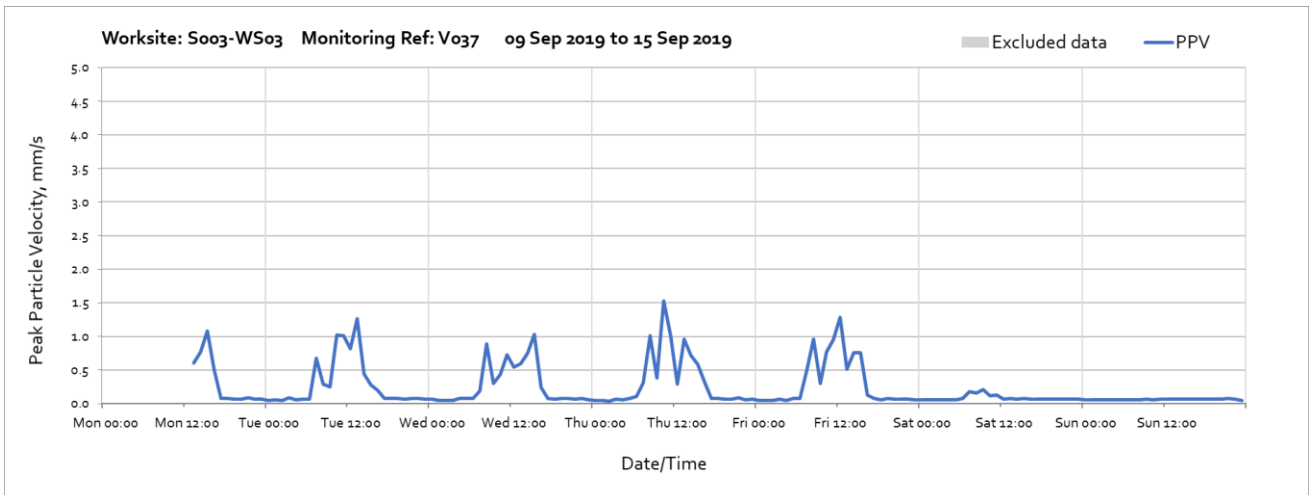
Worksite: S003-WS09 – Monitoring Ref: V003



