

Construction noise and vibration Monthly Report – July 2021

London Borough of Camden

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Non-Technical Summary

This Noise and Vibration Monitoring Report fulfils HS2 Limited's commitment detailed in the Environmental Minimum Requirements (EMRs), Annex 1, Code of Construction Practice, to present the results of noise and vibration monitoring carried out within the London Borough of Camden during the month of July 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 utility works, vegetation clearance, installation of working platforms, concrete pouring, installation of site welfare units, digging of trial holes and hoarding and fencing works were underway.
- Noise monitoring was undertaken in the vicinity of Euston Throat Retained Cut and Granby Terrace Bridge worksite (ref.: ETRC & GTB) where piling, pile cap trials, welfare unit fitout works, drain pipe installation, utility works, portable water installation, excavation and movement of arisings, concrete breaking, vegetation clearance, roadworks and earthworks were underway.
- Noise monitoring was undertaken in the vicinity of Euston Scissor Cut worksite (ref.: ESC) where line works, piling, electricity substation installation, roadworks, wall demolitions and installation, pile mat construction and excavations were underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Hampstead Road Bridge worksite (ref.: HRB) where hoarding works, utility works and roadworks were underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Euston Cavern worksite (ref.: ECAV), where wall works and pile mate construction were underway.
- Noise monitoring was undertaken in the vicinity of On-Network worksites (ref.: B, C, D, E, F, G and H), where:
 - excavation of track-side trial pits (worksite E); and
 - cable management systems works (worksite H).
- Noise monitoring was undertaken in the vicinity of the 140 Hampstead Road and Power Signal Box worksite (ref.: S001-WS02), where demolition and earthworks were 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 earthworks 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 no works were undertaken.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital - Euston North worksite (ref.: NTH-EN) where concrete pouring, gate and hoarding works, extension of access, removal of brick walls, installation of level markers and borehole drilling were underway.
- Noise monitoring was undertaken in the vicinity of the Euston Towers Demolition worksite (ref.: ETD), where demolition and hoarding works were underway.
- Noise monitoring was undertaken in the vicinity of the Vehicle Holding Area worksite (ref.: VHA), where vehicle movements were underway.
- Noise monitoring was undertaken in the vicinity of the Traction Substation worksite (ref.: TSS) where site setup, caisson ring installation and concrete lining works were underway.
- Noise monitoring was undertaken in the vicinity of the Interim Taxi Rank worksite (ref.: ITR), where site maintenance was underway.

Further works, where monitoring did not take place, were:

- Stephenson Way, Regnart Buildings, Gower Street and Harrington Street where utilities works were underway;
- Doric Way, where borehole drilling was 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 nine (9) times due to HS2 works in the Local Authority Area during July 2021.

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

Ten (10) 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 July 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:
 - utility works (saw cutting, road breakout, excavations, duct laying and backfilling);
 - vegetation clearance;
 - installation of working platforms;
 - concrete pour of slab for security cabin;
 - installation of new welfare area (installation of plinths, utility run, temporary sewage holding tank, installation of site cabins during weekend shift and relocation of generator);
 - digging of trial holes; and
 - installation of hoarding and modification of access gate.
- Euston Throat Retained Cut and Granby Terrace Bridge worksite ref.: ETRC & GTB (see plan 2 in Appendix A), where work activities included:
 - sheet piling;

- bored piling (case installation, digging, cage installation, concrete pour and vacuum excavation of excess concrete);
 - pile cap trial;
 - welfare unit fitout and electric works;
 - earthworks (excavation, backfill and compaction) for drain pipe installation;
 - utility works (sewer connection) on Stanhope Street;
 - portable water installation;
 - excavation and movement of arisings;
 - concrete breaking;
 - vegetation clearance;
 - haul road modification; and
 - earthworks (compaction).
- Euston Scissor Cut worksite ref.: ESC (see plan 2 in Appendix A), where work activities included:
 - line works (mobilisation, bridge strengthening and anchor installation);
 - contiguous pile piling;
 - low voltage substation installation;
 - haul road modification;
 - wall demolition (excavations, concrete breaking, backfilling, compaction and muckaway);
 - wall works (coring, installation of ground anchors and unexploded ordnance survey probing);
 - wall capping beam installation (steel fixing, formworks, sheet piling, concrete pouring and breaking out of guide walls);
 - portal pile mat construction (excavation, backfill, compaction, muckaway and piling); and
 - bulk excavations.
- Hampstead Road Bridge worksite ref.: HRB (see plan 3 in Appendix A), where work activities included:
 - hoarding modifications;
 - utility works (temporary site installation, removal of tree stump and road breaking); and

- modification of central reservation on Hampstead Road (fencing works, digging of trial pit, breaking out of central reservation, excavation, concrete pouring and repositioning of kerbs).
- Euston Cavern worksite ref.: ECAV (see plan 3 in Appendix A), where work activities included:
 - wall works on Park Village East (coring, installation of ground anchors and unexploded ordnance survey probing); and
 - portal pile mat construction (excavations, backfilling, compaction, muckaway and piling)
- On-Network worksites ref.: B, C, D, E, F, G and H (see plan 3 in Appendix A), where work activities included:
 - excavation of track-side trial pits (worksite E) and;
 - cable management systems works (worksite H).
- 140 Hampstead Road and Power Signal Box worksite ref.: S001-WS02 (see plan 2 in Appendix A), where work activities included:
 - substructure demolition; and
 - earthworks (ground remediation and backfilling).
- Wolfson House, Walkden House, 67-75 & 77-79 Euston Road worksite ref.: S003-WS03 (see plan 3 in Appendix A), where work activities included:
 - earthworks (backfilling); and
 - propping.
- Former National Temperance Hospital, 110 Hampstead Road worksite ref.: S003-WS06 (see plan 3 in Appendix A), where no works were undertaken.
- Former National Temperance Hospital - Euston North worksite ref.: NTH-EN (see plan 3 in Appendix A), where work activities included:
 - concrete pouring;
 - relocation of access gate on Starcross Street;
 - refurbishment of hoarding on Cardington Street and Hampstead Road;
 - extension to Maris Fidelis access;
 - removal of brick wall at Maria Fidelis to allow sheet pile installation;
 - installation of deep level markers (deep datum installation) at Maria Fidelis; and
 - borehole drilling adjacent Cardington Street.
- Euston Towers Demolition worksite ref.: ETD (see plan 3 in Appendix A), where work activities included:

- ground floor slab demolition; and
- refurbishment of site hoarding.
- Vehicle Holding Area worksite ref.: VHA (see plan 1 in Appendix A), where work activities included:
 - general compound operation (vehicle movements).
- Traction Substation worksite ref.: TSS (see plan 3 in Appendix A), where work activities included:
 - completion of site setup including muck bays and services;
 - completion of caisson ring installation including grouting; and
 - spray concrete lining works.
- Interim Taxi Rank worksite ref.: ITR (see plan 3 in Appendix A), where work activities included:
 - site maintenance.

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

- Stephenson Way, Regnart Buildings, Gower Street and Harrington Street where utilities works were undertaken;
- Doric Way, where completion of borehole drilling was 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 July in the LBC area. Table 2 summarises the position of noise and vibration monitoring installations within the LBC area in July 2021.

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

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
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)
	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, H	HH	Euston Station Parcel Deck, Barnby Street
G	BS	Roof of Stockbeck House, Barnby Street

Worksite Reference	Measurement Reference	Address
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 LAeq Data over the Monitoring Period

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average LAeq,T (Highest Day LAeq,T)					Saturday Average LAeq,T (highest day LAeq,T)					Sunday / Public Holiday Average LAeq,T (highest day LAeq,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 (72.9)	67.9 (73.3)	67.1 (71.8)	67.8 (79.4)	63.4 (71.7)	64.0 (66.6)	65.3 (66.2)	65.4 (66.9)	66.6 (72.6)	64.5 (73.5)	65.5 (70.0)	63.9 (69.4)
	N052	Adelaide Road-Beaumont Walk	Free-field	65.3 (72.3)	66.2 (68.9)	65.7 (72.2)	66.3 (72.7)	62.5 (73.1)	63.4 (65.0)	63.5 (65.4)	65.5 (68.2)	66.2 (76.5)	63.0 (72.5)	63.7 (68.5)	62.3 (65.8)
B	JC	Juniper Crescent	Free-field	56.9 (58.9)	57.5 (59.6)	56.5 (58.1)	58.5 (62.0)	54.6 (58.2)	56.5 (58.1)	56.5 (57.9)	55.0 (55.3)	55.2 (59.1)	51.3 (57.1)	54.8 (57.7)	53.3 (56.6)
ESC	N024	External to Park Village Studios, Park Village East	Free-field	58.7 (64.0)	65.9 (84.0)	58.7 (62.1)	57.2 (64.5)	53.9 (71.1)	54.9 (56.1)	60.8 (68.7)	59.1 (63.9)	57.8 (63.3)	53.4 (60.9)	56.0 (63.6)	52.0 (55.5)
	N047	Park Village East/Mornington Street bridge, lamppost #13	Free-field	59.6 (65.4)	62.4 (73.4)	60.7 (62.4)	59.1 (62.5)	53.7 (61.7)	55.5 (56.1)	58.9 (60.2)	59.2 (62.0)	58.8 (62.2)	54.0 (60.5)	57.3 (60.9)	53.1 (57.0)
ESC, C	N022	External to 34 Mornington Terrace	Free-field	59.2 (65.5)	60.6 (64.7)	59.2 (60.9)	58.4 (61.5)	53.5 (59.0)	56.9 (57.8)	58.4 (59.4)	58.9 (61.1)	57.6 (59.7)	53.4 (61.1)	56.4 (59.8)	52.8 (56.7)
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18	Free-field	62.9 (67.1)	63.9 (65.9)	62.9 (64.7)	62.5 (65.3)	57.5 (63.6)	61.7 (62.8)	62.9 (63.9)	63.3 (64.6)	62.2 (63.8)	56.6 (62.9)	61.2 (63.8)	57.6 (61.8)
ETRC & GTB	N001	External to Cubitt Court, 100 Park Village East	Free-field	58.6 (63.2)	68.6 (74.5)	61.2 (70.4)	58.9 (63.9)	52.2 (57.9)	54.5 (55.8)	64.1 (67.1)	59.4 (61.8)	58.3 (62.4)	53.0 (56.8)	56.5 (63.0)	52.3 (57.5)
	N002	Richmond Court, Park Village East	Free-field	58.2 (60.9)	62.7 (65.1)	61.1 (63.2)	58.7 (62.2)	53.0 (61.0)	54.7 (56.3)	59.8 (61.1)	59.2 (61.4)	58.9 (63.0)	53.7 (57.3)	56.5 (59.1)	52.3 (56.2)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Saturday Average L _{Aeq,T} (highest day L _{Aeq,T})					Sunday / Public Holiday Average L _{Aeq,T} (highest day L _{Aeq,T})	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
	N003	Silsoe House, Park Village East	Façade	58.7 (61.5)	62.2 (64.8)	61.1 (63.3)	59.0 (62.8)	53.5 (61.7)	54.6 (56.0)	59.3 (63.2)	59.2 (61.4)	59.0 (62.7)	54.3 (57.4)	56.9 (59.8)	53.6 (58.9)
ETRC & GTB, D	N004	Mornington Terrace, lamppost #7	Free-field	65.0 (69.4)	67.4 (70.1)	66.0 (70.5)	66.4 (75.2)	59.4 (70.3)	64.4 (66.1)	65.2 (67.6)	64.3 (65.1)	63.6 (65.9)	57.9 (64.6)	62.6 (67.1)	58.4 (65.2)
ETRC & GTB, E	N005	5A Granby Terrace	Free-field	65.2 (68.7)	68.5 (72.3)	65.8 (67.3)	65.4 (67.5)	61.6 (68.7)	63.2 (63.6)	66.5 (68.8)	64.8 (66.6)	63.6 (66.3)	60.8 (64.4)	63.2 (67.5)	61.1 (65.9)
ETRC & GTB, F	N023	Lamppost #21 on Hampstead Road	Free-field	68.3 (72.0)	70.2 (74.3)	67.9 (71.7)	67.4 (73.5)	65.9 (74.4)	66.5 (68.2)	68.1 (69.0)	67.7 (69.0)	67.2 (72.2)	65.4 (69.5)	67.4 (75.0)	66.1 (72.5)
HRB	N020	Mackworth Street, lamppost #1	Free-field	54.0 (62.8)	72.6 (79.0)	50.9 (60.0)	50.2 (54.5)	47.1 (53.8)	50.6 (51.6)	71.8 (73.7)	53.1 (58.7)	49.6 (54.9)	46.4 (49.5)	49.3 (57.4)	46.4 (50.9)
	N021	Stanhope Street, lamppost #2	Free-field	58.0 (62.0)	67.6 (79.2)	59.9 (74.7)	56.8 (62.0)	51.8 (60.0)	53.1 (55.5)	60.5 (61.9)	59.4 (62.4)	57.4 (63.2)	52.4 (55.7)	55.4 (60.1)	51.3 (55.5)
	N044	Regents Park Estate west, near Langdale	Free-field	62.6 (65.9)	69.2 (72.5)	52.8 (62.6)	50.9 (54.9)	48.5 (65.8)	49.9 (50.8)	67.3 (70.0)	67.8 (72.0)	59.0 (67.7)	50.1 (66.2)	59.4 (67.0)	50.1 (66.1)
	N045	Regents Park Estate south, external to Coniston	Free-field	57.6 (62.6)	68.6 (75.9)	56.5 (70.1)	55.2 (59.0)	52.9 (59.1)	54.9 (56.1)	66.4 (70.2)	56.8 (61.6)	54.3 (60.5)	51.6 (53.3)	55.2 (67.5)	52.5 (55.3)
G, H	HH	Euston Station Parcel Deck, Barnby Street	Free-field	58.5 (64.7)	60.8 (63.1)	61.9 (68.1)	61.0 (66.7)	57.0 (68.5)	57.7 (63.1)	59.5 (61.6)	58.3 (63.6)	59.9 (69.6)	57.4 (66.5)	60.4 (67.4)	55.5 (58.4)
G	BS	Roof of Stockbeck House, Barnby Street	Free-field	62.3 (68.9)	64.0 (65.6)	63.1 (64.8)	62.8 (65.1)	58.6 (66.5)	61.3 (62.2)	62.8 (64.3)	62.7 (64.1)	62.3 (64.3)	56.7 (61.1)	61.5 (65.3)	57.4 (63.2)

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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	68.4 (73.1)	75.0 (83.4)	67.8 (72.9)	68.1 (76.5)	65.7 (74.8)	66.5 (69.9)	71.5 (75.0)	67.8 (69.9)	69.2 (78.7)	65.6 (70.4)	67.8 (75.8)	66.7 (75.2)
	N019	Outside Cartmel, Hampstead Road	Free-field	55.6 (60.8)	63.6 (68.3)	54.9 (58.4)	55.2 (60.1)	52.6 (61.3)	54.5 (56.3)	59.0 (61.5)	54.7 (58.5)	54.2 (57.3)	51.8 (53.7)	53.5 (57.4)	52.3 (57.6)
S003-WS03, ETD, TSS	N006	Royal College of General Practitioners roof level	Free-field	58.9 (62.2)	68.0 (71.6)	58.4 (60.7)	58.4 (60.6)	57.2 (62.9)	57.4 (58.6)	60.4 (64.8)	57.1 (59.1)	56.9 (60.4)	54.9 (56.3)	57.0 (61.6)	54.5 (56.8)
S003-WS03, TSS	N008	Stephenson's Way lamppost (external to RCGP)	Façade	58.5 (64.4)	65.6 (70.1)	55.9 (64.7)	56.2 (63.7)	56.0 (64.9)	55.8 (56.8)	59.9 (63.7)	55.3 (58.2)	56.1 (65.8)	53.2 (56.7)	54.5 (61.5)	54.5 (60.9)
	N010	Wesley Hotel	Façade	67.5 (70.3)	69.0 (71.7)	61.5 (69.8)	61.9 (69.9)	59.3 (81.4)	67.7 (70.1)	68.6 (69.7)	66.9 (69.0)	66.6 (69.2)	53.6 (63.3)	64.6 (70.1)	55.9 (65.9)
	N011	Outside 82 Euston Street	Free-field	57.1 (62.1)	61.4 (63.6)	55.3 (57.4)	55.7 (63.2)	52.7 (60.1)	55.2 (57.1)	58.6 (59.5)	54.2 (56.3)	54.9 (63.7)	50.9 (54.8)	53.5 (59.5)	52.2 (60.1)
S003-WS03, ETD	N007	Royal College of General Practitioners, Melton Street	Free-field	64.6 (69.9)	69.5 (71.5)	63.6 (66.0)	63.4 (66.3)	62.5 (67.9)	64.3 (66.4)	63.5 (65.1)	62.8 (64.0)	62.6 (64.9)	62.1 (64.8)	63.9 (67.9)	62.6 (67.7)
VHA	N025	External to 3 Prince Albert Road	Free-field	67.2 (75.0)	67.2 (69.6)	65.9 (70.2)	65.6 (75.4)	62.7 (70.1)	64.0 (65.2)	64.5 (64.9)	64.5 (65.1)	65.6 (71.7)	62.7 (66.2)	64.6 (70.9)	62.9 (67.3)
	N026	Thames Water Compound	Free-field	56.4 (61.1)	57.3 (62.0)	56.3 (58.7)	55.2 (59.5)	51.7 (60.0)	54.1 (55.9)	54.1 (54.9)	53.9 (54.3)	54.6 (56.6)	51.4 (56.9)	53.6 (55.7)	50.7 (56.1)

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
NTH-EN, TSS	N012	Opposite 92-94 Drummond Street	Free-field	57.5 (60.1)	60.6 (61.9)	59.0 (61.1)	59.3 (62.3)	57.0 (65.2)	55.8 (56.8)	58.7 (60.0)	58.0 (58.7)	58.8 (61.5)	55.7 (58.0)	58.5 (67.8)	56.0 (60.4)
NTH-EN	N014	Starcross Street lamppost (external to Exmouth Arms)	Free-field	55.4 (62.0)	59.1 (64.4)	60.9 (66.1)	59.8 (67.4)	53.4 (67.2)	52.8 (55.0)	55.3 (57.3)	54.1 (55.5)	56.1 (64.6)	50.7 (58.0)	56.4 (68.2)	53.3 (69.3)
	N016	Margaret Centre roof	Free-field	54.6 (60.0)	59.2 (64.1)	54.2 (56.1)	53.7 (58.4)	51.5 (62.0)	53.2 (54.7)	54.4 (56.1)	53.1 (54.3)	52.9 (57.0)	50.7 (53.9)	53.0 (60.1)	51.2 (58.0)
	N017	Hampstead Road, lamppost #48	Free-field	69.7 (73.4)	71.2 (72.9)	70.7 (74.5)	70.0 (74.8)	67.6 (74.0)	67.5 (68.9)	69.5 (71.2)	70.3 (72.3)	69.6 (74.1)	67.8 (71.7)	68.8 (74.4)	68.7 (78.6)

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	2.40 (Z-axis)
HRB	V039	Coniston, Regents Park Estate	1.37 (Z-axis)
	V043	Cubitt Court, Park Village East	2.81 (X-axis)
S003-WS03	V002	RCGP basement boiler room, 305 Euston Road	2.11 (Z-axis)
	V003	RCGP basement vaults, 305 Euston Road	0.42 (Z-axis)
	V037	Magic Circle, basement	1.23 (Z-axis)
	V038	Wesley Hotel, basement lightwell, Euston Street	1.05 (Z-axis)
NTH-EN	V021	42-44 Cobourg Street (floor)	0.56 (Z-axis)
ESC	PVS-V1	Park Village Studios	2.20 (Y-axis)
ETRC & GTB	SH-V1	Silsoe House	2.09 (Y-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	Weekday	0800-1800	1
			Saturday	1400-2200	2
	N052	Adelaide Road-Beaumont Walk	Saturday	1400-2200	4
B	JC	Juniper Crescent	All days	All periods	No exceedance
ESC	N024	External to Park Village Studios, Park Village East	Weekday	0800-1800	2
	N047	Park Village East/Mornington Street bridge, lamppost #13	All days	All periods	No exceedance
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

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
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	Weekday	0800-1800	3
	N044	Regents Park Estate west, near Langdale	All days	All periods	No exceedance
	N045	Regents Park Estate south, external to Coniston	All days	All periods	No exceedance
G, H	HH	Euston Station Parcel Deck, Barnby Street	All days	All periods	No exceedance
G	BS	Roof of Stockbeck House, Barnby Street	All days	All periods	No exceedance
S001-WS02	N018	Outside replacement housing, Hampstead Road	Weekday	0800-1800	1
	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

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
NTH-EN	N012	Opposite 92-94 Drummond Street	All days	All periods	No exceedance
	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.

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
S001-WS02	N018	Outside replacement housing, Hampstead Road	1
HRB	N021	Stanhope Street, lamppost #2	3
ESC	N024	External to Park Village Studios, Park Village East	2
ARVS	N051	Outside 70 Adelaide Road	2
	N052	Adelaide Road-Beaumont Walk	1

2.2.6 9 exceedances of the SOAEL were recorded due to HS2 construction works during July 2021. The exceedances occurred at:

- Monitoring location N018 during one daytime period due to use of a vacuum excavator;
- Monitoring location N021 during three daytime periods due to utility works;
- Monitoring location N024 during two daytime periods due to utility works;

- Monitoring location N051 during one daytime periods due to utility trial trench works and one Saturday period due to cabin installation works; and
- Monitoring location N052 during one Saturday period due to cabin installation works.

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

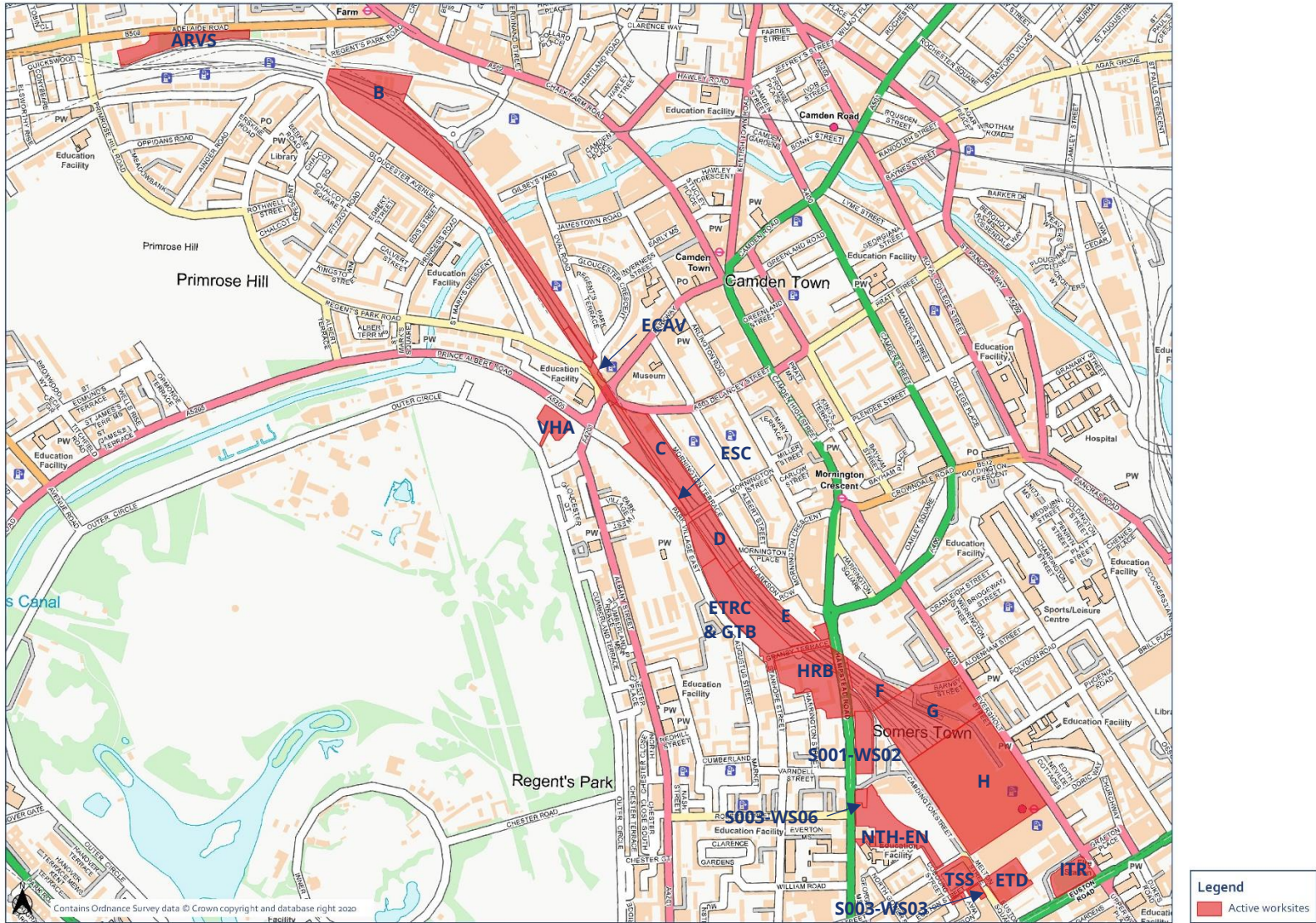
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-42267-C	N/A (Utility works)	Complaint due to construction noise disturbing hotel guests.	Sewer relining works were taking place during extended working hours due to reduced wastewater flow rates.	Information was provided to the stakeholder confirming the works which were undertaken and a notification of future works was provided.

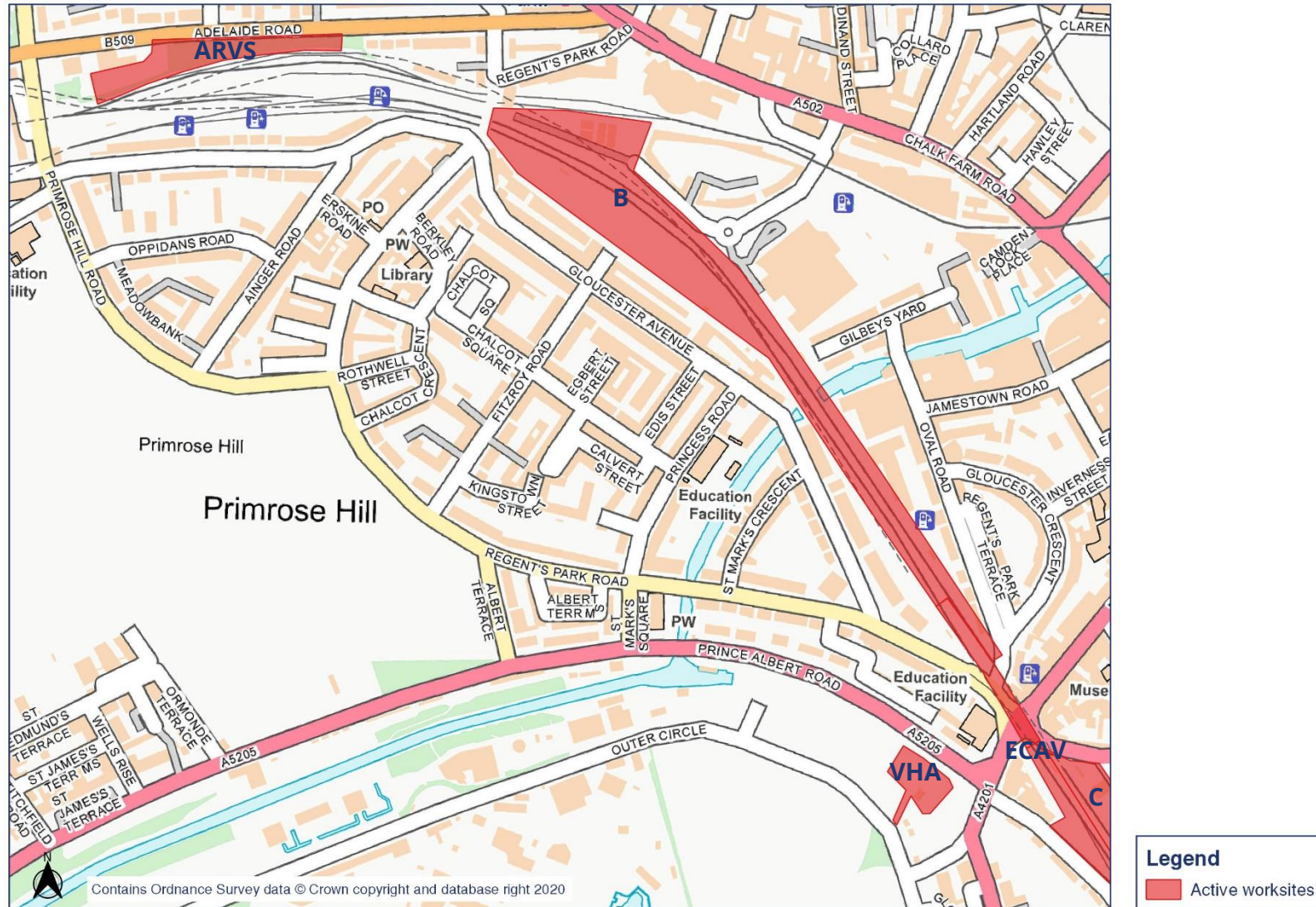
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-42113-C	GTB	Complaint due to construction noise during the night-time.	Piling works were being undertaken at the Granby Terrace worksite. During concrete pouring operations the batching plant broke down mid-way through pouring one of the piles causing a delay to the works. The pouring of concrete had to be finished later the same day to ensure the structural integrity of the pile out of the expected core working hours. This was an exceptional event, not expected to happen regularly. Best Practicable Means (BPM) were being used throughout the works.	Camden Council was notified of this exceptional event. Contact made with the stakeholder and response to enquiry provided.
HS2-21-42231-C	N/A (Utility works)	Complaint due to generator noise during a weekend period.	Use of generator was associated with utility diversion works required to install a power substation. Noise was within consented levels in accordance with current section 61 consent and mitigation measures were in place. BPM were also being used.	Contact made with the stakeholder and response to enquiry provided. The generator is to be swapped with a smaller model. Acoustic screening is being utilised in the interim.
HS2-21-42280-C	HRB	Complaint due to noise and vibration from piling works, noise from operatives and expected impacts of work programme.	Noise and vibration levels were within consented levels in accordance with current section 61 consent and mitigation measures were in place. BPM were also being used.	Contact made with the stakeholder and response to enquiry provided, including where to find information on upcoming works.

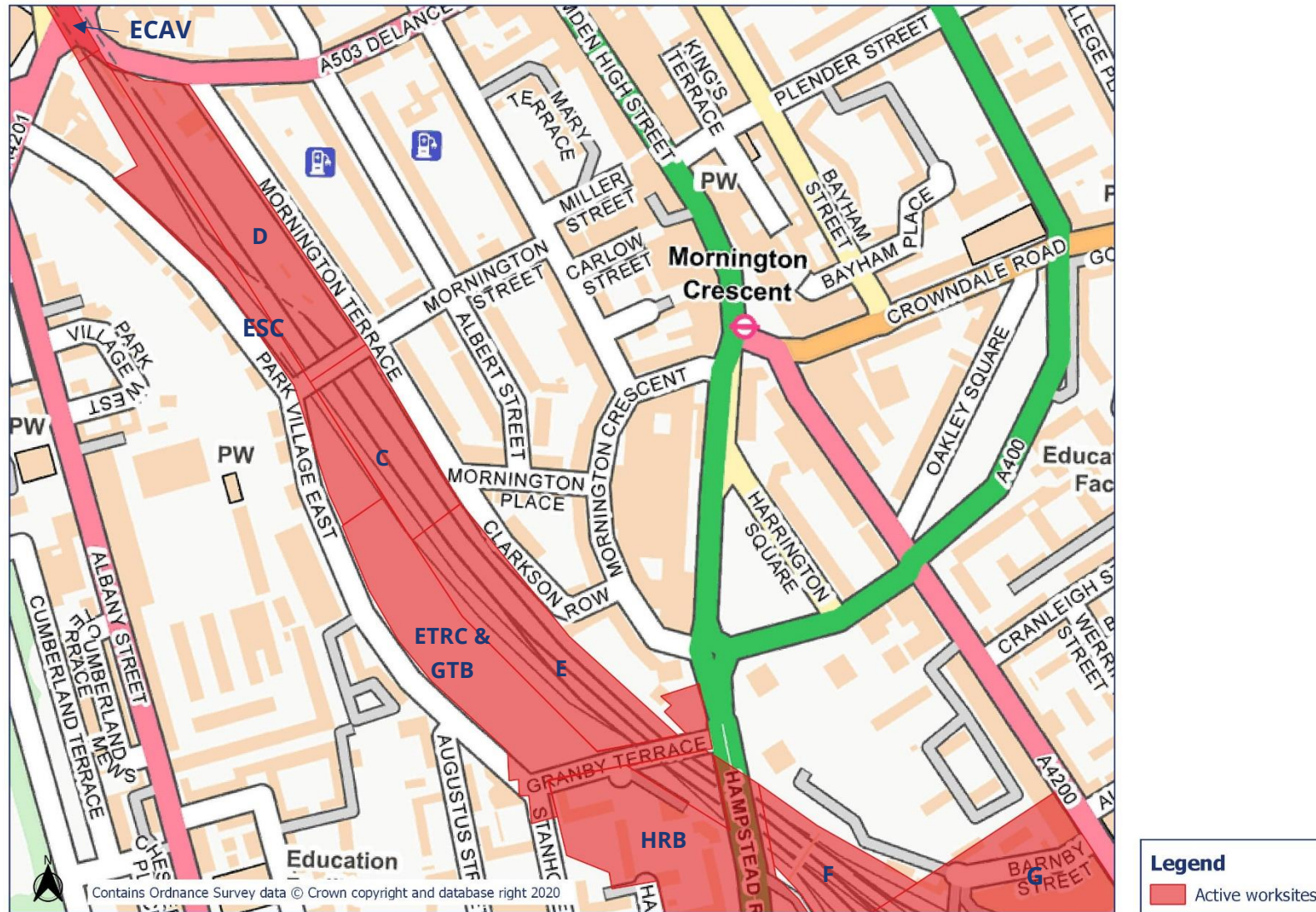
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-42314-C	HRB	General complaint about construction noise.	No specific issue identified as being the cause of the complaint. Noise was within consented levels in accordance with current section 61 consent and mitigation measures were in place. BPM were being used.	Contact made with the stakeholder and response to enquiry provided.
HS2-21-42324-C	HRB	General complaint about construction noise during daytime and night-time periods.	Noise was within consented levels in accordance with current section 61 consent and mitigation measures were in place. BPM were being used. Noise insulation package had been offered to the resident prior to commencement of the works.	Contact was made with the stakeholder with a request to record the noise causing the disturbance so further investigation can take place. Offer for noise insulation was reiterated.
HS2-21-42359-C	HRB	General complaint about construction noise.	Noise was within consented levels in accordance with current section 61 consent and mitigation measures were in place. BPM were being used. Resident is a special case waiting to be re-housed.	Contact made with the stakeholder and response to enquiry provided.
HS2-21-62719-E HS2-21-62599-E HS2-21-52536-E	ARVS	General complaint about construction noise during the daytime.	No specific issue identified as being the cause of the complaint. Noise was within consented levels in accordance with current section 61 consent and mitigation measures were in place.	Best practicable Means (BPM) measures were being used. Contact made with the stakeholder and response to enquiry provided.

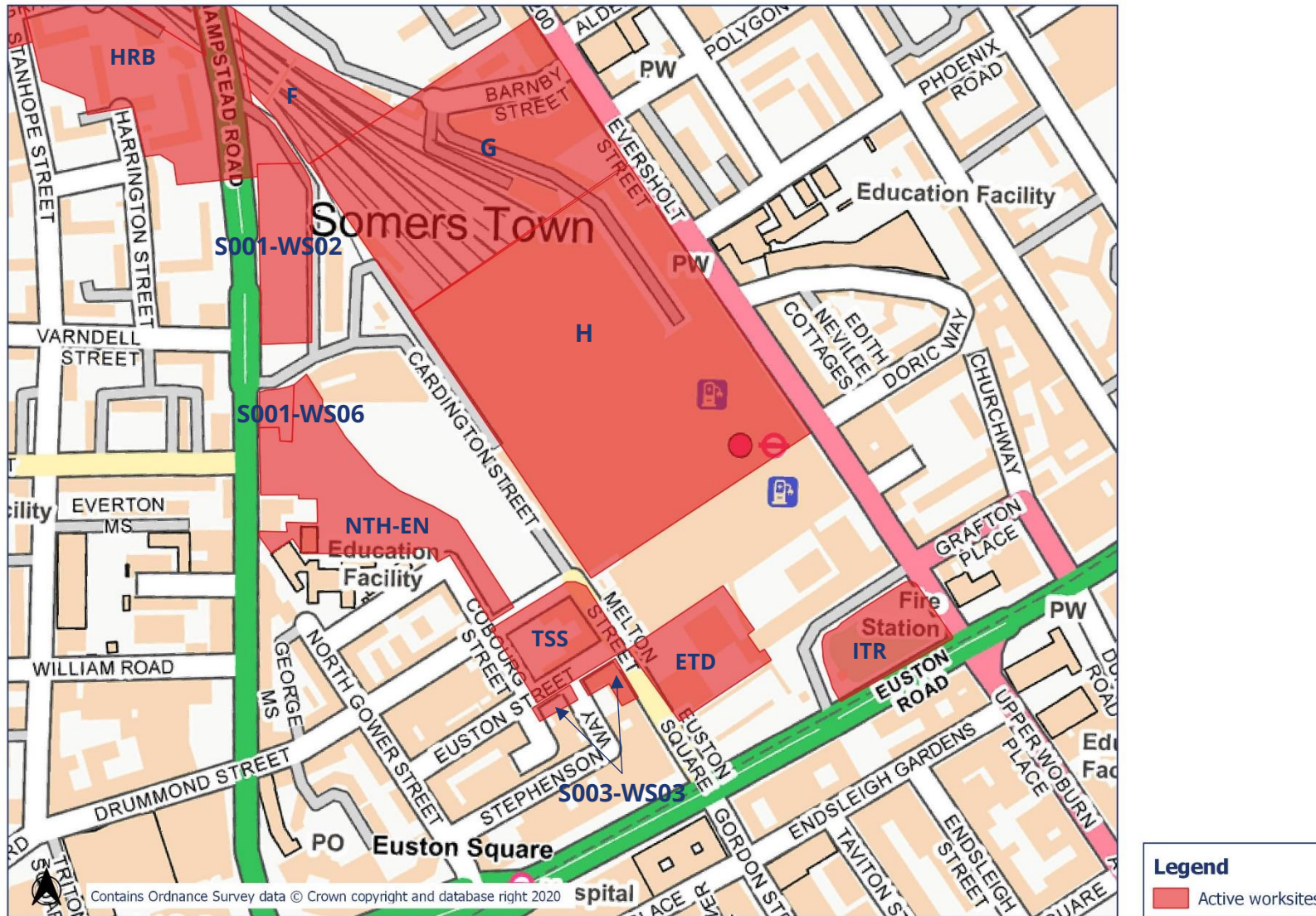
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-42377-C	ARVS	General complaint about construction noise affecting quality of life and sleep.	Noise was within consented levels in accordance with current section 61 consent. BPM were being used.	Contact was made with the stakeholder and a response was provided outlining the measures in place to minimise disruption due to noise.

Appendix A Site Locations

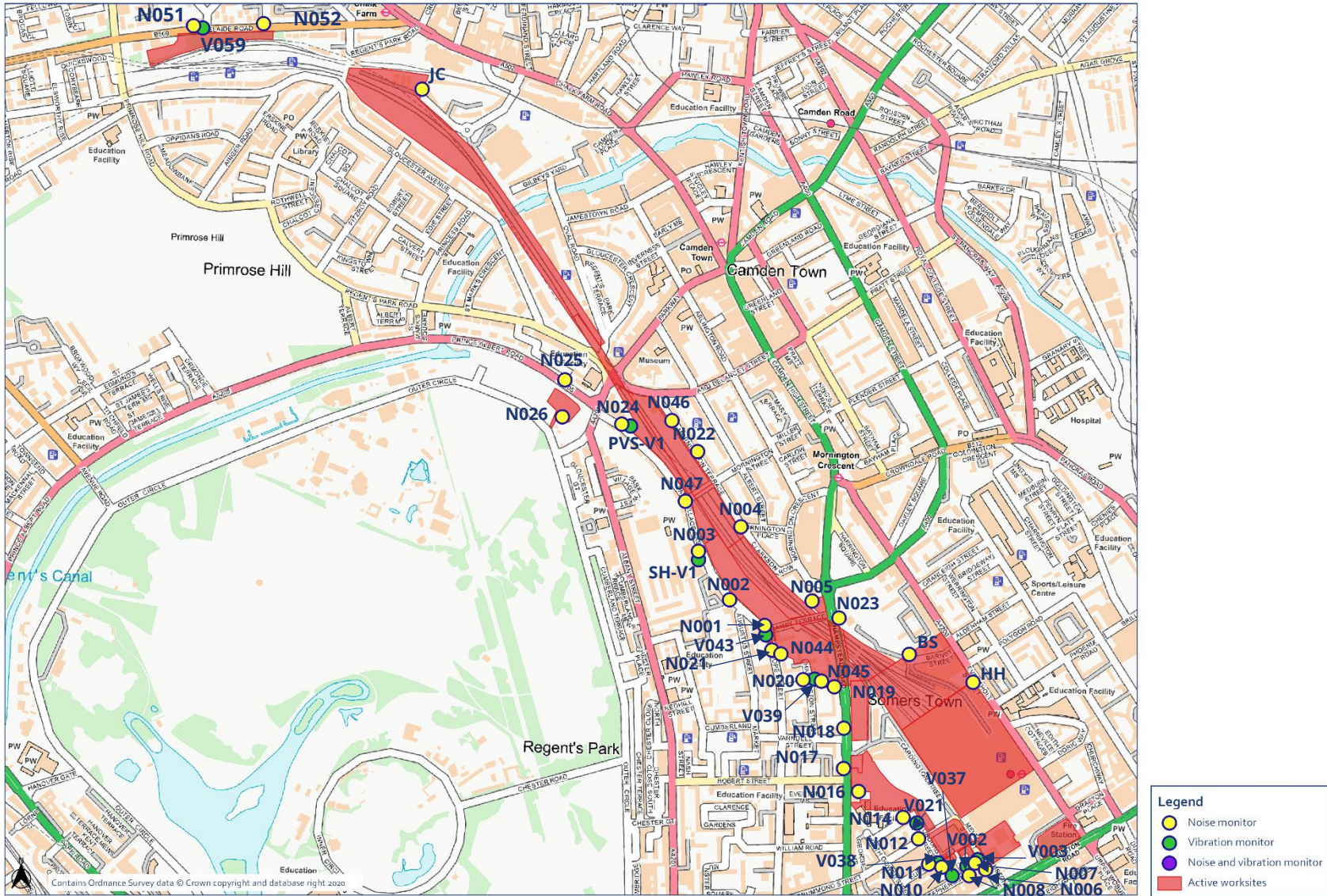


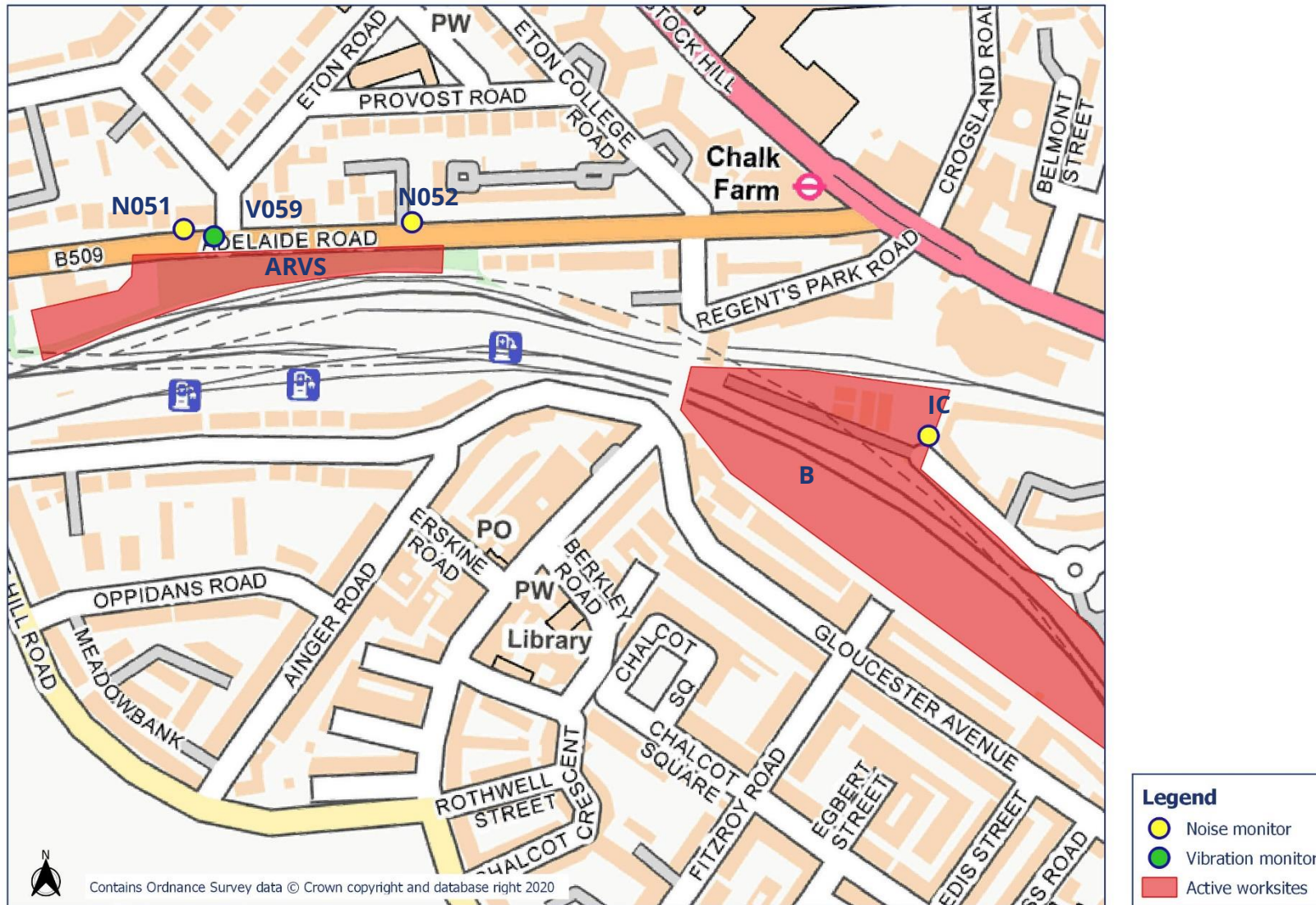






Appendix B Monitoring Locations





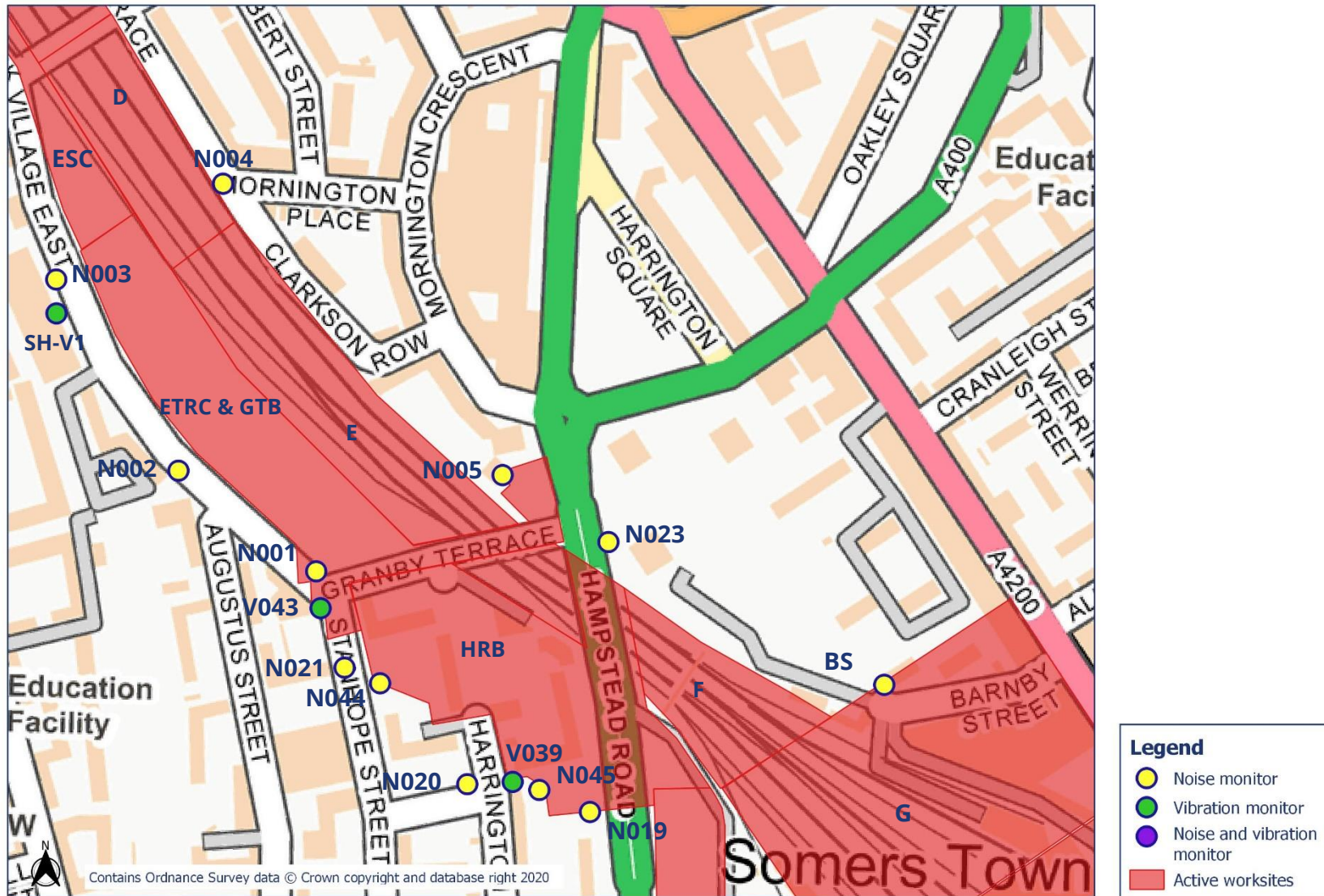
HS2

Noise and vibration monitoring plan - 2



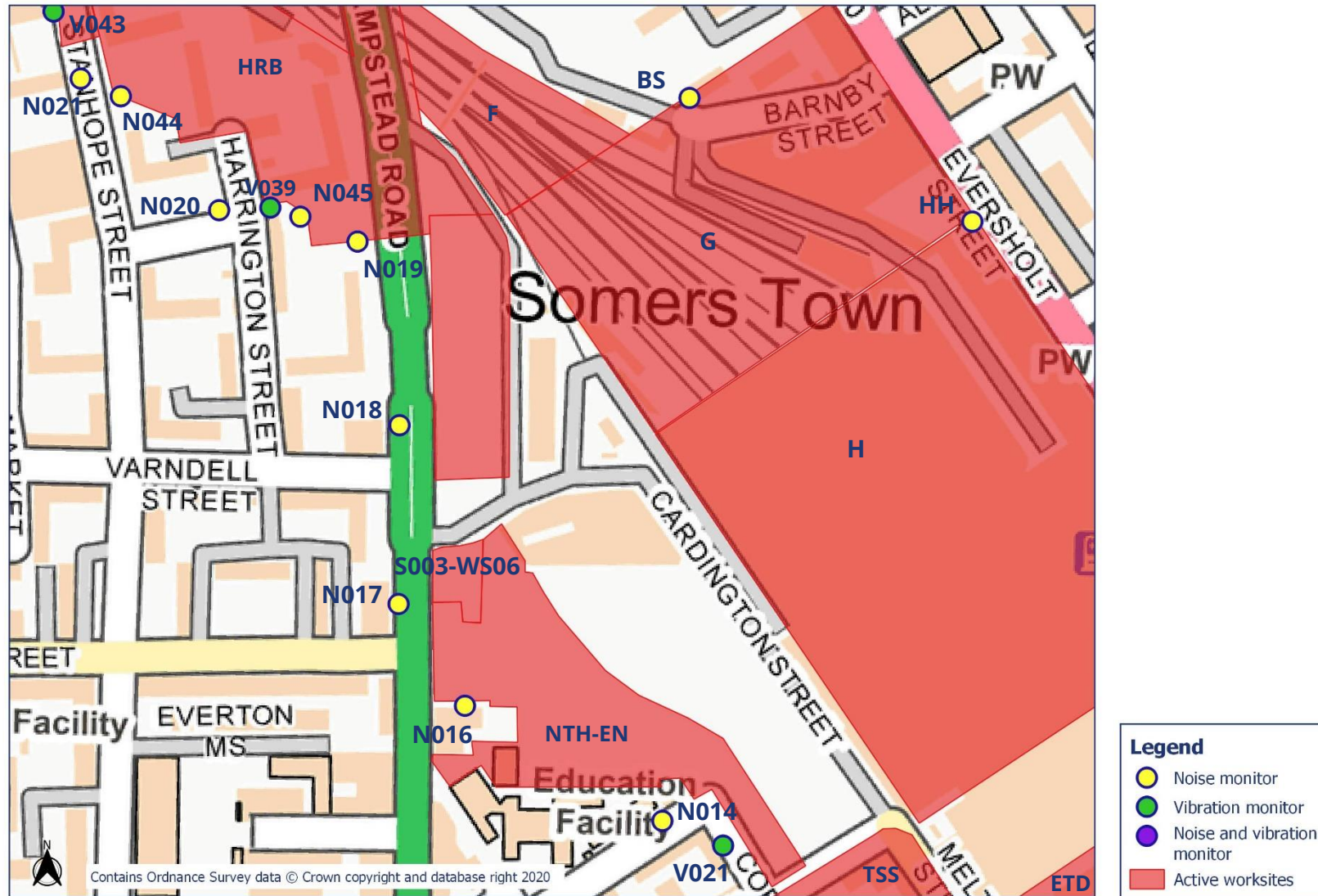
HS2

Noise and vibration monitoring plan - 3

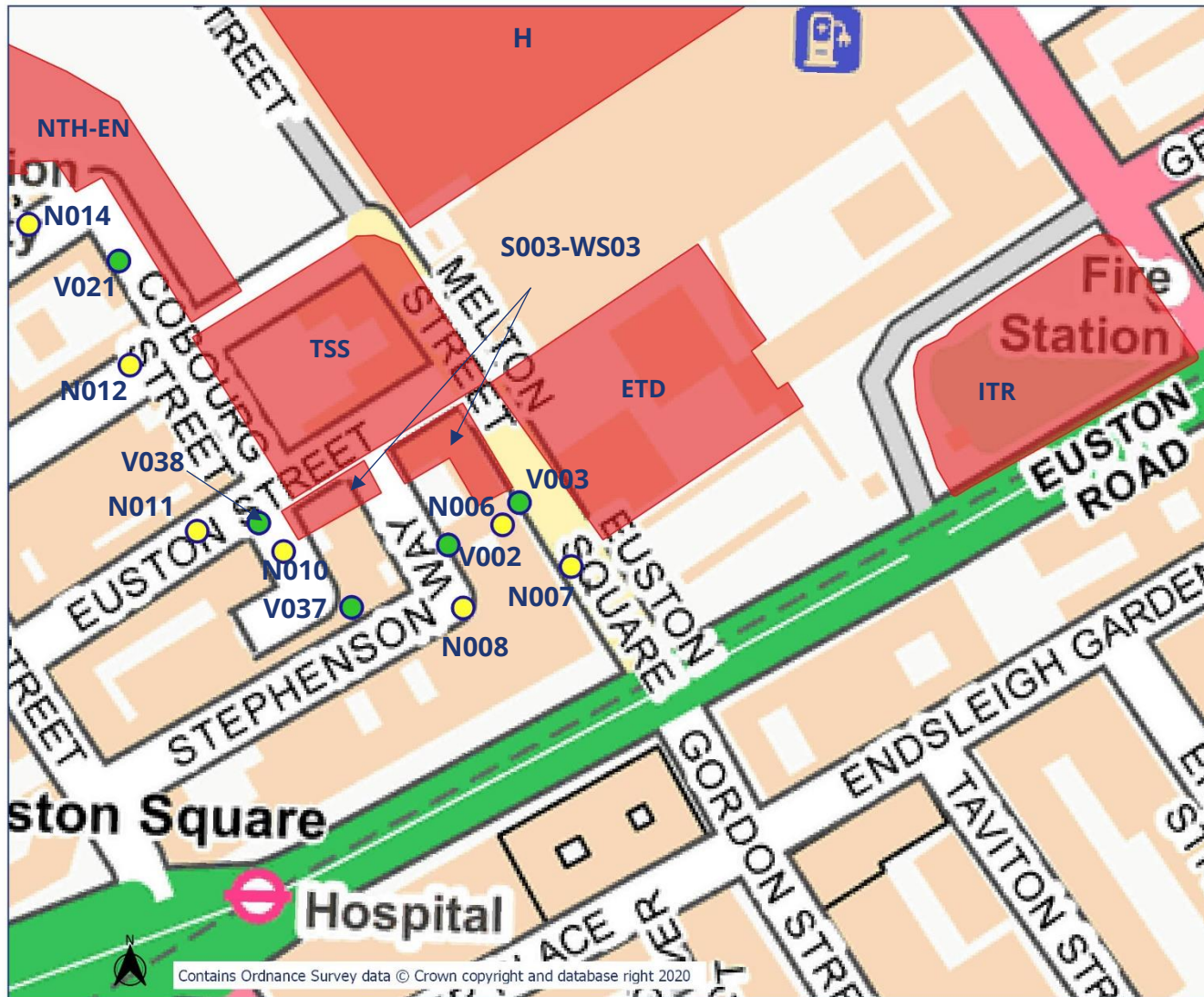


HS2

Noise and vibration monitoring plan - 4



HS2 Noise and vibration monitoring plan - 5

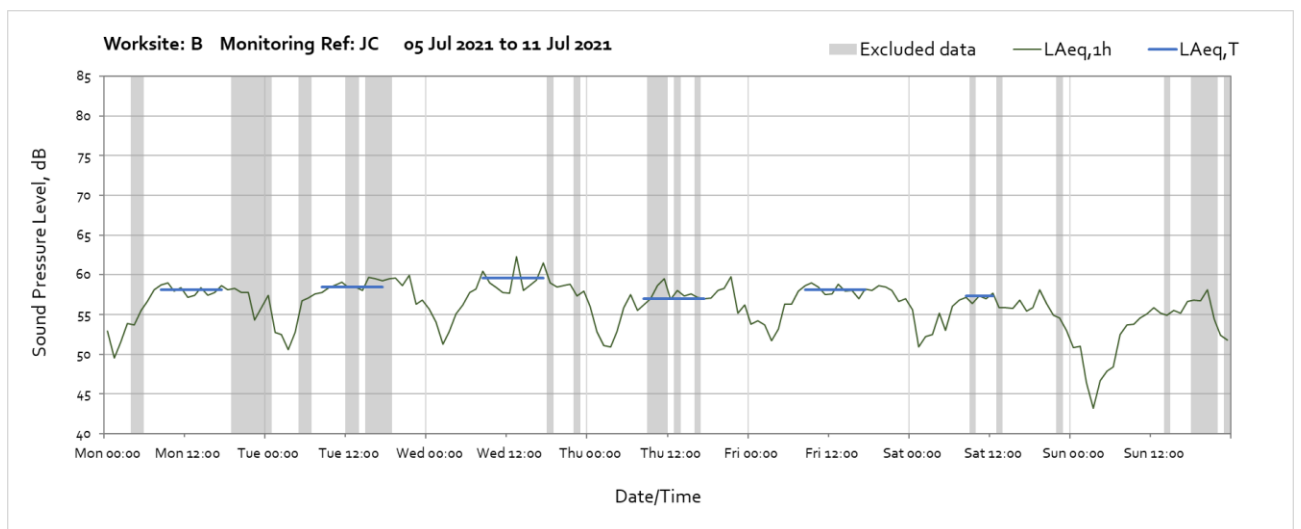
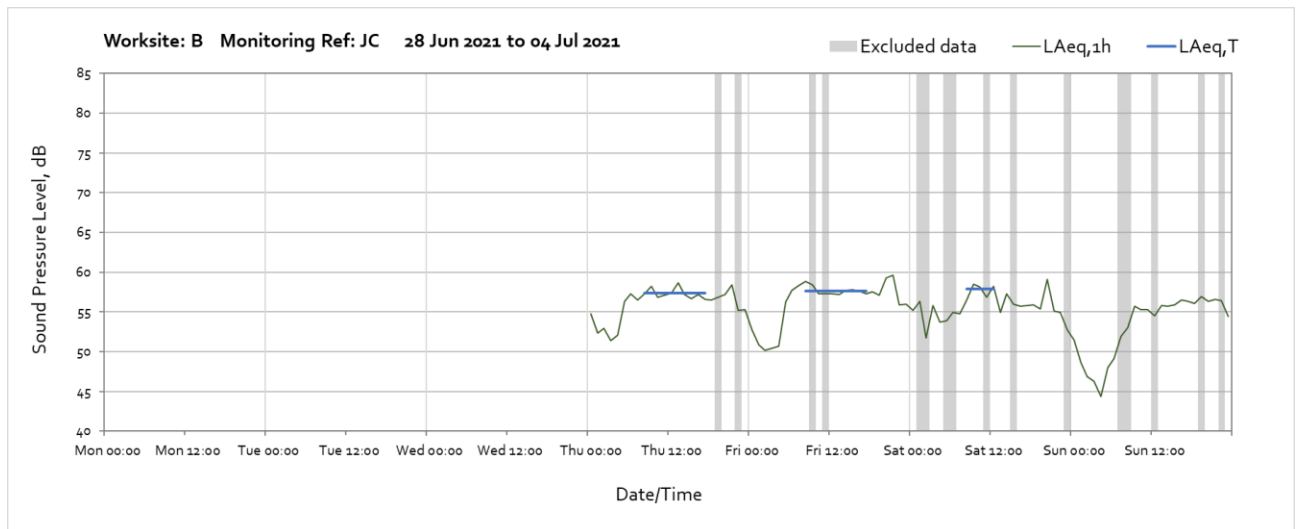


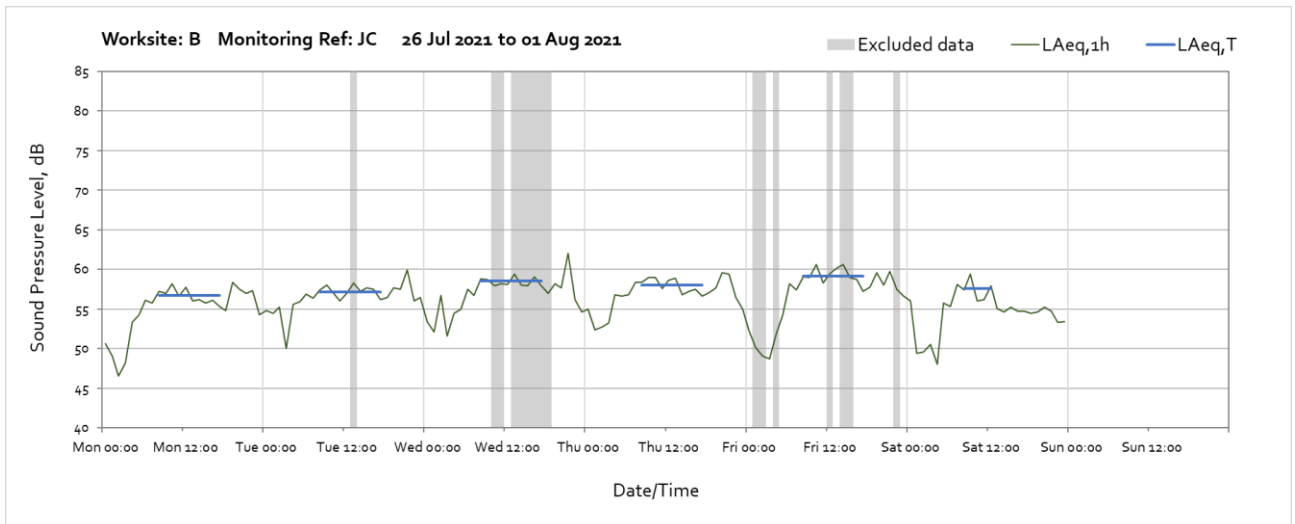
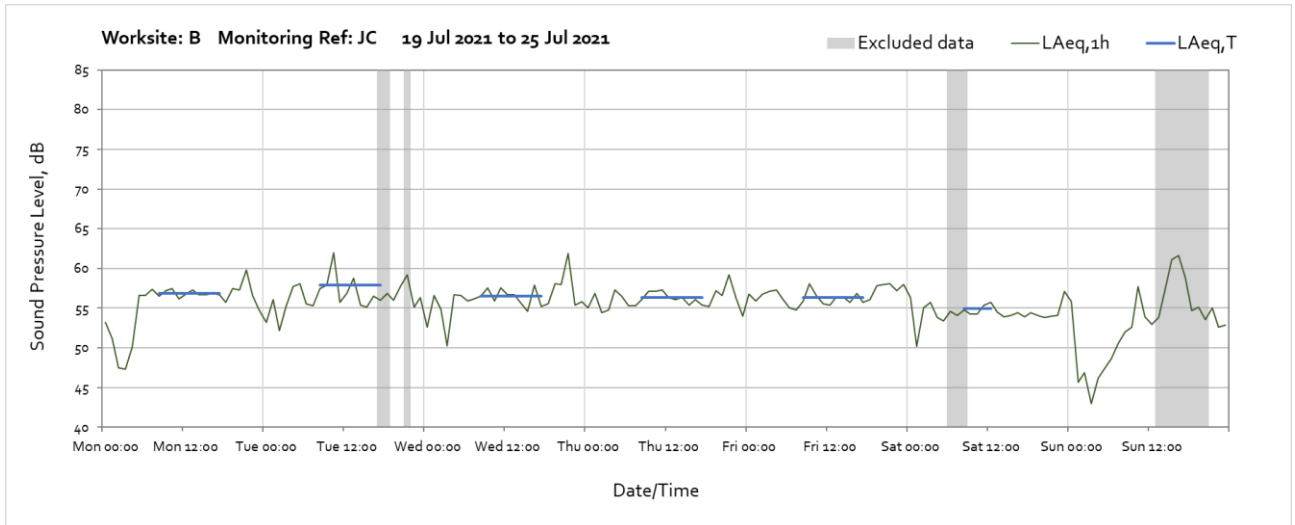
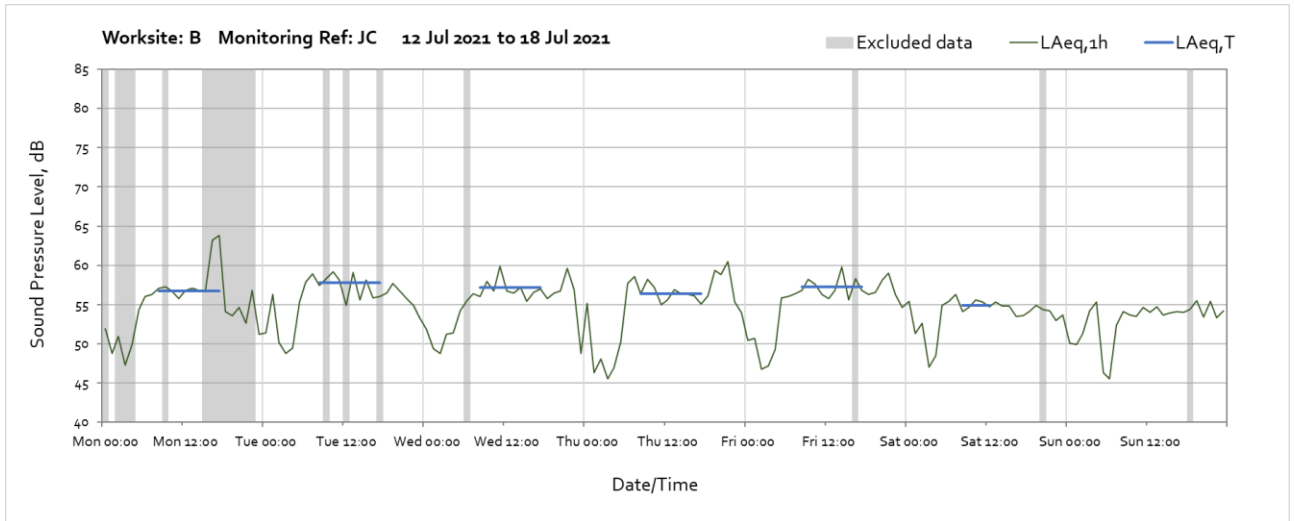
Appendix C Data

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.

