

Construction noise and vibration Monthly Report – November 2020

London Borough of Ealing

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Non-Technical Summary

This Noise and Vibration Monitoring Report fulfils HS2 Limited's commitment detailed in the Environmental Minimum Requirements (EMRs), Annex 1, Code of Construction Practice, to present the results of noise and vibration monitoring carried out within the London Borough of Ealing (LBE) (including one monitoring location on the boundary with the London Borough of Hammersmith and Fulham) during the month of November 2020.

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken in the vicinity of the Atlas Road worksite (ref. S001-WS02) site setup, materials processing, hoarding installations and repairs, removal of materials, excavation of trial holes, fencing installations, construction of hard standing areas, concrete breaking, excavation and removal of redundant piles and power utilities works were underway.
- Noise and vibration monitoring was undertaken in the vicinity of the Willesden EuroTerminal worksite (ref. S001-WS03), where construction of slabs and walls, concrete breaking, laying of new rails, installation of foundations, deliveries, installation of wheel wash and weight bridge equipment and fencing / hoarding modifications were underway.
- Noise monitoring was undertaken in the vicinity of the Victoria Road worksite (ref. S002-WS01), where installation of piles, groundworks, surveys, working platform construction, road construction, removal of materials and installation of drainage and ducts were underway.
- Noise monitoring was undertaken in the vicinity of the Flat Iron compound (within worksite ref. S002-WS01), where extension of the vehicle holding area, removal of materials, upgrades / maintenance to the drainage network, installation of barriers, construction of road sweeper pit and installation of ductwork were underway.
- Noise and vibration monitoring were undertaken in proximity of the Old Oak Common depot worksite (ref. S004-WS01), where site setup and materials processing were underway.
- Noise monitoring was undertaken in proximity of the Mandeville Road Badminton Close compound (ref. BC Compound), where roadworks and power cable diversions were underway.
- Noise and vibration monitoring were undertaken in proximity of the Green Park Way Ventilation Shaft worksite (ref. SS05-SL06), where groundworks, surveys, concrete breaking, hoarding installations, water main installations, excavation of trial holes, cable works and removal of vegetation were underway.

Further water utility works were also undertaken at Horsenden Lane, Perivale.

There were five exceedances of the HS2 threshold levels for significant noise impacts during the reporting period.

There were three exceedances of trigger levels as defined in section 61 consents during the reporting period at any monitoring position.

Three complaints were received during the monitoring period. A description of complaints, the results of investigation and any actions taken are detailed in Table 7 of this report.

Abbreviations and Descriptions

The abbreviations, descriptions and project terminology used within this report can be found in Table 1.

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.
LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
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.
SOAEL	Significant Observed Adverse Effect Level - the level above which significant adverse effects on health and quality of life occur.
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 HS2 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.

1.1.2 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 Ealing (LBE) (including one monitoring location on the boundary with the London Borough of Hammersmith and Fulham) during the month for the period 1st to 30th November 2020.

1.1.3 Active construction sites in the local authority area, where noise and vibration monitoring were conducted during this period, include:

- Atlas Road worksite, ref. S001-WS02 (see plan 3 in Appendix A), where work activities included:
 - Installation and repairs of hoardings;
 - Removal of spoil and crushed stone;
 - Excavation of trial holes, including hand-dug holes to investigate for uncharted services;
 - Installation of fencing at the bus depot entrance;
 - Construction of hardstanding areas;
 - Removal of existing ramp (concrete breaking);
 - Excavation and removal of redundant piles; and
 - Site setup for Grand Union Canal bridge works.

- Willesden EuroTerminal worksite, ref. S001-WS03 (see plan 3 in Appendix A), where work activities included:
 - Construction of concrete slabs and walls for spoil storage bays;
 - Works on track crossings including breakout out of concrete and replacement with new concrete;
 - Laying down of new rails;
 - Installation of foundations for weighbridge cabins;
 - Delivery and installation of wheel wash a 2x no. weighbridges; and
 - Installation and repairs of fencing and hoardings.

- Victoria Road worksite, ref. S002-WS01 (see plan 3 in Appendix A), where work activities included:
 - Installation of piles;
 - Groundworks (backfilling and excavations);
 - Surveys;
 - Working platform construction;
 - Construction of site haul roads;
 - Removal of materials from site;
 - Installation of drainage and ducts; and
 - Construction of a new exit for piling rigs and cranes in the north-west corner of the site.

- Flat Iron compound, within worksite ref. S002-WS01 (see plan 4 in Appendix A), where work activities included:
 - Extension of the vehicle holding area;
 - Removal of redundant materials;
 - Upgrades and maintenance of the drainage network;
 - Barrier installations;
 - Construction of road sweeper pit; and
 - Installation of duct crossings.

- Old Oak Common depot worksite, located in the London Borough of Hammersmith and Fulham (LBHF), ref. S004-WS01 (see plan 5 in Appendix A), where work activities included:
 - Site setup; and
 - Materials processing (screening).
- Noise monitoring was undertaken in proximity of the Mandeville Road Badminton Close compound (ref. BC Compound), where work activities included:
 - Roadworks; and
 - Power cable diversions.
- Noise monitoring was undertaken in proximity of the Green Park Way Ventilation Shaft worksite, reference SS05-SL06 (see plan 1 in Appendix A), where work activities included:
 - Groundworks (excavations and backfilling);
 - Surveys;
 - Removal of materials;
 - Concrete breaking;
 - Hoarding installation;
 - Waters main connections;
 - Excavation of trial holes;
 - Cable works; and
 - Removal of vegetation.

1.1.4 Further works, where monitoring did not take place, were undertaken at:

- Horsenden Lane, Perivale as part of water mains diversions.

1.1.5 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.

1.2 Measurement Locations

- 1.2.1 Fifteen noise and four vibration monitoring installations were active in November 2020 in the LBE area. Table 2 summarises the position of noise and vibration monitoring installations within the LBE area in October 2020.
- 1.2.2 One additional noise monitor (N059) and one additional vibration monitor (V053) were installed at the Green Park Way Ventilation Shaft worksite, ref. SS05-SL06, on the 24th and of 18th November 2020 respectively.
- 1.2.3 Maps showing the position of noise and vibration monitoring installations are presented in Appendix B.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
S001-WS02	N032	Shaftesbury Gardens
	N033	Outside The Collective, Atlas Road / Victoria Road
	N060	Atlas Road next to Bashey Road
S001-WS03	N034	Stephenson Street (north)
	N035	Stephenson Street (south)
	N041	Junction of Stephenson Street / Goodhall Street
	V052	Stephenson Street (north)
S002-WS01	N029	Braitrim House, Victoria Road
	N030	Boden House Car Park
	N031	School Road, outside Acton Business Centre
	N049	Flat Iron compound railway fence, Victoria Rd North Acton
	N050	Acton Square, outside North Acton Station
S004-WS01	N027	Old Oak Common Lane
	N028	Old Oak Common Lane, Hilltop Works
	V045	Old Oak Common Lane
	V051	Kildun Court, Old Oak Common Lane
BC Compound	N040	Badminton Close
SS05-SL06	N059	Green Park Way Ventilation Shaft
	V053	Green Park Way Ventilation Shaft

2 Summary of Results

2.1 Summary of Measured Noise and Vibration Levels

2.1.1 Table 3 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.

Table 3: Summary of Measured dB L_{Aeq} Data over the Monitoring Period

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday Average L _{Aeq,T} (highest day L _{Aeq,T})					Saturday Average L _{Aeq,T} (highest day L _{Aeq,T})					Sunday / Public Holiday Average L _{Aeq,T} (highest day L _{Aeq,T})	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
S001-WS02	N032	Shaftesbury Gardens	Free-field	65.5 (68.8)	66.0 (67.4)	64.7 (66.8)	63.4 (65.9)	60.1 (67.3)	62.5 (63.2)	64.2 (64.6)	64.8 (65.2)	63.7 (66.3)	58.9 (62.1)	63.0 (66.5)	60.1 (64.6)
	N033	Outside The Collective, Atlas Road/Victoria Road	Free-field	68.4 (76.4)	69.1 (70.9)	66.6 (68.8)	64.9 (67.9)	61.7 (68.9)	64.5 (65.6)	66.6 (67.5)	66.5 (67.4)	65.2 (67.1)	60.6 (67.2)	64.5 (68.9)	62.6 (74.5)
	N060	Atlas Road next to Bashey Road	Façade	63.8 (76.8)	64.4 (74.1)	57.0 (68.8)	53.9 (59.6)	54.7 (70.0)	51.8 (52.8)	53.8 (54.9)	52.5 (54.2)	53.5 (58.1)	48.9 (55.9)	54.6 (67.0)	54.4 (65.9)
S001-WS03	N034	Stephenson Street (north)	Free-field	52.3 (55.8)	56.6 (59.7)	53.4 (59.6)	53.1 (72.3)	47.7 (55.4)	50.5 (51.4)	54.1 (55.3)	53.7 (56.9)	53.2 (57.6)	45.4 (53.4)	52.0 (58.0)	47.8 (56.9)
	N035	Stephenson Street (south)	Free-field	55.9 (57.7)	59.2 (69.5)	53.0 (61.4)	53.0 (72.2)	48.2 (57.5)	53.0 (54.4)	58.2 (62.2)	52.8 (56.3)	53.0 (57.8)	46.8 (59.0)	51.4 (60.3)	48.4 (57.0)
	N041	Junction of Stephenson Street/Goodhall Street	Free-field	46.9 (50.1)	48.5 (53.2)	45.5 (52.1)	44.9 (52.9)	41.3 (47.6)	43.8 (46.6)	46.0 (49.1)	45.3 (48.9)	44.9 (49.2)	39.6 (46.0)	43.2 (49.1)	41.4 (49.5)

Worksite Reference	Measurement Reference	Site 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
S002-WS01	N029	Braitrim House, Victoria Road	Free-field	52.5 (59.2)	60.6 (64.0)	56.5 (61.2)	56.8 (63.0)	53.5 (64.4)	49.8 (51.1)	55.7 (58.7)	56.6 (59.7)	55.6 (58.8)	49.6 (58.4)	53.8 (60.1)	53.2 (62.3)
	N030	Bodens car park	Free-field	56.1 (61.4)	64.0 (68.2)	54.8 (59.7)	53.6 (56.7)	50.9 (55.9)	52.6 (53.7)	60.7 (67.3)	57.1 (61.6)	55.7 (64.3)	49.7 (55.2)	54.1 (59.2)	51.7 (60.2)
	N031	School Road, outside Acton Business Centre	Free-field	58.3 (61.0)	67.6 (82.8)	58.4 (61.0)	56.0 (65.9)	52.6 (61.1)	54.2 (55.7)	63.2 (73.1)	59.2 (61.6)	58.2 (64.0)	50.7 (57.9)	58.9 (77.4)	53.3 (60.5)
	N049	Flat Iron compound	Free-field	54.3 (60.8)	60.8 (63.5)	55.5 (60.8)	55.5 (60.7)	53.8 (60.5)	50.9 (52.0)	55.4 (58.8)	55.0 (57.0)	53.6 (57.2)	48.2 (56.8)	52.5 (60.8)	53.4 (60.2)
	N050	Acton Square, outside North Acton Station	Free-field	64.5 (67.9)	65.6 (68.1)	64.4 (74.7)	62.3 (69.6)	58.6 (65.3)	61.4 (62.9)	63.7 (64.9)	64.7 (66.2)	63.8 (74.9)	58.1 (63.3)	62.0 (67.9)	57.7 (62.0)

Worksite Reference	Measurement Reference	Site 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
S004-WS01	N027	Old Oak Common Lane	Free-field	64.4 (66.4)	65.4 (68.0)	63.1 (65.6)	60.1 (63.3)	58.5 (66.8)	59.7 (63.0)	64.1 (71.9)	60.6 (62.3)	60.7 (63.1)	58.5 (62.2)	59.4 (63.8)	57.9 (64.3)
	N028	Old Oak Common Lane, Hilltop Works	Free-field	67.4 (70.3)	69.3 (71.9)	68.4 (73.2)	66.8 (70.5)	63.1 (70.6)	69.8 (70.8)	69.8 (70.3)	69.3 (70.8)	69.3 (73.8)	63.2 (69.5)	69.4 (73.0)	63.7 (71.3)
BC Compound	N040	Badminton Close	Free-field	54.9 (59.2)	56.1 (59.3)	55.3 (62.1)	55.0 (63.0)	51.5 (58.8)	53.0 (55.3)	59.5 (73.3)	58.5 (69.8)	57.0 (69.3)	50.7 (57.4)	55.4 (68.2)	51.5 (57.0)
SS05-SL06	N059	Green Park Way Ventilation Shaft	Façade	54.3 (55.8)	60.7 (63.8)	54.6 (56.8)	52.9 (55.8)	51.4 (55.5)	50.4 (50.4)	50.9 (50.9)	51.6 (51.6)	50.5 (51.4)	46.2 (50.0)	50.5 (53.2)	48.9 (52.0)

2.1.2 Table 4 presents a summary of the measured vibration levels at each monitoring location over the reporting period. The highest PPV measured during the monitoring along any axis is presented in the table.

Table 4: Summary of Measured PPV Data over the Monitoring Period

Worksite Reference	Measurement Reference	Monitor Address	Highest PPV measured in any axis, mm/s
S001-WS03	V052	Stephenson Street (north)	1.45 (Y-axis)
S004-WS01	V045	Old Oak Common Lane	0.99 (Y-axis)
S004-WS01	V051	Kildun Court, Old Oak Common Lane	1.33 (Y-axis)
SS05-SL06	V053	Green Park Way Ventilation Shaft	7.70 * (Y-axis)

* High vibration levels are due to the proximity of the construction activities to the vibration monitor. The nearest residential receptors are 100m further from the works and vibration levels at the receptor will therefore be lower.

2.1.3 Appendix C presents graphs of the 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>.

2.2 Exceedances of the SOAEL

2.2.1 The significant observed adverse effect level (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."

2.2.2 HS2 Phase One Information Paper E23: Control of Construction Noise and Vibration sets out the SOAELs for construction noise.

2.2.3 Where reported construction noise levels exceed the SOAEL, relevant periods will be identified. Summary statistics to evaluate ongoing qualification for noise insulation and temporary rehousing are also presented where relevant.

2.2.4 Table 5 presents a summary of recorded exceedances of the SOAEL at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 5: Summary of Exceedances of SOAEL

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
S001-WS02	N032	Shaftesbury Gardens	All days	All periods	No exceedance
	N033	Outside The Collective, Atlas Road / Victoria Road	All days	All periods	No exceedance
	N060	Atlas Road next to Bashey Road	All days	All periods	No exceedance
S001-WS03	N034	Stephenson Street (north)	All days	All periods	No exceedance
	N035	Stephenson Street (south)	All days	All periods	No exceedance
	N041	Junction of Stephenson Street / Goodhall Street	All days	All periods	No exceedance
S002-WS01	N029	Braitrim House, Victoria Road	All days	All periods	No exceedance
	N030	Bodens Car Park	All days	All periods	No exceedance
	N031	School Road, outside Acton Business Centre	All days	All periods	Not applicable*
	N049	Flat Iron compound	All days	All periods	No exceedance
	N050	Acton Square, outside North Acton Station	All days	All periods	No exceedance
S004-WS01	N027	Old Oak Common Lane	All days	All periods	No exceedance
	N028	Old Oak Common Lane, Hilltop Works	All days	All periods	No exceedance
BC Compound	N040	Badminton Close	All days	All periods	No exceedance

* The defined SOAEL criteria are not applicable to non-residential properties.

2.3 Exceedances of Trigger Level

2.3.1 Table 6 provides a summary of exceedances of the Section 61 trigger noise levels determined to be due to HS2 related construction noise measured during the reporting period, along with the findings of any investigation.

Table 6: Summary of Exceedances of Trigger Levels

Complaint Reference Number (if applicable)	Worksite Reference	Date and Time Period	Identified Source	Results of Investigation (including noise monitoring results)	Actions Taken
N/A	S002-WS01	16 th Nov, Weekday 0800 – 1800	Steel sheet piling.	$L_{Aeq,10h} = 83\text{dB}$ (trigger level $L_{Aeq,10h} = 79\text{dB}$). Trigger caused by tougher than expected pile driving conditions to install a sheet pile to a safe depth.	Works stopped to permit full analysis of cause and devise a solution to the problem. Sheet piling contractor instructed to pre-bore the pile locations, as reflected in a consented Section 61 variation. Ground conditions were also reviewed to see if piling methodology changes were required.
HS2-20-40929-C	S002-WS01	17 th Nov, Weekday 0800 - 1800	Steel sheet piling.	$L_{Aeq,10h} = 80\text{dB}$ (trigger level $L_{Aeq,10h} = 79\text{dB}$). Investigation determined that the noise monitor was located closer to the works than predictions allowed and a change of plant was required which led to an increase in noise levels measured at the monitor.	Works stopped to permit full analysis of cause and devise a solution to the problem. Sheet piling contractor instructed to pre-bore the pile locations, as reflected in a consented Section 61 variation. Vibrator will continue to be used in low power mode to be in compliance with the Section 61 consent until permission granted.
N/A	S002-WS01	18 th Nov, Weekday 0800 - 1800	Steel sheet piling.	$L_{Aeq,10h} = 80\text{dB}$ (trigger level $L_{Aeq,10h} = 79\text{dB}$). Vibrator needed to be used in a higher power mode to safely complete installation of a couple of sheet	Emergency works to complete sheet pile safely required vibrator to be used in a higher power mode.

				piles; treated as emergency works.	
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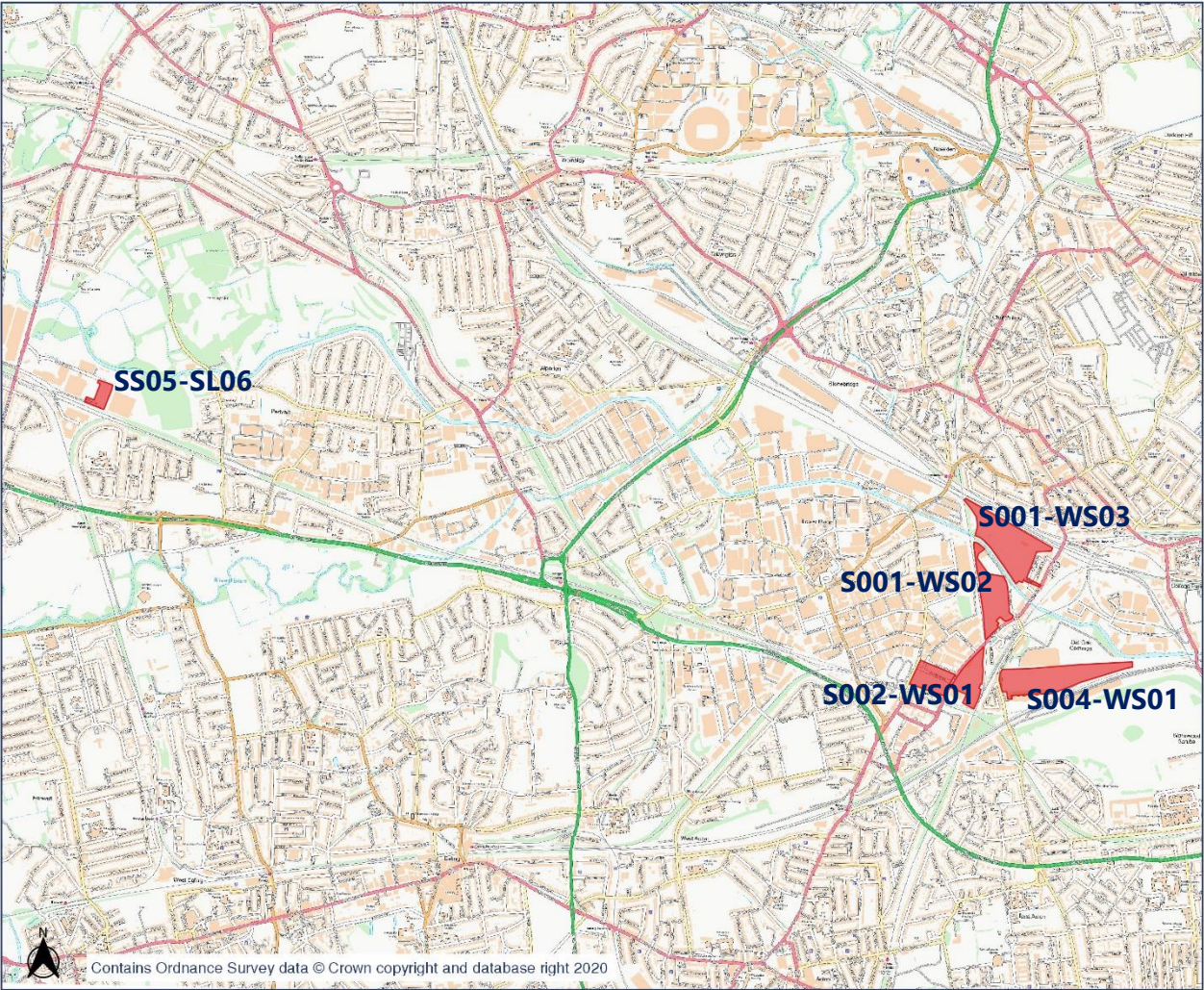
2.4 Complaints

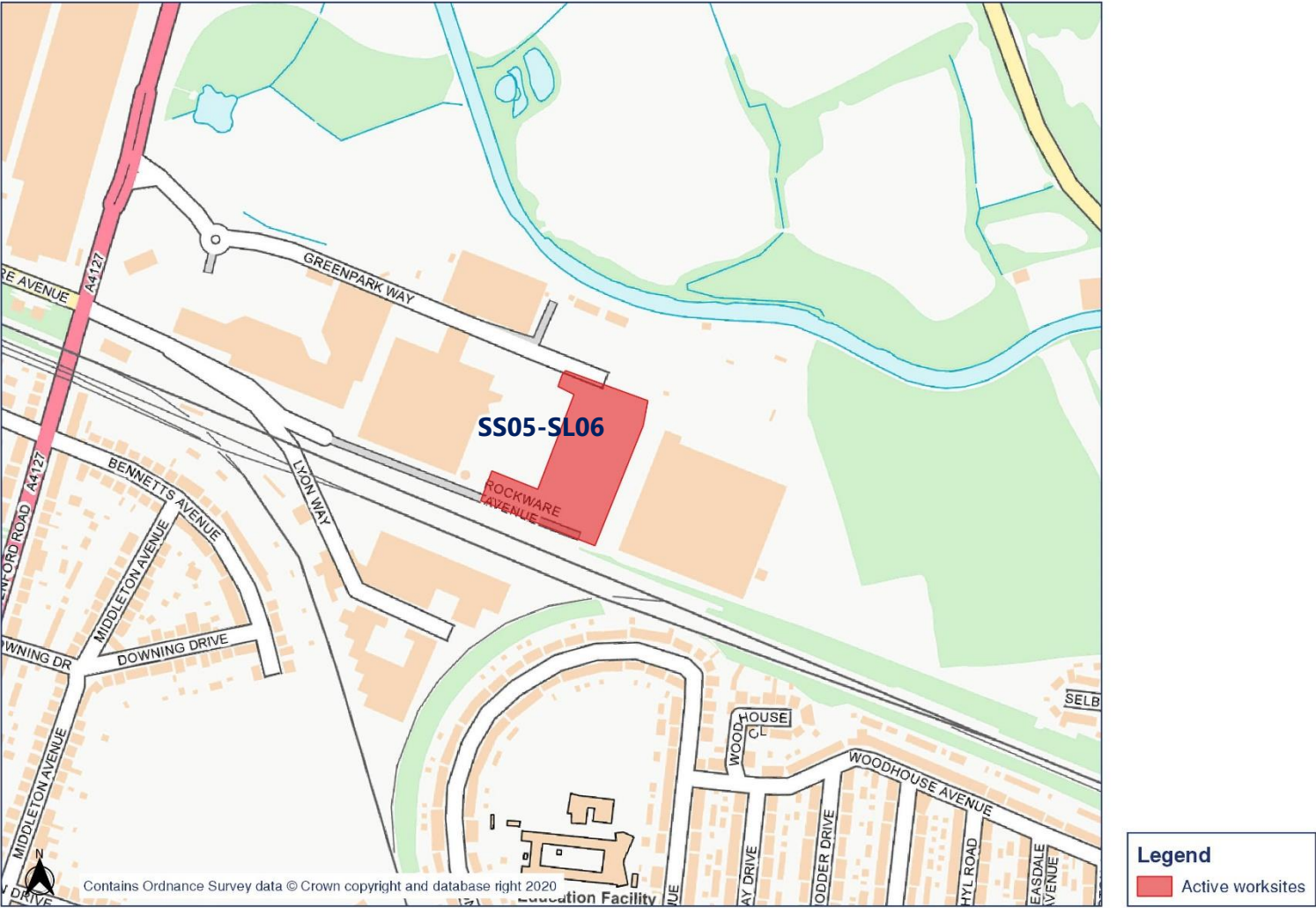
2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

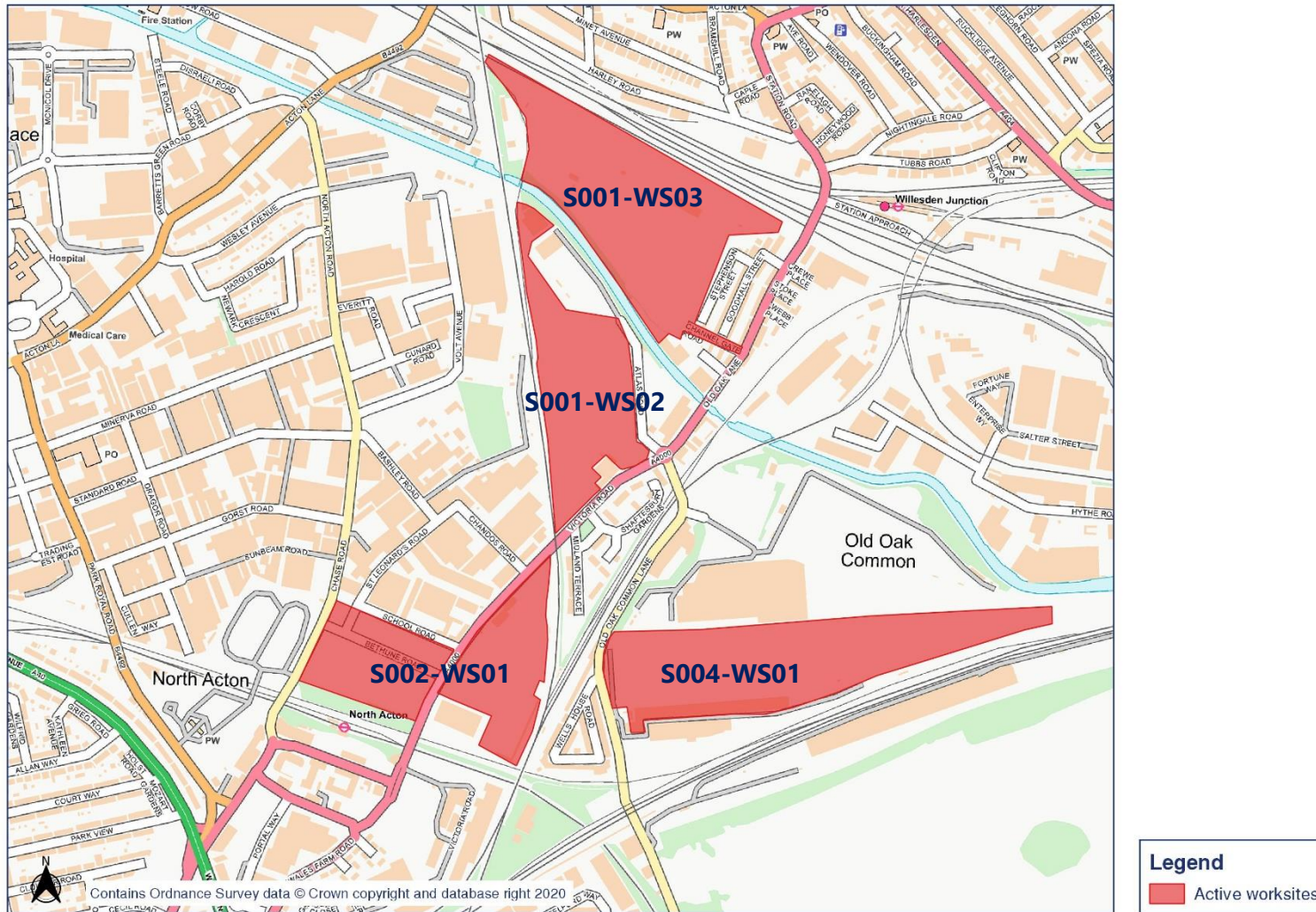
Table 7: Summary of Complaints

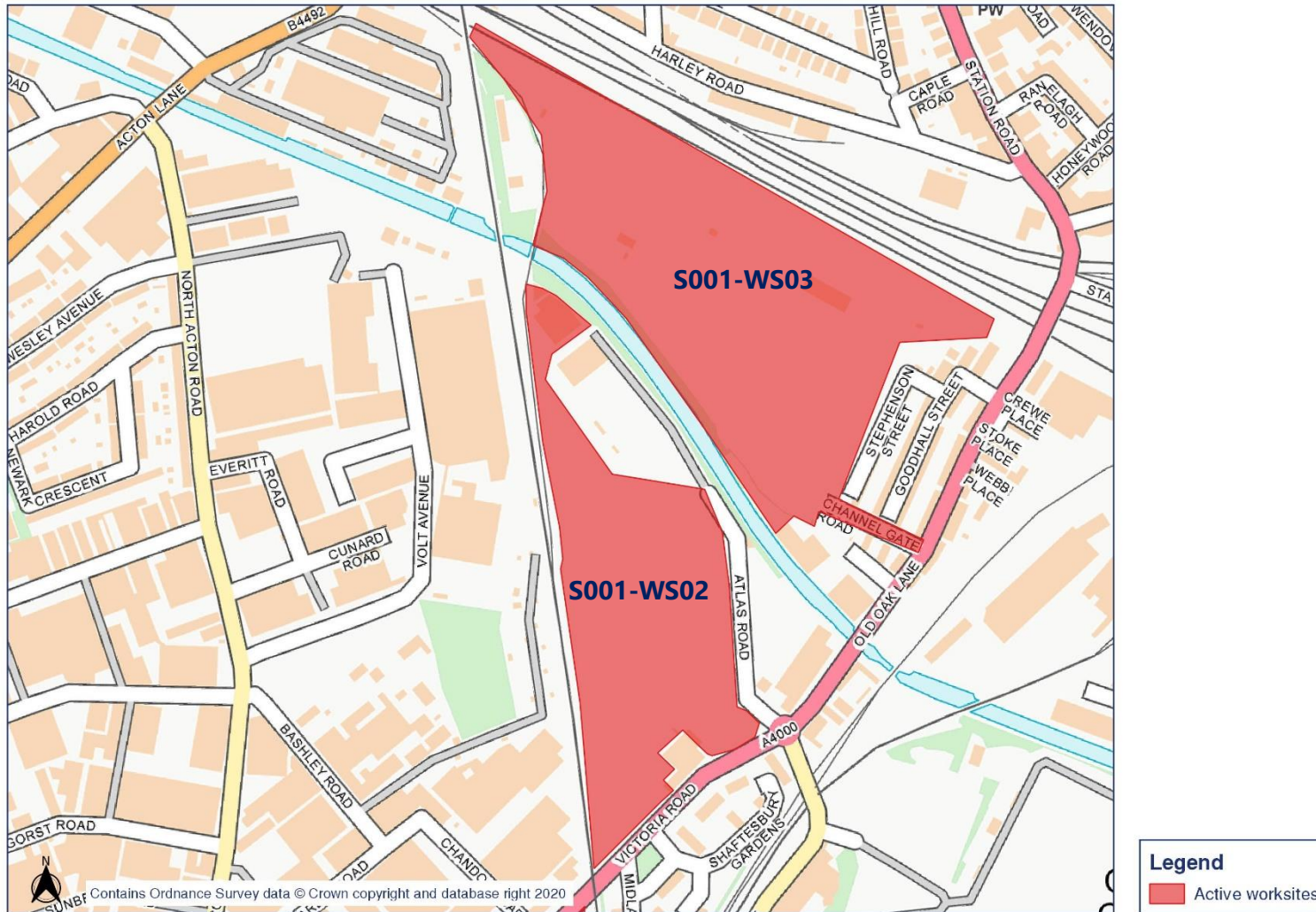
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-20-40929-C	S001-WS02	Complaint due to audible construction noise.	Permitted steel sheet piling works were undertaken at the time of the complaint. Monitoring data demonstrates compliance with Section 61 and works were in line with best practical means.	Works were stopped to allow review of work methodology, which was in line with best practical means. The complainant was informed that temporary weekend works will occur until 18 th December. Confirmed that noise levels are monitored and invited stakeholder to a virtual drop-in to discuss any remaining concerns further.
HS2-20-51749-E	S001-WS03	Request for information about planned sheet piling works .	No investigation required.	Information on times of planned sheet piling activities was provided to the complainant.

