

Construction noise and vibration Monthly Report – May 2021

London Borough of Camden

Non-Technical Summary	1
Abbreviations and Descriptions	3
1 Introduction	4
1.2 Measurement Locations	7
2 Summary of Results	9
2.1 Summary of Measured Noise and Vibration Levels	9
2.2 Exceedances of the SOAEL	14
2.3 Exceedances of Trigger Level	18
2.4 Complaints	18
Appendix A Site Locations	20
Appendix B Monitoring Locations	25
Appendix C Data	32

List of tables

Table 1: Table of Abbreviations	3
Table 2: Monitoring Locations	7
Table 3: Summary of Measured dB L _{Aeq} Data over the Monitoring Period	10
Table 4: Summary of Measured PPV Data over the Monitoring Period	14
Table 5: Summary of Exceedances of SOAEL	15
Table 6: Summary of Total Exceedances of SOAEL	17
Table 7: Summary of Exceedances of Trigger Levels	18
Table 8: Summary of Complaints	18

Non-Technical Summary

This Noise and Vibration Monitoring Report fulfils HS2 Limited's commitment detailed in the Environmental Minimum Requirements (EMRs), Annex 1, Code of Construction Practice, to present the results of noise and vibration monitoring carried out within the London Borough of Camden during the month of May 2021.

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken in the vicinity of The Adelaide Road Ventilation Shaft (ref.: ARVS) where site setup, gate installation, ramp installation, ground investigations, scaffolding works, setup of traffic management, concrete pouring, installation of working platforms, fencing works, removal of lighting columns, vegetation clearance and construction of internal site access routes were underway.
- Noise monitoring was undertaken in the vicinity of Euston Throat Retained Cut and Granby Terrace Bridge worksite (ref.: ETRC & GTB) where guide wall construction, silo installation and grouting, excavations, piling, groundworks and removal of bridge parapets and beams were underway.
- Noise monitoring was undertaken in the vicinity of Euston Scissor Cut worksite (ref.: ESC) where piling, removal of waste materials, pile mat and guide wall installation, installation of access ramp, surveys and haul road maintenance were underway. A rail line blockade started on 2nd April and was ongoing until 17th May allowing the installation of piles during the daytime adjacent to the rail line. Night-time works during the blockade did not have any piling or concrete related activity, with minimal amount of plant used (crane and hand tools).
- Noise and vibration monitoring was undertaken in the vicinity of the Hampstead Road Bridge worksite (ref.: HRB) where installation of hauling, installation of haul road access and installation of traffic management systems were underway.
- Noise and vibration monitoring was undertaken in the vicinity of the Euston Cavern worksite (ref.: ECAV), where testing and installation of ground anchors, wall coring, hoarding works and piling were underway.
- Noise monitoring was undertaken in the vicinity of On-Network worksites (ref.: B, C, D, E, F, G and H), where:
 - Mechanical, electrical and plumbing works, alternation to back-of-house areas and installation of new road markings (worksite H); and
 - signalhead installation (worksites C - H) were underway.
- Noise monitoring was undertaken in the vicinity of the 140 Hampstead Road and Power Signal Box worksite (ref.: S001-WS02), where demolition was underway.

- Noise and vibration monitoring were undertaken in the vicinity of the Wolfson House, Walkden House, 67-75 & 77-79 Euston Road worksite (ref.: S003-WS03) where demolition and removal of redundant basement structures and propping were underway.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital, 110 Hampstead Road worksite (ref.: S003-WS06), where deliveries were underway.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital - Euston North worksite (ref.: NTH-EN) where pile cropping/cutting, excavations and installation of ground level monitoring were underway.
- Noise monitoring was undertaken in the vicinity of the Euston Towers Demolition worksite (ref.: ETD), where groundworks, removal of site cabins, hoarding and lighting installation demolition work preparation were underway.
- Noise monitoring was undertaken in the vicinity of the Vehicle Holding Area worksite (ref.: VHA), where concrete slab construction and site setup were underway.
- Noise monitoring was undertaken in the vicinity of the Traction Substation worksite (ref.: TSS) where site setup, deliveries and mobilisation of excavation works were underway.
- Noise monitoring was undertaken in the vicinity of the Interim Taxi Rank worksite (ref.: ITR), where excavations, haul road construction and hoarding and site access gate installation were underway.

Further works were also undertaken at:

- Stephenson Way, Regnart Buildings, Drummond Street, Gower Street and Harrington Street where utilities works were underway; and
- Doric Way, where installation of hoarding, digging on inspection pits, cable percussion drilling and rotary drilling were underway.

The HS2 threshold levels for significant noise impacts, which are defined in Information Paper E23 (<https://www.gov.uk/government/publications/hs2-information-papers-environment>) were exceeded seven (7) times due to HS2 works in the Local Authority Area during May 2021.

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

Eight (8) complaints were received during the monitoring period. A description of complaints, the results of investigations and any actions taken are detailed in Table 8 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.

Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the London Borough of Camden (LBC) for the period 1st to 31st May 2021.

1.1.2 Active construction sites in the local authority area where monitoring was undertaken during this period include:

- The Adelaide Road ventilation shaft, (see plan 2 in Appendix A), where work activities included:
 - site setup;
 - gate installation and installation of associated foundations;
 - concrete ramp installation;
 - ground investigations (including borehole drilling, digging of trial pits and in-situ testing);
 - scaffolding;
 - setup of traffic management (including installation of vehicle crash barriers, concrete infilling and asphalt removal);
 - formation of concrete channels for future utilities / duct runs;
 - installation of working platforms;
 - fencing works;
 - removal of lighting columns; and

- vegetation clearance.
- Euston Throat Retained Cut and Granby Terrace Bridge worksite ref.: ETRC & GTB (see plan 2 in Appendix A), where work activities included:
 - guide wall construction;
 - polymer silo installation and grouting;
 - excavations;
 - continuous flight auger (CFA) piling and sheet piling;
 - groundworks to provide ramp access; and
 - removal of bridge parapets and beams.
- Euston Scissor Cut worksite ref.: ESC (see plan 2 in Appendix A), where work activities included:
 - CFA and sheet piling;
 - removal of waste materials from site;
 - pile mat installation;
 - installation of access ramp;
 - track and street surveys;
 - haul road maintenance; and
 - activities undertaken during a rail line blockage (piling during the daytime and light works using a crane and hand tools during the night-time).
- Hampstead Road Bridge worksite ref.: HRB (see plan 3 in Appendix A), where work activities included:
 - installation of hoarding;
 - installation of haul road access; and
 - installation of traffic management systems.
- Euston Cavern worksite ref.: ECAV (see plan 3 in Appendix A), where work activities included:
 - testing of ground anchors;
 - wall coring and ground anchor installation;
 - bridge investigations;
 - hoarding works; and
 - steel sheet piling.
- On-Network worksites ref.: C, D, E, F, G and H (see plan 3 in Appendix A), where work activities included:
 - mechanical, electrical and plumbing works, alternation to back-of-house areas and installation of new road markings (worksite H); and

- signalhead installation (worksites C - H).
- 140 Hampstead Road and Power Signal Box worksite ref.: S001-WS02 (see plan 2 in Appendix A), where work activities included:
 - superstructure demolition.
- Wolfson House, Walkden House, 67-75 & 77-79 Euston Road worksite ref.: S003-WS03 (see plan 3 in Appendix A), where work activities included:
 - minor demolition works; and
 - removal of redundant basement structures and propping.
- Former National Temperance Hospital, 110 Hampstead Road worksite ref.: S003-WS06 (see plan 3 in Appendix A), where work activities included:
 - deliveries.
- Former National Temperance Hospital - Euston North worksite ref.: NTH-EN (see plan 3 in Appendix A), where work activities included:
 - hydraulic pile cropping;
 - excavations (wall works and digging of trial holes); and
 - installation of inclinometers.
- Euston Towers Demolition worksite ref.: ETD (see plan 3 in Appendix A), where work activities included:
 - groundworks (propping);
 - removal of site cabins;
 - hoarding and lighting installation; and
 - preparation for demolition works.
- Vehicle Holding Area worksite ref.: VHA (see plan 1 in Appendix A), where work activities included:
 - steel fixing of concrete slabs;
 - concrete pouring; and
 - site setup.
- Traction Substation worksite ref.: TSS (see plan 3 in Appendix A), where work activities included:
 - site setup;
 - deliveries; and
 - setup and mobilisation of excavation works (caisson shaft sinking).
- Interim Taxi Rank worksite ref.: ITR (see plan 3 in Appendix A), where work activities included:
 - excavation of trial holes;

- haul road construction; and
- hoarding and site access gate installation.

1.1.3 Further works, where monitoring did not take place, were also undertaken at the following locations:

- Stephenson Way, Regnart Buildings, Drummond Street, Gower Street and Harrington Street where utilities works were undertaken; and
- Doric Way, where installation of hoarding, digging on inspection pits, cable percussion drilling and rotary drilling were undertaken.

1.1.4 The applicable standards, guidance, and monitoring methodology are 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 Thirty-two (32) noise and ten (10) vibration monitoring installations were active across fifteen (15) worksites in May in the LBC area. Table 2 summarises the position of noise and vibration monitoring installations within the LBC area in May 2021.

1.2.2 An additional vibration monitor, V059, was installed at Adelaide Road Ventilation Shaft, worksite ref. ARVS, on the 26th of May.

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
ARVS	N051	Outside 70 Adelaide Road
	N052	Adelaide Road-Beaumont Walk
	V059	Outside 68 Adelaide Road
B	JC	Juniper Crescent
ESC	N024	External to Park Village Studios, Park Village East
	N047	Park Village East/Mornington Street bridge, lamppost #13
	PVS-V1	Park Village Studios
ESC, C	N022	External to 34 Mornington Terrace
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18
ETRC & GTB	N001	Park Village East, lamppost #1 (external to Cubitt Court, 100 Park Village East)

Worksite Reference	Measurement Reference	Address
	N002	Park Village East, lamppost #2 (external to Richmond Court)
	N003	Park Village East, lamppost #9 (external to Silsoe House)
	SH-V1	Silsoe House
ETRC & GTB, D	N004	Mornington Terrace, lamppost #7 (junction of Mornington Terrace, Mornington Place and Clarkson Row)
ETRC & GTB, E	N005	5A Granby Terrace
ETRC & GTB, F	N023	Lamppost #21 on Hampstead Road
HRB	N020	Mackworth Street, lamppost #1
	N021	Stanhope Street, lamppost #2
	N044	Regents Park Estate west, near Langdale
	N045	Regents Park Estate south, external to Coniston
	V039	Coniston, Regents Park Estate
	V043	Cubitt Court, Park Village East
G	HH	Euston Station Parcel Deck, Barnby Street
	BS	Roof of Stockbeck House, Barnby Street
S001-WS02	N018	Outside replacement housing, Hampstead Road
	N019	Outside Cartmel, Hampstead Road
S003-WS03, ETD, TSS	N006	Royal College of General Practitioners roof level
S003-WS03, TSS	N008	Stephenson's Way lamppost (external to RCGP)
	N010	Wesley Hotel
	N011	Euston Street, lamppost #4 (external to 82 Euston Street)
S003-WS03	V002	Royal College of General Practitioners basement boiler room by Stephenson Way
	V037	Magic Circle, basement
	V038	Wesley Hotel, basement lightwell, Euston Street
S003-WS03, ETD	N007	Royal College of General Practitioners, Melton Street
	V003	Royal College of General Practitioners basement vaults under Melton St
VHA	N025	External to 3 Prince Albert Road
	N026	Thames Water Compound
NTH-EN, TSS	N012	Drummond Street, lamppost #14 (opposite to 92-94 Drummond Street)
NTH-EN	N014	Starcross Street lamppost (external to Exmouth Arms)
	N016	Margaret Centre roof
	N017	Hampstead Road, lamppost #48
	V021	42-44 Cobourg Street

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	Weekly Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Saturday Average L _{Aeq,T} (highest day L _{Aeq,T})					Sunday / Public Holiday Average L _{Aeq,T} (highest day L _{Aeq,T})	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
ARVS	N051	Outside 70 Adelaide Road	Free-field	67.0 (69.3)	68.7 (71.6)	66.9 (70.4)	67.1 (72.1)	64.5 (75.2)	64.8 (65.7)	68.1 (70.5)	67.6 (68.3)	68.0 (74.8)	65.6 (72.9)	67.2 (74.7)	63.7 (68.0)
	N052	Adelaide Road-Beaumont Walk	Free-field	66.2 (69.4)	68.6 (79.8)	66.8 (72.1)	66.9 (72.3)	63.9 (74.7)	64.0 (64.9)	66.6 (69.1)	66.4 (67.8)	66.4 (72.8)	63.9 (68.2)	65.6 (71.5)	62.9 (68.4)
B	JC	Juniper Crescent	Free-field	57.1 (61.1)	57.2 (60.9)	56.4 (60.0)	57.6 (60.8)	54.8 (60.9)	54.9 (56.8)	55.7 (58.1)	53.8 (59.2)	54.2 (59.6)	52.7 (59.7)	52.8 (59.1)	52.9 (57.1)
ESC	N024	External to Park Village Studios, Park Village East	Free-field	59.1 (61.0)	60.3 (65.3)	59.3 (61.7)	58.2 (64.9)	54.6 (67.3)	55.3 (56.3)	58.2 (60.9)	58.7 (59.7)	58.4 (65.0)	53.6 (58.0)	57.3 (66.1)	53.3 (57.8)
	N047	Park Village East/Mornington Street bridge, lamppost #13	Free-field	59.2 (62.1)	63.1 (76.2)	60.2 (62.5)	58.8 (63.7)	54.0 (64.8)	56.4 (57.5)	58.3 (59.5)	59.2 (59.9)	58.8 (60.2)	53.5 (57.9)	57.7 (61.3)	53.3 (60.3)
ESC, C	N022	External to 34 Mornington Terrace	Free-field	58.9 (60.8)	61.3 (71.5)	59.2 (62.1)	58.4 (62.6)	54.1 (63.6)	55.7 (59.0)	58.8 (60.7)	58.3 (59.4)	58.0 (60.2)	53.3 (60.9)	56.8 (63.6)	52.2 (56.6)
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18	Free-field	62.3 (63.4)	63.7 (65.0)	62.3 (63.8)	61.8 (63.7)	57.6 (64.2)	59.3 (63.7)	62.3 (64.3)	61.2 (63.3)	61.4 (64.0)	55.8 (62.7)	59.7 (64.1)	55.9 (61.1)
ETRC & GTB	N001	External to Cubitt Court, 100 Park Village East	Free-field	59.6 (63.1)	66.3 (73.1)	60.3 (63.0)	59.0 (62.3)	54.4 (63.1)	56.7 (57.8)	67.1 (71.1)	62.4 (67.9)	58.9 (63.3)	54.5 (58.2)	58.5 (66.0)	54.0 (59.2)
	N002	Richmond Court, Park Village East	Free-field	57.8 (59.7)	62.1 (63.9)	60.3 (61.5)	58.6 (62.5)	53.4 (66.7)	55.6 (57.0)	59.0 (59.9)	59.3 (60.5)	58.8 (61.1)	53.4 (57.8)	57.5 (61.4)	51.8 (57.4)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$)					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
	N003	Silsoe House, Park Village East	Façade	58.5 (60.6)	61.9 (66.2)	60.8 (63.0)	59.2 (64.9)	54.0 (63.9)	56.5 (57.0)	58.4 (60.0)	59.4 (60.0)	59.2 (61.1)	54.3 (59.1)	58.6 (65.0)	53.0 (58.3)
ETRC & GTB, D	N004	Mornington Terrace, lamppost #7	Free-field	64.1 (67.7)	66.6 (68.4)	64.9 (70.2)	64.5 (71.1)	60.8 (71.2)	62.4 (69.9)	65.0 (69.6)	64.2 (68.6)	63.0 (72.3)	57.9 (68.6)	63.8 (72.1)	57.9 (69.7)
ETRC & GTB, E	N005	5A Granby Terrace	Free-field	64.6 (66.6)	67.7 (70.6)	64.6 (66.9)	64.0 (66.9)	61.0 (65.7)	62.5 (63.2)	67.0 (68.4)	64.8 (65.9)	63.6 (66.7)	60.6 (64.6)	62.9 (68.1)	60.0 (63.8)
ETRC & GTB, F	N023	Lamppost #21 on Hampstead Road	Free-field	70.0 (71.5)	71.1 (72.2)	69.3 (71.7)	68.5 (71.5)	66.2 (71.1)	67.3 (67.8)	69.7 (71.0)	68.6 (69.0)	68.6 (70.9)	66.3 (71.0)	67.8 (73.9)	65.9 (71.0)
HRB	N020	Mackworth Street, lamppost #1	Free-field	55.3 (62.8)	66.3 (70.1)	54.8 (62.8)	52.3 (57.2)	49.9 (58.7)	53.8 (54.9)	64.5 (66.3)	57.2 (62.4)	53.1 (60.0)	50.5 (57.1)	54.6 (67.2)	49.9 (55.1)
	N021	Stanhope Street, lamppost #2	Free-field	58.3 (64.3)	65.7 (72.2)	59.2 (61.2)	57.9 (64.0)	52.8 (62.2)	55.2 (56.0)	64.6 (72.3)	62.8 (72.3)	58.2 (63.1)	53.1 (56.9)	58.9 (68.8)	51.8 (56.0)
	N044	Regents Park Estate west, near Langdale	Free-field	54.8 (60.8)	67.9 (80.6)	56.5 (67.8)	53.8 (68.0)	48.6 (60.9)	52.0 (53.0)	67.9 (70.5)	60.2 (69.1)	53.9 (66.8)	48.4 (54.3)	55.8 (70.8)	47.6 (52.5)
	N045	Regents Park Estate south, external to Coniston	Free-field	57.9 (62.3)	69.0 (82.2)	59.8 (75.6)	55.9 (64.6)	52.2 (59.5)	56.3 (57.2)	65.4 (67.9)	60.9 (69.4)	56.2 (62.2)	52.7 (55.6)	58.5 (69.6)	52.7 (56.5)
G	HH	Euston Station Parcel Deck, Barnby Street	Free-field	58.7 (62.6)	60.3 (62.9)	60.2 (64.7)	60.5 (67.2)	57.1 (70.8)	57.9 (59.0)	59.0 (60.0)	59.5 (62.9)	59.9 (65.2)	58.5 (69.4)	59.1 (67.9)	56.2 (63.5)
	BS	Roof of Stockbeck House, Barnby Street	Free-field	61.6 (64.2)	63.5 (65.4)	61.5 (63.5)	61.7 (64.7)	57.7 (64.2)	59.8 (65.1)	61.1 (63.1)	59.8 (62.7)	60.2 (63.3)	55.3 (61.8)	60.7 (65.1)	55.5 (62.1)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$)					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
S001-WS02	N018	Outside replacement housing, Hampstead Road	Free-field	69.8 (73.0)	71.4 (73.7)	70.4 (74.8)	70.3 (74.3)	67.2 (72.4)	68.6 (69.9)	69.5 (70.7)	69.0 (70.1)	70.3 (74.0)	67.9 (73.2)	68.9 (74.0)	67.2 (72.4)
	N019	Outside Cartmel, Hampstead Road	Free-field	57.3 (59.9)	63.6 (73.1)	56.6 (59.3)	56.4 (62.1)	54.1 (59.7)	56.2 (56.3)	60.4 (62.1)	56.9 (59.6)	56.0 (60.7)	54.1 (58.9)	55.7 (59.6)	53.7 (56.7)
S003-WS03, ETD, TSS	N006	Royal College of General Practitioners roof level	Free-field	57.0 (63.1)	63.8 (70.8)	54.9 (56.0)	54.8 (61.7)	53.4 (59.1)	56.1 (58.0)	61.3 (70.8)	55.4 (60.1)	54.6 (56.0)	53.0 (53.8)	54.4 (61.2)	52.8 (54.5)
S003-WS03, TSS	N008	Stephenson's Way lamppost (external to RCGP)	Façade	57.9 (63.3)	68.1 (81.6)	53.6 (55.9)	54.4 (63.1)	53.0 (61.1)	56.4 (58.0)	64.8 (70.1)	53.8 (54.7)	53.8 (57.3)	51.6 (53.0)	53.2 (58.4)	52.5 (57.4)
	N010	Wesley Hotel	Façade	61.3 (68.7)	68.3 (73.3)	55.7 (65.7)	56.8 (67.9)	53.7 (68.3)	61.5 (65.6)	66.6 (73.3)	57.0 (64.9)	56.7 (65.0)	51.4 (60.2)	58.1 (65.4)	53.1 (62.9)
	N011	Outside 82 Euston Street	Free-field	56.4 (60.6)	61.0 (66.6)	55.8 (61.3)	55.5 (63.3)	52.9 (64.7)	53.0 (53.6)	58.2 (60.4)	57.3 (60.9)	55.0 (60.9)	50.2 (53.6)	54.8 (66.3)	52.0 (63.2)
S003-WS03, ETD	N007	Royal College of General Practitioners, Melton Street	Free-field	64.2 (67.3)	65.8 (71.7)	63.5 (66.7)	62.8 (68.0)	61.9 (68.1)	63.2 (64.3)	63.7 (65.5)	63.3 (65.6)	63.2 (66.9)	63.3 (77.9)	62.5 (67.6)	61.8 (66.2)
VHA	N025	External to 3 Prince Albert Road	Free-field	67.6 (69.5)	67.5 (69.4)	66.0 (67.7)	66.1 (71.5)	63.1 (70.3)	64.6 (65.6)	66.8 (67.5)	66.3 (67.6)	66.4 (71.9)	63.9 (68.4)	65.8 (72.1)	63.0 (67.7)
	N026	Thames Water Compound	Free-field	58.3 (61.5)	62.6 (70.7)	56.7 (58.7)	56.3 (58.4)	53.1 (59.1)	55.3 (56.5)	57.1 (58.8)	56.5 (58.6)	56.4 (60.6)	53.5 (57.4)	55.9 (58.9)	53.6 (58.8)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$)					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
NTH-EN, TSS	N012	Opposite 92-94 Drummond Street	Free-field	58.1 (63.2)	64.9 (74.2)	57.3 (60.4)	57.7 (61.3)	55.0 (58.9)	55.6 (55.9)	63.8 (75.4)	57.9 (62.6)	57.2 (59.5)	54.9 (58.3)	57.0 (63.3)	54.2 (57.9)
NTH-EN	N014	Starcross Street lamppost (external to Exmouth Arms)	Free-field	55.3 (67.7)	58.7 (60.8)	61.1 (65.6)	60.3 (68.2)	53.6 (67.8)	54.1 (59.4)	55.6 (56.7)	57.3 (59.1)	59.5 (66.8)	50.9 (58.4)	56.3 (61.9)	52.0 (57.8)
	N016	Margaret Centre roof	Free-field	55.6 (58.8)	57.8 (59.8)	54.0 (56.4)	54.0 (60.3)	51.7 (57.7)	53.5 (53.8)	55.5 (57.1)	55.1 (57.7)	54.0 (57.1)	51.7 (55.3)	53.1 (58.2)	51.4 (57.8)
	N017	Hampstead Road, lamppost #48	Free-field	70.5 (73.0)	71.2 (78.6)	71.0 (74.8)	70.3 (76.4)	67.3 (73.0)	68.3 (69.4)	69.7 (71.1)	68.5 (69.4)	70.4 (75.3)	67.9 (72.7)	69.5 (77.4)	67.5 (72.4)

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
ARVS	V059	Outside 68 Adelaide Road	2.32 (Z-axis)
HRB	V039	Coniston, Regents Park Estate	2.11 (Z-axis)
	V043	Cubitt Court, Park Village East	1.00 (Z-axis)
S003-WS03	V002	RCGP basement boiler room, 305 Euston Road	4.01 (Z-axis)
	V003	RCGP basement vaults, 305 Euston Road	0.61 (Z-axis)
	V037	Magic Circle, basement	3.85 (Z-axis)
	V038	Wesley Hotel, basement lightwell, Euston Street	1.80 (Z-axis)
NTH-EN	V021	42-44 Cobourg Street (floor)	0.70 (Z-axis)
ESC	PVS-V1	Park Village Studios	0.99 (Z-axis)
ETRC & GTB	SH-V1	Silsoe House	0.83 (Z-axis)

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 at nearby receptors, 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
ARVS	N051	Outside 70 Adelaide Road	All days	All periods	No exceedance
	N052	Adelaide Road-Beaumont Walk	Weekday	0800-1800	1
B	JC	Juniper Crescent	All days	All periods	No exceedance
ESC	N024	External to Park Village Studios, Park Village East	All days	All periods	No exceedance
	N047	Park Village East/Mornington Street bridge, lamppost #13	Weekday	0800-1800	2
ESC, C	N022	External to 34 Mornington Terrace	All days	All periods	No exceedance
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18	All days	All periods	No exceedance
ETRC & GTB	N001	External to Cubitt Court, 100 Park Village East	All days	All periods	No exceedance
	N002	Richmond Court, Park Village East	All days	All periods	No exceedance
	N003	Silsoe House, Park Village East	All days	All periods	No exceedance
ETRC & GTB, D	N004	Mornington Terrace, lamppost #7	All days	All periods	No exceedance
ETRC & GTB, E	N005	5A Granby Terrace	All days	All periods	No exceedance
ETRC & GTB, F	N023	Lamppost #21 on Hampstead Road	All days	All periods	No exceedance
HRB	N020	Mackworth Street, lamppost #1	All days	All periods	No exceedance
	N021	Stanhope Street, lamppost #2	All days	All periods	No exceedance
	N044	Regents Park Estate west, near Langdale	Weekday	0800-1800	4
	N045	Regents Park Estate south, external to Coniston	Weekday	0800-1800	2

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
G	HH	Euston Station Parcel Deck, Barnby Street	All days	All periods	No exceedance
	BS	Roof of Stockbeck House, Barnby Street	All days	All periods	No exceedance
S001-WS02	N018	Outside replacement housing, Hampstead Road	All days	All periods	No exceedance
	N019	Outside Cartmel, Hampstead Road	All days	All periods	No exceedance
S003-WS03, ETD, TSS	N006	RCGP Roof level	All days	All periods	Not applicable*
S003-WS03, TSS	N008	RCGP Stephenson Way	All days	All periods	No exceedance
	N010	Wesley Hotel	All days	All periods	No exceedance
	N011	Outside 82 Euston Street	All days	All periods	No exceedance
S003-WS03, ETD	N007	RCGP, Melton Street	All days	All periods	No exceedance
VHA	N025	External to 3 Prince Albert Road	All days	All periods	No exceedance
	N026	Thames Water Compound	All days	All periods	No exceedance
NTH-EN	N012	Opposite 92-94 Drummond Street	Weekday	0800-1800	1**
			Saturday	0800-1300	1**
	N014	Starcross Street lamppost (external to Exmouth Arms)	All days	All periods	No exceedance
	N016	Margarete Centre roof	All days	All periods	No exceedance
	N017	Hampstead Road, lamppost #48	All days	All periods	No exceedance

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

** Exceedance of the SOAEL was due to utility works happening in close proximity to the monitor, noise levels at the nearest receptor are predicted to be below the SOAEL.

2.2.5 For the purpose of assessing eligibility for noise insulation or temporary rehousing, multiple exceedances of the SOAEL in a 24-hour period would be counted as a single exceedance during that day. Over the reporting period, the overall number of SOAEL exceedances at each measurement location is shown in Table 6 and may be lower than the total sum of individual exceedances reported in Table 5 for each location.

Table 6: Summary of Total Exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
ARVS	N052	Adelaide Road-Beaumont Walk	1
ESC	N047	Park Village East/Mornington Street bridge, lamppost #13	2
HRB	N044	Regents Park Estate west, near Langdale	4
HRB	N045	Regents Park Estate south, external to Coniston	2

2.2.6 7 exceedances of the SOAEL were recorded due to HS2 construction works during May 2021. The exceedances occurred at:

- Monitoring location N052 during one daytime period due to utility trial trench works;
- Monitoring location N047 during two daytime periods due to concrete breaking;
- Monitoring location N044 during four daytime periods due to excavations and piling; and
- Monitoring location N045 during one daytime period due to excavations / fusion welding and one daytime period due to excavations.

2.3 Exceedances of Trigger Level

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

Table 7: Summary of Exceedances of Trigger Levels

Complaint Reference Number (if applicable)	Worksite Reference	Date and Time Period	Identified Source	Results of Investigation (including noise monitoring results)	Actions Taken
-	-	-	-	-	-

2.4 Complaints

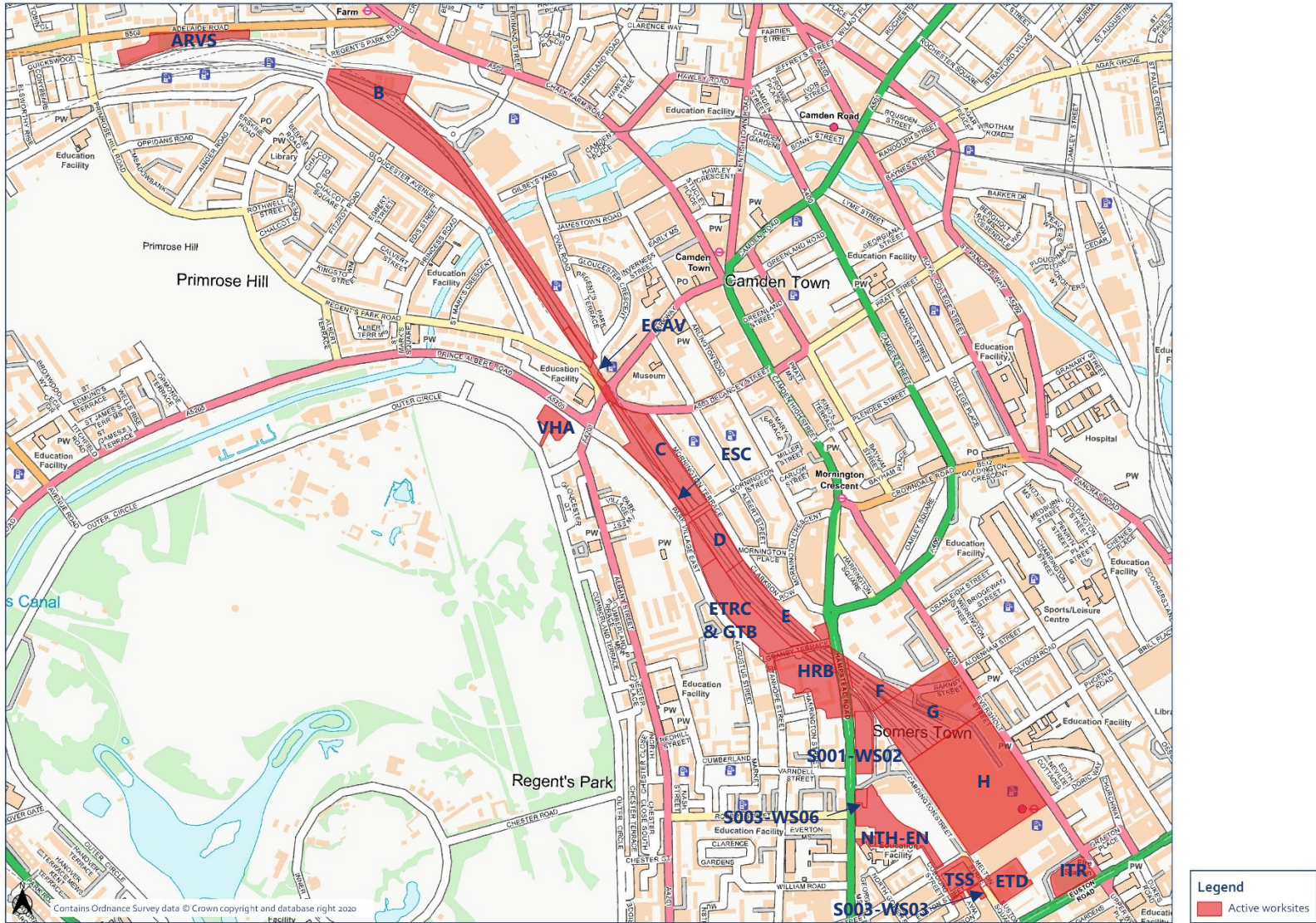
2.4.1 Table 8 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

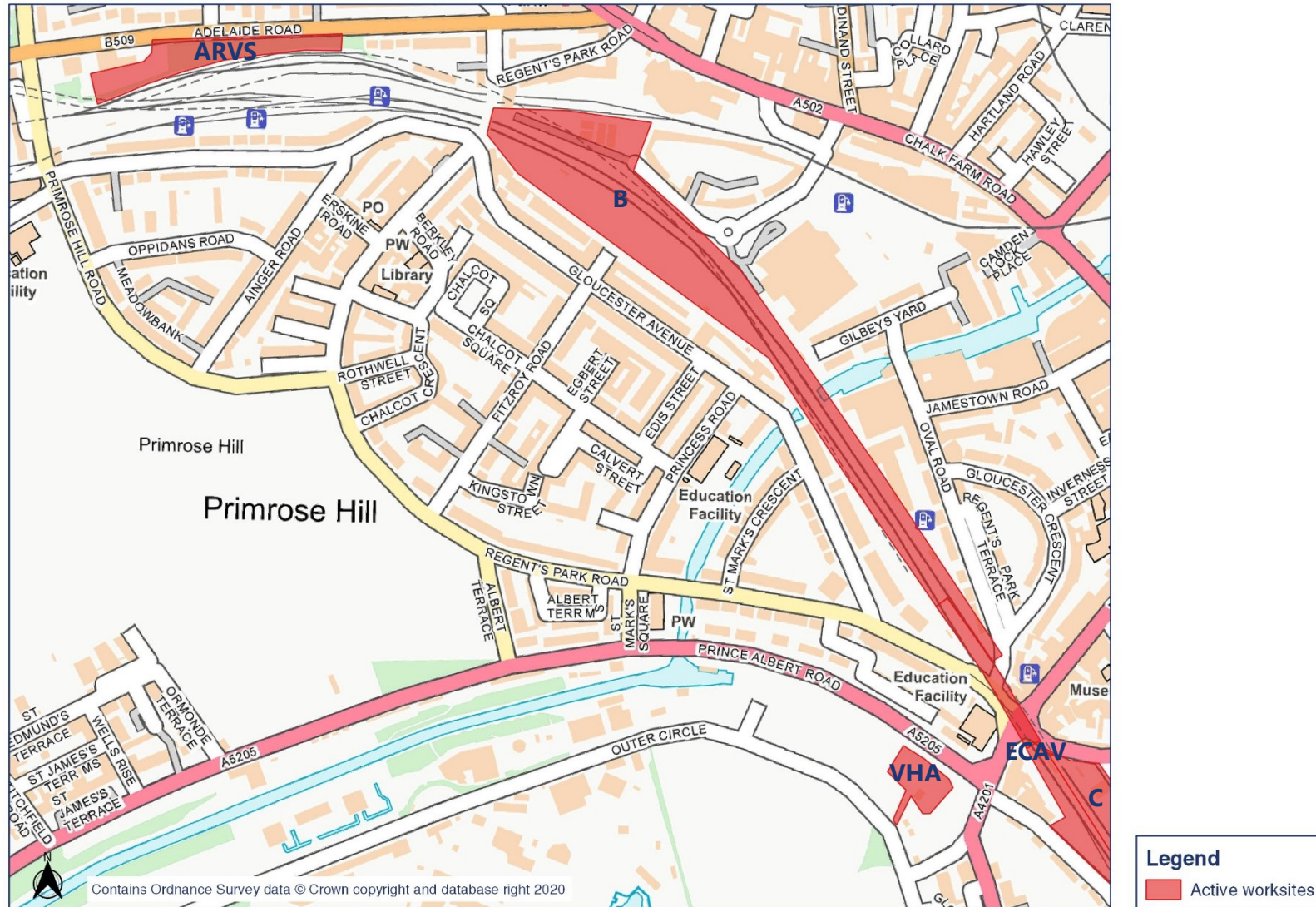
Table 8: Summary of Complaints

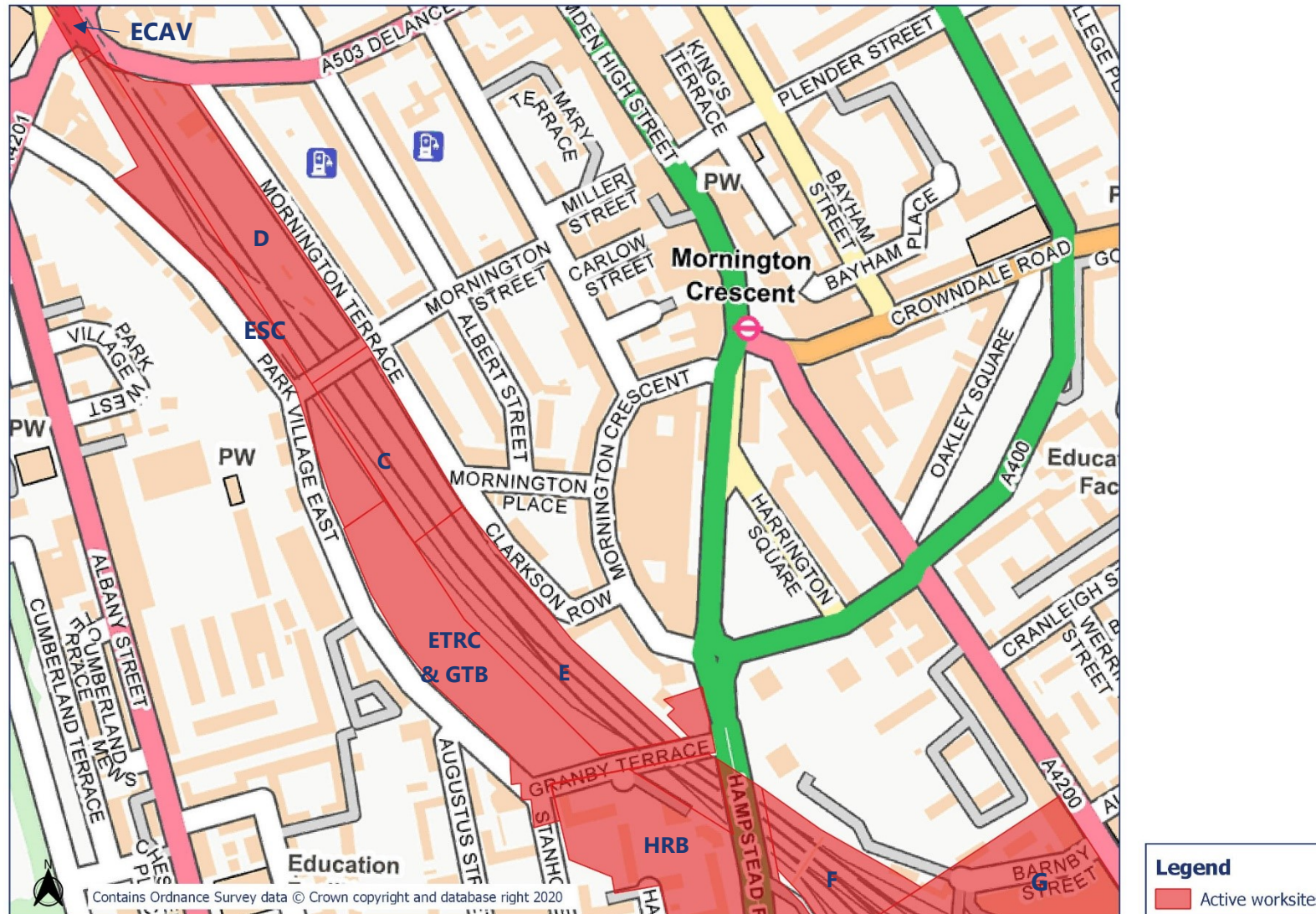
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-41881-C	ESC, C	General complaint regarding construction noise during the night-time.	HS2 construction and rail maintenance works were undertaken during the nights in question. Monitoring data demonstrates compliance with Section 61 requirements	Information was provided to the Stakeholder regarding the monitoring data and mitigation measures that are in place to reduce noise.
HS2-21-41901-C	ETRC & GTB	Complaint due to reversing sirens during morning hours.	The noise was associated with an abnormal load delivery which had to be conducted out of hours. Monitoring data demonstrates compliance with Section 61 requirements	The Stakeholder was provided with information on how to check for future large load movement notices. The site team are also investigating additional mitigation measures which can be put in place during abnormal load deliveries.
HS2-21-41914-C	ETRC & GTB	General complaint regarding construction noise during the night-time and weekend.	The noise was associated with HS2 construction works. Monitoring data demonstrates compliance with Section 61 requirements.	Information was provided to the Stakeholder outlining mitigation measures which are in place to reduce noise.

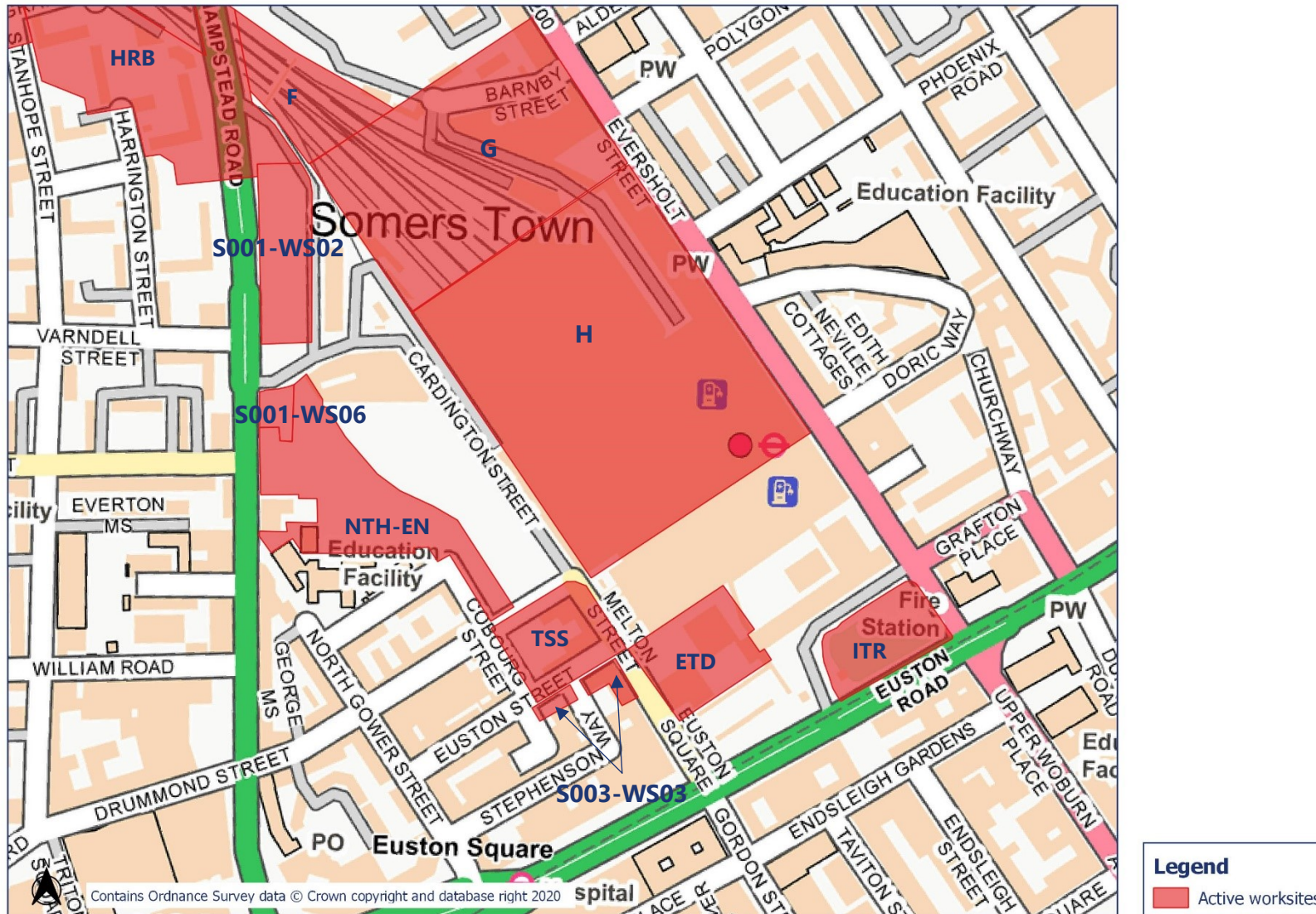
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-41915-C	ARVS	Complaint due to vibration occurring during the night-time.	All contractors working within the area (including rail maintenance contractors) were contacted and no works were identified which could have caused the disturbance. Concluded that the works were not associated with HS2 construction.	Information was provided to the Stakeholder.
HS2-21-41958-C	ARVS	General complaint regarding construction noise.	The noise was caused by ground investigation works whereby a vacuum excavator was utilised. Monitoring data demonstrates compliance with Section 61 requirements.	Additional localised acoustic barriers have now been erected with view of reducing noise levels.
HS2-21-41991-C	ETRC & GTB	Complaint due to use of a road sweeper between 0800-1100 on a Sunday.	No works were ongoing at the time but routine cleaning was taking place to ensure the road remained free of debris and to mitigate levels of dust.	The Stakeholder was added to contractor's e-mail list for notification of further works.
HS2-21-41992-C	ARVS	Complaint due to noise emissions from temporary traffic lights.	Investigation is on-going to determine whether the temporary traffic lights can be relocated further away from receptors.	Information was provided to the Stakeholder.
HS2-21-41998-C	HRB	General complaint regarding construction noise. The Stakeholder wishes to be moved to temporary accommodation.	The noise was associated with HS2 construction works. Monitoring data demonstrates compliance with Section 61 requirements.	Information was provided to the Stakeholder which confirmed that temporary rehousing is a possibility as per special cases panel. The associated contractor will discuss this further with the Stakeholder.

Appendix A Site Locations

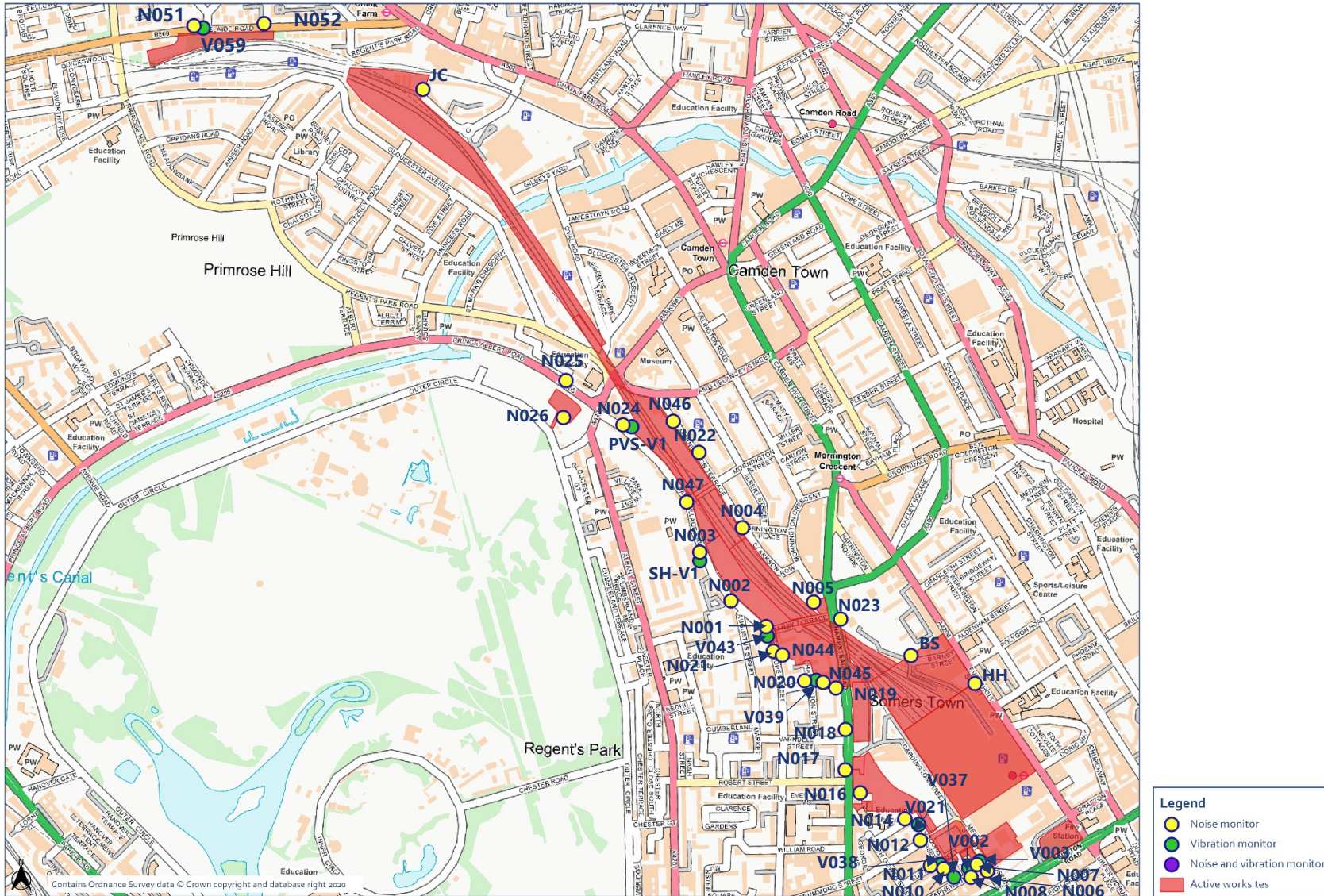


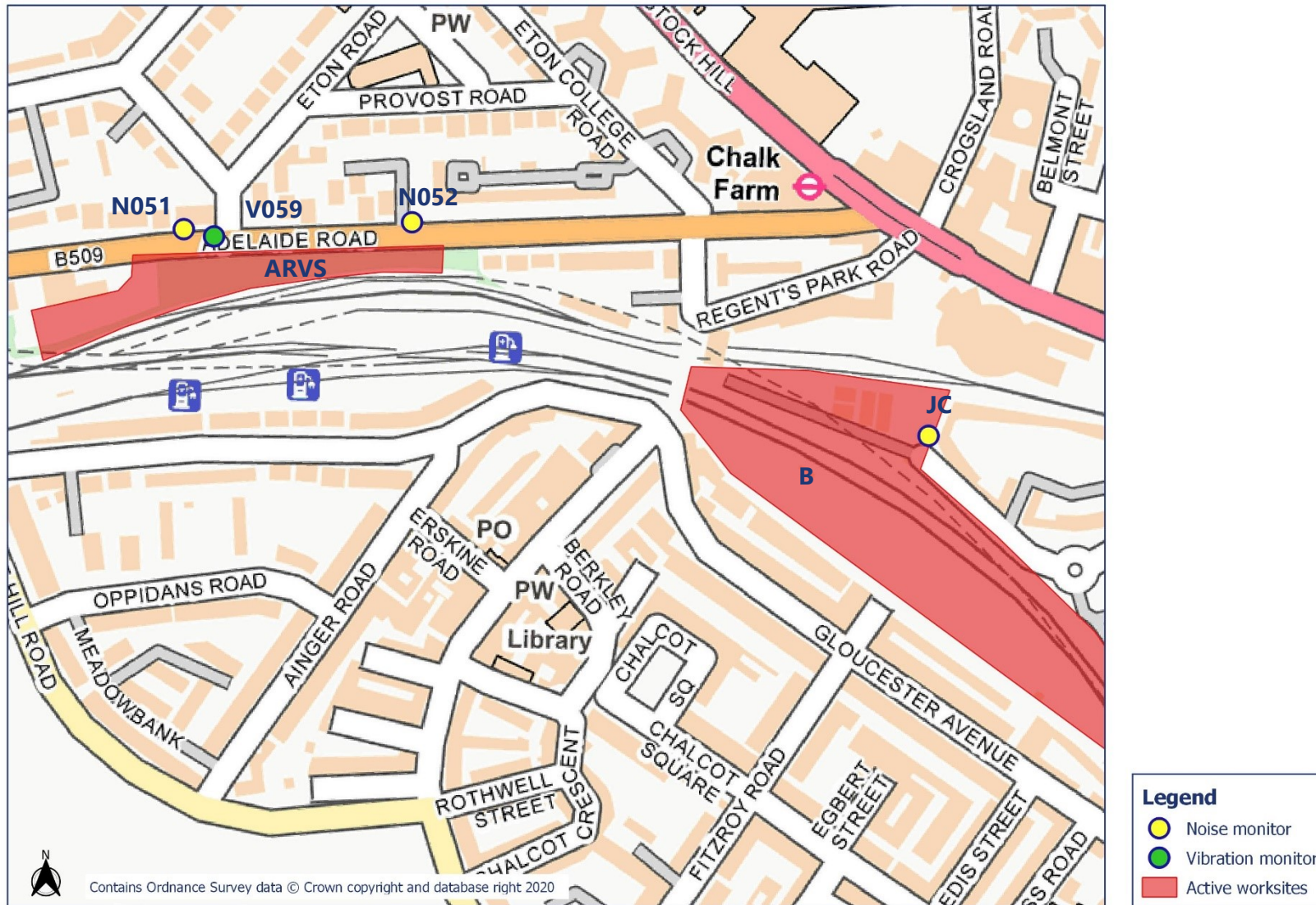






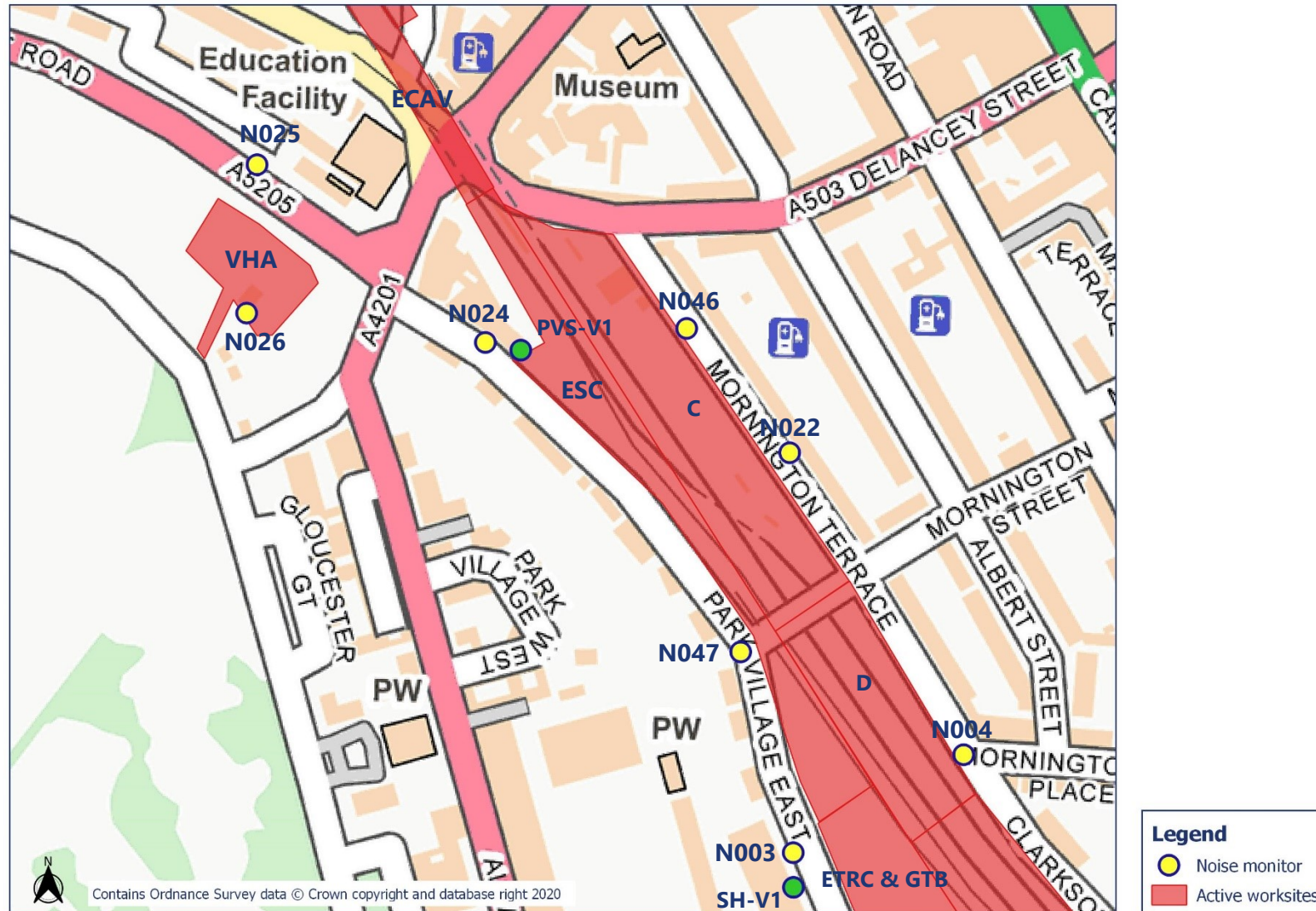
Appendix B Monitoring Locations





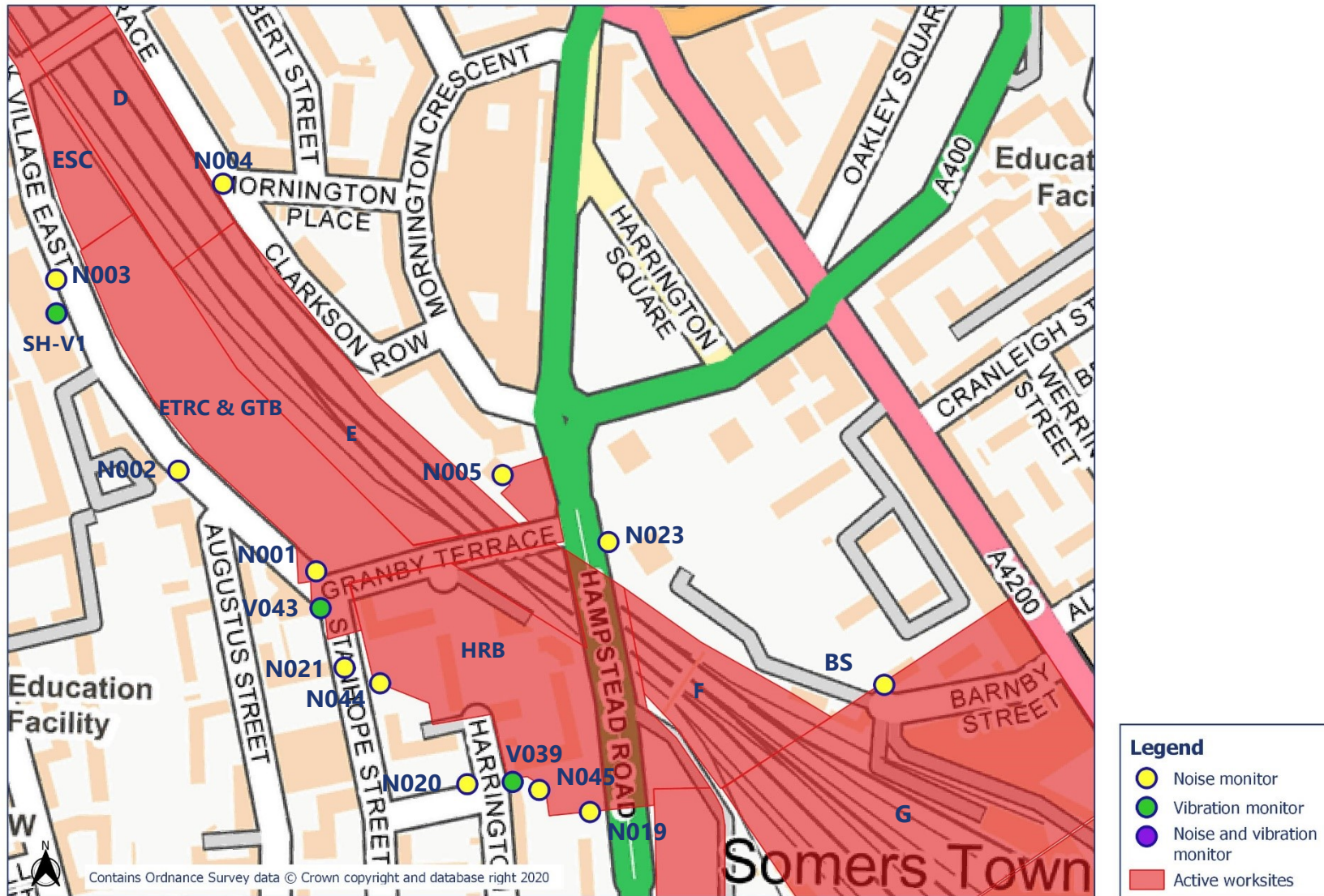
HS2

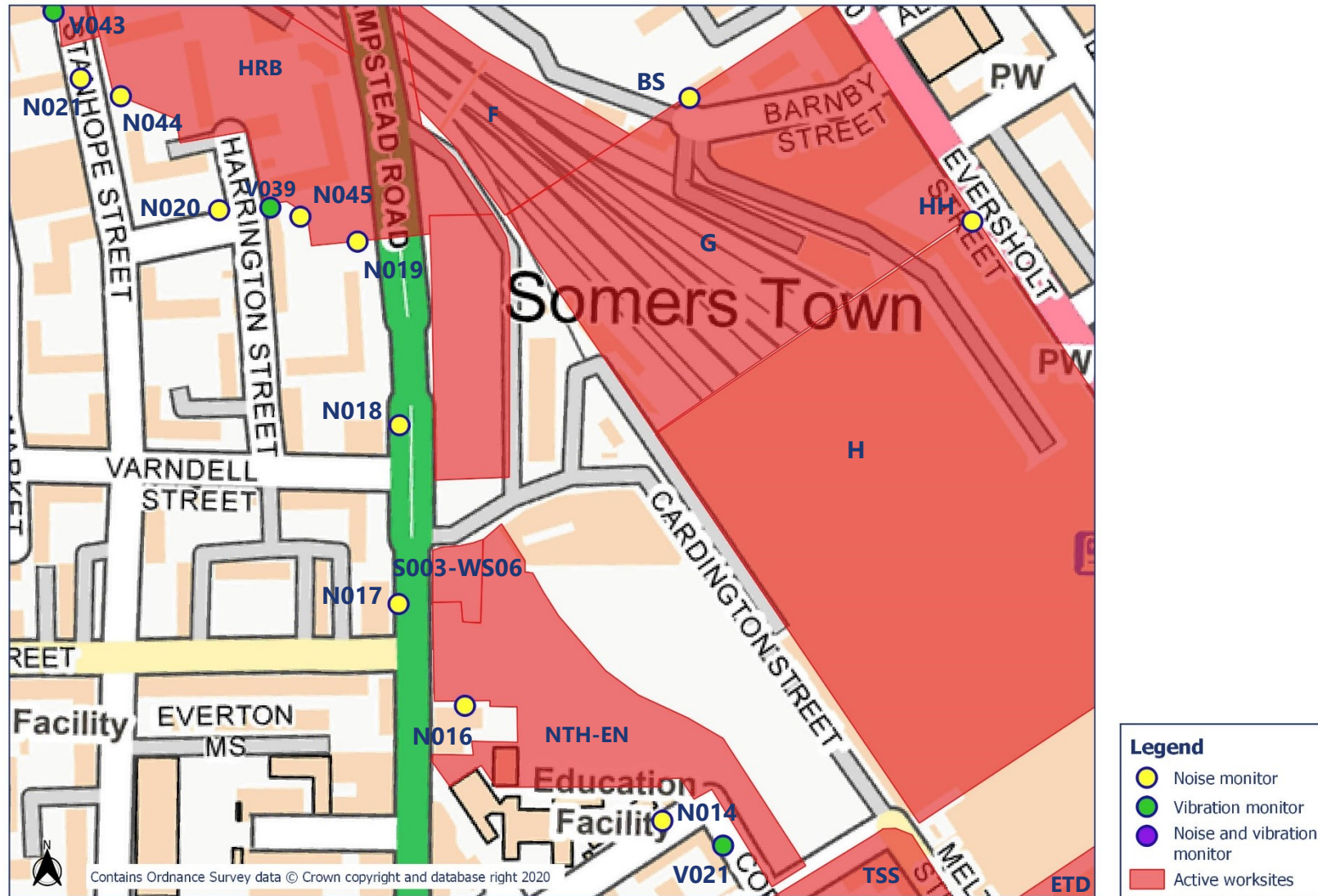
Noise and vibration monitoring plan - 2



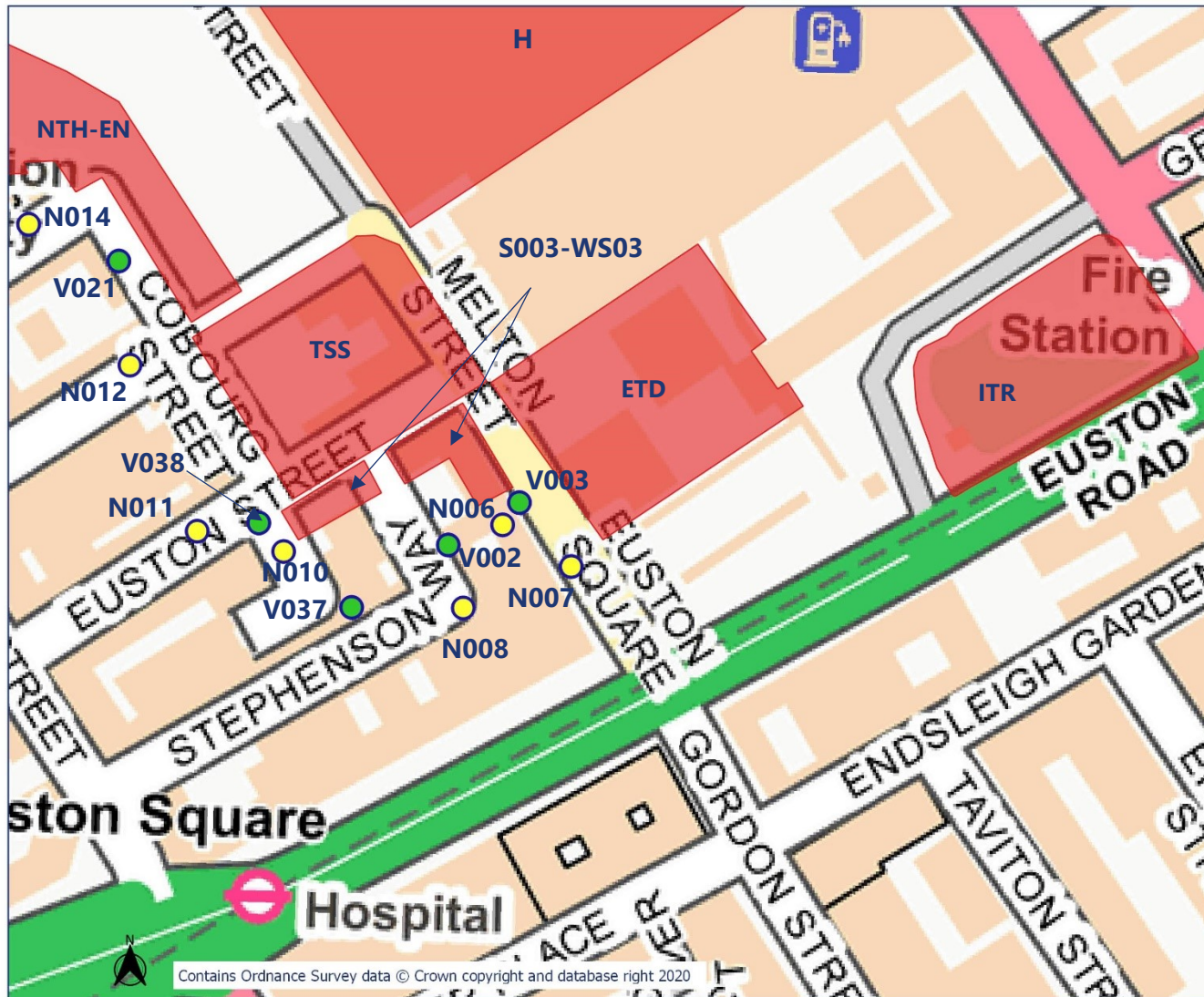
HS2

Noise and vibration monitoring plan - 3





HS2 Noise and vibration monitoring plan - 5



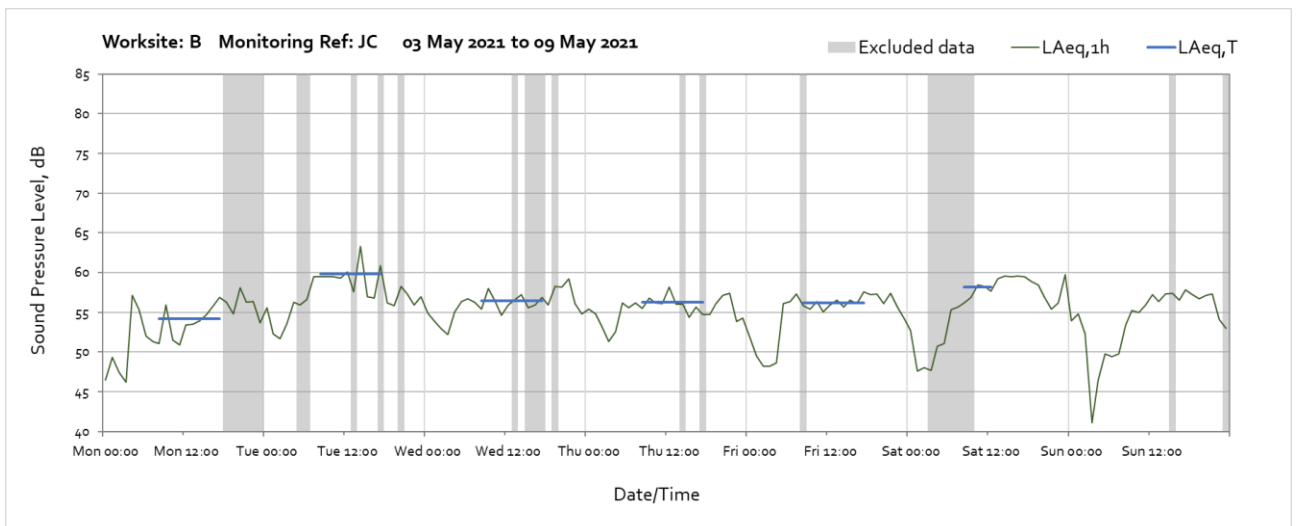
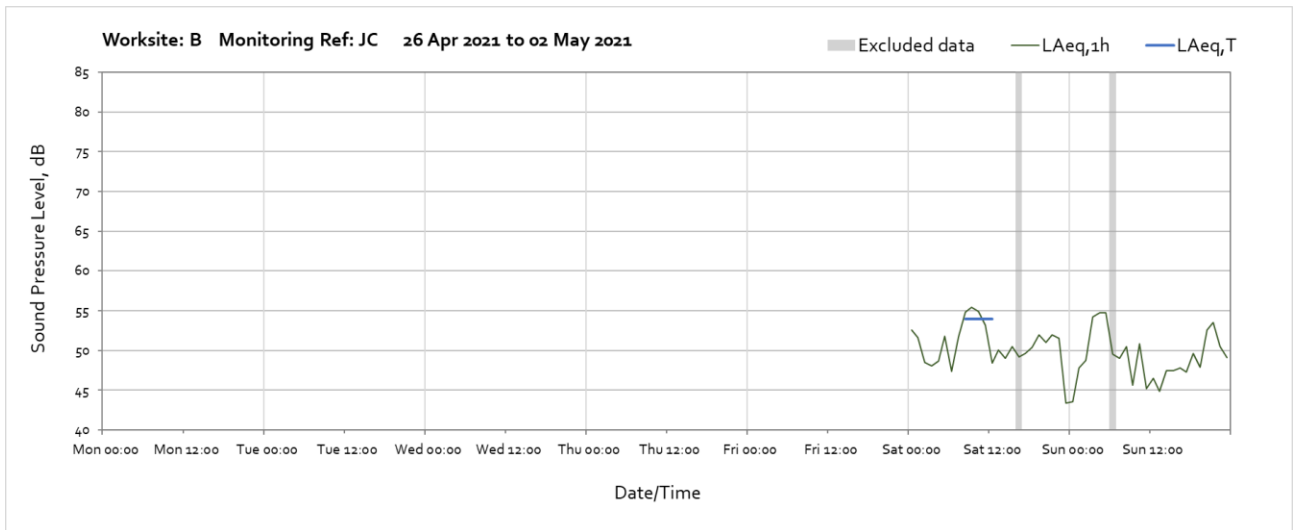
OFFICIAL

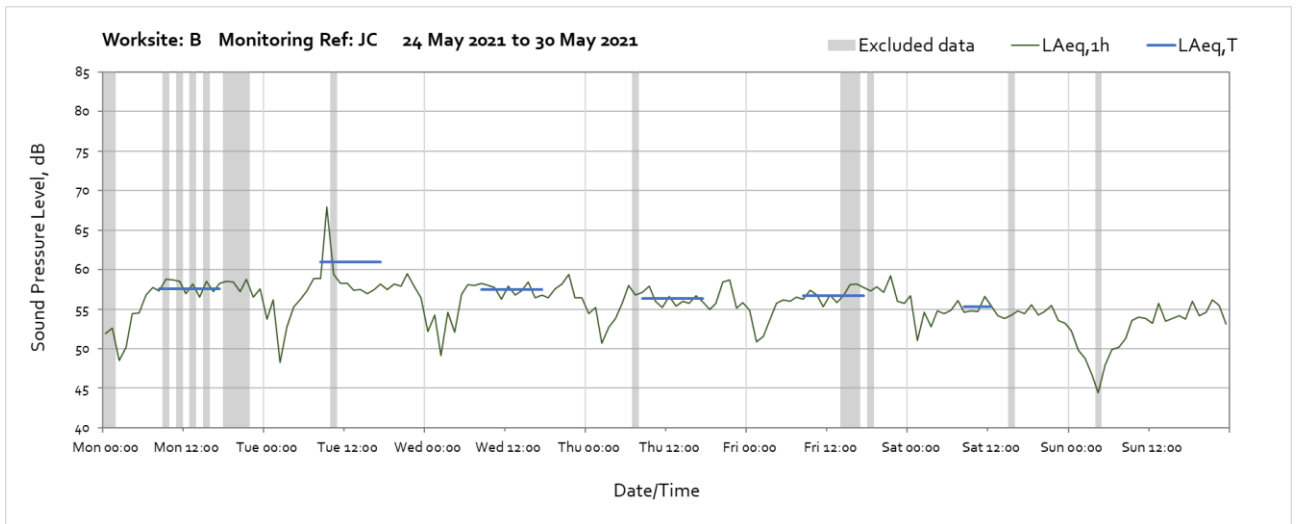
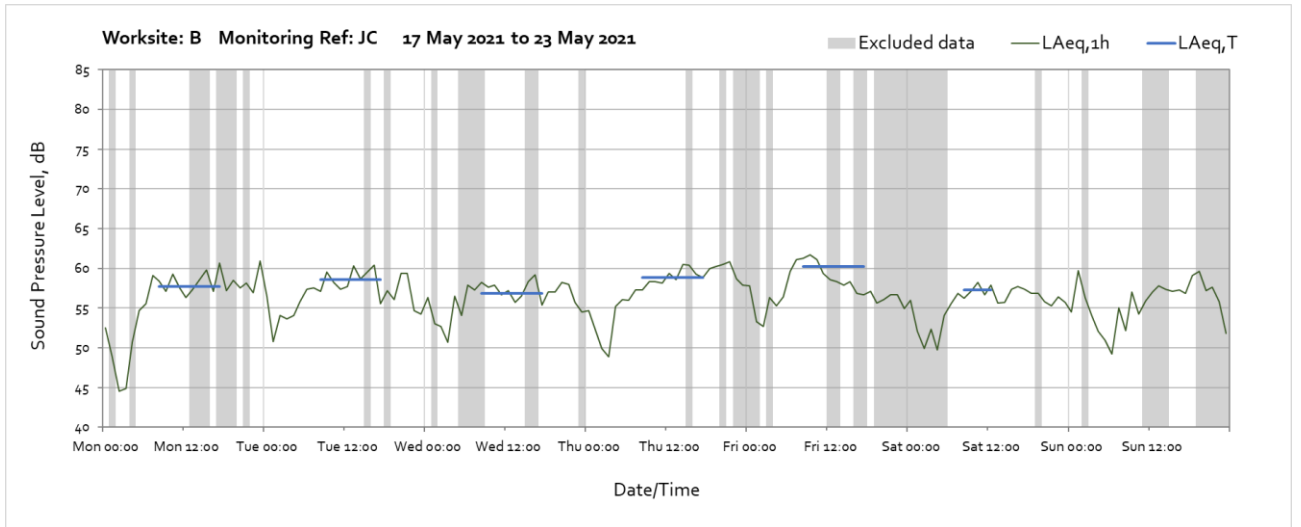
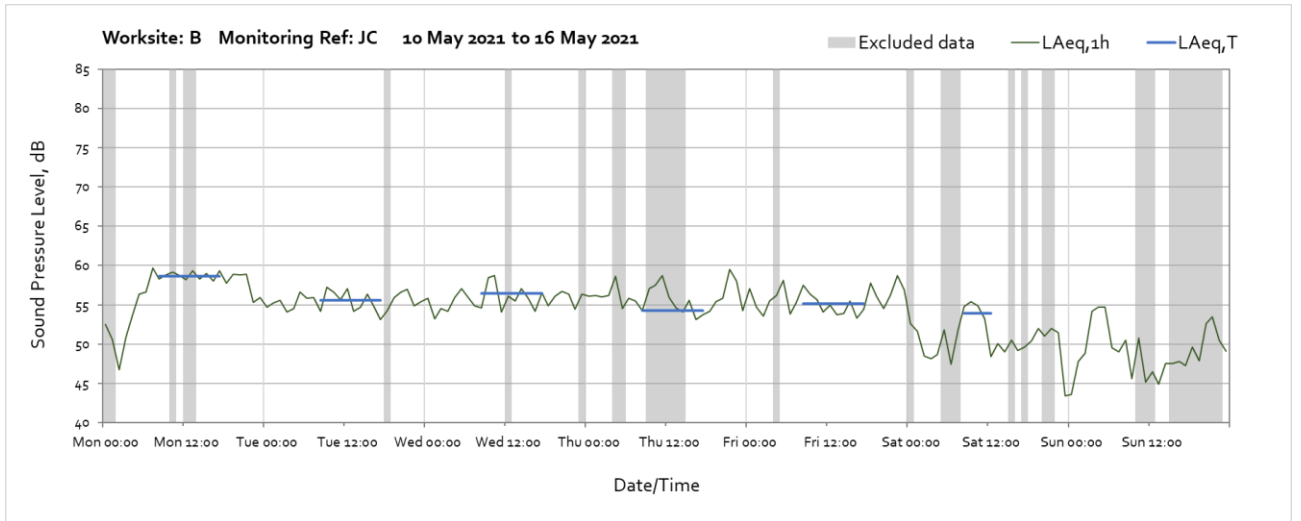
Appendix C Data

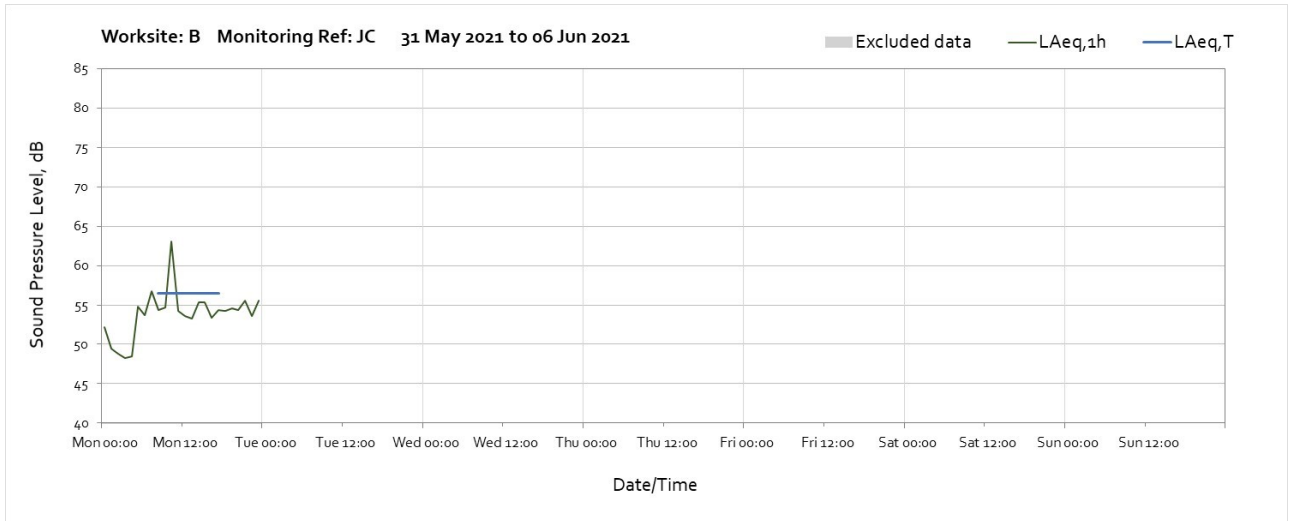
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have been excluded from the calculation of the $L_{Aeq,T}$ values in Table 3 of the main report.

