

Construction noise and vibration Monthly Report – December 2021

London Borough of Brent

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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 monitoring carried out within the London Borough of Brent (LBB) area during the month of December 2021.

Noise and vibration monitoring were undertaken in the vicinity of the Canterbury Road Vent Shaft worksite (ref: CRVS), where the following activities were underway:

- breaking out of existing slabs for excavation of trenches;
- excavation, installation of pipework, backfilling and reinstatement for water line;
- installation of new front gates;
- construction works for muck bin;
- concreting sections of working platform;
- concrete blinding;
- extending of ducts for silo;
- pulling cable through ducts for silos;
- pouring of sections of silo base slab;
- completion of drainage channels for silos;
- work set up for shaft sinking operations;
- deliveries for shaft sinking segments;
- shaft sinking construction;
- removal of site generators;
- removal of concrete generator slab and casting replacement section; and
- installation of borehole for inclinometer;

There was six (6) exceedances of 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>), during the reporting period.

There was one (1) exceedance of trigger levels as defined in Section 61 consents during the reporting period at the measurement positions.

No complaints were received during the monitoring period.

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 (+3 dB) sound level than it would be if the reflecting surface was not there.
Free-field	A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
Peak particle velocity, or PPV	Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position. The PPV is a simple indicator of perceptibility and risk of damage to structures due to vibration. It is usually measured in mm/s.
SOAEL	Significant Observed Adverse Effect Level - the level above which significant adverse effects on health and quality of life occur.
Sound pressure level	The parameter by which sound levels are measured in air. It is measured in decibels. The threshold of hearing has been set at 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB at a distance of 1 metre and a change of 3dB in a time varying sound signal is commonly regarded as being just detectable. A change of 10dB is subjectively twice, or half, as loud.
Vibration dose value, or VDV	An index used to evaluate human exposure to vibration in buildings. While the PPV provides information regarding the magnitude of single vibration events, the VDV provides a measure of the total vibration experienced over a specified period of time (typically 16h daytime and 8h night-time). It takes into account the magnitude, the number and the duration of vibration events and can be used to quantify exposure to continuous, impulsive, occasional and intermittent vibration. The vibration dose value is measured in m/s ^{1.75} .

1 Introduction

1.1.1 HS2 is required to undertake noise (and vibration) monitoring as necessary to comply with the requirements of the High Speed Rail (London-West Midlands) Environmental Minimum Requirements, including specifically Annex 1: Code of Construction Practice, in addition to any monitoring requirements arising from conditions imposed through consents under Section 61 of the Control of Pollution Act, 1974 or through Undertakings & Assurances given to third parties. Such monitoring may be undertaken for the following purposes:

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

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

1.1.3 There was one active construction site in the local authority area, where monitoring was undertaken, during this period:

- Canterbury Road Vent Shaft worksite ref.: CRVS (see plan 1 in Appendix A), where work activities included:
 - breaking out of existing slabs for excavation of trenches for Thames Water permanent water line;
 - excavation, installation of pipework, backfilling and reinstatement for water line;
 - installation of new front gates;
 - poured and completed muck bin concrete slab and construction works for muck bin;
 - concreting sections of working platform in western part of site;
 - concrete blinding for northern batter between sheet piled wall and shaft site;

- extending of ducts for silo between plinth and welfare cabin for cable install;
- pulling cable through ducts for silos;
- pouring of sections of silo base slab;
- completion of drainage channels for silos;
- continuation of work set up for shaft sinking operations;
- deliveries for shaft sinking segments;
- shaft sinking construction including excavation and installation of segments;
- removal of site generators;
- removal of concrete generator slab and casting replacement section of working platform; and
- installation of borehole for inclinometer;

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 Three noise and one vibration monitoring installations were active in December in the LBB area. Table 2 summarises the positions of the noise and vibration monitoring installations within the LBB area in December 2021.

1.2.2 The noise monitor N055 was relocated on 6th December 2021 to a new position.

1.2.3 The noise monitor N053 was moved at the beginning of December 2021 to be a few meters away from old position.

1.2.4 A map showing the positions of the noise monitoring installations is presented in Appendix B.

Table 2: Monitoring Location

Worksite Reference	Measurement Reference	Address
CRVS	N053	St Mary's Catholic Primary School, Canterbury Road, London
	N054	Canterbury House, Canterbury Road, London
	N055_Old	Carlton House, Canterbury Terrace, London
	N055_New	Carlton House, Canterbury Terrace, London
	V061	St Mary's Catholic Primary School, Canterbury Road, London

2 Summary of Results

2.1 Summary of Measured Noise Levels

2.1.1 Table 3 presents a summary of the measured noise levels at the monitoring location over the reporting period. The $L_{Aeq,T}$ is presented for each of the relevant time periods averaged over the calendar month, along with the highest single period $L_{Aeq,T}$ that was found to occur within the month.

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

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekday Average L _{Aeq,T} (highest day L _{Aeq,T})					Saturday Average L _{Aeq,T} (highest day L _{Aeq,T})					Sunday / Public Holiday Average L _{Aeq,T} (highest day L _{Aeq,T})	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
CRVS	N053	St Mary's Catholic Primary School, Canterbury Road, London	Free-field	57.0 (60.4)	64.0 (70.7)	57.6 (60.0)	57.2 (60.0)	53.1 (58.1)	54.3 (58.4)	58.8 (66.5)	52.1 (57.1)	56.4 (67.5)	47.6 (57.1)	53.4 (59.6)	52.5 (59.0)
	N054	Canterbury House, Canterbury Road, London	Free-field	56.3 (60.5)	64.1 (73.9)	57.0 (59.5)	56.6 (60.5)	52.0 (59.9)	53.6 (57.8)	58.9 (66.1)	52.0 (56.8)	56.1 (67.7)	46.0 (56.5)	53.0 (59.2)	49.2 (58.2)
	N055_Old	Carlton House, Canterbury Terrace, London	Free-field	59.3 (61.4)	60.9 (61.9)	60.3 (60.3)	60.2 (61.7)	54.6 (58.5)	59.6 (59.6)	60.1 (60.1)	58.2 (58.2)	58.8 (59.7)	43.9 (46.2)	59.1 (60.9)	57.5 (60.6)
	N055_New	Carlton House, Canterbury Terrace, London	Free-field	54.5 (58.9)	64.5 (80.6)	54.7 (59.6)	53.8 (56.0)	50.0 (63.3)	51.9 (54.1)	63.9 (71.9)	49.9 (49.9)	54.4 (64.5)	47.3 (57.0)	51.9 (61.1)	47.7 (53.1)