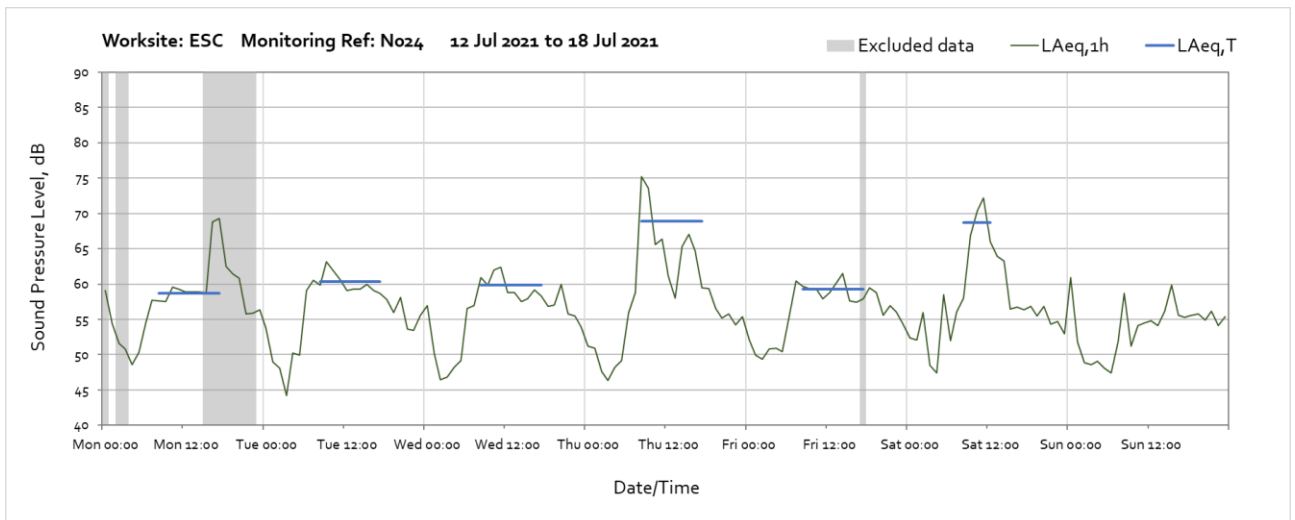
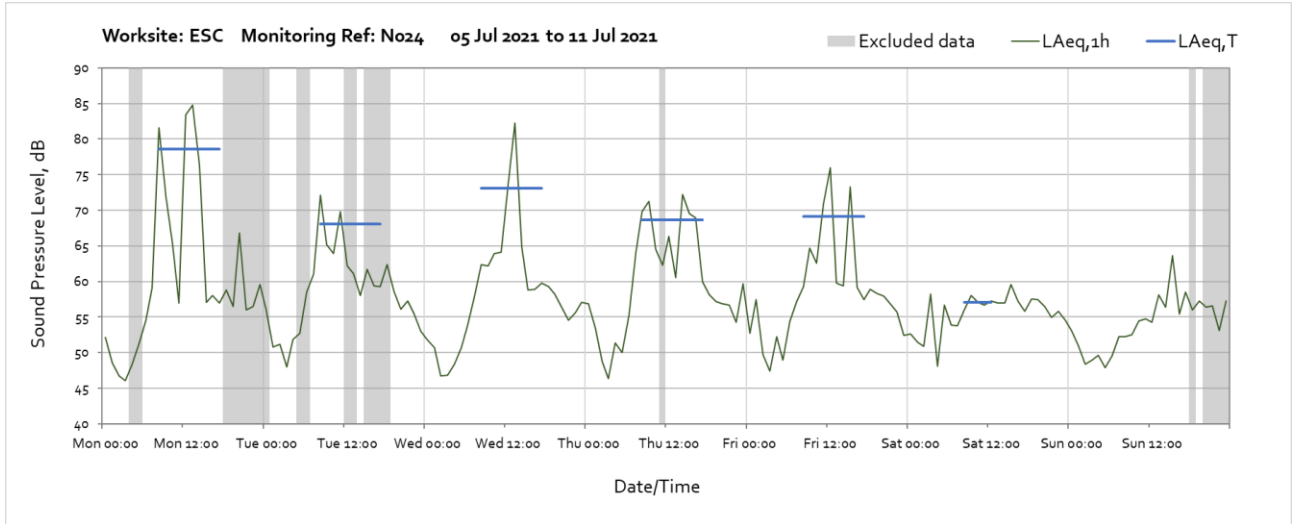
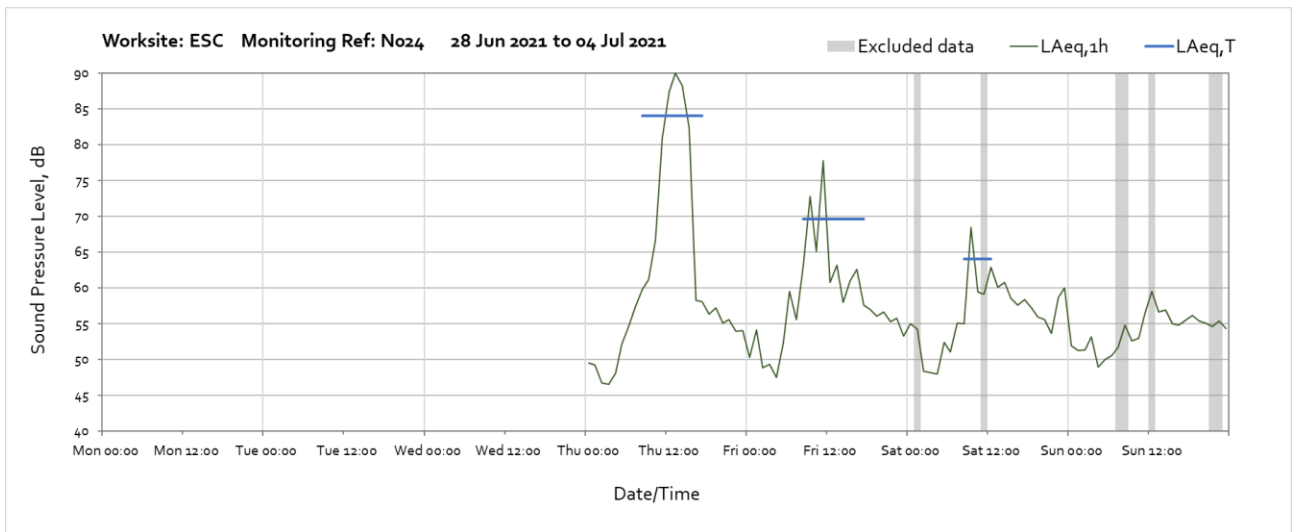
Noise

Worksite: B – Monitoring Ref: JC

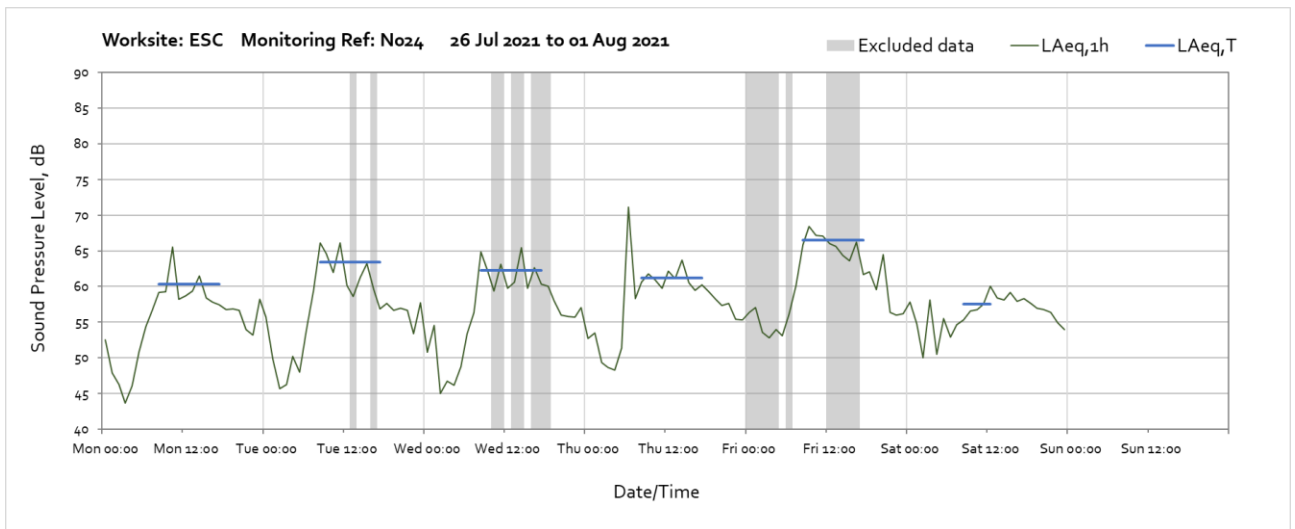
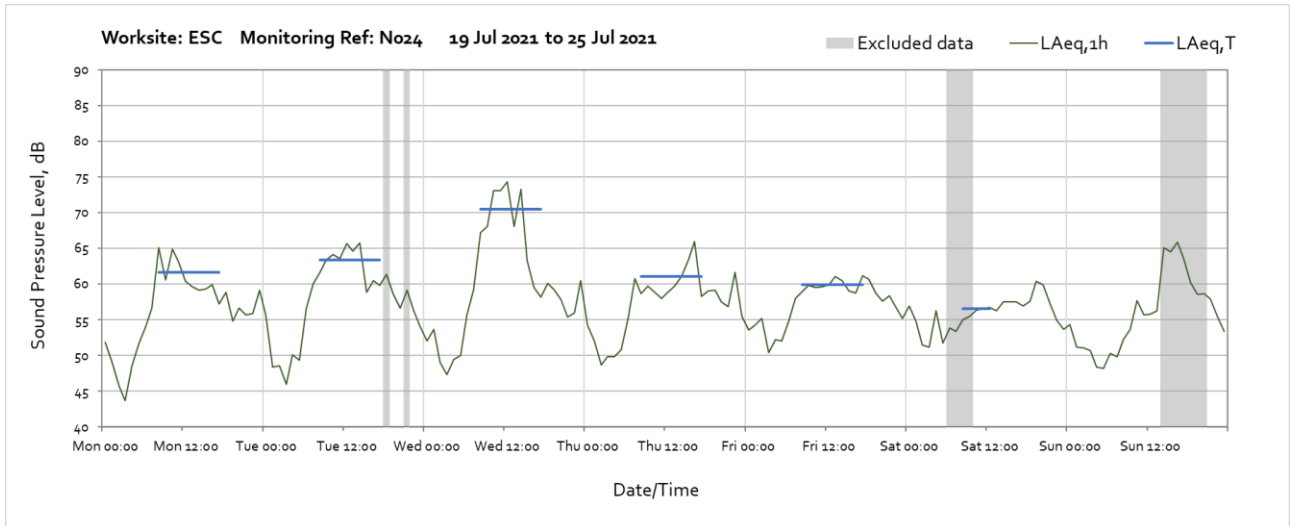




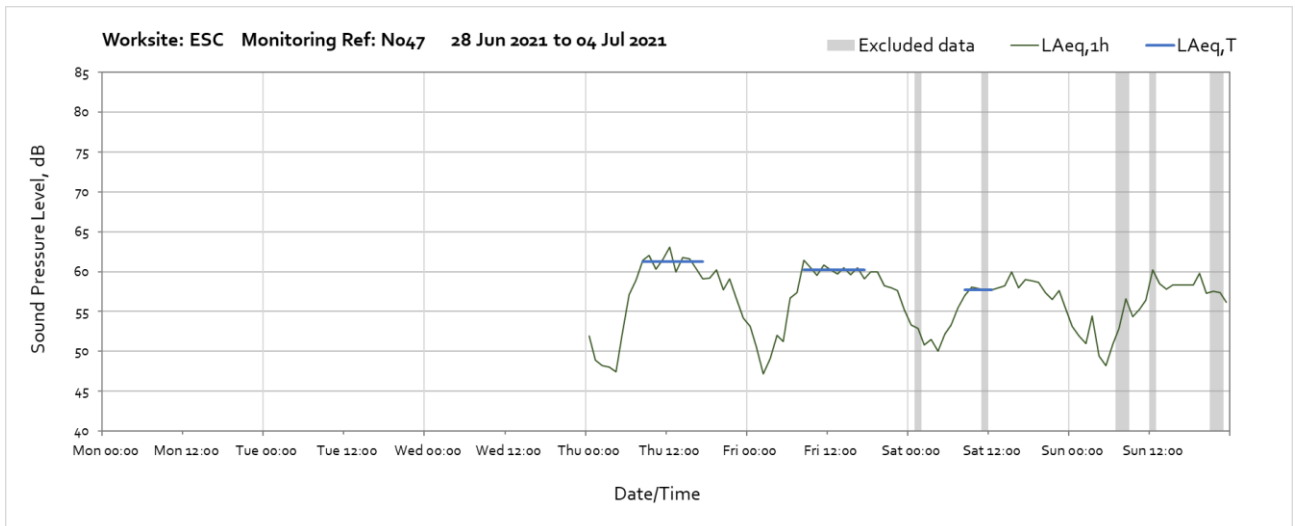
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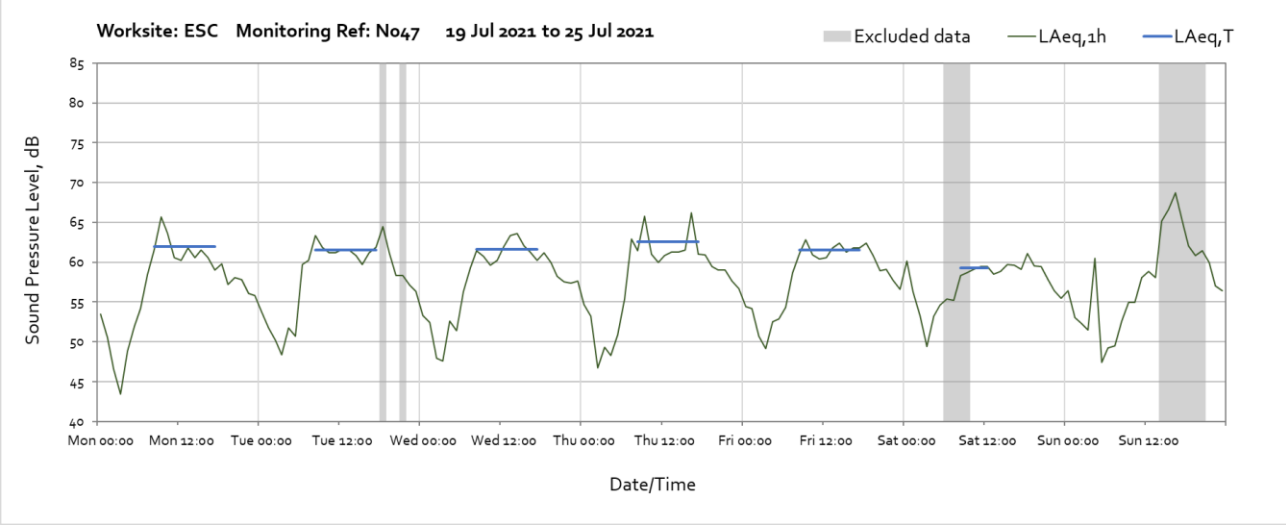
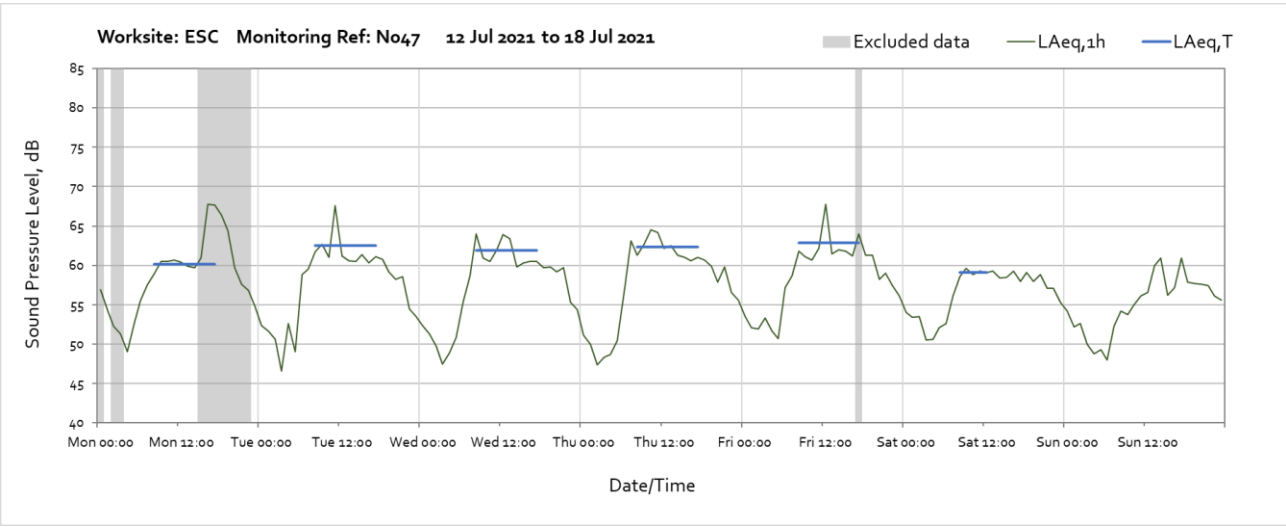
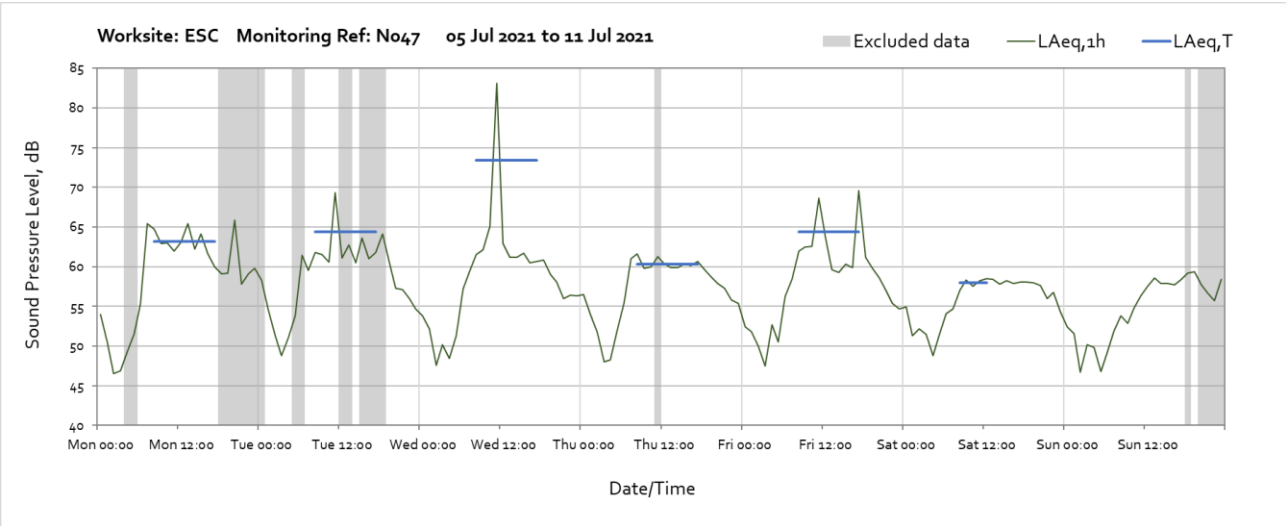


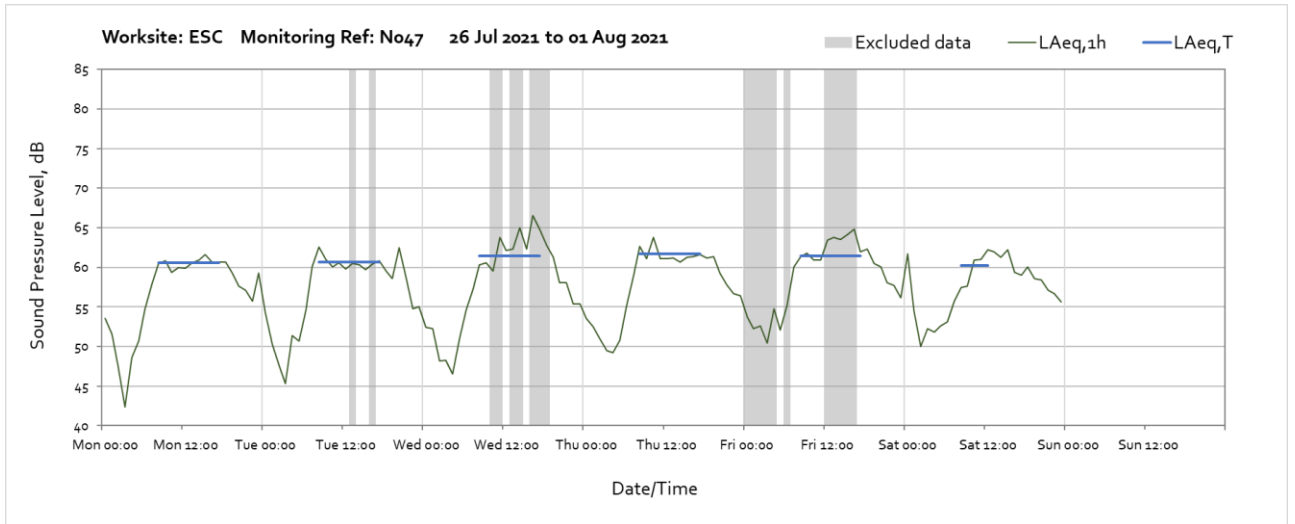
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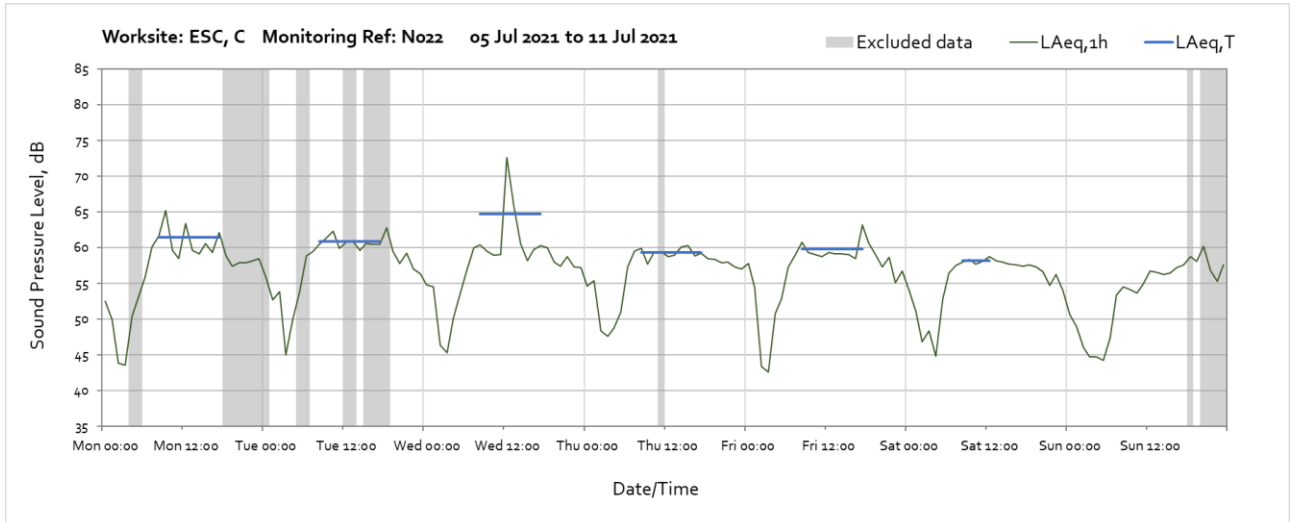
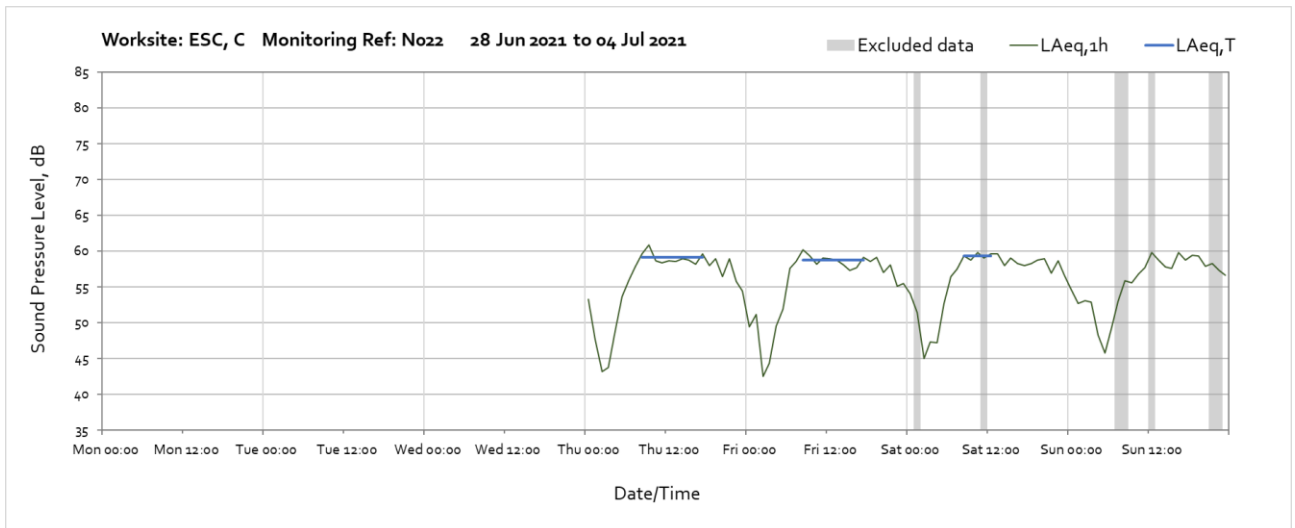
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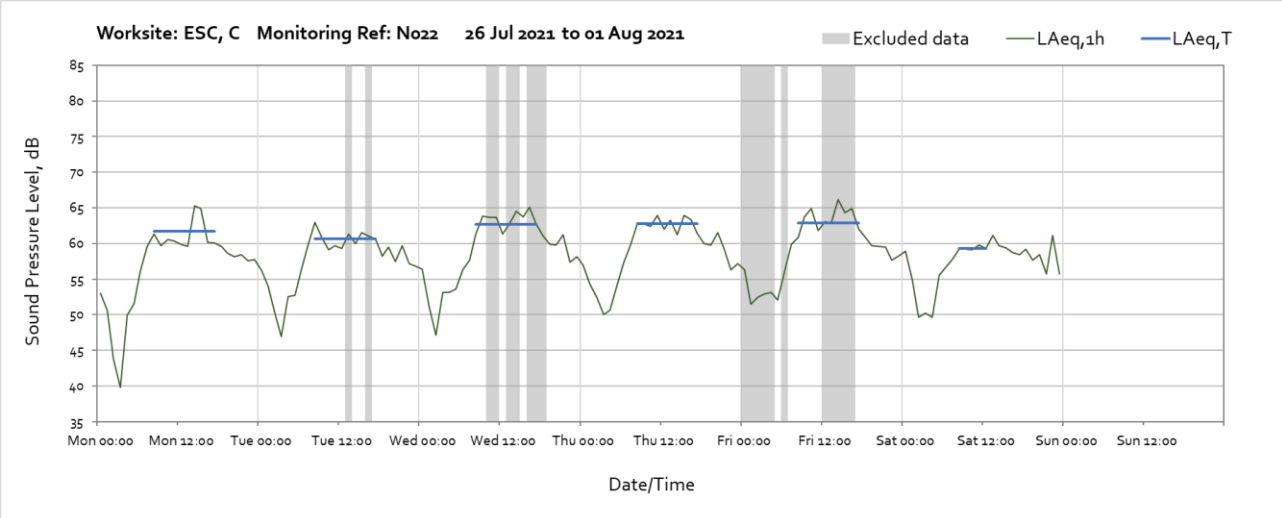
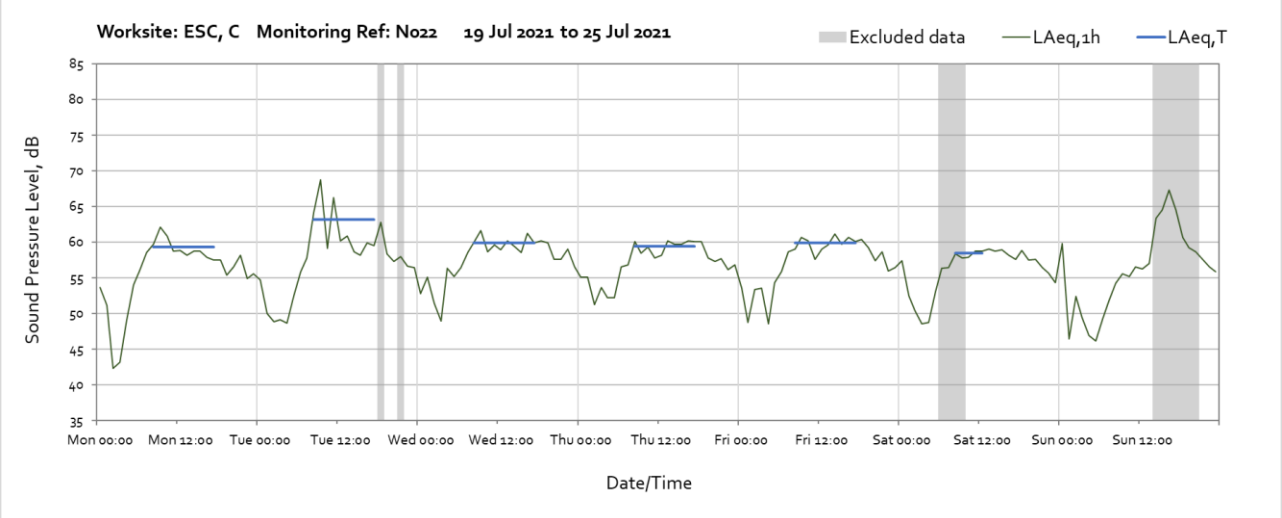
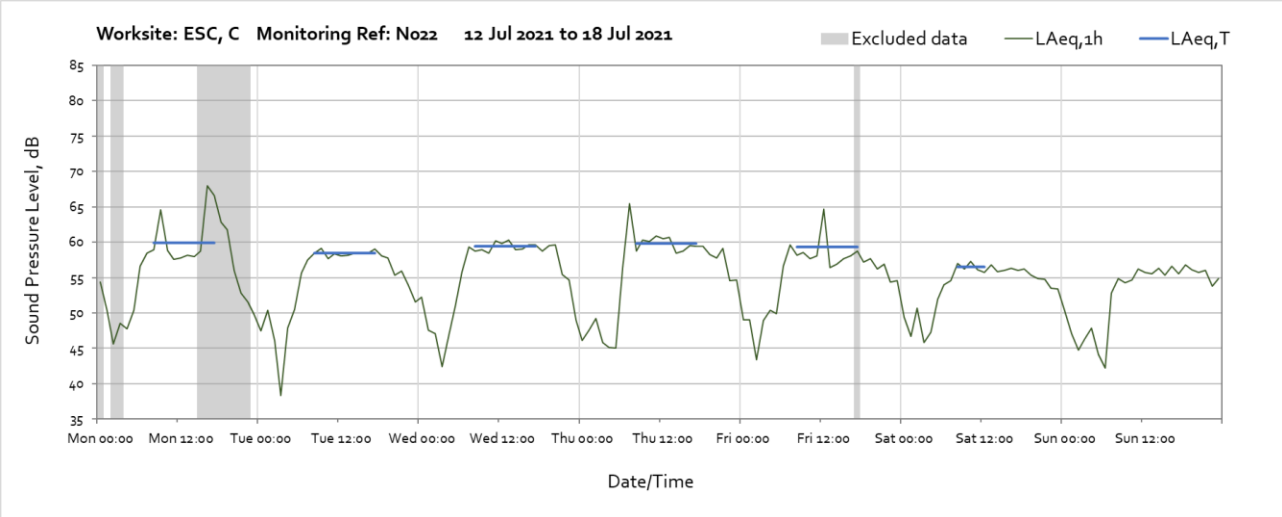




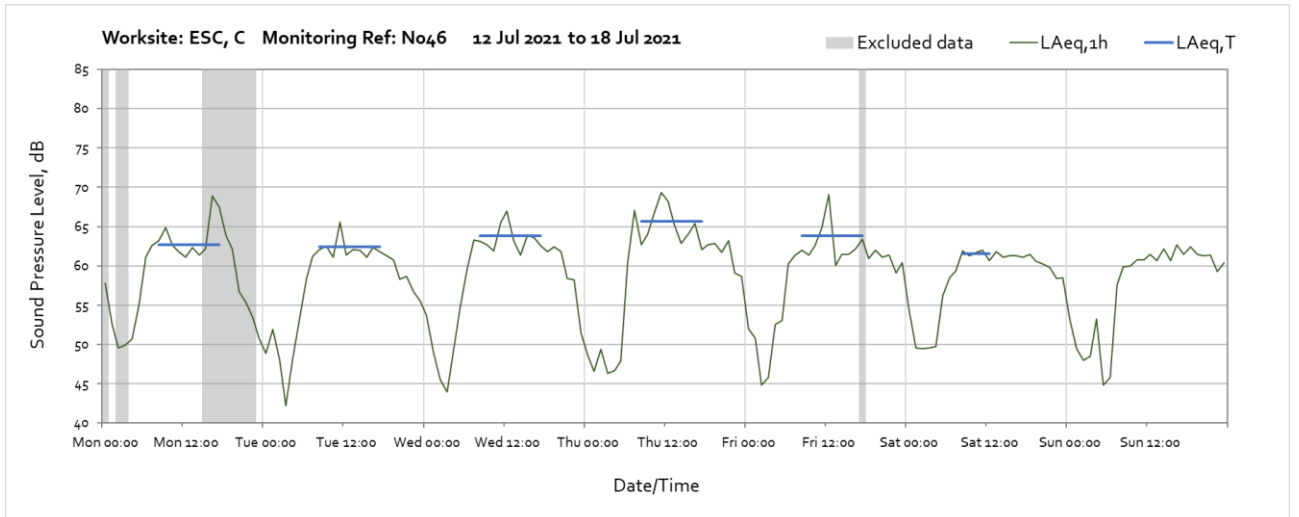
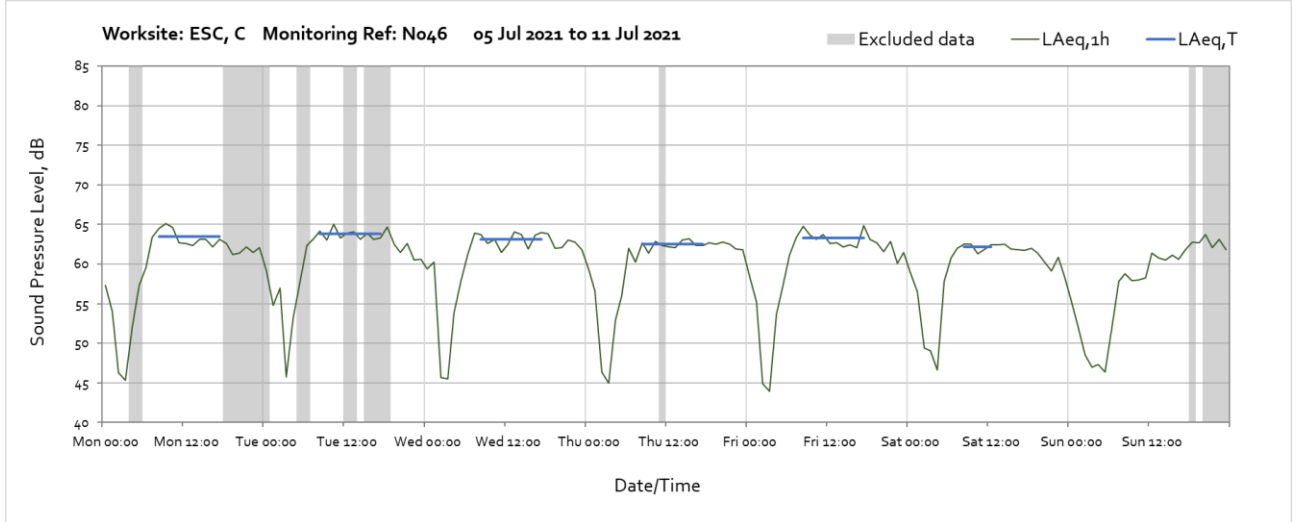
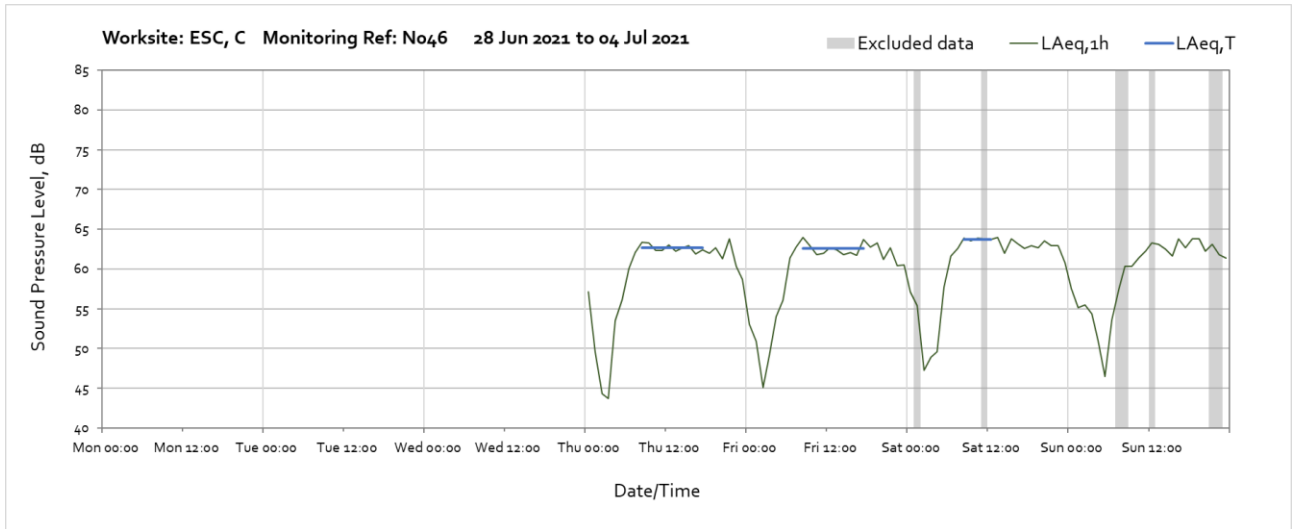


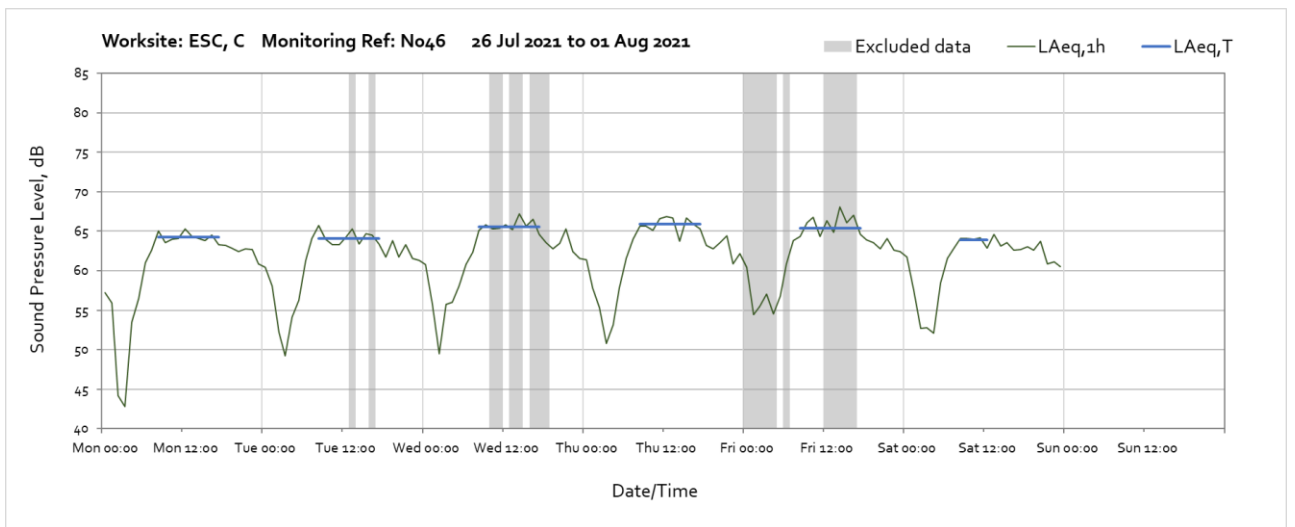
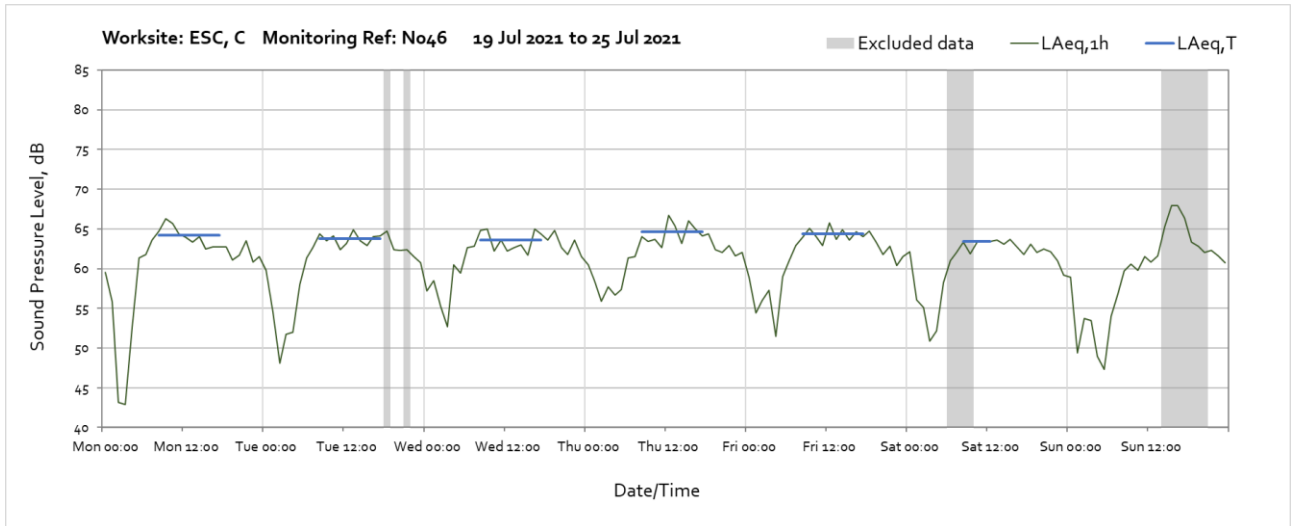
Worksite: ESC, C – Monitoring Ref: N022



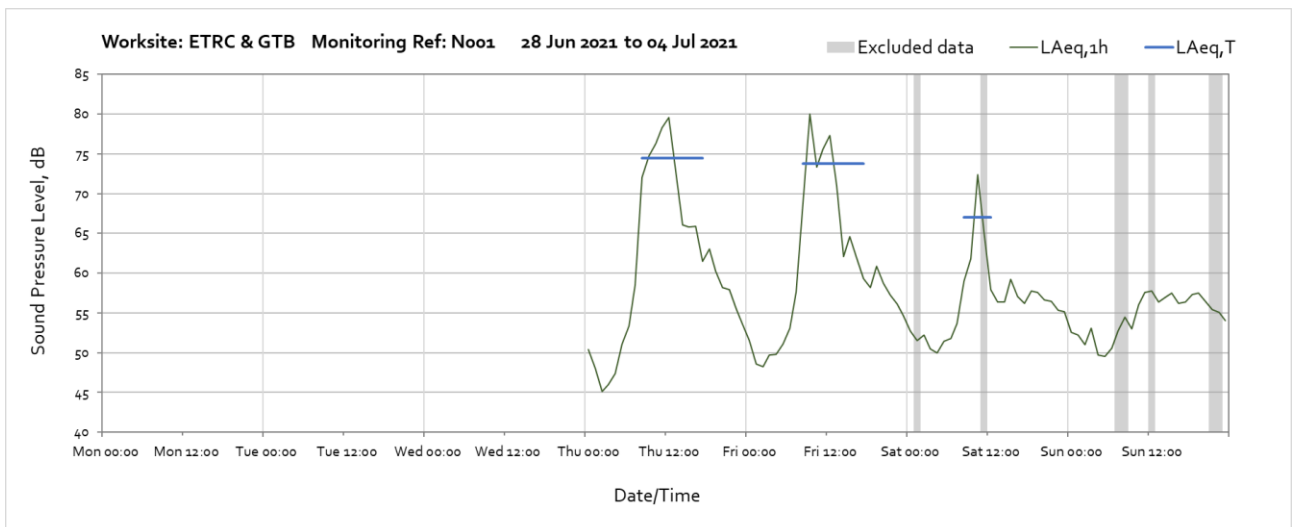


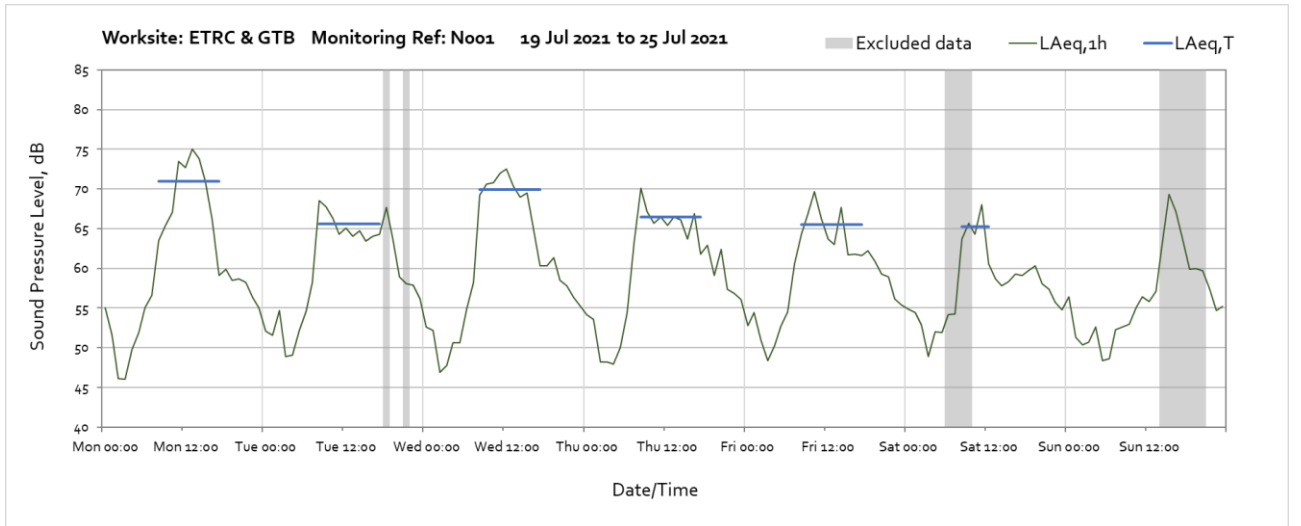
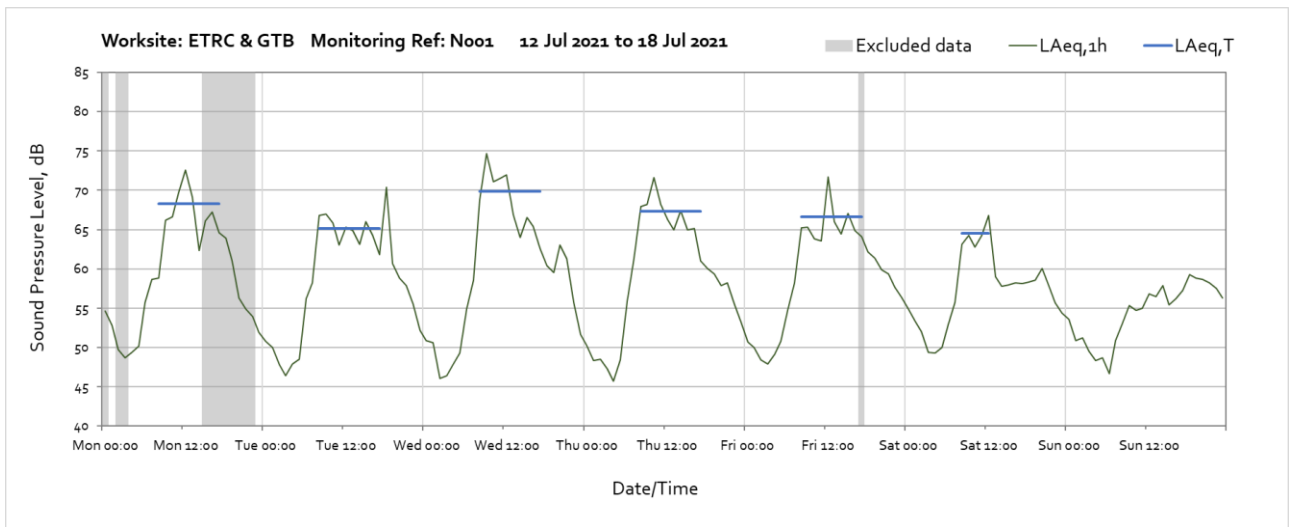
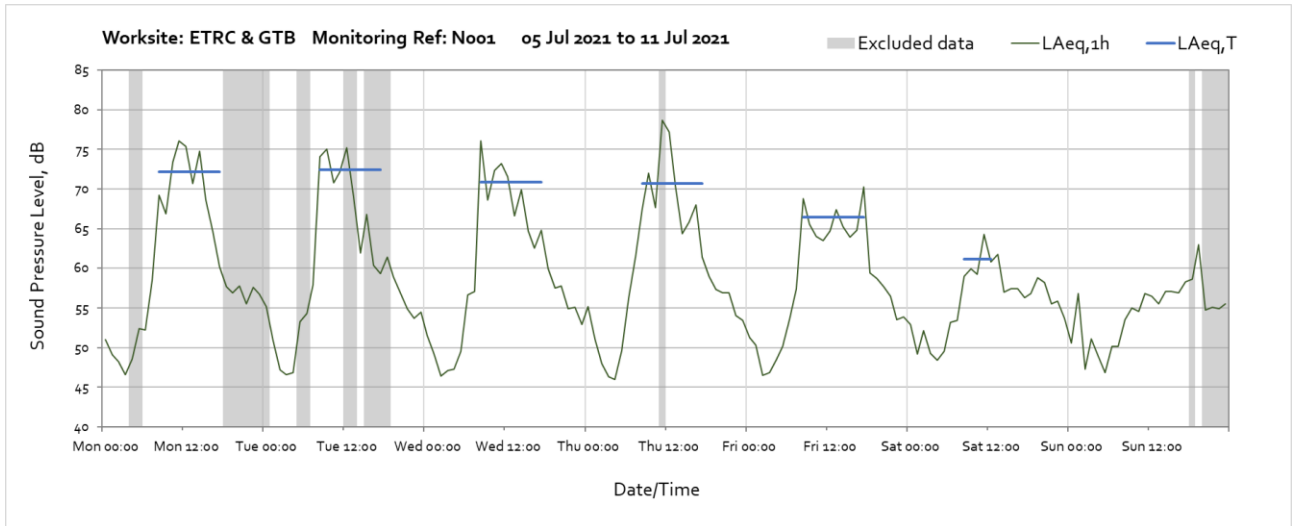
Worksite: ESC, C – Monitoring Ref: N046

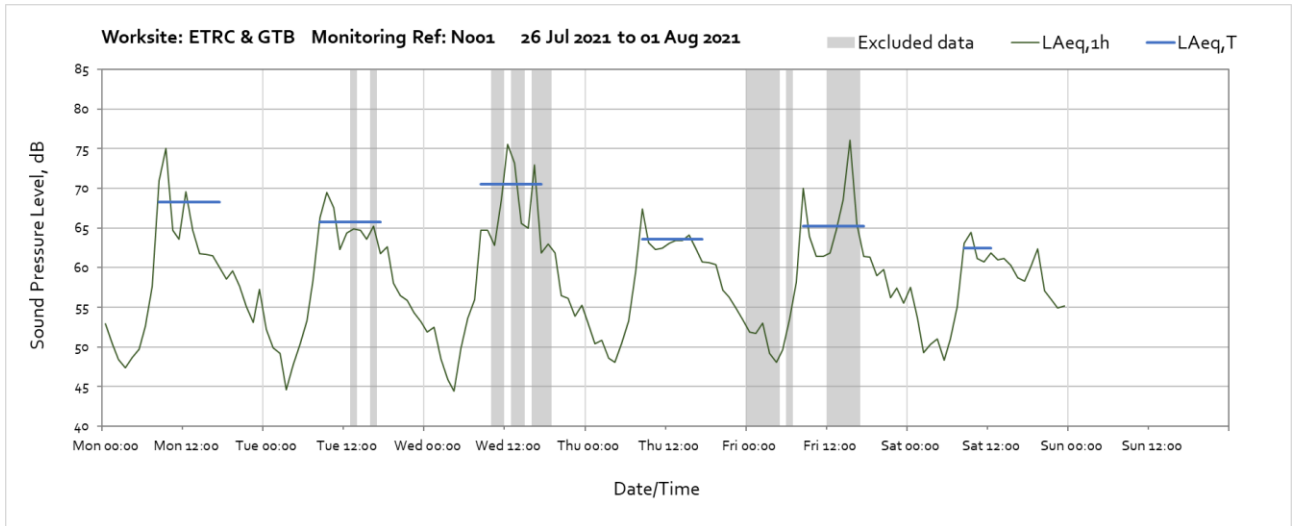




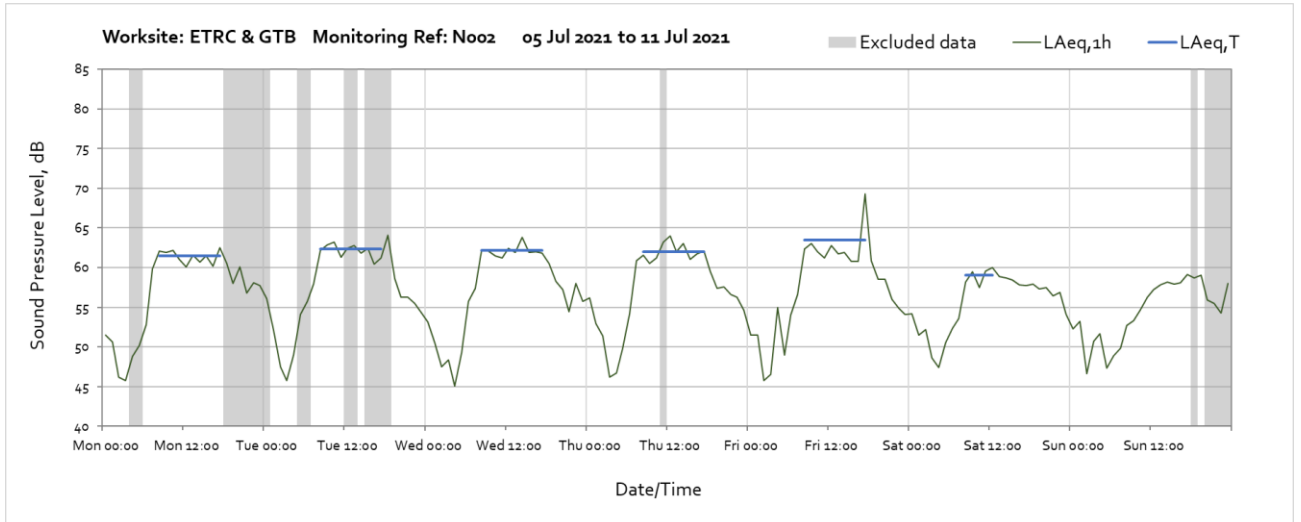
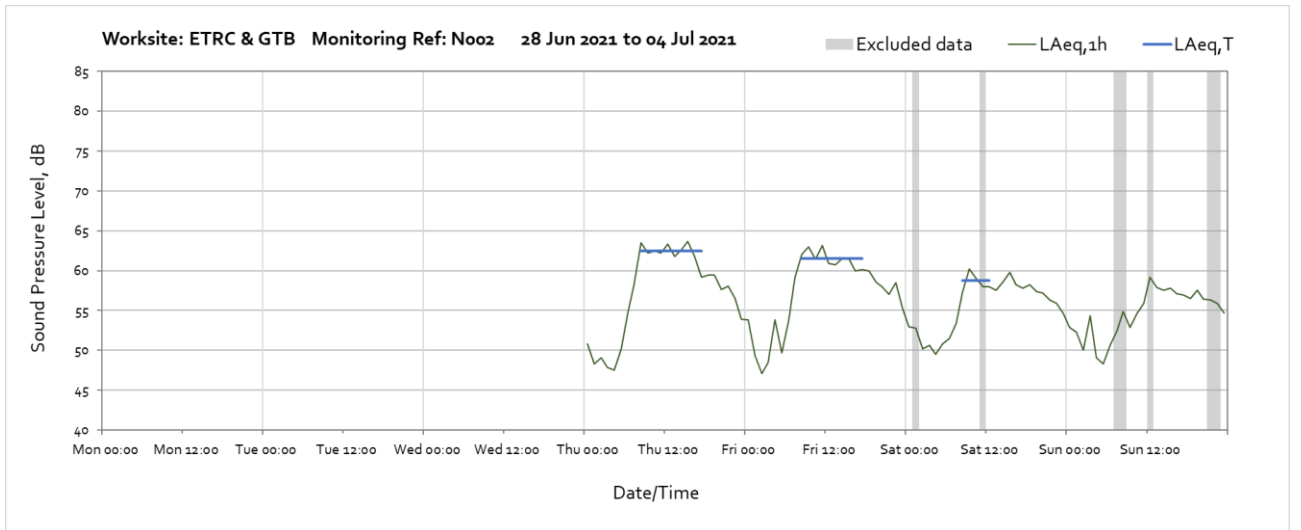
Worksite: ETRC & GTB - Monitoring Ref: N001