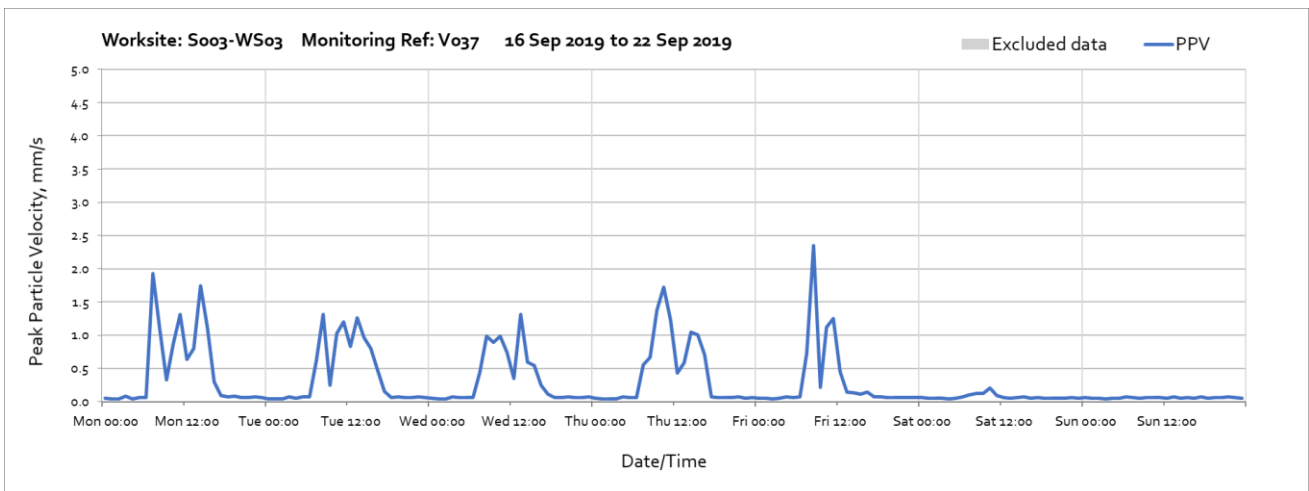


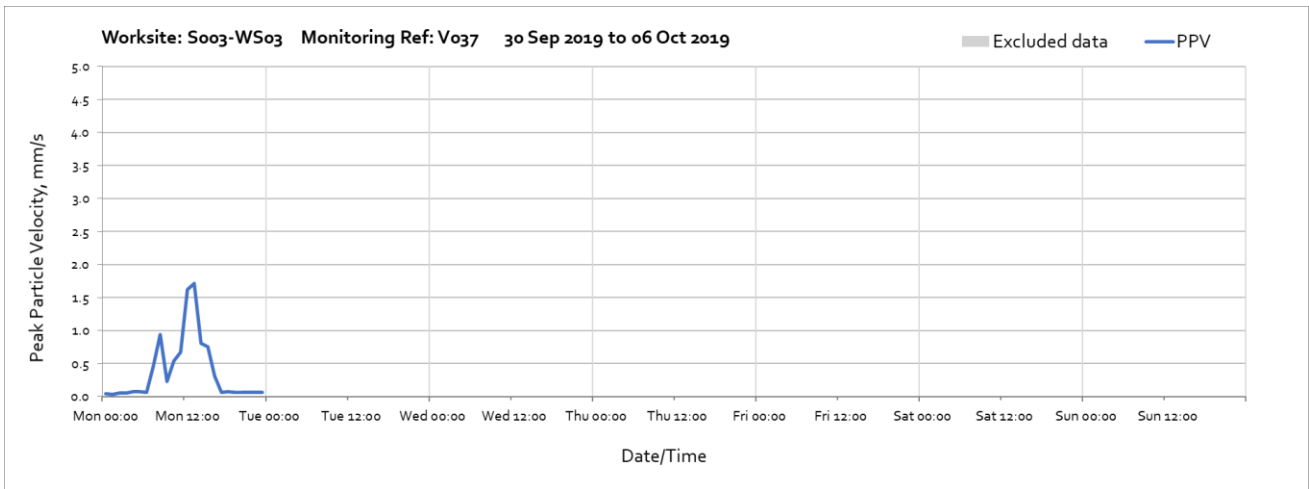
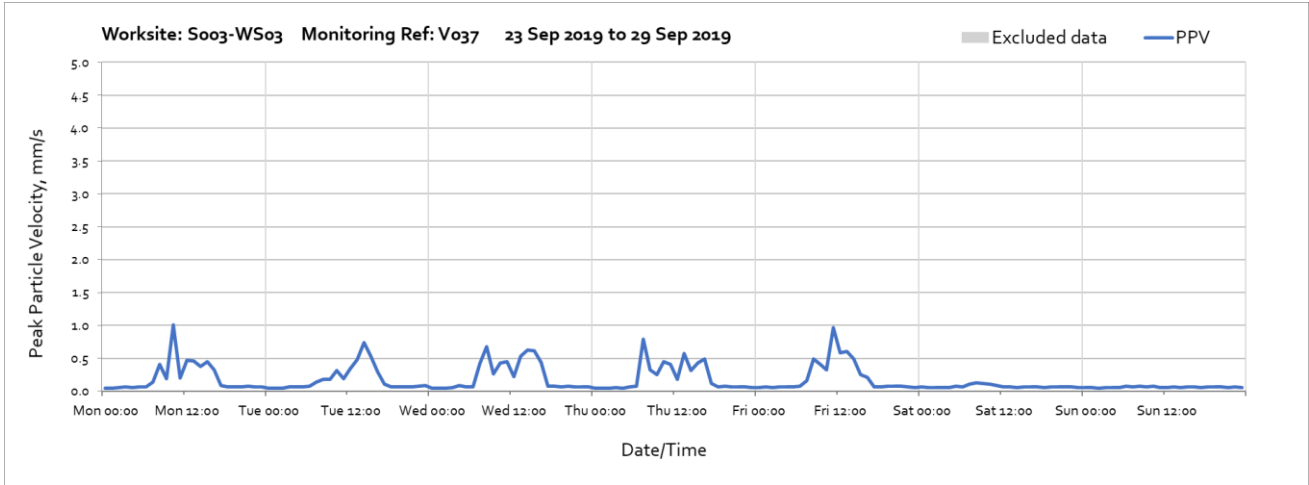


