HS2

December 2020

Construction noise and vibration Monthly Report – October 2020

London Borough of Ealing

gov.uk/hs2

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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 October 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), where installation of containers, hoarding works, vegetation clearance, excavation works were undertaken. Utility diversion works were also undertaken in the vicinity of the worksite.
- Noise and vibration monitoring was undertaken in the vicinity of the Willesden EuroTerminal worksite (ref. S001-WS03), where construction of slabs and foundations, asbestos removal works, welfare installation works, hoarding works and track laying works were undertaken
- Noise monitoring was undertaken in the vicinity of the Victoria Road worksite (ref. S002-WS01), where excavation works, construction of working platforms, hoarding works, drainage works, excavation of trial pits, sheet piling works. ground testing. Utility diversion works were also underway in the vicinity of the worksite.
- Noise monitoring was undertaken in the vicinity of the Flat Iron compound (within worksite ref. S002-WS01), where extension of the vehicle holding area and removal of redundant ground slabs were underway.
- Noise and vibration monitoring were also undertaken in proximity of the Old Oak Common depot worksite (ref. S004-WS01), where interim accommodation fitout was undertaken.
- Noise monitoring was undertaken in proximity of the Mandeville Road Badminton Close compound (ref. BC Compound), where no construction activities took place during October 2020.

Further works were also undertaken at the Green Park Way Ventilation Shaft and in Horsenden Lane, Perivale.

There were no exceedances of the HS2 threshold levels for significant noise impacts during the reporting period at any monitoring position.

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

Two 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 31st October 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 2 in Appendix A), where work activities included:
  - Installation and repair of hoardings, breakout of sealing block, vegetation clearance, excavation of trials pits for soil sampling, installation of cabins and containers, installation of traffic managements, road layout alteration works and pothole repairs to access road, excavation of trial holes, removal of temporary welfare cabins and relocation of store cabin. Power line diversion works were also undertaken in the vicinity of the worksite.
- Willesden EuroTerminal worksite, ref. S001-WS03 (see plan 2 in Appendix A), where work activities included:
  - Construction of slabs and foundations, removal of asbestos, installation of welfare hoarding works, track laying works, installation of hoardings and fencings.

- Victoria Road worksite, ref. S002-WS01 (see plan 3 in Appendix A), where work activities included:
    - Continued excavation works, construction of working platforms, drainage installation works, probing for potential unexploded ordnance (UXO), excavations of trial pits, hoarding works, and sheet piling works. Utility diversion works were also underway in the vicinity of the worksite.
- Flat Iron compound, within worksite ref. S002-WS01 (see plan 3 in Appendix A), where work activities included:
    - Preparation works for extension of vehicle holding area and removal of redundant ground slabs.
- Old Oak Common depot worksite, located in the London Borough of Hammersmith and Fulham (LBHF), ref. S004-WS01 (see plan 4 in Appendix A), where work activities included:
    - Site set-up and interim accommodation fitout.
- Noise monitoring was undertaken in proximity of the Mandeville Road Badminton Close compound (ref. BC Compound), where no construction activities took place and only provision of site security was undertaken during the month. However, the worksite was used as a storage area.

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

- The Green Park Way Ventilation Shaft where works included excavation and construction of haul road and working platform; construction of hard standings; installation of site hoardings; and breaking of concrete walls.
- 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 Fourteen noise and three vibration monitoring installations were active in October 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 (N060) was installed at Atlas Road west site hoarding, next to Bashey Road, Atlas Road worksite, ref. S001-WS02, on the 30th of October 2020.

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

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	65.2	65.6	64.8	63.8	60.2	62.8	64.9	65.0	65.4	59.9	63.7	60.0
				(66.1)	(66.5)	(67.7)	(66.1)	(66.4)	(63.8)	(66.1)	(65.4)	(67.9)	(63.8)	(65.6)	(64.8)
	N033	Outside The Collective, Atlas Road/Victoria Road	Free-field	68.1	68.2	66.8	65.3	61.9	68.0	65.8	65.9	66.5	61.7	64.6	61.5
				(70.2)	(68.9)	(69.4)	(67.5)	(69.7)	(74.8)	(66.4)	(67.1)	(70.0)	(69.7)	(68.8)	(66.5)
	N060*	Atlas Road next to Bashey Road	Free-field	-	68.1	57.8	52.1	52.7	59.8	53.7	-	52.0	51.4	-	-
				-	(68.1)	(57.8)	(54.6)	(59.1)	(59.8)	(53.7)	-	(53.1)	(51.8)	(0.0)	-
S001-WS03	N034	Stephenson Street (north)	Free-field	53.0	56.8	52.9	52.0	48.0	52.3	55.4	53.5	52.7	46.7	50.2	46.7
				(56.0)	(62.0)	(58.0)	(56.1)	(56.3)	(54.2)	(61.8)	(55.1)	(55.5)	(51.9)	(55.4)	(52.6)
	N035	Stephenson Street (south)	Free-field	56.1	57.9	52.4	50.8	48.6	54.3	62.5	58.2	56.2	47.7	50.5	47.4
				(57.9)	(61.4)	(55.5)	(54.7)	(55.8)	(54.8)	(88.0)	(71.1)	(76.6)	(51.4)	(55.9)	(53.1)
	N041	Junction of Stephenson Street/Goodhall Street	Free-field	55.6	58.5	55.1	54.2	49.7	52.8	55.2	54.4	54.5	49.0	53.5	48.5
				(58.9)	(66.0)	(60.7)	(58.3)	(58.4)	(54.4)	(56.3)	(54.9)	(58.5)	(52.1)	(57.2)	(53.3)

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	51.2 (52.4)	57.5 (60.5)	55.4 (61.2)	56.1 (61.4)	52.5 (66.0)	52.1 (54.7)	55.1 (58.1)	57.4 (62.5)	54.7 (62.5)	48.0 (55.6)	53.1 (55.0)	49.6 (57.6)
	N030	Bodens car park	Free-field	55.5 (58.5)	61.4 (64.7)	54.1 (55.2)	53.2 (56.3)	50.3 (55.8)	52.4 (53.2)	59.6 (65.0)	56.0 (63.1)	54.4 (61.5)	49.2 (54.5)	52.7 (60.1)	49.4 (53.7)
	N031	School Road, outside Acton Business Centre	Free-field	58.5 (62.6)	64.3 (70.1)	57.4 (60.1)	55.4 (60.3)	52.3 (62.6)	52.5 (53.9)	60.1 (62.7)	56.9 (58.8)	57.0 (62.6)	52.4 (63.9)	54.5 (57.0)	50.8 (56.5)
	N049	Flat Iron compound	Free-field	53.2 (54.8)	58.9 (62.0)	55.7 (62.3)	54.5 (58.1)	53.7 (67.7)	55.2 (57.8)	55.6 (59.4)	55.3 (56.7)	53.3 (57.1)	48.2 (55.2)	50.6 (52.4)	51.6 (57.5)
	N050	Acton Square, outside North Acton Station	Free-field	64.1 (67.8)	65.4 (73.2)	63.0 (64.7)	62.6 (68.1)	58.3 (71.0)	62.5 (63.0)	64.9 (70.1)	64.7 (69.9)	63.5 (66.2)	58.7 (63.6)	61.8 (69.0)	57.5 (61.4)
S004-WS01	N027	Old Oak Common Lane	Free-field	64.9 (67.0)	63.8 (66.7)	62.6 (64.2)	60.0 (64.2)	57.7 (63.6)	58.9 (59.4)	60.9 (61.5)	60.9 (61.3)	61.3 (64.4)	58.2 (63.8)	59.9 (62.3)	57.7 (63.2)
	N028	Old Oak Common Lane, Hilltop Works	Free-field	69.1 (70.3)	69.1 (70.8)	68.4 (73.2)	66.4 (72.2)	61.9 (67.6)	65.8 (67.7)	70.0 (81.4)	67.6 (68.7)	67.8 (72.0)	61.4 (65.4)	65.9 (68.6)	62.1 (68.8)
BC Compound	N040	Badminton Close	Free-field	55.5 (57.6)	56.4 (58.5)	55.3 (57.0)	54.6 (57.8)	51.5 (59.0)	55.0 (56.4)	55.4 (57.7)	54.9 (57.3)	55.1 (58.5)	51.9 (59.2)	54.2 (56.5)	50.8 (57.4)

* Noise monitor N060 was installed at 10:00 on Friday 30th October. Due to installation late in the month data were recorded only for certain time periods at this position.

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)	1.21 (Z-axis)
S004-WS01	V045	Old Oak Common Lane	1.21 (Z-axis)
S004-WS01	V051	Kildun Court, Old Oak Common Lane	4.33* (Z-axis)

* High levels of vibration are due to activities being undertaken in close proximity to the monitor and not representative of vibration levels at nearby receptors.

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 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.

2.2.4 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	No exceedance
	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

2.2.5 No exceedances of the SOAEL were recorded due to HS2 construction works during October 2020.

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
-	-	-	-	-	-

2.4 Complaints

2.4.1

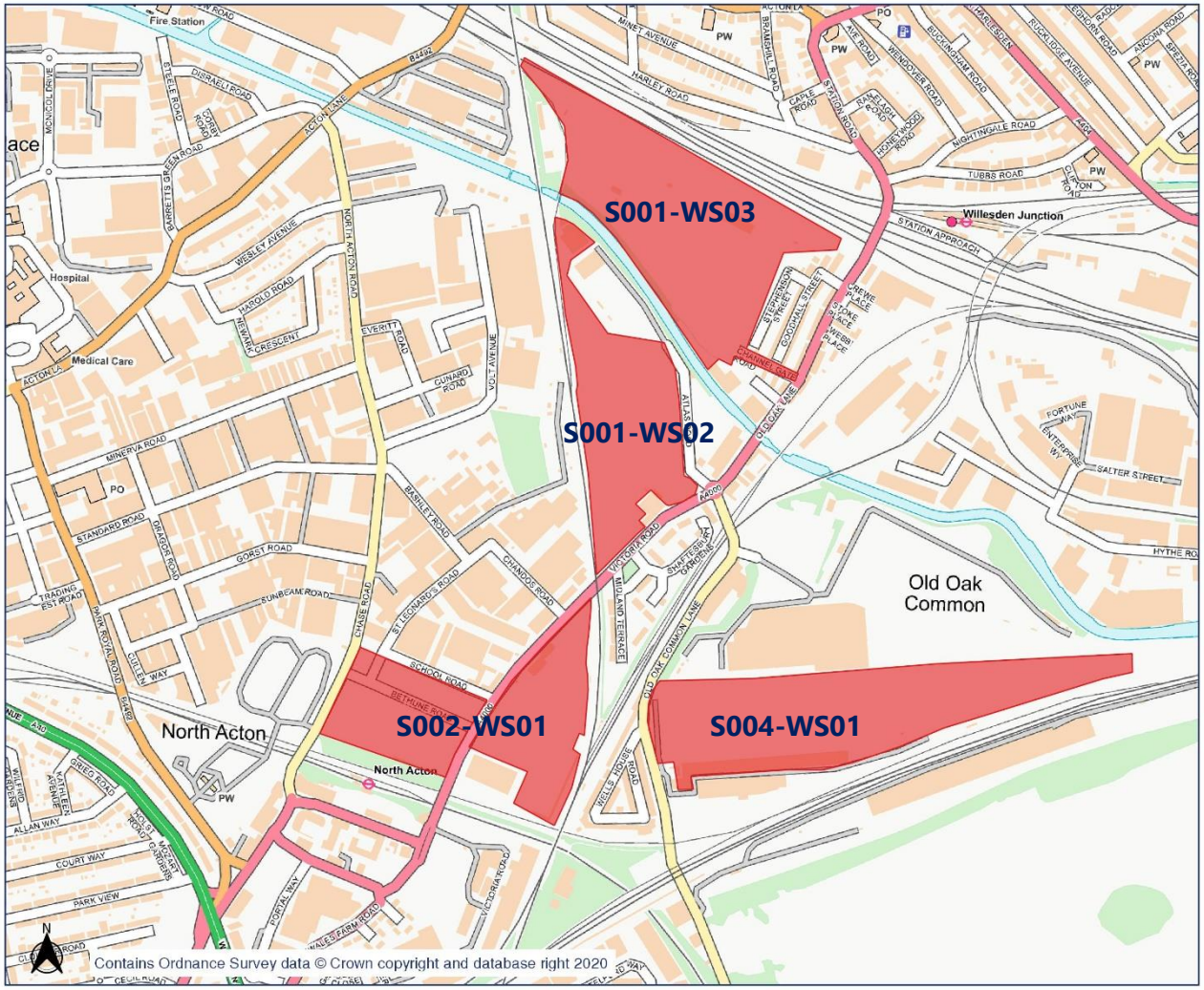
2.4.2 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 7: Summary of Complaints

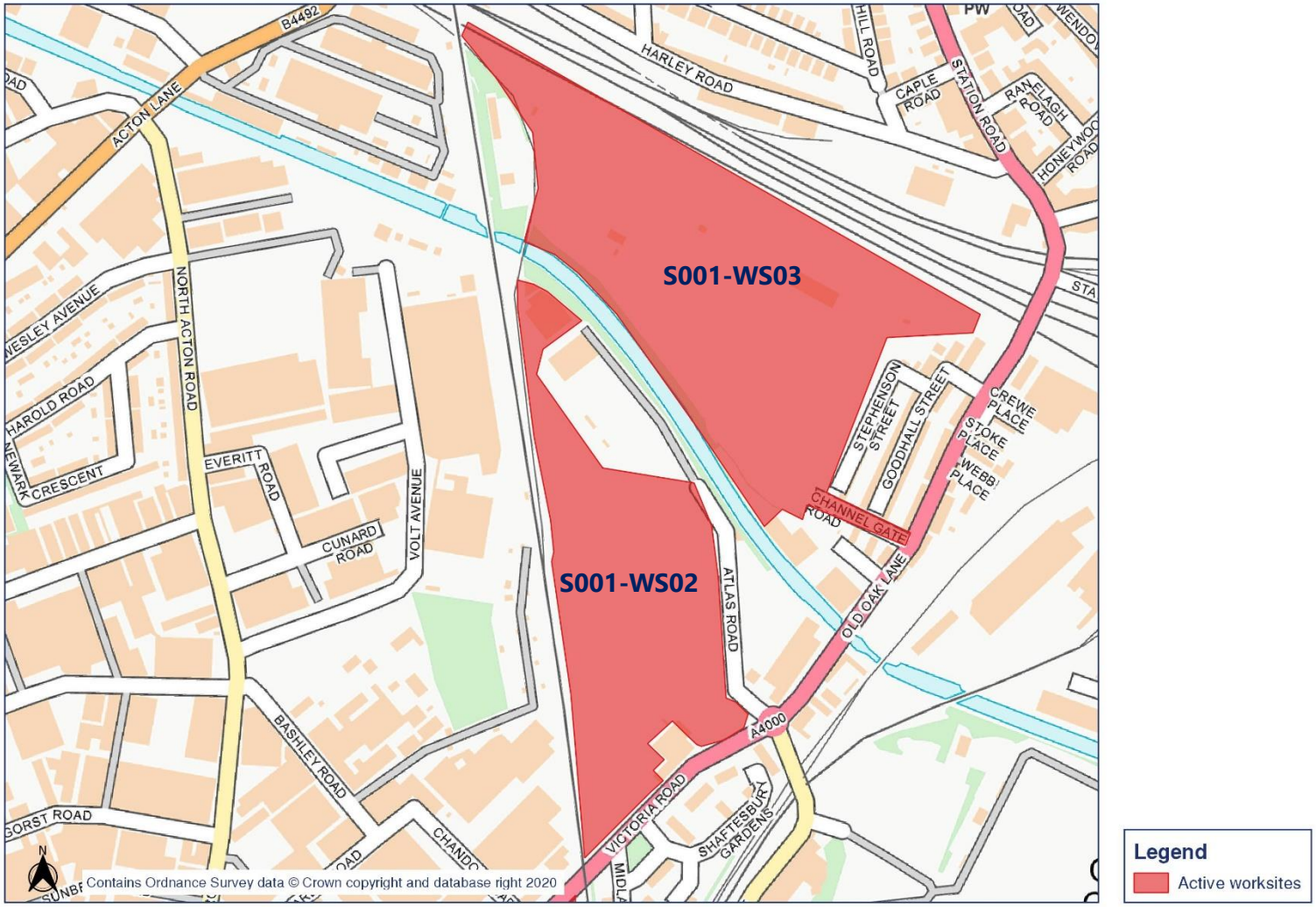
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-20-40790-C	S002-WS01	Complaint regarding increase of noise levels from road vehicles (e.g. horns) due to traffic management system (e.g. placement of temporary traffic lights.)	Traffic management works were underway in the vicinity of Victoria Road worksite.	Operation of the traffic management system has changed to reduce impacts.
HS2-20-40807-C	BC Compound	Complaint regarding shaking of building due to heavy construction works taking place nearby.	On-going	On-going

Appendix A Site Locations

Worksite identification plan - 1



HS2 Worksite identification plan - 2



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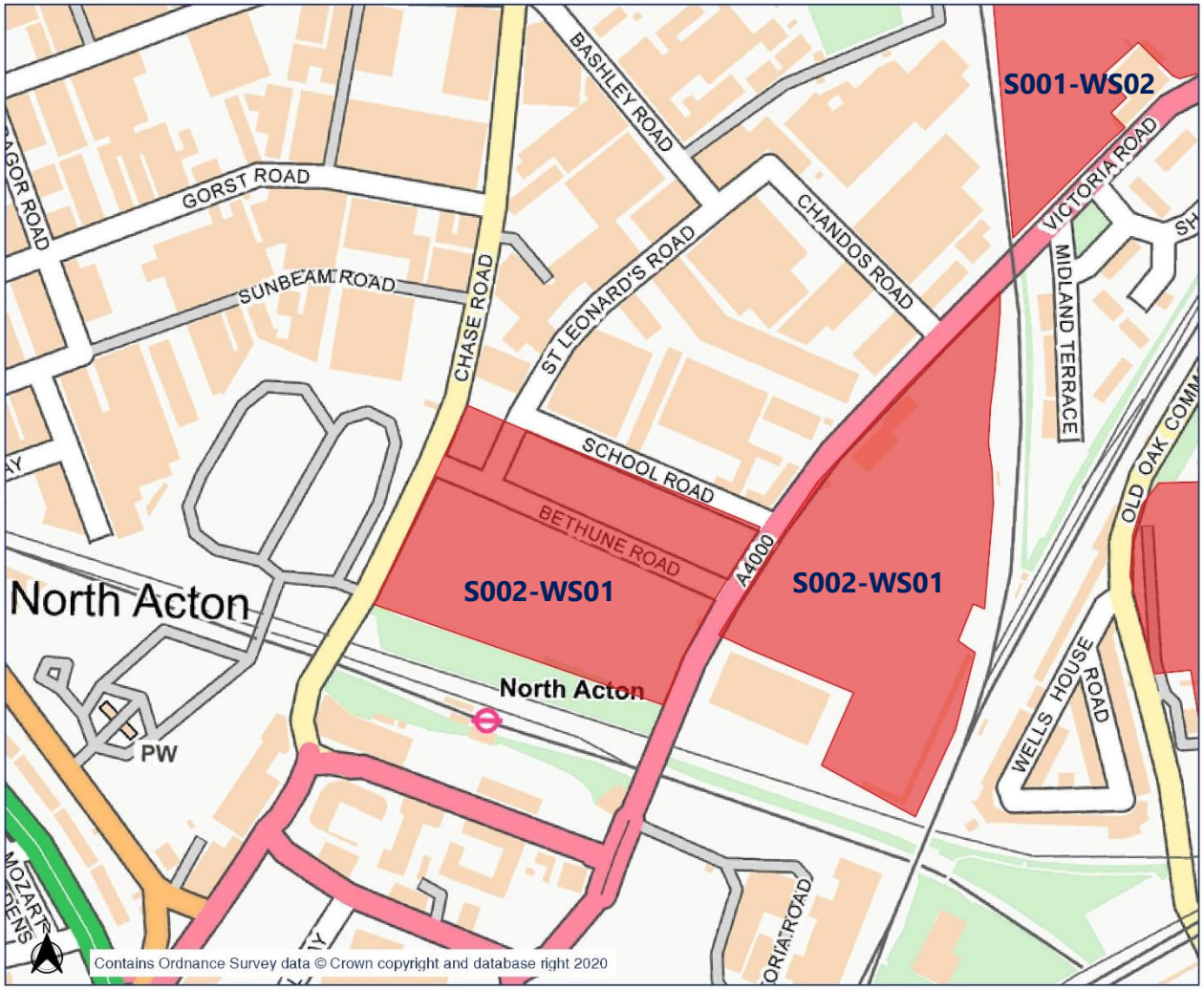
Worksite identification plan - 3



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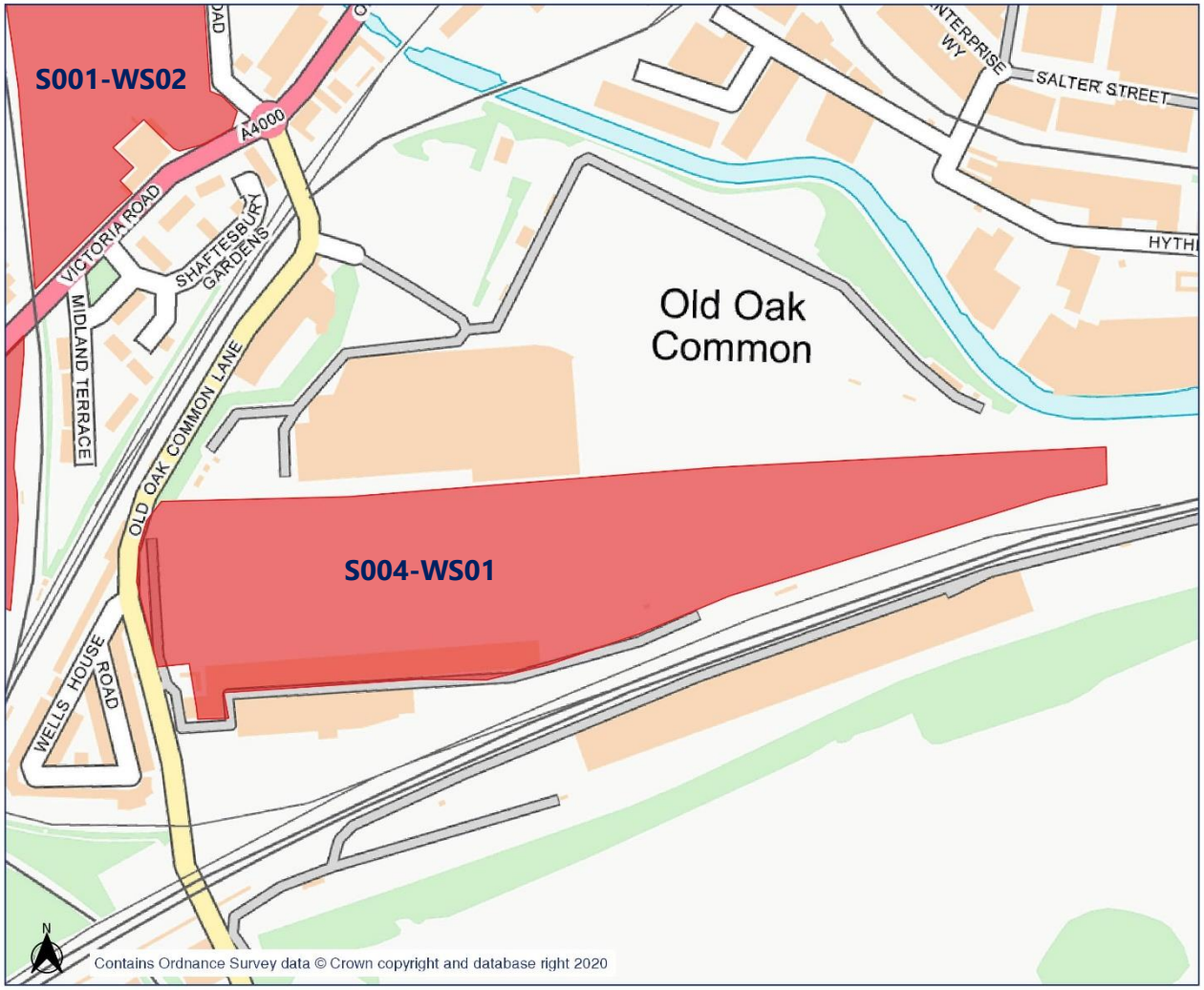
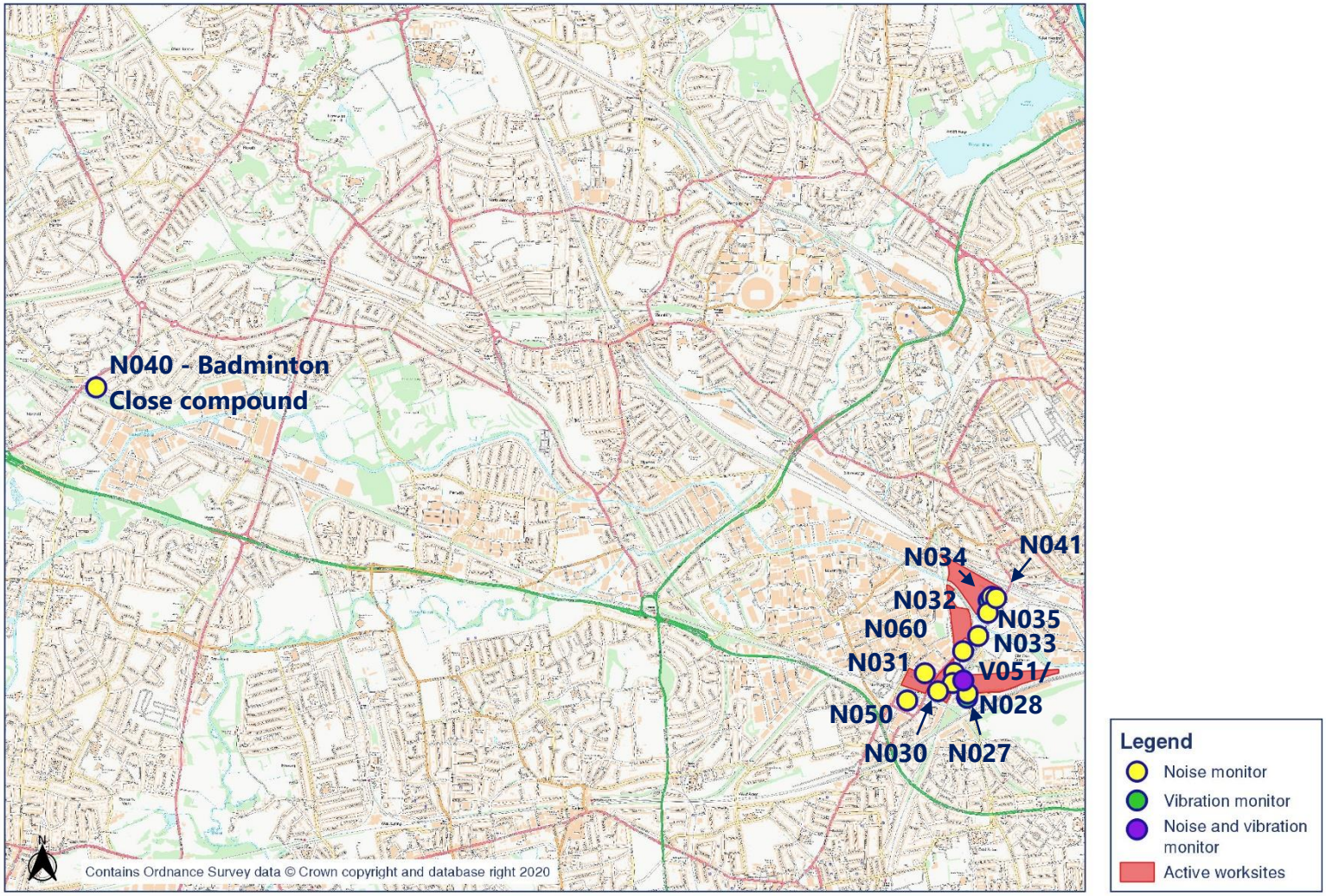
Worksite identification plan - 4