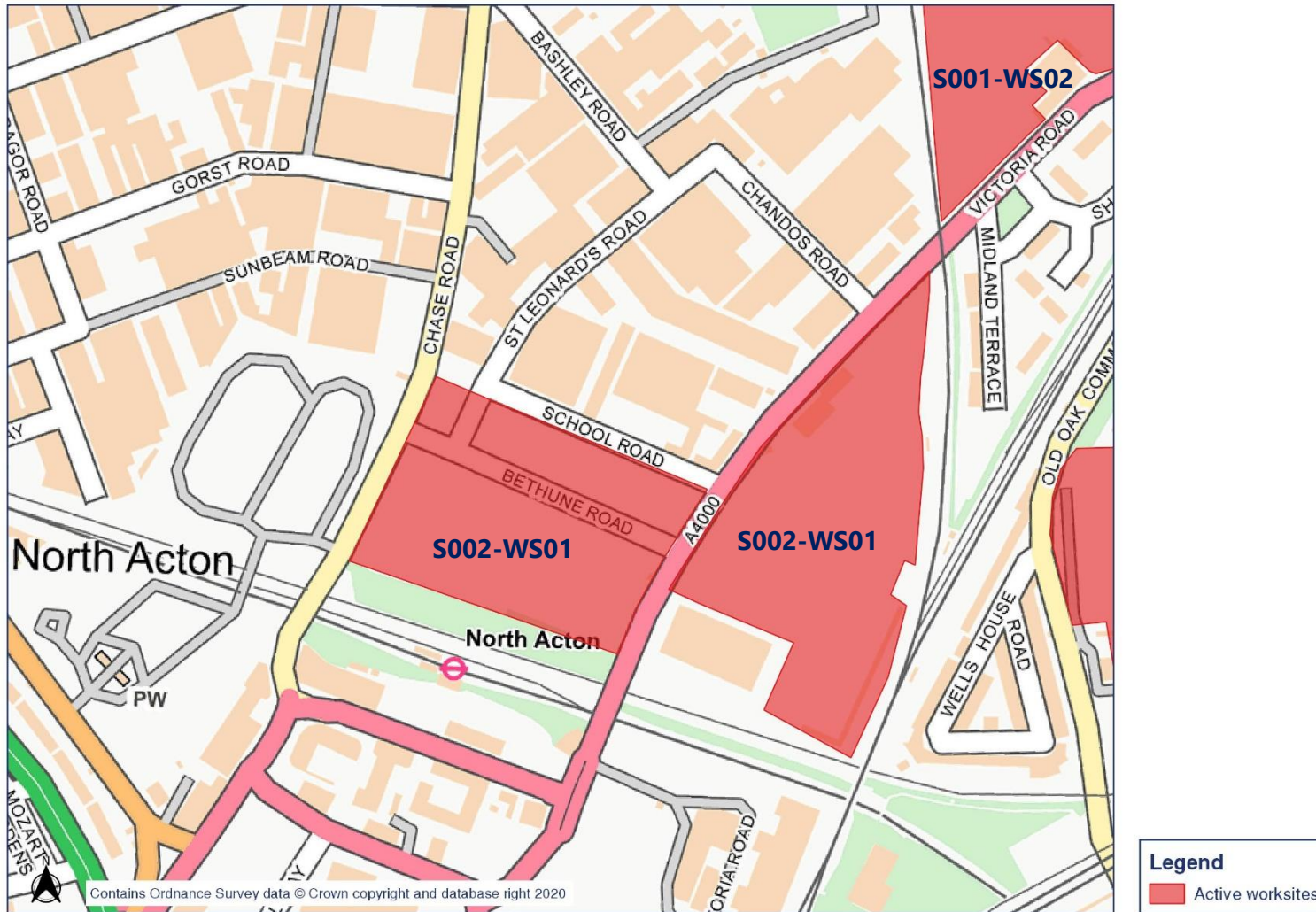
Appendix A Site Locations







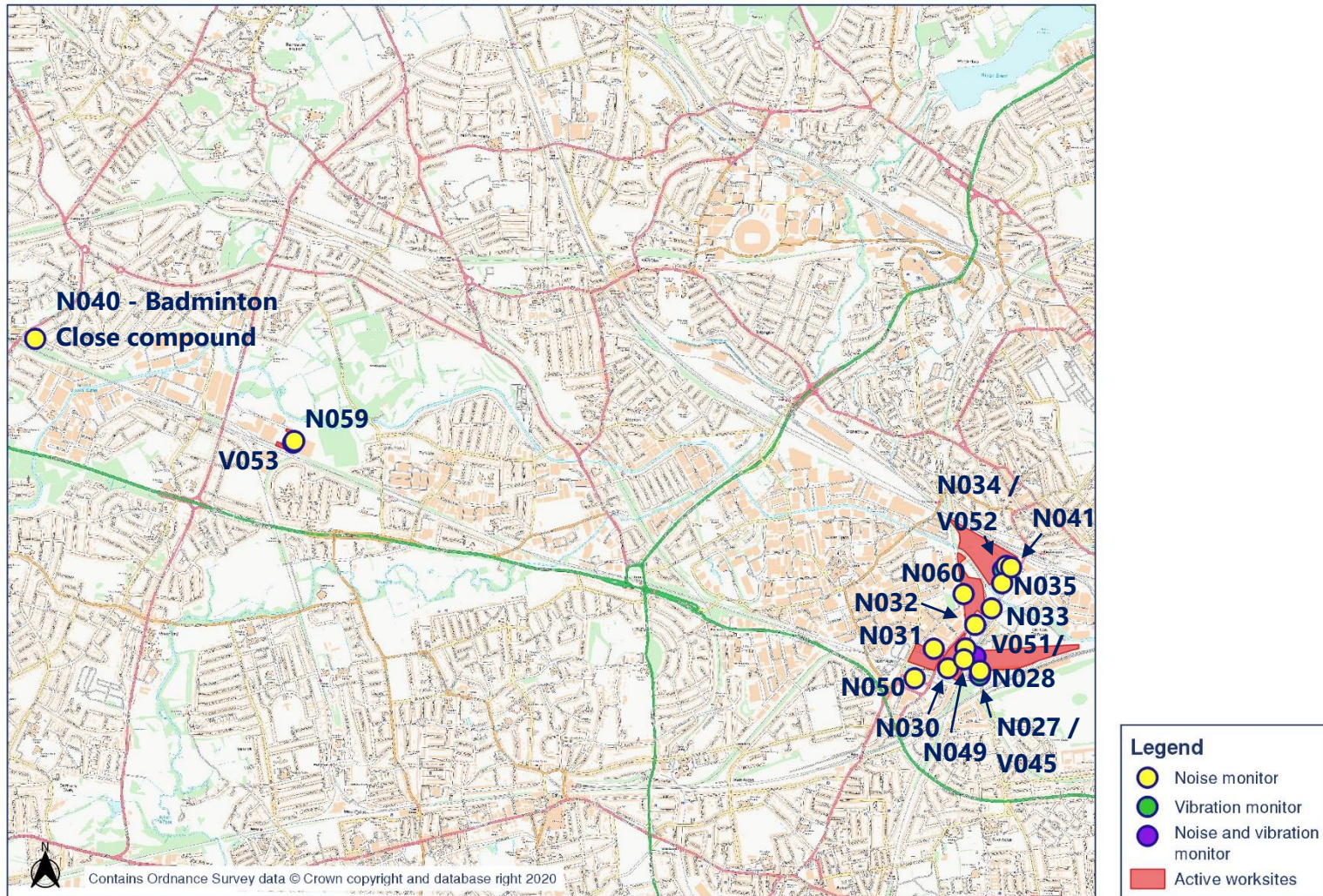


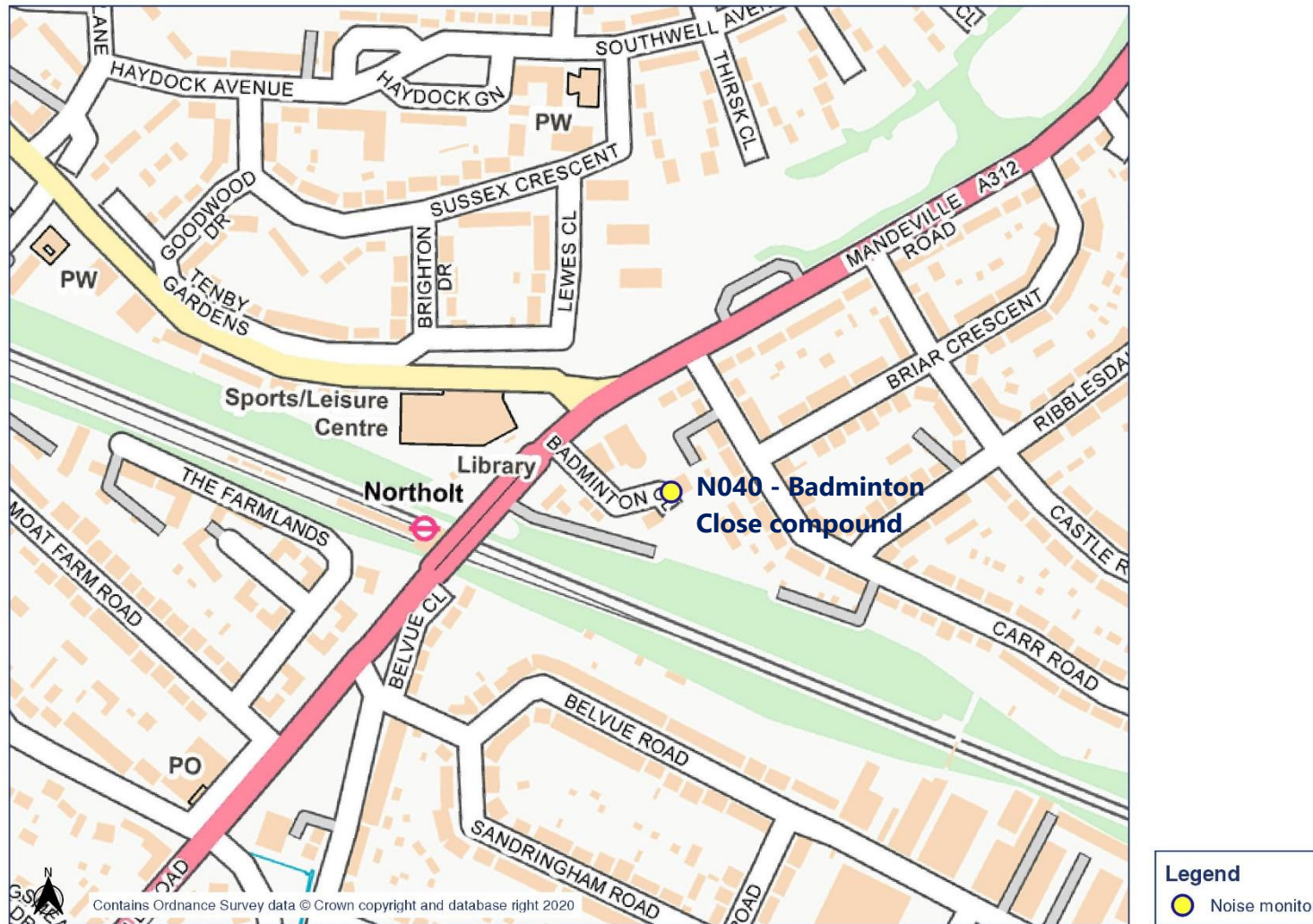


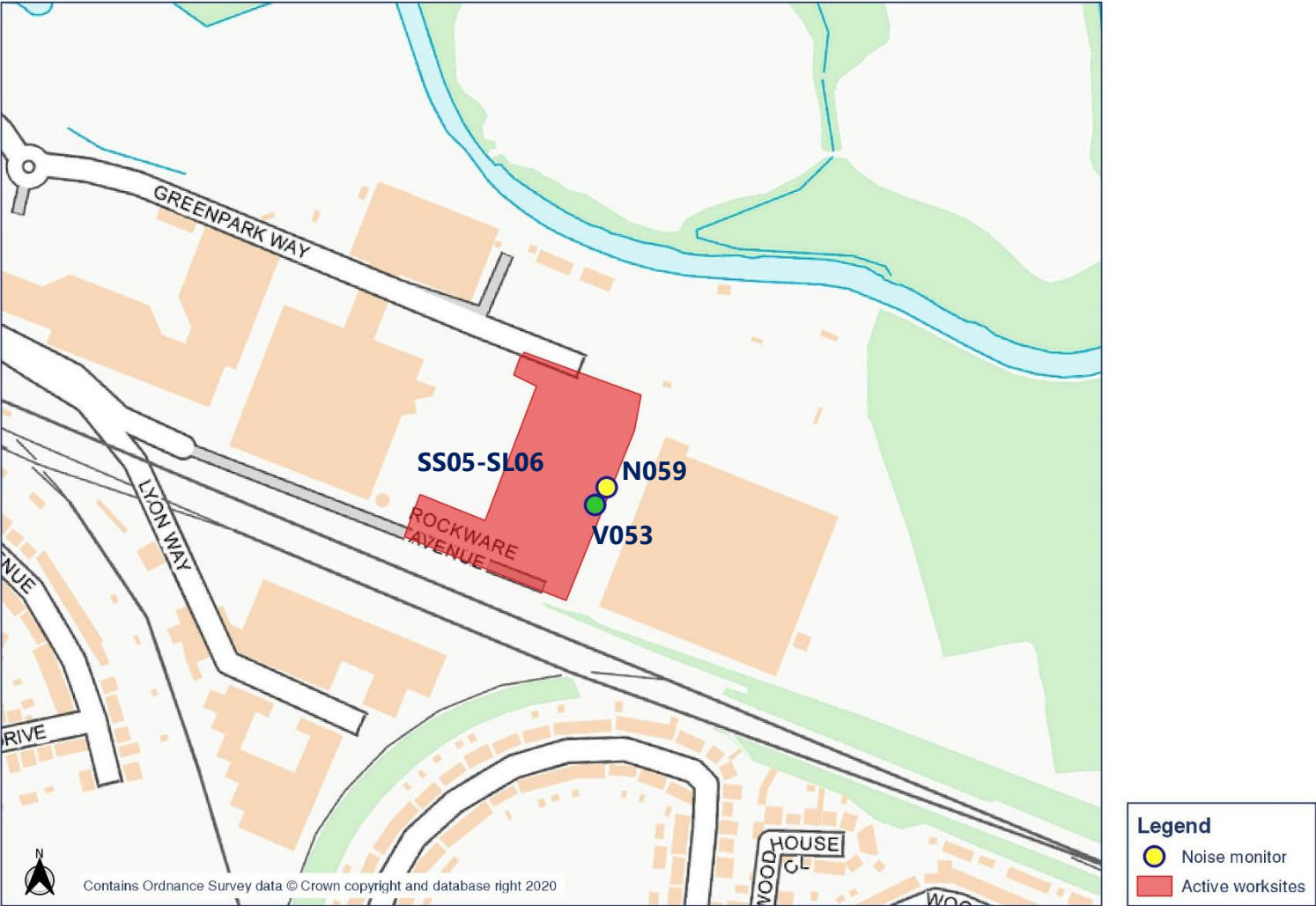


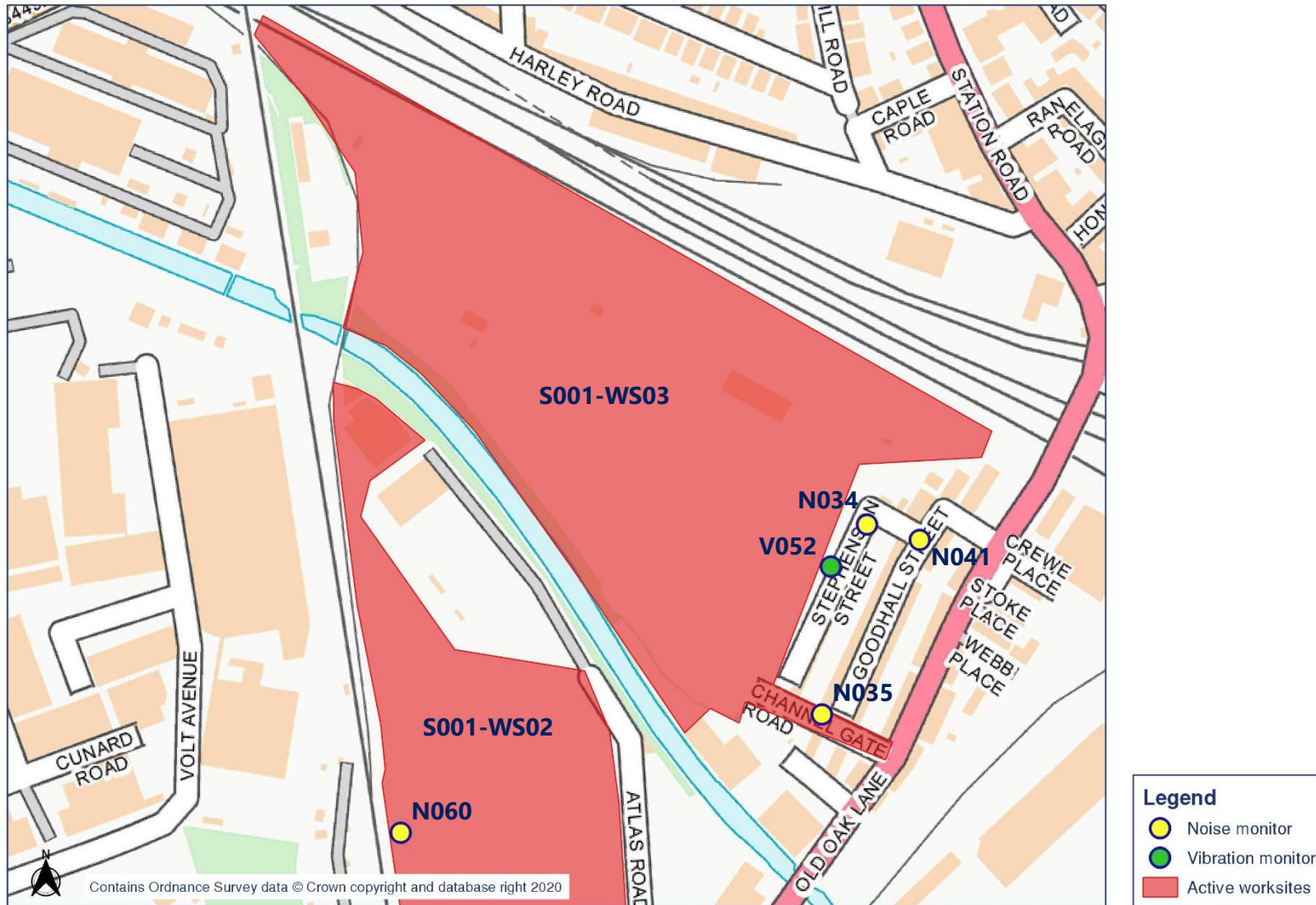
Appendix B Monitoring Locations

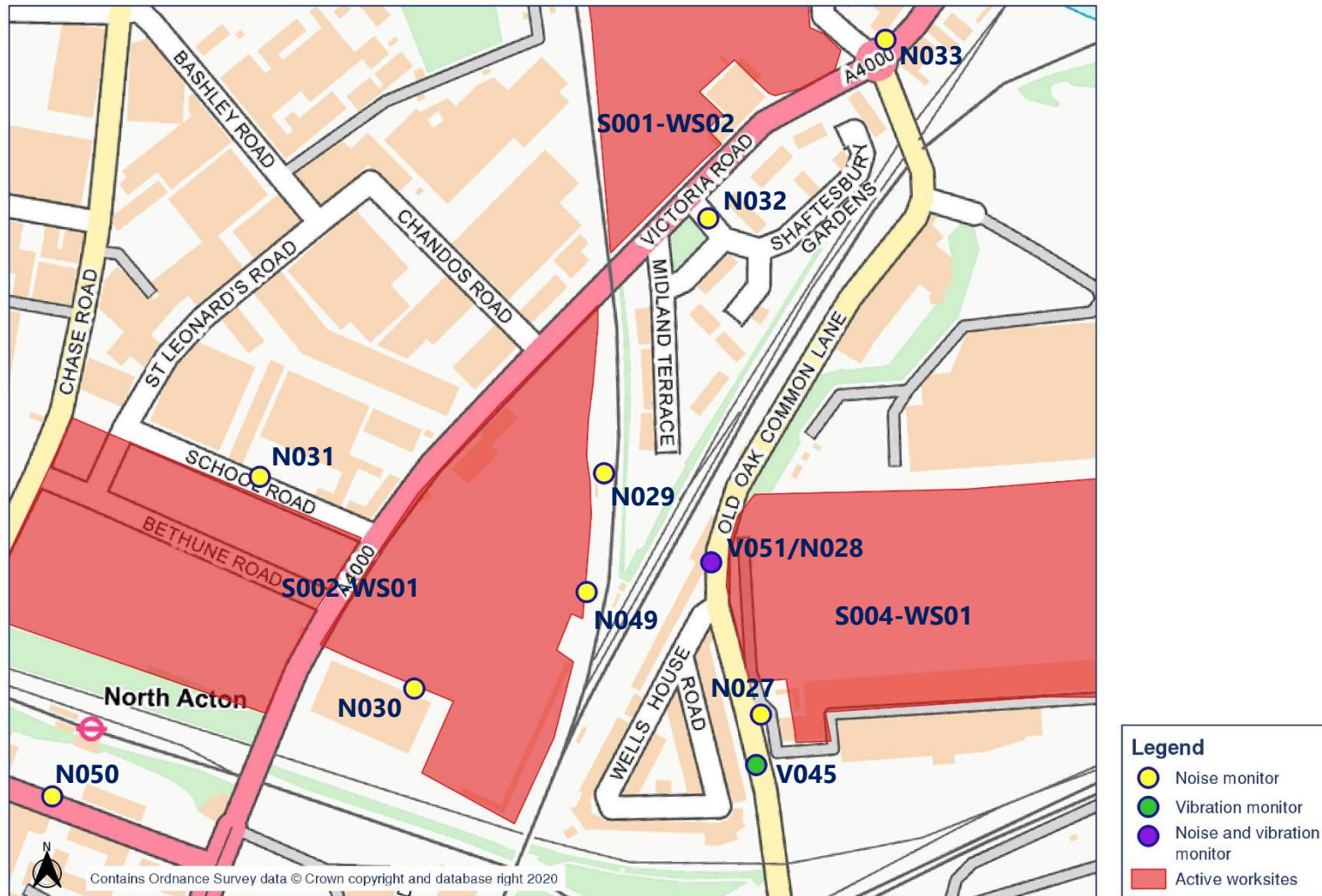
HS2 Noise and vibration monitoring plan - Overview









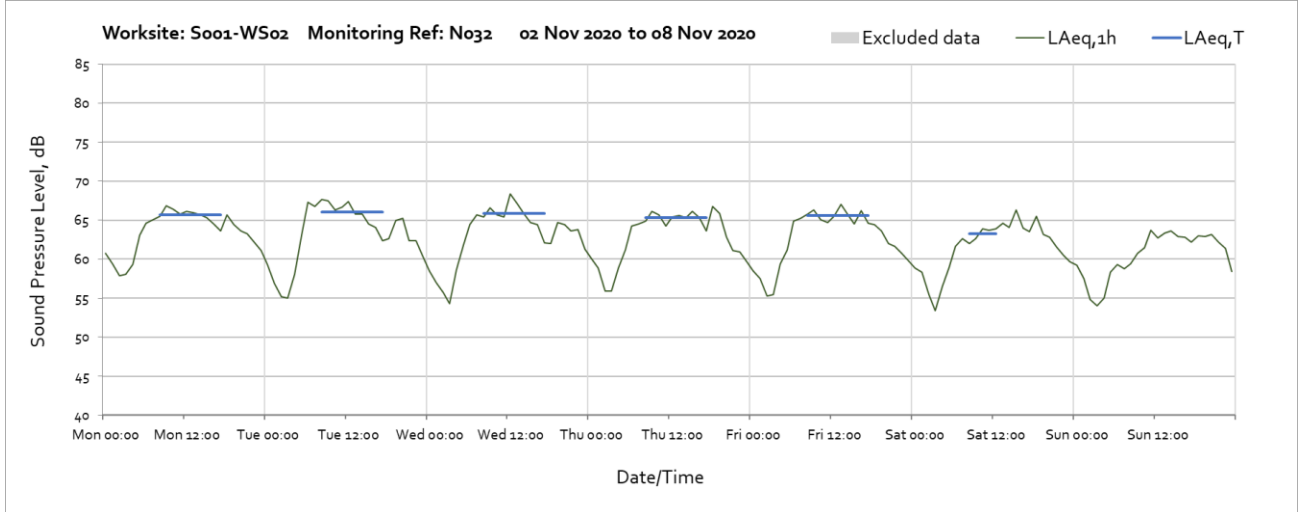
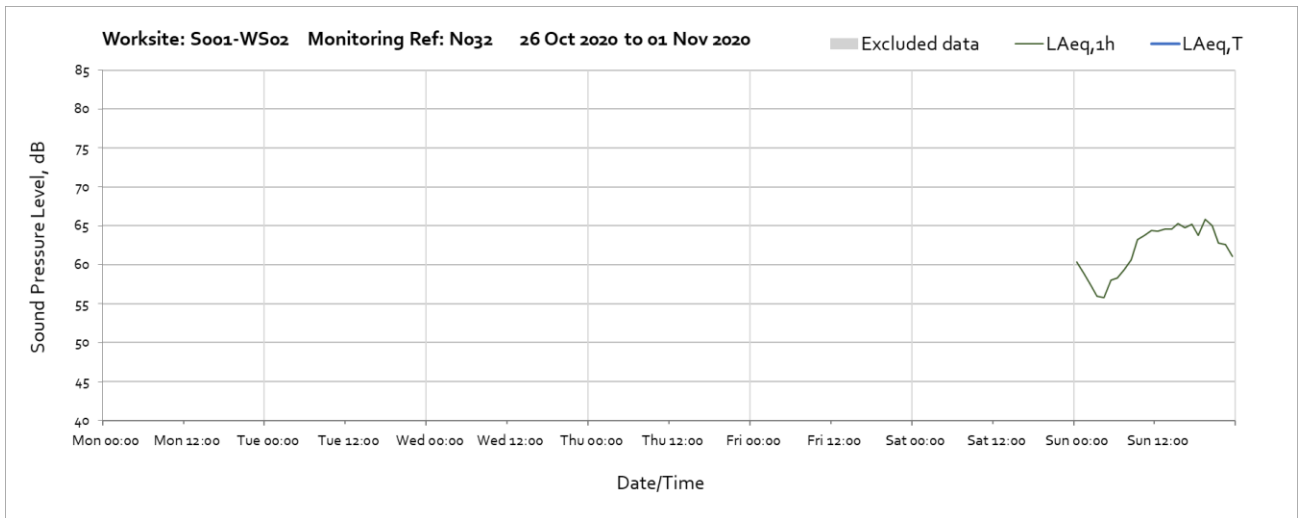


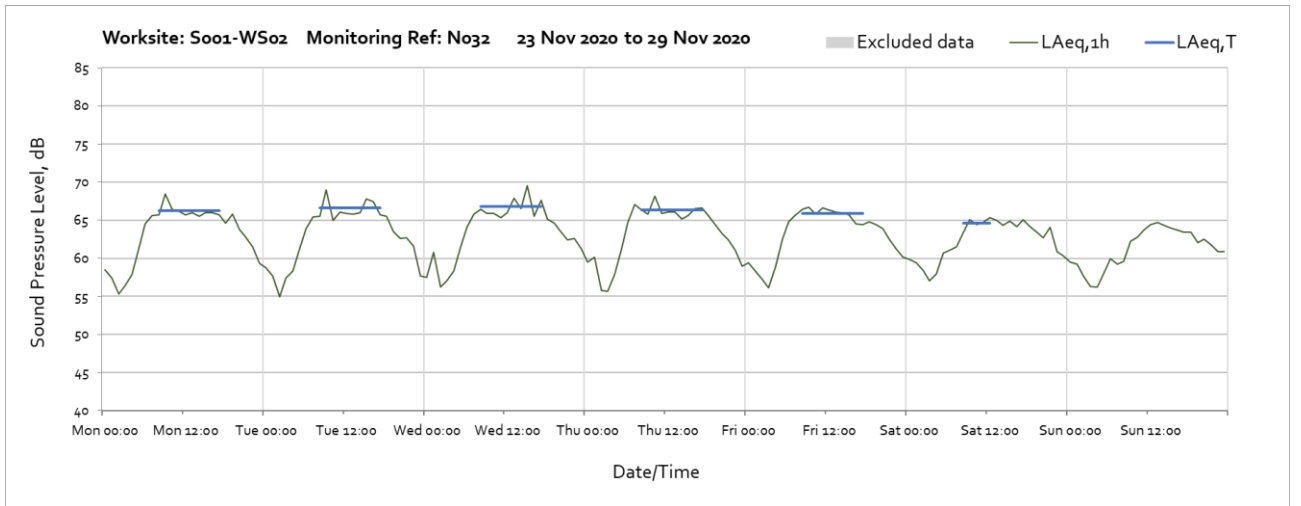
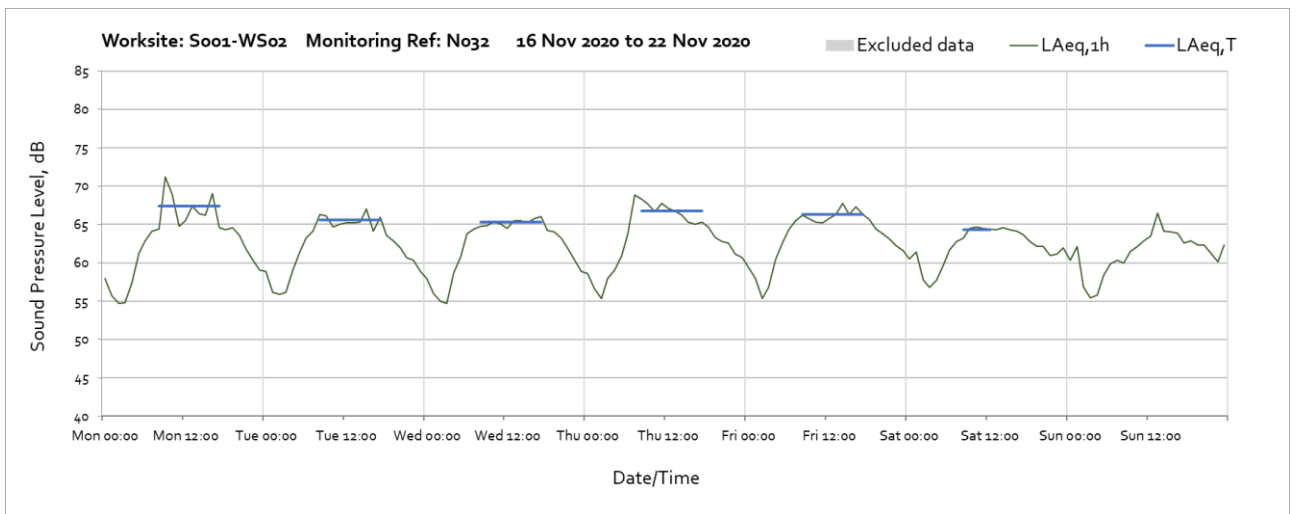
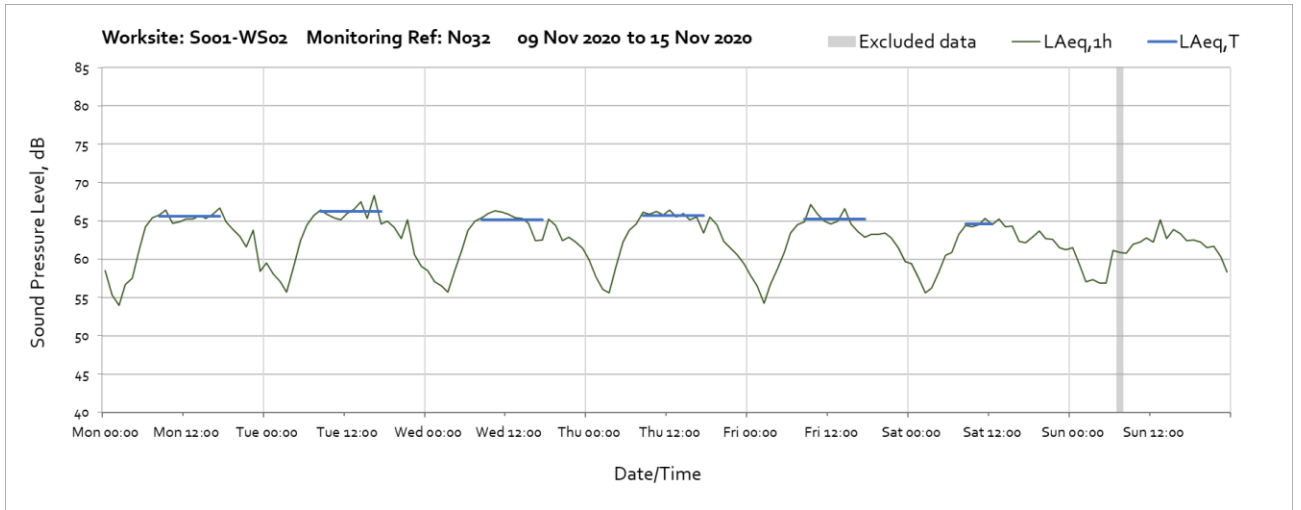
Appendix C Data

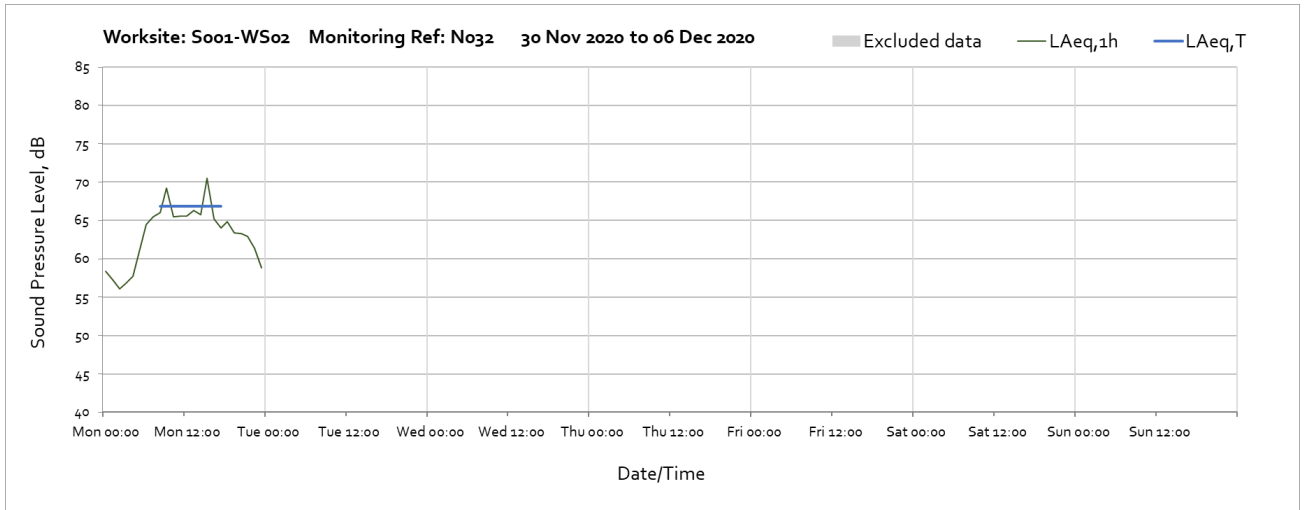
Noise

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 3 of the main report.