Worksite: S003-WS03 – Monitoring Ref: V037

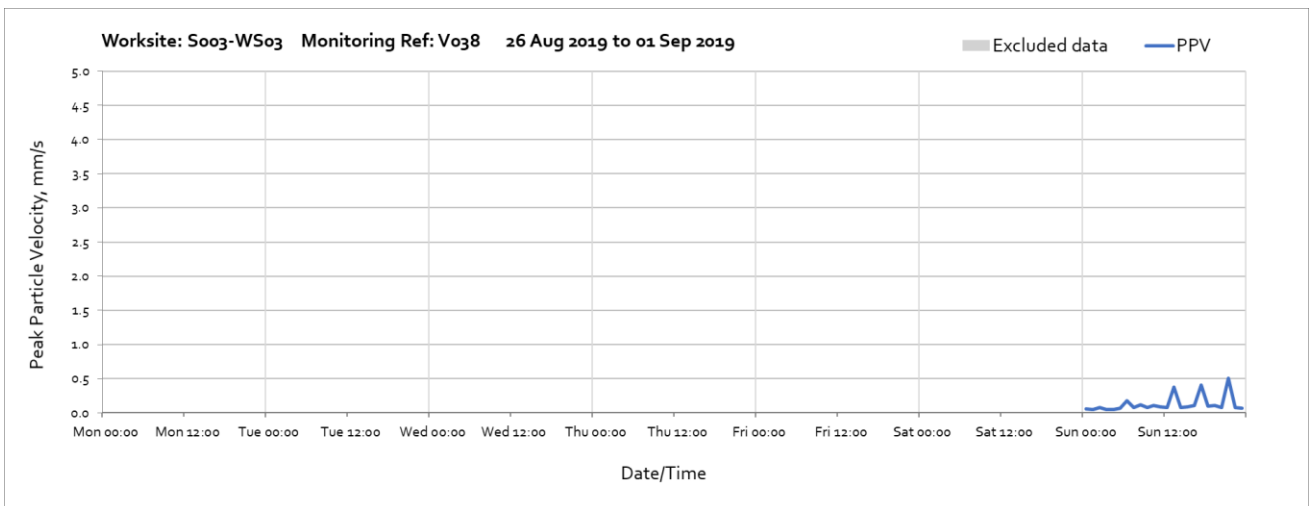


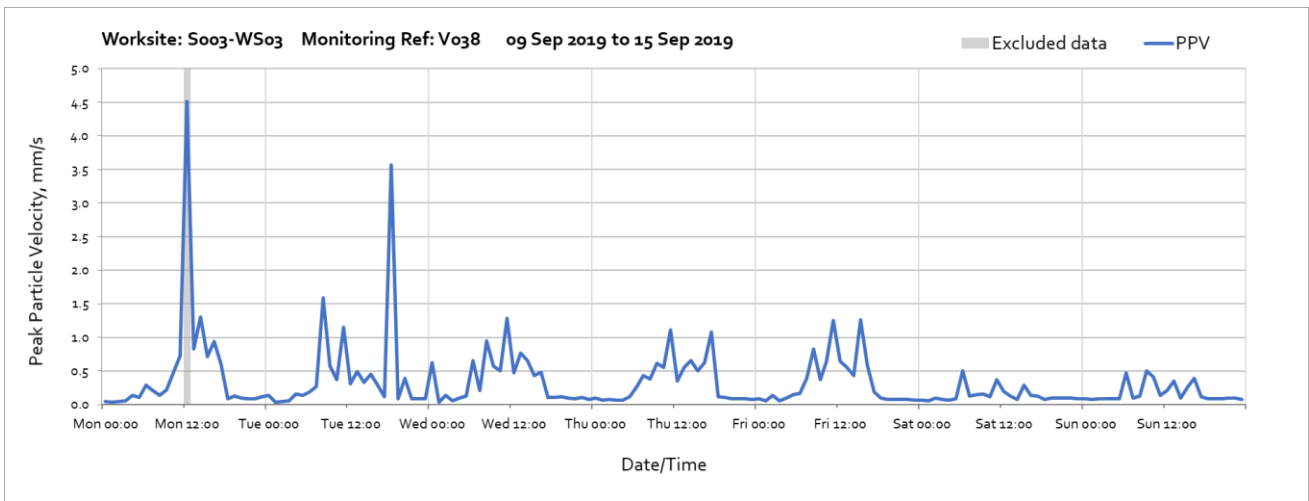
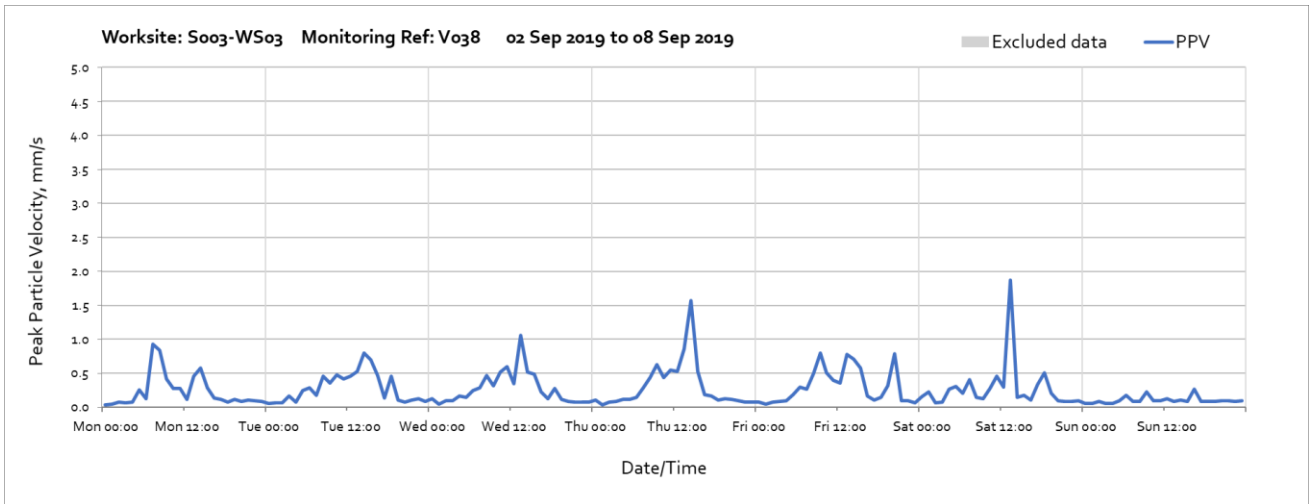
Note: Missing data between 00:00 on Sunday 1st and 13:00 on Monday 9th of September was due due to loss of power at the monitoring station.



