HS2

January 2020

Construction noise and vibration Monthly Report – November 2019

London Borough of Camden

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List of tables

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 November 2019.

A number of worksites were active during the reporting month in the LBC area. Works at Network Rail worksites G and H included works at platforms, installation of steel work for troughing and cabling, lighting installations, distribution box installation and site inspections. Ancillary activities and materials processing were undertaken at the DB Cargo and former Addison Lee worksite (ref. S001-WS01). Scaffolding and demolition were underway at the Regent's Park Estate worksite (ref. S001–WS07). Backfilling works were underway at St James's Garden worksite (ref. S003-WS01). Demolition and structural surveys were undertaken at the Wolfson House, Walkden House, 67-75 & 77-79 Euston Rd, worksite (ref. S003-WS03). Demolition and backfilling were undertaken at the Thistle Hotel worksite (ref. S003-WS04). Processing of arisings was carried out at the Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street worksite (ref. S003-WS05). Deliveries were carried out at the former National Temperance Hospital, 110-122 Hampstead Road worksite (ref. S003-WS06). Propping and backfilling were undertaken at 93-103 Drummond Street, 11-15 Melton Street, 54-64 Euston Street, 69 Cobourg Street worksite (ref. S003-WS07). Demolition and scaffolding were undertaken at One Euston Square, 40 Melton Street, Grant Thornton House, 22 Melton Street worksite (ref. S003-WS09). Utilities diversion works were undertaken on Stanhope Street and Hampstead Road. Shaft fitout works were carried out at Park Village East / London Zoo Compound and pipe installation, excavations and backfilling / reinstatement were carried out at Albany Street, Robert Street, Robert Street and Onsaburgh Street.

Noise monitoring was undertaken in the vicinity of Network Rail worksites B, C, D, E, F and G; in the vicinity of the DB Cargo worksite (ref. S001-WS01), 132 and 140 Hampstead Road and Petrol Station worksite (ref. S001-WS02), Regent's Park Estate worksite (ref. S001–WS07), St James's Gardens worksite (ref. S003-WS01), Wolfson House, Walkden House, 67-75 & 77-79 Euston Rd worksite (ref. S003-WS03), the Thistle Hotel (ref. S003-WS04), 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). Further noise monitoring was also undertaken in the vicinity of Regents Park Lorry Holding Area.

Vibration monitoring was undertaken in the vicinity of the Regent's Park Estate worksite (ref. S001–WS07), the Walkden House, 67-75 & 77-79 Euston Road worksite (ref. S003-WS03), the Ibis Hotel, 3 Cardington Street & 1-3 Cobourg Street worksite (ref. S003-WS05) and the One Euston Square & Grant Thornton house 40 & 22 Melton Street worksite (ref. S003-WS09).

Exceedances of the SOAEL were measured at two locations in the LBC area due to HS2 on-network night-time construction activities during November 2019. Eight complaints were received during the monitoring period. Description of complaints, results of investigations and any actions taken are detailed in this report.

Abbreviations and descriptions

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

Table 1: Table of abbreviations

Acronym/Term	Definition
$L_{Aeq,T}$	See equivalent continuous sound pressure level
Ambient sound	A description of the all-encompassing sound at a given location and time which will include sound from many sources near and far. Ambient sound can be quantified in terms of the equivalent continuous sound pressure level, $L_{pAeq,T}$
Decibel(s), or dB	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140dB.
Decibel(s) A-weighted, or dB(A)	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.
Equivalent continuous sound pressure level, or $L_{Aeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Exclusion of data	Measurement of noise levels can be affected by weather conditions such as prolonged periods of rain, winds speeds higher than 5m/s and snow/ice ground cover. Noise levels measured during these periods are considered not representative of normal noise conditions at the site and, for the purposes of this report, are excluded from the assessment of exceedances and calculation of typical noise levels and are also greyed out in charts. Identifiable incongruous noise and vibration events not attributable to HS2 construction noise are also excluded.
Façade	A facade noise level is the noise level 1m in front of a large reflecting surface. The effect of reflection, is to produce a slightly higher (typically +2.5 to +3 dB) sound level than it would be if the reflecting surface was not there.
Free-field	A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
Equivalent continuous sound pressure level, or $L_{pAeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Peak particle velocity, or PPV	Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position. The PPV is a simple indicator of perceptibility and risk of damage to structures due to vibration. It is usually measured in mm/s.
Sound pressure level	The parameter by which sound levels are measured in air. It is measured in decibels. The threshold of hearing has been set at 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB at a distance of 1 metre and a change of 3dB in a time varying sound signal is commonly regarded as being just detectable. A change of 10dB is subjectively twice, or half, as loud.
Vibration dose value, or VDV	An index used to evaluate human exposure to vibration in buildings. While the PPV provides information regarding the magnitude of single vibration events, the VDV provides a measure of the total vibration experienced over a specified period of time (typically 16h daytime and 8h night-time). It takes into account the magnitude, the number and the duration of vibration events and can be used to quantify exposure to continuous, impulsive, occasional and intermittent vibration. The vibration dose value is measured in $m/s^{1.75}$.

1 Introduction

1.1.1 The nominated undertaker is required to undertake noise (and vibration) monitoring as necessary to comply with the requirements of the High Speed Rail (London-West Midlands) Environmental Minimum Requirements, including specifically Annex 1: Code of Construction Practice, in addition to any monitoring requirements arising from conditions imposed through consents under section 61 of the Control of Pollution Act, 1974 or through Undertakings & Assurances given to third parties. Such monitoring may be undertaken for the following purposes:

- monitoring the impact of construction works;
- to investigate complaints, incidents and exceedance of trigger levels; or
- monitoring the effectiveness of noise and vibration control measures.

Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the London Borough of Camden (LBC) for the period 1st to 30th November 2019.

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

- Network Rail on-networks HS2 preparatory works: worksites ref. G and H (see plans 1 to 3 in Appendix A)
  - Works included works at platforms (including fire-stopping works, installation of steel work for troughing and cabling, cabling and lighting installation, distribution box installation, site inspection and modifications of signals).
- DB Cargo shed and adjacent land on Granby Terrace, worksite ref. S001-WS01 (see plan 2 in Appendix A)
  - Works included materials processing and ancillary activities.
- Regent's Park Estate, worksite ref. S001–WS07 (see plan 2 and 3 in Appendix A)
  - Works activities included scaffolding and demolition.
- St James's Gardens, worksite ref. S003-WS01 (see plan 2 in Appendix A)
  - Works activities included backfilling.
- Wolfson House, Walkden House, 67-75 & 77-79 Euston Rd, worksite ref. S003-WS03 (see plan 3 in Appendix A)
  - Works activities included demolition and structural surveys.
- Thistle Hotel, Cardington Street, worksite ref. S003-WS04 (see plan 3 in Appendix A)
  - Works activities include demolition and backfilling.

- Ibis Hotel, 3 Cardington Street, worksite ref. S003-WS05 (see plan 3 in Appendix A)
  - Work activities included processing of arisings.
- Former National Temperance Hospital, 110 Hampstead Road, worksite ref. S003-WS06 (see plan 3 in Appendix A)
  - Site activities included deliveries.
- 93-103 Drummond Street, 11-15 Melton Street, 54-64 Euston Street, 69 Cobourg Street, worksite ref. S003-WS07 (see plan 3 in Appendix A)
  - Works activities included propping and backfilling.
- One Euston Square, 40 Melton Street, Grant Thornton House, 22 Melton Street, worksite ref. S003-WS09 (see plan 3 in Appendix A)
  - Works activities included demolition and scaffolding.

Excavation and duct installation works were also undertaken as part of the Granby Terrace Bridge utilities diversion (GTB Utilities) on Stanhope Street and Hampstead Road. Shaft fitout works were carried out at Park Village East / London Zoo Compound and pipe installation excavations and backfilling / reinstatement were carried out at Albany Street, Robert Street, Robert Street and Onsaburgh Street.

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

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

1.2 Measurement locations

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

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

Table 2: Monitoring locations.

Worksite Reference	Measurement Reference	Address
B	CC	Whittlebury Mews West
	JC	Juniper Crescent

Worksite Reference	Measurement Reference	Address
C	MT2	Lamppost opposite to 49 Mornington Terrace
	N022	External to 34 Mornington Terrace
	N024	External to Park Village Studios, Park Village East
D	N004	Mornington Terrace, lamppost #7 (junction of Mornington Terrace, Mornington Place and Clarkson Row)
E	N005	5A Granby Terrace
F	BS	Roof of Stockbeck House, Barnby Street
	N023	Lamppost #21 on Hampstead Road
G	HH	Euston Station Parcel Deck, Barnby Street
S001-WS01	N001	Park Village East, lamppost #1 (external to Cubitt Court, 100 Park Village East)
	N002	Park Village East, lamppost #2 (external to Richmond Court)
	N003	Park Village East, lamppost #9 (external to Silsoe House)
S001-WS02	N018	Outside replacement housing, Hampstead Road
	N019	Outside Cartmel, Hampstead Road
S001-WS07	N020	Mackworth Street, lamppost #1
	N021	Stanhope Street, lamppost #2
	N044	Regents Park Estate west, near Langdale
	N045	Regents Park Estate south, external to Coniston
	V039	Coniston, Regents Park Estate
	V043	Cubitt Court, Park Village East
S003-WS01	N016	Margarete 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)
	V002	Royal College of General Practitioners basement boiler room by Stephenson Way
	V037	Magic Circle, basement
	V038	Wesley Hotel, basement lightwell, Euston Street
S003-WS05	N014	Starcross Street lamppost (external to Exmouth Arms)
	V021	42-44 Cobourg Street
S003-WS06	N017	Hampstead Road, lamppost #48
S003-WS07	N012	Drummond Street, lamppost #14 (opposite to 92-94 Drummond Street)
S003-WS08	N007	Royal College of General Practitioners, Melton Street
	V003	Royal College of General Practitioners basement vaults under Melton St

Worksite Reference	Measurement Reference	Address
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 SOAEL.

Worksite Reference	Measurement Reference	Monitor Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
B	CC	Whittlebury Mews West	All days	All periods	No exceedance
	JC	Juniper Crescent	All days	All periods	No exceedance
C	MT2	Lamppost opposite to 49 Mornington Terrace	Night	2200–0700	1
	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 (junction of Mornington	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Monitor Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
		Terrace, Mornington Place and Clarkson Row)			
	N003	Park Village East, lamppost #9 (external to Silsoe House)	Night	2200-0700	1
E	N005	5A Granby Terrace	All days	All periods	No exceedance
F	BS	Roof of Stockbeck House, Barnby Street	All days	All periods	No exceedance
	N023	Lamppost #21 on Hampstead Road	All days	All periods	No exceedance
G	HH	Euston Station Parcel Deck, Barnby Street	All days	All periods	No exceedance
S001-WS01	N001	Park Village East, lamppost #1 (external to Cubitt Court, 100 Park Village East)	All days	All periods	No exceedance
	N002	Park Village East, lamppost #2 (external to Richmond Court)	All days	All periods	No exceedance
	N003	Park Village East, lamppost #9 (external to Silsoe House)	All days	All periods	No exceedance
S001-WS02	N018	Outside replacement housing, Hampstead Road	All days	All periods	No exceedance
	N019	Outside Cartmel, Hampstead Road	All days	All periods	No exceedance
S001-WS07	N020	Mackworth Street, lamppost #1	All days	All periods	No exceedance
	N021	Stanhope Street, lamppost #2	All days	All periods	No exceedance
	N044	Regents Park Estate west, near Langdale	All days	All periods	No exceedance
	N045	Regents Park Estate south, external to Coniston	All days	All periods	No exceedance
S003-WS01	N016	Margarete Centre	All days	All periods	No exceedance
S003-WS03	N006	Royal College of General Practitioners roof level	All days	All periods	No exceedance
	N008	Stephenson's Way lamppost (external to RCGP)	All days	All periods	No exceedance
	N010	Wesley Hotel	All days	All periods	No exceedance
	N011	Euston Street, lamppost #4 (external to 82 Euston Street)	All days	All periods	No exceedance
S003-WS05	N014	Starcross Street lamppost (external to Exmouth Arms)	All days	All periods	No exceedance

Worksite Reference	Measurement Reference	Monitor Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
S003-WS06	N017	Hampstead Road, lamppost #48	All days	All periods	No exceedance
S003-WS07	N012	Drummond Street, lamppost #14 (opposite to 92-94 Drummond Street)	All days	All periods	No exceedance
S003-WS08	N007	Royal College of General Practitioners, Melton Street	All days	All periods	No exceedance
Not near worksite	N025	External to 3 Prince Albert Road	All days	All periods	No exceedance
Not near worksite	N026	Thames Water Compound	All days	All periods	No exceedance

2.1.4 Exceedances of the SOAEL were measured at locations in proximity to worksite C and D and were associated with the recovery of redundant signalling asset during one night time period.

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

Table 4: Summary of total exceedances of SOAEL.

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
C	MT2	Lamppost opposite to 49 Mornington Terrace	1
D	N003	Park Village East, lamppost #9 (external to Silsoe House)	1

2.1.6 Construction and demolition works taking place at worksites S001-WS07, S003-WS03, S003-WS04 and S003-WS09 were ongoing for the majority of the period and are likely to have given rise to noise which would have been audible beyond the site boundary and, at times, in excess of the LOAEL at sensitive receptors.

2.1.7 Activities taking place at other worksites were either intermittent or not considered to give rise to substantial levels of HS2 related construction noise during this period, with the measured noise levels largely dominated by the underlying ambient noise, acknowledging that intermittent HS2 works may on occasion be taking place within the area.

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

2.2 Summary of measured noise and vibration levels

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

2.2.2 Noise monitoring in the vicinity of worksites G, H, S001-WS07, S003-WS03, S003-WS04, S003-WS07 and S003-WS09 is considered representative of HS2 works in LBC during periods of construction works. Other worksites were not considered to be giving rise to substantial levels of HS2 related construction noise, with the measured noise levels largely dominated by the underlying ambient noise, acknowledging that intermittent HS2 works may on occasion be taking place within the area.

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

Worksite Reference	Measurement Reference	Monitor Address	Free-field or Façade measurement	Weekday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)				Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)				Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)			
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
B	CC	Whittlebury Mews West	Free-field	60.7 (63.2)	59.1 (61.0)	63.5 (66.3)	62.2 (68.7)	55.5 (62.6)	59.5 (60.6)	61.4 (61.9)	62.2 (63.2)	61.0 (67.6)	55.0 (60.5)	61.0 (64.3)	56.1 (60.0)
	JC	Juniper Crescent	Free-field	59.5 (63.8)	60.1 (65.8)	59.6 (64.0)	59.3 (65.6)	55.9 (65.8)	56.9 (60.6)	58.4 (63.9)	56.0 (56.4)	59.2 (69.5)	56.8 (63.4)	58.6 (66.3)	54.7 (62.5)
C	MT2	Lamppost opposite to 49 Mornington Terrace	Free field	63.6 (64.5)	63.8 (66.2)	63.8 (65.7)	62.8 (64.6)	58.6 (63.6)	62.2 (63.5)	62.8 (63.9)	61.4 (61.9)	61.9 (63.3)	57.9 (62.6)	61.6 (64.7)	58.0 (62.5)
	N022	52A Mornington Terrace	Free-field	60.6 (61.6)	61.6 (64.1)	61.3 (63.6)	60.0 (62.0)	55.5 (61.1)	58.9 (60.3)	60.7 (62.5)	58.8 (59.1)	59.5 (62.1)	55.5 (59.1)	58.6 (63.0)	54.7 (59.2)
	N024	External to Park Village Studios, Park Village East	Free-field	57.0 (66.4)	64.1 (78.9)	57.9 (66.4)	54.6 (62.4)	50.9 (61.0)	53.1 (55.2)	59.3 (80.0)	53.5 (54.8)	56.0 (60.7)	52.7 (60.2)	53.9 (64.5)	51.1 (56.3)
D	N004	Mornington Terrace, lamppost #7	Free-field	62.3 (63.7)	65.3 (66.6)	63.1 (67.5)	61.8 (63.2)	57.1 (62.4)	61.2 (62.2)	62.3 (63.2)	61.0 (61.3)	60.8 (64.3)	56.0 (60.5)	60.6 (64.1)	56.9 (60.9)
E	N005	5A Granby Terrace	Free-field	66.1 (67.5)	68.0 (68.8)	66.5 (70.5)	65.7 (70.5)	63.7 (69.8)	65.4 (67.8)	65.8 (66.6)	66.3 (66.9)	65.4 (68.8)	64.0 (65.5)	64.9 (66.4)	63.6 (66.6)
F	BS	Roof of Stockbeck House, Barnby Street	Free-field	60.6 (61.5)	62.2 (64.7)	61.3 (71.1)	60.4 (63.6)	57.6 (64.1)	59.6 (60.9)	60.5 (61.6)	60.6 (62.0)	59.7 (65.3)	56.4 (59.6)	59.5 (62.3)	57.4 (61.7)
	N023	Ampthill Estate, Hampstead Road	Free-field	72.6 (75.3)	71.6 (72.2)	71.5 (77.1)	70.7 (74.4)	69.0 (72.4)	70.7 (72.0)	70.8 (71.1)	71.2 (72.0)	71.0 (73.3)	70.3 (75.7)	70.3 (73.0)	68.2 (71.2)

Worksite Reference	Measurement Reference	Monitor Address	Free-field or Façade measurement	Weekday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)				Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)				Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)			
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
G	HH	Euston Station Parcel Deck, Barnby Street	Free-field	63.2 (68.1)	66.8 (69.6)	65.0 (70.4)	63.0 (72.0)	61.7 (67.7)	62.7 (65.0)	64.1 (65.0)	64.9 (66.4)	64.8 (72.1)	62.1 (66.2)	63.6 (71.7)	60.5 (64.0)
S001-WS01	N001	External to Cubitt Court, 100 Park Village East	Façade	57.4 (61.9)	68.8 (74.6)	57.8 (72.1)	56.5 (63.6)	52.5 (59.6)	55.3 (56.3)	62.5 (70.2)	64.2 (77.0)	57.6 (67.7)	52.9 (57.6)	55.3 (57.5)	51.8 (55.7)
	N002	Richmond Court, Park Village East	Free-field	59.1 (61.4)	63.8 (75.5)	60.8 (68.3)	59.0 (62.2)	54.2 (60.2)	56.6 (57.2)	59.8 (61.0)	59.9 (60.7)	60.1 (65.7)	55.1 (60.3)	58.0 (62.5)	53.5 (58.0)
	N003	Silsoe House, Park Village East	Free-field	59.3 (60.3)	62.6 (64.1)	61.1 (65.1)	59.6 (62.5)	54.7 (59.7)	57.2 (58.0)	59.7 (60.5)	59.8 (60.5)	61.0 (69.0)	56.0 (63.3)	58.3 (63.4)	54.1 (59.6)
S001-WS02	N018	Outside replacement housing, Hampstead Road	Free-field	72.6 (73.5)	73.8 (77.8)	73.8 (76.9)	73.2 (76.2)	71.9 (76.1)	72.1 (72.9)	73.2 (73.6)	74.5 (77.4)	73.6 (75.8)	72.7 (74.4)	72.8 (75.3)	70.9 (73.3)
	N019	Outside Cartmel, Hampstead Road	Free-field	71.1 (72.3)	72.6 (74.3)	72.3 (74.0)	71.8 (75.4)	70.6 (76.2)	71.7 (73.6)	71.7 (72.5)	73.6 (76.8)	72.6 (76.6)	71.2 (73.5)	71.3 (77.1)	70.0 (75.8)
S001-WS07	N020	Mackworth Street	Free-field	54.2 (59.7)	63.1 (68.0)	54.0 (72.7)	53.3 (68.3)	50.9 (59.4)	51.4 (52.5)	58.1 (62.7)	56.6 (59.3)	56.2 (67.5)	51.4 (54.5)	52.3 (57.0)	50.4 (52.4)
	N021	Stanhope Street, lamppost #2	Free-field	52.3 (58.3)	67.8 (77.9)	52.8 (71.5)	52.2 (71.6)	48.5 (58.7)	52.2 (54.0)	59.9 (72.5)	63.3 (82.4)	54.7 (69.1)	49.0 (51.5)	50.6 (55.5)	47.2 (50.5)
	N044	Regents Park Estate west	Free field	52.6 (56.1)	69.0 (78.3)	52.8 (73.8)	52.4 (69.4)	49.7 (59.0)	51.8 (52.7)	59.3 (70.0)	58.2 (68.1)	54.3 (66.8)	50.2 (53.2)	50.6 (55.5)	48.5 (51.0)
	N045	Regents Park Estate south, external to Coniston	Free field	57.5 (58.7)	63.1 (68.6)	58.5 (65.5)	57.6 (61.8)	56.2 (63.6)	57.4 (58.5)	58.6 (59.6)	58.9 (61.0)	59.0 (68.6)	56.6 (59.3)	57.1 (59.8)	55.5 (57.7)

Worksite Reference	Measurement Reference	Monitor Address	Free-field or Façade measurement	Weekday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)				Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)				Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)			
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
S003-WS03	N006	RCGP Roof level	Free-field	57.6 (66.7)	66.2 (70.1)	54.9 (66.2)	54.2 (61.9)	53.3 (57.9)	54.2 (55.5)	56.6 (59.3)	54.1 (54.4)	54.3 (58.9)	53.1 (54.3)	53.8 (56.0)	52.7 (54.1)
	N008	RCGP Stephenson Way	Façade	65.4 (71.9)	66.3 (68.5)	58.2 (69.4)	56.8 (66.1)	58.5 (70.5)	57.2 (58.2)	57.2 (57.9)	55.0 (55.5)	56.7 (62.9)	54.6 (56.3)	56.0 (62.9)	59.5 (73.4)
	N010	Wesley Hotel	Façade	66.4 (67.2)	67.2 (69.9)	65.5 (67.5)	65.4 (67.0)	60.4 (66.2)	66.4 (66.7)	65.7 (65.9)	65.5 (65.7)	65.8 (66.4)	61.3 (67.5)	65.7 (66.2)	61.2 (66.3)
	N011	Outside 82 Euston Street	Free-field	59.8 (64.9)	61.1 (62.9)	57.4 (63.1)	56.4 (61.4)	54.8 (61.7)	56.9 (58.6)	58.2 (59.3)	57.6 (61.0)	56.7 (61.9)	53.5 (56.3)	56.1 (62.2)	53.4 (57.6)
S003-WS05	N014	Starcross Street	Free-field	56.9 (61.3)	59.6 (63.0)	58.0 (65.0)	56.9 (64.2)	52.5 (66.3)	54.6 (55.9)	57.2 (61.4)	54.9 (55.8)	56.3 (64.6)	51.7 (56.7)	54.8 (64.7)	51.7 (56.7)
S003-WS01	N016	Margaret Centre roof	Free-field	59.1 (61.1)	61.5 (63.8)	58.3 (65.4)	57.7 (61.8)	56.7 (61.4)	58.5 (60.7)	60.0 (62.2)	57.9 (58.8)	57.8 (62.3)	56.6 (57.9)	56.7 (59.1)	55.7 (58.0)
S003-WS06	N017	Hampstead Road, lamppost #48	Free-field	72.9 (74.5)	73.0 (74.8)	72.5 (76.5)	72.3 (75.5)	70.6 (74.9)	72.9 (76.3)	72.5 (73.4)	73.8 (77.4)	72.6 (76.9)	71.3 (74.1)	71.3 (76.0)	70.2 (72.4)
S003-WS07	N012	Opposite 92-94 Drummond Street	Free-field	60.2 (63.4)	63.1 (70.8)	59.8 (62.7)	60.2 (64.0)	57.5 (70.6)	58.5 (59.6)	61.3 (63.5)	59.4 (61.0)	60.6 (66.6)	57.0 (59.3)	59.7 (65.8)	57.2 (60.3)
S003-WS08	N007	RCGP, Melton Street	Free-field	66.6 (68.8)	68.9 (73.1)	65.8 (68.5)	65.4 (67.0)	64.3 (68.4)	65.8 (67.4)	67.6 (71.2)	64.8 (65.2)	65.2 (67.6)	63.7 (65.7)	64.8 (69.6)	63.9 (66.6)
Not near worksite	N025	External to 3 Prince Albert Road	Free-field	69.8 (72.3)	69.2 (70.4)	68.2 (72.7)	68.1 (73.1)	66.3 (70.7)	67.6 (68.2)	68.1 (68.7)	67.5 (68.9)	68.0 (71.2)	67.6 (71.9)	67.5 (73.2)	66.1 (71.4)
Not near worksite	N026	Thames Water Compound	Free-field	59.3 (60.5)	62.7 (65.9)	58.3 (62.5)	57.5 (60.8)	54.1 (62.1)	56.5 (59.8)	57.4 (59.4)	58.8 (60.4)	58.0 (61.1)	55.5 (58.9)	56.9 (62.3)	53.6 (57.3)

2.2.3 Table 6 presents a summary of the measured vibration levels at monitoring locations V002, V003, V021, V037, V038 and V039 over the reporting period. The highest PPV measured during the monitoring along any axis is presented in the table.

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

Worksite Reference	Measurement Reference	Monitor Address	Highest PPV measured in any axis, mm/s
S001-WS07	V039	Coniston, Regents Park Estate	0.62 (Y-axis)
	V043	Cubitt Court, Park Village East	0.57 (Z-axis)
S003-WS03	V002	Royal College of General Practitioners basement boiler room by Stephenson Way	0.51 (Z-axis)
	V037	Magic Circle, basement	0.57 (X-axis)
	V038	Wesley Hotel, basement lightwell, Euston Street	1.96 (Z-axis)
S003-WS05	V021	42-44 Cobourg Street (floor)	0.51 (Z-axis)
S003-WS09	V003	Royal College of General Practitioners basement vaults under Melton St	0.57 (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 consists of the hourly L_{Aeq} values and, where relevant, the $L_{Aeq,T}$ values (where the time period T has been taken to be the averaging period as specified in Table 1 of HS2 Information Paper E23). Vibration data presented consist of hourly PPV values. The full data set for the monitoring equipment can be found at the following location: https://data.gov.uk/dataset/24542ae7-dd44-444f-b259-871c4cc43b5e/environmental-monitoring-data.

2.3 Exceedances of trigger level

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

Table 7: Summary of exceedances of trigger levels.

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

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

2.4 Complaints

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

Table 8: Summary of complaints.

Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
HS2-20-14083-C	G	Complaint from resident adjacent to worksite G about high noise levels at night.	Complaint potentially attributable to the dismantling of a HAKI staircase causing short-duration banging and clanging noise. The methodology adopted was not authorised.	The person responsible has been re-briefed and reminded of consented hours. Importance of compliance to S61 consented hours and management of construction noise to be reinforced through a series of talks, briefings, information posters and monthly newsletters. Implementation of improved communication and complaint handling procedures.
HS2-19-11150-C	C/D/E	Complaint from a resident on Park Village East regarding long-lasting exposure to high noise levels from construction activities.	The complaint is regarding ongoing, long-term exposure and not related to any specific event.	A response has been provided to the resident. The complaint is still open.

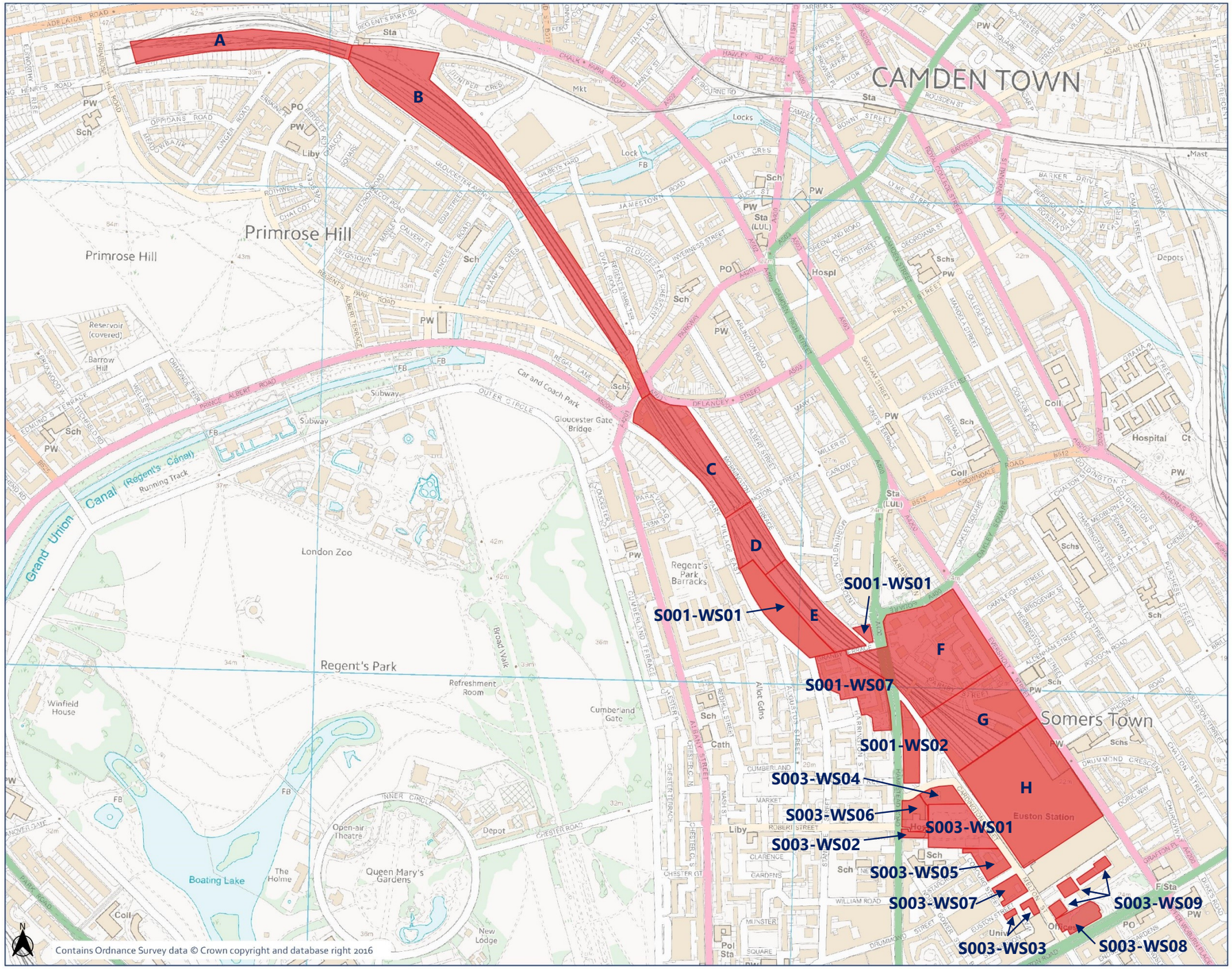
Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
HS2-19-11685-C	S001-WS04	Complaint from Regent's Park Estate regarding perceptible vibration from isolated event.	No demolition works taking place at the time. Only potential source of vibration at time of complaint from tracking movement of excavator being used to move demolition arisings. No significant vibration events measured at adjacent receptors.	Further communication to residents regarding works and ongoing monitoring.
HS2-19-11829-C	S001-WS07	Complaint from resident of Cartmel, Regent's Park Estate regarding high noise levels from drilling.	Methodology and noise monitoring data demonstrate compliance with S61.	Resident advised on programme of works.
HS2-19-11934-C	S001-WS04	Complaint from resident at Regent's Park Estate regarding dust and generalised noise.	Ongoing demolition works. Methodology and noise monitoring data demonstrates compliance with s61.	Further communication to residents regarding works and ongoing monitoring.
HS2-19-11955-C	S001-WS04	Complaint from non-residential premises at Regent's Park Estate regarding dust and perceptible vibration.	Potential sources of transient vibration events include occasional tracking of plant movements on worksite S001-WS04 or occasional nearby plant movements at Stanhope St utility works. Such transient vibration events could potentially be perceptible, however methodology and noise monitoring data demonstrates compliance with S61.	Further communication to residents regarding works and ongoing monitoring.
HS2-19-12180-C	-	Complaint from a resident on Park Village East regarding night-time noise disturbance from on-network construction activities.	No HS2 on-network construction activities were being undertaken at the time of the complaint.	Resident advised of findings. No further action taken.

Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
HS2-19-12233-C	S003-WS09	Complaint from non-residential property regarding noise from demolition of Grant Thornton House.	Breakout of RC beam as part of Grant Thornton 1st floor slab demolition, with associated short terms elevated noise levels. Methodology and monitoring data complaint with S61 and TAP.	Review future sequencing to ensure works are mitigated in line with BPM.

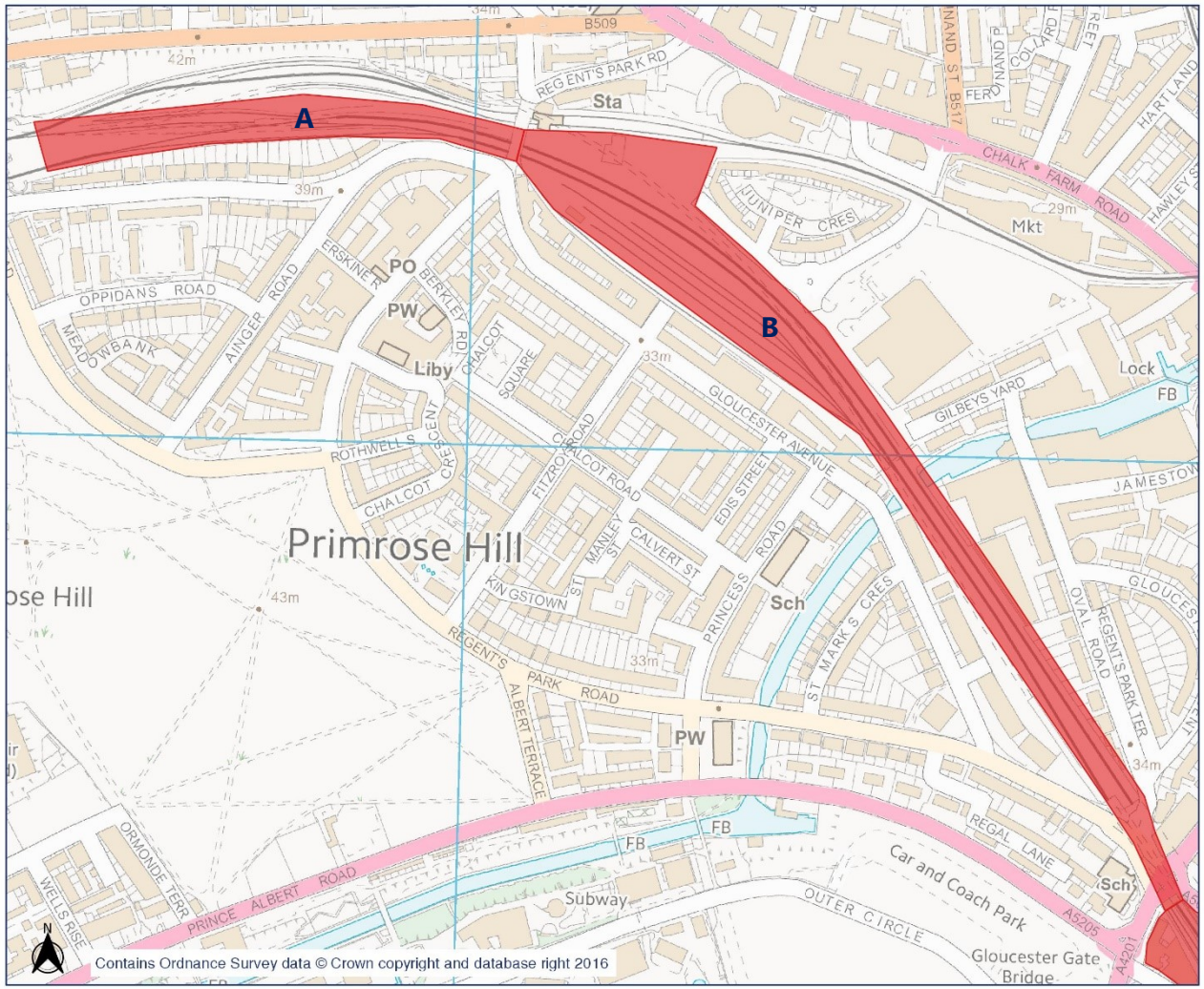
Appendix A Site Locations

HS2

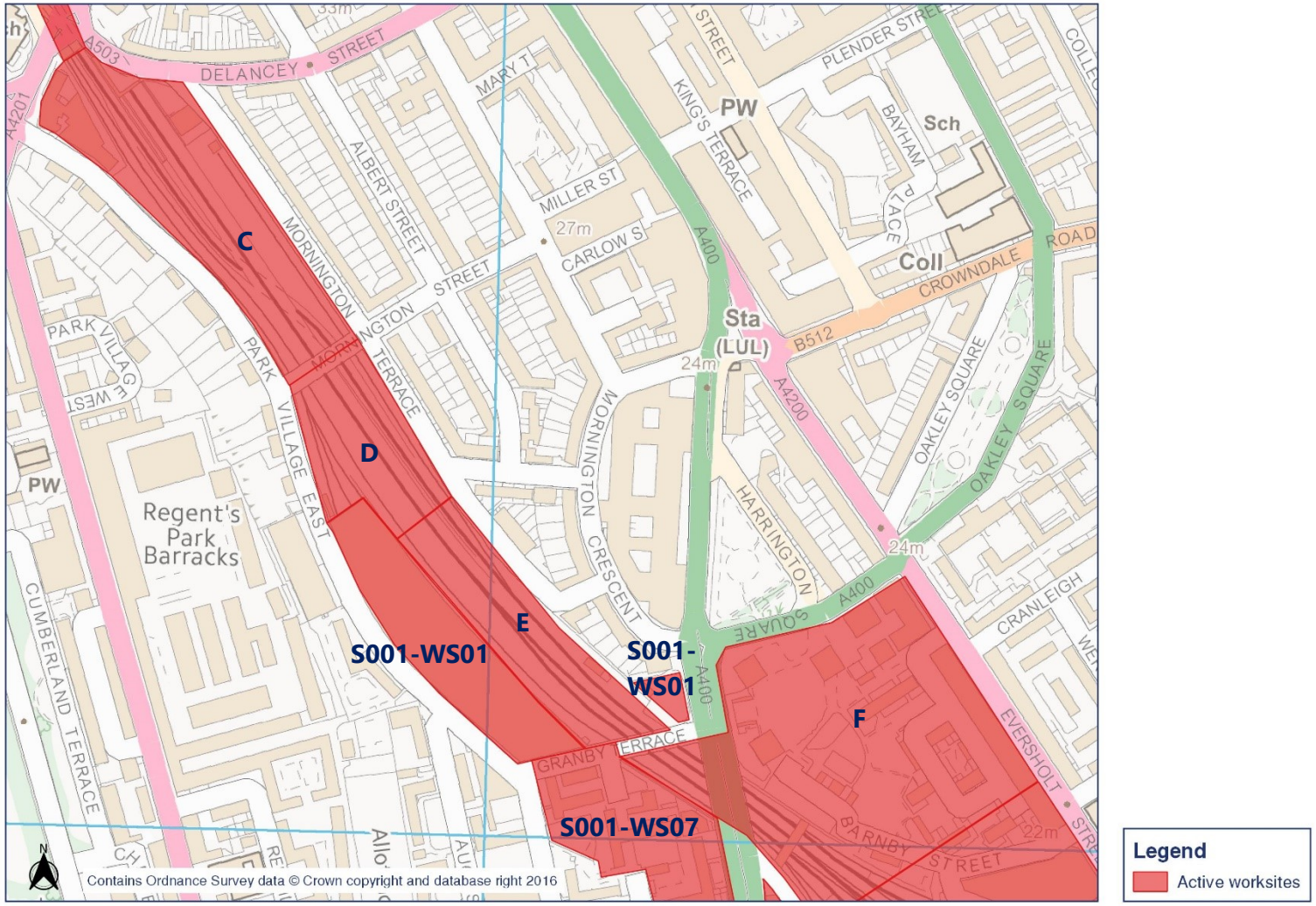
Worksite identification plan - Overview



Worksite identification plan - 1

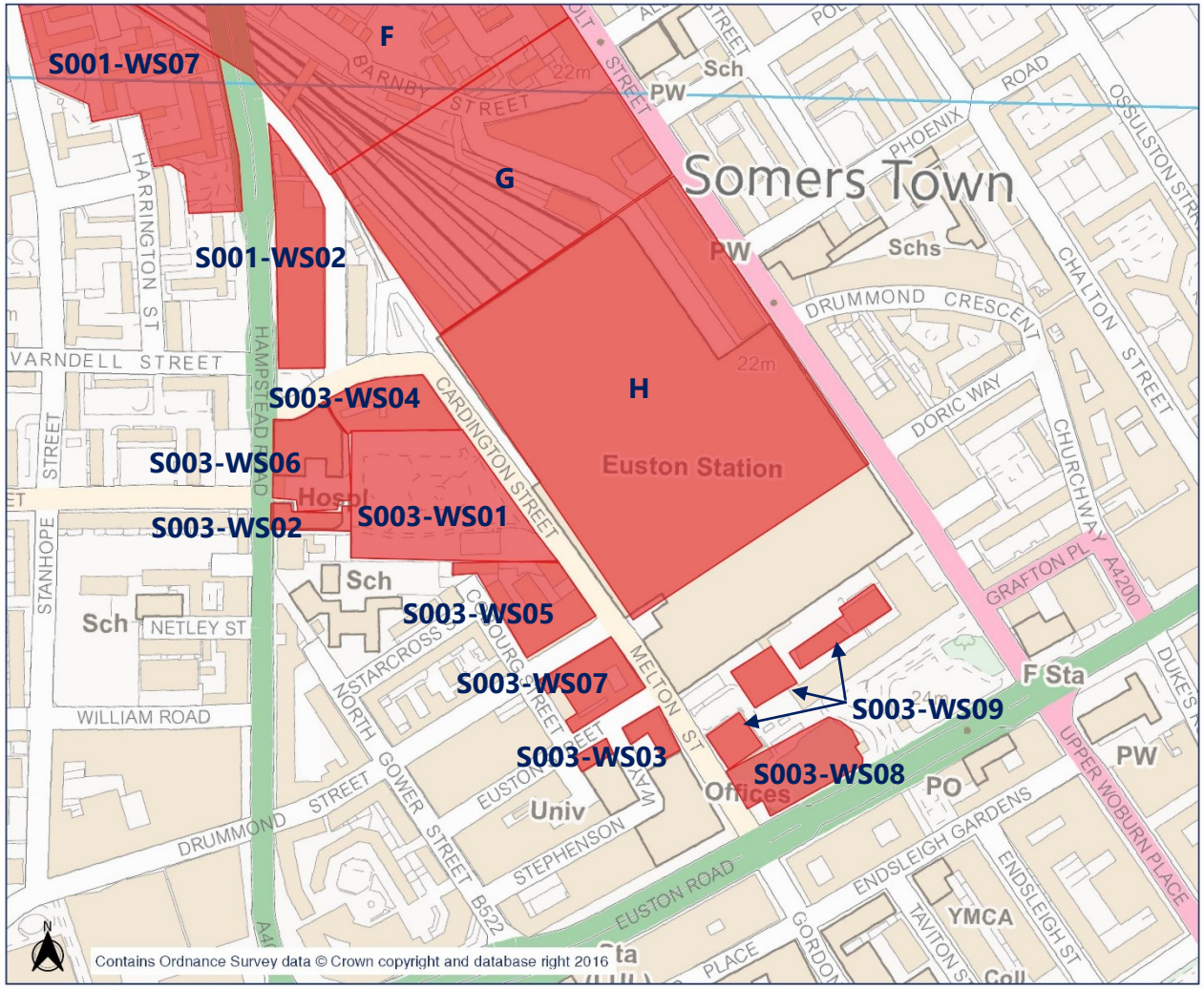


Worksite identification plan - 2



HS2

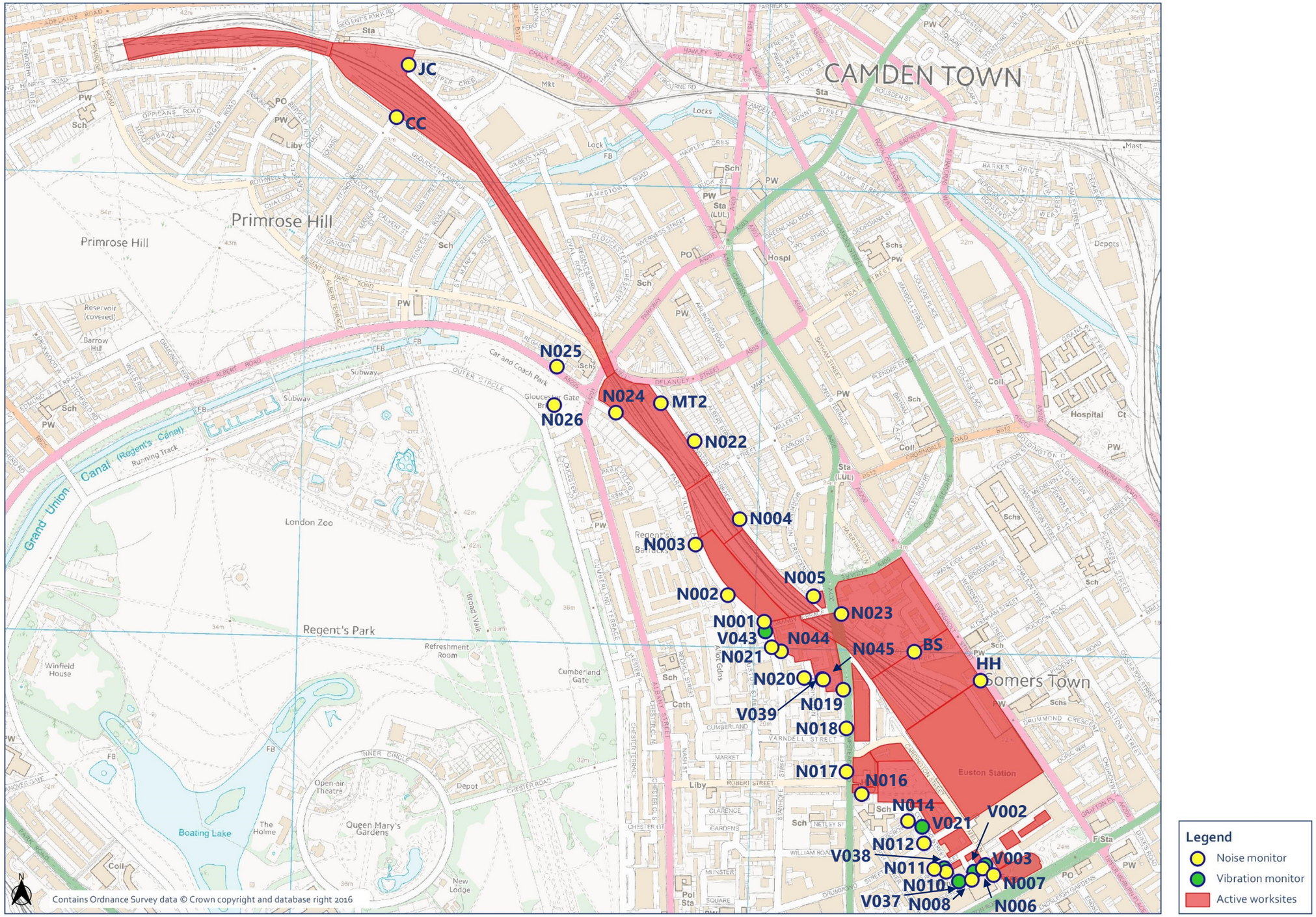
Worksite identification plan - 3



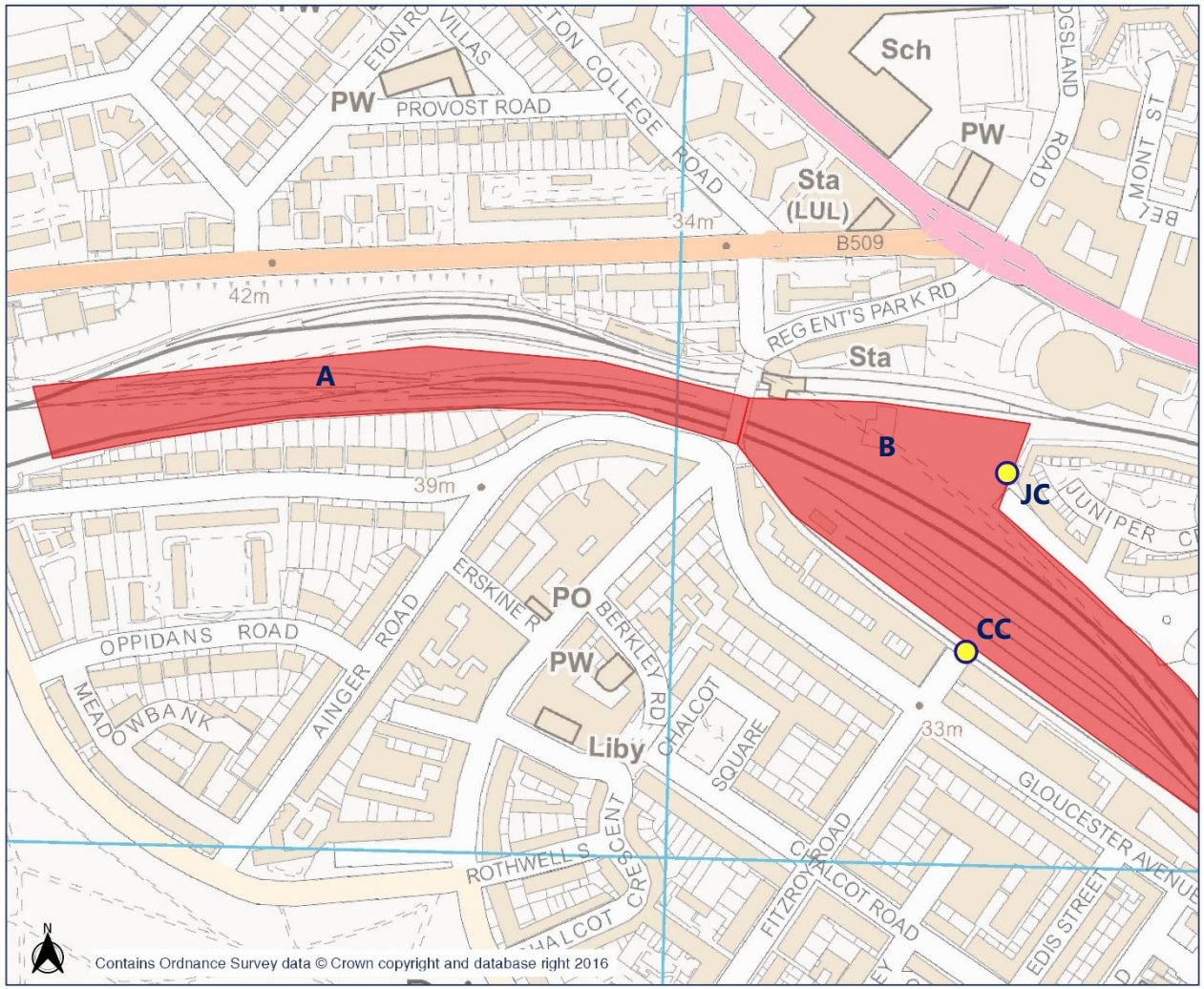
Appendix B Monitoring Locations

HS2

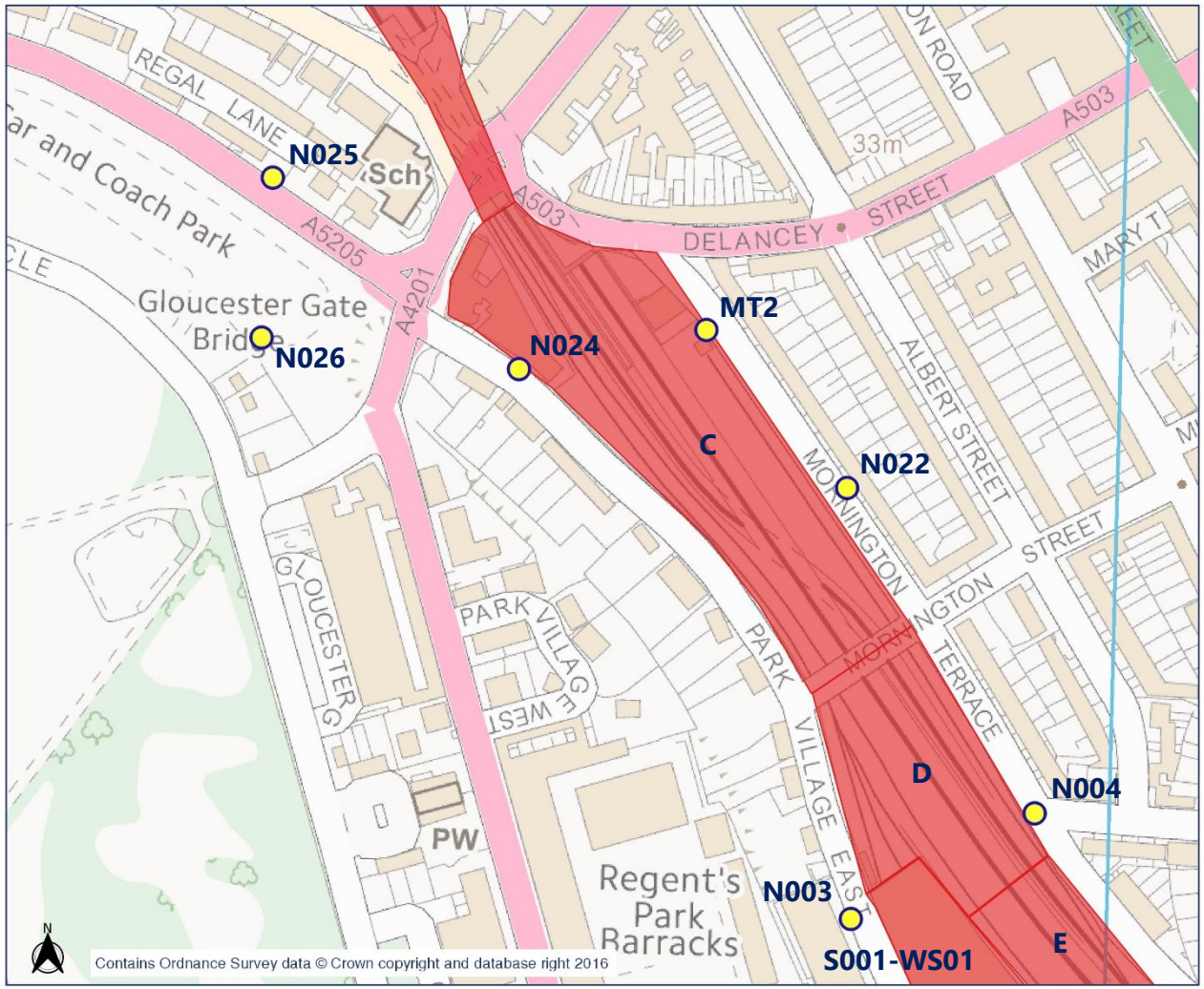
Noise monitoring plan - Overview



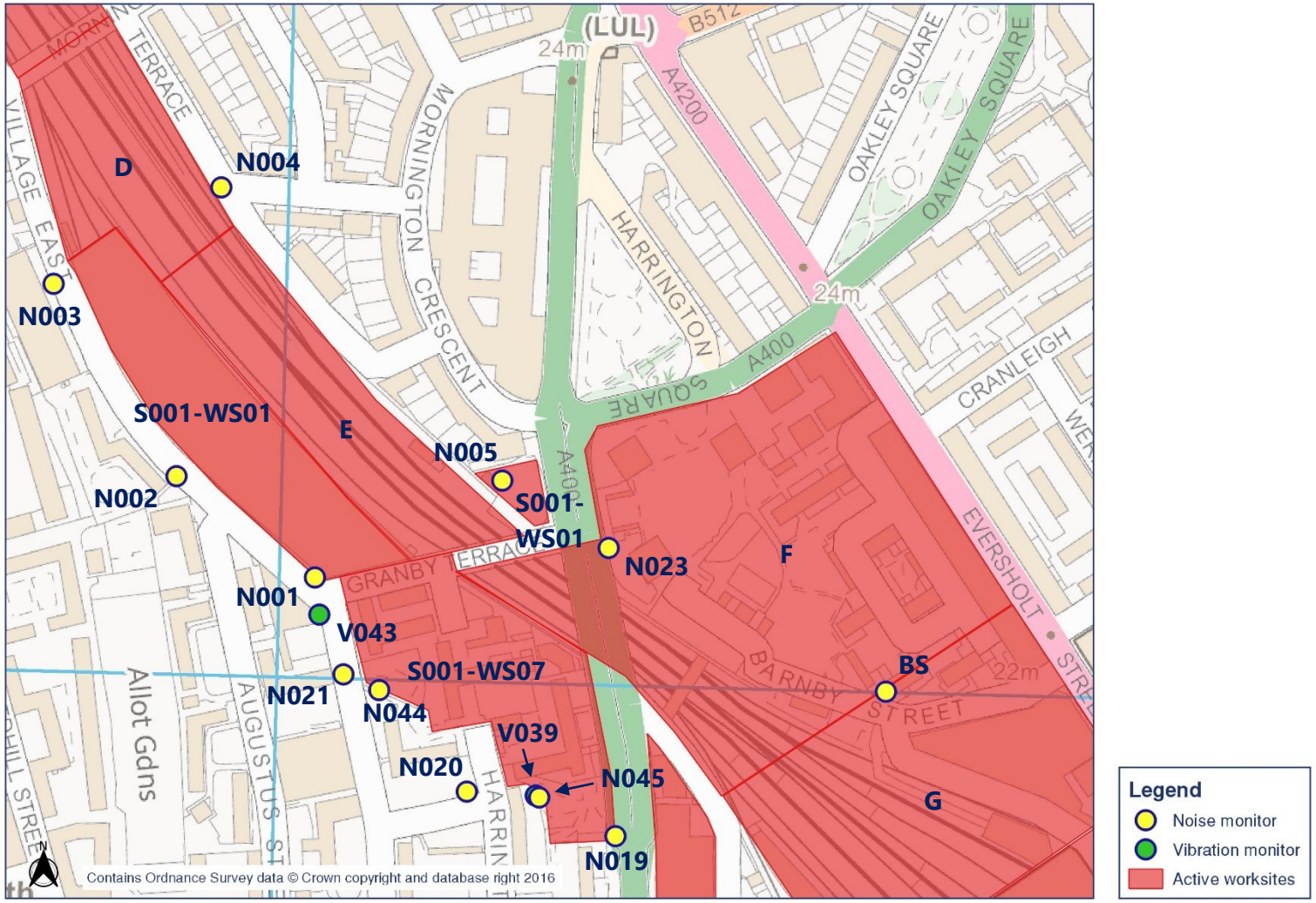
Noise monitoring plan - 1



Noise monitoring plan - 2

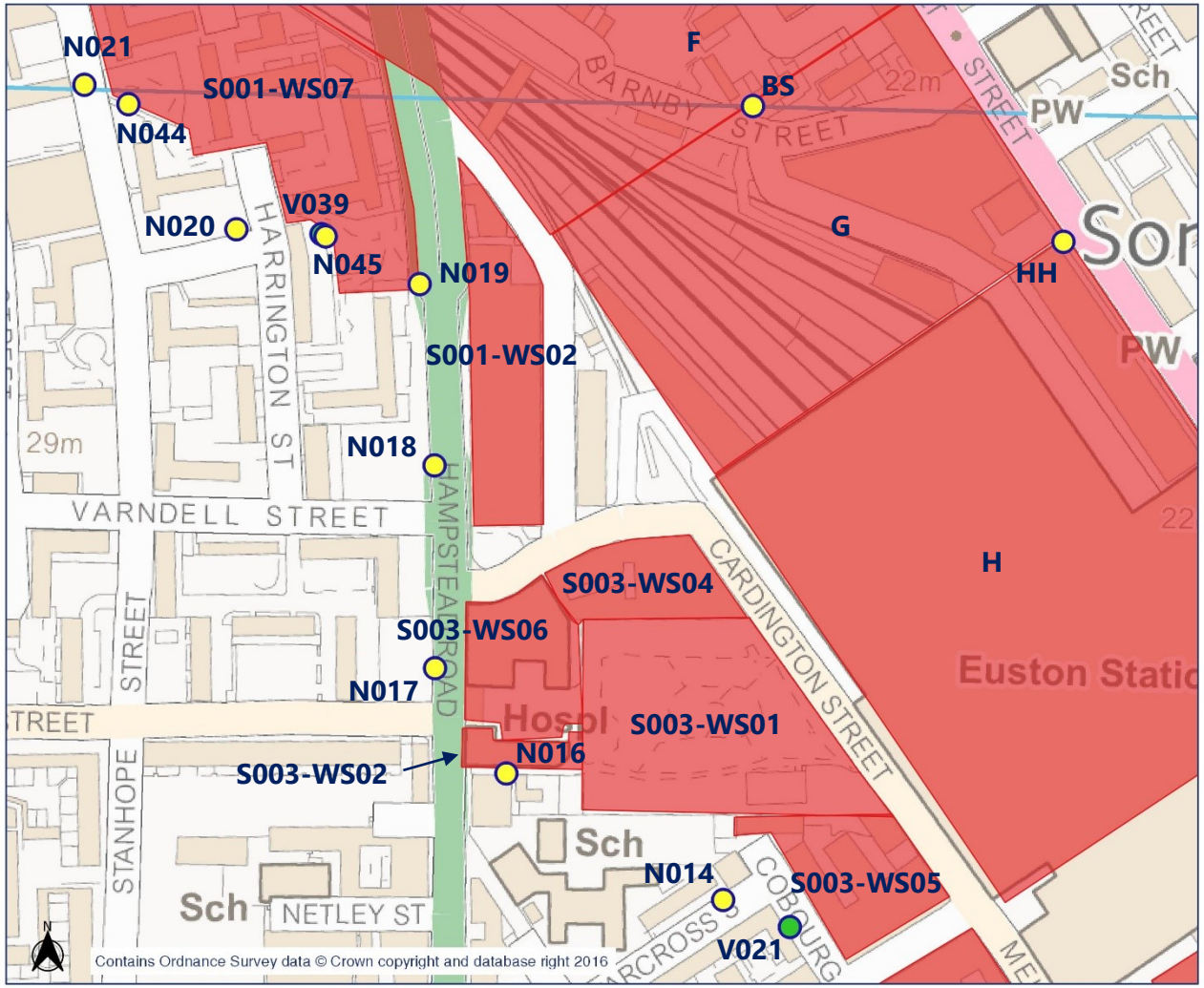


Noise monitoring plan - 3



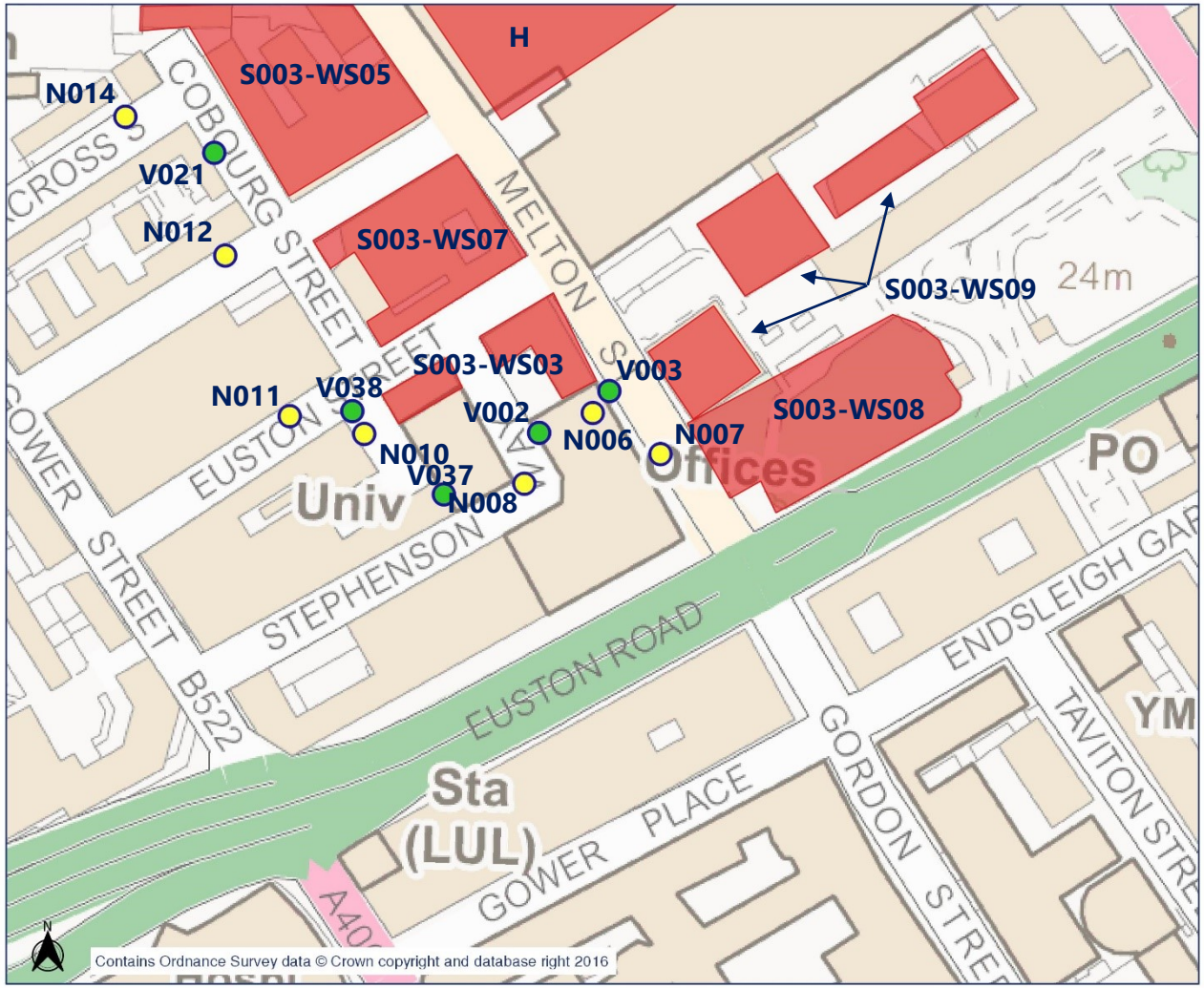
HS2

Noise monitoring plan - 4



HS2

Noise monitoring plan - 5



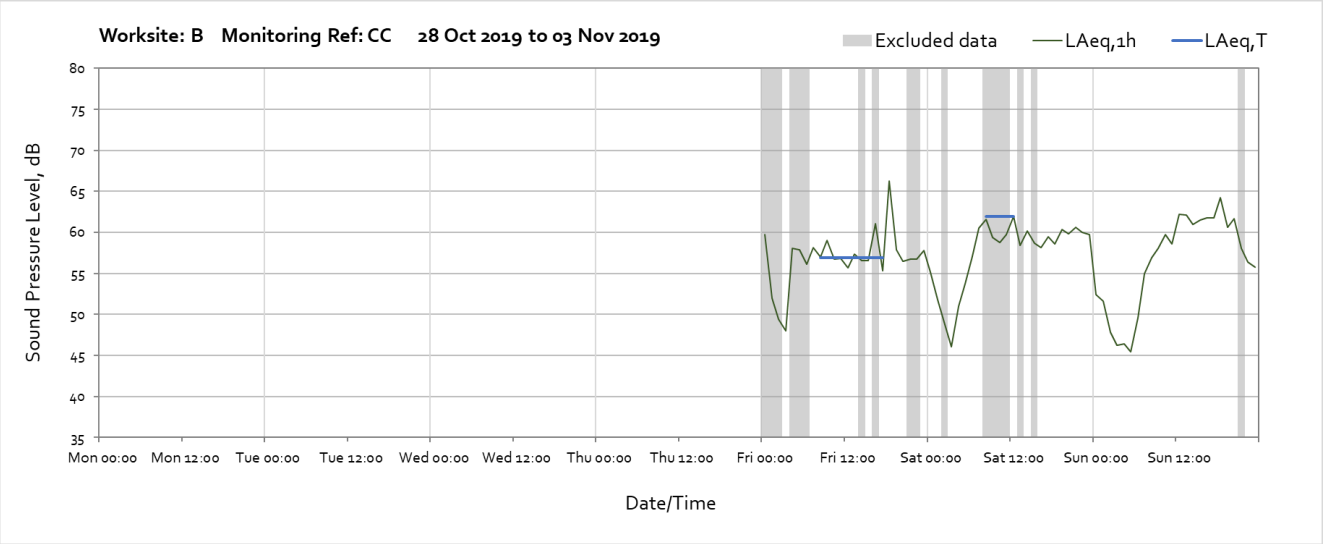
Legend
- Noise monitor
- Vibration monitor
- Active worksites

