

## **Construction noise and vibration Monthly Report – February 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 February 2019.

A number of worksites were active during the reporting month in the LBC area. Deliveries, modifications to tracks and installation of walkway and controlled emission toilet were underway at Network Rail worksite B. Works at Network Rail worksites C, D and E were undertaken at Up Sidings, Granby Terrace and "backing out road" sidings and mainly included works at overhead line equipment and under track crossings, installation of ancillary structures and spoil clearance. Pulling of cables, checking of high voltage switchgear and brickworks, jet washing and landscaping were underway at Network Rail worksite F. Removal of roof canopy was underway at Network Rail worksite G. Ancillary activities were undertaken at the DB Cargo and former Addison Lee worksite (ref. S001-WS01). Demolitions were underway at 132 and 140 Hampstead Road and Petrol Station, worksite (ref. S001-WS02), at the former National Temperance Hospital, 110 Insull Wing worksite (ref. S003-WS02) and at the Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street worksite (ref. S003-WS05). Archaeological excavations and construction of screening structures were underway at St James's Gardens worksite (ref. S003-WS01). Removal of fixtures and fittings and scaffolding of buildings were carried out at Walkden House, 67-75 & 77-79 Euston Rd worksite (ref. S003-WS03), at Drummond Street / Euston Street worksite (ref.: S003-WS07) and at One Euston Square, 40 Melton Street, Grant Thornton House, 22 Melton Street worksite (ref. S003-WS09). Removal of fixtures and fittings, asbestos removal, scaffolding and demolition were carried out at the Thistle Hotel worksite (ref. S003-WS04). Site deliveries were underway at the former National Temperance Hospital, 110-122 Hampstead Road, worksite (ref. S003-WS06). Utilities diversions were also undertaken around Granby Terrace Bridge, along Stanhope Street, Varndell Street and at the north end of Park Village East. Details of works undertaken at each worksite are presented in the report.

Noise monitoring was undertaken in the vicinity of Network Rail worksites B, C, D, E and F, 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, 67-75 & 77-79 Euston Rd worksite (ref.: S003-WS03), the Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street worksite (ref. S003-WS05), former National Temperance Hospital, 110-122 Hampstead Road worksite (ref. S003-WS06), Drummond Street / Euston Street worksites (ref.: S003-WS07), Ibis Hotel, Euston Square Gardens (west) worksite (ref. S003-WS08) and the Thistle Hotel (ref. S003-WS04). Further noise monitoring was also undertaken at Regents Park Estate, in the vicinity of Regents Park Lorry Holding Area and on Eversholt Street. Monitor EC was removed in February. To cover receptors in this area monitor MT was moved to a more representative location along Mornington Terrace (MT2).

Vibration monitoring was undertaken in the vicinity of the Walkden House, 67-75 & 77-79 Euston Rd worksite (ref. S003-WS03) and the Ibis Hotel, Euston Square Gardens (west) worksite (ref. S003-WS08). A new vibration monitor (V021) was installed in February at ground floor of 42-44 Cobourg Street, to monitor vibration levels during demolition at the Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street worksite (ref. S003-WS05).

Exceedances of the SOAELs were measured at some monitoring positions surrounding worksites B and near Granby Terrace Bridge. One exceedance of S61 trigger levels was measured at a monitoring location in proximity to Granby Terrace Bridge, this was due to utility diversion works. Nine complaints were received during the monitoring period. Description of exceedance of trigger levels, complaints, results of investigations and any actions taken are detailed in the report.



# Abbreviations and descriptions

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

Table 1: Table of abbreviations

Acronym	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 $L_{Aeq,T}$	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 1<sup>st</sup> to 28<sup>th</sup> February 2019.

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

- Network Rail on-networks HS2 preparatory works: worksite ref. B (see plan 1 in Appendix A)
  - Works activities include deliveries, installation of walkway, bases and troughing around siding 6 renewal, installation of control emission toilet (CET) chamber and unit base and spoil removal.
- Network Rail on-networks HS2 preparatory works: worksite ref. C, D and E (see plan 2 in Appendix A)
  - Works activities include recovery of materials, installation and register of small part steel for overhead line equipment, installation of under track crossing (UTX) under Up Sidings, coring of retaining wall between Line E & X, installation of hollow bearers, installation of telecoms, cabling works, installation of wall-fixed troughs under Granby Terrace bridge, completion of boom connection, UTX follow up works, installation of cable management system (CMS), trunking on platform 1-3, drainage works on platforms 6-9, cable bedding and spoil clearance in sidings known as "backing out road".

- Network Rail on-networks HS2 preparatory works: worksite ref. F (see plan 2 in Appendix A)
  - Works activities include pulling of cables, alterations to CMS, pre-commission checking of high voltage switchgear, mounting of electrical assets, landscaping, excavations, jet washing, inspection of brickwork for defects, bonding Network Rail building doors, removal of temporary ramp to Network Rail building and sealing expansion joints for brickwork.
- Network Rail on-networks HS2 preparatory works: worksite ref. G (see plan 2 in Appendix A)
  - Works activities include removal of roof canopy with crane.
- DB Cargo shed and adjacent land on Granby Terrace, worksite ref. S001-WS01 (see plan 2 in Appendix A)
  - Works activities include 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 demolition.
- St James's Gardens, worksite ref. S003-WS01 (see plan 3 in Appendix A)
  - Works activities include archaeological excavations and construction of screening structures.
- Former National Temperance Hospital, Insull Wing, worksite ref. S003-WS02 (see 3 in Appendix A)
  - Works activities include demolition.
- 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 scaffolding.
- Thistle Hotel, Cardington Street, worksite ref. S003-WS04 (see plan 3 in Appendix A)
  - Works activities include removal of fixtures and fittings, asbestos removal, scaffolding and demolition.
- Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street, worksite ref. S003-WS05 (see plan 3 in Appendix A)
  - Works activities include 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 scaffolding.
- 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 and scaffolding.
- Further works were also undertaken as part of the Granby Terrace Bridge utilities diversion (GTB Utilities) on Stanhope Street and Varndell Street. Works were also carried out at the north end of Park Village East to divert utilities, including trial holes to caliper existing main, in preparation for the site main works.

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

## 1.2 Measurement locations

- 1.2.1 Table 2 summarises the position of noise and vibration monitoring installations within the LBC area in February 2019.
- 1.2.2 Monitor EC was removed in February, due to its location not being representative of surrounding residential receptors. To better cover receptors along the north end of Mornington Terrace monitor MT was relocated at a new location in this area (location MT2 in this report) at the beginning of February, mounted on a lamppost and connected to power mains. Other existing monitors will continue to offer adequate coverage of noise sensitive receptors further south along Mornington Terrace. Following these changes, monitoring locations MT and EC will no longer be included in monitoring reports.
- 1.2.3 A new vibration monitor (V021) was installed on the 26<sup>th</sup> of February at ground floor of 42-44 Cobourg Street, to monitor vibration levels during demolition at the Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street worksite (ref. S003-WS05).
- 1.2.4 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, Camden Town, London, NW1 8JB
	JC	Juniper Crescent, London, NW1 8HA
C	MT2	Mornington Terrace lamppost #49
	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, 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
G	HH	Euston Station Parcel Deck, Barnby Street, Euston, London, NW1 2RS
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-WS02	N016	Margarete Centre roof
	V009	Margaret Centre
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)
	V001	Royal College of General Practitioners basement boiler room by Stephenson Way
S003-WS05	N014	Starcross Street lamppost (external to Exmouth Arms)
	V021	42-44 Cobourg Street
S003-WS06	N015	Maria Fidelis School
	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
	V002	Royal College of General Practitioners basement vaults under Melton St
Not near worksite	N020	Mackworth Street lamppost #1
Not near worksite	N025	External to #3 Prince Albert Road

Worksite Reference	Measurement Reference	Address
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 <sup>(1)</sup>
B	CC	Whittlebury Mews West, Camden Town, London, NW1 8JB	Sunday Night	0700-2200 2200-0700	1 1
	JC <sup>(1)</sup>	Juniper Crescent	Saturday Night	1400-2200 2200-0700	1 9
C	MT2	Mornington Terrace lamppost #49	All days	All periods	No exceedance
	N022	External to #34 Mornington Terrace	All days	All periods	No exceedance
	N024	External to Park Village Studios, Park Village East	All days	All periods	No exceedance
D	N004	Mornington Terrace lamppost #7	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL <sup>(1)</sup>
E	N005	5A Granby Terrace, Kings Cross, London, NW1 3SA	All days	All periods	No exceedance
F	BS	Barnby Street	All days	All periods	No exceedance
	N023	Amphill Estate lighting column #21, Hampstead Road	All days	All periods	No exceedance
G	HH	Euston Station Parcel Deck, Barnby Street, Euston, London, NW1 2RS	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
	N005	5A Granby Terrace, Kings Cross, London, NW1 3SA	All days	All periods	No exceedance
	N021	Stanhope Street, Lamppost #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
S003-WS02	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	N015	Maria Fidelis School	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	N020	Mackworth Street lamppost #1	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL <sup>(1)</sup>
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
GTB Utilities	N001	DB Cargo shed and adjacent land on Granby Terrace	Weekday	0800-1800	1

<sup>(1)</sup> 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. Alternative locations for repositioning of this monitor are being considered in discussion with the Local Council.

2.1.4 Over the reporting period the SOAEL was exceeded at measurement locations in the vicinity of worksite B and near Granby Terrace Bridge. These were caused by activities at Network Rail worksite B during night-time periods and Sunday periods, and to utility diversion works at Granby Terrace Bridge during core working hours. Except at these two locations 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	1
	JC <sup>(1)</sup>	Juniper Crescent	9
GTB Utilities	N001	DB Cargo shed and adjacent land on Granby Terrace	1

<sup>(1)</sup> 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. Alternative locations for repositioning of this monitor are being considered in discussion with the Local Council.

2.1.6 Monitoring of vibration peak particle velocity (PPV) was undertaken with the purpose of ensuring that construction generated vibration are not of such a magnitude to damage adjacent buildings, in accordance with Annex 1: Code of Construction Practice of the High



Speed Rail (London-West Midlands) Environmental Minimum Requirements. There are no LOAEL and SOAEL criteria based on PPV applicable to HS2 construction vibration.

## **2.2 Summary of measured noise and vibration levels**

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

2.2.2 Noise monitoring in the vicinity of worksites B, C, D, E, F, S001-WS02, S003-WS01, S003-WS02, S003-WS04, S003-WS05 and Granby Terrace Bridge is considered representative of HS2 Area South works during periods of construction works. Other worksites were not considered to be giving rise to substantial levels of HS2 related construction noise, with the measured noise levels largely dominated by the underlying ambient noise, acknowledging that intermittent HS2 works may on occasion be taking place within the area.

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

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekly Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )*					Saturday Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )*					Sunday / Public Holiday Average L <sub>Aeq,T</sub> (highest day L <sub>Aeq,T</sub> )*	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
B	CC	Whittlebury Mews West, Camden Tow	Free-field	61.5 (63.3)	63.5 (71.3)	62.5 (65.7)	61.4 (65.5)	56.4 (65.1)	60.9 (61.8)	61.5 (62.1)	57.8 (58.9)	60.3 (64.9)	61.2 (74.9)	60.6 (68.9)	55.2 (61.4)
	JC <sup>(1)</sup>	Juniper Crescent, London	Free-field	67.4 (70.0)	68.1 (69.8)	68.3 (69.9)	66.9 (69.5)	62.2 (67.8)	65.9 (66.3)	67.4 (68.2)	67.2 (67.7)	67.2 (69.9)	63.9 (68.9)	65.9 (69.4)	62.4 (67.9)
C	MT2	Opposite 52a Mornington Terrace, Kings Cross, London	Free field	64.1 (66.8)	64.1 (66.5)	64.2 (68.2)	62.9 (67.5)	59.2 (65.8)	63.0 (64.1)	63.8 (65.4)	64.5 (67.8)	63.4 (68.2)	58.8 (64.1)	62.2 (66.9)	59.4 (65.7)
	N022	External to #34 Mornington Terrace	Free-field	60.5 (61.8)	61.2 (64.1)	61.3 (62.6)	59.8 (67.2)	56.0 (61.9)	59.0 (60.0)	60.2 (61.6)	60.3 (61.2)	59.9 (62.7)	55.9 (59.5)	58.9 (61.5)	55.2 (59.4)
	N024	External to Park Village Studios, Park Village East	Free-field	57.9 (66.1)	60.3 (71.5)	57.3 (61.9)	56.8 (70.3)	52.4 (61.6)	53.7 (55.2)	55.2 (55.9)	56.0 (56.7)	55.3 (61.7)	52.2 (57.7)	54.3 (59.3)	51.8 (66.1)
D	N004	Mornington Terrace lamppost #7	Free-field	64.0 (67.5)	65.2 (66.5)	65.3 (67.1)	64.7 (73.9)	59.5 (65.9)	62.9 (63.7)	63.8 (64.9)	63.3 (63.5)	64.3 (68.9)	62.1 (76.4)	63.5 (69.0)	59.1 (64.2)
E	N005	5A Granby Terrace, Kings Cross, London	Free-field	67.0 (69.1)	67.8 (69.2)	67.5 (68.7)	66.6 (67.7)	64.7 (68.3)	66.1 (67.6)	67.6 (69.1)	66.9 (68.4)	66.5 (68.6)	64.5 (67.6)	66.0 (68.3)	64.1 (66.5)

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	60.3 (63.2)	67.3 (72.2)	62.3 (64.6)	60.5 (63.6)	56.5 (60.9)	59.7 (60.9)	63.2 (64.4)	62.2 (64.7)	61.7 (64.2)	55.8 (60.1)	60.4 (64.5)	56.3 (59.4)
	N023	Ampthill Estate, Hampstead Road	Free-field	72.2 (75.9)	70.9 (72.7)	70.8 (73.7)	70.7 (73.9)	68.7 (74.0)	70.3 (71.6)	70.5 (71.4)	70.4 (71.5)	70.6 (73.1)	69.0 (71.1)	70.8 (76.2)	67.7 (71.5)
G	HH	Euston Station Parcel Deck, Barnby Street	Free-field	65.5 (69.2)	66.0 (67.9)	64.7 (67.9)	64.8 (68.2)	61.7 (68.7)	64.5 (65.6)	64.6 (65.2)	64.6 (66.9)	64.7 (70.1)	62.8 (66.7)	63.5 (68.4)	61.4 (67.4)
S001-WS01	N001	External to Cubitt Court, 100 Park Village East	Façade	56.2 (61.3)	68.6 (85.7)	58.2 (71.5)	56.3 (61.9)	52.5 (60.2)	55.2 (55.8)	60.8 (68.3)	57.0 (59.5)	56.5 (59.5)	52.2 (61.3)	55.9 (60.5)	51.6 (56.7)
	N002	Richmond Court, Park Village East	Free-field	59.6 (63.0)	61.6 (63.7)	61.8 (67.7)	59.8 (64.3)	54.8 (61.3)	56.5 (57.8)	59.7 (62.2)	60.0 (61.0)	59.8 (61.6)	57.5 (72.3)	58.9 (62.7)	54.3 (58.1)
	N003	Silsoe House, Park Village East	Free-field	60.1 (63.5)	61.9 (64.2)	61.8 (69.2)	60.3 (65.1)	54.3 (60.8)	55.9 (57.3)	59.2 (59.8)	59.6 (59.9)	59.9 (62.1)	57.4 (73.9)	58.9 (62.6)	53.5 (57.6)
	N021	Stanhope Street, Lampost #2	Free-field	52.2 (54.6)	67.6 (72.6)	51.3 (53.0)	51.0 (60.2)	49.0 (62.3)	52.4 (58.1)	58.6 (66.9)	54.1 (56.3)	52.2 (57.0)	50.0 (61.7)	52.0 (61.7)	49.0 (57.8)
S001-WS02	N018	Outside replacement housing, Hampstead Road	Free-field	73.1 (75.5)	74.2 (76.8)	73.7 (77.3)	73.7 (77.1)	71.9 (77.4)	71.8 (73.0)	73.6 (74.9)	73.3 (74.8)	73.4 (77.4)	72.6 (75.4)	73.6 (78.1)	70.7 (73.4)
	N019	Outside Cartmel, Hampstead Road	Free-field	71.7 (74.7)	72.7 (74.9)	72.1 (74.5)	72.1 (75.9)	70.6 (77.0)	70.6 (71.3)	72.1 (72.7)	71.4 (72.9)	72.0 (75.2)	71.0 (73.9)	71.9 (73.8)	69.4 (73.2)

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 (54.1)	60.7 (65.8)	50.9 (52.9)	51.3 (58.0)	50.4 (56.1)	51.7 (53.0)	59.9 (62.0)	52.9 (55.5)	51.9 (56.1)	50.3 (53.2)	51.6 (53.9)	49.6 (52.5)
	N008	RCGP Stephenson Way	Façade	64.0 (67.6)	68.2 (73.5)	56.2 (66.2)	55.2 (60.3)	60.2 (78.3)	56.7 (58.6)	59.6 (62.5)	55.0 (55.9)	57.9 (72.6)	54.6 (66.1)	54.8 (59.9)	56.4 (64.6)
	N010	Wesley Hotel	Façade	65.6 (66.8)	66.7 (69.5)	65.4 (66.1)	65.7 (72.4)	60.9 (66.8)	64.2 (65.6)	65.2 (65.9)	64.1 (65.6)	65.2 (66.5)	62.9 (66.0)	65.3 (66.9)	59.6 (65.5)
	N011	Outside #82 Euston Street	Free-field	58.3 (62.9)	60.7 (62.8)	57.1 (62.3)	56.4 (62.9)	54.7 (63.2)	55.4 (58.1)	58.8 (59.2)	60.2 (64.0)	57.0 (64.3)	52.7 (57.8)	57.0 (68.3)	53.6 (58.5)
S003-WS05	N014	Starcross Street	Free-field	56.4 (61.9)	62.3 (67.4)	58.1 (69.6)	58.7 (69.3)	53.2 (62.0)	54.0 (57.7)	60.9 (62.7)	57.6 (58.5)	55.7 (61.1)	50.7 (56.6)	56.6 (68.3)	50.8 (54.3)
S003-WS06	N015	Maria Fidelis School	Free-field	59.1 (61.4)	67.1 (69.0)	57.5 (59.9)	57.9 (61.1)	56.5 (60.5)	58.4 (59.0)	65.0 (67.3)	63.5 (65.1)	59.6 (64.9)	56.6 (60.2)	57.3 (61.7)	55.6 (58.0)
	N016	Margarete Centre roof	Free-field	57.6 (60.2)	64.7 (70.1)	56.3 (58.5)	56.4 (60.9)	58.2 (74.4)	57.1 (58.6)	63.6 (64.6)	60.3 (62.3)	57.3 (61.3)	60.1 (73.7)	56.0 (60.8)	58.7 (71.4)
	N017	Hampstead Road, Lampost #48	Free-field	72.2 (74.1)	72.9 (74.6)	71.6 (75.3)	72.2 (75.6)	70.2 (76.0)	70.2 (70.4)	71.8 (72.1)	71.7 (74.3)	71.8 (77.2)	71.0 (74.9)	71.9 (77.2)	69.0 (71.8)
S003-WS07	N012	Opposite #92-94 Drummond Street	Free-field	58.4 (62.4)	62.8 (65.9)	59.1 (62.1)	59.4 (63.0)	56.8 (69.7)	56.4 (57.0)	62.9 (64.2)	59.2 (59.5)	58.6 (60.6)	55.6 (60.3)	58.4 (62.5)	55.6 (61.4)
S003-WS08	N007	RCGP, Melton Street	Free-field	66.4 (68.0)	68.7 (73.9)	65.2 (67.3)	65.4 (68.6)	64.1 (69.7)	65.0 (65.6)	67.7 (68.2)	65.9 (67.5)	64.4 (67.8)	63.8 (67.2)	64.5 (66.3)	62.8 (65.0)

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
Not near worksite	N020	Mackworth Street	Free-field	55.6 (60.5)	58.3 (61.8)	54.5 (61.5)	52.7 (58.6)	51.4 (59.9)	52.6 (53.9)	55.5 (58.7)	54.0 (56.7)	52.7 (58.2)	50.5 (54.6)	52.2 (56.0)	50.1 (55.3)
Not near worksite	N025	External to #3 Prince Albert Road	Free-field	69.3 (72.7)	69.0 (70.6)	66.8 (71.2)	67.9 (71.2)	66.1 (74.6)	67.5 (68.3)	67.6 (68.2)	68.3 (69.9)	67.7 (72.9)	67.0 (70.0)	67.5 (74.5)	64.7 (68.8)
Not near worksite	N026	Thames Water Compound	Free-field	58.1 (59.7)	58.9 (61.3)	57.2 (59.2)	56.9 (64.8)	54.1 (61.9)	55.9 (57.4)	57.0 (58.6)	57.4 (59.6)	56.9 (60.5)	53.9 (59.0)	56.4 (63.4)	52.5 (56.4)

<sup>(1)</sup> 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. Alternative locations for repositioning of this monitor are being considered in discussion with the Local Council.

2.2.3 Table 6 presents a summary of the measured vibration levels at monitoring locations V001, V002, V009 and V021 over the reporting period. During the monitoring high values of PPV were measured at V002, V009 and 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 of Appendix B, and have been excluded to calculate values in Table 6. The highest PPV measured during the monitoring along any axis is presented in the table.

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

Worksite Reference	Measurement Reference	Site Address	Highest PPV measured in any axis, mm/s
S003-WS03	V001	Royal College of General Practitioners basement boiler room by Stephenson Way	0.31 (X axis)
S003-WS05	V021	42-44 Cobourg Street	0.97 (Z axis)
S003-WS06	V009	Margarete Centre	1.86 (X axis)
S003-WS08	V002	Royal College of General Practitioners basement vaults under Melton St	0.34 (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
N/A	GTB Utilities	18/02/2019, 0800-1800.	Saw cutting of utilities trench immediately beneath monitor / adjacent to receptor for period of approximately 30 minutes.	Trigger level exceeded at receptor by approximately 3 dB (79dB L <sub>Aeq,10h</sub> ). Works methodology, including use of acoustic barriers, was in accordance with best practicable means and S61 consent. Trench relocated slightly closer to receptor due to space constraints within ground.	No additional mitigation practicable due to proximity to monitor / receptor.

2.3.2 There were one exceedance of trigger levels as defined in section 61 consents during the reporting period at any monitoring position, due to works to divert utilities at Granby Terrace Bridge.

## 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
CPA-000708	C	Complaint from resident of Mornington Terrace about non-stopping construction noise during the day.	HS2 contractors were conducting general building works and refurbishments at Mornington Terrace at the time that the noise disturbance was reported. Works were compliant with the s61.	No action taken.

Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
CPA-000716	E / S001-WS01	Complaint from self-employed person of Mornington Crescent about construction noise affecting her ability to carry out noise sensitive work tasks.	The resident has been contacted to clarify the complaint. The investigation of the issue is still ongoing.	Investigation is still ongoing.
CPA-000717	GBT Utilities	General complaint from resident of Park Village East regarding impact of ongoing construction works, including noise and occasional vibration.	Works methodology including use of acoustic barriers in accordance with BPM / s61 consent, notification issued to residents. Reinstatement works currently being completed at this location.	No additional mitigation practicable.
CPA-000723	S001-WS02	Complaint from resident of Consiton about noise disturbance from drilling activities at UCL.	Works were carried out during core day time hours, and undertaken within the limits of the S61 agreement.	No action taken.
CPA-000727	B	General complaint from resident of Primrose Hill about construction noise from worksite near the property.	Investigation of the issue is still ongoing.	Site staff have been notified of the complaint. Investigation is still ongoing.
CPA-000732	C	General complaint from resident of Mornington Terrace about noisy activities in the morning outside of core working hours.	Investigation of the issue is still ongoing.	Site staff have been notified of the complaint. Investigation is still ongoing.
CPA-000733	B	Complaint from resident of Dumpton Place about construction noise causing nuisance during a night-time period and vibration allegedly causing damage to the property.	Works consisting of ballast excavation, installation of track and tamping down of gravel using an automated machine. Works were undertaken within the limits of the S61 agreement. A detailed vibration risk assessment demonstrated that vibration levels would be perceptible but not sufficient to cause structural damage. Investigation of the issue is still ongoing.	Complainant was informed of the findings. Investigation is still ongoing.

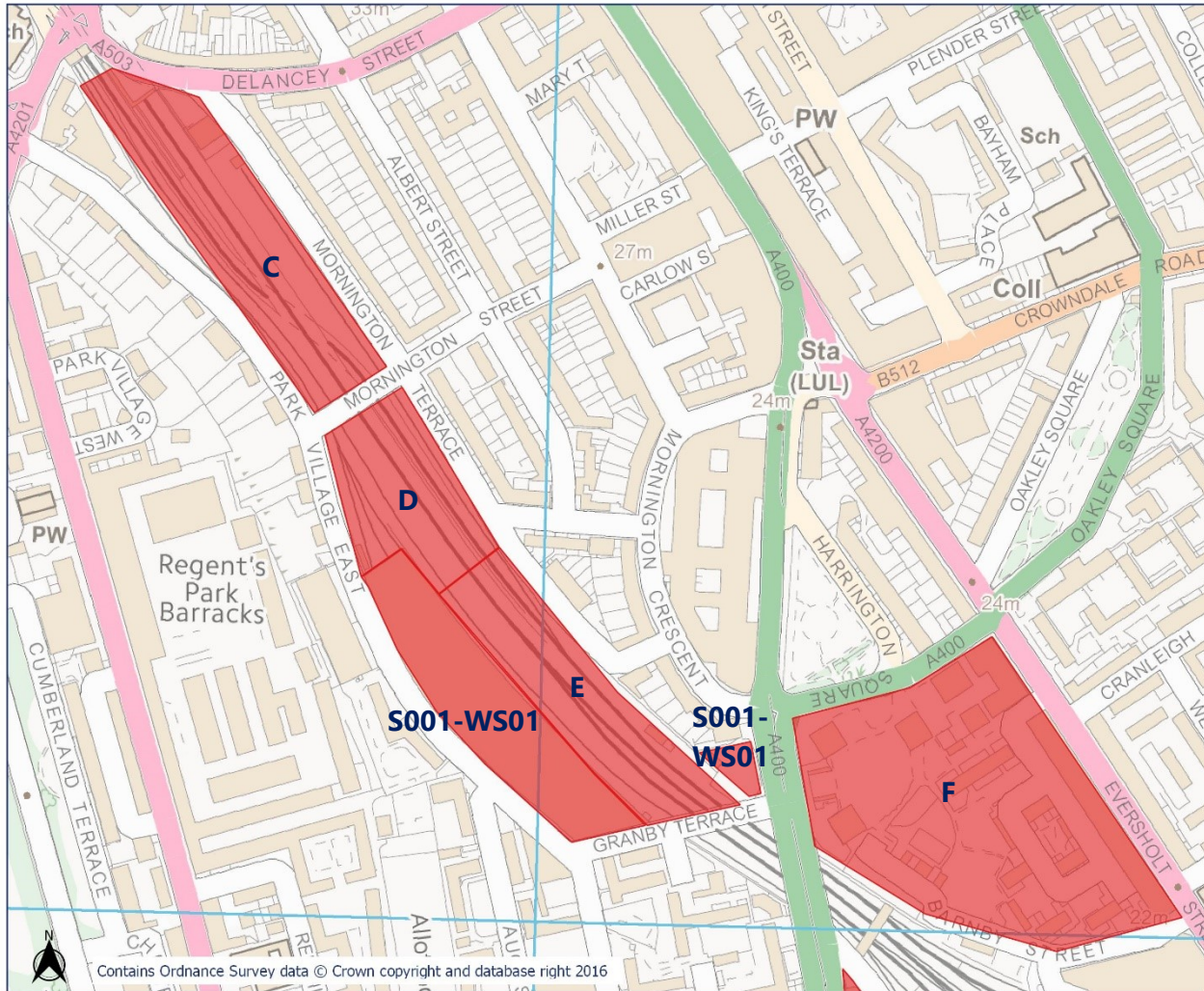


Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
CPA-000734	C	Complaint from resident of Mornington Terrace about alarm noise from a digger during night-time period.	Investigation of the issue is still ongoing.	Site staff have been notified of the complaint and the machine was taken out of service. Investigation is still ongoing.
-	S001-WS02	Complaint from resident of Regent's Park Estate regarding demolition noise.	Works methodology, mitigation and noise levels from demolition works were compliant with s61. There were no exceedances of trigger levels or SOAEL due to these works.	No action taken.

# Appendix A Site Locations

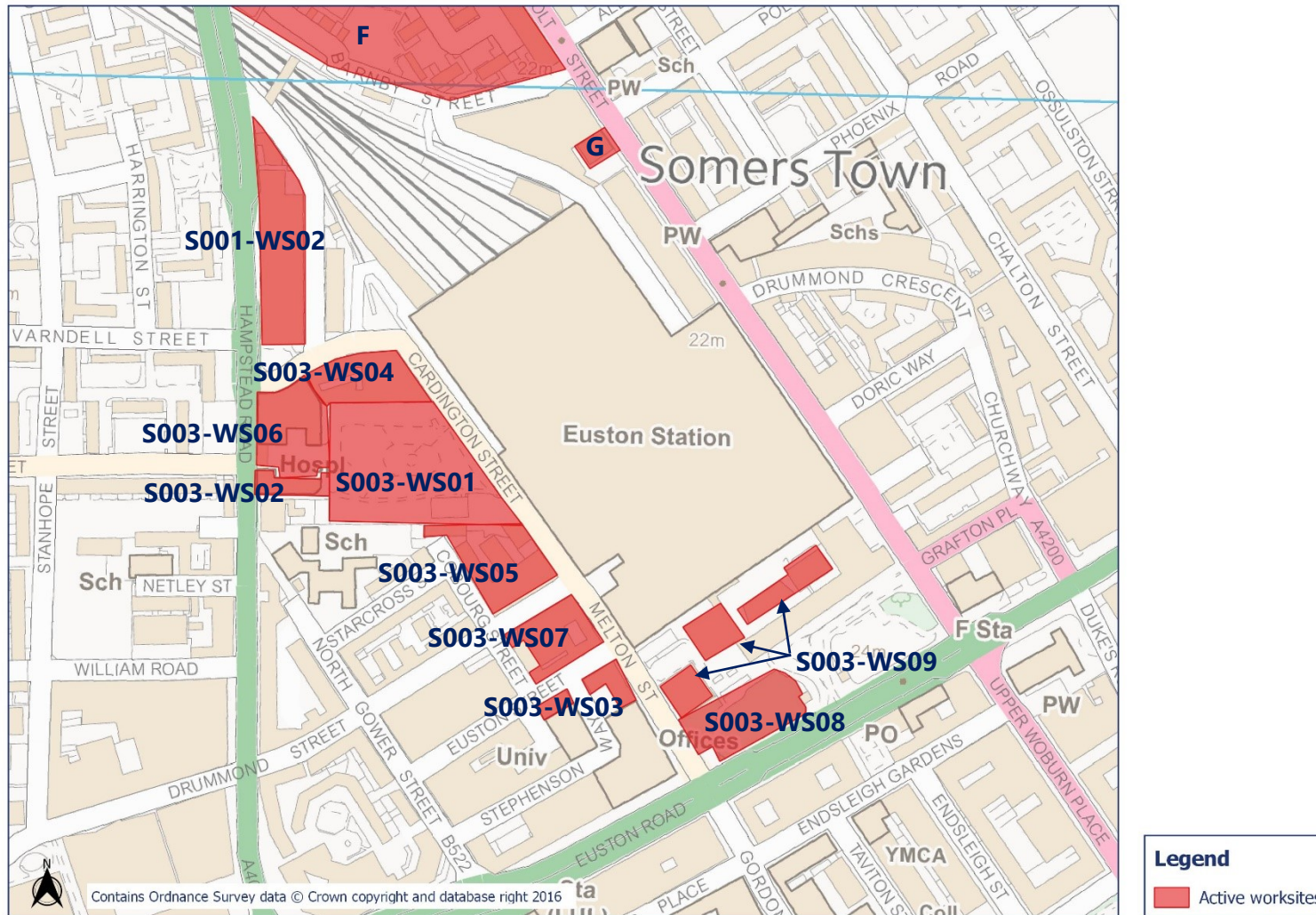






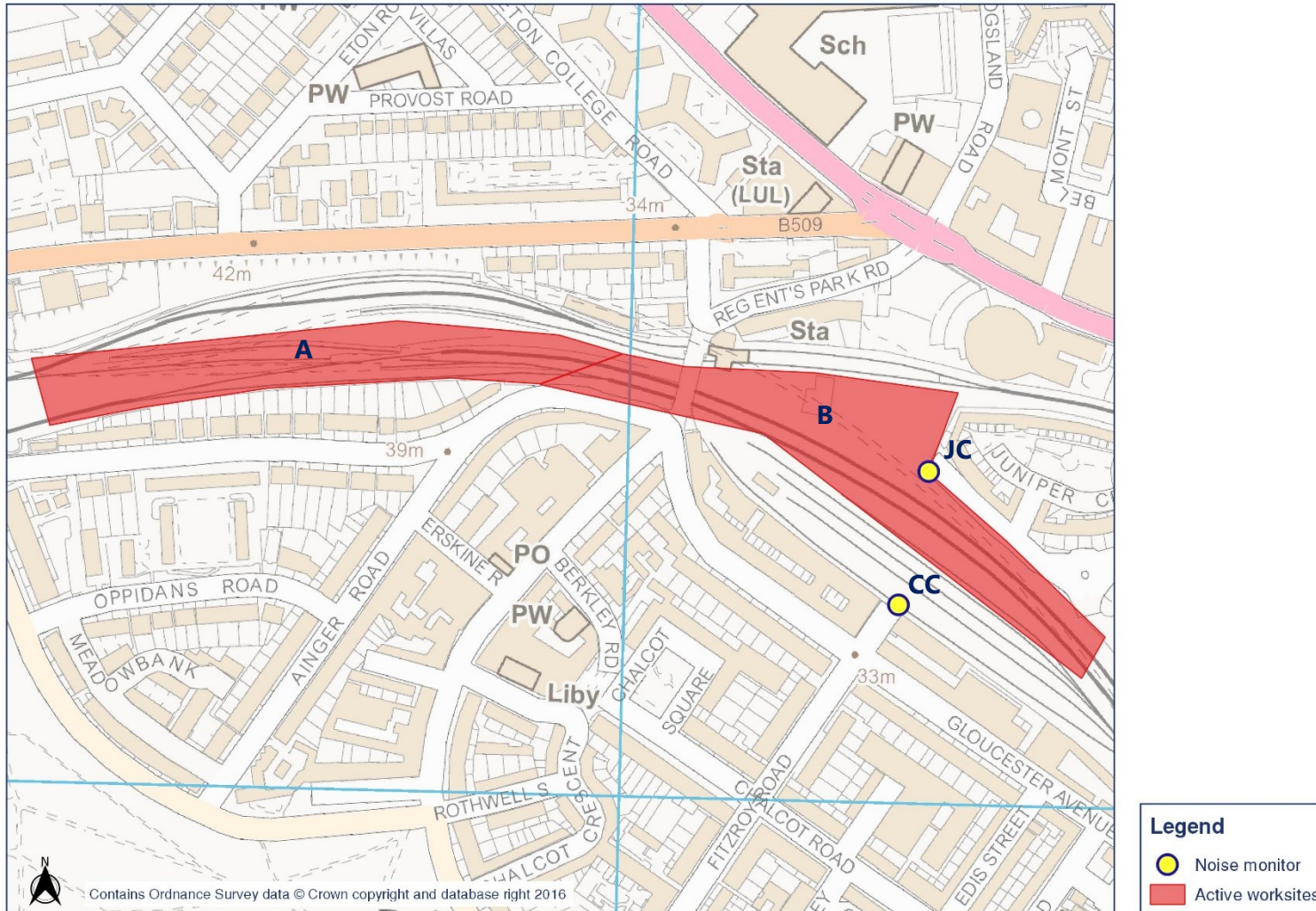
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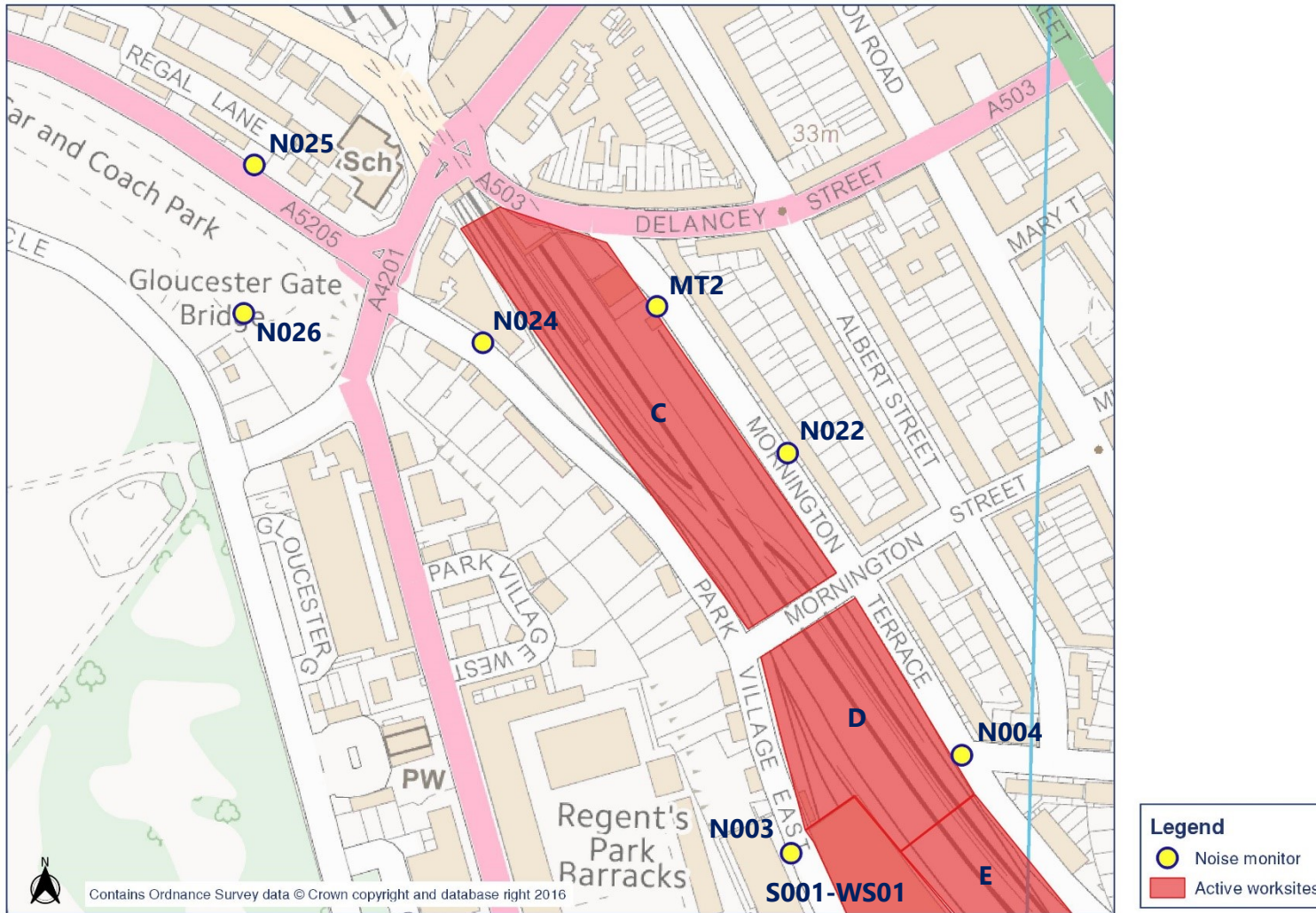
- Active worksites



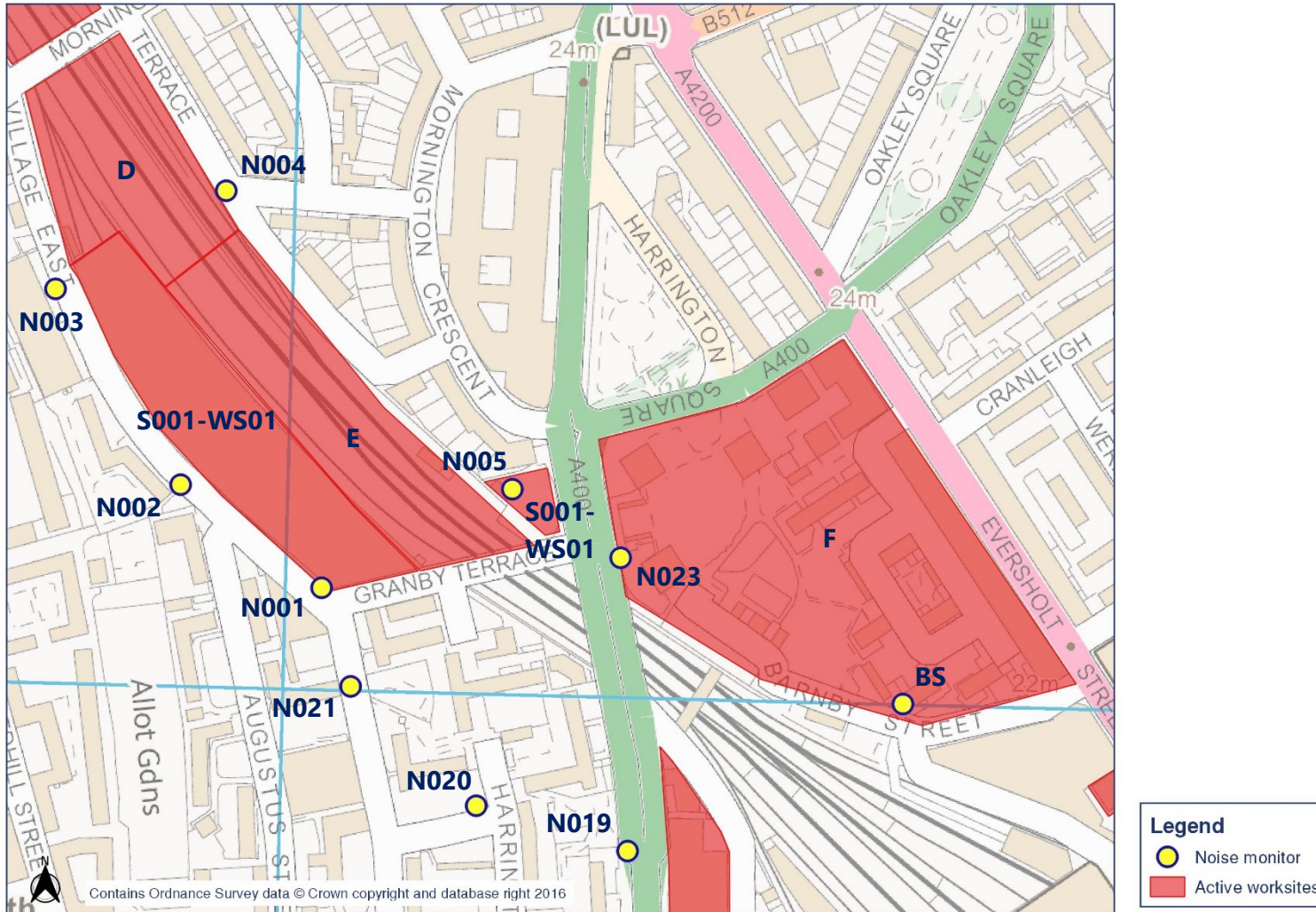
# Appendix B Monitoring Locations

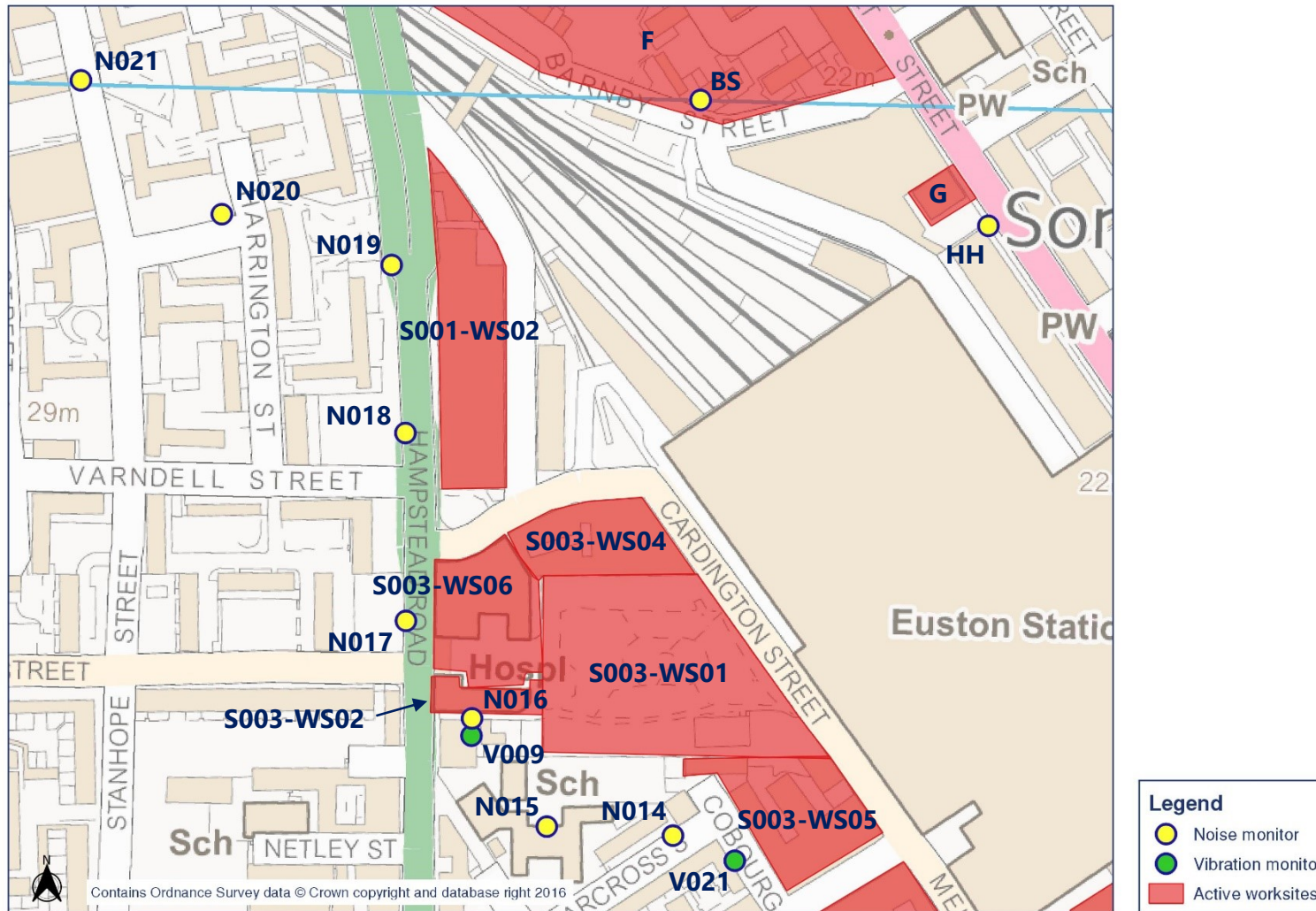




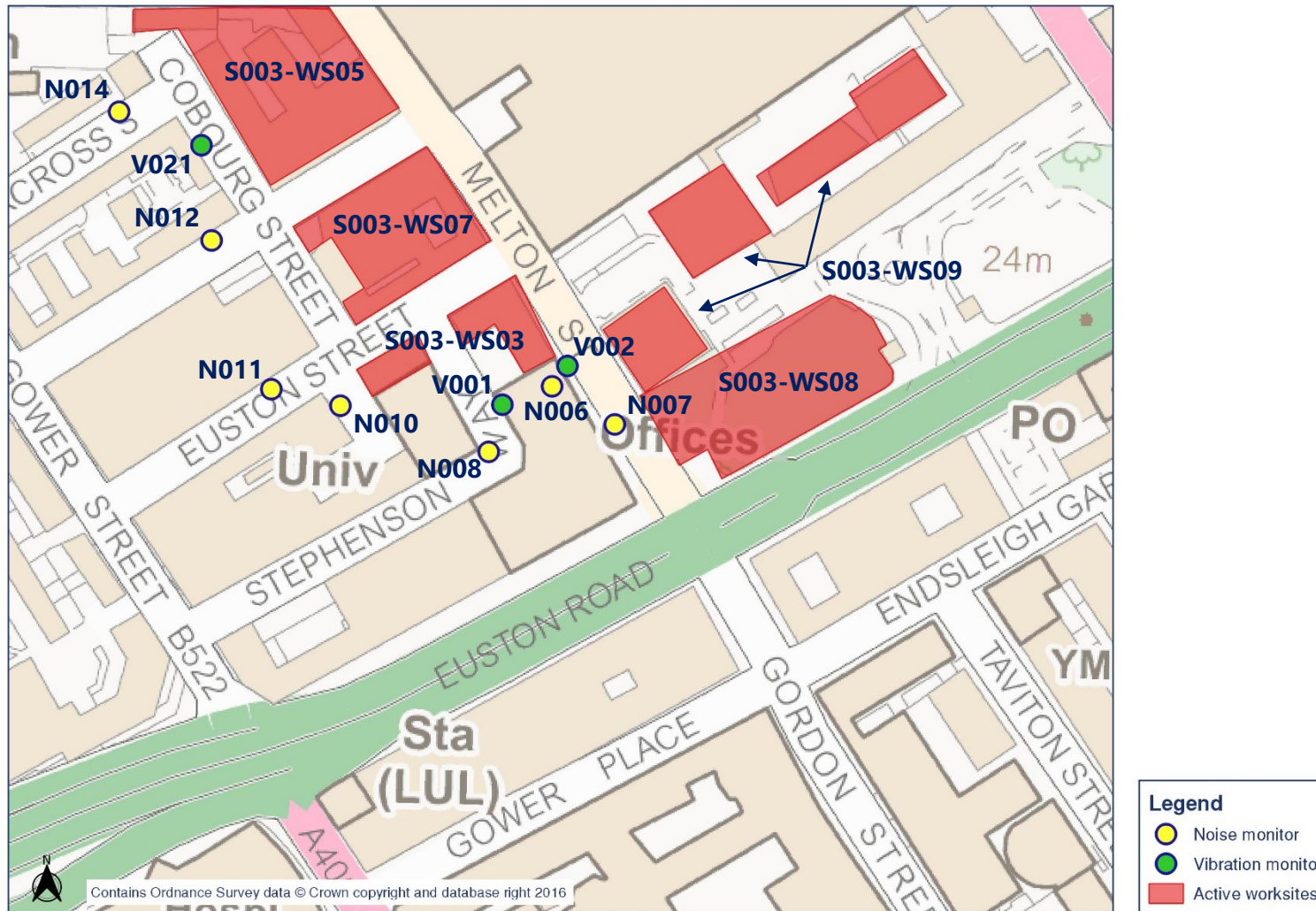










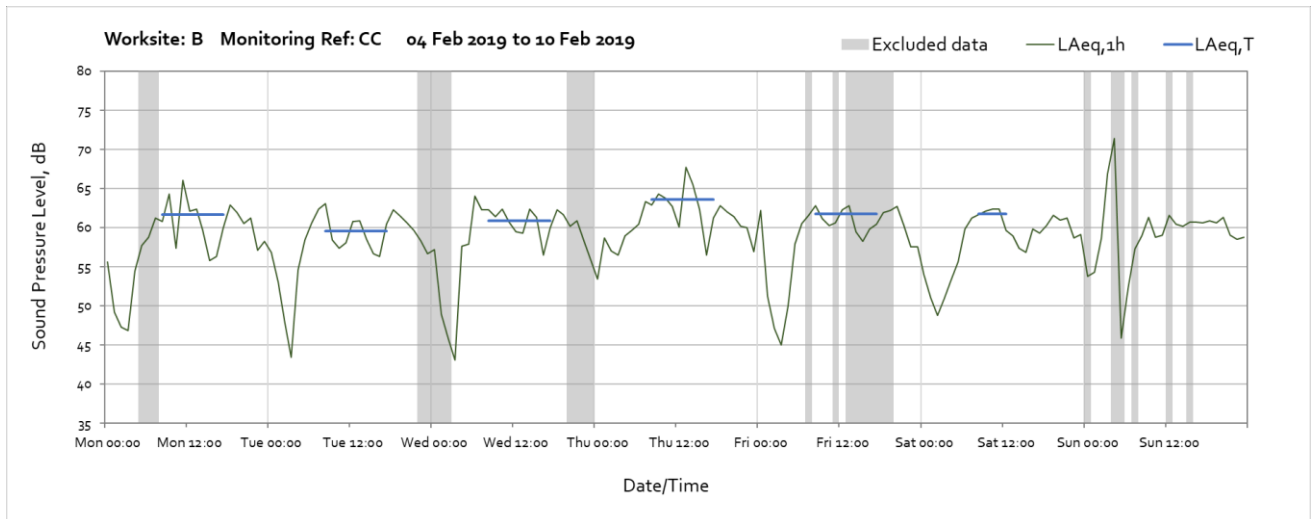
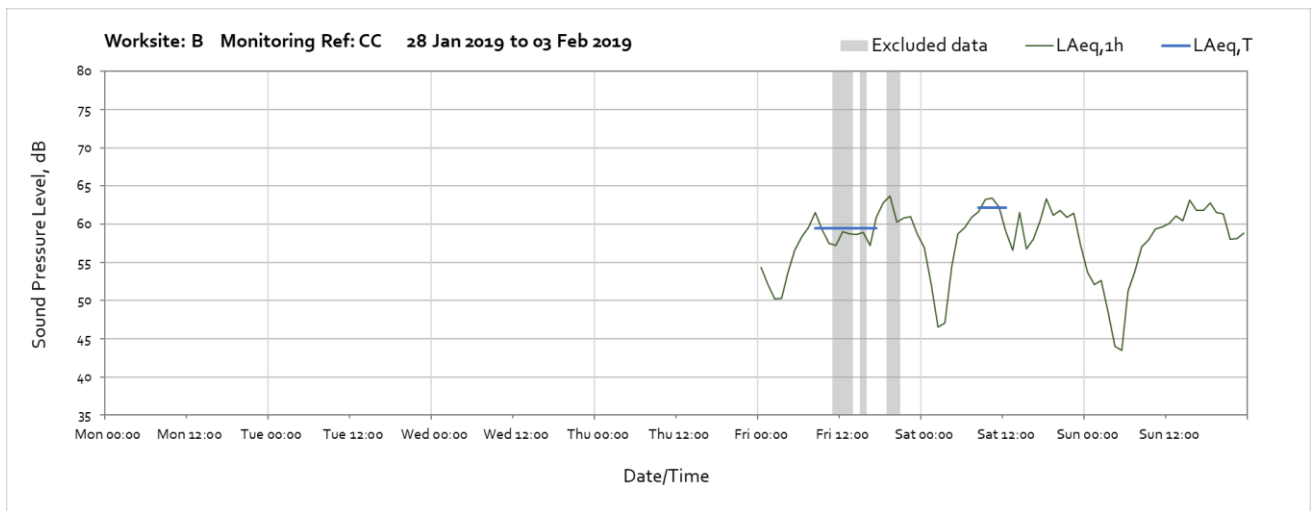