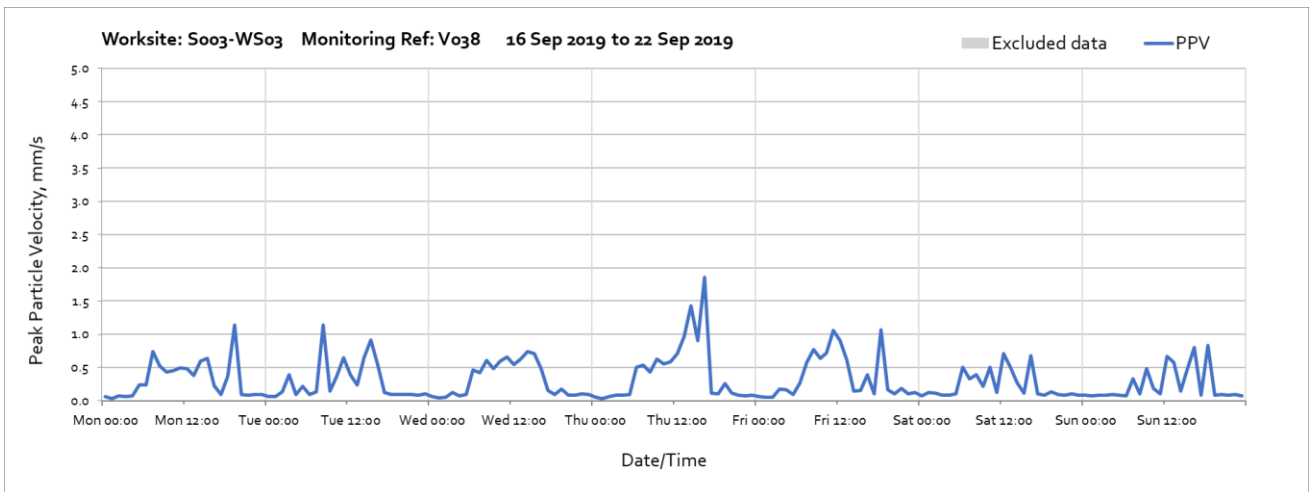


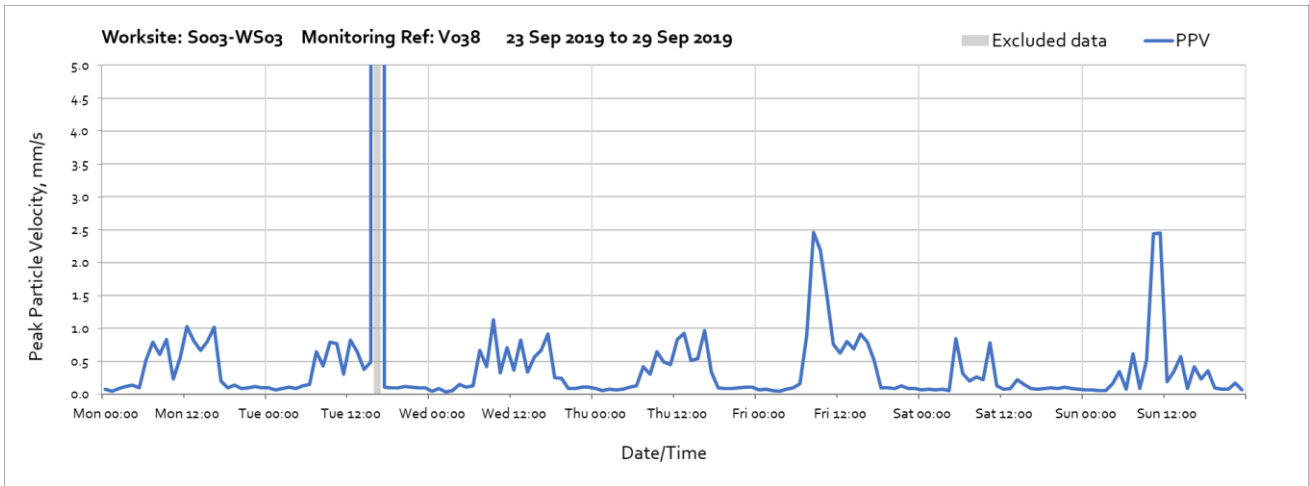
Worksite: S003-WS03 – Monitoring Ref: V038