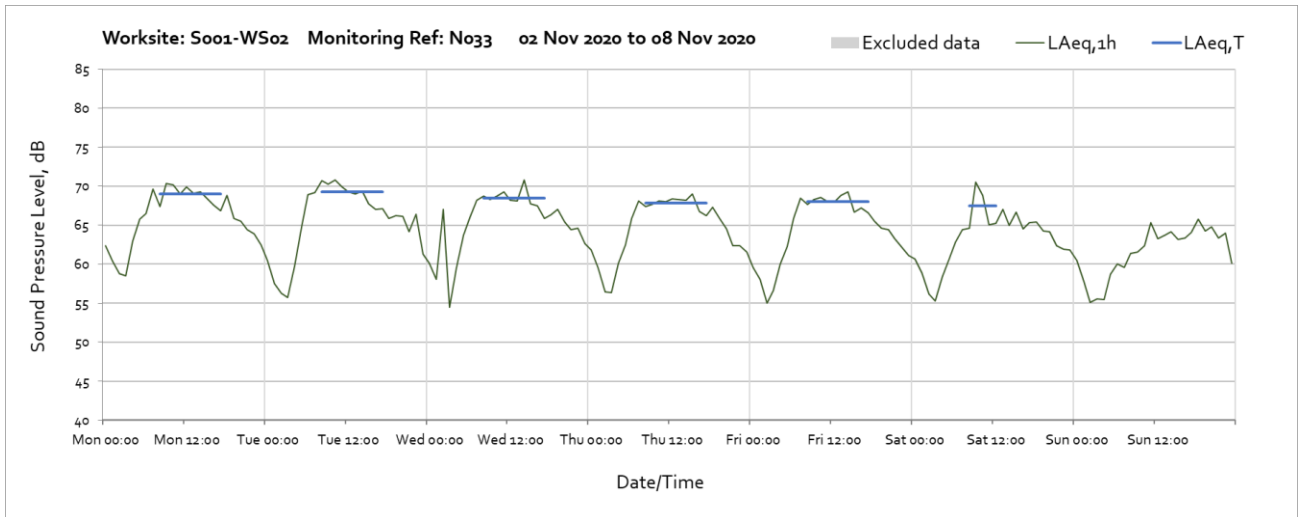
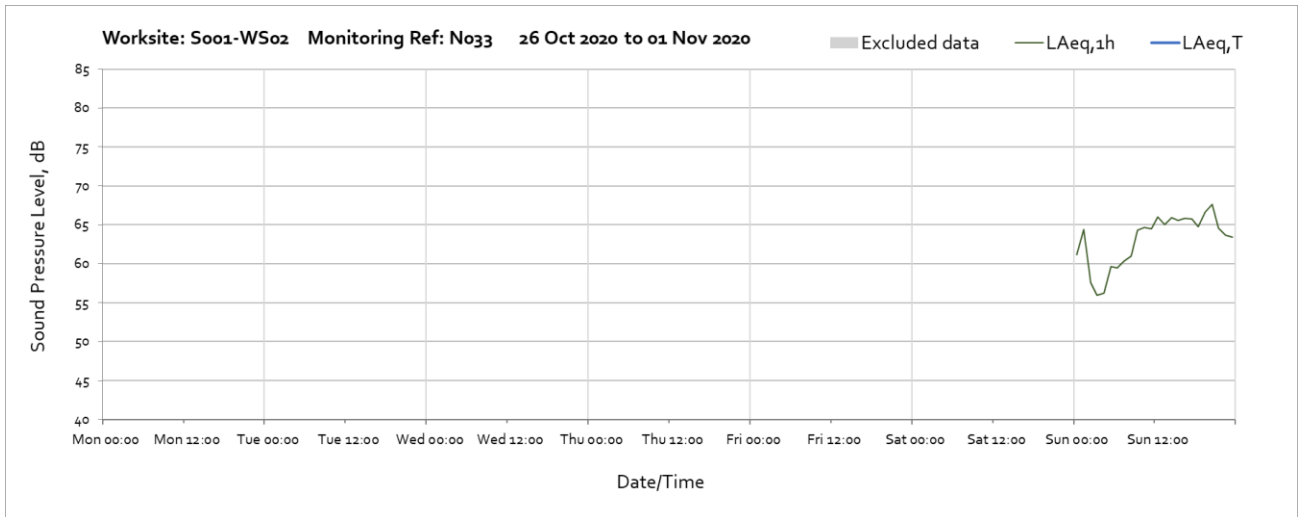
Worksite: S001-WS02 – Monitoring Ref: N032

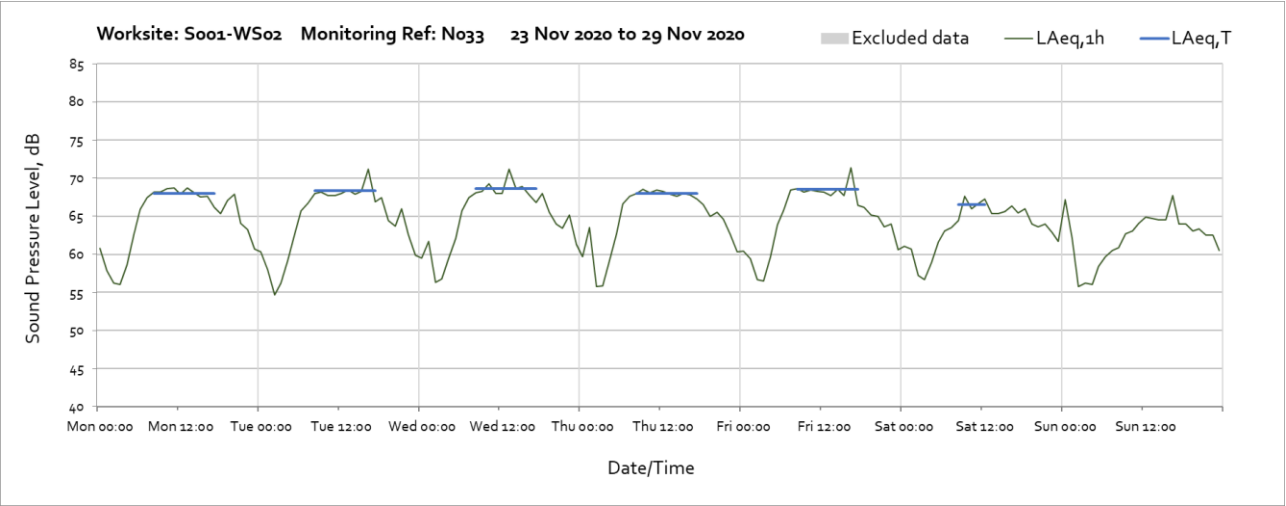
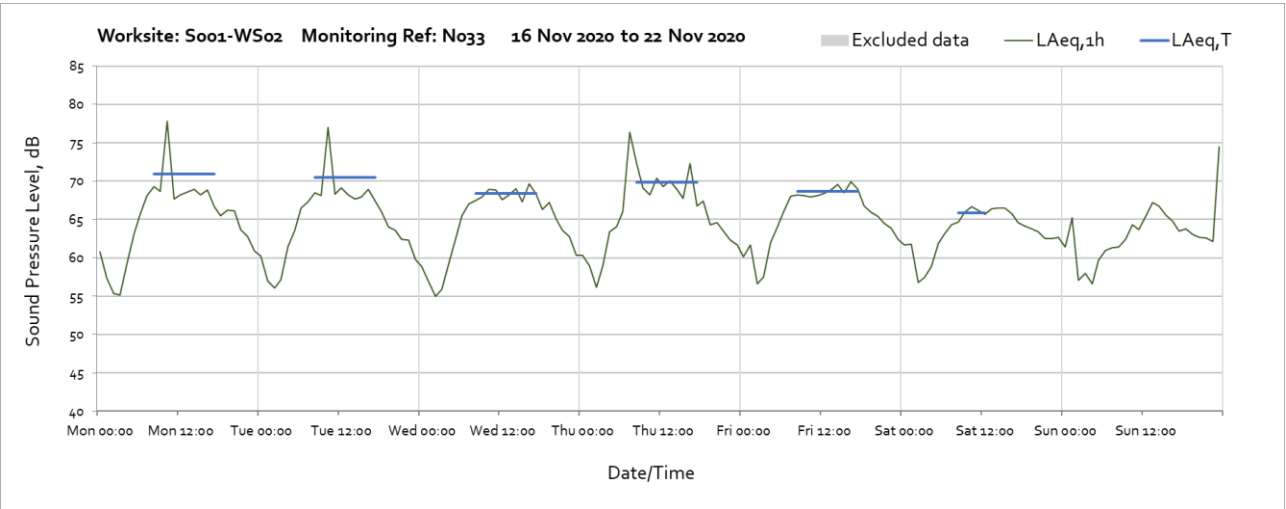
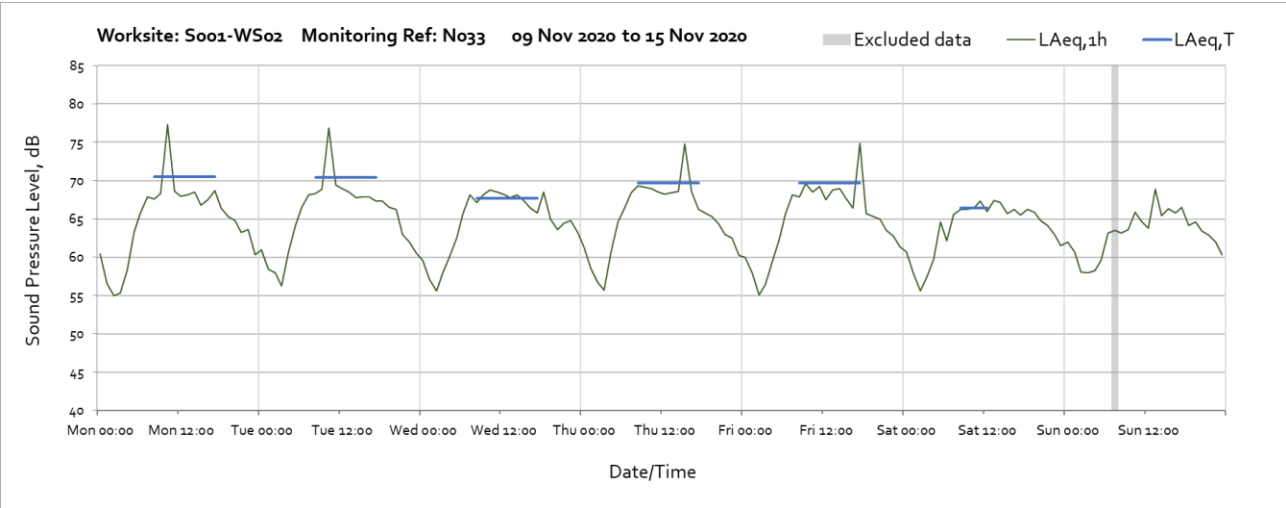


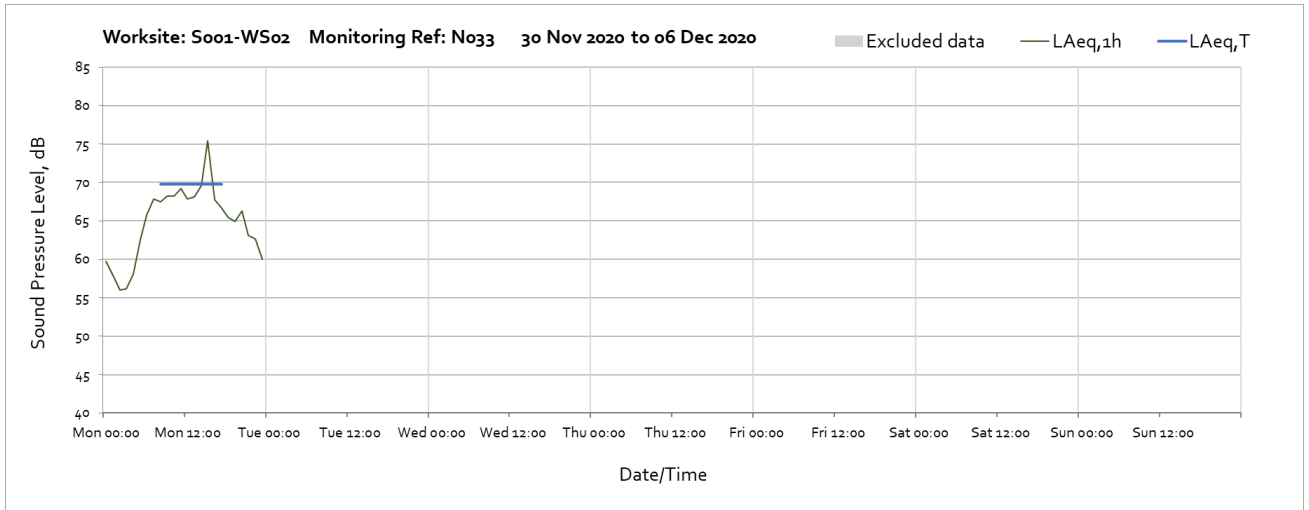




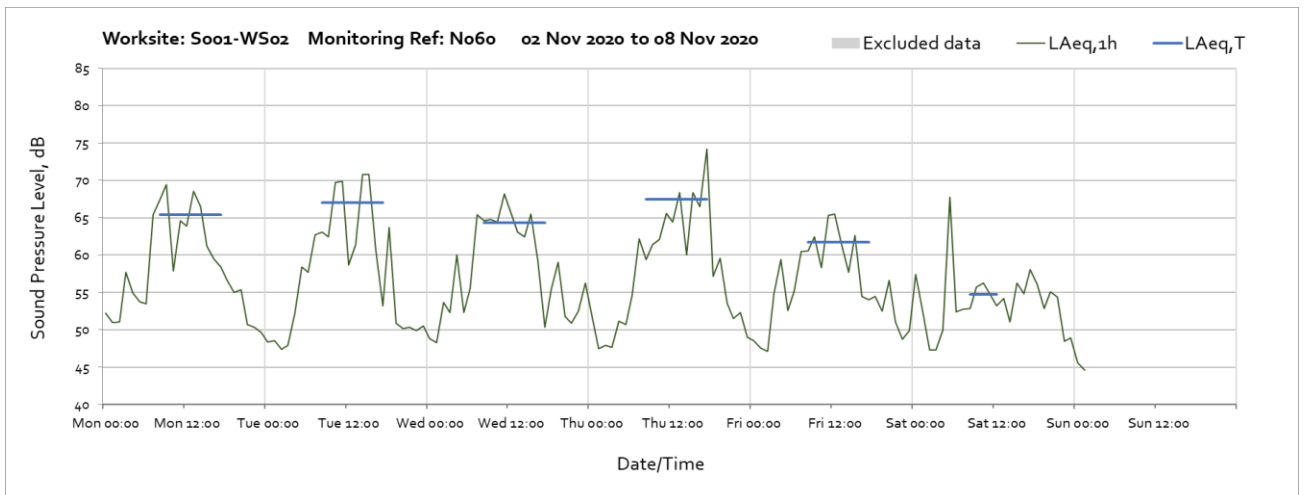
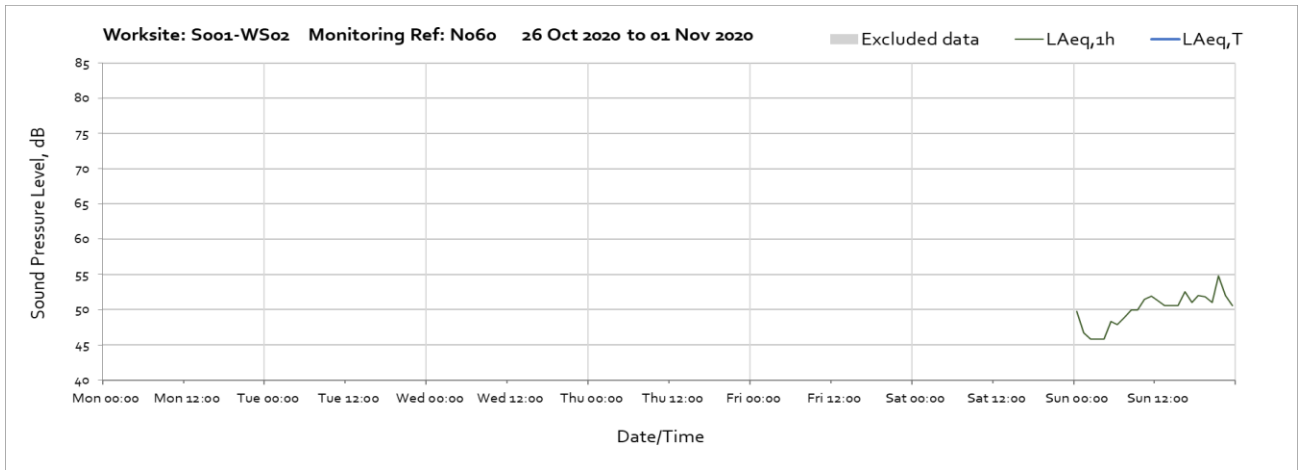
Worksite: S001-WS02 – Monitoring Ref: N033



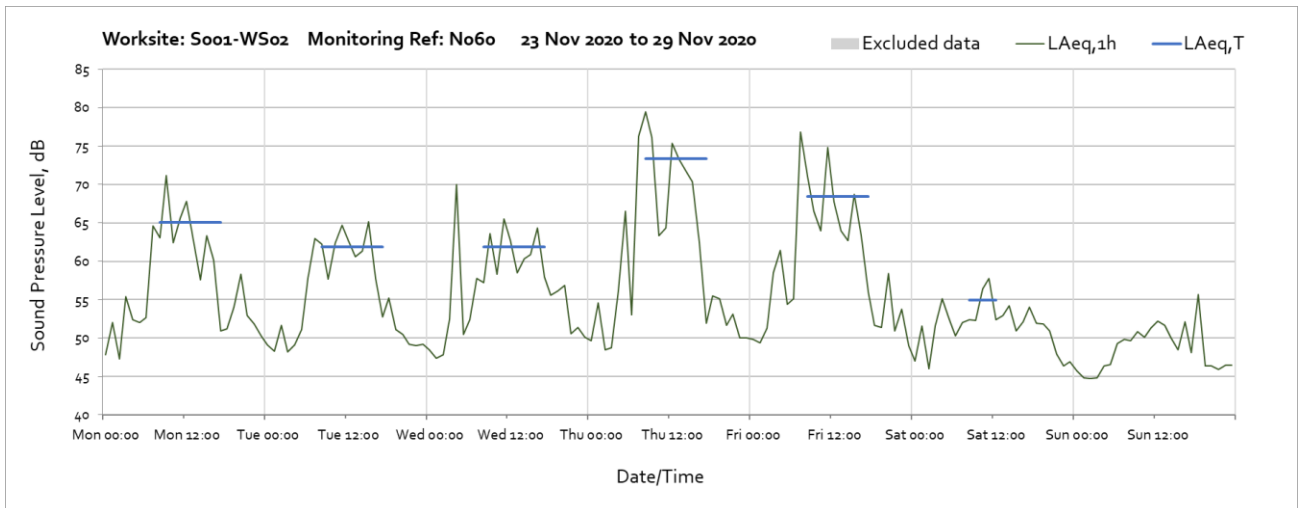
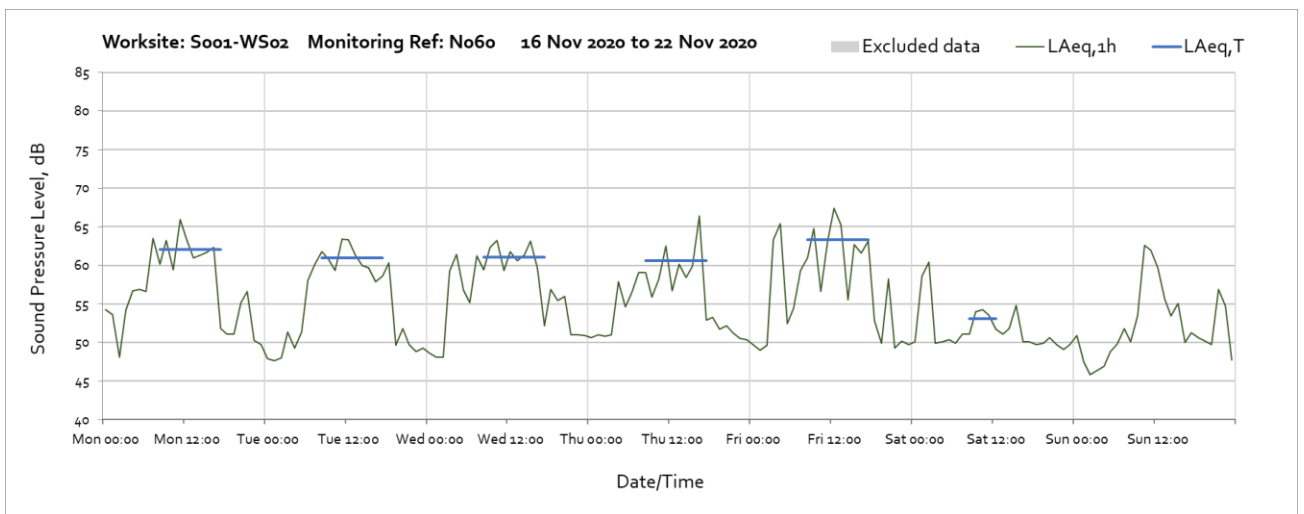
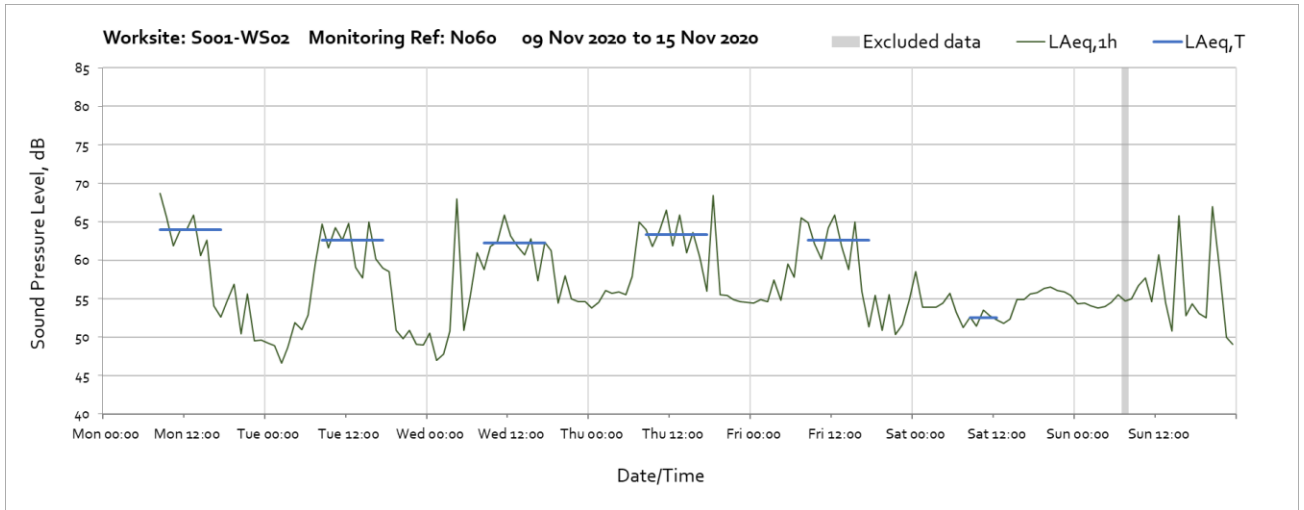


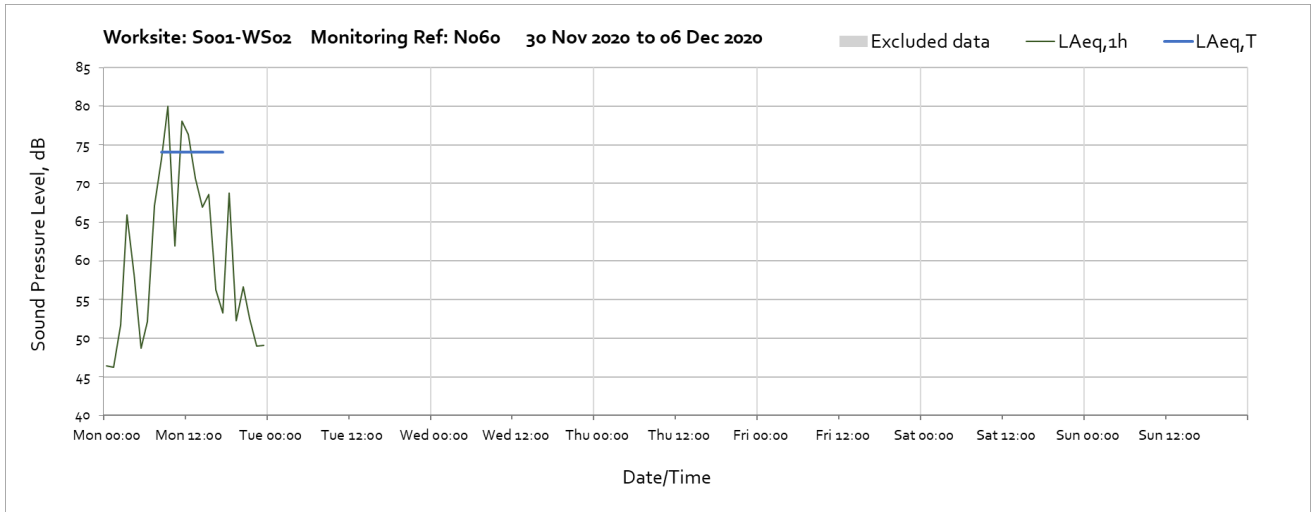


Worksite: S001-WS02 – Monitoring Ref: N060

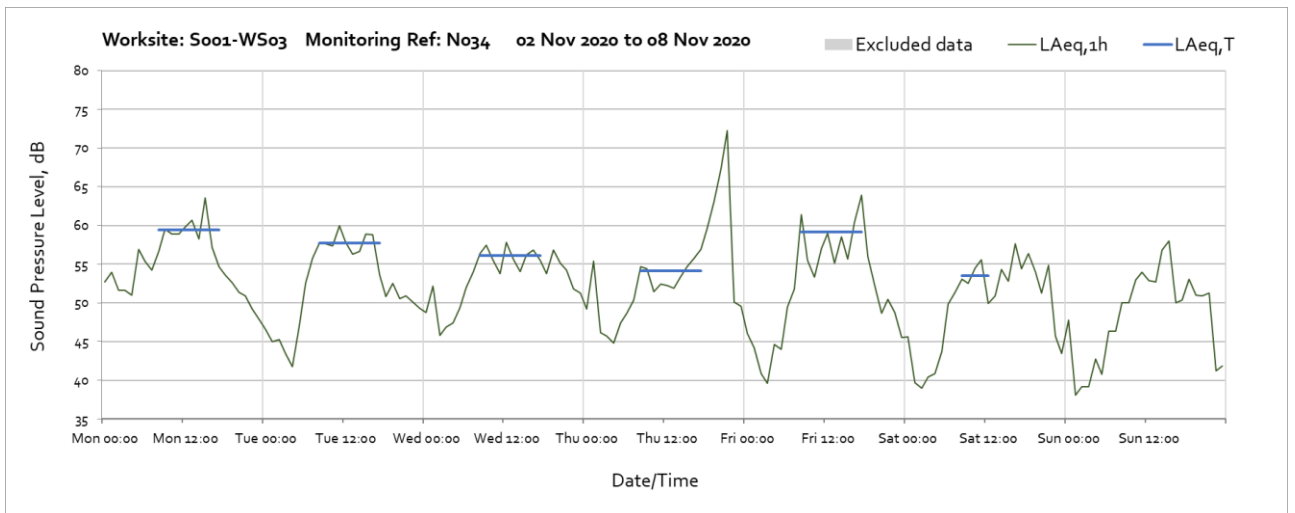
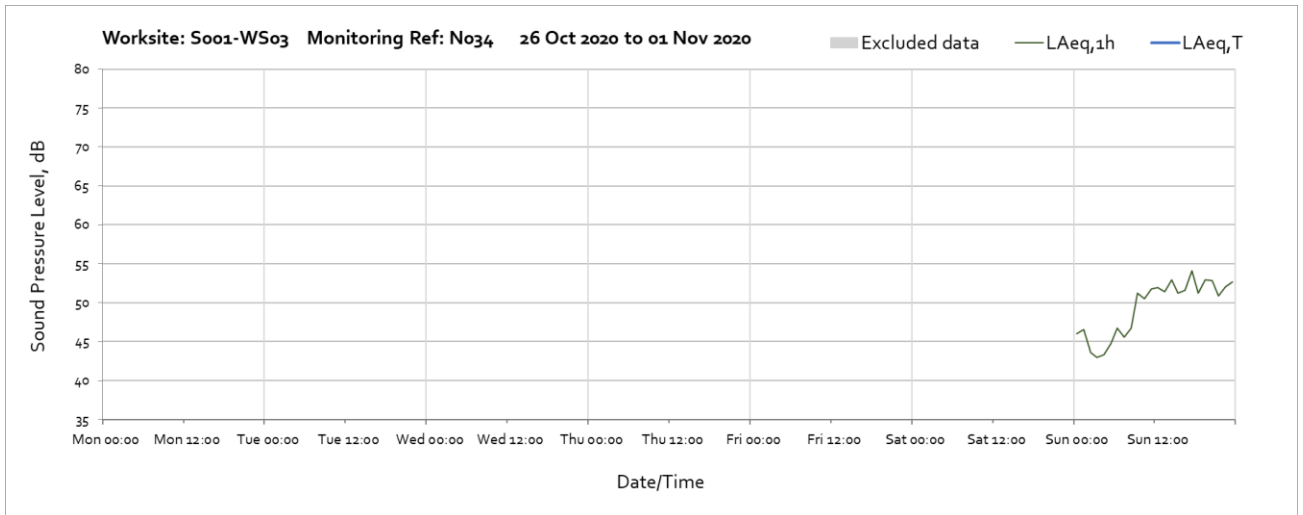


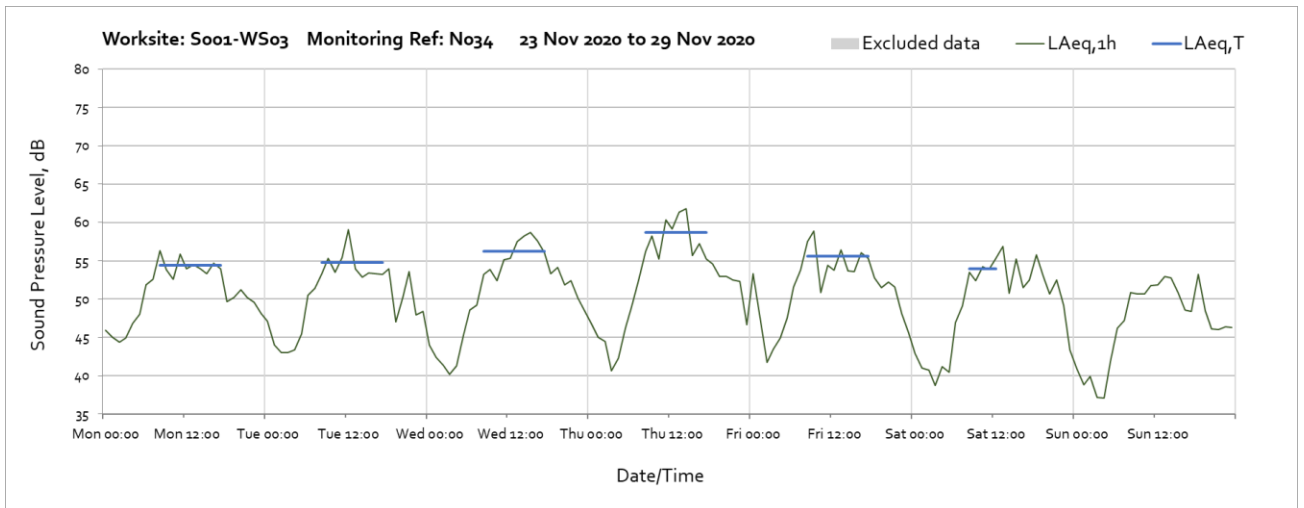
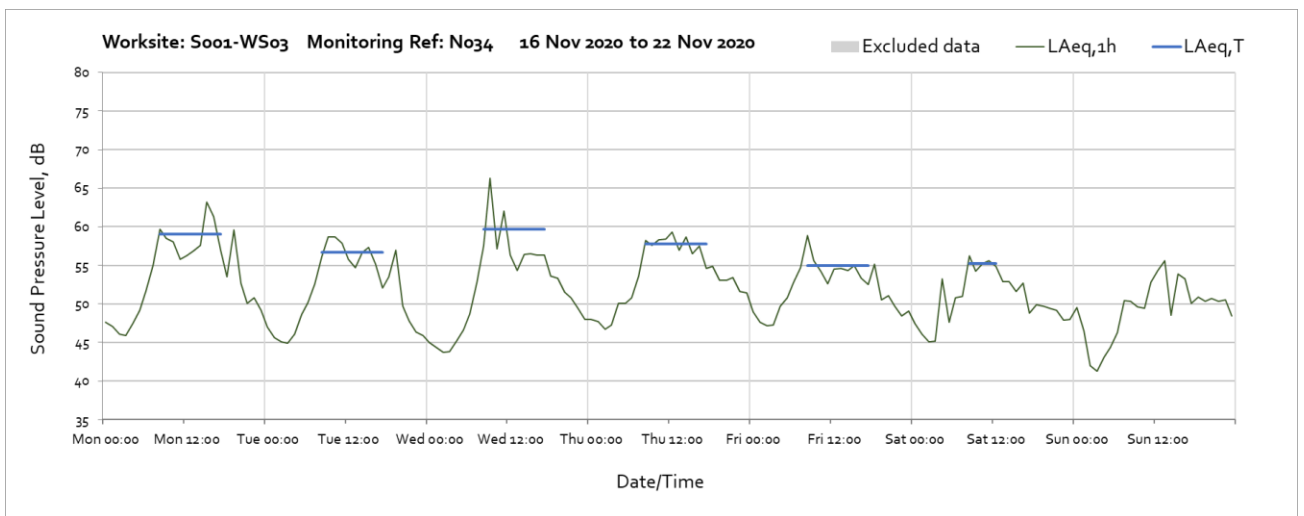
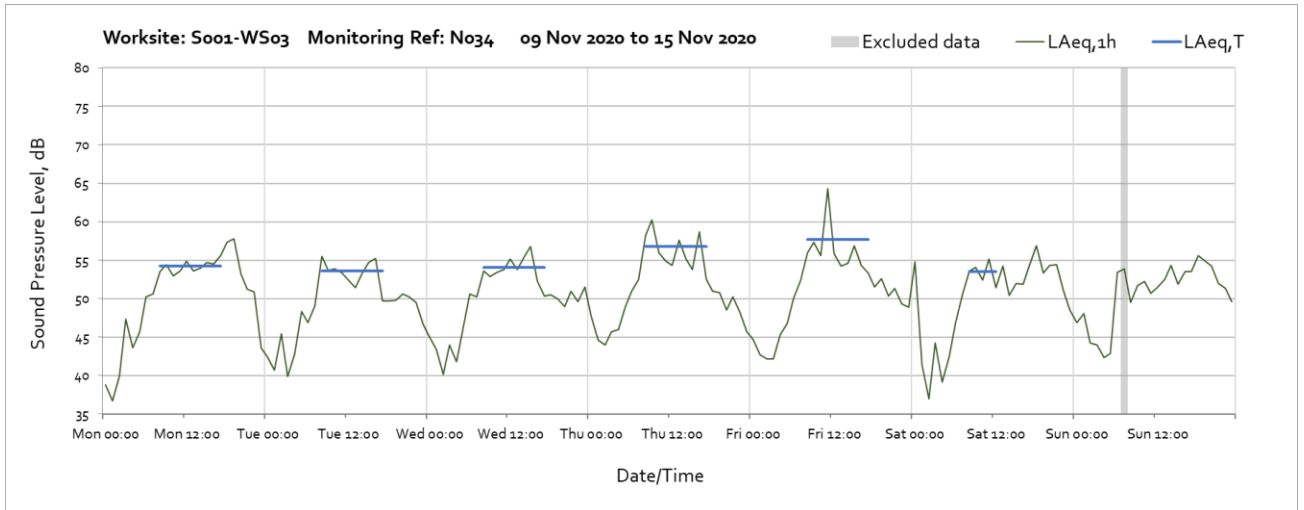
Note: Missing data between 02:00 on Sunday 8th December and 07:00 on Monday 9th December was due depleted noise monitor internal battery.