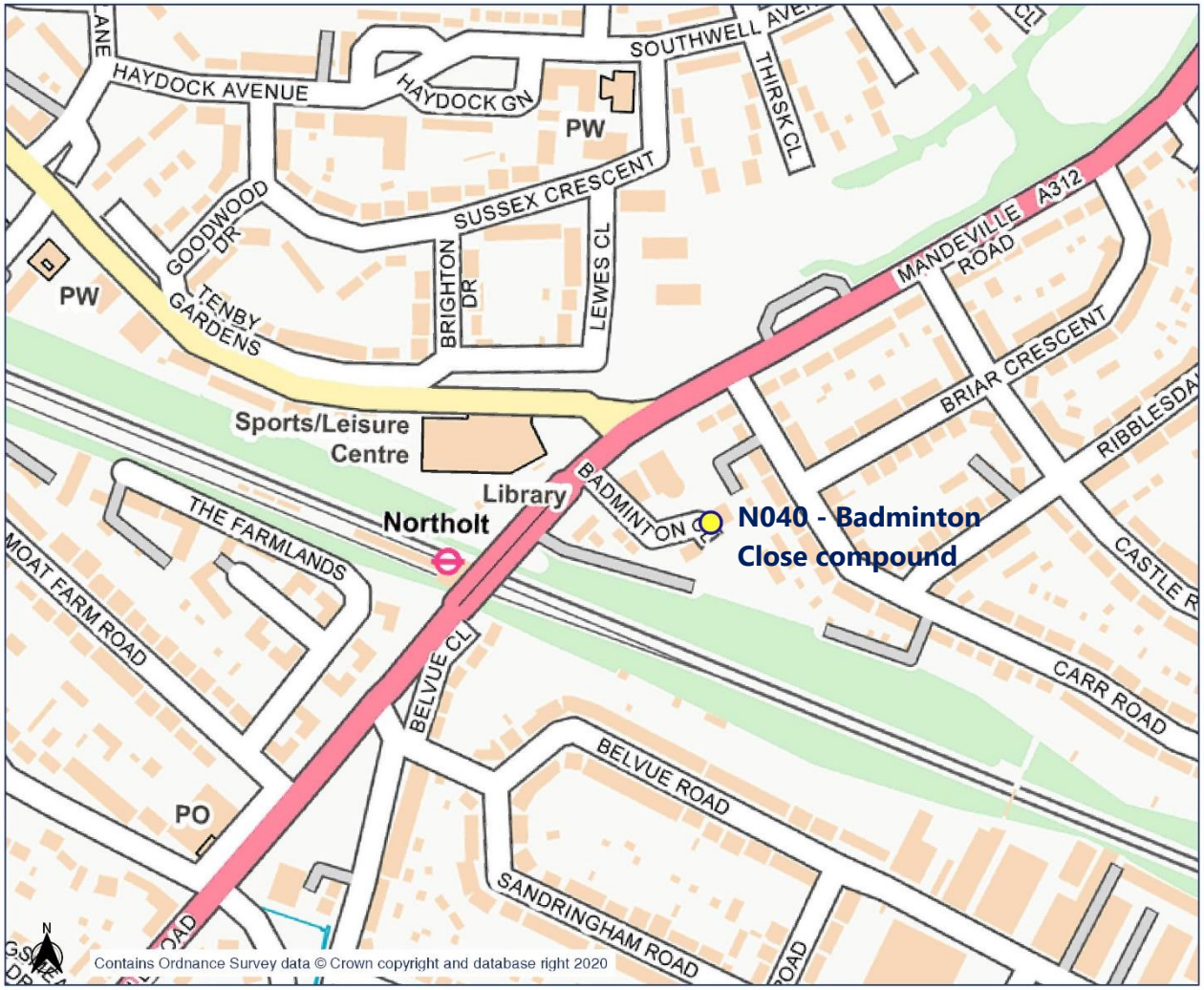


Appendix B Monitoring Locations

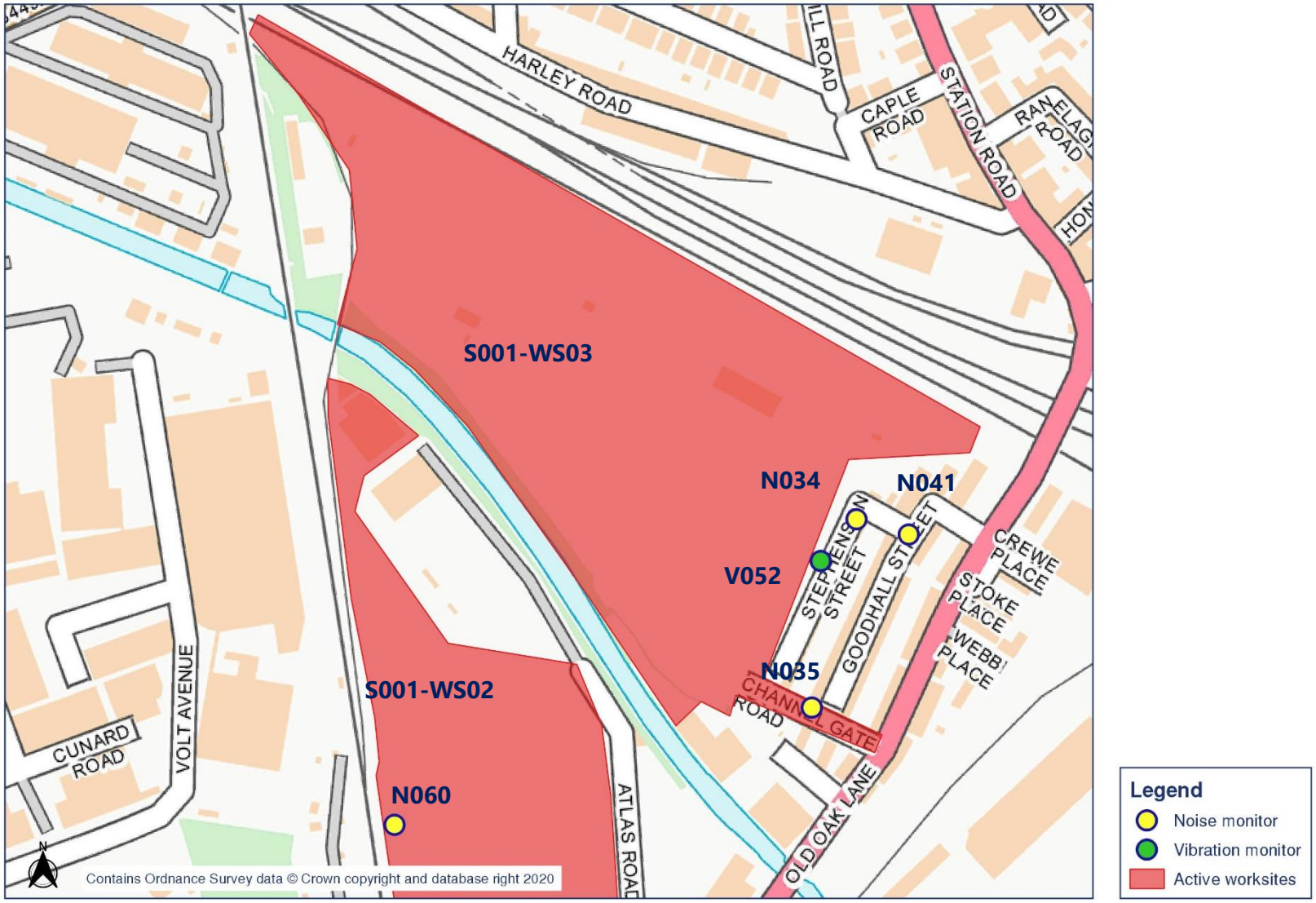
HS2 Noise and vibration monitoring plan - 1



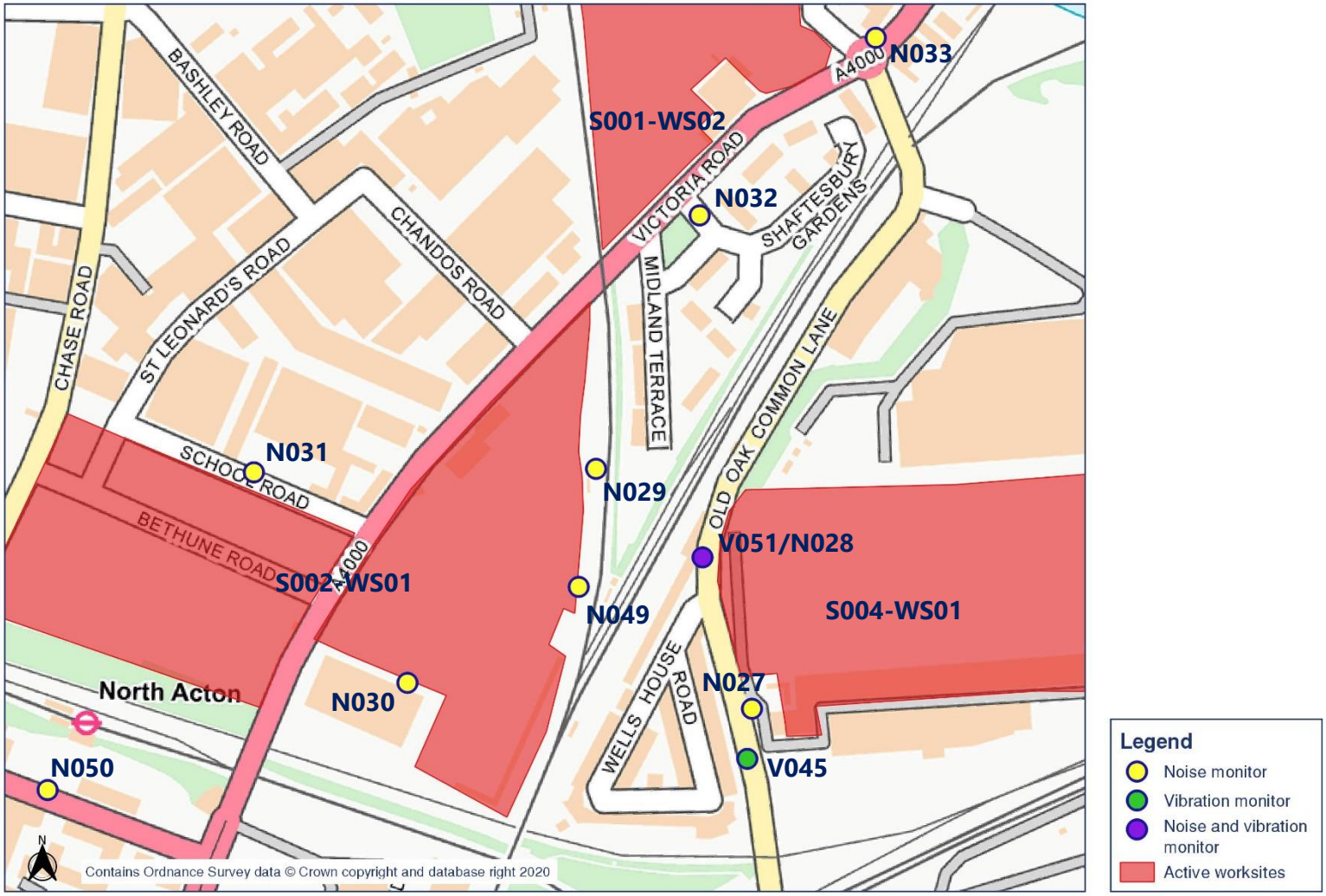
HS2 Noise and vibration monitoring plan - 2



Noise and vibration monitoring plan - 3



HS2 Noise and vibration monitoring plan - 4

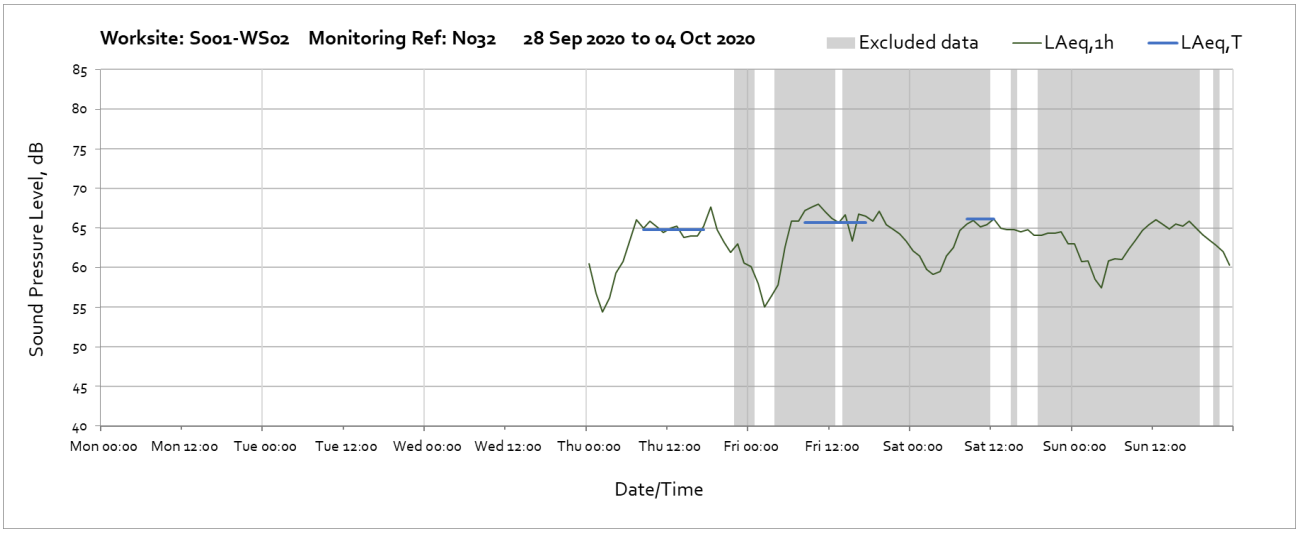


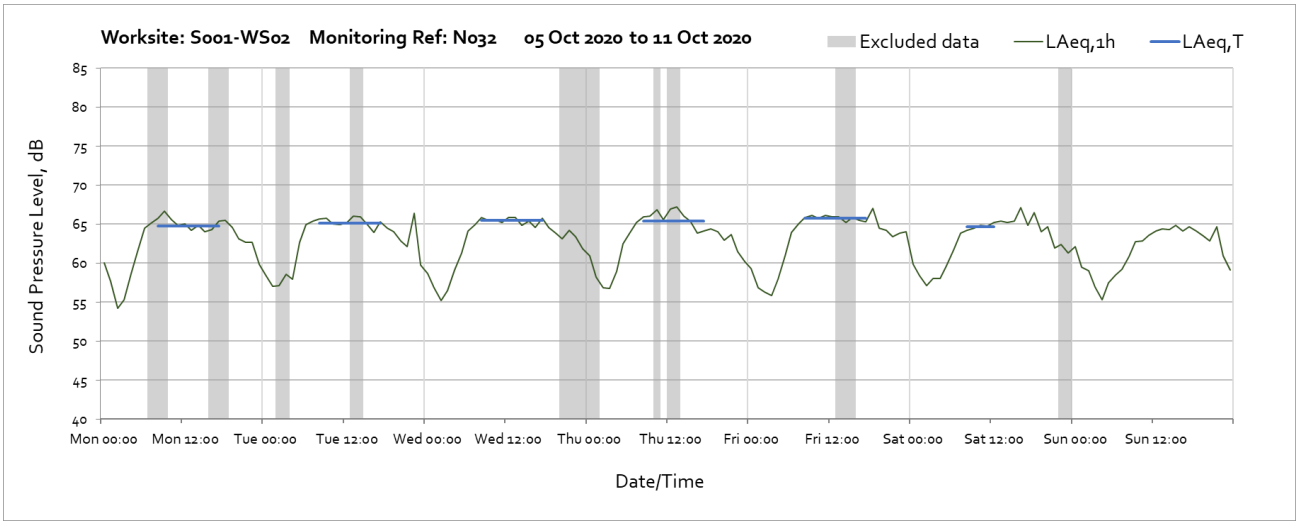
Appendix C Data

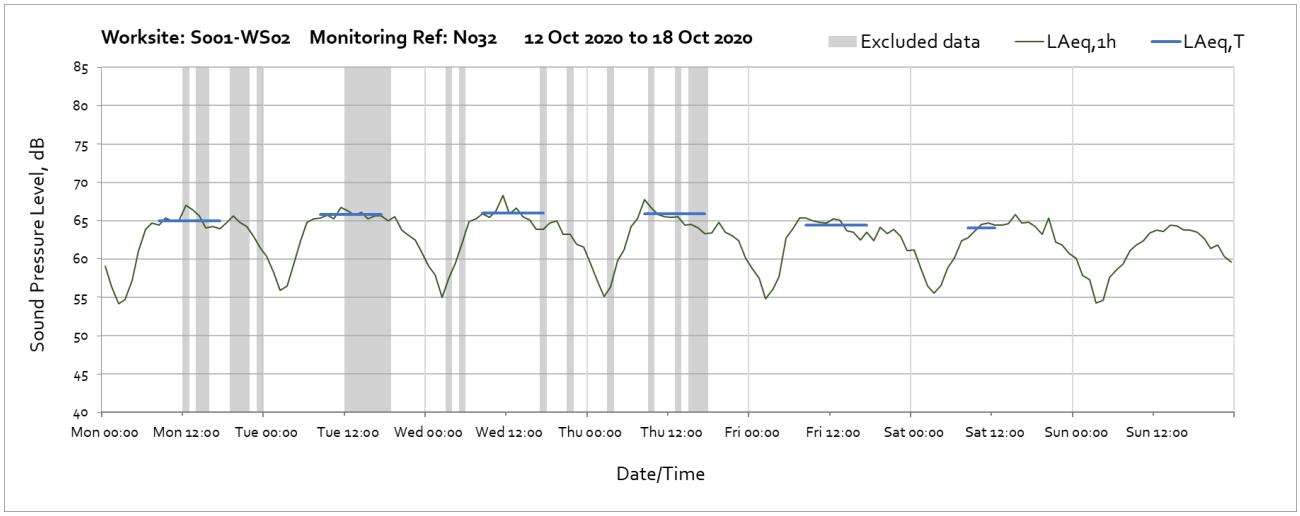
Noise

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: N032 12 Oct 2020 to 18 Oct 2020
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
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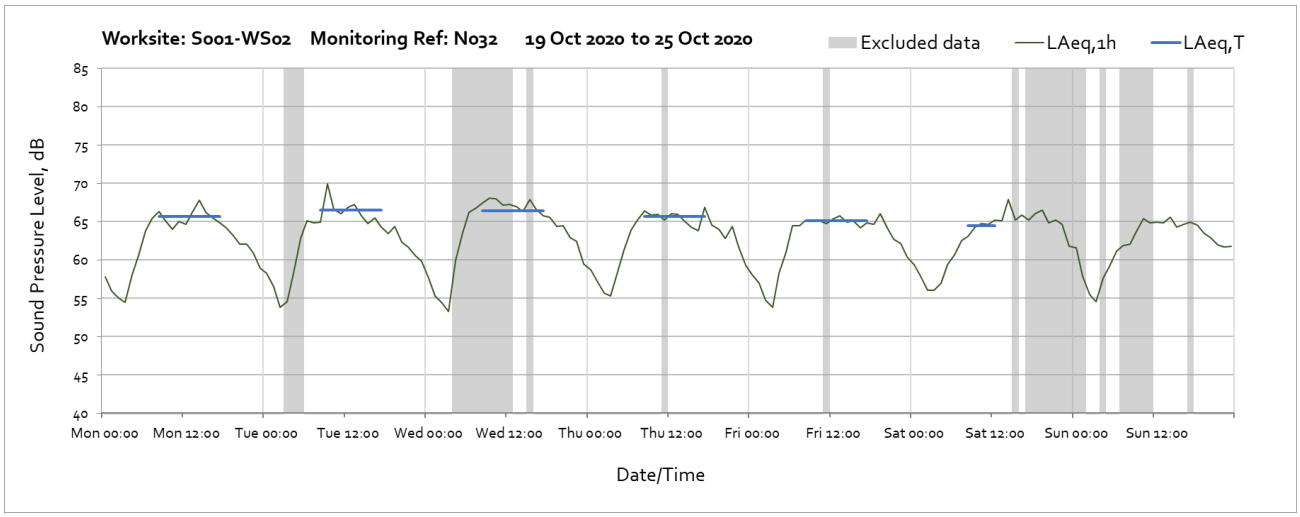
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: S001-WS02 Monitoring Ref: N032 19 Oct 2020 to 25 Oct 2020
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
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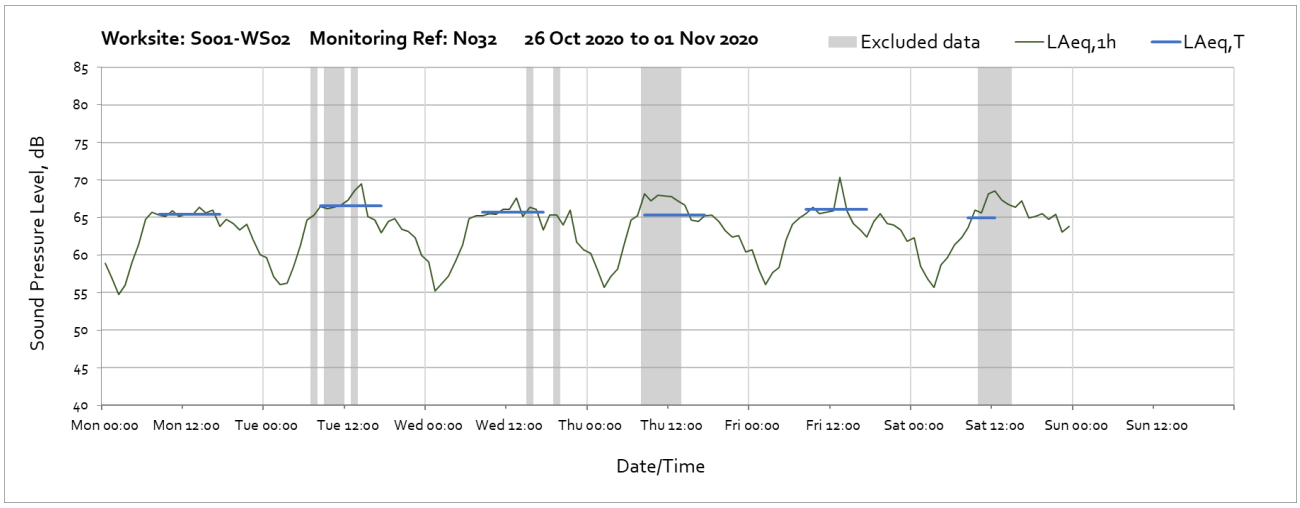
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: S001-WS02 Monitoring Ref: N032 26 Oct 2020 to 01 Nov 2020
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
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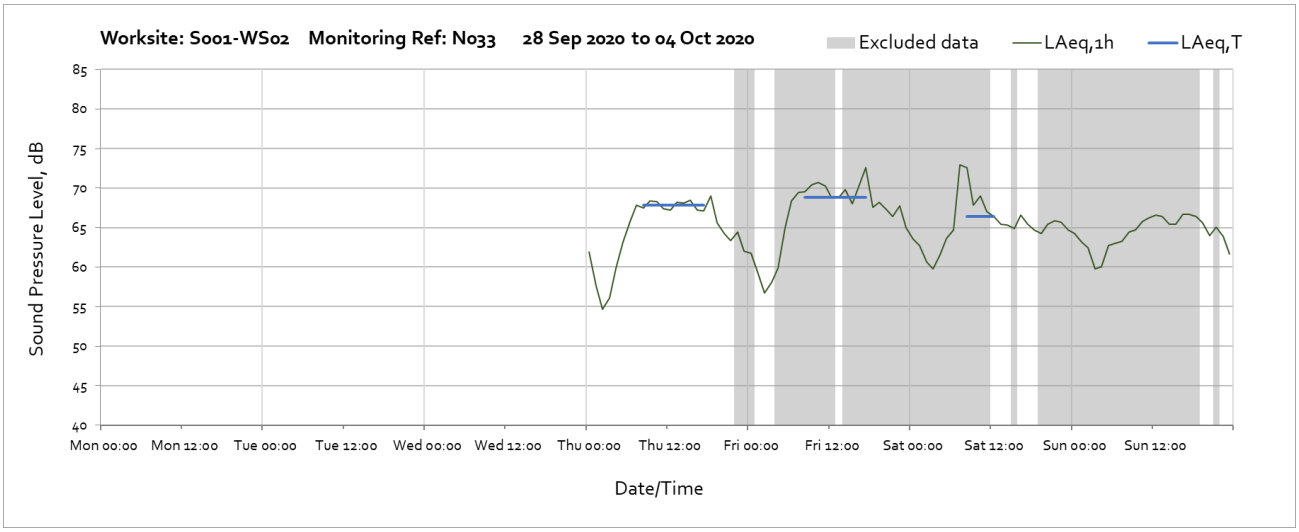
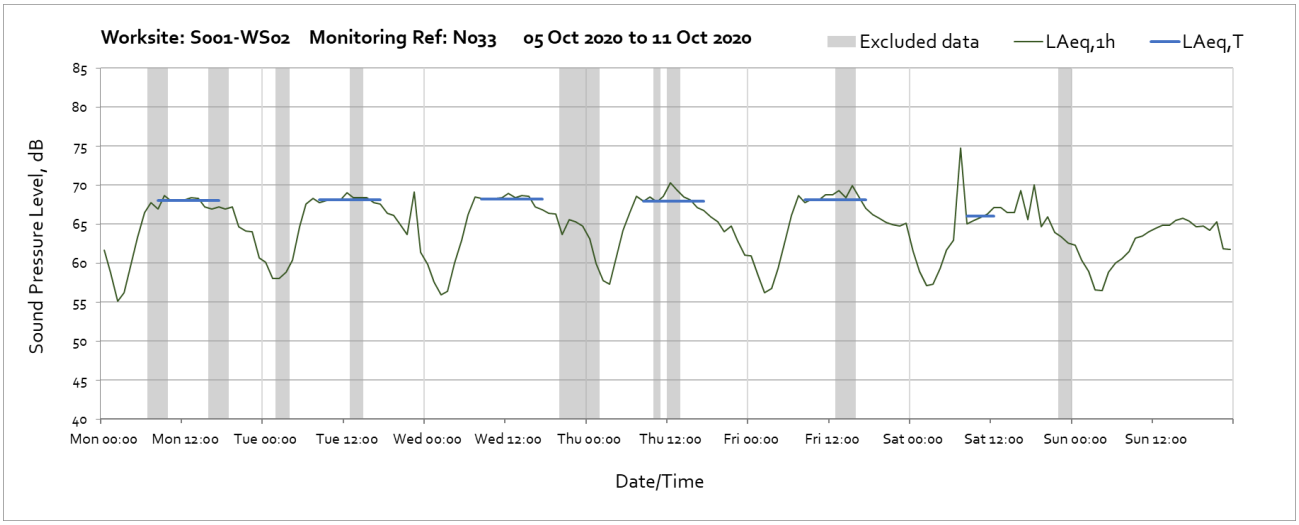
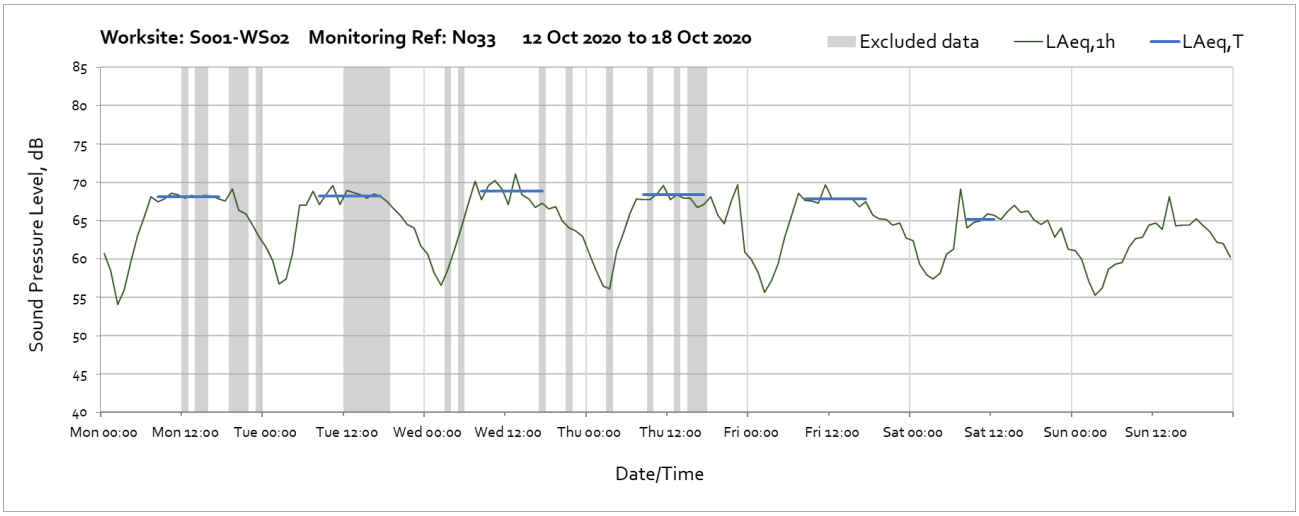
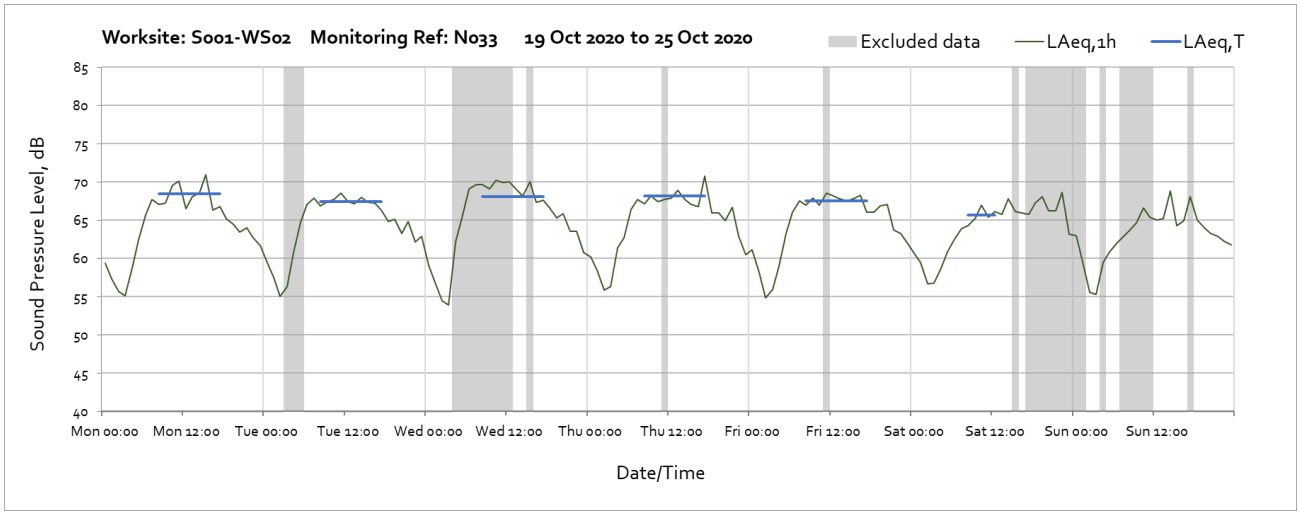
Sun 00:00
Sun 12:00
Date/Time