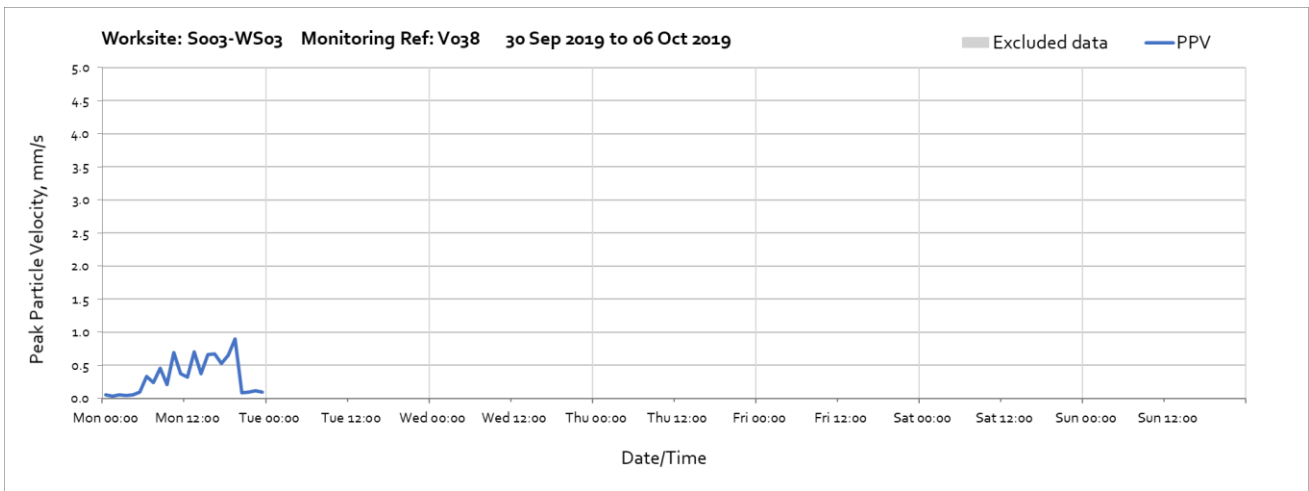


Note: High vibration levels at 12:00 on Monday 9th of September were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