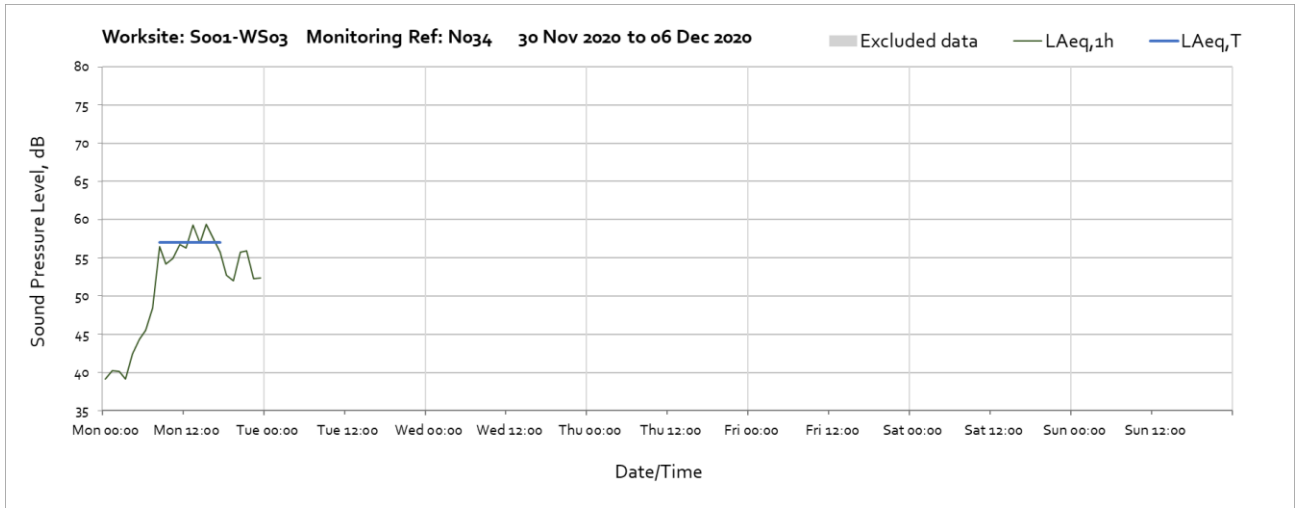




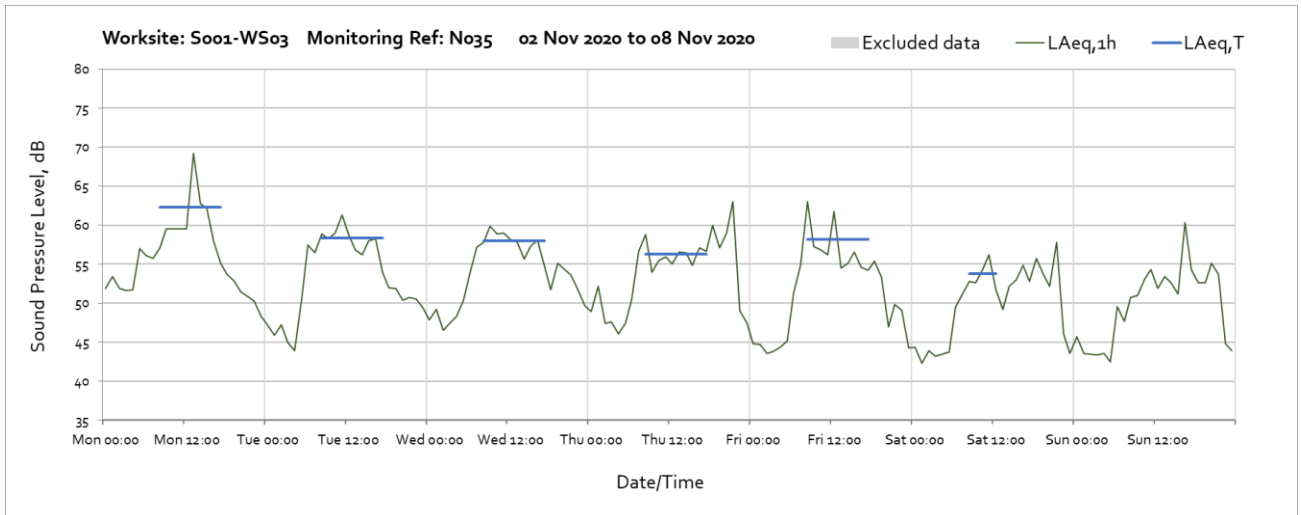
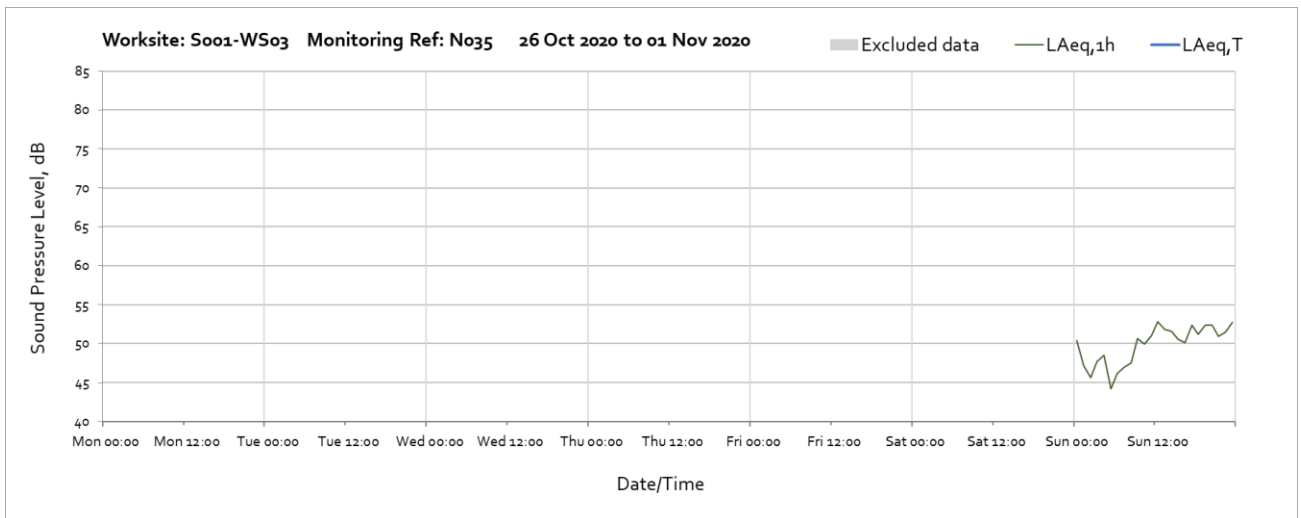
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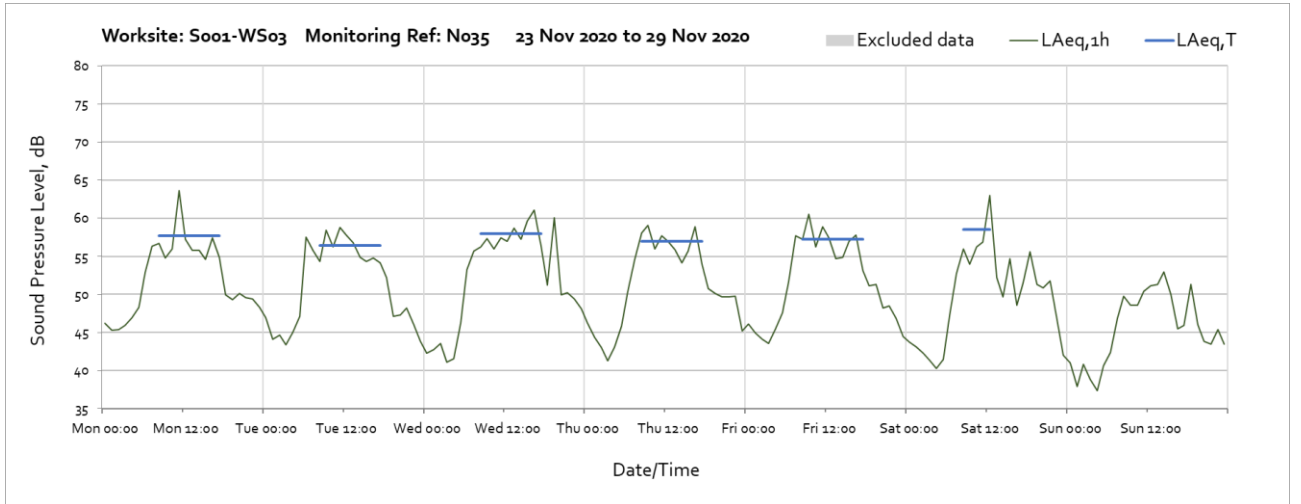
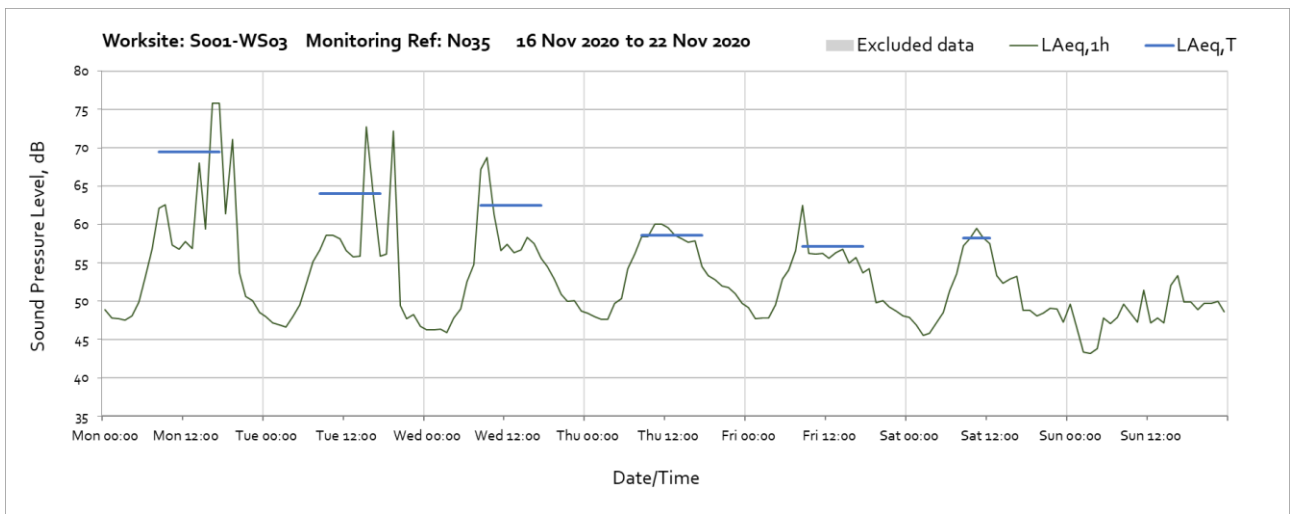
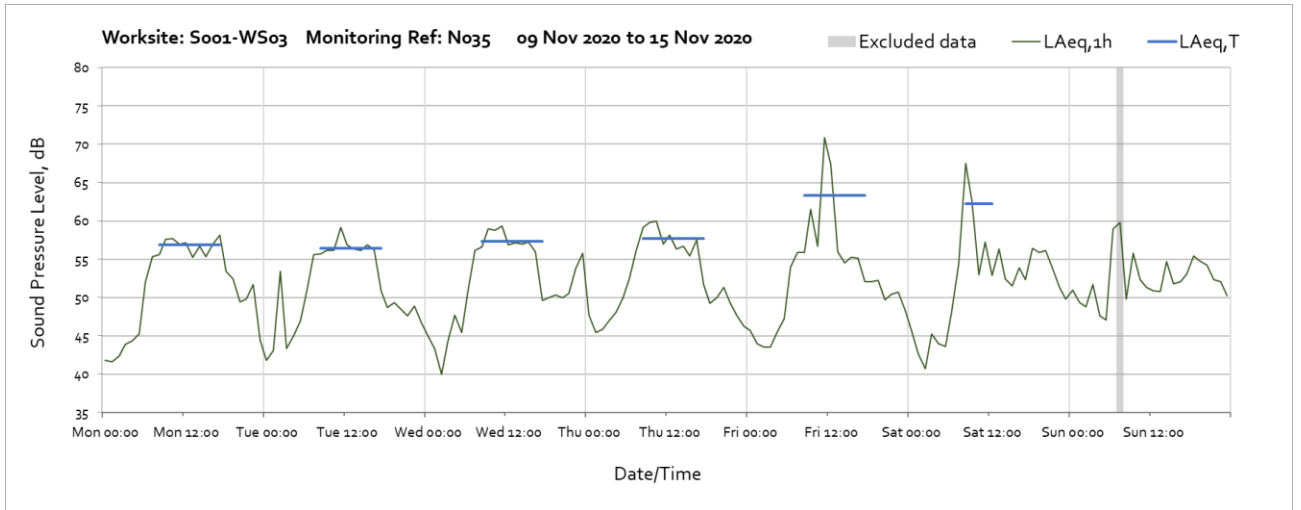


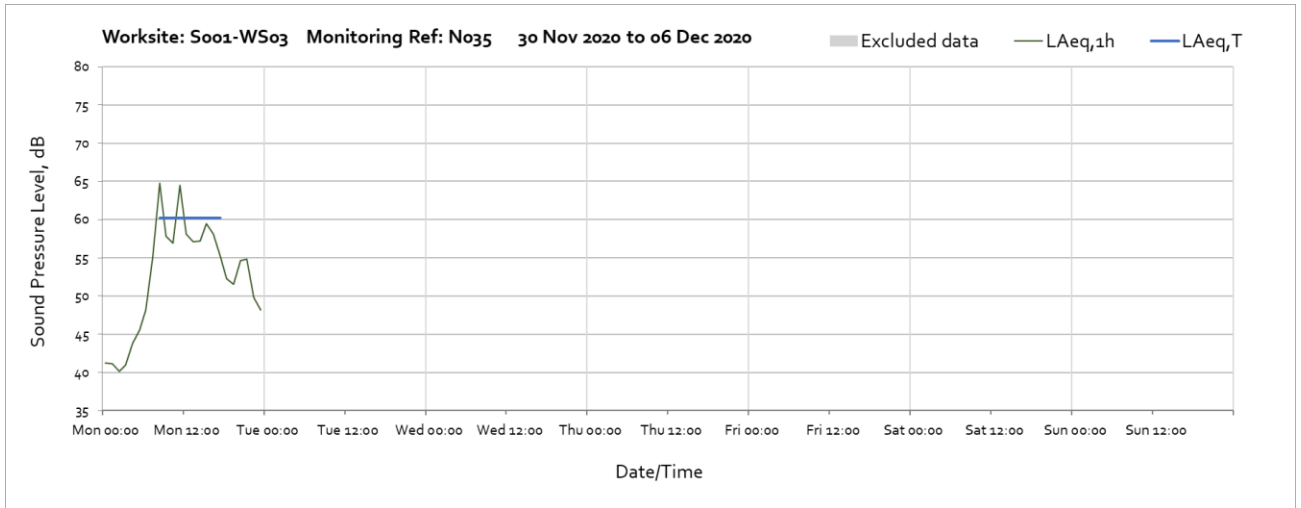




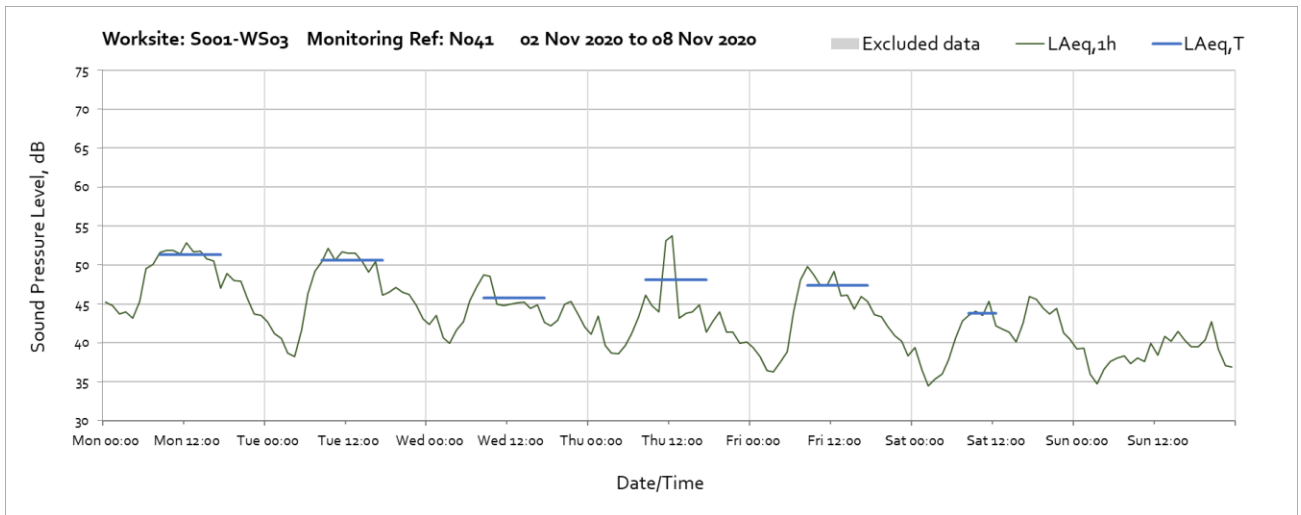
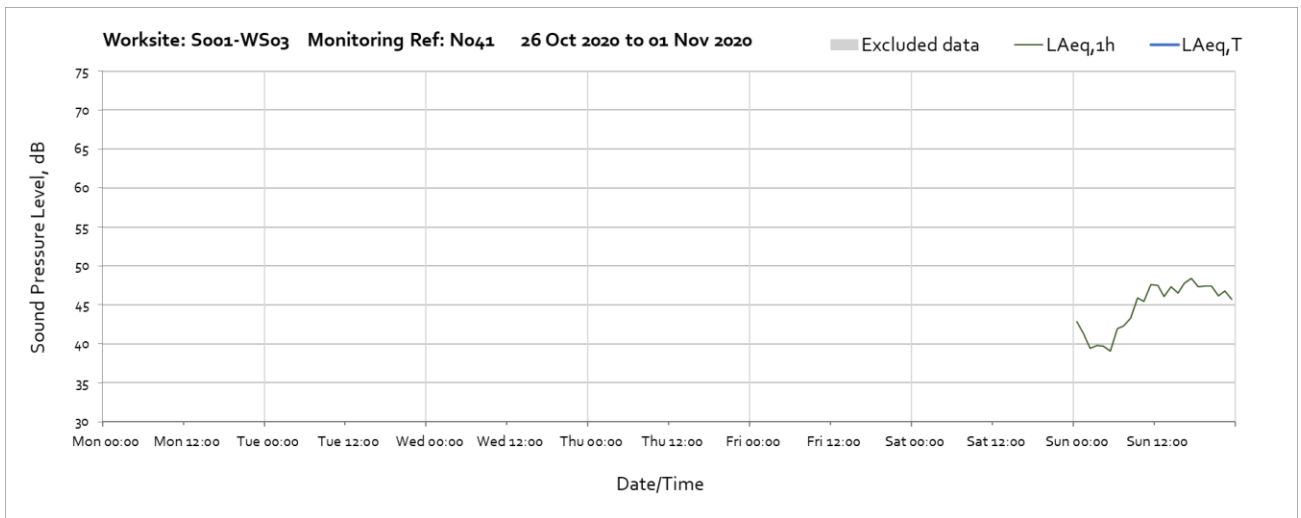
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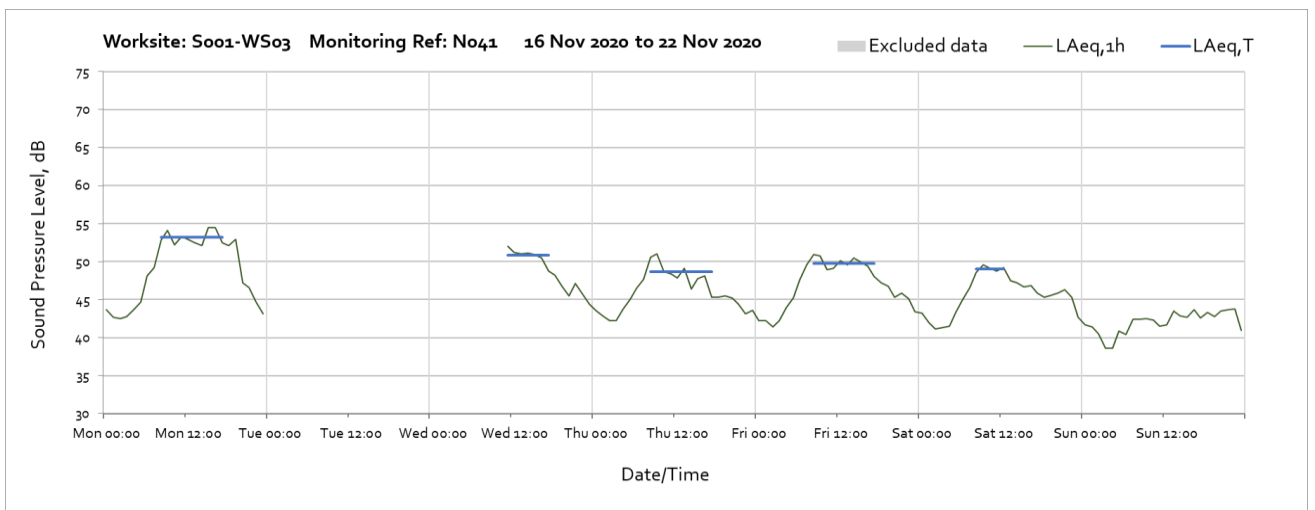
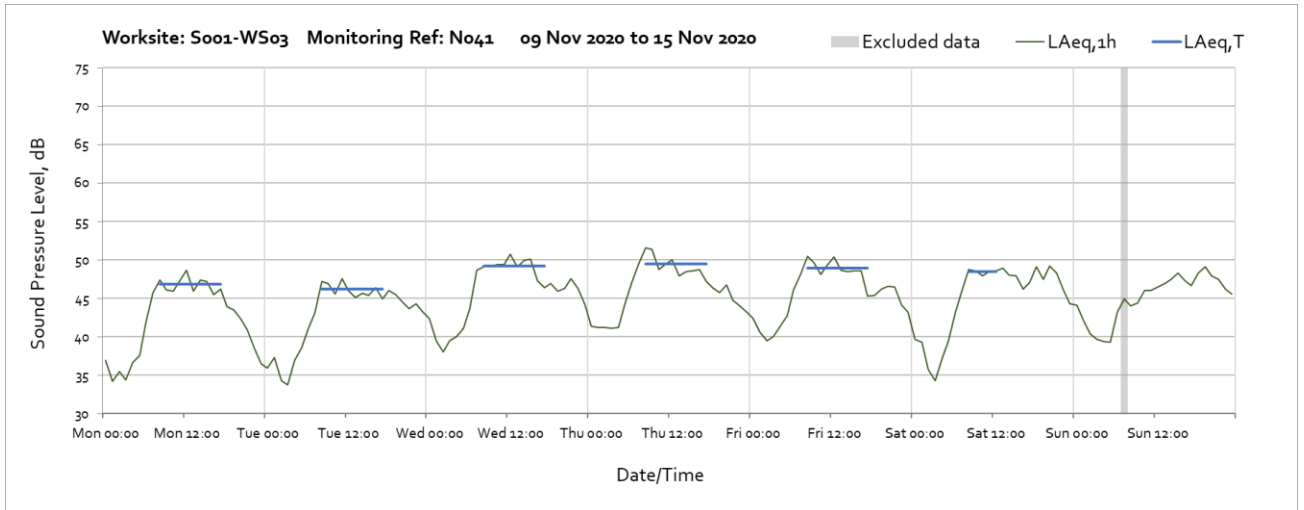




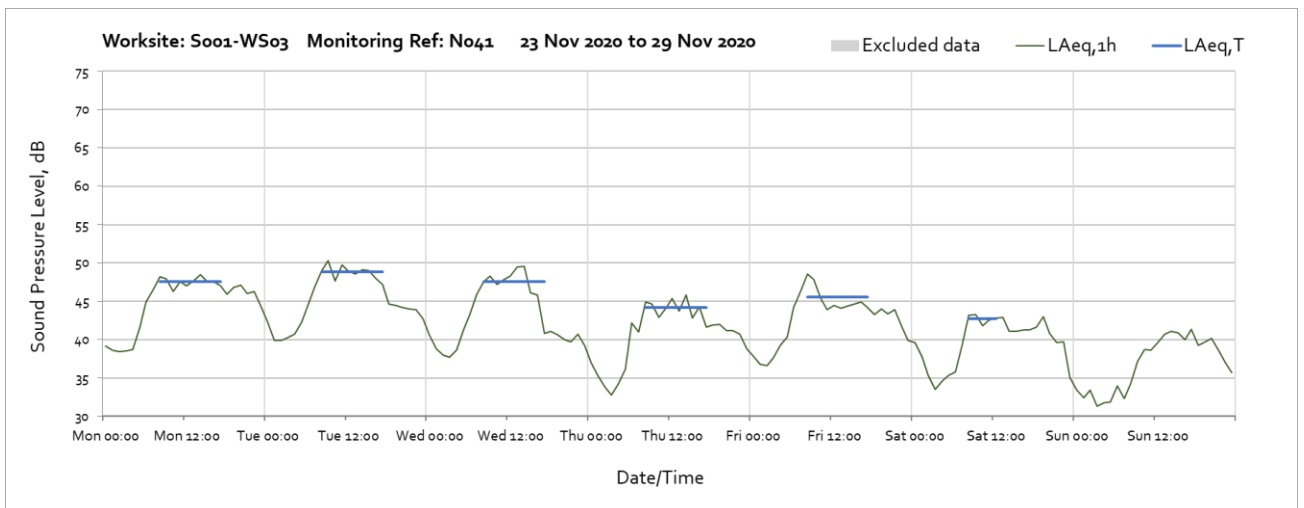


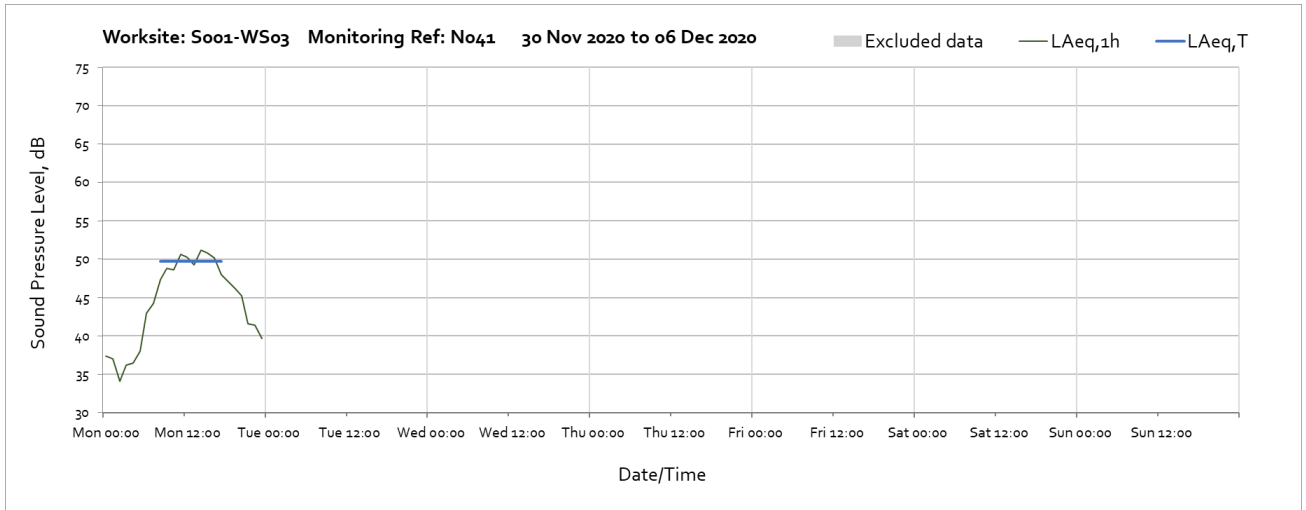
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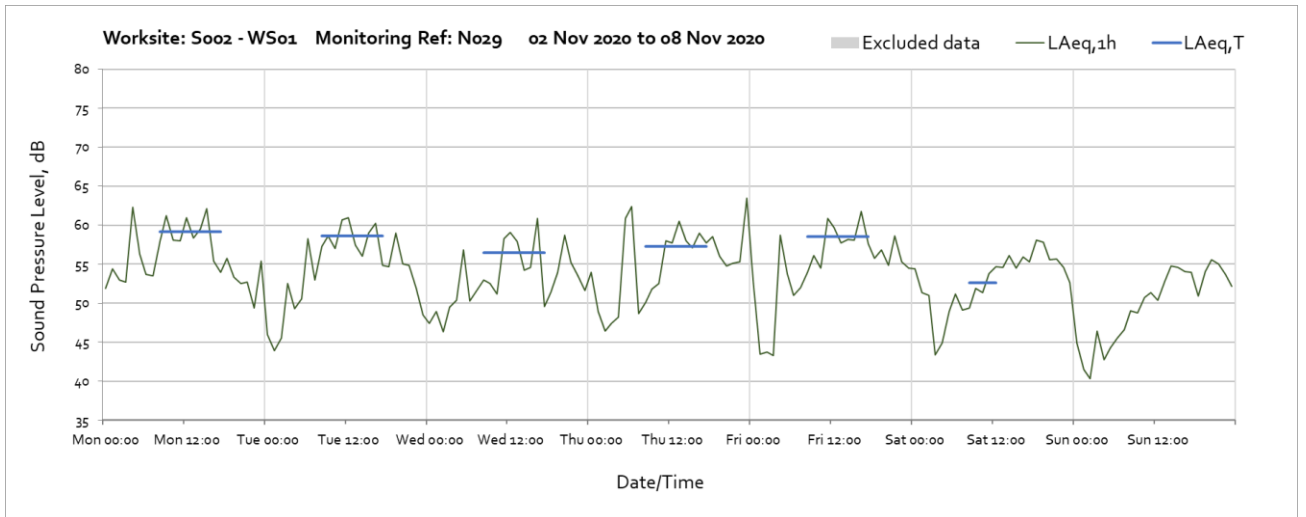
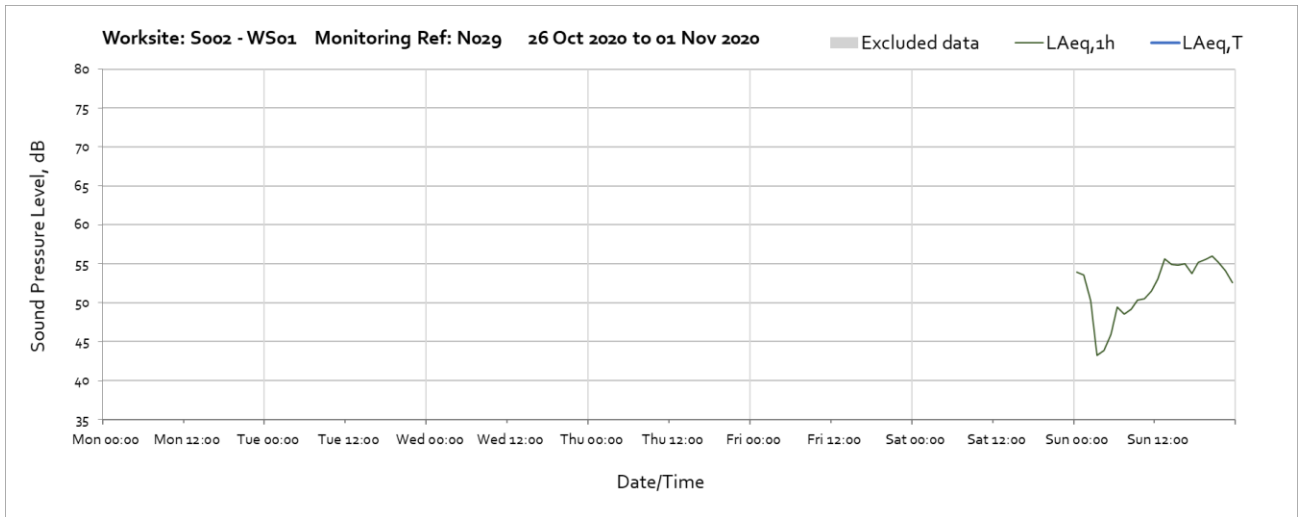


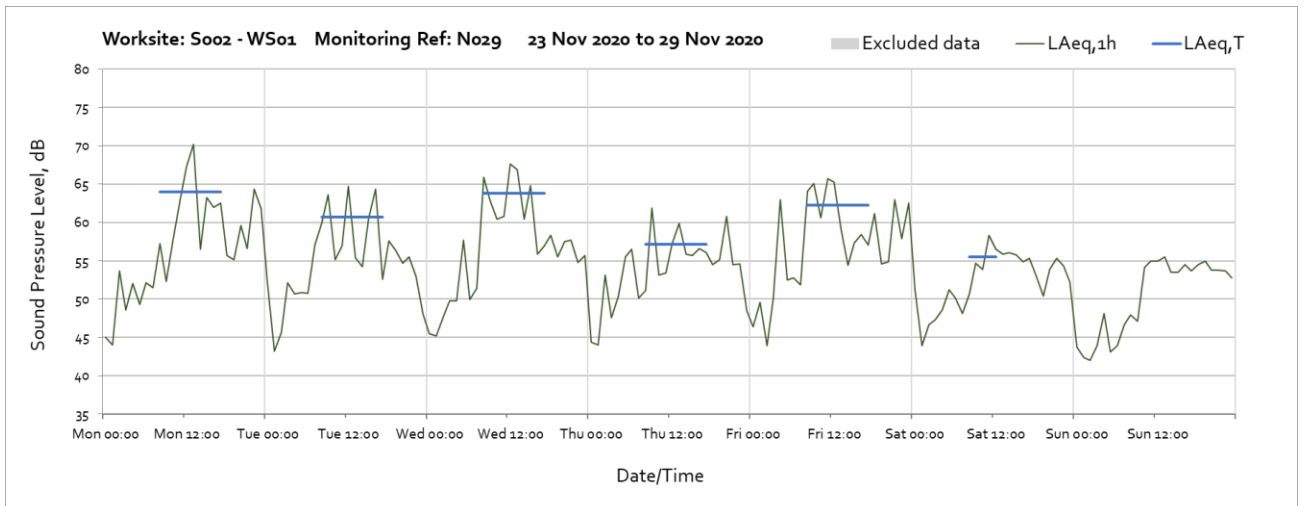
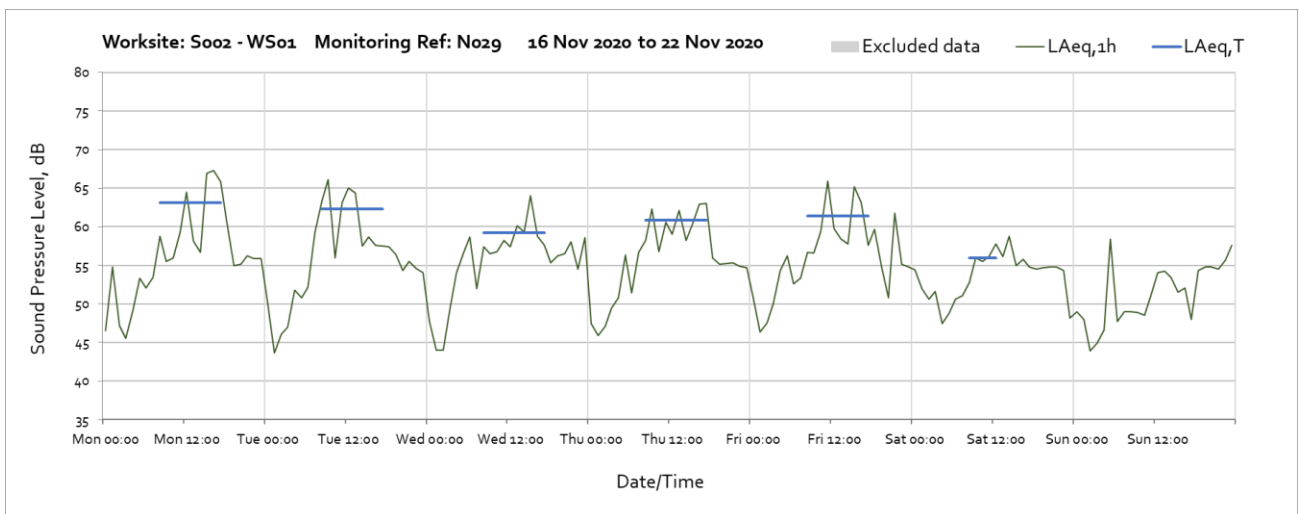
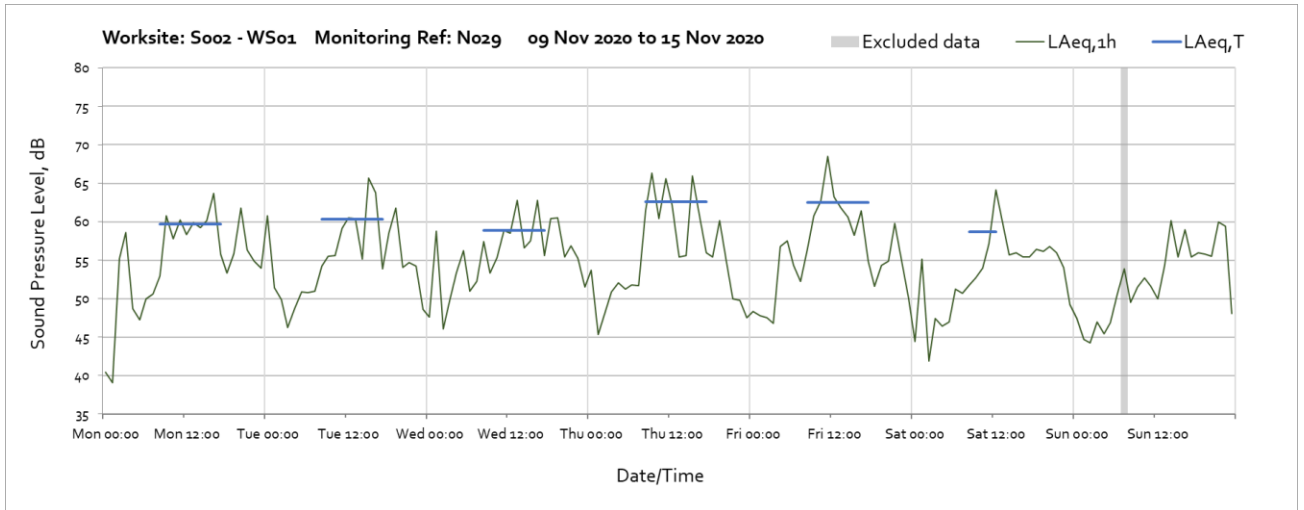
Note: Missing data from 00:00 on Tuesday 17th December until 11:00 on Wednesday 18th December was due to power disconnection during filming of "The Crown" in the area.