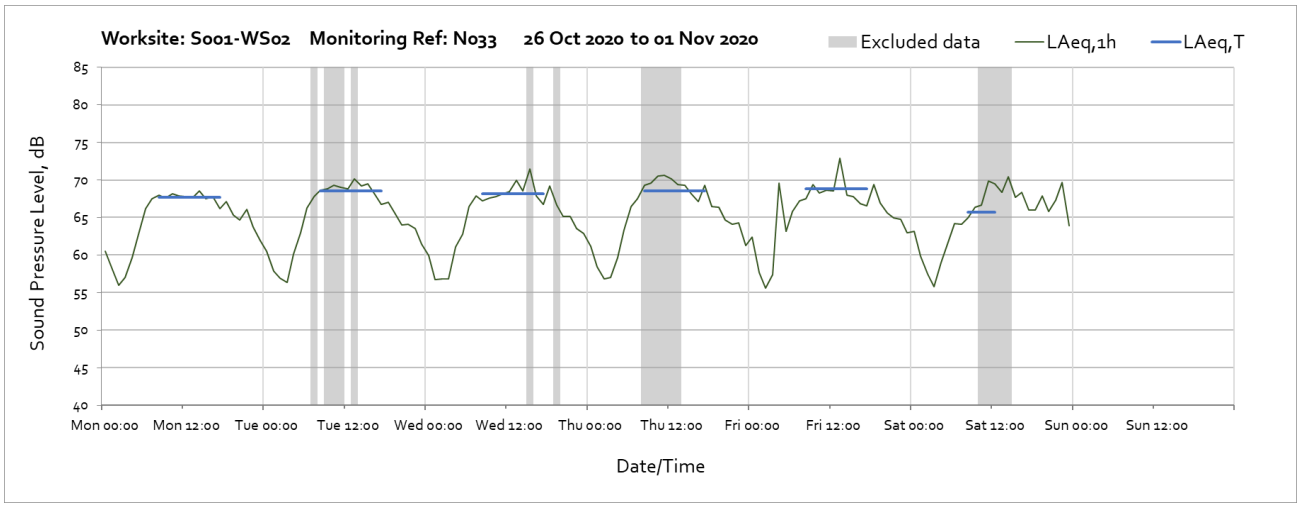
Worksite: S001-WS02 – Monitoring Ref: N033



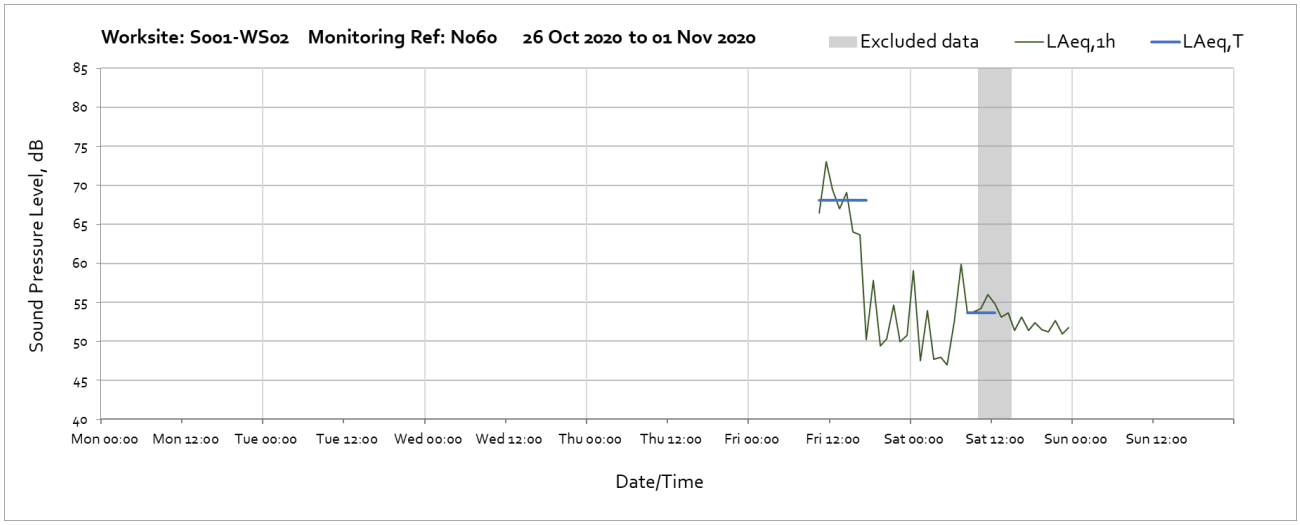






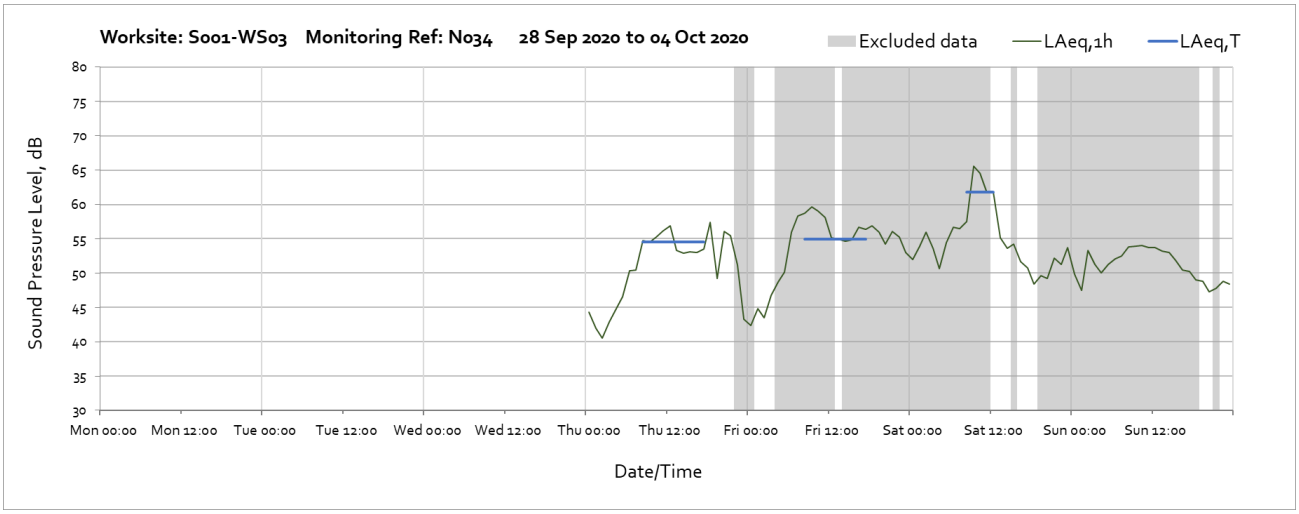


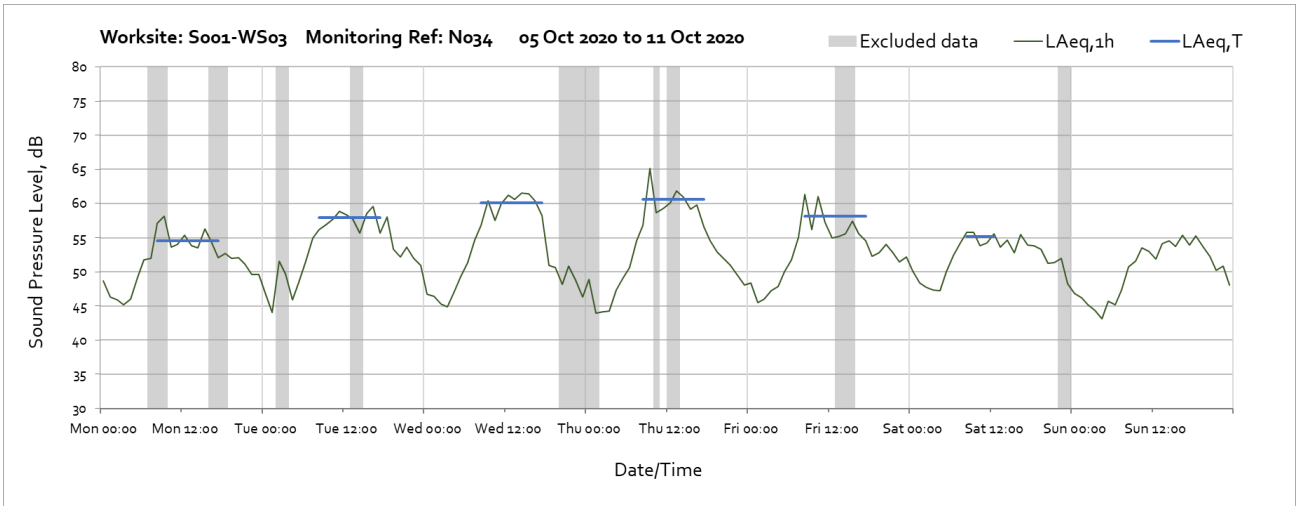
Worksite: S001-WS02 – Monitoring Ref: N060

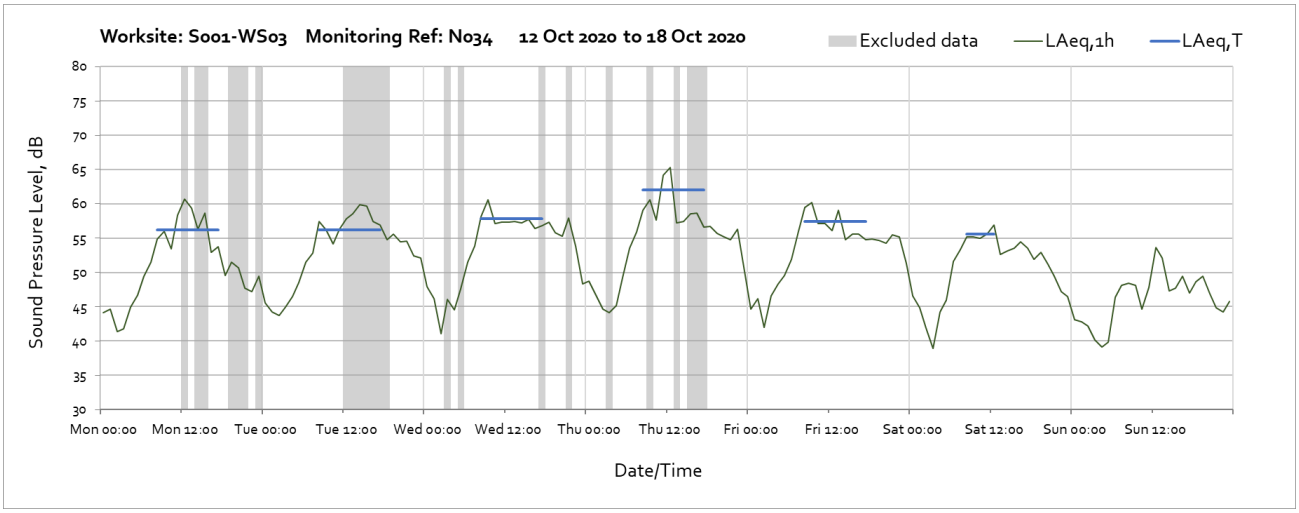


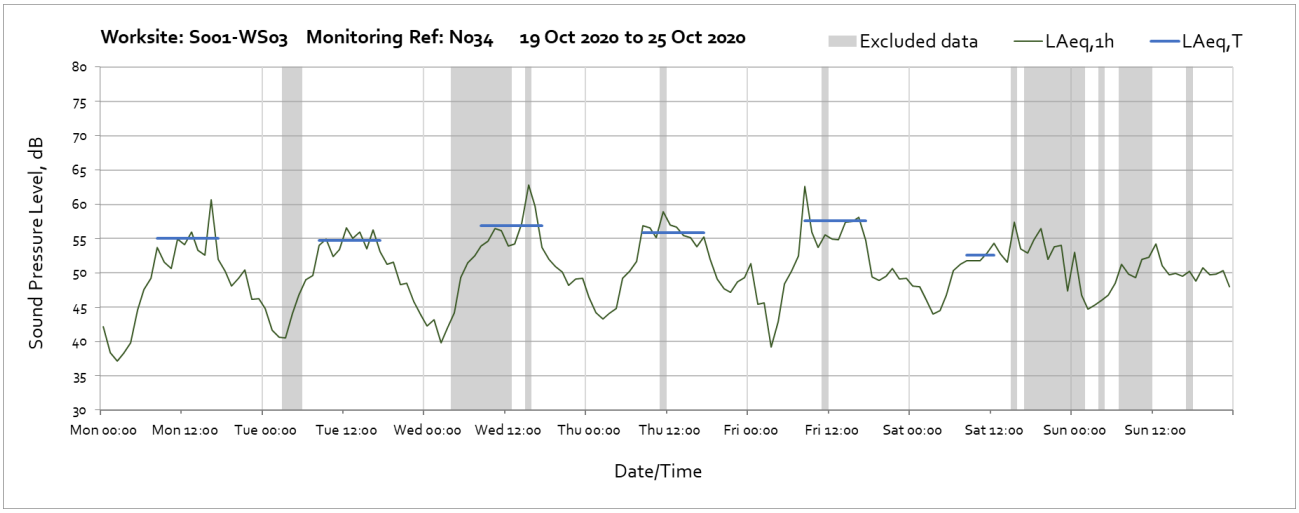
Note: The noise monitor was installed at 10:00 on Friday 30th October.

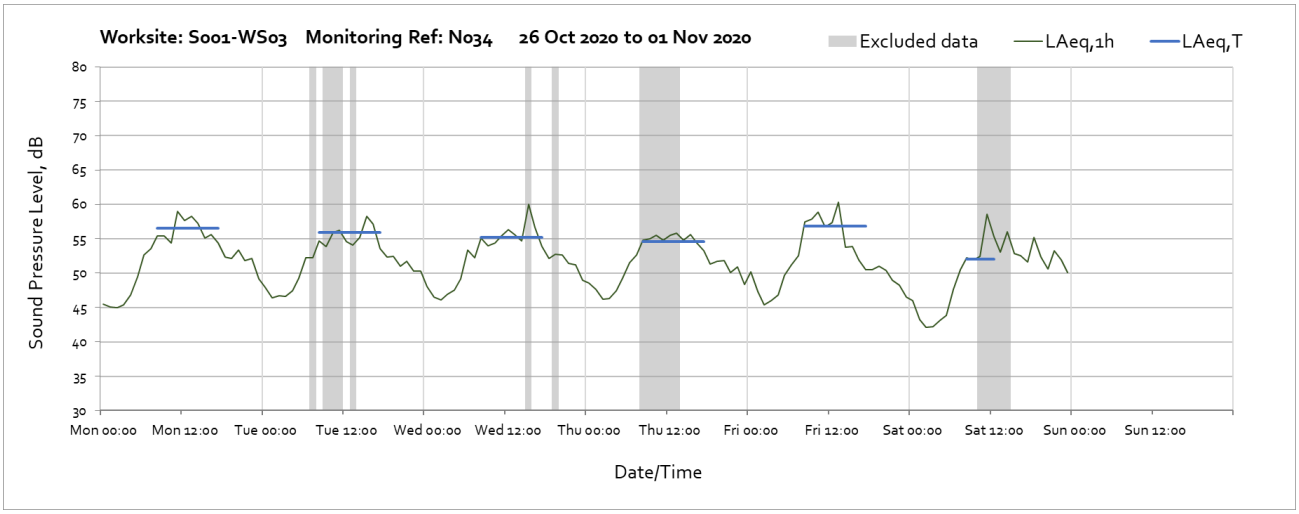
Worksite: S001-WS03 – Monitoring Ref: N034



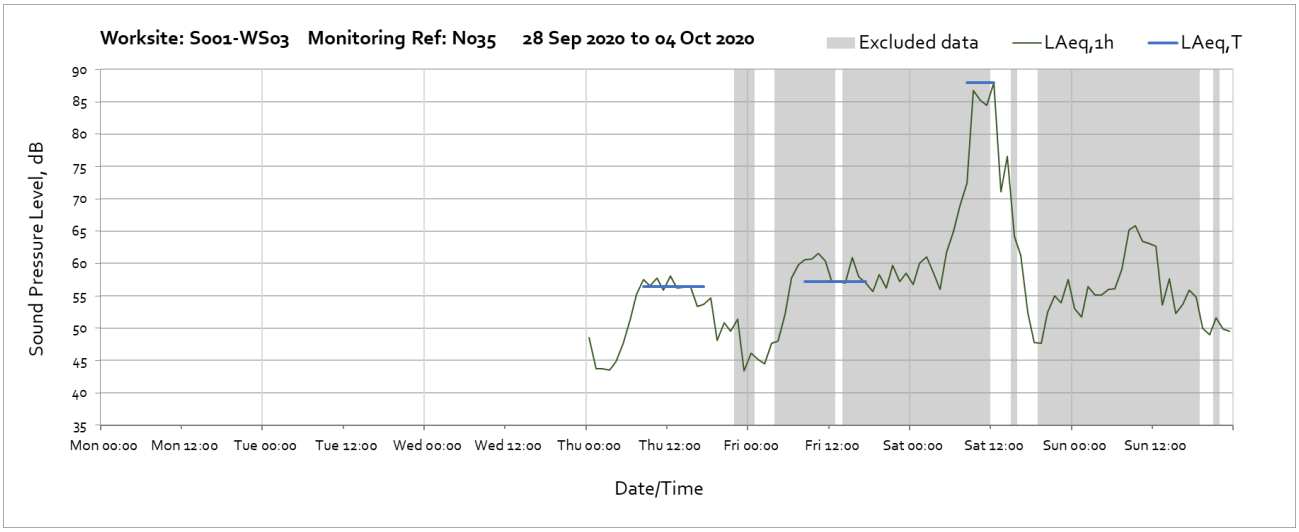


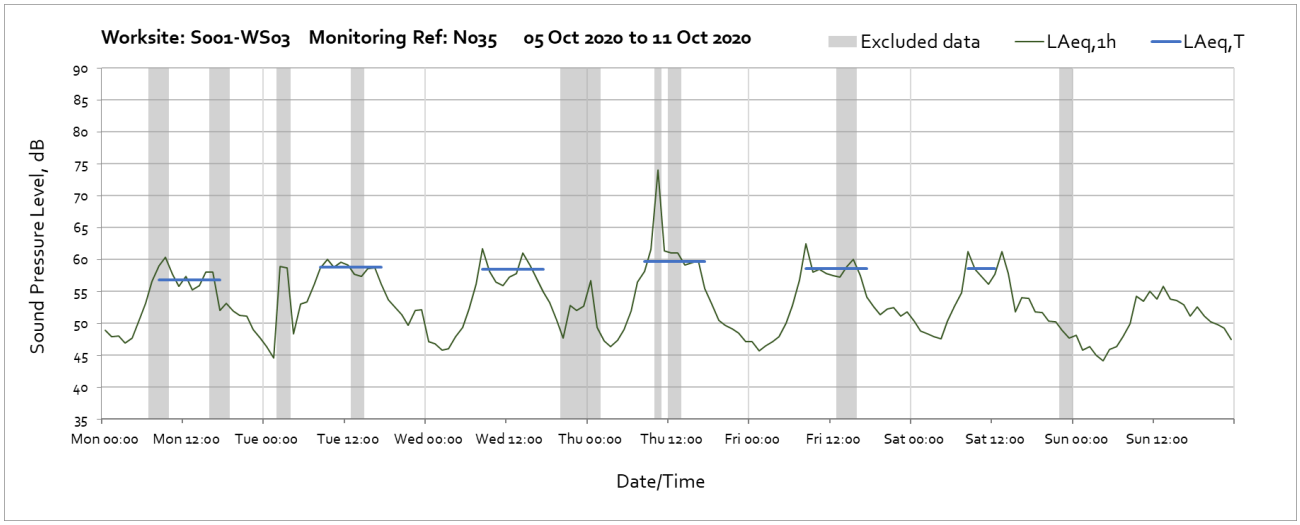






Worksite: S001-WS03 – Monitoring Ref: N035




Worksite: S001-WS03 Monitoring Ref: N035 05 Oct 2020 to 11 Oct 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
90
85
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
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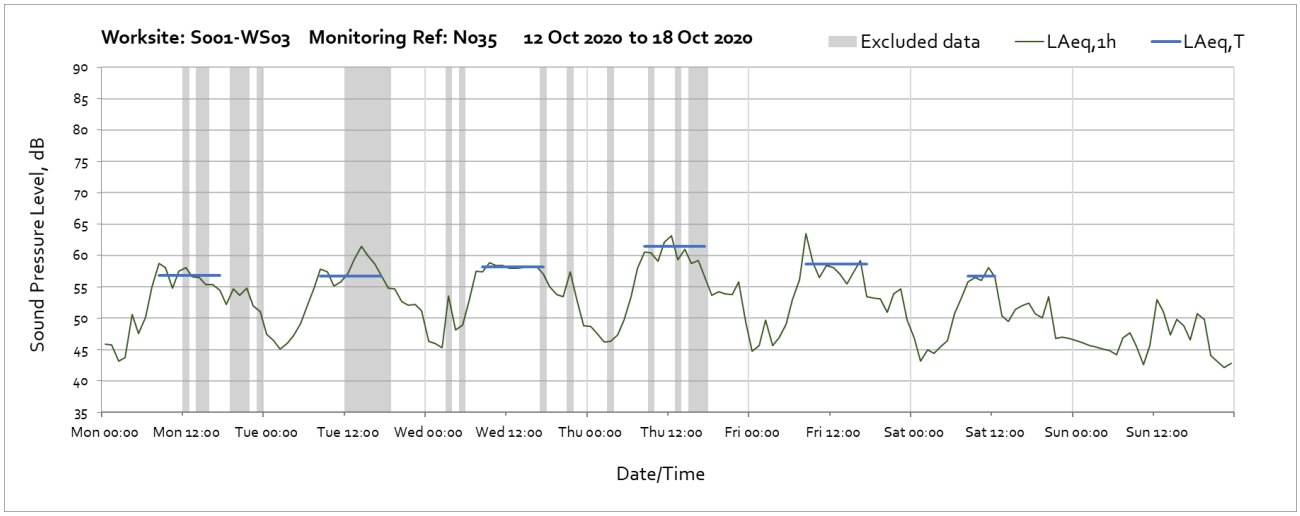
Sun 12:00
Date/Time