2.1.2 Table 4: Summary of Measured PPV Data over the Monitoring Period 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
CRVS	V061	St Mary's Catholic Primary School, Canterbury Road, London	1.89 (Z-axis)

2.1.3 Appendix C presents graphs of the noise and vibration monitoring data over the month for each of the measurement locations. Noise data presented consists of the hourly L_{Aeq} values and, where relevant, the $L_{Aeq,T}$ values (where the time period T has been taken to be the averaging period as specified in Table 1 of HS2 Information Paper E23). Vibration data presented consist of hourly PPV values. The full data set for the monitoring equipment can be found at the following location:

<https://data.gov.uk/dataset/24542ae7-dd44-444f-b259-871c4cc43b5e/environmental-monitoring-data>.

2.2 Exceedances of the SOAEL

2.2.1 The significant observed adverse effect level (SOAEL) is defined in the 'Planning Practice Guidance – Noise' as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

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

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

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

Table 5: Summary of Exceedances of SOAEL

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
CRVS	N053	St Mary's Catholic Primary School, Canterbury Road, London	All days	All periods	No exceedance
	N054	Canterbury House, Canterbury Road, London	All days	All periods	No exceedance
	N055_Old	Carlton House, Canterbury Terrace, London	All days	All periods	No exceedance
	N055_New	Carlton House, Canterbury Terrace, London	Weekday	08:00-18:00	6

2.2.5 Six (6) exceedances of SOAEL were recorded due to HS2 construction works during December 2021.

2.2.6 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 5 and may be lower than the total sum of individual exceedances reported in Table 6 for each location.

Table 6: Summary of Total Exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
CRVS	N055_New	Carlton House, Canterbury Terrace, London	6

2.2.7 Six (6) exceedances of the SOAEL were recorded due to HS2 construction works during December 2021 due to saw cutting and breaking out of existing slab and subsequent excavation and installation of pipework, backfilling and reinstatement next to Canterbury House.

2.3 Exceedances of Trigger Level

2.3.1 Table 7 provides a summary of exceedances of the Section 61 trigger noise levels determined to be due to HS2 related construction noise measured during the reporting period, along with the findings of any investigation.

Table 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
N/A	CRVS	9/12/2021 08:00 – 18:00	SCS JV Works.	Floor saw being used to cut concrete slab to install a mains water connection. Works within 3 metres of the noise monitor. 80.6 dB $L_{Aeq,10hr}$ measured at the time of trigger alert. Noise levels at nearby receptors were compliant with Section-61 trigger levels due to the distance between monitor and nearby receptors.	Works stopped immediately after exceedance and the issue was raised with site foreman.

