

Construction noise and vibration Monthly Report – September 2018

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 2018.

A number of worksites were active during the reporting month in the LBC area. Demolition was undertaken at the DB Cargo worksite (ref. S001-WS01), along with site establishment works at the former Addison Lee site. Archaeological excavations, foundation construction and encapsulation of structures were underway at St James's Gardens worksite (ref. S003-WS01). Scaffolding and removal of fixtures and fittings were underway at 132 and 140 Hampstead Road and Petrol Station, worksite (ref. S001-WS02) and at the former National Temperance Hospital, 110 Insull Wing worksite (ref. S003-WS02). Taxi ranks construction were undertaken at Euston Square Gardens (west) worksite (ref. S003-WS08). Removal of fixtures and fittings of buildings and utilities disconnections were carried out at Walkden House worksite (ref. S003-WS03) and at Drummond Street / Euston Street worksites (ref.: S003-WS07). Removal of fixtures and fittings of buildings and asbestos removal were carried out at the Thistle Hotel worksite (ref. S003-WS04). Scaffolding and removal of fixtures and fittings were undertaken at the Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street worksite (ref. S003-WS05), where demolition works also had commenced. Movement of plant, erection of acoustic barriers, installation of walkway, earthworks, dismantling of overhead line equipment, scaffolding and demolition of relay room were underway at Network Rail worksite B. Movement of plant, trial holes digging and excavation of trial trenches, concrete coring, small part steel installation and removal, dismantling of overhead line equipment were underway at Network Rail worksites C, D and E. Further non-intrusive activities were underway at other worksites around Euston Station (worksites ref. S003-WS01, S003-WS06, S003-WS09). Utility diversion works were also undertaken at the north end of Park Village East. Details of works undertaken at each worksite is presented in the report.

Noise monitoring was undertaken in the vicinity of the DB Cargo worksite (ref.: S001-WS01), 132 and 140 Hampstead Road and Petrol Station worksite (ref.: S001-WS02), St James's Gardens worksite (ref.: S003-WS01), Walkden House 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), the Thistle Hotel (ref. S003-WS04) and Network Rail worksites B, C, D, E and F. Further noise monitoring installations were also installed at Regents Park Estate, in the vicinity of Regents Park Lorry Holding Area, at Edinboro Castle on Mornington Terrace and on Eversholt Street.

Exceedances of the SOAELs were measured at some monitoring positions surrounding worksites S001-WS01, C and D, which were caused by activities at on-network HS2 construction sites outside core working hours. No exceedances of S61 trigger levels due to HS2 related works were measured during the monitoring period. Two complaints were received during the monitoring period. A noise complaint was received regarding noise from a compressor being run outside permitted hours in proximity to S001-WS01 worksite. A vibration complaint was received from a resident living near S001-WS01 worksite and regarding perceptible vibration within the building. Description of the complaints, results of investigation and any action taken are detailed in the report.

Three new noise monitors were installed during September. Location CC was installed on the 1st September at the Camden Carriage side, location N006 on the 12th September at the Royal College of General Practitioners (roof level) and location N016 on the 28th September at the Margarete Centre. Two new vibration monitors were installed on the 17th September at the Royal College of General Practitioners, one in the basement boiler room by Stephenson Way, and one in the basement vaults under Melton Street (V01 & V02 respectively).

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	Meaning
$L_{Aeq,T}$	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 $L_{pAeq,T}$	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.
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.
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.
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.
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 2018.

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

- Network Rail on-networks HS2 preparatory works: worksite ref. B (see plan 1 in Appendix A)
 - Works activities include movement of plant/equipment/materials by road/rail vehicles, erection of acoustic barriers, installation of walkway, dismantling of overhead line equipment (OLE) structures, back-filling previous excavations, erecting scaffolding around redundant relay room and demolition of redundant relay room.
- Network Rail on-networks HS2 preparatory works: worksite ref. C, D and E (see plan 2 in Appendix A)
 - Works activities include movement of plant/equipment/materials by road/rail vehicles, removal of scrap, hand dug trial holes, excavating trial trenches, concrete coring, small part steel (SPS) installation and removal, dismantling OLE structures, running cables.
- DB Cargo shed and adjacent land on Granby Terrace, worksite ref. S001-WS01 (see plan 2 in Appendix A)
 - Works activities include demolition and ancillary activities at the former Addison Lee site.

- 132 and 140 Hampstead Road and Petrol Station, worksite ref. S001-WS02 (see plan 3 in Appendix A)
 - Works activities include scaffolding and removal of fixtures and fittings.
- St James's Gardens, worksite ref. S003-WS01 (see plan 3 in Appendix A)
 - Works activities include archaeological excavations, foundation construction and construction of screening structures.
- Former National Temperance Hospital, Insull Wing, worksite ref. S003-WS02 (see 3 in Appendix A)
 - Works activities include scaffolding and removal of fixtures and fittings.
- Walkden House, 67-75 & 77-79 Euston Rd, worksite ref. S003-WS03 (see plan 3 in Appendix A)
 - Works activities include removal of fixtures and fittings and utilities disconnections.
- Thistle Hotel, Cardington Street, worksite ref. S003-WS04 (see plan 3 in Appendix A)
 - Works activities include removal of fixtures and fittings and asbestos removal.
- Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street, worksite ref. S003-WS05 (see plan 3 in Appendix A)
 - Works activities include scaffolding, removal of fixtures and fittings and commencement of demolition.
- Former National Temperance Hospital, 110-122 Hampstead Road, worksite ref. S003-WS06 (see plan 3 in Appendix A)
 - Site activities include deliveries.
- 93-103 Drummond Street, 11-15 Melton Street, 54-64 Euston Street, 69 Cobourg Street, worksite ref. S003-WS07 (see plan 3 in Appendix A)
 - Works activities include removal of fixtures and fittings and utilities disconnections.
- Euston Square Gardens (west), worksite ref. S003-WS08 (see plan 3 in Appendix A)
 - Works activities include taxi rank 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 include removal of fixtures and fittings.
- Further works were also carried out at the north end of Park Village East to divert utilities (including gas, fibre optics and sewers in the area) in preparation for the

main works, planned to start in March 2019. These included breaking out of the road surface and excavations, followed by utility installations and surface reinstatement.

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 The following table summarises the position of noise and vibration monitoring installations within the LBC area in September 2018.

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

Table 2: Monitoring locations.

Worksite Reference	Measurement Reference	Address
B	CC	Whittlebury Mews West, Camden Town, London, NW1 8JB
	JC	Juniper Crescent, London, NW1 8HA
C	EC	The Edinboro Castle, 57 Mornington Terrace, London, NW1 7RU
	N022	External to #34 Mornington Terrace
	N024	External to Park Village Studios, Park Village East
D	MT	13 Mornington Terrace, Kings Cross, London, NW1 7RR
	N004	Mornington Terrace lamppost #7 (junction of Mornington Terrace, Mornington Place and Clarkson Row)
E	GT	5A Granby Terrace, Kings Cross, London, NW1 3SA
F	BS	Roof of Stockbeck House, Barnby Street, Kings Cross, London, NW1 2RS
	N023	Lighting column #21 on Hampstead Road
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)
	N021	Stanhope Street, Lamppost #2
S001-WS02	N018	Outside replacement housing, Hampstead Road
	N019	Outside Cartmel, Hampstead Road
S003-WS03	N006	Royal College of General Practitioners Roof level
	N008	Stephenson's Way lamppost (external to RCGP)

Worksite Reference	Measurement Reference	Address
	N010	Wesley Hotel
	N011	Euston Street lamppost #4 (external to 82 Euston Street)
	V01	Royal College of General Practitioners basement boiler room by Stephenson Way
	V02	Royal College of General Practitioners basement vaults under Melton St
S003-WS05	N014	Starcross Street lamppost (external to Exmouth Arms)
S003-WS06	N015	Maria Fidelis School
	N016	Margarete Centre roof
	N017	Hampstead Road, Lamppost #48
S003-WS07	N012	Drummond Street lamppost #14 (opposite to 92-94 Drummond Street)
S003-WS08	N007	Royal College of General Practitioners, Melton Street
Not near worksite	HH	Euston Station Parcel Deck, Barnby Street, Euston, London, NW1 2RS
Not near worksite	N020	Mackworth Street lamppost #1
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	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL ⁽¹⁾
B	CC	Whittlebury Mews West, Camden Town, London, NW1 8JB	Night	2200-0700	2
	JC ⁽¹⁾	Juniper Crescent	Saturday	1400-2200	4
			Sunday	0700-2200	3
Night			2200-0700	10	
C	EC	The Edinboro Castle, 57 Mornington Terrace, London, NW1 7RU	All days	All periods	No exceedance
	N022	External to #34 Mornington Terrace	Night	2200-0700	2
	N024	External to Park Village Studios, Park Village East	All days	All periods	No exceedance
D	MT	Mornington Terrace	Saturday	1300-1400	1
			Night	2200-0700	2
	N003	DB Cargo shed and adjacent land on Granby Terrace	Night	2200-0700	2
	N004	Mornington Terrace lamppost #7	Night	2200-0700	2
E	GT ⁽²⁾	Granby Terrace	All days	All periods	No exceedance
F	BS	Barnby Street	All days	All periods	No exceedance
	N023	Ampthill Estate lighting column #21, Hampstead Road	All days	All periods	No exceedance
S001-WS01	GT ⁽²⁾	Granby Terrace	Night	2200-0700	30
	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
	N021	Stanhope Street, Lampost #2	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

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL ⁽¹⁾
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	N015	Maria Fidelis School	All days	All periods	No exceedance
	N016	Margarete Centre roof	All days	All periods	No exceedance
	N017	Hampstead Road, Lamppost #48	All days	All periods	No exceedance
S003-WS07	N012	93-103 Drummond Street, 11-15 Melton Street, 54-64 Euston Street, 69 Cobourg Street	All days	All periods	No exceedance
S003-WS08	N007	Euston Square Gardens (west)	All days	All periods	No exceedance
Not near worksite	HH	Euston Station Parcel Deck, Barnby Street, Euston, London, NW1 2RS	All days	All periods	No exceedance
Not near worksite	N020	Mackworth Street lamppost #1	All days	All periods	No exceedance
Not near worksite	N025	External to #3 Prince Albert Road	All days	All periods	No exceedance
Not near worksite	N026	Thames Water Compound	All days	All periods	No exceedance

- (1) This monitor is located within the worksite and the measured noise levels and exceedances of the SOAEL are not representative of noise at the surrounding residential properties. This monitor is being relocated to a more representative location on site in closer proximity to nearby residential properties.
- (2) Due to the recent installation of a power generator in close proximity to the noise monitor, the measured noise levels and exceedances of the SOAEL due to activities at worksite S001-WS01 are not representative of noise at surrounding areas. This monitor is being relocated to a more representative location on site further from the generator to be more representative of nearby residential properties.

2.1.4 Over the reporting period the SOAEL was exceeded at a number of measurement locations in the vicinity of worksites B, C and D. These were caused by activities at Network Rail on-network HS2 construction sites mainly during night-time periods and during weekend days. Outside of these times any exceedances of the SOAEL were caused

by the underlying ambient noise levels or other construction activities not related to HS2, rather than being attributable to HS2 construction noise.

2.1.5 For the purpose of assessing eligibility for noise insulation or temporary rehousing, multiple exceedances of the SOAEL in a 24-hour period would be counted as a single exceedance during that day. Over the reporting period, the overall number of SOAEL exceedances at each measurement location is shown in Table 4 and may be lower than the total sum of individual exceedances reported in Table 3 for each location.

Table 4: Summary of total exceedances of SOAEL.

Worksite Reference	Measurement Reference	Site Address	Total of SOAEL exceedances in the month
B	CC	Whittlebury Mews West, Camden Town, London, NW1 8JB	2
	JC ⁽¹⁾	Juniper Crescent	10
C	N022	External to #34 Mornington Terrace	2
D	MT	Mornington Terrace	2
	N003	DB Cargo shed and adjacent land on Granby Terrace	2
	N004	DB Cargo shed and adjacent land on Granby Terrace	2
S001-WS01	GT ⁽²⁾	Granby Terrace	30

⁽¹⁾ This monitor is located within the worksite and the measured noise levels and exceedances of the SOAEL are not representative of noise at the surrounding residential properties.

⁽²⁾ Due to the recent installation of a power generator in close proximity to the noise monitor, the measured noise levels and exceedances of the SOAEL due to activities at worksite S001-WS01 are not representative of noise at surrounding areas.

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

2.2 Summary of Measured Noise and Vibration Levels

2.2.1 Table 5 presents a summary of the measured noise levels at each monitoring location over the reporting period. The $L_{Aeq,T}$ is presented for each of the relevant time periods averaged over the calendar month, along with the highest single period $L_{Aeq,T}$ that was found to occur within the month.

2.2.2 Noise monitoring in the vicinity of worksites S001-WS01, S003-WS01, S003-WS05, S003-WS08, B, C, D and E is considered representative of HS2 Area South works during periods of construction works. Other worksites were not considered to be giving rise to substantial levels of HS2 related construction noise, with the measured noise levels largely dominated by the underlying ambient noise, acknowledging that intermittent HS2 works may on occasion be taking place within the area.

Table 5: Summary of measured dB L_{Aeq} data over the monitoring period.

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekly Average L _{Aeq,T} (highest day L _{Aeq,T})*					Saturday Average L _{Aeq,T} (highest day L _{Aeq,T})*					Sunday / Public Holiday Average L _{Aeq,T} (highest day L _{Aeq,T})*	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
B	CC	Whittlebury Mews West, Camden Tow	Free-field	56.0 (60.5)	59.0 (62.1)	58.2 (60.6)	60.4 (64.2)	56.4 (64.3)	52.3 (60.4)	58.4 (68.6)	56.8 (59.9)	60.2 (66.4)	56.2 (64.2)	58.7 (67.8)	57.1 (63.8)
	JC	Juniper Crescent, London, NW1 8HA	Free-field	68.4 (71.6)	68.7 (70.2)	69.2 (70.9)	68.1 (70.8)	62.8 (68.6)	63.6 (68.1)	65.6 (68.7)	64.8 (66.8)	65.1 (69.2)	63.6 (76.7)	65.9 (70.8)	62.7 (67.9)
C	EC	The Edinboro Castle, 57 Mornington Terrace	Free field	66.5 (71.6)	65.8 (67.0)	67.1 (68.9)	66.7 (69.9)	61.3 (69.0)	61.8 (65.8)	62.7 (65.2)	62.7 (64.9)	65.6 (68.5)	57.4 (66.2)	63.1 (67.6)	61.2 (65.7)
	N022	External to #34 Mornington Terrace	Free-field	59.9 (64.8)	61.1 (62.9)	60.7 (62.0)	59.1 (61.4)	54.8 (62.1)	56.8 (59.4)	58.5 (60.3)	58.3 (60.4)	58.1 (61.8)	54.5 (59.2)	57.9 (61.3)	54.1 (57.7)
	N024	External to Park Village Studios, Park Village East	Free-field	56.6 (60.9)	61.9 (73.0)	59.2 (69.9)	59.8 (77.8)	53.4 (75.9)	53.6 (58.6)	57.3 (62.3)	56.0 (61.3)	56.9 (67.6)	52.7 (60.3)	56.2 (66.1)	51.8 (57.1)
D	MT	13 Mornington Terrace, Kings Cross, London, NW1 7RR	Free-field	57.5 (62.8)	60.4 (70.9)	58.5 (60.1)	56.8 (60.0)	52.0 (59.5)	54.2 (56.3)	57.1 (59.2)	55.9 (57.6)	55.9 (58.9)	53.1 (56.2)	55.5 (59.2)	50.6 (53.9)
	N004	Mornington Terrace lamppost #7	Free-field	64.2 (67.5)	66.0 (67.5)	65.2 (66.5)	64.5 (68.1)	59.9 (67.7)	61.7 (64.9)	62.5 (64.3)	61.1 (62.9)	62.2 (70.3)	58.0 (65.5)	61.9 (66.4)	59.5 (68.4)
E	GT ⁽²⁾	5A Granby Terrace, Kings Cross, London, NW1 3SA	Free-field	68.7 (71.3)	69.4 (71.0)	69.9 (73.3)	67.8 (70.5)	64.4 (71.6)	66.0 (67.3)	67.4 (69.9)	66.0 (68.1)	66.2 (70.3)	63.0 (67.2)	66.2 (71.2)	64.5 (69.1)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekly Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) *					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) *					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) *	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
F	BS	Roof of Stockbeck House, Barnby Street	Free-field	62.1 (72.1)	64.8 (66.7)	62.0 (63.8)	61.4 (63.9)	57.8 (66.8)	59.5 (64.4)	63.2 (66.4)	62.8 (66.5)	60.7 (67.2)	56.2 (63.0)	60.4 (65.2)	58.0 (63.2)
	N023	Ampthill Estate, Hampstead Road	Free-field	71.6 (73.0)	70.4 (71.3)	70.2 (71.8)	70.0 (82.5)	67.9 (72.9)	69.1 (69.8)	69.7 (70.2)	70.0 (70.7)	69.9 (72.4)	68.3 (70.3)	69.3 (73.0)	67.1 (70.7)
S001-WS01	N001	External to Cubitt Court, 100 Park Village East	Façade	60.4 (70.6)	63.4 (66.9)	60.9 (72.0)	58.8 (64.7)	54.9 (72.0)	57.2 (61.5)	58.5 (60.7)	59.0 (60.5)	58.8 (64.5)	54.2 (58.3)	57.9 (61.6)	53.5 (59.3)
	N002	Richmond Court, Park Village East	Free-field	58.8 (61.6)	61.1 (63.7)	60.3 (64.9)	58.9 (62.8)	54.7 (67.3)	55.4 (58.9)	58.1 (60.4)	59.4 (61.6)	59.7 (66.8)	55.0 (61.9)	58.4 (62.6)	54.1 (60.9)
	N003	Silsoe House, Park Village East	Free-field	58.6 (63.1)	61.0 (67.5)	59.7 (64.0)	58.6 (64.5)	54.3 (67.8)	54.8 (58.3)	58.0 (60.1)	59.3 (62.1)	59.4 (66.7)	54.6 (63.2)	57.7 (61.8)	53.0 (57.8)
	N021	Stanhope Street, Lampost #2	Free-field	58.8 (64.1)	62.0 (66.6)	59.3 (63.1)	57.4 (62.7)	54.6 (69.3)	56.5 (64.2)	57.7 (59.0)	58.3 (60.0)	57.6 (61.8)	53.7 (63.0)	57.3 (61.5)	52.4 (57.7)
S001-WS02	N018	Outside replacement housing, Hampstead Road	Free-field	72.7 (75.2)	73.8 (74.6)	73.8 (76.5)	73.0 (76.4)	71.3 (75.2)	71.1 (71.6)	72.1 (72.5)	72.9 (74.9)	73.1 (76.6)	71.9 (74.1)	72.5 (76.7)	70.6 (73.2)
	N019	Outside Cartmel, Hampstead Road	Free-field	70.9 (73.4)	71.9 (73.1)	71.7 (74.5)	71.0 (74.0)	69.8 (75.5)	69.6 (69.9)	70.2 (71.3)	70.9 (72.1)	71.5 (75.9)	70.1 (71.8)	70.6 (74.6)	69.0 (73.0)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekly Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) *					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) *					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) *	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
S003-WS03	N006	RCGP Roof level	Free-field	52.4 (53.5)	56.7 (60.2)	51.7 (54.2)	51.3 (57.1)	50.0 (54.7)	51.8 (53.1)	52.5 (53.9)	53.4 (55.4)	51.2 (53.1)	48.9 (52.2)	51.3 (55.3)	49.6 (52.5)
	N008	RCGP Stephenson Way	Façade	64.4 (68.3)	63.5 (67.9)	57.4 (69.1)	56.9 (68.1)	58.5 (72.7)	59.5 (63.6)	58.7 (61.3)	59.6 (62.7)	56.8 (62.5)	55.0 (61.6)	58.9 (73.5)	58.6 (69.9)
	N010	Wesley Hotel	Façade	65.2 (68.5)	63.7 (64.7)	62.8 (64.8)	62.8 (66.9)	59.2 (66.9)	64.0 (65.3)	63.4 (64.1)	62.9 (64.5)	62.4 (64.2)	58.3 (65.0)	62.4 (64.8)	60.1 (67.0)
	N011	Outside #82 Euston Street	Free-field	59.2 (66.6)	60.4 (63.9)	57.4 (66.8)	56.2 (63.2)	54.1 (64.0)	55.9 (59.2)	59.0 (64.0)	56.6 (59.0)	56.0 (61.9)	51.5 (55.8)	54.9 (63.1)	52.8 (57.4)
S003-WS05	N014	Starcross Street	Free-field	54.2 (58.7)	61.6 (63.6)	61.9 (71.2)	61.2 (72.7)	52.9 (66.1)	55.6 (60.1)	60.7 (64.8)	57.5 (59.0)	57.0 (67.1)	50.1 (56.0)	55.1 (66.1)	50.1 (54.9)
S003-WS06	N015	Maria Fidelis School	Free-field	55.3 (59.3)	66.8 (68.3)	54.7 (56.8)	54.0 (58.8)	51.8 (57.4)	54.5 (56.7)	65.8 (66.6)	65.0 (68.1)	59.6 (68.1)	51.7 (53.5)	57.6 (66.8)	51.3 (55.2)
	N016	Margarete Centre roof	Free-field	- (-)	59.8 (59.8)	54.3 (54.3)	53.3 (54.8)	51.5 (52.8)	53.0 (53.0)	58.2 (58.2)	58.6 (58.6)	54.1 (57.0)	51.5 (52.7)	52.2 (54.9)	49.9 (50.0)
	N017	Hampstead Road, Lampost #48	Free-field	72.4 (74.9)	73.1 (74.1)	71.8 (74.9)	71.9 (75.4)	70.2 (75.6)	70.6 (71.0)	71.6 (72.3)	71.7 (72.3)	72.4 (75.2)	70.5 (73.0)	71.6 (75.2)	70.1 (73.5)
S003-WS07	N012	Opposite #92-94 Drummond Street	Free-field	60.2 (62.1)	63.5 (73.4)	60.0 (62.6)	59.9 (65.7)	56.6 (67.8)	57.4 (58.5)	59.4 (60.5)	59.3 (60.4)	59.5 (63.1)	56.4 (61.2)	59.0 (65.1)	56.0 (61.6)
S003-WS08	N007	RCGP, Melton Street	Free-field	67.9 (70.4)	70.9 (72.2)	68.4 (70.7)	67.9 (73.4)	66.2 (73.5)	68.2 (69.9)	68.6 (70.3)	68.5 (70.5)	67.6 (73.7)	65.3 (70.9)	67.4 (77.7)	65.0 (72.3)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekly Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) *					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) *					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$) *	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
Not near worksite	HH	Euston Station Parcel Deck, Barnby Street	Free-field	64.5 (67.1)	65.5 (67.8)	64.3 (67.4)	63.7 (67.5)	61.2 (67.9)	62.2 (64.5)	64.5 (66.5)	62.0 (62.9)	63.8 (68.6)	61.8 (67.9)	63.3 (70.1)	60.5 (65.9)
Not near worksite	N020	Mackworth Street	Free-field	52.6 (57.7)	56.1 (66.8)	58.9 (69.9)	51.4 (57.6)	49.0 (58.8)	50.7 (52.8)	52.5 (53.6)	52.6 (53.1)	52.0 (57.4)	48.9 (54.9)	51.7 (55.8)	49.0 (57.1)
Not near worksite	N025	External to #3 Prince Albert Road	Free-field	68.9 (71.1)	68.6 (70.4)	68.2 (72.0)	66.8 (71.3)	65.0 (70.5)	66.5 (66.9)	66.9 (67.9)	67.2 (69.0)	67.2 (70.9)	65.5 (71.3)	66.8 (71.9)	64.1 (69.4)
Not near worksite	N026	Thames Water Compound	Free-field	58.4 (59.6)	59.4 (63.2)	57.6 (59.8)	56.6 (59.1)	53.9 (61.9)	55.2 (56.7)	56.4 (57.6)	56.3 (59.6)	56.4 (60.8)	53.5 (58.3)	56.7 (61.6)	53.3 (57.6)

- (1) This monitor is located within the worksite and the measured noise levels and exceedances of the SOAEL are not representative of noise at the surrounding residential properties.
- (2) Due to the recent installation of a power generator in close proximity to the noise monitor, the measured noise levels are not representative of noise at surrounding residential properties.

2.2.3 Table 7 presents a summary of the measured vibration levels at monitoring locations V01 and V02 over the reporting period. The highest PPV measured during the monitoring along any axis is presented in the table. Exceptionally high values of PPV were measured in the afternoon of Thursday 27th September. These elevated vibration levels are thought to be due to events not related to HS2 works in close proximity to the vibration sensor. The data was not considered representative of HS2 construction vibration levels, because high vibration generating activities were not undertaken at these times. Therefore, these vibration levels have been excluded from the table below.

Table 6: Summary of Measured PPV Data over the monitoring period.

Worksite Reference	Measurement Reference	Site Address	Highest PPV measured in any axis, mm/s
S003-WS03	V01	Royal College of General Practitioners basement boiler room by Stephenson Way	0.28 (Z axis)
	V02	Royal College of General Practitioners basement vaults under Melton St	0.20 (Z axis)

2.2.4 Appendix C presents graphs of noise and vibration monitoring data over the month for each of the measurement locations. Noise data presented consist of the hourly L_{Aeq} values and, where relevant, the $L_{Aeq,T}$ values (where the time period T has been taken to be the averaging period as specified in Table 1 of HS2 Information Paper E23). Vibration data presented consist of hourly PPV values. The full data set for the monitoring equipment can be found at the following location: <https://data.gov.uk/dataset/24542ae7-dd44-444f-b259-871c4cc43b5e/environmental-monitoring-data>.

2.3 Exceedances of Trigger Level

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

Table 7: Summary of exceedances of trigger levels.

Complaint reference number (if applicable)	Worksite reference	Date and time period	Identified Source	Results of investigation (including noise monitoring results)	Actions taken
-	-	-	-	-	-

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

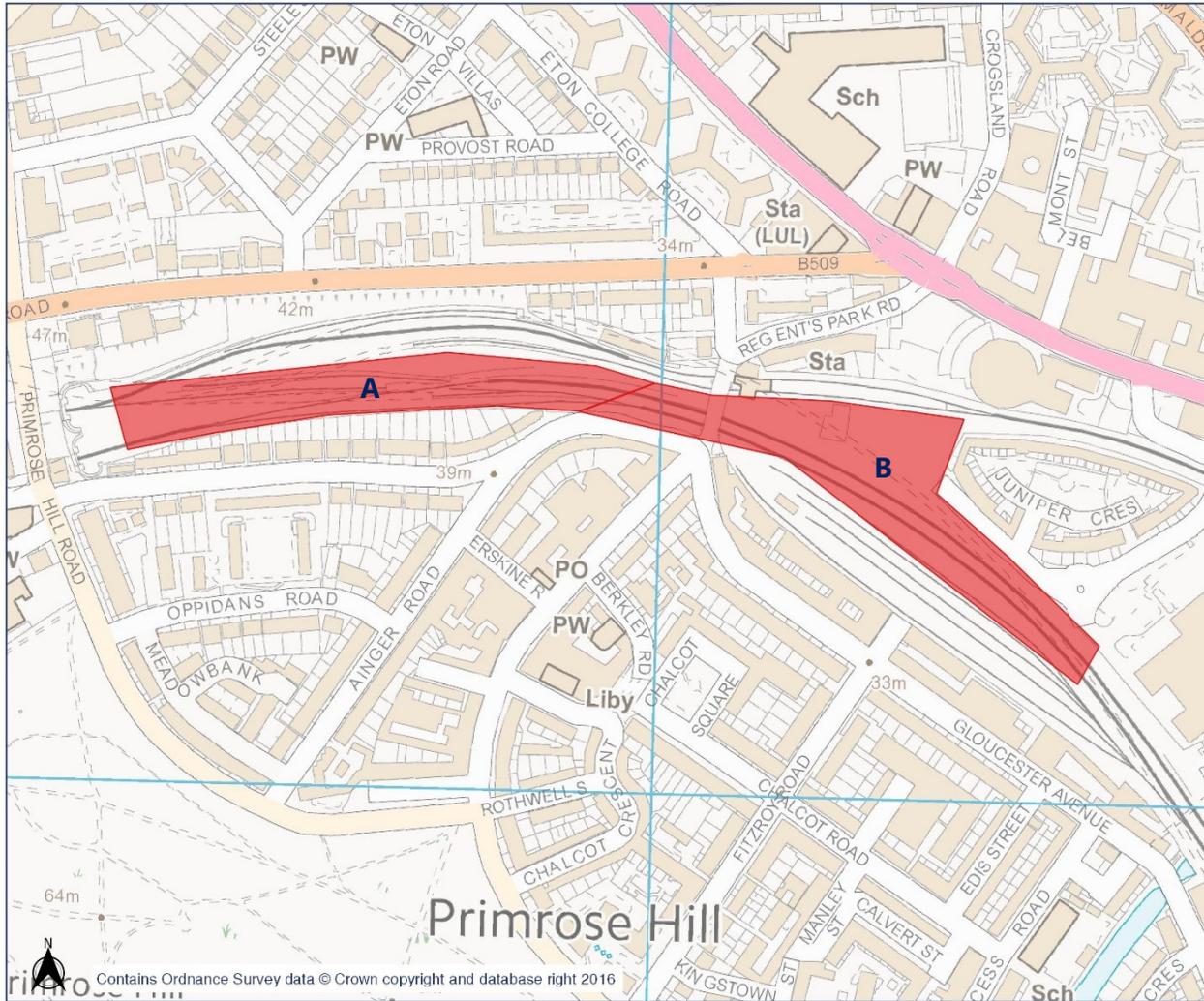
2.4 Complaints

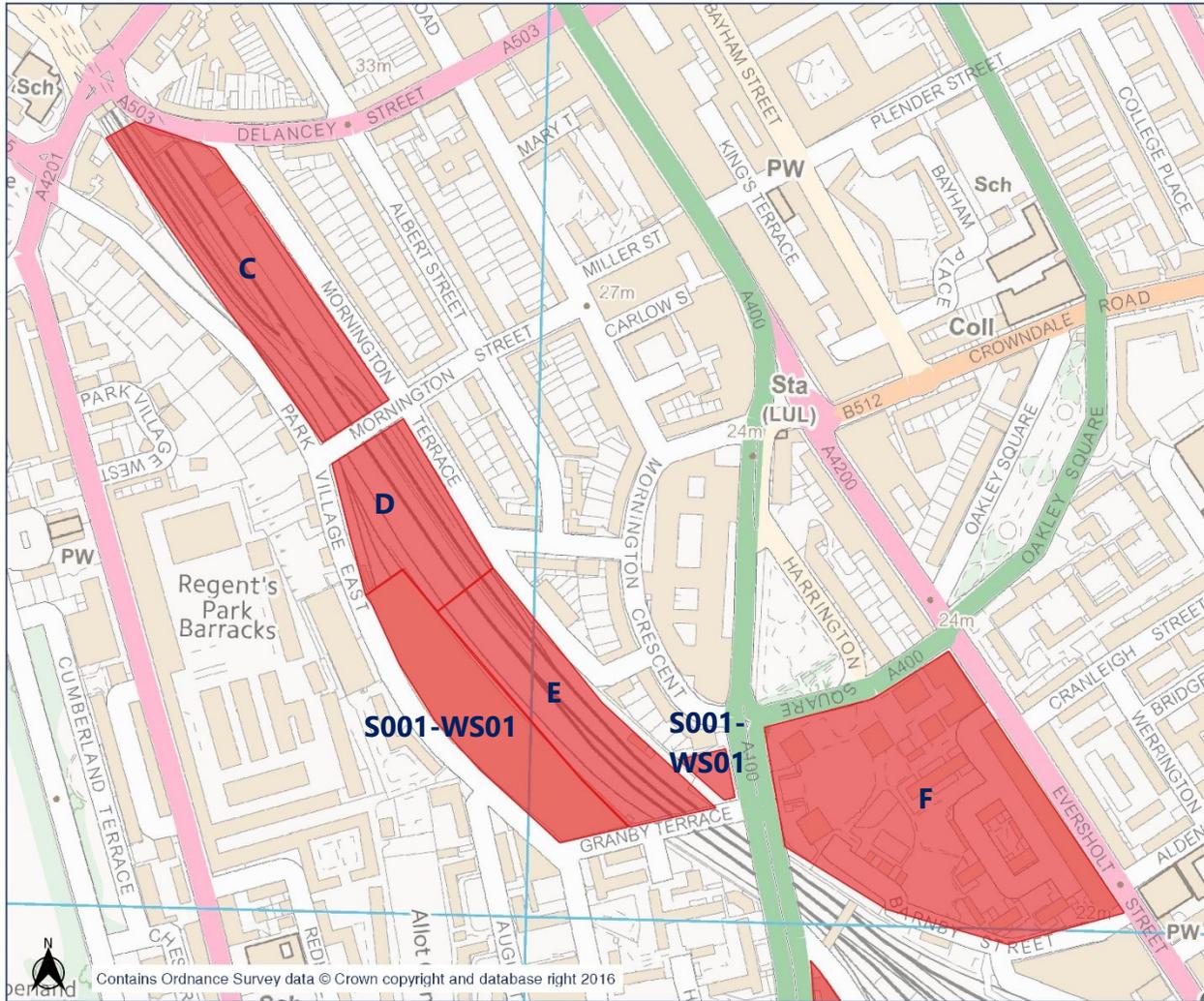
2.4.1 Table 8 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

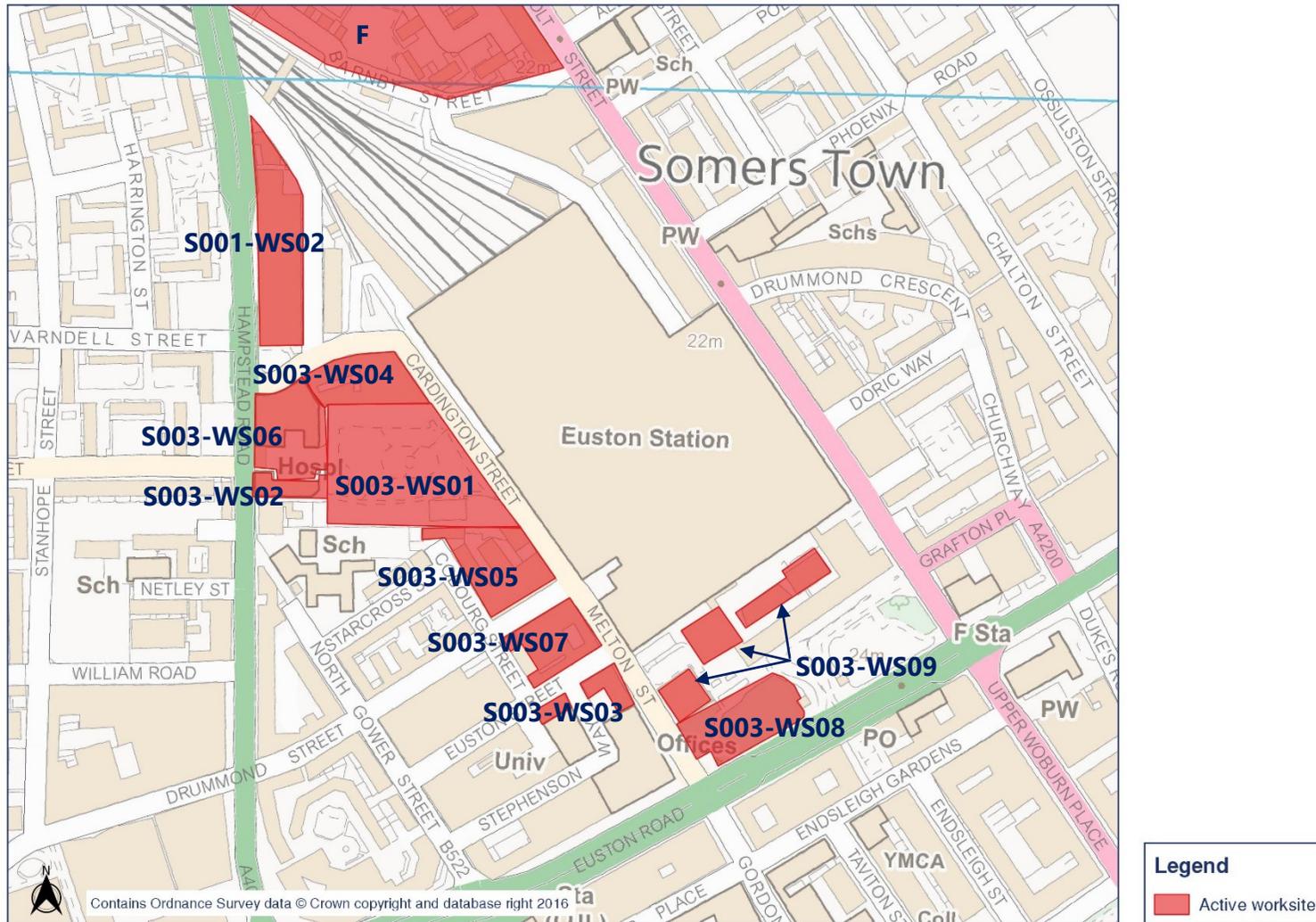
Table 8: Summary of complaints.

Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
-	S001-WS01	Complaint from a resident at Augustus Street regarding vibration perceived within building.	No HS2 works which might create significant vibration were being undertaken locally other than a single tracking movement of large excavator being removed from site.	No actions taken.
CPA-000427	S001-WS01	Complaint from resident at Park Village East about noise from a compressor outside permitted hours.	Works indirectly related to Thames Water and not directly related to HS2. No notification received of any BT works in the area on that evening.	HS2 liaised with BT to brief on BPM and conduct.