Worksite: S001-WS03 Monitoring Ref: N035 12 Oct 2020 to 18 Oct 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
90
85
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
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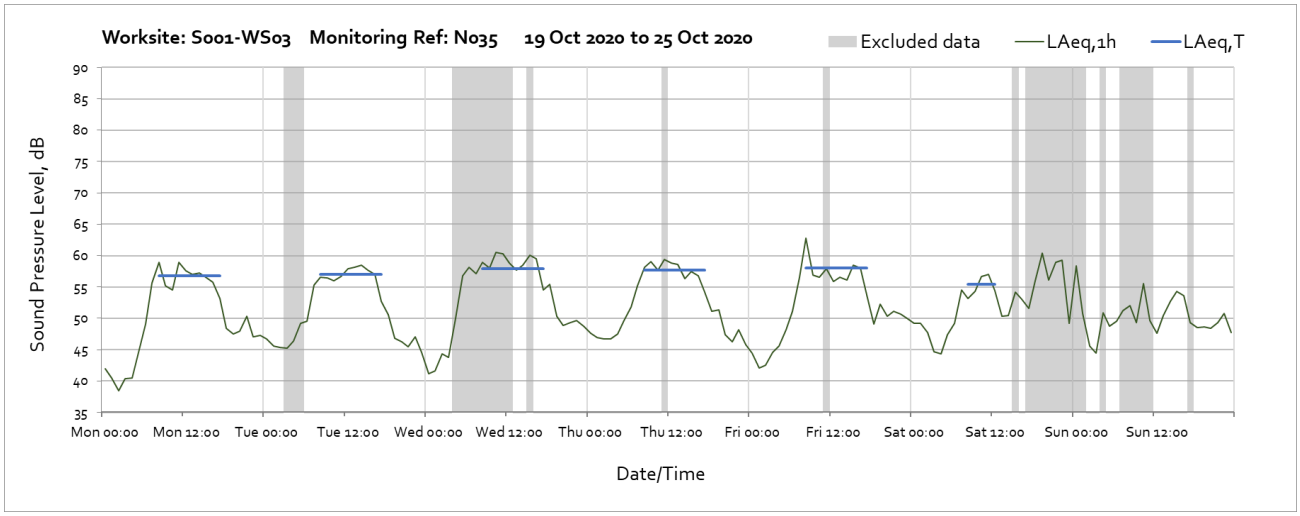
Sun 00:00
Sun 12:00
Date/Time


Worksite: S001-WS03 Monitoring Ref: N035 19 Oct 2020 to 25 Oct 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
90
85
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
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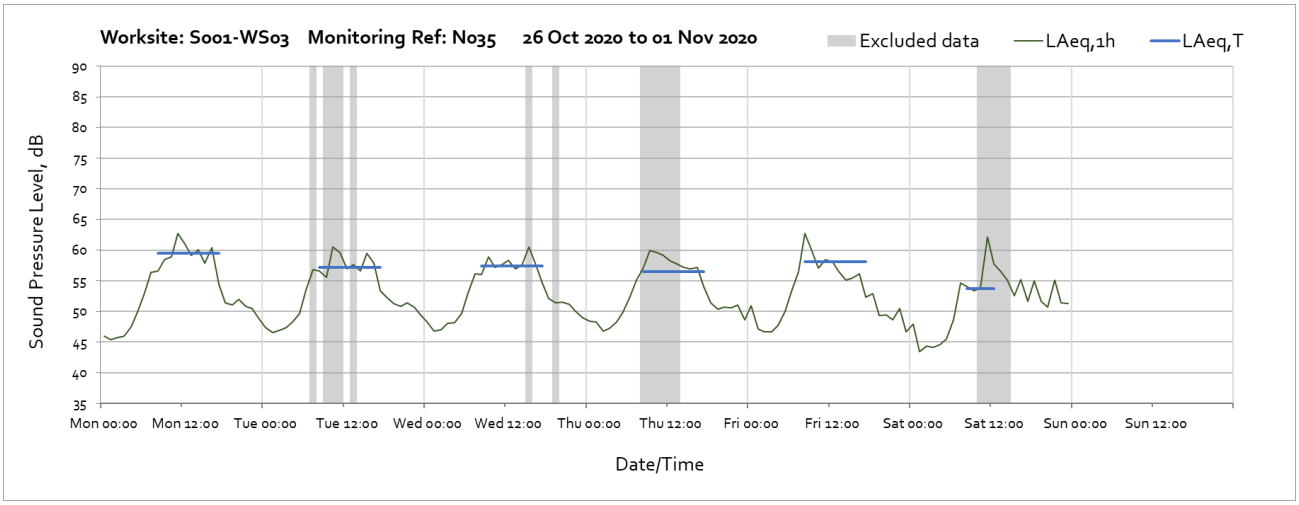
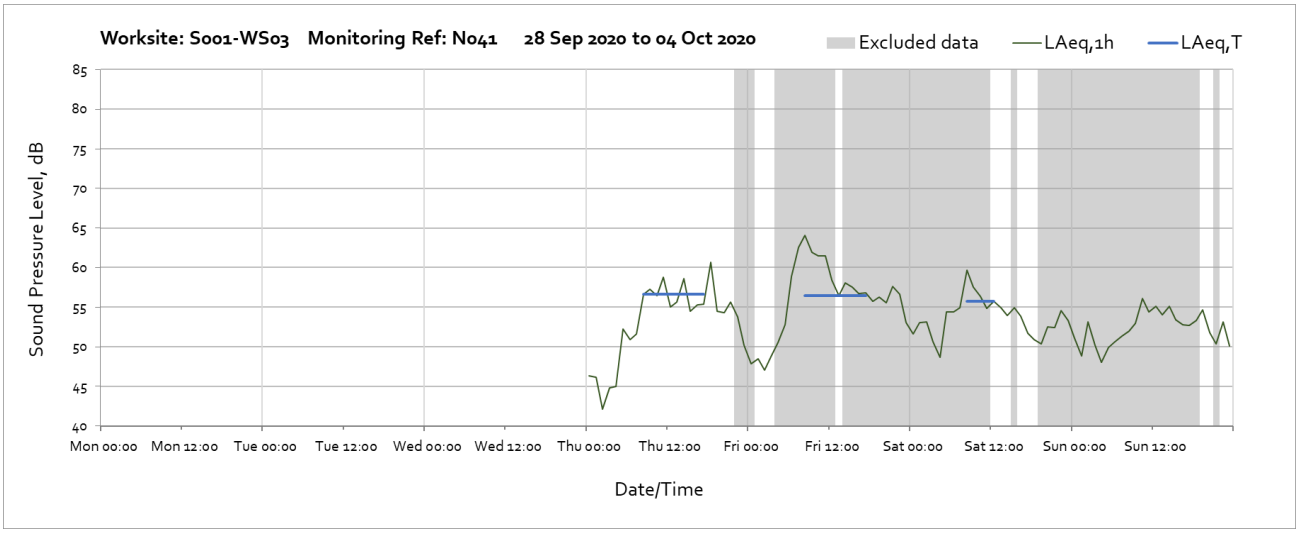
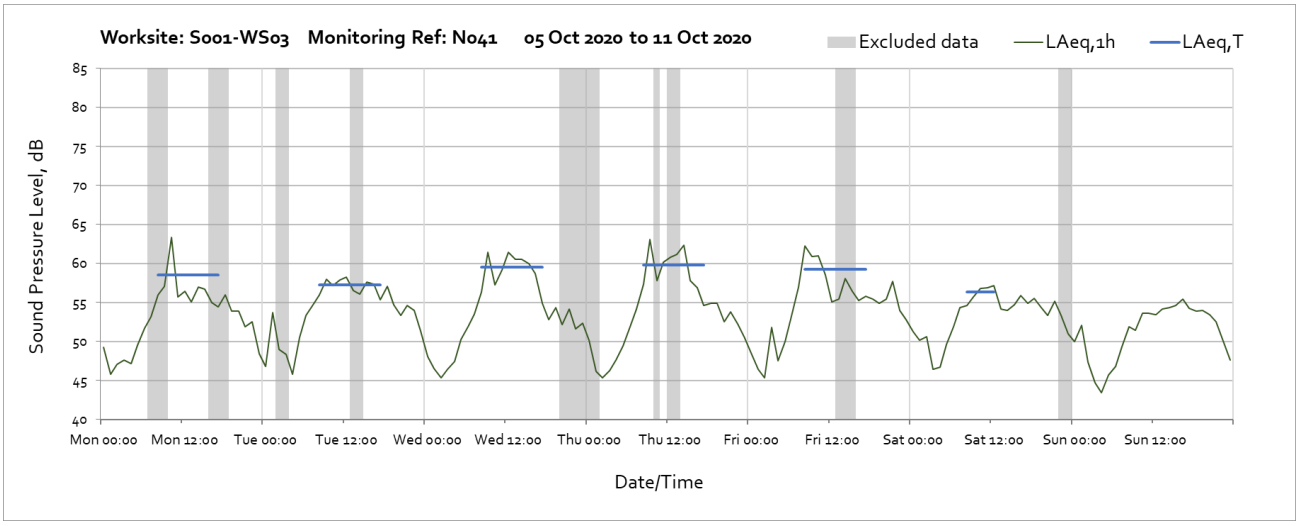
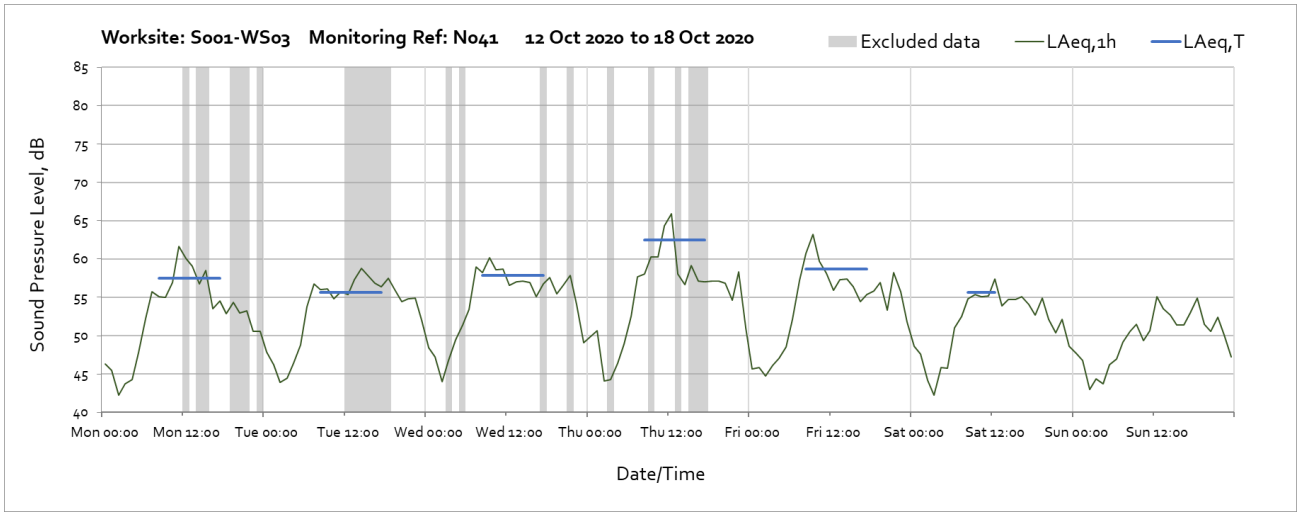
Date/Time



Worksite: S001-WS03 – Monitoring Ref: N041






Worksite: S001-WS03 Monitoring Ref: N041 12 Oct 2020 to 18 Oct 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
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65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
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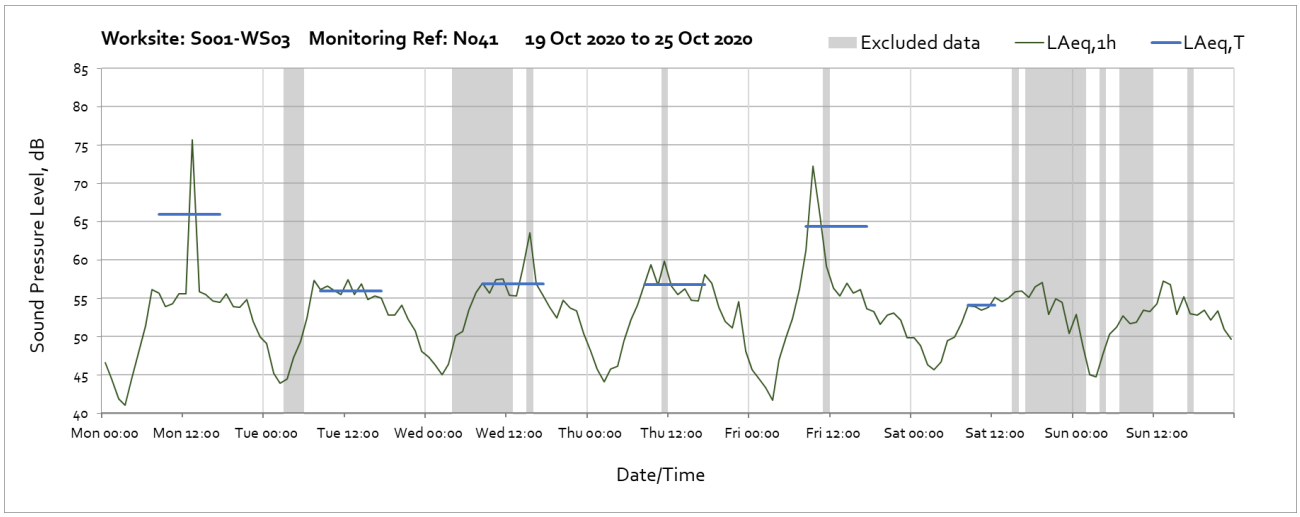
Date/Time


Worksite: S001-WS03 Monitoring Ref: N041 19 Oct 2020 to 25 Oct 2020
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
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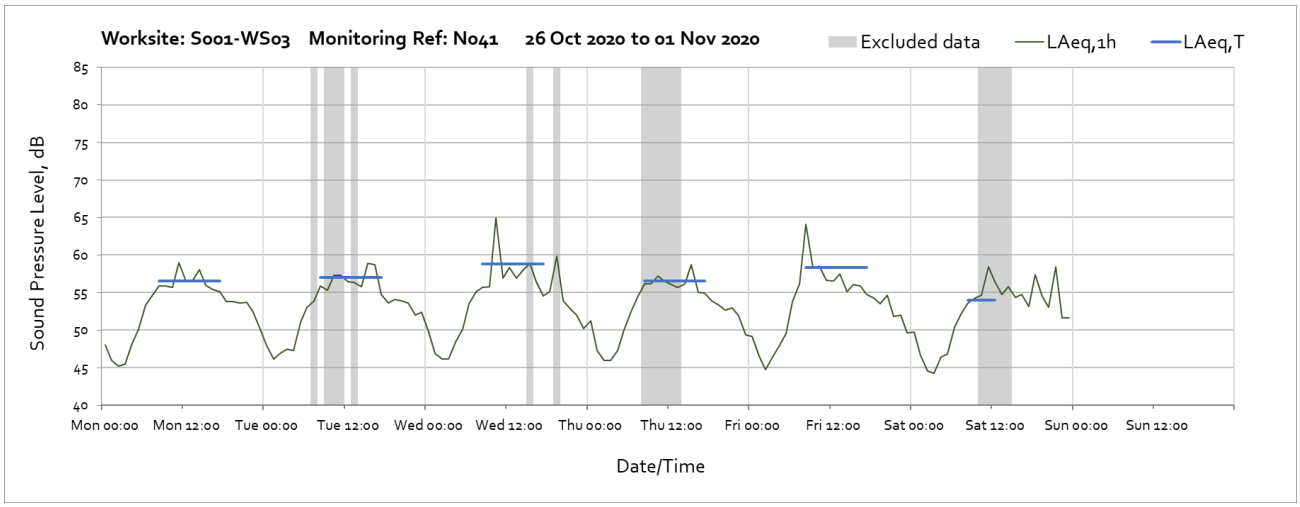
Sun 12:00
Date/Time


Worksite: S001-WS03 Monitoring Ref: N041 26 Oct 2020 to 01 Nov 2020
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
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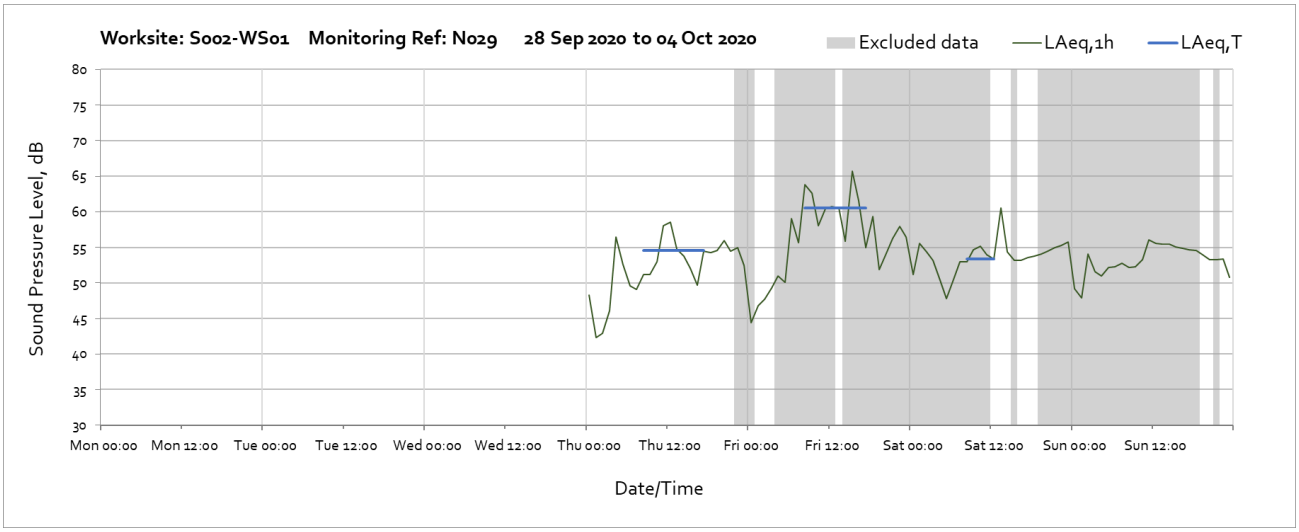
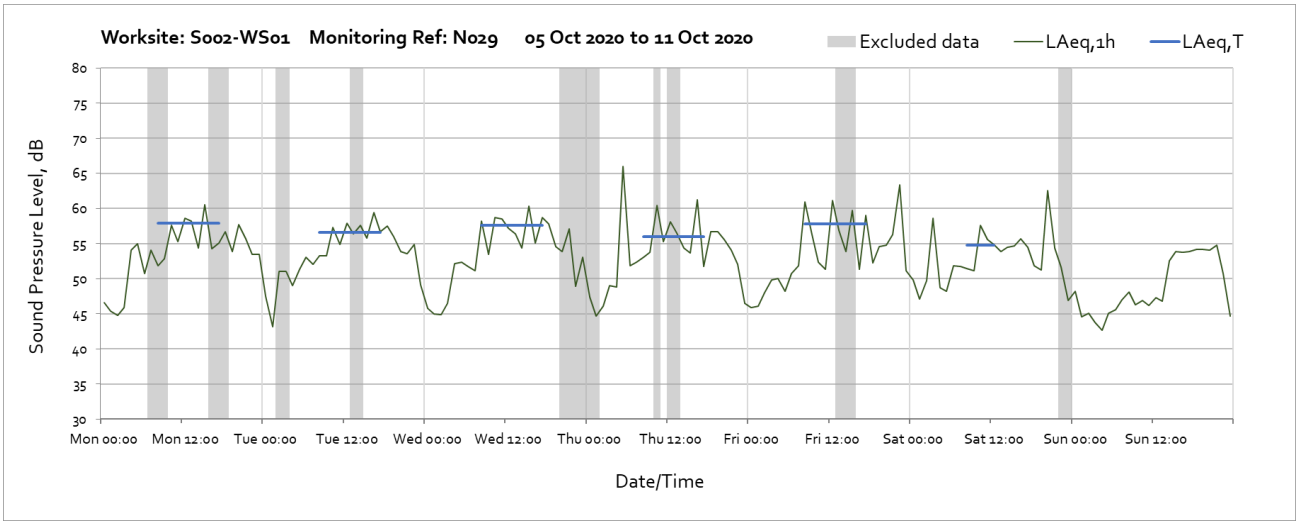
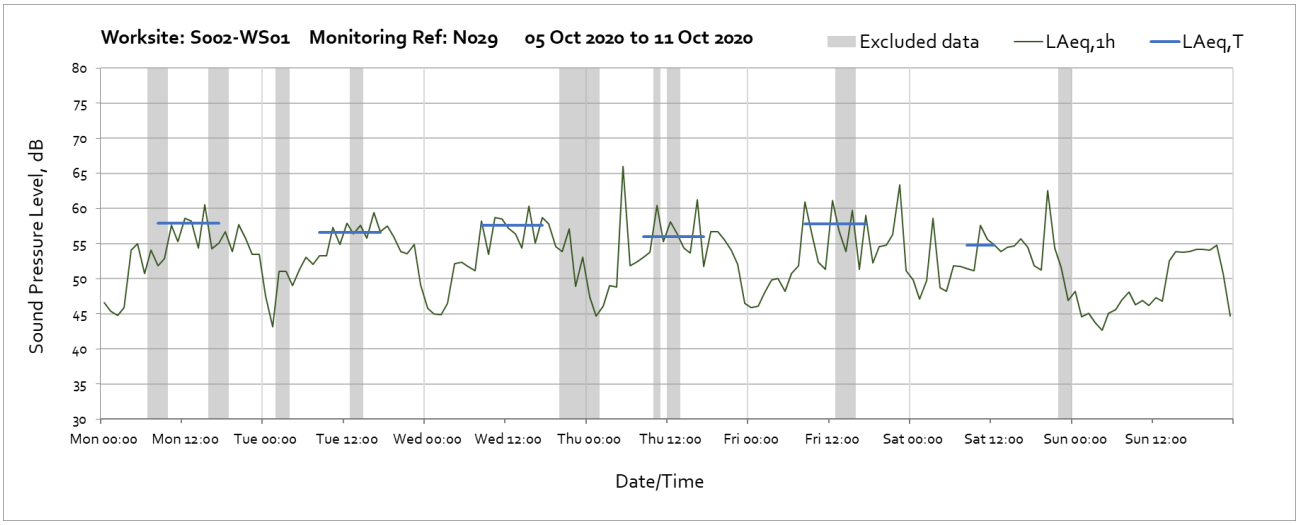
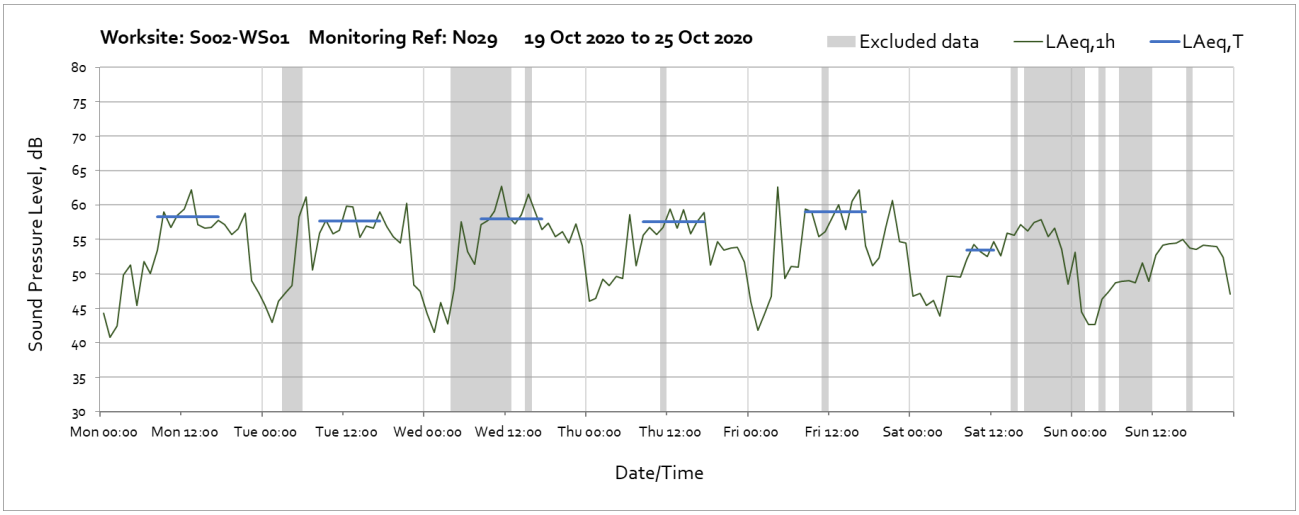
Sun 00:00
Sun 12:00
Date/Time

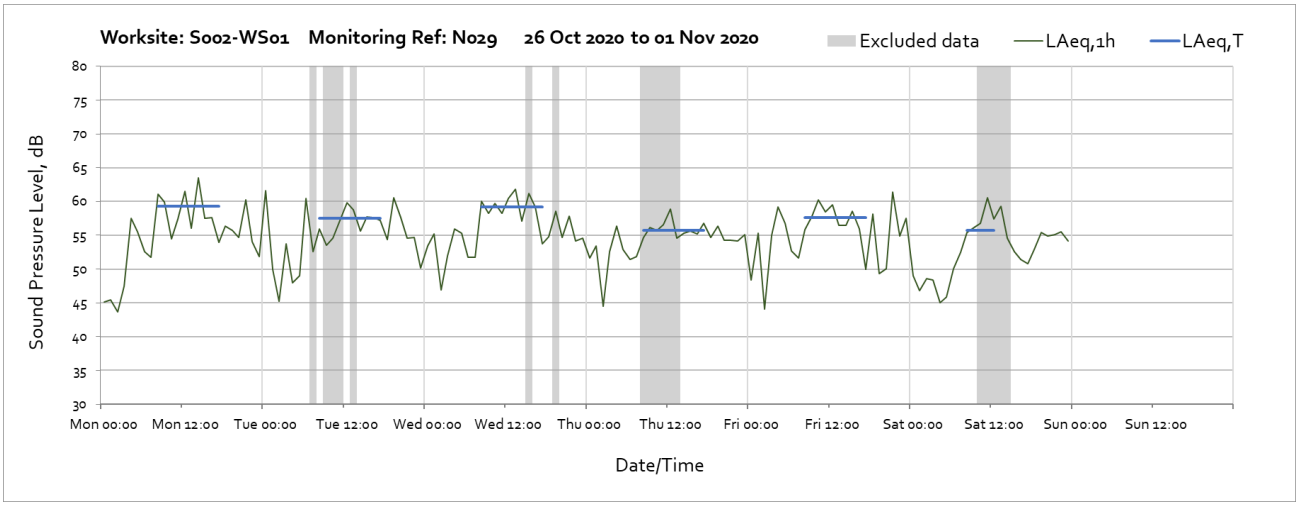
Worksite: S002-WS01 – Monitoring Ref: N029