Noise

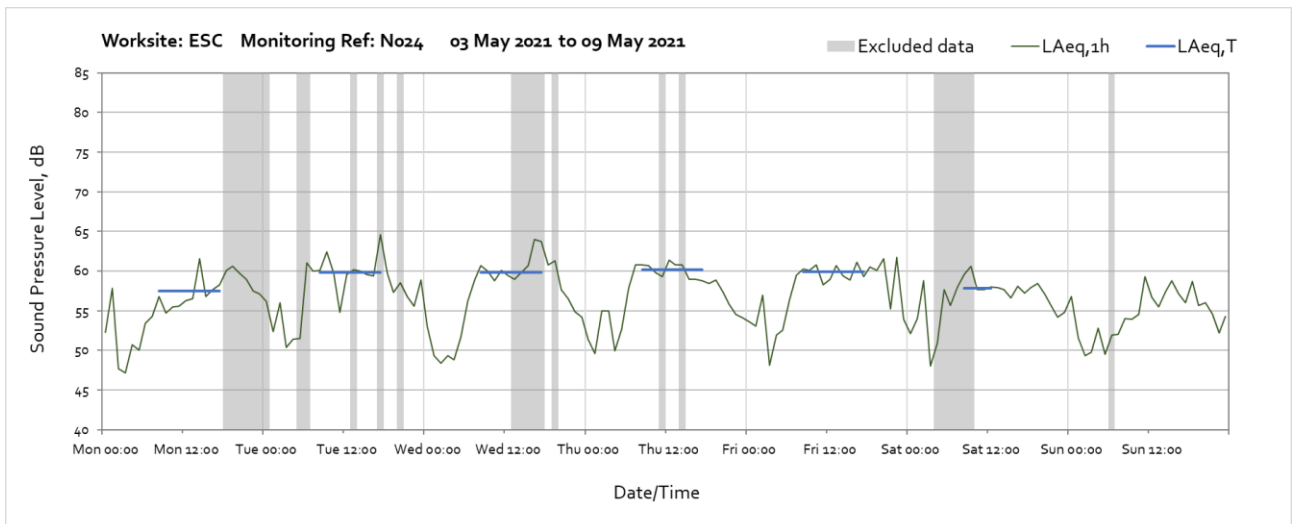
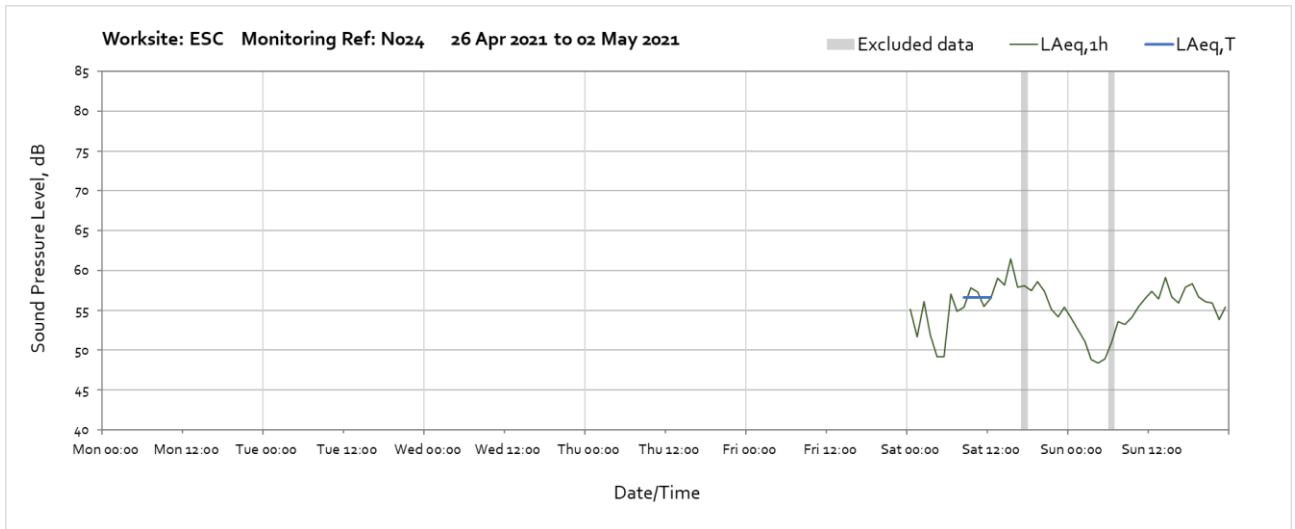
Worksite: B – Monitoring Ref: JC

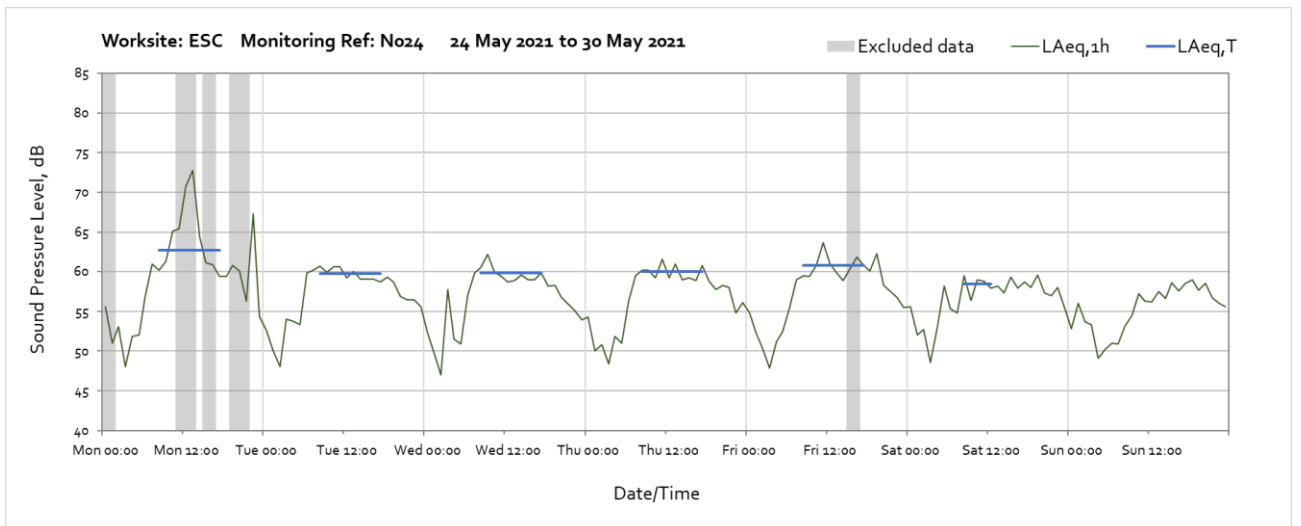
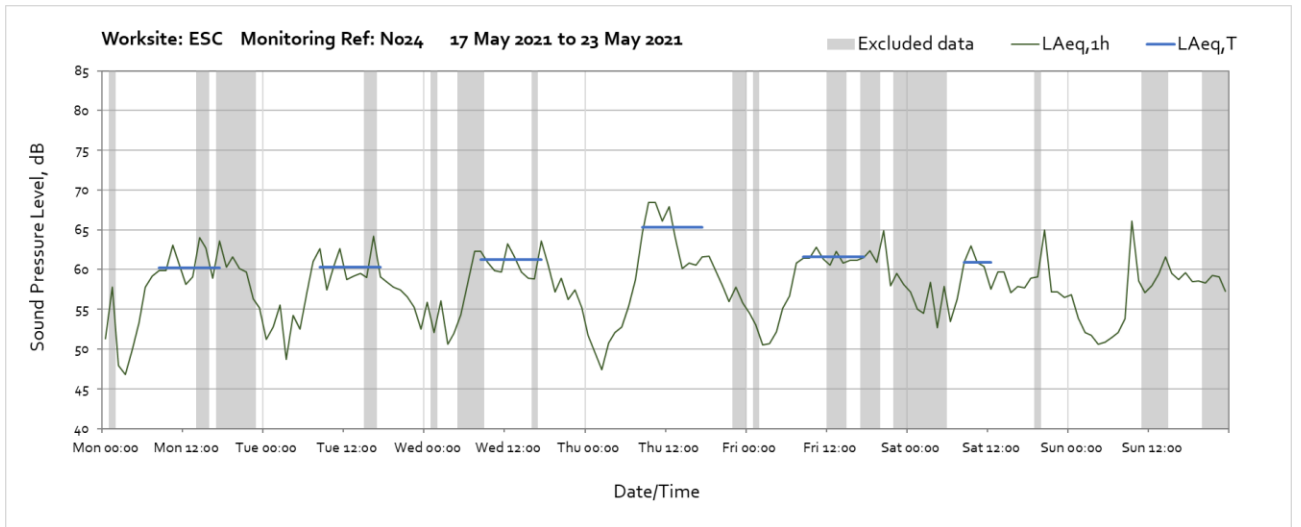
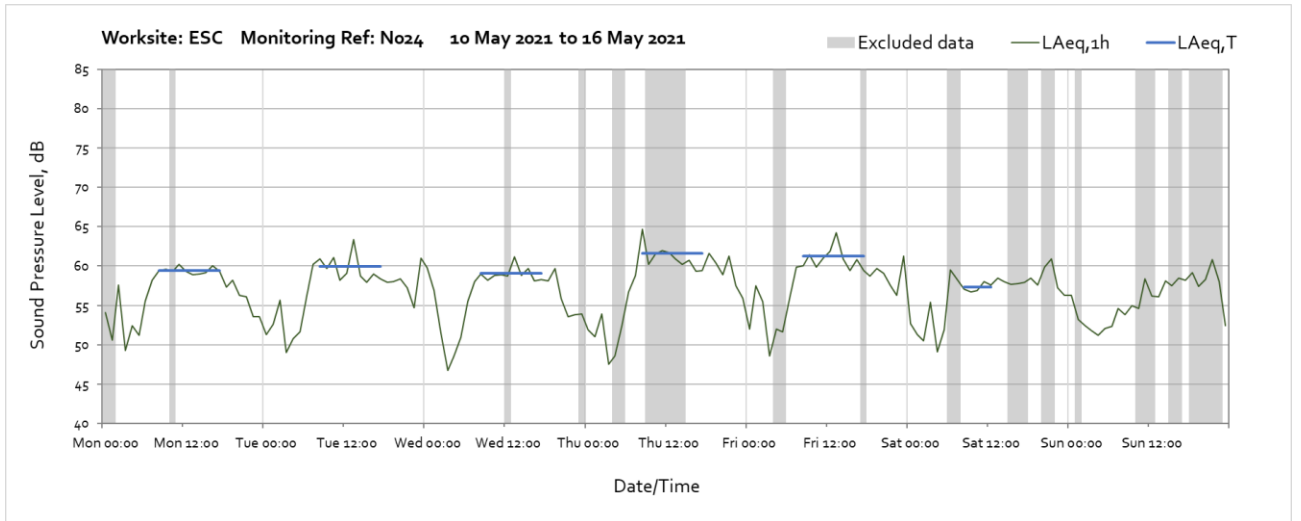


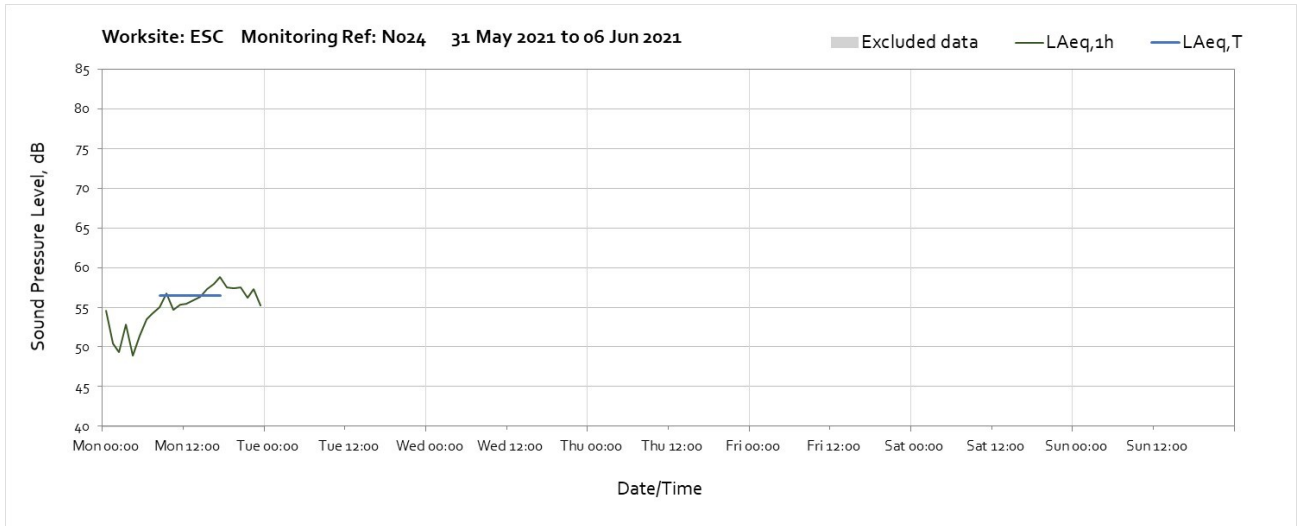




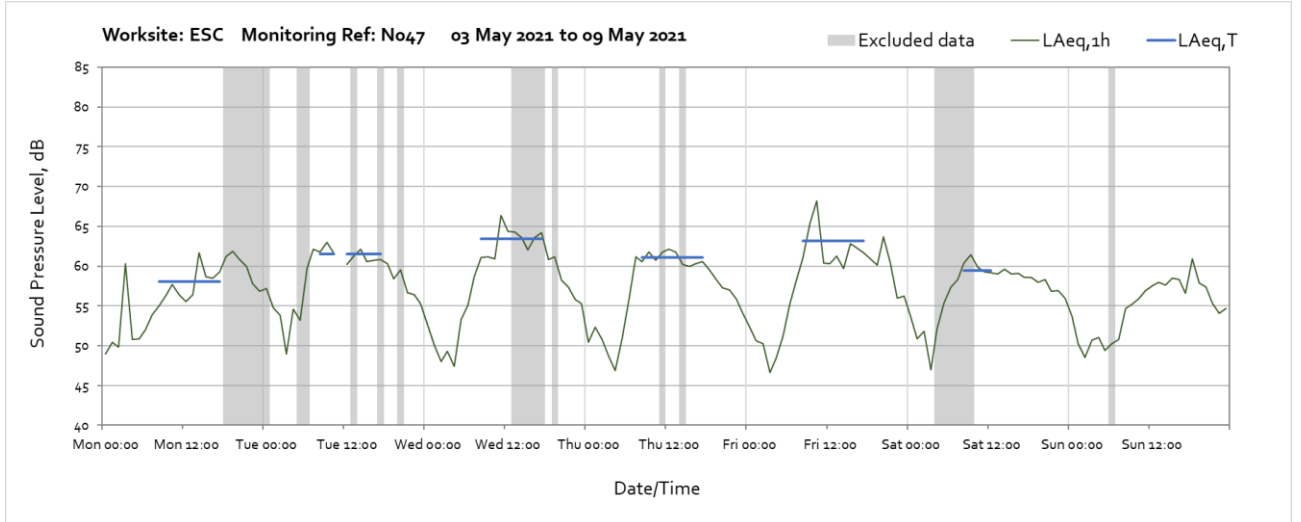
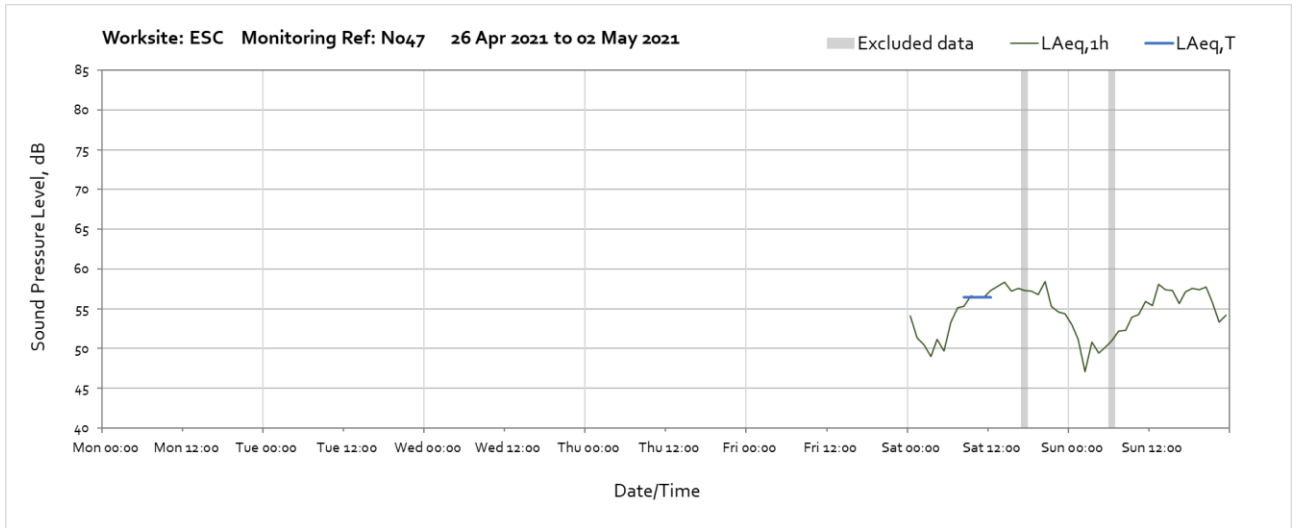
Worksite: ESC – Monitoring Ref: N024





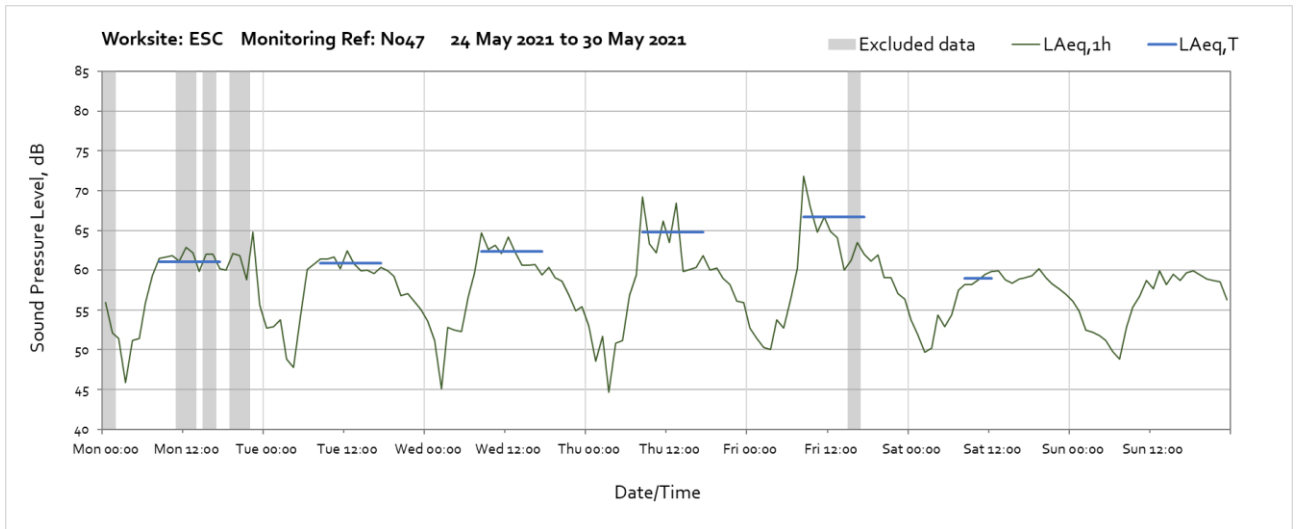
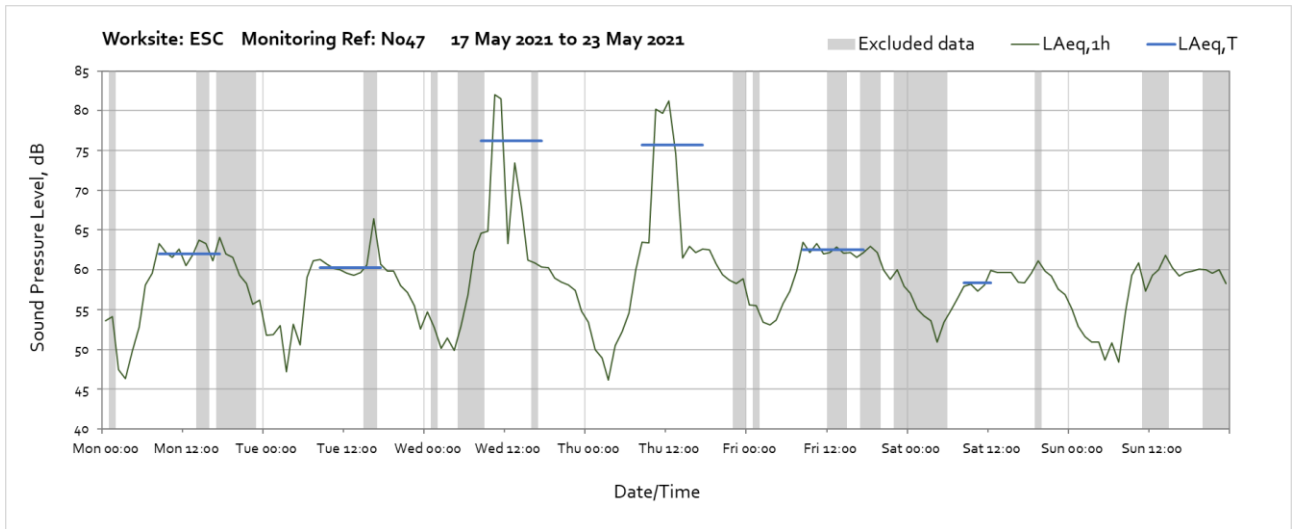
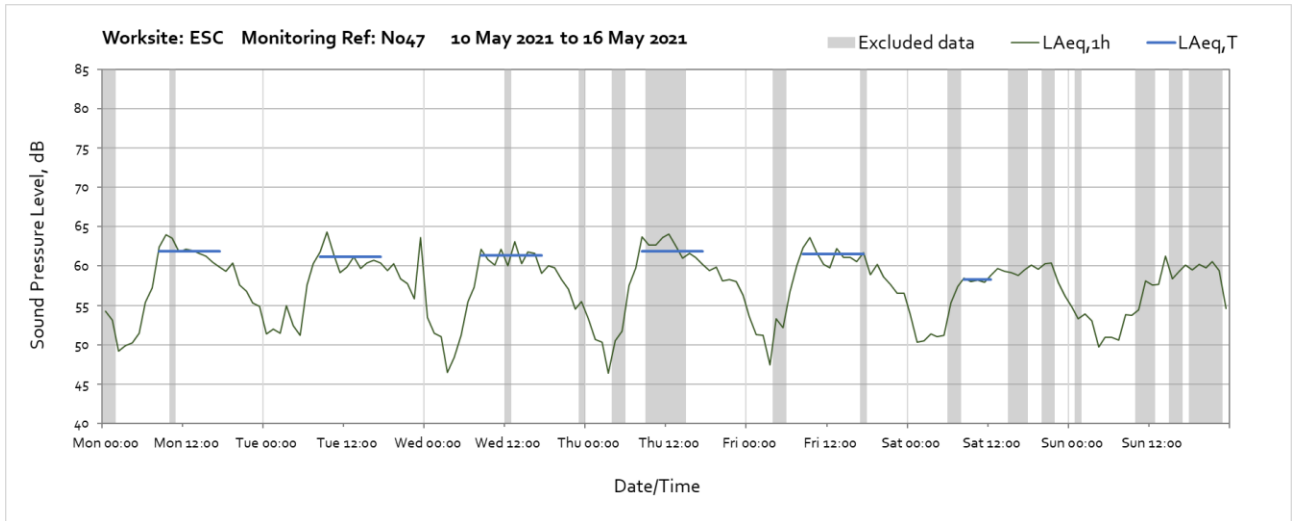


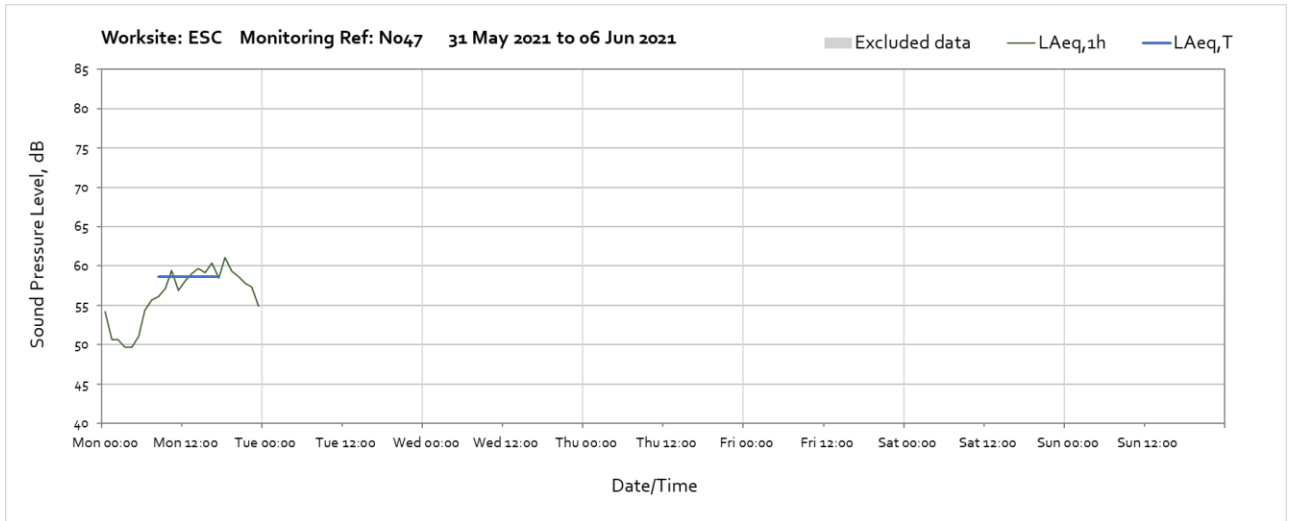
Worksite: ESC – Monitoring Ref: N047



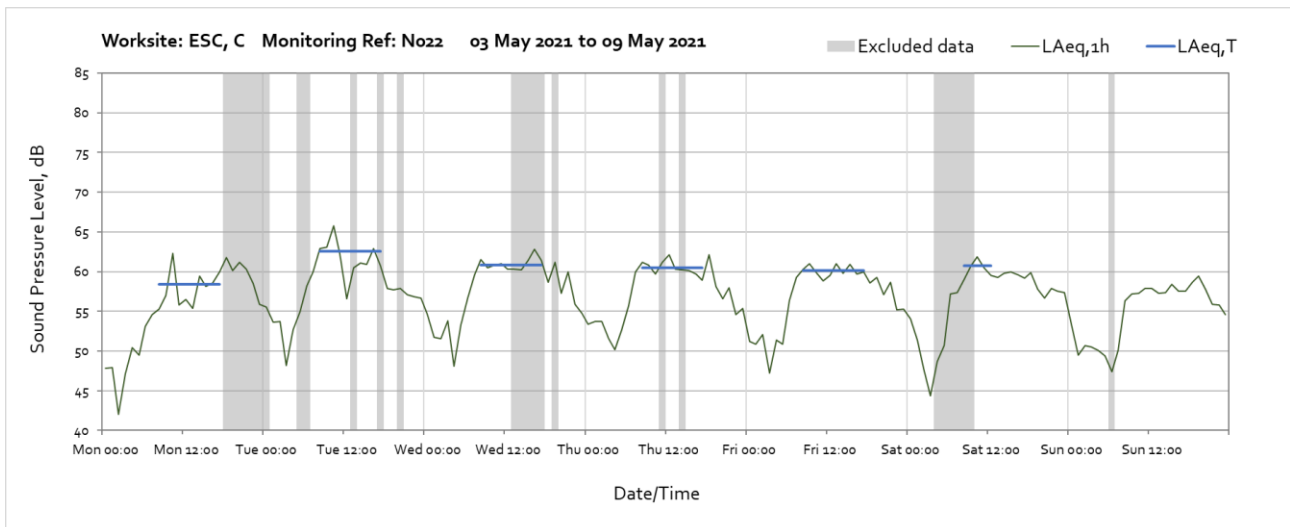
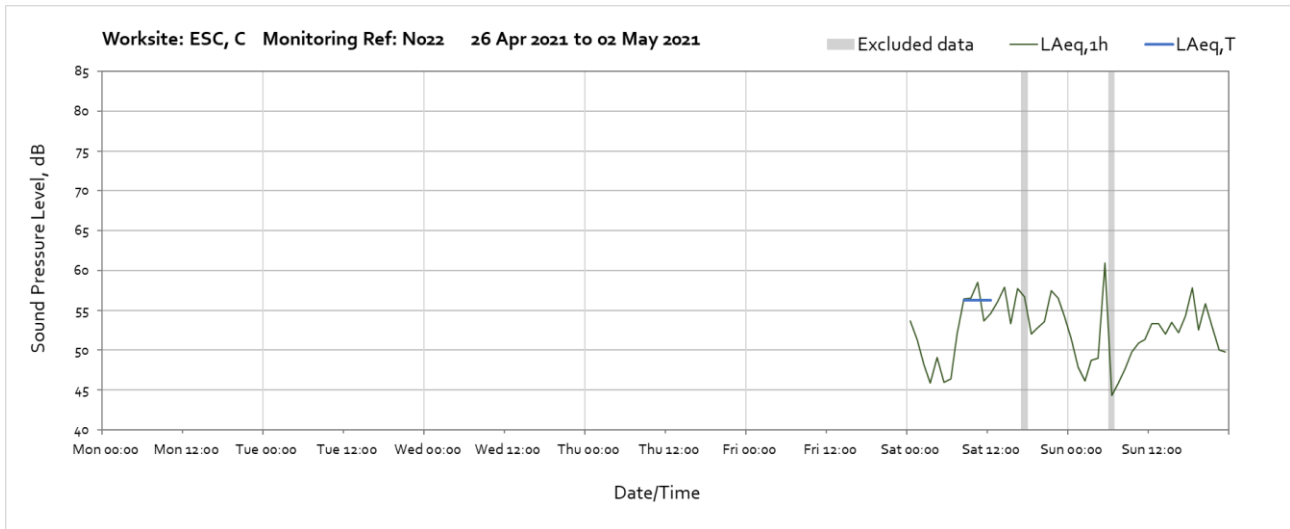
Note: Missing data between 11:00 until 12:00 on Tuesday 4th May was due to a memory card error.

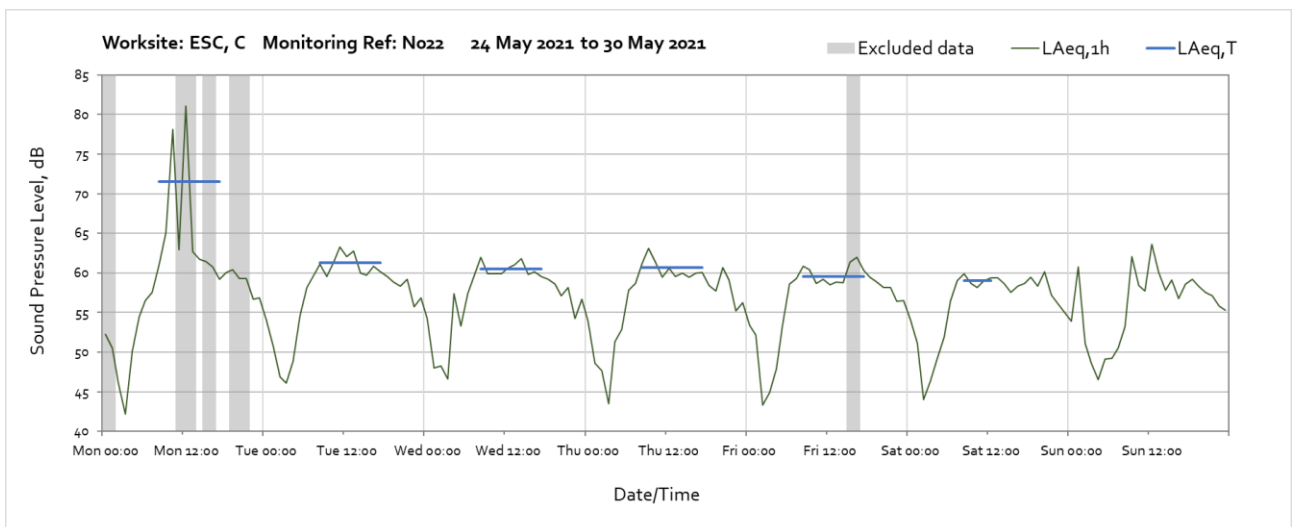
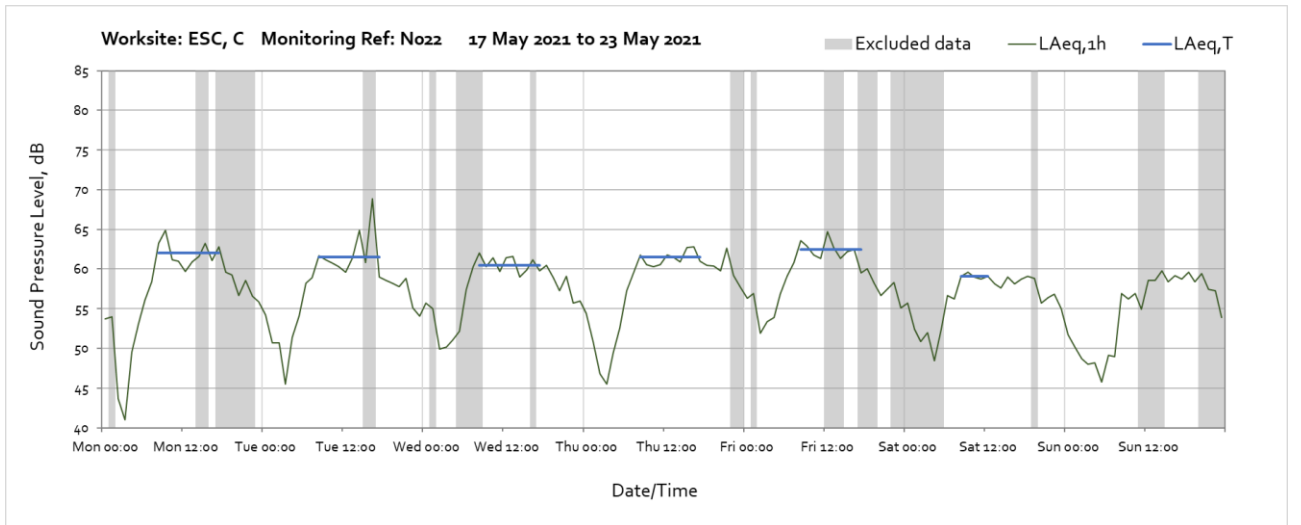
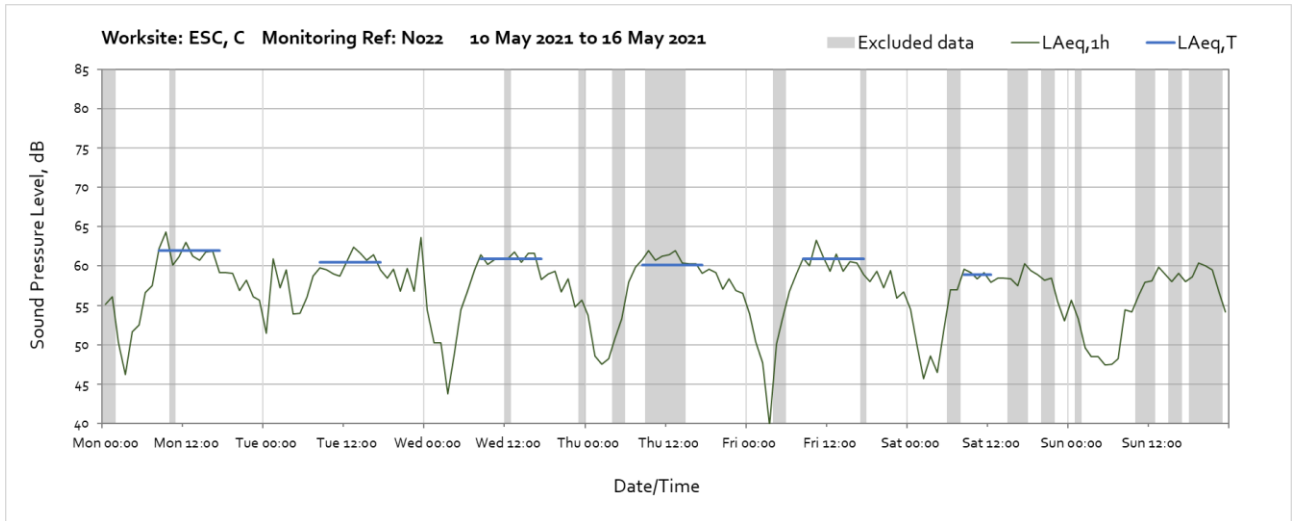
OFFICIAL

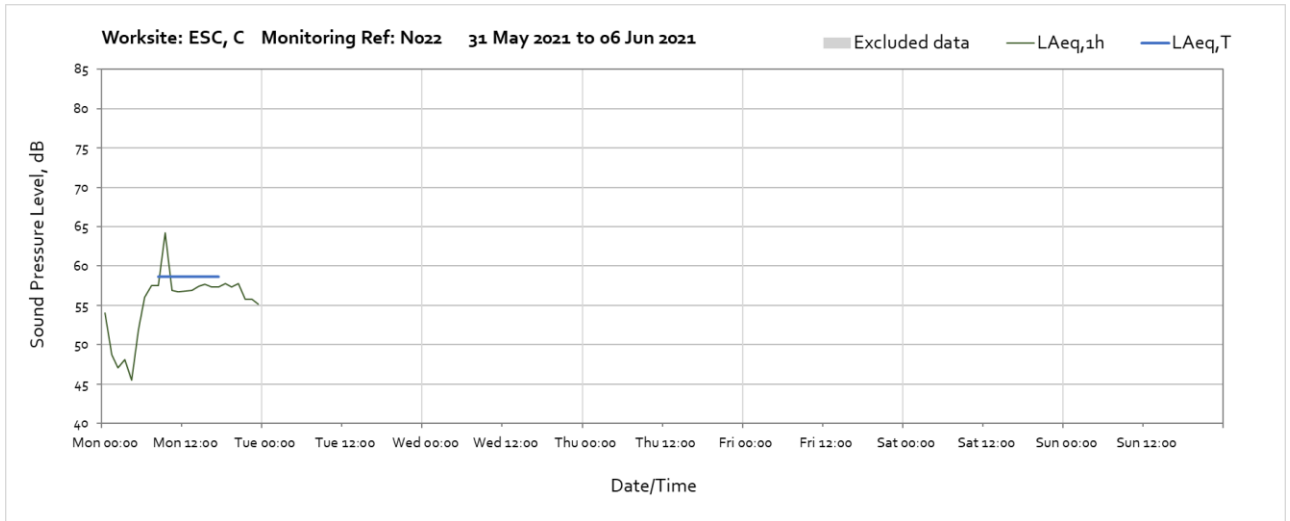




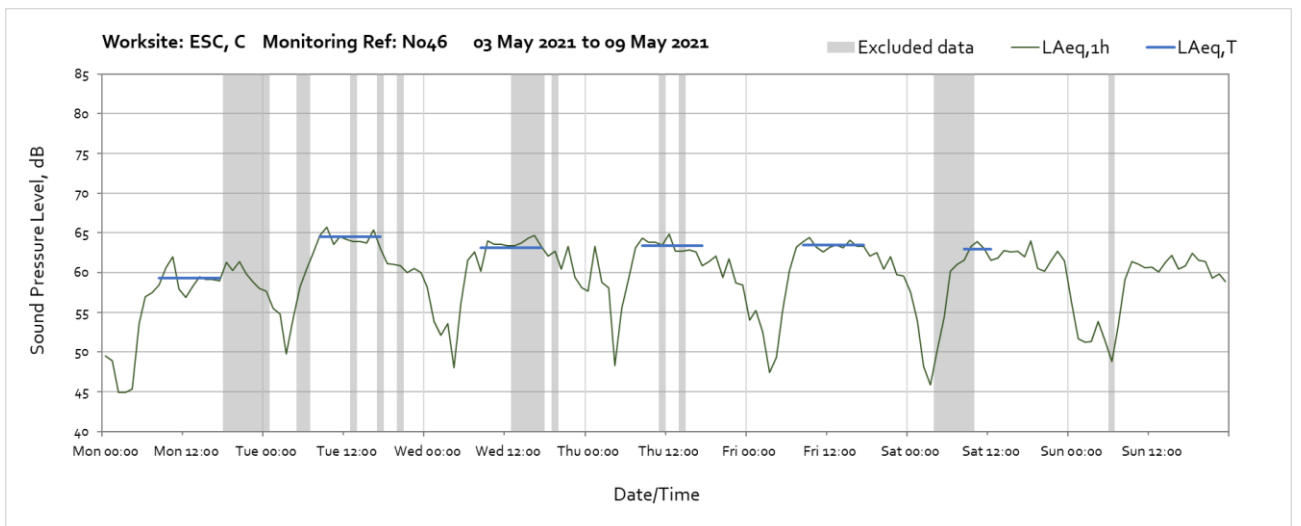
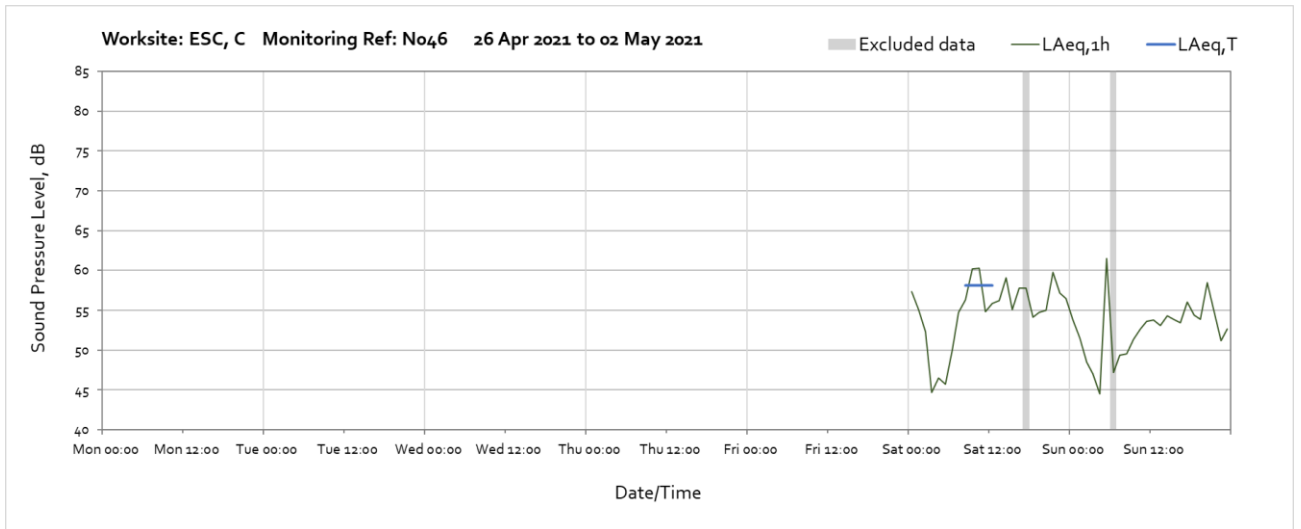
Worksite: ESC, C – Monitoring Ref: N022

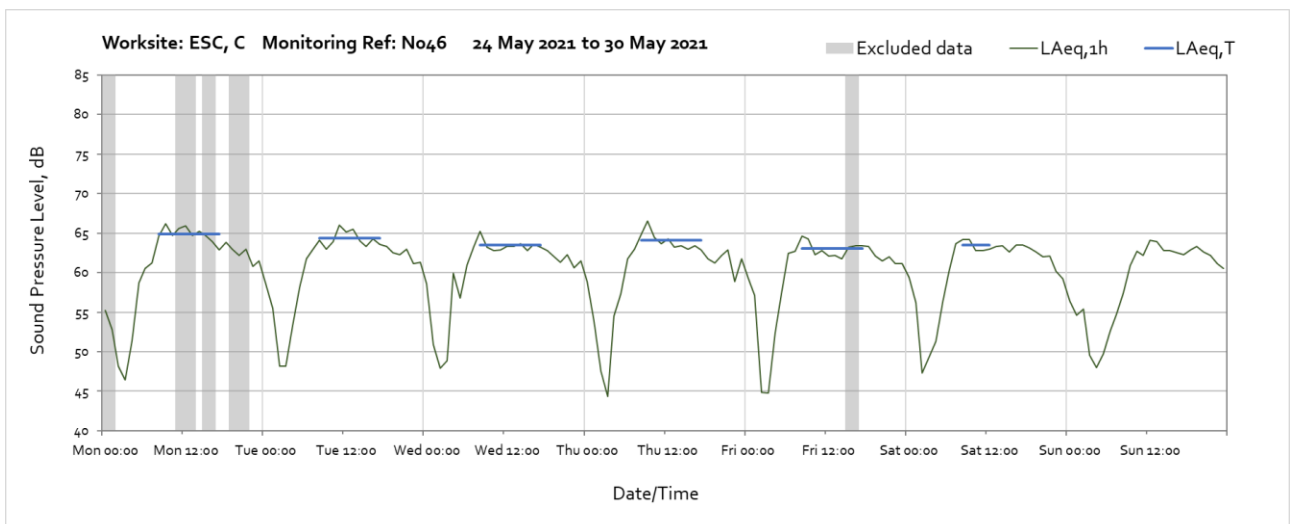
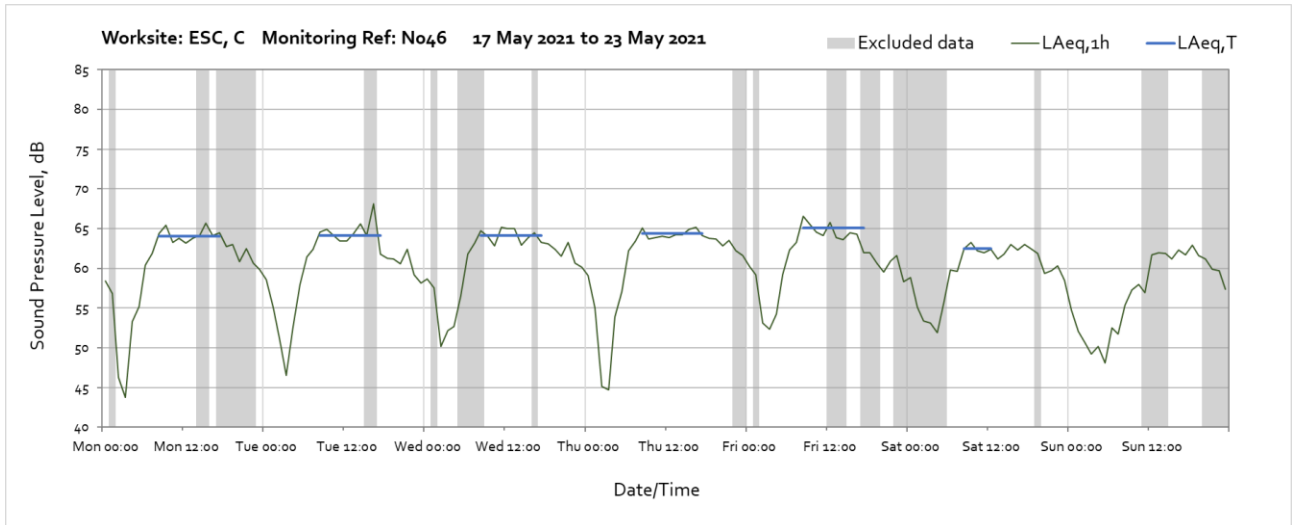
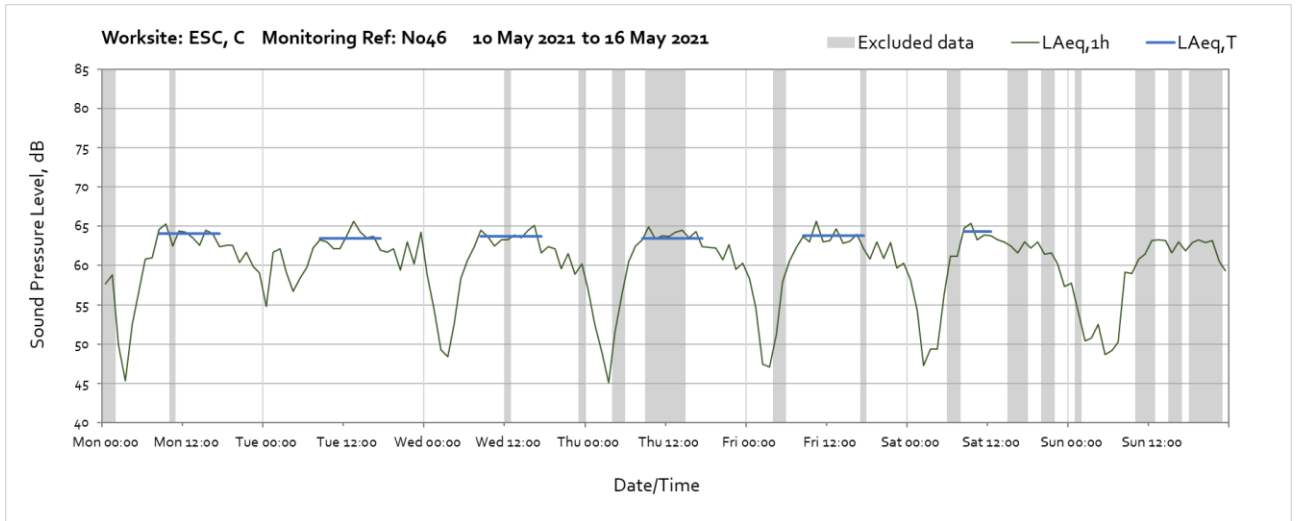


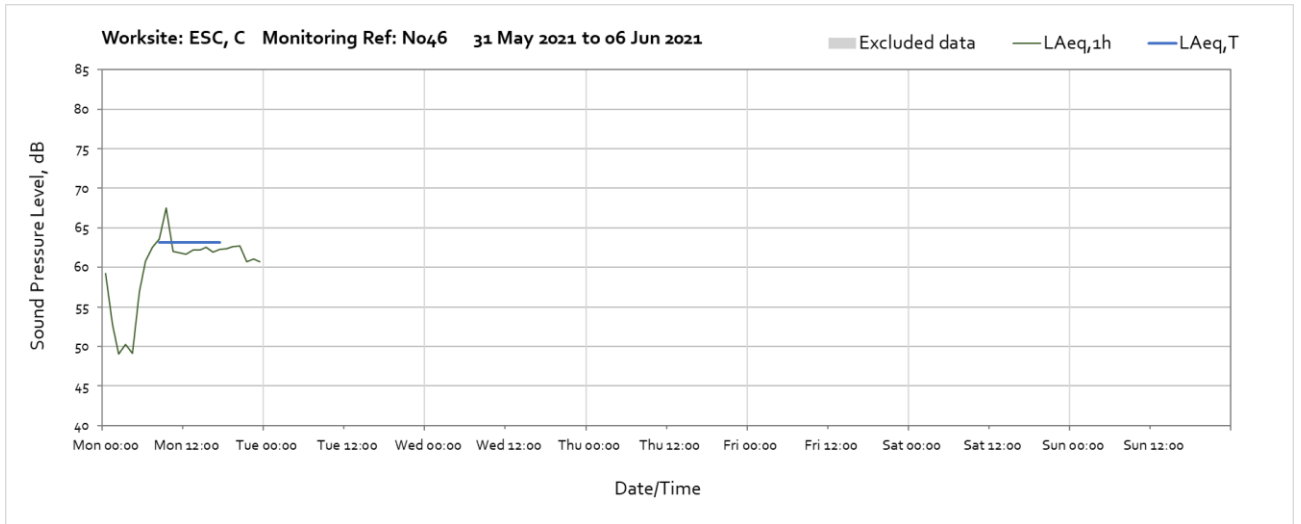




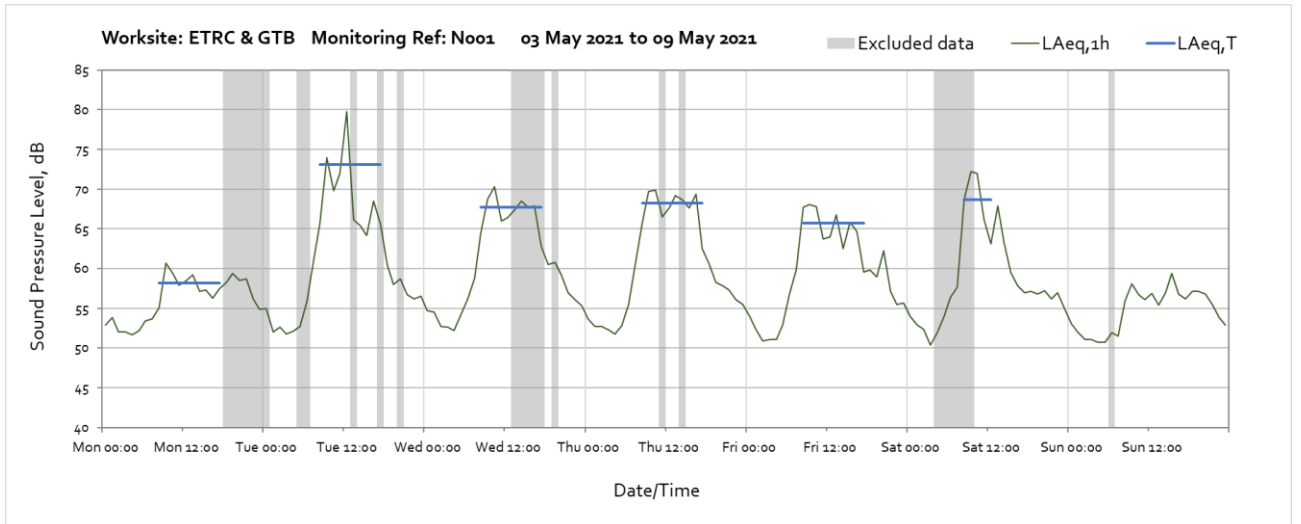
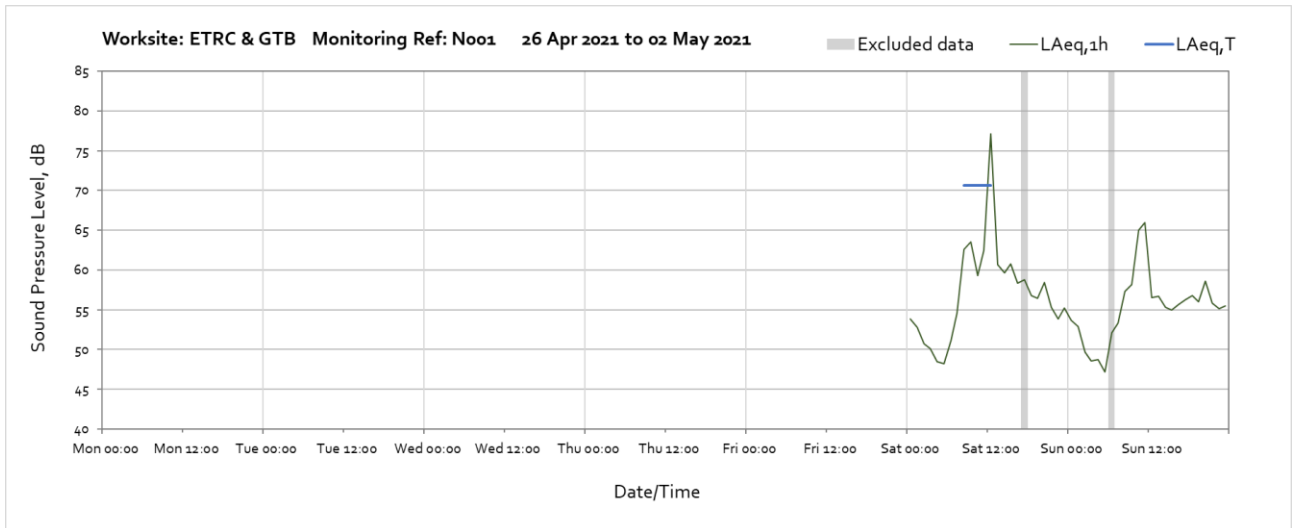
Worksite: ESC, C – Monitoring Ref: N046

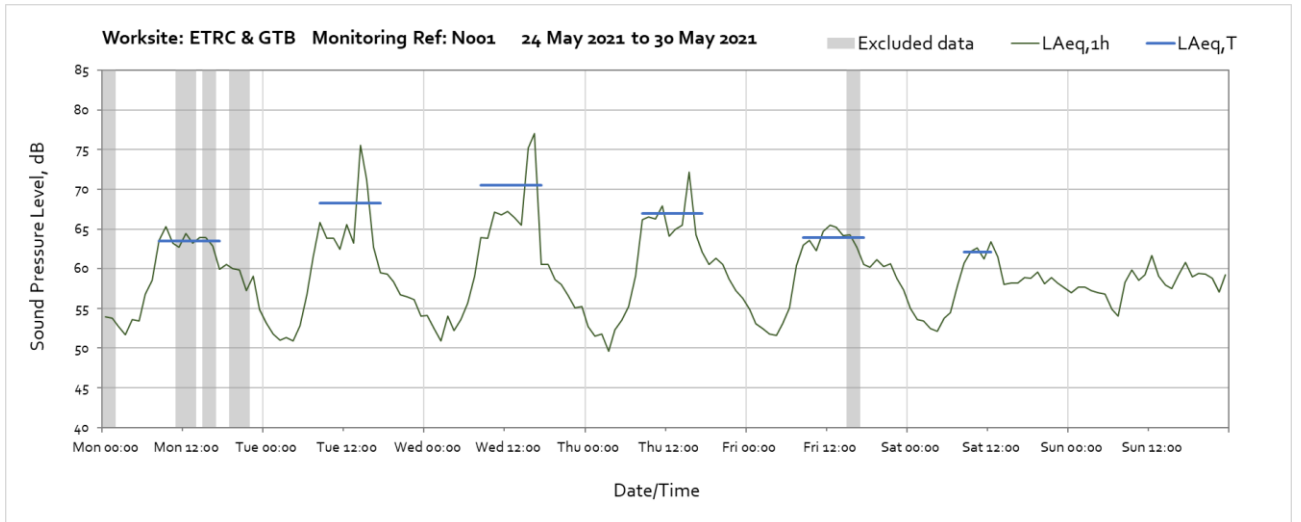
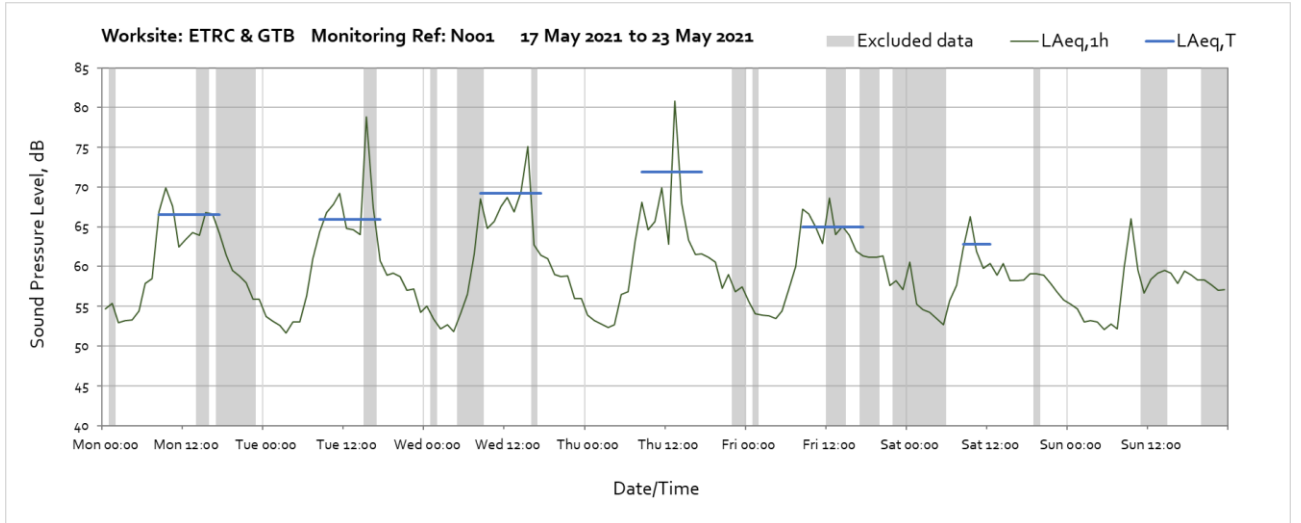
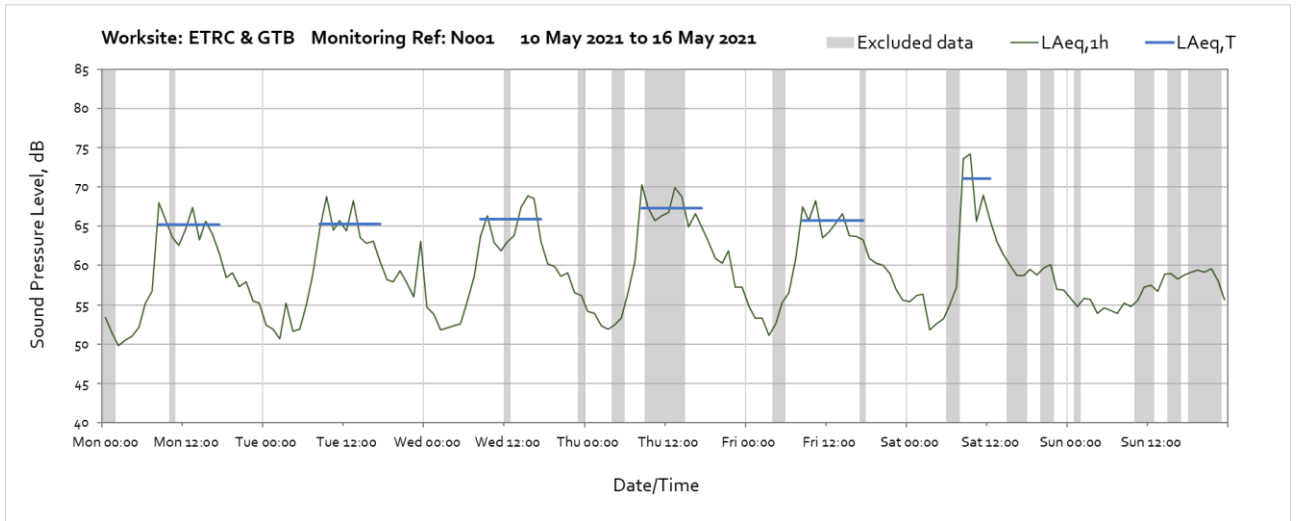


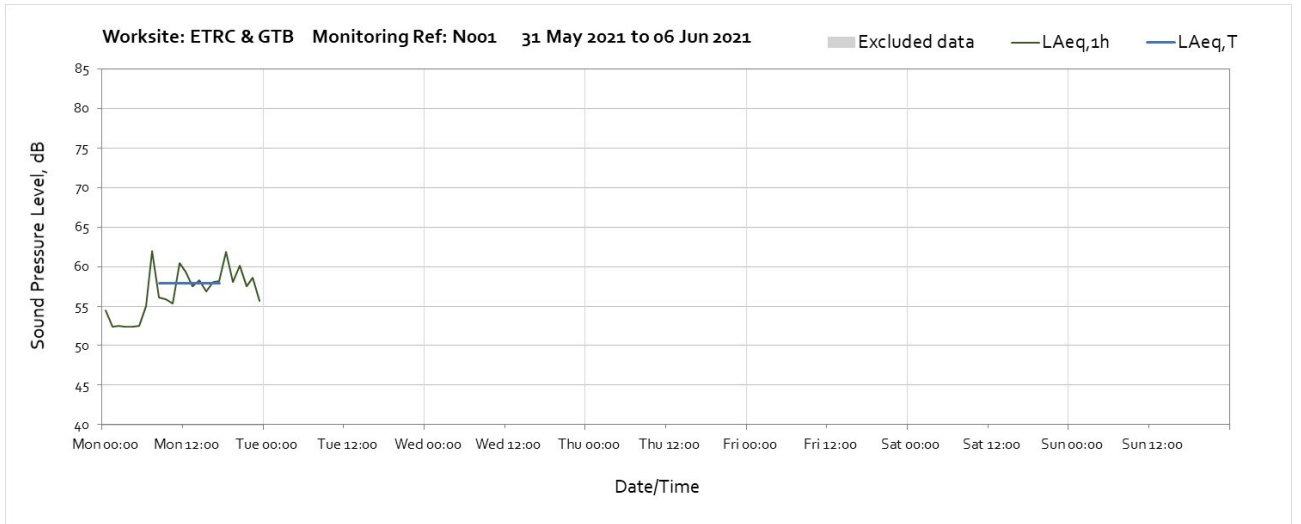




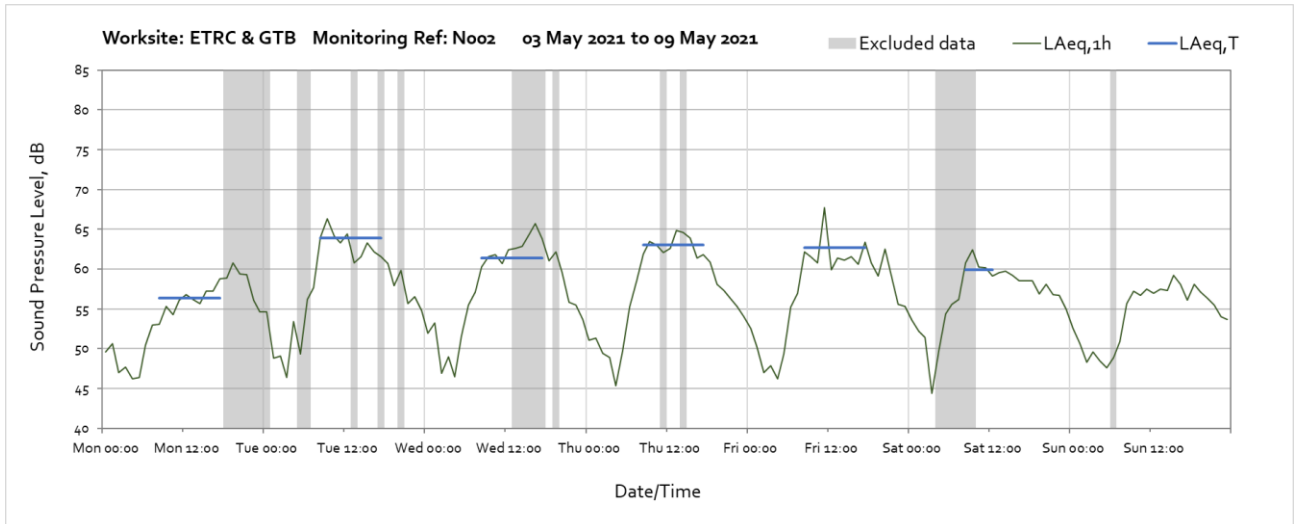
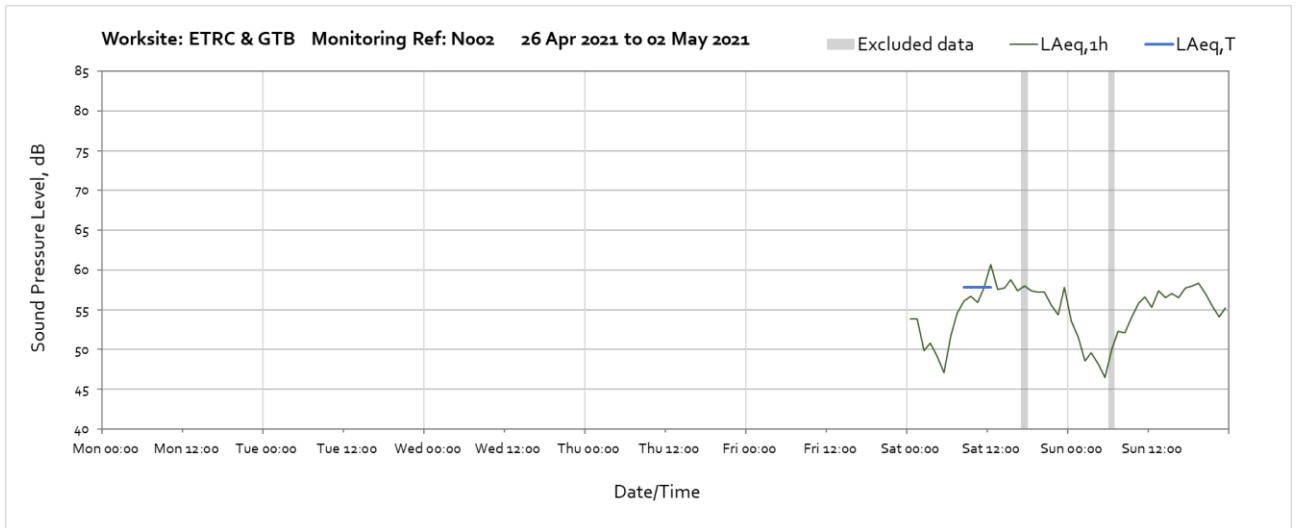
Worksite: ETRC & GTB – Monitoring Ref: N001