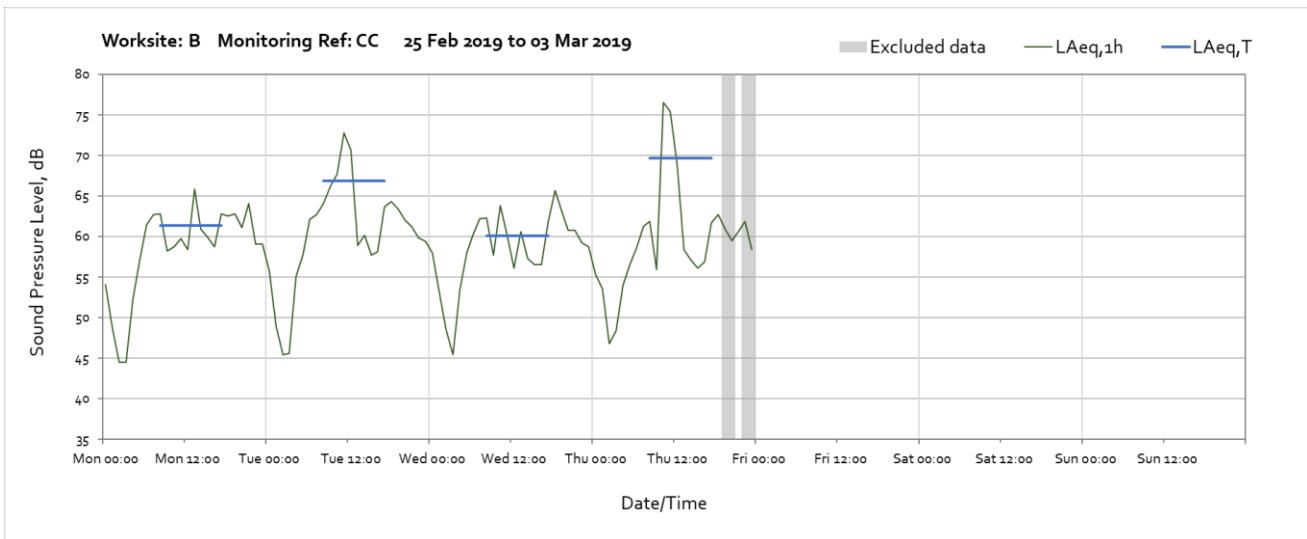
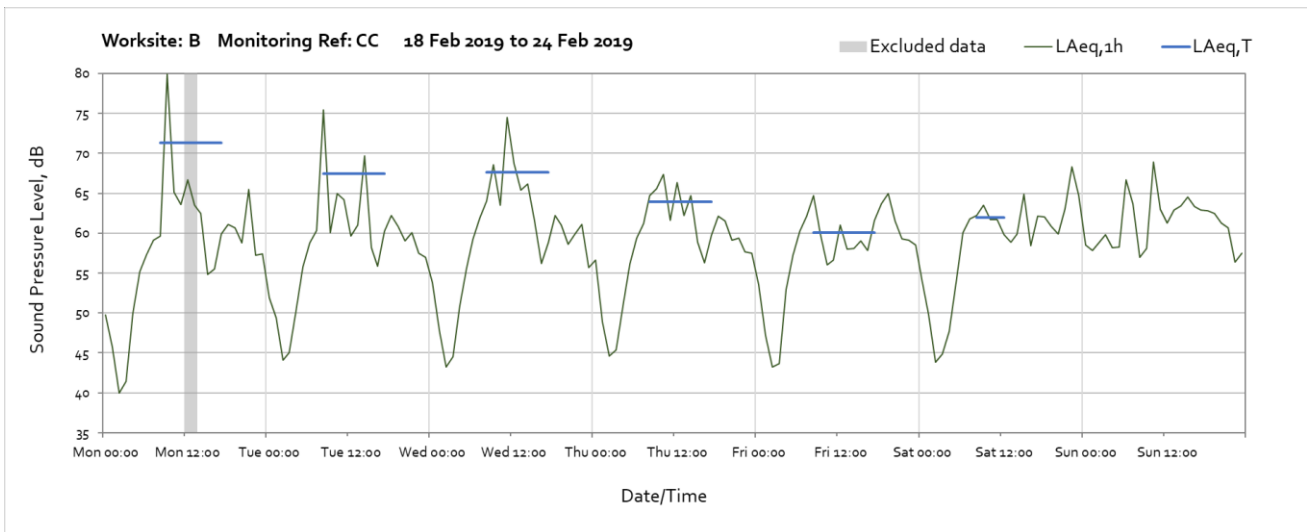
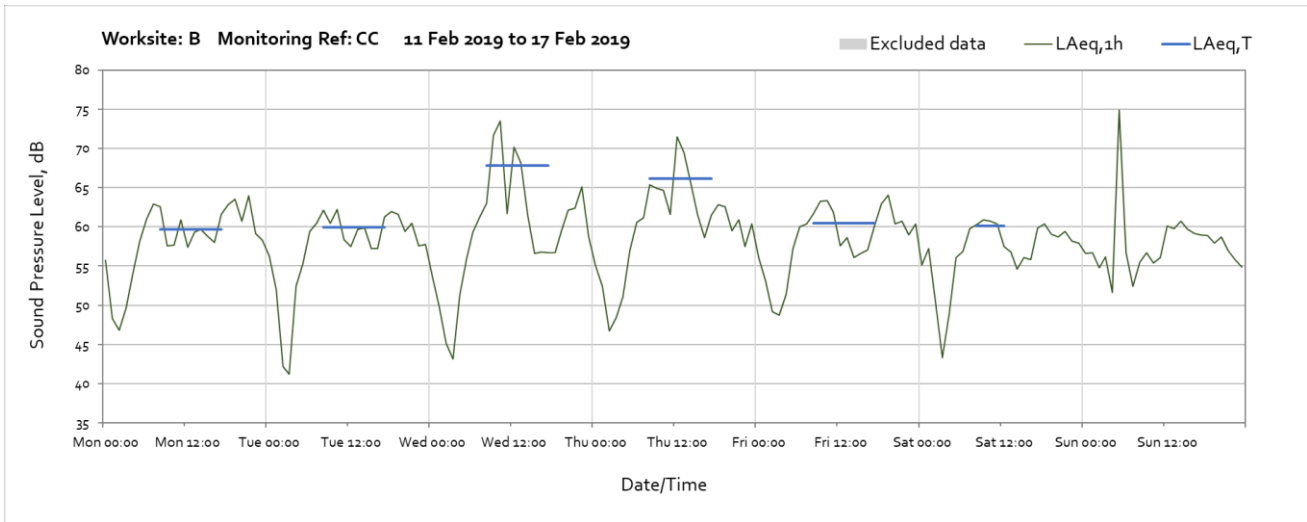
# Appendix C Data

## Noise

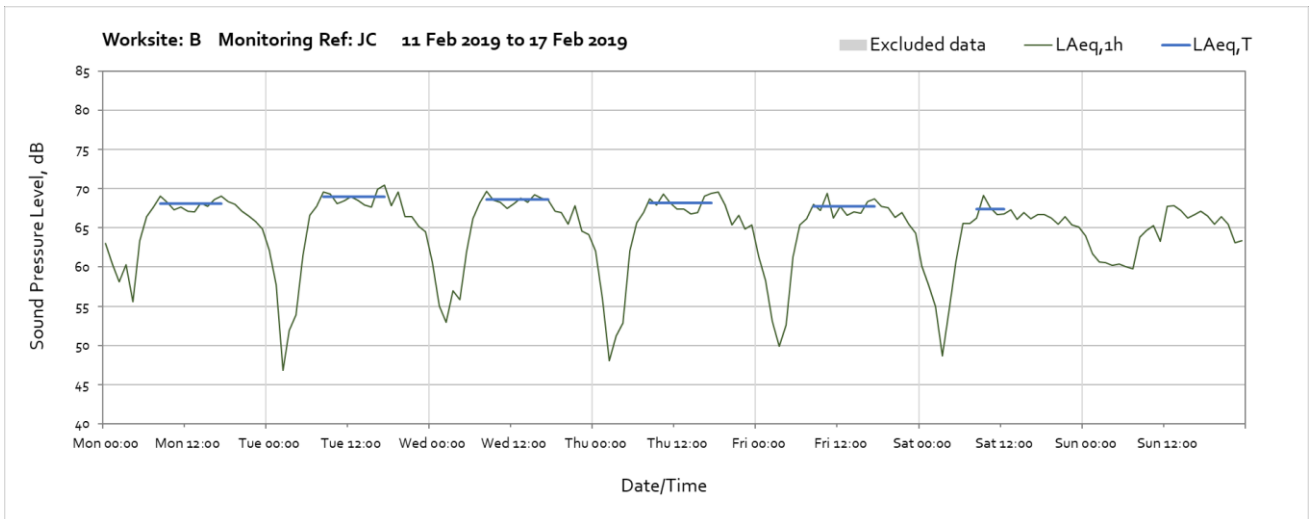
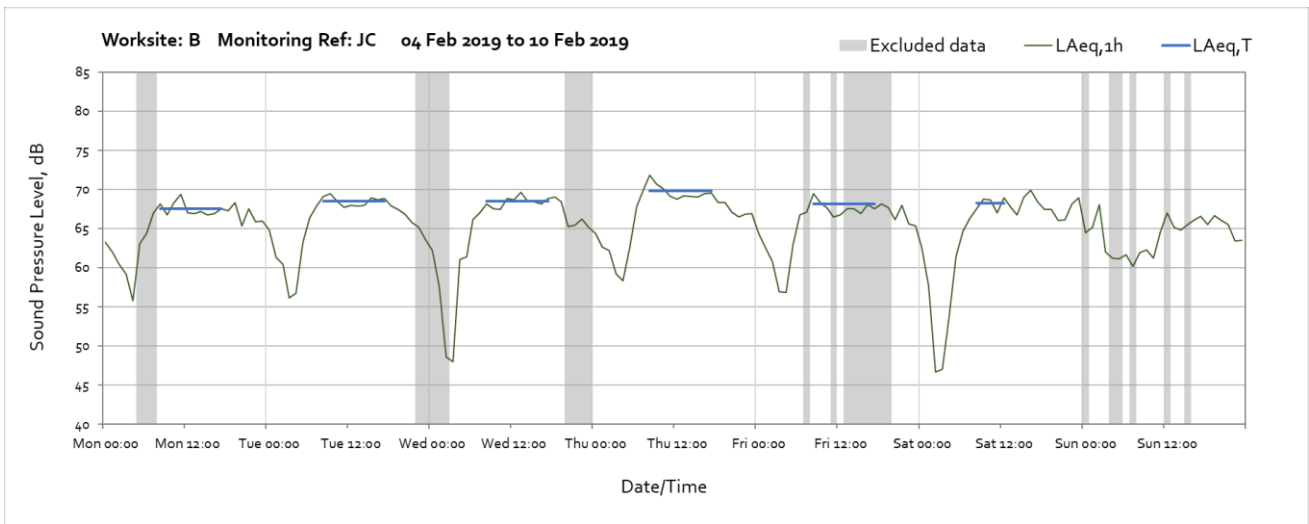
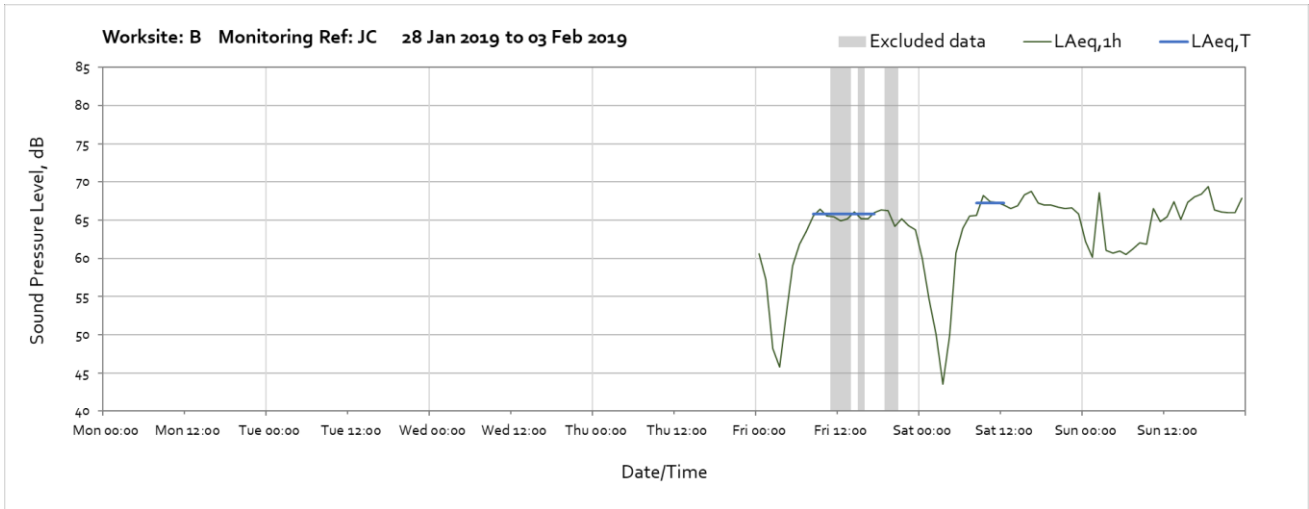
The following graphs show the hourly measured ambient noise level  $L_{Aeq,1h}$  and, where relevant, the averaged noise level  $L_{Aeq,T}$  values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and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

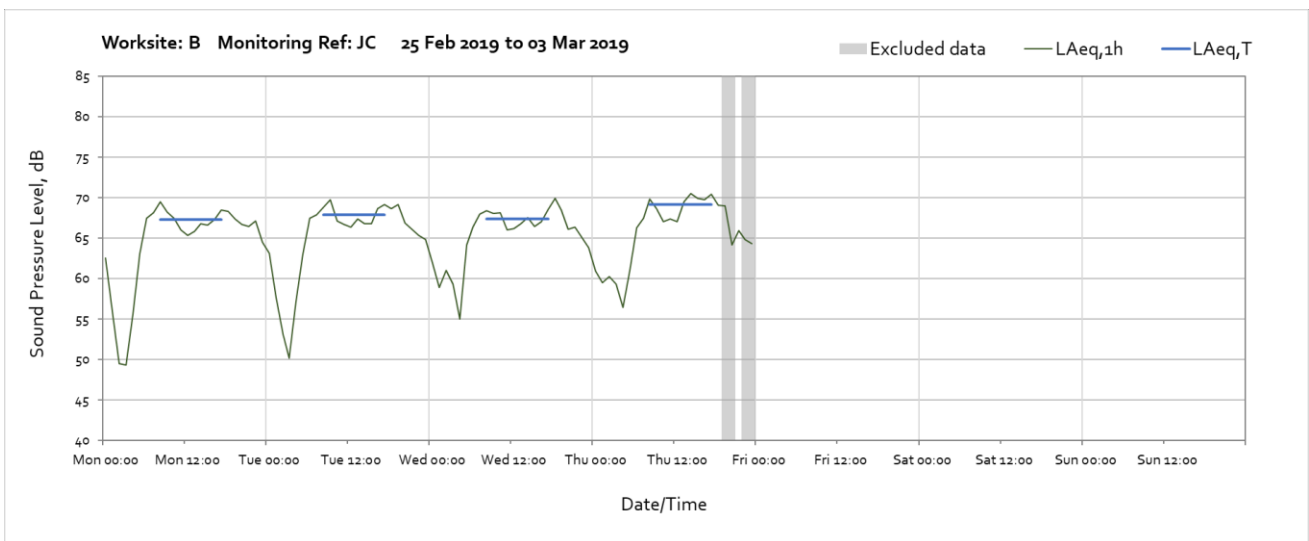
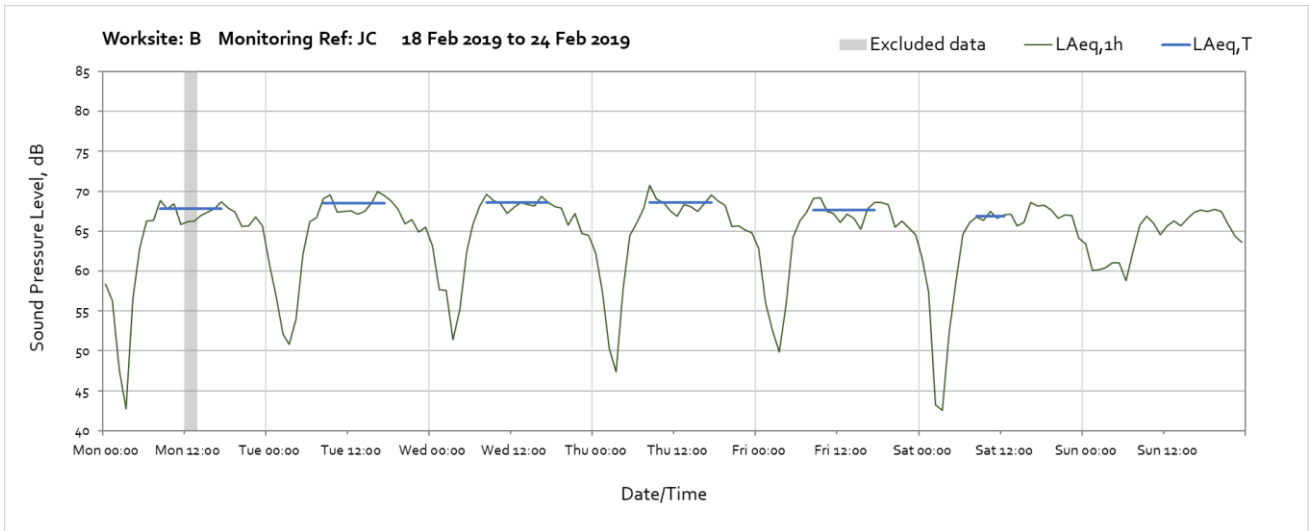
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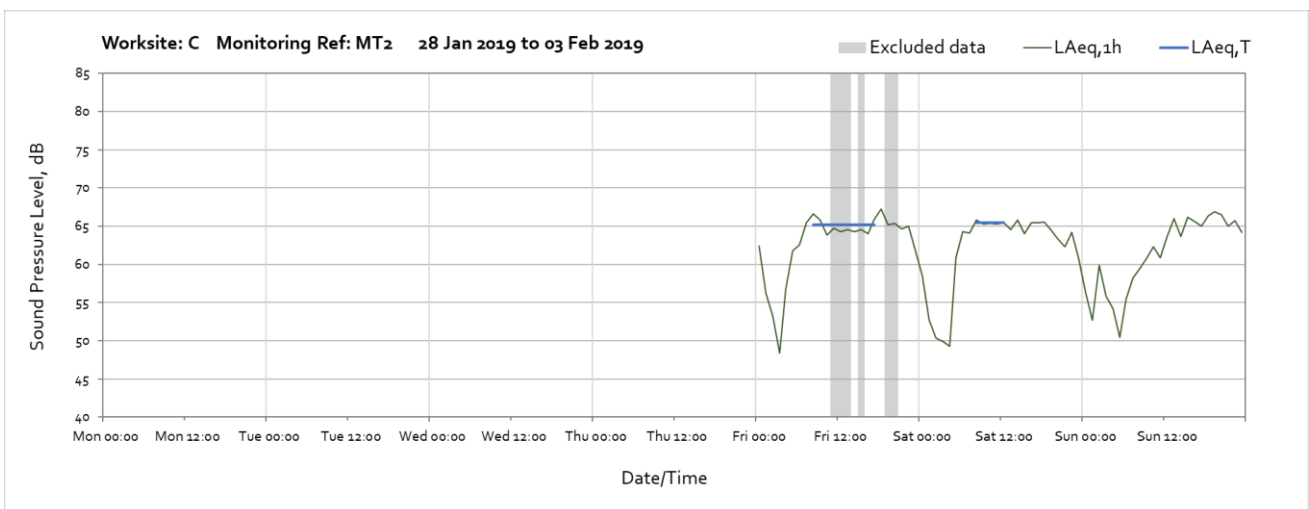


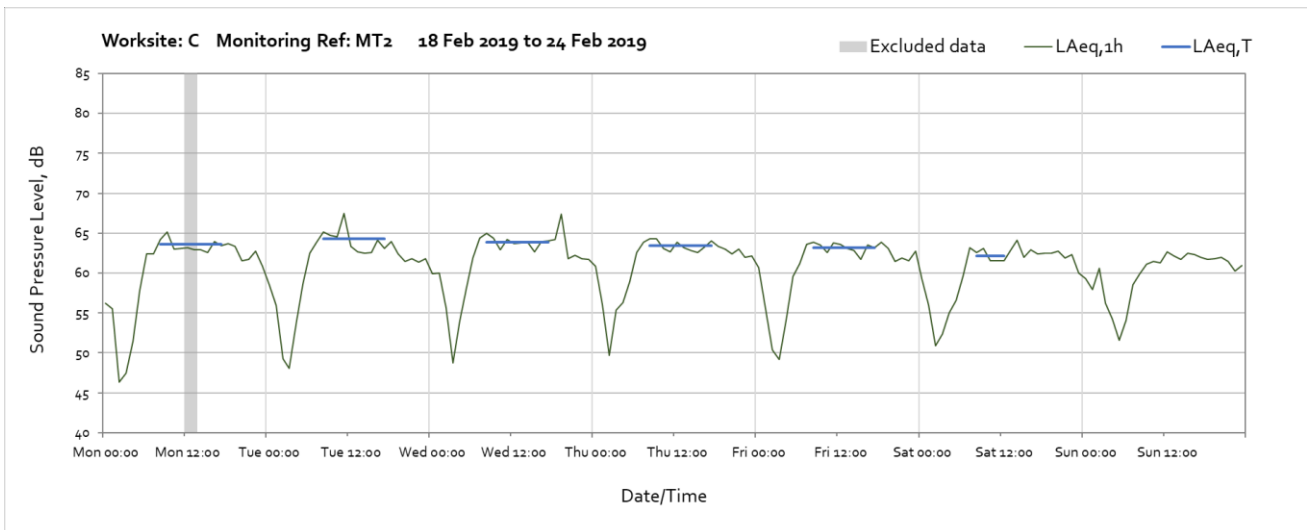
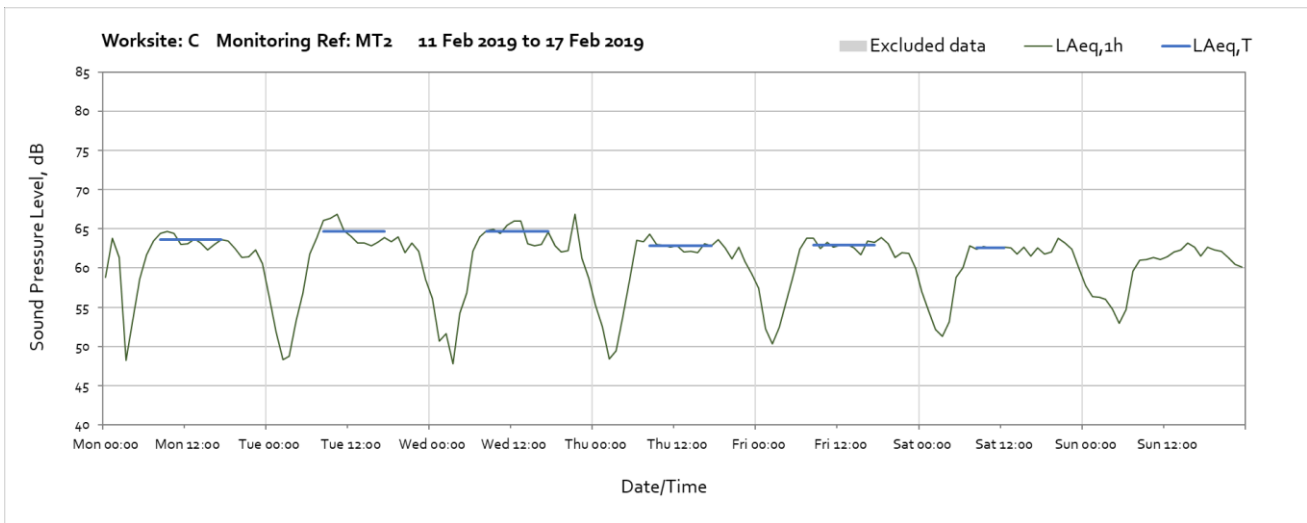
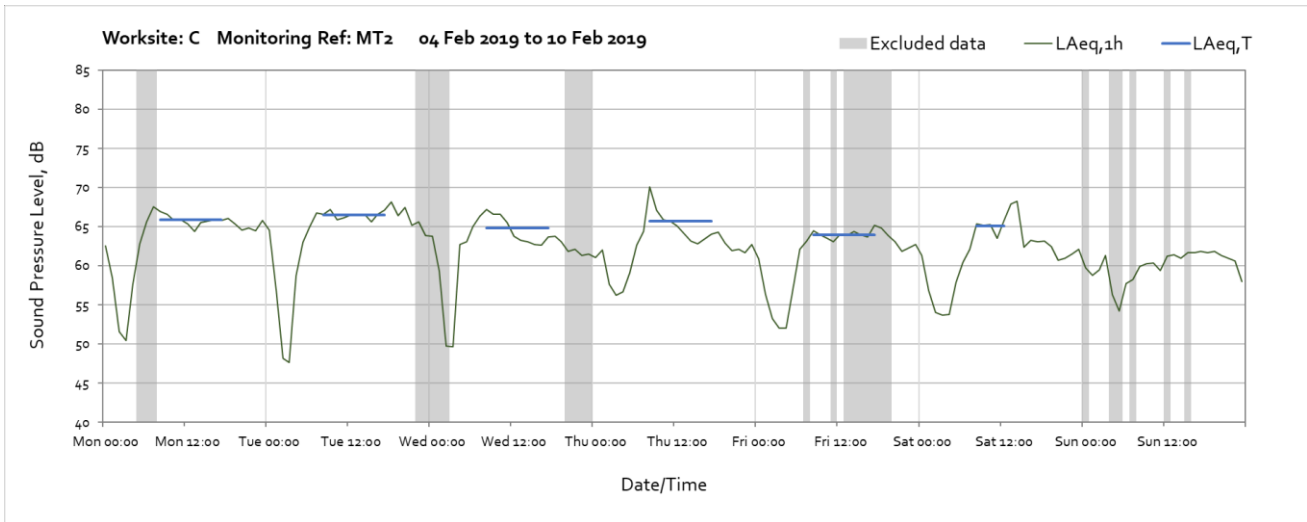
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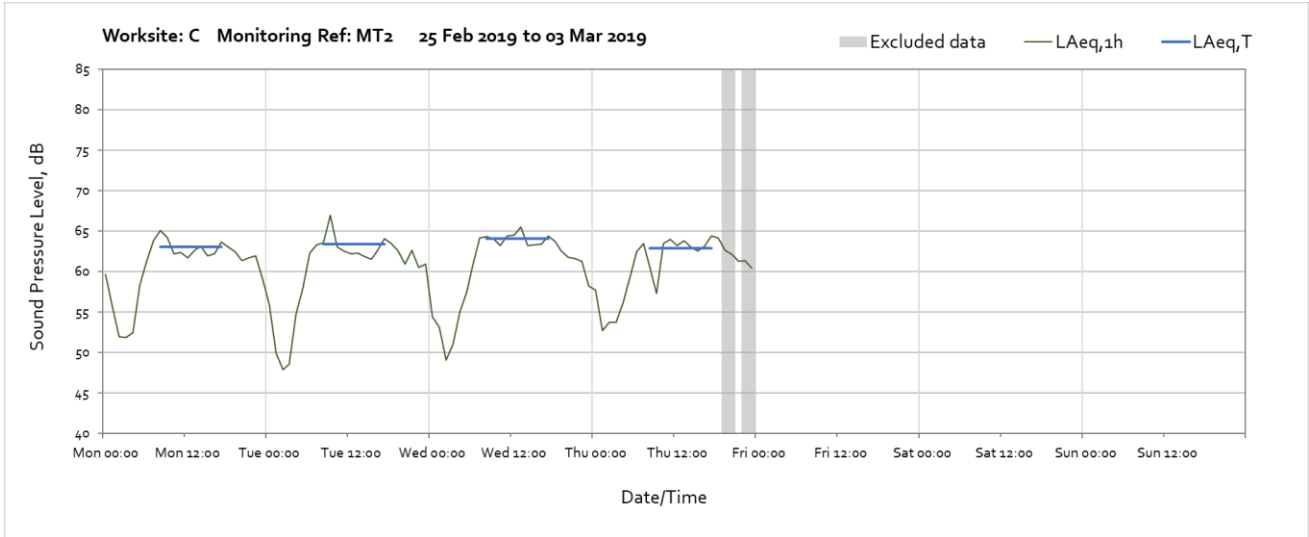


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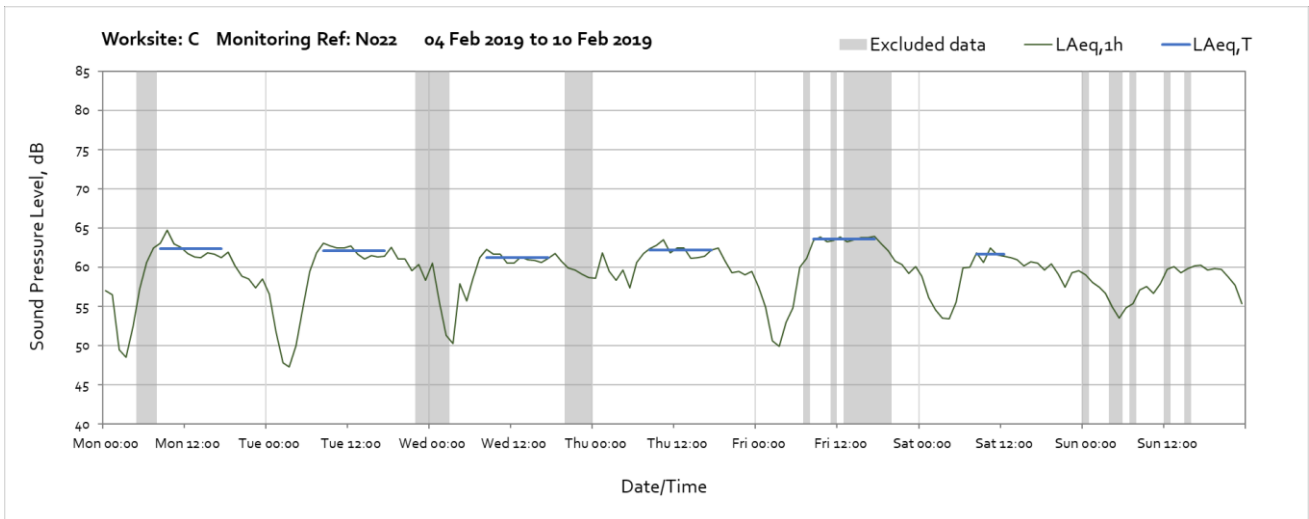
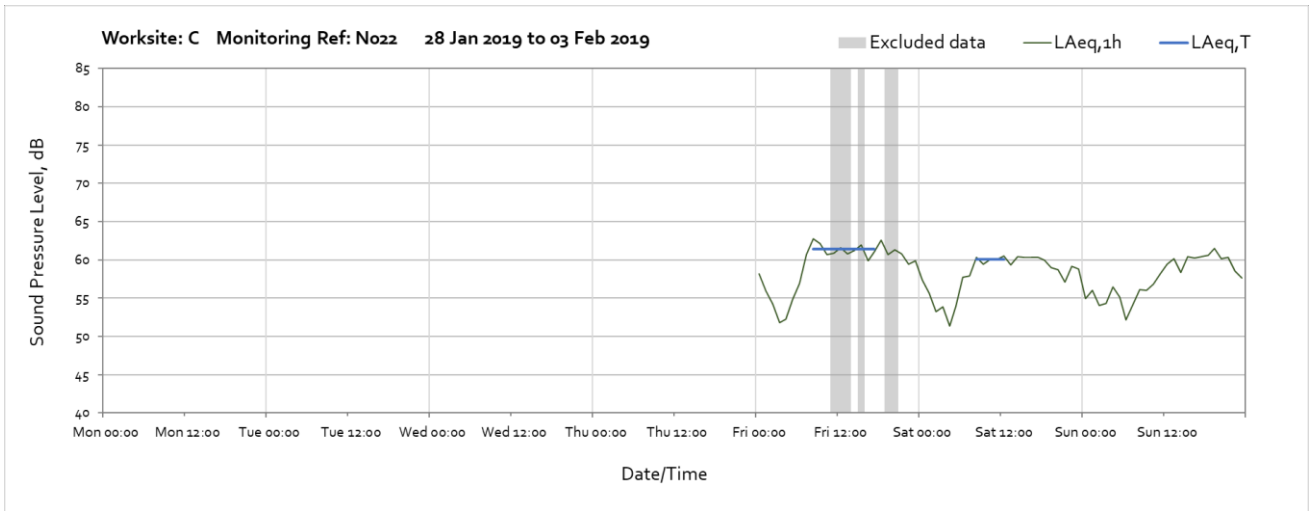


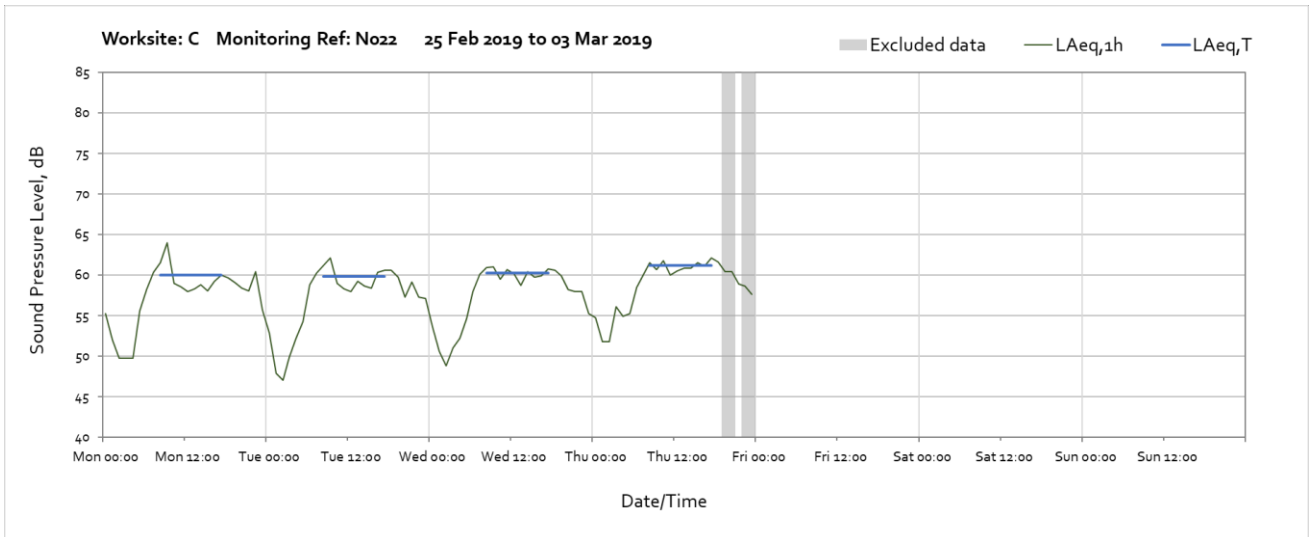
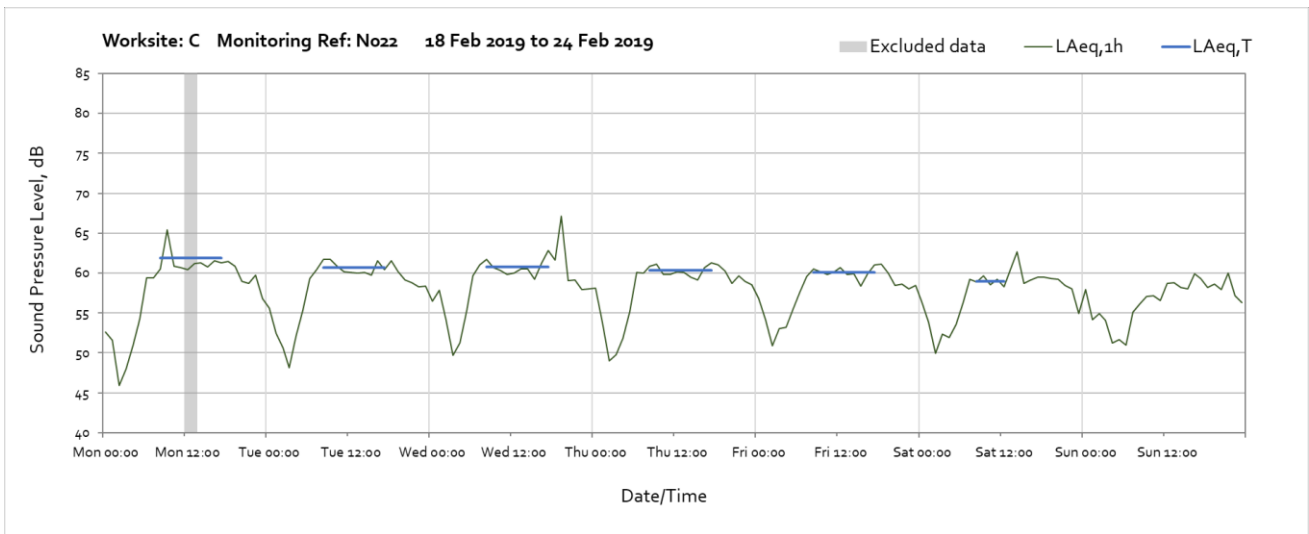
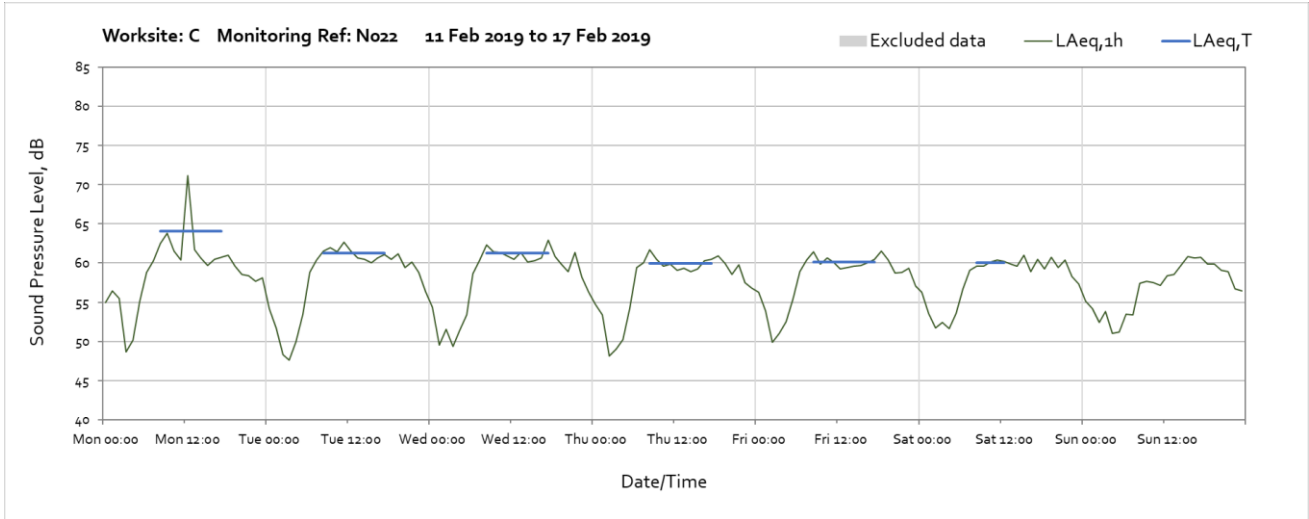




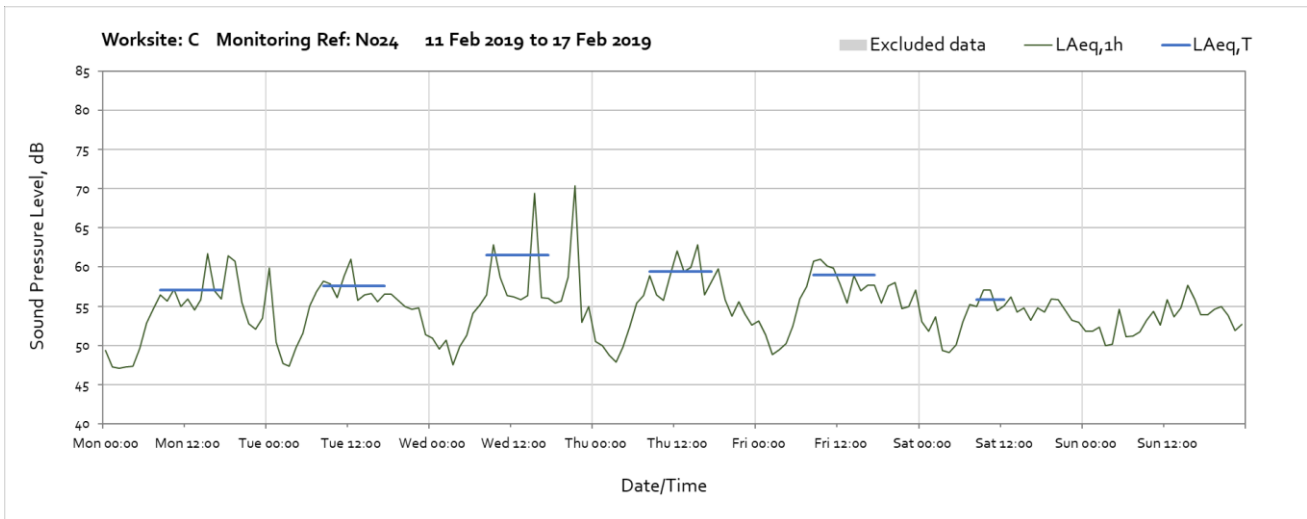
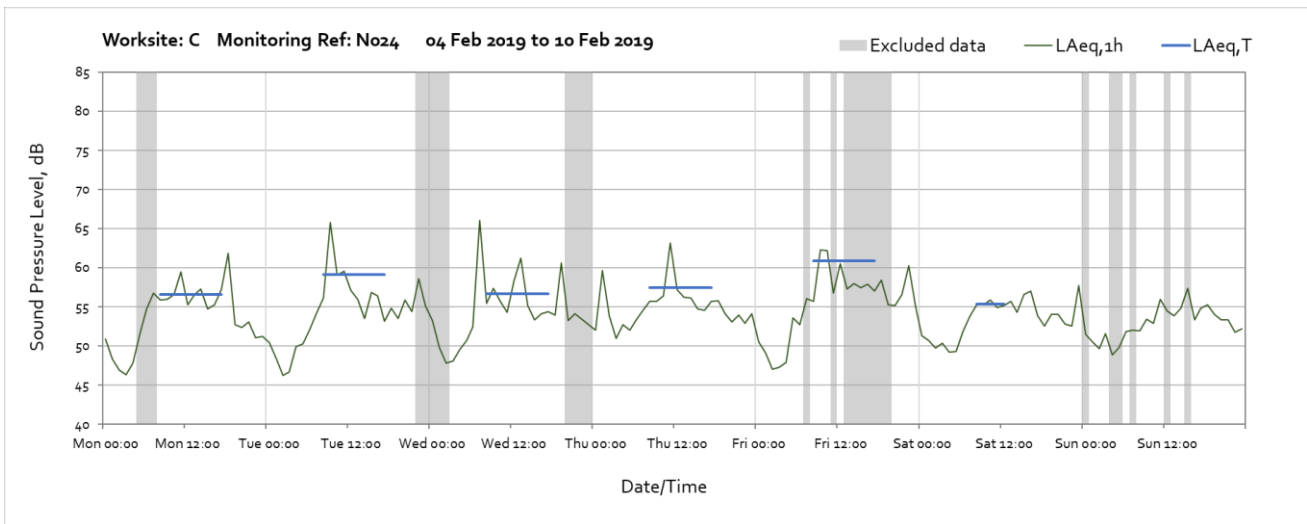
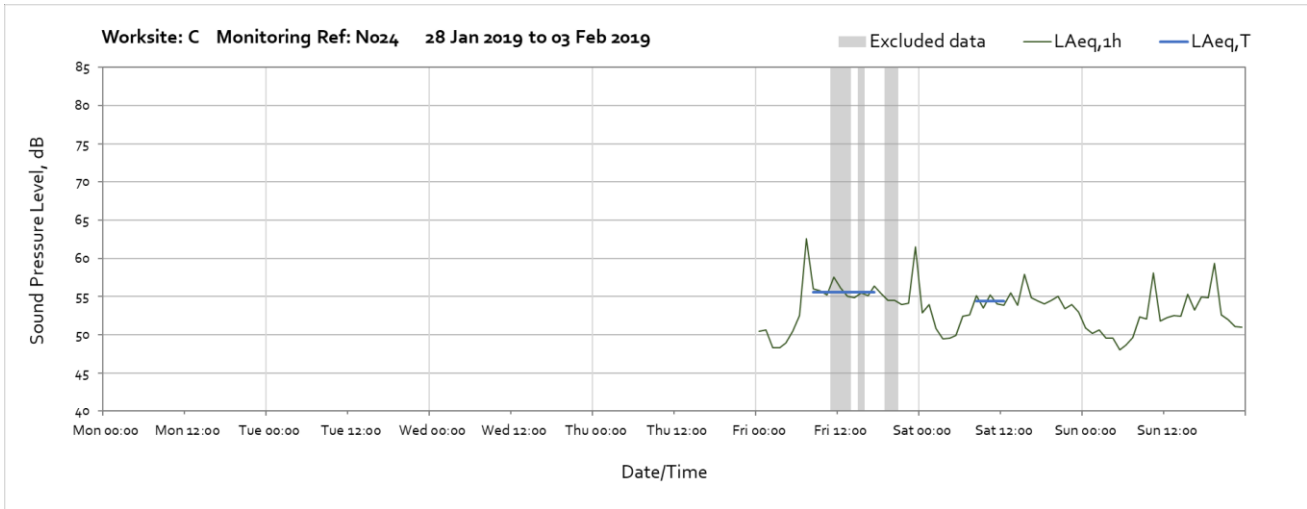