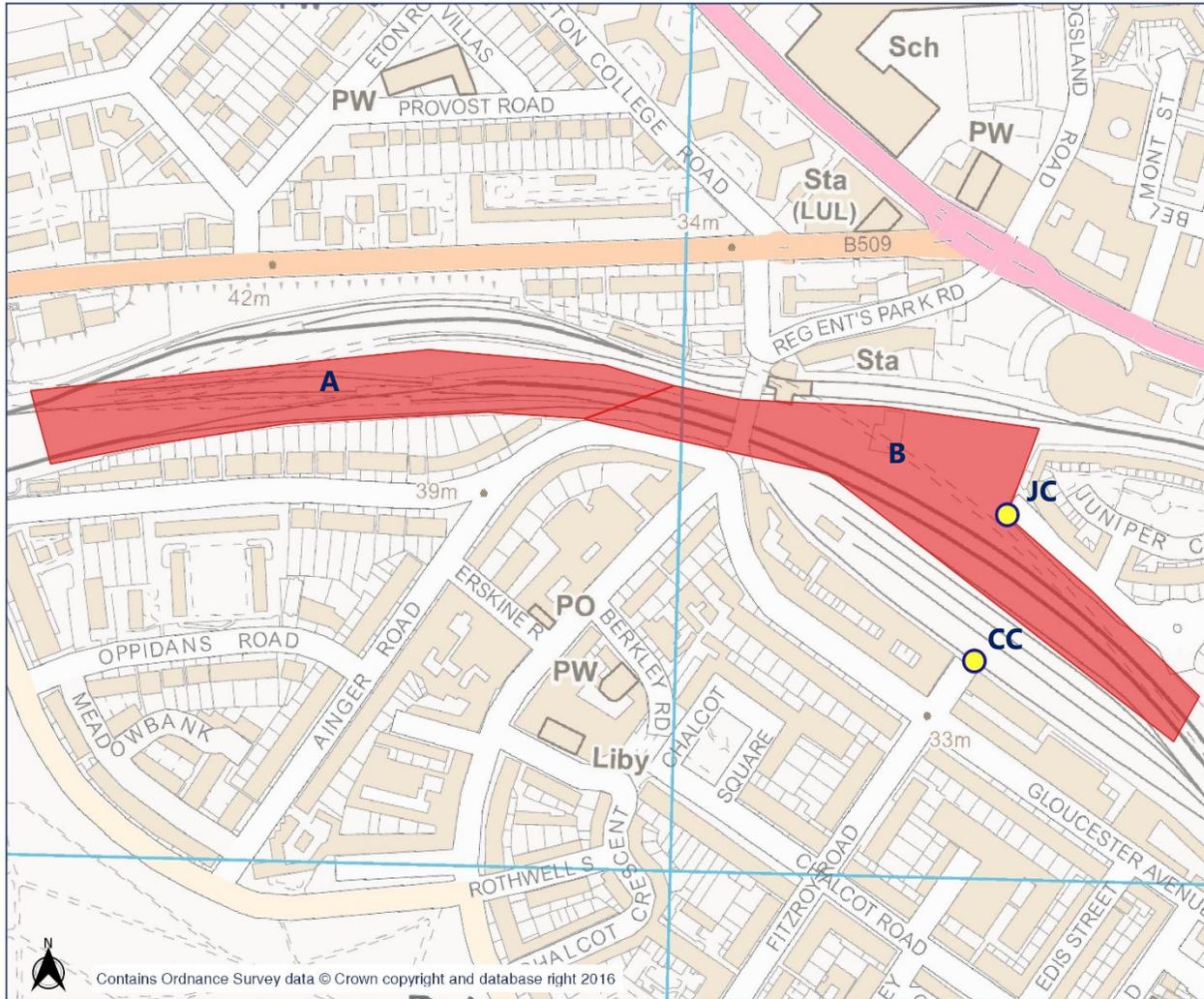
Appendix A Site Locations

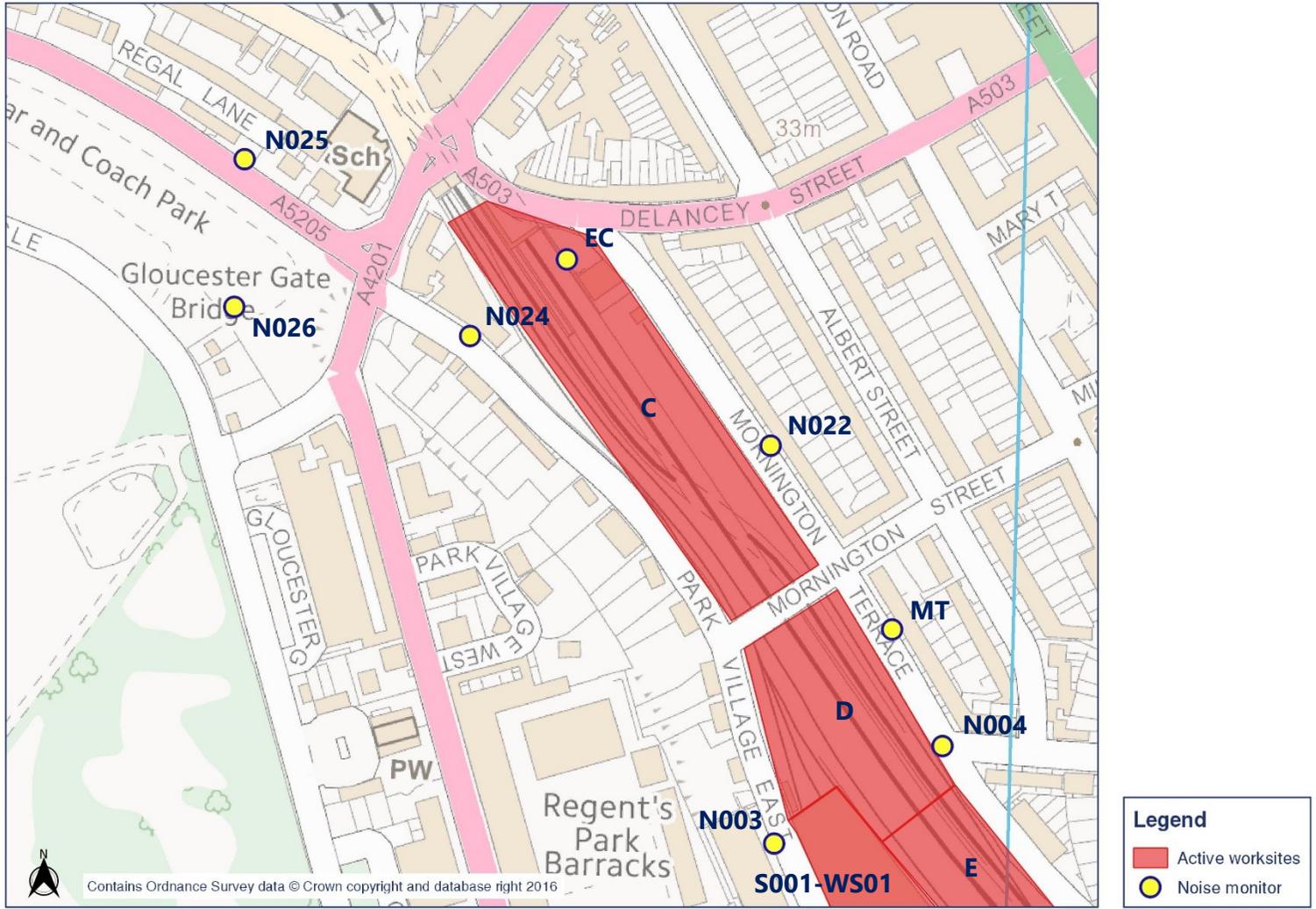


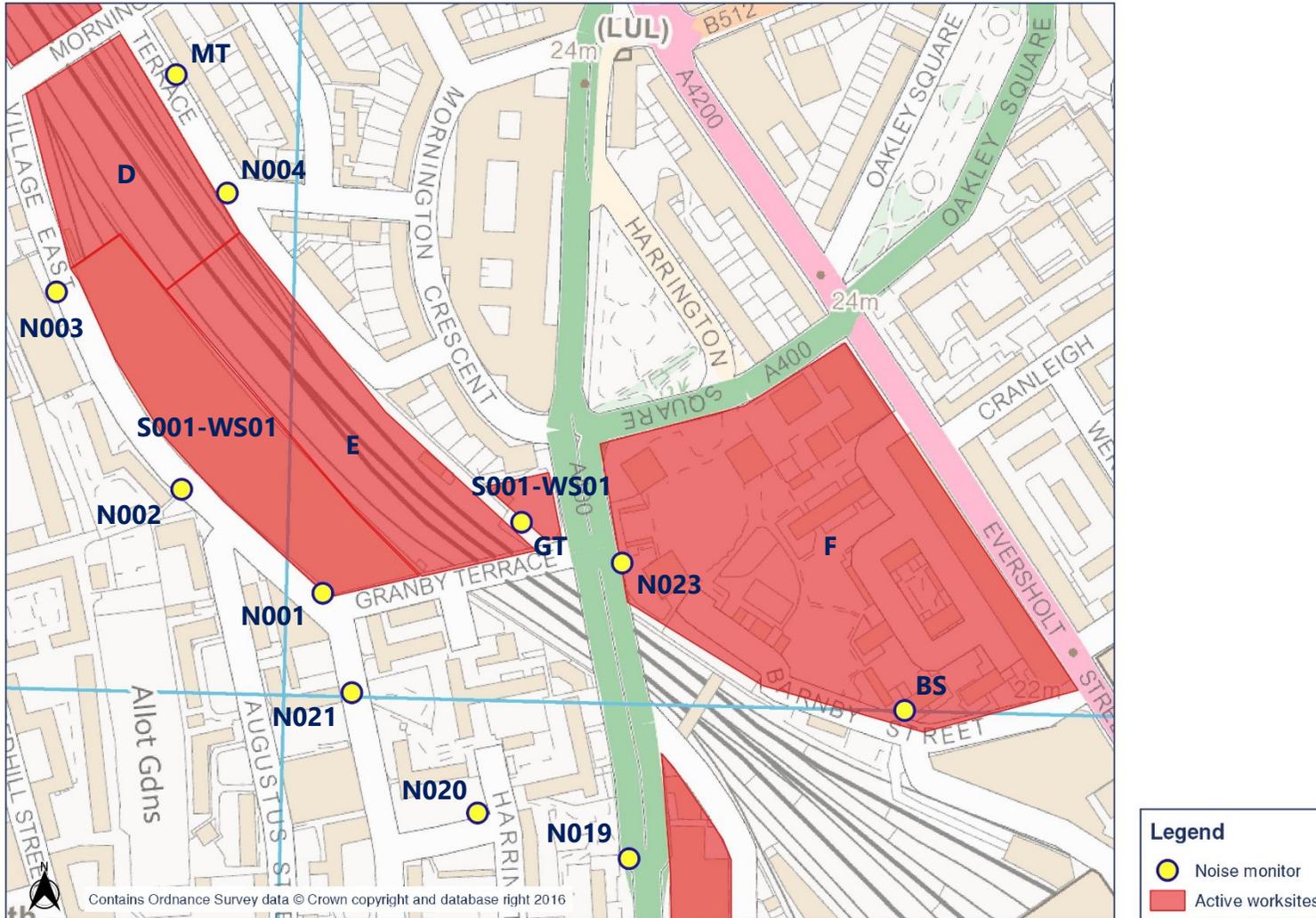


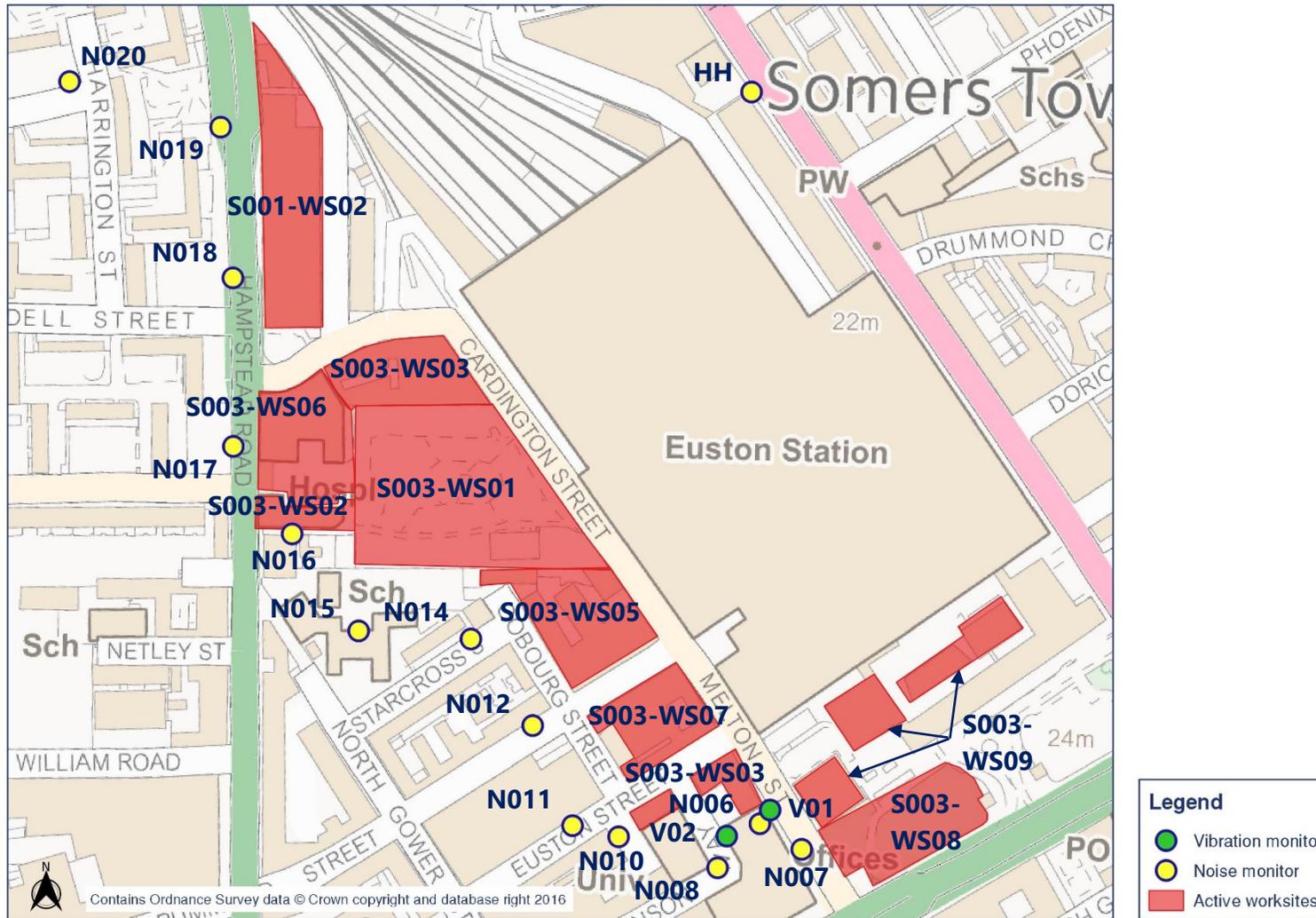


Appendix B Monitoring Locations







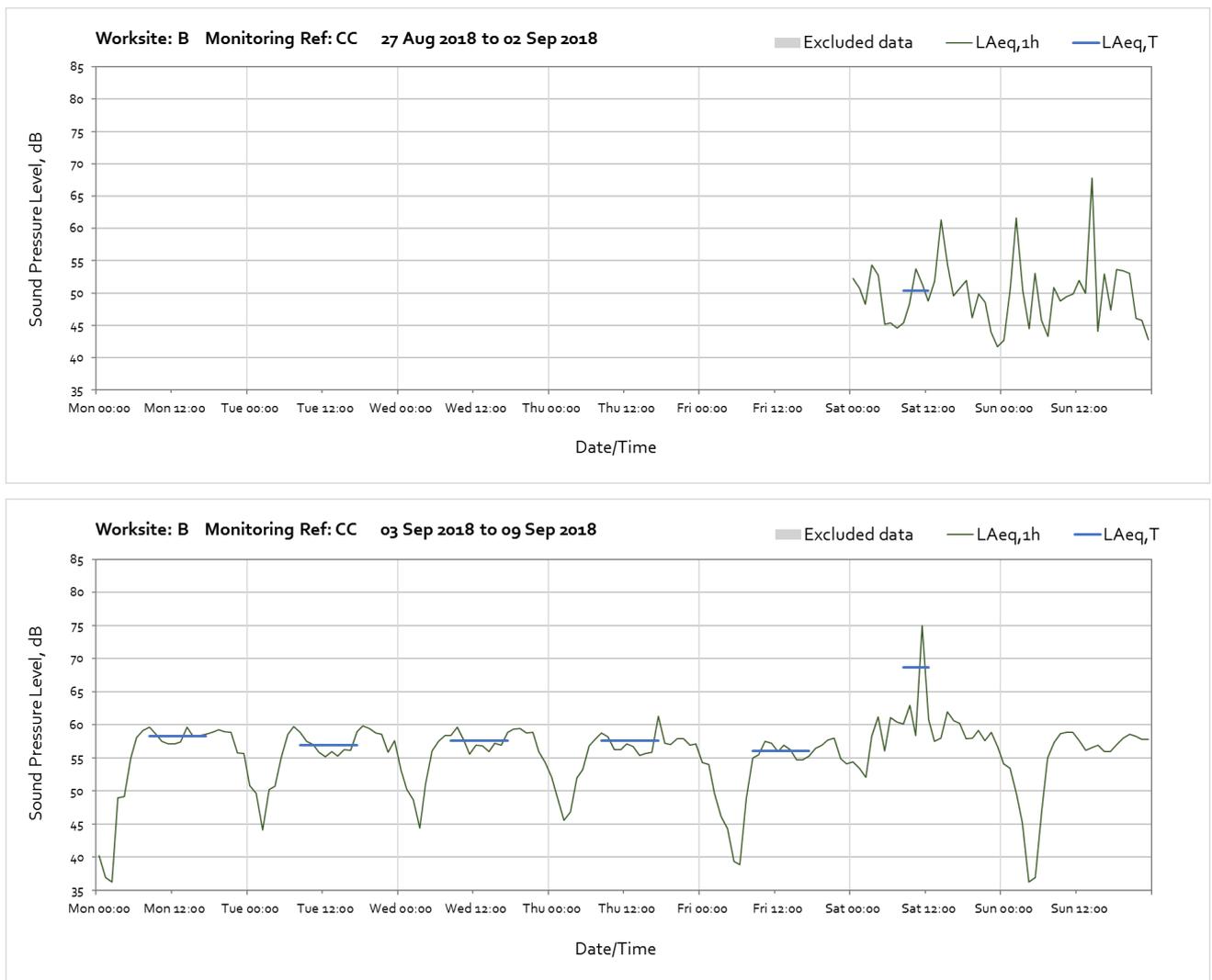


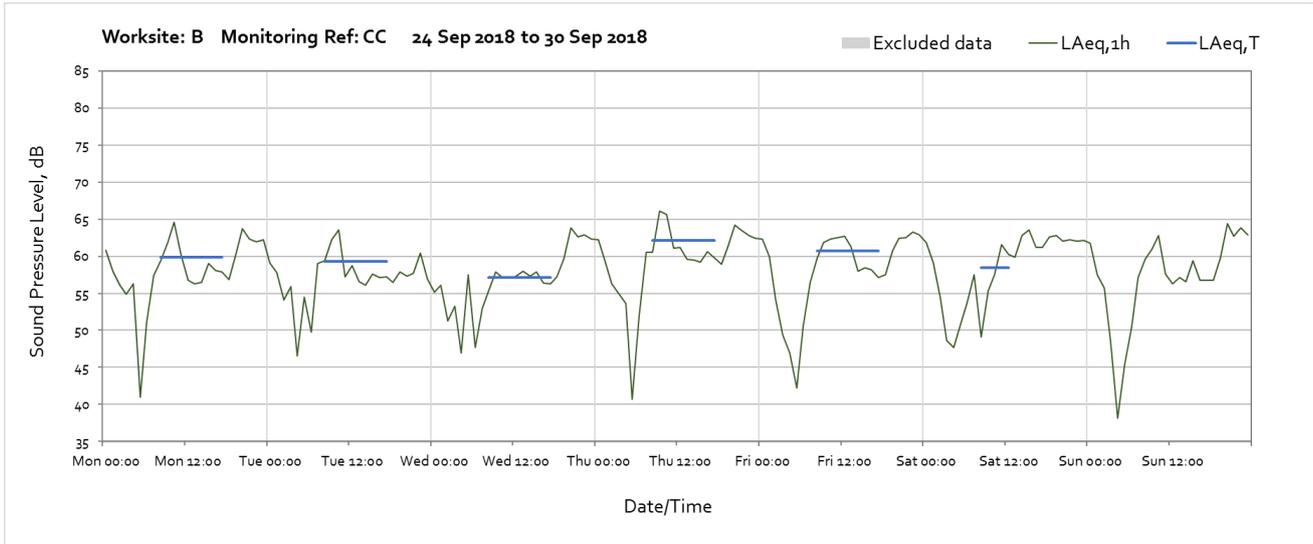
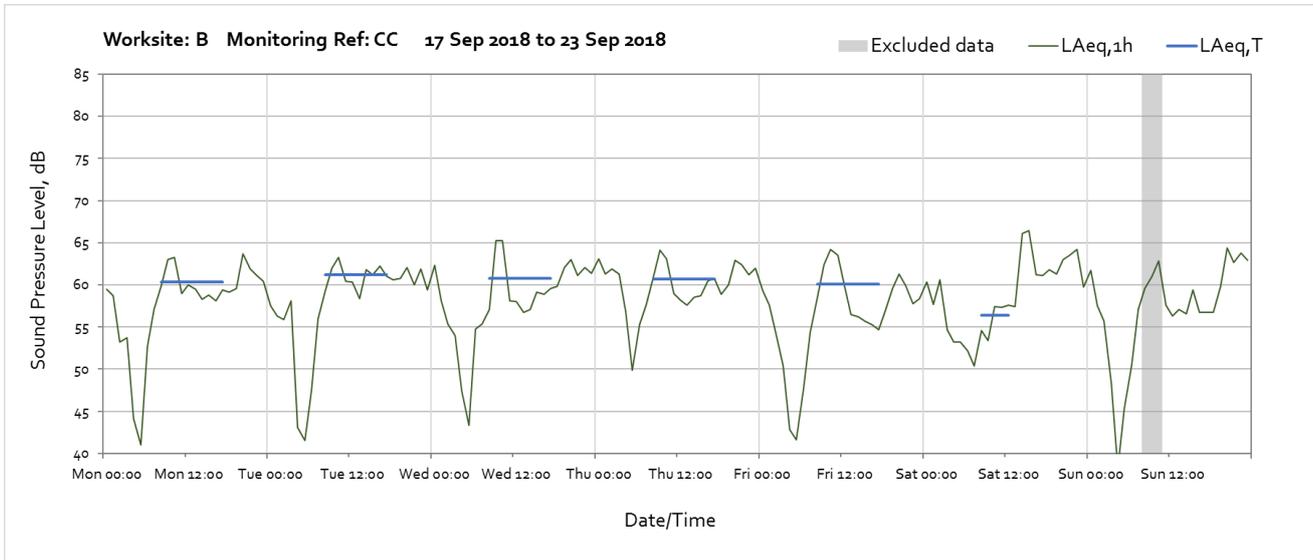
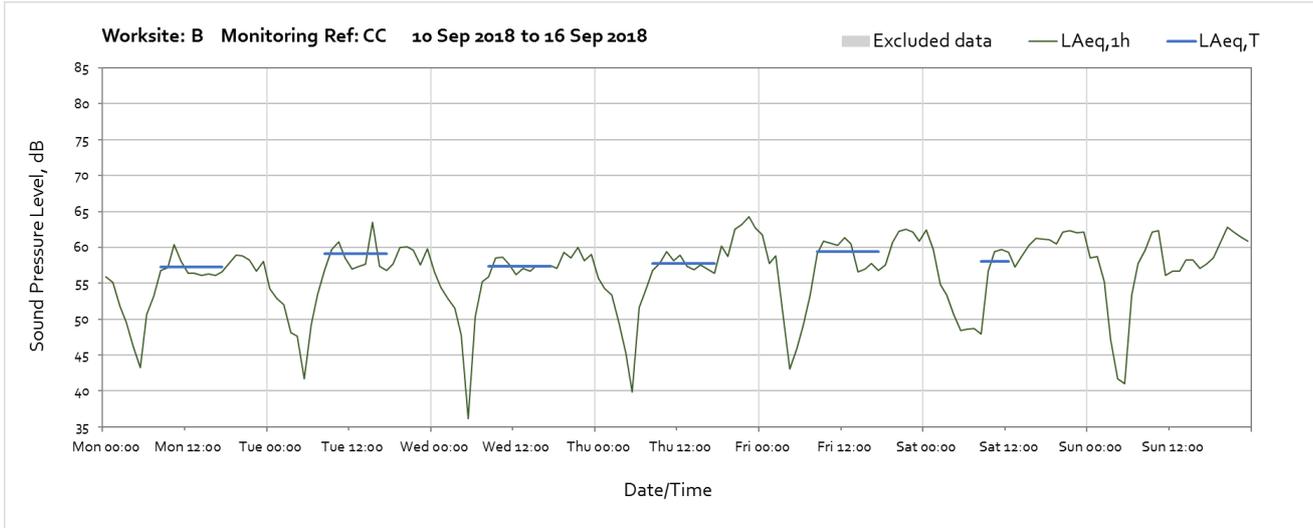
Appendix C Data

Noise

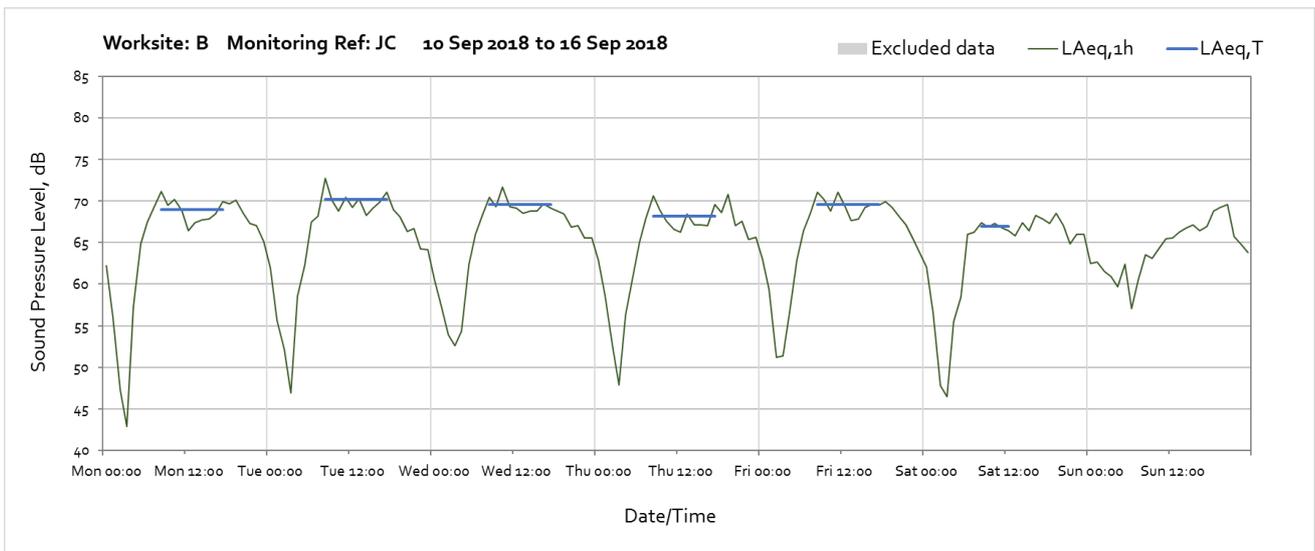
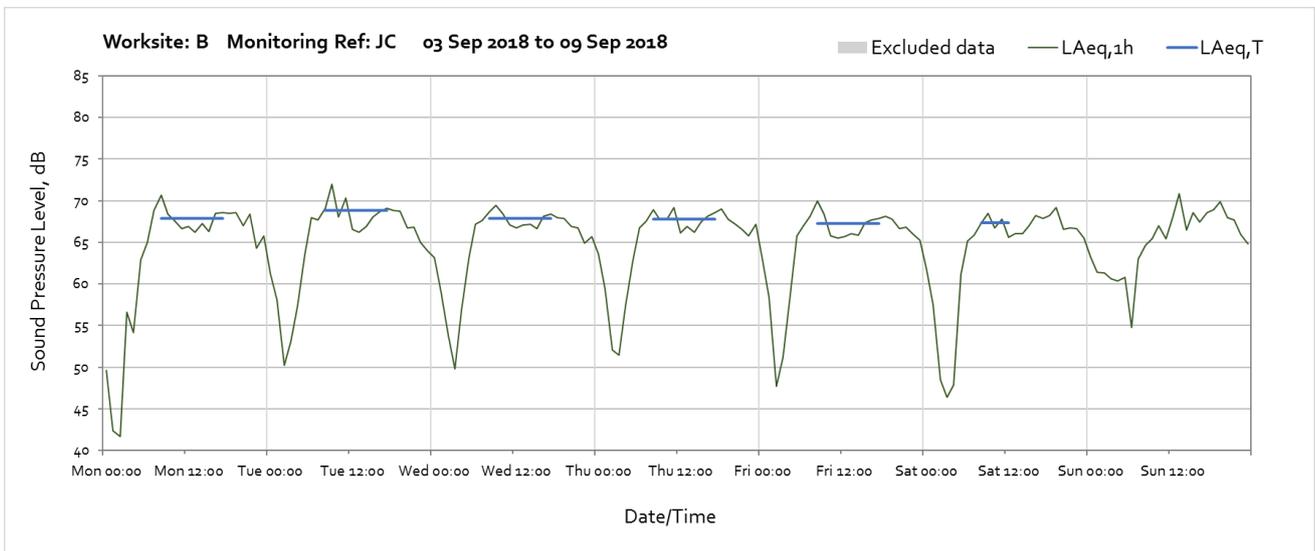
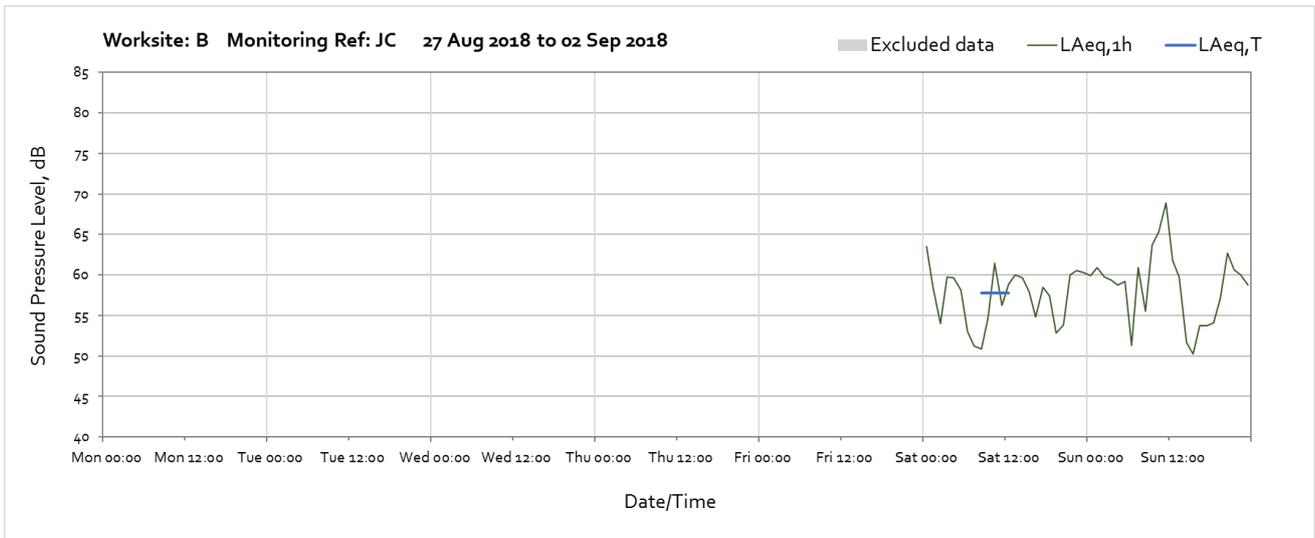
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

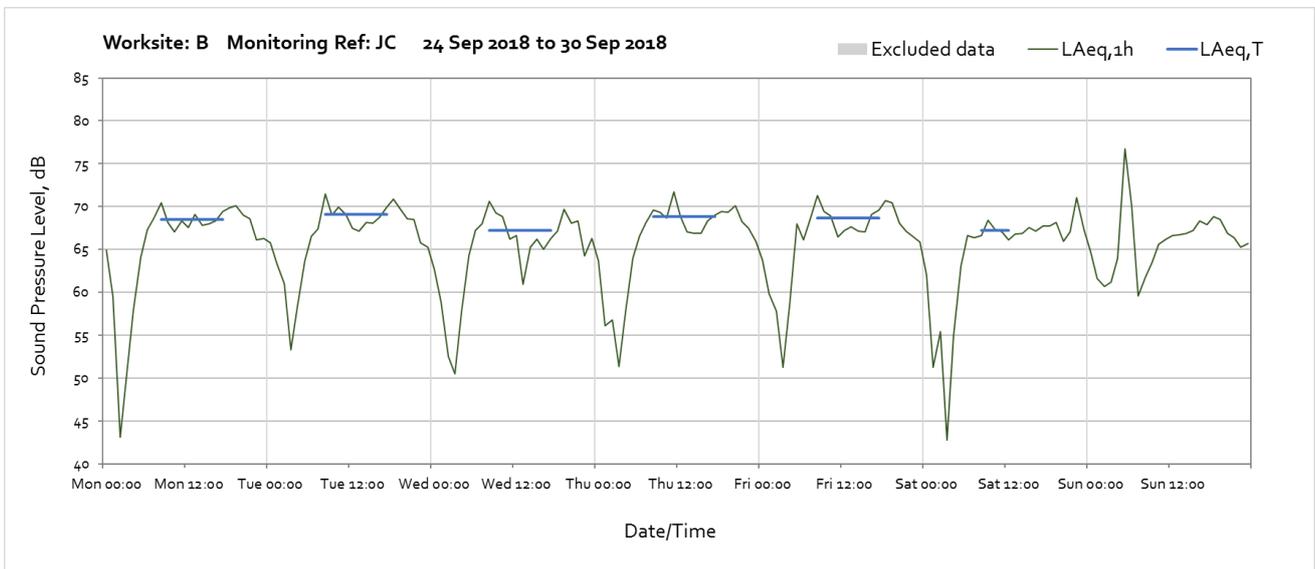
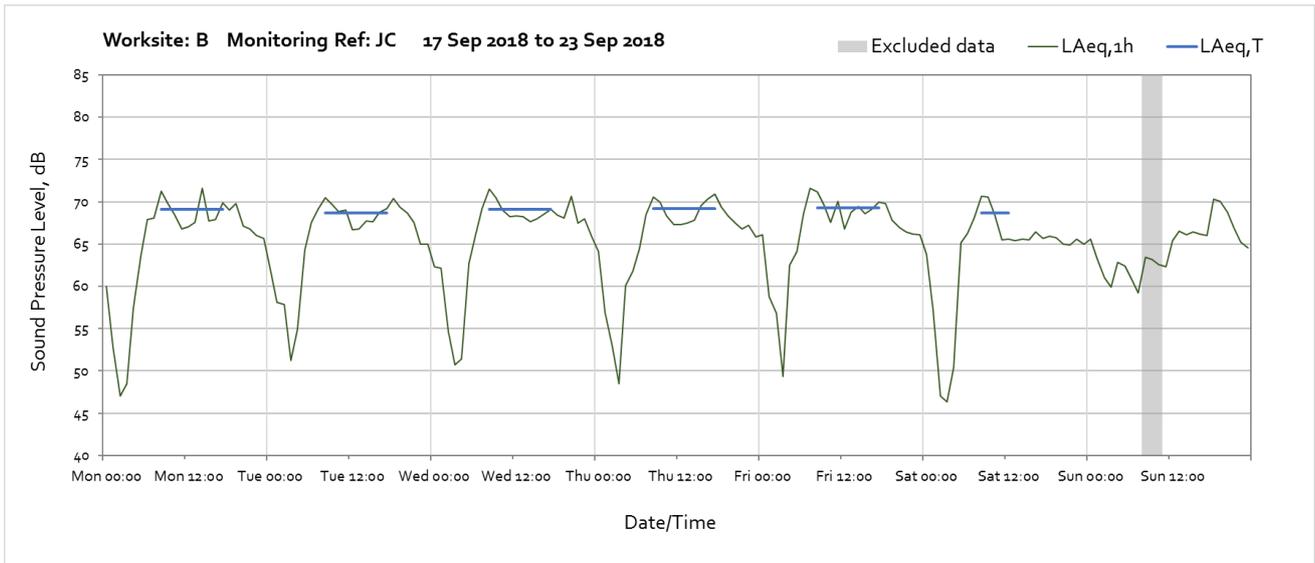
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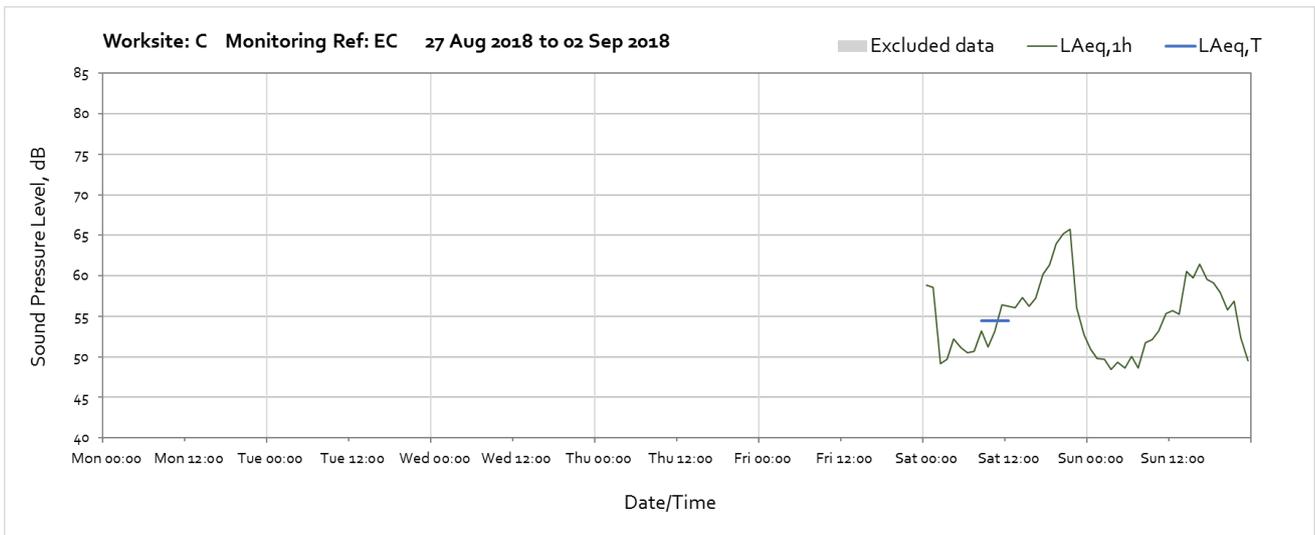


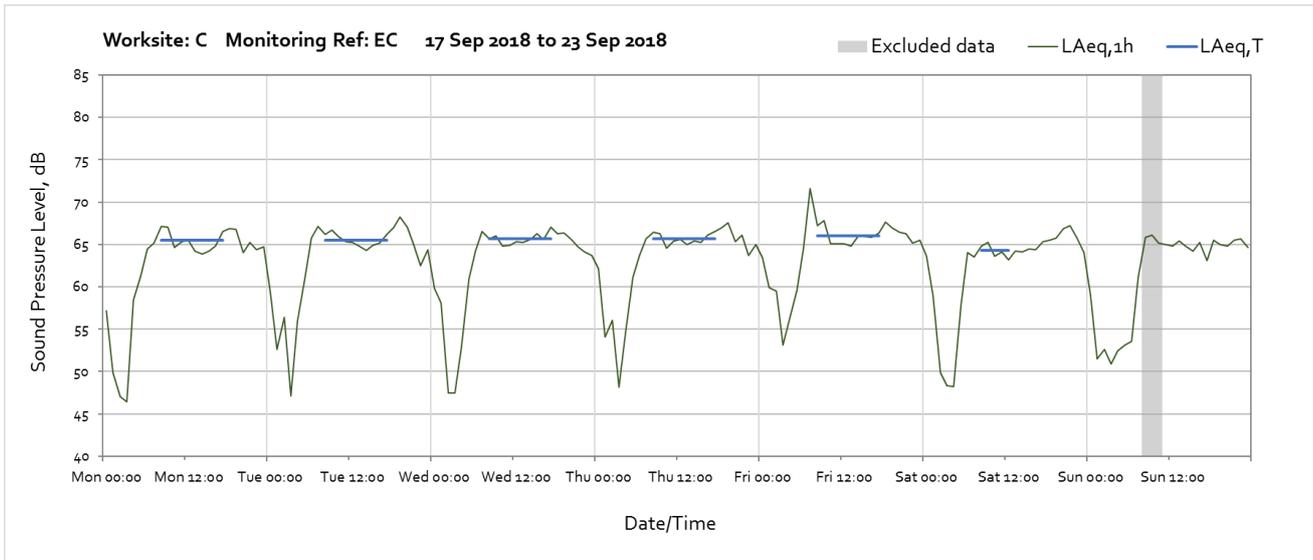
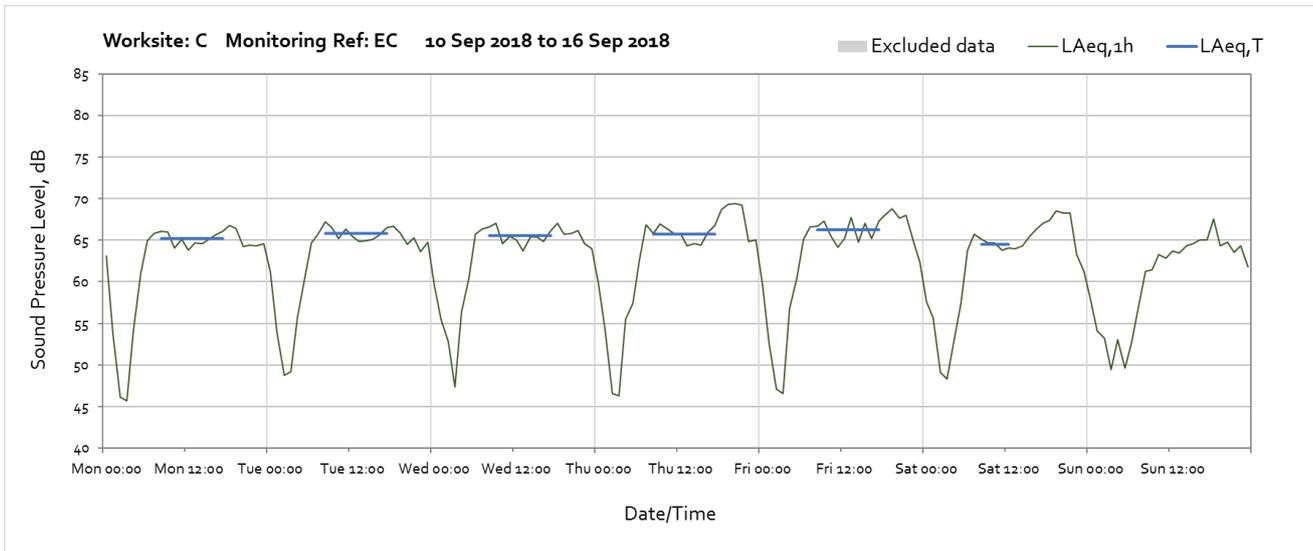
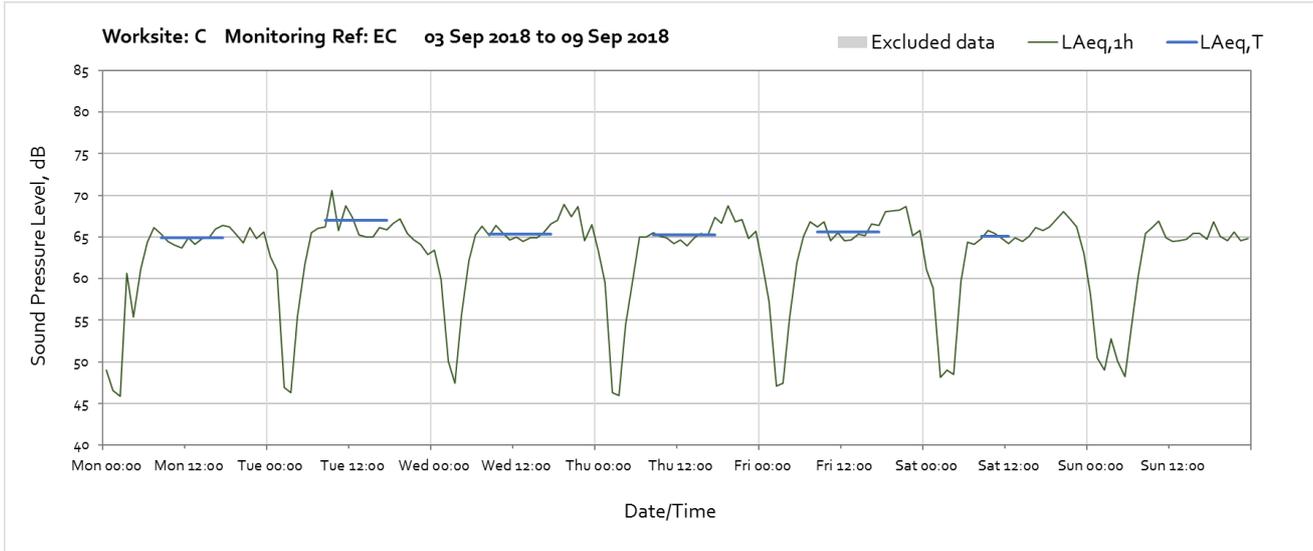
Worksite: B – Monitoring Ref: JC





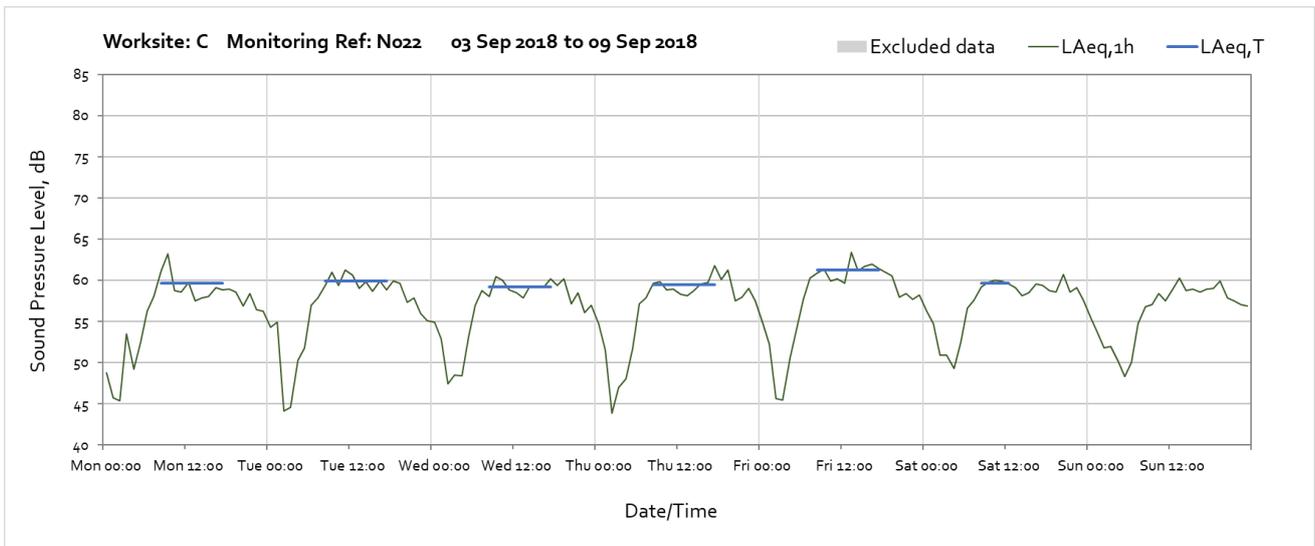
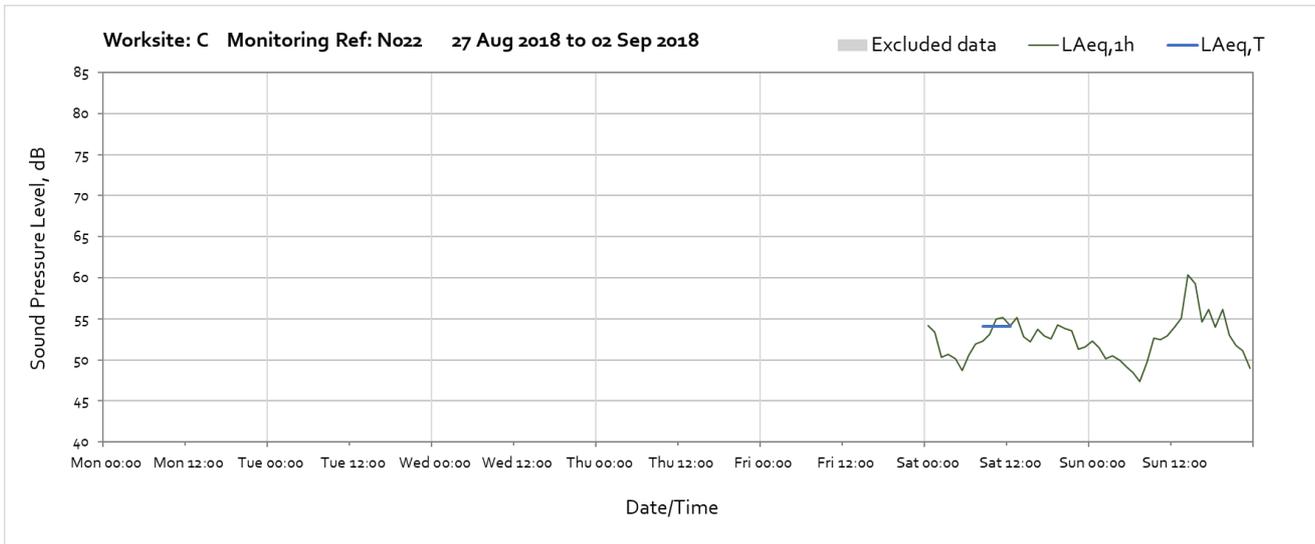
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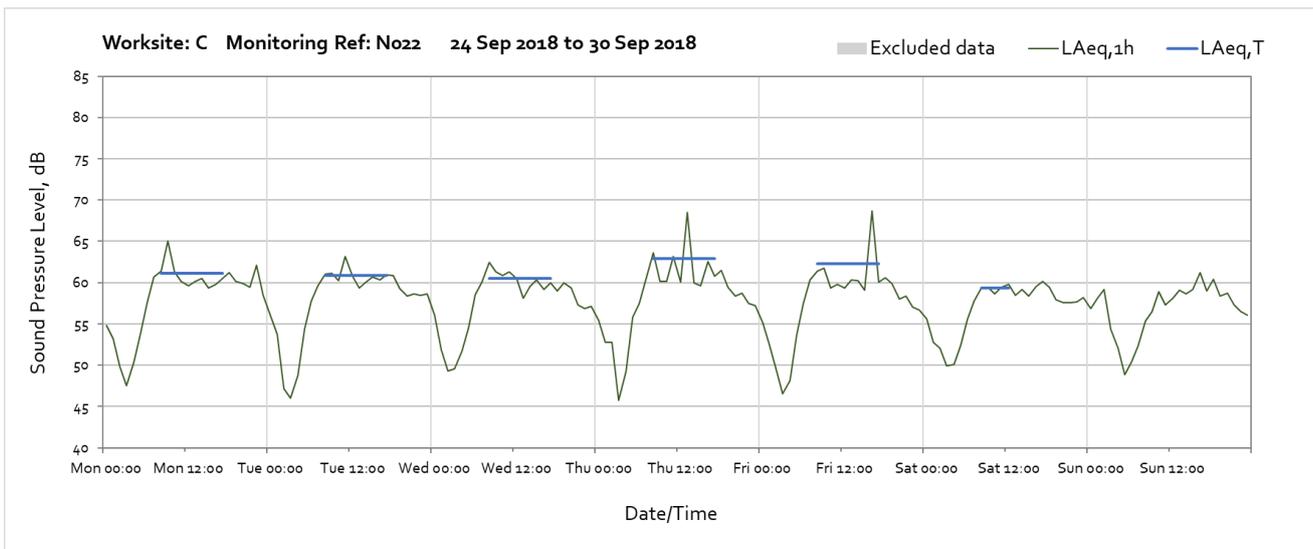
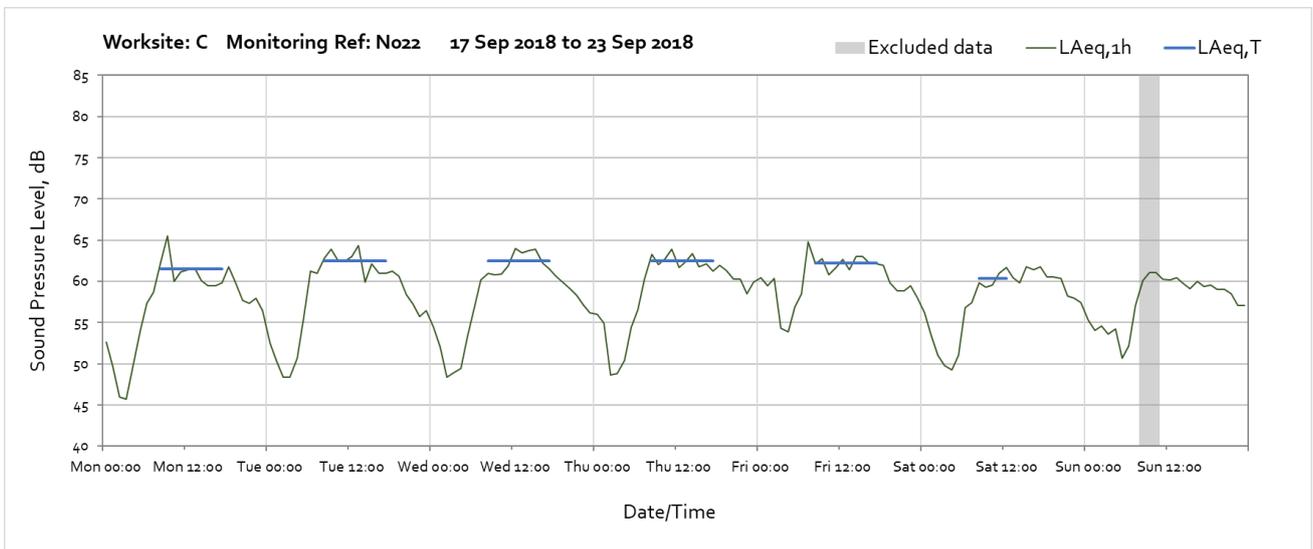
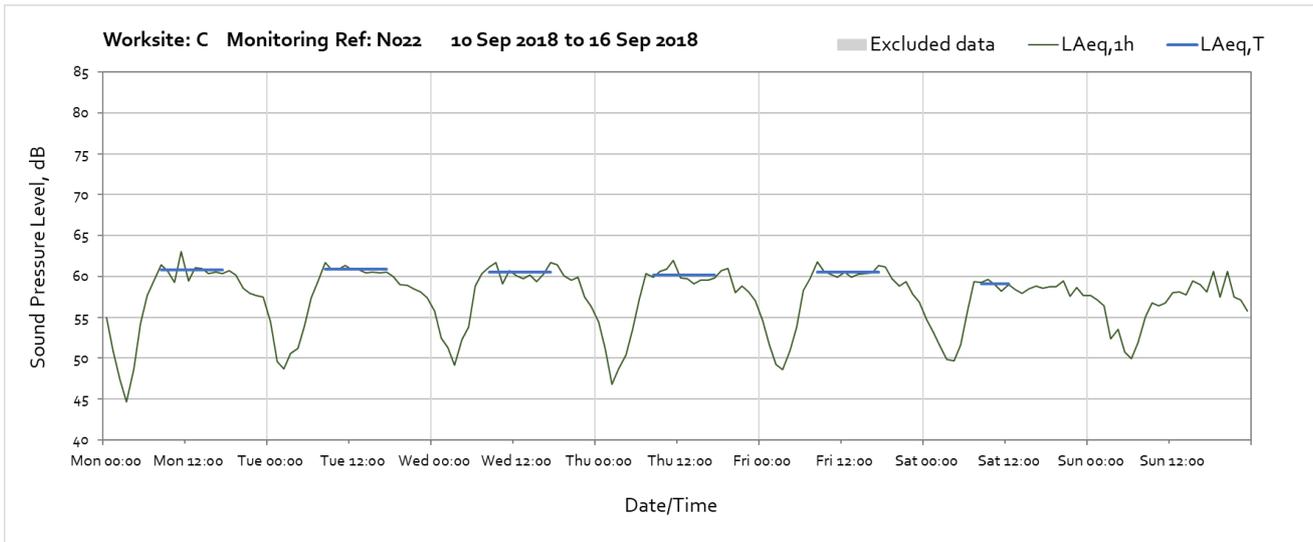