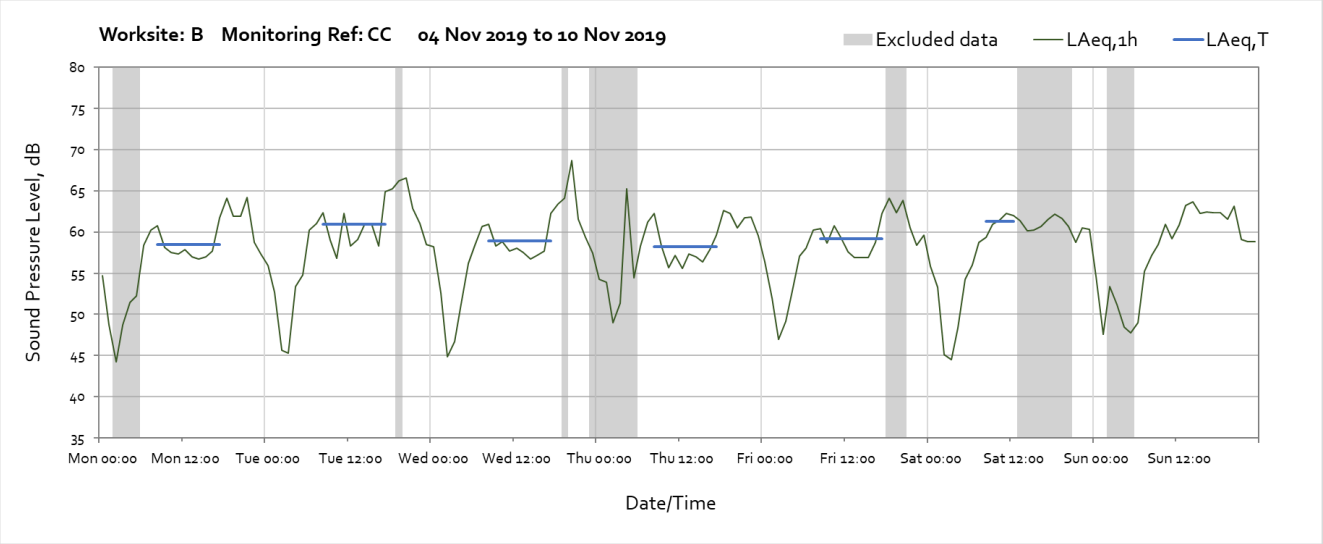
Appendix C Data

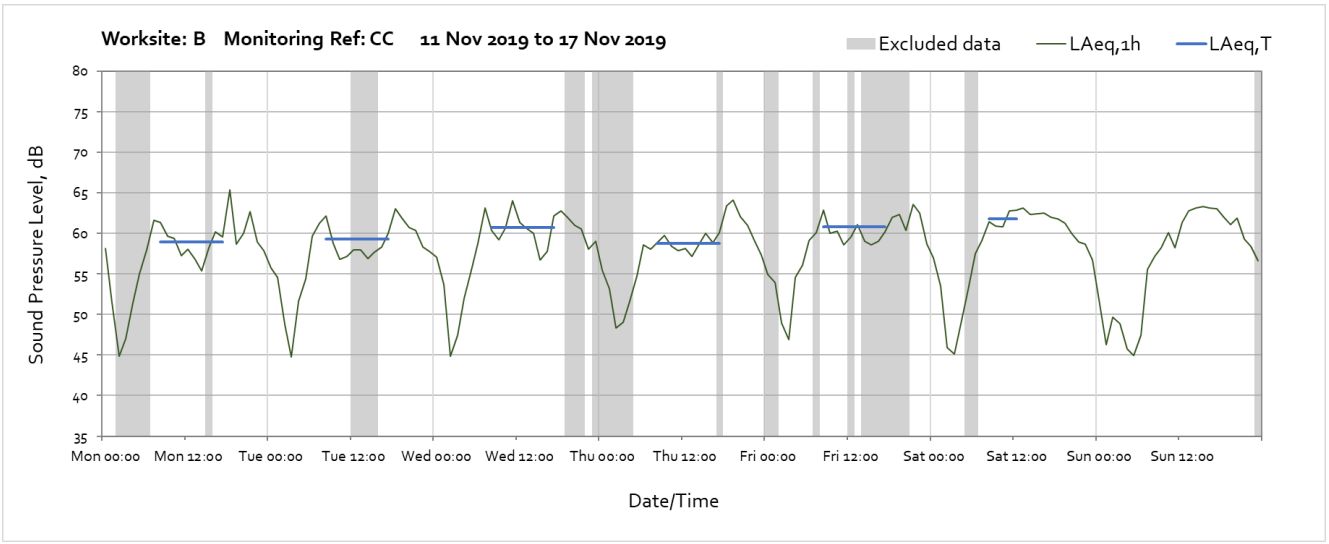
Noise

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

Worksite: B – Monitoring Ref: CC



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LAeq,T
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70
65
60
55
50
45
40
35
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Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
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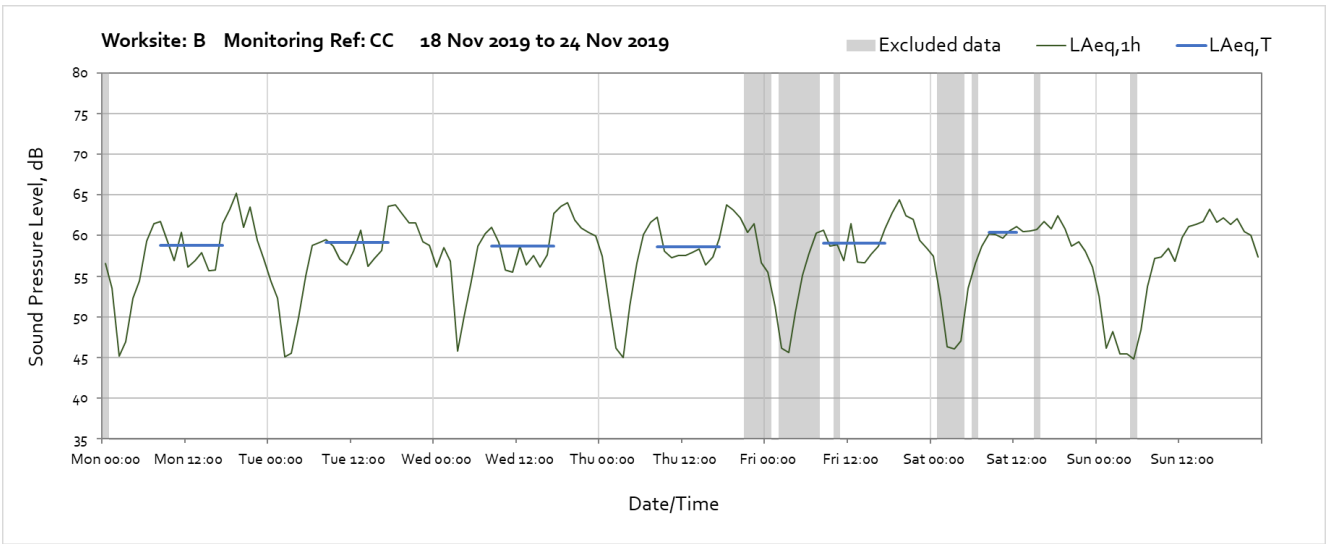
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time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LAeq,T
Sound Pressure Level, dB
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75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
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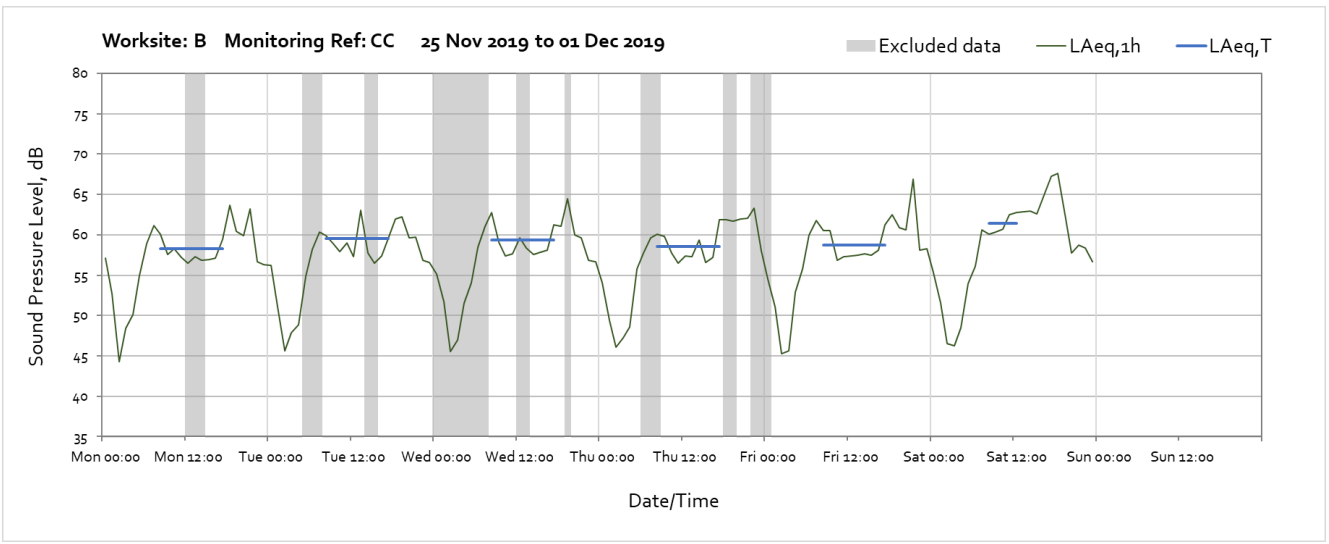
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time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Tue 12:00
Wed 00:00
Wed 12:00
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Date/Time

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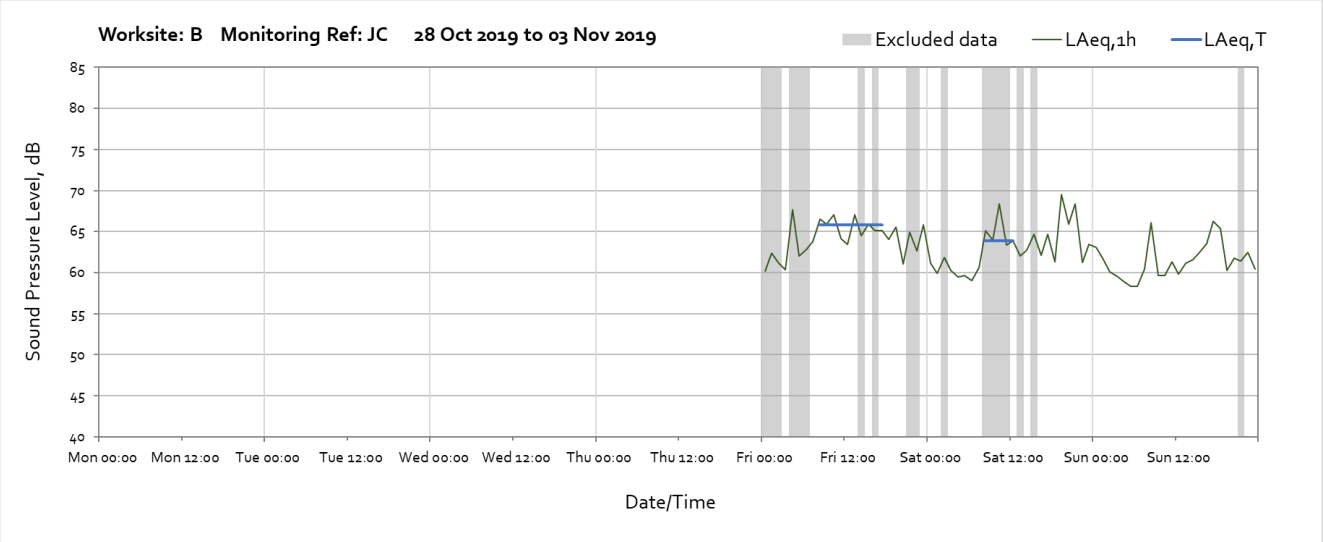
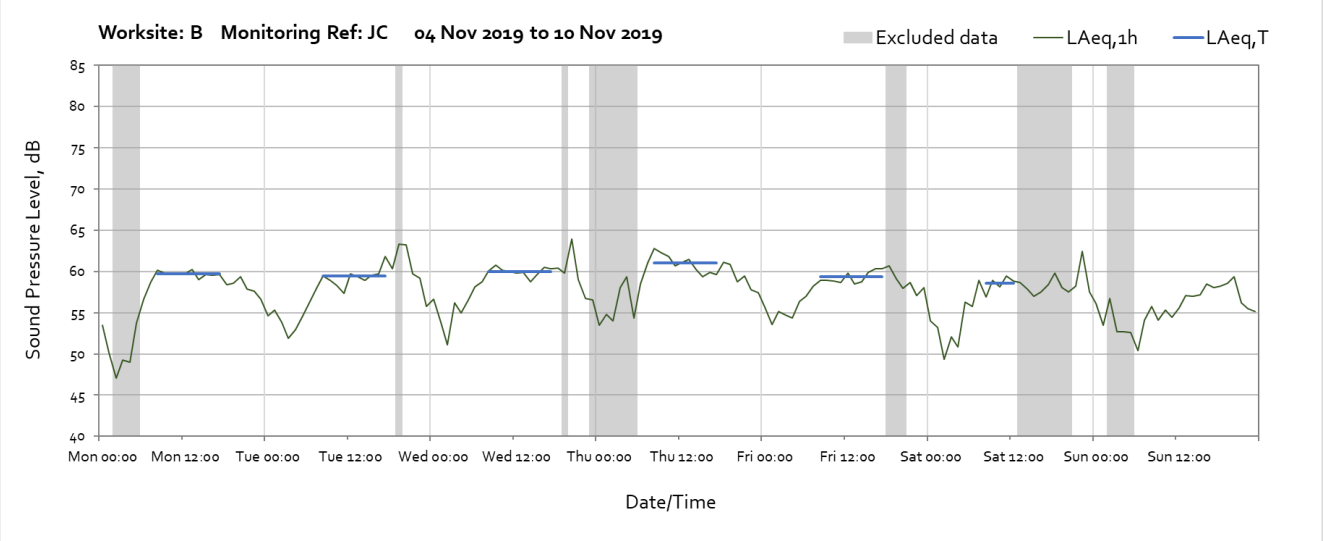
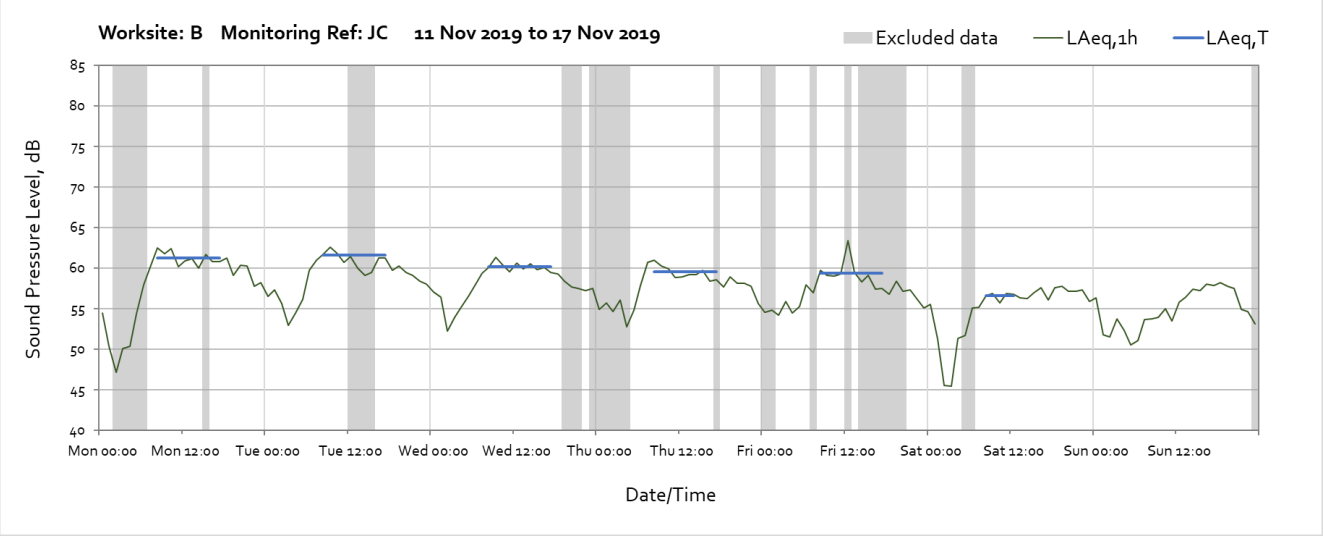
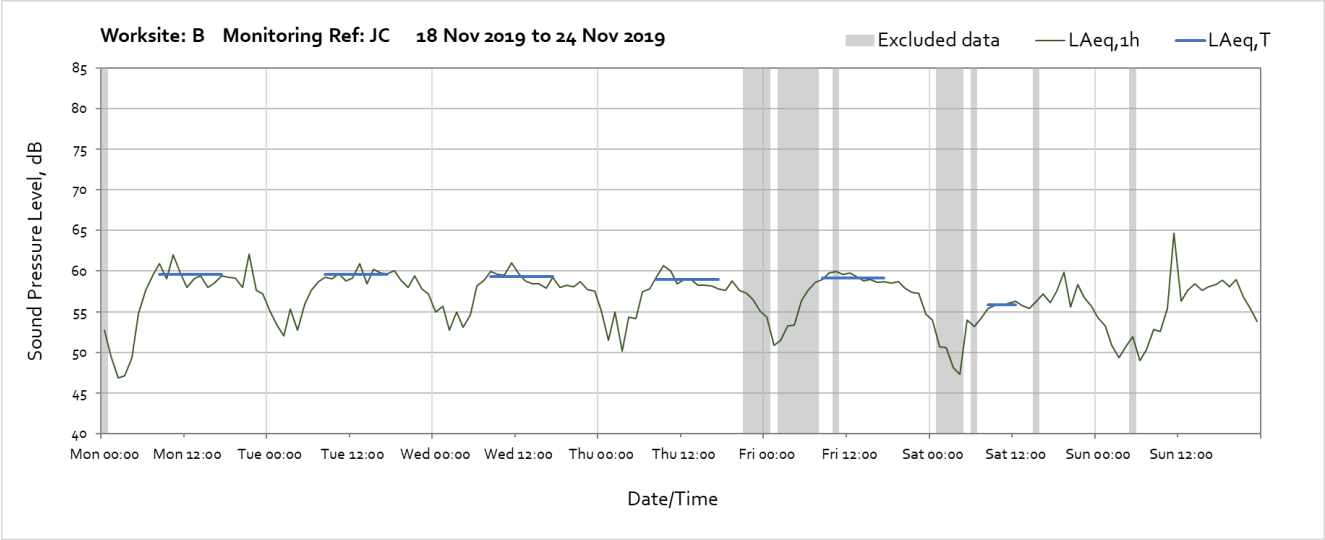
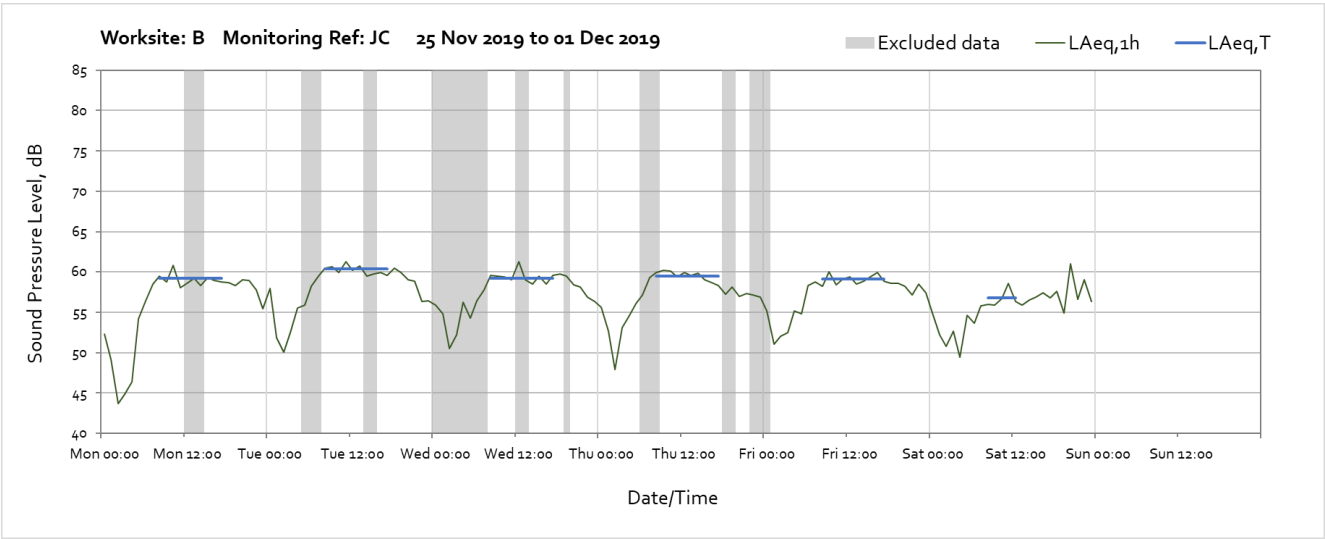


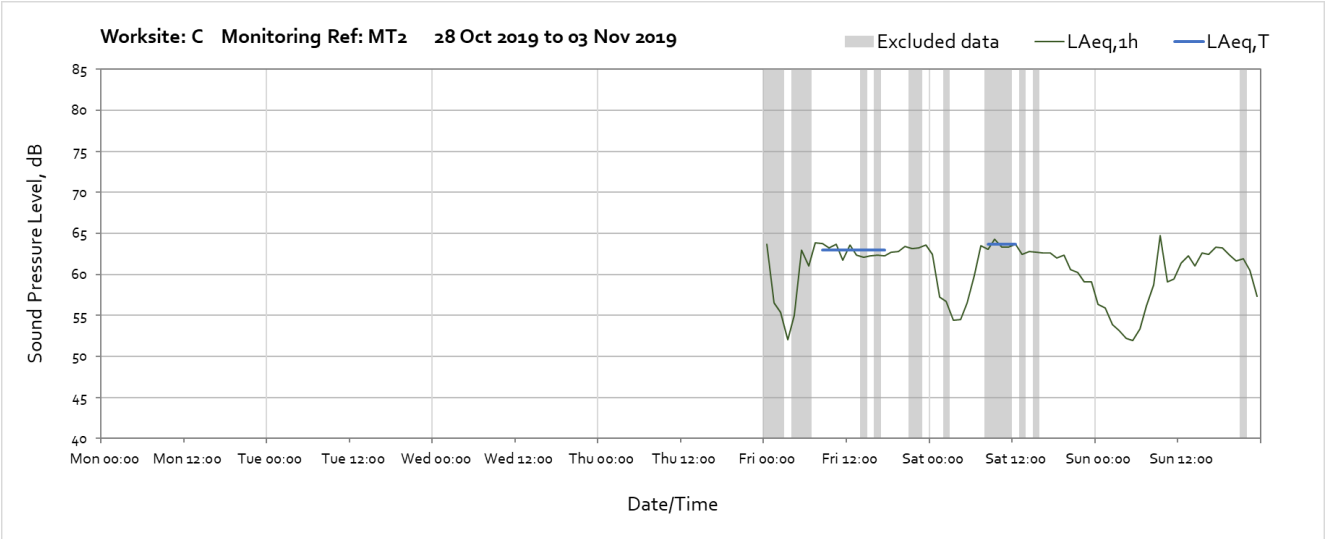


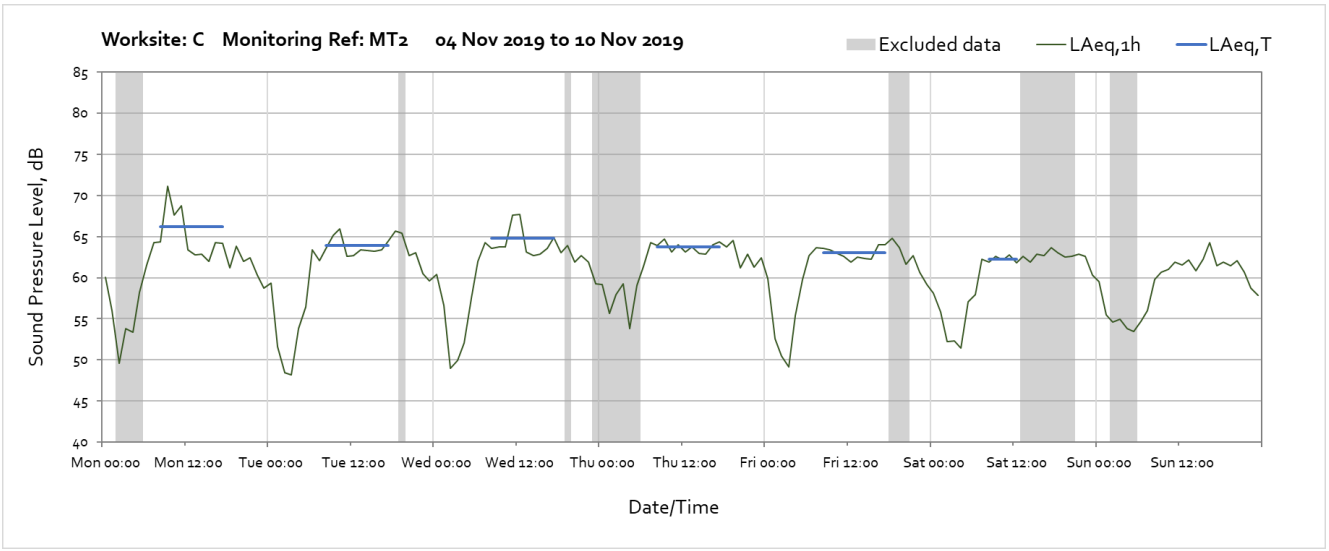






Worksite: C – Monitoring Ref: MT2

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55
50
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Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
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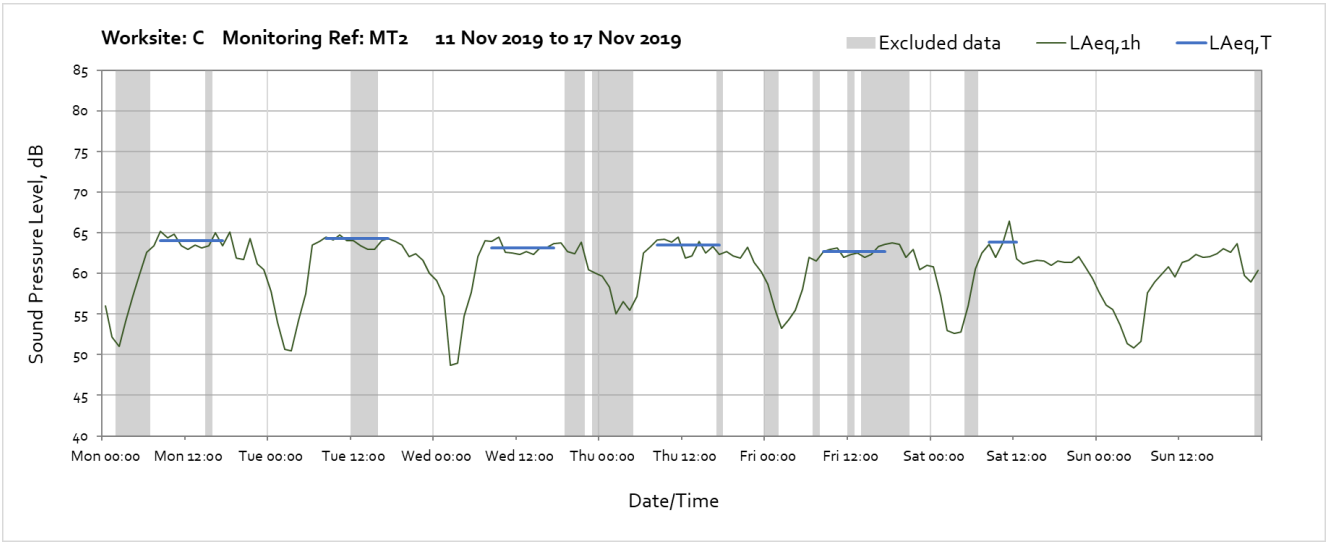
Date/Time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LAeq,T
Sound Pressure Level, dB
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75
70
65
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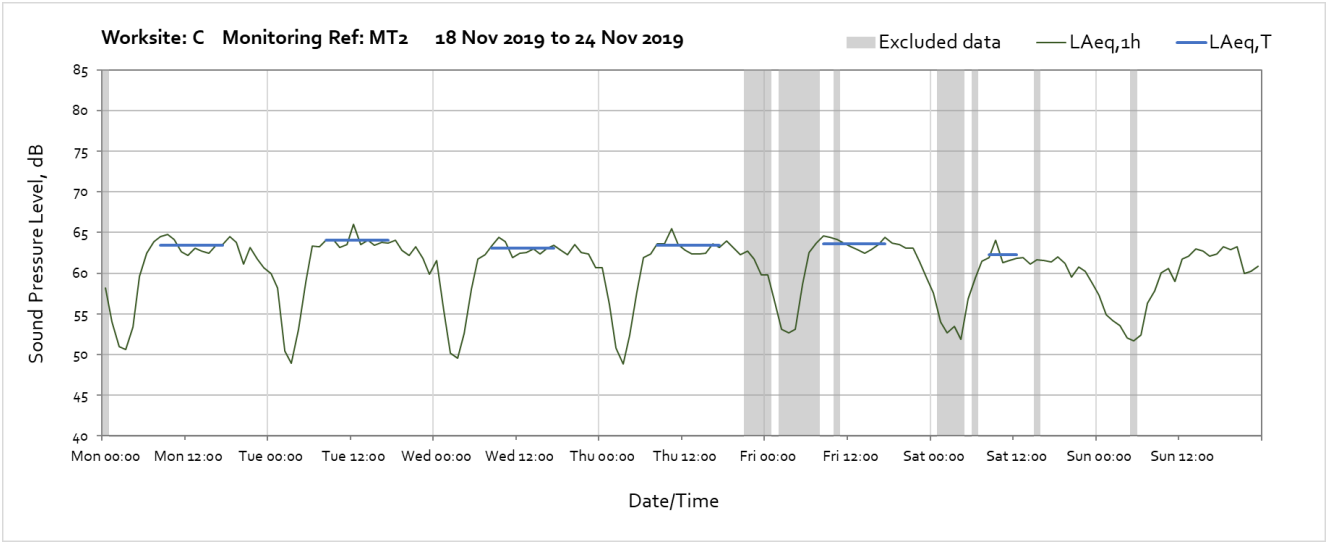
Date/Time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LAeq,T
Sound Pressure Level, dB
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75
70
65
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Tue 12:00
Wed 00:00
Wed 12:00
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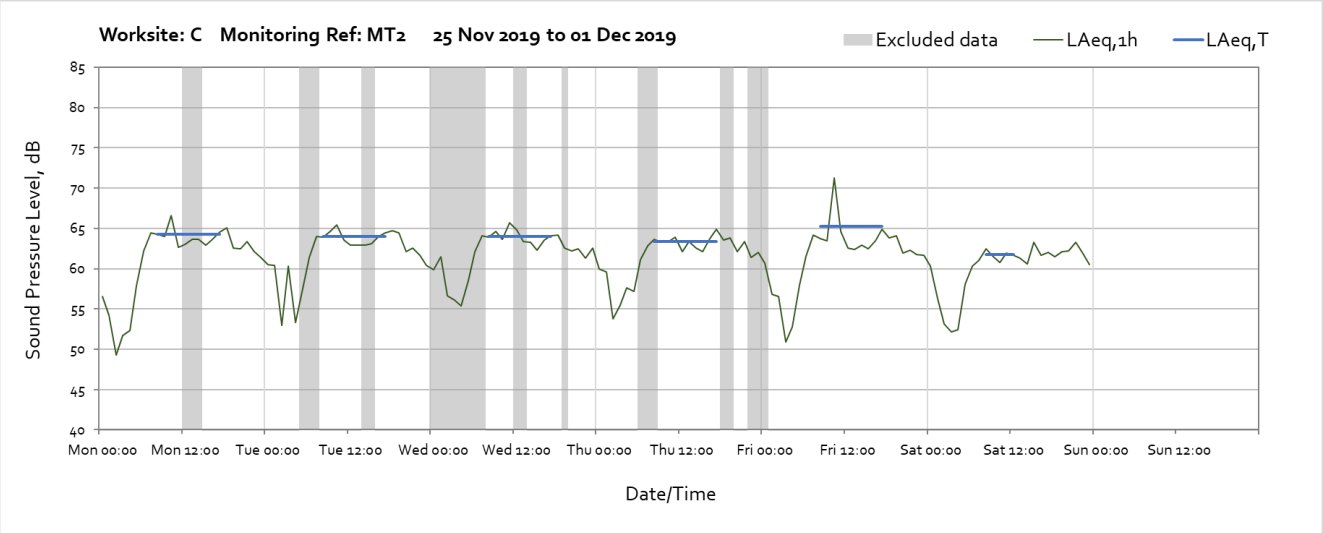
Date/Time



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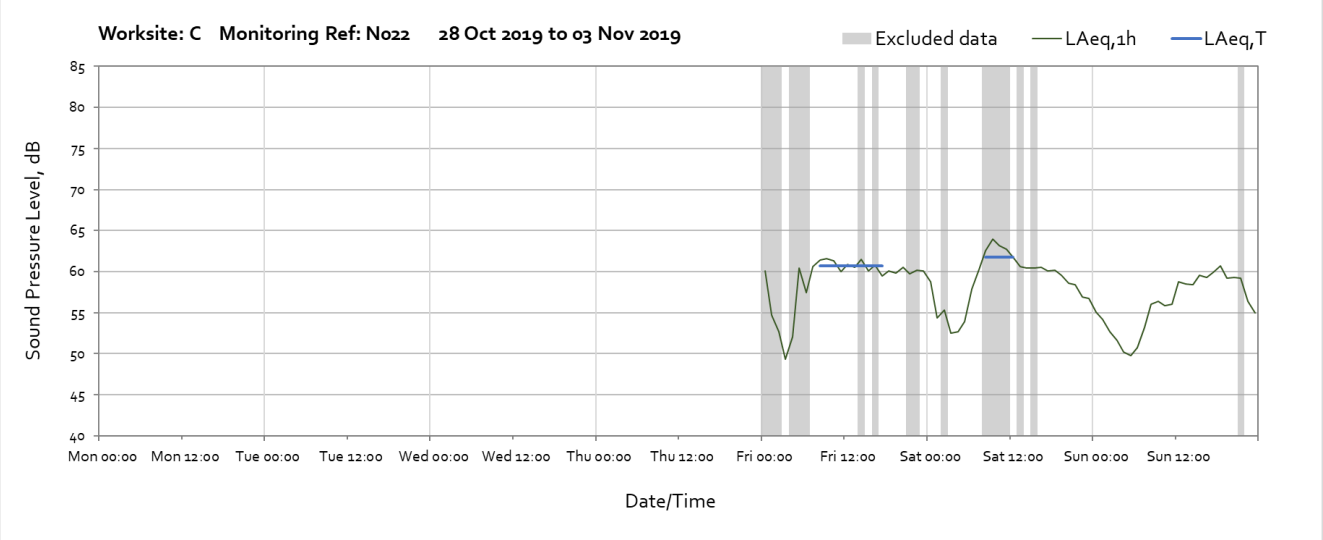

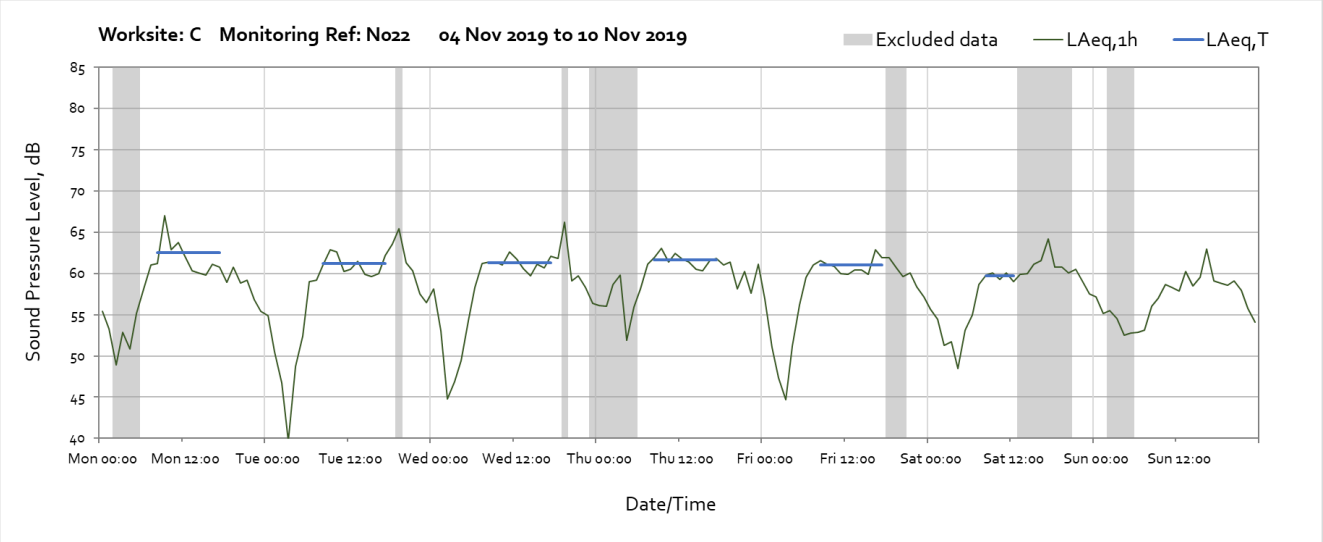

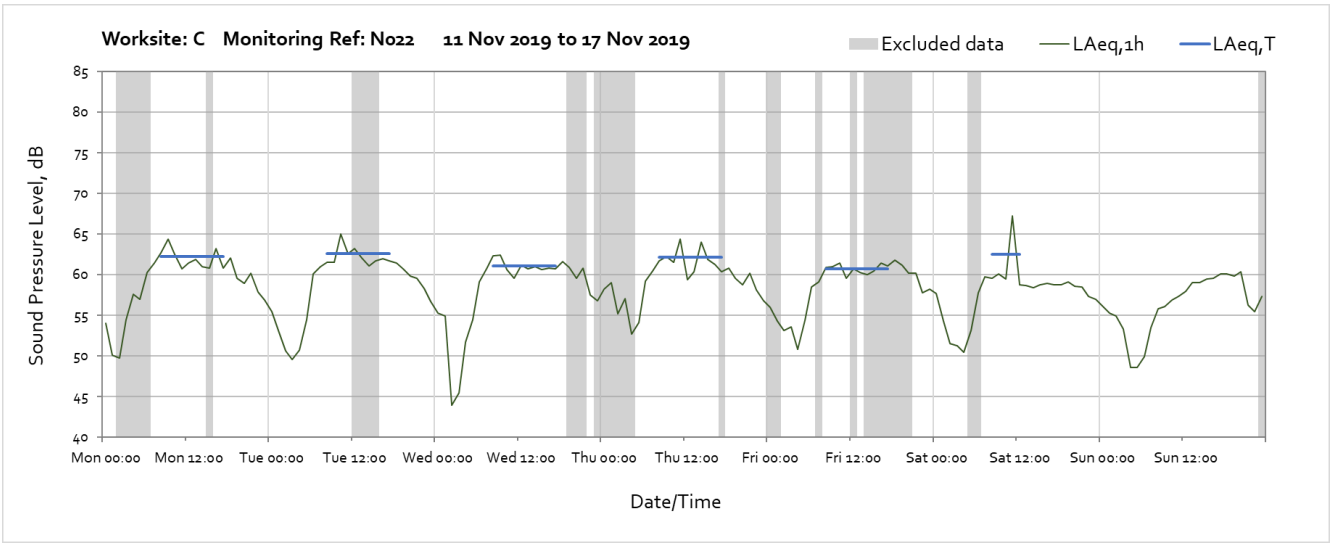
Worksite: C Monitoring Ref: No22 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
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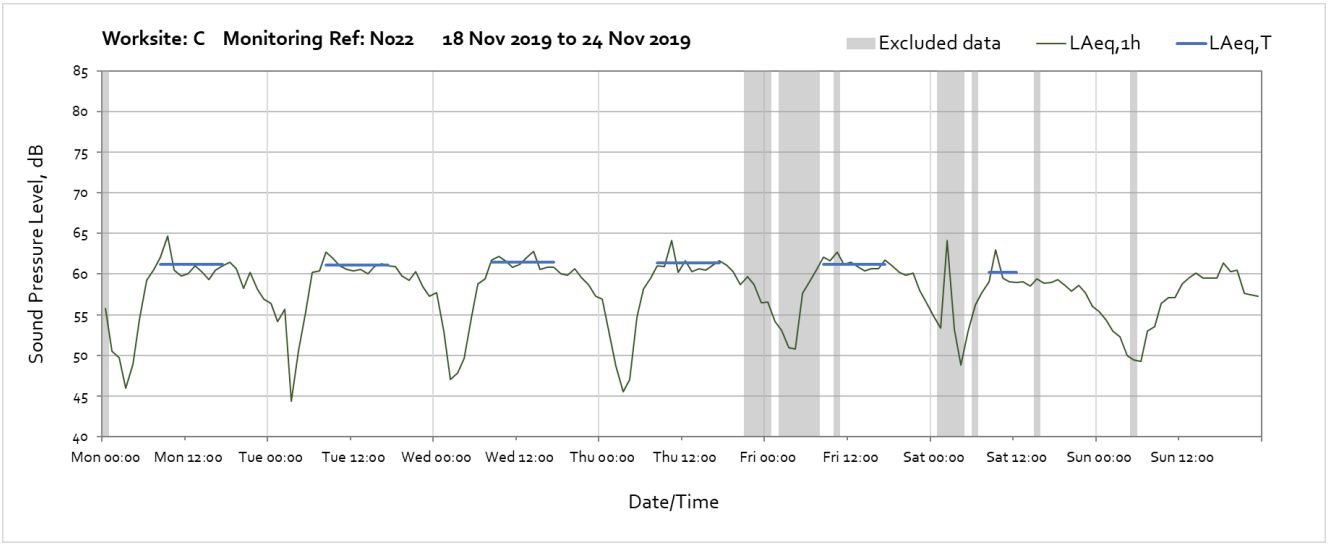
Date/Time


Worksite: C Monitoring Ref: No22 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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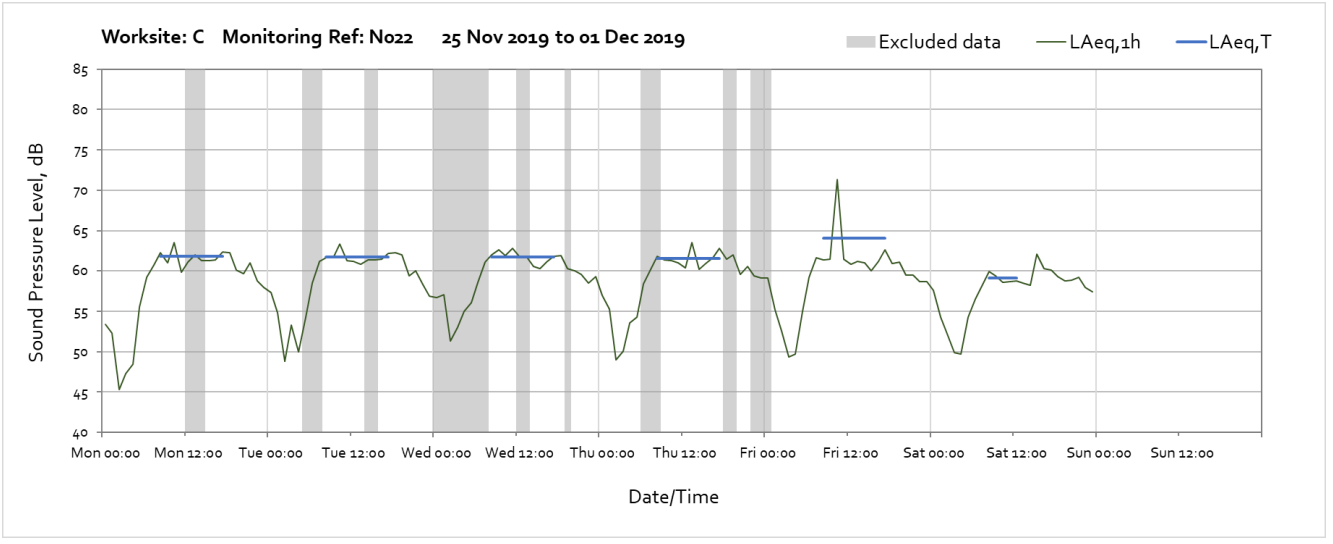
Worksite: C Monitoring Ref: No22 25 Nov 2019 to 01 Dec 2019
Excluded data
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LAeq,T
Sound Pressure Level, dB
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Mon 00:00
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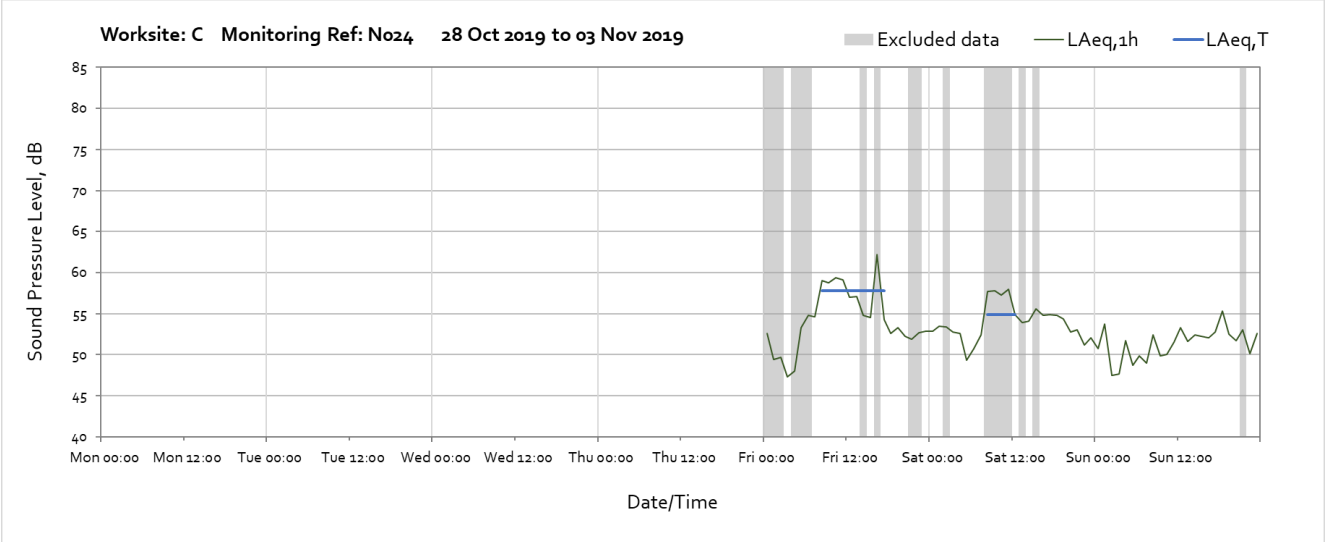
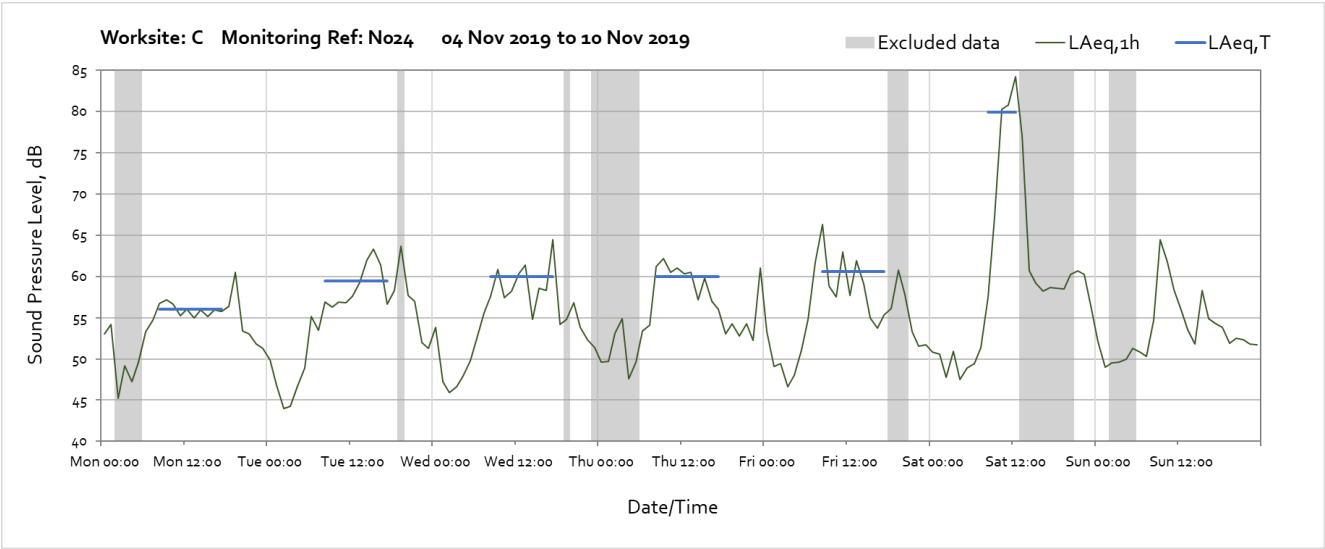
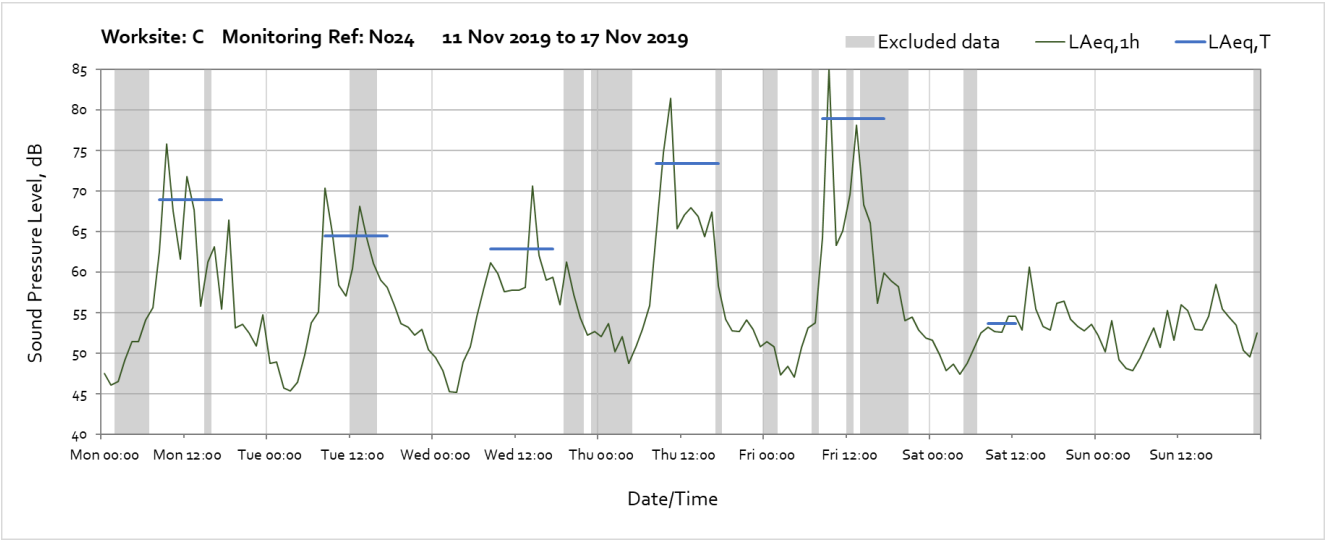
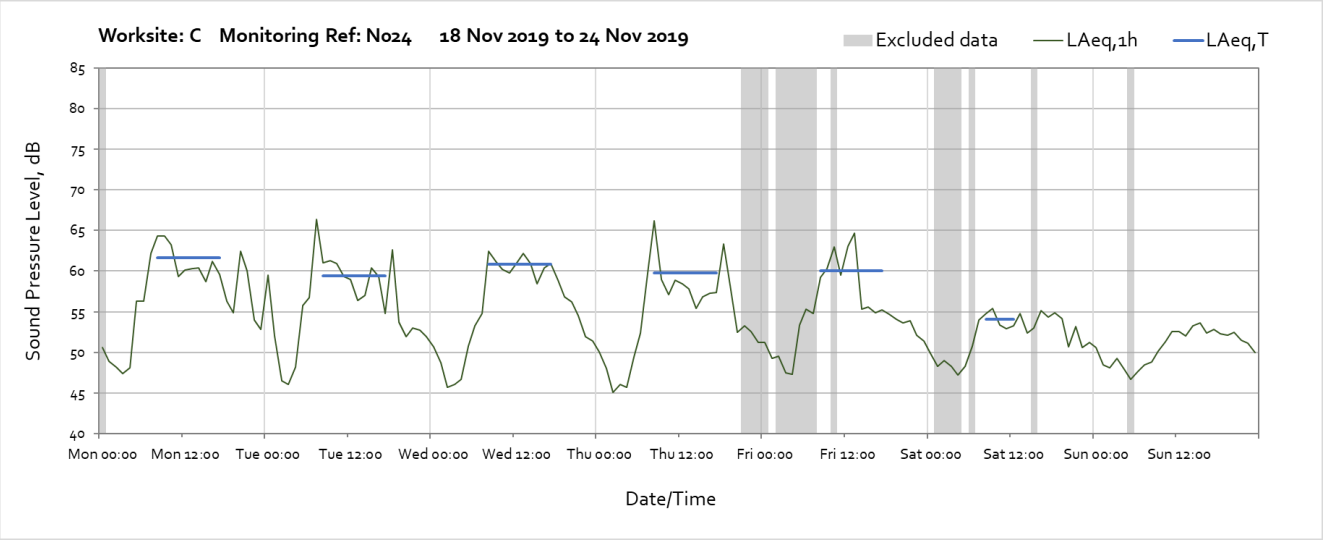
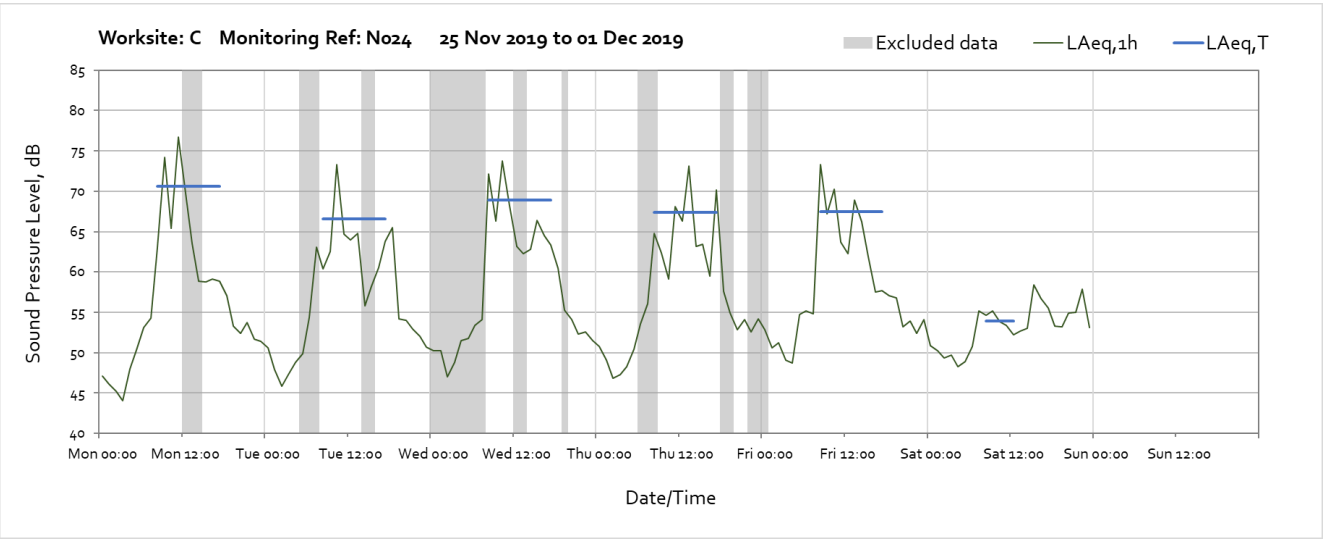
Worksite: C – Monitoring Ref: N024