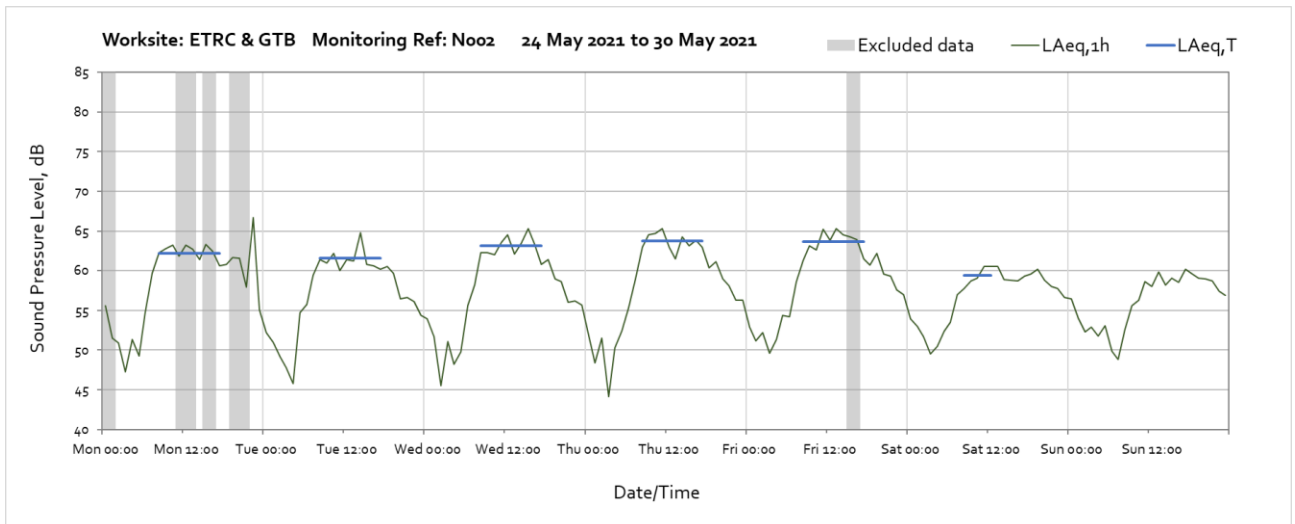
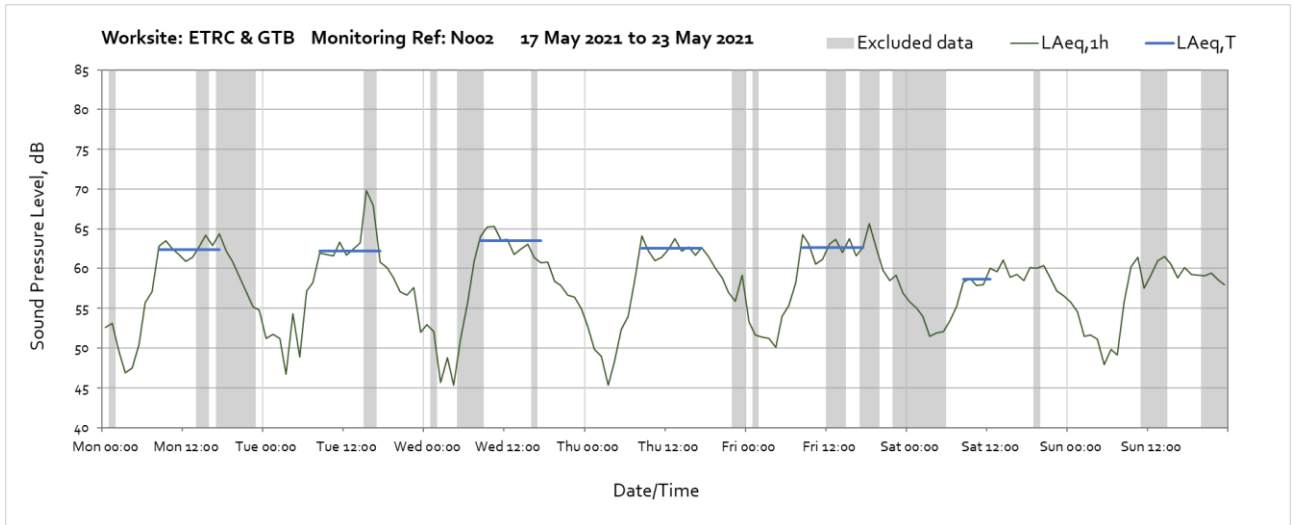
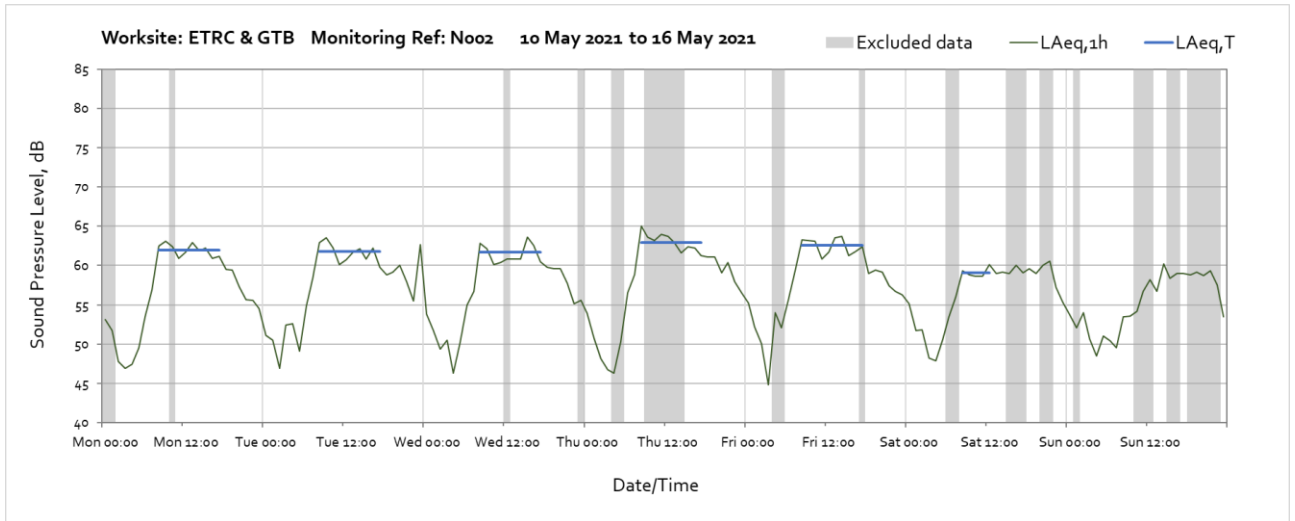


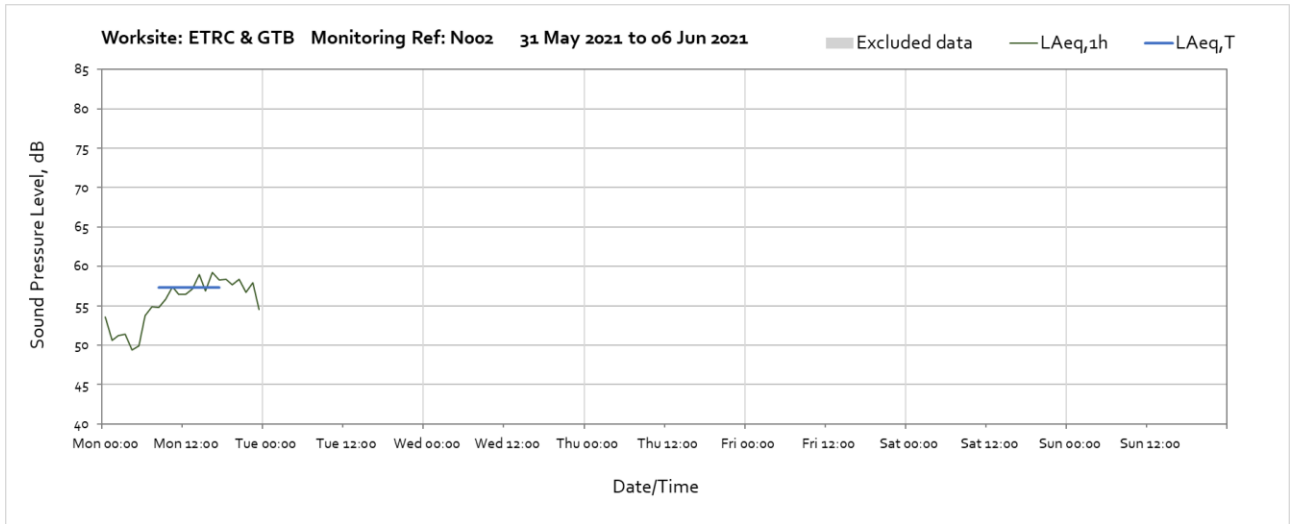




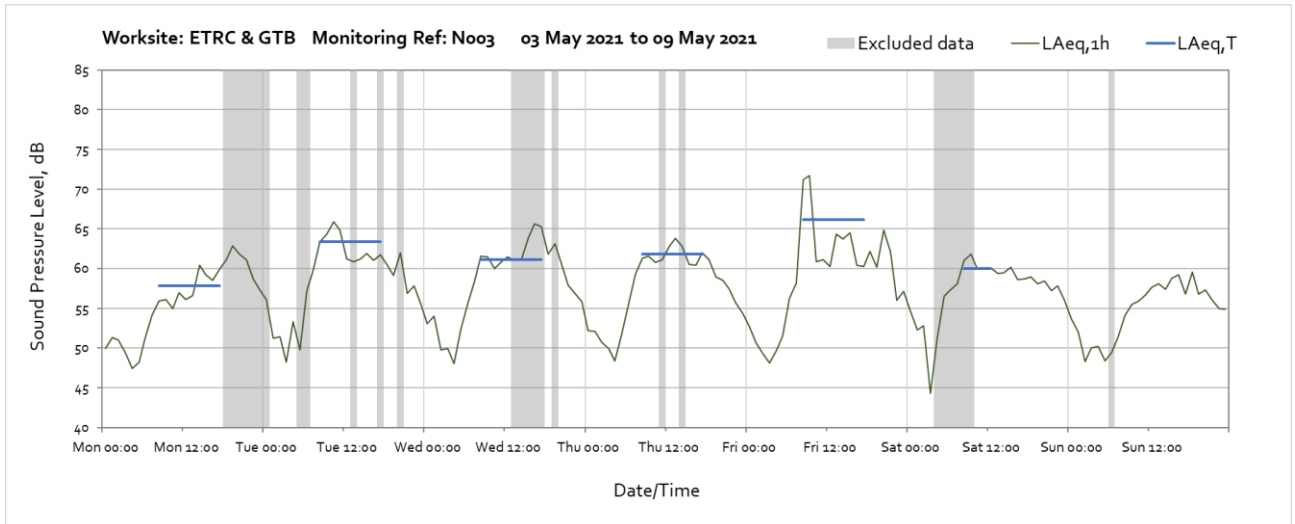
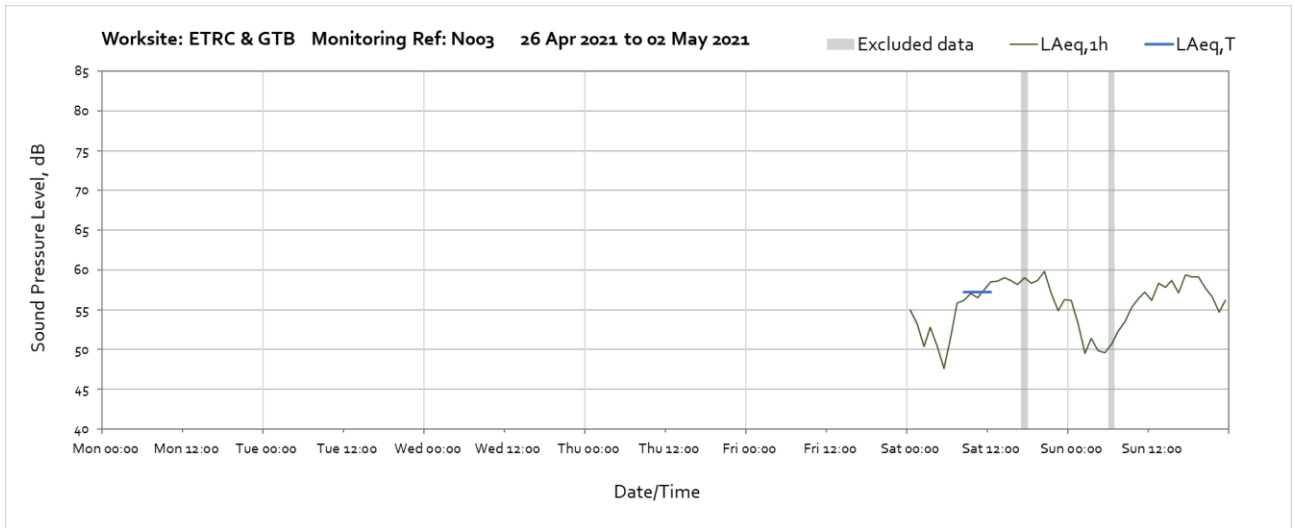
Worksite: ETRC & GTB – Monitoring Ref: N002

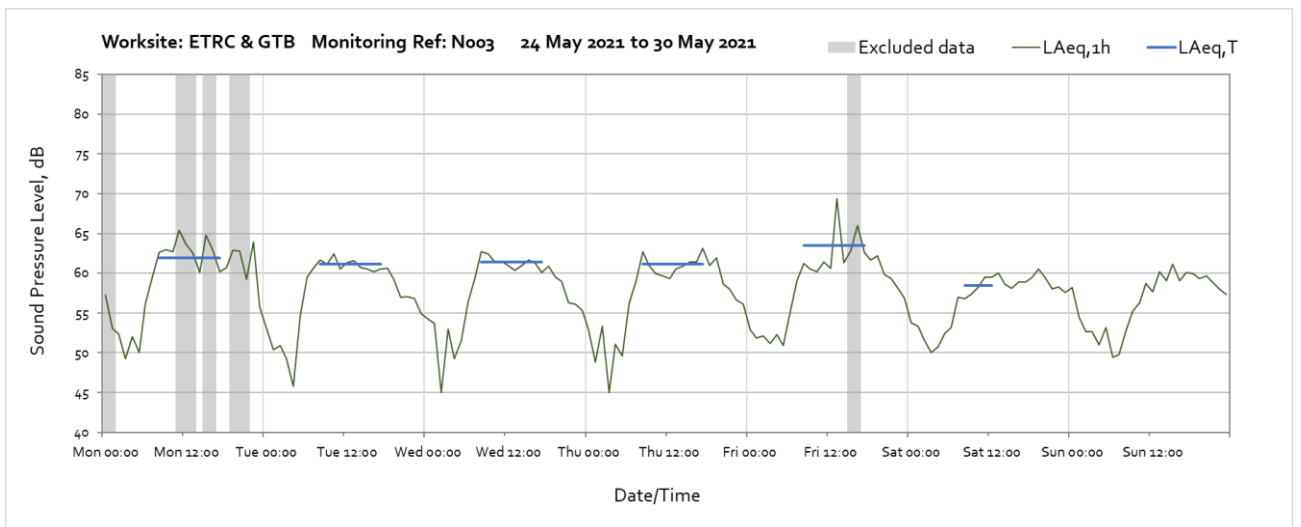
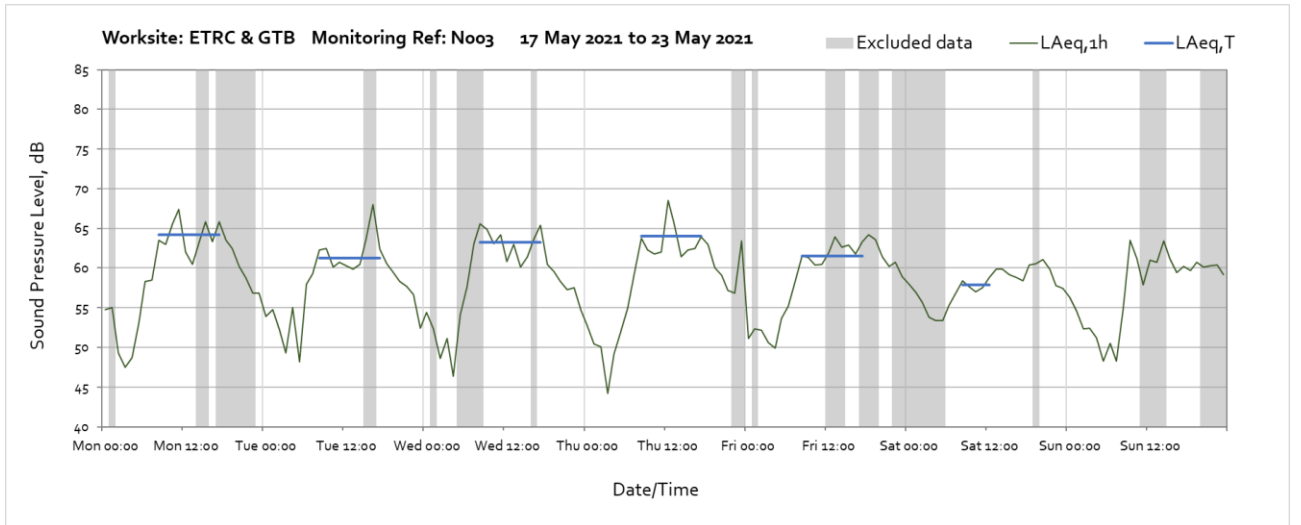
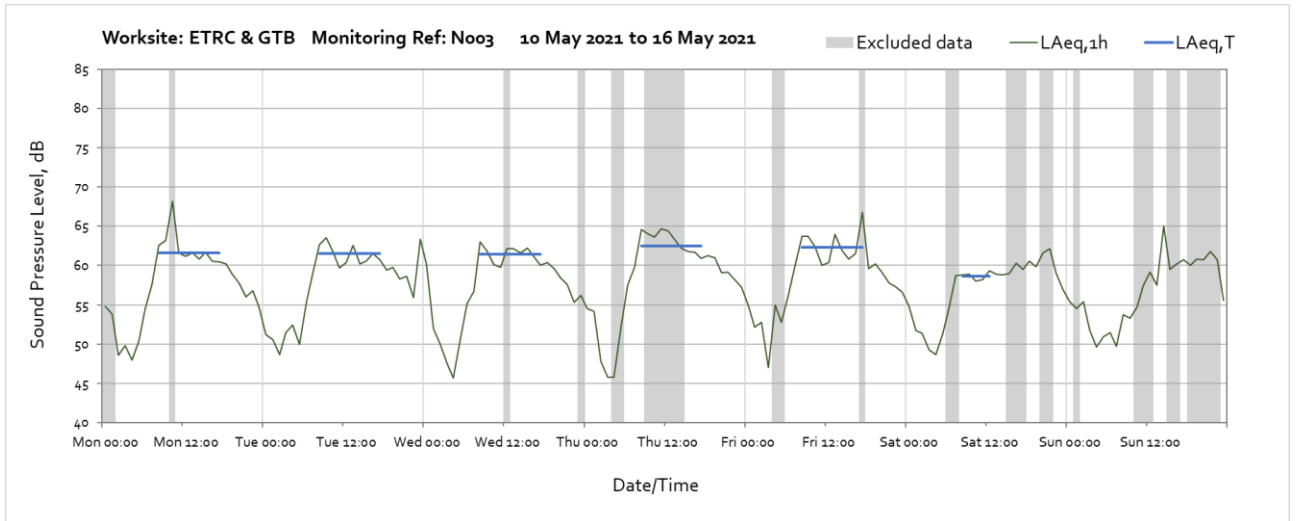


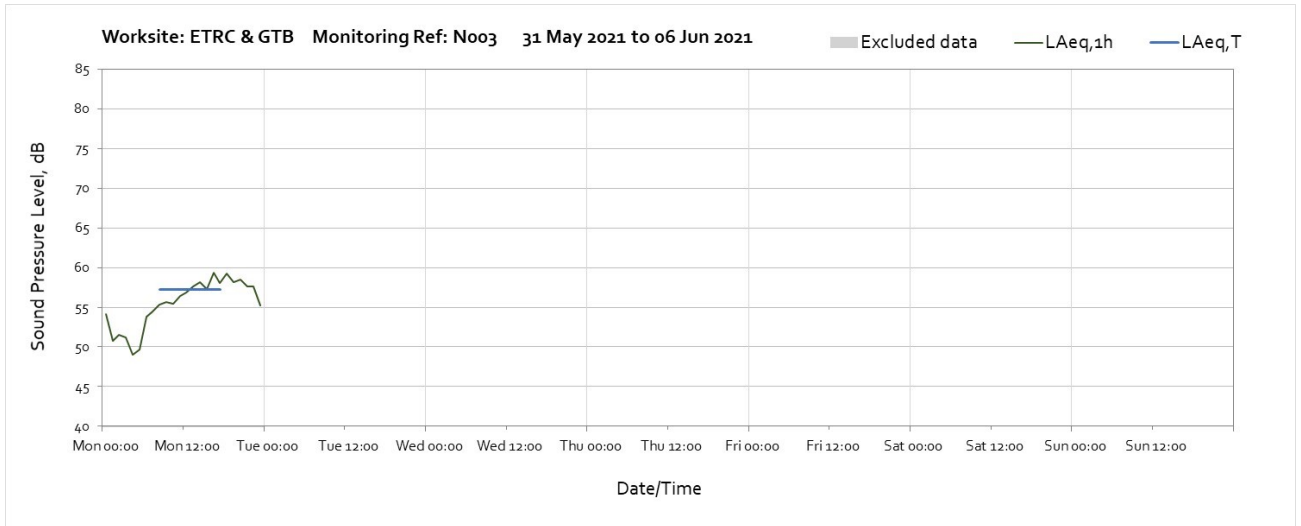




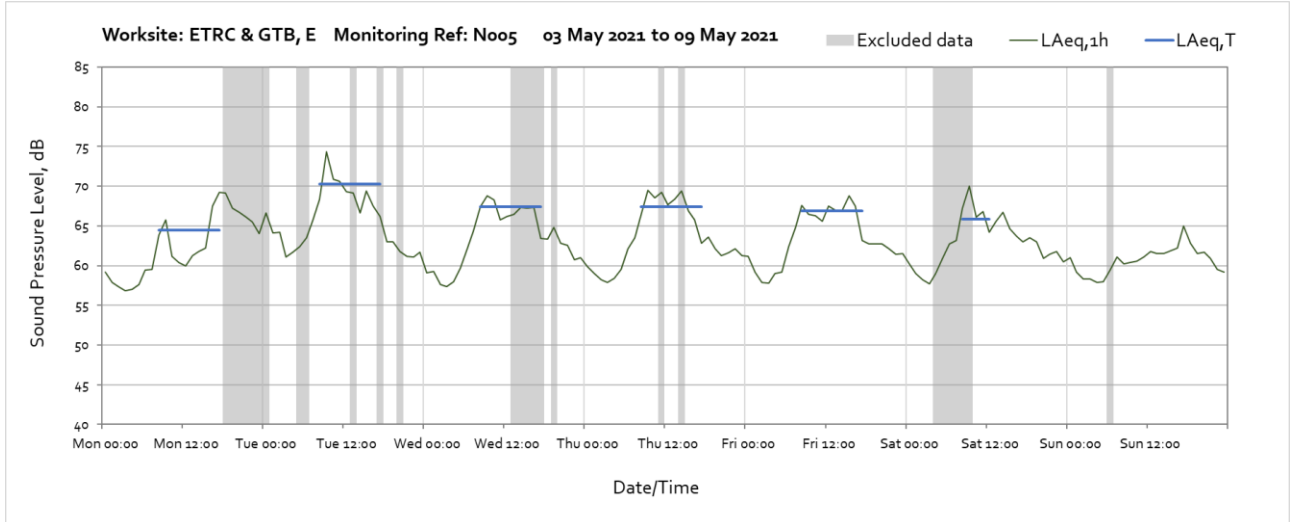
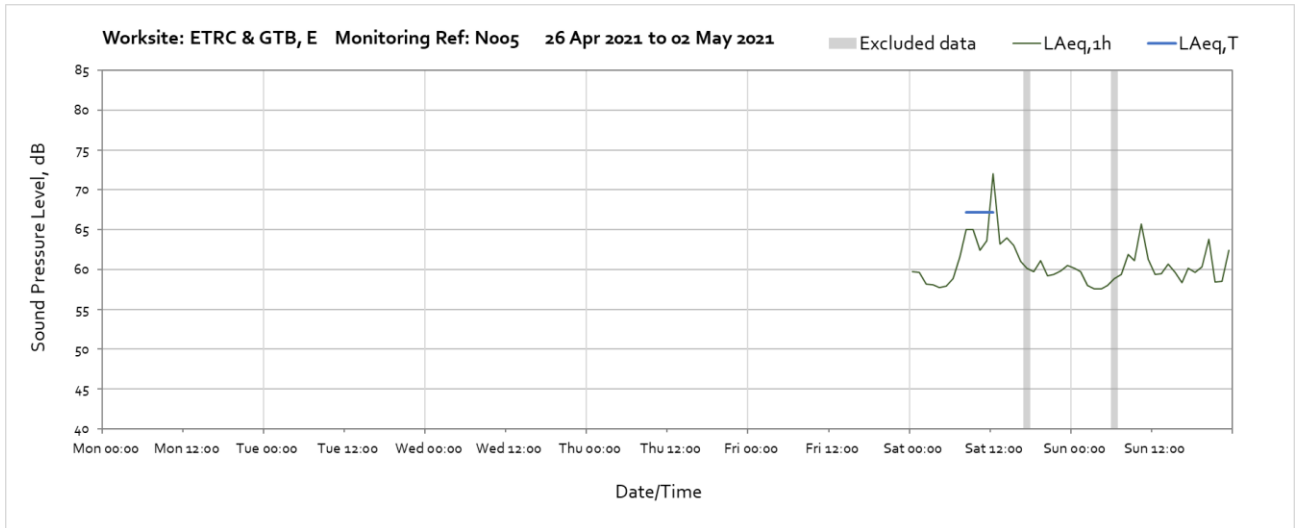
Worksite: ETRC & GTB – Monitoring Ref: N003

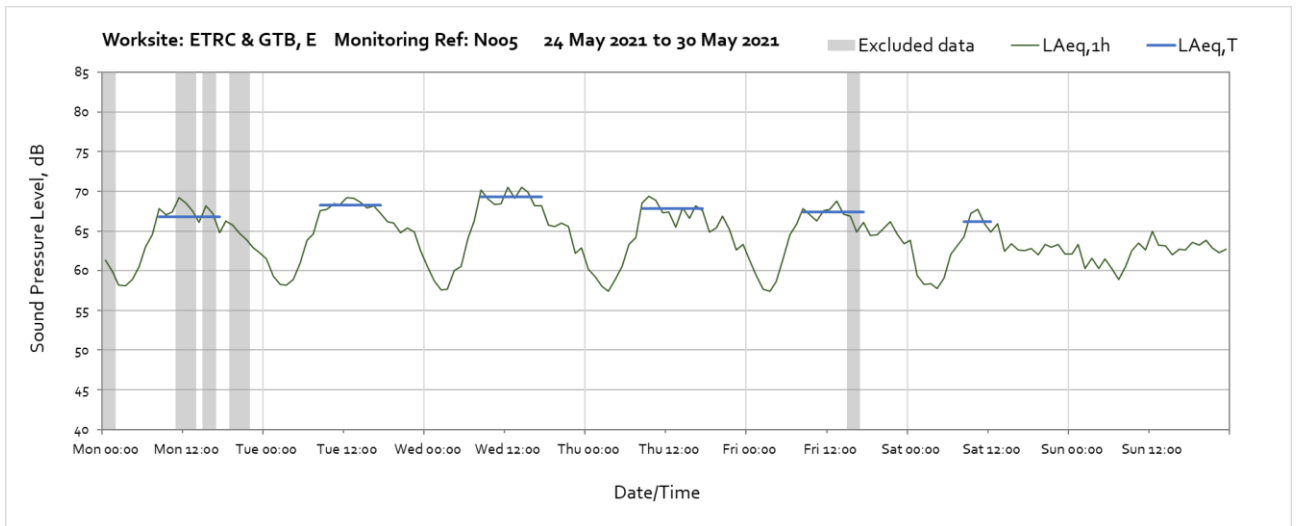
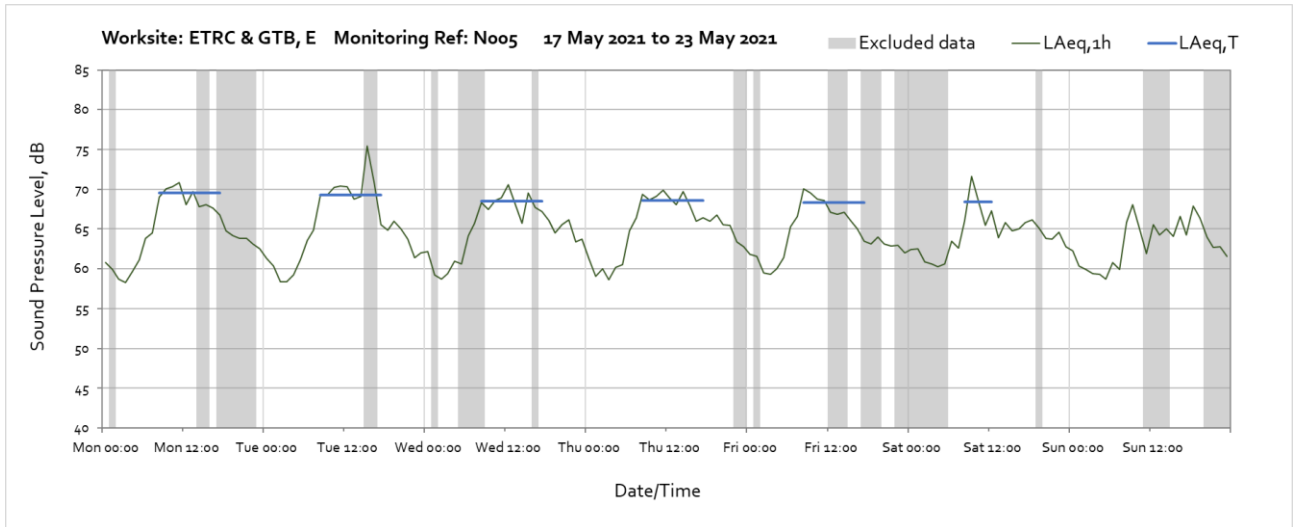
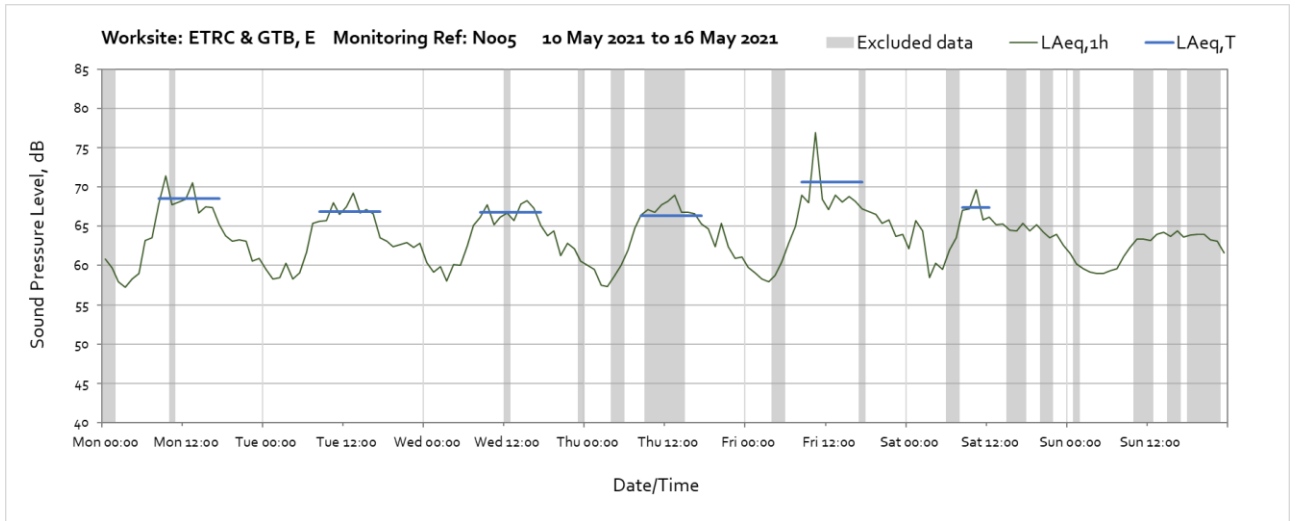


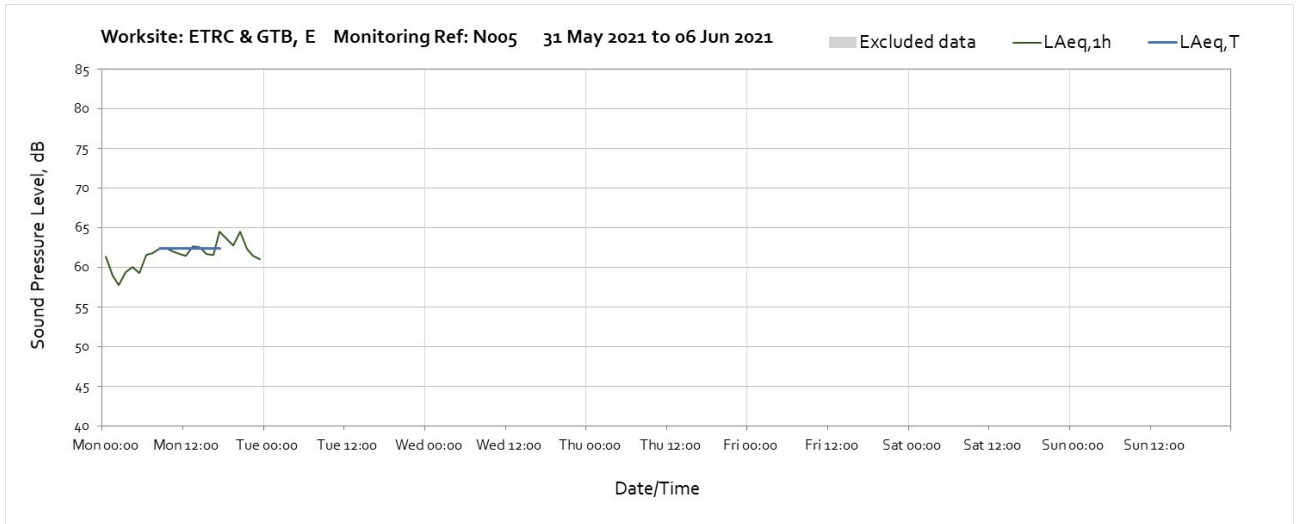




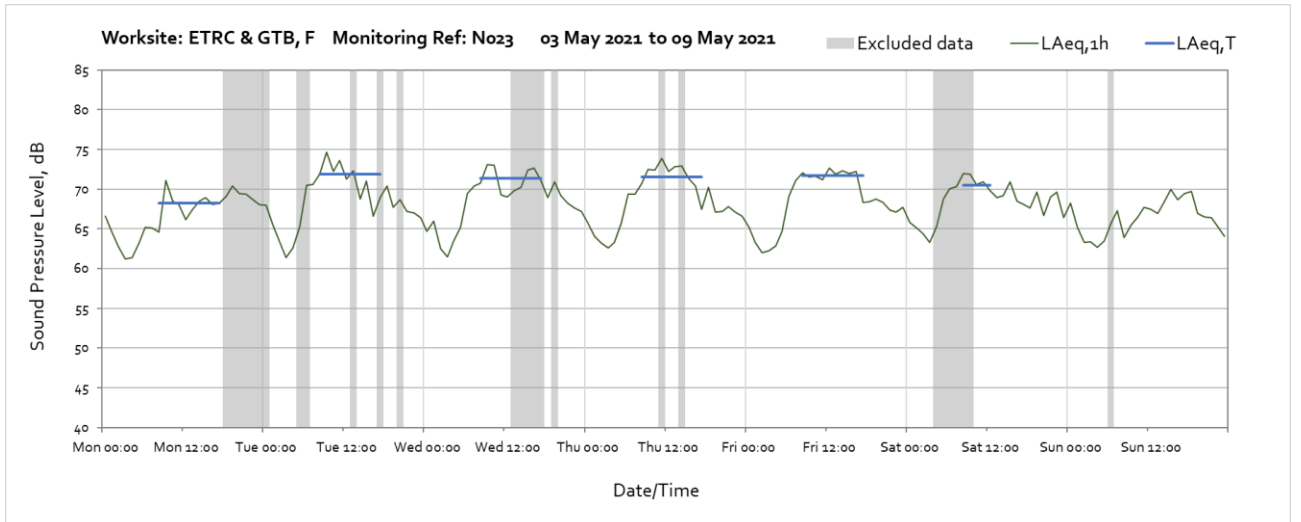
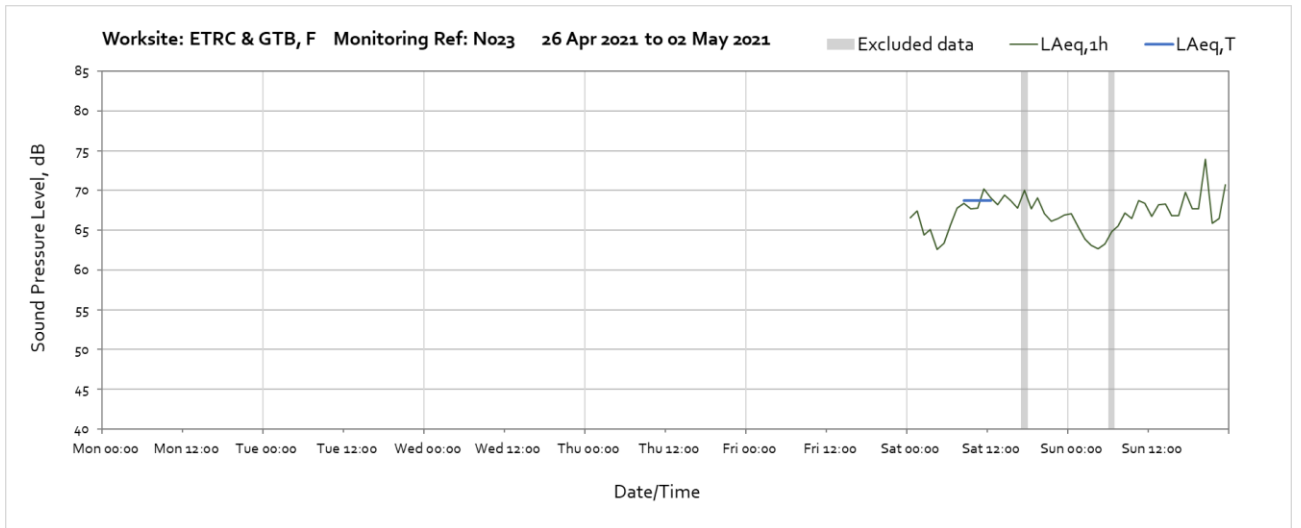
Worksite: ETRC & GTB, E – Monitoring Ref: N005

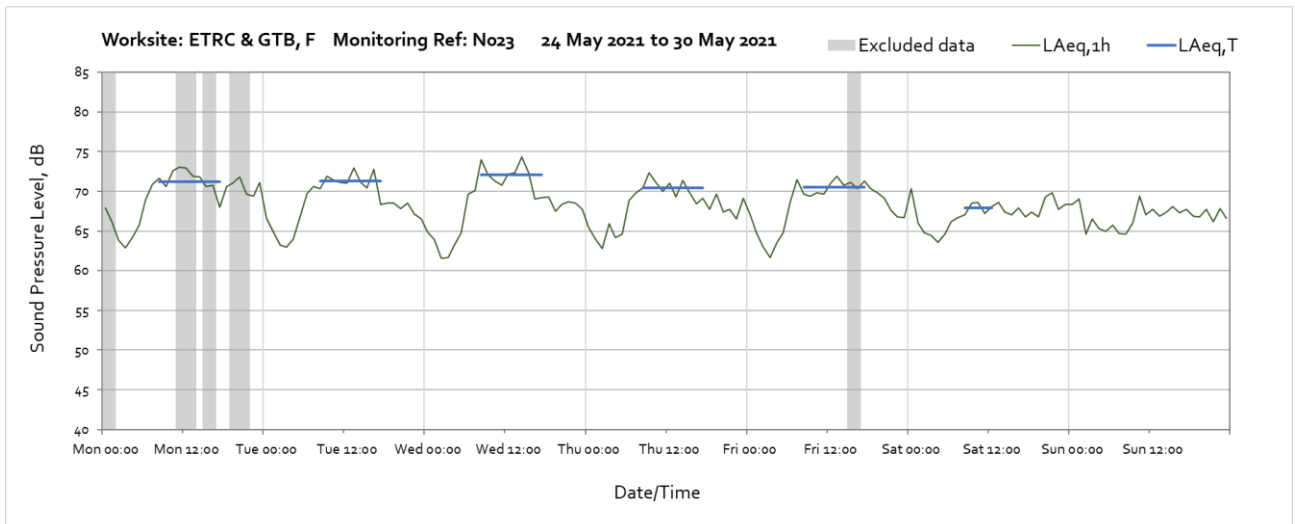
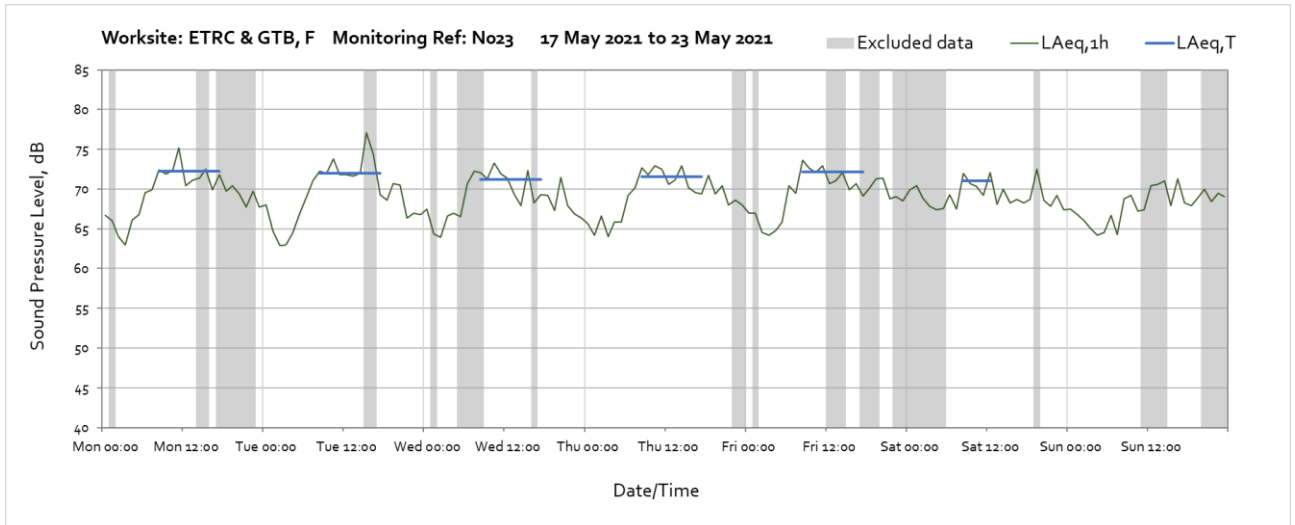
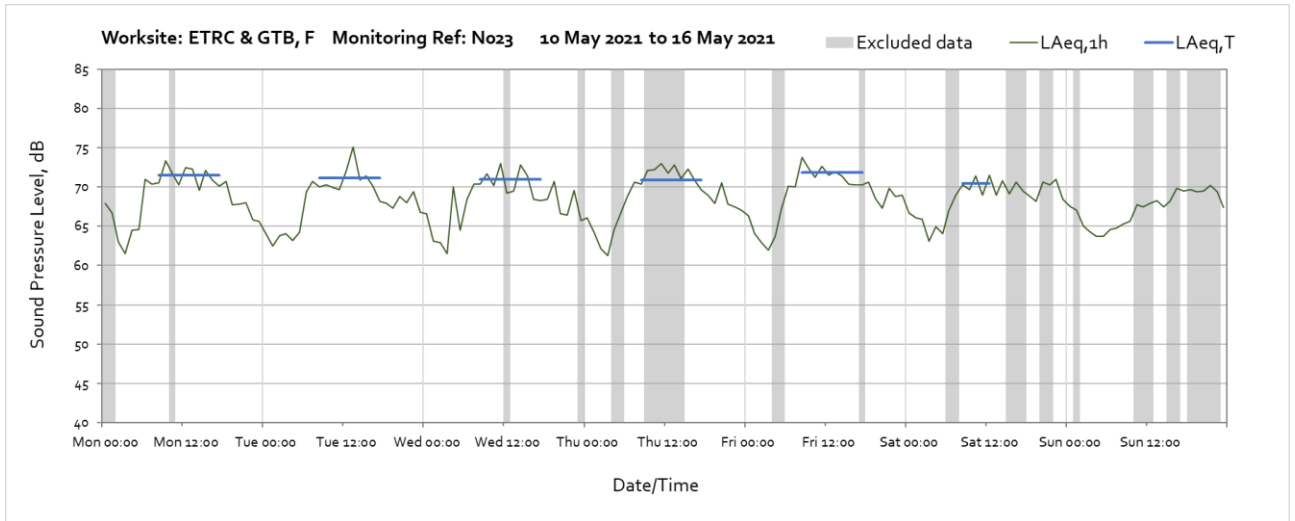


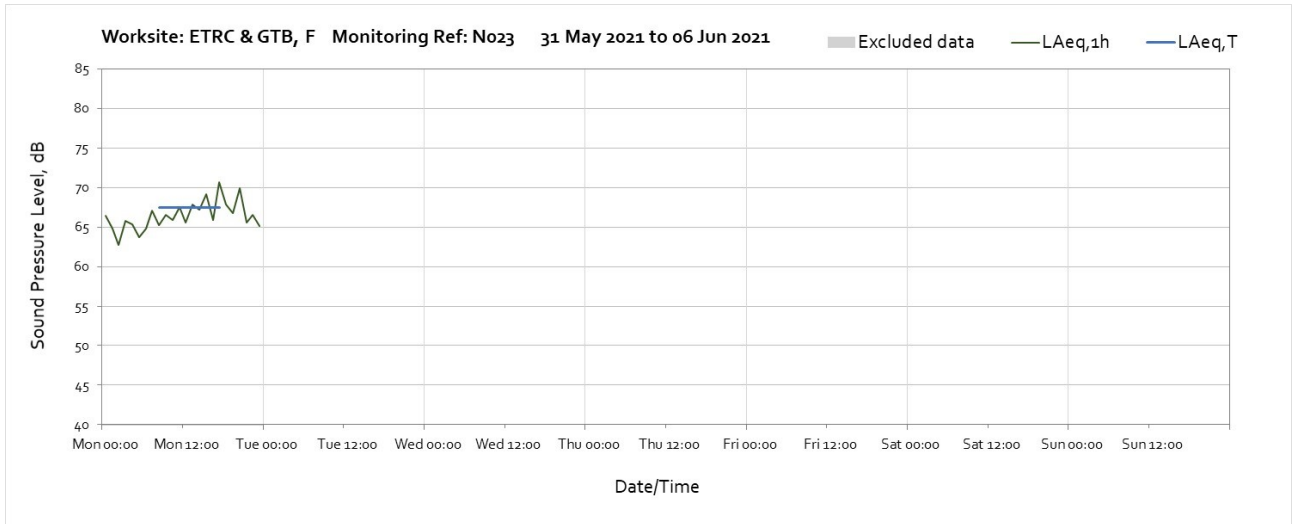




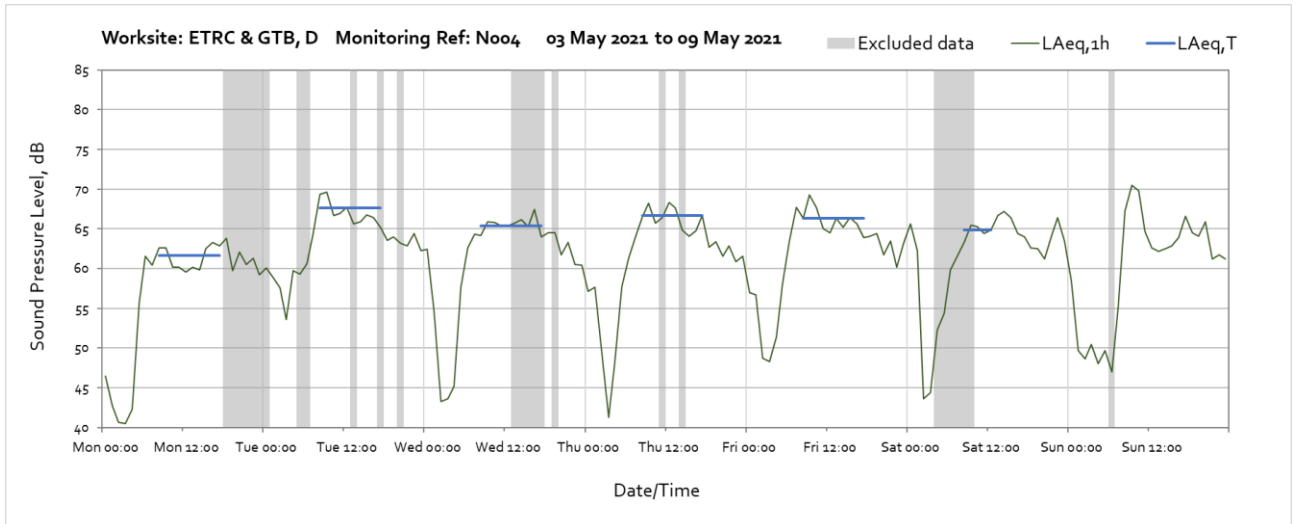
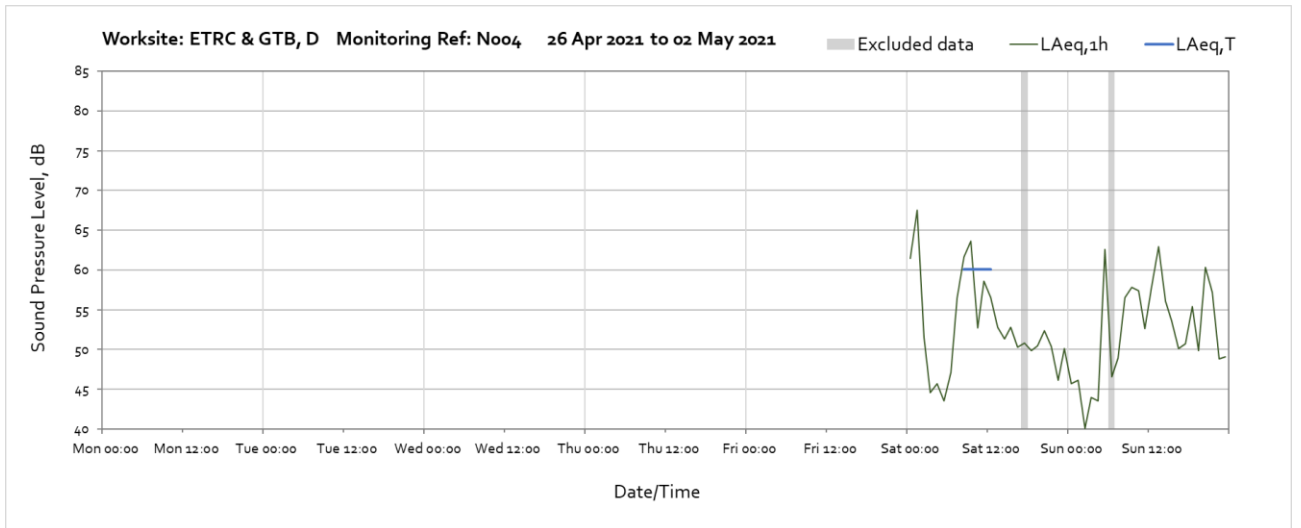
Worksite: ETRC – Monitoring Ref: N023

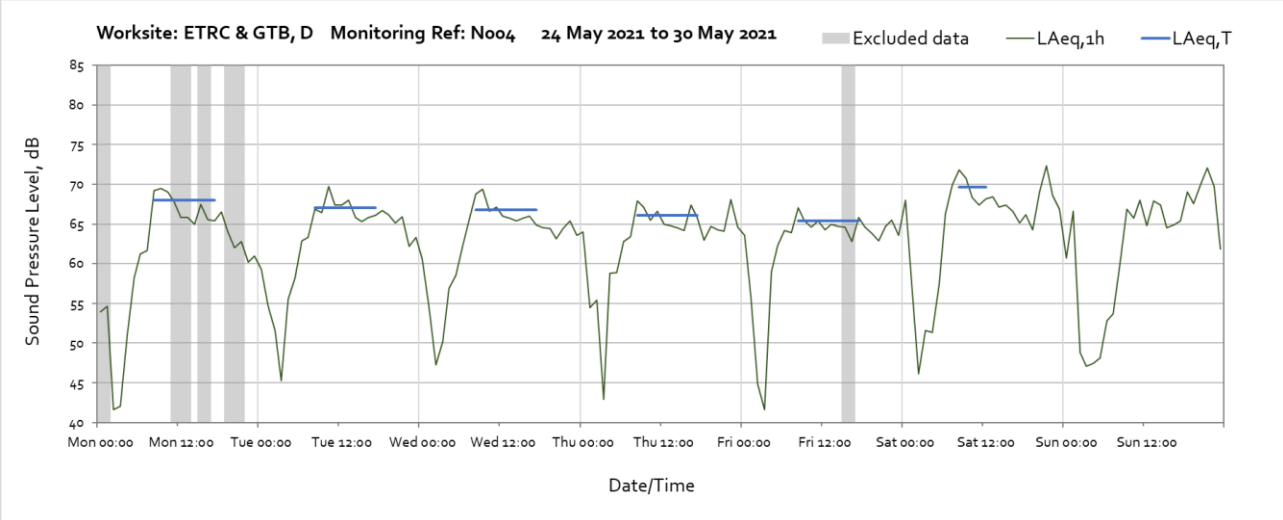
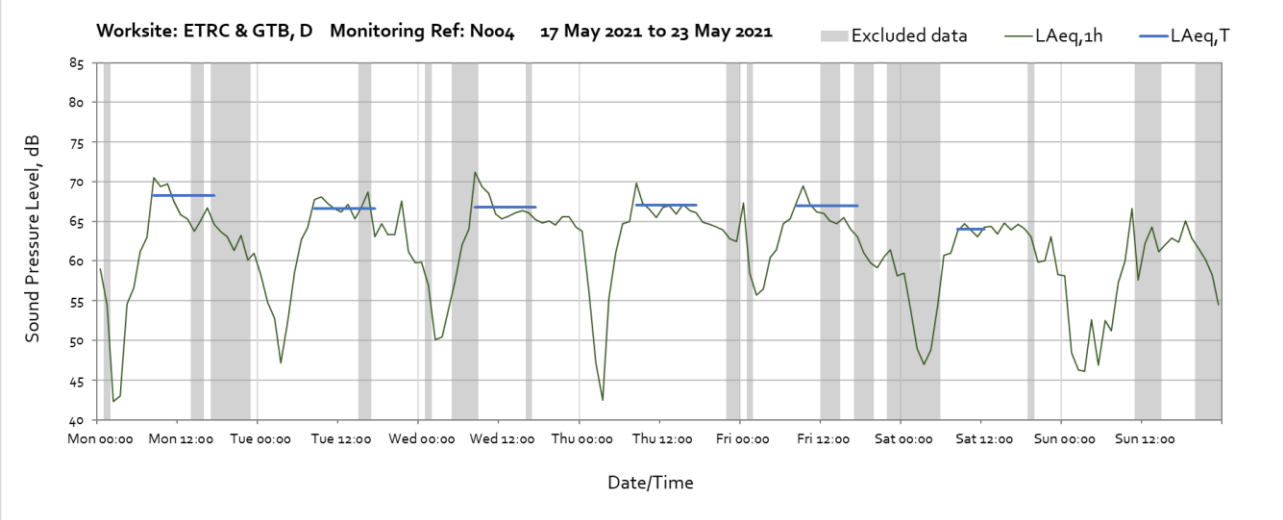
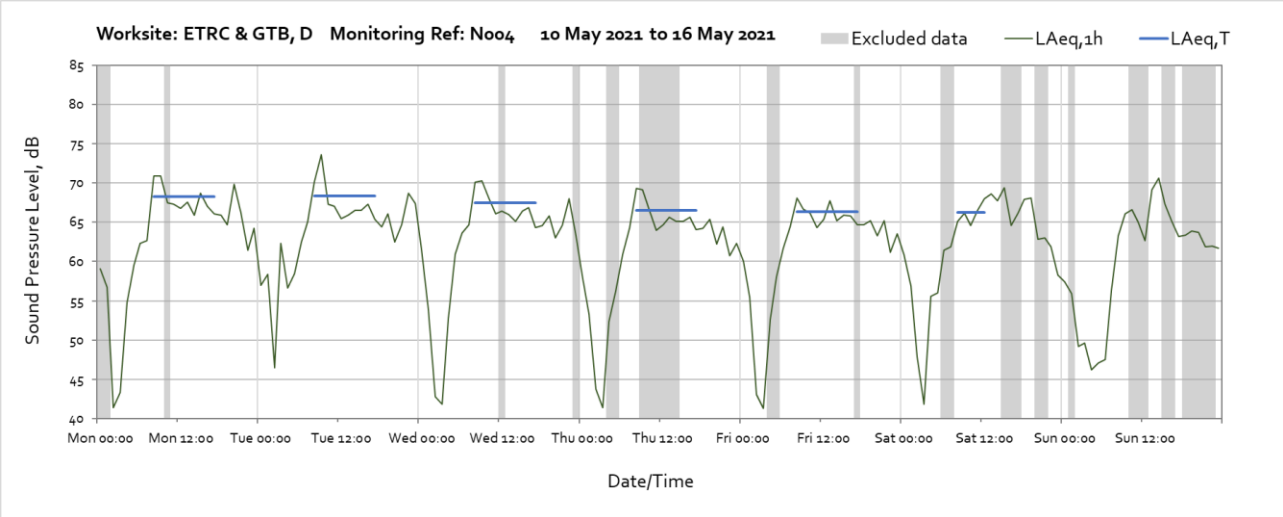


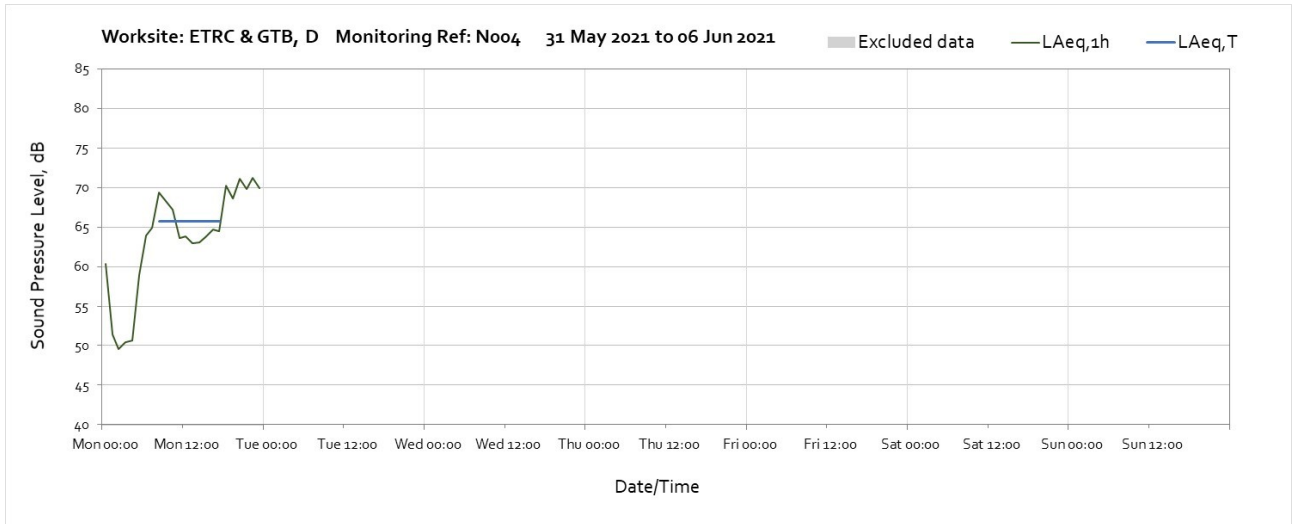




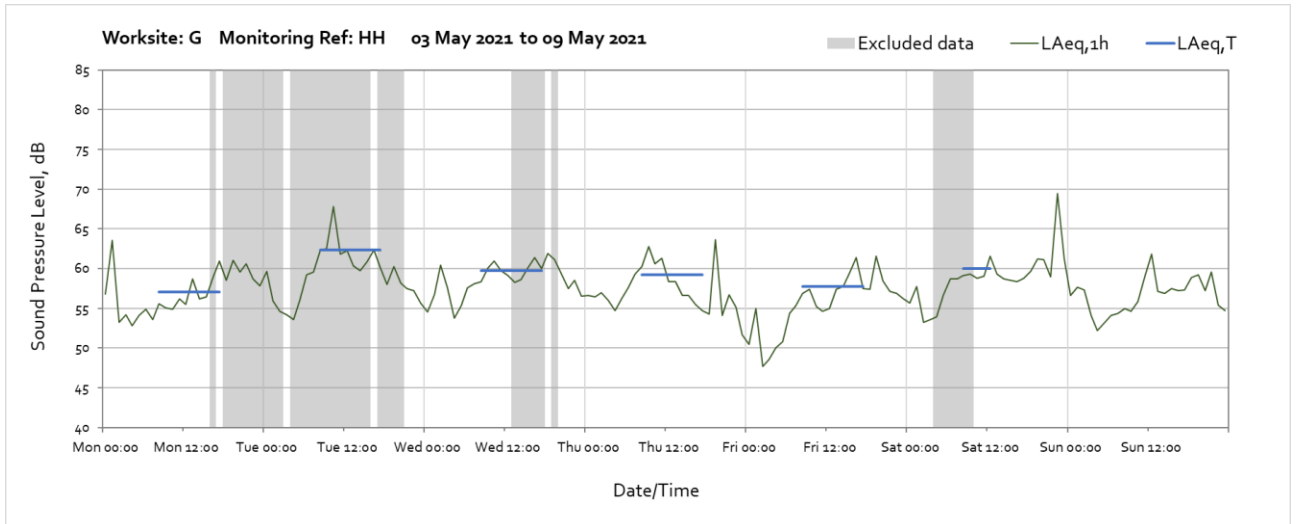
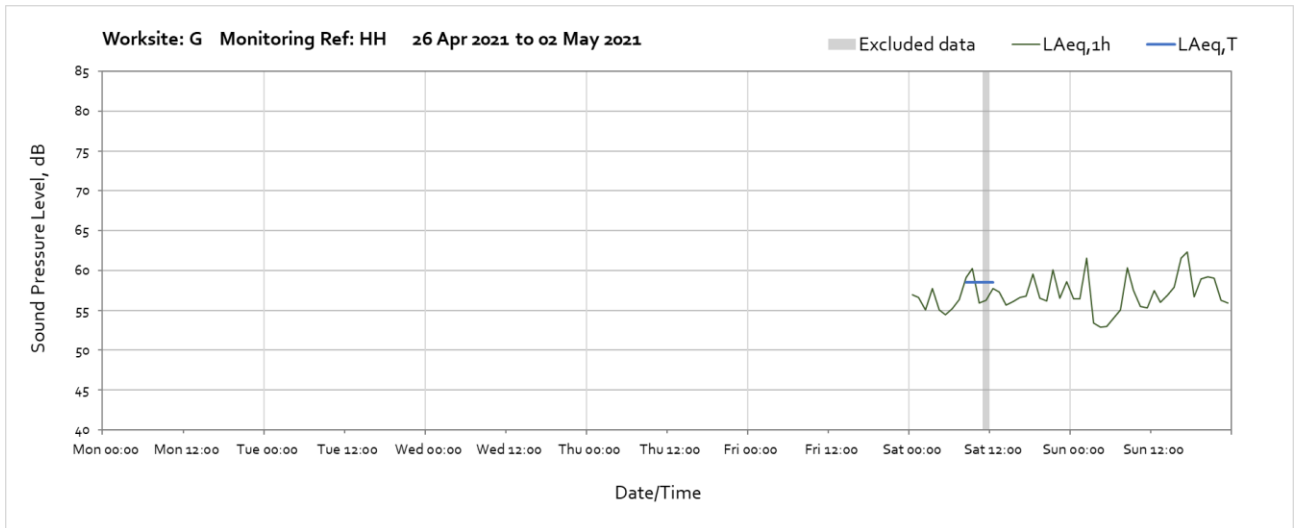
Worksite: ETRC & GTB, D – Monitoring Ref: N004

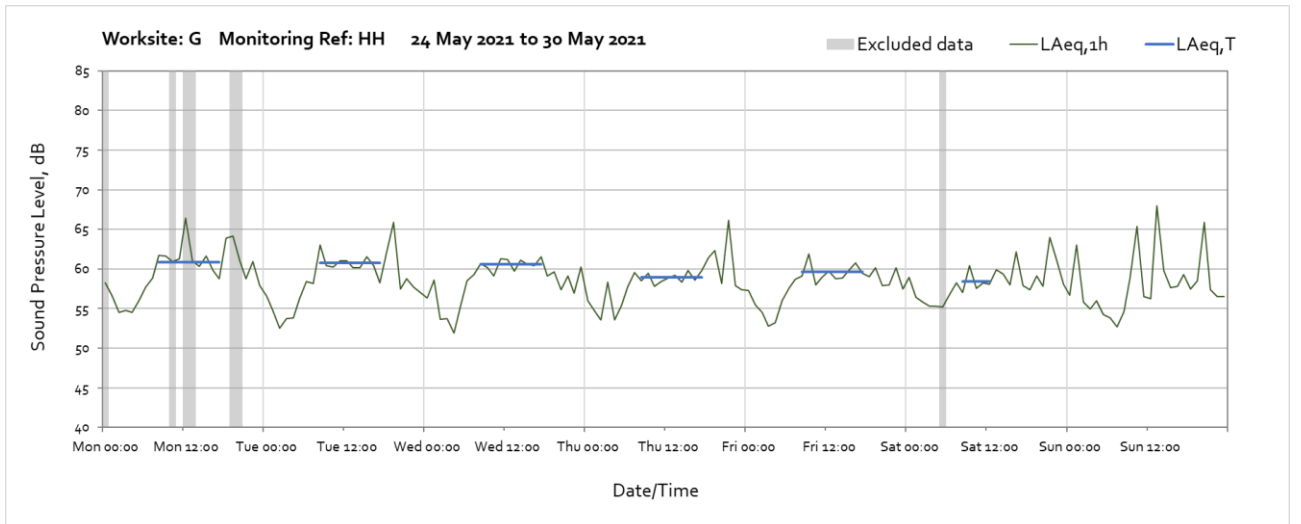
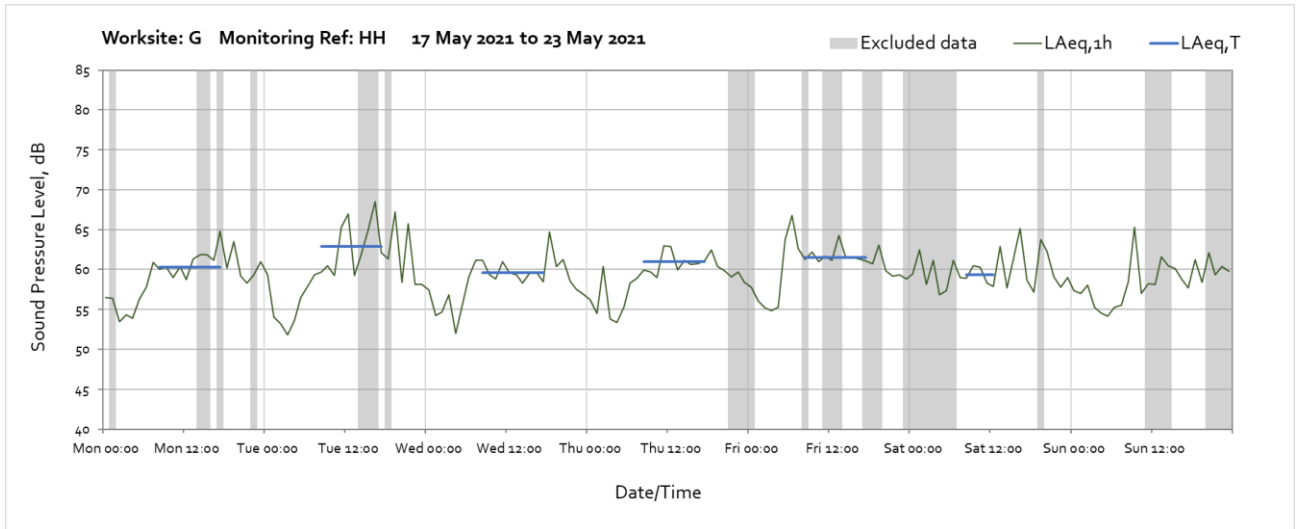
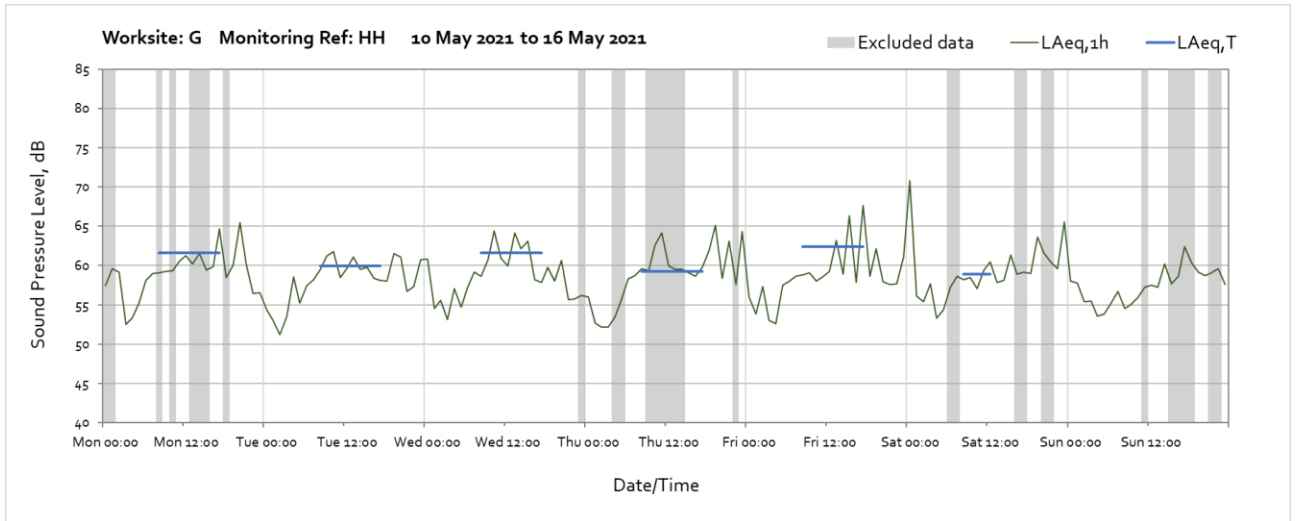


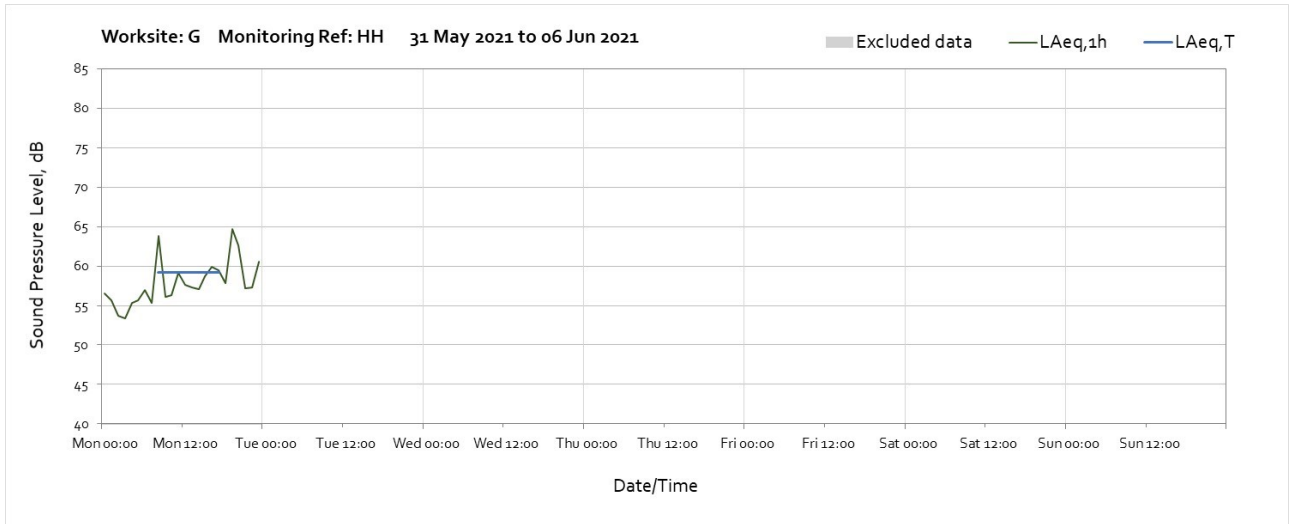




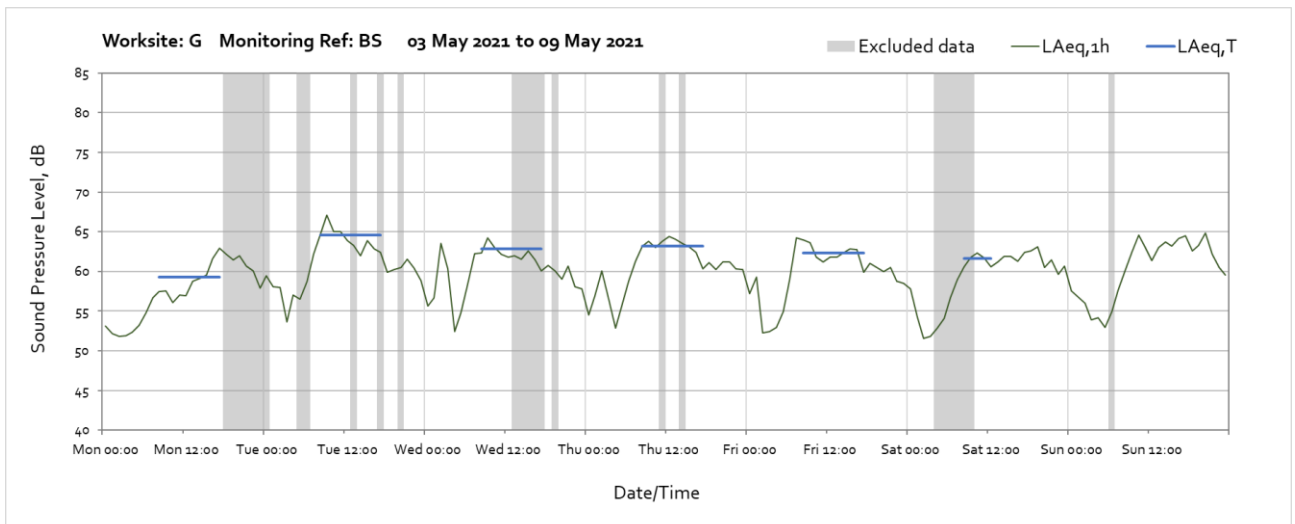
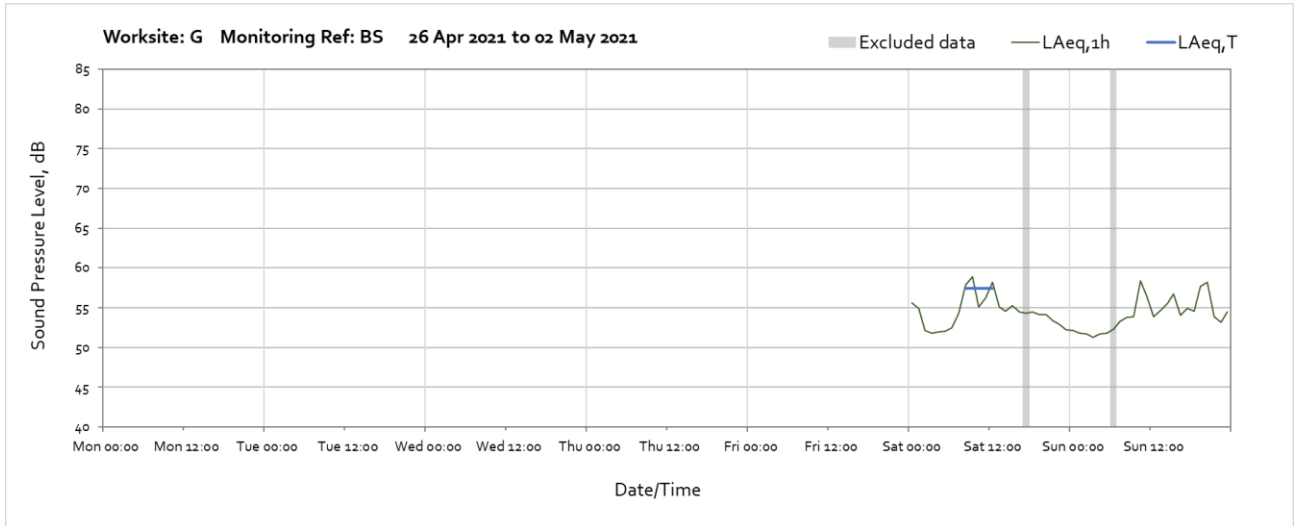
Worksite: G – Monitoring Ref: HH