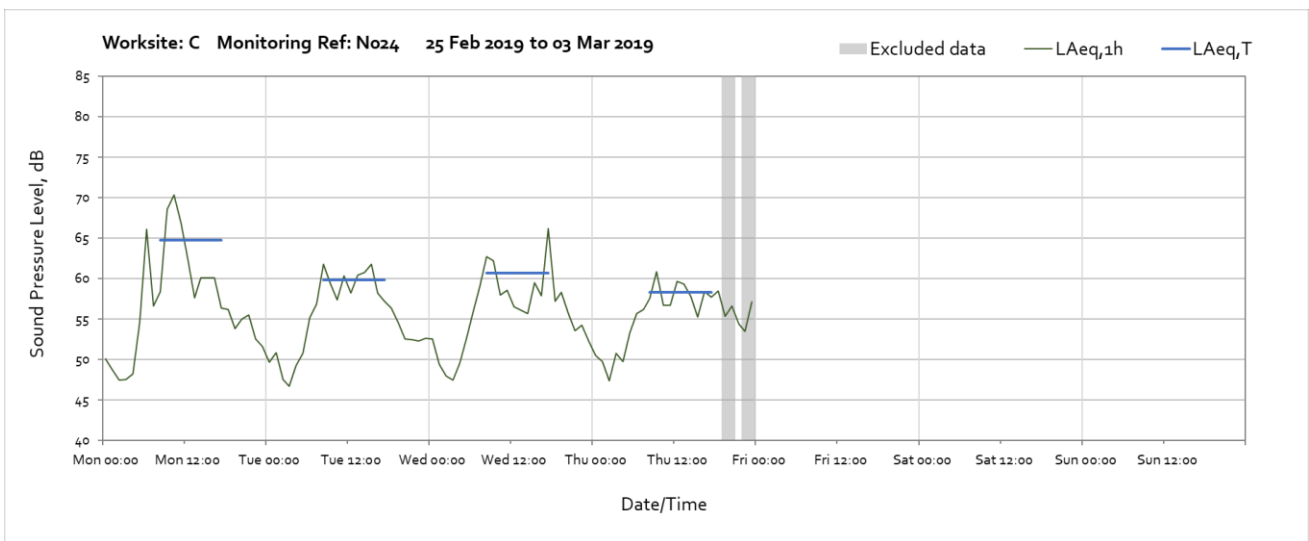
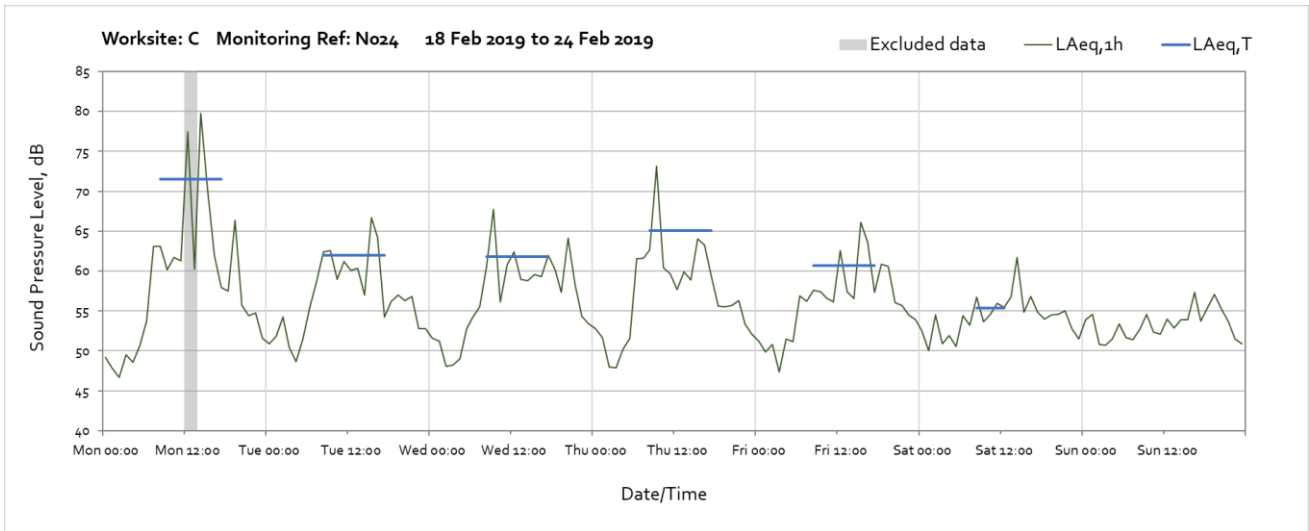
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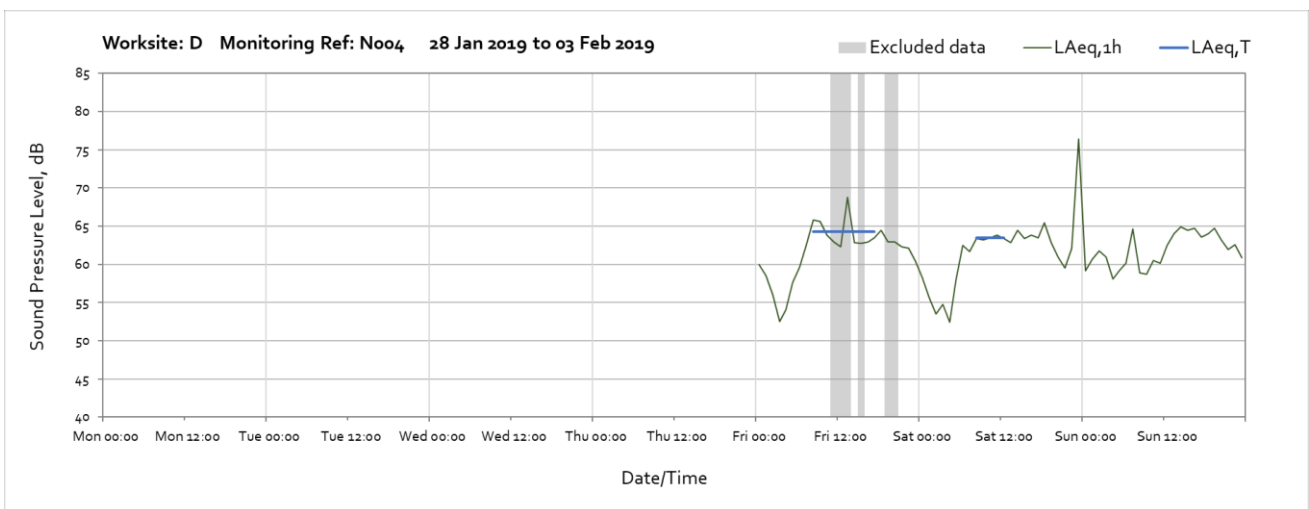


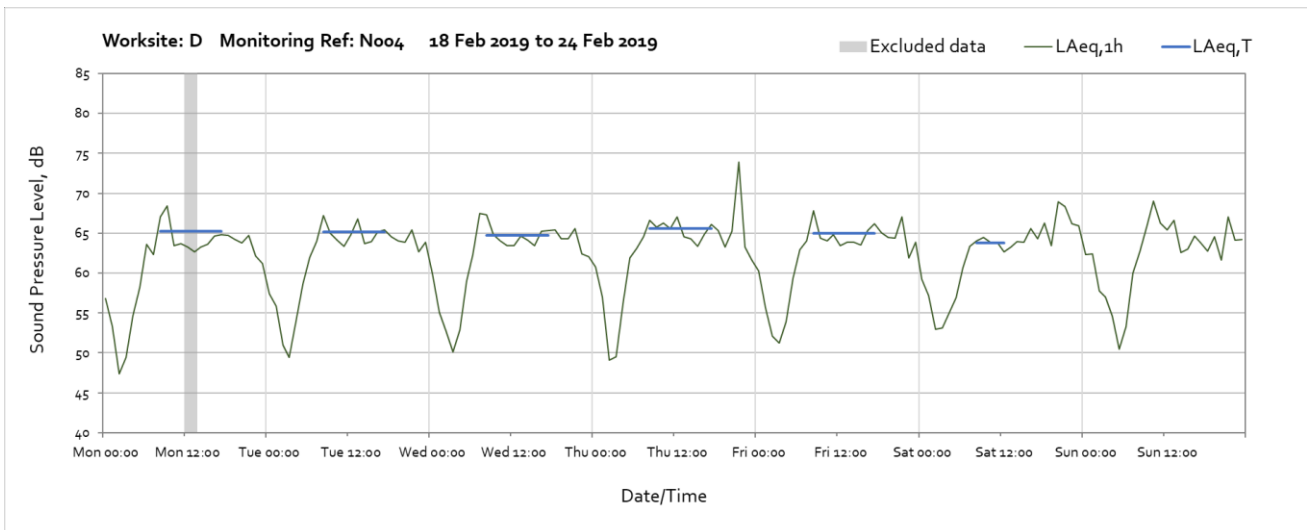
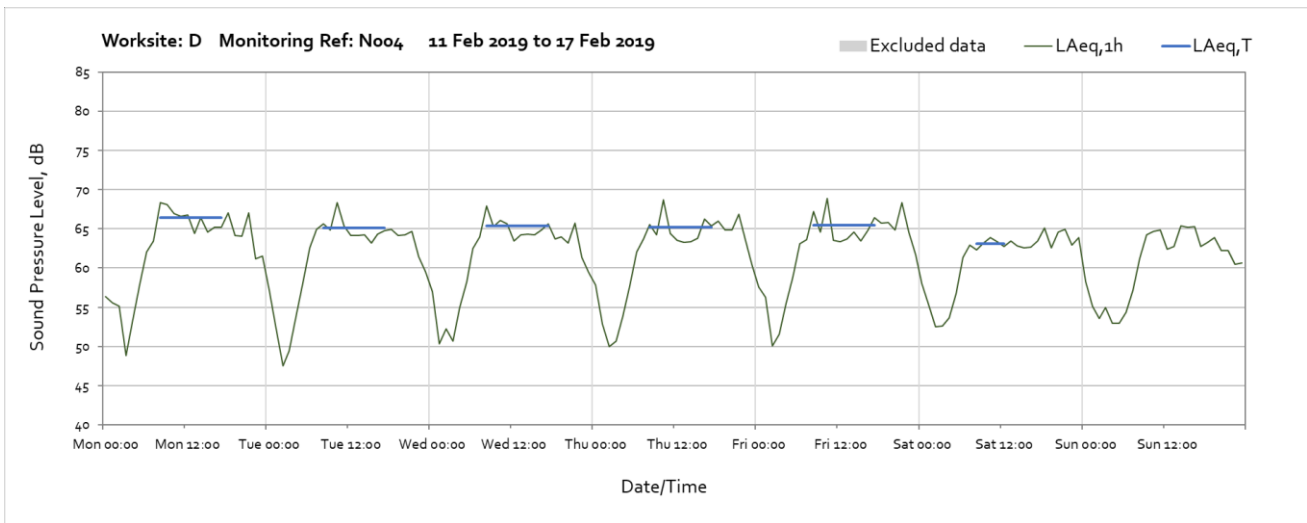
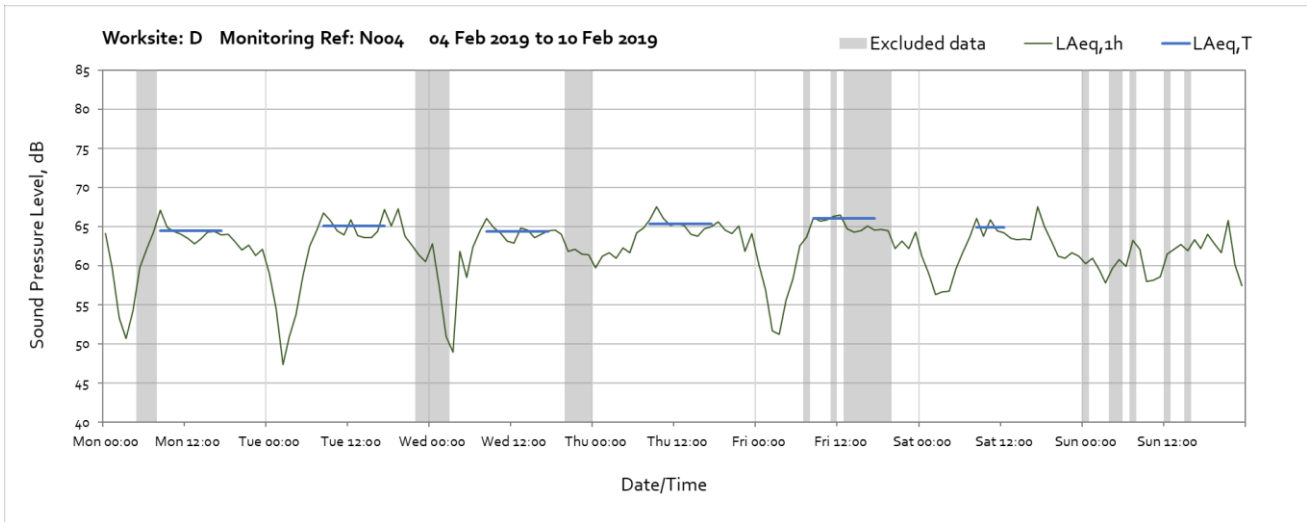
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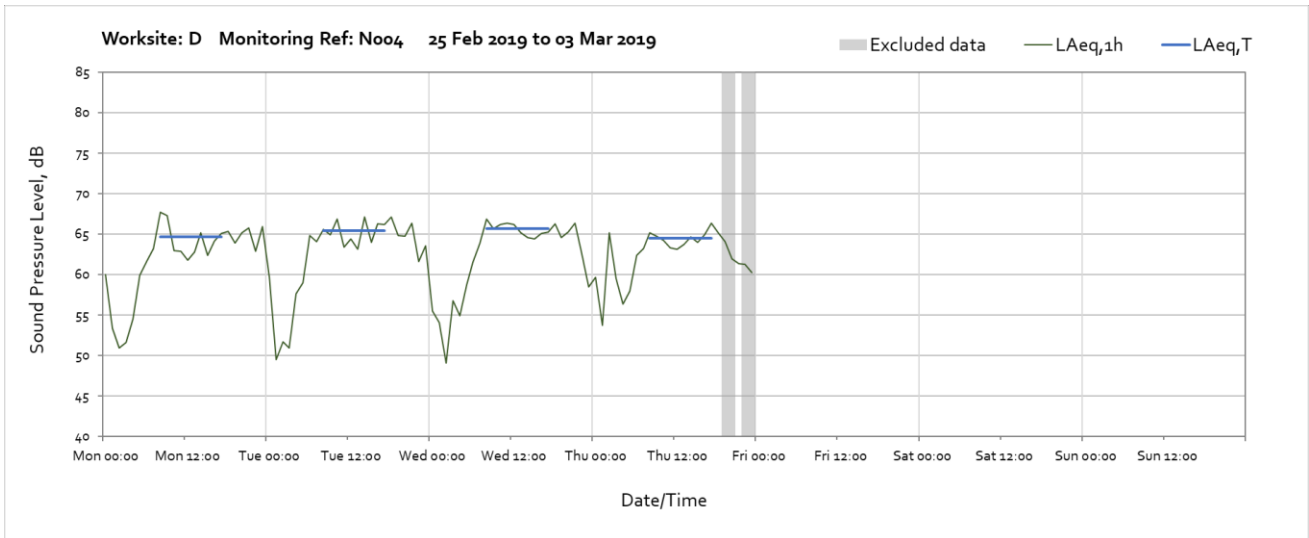




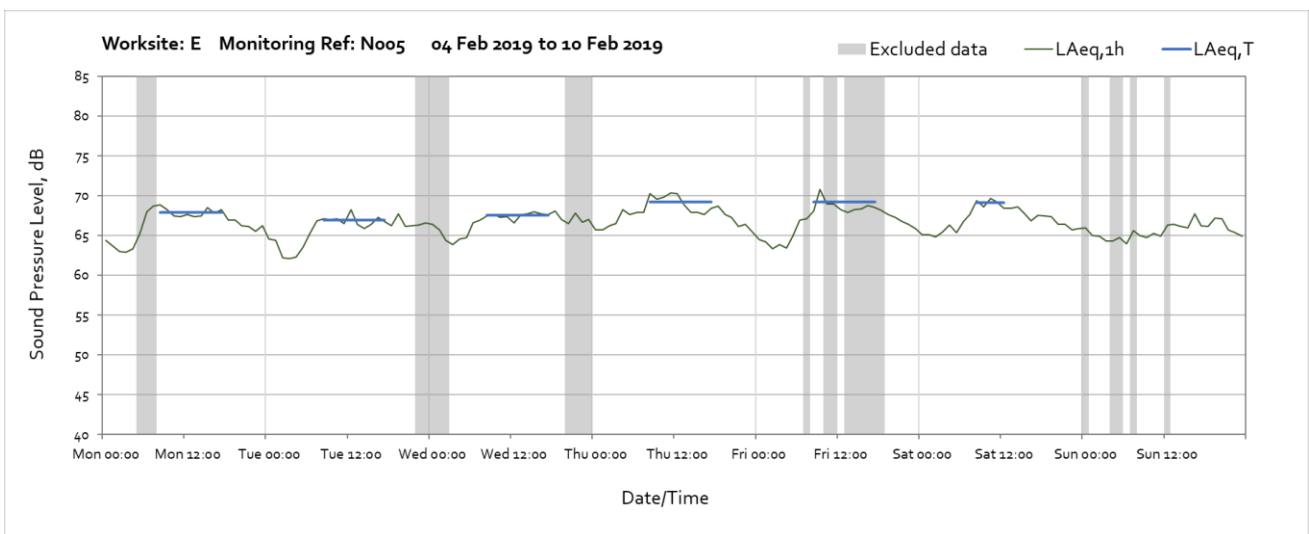
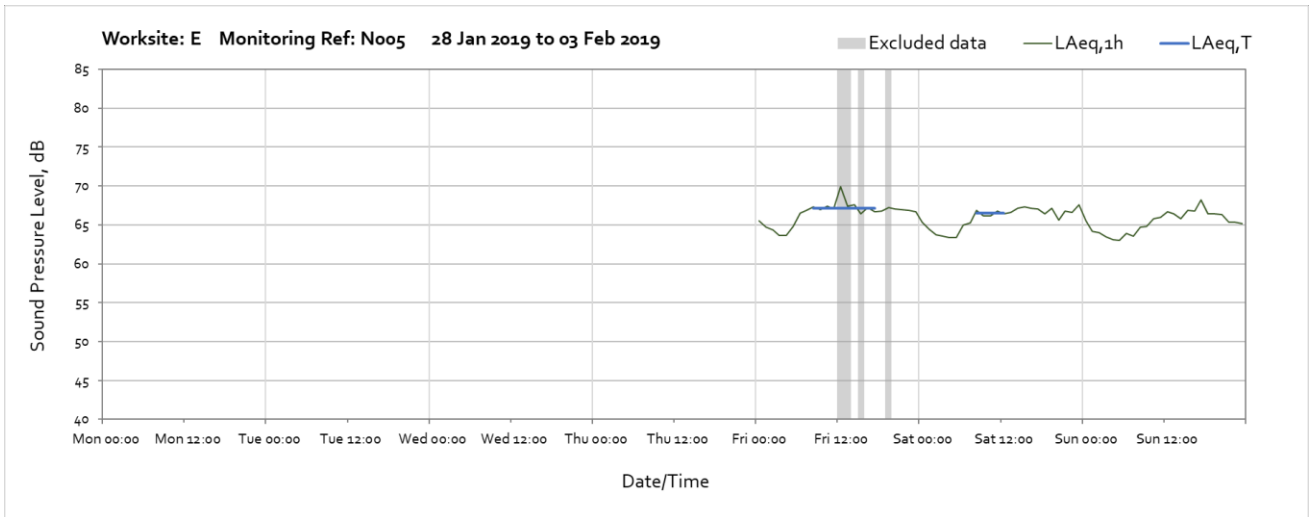
## Worksite: D – Monitoring Ref: N004



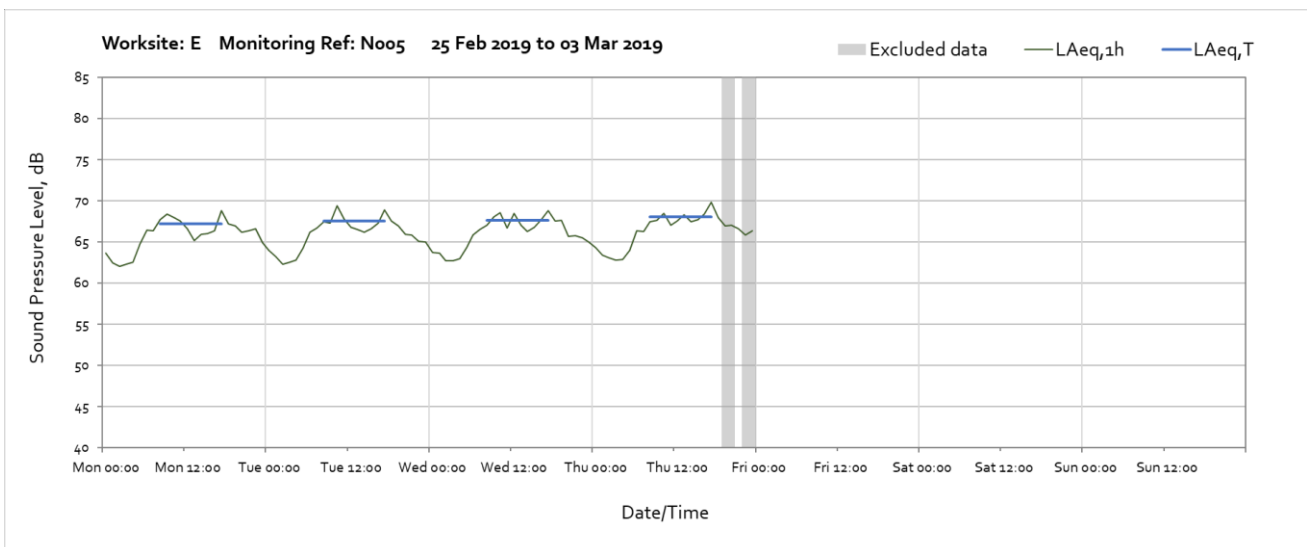
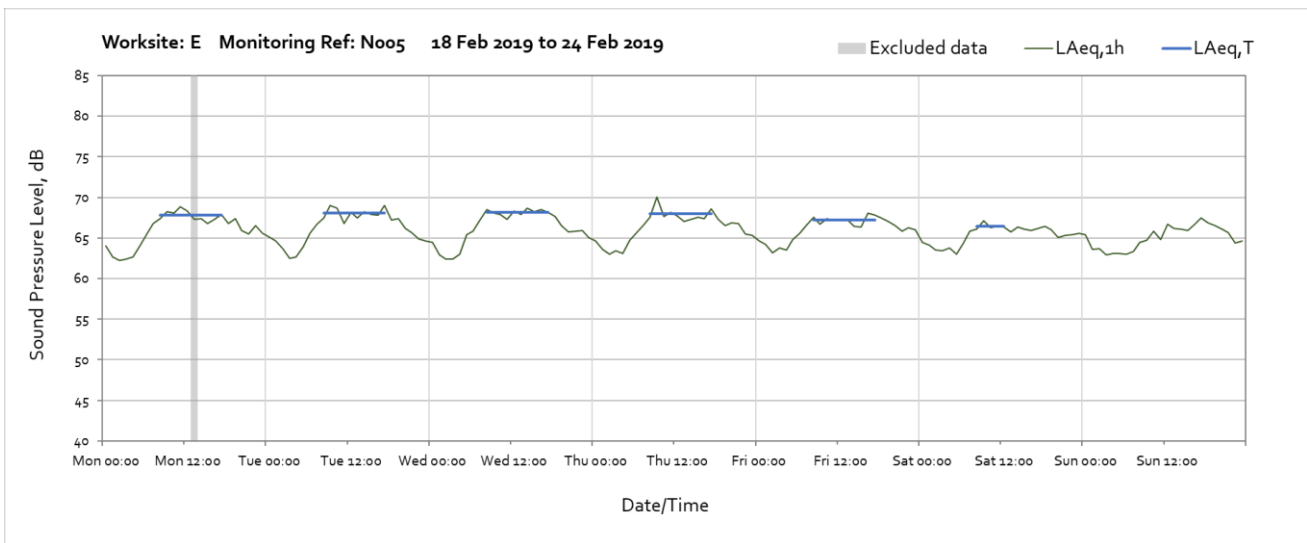
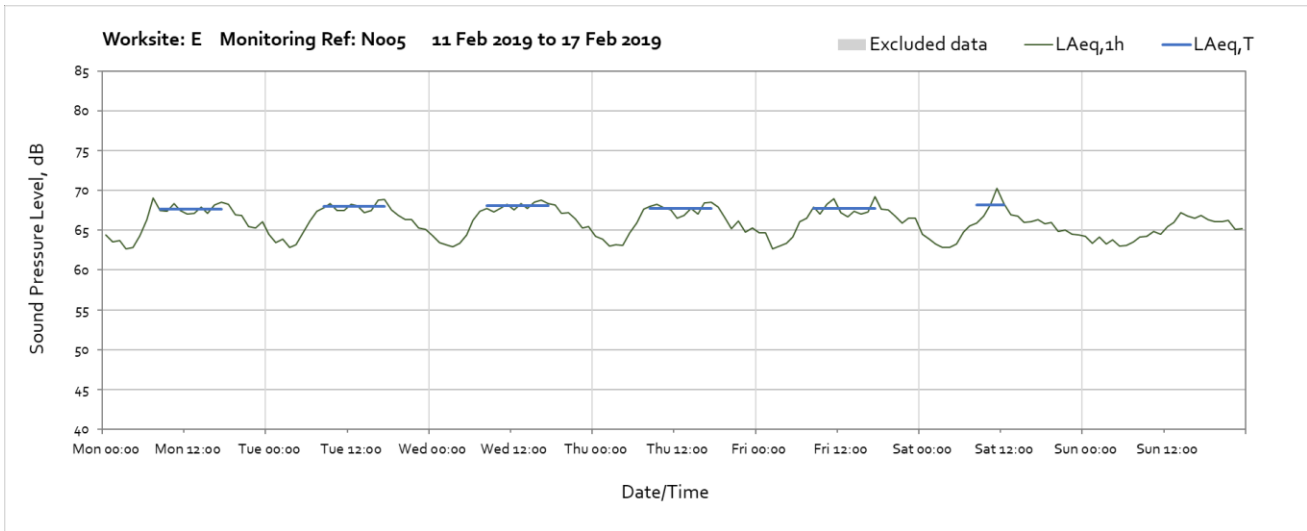




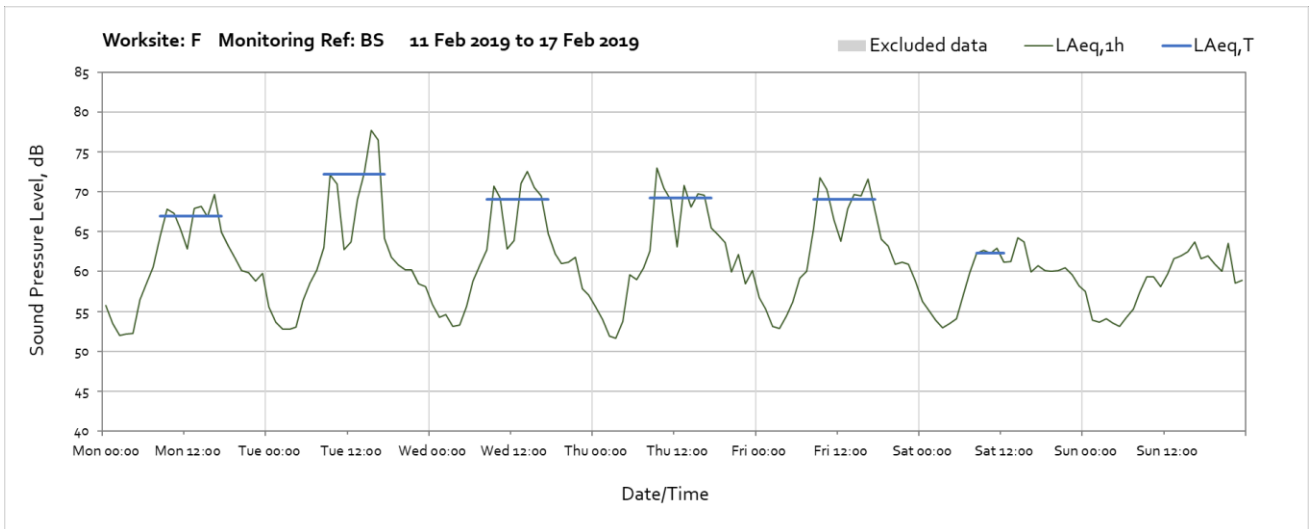
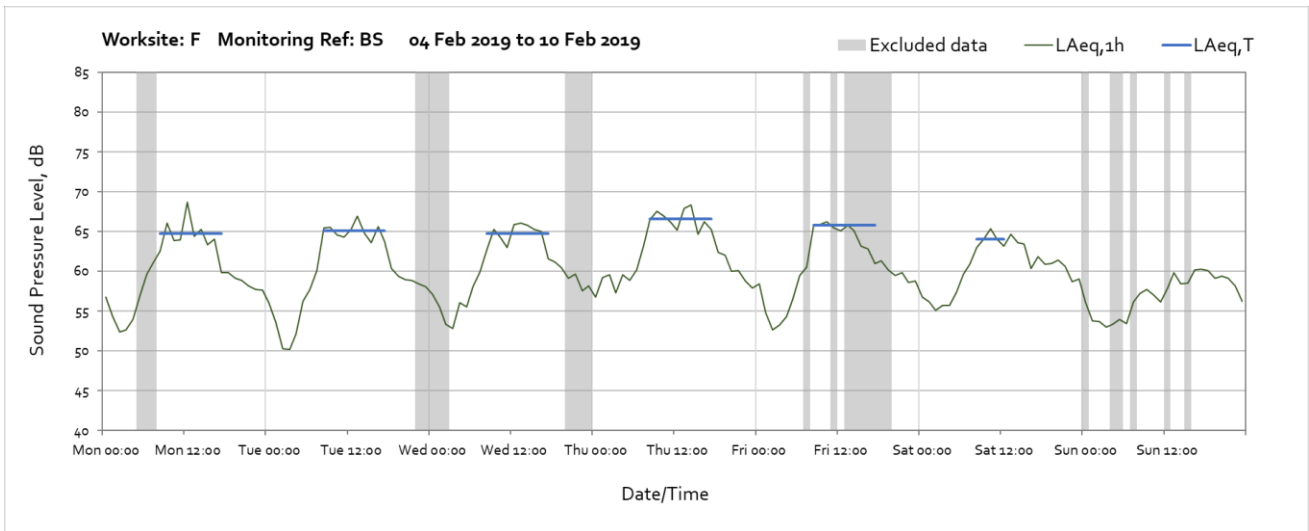
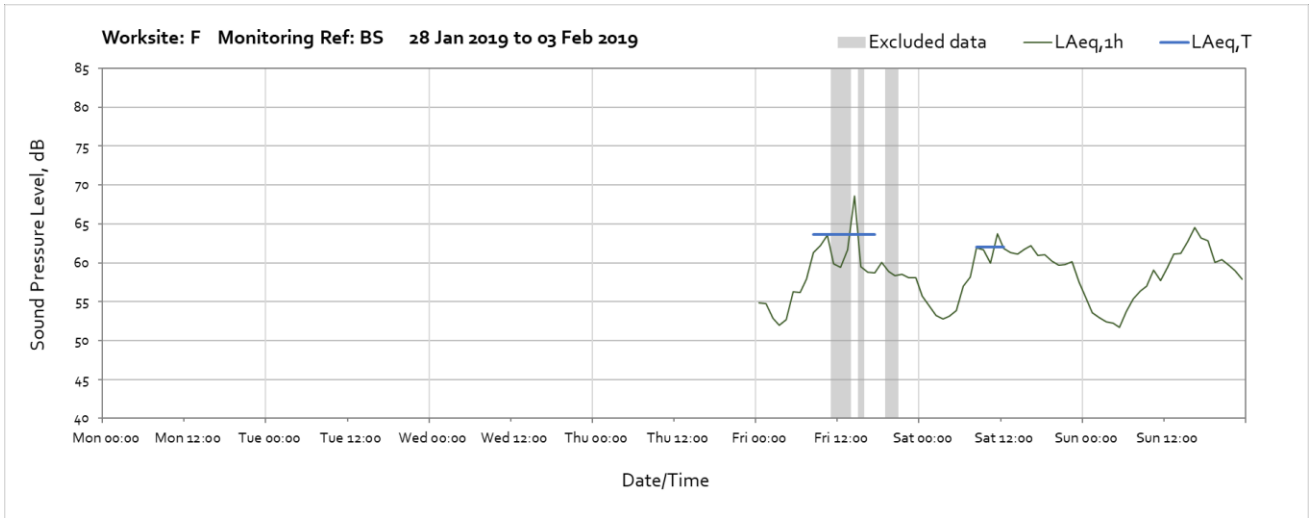
## Worksite: E – Monitoring Ref: N005

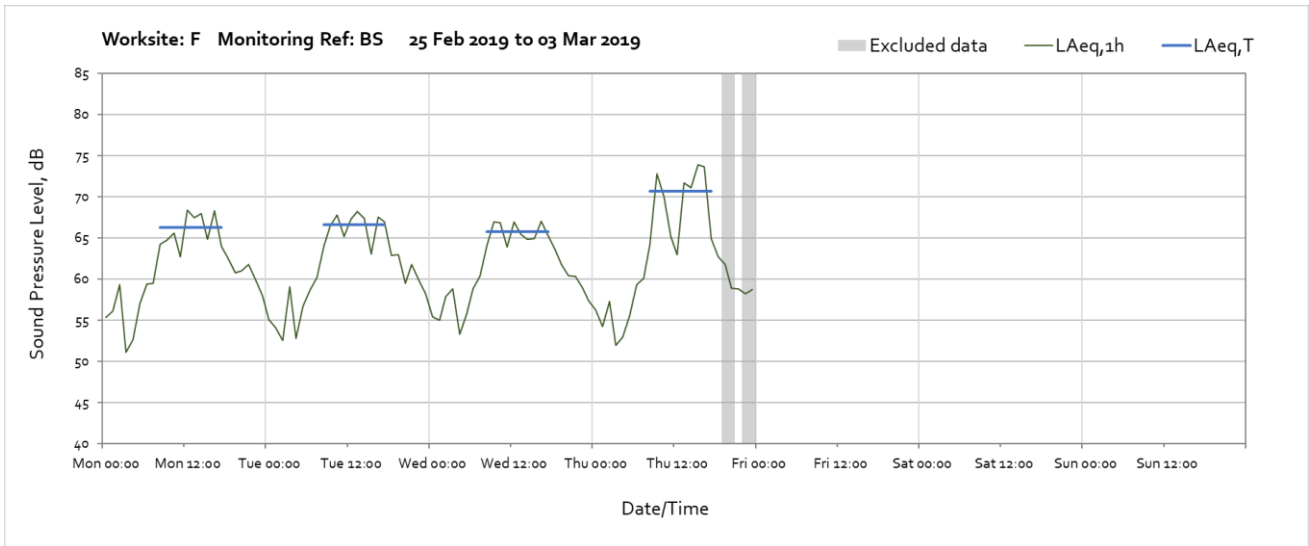
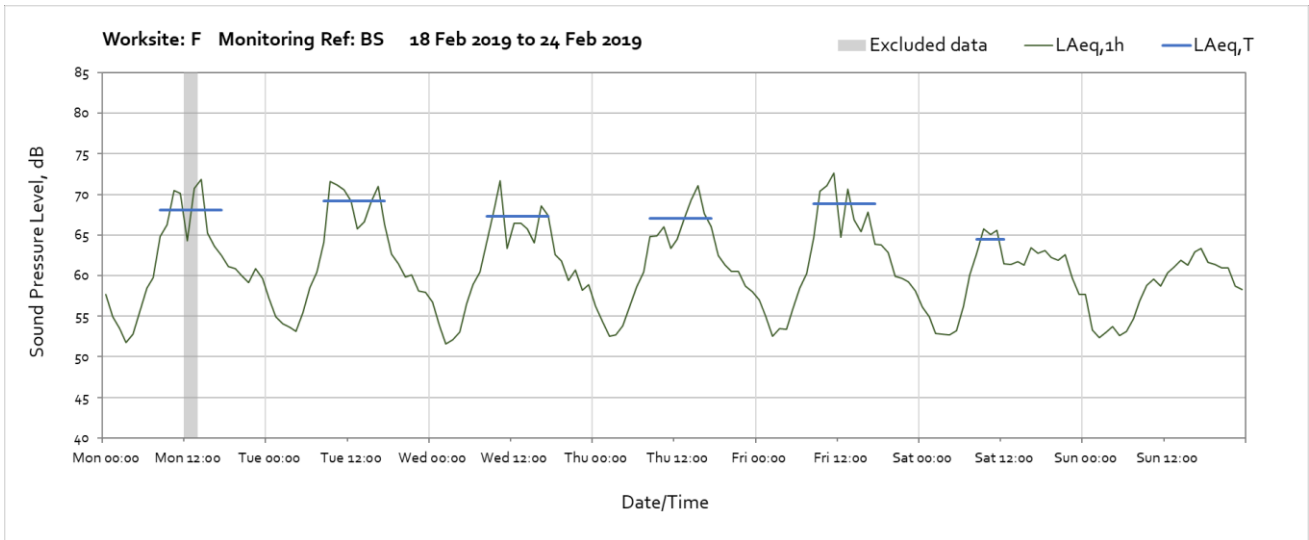




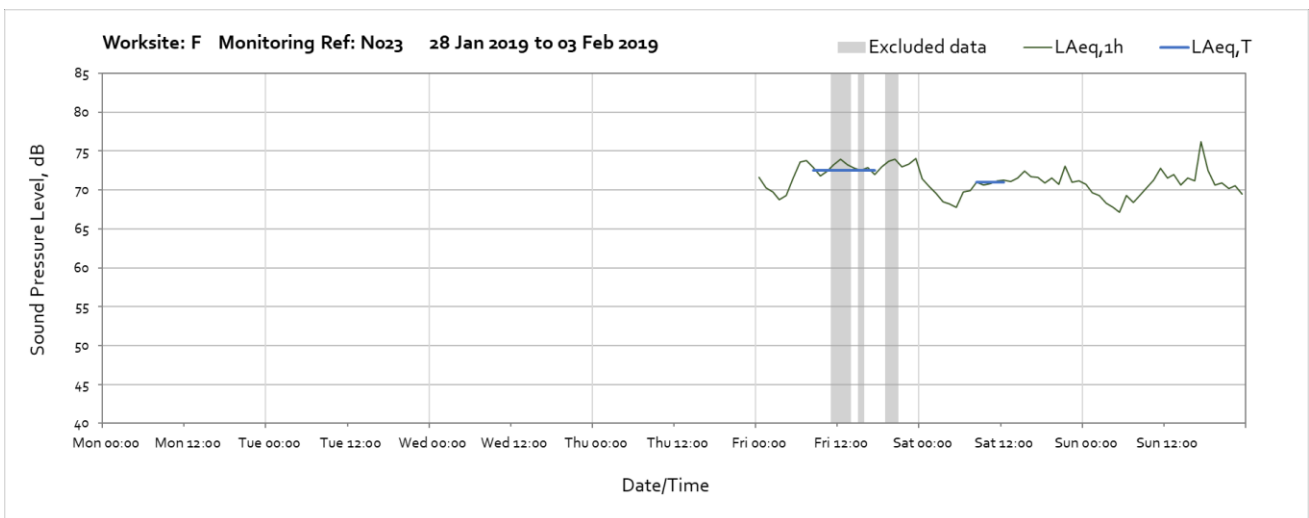


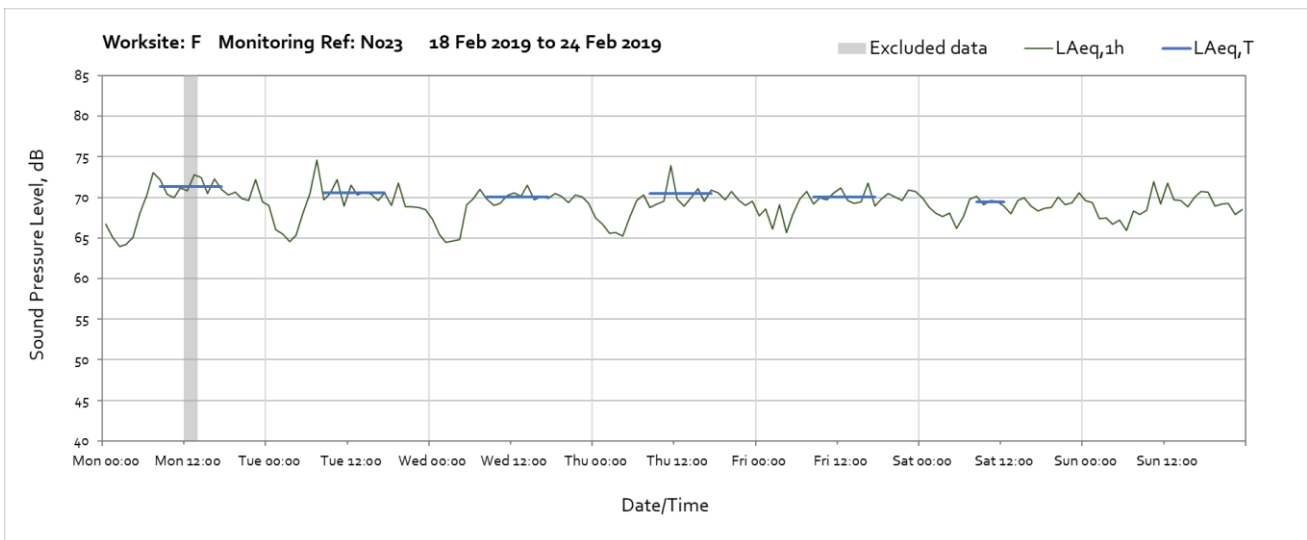
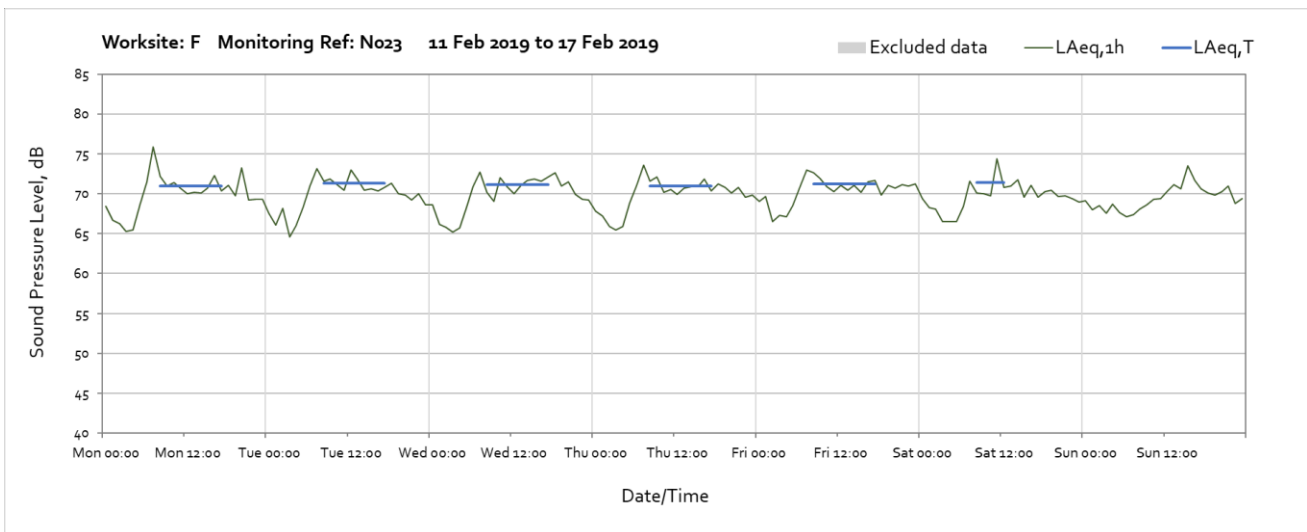
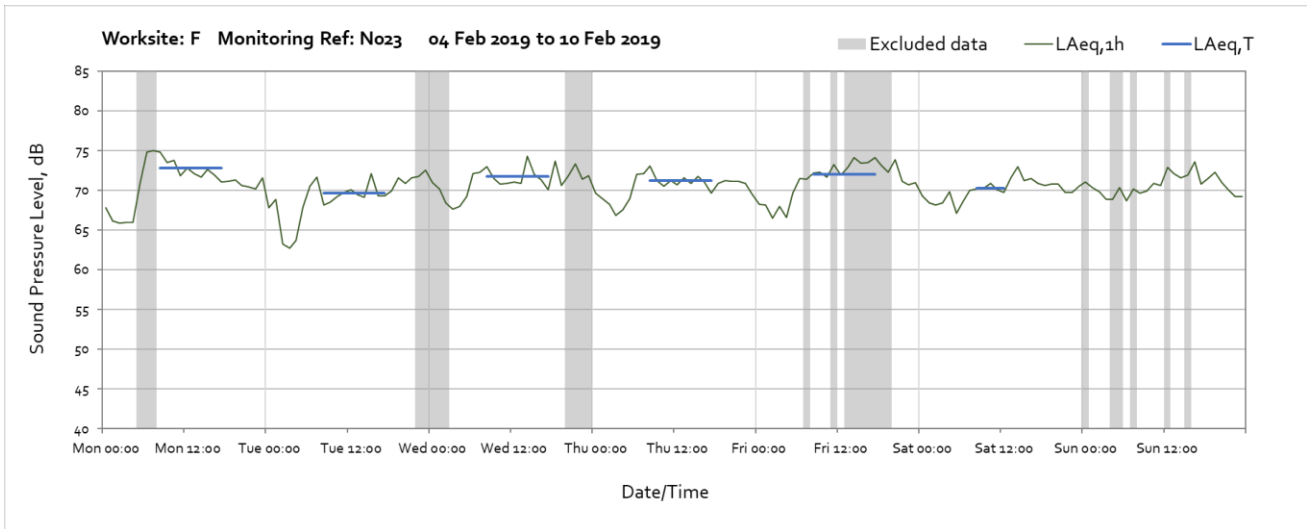
# Worksite: F – Monitoring Ref: BS

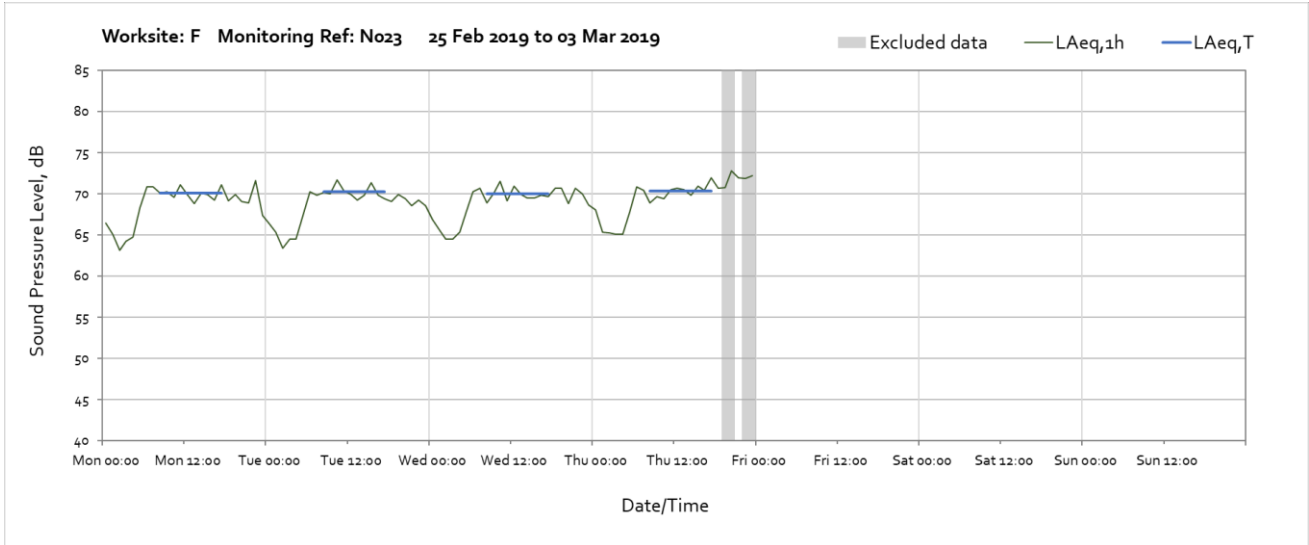




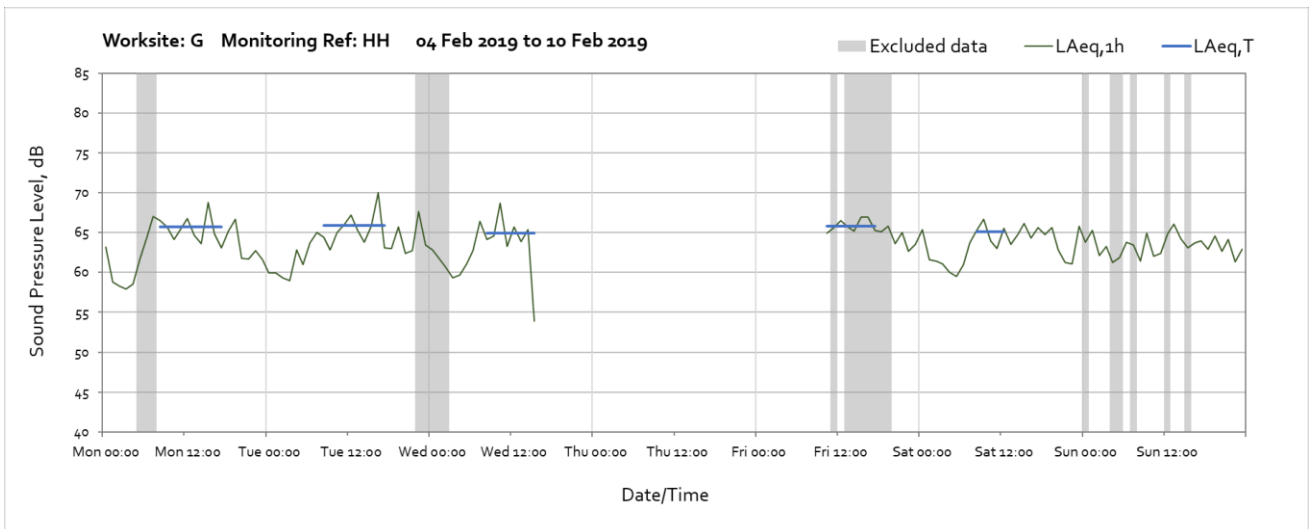
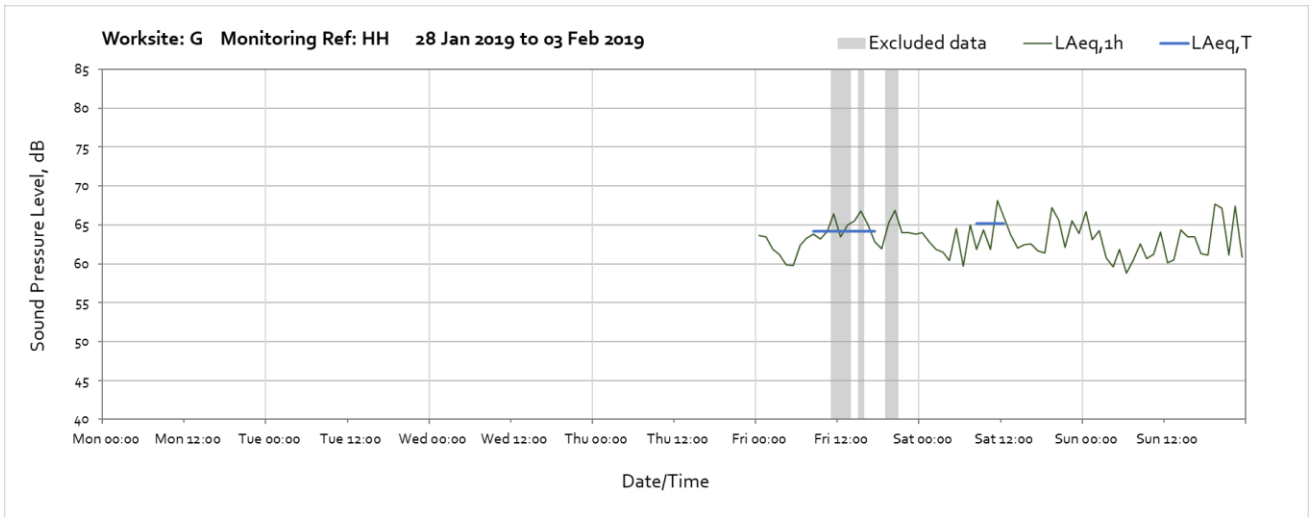
## Worksite: F – Monitoring Ref: N023