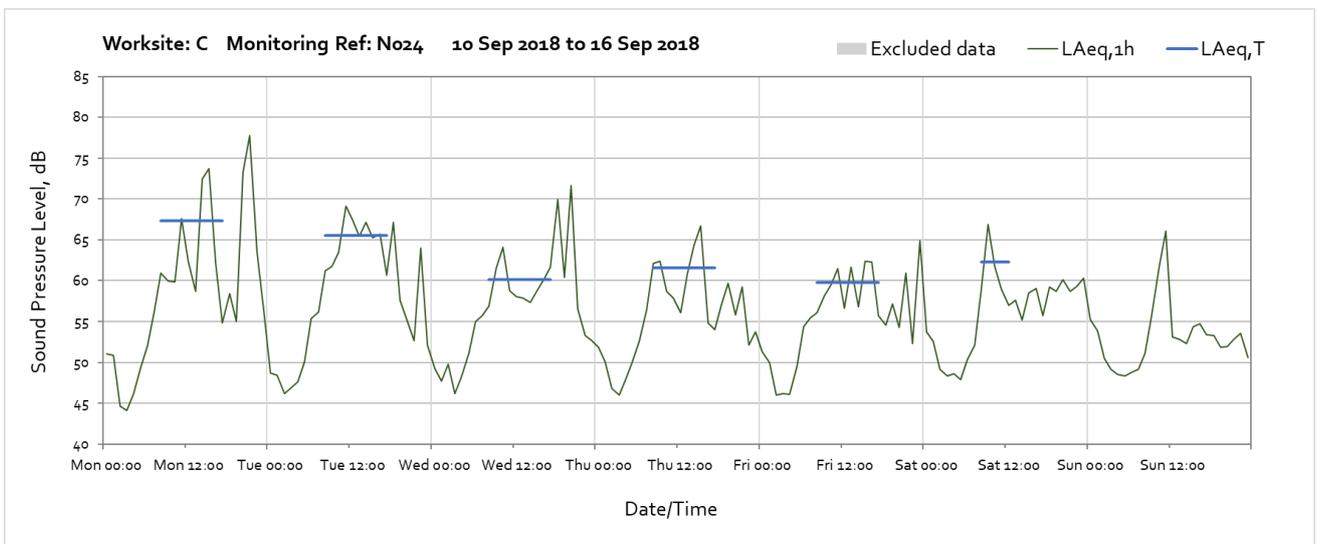
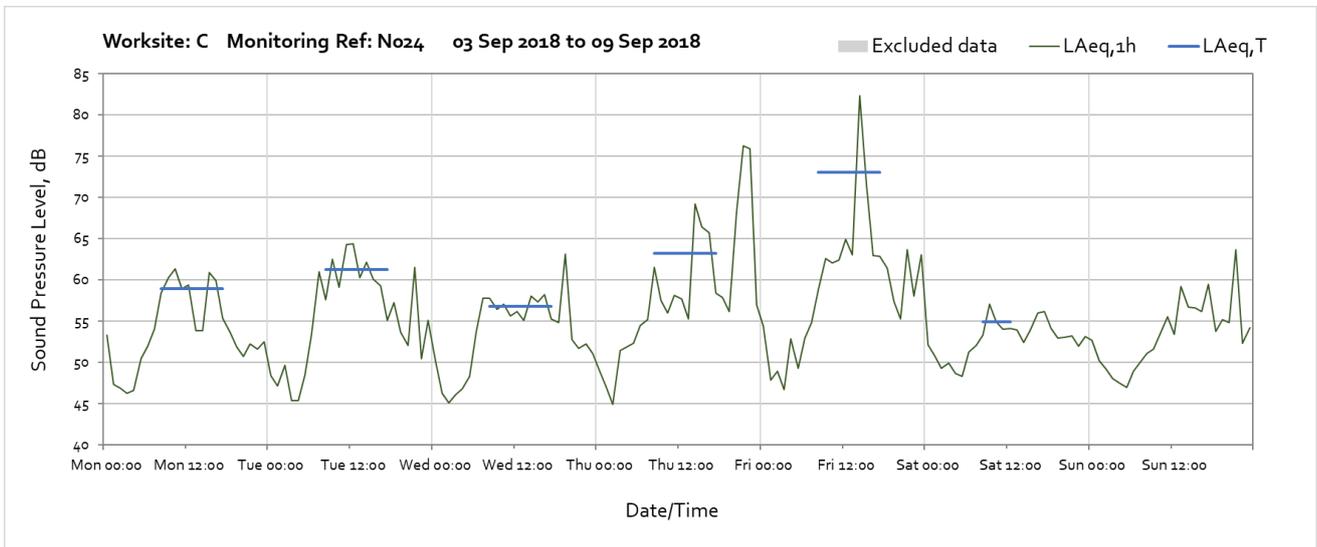
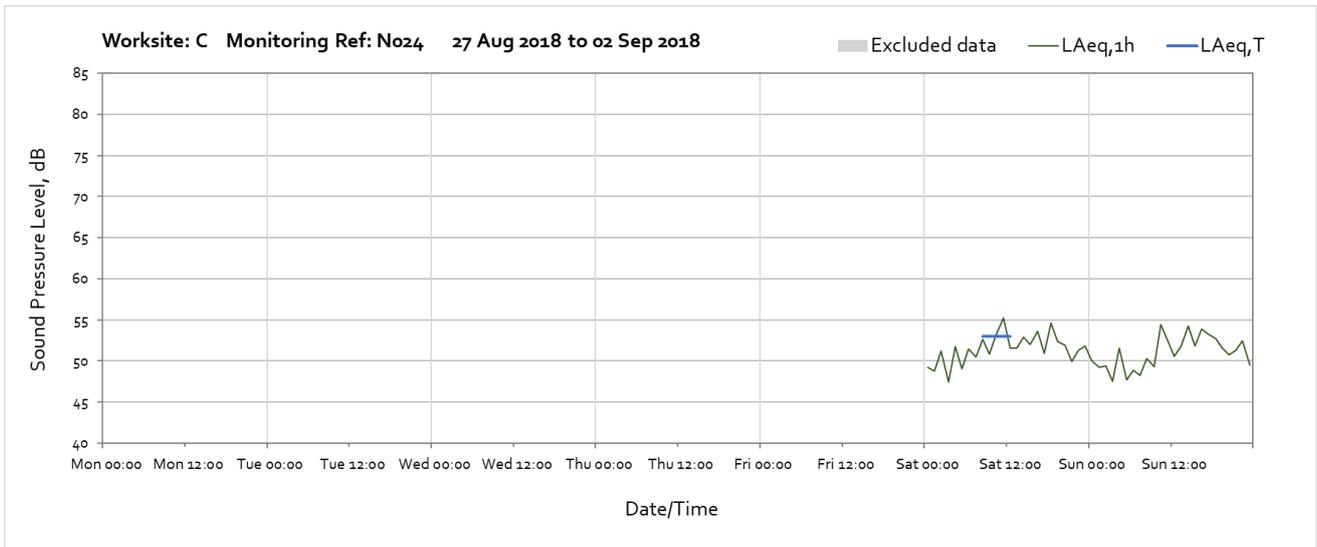


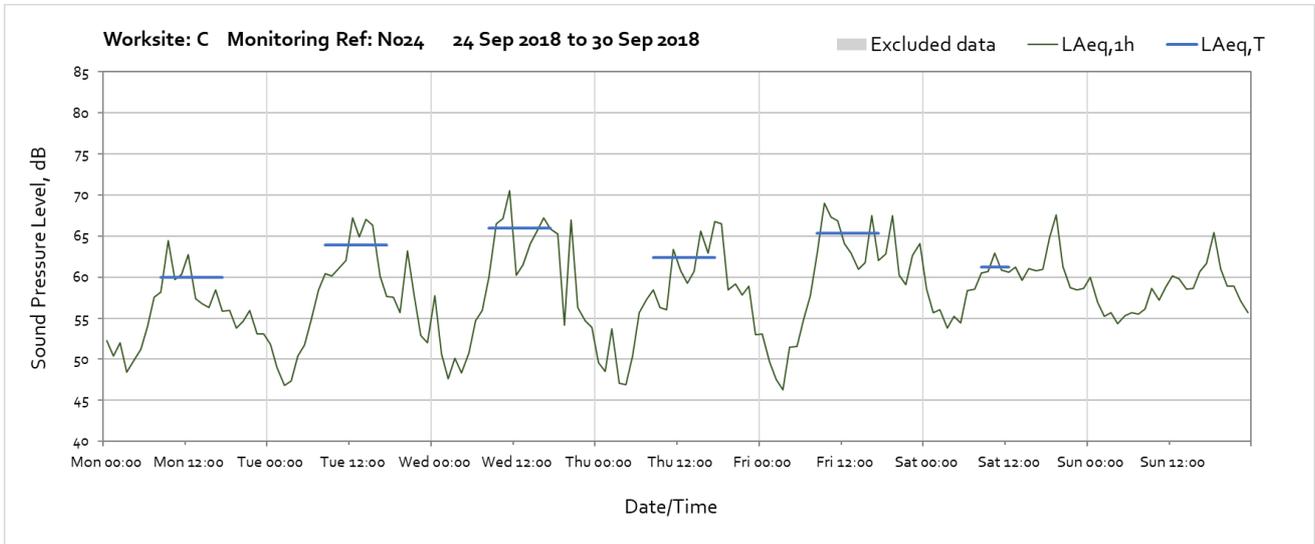
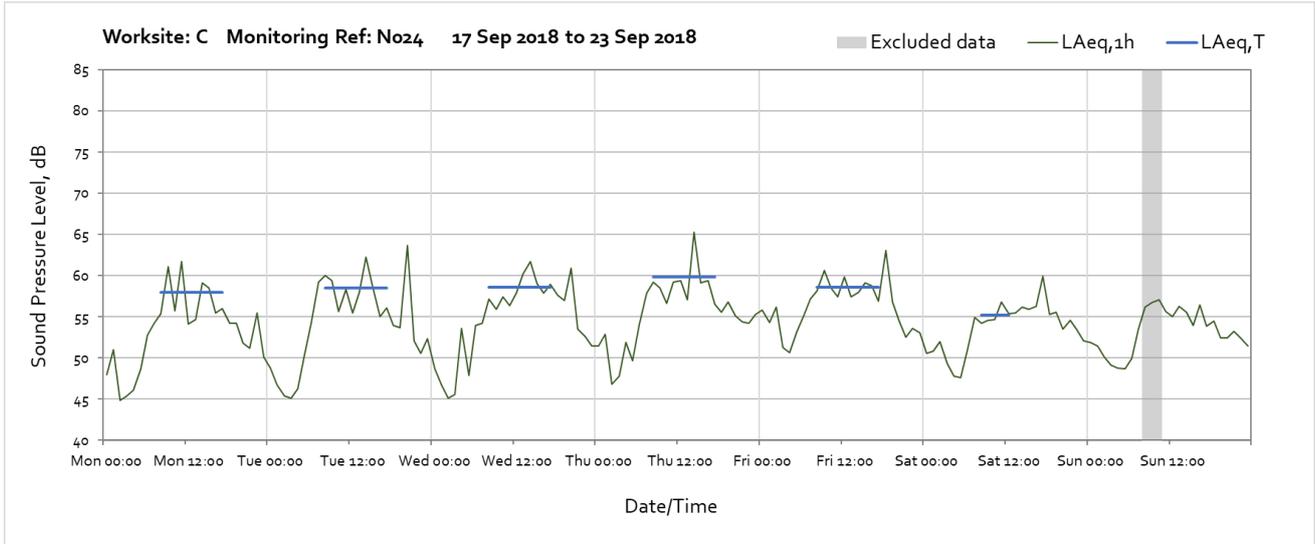
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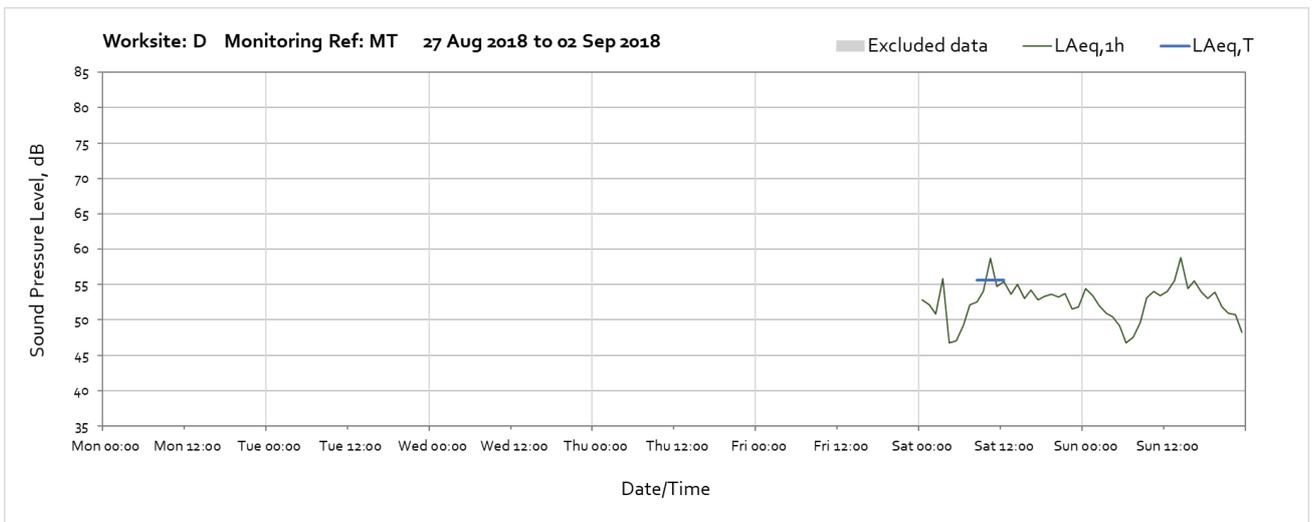


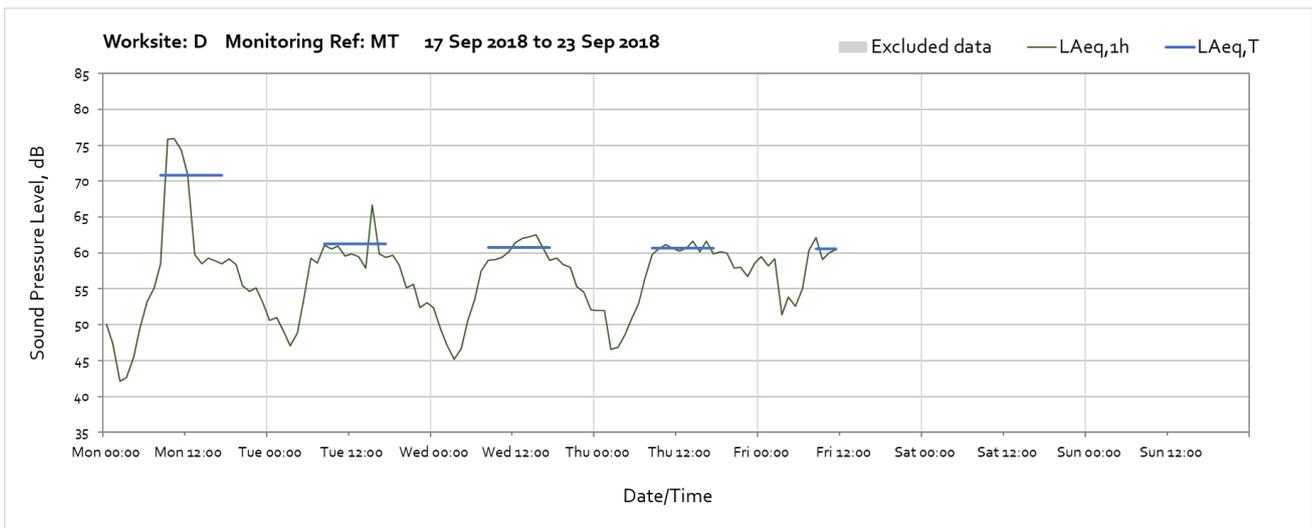
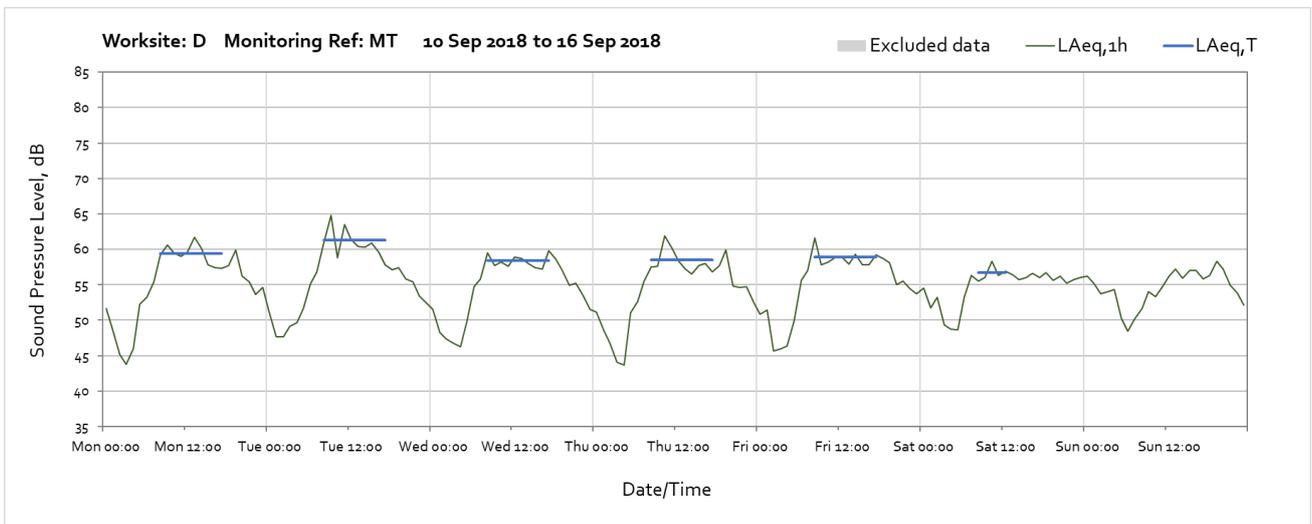
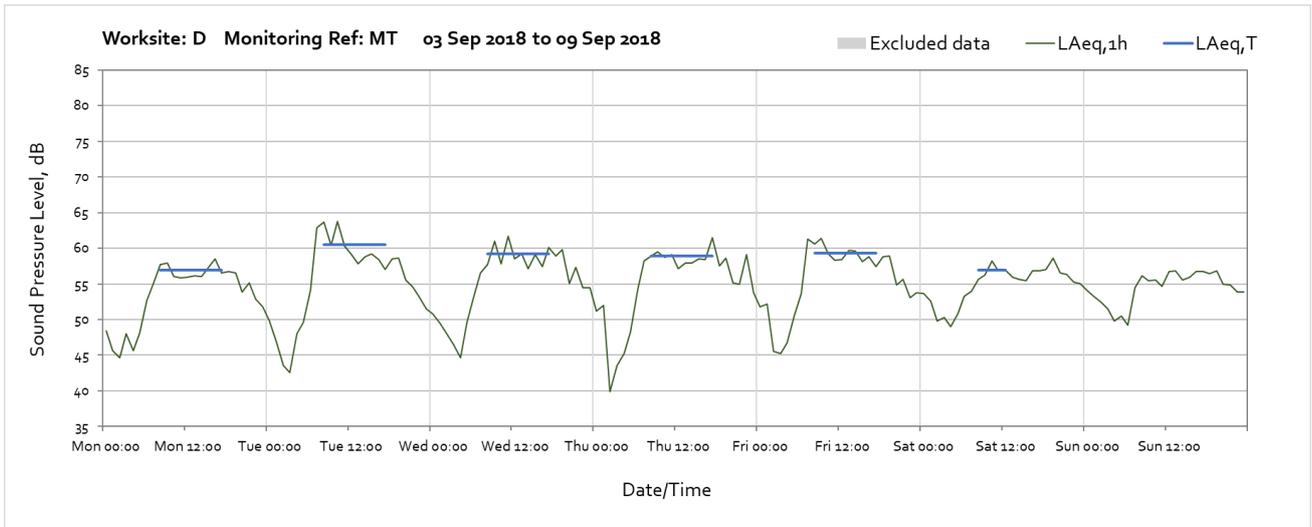
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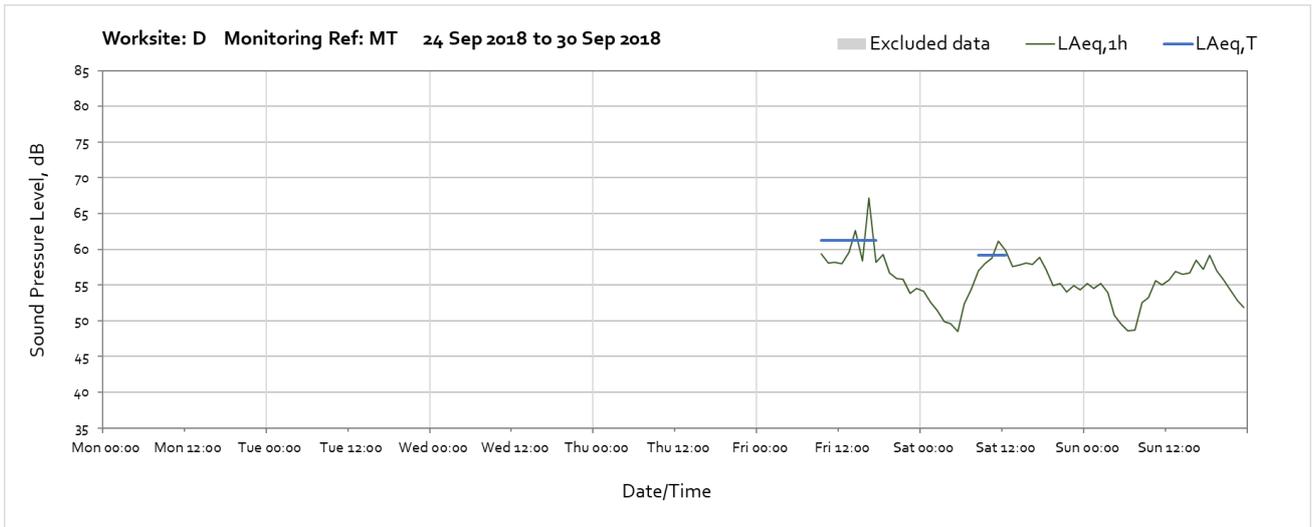


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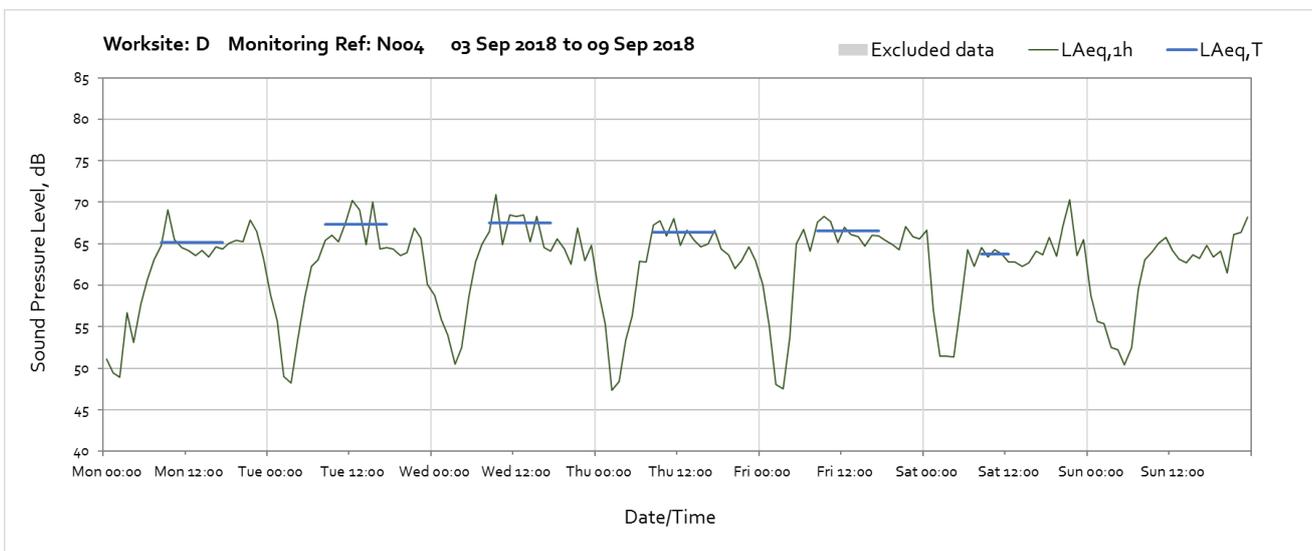
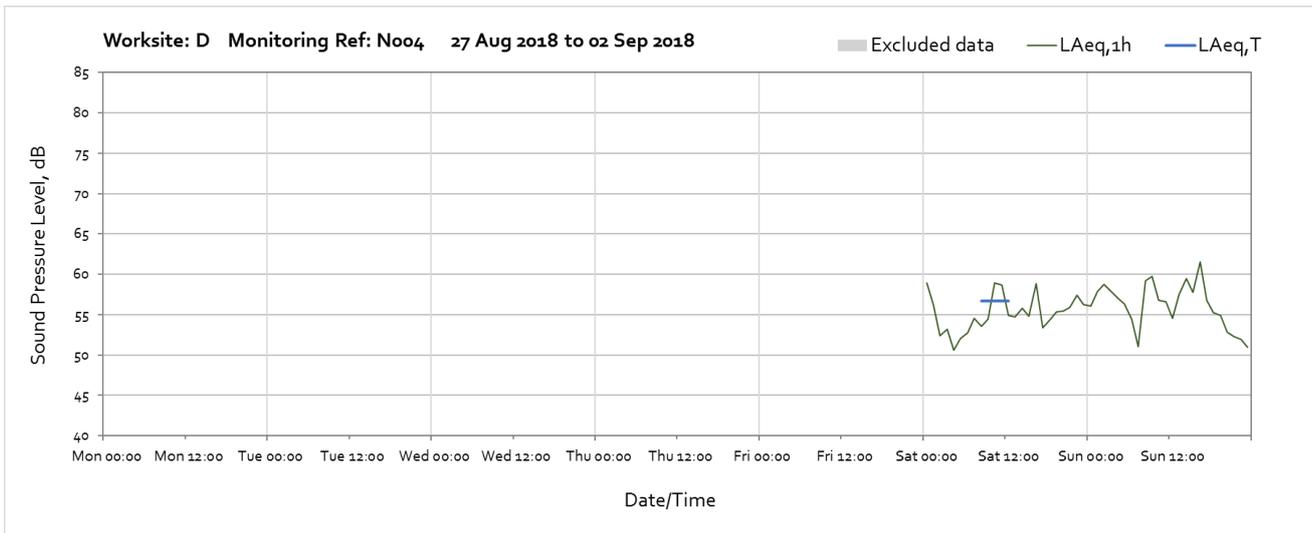


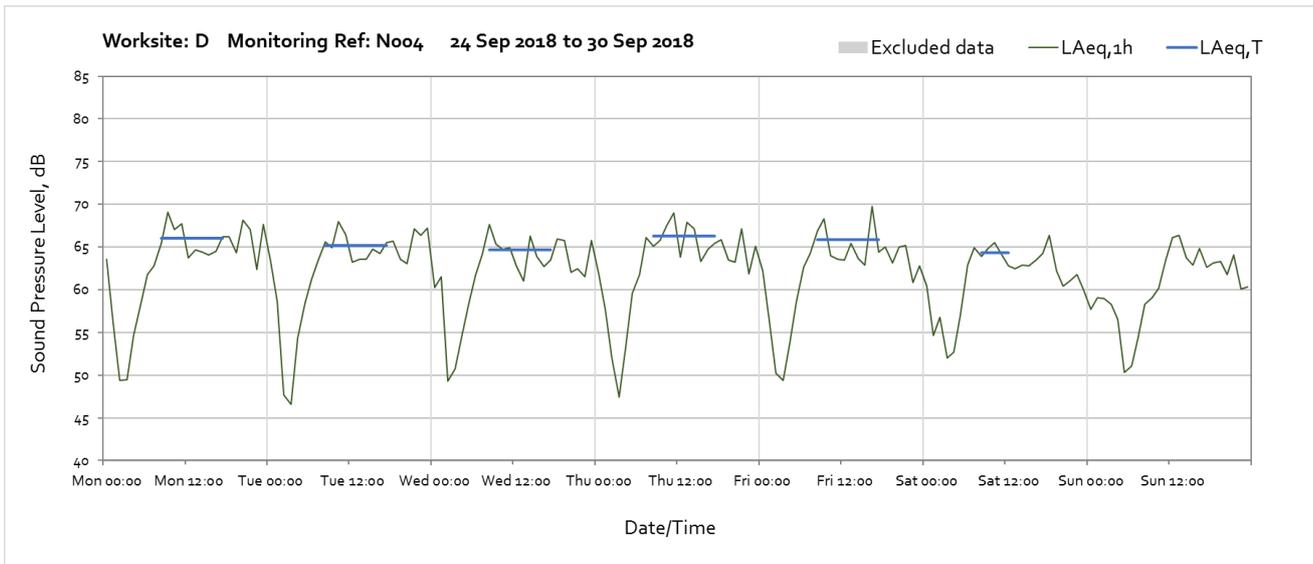
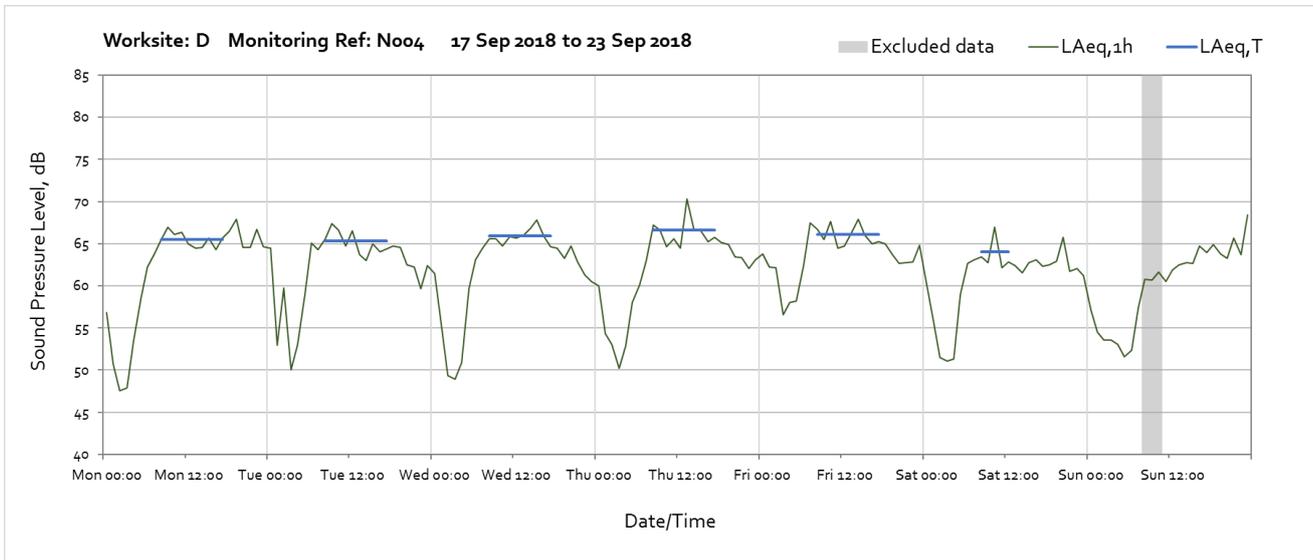
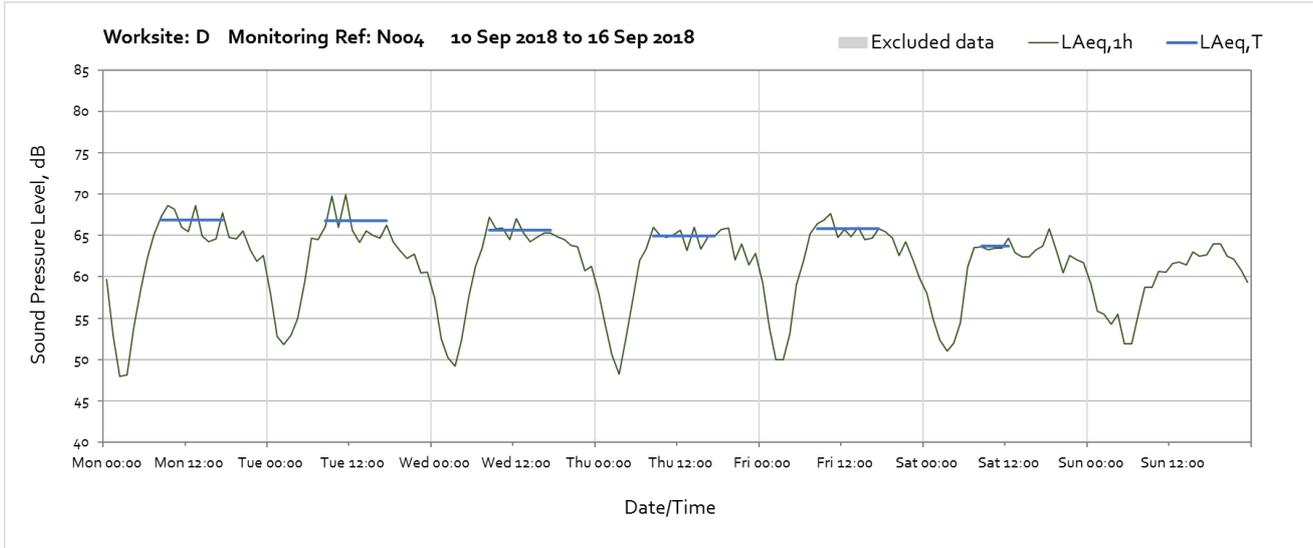
Note – Missing data between 12:00 on Thursday 21 and 09:00 on Friday 28 due to a loss of power at the noise monitor.



Note – Missing data between 12:00 on Thursday 21 and 09:00 on Friday 28 due to a loss of power at the noise monitor.

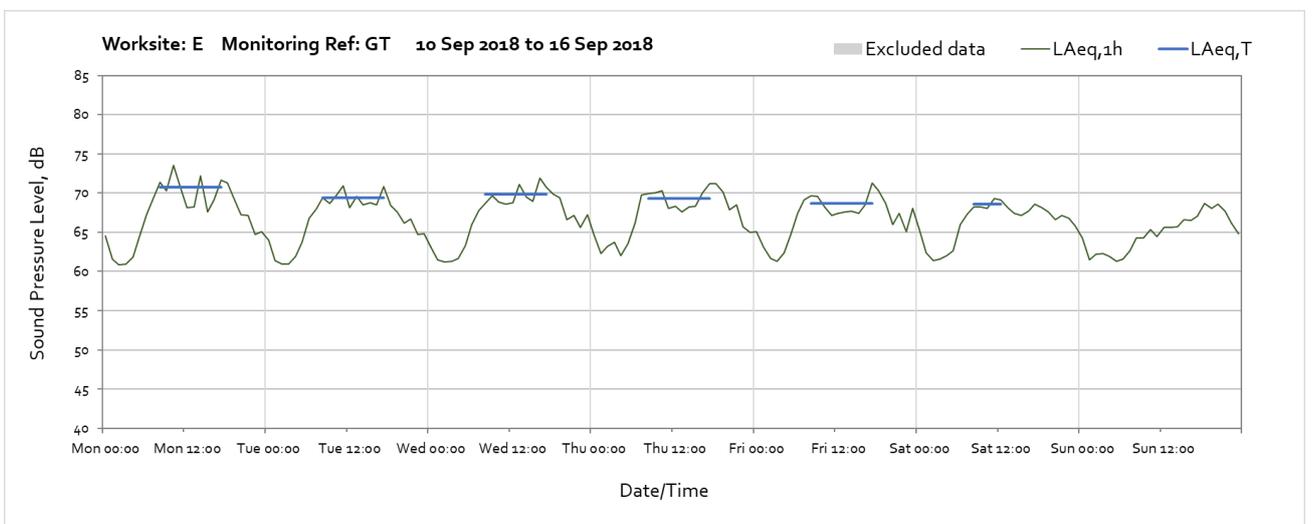
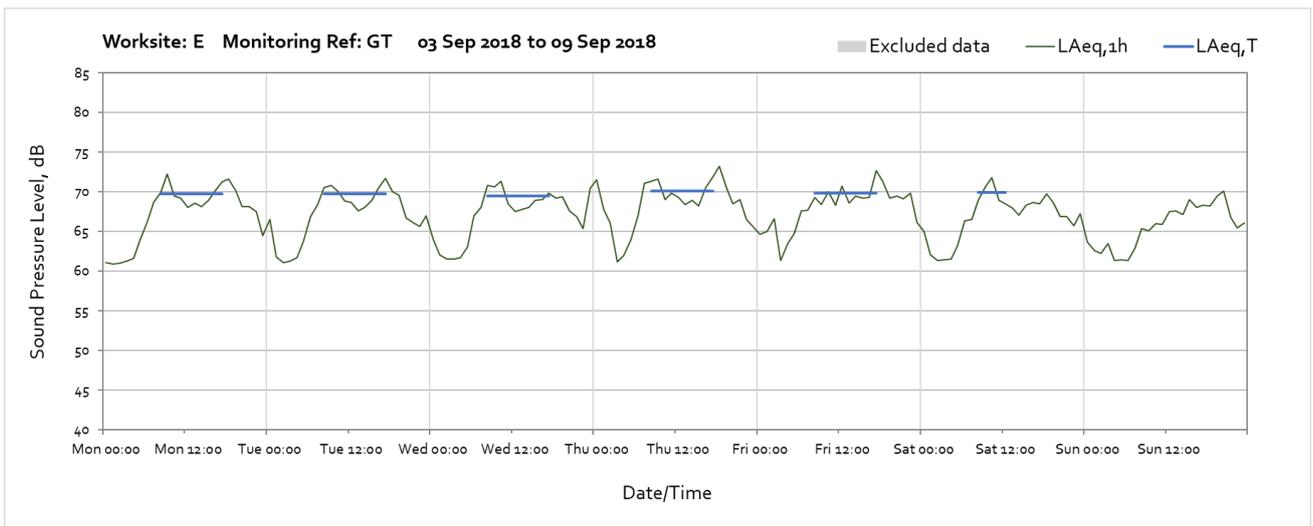
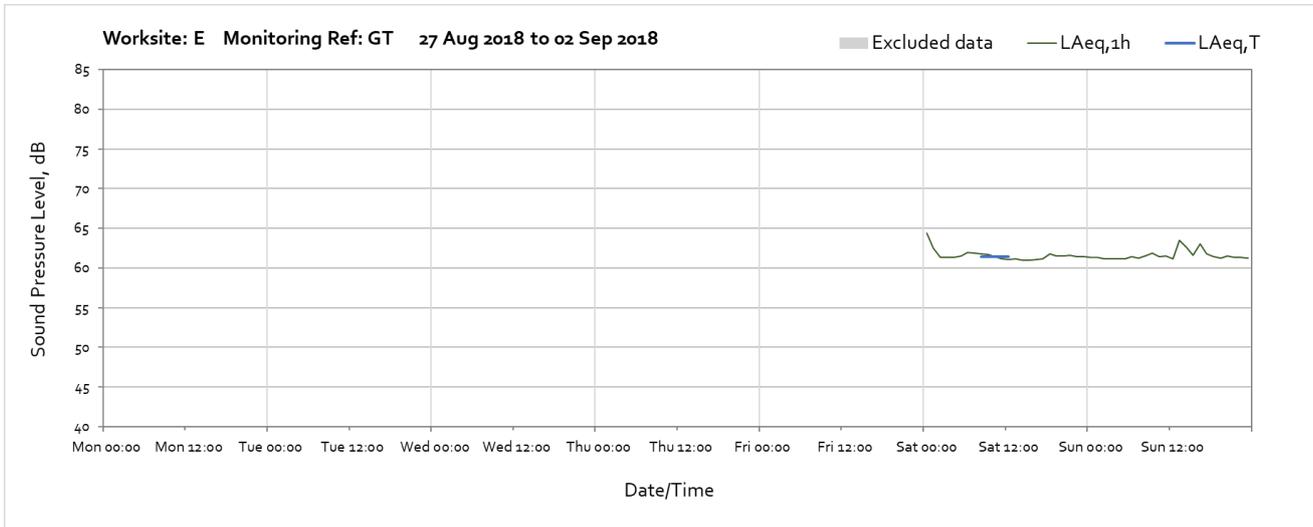
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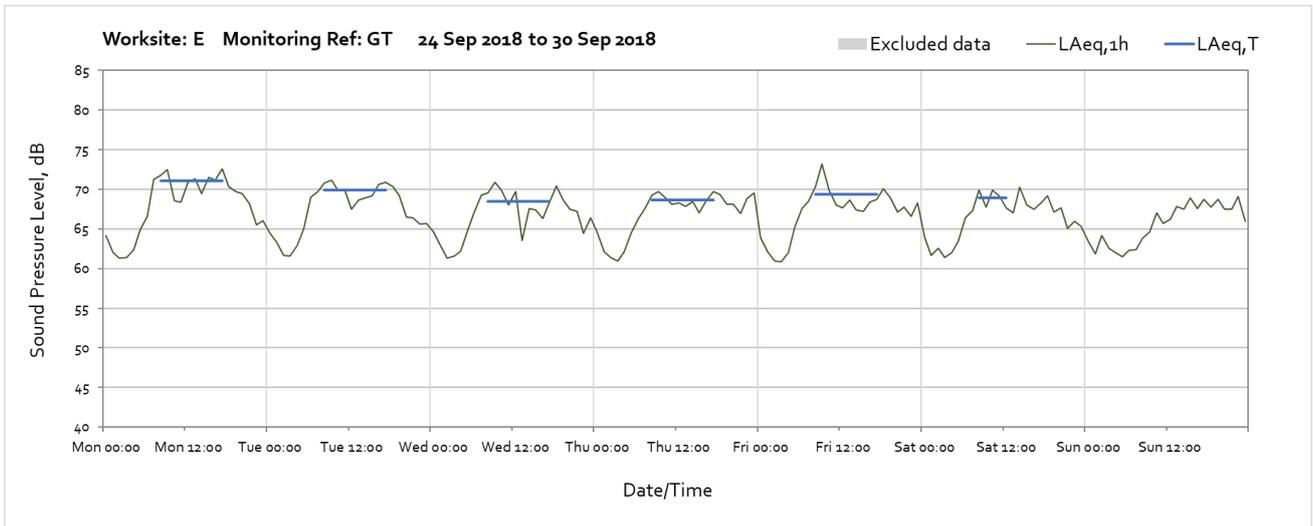
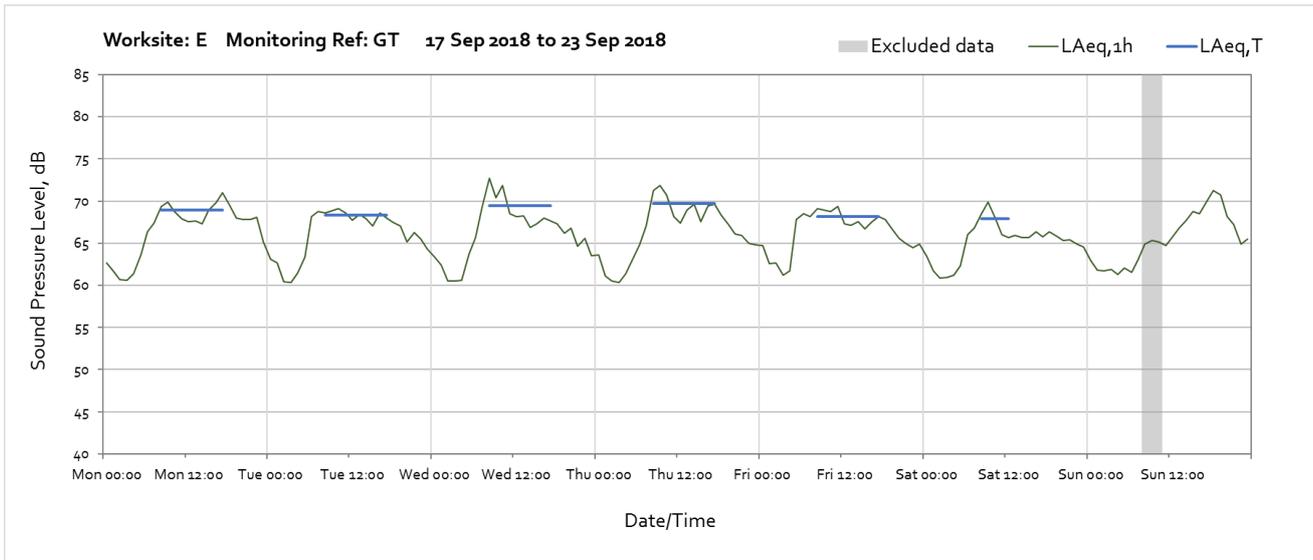




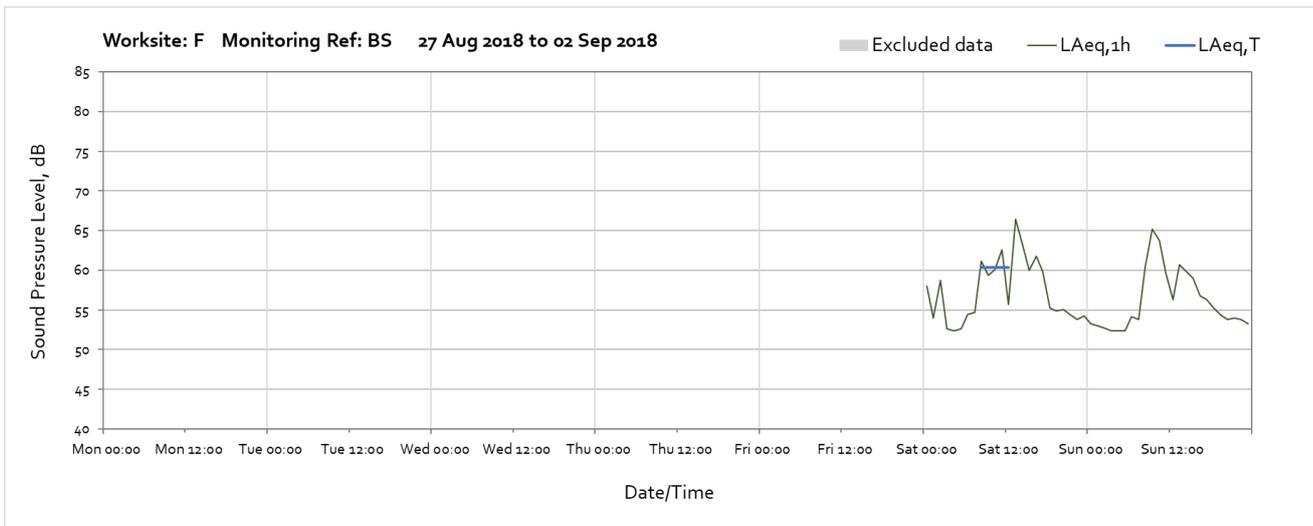
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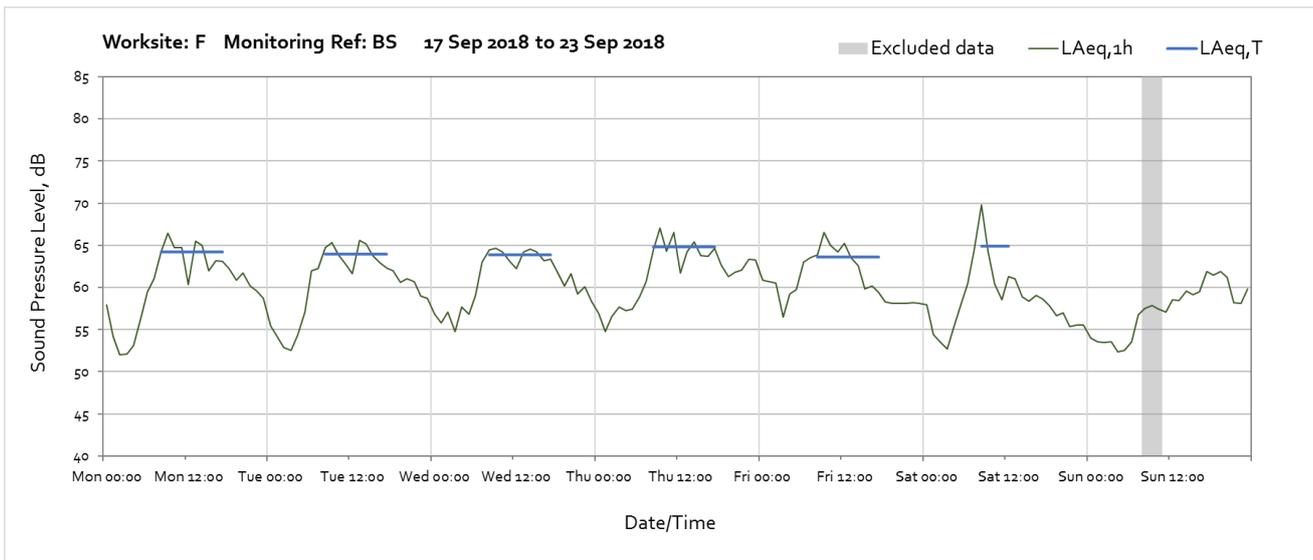
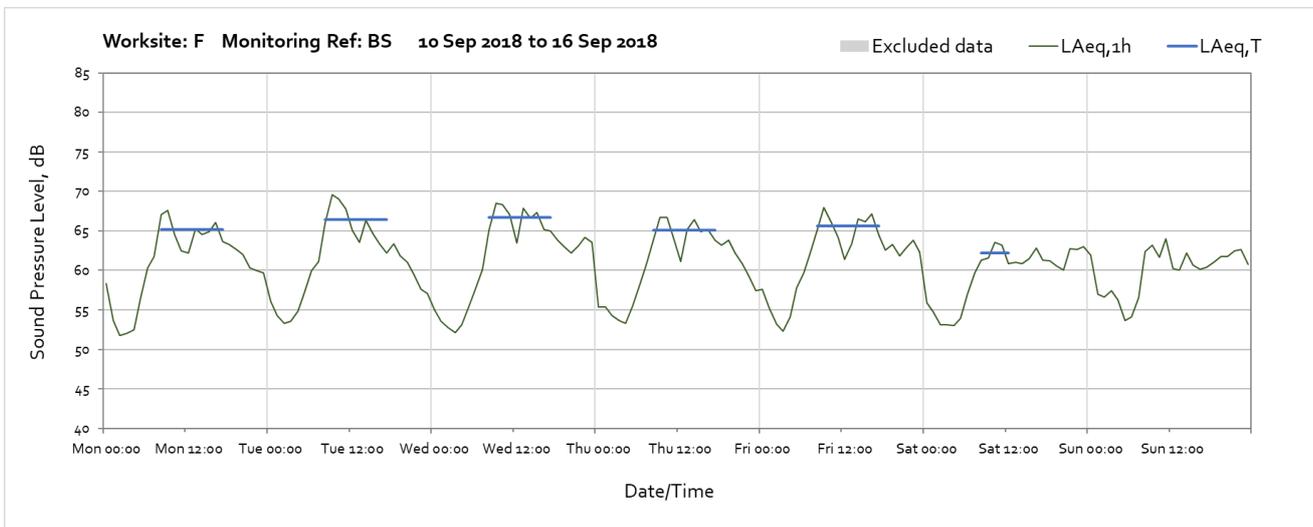
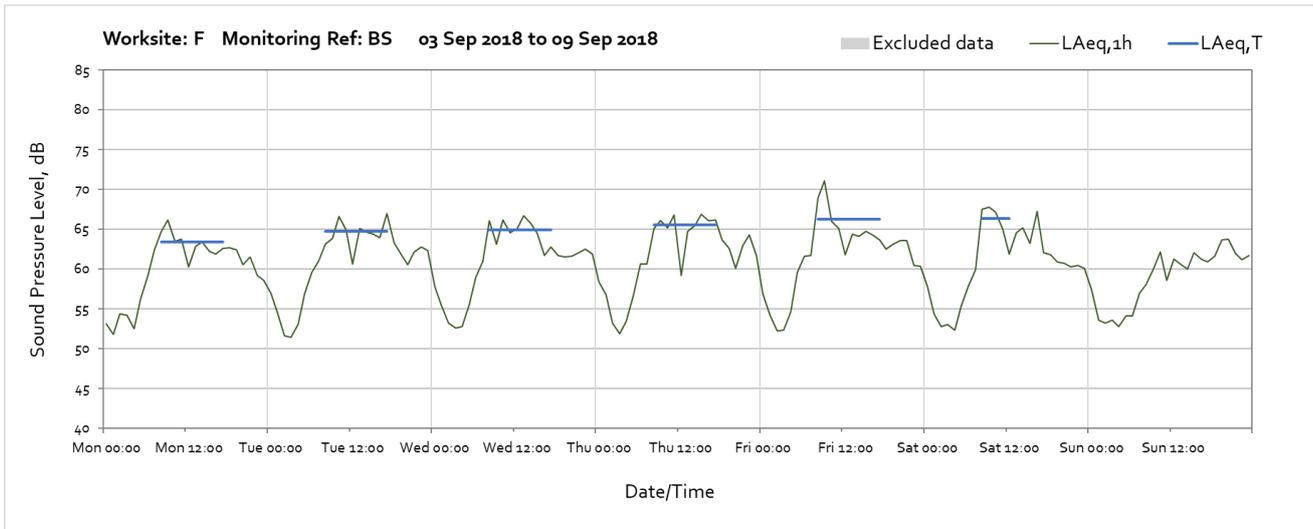
NOTE – Due to the recent installation of a power generator in close proximity to the noise monitor, the measured noise levels are not representative of noise at surrounding areas. This monitor is being relocated to a more representative location on site further from the generator to be more representative of nearby residential properties.