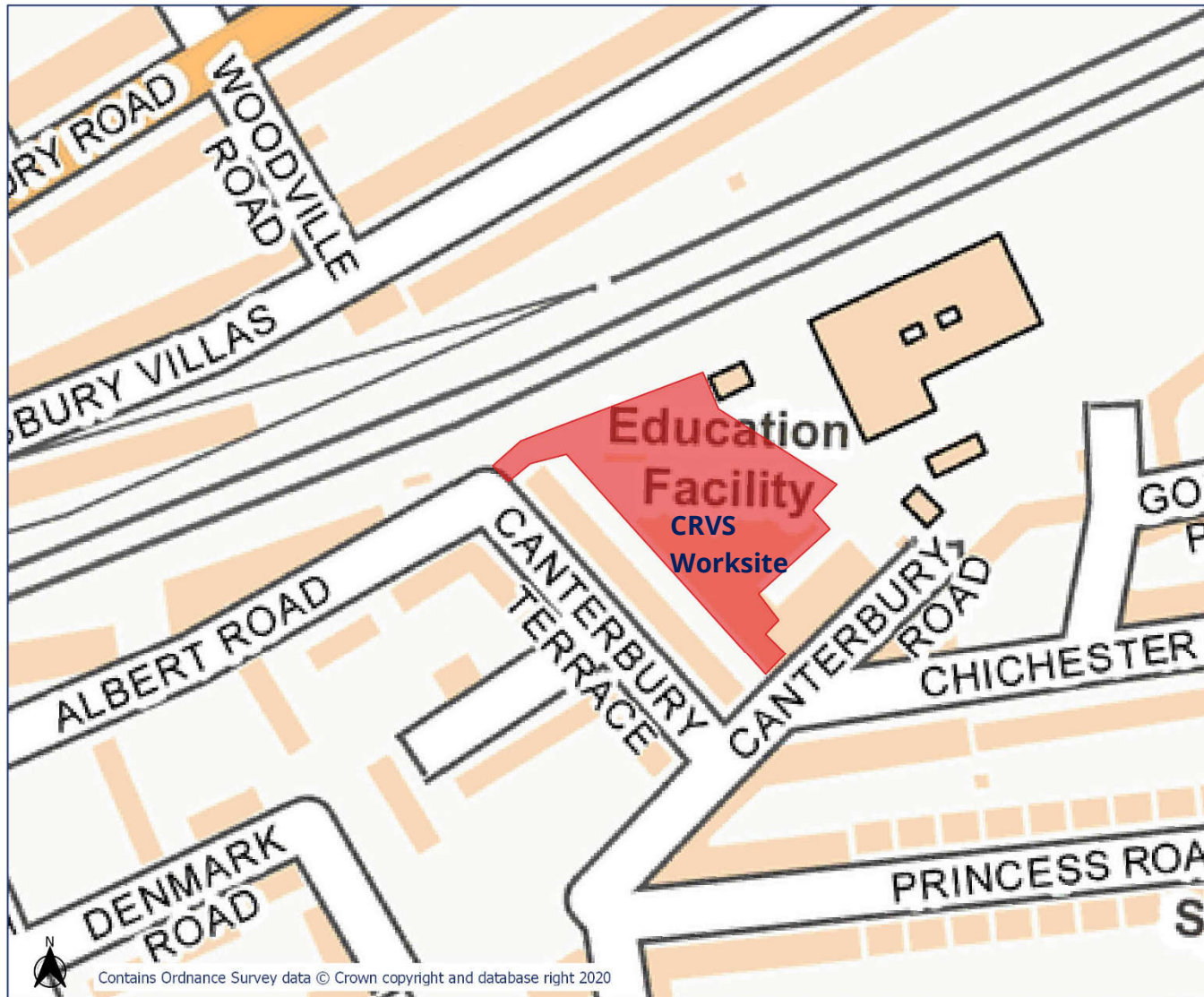
2.4 Complaints

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

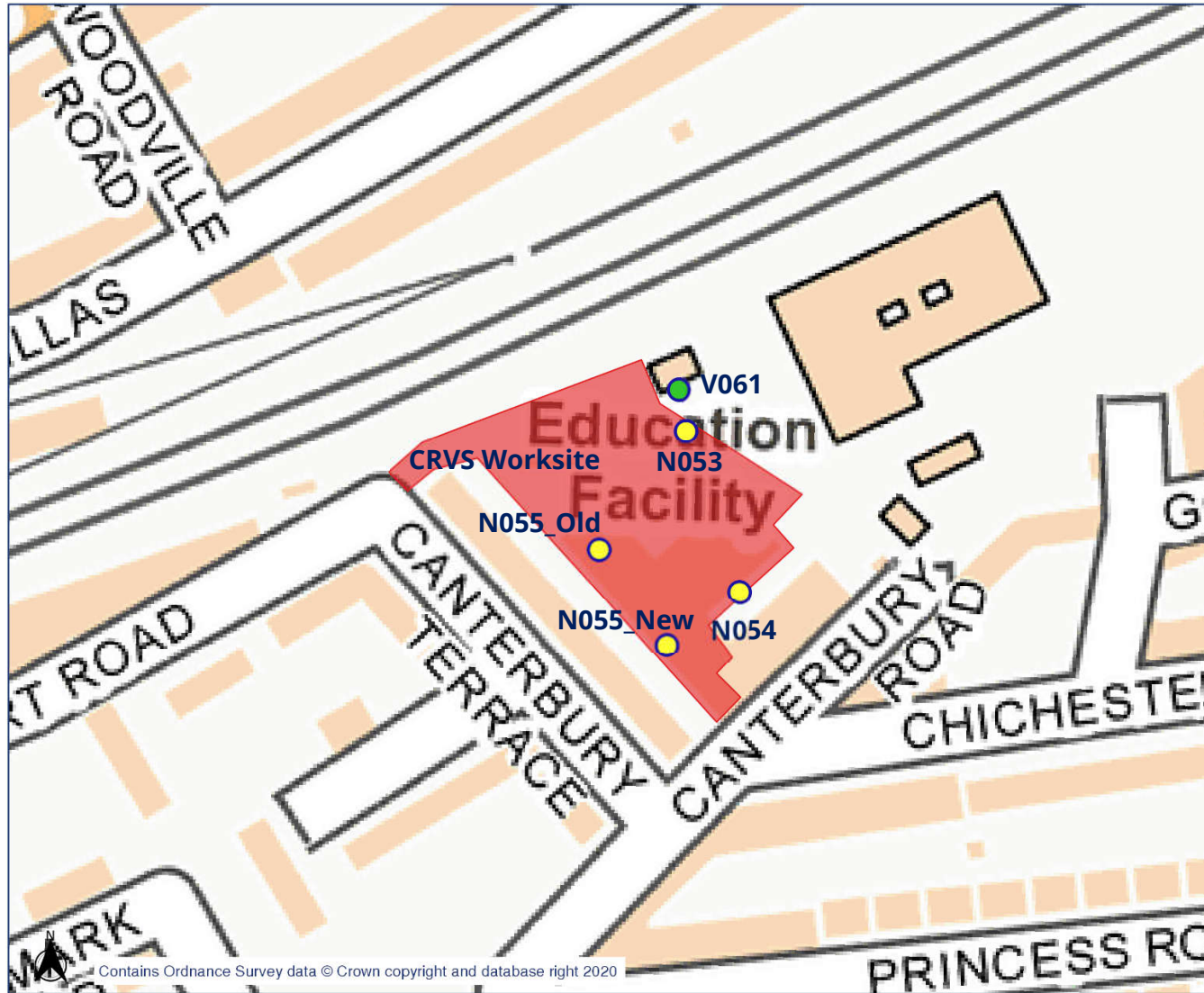
Table 8: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
-	-	-	-	-