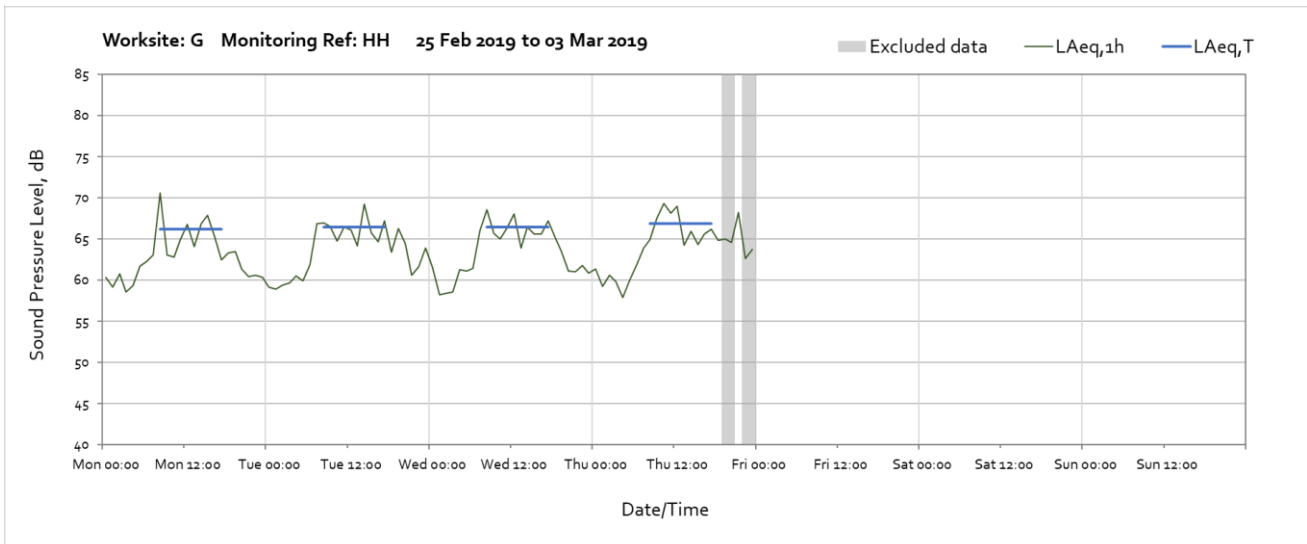
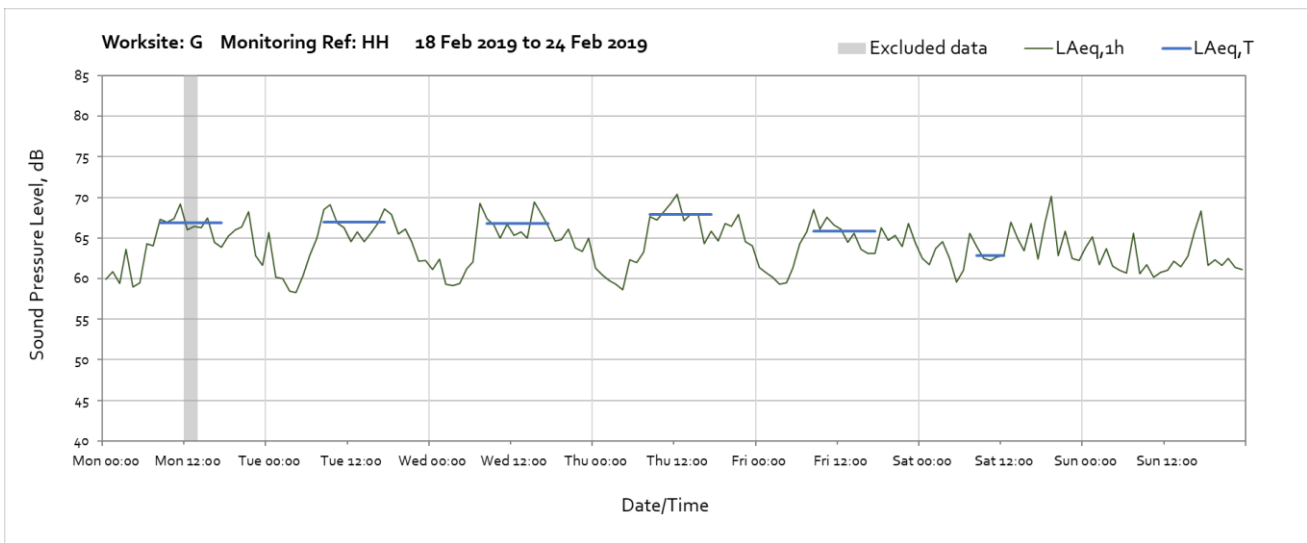
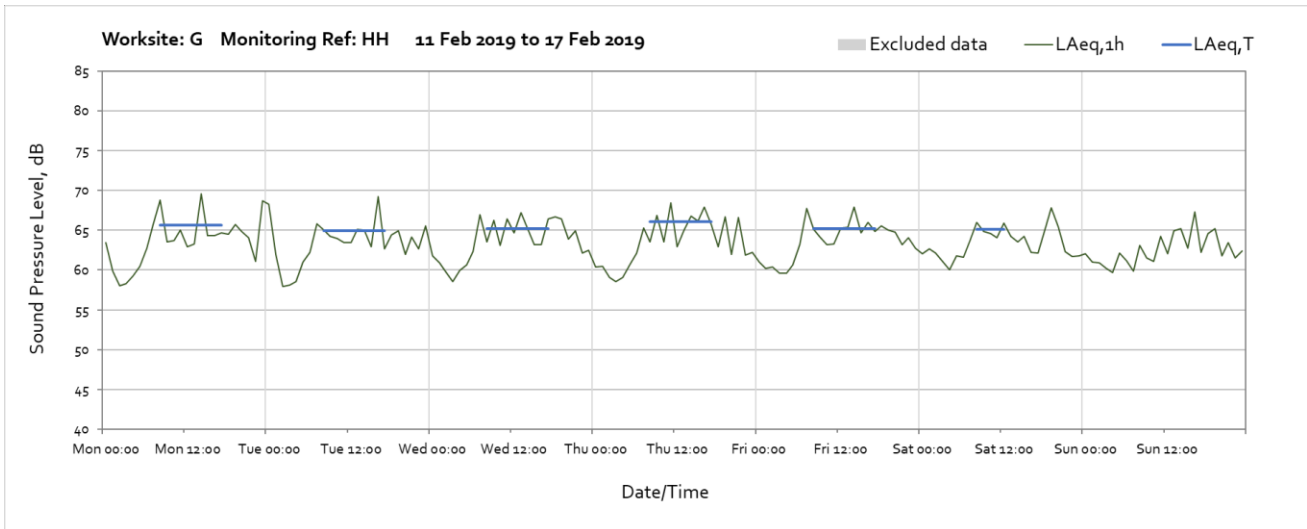




## Worksite: G – Monitoring Ref: HH

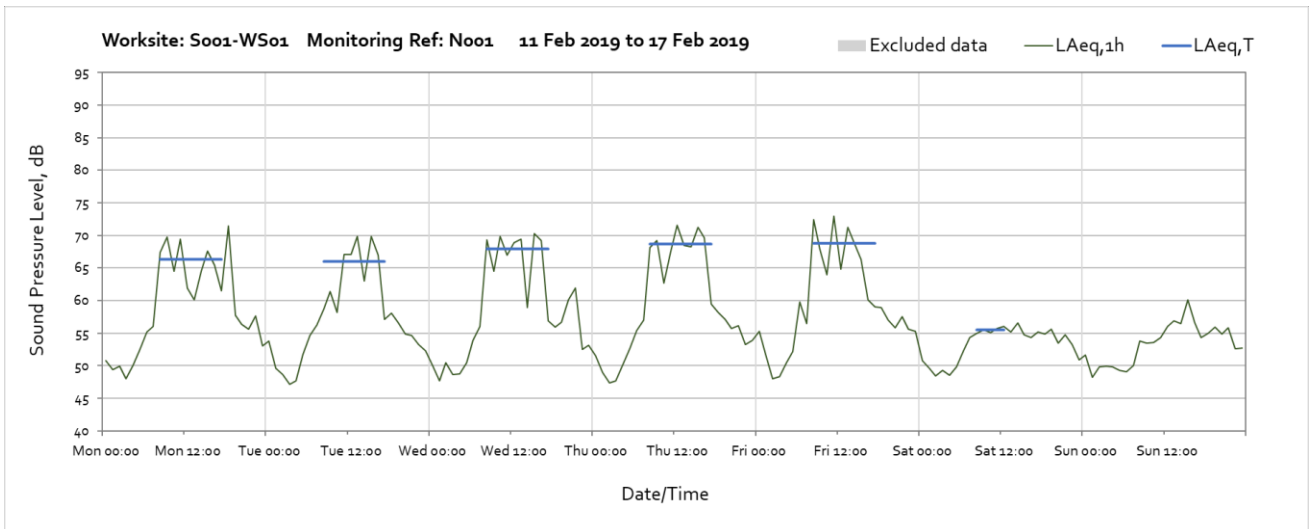
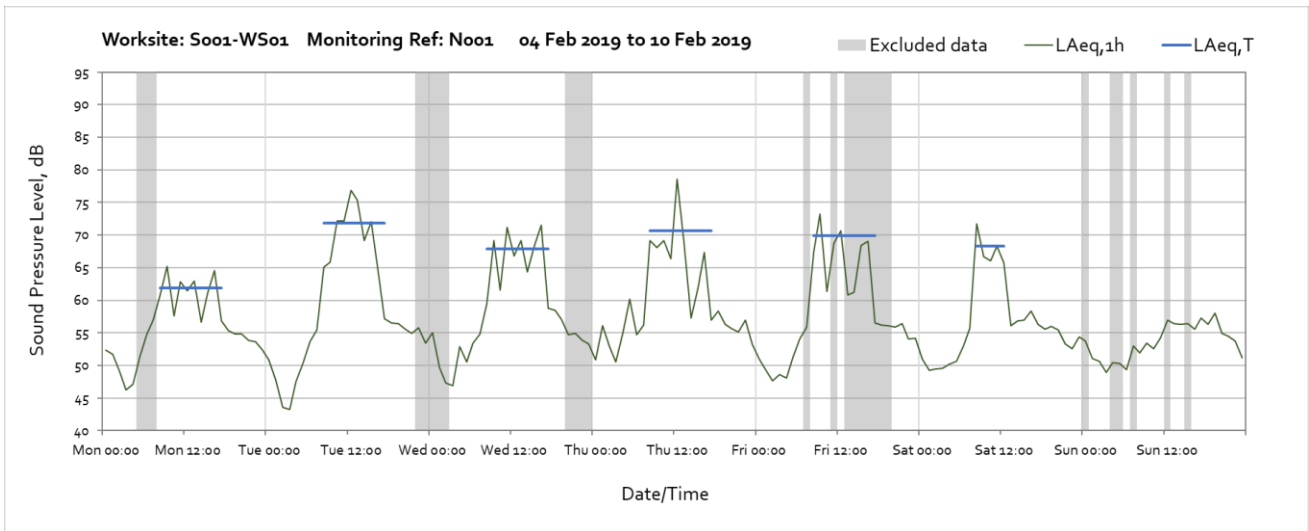
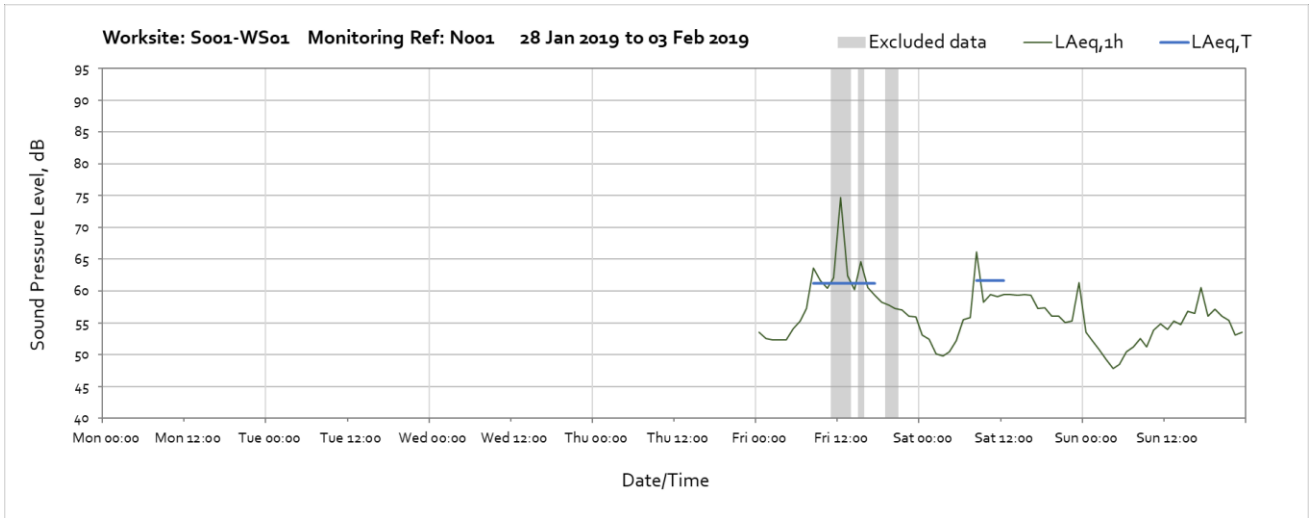


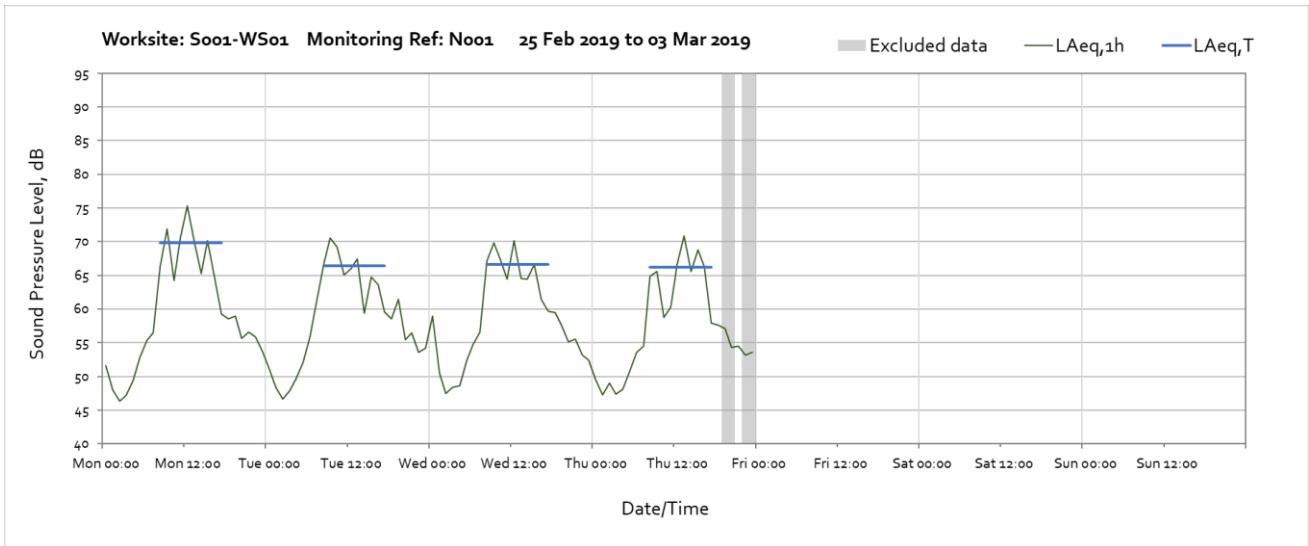
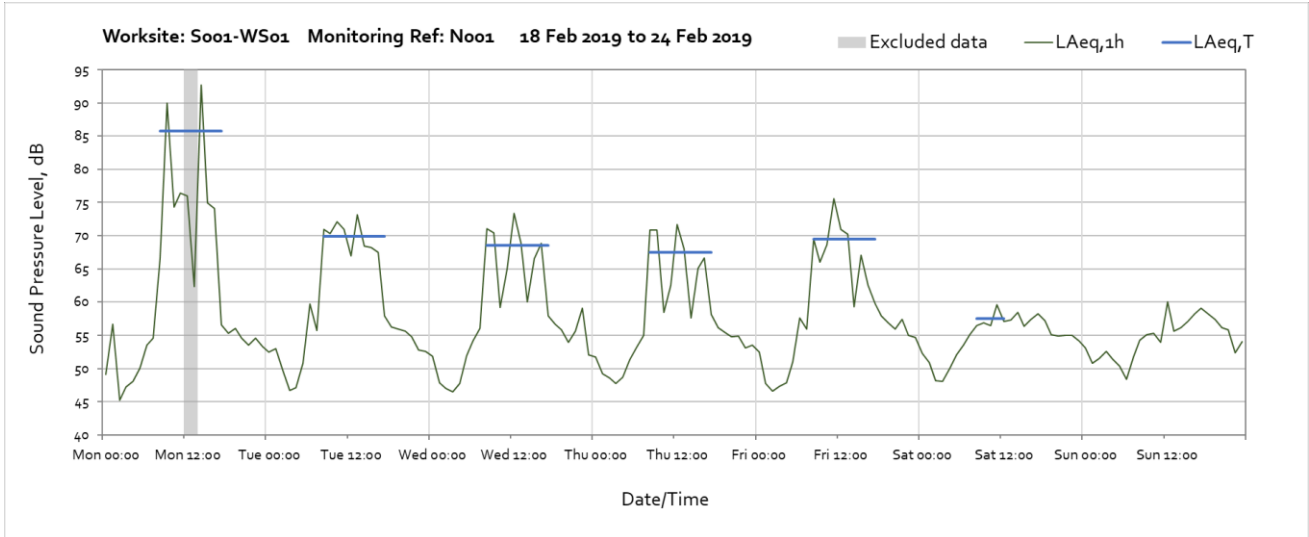
Note – Missing data between 16:00 on Wednesday 6<sup>th</sup> and 10:00 on Friday 8<sup>th</sup> of February due to a loss of power at the noise monitor.



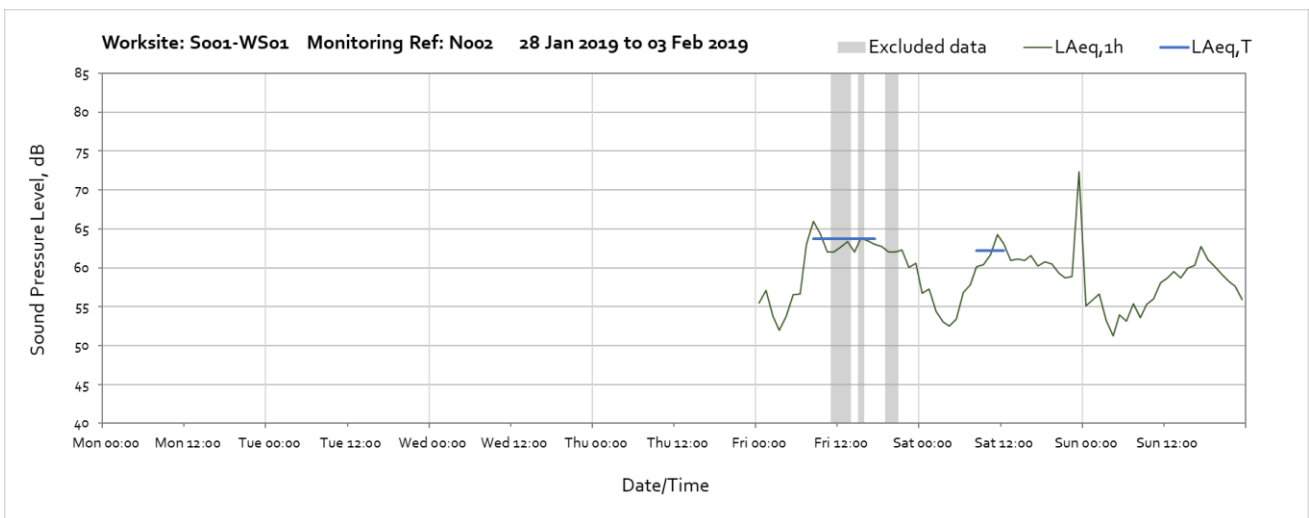


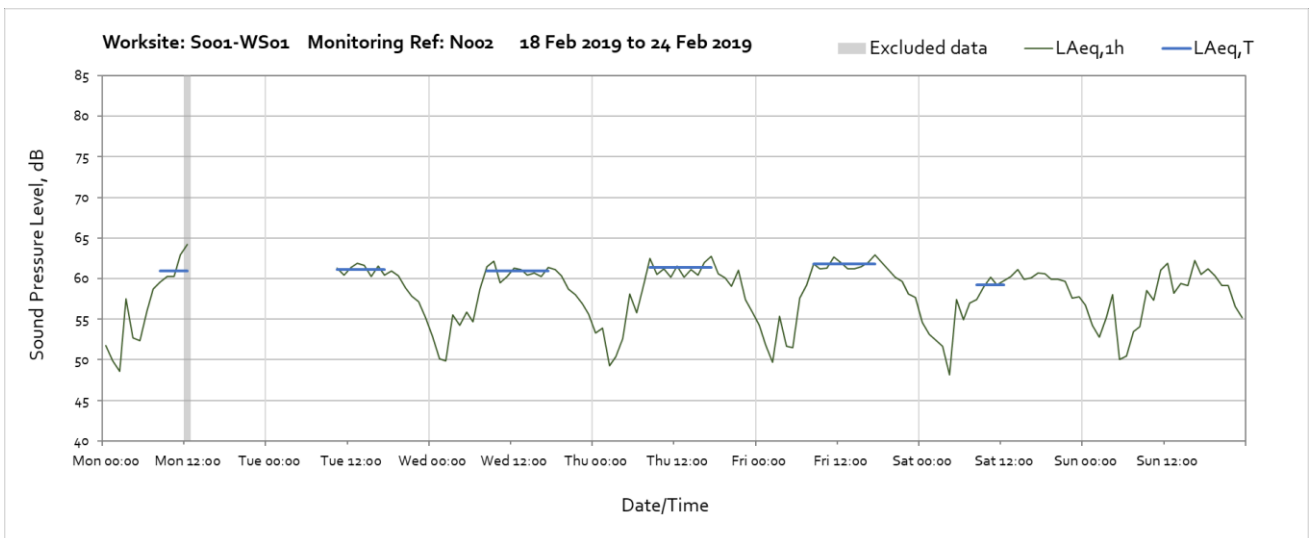
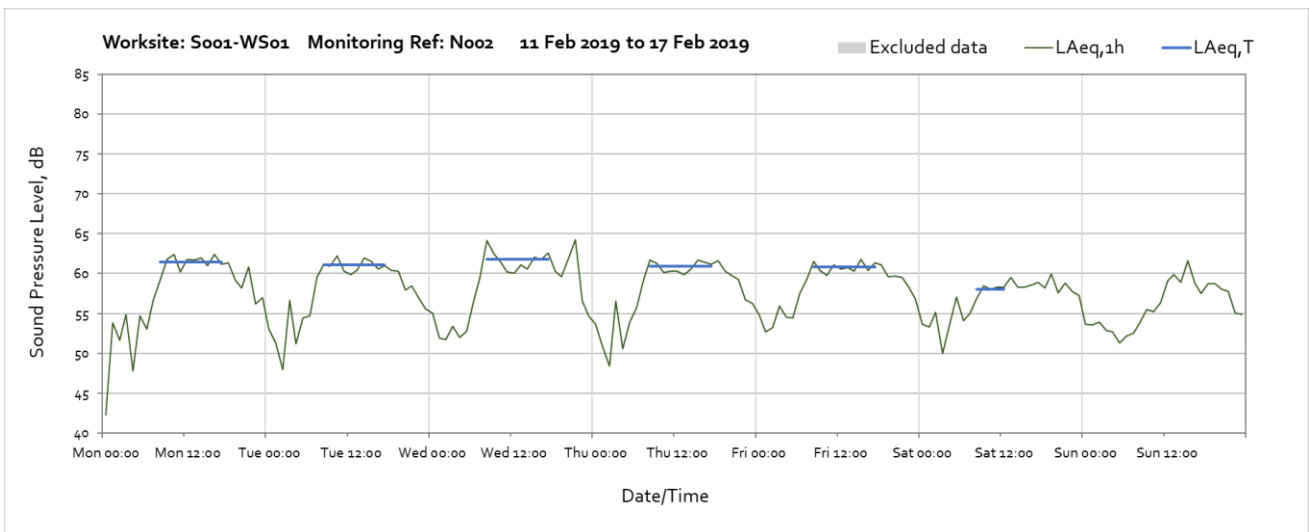
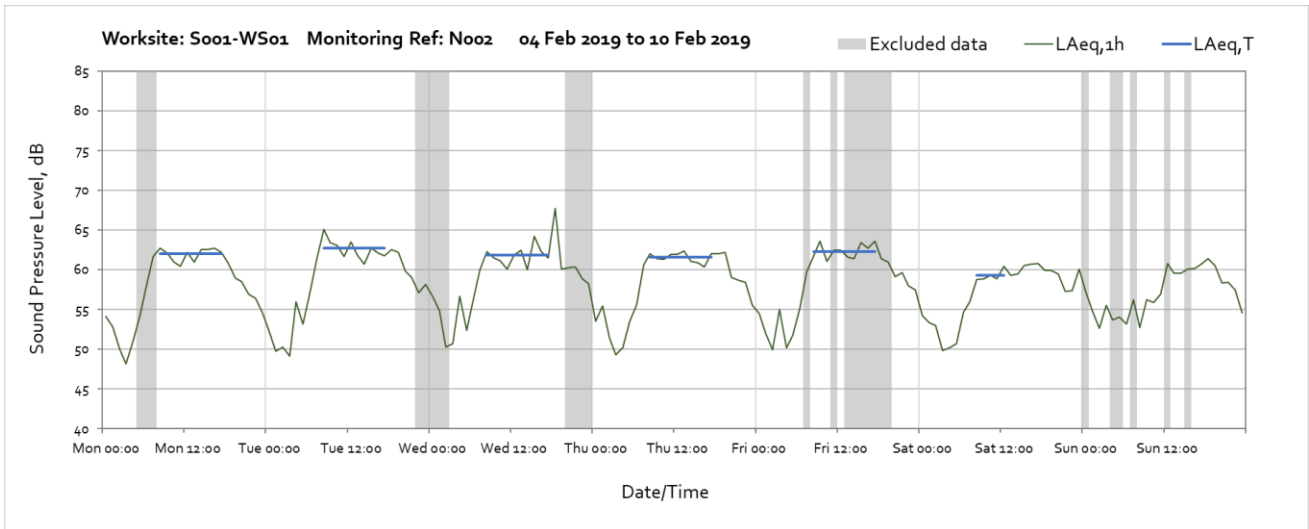
# Worksite: S001-WS01 – Monitoring Ref: N001



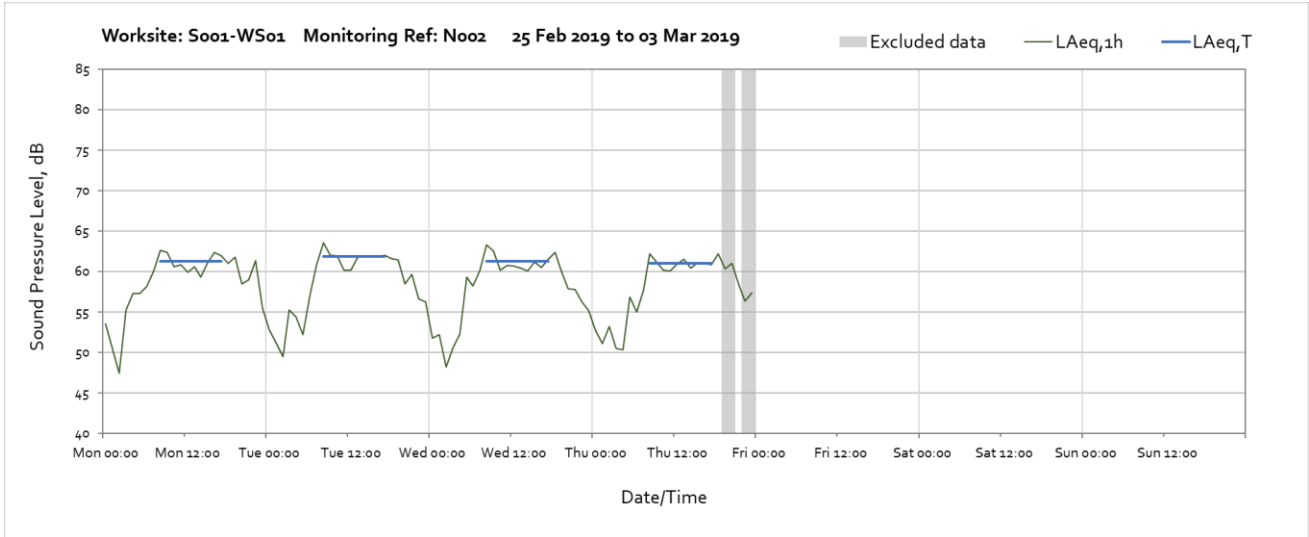


## Worksite: S001-WS01 – Monitoring Ref: N002

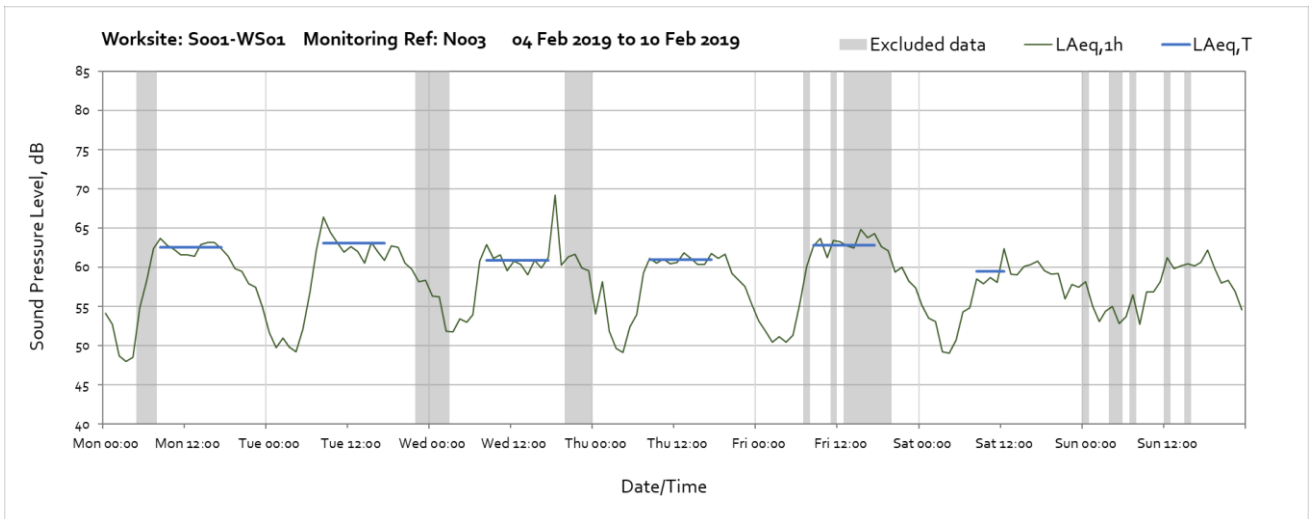
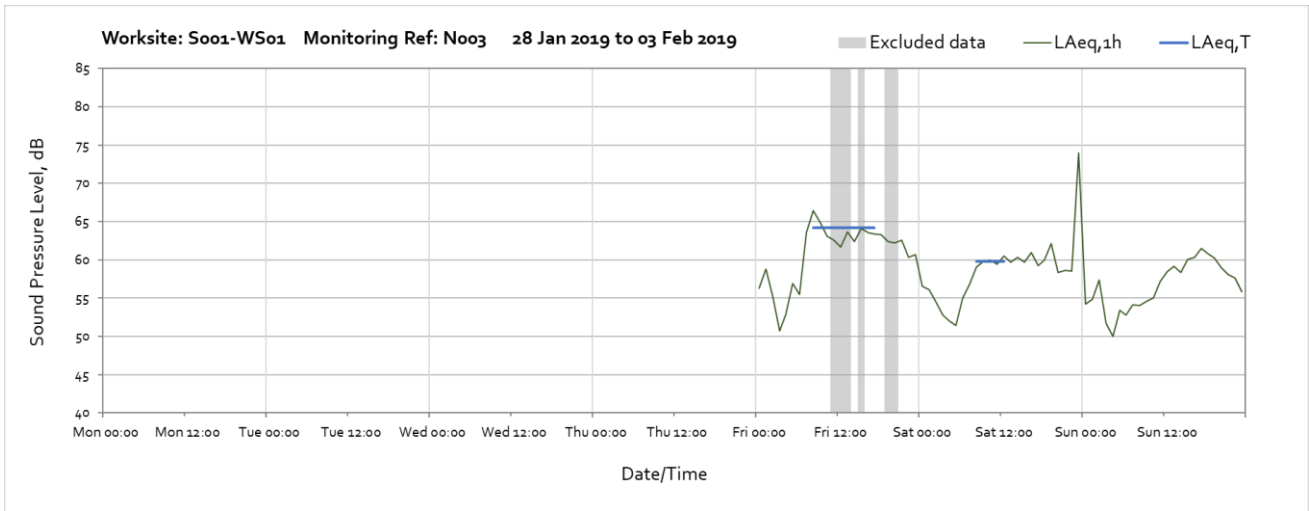


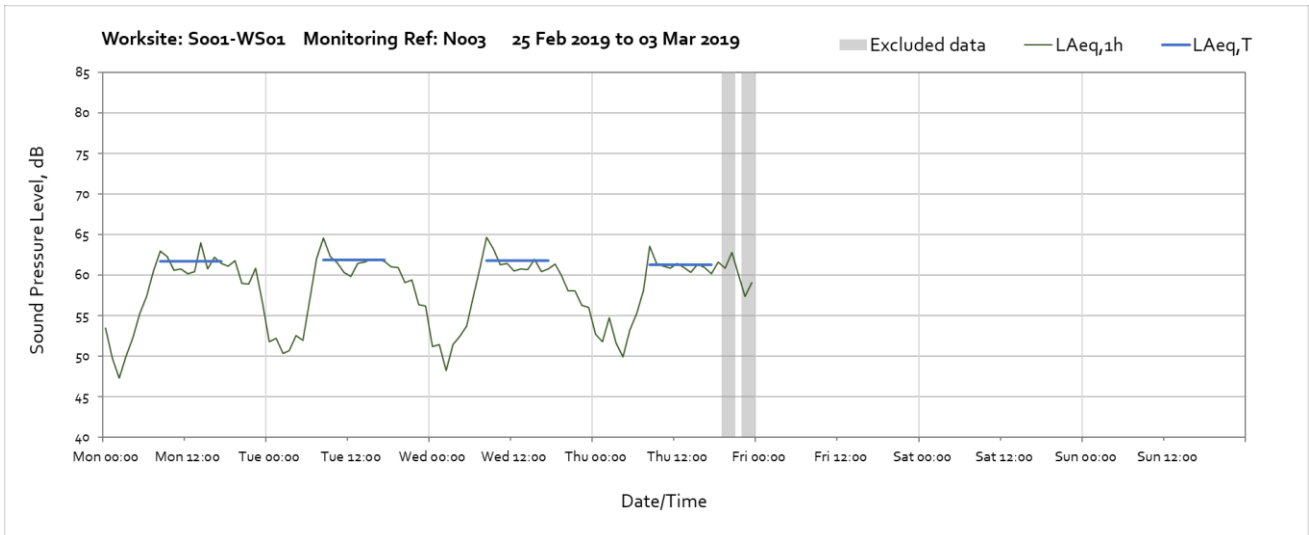
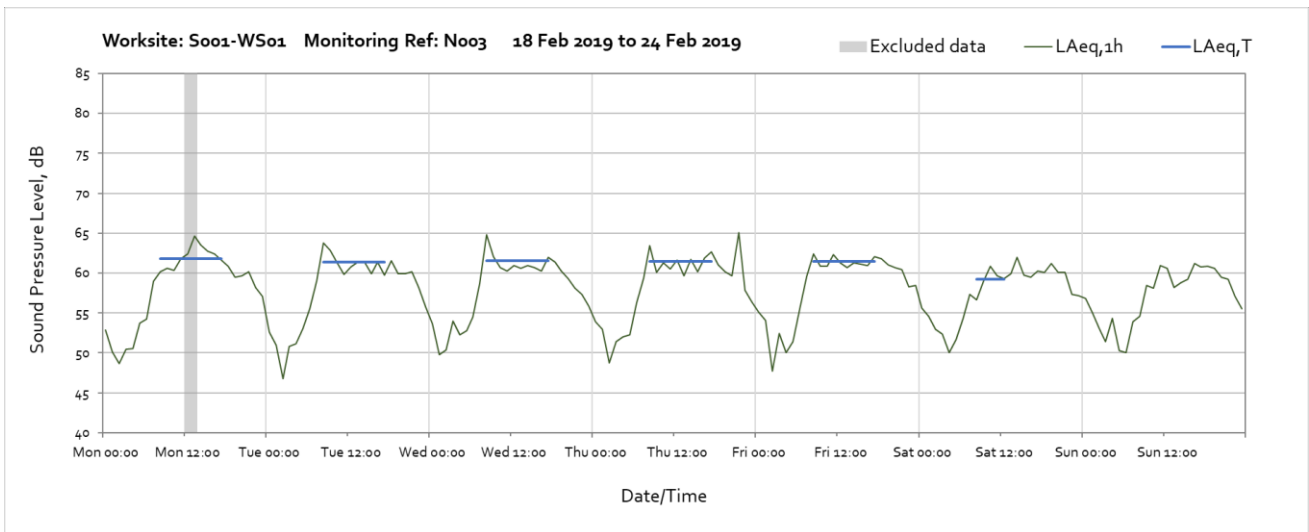
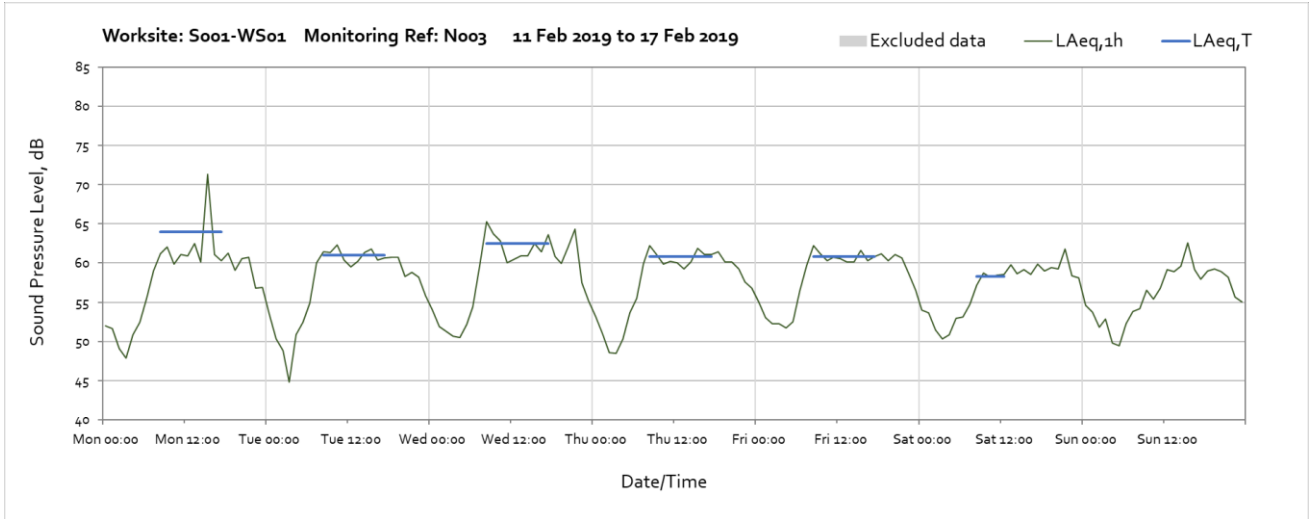


Note – Missing data between 12:00 on Monday 18<sup>th</sup> and 10:00 on Tuesday 19<sup>th</sup> of February due to a loss of power at the noise monitor.

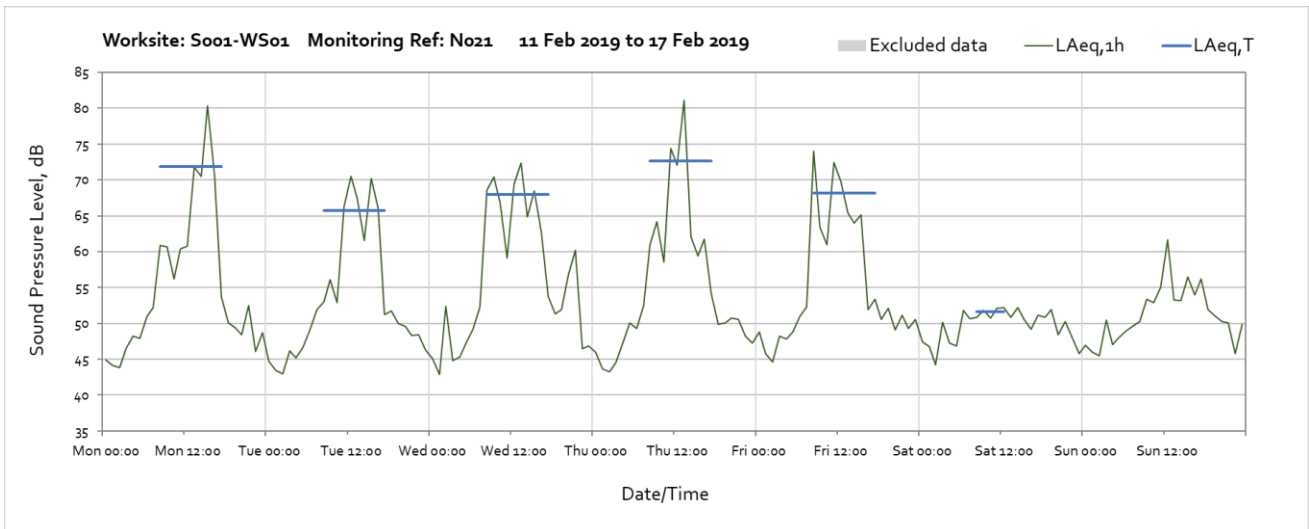
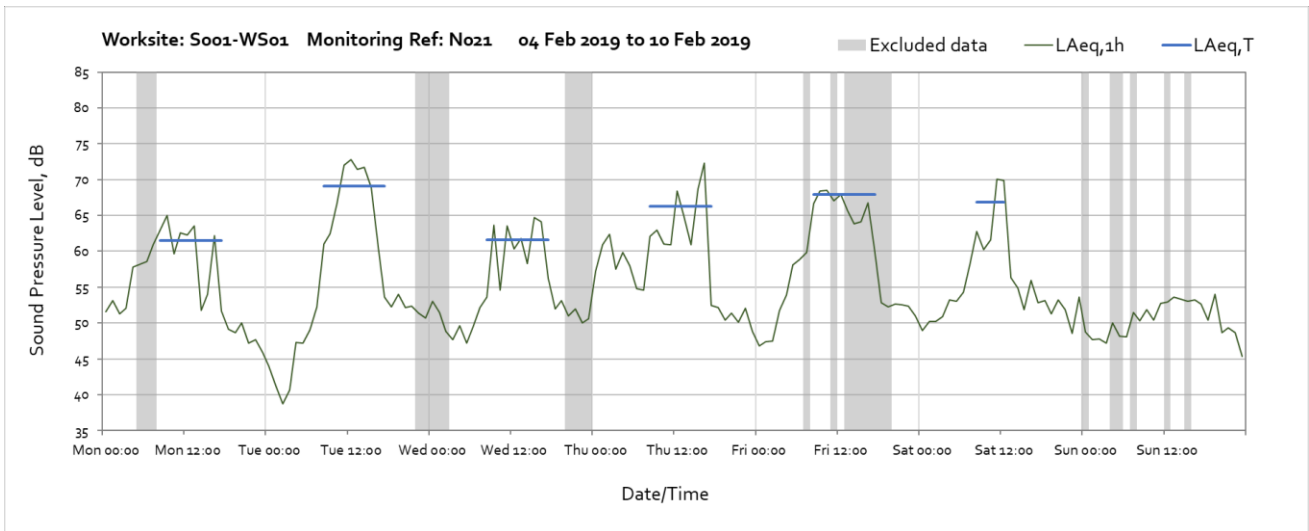
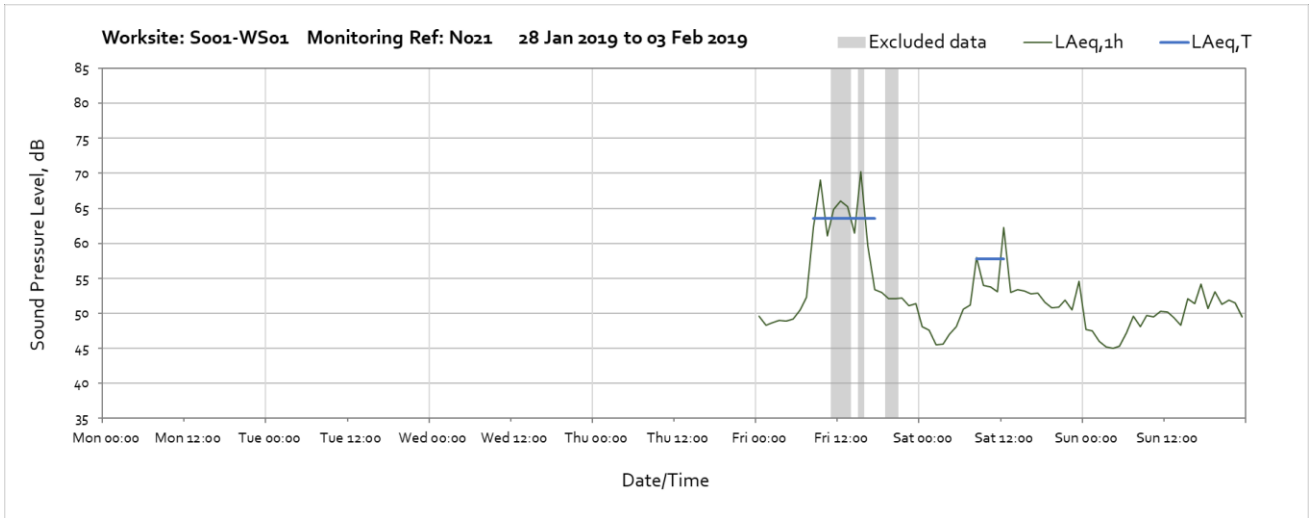