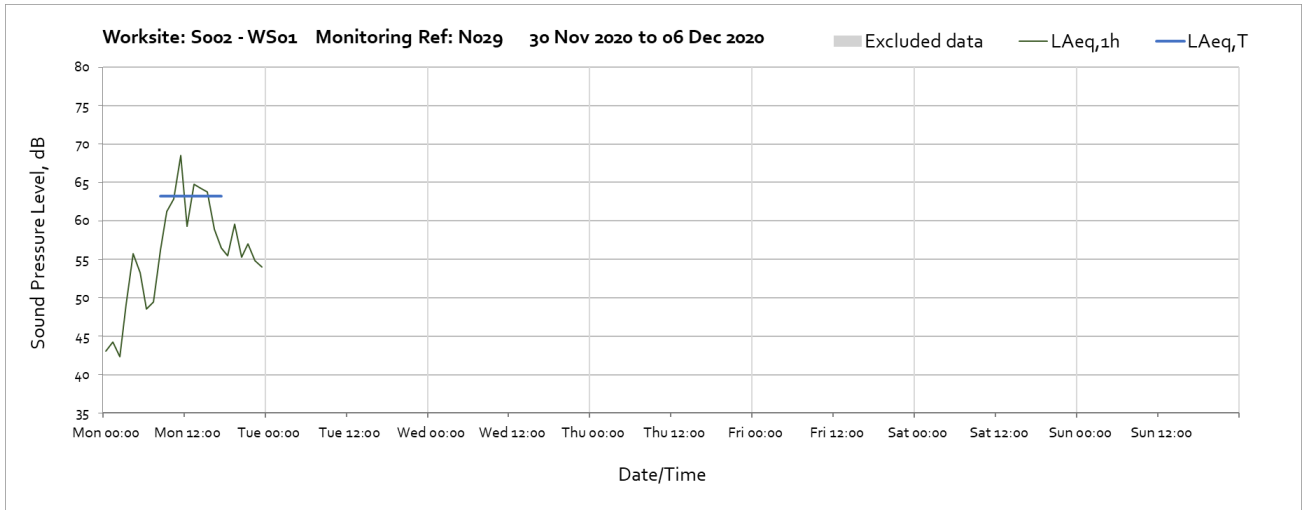




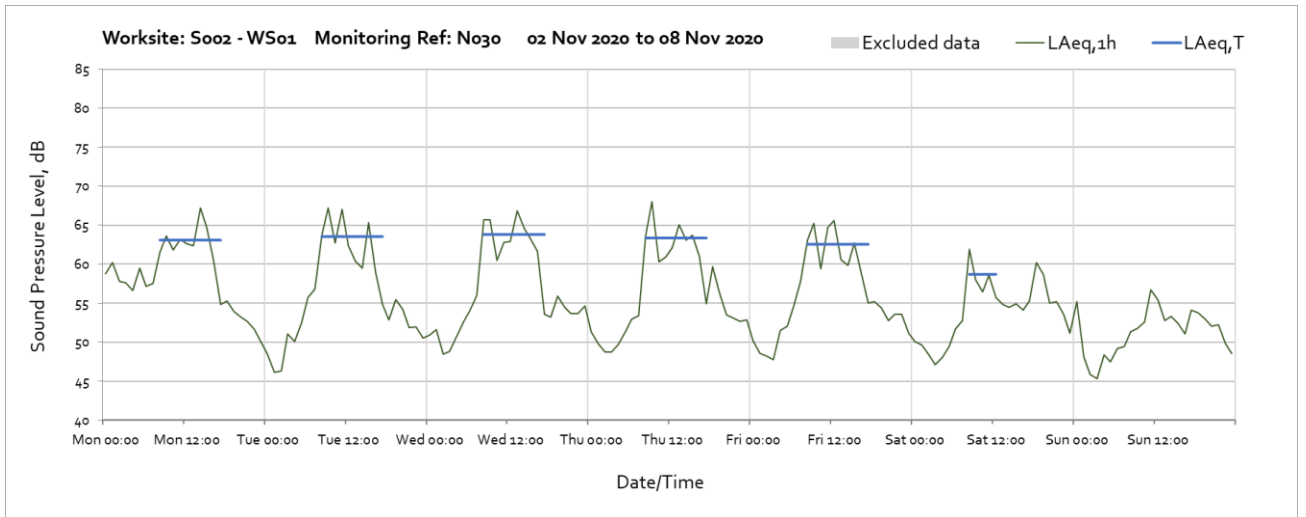
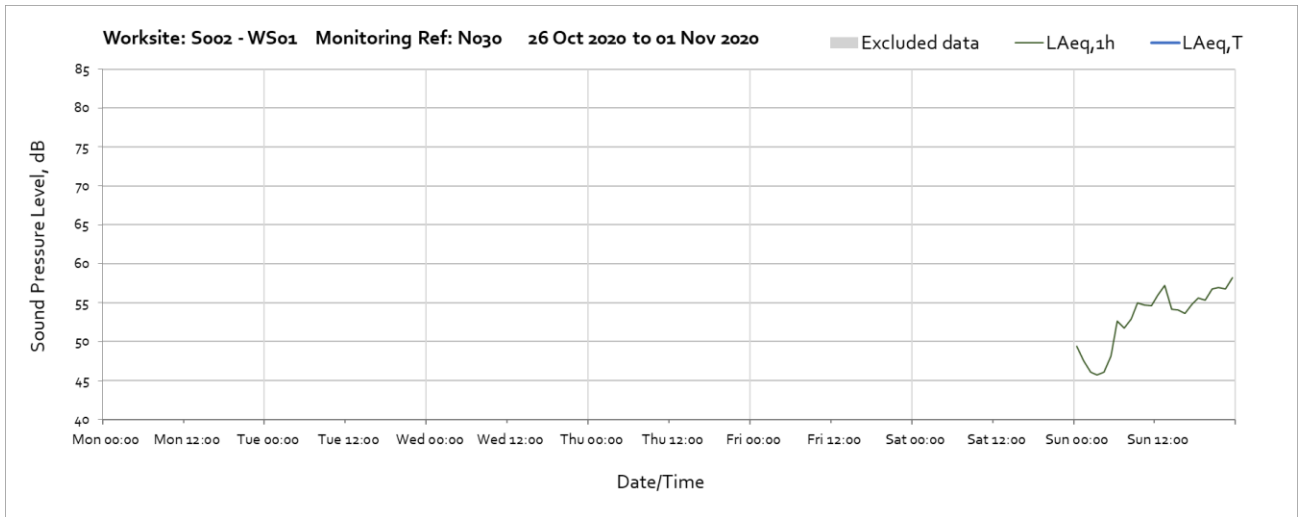
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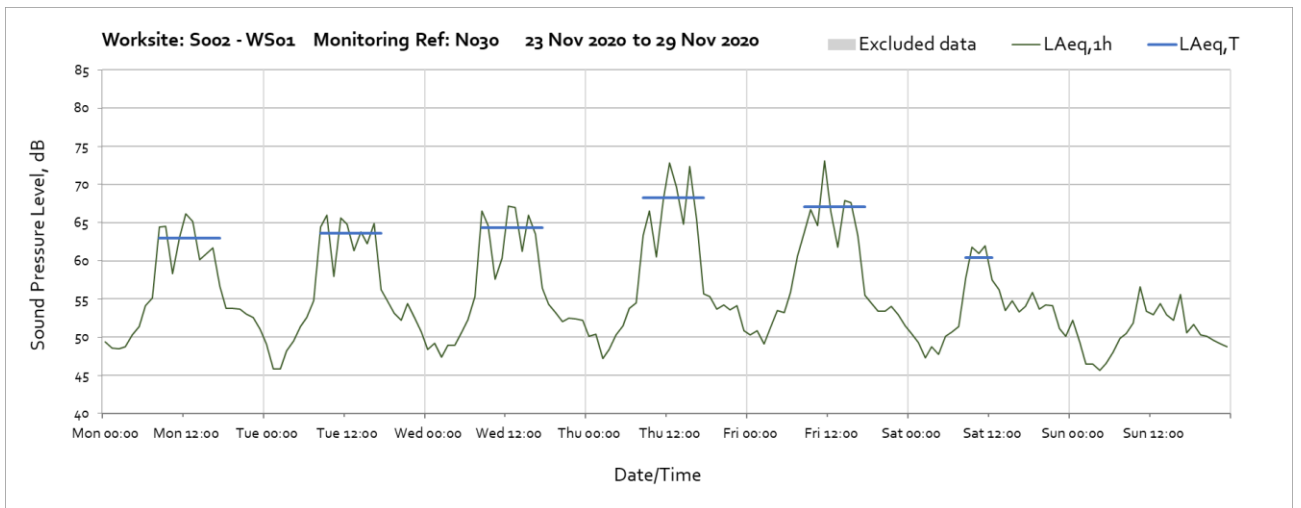
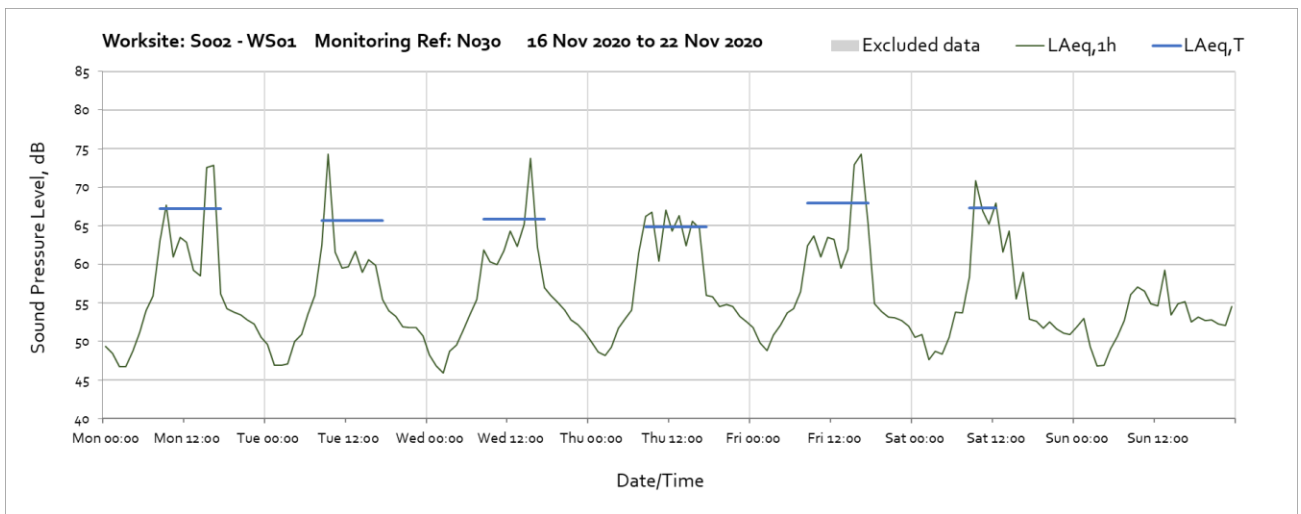
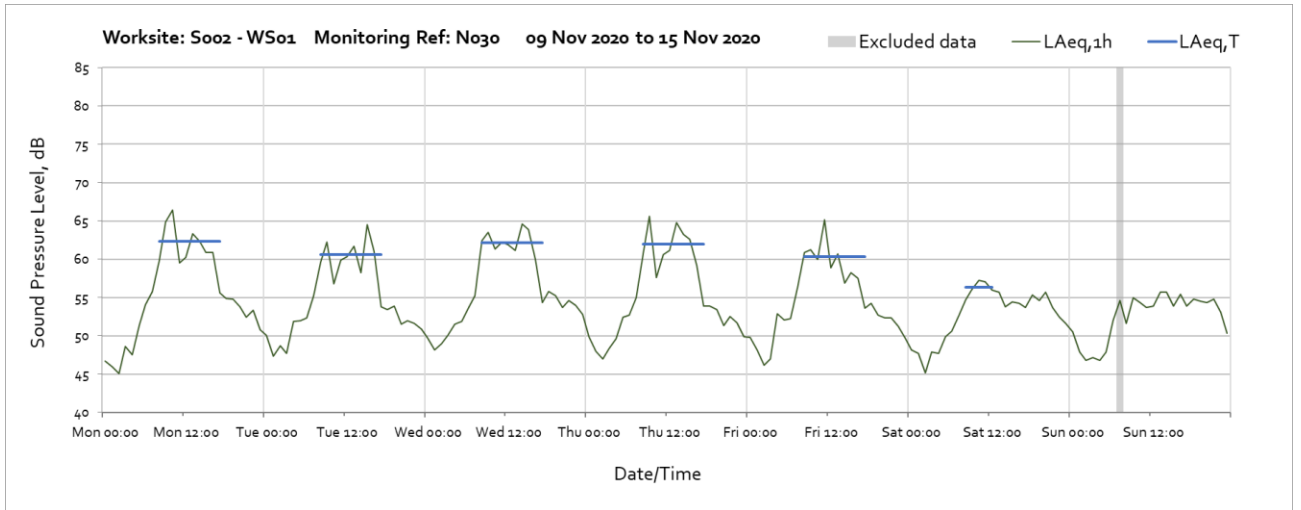


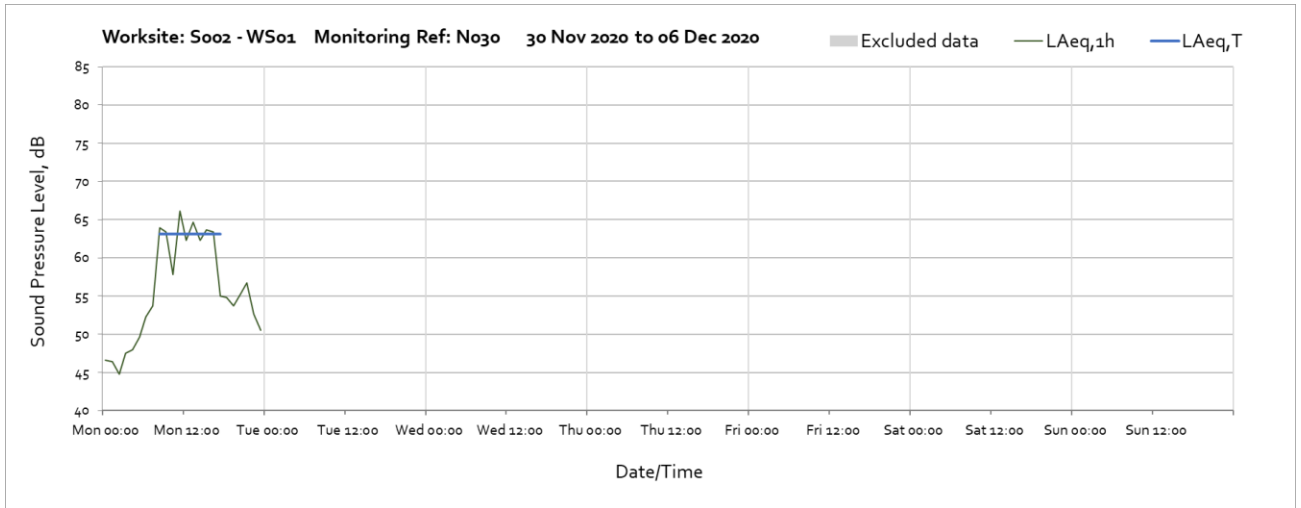




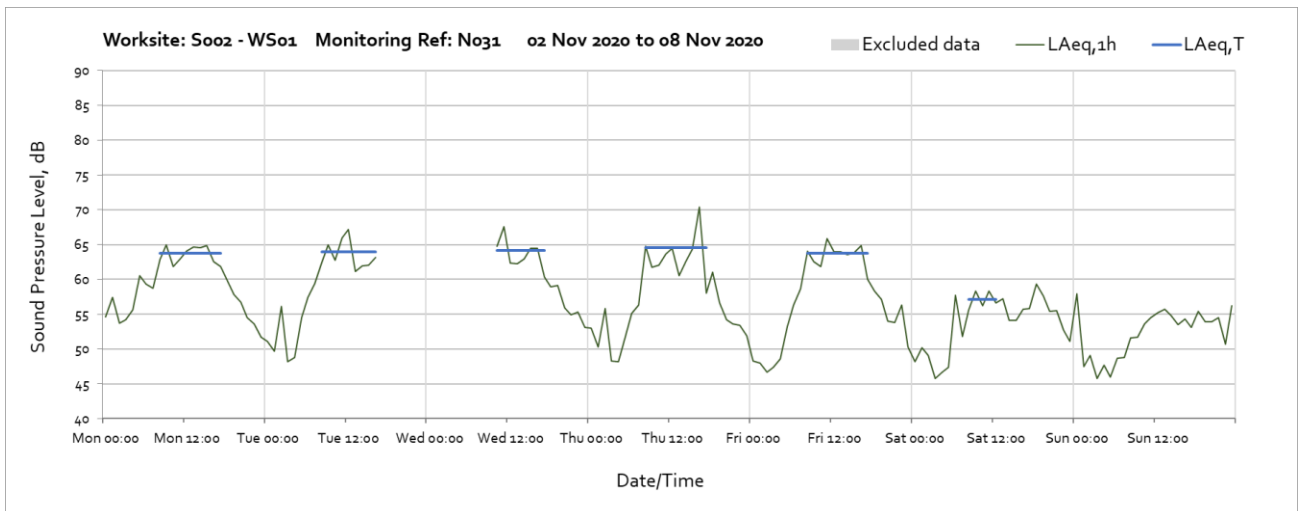
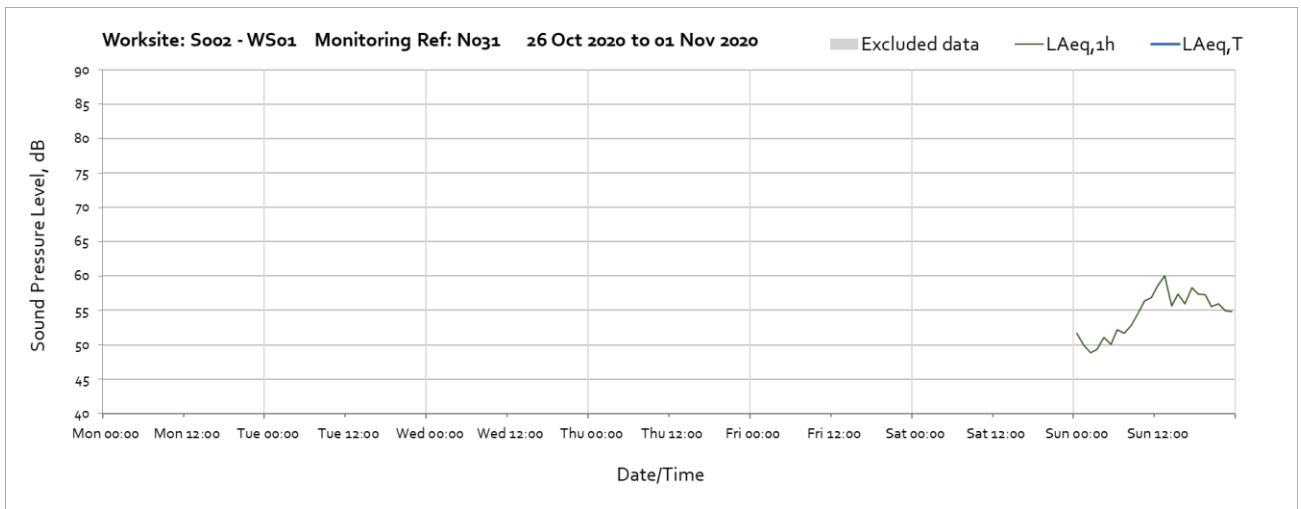
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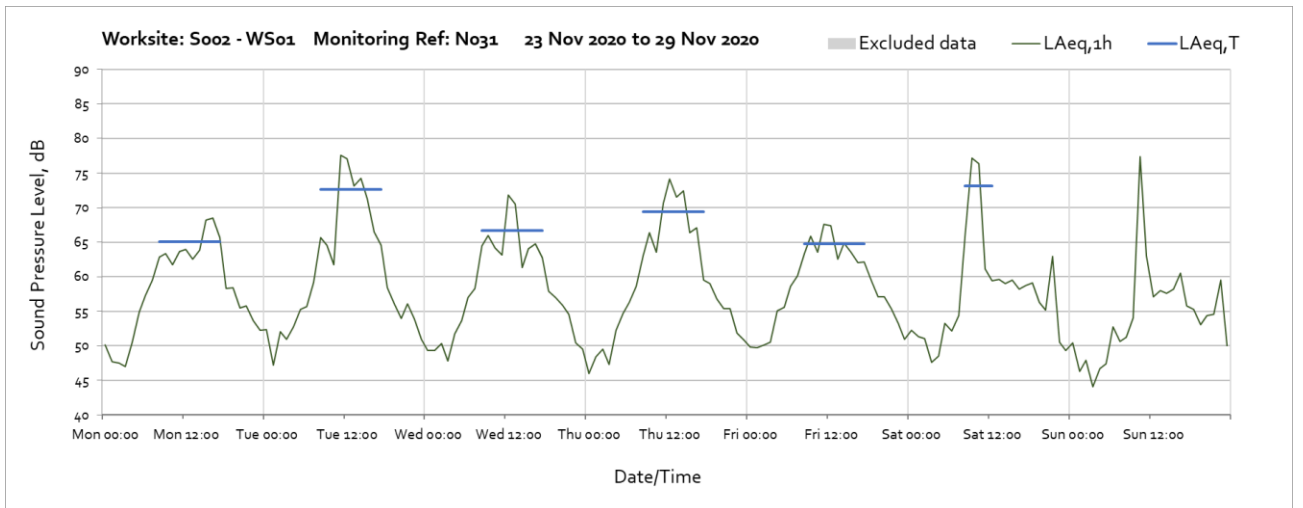
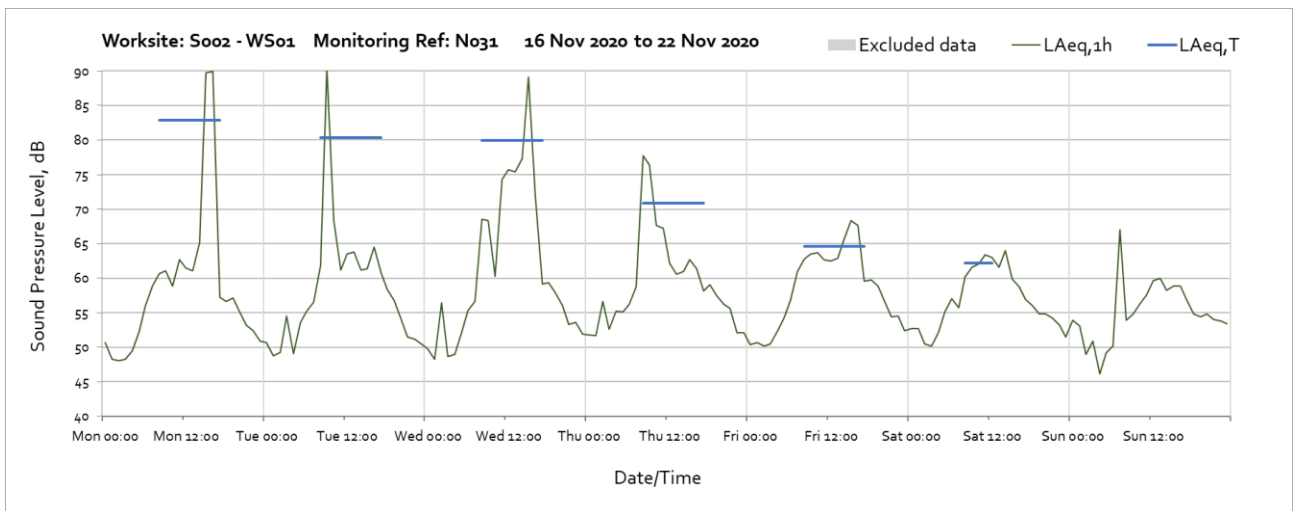
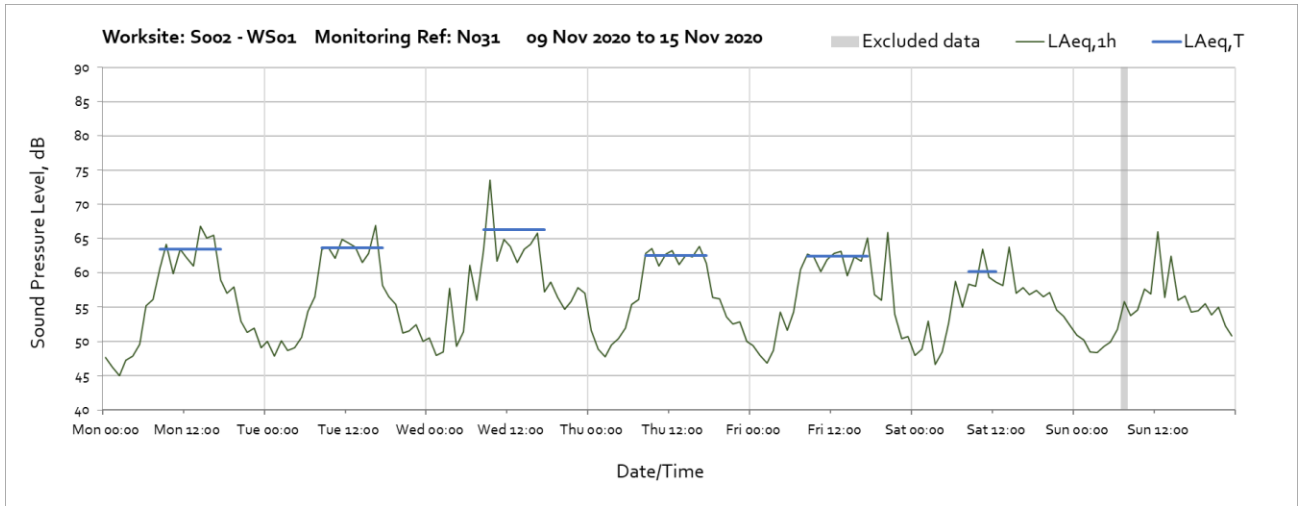


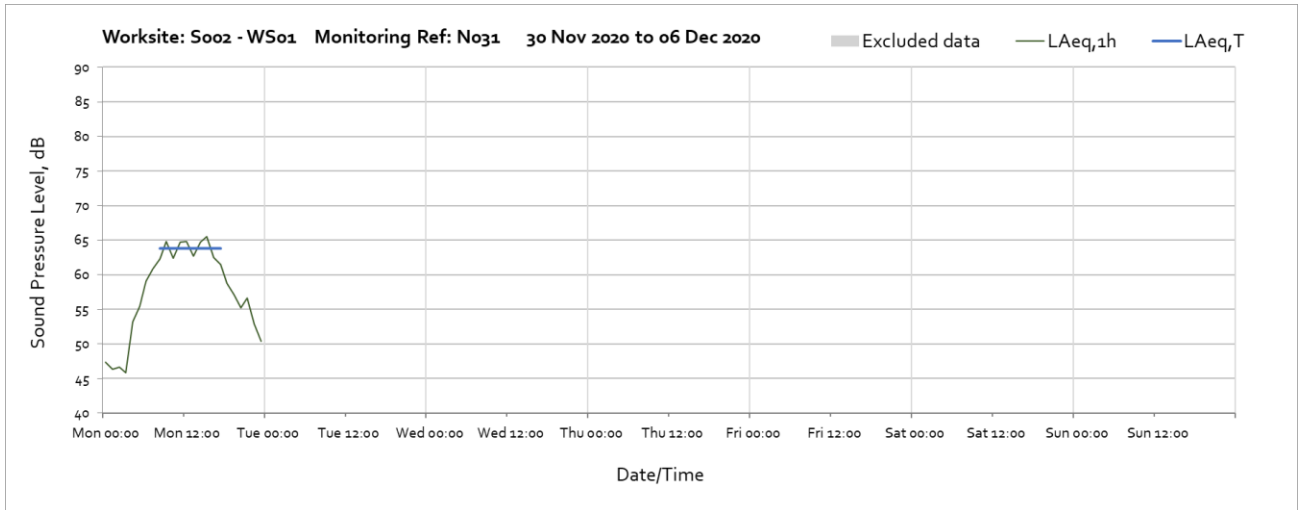


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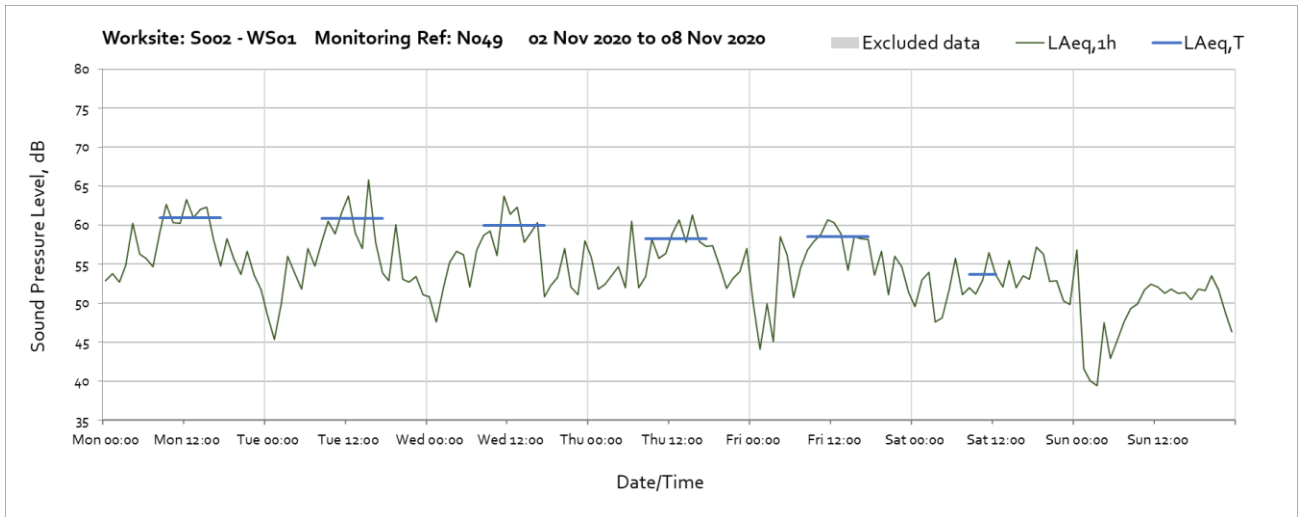
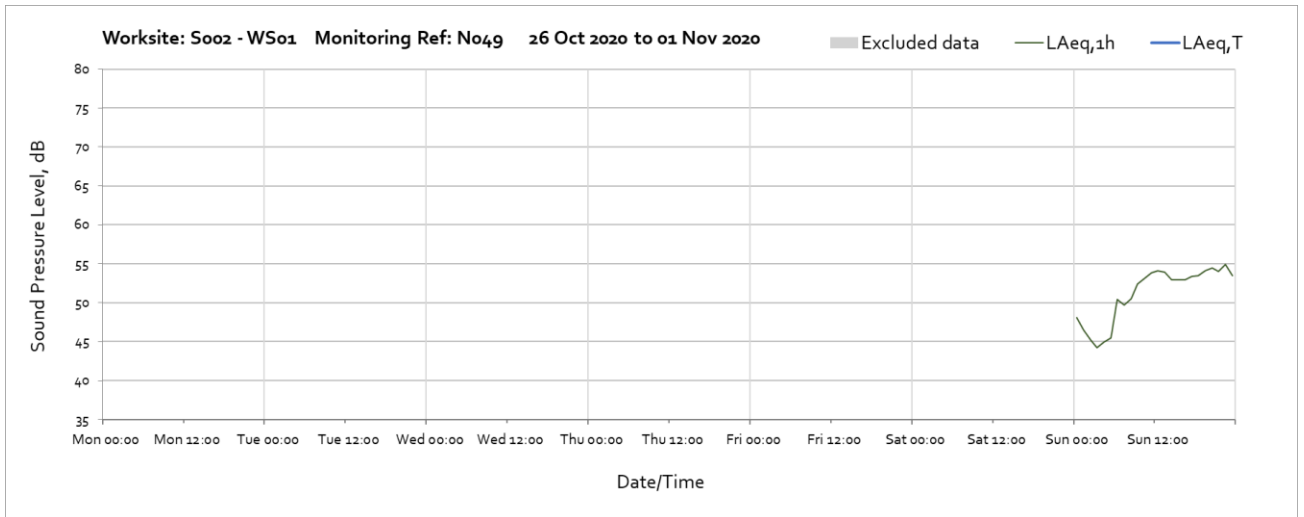


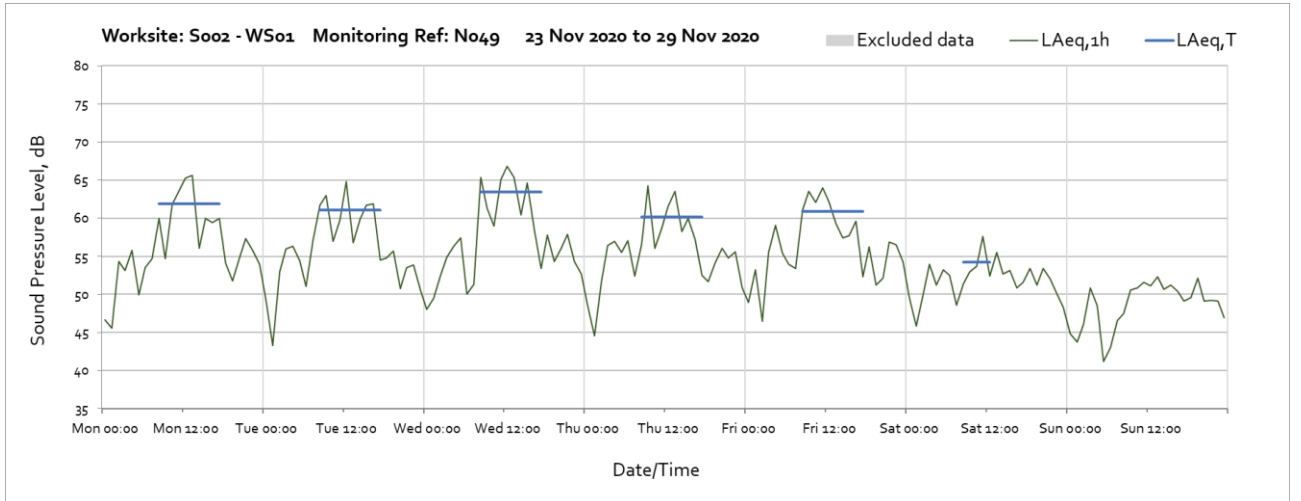
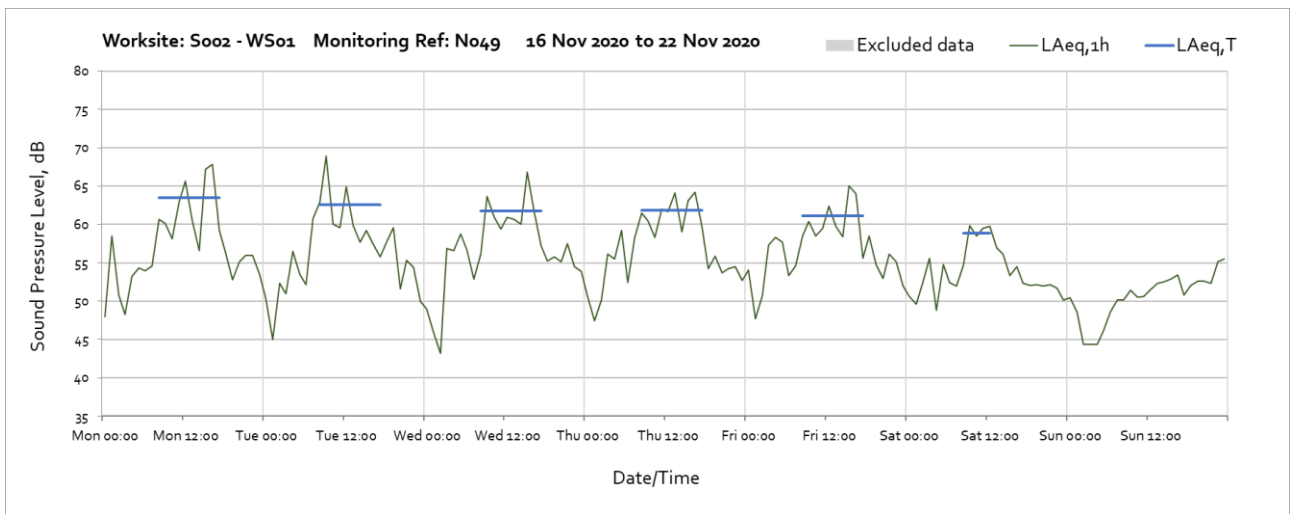
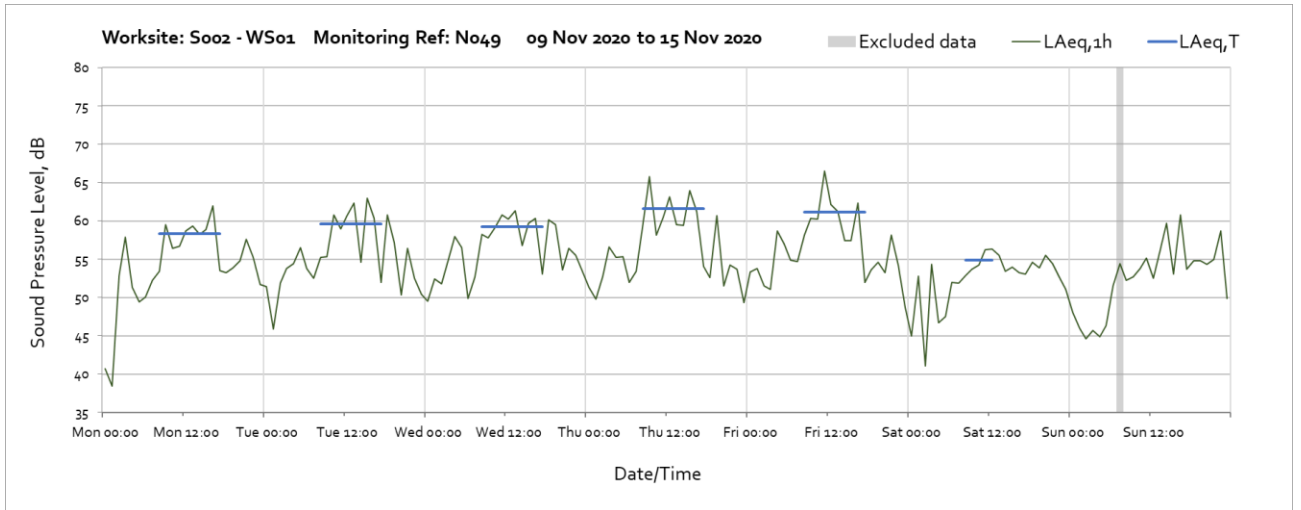
Note: Missing data due to loss of power at the monitoring station.