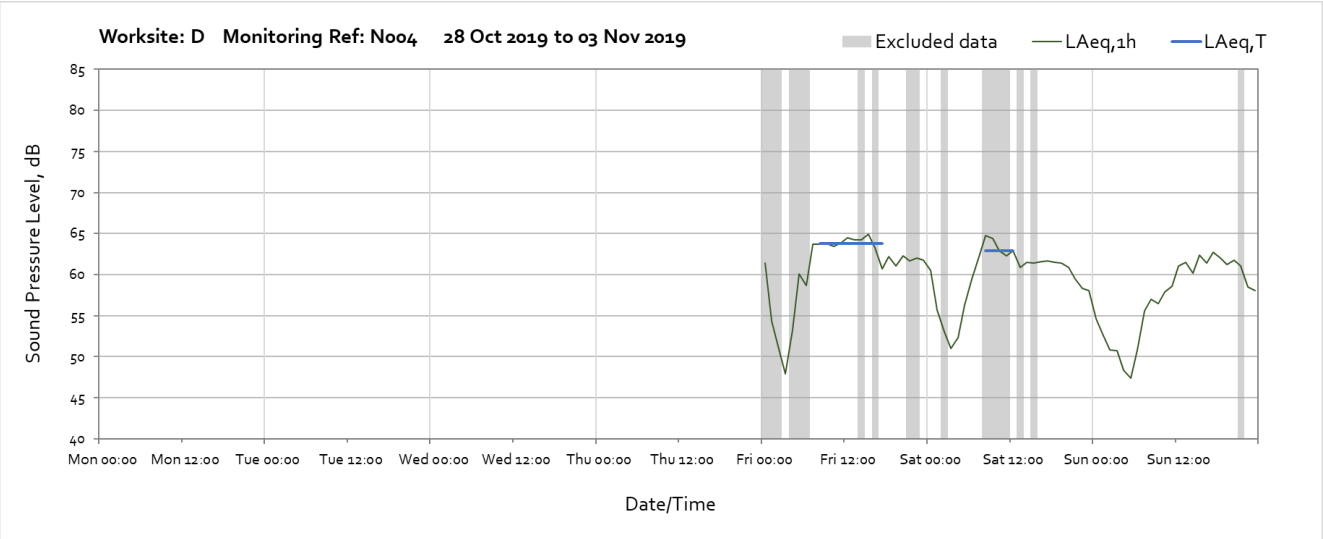


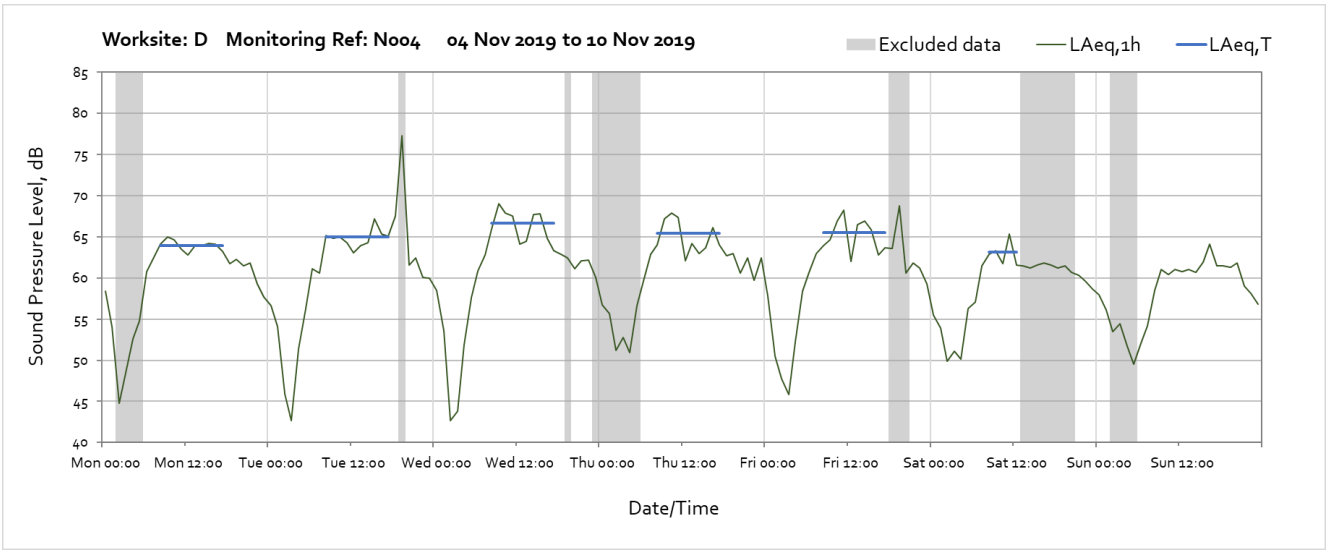






Worksite: D – Monitoring Ref: N004




Worksite: D Monitoring Ref: No04 04 Nov 2019 to 10 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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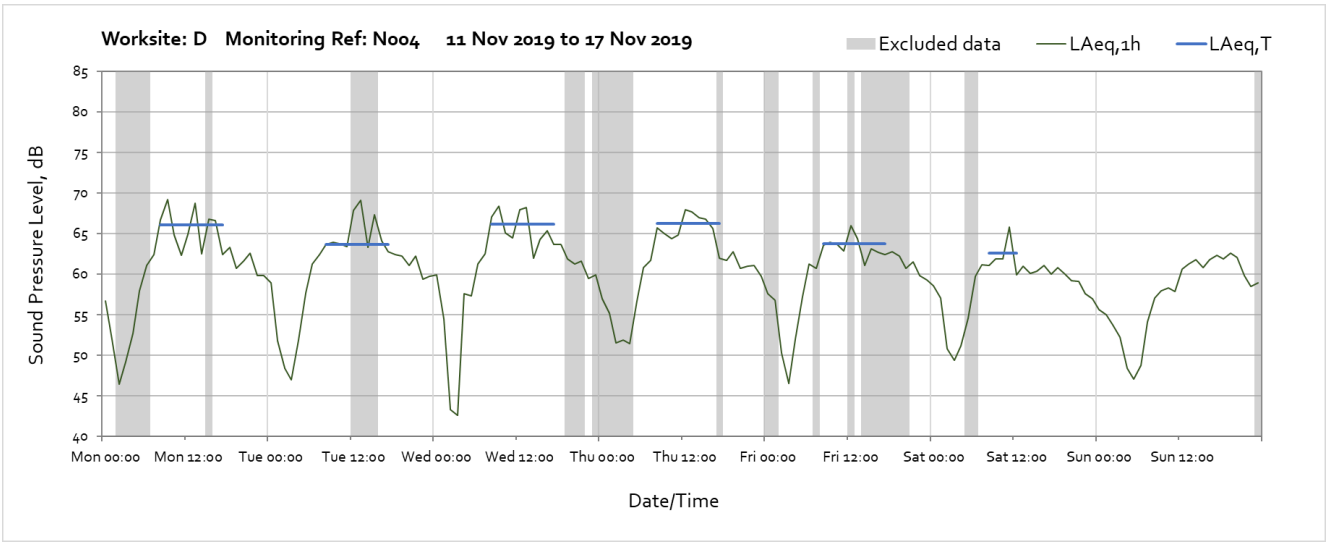
Date/Time


Worksite: D Monitoring Ref: No04 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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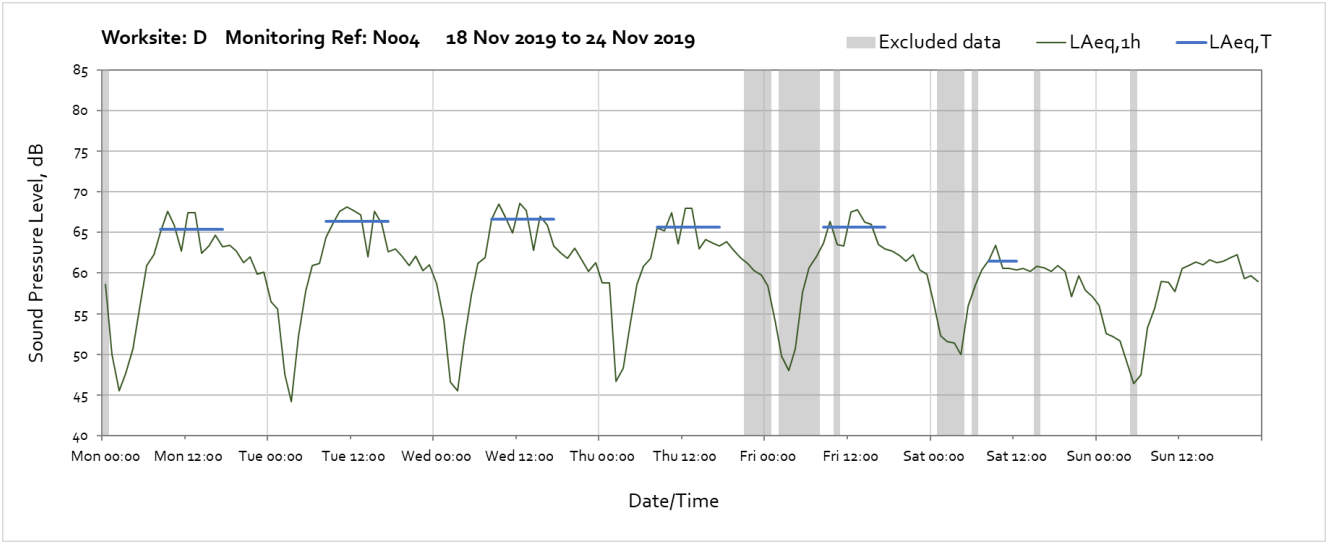
Date/Time


Worksite: D Monitoring Ref: No04 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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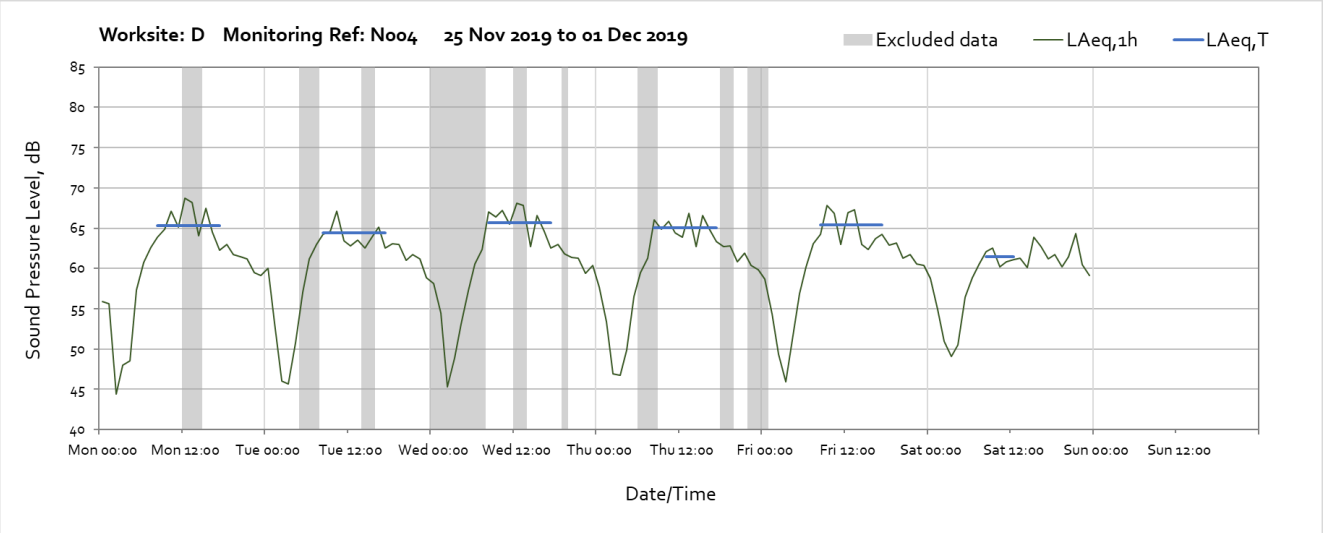
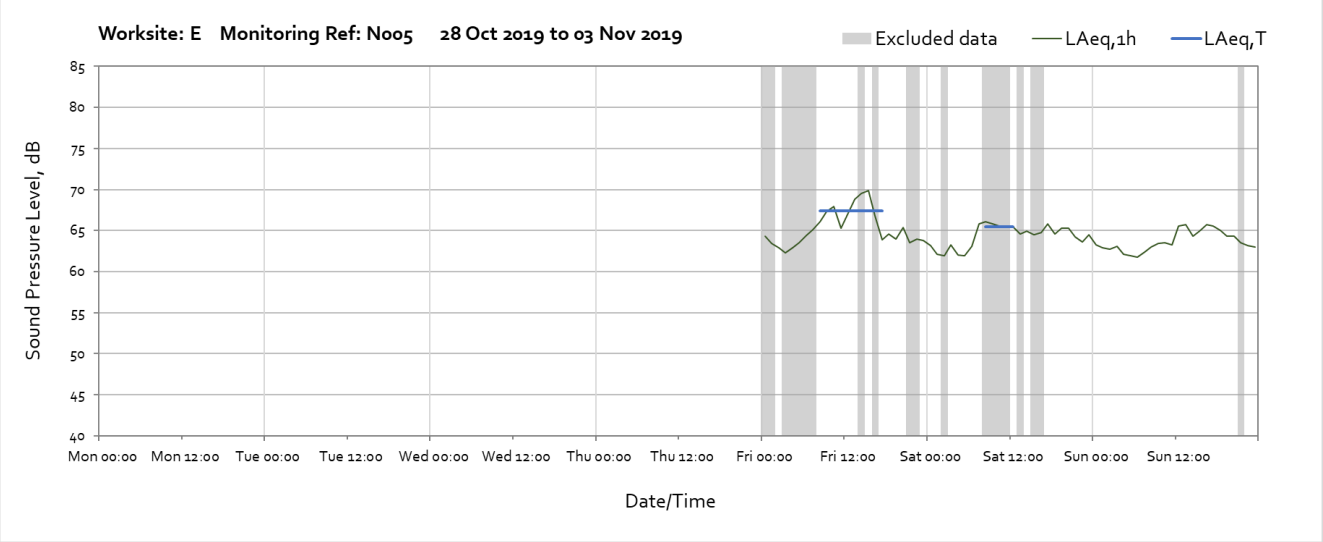
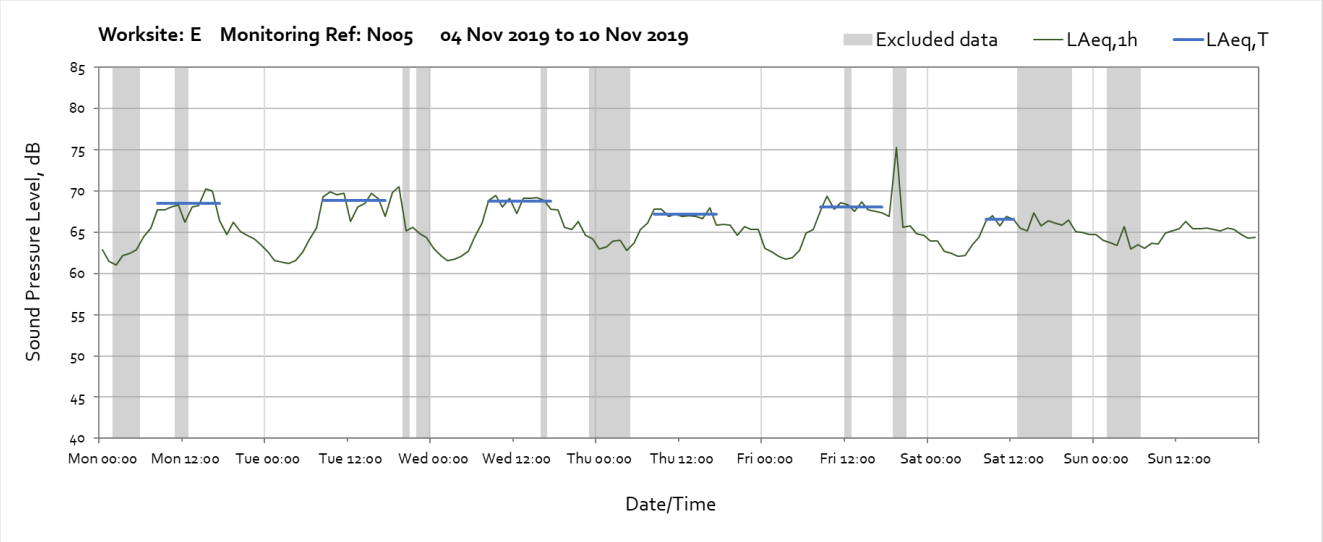


Worksite: E – Monitoring Ref: N005






Worksite: E Monitoring Ref: No05 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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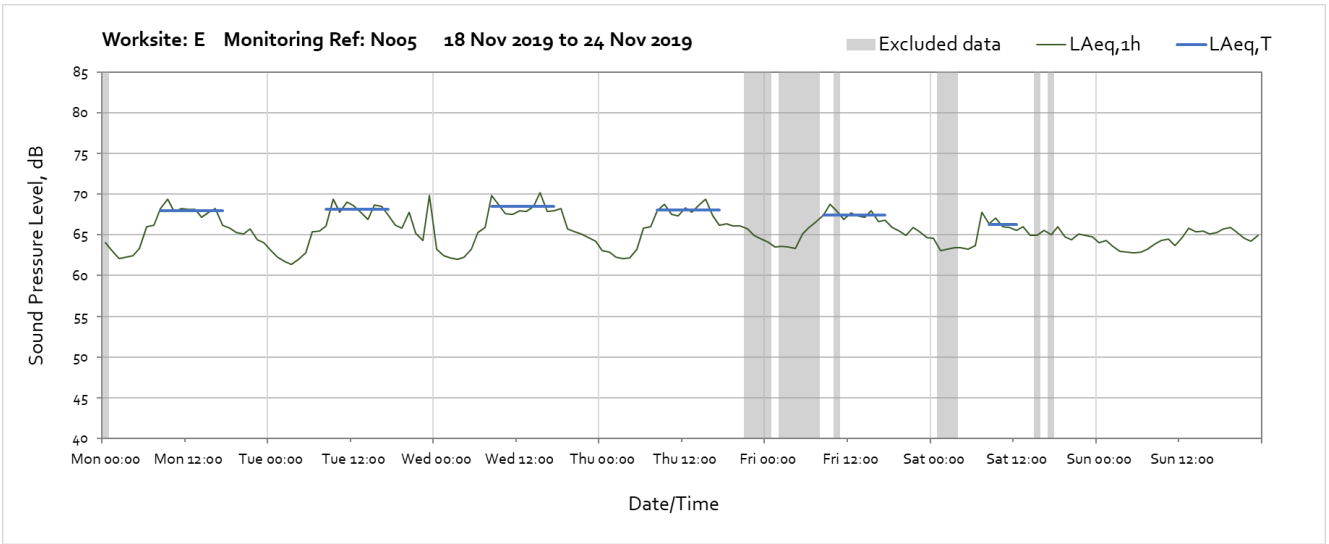
Date/Time


Worksite: E Monitoring Ref: No05 18 Nov 2019 to 24 Nov 2019
Excluded data
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LAeq,T
Sound Pressure Level, dB
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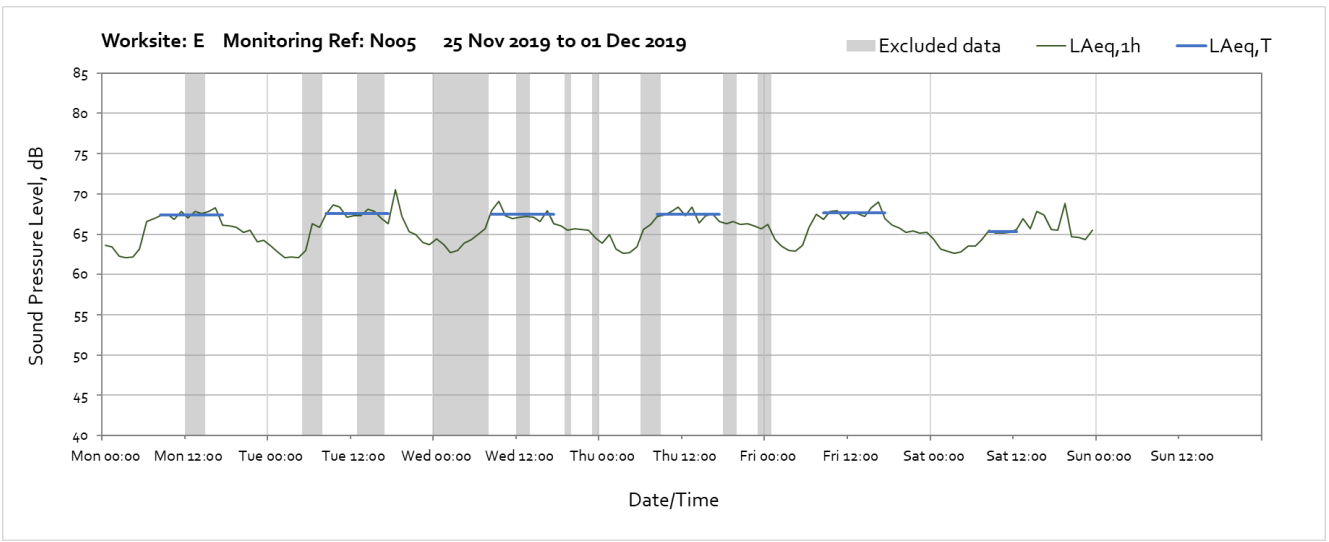
Date/Time


Worksite: E Monitoring Ref: No05 25 Nov 2019 to 01 Dec 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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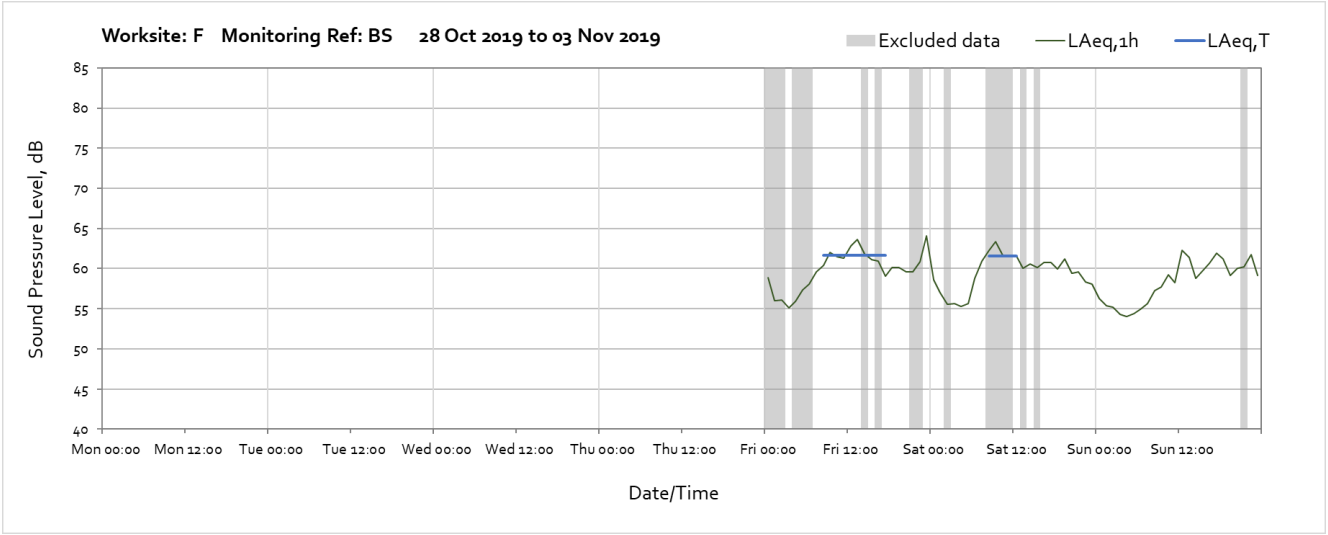
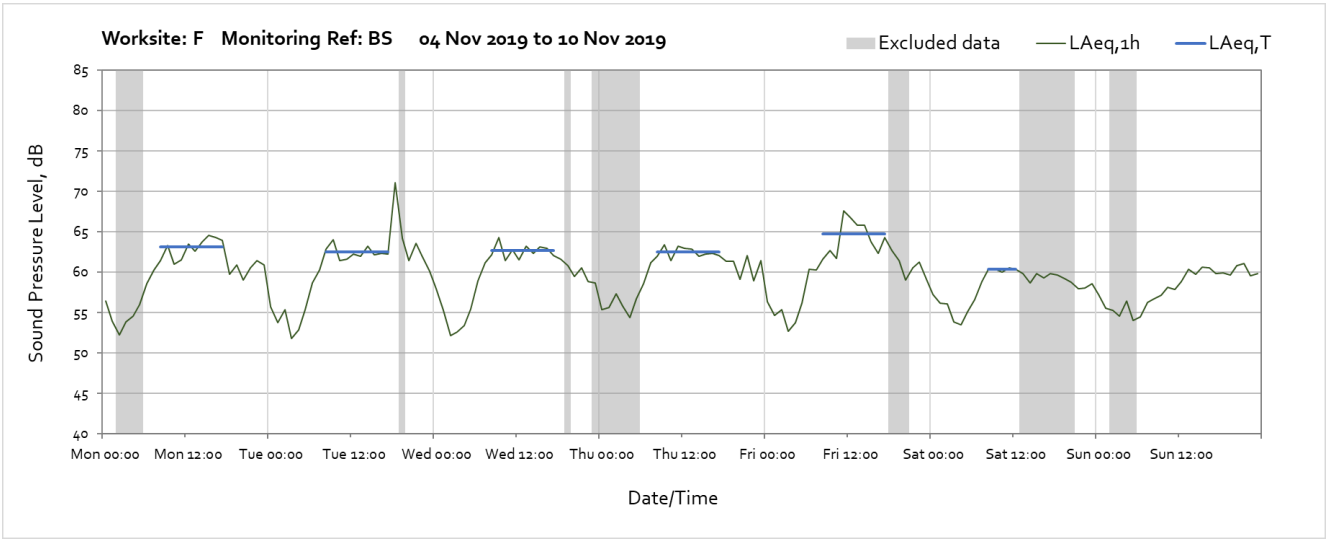
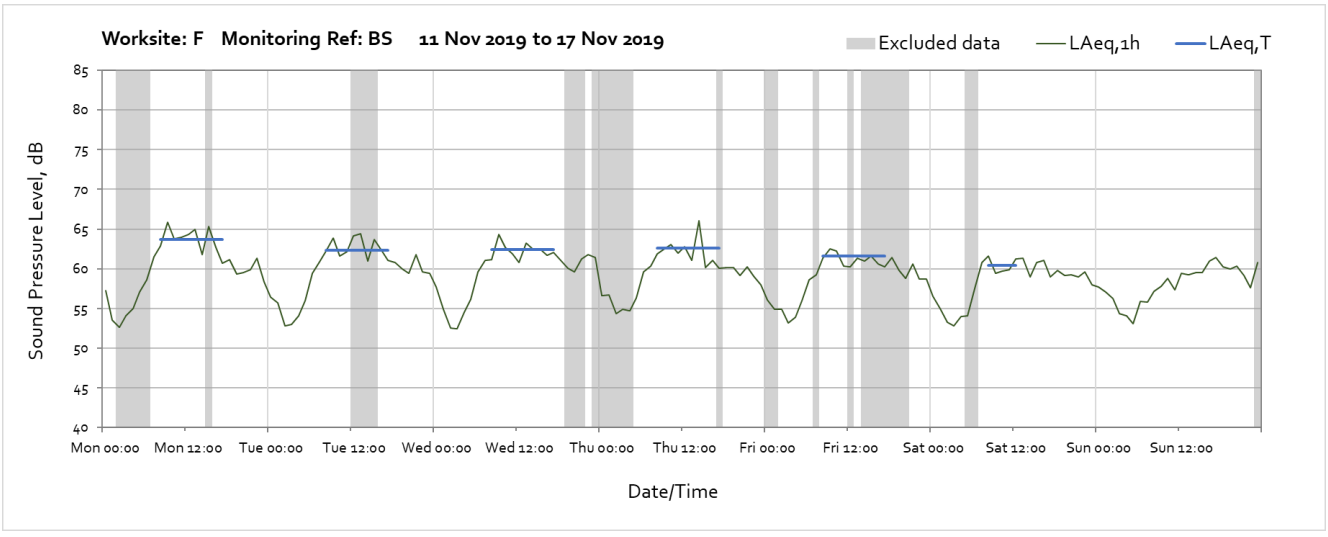
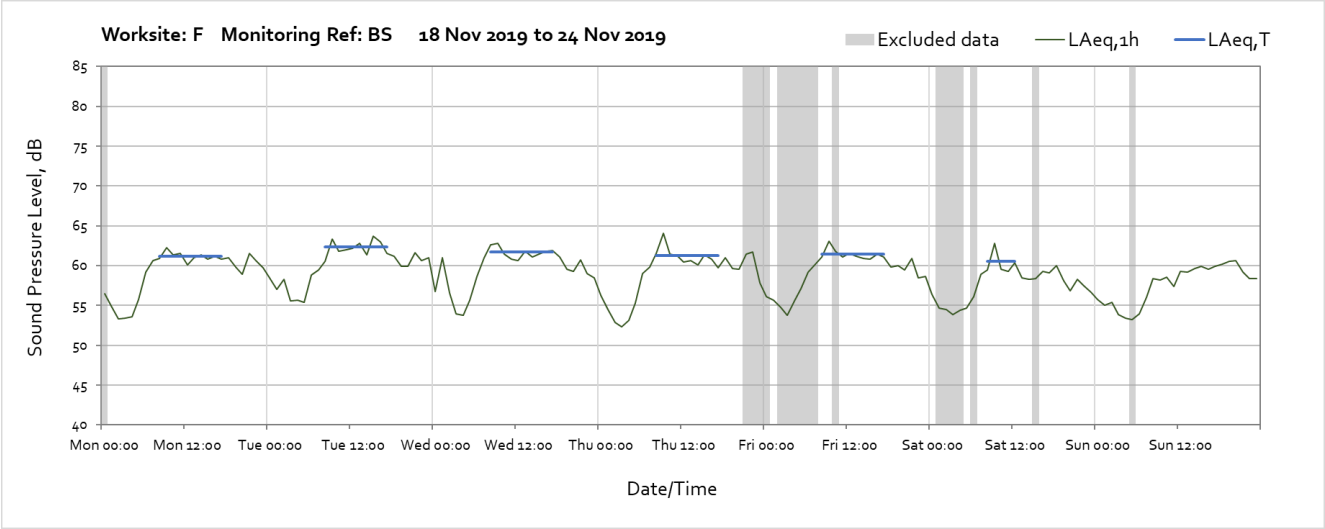
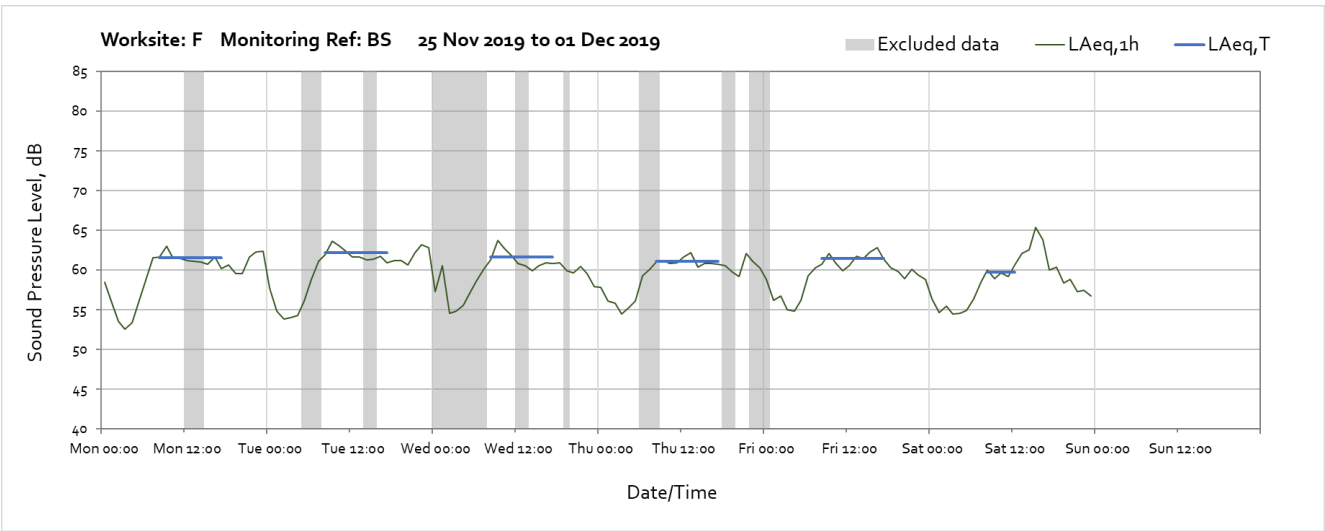
Worksite: F – Monitoring Ref: BS



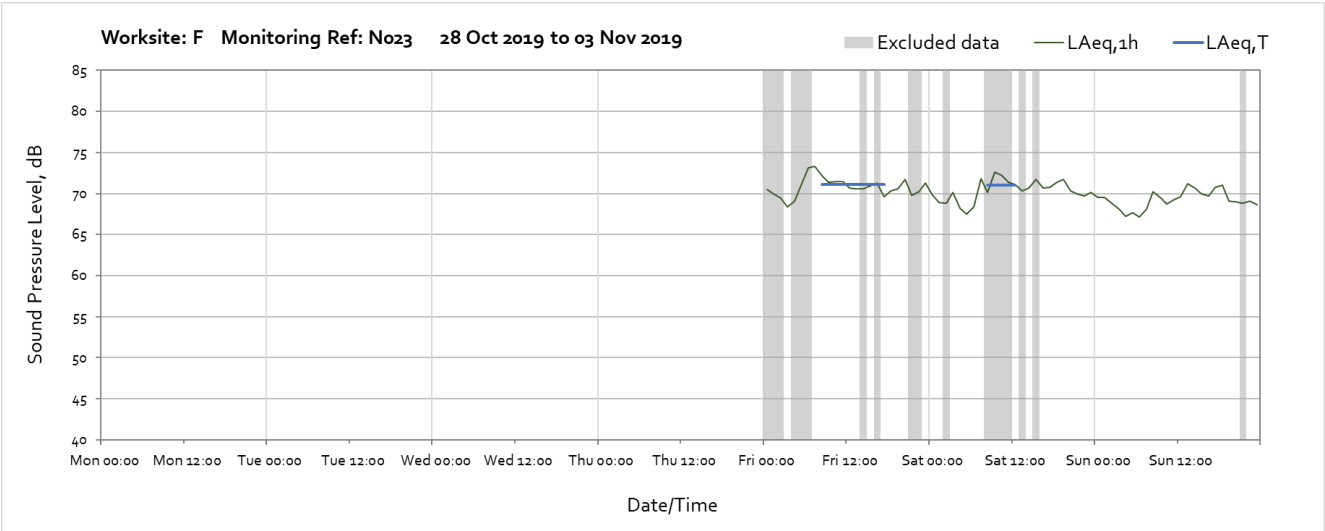


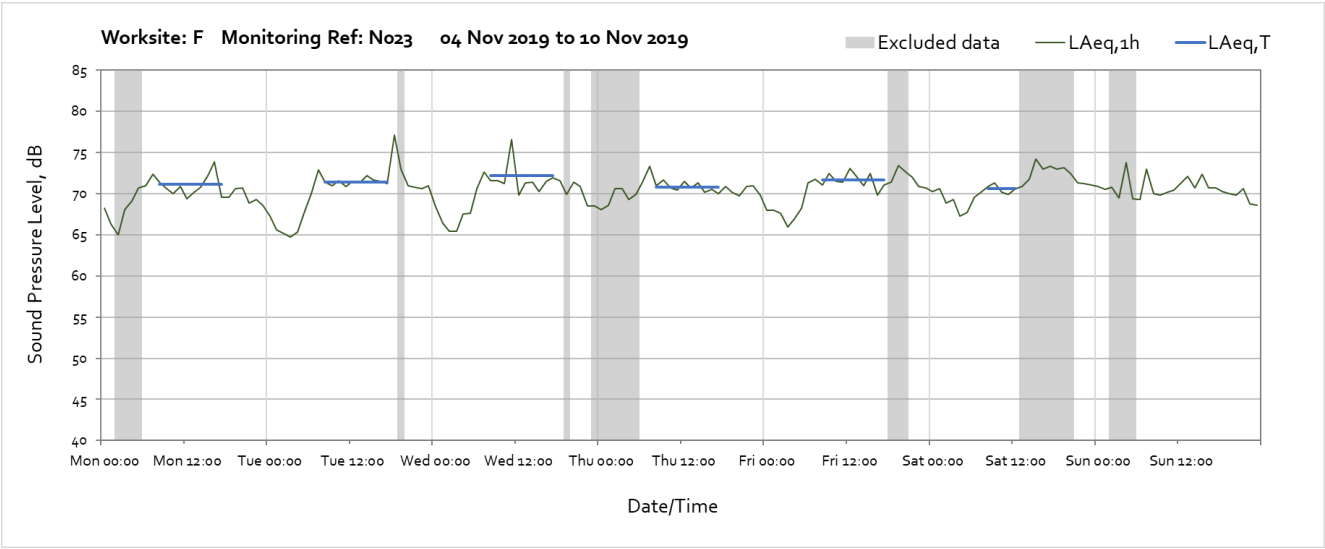






Worksite: F – Monitoring Ref: N023




Worksite: F Monitoring Ref: No23 04 Nov 2019 to 10 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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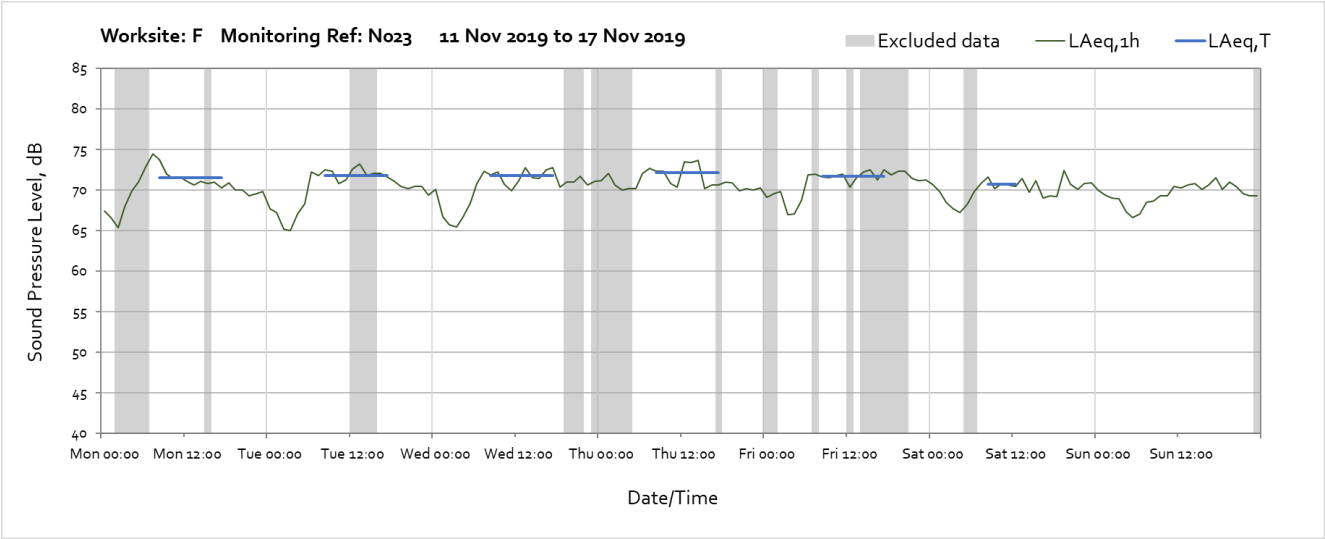
Date/Time


Worksite: F Monitoring Ref: No23 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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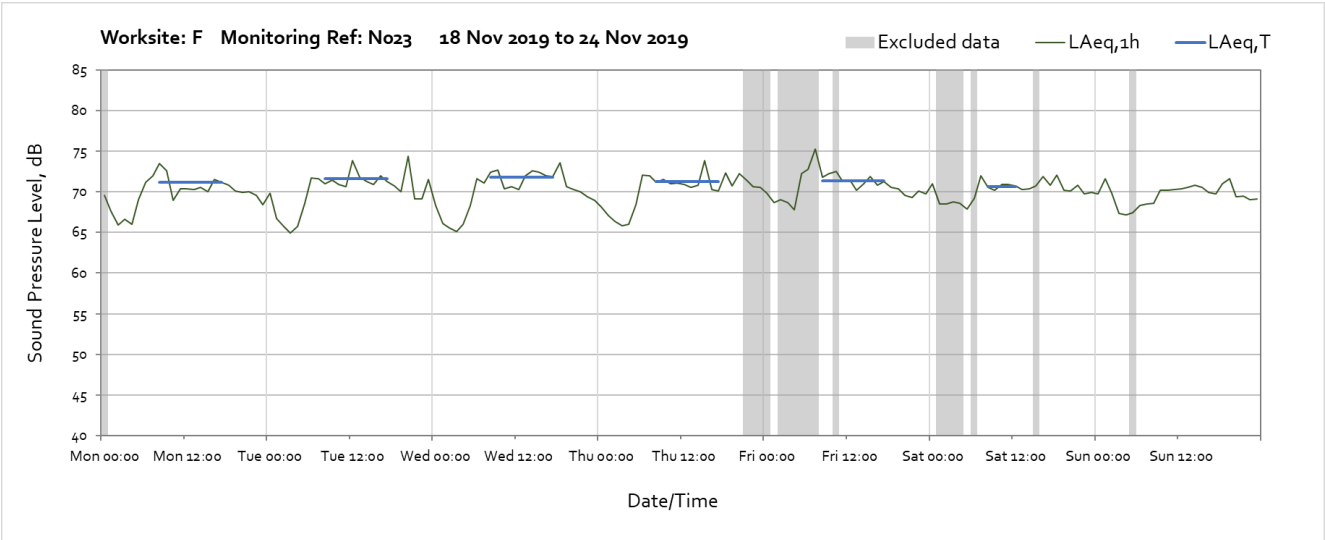
Date/Time


Worksite: F Monitoring Ref: No23 18 Nov 2019 to 24 Nov 2019
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LAeq,1h
LAeq,T
Sound Pressure Level, dB
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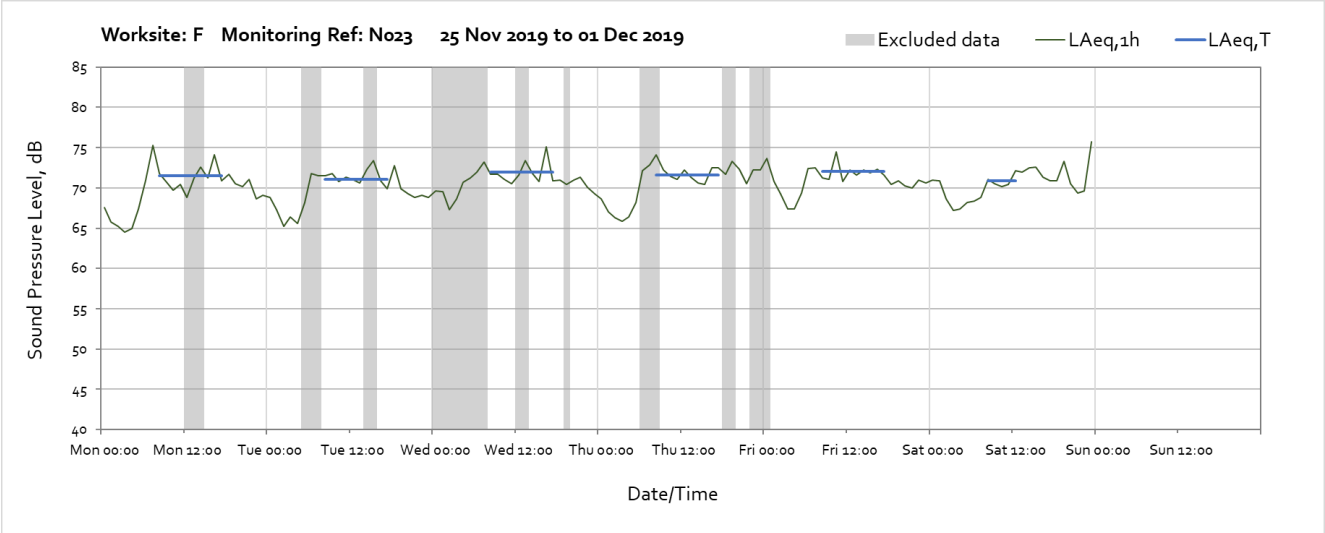
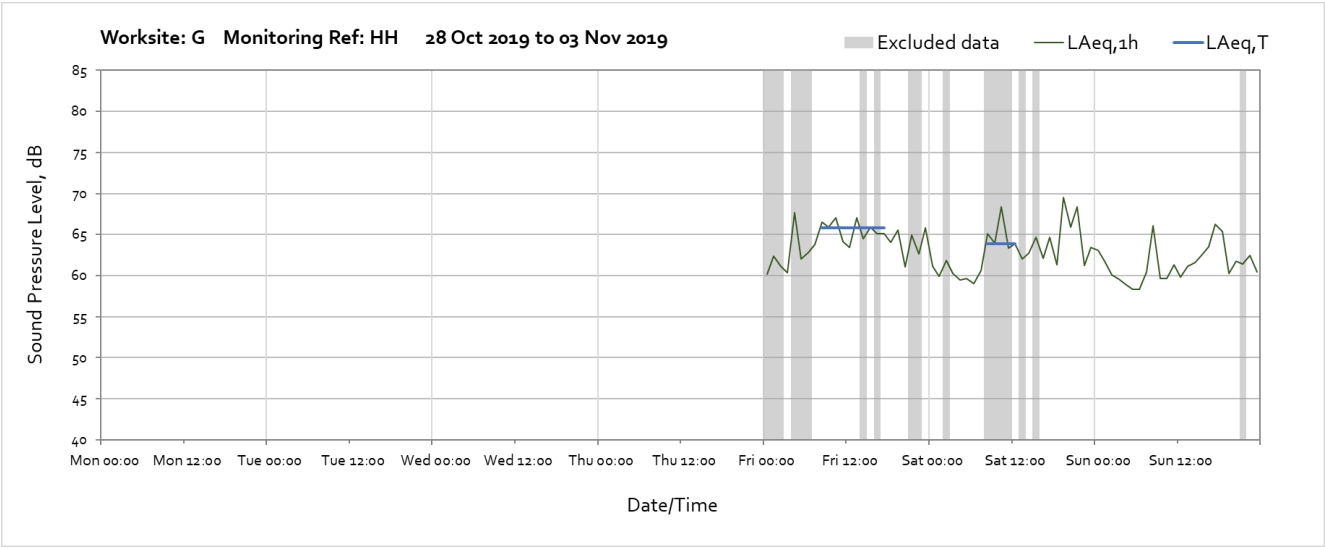
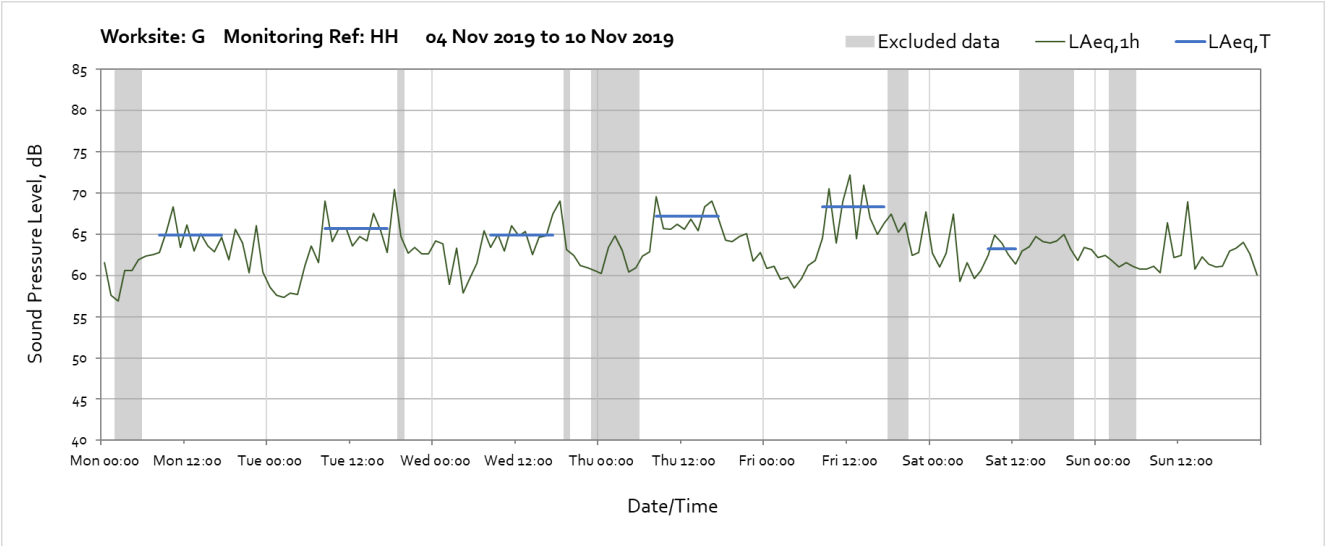
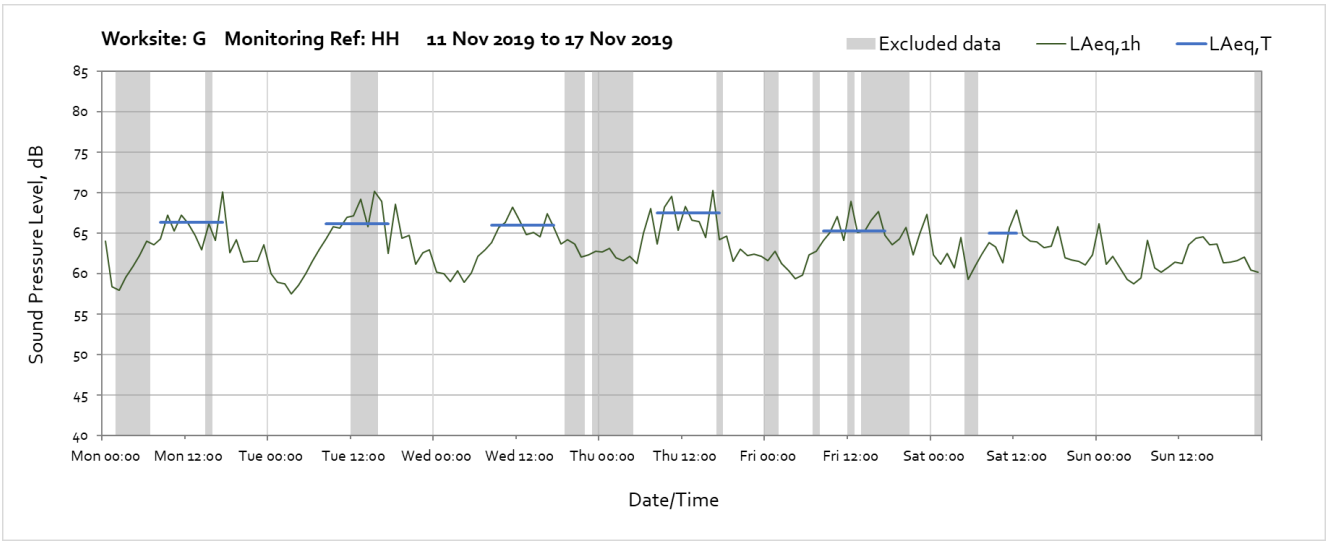
Date/Time



Worksite: G – Monitoring Ref: HH






Worksite: G Monitoring Ref: HH 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
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Sound Pressure Level, dB
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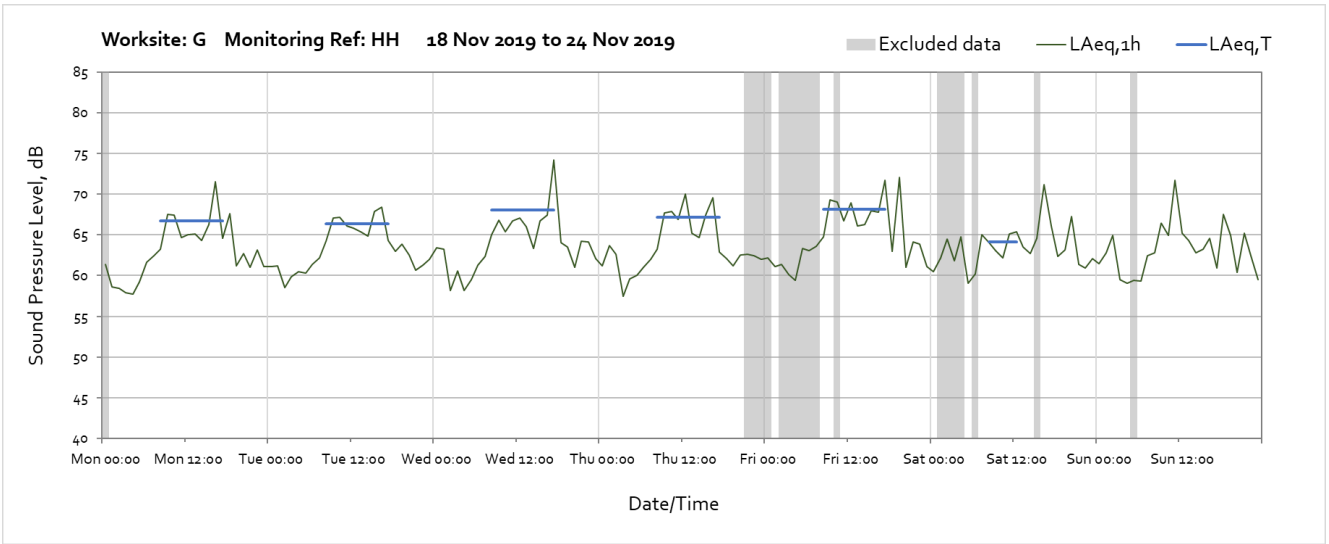
Worksite: G Monitoring Ref: HH 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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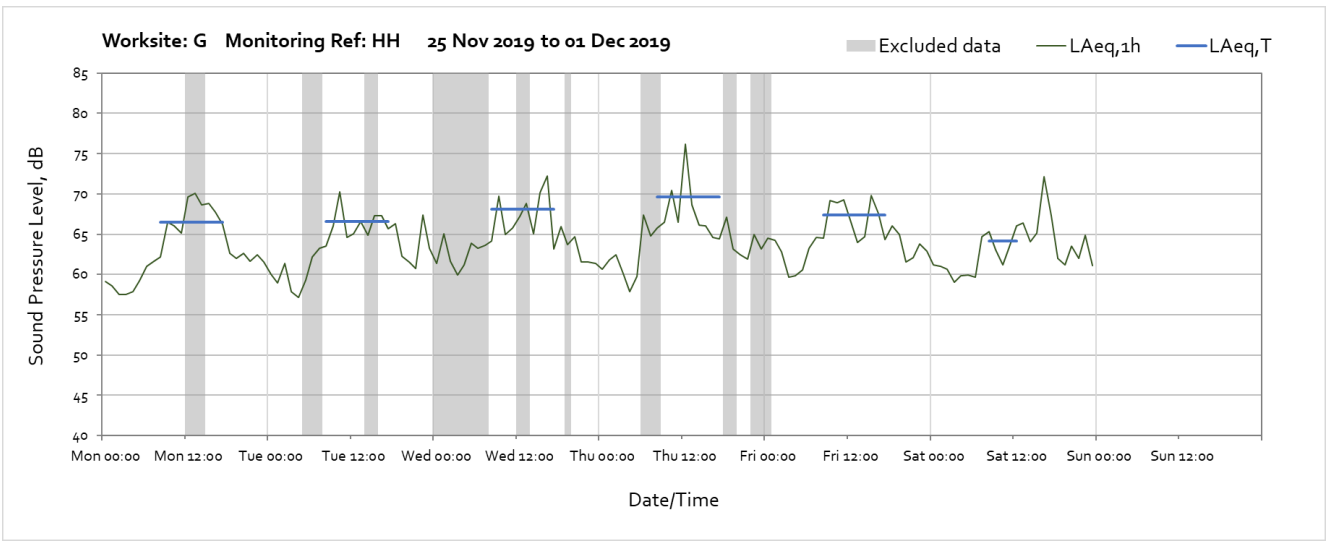
Date/Time