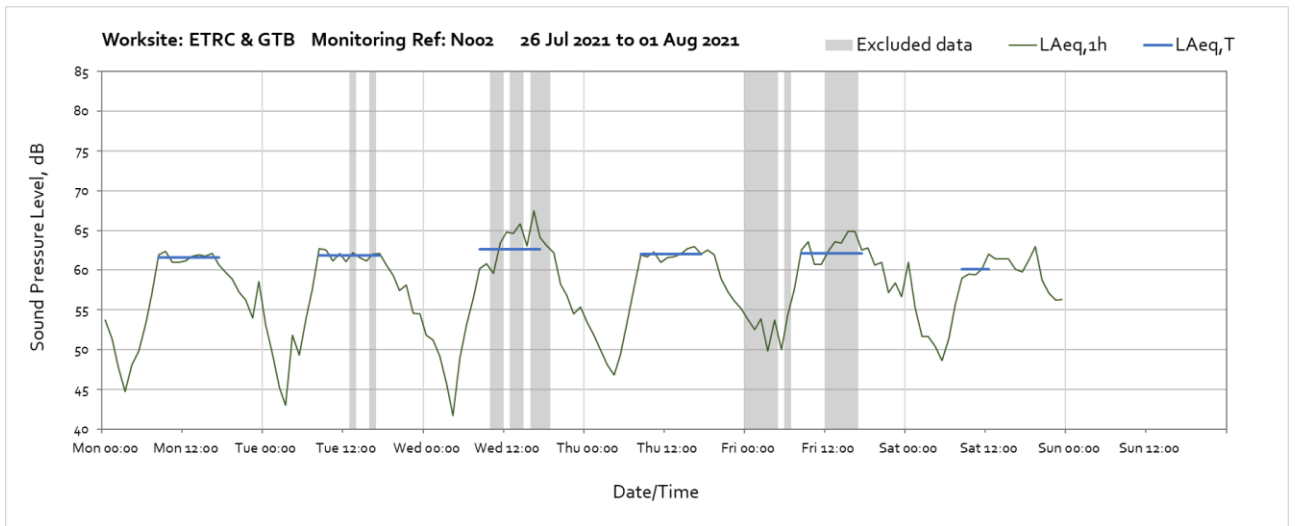
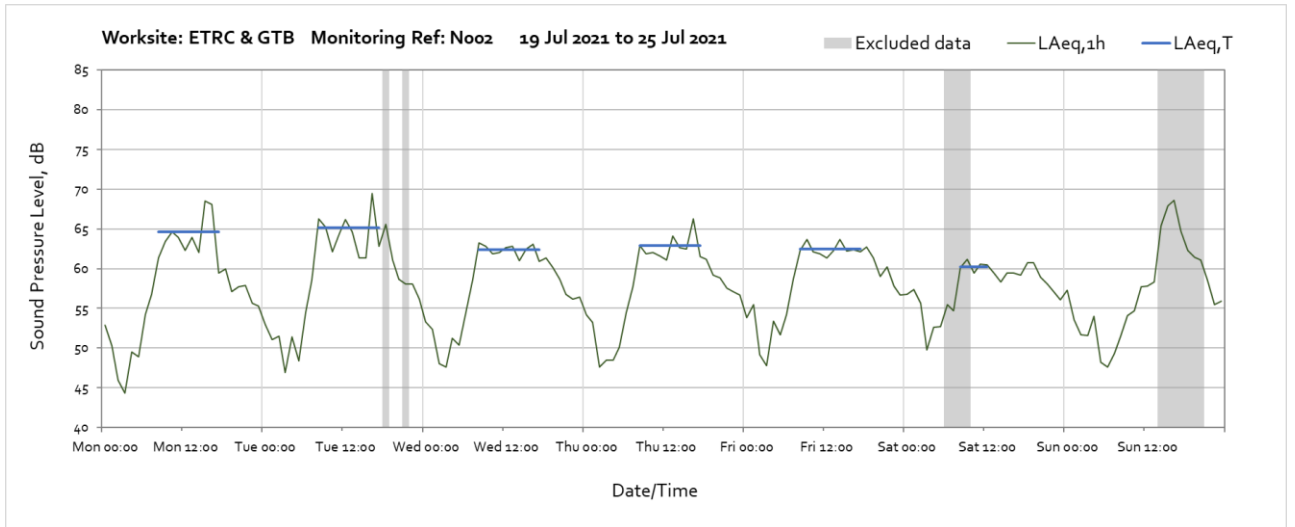
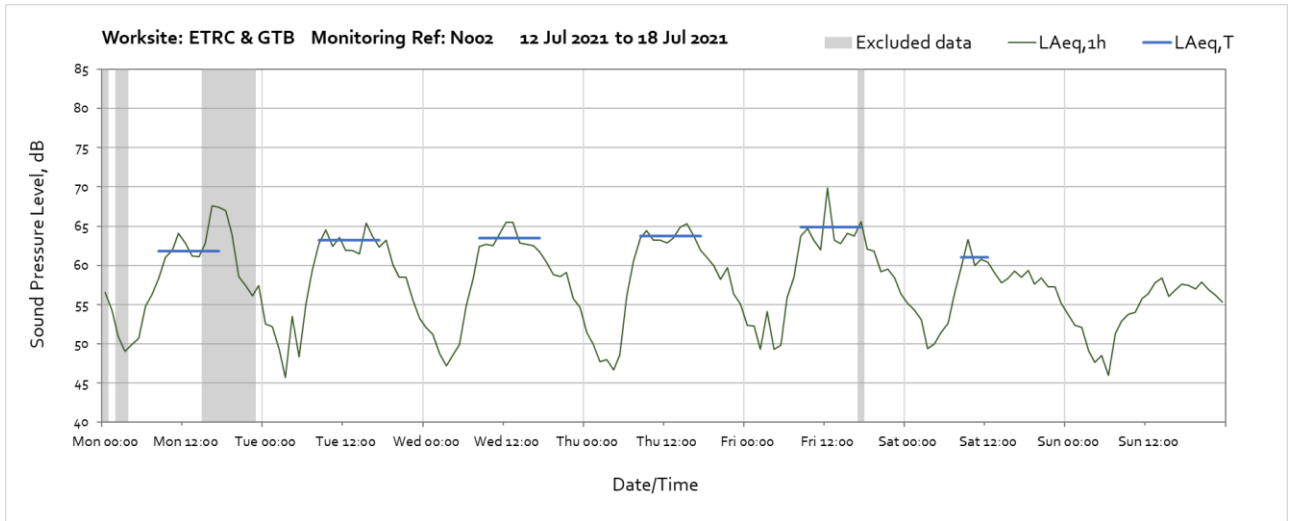




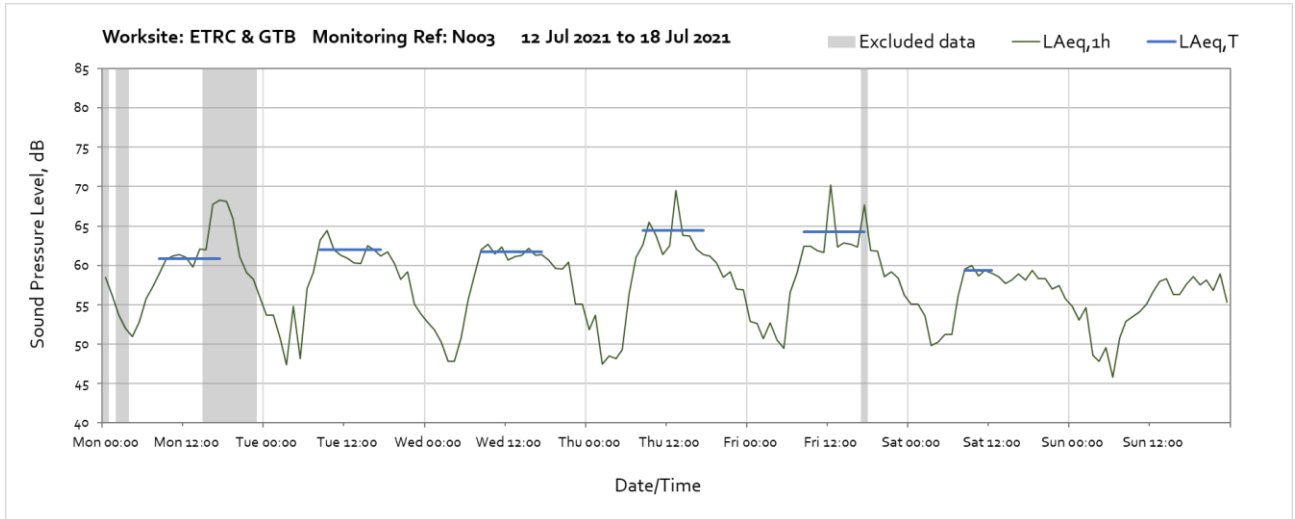
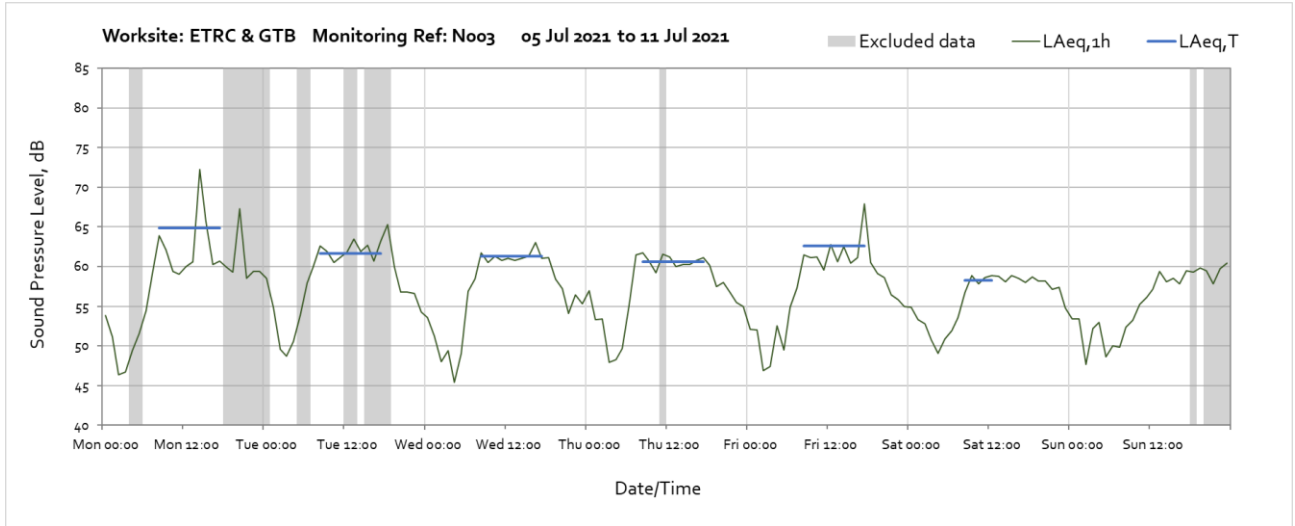
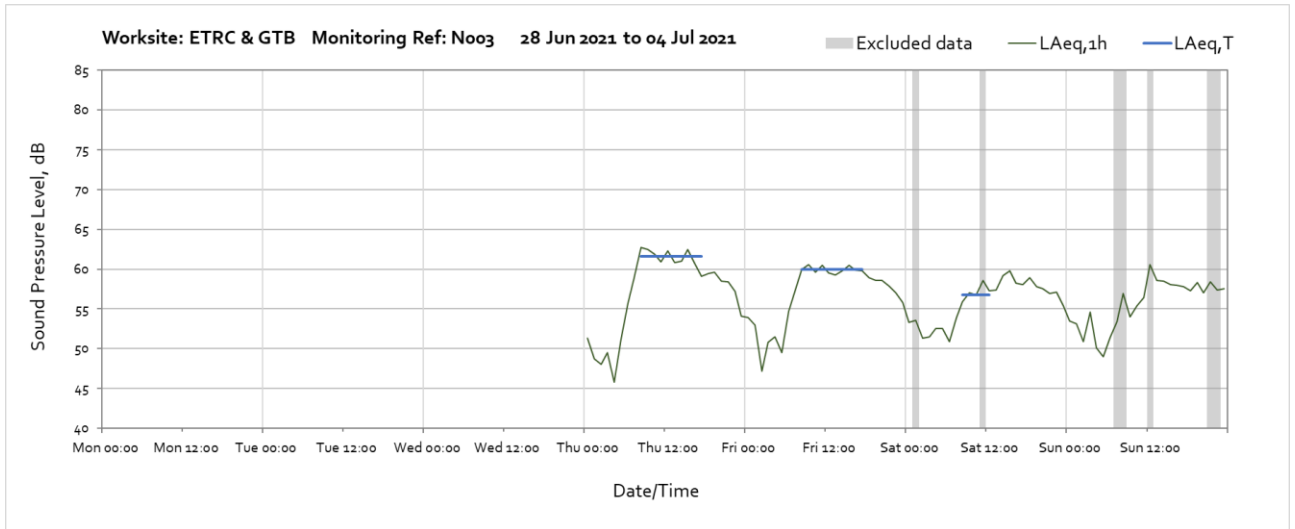


Worksite: ETRC & GTB – Monitoring Ref: N002

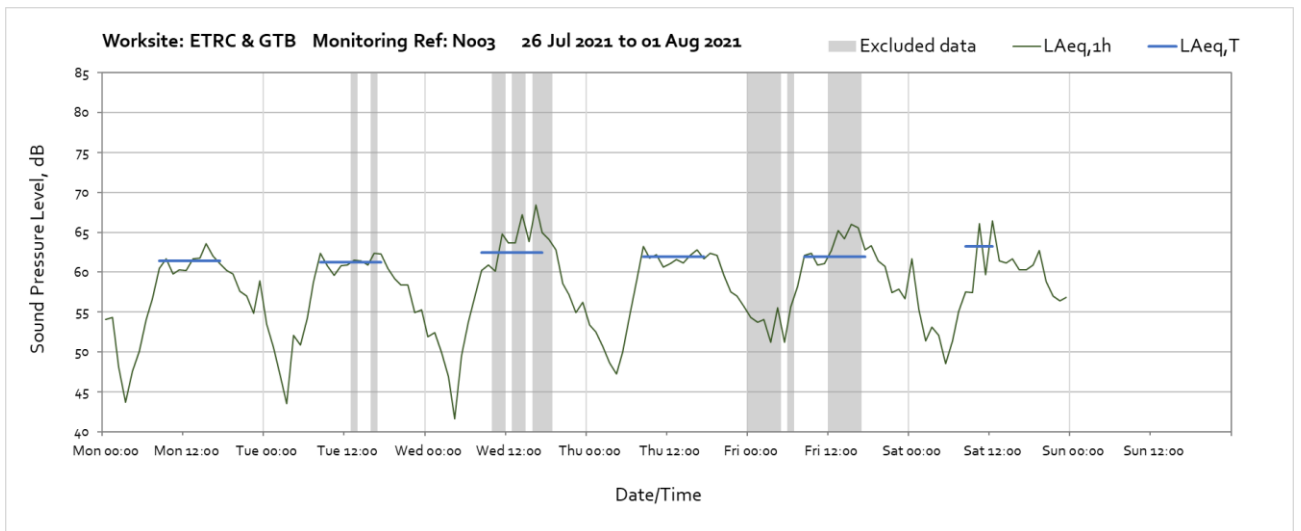
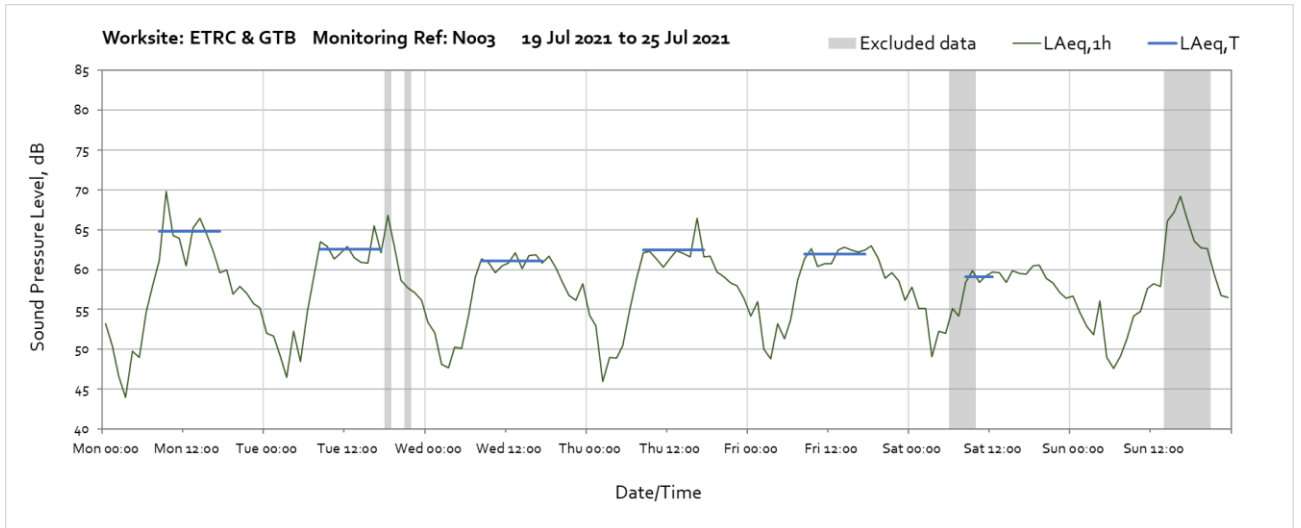




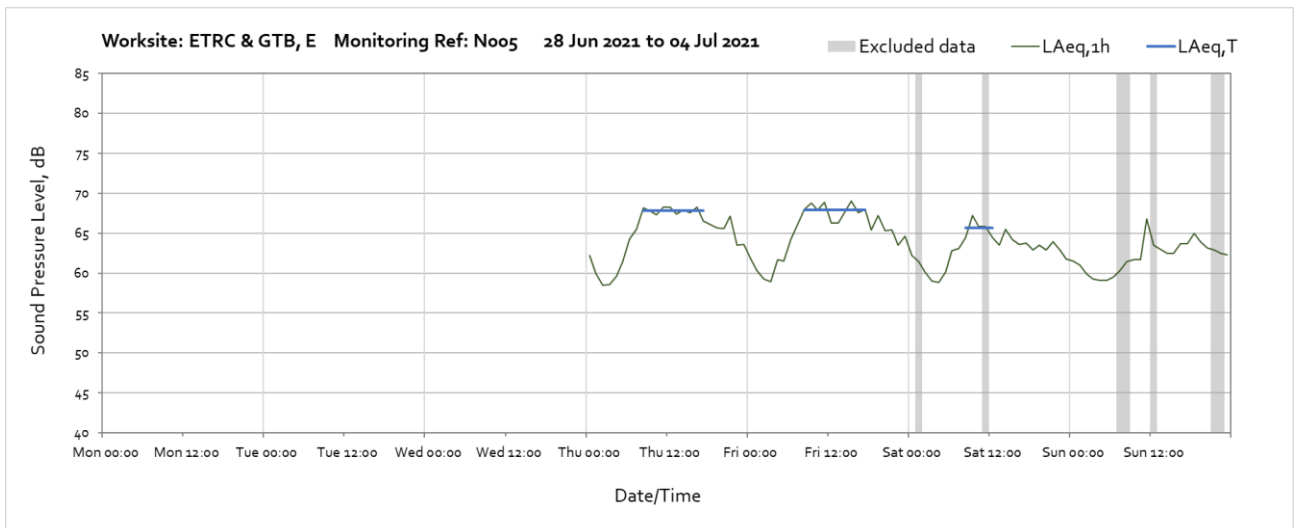
Worksite: ETRC & GTB – Monitoring Ref: N003

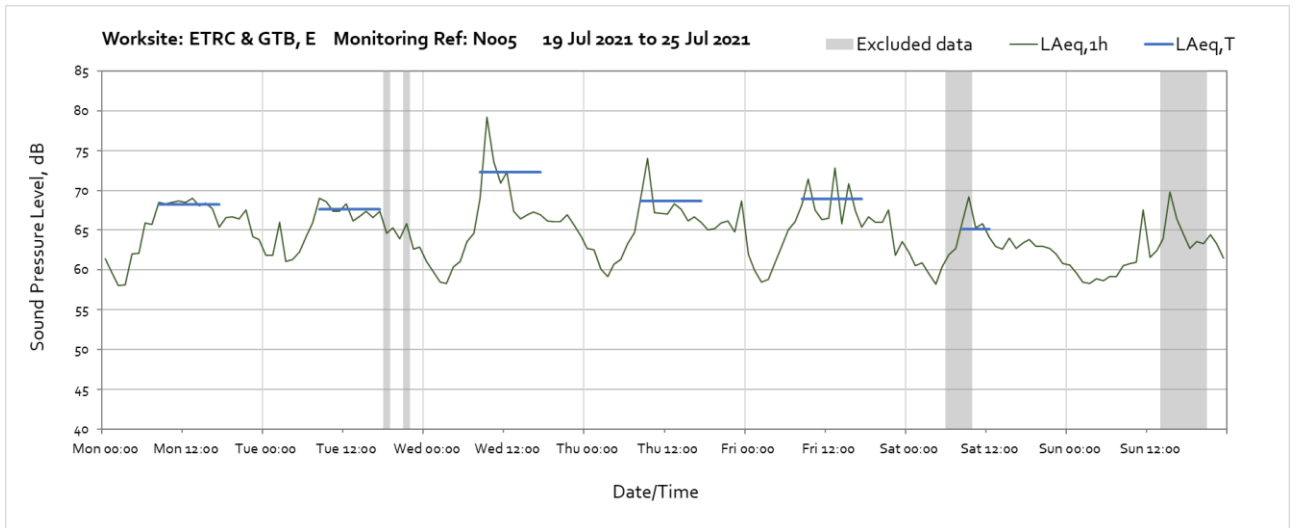
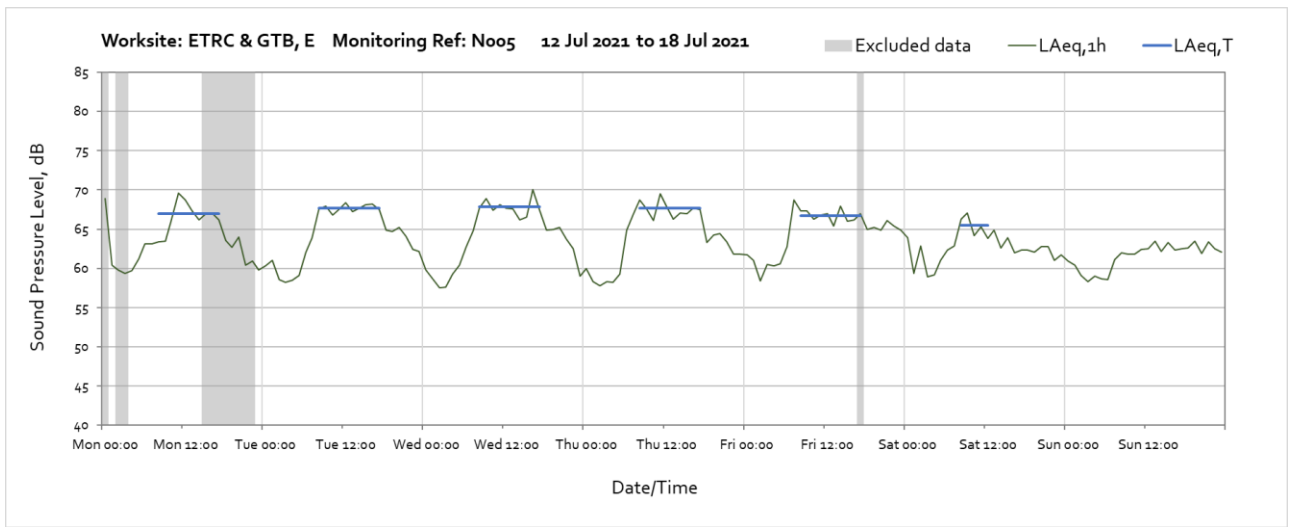
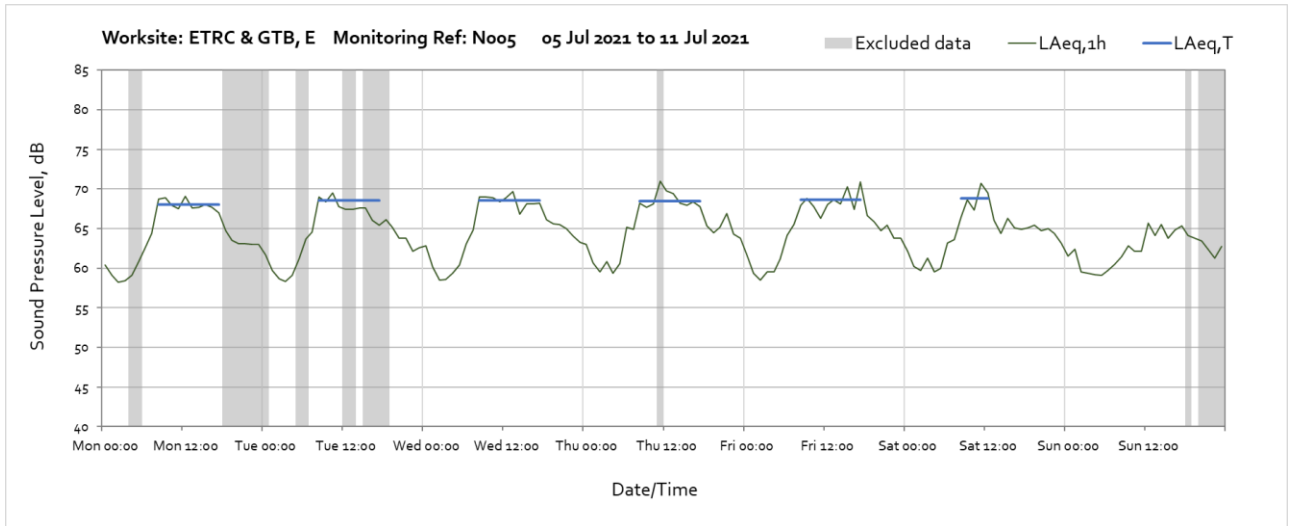


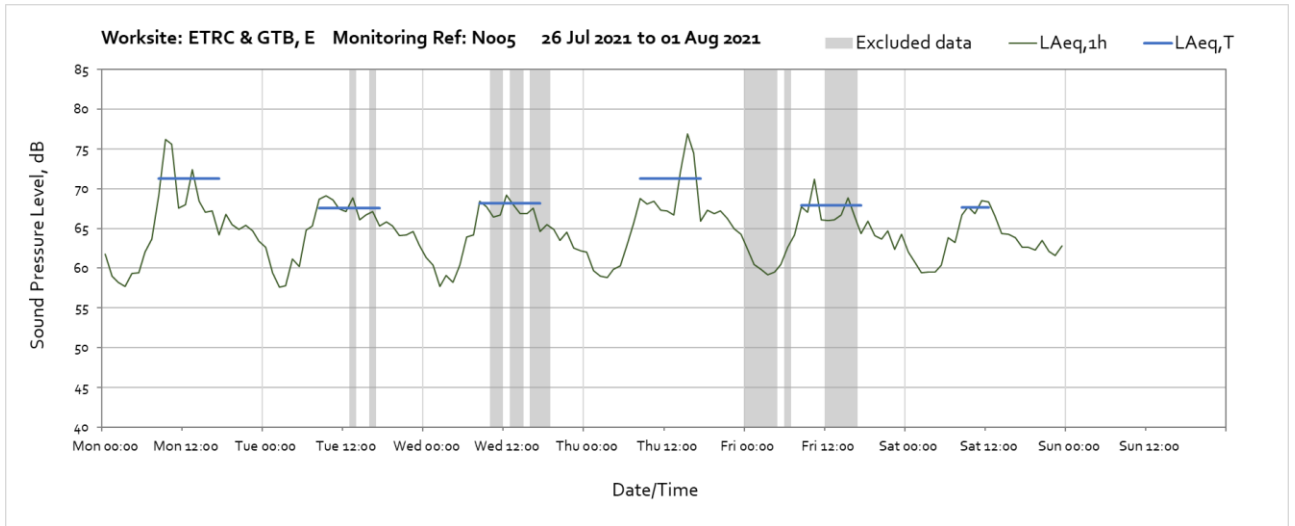
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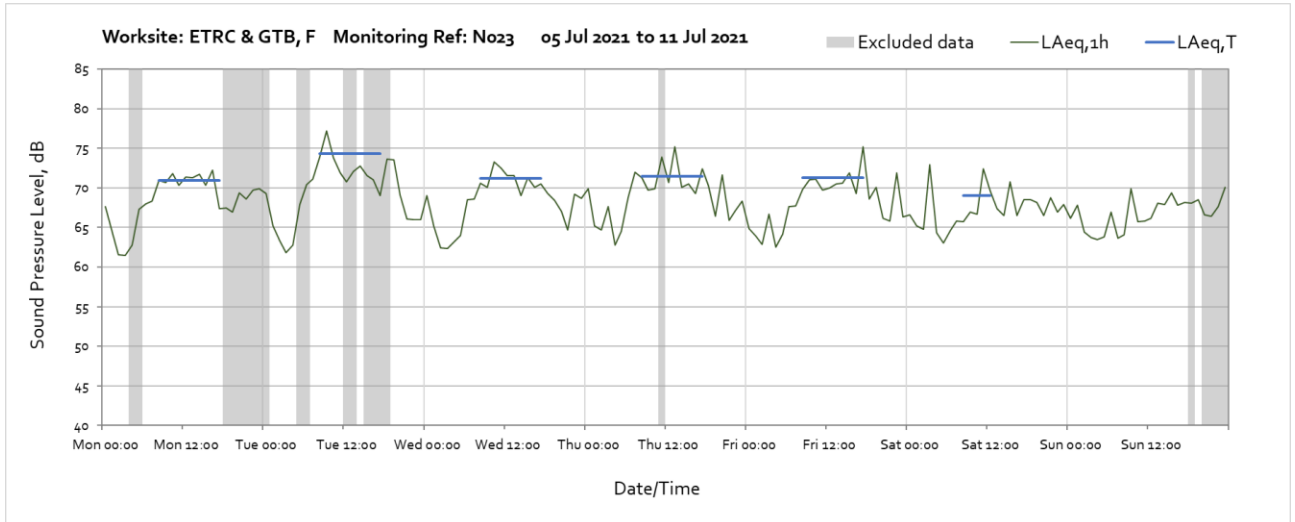
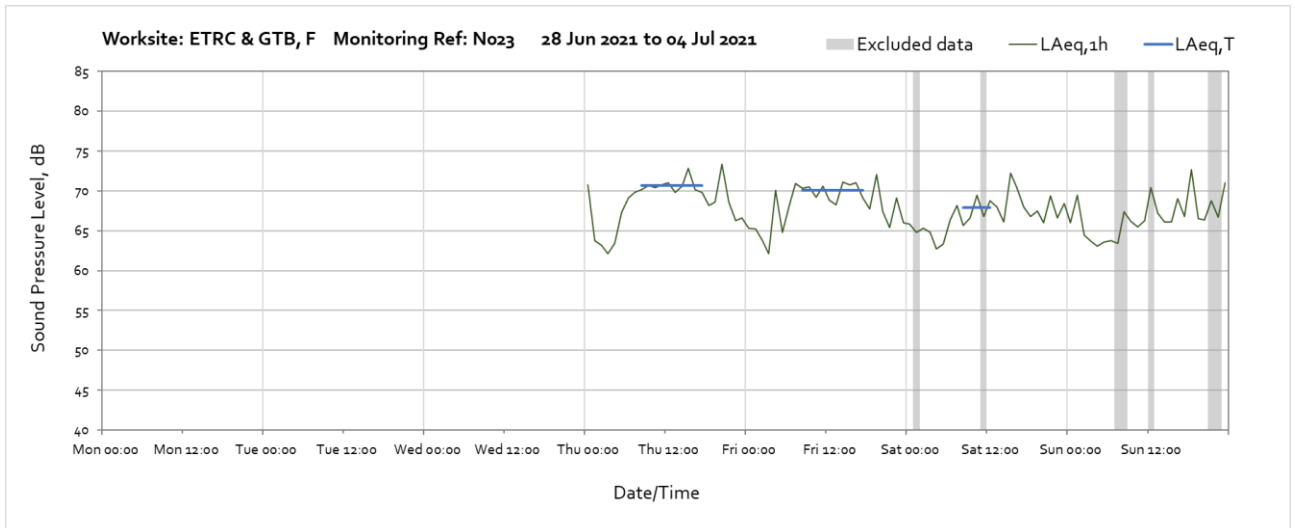
Worksite: ETRC & GTB, E - Monitoring Ref: N005

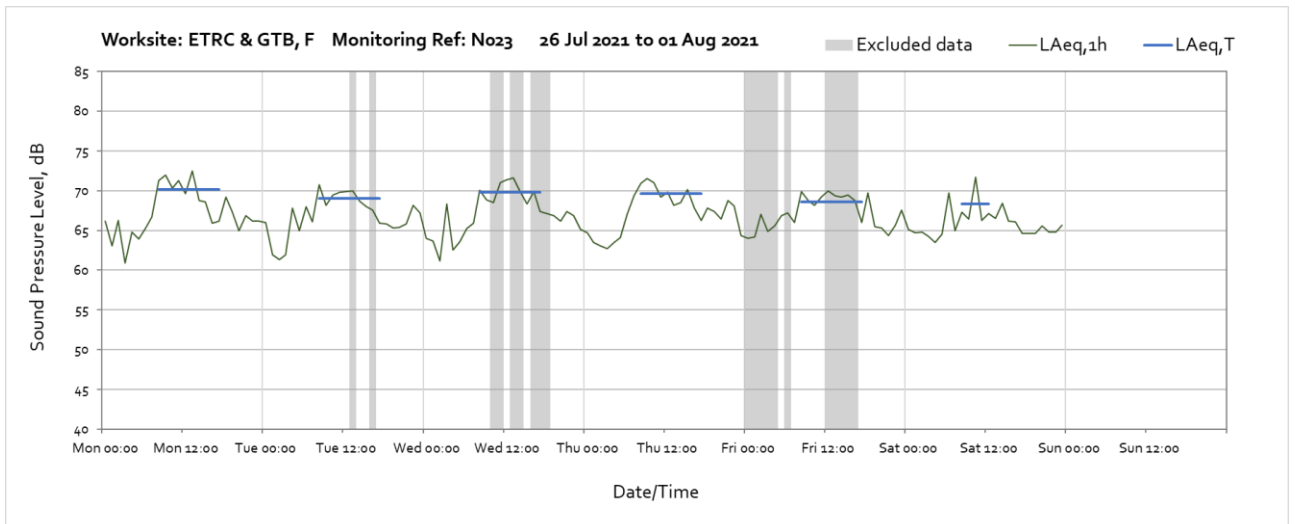
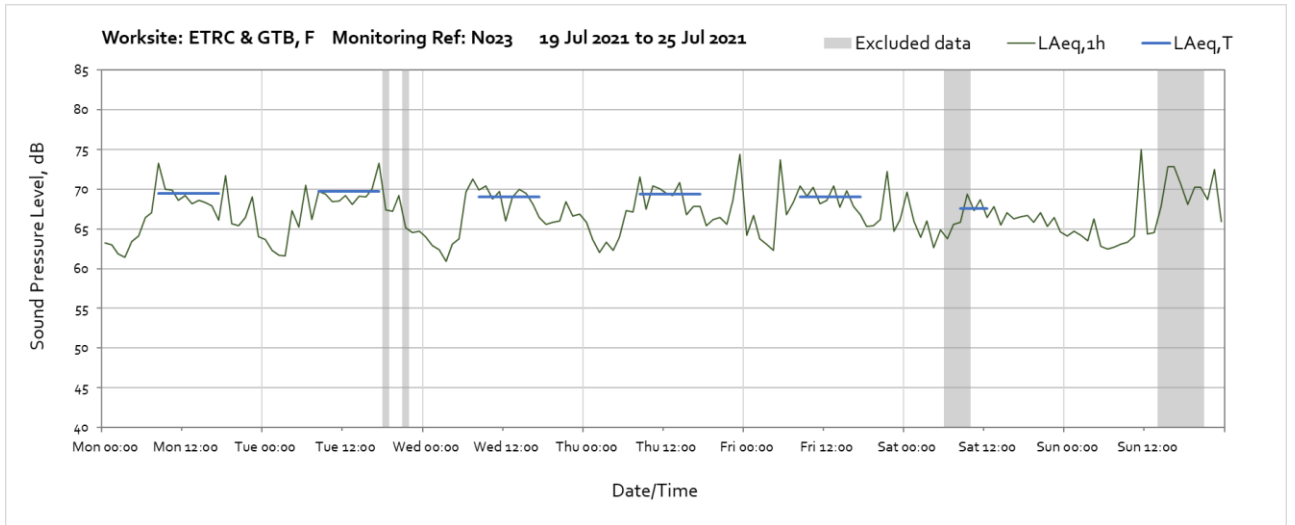
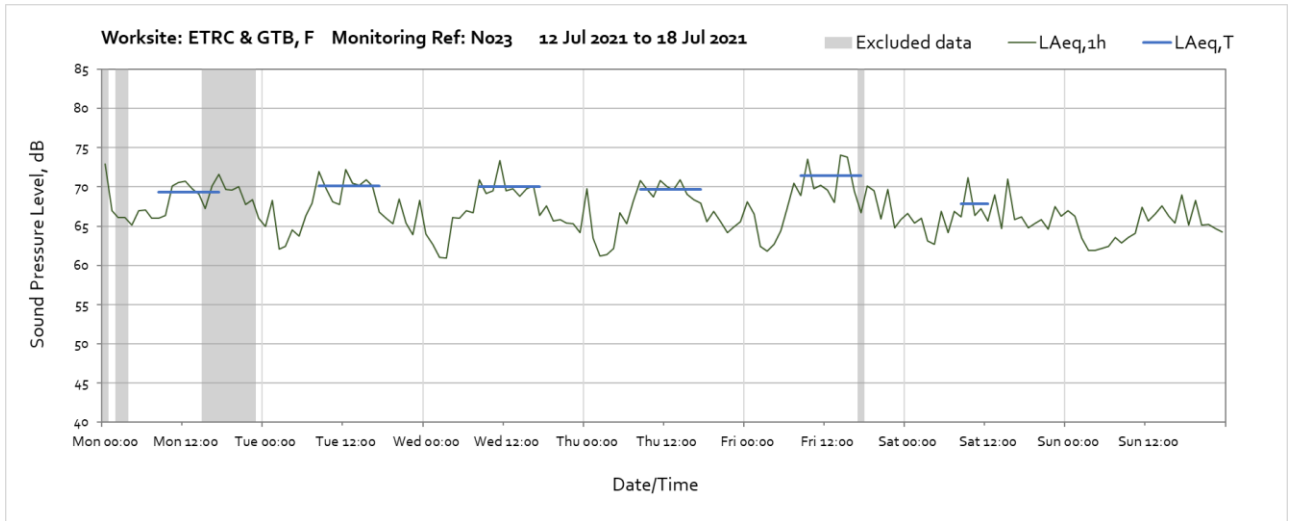




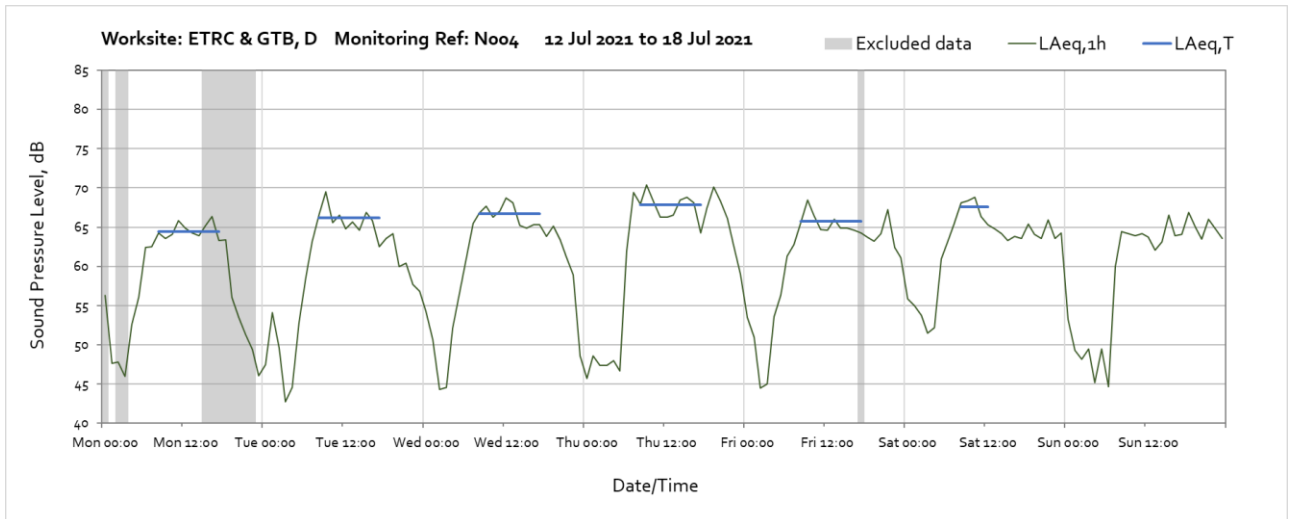
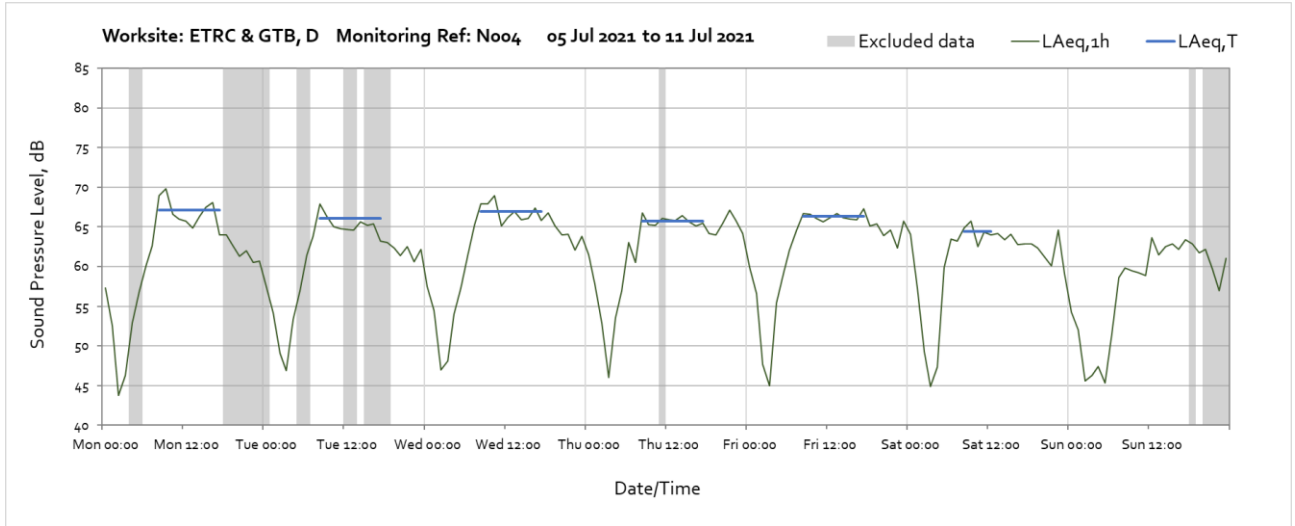
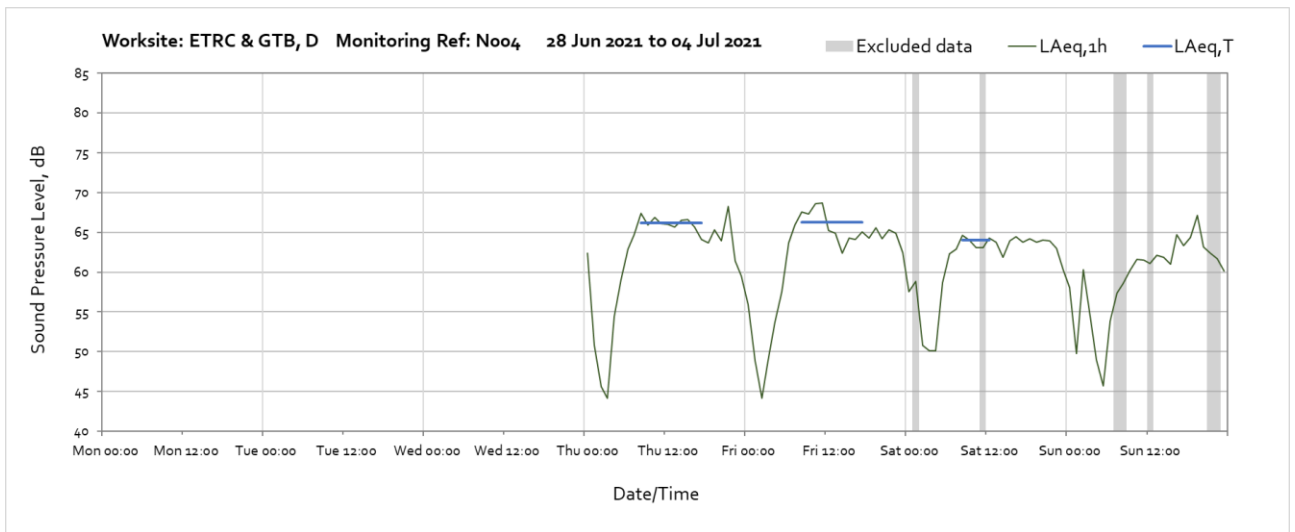


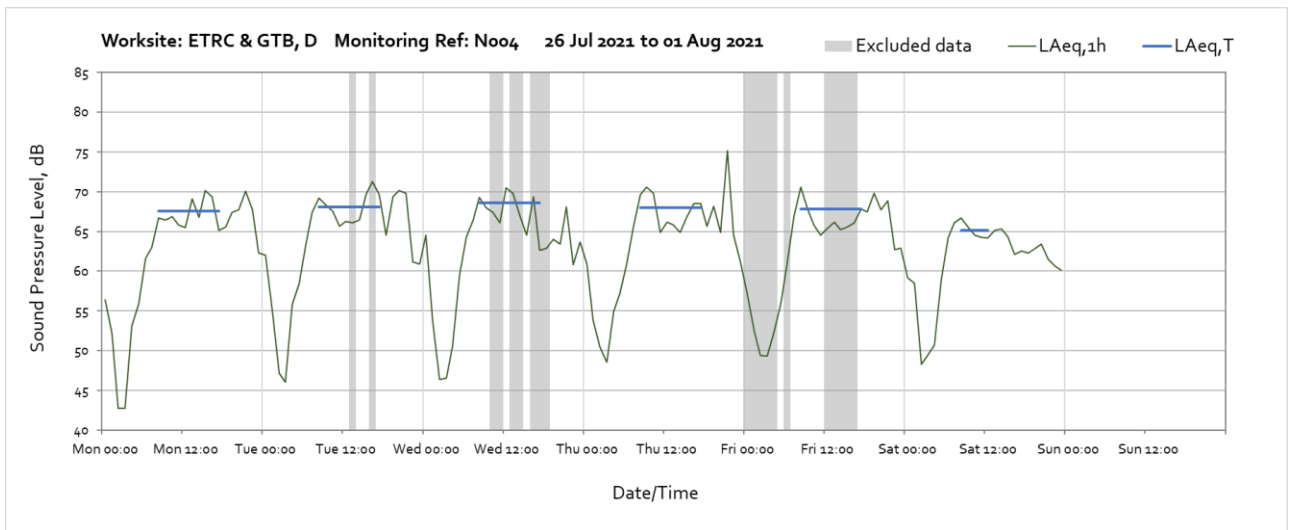
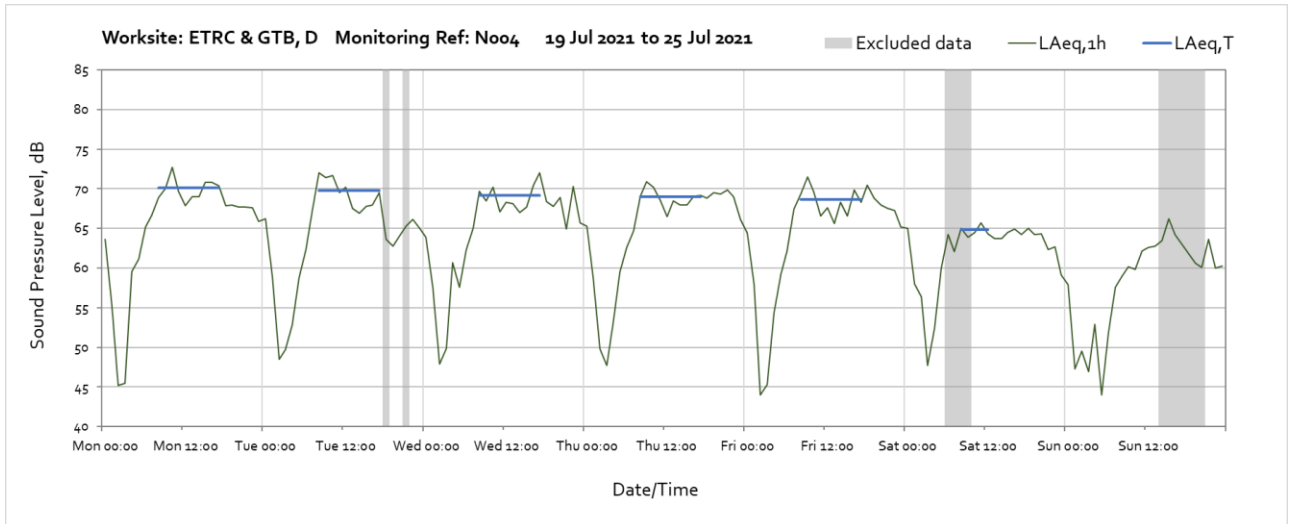
Worksite: ETRC & GTB, F – Monitoring Ref: N023



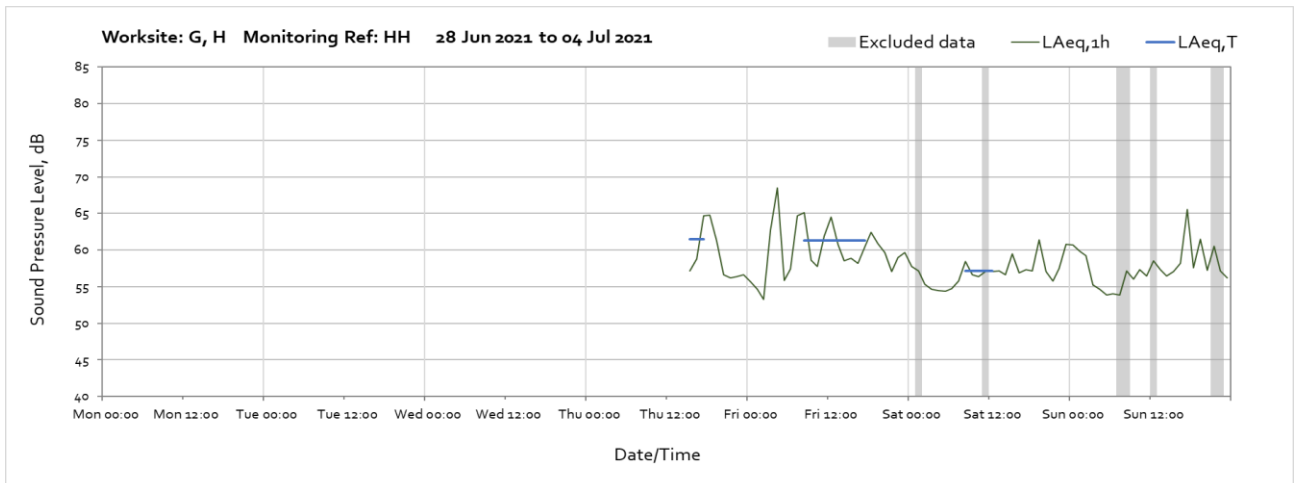


Worksite: ETRC & GTB, D – Monitoring Ref: N004

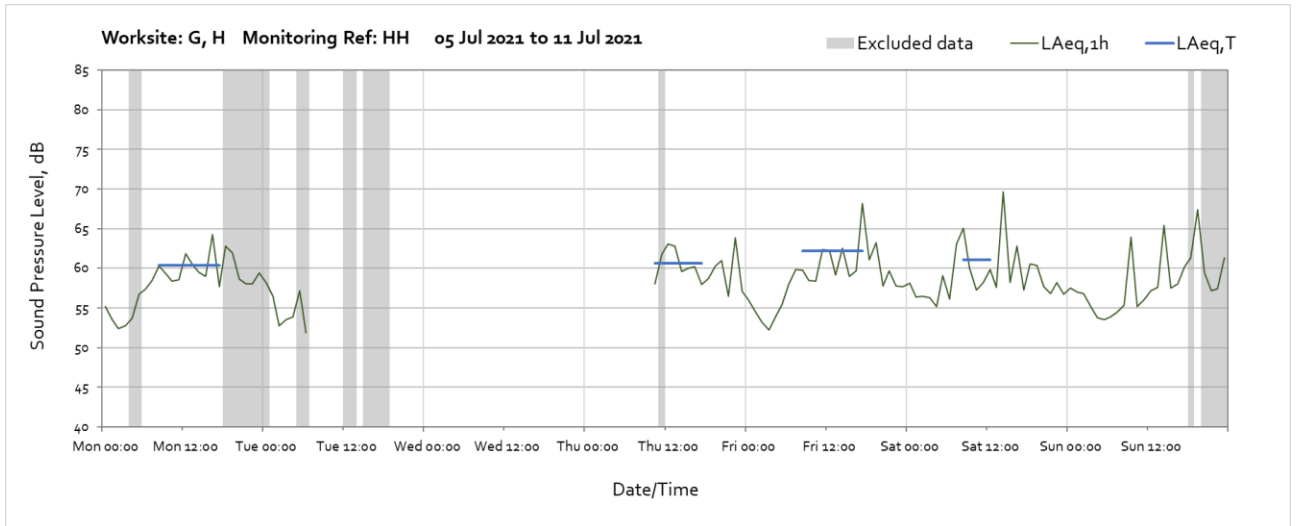




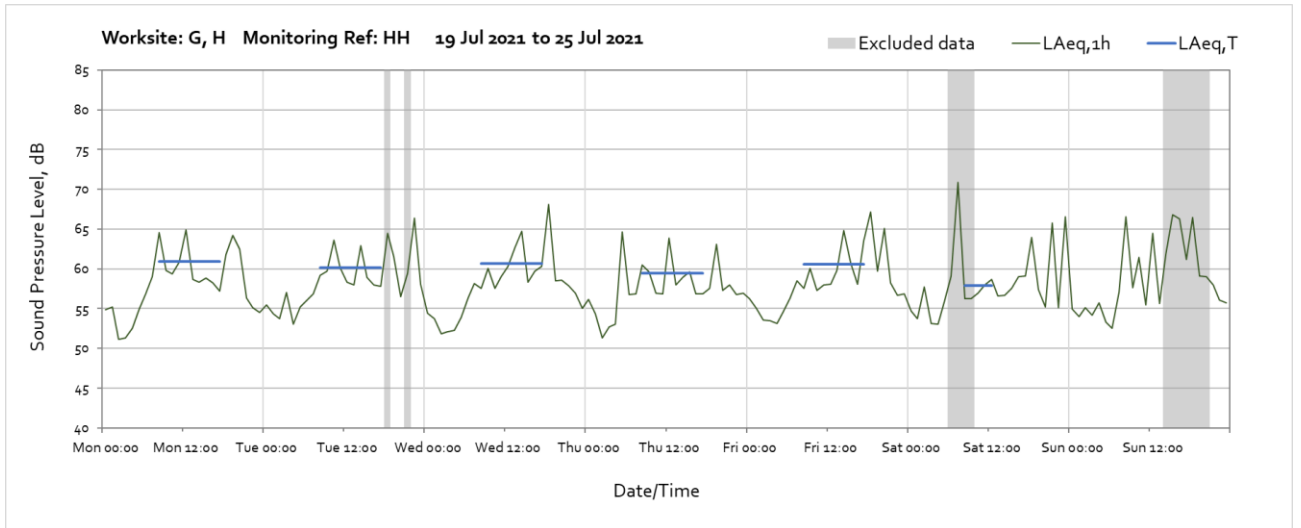
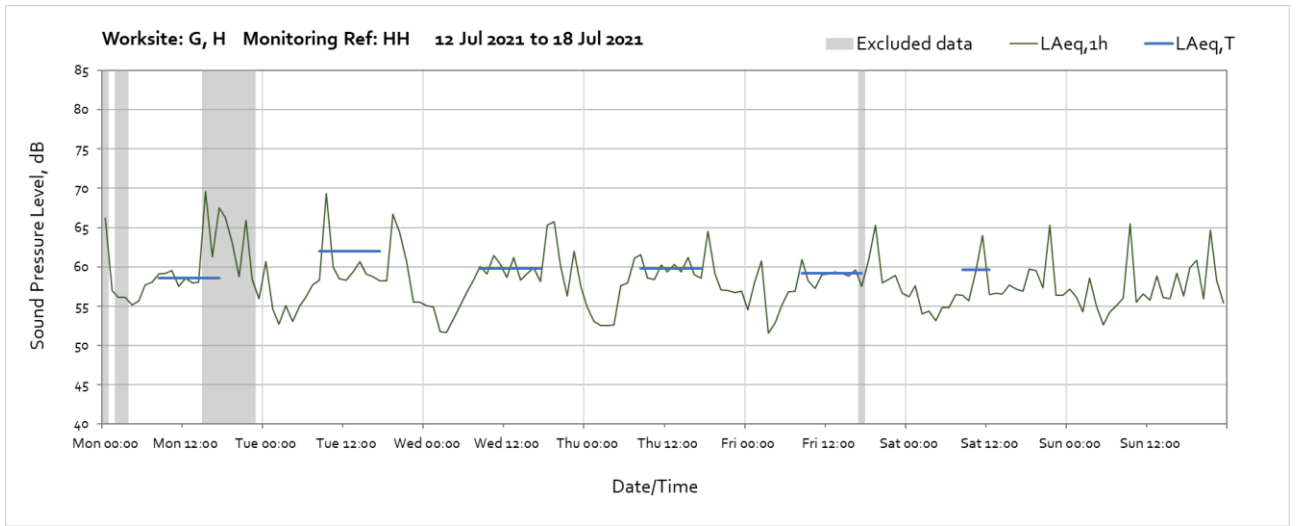
Worksite: G - Monitoring Ref: HH

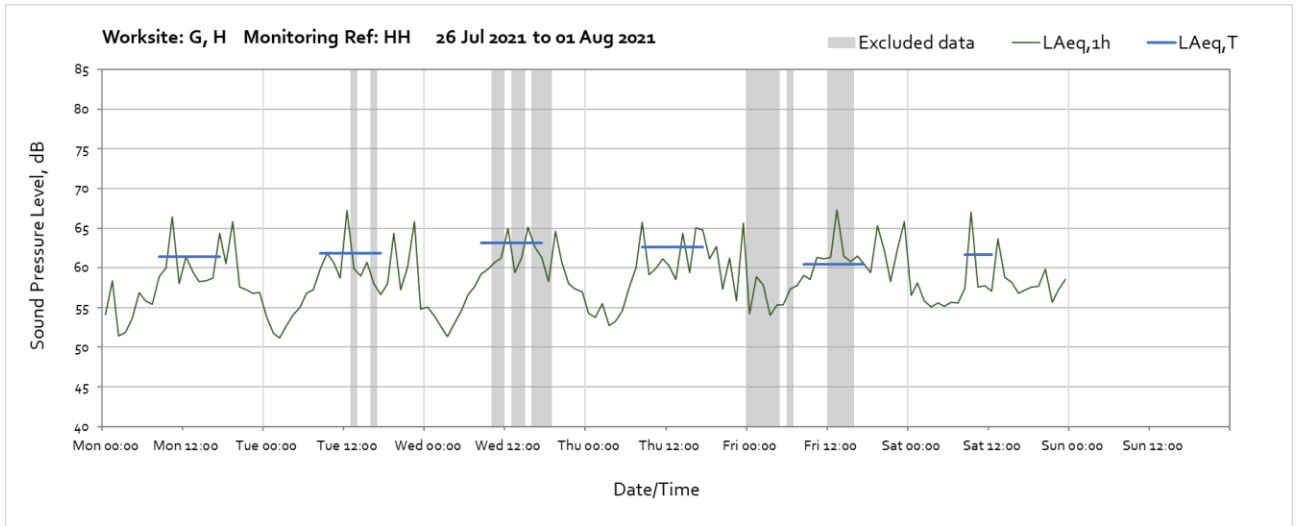


Note: Missing data from the start of the month until 15:00 on Thursday 1st July was due to a monitoring station software error. The monitor will be exchanged for another unit as soon as is reasonably practical with view of minimising loss of data in the future.