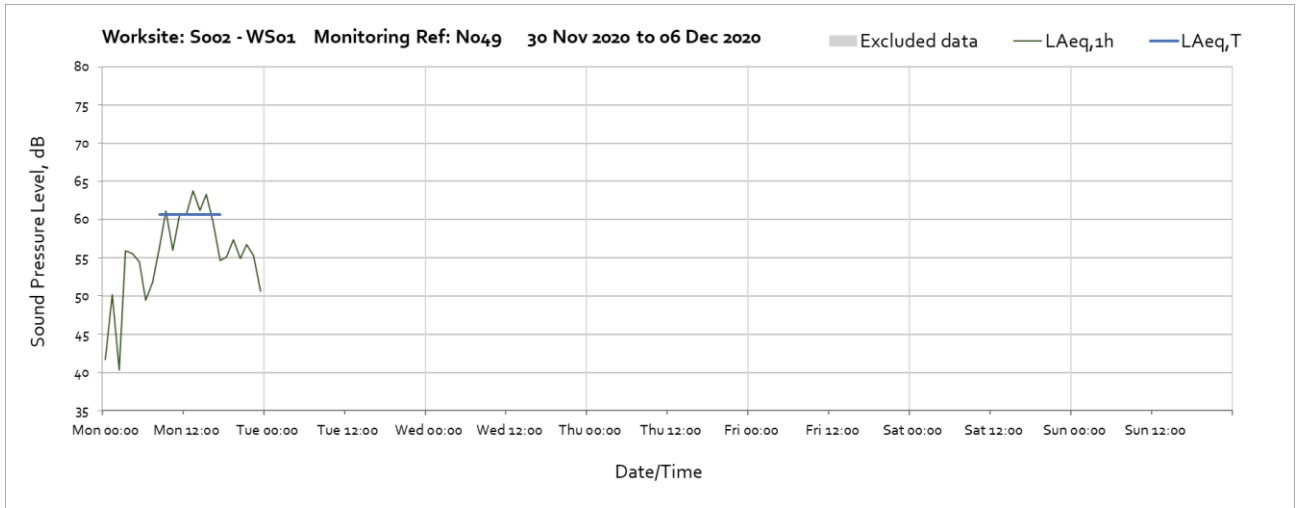




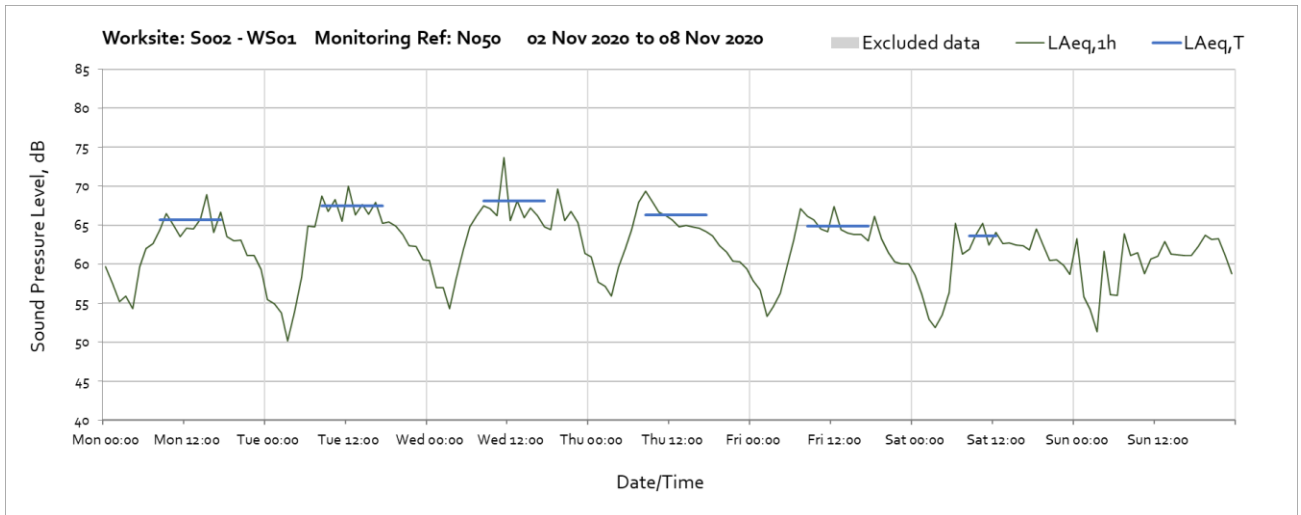
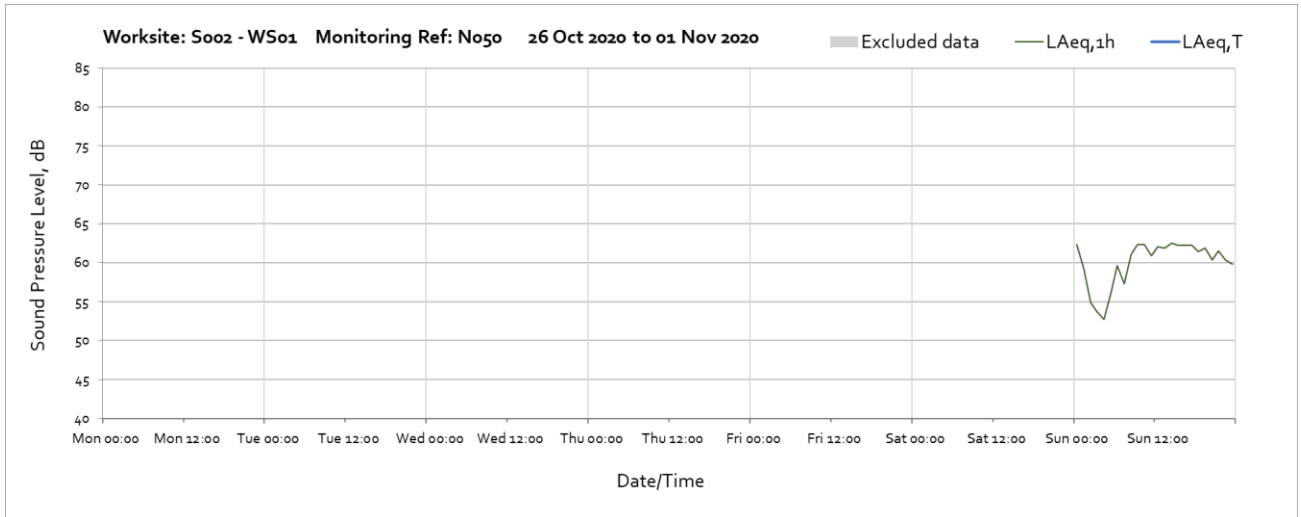
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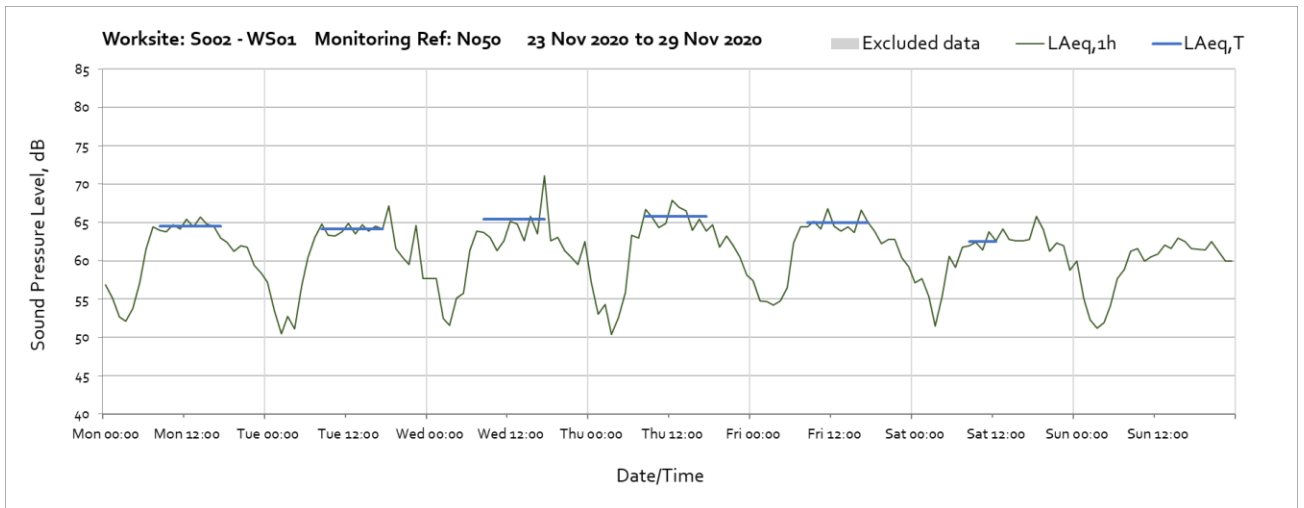
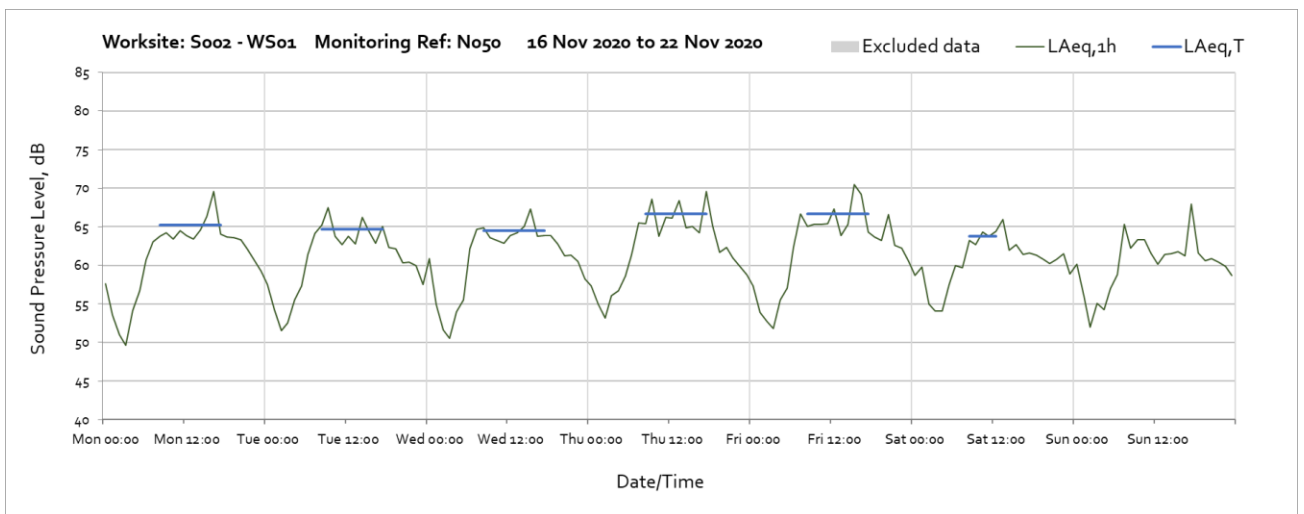
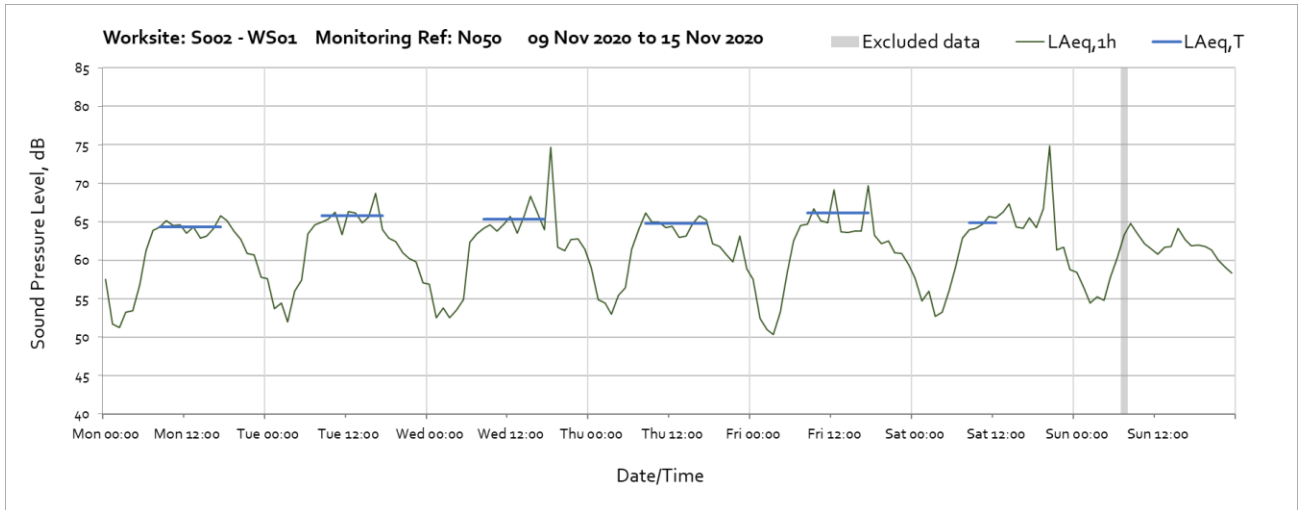


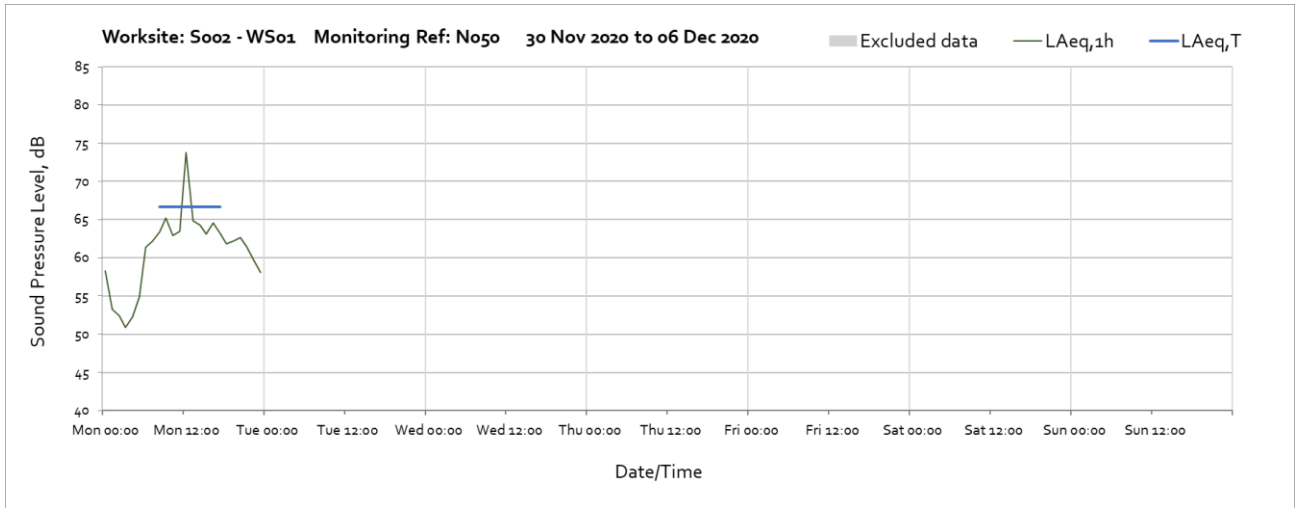




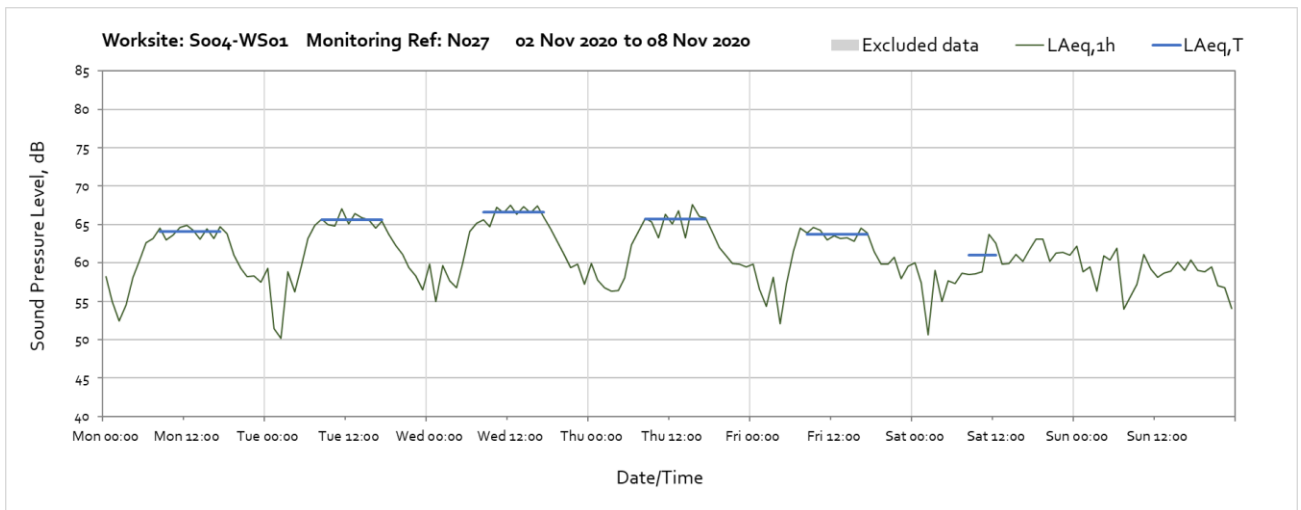
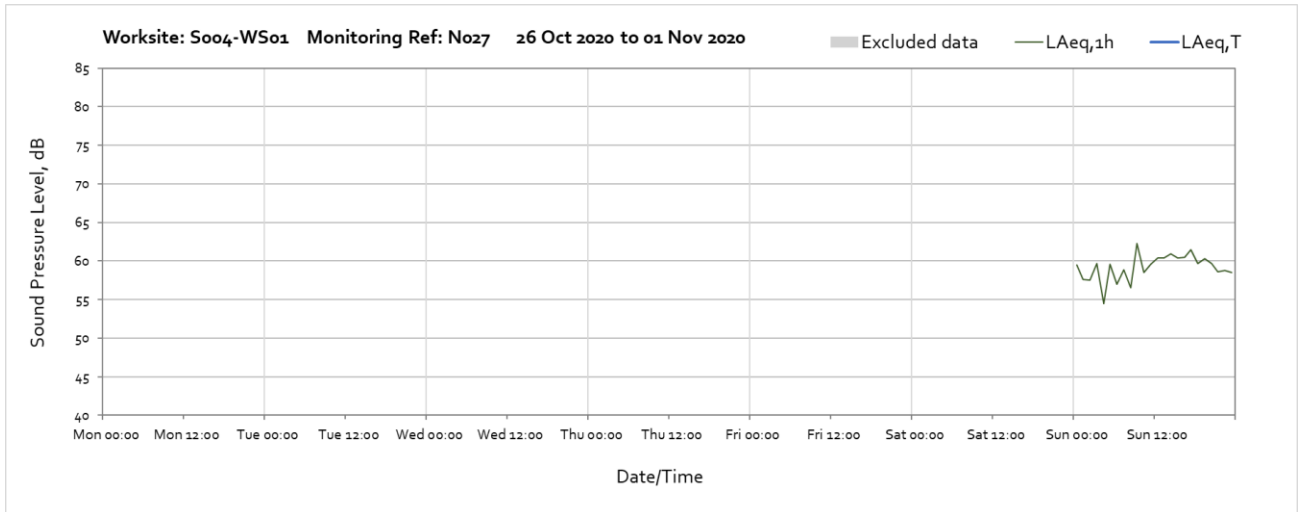
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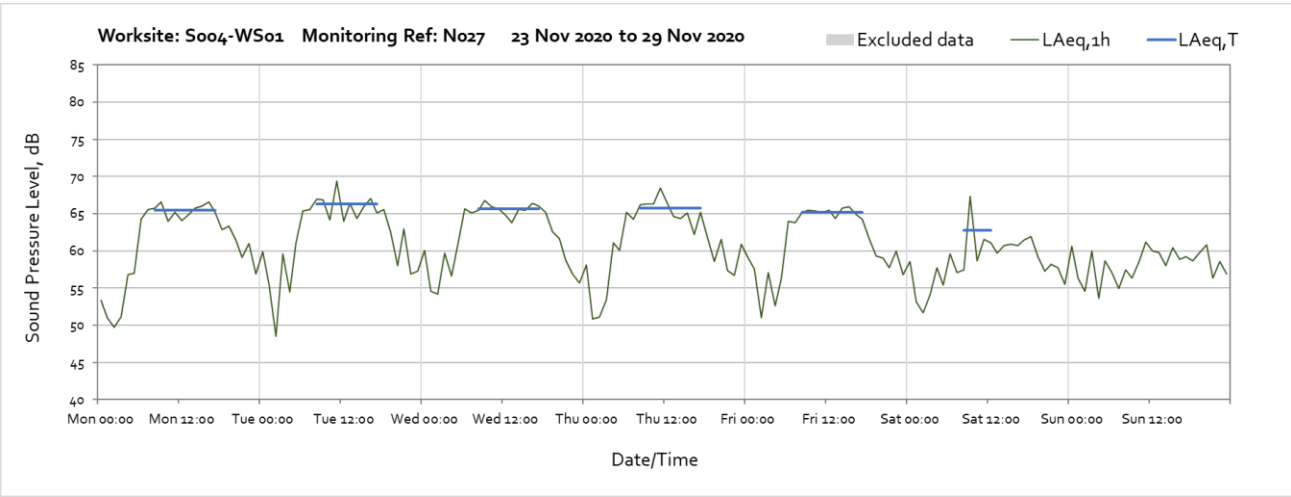
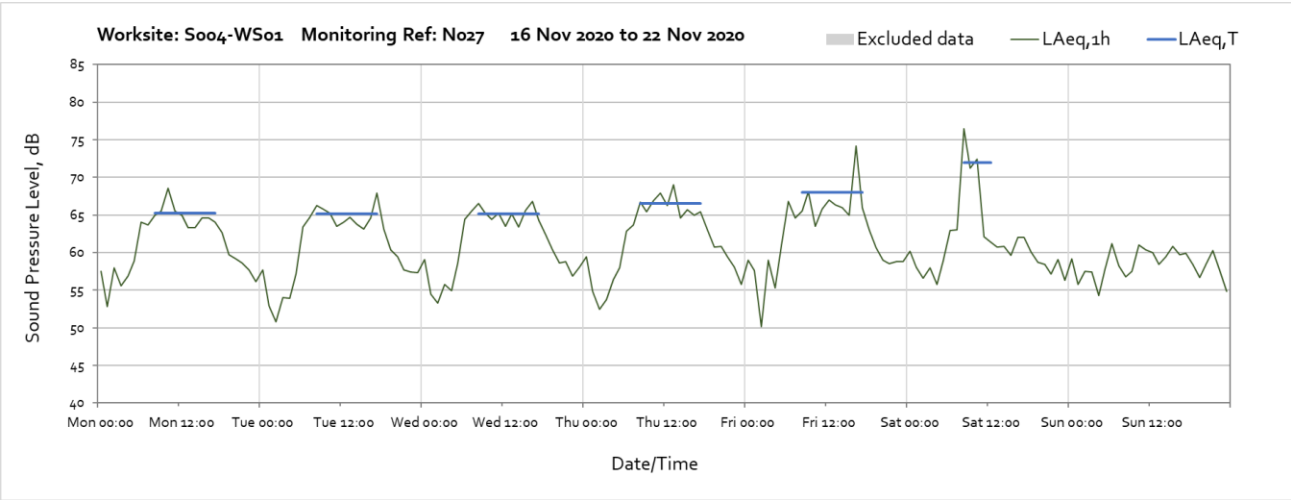
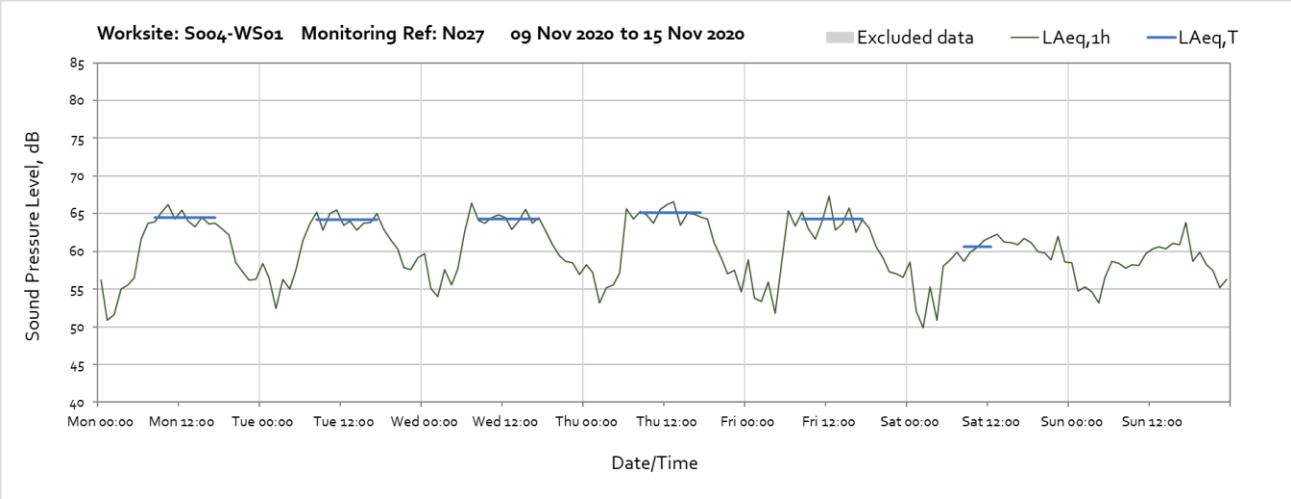