Worksite: G Monitoring Ref: HH 25 Nov 2019 to 01 Dec 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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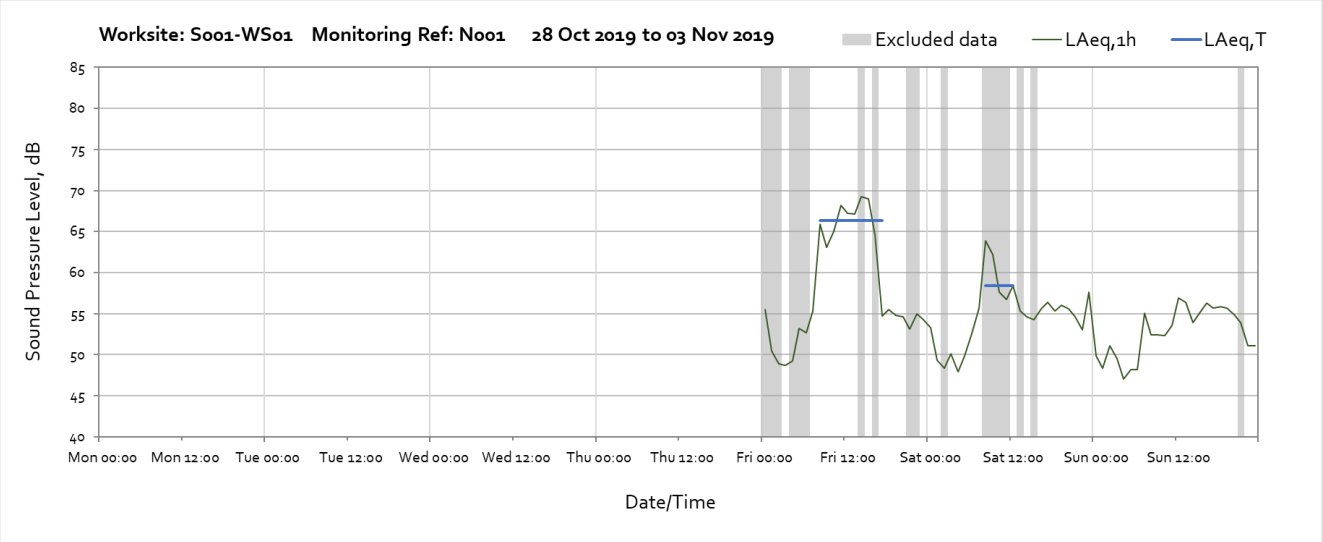
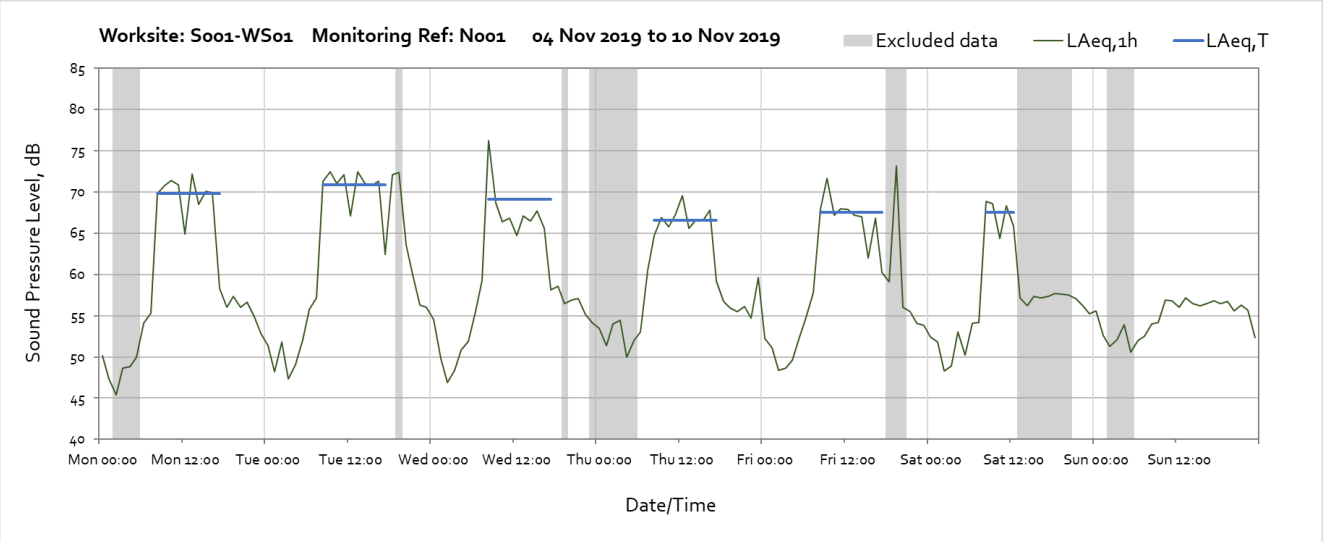
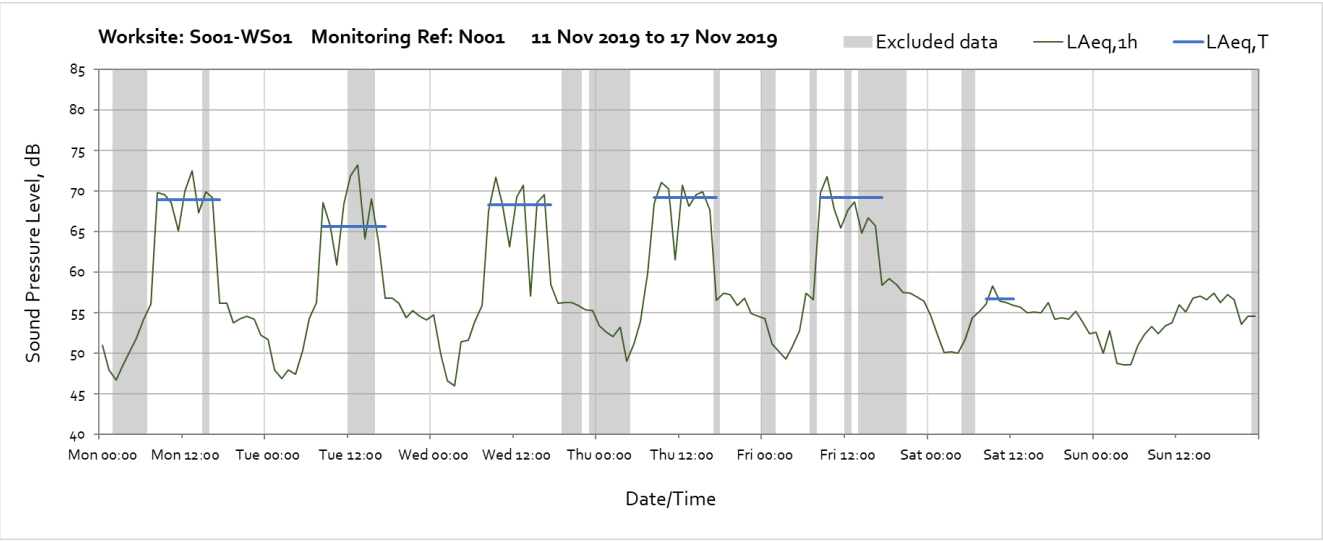
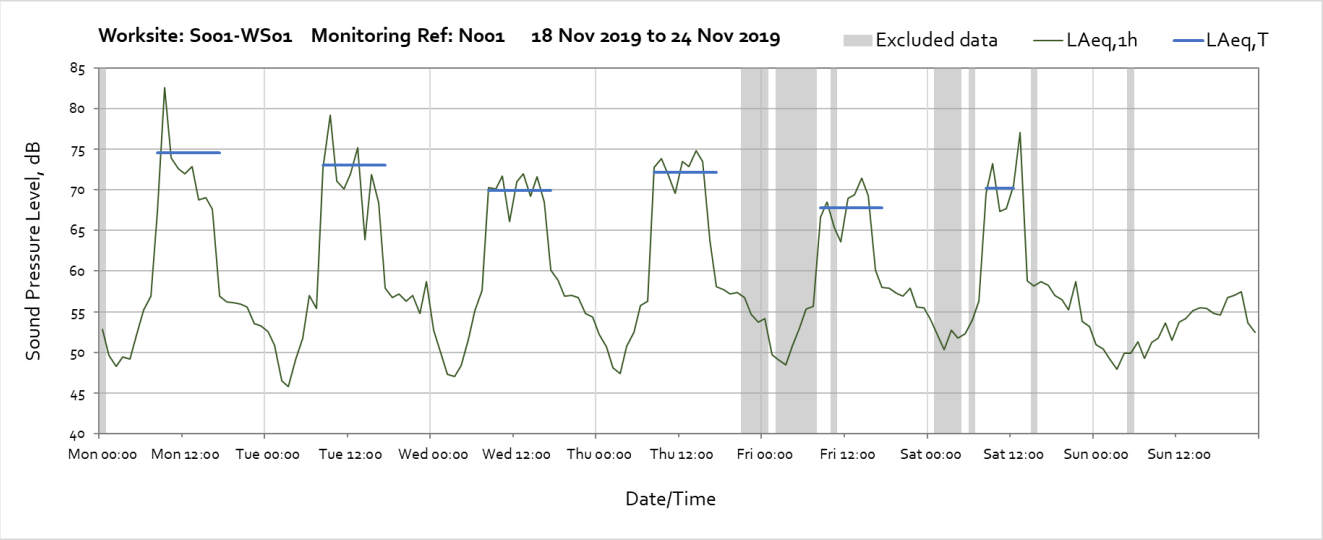
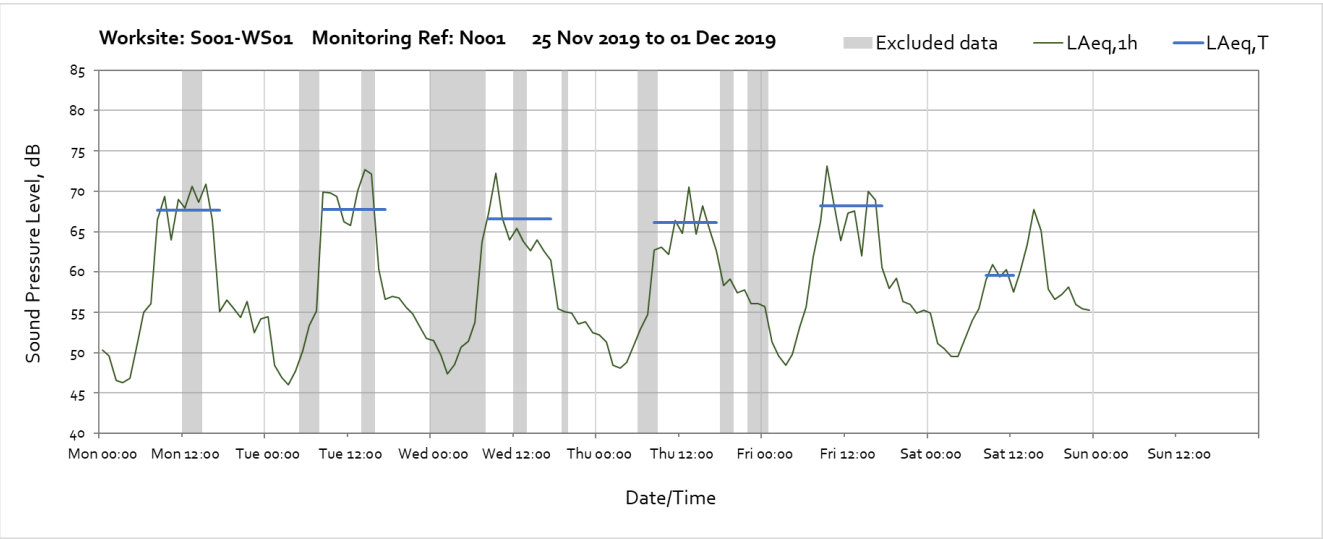
Worksite: S001-WS01 – Monitoring Ref: N001



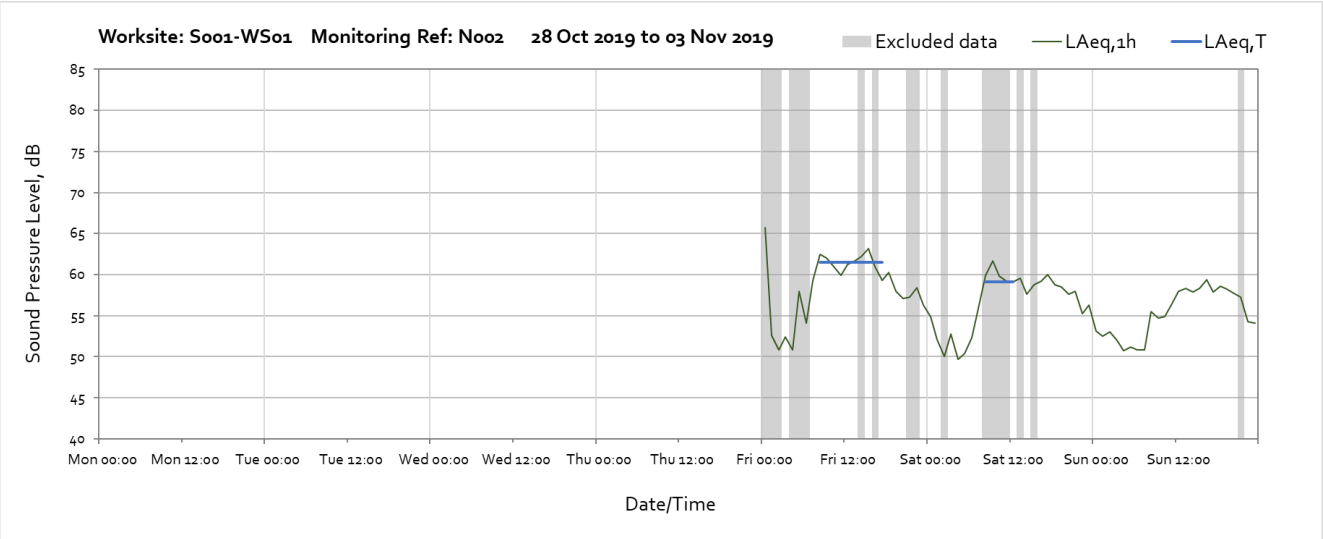


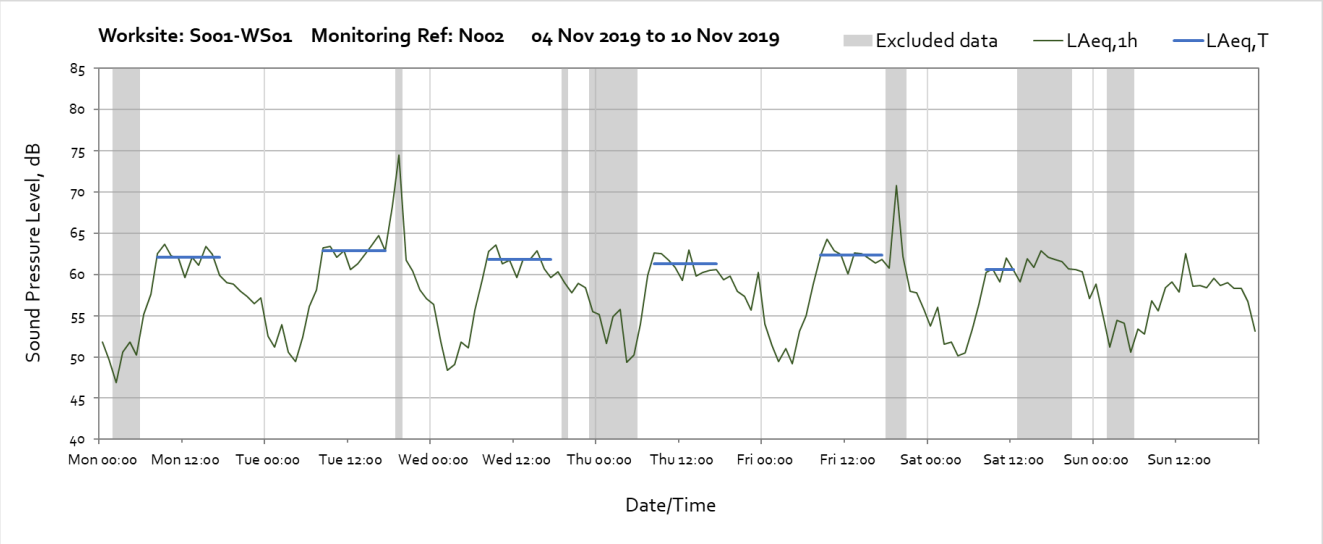


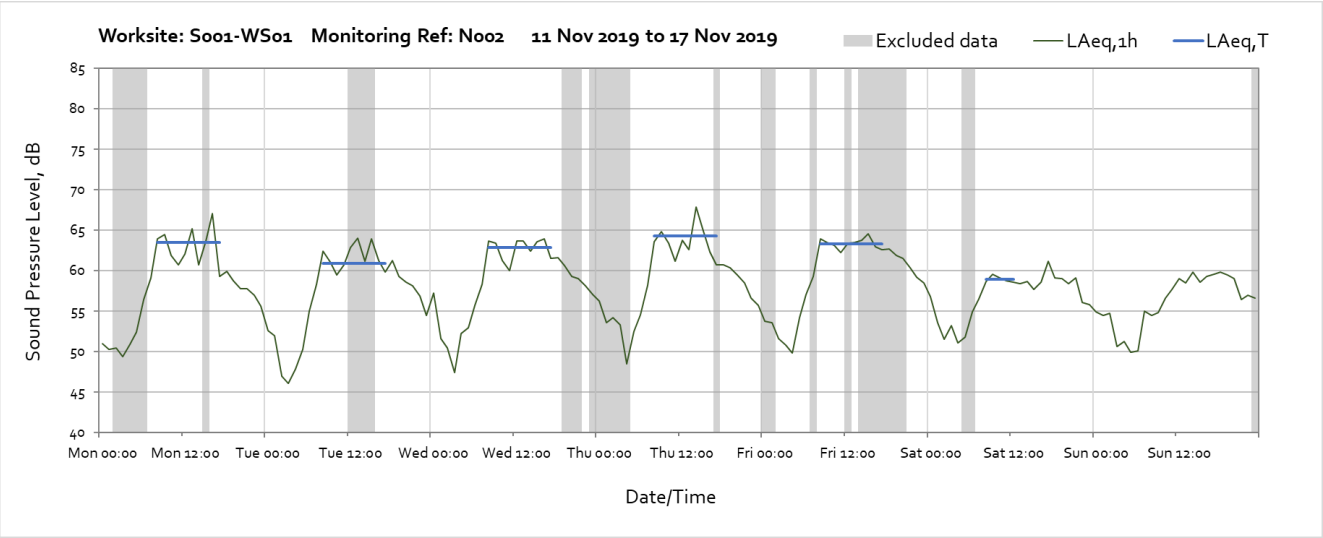


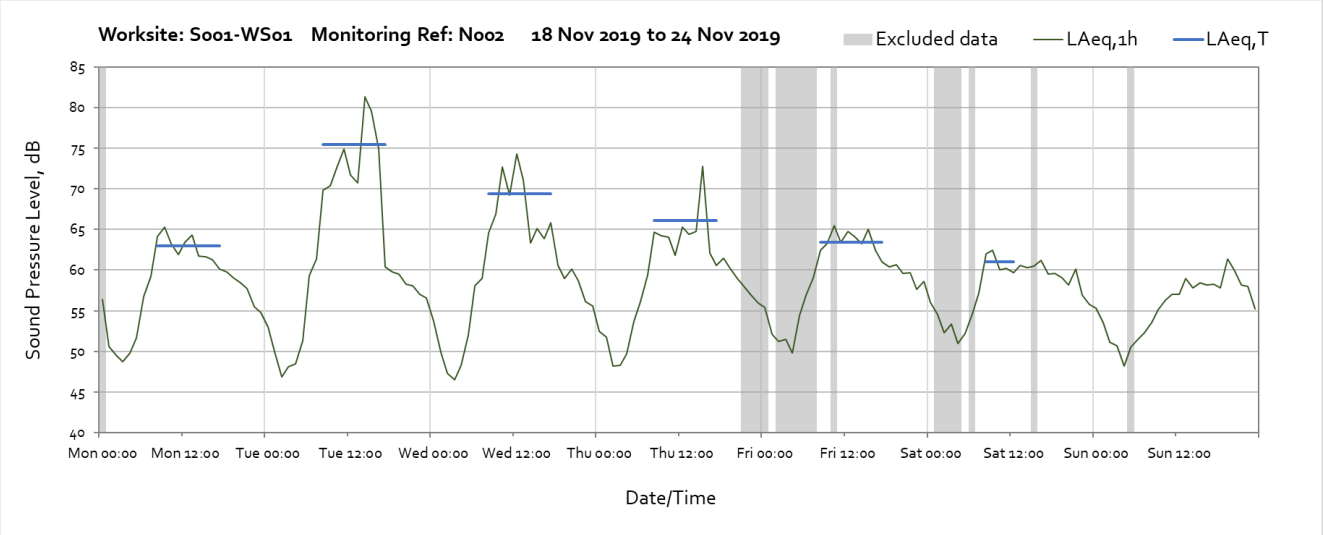


Worksite: S001-WS01 – Monitoring Ref: N002

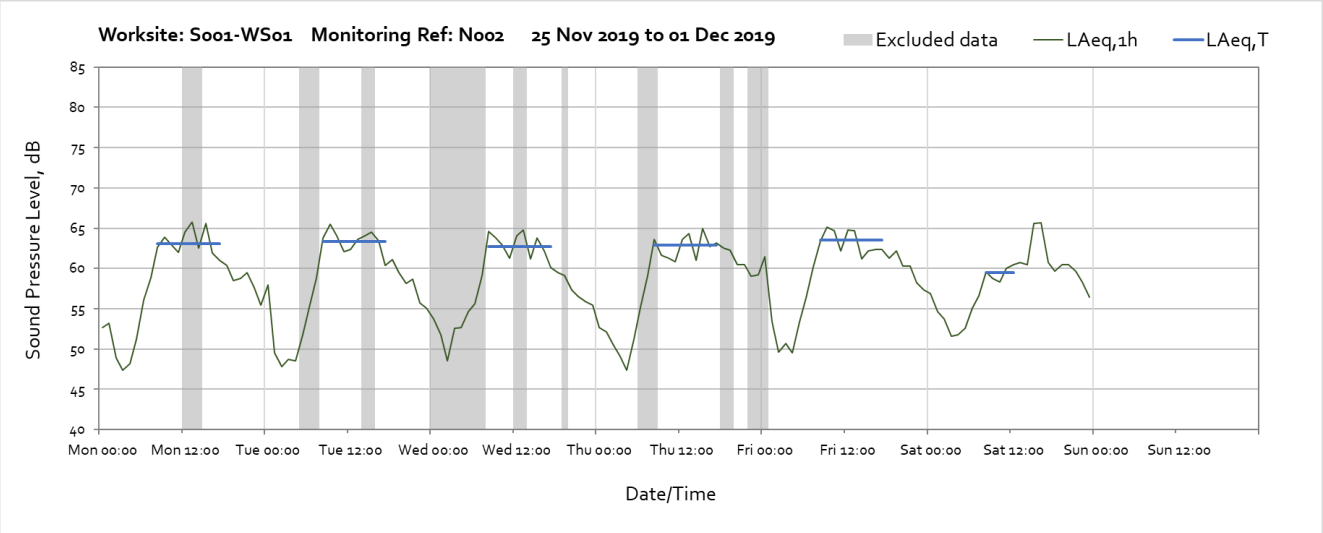




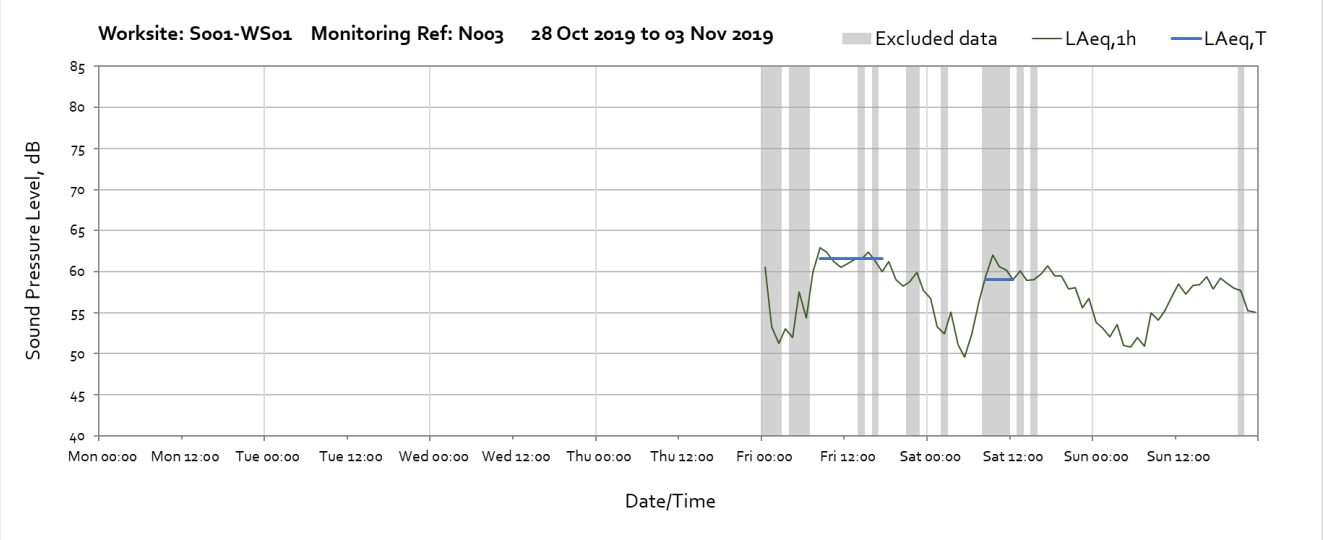


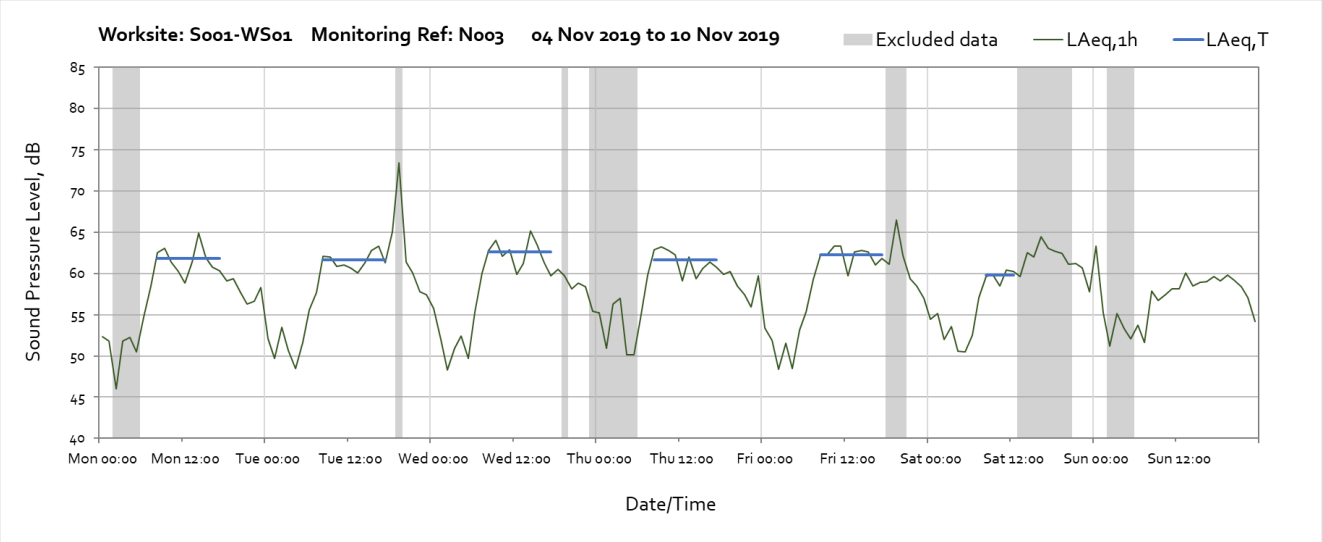


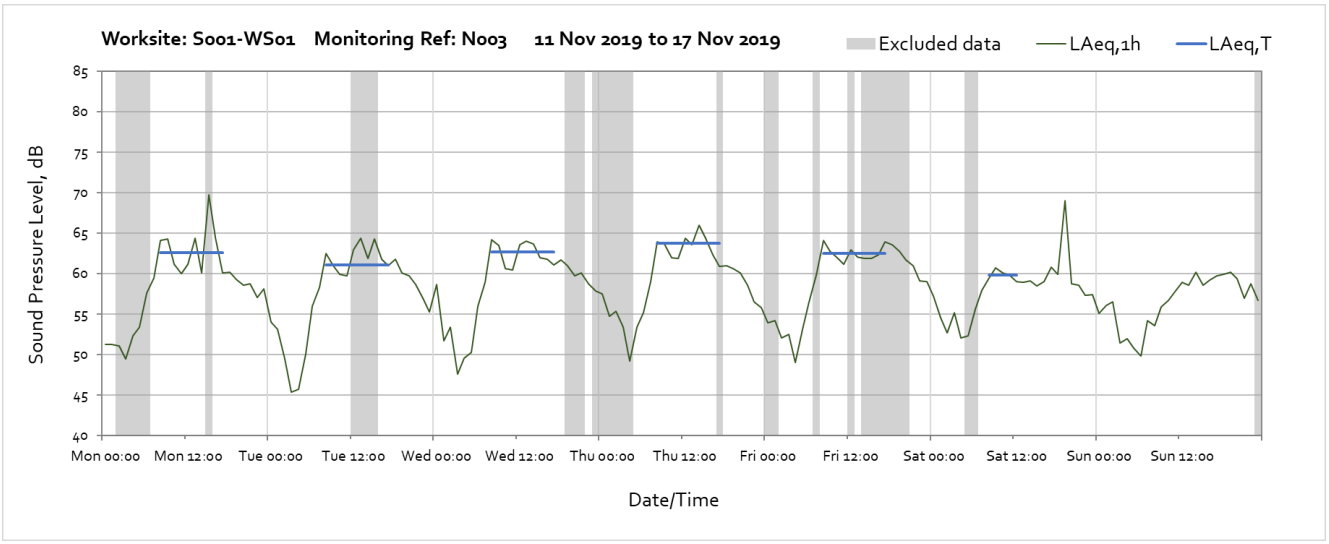
Note: Noise levels above the SOAEL on Tuesday the 19th of November were due to non-HS2 utilities works being undertaken in proximity to the monitor.

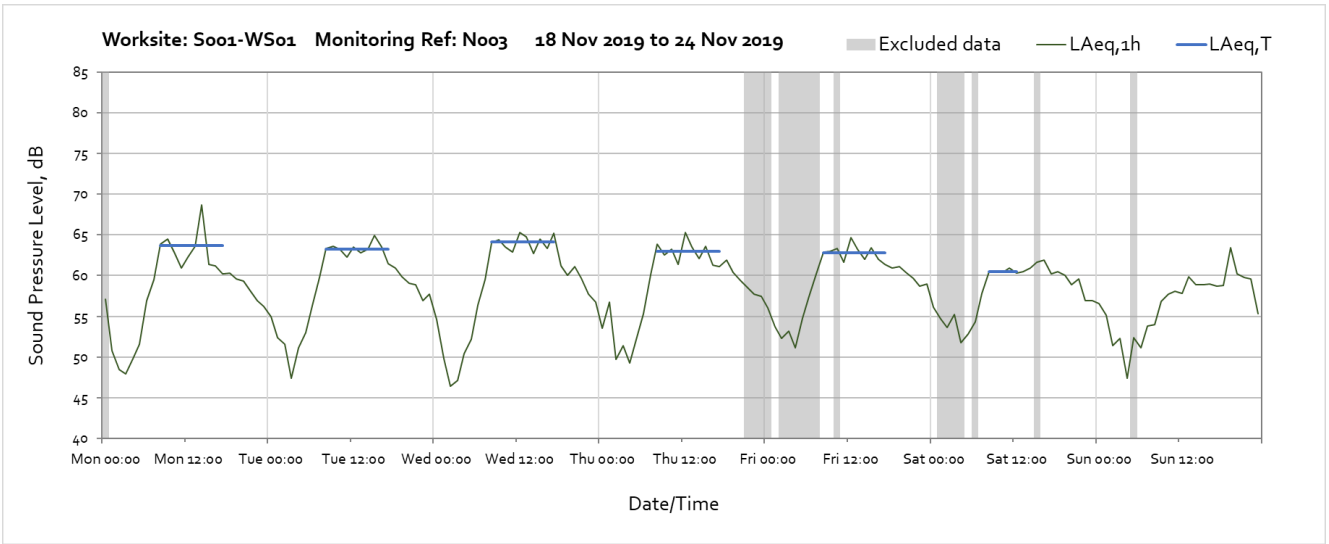


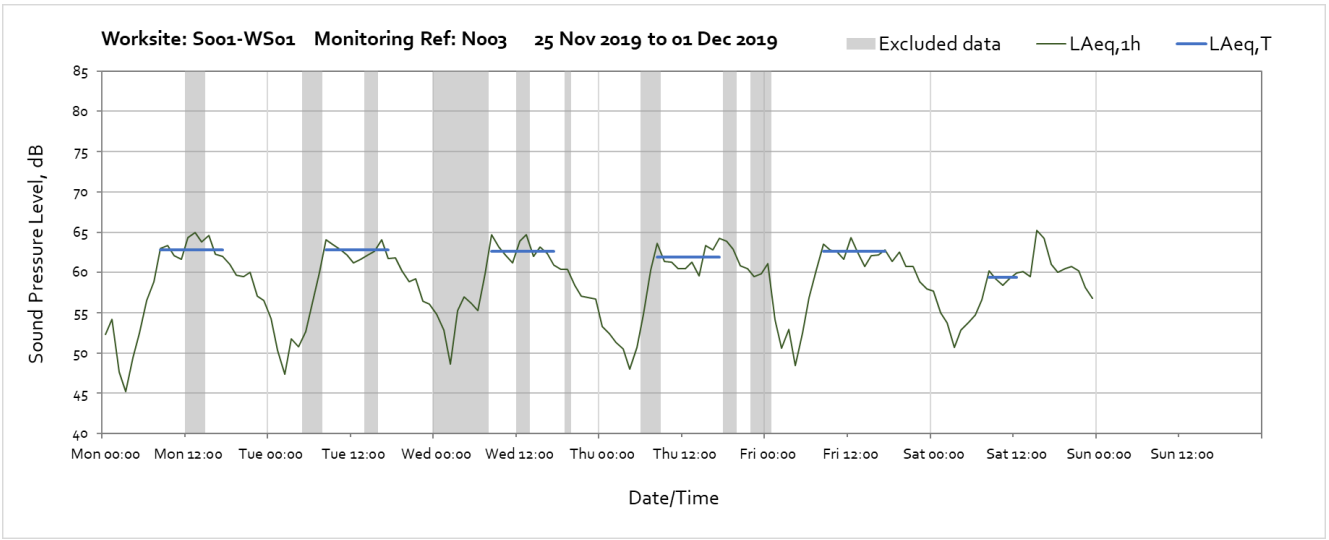
Worksite: S001-WS01 – Monitoring Ref: N003



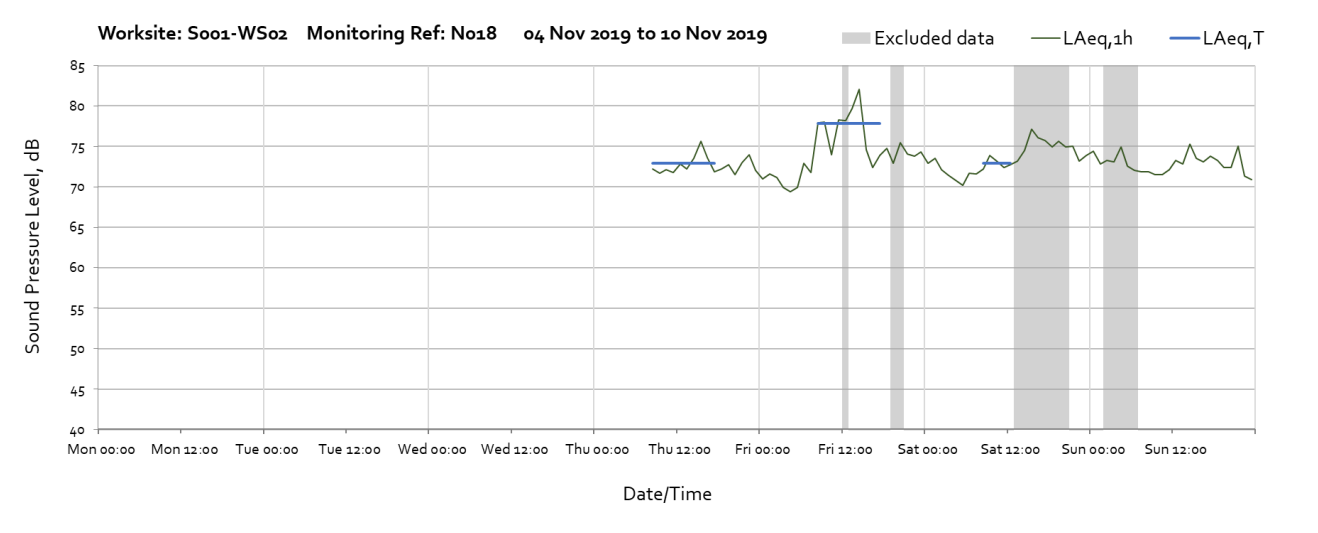



Worksite: S001-WS01 Monitoring Ref: N003 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

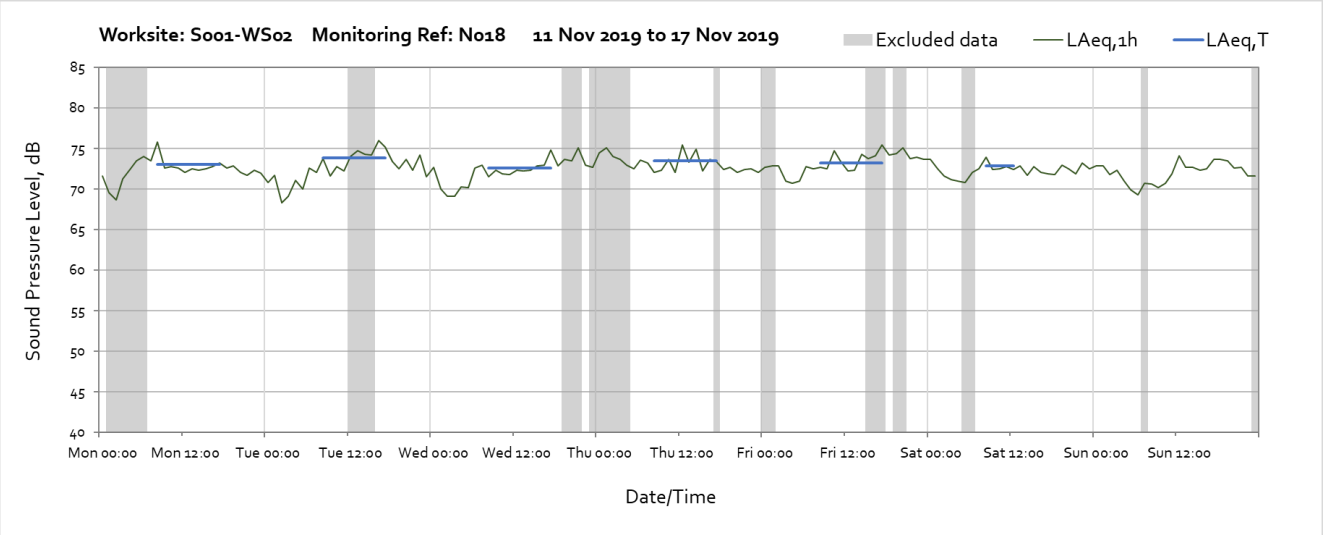

Worksite: S001-WS01 Monitoring Ref: N003 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

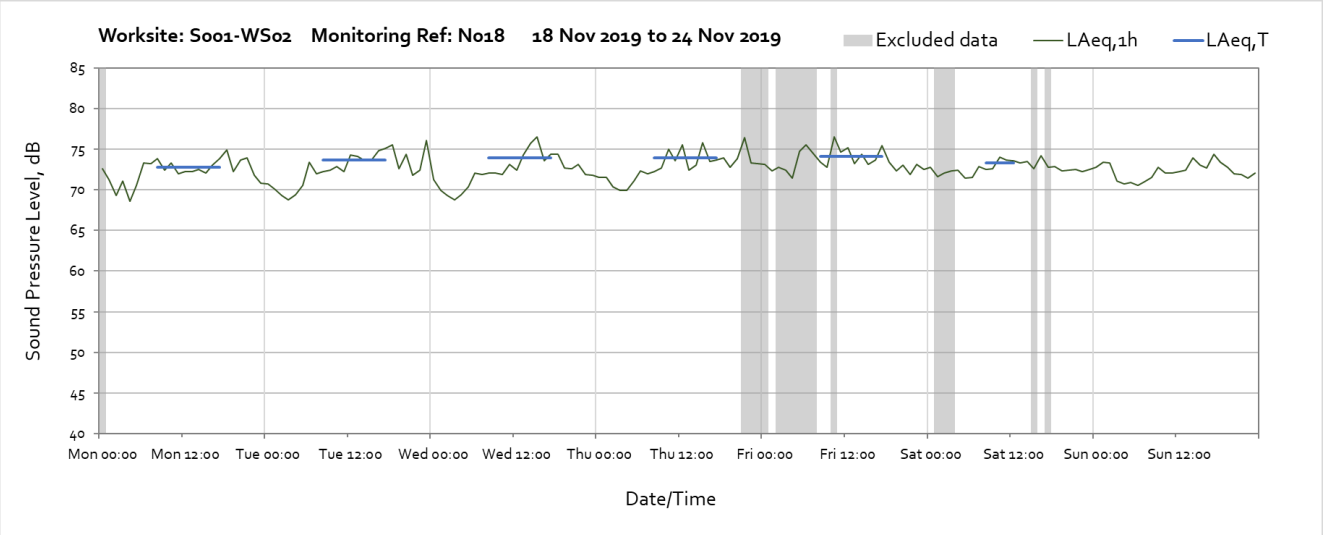

Worksite: S001-WS01 Monitoring Ref: N003 25 Nov 2019 to 01 Dec 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

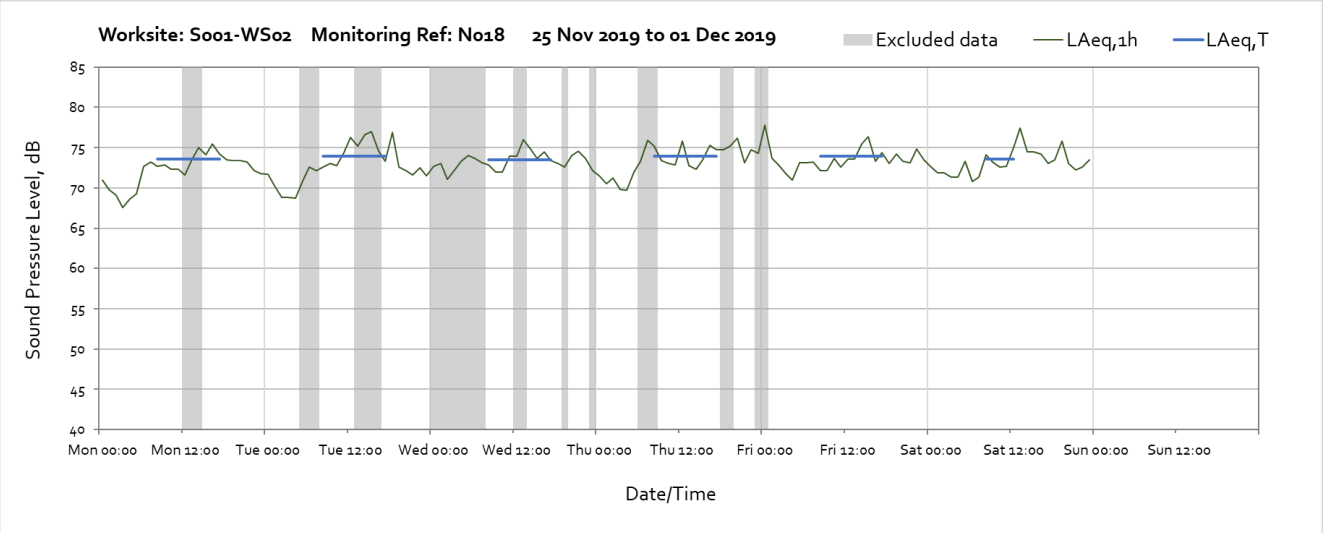
Worksite: S001-WS02 – Monitoring Ref: N018



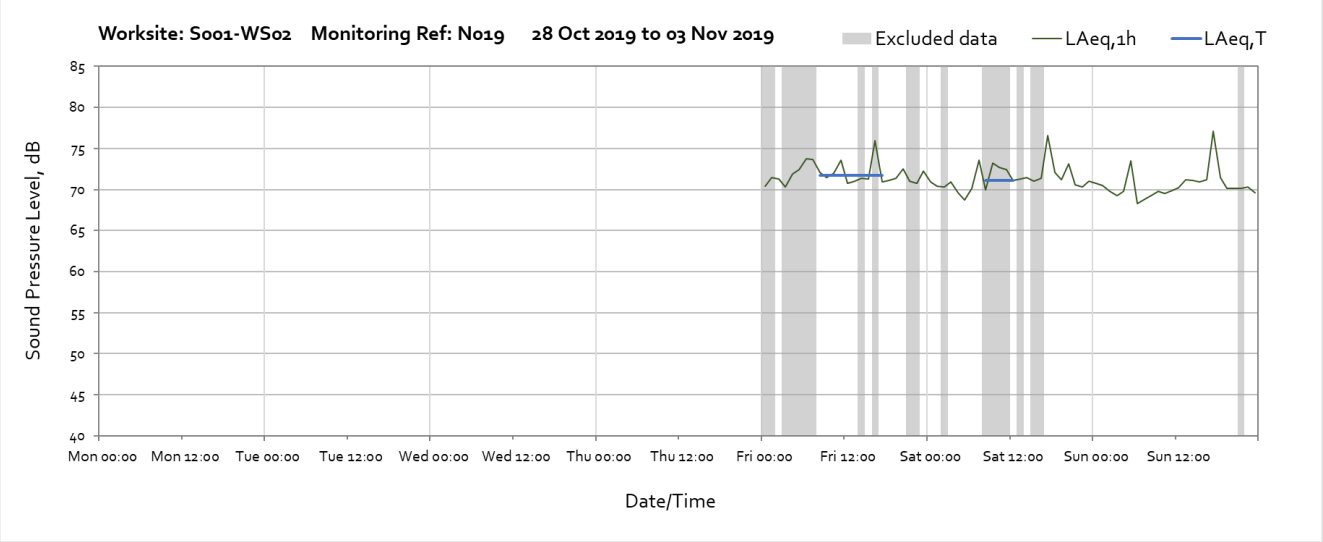
Note: Missing data until 08:00 on Thursday the 6th of November were due to a power failure at the monitoring station.

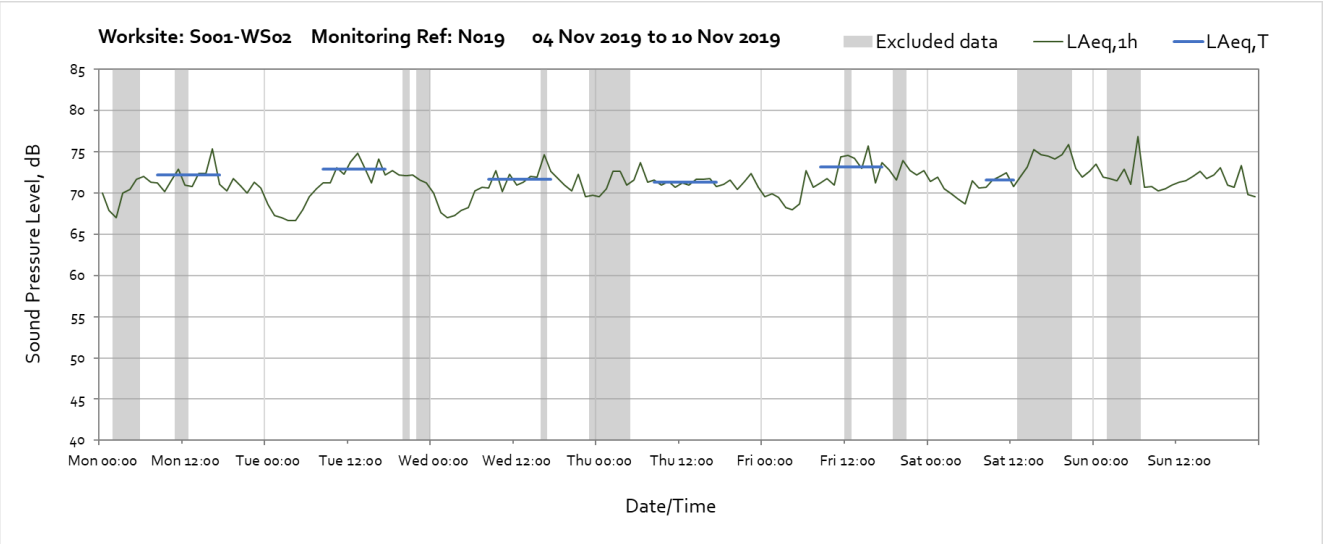


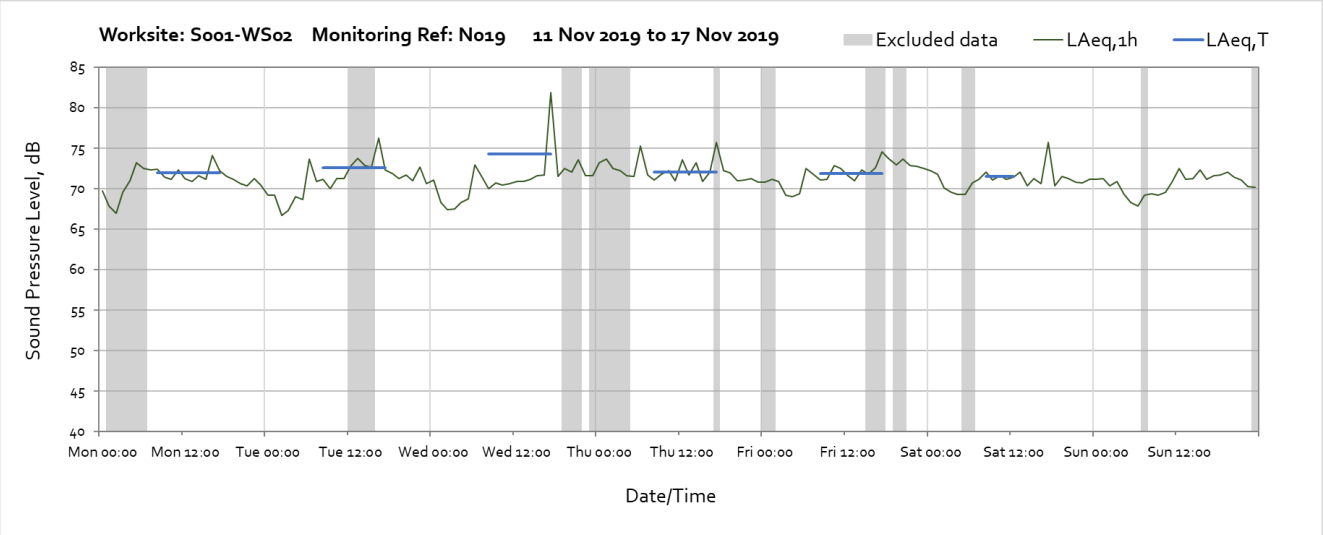




Worksite: S001-WS02 – Monitoring Ref: N019






Worksite: S001-WS02 Monitoring Ref: N019 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
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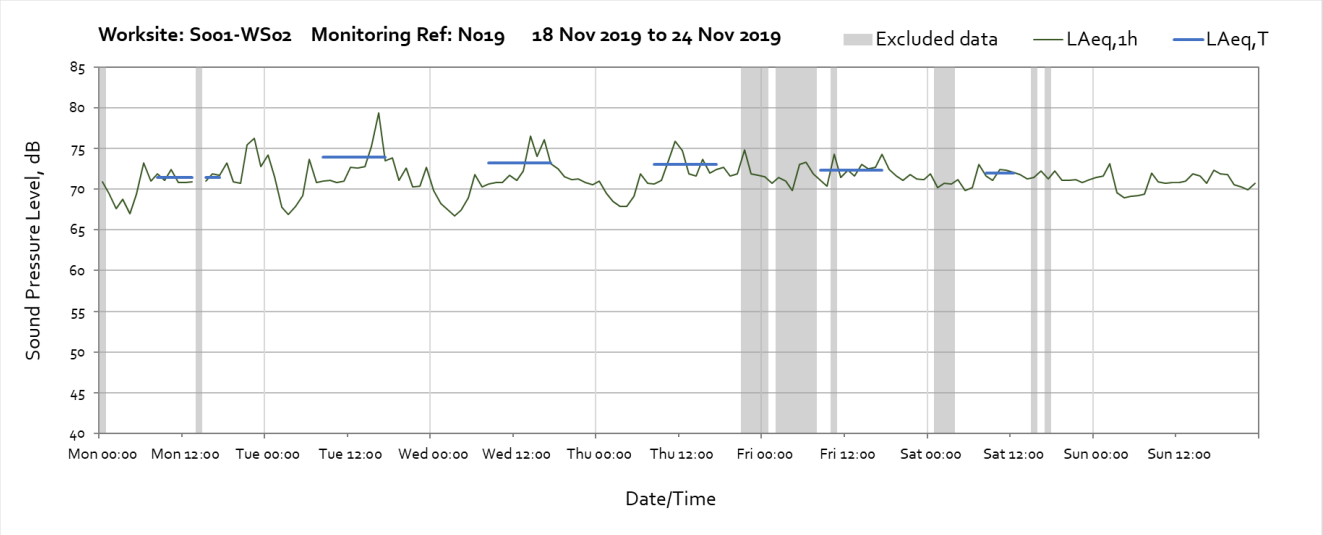
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: S001-WS02 Monitoring Ref: N019 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
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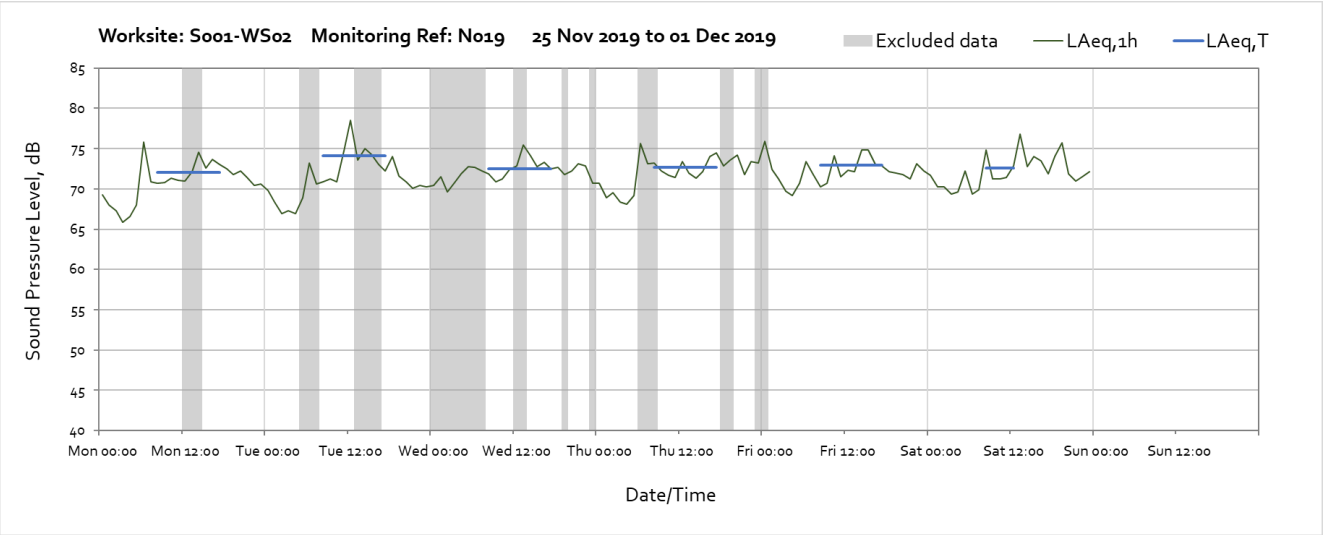
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: S001-WS02 Monitoring Ref: N019 25 Nov 2019 to 01 Dec 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
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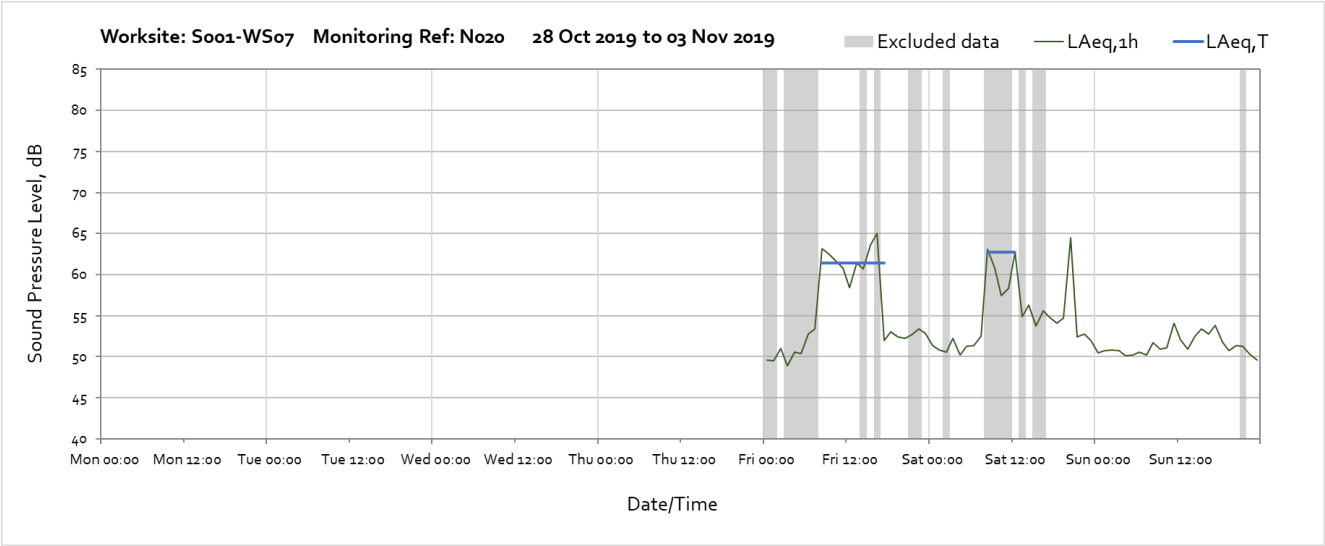
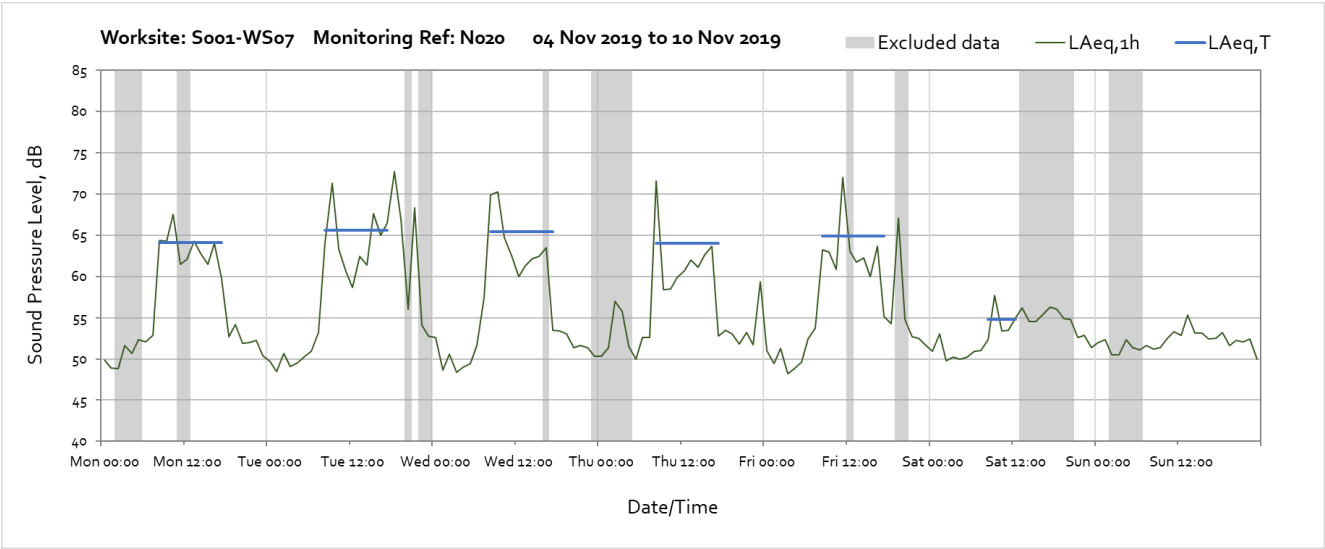
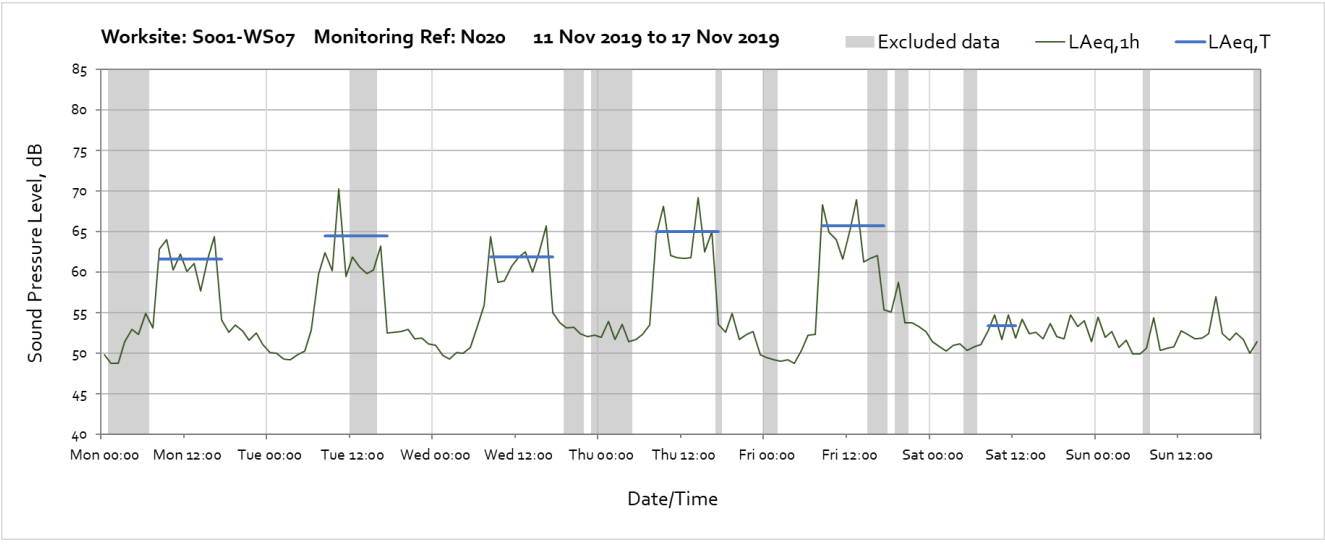
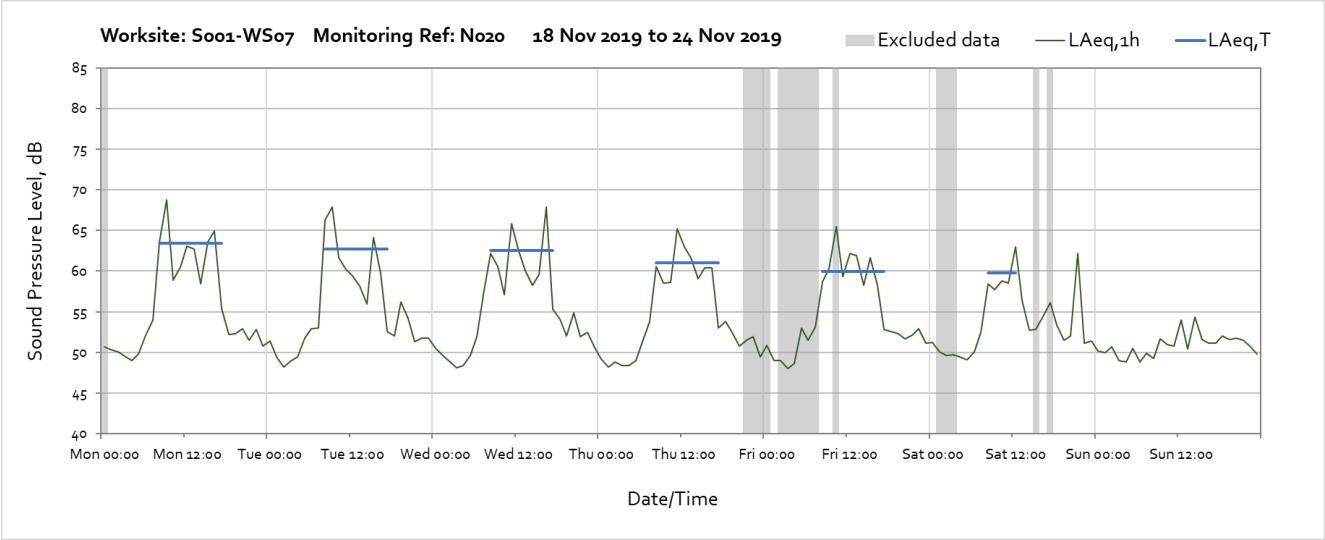
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