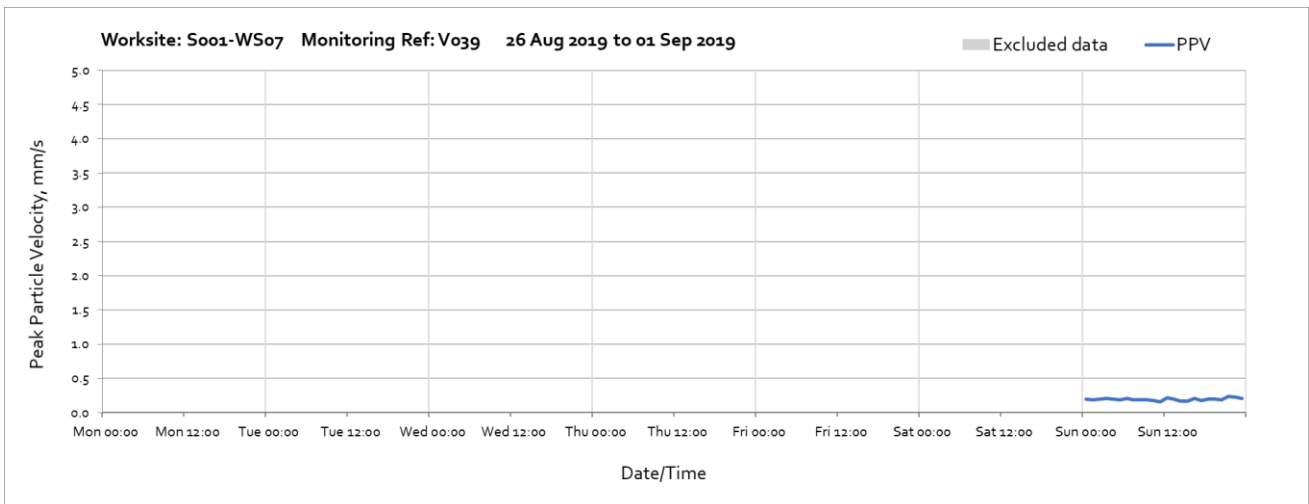


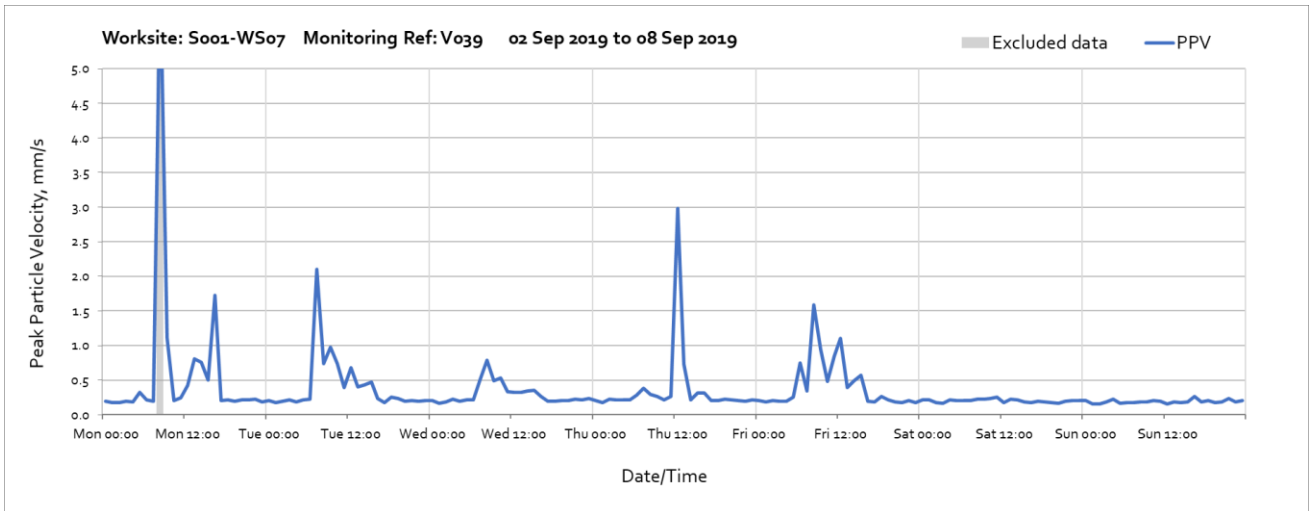


Note: High vibration levels at 16:00 on Tuesday 24th of September