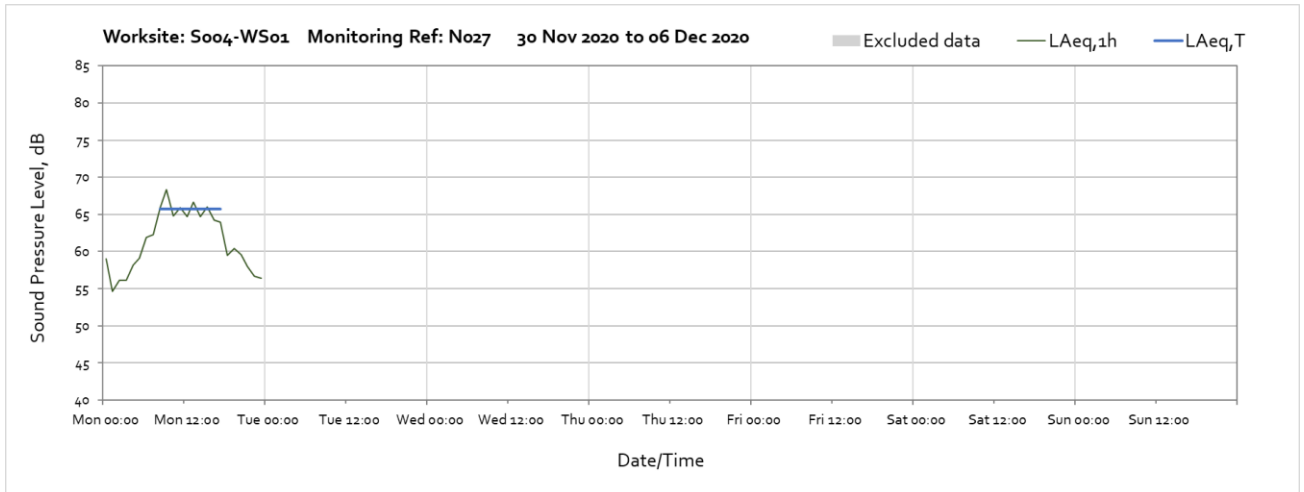




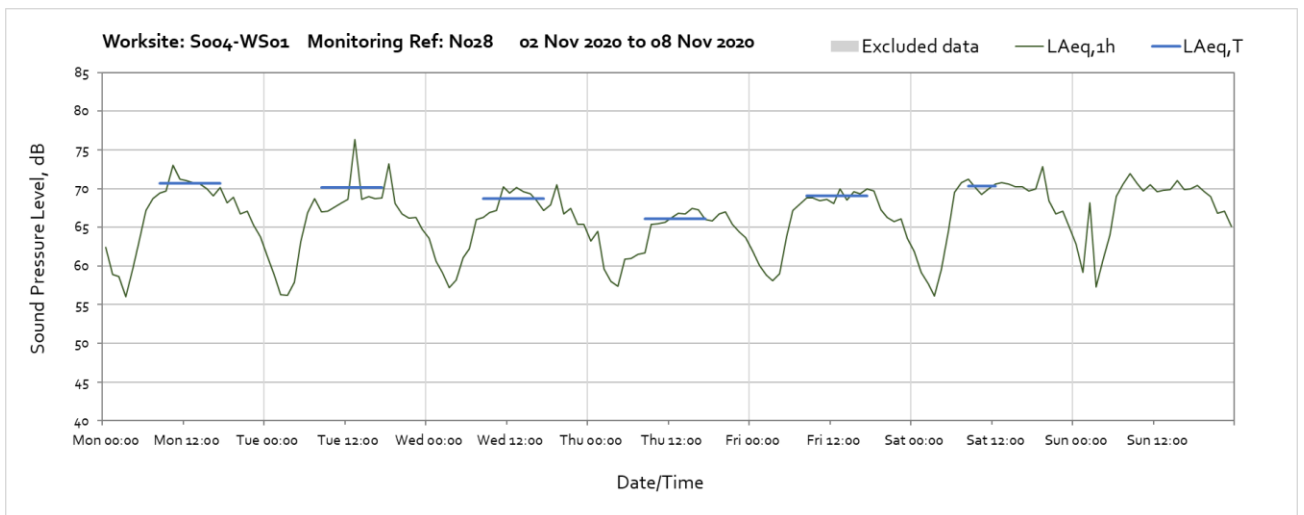
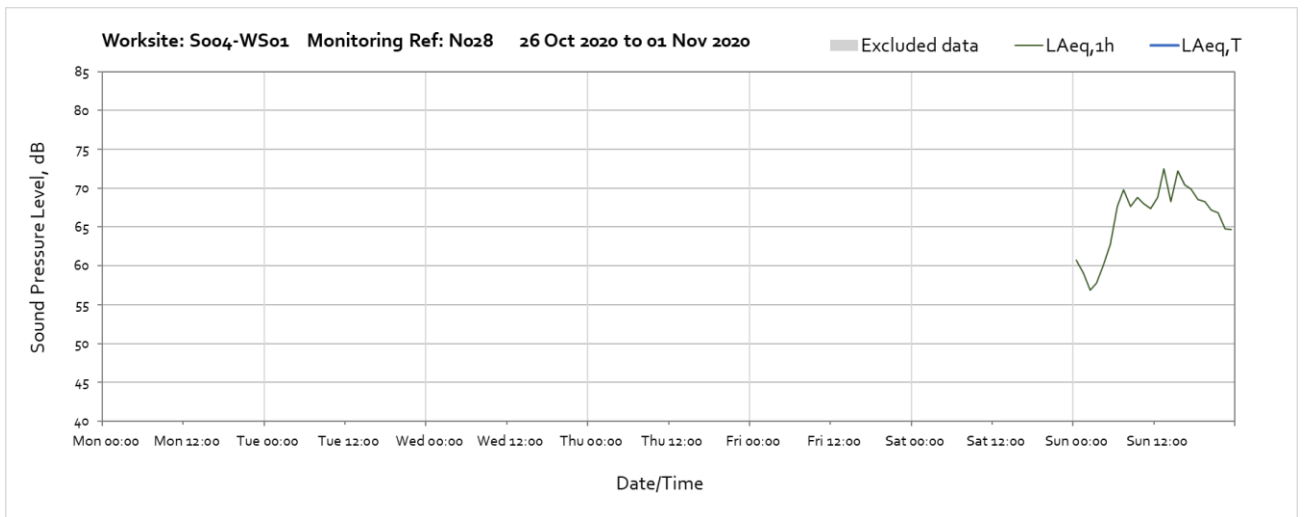
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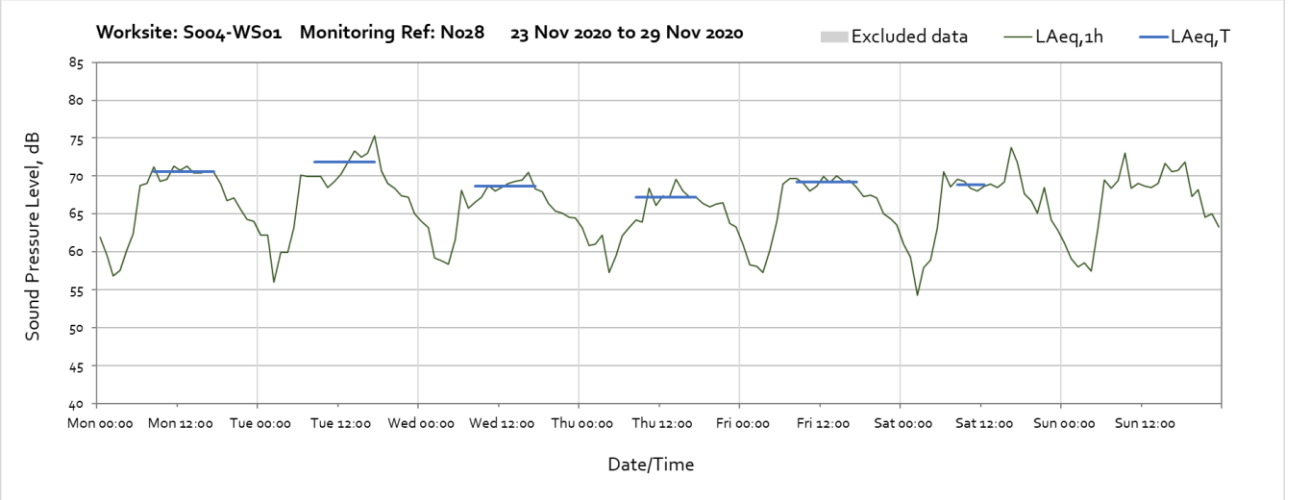
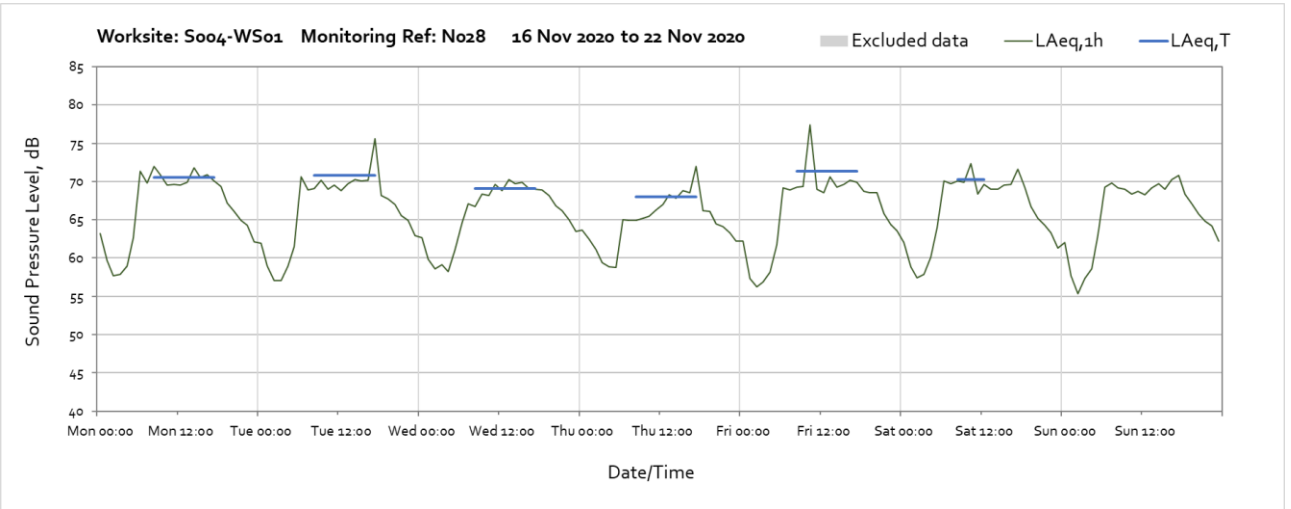
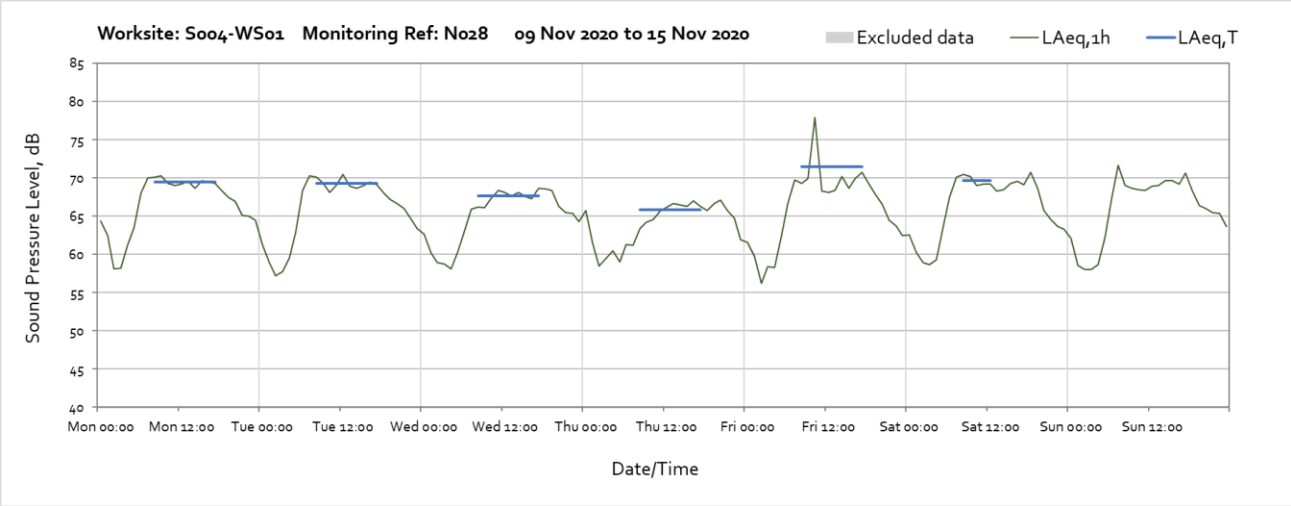


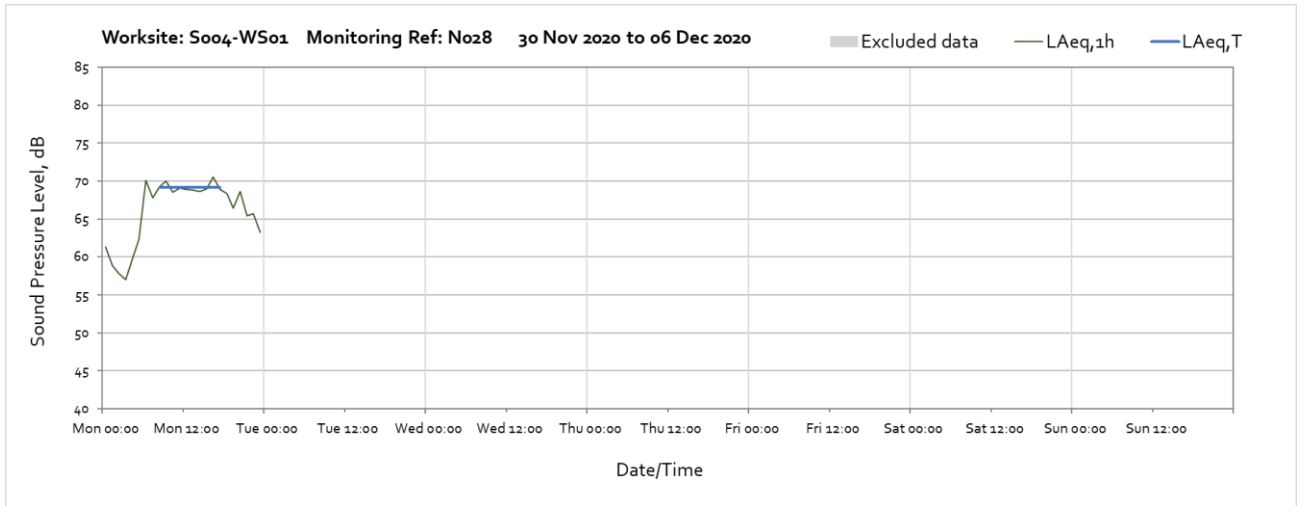




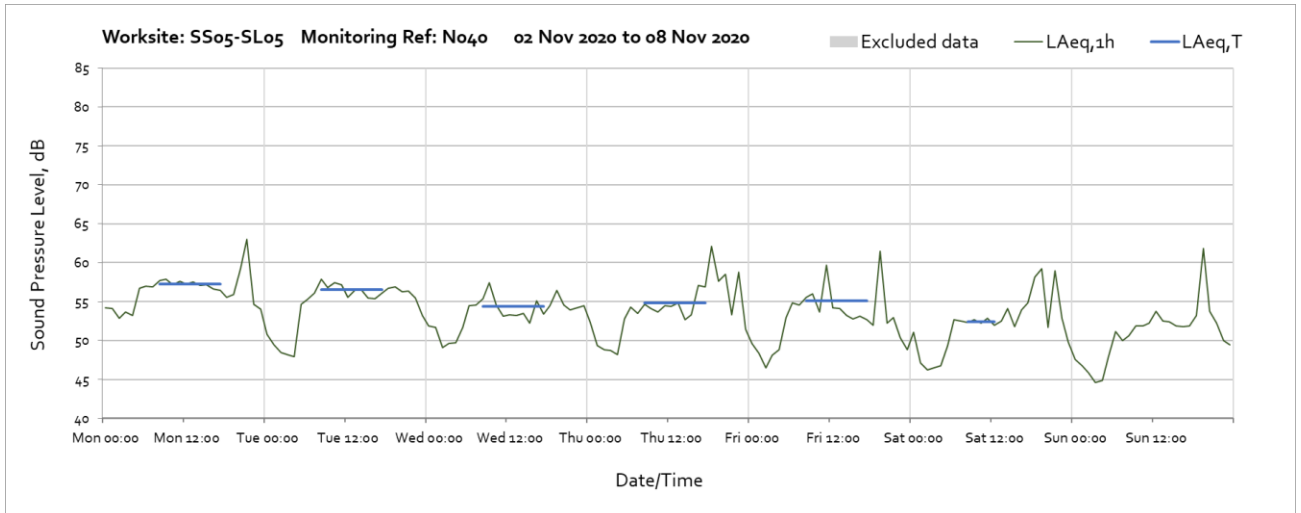
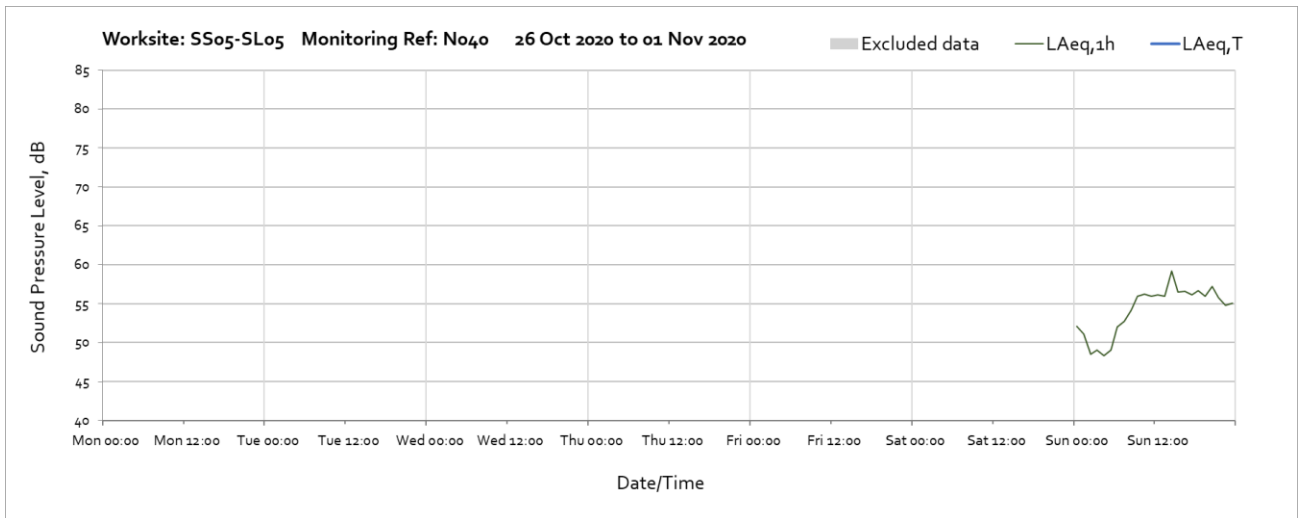
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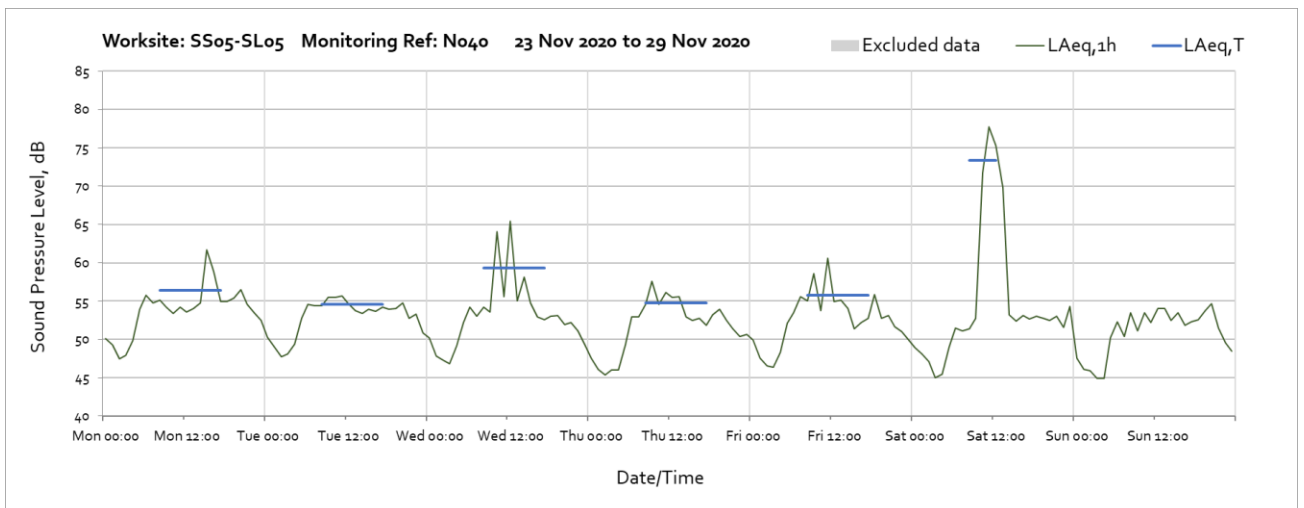
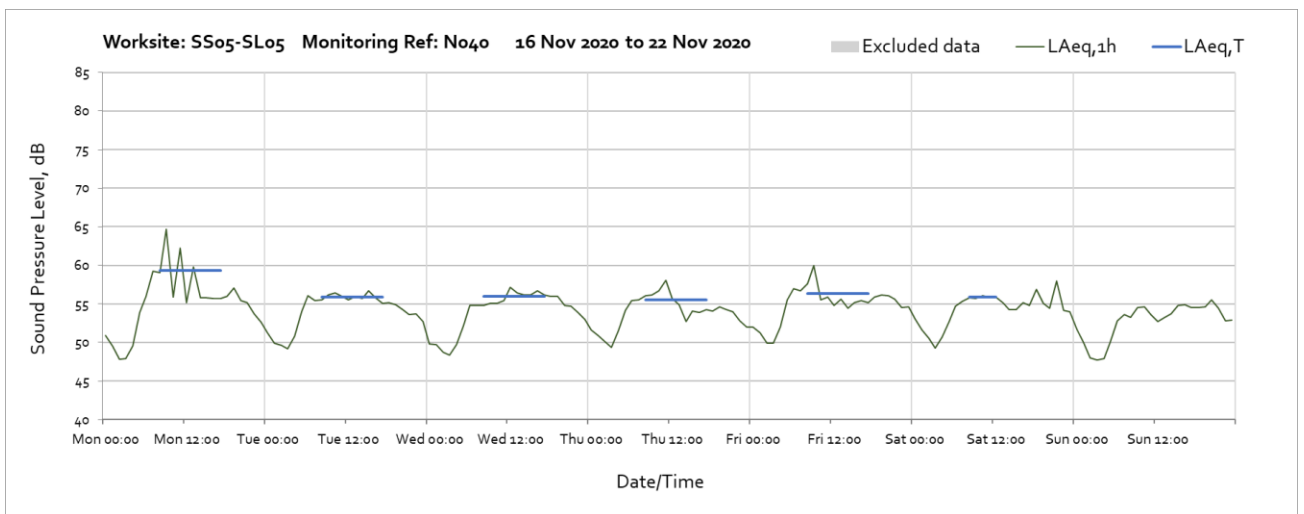
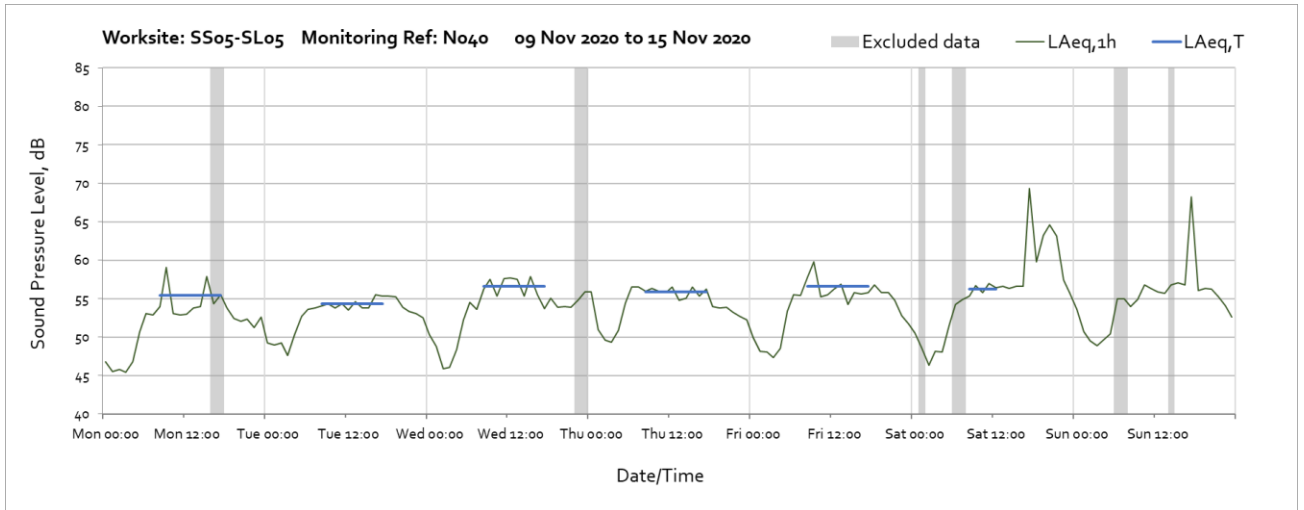


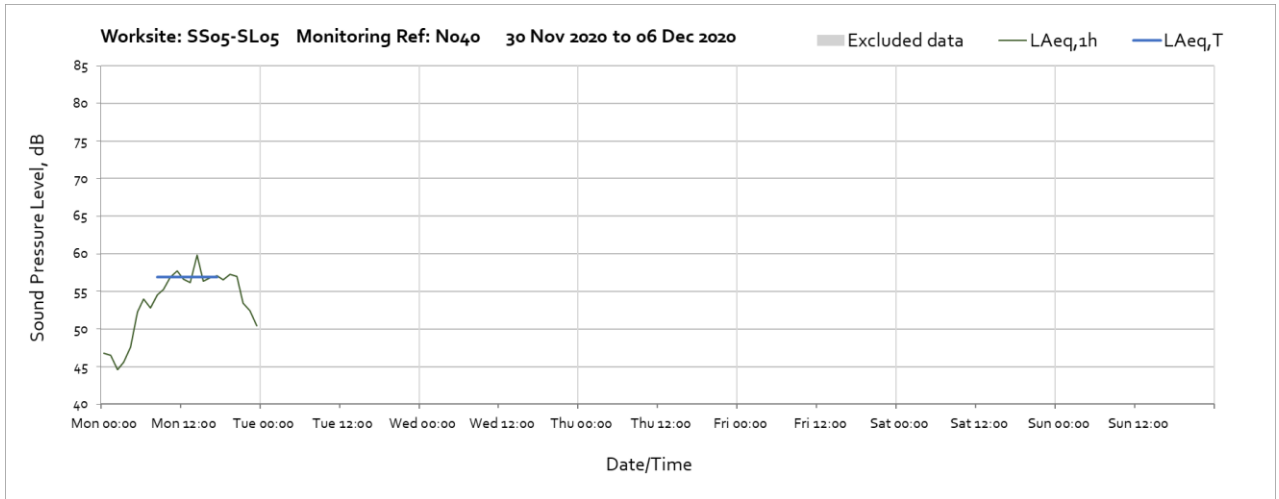




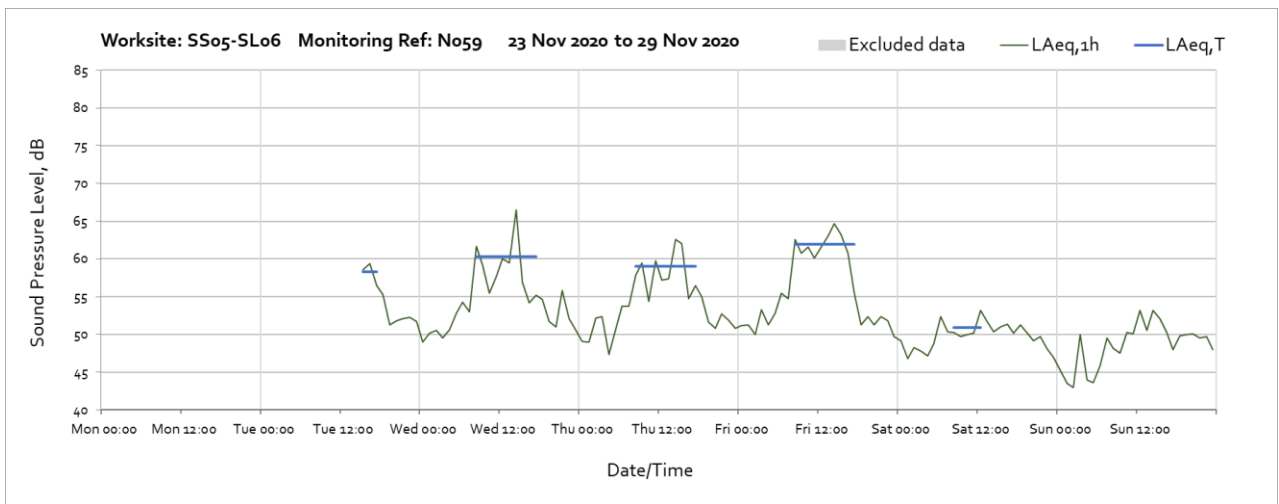
Worksite: BC Compound – Monitoring Ref: N040



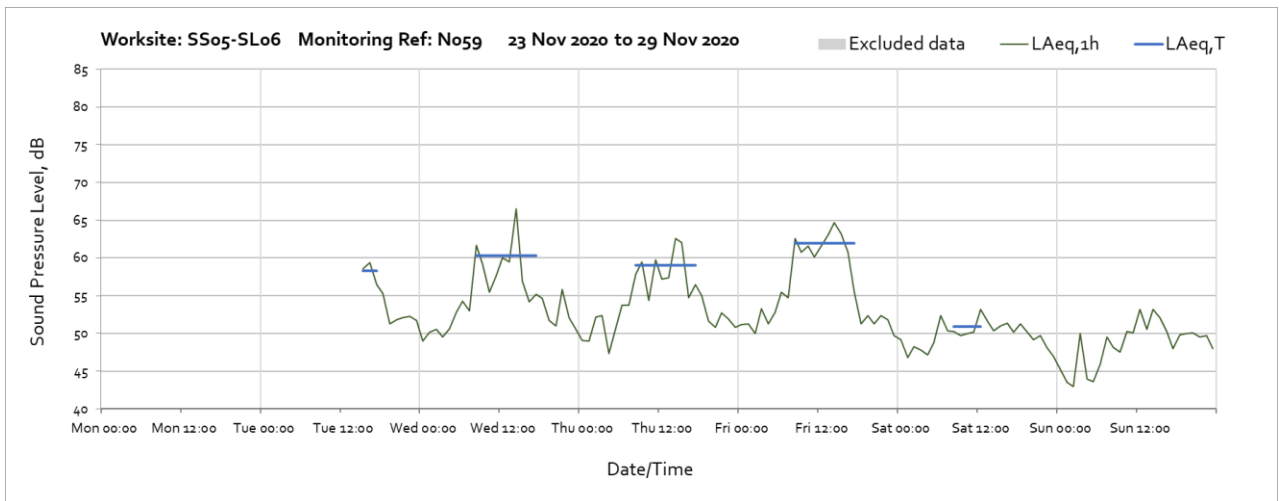


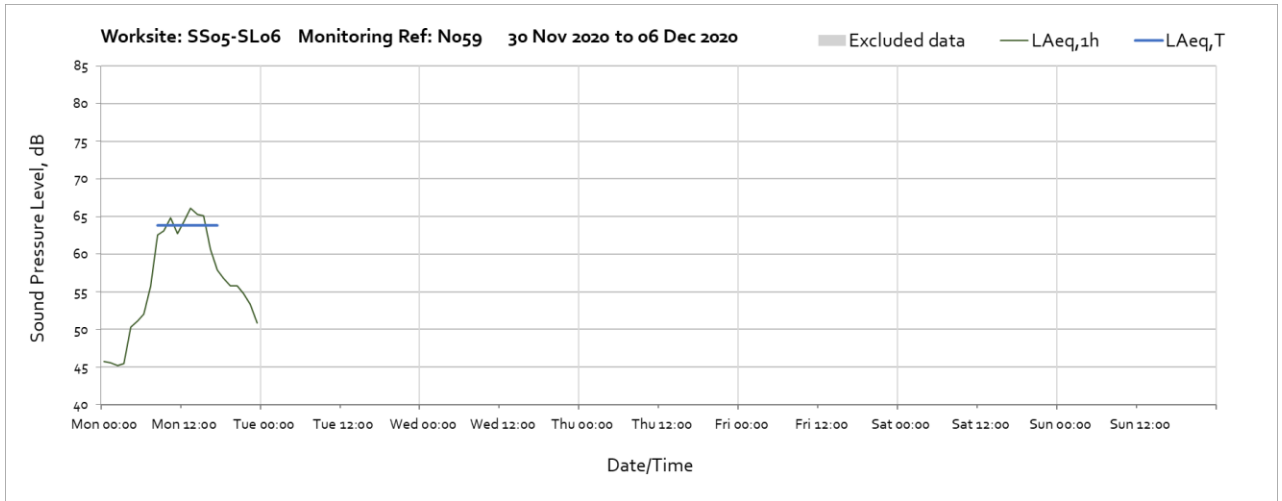


Worksite: SS05-SL-6 – Monitoring Ref: N059



Note: Monitor installed on Tuesday 24th November.

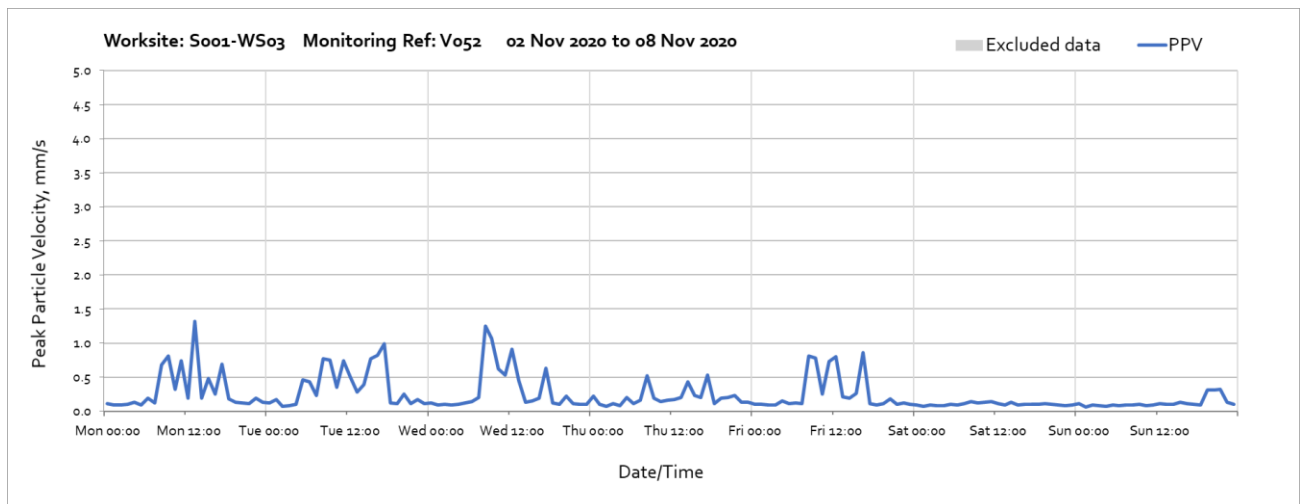
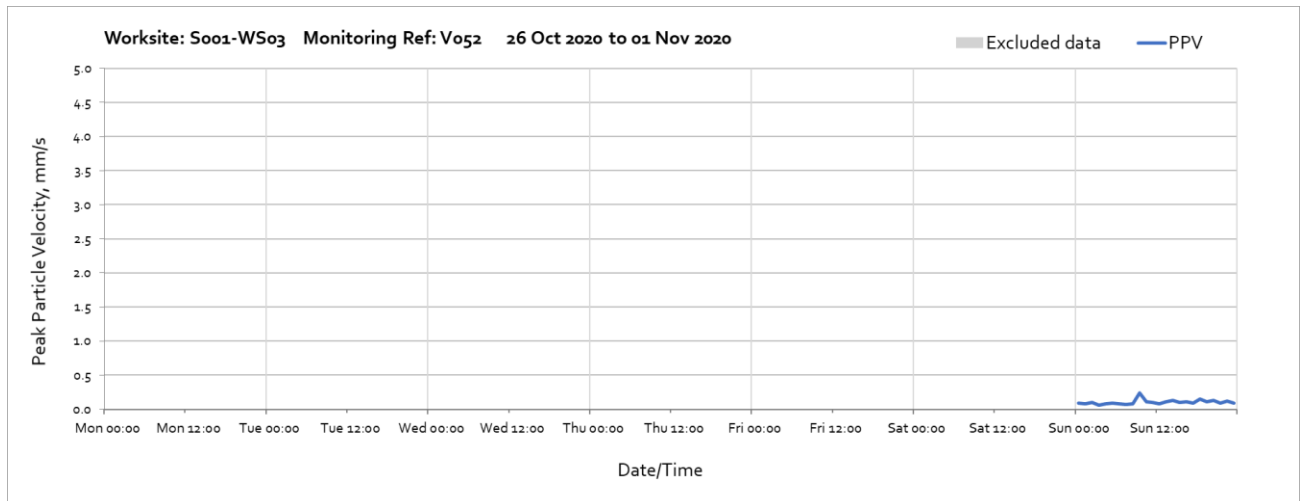