Appendix A Site Locations



Appendix B Monitoring Locations

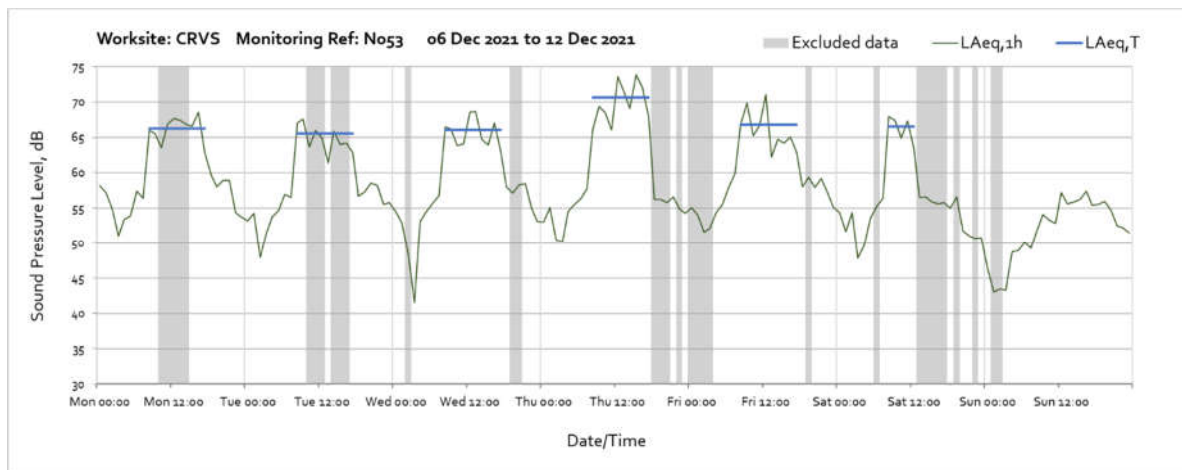
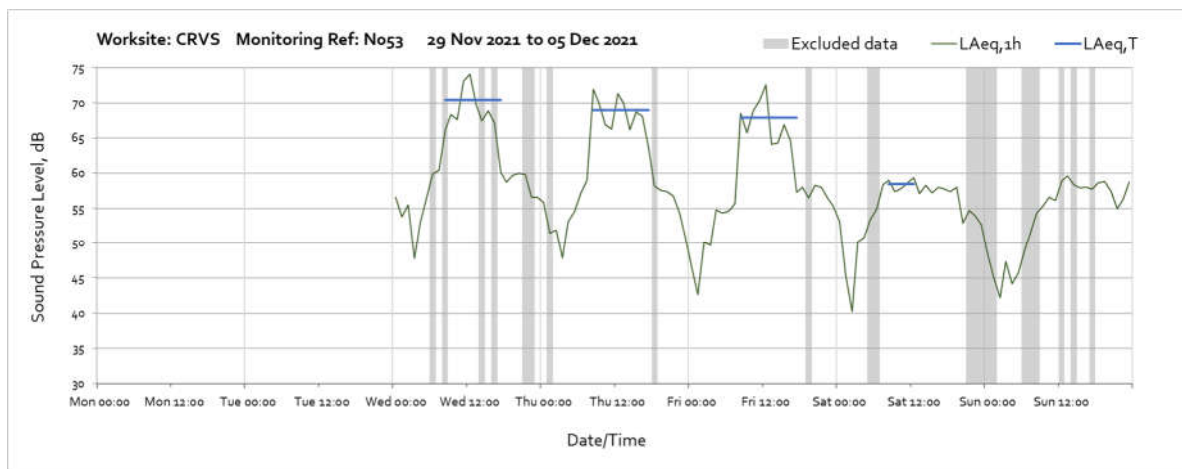


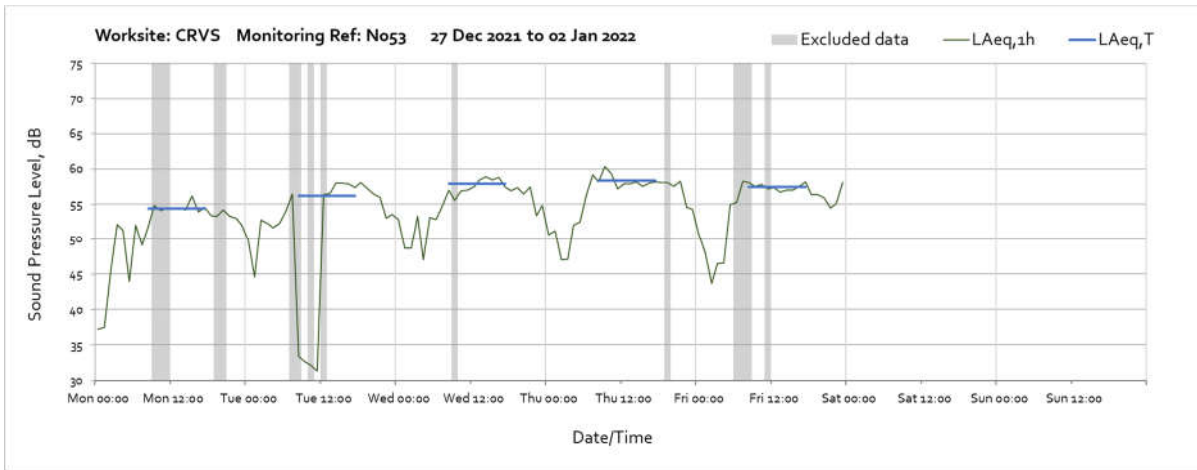
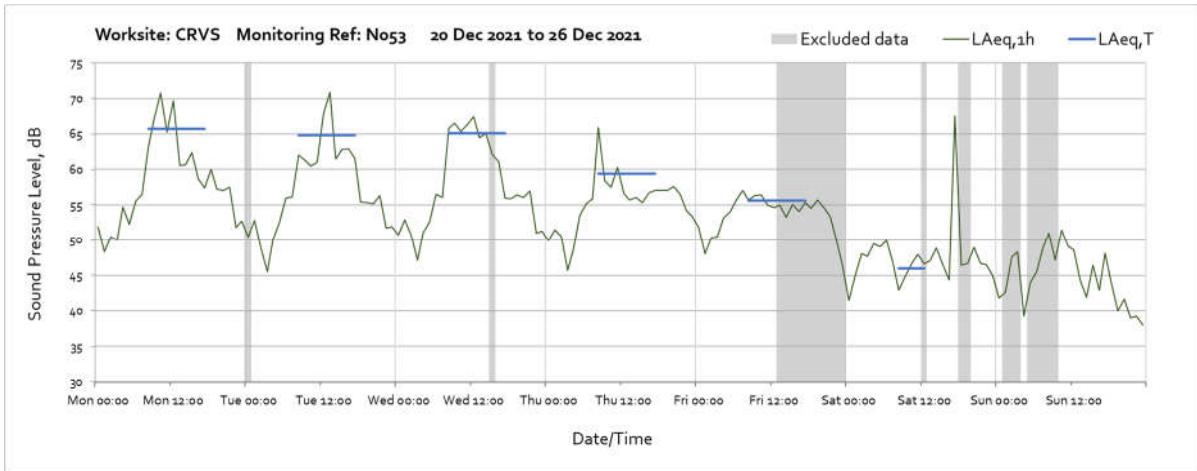
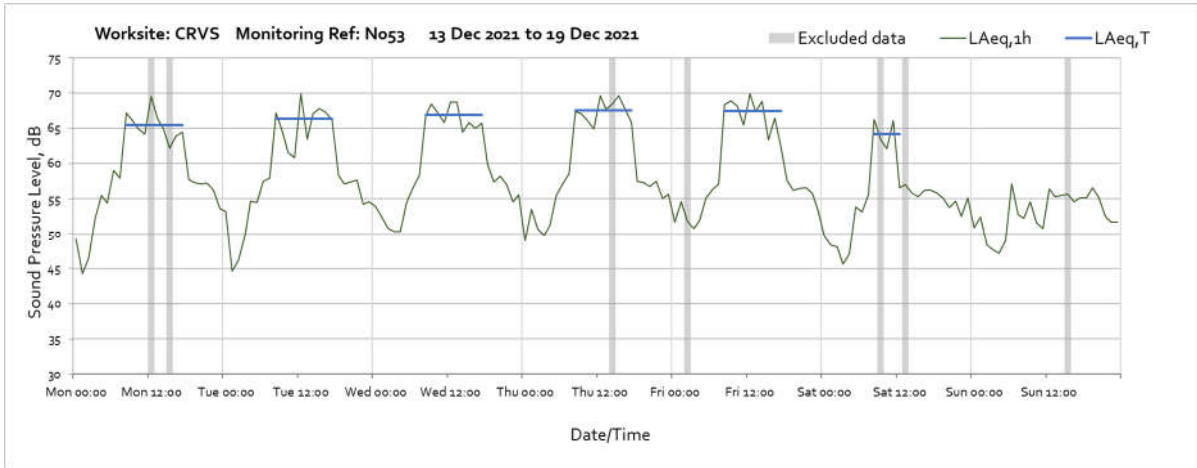
Appendix C Data