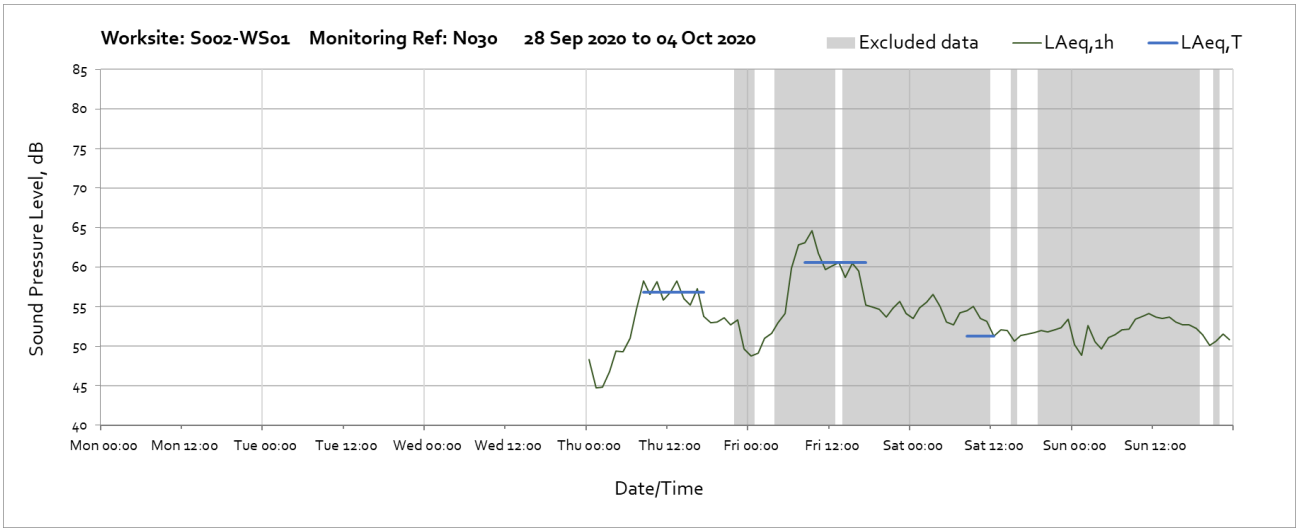


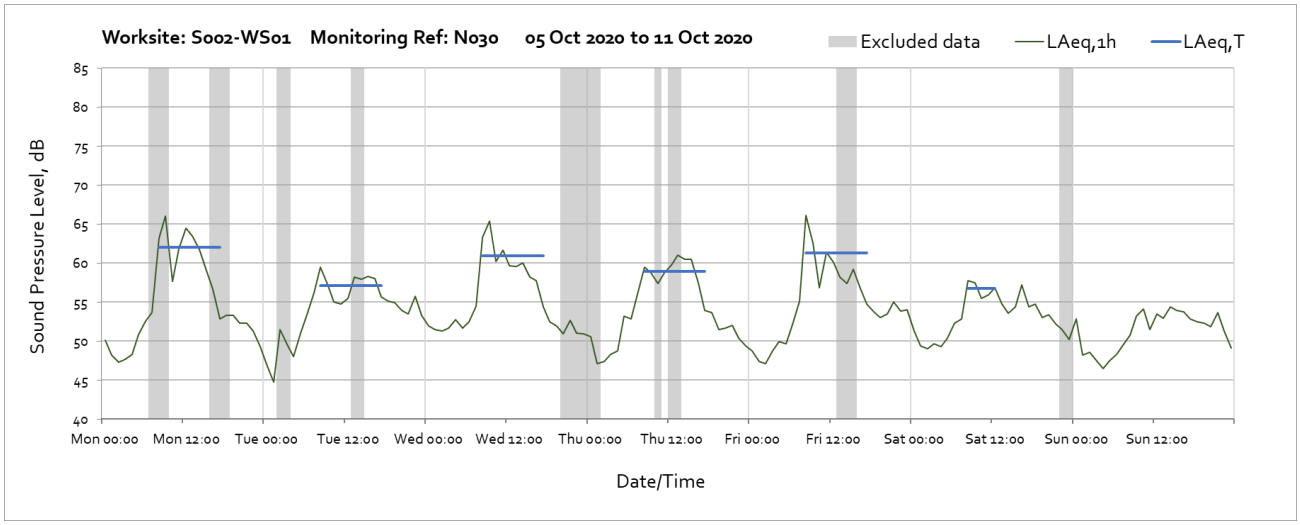






Worksite: S002-WS01 – Monitoring Ref: N030




Worksite: S002-WS01 Monitoring Ref: N030 05 Oct 2020 to 11 Oct 2020
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
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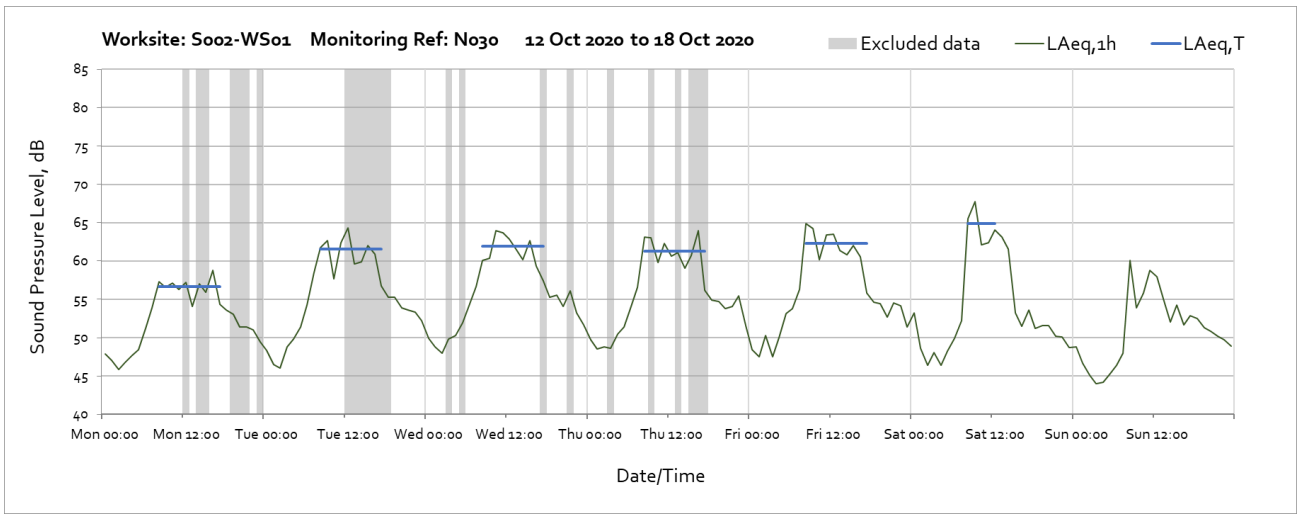
Sun 12:00
Date/Time


Worksite: S002-WS01 Monitoring Ref: N030 12 Oct 2020 to 18 Oct 2020
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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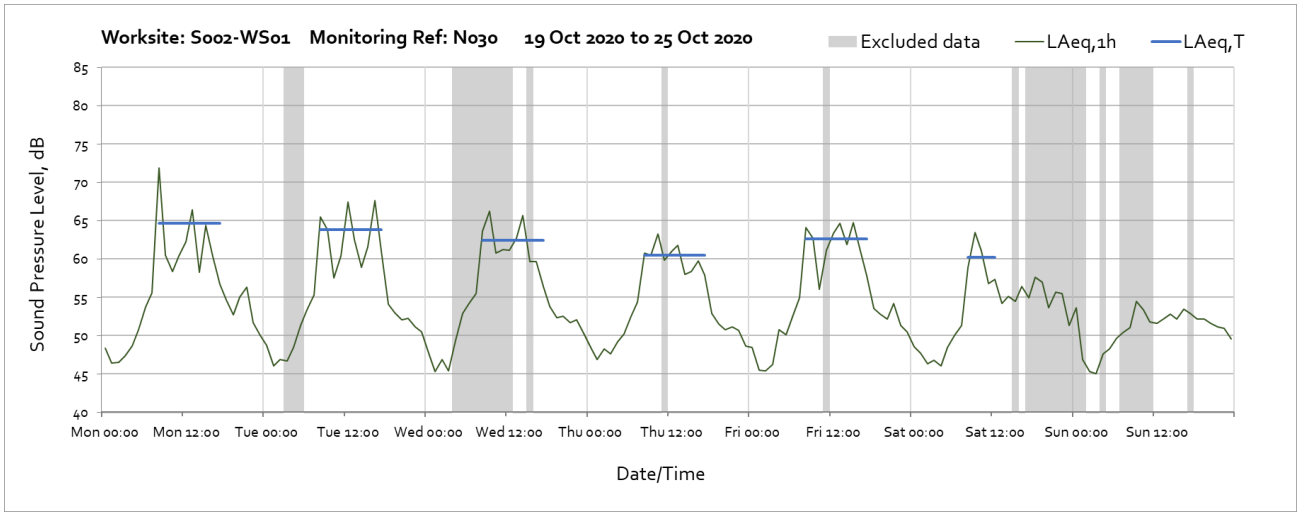
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: S002-WS01 Monitoring Ref: N030 19 Oct 2020 to 25 Oct 2020
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
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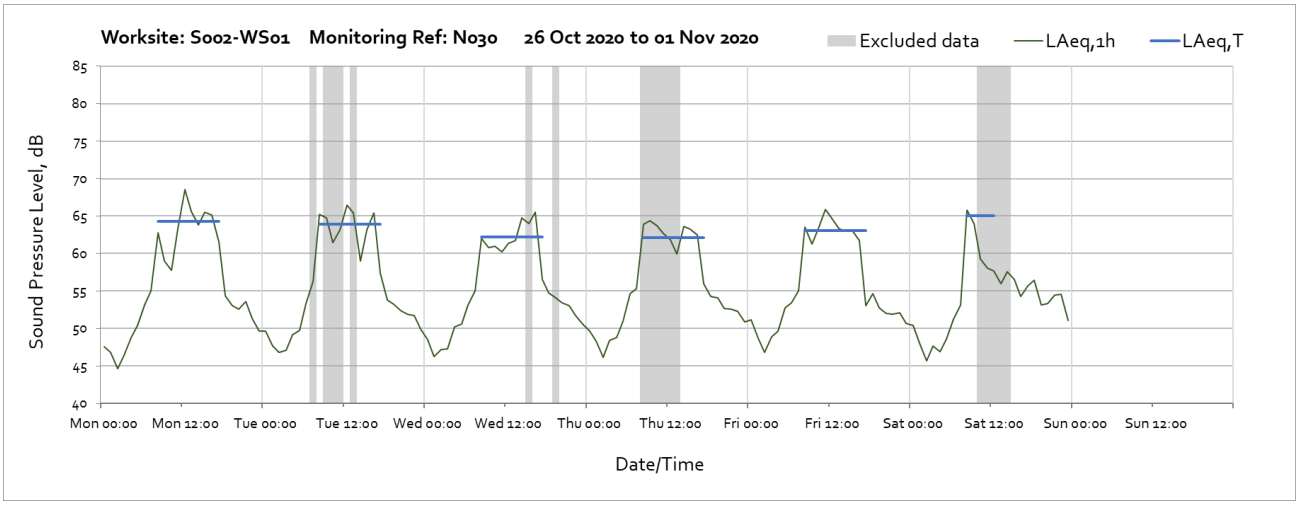
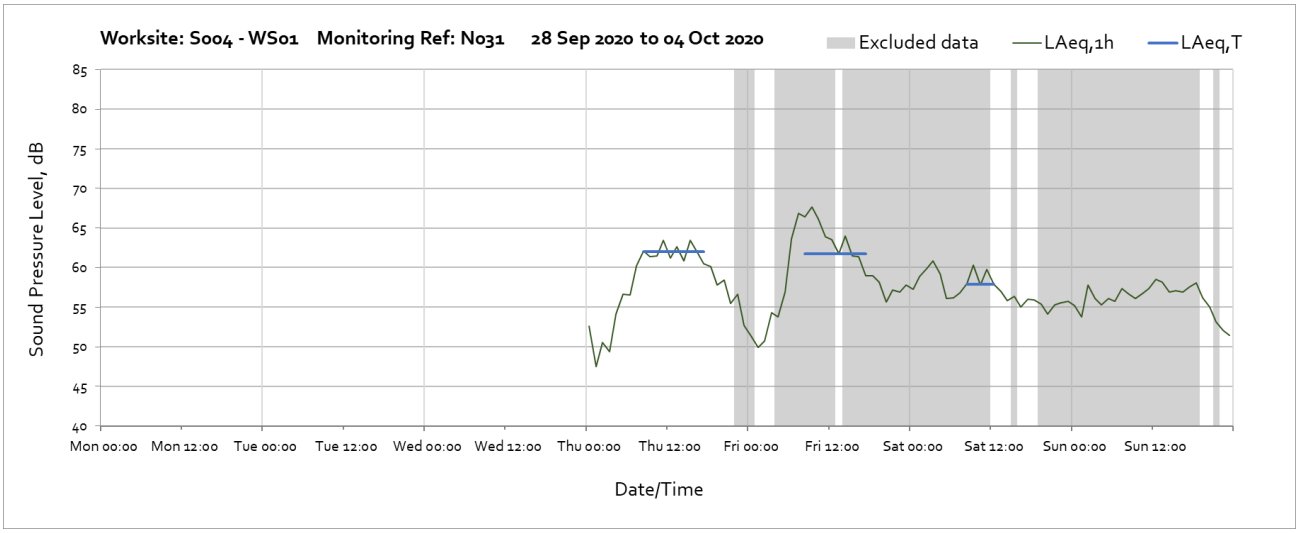
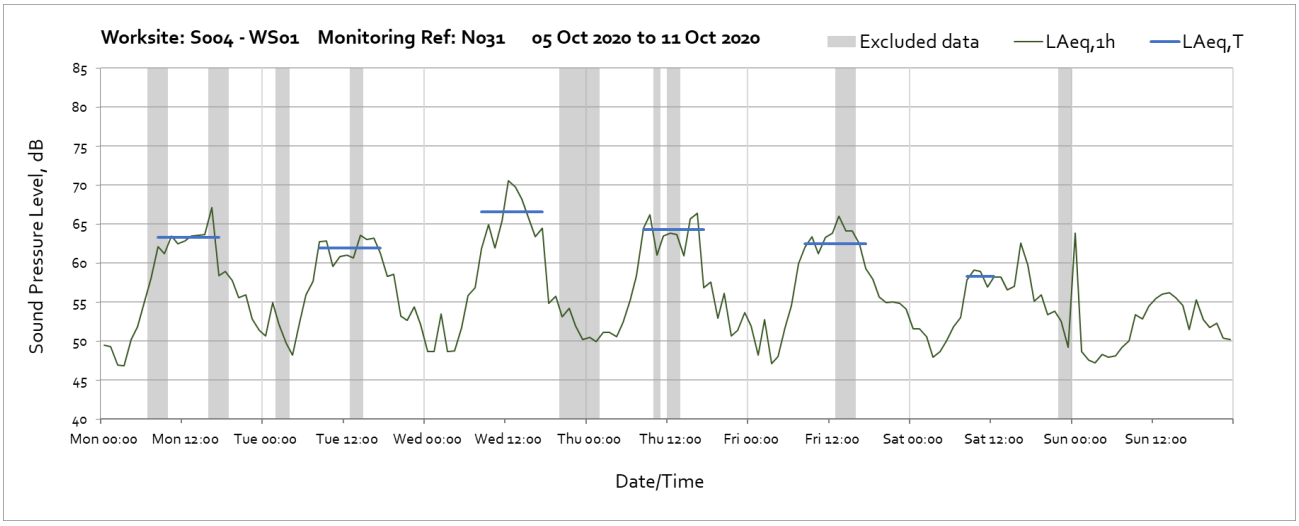
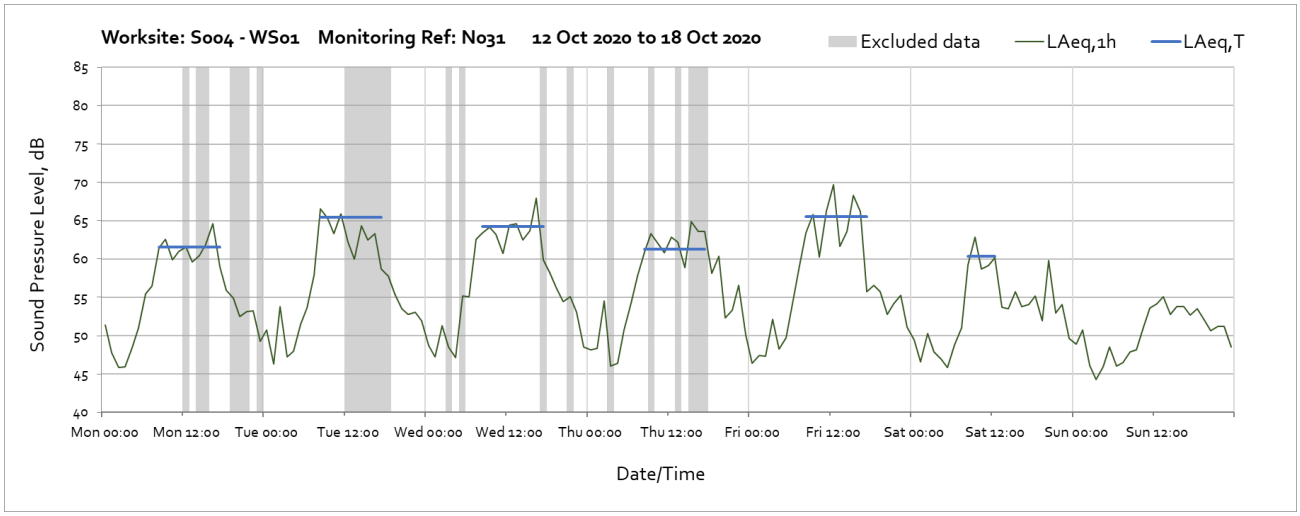
Sun 00:00
Sun 12:00
Date/Time



Worksite: S002-WS01 – Monitoring Ref: N031






Worksite: S004 - WS01 Monitoring Ref: N031 12 Oct 2020 to 18 Oct 2020
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
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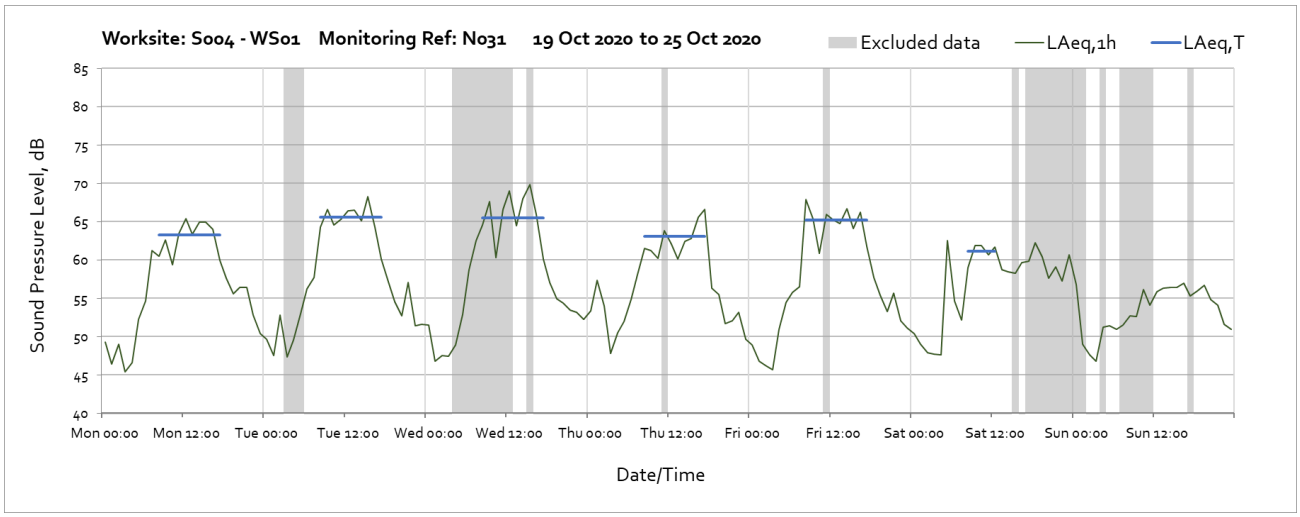
Date/Time


Worksite: S004 - WS01 Monitoring Ref: N031 19 Oct 2020 to 25 Oct 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
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60
55
50
45
40
Mon 00:00
Mon 12:00
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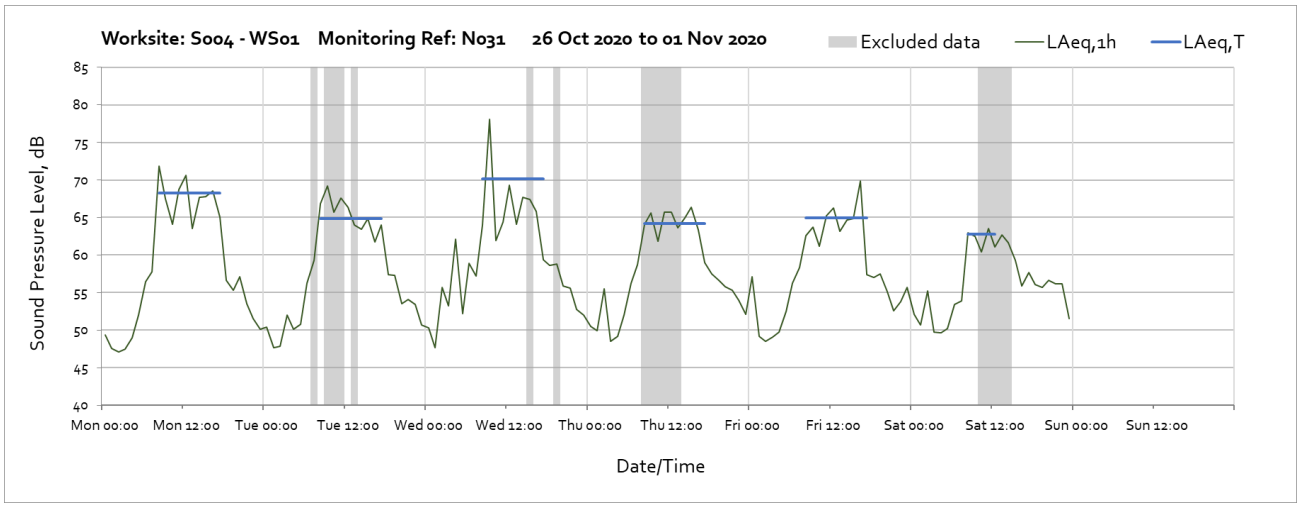
Sun 12:00
Date/Time


Worksite: S004 - WS01 Monitoring Ref: N031 26 Oct 2020 to 01 Nov 2020
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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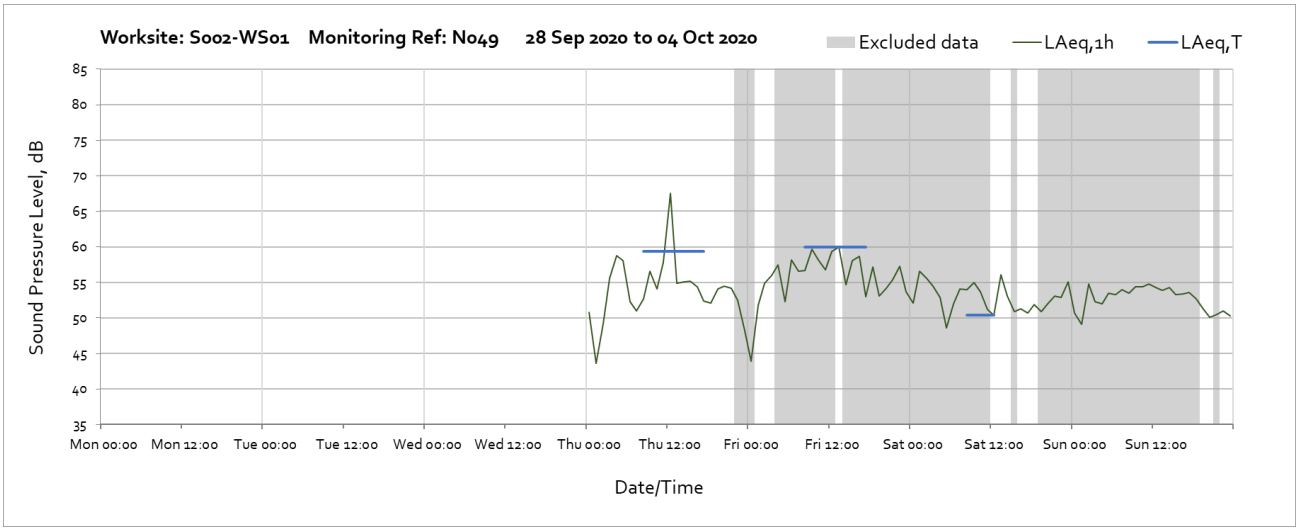
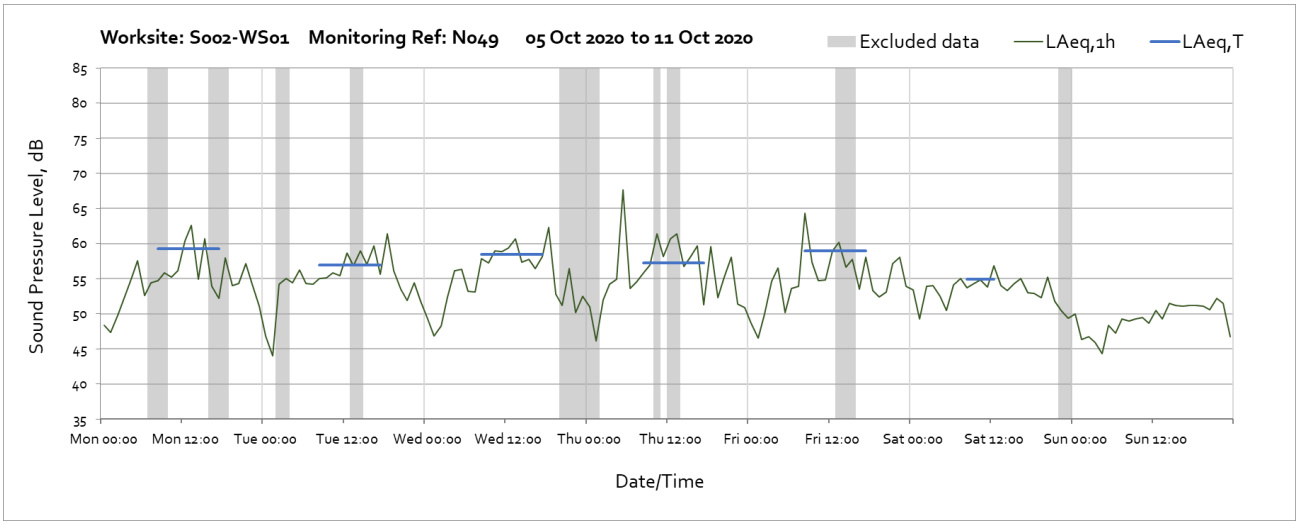
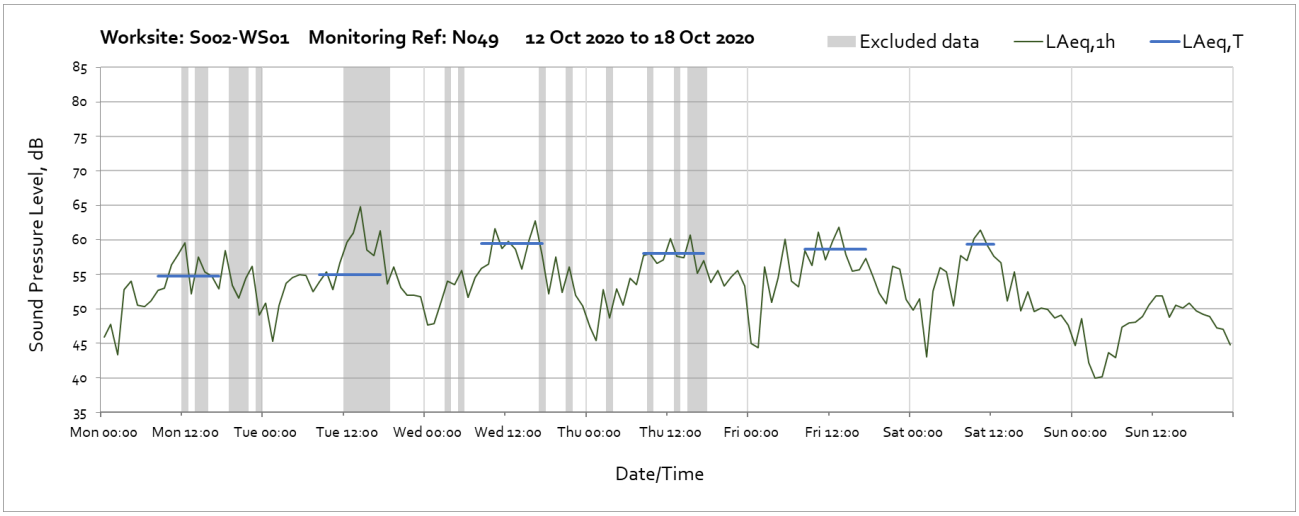
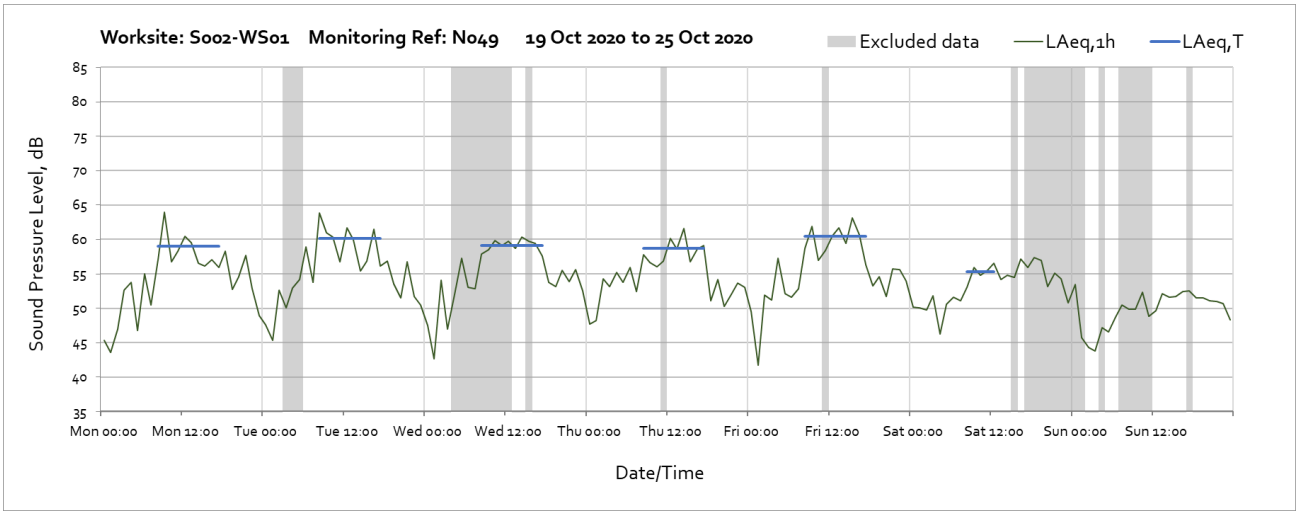
Sun 00:00
Sun 12:00
Date/Time