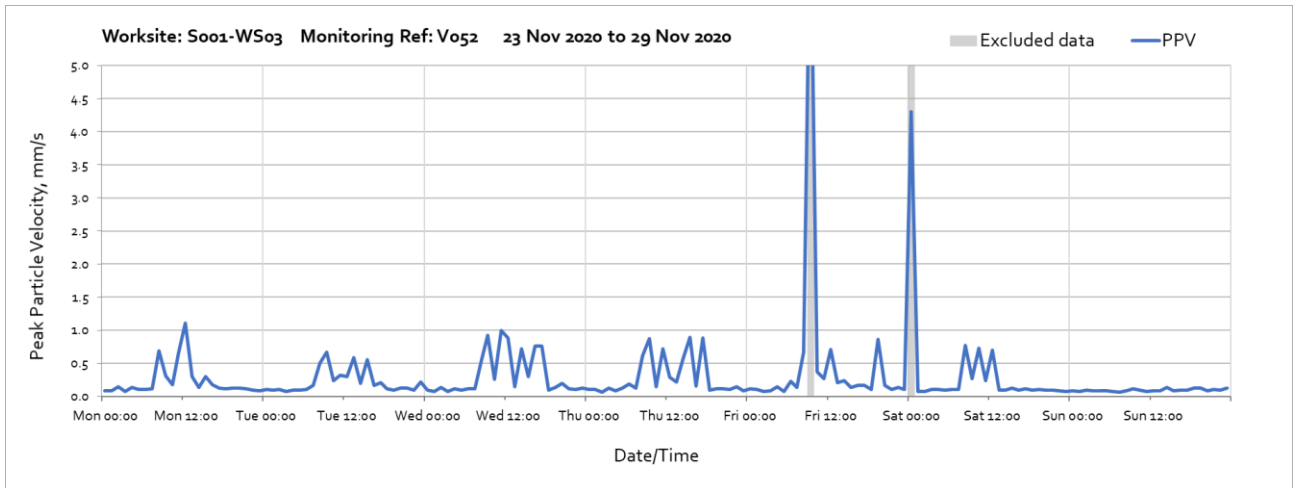
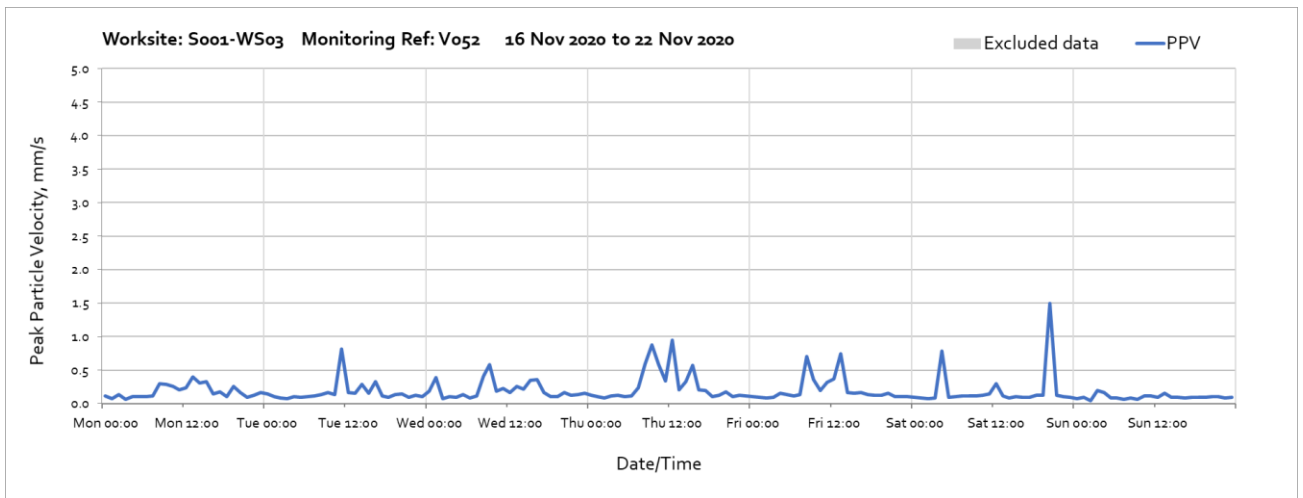
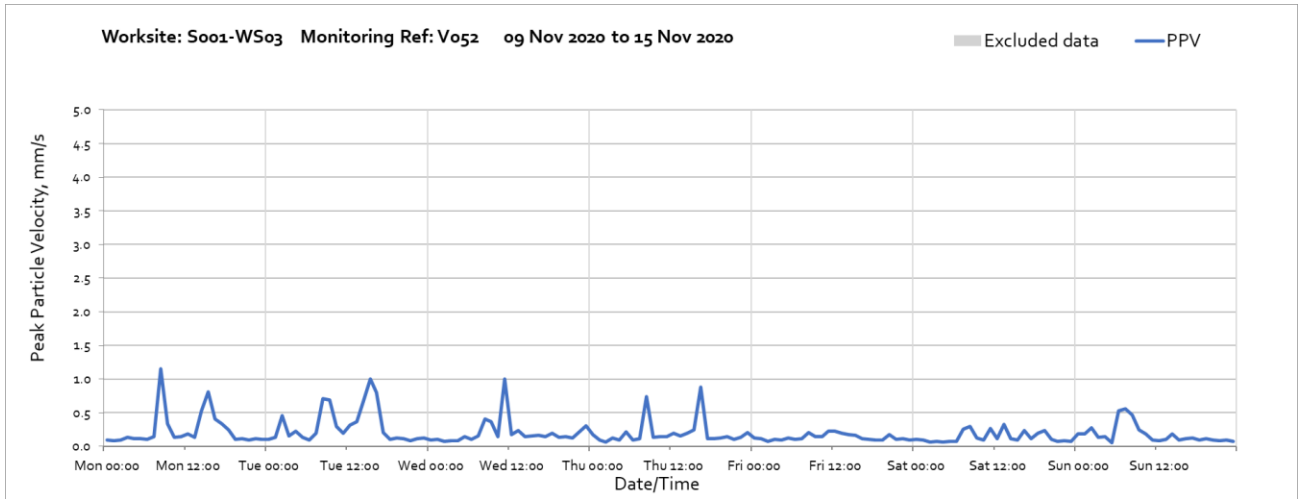


Vibration

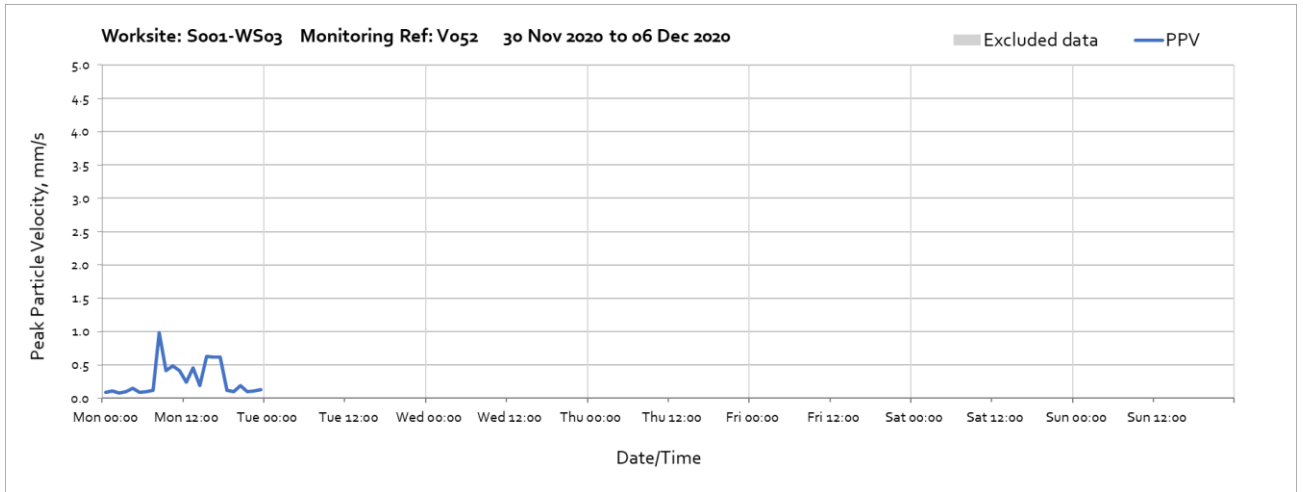
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative of HS2 construction works, these values have been greyed out in the following charts and have been excluded to calculate values in Table 4 of the main report.

Worksite: S001-WS03 – Monitoring Ref: V052

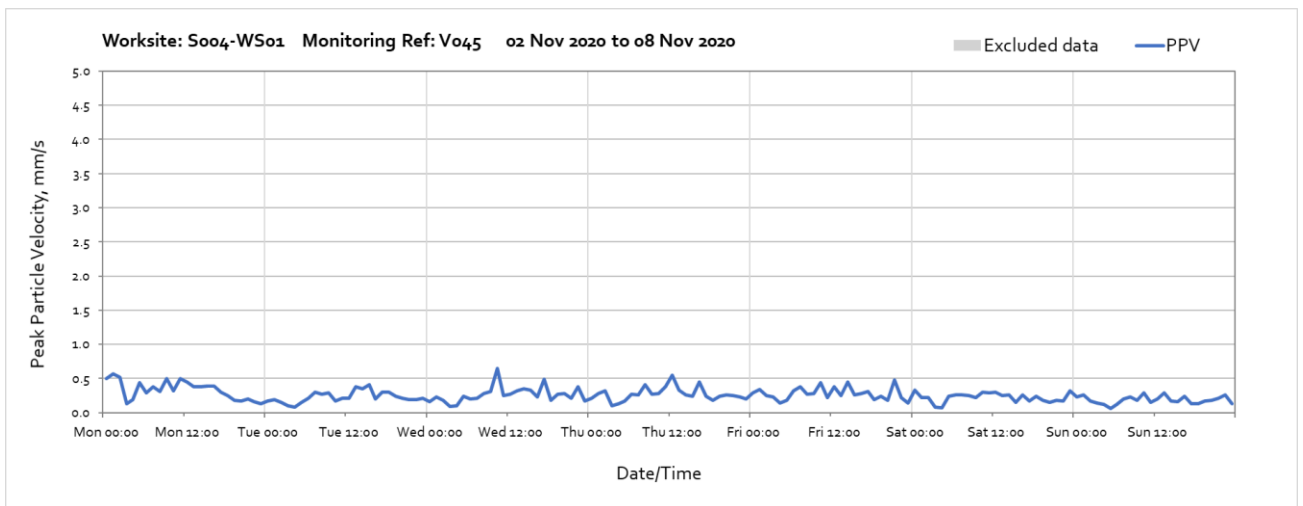
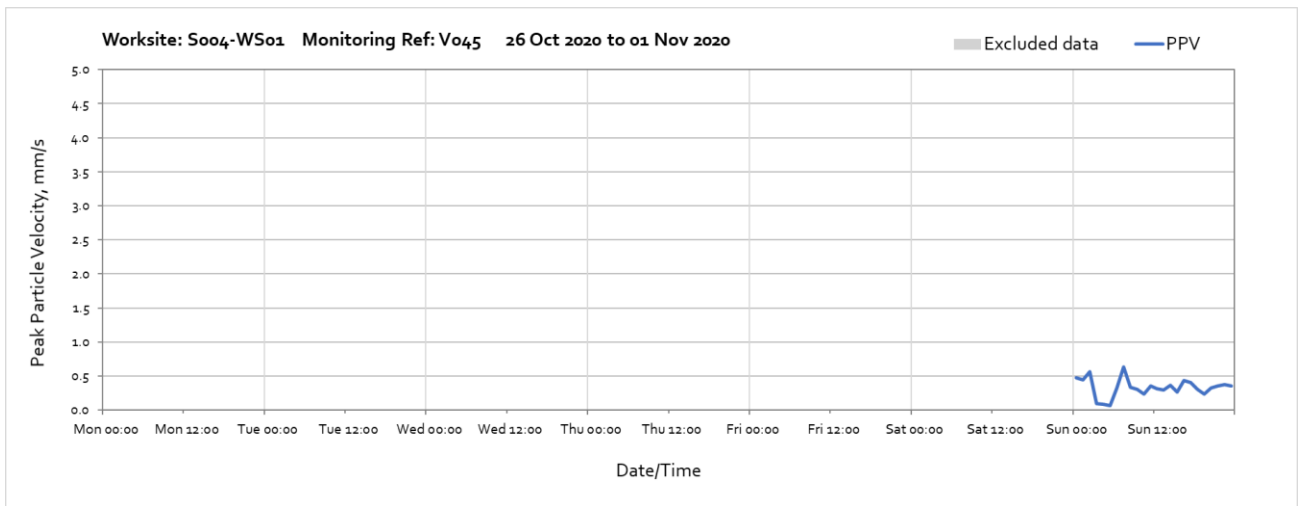


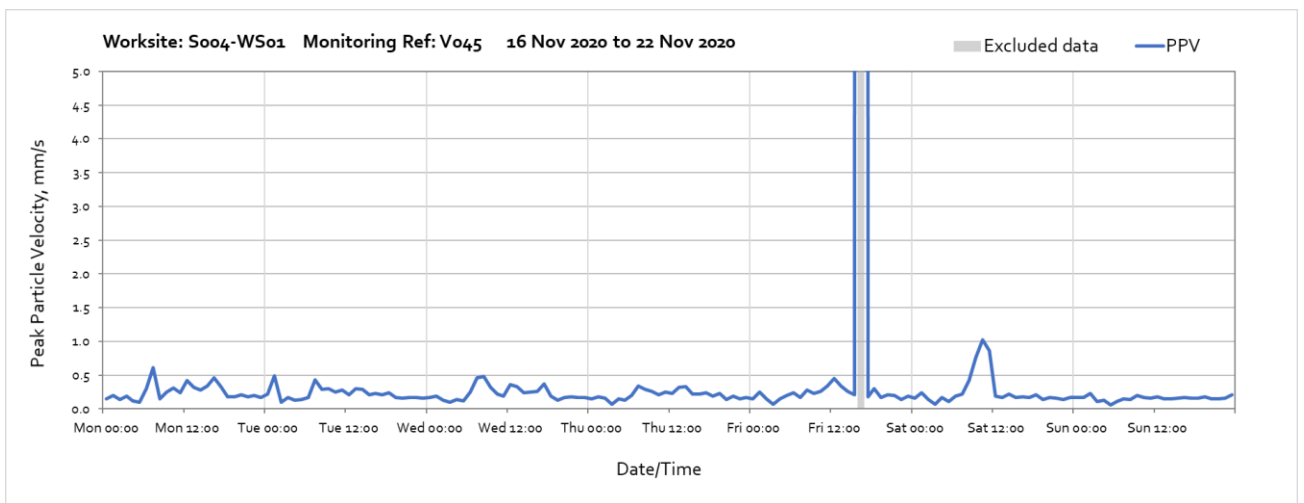
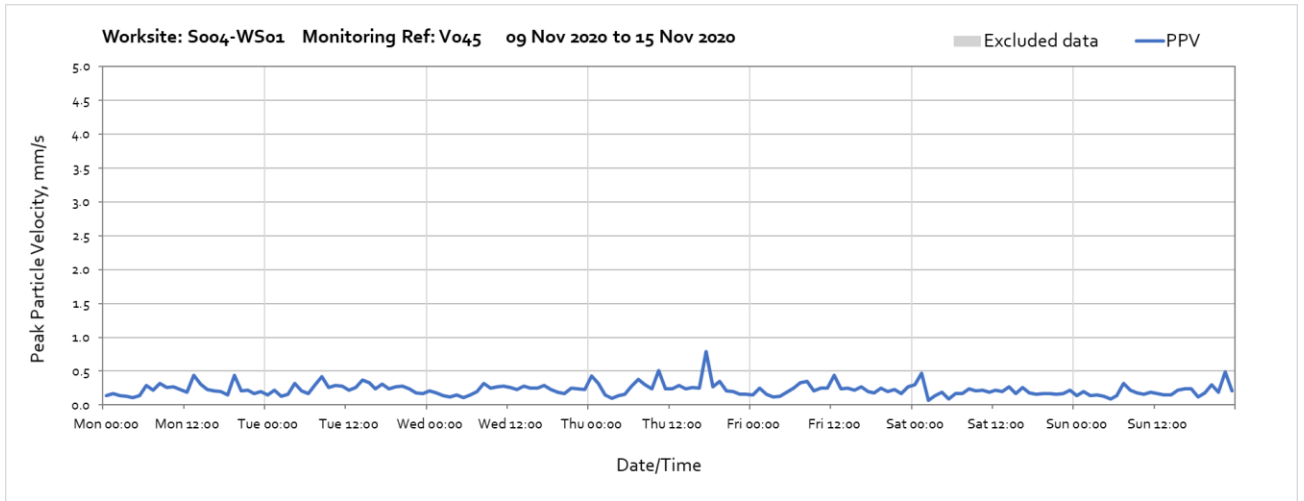


Note: High vibration levels measured at 09:00 on Friday 27th November and 00:00 on Saturday 28th November were due to local disturbance of the monitor and are not representative of HS2 construction vibration.

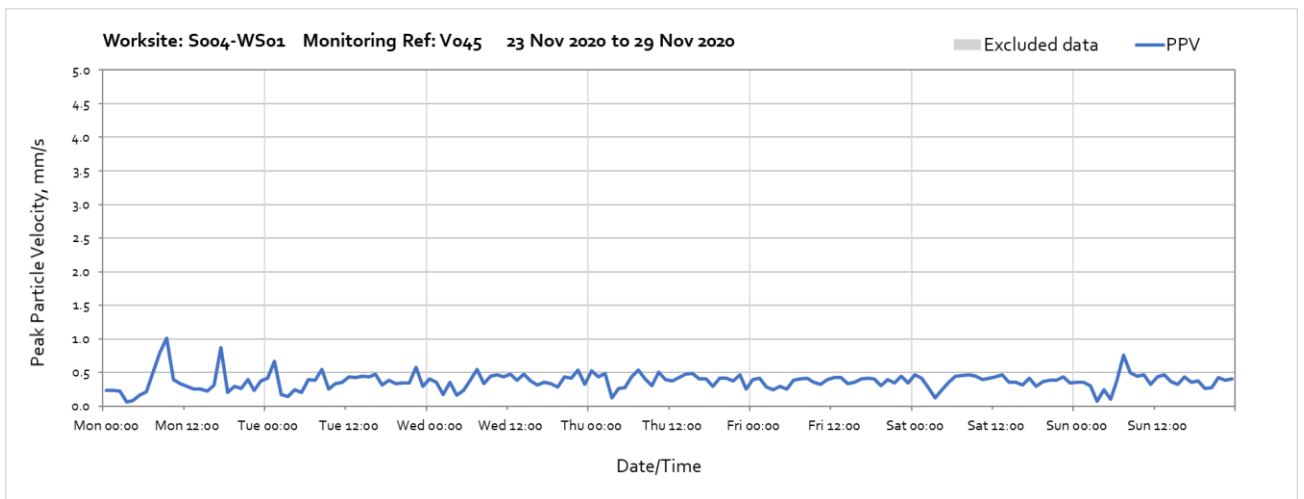


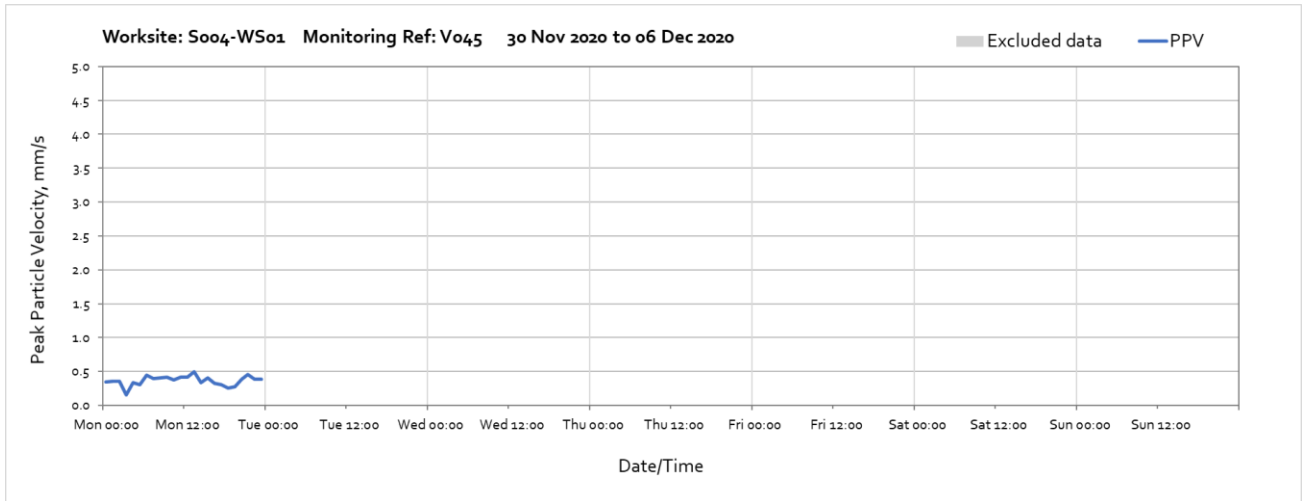
Worksite: S004-WS01 – Monitoring Ref: V045



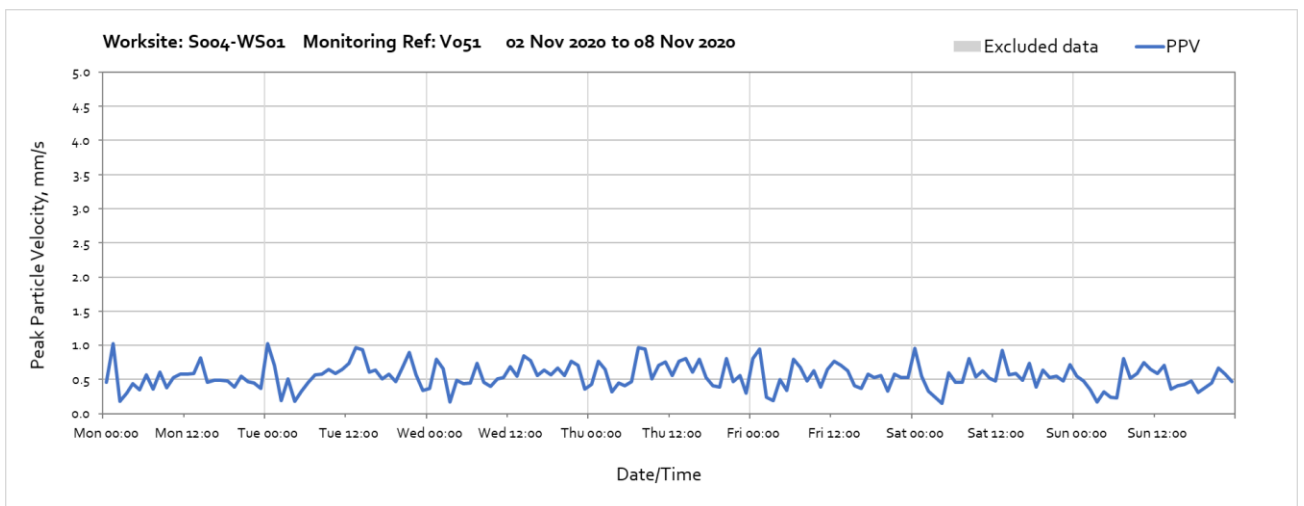
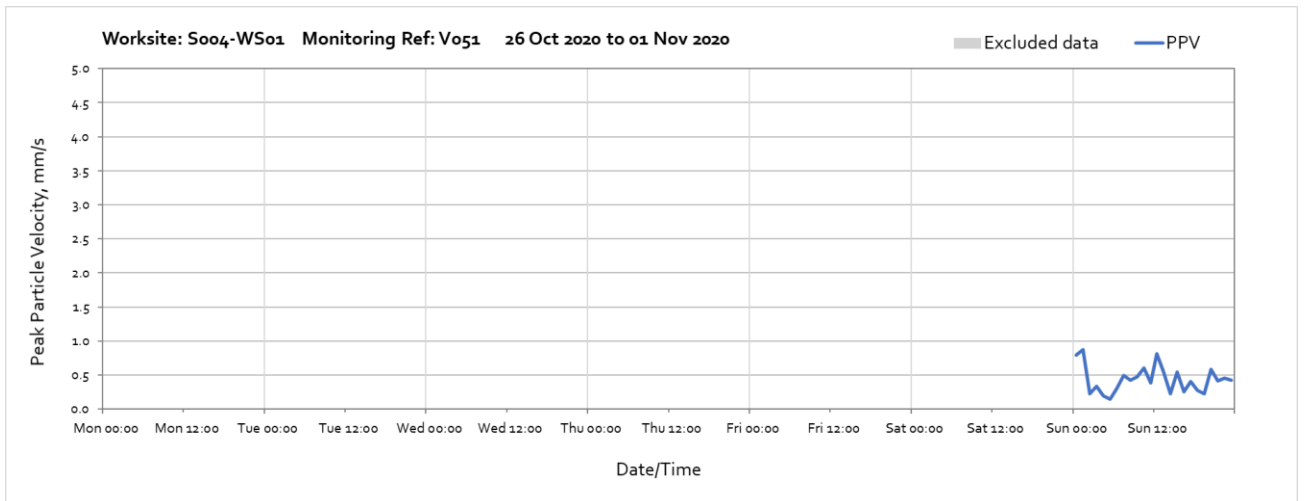


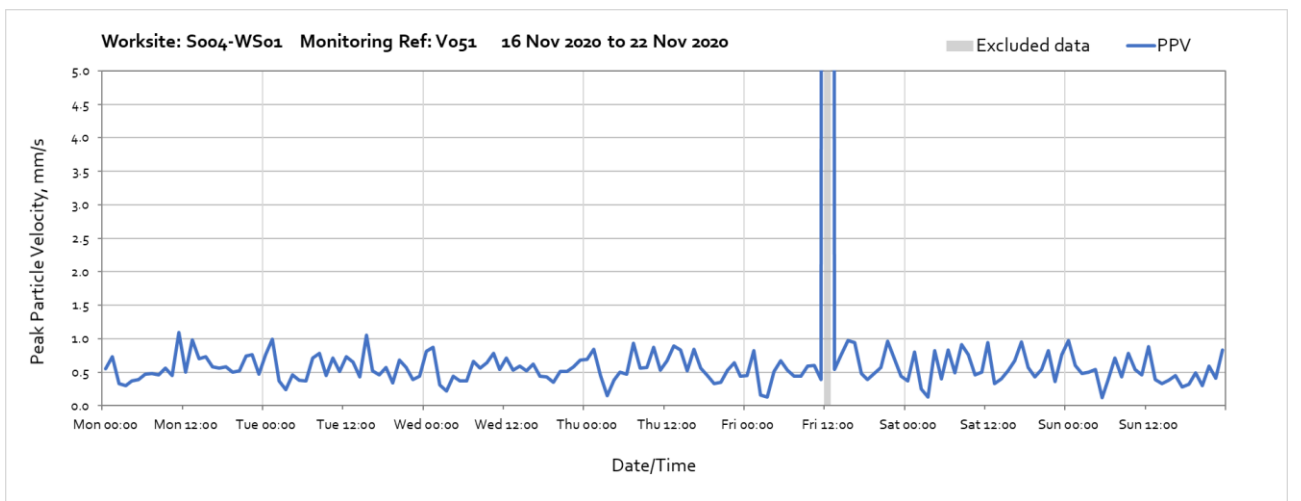
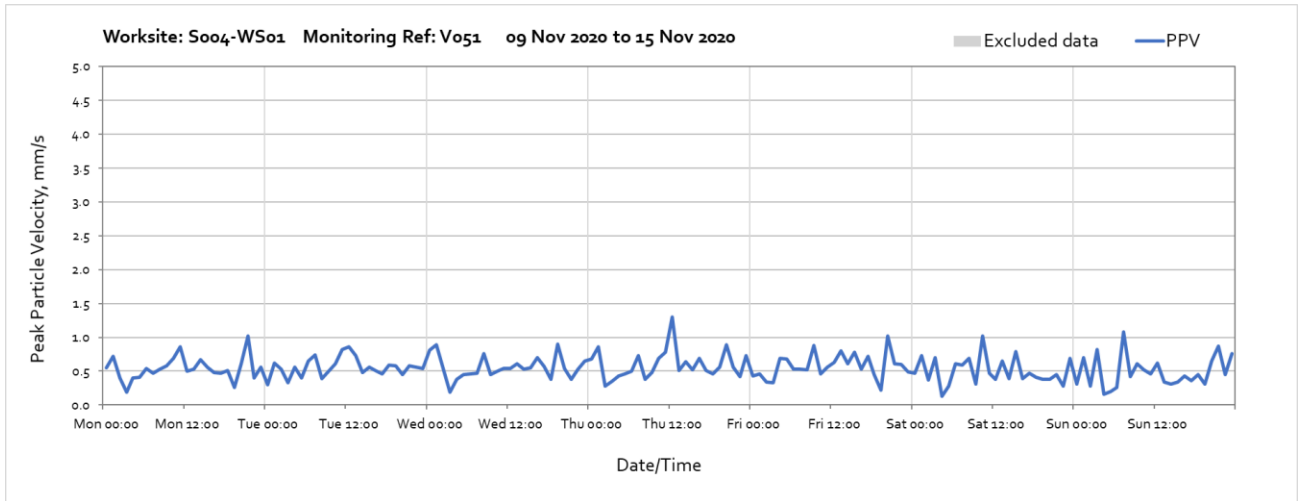
Note: High vibration levels measured at 16:00 on Friday 20th November was due to local disturbance of the monitor during battery changes and are not representative of HS2 construction vibration.



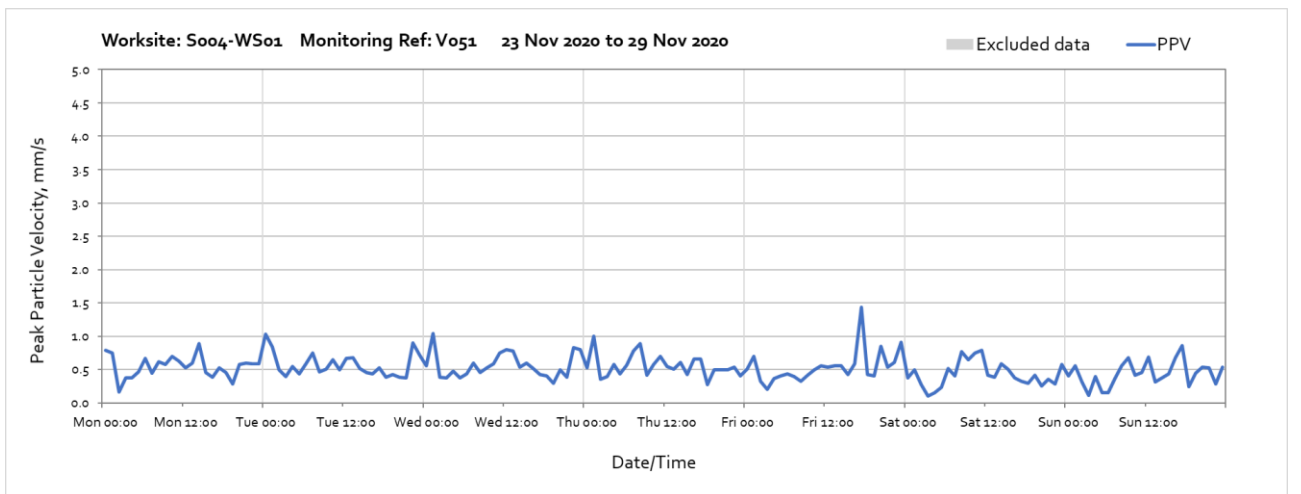


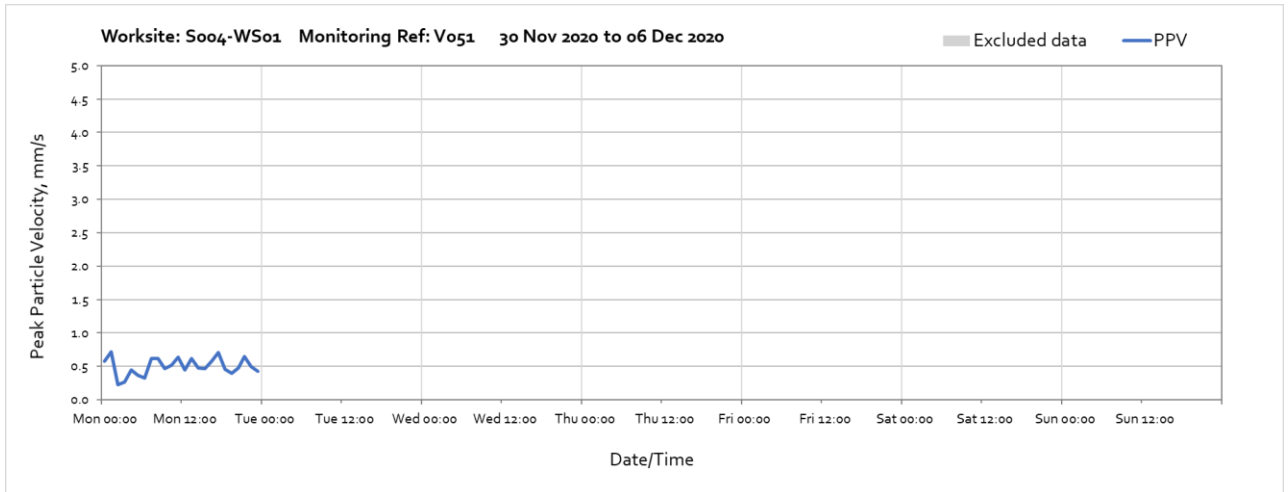
Worksite: S004-WS01 – Monitoring Ref: V051



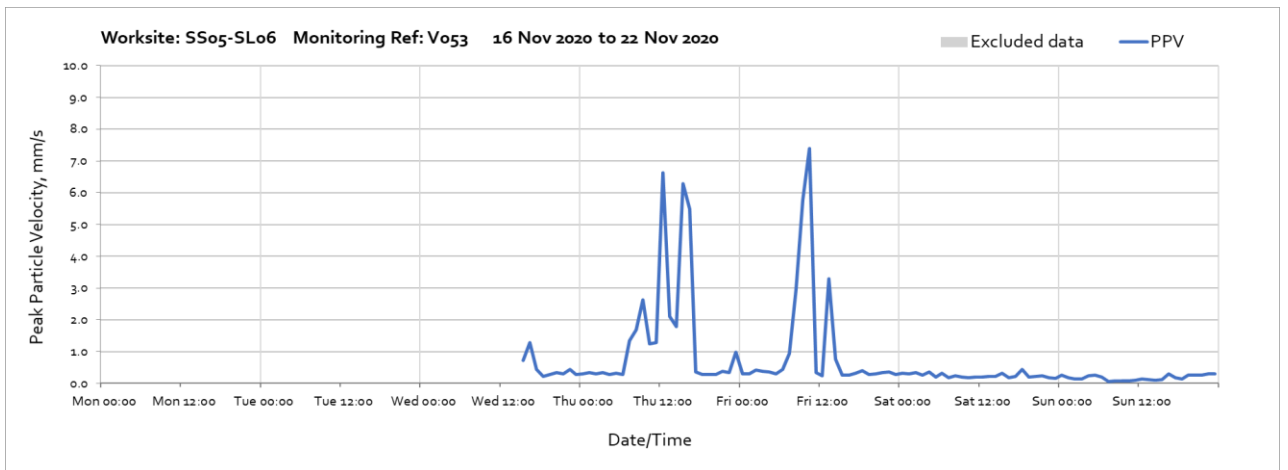


Note: High vibration levels measured at 12:00 on Friday 20th November was due to local disturbance of the monitor during battery changes and are not representative of HS2 construction vibration.

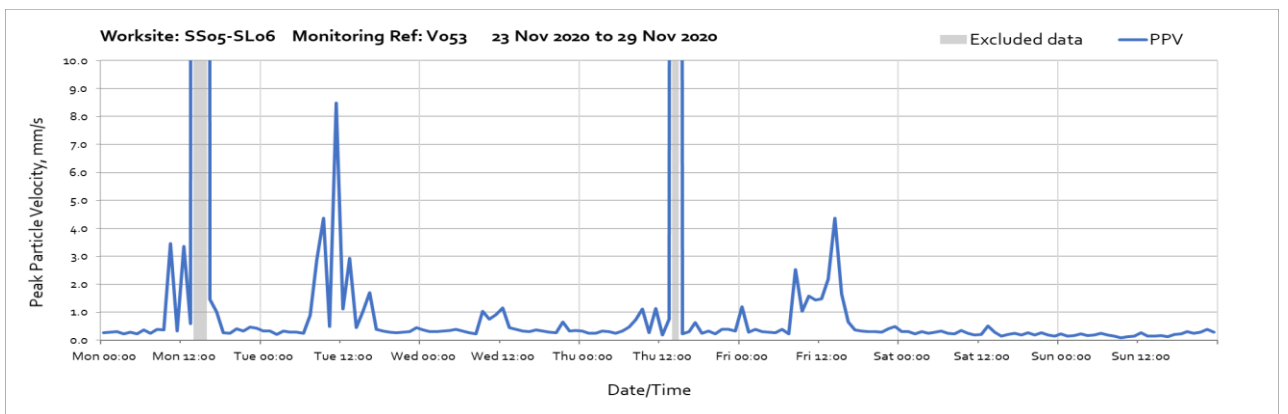




Worksite: S004-WS01 – Monitoring Ref: V053



Note: Monitor installed on Wednesday 17th November.



Note: High vibration levels measured between 14:00 and 15:00 on Monday 23rd November and at 14:00 on Thursday 26th November was due to local disturbance of the monitor and are not representative of HS2 construction vibration.