were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

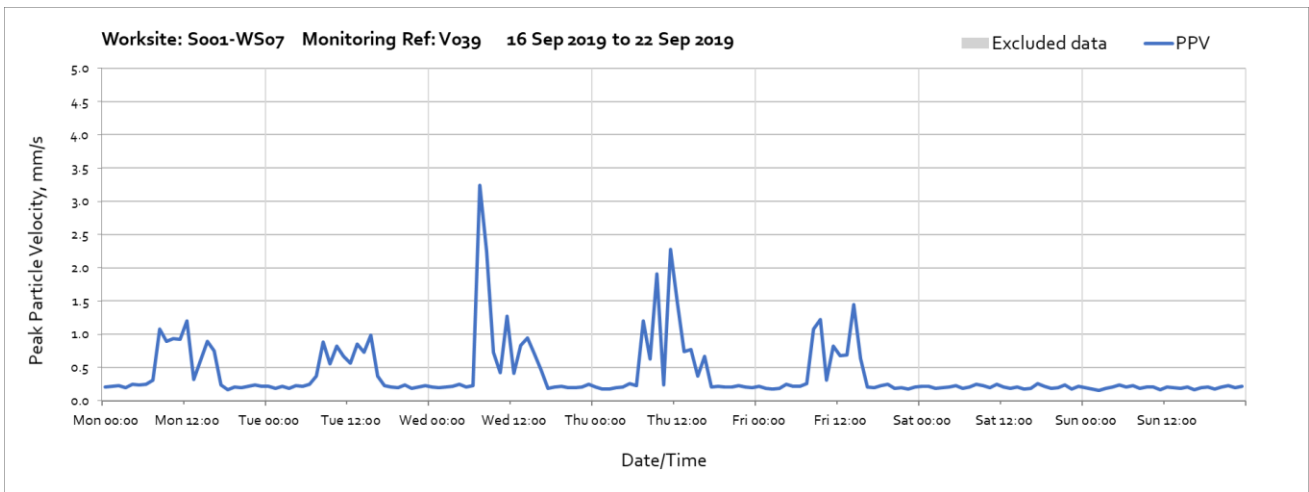
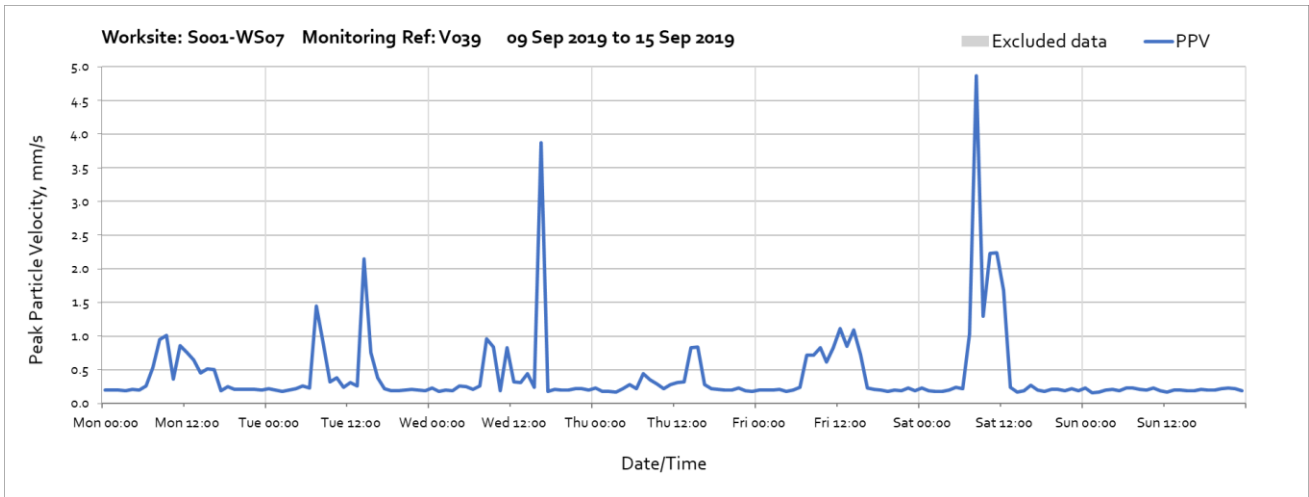