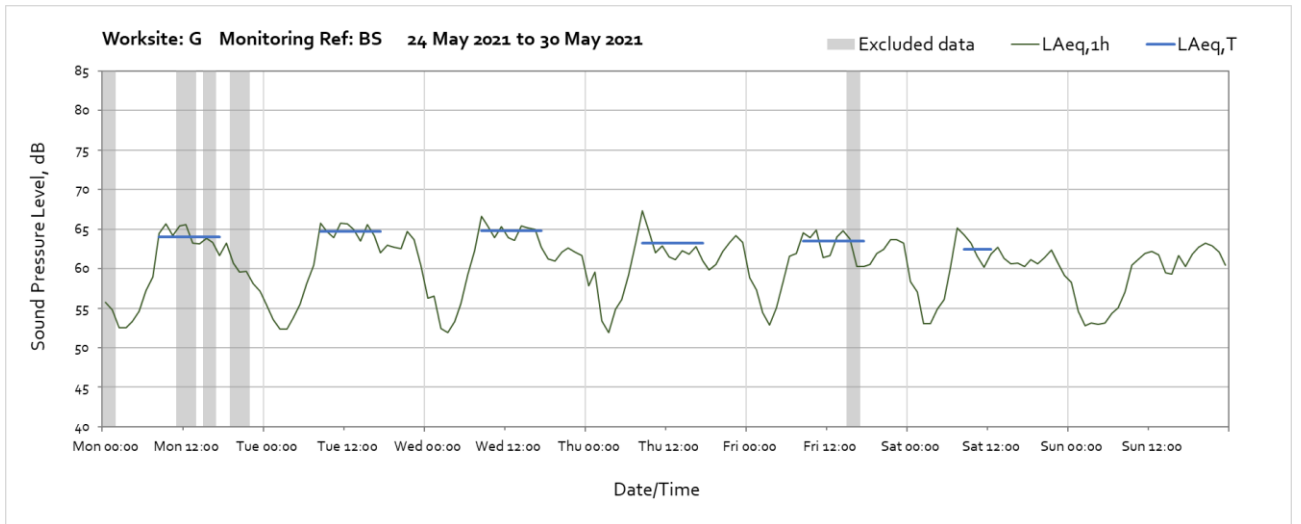
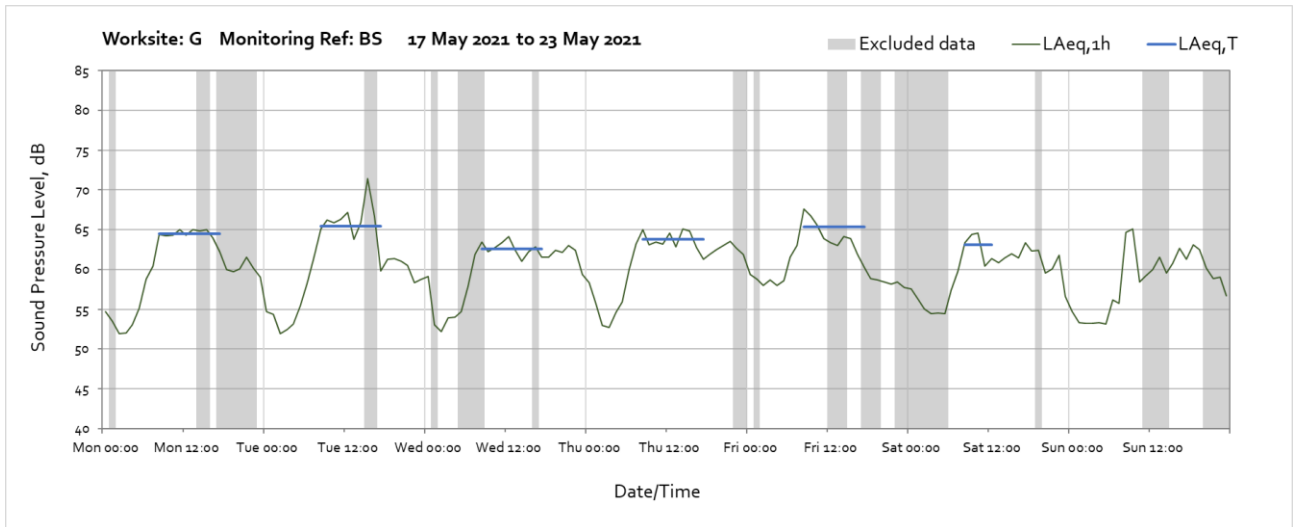
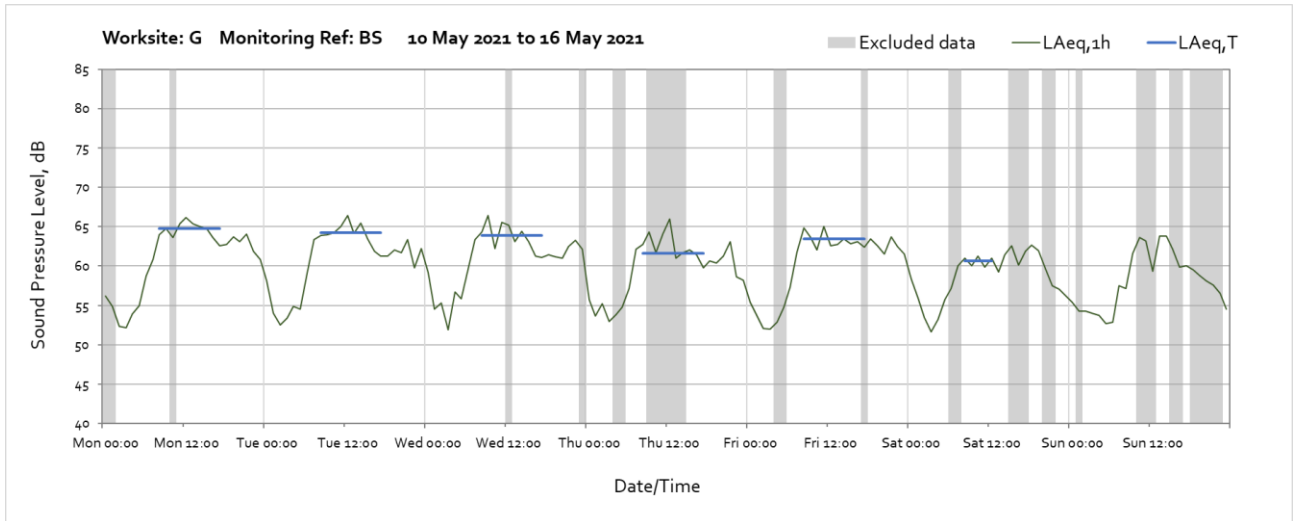


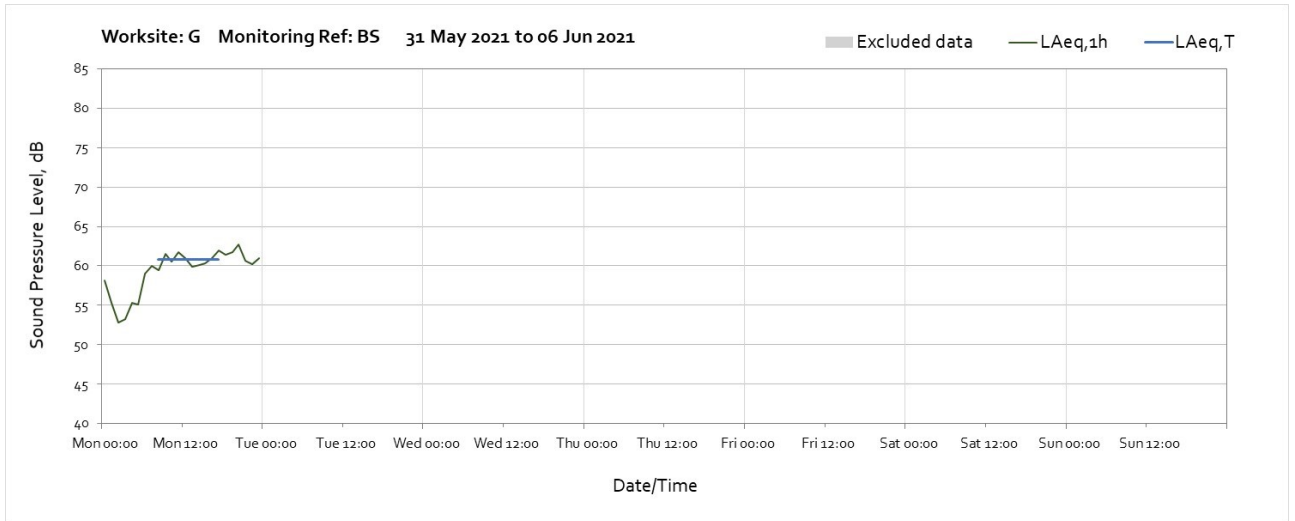




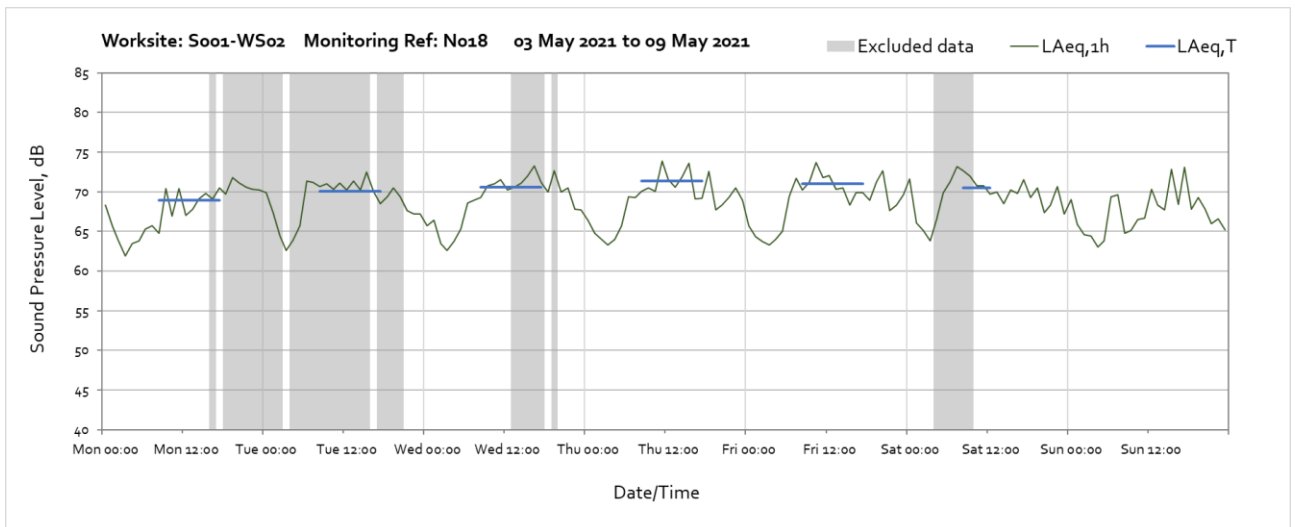
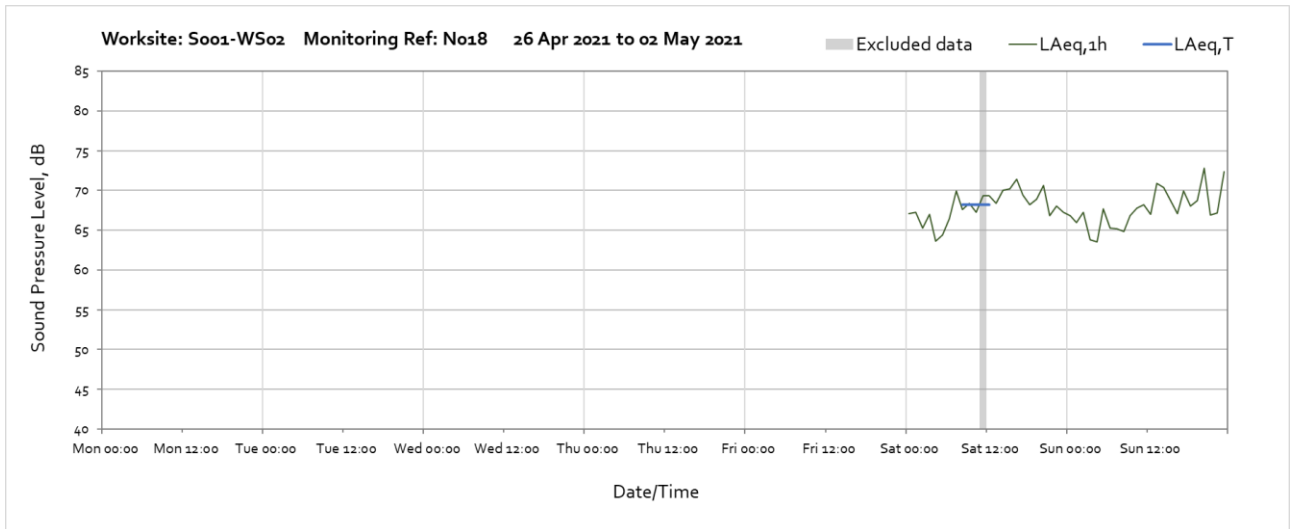
Worksite: G – Monitoring Ref: BS

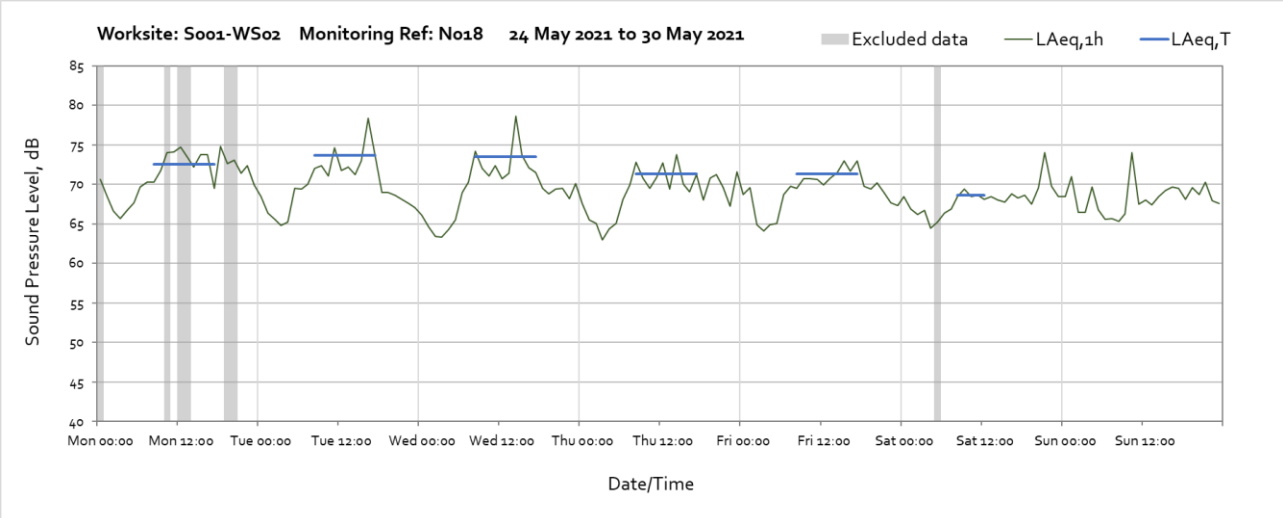
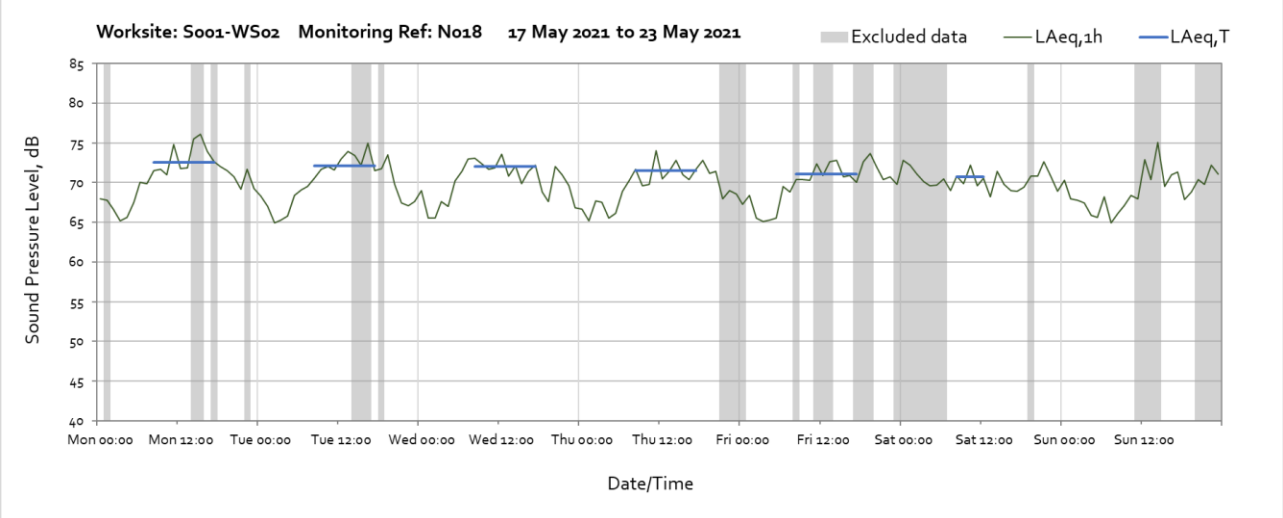
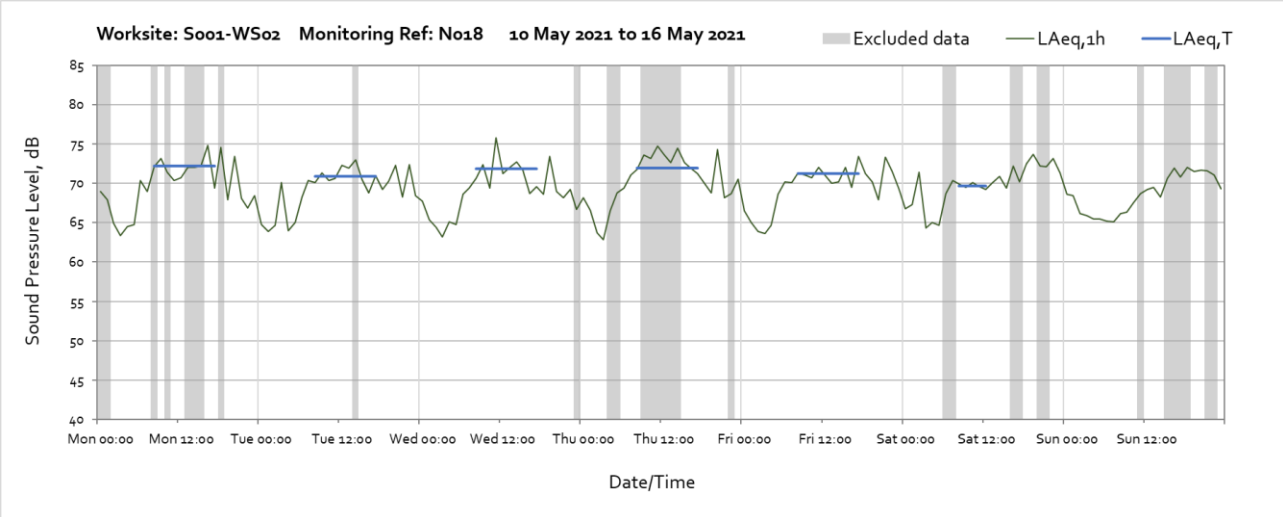


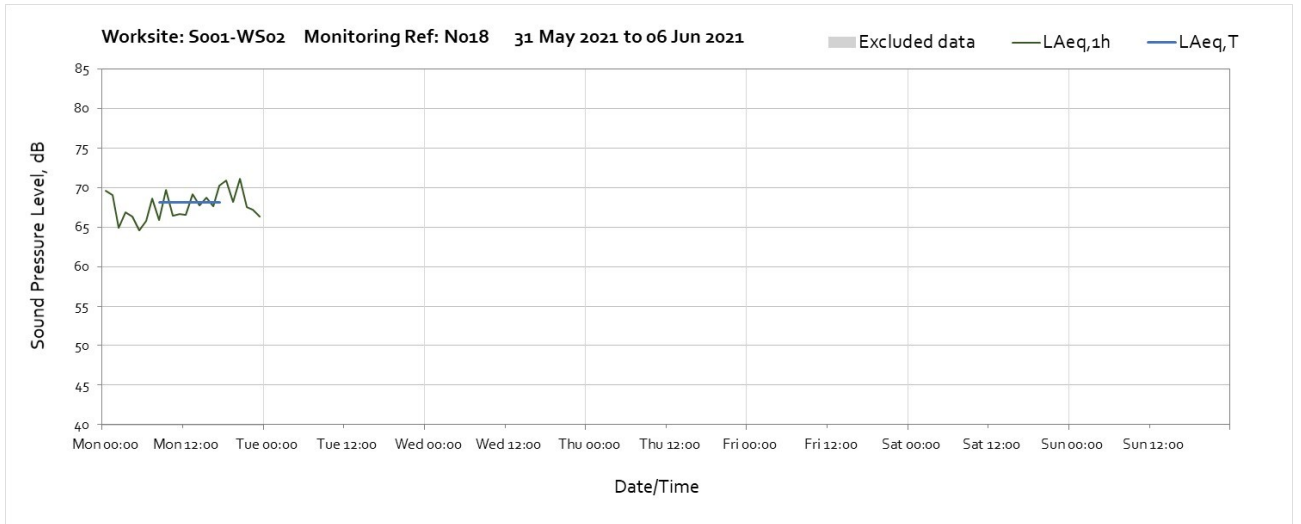




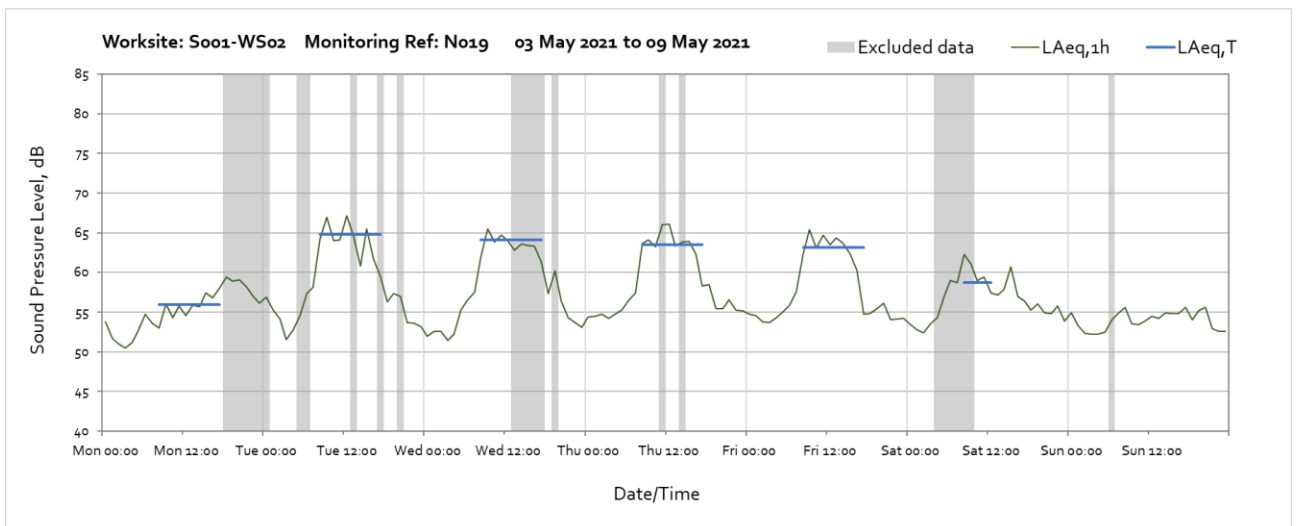
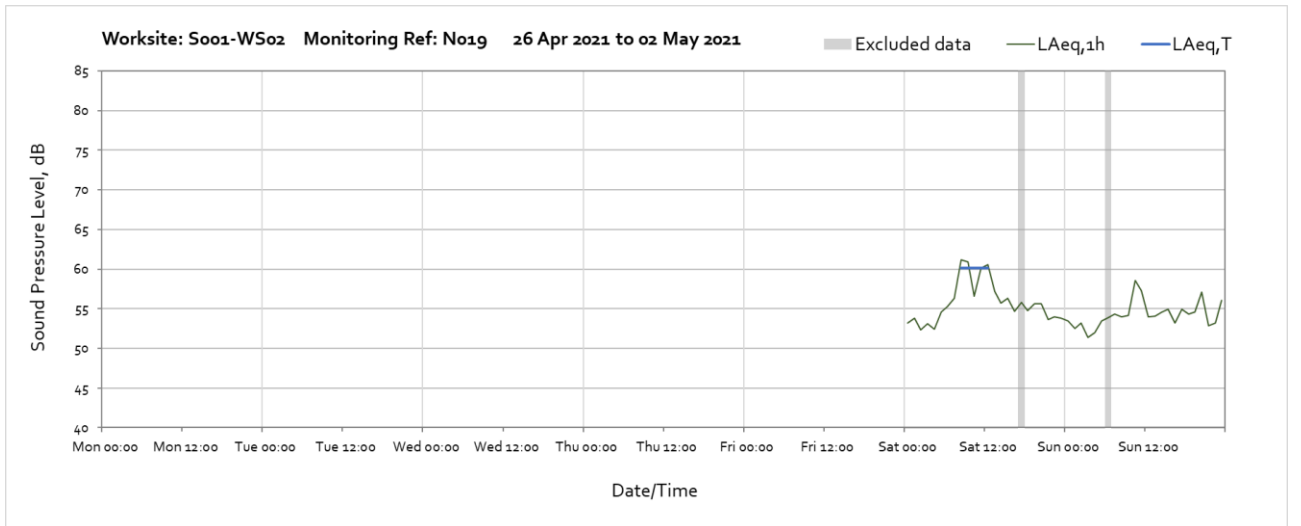
Worksite: S001-WS02 – Monitoring Ref: N018

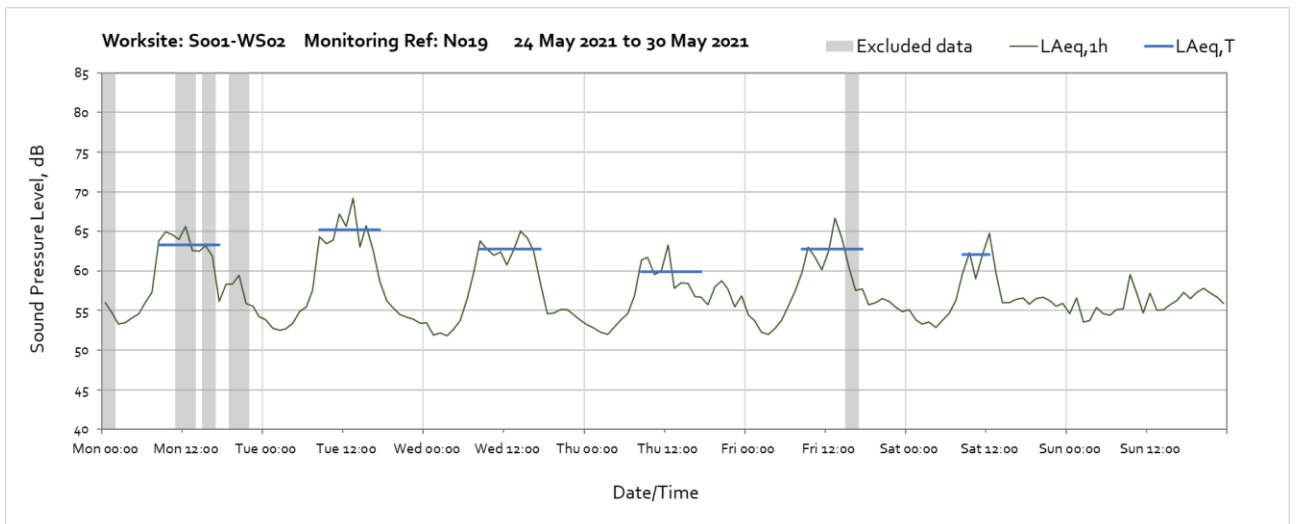
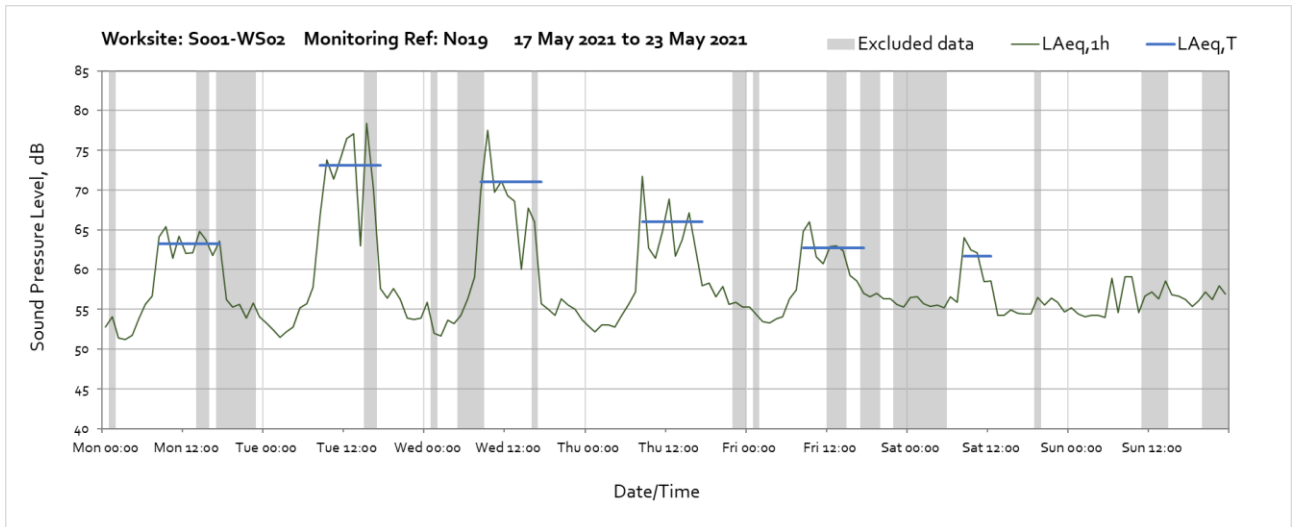
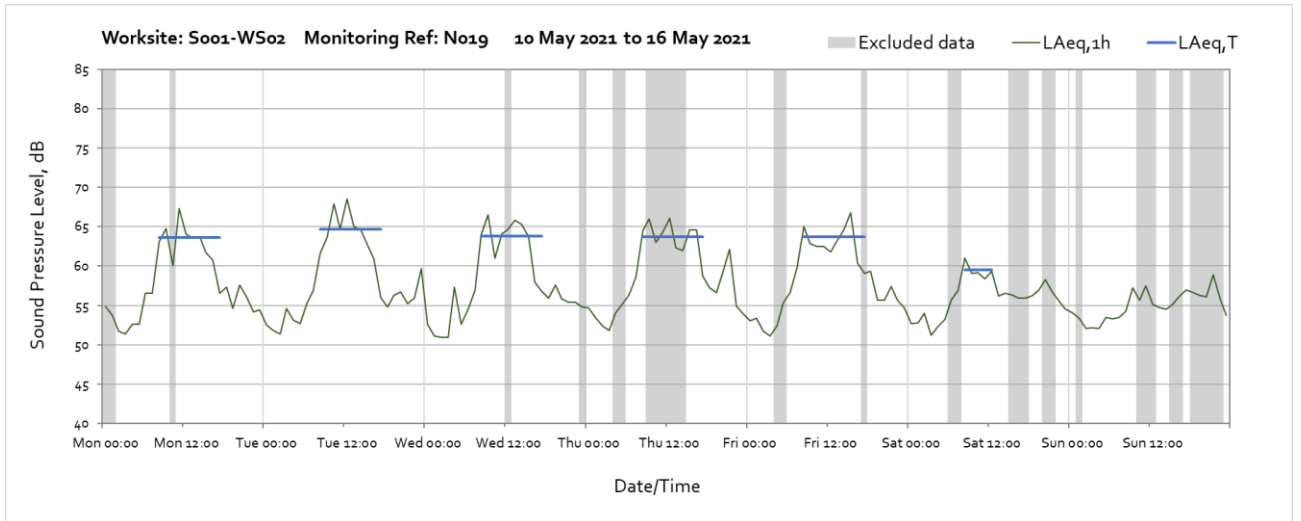


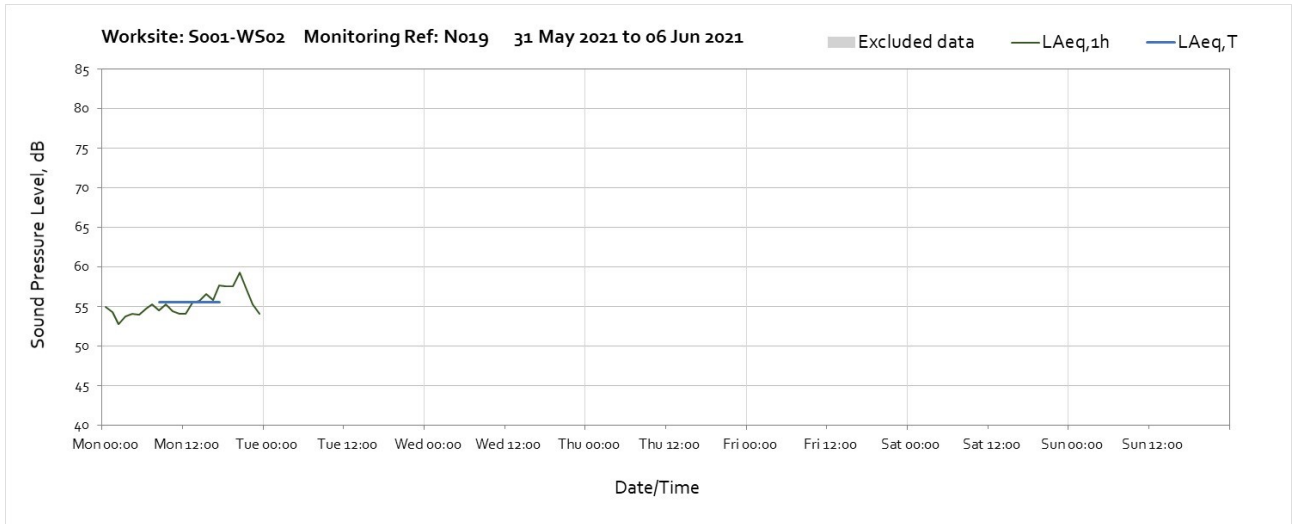




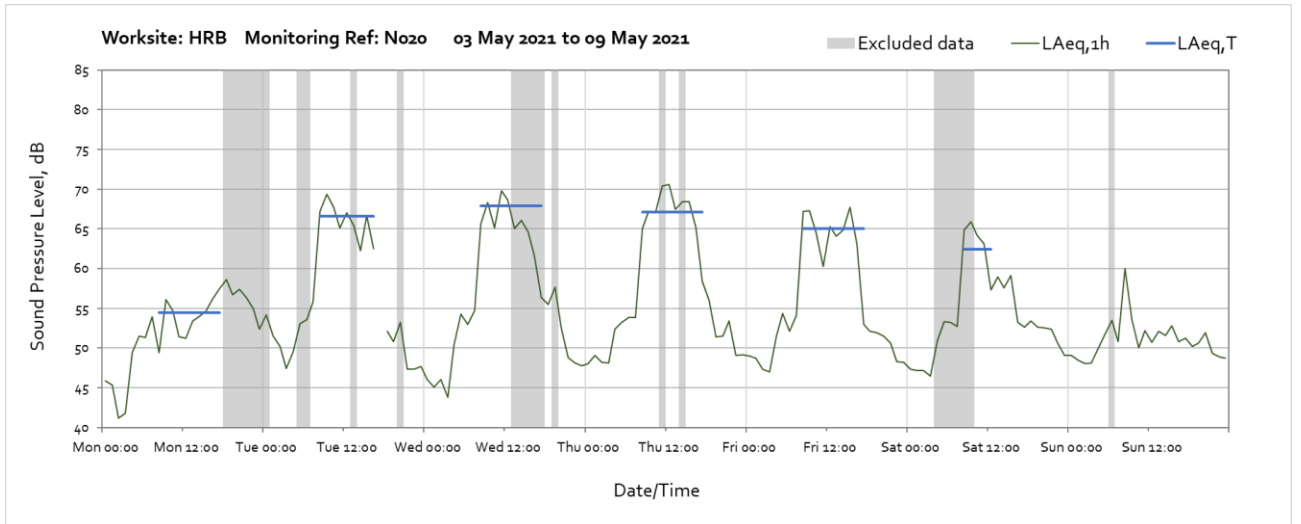
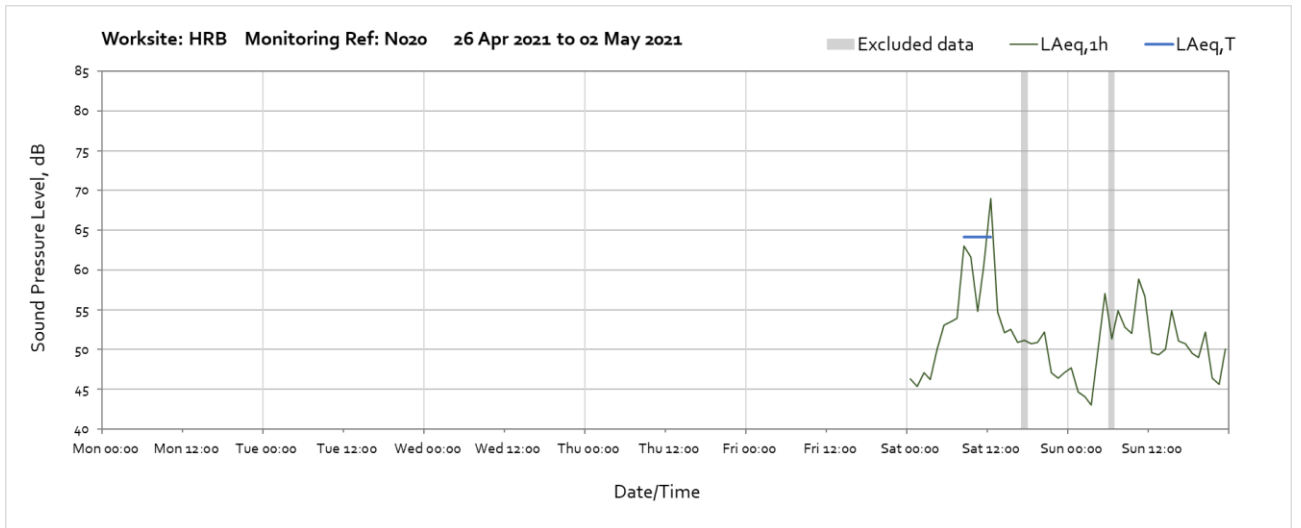
Worksite: S001-WS02 – Monitoring Ref: N019





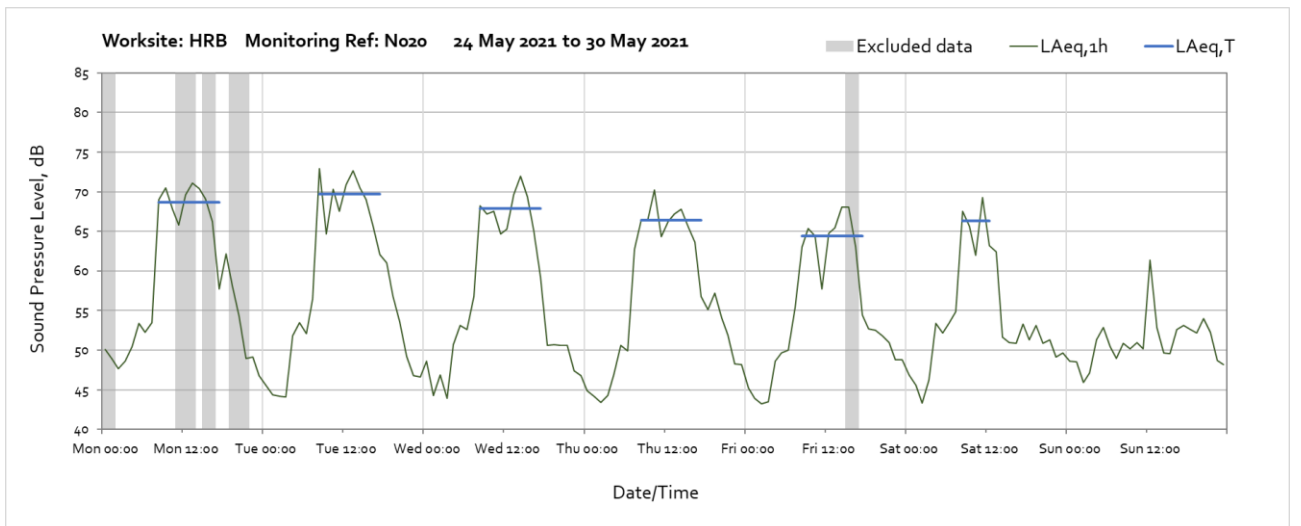
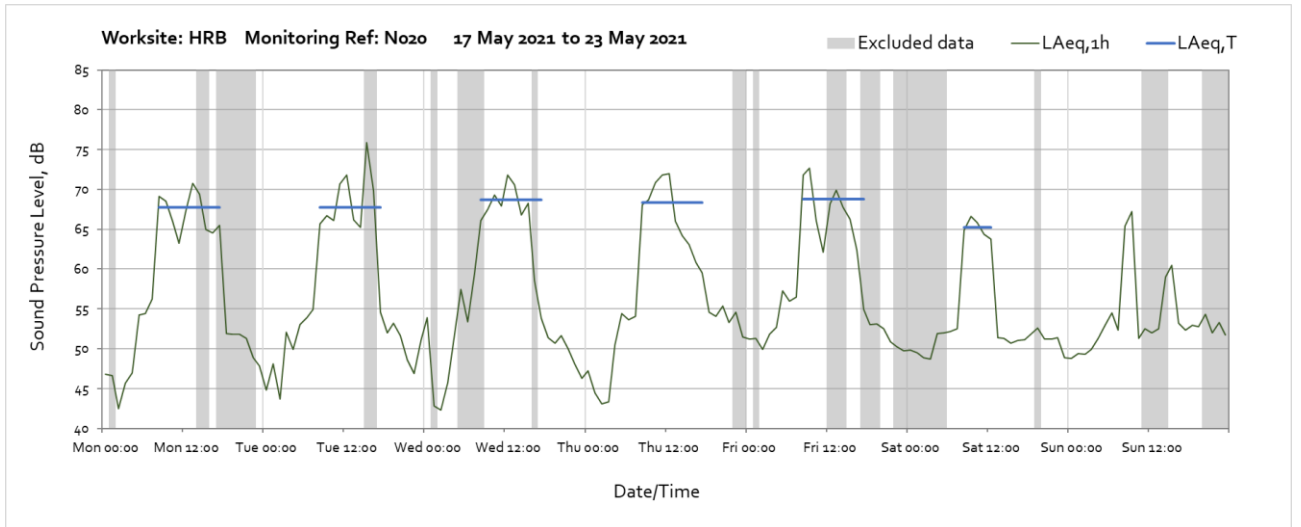
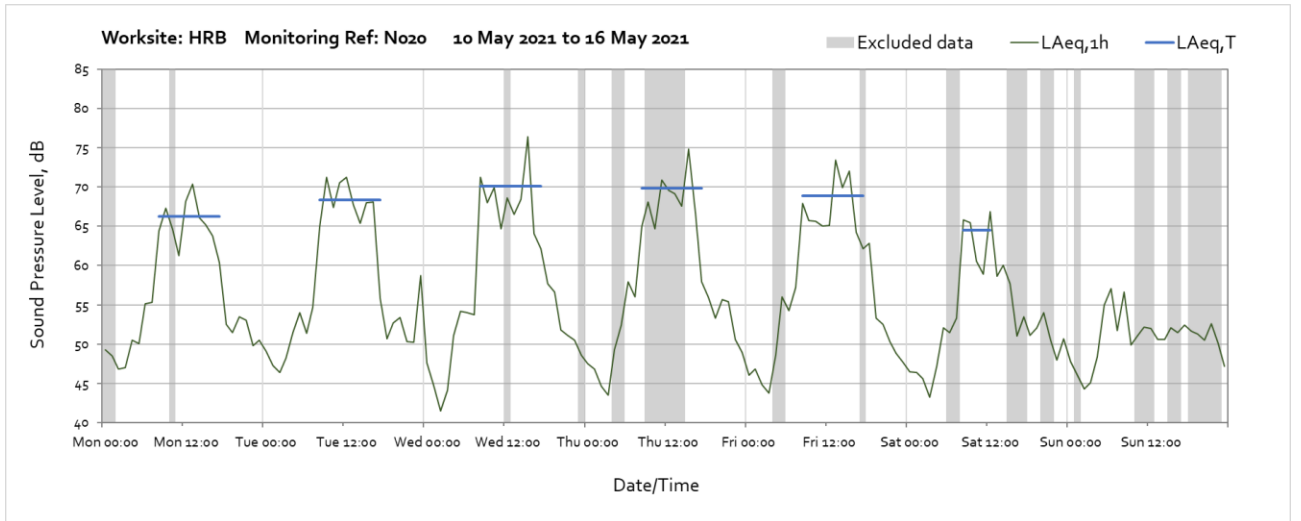


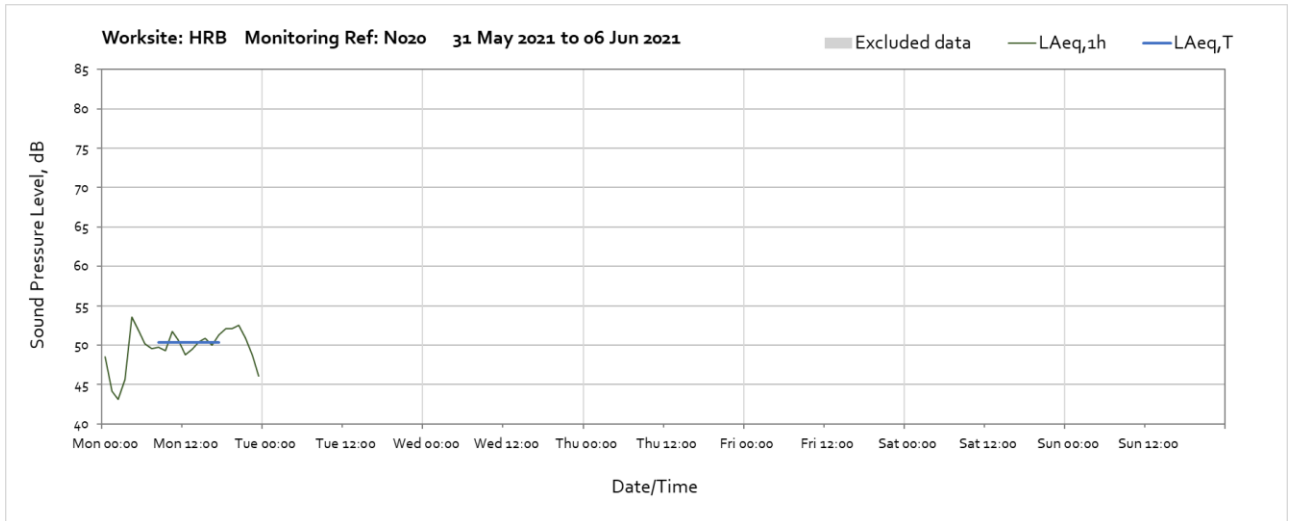
Worksite: HRB – Monitoring Ref: N020



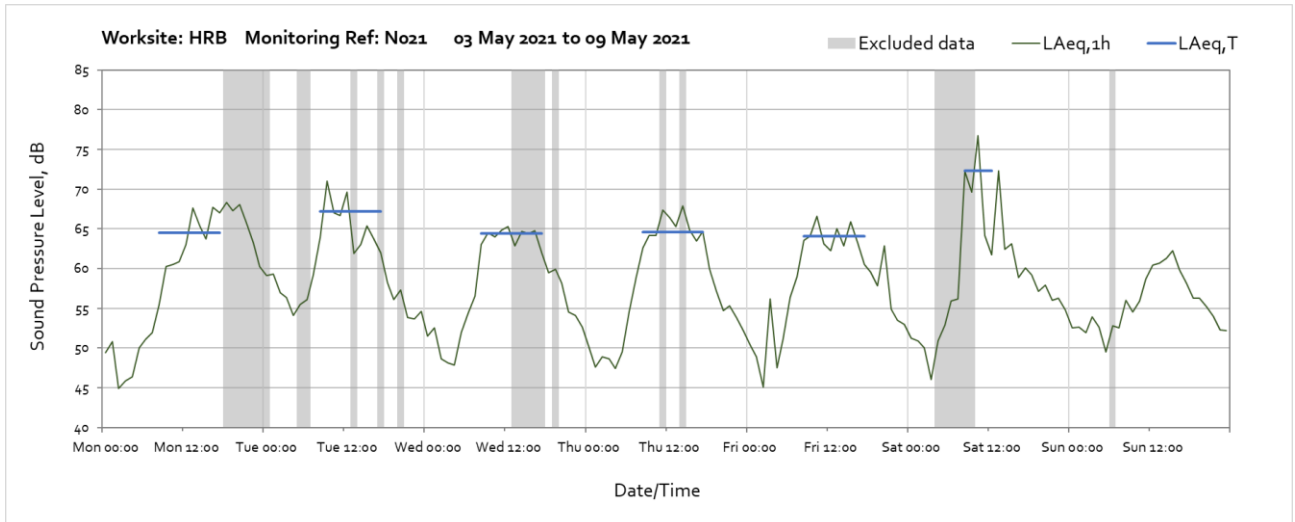
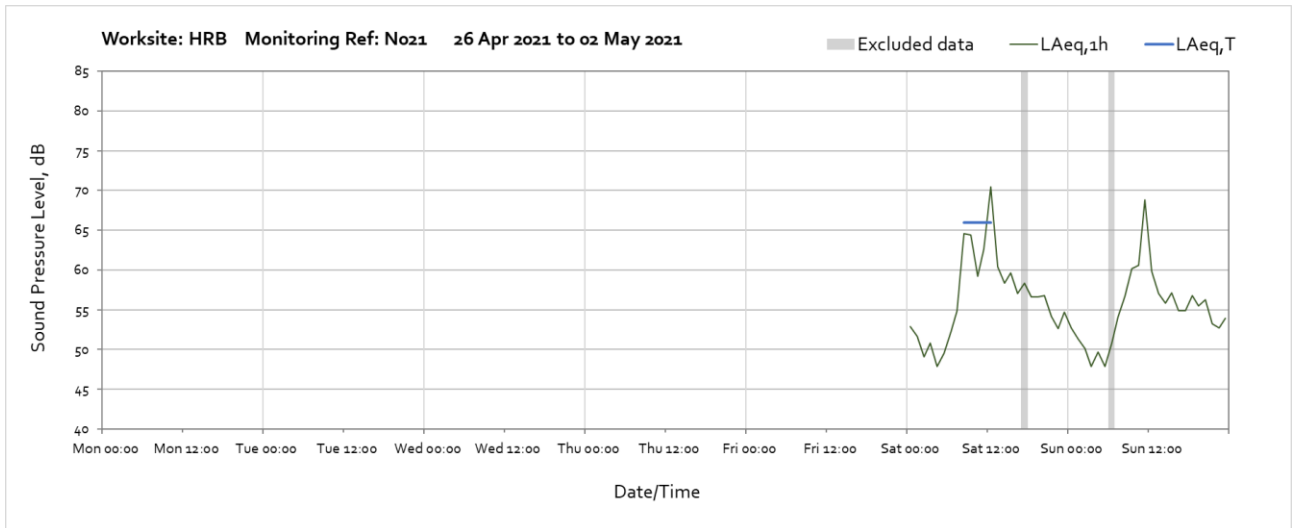
Note: Missing data from 17:00 until 18:00 on Tuesday 4th May was due to a memory card error.

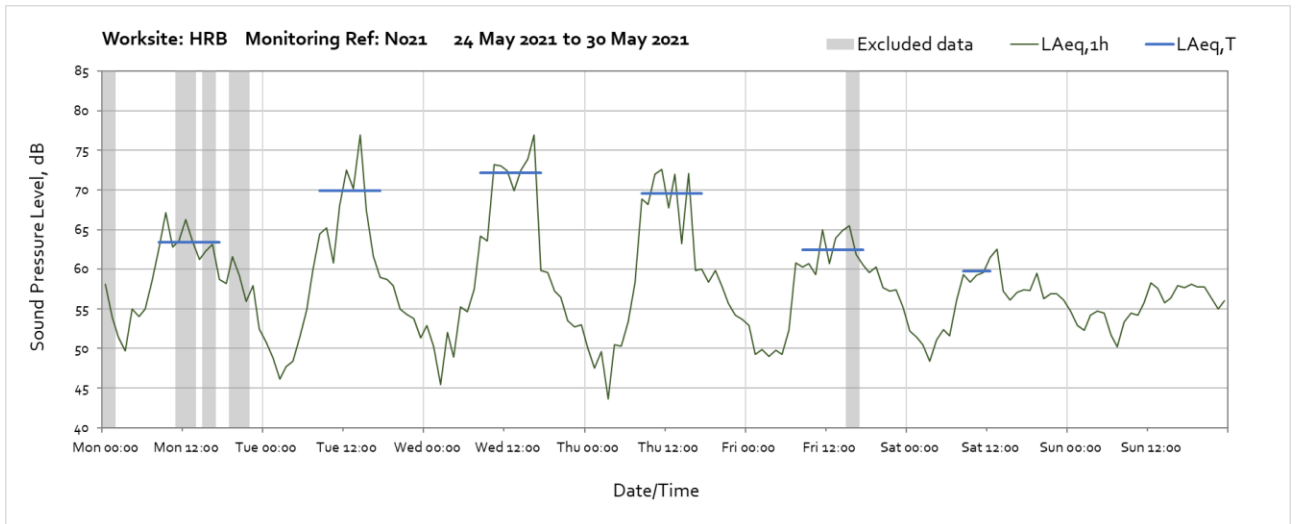
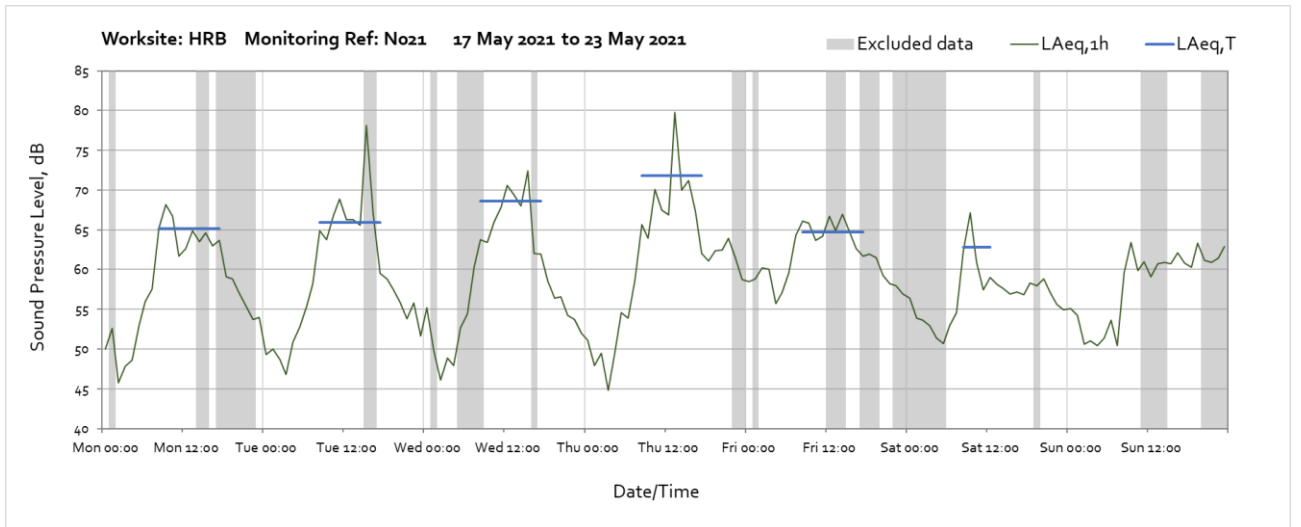
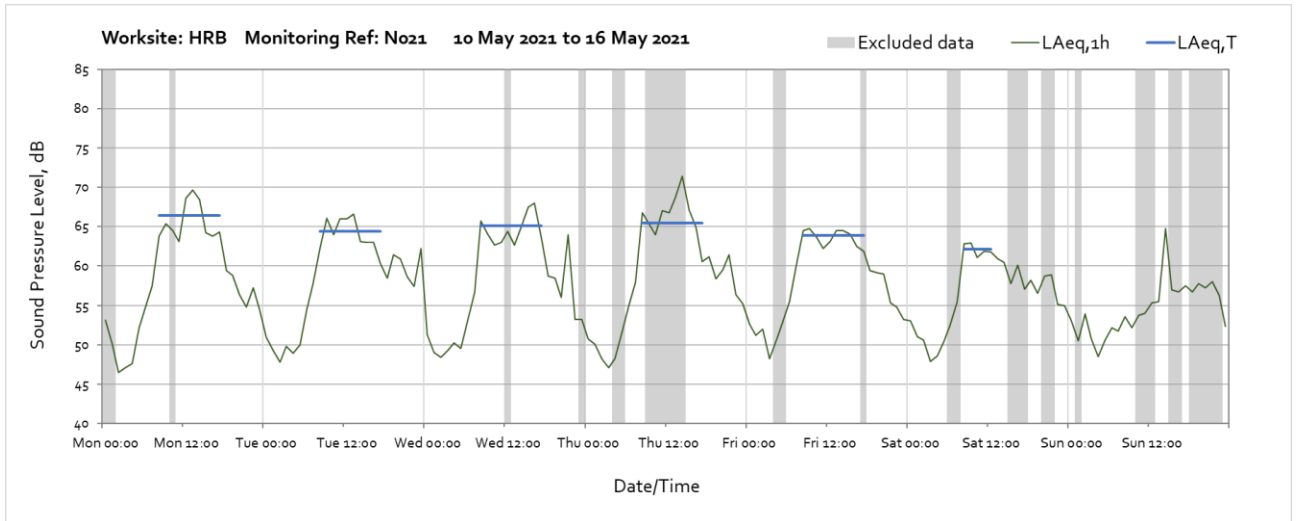
OFFICIAL

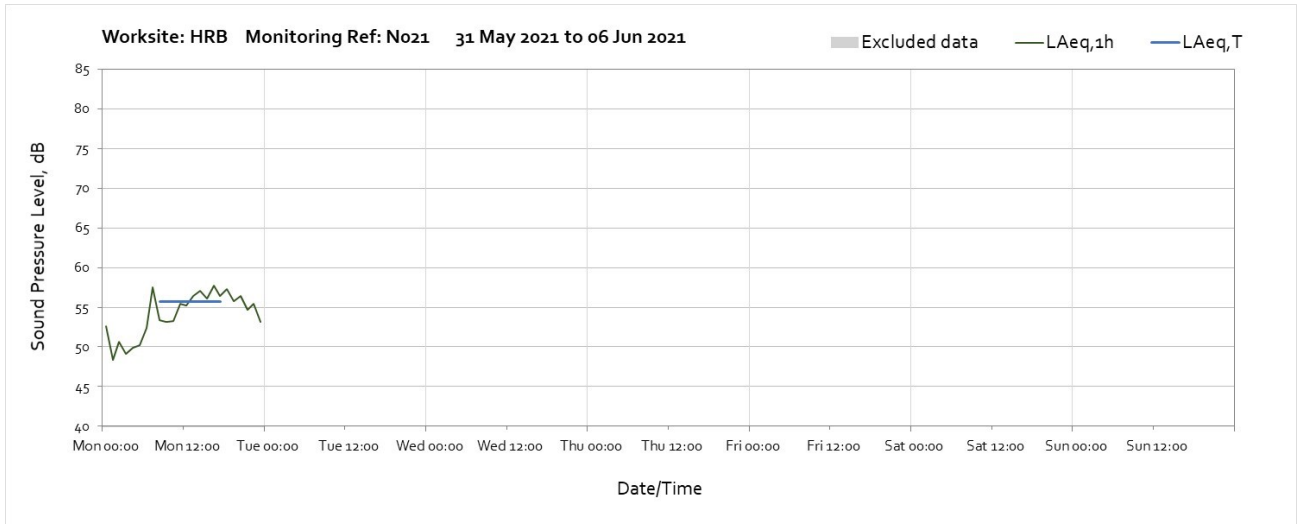




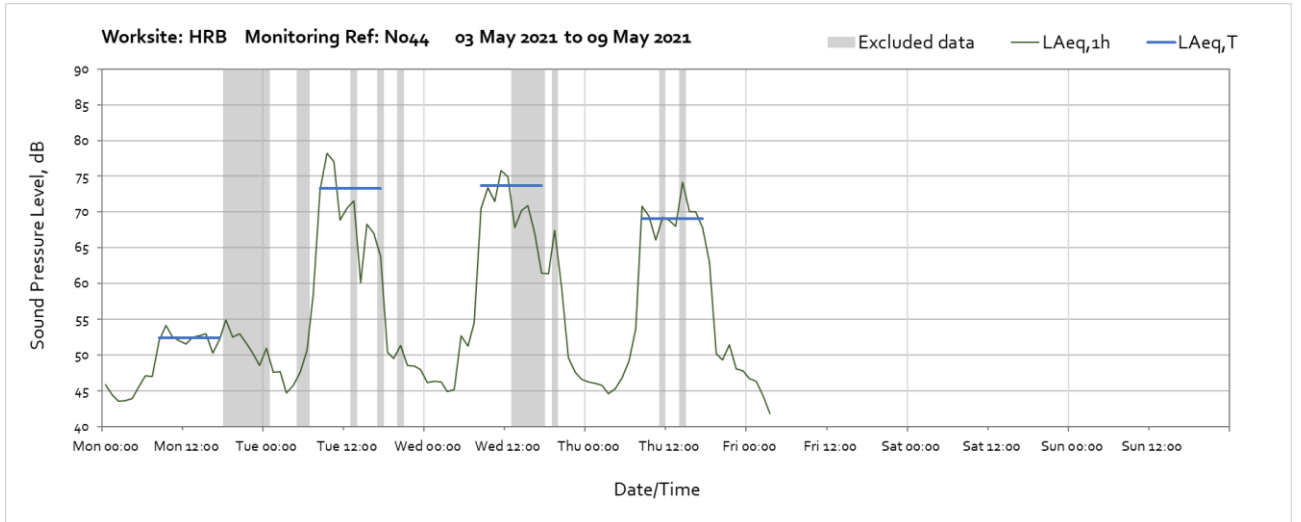
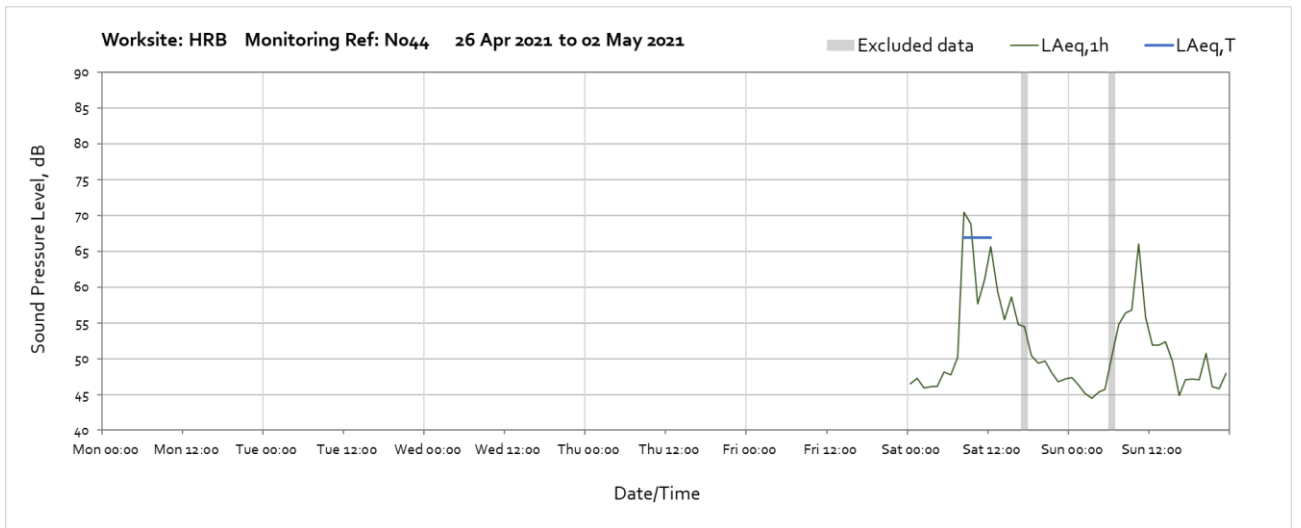
Worksite: HRB – Monitoring Ref: N021





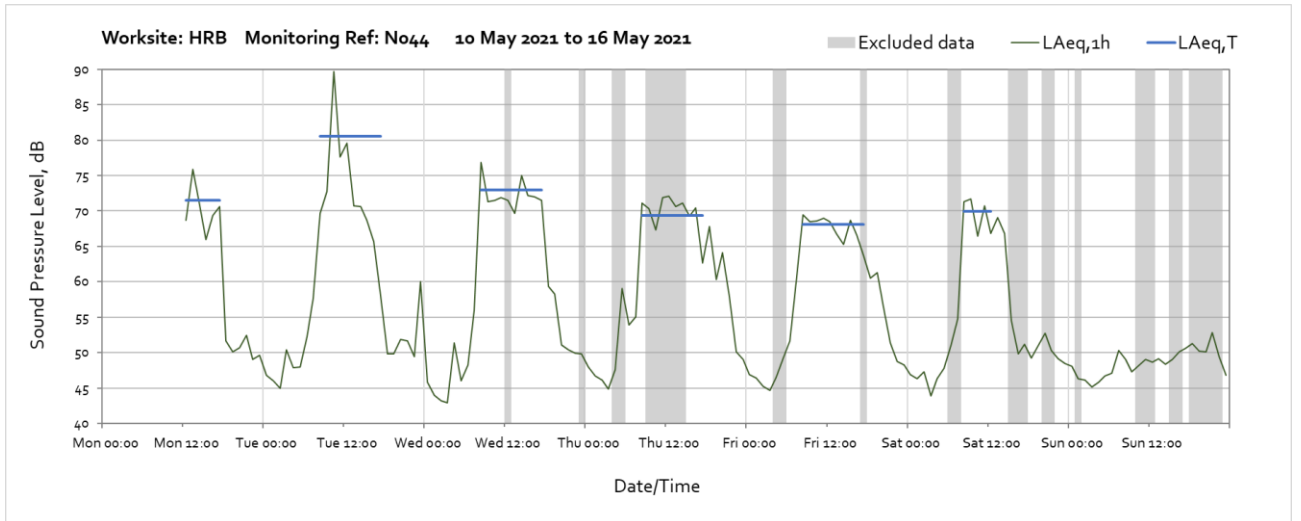


Worksite: HRB – Monitoring Ref: N044

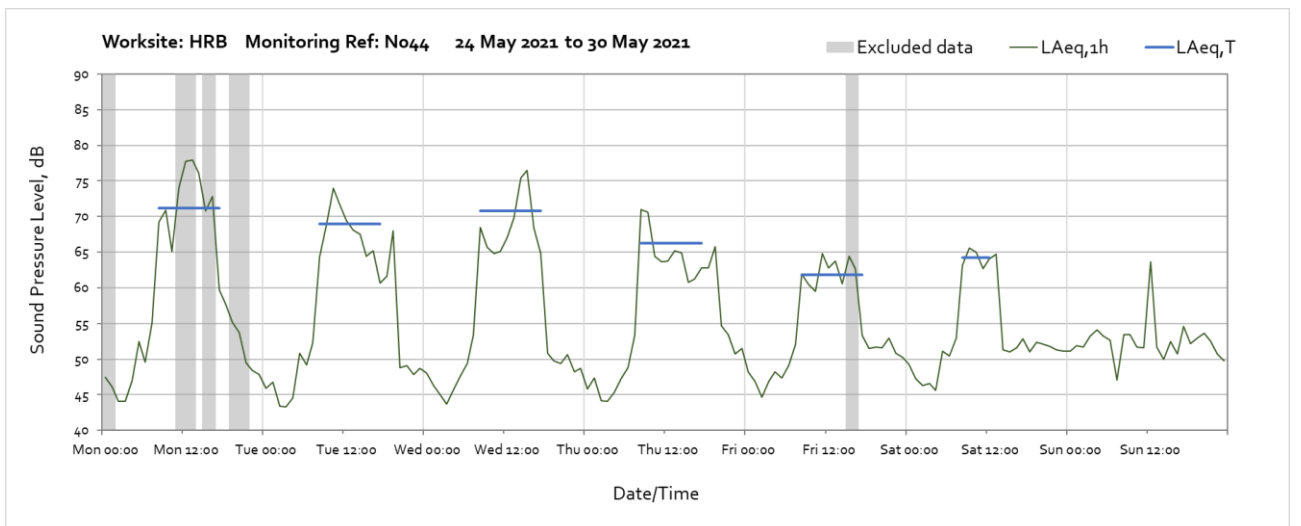
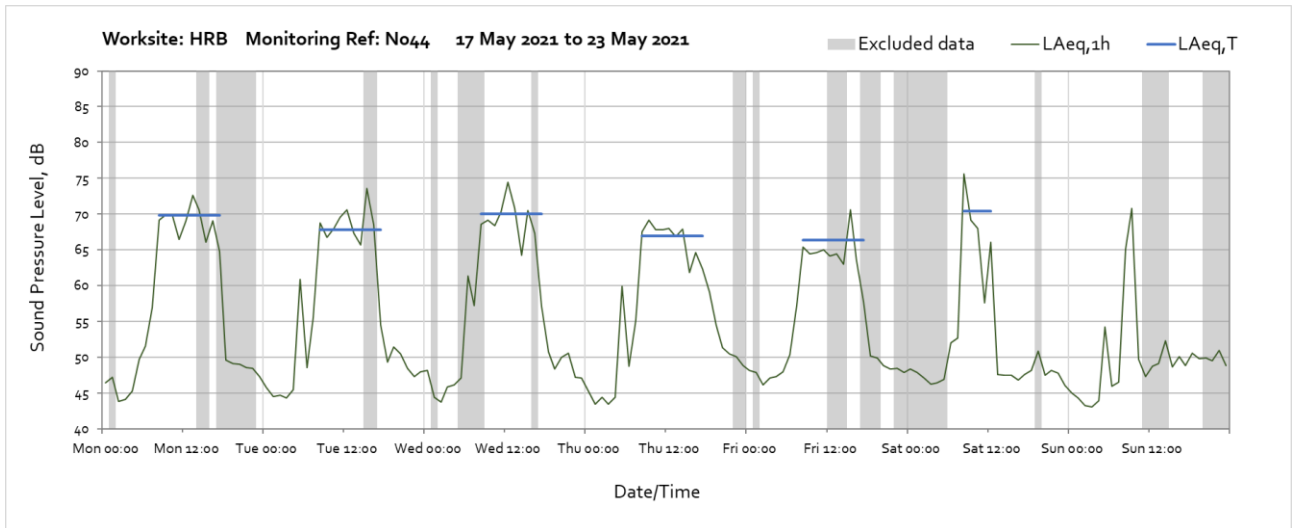


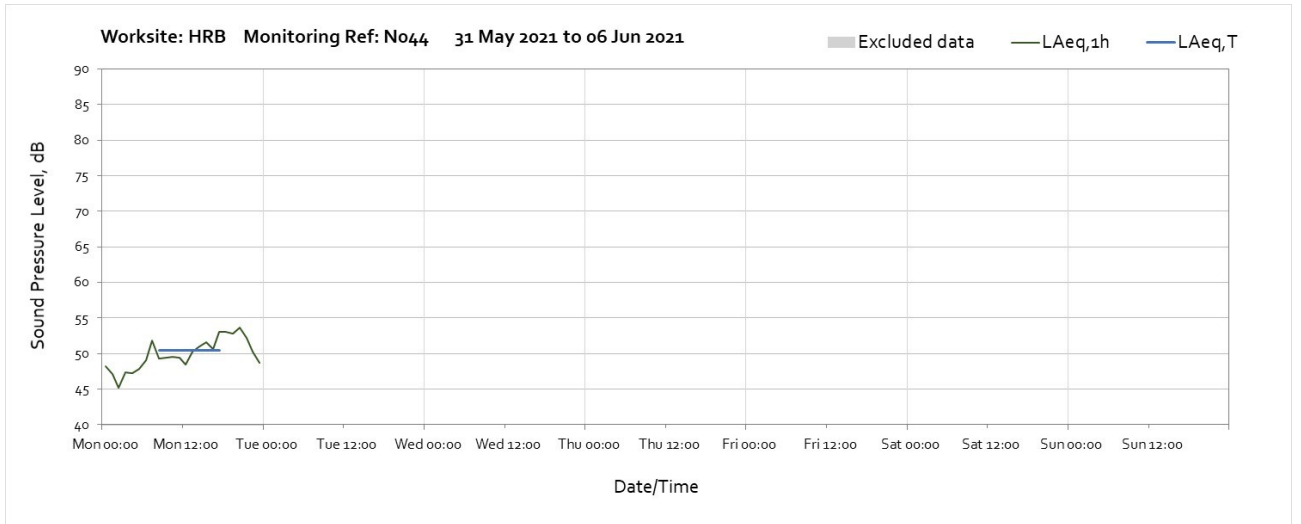
Note: Missing data from 04:00 on Friday 7th May until 12:00 on Monday 10th May was due to a loss of site power.