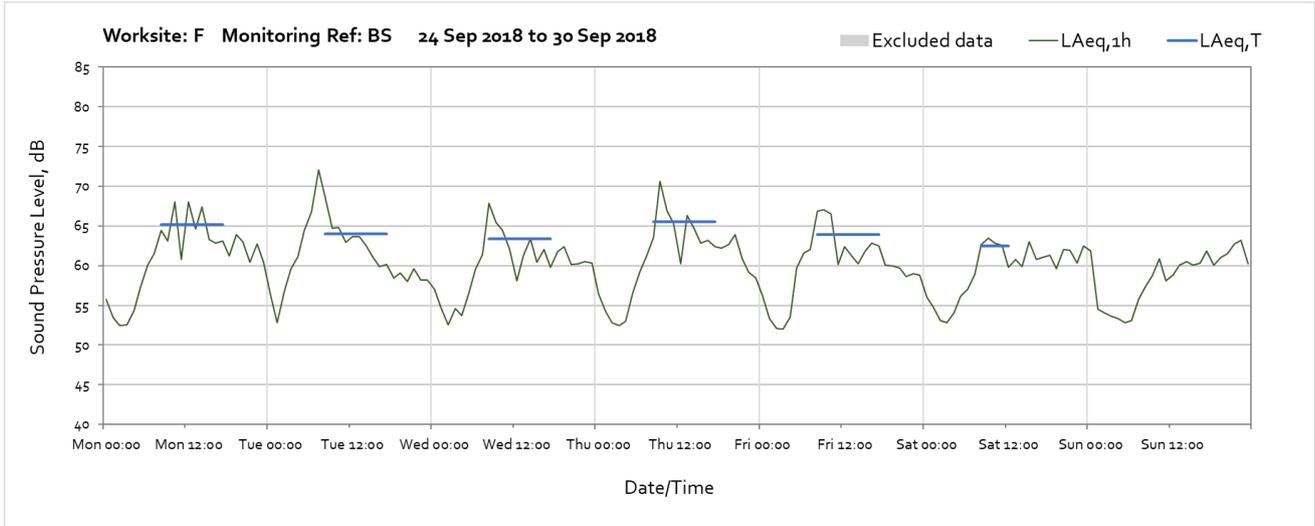




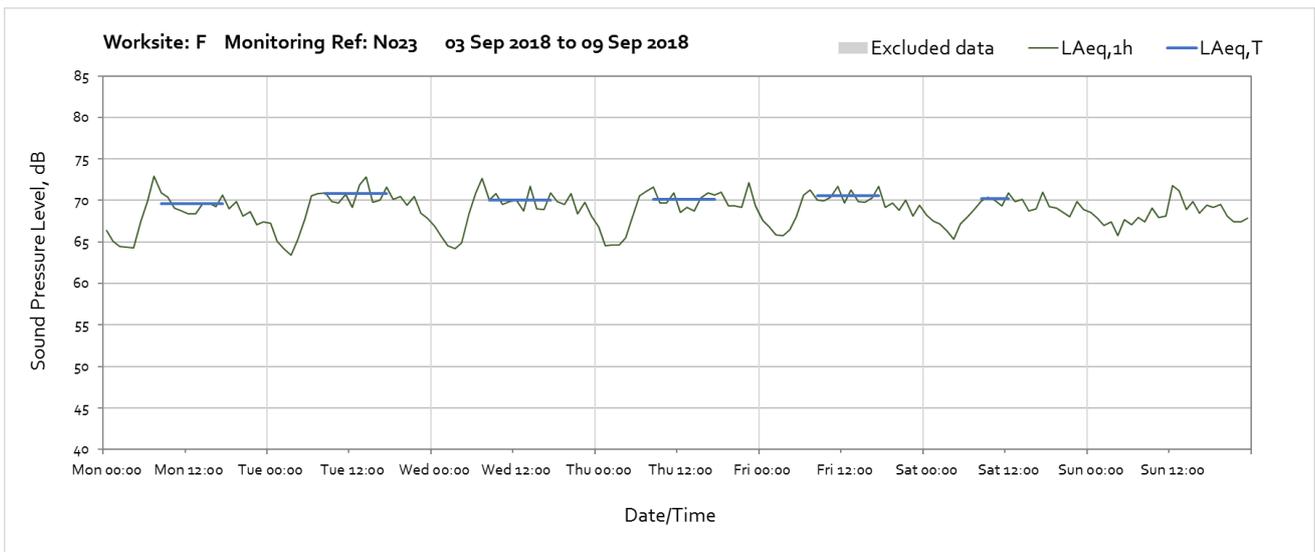
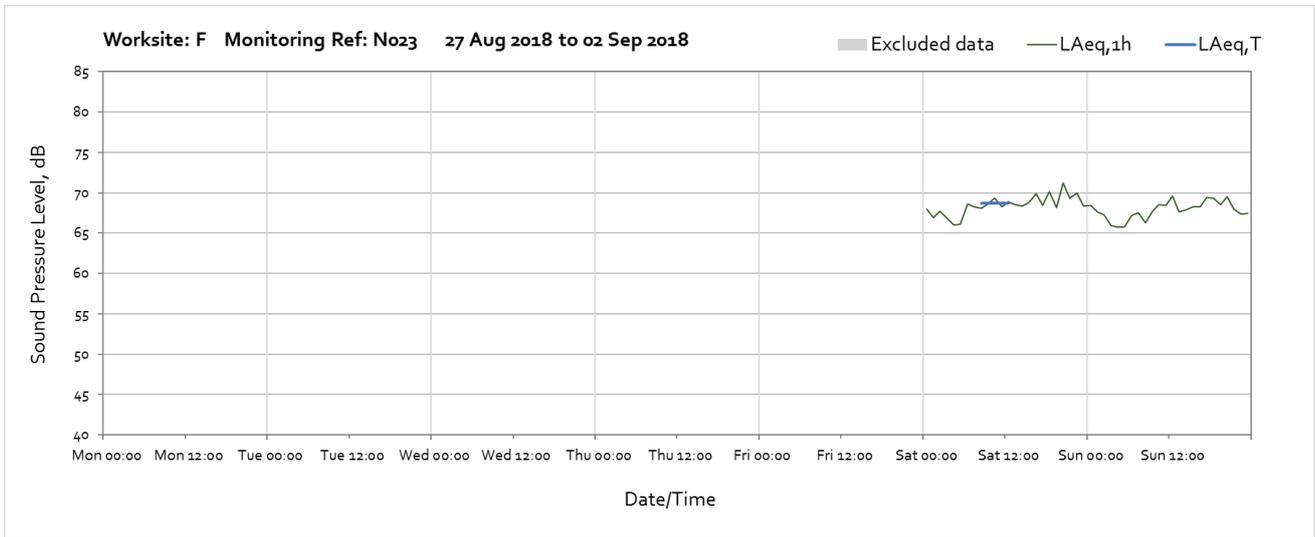
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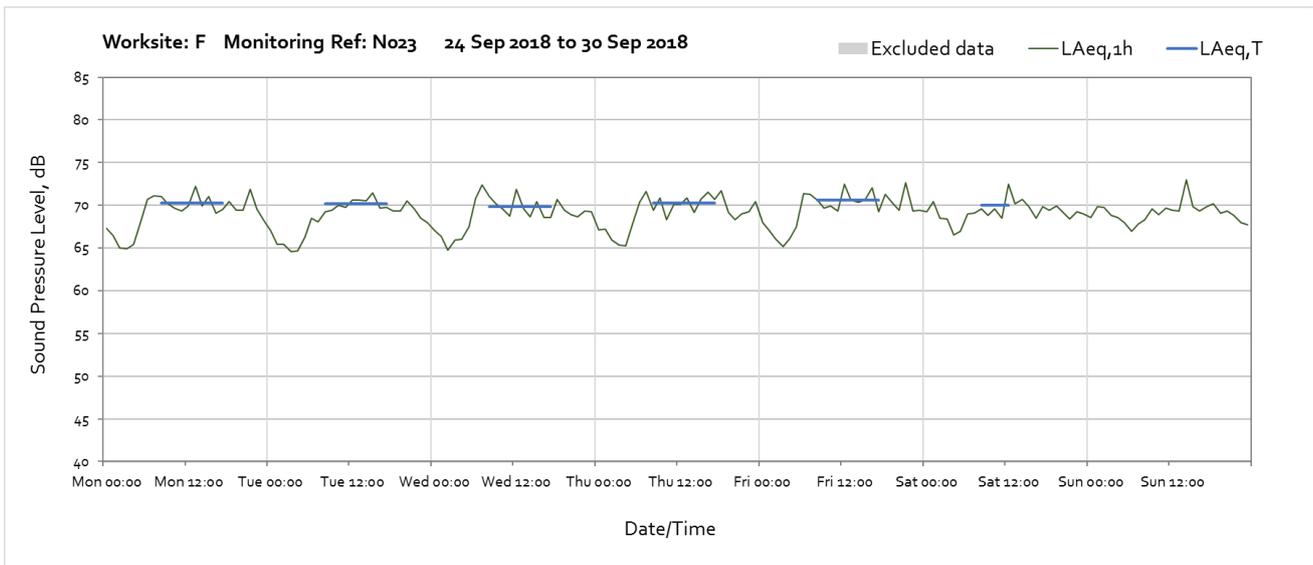
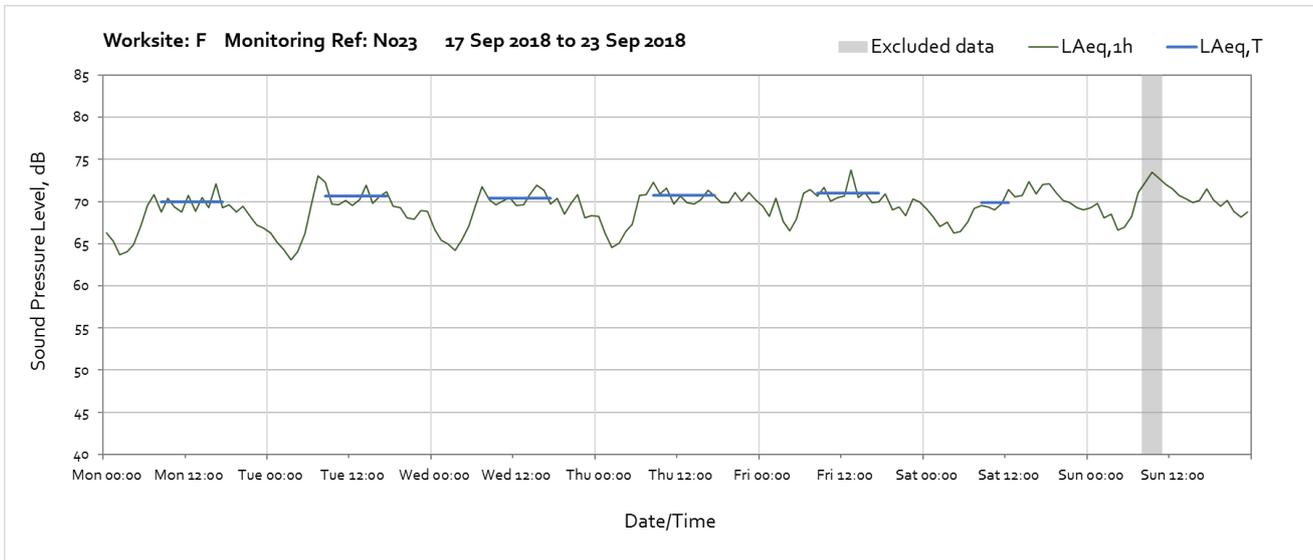
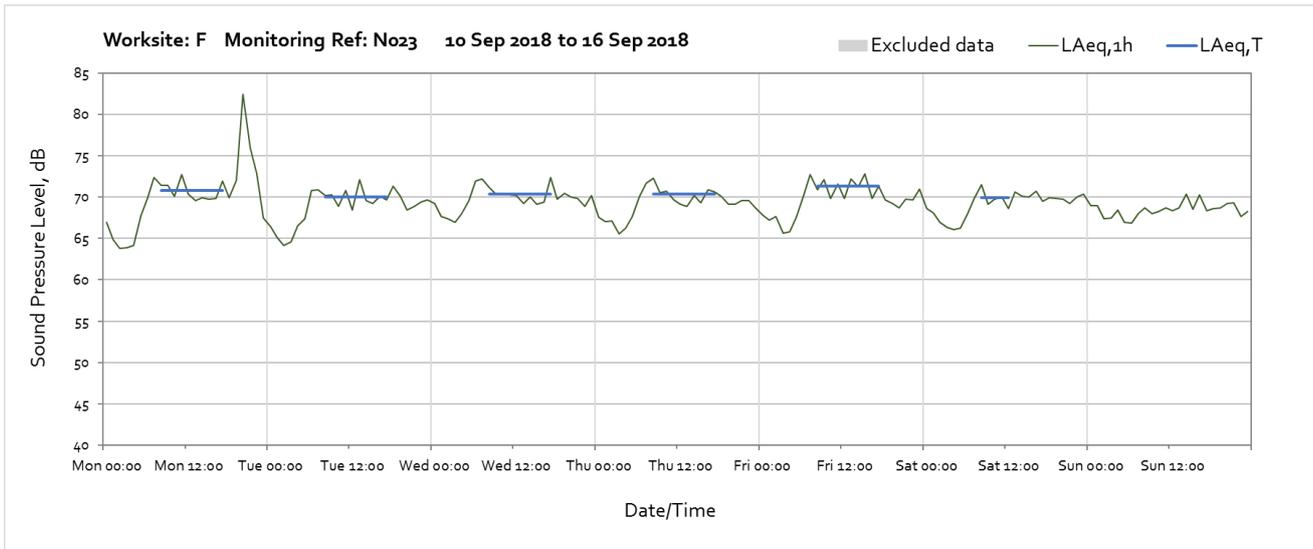




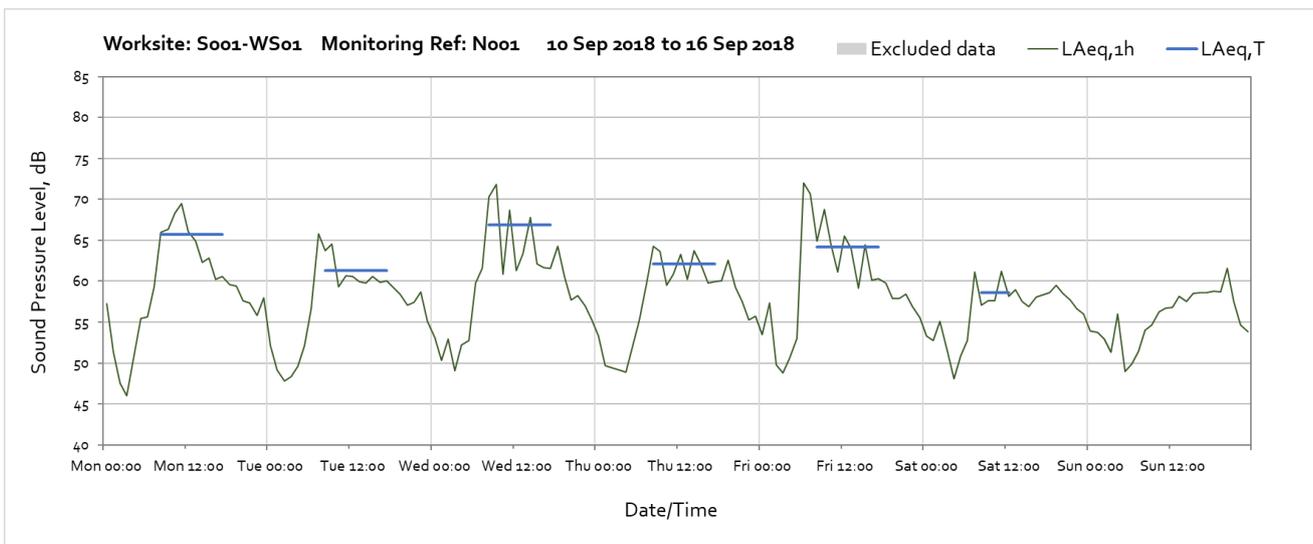
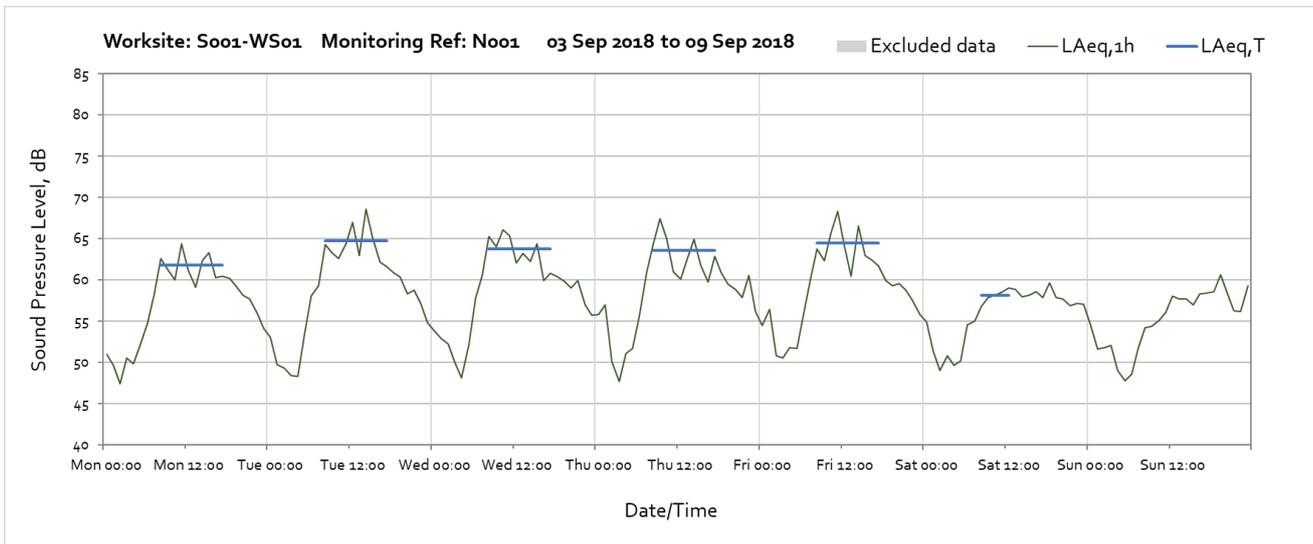
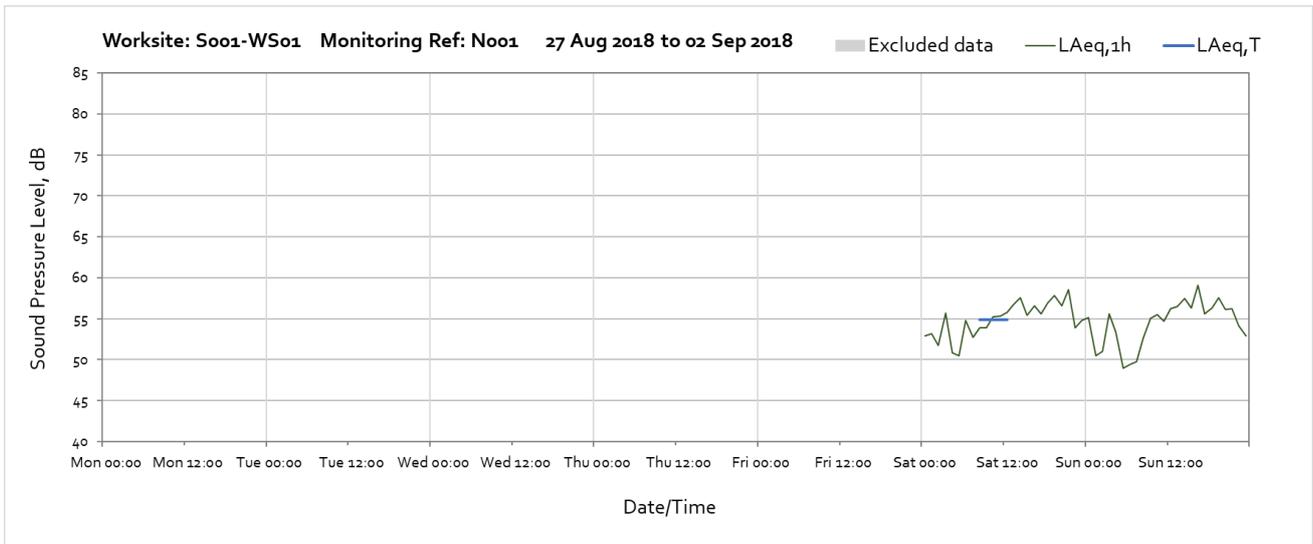


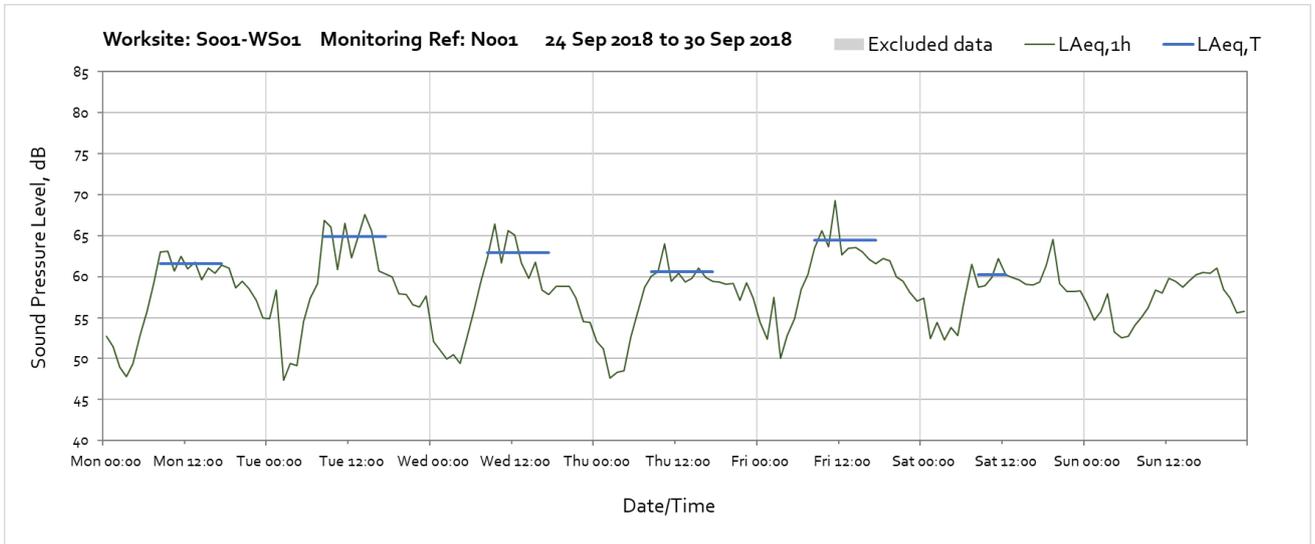
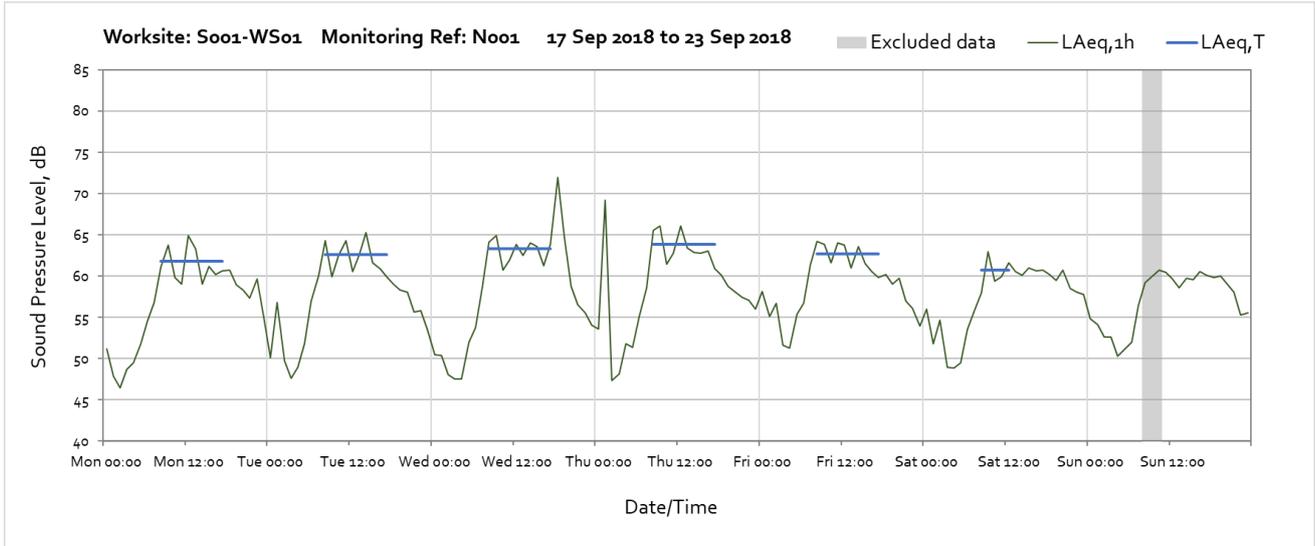
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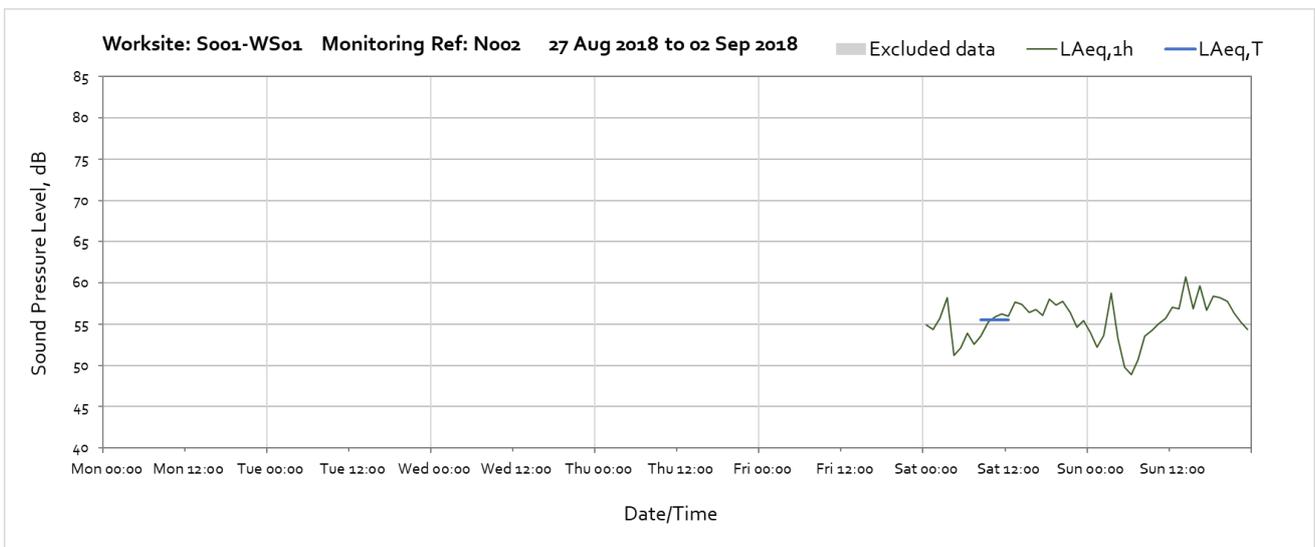


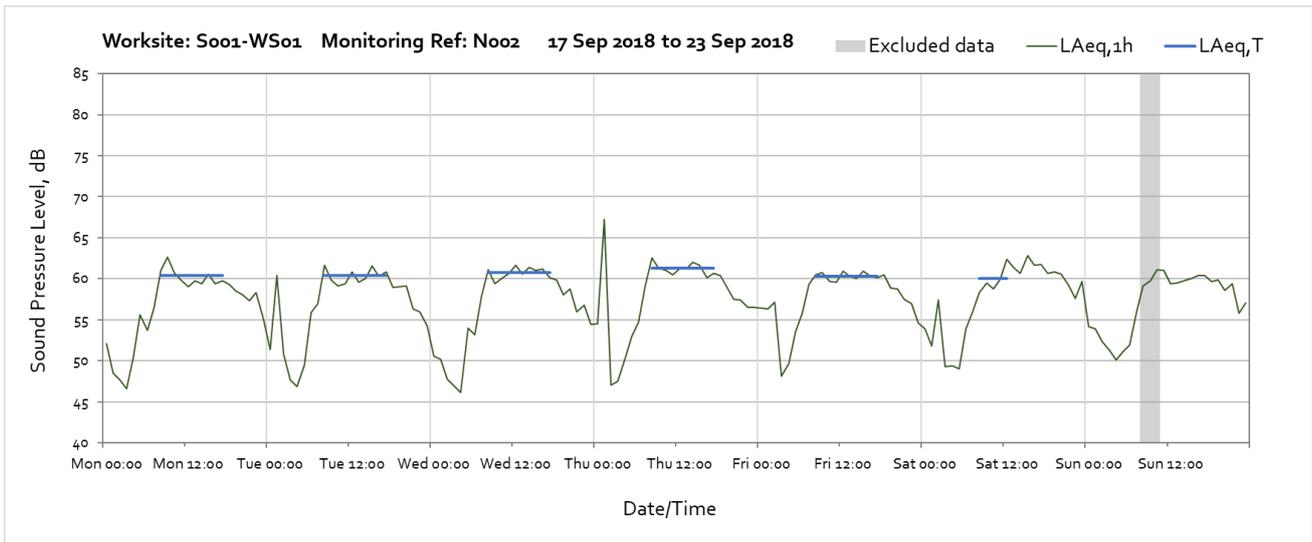
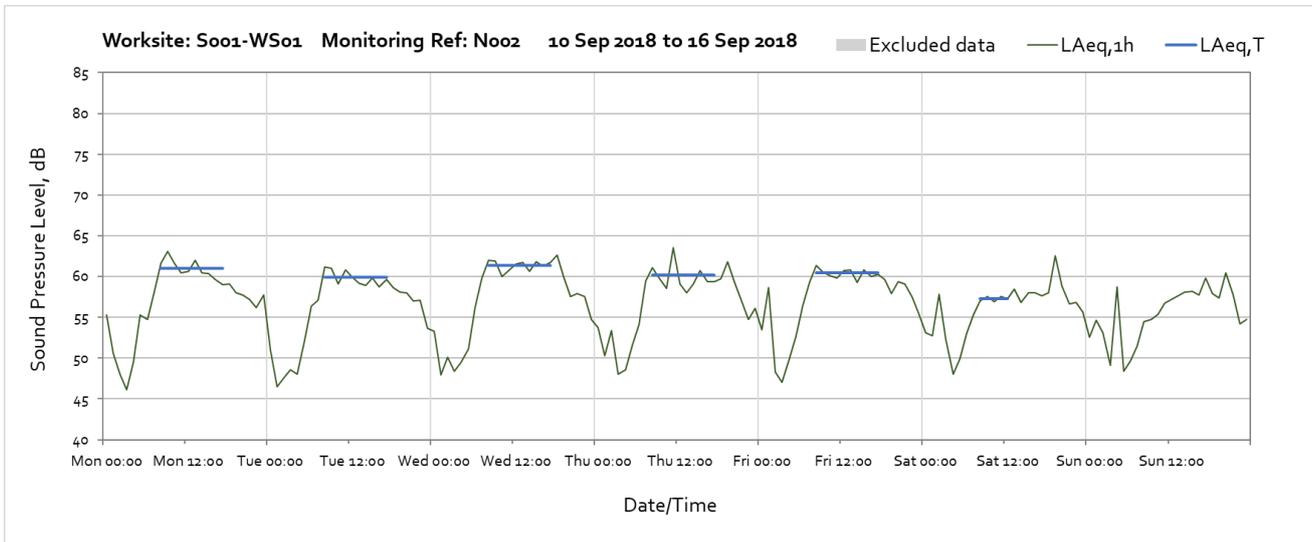
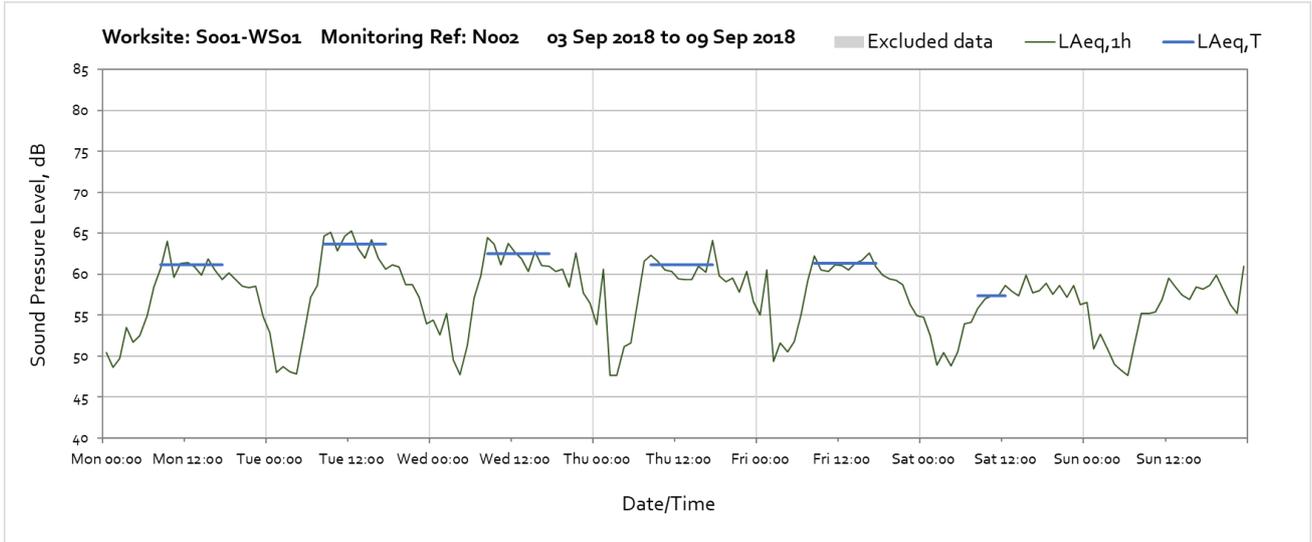
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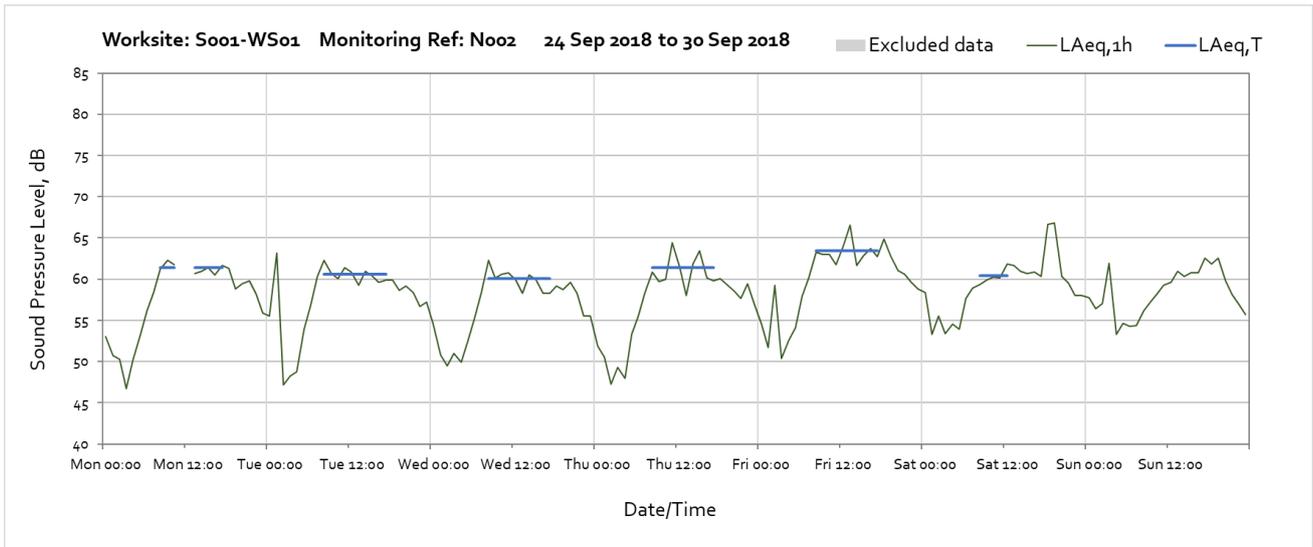




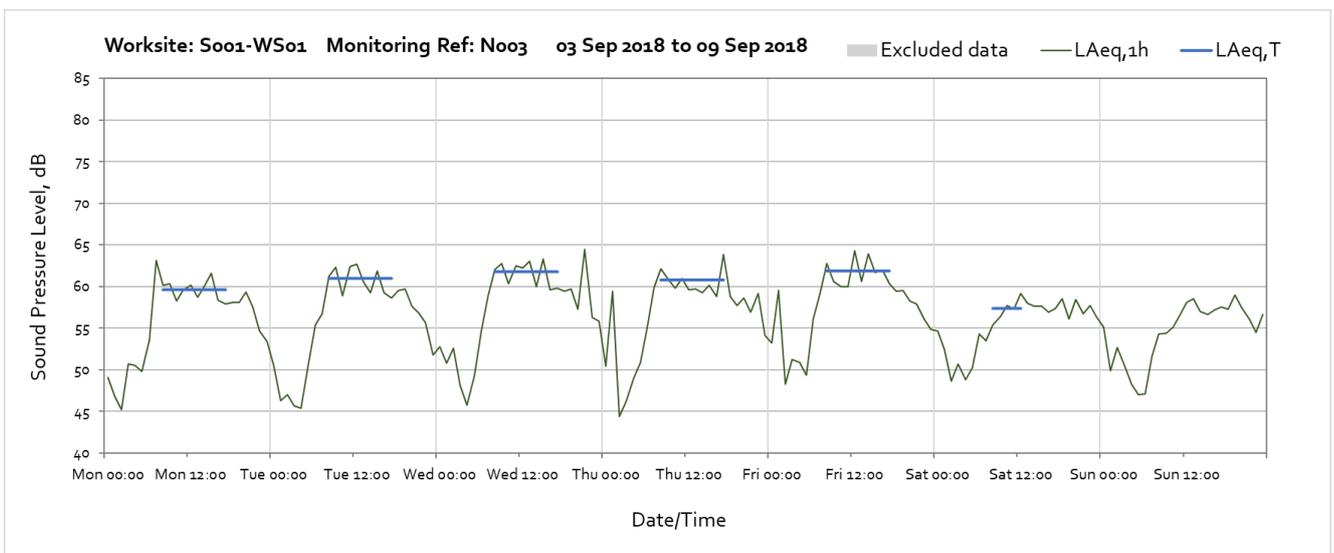
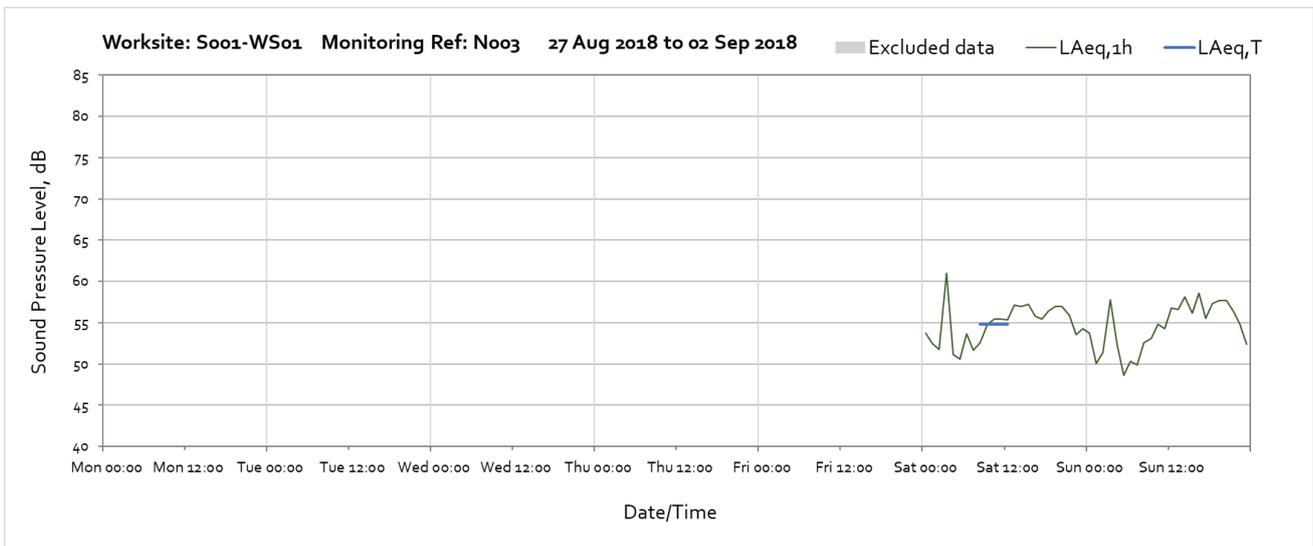
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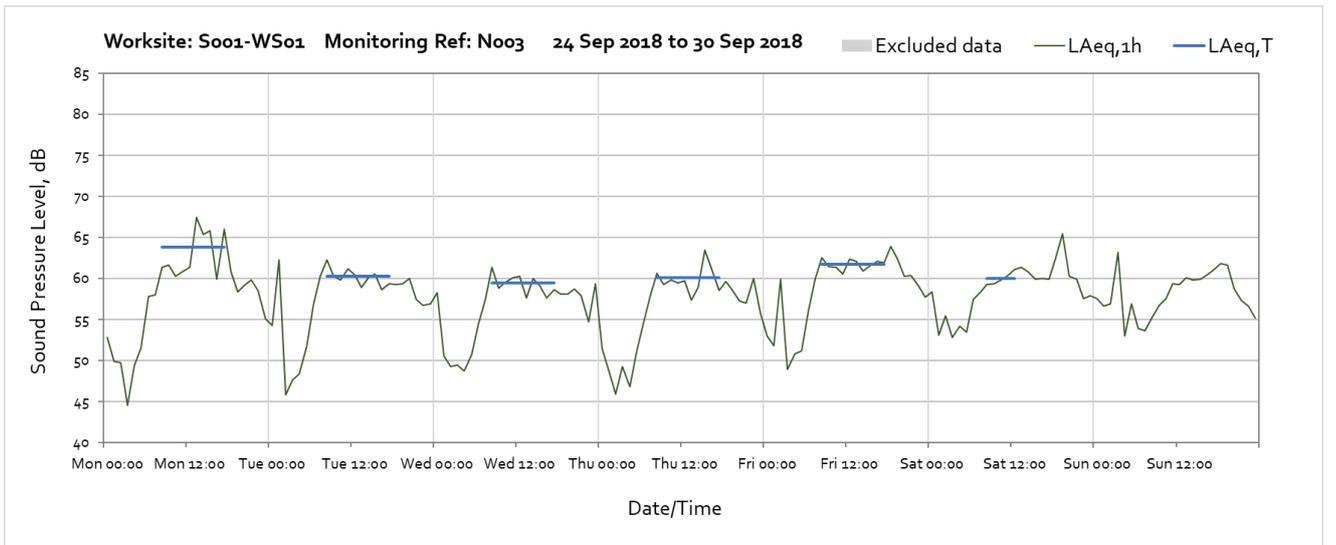
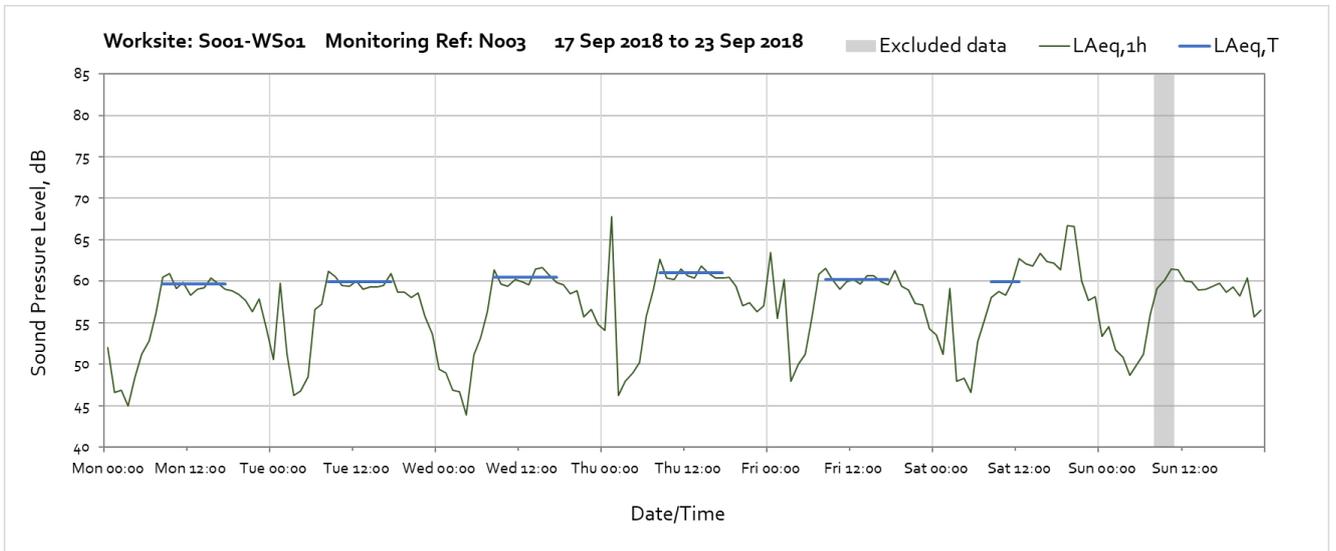
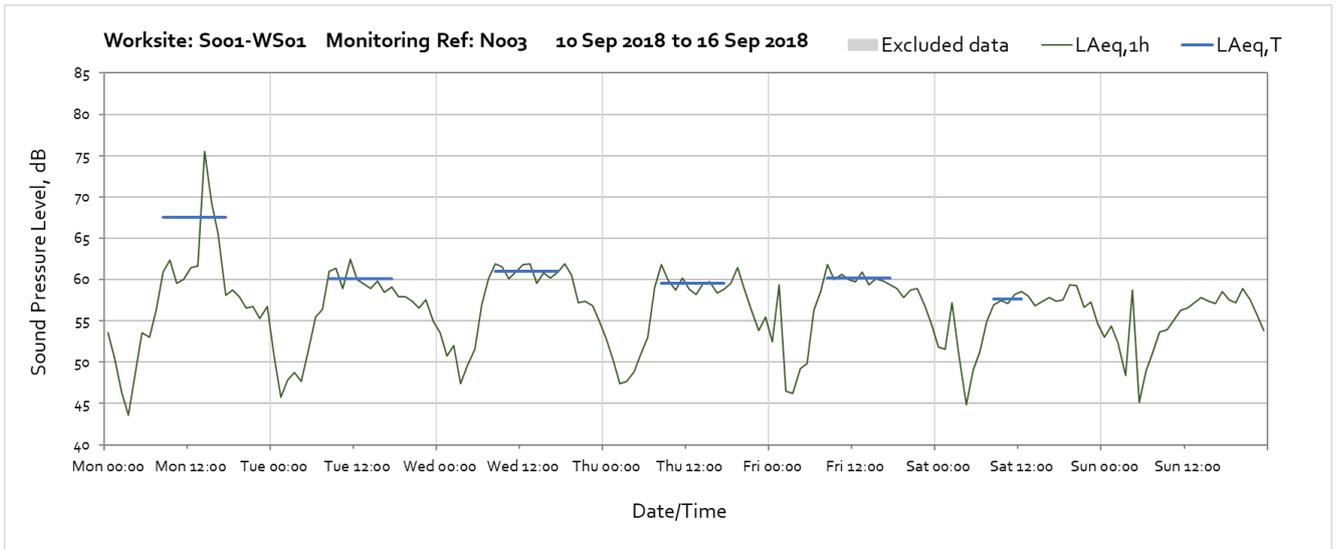