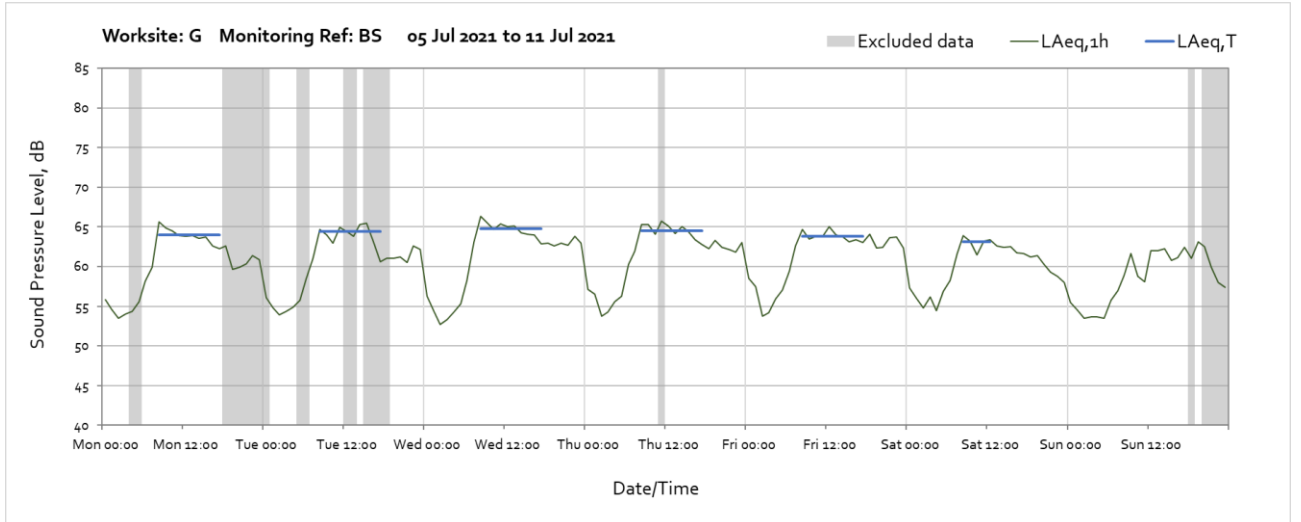
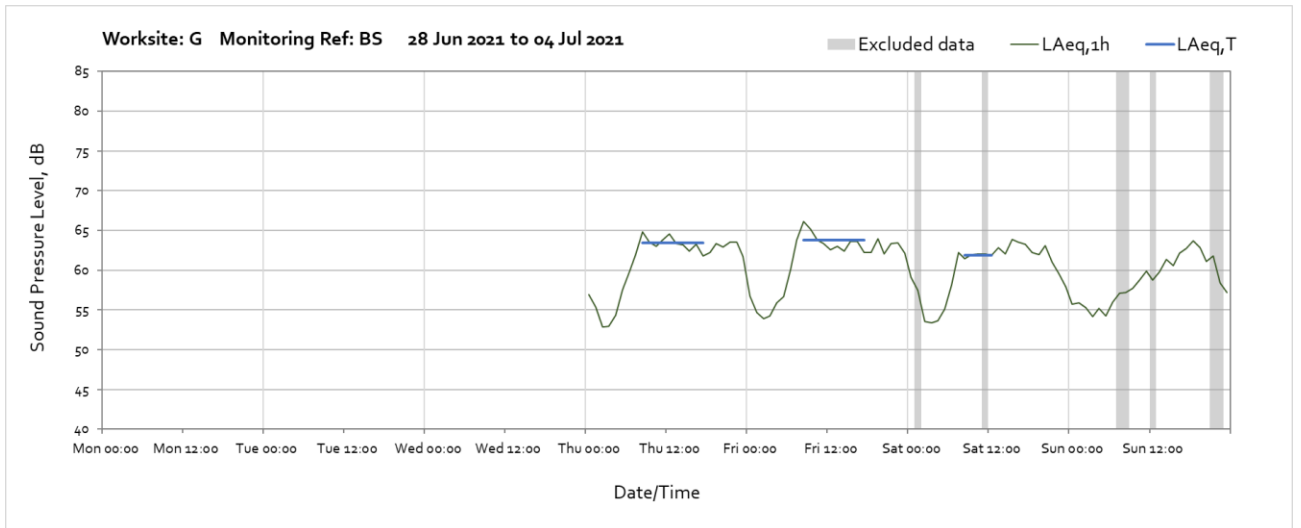


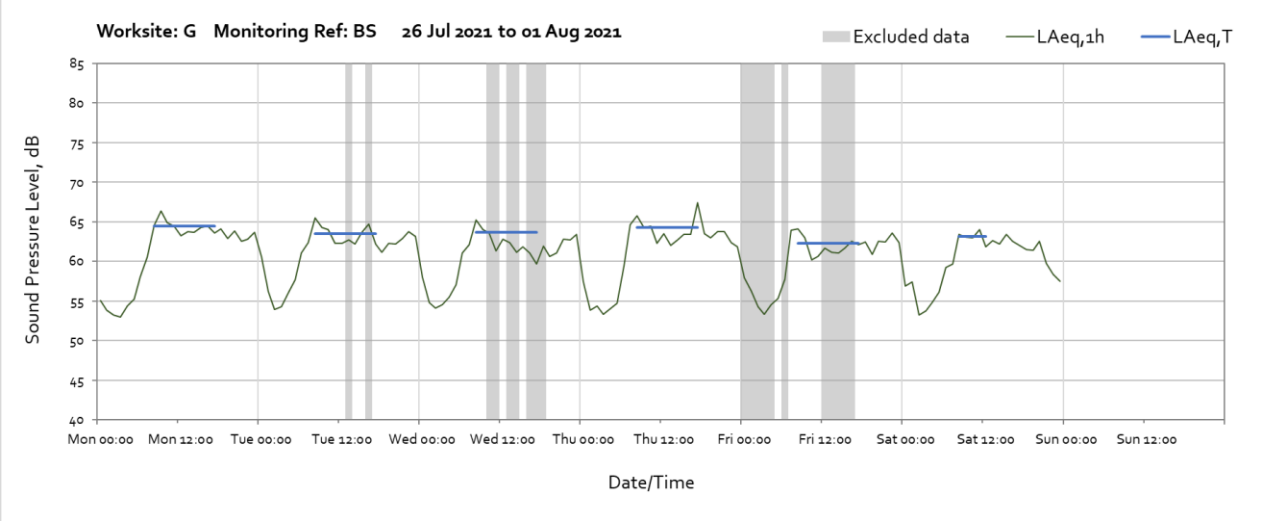
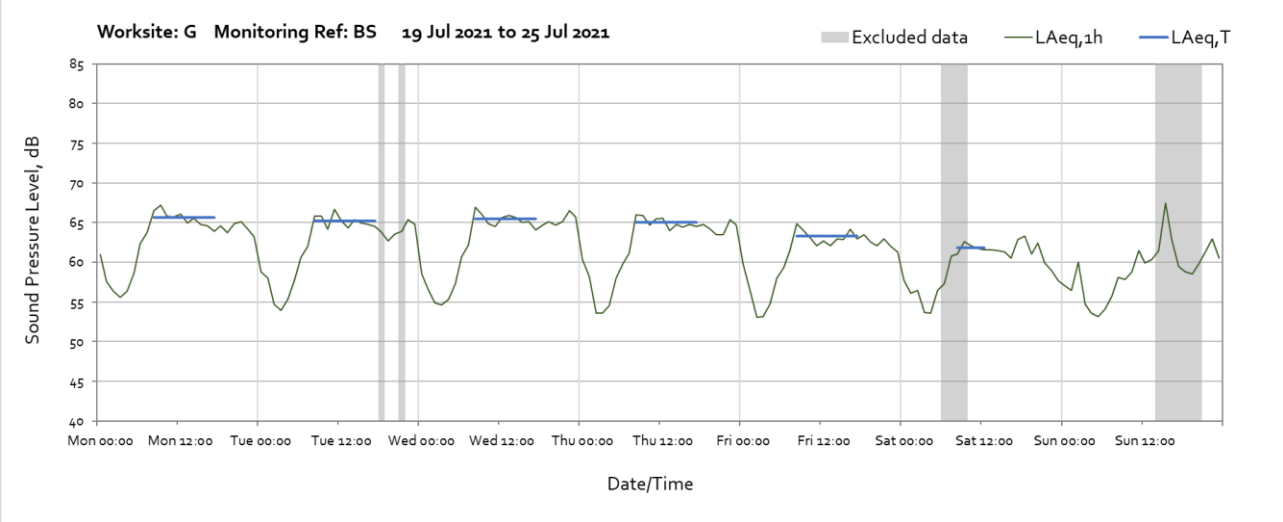
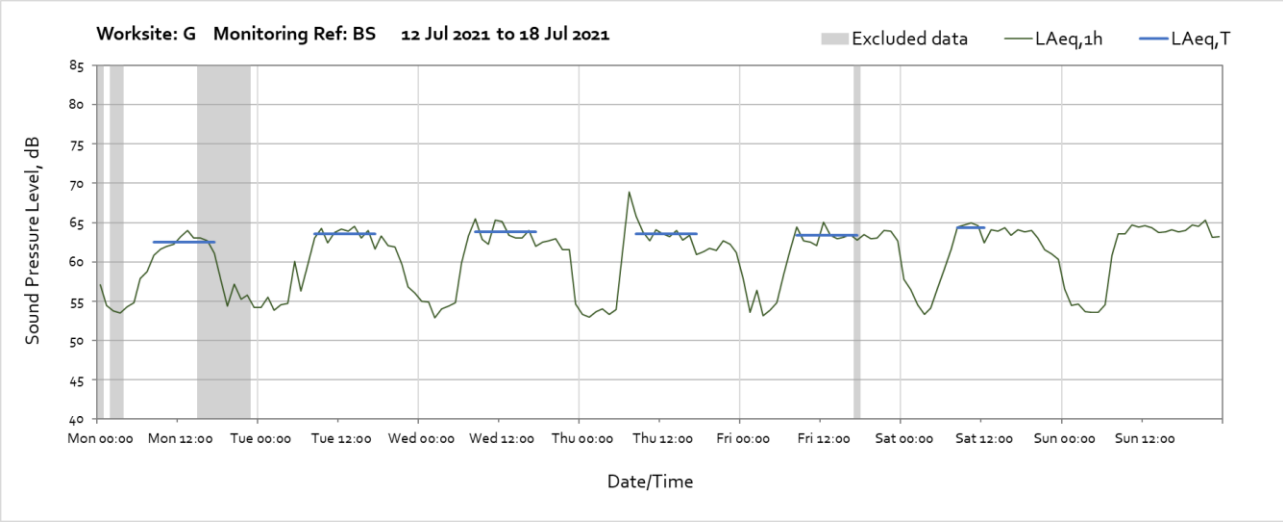
Note: Missing data from 07:00 on Tuesday 6th July until 10:00 on Thursday 8th July was due to a monitoring station software error. The monitor will be exchanged for another unit as soon as is reasonably practical with view of minimising loss of data in the future.



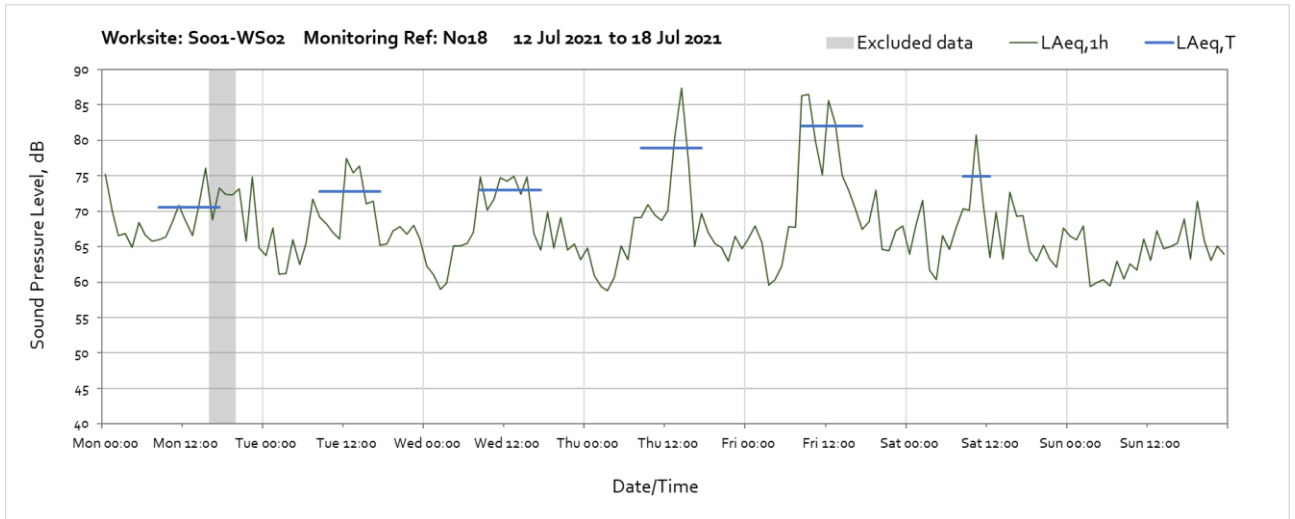
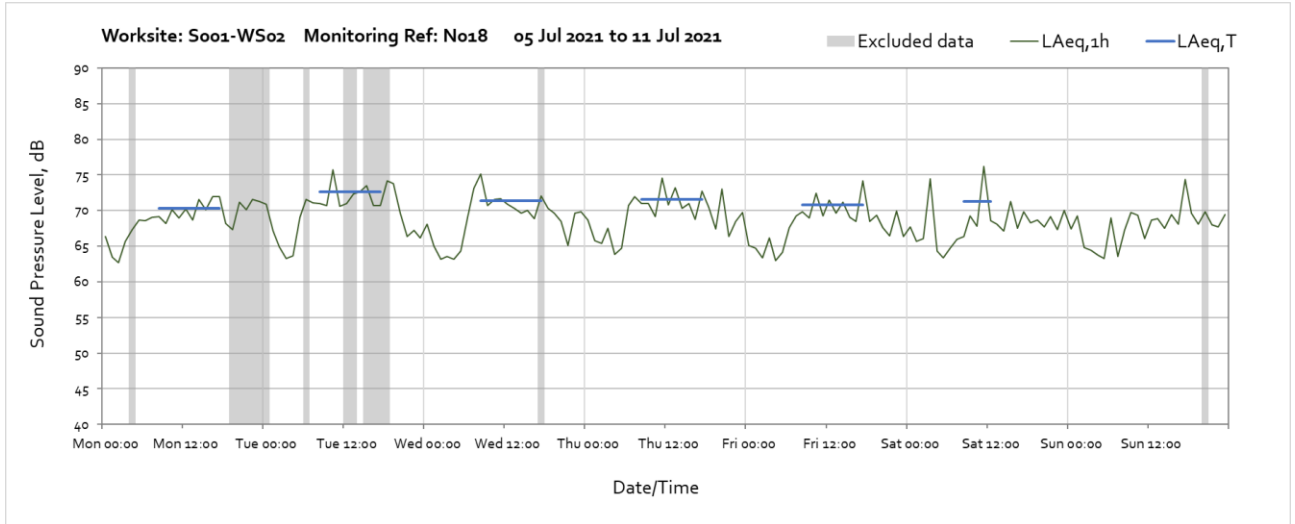
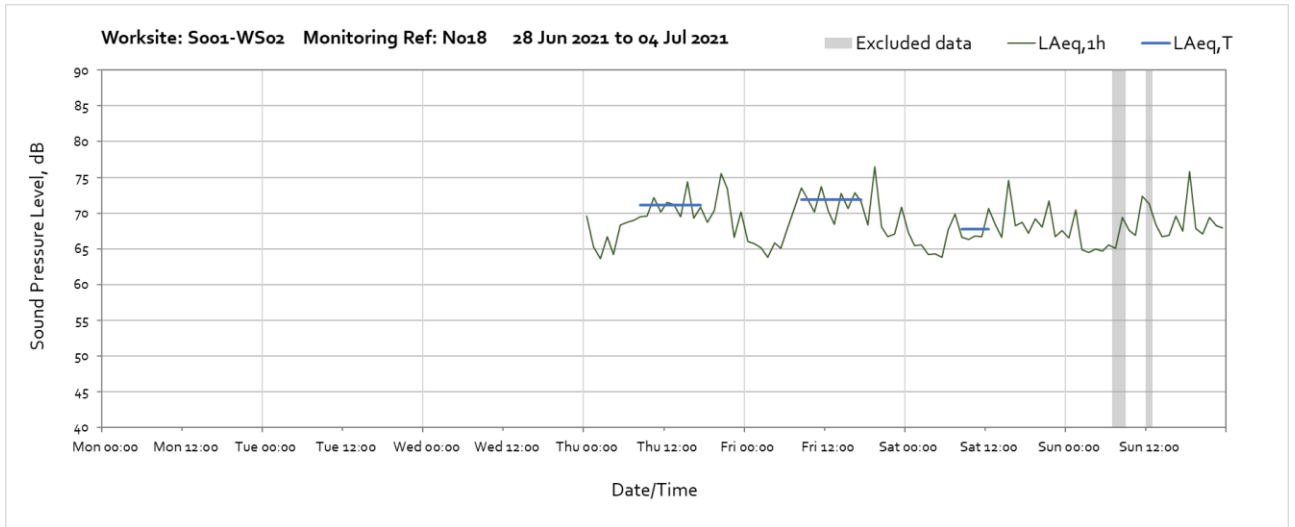


Worksite: G - Monitoring Ref: BS

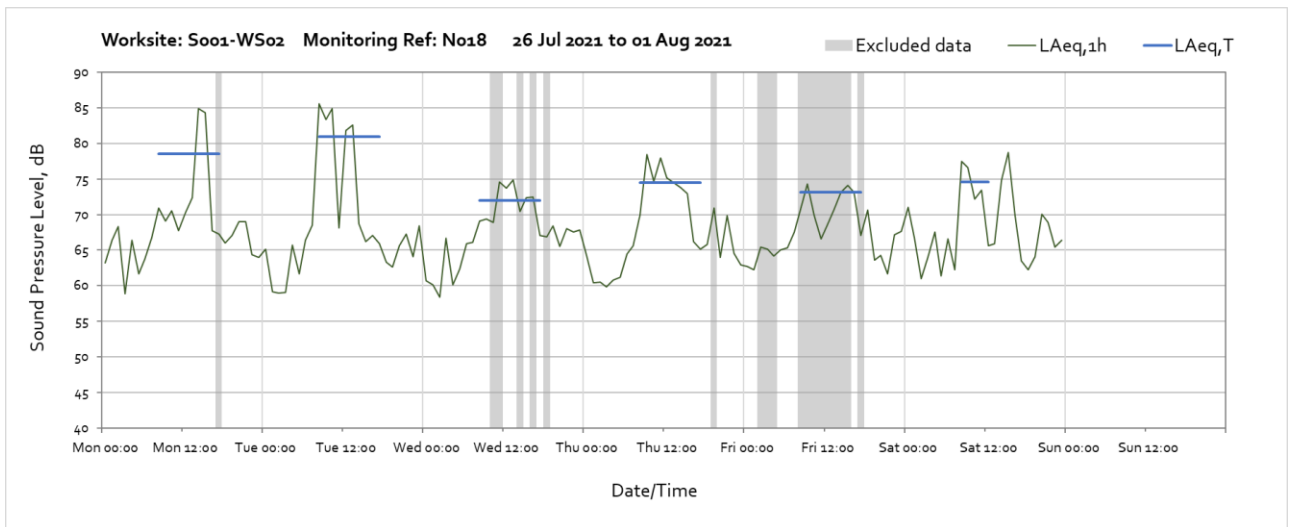
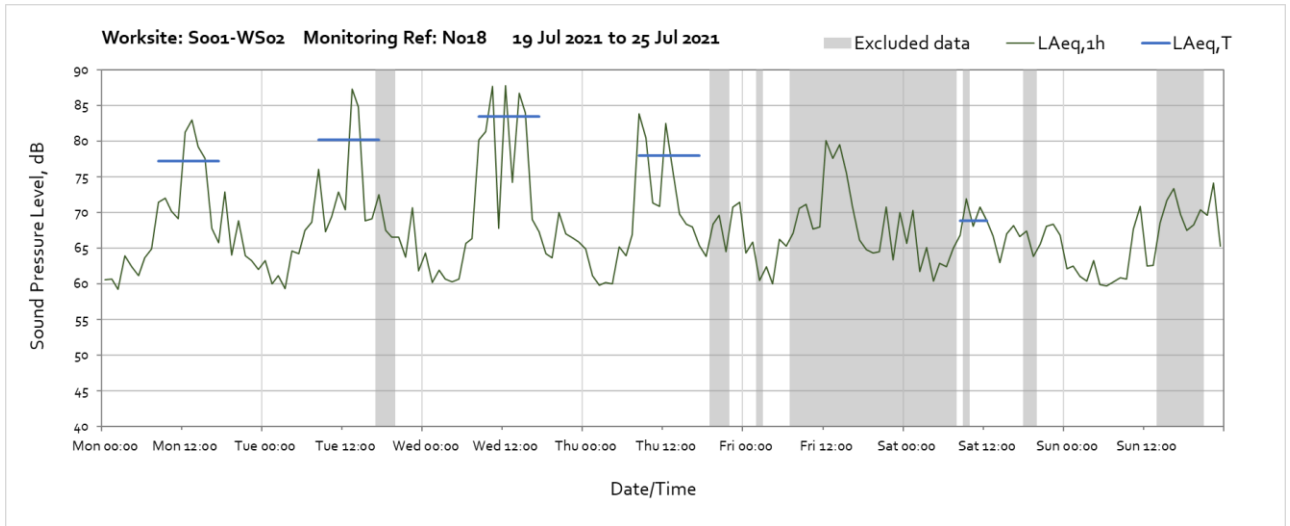




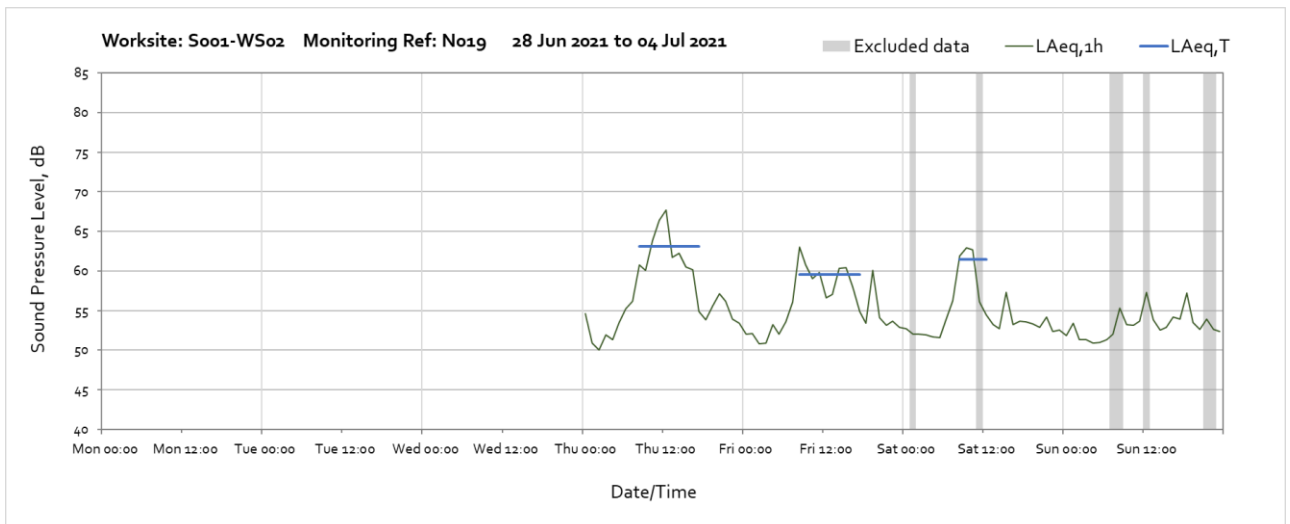
Worksite: S001-WS02 – Monitoring Ref: N018

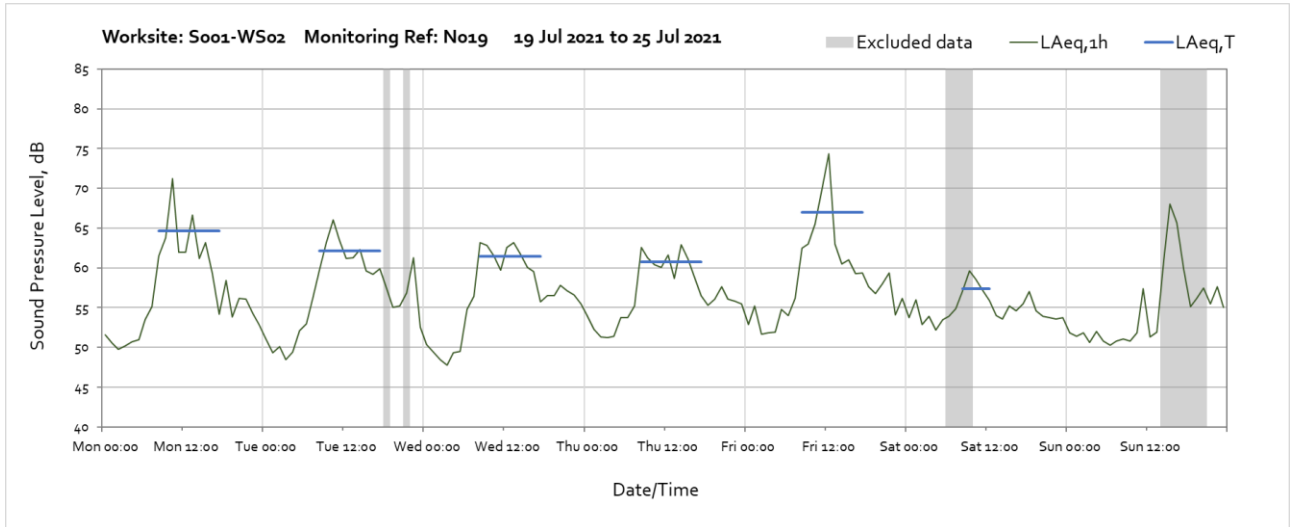
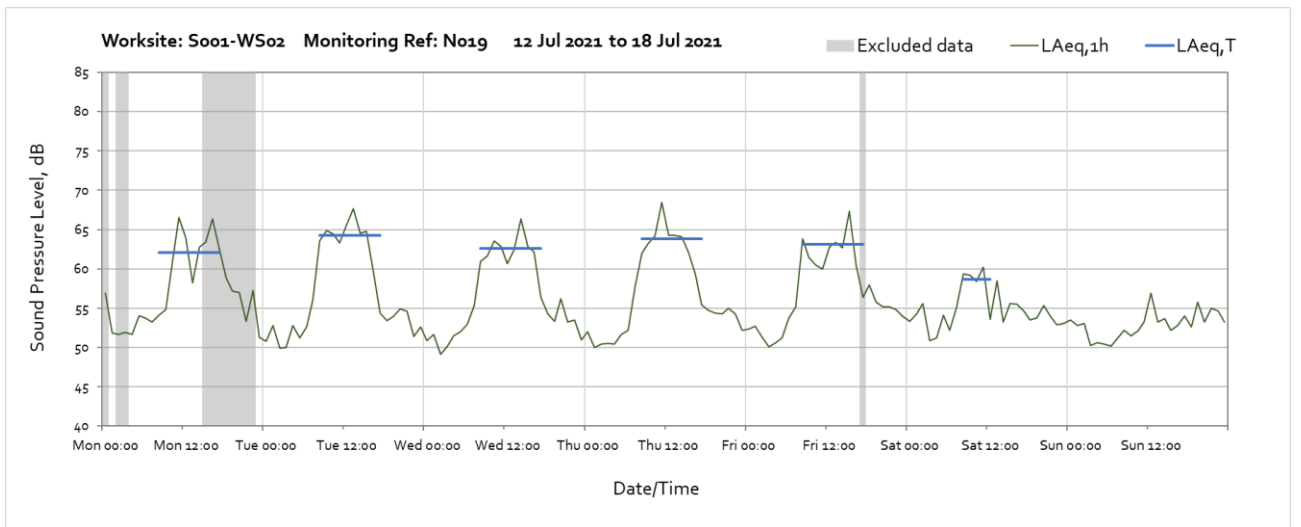
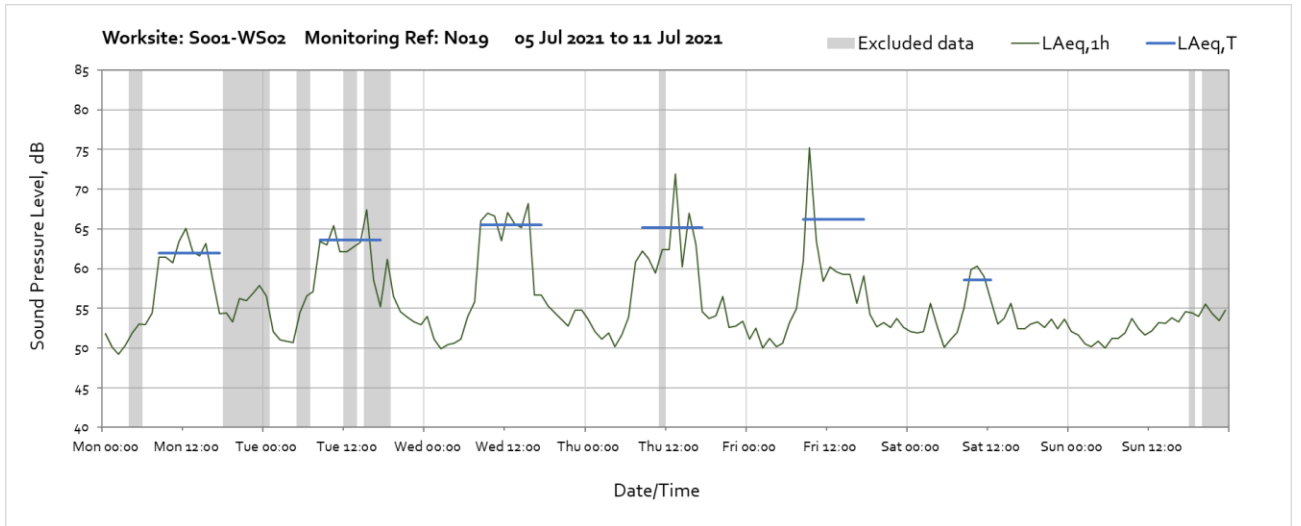


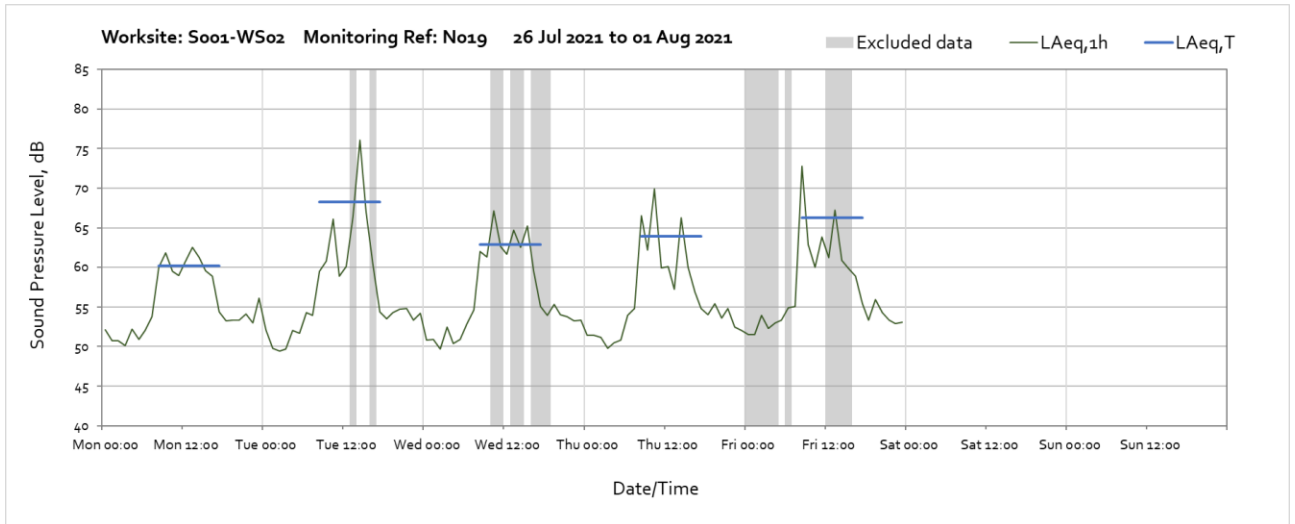
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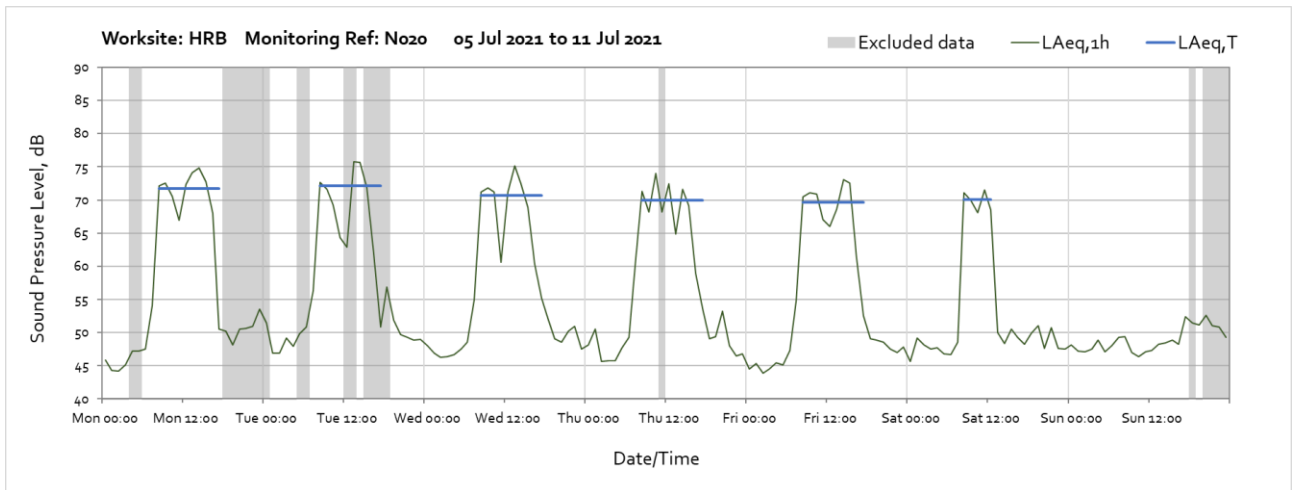
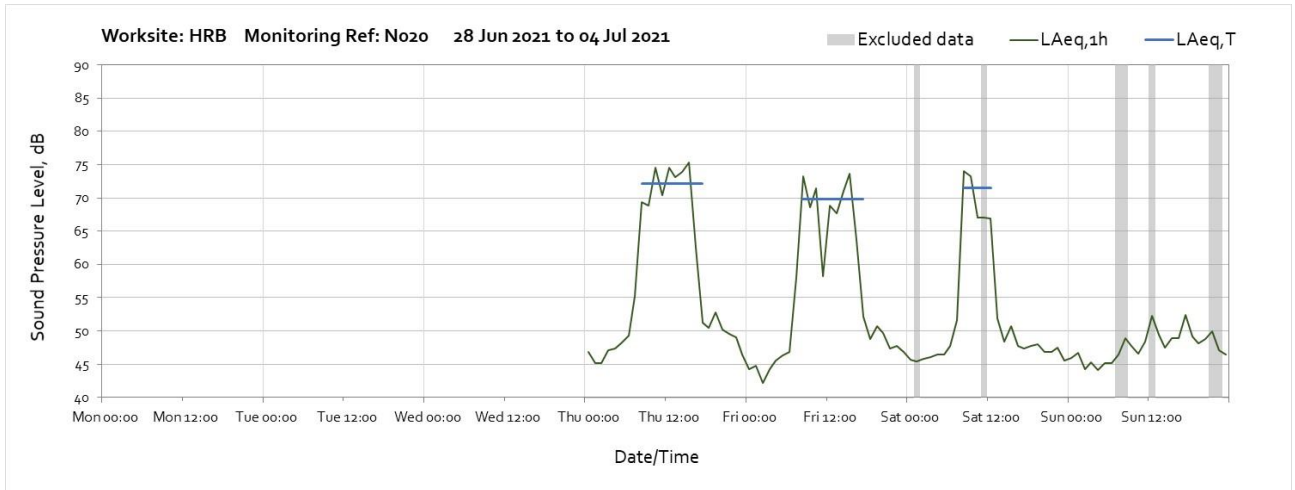
Worksite: S001-WS02 – Monitoring Ref: N019

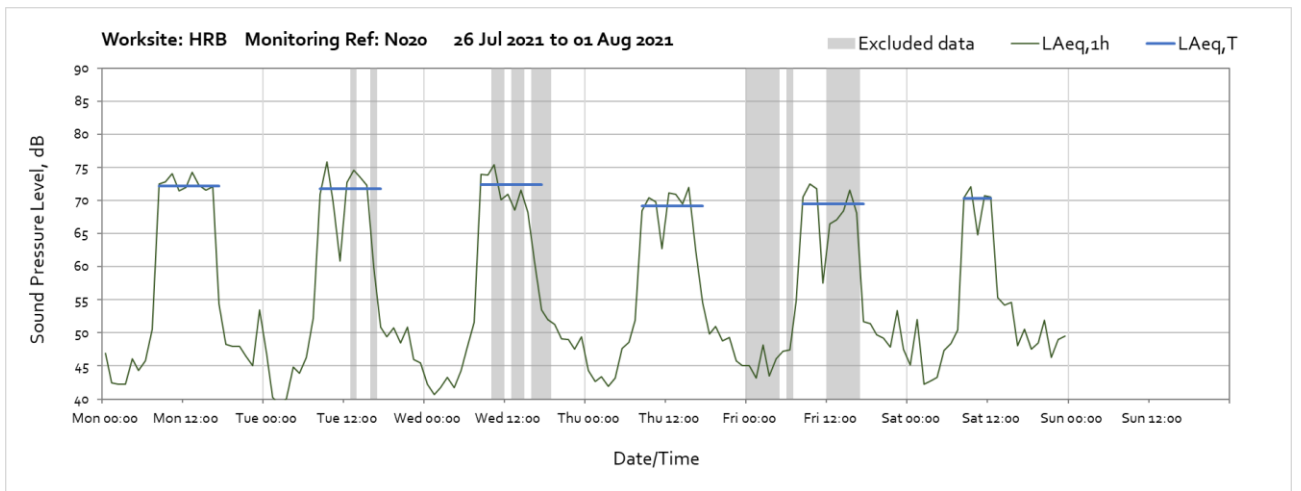
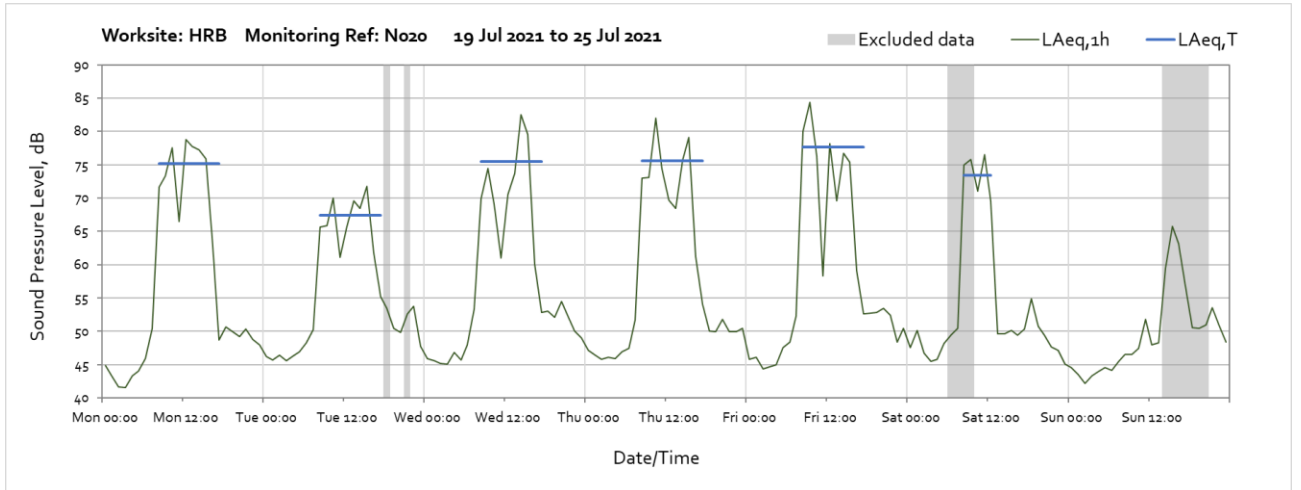
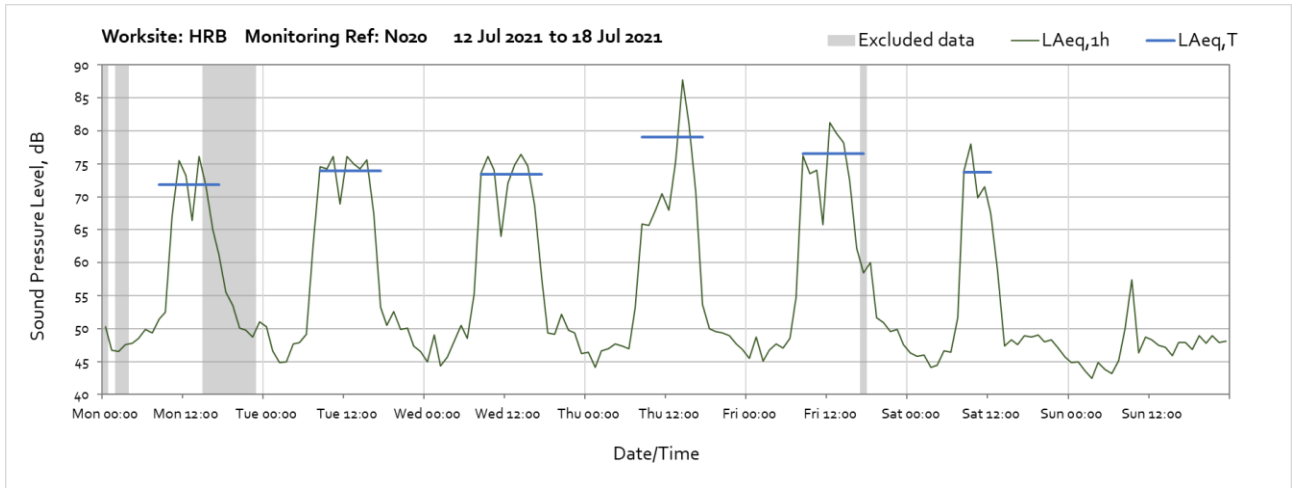




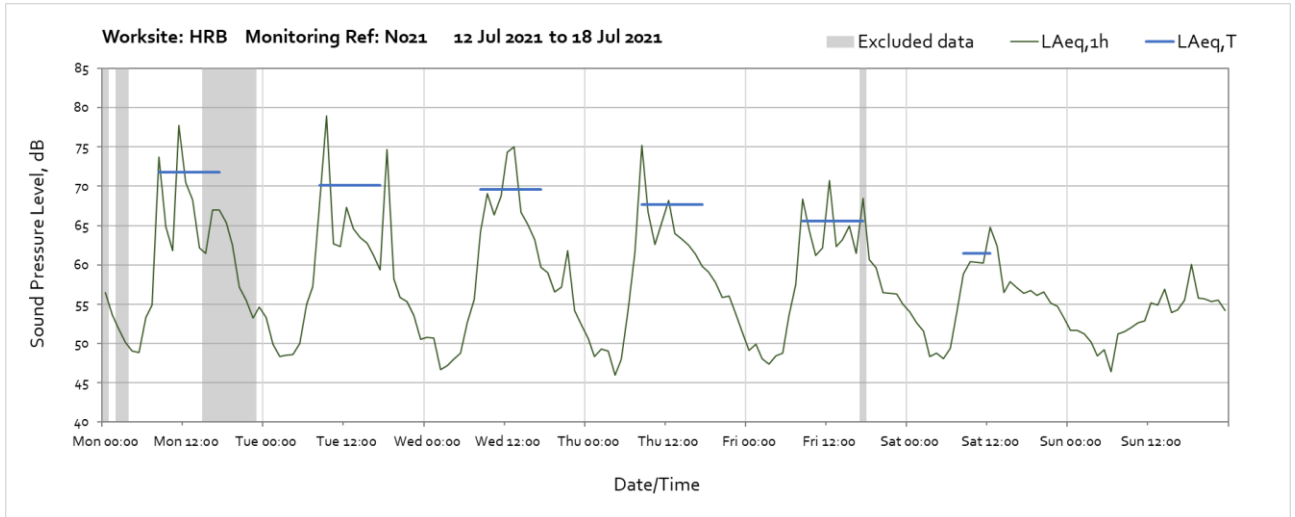
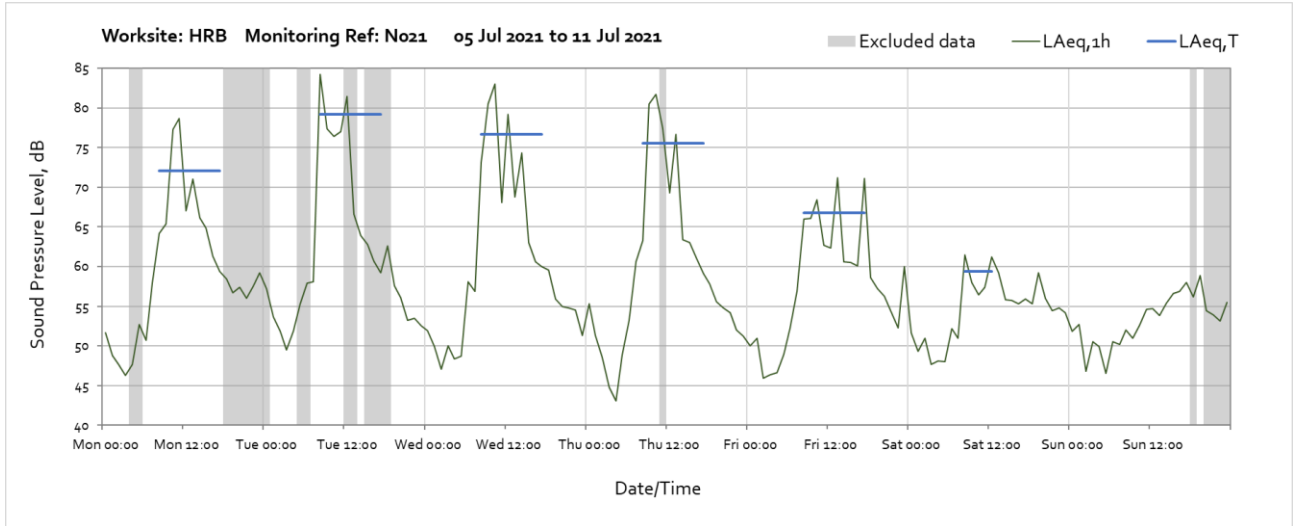
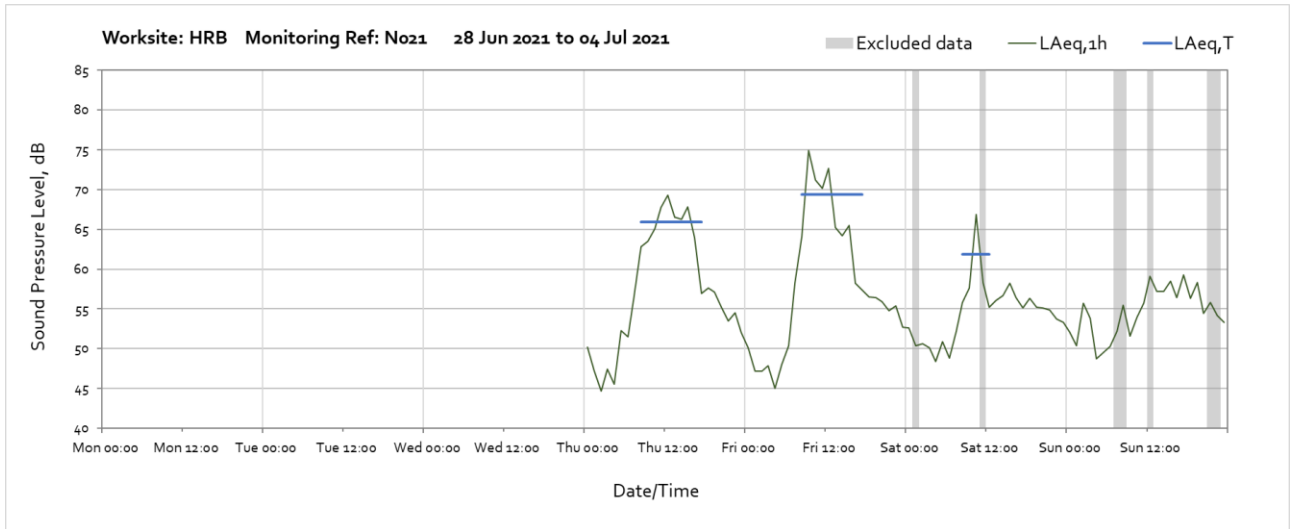


Worksite: HRB – Monitoring Ref: N020

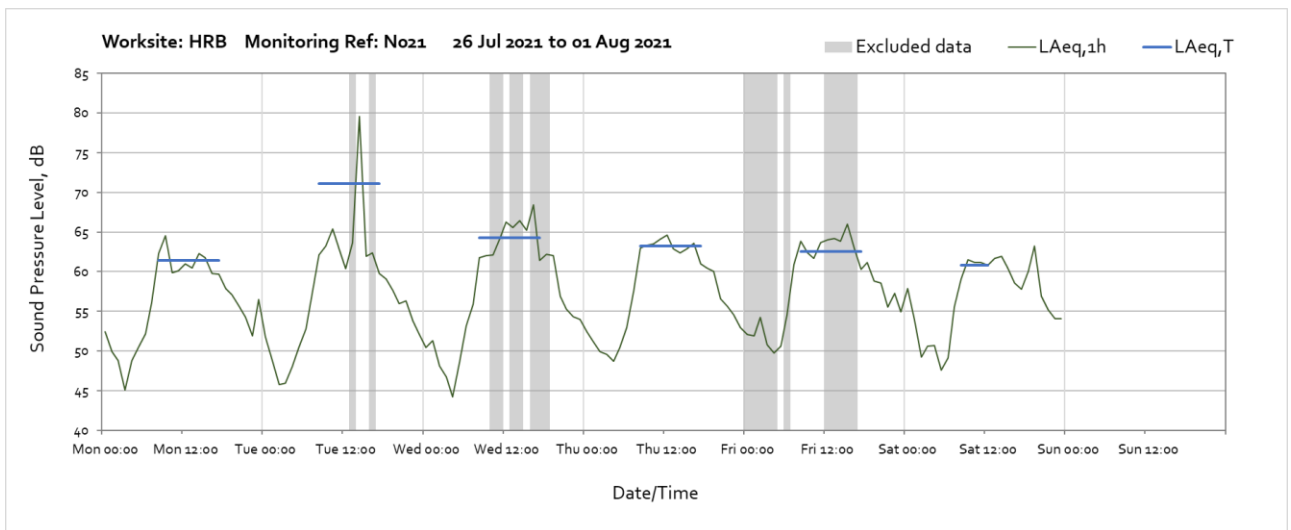
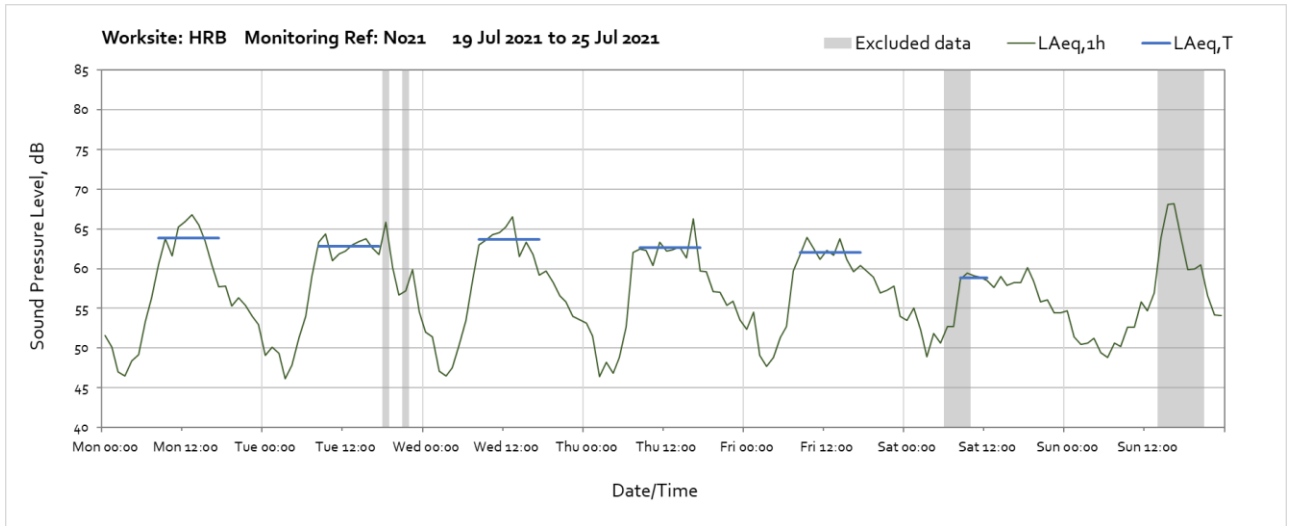




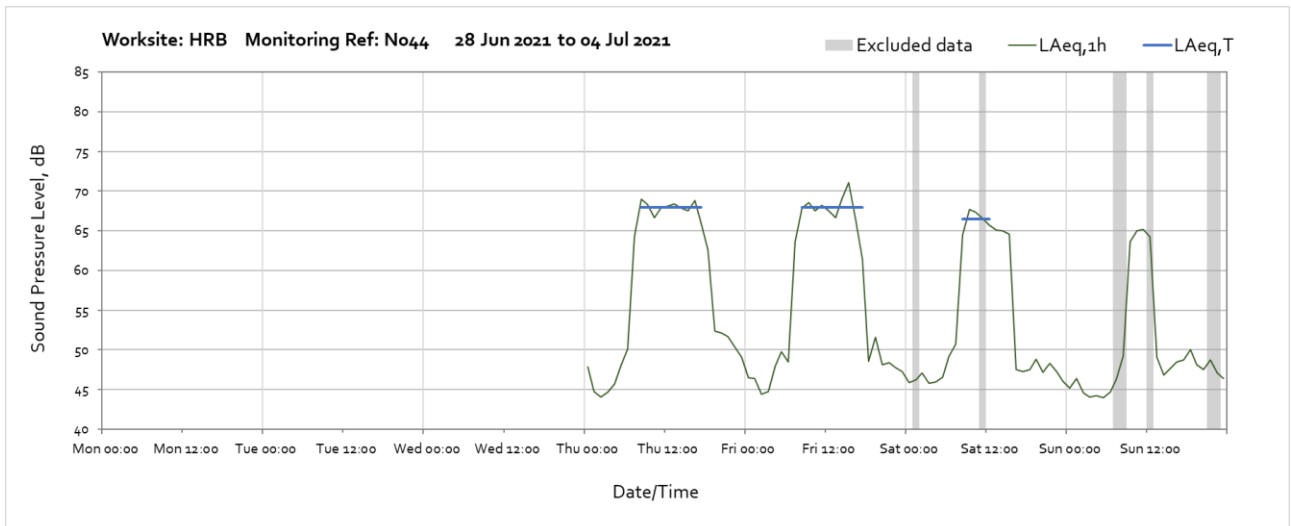
Worksite: HRB – Monitoring Ref: N021

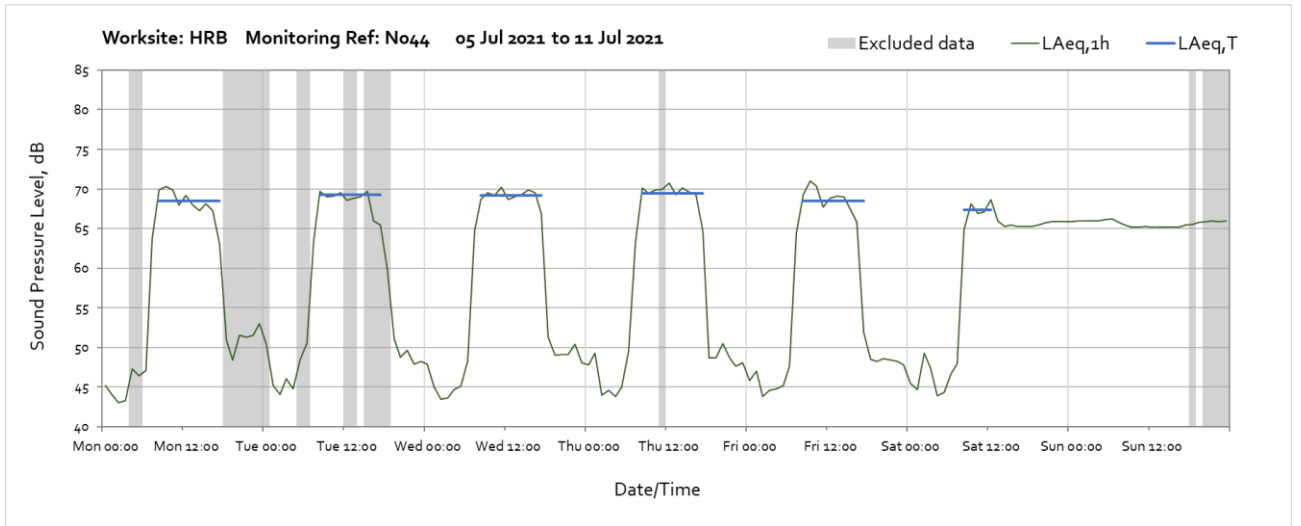


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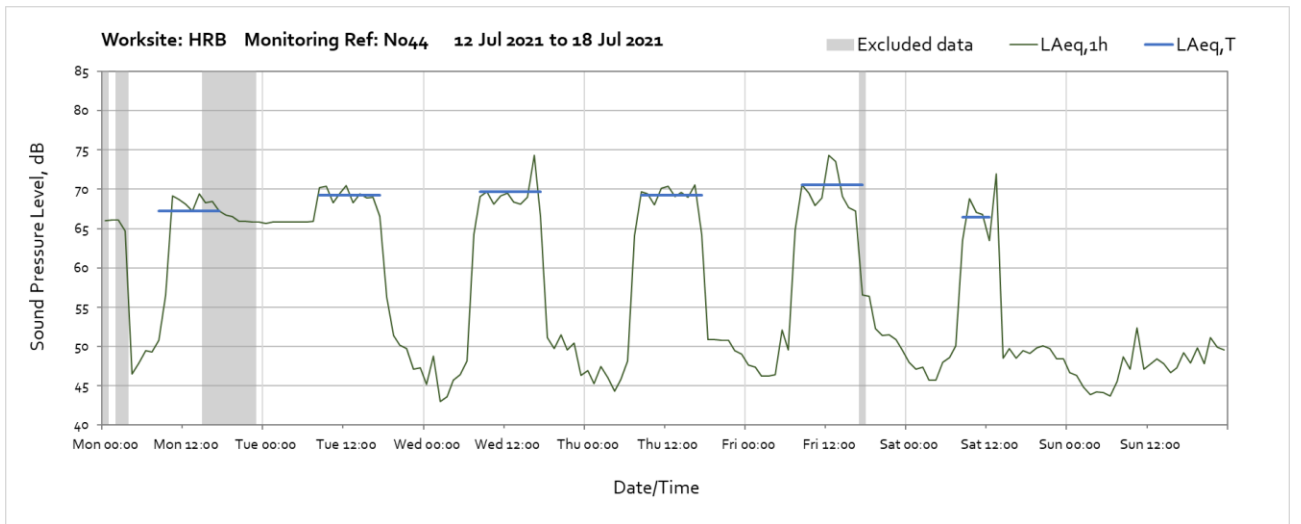


Worksite: HRB - Monitoring Ref: N044

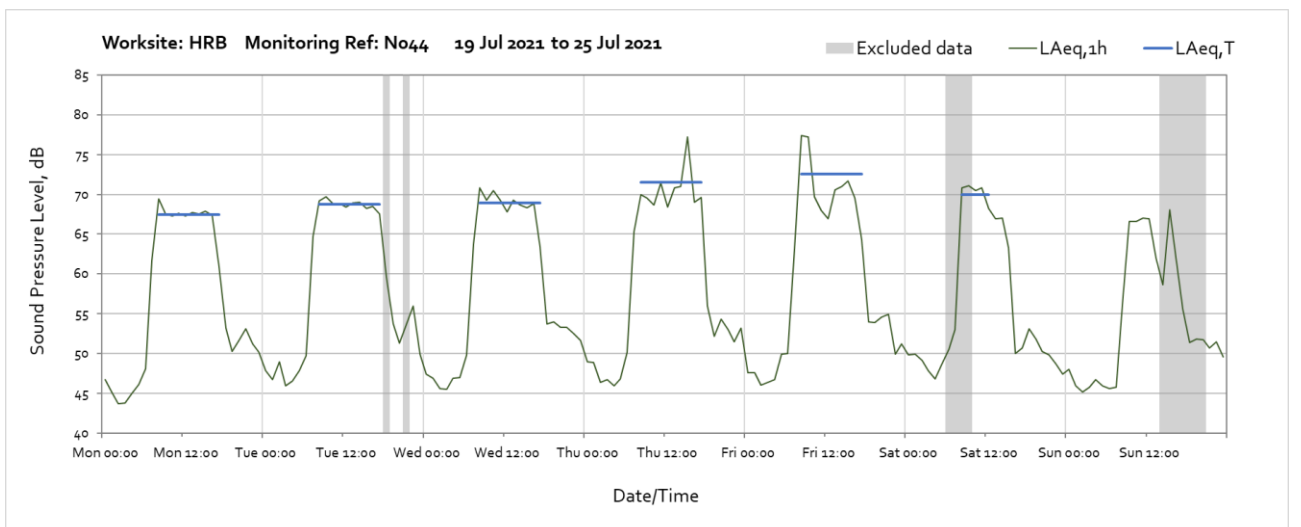


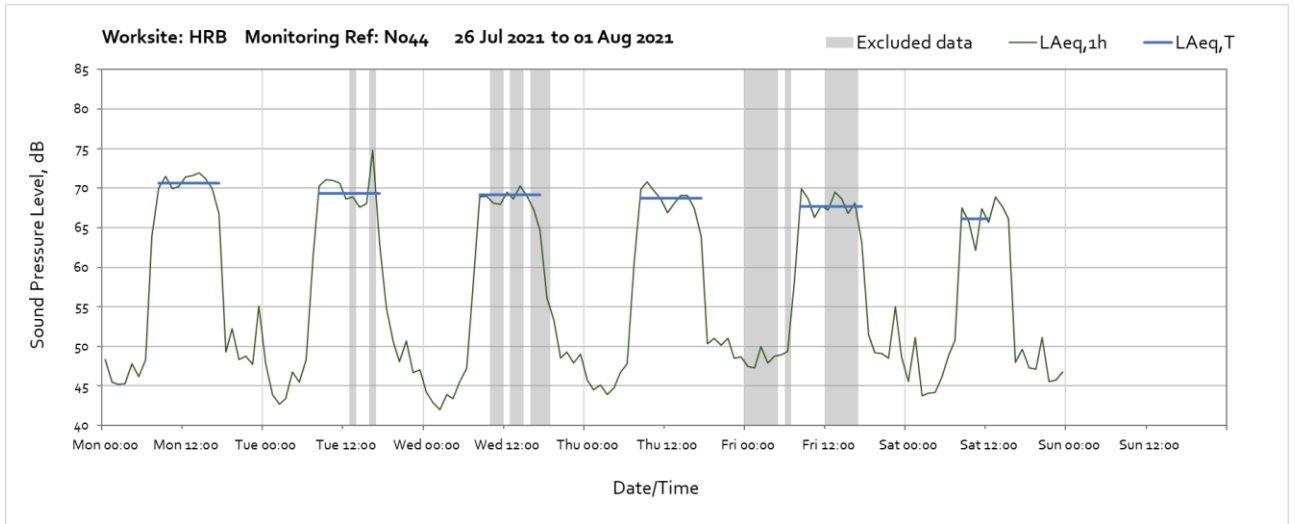


Note: Continuous noise levels from 14:00 on Saturday 10th July until 02:00 on Monday 12th July were not caused by HS2 construction plant equipment.