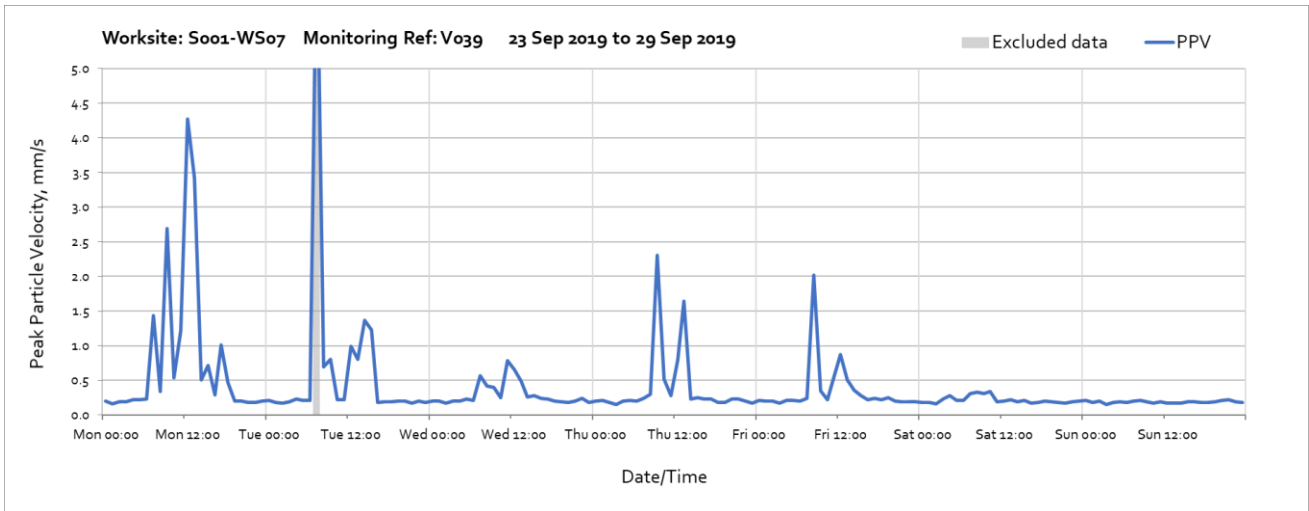
Worksite: S001-WS07 – Monitoring Ref: V039





Note: High vibration levels at 08:00 on Monday 2nd of September were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.





Note: High vibration levels at 07:00 on Tuesday 24th of September were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