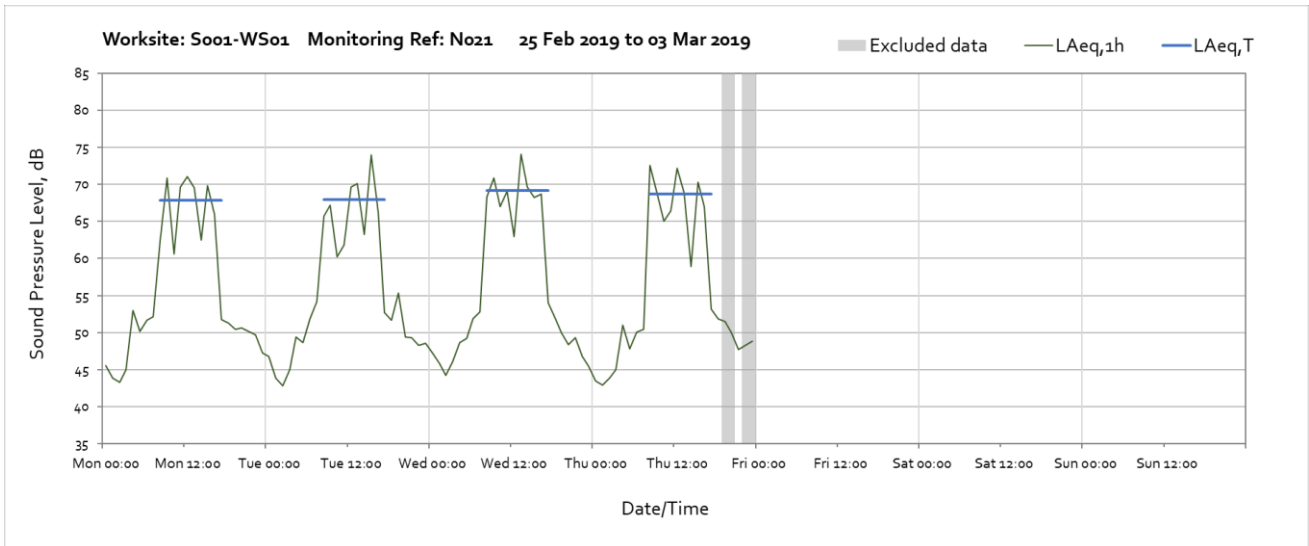
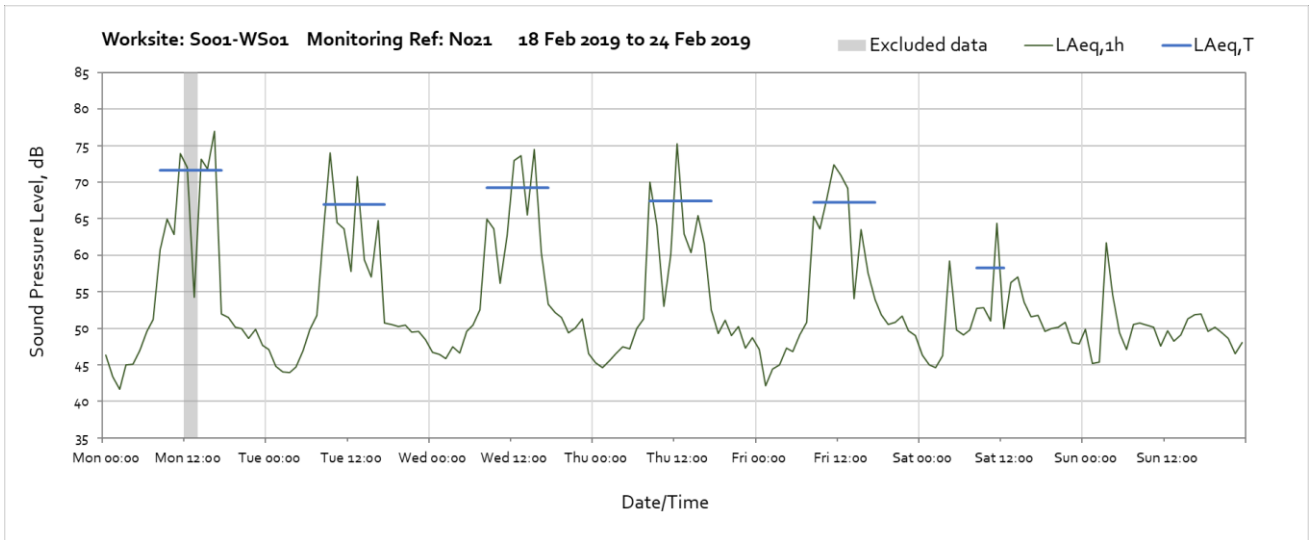
## Worksite: S001-WS01 – Monitoring Ref: N003



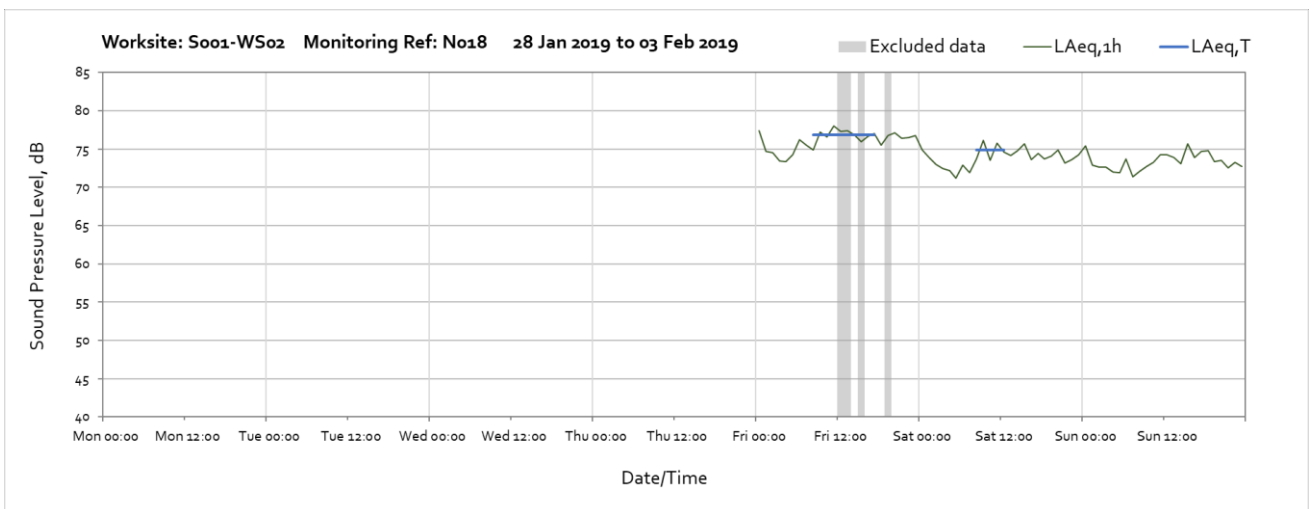


# Worksite: S001-WS01 – Monitoring Ref: N021

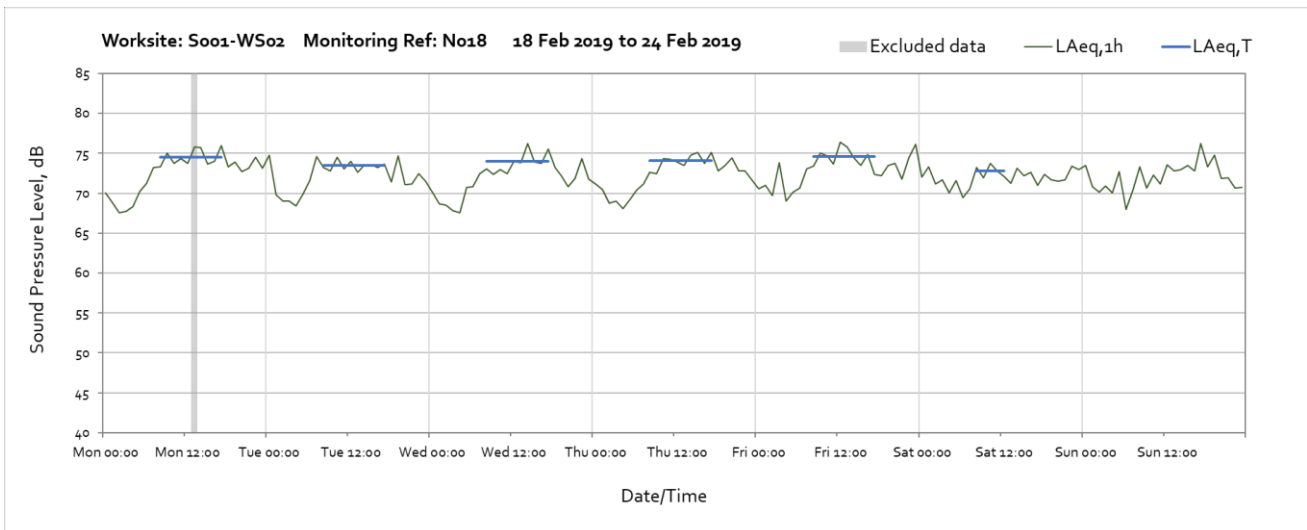
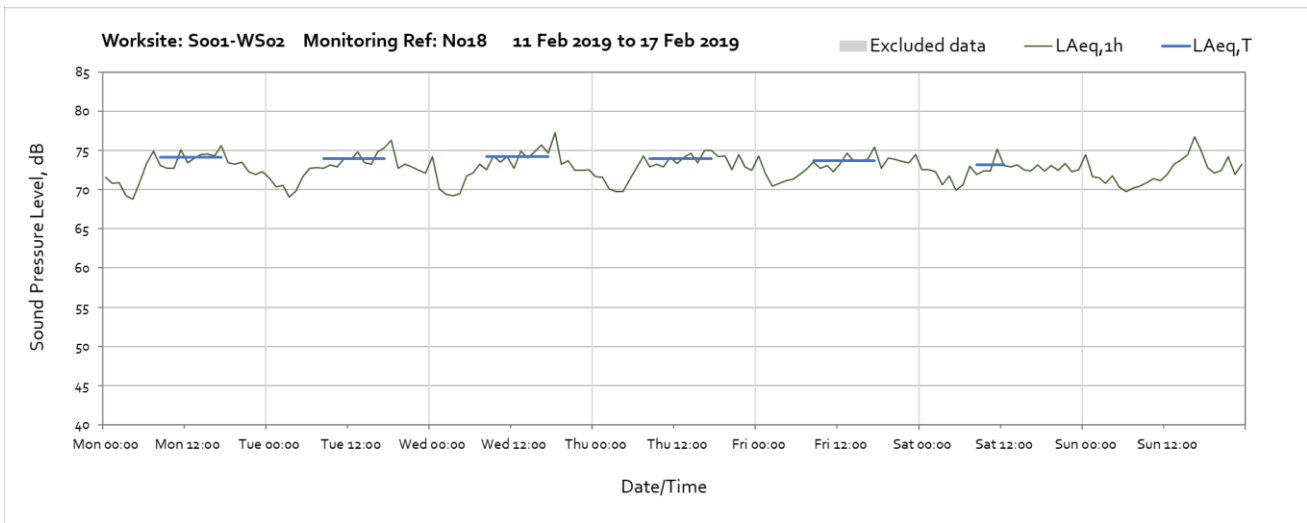
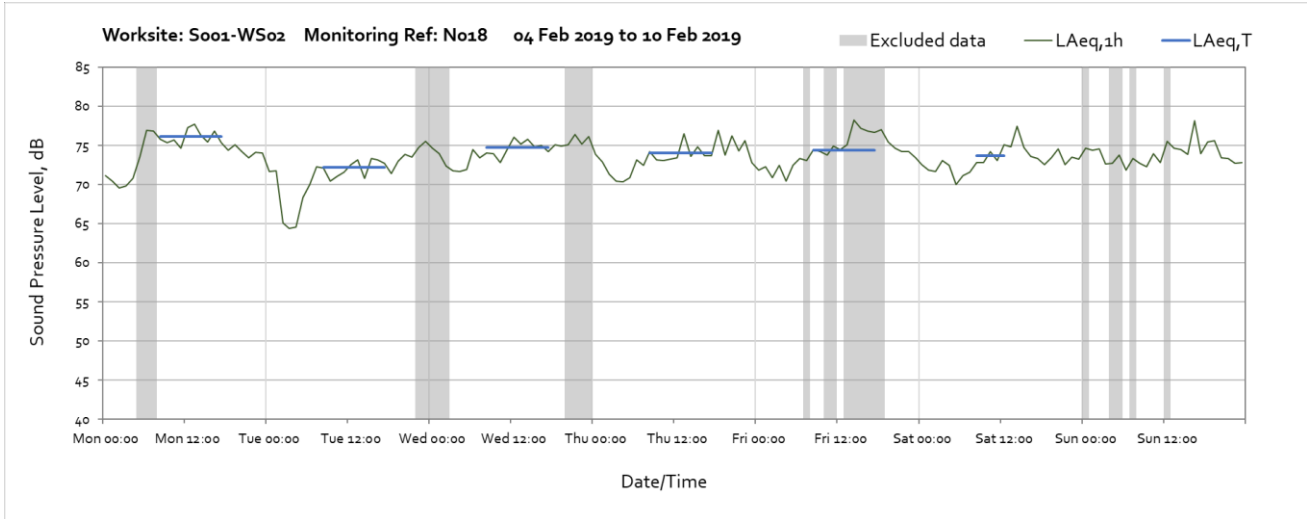


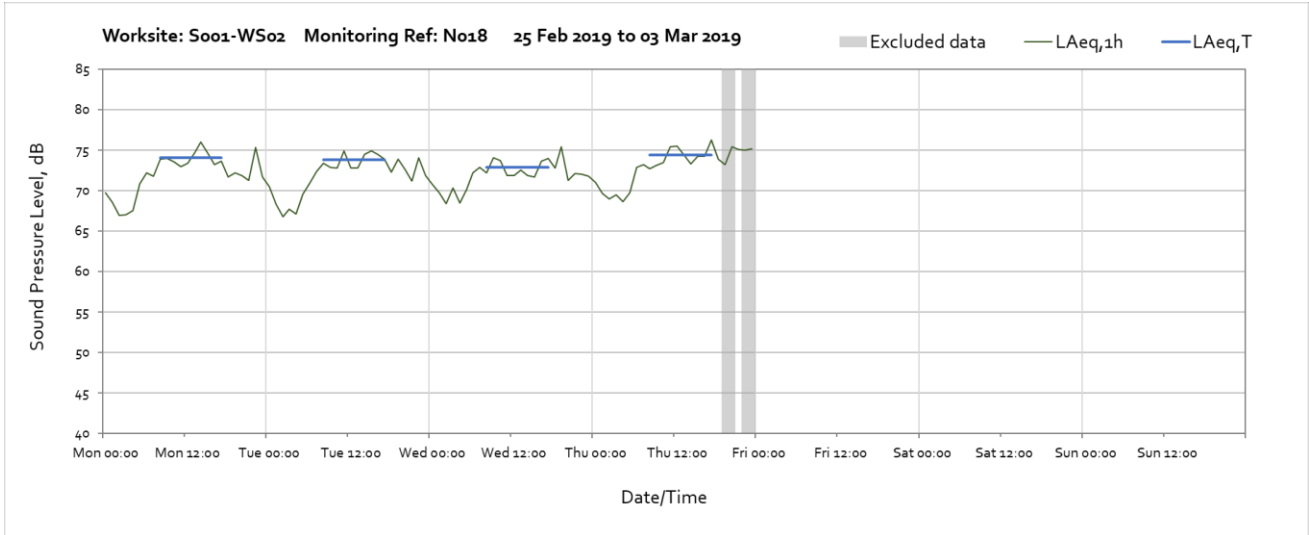


## Worksite: S001-WS02 – Monitoring Ref: N018

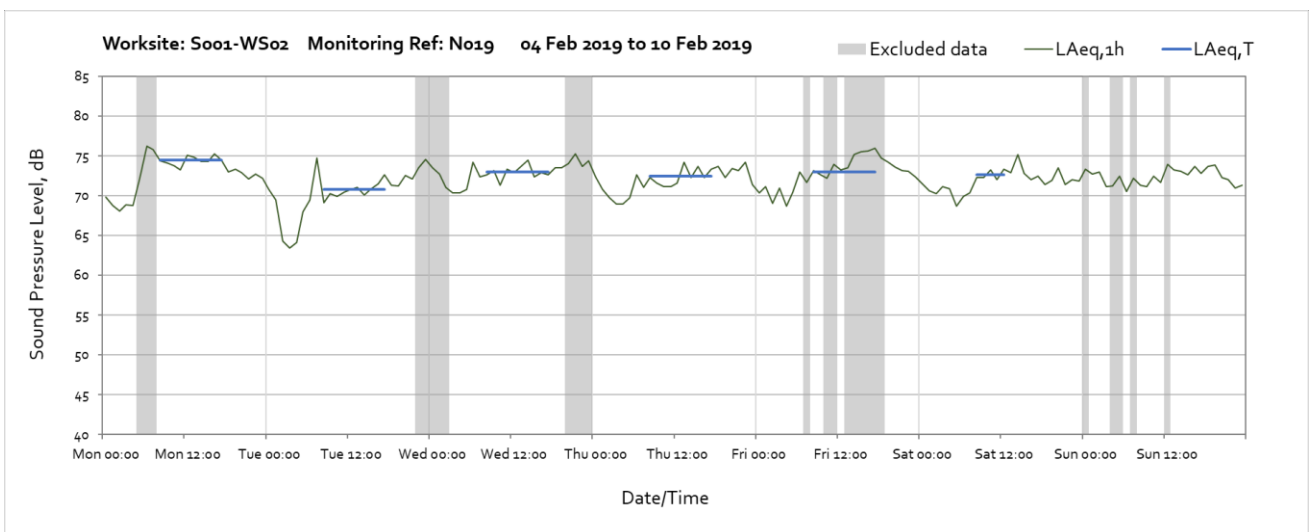
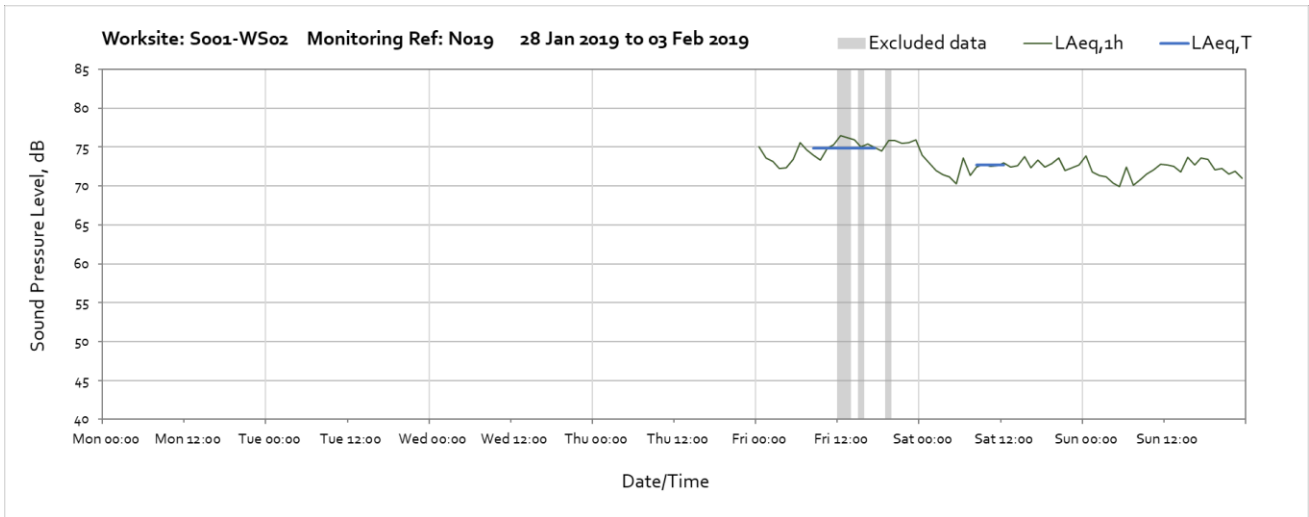


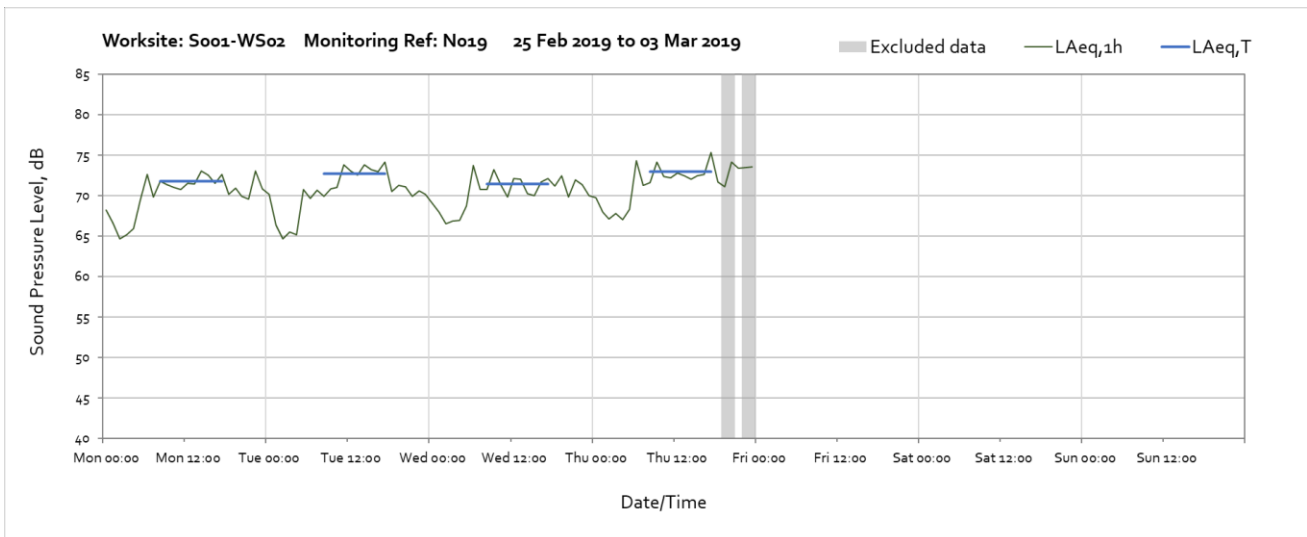
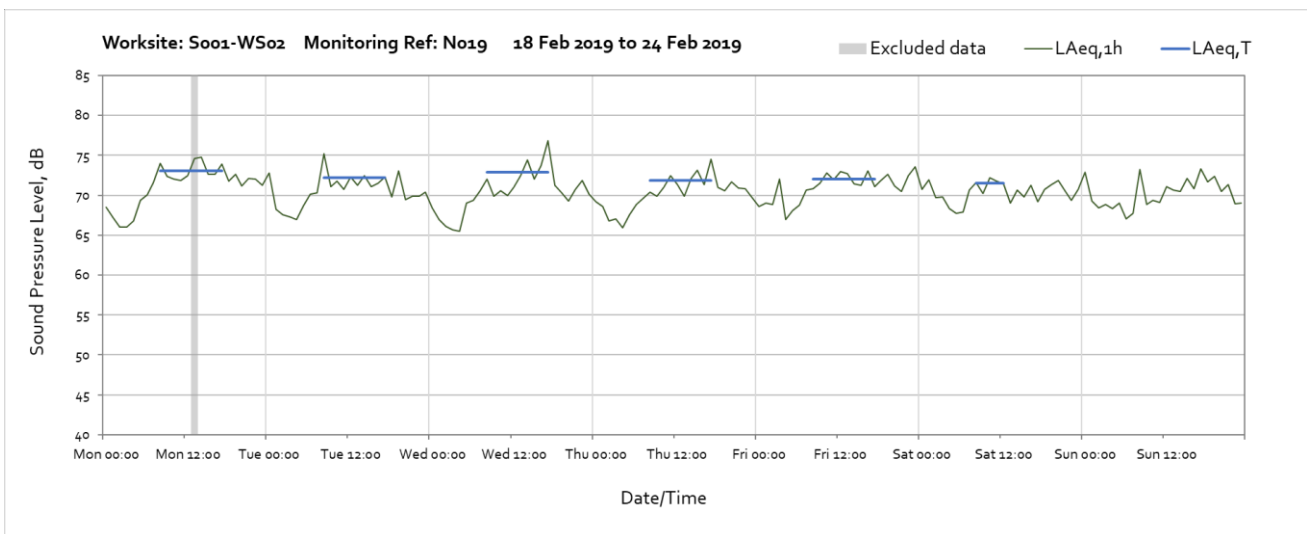
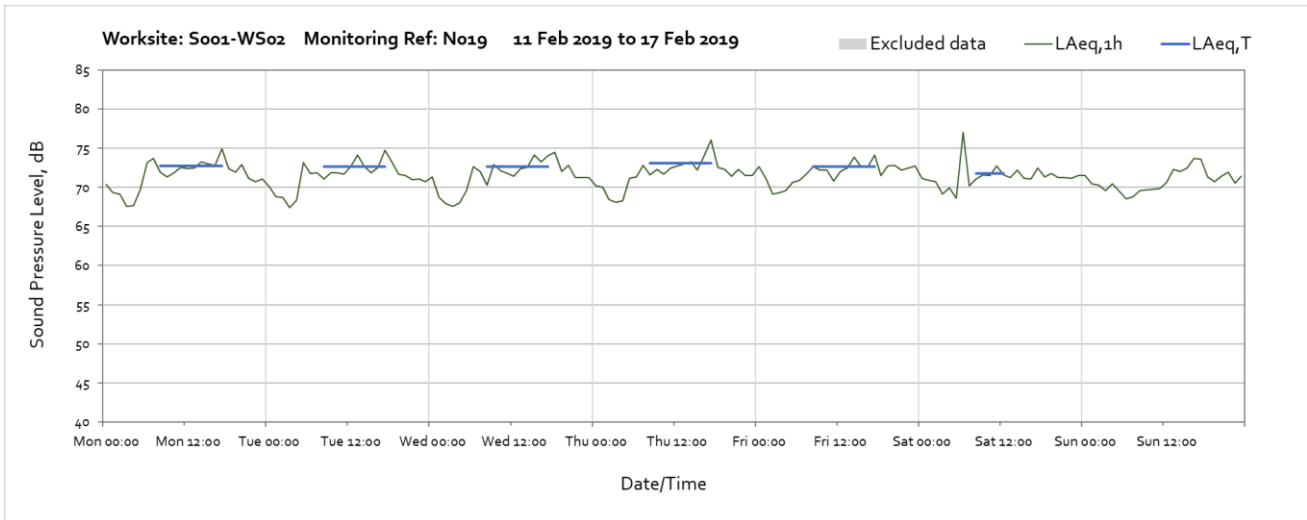




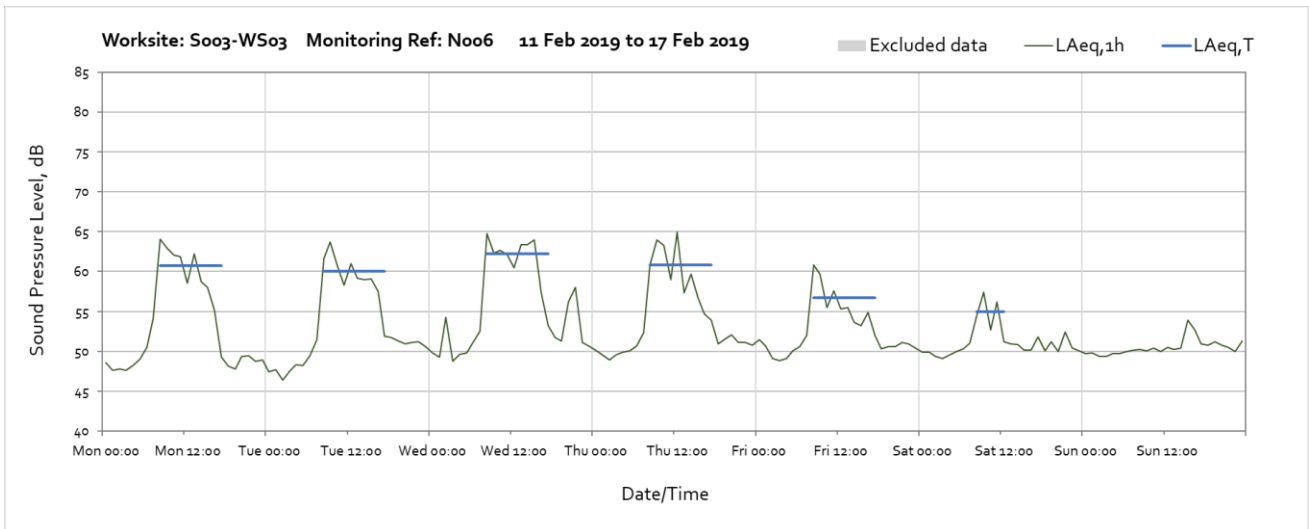
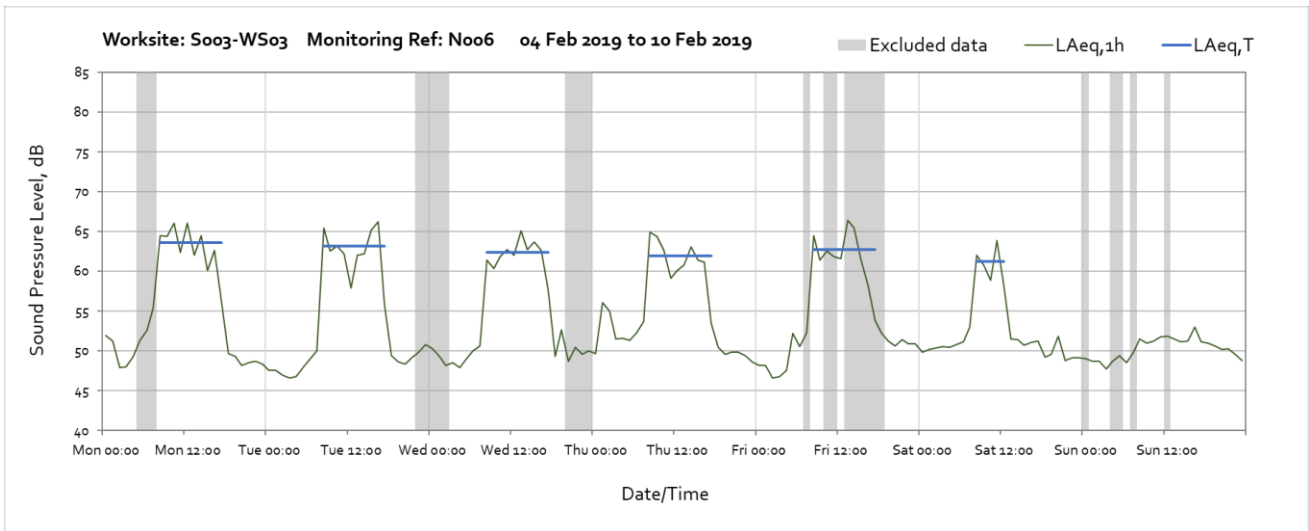
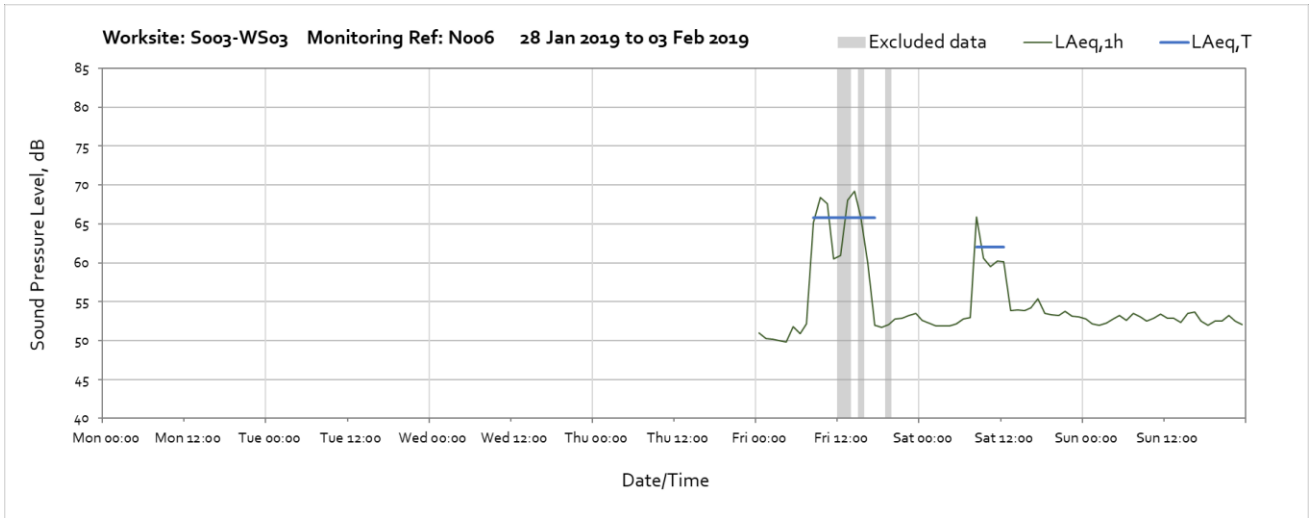


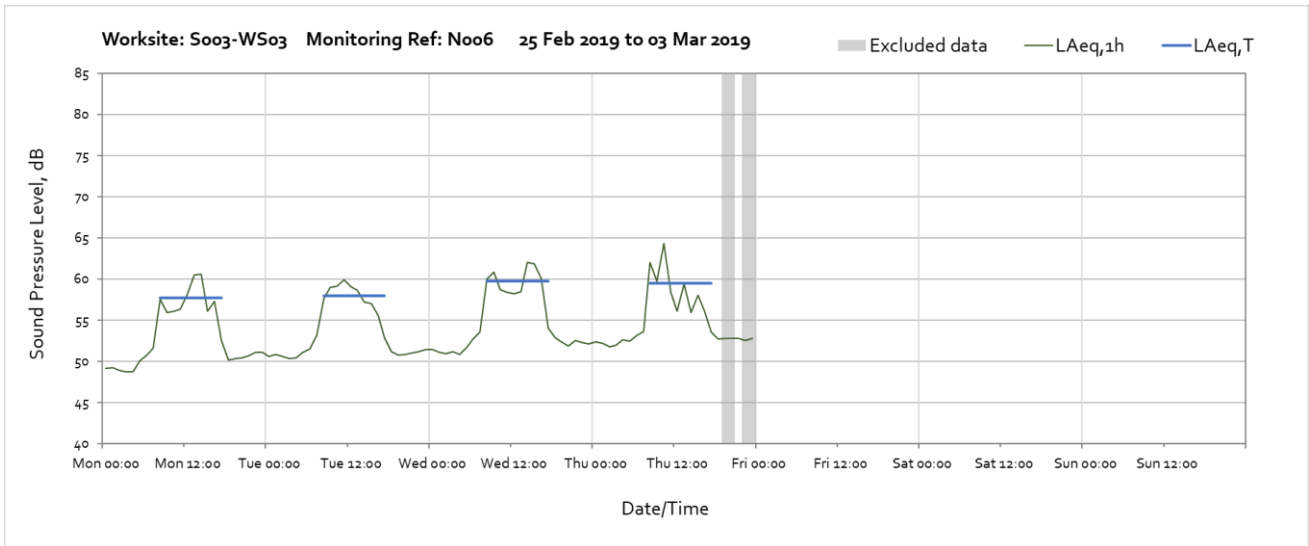
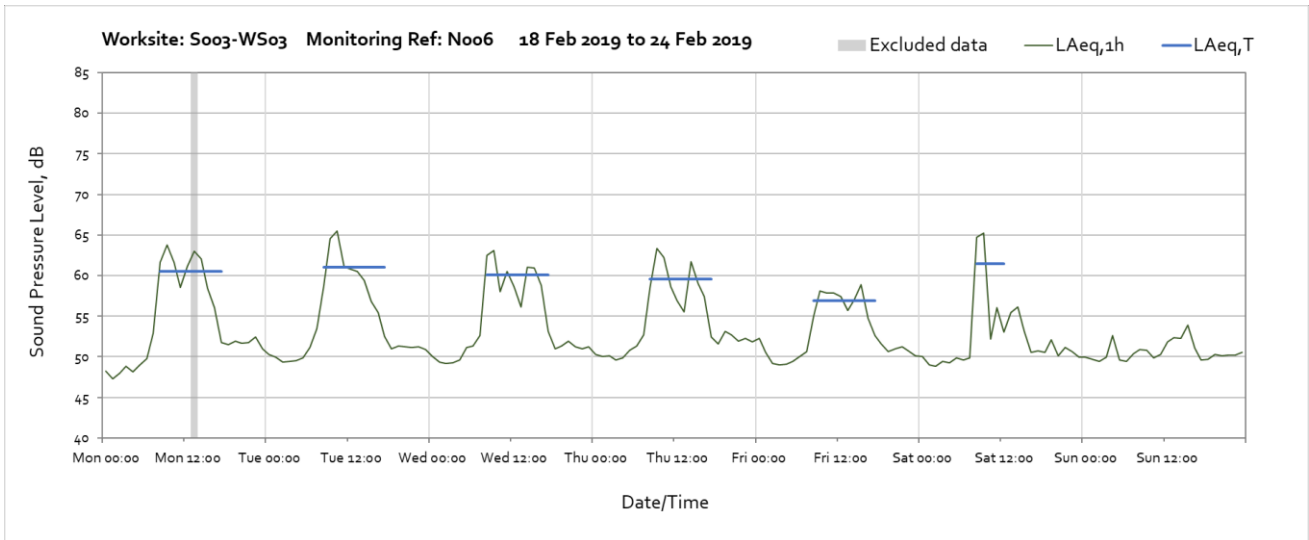
## Worksite: S001-WS02 – Monitoring Ref: N019



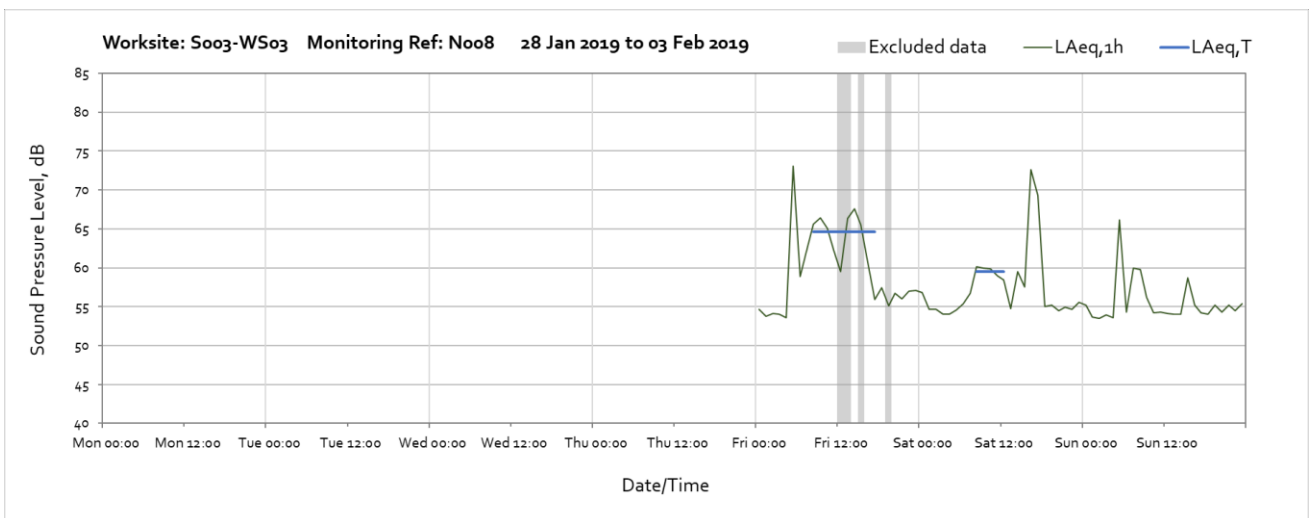


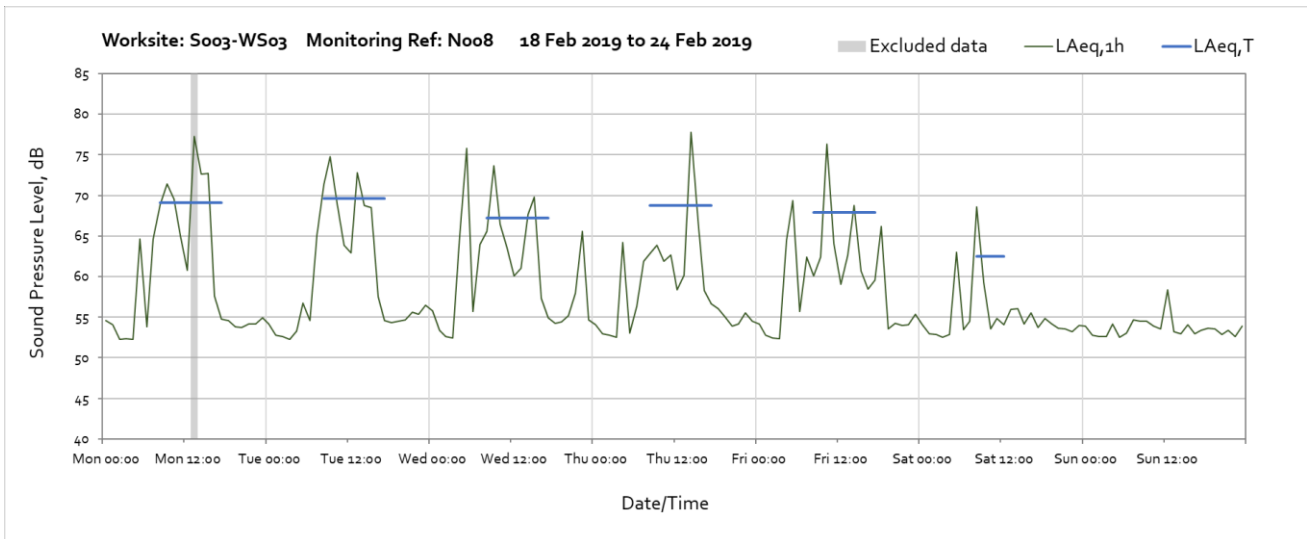
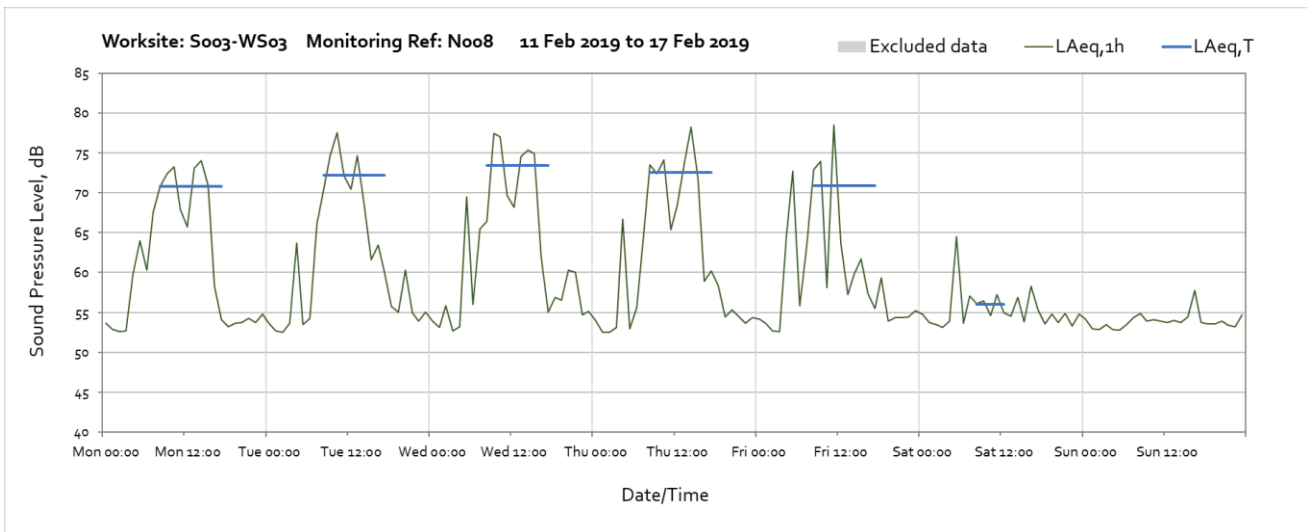
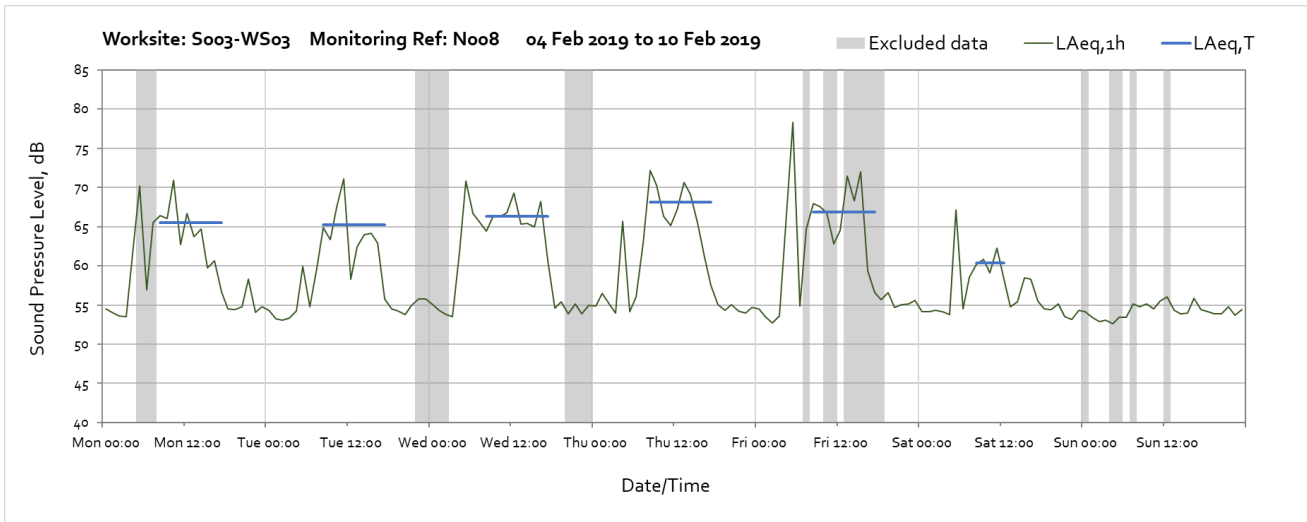
# Worksite: S003-WS03 – Monitoring Ref: N006

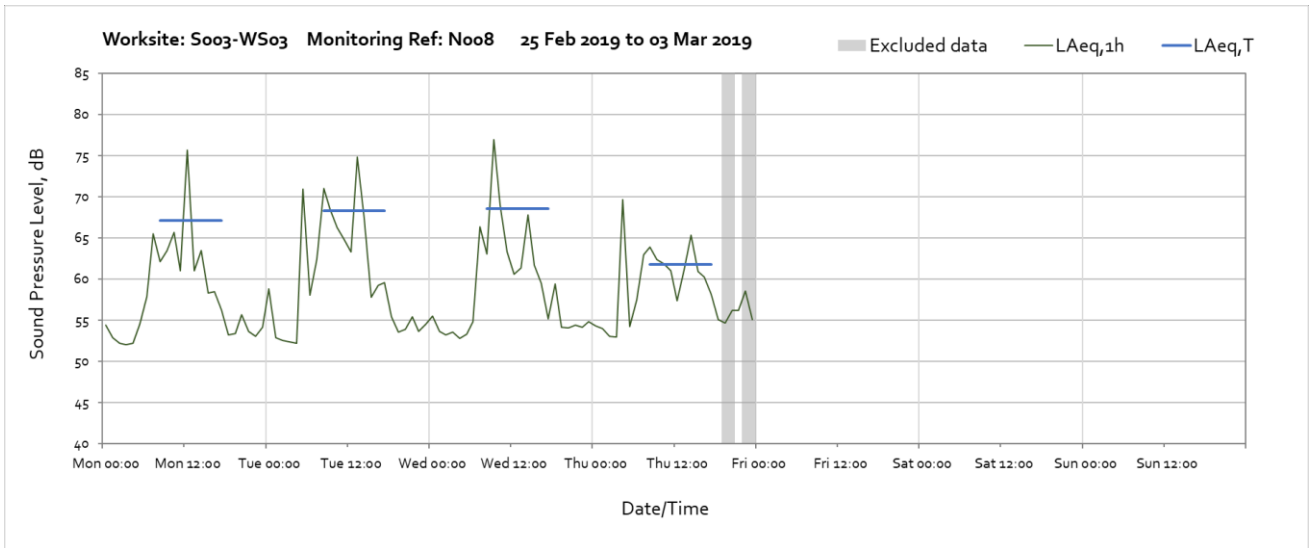




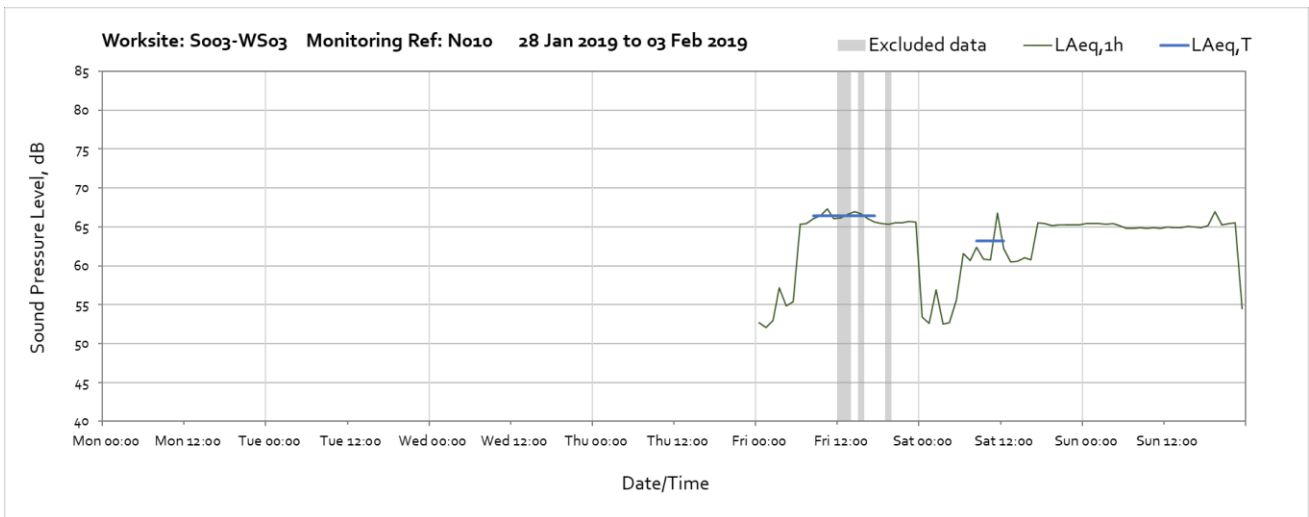
## Worksite: S003-WS03 – Monitoring Ref: N008





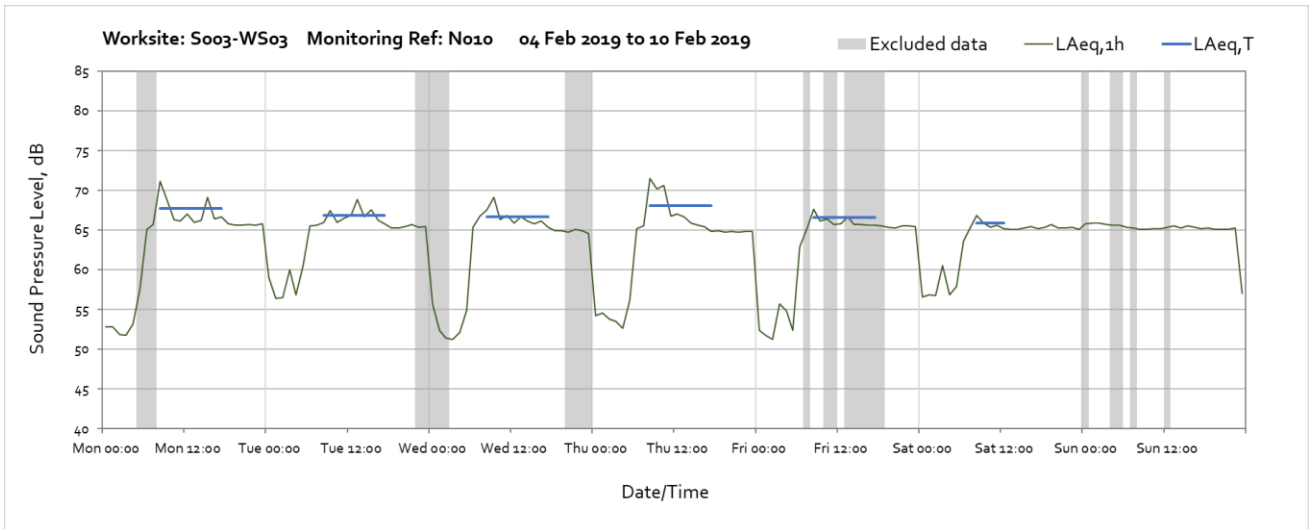


## Worksite: S003-WS03 – Monitoring Ref: N010

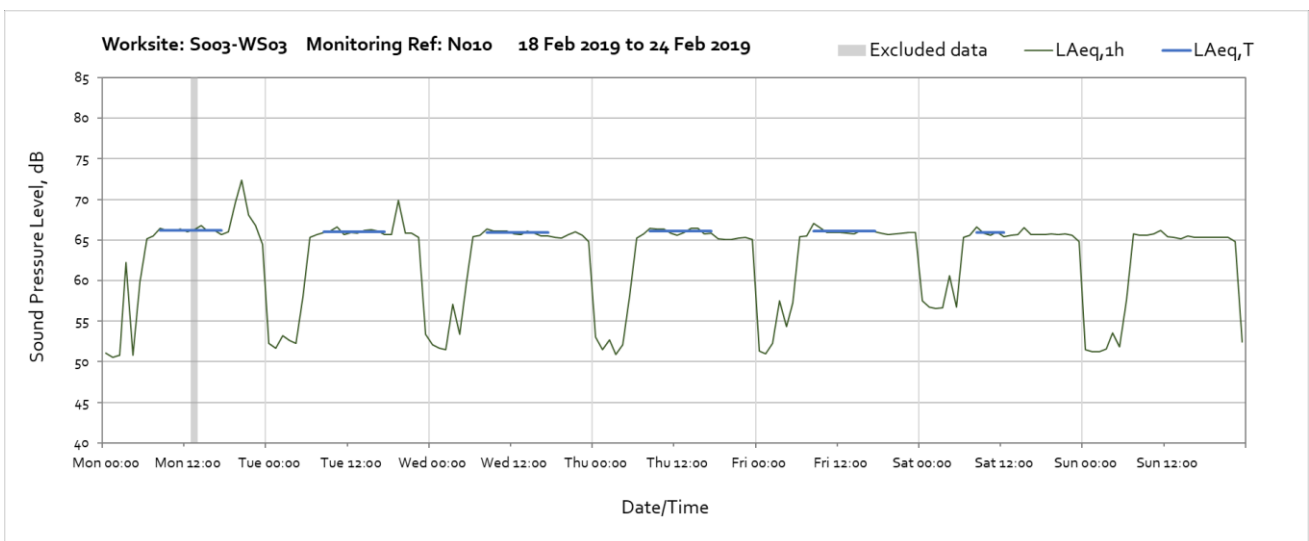
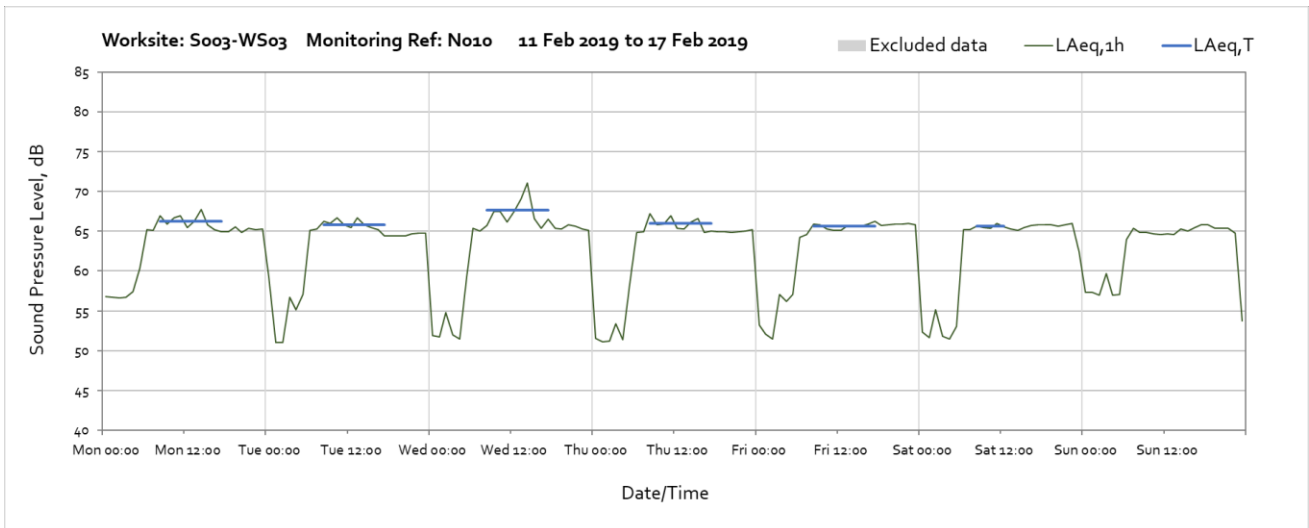


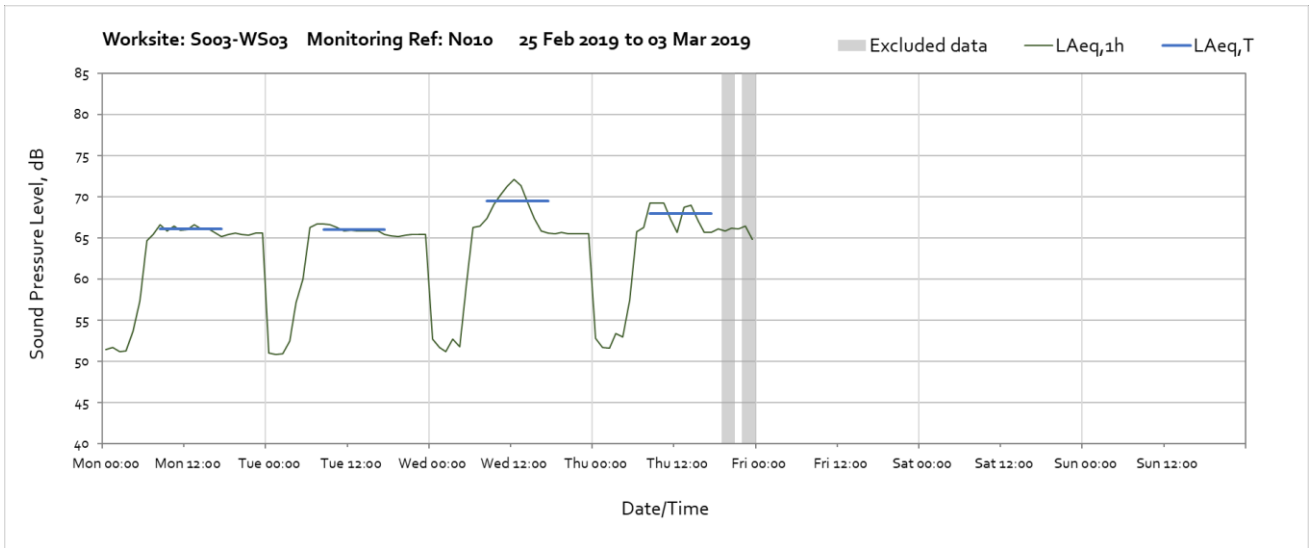
Note – High noise levels during the night of Saturday 2<sup>nd</sup> of February are thought to be due to noise from mechanical plant at a nearby hotel. No HS2 construction activities were taking place in proximity to this location during this period.