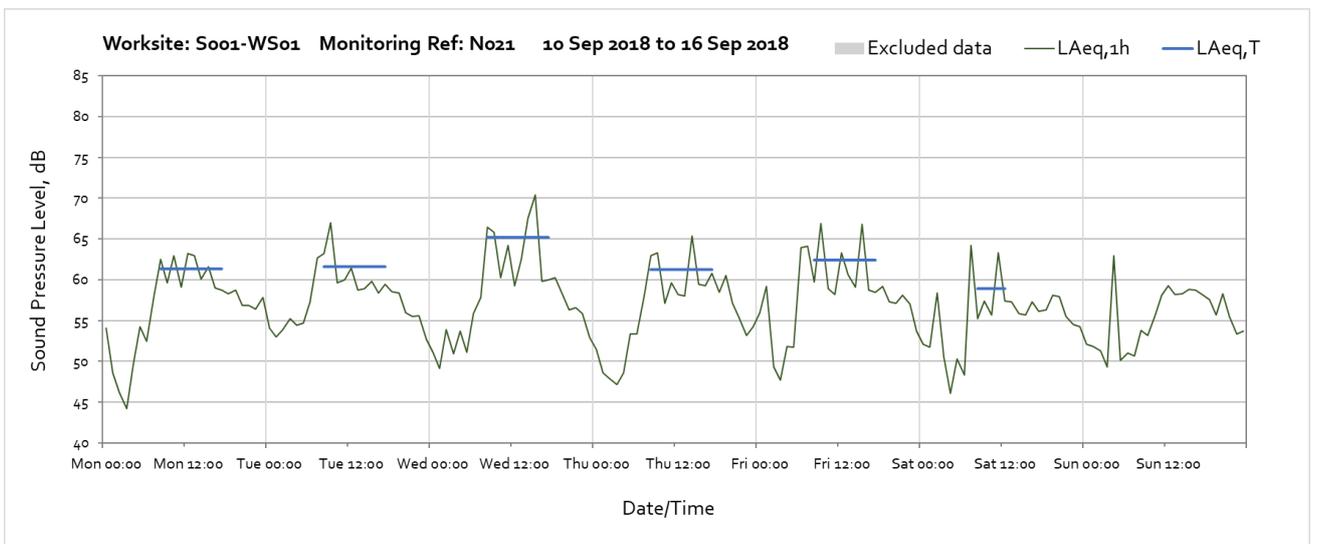
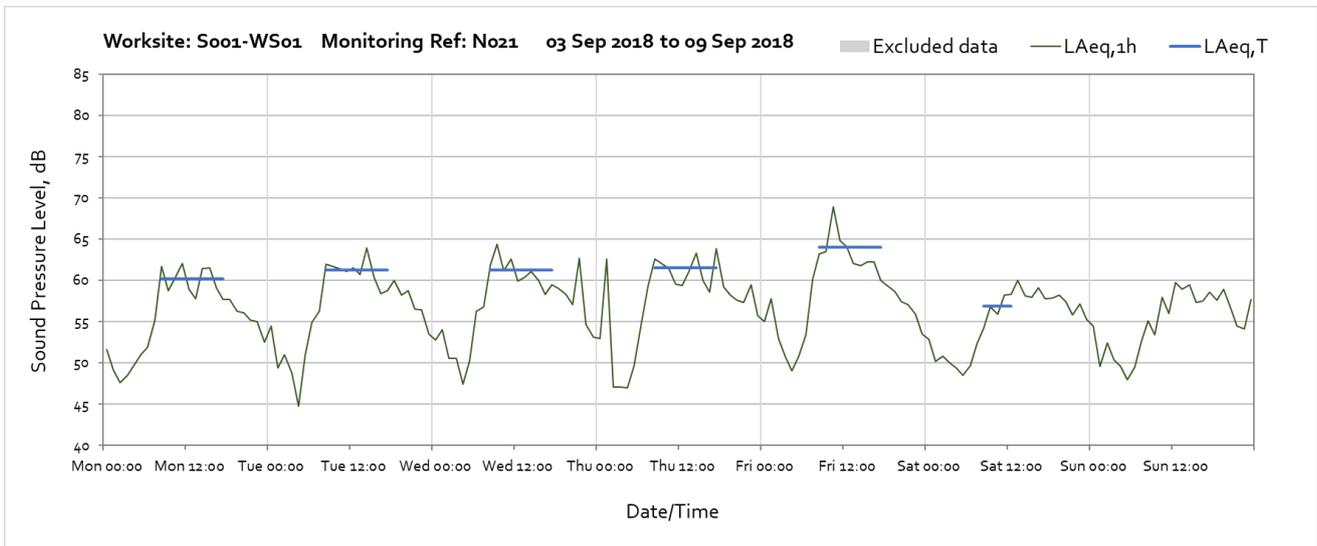
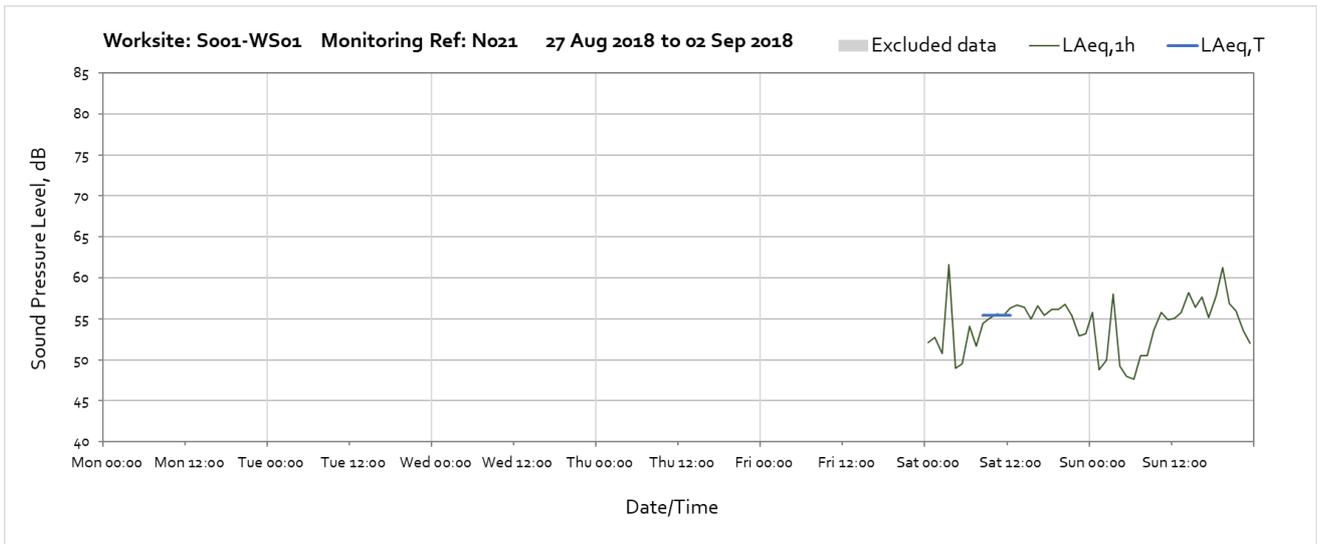


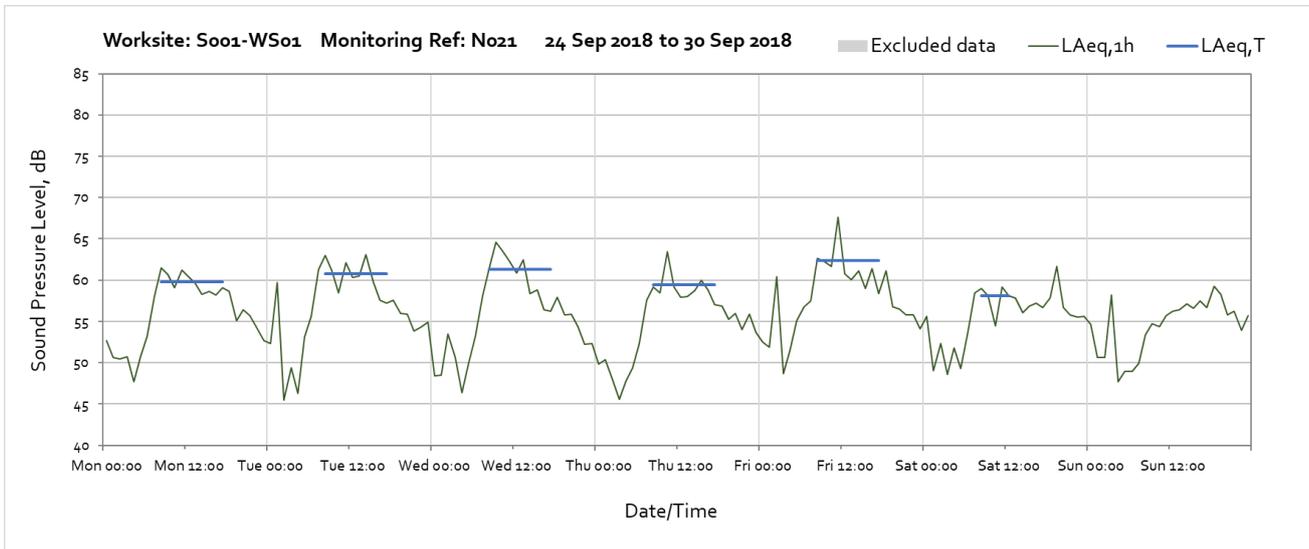
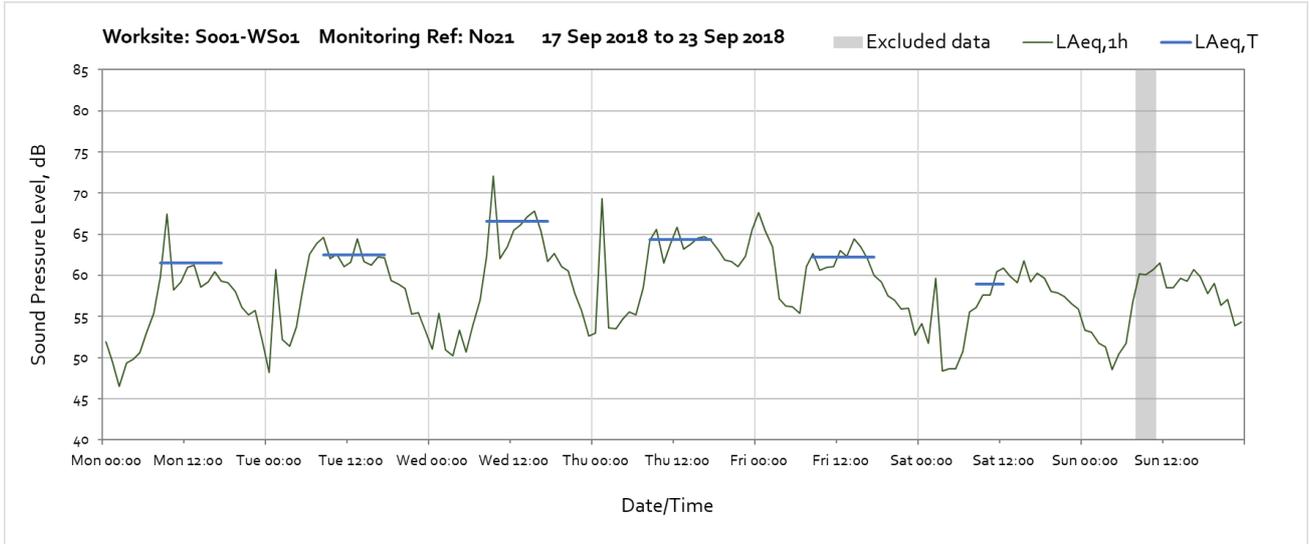
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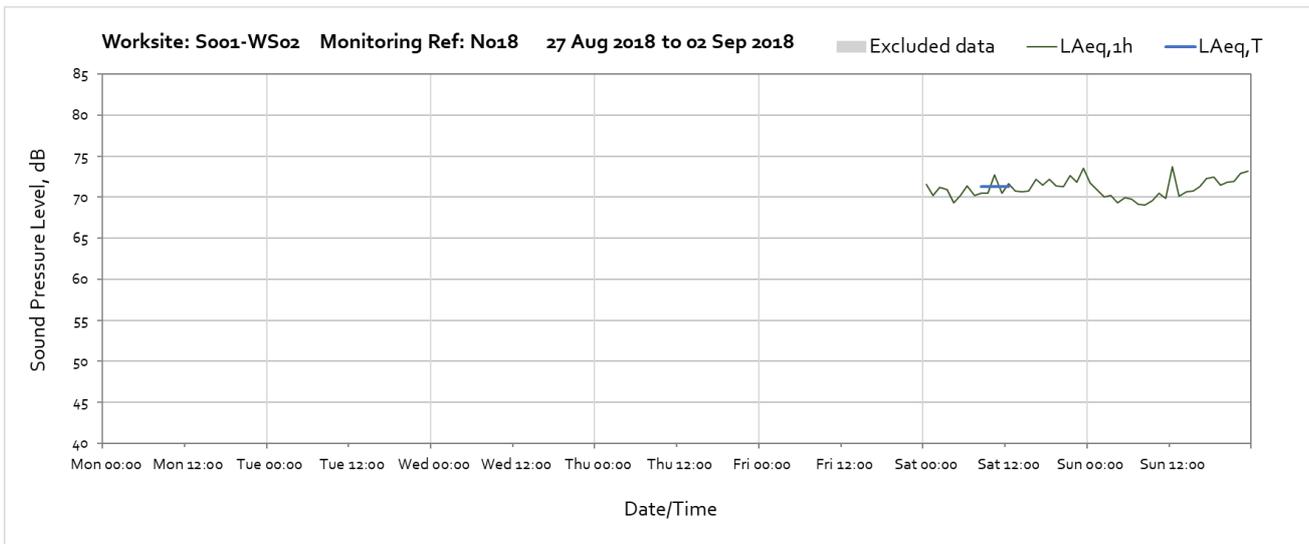


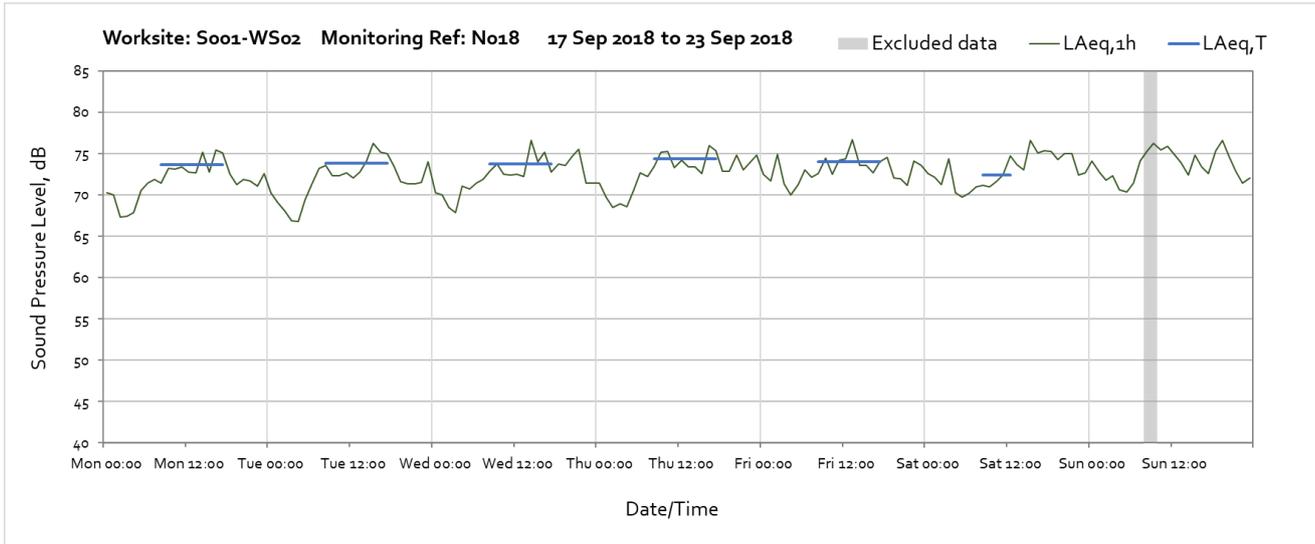
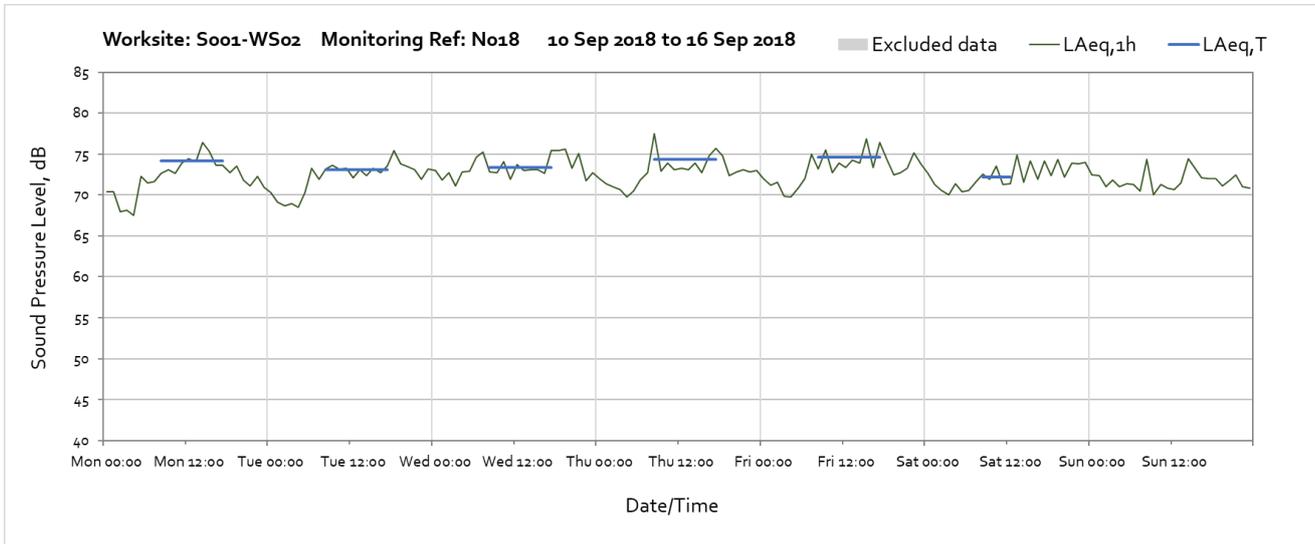
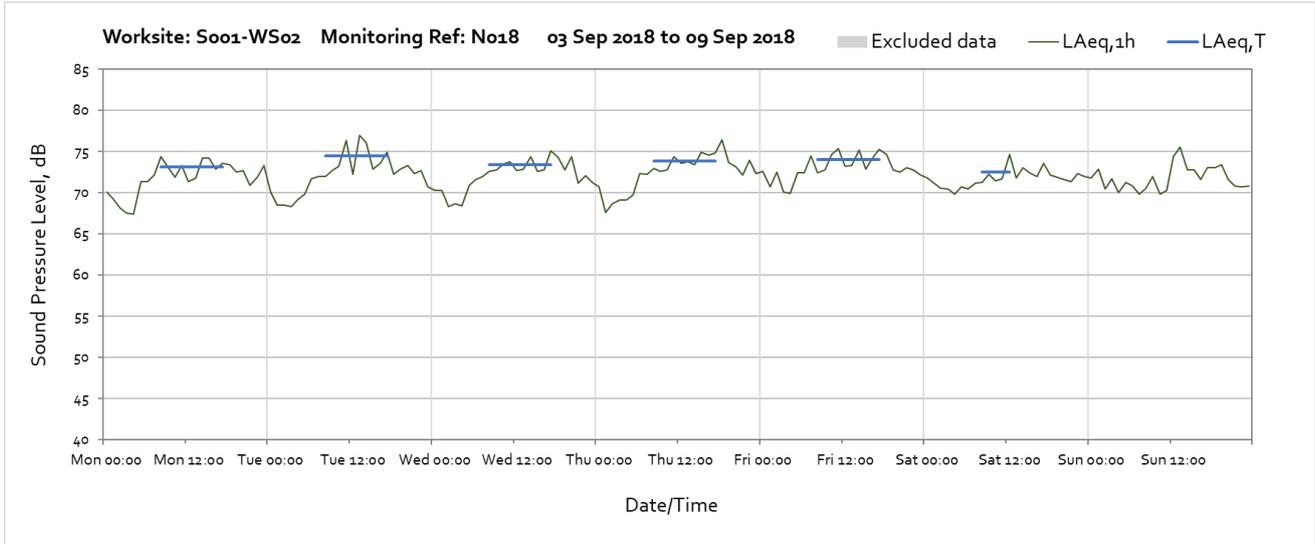
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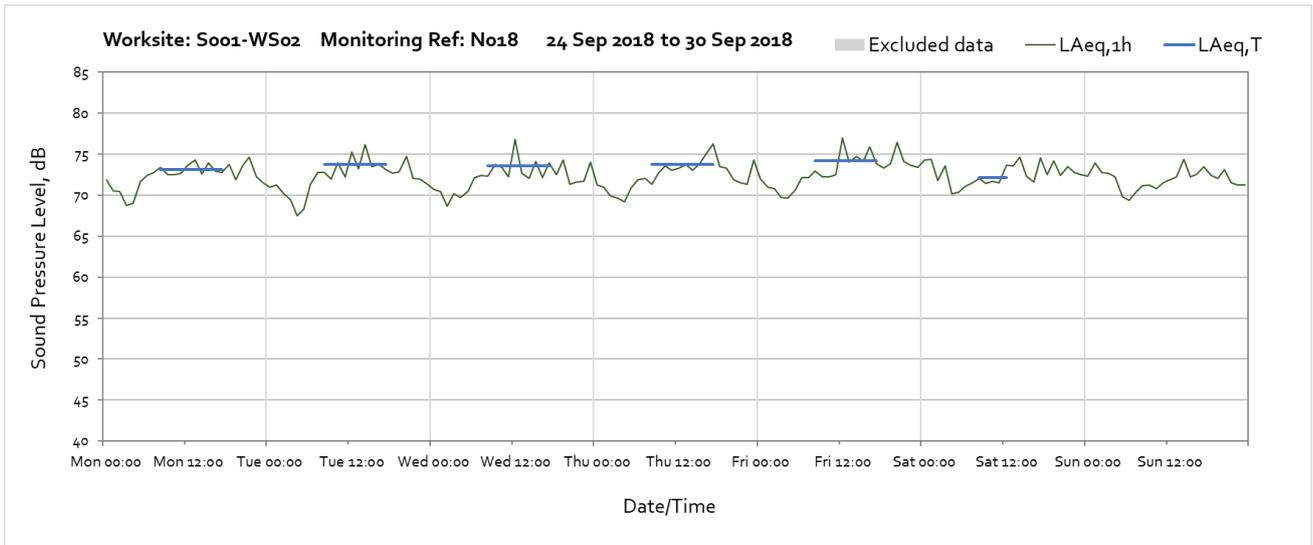




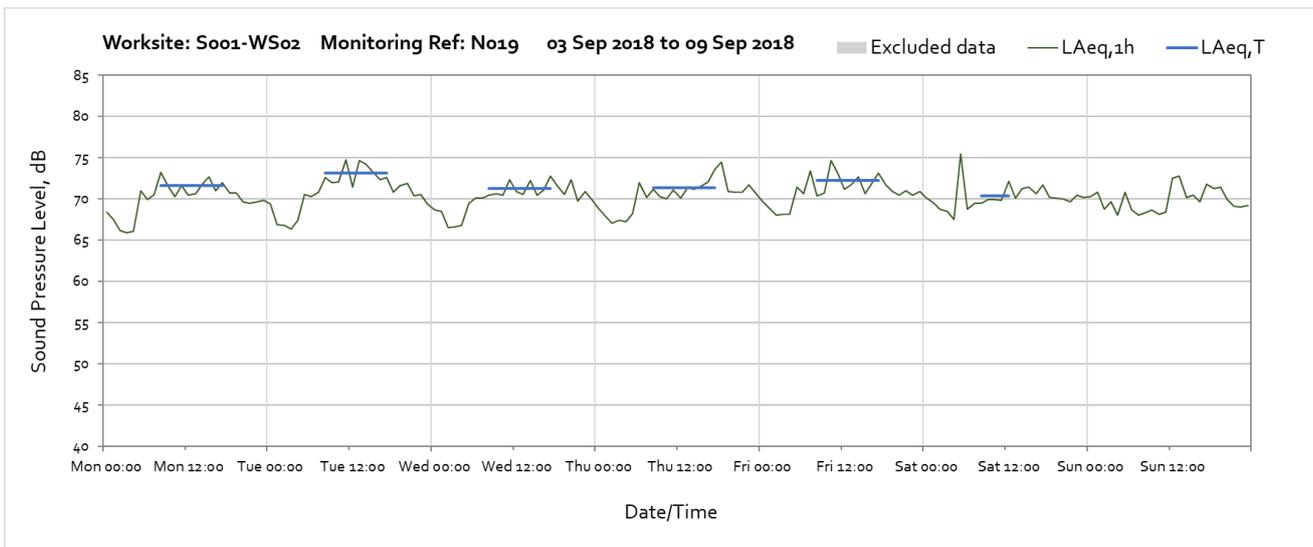
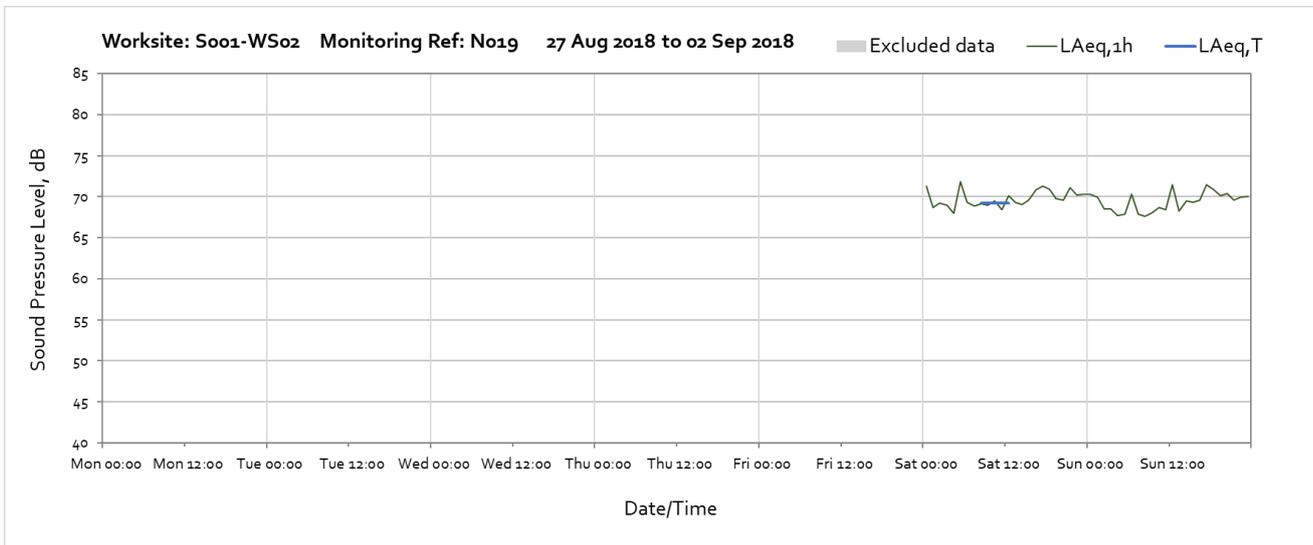
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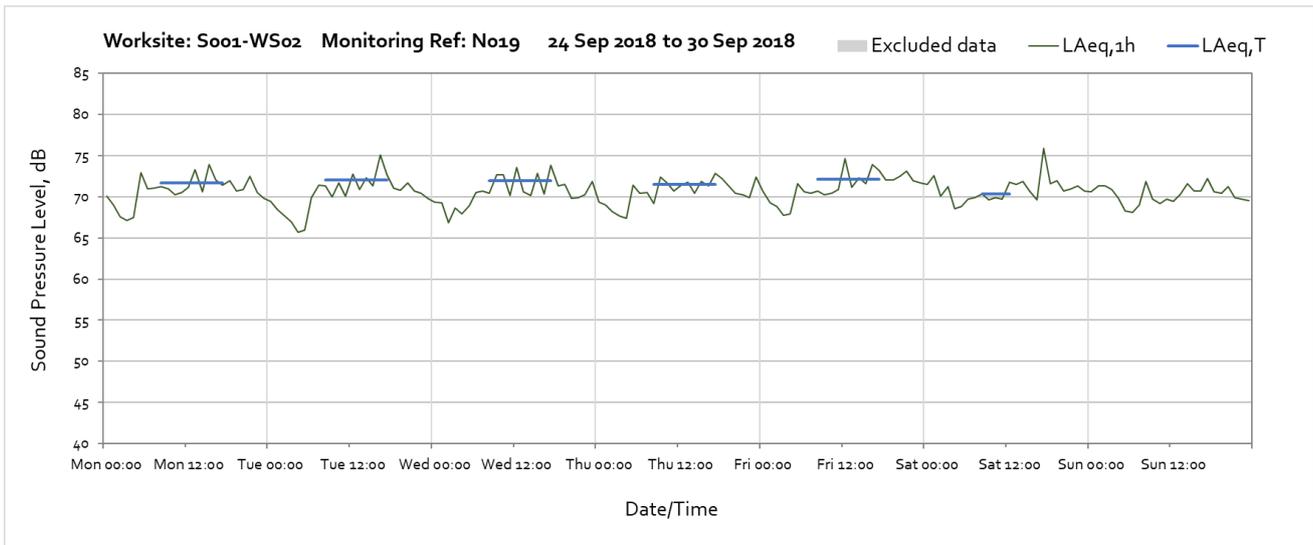
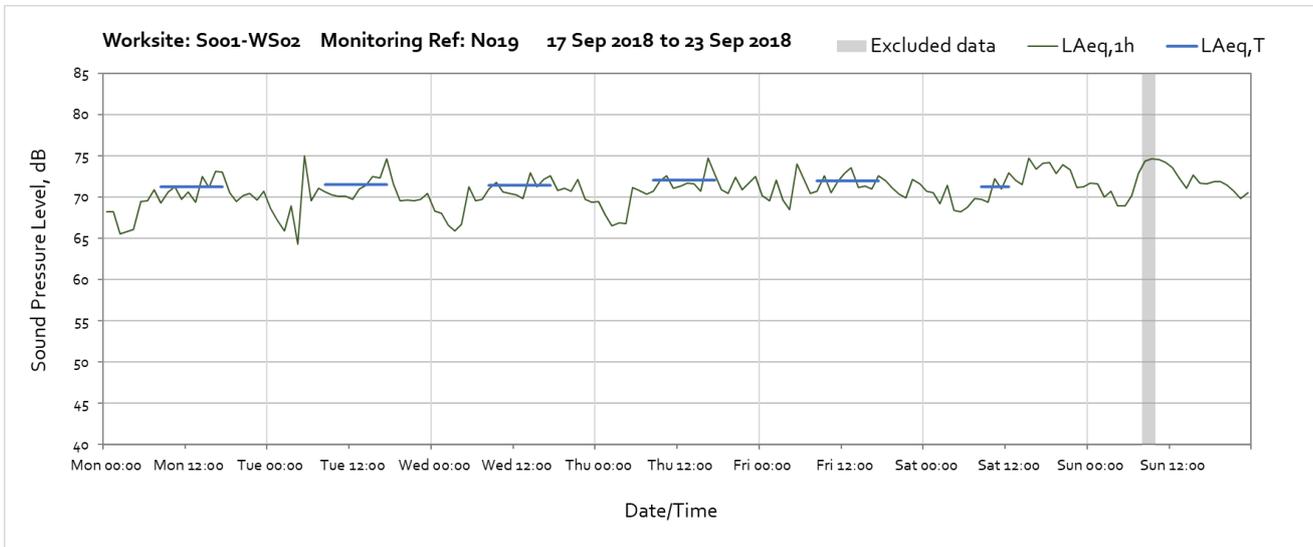
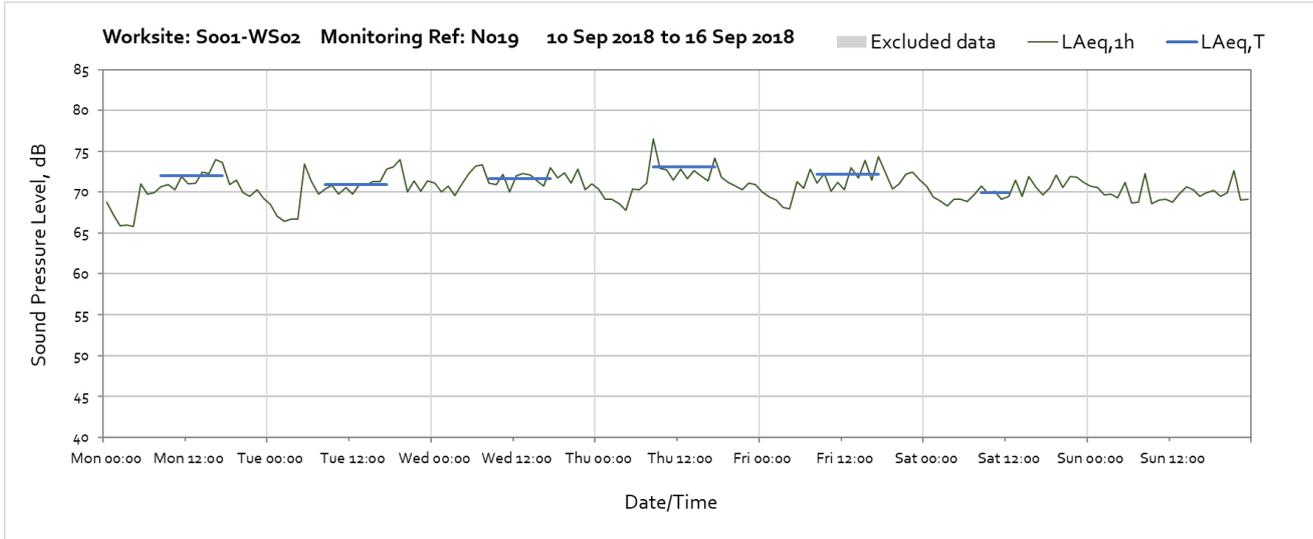




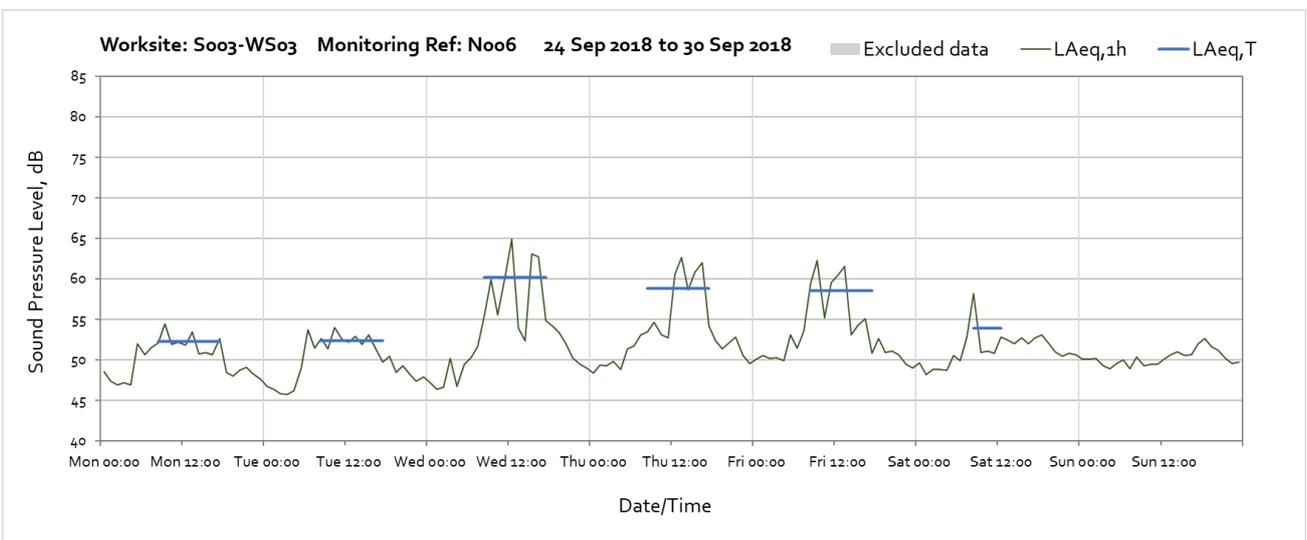
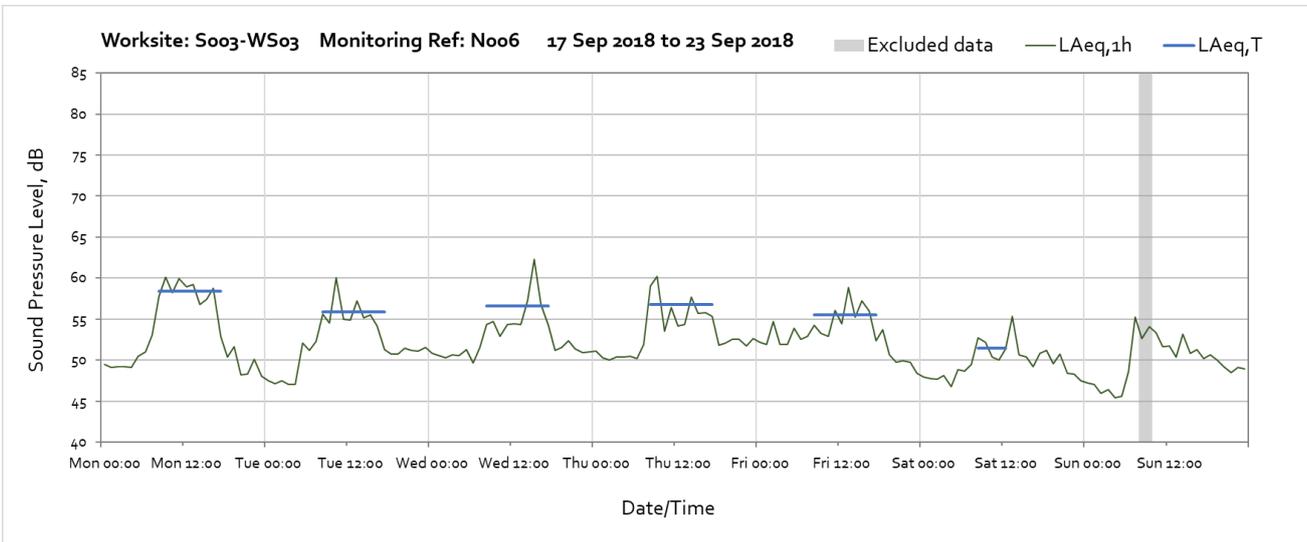
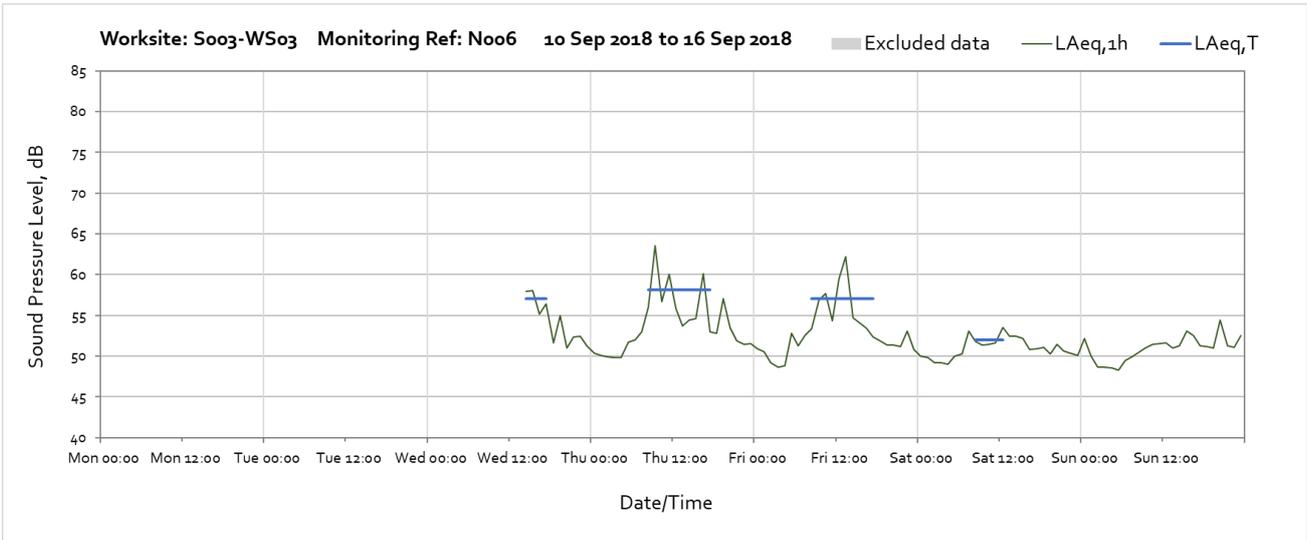