Noise

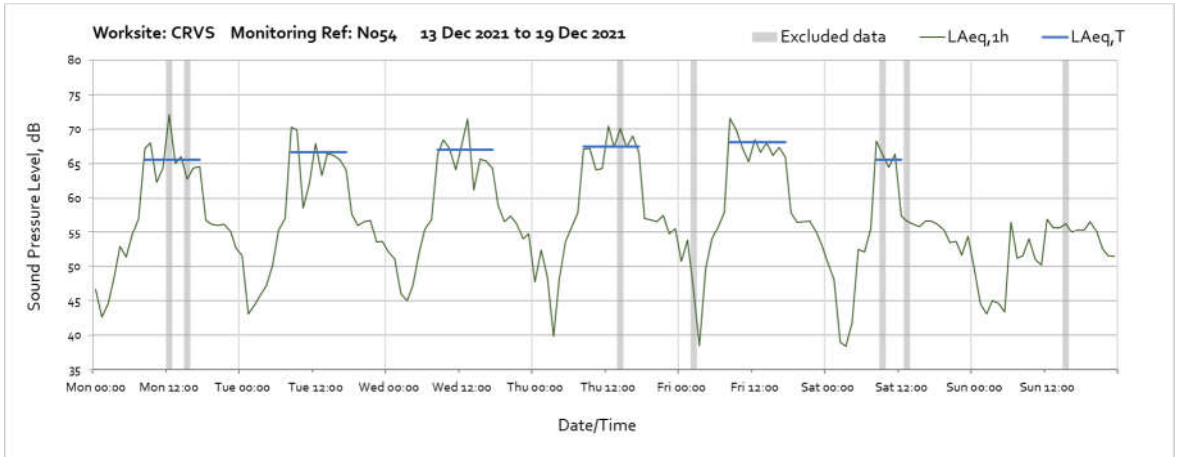
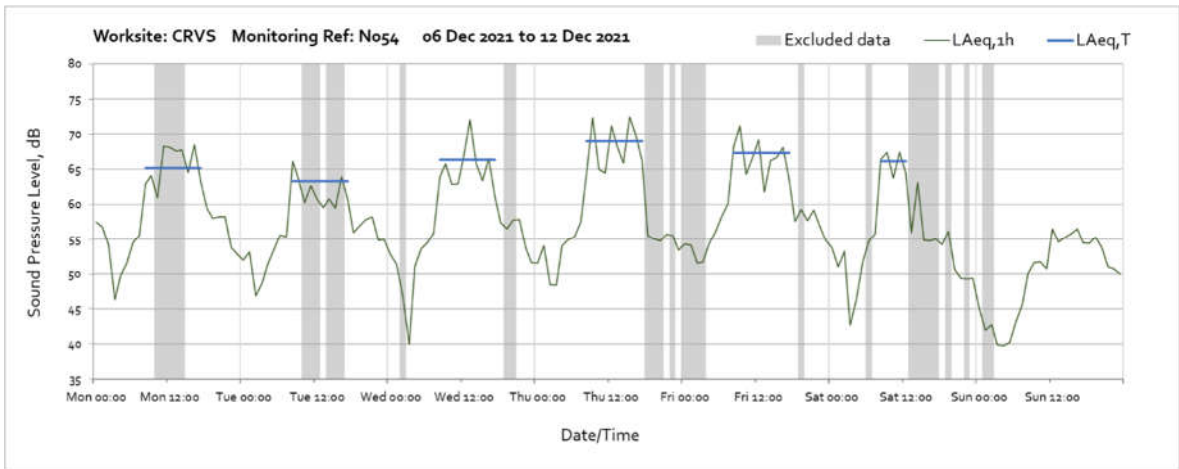
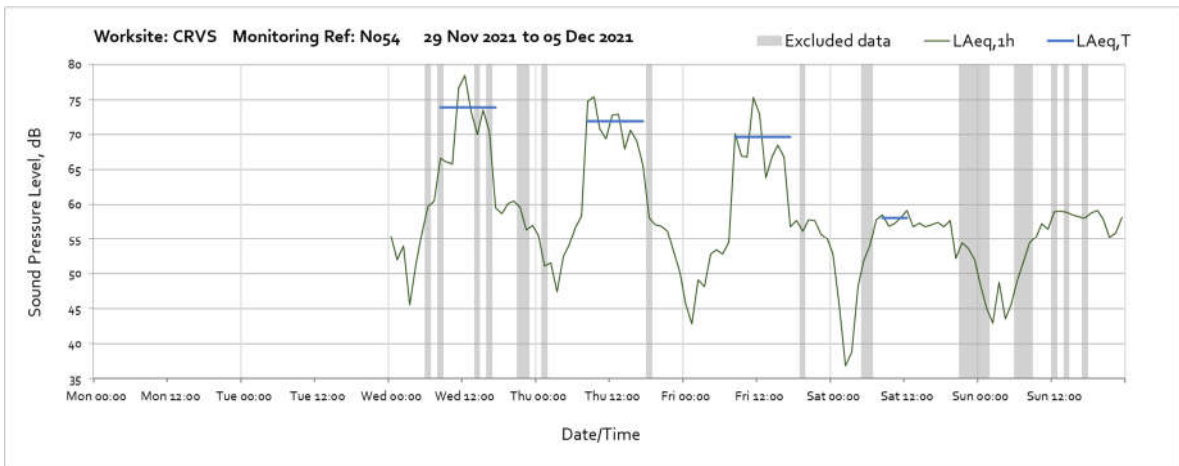
The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have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