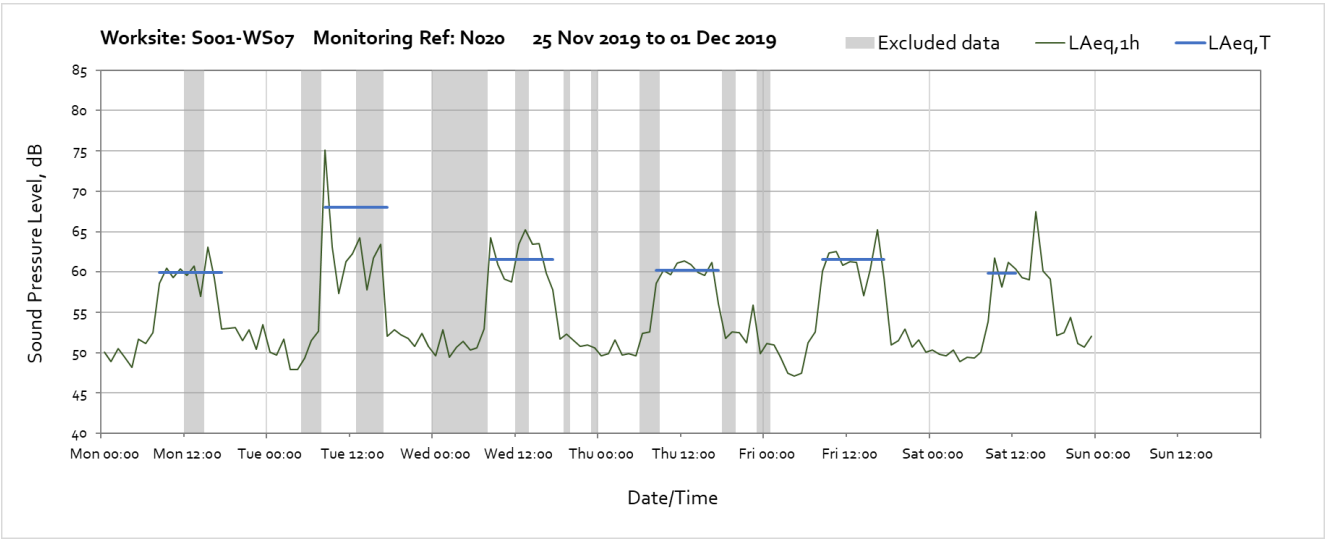
Worksite: S001-WS07 – Monitoring Ref: N020



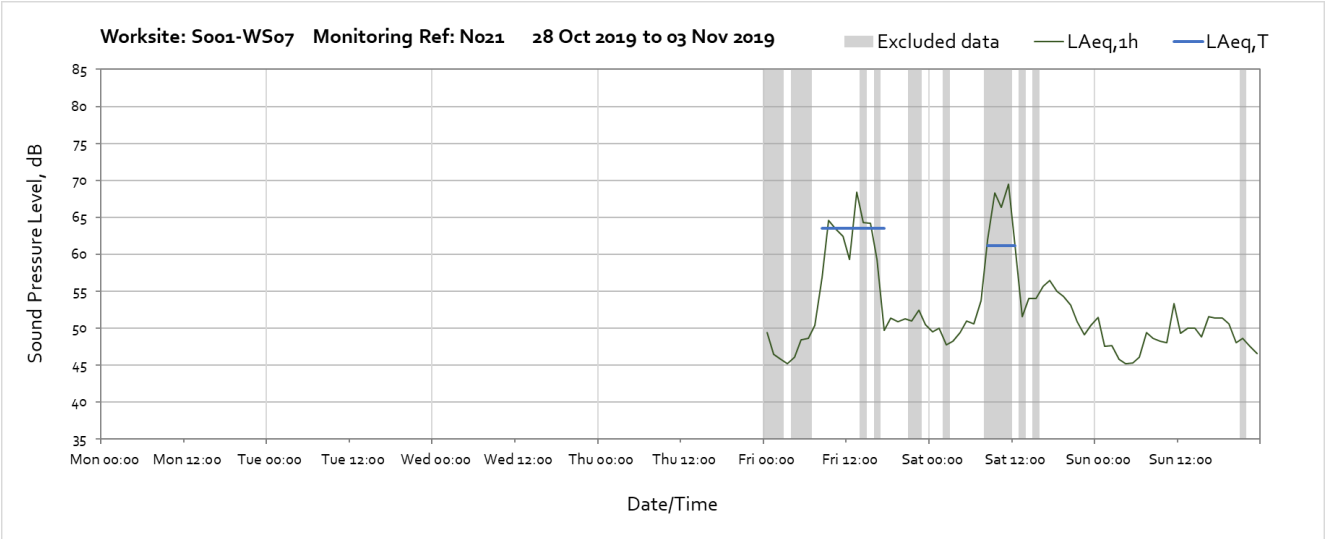


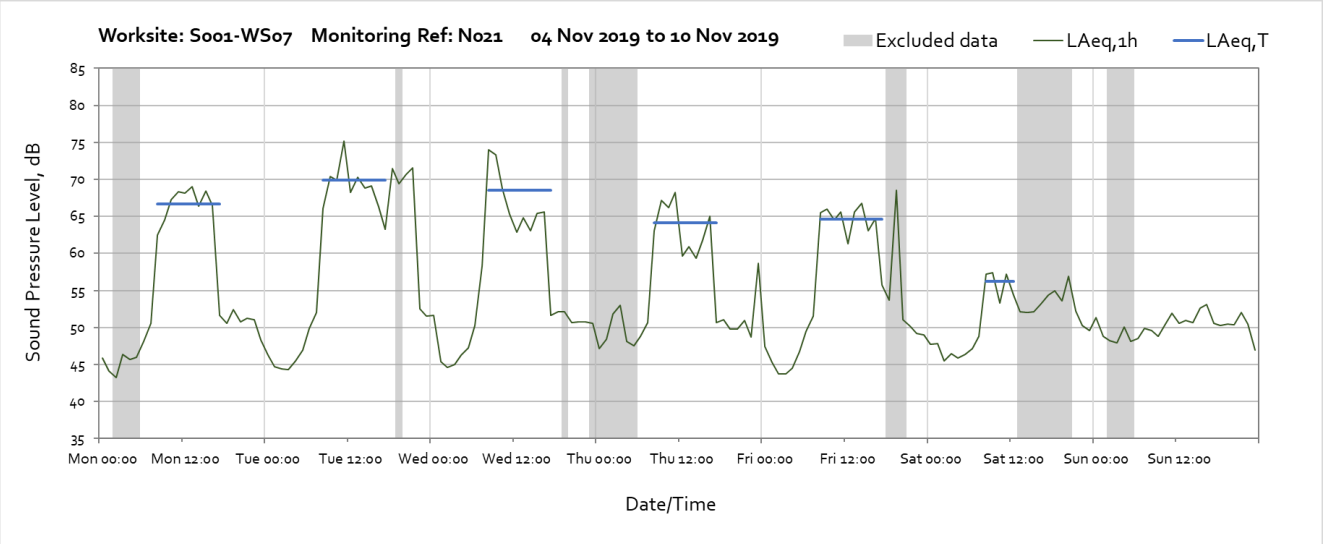


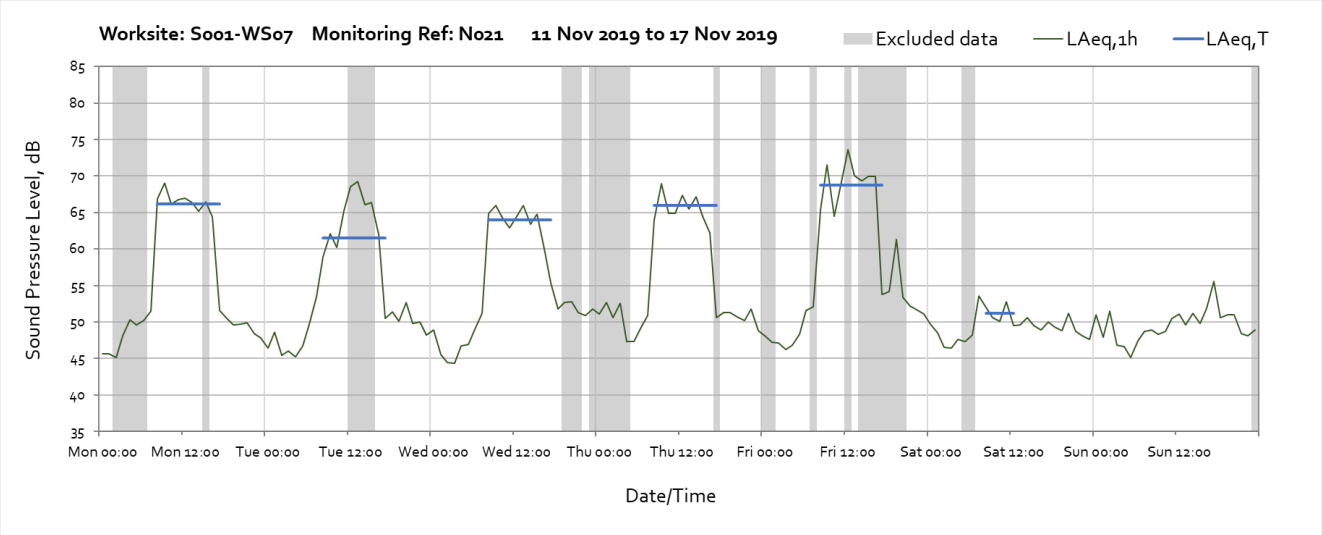


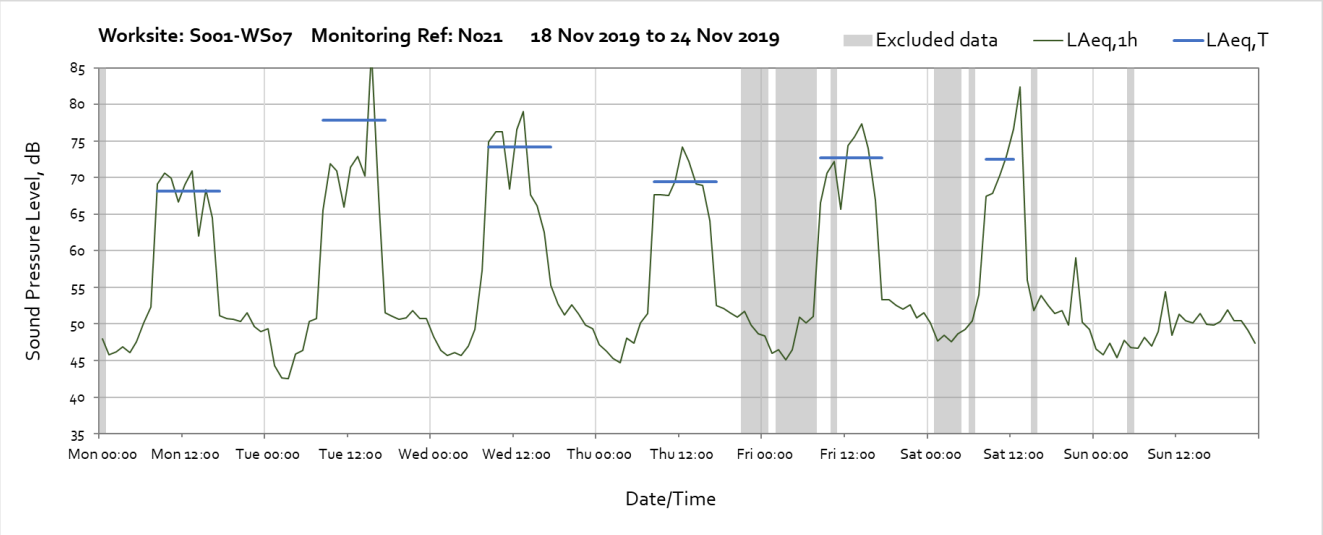


Worksite: S001-WS07 – Monitoring Ref: N021

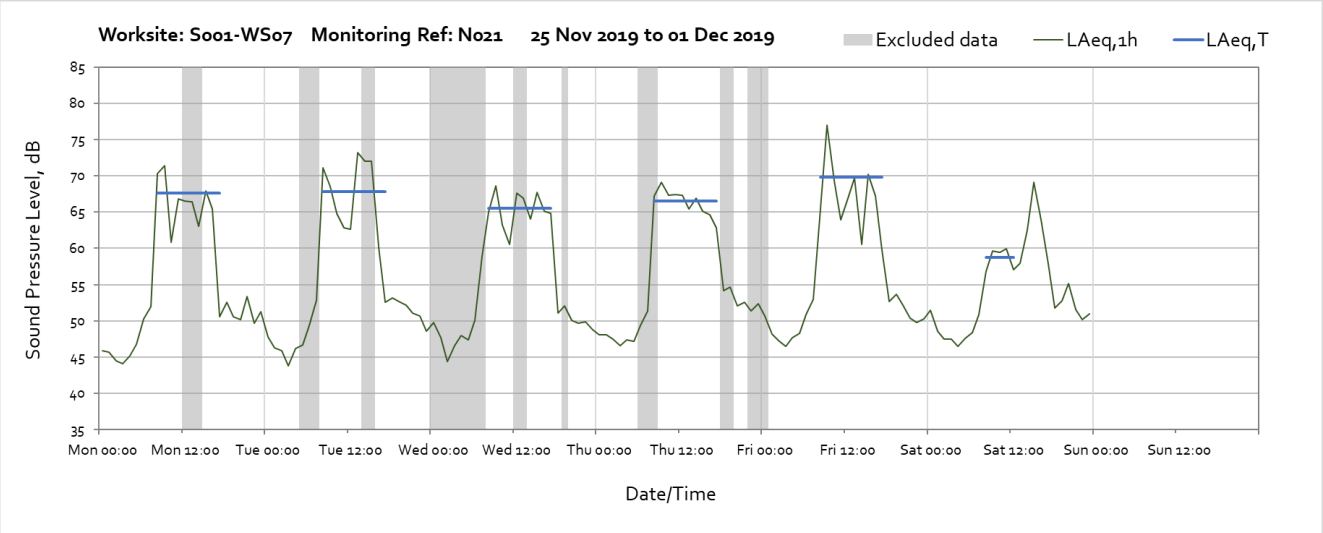




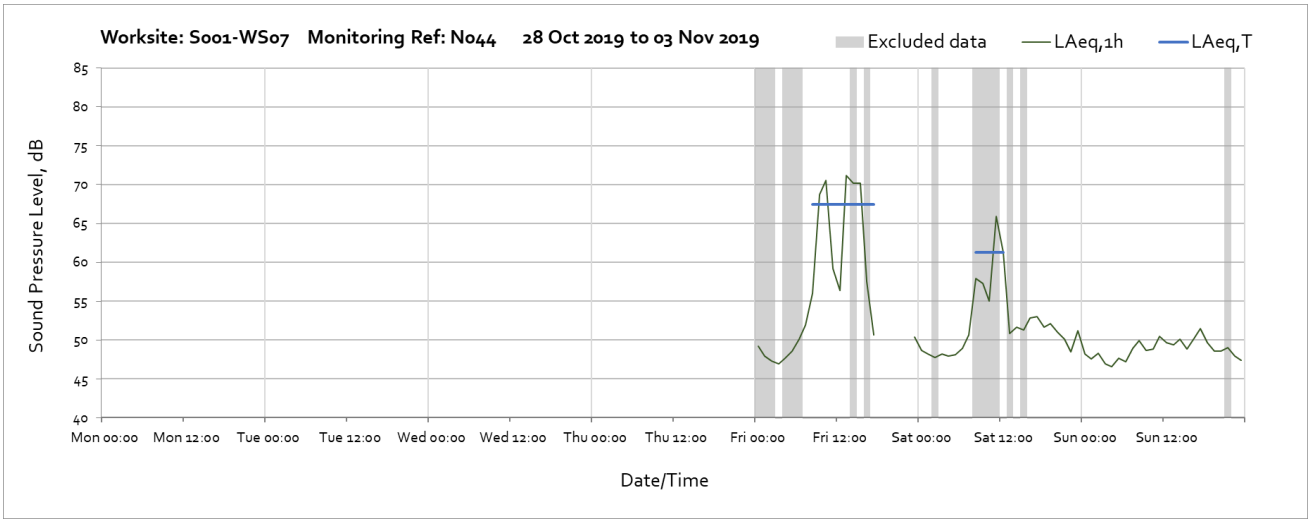




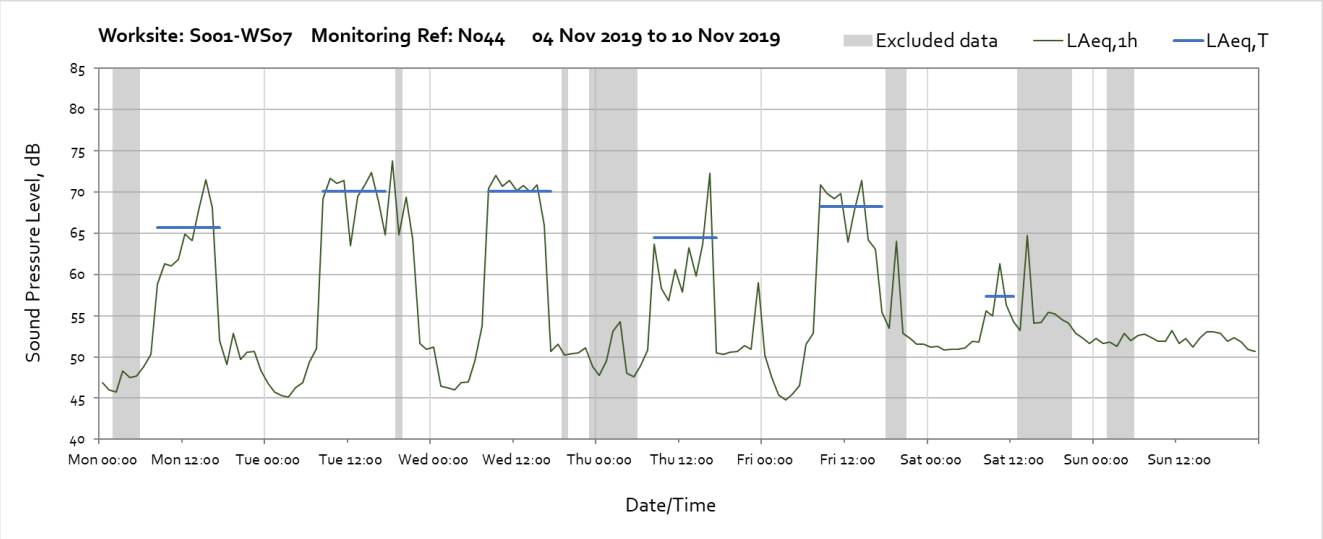
Note: Noise levels above the SOAEL on Tuesday the 19th and Wednesday the 20th of November were due to construction activities happening in close proximity to the monitor. Considering distance attenuation noise levels would be below the SOAEL at the nearest receptors to the works.

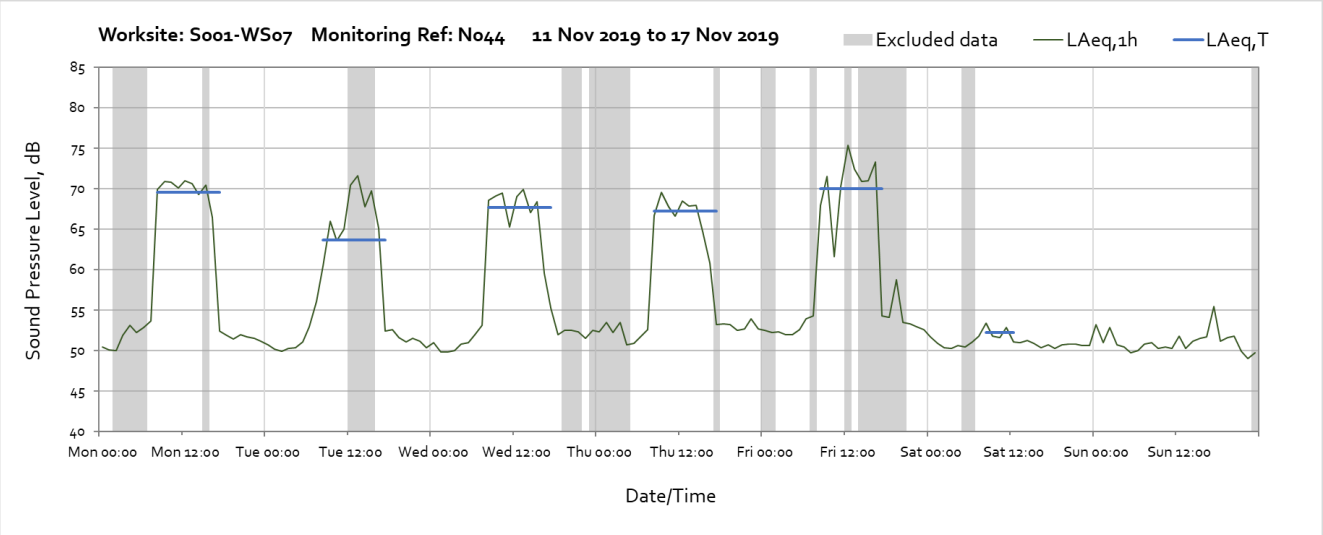


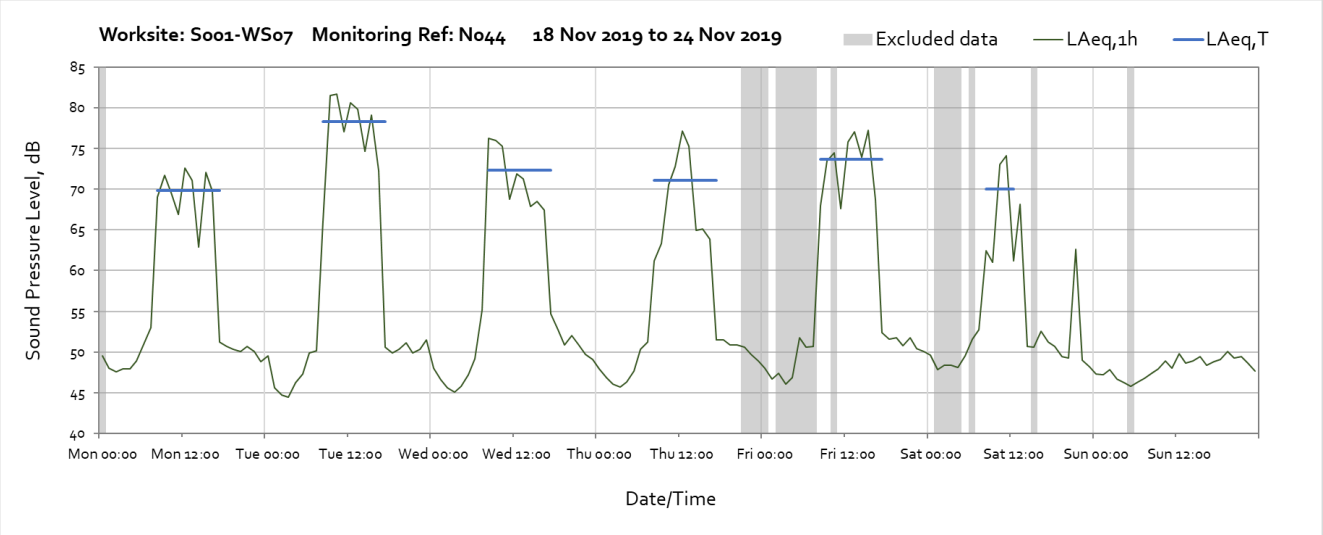
Worksite: S001-WS07 – Monitoring Ref: N044



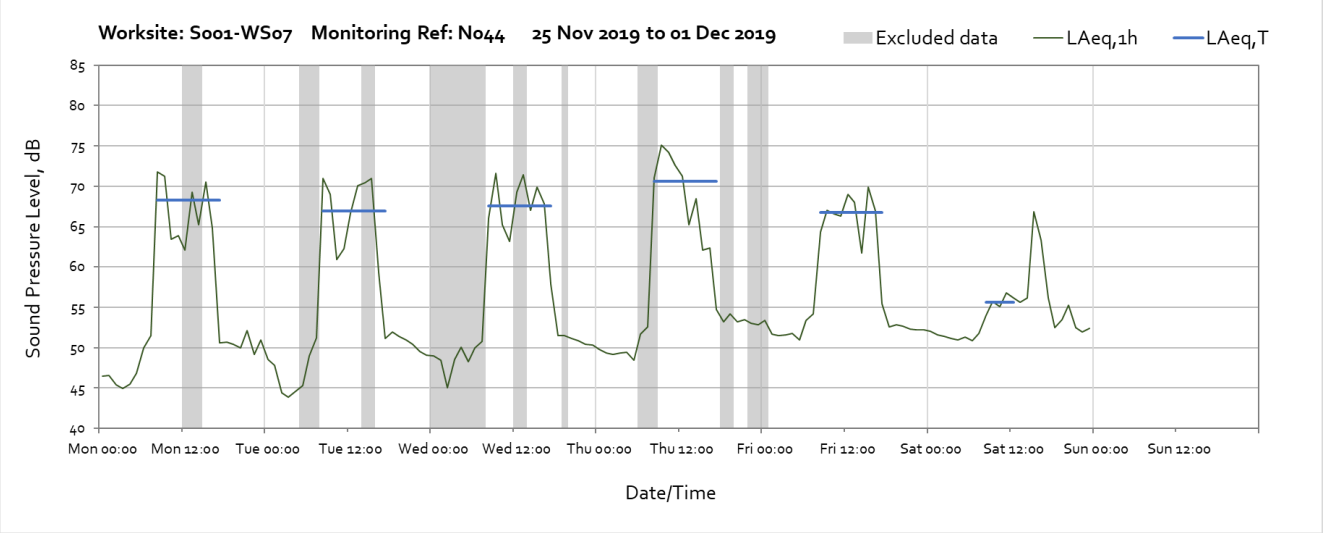
Note: Missing data between 18:00 and 23:00 on Friday the 1st of November were due to a power failure at the construction site.



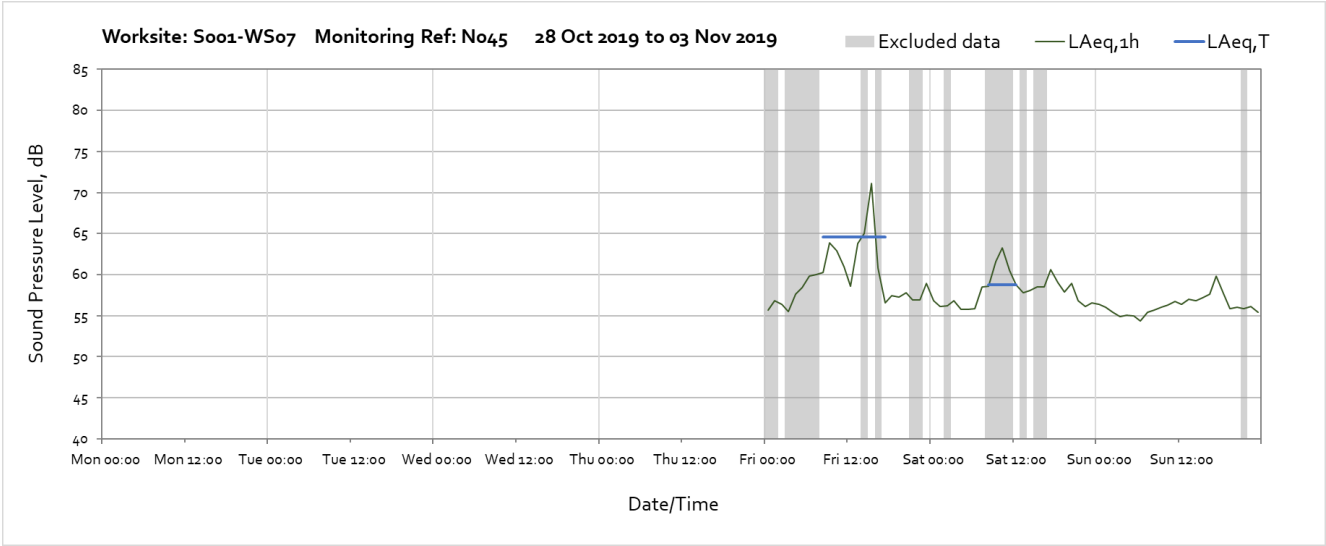


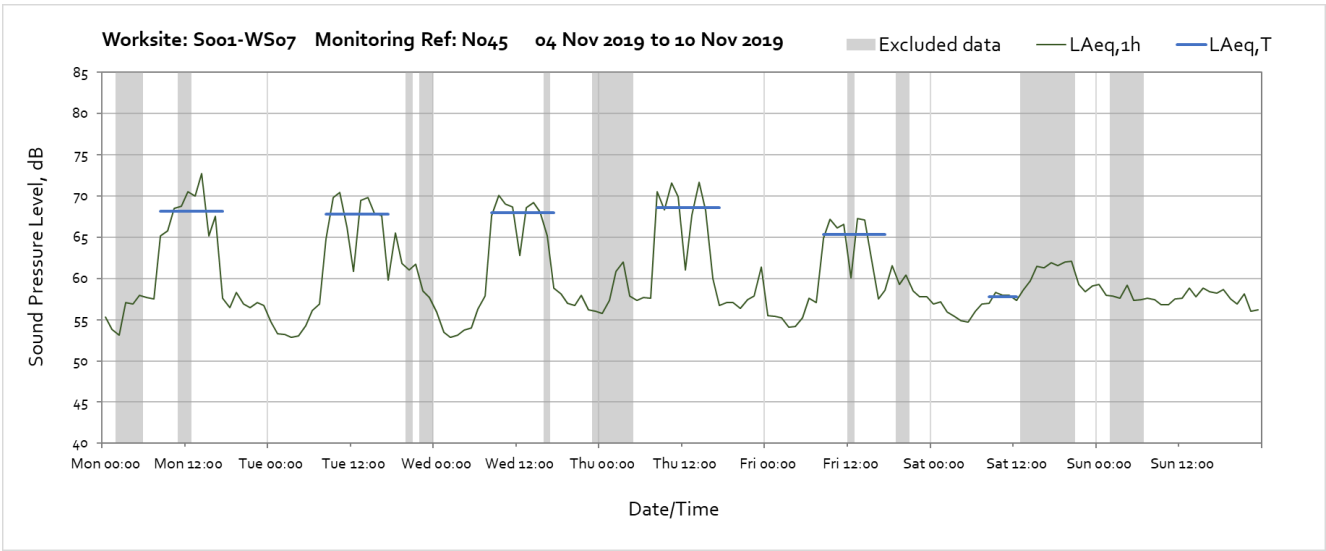


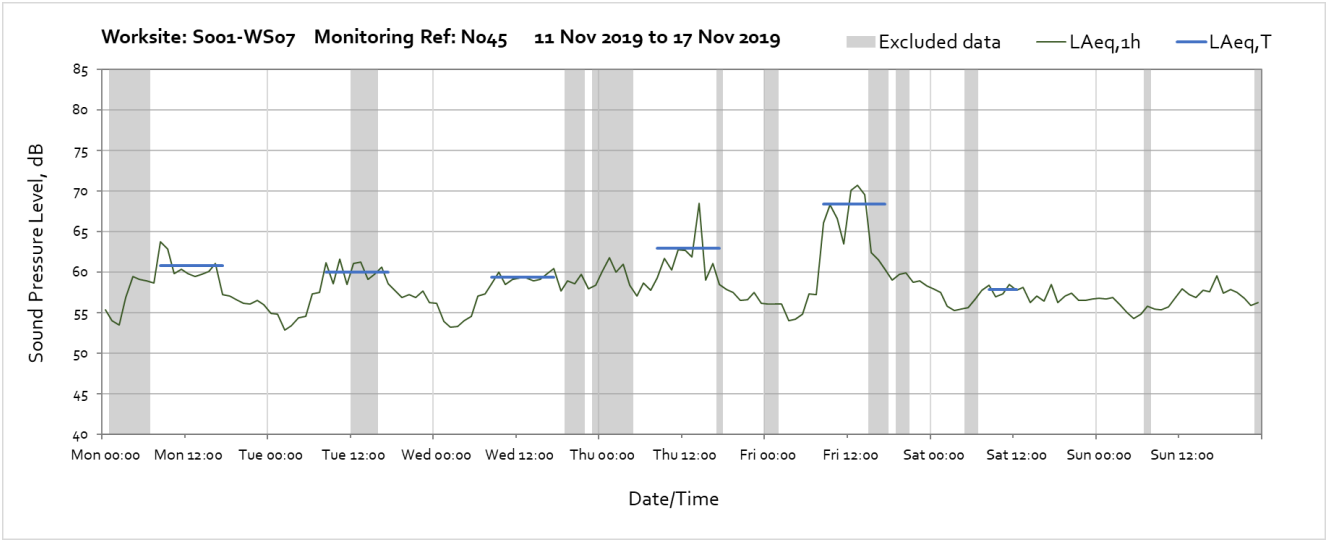
Note: Noise levels above the SOAEL on Tuesday the 19th and Thursday the 21st of November were due to noise from dust suppression equipment installed in proximity to the monitor. Considering distance attenuation noise levels would be below the SOAEL at the nearest receptors to the works.

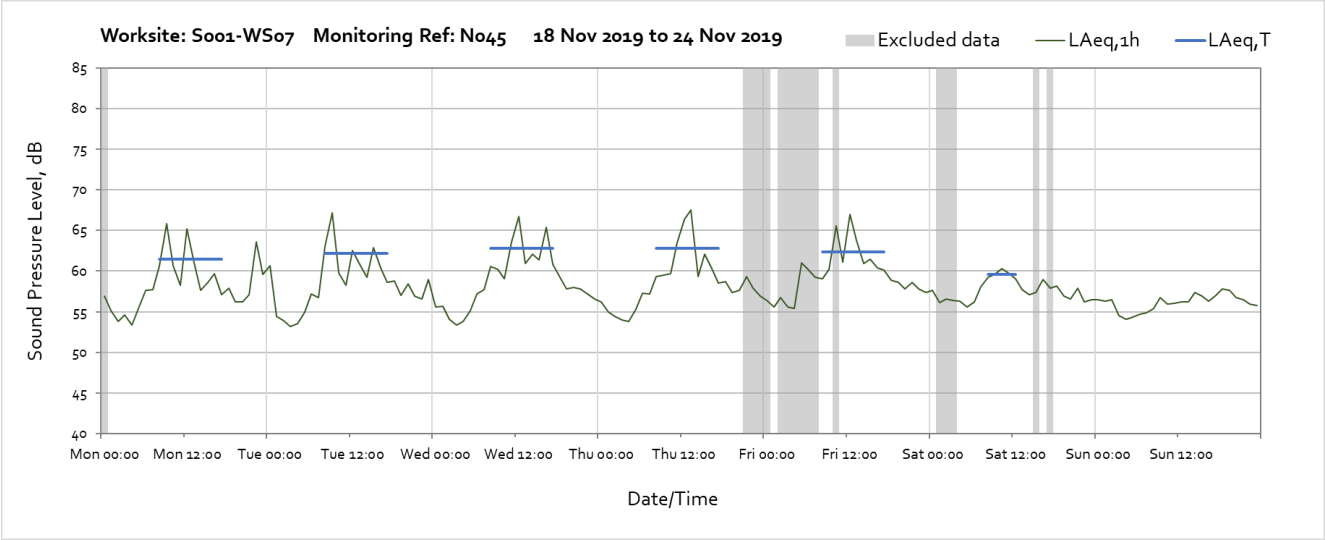


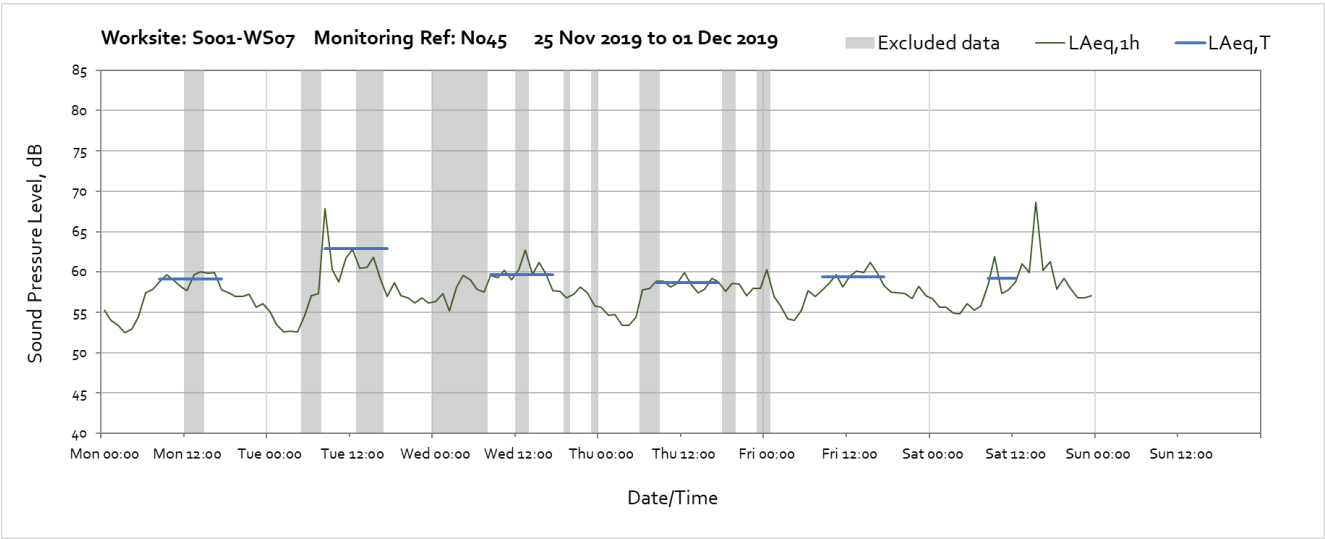
Worksite: S001-WS07 – Monitoring Ref: N045



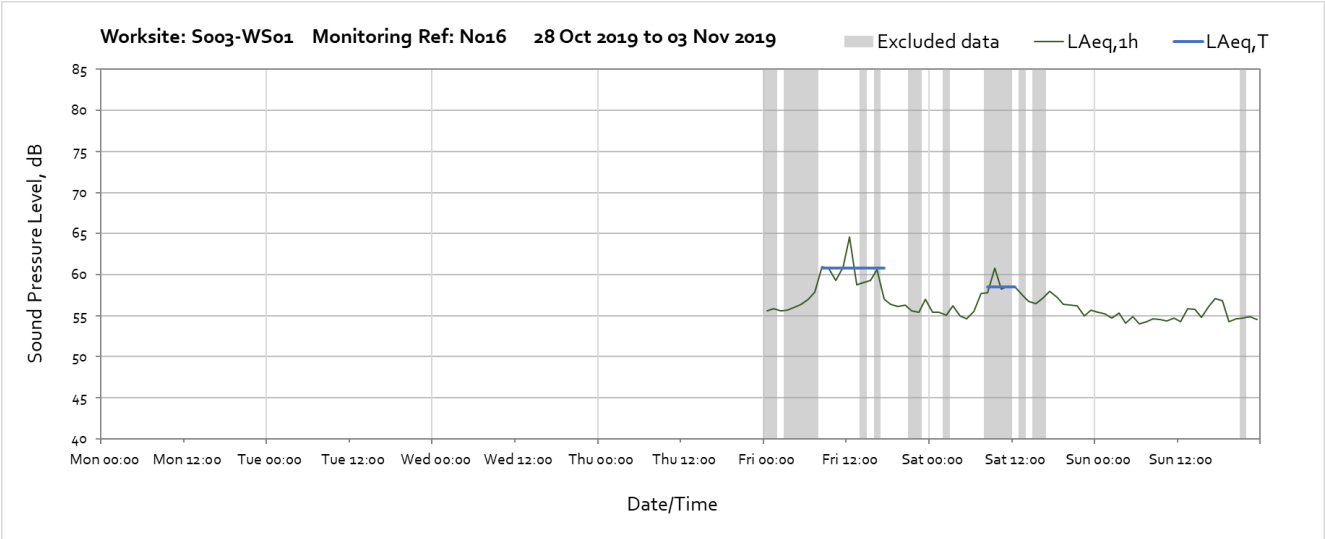


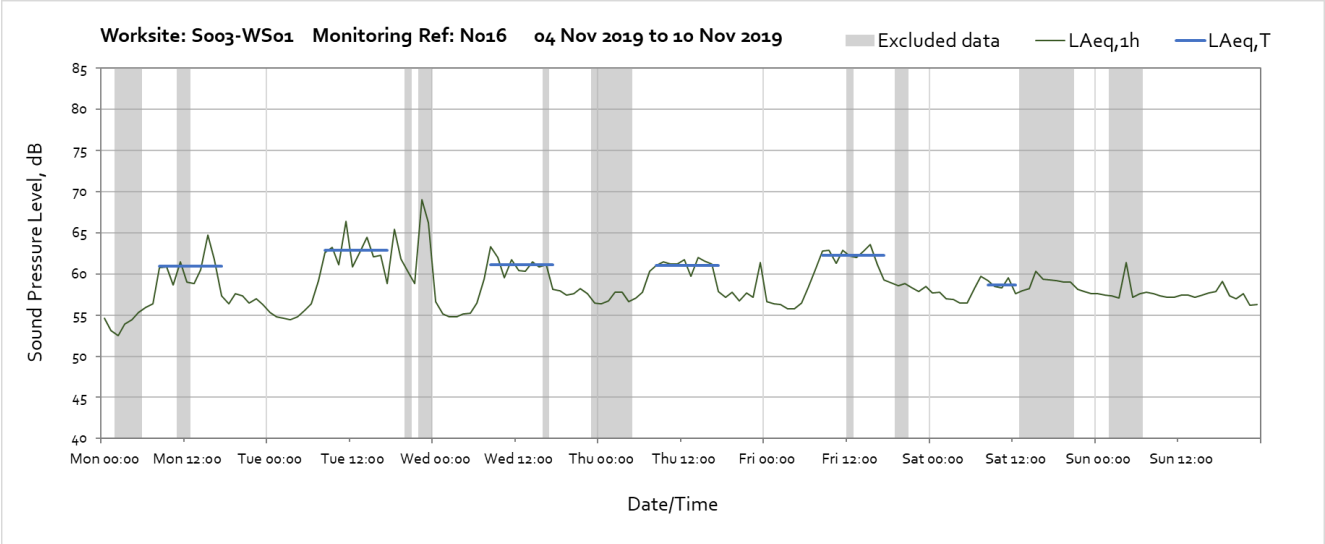


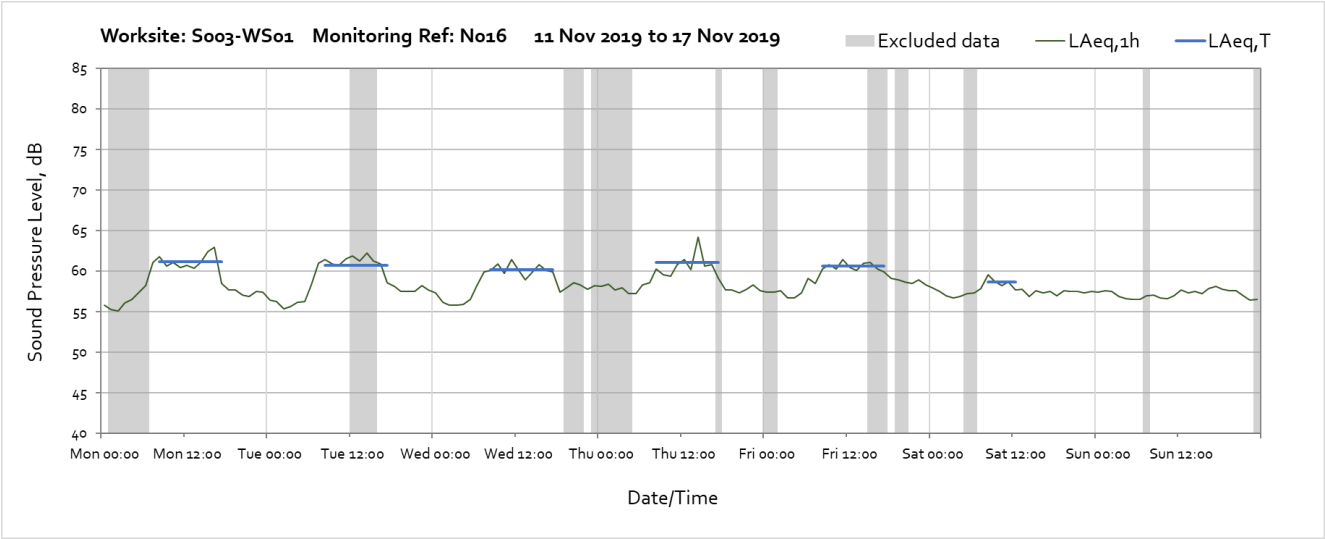


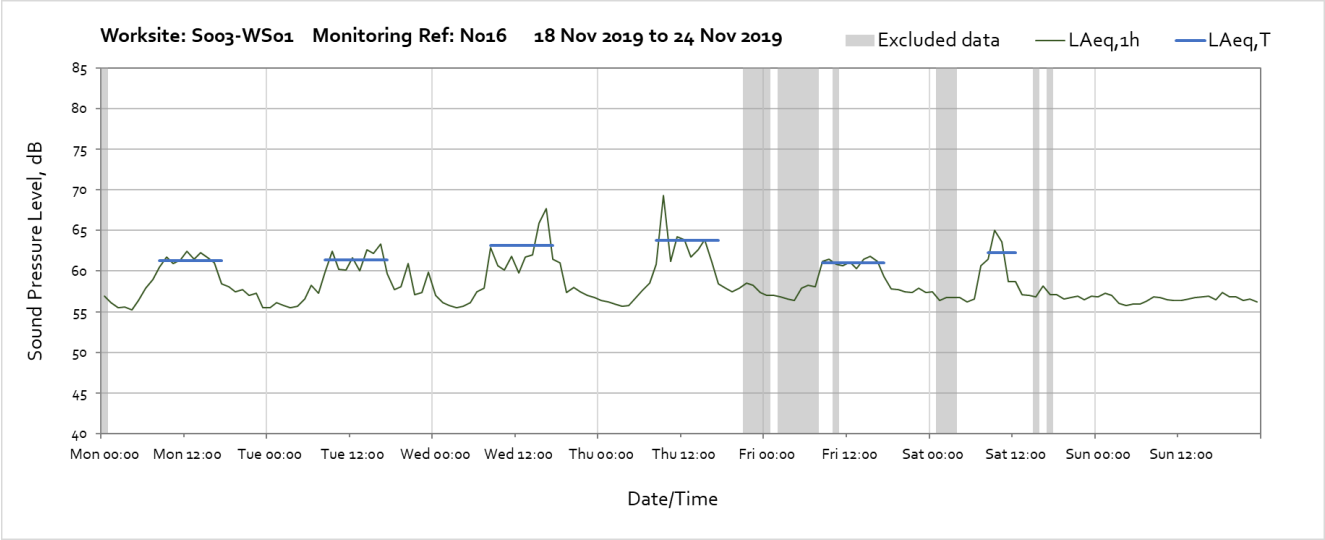


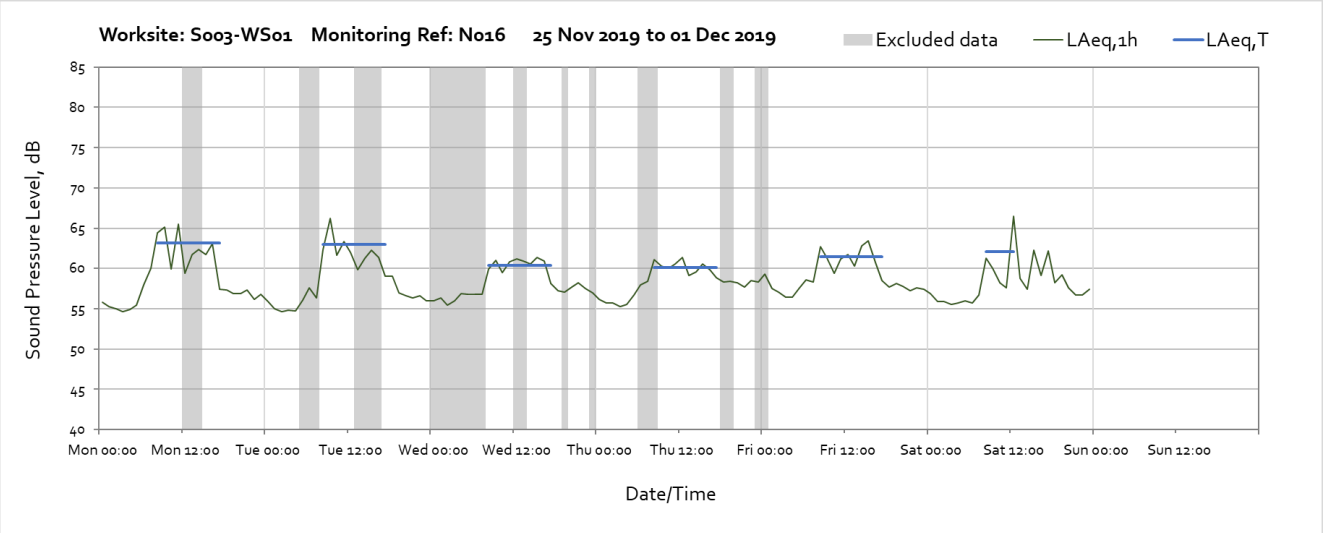
Worksite: S003-WS01 – Monitoring Ref: N016



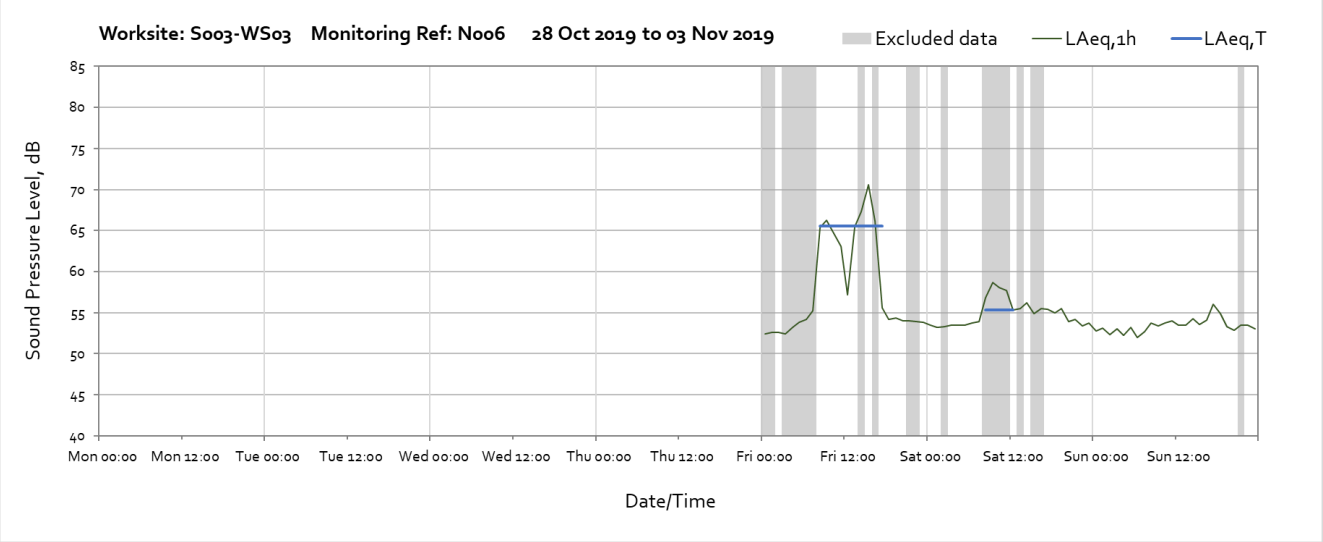

Worksite: S003-WS01 Monitoring Ref: N016 04 Nov 2019 to 10 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

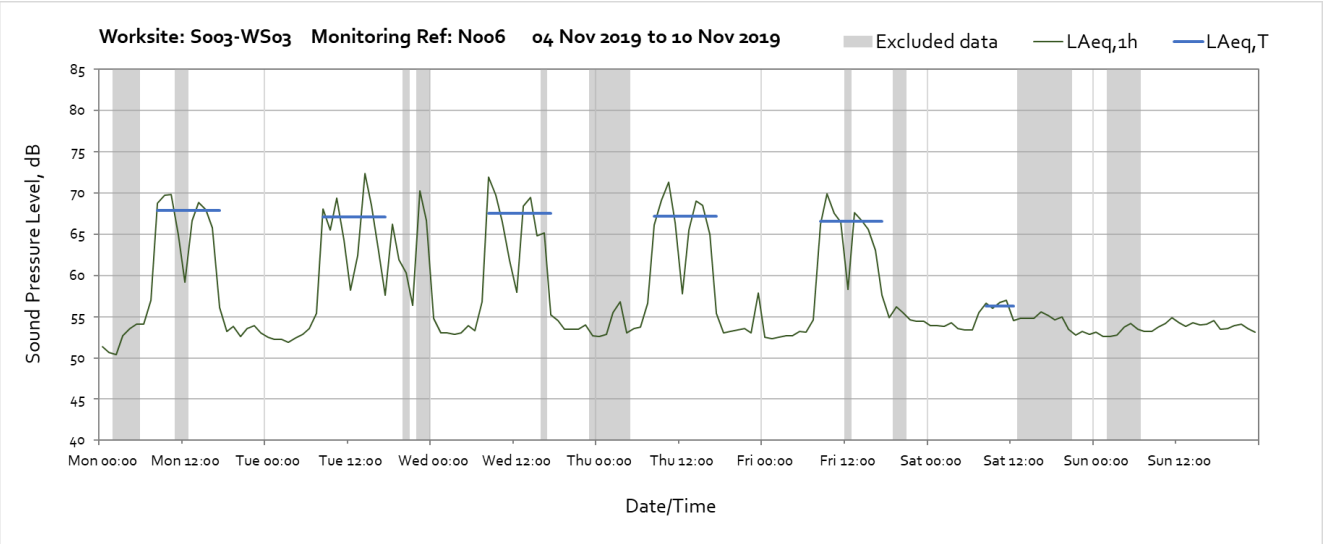

Worksite: S003-WS01 Monitoring Ref: N016 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