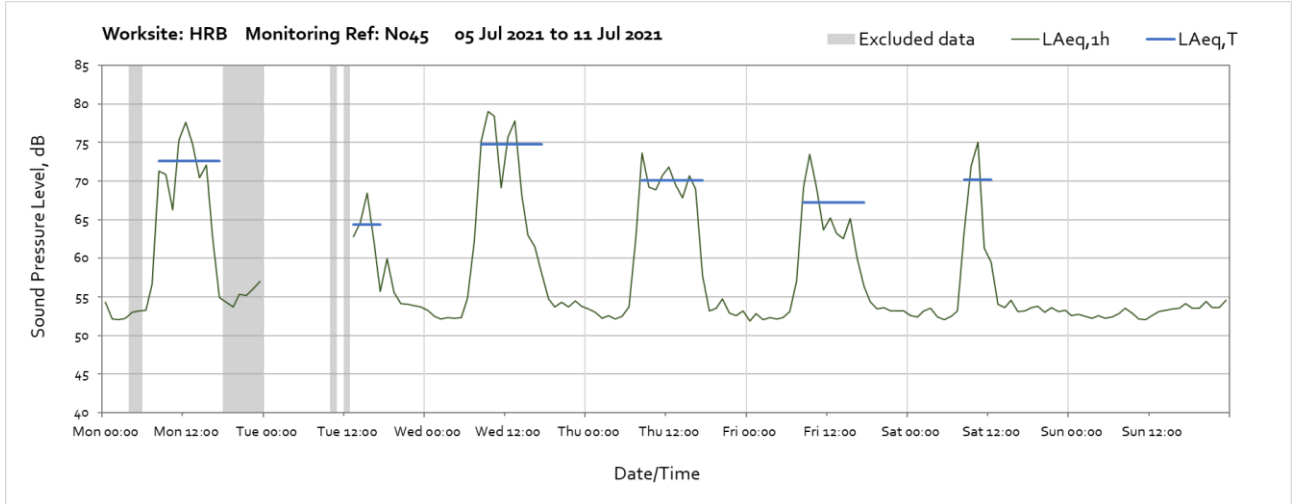
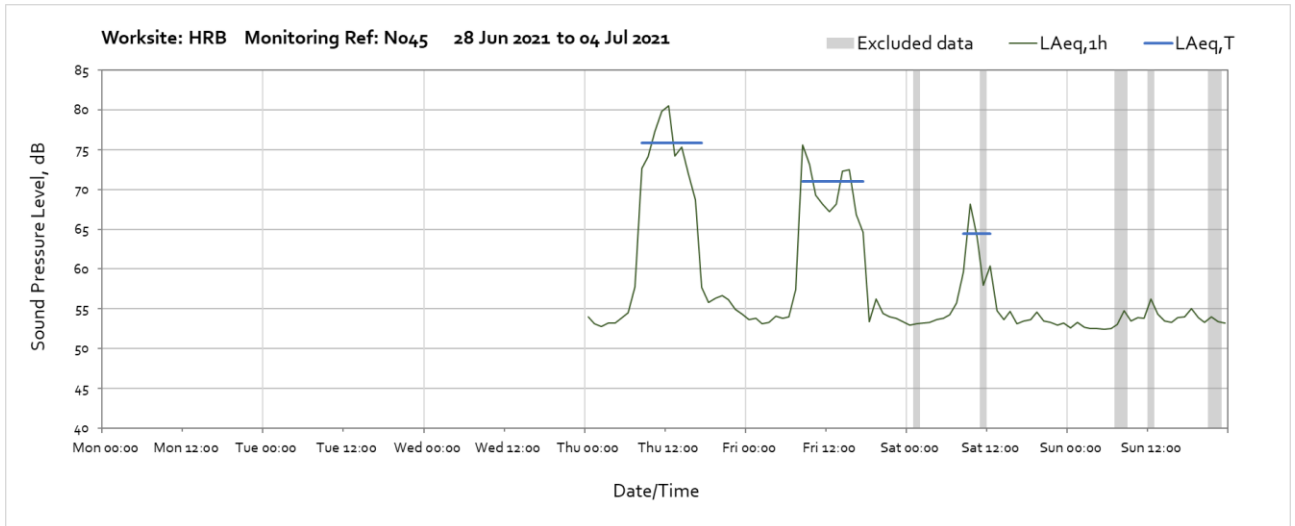


Note: Continuous noise levels from 14:00 on Saturday 10th July until 02:00 on Monday 12th July were not caused by HS2 construction plant equipment.



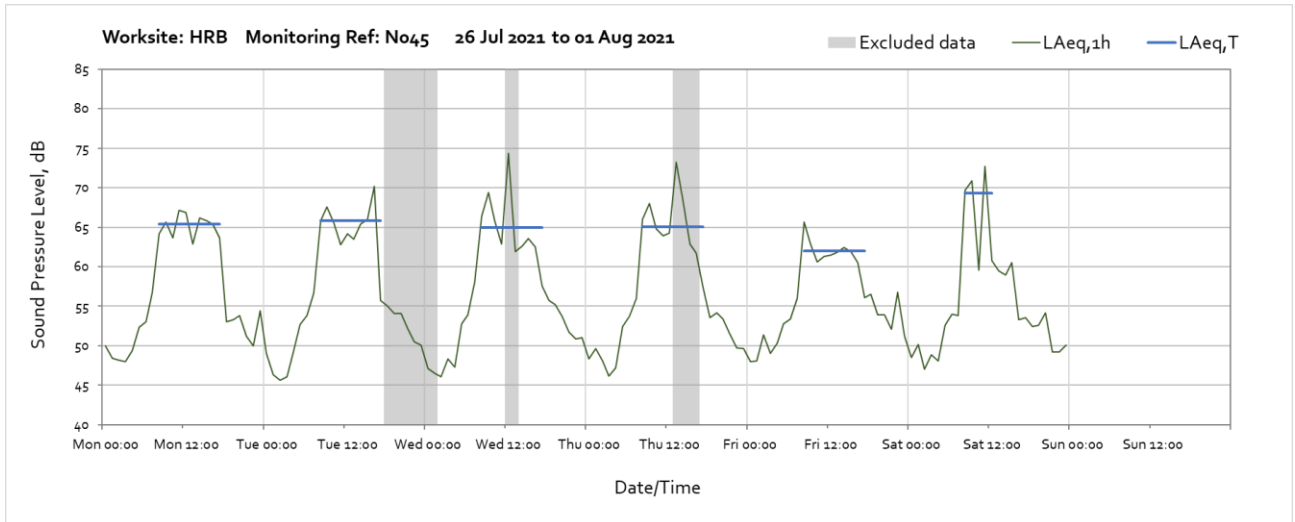
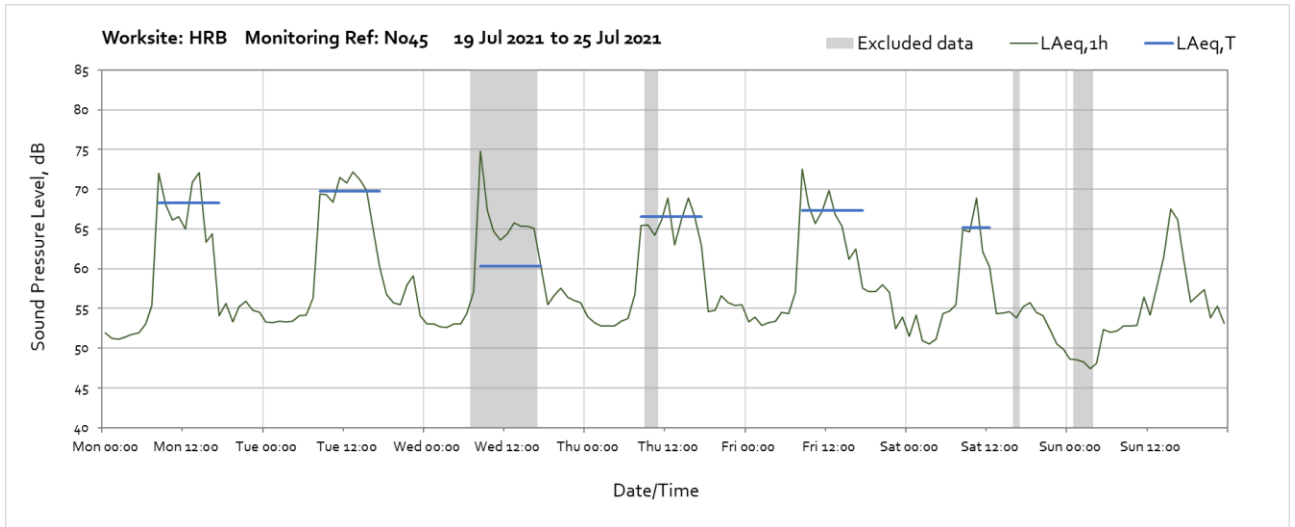
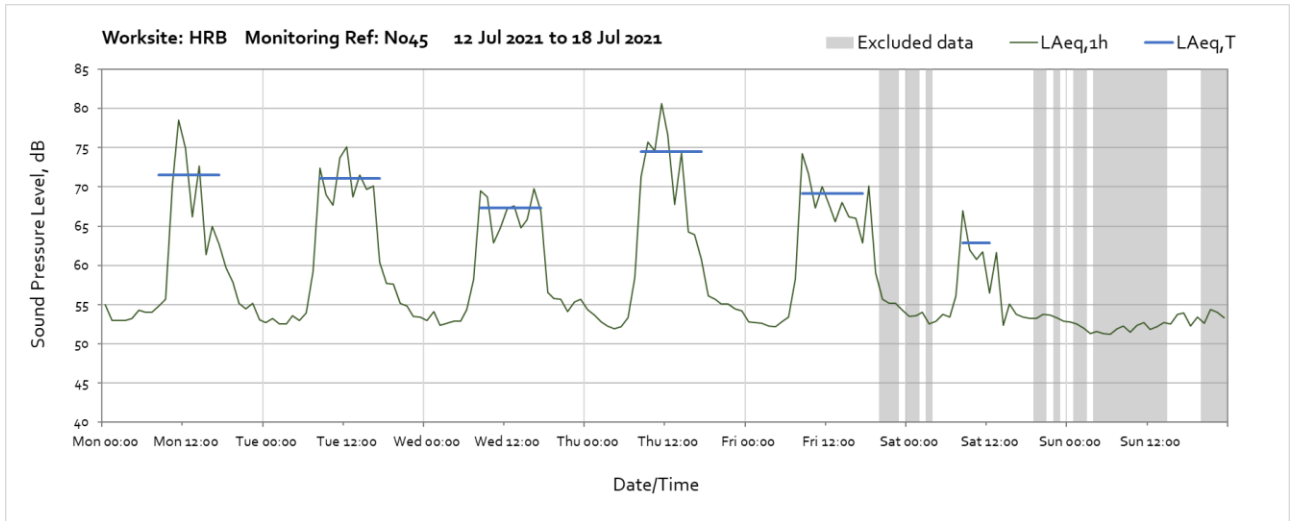


Worksite: HRB – Monitoring Ref: N045

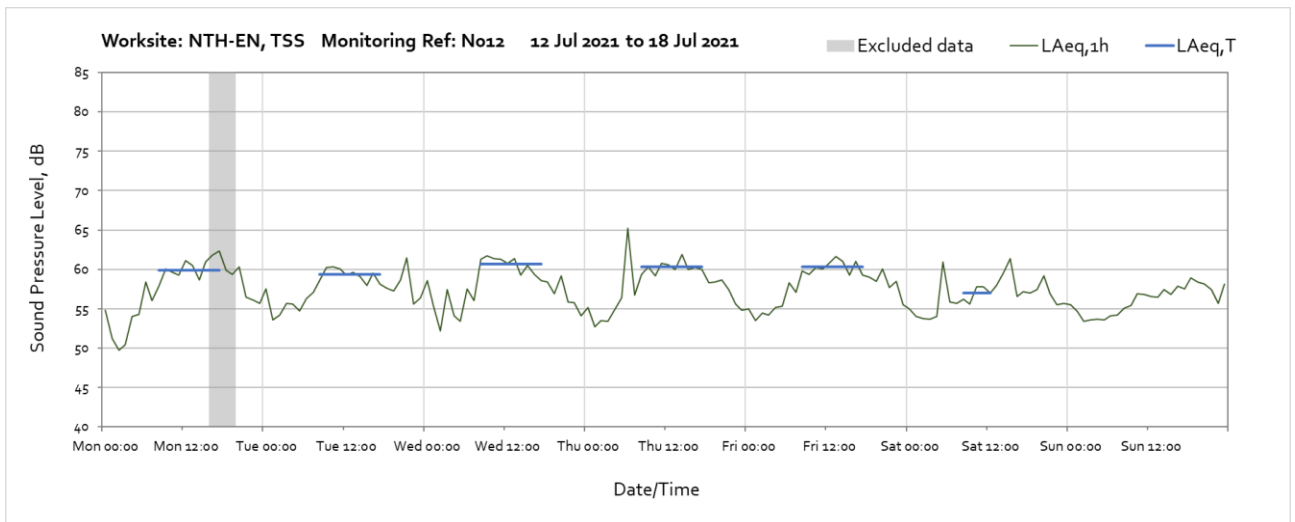
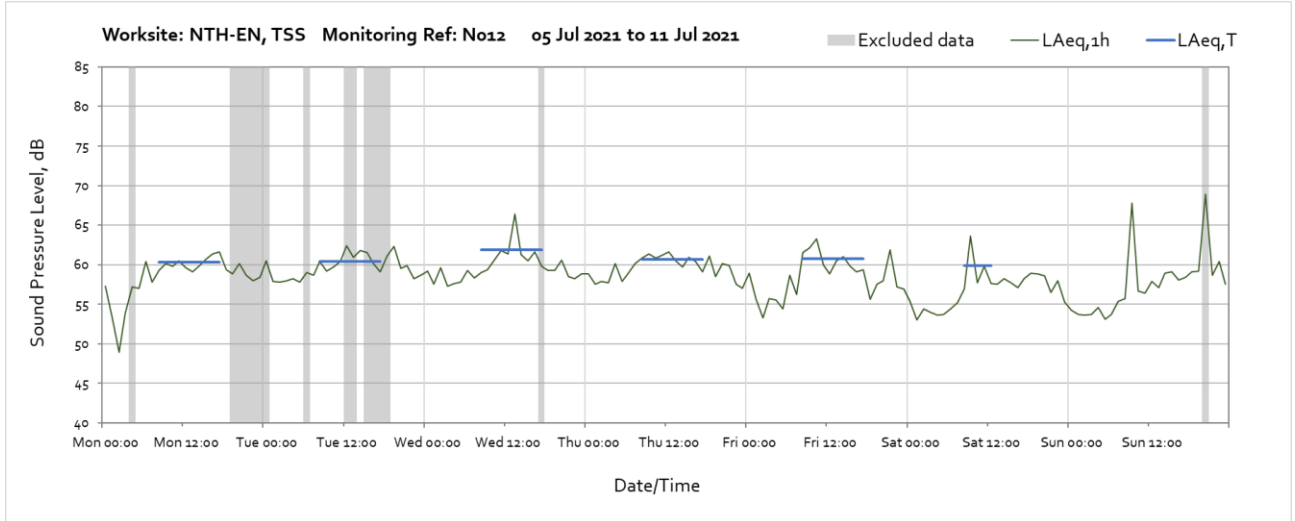
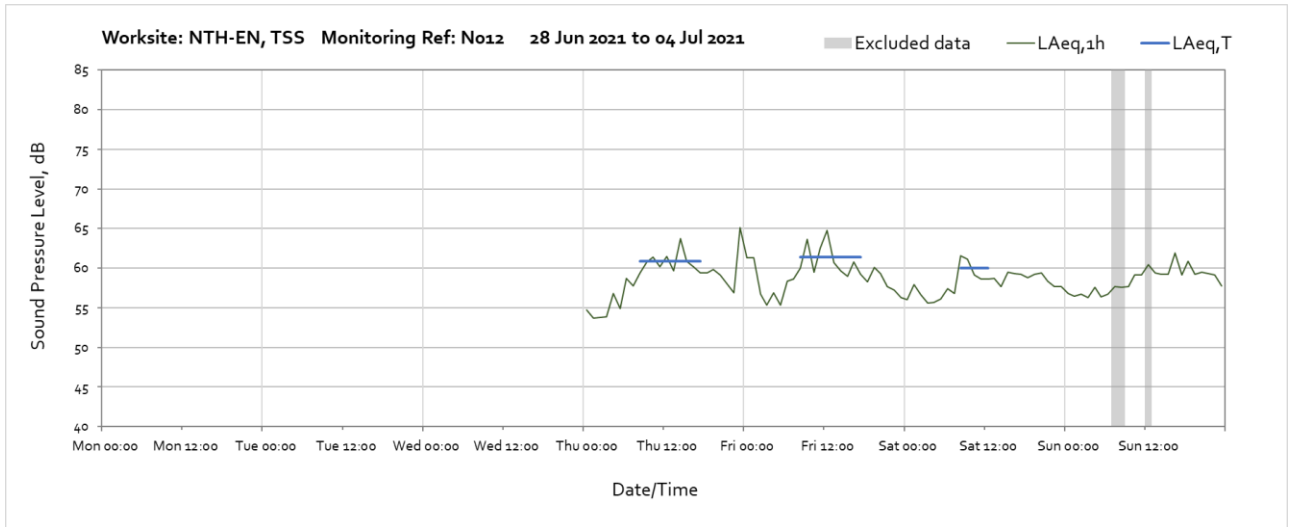


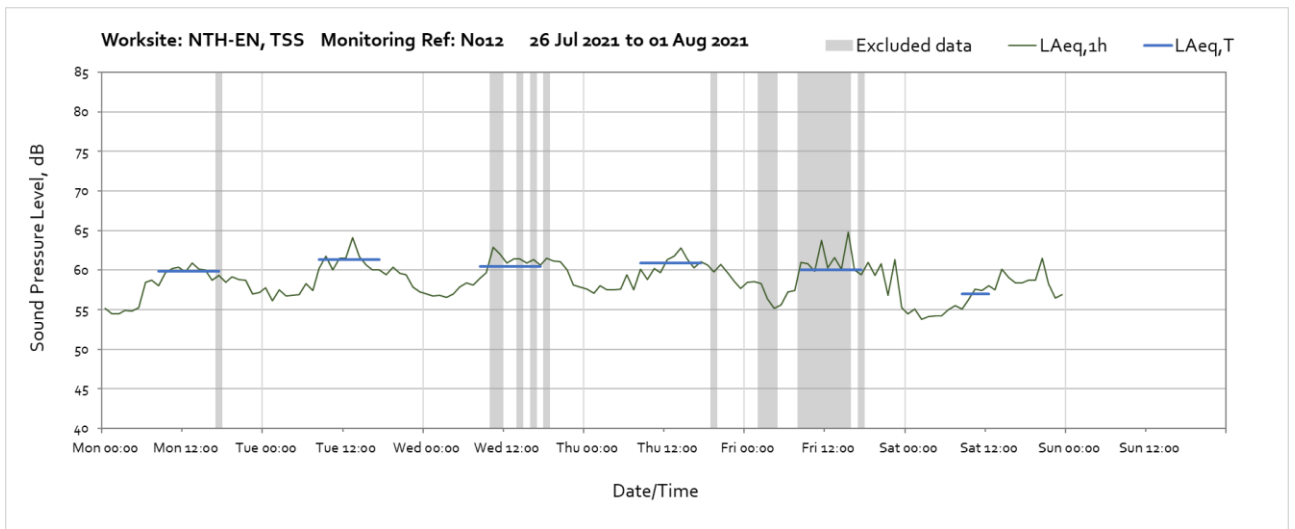
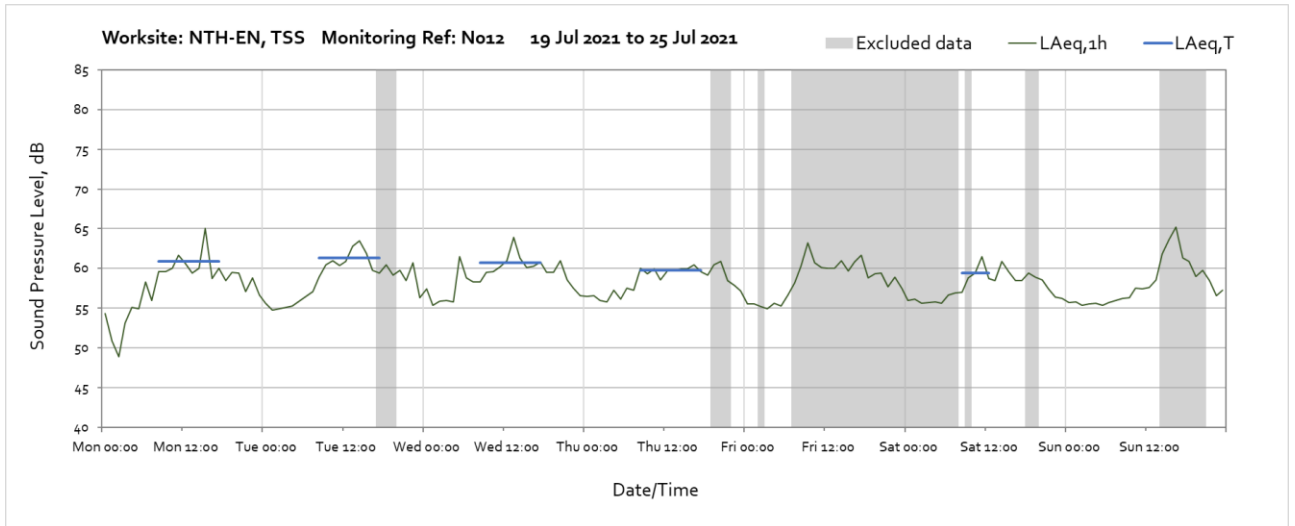
Note: Missing data from 00:00 until 13:00 on Tuesday 6th July was due to a fault with the monitoring station whereby the monitor stopped measuring data and did not restart. The memory card was reformatted with view of minimising future data loss.

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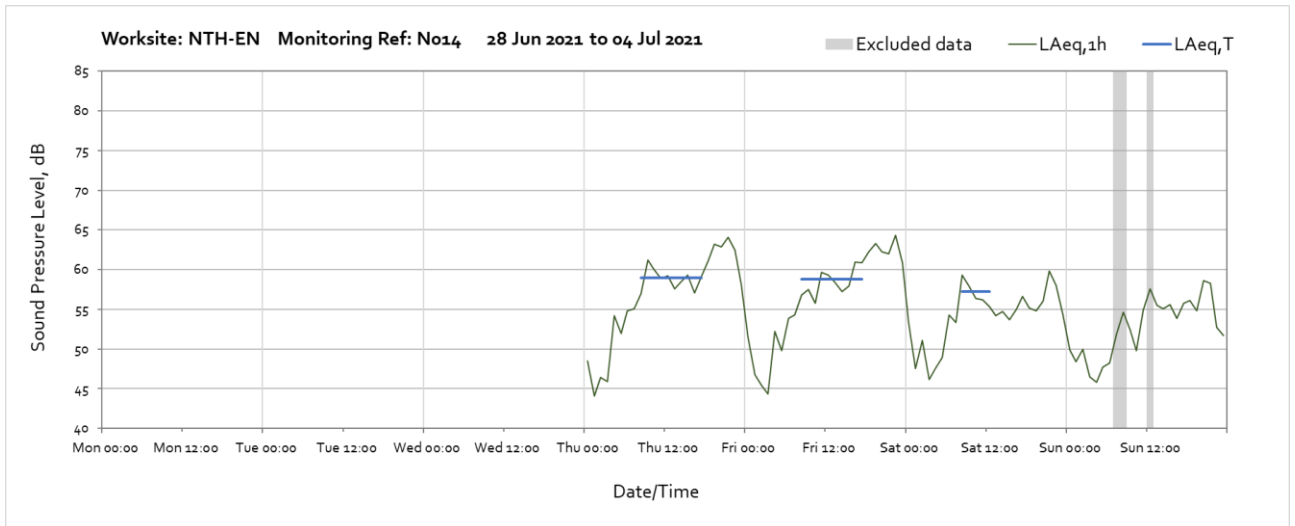


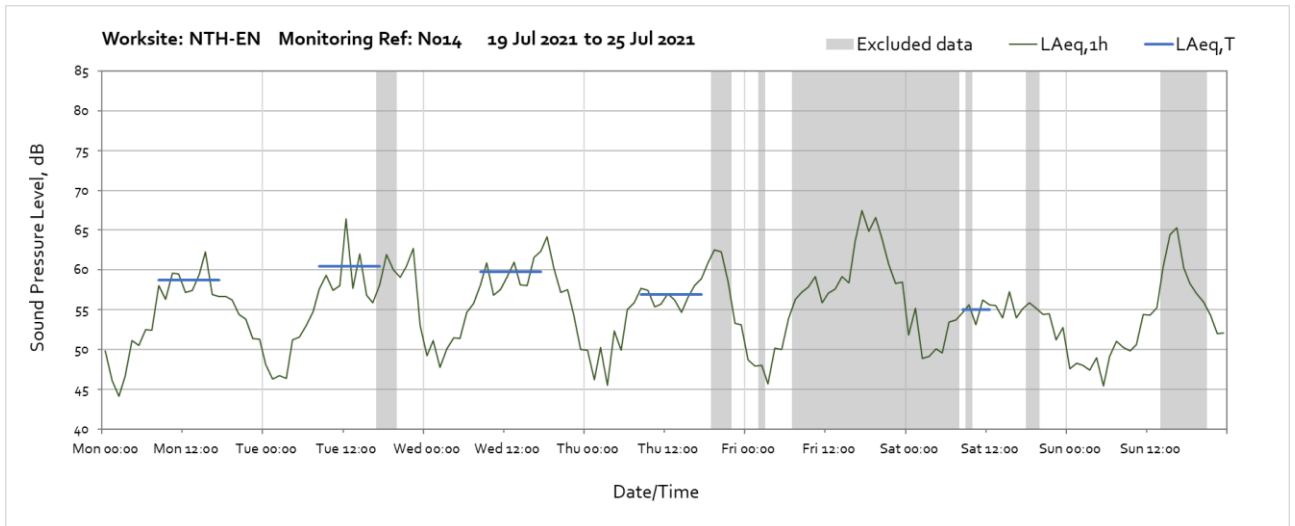
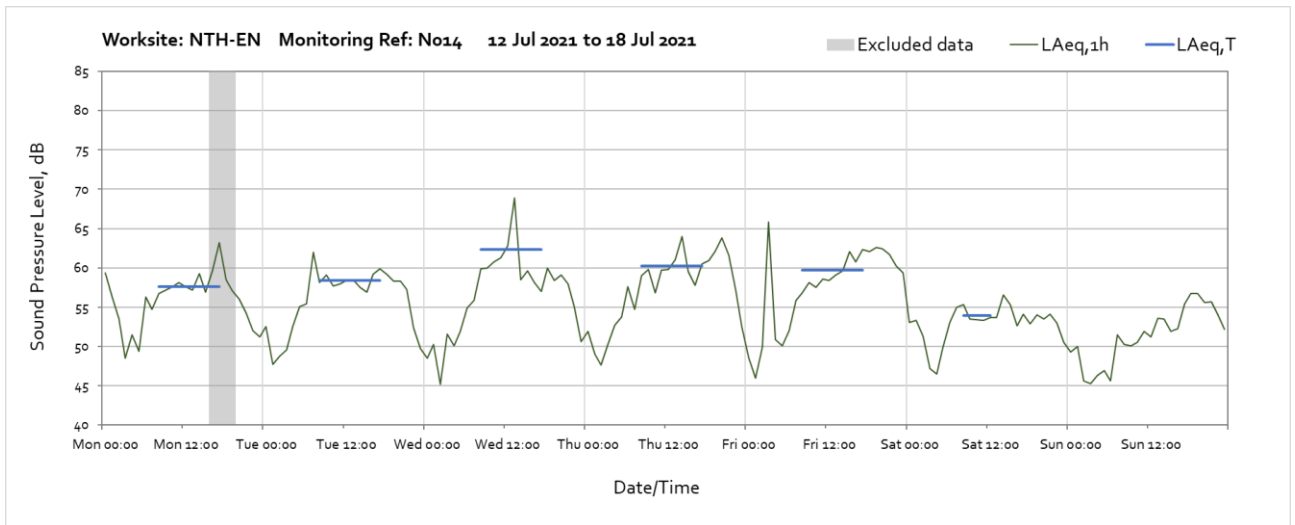
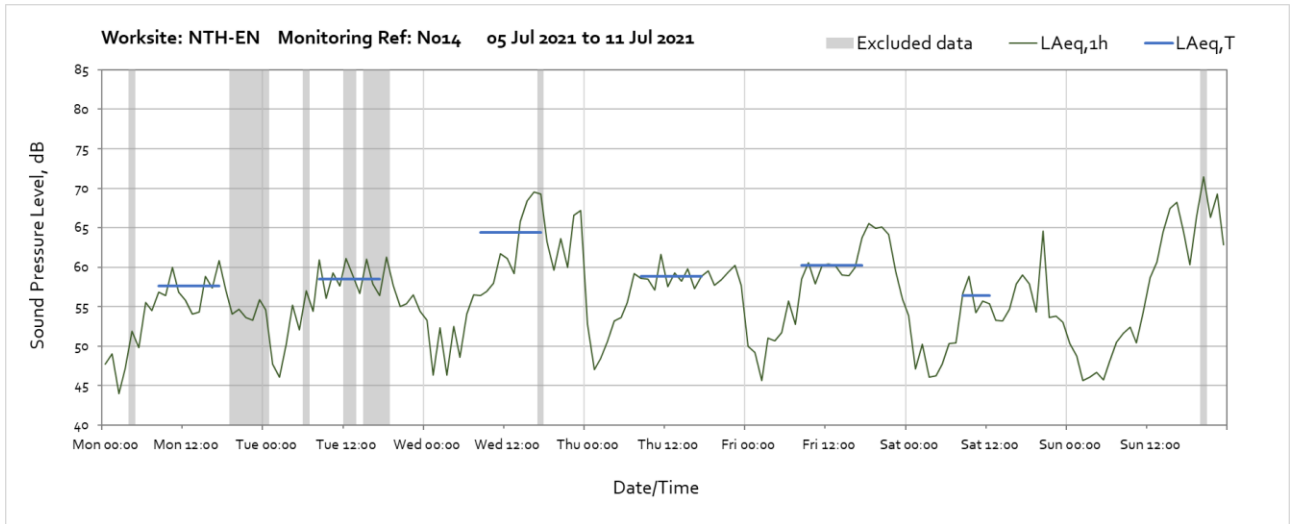
Worksite: NTH-EN, TSS - Monitoring Ref: N012

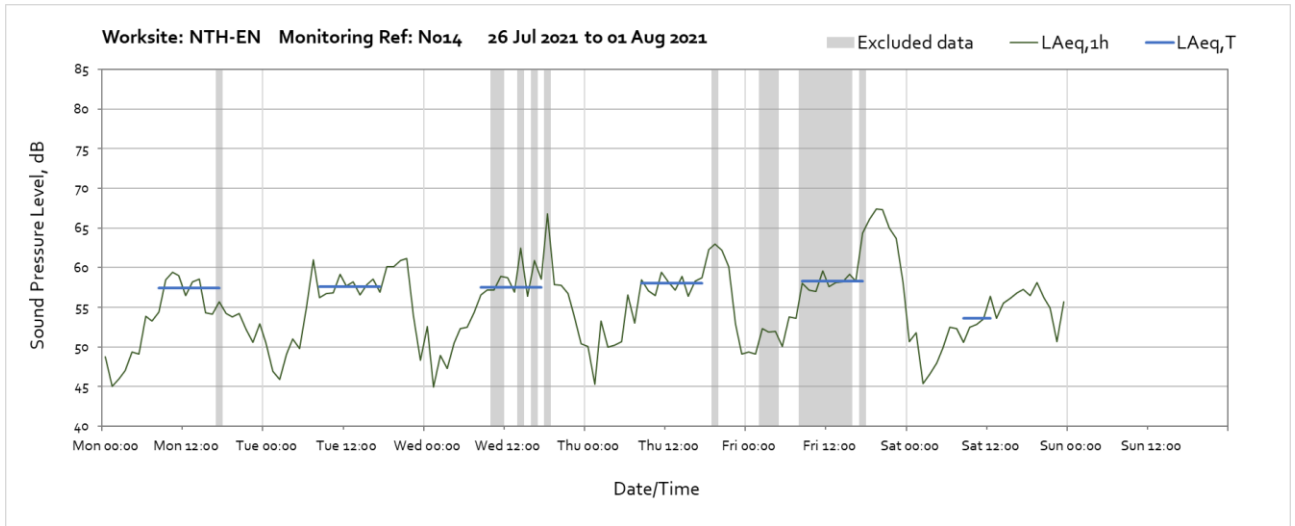




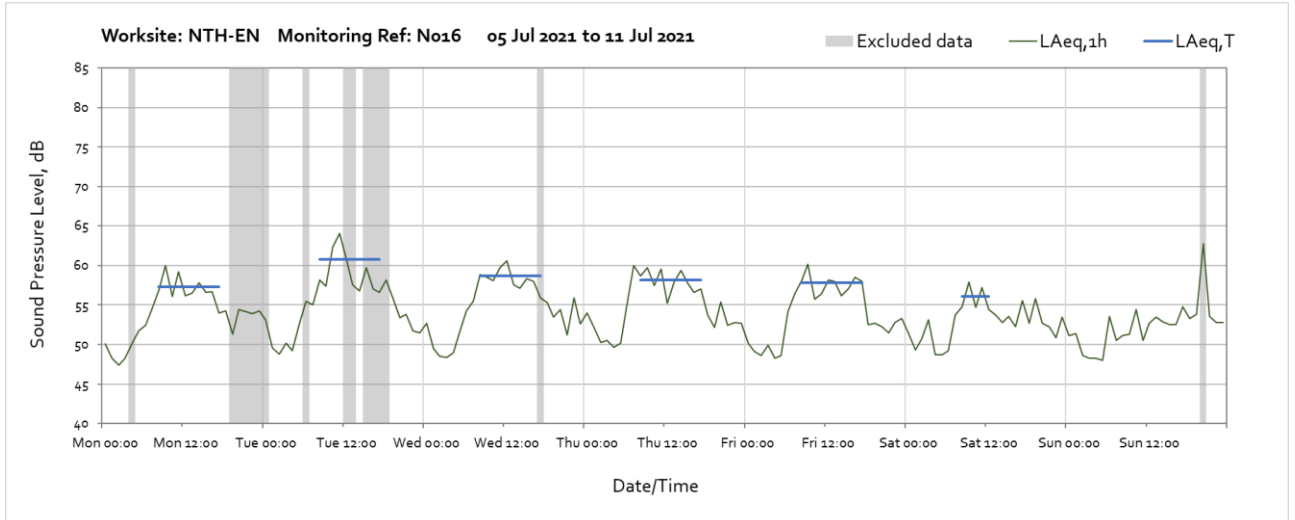
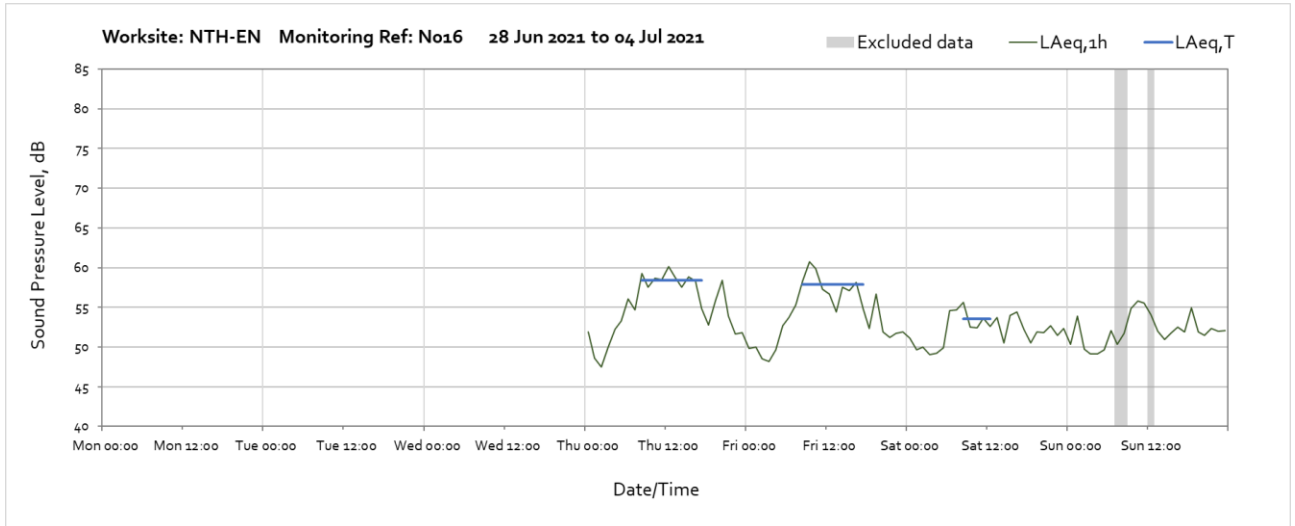
Worksite: NTH-EN - Monitoring Ref: N014

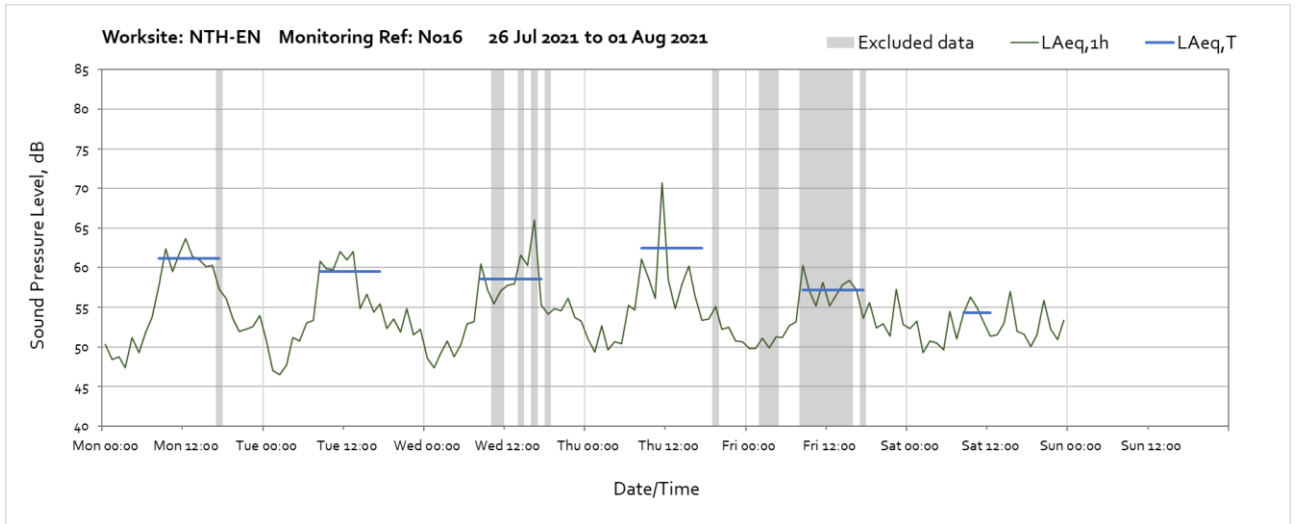
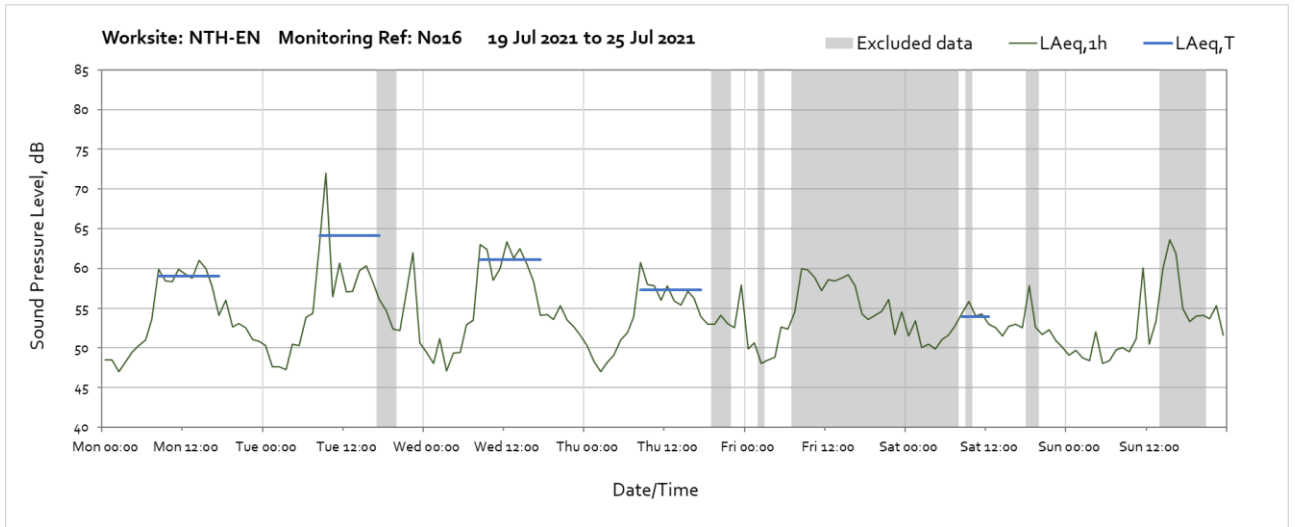
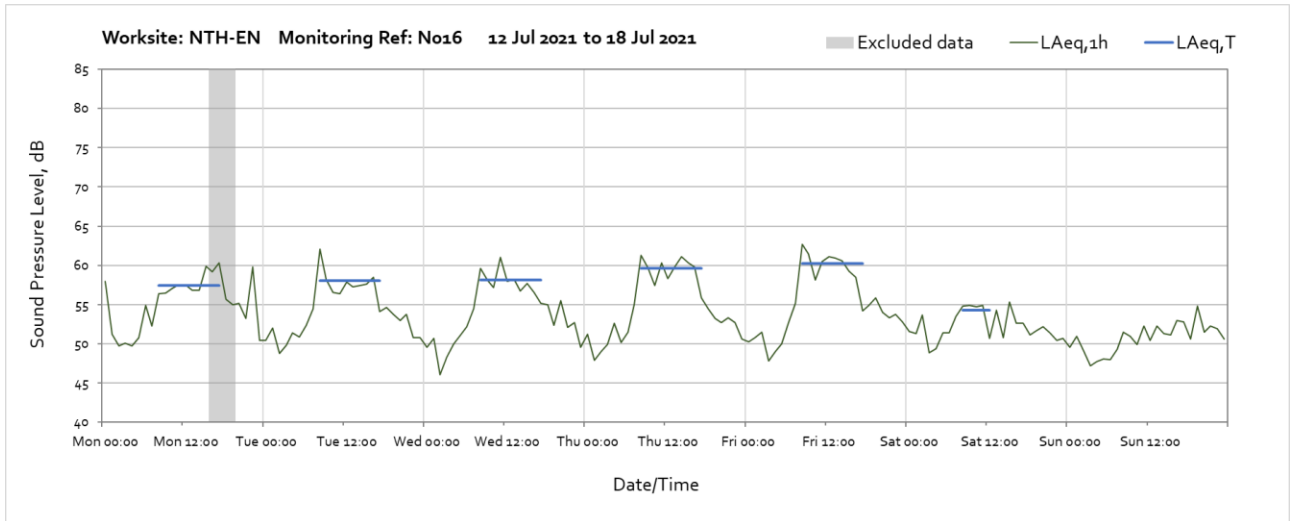




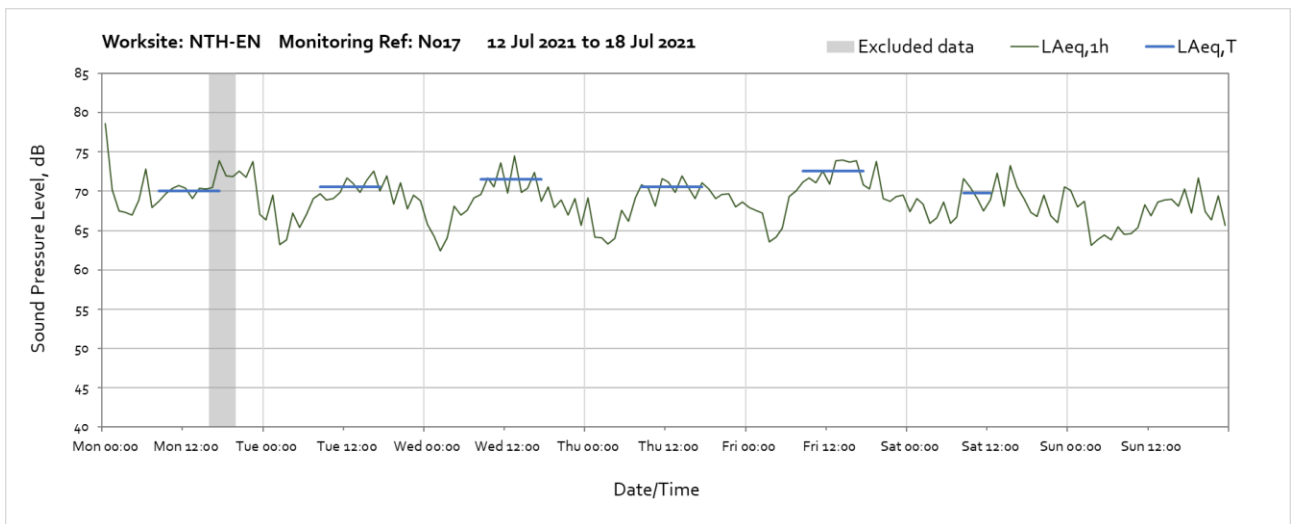
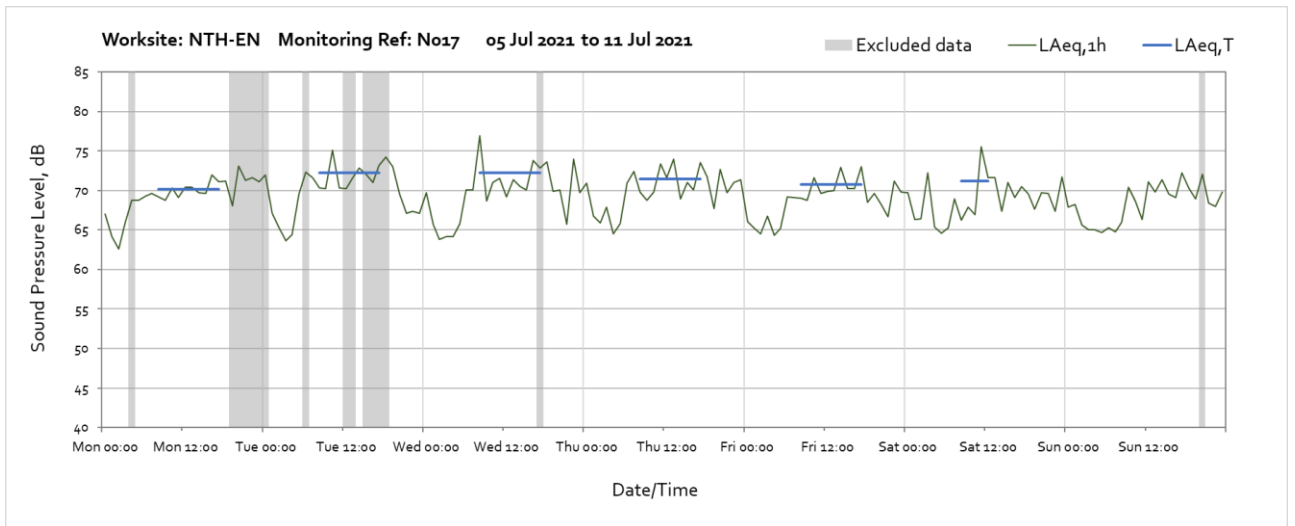
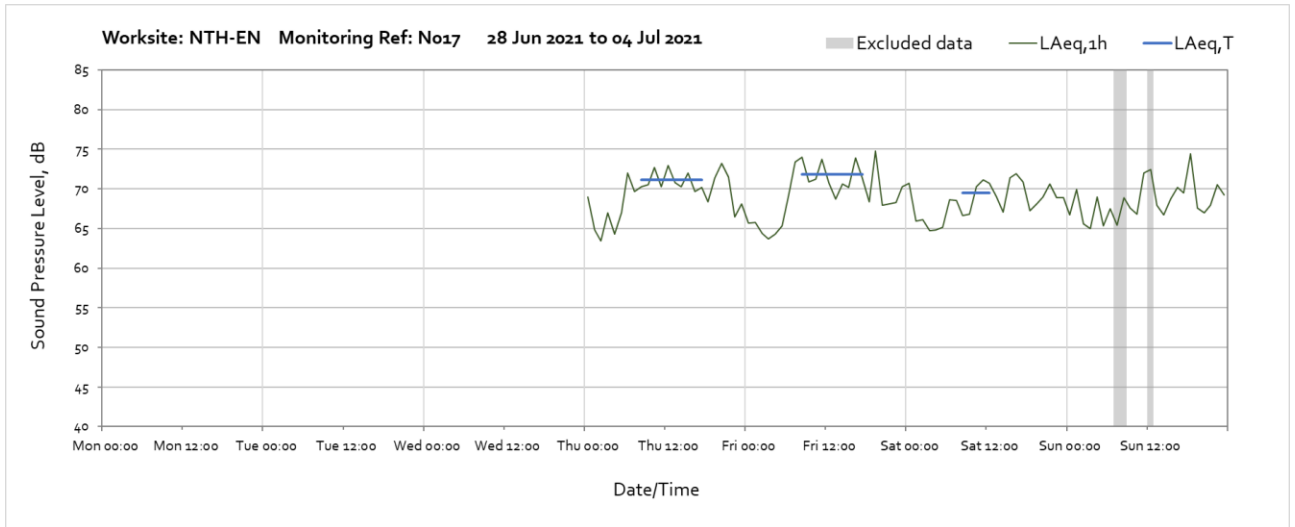


Worksite: NTH-EN - Monitoring Ref: N016

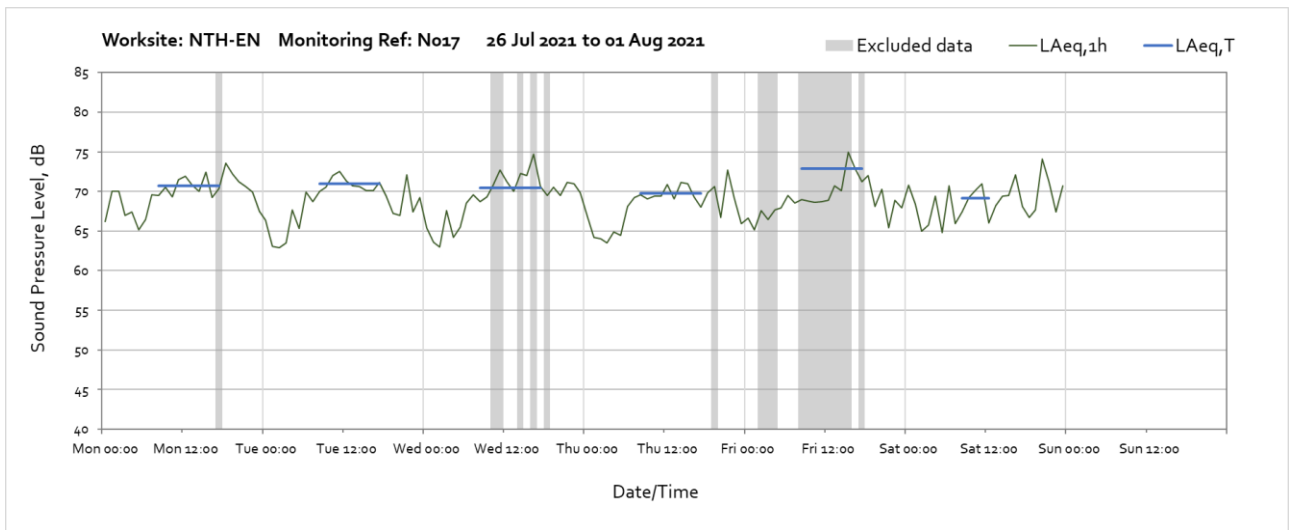
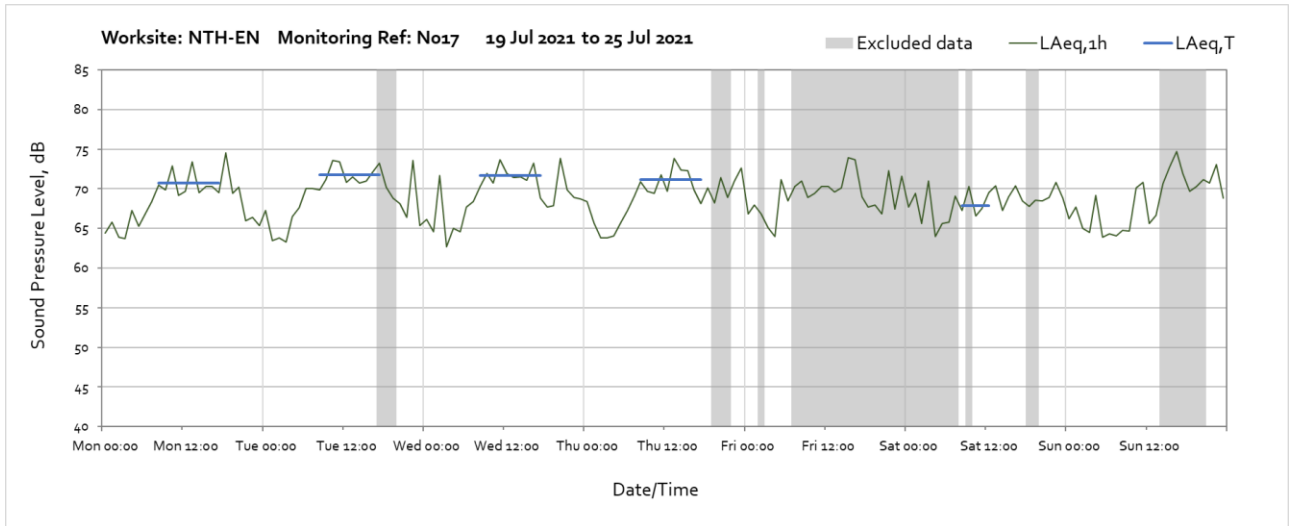




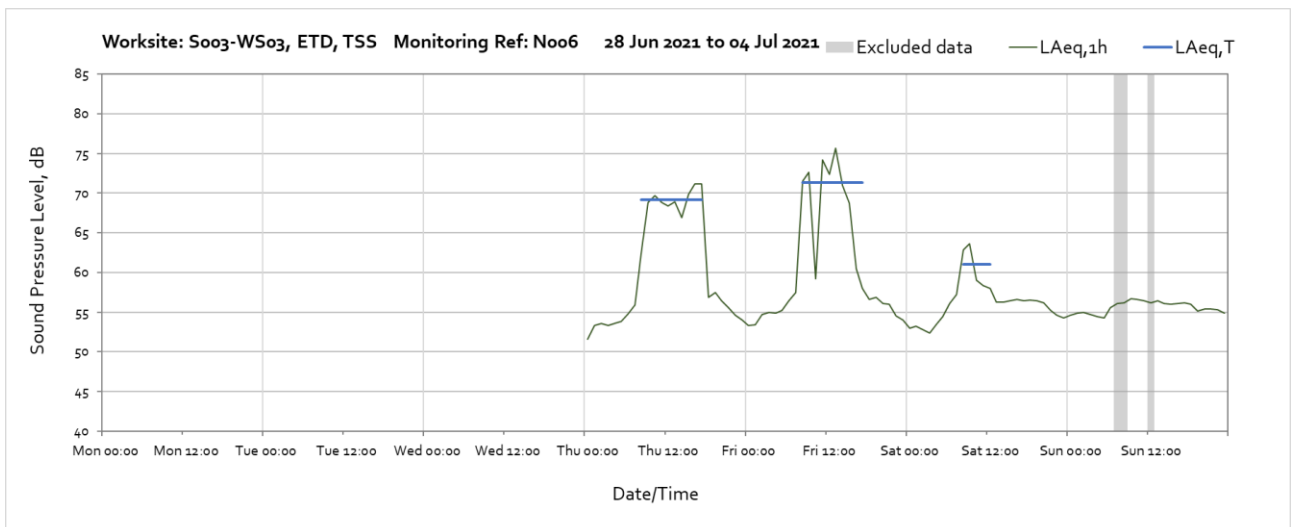
Worksite: NTH-EN – Monitoring Ref: N017

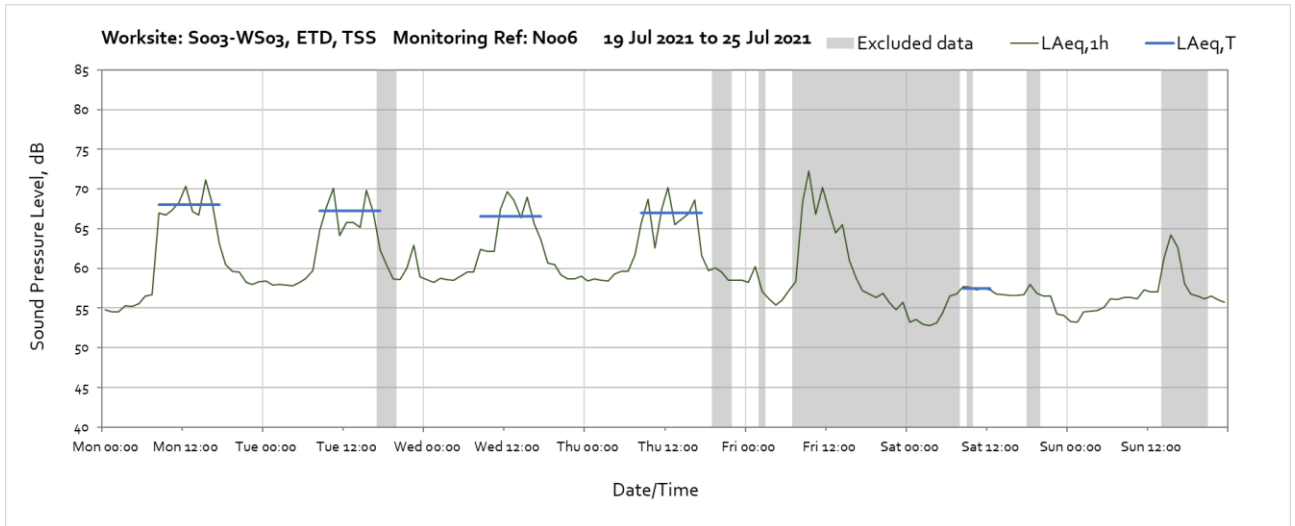
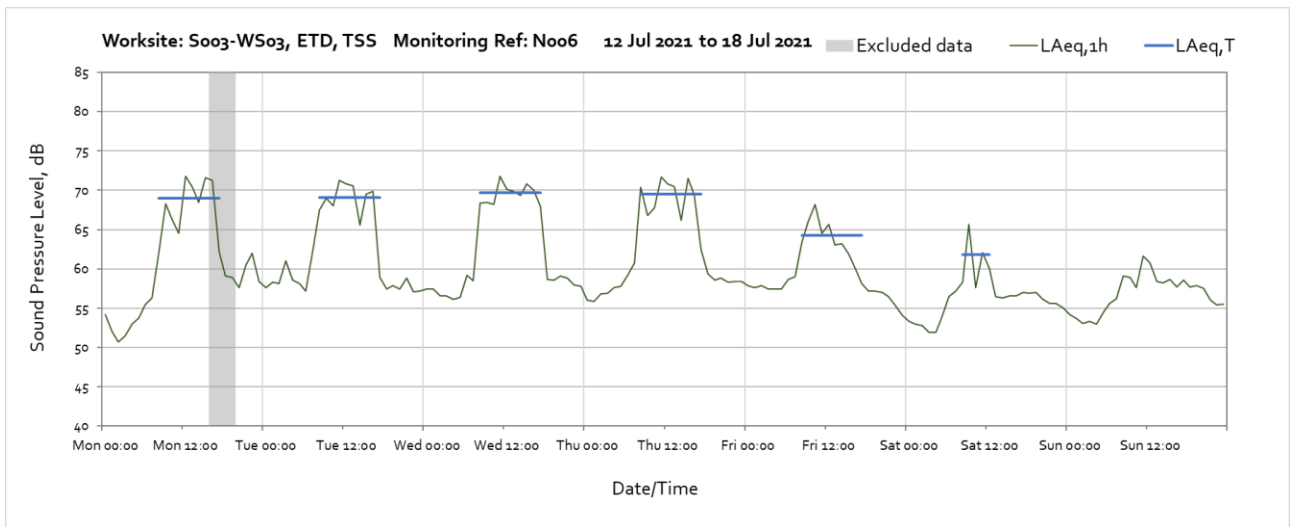
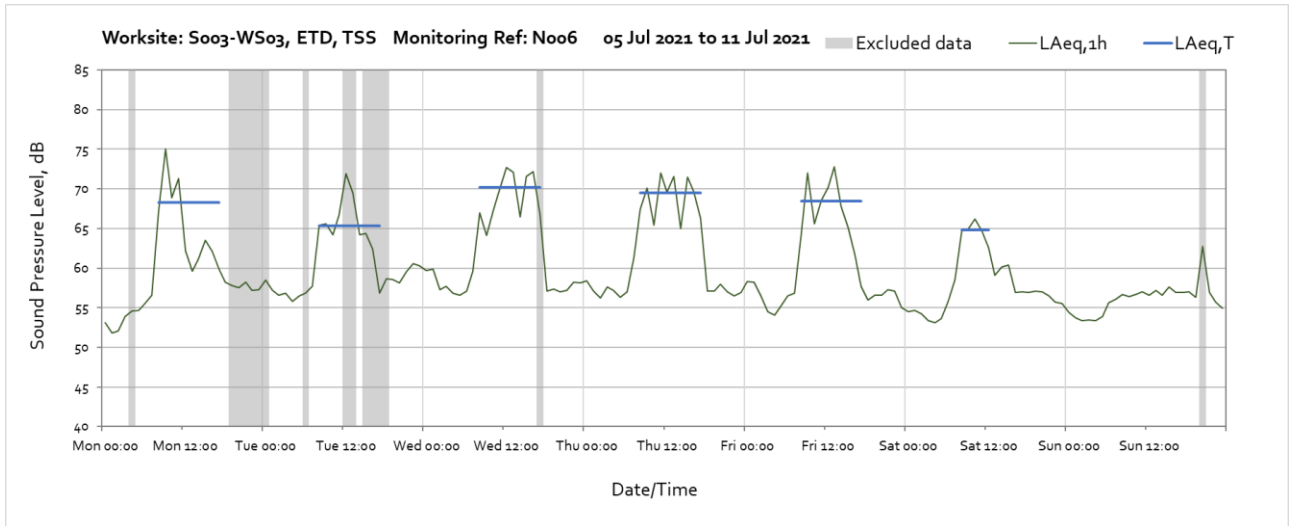