Worksite: S001-WSo2 – Monitoring Ref: N019

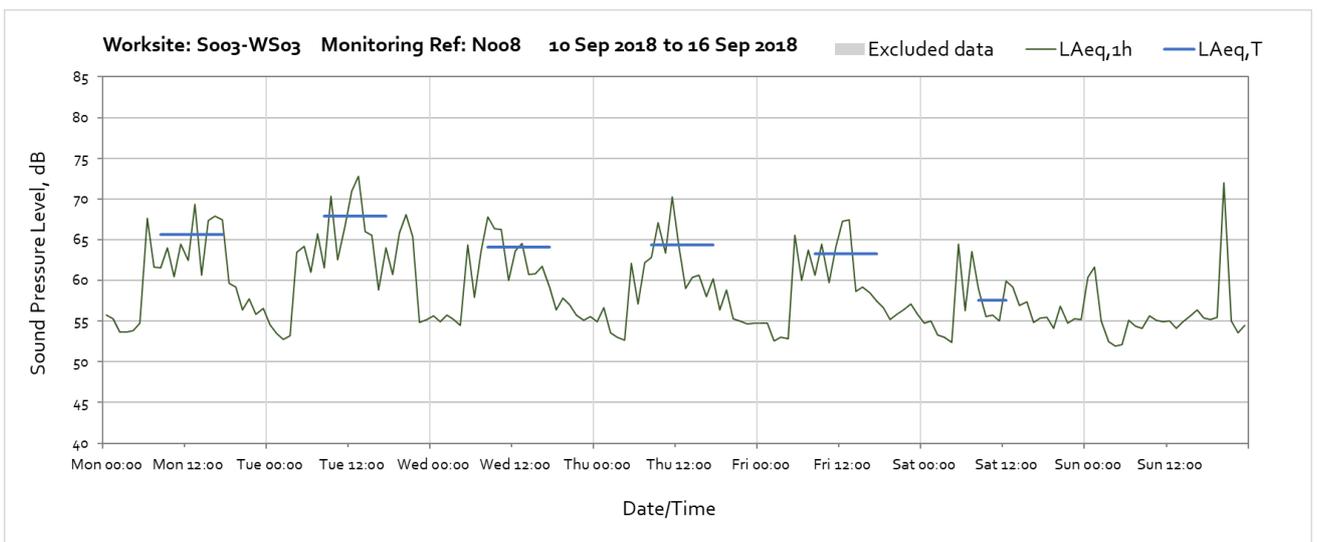
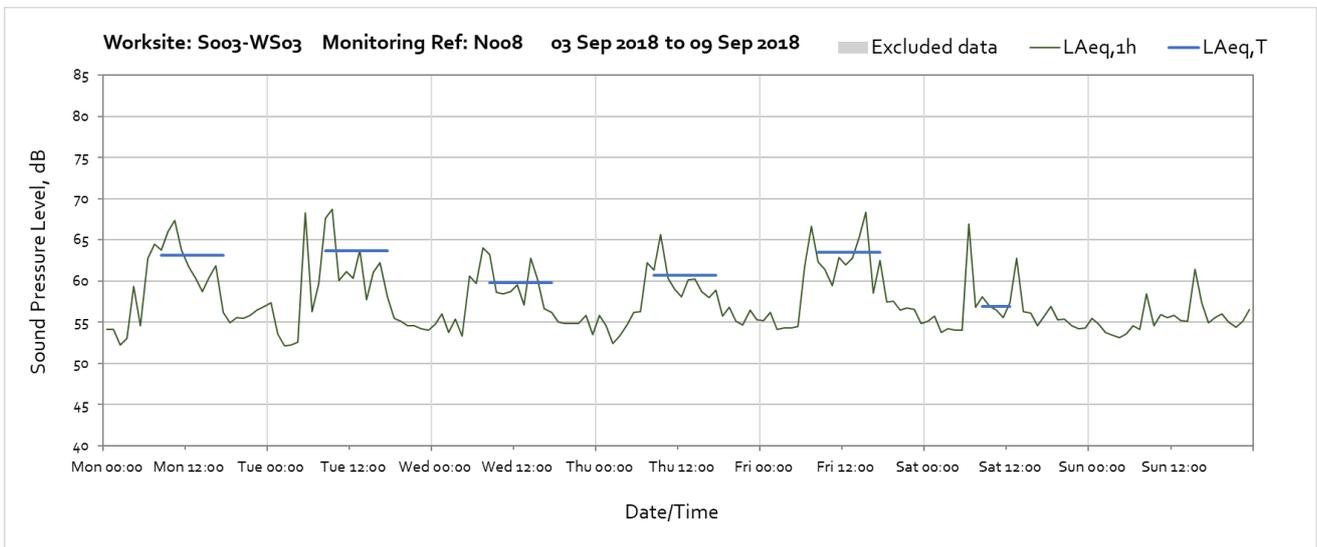
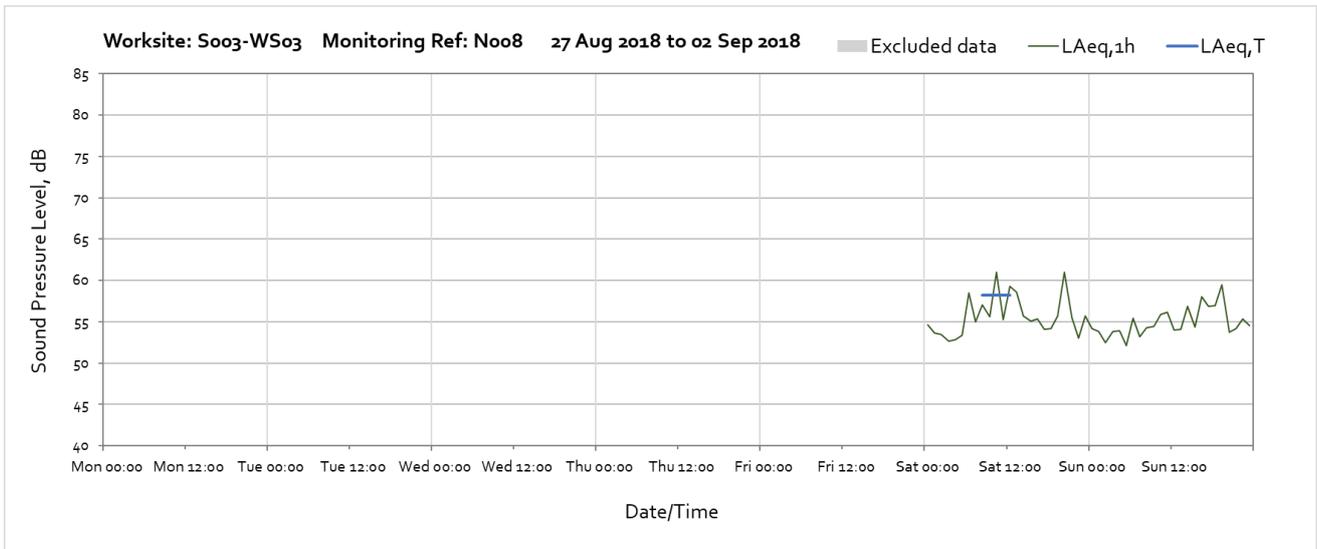


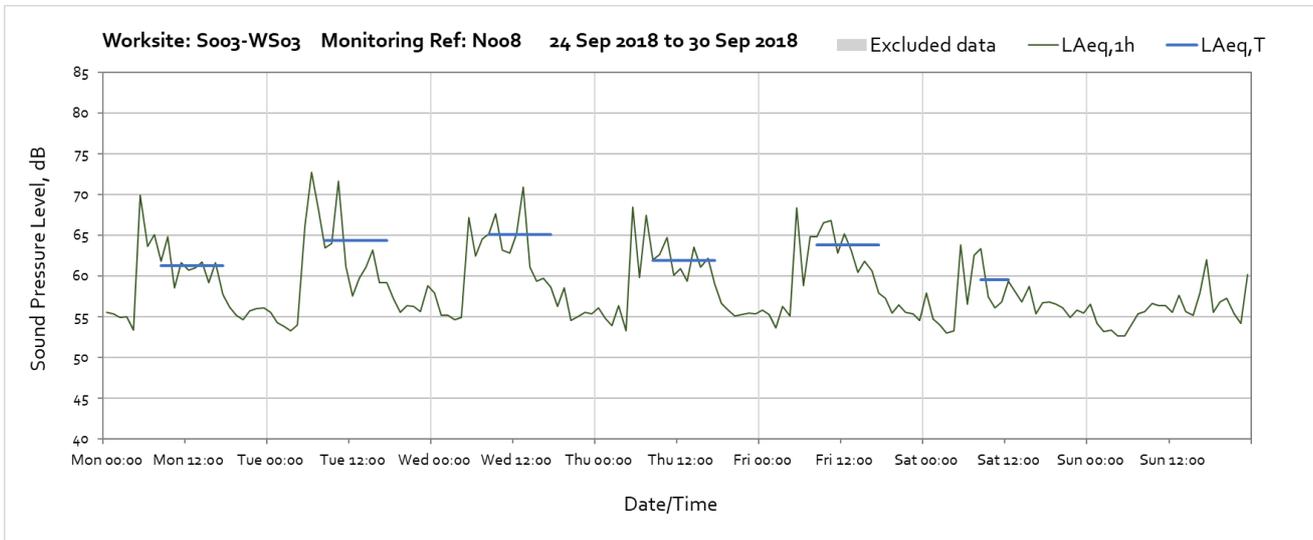
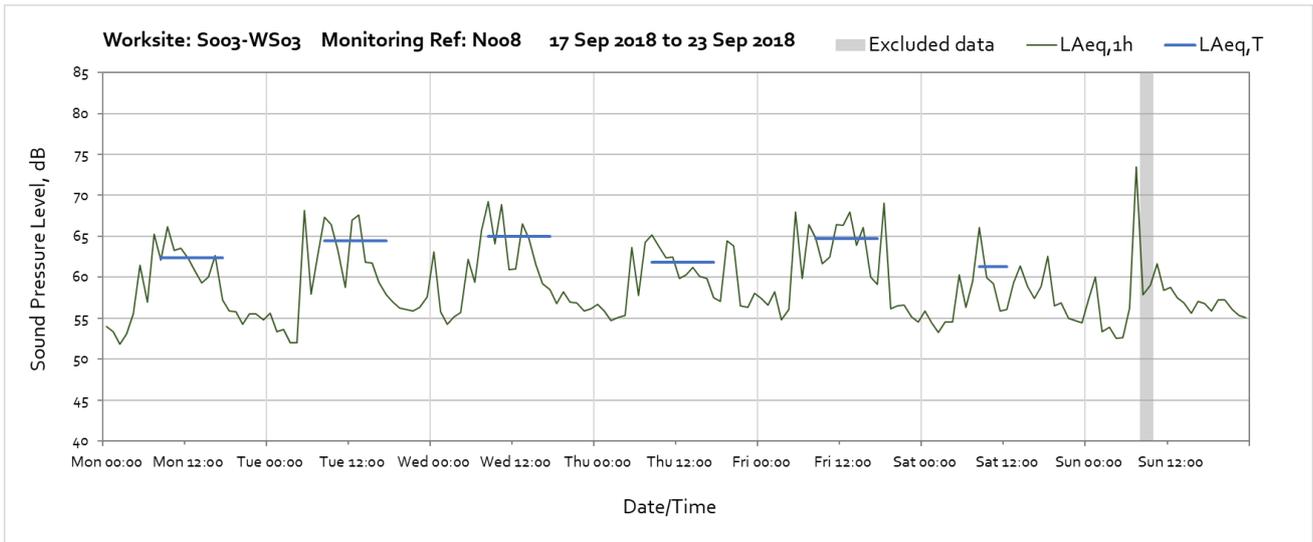


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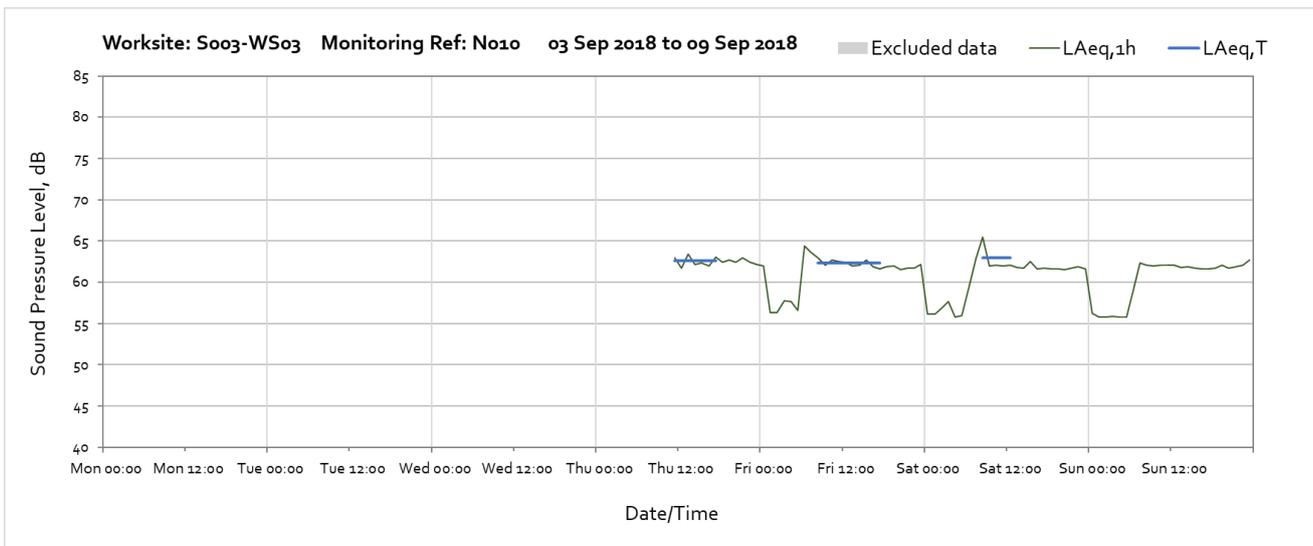


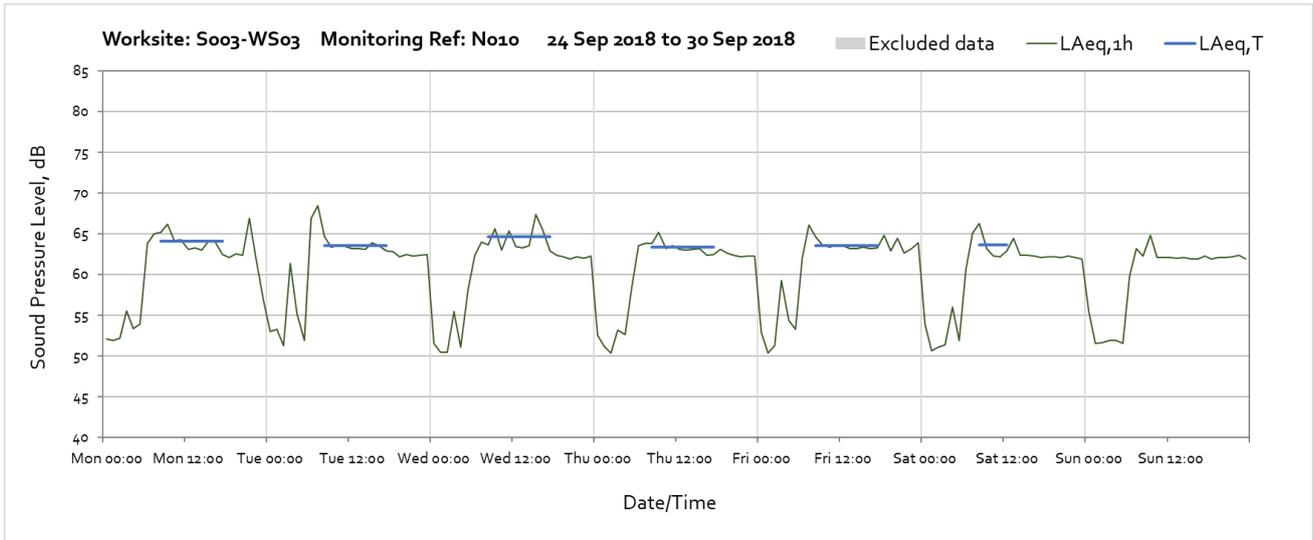
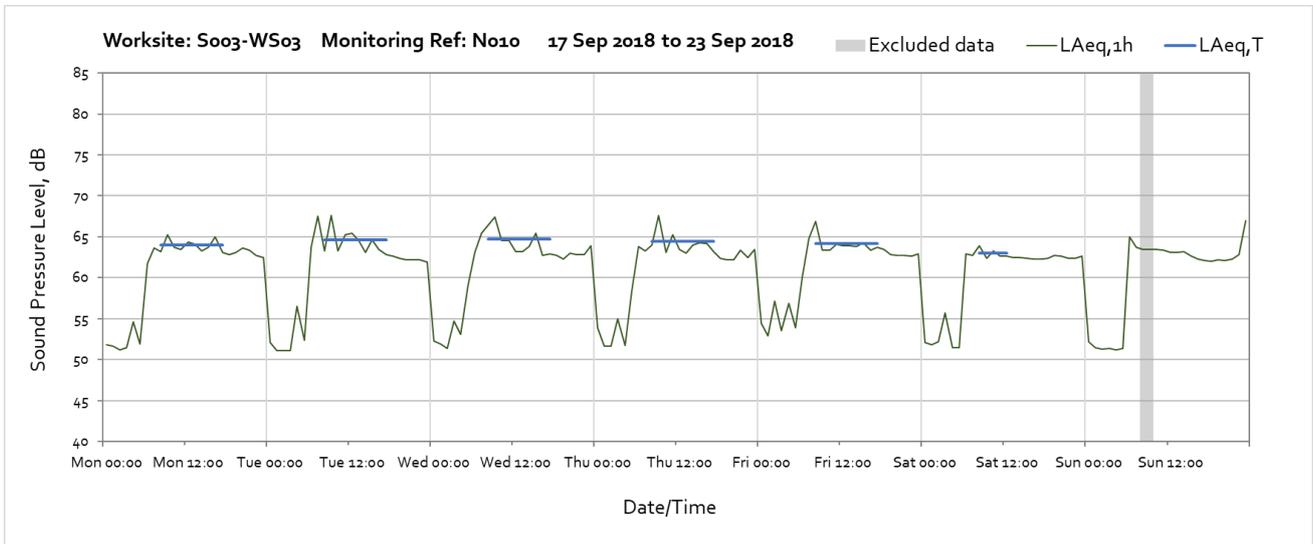
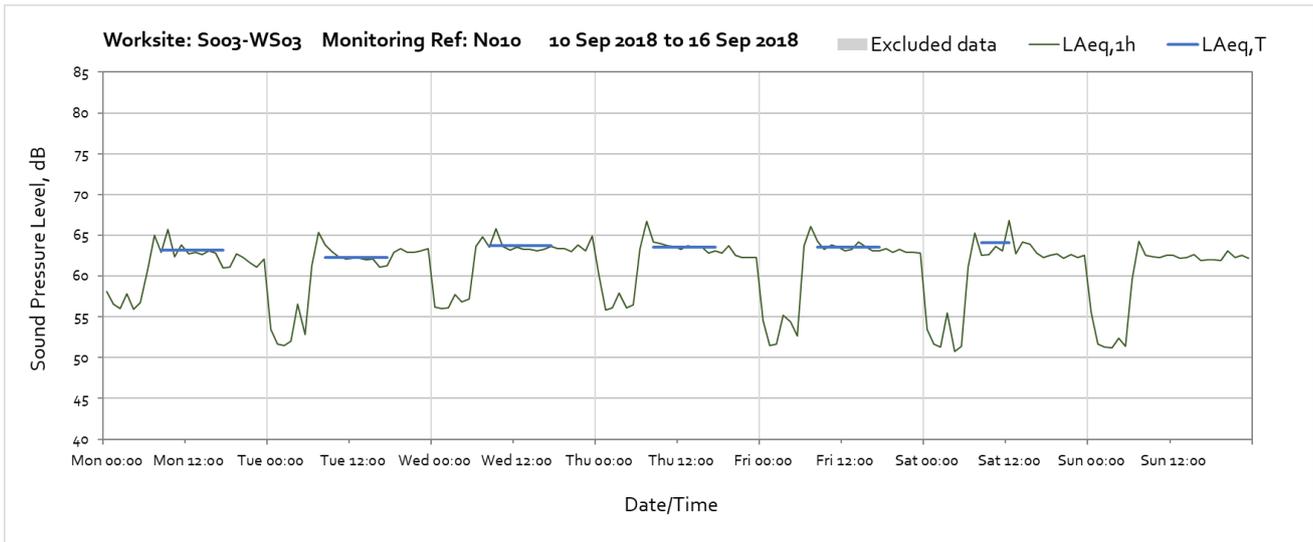
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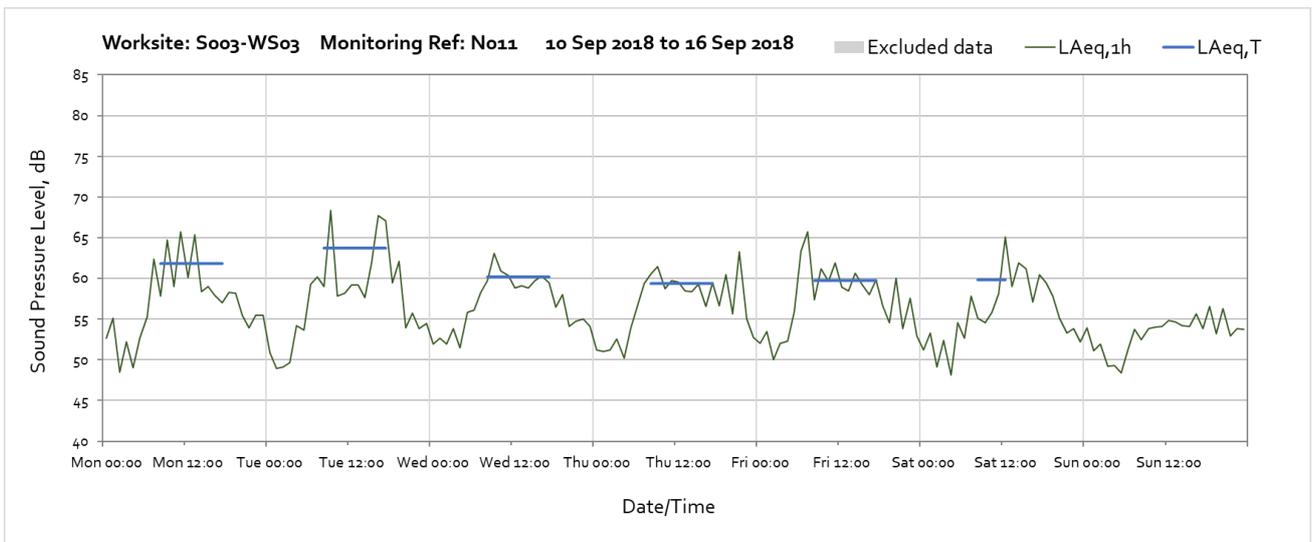
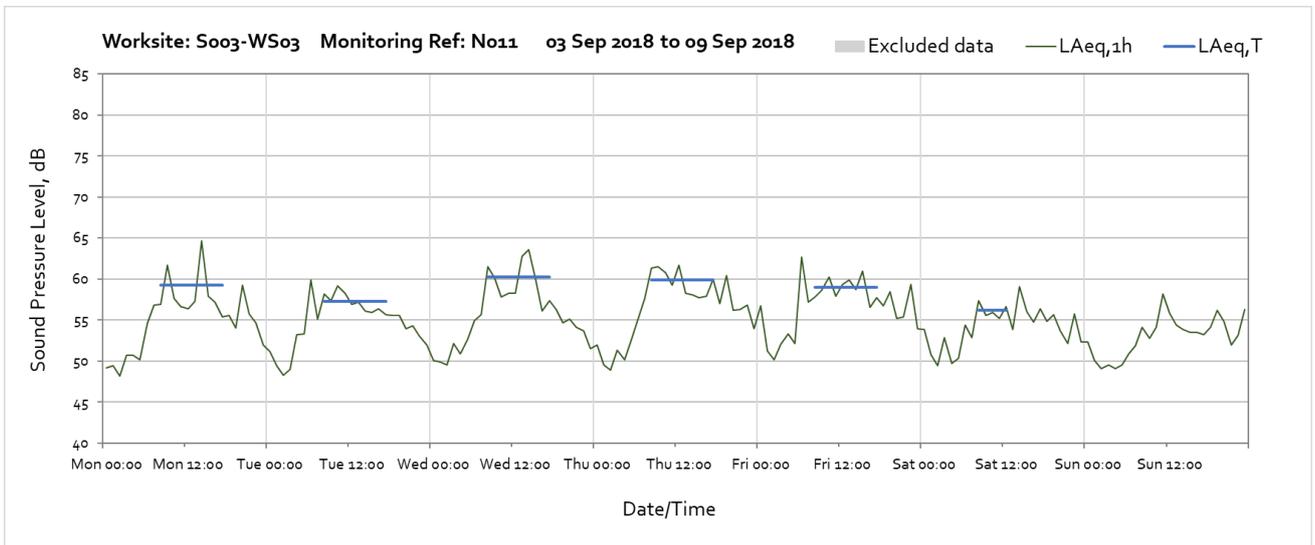
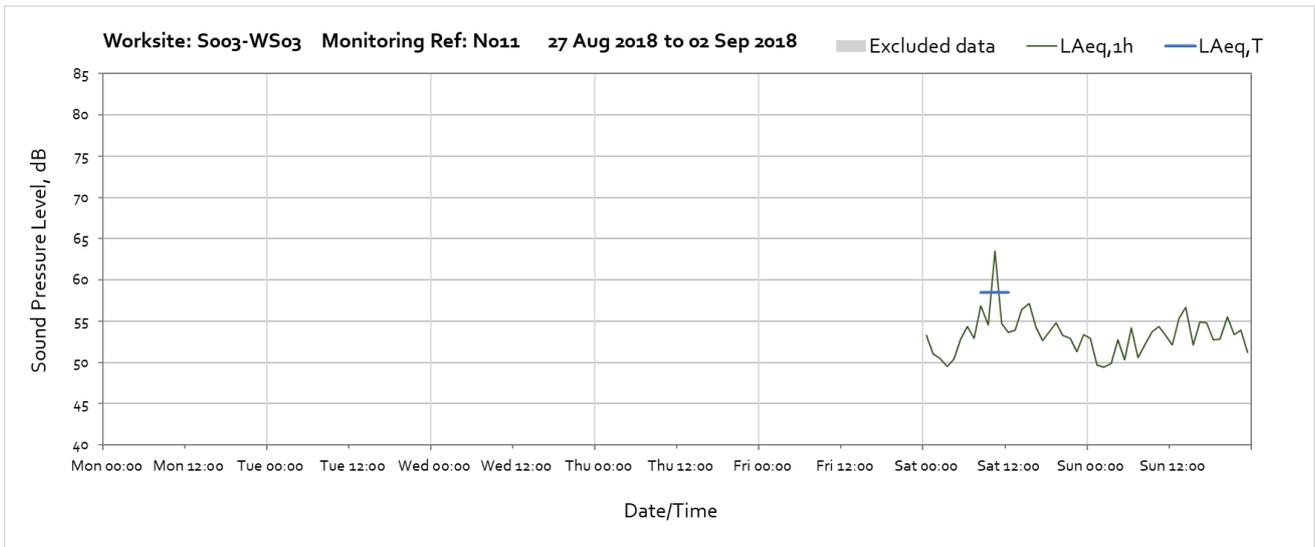


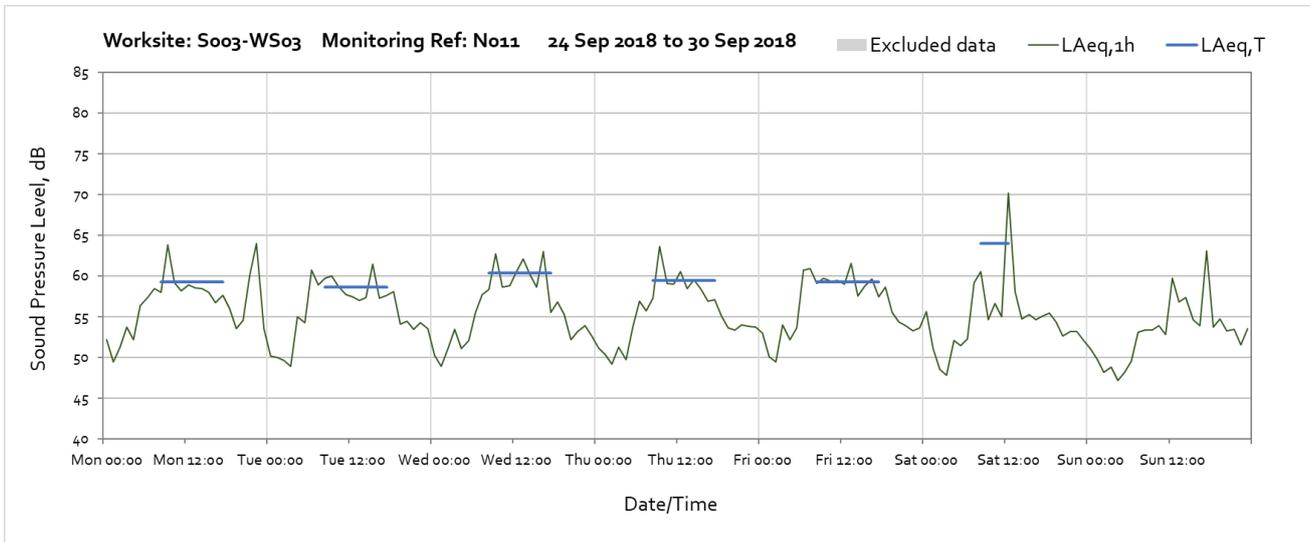
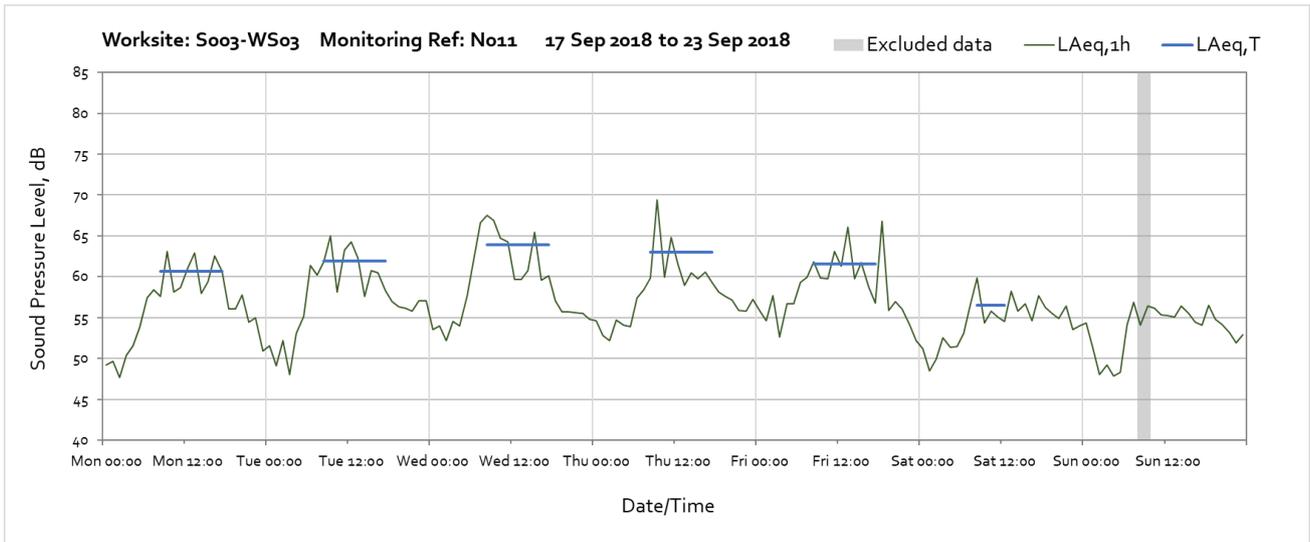
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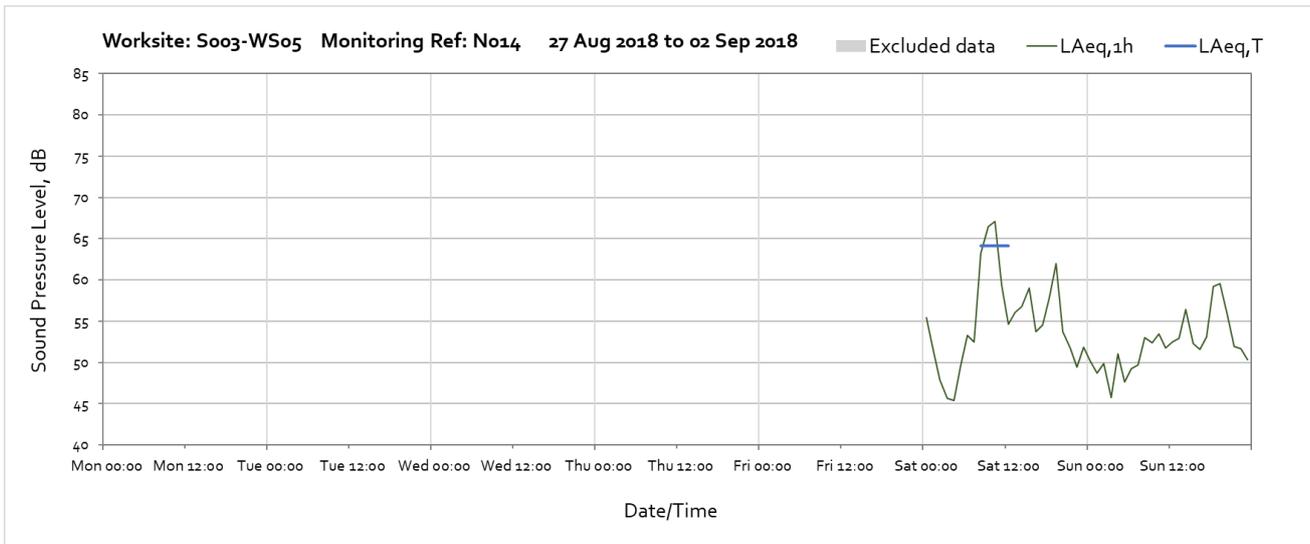


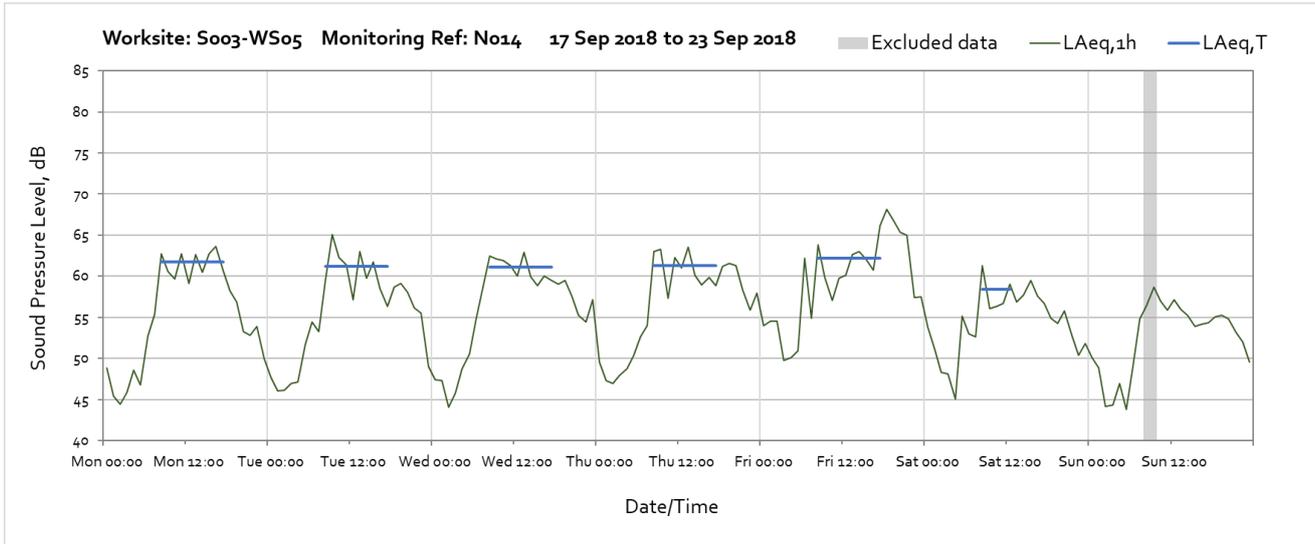
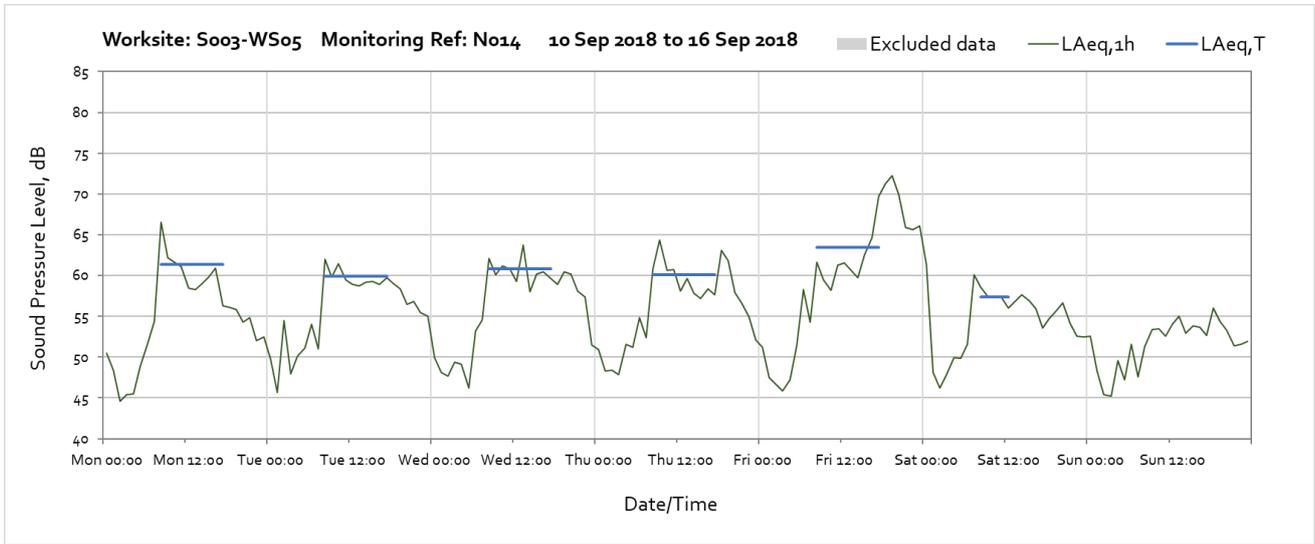
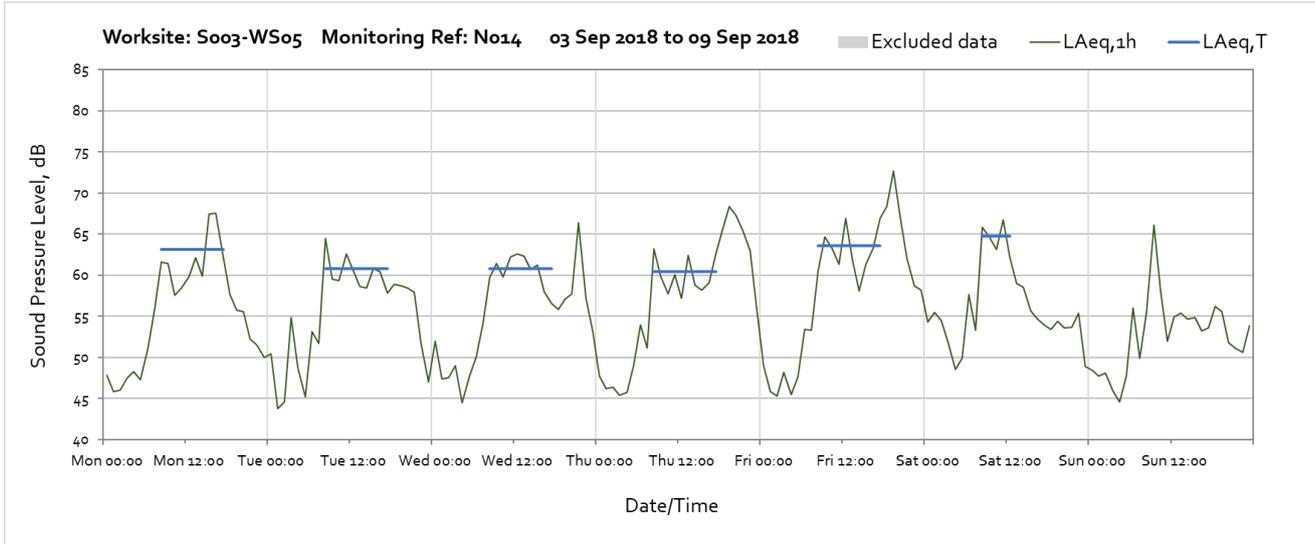
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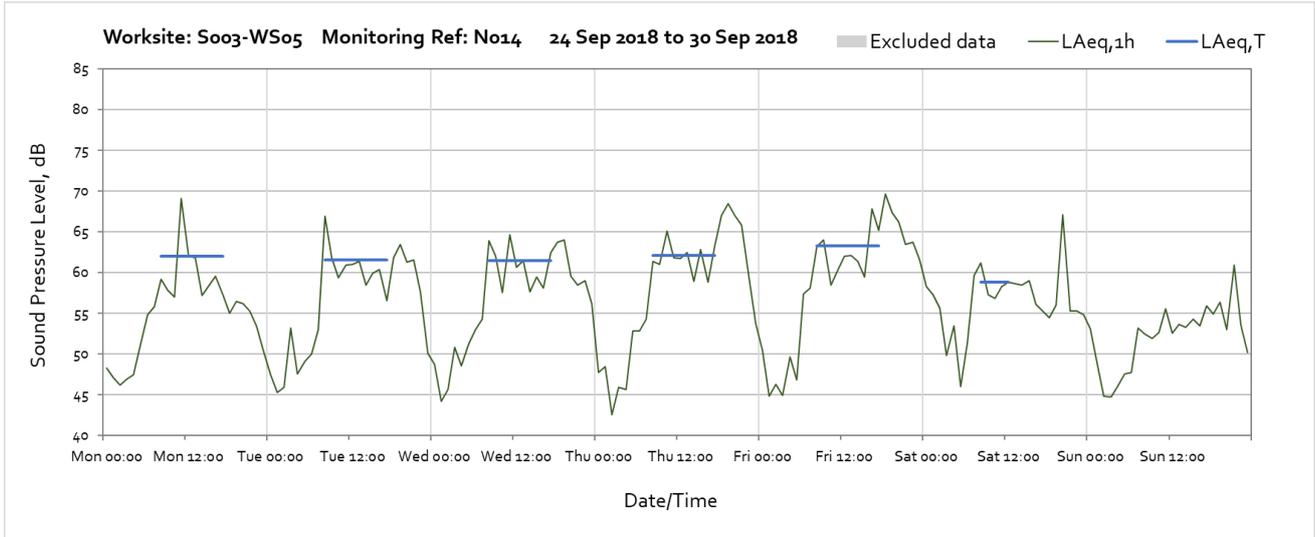




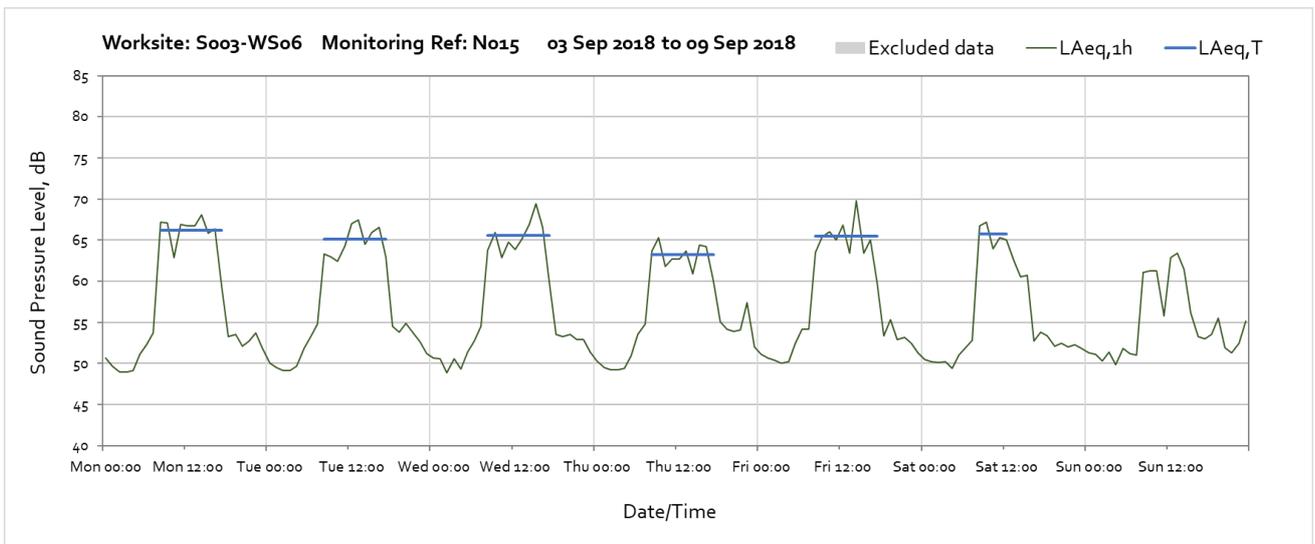
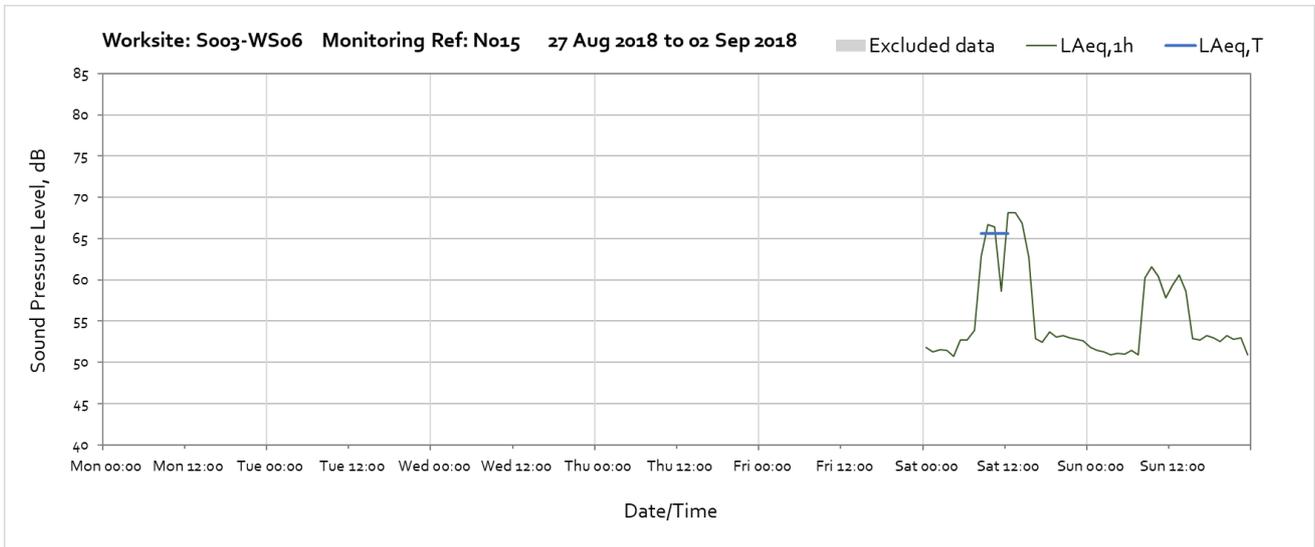
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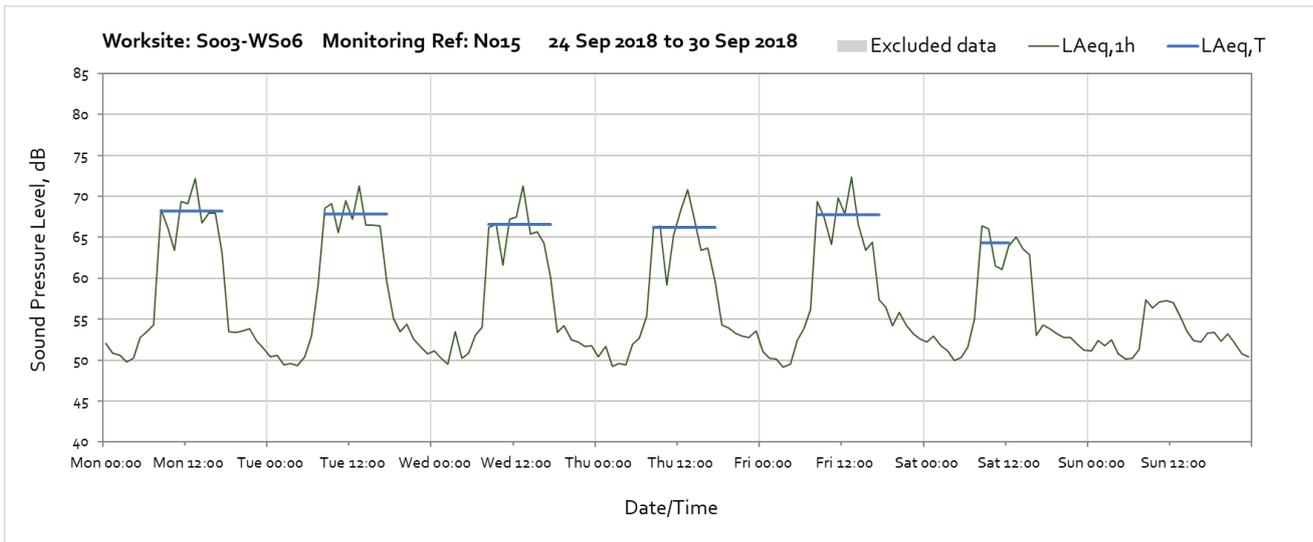
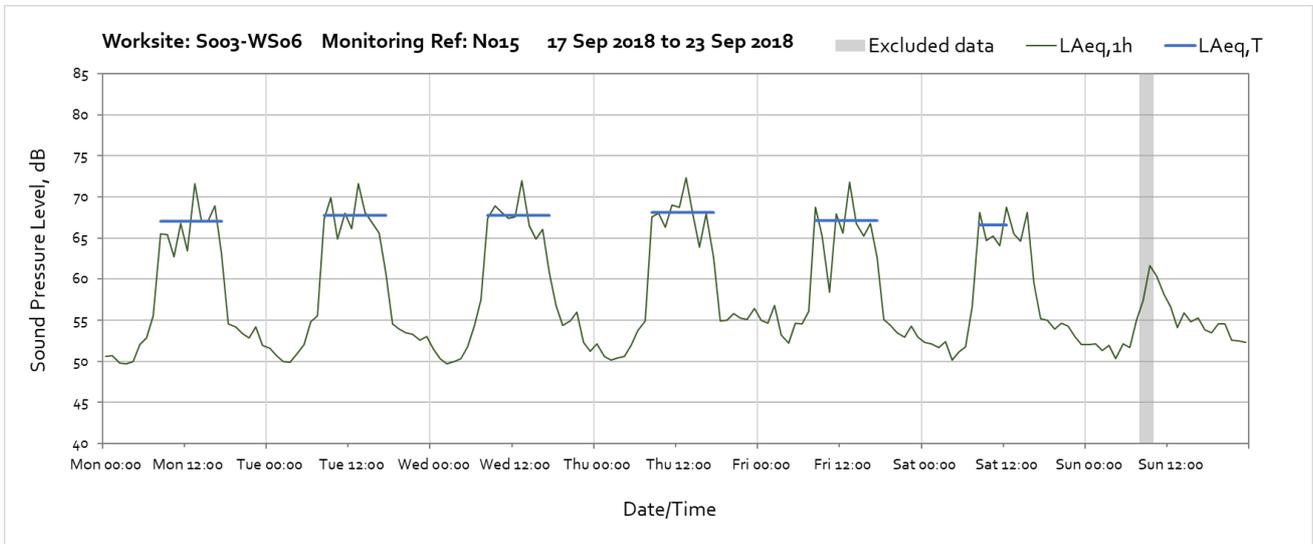
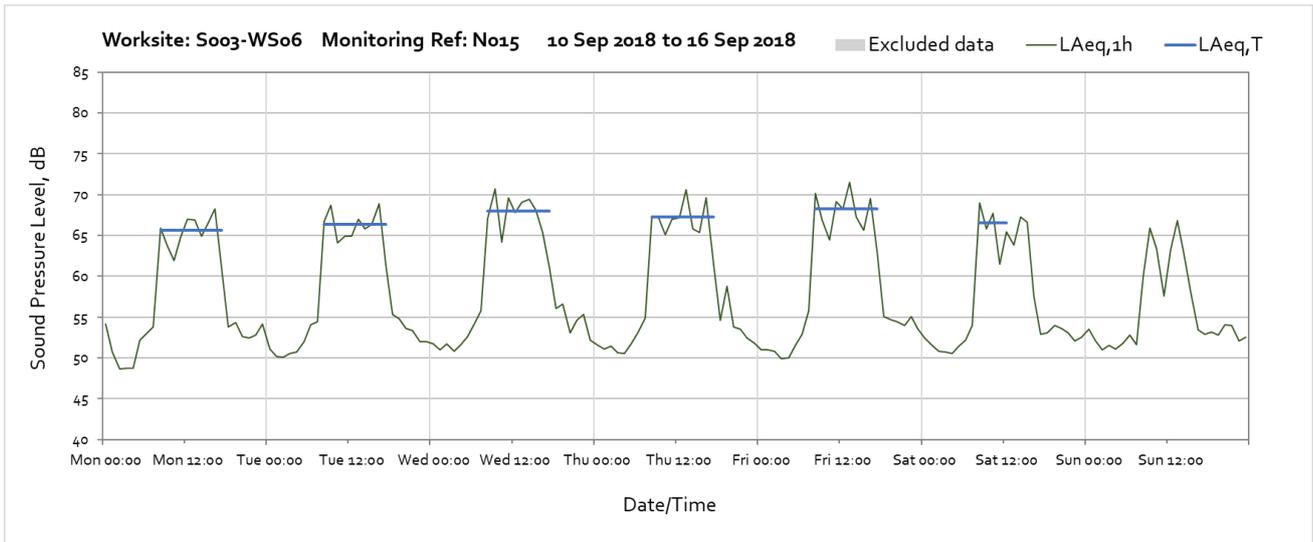