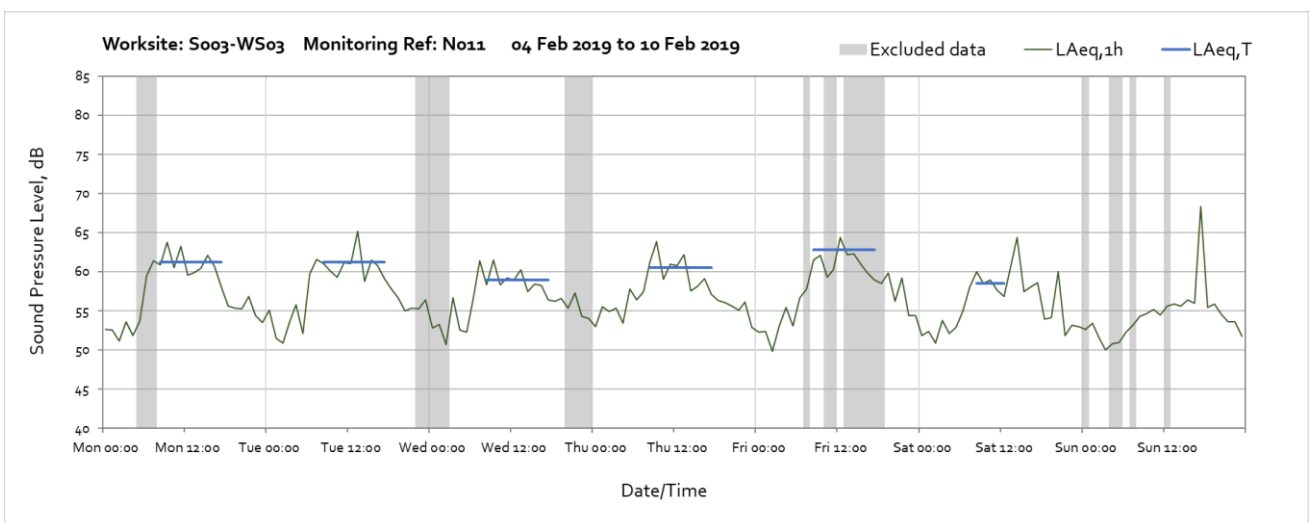
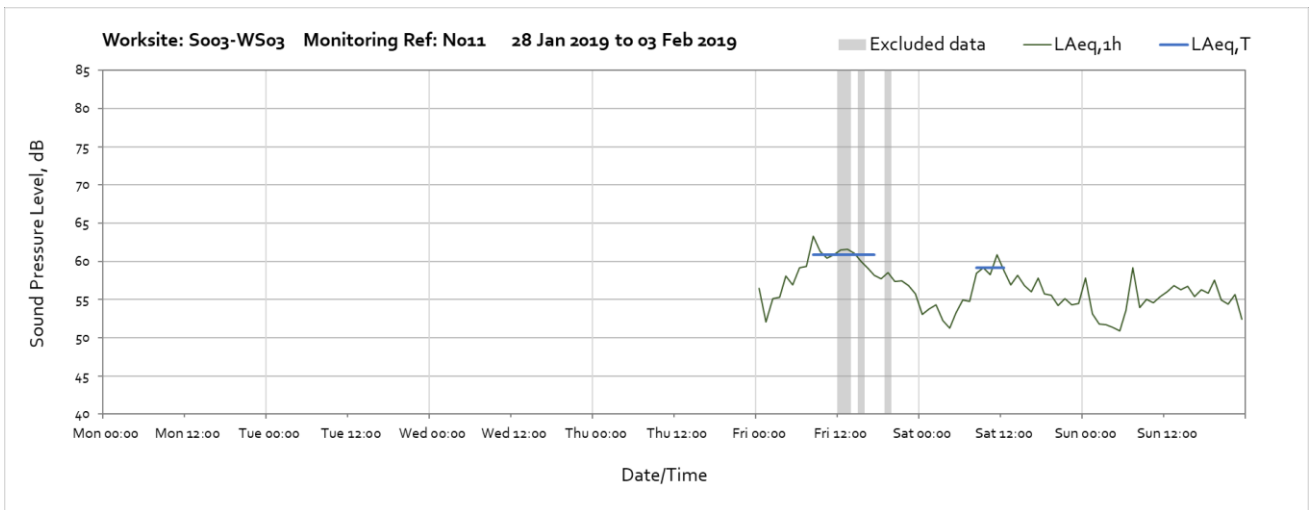


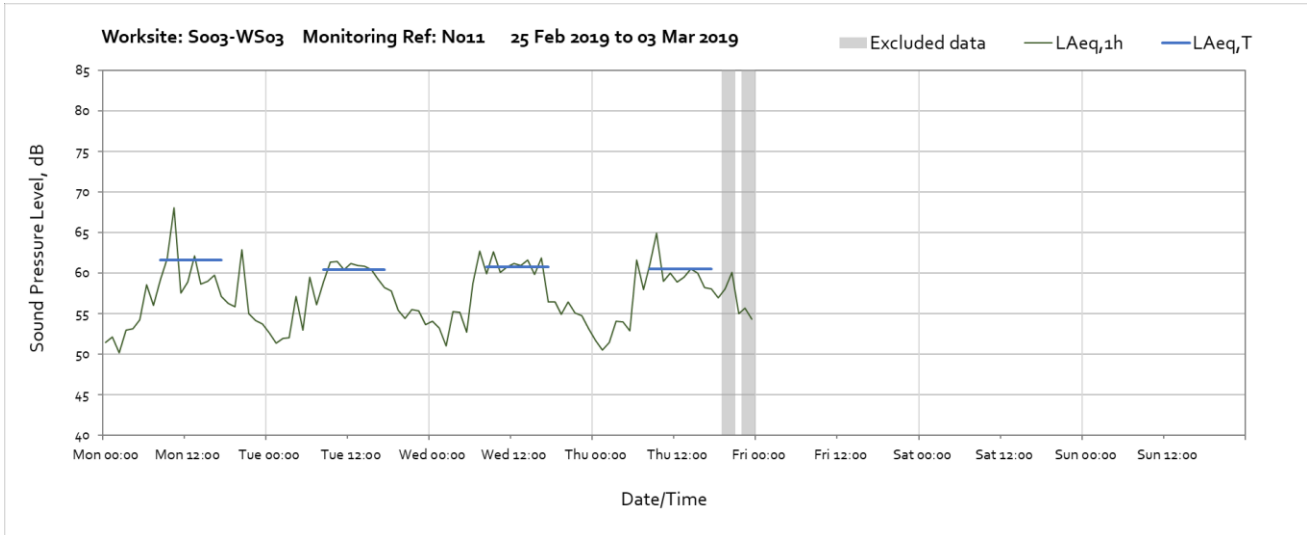
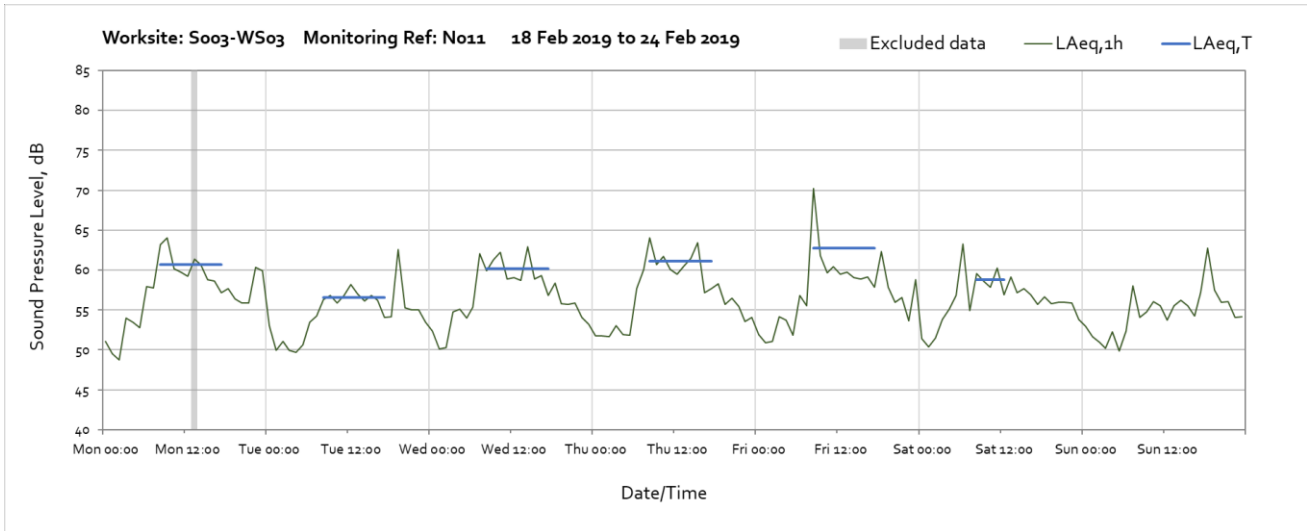
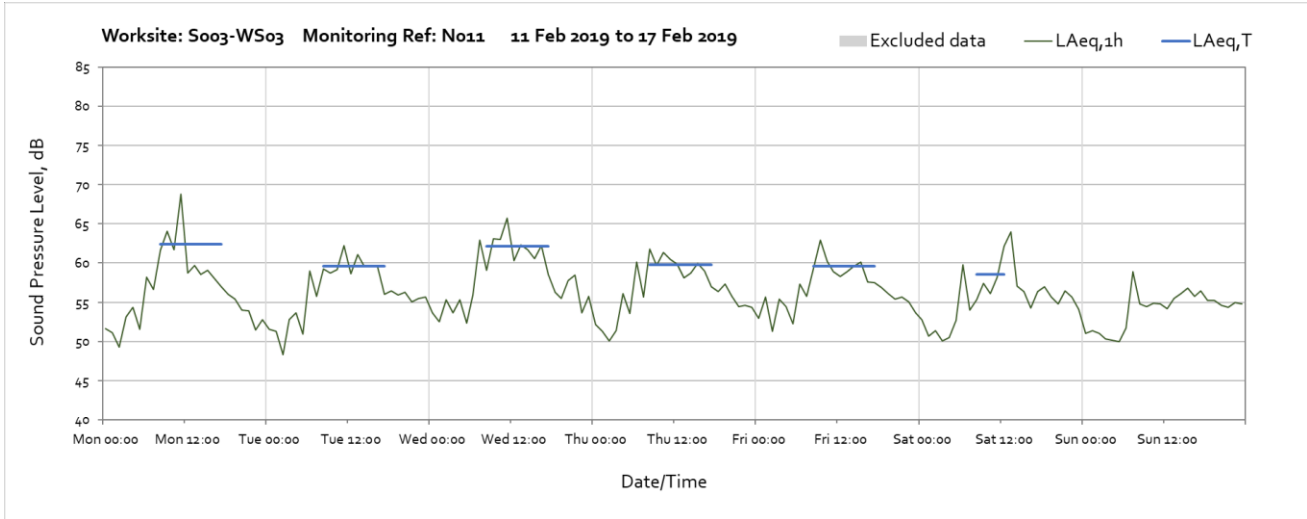
Note – High noise levels during the night of Saturday 9<sup>th</sup> of February are thought to be due to noise from mechanical plant at a nearby hotel. No HS2 construction activities were taking place in proximity to this location during this period.



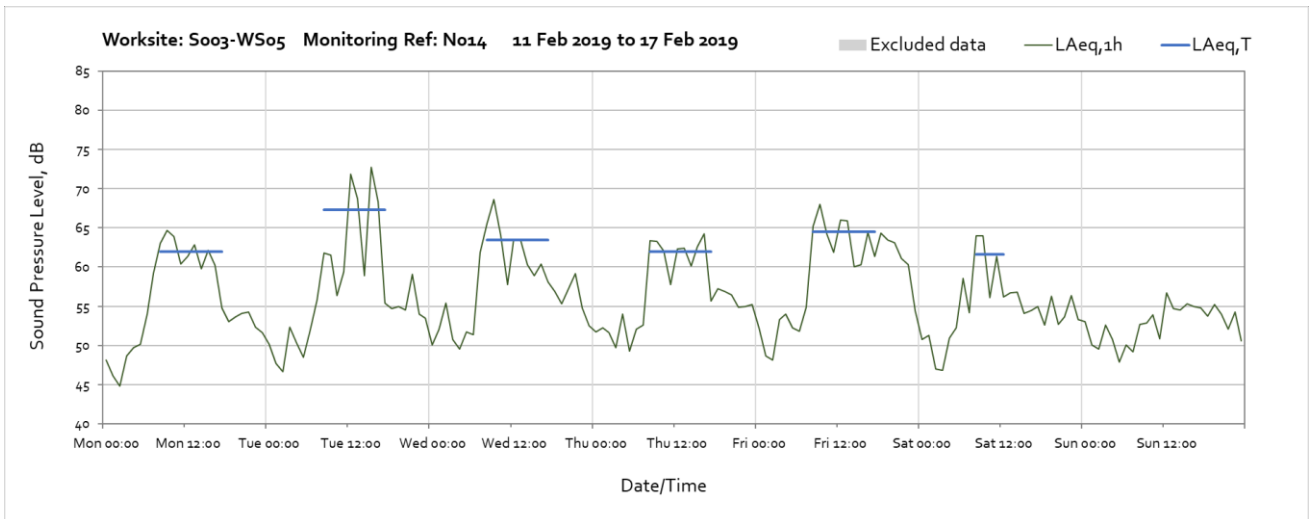
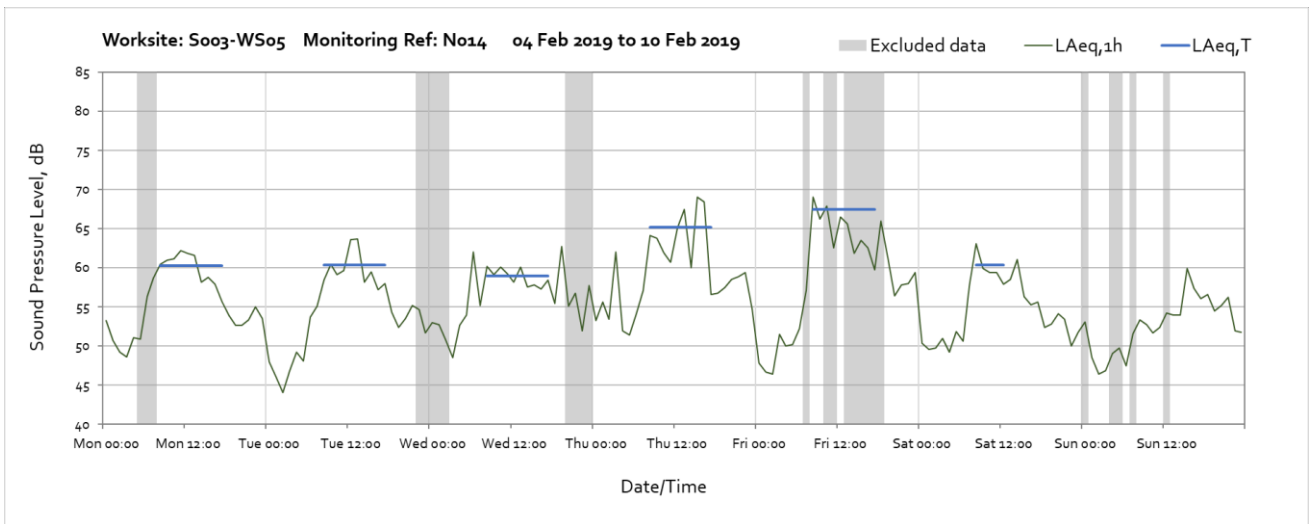
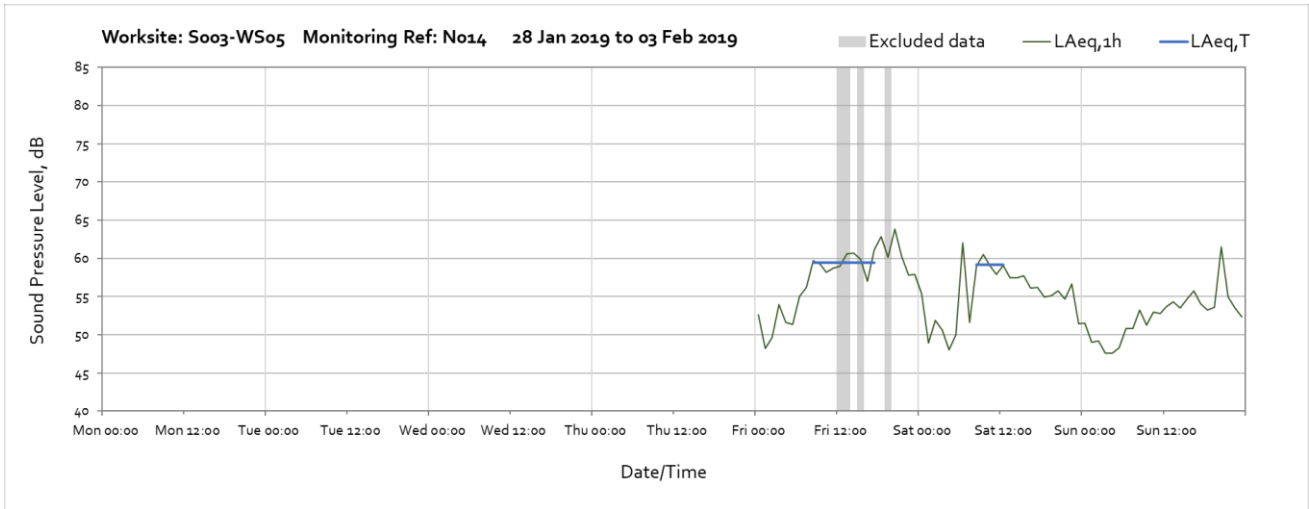


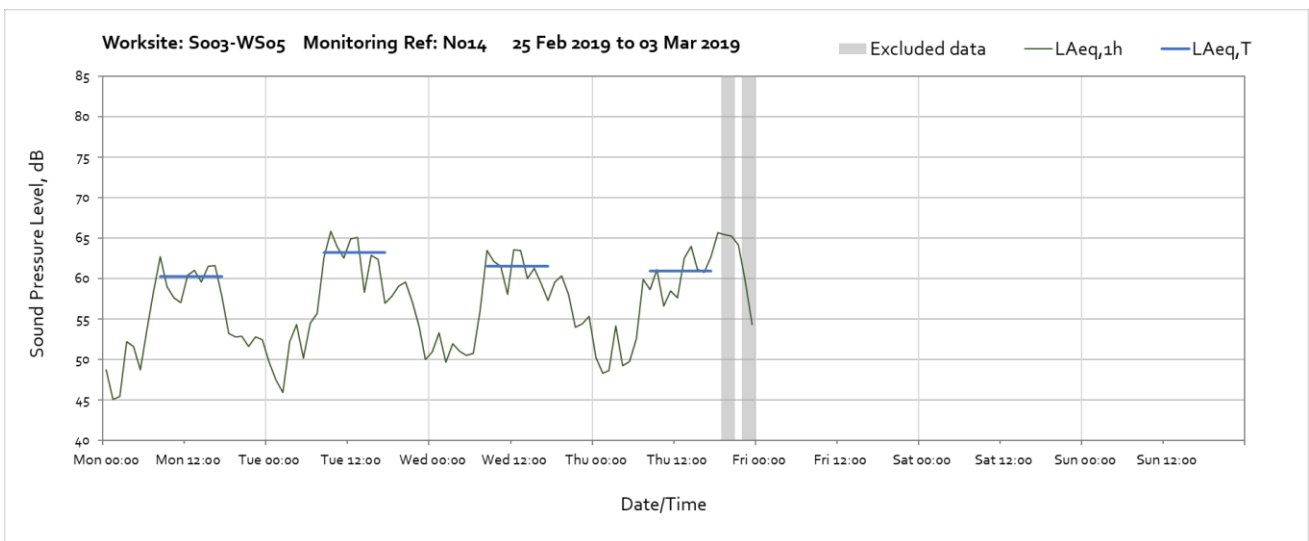
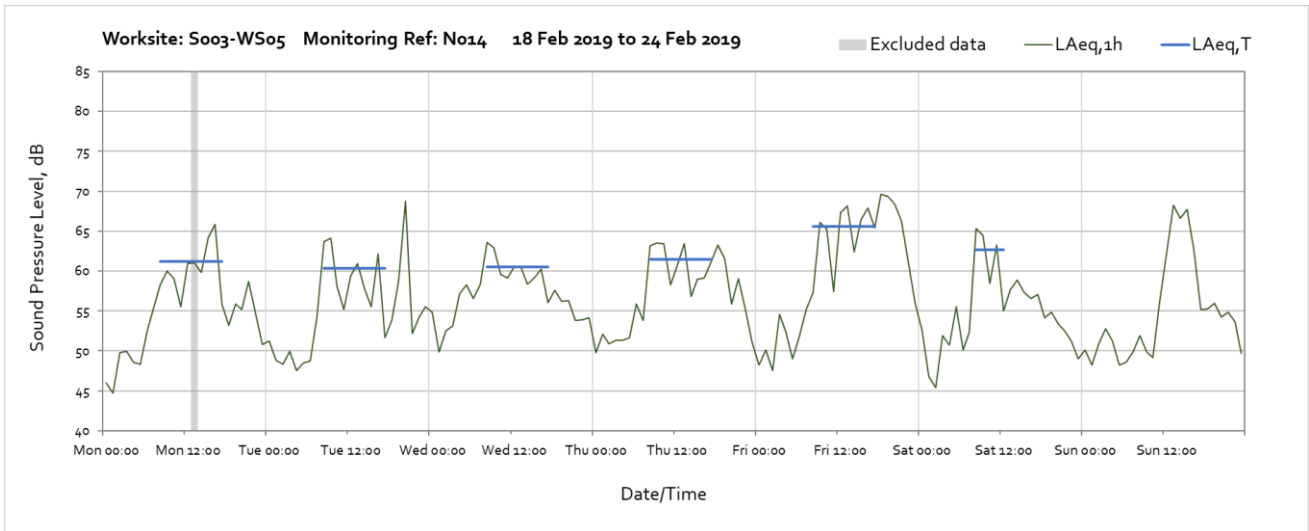
## Worksite: S003-WS03 – Monitoring Ref: N011



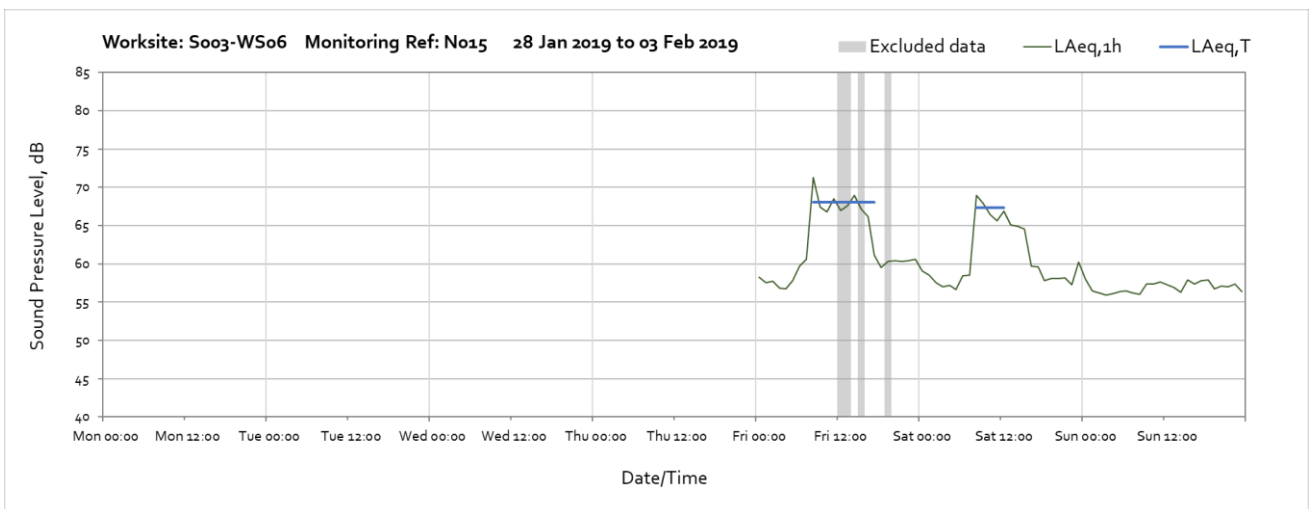


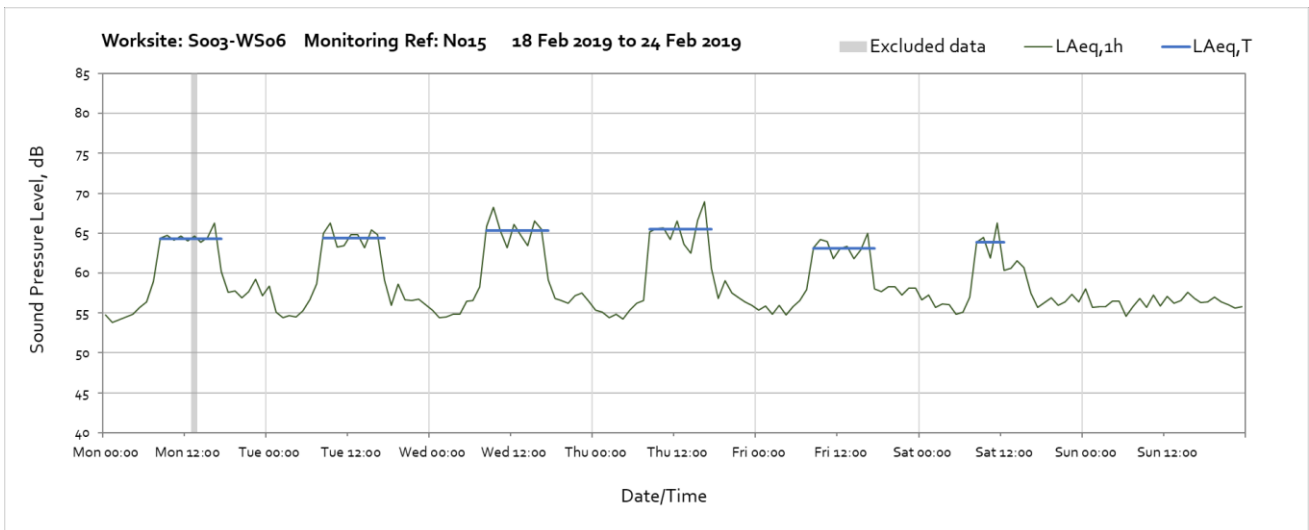
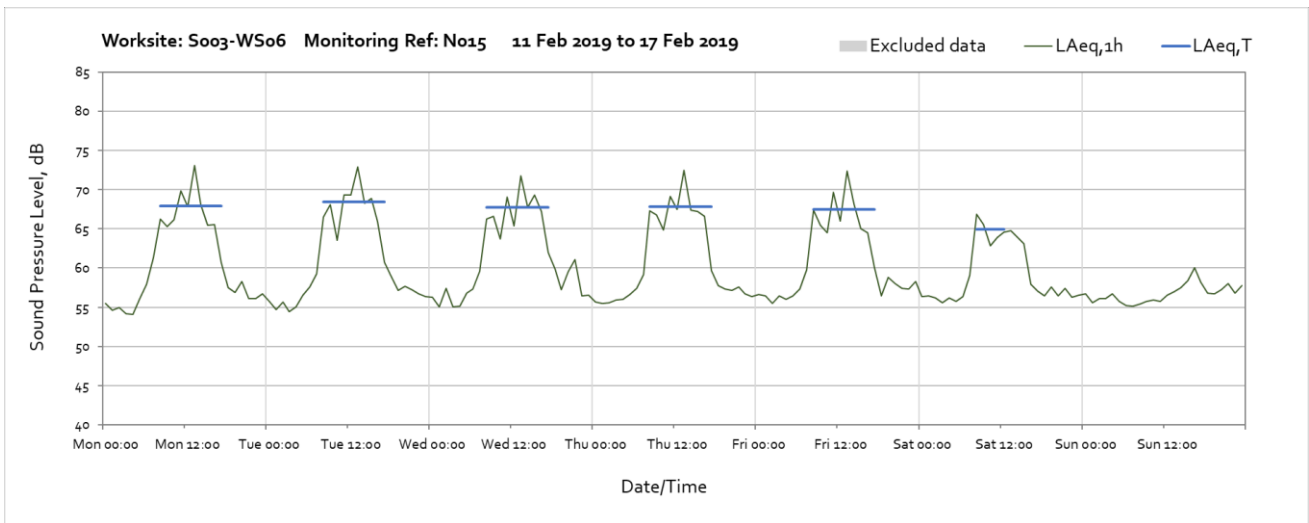
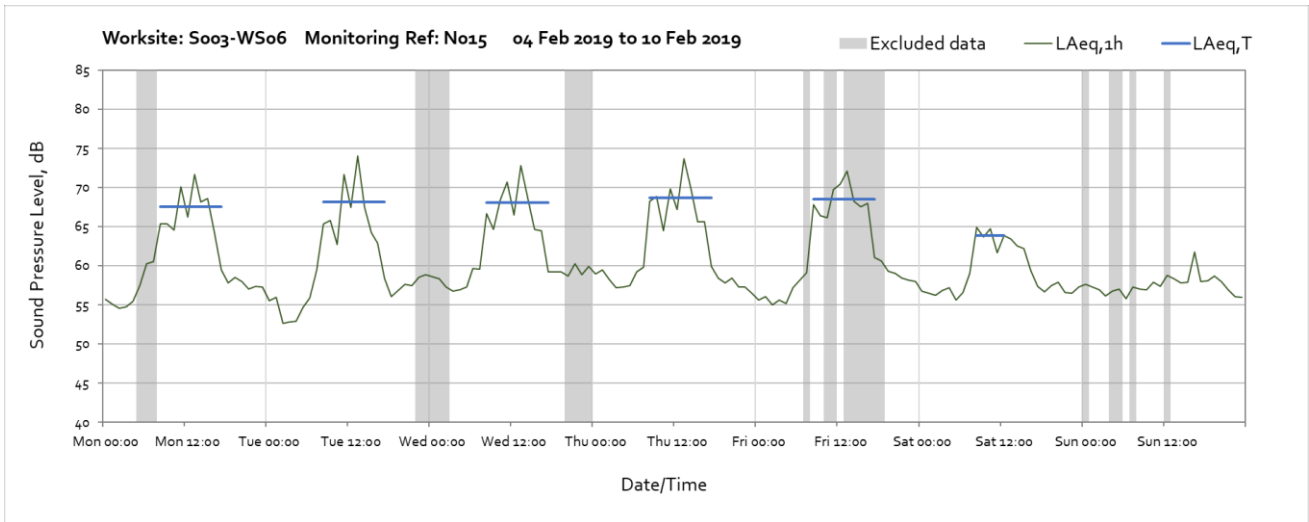
# Worksite: S003-WS05 – Monitoring Ref: N014

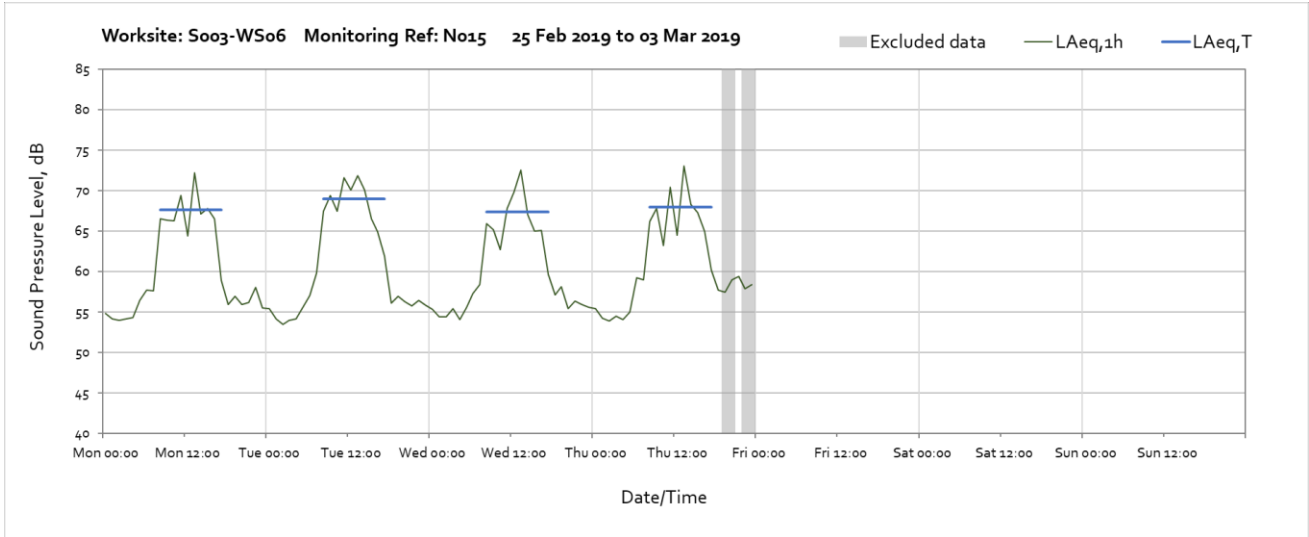




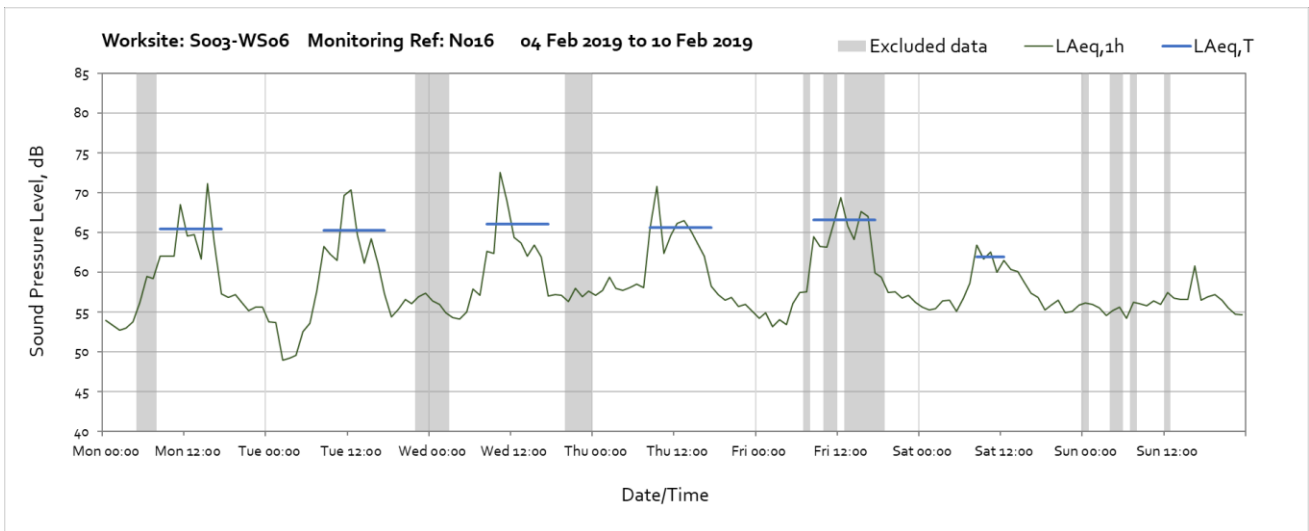
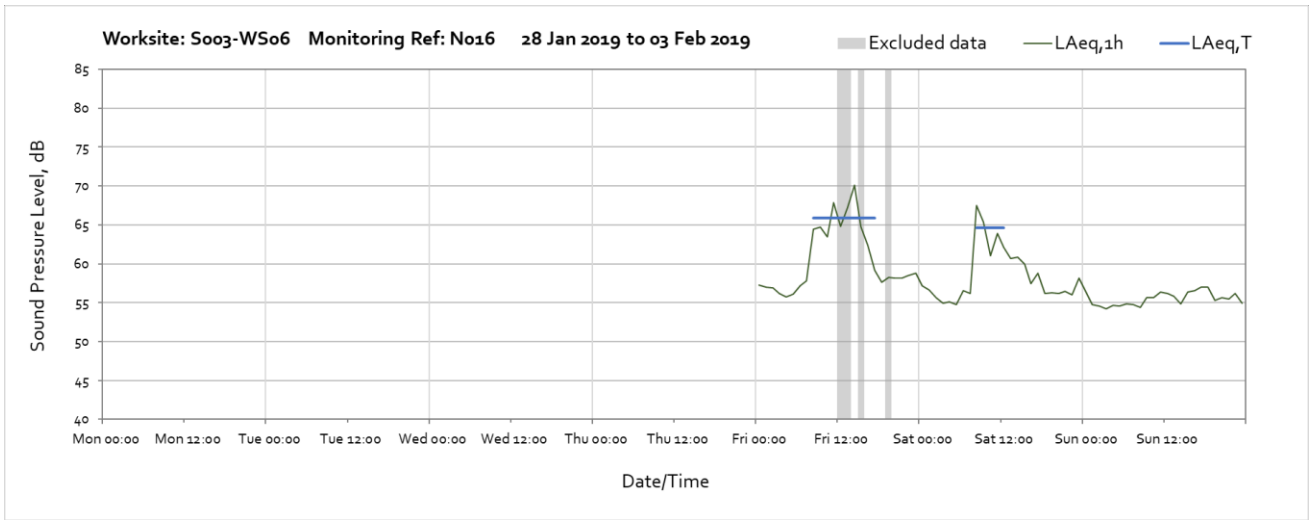
## Worksite: S003-WS06 – Monitoring Ref: N015



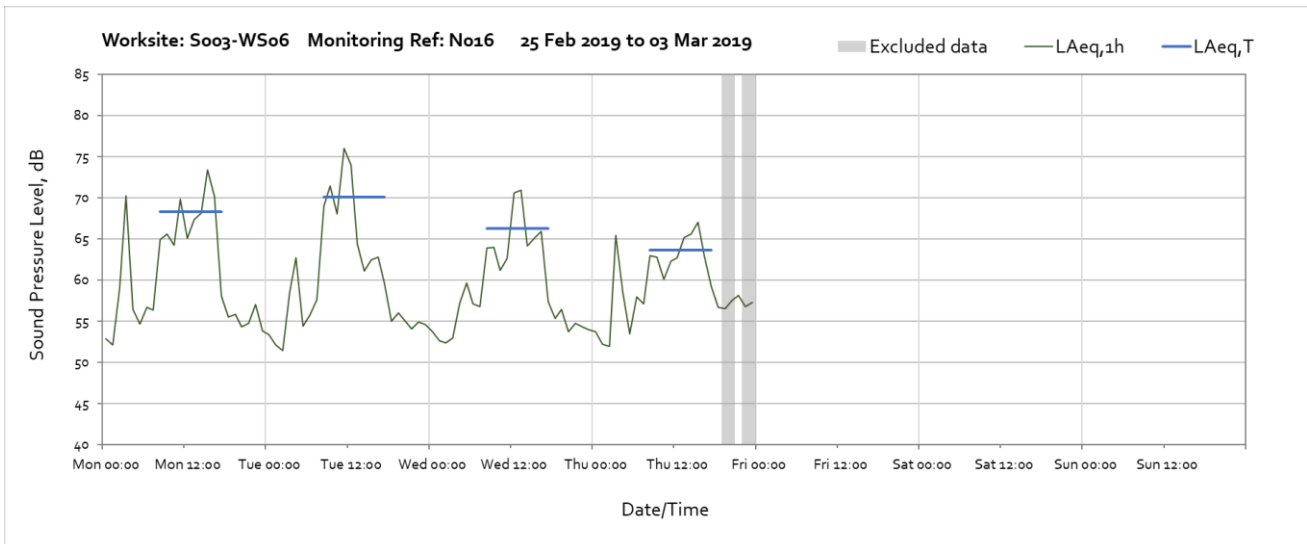
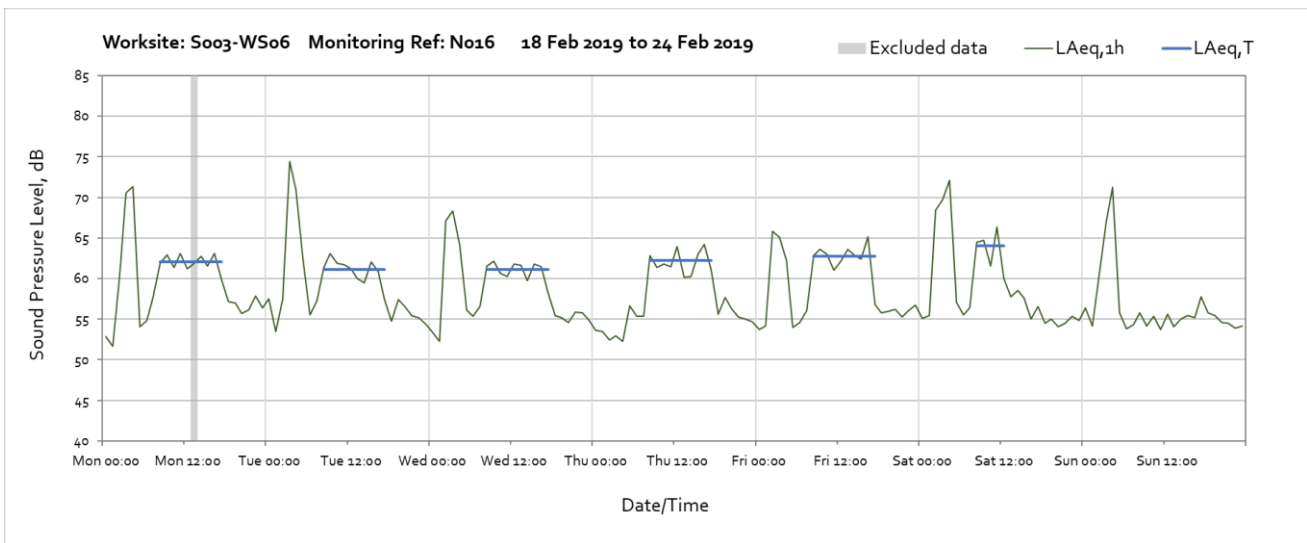
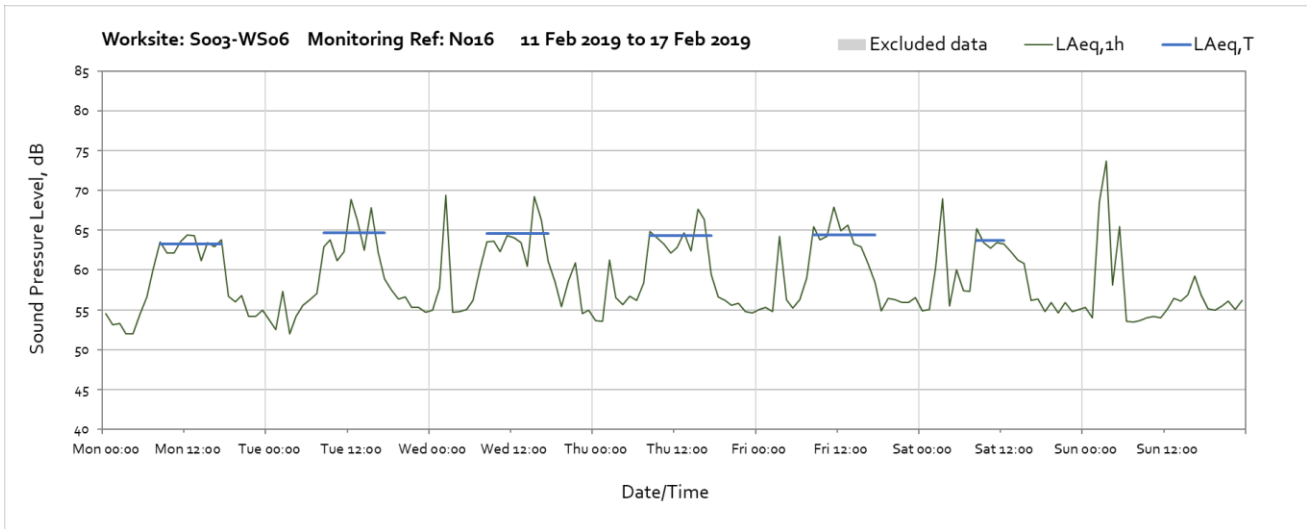