OFFICIAL

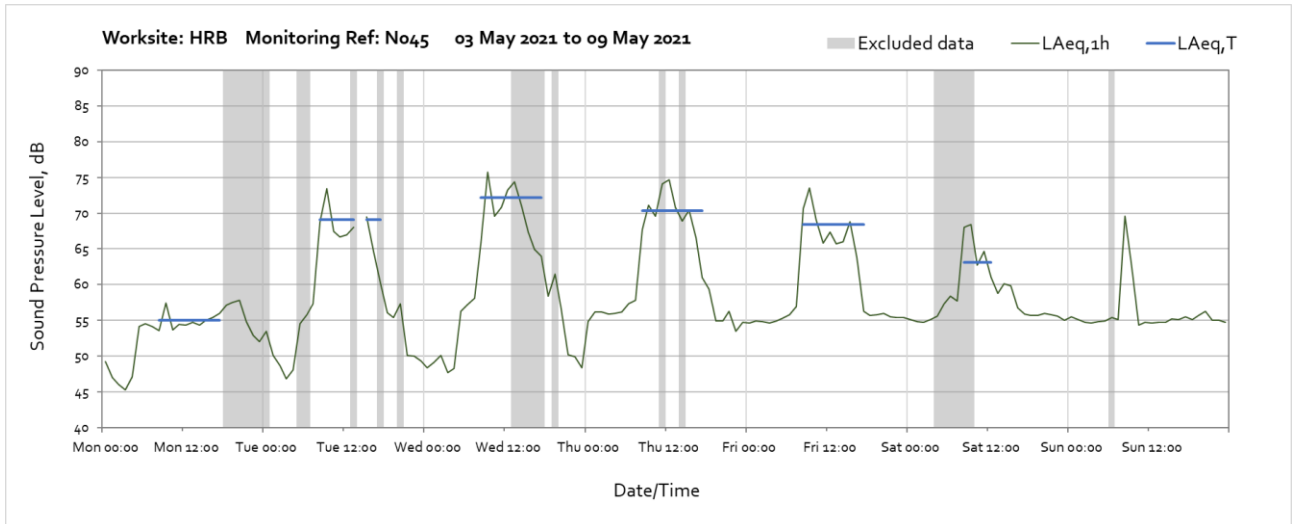
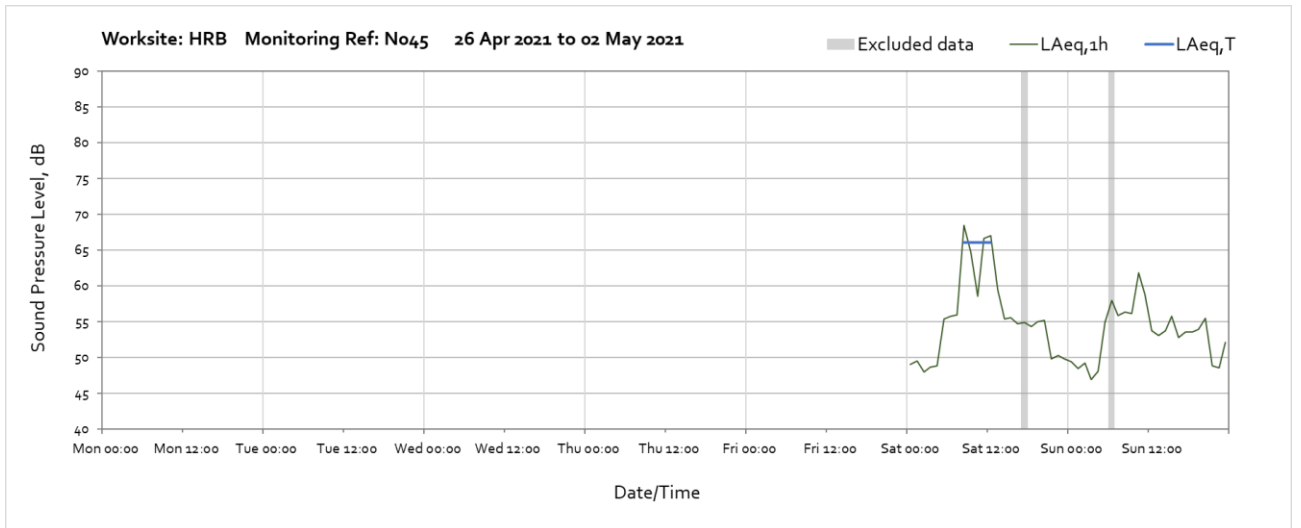


Note: Missing data from 04:00 on Friday 7th May until 12:00 on Monday 10th May was due to a loss of site power.



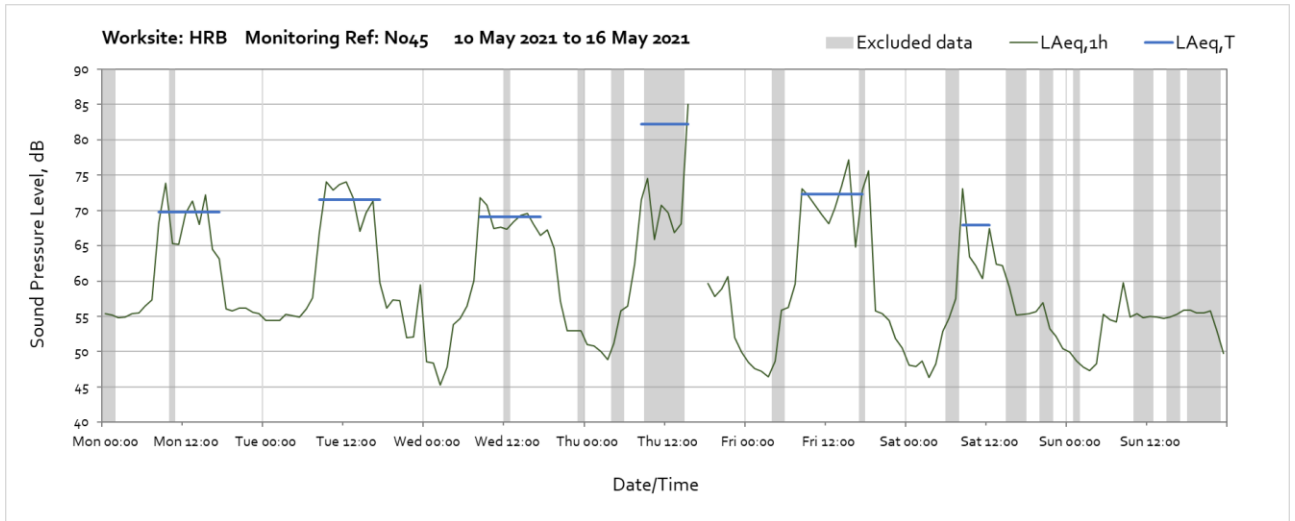


Worksite: HRB – Monitoring Ref: N045

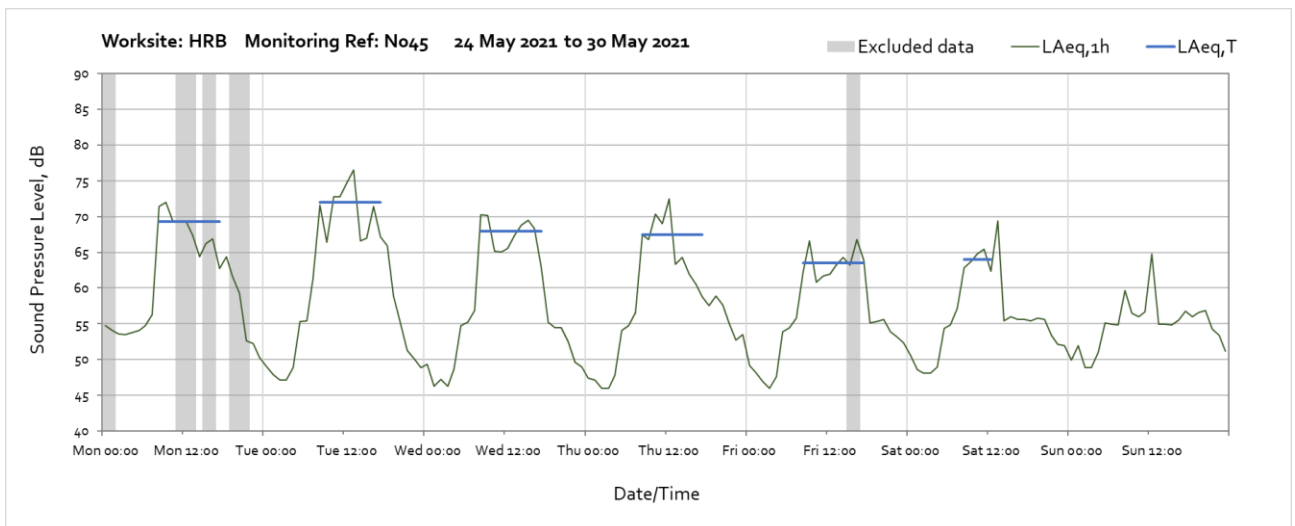
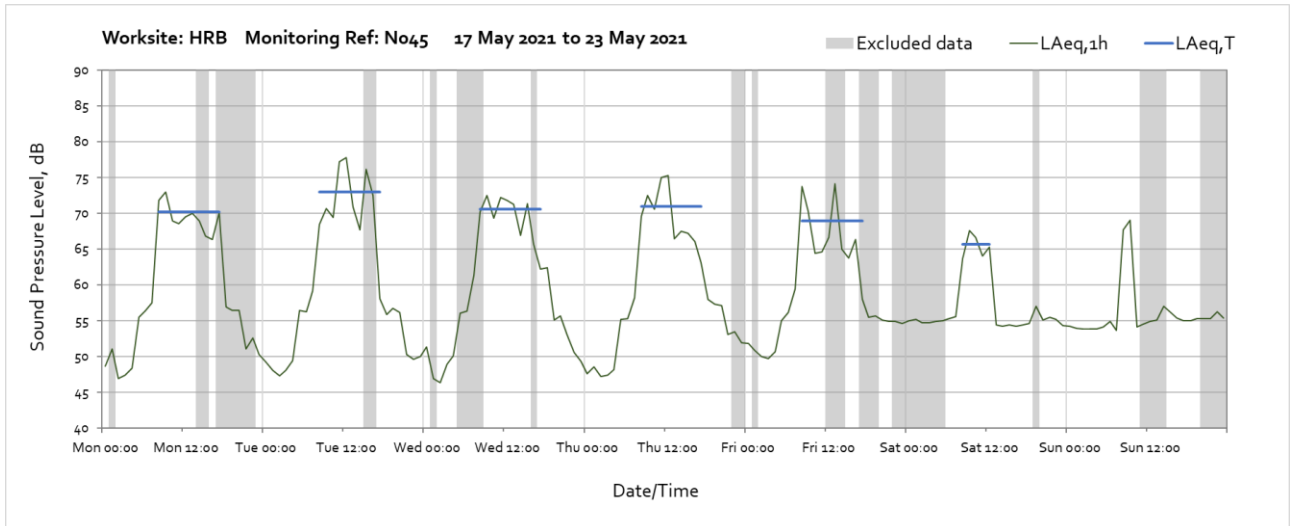


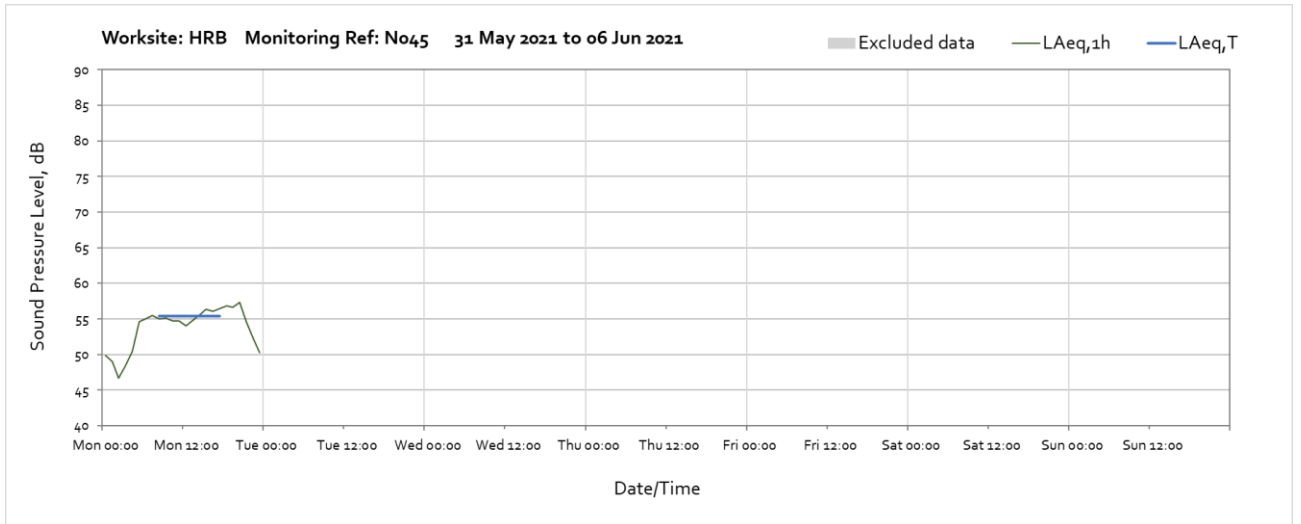
Note: Missing data from 14:00 until 15:00 on Tuesday 4th May was due to a memory card error.

OFFICIAL

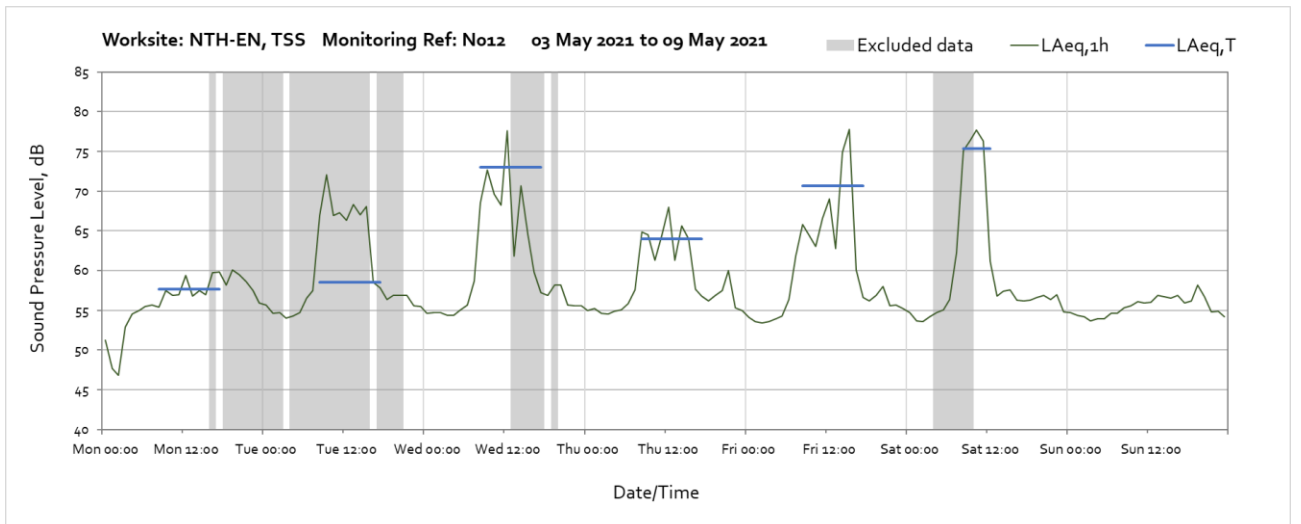
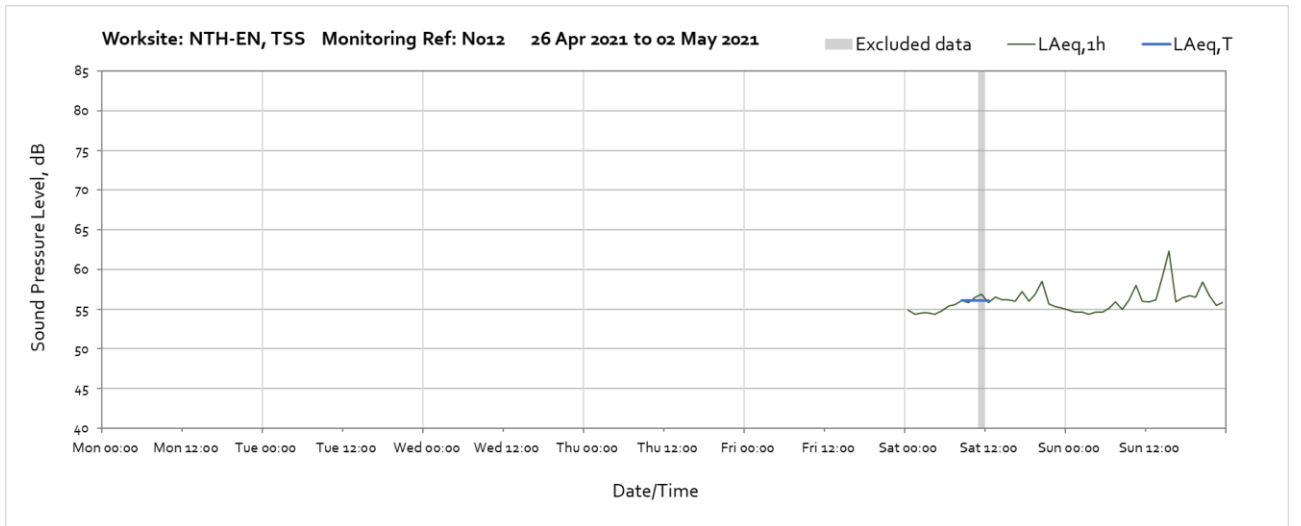


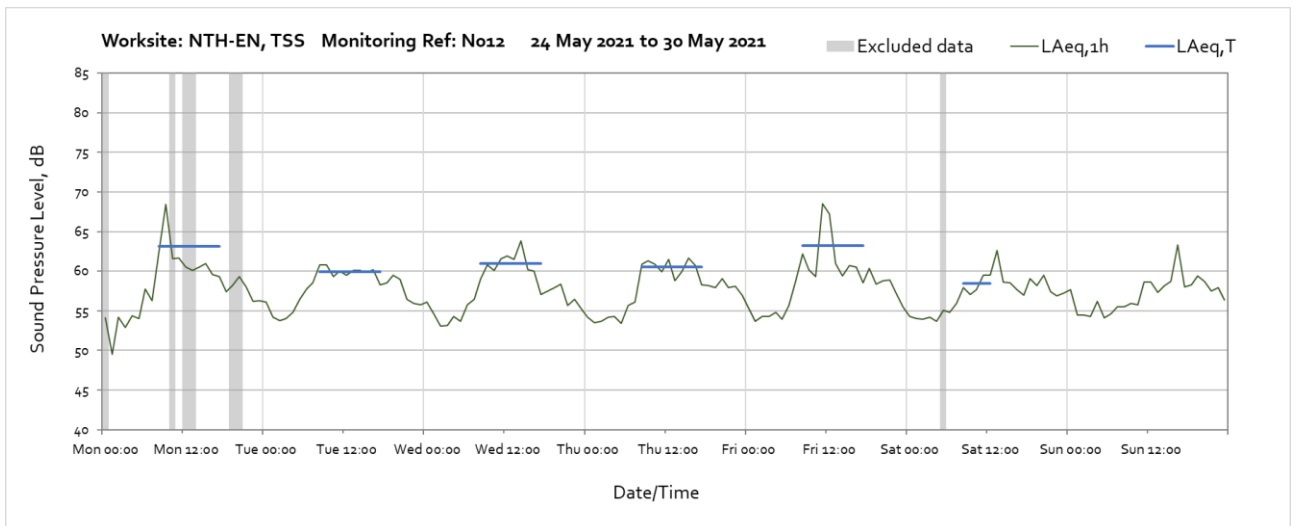
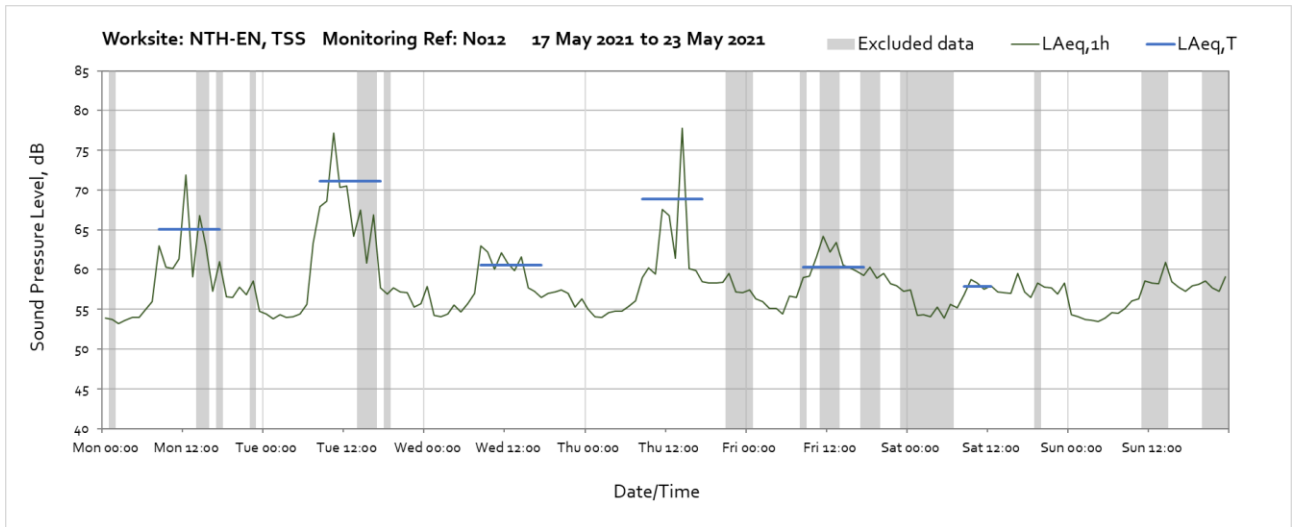
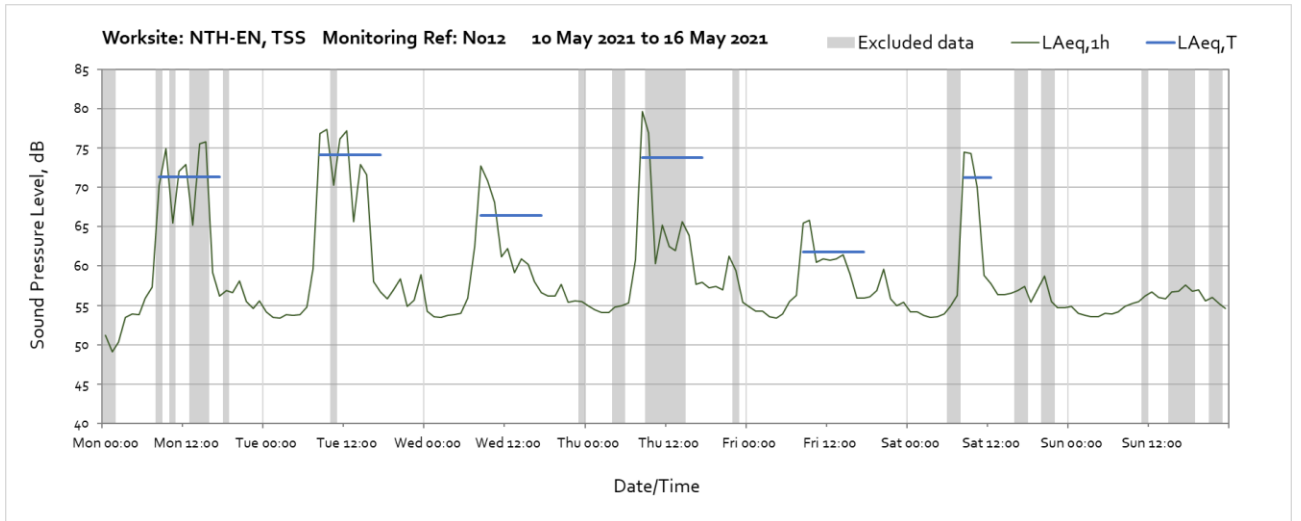
Note: Missing data from 16:00 until 18:00 on Thursday 13th May was due to a memory card error.

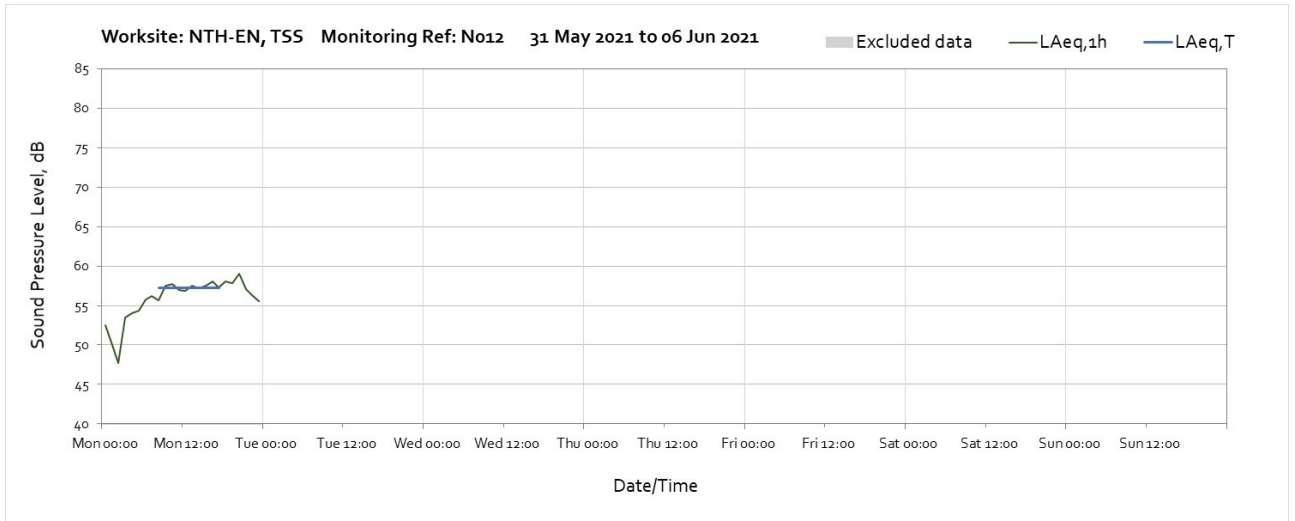




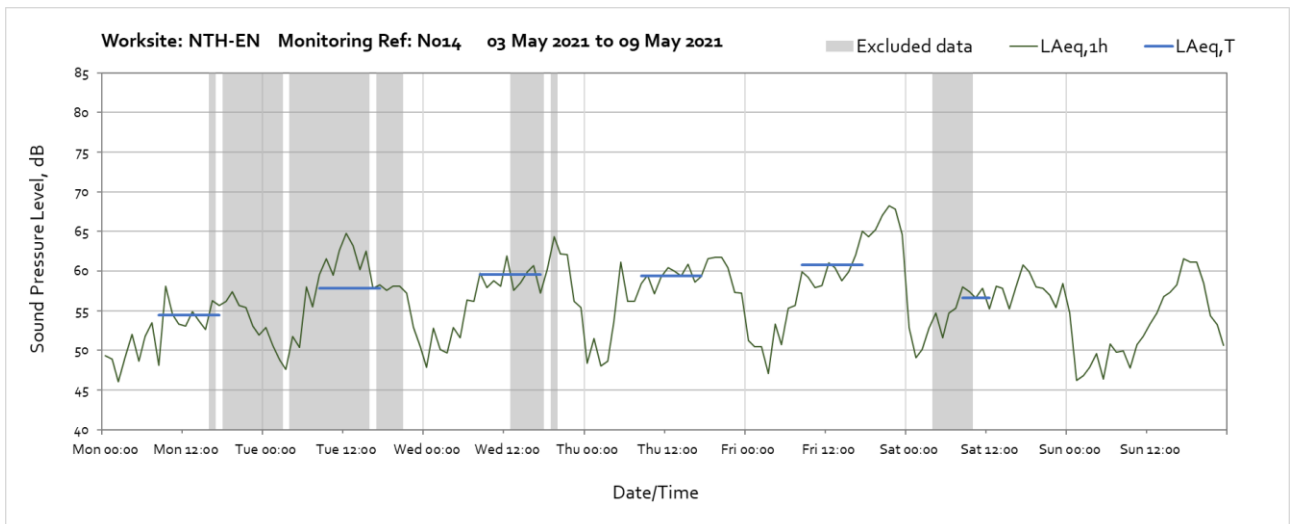
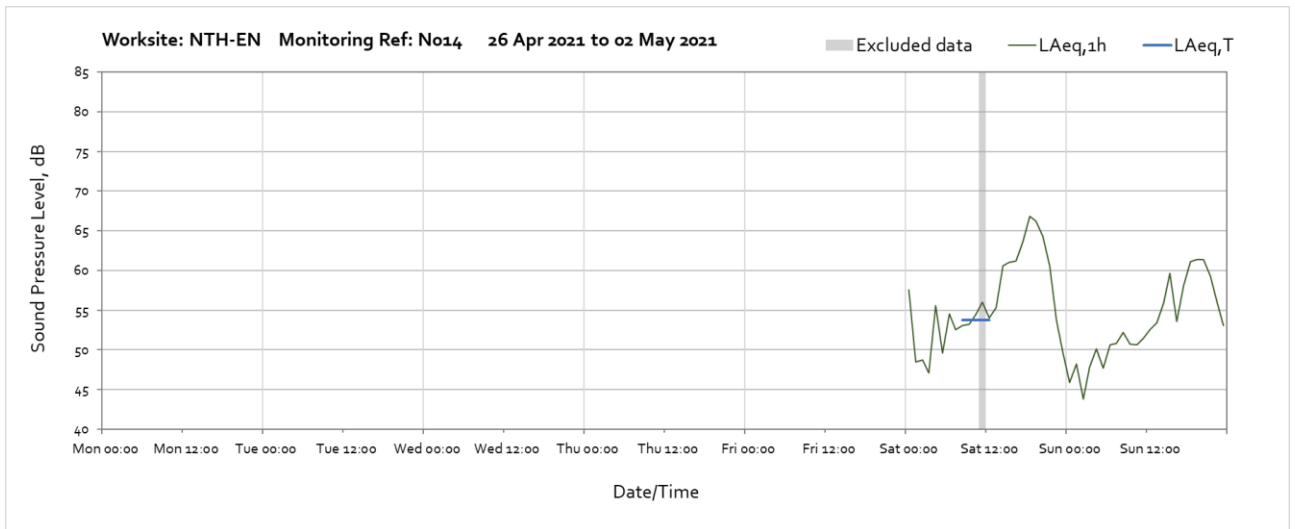
Worksite: NTH-EN, TSS – Monitoring Ref: N012

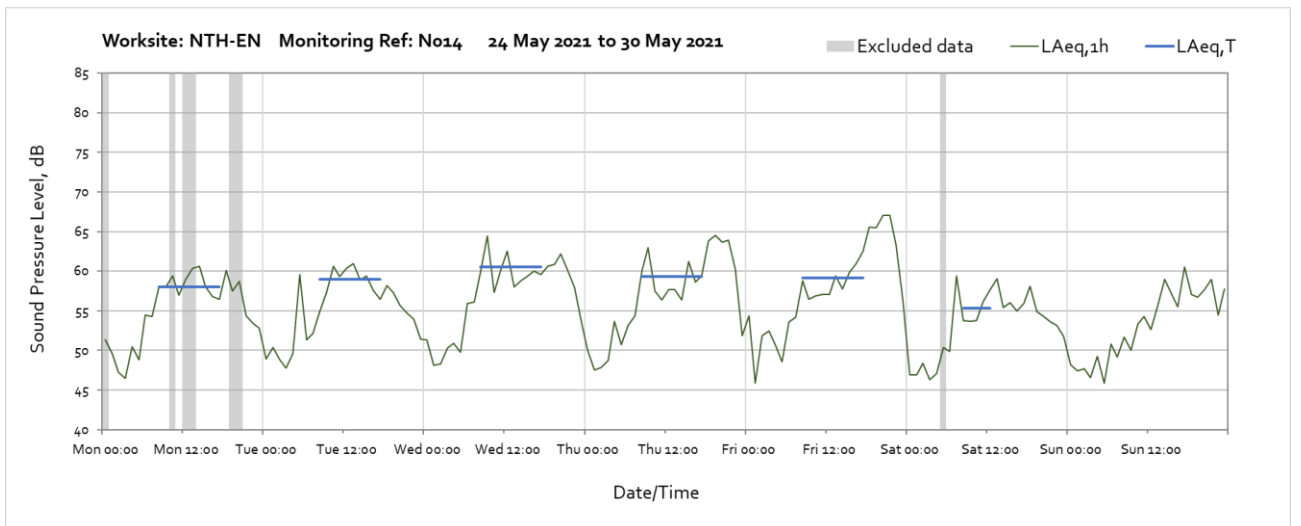
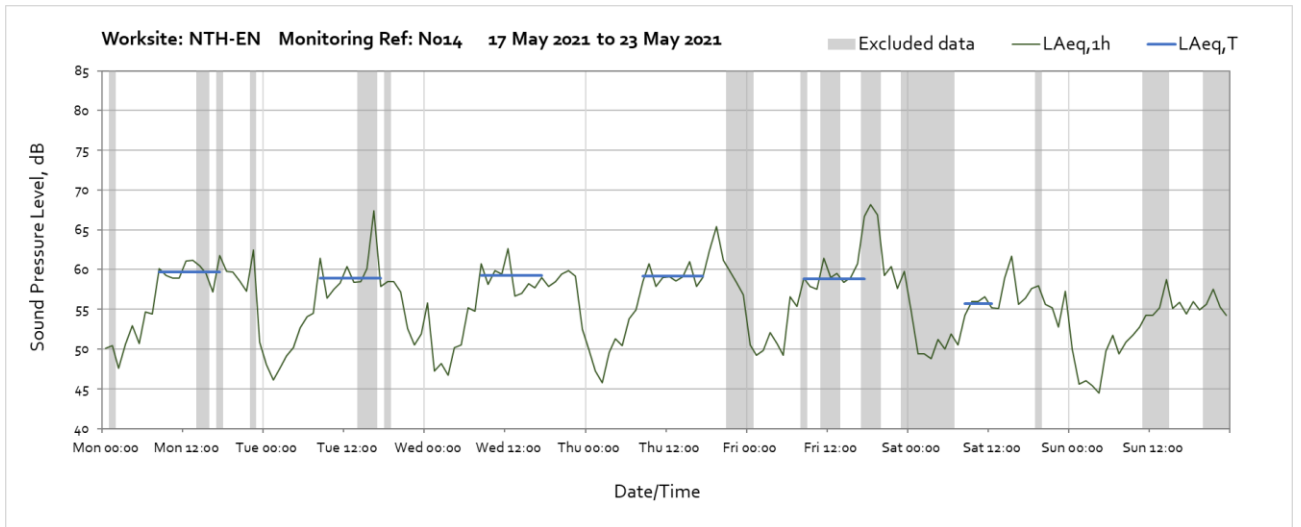
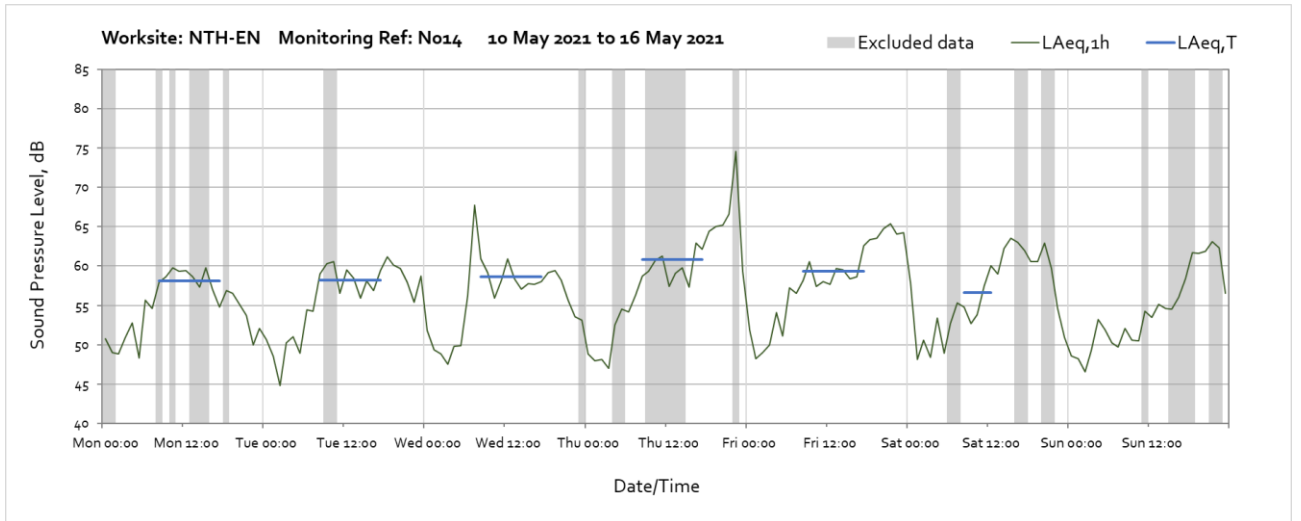


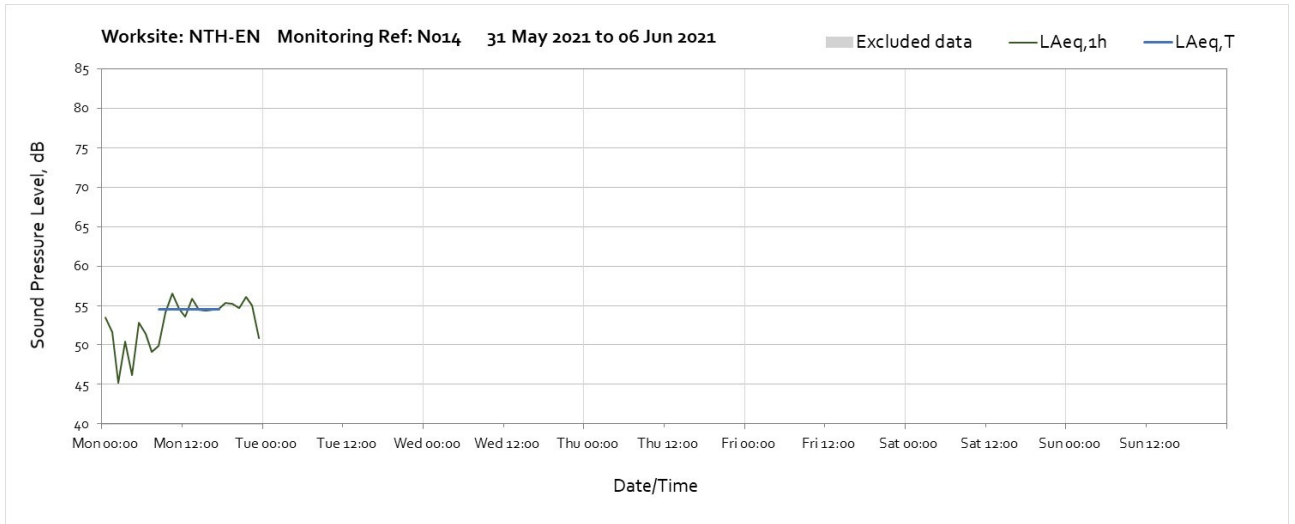




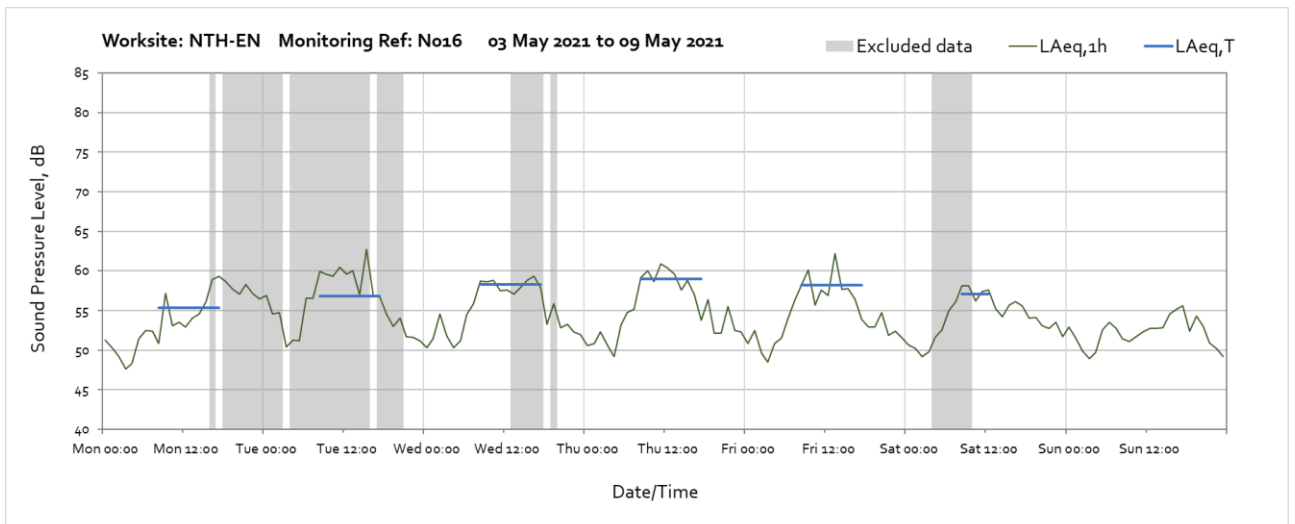
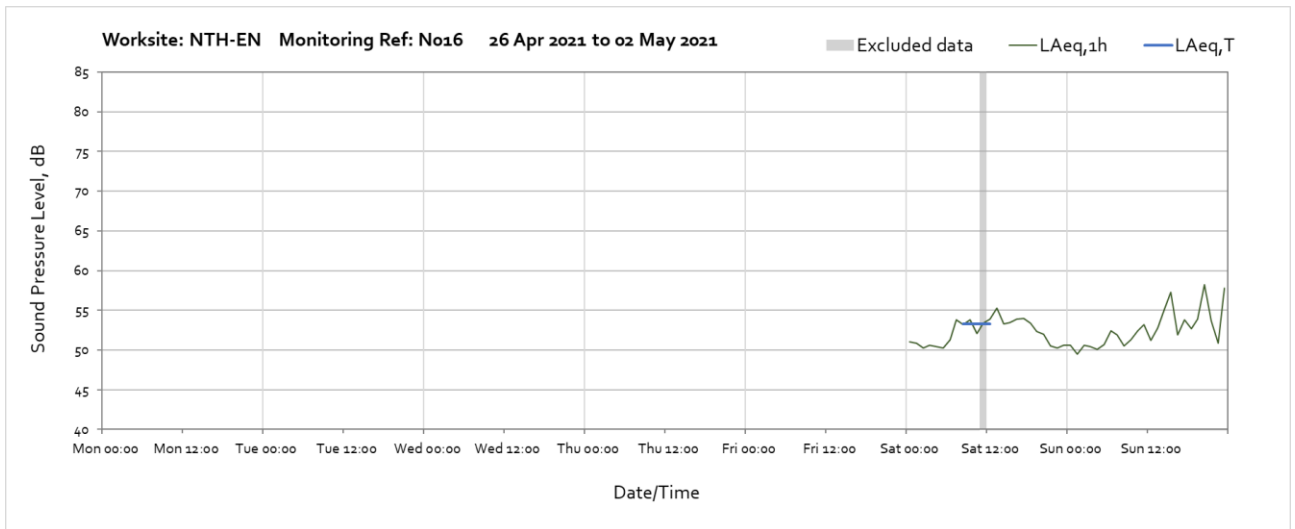
Worksite: NTH-EN – Monitoring Ref: N014

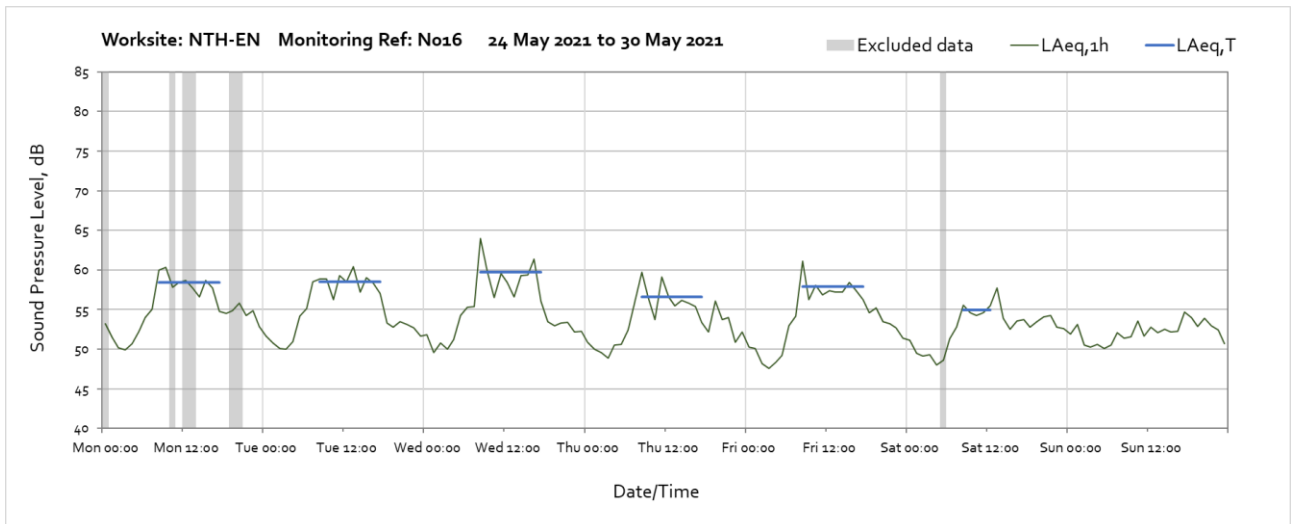
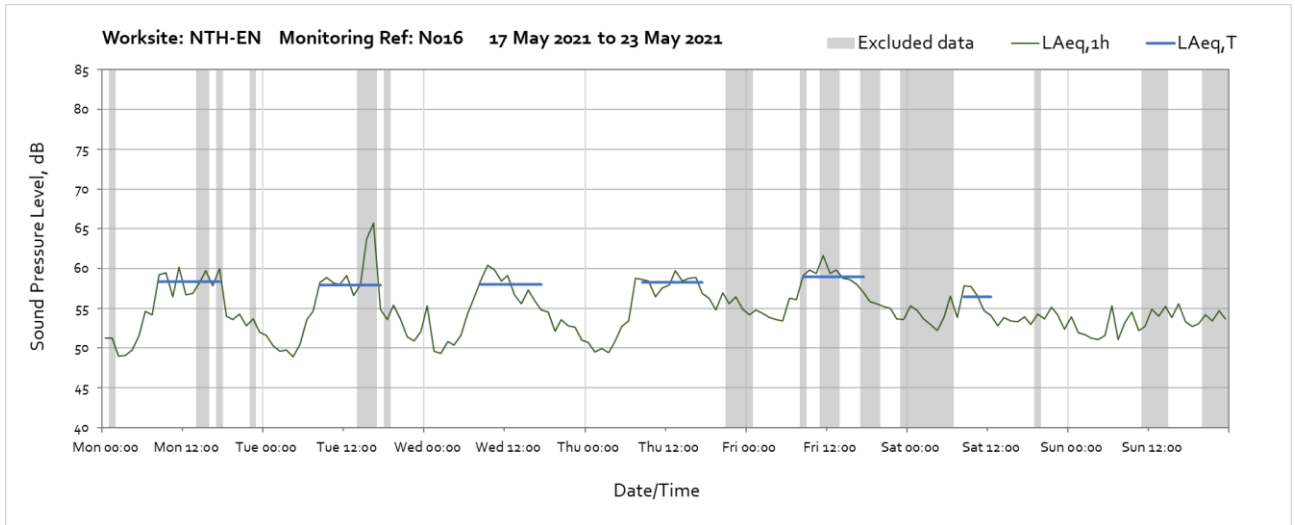
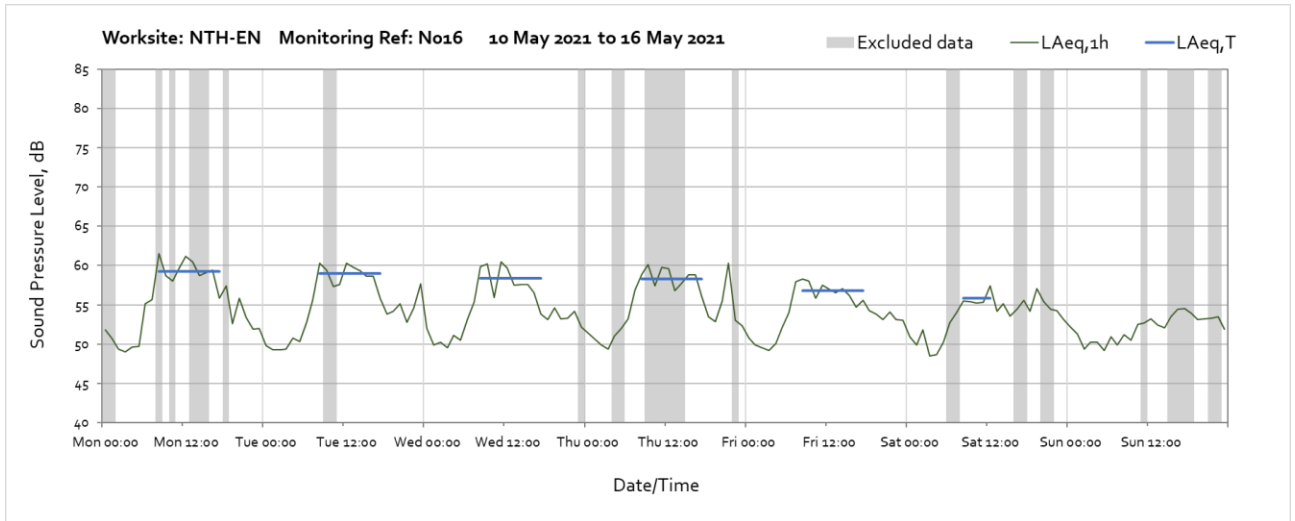


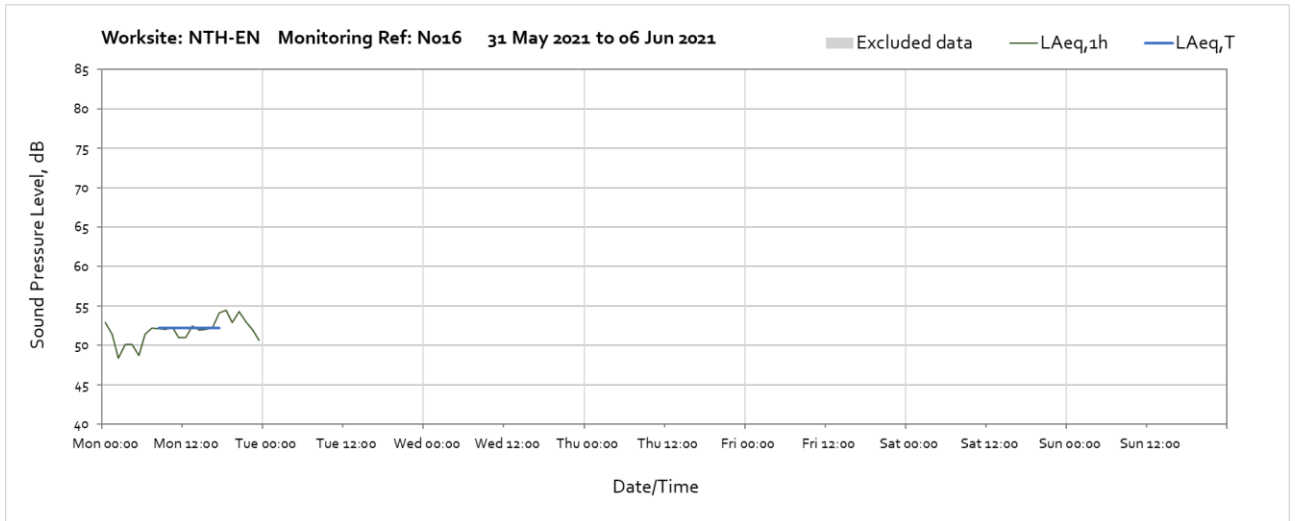




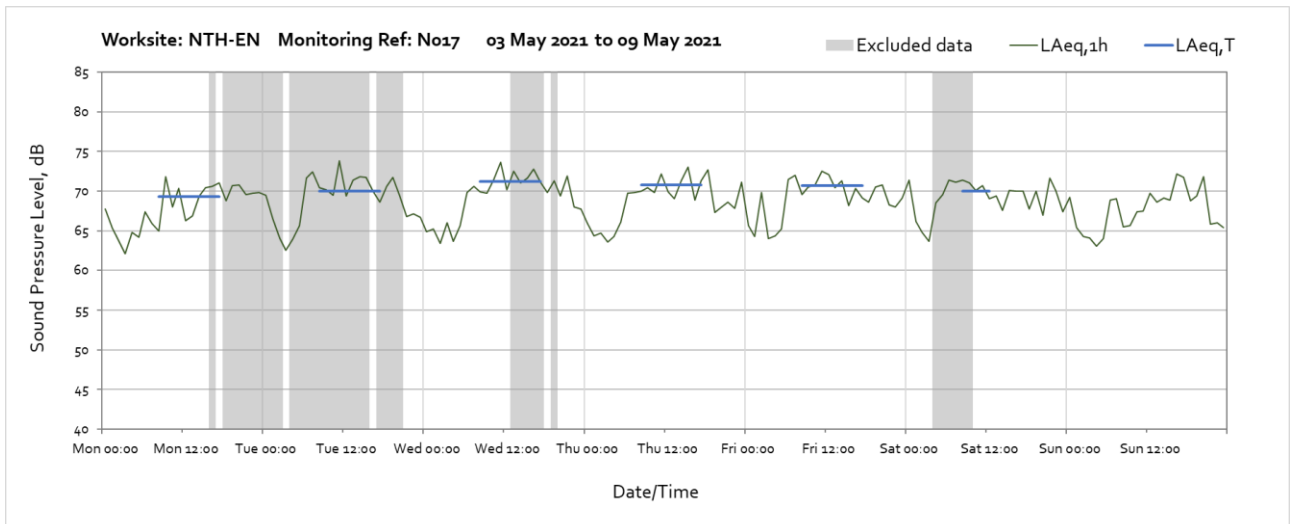
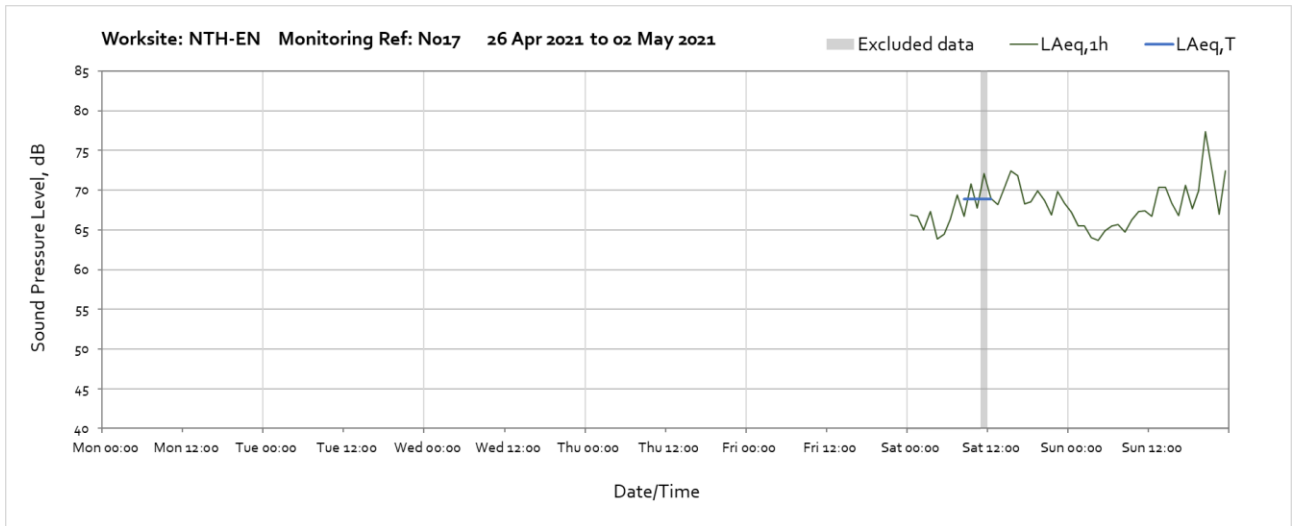
Worksite: NTH-EN – Monitoring Ref: N016

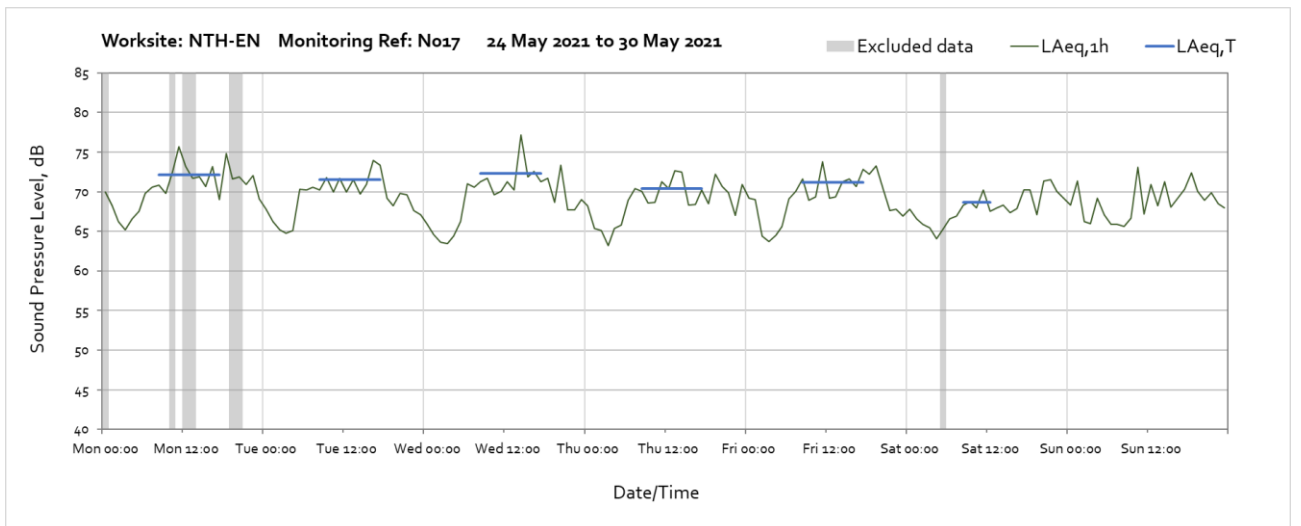
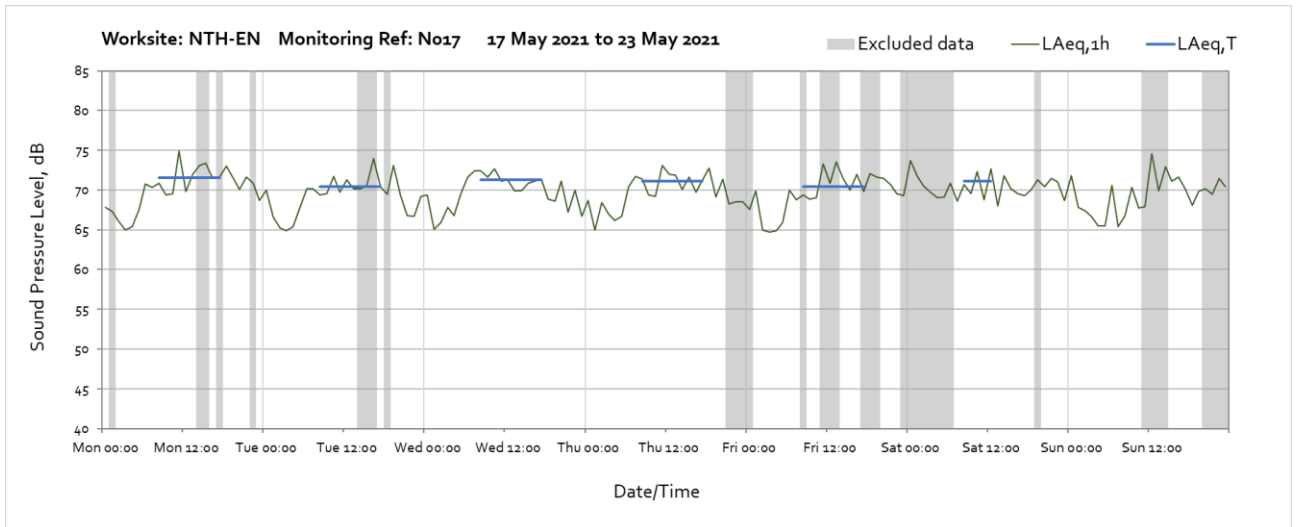
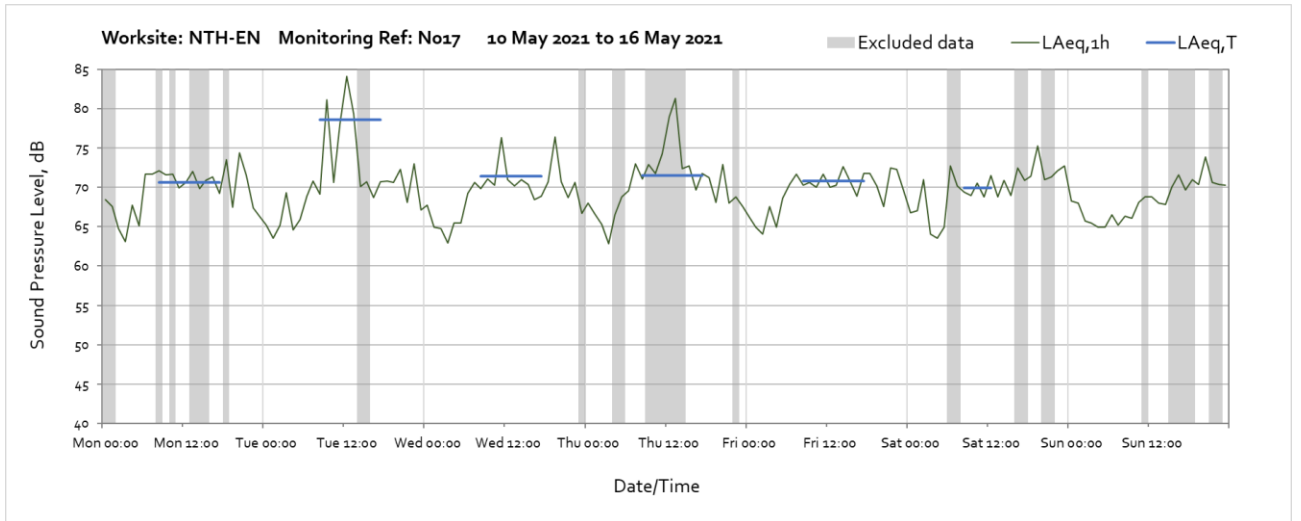


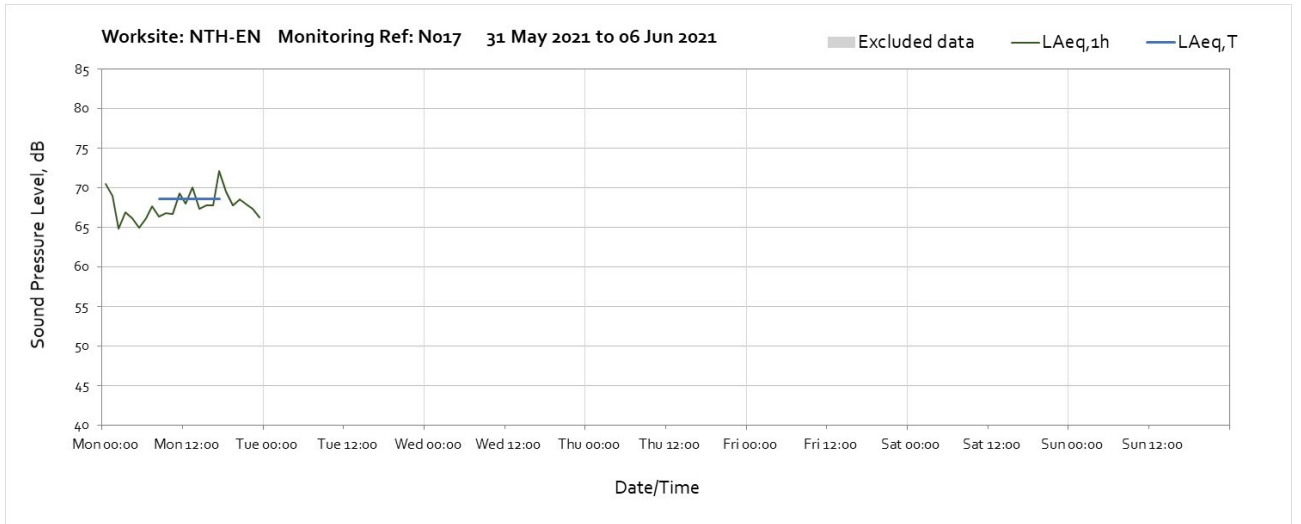




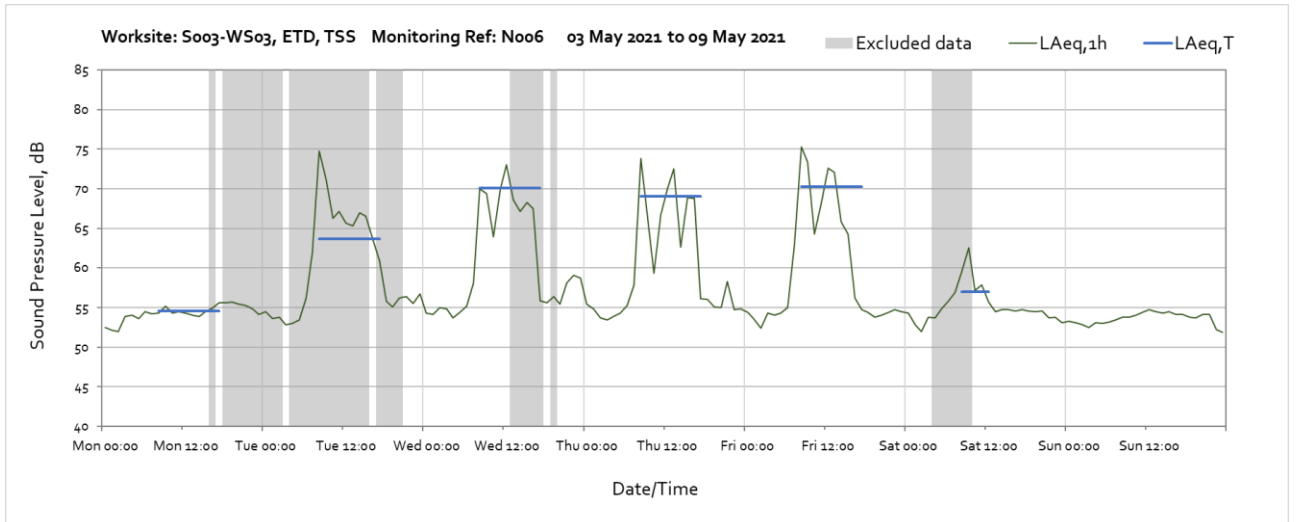
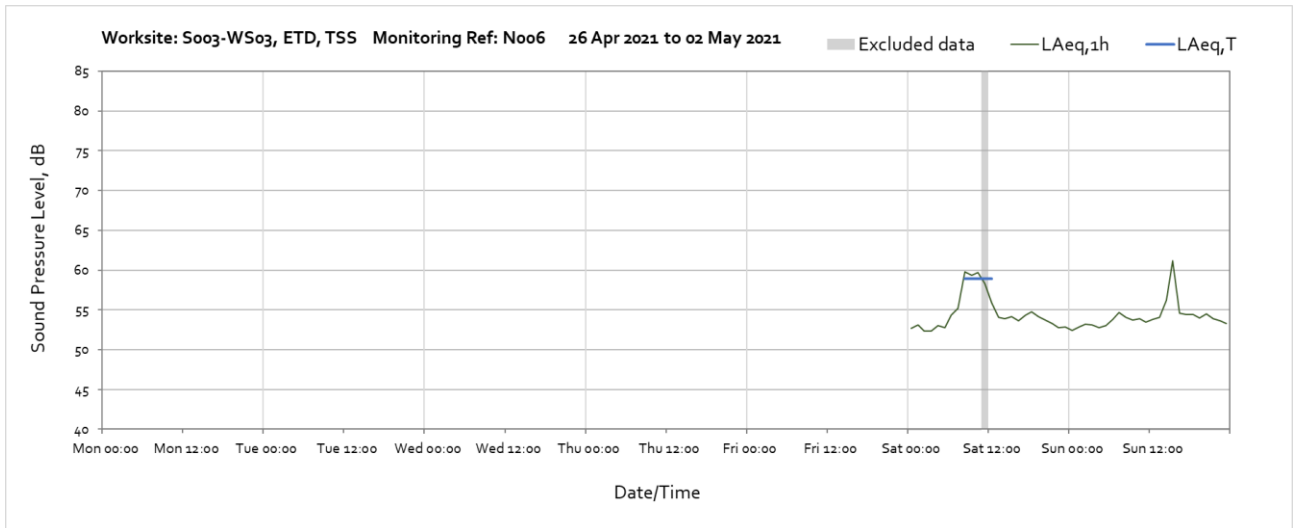
Worksite: NTH-EN – Monitoring Ref: N017

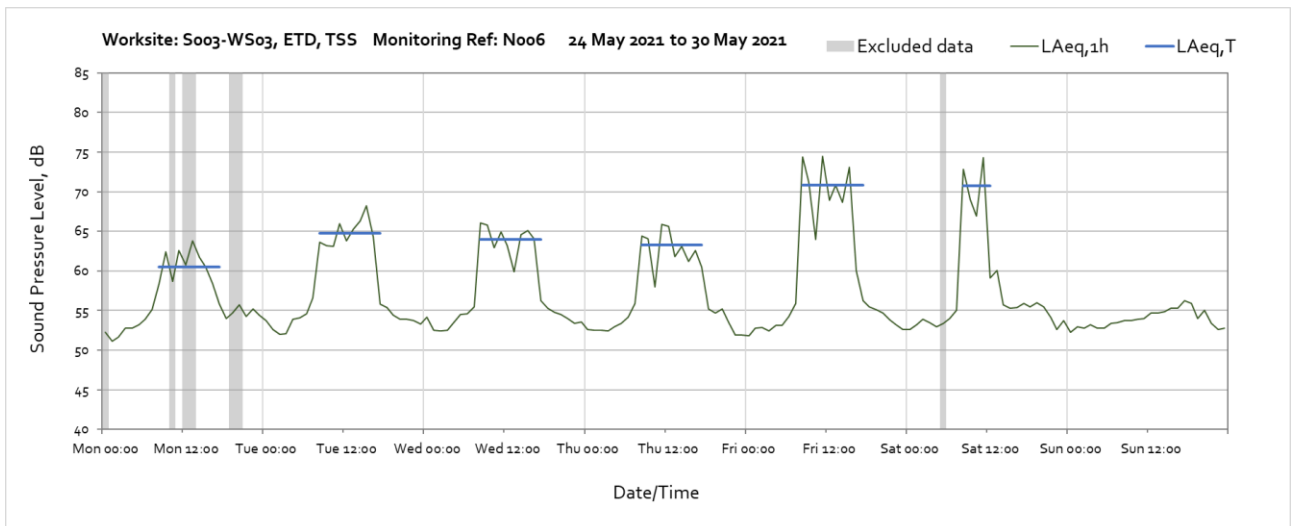
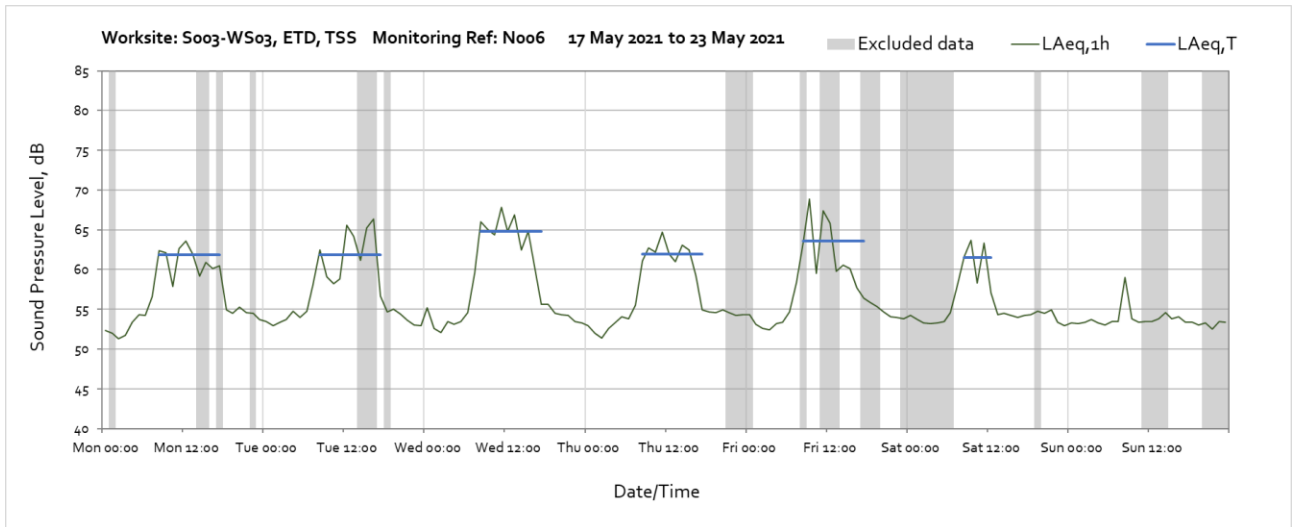
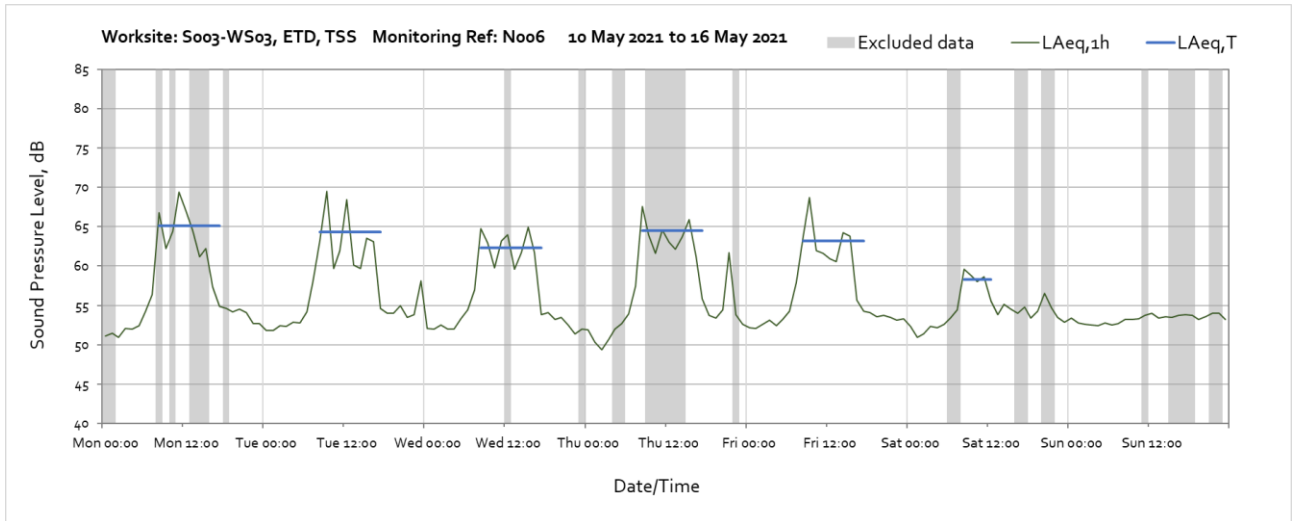