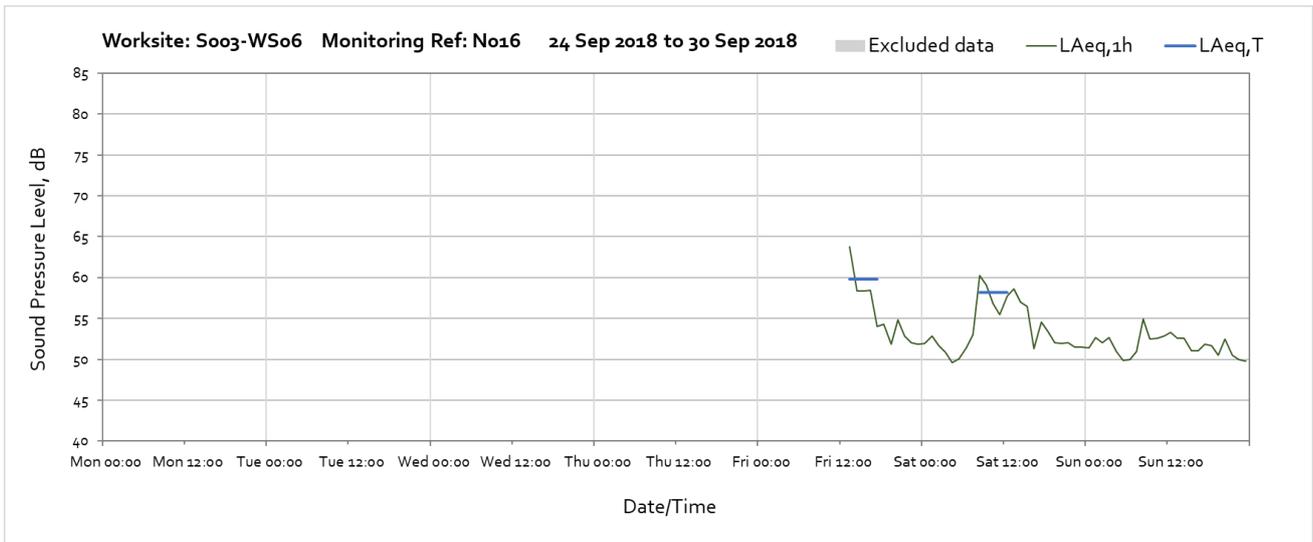


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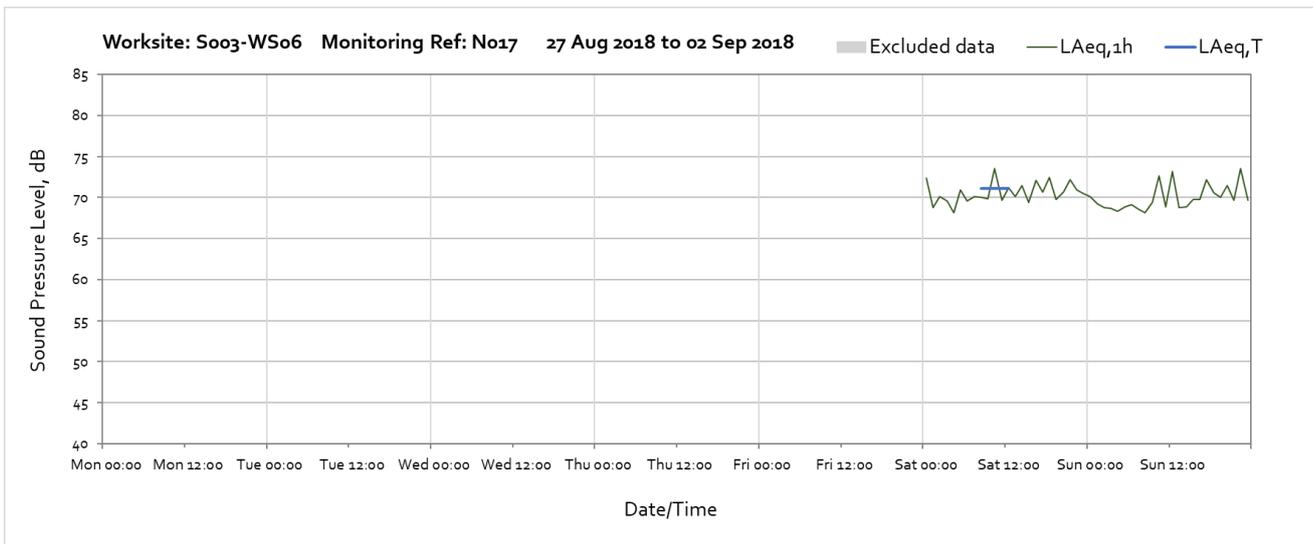


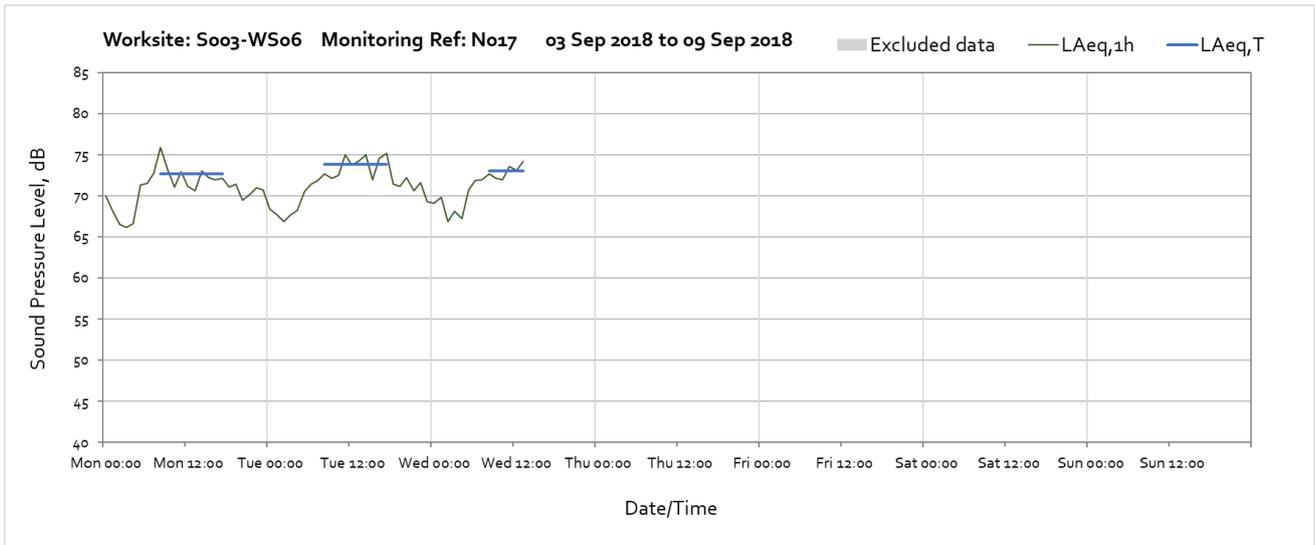


Worksite: S003-WS06 – Monitoring Ref: N016

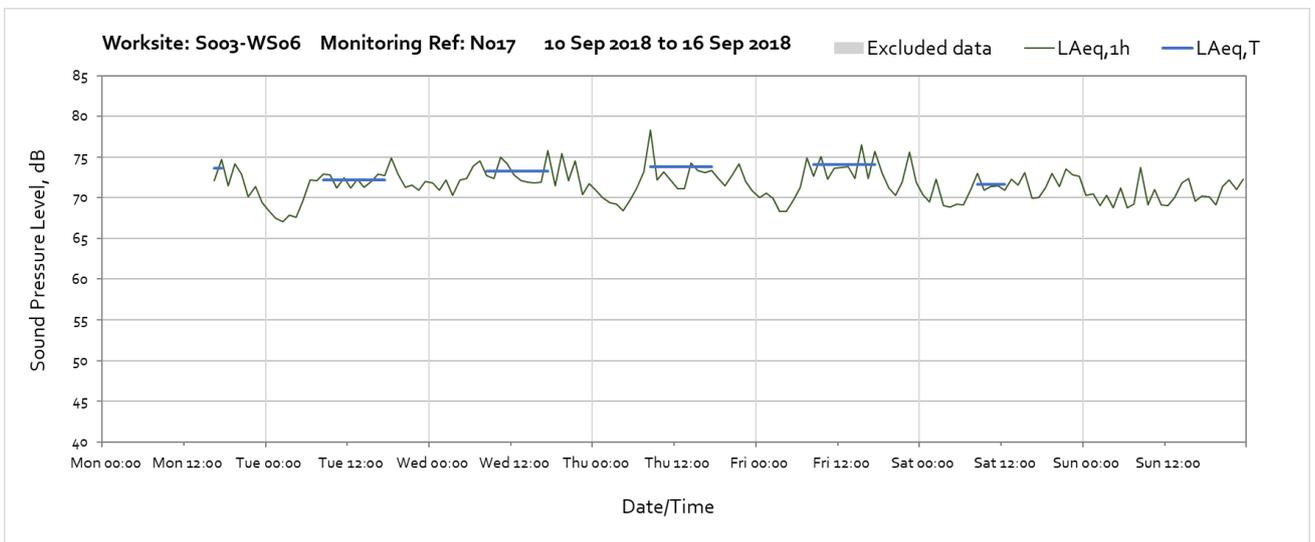


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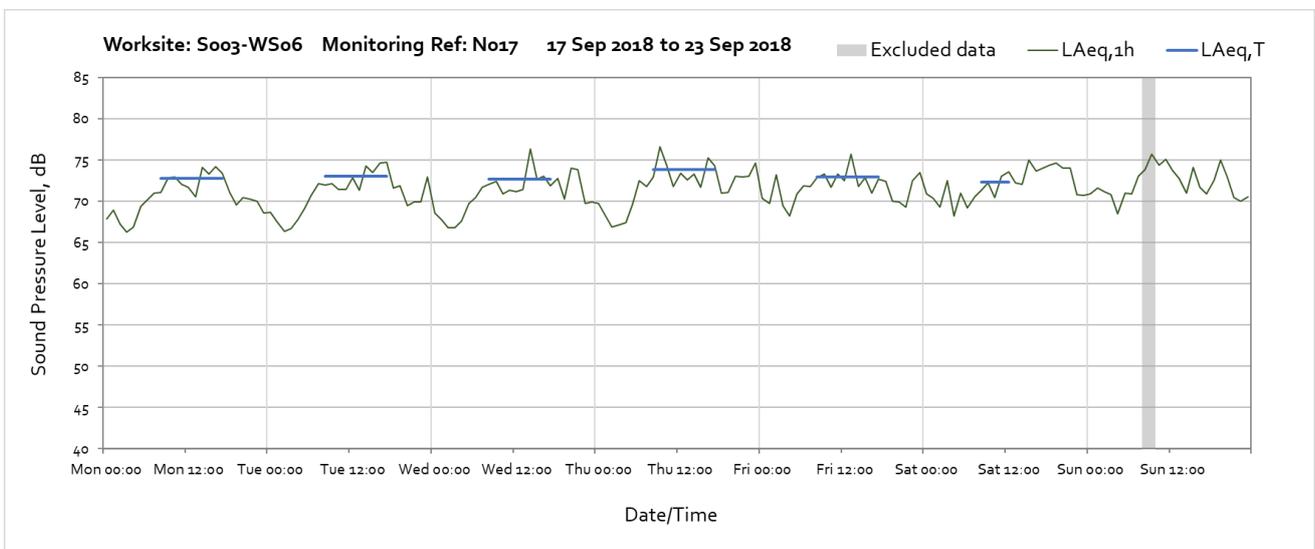


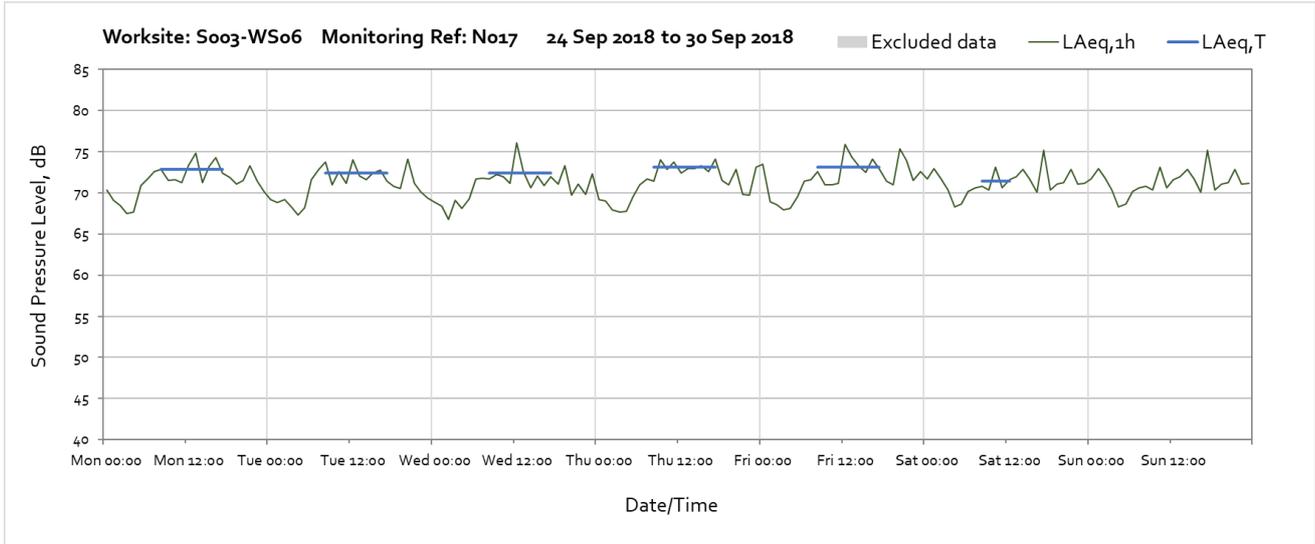


Note – Missing data between 13:00 between Wednesday 05 and 16:00 on Monday 10 due to sound level meter failure.

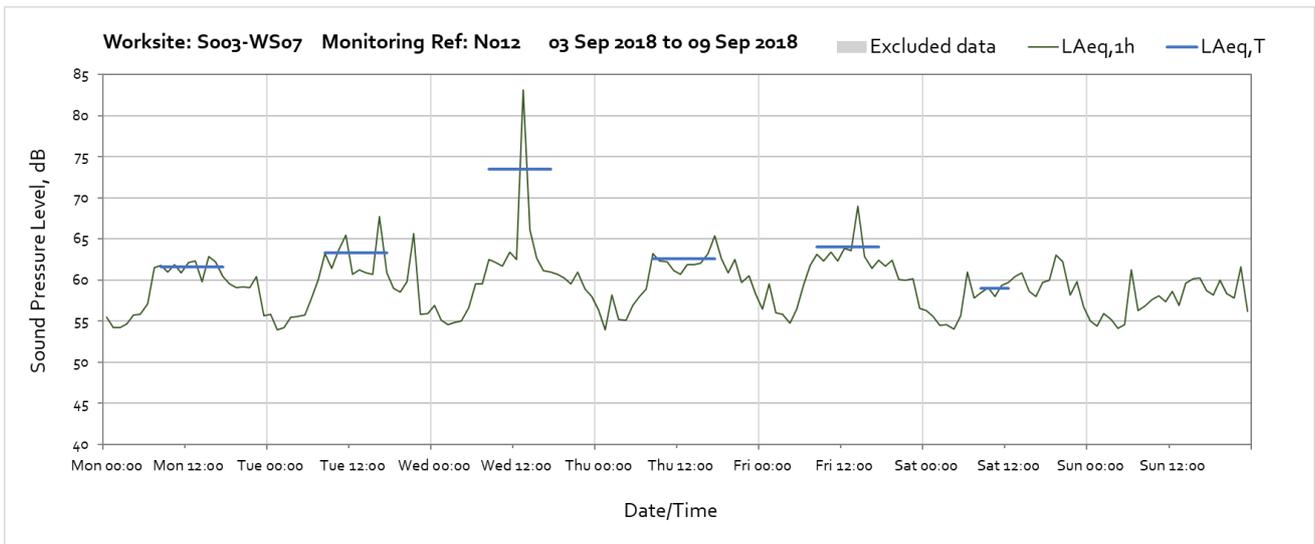
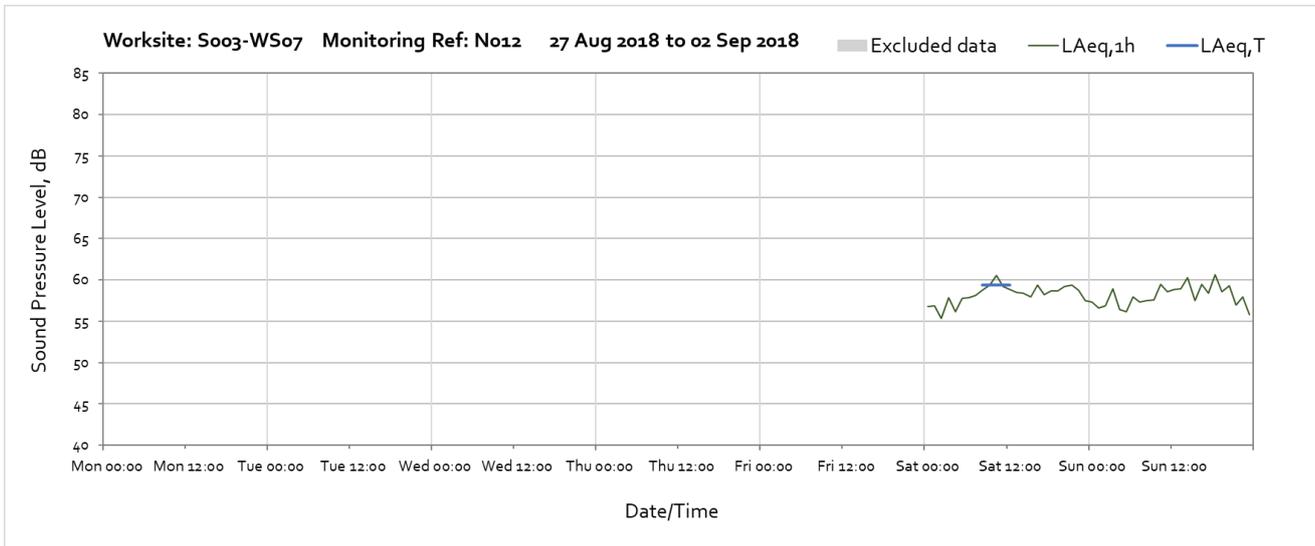


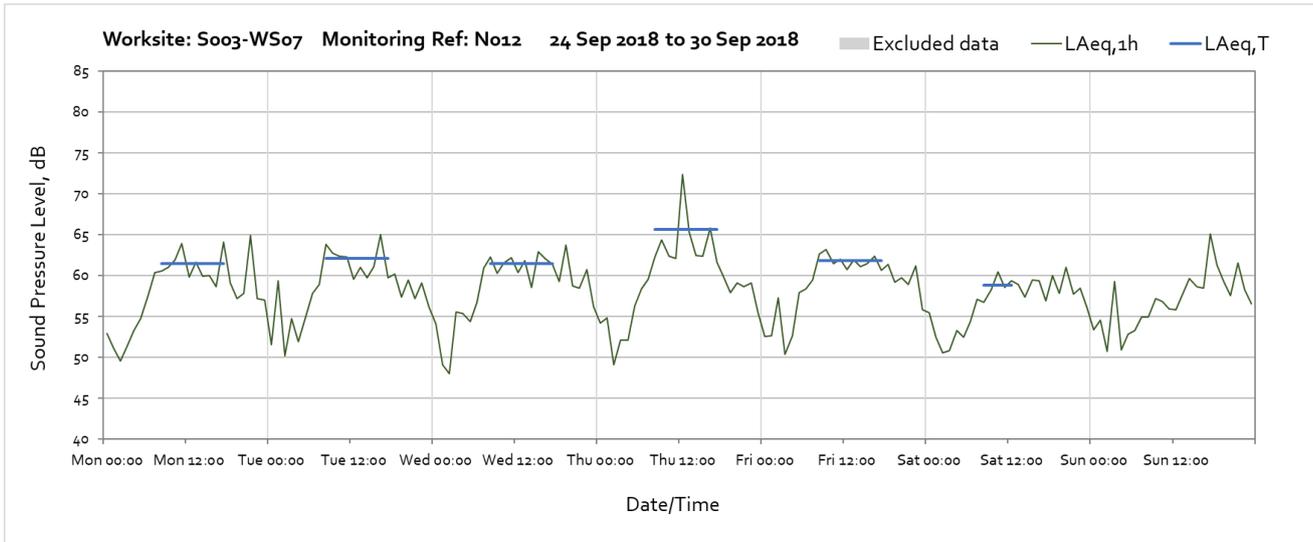
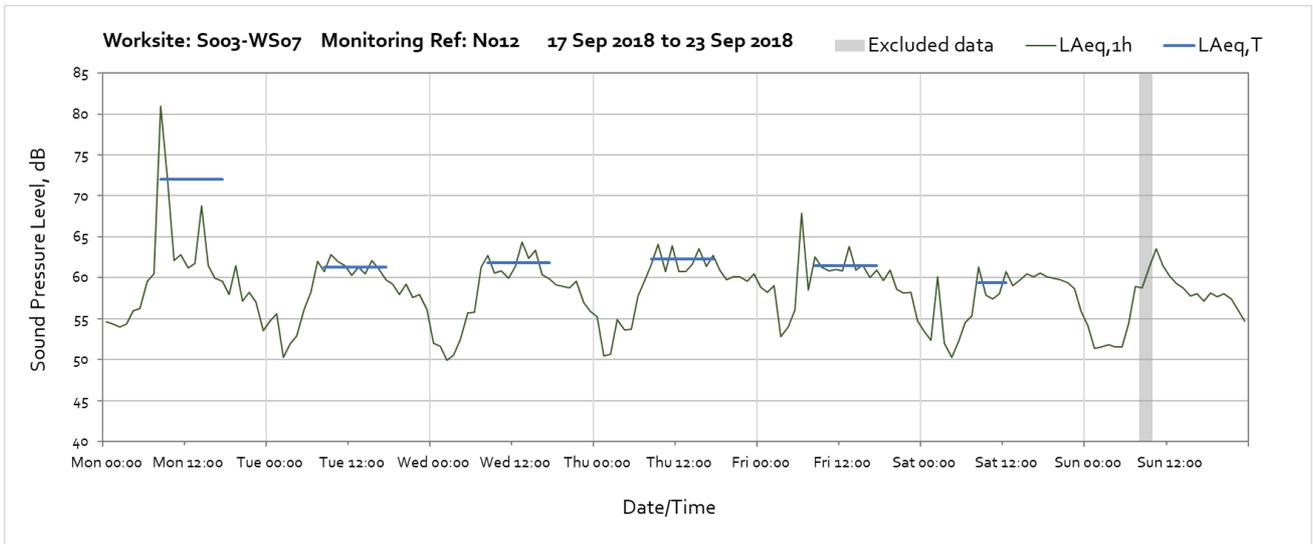
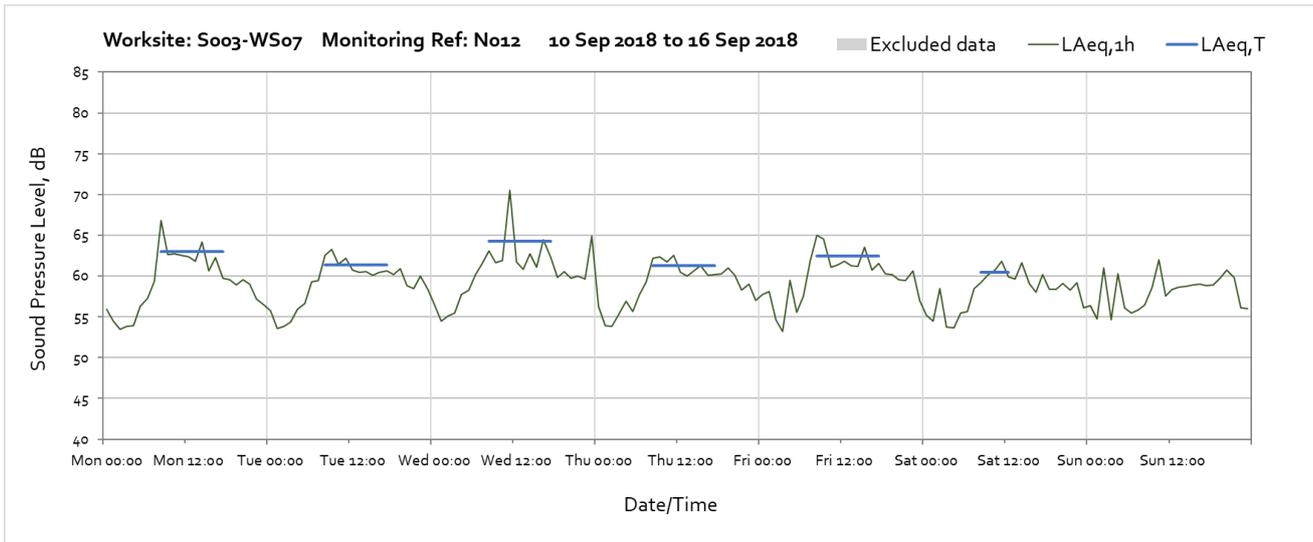
Note – Missing data between 13:00 between Wednesday 05 and 16:00 on Monday 10 due to sound level meter failure.



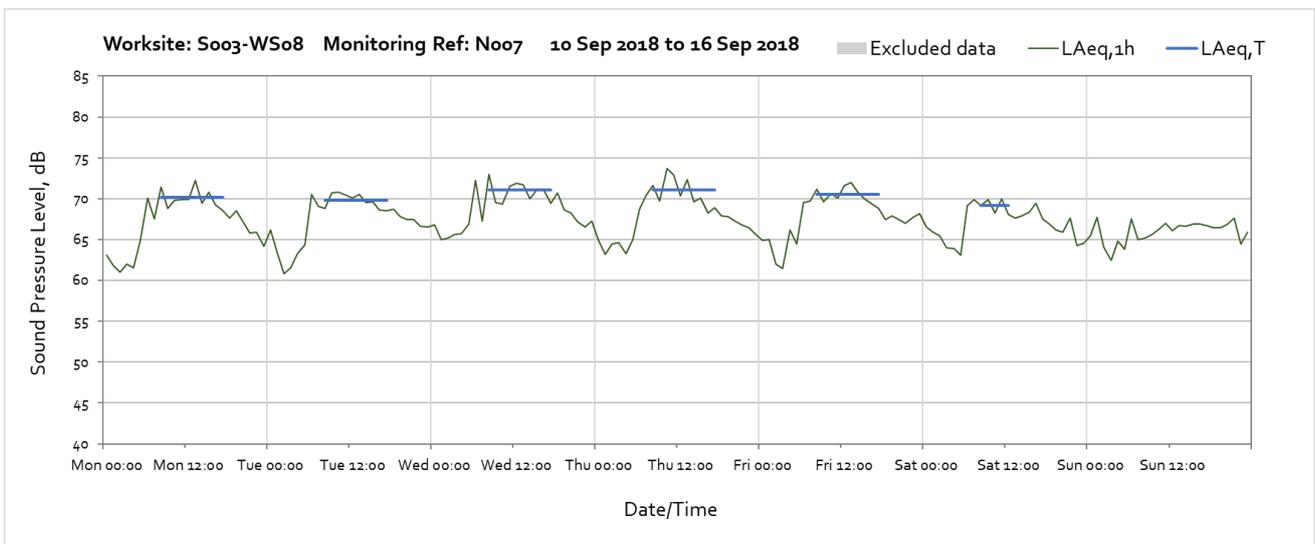
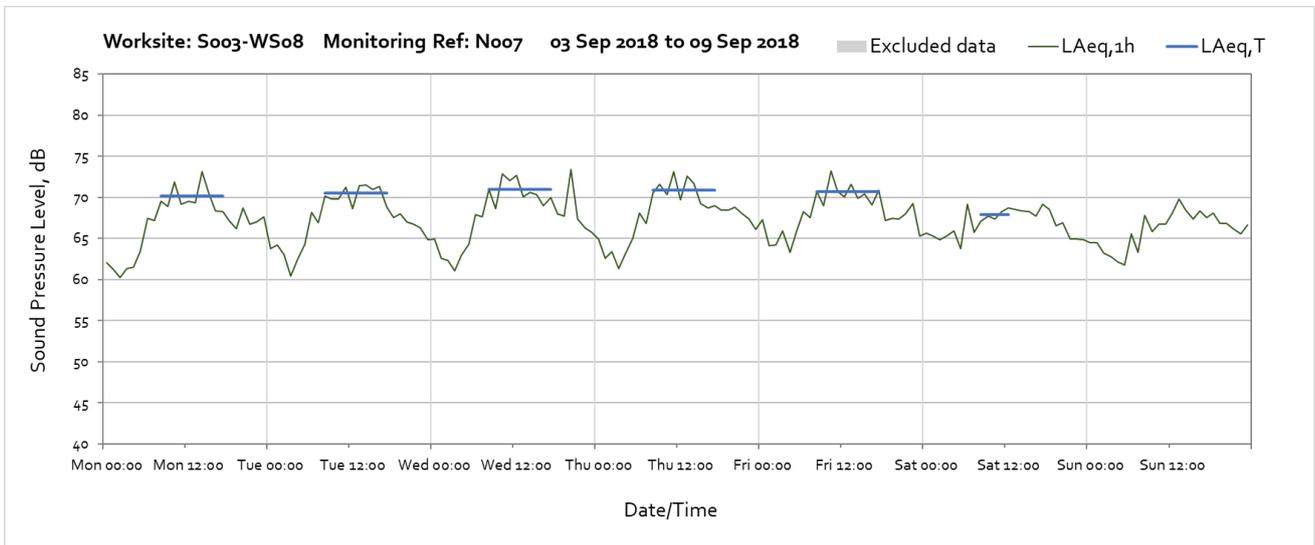
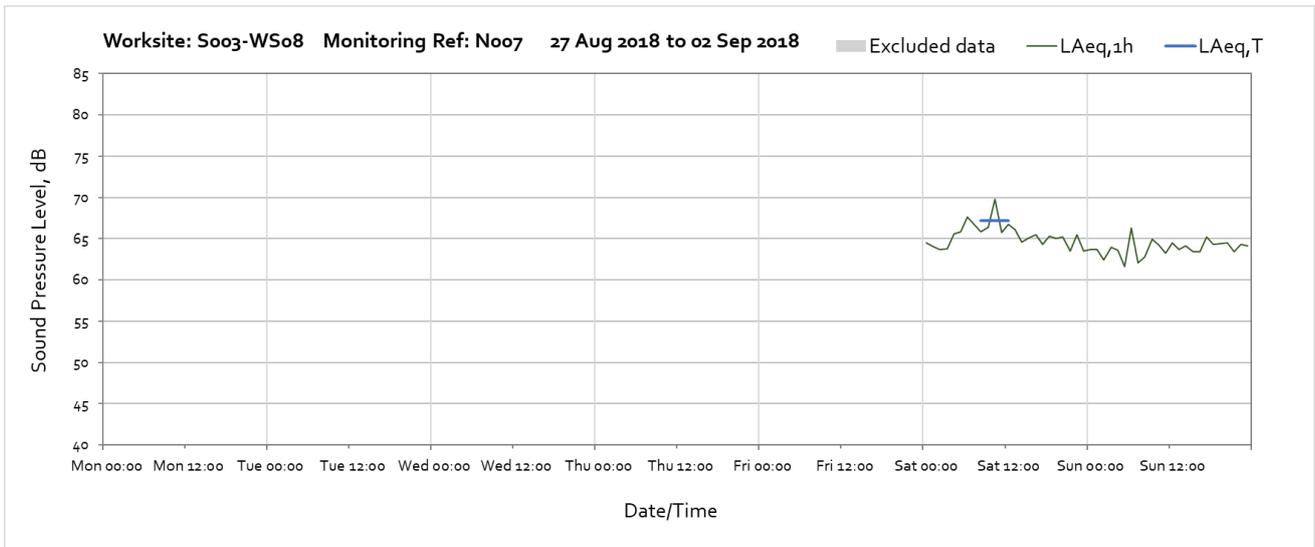


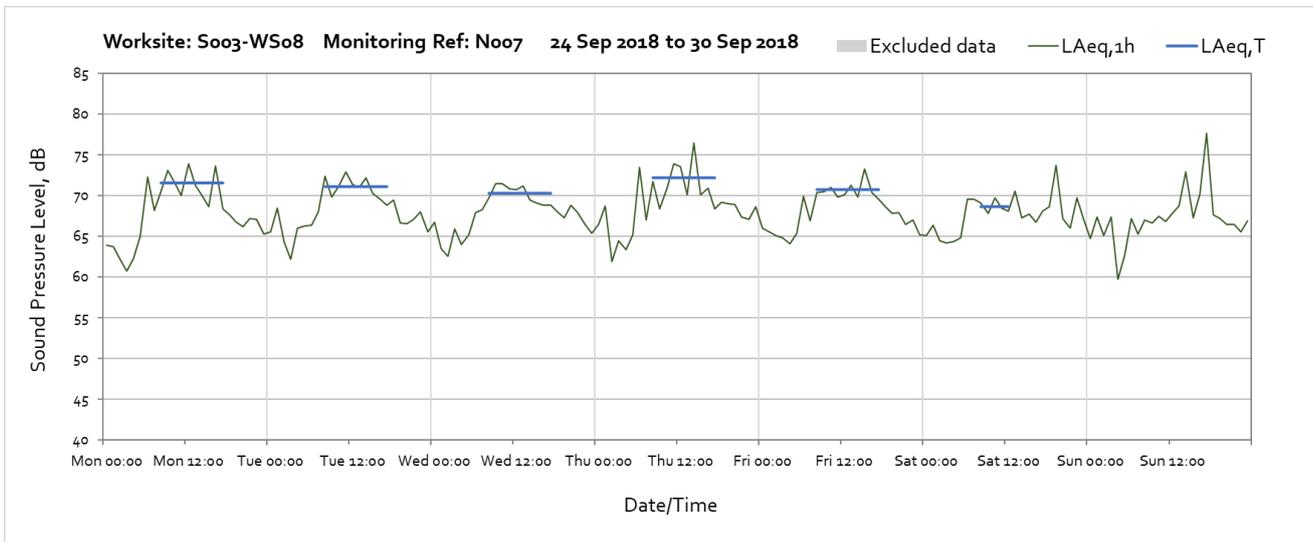
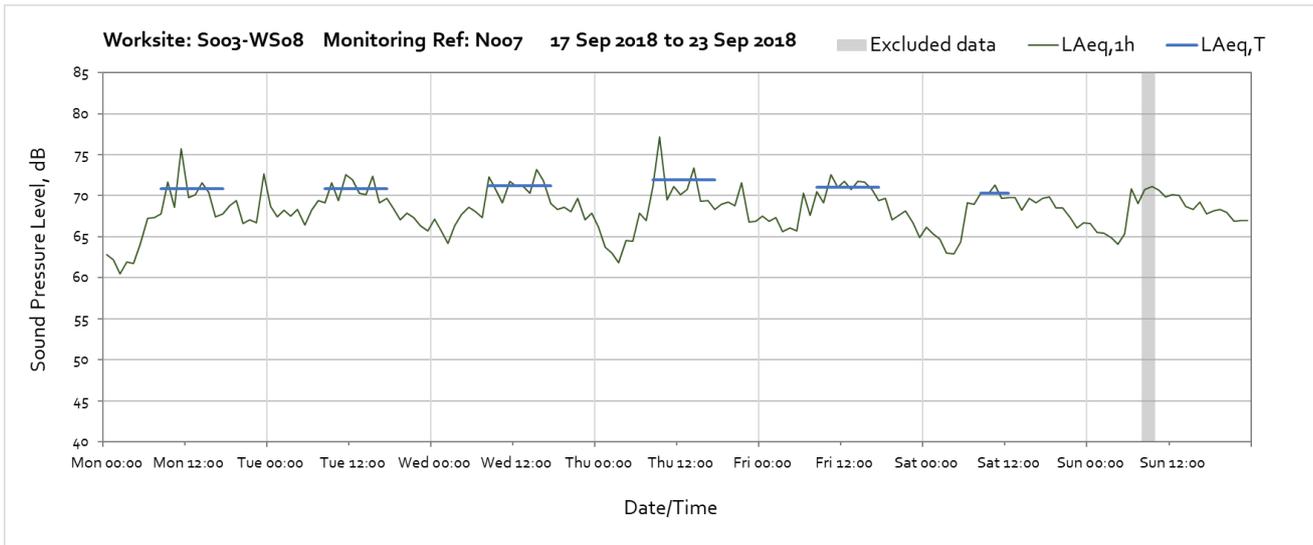
Worksite: S003-WS07 – Monitoring Ref: N012



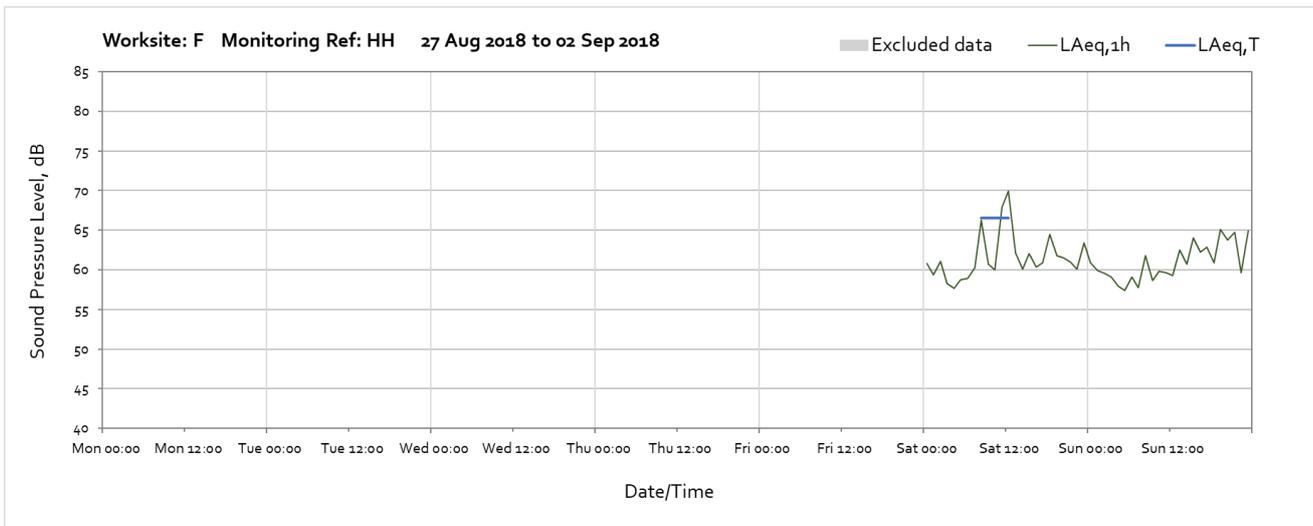


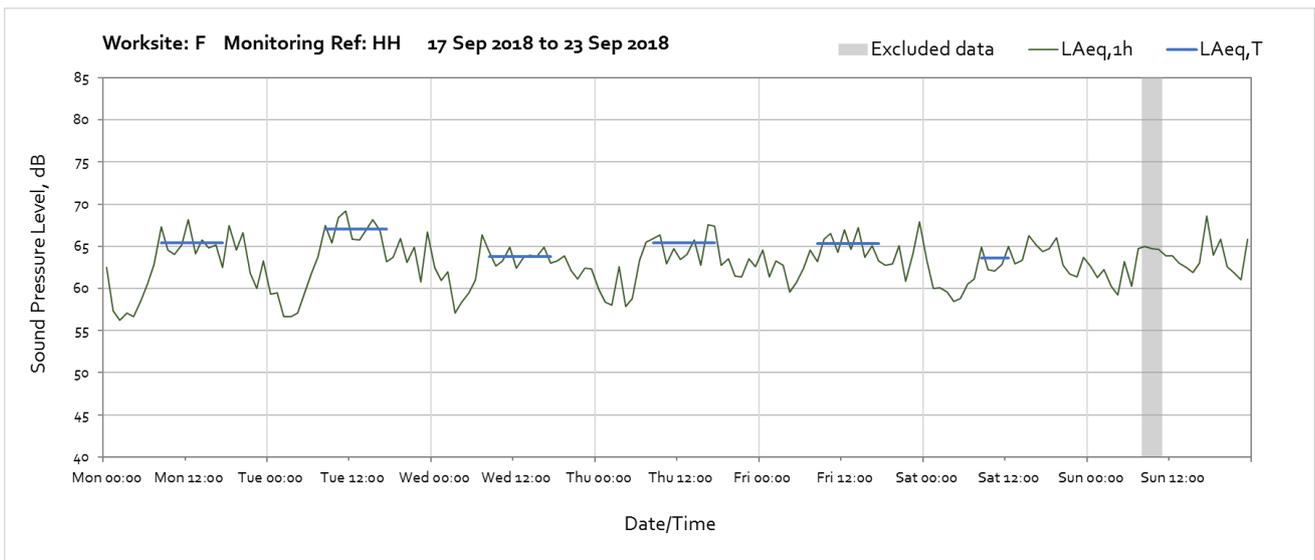
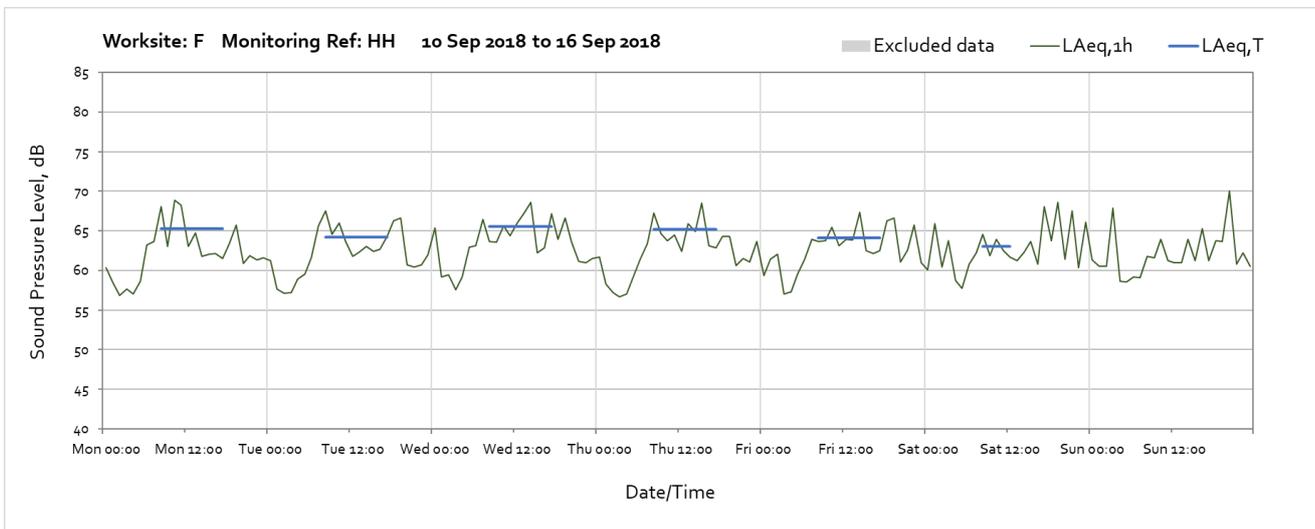
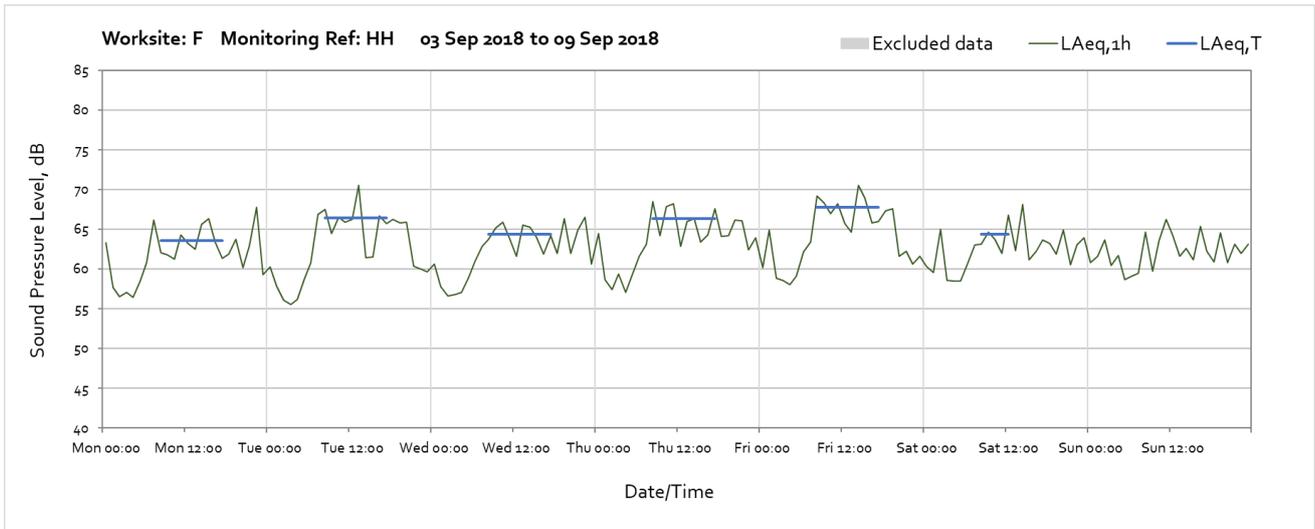
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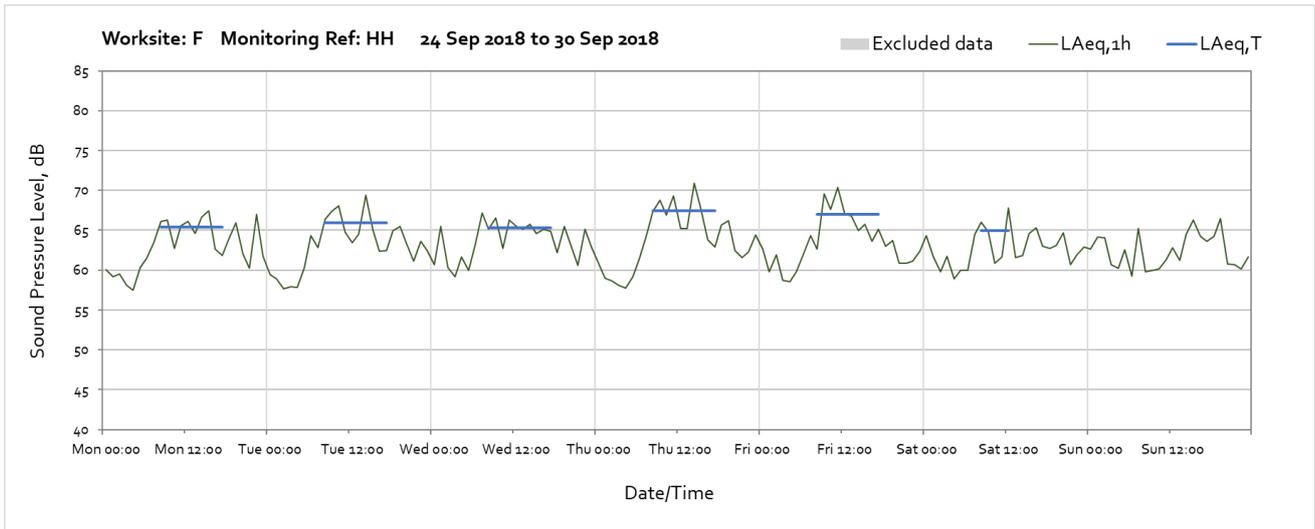