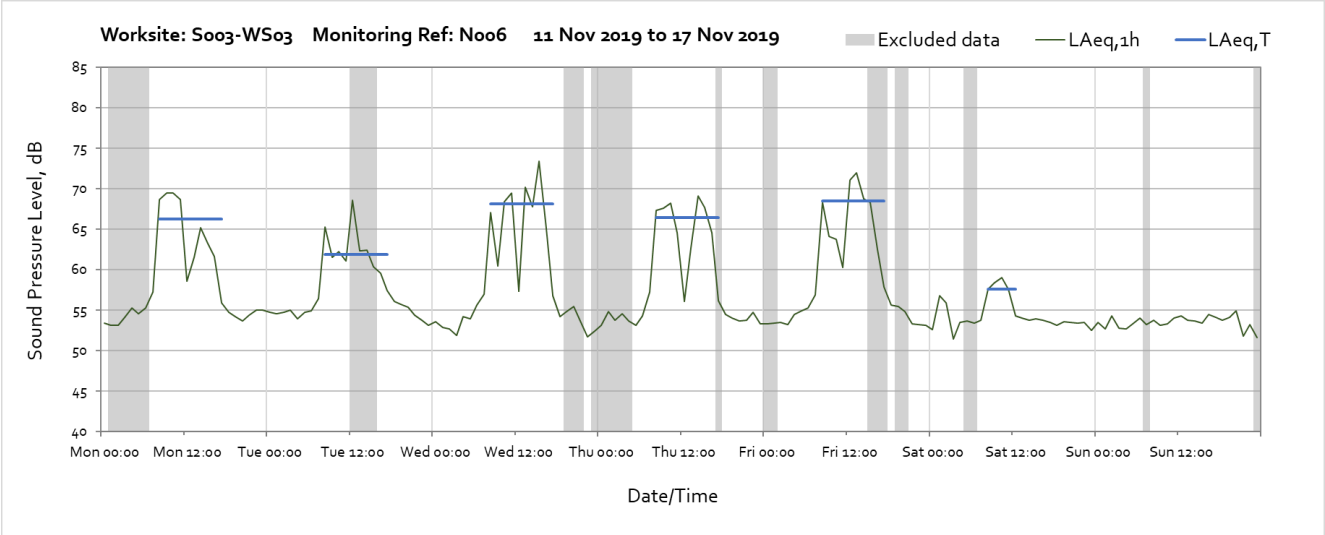

Worksite: S003-WS01 Monitoring Ref: N016 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time



Worksite: S003-WS03 – Monitoring Ref: N006






Worksite: S003-WS03 Monitoring Ref: N006 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
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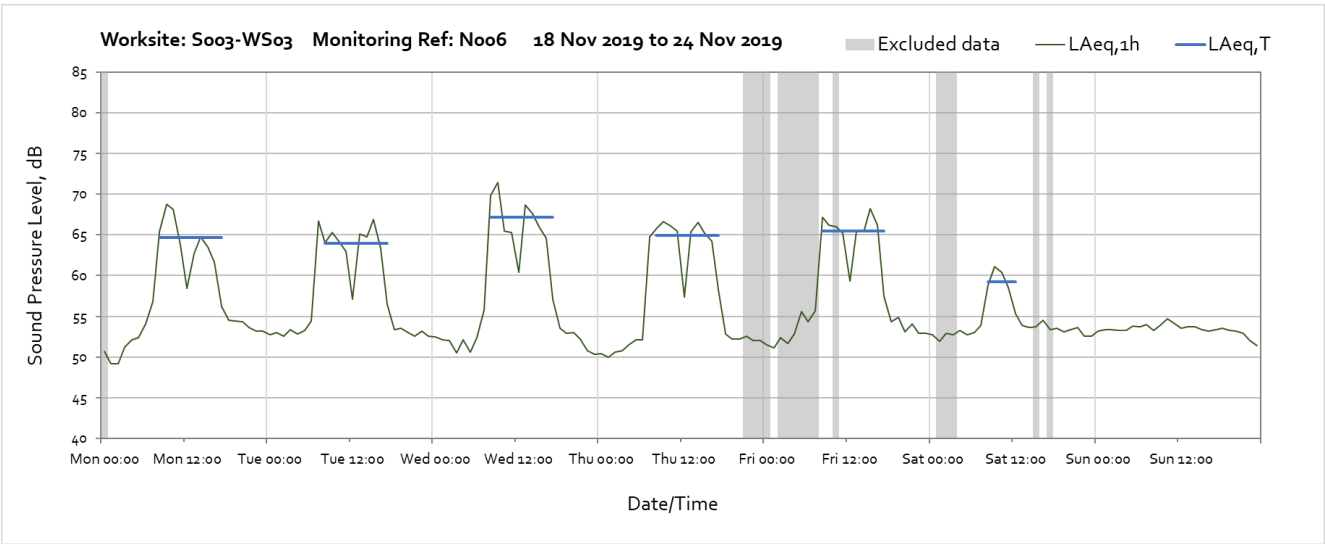
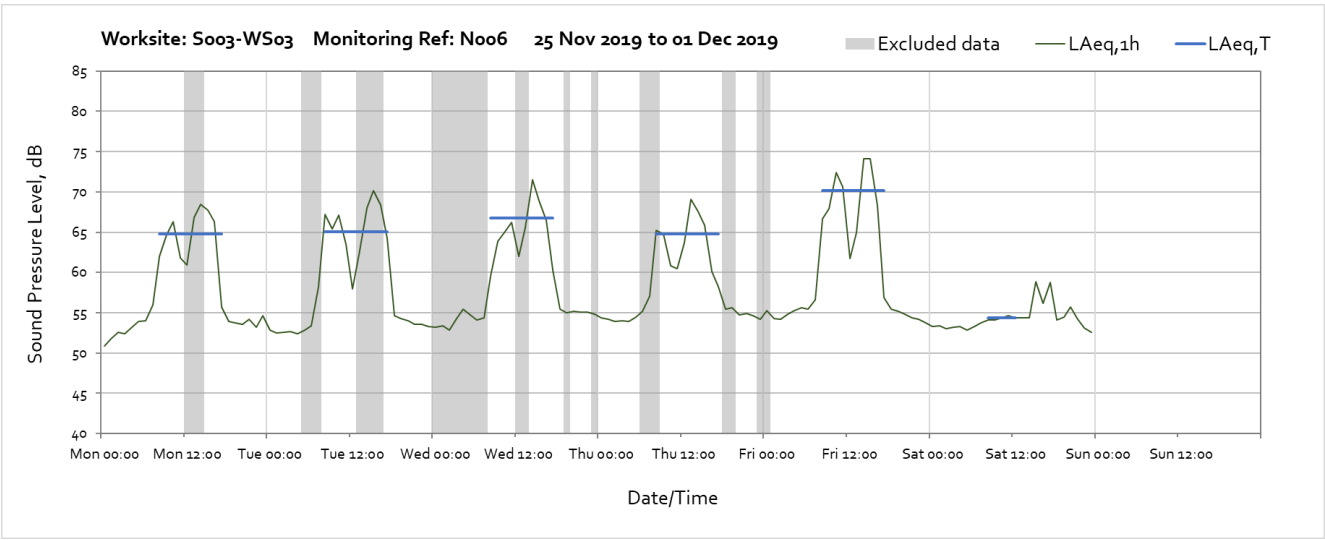
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: S003-WS03 Monitoring Ref: N006 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: S003-WS03 Monitoring Ref: N006 25 Nov 2019 to 01 Dec 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
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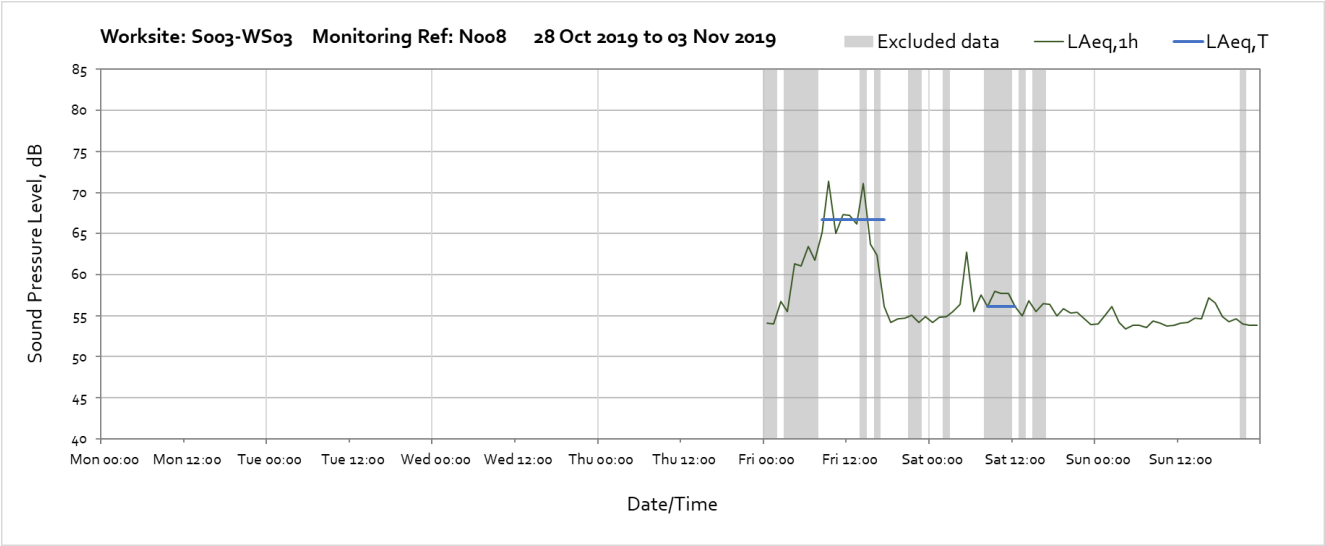
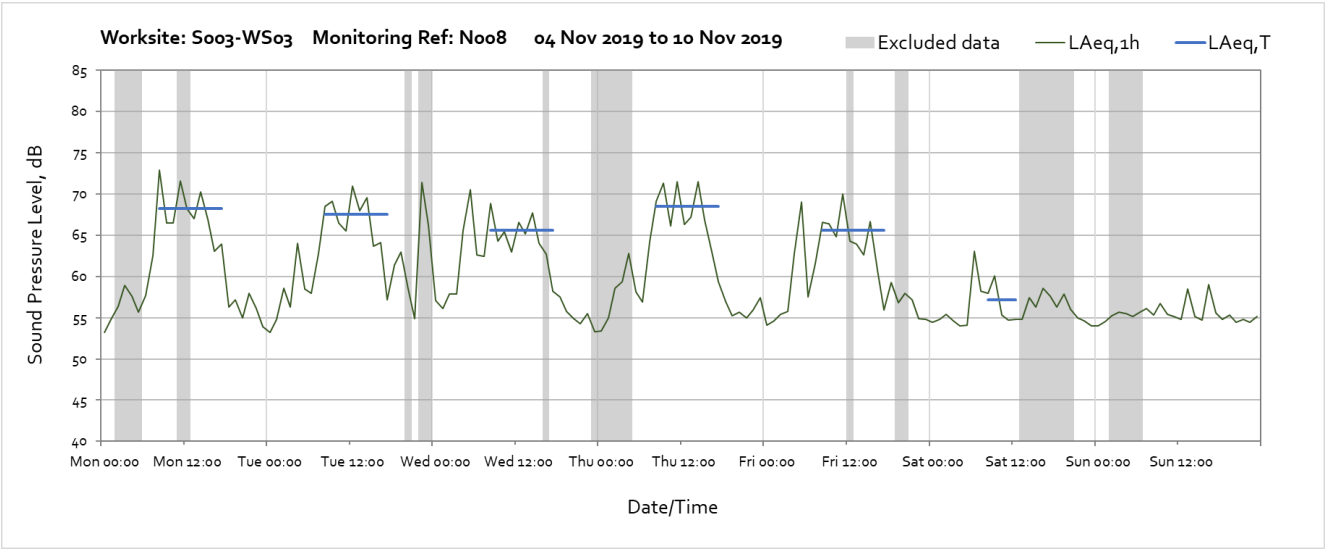
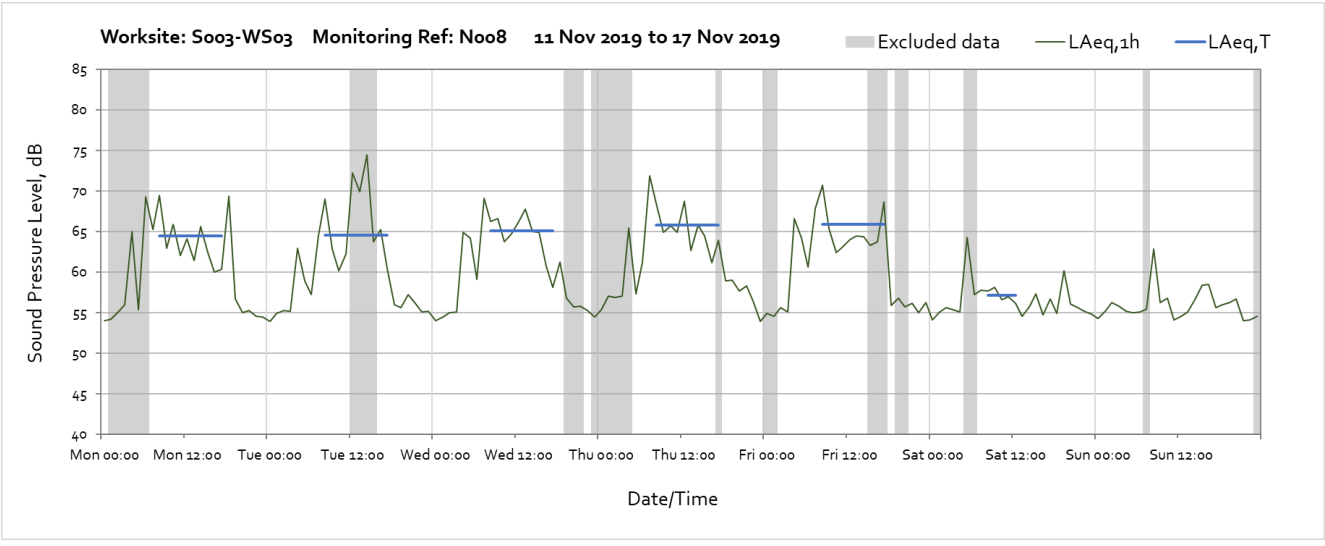
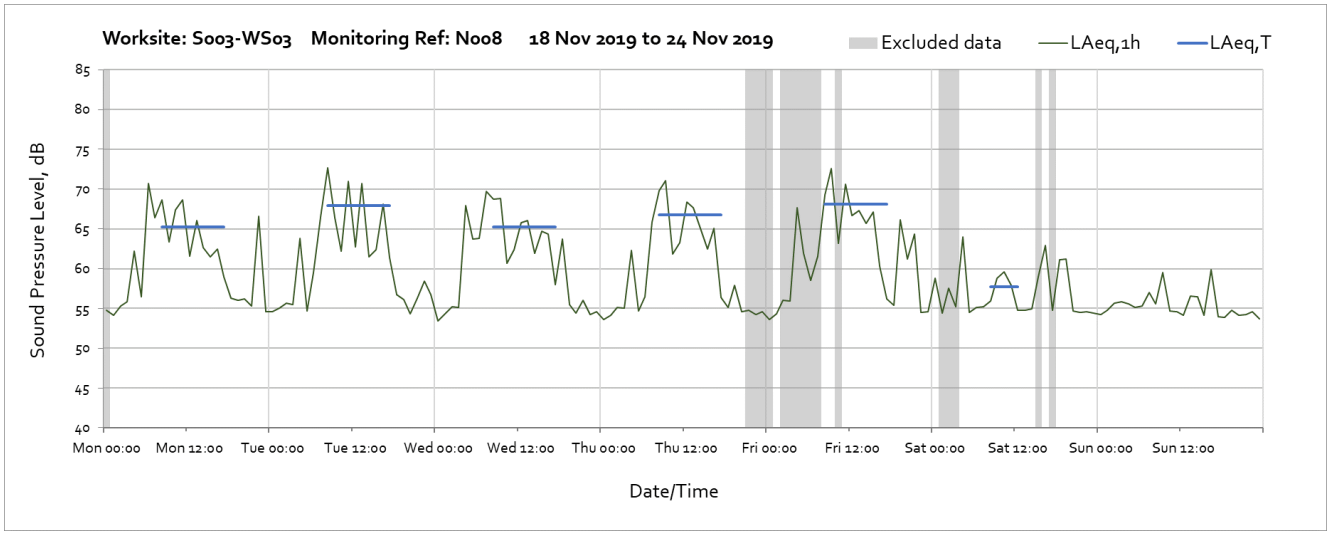
Date/Time

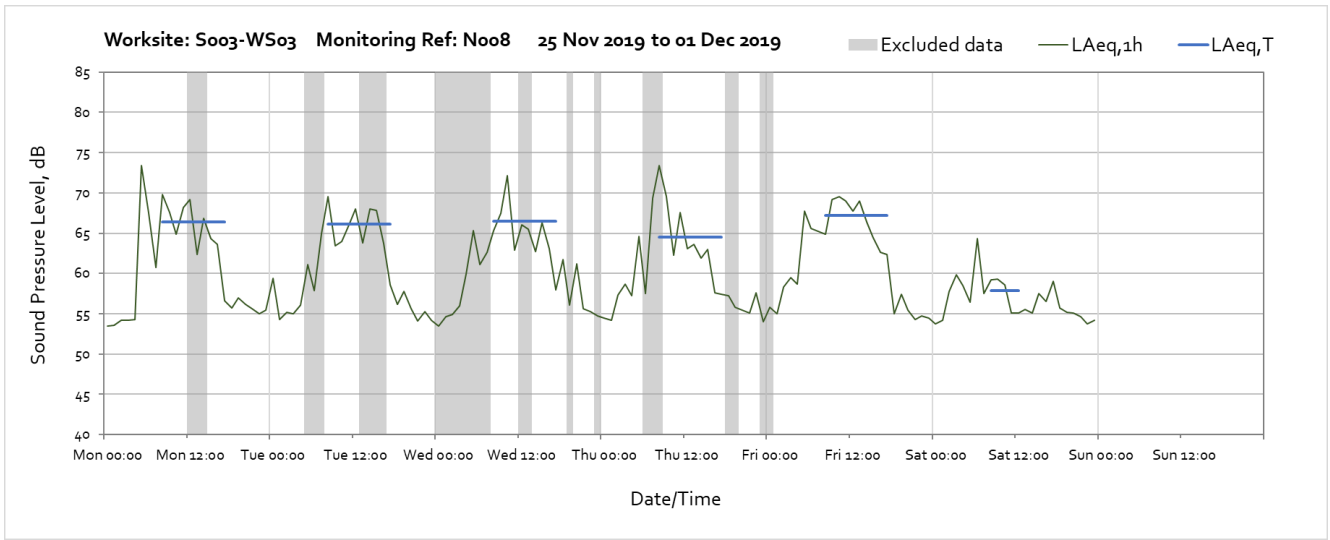
Worksite: S003-WS03 – Monitoring Ref: N008



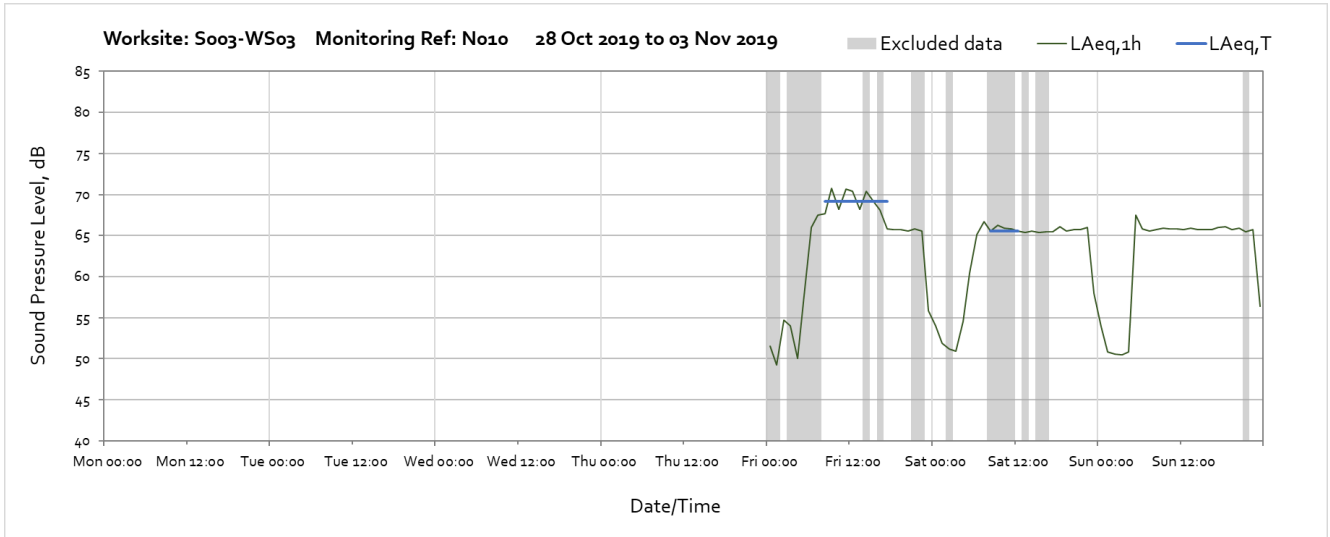


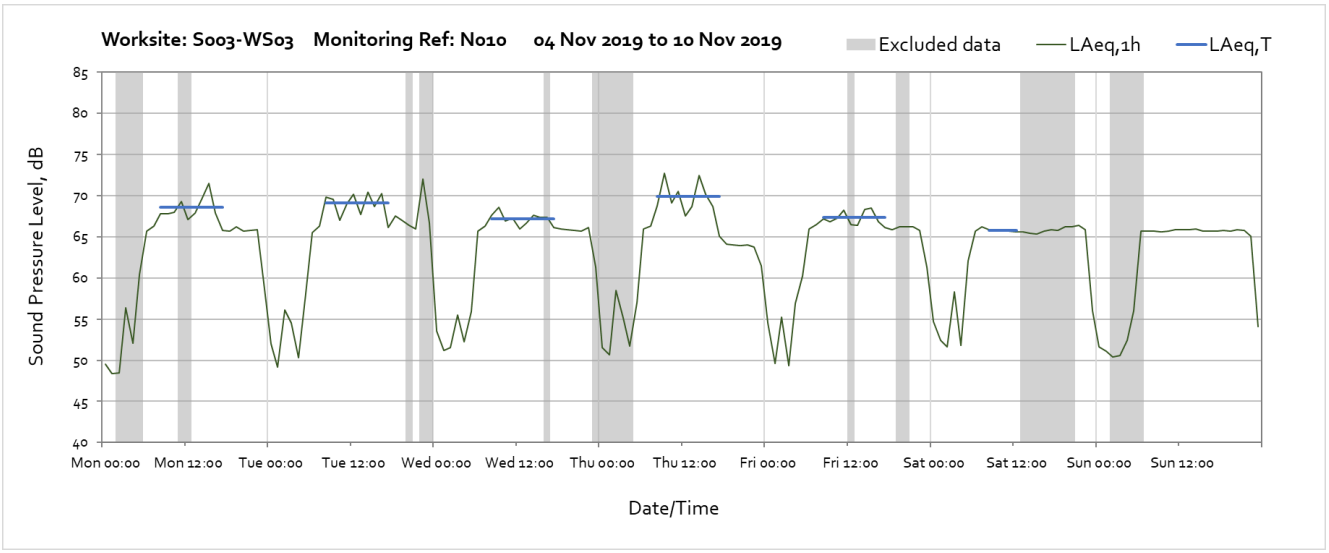






Worksite: S003-WS03 – Monitoring Ref: N010




Worksite: S003-WS03 Monitoring Ref: N010 04 Nov 2019 to 10 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
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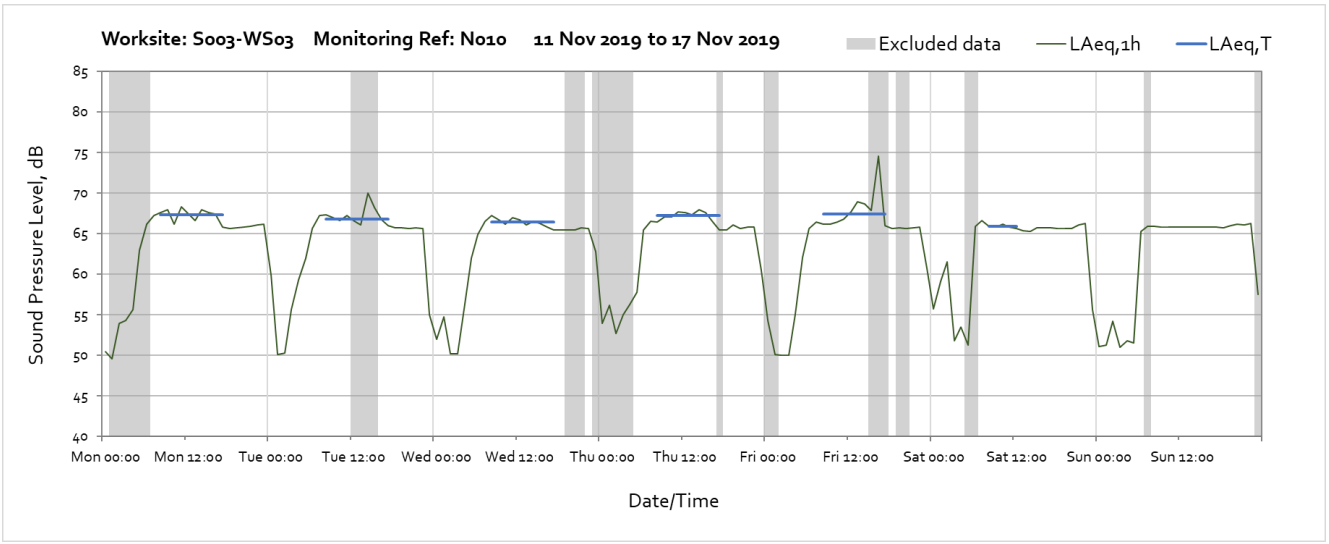
Date/Time


Worksite: S003-WS03 Monitoring Ref: N010 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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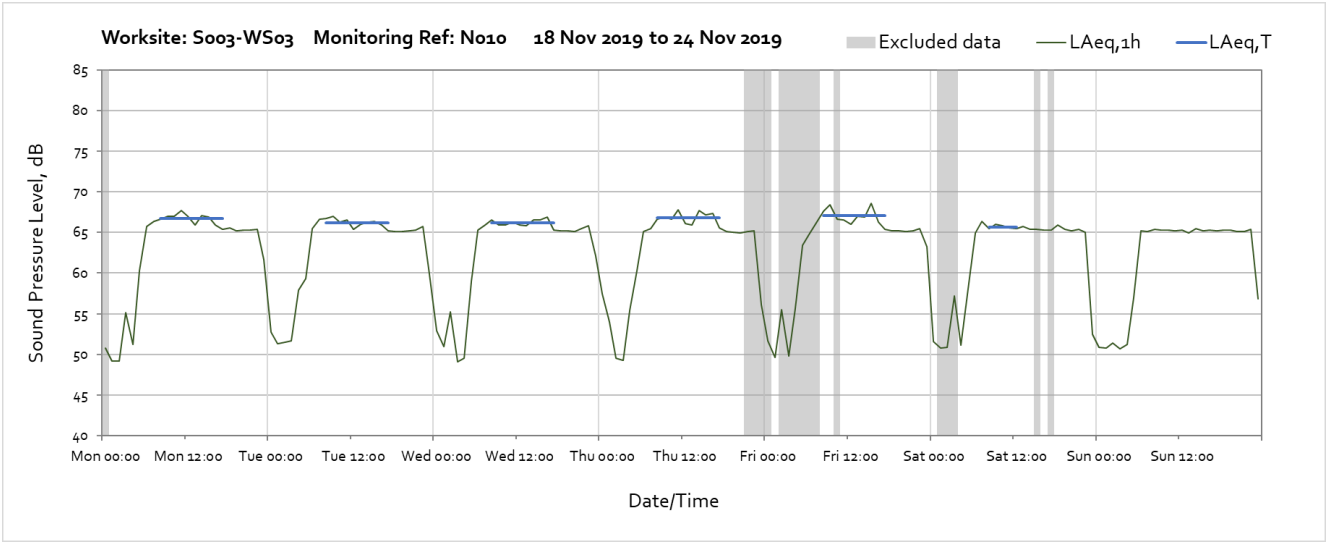
Date/Time


Worksite: S003-WS03 Monitoring Ref: N010 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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Mon 12:00
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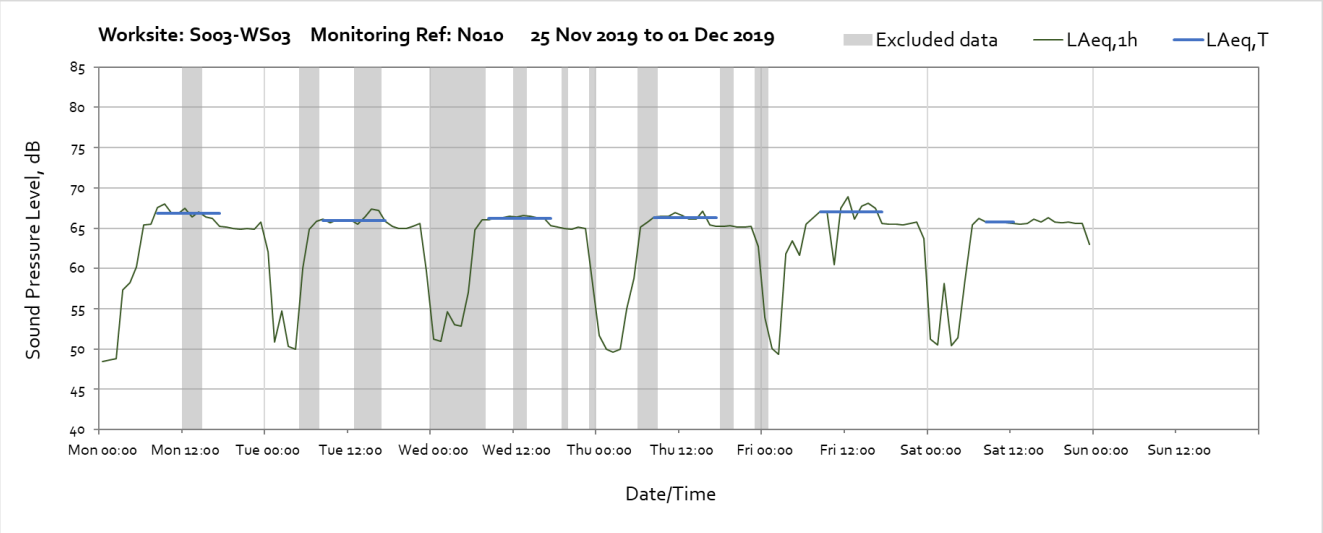
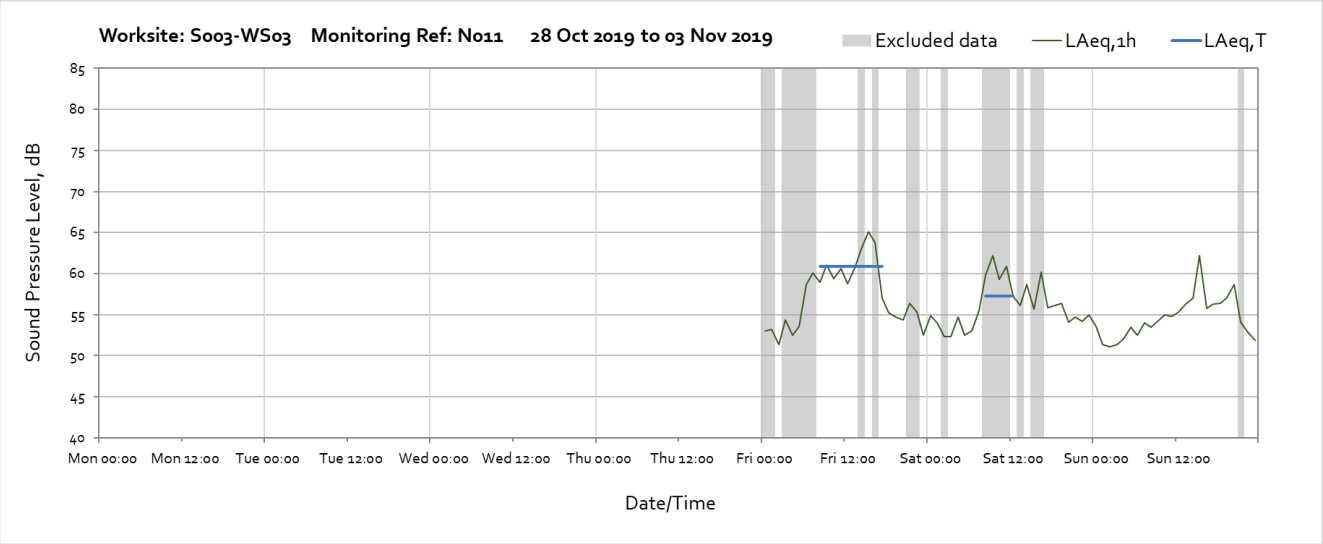
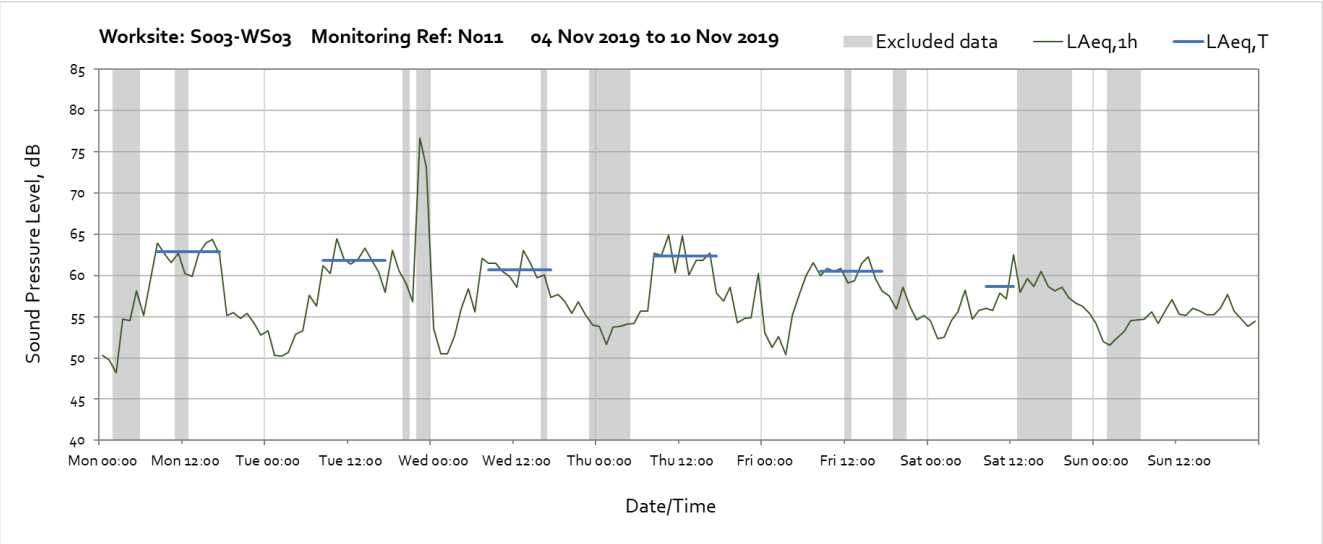
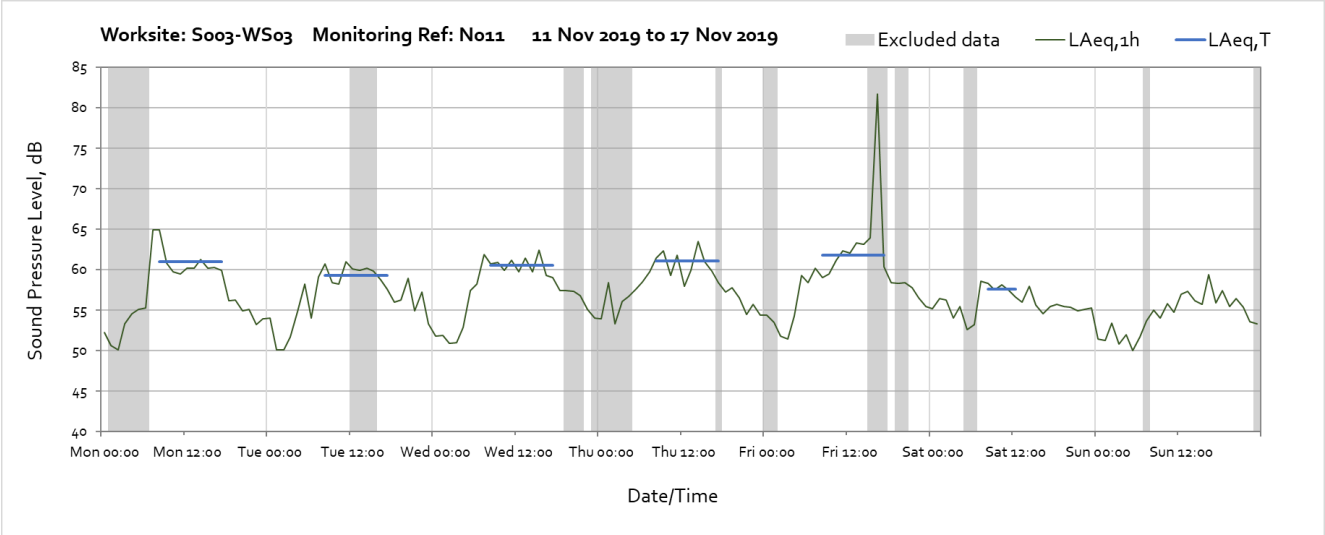
Date/Time



Worksite: S003-WS03 – Monitoring Ref: N011






Worksite: S003-WS03 Monitoring Ref: N011 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
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Mon 00:00
Mon 12:00
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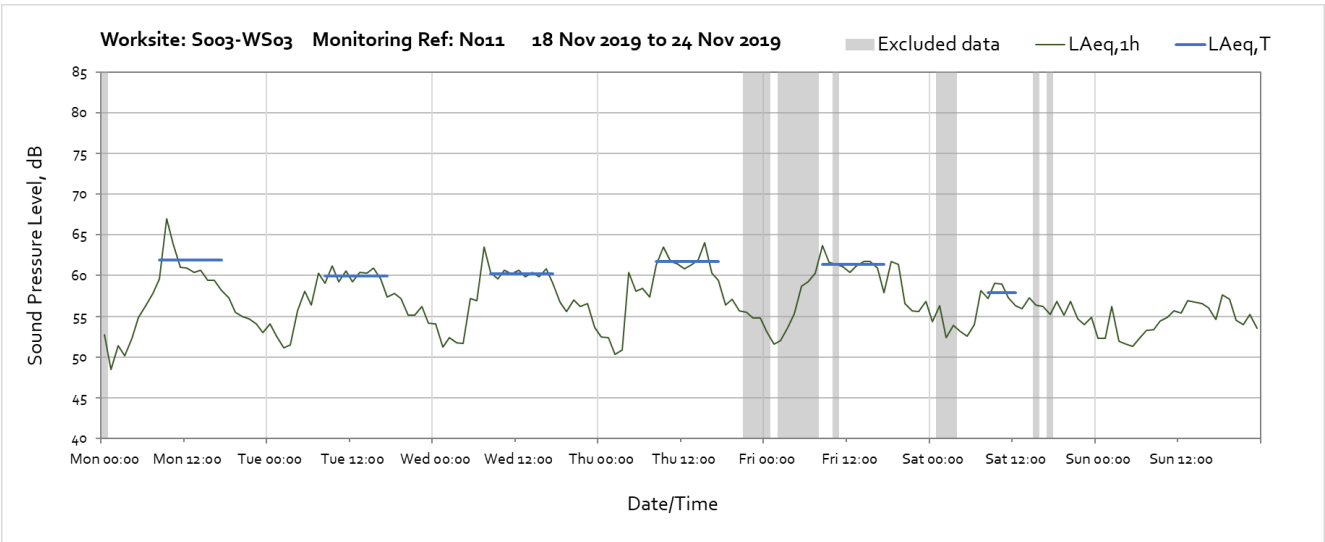
Date/Time


Worksite: S003-WS03 Monitoring Ref: N011 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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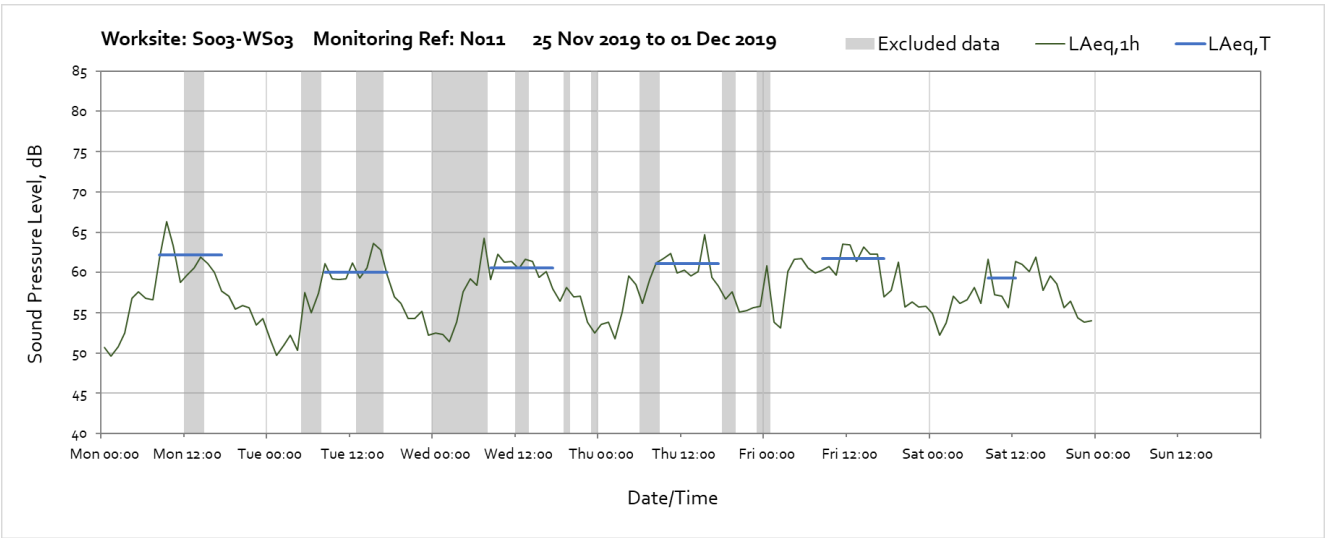
Date/Time


Worksite: S003-WS03 Monitoring Ref: N011 25 Nov 2019 to 01 Dec 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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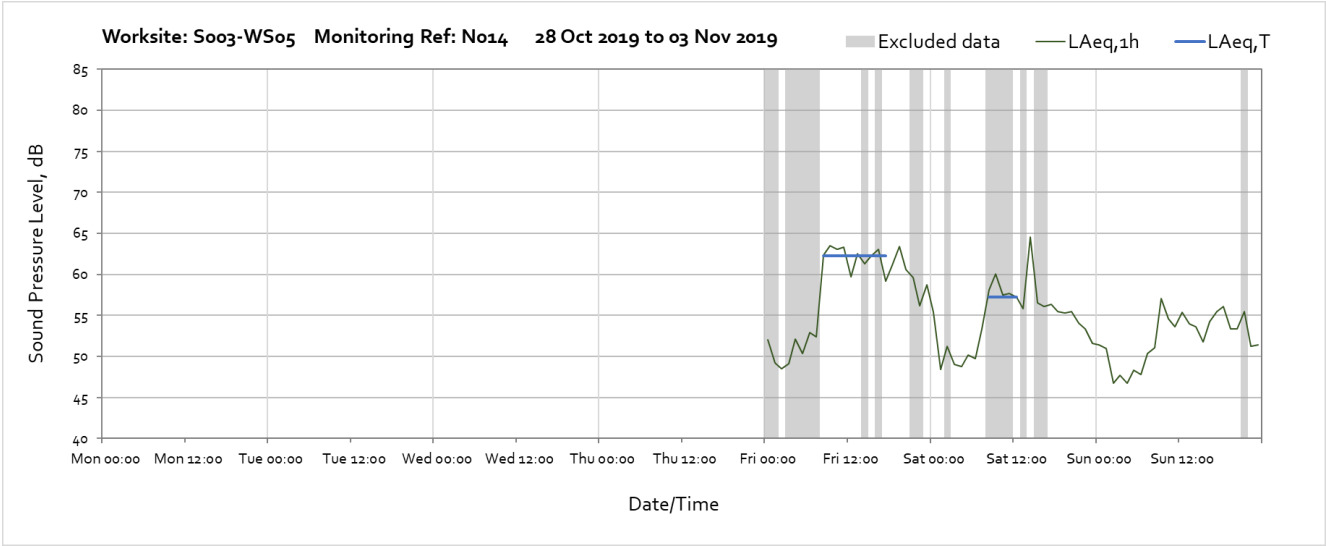
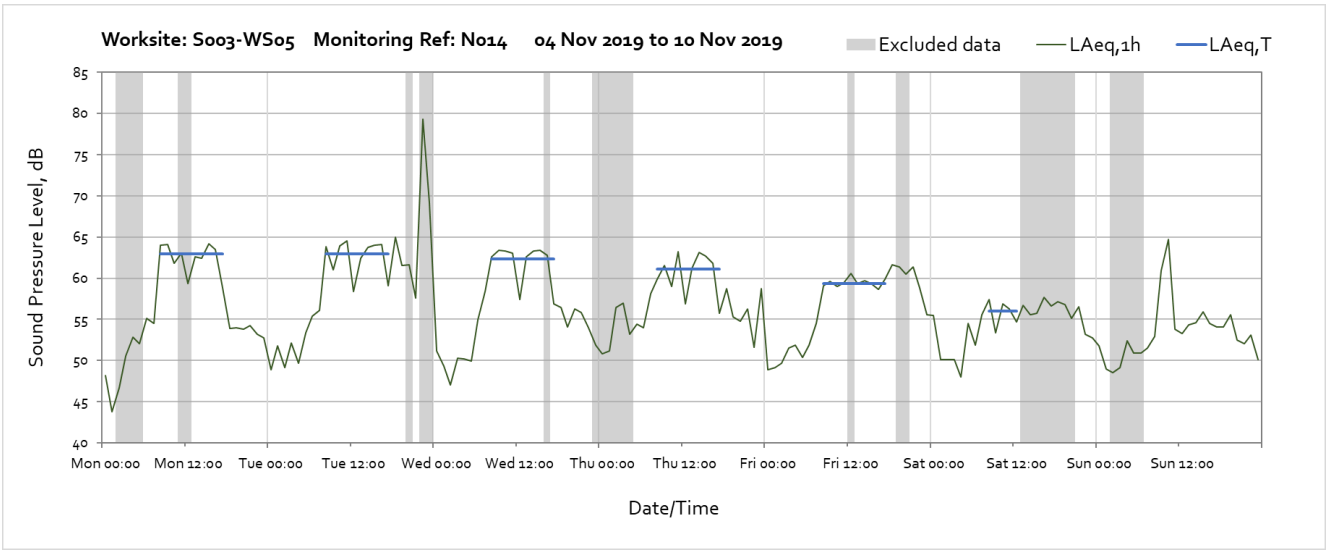
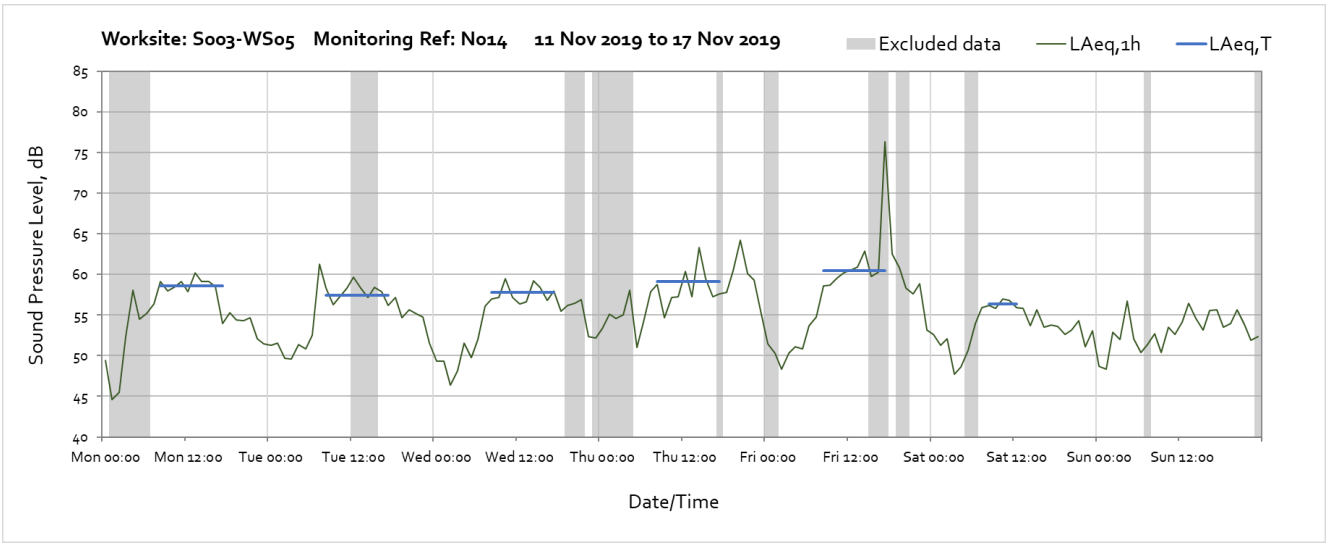
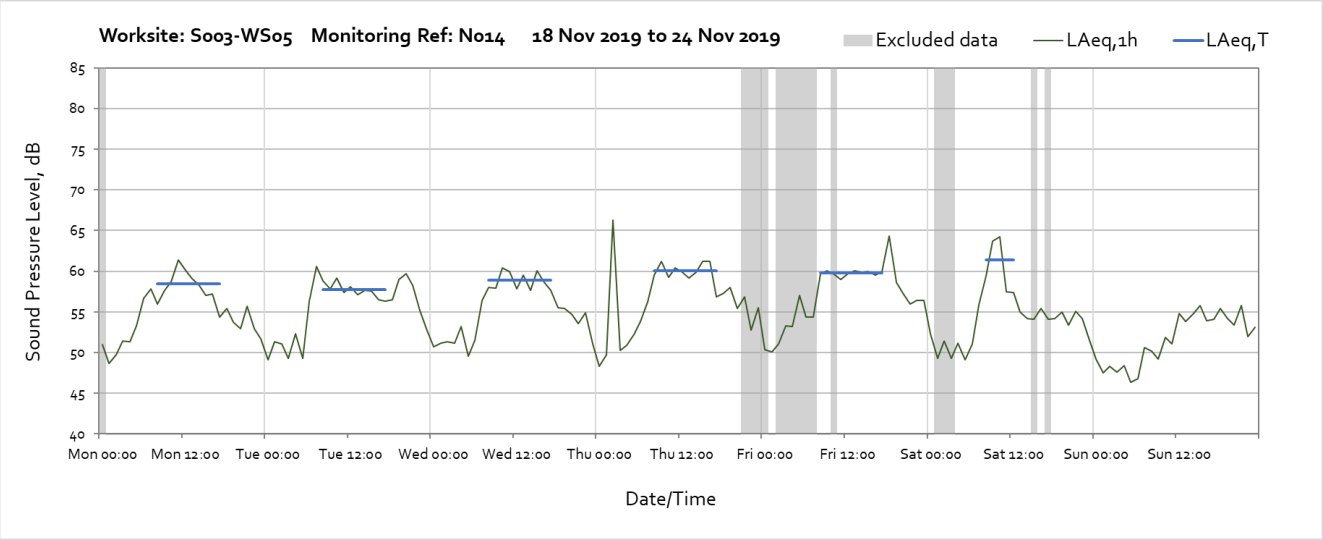
Date/Time

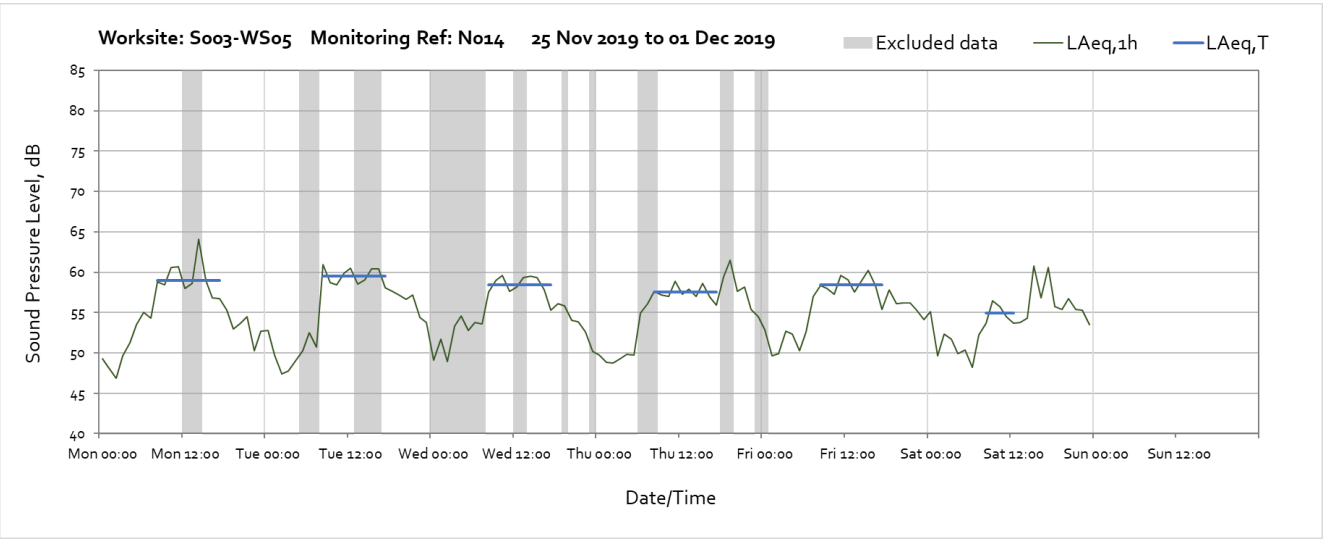
Worksite: S003-WS05 – Monitoring Ref: N014



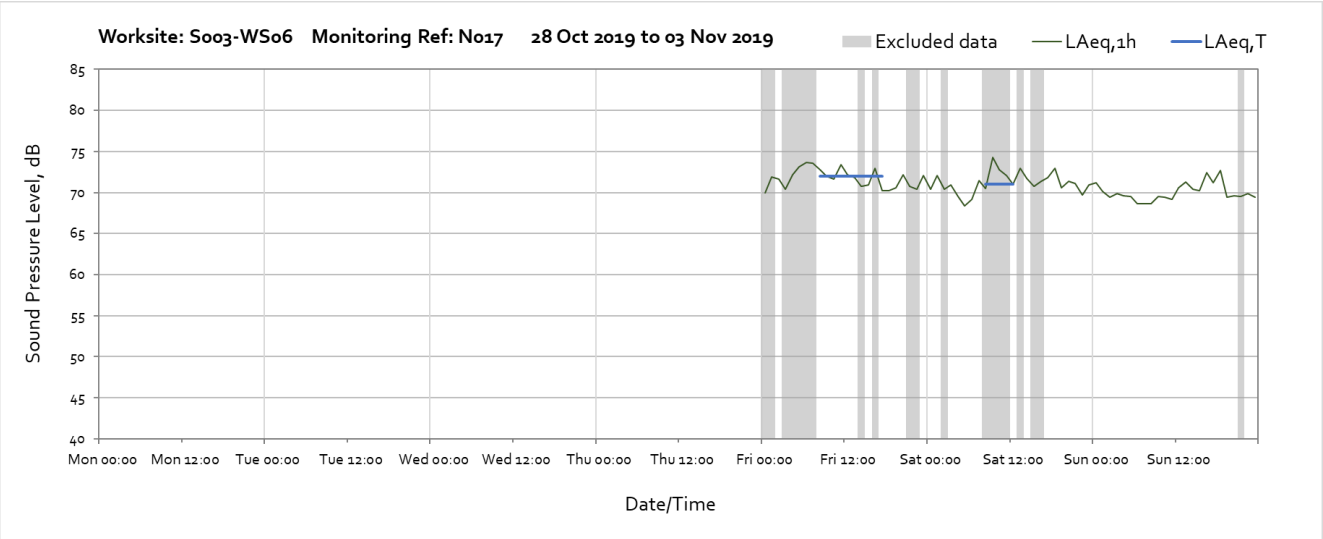


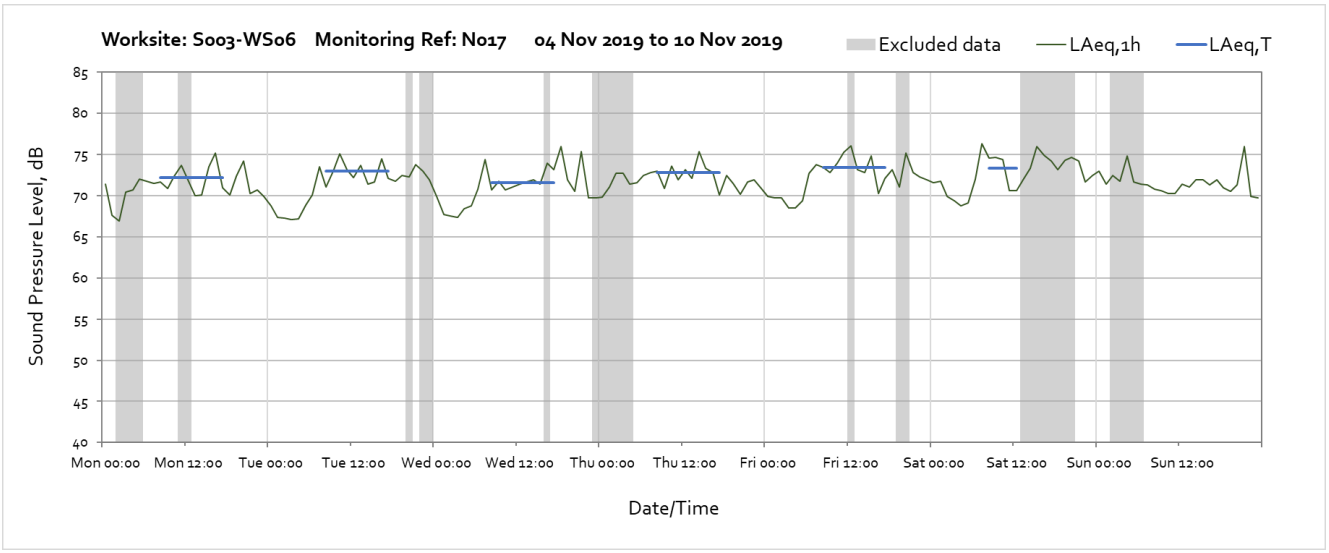






Worksite: S003-WS06 – Monitoring Ref: N017




Worksite: S003-WS06 Monitoring Ref: N017 04 Nov 2019 to 10 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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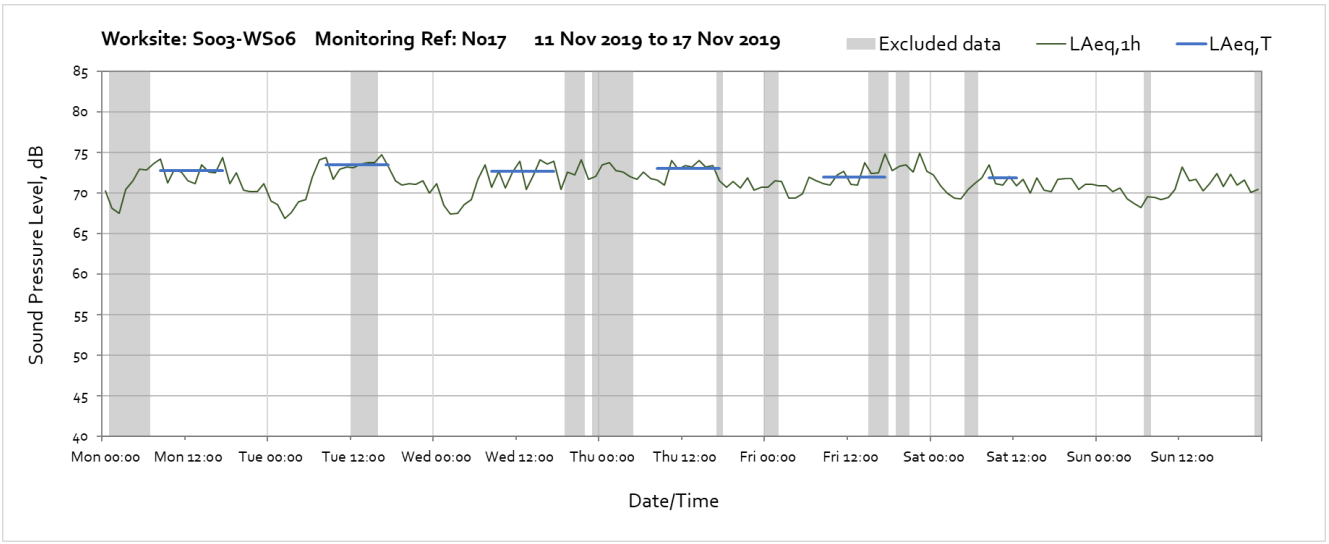
Date/Time