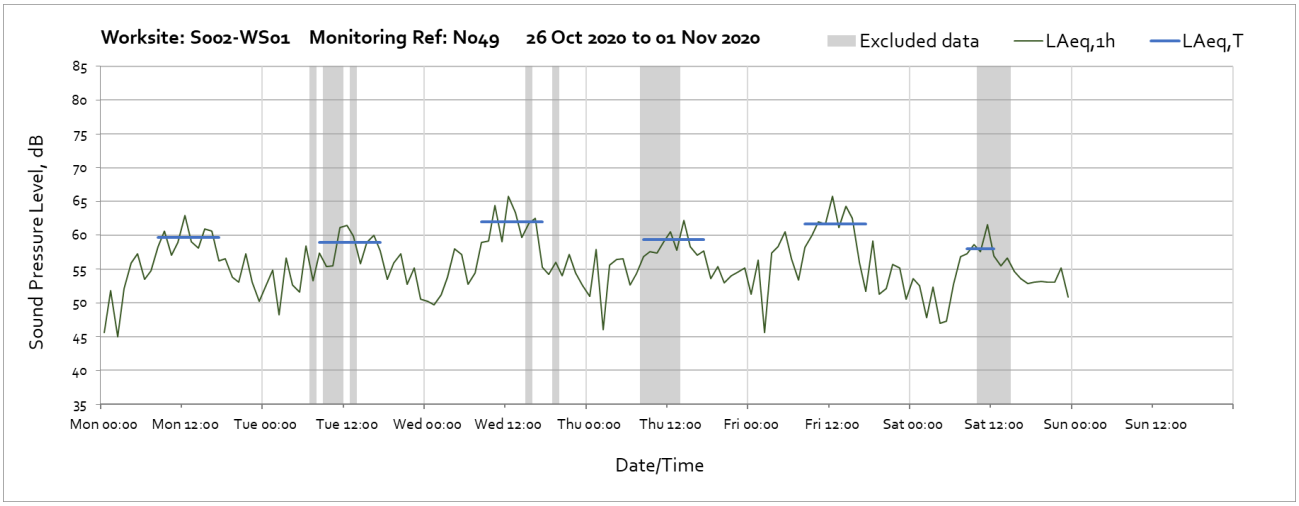
Worksite: S002-WS01 – Monitoring Ref: N049



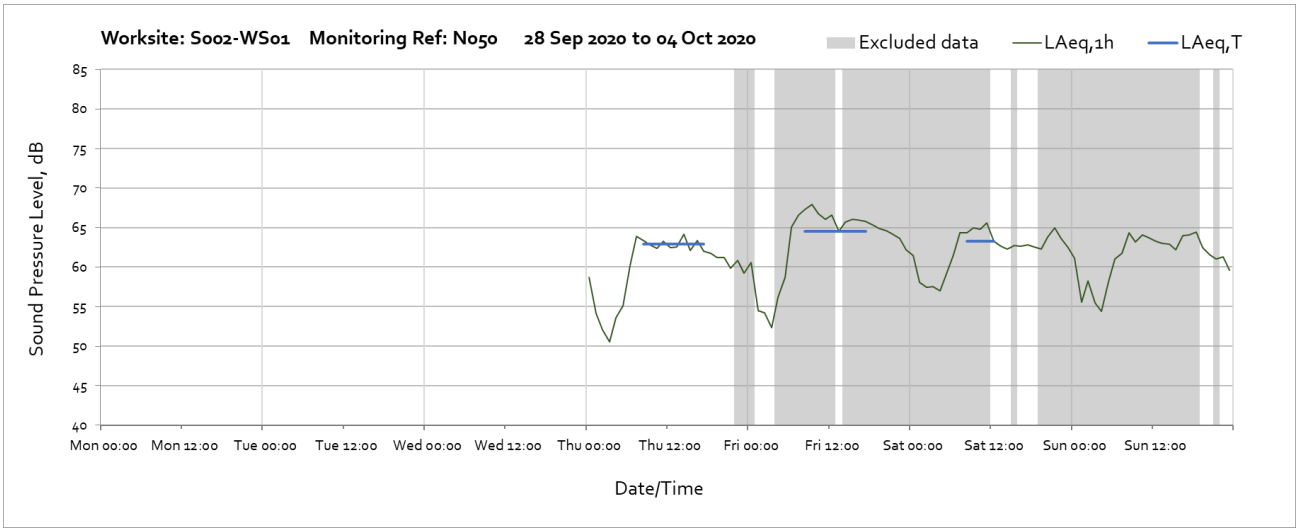


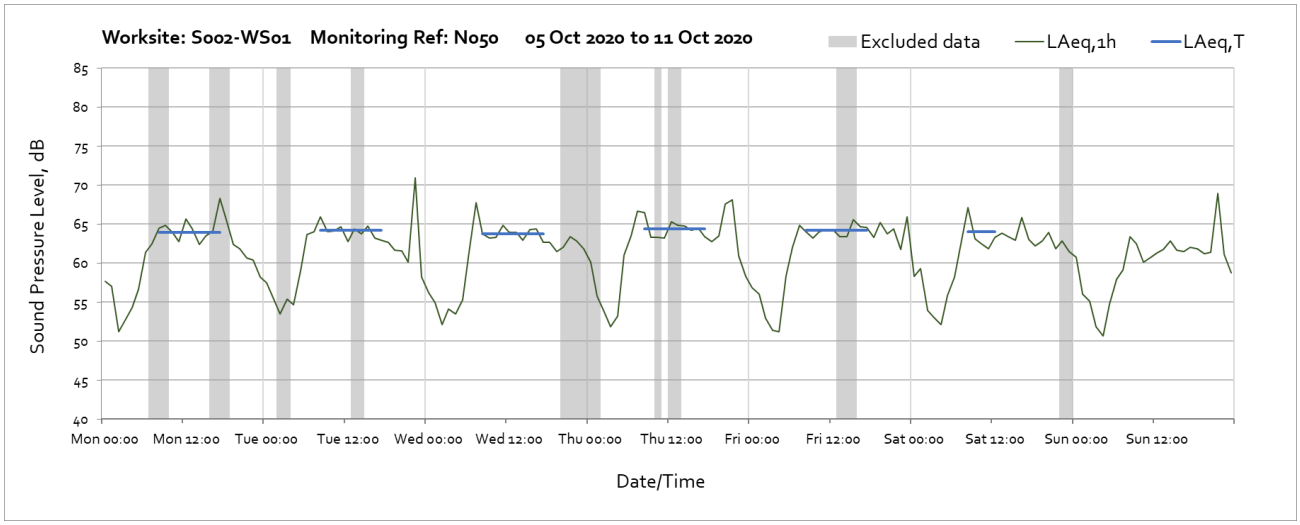


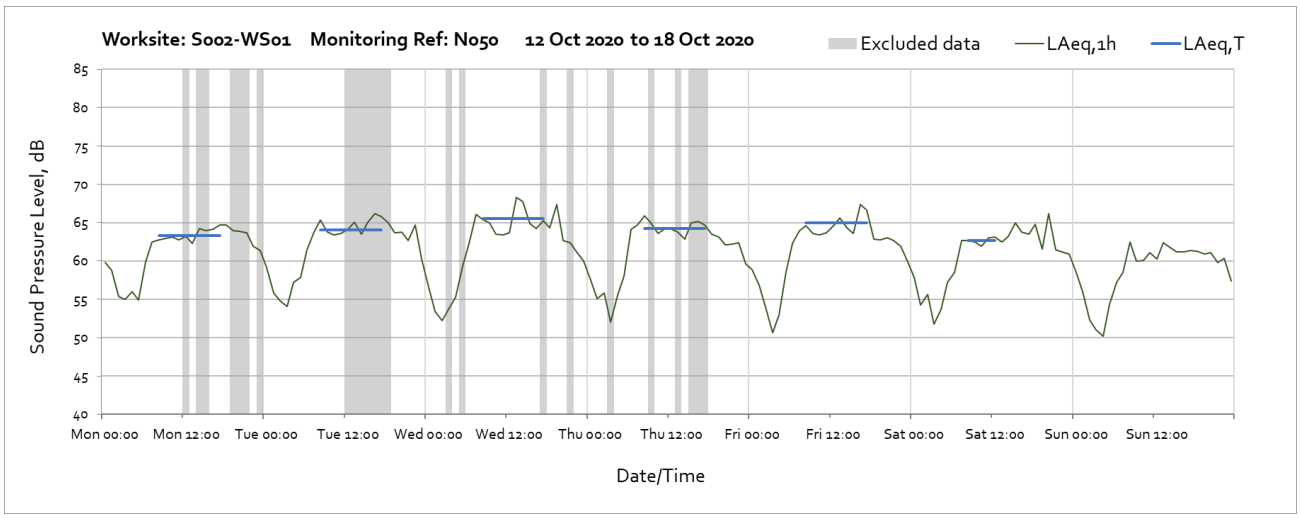




Worksite: S002-WS01 – Monitoring Ref: N050




Worksite: S002-WS01 Monitoring Ref: N050 05 Oct 2020 to 11 Oct 2020
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: S002-WS01 Monitoring Ref: N050 12 Oct 2020 to 18 Oct 2020
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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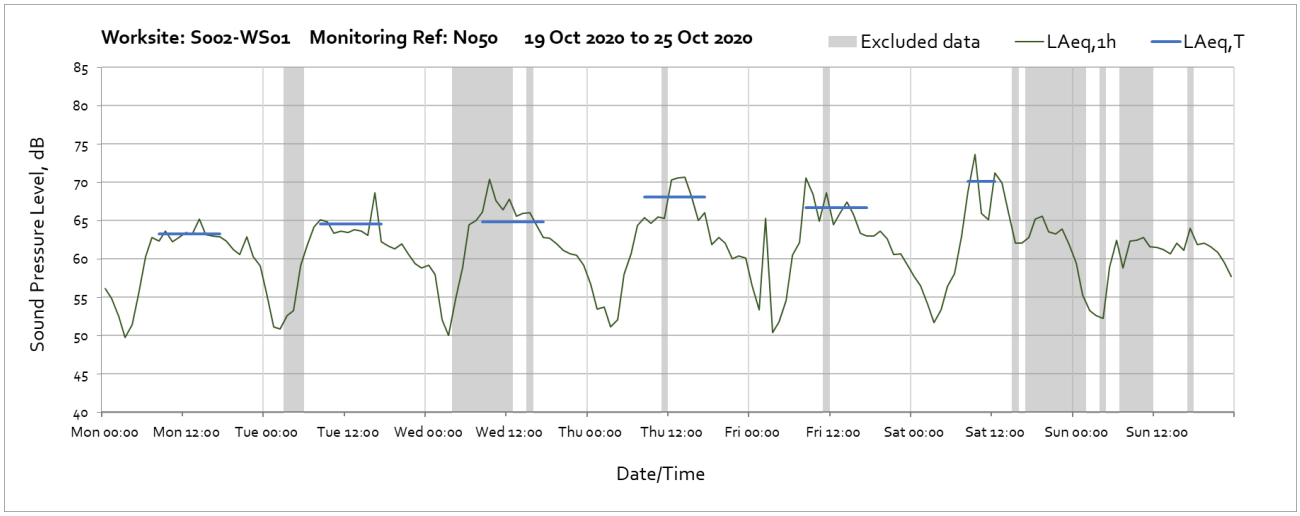
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: S002-WS01 Monitoring Ref: N050 19 Oct 2020 to 25 Oct 2020
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
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Sat 12:00
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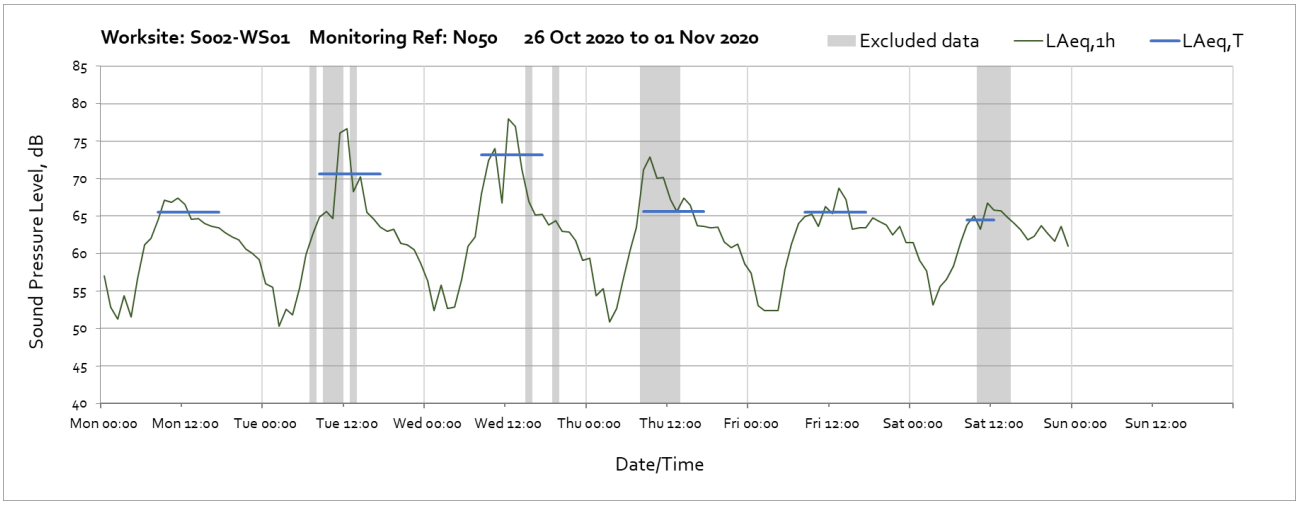
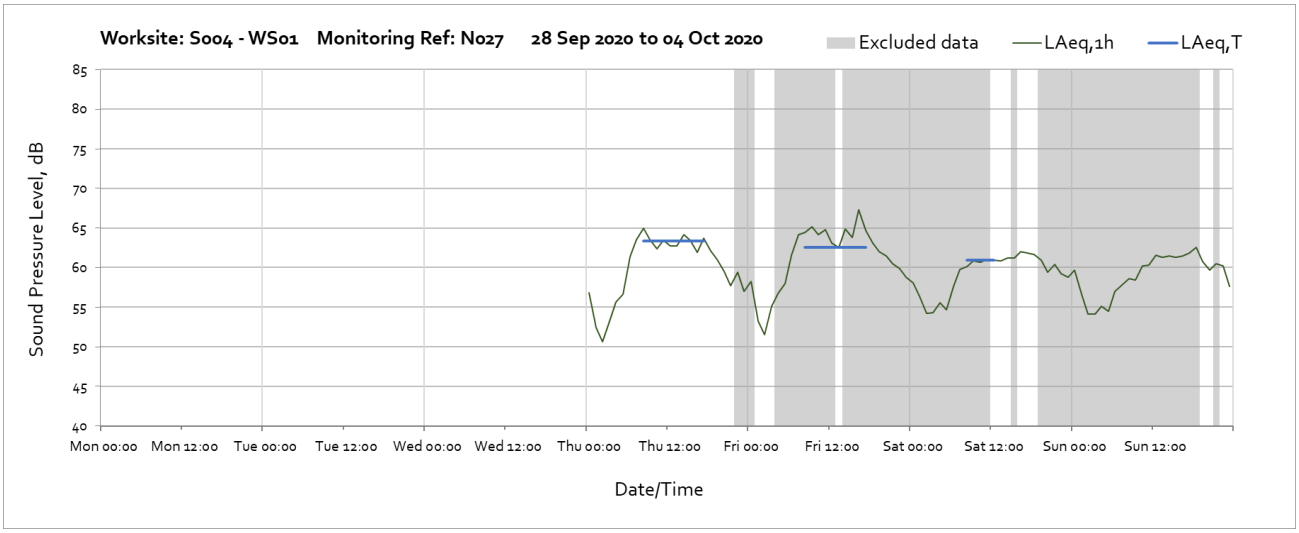
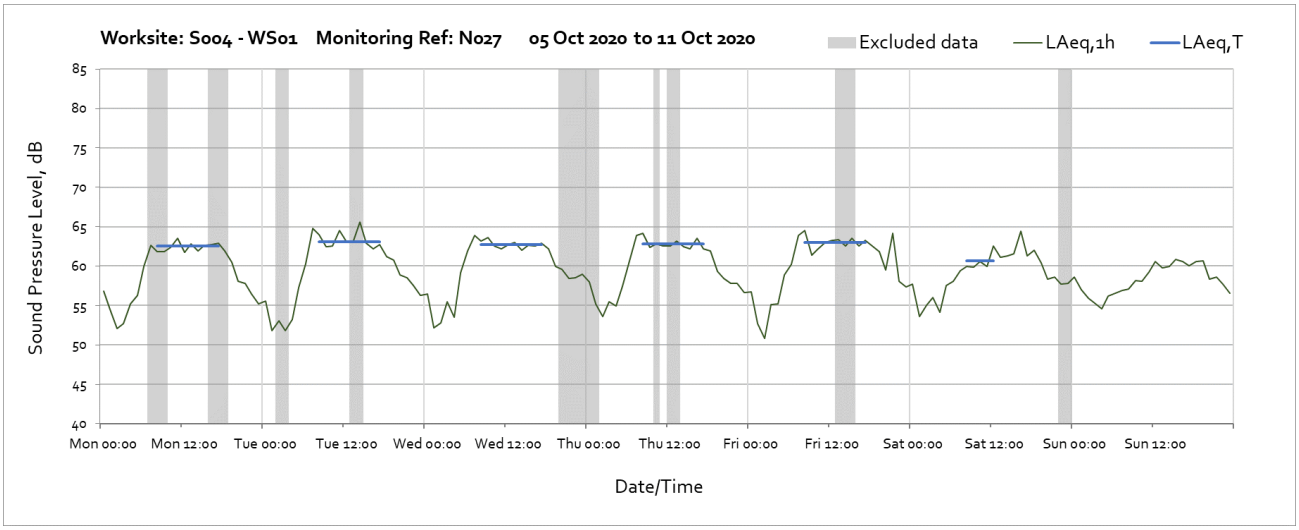
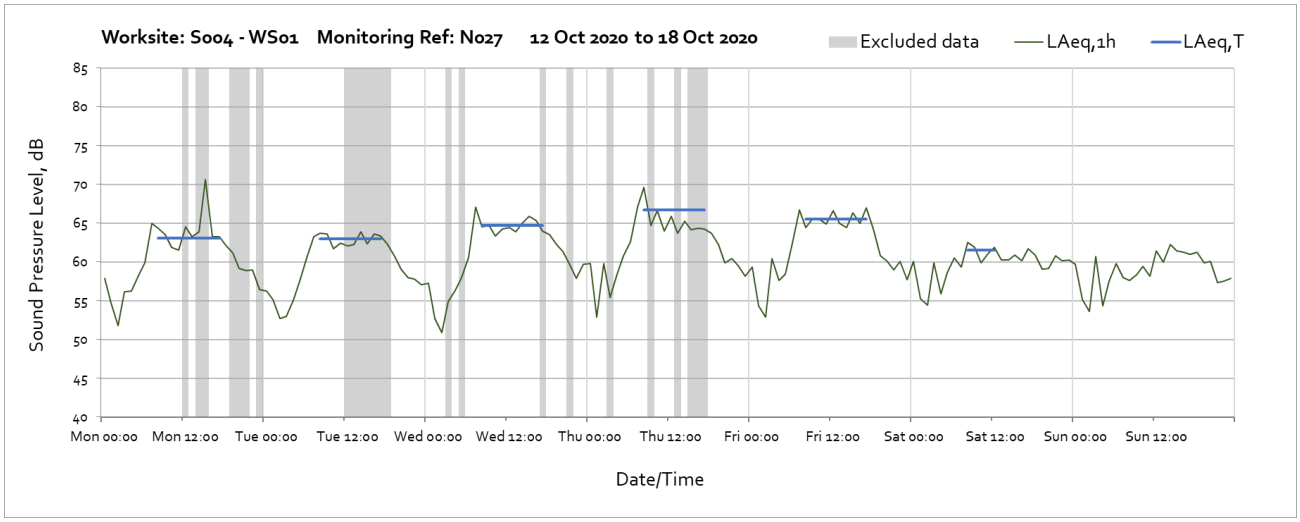
Date/Time