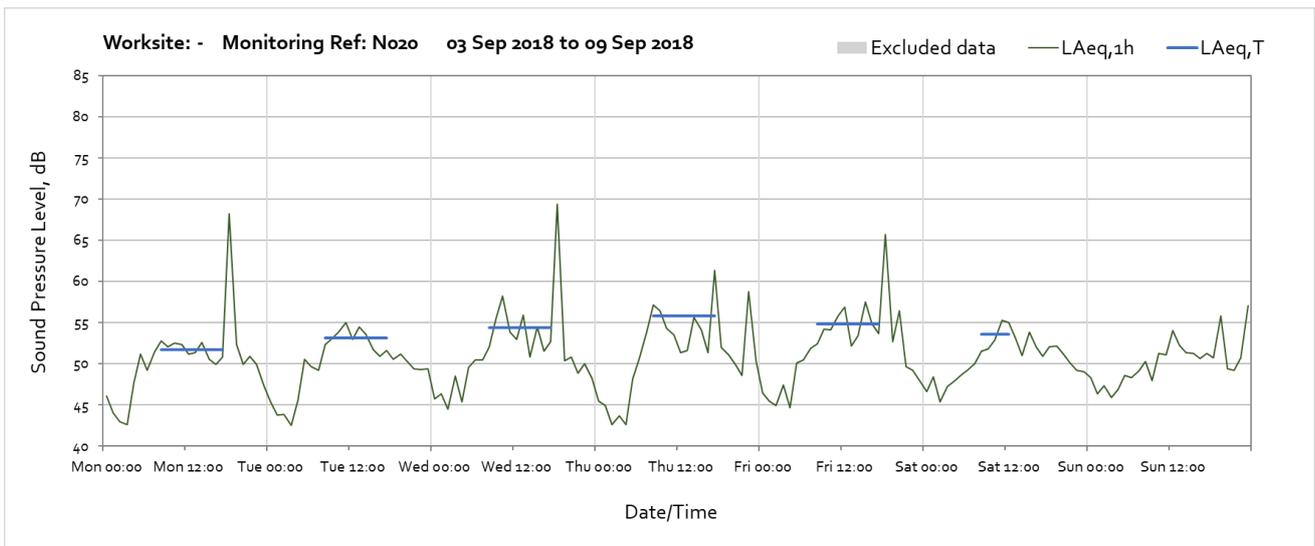
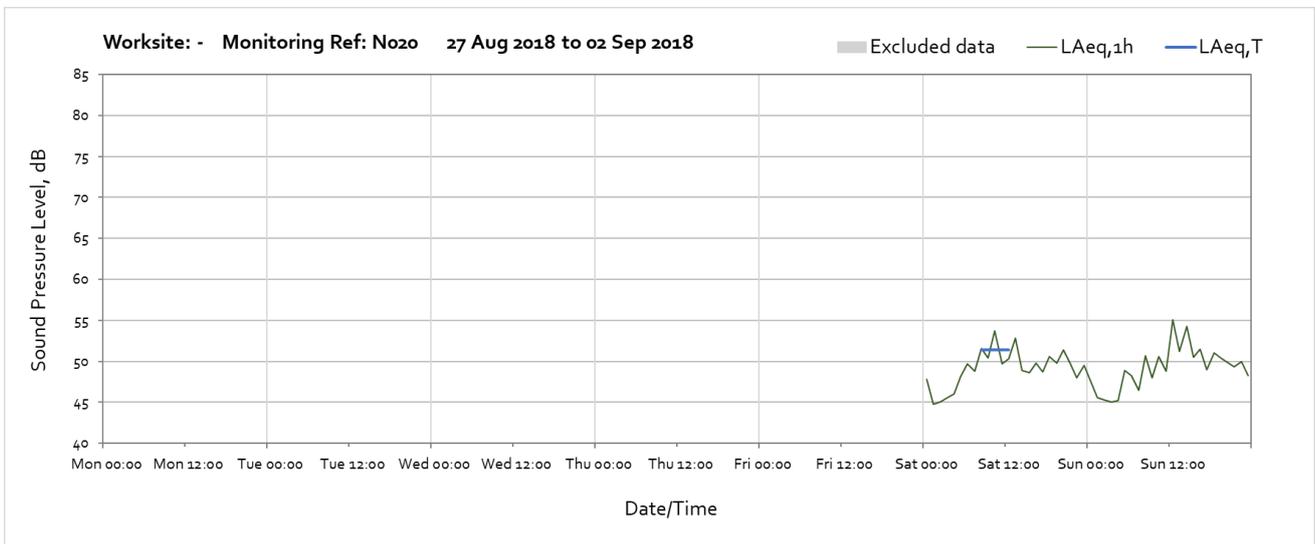
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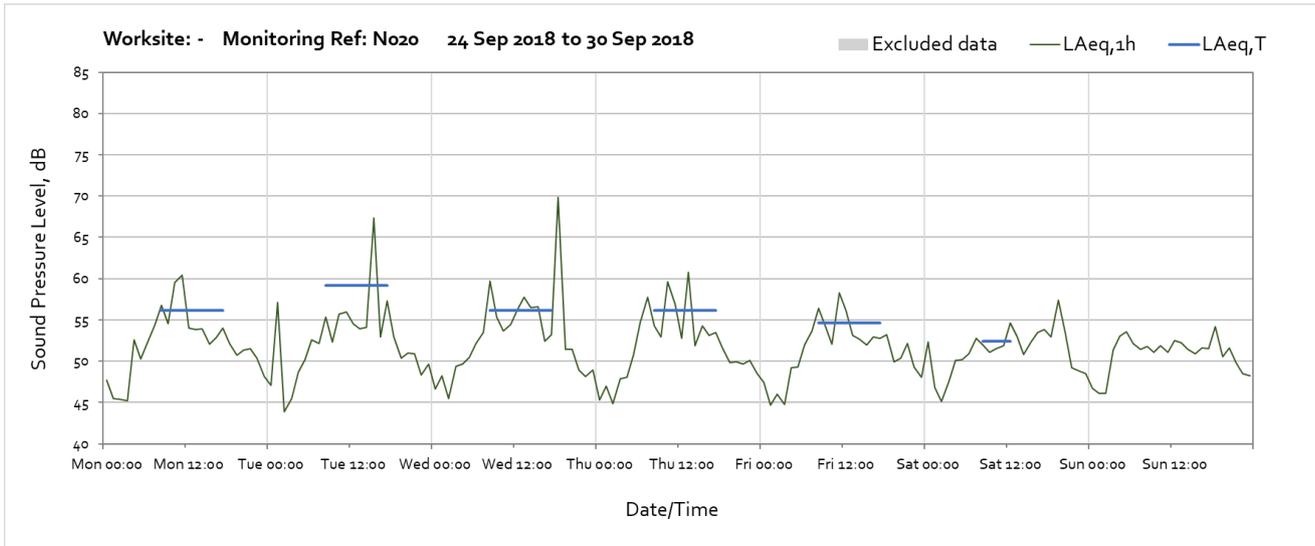
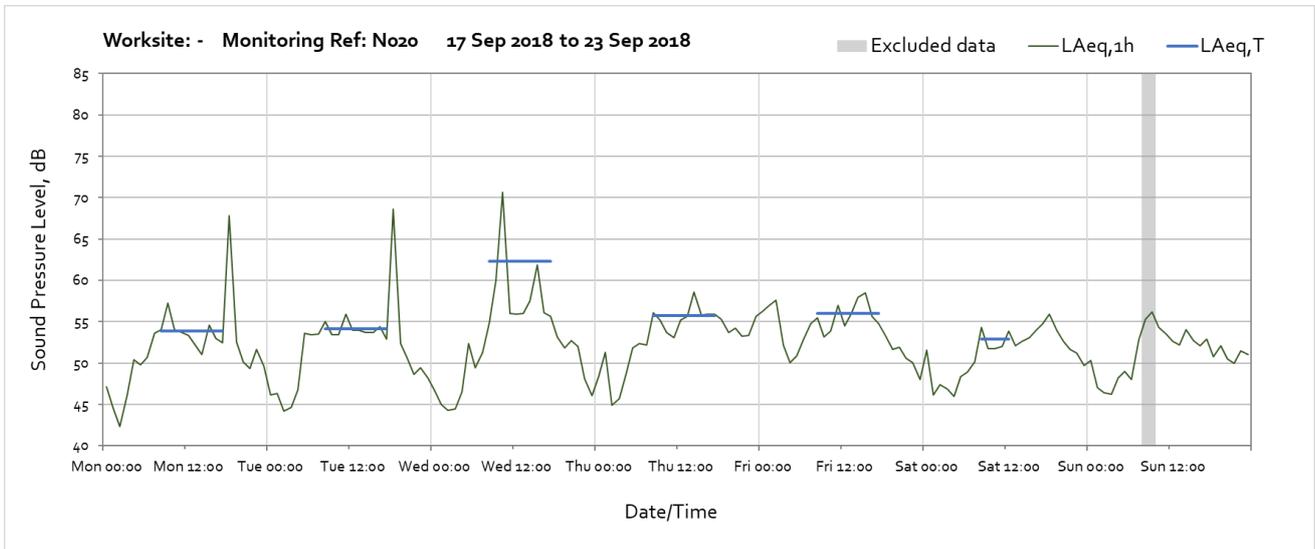
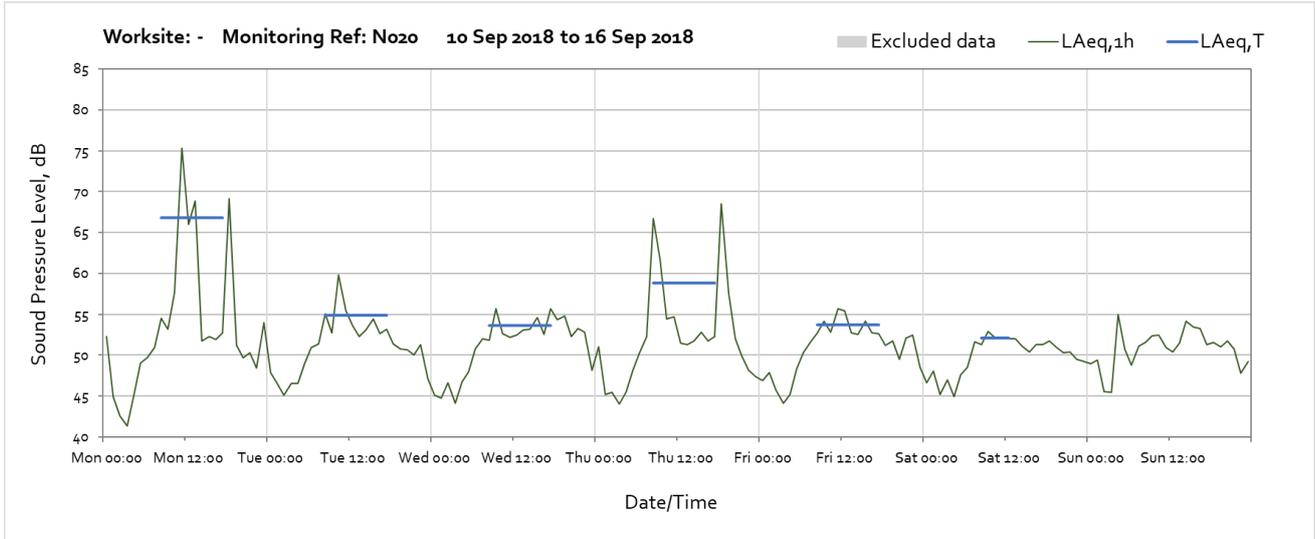




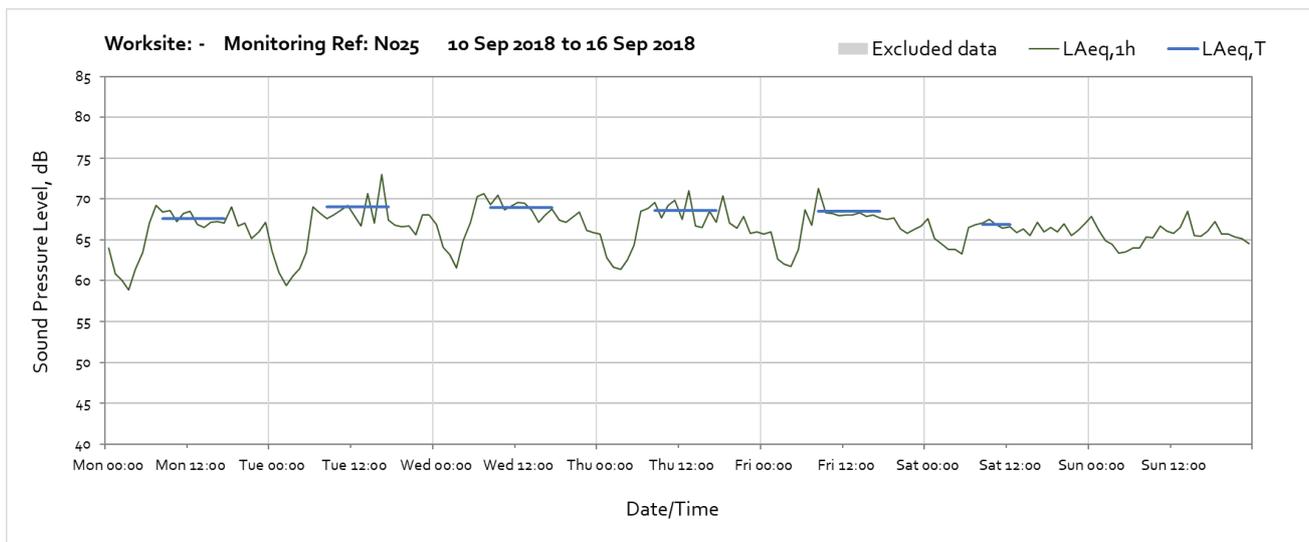
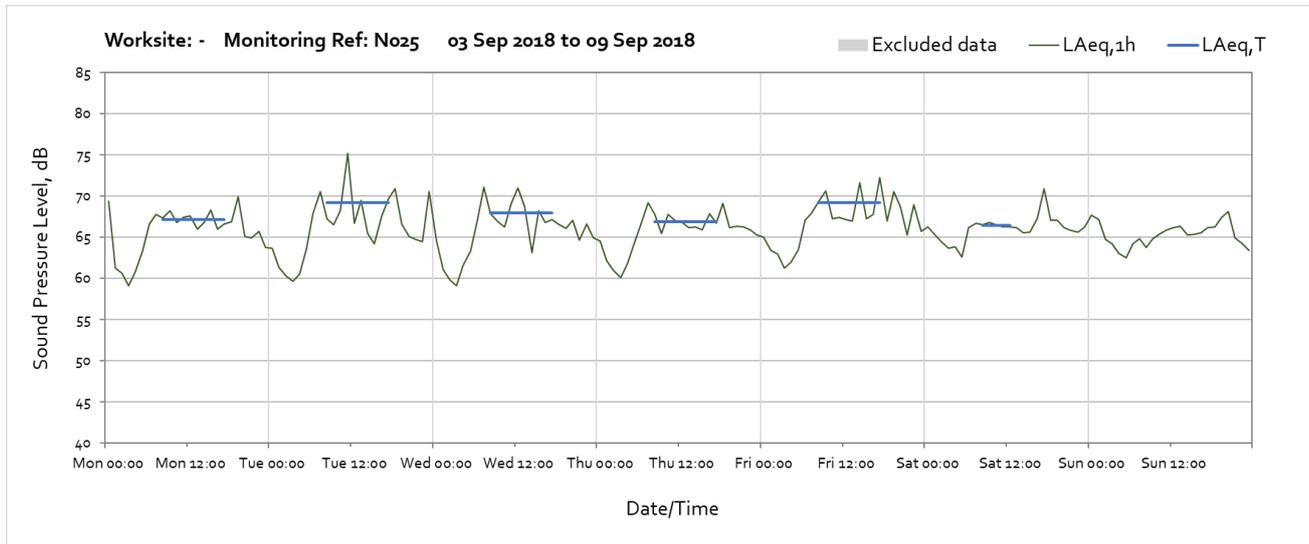
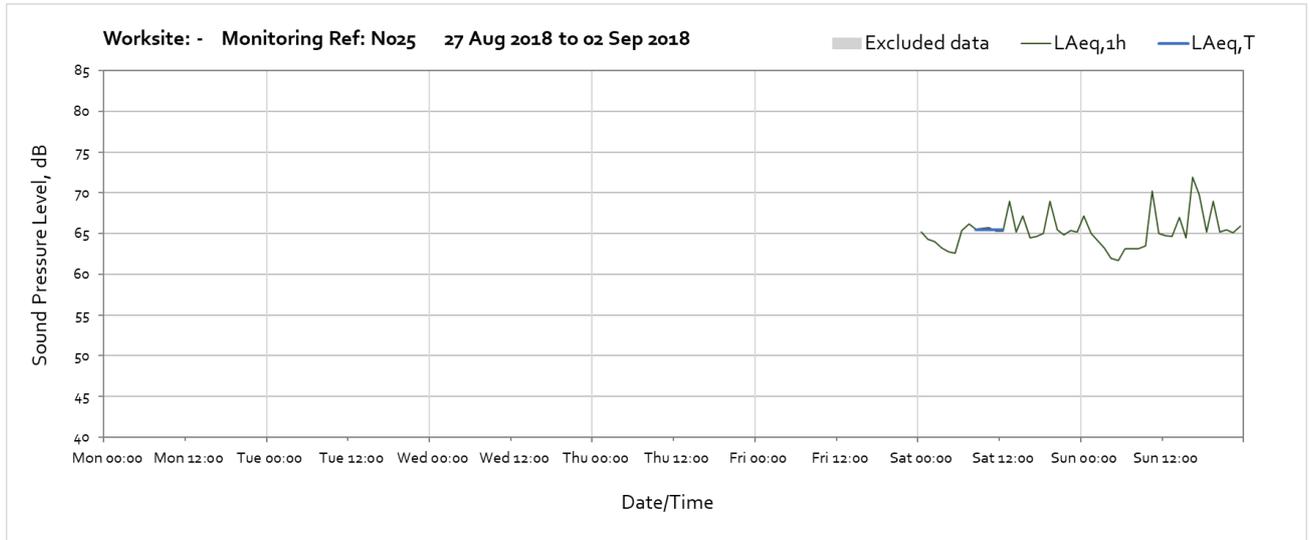


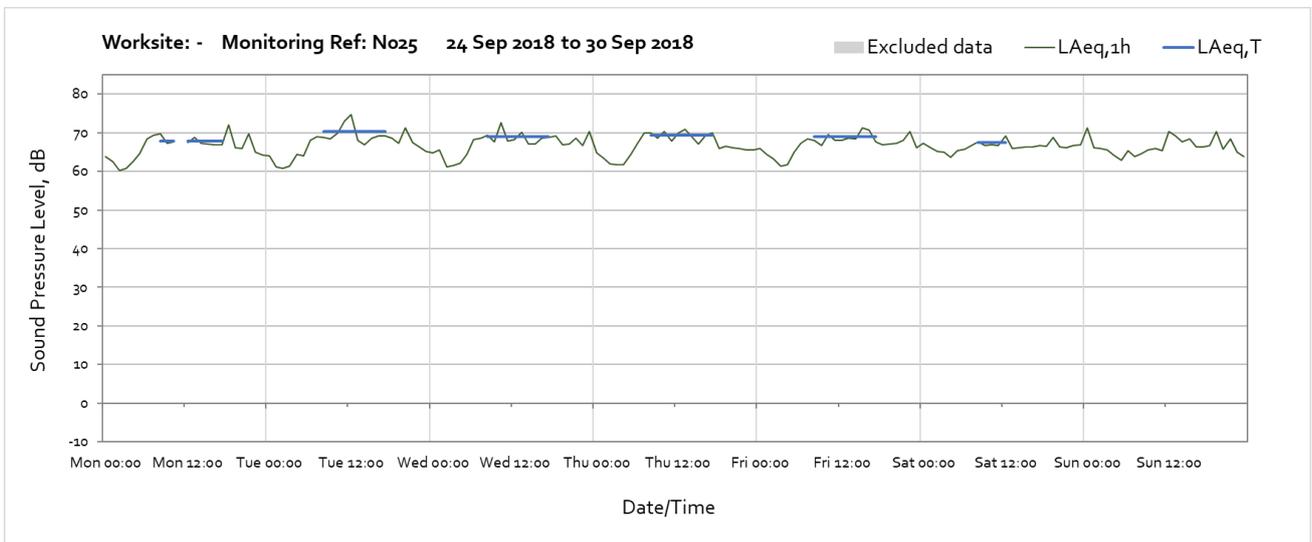
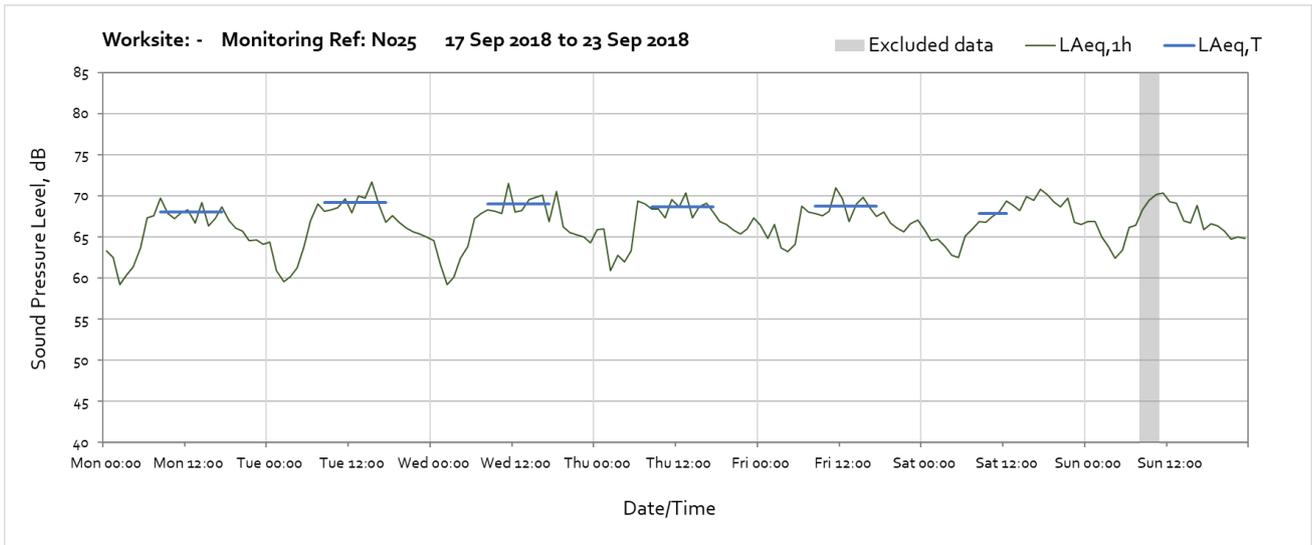
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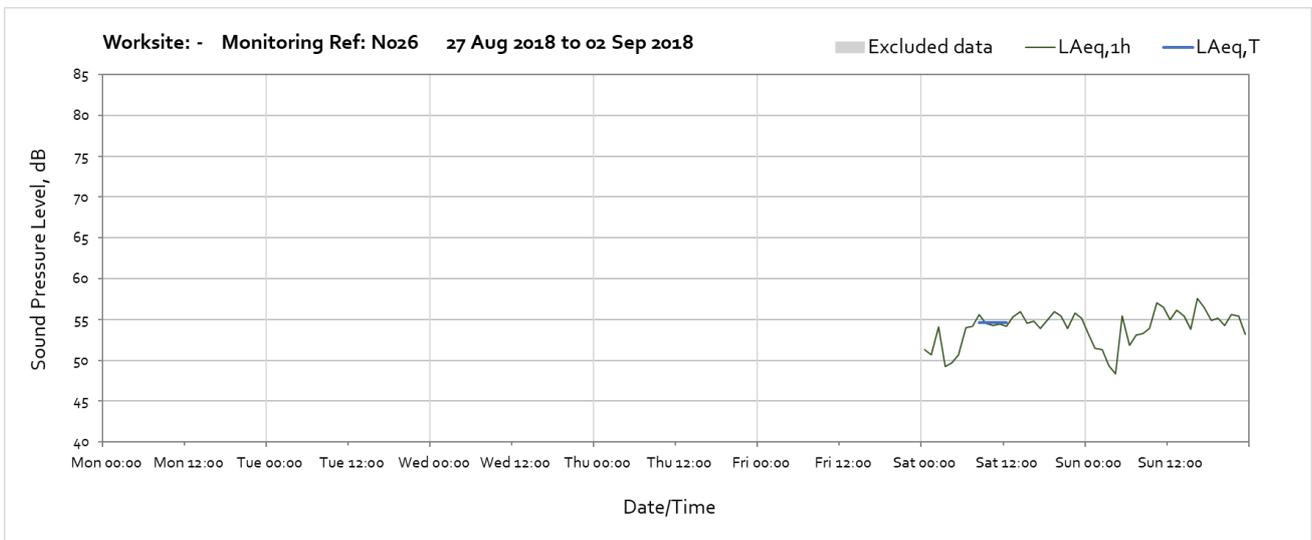
Monitoring Ref: N025

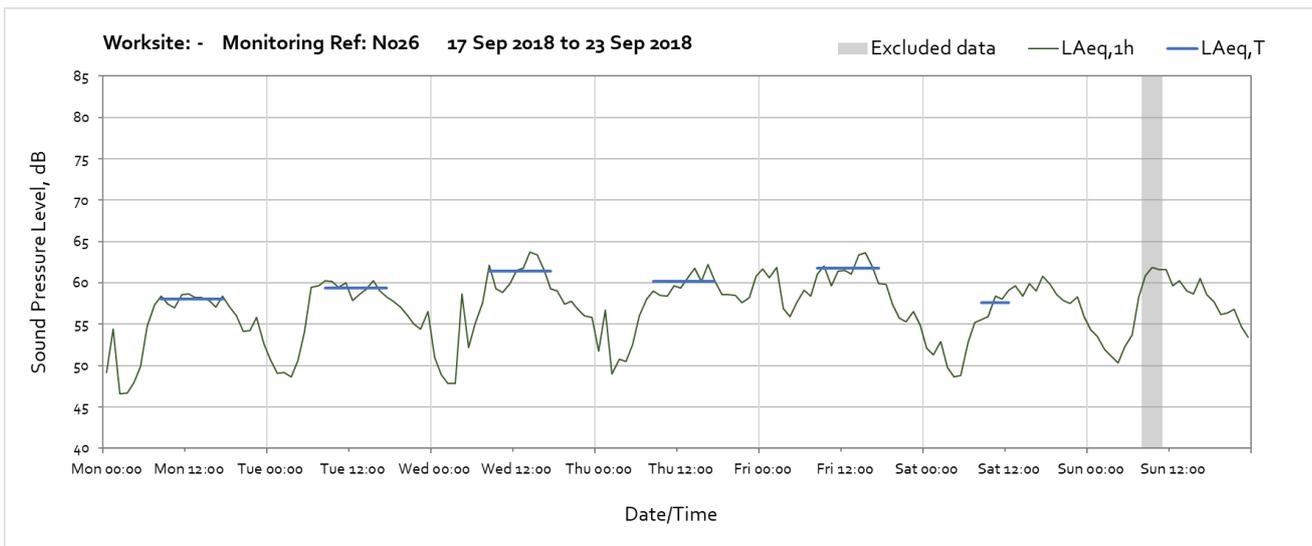
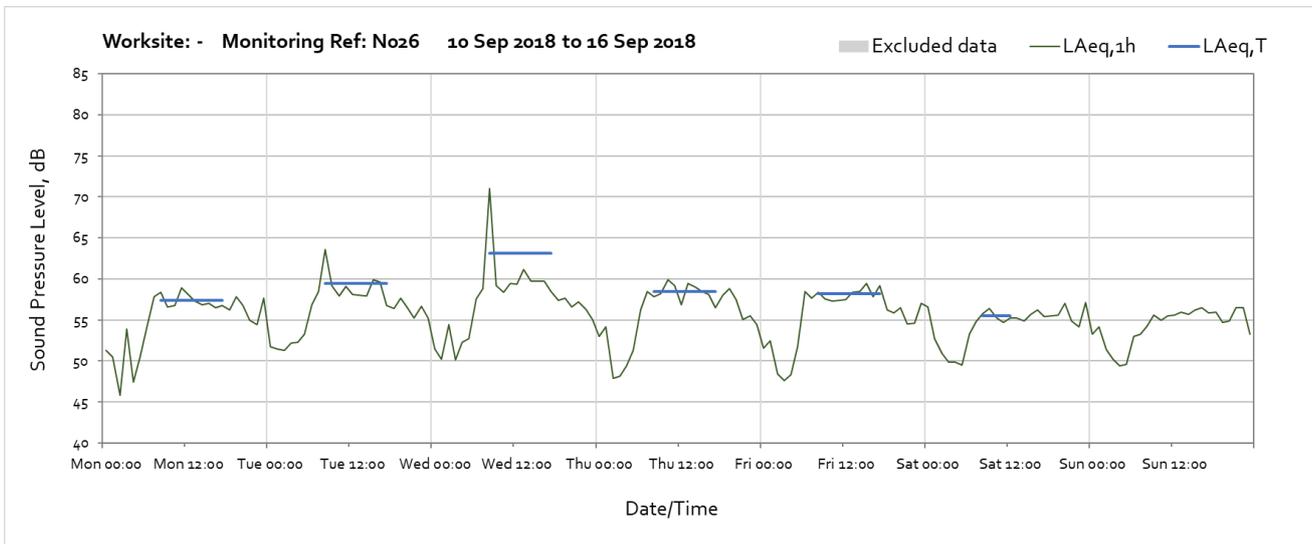
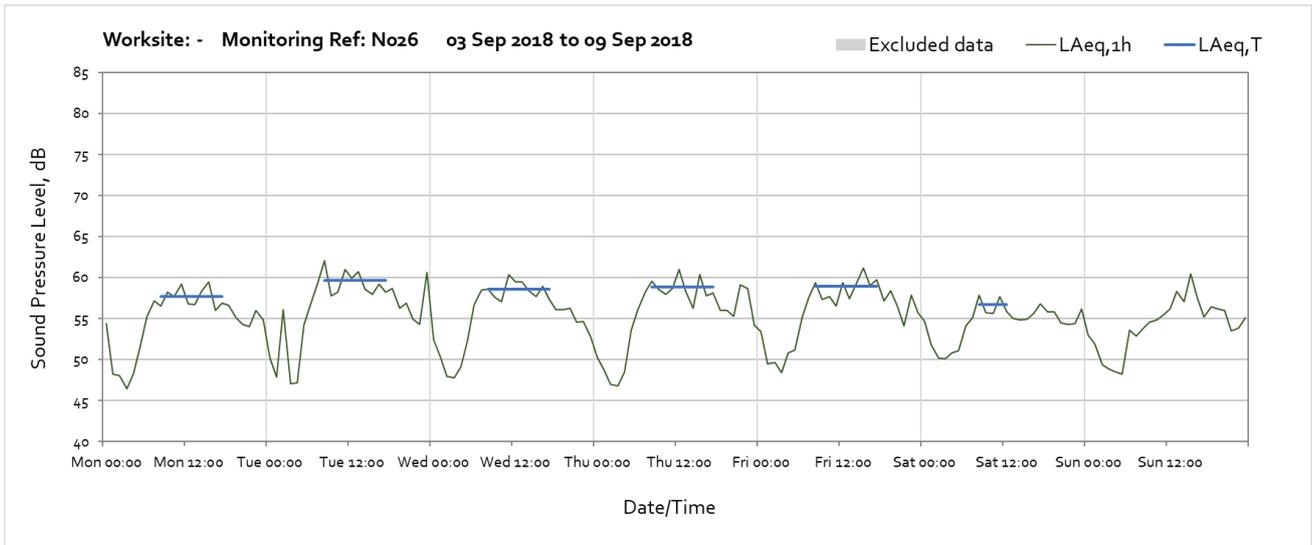




Note – Missing data between 11:00 on Monday 24 and 12:00 on Monday 24 due to pause in measurement for maintenance.

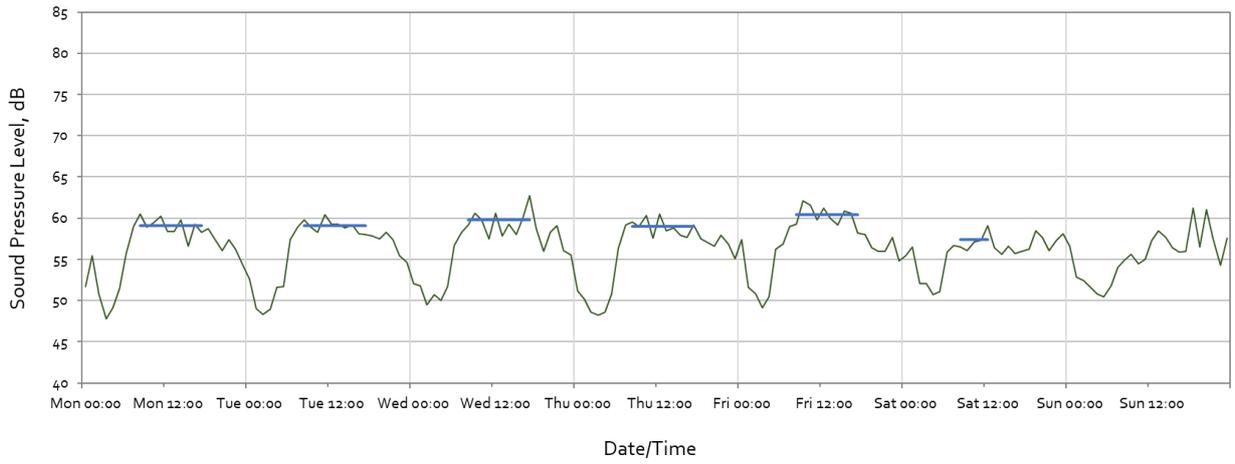
Monitoring Ref: N026





Worksite: - Monitoring Ref: No26 24 Sep 2018 to 30 Sep 2018

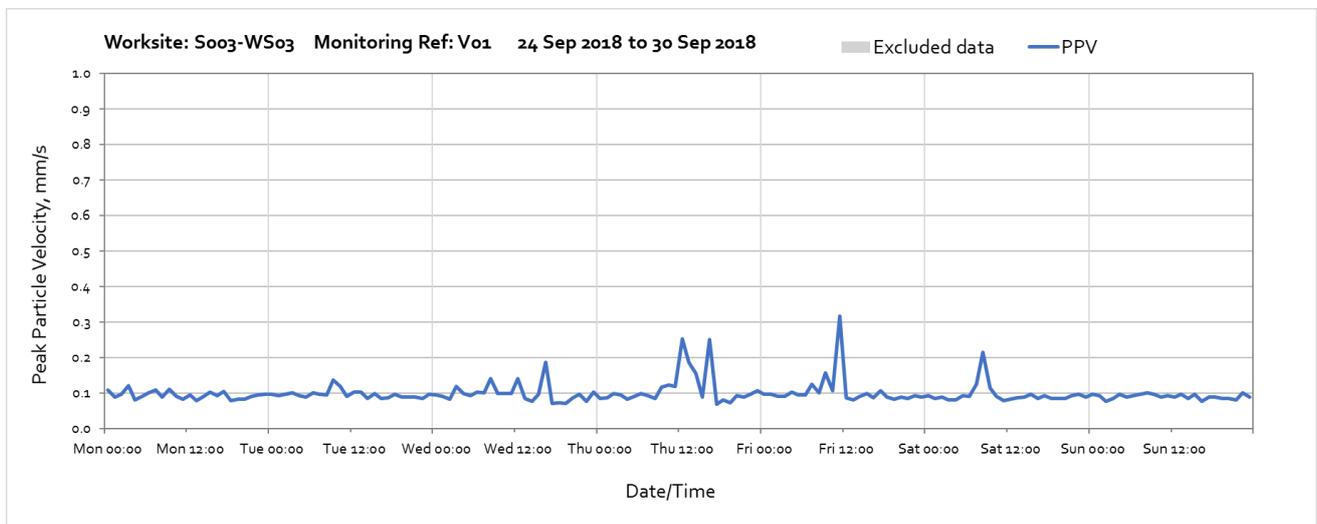
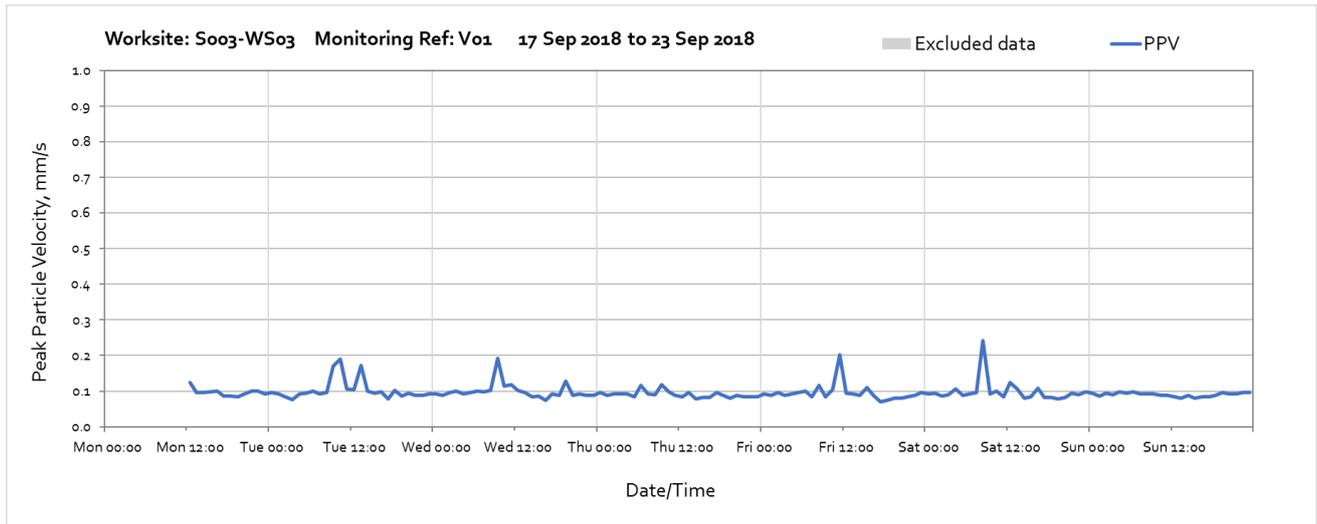
Excluded data LAeq,1h LAeq,T



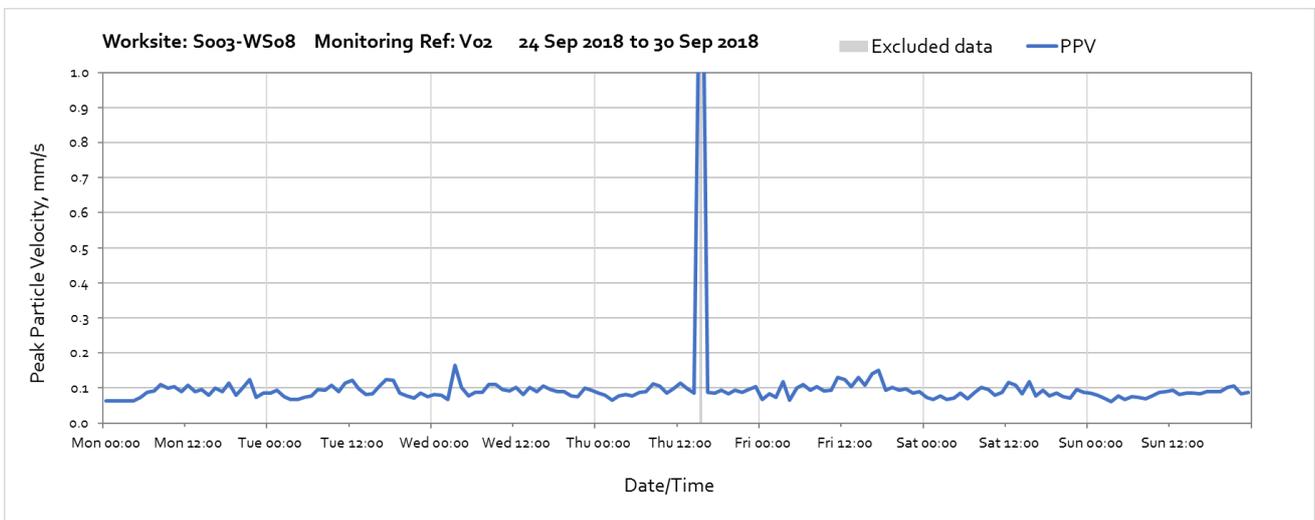
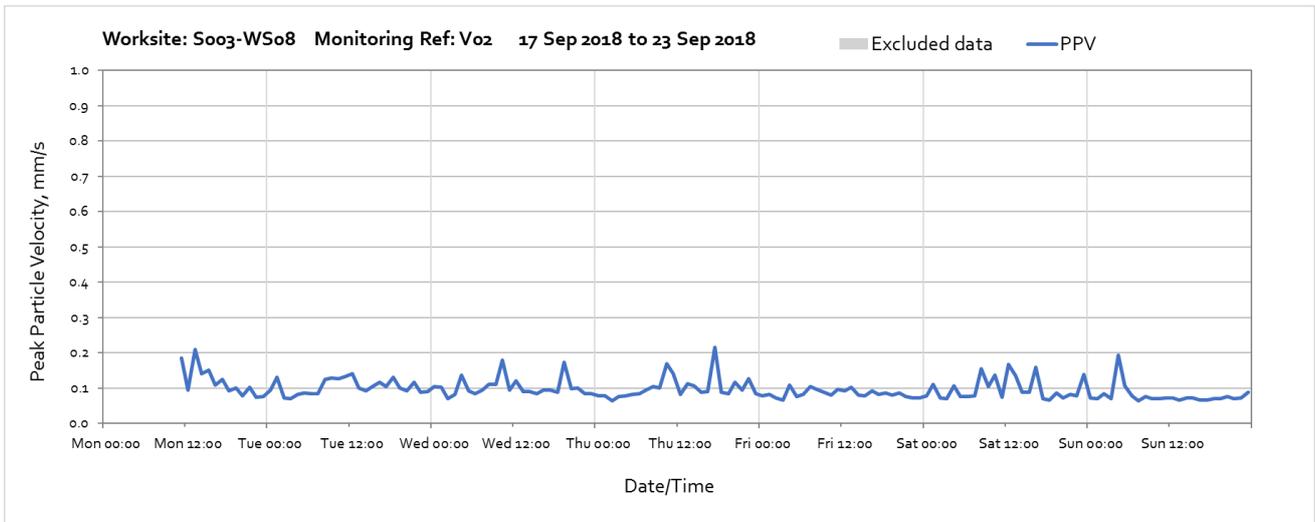
Vibration

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. Exceptionally high values of PPV were measured in the afternoon of Thursday 27th of September, which were not related to HS2 construction activities. These data entries have been greyed out and excluded to calculate values in Table 6.

Worksite: S003-WS03 – Monitoring Ref: V01



Worksite: S003-WS08 – Monitoring Ref: V02



Note – Elevated vibration events in the afternoon of Thursday 27th were not due to HS2 related works.