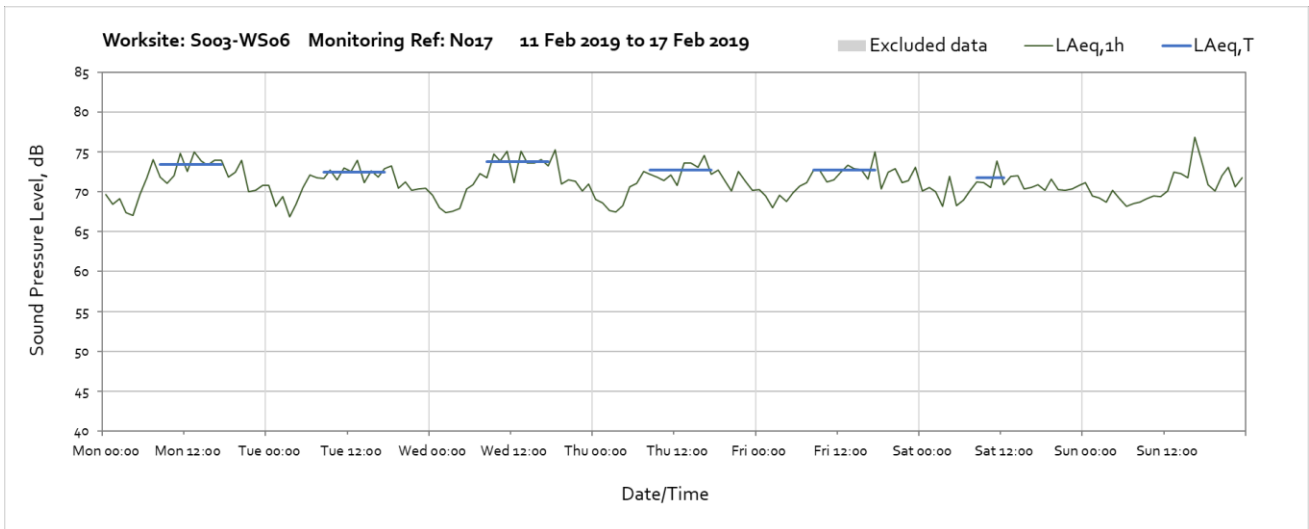
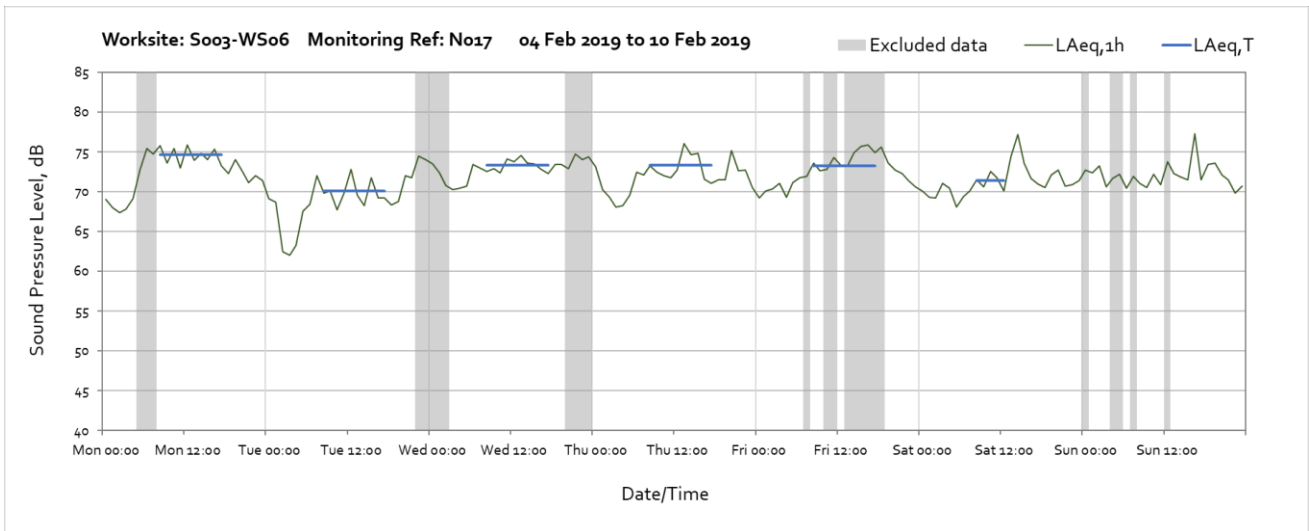
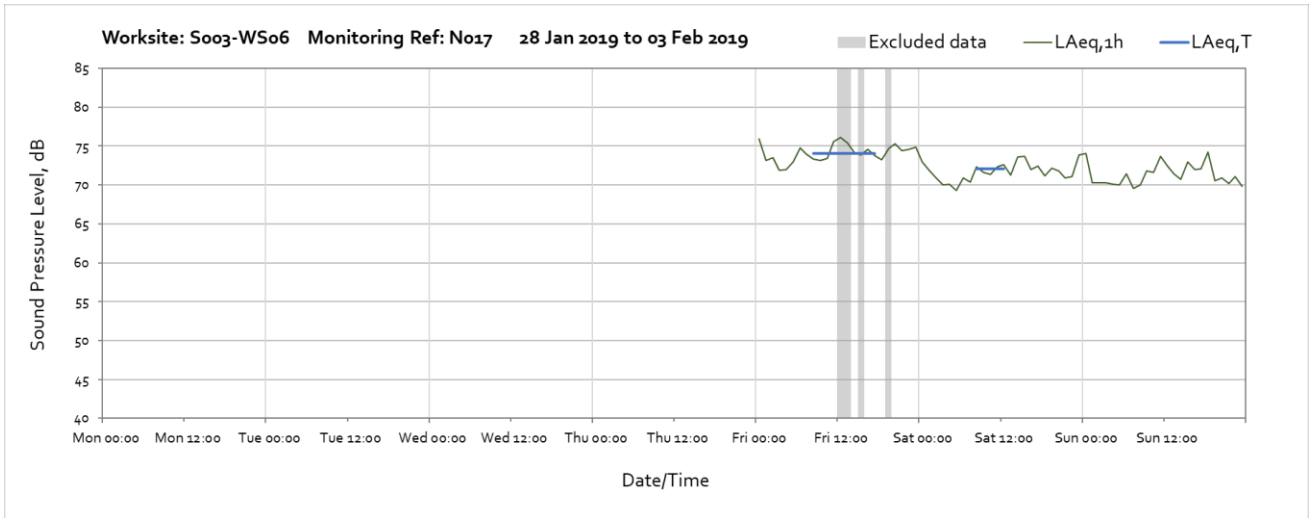
## Worksite: S003-WS06 – Monitoring Ref: N016

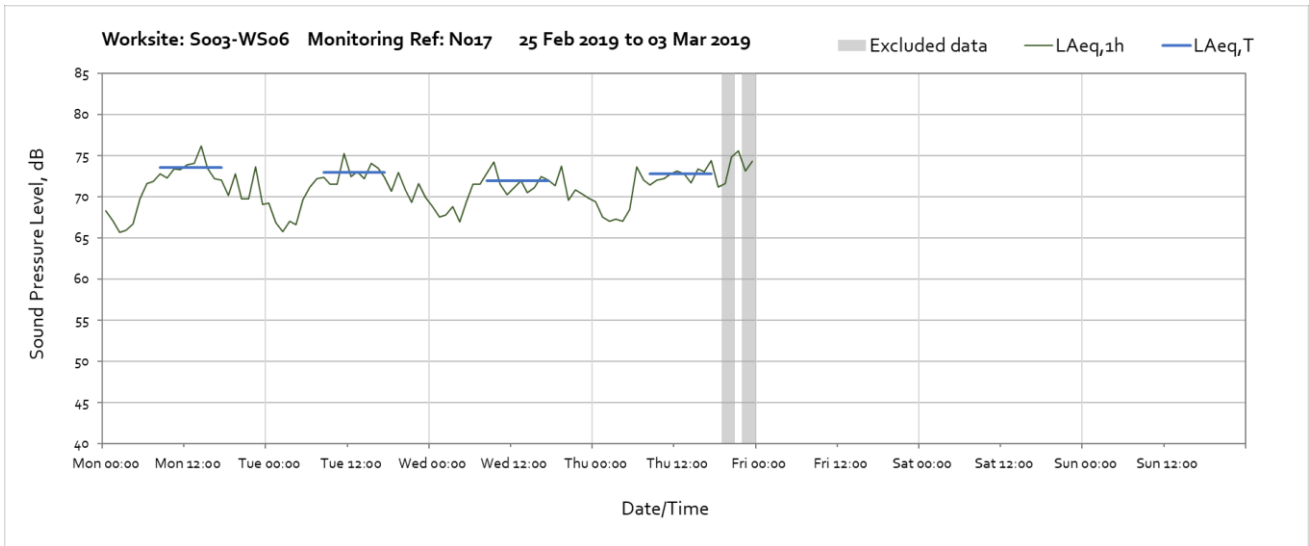
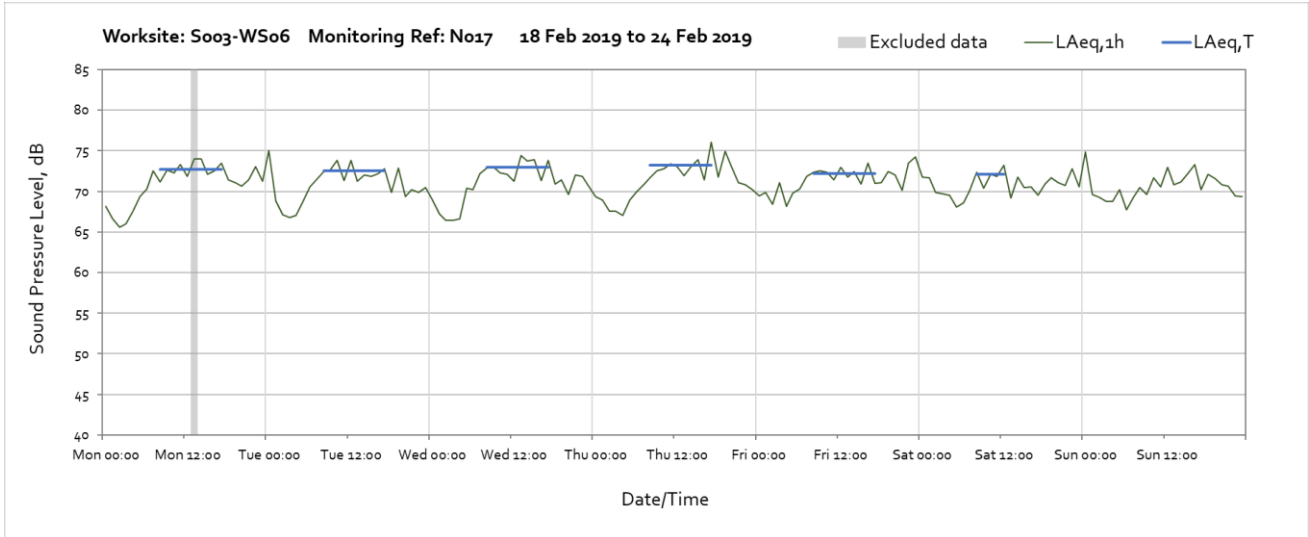




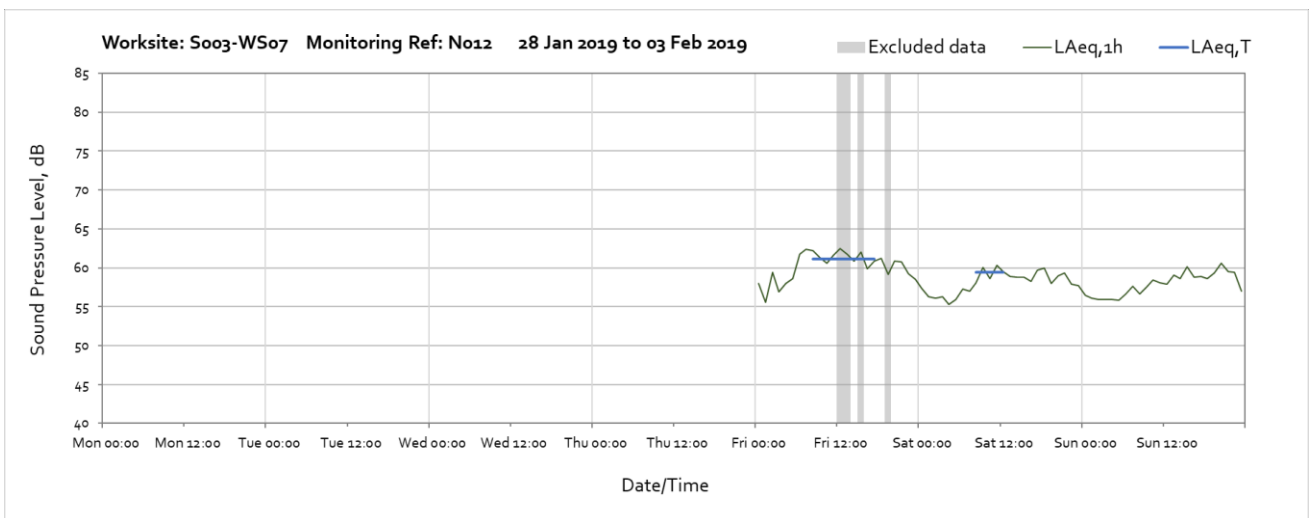


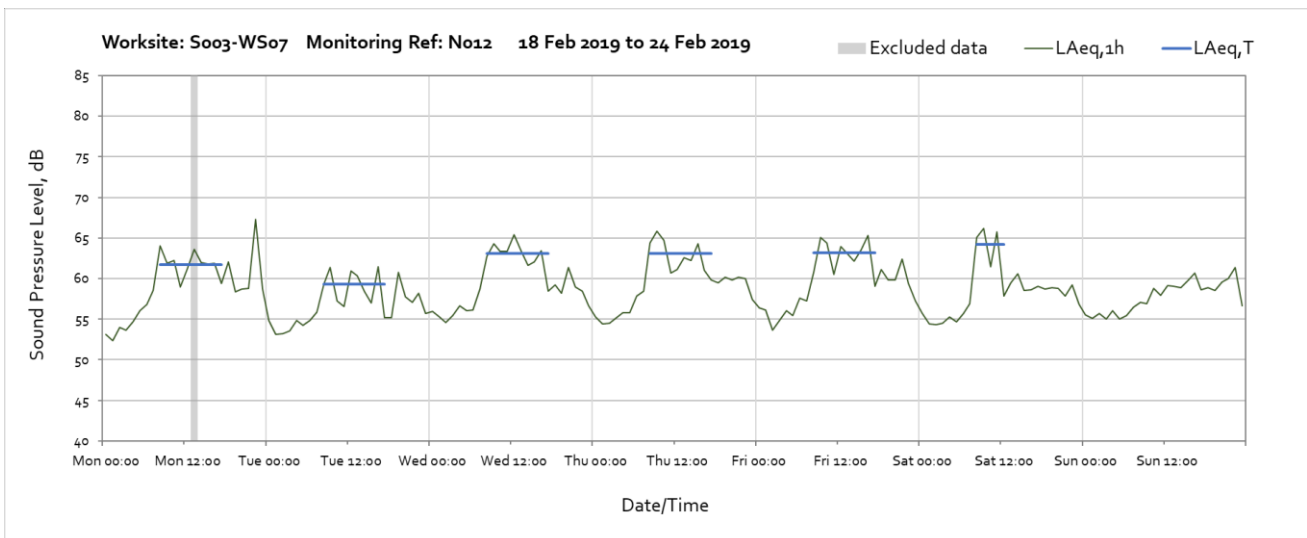
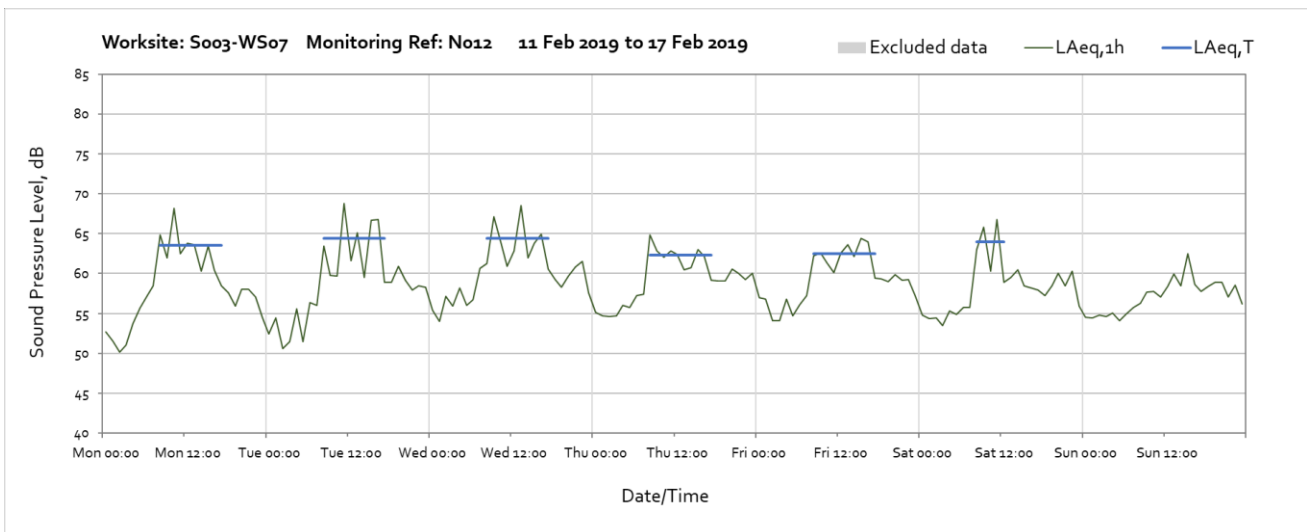
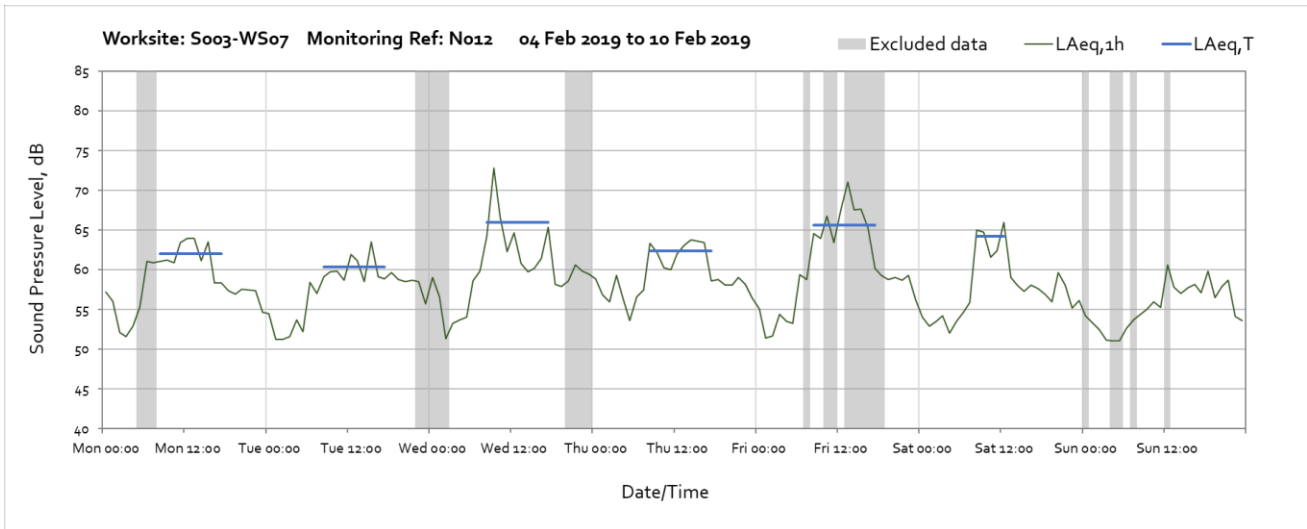
# Worksite: S003-WS06 – Monitoring Ref: N017

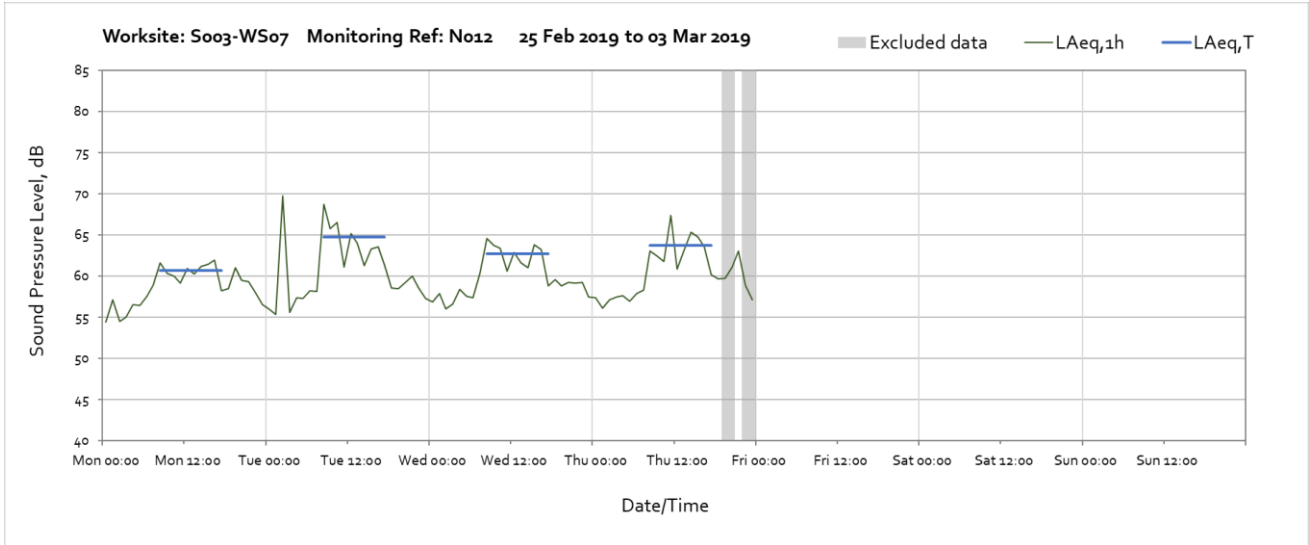




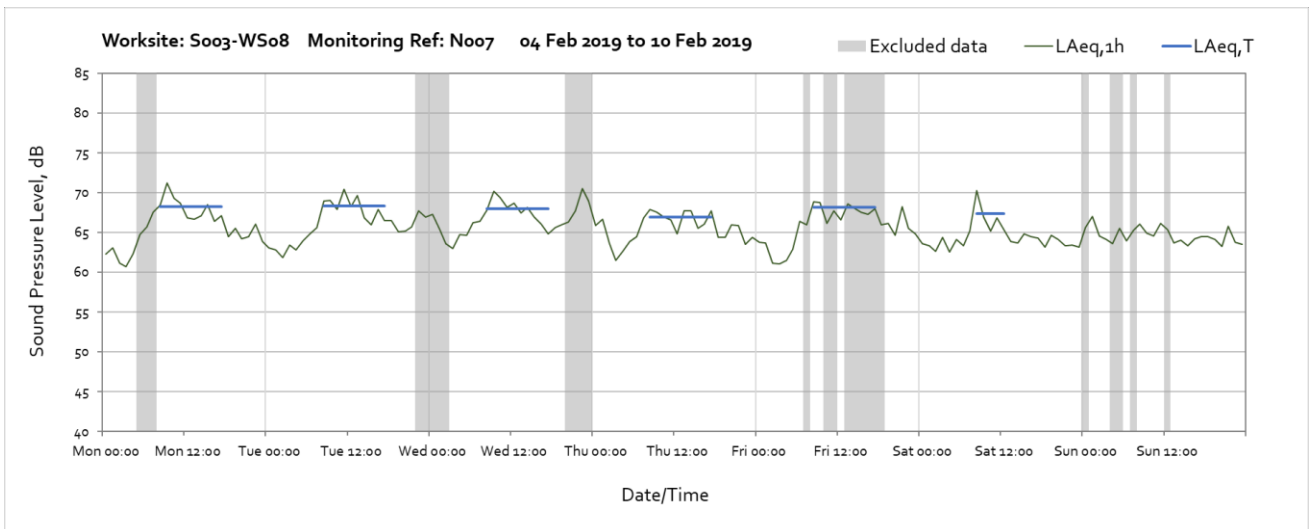
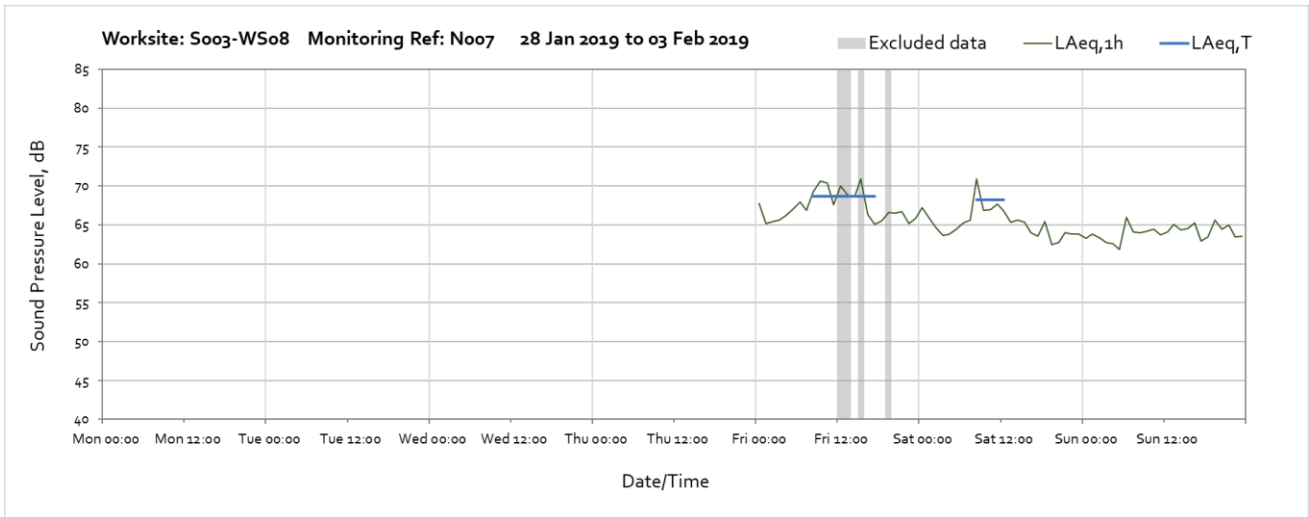
## Worksite: S003-WS07 – Monitoring Ref: N012

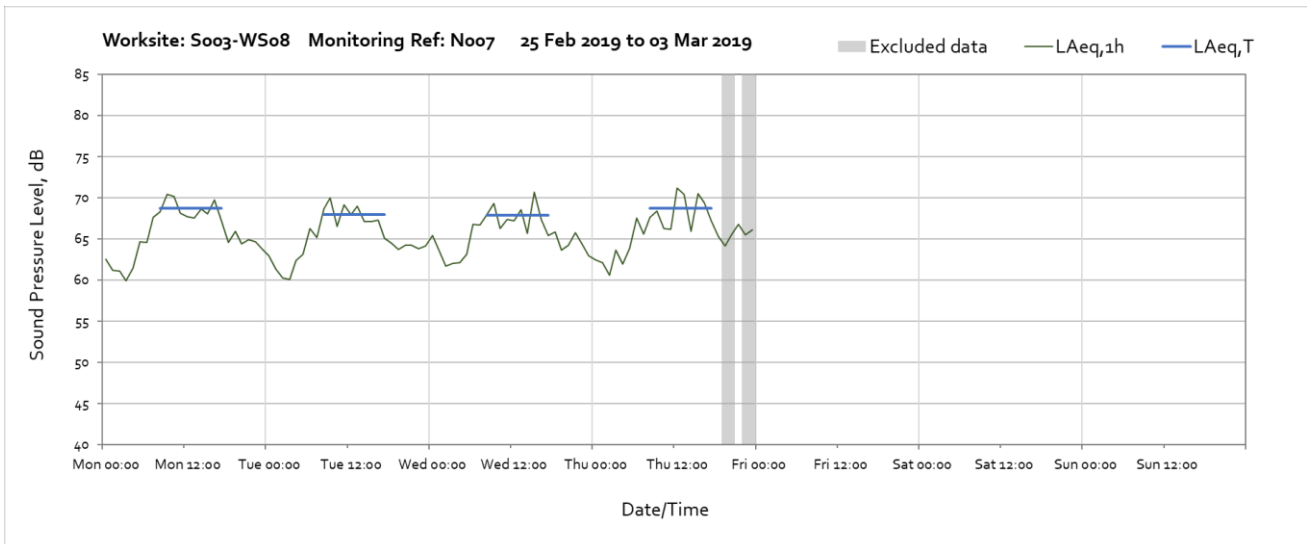
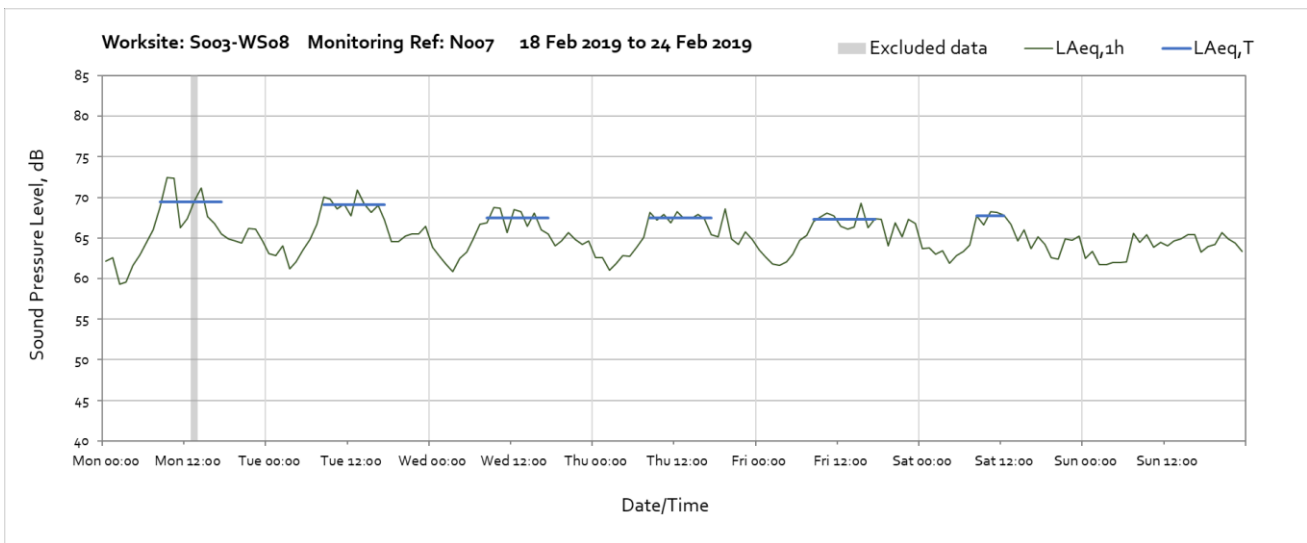
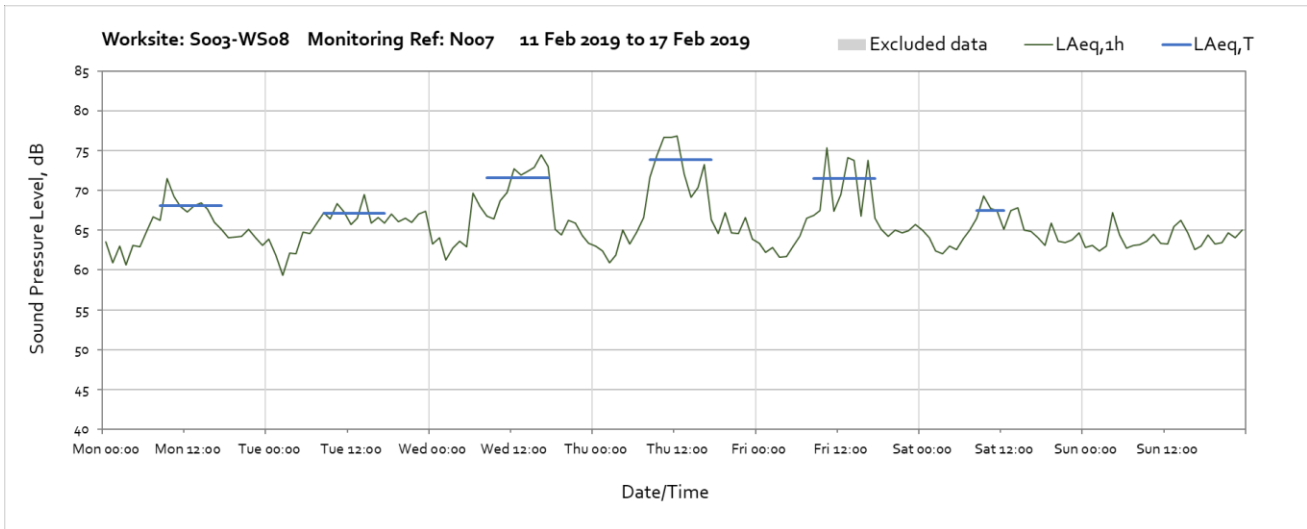




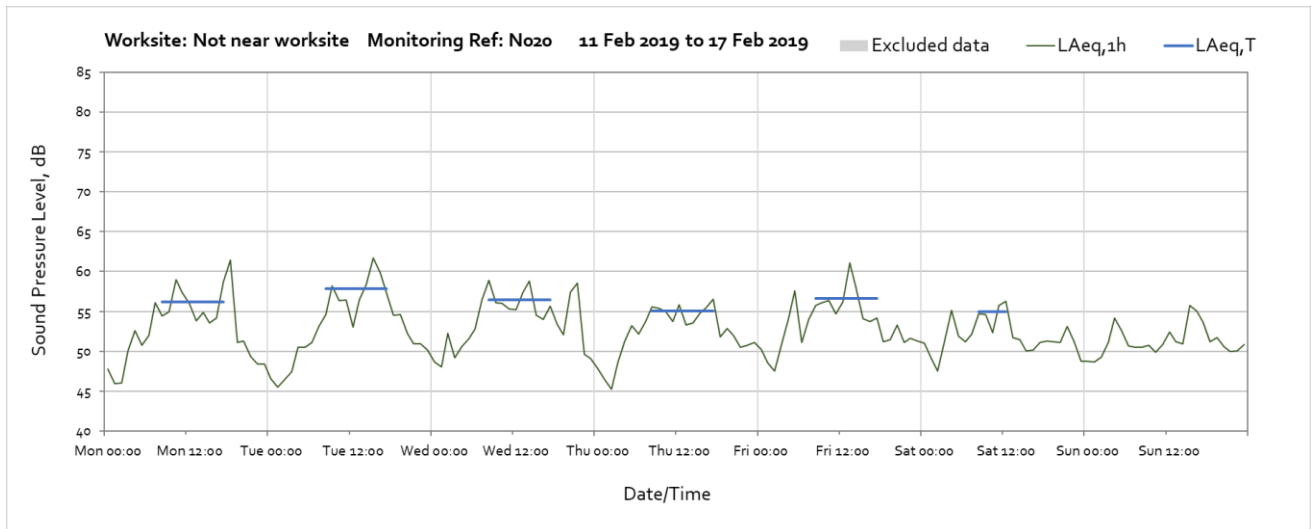
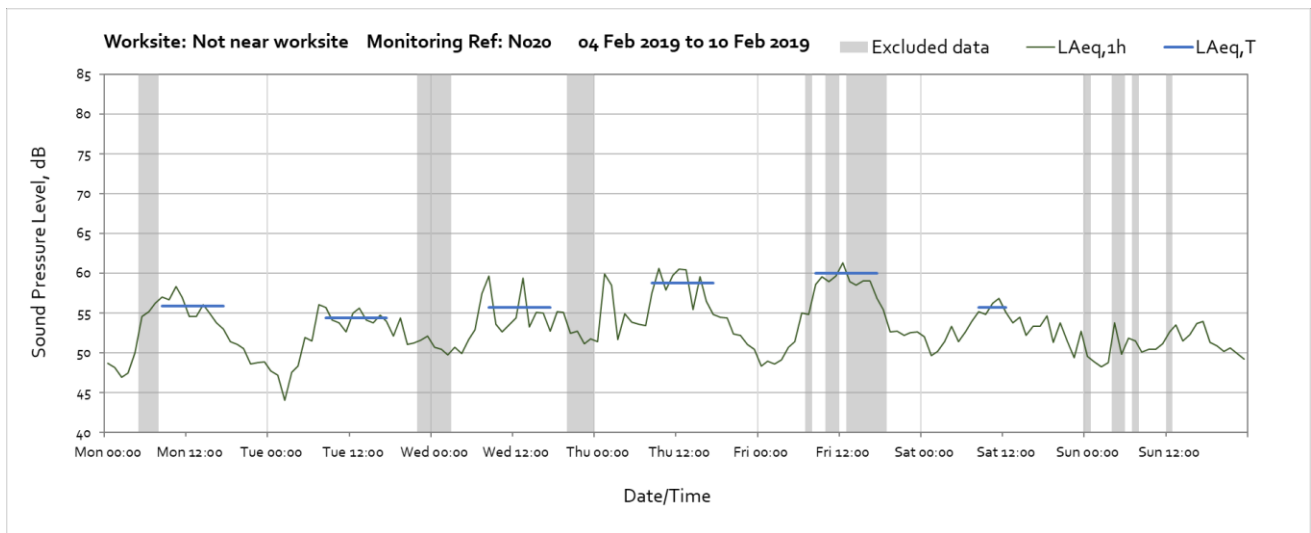
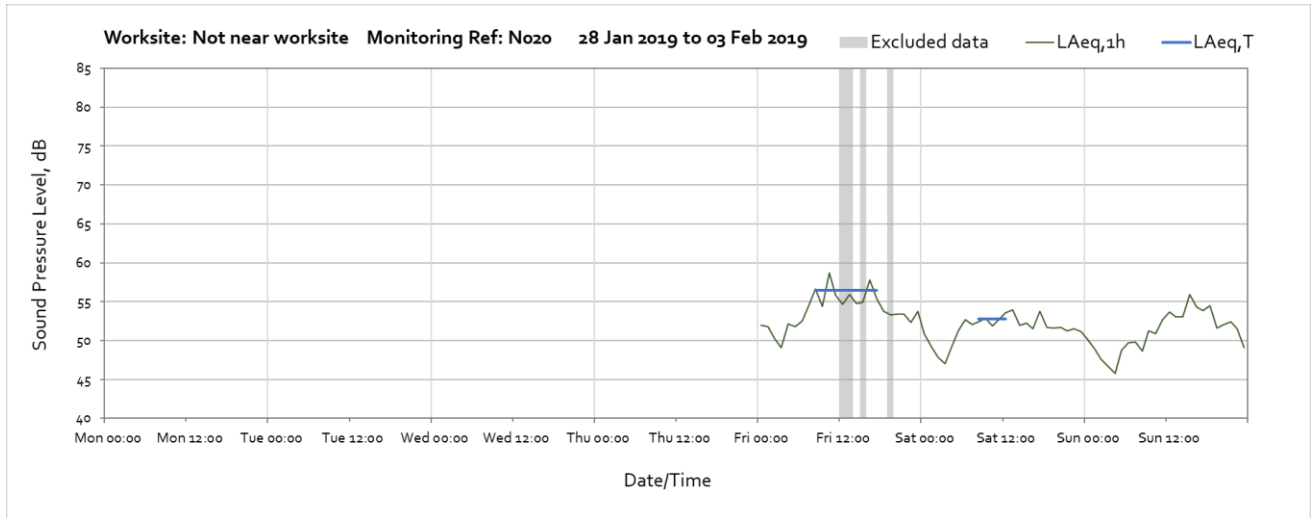


## Worksite: S003-WS08 – Monitoring Ref: N007

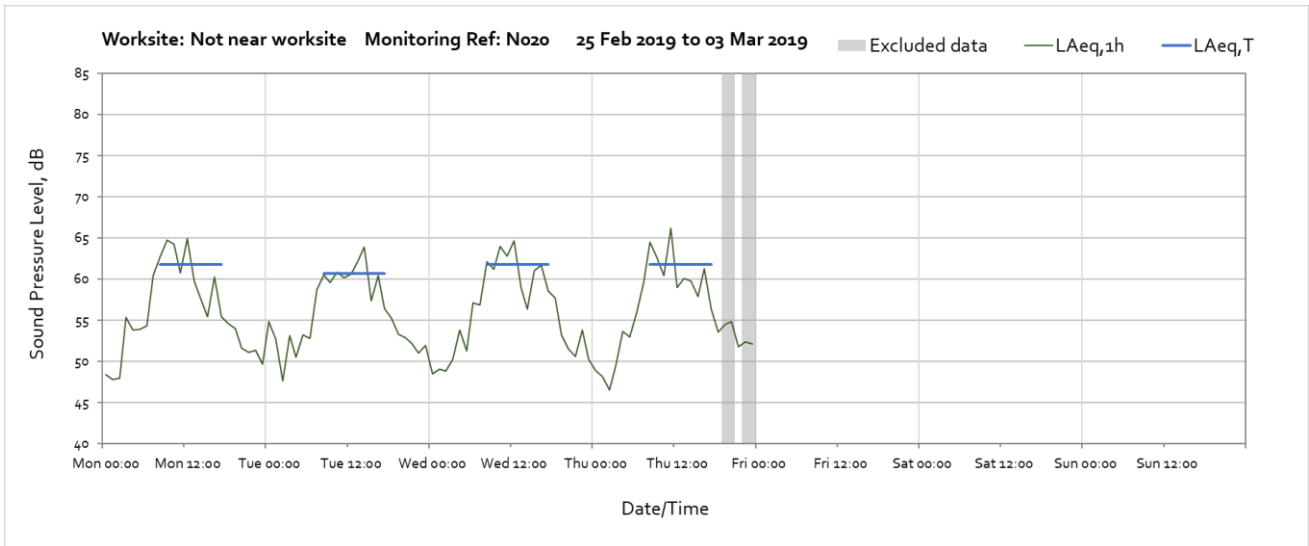
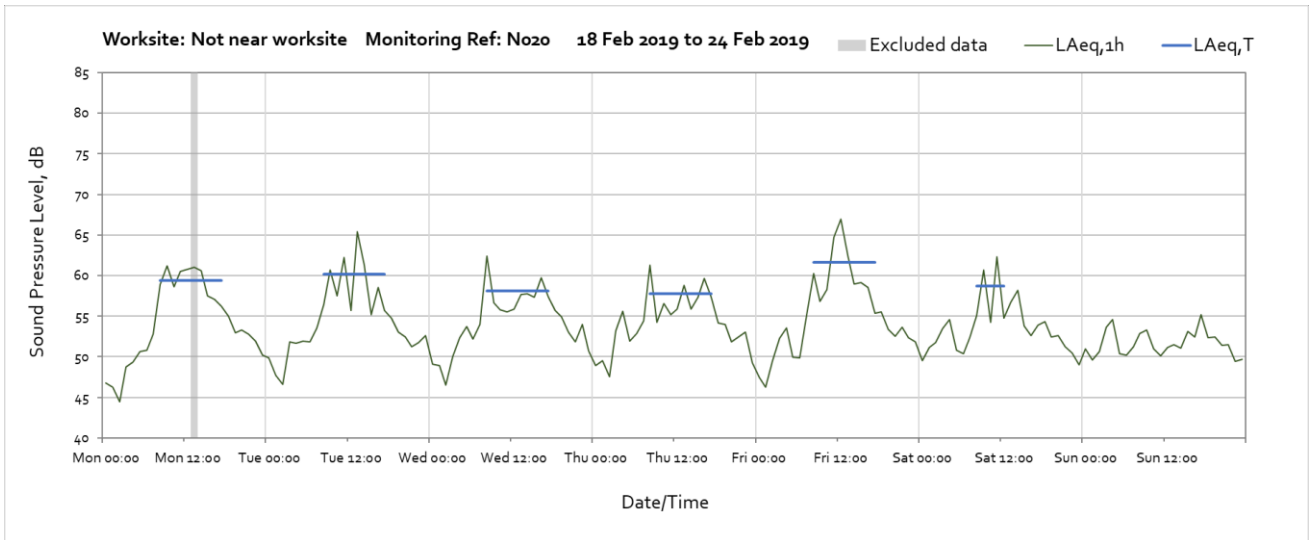




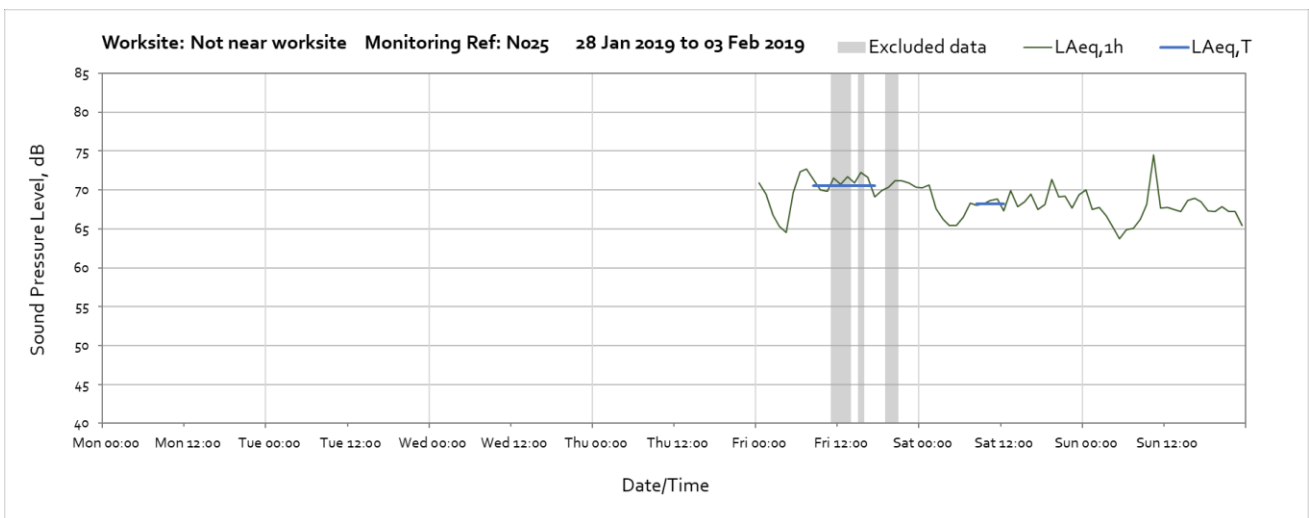
# Monitoring Ref: N020

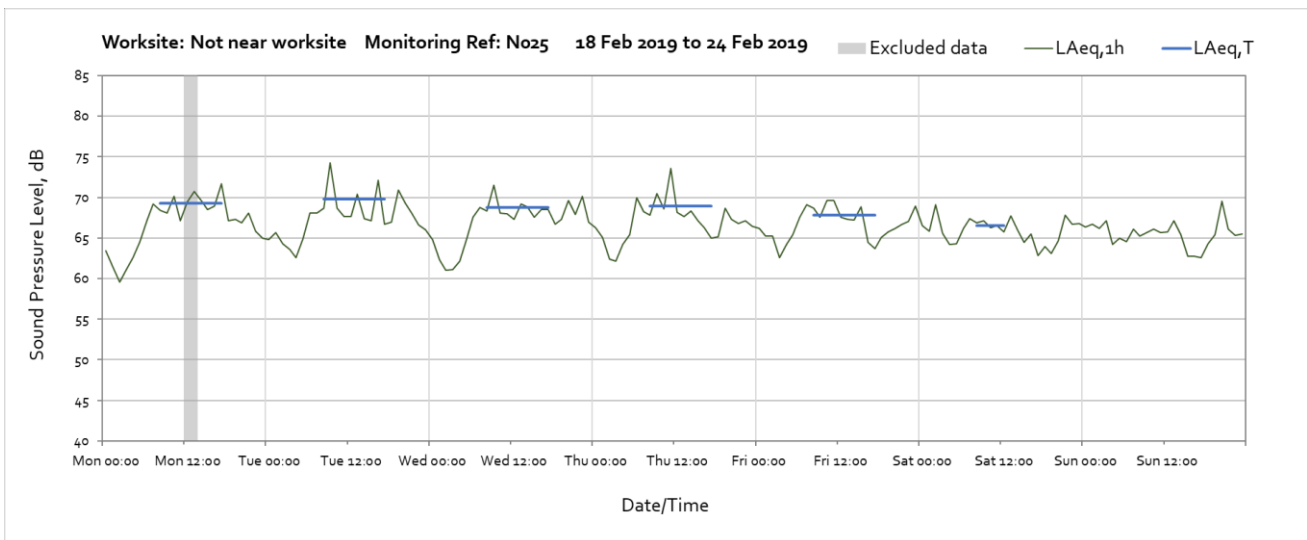
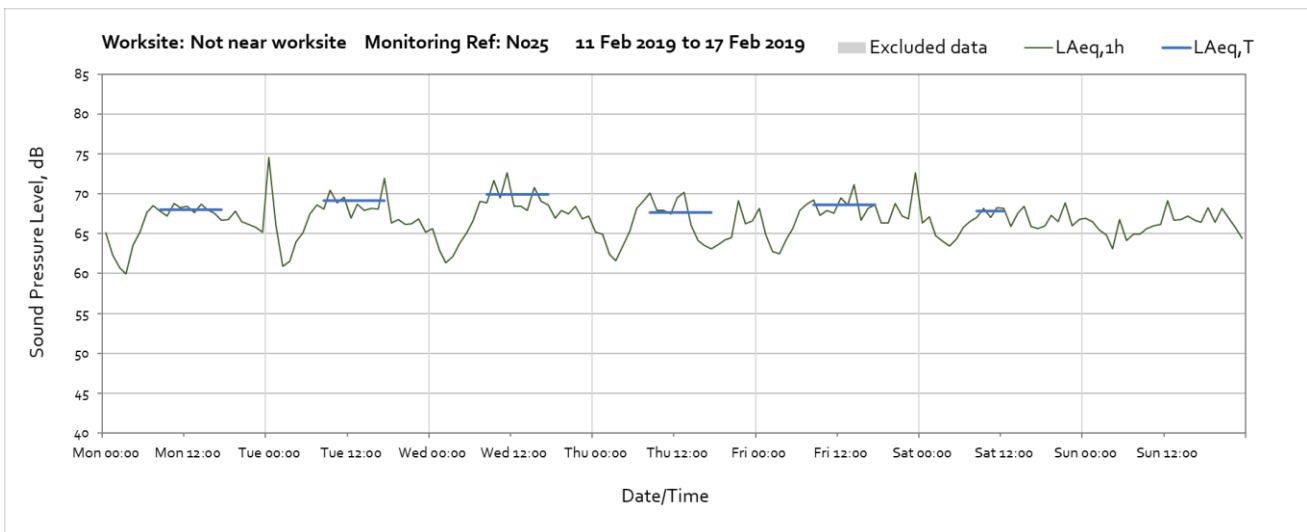
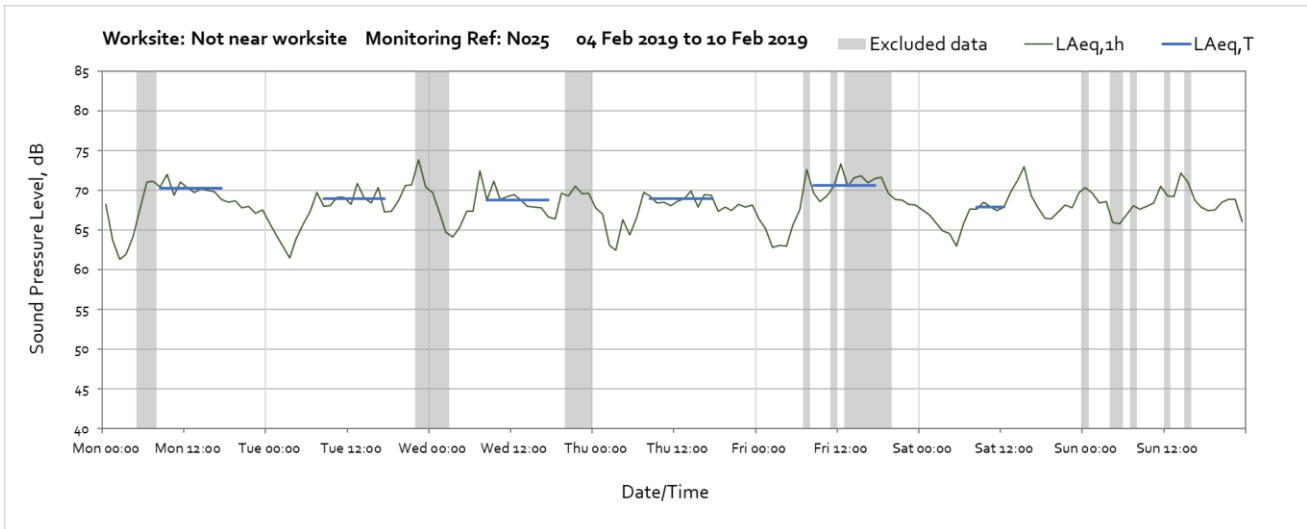