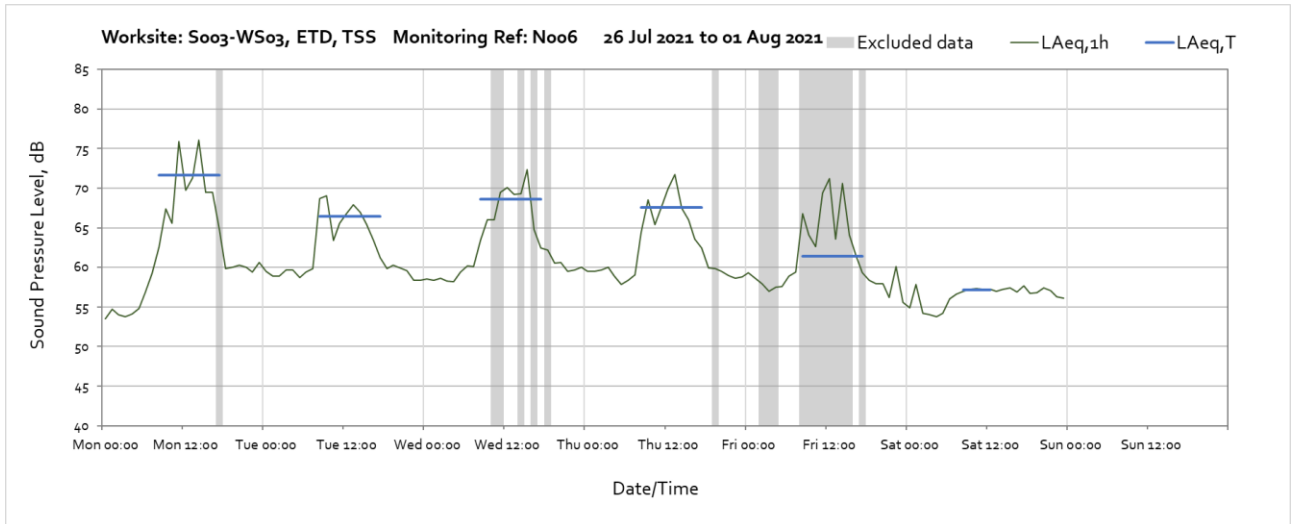
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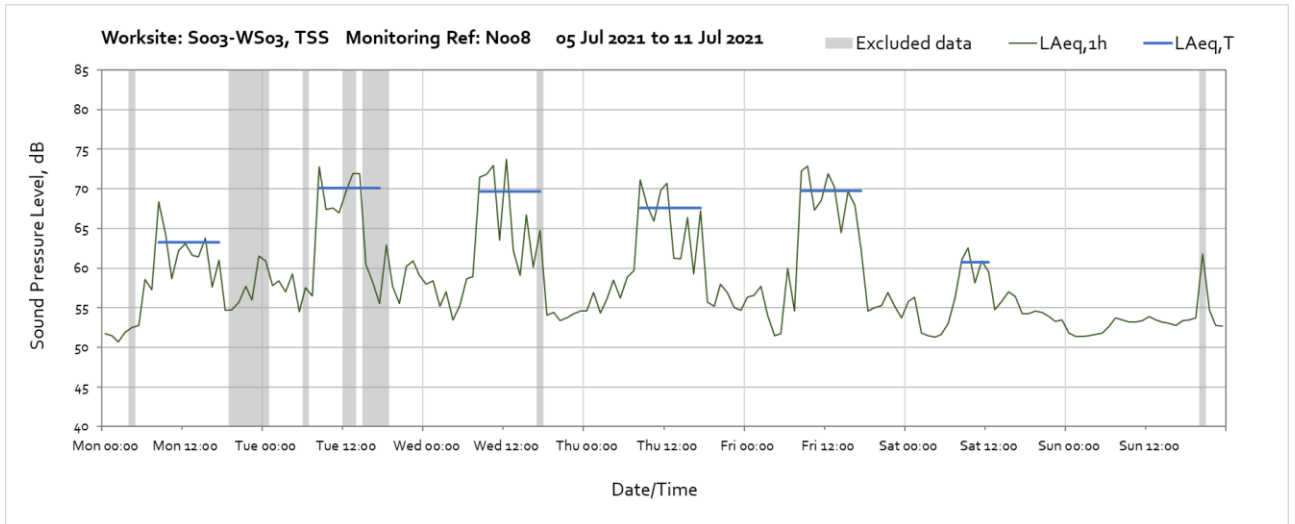
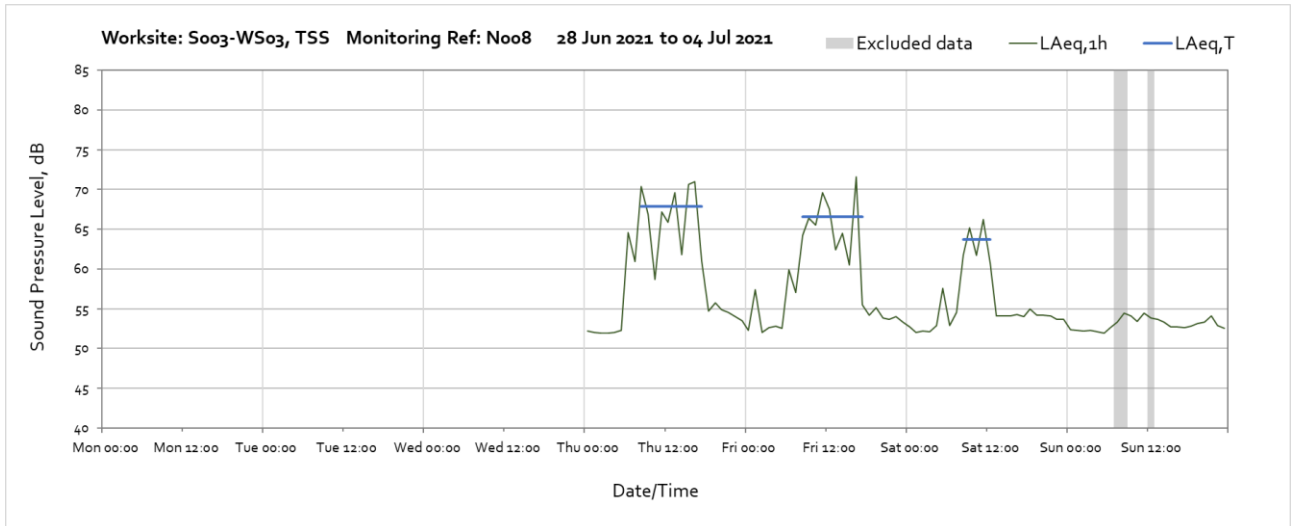
Worksite: S003-WS03, ETD, TSS - Monitoring Ref: N006

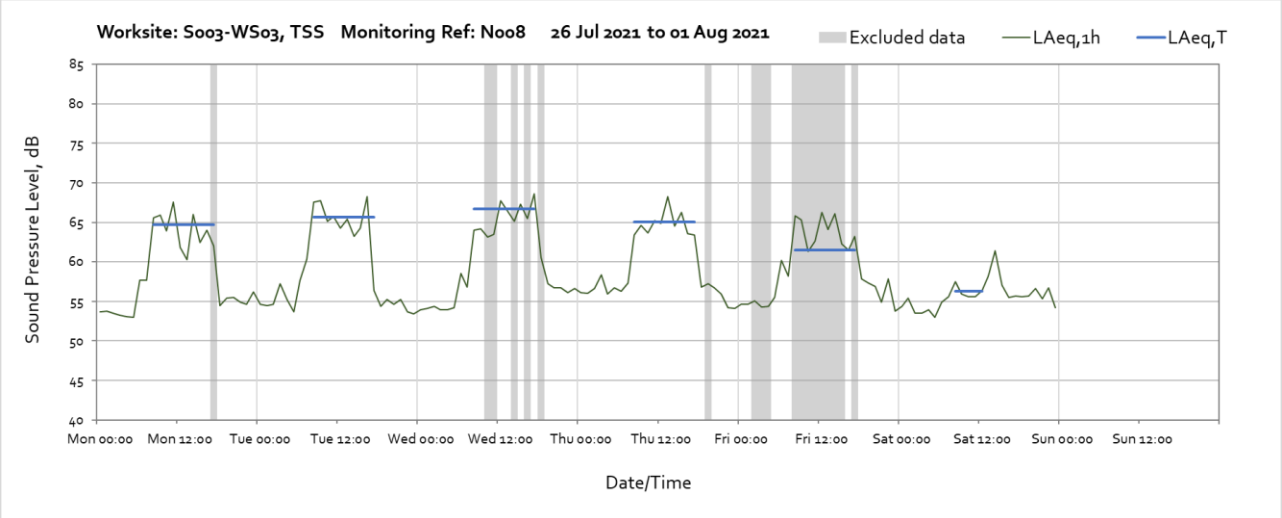
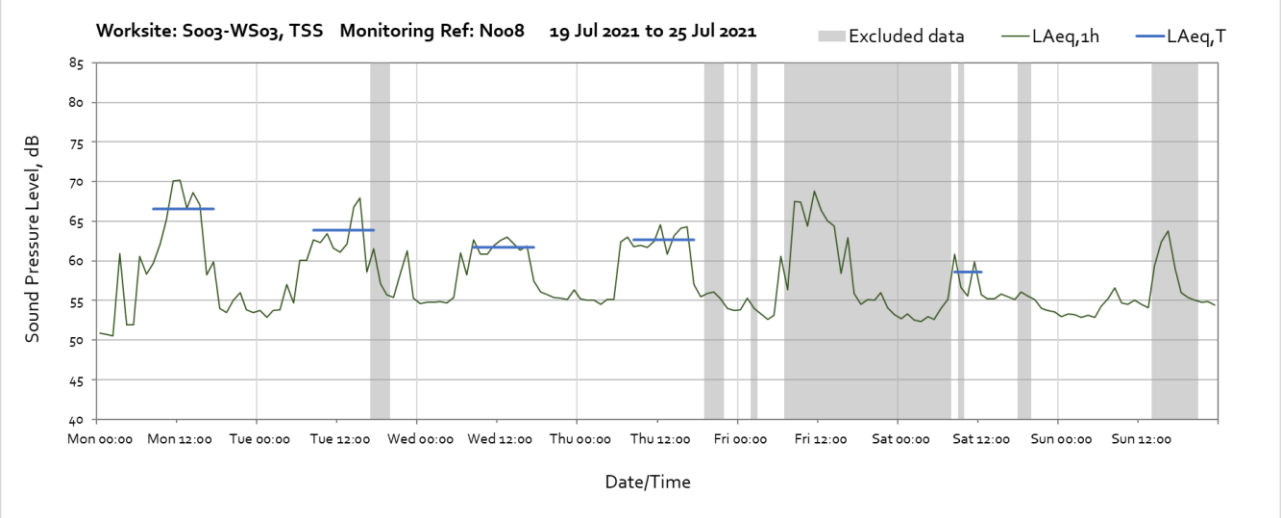
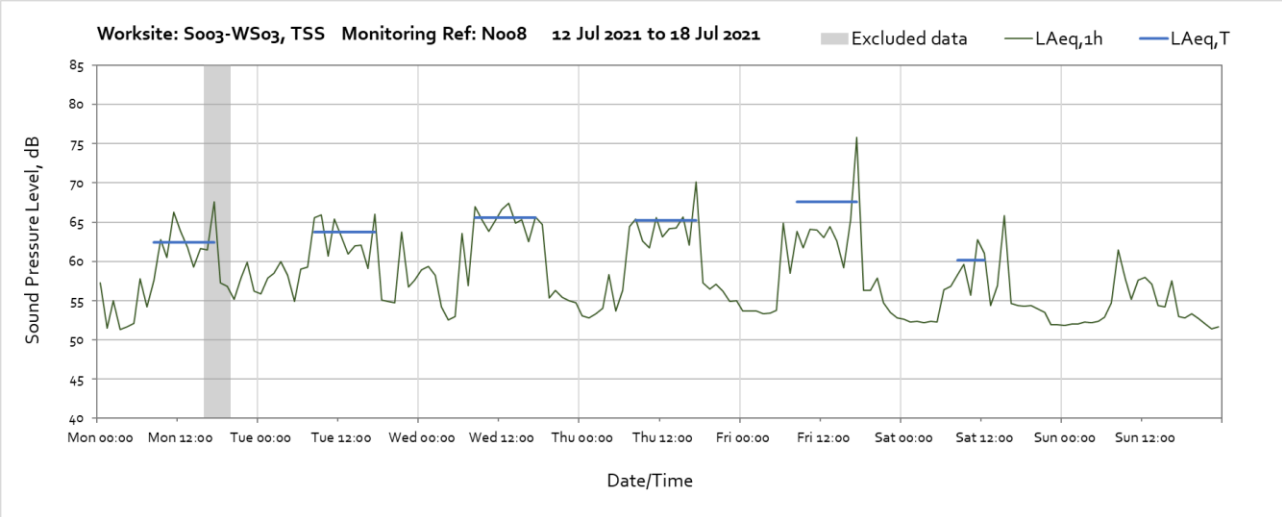




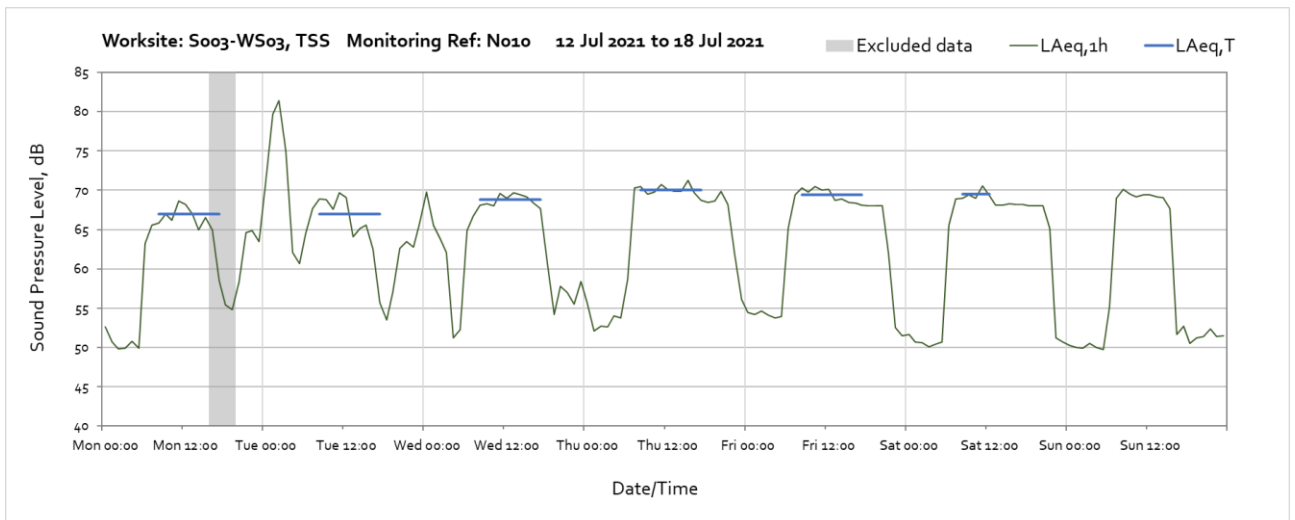
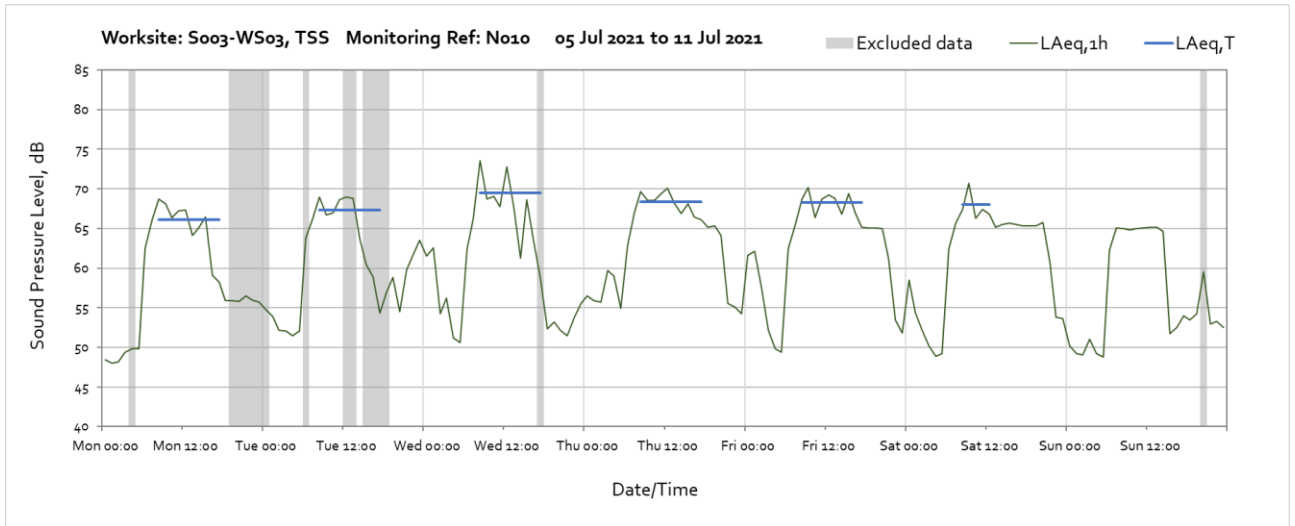
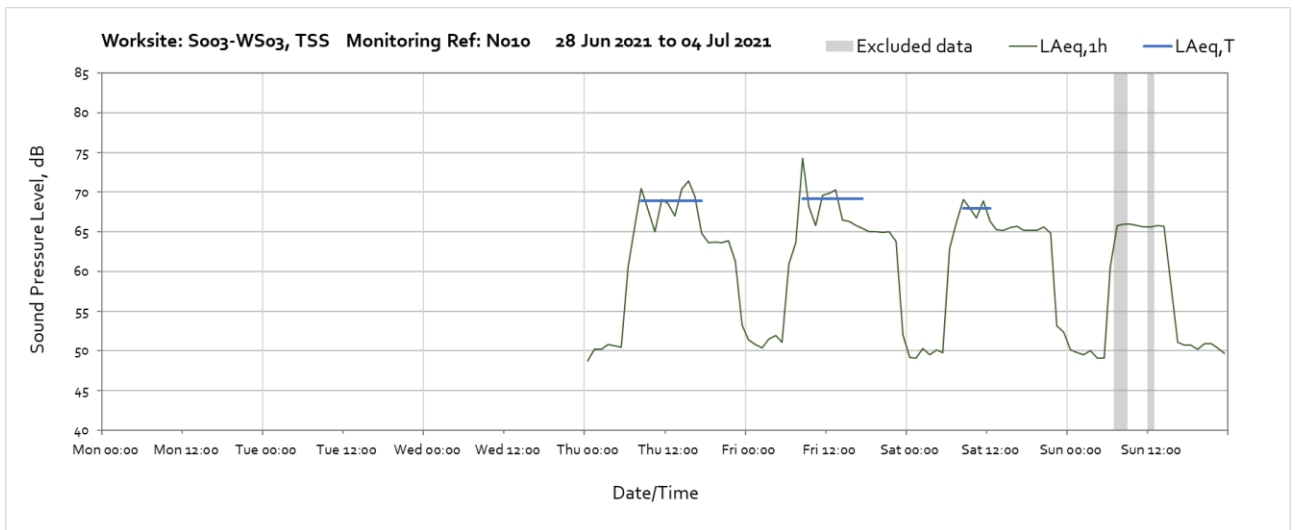


Worksite: S003-WS03, TSS – Monitoring Ref: N008

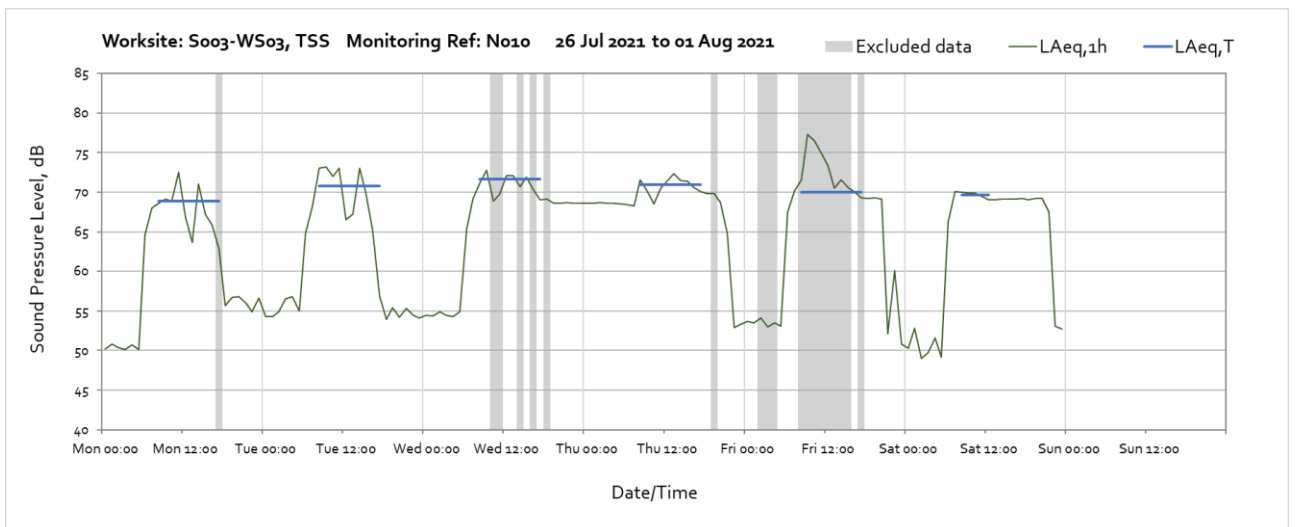
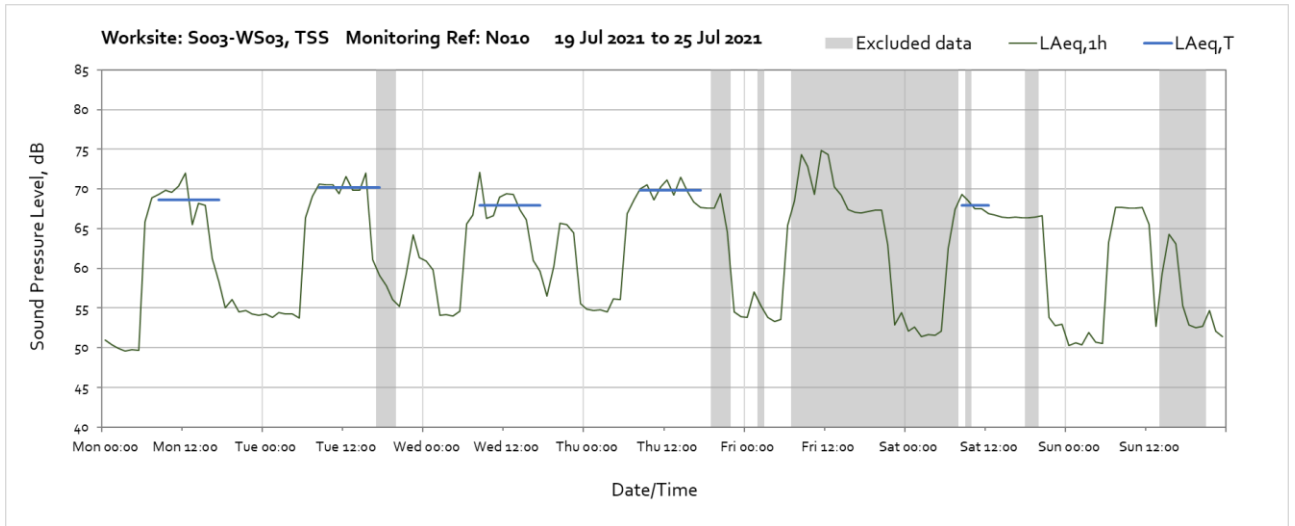




Worksite: S003-WS03, TSS – Monitoring Ref: N010

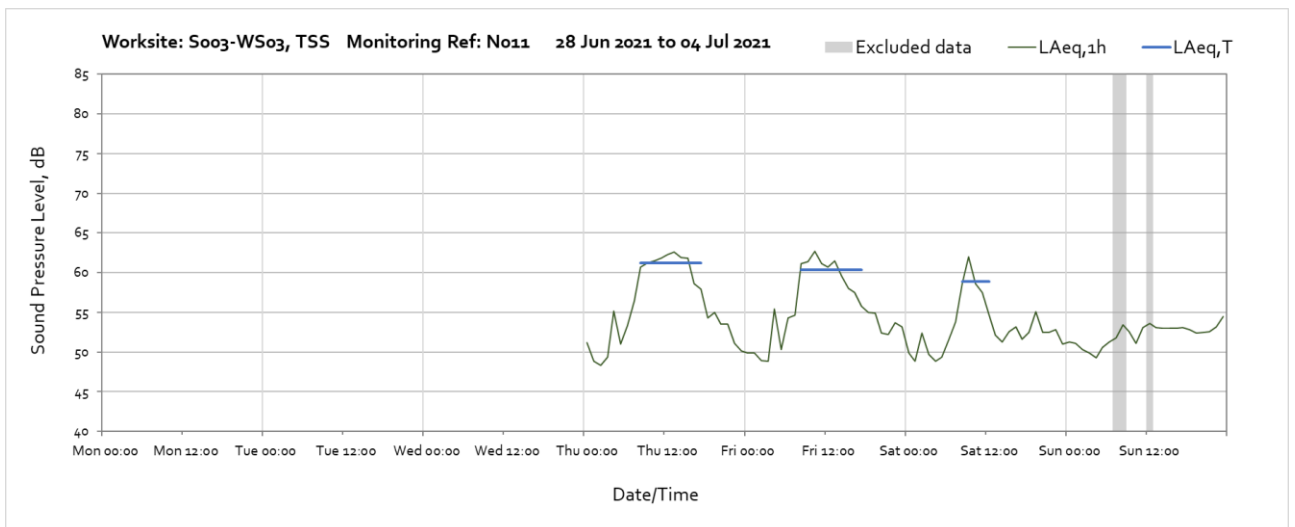


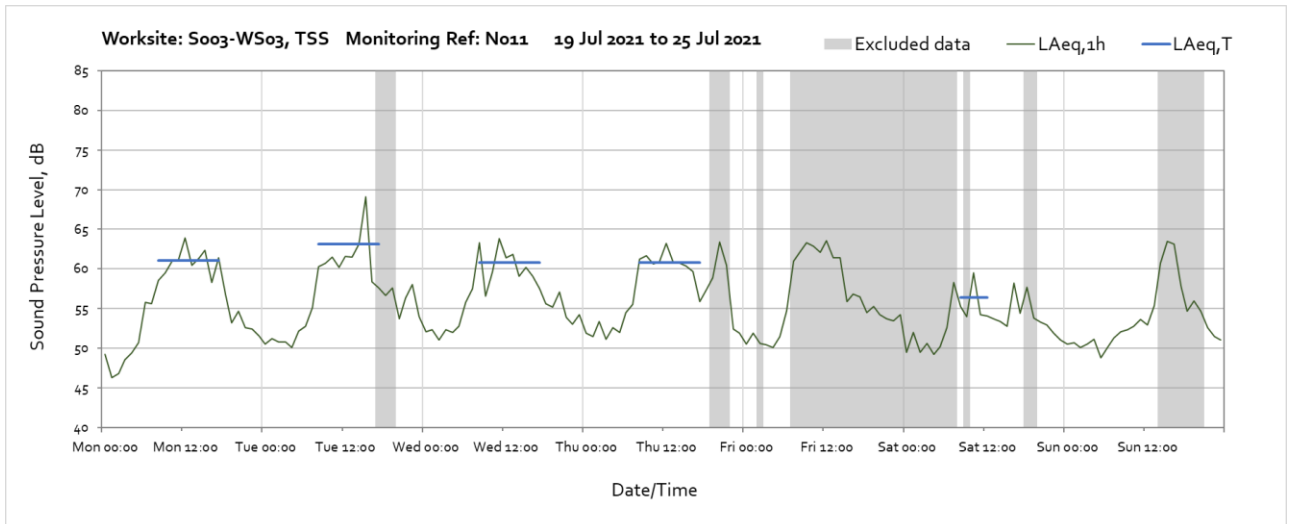
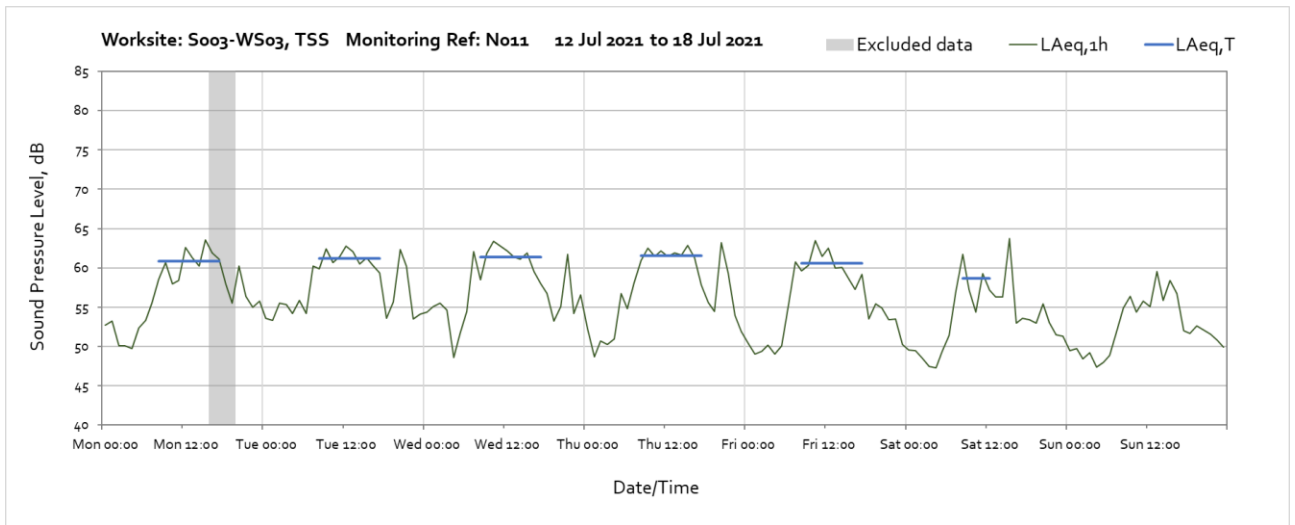
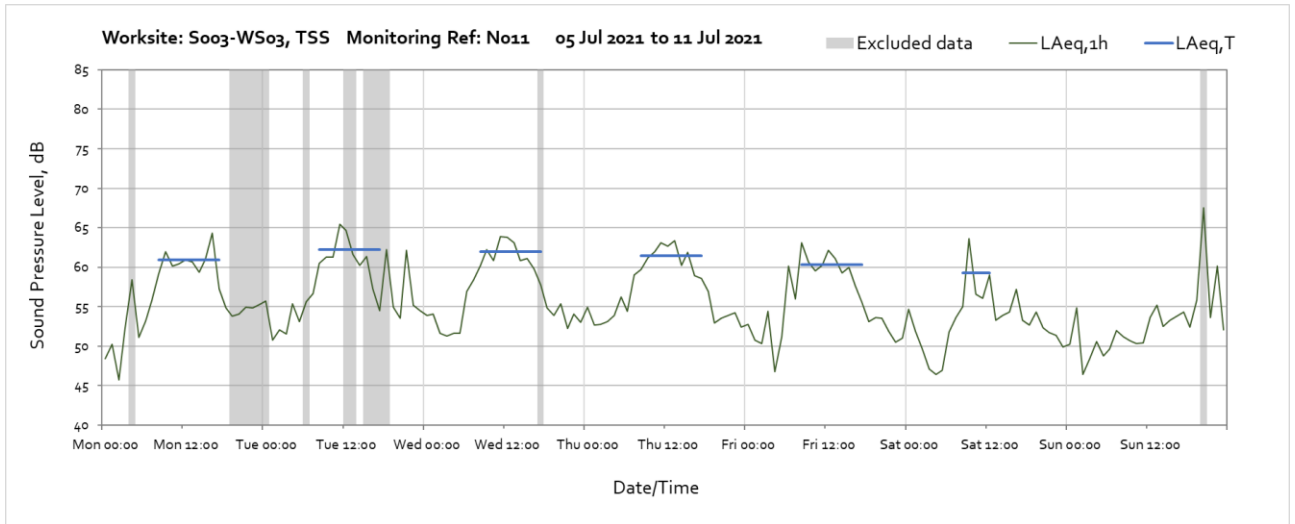
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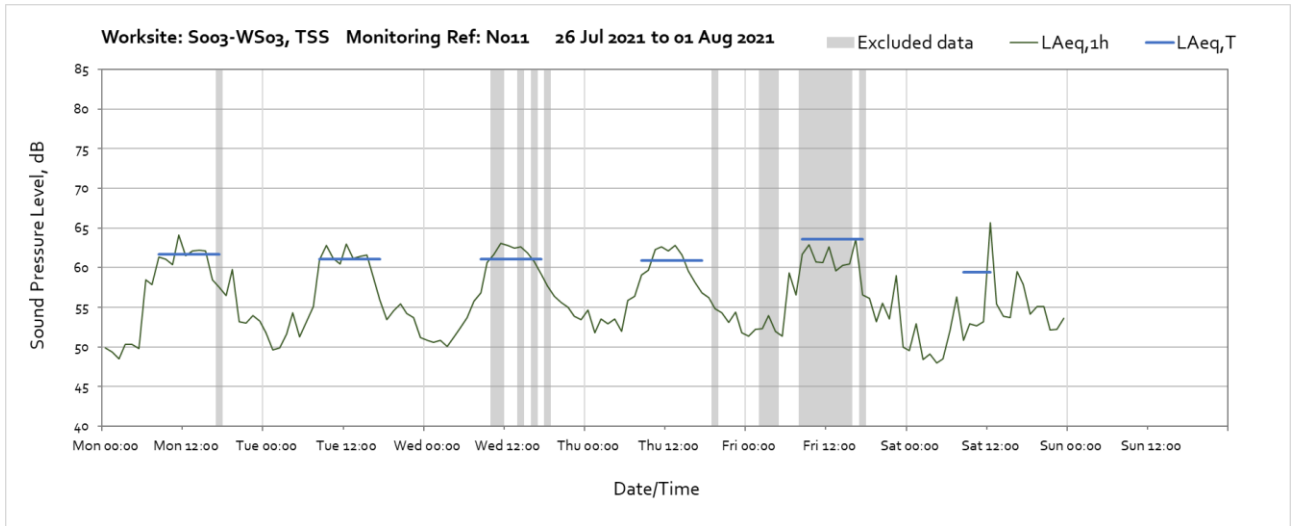


Note: Continuous noise levels measured outside of core construction hours were due to re Fridgeration plant equipment associated with a nearby hotel and is not associated with HS2 construction.

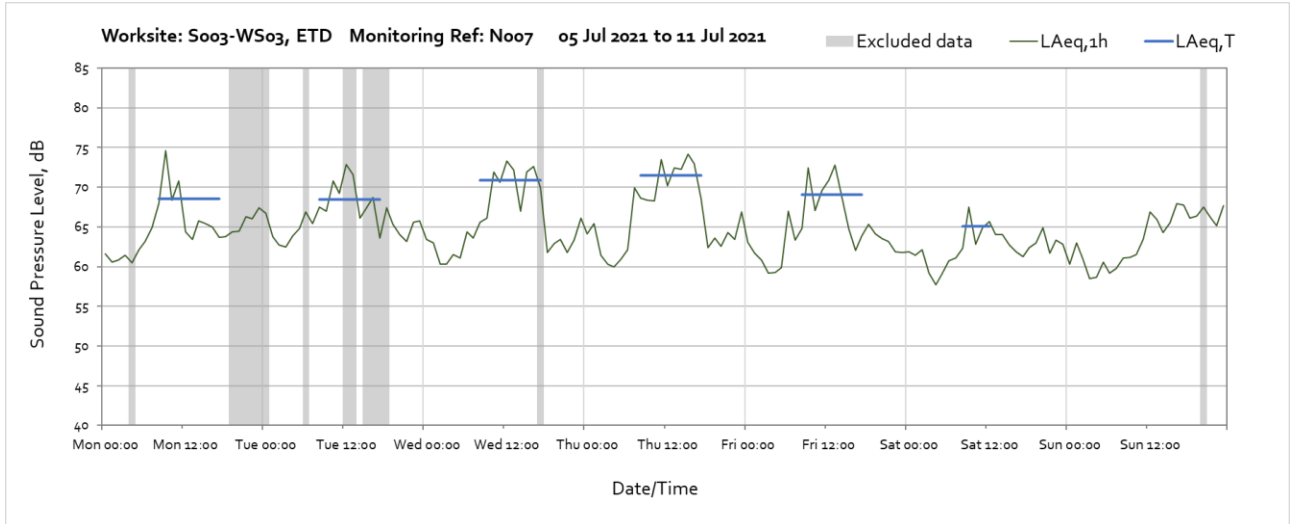
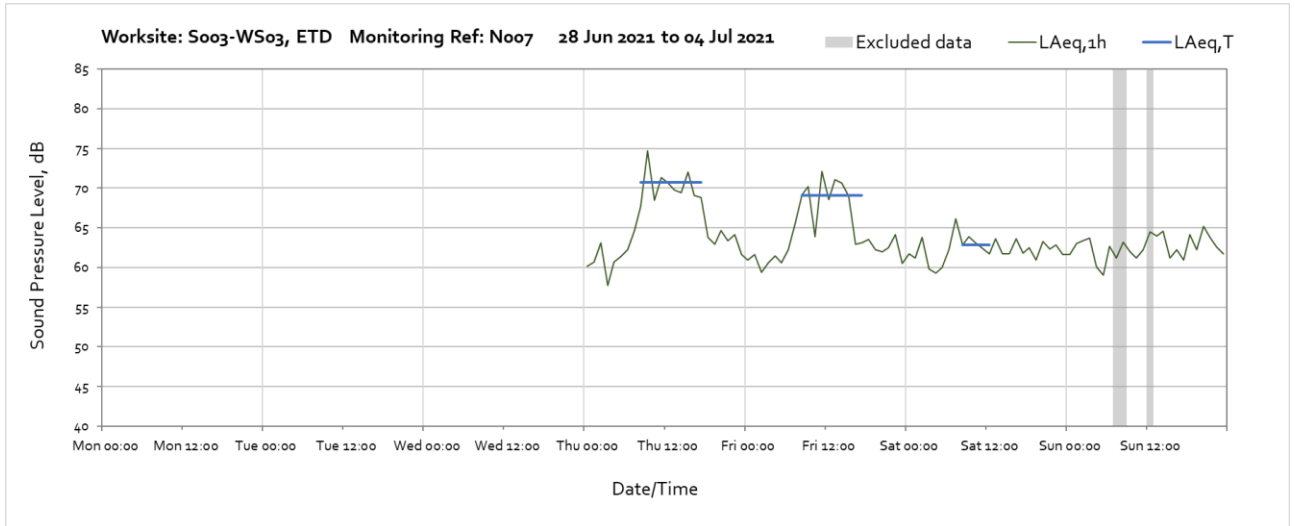
Worksite: S003-WS03 – Monitoring Ref: N011

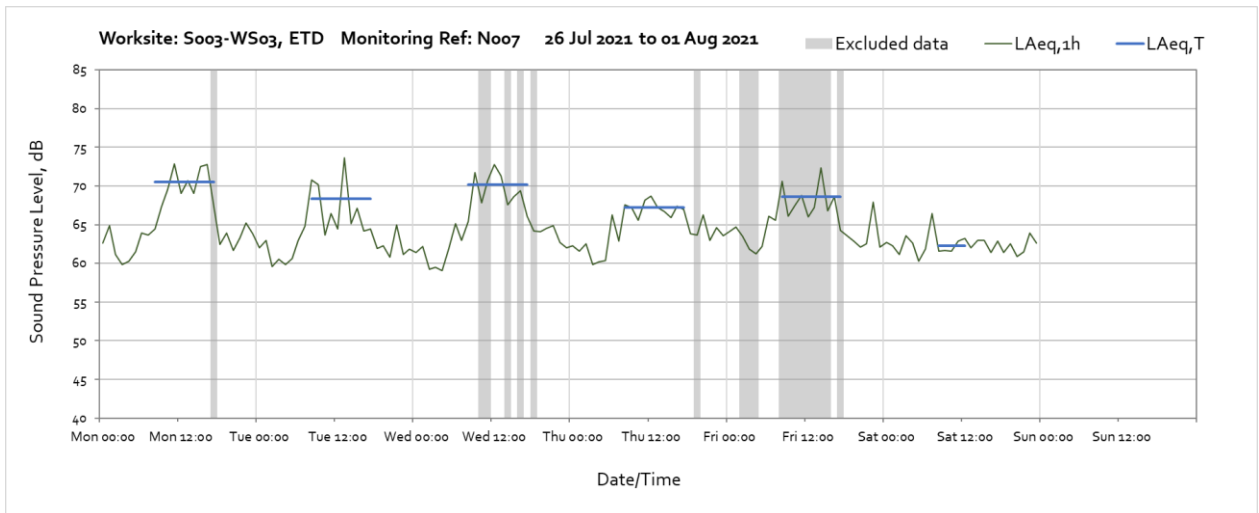
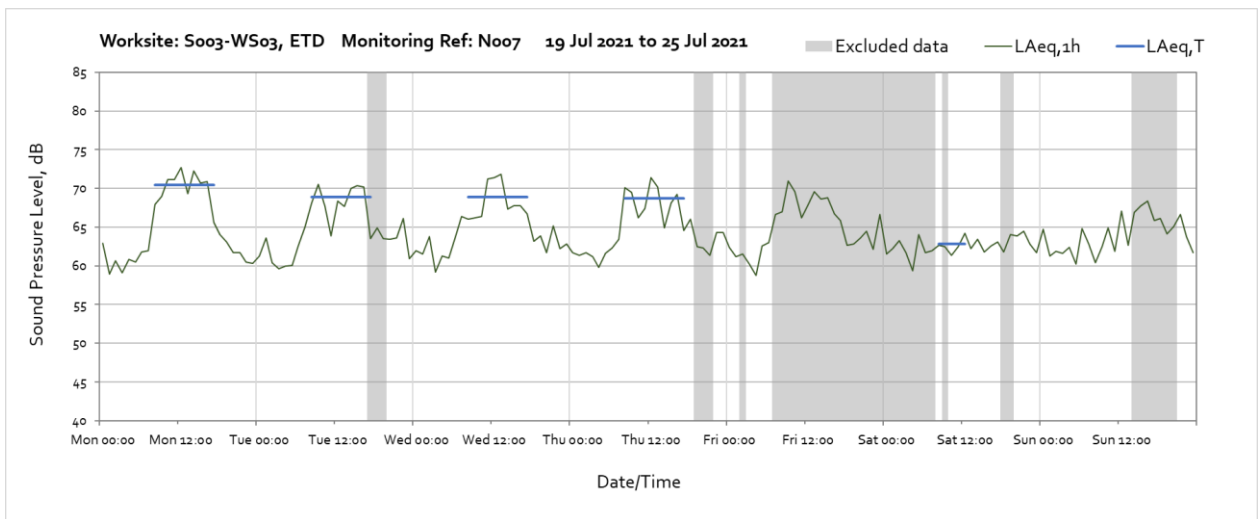
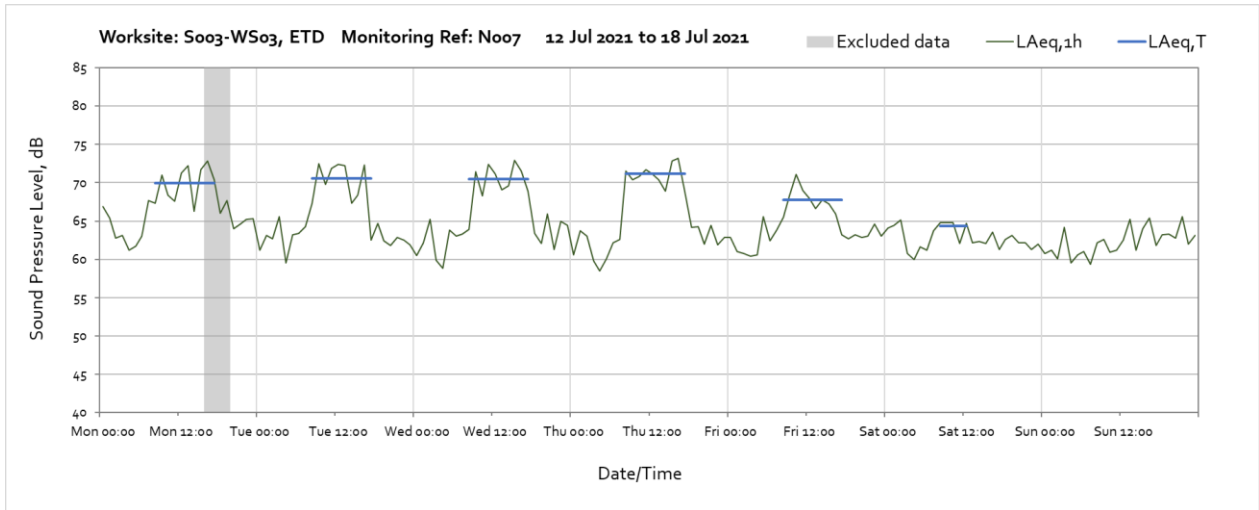




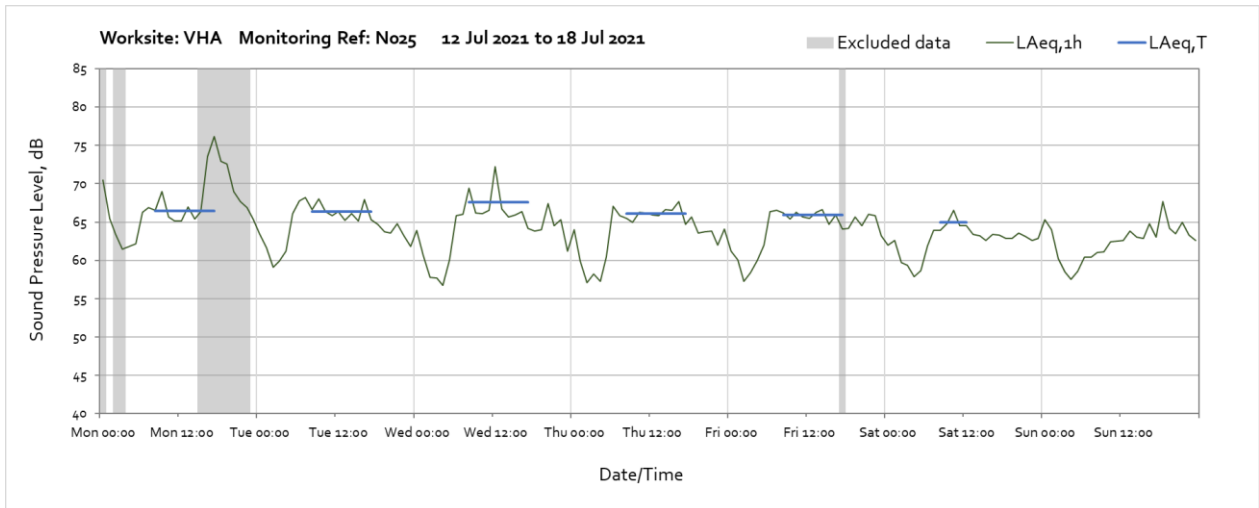
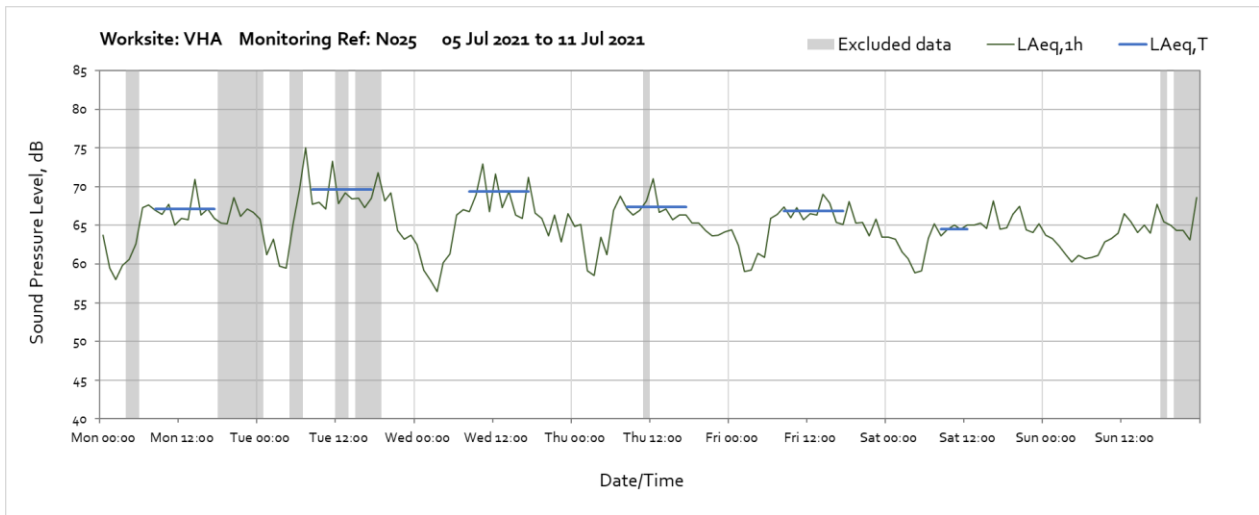
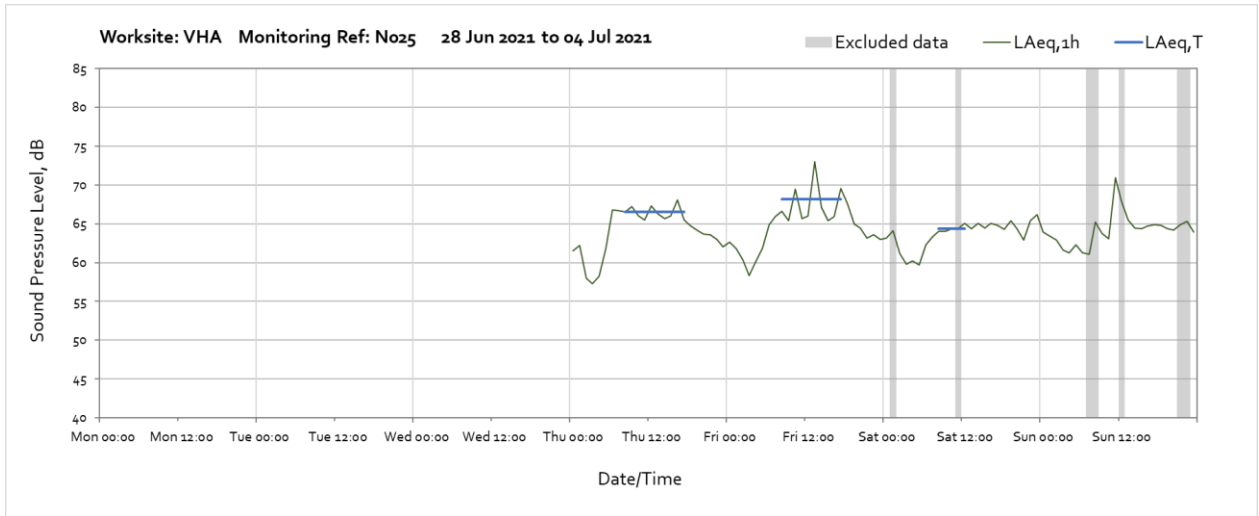


Worksite: S003-WS03, ETD – Monitoring Ref: N007

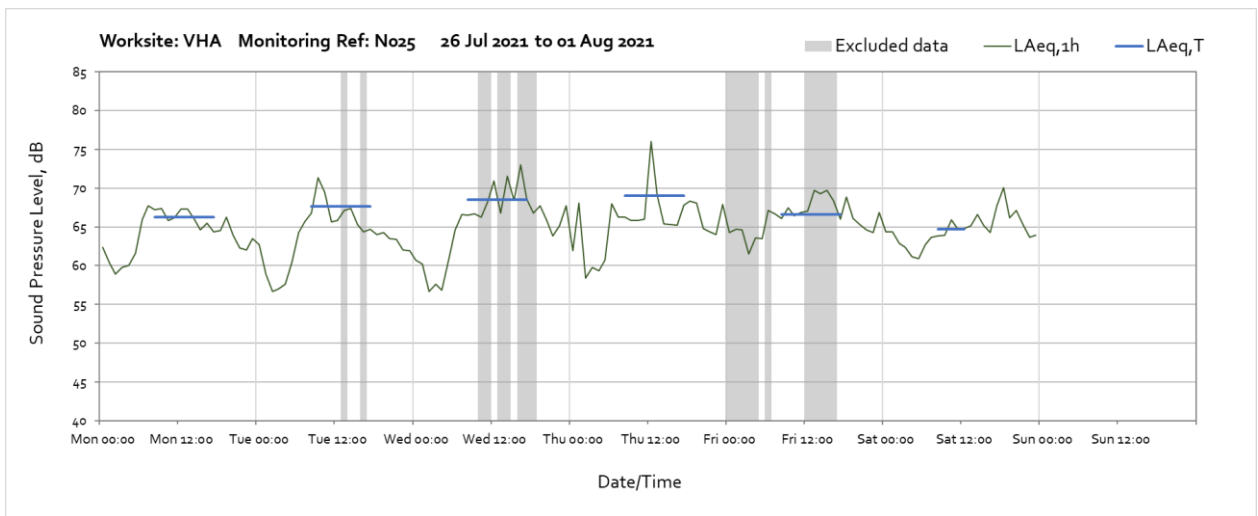
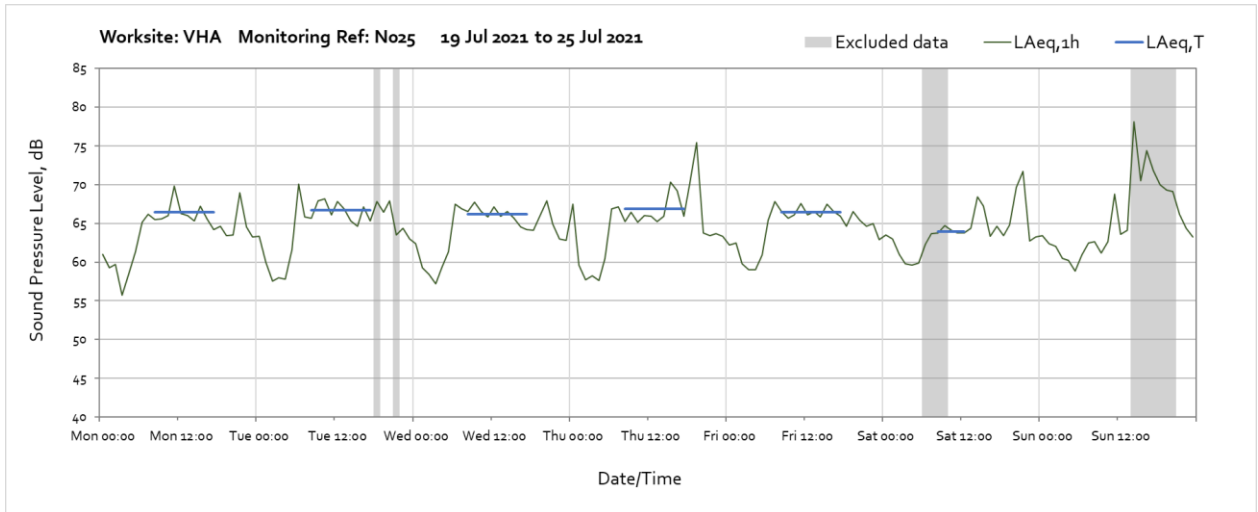




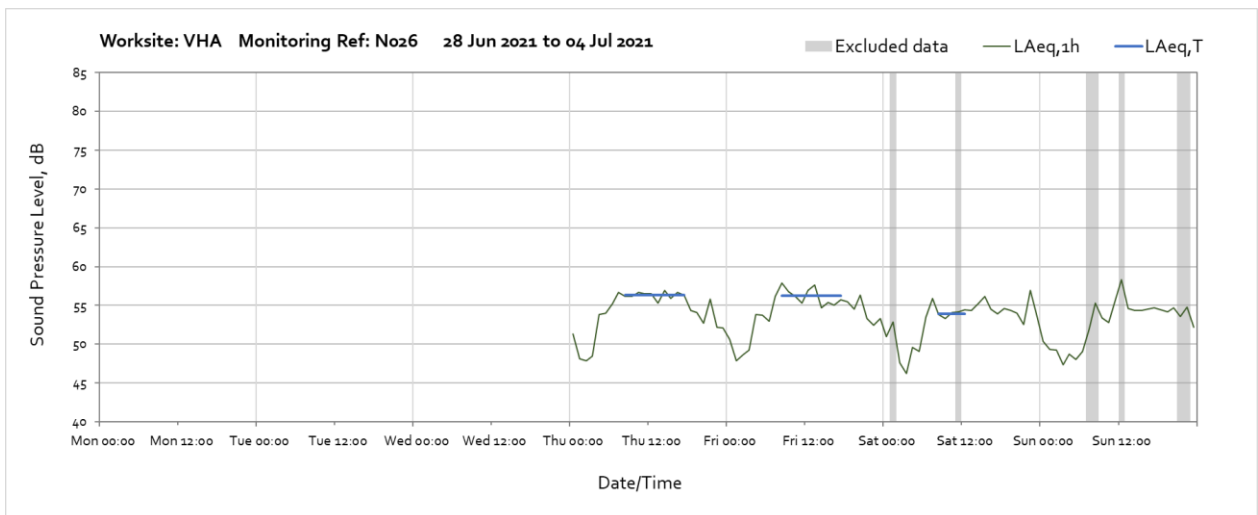
Vehicle Holding Area (VHA) – Monitoring Ref: N025

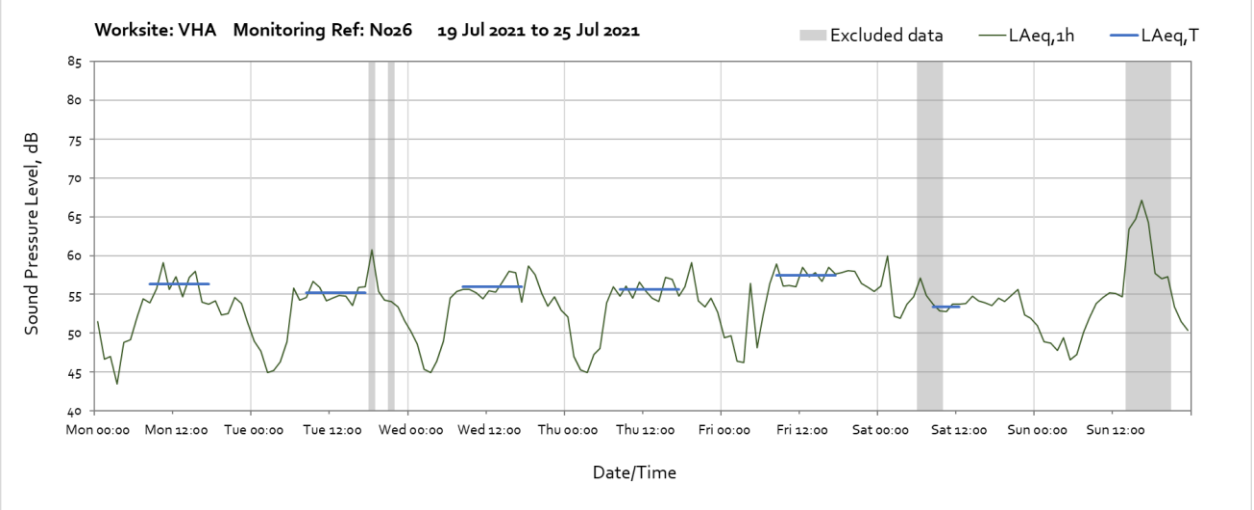
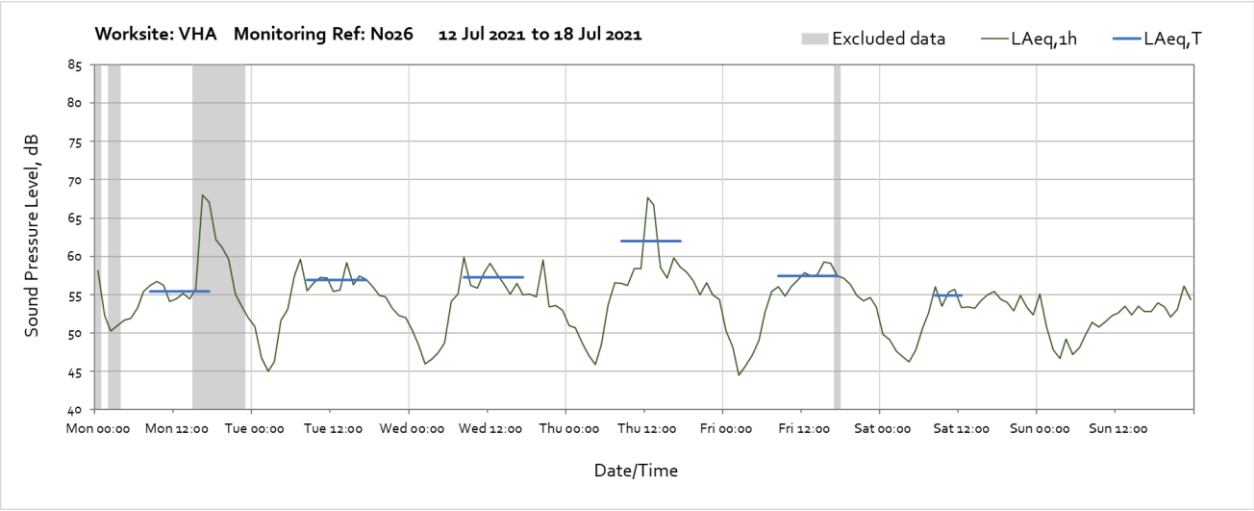
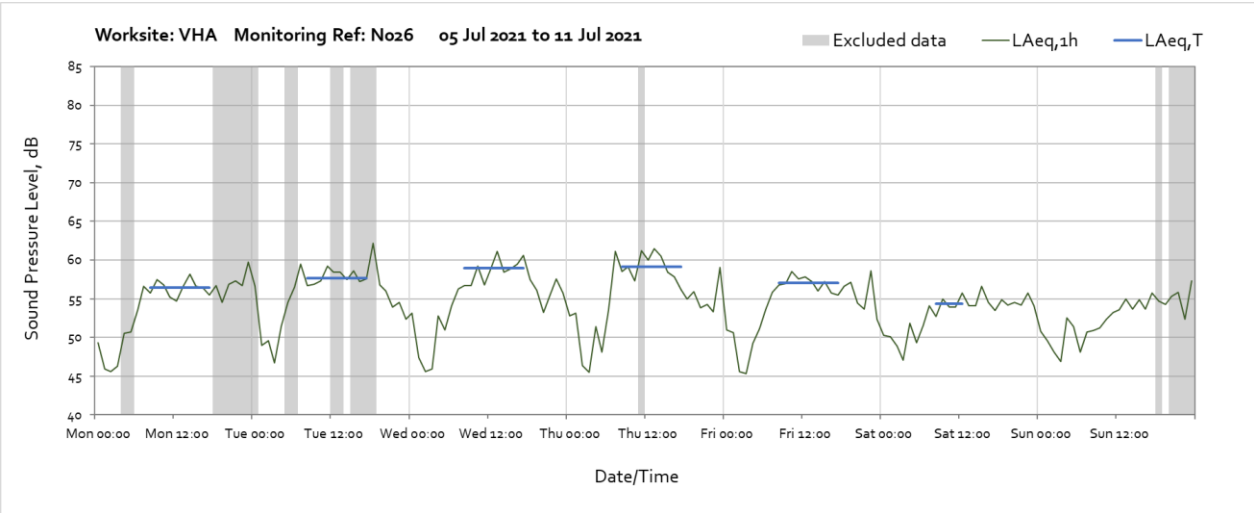