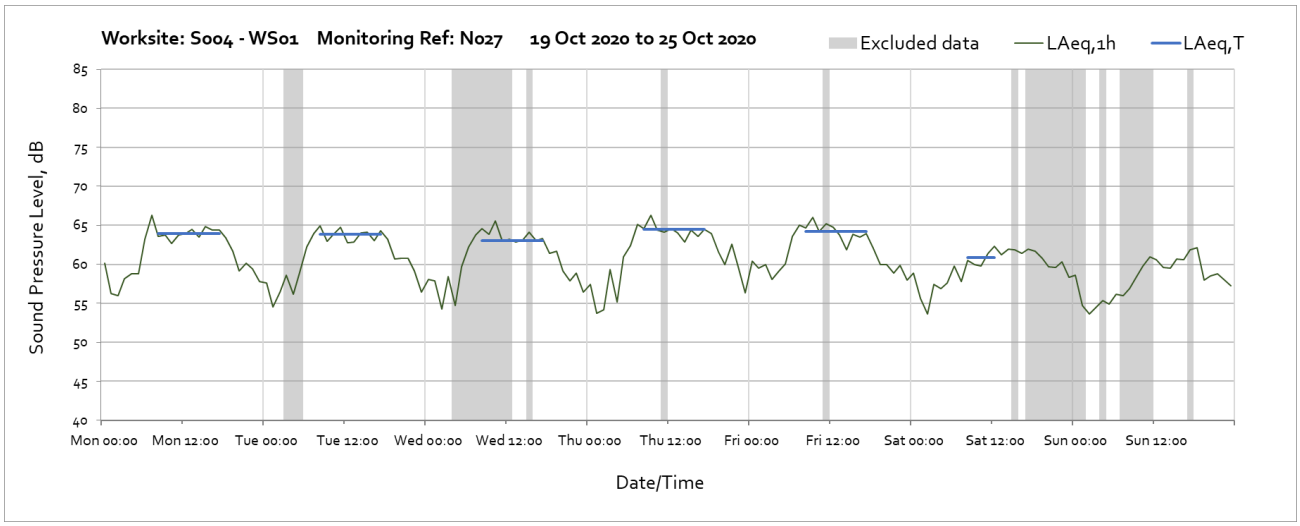


Worksite: S004-WS01 – Monitoring Ref: N027






Worksite: S004 - WS01 Monitoring Ref: N027 12 Oct 2020 to 18 Oct 2020
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: S004 - WS01 Monitoring Ref: N027 19 Oct 2020 to 25 Oct 2020
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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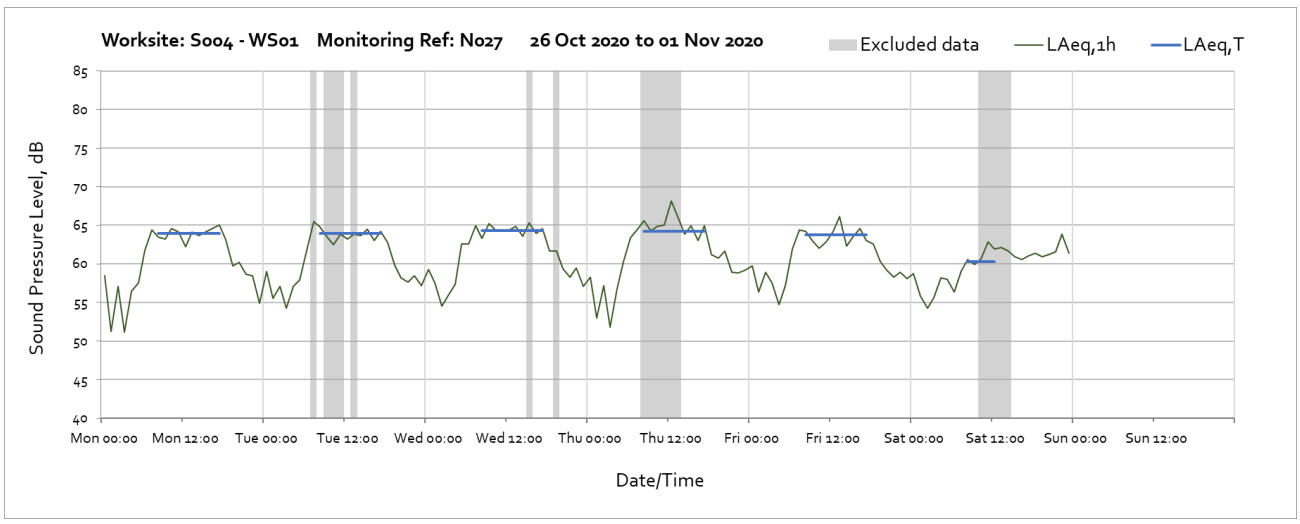
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: S004 - WS01 Monitoring Ref: N027 26 Oct 2020 to 01 Nov 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
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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
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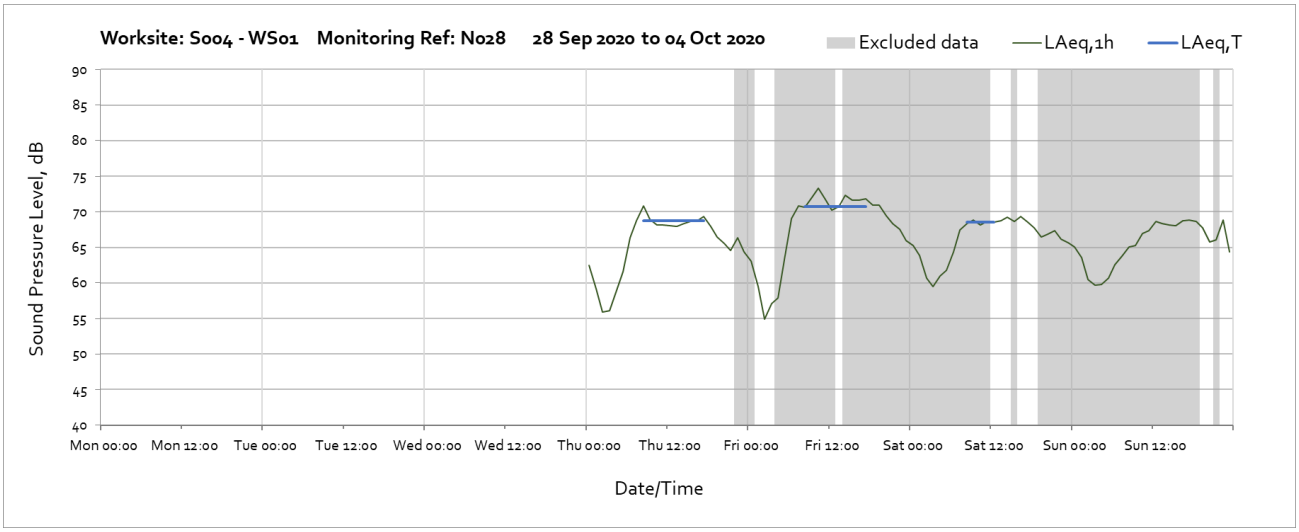
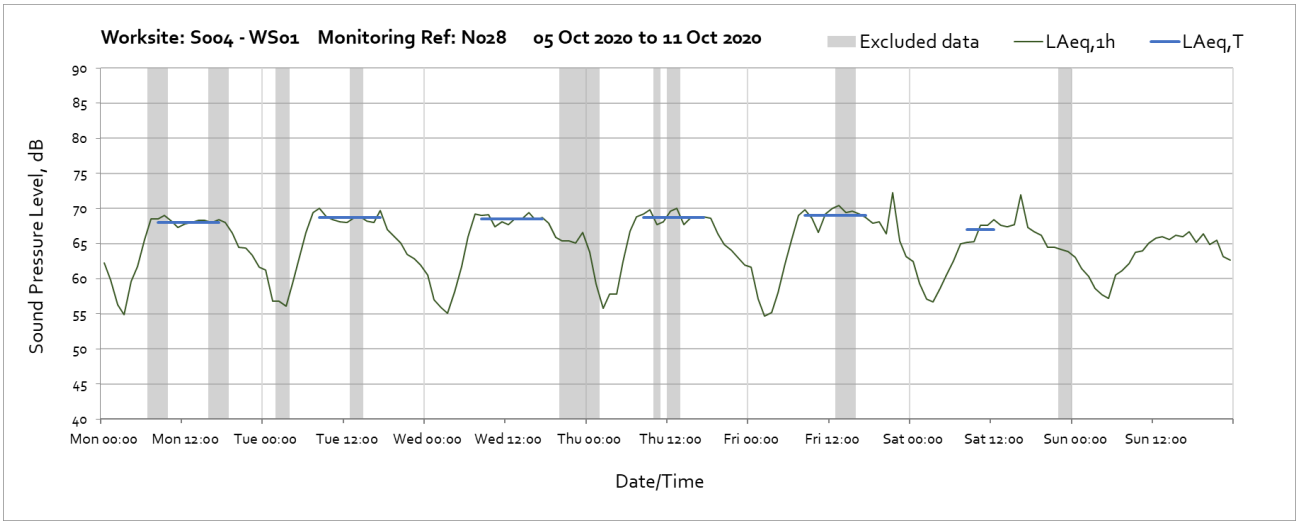
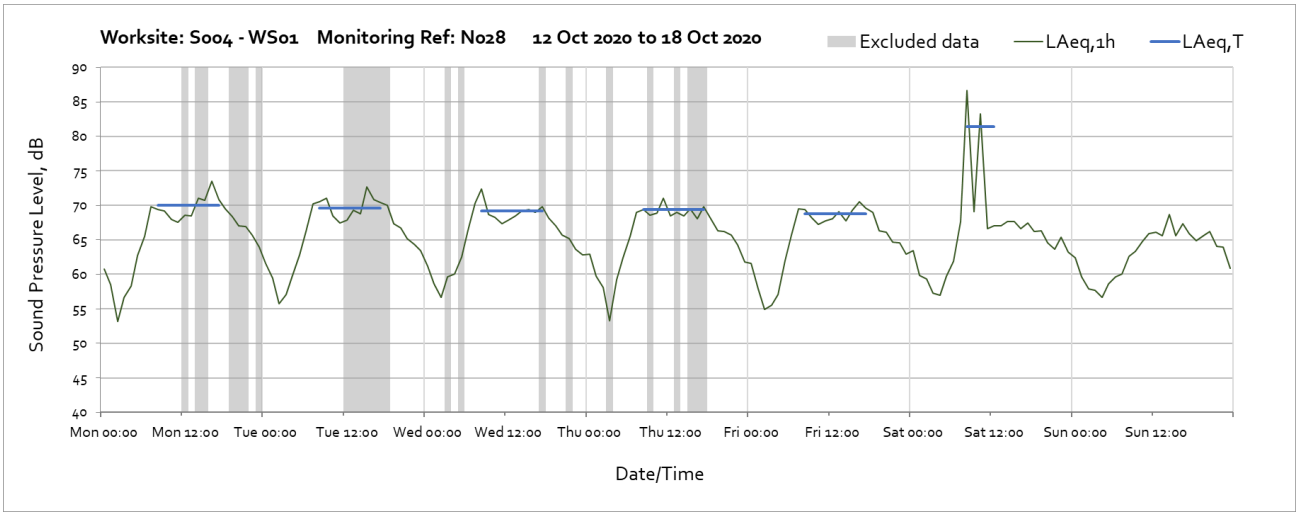
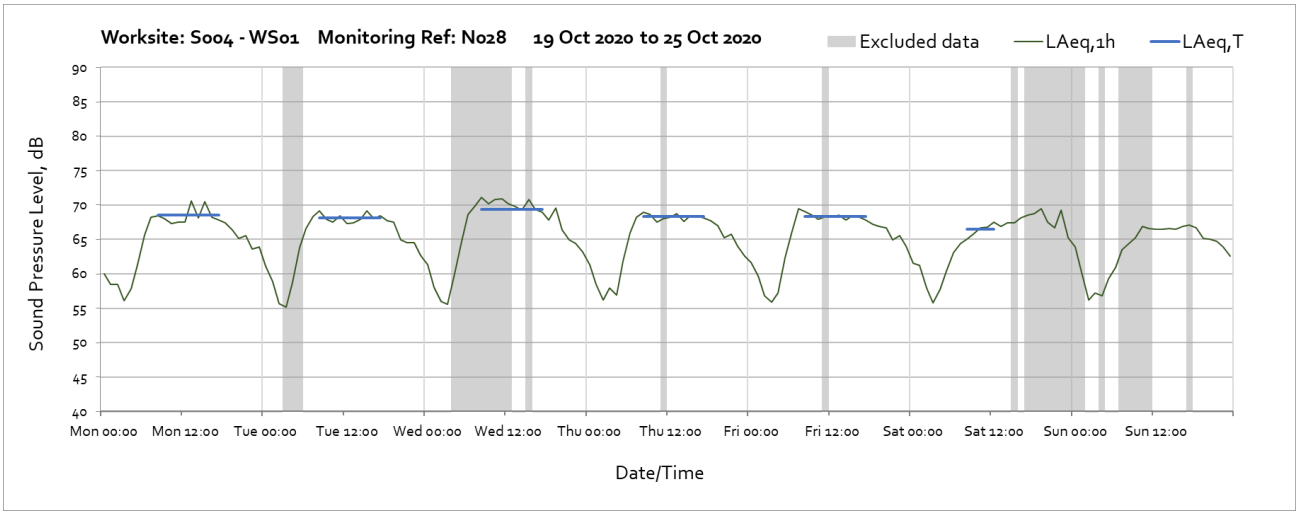
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

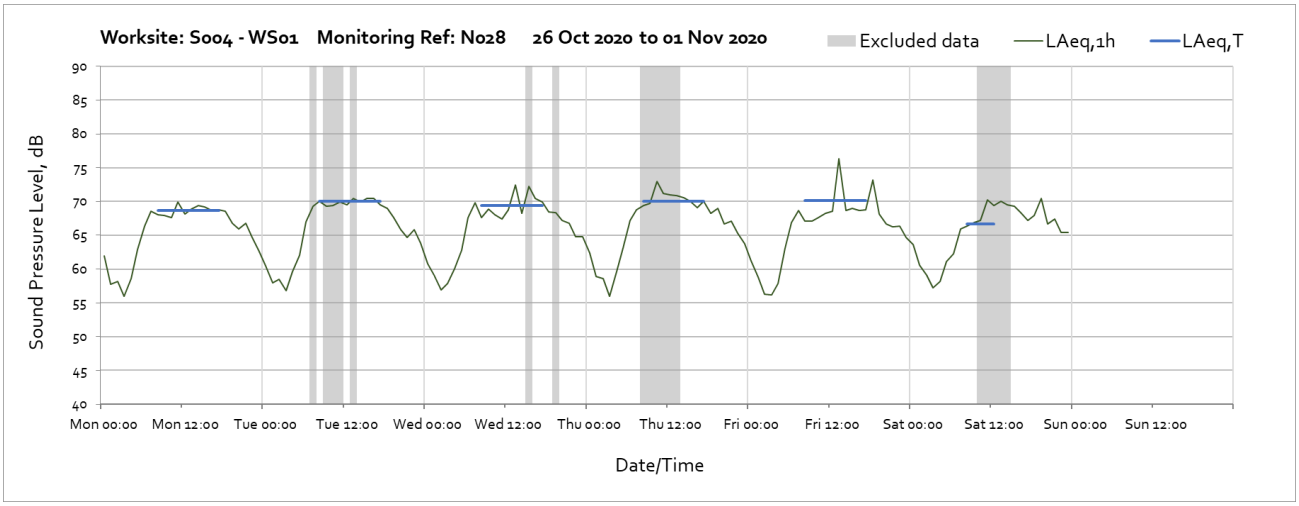
Worksite: S004-WS01 – Monitoring Ref: N028



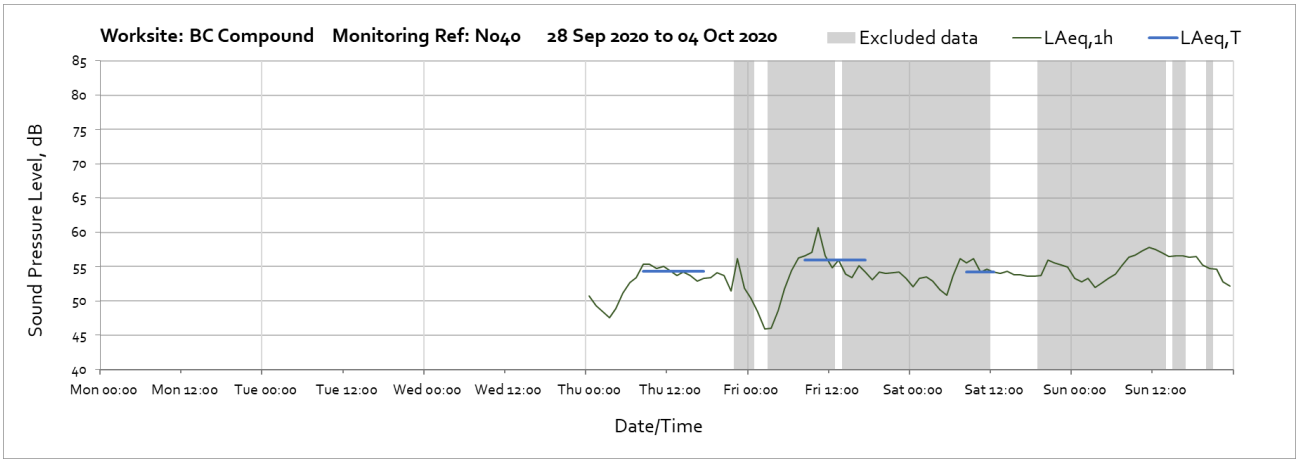


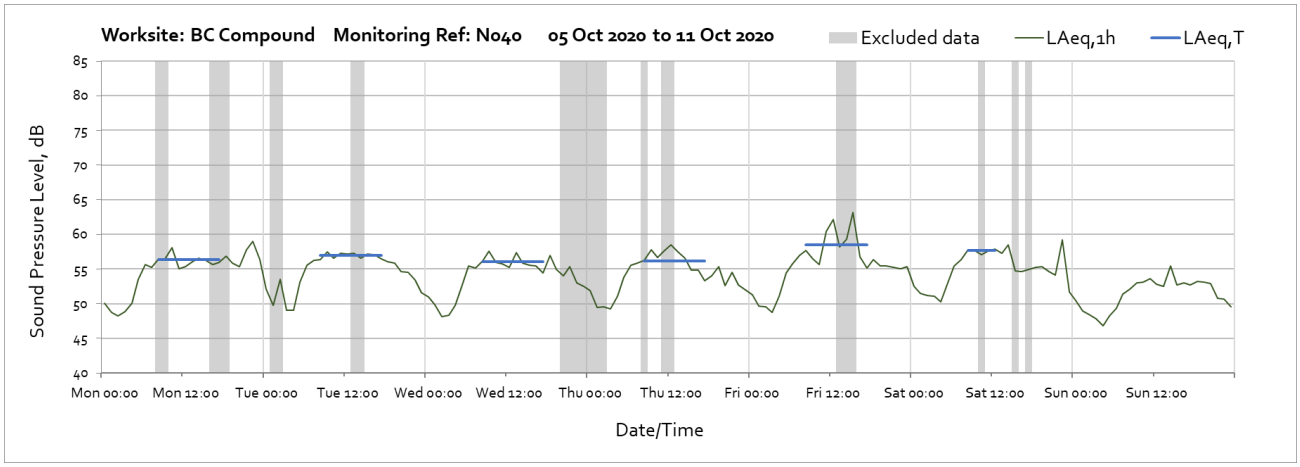


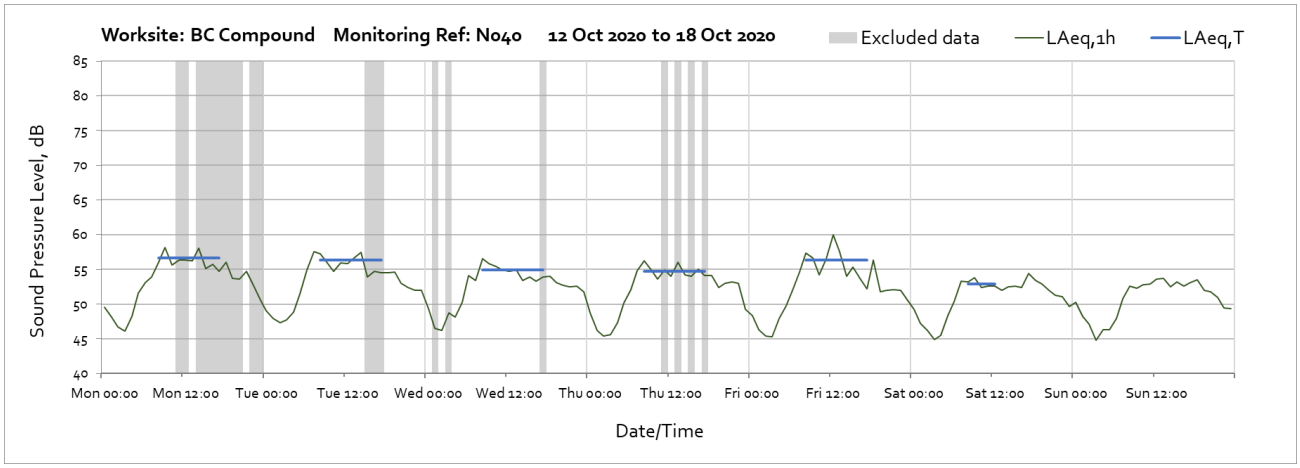


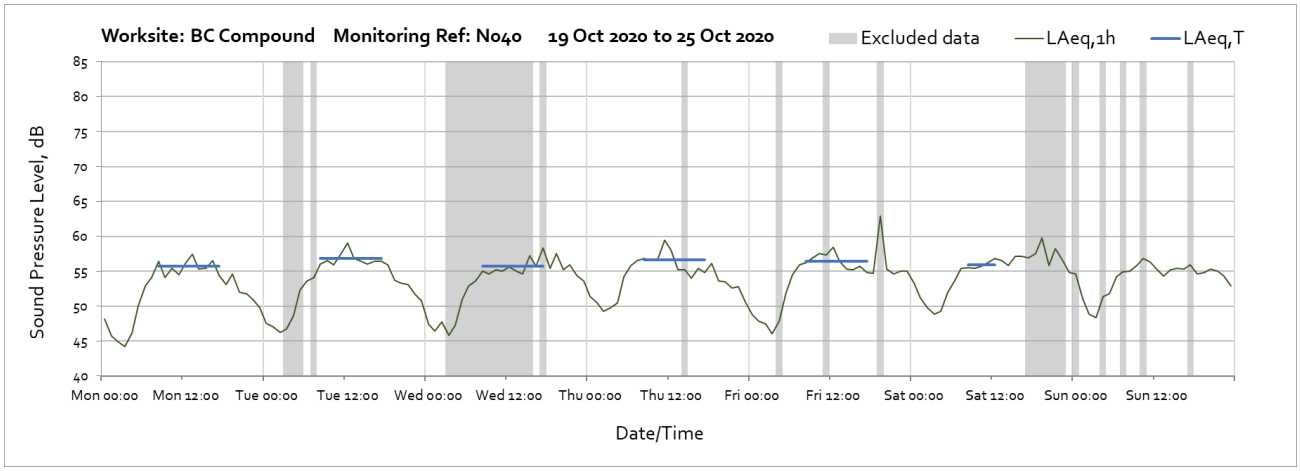


Worksite: BC Compound – Monitoring Ref: N040




Worksite: BC Compound Monitoring Ref: N040 05 Oct 2020 to 11 Oct 2020
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: BC Compound Monitoring Ref: N040 12 Oct 2020 to 18 Oct 2020
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: BC Compound Monitoring Ref: N040 19 Oct 2020 to 25 Oct 2020
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
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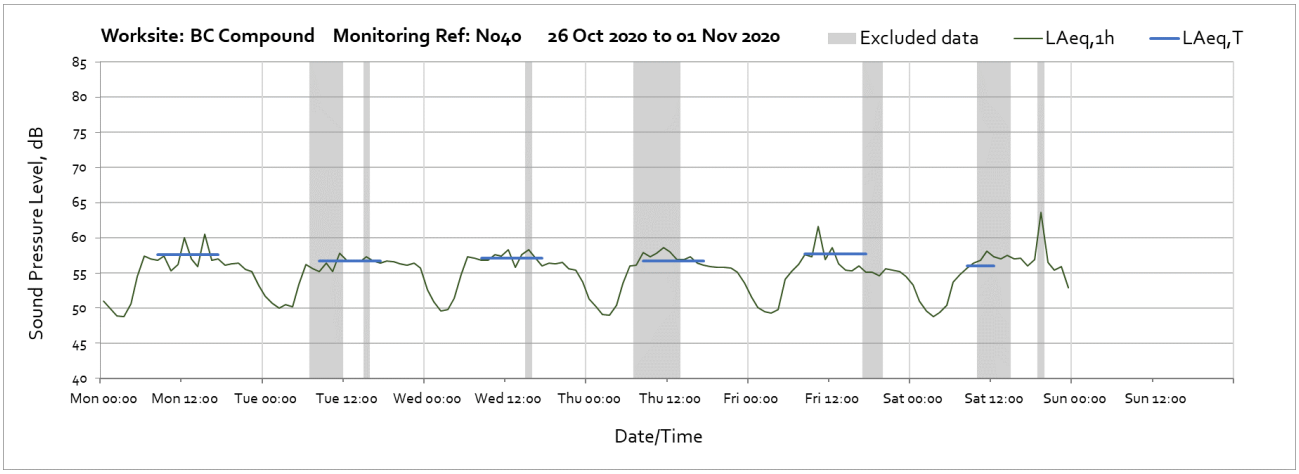
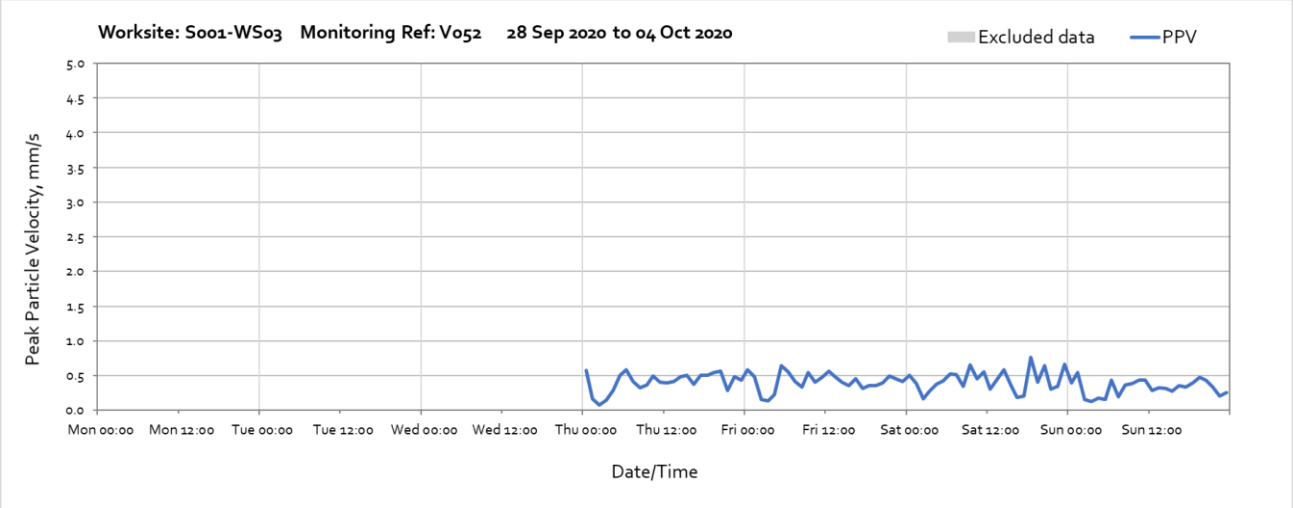
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

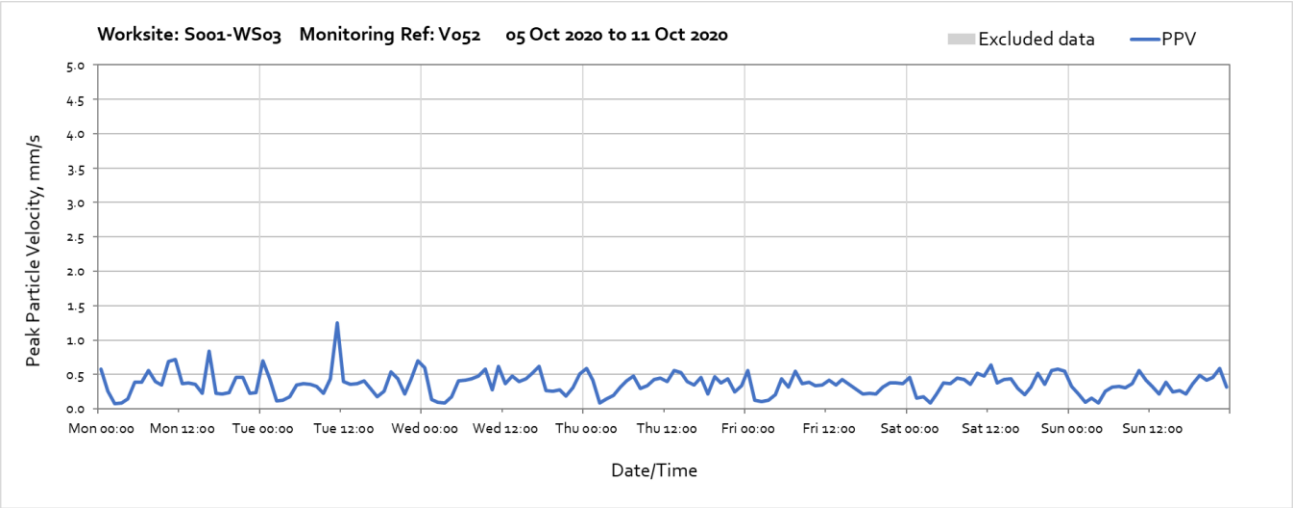

Worksite: BC Compound Monitoring Ref: No40 26 Oct 2020 to 01 Nov 2020
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

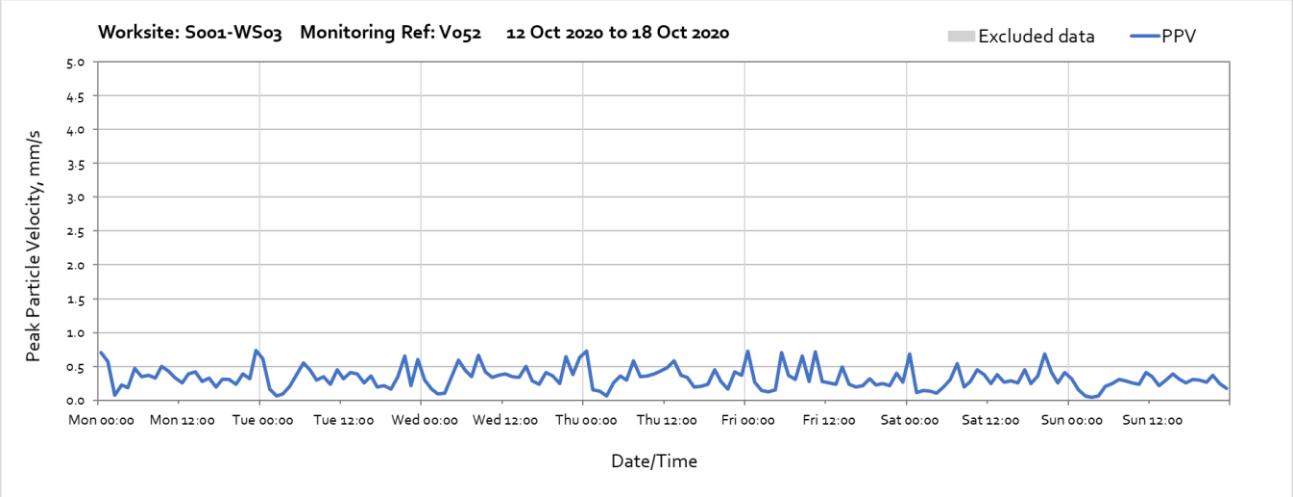
Vibration

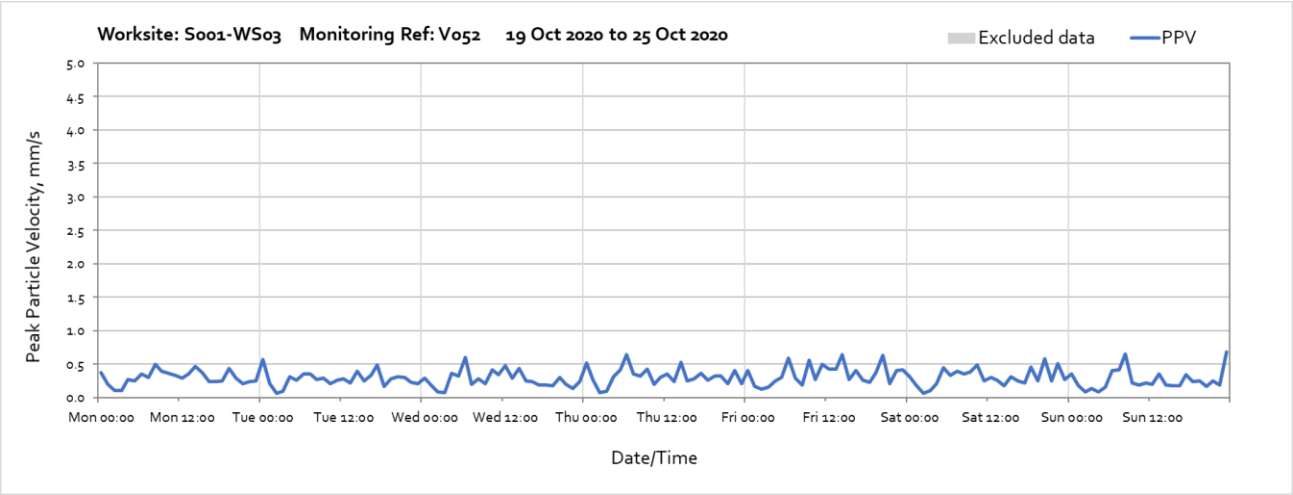
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which 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.