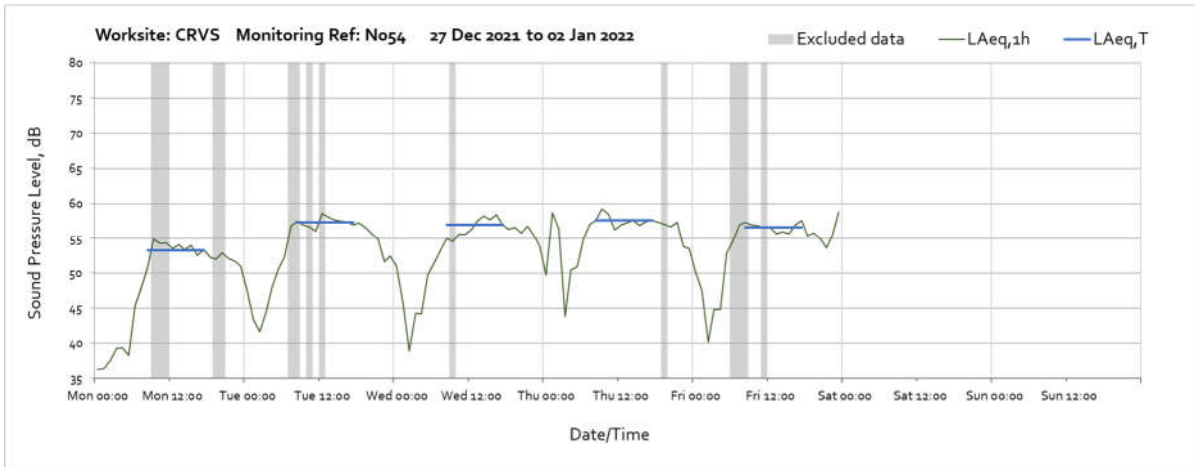
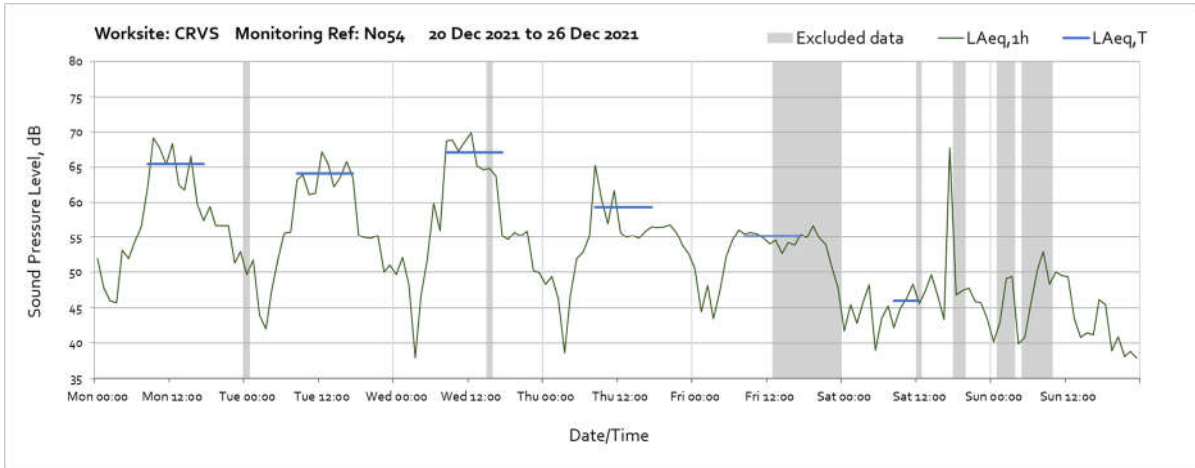
Worksite: CRVS – Monitoring Ref: N053