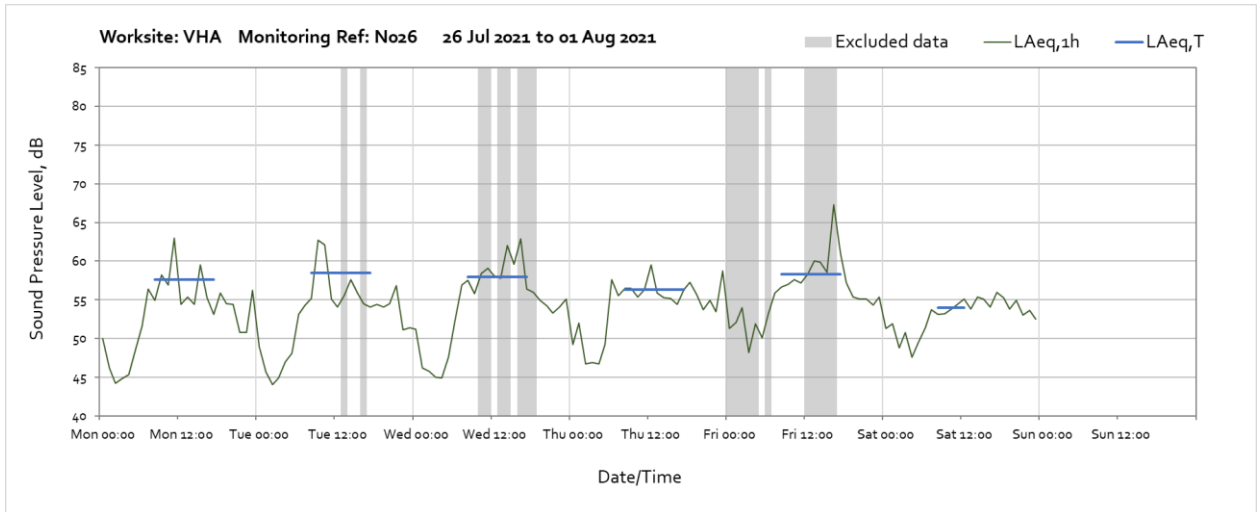
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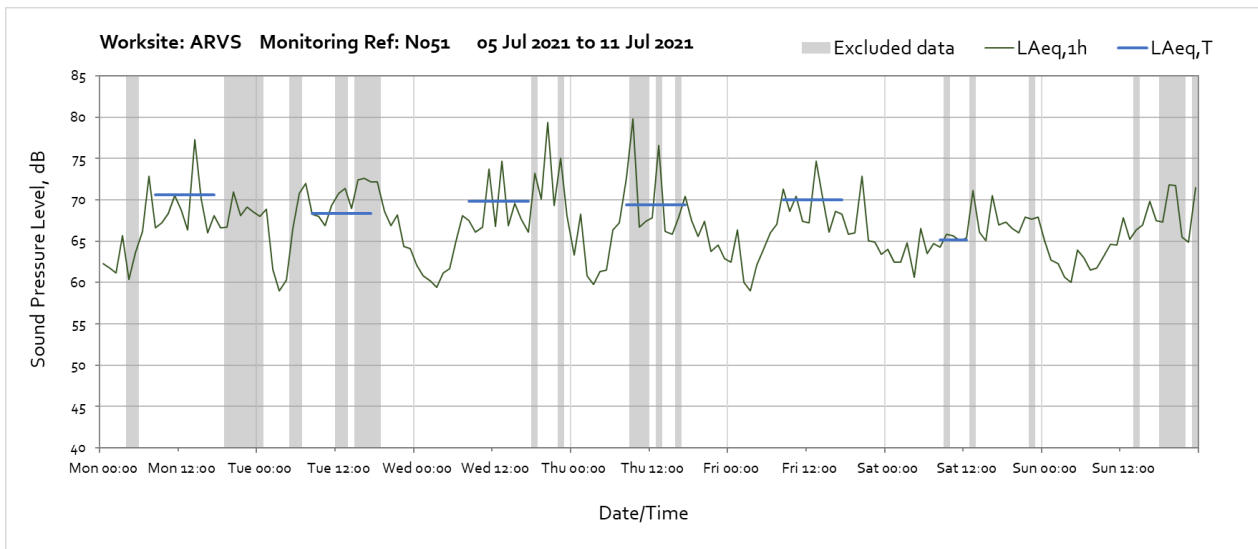
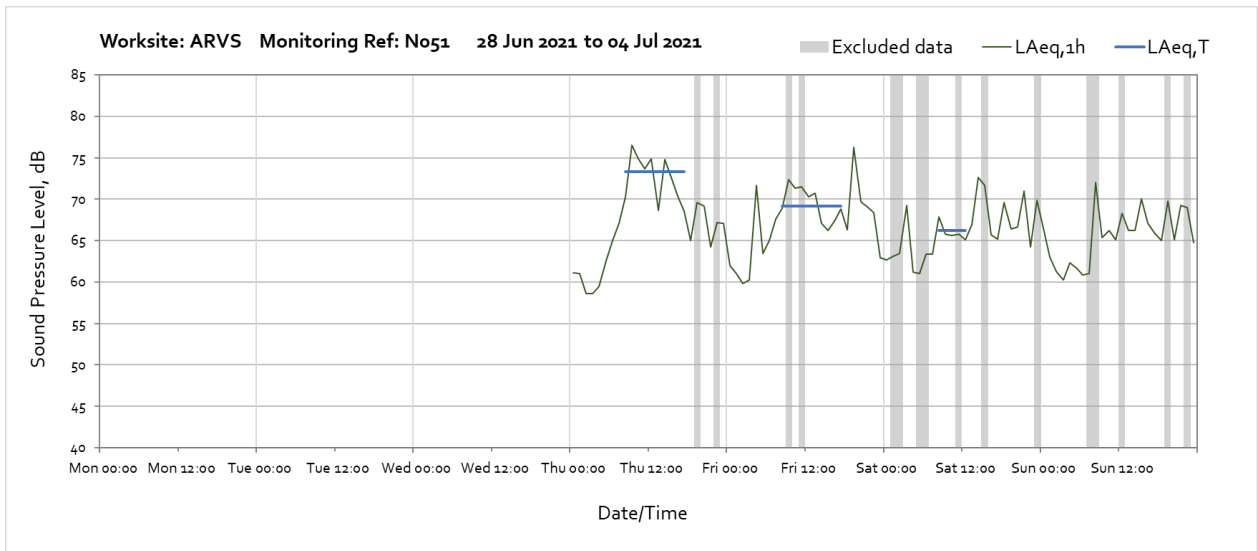
Vehicle Holding Area (VHA) - Monitoring Ref: N026

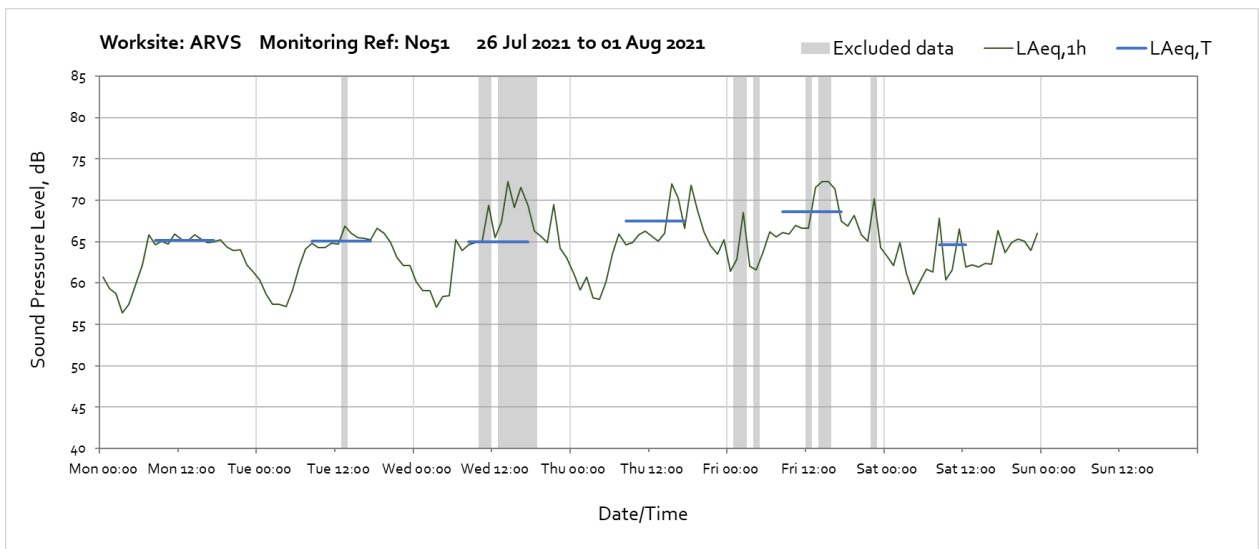
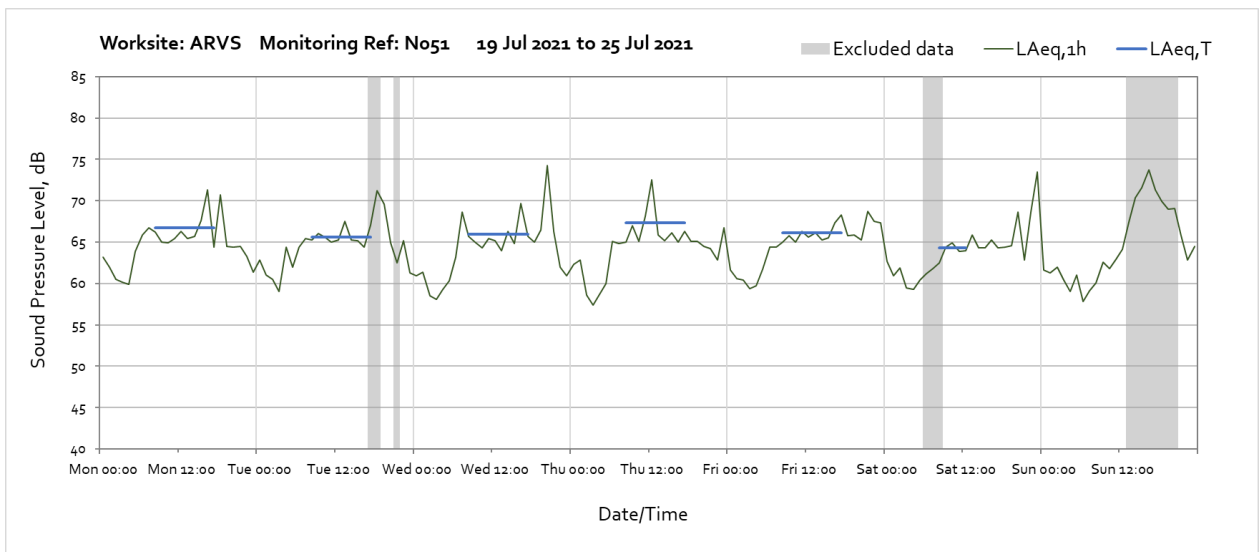
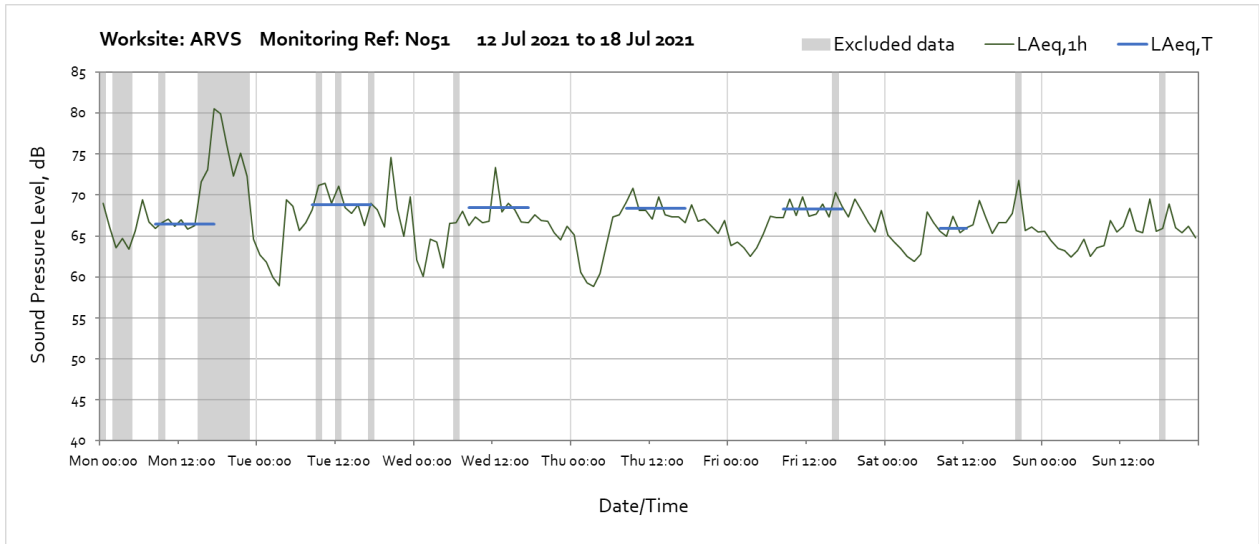




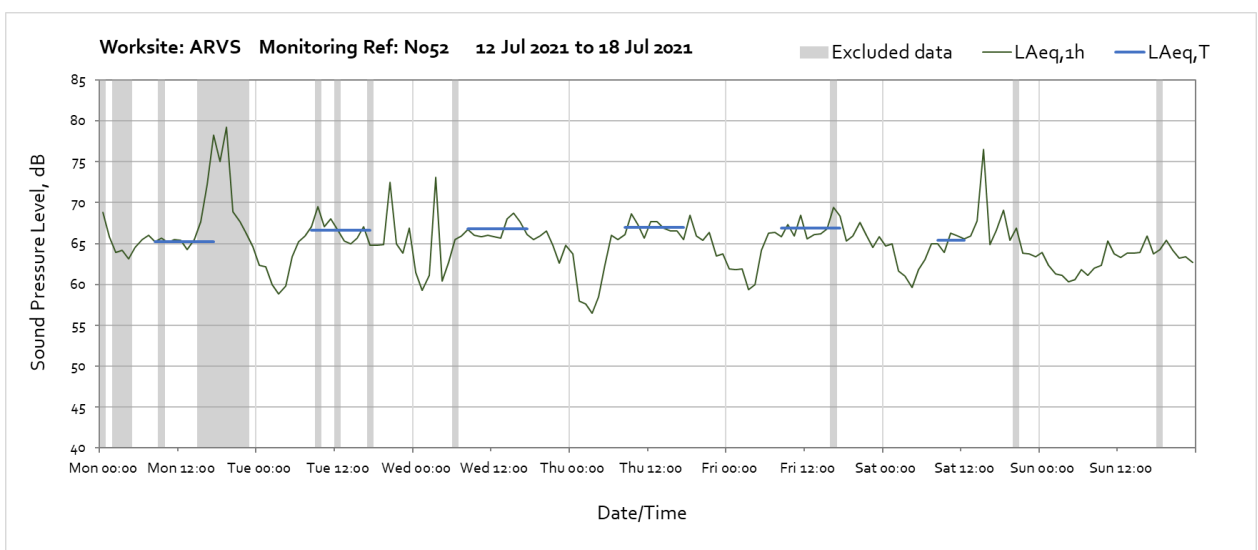
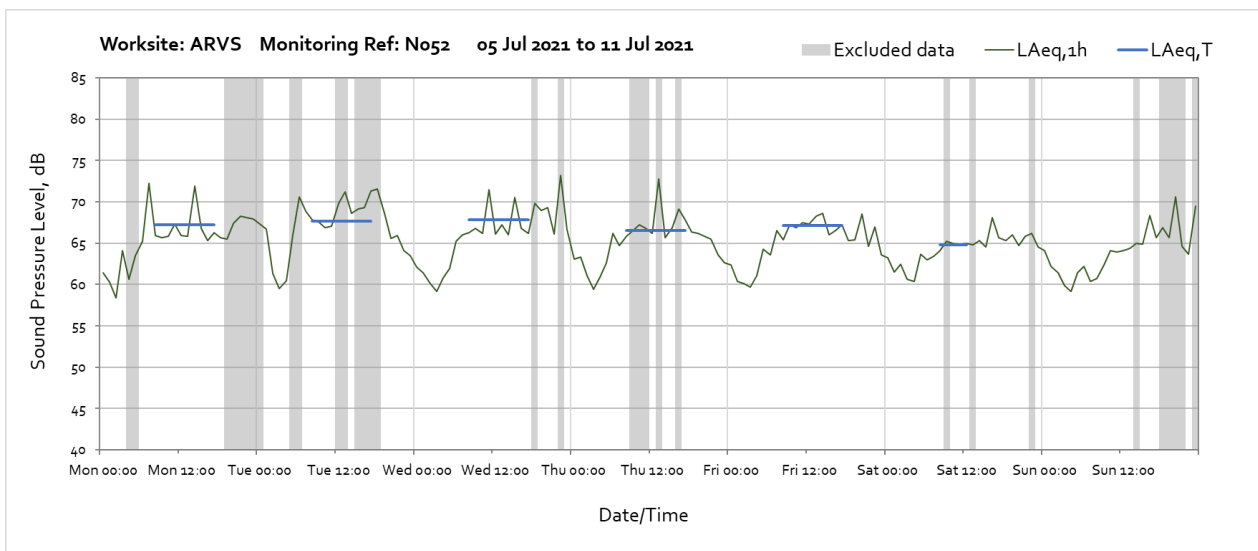
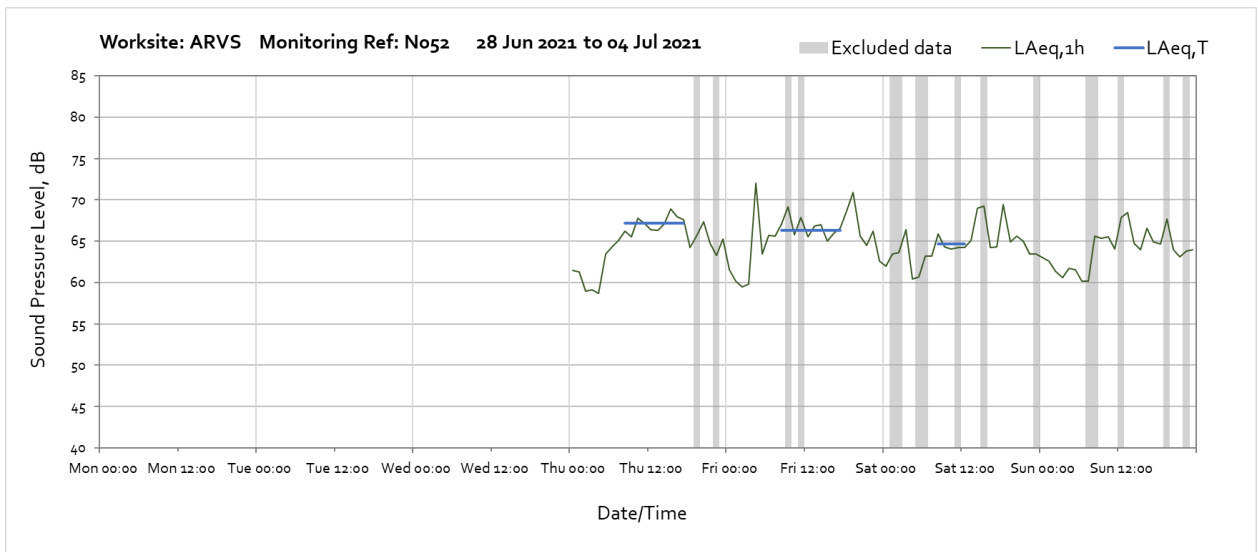


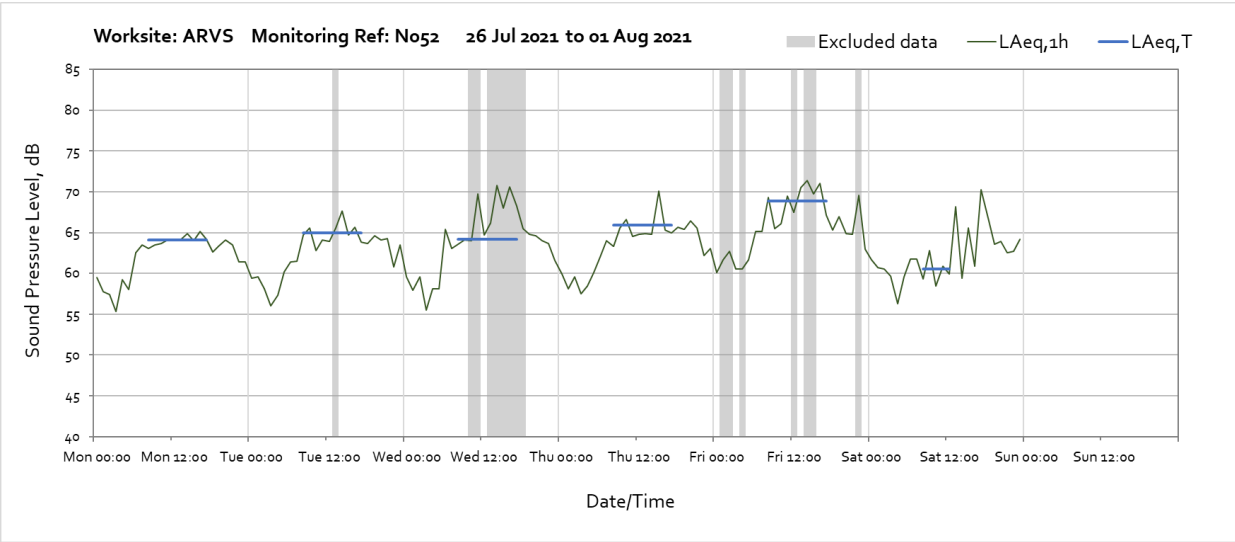
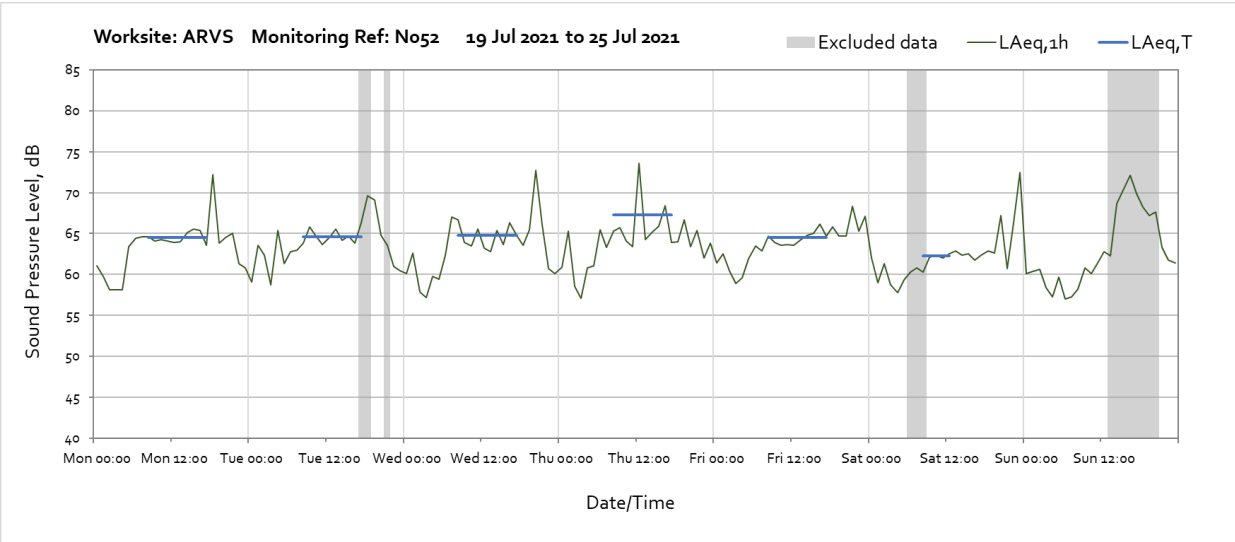
Adelaide Road Ventilation Shaft (ARVS) – Monitoring Ref: N051





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

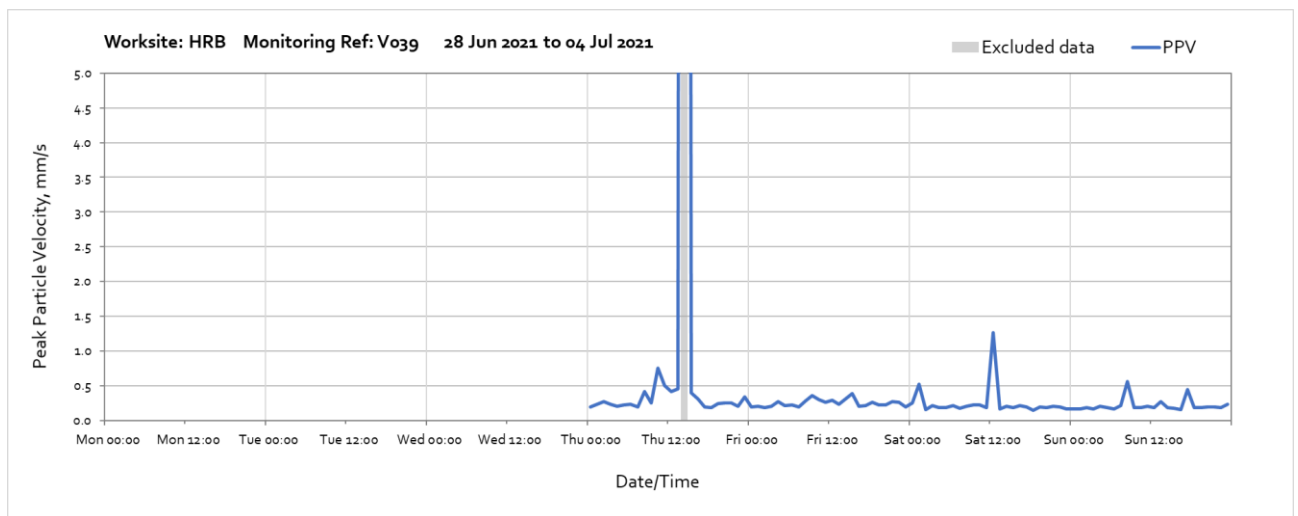




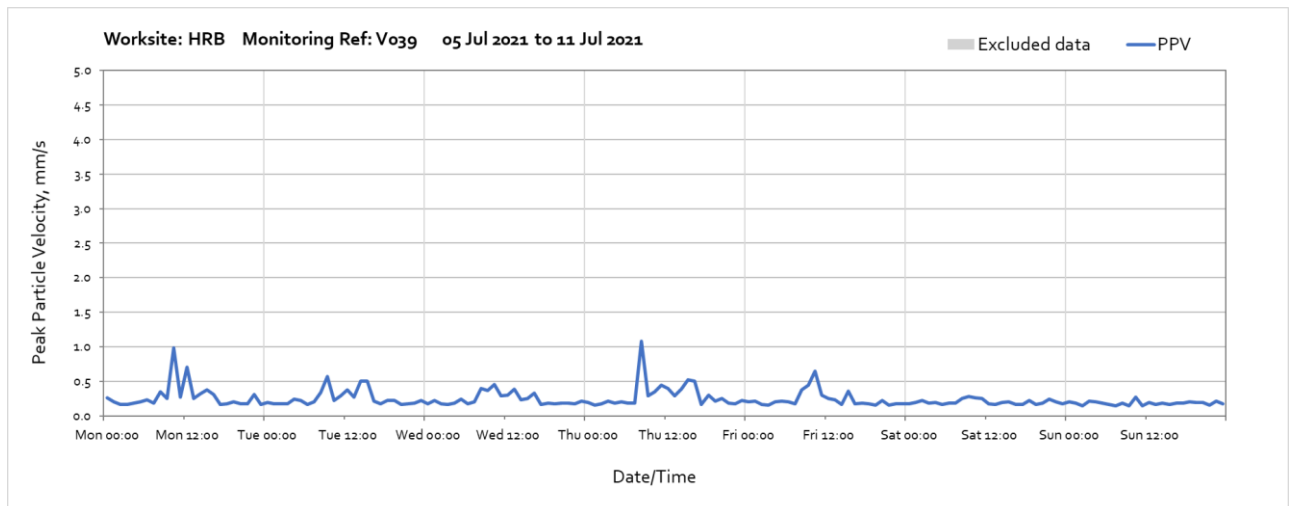
Vibration

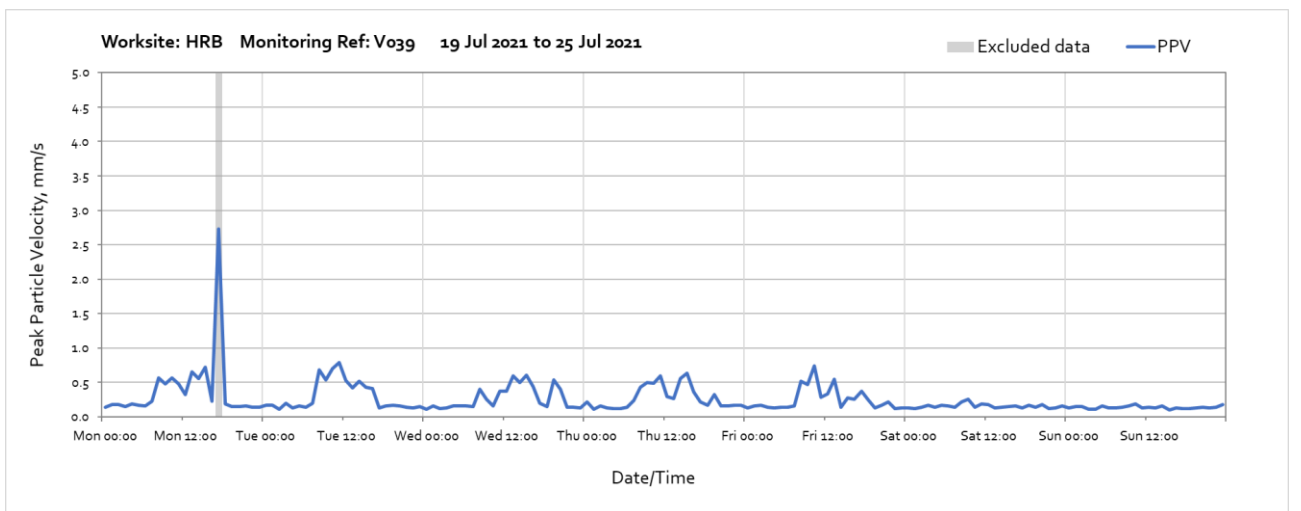
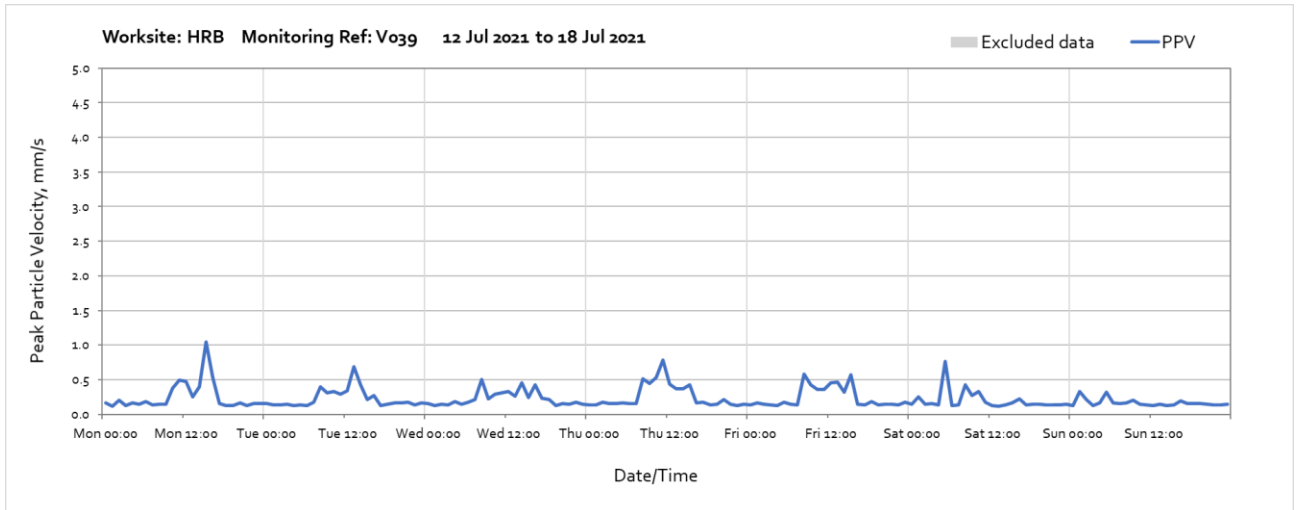
The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axes x, y and z. Where resultant PPV data is not available (monitors V039 and V043), the highest vibration 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

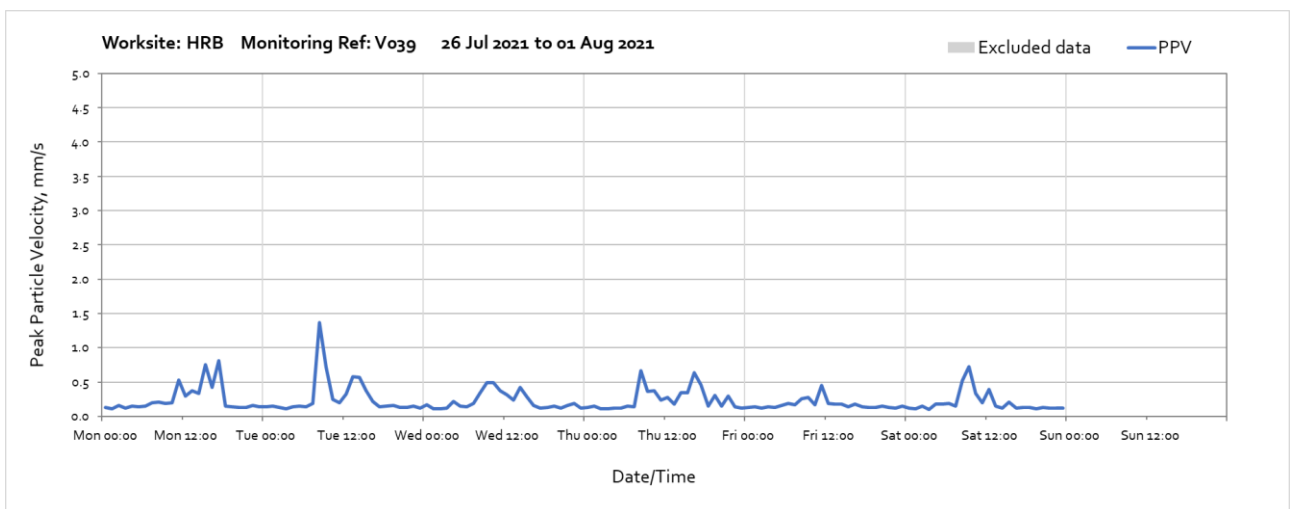


Note: High vibraton levels measured from 14:00 until 15:00 on Thursday 1st July were due local intereference of the monitor and are not representative of HS2 vibration levels at the receptor.

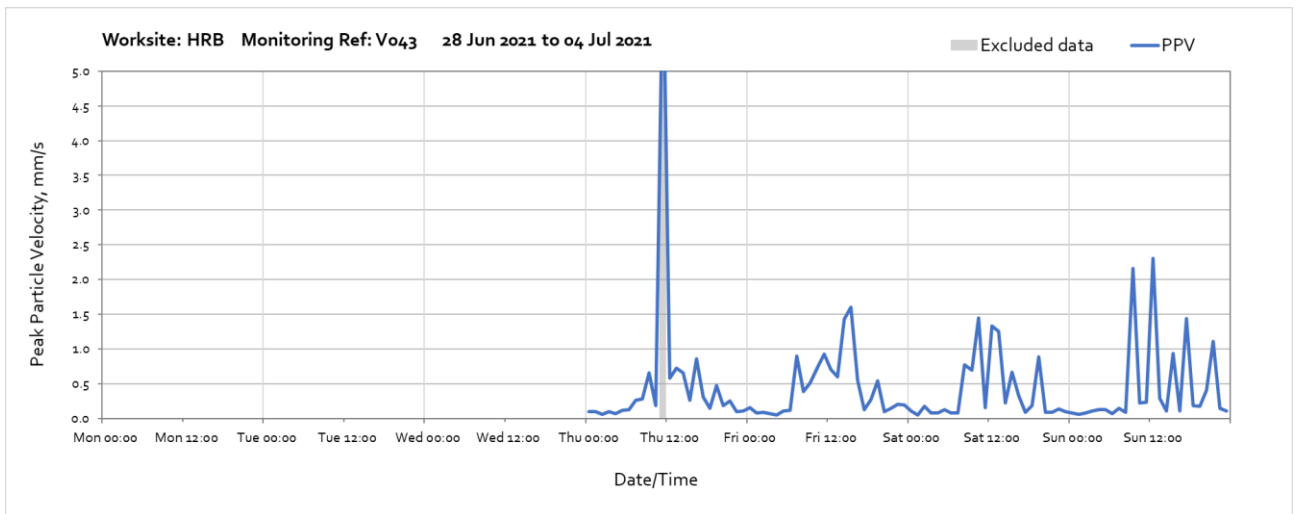




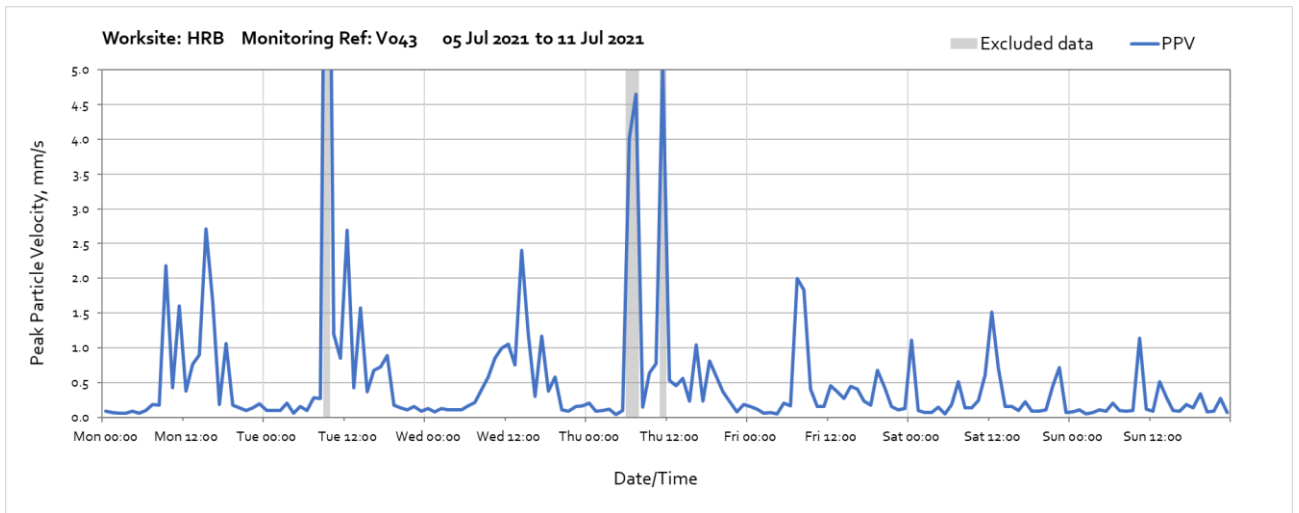
Note: High vibration levels measured from 17:00 until 18:00 on Monday 19th July were due a localised vibrator event near to the monitor and are not representative of HS2 vibration levels at the receptor.



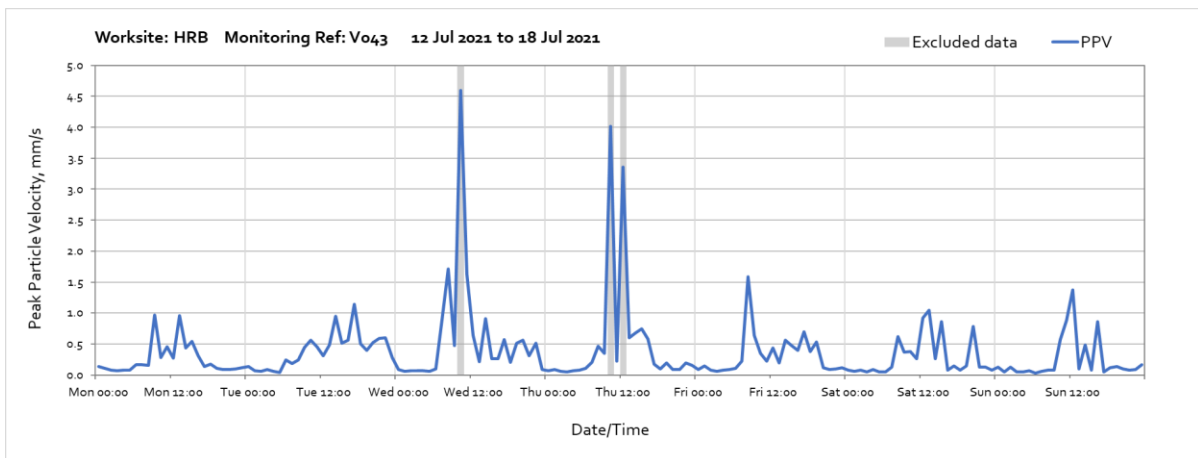
Worksite: HRB – Monitoring Ref: V043



Note: High vibration levels measured from 11:00 until 12:00 on Monday 1st July were due a localised vibraton event near to the monitor and are not representative of HS2 vibration levels at the receptor.

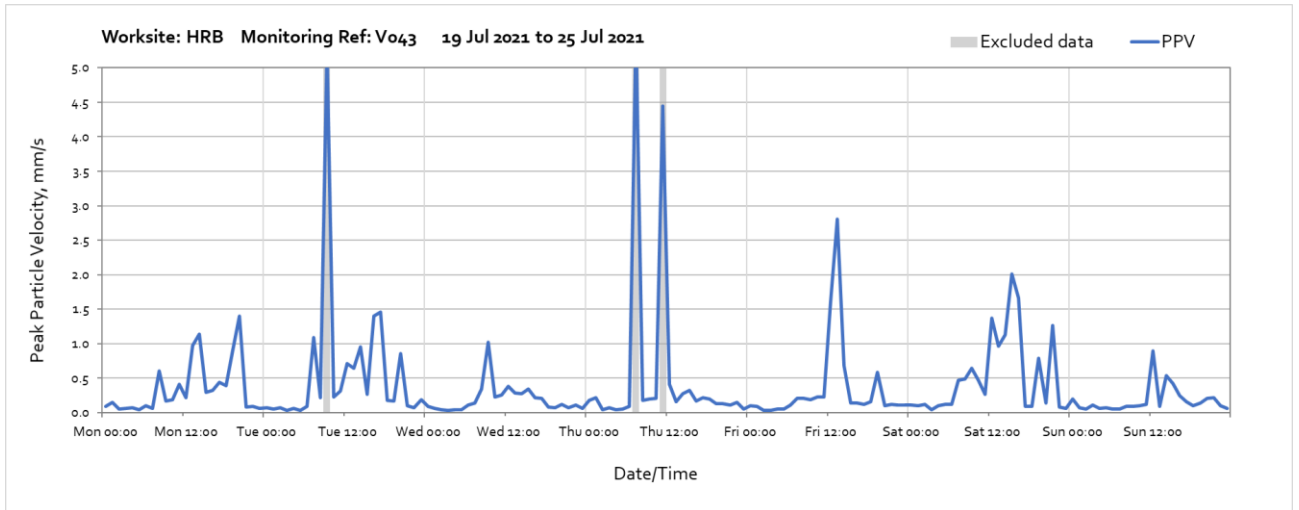


Note: High vibration levels measured throughout the week were due localised vibraton events near to the monitor and are not representative of HS2 vibration levels at the receptor.

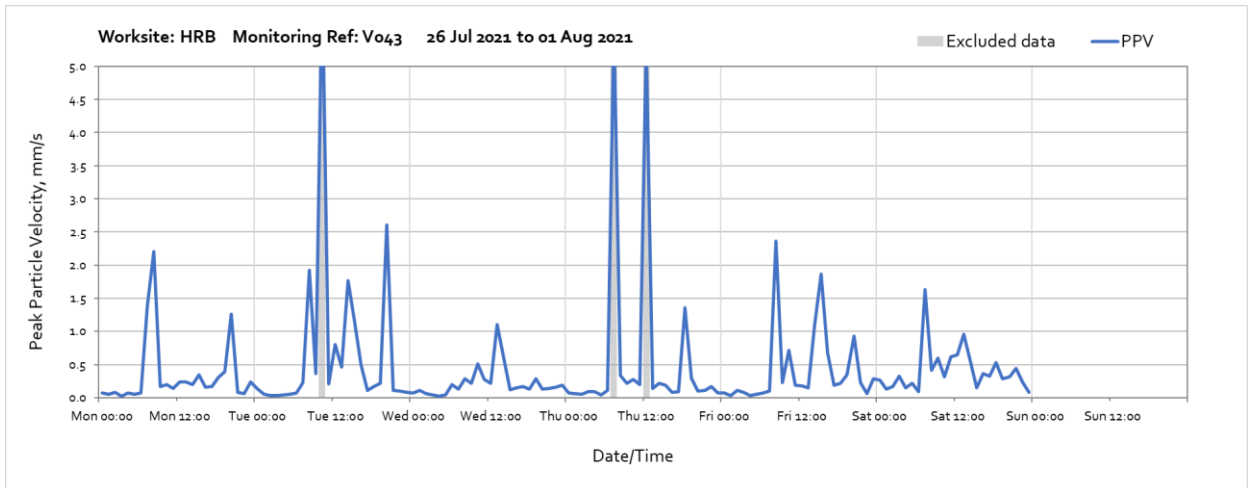


Note: High vibration levels measured throughout the week were due localised vibraton events near to the monitor and are not representative of HS2 vibration levels at the receptor.

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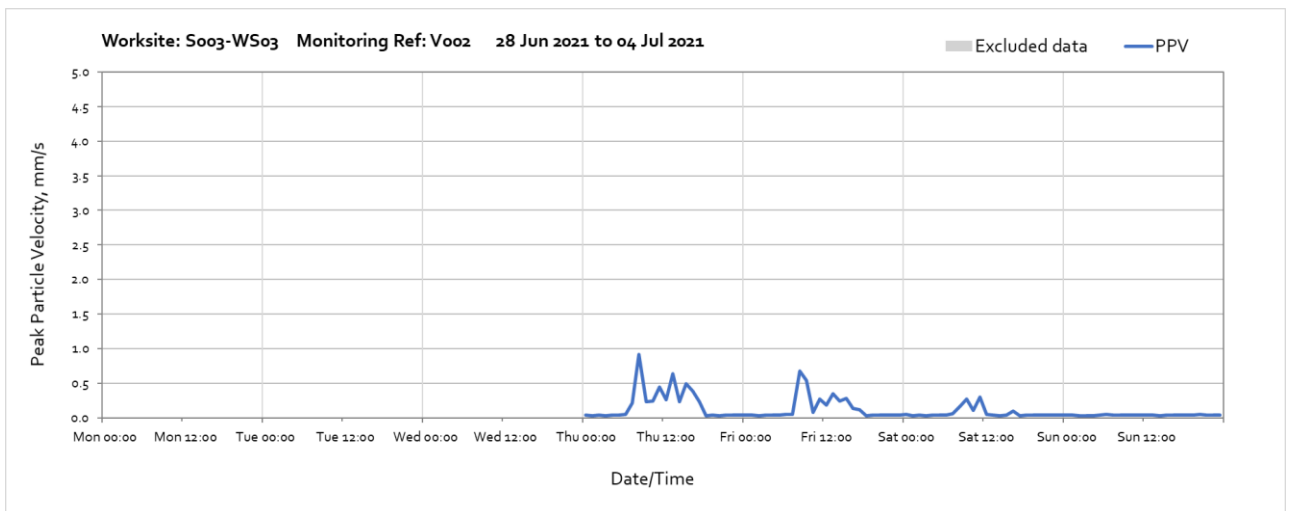


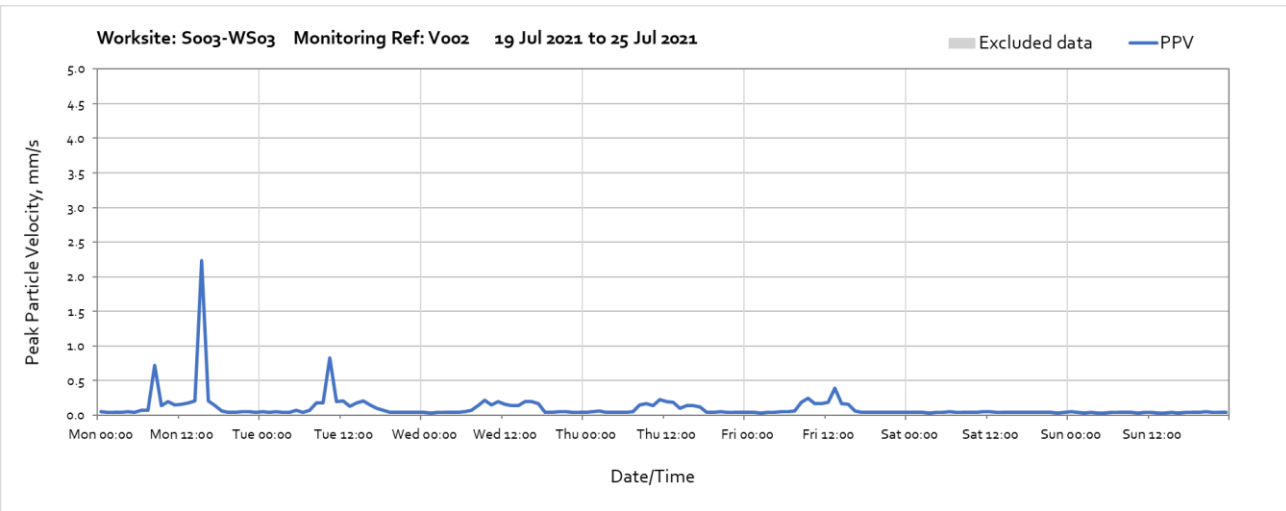
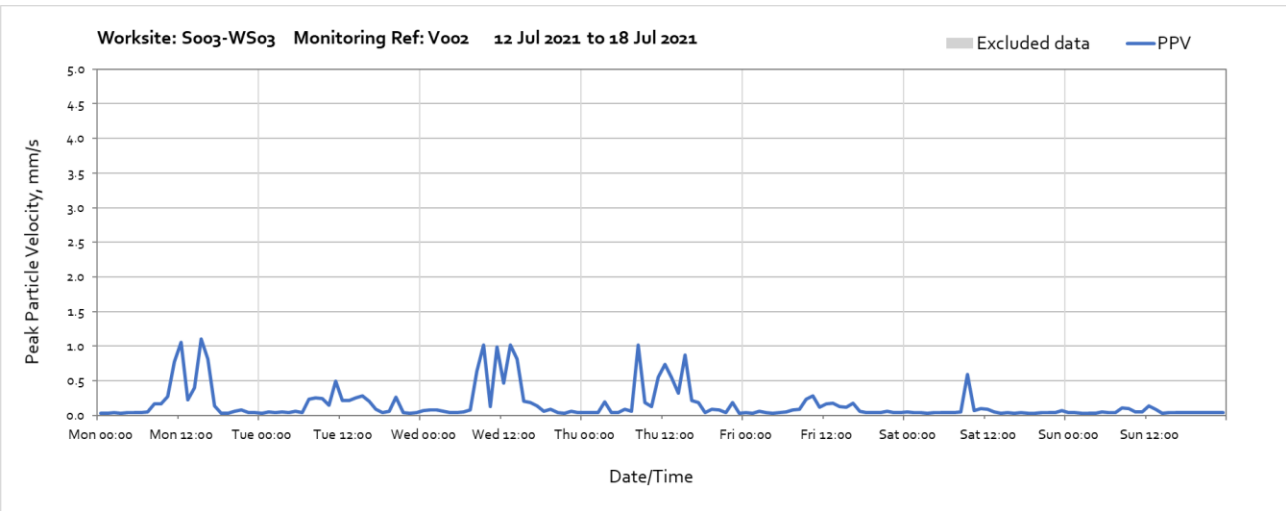
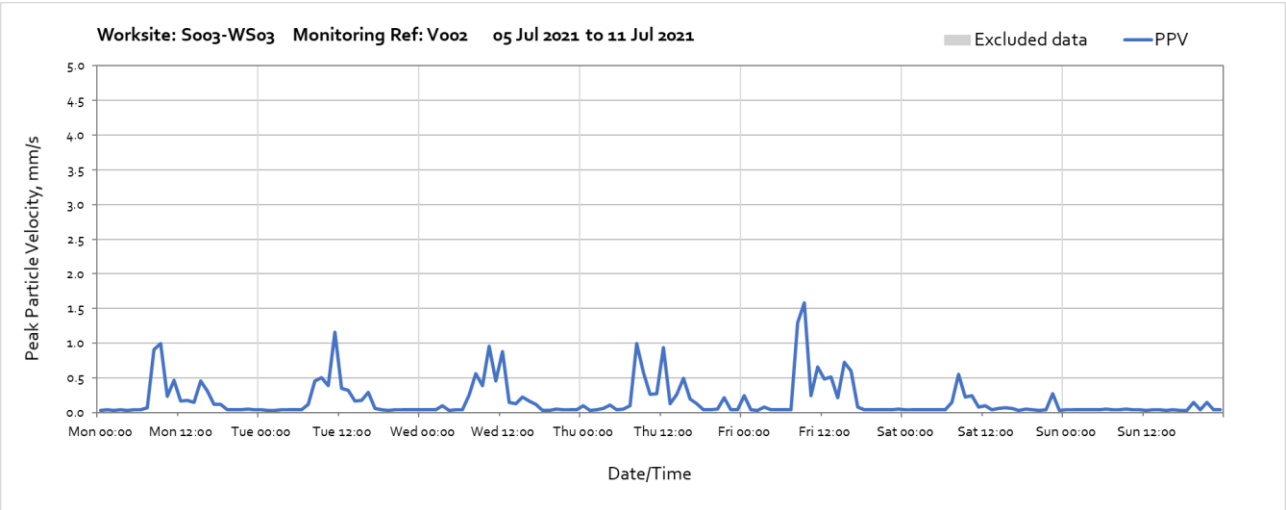
Note: High vibration levels measured throughout the week were due localised vibraton events near to the monitor and are not representative of HS2 vibration levels at the receptor.

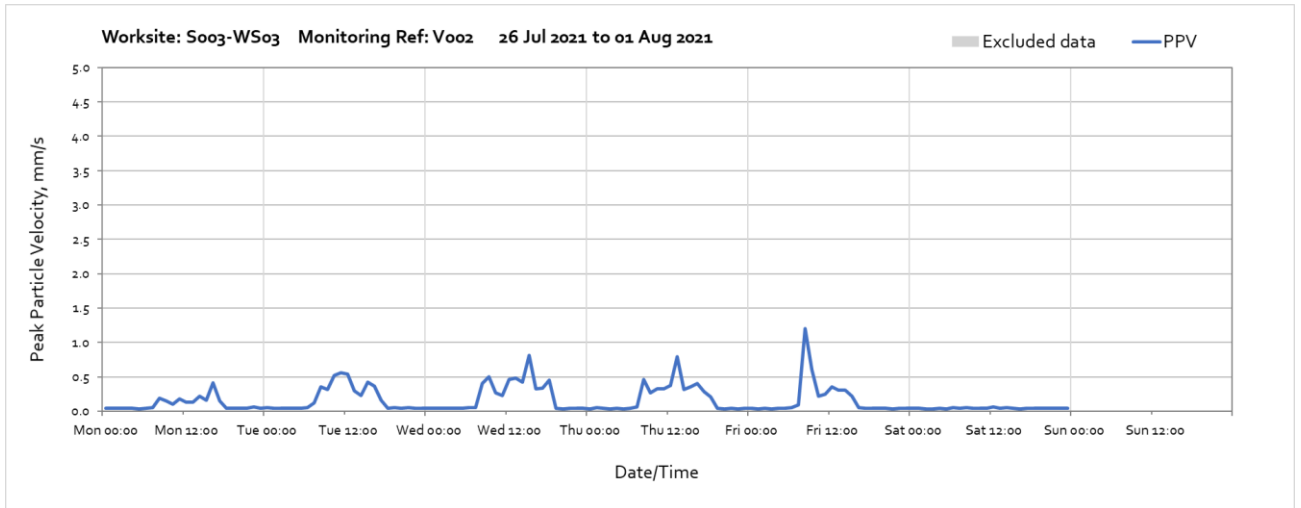


Note: High vibration levels measured throughout the week were due localised vibraton events near to the monitor and are not representative of HS2 vibration levels at the receptor.