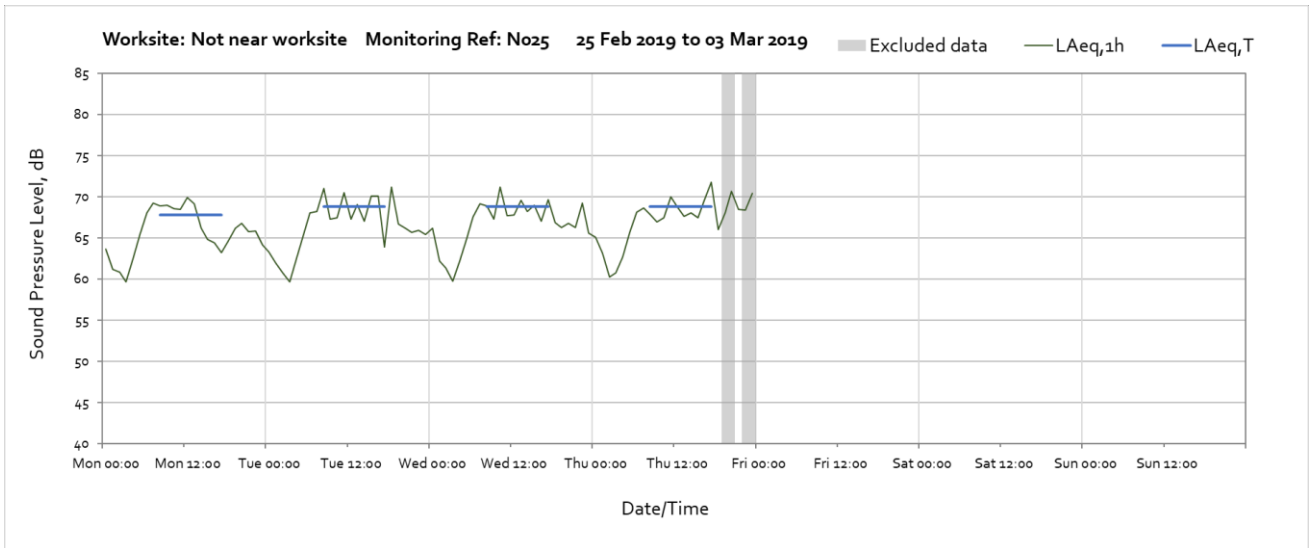




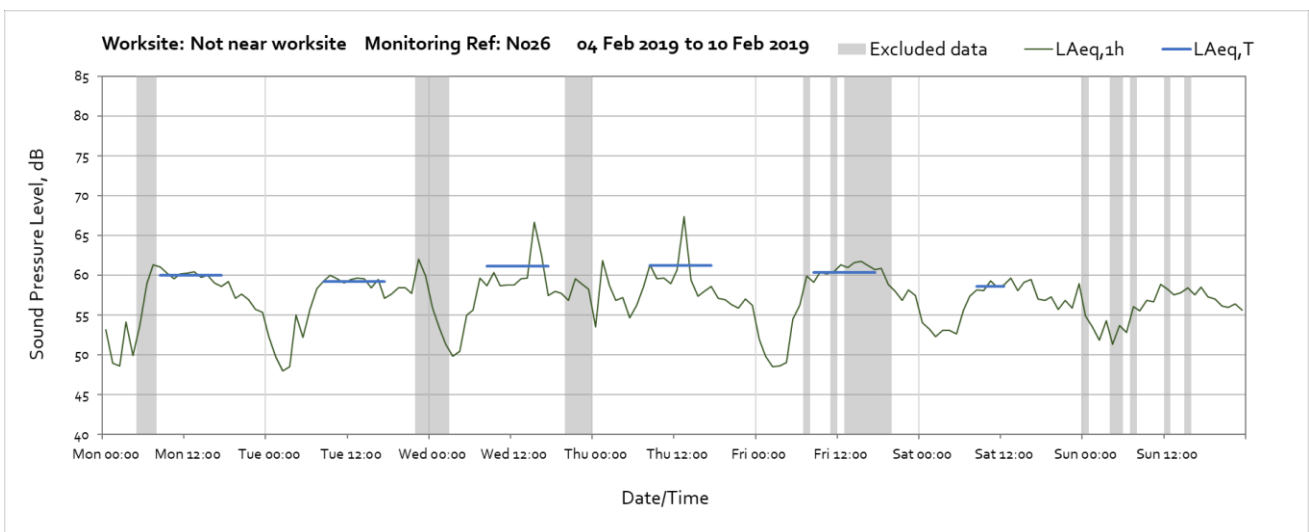
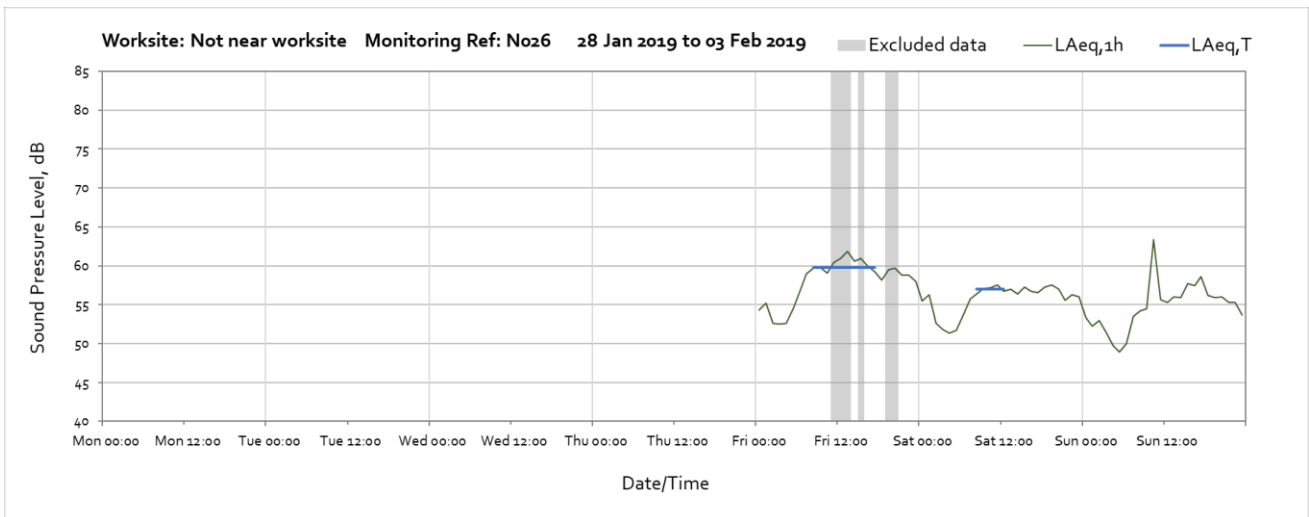
## Monitoring Ref: N025

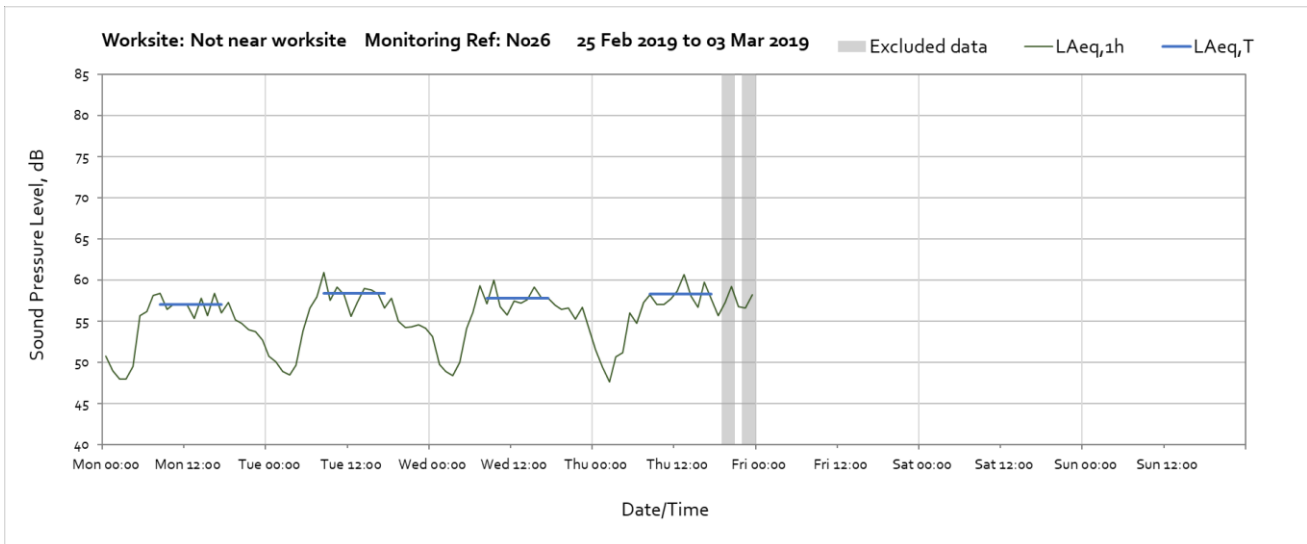
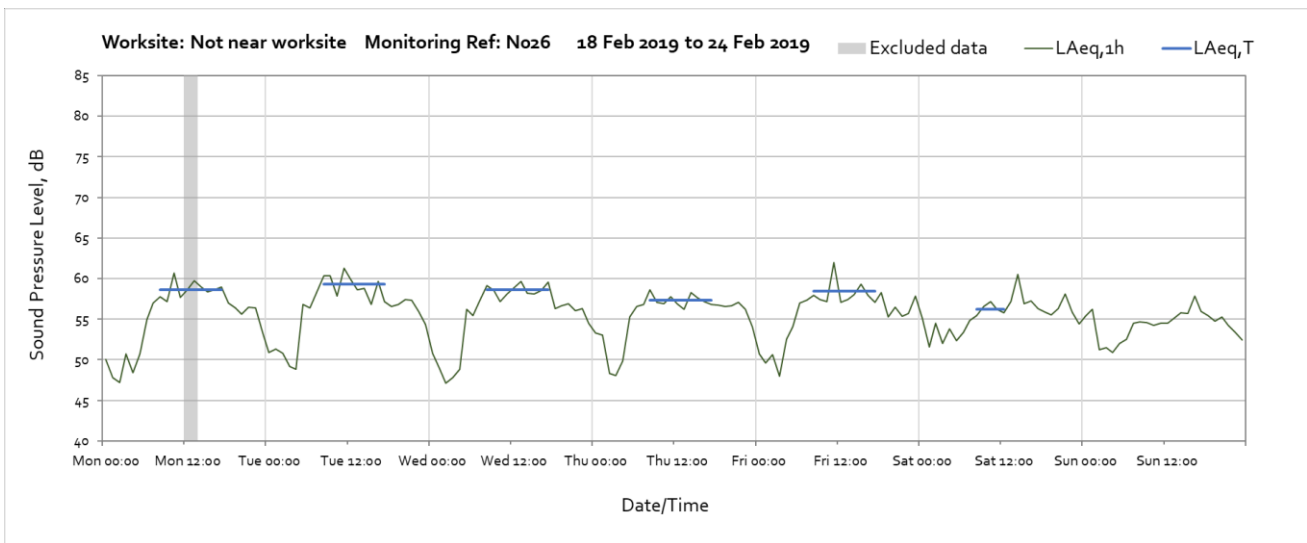
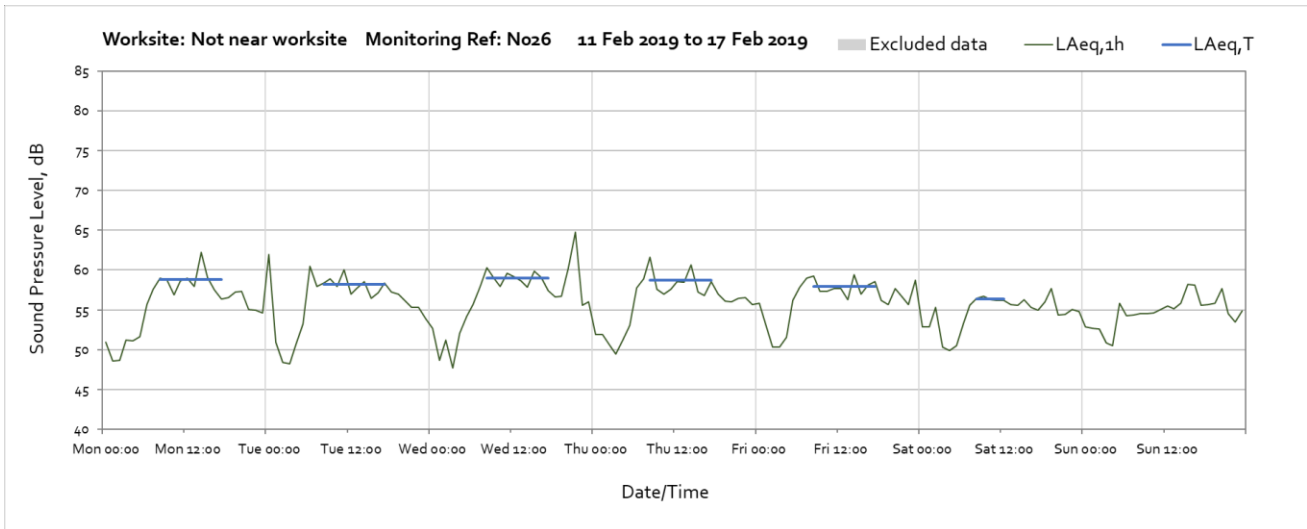






## Monitoring Ref: N026

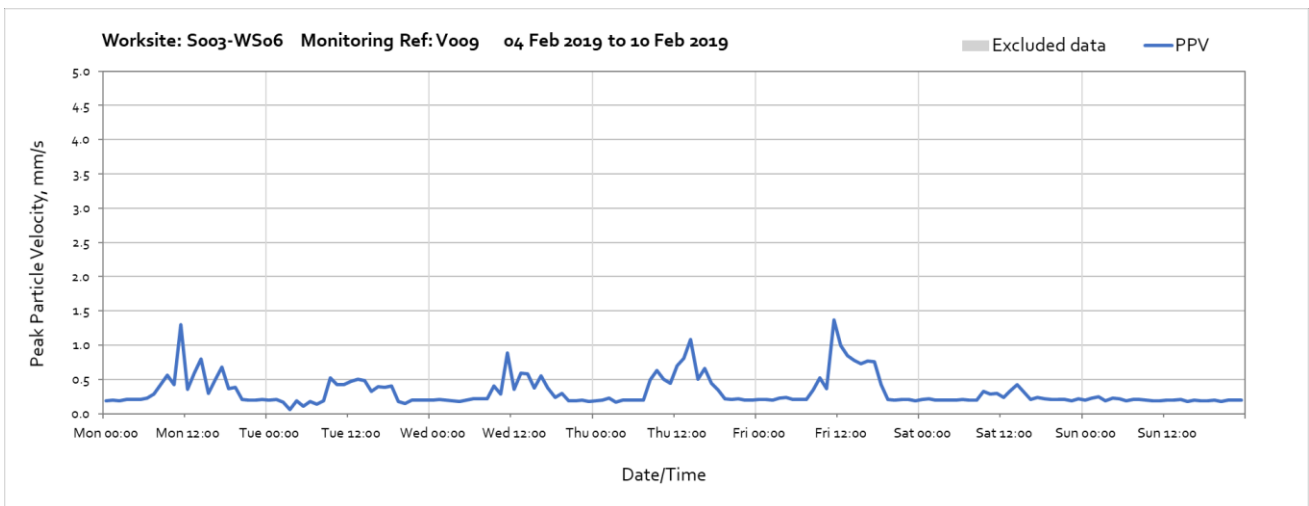
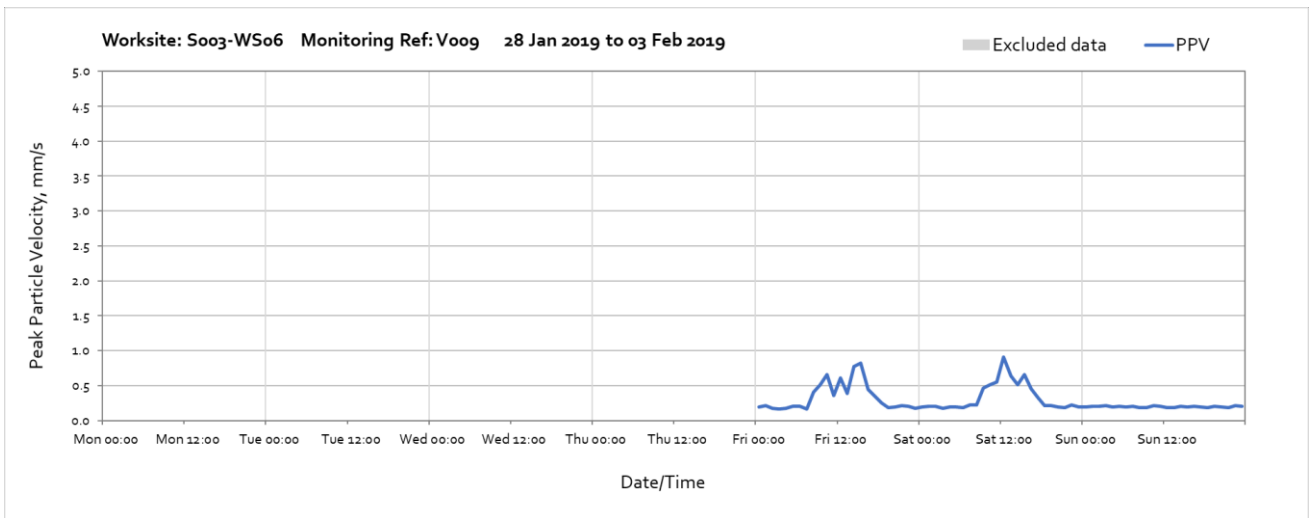


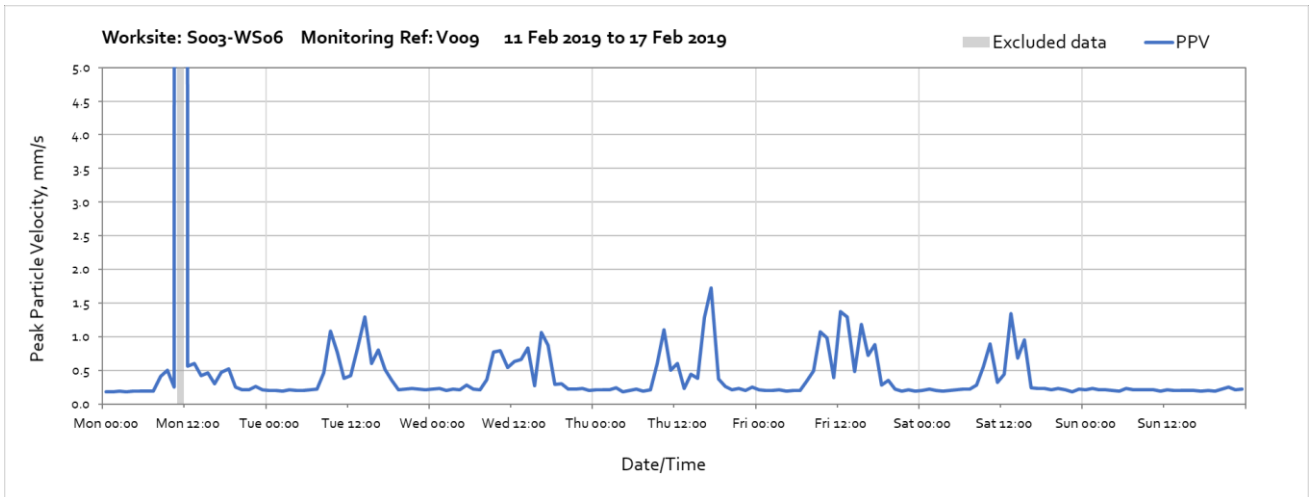


## Vibration

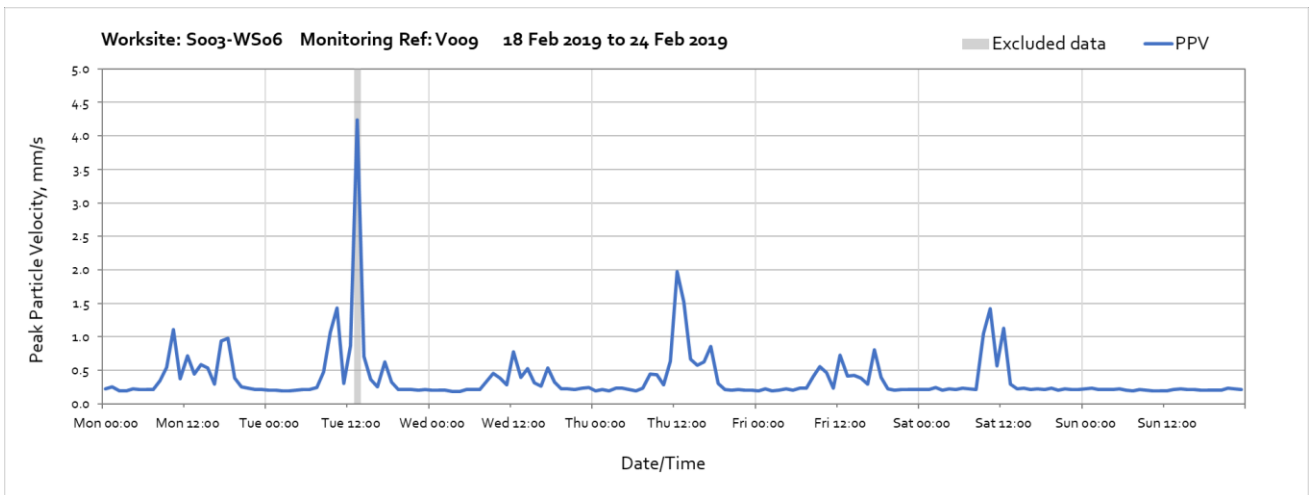
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axis x, y and z. High values of PPV were measured on occasions at locations V002, V009 and V021. These were due to local interference with the vibration monitor and are not representative of HS2 construction works. These data entries have been greyed out in the following charts and have been excluded to calculate values in Table 6.

### Worksite: S003-WS02 – Monitoring Ref: V009

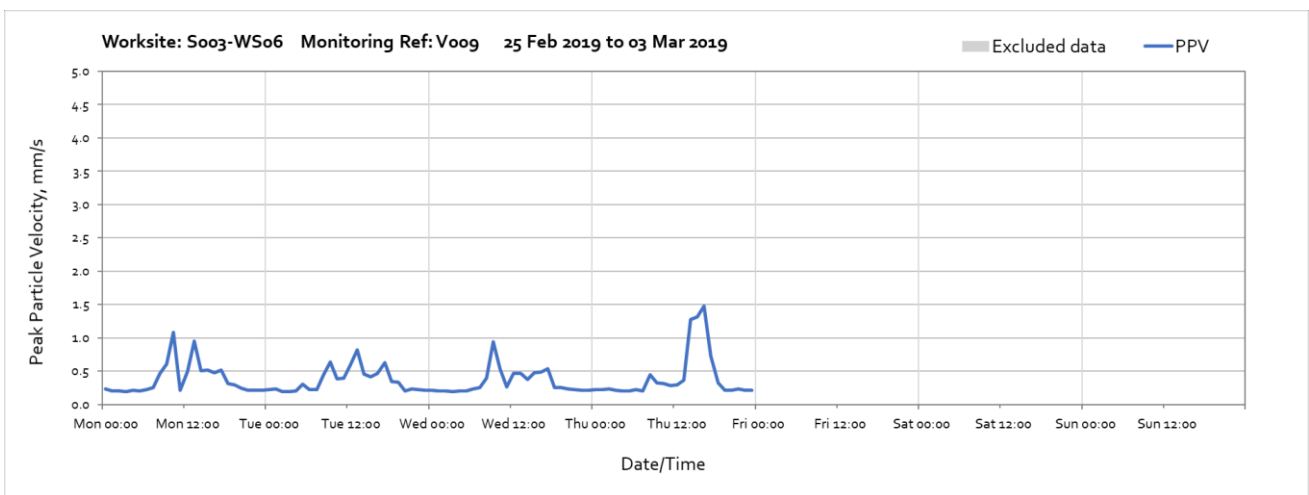




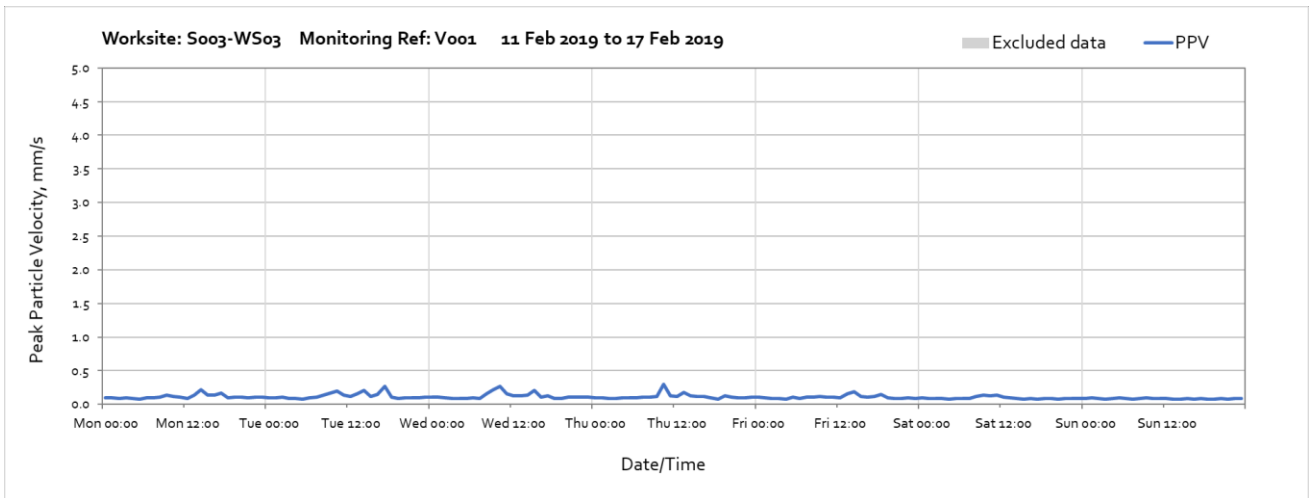
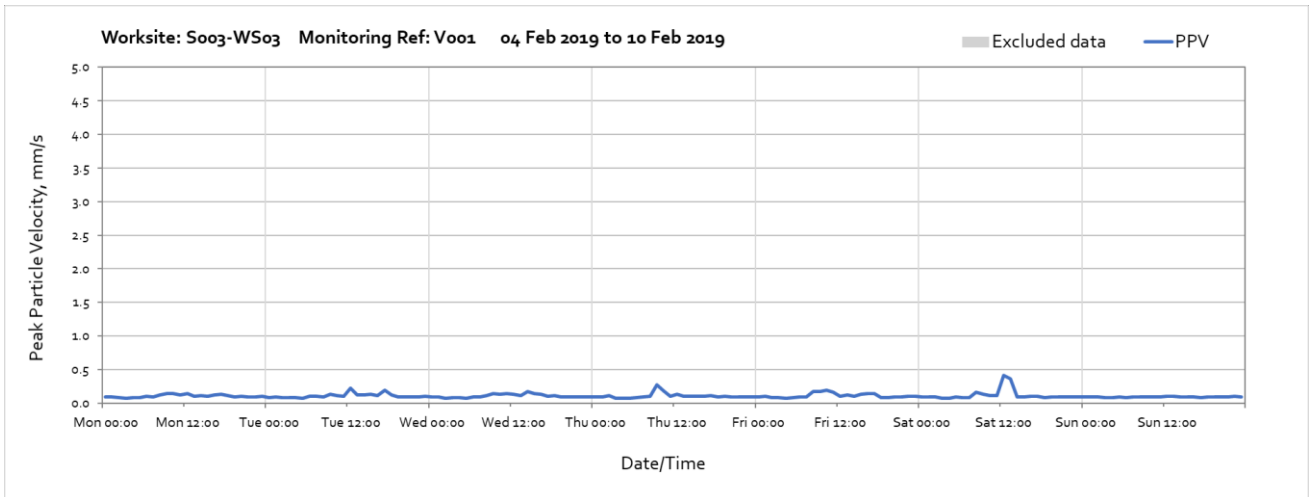
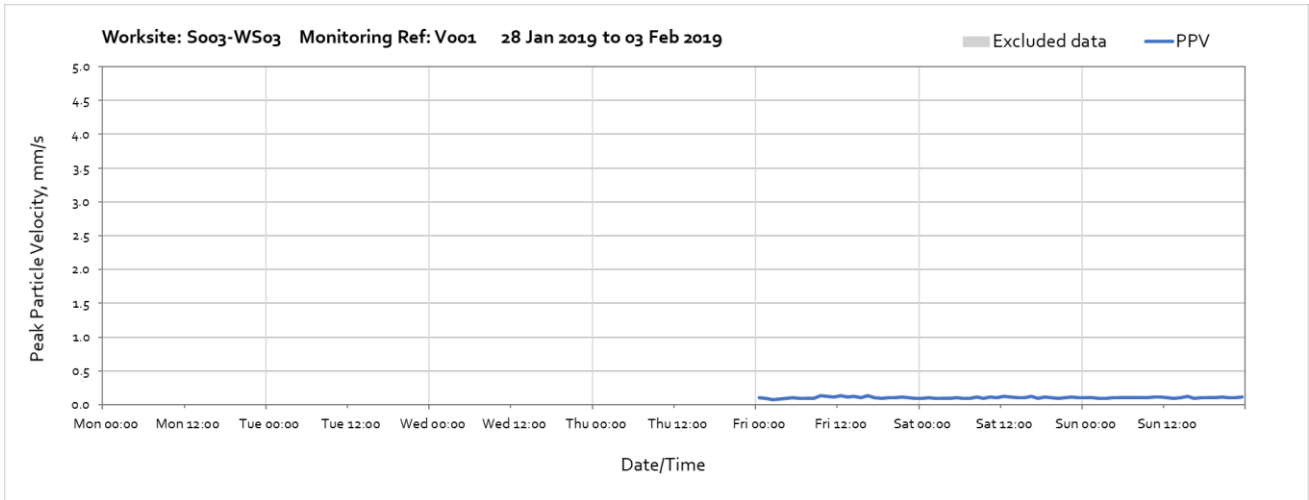
Note – High vibration levels at 11:00 on the 11<sup>th</sup> of February were due to disturbance of the monitor and were not due to HS2 construction works.

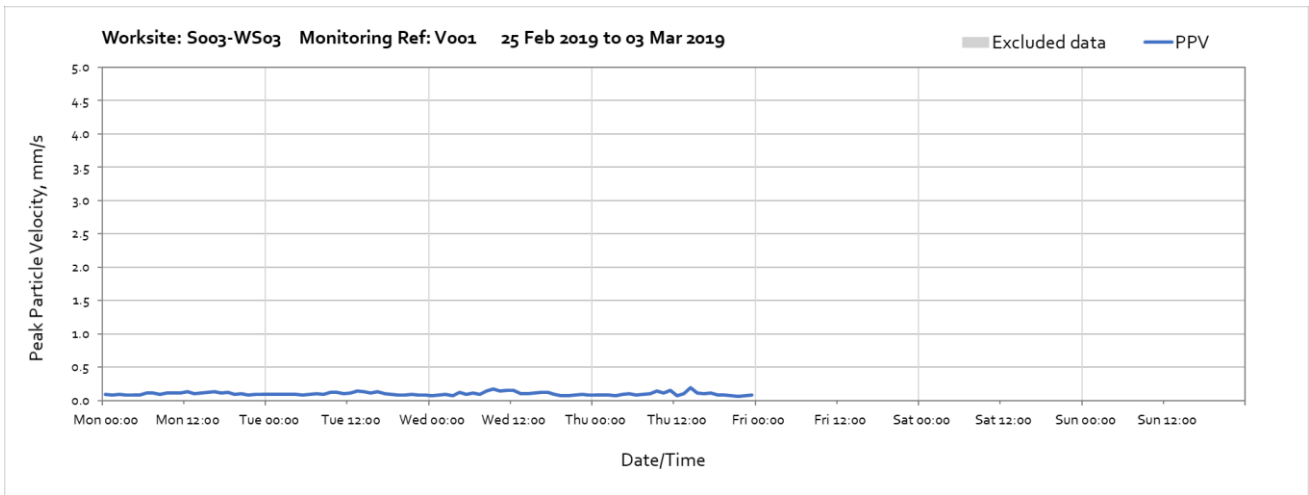
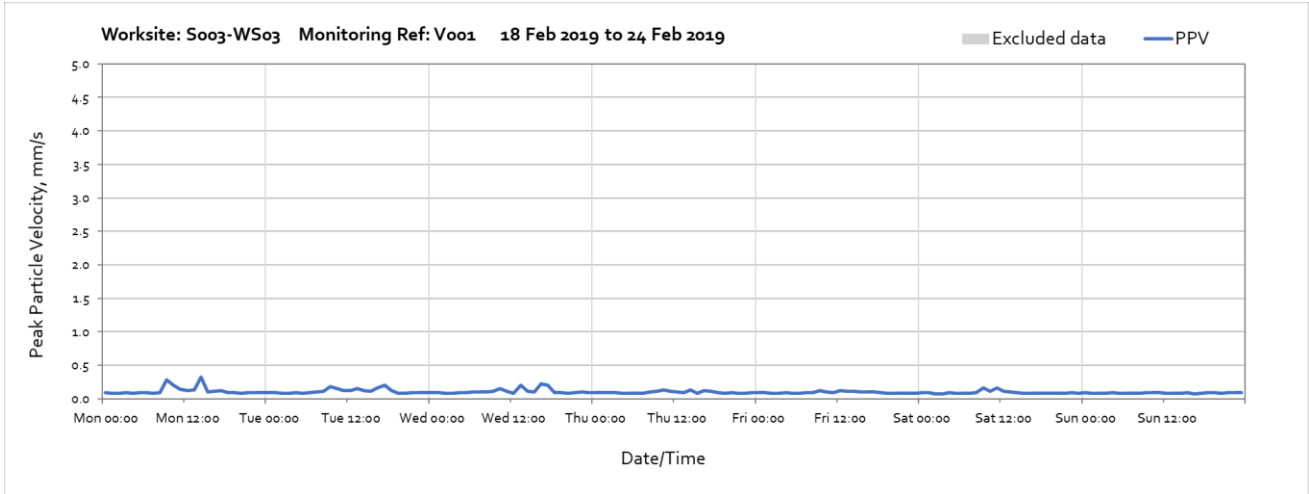


Note – High vibration levels at 13:00 on the 19<sup>th</sup> of February were due to disturbance of the monitor and were not due to HS2 construction works.

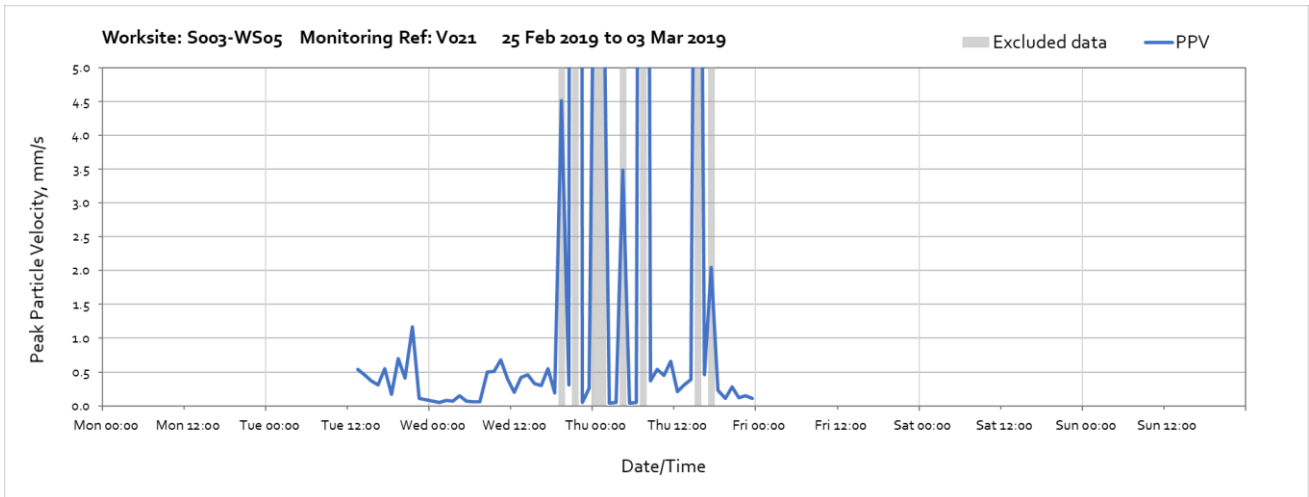


# Worksite: S003-WS03 – Monitoring Ref: V001





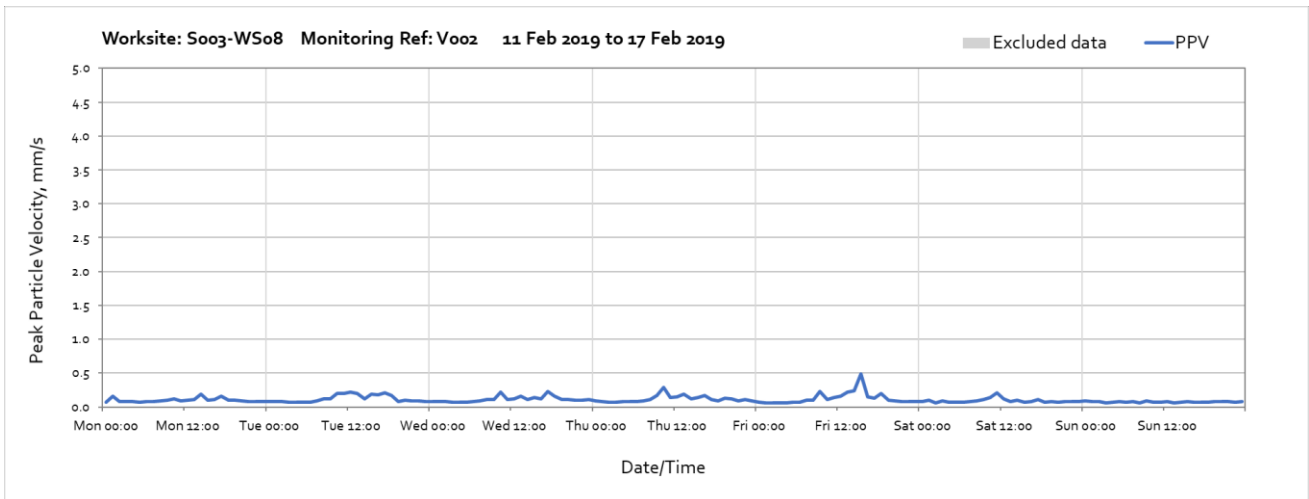
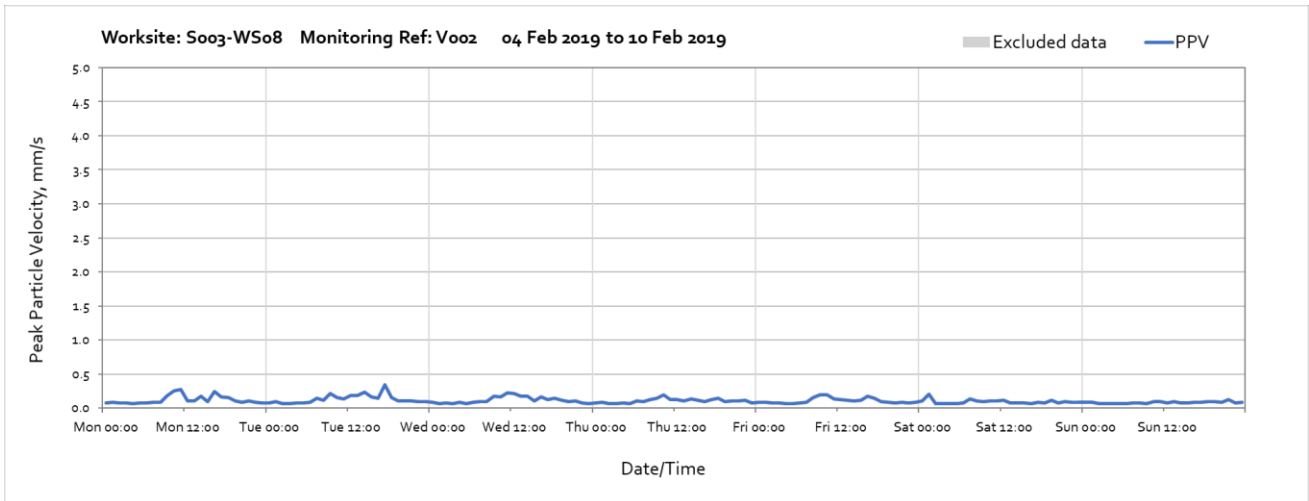
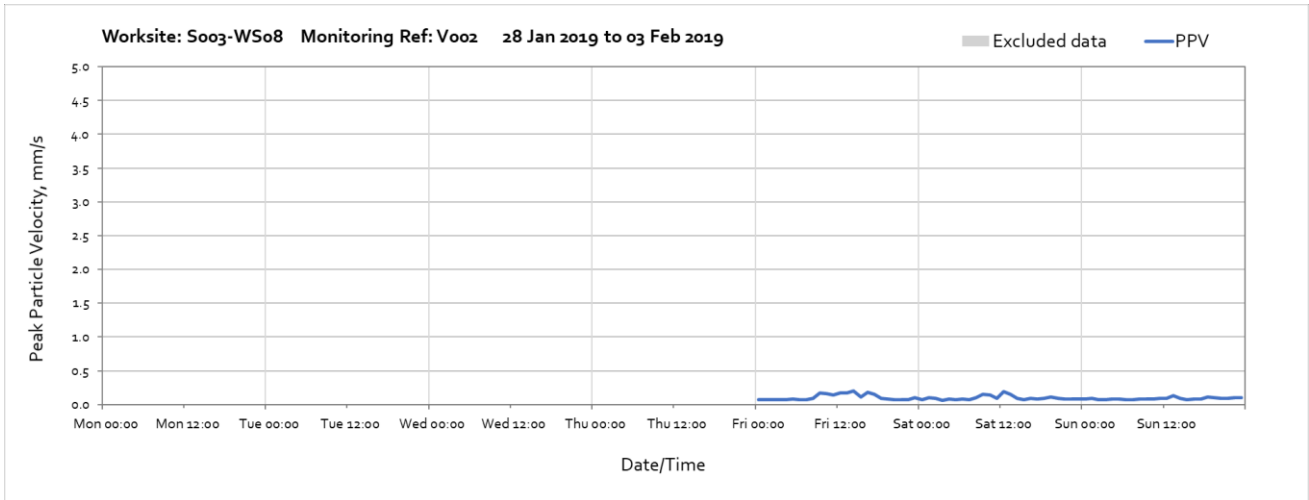
## Worksite: S003-WS05 – Monitoring Ref: V021

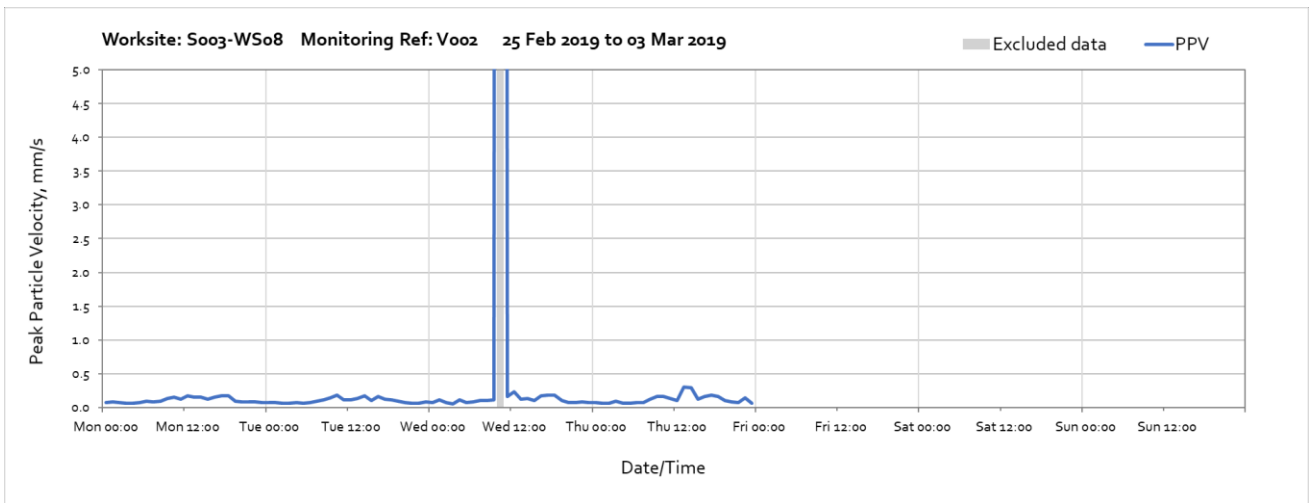
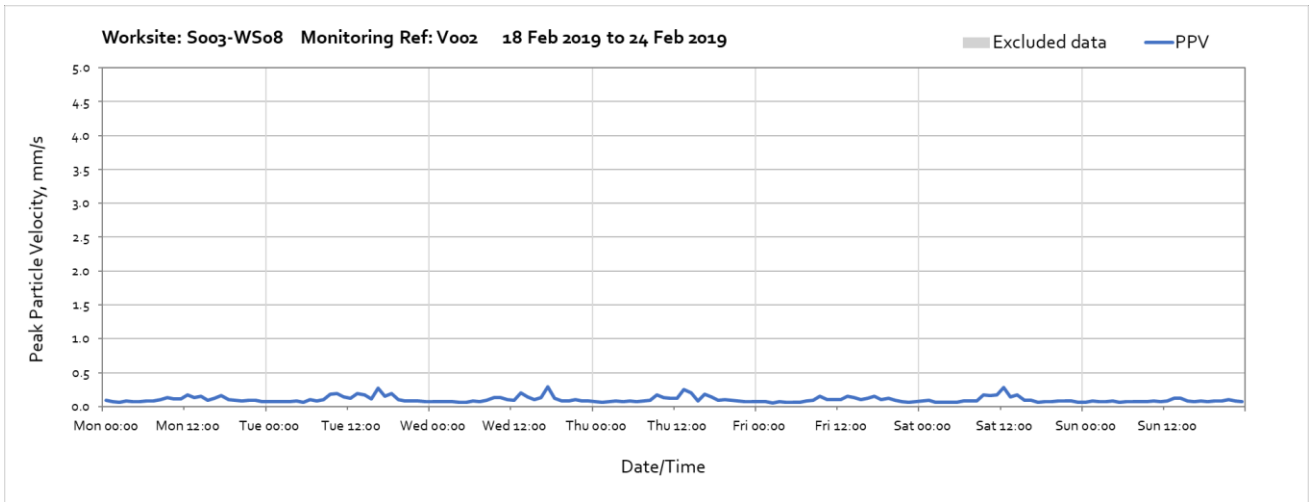


Note – High vibration levels on Wednesday 27<sup>th</sup> and Thursday 28<sup>th</sup> of February were due to disturbance of the monitor and were not due to HS2 construction works.



# Worksite: S003-WS08 – Monitoring Ref: V002





Note – High vibration levels at 10:00 on 27<sup>th</sup> of February were due to disturbance of the monitor and were not due to HS2 construction works.