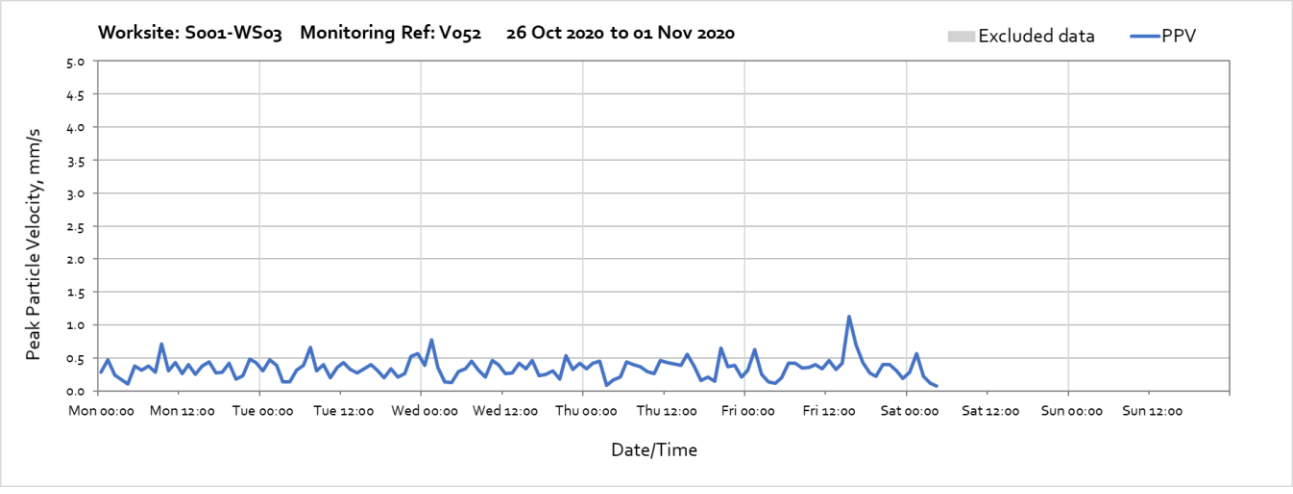
Worksite: S001-WS03 – Monitoring Ref: V052






Worksite: S001-WS03 Monitoring Ref: V052 12 Oct 2020 to 18 Oct 2020
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: S001-WS03 Monitoring Ref: V052 19 Oct 2020 to 25 Oct 2020
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: S001-WS03 Monitoring Ref: V052 26 Oct 2020 to 01 Nov 2020
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
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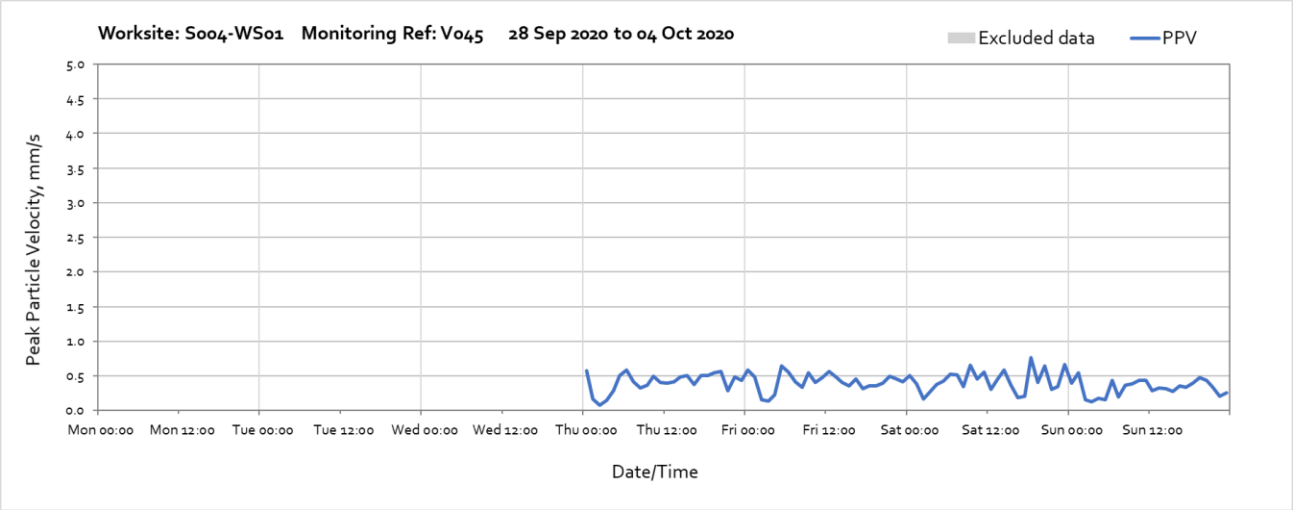
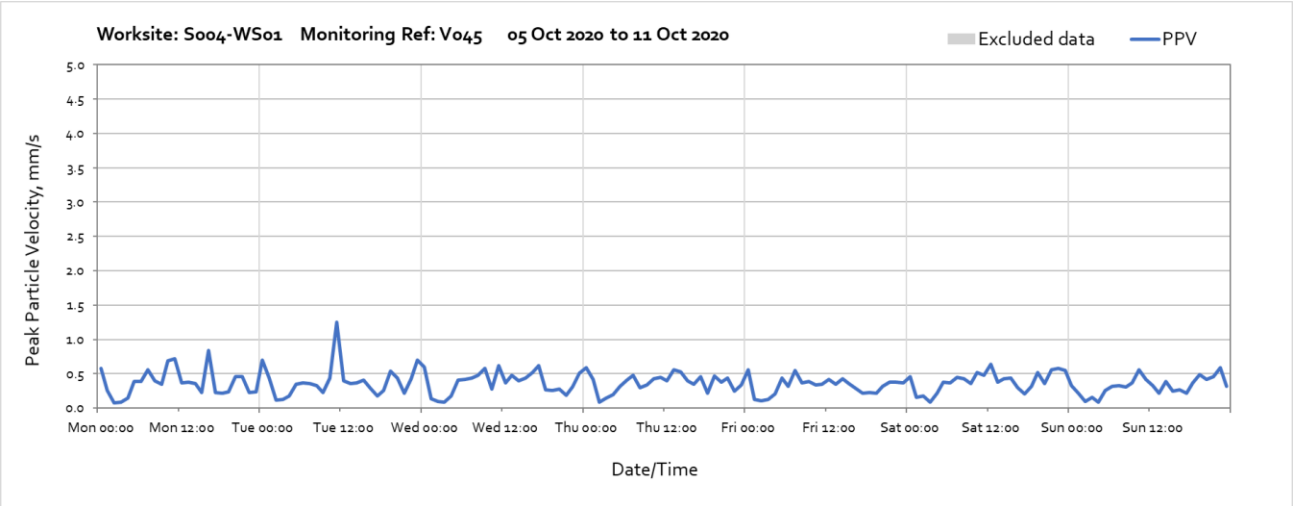
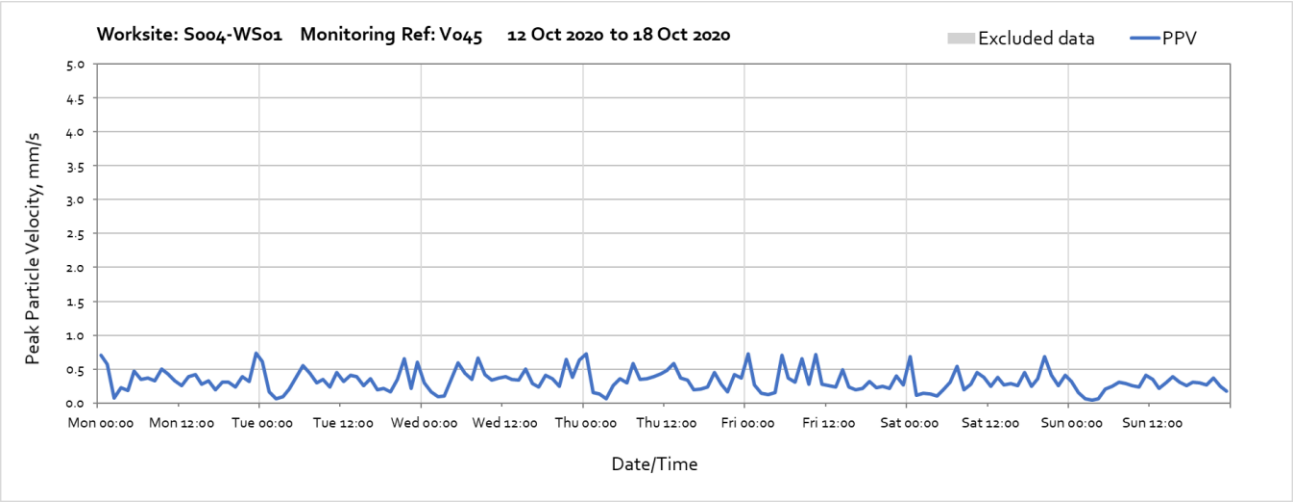
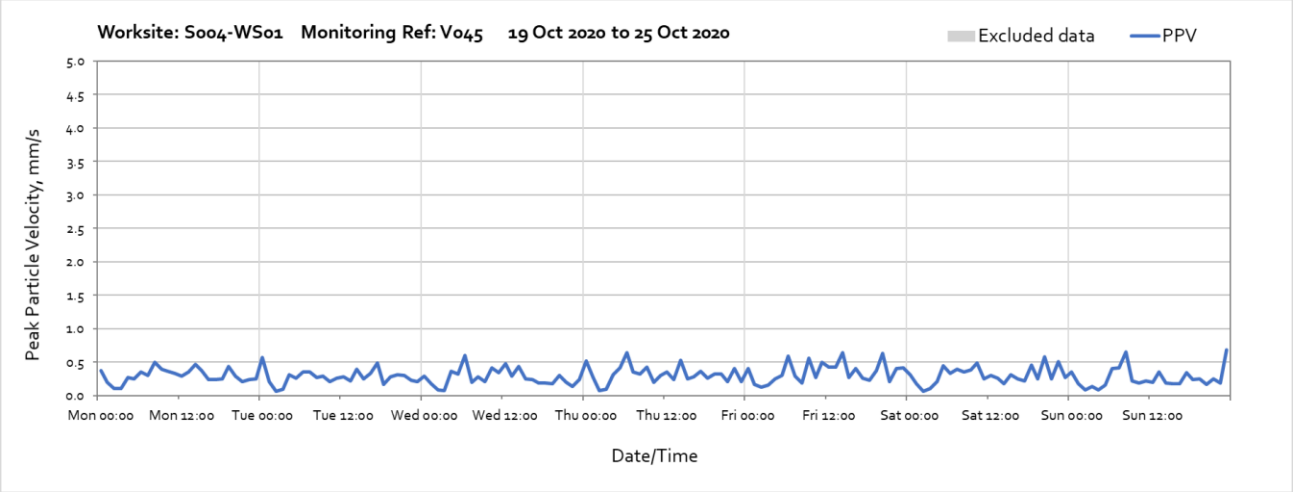
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

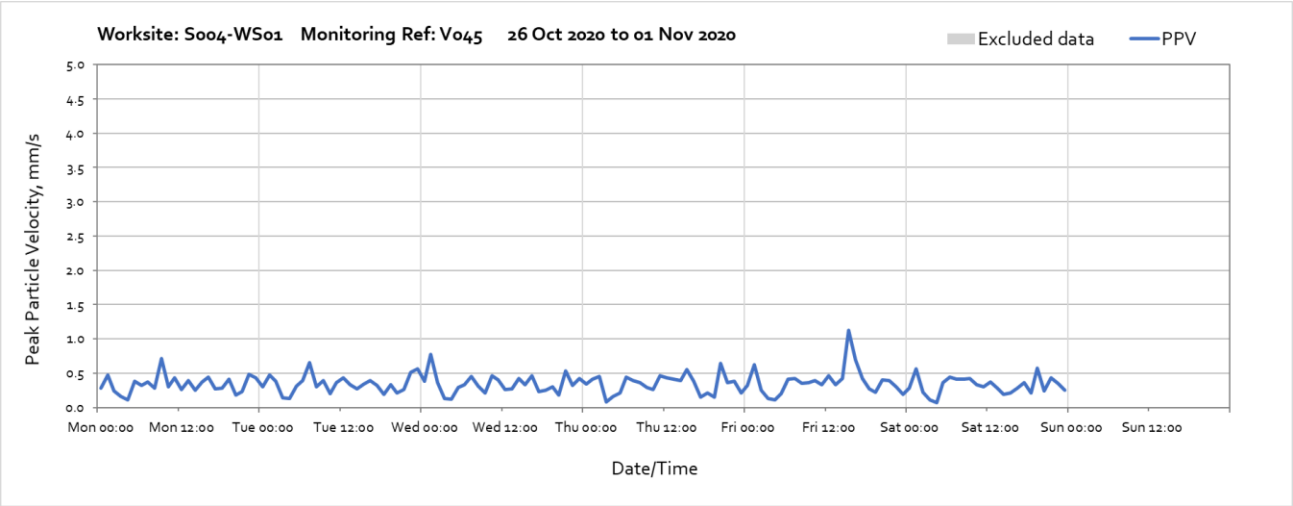
Worksite: S004-WS01 – Monitoring Ref: V045



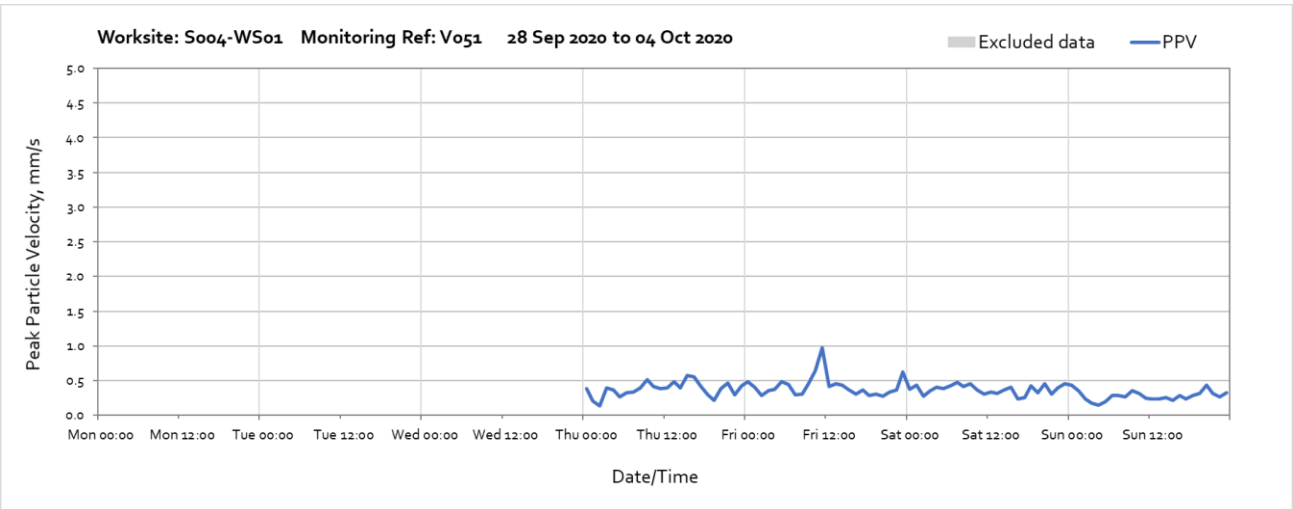


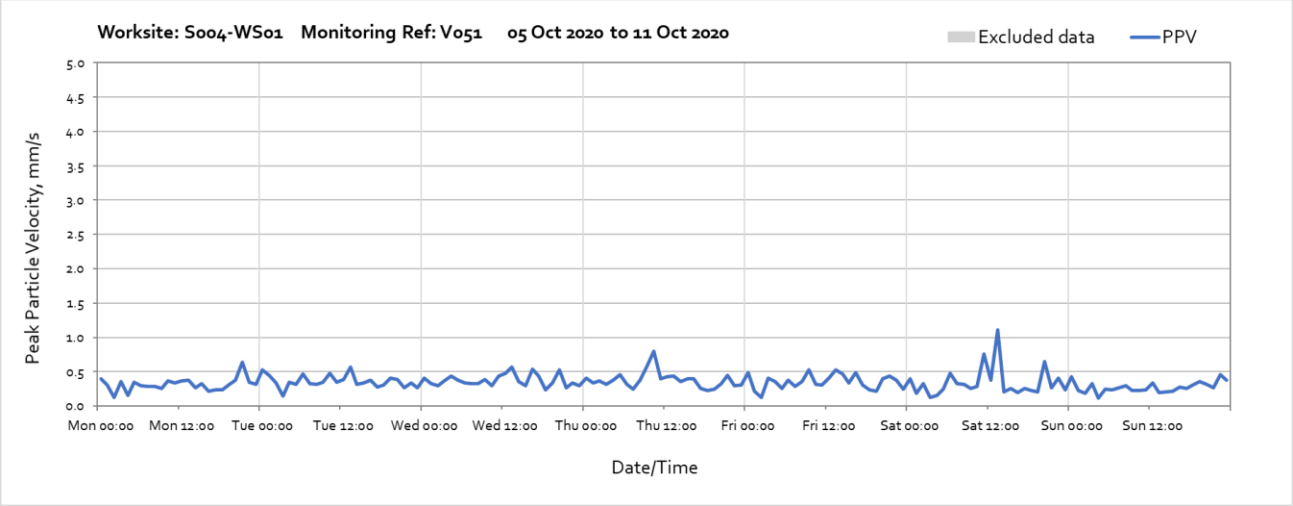






Worksite: S004-WS01 – Monitoring Ref: V051




Worksite: S004-WS01 Monitoring Ref: V051 05 Oct 2020 to 11 Oct 2020
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
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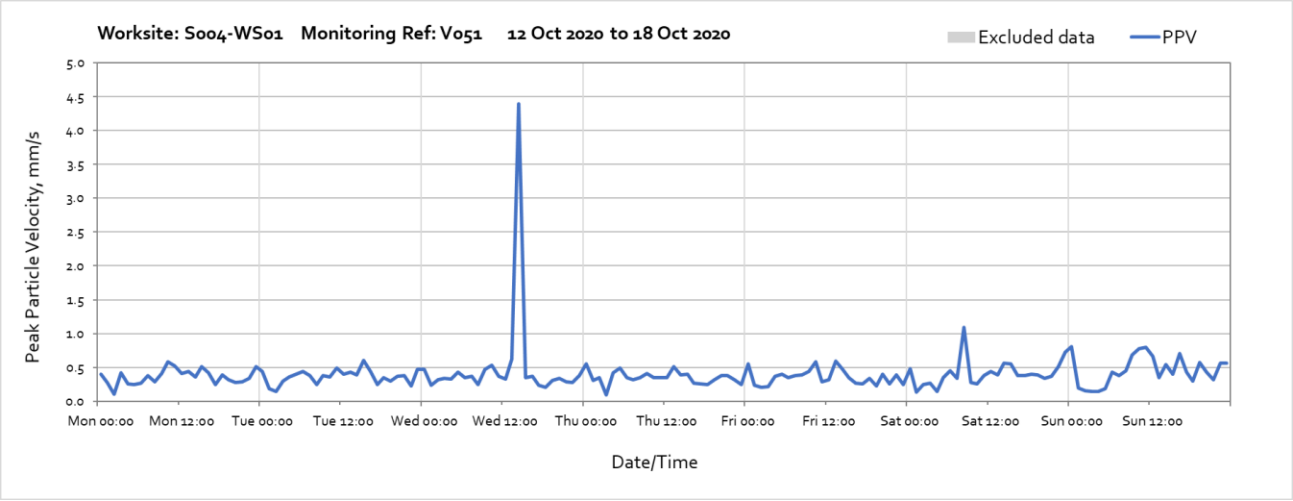
Date/Time


Worksite: S004-WS01 Monitoring Ref: V051 12 Oct 2020 to 18 Oct 2020
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
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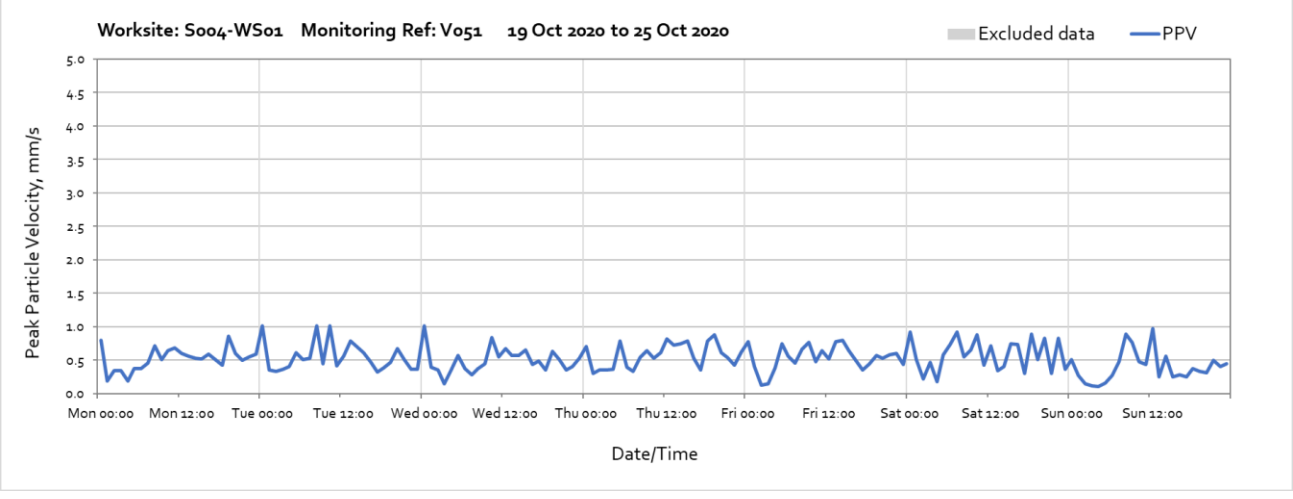
Sun 12:00
Date/Time


Worksite: S004-WS01 Monitoring Ref: V051 19 Oct 2020 to 25 Oct 2020
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
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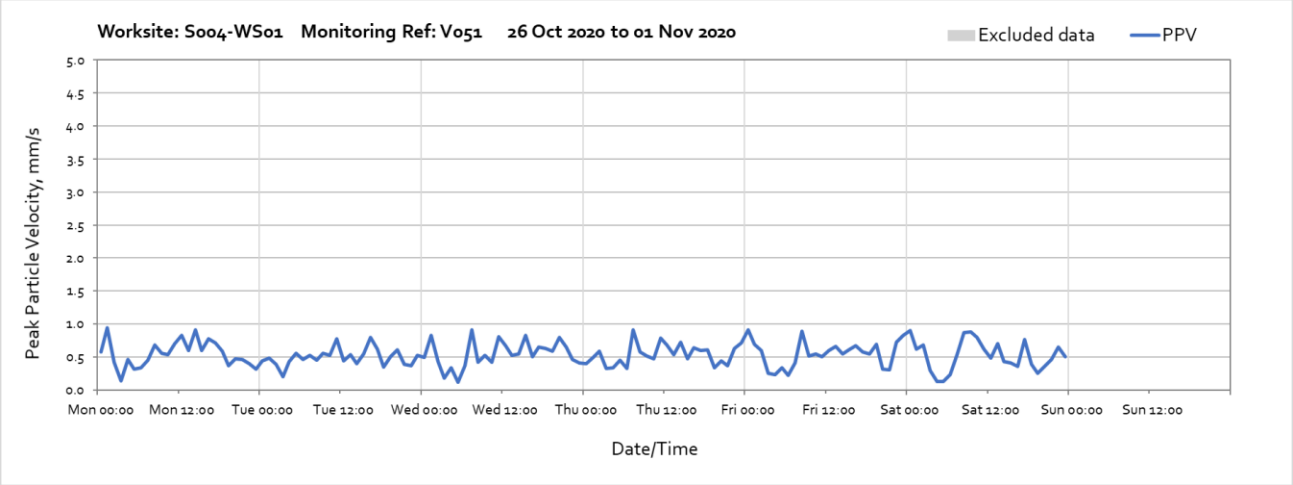
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: S004-WS01 Monitoring Ref: V051 26 Oct 2020 to 01 Nov 2020
Excluded data
PPV
Peak Particle Velocity, mm/s
5.0
4.5
4.0
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