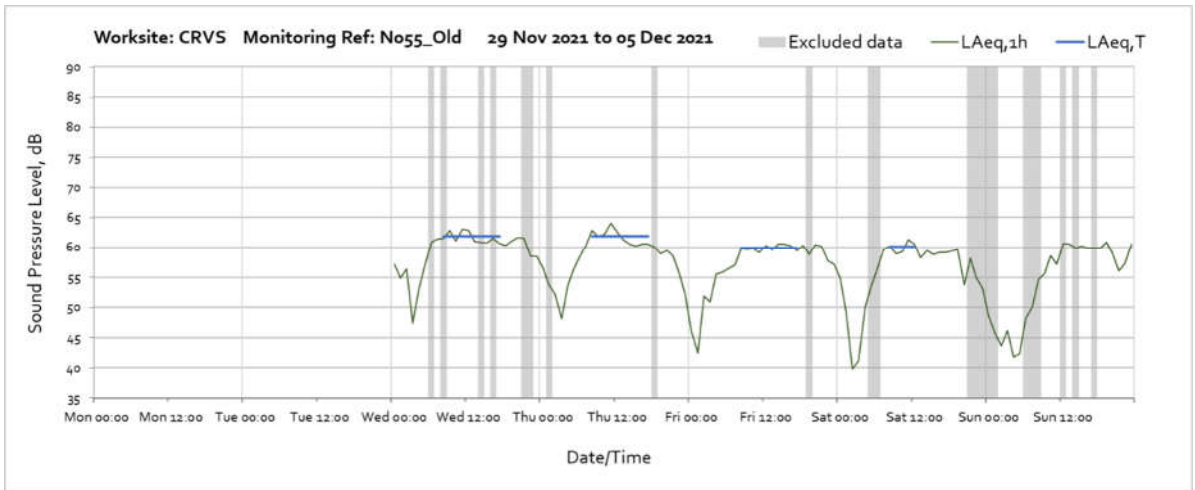


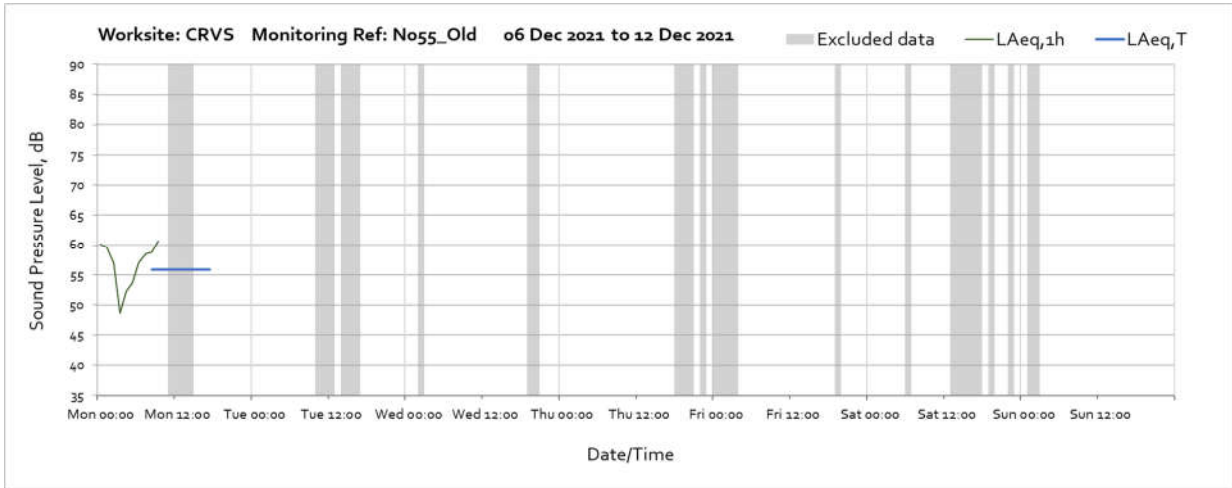
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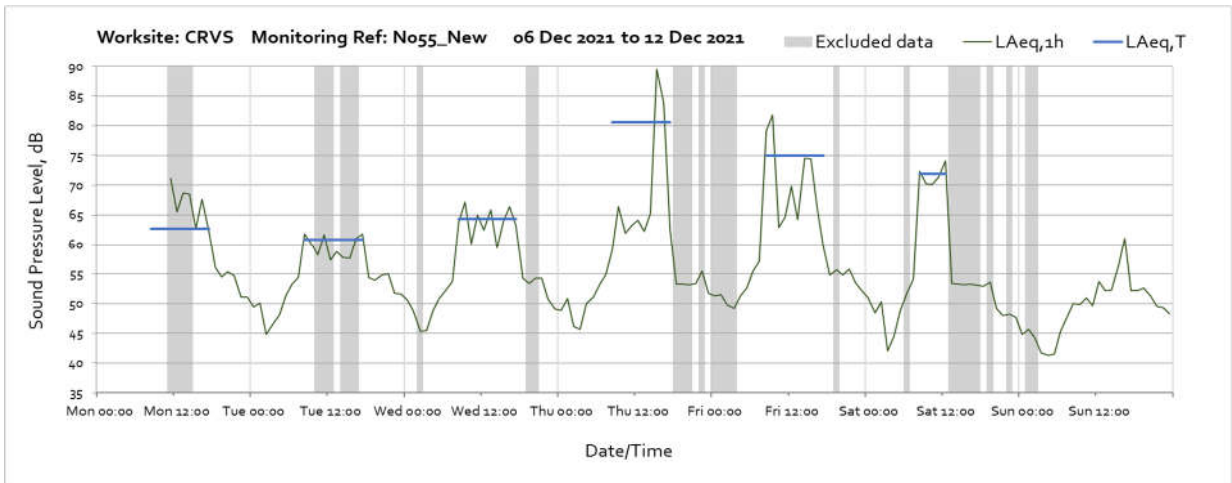
Worksite: CRVS - Monitoring Ref: N055_Old