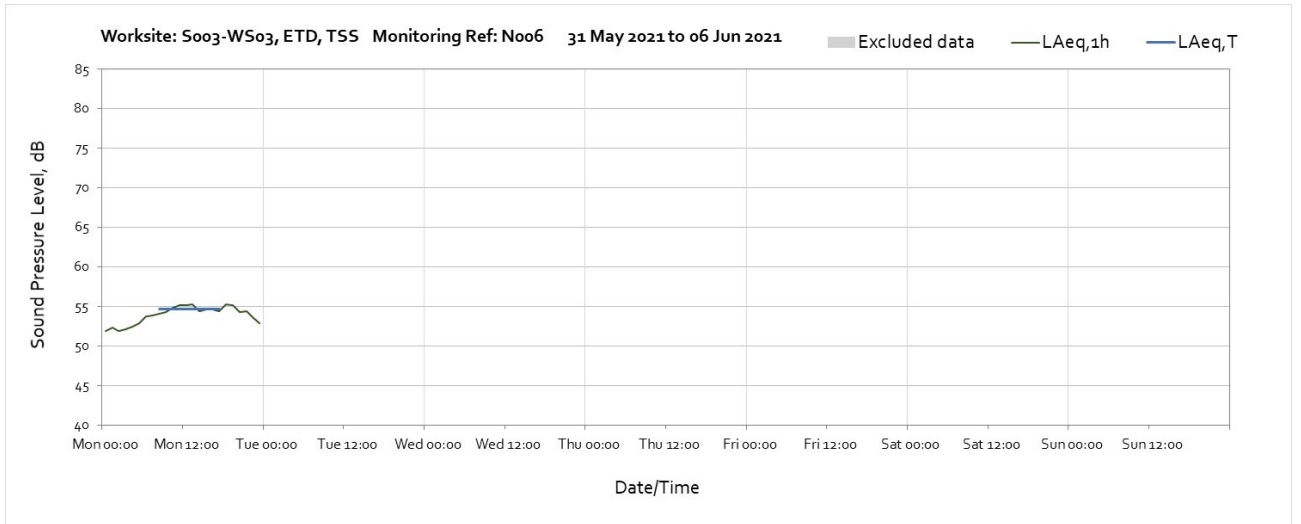




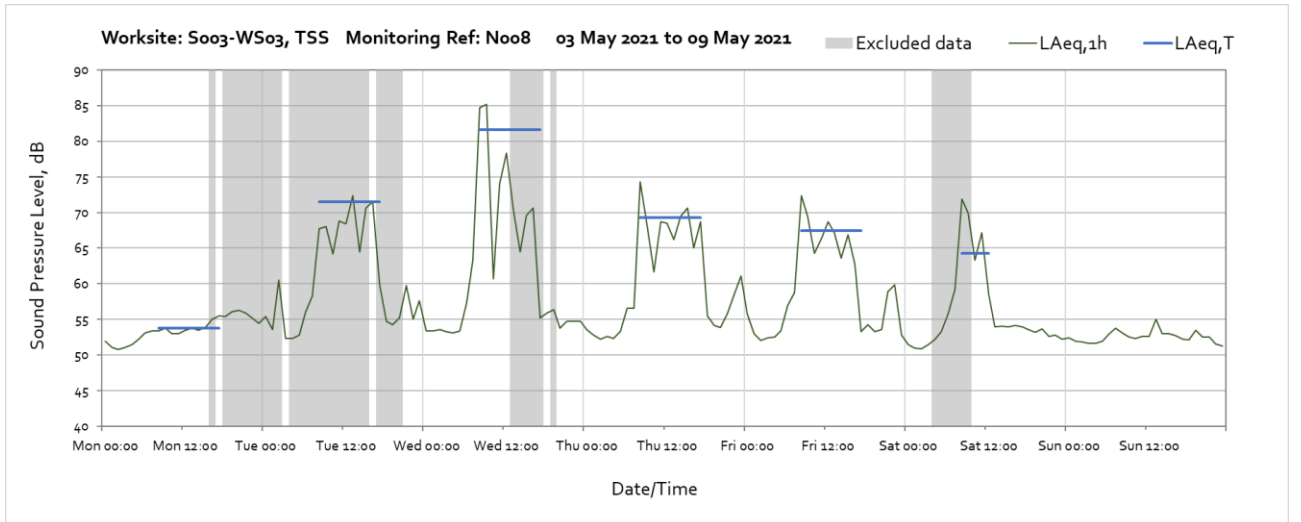
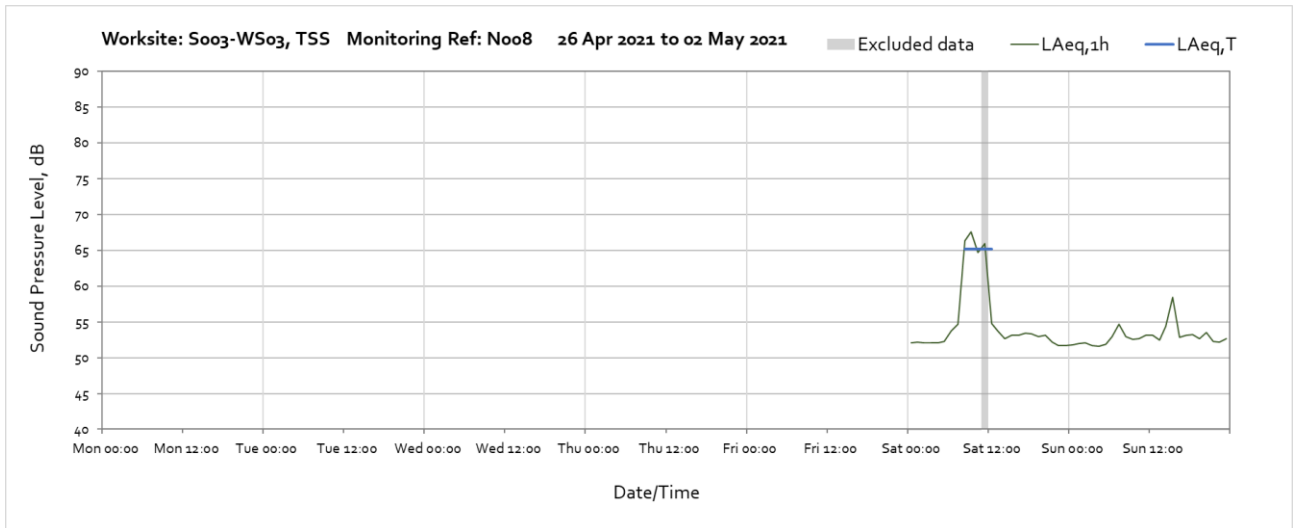
Worksite: S003-WS03, ETD, TSS – Monitoring Ref: N006

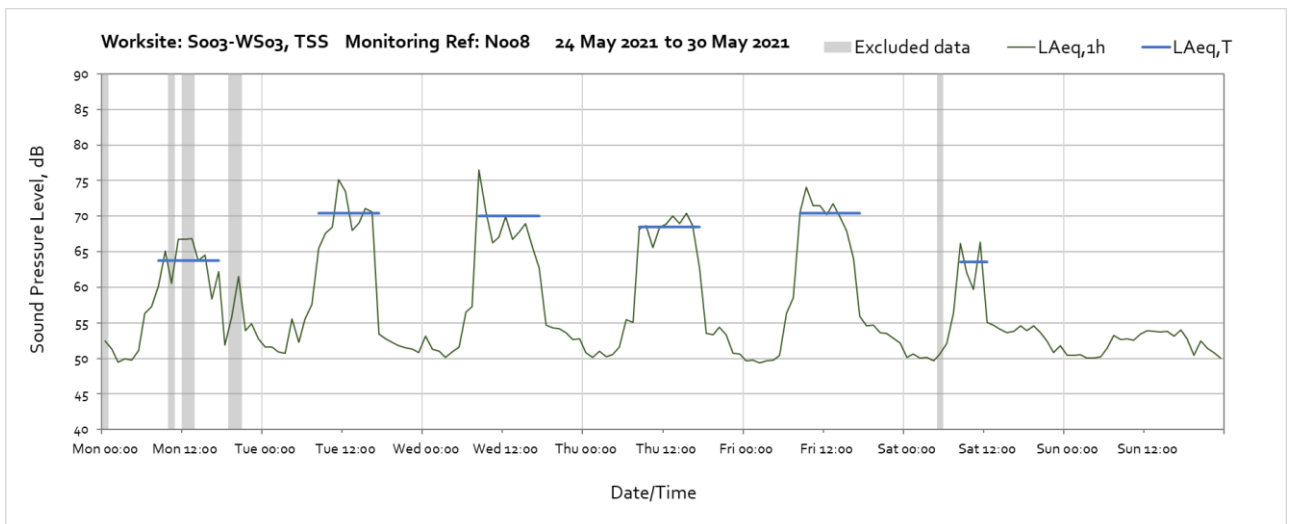
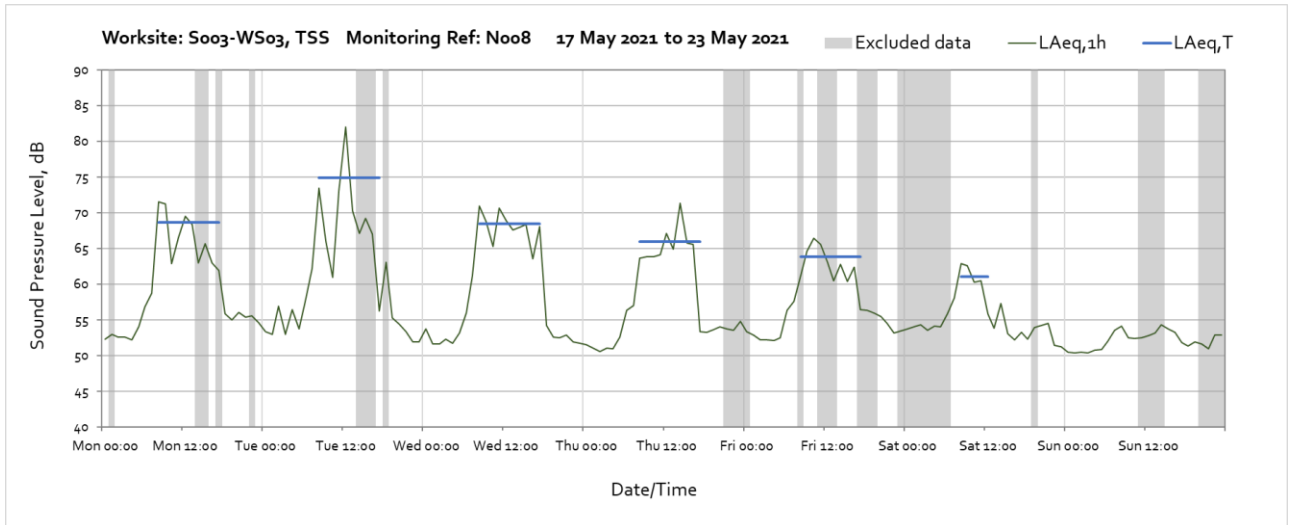
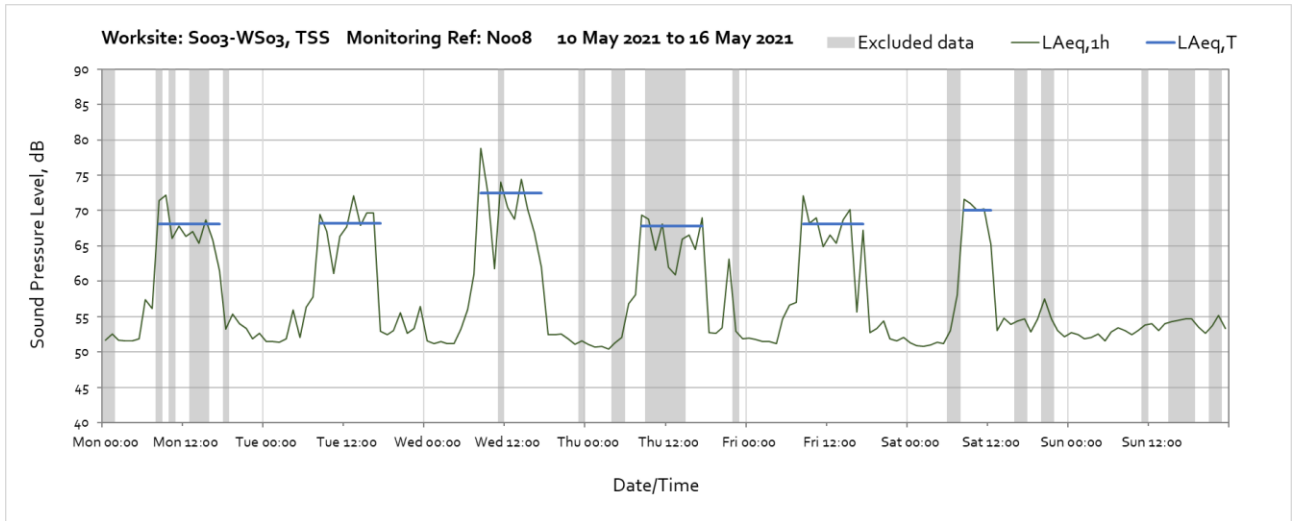


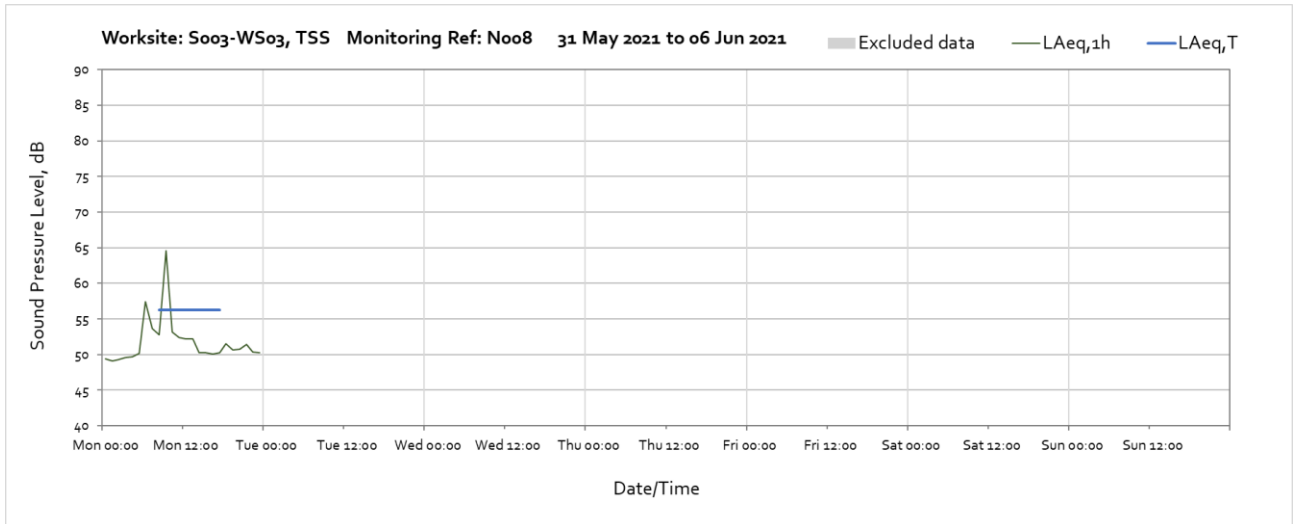




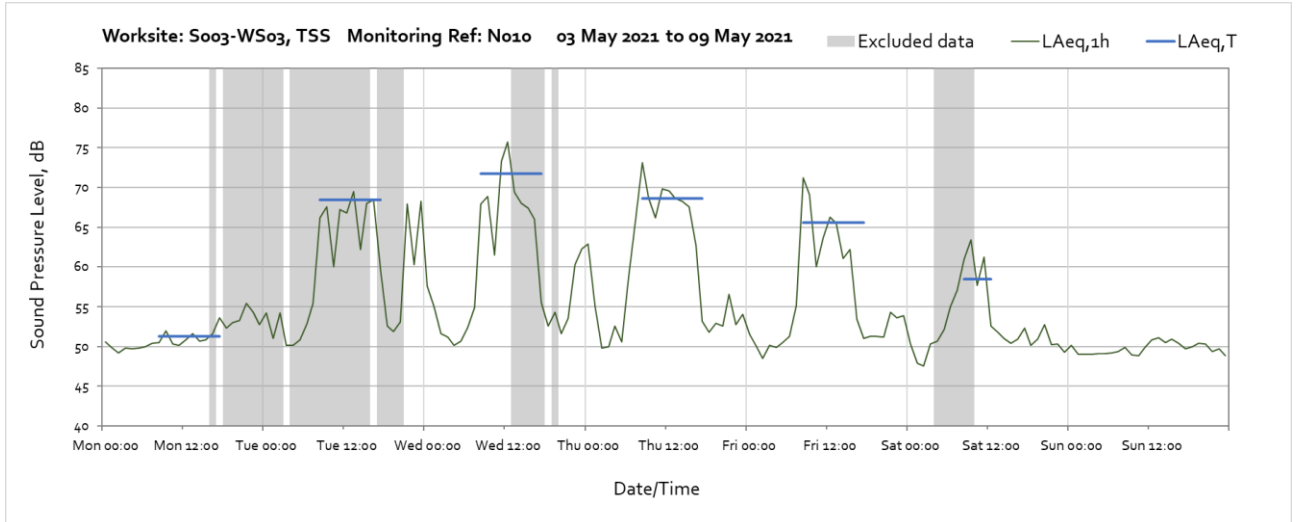
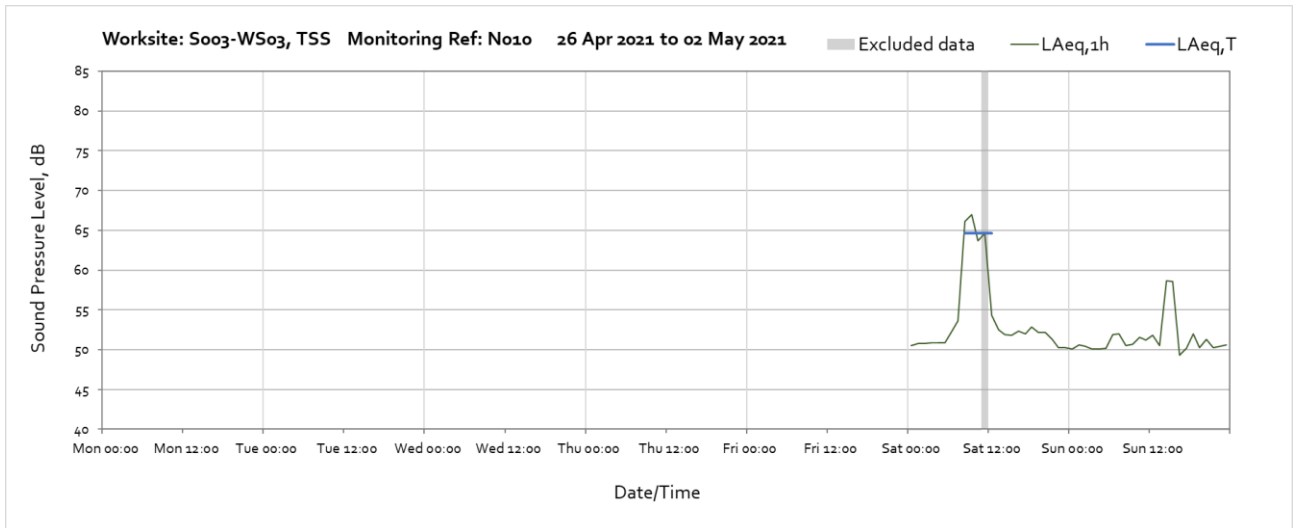
Worksite: S003-WS03, TSS – Monitoring Ref: N008

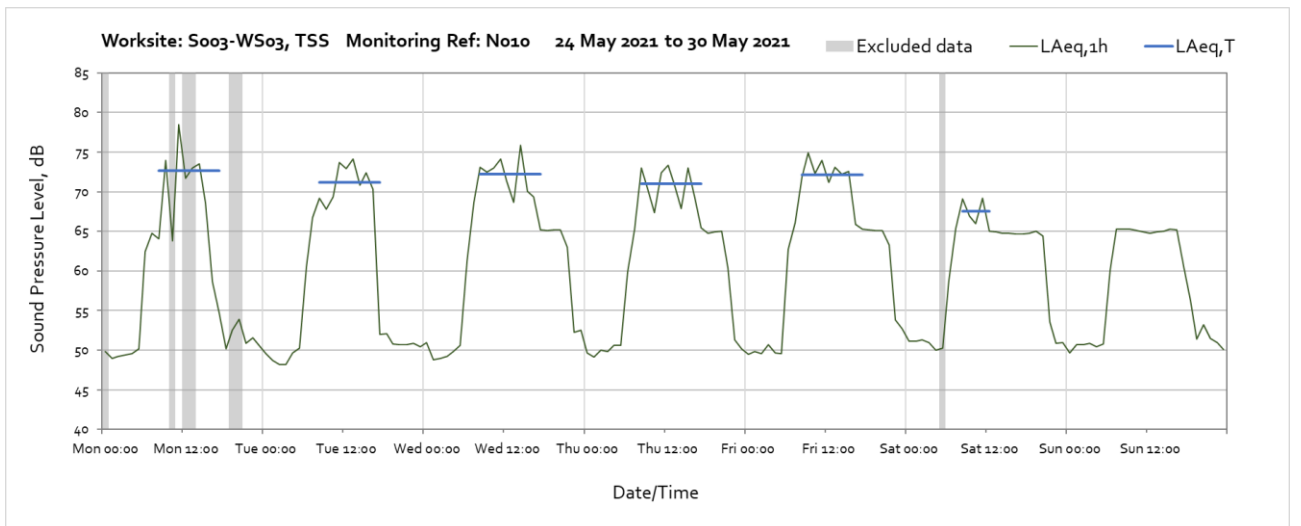
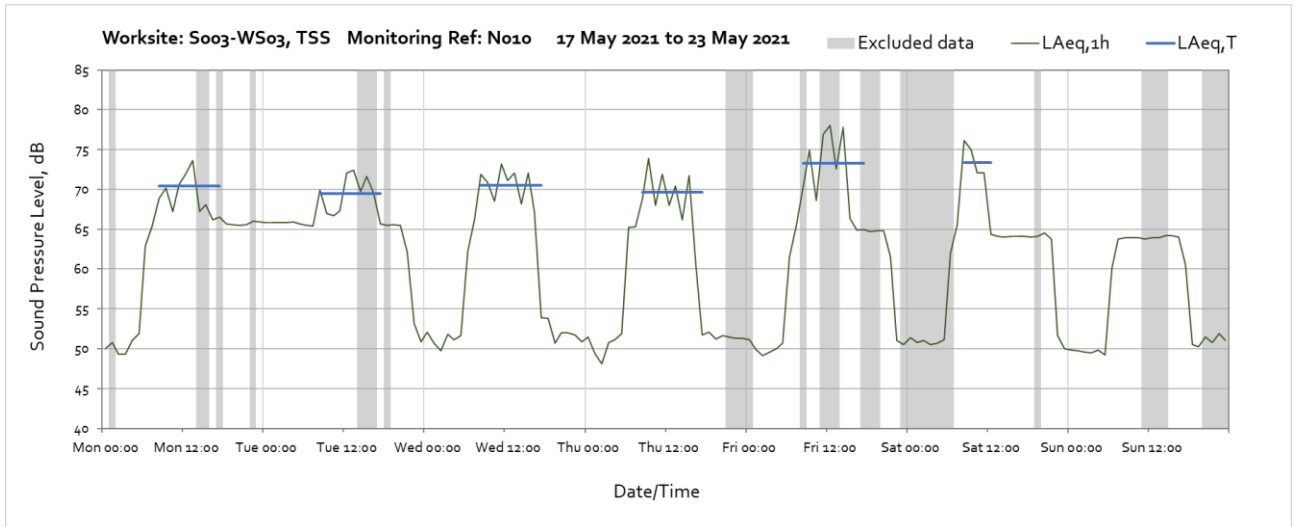
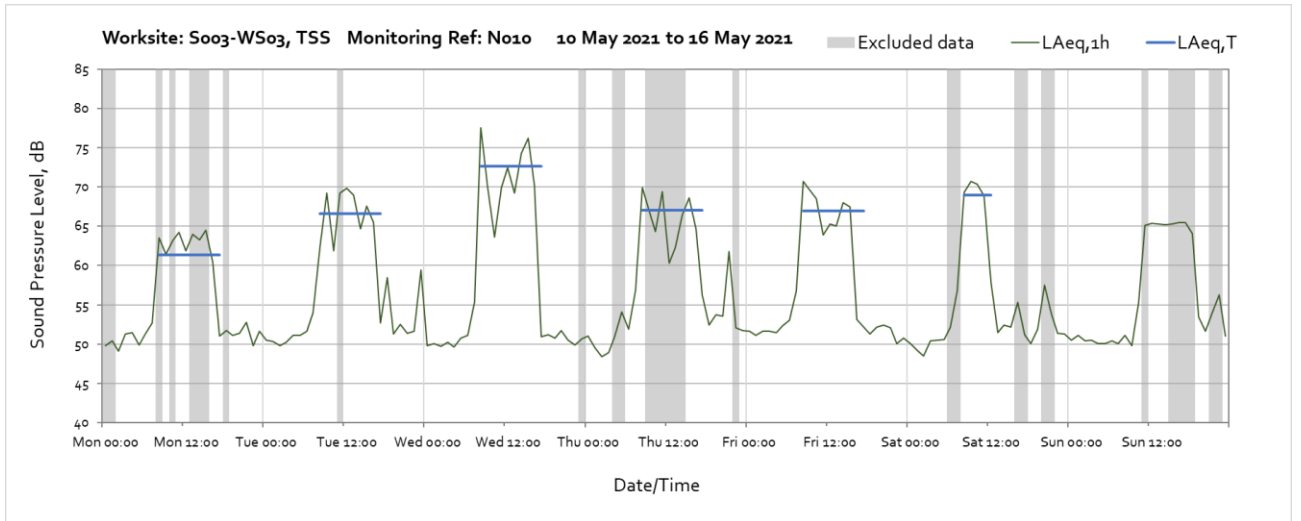


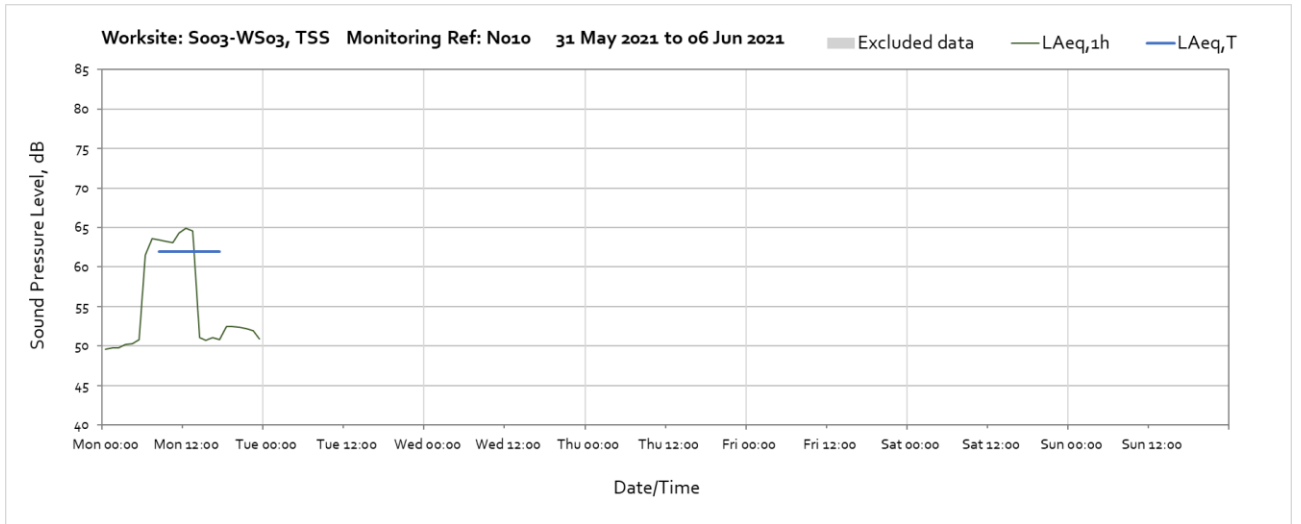




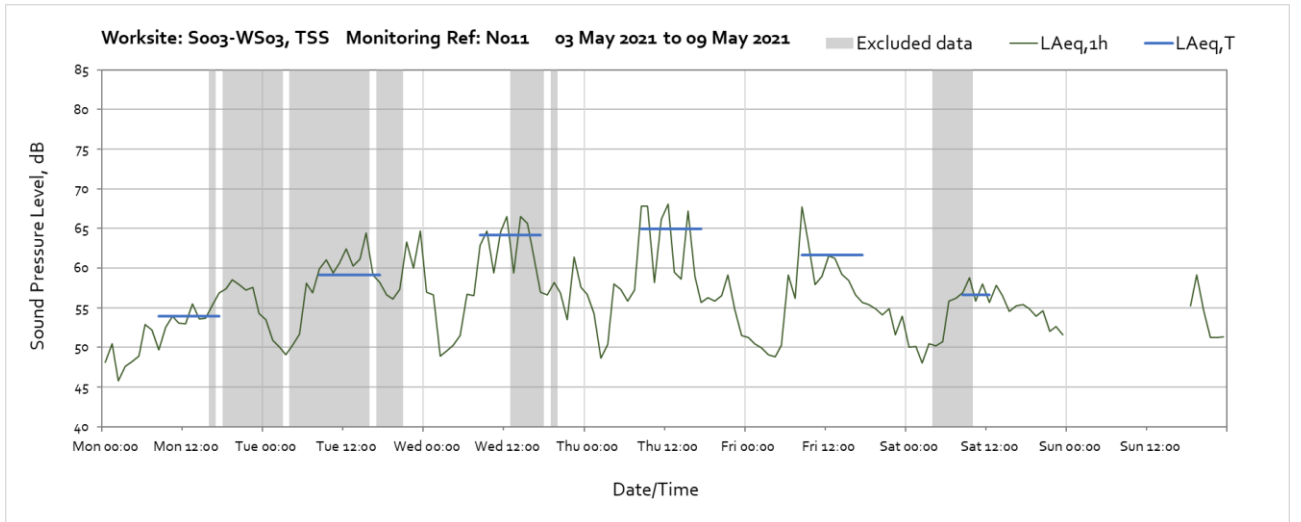
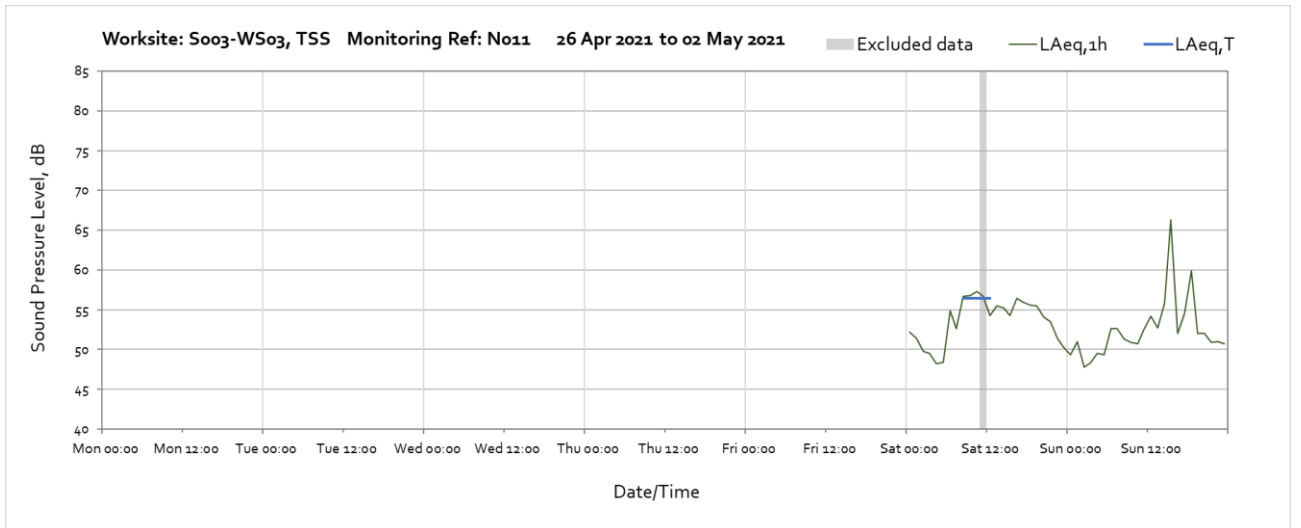
Worksite: S003-WS03, TSS – Monitoring Ref: N010





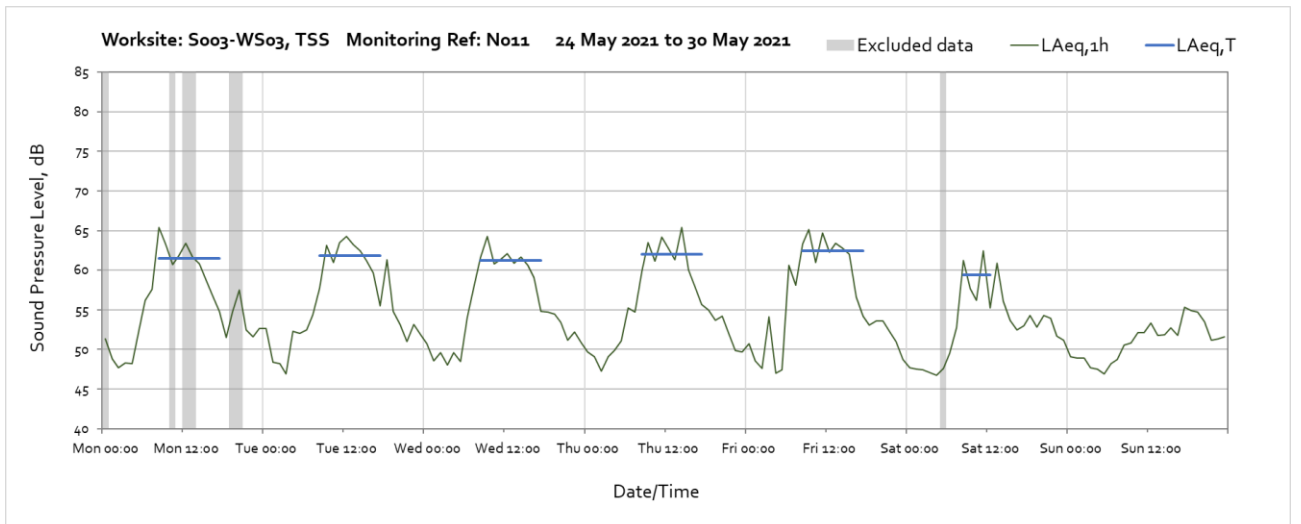
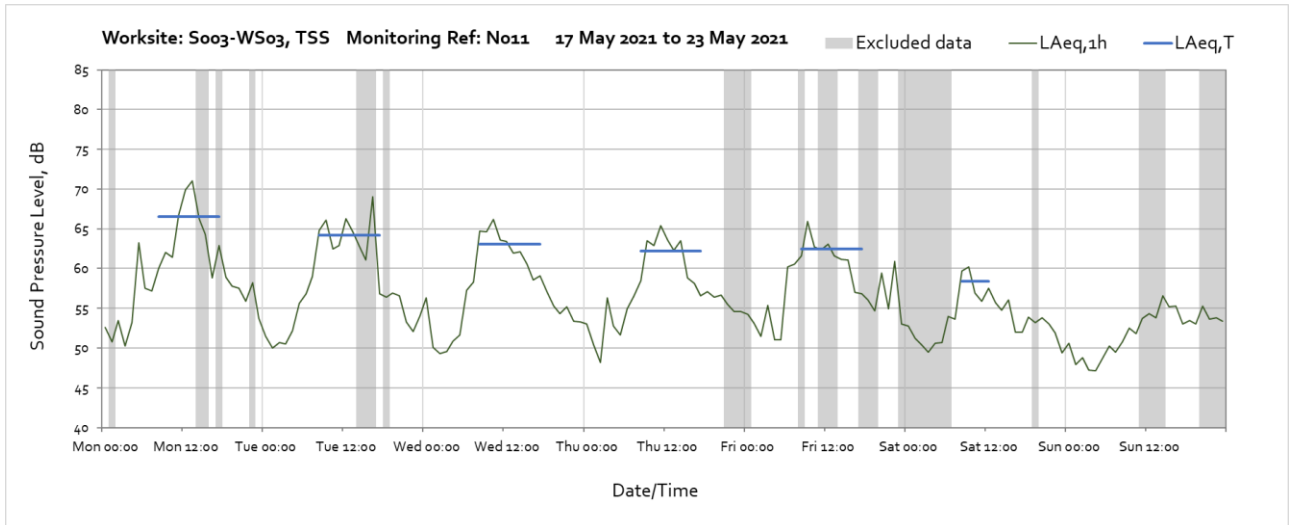
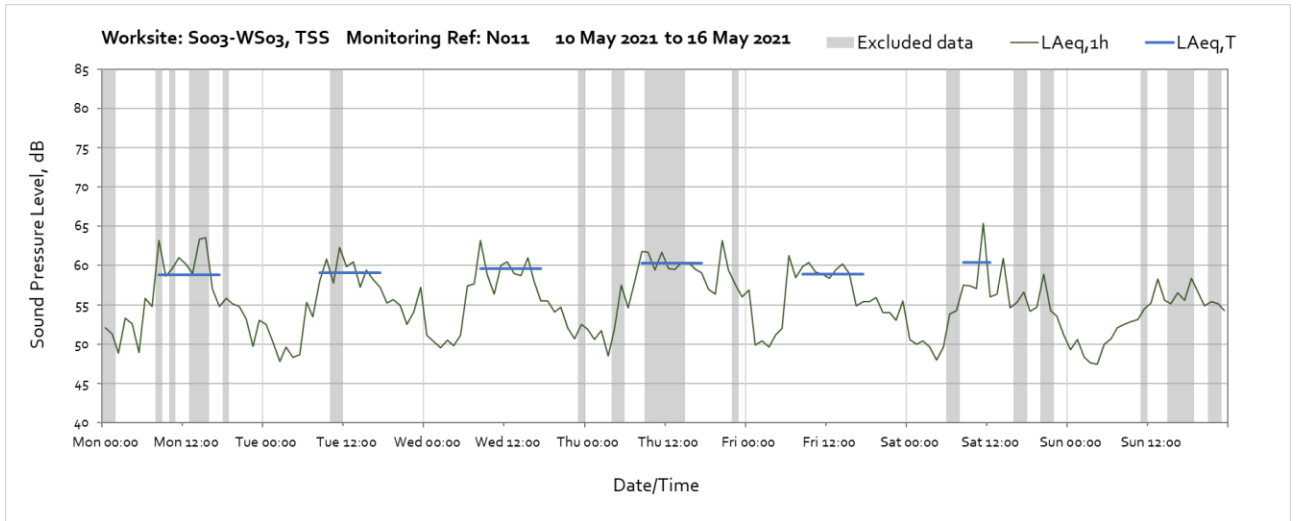


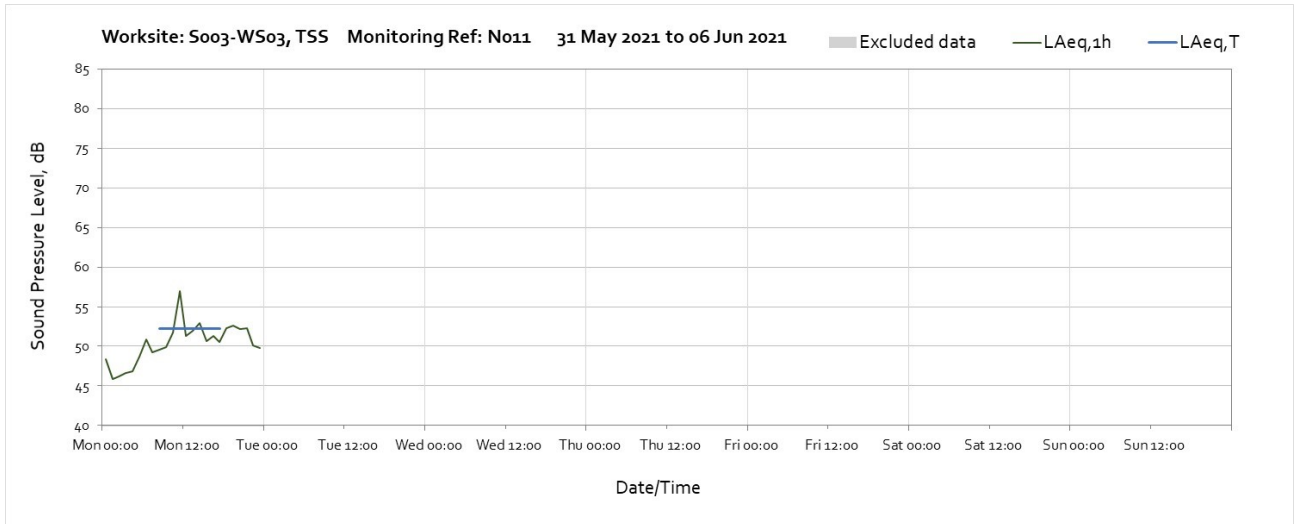
Worksite: S003-WS03 – Monitoring Ref: N011



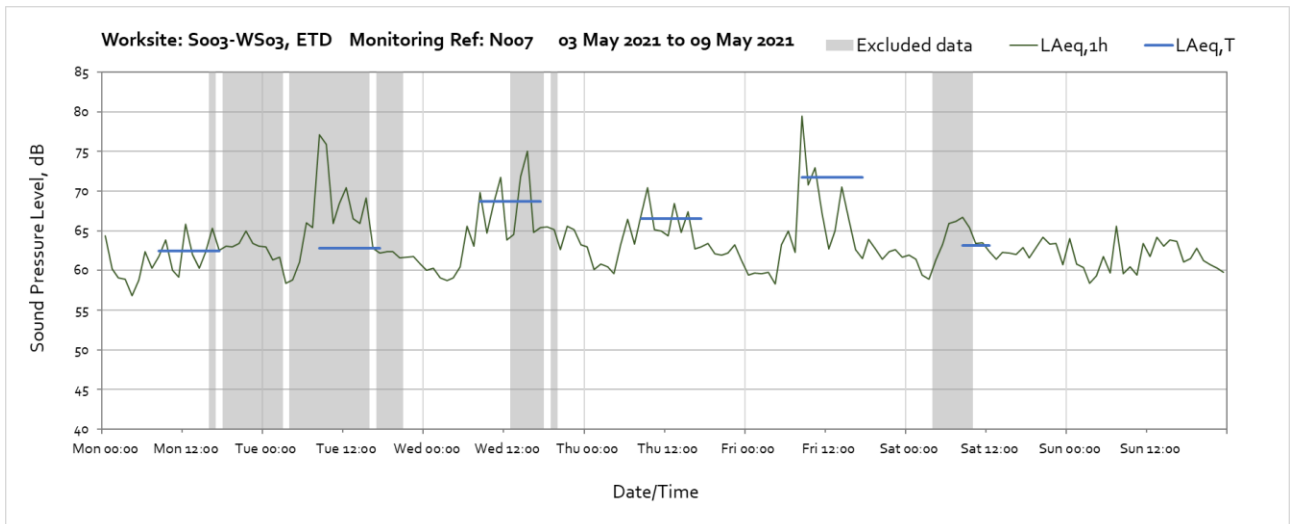
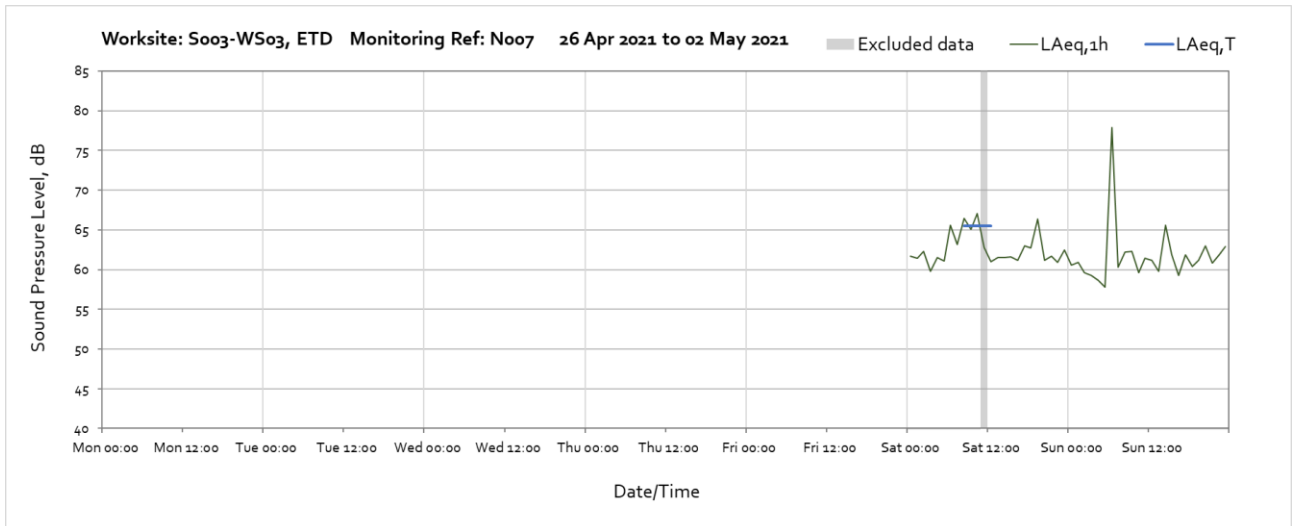
Note: Missing data from 00:00 until 18:00 on Sunday 9th May was due to a fault with the monitoring station. The monitoring station has been replaced with view of minimising further loss of data.

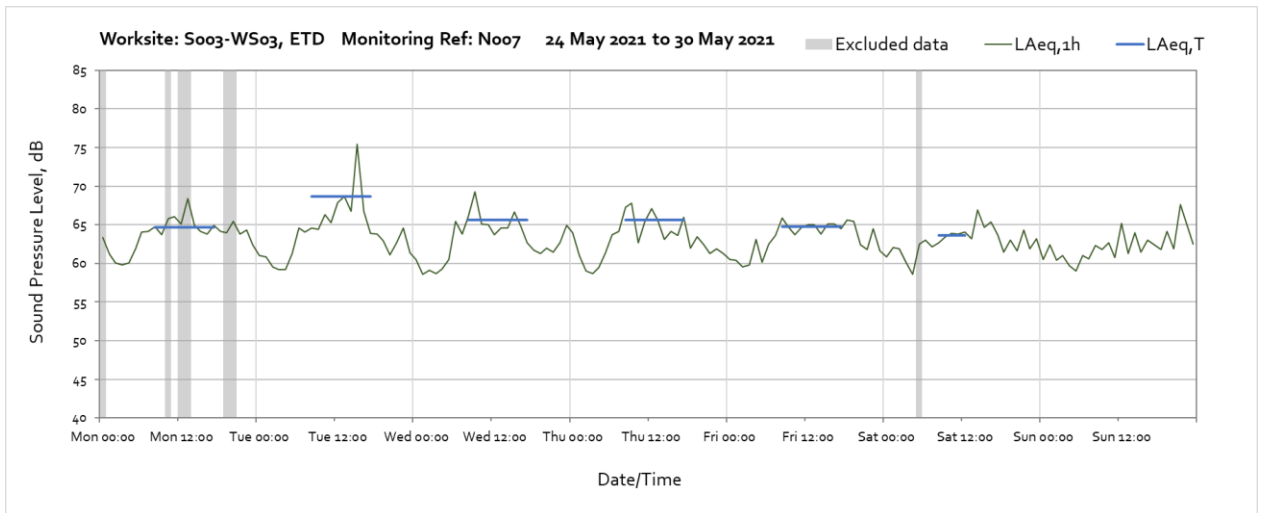
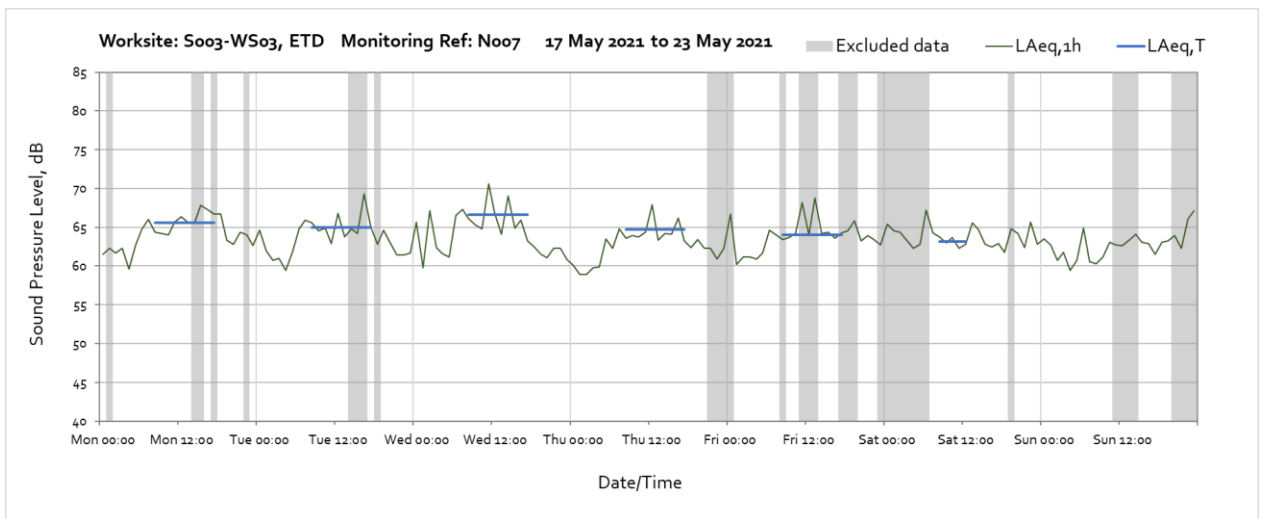
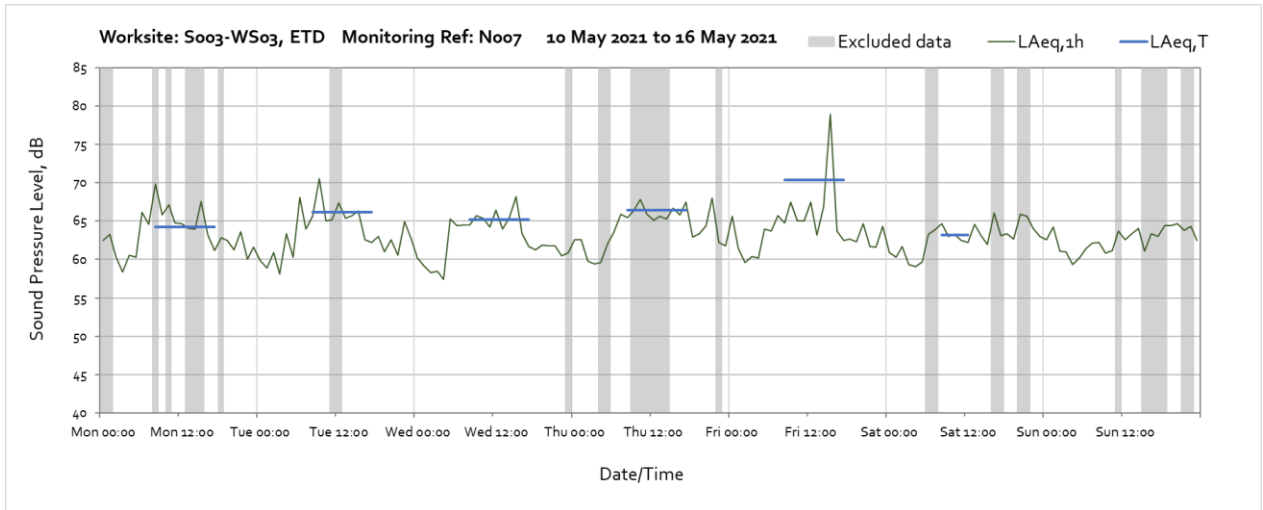
OFFICIAL

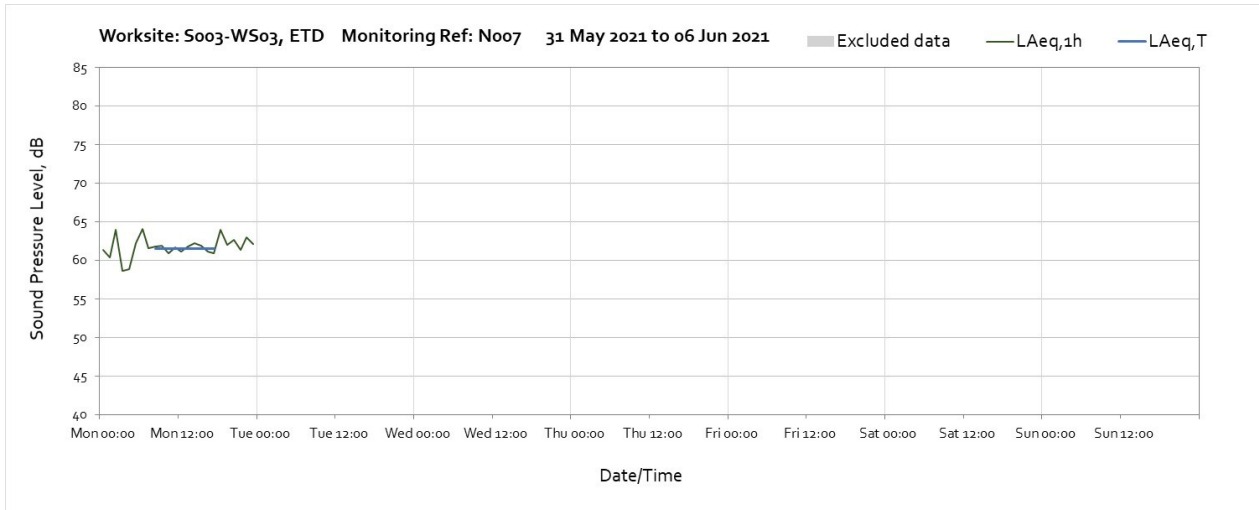




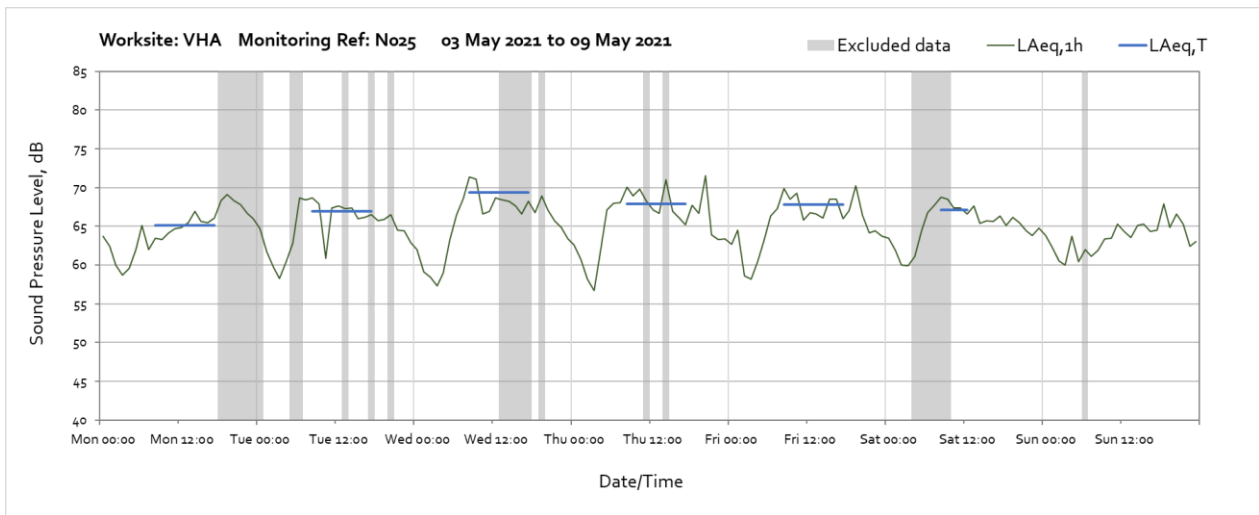
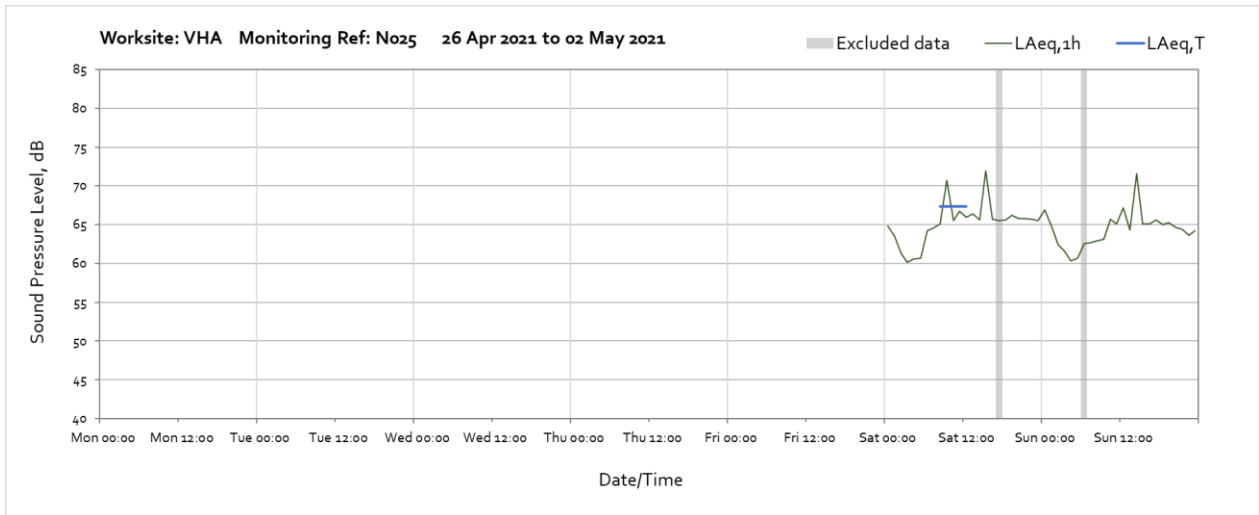
Worksite: S003-WS03, ETD – Monitoring Ref: N007

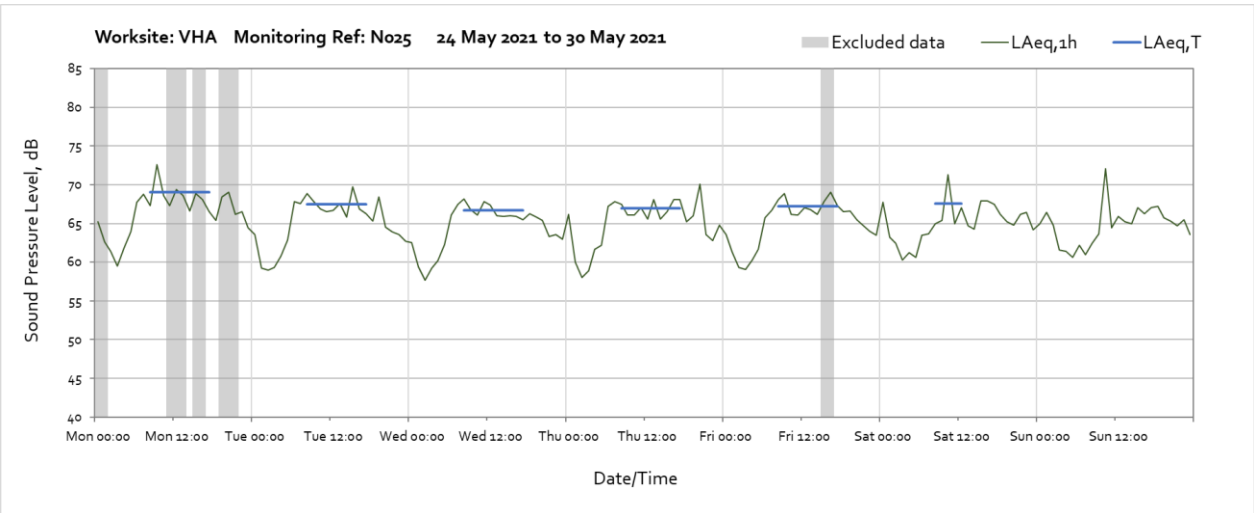
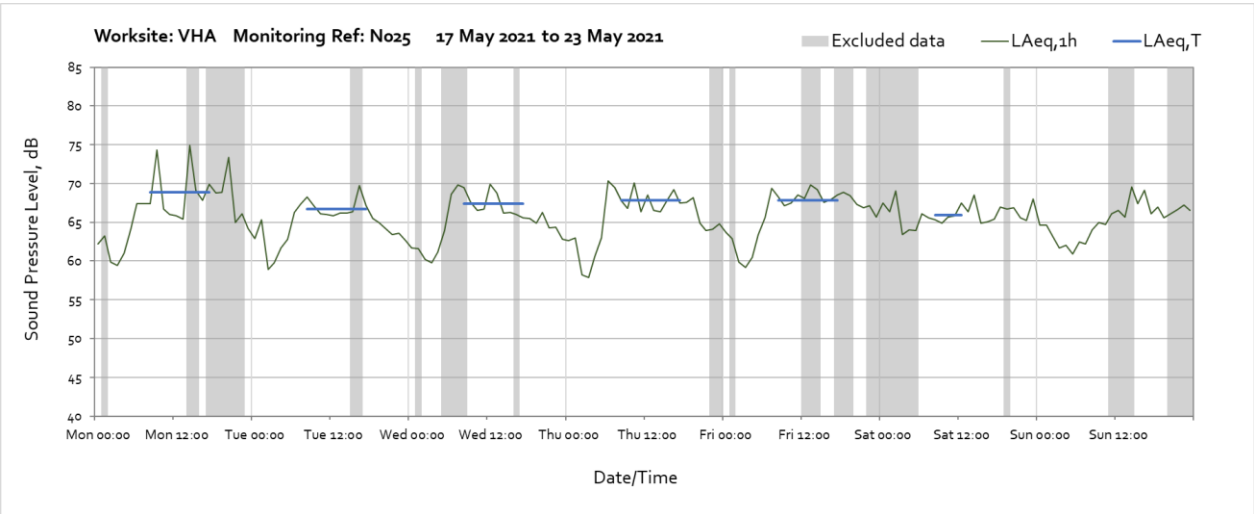
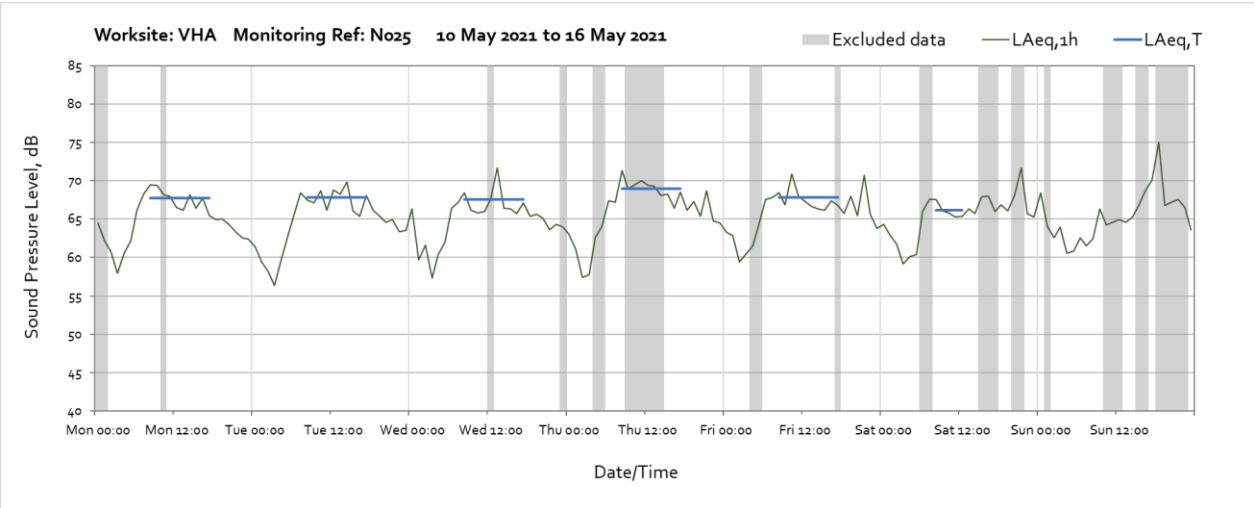


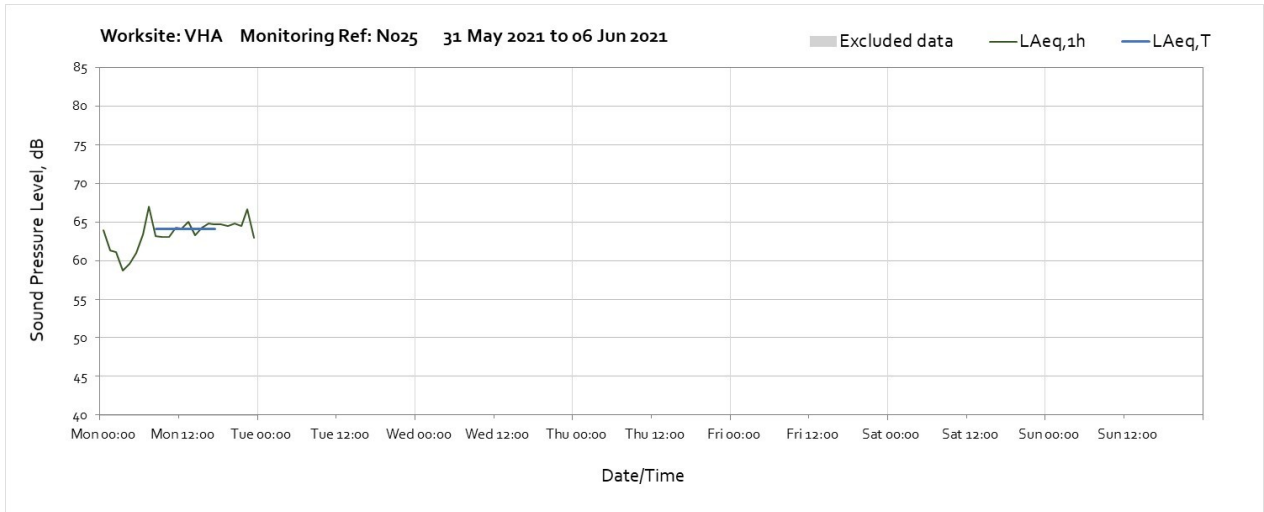




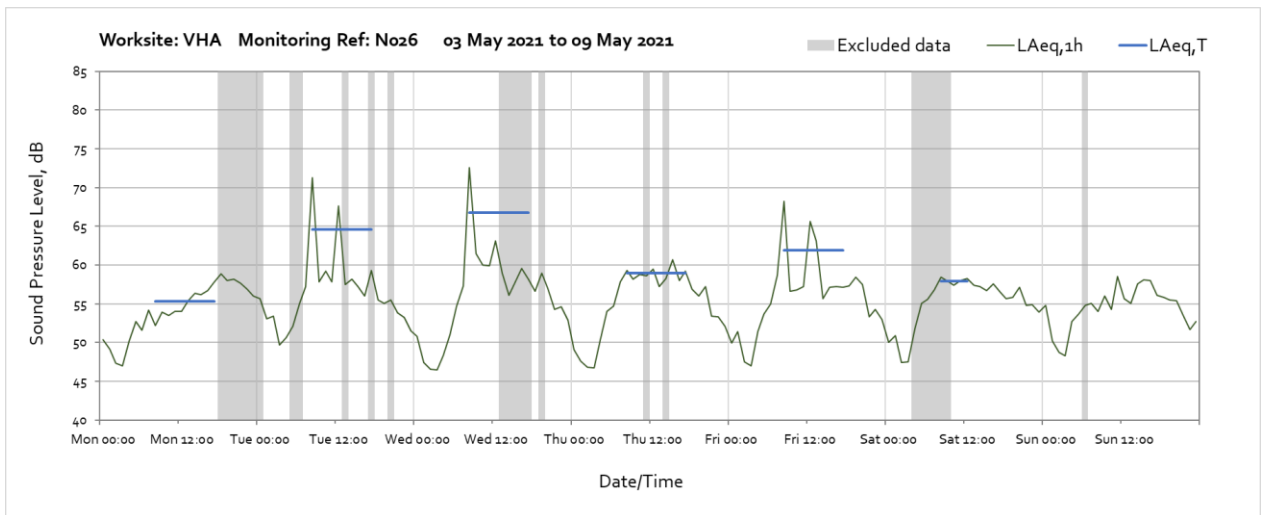
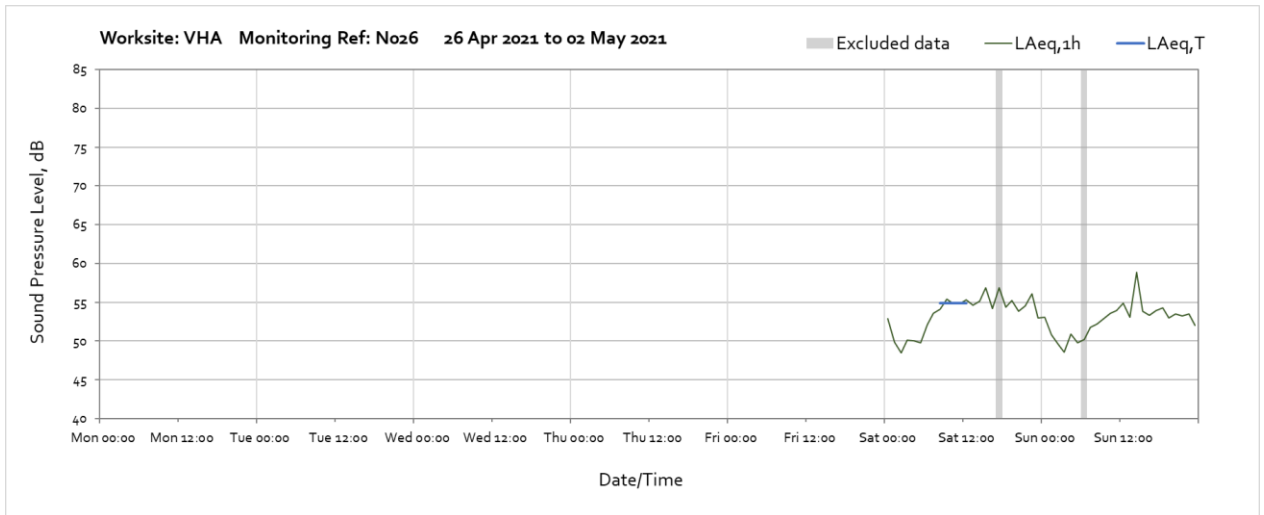
Vehicle Holding Area (VHA) – Monitoring Ref: N025

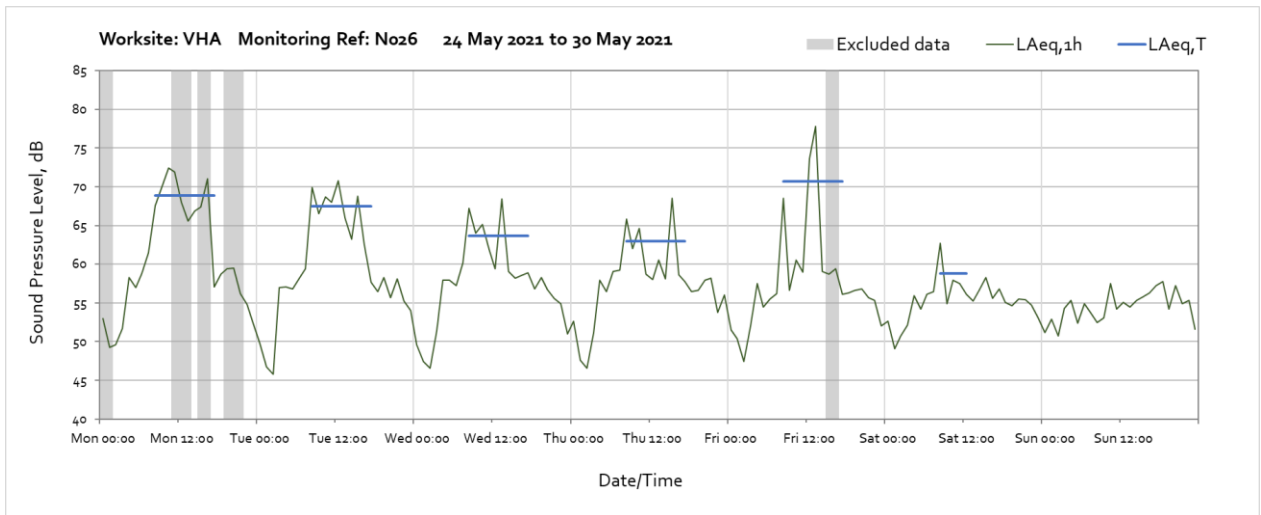
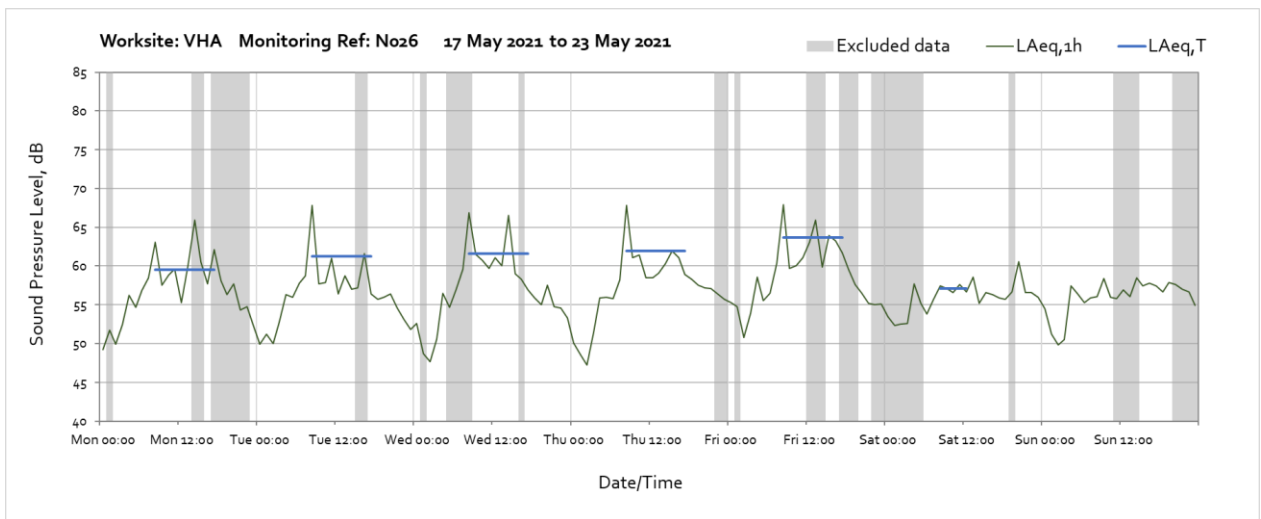
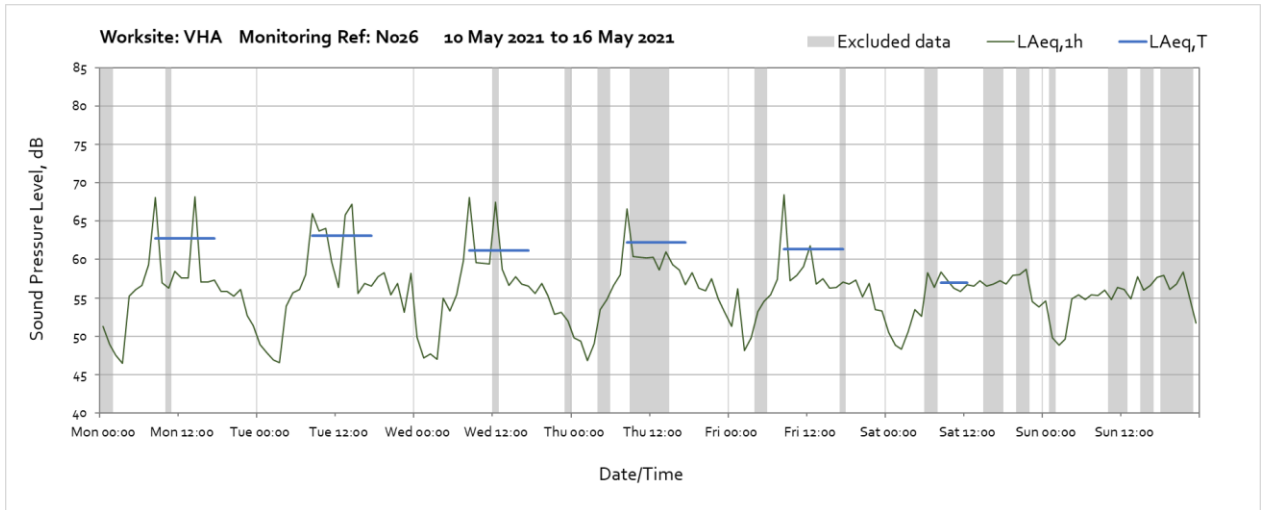