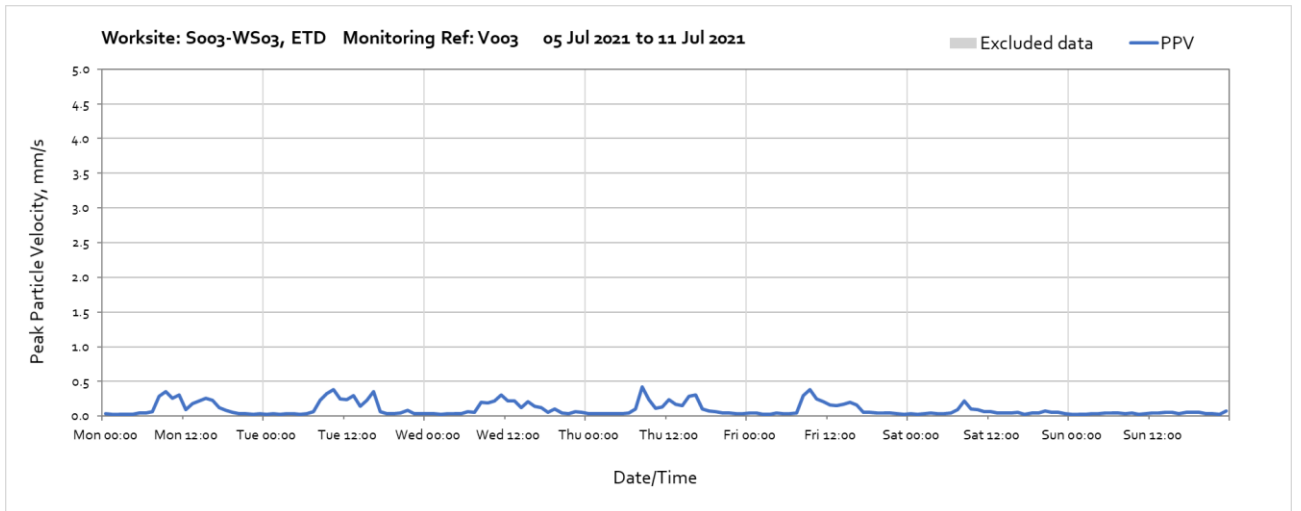
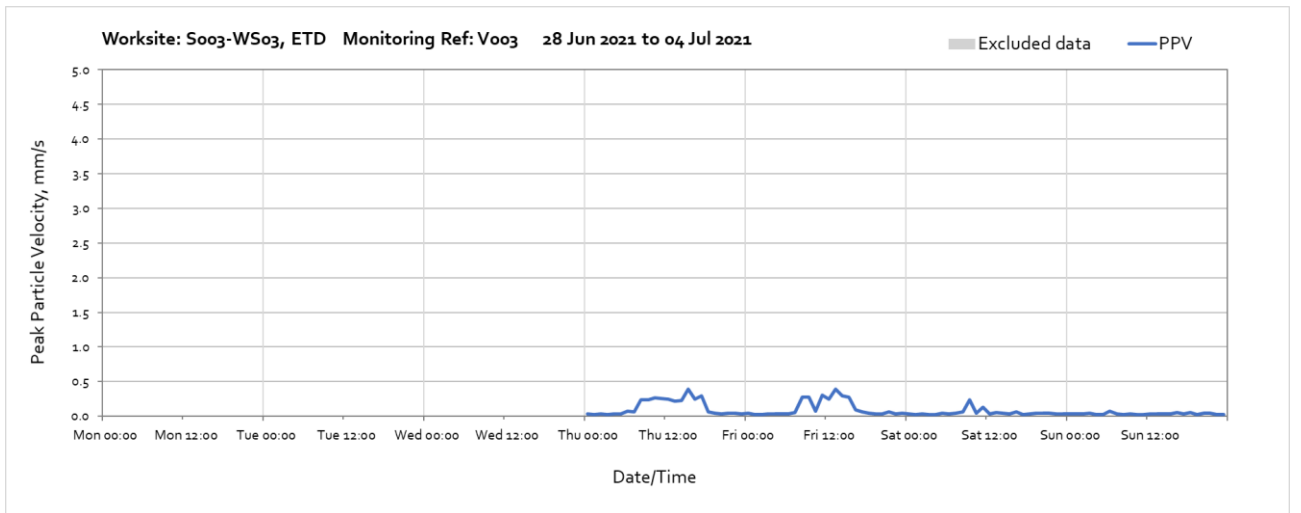
Worksite: S003-WS03 – Monitoring Ref: V002

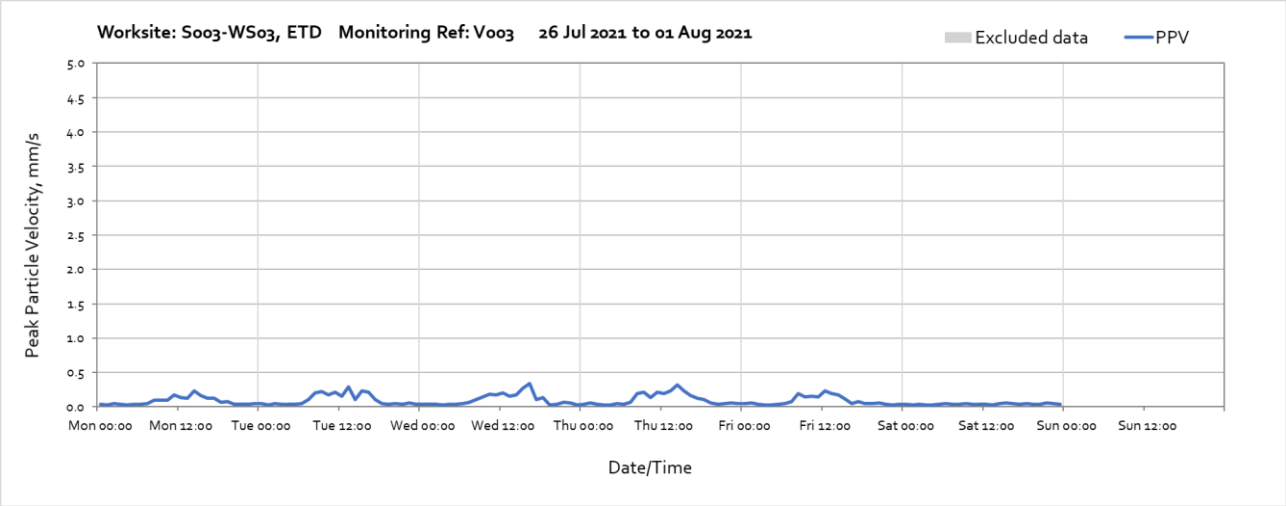
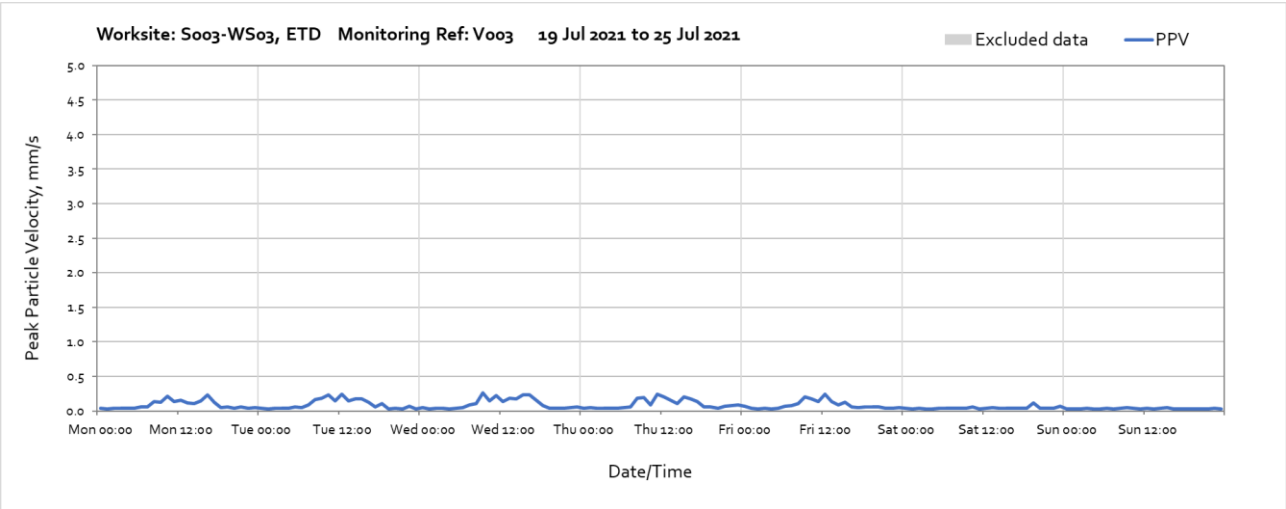
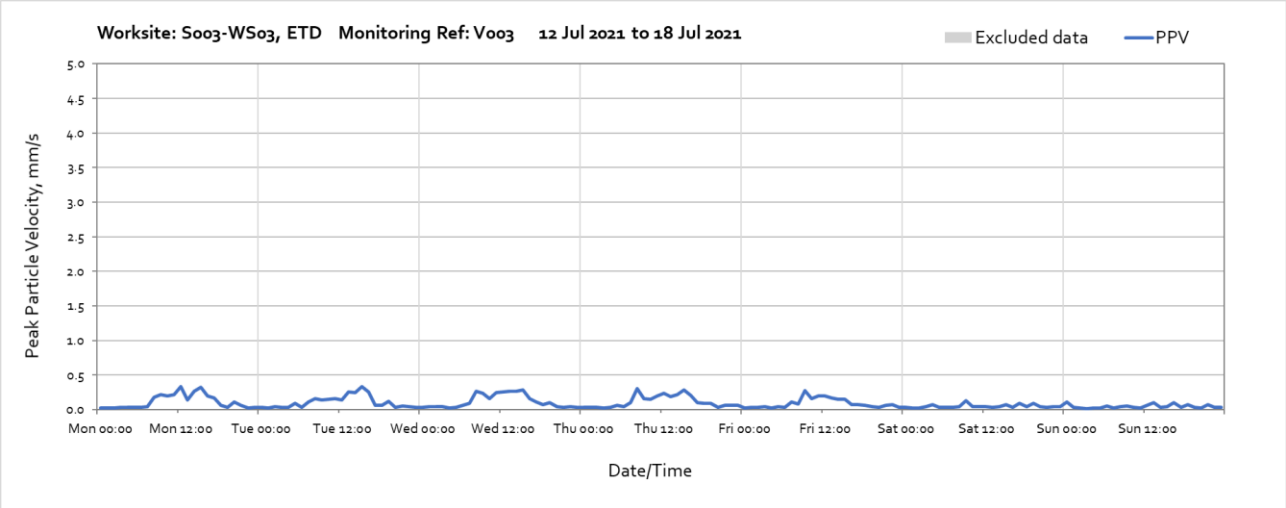




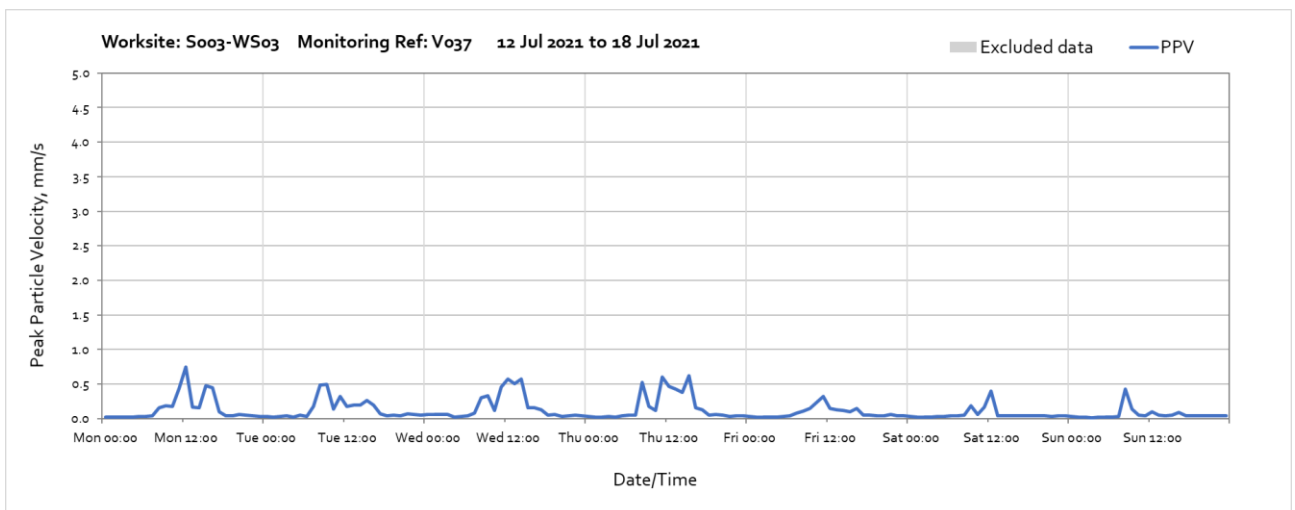
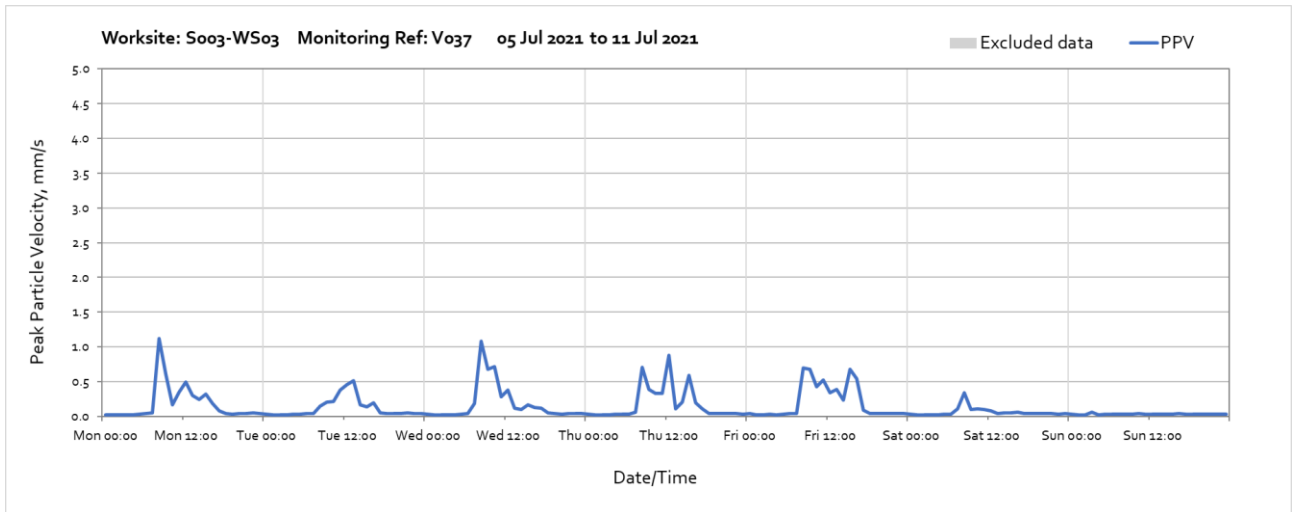
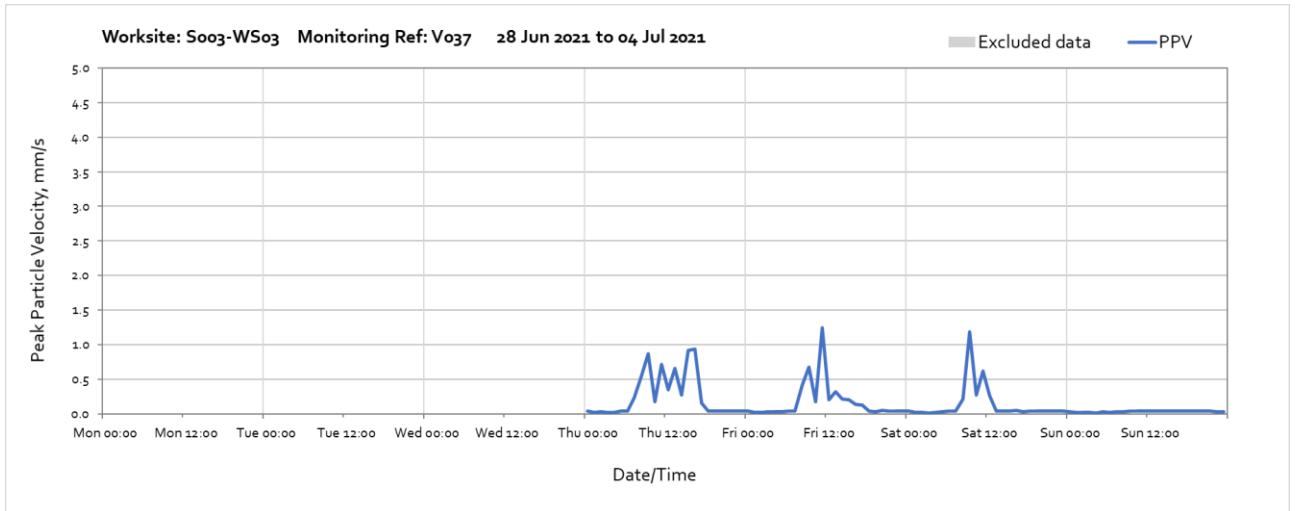


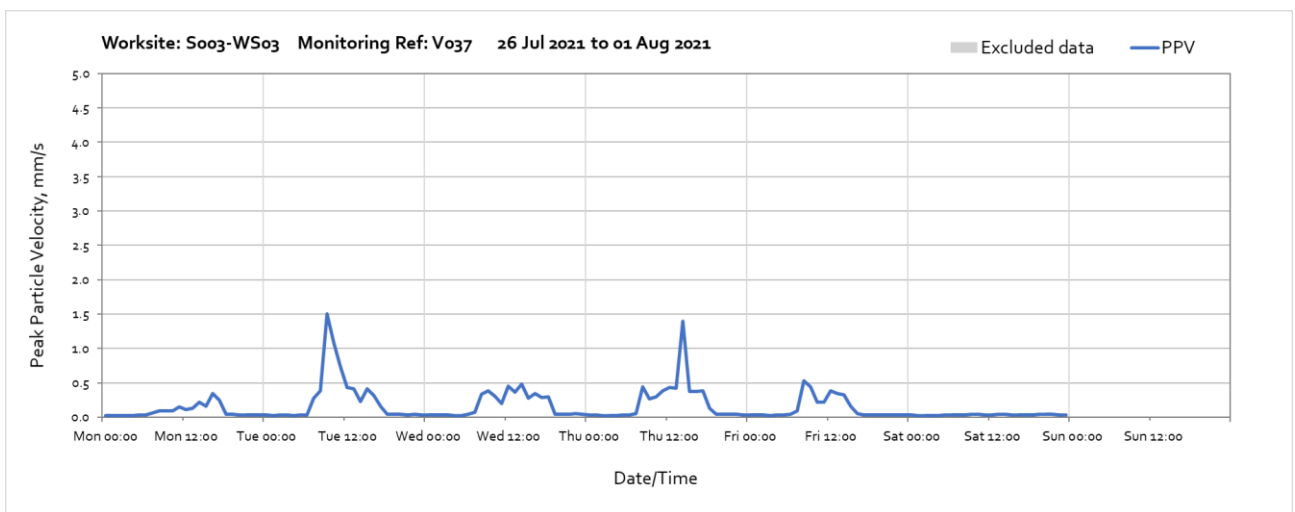
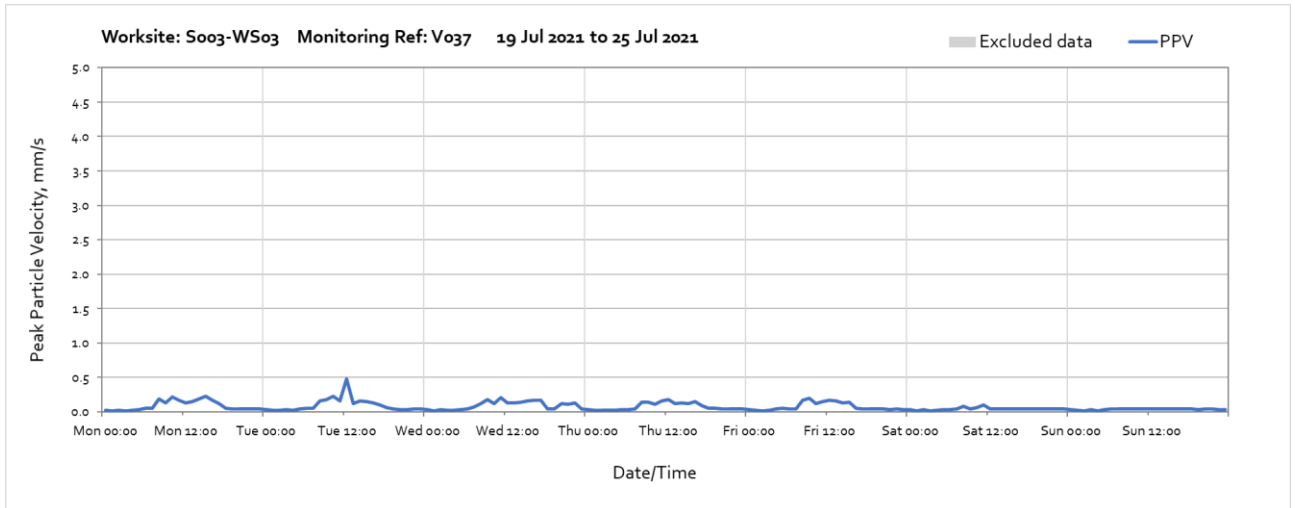
Worksite: S003-WS03, ETD – Monitoring Ref: V003



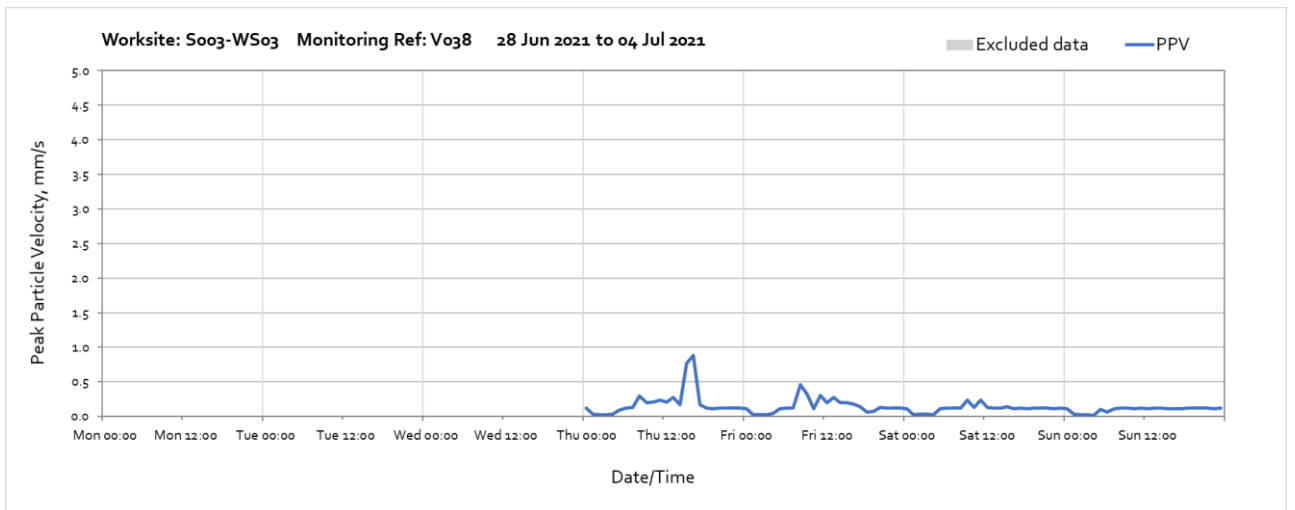


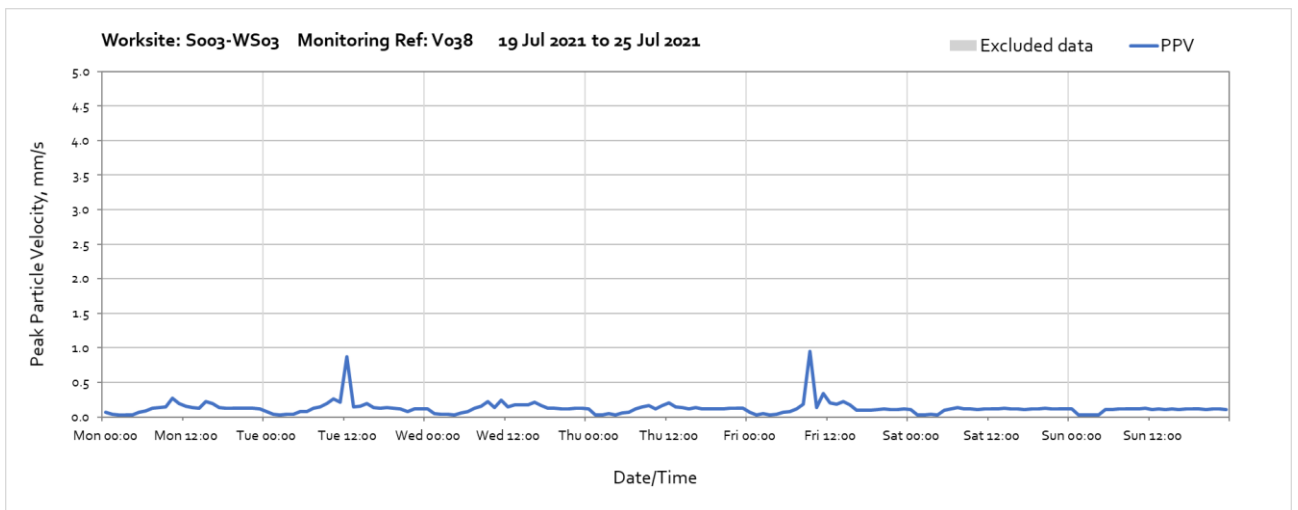
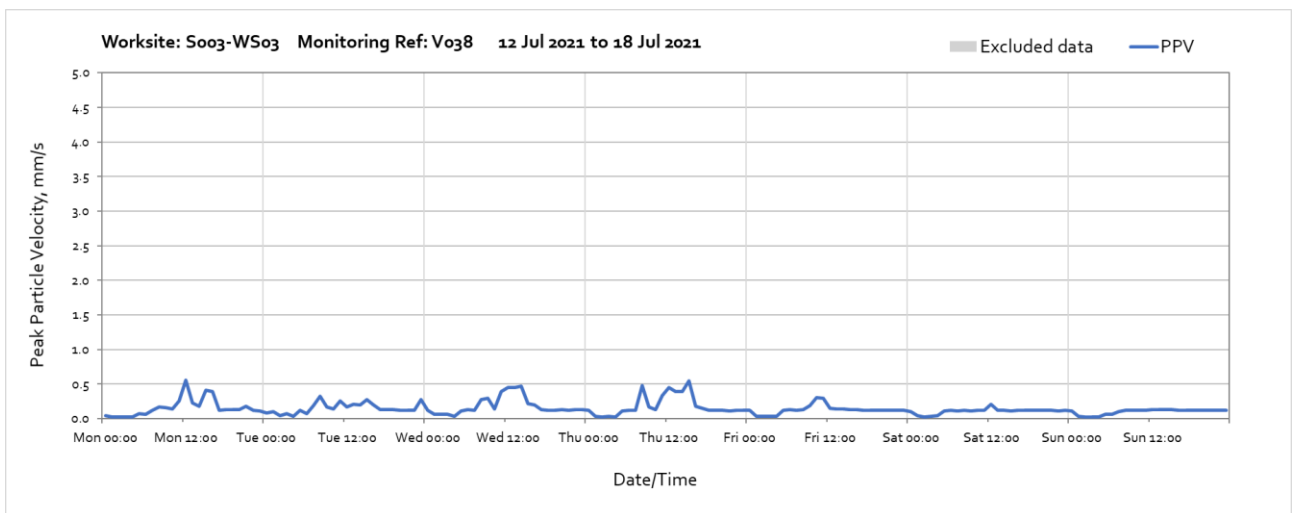
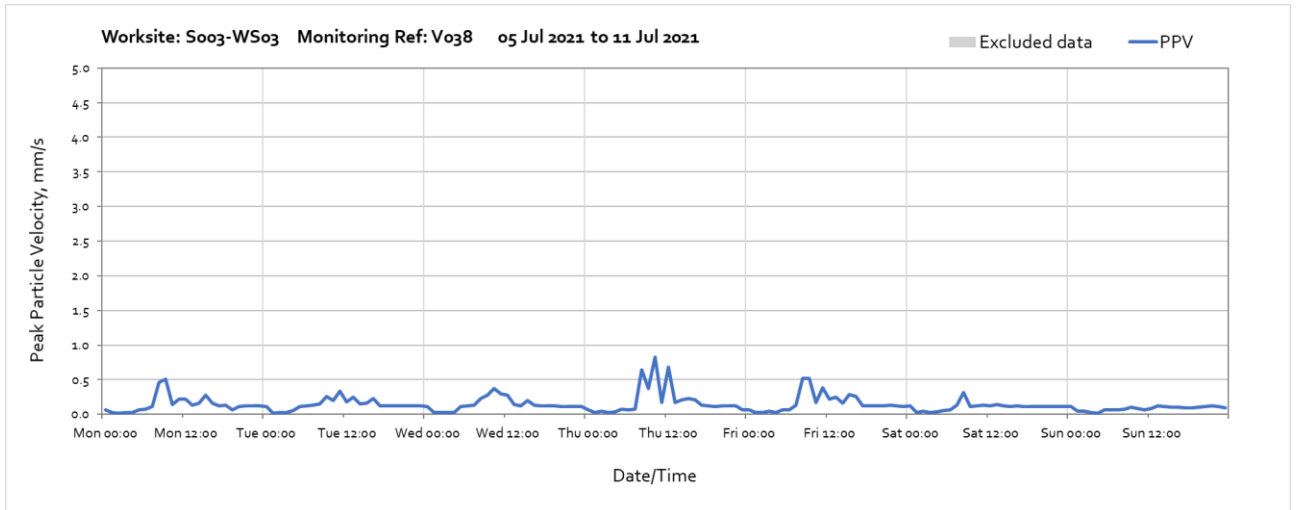
Worksite: S003-WS03 – Monitoring Ref: V037

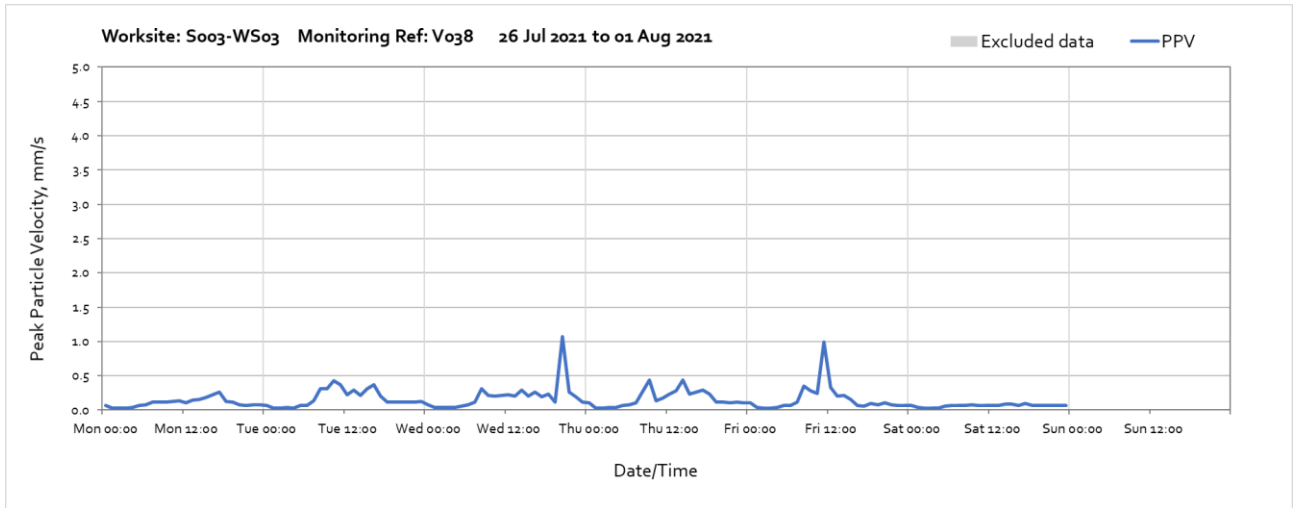




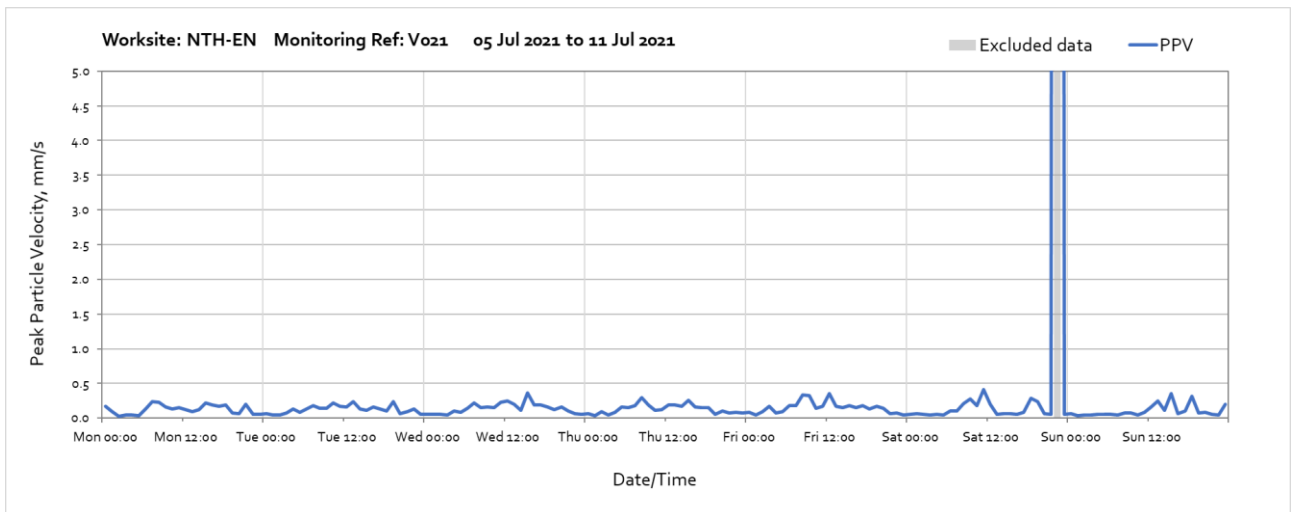
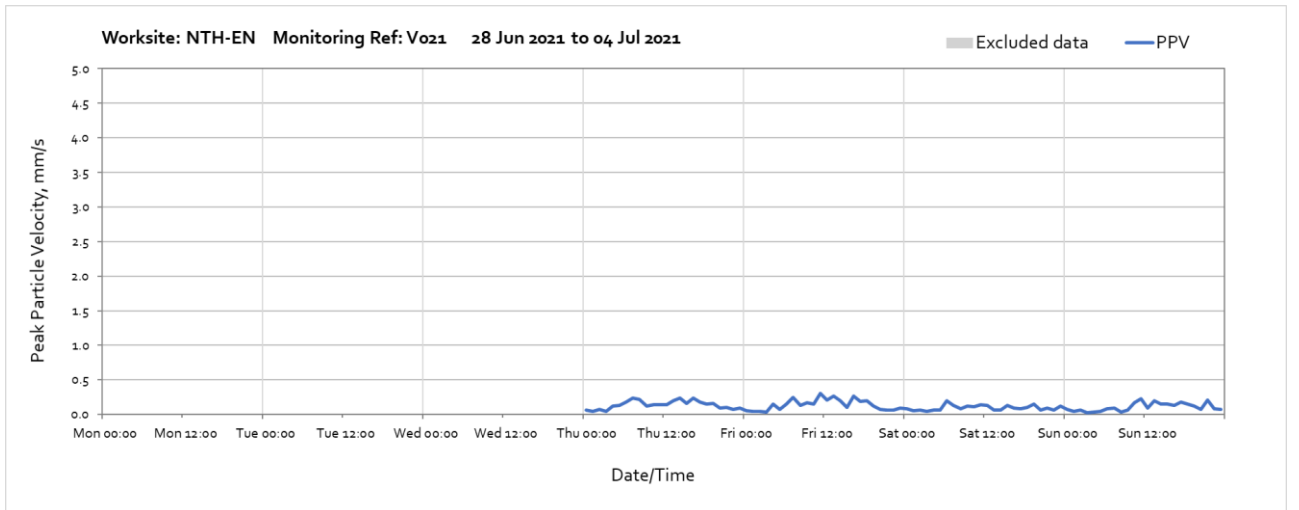
Worksite: S003-WS03 – Monitoring Ref: V038



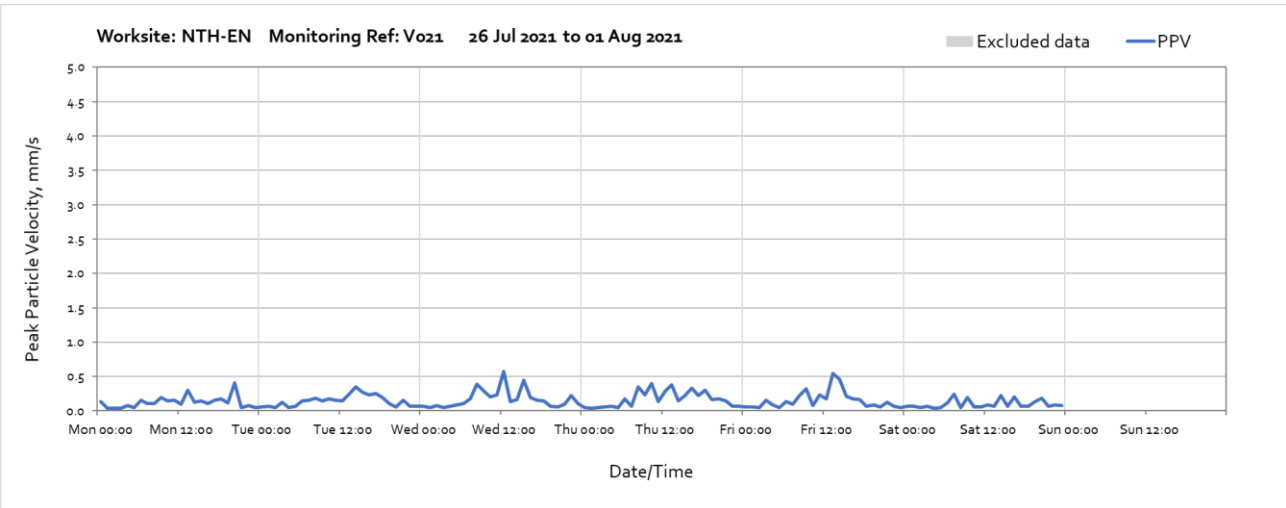
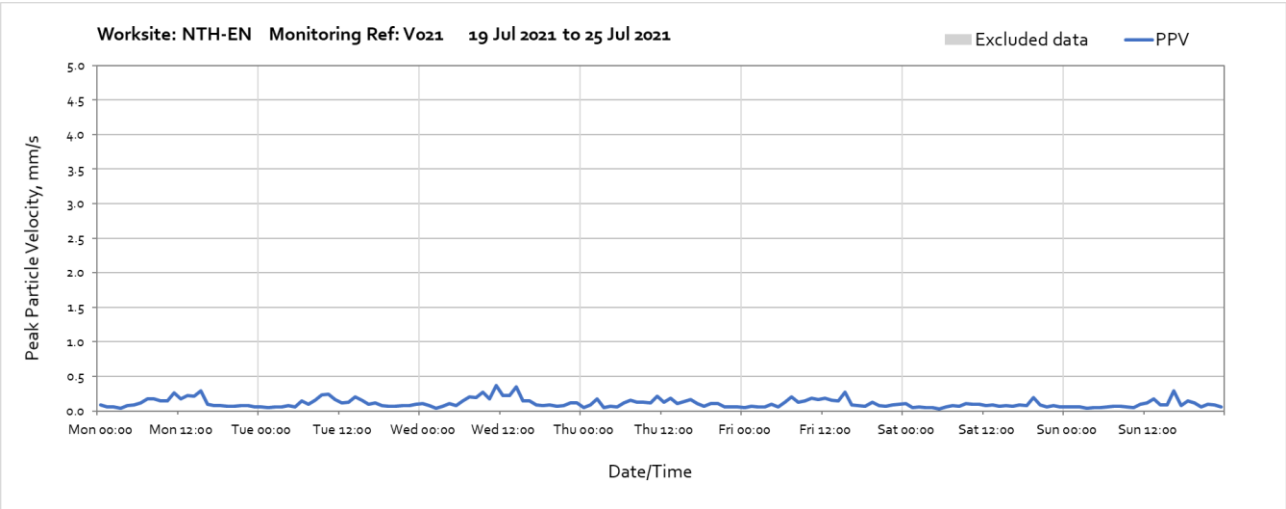
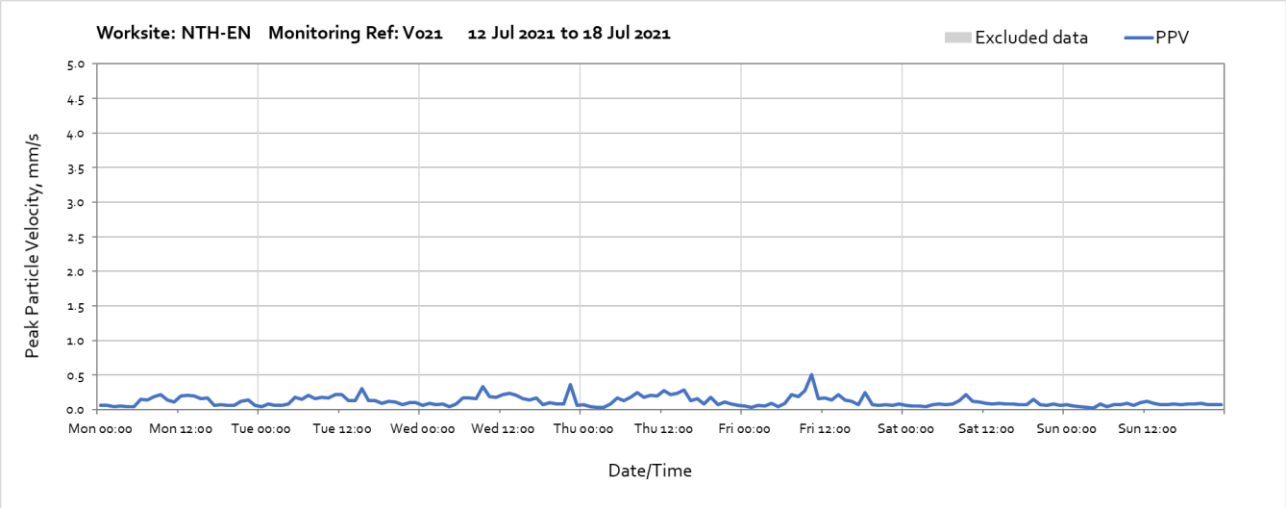




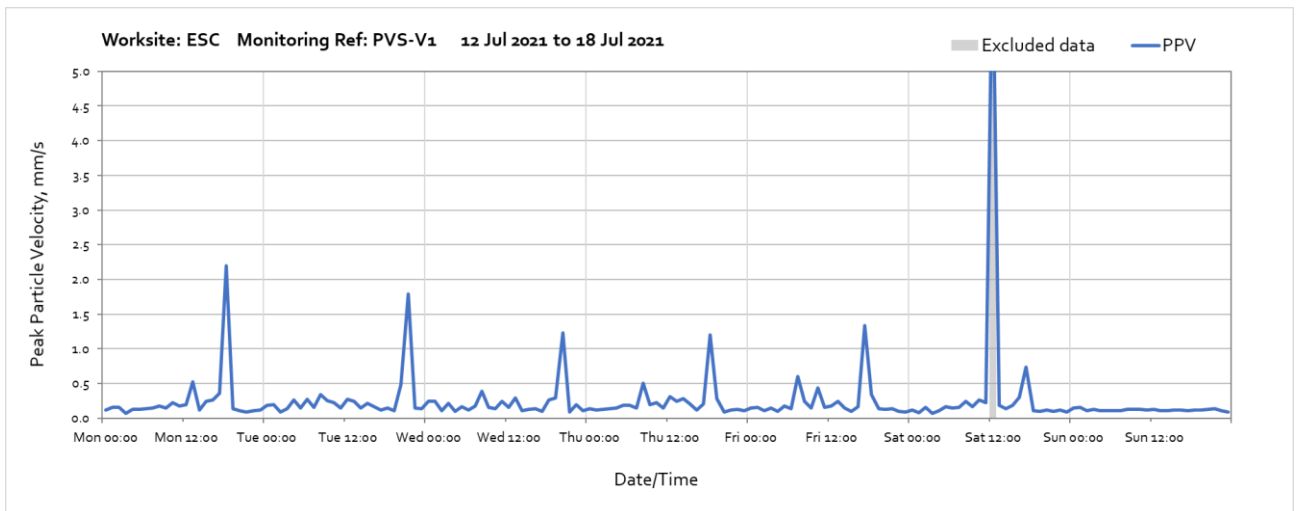
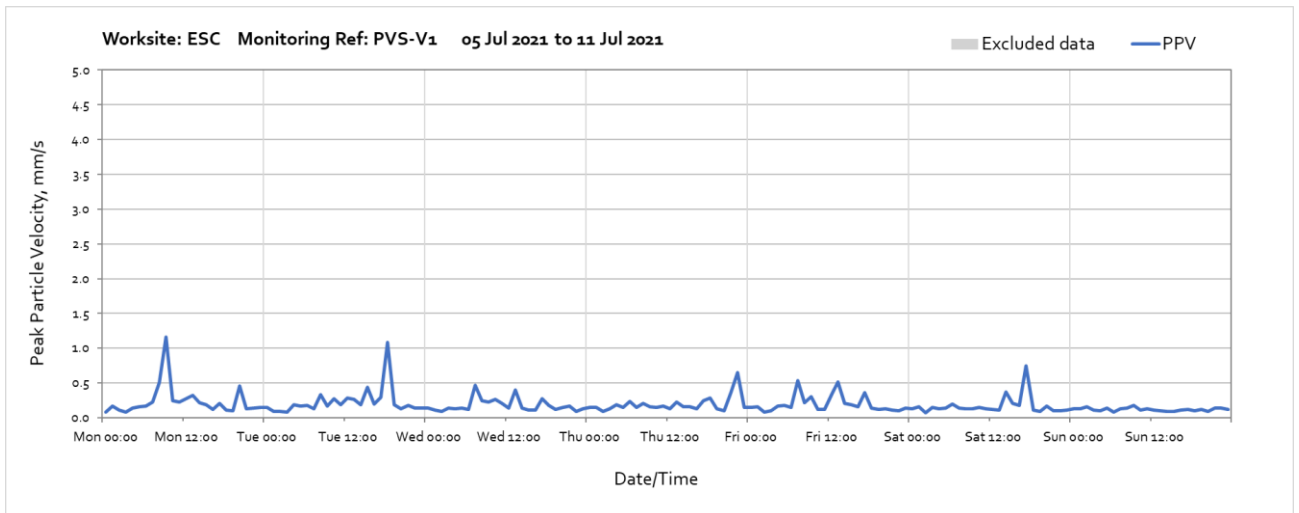
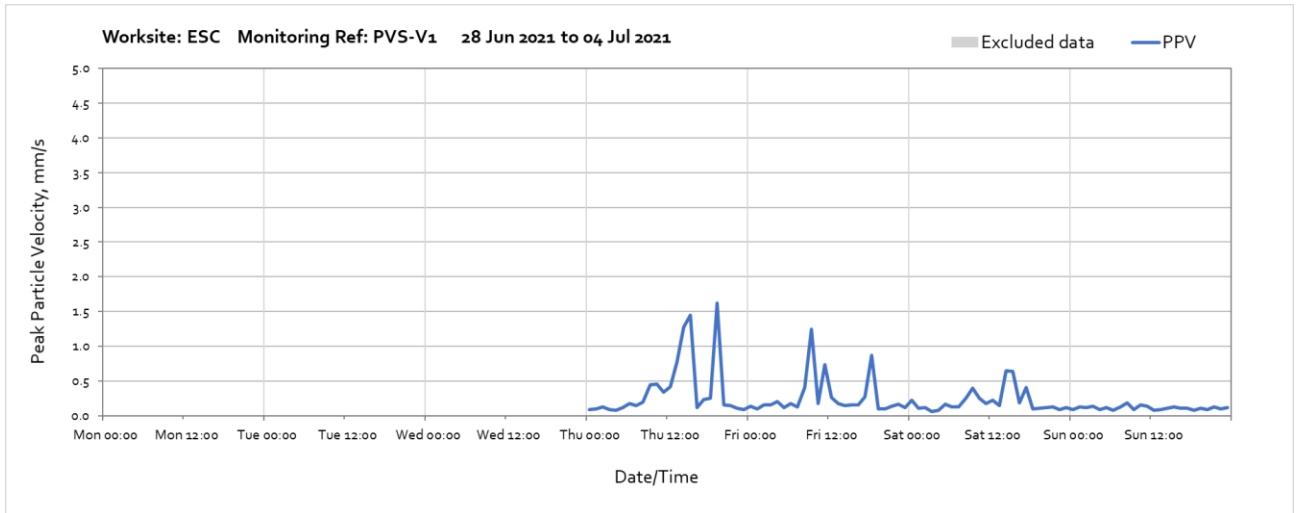
Worksite: NTH-EN - Monitoring Ref: V021



Note: High vibration levels measured from 22:00 until 23:00 on Saturday 10th July were due local interference of the monitor and are not representative of HS2 vibration levels.

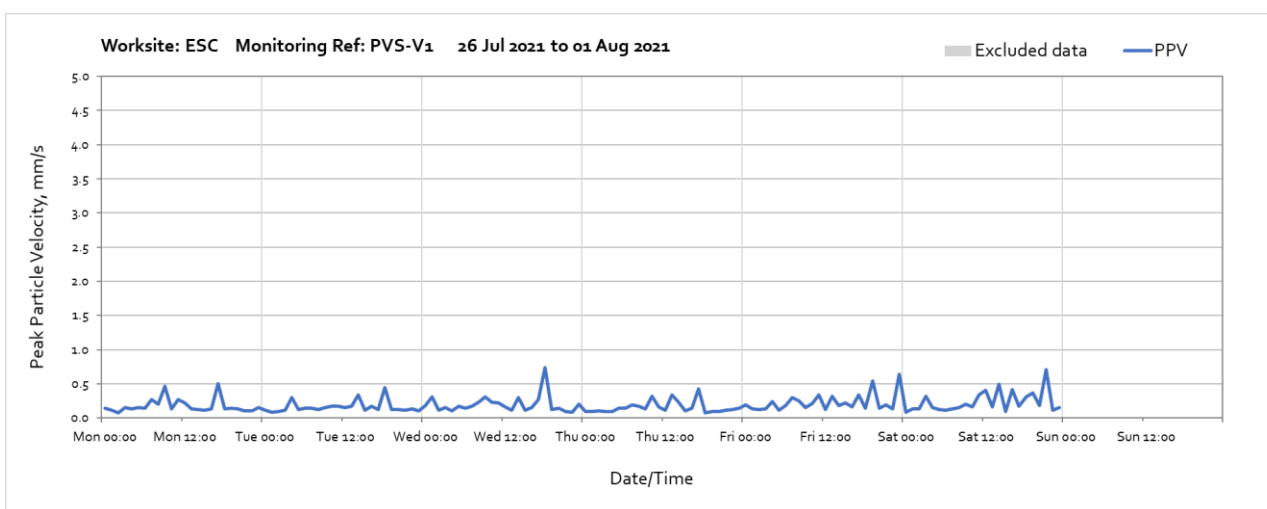
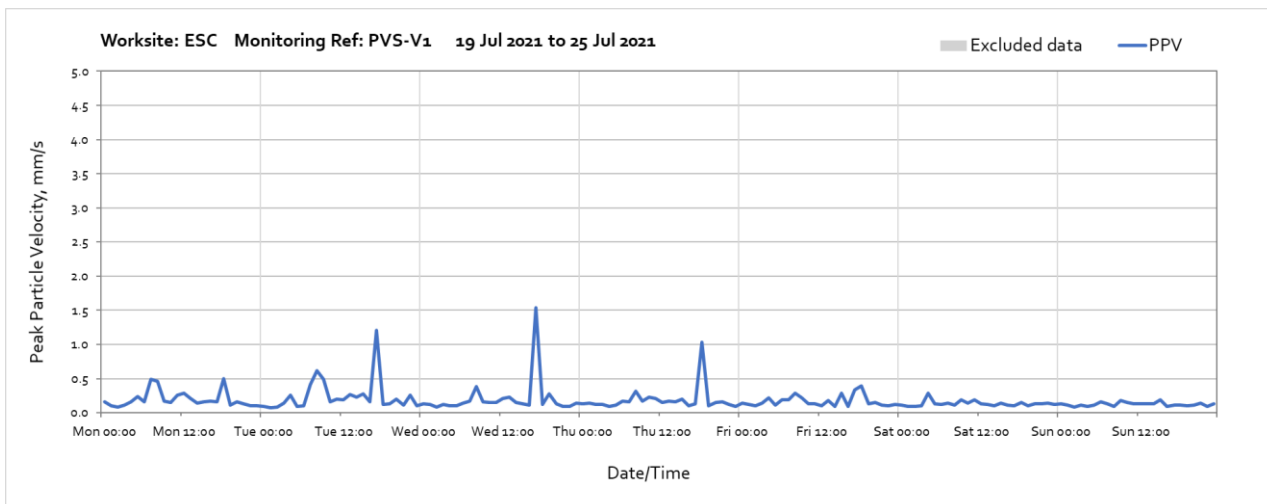


Worksite: ESC - Monitoring Ref: PVS-V1

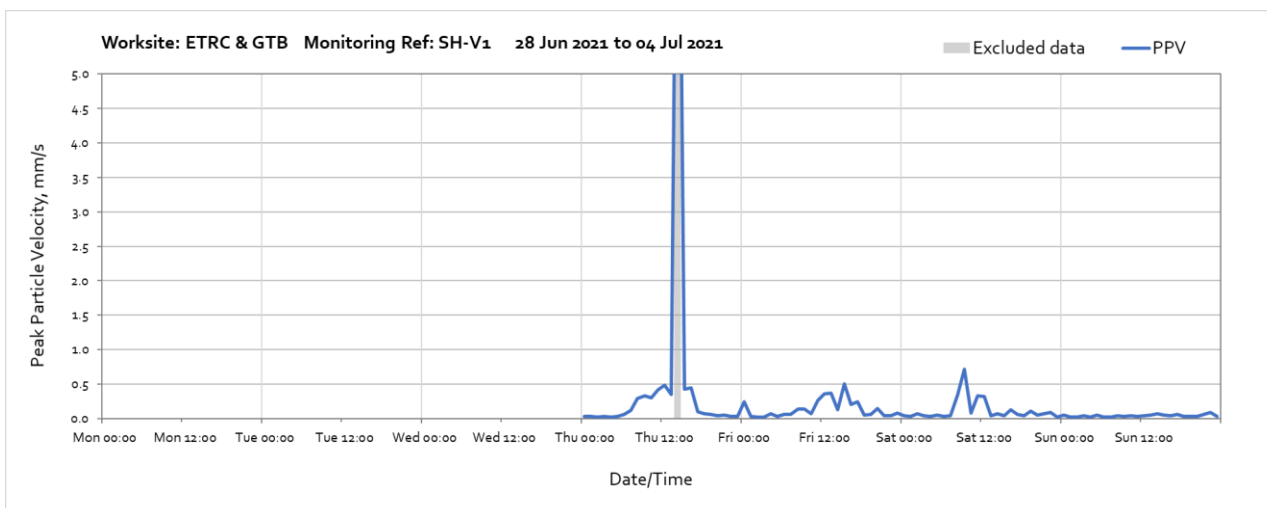


Note: High vibration levels measured from 12:00 until 13:00 on Saturday 17th July were due to a localised vibraton event near to the monitor and are not representative of HS2 vibration levels at the receptor.

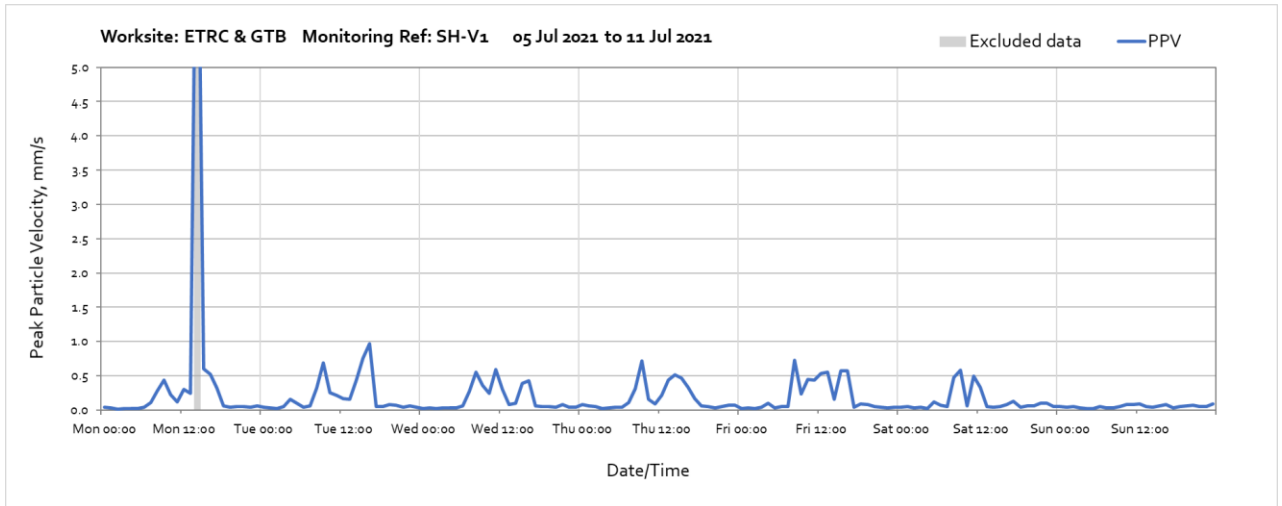
OFFICIAL



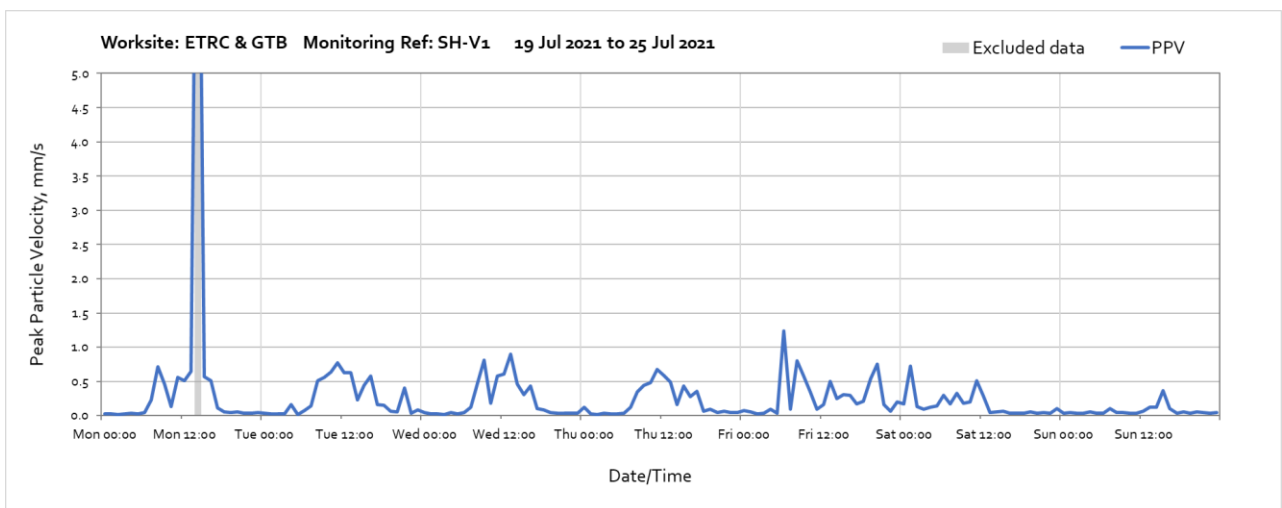
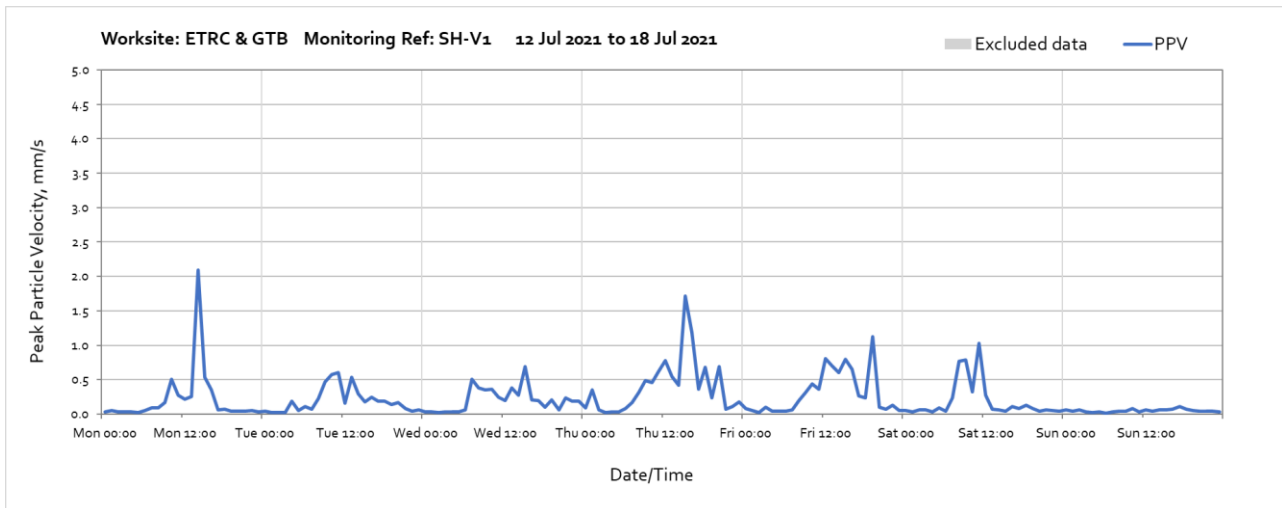
Worksite: ETRC & GTB – Monitoring Ref: SH-V1



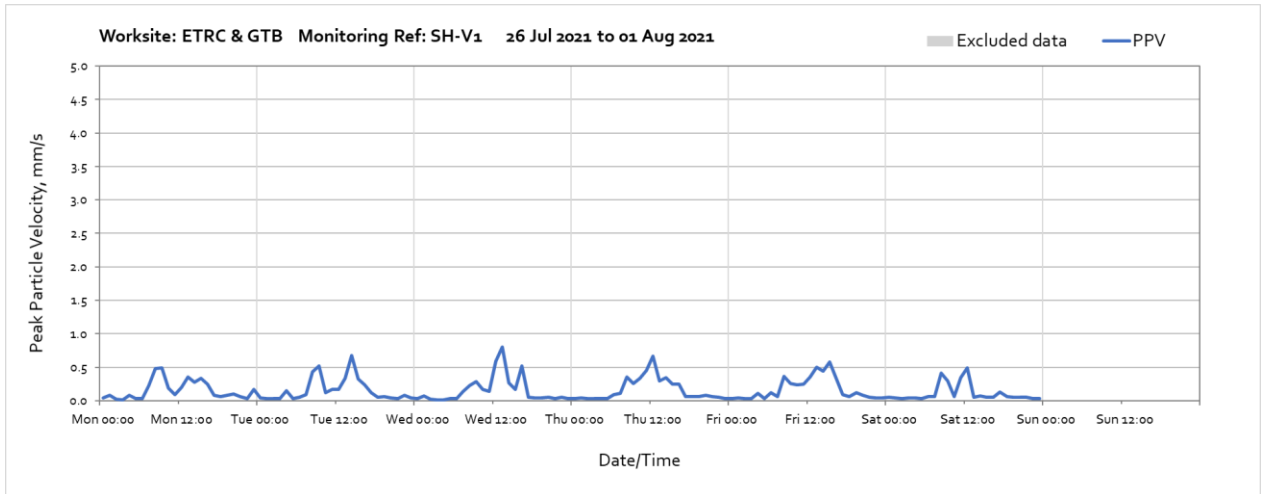
Note: High vibration levels measured from 14:00 until 15:00 on Thursday 1st July were due to a localised vibraton event near to the monitor and are not representative of HS2 vibration levels at the receptor.



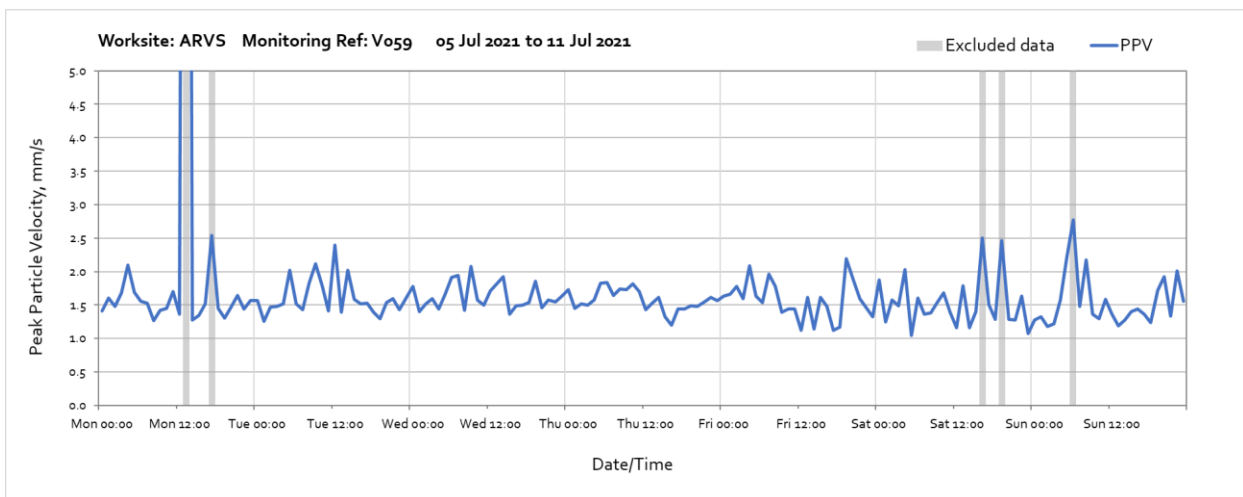
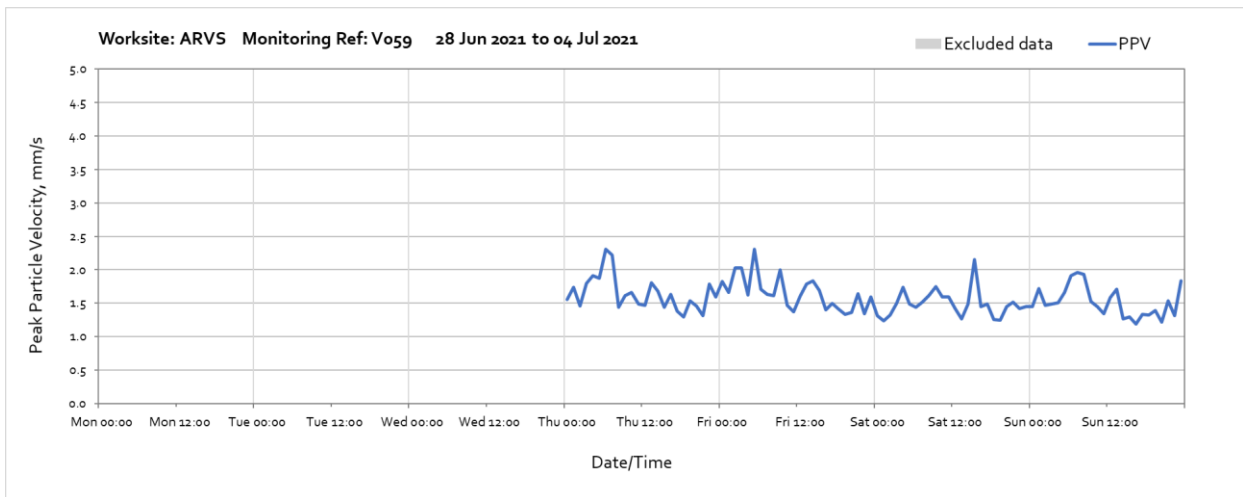
Note: High vibration levels measured from 14:00 until 15:00 on Monday 5th July were due to a localised vibraton event near to the monitor and are not representative of HS2 vibration levels at the receptor.



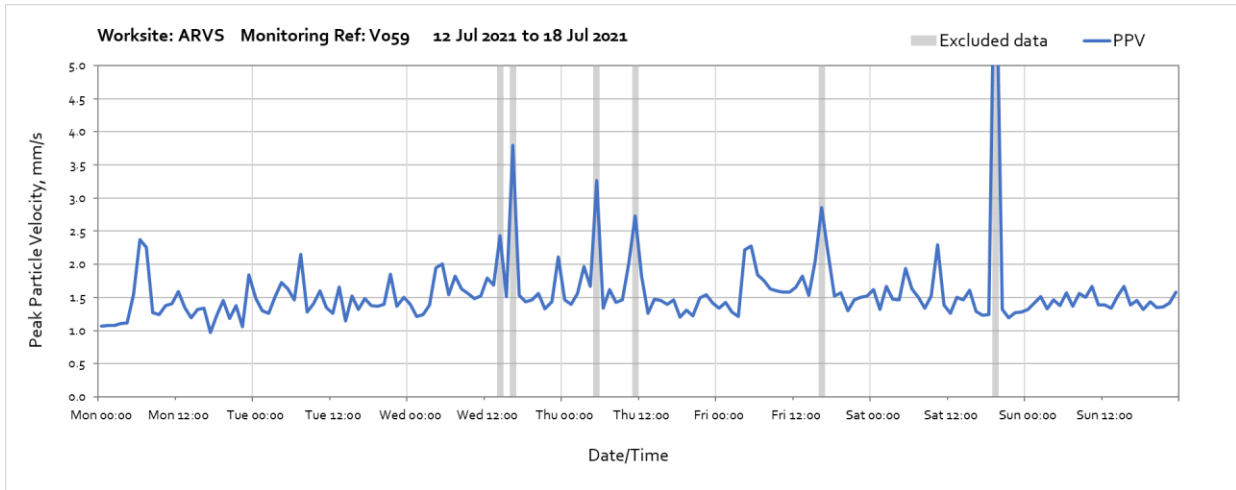
Note: High vibration levels measured from 14:00 until 15:00 on Monday 19th July were due to a localised vibraton event near to the monitor and are not representative of HS2 vibration levels at the receptor.



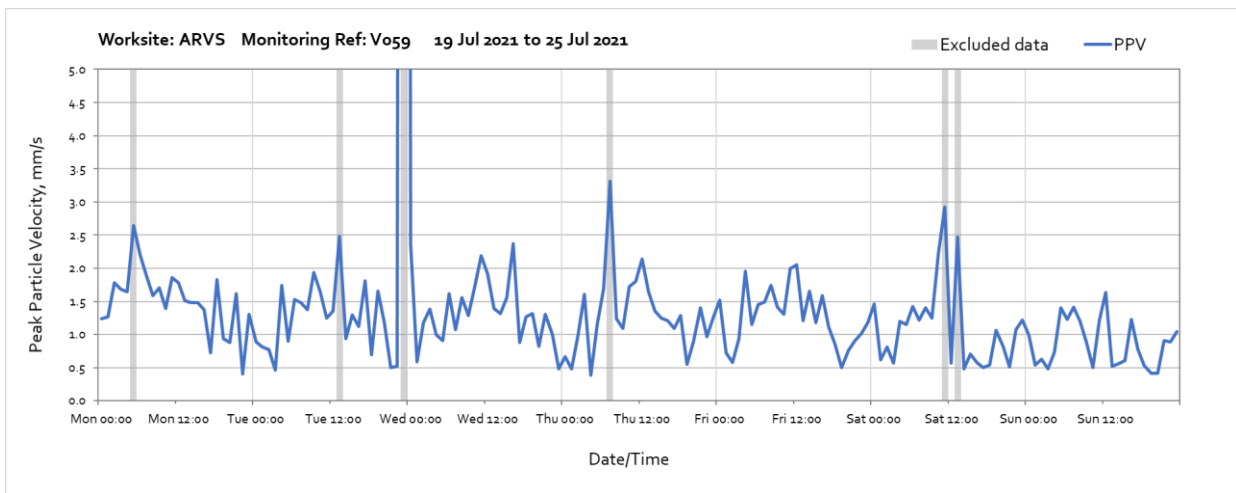
Worksite: ARVS – Monitoring Ref: V059



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



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