Worksite: S003-WS06 Monitoring Ref: N017 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
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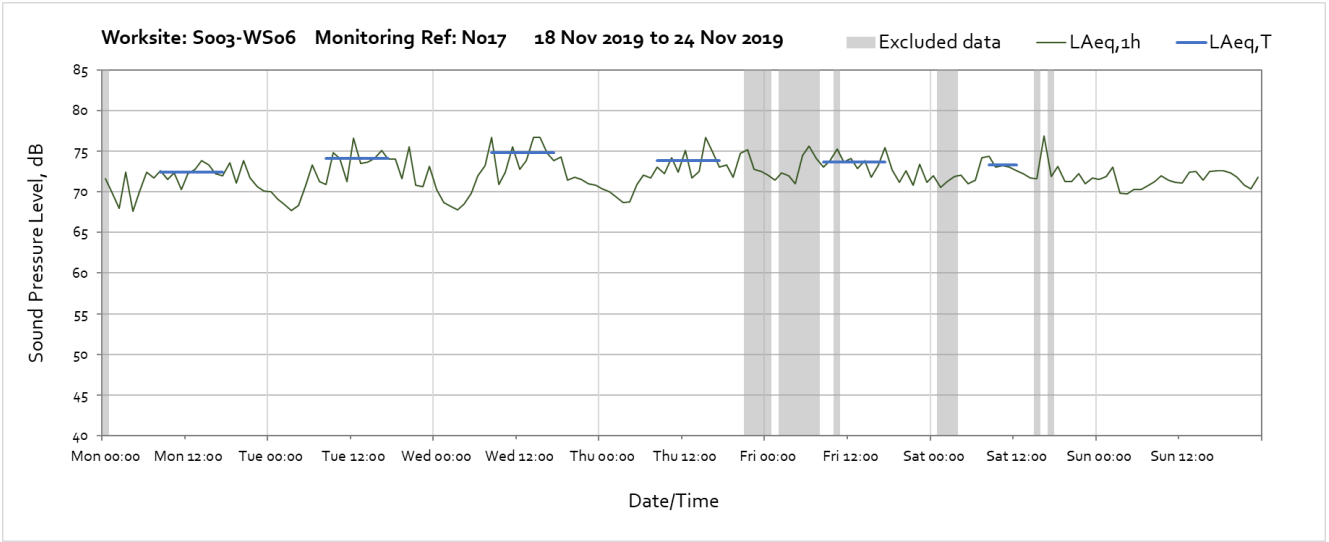
Date/Time


Worksite: S003-WS06 Monitoring Ref: N017 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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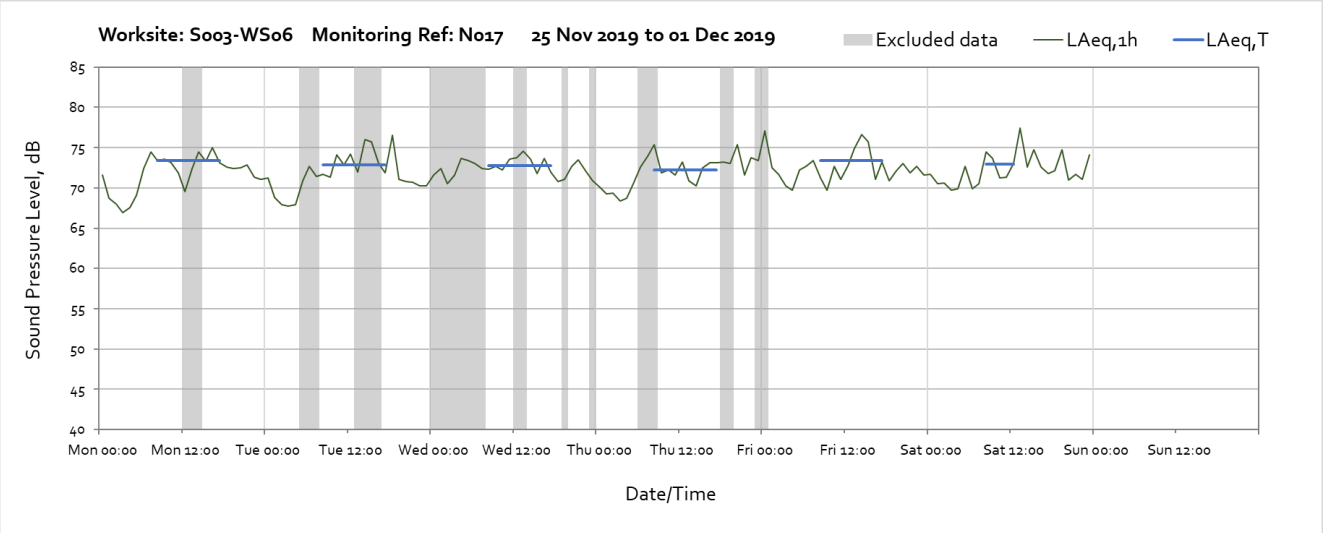
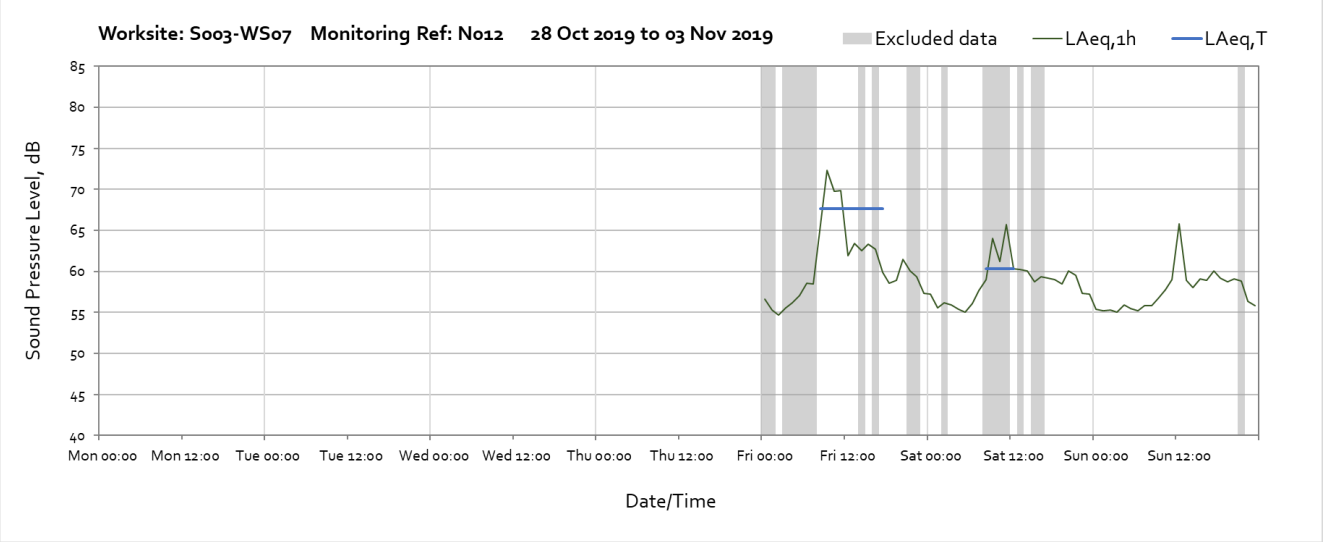
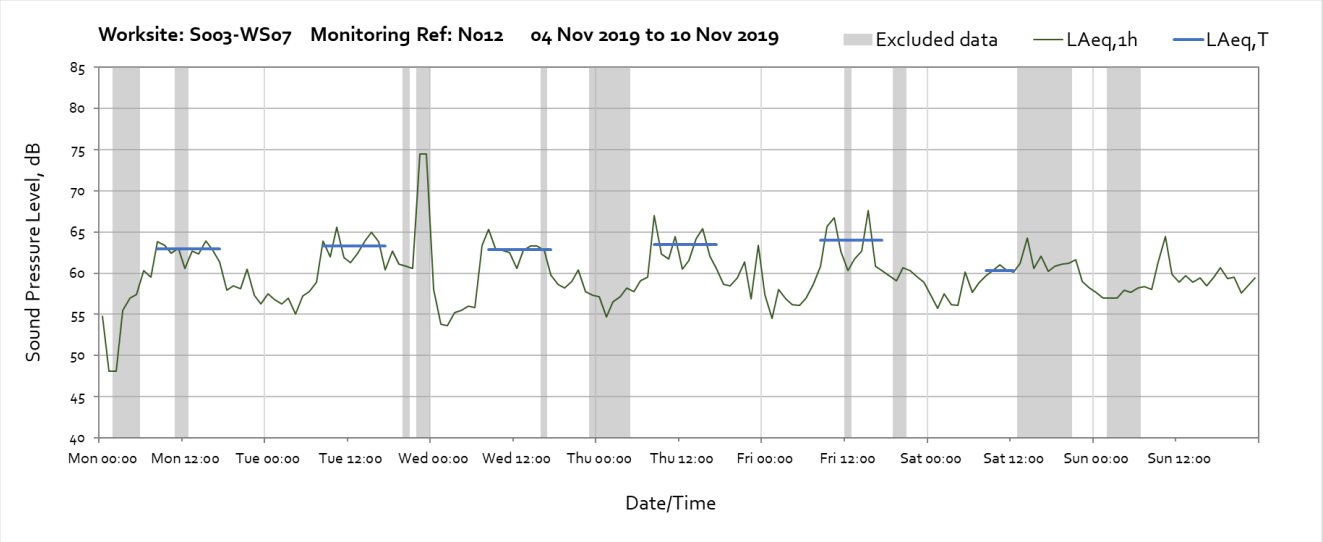
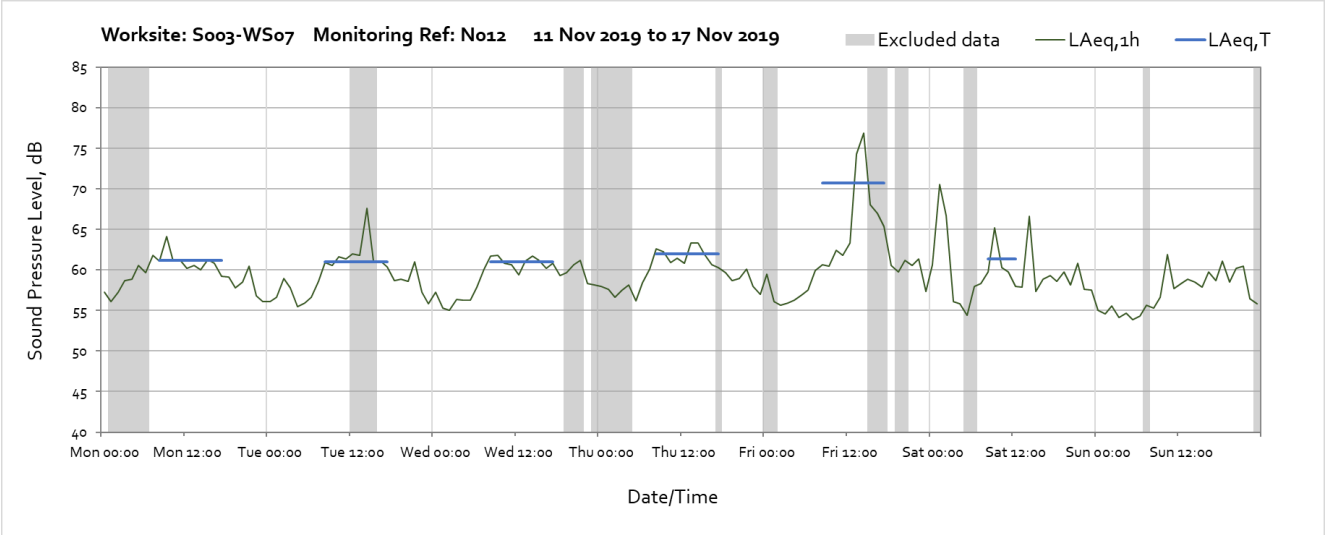
Date/Time



Worksite: S003-WS07 – Monitoring Ref: N012






Worksite: S003-WS07 Monitoring Ref: N012 11 Nov 2019 to 17 Nov 2019
Excluded data
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LAeq,T
Sound Pressure Level, dB
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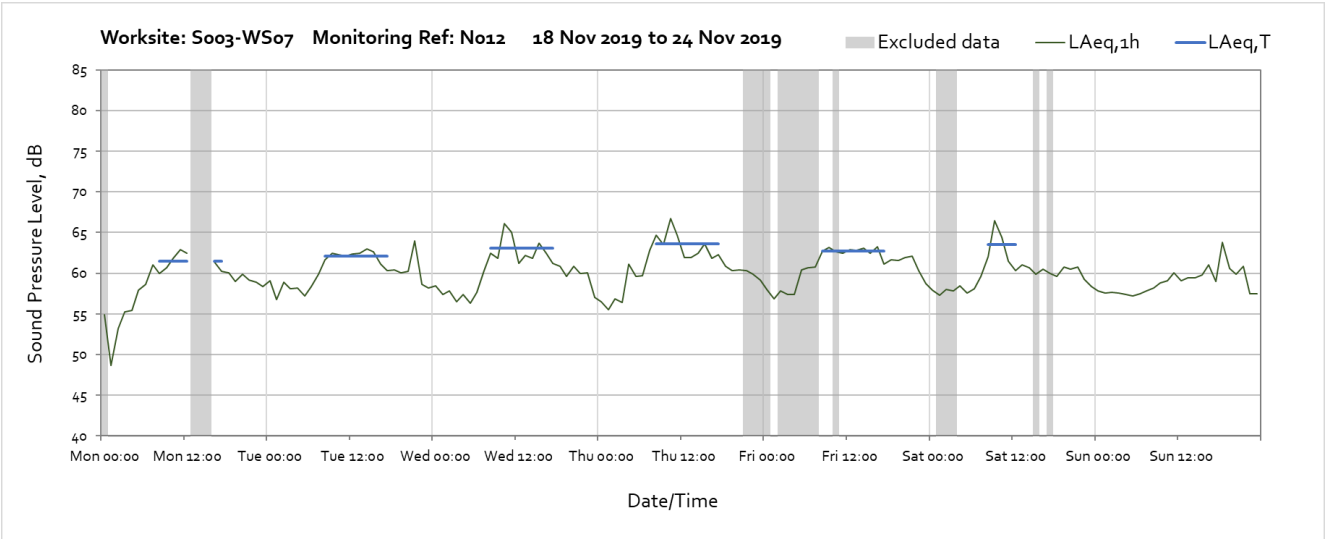
Date/Time


Worksite: S003-WS07 Monitoring Ref: N012 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
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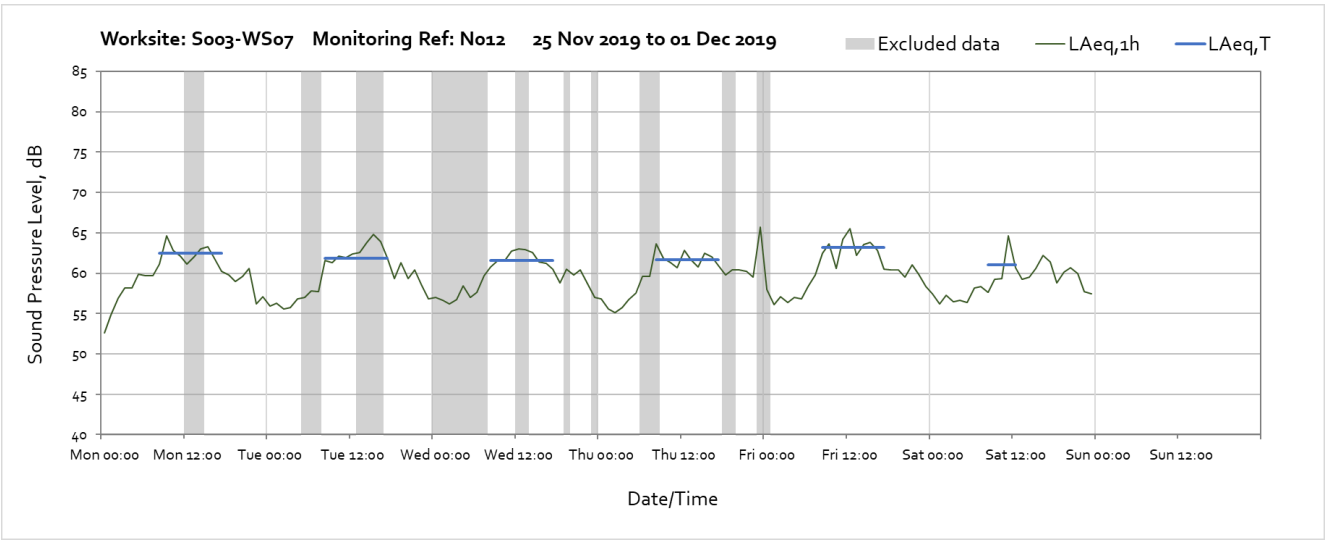
Date/Time


Worksite: S003-WS07 Monitoring Ref: N012 25 Nov 2019 to 01 Dec 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
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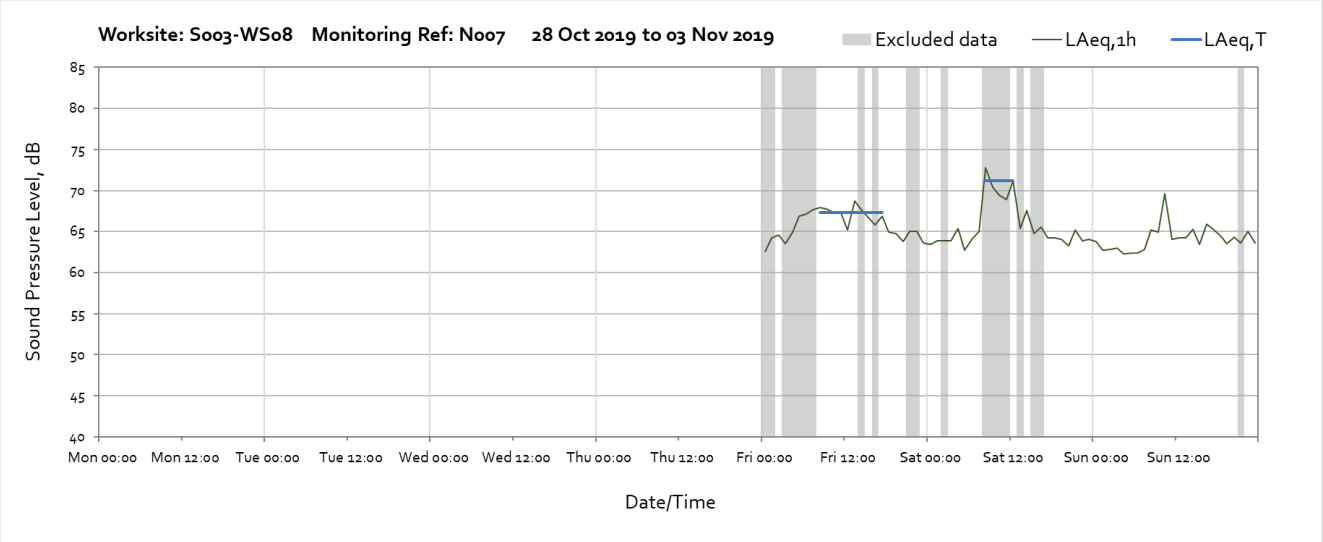
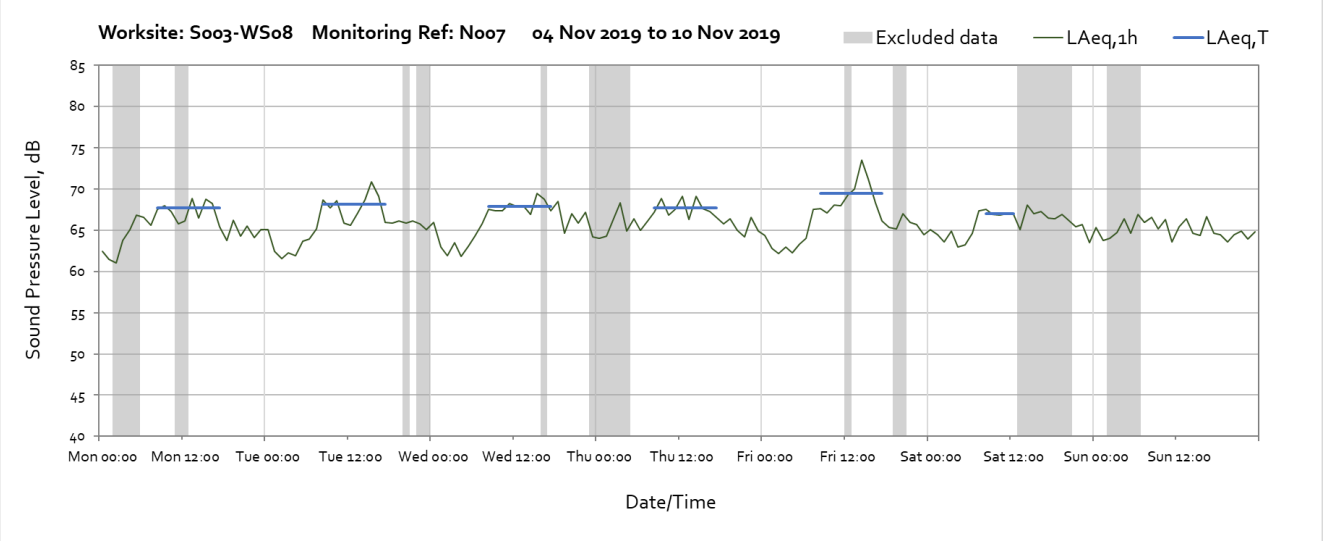
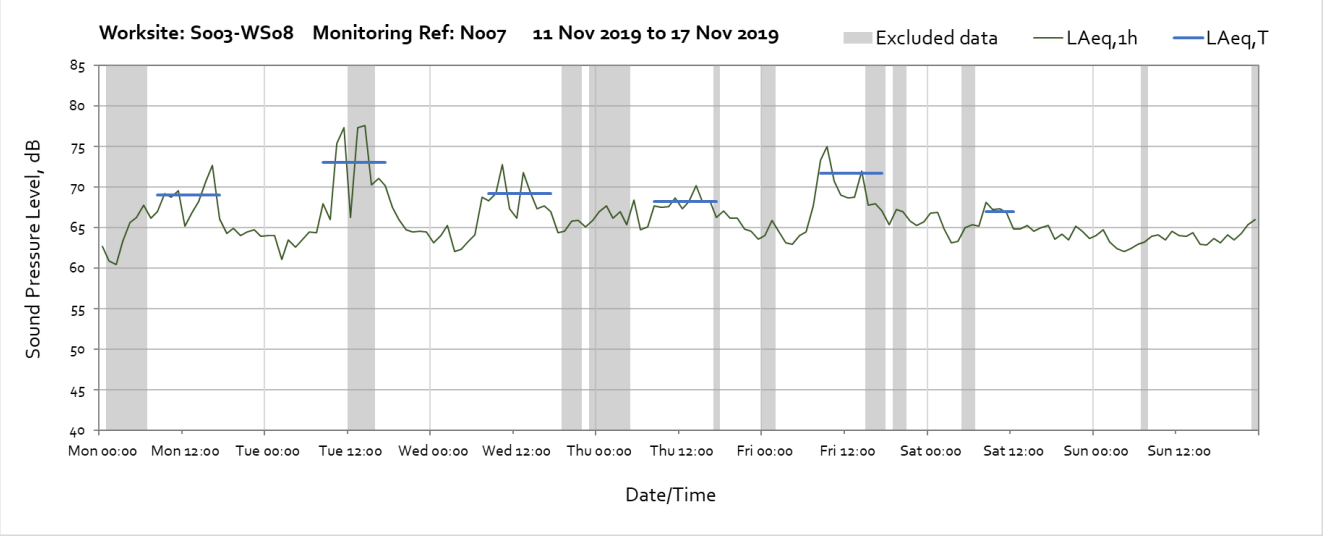
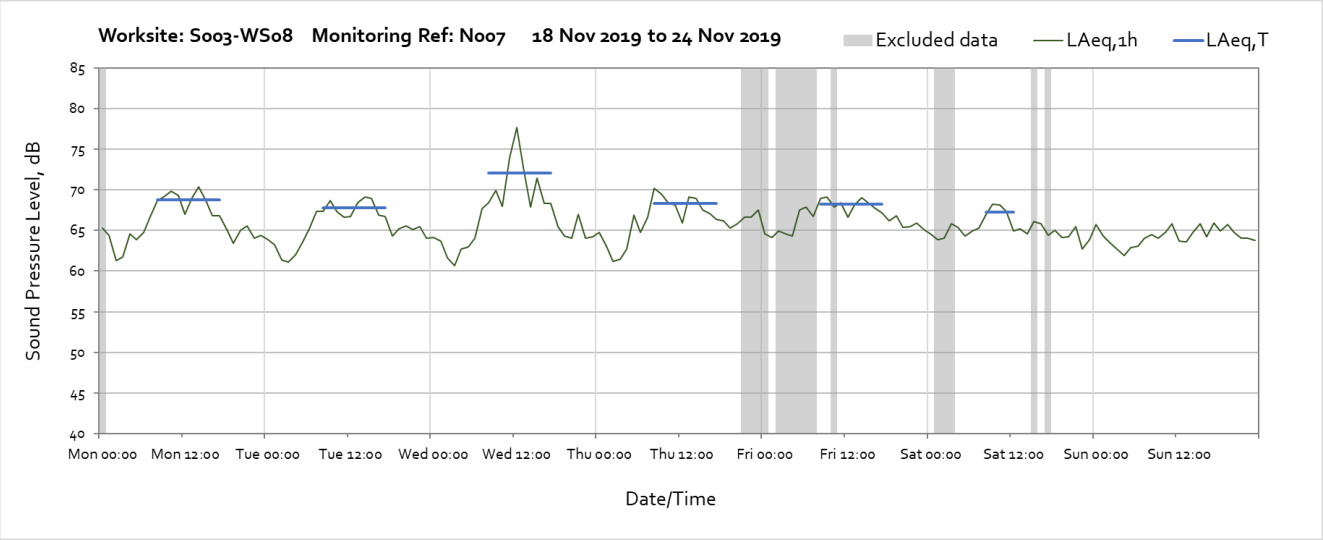
Date/Time

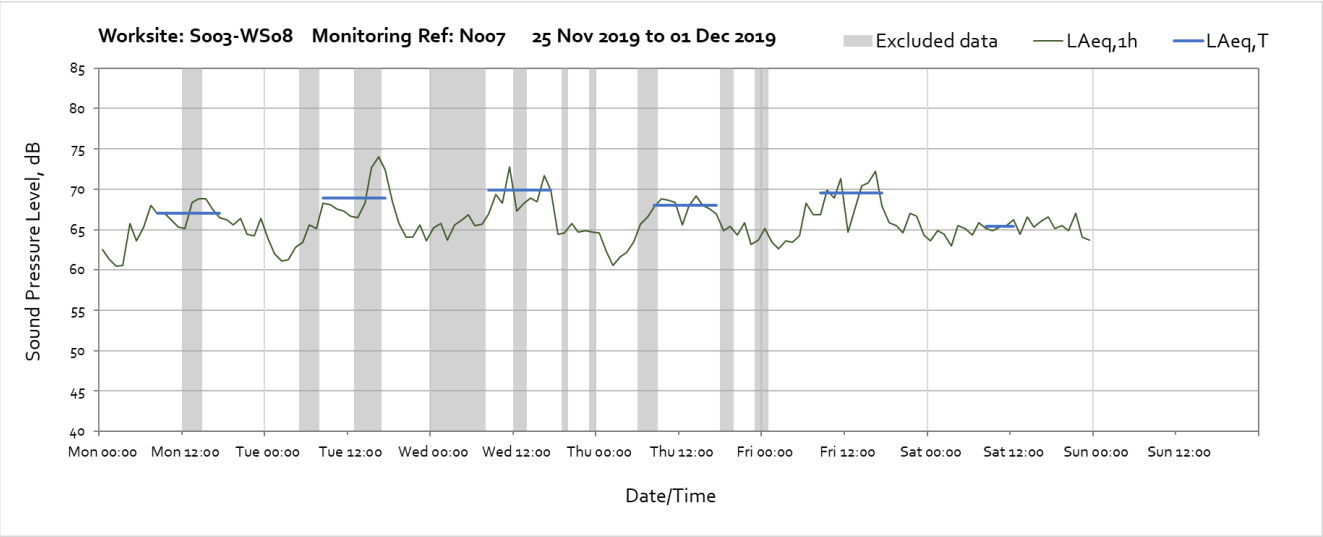
Worksite: S003-WS08 – Monitoring Ref: N007



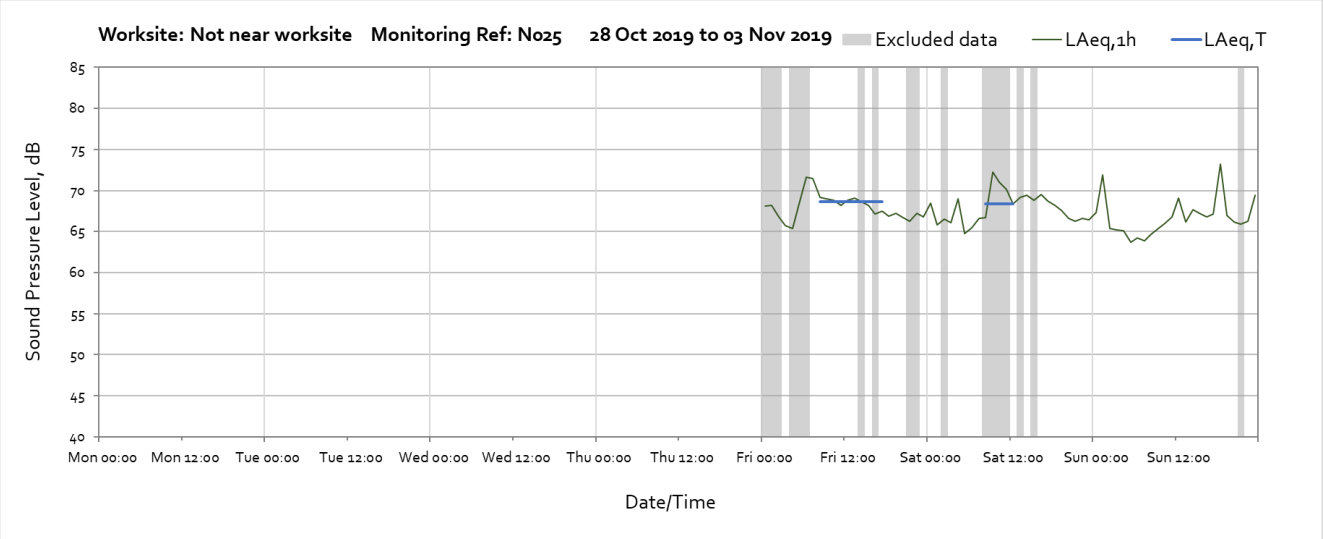


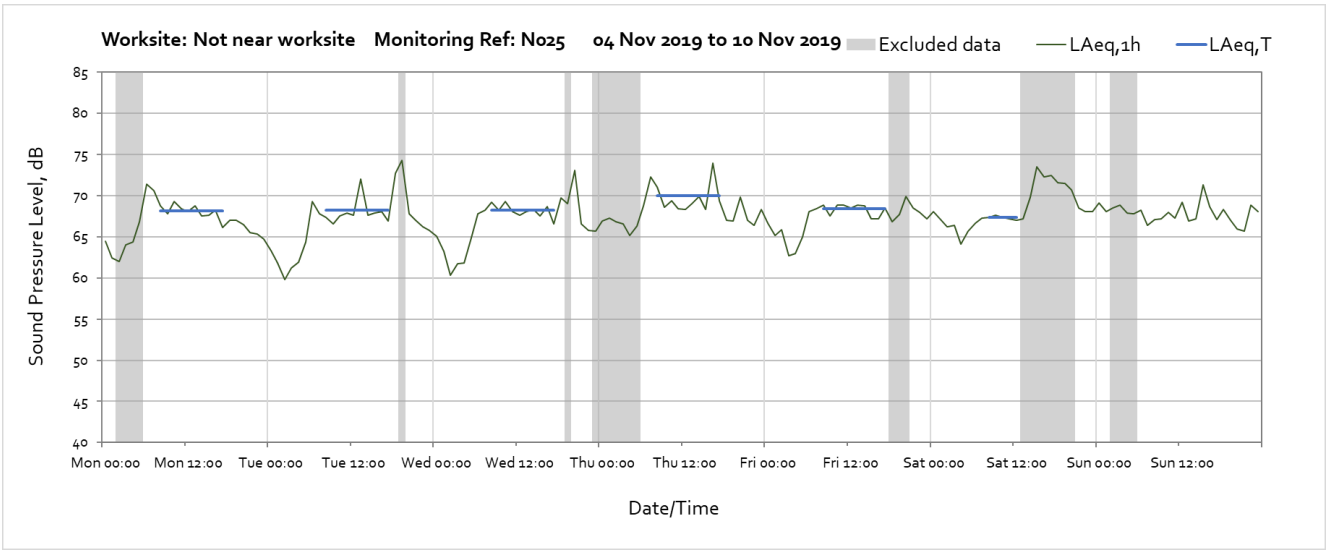






Monitoring Ref: N025




Worksite: Not near worksite Monitoring Ref: No25 04 Nov 2019 to 10 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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Mon 00:00
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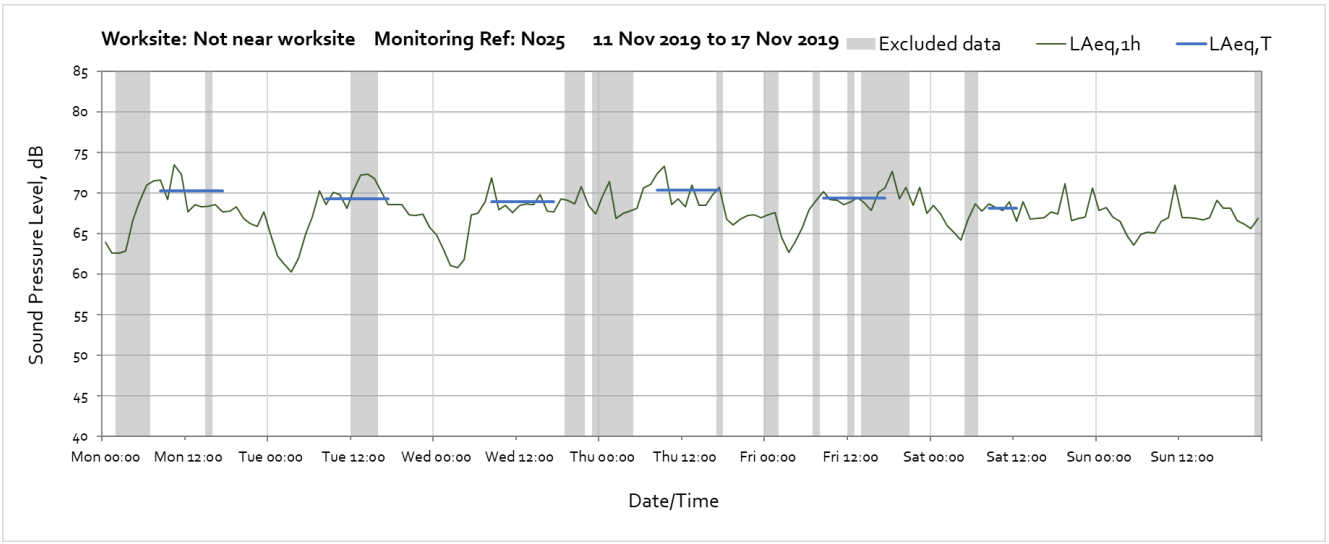
Date/Time


Worksite: Not near worksite Monitoring Ref: No25 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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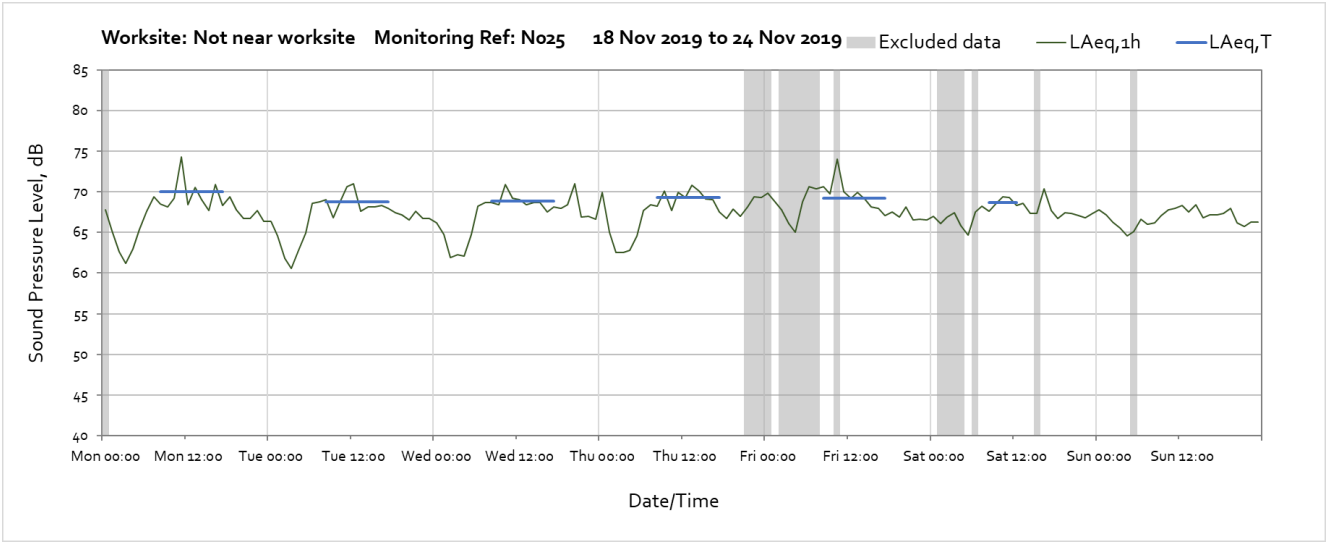
Date/Time


Worksite: Not near worksite Monitoring Ref: No25 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
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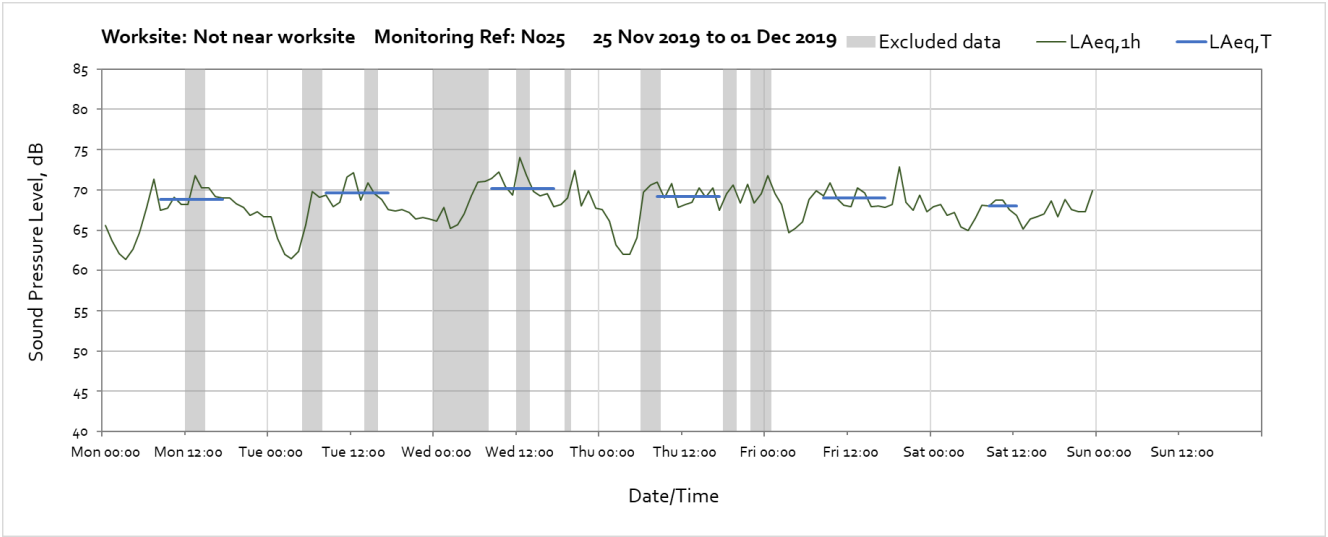
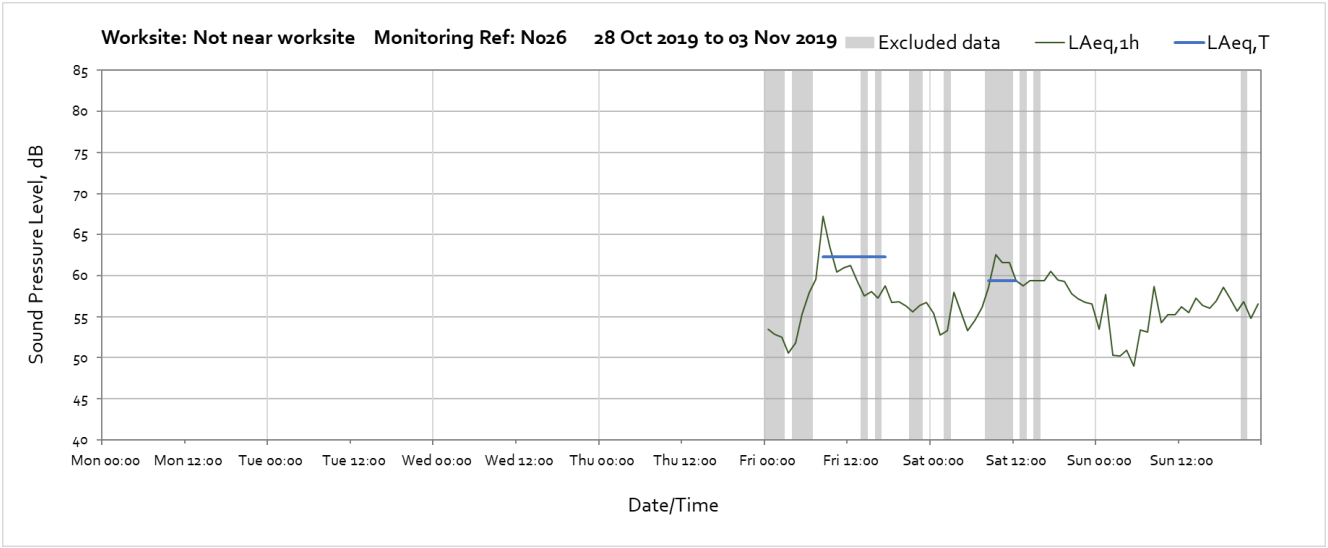
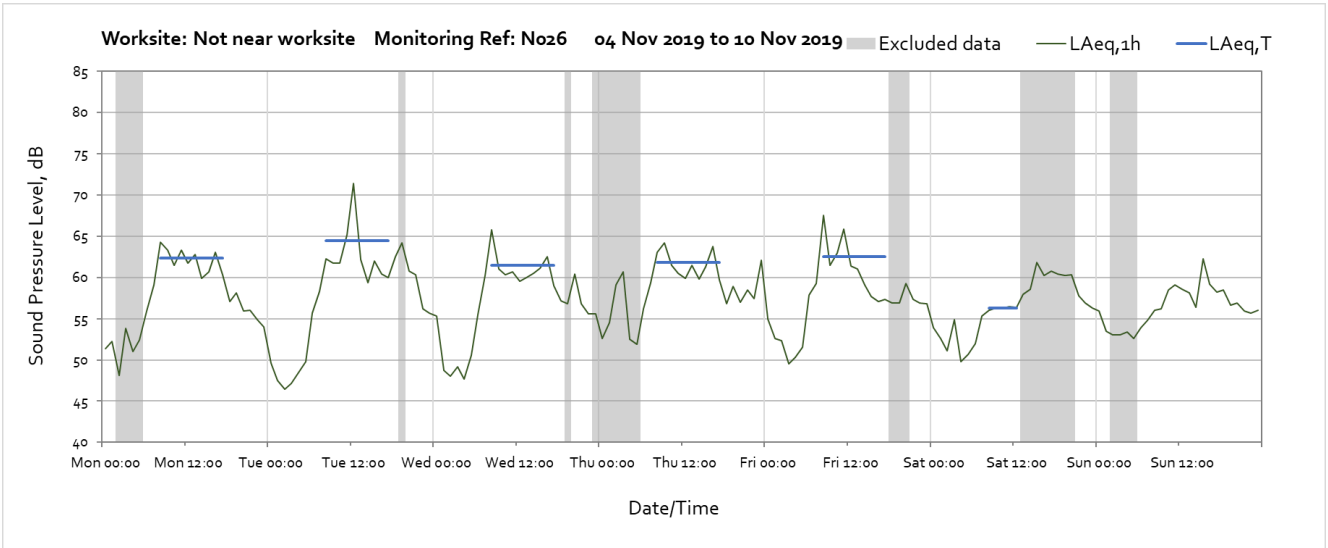
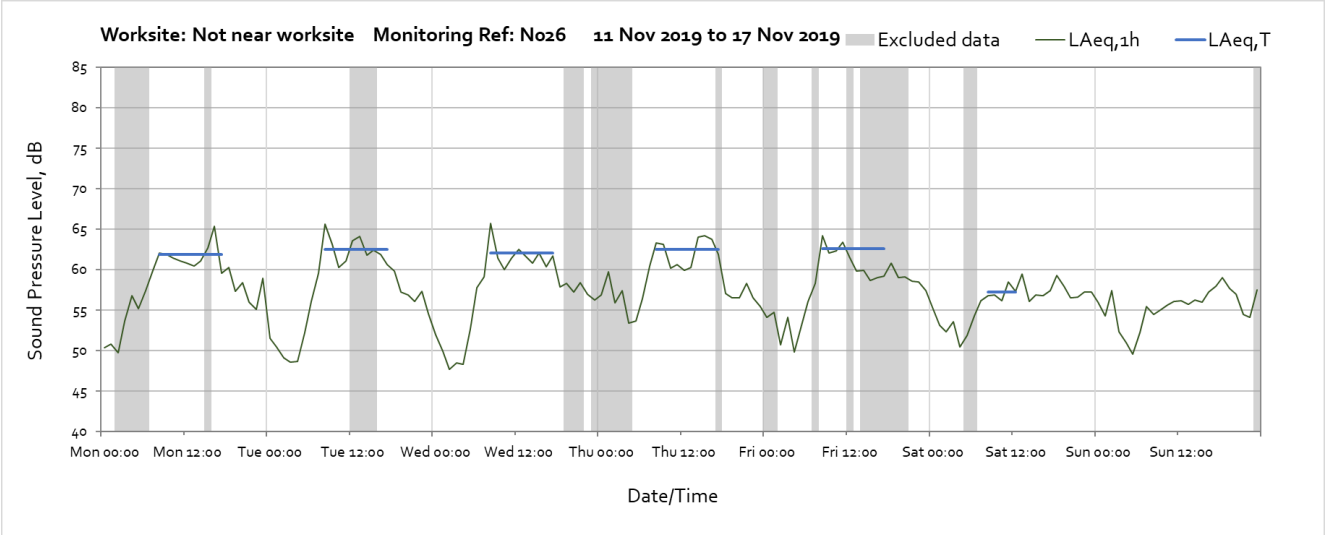
Date/Time

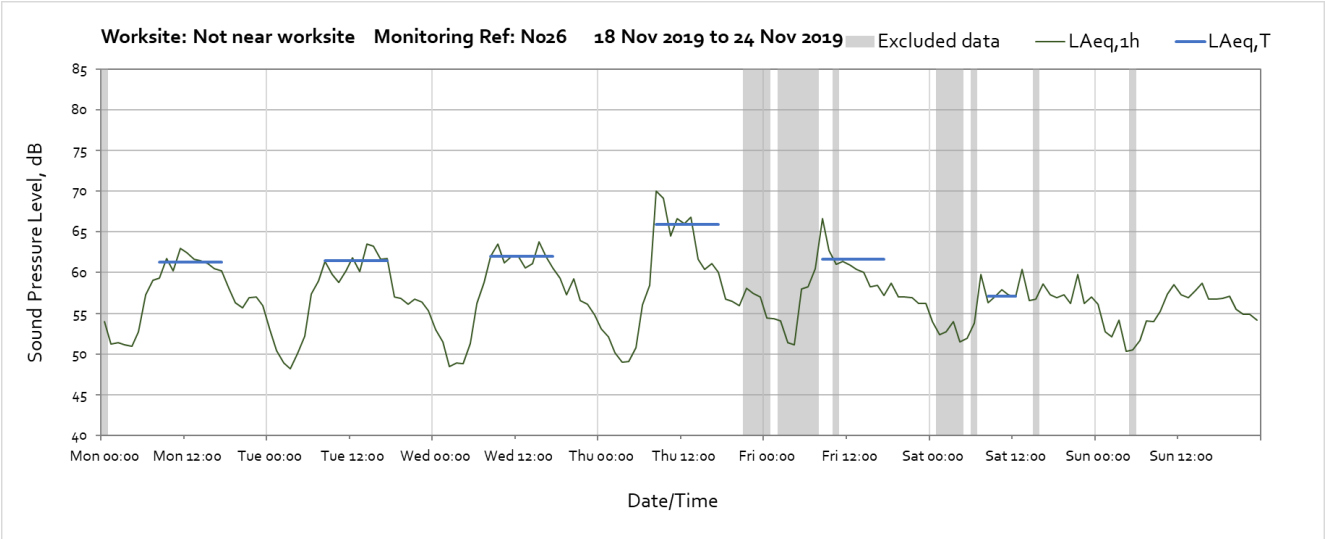


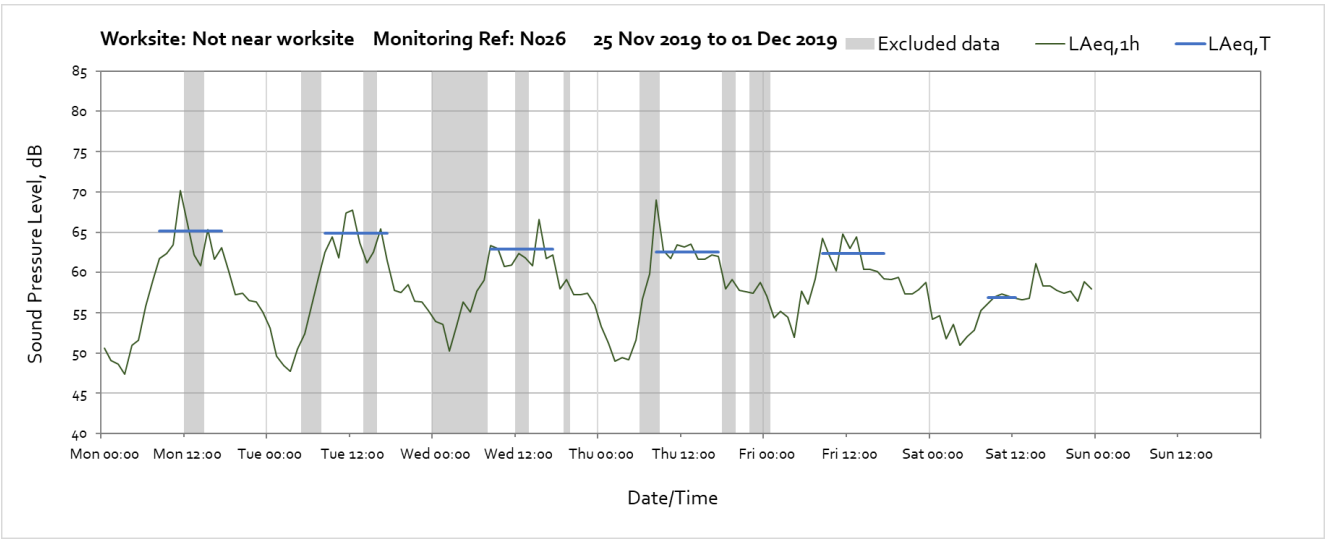
Monitoring Ref: N026






Worksite: Not near worksite Monitoring Ref: No26 11 Nov 2019 to 17 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

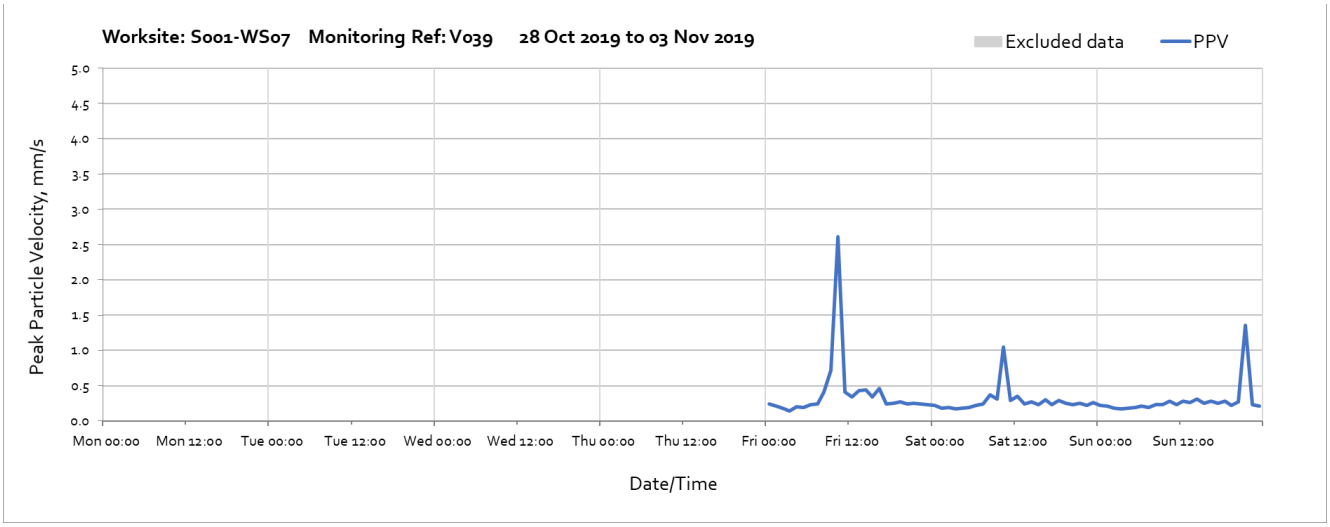

Worksite: Not near worksite Monitoring Ref: No26 18 Nov 2019 to 24 Nov 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

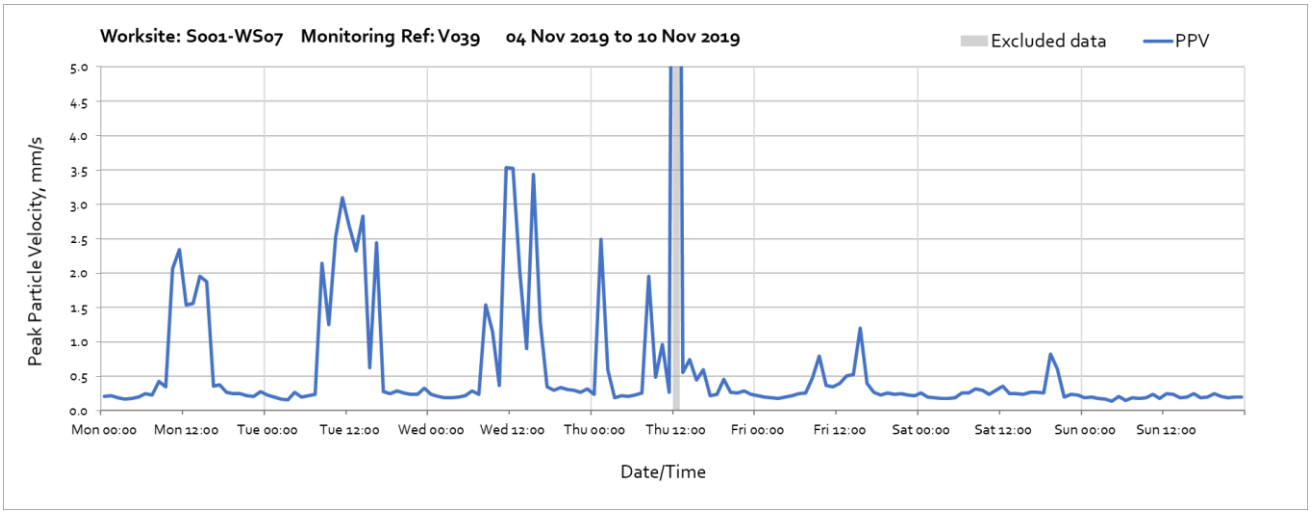

Worksite: Not near worksite Monitoring Ref: No26 25 Nov 2019 to 01 Dec 2019
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

Vibration

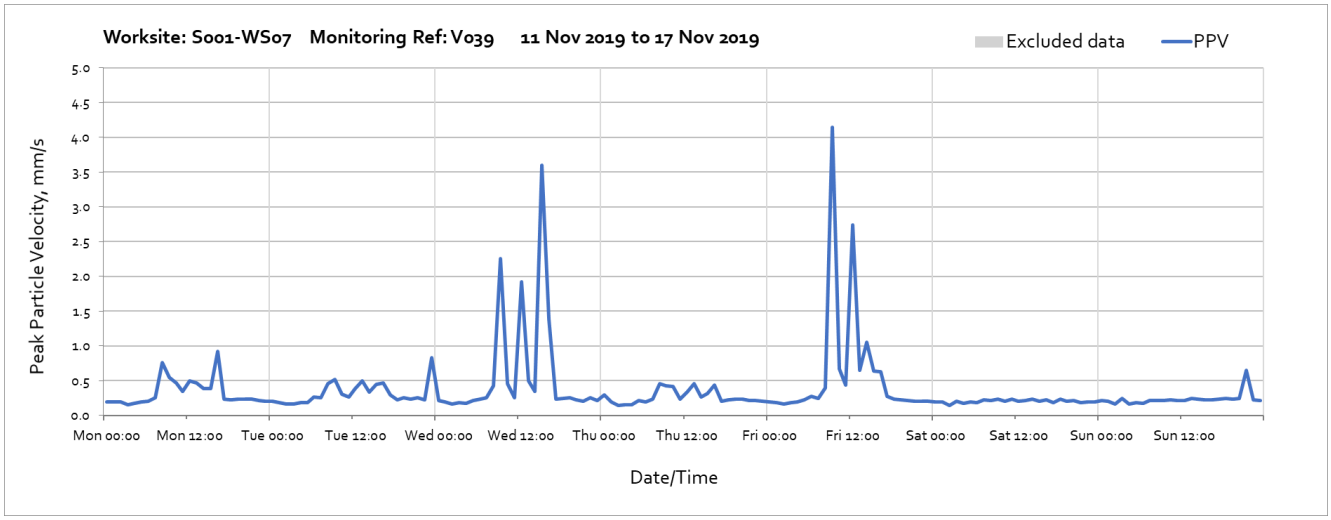
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axis x, y and z. High values of PPV were measured on occasions at locations V021, V038 and V039. These were due to local interference with the vibration monitor and are not representative of HS2 construction works. These data entries have been greyed out in the following charts and have been excluded to calculate values in Table 6.