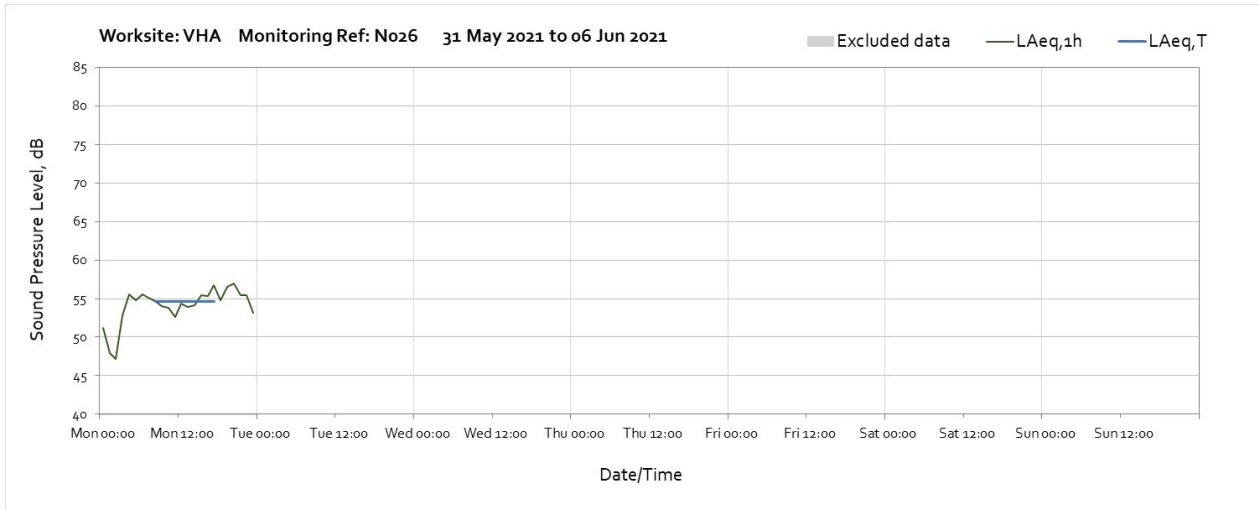




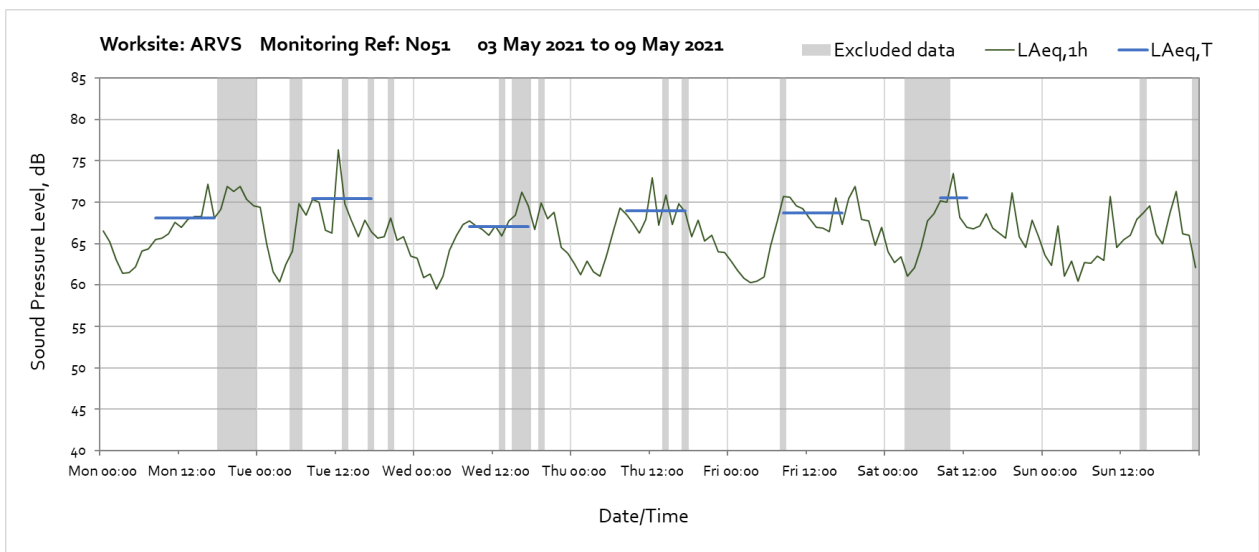
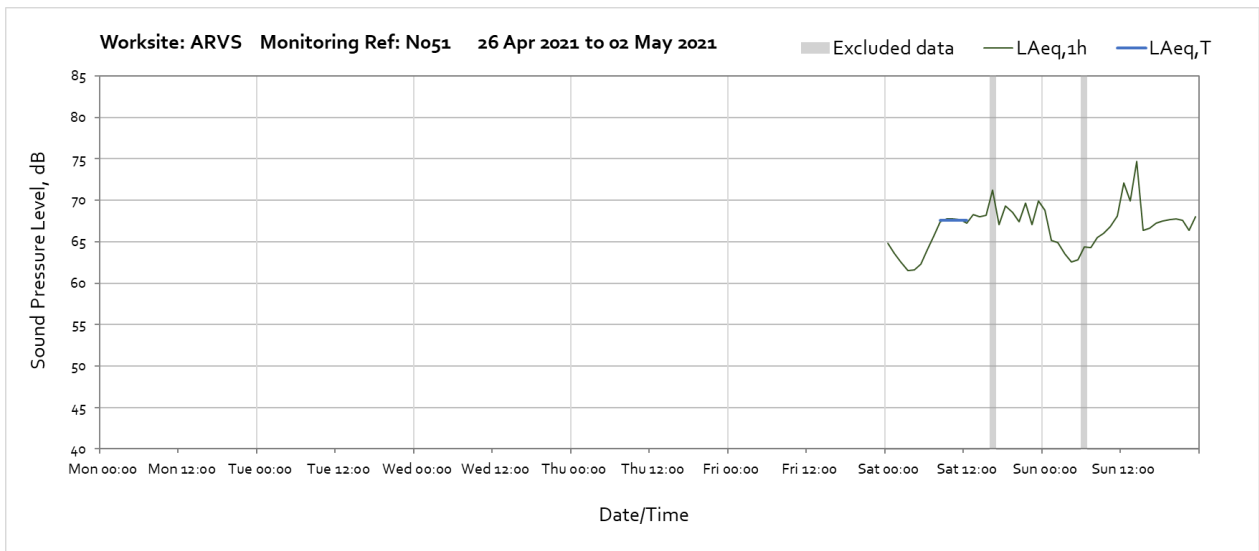
Vehicle Holding Area (VHA) – Monitoring Ref: N026

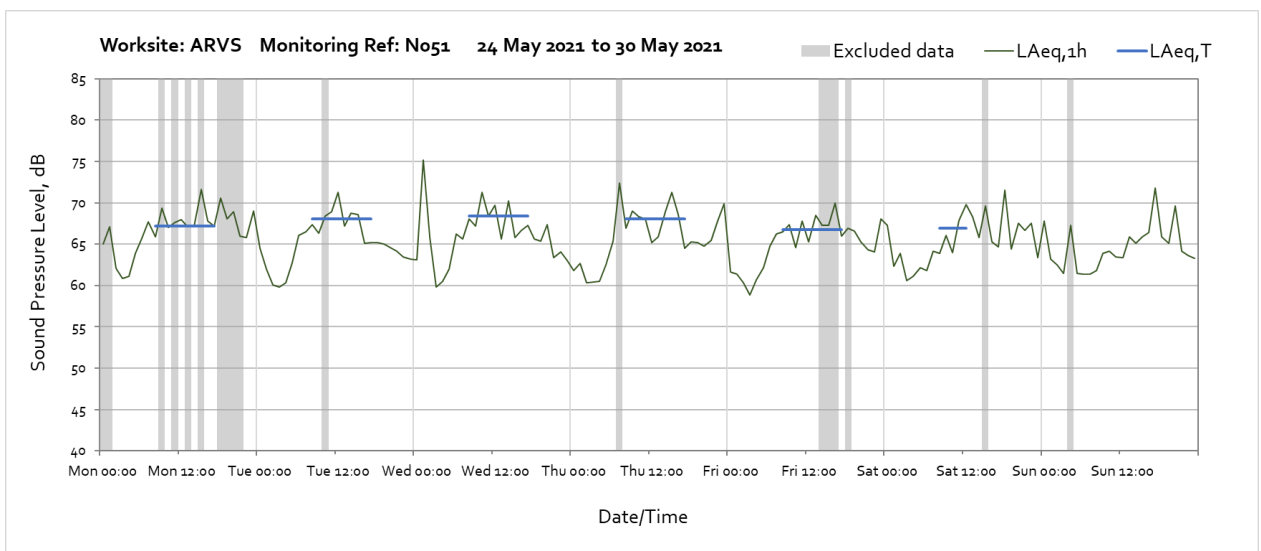
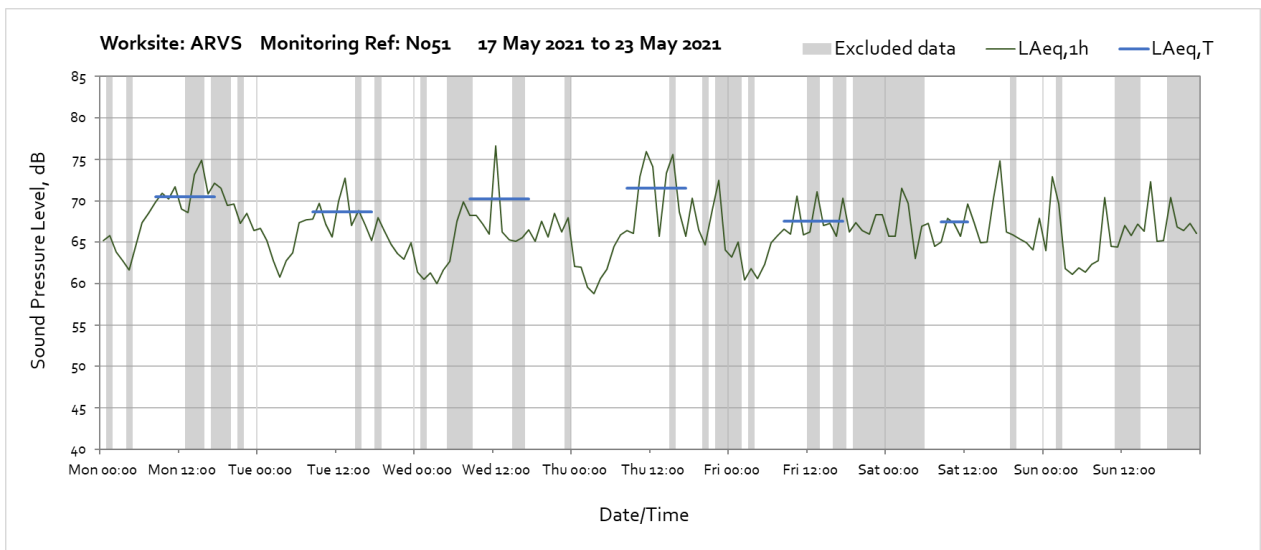
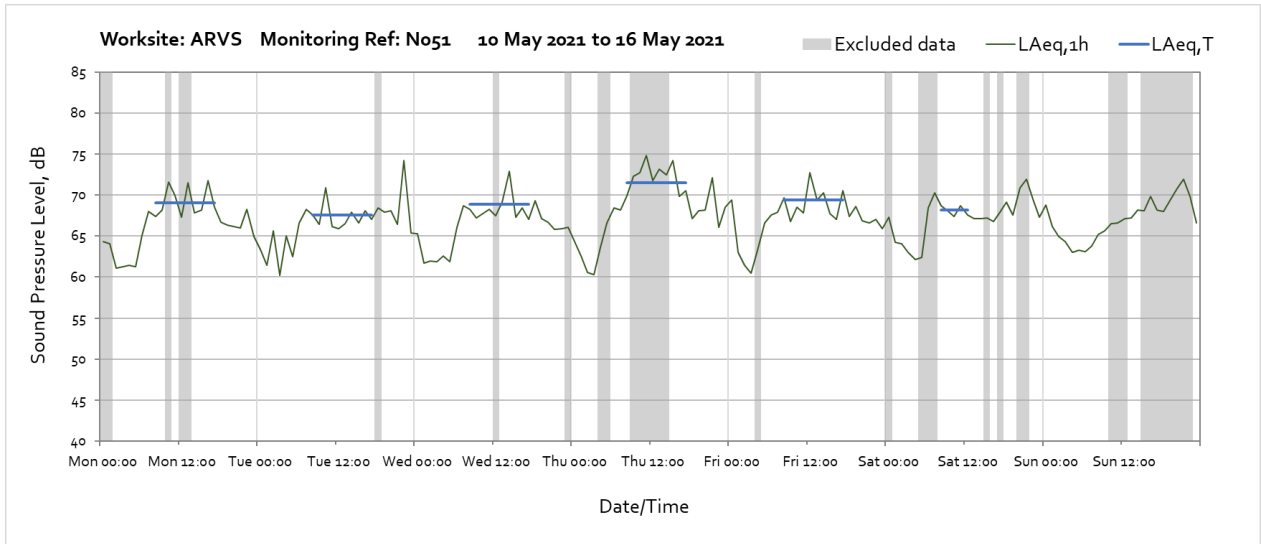


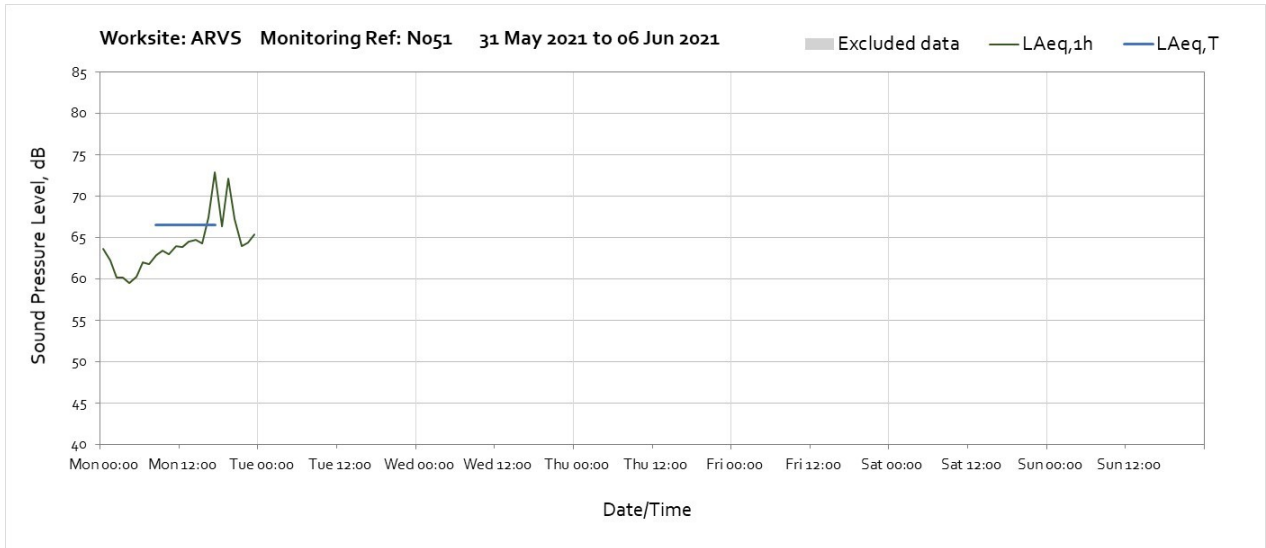




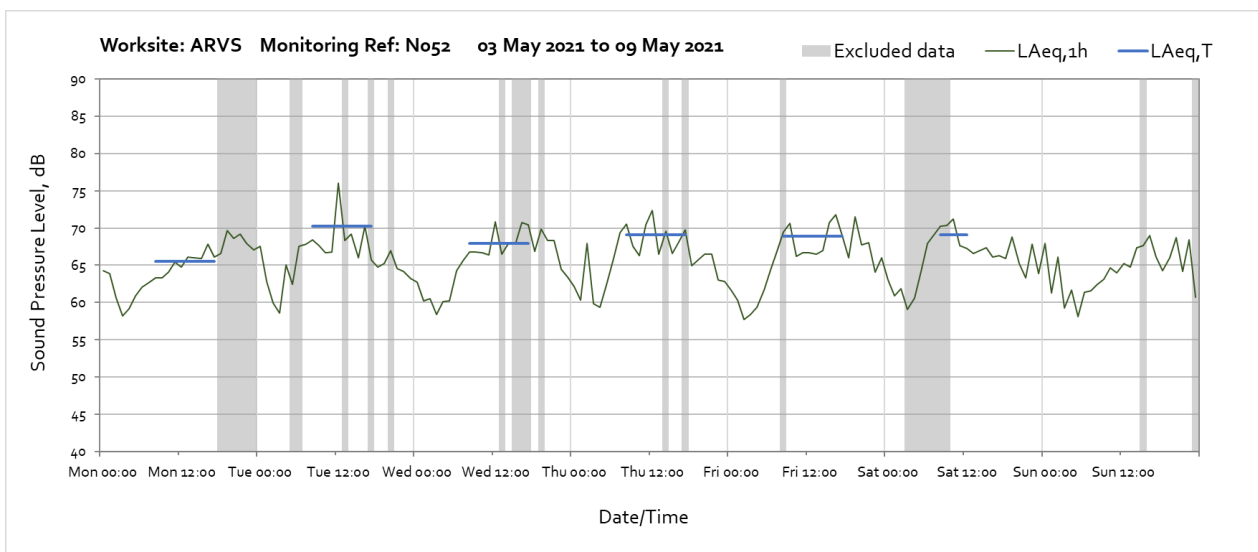
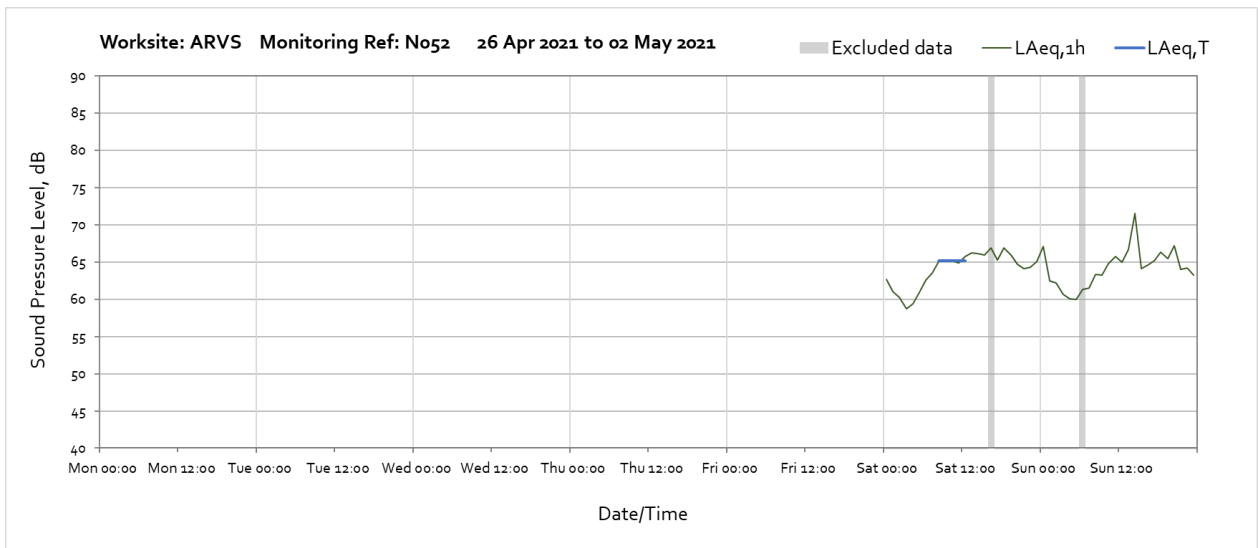
Adelaide Road Ventilation Shaft (ARVS) – Monitoring Ref: N051

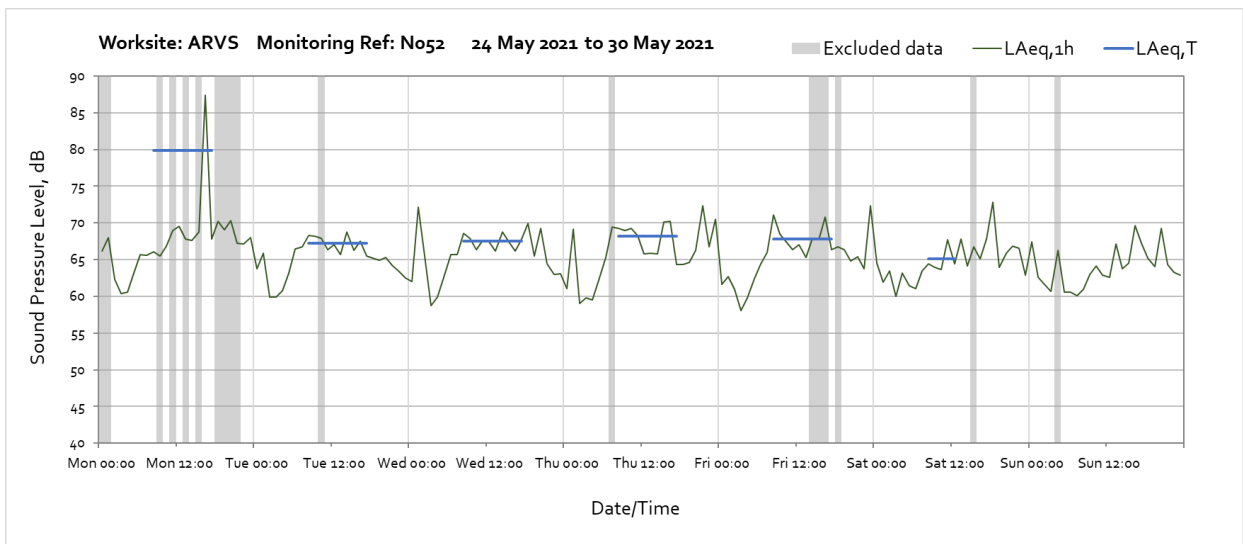
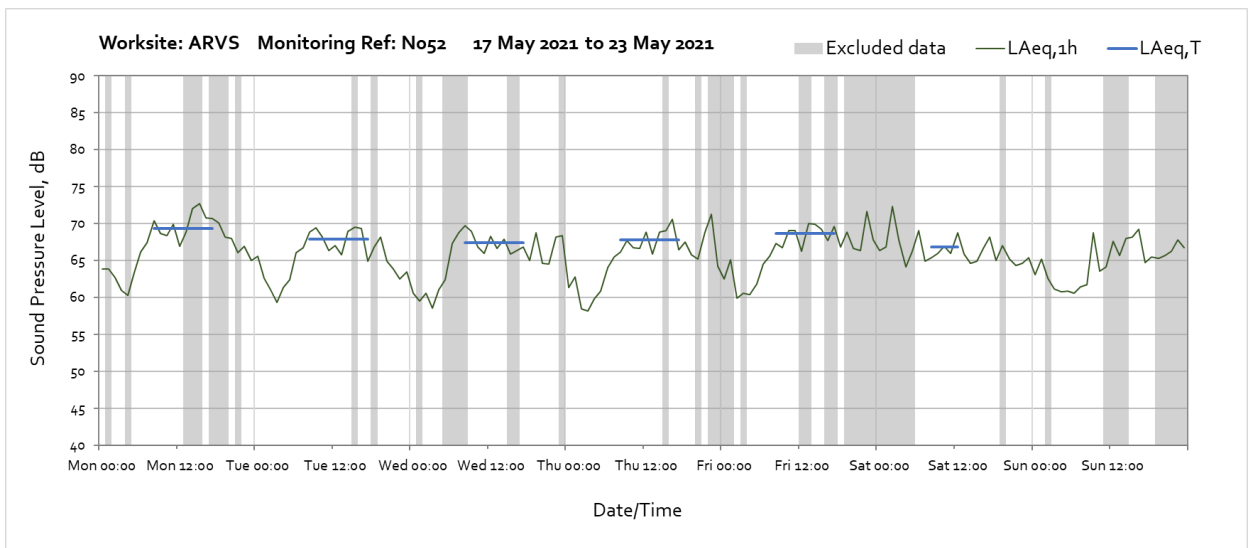
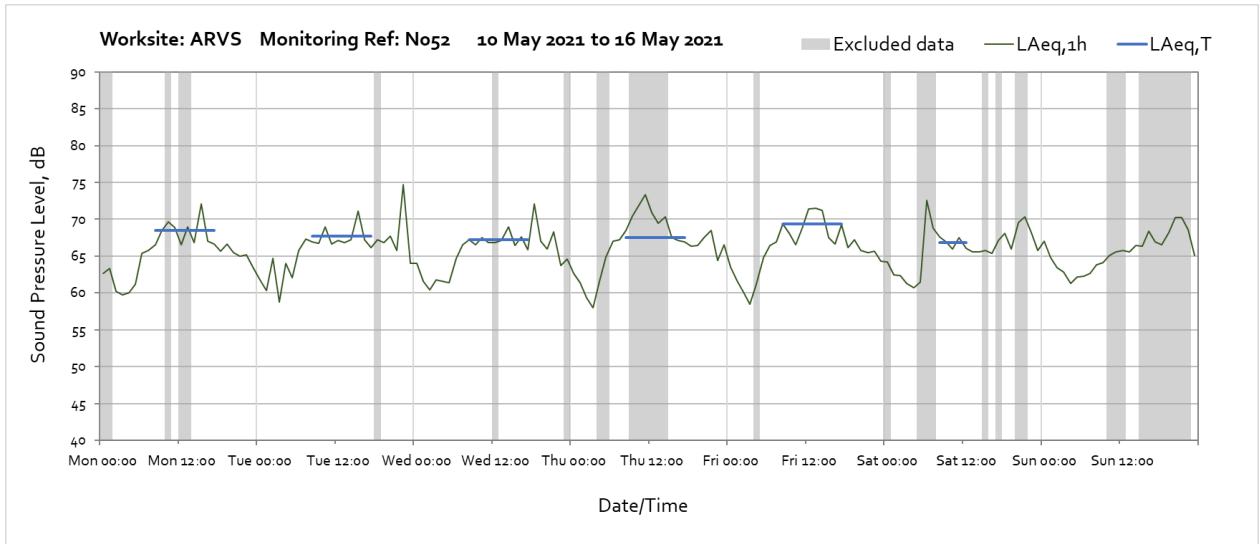


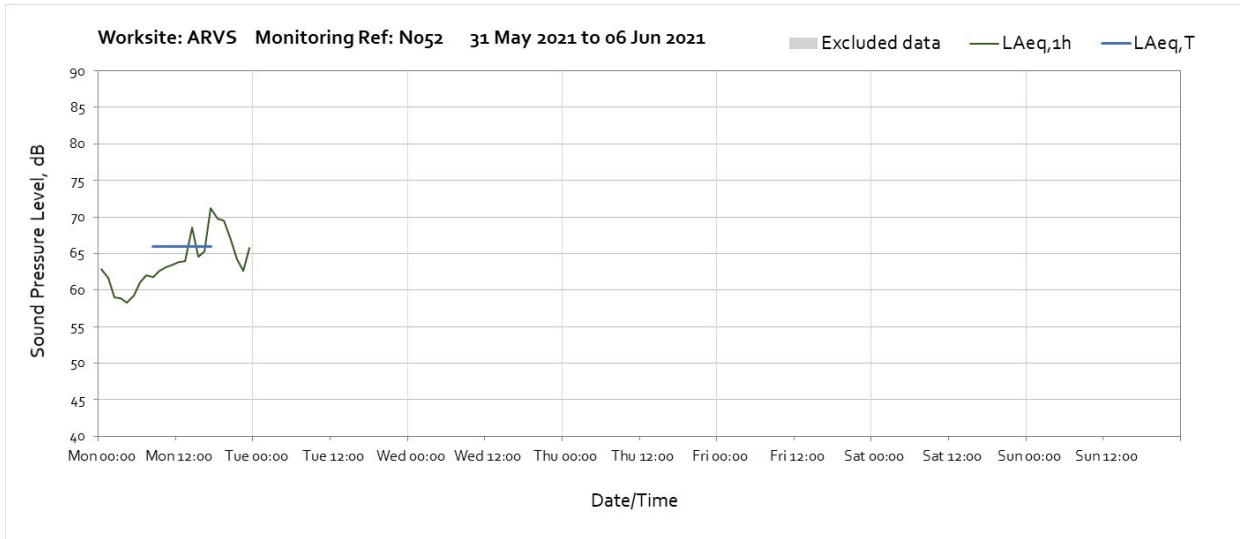




Adelaide Road Ventilation Shaft (ARVS) – Monitoring Ref: N052



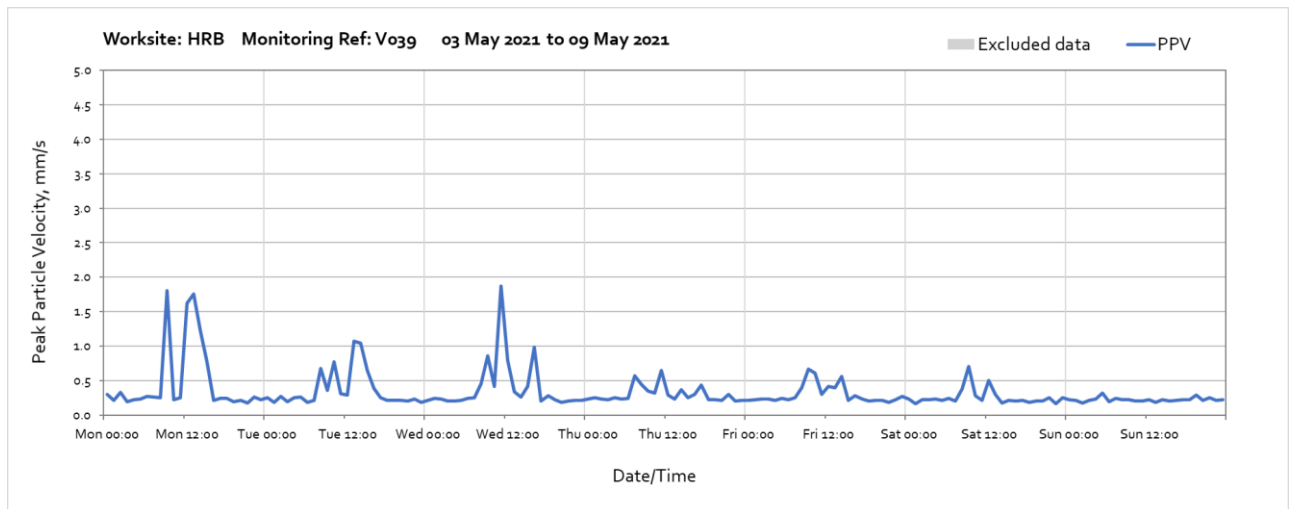
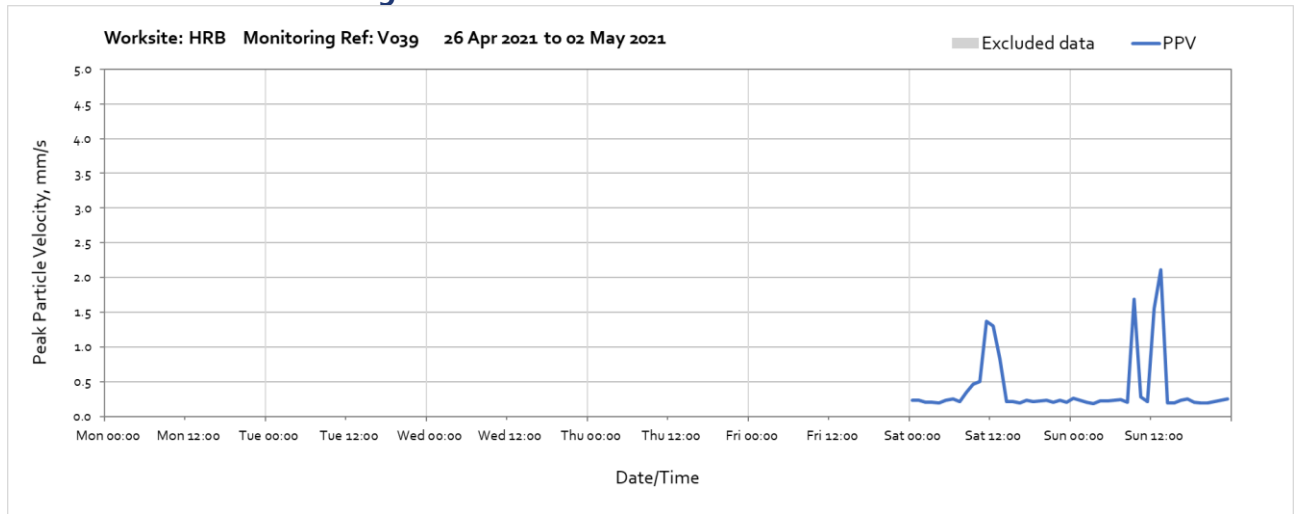


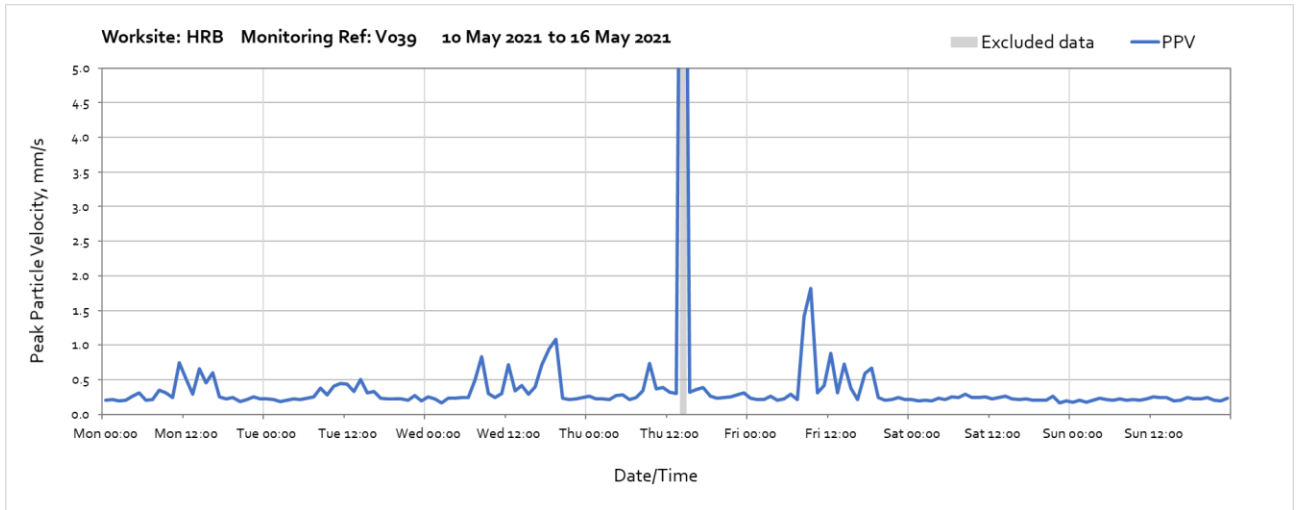


Vibration

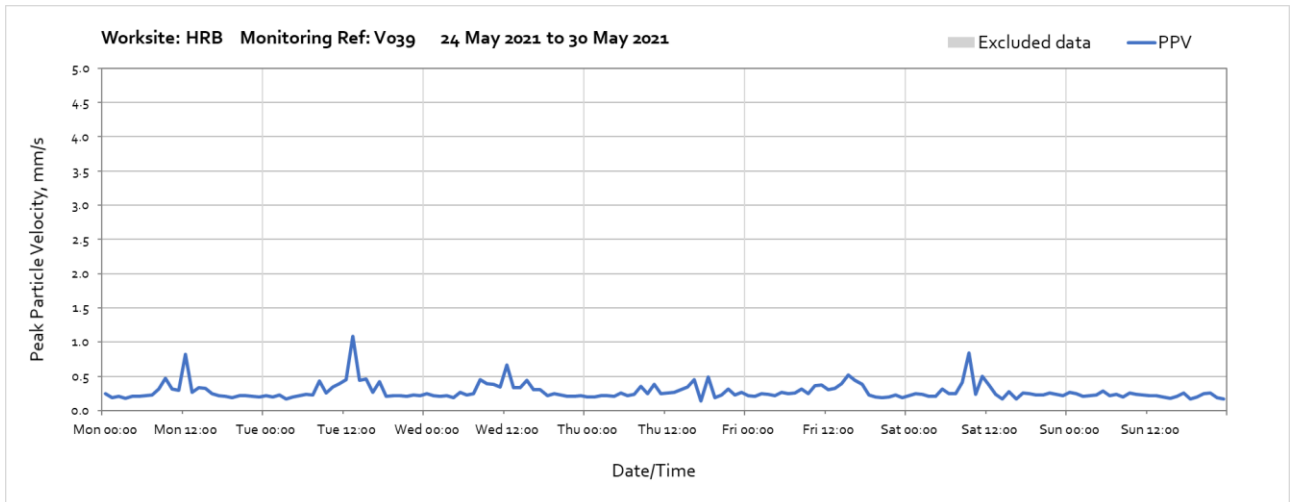
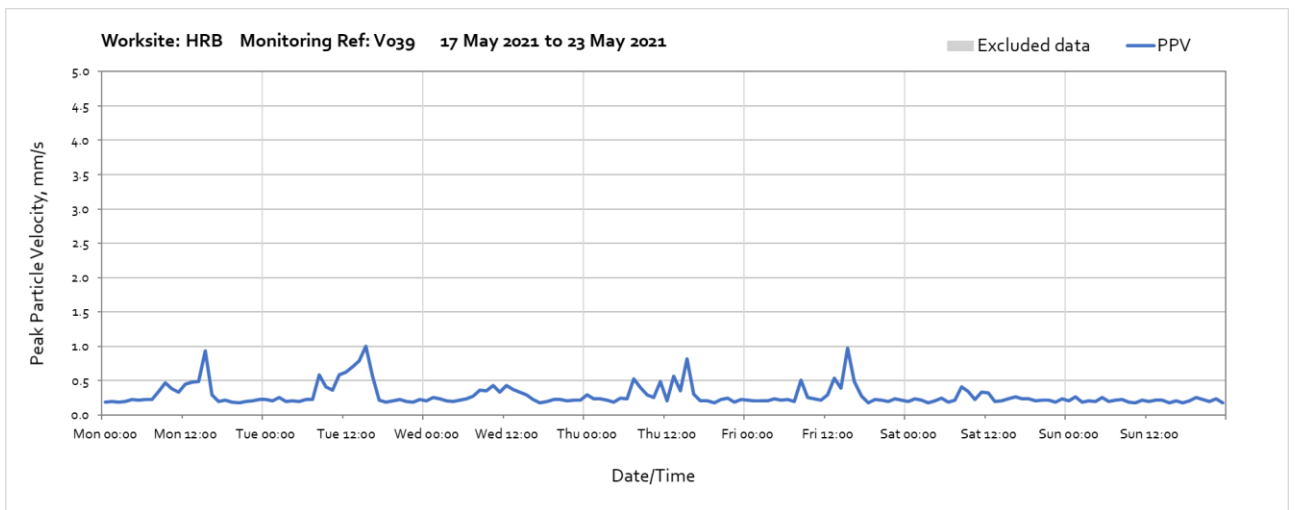
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axes x, y and z. Where resultant PPV data is not available (monitors V039 and V043), the highest vibration component in either of the three axes is presented for each 1hr measurement period respectively. 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.

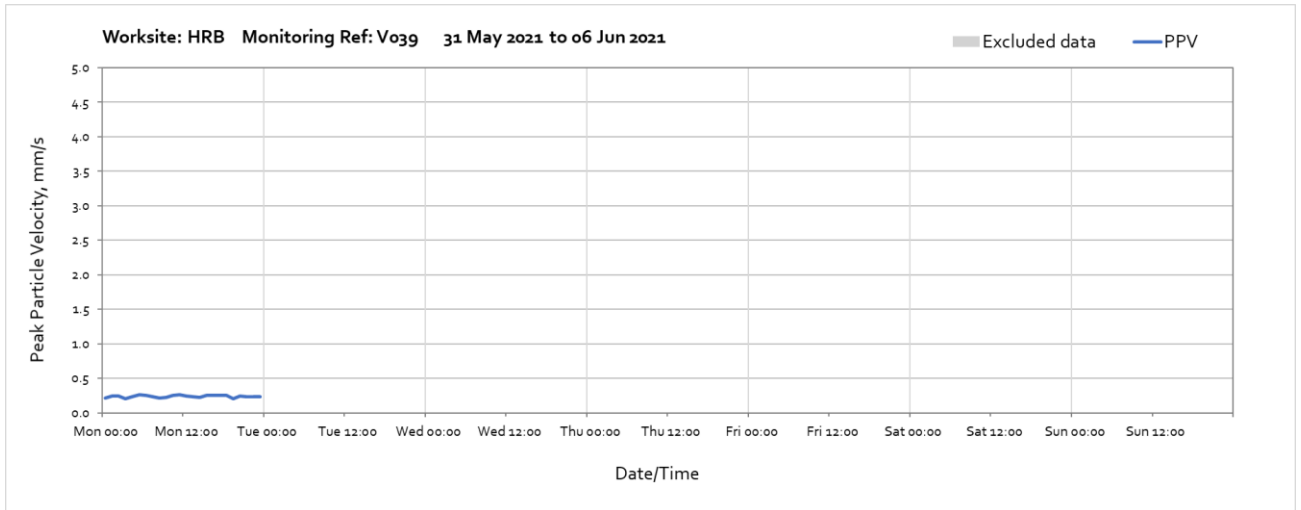
Worksite: HRB – Monitoring Ref: V039



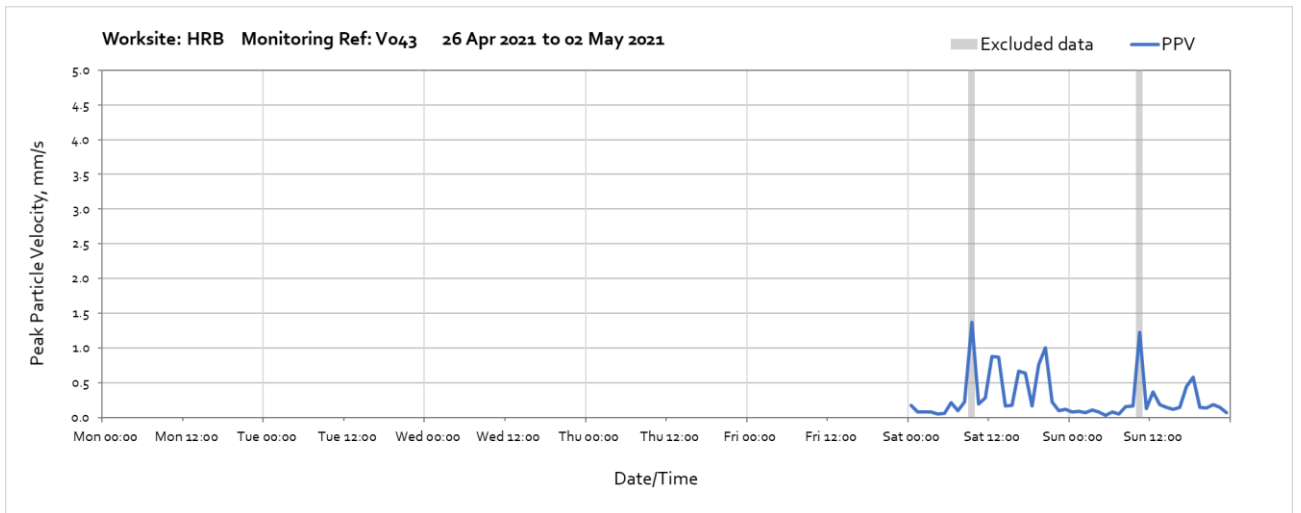


Note: High vibration levels measured at 14:00 on Thursday 13th May were due to local interference of the monitor and are not representative of HS2 vibration levels.

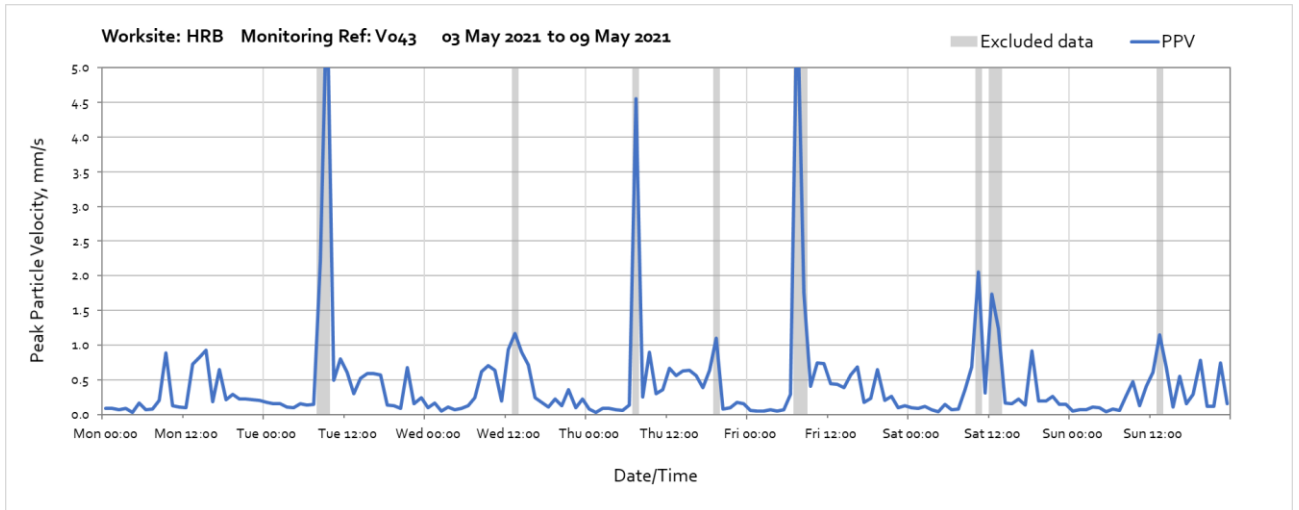




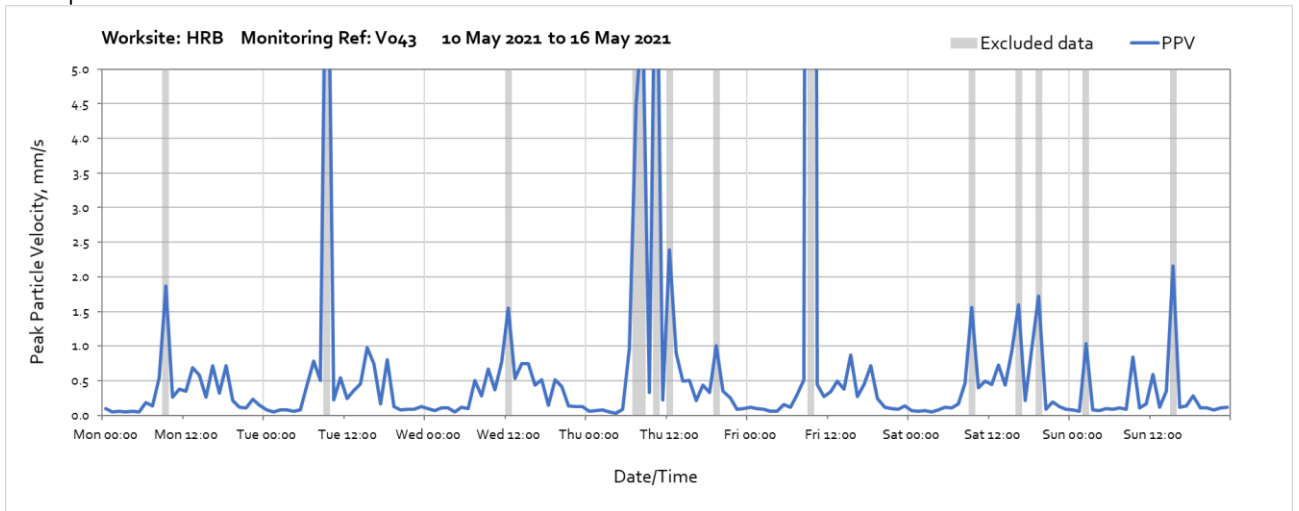
Worksite: HRB – Monitoring Ref: V043



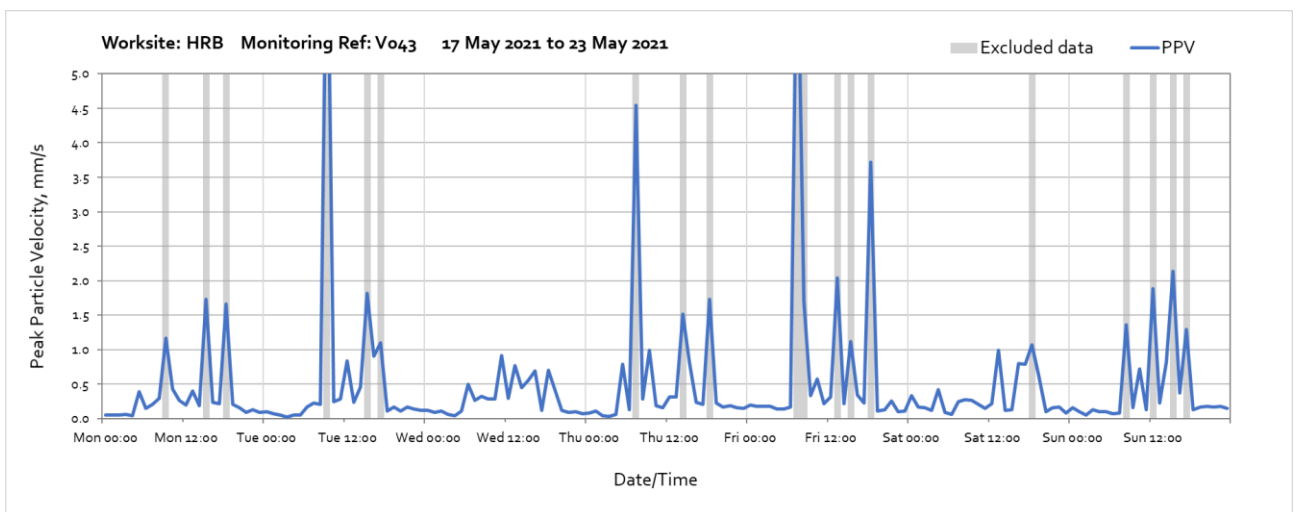
Note: Higher vibration levels measured throughout the weekend were due local interference of the monitor and are not representative of HS2 vibration levels.



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

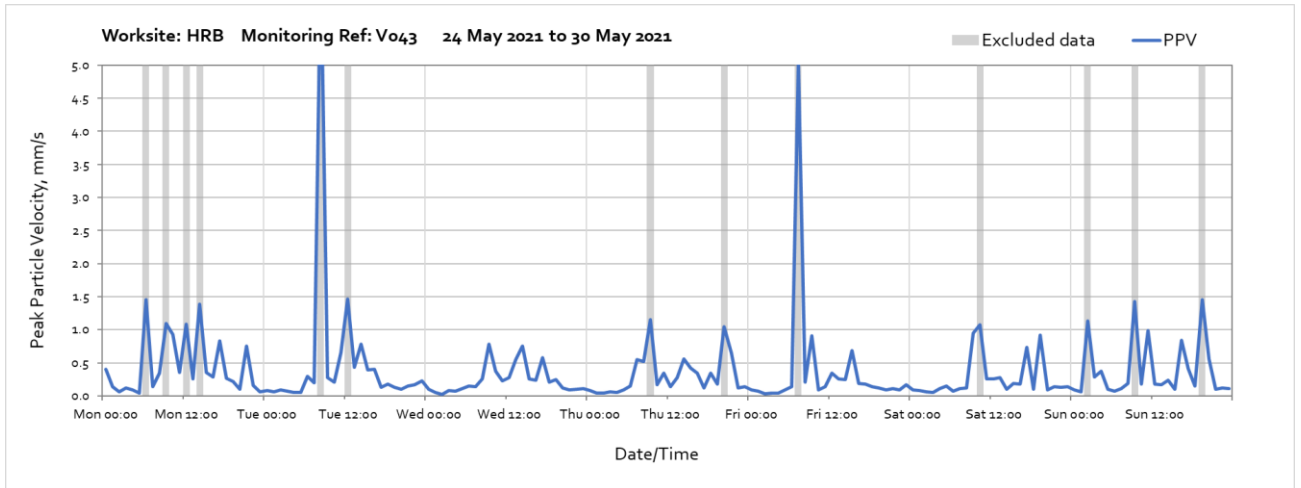


Note: High vibration levels measured throughout the week were due local interference of the monitor and are not representative of HS2 vibration levels.

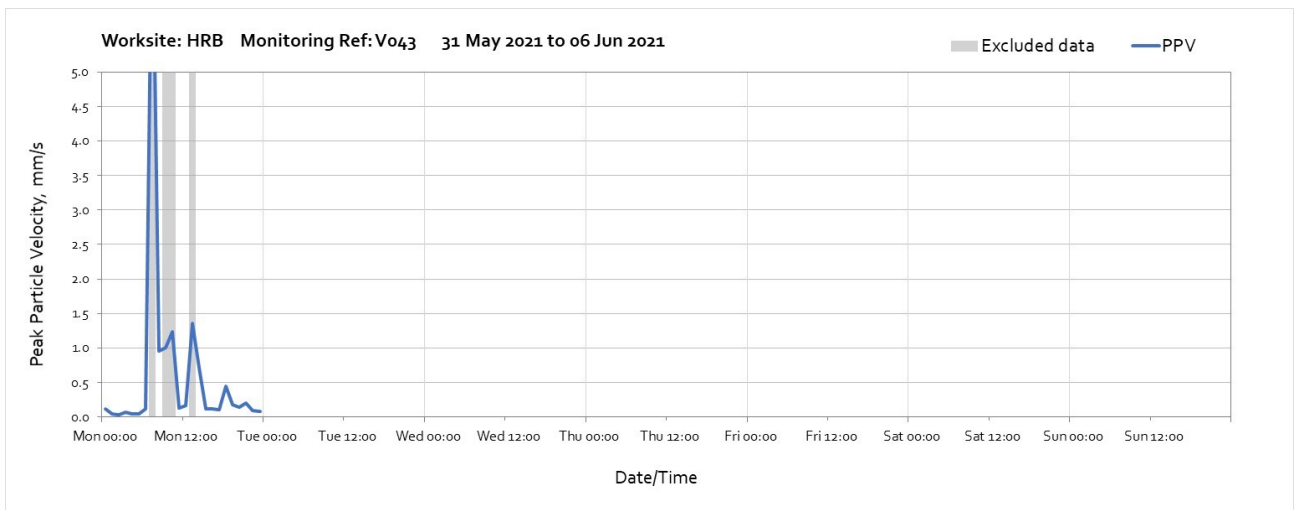


Note: High vibration levels measured throughout the week were due local interference of the monitor and are not representative of HS2 vibration levels.

OFFICIAL

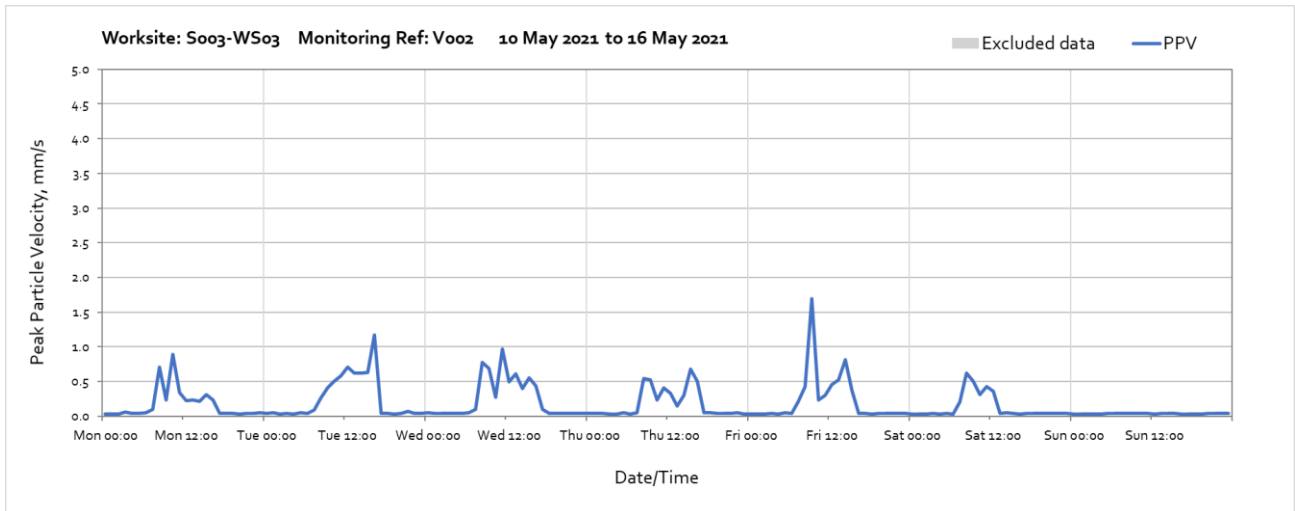
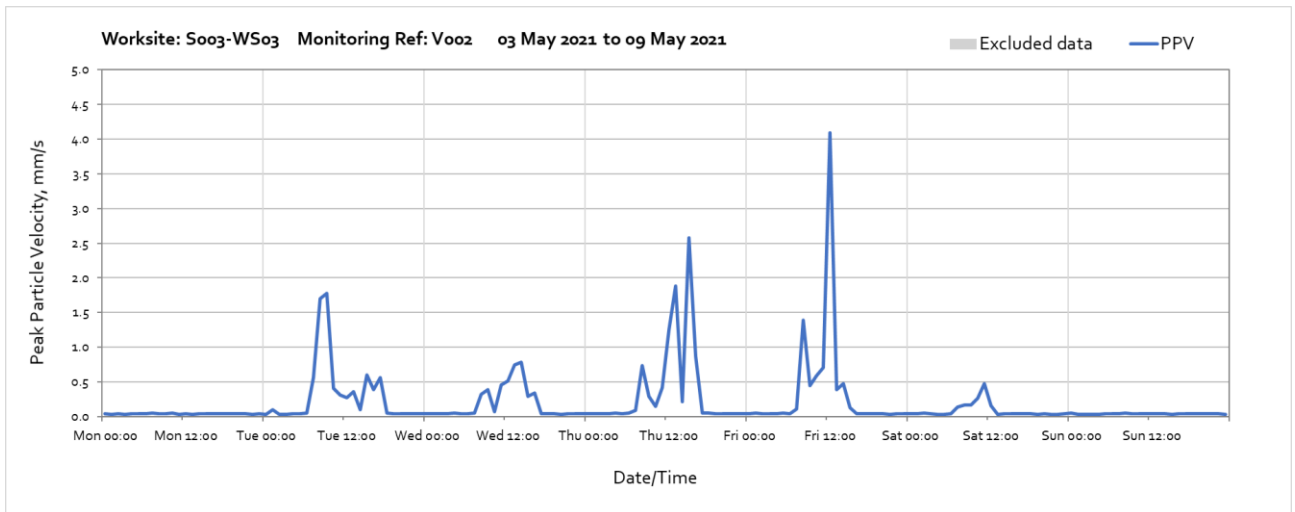
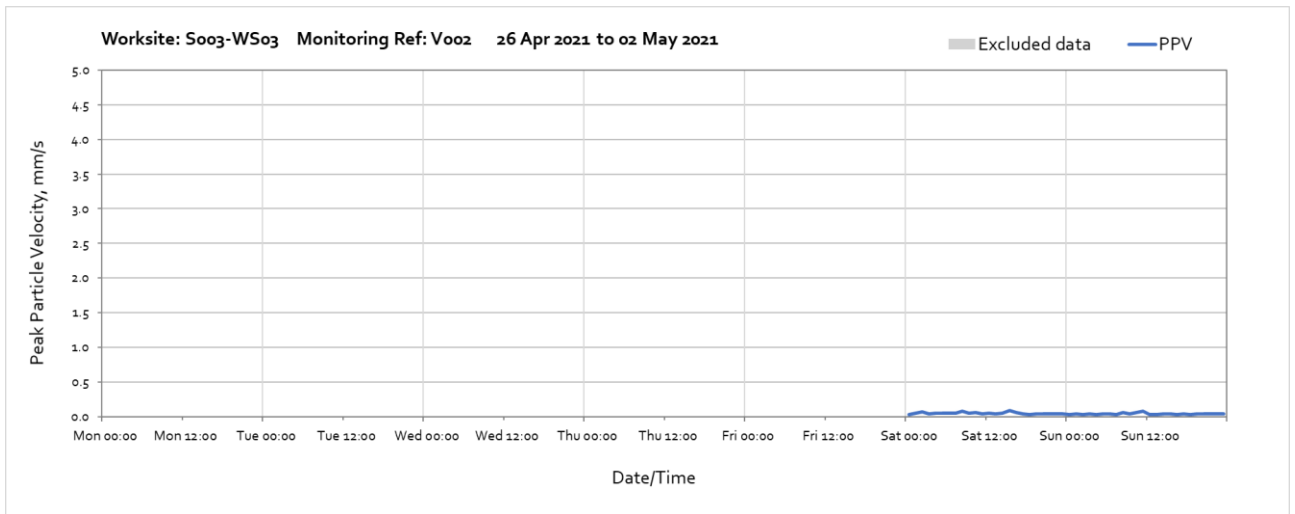


Note: High vibration levels measured throughout the week were due local interference of the monitor and are not representative of HS2 vibration levels.

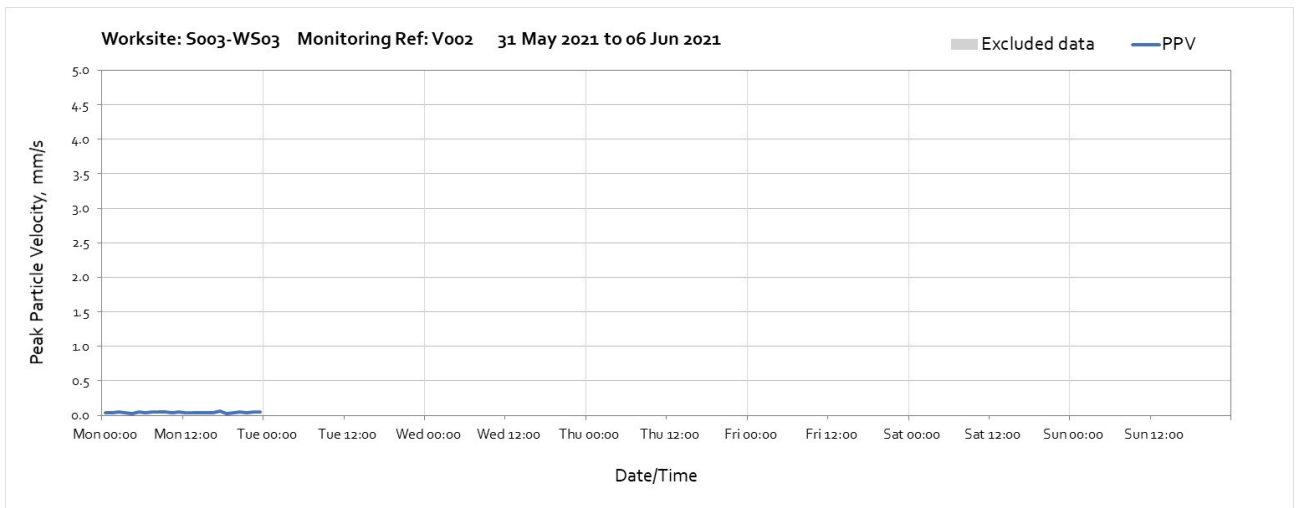
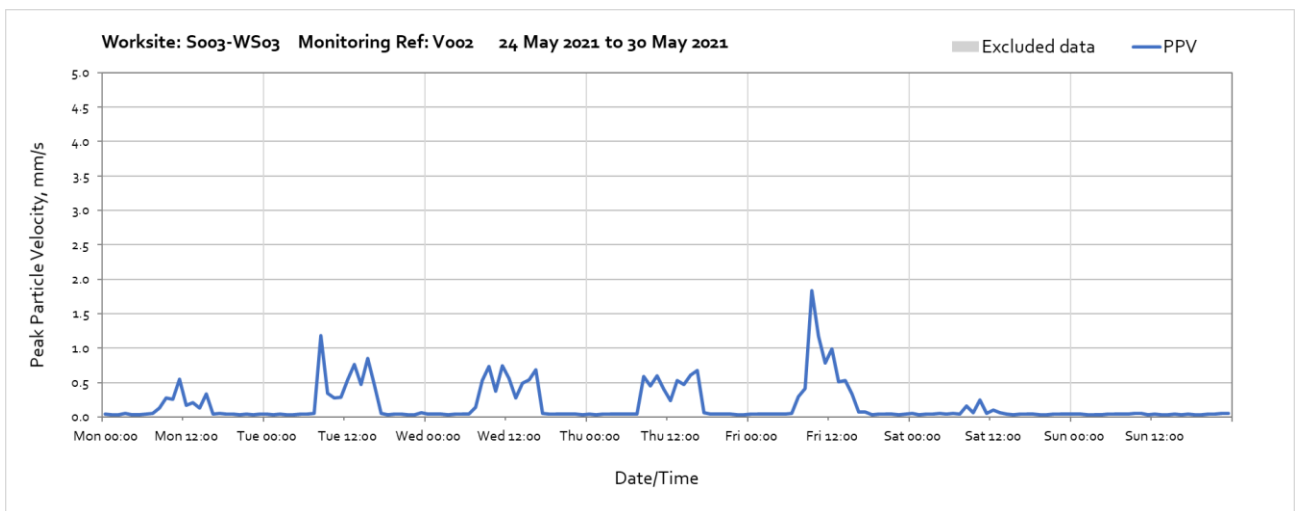
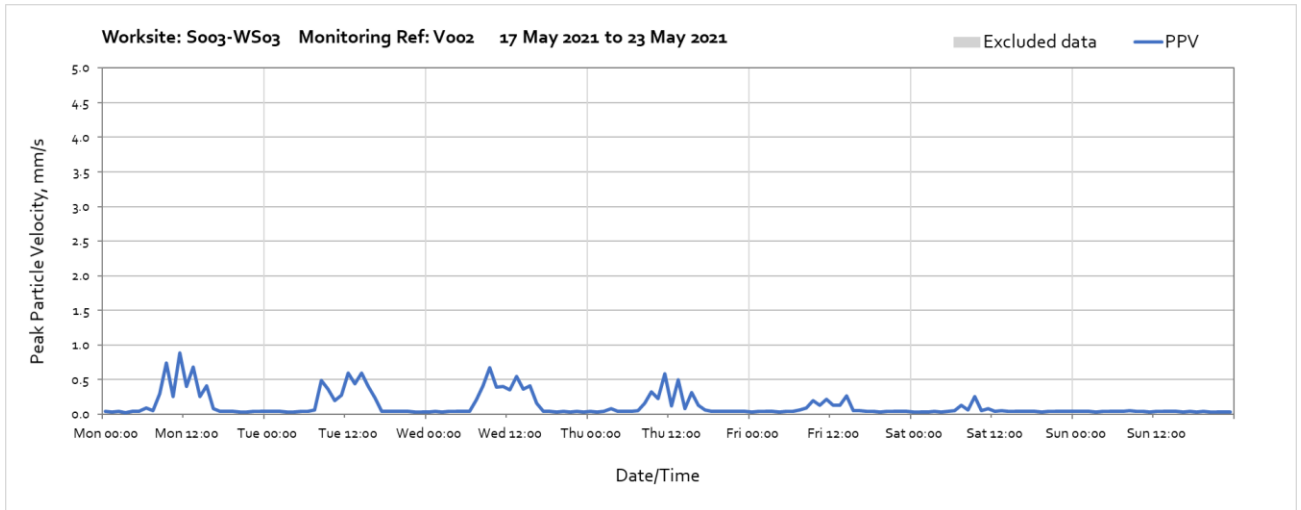


Note: High vibration levels measured throughout Monday 31st May were due to local interference of the monitor and are not representative of HS2 vibration levels.