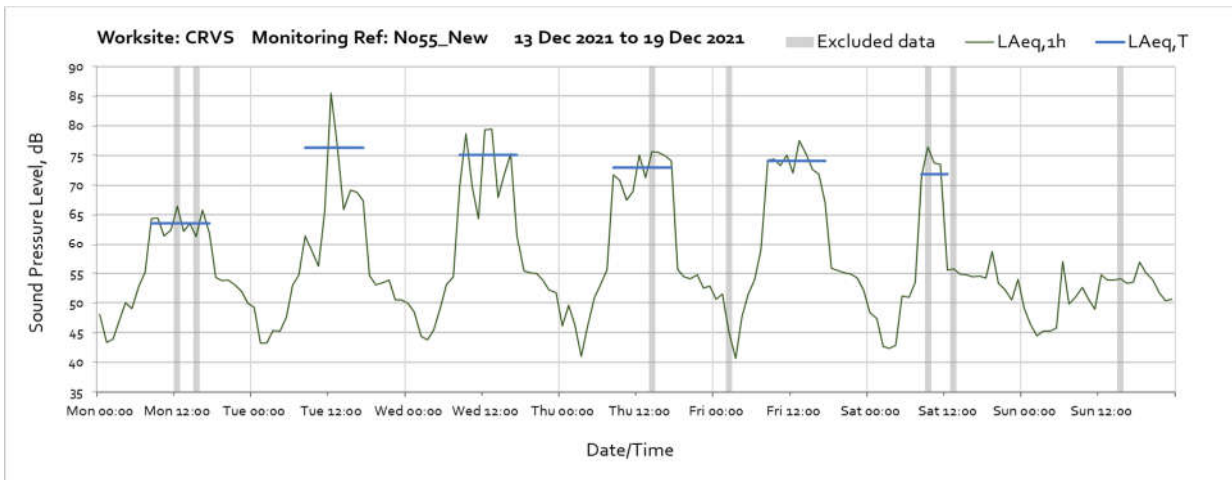


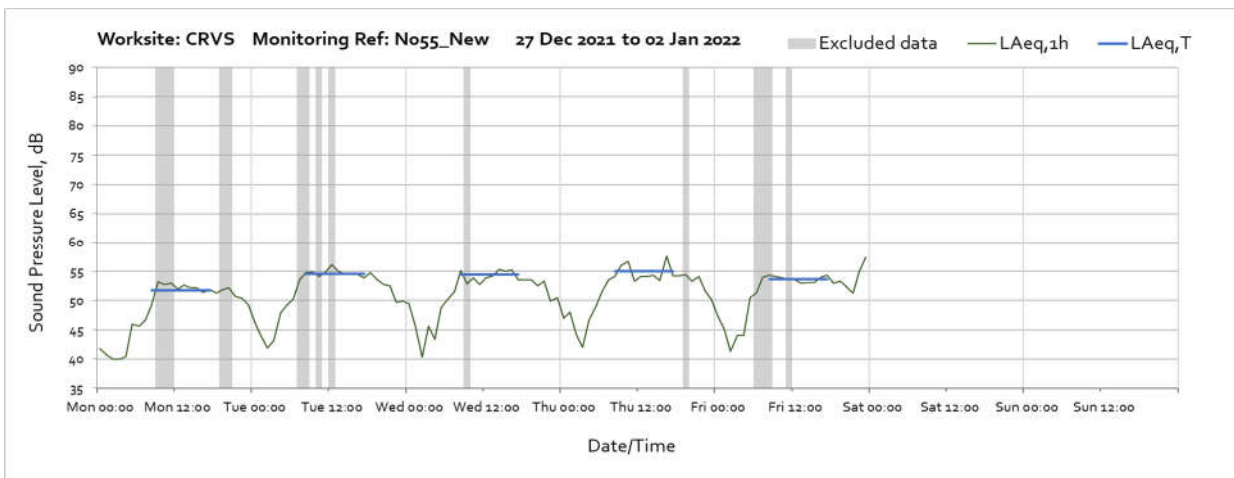
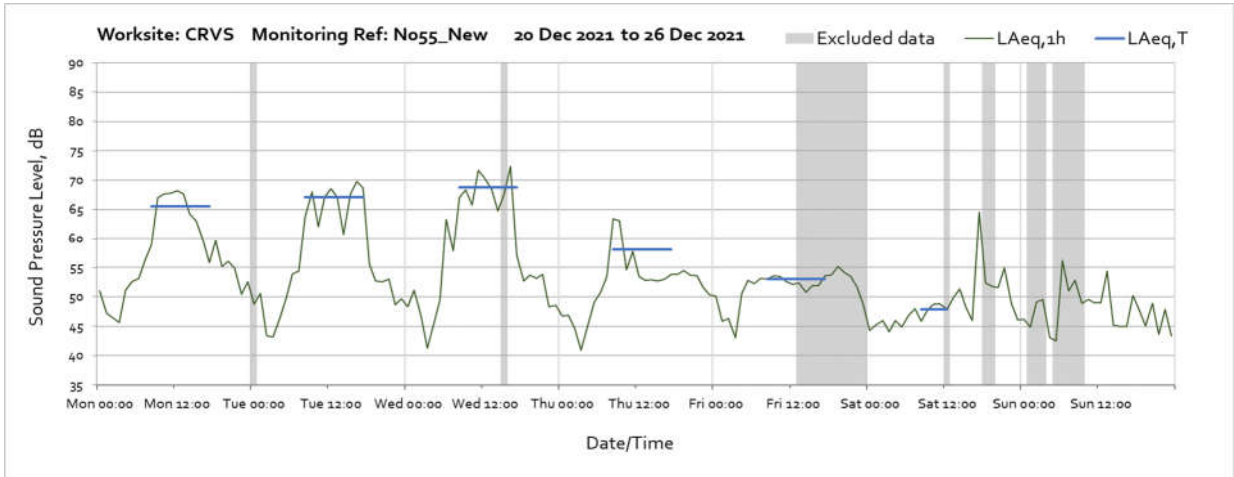
Note: Missing data from 10:00 on Monday 6th December 2021 was due to monitor relocation where monitoring reference is now N055_New.

Worksite: CRVS – Monitoring Ref: N055_New



Note: N055_New starts from 11:00 on Monday 6th December 2021 due to relocation from N055_Old location. High noise level at 15:00 on Thursday 9th December 2021 was due to a flaw saw being used to install pipes within 3 metres of the monitor.





Vibration

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

Worksite: CRVS – Monitoring Ref: V061