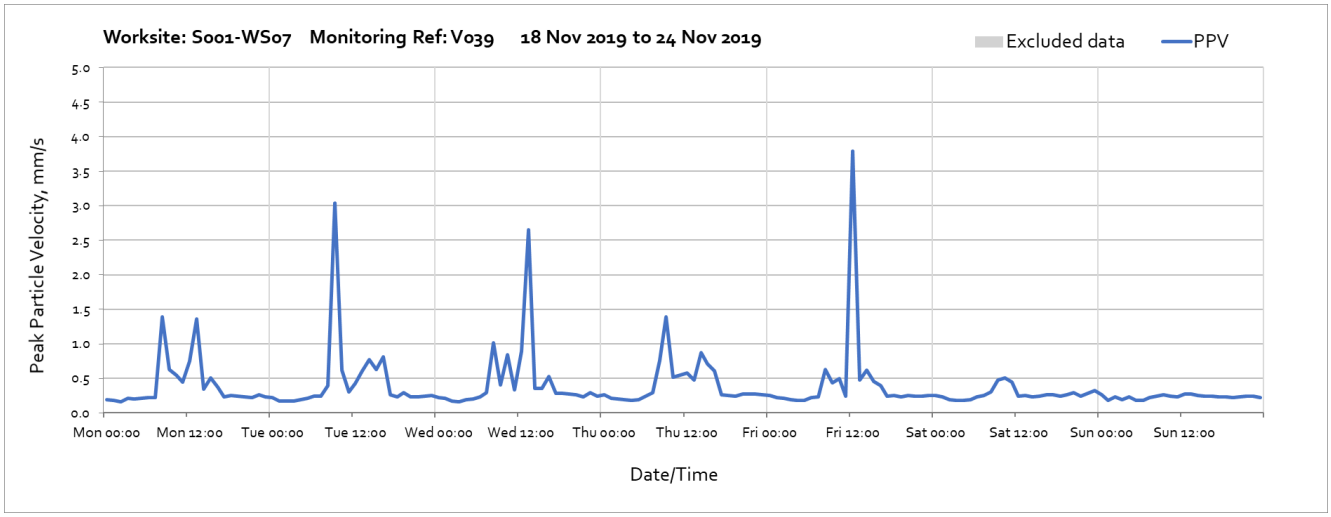
Worksite: S001-WS07 – Monitoring Ref: V039

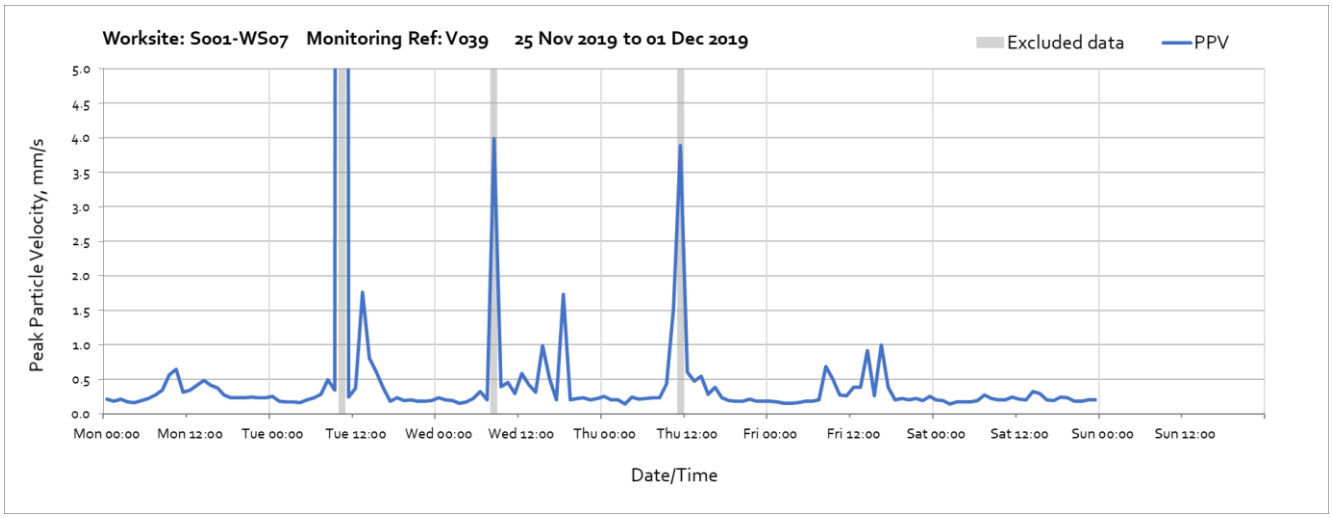




Note: High vibration levels throughout the week were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

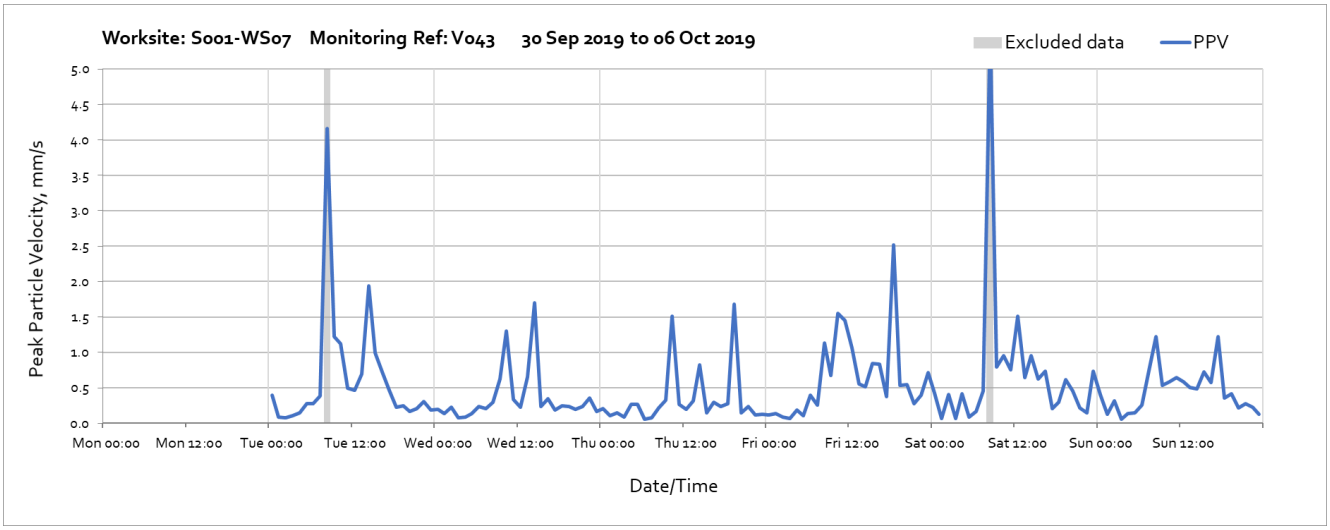




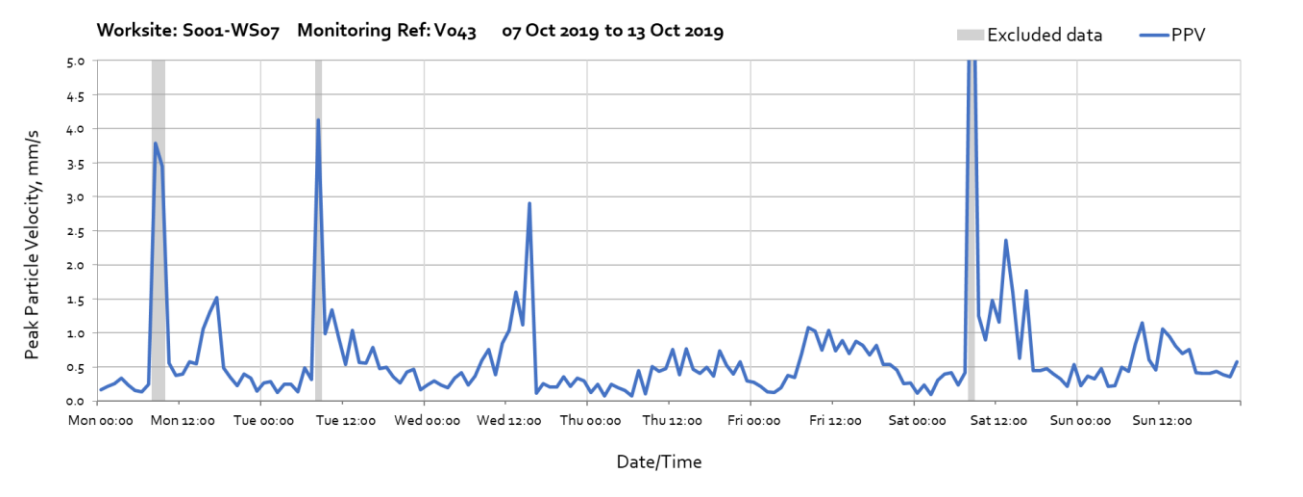


Note: High vibration levels throughout the week were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

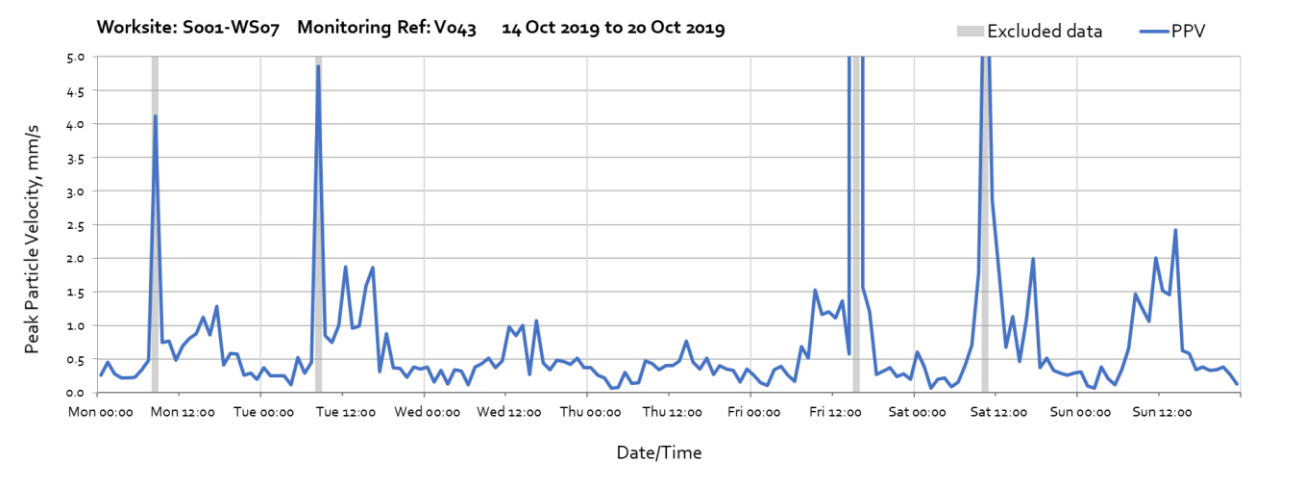
Worksite: S001-WS07 – Monitoring Ref: V043



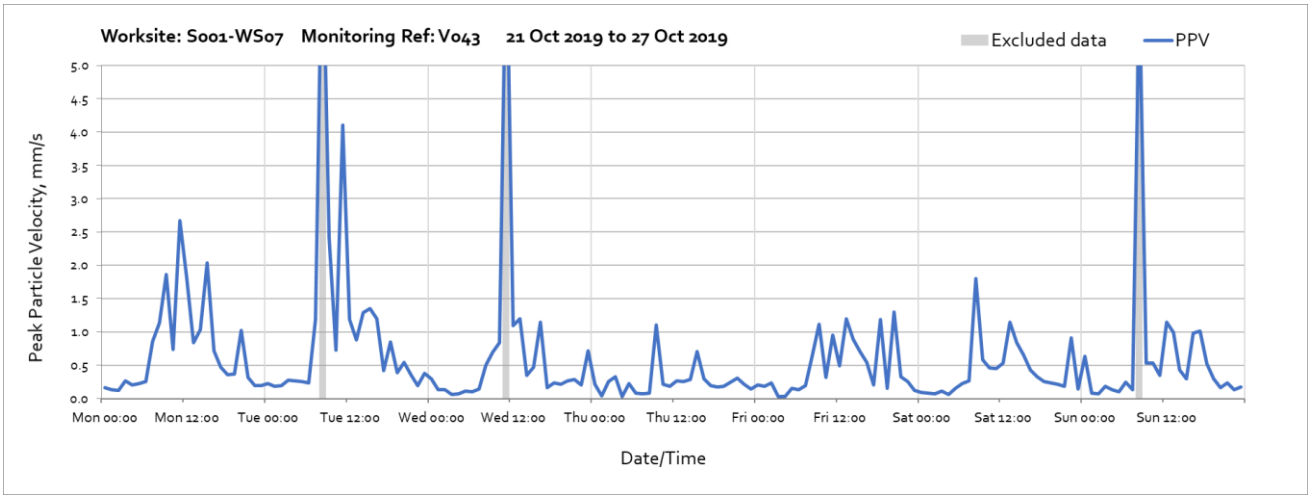
Note: High vibration levels throughout the week were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.



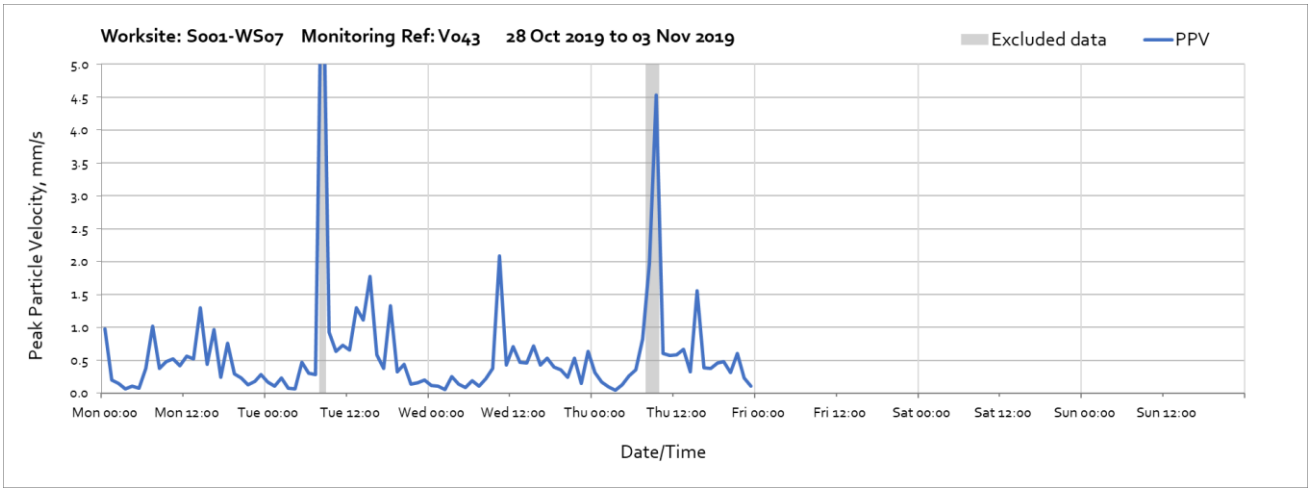
Note: High vibration levels throughout the week were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.



Note: High vibration levels throughout the week were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

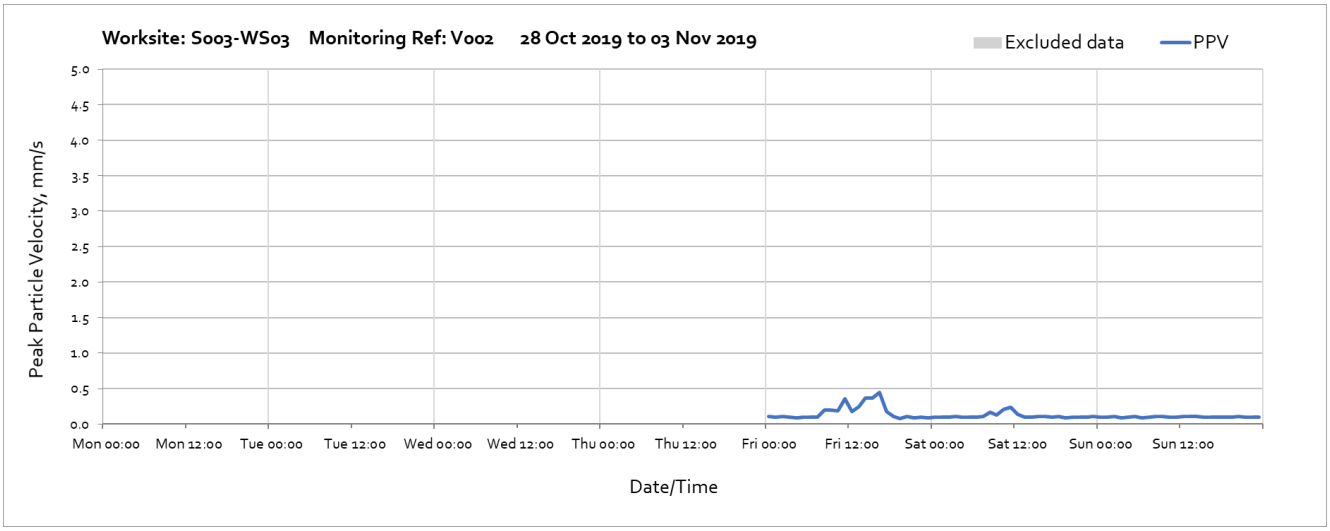


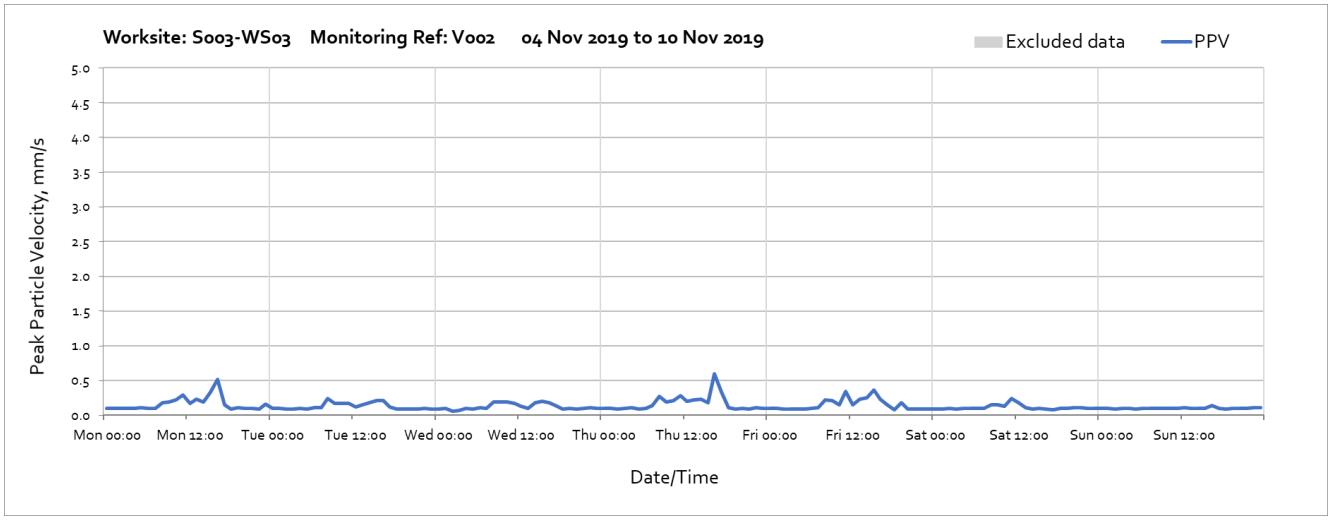
Note: High vibration levels throughout the week were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

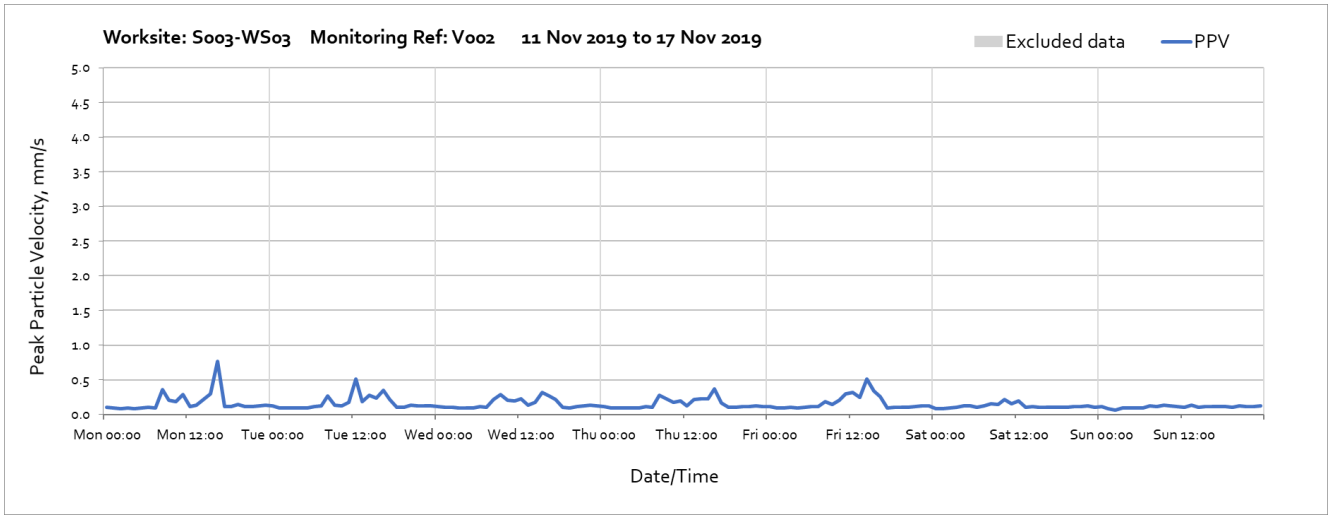


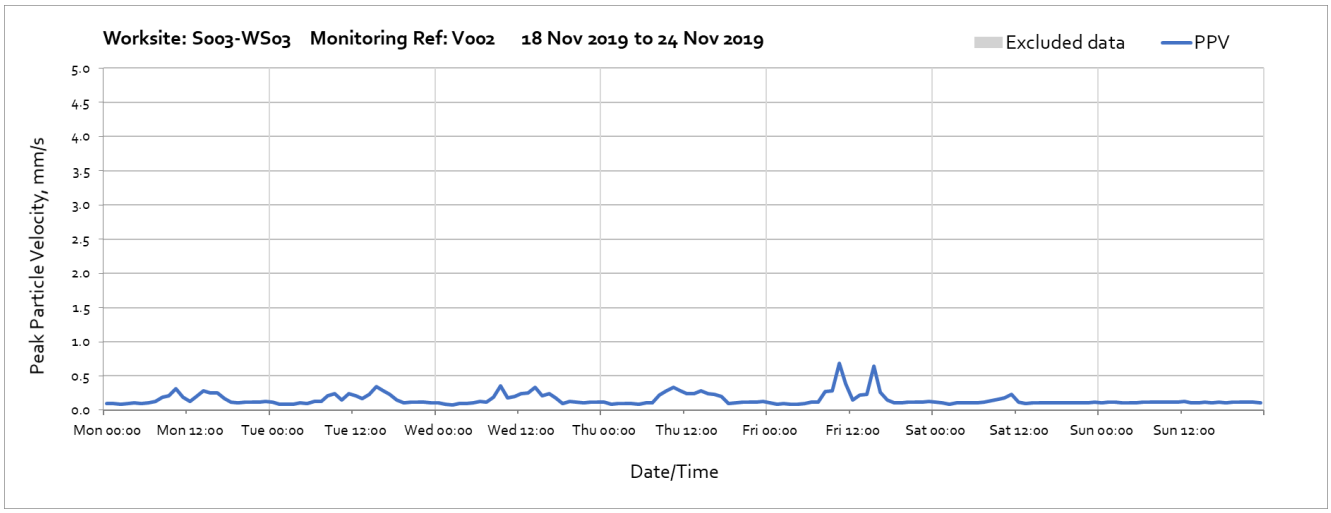
Note: High vibration levels throughout the week were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

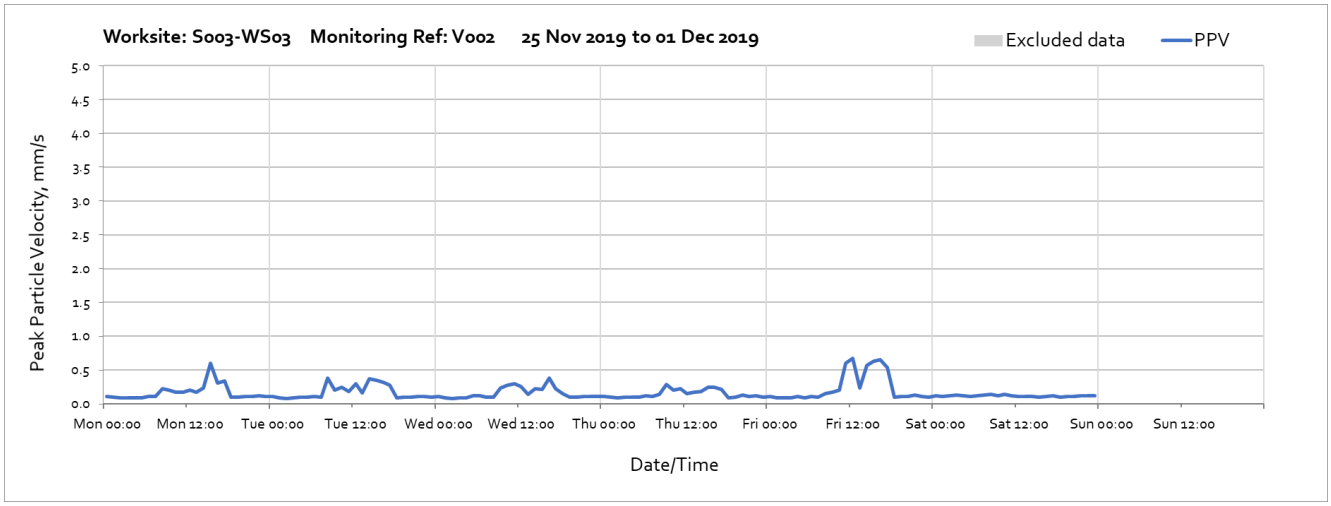
Worksite: S003-WS03 – Monitoring Ref: V002



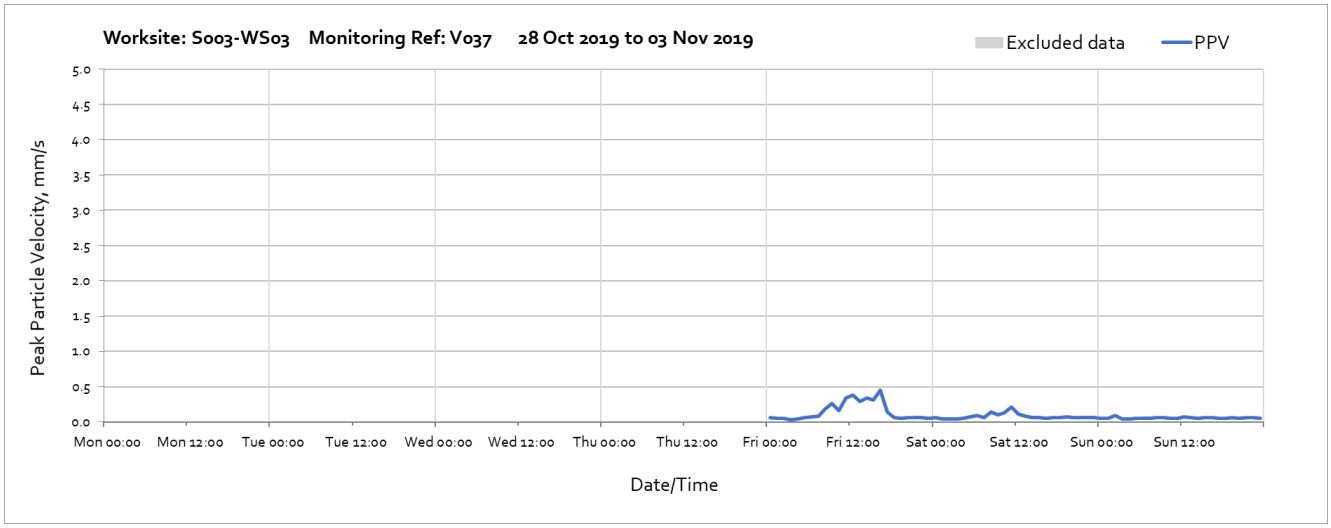

Worksite: S003-WS03 Monitoring Ref: V002 04 Nov 2019 to 10 Nov 2019
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

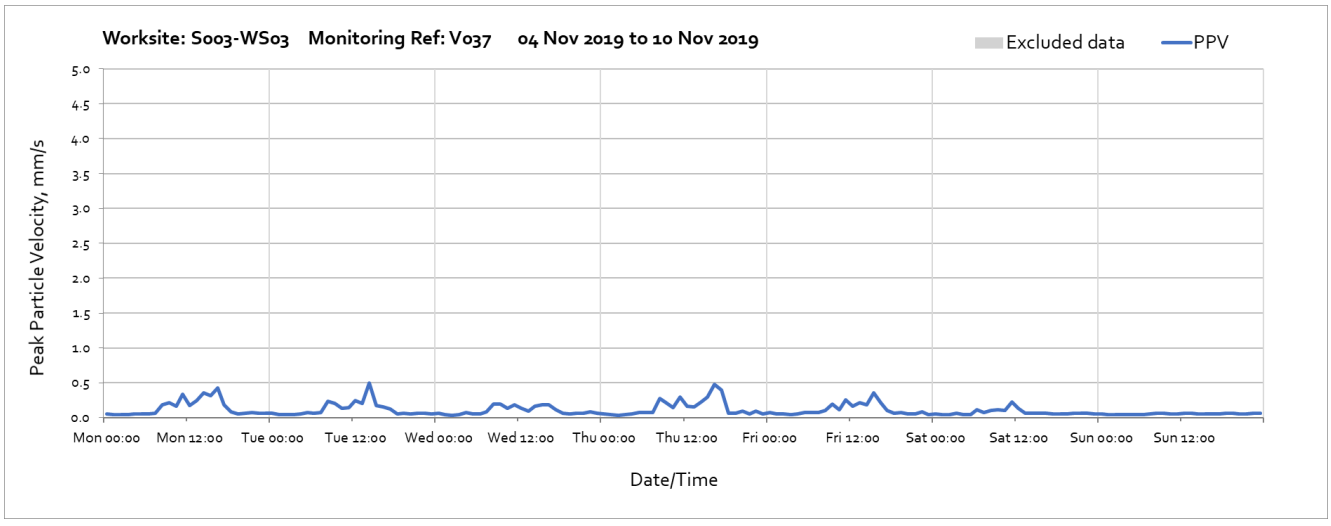

Worksite: S003-WS03 Monitoring Ref: V002 11 Nov 2019 to 17 Nov 2019
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

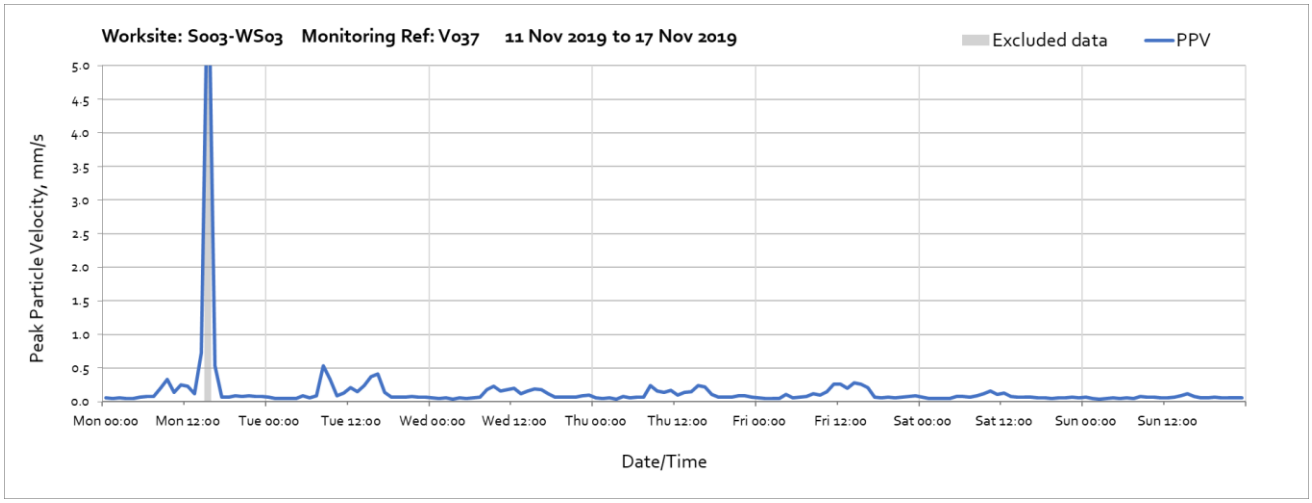

Worksite: S003-WS03 Monitoring Ref: V002 18 Nov 2019 to 24 Nov 2019
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time



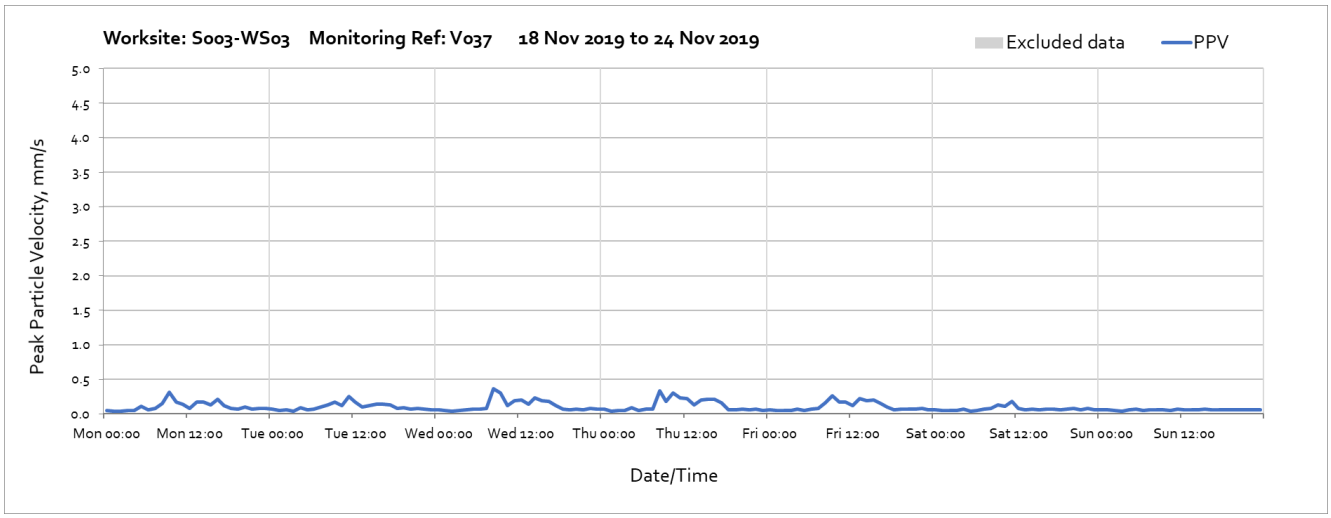
Worksite: S003-WS03 – Monitoring Ref: V037

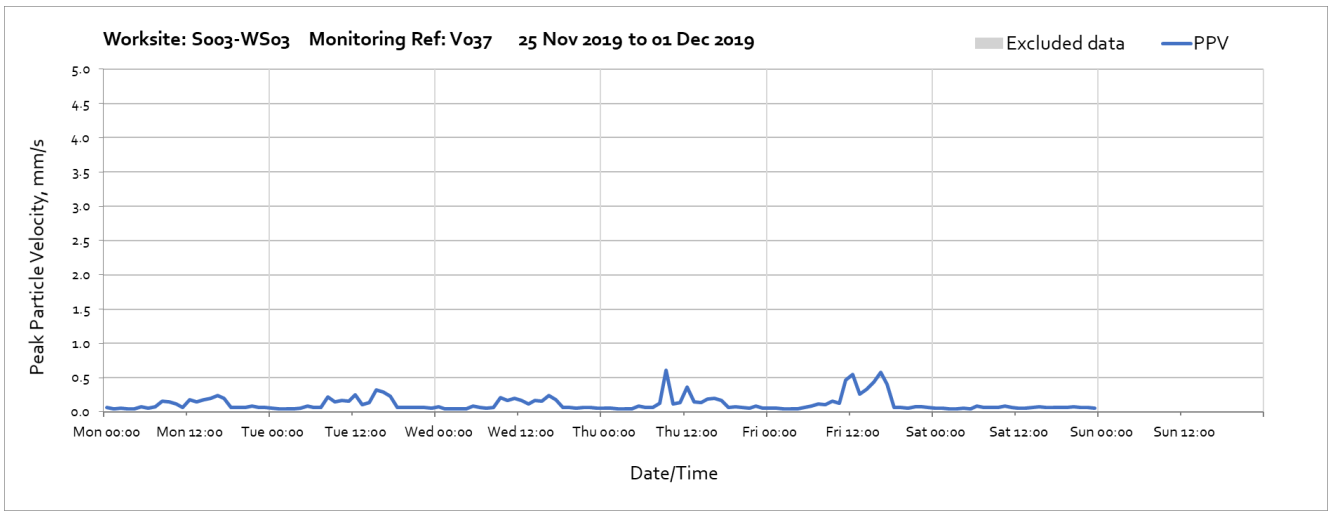




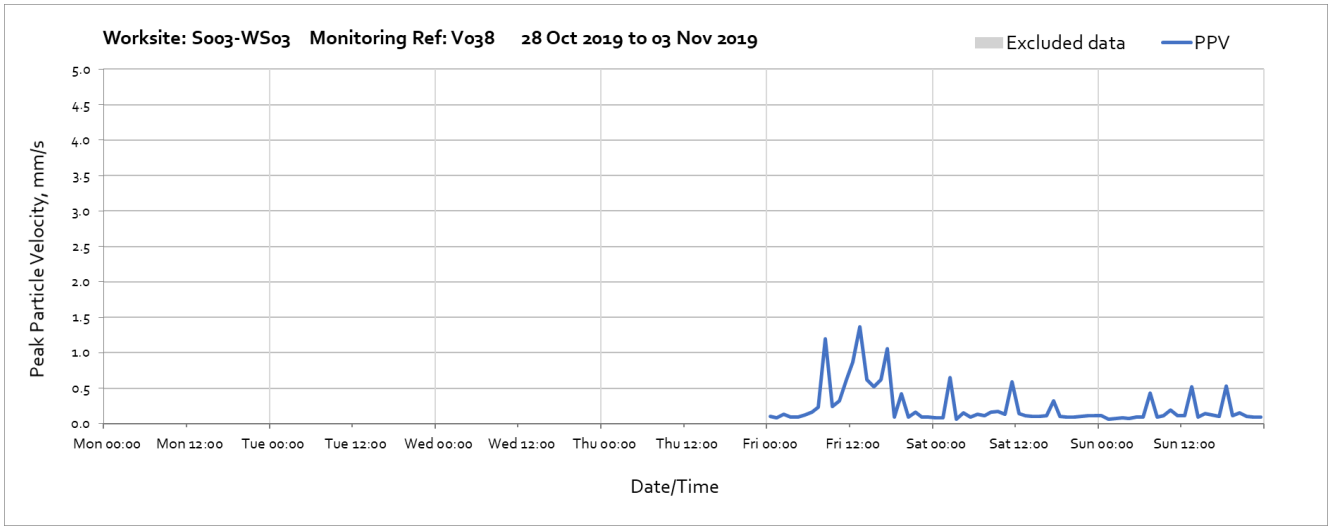


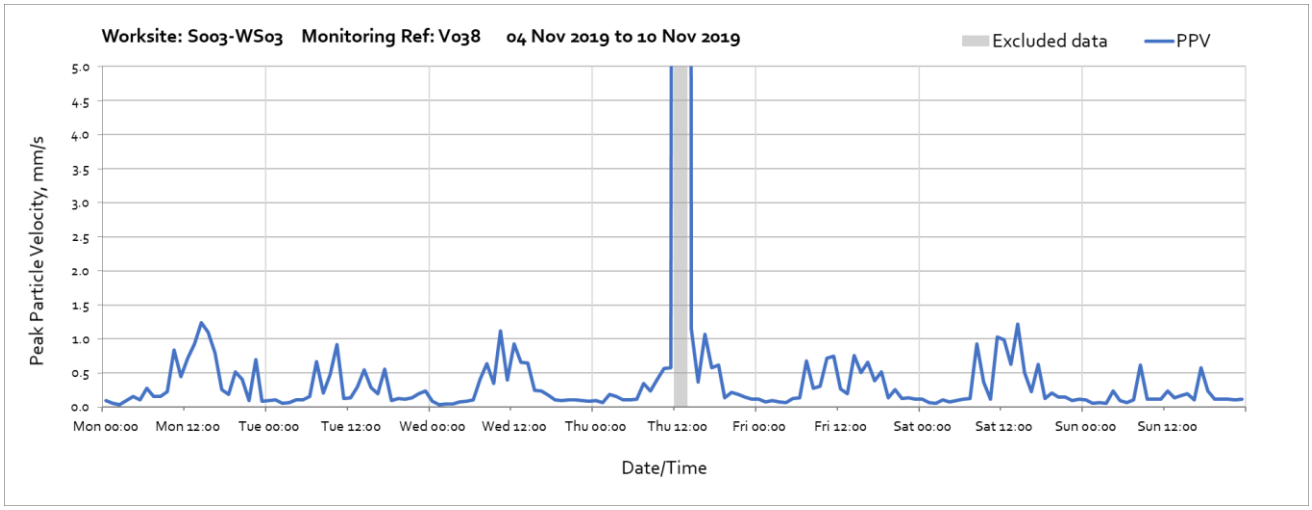
Note: High vibration levels at 11:00 on Monday 11th November were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.



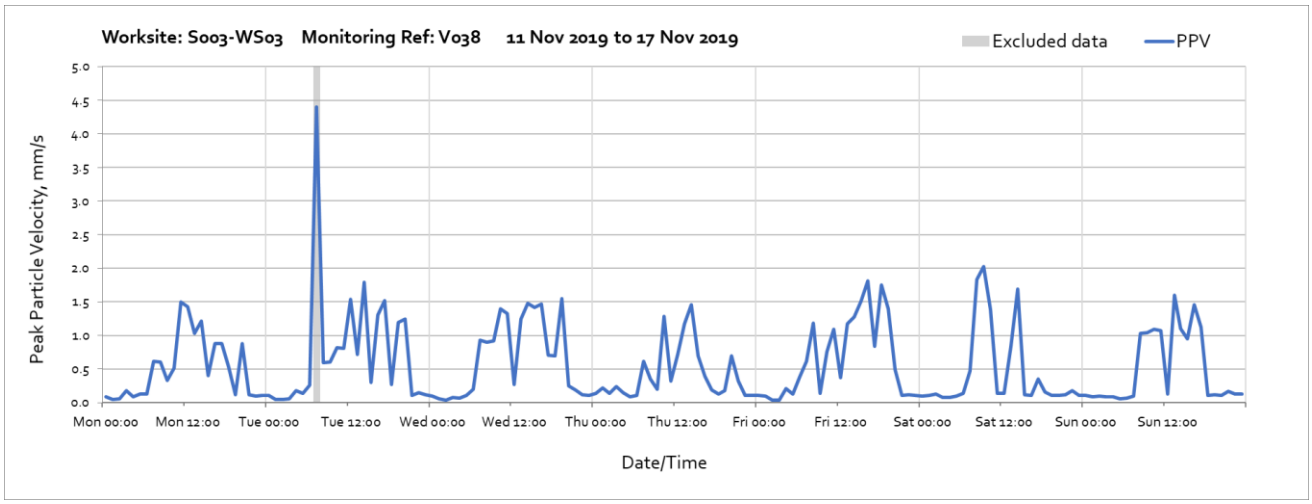


Worksite: S003-WS03 – Monitoring Ref: V038

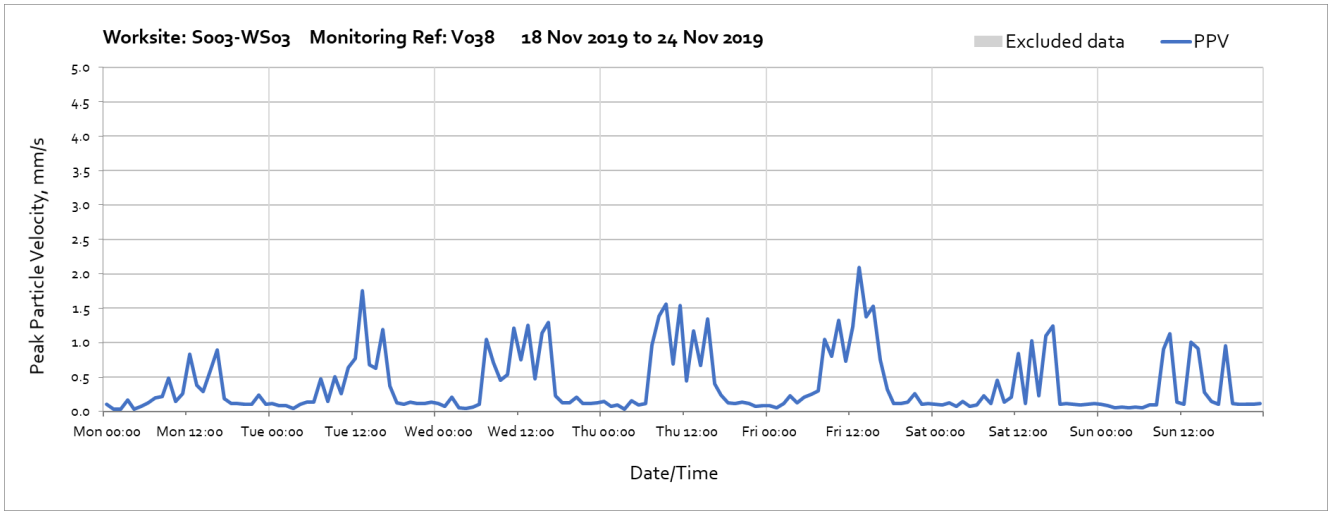


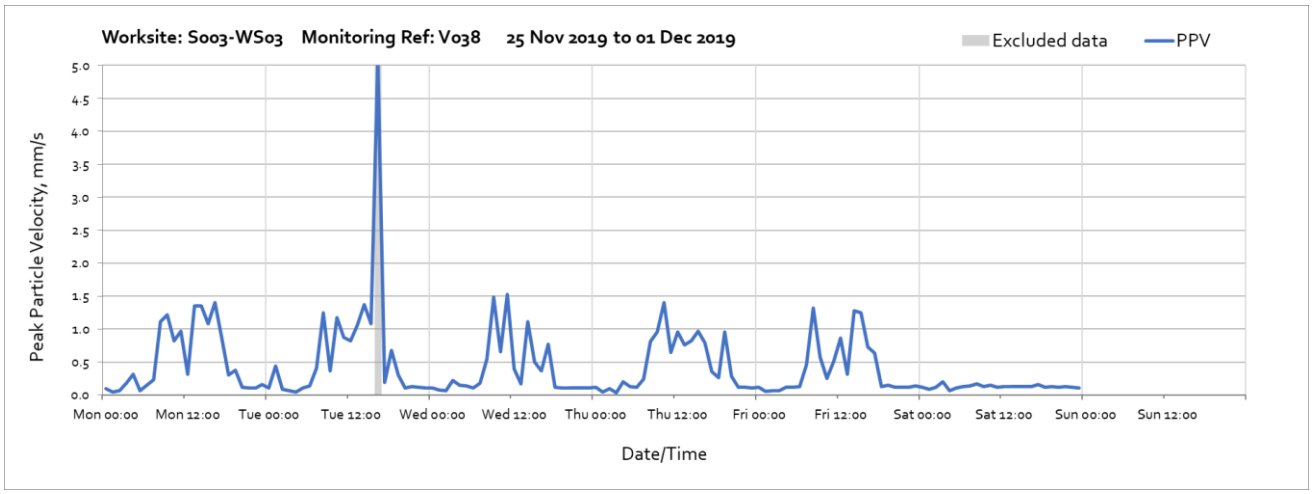


Note: High vibration levels between 12:00 and 15:00 on Thursday 7th November were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.



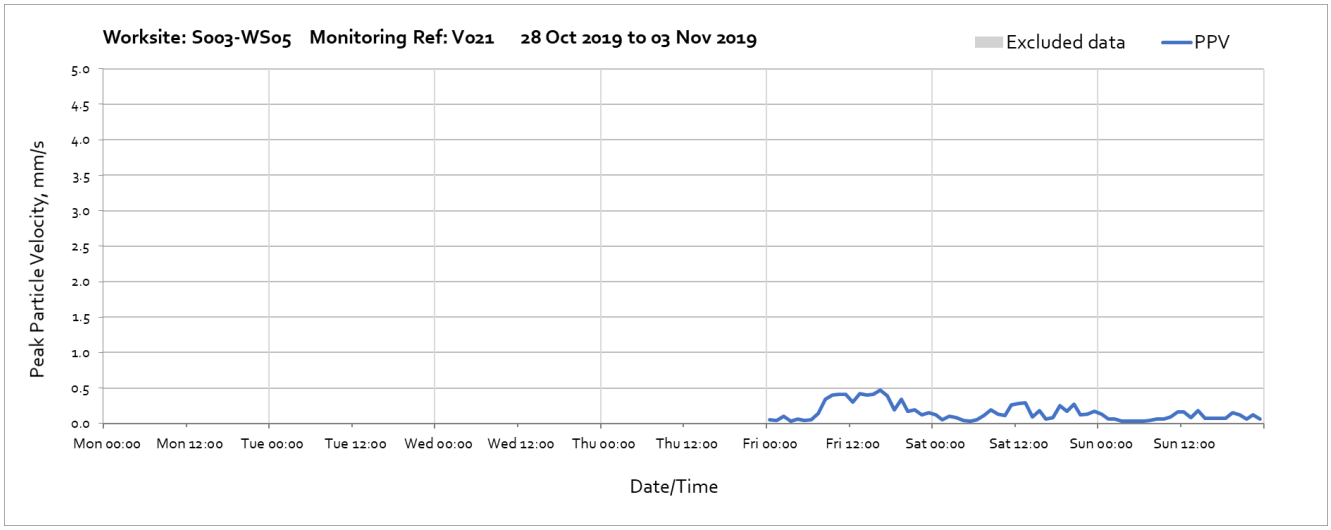
Note: High vibration levels throughout the week were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

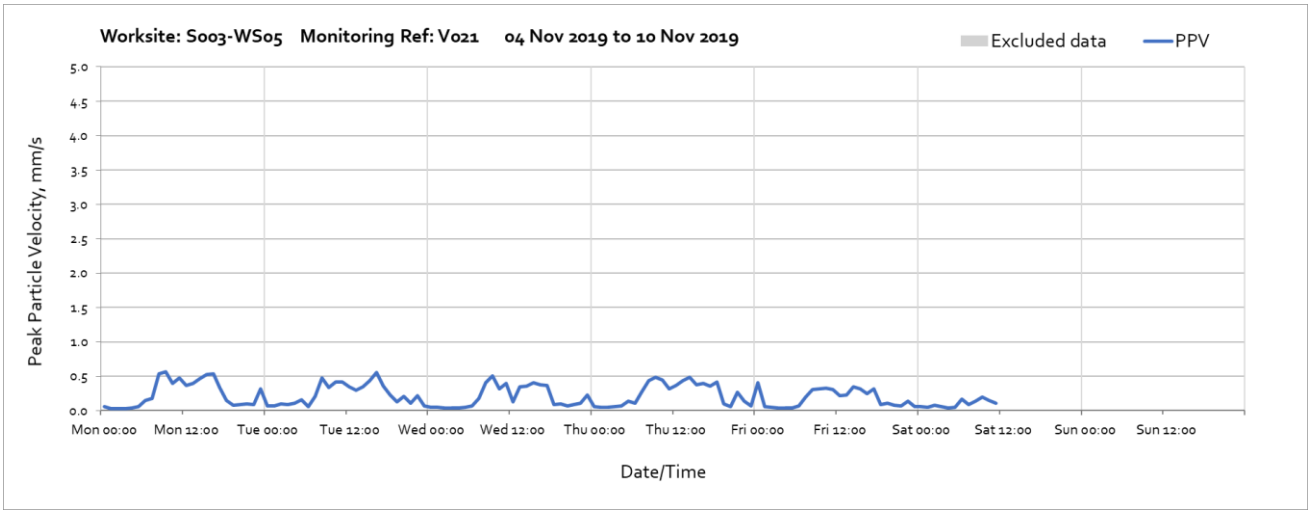




Note: High vibration levels throughout the week were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.

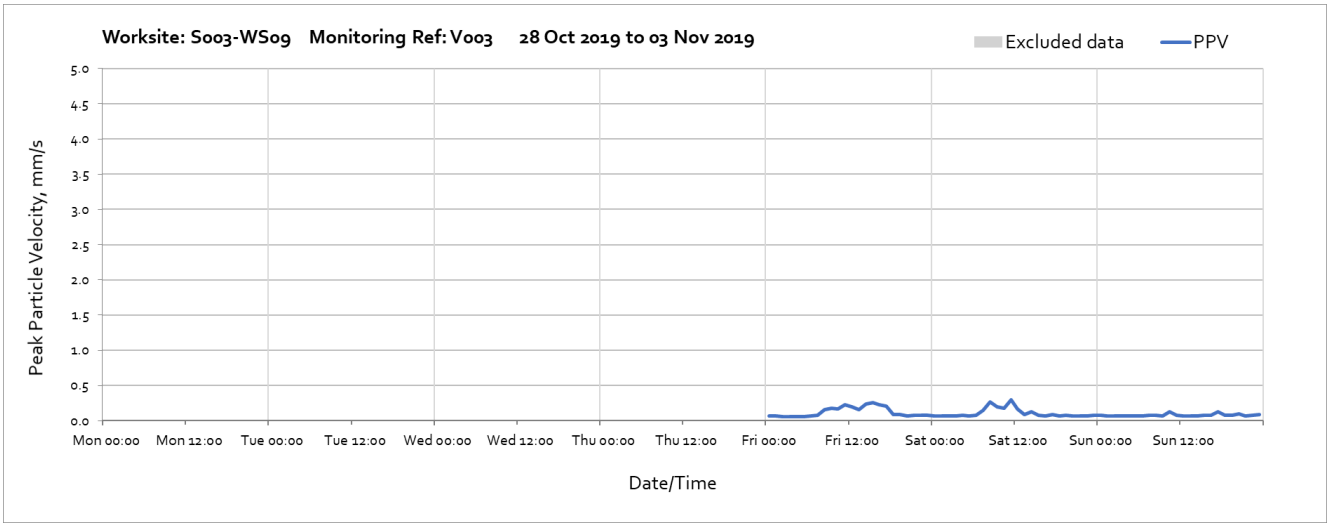
Worksite: S003-WS05 – Monitoring Ref: V021

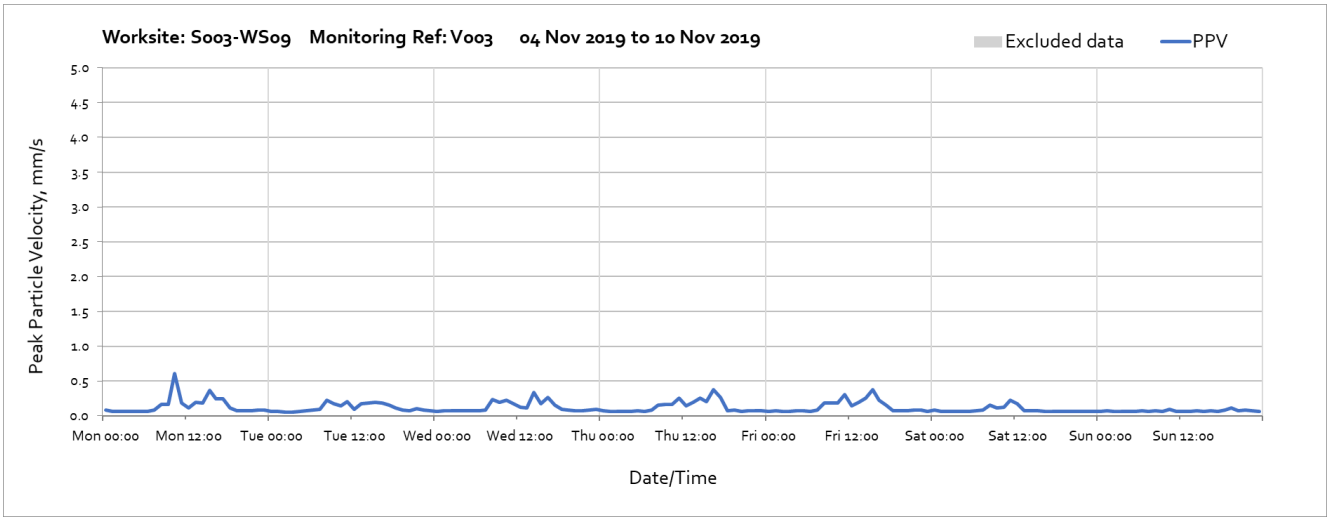


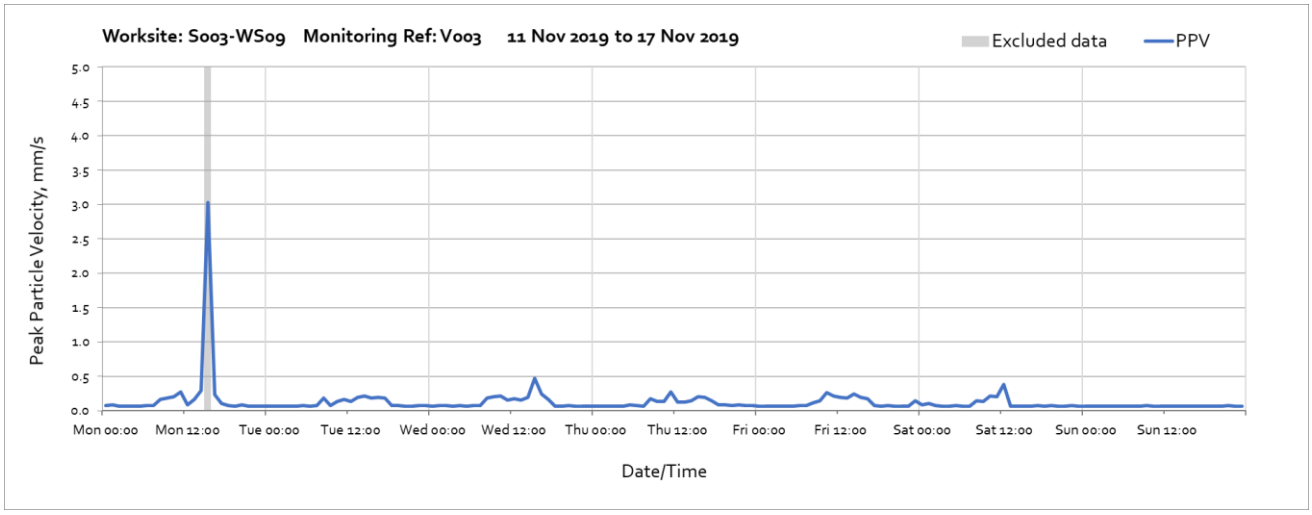


Note: Missing data between 12:00 on Saturday 9th and 23:00 on Saturday 30th November was due to a restart error following an update of the noise monitor firmware.

Worksite: S003-WS09 – Monitoring Ref: V003







Note: High vibration levels on Monday the 11th of November were due to local disturbance of the vibration monitor and are not representative of HS2 vibration levels.