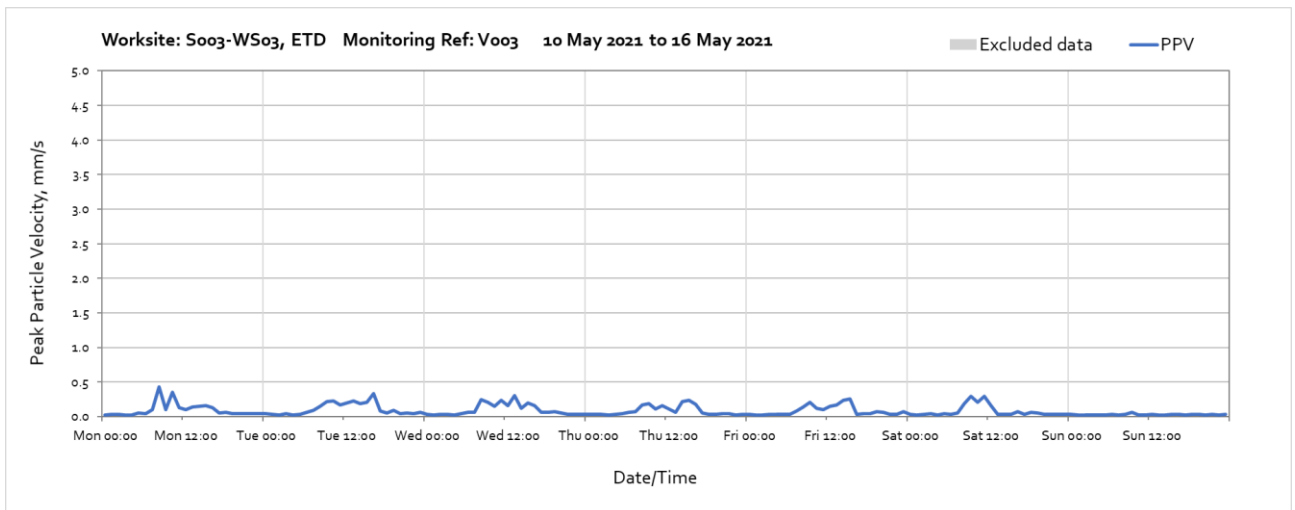
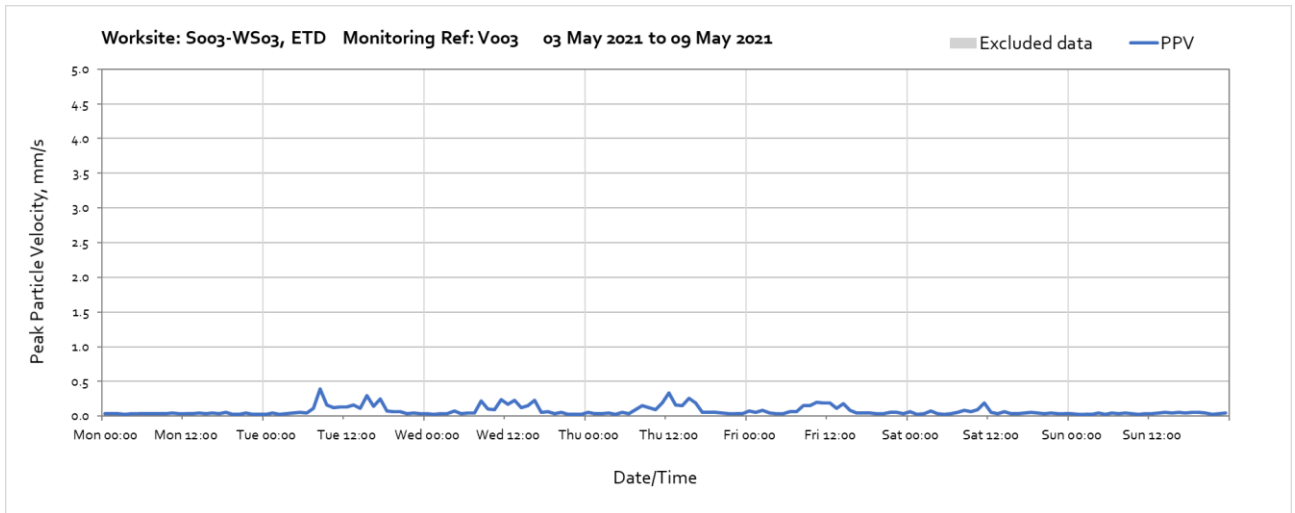
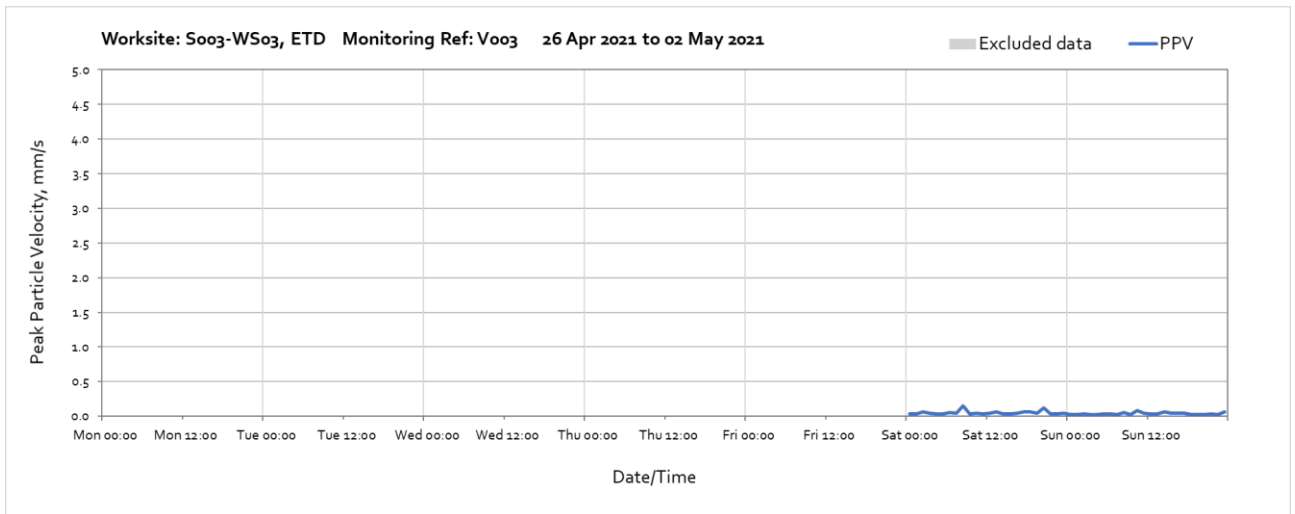
Worksite: S003-WS03 – Monitoring Ref: V002

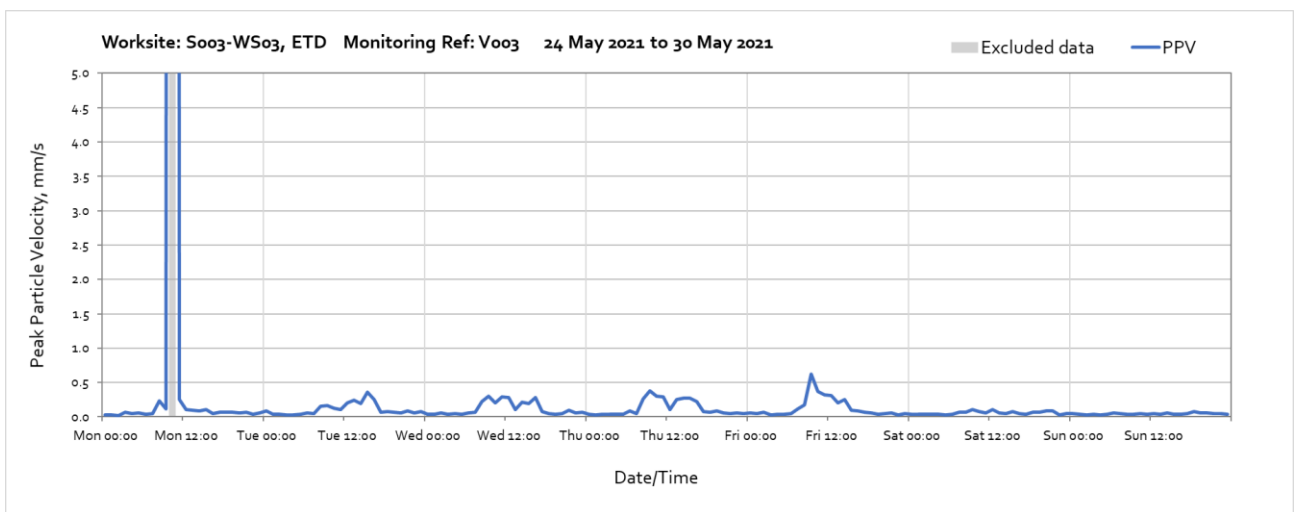
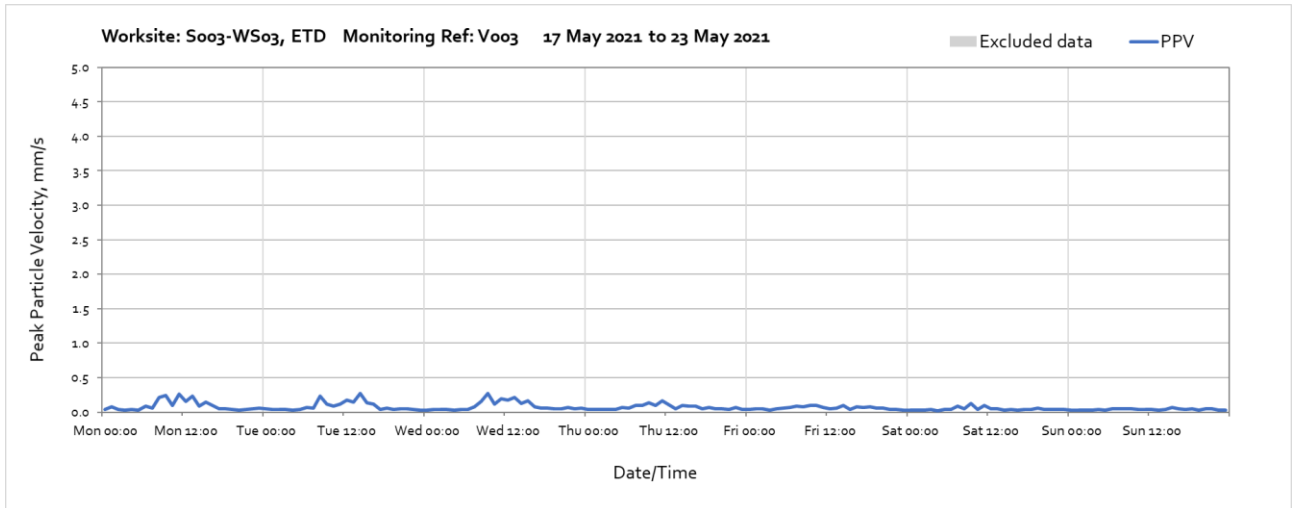


OFFICIAL



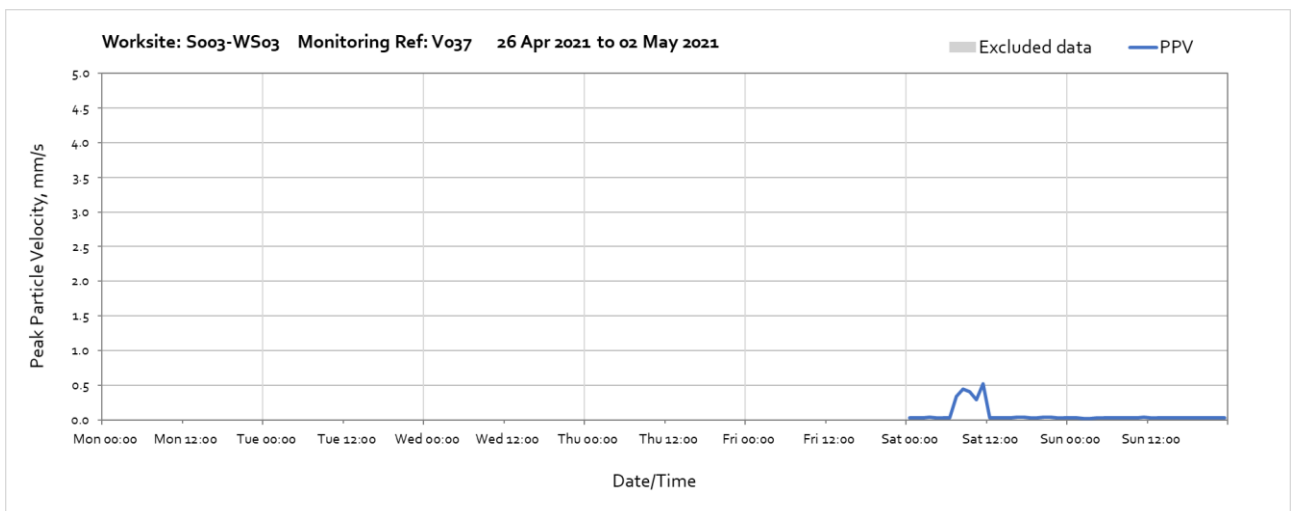
Worksite: S003-WS03, ETD – Monitoring Ref: V003

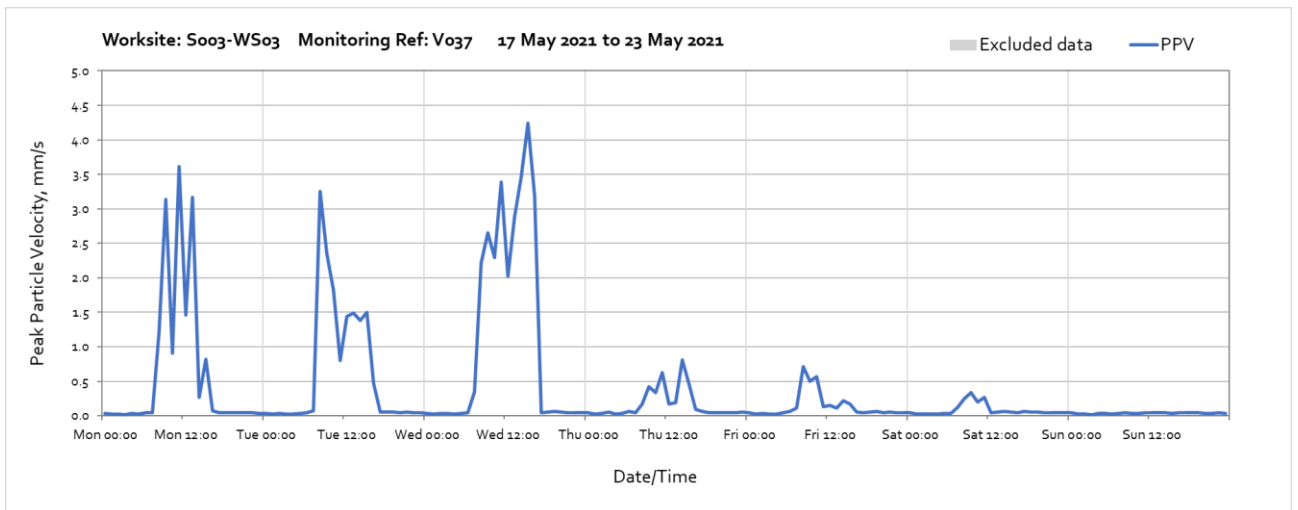
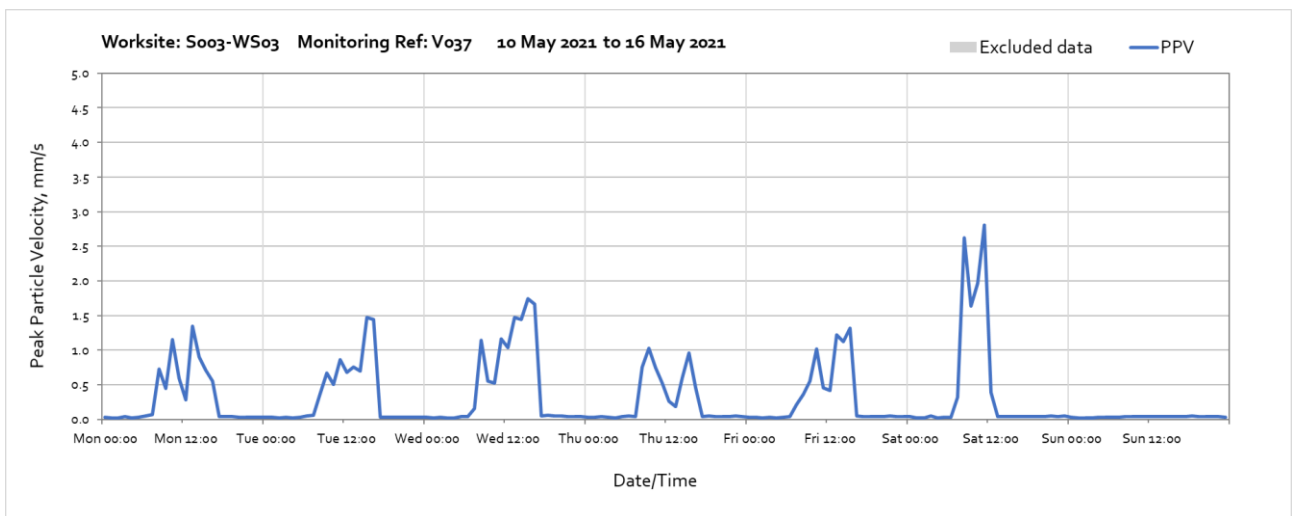
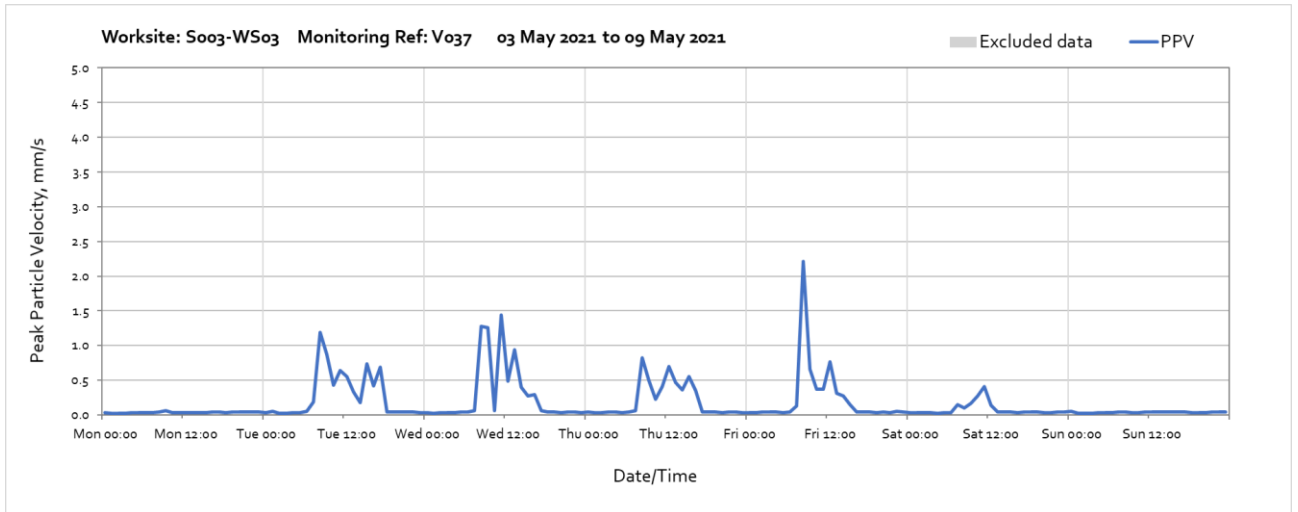


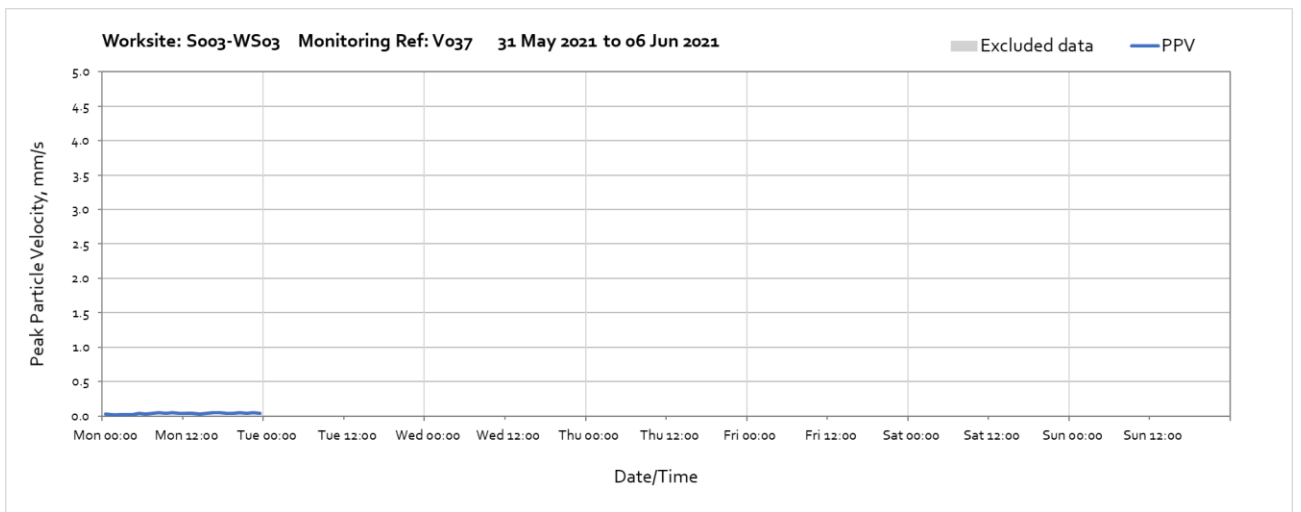
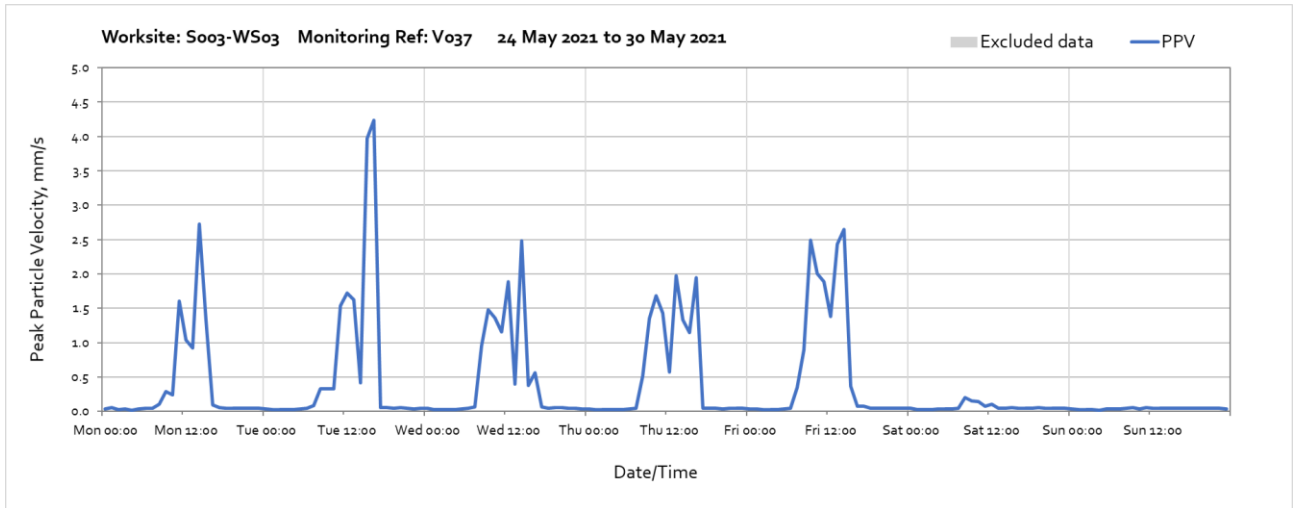


Note: High vibration levels measured between 10:00 – 11:00 on Monday 24th May were due to local interference of the monitor and are not representative of HS2 vibration levels.

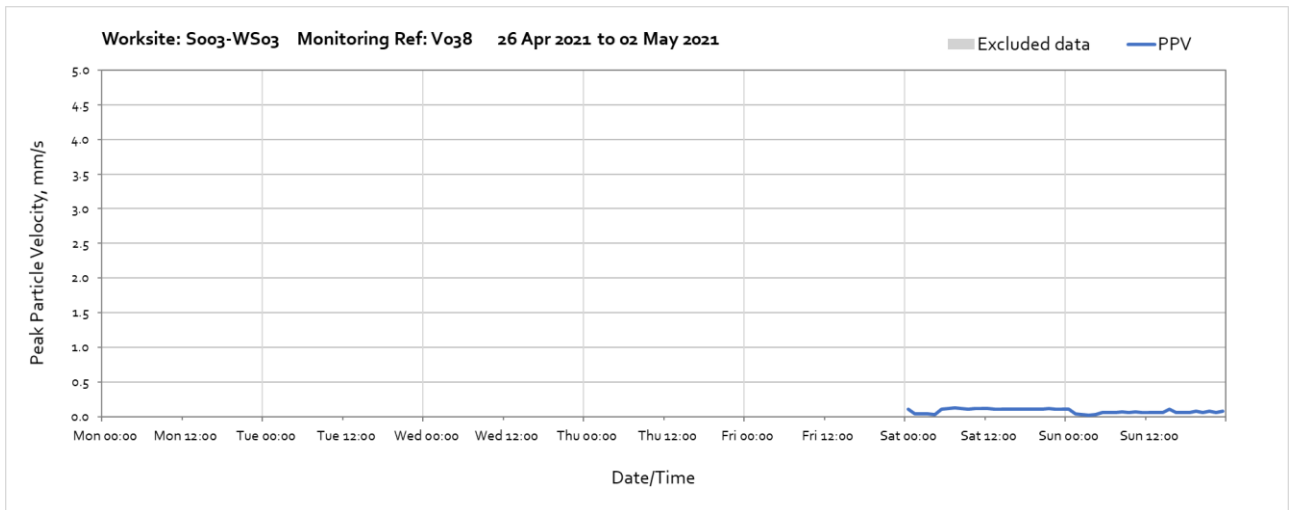
Worksite: S003-WS03 – Monitoring Ref: V037

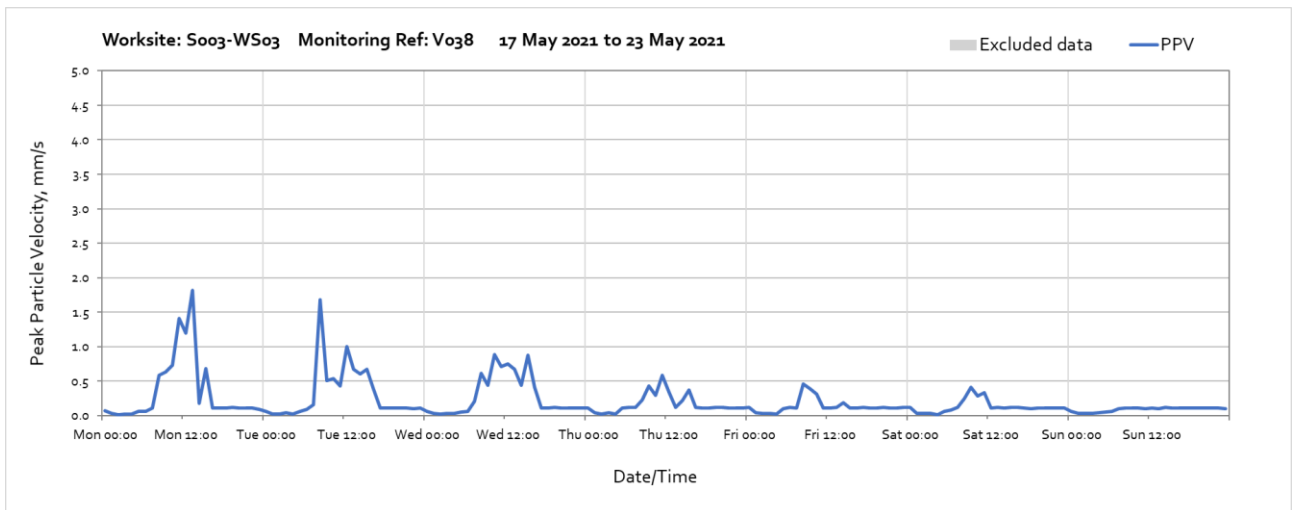
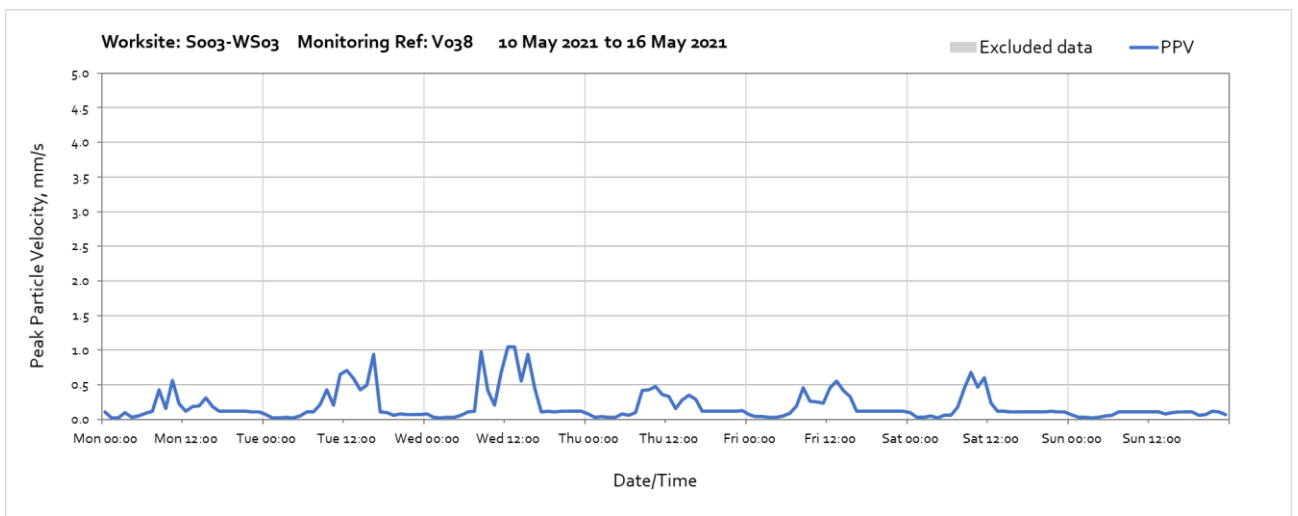
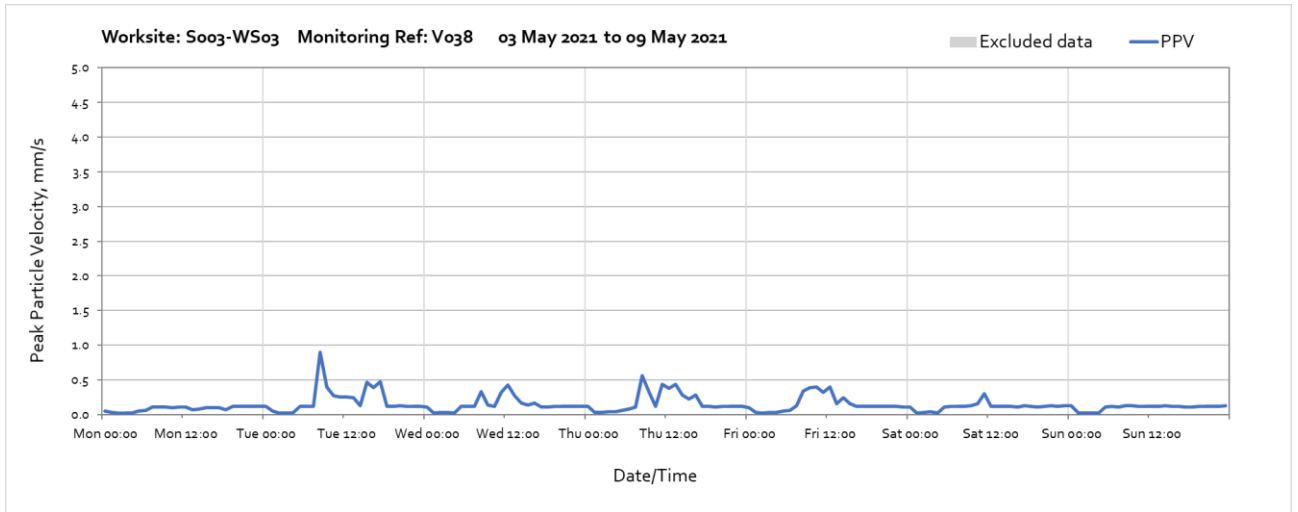


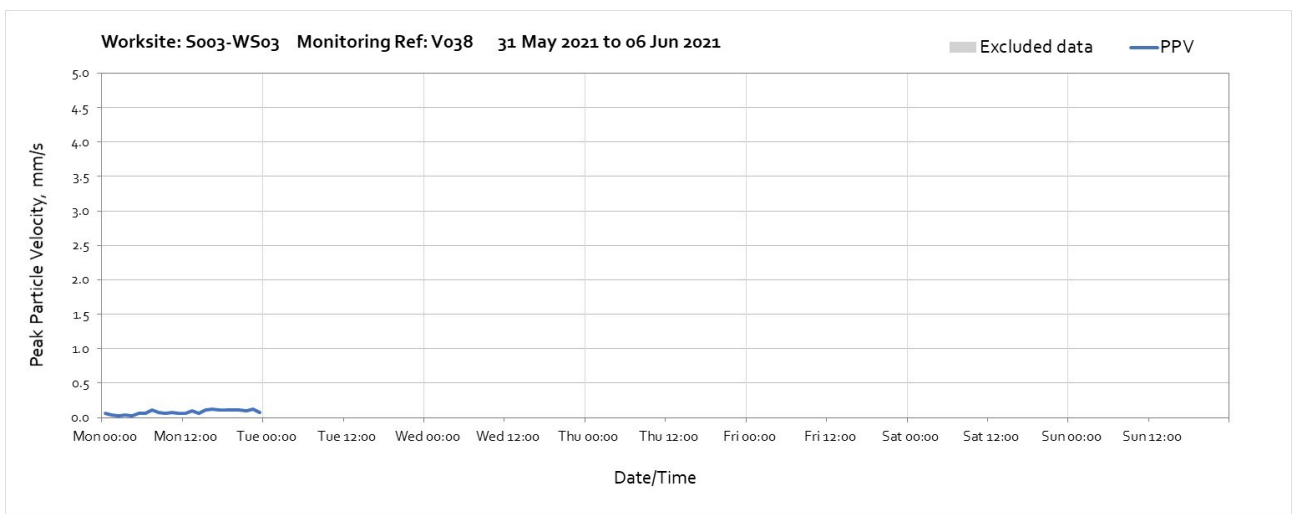
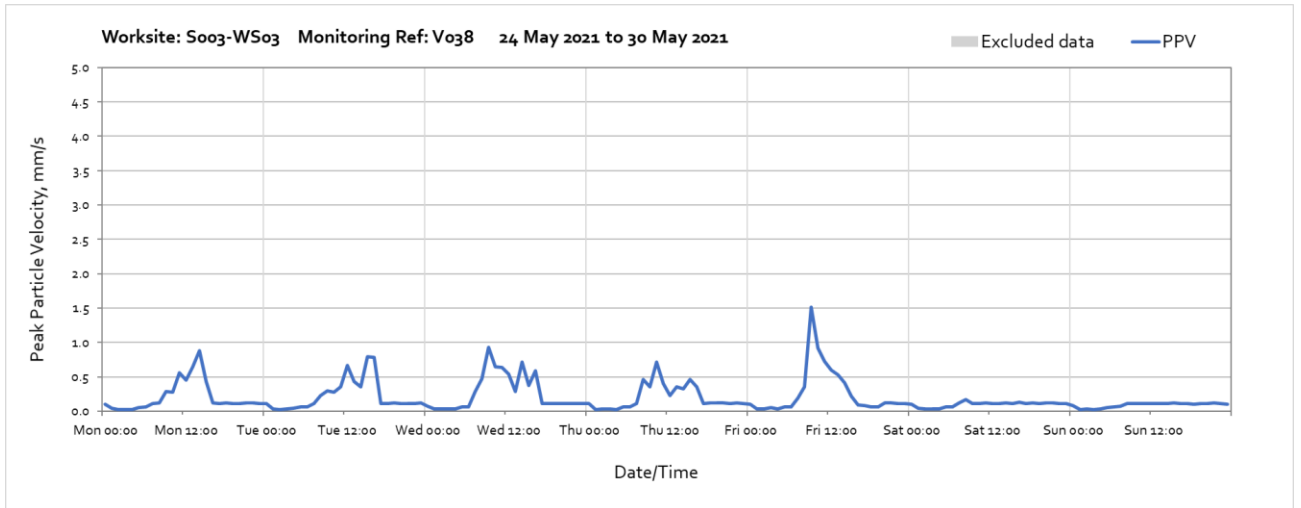




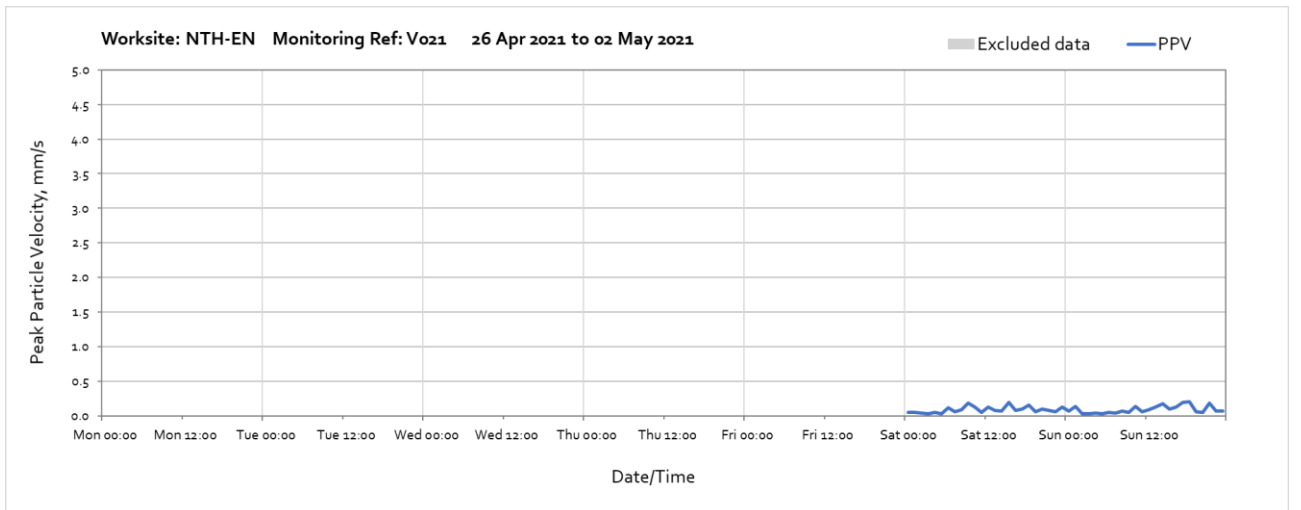
Worksite: S003-WS03 – Monitoring Ref: V038

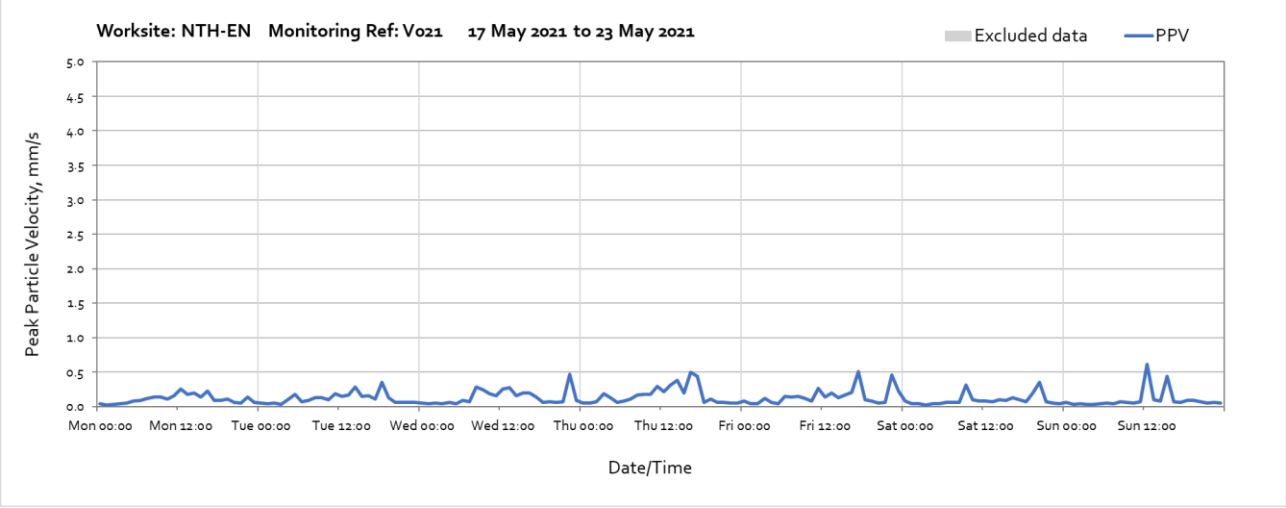
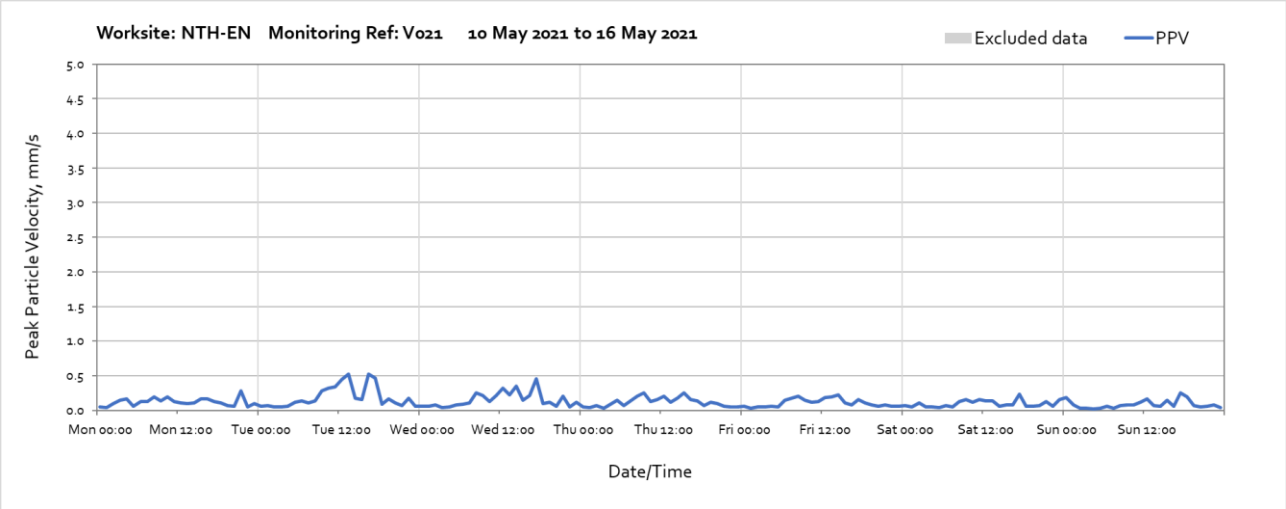
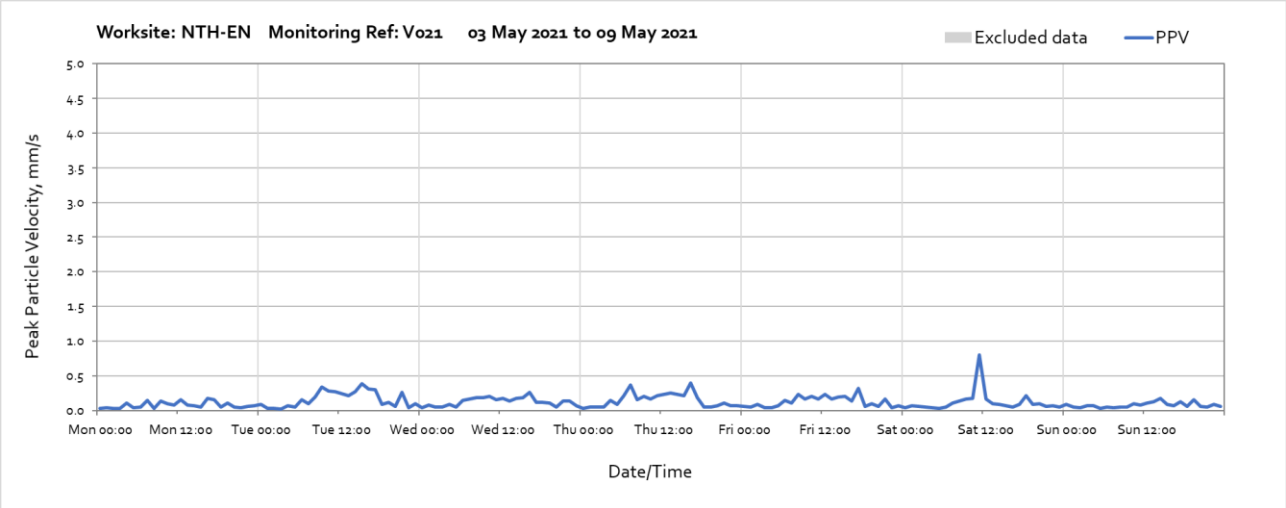


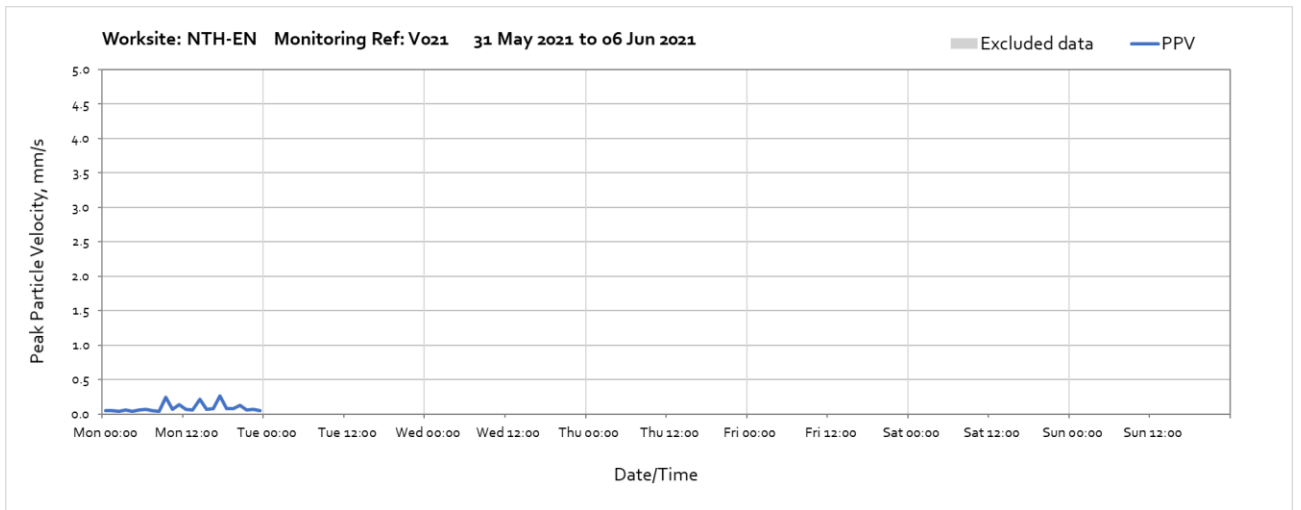
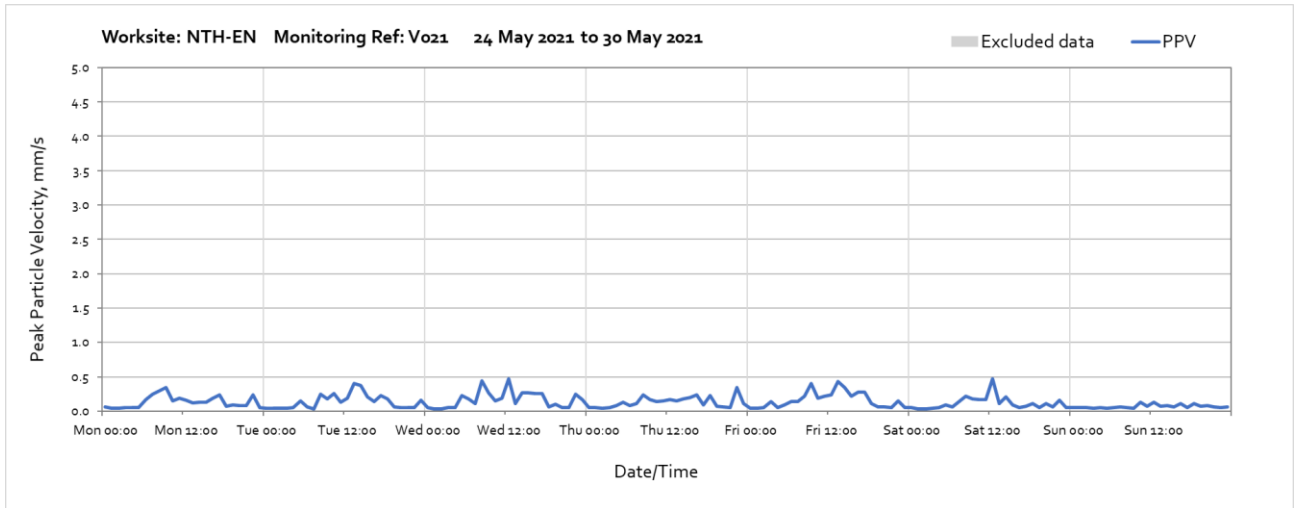




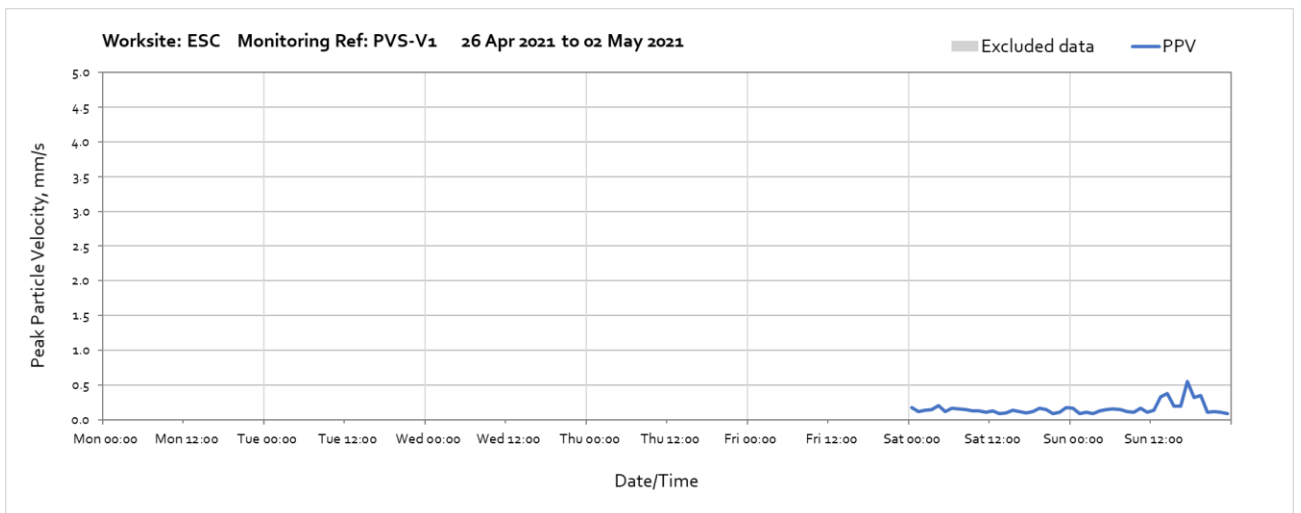
Worksite: NTH-EN – Monitoring Ref: V021

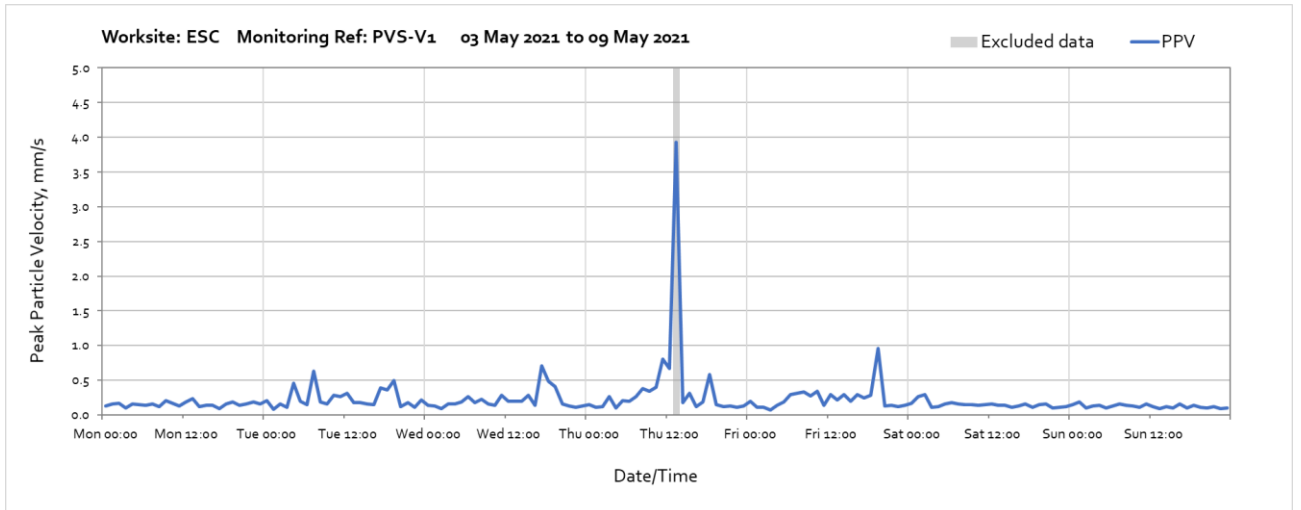




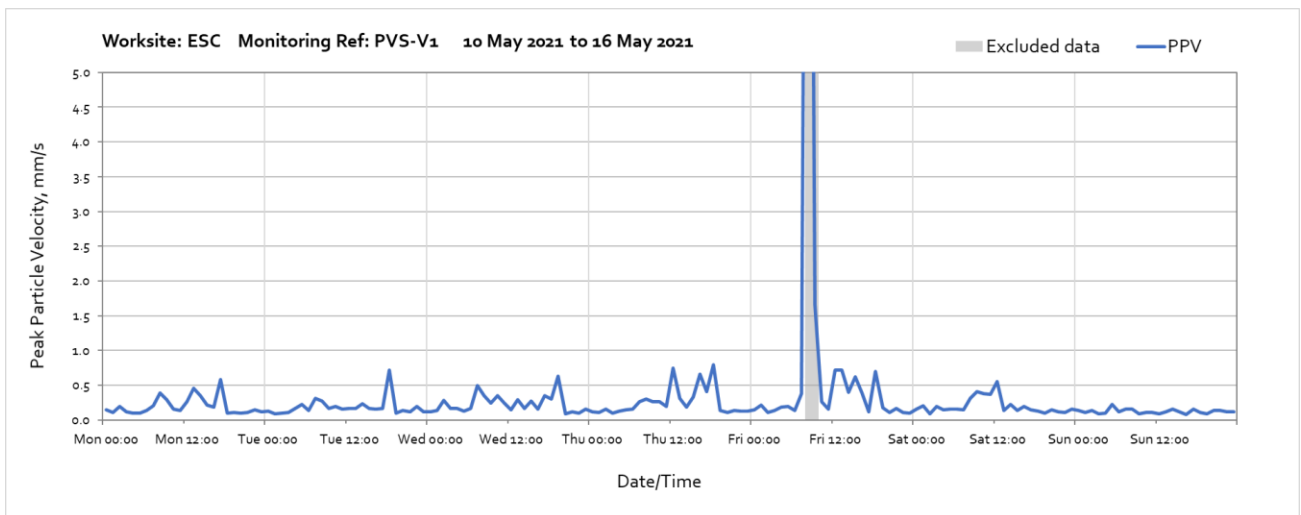


Worksite: ESC – Monitoring Ref: PVS-V1

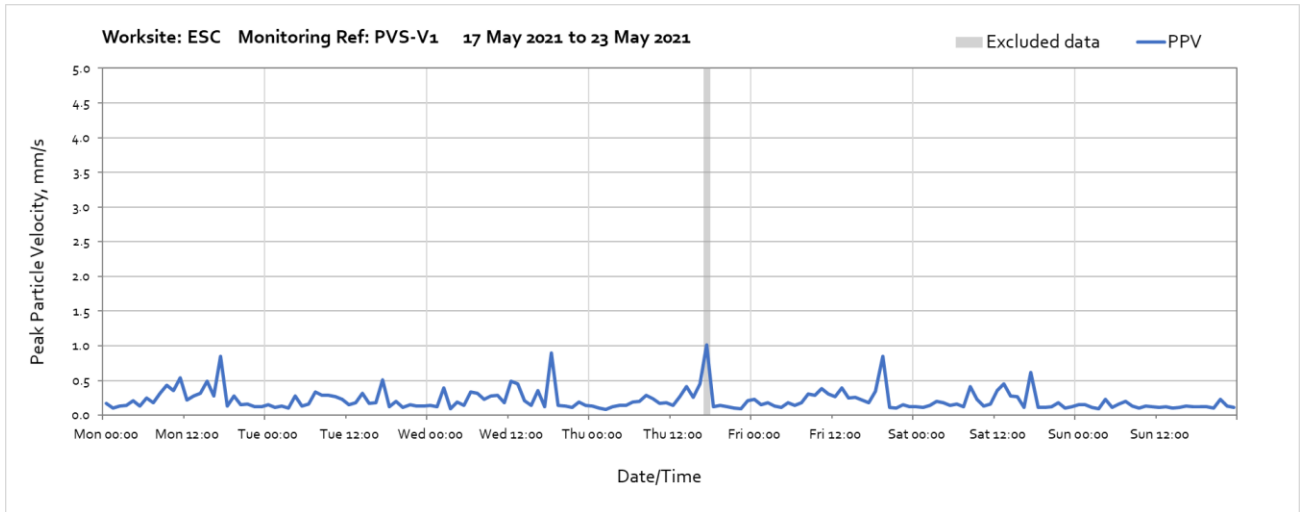




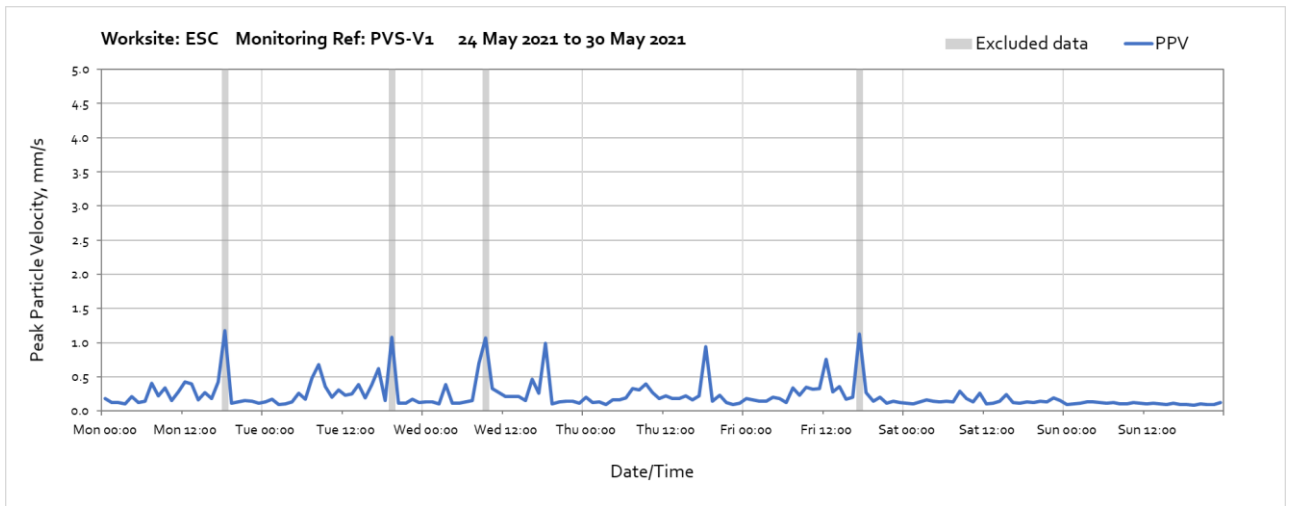
Note: High vibration levels measured between 13:00 and 14:00 on Thursday 6th May were due to local interference of the monitor and are not representative of HS2 vibration levels.



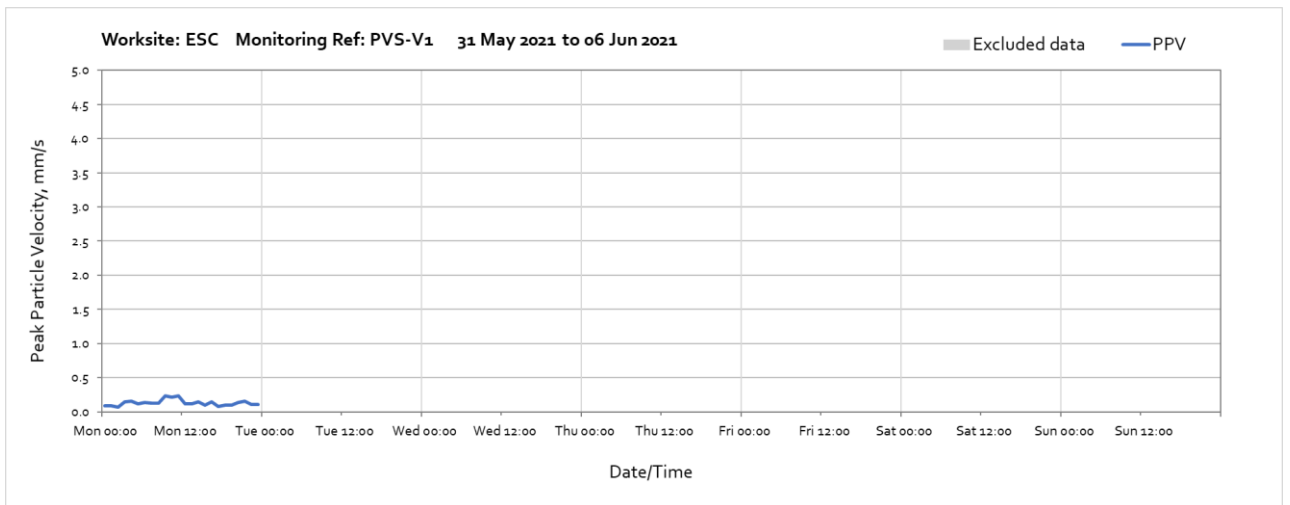
Note: High vibration levels measured between 08:00 and 10:00 on Friday 14th May were due to local interference of the monitor and are not representative of HS2 vibration levels.



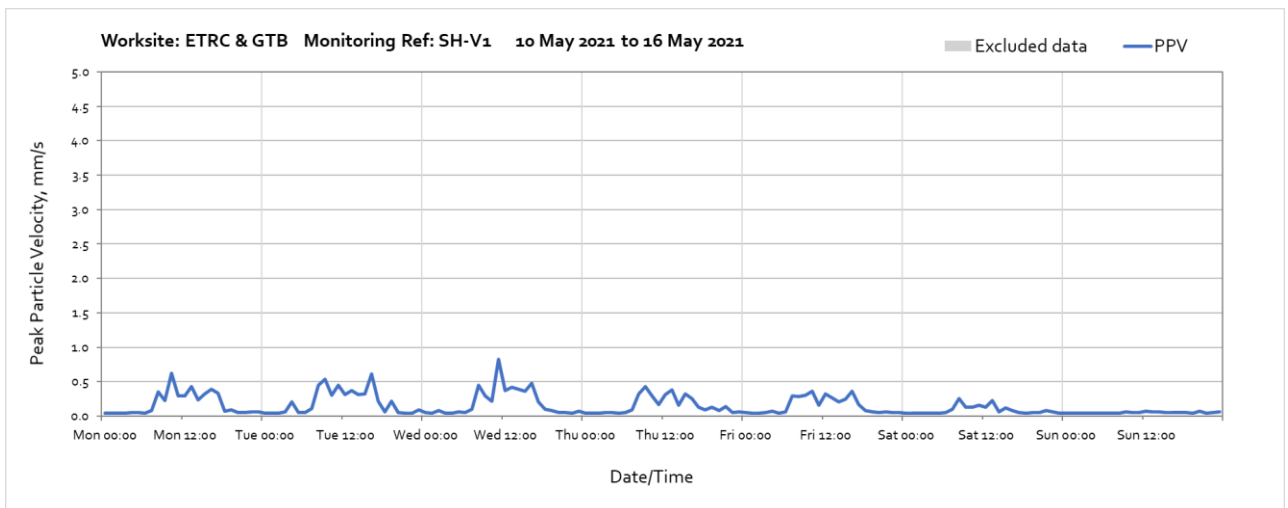
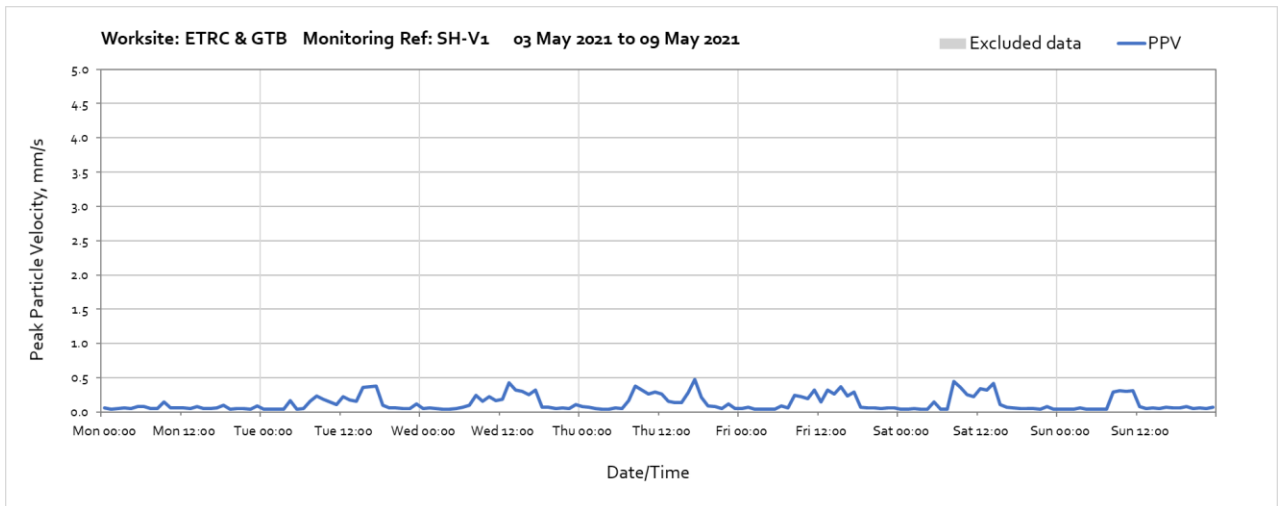
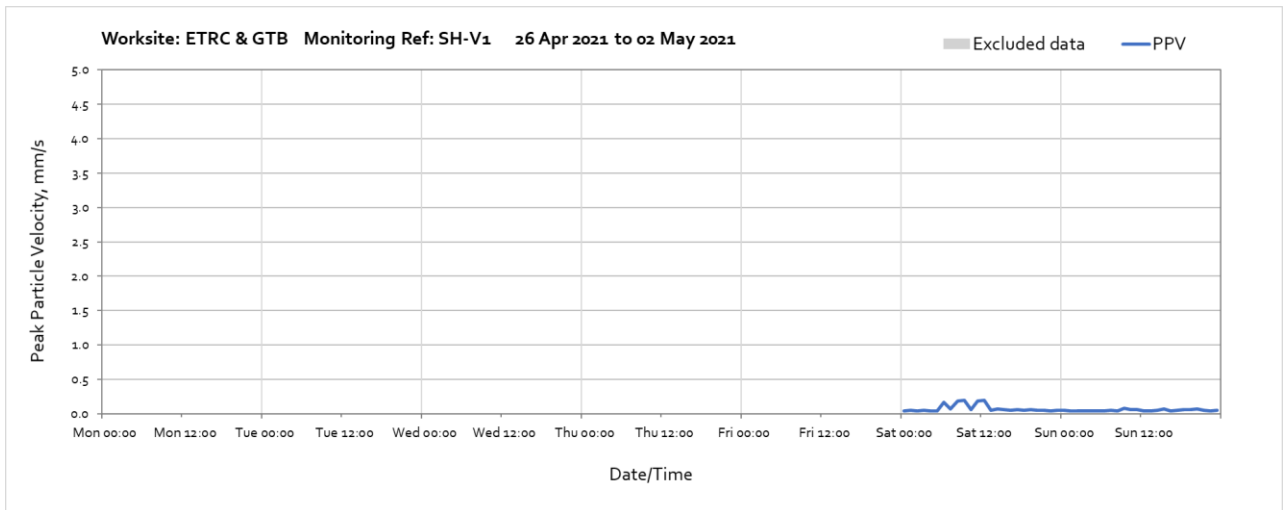
Note: Higher vibration levels measured between 17:00 and 18:00 were due to works being undertaken within close proximity of the monitoring station and are not representative of HS2 vibration levels.

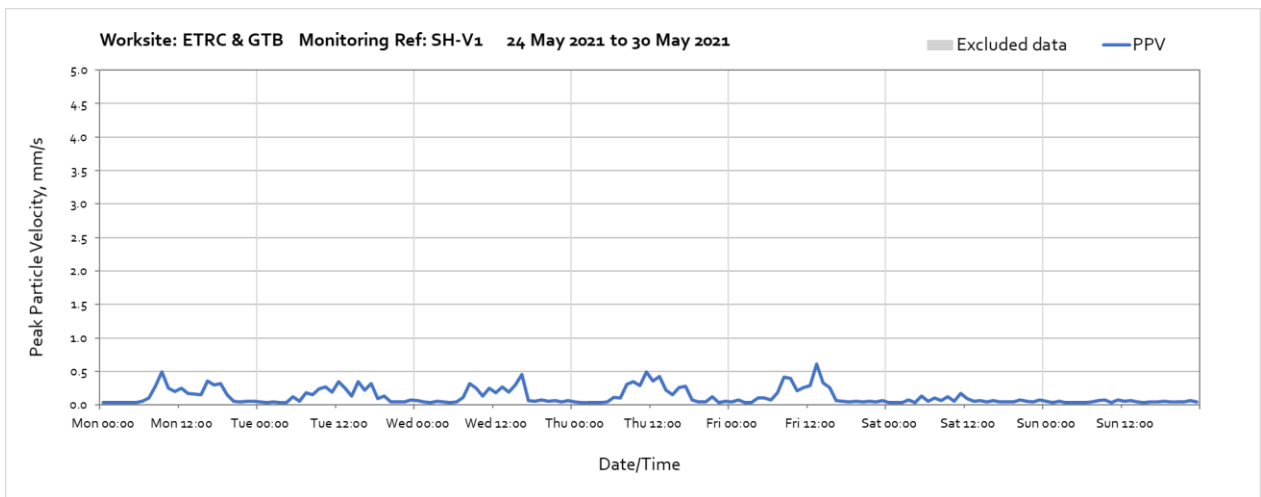
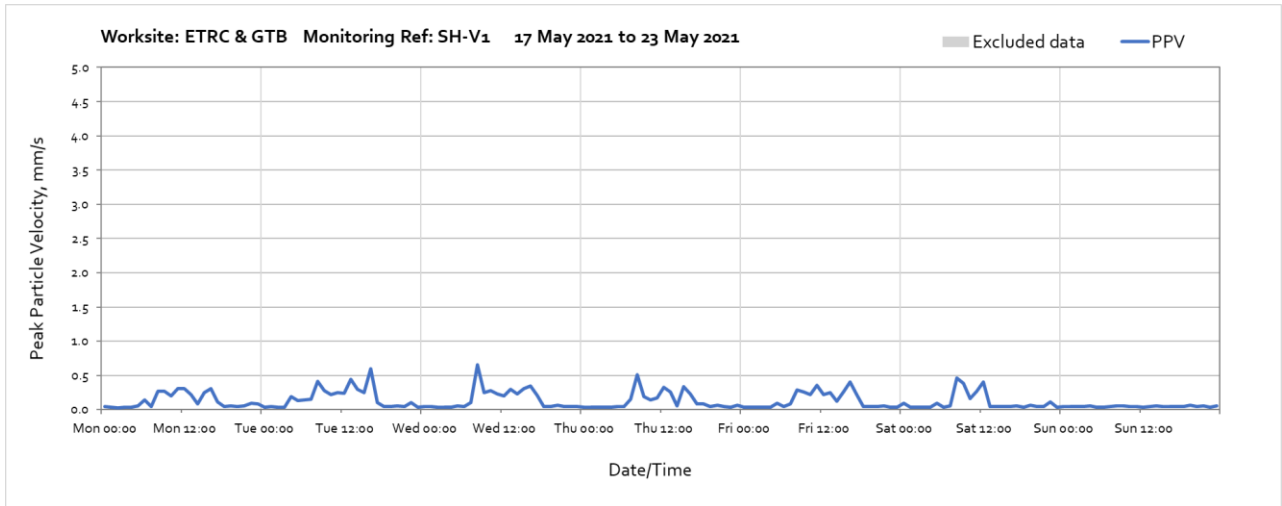


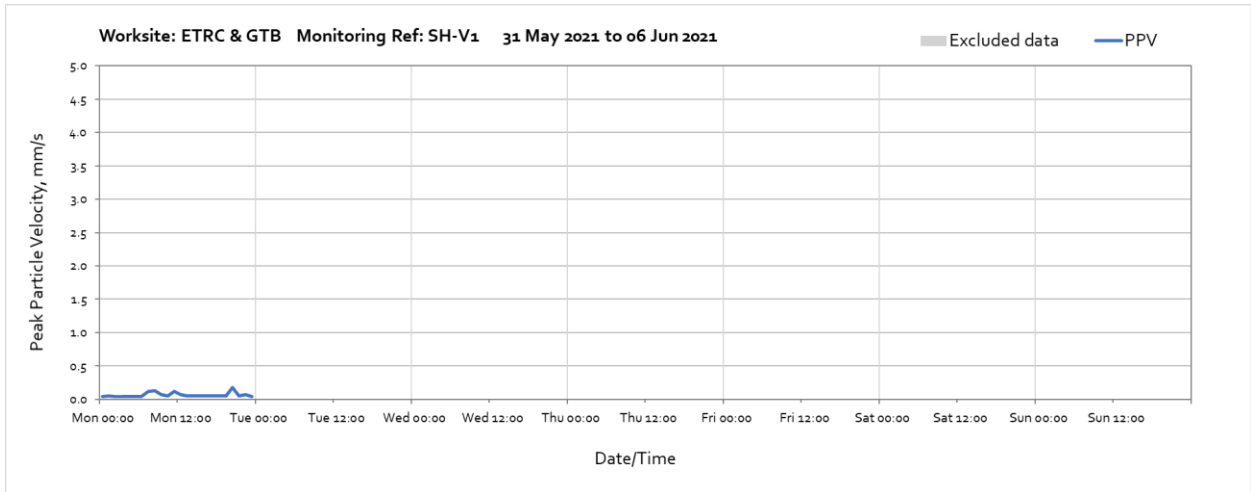
Note: Higher vibration levels measured throughout the week were due to works being undertaken within close proximity of the monitoring station and are not representative of HS2 vibration levels.



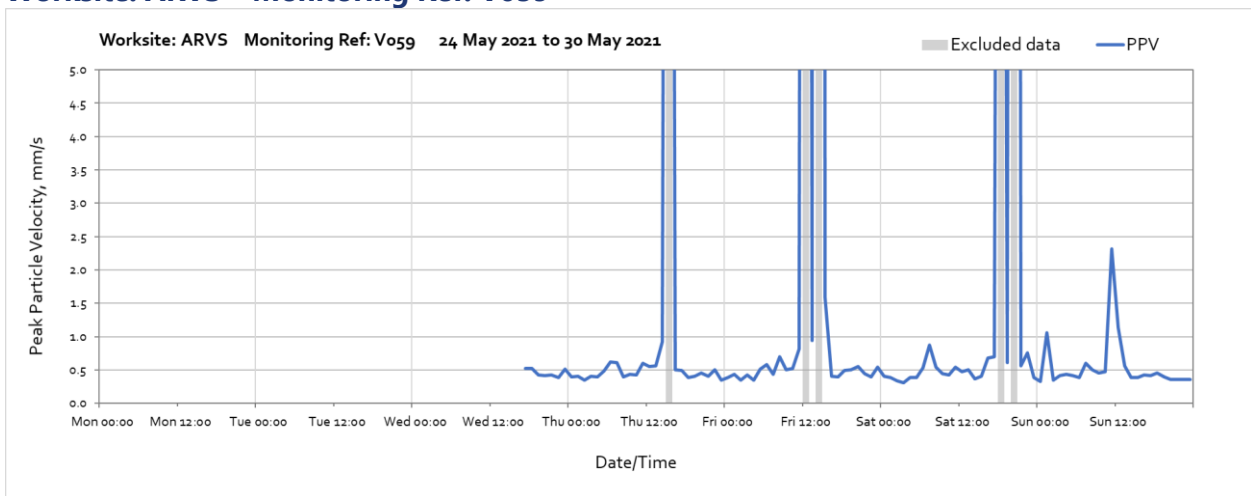
Worksite: ETRC & GTB – Monitoring Ref: SH-V1



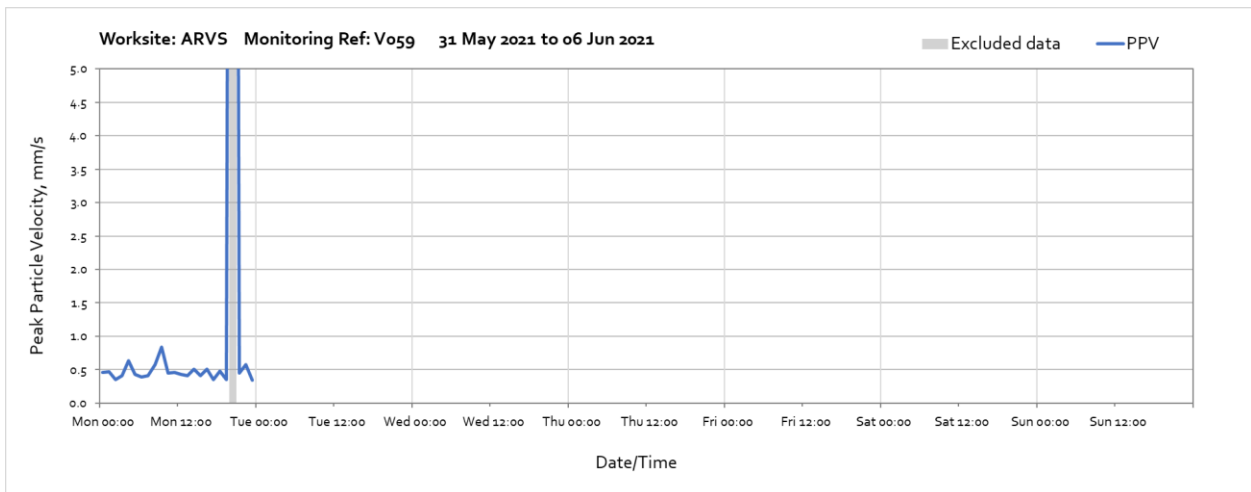




Worksite: ARVS – Monitoring Ref: V059



Note: Monitor was installed at 17:00 on Wednesday 26th May. High vibration levels measured throughout the week were due to local interference of the monitor and are not representative of HS2 vibration levels.



Note: High vibration levels measured between 20:00 and 21:00 on Monday 31st May were due to local interference of the monitor and are not representative of HS2 vibration levels.

